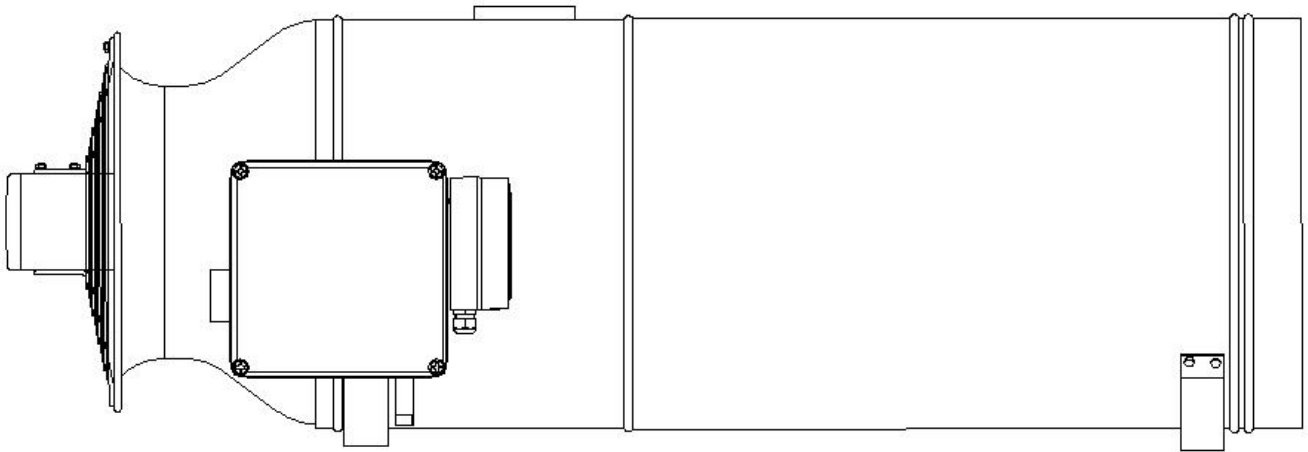




USER MANUAL AND INSTALLATION INSTRUCTIONS



RGA 100

**NATURAL GAS
PROPANE**



Congratulations on your purchase!

We're sure you'll be very happy with your new ERMAF

RGA100



EC Declaration of Conformity

We declare that the design and model of the machine described above being placed on the market by ourselves complies with the relevant health and safety requirements of the EC Directive.

Note

In order to ensure that your new equipment will always work properly and efficiently and to ensure your personal safety, we would ask you the following:

Please read through this User Manual thoroughly and take particular note of the warning and safety instructions before starting up the machine for the first time




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1. General Information

1.1. Symbols

You will see the following symbols when you read through the User Manual:

	Warning of a general danger
	Warning of dangerous voltage
	Wear protective gloves

1.2. Special safety instructions

	CAUTION	This indicates risks or unsafe processes, which can easily cause slight injury or damage to property.
	NOTE	This provides information on how to handle the equipment effectively, economically and in an environmentally sound manner.

1.3. General safety regulations


This appliance is for use in animal sheds and greenhouses. Use of the equipment for any other purpose shall be regarded as improper use. The manufacturer will not be liable for any damage resulting from improper use; the user shall bear the sole risk thereof.

Proper use of the equipment also entails observing the manufacturer's conditions of operation, maintenance and installation.

Currently applicable accident prevention regulations and all other generally recognized rules of occupational medicine and safety must be observed.

Check all safety and operational equipment

- before starting up
- at reasonable intervals
- after any modifications or maintenance work to ensure that it is safe and fully operational.

	<p>With storing manure, gases are formed which are partly dissolved. These poisonous and explosive gases (e.g. sulphurhydrogen and methane) can be released during stirring and rinsing. With a source of ignition a big explosion may occur. To prevent a hazardous situation shut off the appliances completely before stirring or rinsing.</p> <p>Also observe the following points:</p> <ul style="list-style-type: none"> • Close the doors when manure is stored outside. • Ventilate the room thoroughly.
---	--

Notice:

No account is taken with general hazard of fire in this manual. Consult your fire insurance company and/or your local fire brigade for more information.

1.4. Electrical equipment

Only a specialist must perform any work extending beyond the scope of equipment maintenance.

Always disconnect the appliance from the mains before performing any work on it.

Before starting up the appliance, examine all electrical wiring for any visible defects.


Change any damaged wiring before switching on the appliance.

Have any plug devices that are damaged or destroyed replaced by a qualified electrician.

Do not pull the plug out of the socket by the flex.


Covering electric motors can cause high temperatures to build up, which can destroy the electrical equipment and cause fires.

1.5. Maintenance

	Always disconnect the appliance from the mains before working on the electrical equipment!
---	--

Only persons who have the training, knowledge or practical experience to ensure that the repair is done properly should carry out repairs.

Maintenance, repair and cleaning work should only be carried out with the drive switched off and the motor idle. The same applies to the rectification of functional defects.

	Wear protective gloves if there is a danger of injuring your hands!
--	---

The user must satisfy himself that the appliance or machine has been returned to its proper state after carrying out repair work. Technical equipment must not be re-started until all safety devices are in place.

Spare parts must as a very minimum correspond to the technical requirements specified by the manufacturer of the equipment. This will be the case if, for example, original spares are used.

1.6. Ordering spare parts

When ordering spare parts, always indicate the following:

- Code no. and description of part or item number with description and manual number for uncoded parts;
- Number of original invoice;
- Electricity supply, e.g. 230/400 V, 3 ph, 50 Hz.

1.7. Liability

Any unlawful alterations to the machine or the software will rule out manufacturer liability for any resultant damage.

1.8. Interruptions

We recommend installing warning systems to monitor your operating equipment. This will protect your animals and consequently your economic existence.

In case of a power failure, the emergency power unit should automatically switch on.

Power units with cardan transmission for attachment to tractors are also suitable for use as emergency power units. Please consult your property insurance company for more information.

1.9. First Aid

Unless explicitly specified otherwise, there should always be a first aid box at the workplace in case of accidents. Any material removed from the first aid box must be replaced immediately.

If you ask for help, always provide the following information:

- where the accident happened;
- what happened;
- how many persons injured;
- what the risk of injury is;
- who is reporting the accident!

1.10. Discharge

After the installation or repairs of the installation, the packaging and non-usable waste should be delivered to the appropriate places.

The contents of this manual are liable to change without notice.

If you discover any errors or inaccurate information, we would be grateful if you could inform us of these. All trademarks named or depicted in the text are trademarks of their respective holders and are recognized as protected.

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2. Technical Data

Output	:±60-95 kW
Gas connection	:3/4"
Burner pressure	: see annex A
Maximum line pressure	:	100 mbar
Gas consumption	:	Natural gas L:.....± 9,5 m³/h Natural gas H:± 8 m³/h Propane: ± 6,9 kg/h
Power supply	: 230 V/50 Hz/900 W
Current	:	I _A / I _N ± 22 A / 5,3 A
Air circulation	:	Heating..... ± 5.000 m³/h Ventilating ± 7.000 m³/h
Throw	: ± 40 m
Materials	:	Mantle Stainless steel 430 Burner chamber Stainless steel 430 BCU PPE (Ambient temperature BCU: -10 to +60°C)

The materials used are capable of withstanding the maximum loads.

Length	: 196 cm
Width	:	(Diameter Mantel / Total)..... 61 / 87 cm
Height	: 73 cm
Weight	: ±110 kg

System:

The combination of ventilator for air, gas regulator for gas and a short ignition ensures a good combustion.

Safety devices are built in to prevent dangerous situations and to prevent damage to the appliance:

1. Two pressure switches check for sufficient airflow
2. Gas- air-mixture stabilized by regulator
3. The burner is being checked by means of ionization
4. Two class-A gas valves for a certain shut down of gas flow
5. Overheat sensors for appliance and ventilator

The burner control unit (BCU) checks and controls all connected components. Functioning and errors are signalized.

3. Installation

3.1 Placement

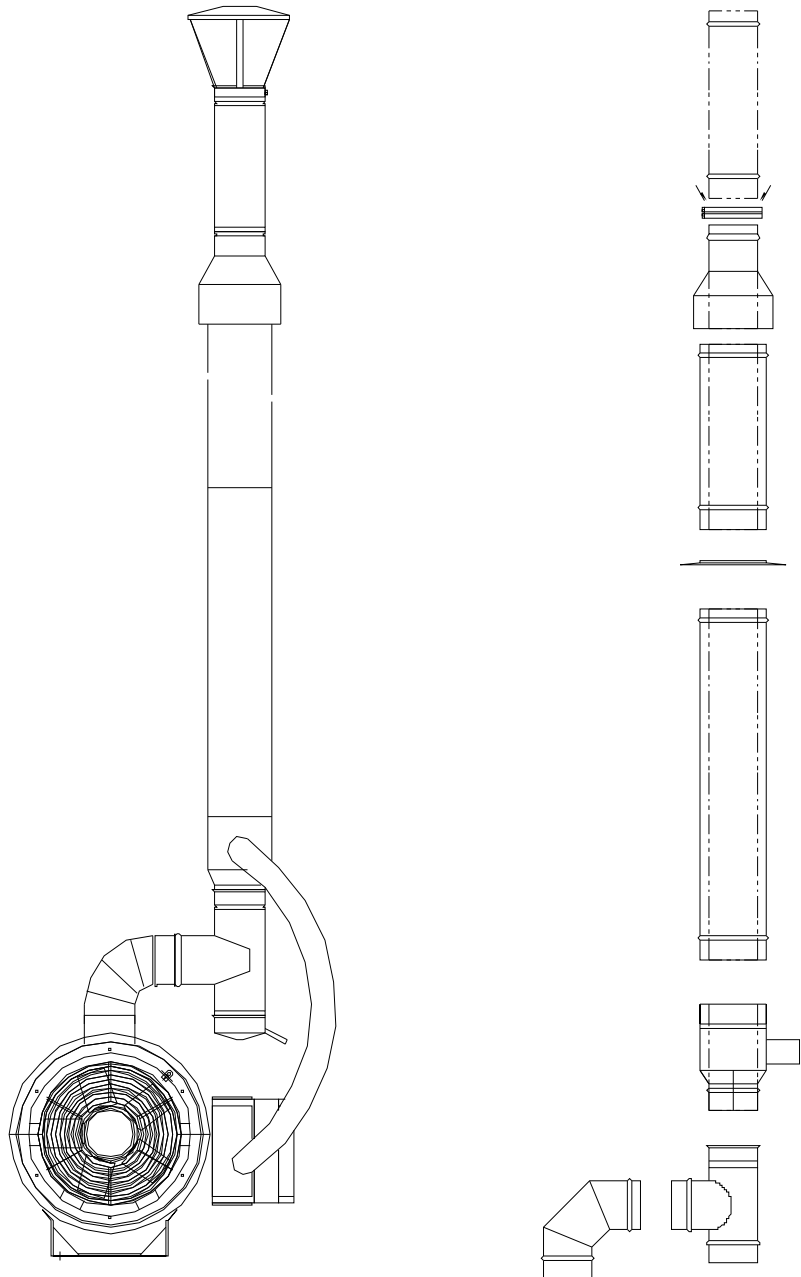
The number of appliances required depends on the size and nature of the room, the required temperature and the relevant climate zone.

The appliance must not be connected to or inside closed duct/pipe systems.




Suspension/placement

Place the appliance so that:

- the inlet of the appliance is at least 1 meter away from the wall
- it's not pointed to flammable materials and at least 3 meters away from a wall.
- the delivered heat cannot cause any damage (also concerning e.g. dehydration)
- neither at the inlet- nor the outlet obstacles can influence the free airflow.
- it hangs horizontally

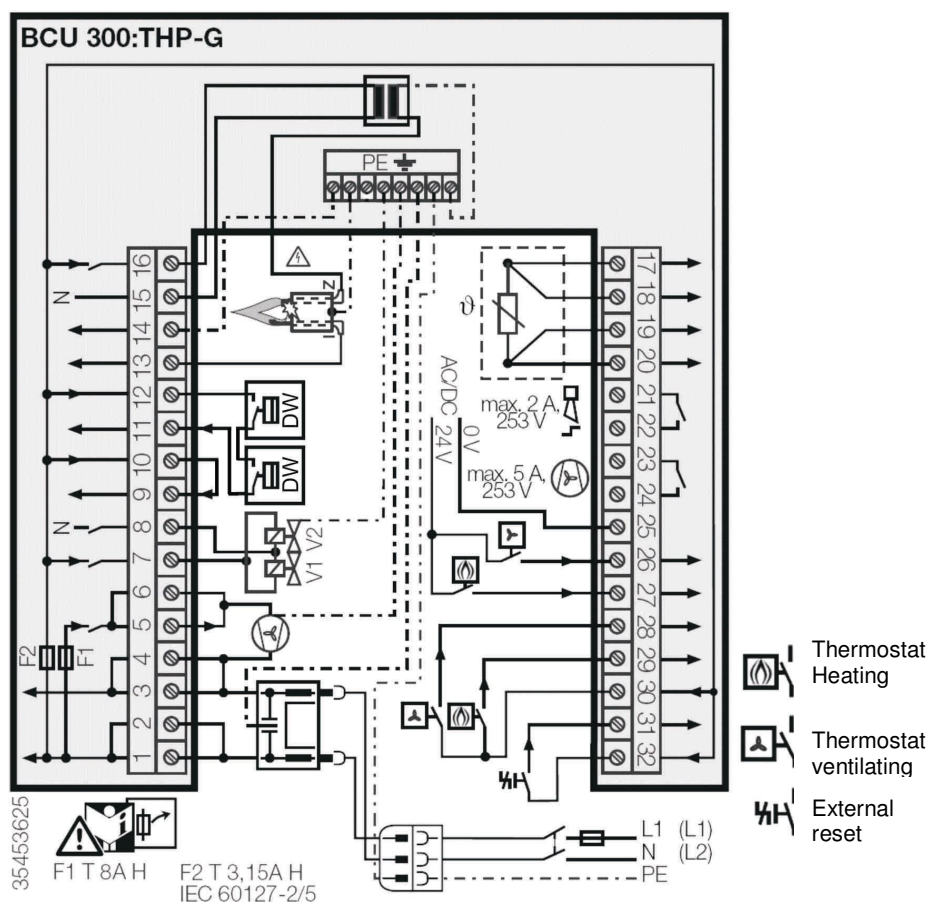


3.2 Connecting


	<p>Work on the heater;</p> <ul style="list-style-type: none"> • Installing • Commissioning • Adjusting • Converting for other gases <p>and connecting to the local electro- and gas supply should only be done by a qualified installer with approved connection materials.</p> <p>Local regulations must be observed for connecting to the electricity and gas supplies</p>
	<p>Before installation, check that the local distribution conditions, nature of gas and pressure, and the current state of adjustment of the appliance are compatible (see data plate)</p> <p>Also mind the ambient temperature; thaw in the BCU is not allowed</p>
	<p>The heater needs a constant power supply for cooling down, do not use the power supply as a thermostat.</p>

3.3 Electricity

Unscrew the lid from the BCU and pull it off with both hands. Inside, you will find the wiring diagram:



For connection of the mains 230VAC, use the contacts 1(2) and 3(4) (Not phase sensitive)

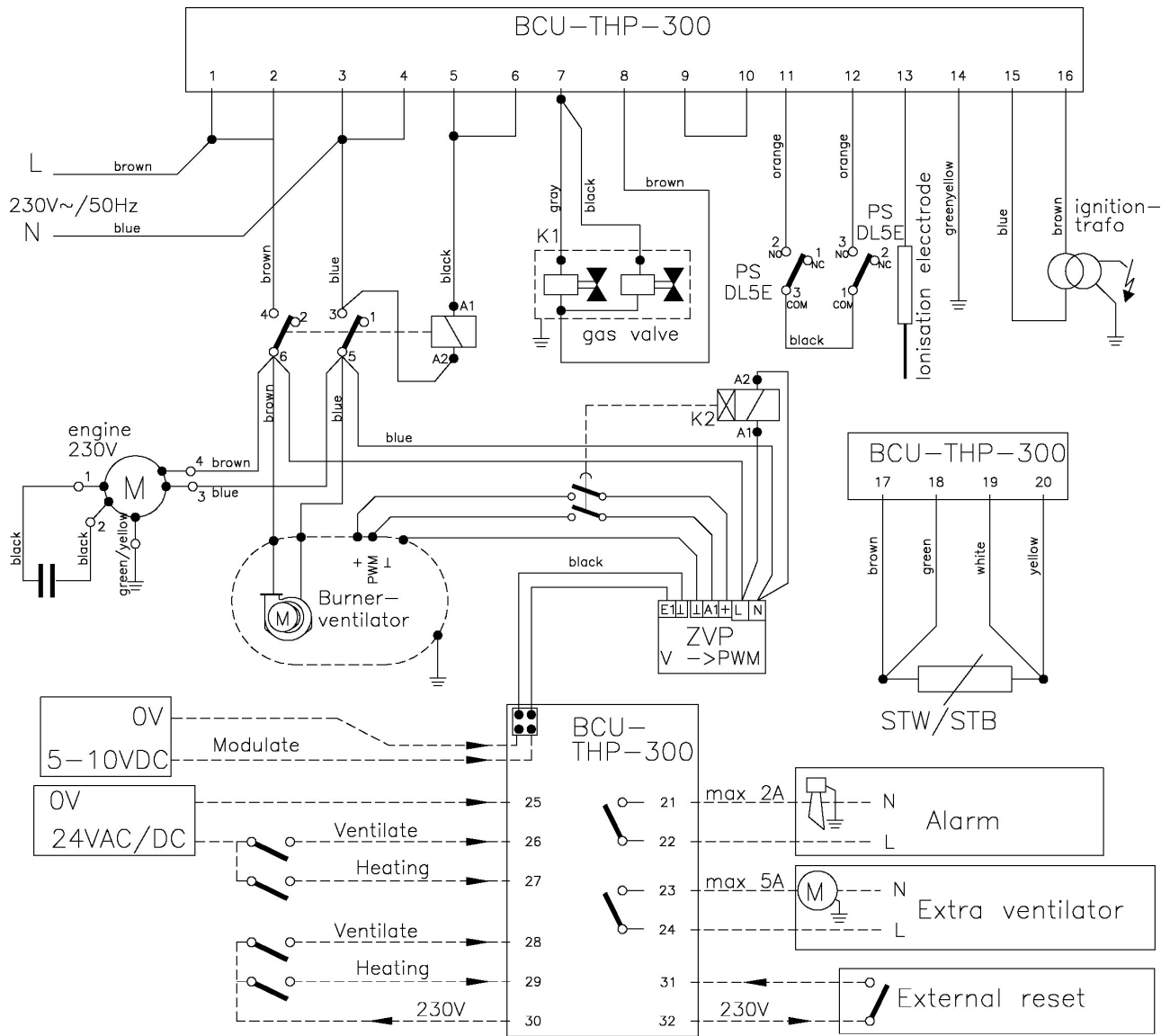
	<p>Do NOT connect the heaters to 400VAC</p>
---	--

The connection of the thermostat, external signals etc. are described below:
(Wiring max. 2,5 mm².)

Contact for heating signal 230VAC (thermostat):	
Contact for ventilation signal 230VAC (ventilating):	
Contact for heating signal (thermostat) using the potential free contacts (24 V AC/DC):	
Contact for ventilation signal (ventilating) using the potential free contacts (24 V AC/DC):	
Optional connection contact for external reset button (make contact):	
Optional connection contact for external alarm (lamp/claxon, max 2 A !):	
Optional connection contact for external ventilator. Switch on and off together with the heater (max 5 A !):	

Put the BCU lid **straight** back to its socket and tighten it with the screws.

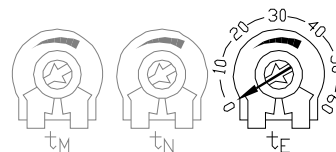
	Do NOT connect other heaters on contacts 28 till 32 (Phase sensitive)
--	--



Starting delay

When multiple appliances start at the same time, some appliances may not get enough tension (230V) or gas(pressure)

The BCU (lid) has a potentiometer (tE) with which per appliance a start delay of 0-60 seconds can be set. Per appliance a delay of 5-10 seconds should suffice.

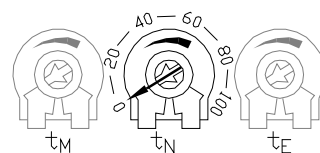


The following settings are set by the producer and should NOT be altered.

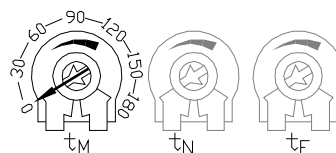
Changes might lead to damage!

Cooling down period:

A standard of 10 seconds cooling down period is set but a longer period can be set. The middle potentiometer can add 0 to 100 seconds

**Minimal burning time**

Every time a appliance starts, there is a short incomplete combustion
A minimal burning time can be set with the left potentiometer, with which also life expectancy of relays, engine and other parts can be extended. (Only necessary when room thermostat is set too sensitive)
Range: 0-180 Seconds



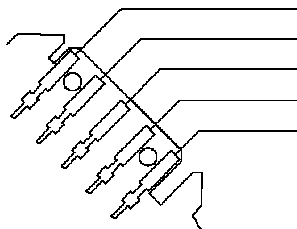
Put the BCU lid **straight** back to its socket and tighten it with the screws.

Modulating

For modulating the heater between 60-100kW, use the separate 2-pole terminal block in the BCU socket. It leads to the ZVP (Volt->PWM converter). Regulate the voltage between 5 - 10VDC.

Also connect the transparent AMP connector (MT Edge) on the circuit board of the burner ventilator.

Standard, the plug is loose, without 5-10V power supply the ventilator will not turn or turn slowly.



1. Power supply - (GND)
2. PWM input
3. GND
4. Hall sensor out
5. Power supply + (20-40V DC)

3.4 Gas

Connection: 3/4" at the gas combination.

Use for suspension with chains an approved flexible gas hose.






Always use approved tightening material.

3.5 Operating

Disconnect from 230V mains and open the (manual) gas valve.


Press the white button (ON/OFF) of the BCU until one of the other LED's light up, the appliance is switched "on" in the last chosen setting.

By continuously pushing the red button different settings can be chosen (the chosen setting will start after 3 seconds)

OFF	Appliance will not react to any signal
AUTO 	Appliance waits for a signal from the thermostat for heating or ventilating
	Appliance will start burning (manual setting)
	The ventilator will start running (and only this)
 + AUTO 	Appliance will ventilate continuously and waits for a signal from the thermostat for heating.

In every setting where the appliance should burn the following will happen:

1. Appliance waits until "starting delay" is over (0-60 sec)
2. Checking of "off" position air switches (the ventilator will switch off, in case it was on)
3. Ventilator will turn and will switch the air switch to "on" position
4. 5 seconds later the ignition transformer starts sparking and the gas valves will open.
5. When a flame is detected (via an ionization current) the ignition transformer will stop, the appliance is burning safely.
(The ignition transformer stops igniting one second before the end of the safety time whether or not a flame has been detected)
6. When the appliance is switched off, the ventilator will continue for at least 10 seconds.
7. The STW/STB (max. safety temperature) might switch the ventilator on again for cooling down purposes.

	Always allow the heater to cool down at least 100 seconds.
---	--

3.6 Adjustment

Although the heaters are adjusted by the producer for a correct air/gas mixture, they must always be checked again and re-adjusted at first use. The chimney-, fresh air system but also variation in gas mixtures can result in incorrect working of the heater and overload.

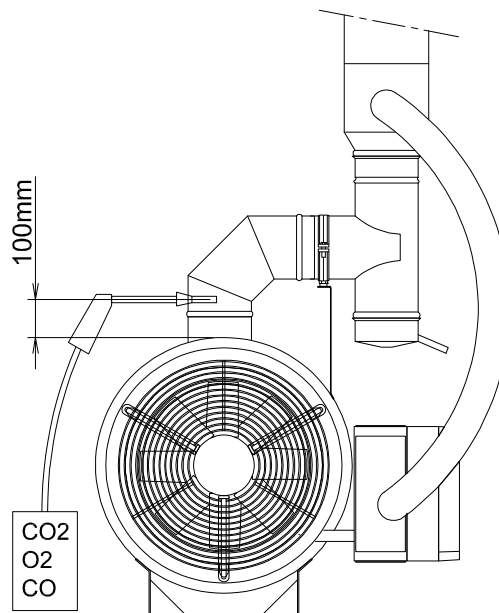
When the gas mixture and pressure was mentioned by ordering, the heaters are already adjusted and will probably start immediately or may be after a few times when there is air in the gas system

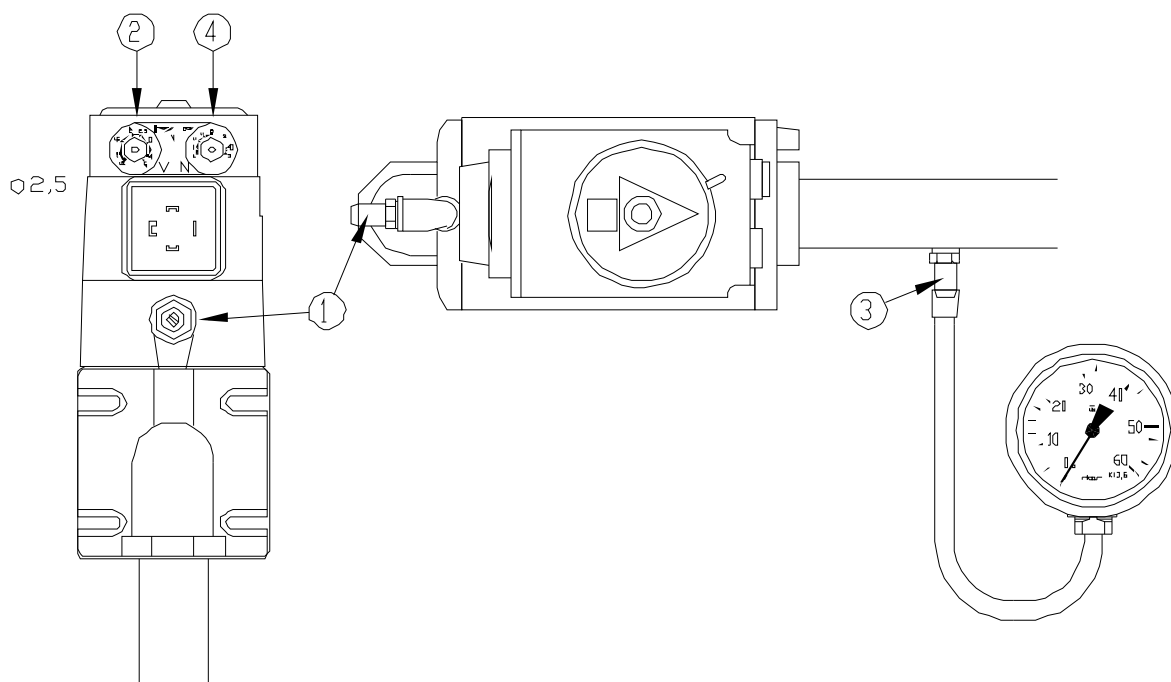
When flue gases are measured, the Lambda (excess air) should be between 1,25 and 1,35 for a good nett return (>91%),

This means O₂ values between 4 and 5,5% (Lower is possible when good, clean air supply can be guaranteed and when not too much CO is produced)

Preparing for Adjustment the RGA100 gasheater (using the figures)

- Check the chimney whether the chimney is assembled according to the technical guide.
- Connect the fresh air hose between the plastic control cabinet and the chimney connection.
- Drill a hole in the chimney according to the drawing to place the measurement tool or analyser into the chimney tube.
- Open the pressure nipple (3) (loosen the crew inside) and connect the pressure meter. (Do not forget to fix it again after adjustment)





1. Measure point gas inlet pressure
2. Adjustment burner pressure (via air factor)
3. Measure point burner pressure
4. Correction setting high/low

Adjustment:

1. Start the heater and check if the heater starts after some attempts. If so, go to 11, if not, the heater is deranged and:
2. The heater should be adjusted completely
3. **For natural gas:**
4. Adjust the gas pressure (2) till the white indicator on the **indicates 1** with the help of a **2.5 mm socket wrench**
5. Adjust the air valve (nr.12 in drawing chapter Annex C) so that the wing screw is in position **45°**. *How to adjust the screw: loosen with the help of a tool of 13 mm the locking nut while blocking the wing screw by hand. Put the wing screw in the right position of 45° while fastening the locking nut.*
6. **For Propane:**
7. Adjust the gas pressure (2) till the white indicator *indicates 2*
8. Adjust the air valve (nr.12 in drawing chapter Annex C manual) so that the wing screw is in position **25°-30°**. *How to adjust the screw: loosen with the help of the tool of 13 mm the locking nut while blocking the wing screw by hand. Put the wing screw in the right position of 25°-30° while fastening the nut.*
9. Start the heater and check if it starts to burn. If not close the air valve a little bit and try it again. Do this exercise again till the heater keeps burning.
10. When the heater burns check the level of CO by means of the analyser . If CO level increases too much too fast (>2000 ppm) stop the measurement, disconnect the analyser from the chimney and refresh the analyser. Then open the air valve a little bit more and do the measurement again. When the CO does not increase too much leave it in the chimney.
11. The heater burns now for some minutes , check the burner pressure according to the figures in chapter 8 of the manual and the type plate on the heater. *Adjust the burner pressure with the help of the socket wrench of 2,5 mm.*

12. Read the lambda on the analyser and check if the value is between 1,20 and 1,35. To change the excess air lambda, move again the air valve very carefully till the value will be between 1,20-1,35. *How to adjust the screw: loosen with the help of the tool of 13 mm the locking nut while blocking the wing screw by hand. Put the wing screw in the right position while fastening the nut. By changing this air valve, gas pressure will change too in the way that more air means decrease of gas pressure and less air means increase of gas pressure. Repeat this adjustment process till the air and gas pressure have the right values.*



Look at the gas pressure while adjusting the air valve. A small adjustment results directly in a change of pressure. Do the adjustment in small steps of 0,5 mbar. *Please remember: more air is decrease of gas pressure, less air means increase of gas pressure.*

13. Measure the combustion gasses in the chimney. CO should be under 100 ppm (at 0% O₂). If CO is higher:
- check the configuration of the chimney,
 - check the fuel
 - supply some more fresh air
 - check the burner
14. The ionisation current is indicated by means of LED lights when pushing the red button and directly the white button together on the Burner control cabinet.



Before installation, check that the local distribution conditions, nature of gas and pressure, and the current state of adjustment of the appliance are compatible (see data plate)

15. Disconnect the pressure meter (close the nipple with the screw)
16. Do the measurement after 30minutes to be sure adjustment has been done right.

There are 11 steps:

OFF	○	1																	○	●
AUTO	⦿	2										○	●	●	●	●	●	●	●	●
	⦿	3						○	●	●	●	●	●	●	●	●	●	●	●	●
	⦿	4				○	●	●	●	●	●	●	●	●	●	●	●	●	●	●
+AUTO	⦿	5		○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
			0	2	4	6	8	10	12	14	16	18	20	[μA]						

- Flashing
● Burning

4. Maintenance



Do not use water to clean the appliance!
Inadequate cleaning can result in damage by fire.

Have your appliances checked and adjusted by a recognized gas fitter at least once a year. The appliance must be thoroughly cleaned of dust at regular intervals and after every throughput. Do not use water. Clean with a compressor.

Clean the appliance with compressed air before every use.



Disconnect from main power!

Method:

- Blow through the appliance on the inside. Especially remove dust accumulating around pressure measuring points.
- If using propane, make sure the exhaust opening on the gas pressure governor is clean.

5. Malfunctions

A malfunction is shown by the big red LED on the BCU.

The internal malfunction contact (21,22) closes.

The kind of malfunction is shown by the blinking red LED's (No. 1-5).

See annex B.

To reset the appliance the red button should be pushed for at least half a second.

Annex A: Burner pressure settings

The burner pressure depends on the output, the Wobbe-index and diameter of the injector.

The *Wobbe-index* is a relation between calorific value of the gas (Hs) and the square root of the relative density of the gas (d).

$$\text{Wobbe-index} = \frac{H_s}{\sqrt{d}}$$

The burner pressures are valid for 15°C atmospheric 1,013 mbar pressure and dry Gas

The inlet gas pressure can decrease because of resistance, the needed gas pressure might not be reached. Always check the inlet pressure of each heater during operation.

1. Natural gas:

Inlet pressure: 20 - 25 mbar

RGA 100 Injector 12 x ø3,0 mm	
Wobbe index [kWh/m ³] (MJ/m ³)	Burner pressure [mbar]
11,7 (42,2)	15,1
11,9	14,4
12,15	13,9
L-gas 12,40 kWh/m ³	13,3
12,65	12,8
12,90	12,3
13,25	11,6
13,50	11,2
13,75	10,8
14,00	10,4
14,25	10,1
14,50	9,7
14,85	9,4
H-gas 15,00 kWh/m ³	9,1
15,25	8,8
15,50	8,5

2. Propane

Inlet pressure : 50 mbar
 Injector : 12 x ø 1,80 mm
 Burner pressure : 23 mbar

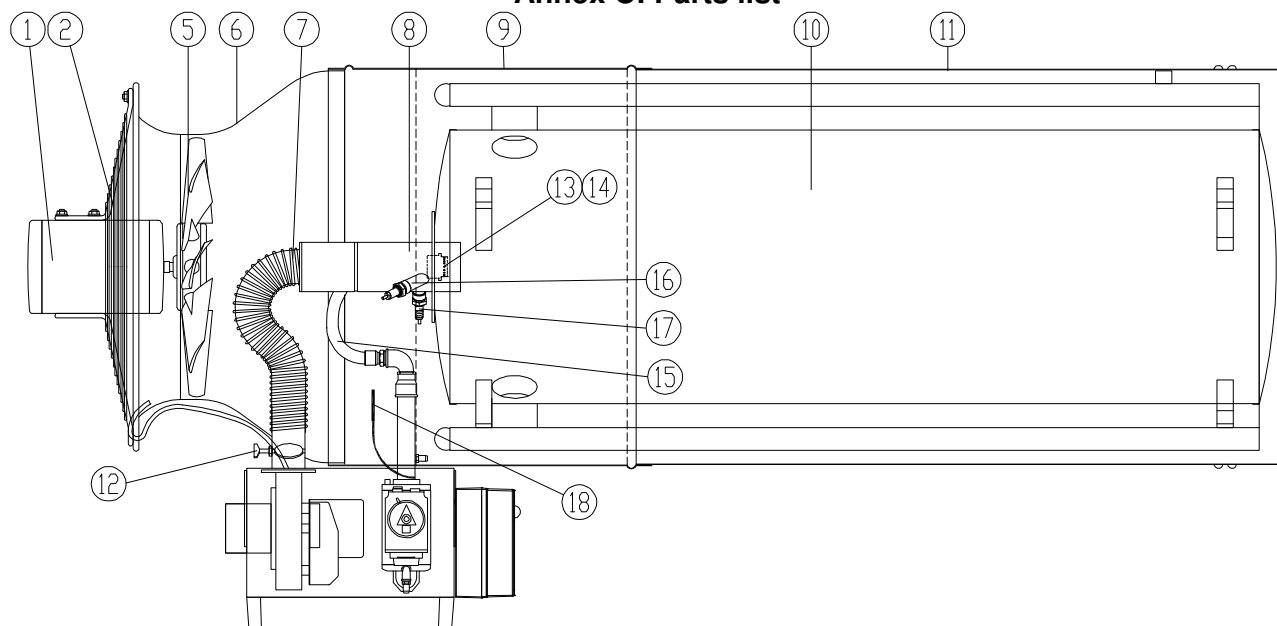
These values are for 100% propane only. For propane/butane- mixes other pressures should be set. These pressures should be requested at the producer. Using propane/butane mixes without adjusting the burner pressure can lead to a bad combustion or serious damage to the heater.

Annex B: List of possible malfunctions

LED	Malfunction	Cause (■) / Solution (►)
1 *	Contact between 9 and 10 is broken	■ Fuse F2 defect, check for separate thermostat connection
2	Both air switches are switched before ventilators turn.	► Check switches
3	One or both of the air switches doesn't switch when ventilator turns	► Check switches for functioning ■ Switch/hoses dirty ► clean ■ Fuse F1 defect (8 A, slow, H)
4	BCU did not recognize a flame during the safety time. This appliance has 3 start attempts. The error will reset automatically after the cooling down period until the 3rd time.	■ No (adequate) ignition ► Check distance electrodes; check connection ignition cable; clean ignition electrode; check ignition ■ Bad flame signal caused by wrong setting burner ► Adjust burner (pressure) properly ■ Bad ionization current caused by dirty or badly connected ionization electrode ► clean ionization electrode; check ionization cable and earth connections ■ Air is the gas supply -> Bleed gas piping ■ Short circuit at ignition- or gas valve connection BCU ► Check wiring.
Advise: When a short circuit is found at the gas valve exit, the BCU should be sent back to the manufacturer, or: 1. Replace fuse F2: 3,15 A (slow, H) and check <u>security function</u> 2. Close manual gas valve. 3. Start the appliance for a few times and check security function 4. When a malfunction is detected, send the BCU to the manufacturer. WARNING! When this security function is not checked, the gas valves may stay open and unburned gas might flow into the room – Danger of explosion!		
5	Max. temperature of overheat cut off device (STB) exceeded. (manual reset needed)	■ Ventilator does not cool down ■ Dirt ► Clean
4+5	Max. temperature of overheat guard device (STW) exceeded. (automatic reset)	► Set a longer cooling down period ■ Dirt ► Clean
3+5	In three start attempts, during the safety time, the connection 9+10 has opened (gas inlet pressure switch?) (Oscillates)	► Ensure a stabile inlet gas pressure; ► Higher inlet pressure ► Use larger gas pipes
2+5	Premature flame signal (before a flame is possible)	► Faulty flame signal.
1+5	Incorrect function of overheat cut off/guard device	► check connections ■ Temperature sensor is below –20 °C
3+4	Time between two starts is too short. (automatic reset after waiting time)	
2+4	Flame dropped during operation (Heaters with 3 start attempts will make a new start when the heater has burnt for at least 2 seconds)	■ Bad flame signal caused by wrong setting burner ► Adjust burner (pressure) properly ■ Bad flame signal caused by dirty or badly connected ionization electrode. ► Clean ionization electrode; check Ionization cable and connection to earth
1+4	Remote reset (connection 31/32) is switched longer than 10 seconds. (Permanent reset)	► Only push reset when appliance has a malfunction
1+3	Flame signal did not dissipate within 5 seconds after the gas valves closed -> Gas valves do not close properly.	► close gas supply ► check correct functioning burner / gas valves
1+2	Internal tension error	
3+4+5	During a malfunction more than 5 times in 15 minutes the remote reset (connection 31/32) is switched. (automatic reset after waiting time)	

Errors indicated with a * will reset automatically after the problem has dissolved, sometimes after a small pause. Pushing the reset-button in this case has no use.

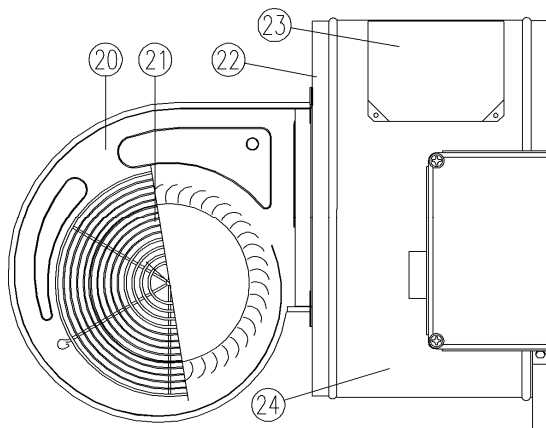
Annex C: Parts list

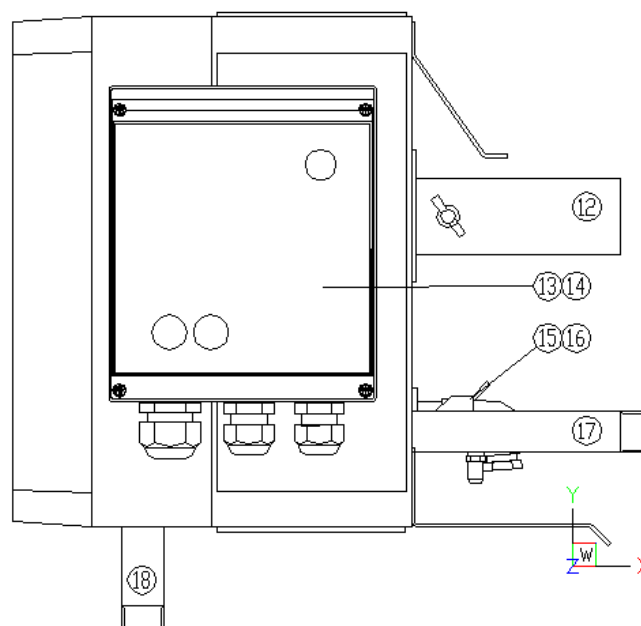
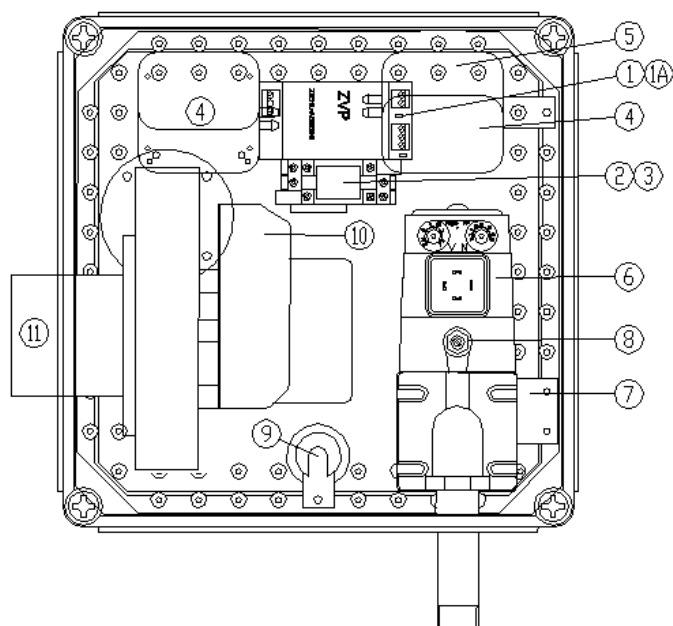


No.	Name	Code
1	Motor ElnorBX275	N50820001
2	Grille RGA100	N50820031
5	Fan 400mm white, 8-blade	N50820029
6	Air inlet duct RGA100	N50820033
7	Air hose inside	N50820048
	Clamp rings (2x)	N50820049
8	Burner RGA100 V4 without accessories	N50820018
9	Mantle short	N50820015
10	Burner chamber RGA100 complete	N50820070
11	Mantle long	N50820013
12	Air supply limiting valve	N50820025
13	Injector: Natural gas (12xø3,0mm)	N50820021
	Propane (12xø1,8mm)	N50400066
14	Baffle disc (ø 48mm)	N50260167
15	Gas hose stainless steel flexible	N50820047
16	Ionization electrode	N50820082
17	Ignition electrode	N50260030
18	TSK1054 Temperatursensor 6x45 1M T.B.V. RGA	N50820039

Centrifugal ventilator (option)

20	Nicotra DDC 321-321 (230V)	N51900051
	Nicotra DDC 321-321 (400V)	N51900053
21	Grille flat EB 35	N52700006
22	Lid rear complete RGA 95	N52100005
23	Service hatch	
24	Lengthening tube 30cm	





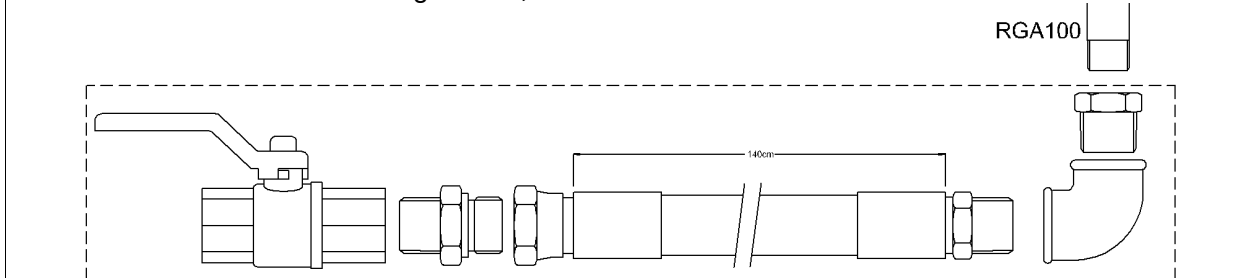
No.	Name	Code
1	Ziehl Abegg V->PWM Signal converter	N50820027
1A	<u>Setting jumper:</u>	
	Closed : 0->10V = 0->100%	
	Open : 0->10V = 100->0%	
2	(Motor-) Relay Omron LY2 / Finder 56.32	N50260024
3	Socket PTF08A-E for Relais LY2	N51600011
4	Air pressure switch Kromschröder DL-5E-1	N50280102
5	Support air pressure switch	N50820009
6	Gas combination Kromschröder CG20V	N50280116
7	Support gas combination	N50820012
8	Angle 1/8" no. 92	N50310024
9	Support capacitor motor	N50820011
	Motor capacitor 16µF, 400V	N52800034
10	MVL RG148 burner ventilator complete	N50820070
11	Flange air inlet	N50820025
12	Flange air outlet with valve	N50820026
13	BCU-300 RGA gas lid	N50260444
14	BCU Socket (Including ignition transformer)	N50260102
	Ignition transformer Eichhoff 4718/54	N50260109
	Ignition transformer Danfoss EBI-1P	N52600028
15	Plug RGA main ventilator	N50820045
16	Counter plug ventilator	N50820046
17	Gas tube 3/4" 177mm with gas pressure measuring point	N50280137
18	Gas tube 3/4" 95mm	N50280136

Annex D: Accessories

- Chimney set..... N50820003
- Room thermostat 230V N50260146

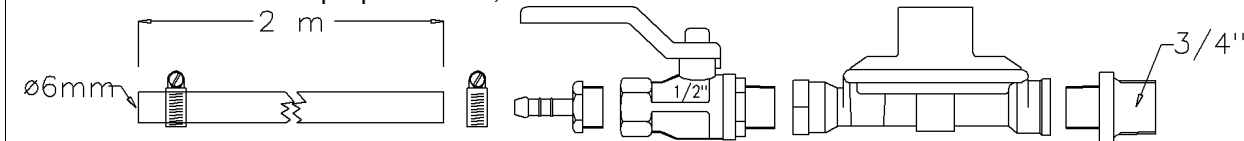
Natural gas

- Connection set natural gas 1" 1,5 meter N52600070

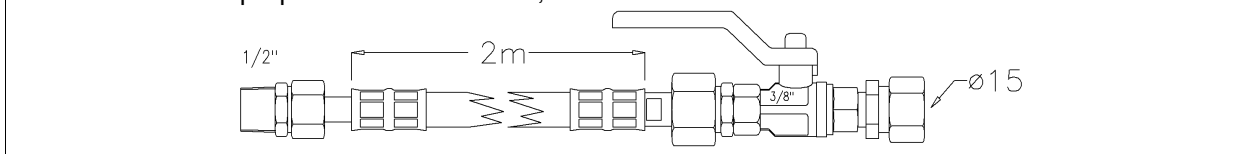


Propane

- Connection set propane 1/2" 1,5 meter..... N52800136



- Certified propane hose with valve, 2 meter N52990209



- Propane regulator RECA 1,5 bar -> 50mbar..... N52600023
- Certified propane regulator: GOK (12kg) 0,5-2,5 bar -> 50 mbar N52600039
- Mind the output of the heater!
- Gas valve 1/2" in/out..... N52600027
- Gas valve 1/2" in/in..... N52600019



elster
Ermaf

Annex E: Return of goods form

User name :
Address :
Telephone number :
E-mail address :
Returned by ; Mr./ Mrs :
Date :

Description of returned goods	
Quantity	
Serial number heater	
Power supply	V / Hz
Inlet gas pressure	mbar
Working gas pressure	mbar
Reason for return	
Description of failure	
Requested action	Credit / Exchange / Repair
Remarks	

Return date ; _____

Please return the goods to your nearest Dealer