

Installation, Commissioning, Servicing User Instructions for steam radiant panels



N° V00_2013_GB

updated on the 31/01/2013

Z024KV130GB



CONTENENTS

- General remarks.....	pag.	3
- Use.....	pag.	3
- Recommendations for installation	pag.	3
- Dimensions and characteristics.....	pag.	4
- Dimensions and characteristics of generator with condensing unit.....	pag.	5
- Dimensions and characteristics of fan heaters.....	pag.	6
- Gas supply	pag.	7
- Chimneys	pag.	7
- Security valve	pag.	8
- Installation of generator.....	pag.	8
- Installation of generator with condensing unit	pag.	9
- Installation of fan heaters	pag.	10
- Internal electrical panel	pag.	10
- Installation of the system - Primary circuit.....	pag.	11
- Installation of the system - Secondary circuit.....	pag.	13
- Electrical features of the generator	pag.	13
- GQK type control panel.....	pag.	13
- Electrical connection from generator to pump and fan heater.....	pag.	14
- Electrical connection with GQK type control panel.....	pag.	14
- Diagram of electrical connection of the SCP200GEN controller	pag.	15
- Electrical connection of the SCP200GEN general controller	pag.	16
- Electrical connection of the SCP200GEN general controller with 4-wire cable.....	pag.	17
- Installation and use of thermostat 1096482	pag.	18
- Installation and use of time switch.....	pag.	20
- Start-up: preliminary operations	pag.	21
- Switch on.....	pag.	21
- Solenoid valves adjustment and gas pressure checking.....	pag.	22
- Nozzle replacement.....	pag.	22
- Table pressure and nozzle-size.....	pag.	23
- Ordinary maintenance	pag.	24
- List of interventions	pag.	24

GENERAL REMARKS

This instruction manual should always be kept with the VAPORAD, so that it can be consulted by the maintenance personnel or by the user in case of need.

The installation of generator should be performed in respect of the regulations in effect in each country, according to the manufacturer's instructions or those of professionally qualified personnel with specific technical expertise in the field of radiant heating.

Improper installation and improper use of the system could cause damage to persons, animals or objects for which the manufacturer is not responsible.

Before performing any operation of cleaning or maintenance, disconnect the burner from the supply mains using the switch on the electric control panel and/or the organs of interception provided; in case of breakdown and/or malfunction of the burner it should be disconnected immediately. No attempt at repair or other intervention should be attempted and the user should contact our local Technical Service Center.

If the system should be taken out of use for a prolonged period, close the gas taps and disconnect power using the circuit breaker on the burner.

To ensure the efficiency of the appliance and proper operation it is necessary to have the annual maintenance performed by personnel from our Technical Service Center according to the manufacturer's instructions. Fraccaro s.r.l. could not be held responsible for damages, bad working or breakdowns if annual maintenance were not carried.

Use of the equipment is restricted to authorized personnel only.

Start-up of the unit, and its transformation from gas of one type to gas of another, should be done exclusively by personnel from the Technical Service Center authorized by Fraccaro srl.

USE

Unskilled persons should not be allowed to use any device powered by electricity and the following precautions should be observed:

- do not touch the device with damp or wet parts of the body;
- make an efficient grounding system according to the safety laws in force;
- do not use the gas pipes to ground electrical devices;
- do not touch hot parts of the system, such as steam and condensate conduits, and the exhaust gas discharge conduit, during and after operation, because for some time they remain overheated; do not remove the external covers of the equipment because they act as well as protection from parts which, during and after operation, may become overheated;
- do not touch hot parts of the system such as steam delivery line, the exhaust gas expulsion duct, which are superheated for some time during and after running; do not remove the external panels;
- do not place any object on the generator.

If you smell gas, act as follows

- do not turn on any switches or do anything that could cause sparks;
- open doors and windows immediately to create a draft and air the room, then close the gas taps;
- request the intervention of professionally qualified personnel.

RECOMMENDATIONS FOR INSTALLATIONS

This device must be installed in conformity with local regulations in effect and used only in a well-ventilated place. To allow the evacuation of the exhausted fumes, a correct ventilatio is necessary. According to the UNI EN 13410, 10m³/h air-change rate kW must be provided. Consult the instruction manual before installing and using the equipment.

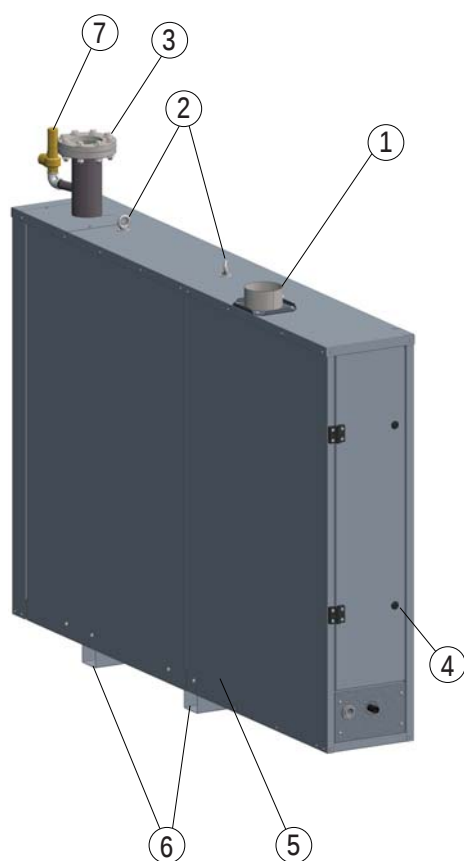
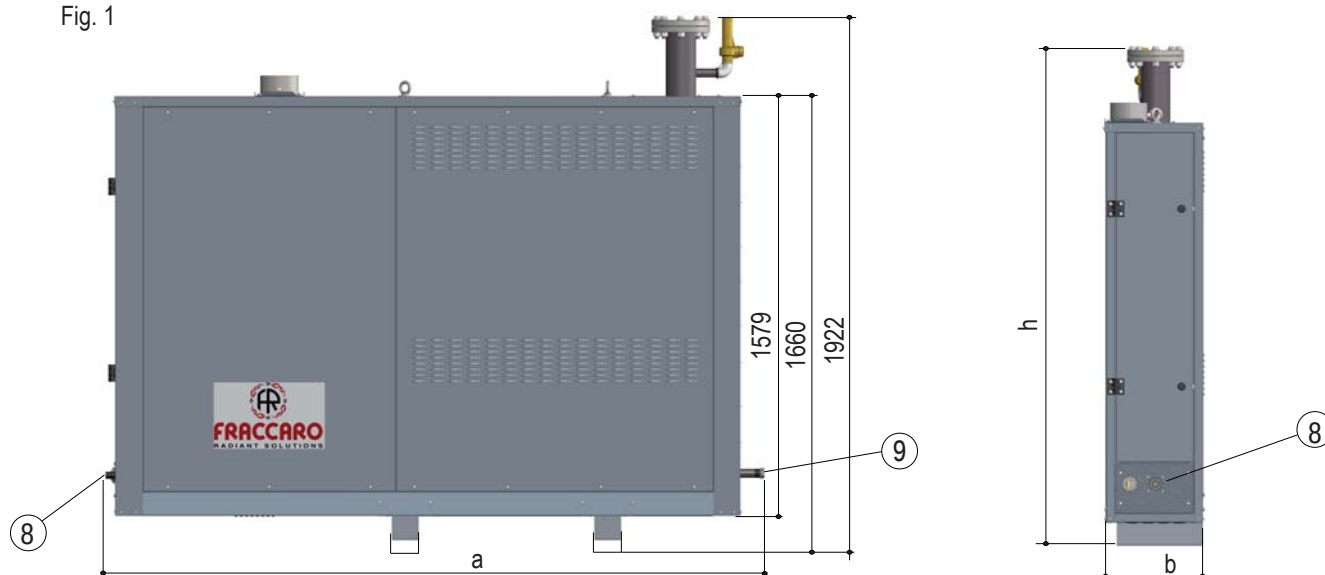


FRACCARO SRL WILL NOT BE HELD RESPONSIBLE IF MAIN RULES WRITTEN IN THIS MANUAL ARE NOT OBSERVED DURING INSTALLATION.

A WRONG INSTALLATION AND INCORRECT MAINTENANCE COULD CAUSE BAD WORKING OF THE APPLIANCES OR MAKE THE INSTALLATION NOT WORKING AT ALL.

DIMENSIONS AND CHARACTERISTICS

Fig. 1



Legend:

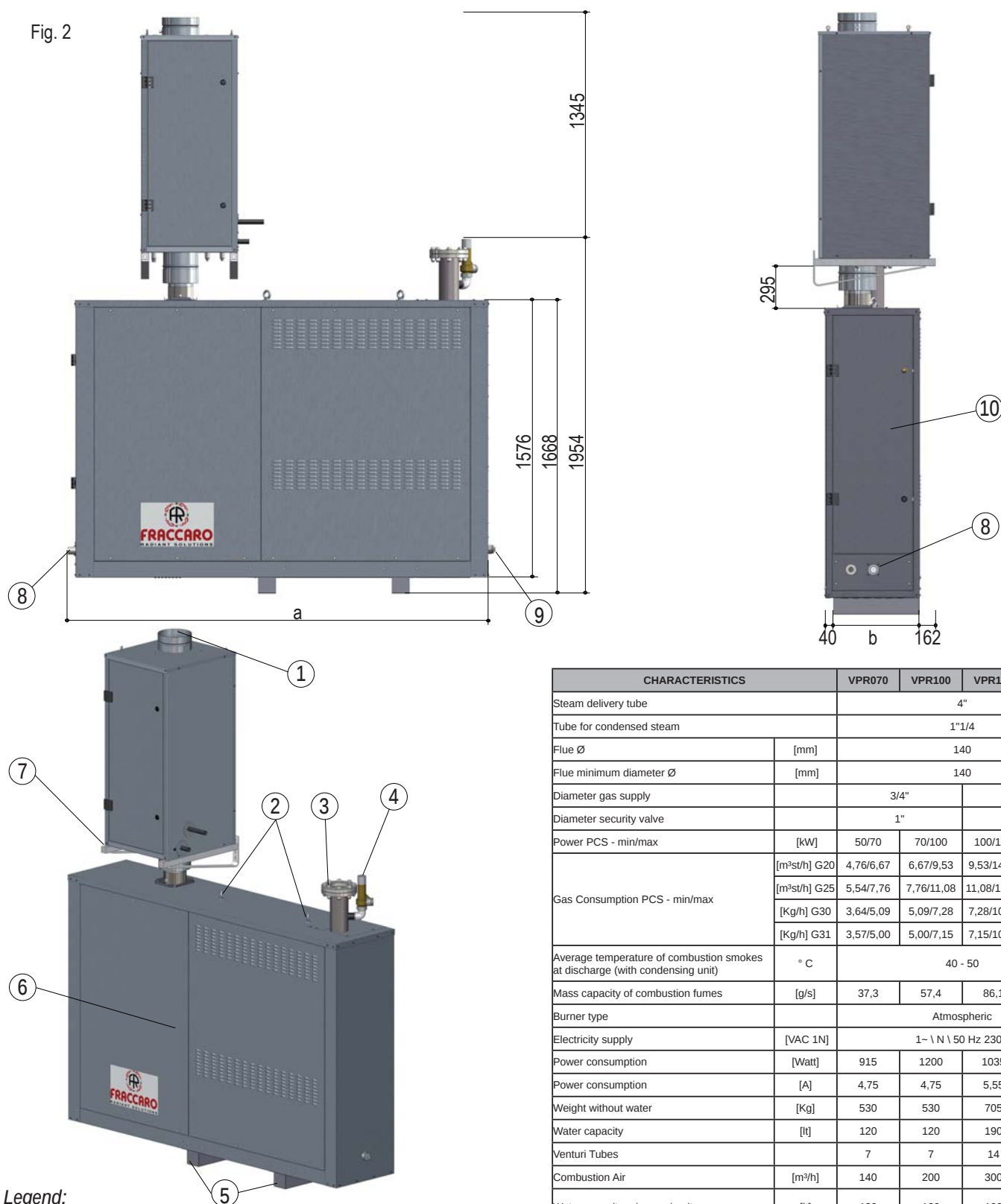
- 1 = Exhaust gas chimney attachment
- 2 = Handling hooks
- 3 = 4" steam delivery conduit with DIN attachment flange
- 4 = 1" 1/4 condensate return conduit with DIN attachment flange
- 5 = Openable door
- 6 = Removable panels
- 7 = Support feet
- 8 = 1" gas attachment
- 9 = 1"1/4 water joint for bank attachment
- 10 = Security valve

CHARACTERISTICS		VPR070	VPR100	VPR150	VPR200
Steam delivery tube		4"			
Tube for condensed steam		1"1/4			
Flue Ø	[mm]	140			
Flue minimum diameter Ø	[mm]	140			
Diameter gas supply		3/4"		1"1/4	
Diameter security valve		1"		1"1/4	
Power PCS - min/max	[kW]	50/70	70/100	100/150	150/200
Gas Consumption PCS - min/max	[m³st/h] G20	4,76/6,67	6,67/9,53	9,53/14,29	14,29/19,06
	[m³st/h] G25	5,54/7,76	7,76/11,08	11,08/16,62	16,62/22,16
	[Kg/h] G30	3,64/5,09	5,09/7,28	7,28/10,92	10,92/14,55
	[Kg/h] G31	3,57/5,00	5,00/7,15	7,15/10,72	10,72/14,29
Average temperature of combustion smokes at discharge	° C	115	135	129	140
Mass capacity of combustion fumes	[g/s]	37,3	57,4	86,1	107,9
Burner type		Atmospheric			
Electricity supply	[VAC 1N]	1~ \ N \ 50 Hz 230V			
Power consumption	[Watt]	95	380	215	380
Power consumption	[A]	0,45	1,75	0,95	1,75
Weight without water	[Kg]	400	400	575	575
Water capacity	[lt]	120	120	190	190
Venturi Tubes		7	7	14	14
Combustion Air	[m³/h]	140	200	300	400
Gas category		II2H3+			
Test pressure	[bar]	1,5			
Max. operating pressure	[bar]	0,49			
Inlet flange steam		DN 100 (8 holes Øext 220 mm) 4"			
Outlet flange condensed		DN 32 (4 holes Øext 140 mm) 1"1/4			
Noise level at 1 m at power max.	[dB]	61		63	
Dimensions (a x b x c)	mm	2410x391x2028		2410x520x2028	

Tab. 1

DIMENSIONS AND CHARACTERISTICS OF GENERATOR WITH CONDENSING UNIT

Fig. 2



CHARACTERISTICS		VPR070	VPR100	VPR150	VPR200
Steam delivery tube		4"			
Tube for condensed steam		1"1/4			
Flue Ø	[mm]	140			
Flue minimum diameter Ø	[mm]	140			
Diameter gas supply		3/4"		1"1/4	
Diameter security valve		1"		1"1/4	
Power PCS - min/max	[kW]	50/70	70/100	100/150	150/200
Gas Consumption PCS - min/max	[m³st/h] G20	4,76/6,67	6,67/9,53	9,53/14,29	14,29/19,06
	[m³st/h] G25	5,54/7,76	7,76/11,08	11,08/16,62	16,62/22,16
	[Kg/h] G30	3,64/5,09	5,09/7,28	7,28/10,92	10,92/14,55
	[Kg/h] G31	3,57/5,00	5,00/7,15	7,15/10,72	10,72/14,29
Average temperature of combustion smokes at discharge (with condensing unit)	° C	40 - 50			
Mass capacity of combustion fumes	[g/s]	37,3	57,4	86,1	107,9
Burner type		Atmospheric			
Electricity supply	[VAC 1N]	1~ \ N \ 50 Hz 230V			
Power consumption	[Watt]	915	1200	1035	1200
Power consumption	[A]	4,75	4,75	5,55	5,55
Weight without water	[Kg]	530	530	705	705
Water capacity	[lt]	120	120	190	190
Venturi Tubes		7	7	14	14
Combustion Air	[m³/h]	140	200	300	400
Water capacity primary circuit	[lt]	120	120	190	190
Gas category		II2H3+			
Test pressure	[bar]	1,5			
Max. operating pressure	[bar]	0,49			
Inlet flange steam		DN 100 (8 holes Øext 220 mm) 4"			
Outlet flange condensed		DN 32 (4 holes Øext 140 mm) 1"1/4			
Noise level at 1 m at power max.	[dB]	61		63	
Dimensions (a x b x c)	mm	2410x391x3340		2410x520x3340	

Tab. 2

Legend:

- 1 = Exhaust gas chimney attachment
- 2 = Handling hooks
- 3 = 4" steam delivery conduit with DIN attachment flange
- 4 = 1"1/4 condensate return conduit with DIN attachment flange
- 5 = Openable door
- 6 = Removable panels
- 7 = Support feet
- 8 = 1" gas attachment
- 9 = 1"1/4 water joint for bank attachment
- 10 = Security valve
- 11 = Support bracket

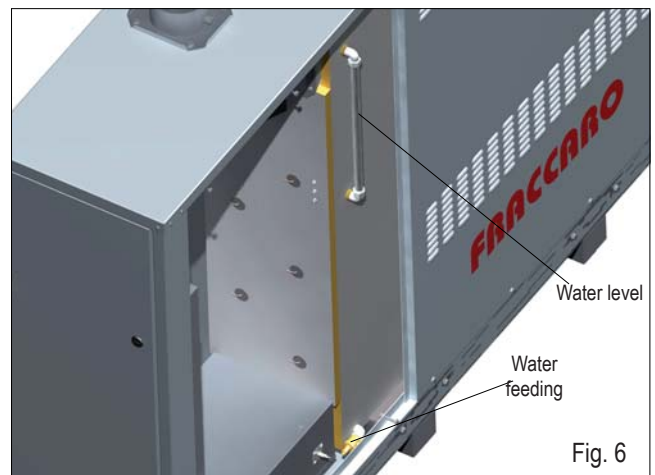
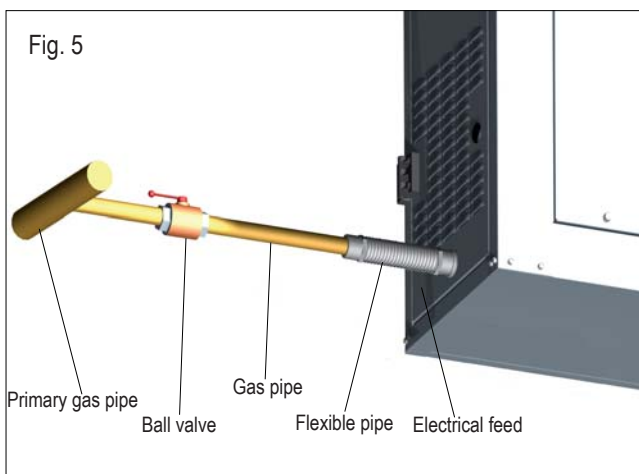
The fan heater is an indoor unit for heating medium to large interiors with a horizontal discharge of warm air. It comprises the following main components:

- A PRE-PAINTED SHEET STEEL CABINET complete with ABS corner trim, internally insulated to prevent condensate from forming on the cabinet during operation with chilled water. The cabinet is complete with adjustable aluminium louvers (spring-operated) placed on the air outlet which enable an optimal distribution of air within the room. On the rear of the cabinet there are 4 brackets for suspending the fan heater from the ceiling or joining it to the mounting board for installation on the wall (accessory DFC, DFP or DFO).
- HEAT EXCHANGER, made up of copper tubing and aluminium fins providing superior thermal conductivity compared to traditional iron pipe exchangers. The heat exchanger is set back in relation to the air outlet; an auxiliary drip tray is fitted onto the front to guarantee complete collection of condensate.
- GALVANISED SHEET STEEL DRIP TRAY INSULATED with closed-cell polyurethane, connected to the auxiliary tray.
- ELECTRIC MOTORS single-phase motor with three speeds corresponding to 4/6/8 poles for sizes from 1 to 4 and 6/8/10 poles for sizes 5 and 6. All motors are fitted with an internal safety thermal cutout, class F windings, protection rating IP 55.
- AXIAL FAN with statically balanced sickle blades housed in a specially designed compartment that enhances ventilation and reduces noise emissions.
- SAFETY GRILLE made of electrogalvanised steel wire: it supports the motor and is fixed to the cabinet by means of vibration-damping supports.

When choosing an installation site, you should observe the following rules:

- The heating unit should not be placed immediately under a socket.
- do not install the unit in places where inflammable gases are present;
- do not expose the unit directly to sprays of water;
- install the unit on walls or ceilings able to withstand its weight; use accessories suited to the purpose and suitable screw anchors.

Store the unit in its packing container until you are ready to install it to prevent dust from infiltrating inside it.



GAS SUPPLY

The gas feed system can only be made by professionally qualified personnel and in compliance with laws in force of each country it is installed in. Size the gas feed piping according to the necessary capacity and pressure, providing safety and control devices established by the laws in force. The connection to the gas feed piping can be performed, for instance, by means of hose and ball valve (fig.2). This material is provided by Fraccaro only on request.



CAUTION: The generator is provided with antifreeze safety controlled by a minimum temperature thermostat. To ensure that the safety is active, leave the generator on and the gas and power supply open. If it is necessary to disable the power and/or gas supply for a long period, completely empty the generator from water to avoid failure due to freeze.

CHIMNEYS

Install discharge conduits with a diameter of 140 mm. The total length of the conduit must not exceed 18 m, in case of either vertical or horizontal installation. The discharge conduit must be as straight as possible. If bends are required, add 1 meter to the total length for each 90° bend.

For vertical chimneys over 5 meters, we recommend to install a T joint for the collection of any condensation. For horizontal chimneys exceeding 5 meters, if you don't want to use the T joint, you can position the conduit with a slight counterslope (approx. 2%) toward the discharge, to ease condensation discharge.

Make sure that the conduit is always provided with a bird protection terminal.

SECURITY VALVE

Any adjustment or calibration operations must be performed by specialised technicians.

Therefore, make sure that the fastenings are fully tightened. When the operating of the valve is being tested or when the installation is operating and the valve is not connected to a point of discharge, Quando si controlla il funzionamento della valvola o quando l'impianto è in funzione e la valvola non è collegata ad uno scarico, any person must stand in front of the valve discharge. Before working on a valve, make sure that it is at room temperature. Never tamper with the valve, nor remove the lead/manufacture's seal for any reason. The valve should be connected to a discharge line; this pipe must be as short as possible, to avoid unforeseen backpressure. The calibration pressure is 0,5 bar and the maximum backpressure allowed is 10% of the calibration pressure.

To make sure that the safety values continue to operate in good working condition, these must be periodically tested. To do this, open the valve manually using the opening nut; this test must be done while keeping the protected appliance at a pressure between 80 and 90% of the valve calibration pressure. The valve must open cleanly, and release an abundant amount of fluid and must then close fully once the nut tightened.

INSTALLATION OF GENERATOR

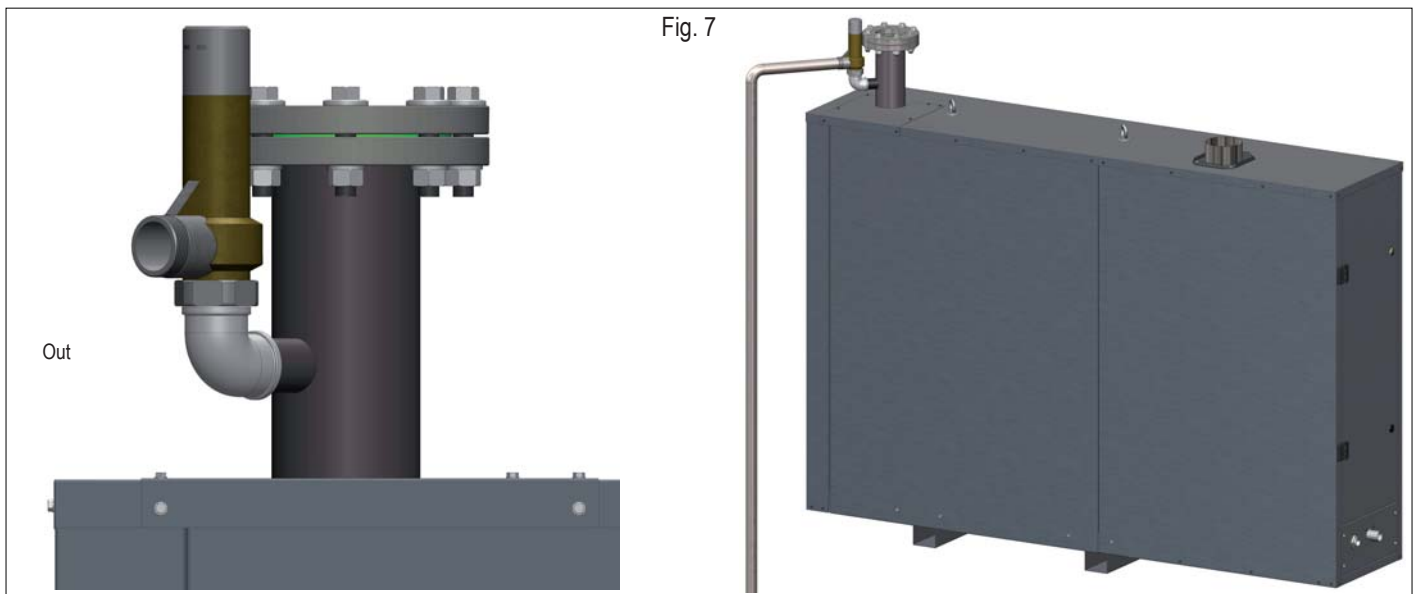
The installation of the generator and of the system is to be carried out by qualified personnel, in compliance with the applicable standards in each country where the installation takes place. Make sure that the installation room is suitable. It is necessary to provide a minimum air replacement of 2 m³/h for each kW installed. The material used for installation and maintenance of the generators must comply with applicable standards.

Position the generator in the selected position, then proceed with connections to the power grid and to the gas supply as indicated in the respective paragraphs.

In case of installation of several generators connected to the same equipment, the boilers must not be positioned too close; a minimum distance of half a meter must be respected. Steam delivery tubes for all boilers must be connected to the distribution network. It is possible to bring several condensate return tubes connected to different boilers. It is mandatory to connect together all the boilers by means of the specific 1"1/4 water joint for bank attachment, located on the rear of the generators (fig 1). All tubes and connection manifolds must be insulated.

Fill the boiler with standard tap water, featuring any hardness allowed by Italian standards for drinkable water, using the load tap located inside, near the burner (fig. 3). The correct amount of fluid can be verified through the level indicator. The fluid must be at about 50 mm from the top end of the glass tube. Make sure to tighten the tap after filling.

Then connect the steam delivery and condensate return conduits to the steam panels circuit, connect the chimney and proceed with the test.



WARNING: It is necessary to provide an outlet pipe from the safety valve to be connected to the wastewater well.

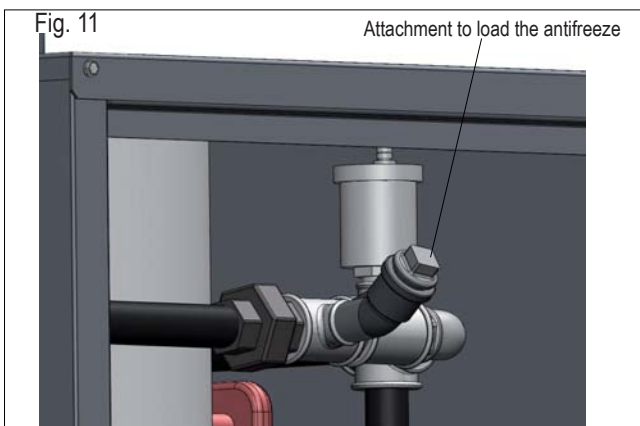
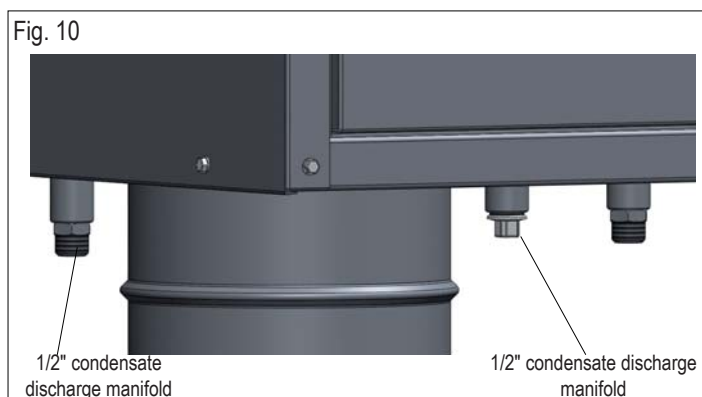
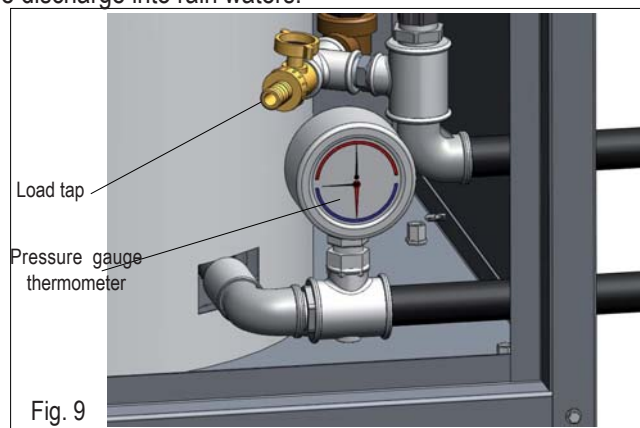
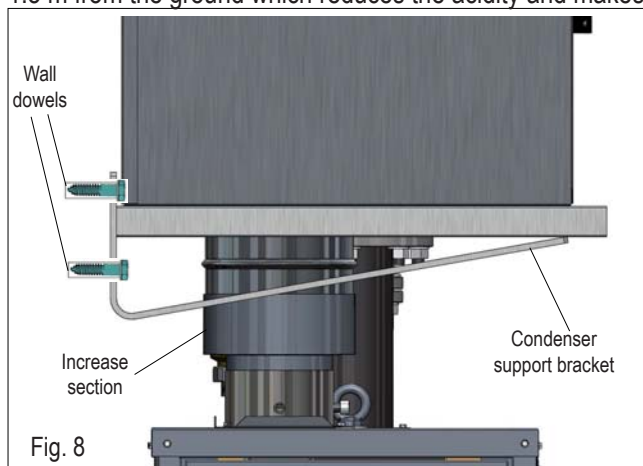


The discharge must be carried to avoid damage to persons, things or animals. The discharge exhaust pipe must have cross sectional flow bigger than the output section of the valve.

INSTALLATION OF GENERATOR WITH CONDENSING UNIT

The installation of the generator and of the system is to be carried out by qualified personnel, in compliance with the applicable standards in each country where the installation takes place. To allow the evacuation of the exhausted fumes, a correct ventilation is necessary. According to the UNI EN 13410, 10m³/h air-change rate kW must be provided. The materials used for installation and maintenance of the generators must comply with applicable standards. After positioning the generator, carry out chimney connections without the condenser; the generator must be a distance from the wall of 40 mm. Then fasten the brackets to the wall with four dowels suitable for the weight of the module (approx. 130 kg), verifying as well that the rest surface is suitable for the purpose (fig. 8); in fact, the condensing module SHALL NOT for any reason be supported by the generator. Now proceed with the insertion of the condenser in the generator chimney and finally carry out the connections from the power grid and gas supply as indicated in the related paragraphs. In case of installation of several generators connected to the same equipment, the boilers must not be positioned too close; a minimum distance of half a meter must be respected. Steam delivery tubes for all boilers must be connected to the distribution network. It is possible to bring several condensate return tubes connected to different boilers. It is mandatory to connect together all the boilers by means of the specific 1"1/4 water joint for bank attachment, located on the rear of the generators (fig 1). All tubes and connection manifolds must be insulated. Fill the boiler with standard tap water, featuring any hardness allowed by Italian standards for drinkable water, using the load tap located inside, near the burner (fig. 3). The correct amount of fluid can be verified through the level indicator. The fluid must be at about 50 mm from the top end of the glass tube. Make sure to tighten the tap after filling. Then connect the steam delivery and condensate return conduits to the steam panels circuit, connect the chimney and proceed with the test. It is necessary to load the secondary system consisting of condenser, piping and forced convection heater; to do this, use a rubber hose and by means of the load tap located inside the condenser, load the entire system with water to lift all the deposits in the pipes; let water flow for approx. half an hour. After completely emptying it, refill the entire secondary circuit (condenser - forced convection heater) with approx. 25% of antifreeze (approx. 7 l) and the remaining 75% with water (approx. 23 l); antifreeze loading operation can be performed by means of, for instance, the attachment of the air valve located on the forced convection heater; if the forced convection heater is located in the lowest section of the circuit, it will not be provided with air valve. In this case, use the specific attachment located inside the condenser near the air valve (fig. 11). The exact amount of antifreeze depends on the minimum temperature required for freeze resistance; in particular with 25% of antifreeze the freezing point will be -15°C. Prepare the water-antifreeze mix before entering it into the system pouring antifreeze into water and not viceversa; we recommend to use a monopropylene glycol based antifreeze with anticorrosion protection (corrosion inhibitor) equal to 1.3% on 25% of antifreeze, for thermal conduction circuits; we recommend as well to use an antifreeze which does not allow the creation of hard mineral antifreeze, ensuring a good thermal exchange and avoiding the risk of erosion of the ducts. Avoid glycol solutions with more than 35%.

The pressure of the secondary water circuit (condenser - forced convection heater) shall be 1.5 - 2 bar. Fig. 10 shows the attachment part for condensate discharge: the condensate pipe is in PVC and by means of a 1/2" male-male nipple carry out the engagement with the manifold located under the condenser. The condensate shall pass through a saline depuration kit (accessory) installed at approx. 1.5 m from the ground which reduces the acidity and makes possible the discharge into rain waters.



INSTALLATION OF FAN HEATHER

Remove the fan heater from the packing container and check that no damage has occurred during transport. Before starting to install the unit, make sure that the installation height and air range conform to the specifications provided in the technical catalogue, according to the number of motor poles and type of air flow (vertical or horizontal). The maximum installation height is also shown in table 4. In the case of wall installation, use suitable mounting boards, available as accessories or if you do not use the mounting boards supplied by the manufacturer, make sure in any case that the unit is adequately spaced from the wall or ceiling, at a distance that is at least that shown in figure 12. Use screw anchors of adequate dimensions to support the weight of the unit and make sure that the surface of the installation site is suited to the purpose.

Using suitable lifting equipment (a forklift truck is recommended), convey the unit to the installation site and rest it on the floor with the fins facing down. The feeding hose should be connected to the upper coupling and the condensate drainage hose to the lower coupling.

The standard motors installed in the fan heaters are of the closed type asynchronous mono-phase 3 speed motors with a thermal cutout. The terminals of the cutouts are connected to the terminal block so that they can be used as protection in series with the coil of a contactor. If the internal cutout is not used to protect the motor, it will be necessary to provide a motor overload cutout set at a current that is 10-15% higher than the current indicated on the unit rating plate.

Make the electrical connections with the power supply disconnected, in accordance with current safety regulations. All the wiring must be done by qualified personnel.

Check that the mains electricity supply is compatible with the voltage shown on the unit rating plate.

Scrupulously follow the wiring diagram provided, according to the type of installation. (see pag. 21).

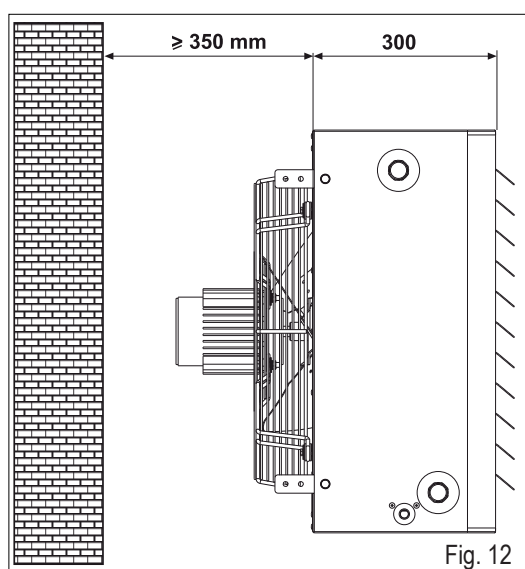


Fig. 12

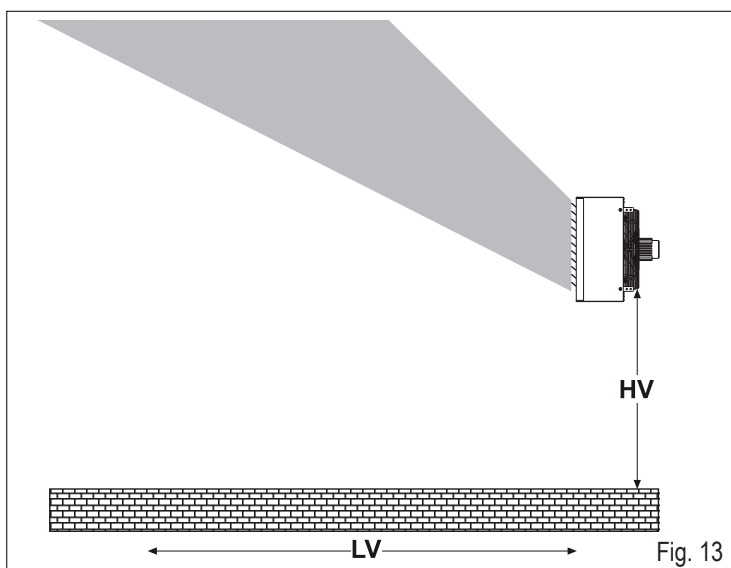


Fig. 13

FAN HEATHER						
Number of poles	Voltage [V]	Power input [W]	Current absorbed [A]	HV (m)	LV (m)	HO (m)
4 poli - 1400 rpm	230	750	3,5	4	18	5,5

Tab. 4

INTERNAL ELECTRIC PANEL

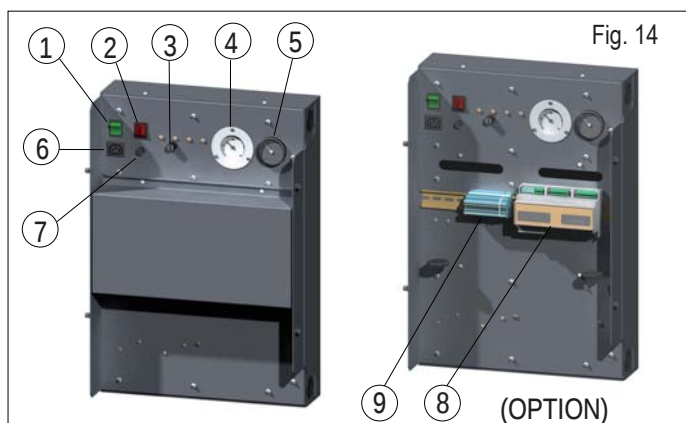


Fig. 14

Opening the door of the boiler, you access the internal electric panel shown in figure 4. It includes the ON/OFF switch (1), the first and second stage switch (2), the manual reset safety thermostat (3), the thermometer (4), the pressure vacuumstat (5), a power outlet (6), the protection fuse (7) and (if foreseen) the optional control board SCP200PER (8). Electric connections are realized by the contacts (9). CAUTION: disabling the operation of both stages with the switch (2), the antifreeze function remains active. Switching off the board with the switch (1) this function is disabled and the boiler is not protected from freeze.

INSTALLATION OF THE SYSTEM

PRIMARY CIRCUIT

The heating system includes the steam generator, the delivery and return tubes, the radiating strips, and a vacuum control device (fig. 26), which removes excess air from the circuit, maintaining vacuum. The strips must be installed on the ceiling with a slope of 1% for each meter of thermal strip (fig. 18), so as to allow the return of the condensate to the boiler. Analogously, the slope of the condensate return conduits must be in the direction of the outflow. The maximum length of a line of thermal strips is 24m.

The boiler must be necessarily positioned at least 3m below the thermal strips, to enable the natural circulation of steam and condensate. The Vaporad boiler can be installed as well outdoor without the necessity of protection elements.

The tubes must be installed resting them on mobile attachments, to allow the thermal expansion of the tube. It is mandatory that the delivery tube is suitably insulated and that the thermal strips are provided with insulating panels. We recommend insulation as well for return tubes.

The vacuum control device is to be installed on the condensate return pipe, in the highest and farthest position from the generator. A system layout is shown in fig. 15.

The purpose of the self vacuum device is to remove the air entered due to infiltrations, to operate, it requires power supply. The power supply of the vacuum control device must be obtained from the same power supply line as the boiler, without using switches. It is mandatory that the above device receives power supply when the boiler is operating. It is mandatory as well to verify, during installation, that the system is tight.

The vacuum control device is to be installed on the return pipe, in the highest and farthest position from the heat generator, after the last thermal strip, or directly on the discharge manifold. It must be positioned 15 cm above the thermal strip. In case of complex systems, always contact our technical department to establish the right position for installation. It is mandatory to take the utmost care when installing steam delivery and condensate return lines. Along the circuit there must be no traps which may lead to condensate stagnation, blocking system operation.

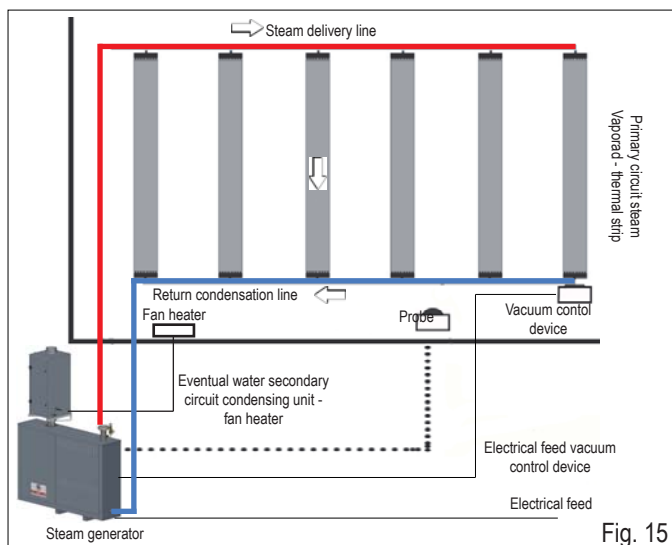


Fig. 15

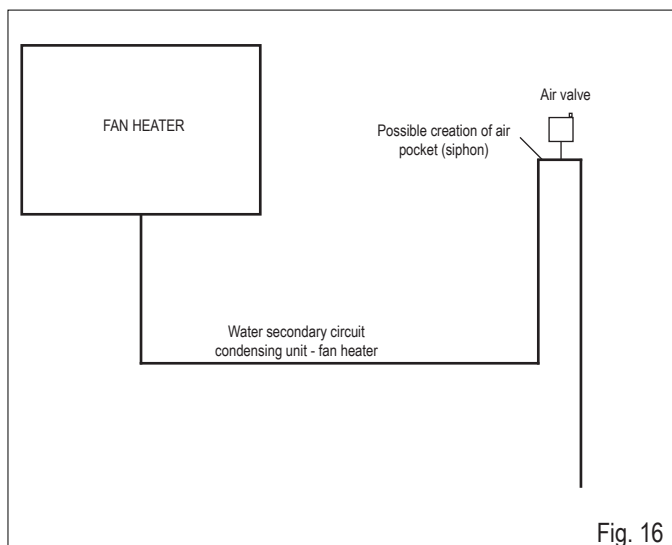


Fig. 16

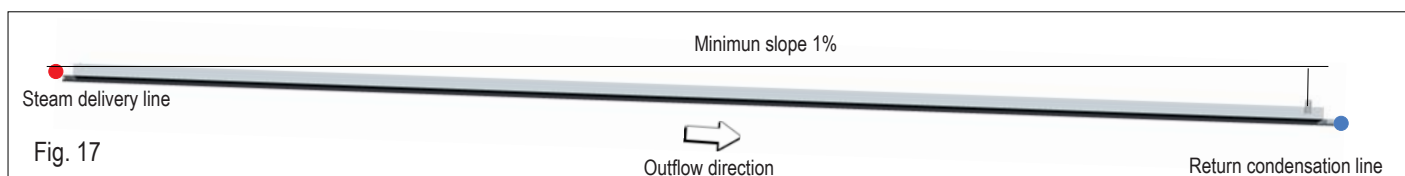
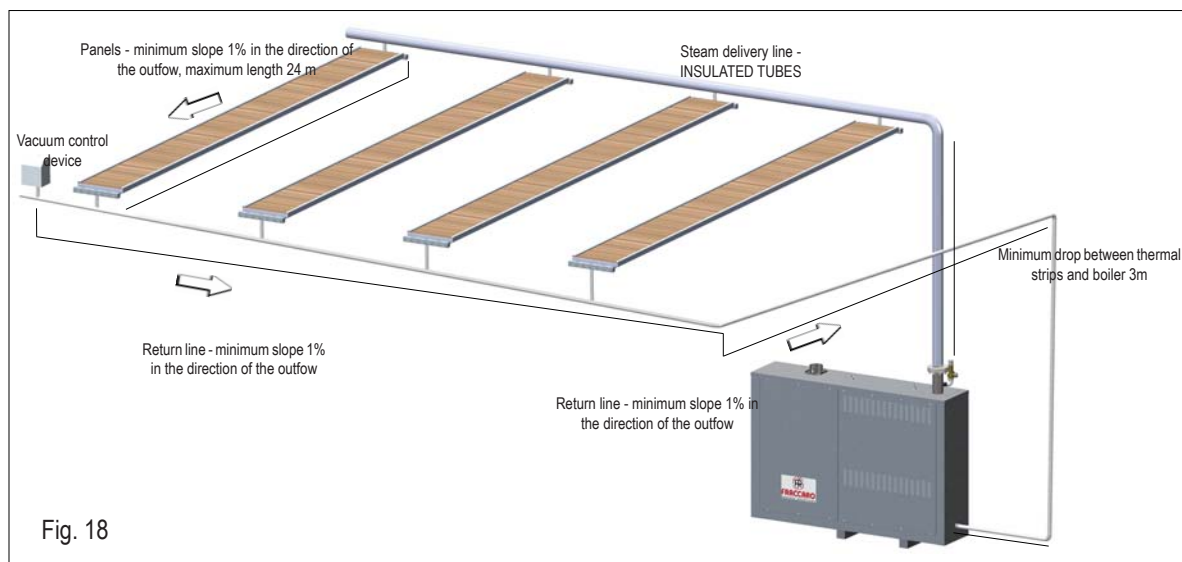


Fig. 17

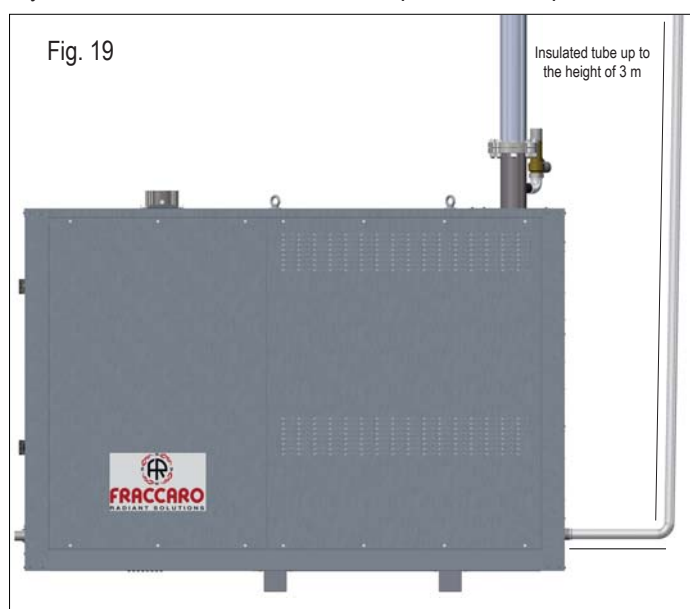
The delivery line must always be insulated, and must preferably be positioned above the thermal strips, feeding the manifolds from above. Usually the delivery line can be installed in level position; the detachments from the main line must be welded flush with the tube without penetration, to allow draining. If, for architectural reasons, it is necessary to put the thermal strips above the delivery lines, such lines must be positioned with at least 0.5% counterslope toward the generator for condensate recovery.



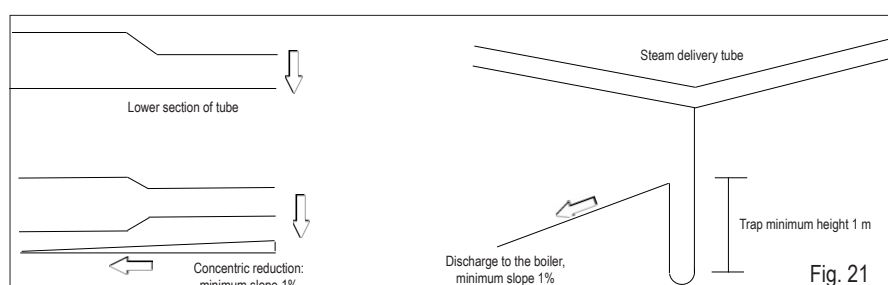
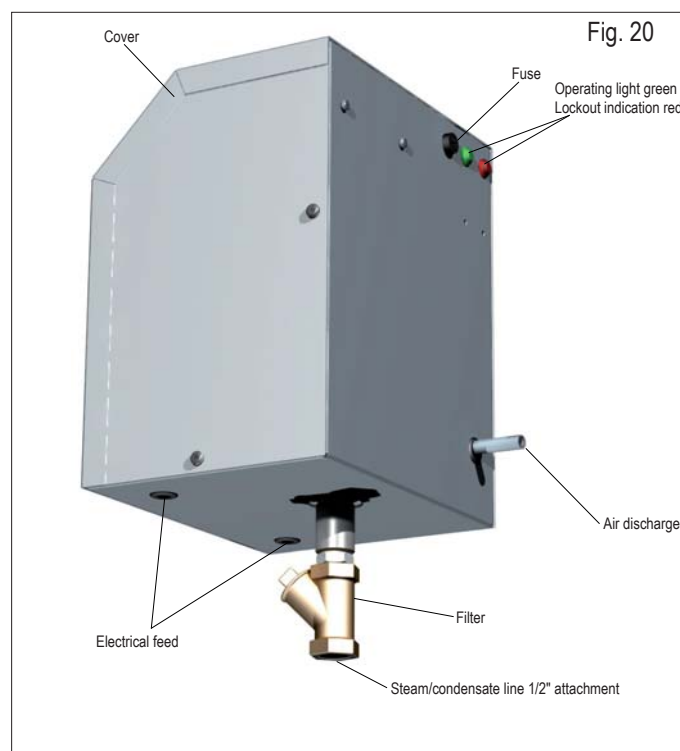
If necessary, it is possible to connect the return tube to the rear attachment. In that case, it is necessary to insulate the whole segment of tube 3 meters below the rest plane of the generator. You should insulate around the section of pipe that runs along the outside of the building and it is strongly recommended NOT EXCEED 30 CM OF TUBE FROM ATTACK CONDENSATE (fig. 19).

If there are reductions in the steam delivery line, they should be eccentric, so that the lower section of the tube has no step, allowing condensate outflow.

If you use concentric reductions, keep a counterslope toward the tube with the greatest diameter, as shown in figure 19.



It is suggested to weld a siphon to the return tube of condensate steam so that when the boiler starts the steam does not return back to the tube as shown in figure 19.



If it is necessary a low point in the delivery line, it is necessary to add a drain point with trap to be connected to the condensate return, as shown in figure 21.

SECONDARY CIRCUIT (ONLY IN A CASE OF INSTALLATION WITH CONDENSING UNIT)

Concerning the installation of the secondary circuit (condenser - forced convection heater), it is indispensable to fit an air valve in the forced convection heater return pipe (fig 16) to avoid air pockets; we recommend to keep the length of the hydraulic pipe between the condenser and the forced convection heater at 10 m (5 m for delivery and 5 m for return), however not over 20 m. If it is necessary to perform height changes of the hydraulic pipe which create siphons for the connection to the forced convection heater, it is necessary to install an air valve for each siphon at the top point to avoid the creation of air pockets (fig. 22), regardless of the fact that the siphon is on the delivery or return circuit. To minimize thermal dispersion, we recommend to insulate the entire secondary water circuit (condenser - forced convection heater). The forced convection heater is to be installed at a maximum height of 5 m (table 4) and wherever possible at a distance from the radiant strip of approx. 4 m. The supply of the condenser pump and of the forced convection heater shall be directly obtained from the generator; in fact inside the control panel of the Vaporad there is a dedicated relay to supply these two components when the generator is switched on.

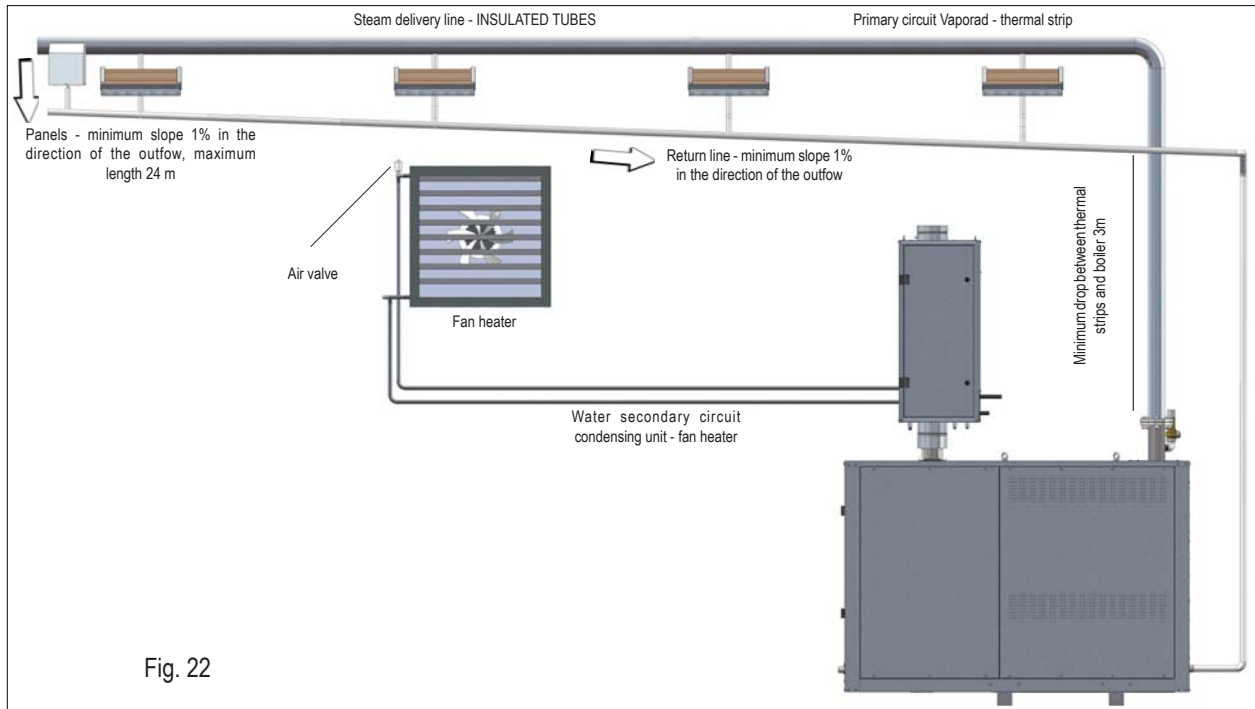


Fig. 22

ELECTRICAL FEATURES OF THE GENERATOR

- Supply the generator with a single phase line 230V/50Hz + neutral + ground taking into account that the drain is 1 A. From the power supply of the boiler it is necessary to obtain the power supply line of the vacuum control device (line, neutral and ground, drain 0.05A), if that device is not powered, the equipment cannot operate correctly. The power supply cable between the boiler and the device must not include any switch.
- Install an automatic bipolar magnetothermic differential circuit breaker with the following characteristics:
 $I_{cn} = 6 \text{ KA}$; $V_n = 400\text{V}$; $I_{an} = 0,03\text{A}$
- If this line powers more than one steam generator, the bipolar magnetothermic differential circuit breaker should be of suitable size considering the effective power absorbed as mentioned above.

GQK TYPE CONTROL PANEL

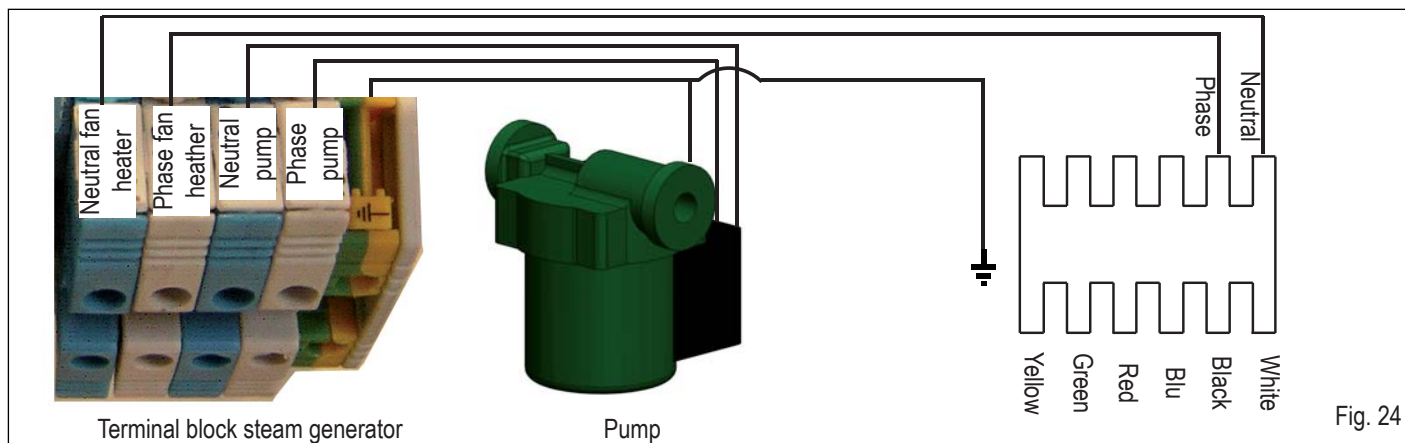
The GQK type control panel in fig. 23 has been made to control a generator and it consists of:

- 1 General sectioning device;
- 2 Digital weekly programming clock;
- 3 Manual clock exclusion switch;
- 4 Electronic digital thermostat to regulate internal temperature;
- 5 Module to control the running state of the generator with various signals and unblocking push button;
- 6 Plastic container with transparent window;
- 7 Globe probe to detect internal temperature.

Fig. 23



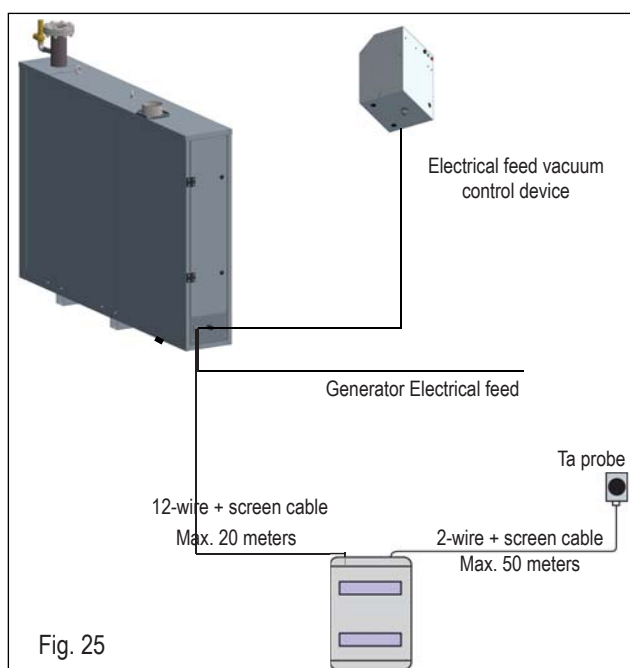
ELECTRIC WIRING BETWEEN GENERATOR, FAN HEATER AND CONDENSER PUMP



Connect the pump of the condensing unit and the air heater directly to the control board of the generator as shown in fig. 24. If the phase of the air heater is connected to the terminal with black wire, the speed of the motor will be at maximum level; if connected to the terminal with blue wire, the speed will be at medium level; if connected to the terminal with red wire, the speed will be at minimum level.

ELECTRICAL CONNECTIONS WITH THE GQK TYPE CONTROL PANEL (FOR VAPORAD WITH CONDENSING UNIT TOO)

- 1) Connect the "GQK" control panel to the generator panel with a 12 wire+screen cable (min. section 1.5 mm²) as in fig. 25.
- 2) Exactly connect the terminals of the "GQK" control panel to the corresponding terminals located on the genrator panel (respecting the numbers corresponding from terminal 4 to terminal 15).



- 3) The terminals n.G1-G2 of the "GQK" control panel must be connected to the probe globe with a screened cable (min. section 1.5 mm²), this probe must be accurately placed in the area to be heated and not on the generator panel.
- 4) The globe probe must be placed at a height of 1.80 m. from the ground, keeping the black semisphere turned towards the radiant belt. This probe is unique both for the room thermostat and for the external thermostat for freezing during the night.
- 5) The GQK panel must not be more than 20 meters from the generator and the 12-wire cable to connect to the generator must not be placed inside the channel or piping containing power cables, this avoids the possible formation of induced tensions that could alter and compromise the normal running of the generator.
- 6) The feeding cable and the control one must be separated, the same cable cannot be used with different wires.
- 7) The screen must be grounded only on one side.

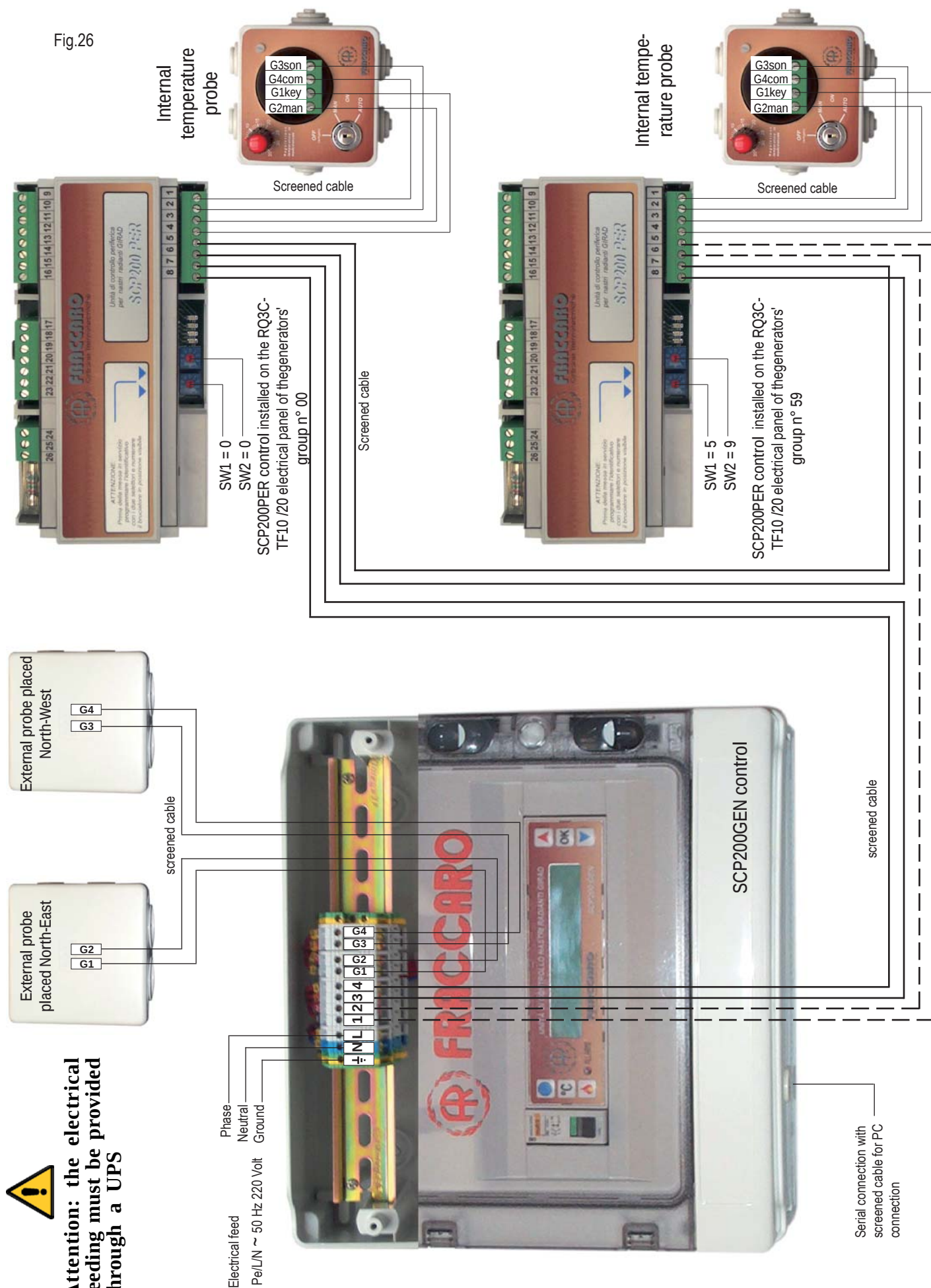
SEE POINT A ABOVE TO SIZE THE SECTION OF THE ELECTRICAL ABSORPTION FEEDING CABLES.

N.B. the 12-wire command cable to connect the generator-GQK panel and the one to connect the GQK panel and the TA room thermostat must always be the screened type, in that there could be the formation of induced currents which cause the generator to malfunction.



DIAGRAM OF ELECTRICAL CONNECTION OF SCP200 GEN GENERAL CONTROL

Fig.26

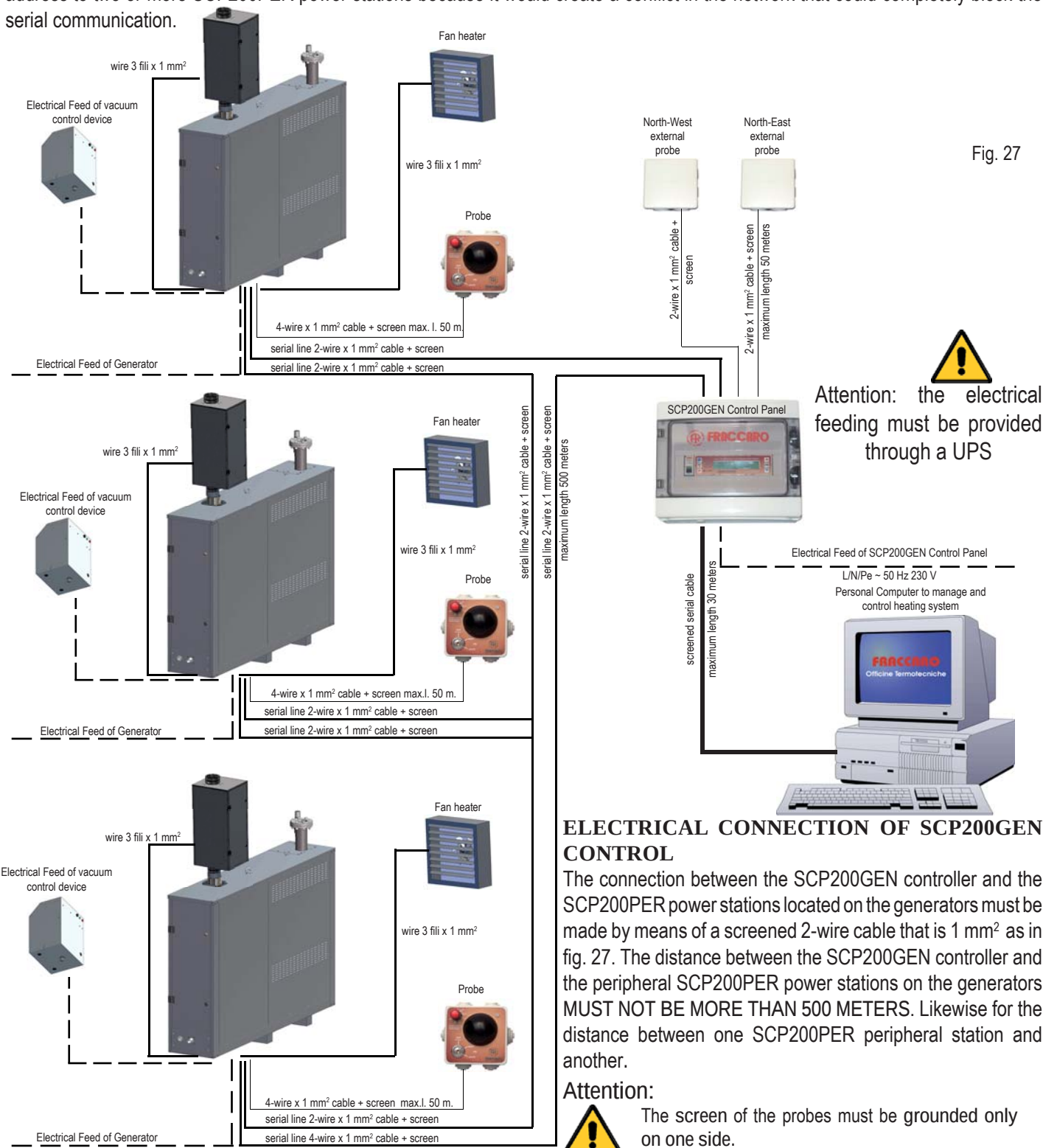


ELECTRICAL CONNECTION OF THE SCP200GEN GENERAL CONTROLLER

The connection between the SCP200GEN control panel and the SCP200PER power stations located on the generators can be done by means of:

- screened cable with PVC sheath, 2 wires that are 1 mm² plus 20 AWG braiding see fig. 27;
- screened cable with PVC sheath, 4 wires that are 1 mm² plus 20 AWG braiding see fig. 28;

The distance between the SCP200GEN control panel and the power station located on the furthest generator must not be more than 500 m. Follow the diagram in fig. 27 for the connection between the panel and the generators, pay careful attention to the positive and negative polarities, furthermore avoid crossing the cables by separating the serial connection of the connections referring to the feed of the generators. Carry out the electrical connections so that no wire passes above the SCP200PER power station. Therefore use the single electrical cables and connect them separately to each use present on the peripheral station, taking advantage of the fairleads next to the extractable connectors. After having connected the power station to the SCP200GEN control panel, address the device by using the rotating dip-switch SW1 (decine) and SW2 (unit) present on each power station, see fig. 26, make sure to not assign the same address to two or more SCP200PER power stations because it would create a conflict in the network that could completely block the serial communication.



ELECTRICAL CONNECTION OF SCP200GEN CONTROL

The connection between the SCP200GEN controller and the SCP200PER power stations located on the generators must be made by means of a screened 2-wire cable that is 1 mm² as in fig. 27. The distance between the SCP200GEN controller and the peripheral SCP200PER power stations on the generators **MUST NOT BE MORE THAN 500 METERS**. Likewise for the distance between one SCP200PER peripheral station and another.

Attention:



The screen of the probes must be grounded only on one side.

The connection between the SCP200GEN controller and the SCP200PER power stations located on the generators must be made by means of a 4-wire screened cable that is 1 mm² as in fig. 28. The distance between the SCP200GEN controller and the farthest SCP200PER peripheral power stations located on the generators **MUST NOT BE MORE THAN 500 METERS**. The distance between one SCP200PER peripheral power station and another **MUST NOT BE MORE THAN 500 METERS**. Only two wires are connected to the SCP200GEN, the other two are connected to the next cable to reach the last generator and carry the return signal back to the SCP200GEN.



Fig. 28

Attention: the electrical feeding must be provided through a UPS

ELECTRICAL CONNECTION OF SCP200GEN CONTROL

The connection between the SCP200GEN controller and the SCP200PER power stations located on the generators must be made by means of a screened 2-wire cable that is 1 mm² as in fig. 26. The distance between the SCP200GEN controller and the peripheral SCP200PER power stations on the generators **MUST NOT BE MORE THAN 500 METERS**. Likewise for the distance between one SCP200PER peripheral station and another.

Attention:



The screen of the probes must be grounded only on one side.

INSTALLATION AND USE OF THERMOSTAT MOD. 1096482

The thermostat mod. 1096482 fig. 29 is supplied by FRACCARO with probe or globeprobe included for inside temperature control. A thermostat can be connected up to 1 generator Vaporad.



Fig. 29

- = UP key: increases display values during set-up phases;
- = SET key sets set-point, if pressed for more than 5 seconds, it enables access to configuration menu;
- = DOWN key: decreases display values during set-up phases;
- = CLOCK led indicates clock contact status:
 - led on, clock contact open
 - led off, clock contact closed
 - led blinking, parameter set-up in progress
- out1 = Led out1 indicates K1 relay status. Burner consent;
 - led on, relay on;
 - led off, relay off;
- out2 = Led out2 not used;
- out3 = Led out3 not used.

DISPLAY AND CHANGE OF SET-POINT VALUE "SP1"

As for value of "set-point" we mean the intervention temperature output K1 that is the internal temperature set-up for a room to be heated.

- Press SET key until letters "SP1";
- Release SET key. The display shows regulator intervention temperature and led CLOCK starts blinking;
- Operate on UP or DOWN keys to alter set-point;
- To exit procedure and save changes, press SET or wait for 30 seconds without operating on keyboard.

CHANGING INSTRUMENT PARAMETERS

- Press SET key until "PA" appears on display;
- Release SET key. The display shows figure "00" and led CLOCK starts blinking;
- Type in the access number operating on UP or DOWN (ask for the access number to FRACCARO Service Center);
- Press briefly the SET key;
- Press briefly the SET key to select the parameter to change;
- Press UP or DOWN keys to change value;
- Press briefly SET to visualize parameter value another time;
- Repeat the same procedure to change value of other parameters;
- To exit procedure and save changes wait for 15 seconds without operating on keyboard.

TIMER INPUT

Thermostat mod. 1096482 is equipped with an AC opto-insulated input that can be connected to the normally open contact of a timer. Thermostat action depends on input status: when led CLOCK is on, it means that thermostat is working according to "St1" parameter setting up (table 2 on page 13).

SETTING-UP INTERVENTION OF SECOND STAGE K2 OUTPUT

Parameter "SP2" is the value to be subtracted to set-point "SP1" in order to activate second stage K2 output.

Example:

Set up the set-point parameter at $SP1=18\text{ }^{\circ}\text{C}$ (internal temperature desired);

Set up the set-point parameter at $SP2=-1.0\text{ }^{\circ}\text{C}$ (intervention of relay K2 second stage);

Set up the parameter of differential at $diF=-0.1\text{ }^{\circ}\text{C}$;

Output status of thermostat:

Temperatures below $17\text{ }^{\circ}\text{C}$ outputs $out1=on$ and $out2=on$; (burner working at maximum power)

Temperatures between $17\text{ }^{\circ}\text{C}$ and $18\text{ }^{\circ}\text{C}$ outputs $out1=on$ and $out2=off$; (burner working at minimum power)

Temperatures above $18\text{ }^{\circ}\text{C}$ outputs $out1=off$ and $out2=off$. (burner off)

DOUBLE IGNITION FUNCTION

In order to increase efficiency of heating system and reduce thermal inertis effects, parameter itS has been added which regulates activity on second power level of burner. If this parameter is different from 0 "double ignition" function is activated, in this condition every time K1 output is activated K2 output is activated for as long as indicated by itS parameter after which K2 output goes back to normal functioning.

ACTIVATION DELAY OF SECOND STAGE K2 OUTPUT

By operating on parameter dtS , it is possible to delay activation of second power level K2 relay. Delay will be inserted before every activation of K2 relay and before every resetting of the burner.

ELECTRIC CONNECTIONS

By connecting to the thermostat keep to fig. 30 - 31 and to table 2. Take care of neutral and supply phase polarity. Avoid criss-crossing cables among them by separating the connections (probe) from those concerning the power supply. Remember that the appliance is not protected against overcharge, equip outputs with the necessary safety devices, and verify also that the employment conditions are within the herebelow indicated limits.

LIST OF INSTRUMENT PARAMETERS

Parameters	Description	Min	Max	UM	Default parameters
diF	Set-point SP1, St1 differential	-9,9	-0,1	°C	-1,0
SP2	Set-point output K2 referred to SP1 or St1: deducting "SP2" from set-point "SP1", we obtain set-point output K2	-9,9	0,0	°C	-0,2
LSP	Minimum set-point limit	-9,9	HSP	°C	10
HSP	Maximum set-point limit	LSP	99,9	°C	30
CAL	Probe signal correction	-9,9	20	°C	0,0
St1	Night or anti-freeze temperature. Set-point output K1 with timer input open. Set 0.0°C to maintain the burners off with timer contact open.	0,0	99,9	°C	10
itS	Duration "double ignition" function. Set 0 minutes to exclude "double ignition" function.	0	59	min	0
dtS	Delay between first and second power level	0	250	sec	0
bdo	Delay in activation of burners when thermostat is turned on	0	250	sec	0
rS	Probe reading stability	0	14	readings	3

Tab. 2

DISPLAY SIGNALS

Display	Meaning	Output status
E0	Thermostat out of order (EEPROM out of order)	Unknown
E1	Thermostat probe in short-circuit or not connected or temperature over instrument limits. Check conditions of cable that connects probe.	OFF

Tab. 3

TECHNICAL FEATURES OF THERMOSTAT

Feed: 230Vac +/- 10%

Work field: -9.9°C a 99.9°C

Thermostat consumption: 5VA a 230 Vac

Container: plastic DIN 4 modules

Assembly: OMEGA guide

Insulation class: II

Frontal protection: IP42

Input:

1 250 Vac input clock contact optoinsulated

1 input prearranged for PTC probe

Output:

2 K1-K2 SPDT 8 (3)A 250 Vac relays

Precision:

0.5% at the bottom of the scale

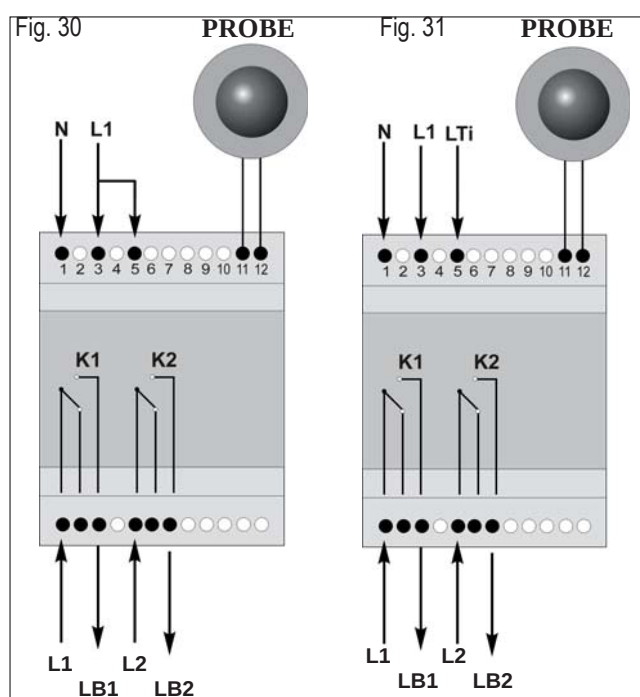
Use conditions:

work temperature 0/+50°C - storage -20/+70°C

Environment relative humidity: 30/80% without condensate

Viewing:

display with 3 figures H12.5+ led indicators



Legend:

N = Neutral

L1 = Thermostat feeding phase

L2 = Thermostat feeding phase

LTi = Programming clock contact

LB1 = Output phase for feeding I° stage min. capacity burners

LB2 = Output phase for feeding II° stage avg. capacity burners

Terminals	Description of terminals
1	Neutral supply 230Vac +/-10%
3	Supply line 230Vac +/-10%
3;5	Timer terminal. If timer is not present, connect the terminals as per fig.18
11;12	Temperature internal probe "globoprobe"
13;14;15	Output K1, first stage burner control relay: 8(3)A 250 Vac
17;18;19	Output K2, second stage burner control relay:8(3)A 250 Vac

Tab. 4

Fig. 32



INSTALLATION AND USE OF TIME SWITCH TYPE LEGRAND

Digital time switch MicroRex D21 Plus 604 774, 230 V 50/60 Hz, 16A ~μ cosφ=1

Buttons:

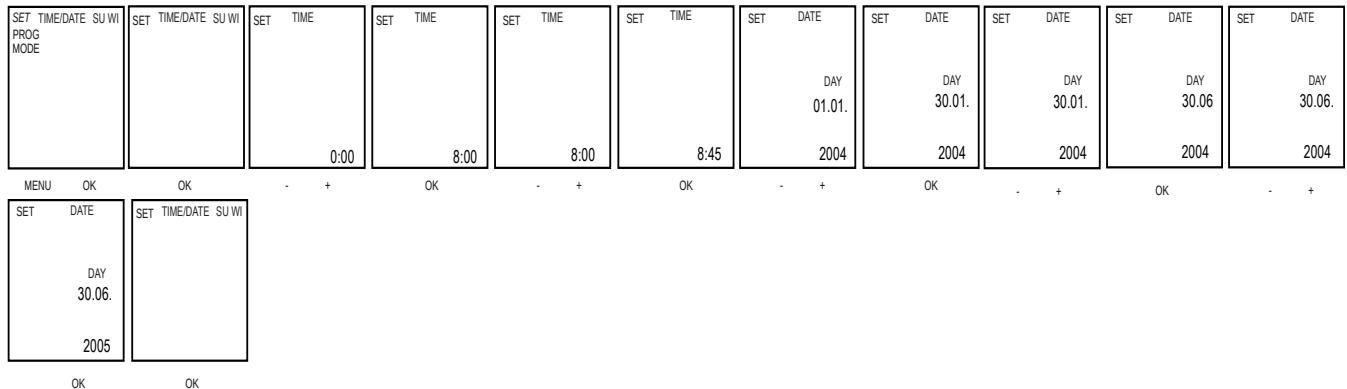
MENU: menu selection, back in menu, actuation > 1s: back to status display.

- +: select menu items or set parameters.

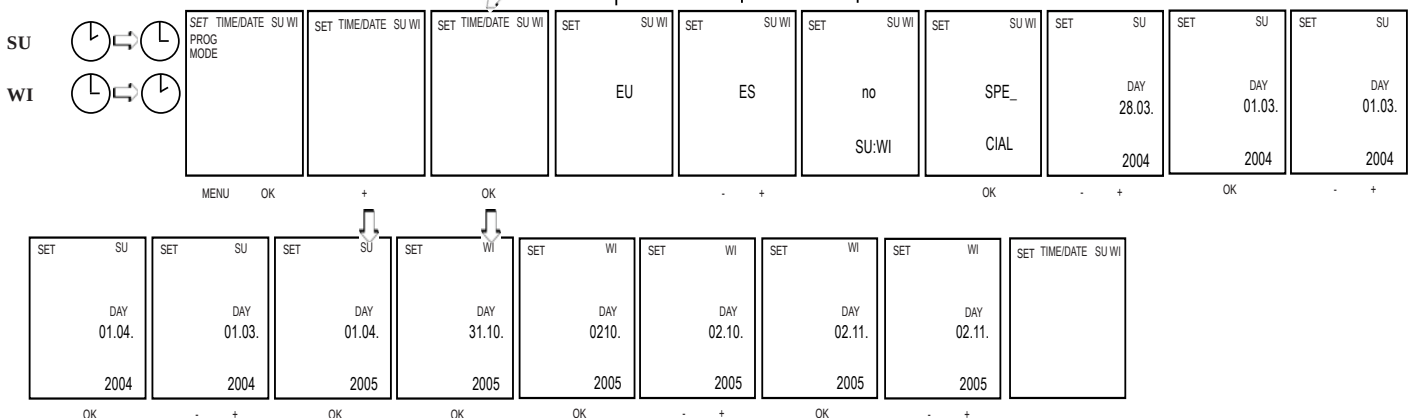
OK: confirm menu selection or adopt parameters.

RESET: press at the same time MENU OK - +: reset, Prog: memo free; Time: 0:00; Date: 01.01.2004; Su/Wi: EU.

SET TIME/DATE



SET Summer - Winter-time



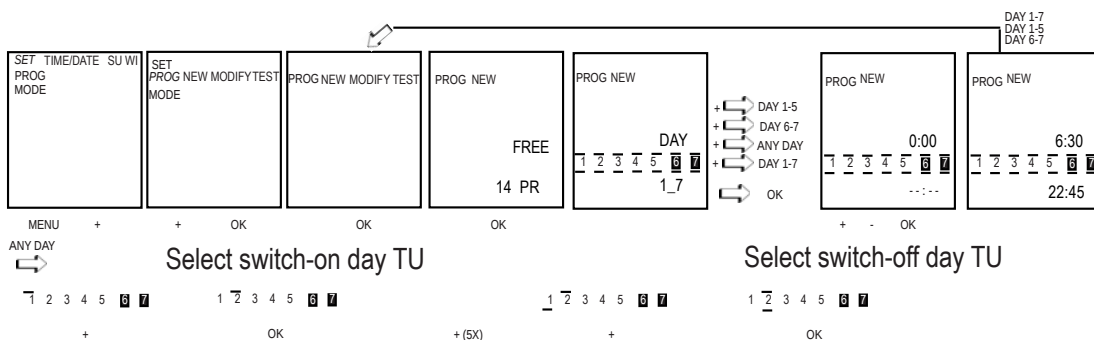
PROG NEW

Programming:

One program= switch-on-time + switch-off-time + switch-on and switch-off days. Programs with predefined switch-on / switch-off days:

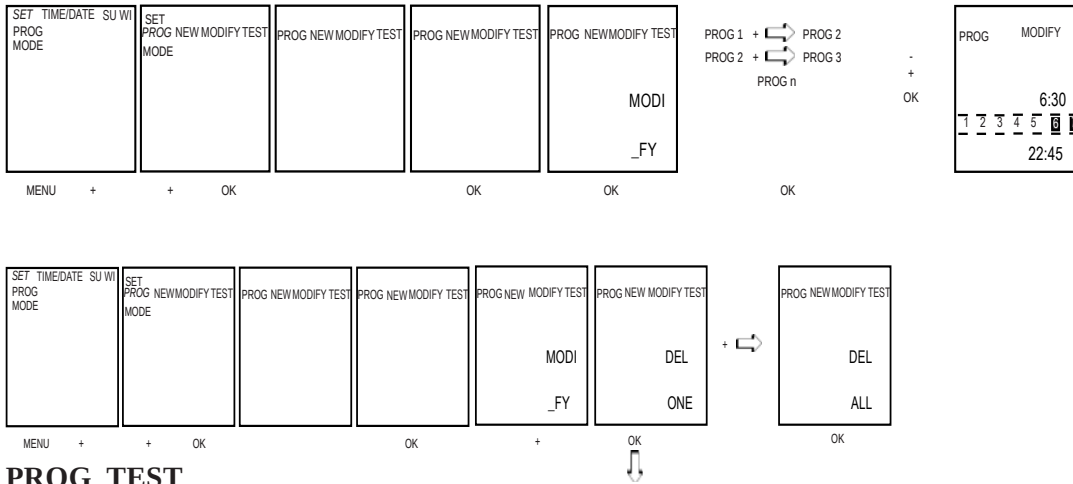
•DAY 1-7 (MO - SU) •DAY 1-5 (MO - FR) •DAY 6-7 (SA and SU)

Programs are interlinked with OR logic.



PROG MODIFY

MODIFY: Edit program



PROG TEST

Prog: programs in the order entered

Serial: switching commands in chronological order

MODE PERM

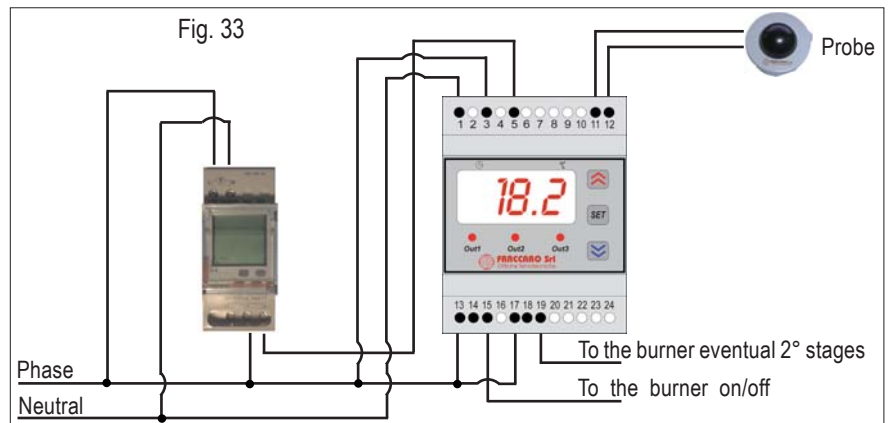
Continuous switching On/Off

MODE EXTRA

State of contact set by program will be reversed. The next program automatically returns the switch to ON or OFF as programmed

EXAMPLE OF CONNECTION BETWEEN THERMOSTAT AND TIME SWITCH

Protect the circuit upstream with adequate magnetothermic circuit breaker. Connection of probe with shielded cable connected one side to earth.



STARTUP: PRELIMINARY OPERATIONS

- Check for system seal, pressurizing it and checking the welds of all joints. CAUTION: the Vaporad generator must not be pressurised. The methods to test the Waterstrip panel systems are indicated in the applicable manual;
- Check for seal of the connection to the gas supply line and verify that the on-off valve is closed; supply gas to the burner and verify that gas type and pressure match those indicated in the burner plate and in table 5. Caution: the combustion unit must never undergo pressures over 50 mbar; higher values may damage its components. If it is necessary to perform adjustments to adapt the generator to the type of gas and supply pressure, replace the nozzles and calibrate the valves according to the values indicated in table 5.
- Check for correct realization of the electric connections, especially the supply polarity in the generator terminal board;
- Fill the generator with water, connecting a rubber hose to the load tap. The correct amount of fluid is reached when the level indicator is at about 50 mm from the top end of the glass tube.
- On the control panel, power on the system, set the target temperature and set the operation of the system to "manual" to perform the generator operating test.

SWITCH ON

Now it is possible to open the gas valve and switch on the generator. Check for correct operation of the generator, in particular check for switch off when the calibration pressure is reached, without the intervention of the safety devices. Check as well the programming of the weekly timer and set the automatic operation.

For the burner test, use a combustion gas analyzer for gaseous fuels and a manometer with scale 0 - 50 mbar to measure gas pressures. Press the switch on switch: BURNER START-UP.

- a) The fan will start to rotate.
- b) The red shut-down lamp will turn on.
- c) After the time required for prewashing, the burner performs ignition. If the gas supply is correct, the burner starts. During burner standard operation, the green operating light remains lit.

Always control the combustion and yield using the combustion analyser at the burner's maximum power, unscrewing the screw located on the end section of the Archimedean screw, on the aspirator near the chimney. The values must lie within the limits foreseen by current standards.

To reset the burner, switch off the power for a few seconds using the zone switch.

SOLENOID VALVE ADJUSTMENT AND GAS PRESSURE CHECKING

To check and measure the gas intake pressure P_i unscrew the screw and connect the pressure gauge to the pressure attachment shown on n° 1 in fig. 34. To check and measure the gas pressure to the nozzle P_u unscrew the screw and connect the pressure gauge to the pressure attachment shown on n° 2 of fig. 34.

If using gas of the IIa family (G20 and G25), adjust the pressure to the nozzle P_u as shown on tab 5, regulating the stabilizer on the solenoid valve. Remove the black plastic protection cap for the solenoid valves applying slight leverage on the edge, connect the pressure gauge to the pressure attachment downstream of the solenoid shown with n° 2, adjust the pressure at I° stage operating on the screw n° 4, adjust the pressure at II° stage operating on the bolt n° 3.

If using gas of the IIIa family (G30 and G31), adjust the pressure to the nozzle according to the values written on the table 5 following the same procedure as above.

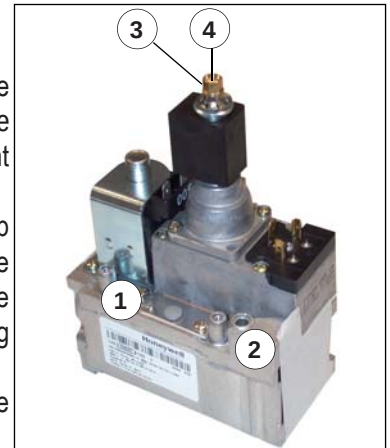


Fig. 34 Solenoid valve type 826

NOZZLE REPLACEMENT

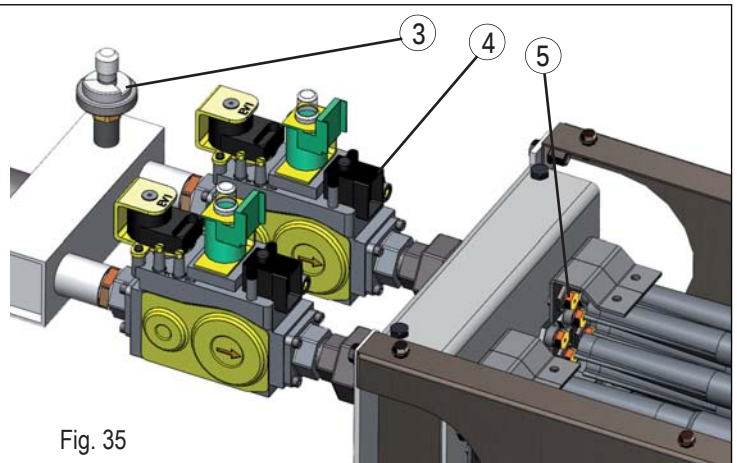
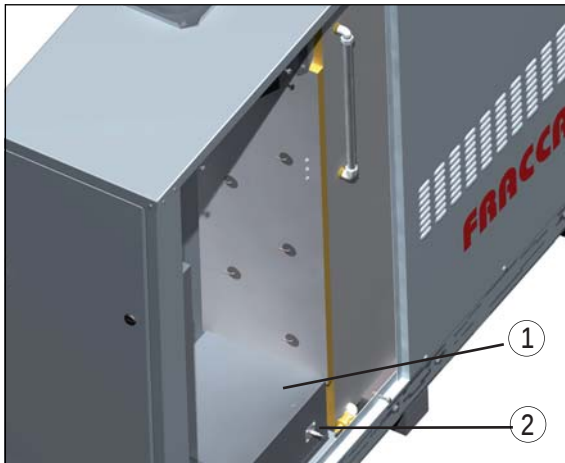


Fig. 35

Legend:

1 =	Combustion group	3 =	Gas pressure switch
2 =	Electrode	4 =	Gas solenoid valve
		5 =	Nozzle

For combustion unit maintenance and adjustment operations, start the burner, removing the side cover of the generator. If the type of gas and the pressure do not correspond to the values listed on the burner indicator plate and in table 5, perform generator adjustments. Replace the nozzles and calibrate the valves according to the values indicated in table 5. To access the nozzles, remove the cover of the burner.

At the end of replacement and adjustments, seal all screws and adjustment organs with a drop of varnish. Put a seal on the side of the nozzles, avoiding with care to occlude the gas emission hole.

PRESSURE AND NOZZLE-SIZE

GAS	Gas intake Pi [mbar]	Pressure to the nozzle I° stage Pu [mbar]	Pressure to the nozzle II° stage Pu [mbar]	Pressure to the nozzle I° stage Pu [mbar]	Pressure to the nozzle II° stage Pu [mbar]	Solenoid-valve code	Stabilizer	Gas Pressure Switch [mbar]	n° and Ø of nozzles	Power Max [KW]
		EV1		EV2						
VPR070										
G20	20/25	6	12			826014	yes	10	7 x 2.60	50 / 70
G25	20	6	12			826014	yes	10	7 x 2.80	50 / 70
G25	25	6	12			826014	yes	15	7 x 2.80	50 / 70
G25.1	25	6	12			826014	yes	15	7 x 2.80	50 / 70
G30	28-30	14	29			826010	no	20	7 x 1.55	50 / 70
G30	50	25	50			826010	no	40	7 x 1.35	50 / 70
G30	30	14	30			826010	no	20	7 x 1.55	50 / 70
G30	36	18	36			826010	no	30	7 x 1.45	50 / 70
G31	30	14	30			826010	no	20	7 x 1.65	50 / 70
G31	37	18	37			826010	no	30	7 x 1.55	50 / 70
G31	50	25	50			826010	no	40	7 x 1.45	50 / 70
G31	36	18	36			826010	no	30	7 x 1.55	50 / 70
VPR100										
G20	20/25	6	11			826014	yes	10	7 x 3.10	70 / 100
G25	20	4,5	7,8			826014	yes	10	7 x 3.80	70 / 100
G25	25	6,5	10,5			826014	yes	15	7 x 3.40	70 / 100
G25.1	25	6,5	10,5			826014	yes	15	7 x 3.40	70 / 100
G30	28-30	12	29			826010	no	20	7 x 1.90	70 / 100
G30	50	20	50			826010	no	40	7 x 1.65	70 / 100
G30	30	12	30			826010	no	20	7 x 1.90	70 / 100
G30	36	17,5	36			826010	no	30	7 x 1.80	70 / 100
G31	30	13,5	30			826010	no	20	7 x 2.00	70 / 100
G31	37	15	37			826010	no	30	7 x 1.90	70 / 100
G31	50	25	50			826010	no	40	7 x 1.75	70 / 100
G31	36	15	36			826010	no	30	7 x 1.90	70 / 100
VPR150										
G20	20/25	5	10	5	10	826014	yes	10	14 x 2.70	100 / 150
G25	20	5	11,0	5	11,0	826014	yes	10	14 x 3.00	100 / 150
G25	25	5	11,0	5	11,0	826014	yes	15	14 x 3.00	100 / 150
G25.1	25	5	11,0	5	11,0	826014	yes	15	14 x 3.00	100 / 150
G30	28-30	14	29	14	29	826010	no	20	14 x 1.55	100 / 150
G30	50	25	50	25	50	826010	no	40	14 x 1.35	100 / 150
G30	30	14	30	14	30	826010	no	20	14 x 1.55	100 / 150
G30	36	18	36	18	36	826010	no	30	14 x 1.45	100 / 150
G31	30	14	30	14	30	826010	no	20	14 x 1.65	100 / 150
G31	37	20	37	20	37	826010	no	30	14 x 1.55	100 / 150
G31	50	25	50	25	50	826010	no	40	14 x 1.50	100 / 150
G31	36	18	36	18	36	826010	no	30	14 x 1.55	100 / 150
VPR200										
G20	20/25	6	11	6	11	826014	yes	10	14 x 3.10	150 / 200
G25	20	4,5	7,8	4,5	7,8	826014	yes	10	14 x 3.80	150 / 200
G25	25	6,5	10,5	6,5	10,5	826014	yes	15	14 x 3.40	150 / 200
G25.1	25	6,5	10,5	6,5	10,5	826014	yes	15	14 x 3.40	150 / 200
G30	28-30	12	29	12	29	826010	no	20	14 x 1.90	150 / 200
G30	50	20	50	20	50	826010	no	40	14 x 1.65	150 / 200
G30	30	12	30	12	30	826010	no	20	14 x 1.90	150 / 200
G30	36	17,5	36	17,5	36	826010	no	30	14 x 1.80	150 / 200
G31	30	13,5	30	13,5	30	826010	no	20	14 x 2.00	150 / 200
G31	37	15	37	15	37	826010	no	30	14 x 1.90	150 / 200
G31	50	25	50	25	50	826010	no	40	14 x 1.75	150 / 200
G31	36	15	36	15	36	826010	no	30	14 x 1.90	150 / 200

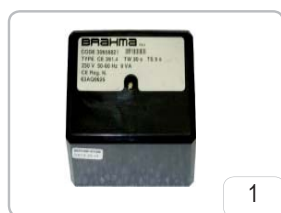
Tab. 5

ORDINARY MAINTENANCE

Maintenance months - hours			
Control and calibration gas	12 months - 2000 hours	Vacuum control device check	12 months - 2000 hours
Control pressure switch (Pc1 - Pc2)	12 months - 2000 hours	Sight check	12 months - 2000 hours
Combustion control	12 months - 2000 hours	Check of correct startup cycle	12 months - 2000 hours
General clean	12 months - 2000 hours	Check of air and gas pressure switches intervention	12 months - 2000 hours
Check of water level at cold in the glass tube	12 months - 2000 hours	Clean and control filter vacuum control device	12 months - 2000 hours
Check of system seal (pressure value lower than -0,5 bar with system at cold)	12 months - 2000 hours	Emptying of secondary system, refill with new antifreeze and replacement of external water pipe insulation	12 months - 2000 hours
Operative check of pump, safety and air valve	12 months - 2000 hours	Check of the pressure of the secondary water circuit (condenser - forced convection heater) at 1.5 bar	12 months - 2000 hours
Check of expansion tank tightness	12 months - 2000 hours	Check of operation and careful cleaning of the thermal exchange battery of the forced convection heater	12 months - 2000 hours

Tab. 9

LIST OF INTERVENTIONS



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Pos.	Code	Description
1	1090580	CONTROL BOX CE 391.4
2	1114015	AIR PRESSURE SWITCH DUNG
3	1099007	PRESSURE SWITCH PS1-A2R0.8/1.5 BAR
4	1114000	GAS PRESSURE SWITCH 10-50
5	1088110	ELECTRODE



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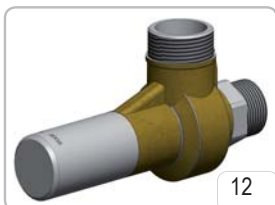


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6	1118037	SOLENOID VALVE 826 NOVA 0826014
7	1089603	FAN MOTOR VA3H60L S60 230/50 (VPR070)
7	1089605	FAN MOTOR VA5H70L S60 230/50 (VPR150)
7	1089606	FAN MOTOR VA6H60L S60 230/50 (VPR100/VPR200)
8	1111001	WATER LEVEL GAUGE PIREX
9	VCV001	VACUUM CONTROL DEVICE
10	1099000	MANOMETER GAUGE 1/1,6 BAR



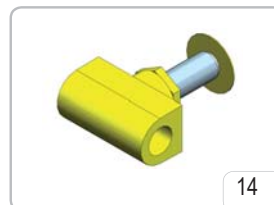
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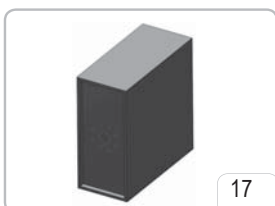


15

11	1099001	TERMOSTATO CACCIATIVITE 0-90°
12	1099011	SECURITY VALVE (VPR070/VPR100)
12	1099012	SECURITY VALVE (VPR150/VPR200)
13	1099004	WATER LEVEL SENSOR
14	1099005	GAS SOLENOID VALVE PARKER
15	1099006	IGNITION COIL PARKER



16



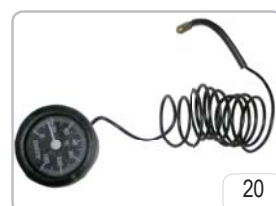
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16	1080609	WATER GAUGE ELECTRONIC SOCKET
17	1099010	ELECTRONIC WATER GAUGE
18	1120700	WATER FILTER
19	1081555	SWITCH ON/OFF-2° STAGE
20	1116480	THERMOMETER SC 0-120°C



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21	1116481	SECURITY THERMOSTAT 110°/130° C
22	1088506	FUSE 6A aM
23	1098016	SCP200PER FOR TRASMISSION DATES
24	1080571	FINDER RELAY 40.51
25	1116200	TIMER CDC TV49 LAMP



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26	1089100	PUMP DAB VA35 130
27	1060006	FLAT EXPANSION TANK
28	1101510	1/2" AIR VALVE
29	1099015	CONDENSER SAFETY VALVE
30	1099014	MANOMETER - THERMOMETER



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