PYRONOX LRR

LRR 47-59
LRR-NT 47-55

Document No. 410821-V10 / 10.12.2019

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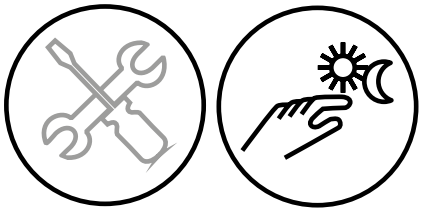


Installation, use and maintenance instructions

COLLECTIVE PRODUCT

CE

GROUPE ATLANTIC
SITE DE CAUROIR
Route de Solesmes
FR - 59400 CAUROIR

WARNINGS AND CONFORMITIES

Symbols used in this document

INFORMATION: This symbol highlights the remarks.

CAUTION: Failure to follow these guidelines carries the risk of damage to the facility or to other objects.

DANGER: Failure to follow these instructions can cause injury and serious property damage.

Conformity

This boiler fulfils the requirements of the low voltage directive 73/23/EEC, of the EMC-directive 89/336/EEC and the efficiency directive 92/42/EEC.

The boiler range with ECA-rating has efficiencies in conformity with the requirements of the Enhanced Capital Allowance Scheme (ECA).

CE-certificate: **CE 0461**

Type marking: **01-226-598 X**

Environmental compatibility

This device contains electrical and electronic elements, and should not be discarded in household waste.
Local regulations in force must be observed.

Steps to be taken in case of danger

- ✓ Close fuel supply, disconnect unit from mains using emergency stop or main switch (outside of the boiler room).
- ✓ Use suitable fire extinguishers to extinguish flames.
- ✓ Occurrence of gas smell (gas units)
  - Ventilate the affected rooms thoroughly by opening doors and windows.
  - Do not use any electronic devices (mobile phone, etc.).
  - Do not activate any electrical contacts (light, motor, lift, door bell, etc.)
  - Do not ignite matches or lighters, and do not smoke.
  - Call the gas board or heating engineer.

The boiler

- ✓ The boiler room must be lockable and it's external air openings must conform to the norms prevailing locally. When in doubt regarding air circulation, measure the CO_2 count with the burner operating at its maximum delivery and the room ventilated only by the burner ventilation air openings and a second time with the door open. The CO_2 count measured in both cases must not differ. Should there be more than one unit in the same room, this test must be performed with all the equipment operating simultaneously.
- ✓ Never obstruct the boiler room's air openings, the burner fan suction opening, and any air ducts and ventilation.
- ✓ The equipment must always be protected against rain, snow, and freezing conditions.
- ✓ The boiler room must be kept clean and free of volatile substances that may be sucked into the fan and clog the inner burner or combustion head air ducts.
- ✓ The combustion air must be free of halogens (chlorine and fluorine compounds). If there is any doubt, the quality of the combustion air must be ensured with an external air intake.

Packaging

✓ After removing all packaging materials, check the contents to make sure that no damage has occurred during shipping. When in doubt, do not use the apparatus and contact the supplier. The packaging materials are to be disposed of properly.

Unit

✓ Smooth boiler performance and manufacturer's guarantee are dependent upon adherence to the boiler installation, operation and maintenance instructions contained in this booklet.

✓ Never permit children or unauthorized persons to tamper with the equipment.

✓ The unit must be used only for its expressed application. All other uses are considered dangerous.

✓ The burner's minimum and maximum delivery settings, all pressures and temperatures must all be contained in the range stipulated in this manual.

✓ Modification of the equipment in order to alter its performance or applications prohibited.

✓ Do not open or tamper with components of the unit other than those parts of the unit that are subject to maintenance operations.

✓ Never touch the hot parts of the unit; these parts (flue gas conduit, sight glass, burner parts, etc) may remain hot for quite some time after the burner has switched off.

✓ Never touch the unit with wet parts of the body or without wearing shoes.

✓ When the unit is not to be used for a longer period, the main power switch on the electrical control panel must be switched off and the manual valve on the unit fuel supply line must be closed.

✓ The device contains components made of synthetic silicon mineral fibres (ceramic and glass fibres, insulation wool). These components must be disposed of appropriately at the end of their life cycle. Local regulations must be observed.

Installation and settings

✓ The installation and calibration of the unit must be performed exclusively by qualified personnel in conformity with existing regulations and the indications provided in this Manual.

INFORMATION:

For hot water installation:

- o Maximal operating temperature: 95°C when the boiler is managed by a Navistem B1000 ou B2000.
- o Maximal operating temperature: 105°C if the regulation system is compatible with this work.

In any case, this device has been designed according to EN 14394. The safety limit thermostat does not exceed 110 °C.

Fuel

✓ The unit must be fed with the type of fuel for which it has been preset as indicated on the rating plate.

✓ The fuel pressure must be according to the values listed in the burner manual.

✓ The fuel line that feeds the unit must be sized according to the requirements of local regulations and the prescriptions in the burner manual. The line must be perfectly sealed. The fuel supply line must also be equipped with all the control and safety mechanisms required by local regulations in force. The line must be free from all impurities; take particular care that foreign matter does not enter the line during installation.

✓ Oil:

- The light oil storage tank must be adequately protected against penetration of impurities and water. The fuel tank must be kept full of fuel during the summer in order to avoid the condensation of humidity. Clean the tank carefully before filling. Beware not to overfill the tank.
- Both the tank and the unit fuel supply line must be protected from frost.
- Oil consumption and tank unit must be checked regularly, in order for leaks to be detected in good time.

✓ Gas:

- The gas line must be checked for leakage during commissioning and after each disconnection.

Water quality

The following rules apply once the boiler is put into service and remain valid until the end of life of the product.

Preparing the water system before putting the boiler into service

For any installation (new or renovation), the water system pipes must be thoroughly cleaned. The purpose of this initial cleaning is to eliminate germs and residue that can cause deposits to form.
In **new installations** in particular, residue from grease, oxidised metal, and even copper microdeposits must be removed.
In **renovated installations**, cleaning should focus on removing sludge and the products of corrosion formed when the unit was last in operation.
There are two types of methods for cleaning and removing sludge: a high intensity approach that takes a few hours and a slower, more gradual approach that takes several weeks. This first type of cleaning must be done **before connecting the new boiler**, and with the second type, a filter should be installed on the back of the boiler to capture loosened deposits.
The cleaning performed prior to installation improves performance, reduces energy consumption, and resists scaling and corrosion on the unit. A professional (water treatment) should carry out the cleaning.

Protecting the unit against scaling

Water naturally contains dissolved calcium ions and carbonates that cause scaling (calcium carbonate) to form. To prevent excessive deposits, take precautions with regard to **the water used to fill the unit: TH < 10°f**

Water must be added during the life of the boiler. The new water adds scaling to the water system. **The amount of fill water plus the amount of make-up water added during the life of the unit should not be more than three times the water capacity of the heating system**. Also, the hardness of the make-up water must be controlled. **Make-up water: TH < 5 °f**

Adding a large amount of untreated water always contributes a significant amount of scaling. To monitor this and to detect problems, **a system water meter must be installed**.
Failure to comply with these guidelines (such that the fill water plus the make-up water is more than three times the water capacity of the heating system) requires a full cleaning (to remove sludge and scaling) to be performed.

Additional precautions are required for operation:

- When the unit has a water softener, the equipment must be inspected on a regular basis in order to ensure that it is not outputting chloride-rich water into the system. The concentration of chlorides must always remain below 50 mg/l.
- To prevent the build-up of calcium deposits (such as on exchange surfaces), the unit should be brought into service slowly, starting by operating at a low power with high primary water flow.
- When the tap water lacks the desired qualities, **water treatment is required**. The fill water must be treated, and whenever new water is added, the make-up water must also be treated.
- Installations with multiple boilers require all of the boilers to be brought up simultaneously at minimal power. Doing this prevents the calcium in the water from depositing on the exchange surfaces of the first boiler.
- When working on the unit, avoid draining it completely; only the required parts of the system are to be drained.

The rules listed above are designed to minimise scaling on the exchange surfaces and thus to increase the life of the boilers.
To optimise how the equipment operates, plan to remove its calcium deposits. This must be done by a specialized company. Also, before putting the unit into service, verify that the heating system is not damaged (ex. leaks). If it has excessive scaling, the unit's settings for operation and for water treatment must be adjusted.

Protecting steel and stainless steel boilers against corrosion

Corrosion can affect the iron components used in boilers and heating systems, which is directly related to the presence of oxygen in the water heater's water. Dissolved oxygen that enters the unit when it is being filled for the first time reacts with the equipment materials and quickly disappears. Without refreshing the oxygen through significant contributions of water, the unit might not experience any damage whatsoever.
However, it is important to follow the sizing rules and installation guidelines in order to prevent oxygen from continuously flowing into the heating water. From these rules, we have:

- Preferably an expansion vessel with a membrane rather than an open expansion vessel that allows direct passage.

- Internal pressure with the unit of more than 1 bar cold.
- Remove leaky (permeable) components that are letting out more gas than as if they were sealed.

If the guidelines above are followed, the unit's system water has the proper characteristics to last a long time: **8.2 < pH < 9.5 with a water concentration of < 0.1 mg/l.**

If there is a chance that oxygen could enter the unit, you must take additional precautions. Adding an oxygen scavenger (ex. sodium sulphite) is highly recommended. We recommend directing any water treatment questions to specialists, which can provide:

- The appropriate treatment based on the characteristics of the unit,
- A monitoring agreement with a guarantee as to the results.

For units in which **the water comes into contact with heterogeneous materials**, such as copper or aluminium, **appropriate treatment is recommended** in order to ensure that the unit will last. In most cases, this consists of adding corrosion inhibitors (in the form of chemical solutions) to the unit. Referring to a water treatment specialist is recommended.

Setting up a filtration system

A filtration system on the back of the boiler is recommended in order to remove suspended particles from the unit.

Choice of burner / boiler

We recommend adopting modulating burners to avoid thermal shock in operation.

Hydraulic

Set up an effective degasser as close as possible to the boiler outlet to evacuate the air from the networks introduced during the filling and the addition of water in order to maintain a good convection coefficient.

Add an additional expansion vessel if the characteristics of the pressure maintenance unit do not allow the pressure variations to be limited to 0.5 bar in order to limit the variations in hydraulic pressure.

Respect the minimum flow rates recommended. (chapter 2.5.1. - 2.5.2.)

Unit monitoring

If the recommendations listed above (new installation or renovation) have been followed, the unit monitoring is limited to:

- Checking the amount of make-up water (fill water volume + make-up water volume < 3 times the unit volume)
- Checking the pH level (stable or slightly increasing)
- Checking the total hardness (stable or slightly decreasing)

We recommend monitoring these parameters two to three times a year. Note: Monitoring the quantity of make-up water is critical to the long life of the unit.
If any of these parameters deviates from the above recommendations, refer to a water treatment specialist to correct the problem.

Setting up a plate exchanger

If the recommendations listed above cannot be met, you can set up a plate exchanger to separate the primary system from the secondary system, which protects the boiler from undesirable effects.

Exploitation

The frequency of cold starts should be as low as possible; during these periods, the flue gas temperature can be low and cause condensation that is detrimental to the life of the boiler; it is recommended not to exceed a cold start per week.

During a cold start, the heat emitters of the installation will be irrigated when the set temperature is reached; the temperature rise of the installation will be carried out at minimum power.

Do not shut off the burner at full load to avoid temperature shock.

Do not hesitate to add buffer volumes to the plant's hydraulic system to avoid short operating cycles, especially when the boiler is protected by an isolation plate heat exchanger. Regarding the regulation of the installation, we recommend burner modulation parameters (PID) sufficiently slow to ensure stability and low temperature variations, start / stop differentials / hysteresis must be reasonable in order to leave a range of operation sufficient for the burner and to ensure its modulation (value +/- 4 ° C). All strategies must allow the burner to be started up for an average operating time of 30 minutes.

The temperature variations of the boiler must be as low

as possible to ensure the highest service life.

The first heating must allow the evacuation of moisture from concrete doors, it is necessary to avoid any heat shock and adopt a rise in temperature as slow as possible.

Do not hesitate to adopt the burner's burner maintenance accessories to minimize structural vibration of the burner assembly.

Unit monitoring

If the recommendations listed above (new installation or renovation) have been followed, the unit monitoring is limited to:
- Checking the amount of make-up water (fill water volume + make-up water volume < 3 times the unit volume)
- Checking the pH level (stable or slightly increasing)
- Checking the total hardness (stable or slightly decreasing)

We recommend monitoring these parameters two to three times a year. Note: Monitoring the quantity of make-up water is critical to the long life of the unit.
If any of these parameters deviates from the above recommendations, refer to a water treatment specialist to correct the problem.

Setting up a plate exchanger

If the recommendations listed above cannot be met, you can set up a plate exchanger to separate the primary system from the secondary system, which protects the boiler from undesirable effects.

Electrical installation

- ✓ Electrical connections must be made exclusively by qualified personnel and all prevailing electrical regulations must be scrupulously observed.
- ✓ Make sure that the electrical power supply used for connection conforms to the specifications indicated on the rating plate and in this manual.
- ✓ The unit must be correctly connected to an efficient ground system in conformity to the prevailing norms and checked and controlled for efficiency by qualified personnel when in doubt.
- ✓ Never confuse neutral wires with phase wires.
- ✓ The unit must be hooked up to the electrical network with a plug-socket connection that is such as to prevent inversion of phase and neutral. Install a master switch for the heating plant as requested by existing legislation.
- ✓ The entire electrical system, and all cable sections in particular, must be adequate to deliver the maximum absorbed power value indicated on the equipment's rating plate and in this manual.
- ✓ If the mains power cable is found to be defective, it must be replaced only by qualified personnel.
- ✓ Never stretch power supply cables and keep them well away from sources of heat.

Maintenance

- ✓ Maintenance must be performed by qualified personnel regularly or at least once a year.
- ✓ Prior to performing any maintenance operations, switch off the power supply by using the main switch and cut off the fuel supply as well.
- ✓ Only parts indicated by the manufacturer in the Spare Parts Catalogue may be replaced.
- ✓ **In order to avoid all types of health hazards, suitable clothing and a protective mask must be worn for work on or with components made of synthetic silicon mineral fibres (ceramic and glass fibres, insulation wool).**

Malfunction

- ✓ If the unit stops working and goes into lock-out and does not resume operation after two or three manual lock-out reset attempts, disconnect the power supply, do not attempt to repair, and contact a qualified specialist.
- ✓ All repairs required must be performed exclusively at a technical servicing and/or technician centre authorized by the manufacturer using original spare parts only. Failure to observe the above may compromise the reliability and safety of the equipment.
- ✓ Any failure or damage resulting from improper use or intentional damage will relieve the manufacturer from any guarantee obligation.

CONTENTS

1. DESCRIPTION

1.1. General information

Pyronox LRR boilers are high efficiency, power-saving boilers ranging from 1150 to 5400 kW, from 1000 to 4700 kW for low-NOx applications and from 1000 to 4300 kW with ECA-rating. They can be operated in combination with oil or gas burners. Models LRR 53-59 (except for NT versions) are also adapted for use with heavy fuel at a maximum output corresponding to the low-NOx applications.

The Pyronox LRR boiler range are three pass, smoke tube boilers with combustion chamber and flue way using the low-Nox technology. The geometry of the furnace, the furnace's low charge, coupled with the Ygnis patented flame escape system, allow users to obtain low emission values and safe operation in conformity with law provisions.

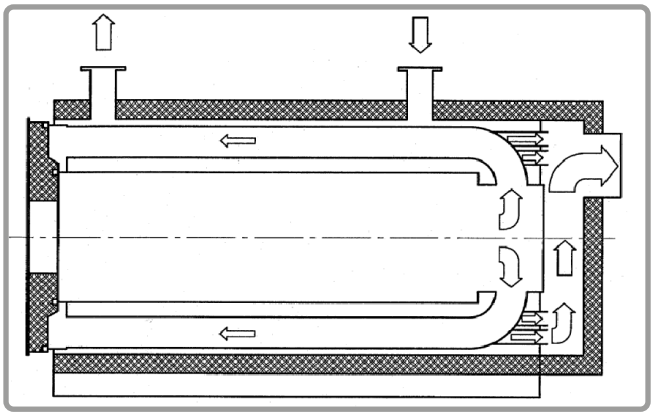


figure 1 - Three pass

The third pass is equipped with turbulators. Their turbulent action further increases the heat exchange and allows the system to work at low combustion gas temperatures, guaranteeing optimal fuel use as a result.

The boiler's thermal insulation is made of glass fibre felt that adheres to the boiler shell, guaranteeing minimal loss in stand-by mode. In addition, the front part of the Pyronox LRR / LRR-NT 47-52 boiler is provided with superior quality ceramic fibre insulation. The outstanding characteristics of the material are the low thermal conductivity and the low specific thermal capacity. This leads to a further reduction of the stand-by losses. On the larger boilers a special concrete with similar characteristics is used as thermal insulation of the boiler door.

The revolving door gives easy access to parts of the boiler that are in contact with combustion gases. This allows cleaning of combustion chamber and passage ways to be easily performed from the front. The turbulators are retractable from the front. The flue gas collector on the rear of the boiler is provided with an opening for easy cleaning.

A divided version of the boiler range can be made available as custom made option. Thanks to the inferior dimensions of the individual parts, this version is most suitable when bringing-in conditions are tight. The individual prefabricated parts must be welded together in the boiler room.

1.2. Scope of supply

- Boiler body, flue gas collector and flue gas tube
- Gas-tight boiler door with insulation and burner connection (and flue gas fan connection if ordered for LRR 47-55)
- Furnace sight glass integrated in the boiler door
- Supply and return tubes as well as safety valve connection with flanges, counterflanges, gaskets and screws
- Filling and discharge tube
- Flue gas turbulators
- Boiler insulation
- Catwalk over the boiler
- Two lifting rings
- Boiler control panel (version depending on order)
- Burner cables (optional)
- Burner pipe insulation material (supplied loose)
- Cleaning set
- Manual of installation and maintenance, and operating instructions

2. DATA

2.1. Main data

			LRR / LRR-GF	LRR-NT / LRR-GF-NT
Max. operating pressure (standard model)			6,0 bar	
Test pressure (other pressures on request)			9,0 bar	
Boiler supply and return pipe flanges			PN 6	
Max. operating temperature (safety cut-out)			110 °C	
Min. operating temperature	with fuel oil		65 °C	
	with natural gas		65 °C	
	with propane		75 °C	
	with heavy fuel (LRR 53-59)		75 °C	
Min. return temperature	with fuel oil		50 °C	40 °C
	with natural gas		60 °C	50 °C
	with propane		60 °C	50 °C
	with heavy fuel (LRR 53-59)		60 °C	(*)
Max. CO_2-content (dry flue gas)	with fuel oil		15.5 %	
	with natural gas		11.7 %	
	with propane		13.7 %	
Min. flue gas temperature	with fuel oil	S-content: 50 ppm	100 °C	
		0.05 %	110 °C	
		0.1 %	115 °C	
		0.2 %	120 °C	
		0.5 %	125 °C	
	with natural gas	S-content: 10 mg/nm^3	95 °C	
		150 mg/nm^3	110 °C	
	with heavy fuel (LRR 53-59)	S-content: 0.5 %	125 °C	
		1.0 %	130 °C	
		2.0 %	135 °C	

(*): No heavy fuel in NT version

2.2. Minimum operating pressure

LRR, LRR-NT	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
bar g	1.4				1.8					2.2			

2.3. Dimensions Pyronox LRR / LRR-NT

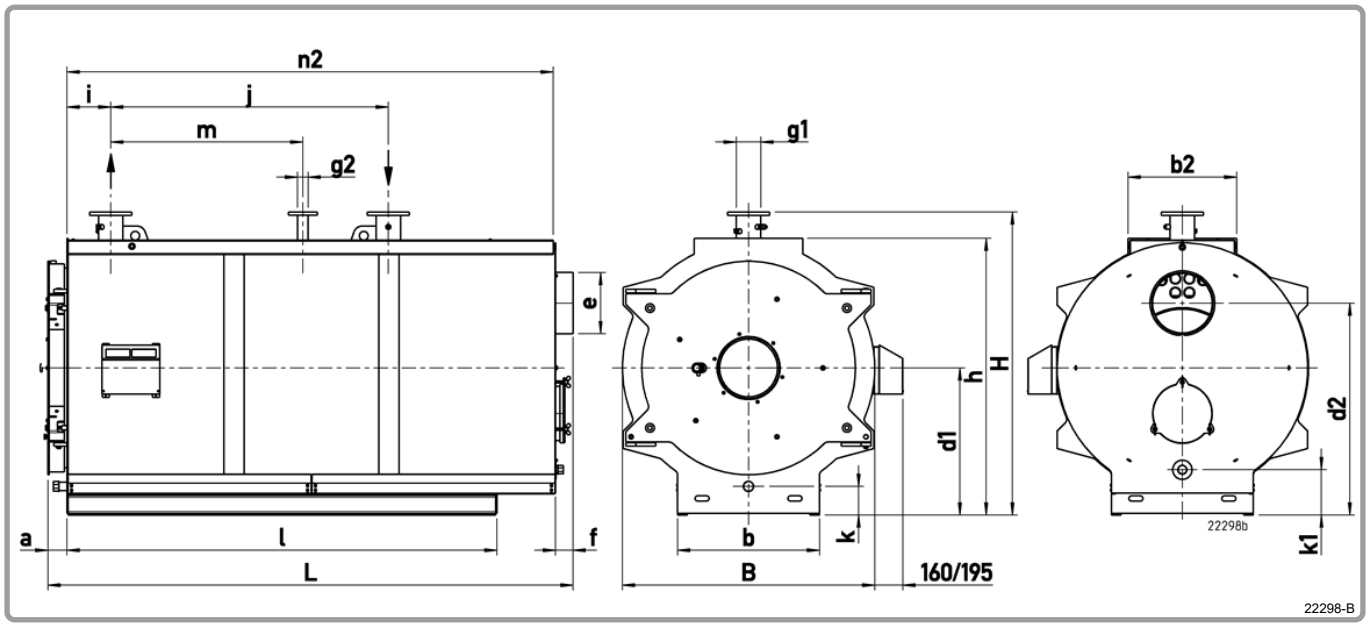


figure 2 - LRR / LRR-NT 47-52

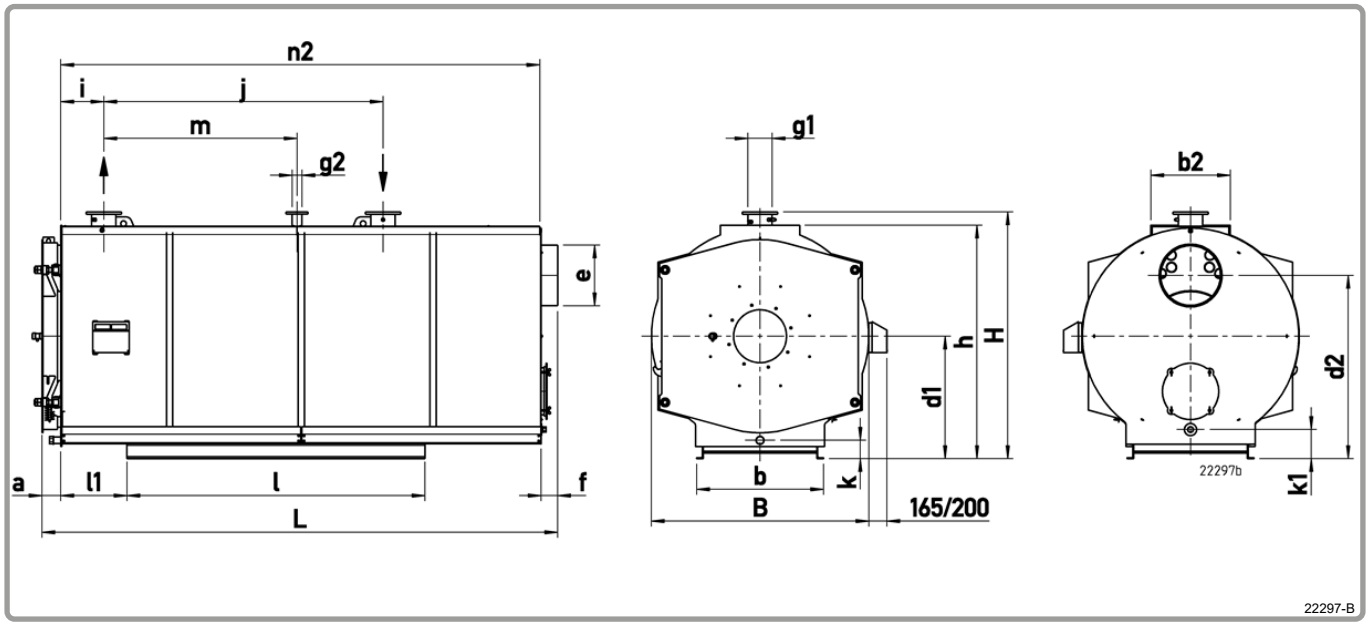


figure 3 - LRR / LRR-NT 53-59

			Pyronox LRR												
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
Boiler feet length	l	mm	2454	2454	2674	2934	3096	3356	2700	2850	3200	4110	4510	4912	5412
Boiler feet width	b	mm	810	810	900	940	1015	1060	1150	1290	1350	1520	1610	1670	1730
Boiler height	h	mm	1570	1570	1642	1707	1829	1920	2105	2320	2435	2740	2895	3005	3100
Door thickness	a	mm	109	109	139	139	139	139	170	170	170	212	212	212	212
Boiler flange centre	d_1	mm	840	840	875	905	965	1015	1110	1225	1285	1450	1530	1590	1640
Height flue	d_2	mm	1210	1210	1275	1315	1410	1470	1660	1850	1940	2120	2280	2390	2460
Flue outside diameter	e	mm	350	350	350	400	450	500	550	600	650	700	750	850	900
Flue length	f	mm	100	100	100	100	100	100	150	150	150	150	150	150	150
Ø supply - return PN6	g_1	DN	125	125	125	150	150	200	200	200	200	250	250	300	300
Distance front - supply	i	mm	252	252	274	300	318	344	390	410	450	495	540	590	645
Distance supply - return	j	mm	1584	1584	1727	1896	2000	2168	2530	2677	2920	3160	3430	3740	4120
Ø safety valve connection PN16	g_2	DN	50	50	50	65	65	65	80	80	100	100	100	125	125
Distance supply - safety valve	m	mm	1104	1104	1195	1309	1385	1501	1751	1855	2024	2190	2370	2590	2850
Discharge position	k	mm DN	164 11/2"	164 11/2"	161 11/2"	157 11/2"	154 11/2"	162 2"	167 2"	182 2"	187 2"	135 65	140 65	150 65	127 80
Height flue collector discharge	k_1	mm DN	259 11/4"	259 11/4"	256 11/4"	252 11/4"	249 11/4"	259 11/4"	264 11/4"	279 11/4"	284 11/4"	335 2"	340 2"	350 2"	360 2"
Distance front / feet	l_1	mm	-	-	-	-	-	-	600	640	650	-	-	-	-
Catwalk width	b_2	mm	600	600	600	600	700	700	700	700	700	750	800	850	850
Catwalk length	n_2	mm	2775	2775	2997	3289	3484	3776	4340	4577	4977	5395	5845	6387	6987
Overall length	L	mm	3000	3000	3250	3540	3740	4030	4670	4910	5310	5771	6221	6763	7364
Boiler width	B	mm	1440	1440	1515	1585	1710	1790	1970	2170	2280	2560	2710	2810	2900
Height supply - return flange	H	mm	1730	1730	1805	1870	1990	2080	2235	2450	2565	2870	3025	3135	3230
Weight empty	G	kg	2365	2365	2865	3385	4070	4735	7025	8425	10075	13545	16040	18620	21900
Boiler water content	V	L	1420	1420	1725	2080	2560	2795	3805	5385	6060	9300	11400	13300	15120
Boiler gas content	VG	L	1530	1530	1880	2320	3020	3970	5870	7380	9450	11640	14250	17240	20720
Furnace diameter	DF	mm	675	675	712	750	811	870	1020	1110	1220	1270	1350	1430	1500
Furnace length	LF	mm	2365	2365	2559	2825	2985	3265	3765	3980	4360	4690	5090	5550	6120
Furnace volume	VF	m^3	0.85	0.85	1.02	1.25	1.54	1.90	2.96	3.72	4.95	5.78	7.12	8.73	10.58

The dimensions of NT versions are identical to the LRR version except the smoke outlet length (f), the total length (L) and empty weight (G):

			Pyronox LRR-NT								
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
Flue length	f	mm	148	148	148	148	148	148	198	198	198
Overall length	L	mm	3048	3048	3298	3588	3788	4078	4718	4958	5358
Weight empty	G	kg	2535	2535	3120	3692	4397	5172	7539	8997	10891

2.4. Dimensions of custom made models for LRR / LRR-NT

The following custom made models are available on request. They are however subject to different delivery times!

2.4.1. Vertical flue connection

CAUTION: The vertical smoke nozzles are not made on the LRR-NT.

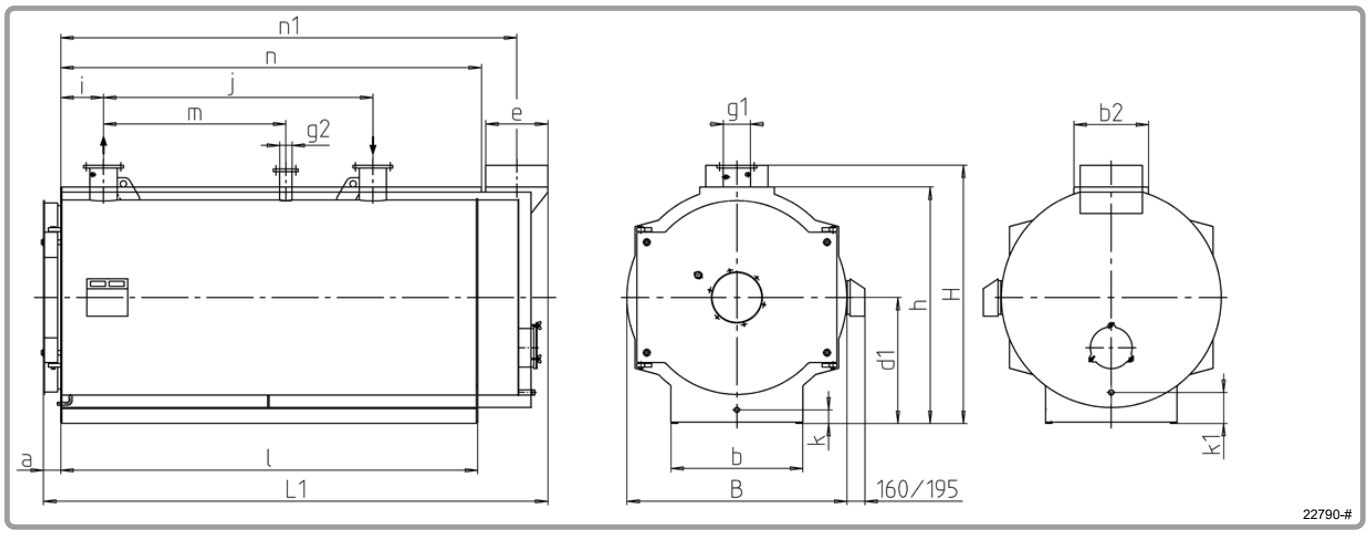


figure 4 - LRR 47-52

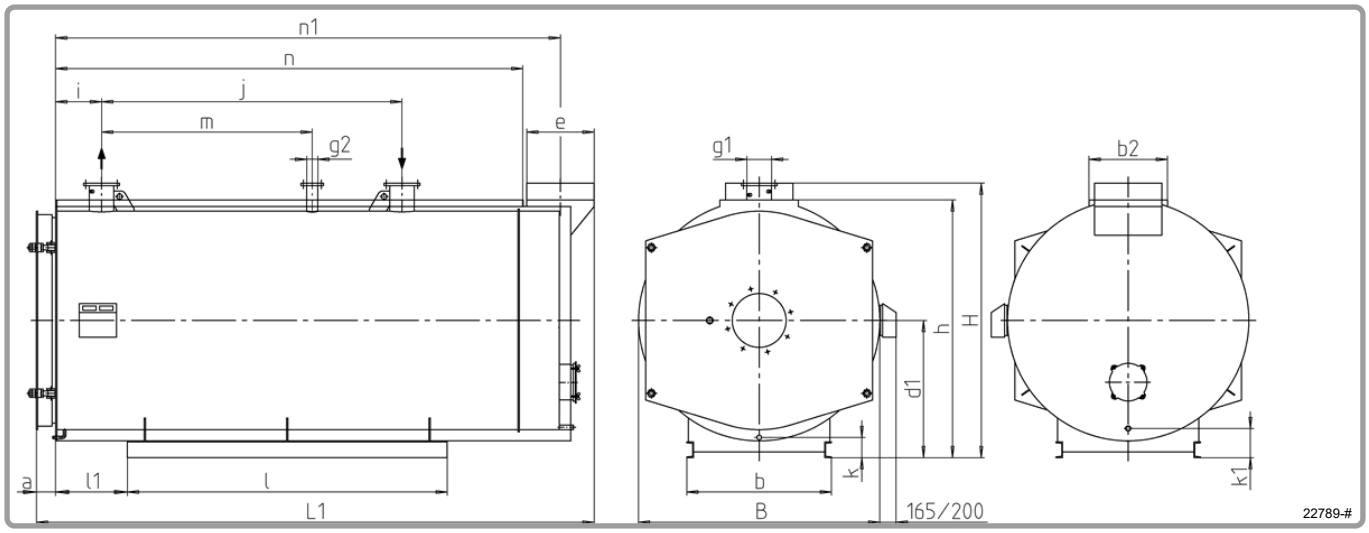


figure 5 - LRR 53-59

			Pyronox LRR												
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
Flue outside diameter	e	mm	350	350	350	400	450	500	550	600	650	700	750	850	900
Flue position	n_1	mm	2674	2674	2894	3179	3366	3651	4235	4477	4872	5277	5722	6254	6849
Overall length	L_1	mm	2985	2985	3235	3530	3745	4055	4695	4960	5380	5850	6320	6900	7520
Catwalk length	n	mm	2479	2479	2699	2959	3121	3381	3940	4157	4527	4905	5325	5807	6377

The other dimensions are identical to those of the standard range.

2.4.2. Divided version

Also available as a custom made option is a divided version of the boiler (except for NT versions).

Thanks to the inferior dimensions of the individual parts, this version is most suitable when bringing-in conditions are tight. The individual prefabricated parts must be welded together in the boiler room.

DANGER: The welding work may only be performed by a qualified welder licenced to weld pressurized vessels.

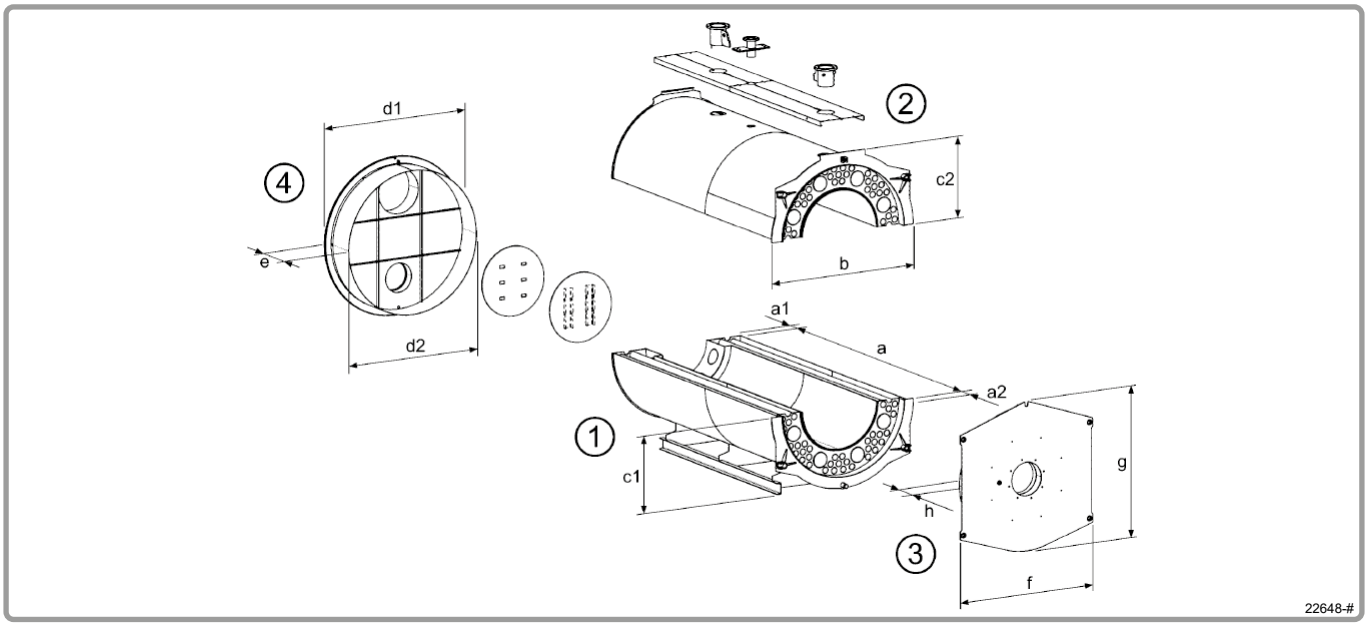


figure 6 - Divided version dimensions

Dimensions		**Pyronox LRR**												
		47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
a	mm	2454	2454	2674	2934	3096	3356	3915	4132	4502	4882	5302	5784	6354
a_1	mm	30	30	30	30	30	30	30	30	30	30	30	30	30
a_2	mm	75	75	100	100	100	100	100	100	100	100	100	100	100
b	mm	1440	1440	1515	1584	1709	1790	1970	2170	2280	2560	2710	2810	2900
c_1	mm	864	864	875	905	965	1029	1110	1263	1285	1295	1530	1760	1572
c_2	mm	740	740	778	812	875	935	1005	1105	1160	1485	1375	1351	1623
d_1	mm	1430	1430	1505	1574	1699	1780	1960	2160	2270	2250	2700	2800	2890
d_2	mm	1220	1220	1295	1364	1489	1570	1750	1950	2060	2300	2450	2550	2640
e	mm	434	434	436	468	501	533	588	608	638	678	708	768	798
f	mm	1400	1400	1475	1544	1669	1750	1820	2020	2130	2430	2580	2680	2770
g	mm	1220	1220	1300	1370	1495	1560	1772	1970	2060	2430	2580	2680	2770
h	mm	134	134	174	174	182	182	240	240	240	303	323	343	343

Weight for 6 bar		**Pyronox LRR**												
		47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
1	kg	917	917	1127	1336	1592	1816	2695	3234	3893	4968	6249	7489	8557
2	kg	813	813	1015	1254	1475	1663	2521	2969	3676	5016	5766	6519	8253
3	kg	147	147	181	199	233	253	683	845	966	1410	1656	1898	2033
4	kg	128	128	140	154	179	199	245	292	322	490	548	595	635

Weights for 4, 8 and 10 bar on request.

2.4.3. Different operating pressures

Pyronox LRR boilers can be provided for the operating pressures of 4, 8 and 10 bar-g. Their dimensions and performances are identical to those of the standard range of 6 bar-g, but their weights are different and the flanges of the return and flow connections of the 8 and 10 bar versions are PN16.

Empty weights

			Pyronox LRR											
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
4 bar	G	kg	2320	2320	2729	3321	3914	4500	6332	7891	9566	12116	14717	17295	20358
8 bar	G	kg	2711	2711	3171	3803	4466	5266	7521	9258	11184	14458	17181	20174	23220
10 bar	G	kg	2774	2774	3248	3998	4882	5601	8225	9907	11923	16022	18574	21378	24754

			Pyronox LRR-NT								
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
4 bar	G	kg	2490	2490	2984	3628	4241	4886	6846	8463	10381
8 bar	G	kg	2881	2881	3426	4110	4793	5652	8035	9830	12000
10 bar	G	kg	2944	2944	3503	4305	5209	5987	8739	10479	12739

2.5. Technical data LRR / LRR-NT

CAUTION:

The power indicated is the maximum power that the corresponding heating body model can deliver.

The selected burner and the output or polluting emissions (NOx) constraints may require the burner to be set at a lower calorific flow value.

For more information, please contact the after sales department.

2.5.1. Pyronox LRR

Technical specifications LRR, fuel oil

			Pyronox LRR											
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
POWER															
Boiler nominal power qN (80/60°C)	max.	kW	1150	1400	1650	2000	2500	3000	3800	4500	5400	6300	7400	8600	10000
	min.		636	636	680	883	1229	1279	1621	2012	2518	2930	3442	4163	5127
Calorific power qF	max.	kW	1240	1528	1812	2187	2722	3284	4160	4922	5887	6852	8047	9319	10785
	min. (2)		670	670	716	929	1293	1346	1706	2116	2649	3083	3621	4380	5393
Modulation rate at 80/60°C	(2)	%	54	44	40	42	48	41	41	43	45	45	45	47	50
EFFICIENCIES															
Overall efficiency 60/80°C	100%	%	92.7	91.6	91.1	91.5	91.8	91.3	91.4	91.4	91.7	91.9	92.0	92.3	92.7
Overall efficiency 50/70°C	30%	%	94.9	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Overall efficiency 60/80°C	min qF	%	95.0	95.0	95.0	95.0	95.1	95.0	95.1	95.1	95.1	95.0	95.0	95.0	95.1
Efficiency DIN4702-8, 60/75°C	ηN	%	94.9	94.8	94.6	94.8	94.8	94.7	94.8	94.8	94.9	94.9	94.9	95.0	95.0
MASS FLOW															
Fuel oil flow	max. (1)	kg/h	104.6	128.9	152.9	184.6	229.7	277.1	351.1	415.4	496.8	578.2	679.1	786.4	910.1
	min. (1) (2)		56.5	56.5	60.4	78.4	109.1	113.6	143.9	178.6	223.6	260.2	305.6	369.6	455.1
Exhaust gas mass flow	max. wet	kg/s	0.53	0.66	0.78	0.94	1.17	1.41	1.79	2.12	2.54	2.95	3.47	4.01	4.64
	min. wet (1) (2)		0.29	0.29	0.31	0.40	0.56	0.58	0.73	0.91	1.14	1.33	1.56	1.89	2.32
EXHAUST GAS DATA, LOSSES															
Overpressure combustion chamber	max.	mbar	6.18	9.49	9.47	10.25	10.16	10.06	10.80	9.99	10.71	12.22	14.13	15.73	17.16
Exhaust gas temperature at 80/60°C	max.	°C	169	192	204	195	187	197	198	196	190	185	185	178	169
	min. (2)		120												
Exhaust gas losses at 80/60°C	max.	%	7.1	8.3	8.8	8.4	8.0	8.6	8.6	8.5	8.2	8.0	8.0	7.6	7.2
Stand-by loss qB	70°C	W	1326	1326	1489	1665	1972	2197	2724	3413	3827	4511	5118	5582	6043
HYDRAULIC DATA															
Water resistance	Δt=15K	mbar	47	69	96	68	107	48	78	109	157	84	116	80	108
	Δt=20K		26	39	54	39	60	27	44	62	89	47	65	45	61
Water flow	max.	m^3/h	66	80	95	115	143	172	218	258	309	361	424	493	573
	mini		P/45 (P = Power in th / h provided at time t.)												
Operating temperatures	max.	°C	95												
	SCO		110												

Values acc. EN304 at:

- lambda = 1.2, CO_2 = 12.7%
- T-air = 20 °C, rel. humidity = 60%, p-baro = 100 kPa

(1): LCV = 11.85 kWh/kg

(2): Sulphur content up to 0.2%

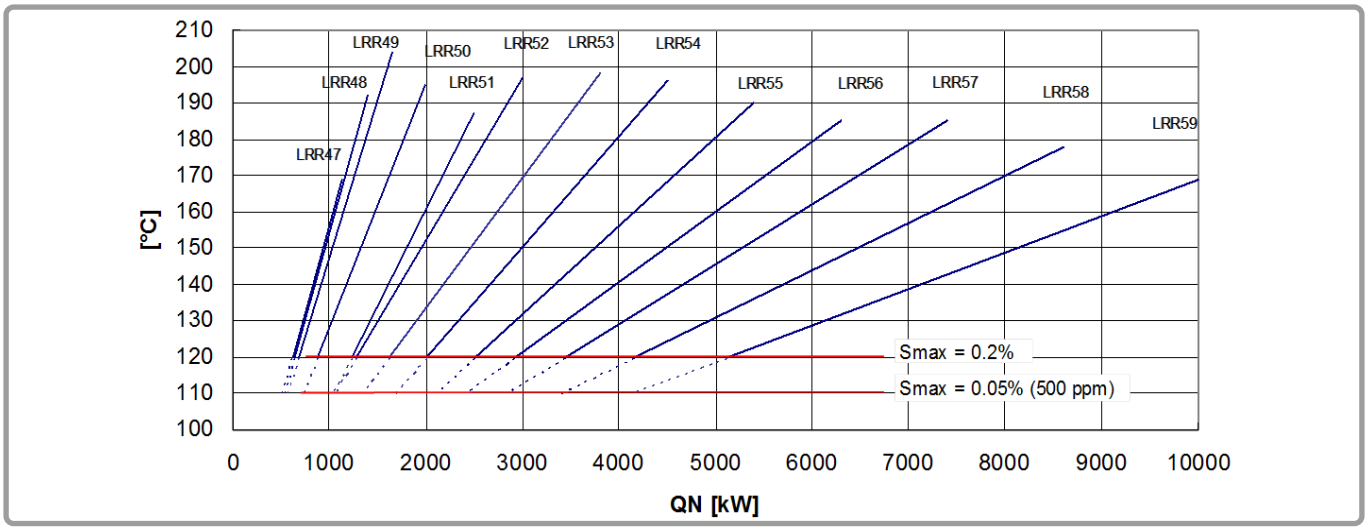


figure 7 - Flue gas temperature diagram LRR, fuel oil with clean boiler

Technical specifications LRR, natural gas

			Pyronox LRR											
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
POWER															
Boiler nominal power qN (80/60°C)	max.	kW	1150	1400	1650	2000	2500	3000	3800	4500	5400	6300	7400	8600	10000
	min.		358	358	366	484	720	726	880	1160	1473	1582	1935	2332	2907
Calorific power qF	max.	kW	1242	1530	1815	2189	2725	3289	4166	4929	5894	6861	8055	9328	10795
	min. (3)		372	372	381	503	749	756	916	1208	1532	1647	2014	2425	3023
Modulation rate at 80/60°C	(3)	%	30	24	21	23	27	23	22	25	26	24	25	26	28
EFFICIENCIES															
Overall efficiency 60/80°C	100%	%	92.6	91.5	90.9	91.3	91.7	91.2	91.2	91.3	91.6	91.8	91.9	92.2	92.6
Overall efficiency 60/80°C	30%	%	96.0	95.8	95.5	95.7	96.0	95.6	95.7	95.8	95.9	95.8	95.8	95.9	96.1
Overall efficiency 60/80°C	min qF	%	96.0	96.0	96.0	96.1	96.1	96.0	96.1	96.1	96.1	96.1	96.1	96.1	96.2
Efficiency DIN4702-8, 60/75°C	ηN	%	95.5	95.2	94.9	95.1	95.4	95.0	95.1	95.1	95.3	95.3	95.3	95.4	95.6
MASS FLOW															
Gas flow, NG type E	max. (1) (2)	nm^3/h	124.6	153.5	182.1	219.7	273.4	330.0	418.0	494.6	591.4	689.0	808.0	936.0	1083.0
	min. (1) (2)		37.4	37.4	38.2	50.5	75.2	75.9	92.0	121.2	153.8	165.0	202.0	243.0	303.0
Exhaust gas mass flow	max. wet	kg/s	0.52	0.64	0.76	0.91	1.14	1.37	1.74	2.06	2.46	2.87	3.36	3.89	4.51
	min. wet (1) (3)		0.16	0.16	0.16	0.21	0.31	0.32	0.38	0.50	0.64	0.69	0.84	1.01	1.26
EXHAUST GAS DATA, LOSSES															
Overpressure combustion chamber	max.	mbar	6.30	9.68	9.67	10.45	10.35	10.26	11.01	10.18	10.91	12.46	14.4	16.03	17.48
Exhaust gas temperature at 80/60°C	max.	°C	170	193	205	196	188	198	199	197	191	186	185	179	170
	min. (3)		95												
Exhaust gas losses at 80/60°C	max.	%	7.2	8.4	9.0	8.5	8.2	8.7	8.7	8.6	8.3	8.1	8.0	7.7	7.3
Stand-by loss qB	70°C	W	1326	1326	1489	1665	1972	2197	2724	3413	3827	4511	5118	5582	6043
HYDRAULIC DATA															
Water resistance	Δt=15K	mbar	47	69	96	68	107	48	78	109	157	84	116	80	108
	Δt=20K		26	39	54	39	60	27	44	62	89	47	65	45	61
Water flow	max.	m^3/h	66	80	95	115	143	172	218	258	309	361	424	493	573
	mini		P/45 (P = Power in th / h provided at time t.)												
Operating temperatures	max.	°C	95												
	SCO		110												

Values acc. EN303-3 at:

- lambda = 1.15, CO_2 = 10%
- T-air = 20 °C, rel. humidity = 60%, p-baro = 100 kPa

(1): LCV = 9.97 kWh/nm^3
(2): nm^3 at 0°C, 1013 mbar
(3): S max = 10 mg / nm^3

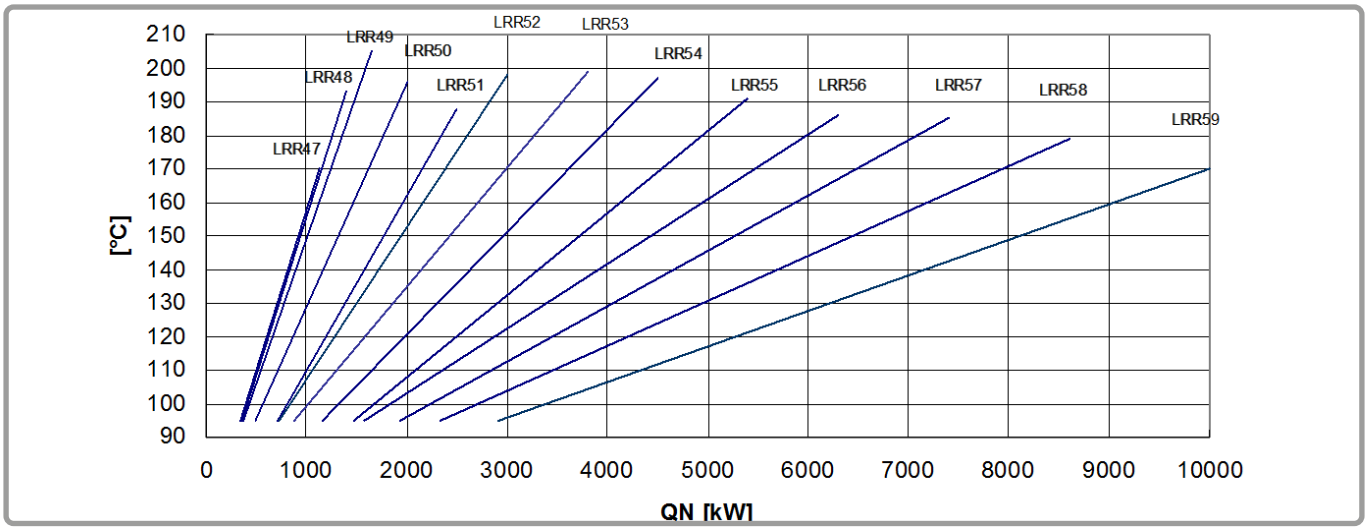


figure 8 - Flue gas temperature diagram LRR, natural gas with clean boiler

Technical specifications LRR, heavy fuel

			Pyronox LRR						
			53	**54**	**55**	**56**	**57**	**58**	**59**
POWER									
Boiler nominal power qN (80/60°C)	max.	kW	3300	4000	4700	5600	6700	8100	9700
Calorific power qF	max. (1)	kW	3579	4336	5075	6047	7243	8751	10443

(1): LCV = 11.53 kWh/kg, 970 kg/m^3, 1% S

Respect the operating conditions according to chapter 2.1. Further data on request.

2.5.2. Pyronox LRR-NT

Technical specifications LRR-NT, fuel oil

			Pyronox LRR-NT								
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
POWER											
Boiler nominal power qN (80/60°C)	max.	kW	1150	1400	1650	2000	2500	3000	3800	4500	5400
	min.		635	637	687	991	1236	1267	1606	1988	2490
Calorific power qF	max.	kW	1253	1551	1846	2221	2785	3376	4279	5054	6043
	min. (2)		670	673	725	1050	1312	1346	1706	2114	2646
Modulation rate at 80/60°C	(2)	%	54	44	40	48	48	41	41	43	45
EFFICIENCIES											
Overall efficiency 60/80°C	100%	%	91.7	90.3	89.4	90.1	89.8	88.9	88.8	89.0	89.4
Overall efficiency 50/70°C	30%	%	95.1	95.2	95.1	94.8	94.7	94.5	94.2	94.3	94.5
Overall efficiency 60/80°C	min qF	%	94.7	94.8	94.7	94.4	94.2	94.1	94.2	94.1	94.1
Efficiency DIN4702-8, 60/75°C	ηN	%	94.6	94.4	94.2	94.2	94.0	93.5	93.6	93.6	94.0
MASS FLOW											
Fuel oil flow	max. (1)	kg/h	105.8	130.9	155.7	187.4	235.0	284.9	361.1	426.5	509.9
	min. (1) (2)		56.6	56.8	61.2	88.6	110.7	113.6	143.9	178.4	223.3
Exhaust gas mass flow	max. wet	kg/s	0.54	0.67	0.79	0.96	1.20	1.45	1.84	2.18	2.60
	min. wet (1) (2)		0.29	0.29	0.31	0.45	0.57	0.58	0.73	0.91	1.14
EXHAUST GAS DATA, LOSSES											
Overpressure combustion chamber	max.	mbar	6.2	9.7	9.9	10.6	10.4	10.6	11.5	11.7	12.4
Exhaust gas temperature at 80/60°C	max.	°C	190	220	238	224	230	248	250	245	238
	min. (2)		126	125	126	133	137	139	139	140	140
Exhaust gas losses at 80/60°C	max.	%	8.1	9.6	10.5	9.8	10.1	11.0	11.1	10.9	10.5
Stand-by loss qB	70°C	W	1301	1303	1460	1633	1935	2200	2728	3361	3769
HYDRAULIC DATA											
Water resistance	Δt=15K	mbar	47	69	94	68	107	48	78	109	119
	Δt=20K		26	39	54	39	60	27	44	62	67
Water flow	max.	m^3/h	66	80	95	115	143	172	218	258	309
	mini		P/45 (P = Power in th / h provided at time t.)								
Operating temperatures	max.	°C	95								
	SCO		110								

Values acc. EN304 at:

- lambda = 1.2, CO_2 = 12.7%
- T-air = 20 °C, rel. humidity = 60%, p-baro = 100 kPa

(1): LCV = 11.85 kWh/kg

(2): Sulphur content up to 0.2%

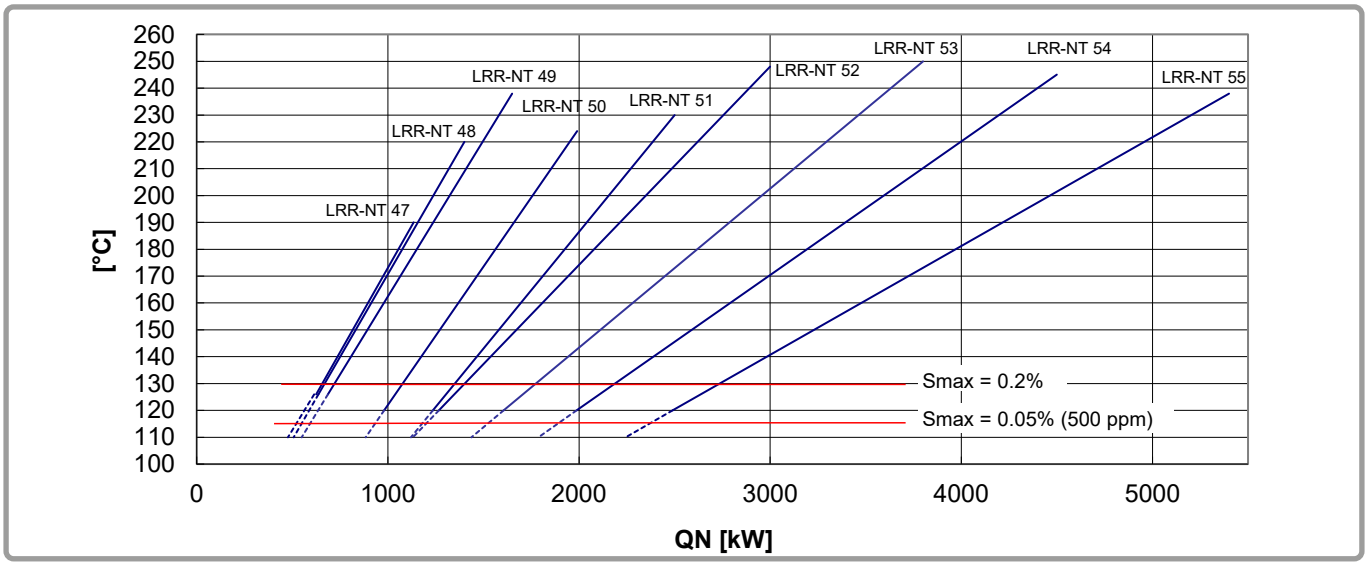


figure 9 - Flue gas temperature diagram LRR-NT, fuel oil with clean boiler

Technical specifications LRR-NT, natural gas

			Pyronox LRR-NT								
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**
POWER											
Boiler nominal power qN (80/60°C)	max.	kW	1150	1400	1650	2000	2789	3000	3800	4500	5400
	min.		357	353	366	484	708	721	876	1174	1462
Calorific power qF	max.	kW	1256	1554	1850	2225	2500	3381	4286	5063	6053
	min. (3)		373	368	381	504	739	757	916	1231	1531
Modulation rate	(3)	%	30	24	21	23	27	23	22	25	26
EFFICIENCIES											
Overall efficiency 60/80°C	100%	%	91.6	90.1	89.2	89.9	89.6	88.7	88.6	88.9	89.2
Overall efficiency 60/80°C	30%	%	96.4	96.2	95.9	96.2	96.1	95.4	95.5	95.5	95.7
Overall efficiency 60/80°C	min qF	%	95.9	96.0	96.0	96.2	95.8	95.4	95.6	95.4	95.5
Efficiency DIN4702-8, 60/75°C	ηN	%	95.4	94.9	94.6	94.9	94.7	94.0	94.1	94.1	94.3
MASS FLOW											
Gas flow, NG type E	max. (1) (2)	nm^3/h	126.0	155.9	185.6	223.3	279.9	339.3	430.1	508.0	607.4
	min. (1) (2)		37.4	36.9	38.3	50.5	74.2	75.9	92.0	123.5	153.6
Exhaust gas mass flow	max. wet	kg/s	0.52	0.65	0.77	0.93	1.16	1.41	1.79	2.11	2.53
	min. wet (1) (3)		0.15	0.15	0.16	0.21	0.31	0.32	0.38	0.51	0.64
EXHAUST GAS DATA, LOSSES											
Overpressure combustion chamber	max.	mbar	6.4	9.9	10.1	10.9	10.6	10.9	11.7	12.0	12.7
Exhaust gas temperature at 80/60°C	max.	°C	191	221	239	226	231	249	251	246	239
	min. (3)		95								
Exhaust gas losses at 80/60°C	max.	%	8.3	9.8	10.7	10.0	10.3	11.2	11.3	11.0	10.7
Stand-by loss qB	70°C	W	1301	1303	1460	1633	1935	2200	2728	3361	3769
HYDRAULIC DATA											
Water resistance	Δt=15K	mbar	47	69	96	68	107	48	78	109	157
	Δt=20K		26	39	54	39	60	27	44	62	89
Water flow	max.	m^3/h	66	80	95	115	143	172	218	258	309
	mini		P/45 (P = Power in th / h provided at time t.)								
Operating temperatures	max.	°C	95								
	SCO		110								

Values acc. EN303-3 at:

- lambda = 1.15, CO_2 = 10%
- T-air = 20 °C, rel. humidity = 60%, p-baro = 100 kPa

(1): LCV = 9.97 kWh/nm^3
(2): nm^3 at 0°C, 1013 mbar
(3): S max = 10 mg / nm^3

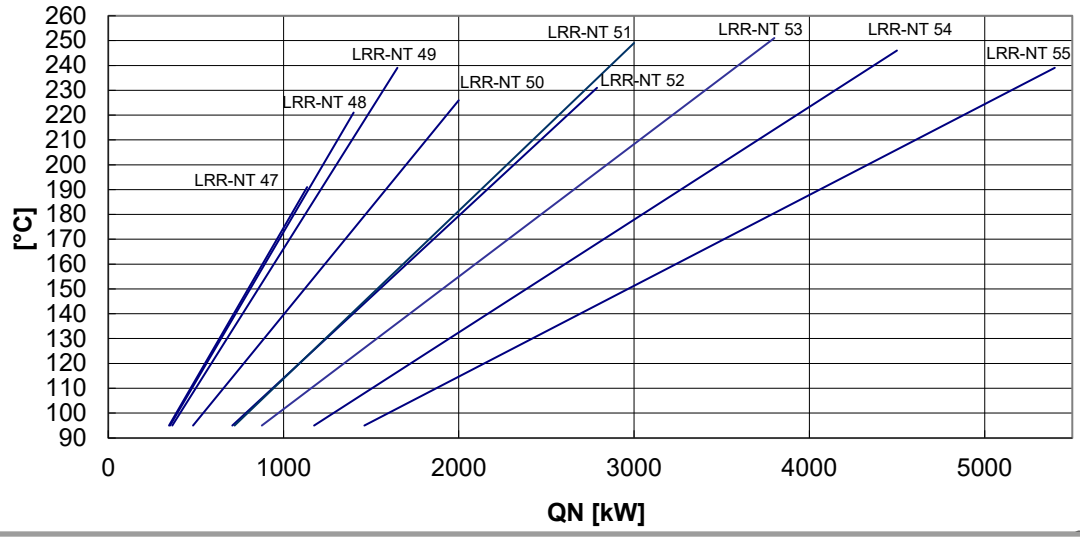


figure 10 - Flue gas temperature diagram LRR-NT, natural gas with clean boiler

2.6. Correction values for different operating conditions

2.6.1. Flue gas temperature correction values

Average boiler water temperature	tm °C	50	60	70	80	90	100
Flue gas temperature difference	Δt K	- 16	- 8	± 0	+ 8	+ 16	+ 24

Excess air	λ –	1.10	1.15	1.20	1.25	1.30	1.35
Flue gas temperature difference	Δt K	- 6	- 3	± 0	+ 3	+ 6	+ 8

2.6.2. Modulation range

In chapter 2.7 modulation ranges are indicated for an average boiler water temperature of tm = 70°C.

Since the minimum power of the boiler is limited by the minimum allowable flue gas temperature, the modulation range increases when the average boiler temperature increases. This is exemplary illustrated in the figure below (example for oil operation with a minimum flue temperature of 120°C).

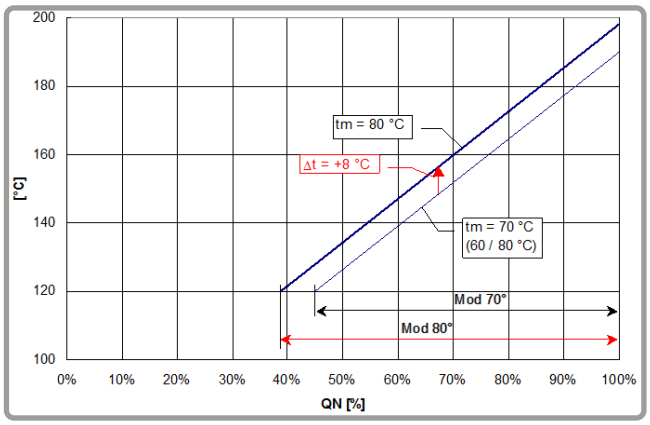


figure 11 - Flue gas temperature – Boiler power diagram
(example for two average boiler water temperatures)

2.6.3. Stand-by loss correction values

Average temperature difference *	tm	°C	30	40	50	60	70
Stand-by loss correction	ΔqB	%	- 40	- 20	± 0	+ 20	+ 40

* Average temperature difference = Average boiler water temperature minus ambient air temperature

Average boiler water temperature = Average of supply and return temperature

3. BOILER CONTROL PANEL

INFORMATION:

For hot water installation:

- o Maximal operating temperature: 95°C when the boiler is managed by a Navistem B1000 ou B2000.
- o Maximal operating temperature: 105°C if the regulation system is compatible with this work.

In any case, this device has been designed according to EN 14394. The safety limit thermostat does not exceed 110 °C.

3.1. Description

Several types of control panel are assigned to Pyronox LRR and LRR-NT.

The NAVISTEM B1000 control panel without heating regulator is used to manage the operation of a burner at 1 or 2 stages using a double regulation thermostat. It does not protect the boiler against condensation in the steel heater housing, ensuring a minimum return temperature of 50° C with oil and 60° C with gas.

The NAVISTEM B2000 control panel with RVS 63 heating regulator enables management of the operation of the burner (speed 1 / 2 or modulating), heating circuits and domestic hot water production.

The RVS 63 regulator is equipped with digital logic enabling the boiler to be protected against cold starts. It also enables management of the flow and temperature of return water by acting on the three-way valves of the heating circuits or three-way valve for heating the boiler return temperature.

The control panels are supplied ready to be connected. The regulators must be set according to the recommendations in the instructions provided in the control panel to protect the boiler against condensation. Settings must also be adapted to comply with the hydraulic system configuration (circuits for heating, domestic hot water, etc.).

The steel sheet housing is ready to be mounted on top of the boiler cover or on the carrier located on the side cover.

The electrical diagram is attached to the control panel.

3.2. Basic equipment NAVISTEM B1000 and B2000

- Burner ON / OFF switch
- 6.3 A H 250VAC fuse for burner
- 6.3 A H 250VAC fuse(s) for regulator(s)
- Safety thermostat
- Regulating thermostat for 1st and 2nd speed (2nd speed inactive for a NAVISTEM B2000 panel with RVS 63 regulator)
- Overheat indicator
- Burner safety indicator
- External fault indicator
- Water thermometer

3.3. Additional equipment

- Timer and pulse counter speeds 1 and 2
- Dry contacts module / overheating fault, burner fault, burner operation at speed 1, burner operation at speed 2, external fault indicators
- Dry contacts module and burner reset
- Three-phase burner power supply
- RVS 46 additional heating regulator (management of a mixer valve circuit)

3.4. Heating regulators

3.4.1. RVS 46 regulator (optional on the NAVISTEM B2000 control panel)

Regulator not included in the basic panel (sold as additional equipment) :

- Slave heating regulator to control a mixer valve heating circuit
- Return temperature mixer valve protection: protection against condensation in the steel heater when the RVS 63 outputs are already used to manage two heating circuits.

3.4.2. RVS 63 regulator (included as standard with NAVISTEM B2000 control panel)

Regulator enabling :

- A burner to be run at one speed, two speeds or modulating
- Running a direct heating circuit
- Running two heating circuits or one heating circuit and a mixer valve protecting the heater in return temperature
- Running domestic hot water preparation
- Achieve a tile effect with one or more other boilers equipped with a SIEMENS regulator (LPB communication bus).

3.5. Burner cables

Depending on the order, sets of cables with standardised 7 and 4 pin connectors (DIN 4791) can be supplied with the control panel. The burners used should be equipped with suitable connectors.

4. INSTALLATION GUIDE

4.1. Boiler room and boiler room ventilation

The boiler room must be arranged in compliance with local regulations and installation specifications. Particular attention should be paid to the ventilation of the boiler room. Supply of combustion air must be guaranteed (non-shut opening).

Minimum air requirement is 1.6 m^3/h for each kW of boiler power.

Minimum free section of combustion air opening is 6 cm^2 for each kW of boiler power.

CAUTION:

The combustion air must not have high dust concentrations.

Furthermore, it must be free of halogens (chlorine and fluorine compounds). An excessive presence of halogen in the combustion air leads to great corrosion damage. The maximum permitted amount of halogen in the combustion air is 5 ppm.

Halogen compounds are found in spray cans, thinners, cleaning agents, degreasing agents and solvents, among others. In addition, halogen emissions are strongly suspected in the vicinity of dry cleaners', hair dressing salons, swimming pools, printing offices and washing machines installed in the same room. In the case of doubt, the perfect quality of the combustion air must be ensured with an external air intake. Make sure that there is a minimum loss of pressure, since this could impair the performance of the burner.

4.2. Planning dimensions

4.2.1. Space required

It must be possible to open the furnace door, including burner, by 90°.

E = Burner length

A = E + d + 150 mm

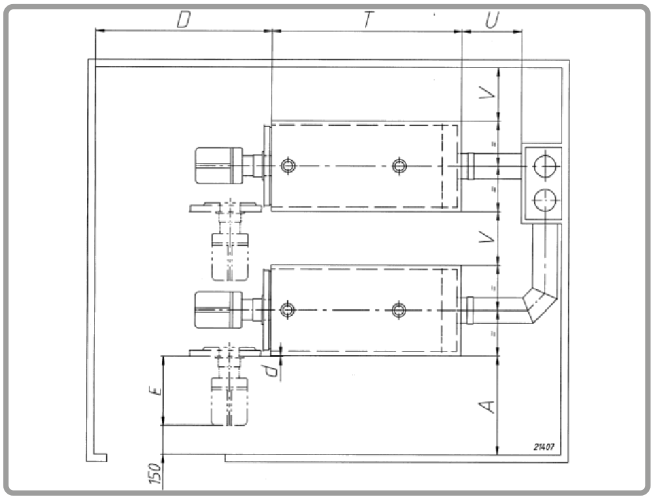


figure 12 - Planning dimensions

4.2.2. Boiler base

If the floor of the boiler room is moist or loose, a sufficiently high boiler base must be provided. Moisture does not go well with electrical equipment!

A base is also a good idea if the height is not sufficient for installing the burner.

Otherwise, no base is needed for the boiler series.

4.2.3. Boiler support

It is possible to mount the boiler on vibration dampers (available as option) to reduce noise transmission caused by vibrations.

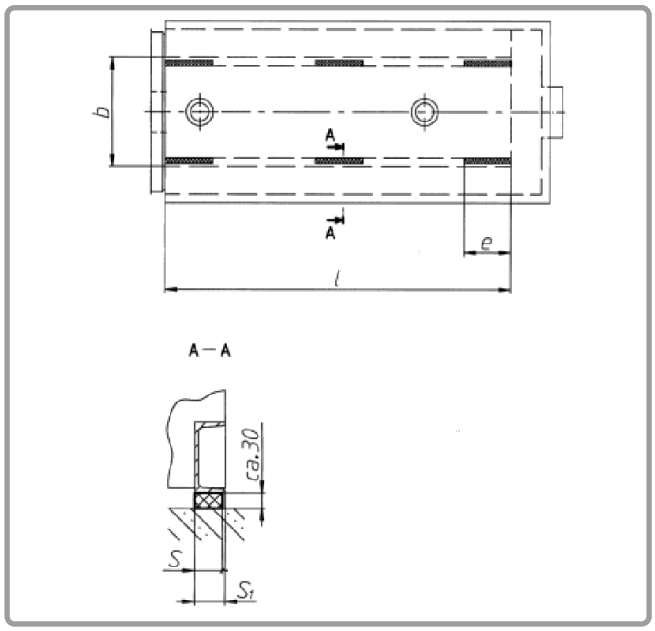


figure 13 - With vibration dampers

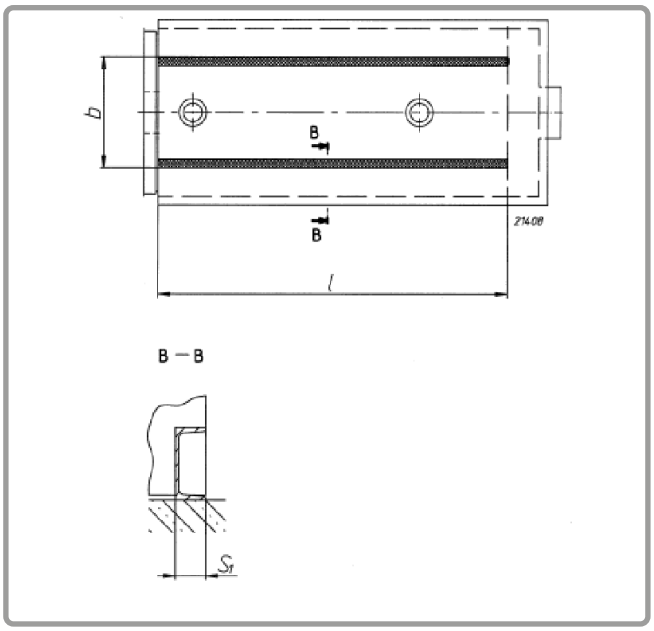


figure 14 - Without vibration dampers

			Pyronox LRR 47-59 / LRR-NT 47-55												
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
Distance wall - boiler body front	D	mm	2400	2400	2700	2900	3100	3300	3800	4000	4400	4800	5200	5700	6200
Boiler length	T	mm	2791	2791	3011	3301	3501	3791	4350	4590	4990	5409	5859	6401	7002
Distance wall - boiler back	U	mm	1000	1000	1000	1150	1150	1150	1150	1150	1150	1150	1150	1150	1150
Distance wall - boiler flank (*)	V	mm	600	600	600	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Boiler feet length	I	mm	2454	2454	2674	2934	3096	3356	2700	2850	3200	4110	4510	4912	5412
Boiler feet width	b	mm	810	810	900	940	1015	1060	1150	1290	1350	1520	1610	1670	1730
Measure	d	mm	0	0	0	0	0	0	15	15	15	42	42	42	42
Silent block length	e	mm	562	562	562	562	562	706	706 / 562	706	634	634	634	670	670
Silent block width	S	mm	50	50	50	50	50	50	50	50	60	75	75	85	85
Number of silent blocks			4	4	4	6	6	6	6 / 2	8	10	12	14	14	16
U-girder width	S1	mm	55	55	55	55	55	55	60	60	65	80	80	90	90

* The dimension can be reduced to 200 mm, as long as this does not impair the operation of the control panel and the ability to open a nearby furnace door.

The mounting instructions for the silent blocks can be found in the separate assembly guide.

After this, you can start installing the connection tubes on the water and flue gas side.

CAUTION: Once the boiler is filled up, it will come down by further 3-5 mm.

4.3. Hydraulic connection

For the hydraulic connection of the heating system and water heaters– in particular with regards to technical safety devices such as safety valves, expansion tanks, etc. – refer to generally accepted engineering rules as well as locally applicable standards, specifications and regulations.

If boilers are installed in **garret-based heating plants** or at the highest point of the heating system, then boilers will have to be provided with additional safety devices (such as protections against water shortage). Observe the minimum operating pressure as specified in chapter 2.2, page 11. Act in compliance with local safety regulations in force at all times.

Before connecting the boiler to an **old installation**, it is necessary to flush the whole heating system. It is also recommended to provide for a sludge separator.

To protect the boiler from return temperatures below the limits as specified in chapter 2.1, page 11, the boiler should be provided with an **automatic return temperature regulation**.

If the boilers are combined with a **water heater**, make sure that their size and capacity correspond to the installed boiler capacity.

A component-tested membrane safety valve must be used to reliably prevent the permitted operating overpressure in the water heater from being exceeded; it must not be possible to shut the valve off from the water heater.

When water heaters with an electrical auxiliary heater are used, a reliable check valve must be installed in the charging tube between the boiler and the water heater.

Boiler's maximum operating pressure and the maximum operating temperature are given in chapter 2.1, page 11.

No minimum level of the amount of circulating water is required.

Damage can occur from **corrosion** when oxygen continuously enters the heating water through open installations, expansion tanks that are too small, floor heaters with pipe material that is not oxygen-tight, etc.

If this cannot be prevented, additional measures are necessary in the form of correctly used oxygen binding agents or chemicals. If it is not possible to realize an installation without oxygen entrance, a **system separation** must be set up using heat exchangers.

4.4. Electrical installation

4.4.1. General notice

The electrical installation must be carried out by an authorised electrician from beginning to end. In carrying out the electrical installation, local regulations as well as any standards and specifications in force must be complied with.

The mounting instructions for the control panel and its support can be found in the separate assembly guide.

The wiring diagram is joined with the control panel.

CAUTION:

Electrical connections, especially the connection to the mains, should only be made after all other assembly and installation work has been completed.

Locally made installations (raceways, etc.) must not be clamped to the boiler's cladding!

4.4.2. Connecting to the supply mains

External supply is one-phase, alternate current type 230VAC, 50Hz or three-phase alternate current 400VAC, 50Hz, both max. 16A. The apparatus is internally protected by a 6,3A delayed-action fuse (burner/boiler) and by an additional 6,3A delayed-action fuse for each additional governor or module.

The quality of the supply must respect norm EN50160 (voltage ±10% maxi, frequency ±1%).

All external connection cables to the boiler must be suitably laid on site.

A DIN VDE 0116-compliant disconnecting device must be provided on site.

4.4.3. Connecting the burner

The electrical connections of the burner (power supply and control) are made by the customer in accordance with the requirements of the burner.

4.5. Turbulators

Thanks to the turbulators, which are to be inserted in the smoke tubes, the combustion gas temperature can be controlled.

All smoke tubes in the third pass must equally be provided with turbulators. These smoke tubes are those that are open on the rear part, in the direction of the combustion gas collector.

The mounting instructions can be found in the separate assembly guide.

			Pyronox LRR / LRR-NT / LRR-GF / LRR-GF-NT											
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
Number of turbulators			36	36	71	48	43	48	54	63	72	80	84	91	99
Outer diameter	Da	mm	44				60	72							
Edge diameter	d	mm	6				8	10							
Pitch	A	mm	55				70	80							
Length	L	mm	1200				2200	3100							

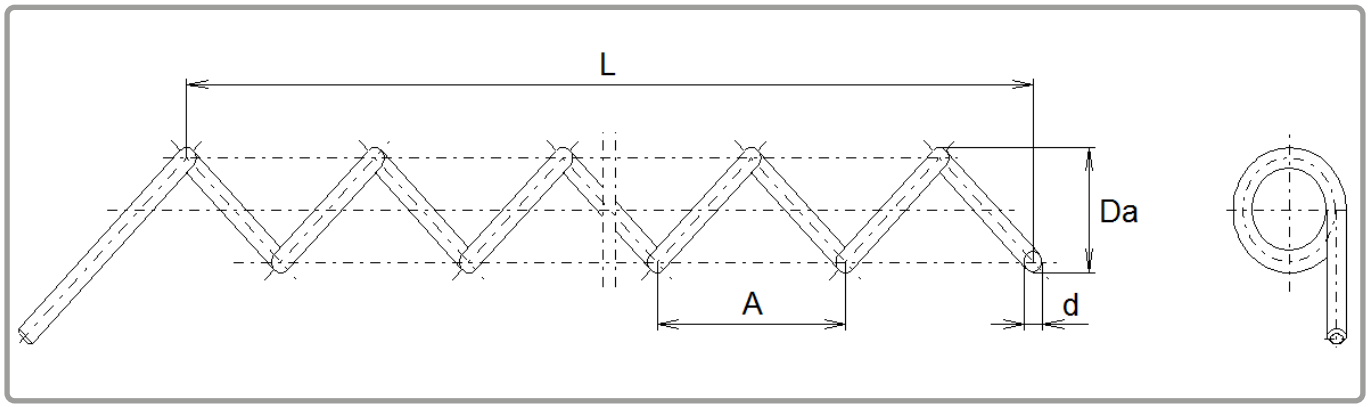
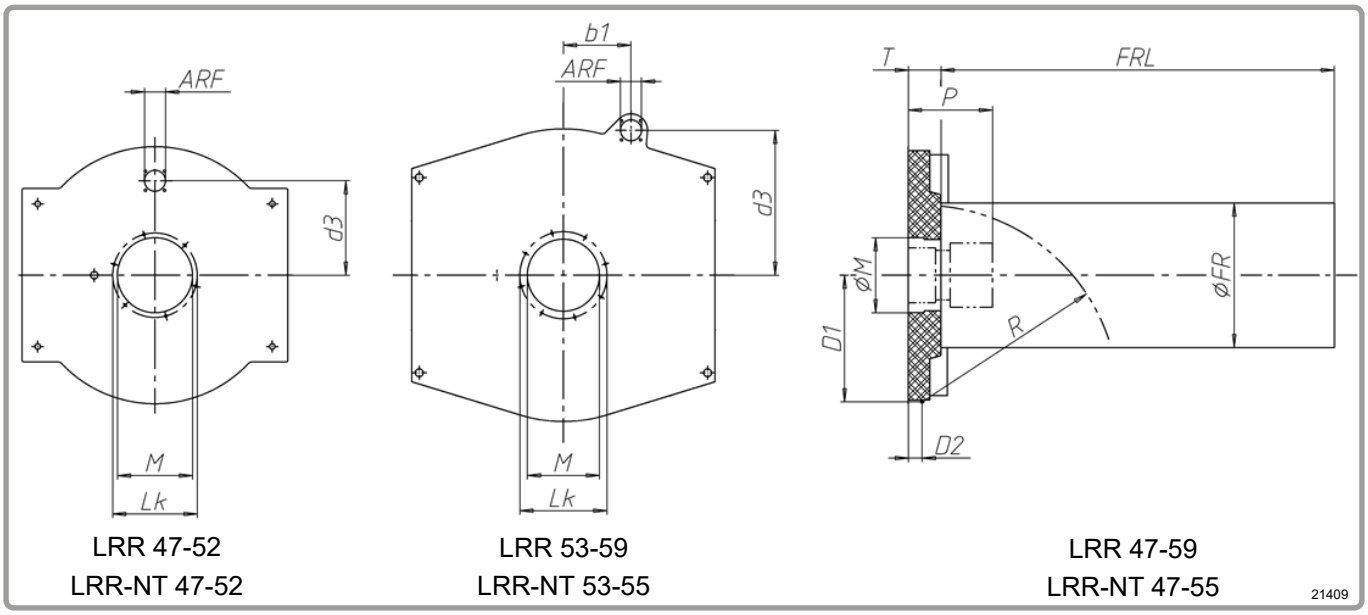


figure 15 - Turbulator

4.6. Connecting the burner

4.6.1. Burner mating dimensions / orientation possibilities for Pyronox LRR & LRR-NT



LRR 47-52
LRR-NT 47-52

LRR 53-59
LRR-NT 53-55

LRR 47-59
LRR-NT 47-55

figure 16 - Burner mating dimensions for LRR / LRR-NT

			Pyronox LRR / LRR-NT												
			47	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
FURNACE															
Length	FRL	mm	2365	2365	2559	2825	2985	3265	3765	3980	4360	4690	5090	5550	6120
Diameter	FR	mm	675	675	712	750	811	870	1020	1110	1220	1270	1350	1430	1500
BURNER CONNECTION															
Burner admittance diameter	M	mm	330		380				480		510	540	580	580	620
Burner mini	P	mm	180		220				290			350	370	390	
tube max (qN max)			350		400		300		440	390		430		500	
length (*) max (qN low NOx)			520		520		470		590	540		580		600	
Screw hole centre diameter	Lk	mm	400		450				580			640	680	680	700
			6xM12, -15°		6xM16, -15°				8xM12, -15°			4xM16, +20° / 4xM12, -20°			
Maximum door load from burner weight (**)		kg x m	190		210	230	270	300	370	440	500	745	850	915	980
BURNER ORIENTATION															
Max. swivel radius	R	mm	1010		1065	1118	1210	1280	1365	1505	1615	1780	1895	1985	2065
Distance boiler axle - pivot	D_1	mm	670		705	739	801	842	860	960	1015	1150	1225	1275	1320
Distance door flange - pivot	D_2	mm	62		79				130			172			
Door thickness	T	mm	134		174				240			292	312	332	

* Burner tube lengths without consideration of an eventual intermediate flange

** Load as burner weight x distance burner centre of gravity - door. When necessary use a burner support.

4.6.2. Burner assembly

The front door of models LRR 47-55 and LRR-NT 47-55 is provided with a norm-conform flange to fit the burner. An additional intermediate flange may nevertheless be necessary to fit the burner. Models LRR 56-59 will in most cases require a special flange. This intermediate flange and related screws must be ordered separately or supplied by the burner manufacturer.

CAUTION: The intermediate space between the burner tube and door hole must be filled with the supplied insulating material before the burner is commissioned (see separate assembly guide).

4.6.3. Connection to the fuel supply

The whole installation may only be carried out by a licensed installation company. The installation must be performed in accordance with local regulations. Particular care is to be taken that measures are foreseen to prevent any burner start when the boiler door is open. Good practice is to connect the fuel supply to the burner in such a way that the supply line has to be disconnected in order to be able to open the boiler door. Another possibility is to attach the burner cables with glands in such a way that the connectors on the burner have to be pulled to open the door.

CAUTION: Customer installations (oil tubes, etc.) must not be attached to the boiler cladding!

Gas burner

Observe the separate instructions of the supplied burner.

The gas installation must be dimensioned in accordance with the gas flow rate and the available gas pressure.

A shut-off valve must be installed in the gas supply line to the burner.

INFORMATION:

Before the gas burner is connected to the gas line, it must be ensured that the line has been blown through and is free from particles and chips.

The gas line must be checked for leakage during commissioning and after each disconnection (leak detector spray).

The installation may only be operated using gas of the intended quality – observe additional panel on boiler!

Oil burner

Observe the separate instructions of the supplied burner.

4.6.4. Part load operation

Stick to the minimum power of the supply heat according the technical data, chapter 2.7 and 2.8.

4.7. Flue gas system

The Pyronox LRR, and LRR-NT boilers have been developed using the latest technologies. The perfect balance existing between boiler and chimney ensures optimal fuel use and economical system operation as a result.

The pertinent rules of technology and good practice as well as the country-specific regulations and valid standards must be observed.

4.7.1. Section determination

Sections must be calculated for boilers without draught.

Fuel type, power output, combustion gas temperature and quantity, chimney construction and height are all important elements in determining sizes.

4.7.2. Flue gas tubes

We recommend the use of flue gas tubes made from acid-resistant, non-corrosive materials. The tube must be laid and introduced in the chimney to an inclination of 30-45° to minimize pressure loss. The tube will have to be inserted in such a way as to prevent any condensation reversal from the chimney down into the boiler. To avoid vibration transmission, combustion gas tubes must be fitted with adequate sleeve tubes or clamps. Connections exceeding 1 m in length should be insulated.

At the same time, ensure that the measuring pipes extend beyond the insulation and that flanges and cleaning covers remain accessible.

The chimney must be designed so that it is gas and pressure-tight as well as moisture-insensitive and acid-resistant.

5. OPERATING CONDITIONS

5.1. Fuels

The Pyronox LRR boilers are designed for operation with fuel oil EL and natural gas. Models Pyronox LRR 53-59 can also be operated on heavy fuel.

CAUTION: The use of other fuels such as for example biogas is only permitted with the express approval of the manufacturer.

5.2. Combustion air

The combustion air must not have high dust concentrations.

CAUTION: Furthermore, it must be free of halogens (chlorine and fluorine compounds). An excessive presence of halogen in the combustion air leads to great corrosion damage. Make sure that no paints, thinners, cleaning agents, degreasing agents, solvents, chlorine containers, etc. are stored in the boiler room!

5.3. Filling the installation and water quality

The installation must be thoroughly rinsed before it is finally filled.

When filling for the first time and refilling, check the quality of the water in accordance with the values recommended in chapter "Water quality", page 5. Poor water quality leads to damage in heating installations from calcification and corrosion. On the other hand, the service life, functional reliability and efficiency can be increased using appropriately treated water.

During the filling process, the circulation pumps should be switched off and all ventilating valves opened, so that the air in the system can completely escape. The filling process is finished when the operating pressure has been reached.

5.4. Protection against corrosion

Normally, no corrosion problems arise if systems are properly designed and installed and are run according to these instructions; consequently there is no need to use chemical additives. However, if water is of poor quality or if oxygen seeps from the air into the heating system (expansion chambers open, expansion/supply chambers too small, plastic tubes without diffusion blocking in floor heating) damages are something which cannot be completely excluded. If you happen to use chemical additives in your system, make sure that they are effective, harmless and above all appropriate for the materials your system is made of. Enquire with your chemical additive supplier.

In this case, you will need to arrange for a specialist water company to carry out annual quality checks on the water used in the heating system in order to avoid any damage to the system

.

5.5. Requirements for operation

The maximum operating pressure and the maximum temperature to be observed are listed on the type plate. The minimum temperatures to be observed are given in chapter 2.1.

It is strictly recommended to maintain the boiler in operation during several hours after a cold start-up in order to evaporate condensates that are inevitably formed in any boiler during cold start-up.

6. OPERATION

Read this section of the manual with great care and get an installer to explain the heat producing system in all its different aspects: regulation and control.

If you suspect that the boiler or other part of the system is frozen, do not start the system.

Note for LRR 53-59 and LRR-NT 53-55: The boiler door screws on the side of the axis of rotation must NOT be loosened!

Please also note the operating conditions described in chapter 5.

6.1. Commission

Before commissioning the system, please check:

- Whether the burner and the fuel system have been checked and the settings of the burner correspond to the required performance of the unit. Observe the instructions for putting the burner into operation,
- Whether any foreign matter has been removed from the boiler furnace,
- Whether the turbulators have been properly installed,
- Whether the clearance space around the burner tube has been filled with insulation material,
- Whether the boiler door is closed properly,
- Whether the heating system has been filled up with water and completely vented,
- Whether the thermostats are properly regulated and whether the heating system governor has been set according to the necessary parameters by the support service or by the installer,
- Whether the regulation and safety devices work properly,
- Whether all shut-off valves (of both water and burner) have been opened,
- Whether the circulation pumps work,
- Whether the air supply is ensured and the flue outlet is free.

The unit is put in operation by actuating the ON/OFF switch of the control panel (position I) or possibly, depending on the installation, by actuating a switch on the burner or within the central control cabinet.

The inside of the burner door is built using insulating, refractory concrete. The residual humidity present in the concrete, resulting from the manufacturing process, may, during the initial operating phase, release steam and form water droplets on the door. The steam must be allowed to escape throughout the pre-heating phase before reaching the operating temperature. This process can last one week. The increase in operating power of the burner must be progressive during this period.

INFORMATION:

Pre-heating may result in the appearance of cracks. Small shrinkage splits and cracks do not hinder operation and do not represent a defect; they are unavoidable.

6.2. Decommission

The unit is put out of operation by actuating the ON/OFF switch of the control panel (position O) or possibly, depending on the installation, by actuating a switch on the burner or within the central control cabinet.

Should the heat producing system remain off for several weeks, we recommend that the following measures be taken:

- Close the fuel supply,
- Clean and protect the heating surface of the boiler. Your installation contractor will be pleased to give you some advice.
- In case of frost warnings, drain the system or add an anti-freeze product and follow the instructions given in chapter 5.4.

6.3. First steps to take in case of failure

In the event of system operational failure, perform the checks in the table below. Also check the governor set-up. If the failure cannot be eliminated, call a reliable engineer or your support service.

Problem	Possible cause	Solution
Burner not functioning	No power.	Check fuse, switch on main or safety switch. Connect supply and burner plug.
	Burner LED is on.	Press burner reset button.
	No oil.	Add oil.
	Gas pressure insufficient.	Call the gas board.
	Overheat temperature LED is on. Safety thermostat has come into operation.	Fix the cause, wait until temperature has dropped below overheat setpoint then reset the safety thermostat by pushing the pin.
	External default LED is on.	Fix the cause.
No heat release to consumers	Incorrect operation type setting on governor.	Set up type of operation and heating programme.
	Circulation pump blocked.	Remove locking screw, turn shaft until no more resistance is left.
	Water level or system pressure.	Top up and ventilate.
	Shut-off elements on supply and return lines closed.	Open them.

7. MAINTENANCE

To maintain the high degree of efficiency of the unit, it is necessary to service it regularly. Depending on the type of operation, annual or semi-annual servicing is recommended.

The boiler and firing must be inspected by a qualified specialist in accordance with the official regulations.

Before performing any work on the unit, it must be disconnected from the mains and the fuel supply must be shut off.

DANGER: The device contains components made of synthetic silicon mineral fibres (ceramic and glass fibres, insulation wool). In order to avoid all types of health hazards, suitable clothing and a protective mask must be worn for work on or with these components.

7.1. Periodical checks and maintenance operations

- Check manometer with circulation pump off. Low water or pressure level indicates that the system must be filled up with water.
- Check that the expansion chambers function properly.
- Check safety valves as well as heating and hot water system blowers.
- Carry out burner maintenance according to the recommendations given in the burner manual.
- Check fuel oil level.
- Clean boiler and chimney.

7.2. Boiler cleaning

Boiler should be cleaned by your chimney sweeper and engineer.

The cylindrical type construction of the boilers makes cleaning much easier to perform. However, we recommend that heating surfaces in fuel oil boilers be cleaned with appropriate chemical products. Your installation contractor, as an engineer, will know how to best advise you.

- Turn off burner,
- Disconnect burner plug from socket,
- Loosen boiler door screws and rotate door together with burner. **Attention: On LRR 53 – 59 and LRR-NT 53-55 do NOT loosen screws on the side of the axis of rotation!**
- Remove the turbulators,
- Clean the combustion chamber and smoke tubes,
- Disassemble the lid on the back of the boiler and clean the flue gas collector,
- Re-install the cleaned turbulators following the instructions given in chapter 4.5 of these instructions,
- Re-install lid and close furnace door,
- Start up burner again.

7.3. Burner maintenance

The regular maintenance of the burner (body, jet, burner head, igniter, pump filters) must be carried out by a qualified specialist in accordance with the instructions of the burner.

After the work has been completed, the settings of the burner must be checked to ensure that they meet the performance requirements of the unit.

8. SPARE PARTS

Spare parts on request.

SATC ATLANTIC SOLUTIONS CHAUFFERIE
1 route de Fleurville
01190 PONT DE VAUX
Tél. : 03 51 42 70 03
Fax : 03 85 51 59 30
www.atlantic-solutions-chaufferie.fr

THERMOR SERVICES
17 rue Croix Fauchet - BP 46
45141 SAINT-JEAN-DE-LA-RUELLE
Tel.: N°Azur 0 810 081 045
0,06 € TTC/MN
www.thermor.fr

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Fax : 902 45 45 20
callcenter@groupe-atlantic.com
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www.ygnis.es

Others countries, contact your local retailer

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