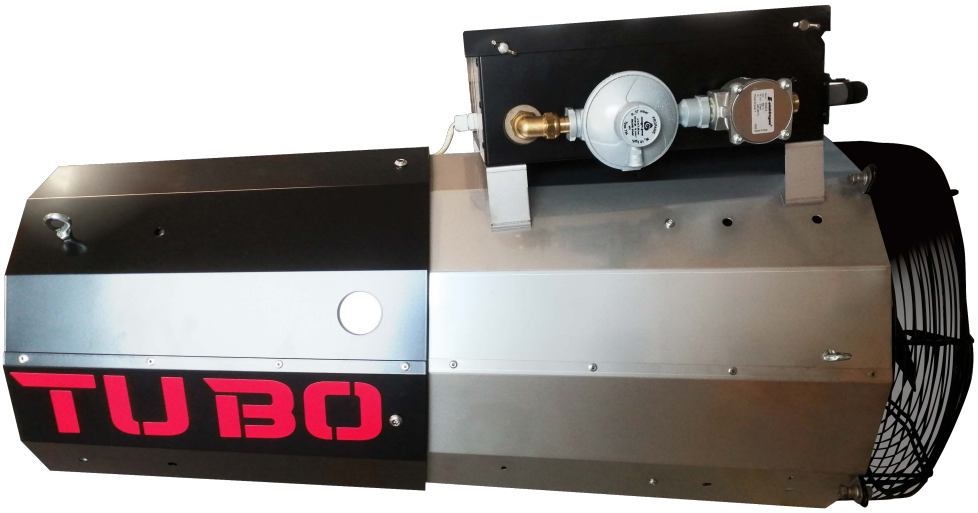
TUBO 50/70/90



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GB

SYSTEL®
Heating mastermind

Table of contents

FOREWORDS

Thank you for buying a hot air generator **TUBO**.

Our French design and manufacturing equipment has been carefully designed, assembled and controlled to give you maximum satisfaction.

Systel develops a range of products and accessories for heat generation, lighting, energy savings, check our website to discover these innovative products:

www.systel-international.com.

In order to improve its manufacturing processes, SYSTEL reserves the right to make any modifications to the products described in this document without prior notice.
This document contains sections in French and translated. In the event of a dispute, the sections in French will be authentic.
Measurements are expressed in metric units. Correspondence with other measurement systems (notably Anglo-Saxon) is given as an indication.
The illustrations are not contractual.

I WARNING

The longevity of this device and its performance will be optimal if its use and maintenance are ensured in accordance with the rules and regulations in force. It is therefore essential to carefully read the instructions contained in this leaflet.
Before installing the device, it is necessary to verify that the local distribution conditions (type, voltage, power, gas type, pressure…) are compatible with the device setting.
Installation, adjustment and possible conversion from one gas to another requires the intervention of a qualified installer.
It is necessary to consult the manufacturer before replacing parts other than those specified in the package insert.
It is the responsibility of the installer, after having set up and verified that the installation complies with the requirements of this manual.

I-1User Information:

• The user cannot himself make changes to the design of the equipment and to the implementation of the installation; the least modification (exchange, removal, etc.) safety components or parts affecting the performance of the device systematically entails the removal of the CE marking for the device, the removal of the manufacturer's warranties.
• It is essential to perform the required cleaning and maintenance.

I-2Delivery of notice:

SYSTEL, with the agreement of the CE marking notifying body, reserves the right to update this technical notice. Only the package leaflet accompanying the product when it is shipped may be considered contractual.

Please keep this manual and all accompanying documents handy so that you can consult them if necessary.

We are not responsible for any damage caused by failure to comply with the instructions in this document.

CAUTION: This device should not be used in a domestic room or a public space.

CAUTION: it is necessary to provide a minimum additional ventilation of 3000m3/h per generator installed.

CAUTION: Before installing the device, it is necessary to check that the local conditions (gas type, pressure) are compatible with the device setting.

I-3Requirements and safety

The hot air generator TUBO can be dangerous if not properly maintained and used. Read this manual carefully, especially the safety notes and instructions.

Failure to follow the safety instructions in this manual may incur liability in the event of an accident.

The warnings and precautions contained in this manual cannot cover all risks related to the use of the device. In addition to the messages given, it is important to use common sense and respect basic safety principles.

I-3-a What to do if you smell gas ?

- Do not turn on or off the light.
- Do not operate an electrical switch.
- Do not use the phone in the risk area.
- Do not light a bright flame (for example, a lighter or matches).
- Do not smoke.
- Turn off the gas valve.
- Open doors and windows.
- Notify other occupants of the space.
- Inform the gas company or your qualified professional.

I-4Requirements

It is mandatory to follow the following safety instructions and requirements:

- Do not use or store explosive or flammable materials (for example, gasoline, paint, etc…) in the room where the device is located.
- Do not use the unit within one hour of cleaning the room where it is located.
- Do not disable the safety devices under any circumstances or attempt to manipulate them or cause malfunction.
- Do not make modifications to the device.
- Do not make changes to the device environment.
- Do not make modifications to air, gas and electrical lines.
- Do not damage or remove seals on components. Only SYSTEL After Sales Services professionals are authorized to make changes to sealed components.
- Do not alter the technical and architectural conditions in the vicinity of the device, as these may affect the safe operation of the device.
- To limit the accumulation of CO2 in the heated room, check that it is properly ventilated (3000m3/h).
- It is essential to provide an adequate air exchange rate in the premises. The air change must take into account, the air necessary for the combustion of the appliances and the air necessary for the animals and operators. Correct operation for the combustion of appliances requires a renewal of 23m3/h of new air per KW.
- It is mandatory to attach the device by its mounting system, any other system is prohibited.

II DESCRIPTION AND OPERATION

TUBO is a direct heating and forced convection hot air generator for livestock heating.

It is all-or-nothing with automatic ignition and runs on natural gas or propane (see page 9).

It is controlled via a dry contact corresponding to capacities of 45Kw/ 67Kw or 87Kw depending on the model. Design and construction according to EN 17082 (forced convection hot air generator using gaseous fuels for the heating of domestic and non-domestic rooms, with a heat output of 300Kw or less on PCI).

CE marking:

CE 1312
1312BP3955

1 Device description

- 1 310S stainless steel hot chamber.
- 1 fixed power burner.
- 1 fixed flow dilution turbine with EC fan.
- 1 gas solenoid valve controlled by a control box that manages the TUBO operating cycle. The control box also controls the safety and ensure ignition. It is equipped with 1 reset device in case of defect.
- 1 push/light button allows to know the condition of the device and to reset it if necessary.
- 1 electrical ignition via 1 ignition electrode and 1 flame control via 1 ionization electrode.
- 1 thermal protection provided by a manual overheating thermostat.
- 1 function controlling fan operation by a pressure switch.

2 Instructions for use

- For the use, ordering and maintenance of this generator, please review the instructions in this booklet.
- Maintenance between each band is mandatory. It is also necessary to check regularly that there is no deformation of the device: hot chamber, burner, state of injectors, various pipes.
- Check regularly that the air intake of the device is not obstructed.
- Check that hot air can circulate normally in the building and especially that there is no obstacle in front of the blower.

II-3 Operation

During a heat demand created by the building's environmental regulation, the turbine starts and after about 20 seconds, the burner lights up with the ignition electrode. Hot air, obtained by dilution of combustion products, is then blown into the building.
When the setpoint temperature is reached, the ventilation continues to run for about 40 seconds to cool the hot chamber. Then the device is stopped until the next heat demand.

II-4 Security

The possible flame defect is detected by the ionization probe, the gas solenoid valve is immediately closed (not letting the gas pass through), causing the burner to stop and the device to be made safe. After about forty seconds the fan stops and the fault light comes on.
The thermal protection of the device is provided by an overheating thermostat, it protects against too much rise of the generator wall due to insufficient air flow.
The pressure switch makes it possible to check the correct operation of the turbine.

II-5 Ignition

See le 1.3 operating

II-6 Cut

To stop the generator for a short time, simply send a minimum instruction (to the computer or thermostat that manages the heating).
For an extended shutdown, send a minimum instruction to the generator, wait about forty seconds for the burner and turbine to stop. You can then close the gas valve and turn off the power supply at the on/off switch.

III TECHNICAL CHARACTERISTICS

The 45 KW, 67 KW, 87 KW are designed to operate in G20 under 20 mbars, G25 under 20 and 25 mbars, G31 under 37 and 50 mbars.

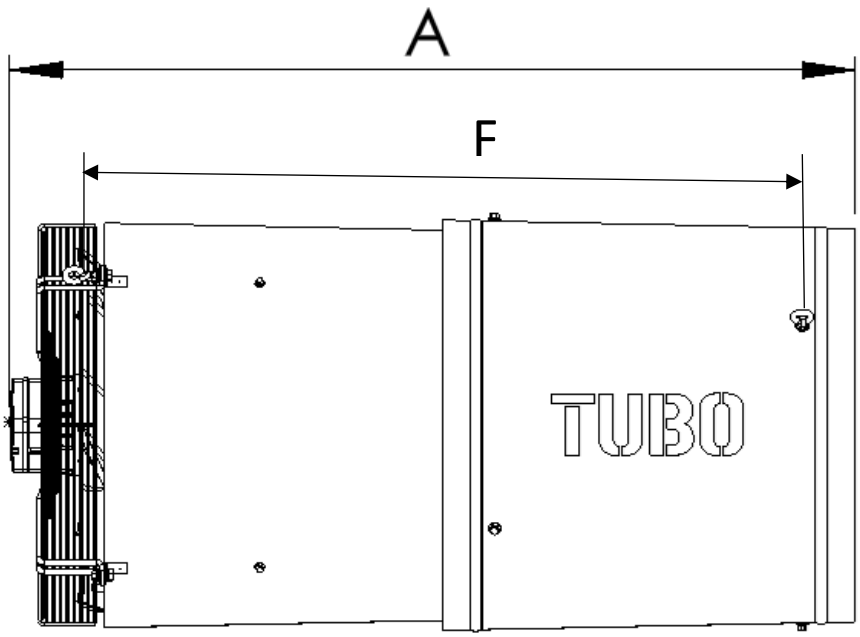
COUNTRY OF DESTINATION	GAS OF RÉFERENCE	PRESSURE (mbar)	CATEGORIES
FR	G20 ; G31	20/25 ; 37	II_{2Esi3P}
DE	G20/G25 ; G31	20/20 ; 50	II_{2ELL3P}
ES-GR-IT-IE-PT-GB-SK-CZ-SI	G20/G31	20 ; 37	II_{2E3P}
DK-SE-FI-EE-LV	G20	20	I_{2H}
LT	G20/G31	20 ; 37	II_{2H3P}
RO	G20	20	I_{2H}
AT-CH	G20/G31	20 ; 50	II_{2H3P}
LU	G20/G31	20 ; 50	II_{2E3P}
NL	G25/G31	20 ; 50	II_{2L3P}
BE	G20 G20 G31	20/25 20/25 37	$I_{2E(S)}$ $I_{2E(R)}$ I_{3P}
MT-CY	G31	50	I_{3P}

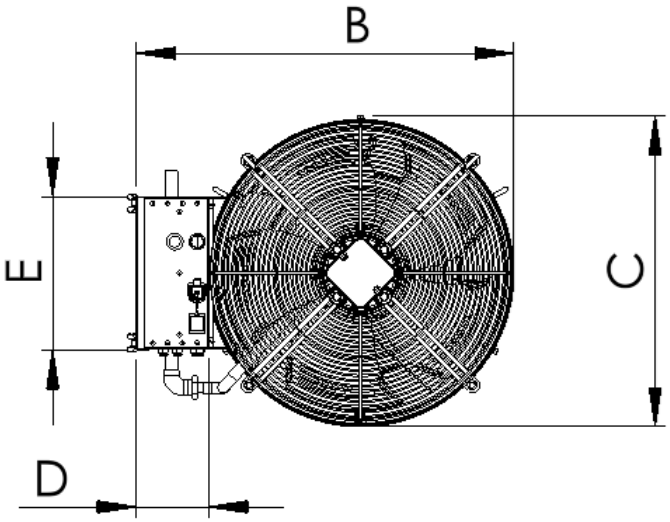
TYPES	TUBO 50	TUBO 70	TUBO 90
CALORIFIC DEBIT (PCS)	45 KW	67 KW	87 KW
AIR FLOW AT 15°C	1440 M3/H	2800 M3/H	4040 M3/H
FAN DIAMETER	400 MM	450 MM	500 MM
FAN SPEED	1600 TR/MN	1500 TR/MN	1680 TR/MN
GAS FLOW			
NATURAL G20	4.45 M3/H	6.5 M3/H	8.4 M3/H
GRONINGEN G25	4 M3/H	7.6 M3/H	10 M3/H
PROPANE G31	3.2KG/H	4.8KG/H	6.3KG/H
POWER SUPPLY VOLTAGE	SINGLE PHASE 230 VOLT 50HZ	SINGLE PHASE 230 VOLT 50HZ	SINGLE PHASE 230 VOLT 50HZ
POWER INPUT	400 W	580 W	1035 W
NOMINAL INTENSITY	1.7 A	2.5 A	4.5 A
SOUND LEVEL	75 DB	70 DB	80 DB

IV DIMENTIONAL CHARACTERITICS

The dimensions are in mm.

	TUBO 50	TUBO 70	TUBO 90
WEIGHT	30 KG	36 KG	45 KG
A	948	1095	1126
B	573	627	676
C	440	497	557
D	128	128	128
E	270	270	270
F	730	890	910





V REGULATION

V-1 Decrees, Standards, Directives

When the appliance is installed and put into operation, the decrees, directives, technical rules, standards and provisions must be complied with in their current version.
It is also the responsibility of the installer to respect the regulations specific to the type of room.

V-2 Recycling

The apparatus consists largely of recyclable materials.
The packaging, equipment and contents of the package must not be disposed of with household waste but must be disposed of in accordance with the regulations in force.

V-3 Installation

The TUBO is designed to operate inside livestock buildings.

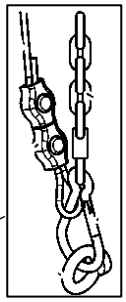
V-4 Position of the device :

The device must be mounted horizontally.
There must be no obstacles in front of the air inlet or air outlet.
Minimum distances from the walls: Care should be taken to maintain a minimum clearance around the appliance so as to allow a good air intake, as well as for maintenance.

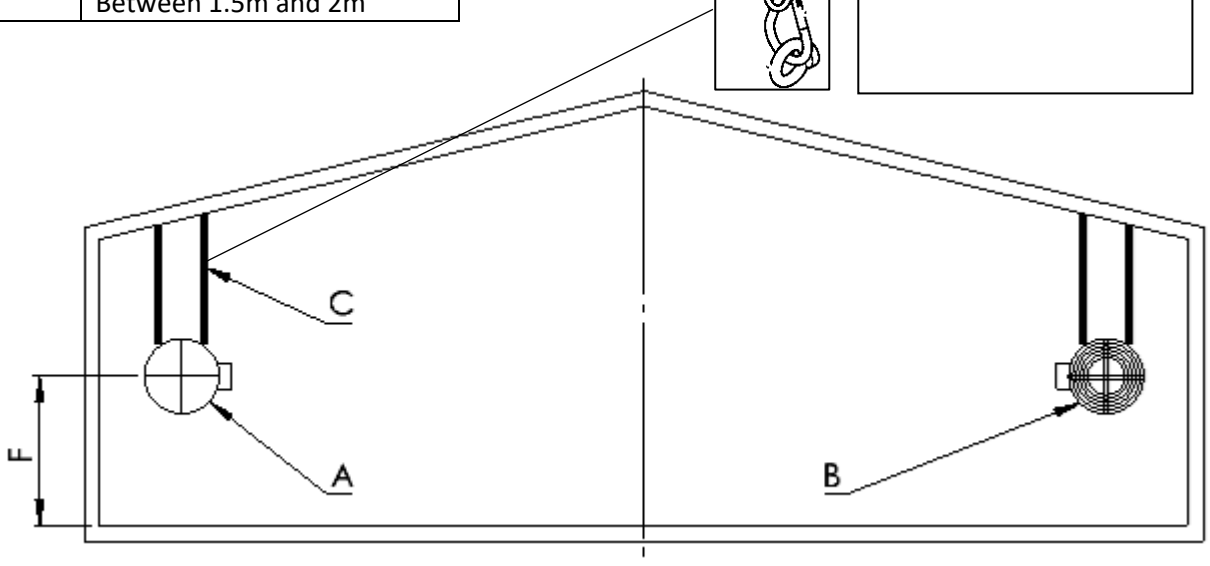
V-5 Installation of the generator :

Ensure that the structural elements of the building are well suited to support the device and accessories.
The location for the installation of the equipment must have sufficient space around the equipment to allow for maintenance and to respect safe distances.
The appliance must be installed or suspended on a rigid support to avoid voltages on gas and electrical connections.
It is mandatory to install the appliance in the shelter of the weather (rain, snow, frost) and to carefully check the closure of the electric hood and the cable presses.

MARK	DESIGNATION
A	Protective grid side
B	Fan side
C	Suspension chains
D	1.5m mini
E	1.5m mini
F	Between 1.5m and 2m

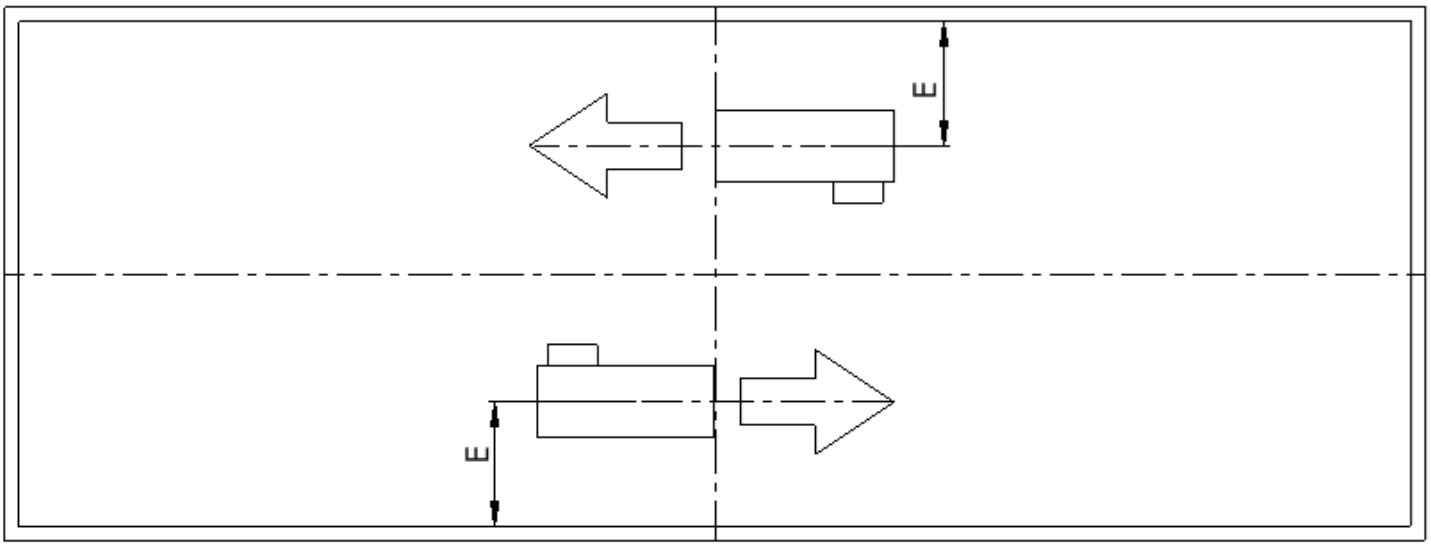


Not provideed
Chain
Lifting cable
Clamp
Carabiner



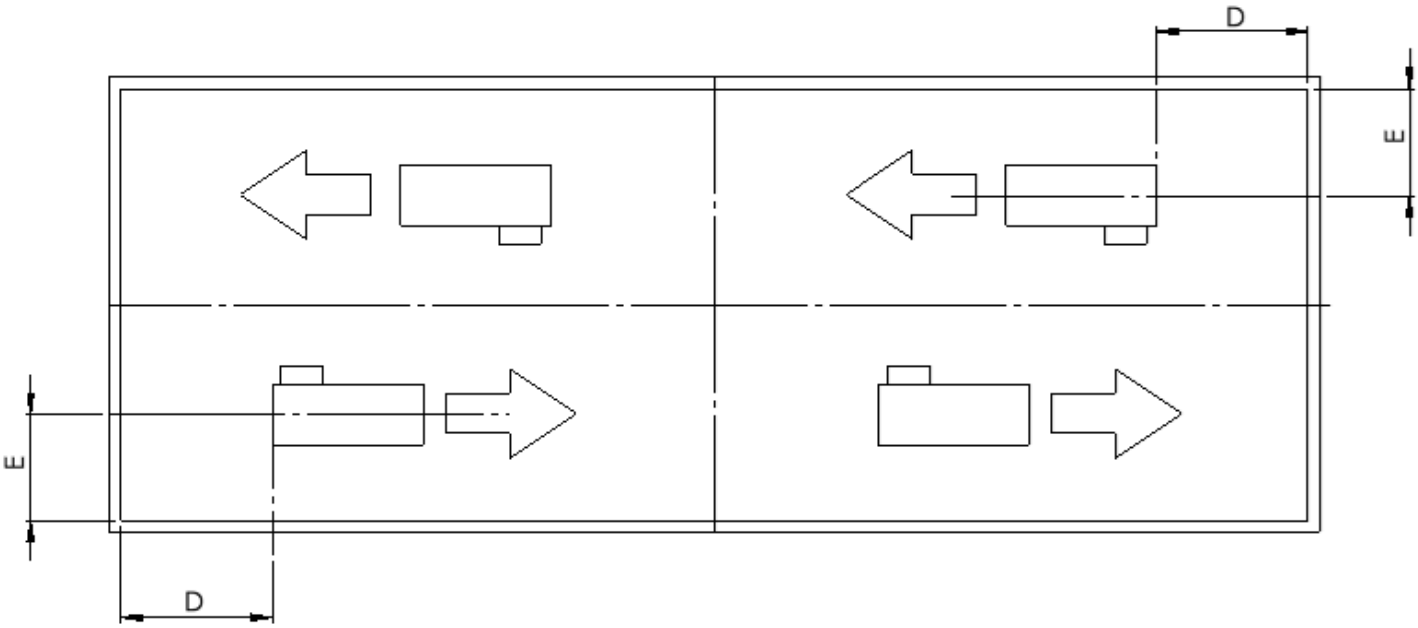
FACE VIEW

2 devices



TOP VIEW

More than 2 devices

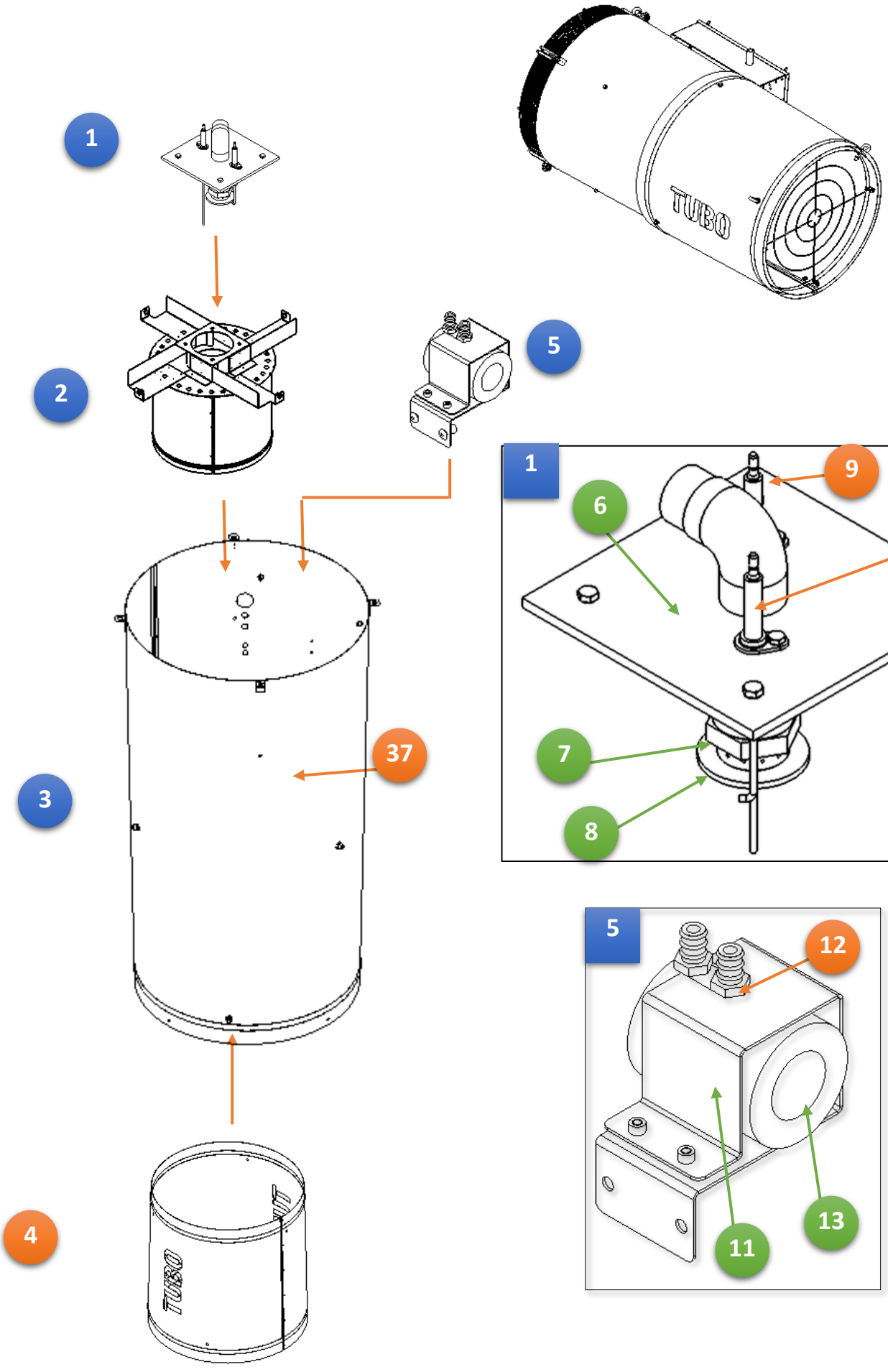


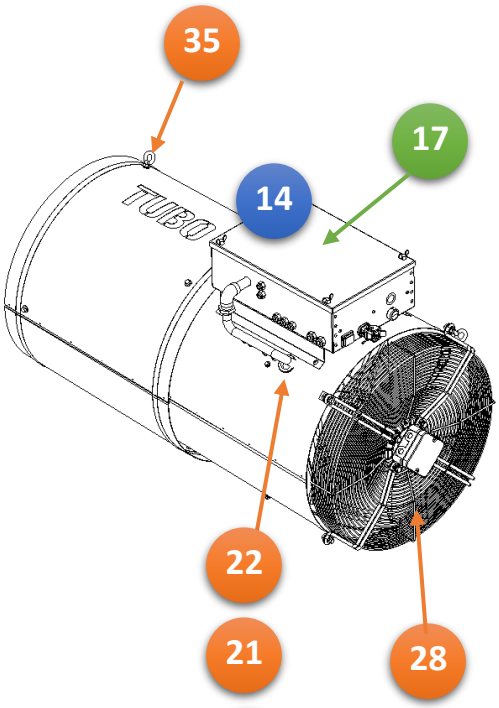
TOP VIEW

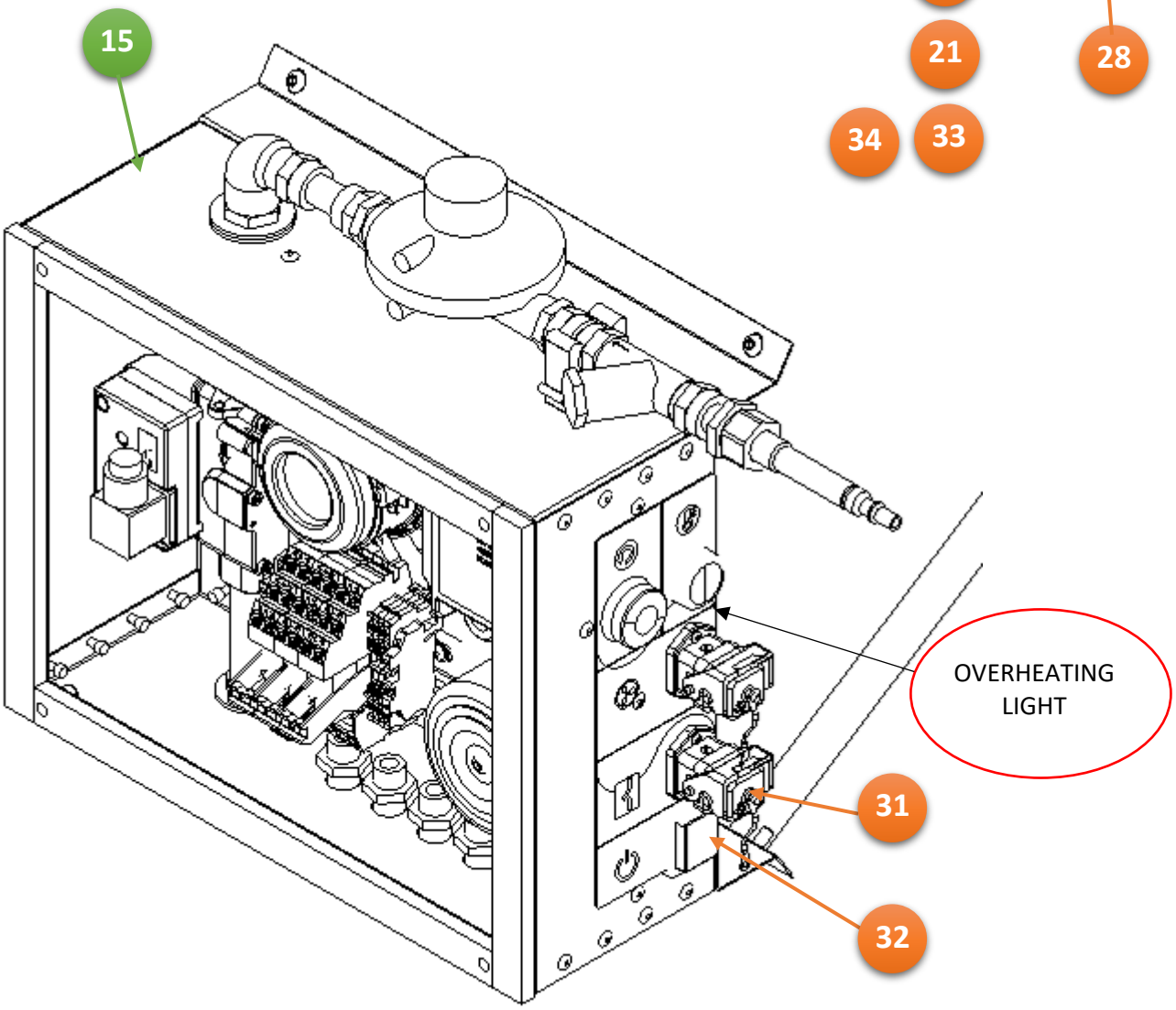
Installation example

Systel can implement the devices according to a plan.

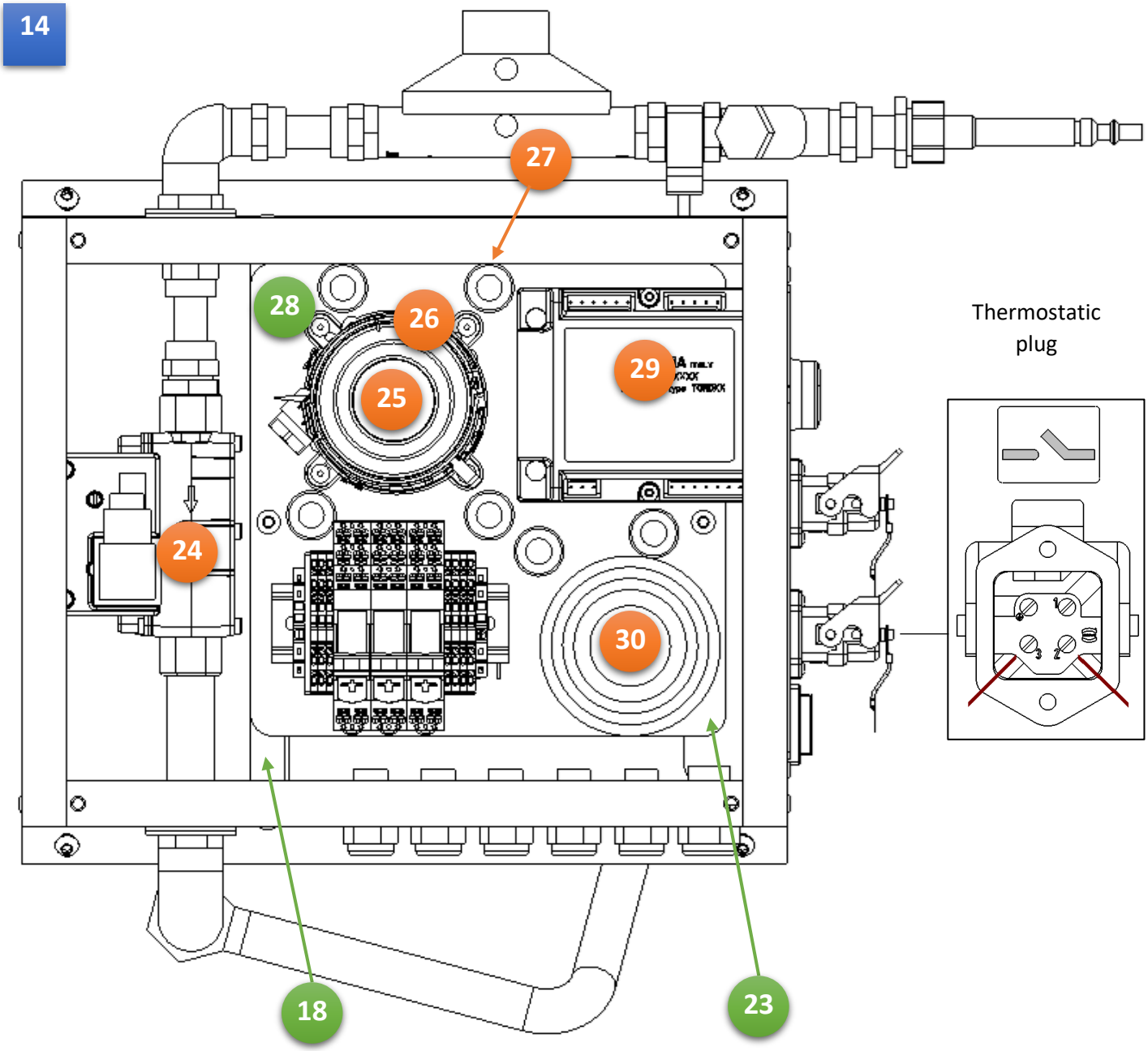
V-5-a Mounting




35
17
14
TUBO
22
21
34
33
28


15
OVERHEATING
LIGHT
31
32

14



MARK	DESIGNATION	TUBO 90	TUBO 70	TUBO 50
1	BURNER SUBSET	A101510	A111010	A111510
2	COMBUSTION CHAMBER SUBSET	A101520	A111020	A111520
3	BARREL SUBSET	A101560	A111060	A111560
4	FLAME SHIELD	A101571	A111071	A111571
5	VENTURI SHIELD	A101550		
6	PLATE	A101511	A111011	
7a	PROPANE NOZZLE	A101512	A111012	A111512
7b	NATURAL GAS NOZZLE	A101514	A111014	A111514
8	WASHER	A101513		
9	IONIZATION ELECTRODE	SOALBR / CAIOBR		
10	IGNITION ELECTRODE	SOIOBR / CAALBR		
11	VENTURI SUPPORT	A101551		
12	1/8" BARB FITTING	RACA5X18		
13	VENTURI	A108114		
14	ELECTRICAL SUBSET	A101540	A111040	A111540
15	BOX	A101547		
16	M3/4" F1/2" ELBOW	COFF34X12		
17	COVER	A101546		
18	BRACKET	A101545		
19	FOOT	A101543	A111043	A111543
21	CABLE PASS DIAM 8	PASFID8		
22	CABLE PASS DIAM 29	PASFID29		
23	INNER PLATE	A101541		
24	SOLENOIDE VALVE	EVTU		
25	PRESSURE SWITCH	PRESHUB		
26	PRESSURE SWITCH FLANGE	BRIVIS		
27	CABLE PASS Ø18	PASFID11		
28	FAN	EC400TU40	EC102-A450	EC102-A400
29	CONTROL BOX	BOCOPGR		
30	TRANSFORMER	TRTOIS70VA		
31	CONNECTOR SUBSET	INSF3PT10A + EMBLVINS + CVJIF		
32	SWITCH	BOIMCP1		
33	CABLE PASS DIAM 8	PASFID9		
34	SAFETY THERMOSTAT	CLK80M		
35	PAD-EYE	PIM8X30		

VI GAS CONNECTION

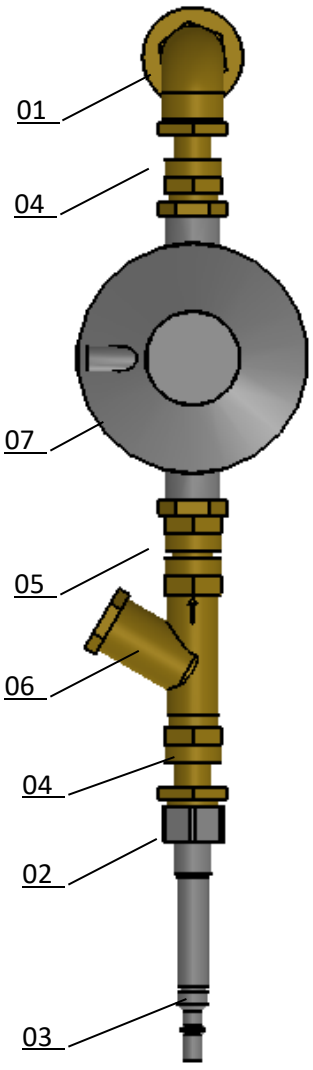
The TUBO is connected to the gas network via a male ½.

The pressure and nature of the device supply gas must be the same as indicated by the device rating plate (a pressure regulator or regulator may be required to obtain the device operating pressure).
Upstream of the installation it is important to provide a gas filter.
The gas line must be adapted to the maximum flow required for the proper functioning of all appliances.
A precise study will have to be made of the diameters of the pipes according to the nature, the flow rate and the length of the pipes. It is necessary to ensure that the pressure losses of the pipes do not exceed 5% of the supply pressure.
Gas connections must be made in accordance with the requirements for indoor installations, regardless of the type of gas, by qualified personnel holding the necessary approvals.
Once the gas connection is completed and before the first commissioning, it is imperative that:

- Purge the network and check for leaks on the network.
- Check the mains distribution pressure as well as the generator supply pressure.

PROPANE GAS

MARK	CODE	DESCRIPTION
01	CDEMF1521	ELBOW 90° MF
02	EC1521NIC	1/2" NUT
03	DOUILGROM	GROMELLE SOCKET
04	RACDBLE20150x1/2	CONNECTION F/M 20X150 - 1/2
05	RACFF20X150X1521	CONNECTION F/F 20X150 / 1/2"
06	FILTPFIL20X150	PROPANE FILTER THREAD 20 X 150
07	DTD37	REGULATOR 37 MBARS FIXED 8 KG/H



NATURAL GAS

A faire

VII ELECTRICAL CONNECTION

The delivered device is completely wired according to the electrical diagrams on the following pages.
The device must be connected to a control cabinet with a dry contact outlet, or to a temperature thermostat as shown on the following pages.
The electrical connection must be made according to the applicable standards (NFC 15-100) (section of conductors, ground connection, disconnector, protection etc.) and according to the electrical diagrams given in the following pages.

VII-1 Supply voltage

The supply voltage is 230 volt single phase.
For the dilution turbine, check that the direction of rotation corresponds to the direction indicated by the arrow on the fan support.
A light indicates the possible safety of the device.

VII-2 Return of safety signage

The information can be reported remotely for sound information or alarm via a dry contact (see connections on the electrical diagram).

THE GROUND CONNECTION IS THROUGH THE MALE 230V PLUG OF THE TUBO THAT MUST BE PLUGGED INTO A PLUG WITH A GROUND TERMINAL.

Electrical diagram :

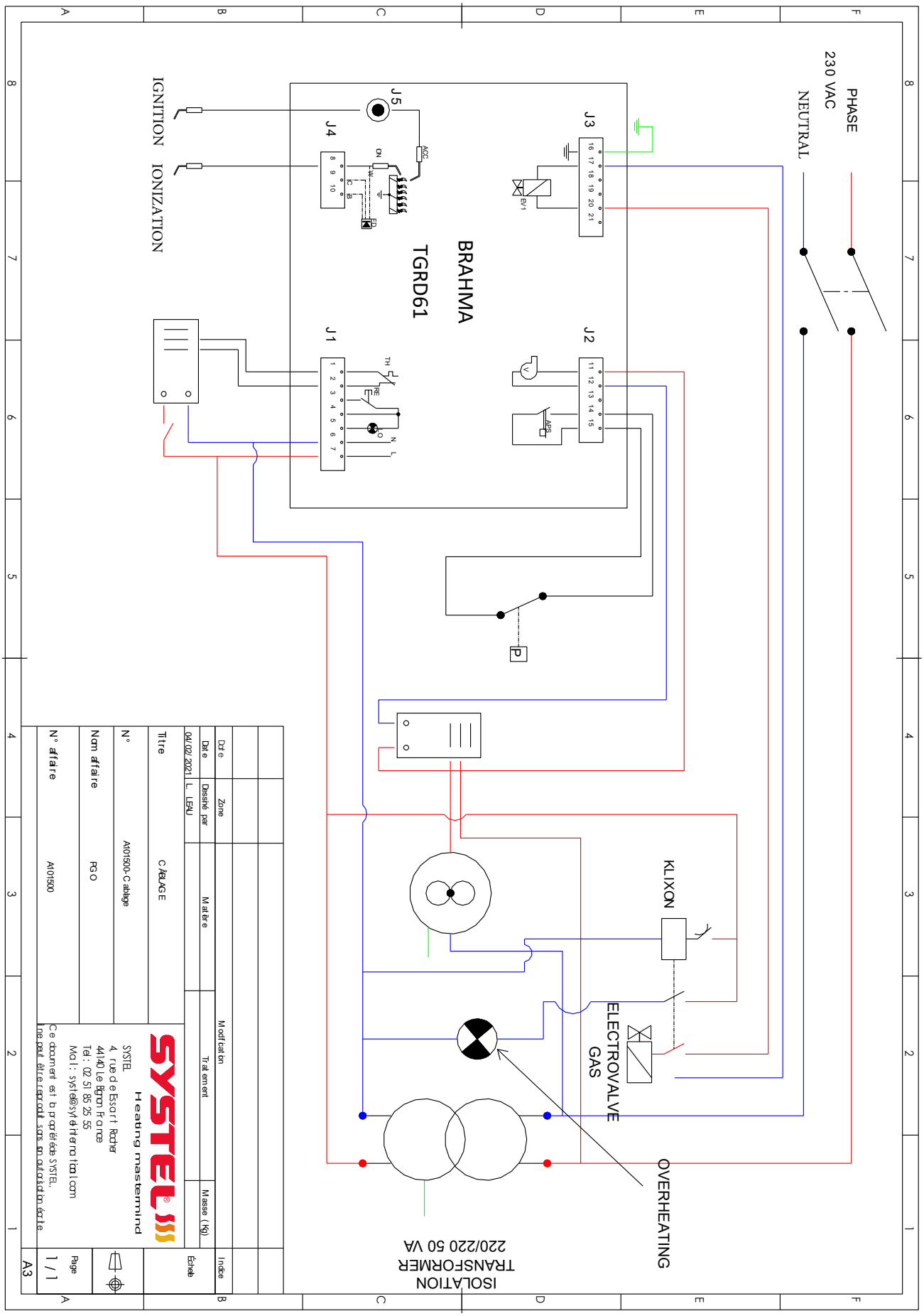
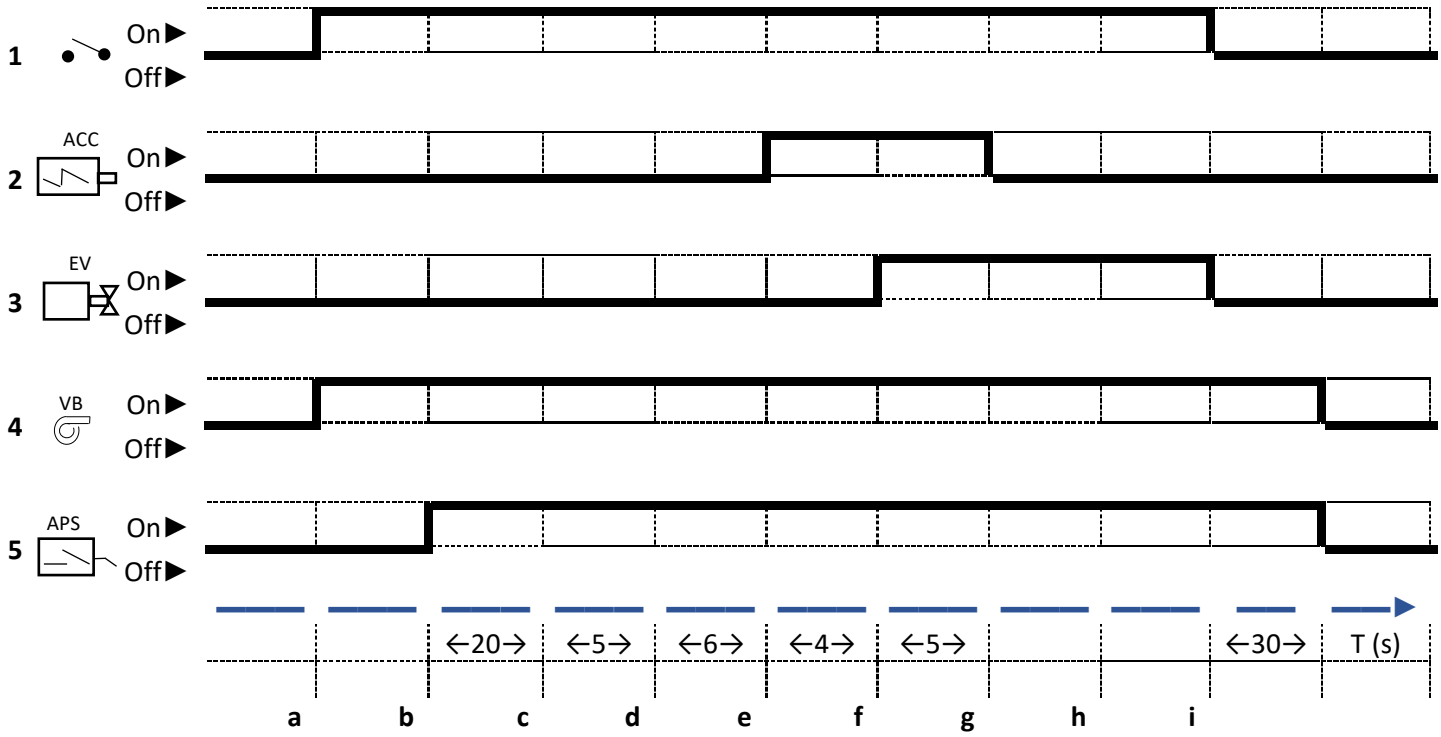


Diagram :



Standard reset button :

- Manual Reset (non-volatile)
- Operating conditions
- Diagnoses

Stable green	Working with a good flame signal
Stable orange	Ignition state
Stable red	Lock state
Flashing green	Operation with bad flame signal
Flashing orange	Ignition state with good flame signal
Flashing red	Diagnosis in a locked state or stray flame
Alternating green/orange	Ignition state with bad flame signal
Alternating red/ orange	Low/High Voltage

If the overheating light is lit (see page 15), the clikson must be reset manually to the right of the ionization electrode.

Error code table	
Flashing alarm code (red led)	**Probable cause**
2 flashing • •	Safety end-cycle flame fault (TS) - Defective or dirty gas valve - Defective or dirty flame detector - Wrong burner setting or no gas - Defective ignition equipment
3 flashing • • •	The air pressure switch does not close or the revolutions per minute are less than the minimum setpoint. Preheat Thermostat Shutdown Failure The safety thermostat does not close.
4 flashing • • • •	Simulation of light/flame at start-up
5 flashing • • • • •	Air pressure switch does not open or rpm is greater than minimum setpoint
6 flashing • • • • • •	Failure of the air pressure switch to be opened or revolutions per minute, in the on position, are less than the minimum value Failure of the safety thermostat in the on position
7 flashing • • • • • • •	Flame fault in on position
8 to 14 flashing	Generic Internal Failure

VIII COMMISSIONING-OPERATION

The genratorTUBO has been fully checked and factory tested prior to delivery. Prior to commissioning, it is imperative to verify that the installation has been completed in accordance with the instructions.

•1Ignition.

- Make sure that nothing prevents the hot air from escaping, and that the opening part of the appliance is closed.
- Open the gas valve.
- Close the circuit (on/off button).
- Put the vessel's steering control on heat.
- Press the reset button if necessary.
- The generator should turn on in less than 2 minutes.
- For an initial start-up, it is sometimes necessary to carry out three successive start-ups in order to purge the pipes.

VIII-2 Operation.

The building regulation sends the generator a heating request in the form of a dry contact, the dilution turbine starts.

When the pressure difference is stabilized a pre-purge of plus or minus 20 seconds to degas the combustion chamber is performed.

The ignition is carried out directly on the burner by an ignition electrode, sparks occur and the gas valves open.

If after 5 seconds the burner has not lit or if the flame is not correct, the appliance will be safe. The fault light on the generator lights up. This defect can be cleared after a waiting time of a few seconds by pressing the reset button.

Once the burner is turned on the ionization probe controls the flame of the burner.

If the oxidizing air is insufficient, the burner shuts down and a new cycle takes effect. If the operating conditions are correct again, the unit restarts, otherwise it will be safe. It is then necessary to perform a reset for the restart after the operating conditions necessary for the aircraft have been restored.

Same for a turbine problem, or for a burner shutdown for some reason.

In case of overheating, a manually reset overheating thermostat shuts off the solenoid valve and the light illuminates. This thermostat limits a too high wall temperature. It is to be reset via the reset button on the clickson and then reset via the push button on the control box.

When the setpoint temperature is reached, the building regulation sends a shutdown request to the generator. The burner of this one turns off, however the dilution fan continues to operate for about 40 seconds. The goal is to cool the hot room.
To shut down the generator for a short time, simply set the building regulation to the minimum setpoint.
For an extended shutdown, also set the building regulation to the minimum setpoint, wait for the fan to stop, close the gas valve and turn off the power.

IX PERMANENT CHECKS

- For your safety, check that the hot air outlet duct is not obstructed.
- For your safety, check the quality and strength of the suspension elements.
- Check that the burner oxidizing air intakes remain clean and functional.
- Check the burner condition.
- Check the status of the injector.
- Check the condition of the hot chamber.
- Check the fan grille for cleanliness

X PERIODIC MAINTENANCE

- Before starting maintenance, turn off the gas inlet and after the turbine has stopped, turn off the power.
- Maintenance must be performed cold.
- Maintenance at least once per breeding period (flock) is mandatory. However, the frequency of maintenance operations depends on the environment in which the aircraft is operating.
- A permanent inspection must be carried out (see above), in case of doubt or problem, please contact your authorized professional.

Breeder

Before heating the building

- Check the tightness of the gas installation.
- Check device connection systems and replace them based on their expiry date or condition.
- Check for proper operation of quick couplings (external and internal cleanliness, locking operation, leak control (disconnected and coupled connection), condition of seals, lubrication of parts). In a corrosive environment, annual verification is essential.
- Clean the regulator (vent hole) and generator gas filter (if present).
- Check the appliance's power outlet.

During the heating period

- Dust devices regularly during use.
- Check and clean exterior air intakes required for combustion.

After use of heating

- Clean the generators at each heating cycle, and pay special attention to the safety devices (flame control, overheating thermostat, ignition electrode, ionization electrode, etc.).

A periodic check of the generators must be carried out by a professional (at least every 3 years).
In addition to the regulatory aspect, a gas heating system must be regularly checked and maintained by a qualified professional, for example a company adhering to the Charter Gas Quality in Livestock.
This visit allows you to:

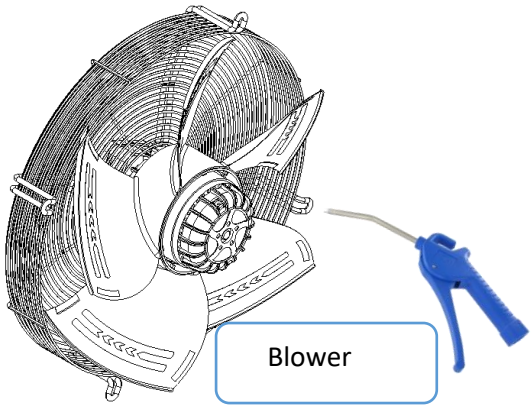
- Perform a regular inspection of the installation and check the operation of the safety devices,
- Check the tightness of the gas distribution circuits, the condition of the regulators (recommended to change them at least every 10 years) and the condition of the heaters,
- Change heating connection systems, depending on their condition or expiry date,
- Check the correct operation of the quick couplings: visual aspects, external and internal cleanliness, operation of the lock, leak control (disconnected and coupled connection), condition of the seals, lubrication of the parts… In a corrosive environment, an annual verification is essential,
- Replace quick couplings periodically (it is recommended to change them at least every 10 years),
- Provide advice and improvements that are appropriate to the configuration of the facility and the evolution of the farm.

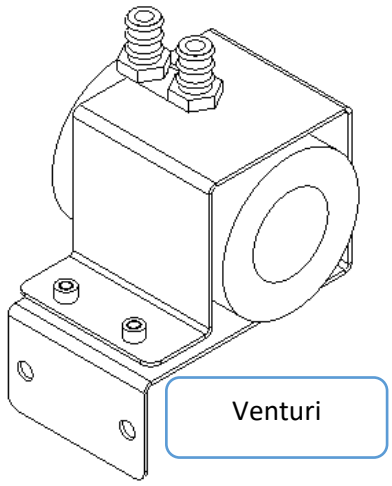
X-1 CLEANING THE DEVICE.

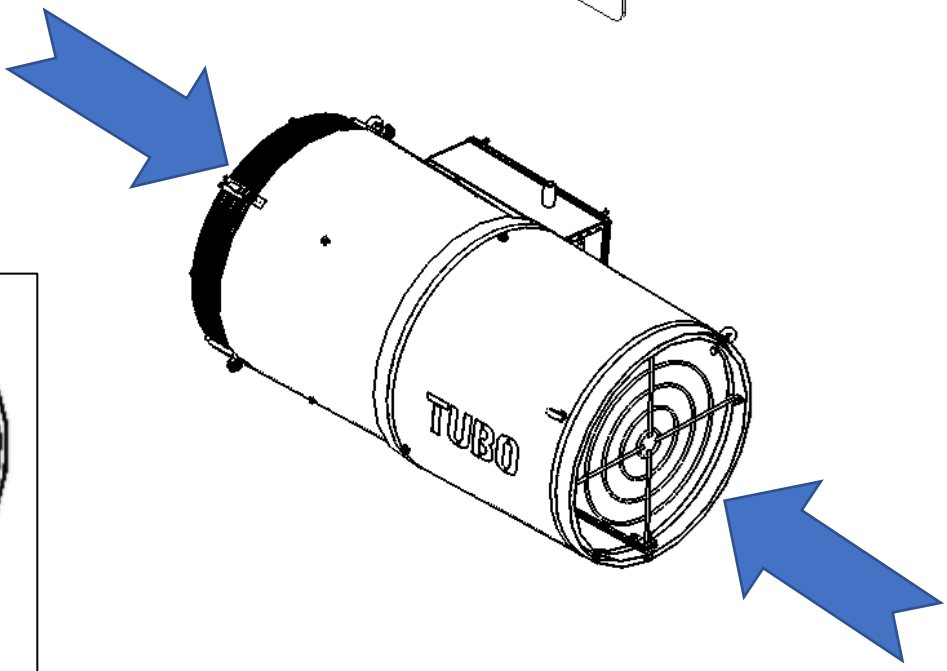
1. Electrically disconnect the TUBO and position the shutter.
2. Disconnect the fan by disconnecting its outlet on the power box and position the shutter.
3. Disassemble the fan using the wrench provided with the unit.
4. Clean each side of the fan with compressed air.
5. Clean the hot chamber, venturi and double skin with clean water.

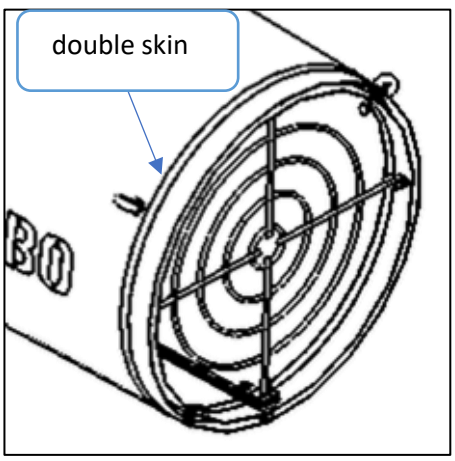
Do not put water on the electrical box.

6. Reassemble the fan by positioning it on its bolts and tighten the nuts using the provided wrench.
7. Make sure the fan is secure and the blades do not rub on any parts.
8. Reconnect the fan outlet to the TUBO power box.









XI OPERATING ANOMALIES

XI-1 The burner assembly does not light up during a start-up.

What are the potential causes?

- The device is not powered on: set the on/off button to position 1.
- Building regulation sends a heating instruction too low.
- The circuit board fuse is out.
- The device is safe, the fault light is on (mark 14 page 23).
- During a start-up the burner does not turn on and the turbine runs continuously without safety of the device. Check the pressure switch and its pipes.
- Control box is disconnected or DOWN.
- Solenoid valves are disconnected or off.

XI-2 Security

FAULT LIGHT IS ILLUMINATED CONTINUOUSLY

What are the potential causes?

- There is air in the gas piping.
- Facility Gas Filter is blocked.
- Gas valve is not open.
- There is a defect in the Ion Probe (mark 27 page22), check its status and connections.
- There is an ignition defect, check the ignition electrode.
- Turbine is disconnected or damaged.
- There is a temperature over temperature thermostat fault standard temperature plus or minus 90°C.
- See page 22 for more information.

XI-3 The pressure switch cuts the burner

- Check turbine operation.
- Check the condition of the turbine inlet grille.
- Check pressure switch, wiring, hoses.

XI-4 The device does not give its power

What are the potential causes?

- Check gas pressures.
- Clogged facility gas filter.
- Plugged injector(s) (page 20).
- The turbine is not working.
- No voltage on turbine terminals.
- Motor or capacitor defect.

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