Installation & Servicing Instructions

High efficiency condensing gas boiler

Q Premier

QP85N / QP130N

Pictured: QP130N

CAUTION!
Read this manual thoroughly before installing, servicing, putting into operation or using this boiler and vent system.

WARNING!
Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury (exposure of hazardous materials)* or loss of life. Refer to the user's information manual provided with this boiler. Installation and service must be performed by a licensed professional, service agency or the gas supplier (who must read and follow the supplied instructions before installing, servicing, or removing this boiler).

CAUTION!
The user manual is part of the documentation that is delivered to the installation's operator. Go through the information in this manual with the owner/operator and make sure that they are familair with all necessary operating instructions.

NOTICE!
Installation and service must be performed by a licensed professional, service technician or the gas supplier.
In the Commonwealth of Massachusetts this boiler must be installed by a licensed Plumber or Gas Fitter.

WARNING!
If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**
- **WHAT TO DO IF YOU SMELL GAS**
  - **Do NOT try to light any appliance.**
  - **Do NOT touch any electrical switch.**
  - **Do NOT use any phone in your building.**
  - **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
  - **If you cannot reach your gas supplier, call the fire department.**

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These instructions to be retained by user.

8U.51.54.02/10.13

Contents of instructions
These installation instructions contain important information for the safe installation, start-up and maintenance of boilers with capacities 85,000 through 130,000 BTU/hr.
These installation instructions are intended for licensed professionals, who have the necessary knowledge and are approved for working on heating and gas systems.

Subject to technical changes
Changes may be made without notice to the illustrations, process steps and technical data as a result of our policy of continuous improvement.

Updating of documentation
Please contact us if you have any suggestions for improvements or corrections.

Find our contact details on the back of this manual.

California Proposition 65 lists chemical substances known to the state to cause cancer, birth defects, death, serious illness or other reproductive harm. This product may contain such substances, be their origin from fuel combustion (gas, oil) or components of the product itself.

Rinnai combi boilers comply with the State of California Lead Law (AB1953).

Content

1 Safety and general instructions

Please observe these instructions in the interest of your own safety.

1.1 Designated use

The boiler is designed for heating water for a central heating system and, if applicable, generating domestic hot water. The boiler is delivered with a burner controller (MCBA) pre-installed.The boiler can be fitted with a modulating outdoor reset sensor ARV12 (included with the boiler) or an On/Off thermostat or relay panel end switch (accessories).

1.2 Hazard definitions

The following defined terms are used throughout the documentation to bring attention to the presence of hazards of various risk levels. Notices give important information concerning the operation of the product.

DANGER

DANGER:
Indicates the presence of hazards that will cause severe personal injury, death or substantial property damage.

WARNING

WARNING:
Indicates the presence of hazards that can cause severe personal injury, death or substantial property damage.

CAUTION

CAUTION:
Indicates presence of hazards that will or can cause minor personal injury or property damage.

CAUTION

CAUTION:
Risk of electric shock. Indicates presence of hazards due to electric shock.

NOTICE

NOTICE:
Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

1.3 Symbol definitions

The following (safety) symbols may be encountered in these installation instructions and on the unit:

This symbol indicates that the unit must be stored away from freezing conditions.

This symbol indicates that the packaging and/or contents can be damaged as a result of insufficient care taken during transport.

This symbol indicates that, while still in its packaging, the unit must be protected from weather conditions during transport and storage.

1.4 The following instructions must be followed

- The boiler must only be used for its designated purpose, as described in the Installation Instructions.
- Each unit is fitted with a data plate. Consult the details on this plate to verify whether the boiler is compliant with its intended location, e.g.: gas type, power source and venting classification.
- Only use the boiler with the accessories and spare parts listed.
- Other combinations, accessories and consumables may only be used if they are specifically designed for the intended application and do not affect the system performance and the safety requirements.
- Maintenance and repairs must be performed by a licensed professional.
- Installation of a condensing gas boiler must be reported to the relevant gas utility company and have it approved.
- You are only allowed to operate the condensing gas boiler with the vent system that has been specifically designed and approved for this type of boiler.
- Please note that local permission for the vent system and the condensate water connection to the public sewer system may be required.

You must also respect:

- The local building codes stipulating the installation rules.
- The local building codes concerning the air intake and outlet systems and the chimney connection.
- The regulations for the power supply connection.
- The technical rules established by the gas utility company concerning the connection of the gas connection to the local gas mains.
- The instructions and standards concerning the safety equipment for the water/ space heating system.
- The Installation Instructions for building heating systems.
- The boiler must be located in an area where leakage of the boiler or connections will not result in damage to the area adjacent to the boiler or to lower floors of the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan be installed under the boiler.
- The boiler must be installed in such way that the all components are protected from water (dripping, spraying, rain etc.) during boiler operation and service.
- The boiler must not be installed on or against carpeting.
- Do not restrict or seal any air intake or outlet openings.
- If you find any defects, you must inform the owner of the system of the defect and the associated hazard in writing.

WARNING

In failure to properly commission the boiler as described in section 13 may result unreliable burner operation, reduced component life, and unsafe boiler operation.

DANGER

DANGER. Gas is flammable and may cause an explosion.
Beware if you smell gas: there may be an explosion hazard!

If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WARNING

WHAT TO DO IF YOU SMELL GAS

- Do NOT try to light any appliance.
- Do NOT touch any electrical switch.
- Do NOT use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supllier, call the fire department.

WARNING

Should overheating occur or the gas supply fail to shut off, do not turn off or disconnect the electrical supply to the pump. Instead, shut off the gas supply at a location external to the boiler.

NOTICE

Chemicals that are corrosive in nature should not be stored or used near the boiler or vent termination.

1.5 Follow these instructions for the space heating water

Unsuitable heating system water can cause the formation of scale or sludge, which affects system efficiency. It can also cause corrosion and reduce life of the heat exchanger.

– You must follow Rinnai guidelines for boiler water quality.
– Thoroughly flush the system prior to filling.
– Follow the Rinnai cleaning instructions.
– Never use water that has been treated by a reverse osmosis, D.I., or distilled water to soften the water to fill the heating system.
– Do not use inhibitors or other additives unless approved by Rinnai for that purpose.
– When freeze protection of the heating system is desired, only use Rinnai-approved antifreezes. The allowed maximum concentration is 50%.
– When using oxygen-permeable pipes, e. g. for under floor heating systems, you must separate the system from the boiler using plate heat exchangers.
– Valve off boiler while flushing system, do not introduce any system cleaner into the boiler loop. Flush system thoroughly to remove all system cleaner before filling boiler.

Approved antifreeze: (max. concentration 50%)	• Rhomar RhoGard Mutli-Metal (AL safe) • Noble Noburst AL	• Sentinel X500 • Fernox Alphi 11
Approved system cleaner:	• Noble Noburst Hydronic System Cleaner • Rhomar Hydro-Solv 9100	• Fernox F3 Cleaner • Sentinel X400

NOTICE

The system cleaners from NoBurst, Rhomar, and Fernox are not to be used in the boiler. The boiler must be closed off (valved off) from the rest of the system or not connected while the cleaners are in the system. The system should then be drained and then thoroughly flushed with clean water to remove all the system cleaner.

Approved inhibitors:	• Rhomar Pro-tek 922 • Noble Noburst AL inhibitor	• Sentinel X100

See the Rinnai Boiler Applications Manual or Chapter 6 and 10 of this manual for additional information.

NOTICE

If problems occur when using sanitary water with a chlorine content higher than 150 mg/l, no recourse can be made to the terms of the limited warranty.

1.6 Tools, materials and additional equipment

For the installation and maintenance of the boiler you will need:
– Standard tools for space heating, gas and water fitting
– Digital manometer that is capable of reading both positive and negative pressures
– Combustion analyzer (intended for use with condensing boilers)
– Digital multimeter
– pH digital meter
– Metric Allen wrenches
– Metric socket wrenches

In addition, a handtruck with a fastening belt is useful.

For maintenance of the boiler you will need, apart from standard tools for space heating, gas and water fittings the following items:
- Rinnai toolkit Q and E-Series

1.7 Relevant Installation, Service and User manuals

– Approved vent system
– Rinnai Boiler Applications Manual
– User manual

1.8 Disposal

– Dispose of the boiler packaging in an environmentally sound manner.
– Dispose of components of the heating system (e.g. boiler or control device), that must be replaced in an environmentally responsible manner.

2 Regulations and guidelines

The installation must comply to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest edition of the National Fuel Gas Code, ANSI Z223.1/NFPA 54. In Canada, installation must be in accordance with the requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code.

Where required by the authority having jurisdiction, the installation must comply to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ ASME CSD-1.

Install CO detectors per local regulations. Boiler requires an inspection every 2 years or 4000 hours and maintenance every 4 years or 8000 hours. See maintenance section chapter 14.

Operating Limits of the boiler:
Max. boiler temperature: 176 °F (80 °C)
Max. operating pressure: 45 psi (3 bar)
Max. Allowable Working Temperature ASME: 200 °F (93 °C)
Max. Allowable Working Pressure ASME: 45 psi (3 bar)

The hot water distribution system must comply with all applicable codes and regulations. When replacing an existing boiler, it is important to check the condition of the entire hot water distribution system to ensure safe operation.

NOTICE

For installations in the Commonwealth of Massachusetts, the following local requirements apply in addition to all other applicable NFPA requirements**:**
For direct- vent boilers, mechanical-vent heating appliances or domestic hot water equipment, where the bottom of the vent terminal and the intake is installed below four feet above grade the following requirements must comply:

1) If not present on each floor level where there are bedrooms, a carbon monoxide detector and alarm must be placed in a living area outside the bedrooms. The carbon monoxide detector and alarm must comply with NFPA 720 (2005 Edition).
2) A carbon monoxide detector and alarm shall be located in the room that houses the boiler and/or equipment and shall:
   a) Be powered by the same electrical circuit as the boiler and/or equipment such that only one service switch services both the boiler and the carbon monoxide detector;
   b) Have battery back-up power;
   c) Meet ANSI/UL 2034 Standards and comply with NFPA 720 (2005 Edition); and
   d) Have been approved and listed by a Nationally Recognized Testing Lab as recognized under 527 CMR.
3) A product-approved vent terminal must be used, and if applicable, a product approved air intake must be used. Installation shall be performed in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the boiler and/or equipment at the completion of the installation.
4) A metal or plastic identification plate shall be mounted at the exterior of the building, four feet directly above the location of vent terminal. The plate shall be of sufficient size to be easily read from a distance of eight feet away, and read "**Gas Vent Directly Below**".

For direct-vent boilers mechanical-vent heating boilers or domestic hot water equipment where the bottom of the vent terminal and the intake is installed higher than four feet above grade the following requirements must comply:

1) If not present on each floor level where there are bedrooms, a carbon monoxide detector and alarm must be placed in a living area outside the bedrooms. The carbon monoxide detector and alarm must comply with NFPA 720 (2005 Edition).
2) A carbon monoxide detector shall:
   a) Be located in the room where the boiler and/or equipment is located;
   b) Be either hard-wired or battery powered or both; and:
   c) Shall comply with NFPA 720 (2005 Edition).
3) A product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the boiler and/or equipment at the completion of the installation.

3 Description of the boiler

Room sealed boiler
The boiler retreives its combustion air from outside then discharges the flue gasses to the outside.

Condensing
Retrieves heat as much as possible from the flue gasses. Water condensates on the heat exchanger.

Modulating
Stepless higher or lower burning according to the heat demand.

The Rinnai Q Premier boiler is a room sealed, condensing and modulating central heating boiler, with an integrated DHW cylinder.

The boiler is provided with a compact stainless steel heat exchanger with smooth tubes. This design is a well engineered principle using durable materials.
The boiler burns gas for supplying heat. The heat is transferred in the heat exchanger to the water in the central heating system. By cooling down the exhaust gases condensate is formed. This results in high efficiency. The condensate, which has no effect on the heat exchanger and the function of the boiler, is drained through a condensate collector trap.

The boiler is provided with an intelligent control system (CMS Control Management System). The boiler anticipates the heat demand of the central heating system or the domestic hot water facility system.

When an outdoor sensor is connected to the boiler it will operate weather dependantly using outdoor reset. This means that the boiler control measures the outside temperature and supply temperature. With this data the boiler calculates the optimal supply temperature for the installation.

Explanation of the type indication: Rinnai QP130N
QP = Type
130 = Nominal load in (x1,000) BTU
N = Natural Gas

4 Packaging and transportation

4.1 Scope of delivery

The boiler is supplied ready for use.
- Please check if the packaging is intact.
- Check if all the items listed are included in the delivery.

The supply kit contents:

Part No.	Description	Amount QP85N QP130N
	Boiler with:	
ARV1215U	Outdoor reset sensor ARV12	1
44323420	Cover air supply Ø120/Ø80	1
44323510	Gasket vent system ø80	1
44440520	Flue pipe Ø 80 PP	1
44472600	Lip-ring flue pipe ø80	1
44770110	Flue adapter Ø80/Ø3" pps UL appr.	2
44021000	Gasket set hydraulics (5x EPDM)	5
44637900	Gasket set gas (6x Fiber)	1
8U51540x	Installation & Service Instructions	1
8U52540x	User information manual	1
8U304000	Warranty document	1
8U300600	ICSL book	1

4.2 Transportation

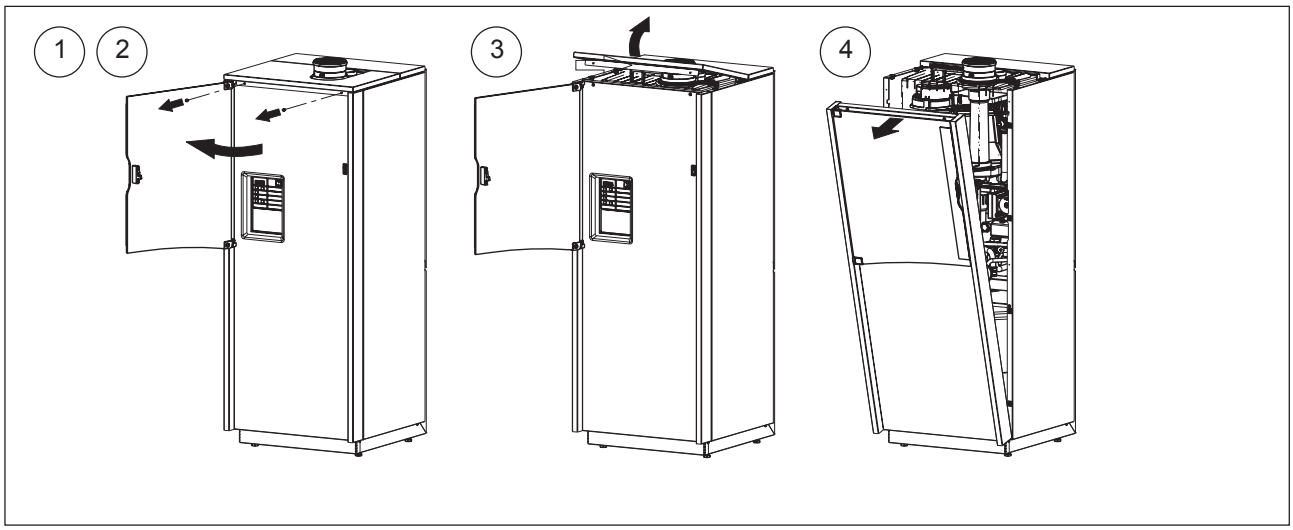
CAUTION **The boiler may be damaged when not secured properly.**

- Only transport the boiler using appropriate transportation equipment, such as a handtruck with a fastening belt or special equipment for maneuvering steps.
- When shipping the boiler must be secured on the transportation equipment to prevent it from falling off.
- Protect all parts against impacts if they are to be transported.
- Follow the transportation markings on the packaging.

• Packaged boilers must always be lifted and carried by two people, or you must use a handtruck or special equipment for transport.

The boiler is delivered on a pallet in a card board box. After removing the packaging certain parts of the casing can be removed to reduce weight for indoor transportation as follows (see figure 1):

1. Open the smoke glass door;
2. Remove the 2 screws just below the upper edge;
3. Lift the front top part at the front;
4. Close the smoke glass door and pull the complete front panel at the top towards you;



removing boiler casing *figure 1*

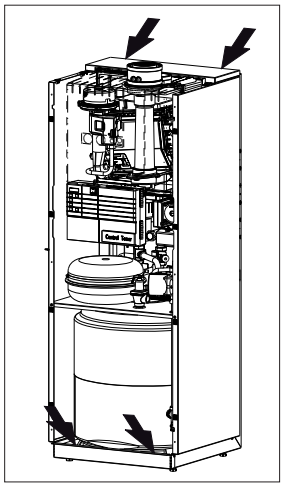
Store all removed parts after transportation and during installation in a safe place.

WARNING **Lift the boiler only by the boiler's grips and the rear wall. See figure 2. Use protective gloves.**

CAUTION **When tilting the boiler, testing water may drain from the boiler.**

Reassembly of the components is done in reverse order.

CAUTION **Make sure the pins are positioned correctly in the snap locks.**



grips *figure 2*

5 Installation

5.1 Requirements for the installation room

DANGER

- **The room where the boiler will be placed must always be free from freezing conditions.**
- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**
- **Never use or store any chlorinated detergents or halogenated hydrocarbons (e.g. in spraycans, solvents and detergents, paints, adhesives) in proximity of the boiler.**
- **The boiler must be installed in such a way that it is protected from water (dripping, spraying, rain, etc.) during operation and service (circulator replacement, condensate trap, control replacement, etc.)**
- **This boiler is for intended for indoor installations only.**

Products to avoid present in boiler room and/or around combustion air intake
Spray cans containing chloro-/fluorcarbons
Ammonium and/or ammonium solutions
Permanent wave solutions (hair product)
Chlorinated waxes and/or cleaners
Swimming pool chemicals based on chlorine
Calcium chloride used for thawing
Sodium chloride used for water softening
Refrigerant leaks
Paint or varnish removers
Hydrochloric acid/muriatic acid
Cements and glues
Antistatic fabric softeners used in clothes dryers
Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
Adhesives used to fasten building products and other similar products
Areas likely to have contaminants
Dry cleaning/laundry areas and establishments
Swimming pools
Metal fabrication plants
Beauty shops
Refrigeration repair shops
Photo processing plants
Auto body shops
Plastic manufacturing plants
Furniture refinishing areas and establishments
New building construction
Remodeling areas
Garages with workshops

5.2 Fitting the boiler

- Remove the packaging materials.

NOTICE

- **Leave the boiler on its pallet during unpacking. When unpacking, the casing can be removed from the boiler. This part can be kept seperate during installation. It must be reinstalled on the boiler and fixed with the screws behind the door before the boiler is started up.**

The boiler can be placed on most floor surfaces. The boiler is not allowed or approved to be installed on carpet flooring.

- The floor must be flat and of sufficient strength in order to be able to securely hold and support the boiler weight with its water content.
- Take note of the necessary space around the boiler for installation of the venting system, pipework and for servicing. See drawing in section 5.3.

WARNING

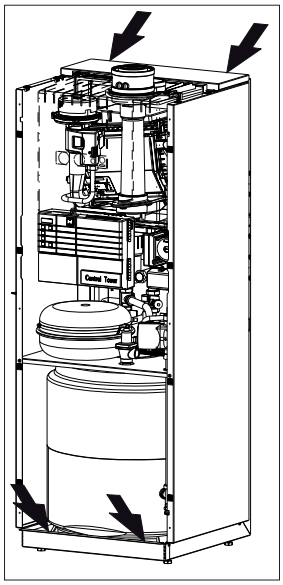
Lift the boiler only by the boiler's grips and the rear wall. See figure 3a.

CAUTION

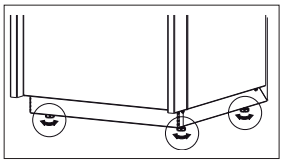
Lifting and carrying precautions.
To avoid personal injury please follow these recommendations:

- **Always lift the boiler with 2 people or use special equipment.**
- **When lifting the boiler, bend the knees, and keep the back straight and feet apart.**
- **Do not lift and twist at the same time.**
- **Lift and carry the boiler close to the body.**
- **Wear protective clothing and gloves to protect from any sharp edges.**

- Dispose the packaging materials.



position boiler grips Q Premier *figure 3a*



adjustment feet Q Premier *figure 3b*

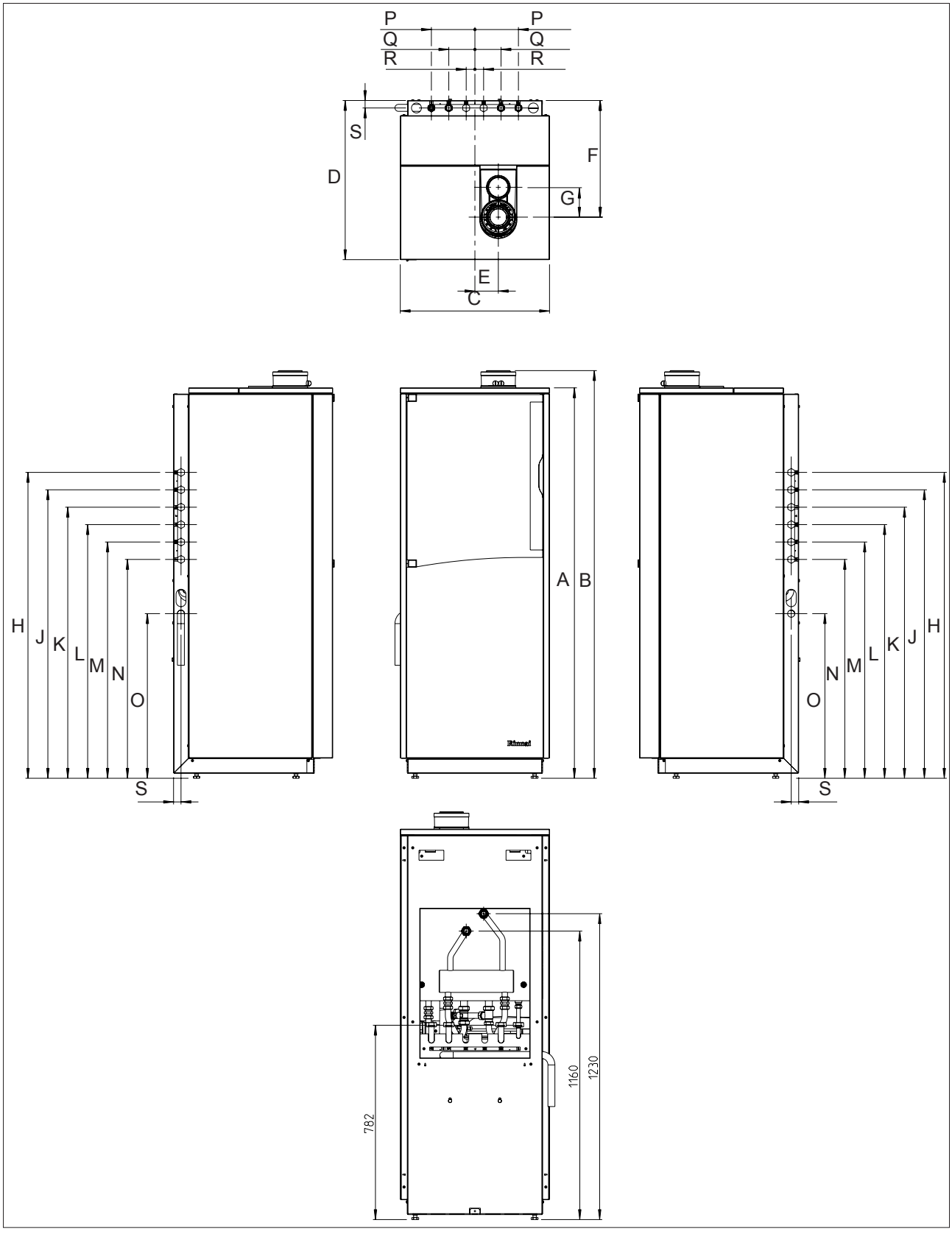
NOTICE

Lift the boiler in it's up right position and place the boiler in it's defined place. Use the adjustment feet to position the boiler vertical using a plumb rule. See figure 3b.

WARNING

Protect all parts against impacts during transportation and installation.

5.3 Dimensions



dimensions Q Premier

figure 4

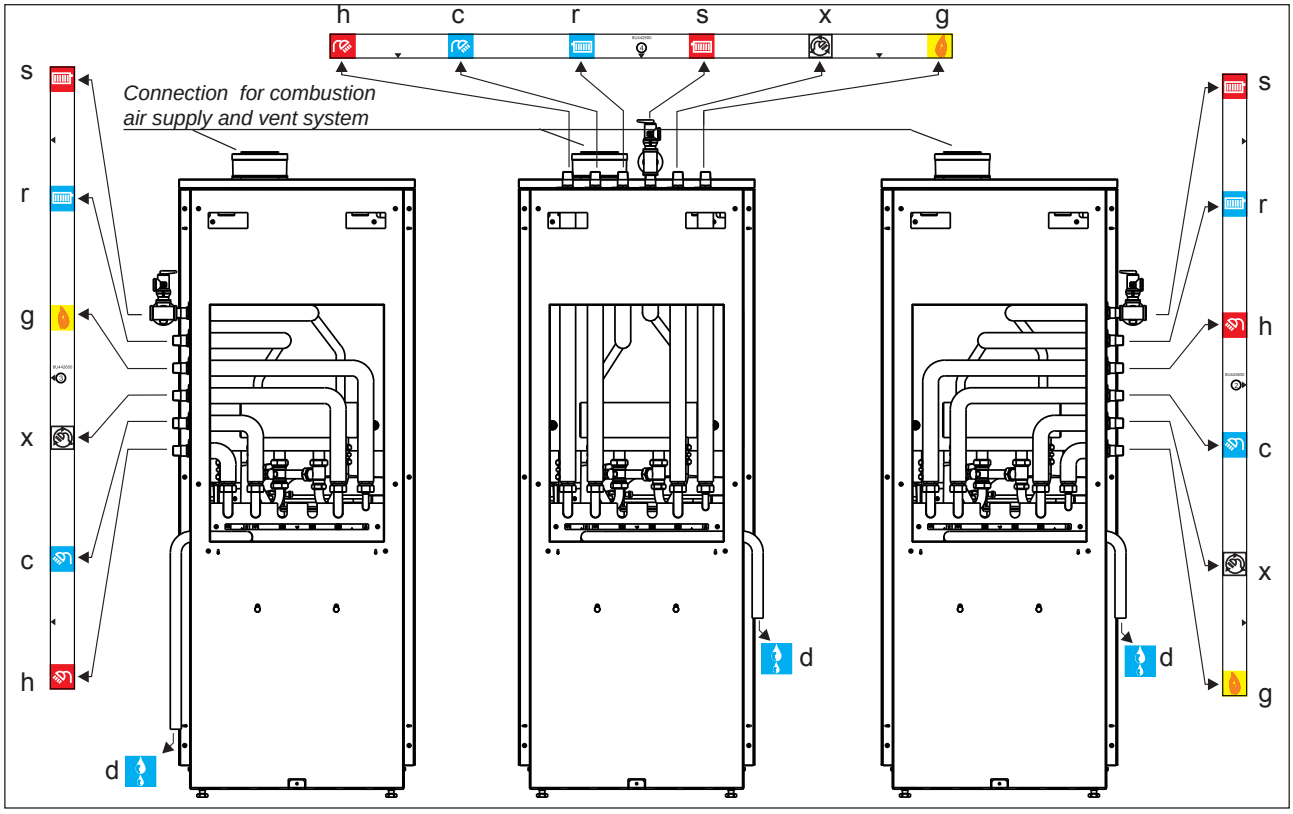
Dimensions

			Boiler type QP85N QP130N	
			inch / mm	
A	Height		61.8" / 1570	
B	Height including vent connection		64.5" / 1640	
C	Width		23.6" / 600	
D	Depth		25.2" / 640	
E	Center boiler / vent		3,7" / 95	
F	Back / vent		18.5" / 470	
G	Center to center / vent and air supply		4.7" / 122	
		Connection side:	**left**	**right**
H	Bottom side boiler /	supply pipe	48.4" / 1230	48.4" / 1230
J	Bottom side boiler /	return pipe	45.7" / 1160	45.7" / 1160
K	Bottom side boiler /	hot water pipe gas pipe	42.9" / 1090	42.9" / 1090
L	Bottom side boiler /	cold water pipe DHW circulation return pipe	40.2" / 1020	40.2" / 1020
M	Bottom side boiler /	DHW circulation return pipe cold water pipe	37.4" / 950	37.4" / 950
N	Bottom side boiler /	gas pipe hot water pipe	34.6" / 880	34.6" / 880
O	Bottom side boiler /	condensate pipe	26.0" / 662	26.0" / 662
		Connection side:	**top**	
P	Center boiler /	gas pipe (g*) hot water pipe (h*)	6.9" / 175	
Q	Center boiler /	DHW circulation return pipe (x*) cold water pipe (c*)	4.1" / 105	
R	Center boiler /	supply pipe (s*) return pipe (r*)	1.4" / 35	
S	Back boiler /	center of all pipe connections	1.2" / 30	

* See figure 5

dimensions table 1

Dimensions

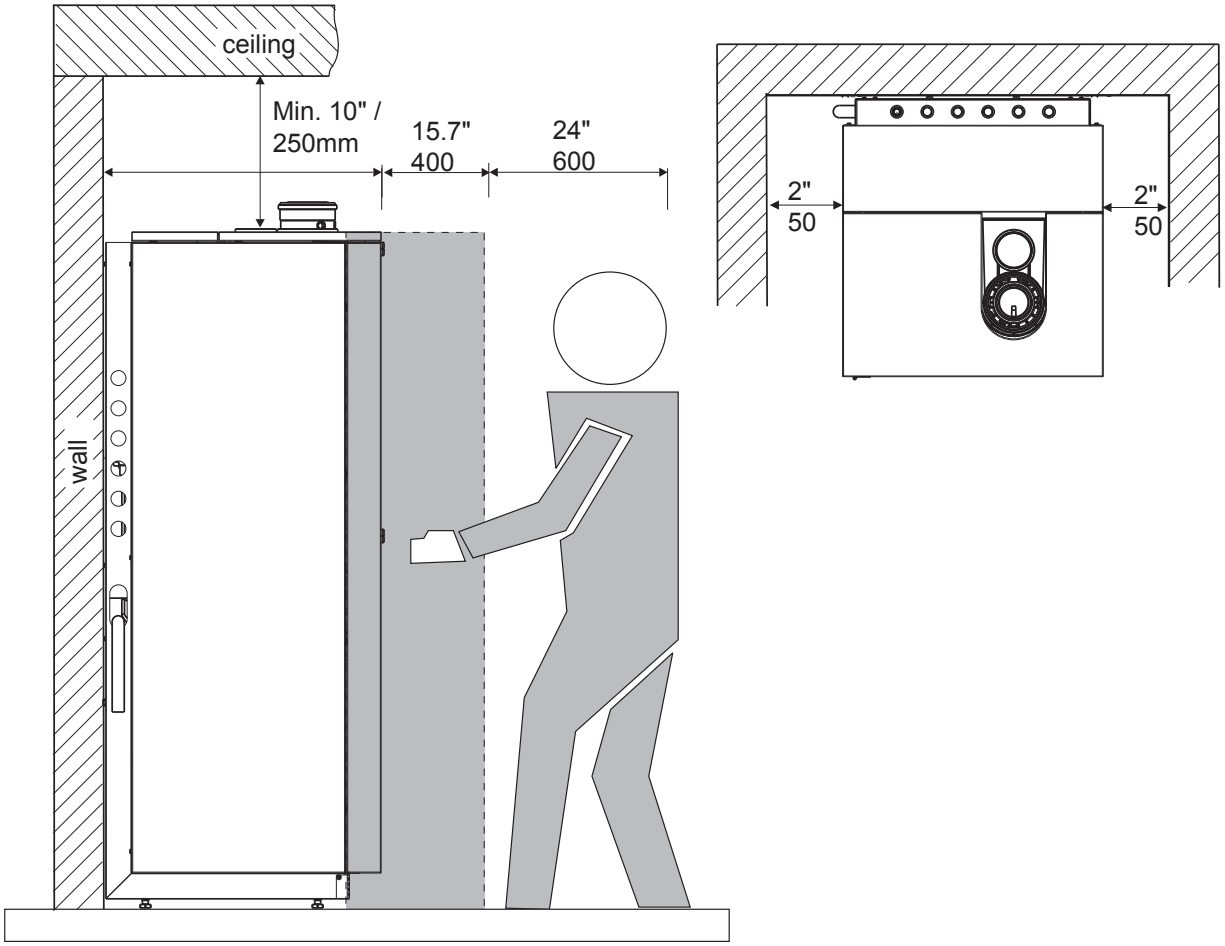


boiler connections figure 5

Boiler type		QP85N QP130N
Vent system / Combustion air supply		80/125mm
Gas pipe	g	3/4"M-NPT
Supply pipe	s	3/4"M-NPT
Return pipe	r	3/4"M-NPT
Cold water pipe	c	3/4"M-NPT
Hot water pipe	h	3/4"M-NPT
DHW circulation return pipe	x	3/4"M-NPT
Condensate pipe	d	1" / 25mm

connection diameters table 2

5.3.1 Clearences from the boiler



service clearances to the boiler

figure 6

	Minimum required clearances to combustibles All types	Minimum required clearances to non-combustibles All types	Recommended service clearances All types
	inch / mm	inch / mm	inch / mm
Top of boiler	0"	0"	10" / 250
Back of boiler	0"	0"	0
Front of boiler *	6" / 150	6" / 150	24" / 600
Left side of boiler	0"	0"	2" / 50
Right side of boiler	0"	0"	2" / 50
Vent	0"	0"	0"

clearances to the boiler

table 3

* For closet installation: clearance is 1” / 25mm from the front.

5.4 Technical specifications

Boiler type		Q Premier QP85N	Q Premier QP130N
Input Hs CH	BTU/hr	85,000	130,000
	kW	25	38
Q_n Output non-condensing CH	BTU/hr	77,000	117,000
	kW	22.5	34.2
Q_n Output EN677 efficiency CH	BTU/hr	84,000	127,600
	kW	24.7	37.3
Q_n Output AFUE CH	BTU/hr	82,000	117,000
	kW	24.1	36.5
Efficiency at 98.6/86°F (36/30°C) part load, Hs, EN677 CH	%	98.8	98.2
AFUE according IBR	%	95.4	95.4
O_2 (at full load)	%	4,4 - 4,7	4,4 - 4,7
Electr. power consumption max.	W	172	199
Electr. power consumption stand by	W	14	14
Current	V/Hz	120Vac/60Hz	120Vac/60Hz
Fuse rating	A	5AF & 4AT	5AF & 4AT
Degree of protection acc. EN 60529		IPX0D	IPX0D
Weight (empty)	lbs / kg	236 / 107	243 / 110
Water content CH	gallon / liter	0.9 / 3.5	1.3 / 5
Water content DHW	gallon / liter	24 / 90	24 / 90
Water content Plumbing Kit	gallon / liter	0.58 / 2.2	0.58 / 2.2
After run time pump CH	min	5	5
After run time pump DHW	min	1	1
P_{MS} Water pressure min.-max.	PSI / bar	14-43 / 1-3	14-43 / 1-3
P_{MW} Water pressure DHW max.	PSI / bar	145 / 10	145 / 10
Flow temperature max.	°F / °C	176 / 80	176 / 80
Pump type		UPER 20-58	UPER 20-78
Approvals		ASME, CSA	ASME, CSA
DHW flow (at ΔT50°F)	gallon/min	3.1	4.1
DHW flow (at ΔT27.8°C)	liter/min	11.73	15.5
DHW flow (at ΔT75°F)	gallon/min	2.1	3,2
DHW flow (at ΔT41.7°C)	liter/min	7.95	12.1
First hour rating	gallon/hour	141	211
	liter/hour	534	799
Pressure difference DHW	PSI / bar	4.3 / 0.3	4.3 / 0.3
CSA number			
CRN number		8101.7CL	8101.7CL

Technical specifications table 4

6 Connecting the boiler

The boiler has the following connections, which can be positioned to the top, left side or right side from the boilers by means of the pre-bend pipe kits. The connections on the back of the boiler are engineered to work with only the Rinnai pre-bend pipe kits. Nuts and gaskets are supplied with the boiler;

s r

g

d

- The central heating circuit pipes.
  It is provided with a 3/4" male thread onto which the supply and return pipes of the heating system can be screwed according to the instructions in chapter 6.1;
- The gas supply pipe.
  It is provided with a 3/4" male thread onto which the tail piece of the gas valve can be screwed. See further chapter 6.4;
- The condensation drain pipe.
  It consists of a 1" (25 mm) flexible plastic pipe. The drain pipe can be connected to this by means of an open connection. See further chapter 6.6;
- The vent system and air supply system.
  It consists of a concentric connection 3"/5" (80/125 mm). The boiler can be converted to a twin pipe connection that will accept 80mm flue and intake air or with the use of the included adapters 3" PVC / CPVC flue and intake. See further chapter 6.7.

x h c

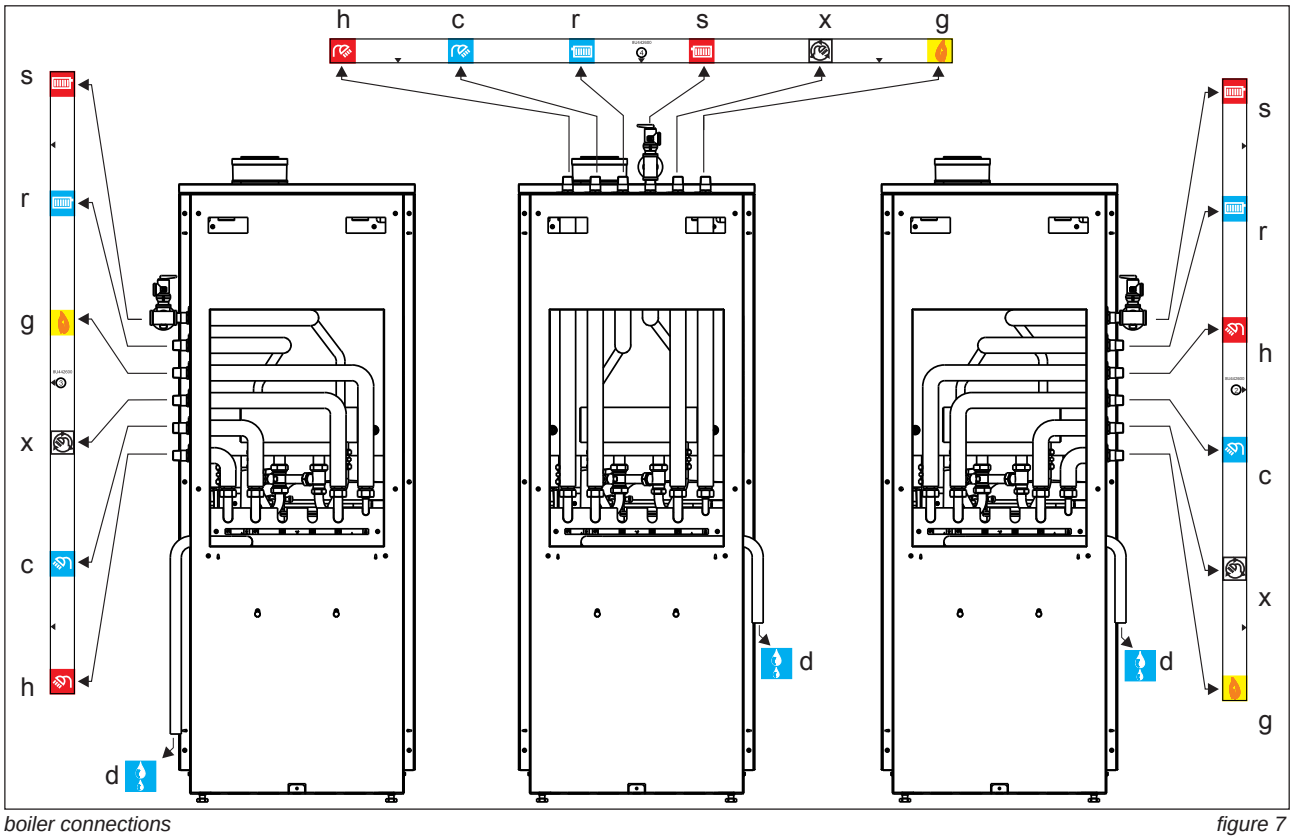
- Cold and hot water pipes for domestic hot water (DHW).
  It is provided with a 3/4" male thread onto which the cold and hot water pipes and hot water circulation return pipe of the DHW system can be screwed according to the instructions in chapter 6.5;

NOTICE

The pipes to be connected to the boiler must be cleaned before connecting in order to prevent dirt from entering and damaging the boiler.

DANGER

Use the supplied gaskets in the 1" fittings. Use the special fiberring (indicated on the gasket package) for the 1" gas pipe fitting. If these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.



boiler connections *figure 7*

6.1 Central heating system

Connect the central heating system according to its instructions.

NOTICE

The boiler pipes can be connected to the installation by means of NPT fittings.

NOTICE

When removing the plastic sealing caps from the pipes, testing water may drain from the boiler.

NOTICE

A low loss header is pre-installed in the boiler. The low loss header not provided with service valves. Service valves must be installed on the supply and return connection pipes of the boiler. Dielectric unions are not provided with the boiler. Dielectric unions must be installed on the supply and return connection pipes of the boiler.

NOTICE

The boiler, when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler with appropriate valves to prevent the chilled medium from entering the boiler.

The boiler piping system of a hot water boiler connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

6.1.1 Pre-bend Kit and Installation

Rinnai provides 3 Pre-bend Plumbing Kit options; top, right side, and left side. One of these options must be selected at the time of purchase. The pre-bend kit must be fitted directly in the back of the boiler on the heating water supply pipe, heating water return pipe, domestic cold water pipe, domestic hot water pipe, domestic recirculation water pipe, and the gas pipe.

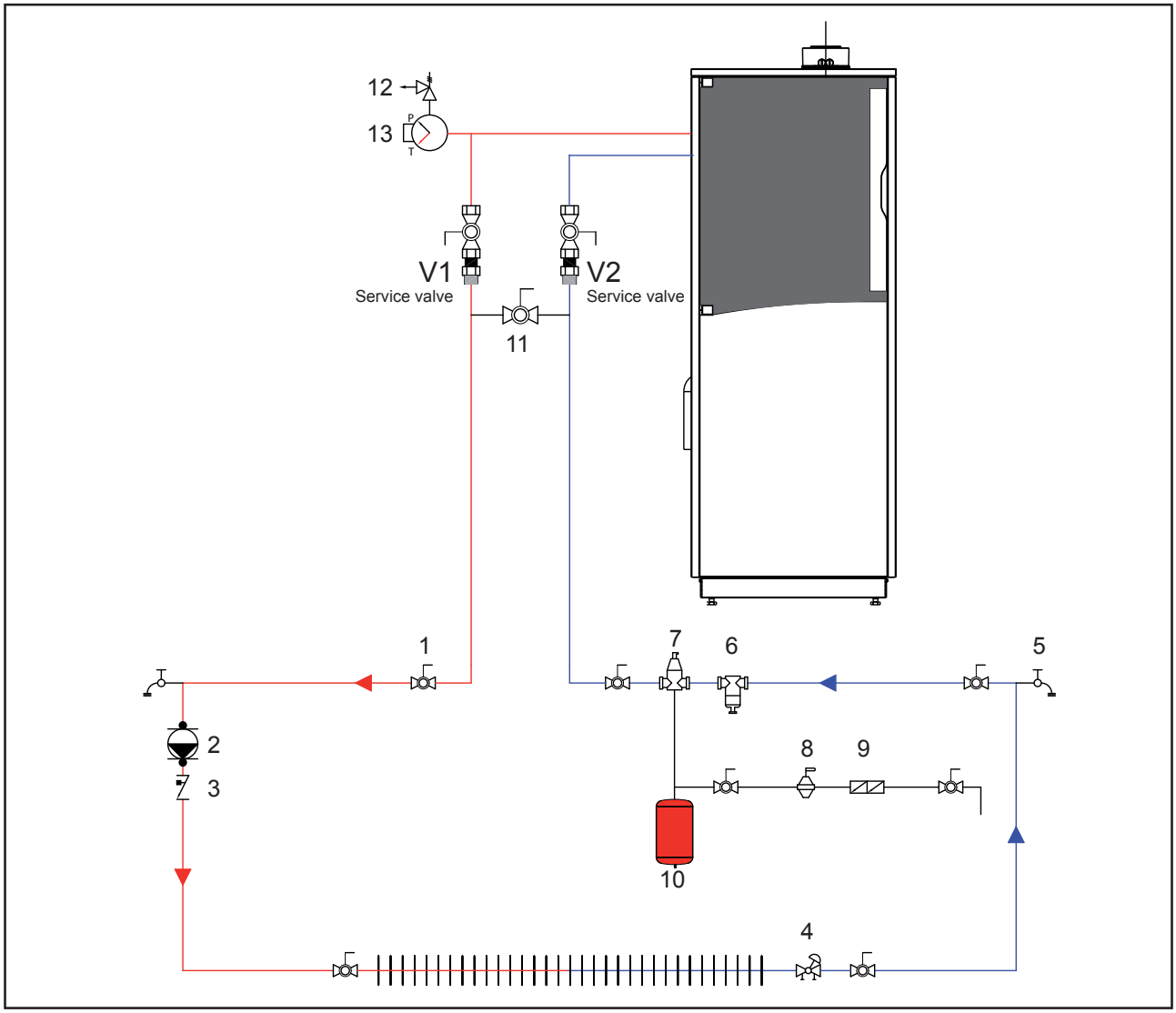
When installing these pre-bend pipes care must be taken. Ensure that the first two ribs on the threaded fitting at the end of the pre-bend pipe are visible on the outside of the boiler; this will provide enough surface area to correctly use a backing wrench. Always using a backing wrench to ensure that the pipe is not damaged during installation, see figure 7a and 7b for the correct position of the backing wrench. Always use a backing wrench when attaching pipes and fittings to the boiler. If a backing wrench is not used damage to the boiler piping might occur.

WARNING

Failure to properly use a backing wrench could result in damage or broken pipes in the boilers. Damage to the boiler and piping caused by incorrect installation is not covered by the warranty.

figure 7a

figure 7b



Boiler basic piping *figure 8*

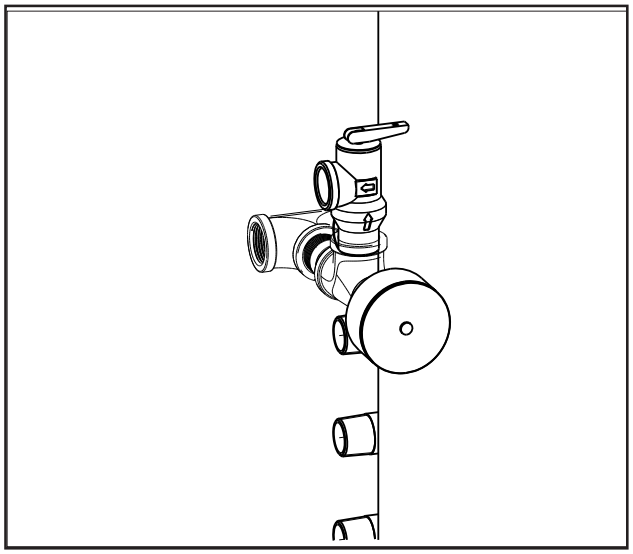
1. shut off valve
2. system circulator
3. check valve
4. balancing valve
5. boiler drain valve
6. dirt trap
7. air separator
8. automatic fill valve
9. back flow preventer
10. expansion tank (in case the content of the built-in expansion tank is not sufficient)
11. bypass for system cleaning
12. ASME 30 psi pressure relief valve
13. Temperature and pressure gauge

NOTICE

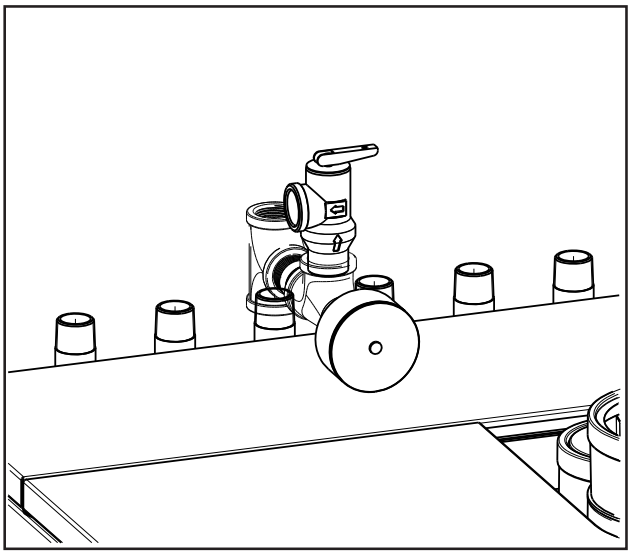
The factory supplied pressure relief valve and temperature and pressure gauge must be installed before any shut-off valves.

NOTICE

The pressure relief valve and the temperature and pressure gauge must be installed as shown in figures 9a and 9b.



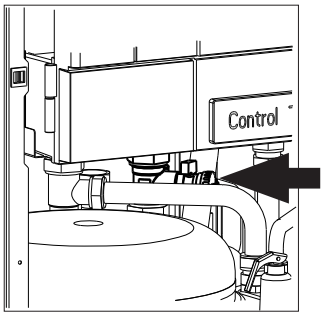
Installed pressure relief valve and T/P gauge on the side figure 9a



Installed pressure relief valve and T/P gauge on the top figure 9b

NOTICE

To protect the entire heating system we recommend installing a dirt particle trap in the return circuit. When the boiler is installed to an existing heating system this trap is required. Use of a Y strainer is not permitted as a substitute for a dirt trap.



Internal boiler drain connection figure 10

- Install shut-off valves immediately before and after the dirt particle filter to allow the trap to be cleaned.
- Figure 10 is the location of a garden hose thread boiler drain that can be used to drain the boiler or add water treatment additives to the system such as inhibitors or glycol.
- For information on locating an additional expansion tank and system fill, please see the Rinnai Boiler Applications Manual.

NOTICE

Thoroughly flush all pipes and radiators. We recommend the use of a Rinnai approved system cleaner. Please refer to the list of approved Rinnai system cleaners in this chapter.

- Refer to the installation template and chapter 5.3 for the pipe connection dimensions.

To ensure the correct heat transfer the system piping must be sized correctly. The piping should be increased in size upon exiting the boiler at the end of the prebend kits to properly suit the system. Table 5 provided shows the correct piping sizes based on the maximum flow rate for piping and system Delta T.

NOTICE

Upon exiting of the boiler cabinet all external piping must be properly supported. The boiler and internal boiler piping are not intended to support the system piping.

Pipe size	Maximum flow rate (gpm)	10°F ΔT (btus)	20° ΔT (btus)	30°F ΔT (btus)	40°F ΔT (btus)
1"	8	40,000	80,000	120,000	160,000
1 ¼"	14	70,000	140,000	210,000	280,000
1 ½"	22	110,000	220,000	330,000	440,000

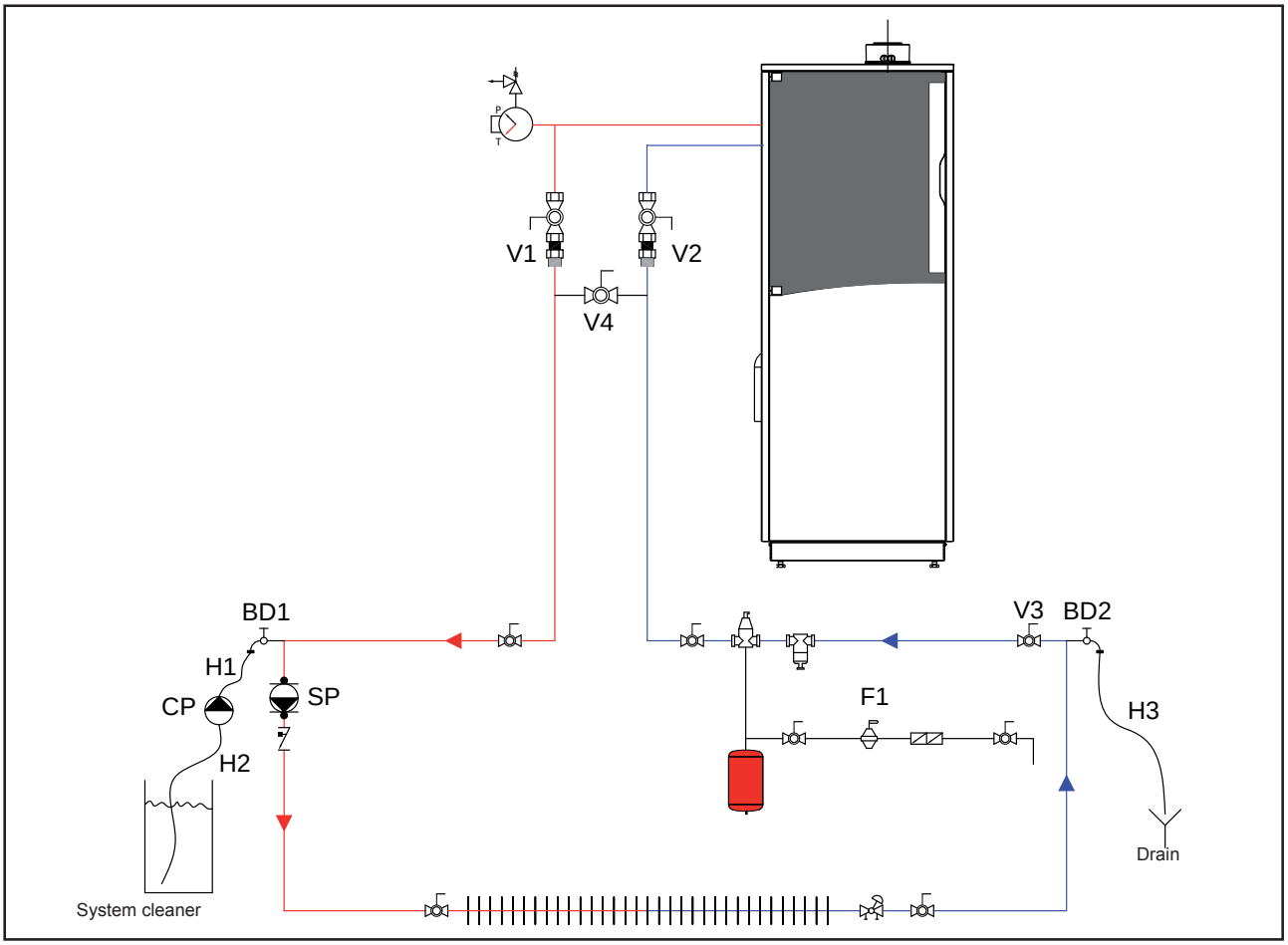
Pipe size and related flow rate table 5

- Boiler system flushing (Not Boiler heat exchanger)

When replacing an existing boiler the heating system should be flushed with the old boiler in place before the new boiler is added to the system. If the old boiler has already been removed a bypass must be piped in when the new boiler is installed in order to facilitate the flushing of the system.

The boiler must be valved off from the system, while the system is flushed. No system cleaner should ever enter the boiler heat exchanger due to its caustic nature which could damage the heat exchanger.

1. Close the shutoff valves on both the supply and return connections (V1 and V2).
2. Open the bypass valve (V4).
3. Connect pump outlet hose (H1) to the supply side purge station (BD1)
4. Connect drain hose (H3) to the return side purge station (BD2).
5. Pour the system cleaner into a pail and follow the system cleaner instructions on circulation time and volume to be added to the system.
6. Operate the charging pump (CP) and charge the system with the required volume of system cleaner
7. Close the supply side purge station (BD1)
8. Turn on the system pump(s) (SP) and circulate the cleaner through the system for required time as established by the cleaner manufacturer.
9. Once the time required by the system cleaner manufacturer has been met place the drain hose (H3) in a drain.
10. Turn off the system pump(s) (SP)
11. Close the main valve on the system return (V3) and open the return side purge station (BD2).
12. Open the auto feed on the system (F1) and allow water to rinse the system for whichever is greater; 10 minutes or the required rinse time by the system cleaner manufacturer.



Boiler system flushing *figure 11*

13. If the installation is a zone system be sure to purge out each zone individually
14. Close the auto feed on the system (F1)
15. Close the return side purge station (BD2) and disconnect the hose (H3).
16. Open the main valve on the system return (V3)
17. Close the bypass valve (V4).
18. Open shutoff valves on both the supply and return connections (V1 and V2).
19. Clean out the dirt trap
20. Test the pH of the water that will be used for filling the system
21. Test the water hardness of the water that will be used for filling the system
22. Use the proper water treatment to ensure the pH and water hardness are within the Rinnai boiler water quality guidelines
23. The boiler and system may now be filled

NOTICE

The following is a list of approved system cleaners, inhibitors, and antifreeze.

Approved antifreeze:

- Rhomar RhoGard Mutli-Metal (AL safe)
- Noble Noburst AL
- Sentinel X500
- Fernox Alphi 11

Approved system cleaner:

- Noble Noburst Hydronic System Cleaner
- Rhomar Hydro-Solv 9100
- Fernox F3 Cleaner
- Sentinel X400

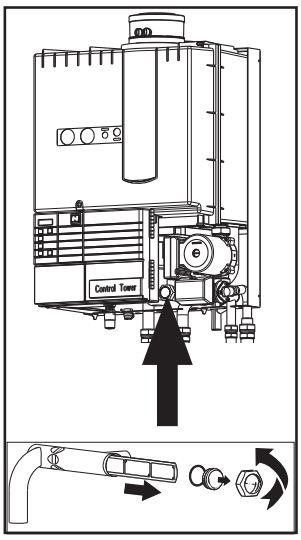
The system cleaners from NoBurst, Rhomar, and Fernox are NOT to be used in the boiler. The boiler must be closed off (valved off) from the rest of the system or not connected while the cleaners are in the system. The system should then be drained and then thoroughly flushed with clean water to remove all the system cleaner.

Approved inhibitors:

- Rhomar Pro-tek 922
- Noble Noburst AL inhibitor
- Sentinel X100

- Connect the expansion tank to the system. See chapter 6.2.
- Connect the pipes so that they are free from strain.

The boiler has a self-adjusting and self-protecting control system for the load and the pump capacity. By this means, the temperature difference between the supply and return water is checked.

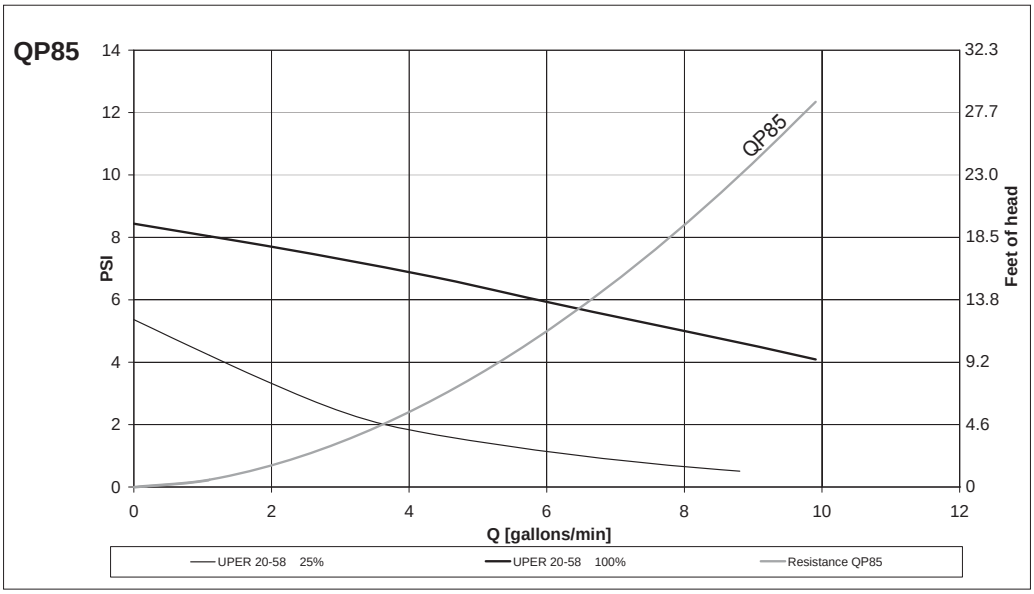


Water filter *figure 12*

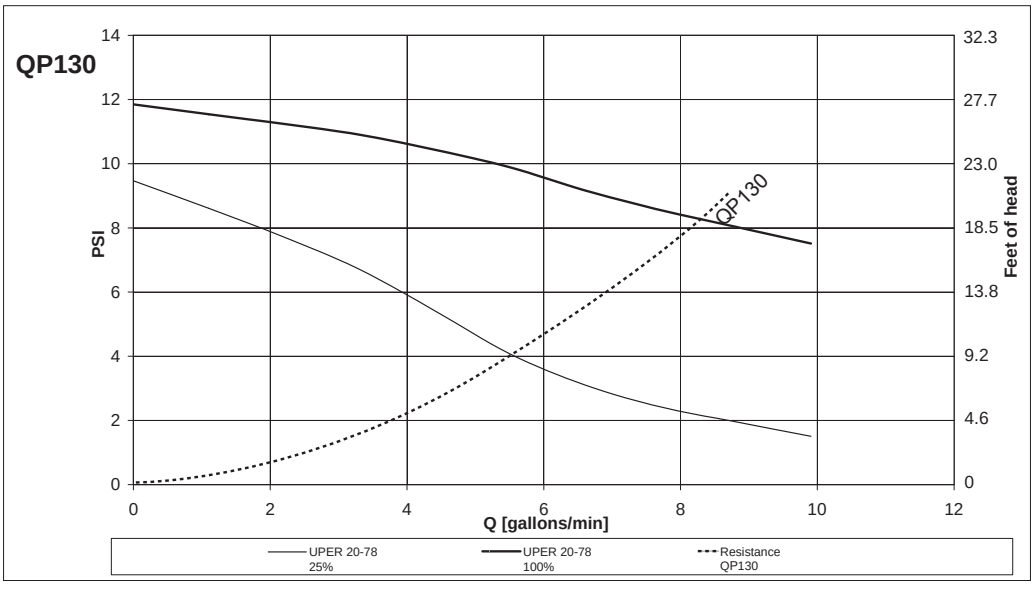
If the installation resistance is over the stated value; the pump will rotate at maximum capacity and the load will be adjusted until an acceptable temperature difference between supply and return water has been obtained. If, after this, the temperature difference is still not acceptable then the boiler will switch off and wait until an acceptable temperature has arisen.
If an unacceptable temperature is detected, the control will repeatedly try to achieve water flow over the boiler. If not the boiler will switch off.
The electrical side of the external circulation pump (fig. 8, pos. 2) can be connected to the Control Tower. This pump thus switches simultaneously to the boiler pump.
The maximum absorbed current consumption of the external circulation pump may not exceed 120V, 2 Amp. If a pump with a larger current draw is required an isolation relay must be used. See the Rinnai Boiler applications manual for further information.
The extra external pump must be selected according to the installation resistance and required flow.
As standard the boiler is provided with a water filter in the return pipe of the boiler (fig. 12), so that debris from the central heating water is prevented from affecting the boiler.

NOTICE

The boiler is designed to be used on pressurized heating systems only (closed loop).



pump index lines UPER 20-58 graph 1a



pump index lines UPER 20-78 graph 1b

6.1.2 Safety Valve and Temperature and Pressure Gauge

NOTICE

An ASME 30 psi pressure relief valve is included with the boiler.

A temperature and pressure gauge is included with the boiler.

6.1.3 Low water cut off

The Rinnai Q Premier boiler has a factory installed pressure switch type Low Water Cut Off (LWCO). Check your local codes to see if a Low Water Cut Off is required (LWCO) and if this device conforms to local code. See the Rinnai Boiler Applications Manual for further information.

NOTICE

The Low water cut off is not serviceable.

6.2 Boiler expansion tank

An expansion tank is part of the boiler for the closed loop heating system only. The expansion tank has a content of 3.17 gallons / 12 liters and a pre-charge pressure of 14.5 psi / 1 bar. Depending on the size of the installation the expansion tank must be appropriate to the water content of the installation. The pre-charge pressure depends on the installation height above the mounted expansion tank. When necessary installing an additonal expansion tank is possible to get to the appropiate summary of the expansion volume. The additional expansion tank is NOT a part of the delivery and should be sourced locally. Please refer to the expansion tank manufacturer for further information.

NOTICE

Fill the additional expansion tank to a minimum of 14.5 psi.

NOTICE

For the boiler to function correctly, it is necessary to connect the additional expansion tank to the installation according to figure 7.

See the Rinnai Boiler Applications Manual for further information regarding placement of the expansion tank in the system.

NOTICE

The boiler cannot be used with an open type expansion tank.

6.3 Underfloor heating system (plastic pipes)

When using oxygen-permeable pipes, e. g. for floor heating systems, you must separate the system using plate heat exchangers.

NOTICE

No recourse can be made to the terms of the limited warranty in the event of failure to observe the regulations pertaining to plastic underfloor heating pipes.

6.4 Gas connection

DANGER

Only work on gas lines if you are licensed for such work.
If these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

WARNING

Rinnai boilers are built to run on Natural Gas or Propane Gas. The gas type the boiler is suitable for is indicated on the packaging and on the boiler by a blue label with Natural Gas or a green label with Propane Gas and on the identification plate on the boiler.
First check the identification plate on the boiler for the suitable gas type.

DANGER

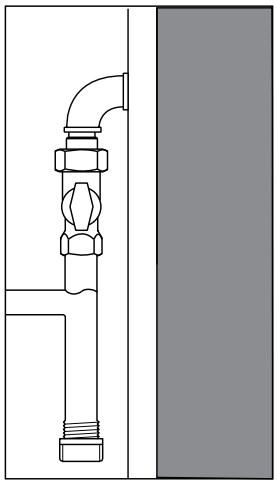
Do not use the boiler for another type of gas than indicated on the identification plate of the boiler. This will cause improper functioning and can damage the boiler.

Natural gas: refer to chapter 6.4.1
Propane gas: refer to chapter 6.4.2

6.4.1. Gas connection with natural gas

NOTICE

The gas supply connection must comply with local regulations or, if such regulations do not exist, with the National Fuel Gas Code, ANSI Z 223.1.
For Canada, the gas connection must comply with local regulations or, if such regulations do not exist, with the CAN/CSA B149.1, Natural Gas and Propane Installation Code.



Sediment trap figure 13a

Pipe sizing for natural gas
Contact gas supplier to size the gas supply line and meter.

Gas piping
A sediment trap must be installed upstream of the gas controls.

The boiler gas pipe is equipped with external 3/4" M-NPT thread, onto which the tail piece of the gas shut off valve can be connected. Use appropriate sealing.

The connection to the boiler must include a suitable method of disconnection and a gas control valve must be installed adjacent to the boiler for isolation purposes. The nominal inlet working gas pressure measured at the boiler should be 7" W.C. (18 mbar) for Natural gas (Gas A). Maximum pressure with no flow (lockup) or with the boiler running is 10.5 inches W.C. Minimum pressure with the gas flowing (verify during boiler startup) is 4.0 inches W.C.

The gas pipe must be fitted to the gas valve free from any strain.

NOTICE

Make sure that the gas pipe system does not contain dirt, particularly with new pipes.

DANGER

Always check the safety of the gas pipe system by means of a bubble test using leak-search spray.

NOTICE

The boiler and its individual shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 PSI (3.5kPa).

NOTICE

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSI (3.5 kPa).

6.4.2 Gas connection with propane gas

NOTICE

The Rinnai Q Premier boiler is sold as a NG product. Conversion kits from natural gas to propane can be purchased for the Q Premier boiler separately.

NOTICE

The gas supply connection must comply with local regulations or, if such regulations do not exist, with the National Fuel Gas Code, ANSI Z 223.1.
For Canada, the gas connection must comply with local regulations or, if such regulations do not exist, with the CAN/CSA B149.1, Natural Gas and Propane Installation Code.

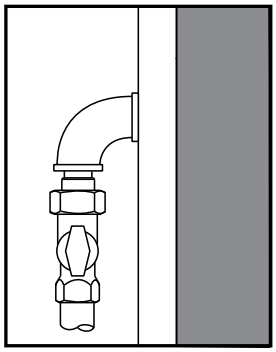
Pipe sizing for propane gas
- Contact gas supplier to size pipes, tanks, and 100% lockup gas pressure regulator.

Propane Supply Pressure Requirements
- Adjust propane supply regulator provided by the gas supplier for 14 inches W.C. maximum pressure.
- Pressure required at gas valve inlet pressure port:
  - Maximum 14 inches W.C. with no flow (lockup) or with boiler running.
  - Minimum 8 inches W.C. with gas flowing (verify during boiler startup).

DANGER

Ensure that the high gas pressure regulator is installed at least 6 to 10 feet upstream of the boiler.

Gas piping
- Use a gas shut off valve compatible with propane gas.
- A sediment trap must be provided upstream of the gas controls.



Gas shut off valve onto boiler
figure 13b

The boiler pipe is provided with external 3/4" M-NPT thread, onto which the tail piece of the gas shut off valve can be screwed. Use appropriate sealing.

The connection to the boiler must include a suitable method of disconnection. A gas control valve must be installed adjacent to the boiler for isolation purposes. The nominal inlet working gas pressure measured at the boiler should be 12 inch W.C. (30mbar) for Propane gas (Gas E).

The gas pipe must be fitted to the gas valve free from any strain.

NOTICE

Make sure that the gas pipe system does not contain dirt, particularly with new pipes.

DANGER

Always check the safety of the gas pipe system by means of a bubble test using leak-search spray.

NOTICE

The boiler and its individual shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 PSI (3.5kPa).

NOTICE

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSI (3.5 kPa).

NOTICE

For information on converting a boiler to propane see the Q Premier propane conversion kit manual.

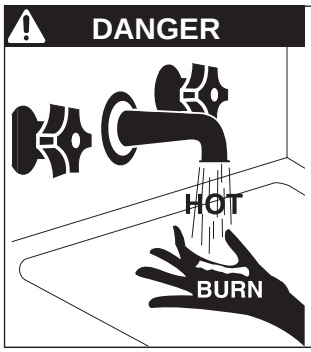
6.5 Hot water supply

Connection of the drinking water installation should be performed according to the national secondary drinking water regulations.

DANGER

Do NOT use toxic chemicals, such as those used for boiler treatment in potable water heating systems used for space heating.

The sanitary water pipes can be connected to the installation by use of the pre-bend kits. The cold water inlet on the boiler must be equipped with the following components (counted in the water flow direction): Flow regulator valve, Safety group, Expansion vessel 87 PSI / 6bar (potable water, blue).



Hot water can be dangerous, especially for infants or children, the elderly, or infirm. There is hot water scald potential if the thermostat is set too high.

Water temperatures over 125º F (51º C) can cause severe burns or scalding resulting in death.

Hot water can cause first degree burns with exposure for as little as:

3 seconds at 140º F (60º C)

20 seconds at 130º F (54º C)

8 minutes at 120º F (48º C)

Test the temperature of the water before placing a child in the bath or shower.

Do not leave a child or an infirm person in the bath unsupervised.

6.5.1 Domestic Water quality

Appropriate steps must be taken to ensure the indirect tank water heater does not become plugged by scale caused by hard water or sediment. If the indirect tank water heater becomes plugged by either scaling from hard water or sediment it is not the responsibility of Rinnai.

1. Water hardness for DHW

When there is a water hardness of more than 6 to 7 grains hardness for domestic water, a water softener must be installed on the inlet side of the DHW connection.

2. Sediment in DHW

If there is sediment in your domestic water supply a sediment filter or other suitable device should be used to remove it before the water enters the indirect tank water heater.

3. Water Chemistry for DHW

The water used for domestic must have a water pH between 6.0 and 8.0, contain less than 1.7 gpg (20 mg/l) of Sodium, and a concentration of Chlorine less than 5.8 gpg (100 mg/L).

NOTICE

If problems occur when using sanitary water outside of the above stated requirements, no recourse can be made to the terms of the limited warranty.

6.5.2 Domestic water treatment Accessory

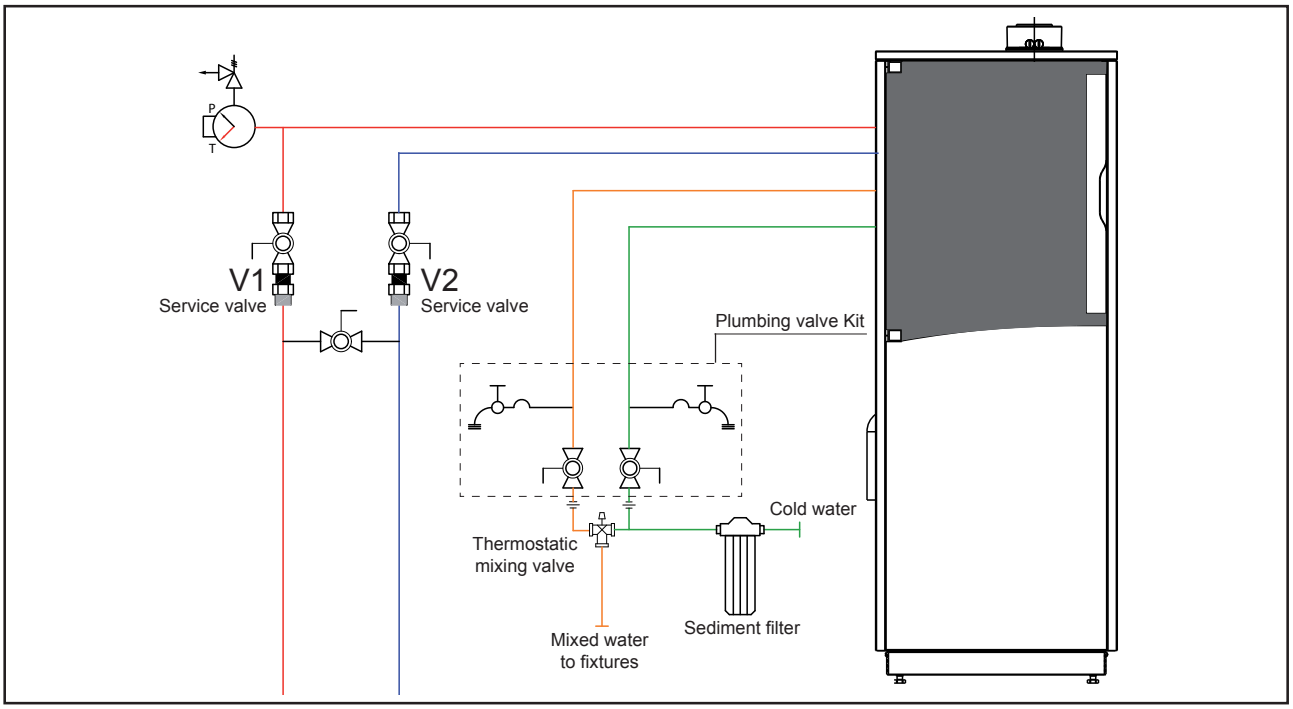
Rinnai offers a domestic water treatment device that can help reduce scale build up. This device can be installed on the incoming cold water line for any combi boiler. For additional information contact Rinnai.

6.5.3 DHW Expansion Tank

A domestic water expansion tank could be required by local code. Check local code to determine if it is required.
If a combi boiler is installed in a closed water supply system, such as one having a backflow preventer in the cold water supply line, means shall be provided to control thermal expansion. Contact the water supplier or local plumbing inspector on how to control thermal expansion.

6.5.4 Installing a Thermostatic Mixing Valve

A thermostatic mixing valve is required to be installed on all Q Premier boilers on the domestic hot water side to prevent scalding. This valve will regulate the water temperature leaving the hot water tank. See figure 14 for the suggest piping.



Boiler DHW piping *figure 14*

6.5.5 Installing a valve kit

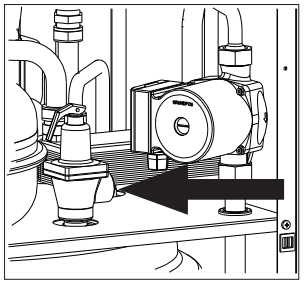
A means to isolate the domestic plate heat exchanger and domestic hot water tank for cleaning must be provided at installation. Refer to figure 14 for proper piping layout. A Rinnai valve kit can be used on domestic water connections for all Q Premier boilers to allow for cleaning of the domestic plate heat exchanger and domestic hot water tank.

- Rinnai recommends the use of the WRIK-LF-F(3/4" NPT thread connection) when connecting the domestic water lines to the boiler.
- Use of this kit will assist in flushing the storage tank in areas where water quality issues exist, as well as improve overall product serviceability.

6.5.6 Domestic Hot Water Recirculation

The boiler is provided with a factory installed connection for a domestic hot water recirculation line. A standard recirculation pump correctly sized for the system and the tank can be used with the Q Premier boiler. If a recirculation line will not be connected to the Q Premier the recirculation connection on the pre-bend pipe cap must be capped off. See figure 7 for the location of the connection.

6.5.7 Pressure relief valve for Combi boilers



Relief valve *figure 15*

- A CSA approved Temperature and Pressure relief valve is provided with the boiler. The relief valve is pre-installed on the indirect tank.
- The discharge from the pressure relief valve should be piped to the ground or into a drain system to prevent exposure or possible burn hazards to humans or other plant or animal life. Follow local codes. Water discharged from the relief valve could cause severe burns instantly, scalds, or death.
- A cutout is provided to pipe the relief valve to the ground see Figure 15
- The pressure relief valve must be manually operated once a year to check for correct operation.
- Do not plug the relief valve and do not install any reducing fittings or other restrictions in the relief line. The relief line should allow for complete drainage of the valve and the line.
- If a relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct this situation. Do not plug the relief valve.
- If a combi boiler is installed in a closed water supply system, such as one having a backflow preventer in the cold water supply line, means shall be provided to control thermal expansion. Contact the water supplier or local plumbing inspector on how to control thermal expansion.

6.6 Condensate drain pipe

This boiler produces condensate. Condensate must be drained otherwise the boiler will not function and can cause product or property damage.
The condensation drain pipe should be connected to a drain in the building by means of an open connection. By this means the possibility of drain gases effecting the boiler is prevented. The drain connection should have a minimum diameter of 1.3" / 32mm.

Install the condensation drain pipe according to applicable local code.

If the condensate outlet of the boiler is lower than the public sewage system a condensate pump must be used.
The condensate produced by the boiler has a pH value between 3 and 4.
Install a neutralization unit if required by local code. It is recommended, but not required to install a condensate neutralizer.
Rianni offers a condensate neutralizer designed to work with all boiler models. The condensate neutralizer kit comes with all the necessary fittings and mounting material. PVC pipe must be supplied by the installation contractor.
Rinnai part number: 804000074

NOTICE **Do not drain the condensation water to the external rain gutter because of the danger of freezing and blockage of the drain.**

NOTICE **Before putting the boiler into operation fill the condensate trap with 1.27 cups / 300 ml of water. If the boiler will be installed in a high temperature installation such as baseboard with a supply temperature of 160°F or above, fill the condensate trap with mineral oil instead of water.**

NOTICE **Use materials approved by the authority having jurisdiction. In absence of such authority, PVC and CPVC pipe must comply with ASTM D1785, F441 or D2665. Cement and primer must comply with ASTM D2564 or F493.**
For Canada, use CSA or ULC certified PVC or CPVC pipe, fittings and cement.

NOTICE **Periodic cleaning of the condensate disposal system must be carried out. See the Rinnai Boiler Applications Manual for further information and a piping diagram for the condensate.**

6.7 Vent system and air supply system

Provisions for combustion and ventilation air must be made in accordance with section, Air for Combustion and Ventilation of the National Flue Gas Code, ANSI Z223.1, or Sections 7.2, 7.3 of 7.4 of CAN/CGA B149.1, Installation Codes, or applicable provisions of the local building codes.

- Do not store chemicals near the boiler or in rooms where the air is being supplied to the boiler. **See the list on page 11**.
- Do not allow the flue gases of other appliances to enter the boiler.
- Keep cabinet free of moisture

NOTICE

In the event that the system has actuated to shut off the main burner gas, do not attempt to place the boiler in operation. Contact a licensed professional.

6.7.1 Intake / Exhaust Guidelines

Refer to the specific instructions on your vent product for additional installation requirements.

- For direct vent boilers, proper reassembly and resealing of the vent-air intake system is required.
- You must use vent components that are certified and listed with this model.
- Do not combine vent components from different manufacturers.
- Venting should be as direct as possible with a minimum number of pipe fittings.
- Avoid dips or sags in horizontal vent runs by installing supports per the vent manufacturer's instructions.
- Support horizontal vent runs every four feet and all vertical vent runs every six feet or in accordance with local codes.
- Vent diameter must not be reduced.
- The boiler is unsuitable to install on a common vent installation, see also chapter 20.
- Do not connect the venting system with an existing vent or chimney.
- Do not common vent with the vent pipe of any other combi boiler or appliance.
- Vent connections must be firmly pressed together so that the gaskets form an air tight seal.
- Refer to the instructions of the vent system manufacturer for component assembly instructions.
- If the vent system is to be enclosed, it is suggested that the design of the enclosure shall permit inspection of the vent system. The design of such enclosure shall be deemed acceptable by the installer or the local inspector.

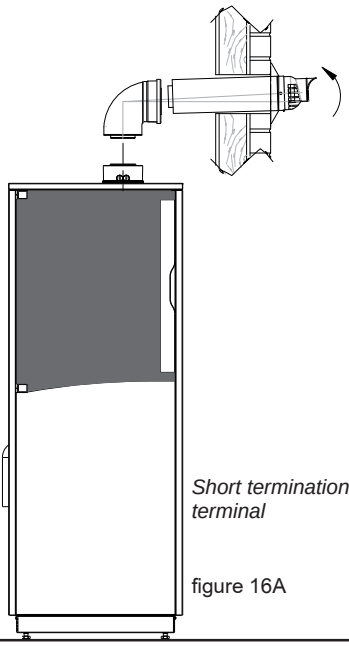
NOTICE

If it becomes necessary to access an enclosed vent system for service or repairs, Rinnai is not responsible for any costs or difficulties in accessing the vent system. The limited warranty does not cover obtaining access to an enclosed vent system.

6.7.2a Examples vent and air supply systems (concentric)

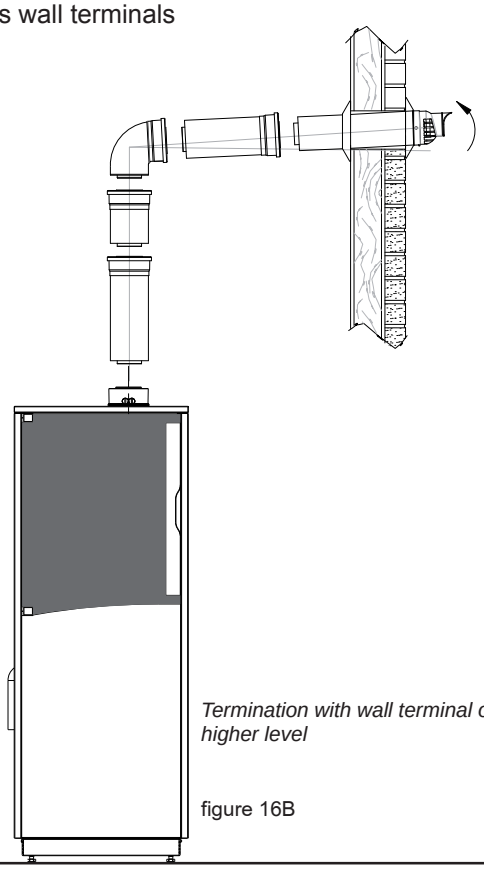
Examples wall terminals

Wall thickness for vent termination installation:
Minimum: 100mm / 4”
Maximum: 508mm / 20”



Short termination with wall terminal

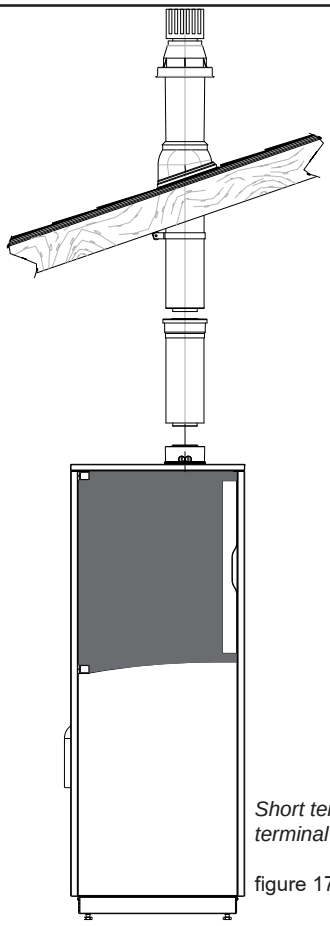
figure 16A



Termination with wall terminal on higher level

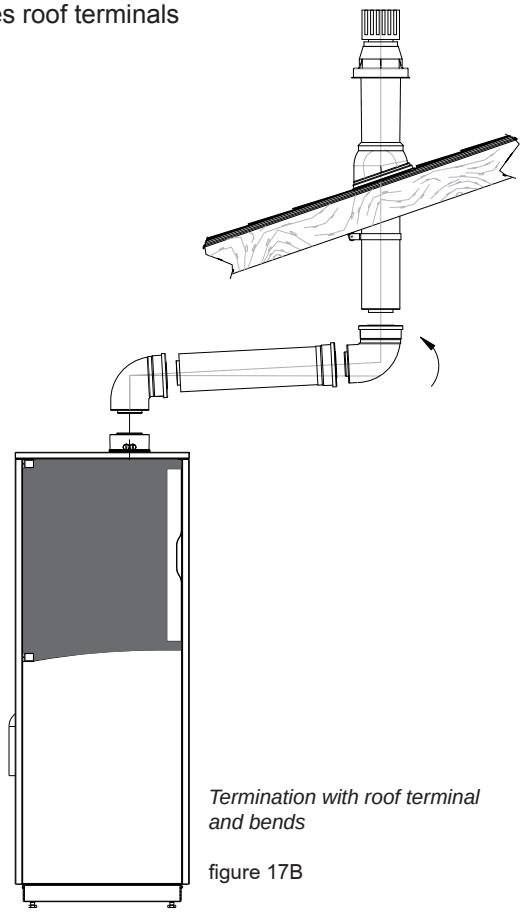
figure 16B

Examples roof terminals



Short termination with roof terminal

figure 17A



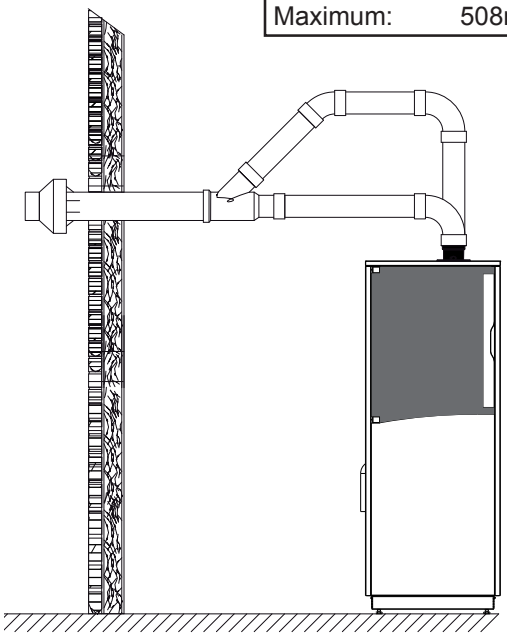
Termination with roof terminal and bends

figure 17B

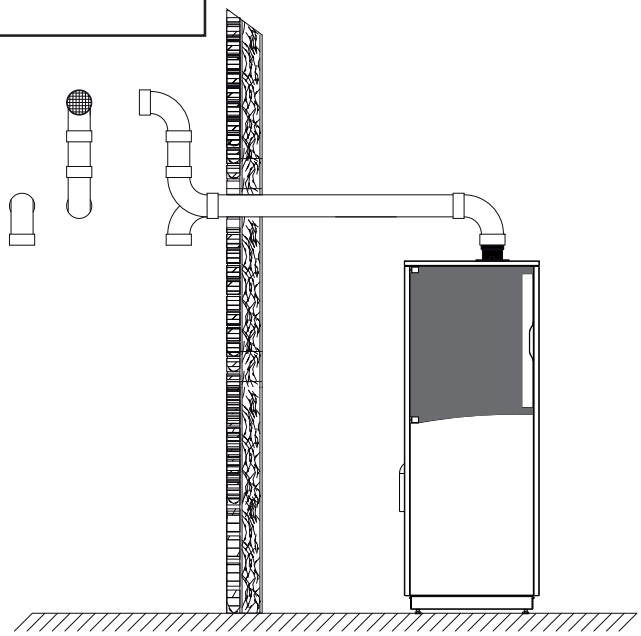
6.7.2b Examples vent and air supply systems (parallel)

Wall thickness for vent termination installation:
Minimum: 100mm / 4”
Maximum: 508mm / 20”

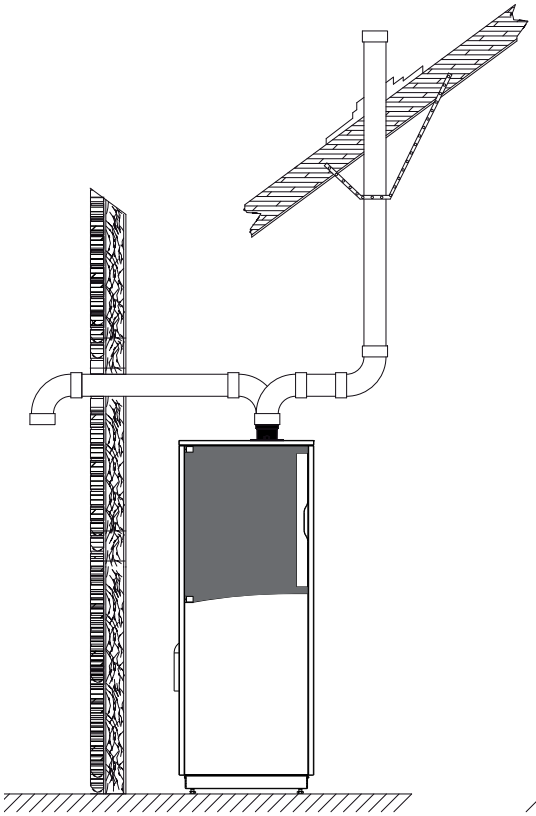
Examples sealed combustions



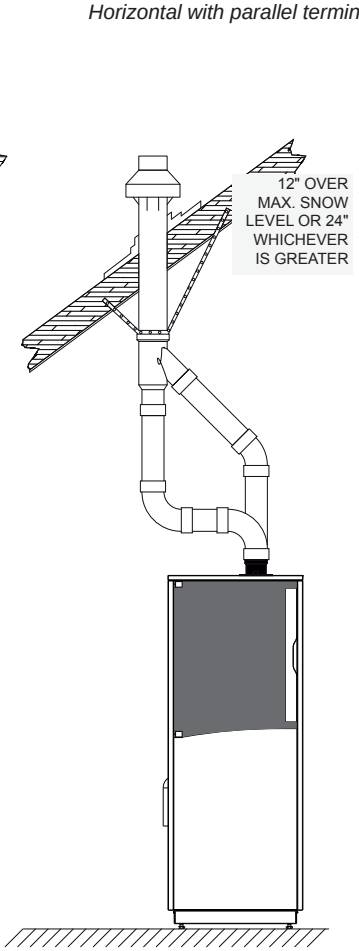
Horizontal with concentric termination figure 18A



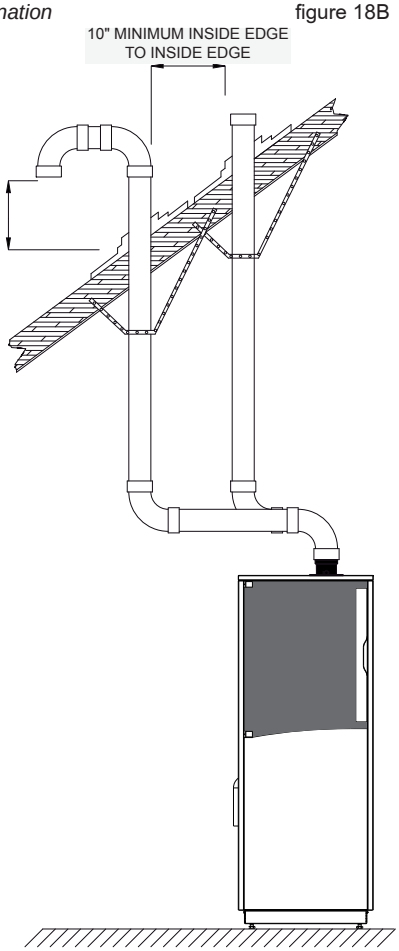
Horizontal with parallel termination figure 18B



Vertical vent and horizontal air intake figure 18C



Vertical with concentric termination figure 18D



Vertical with parallel termination figure 18E

6.7.3 Installation of the vent system

NOTICE

Consult local and state codes pertaining to special building code and fire department requirements. Adhere to national code requirements.

NOTICE

Follow the listed maximum length of vent systems, which are boiler output dependent. The maximum permissible lengths are listed in table 9, chapter 6.7.7.

Decide how to install the exhaust and air intake system. You can choose among:

- Concentric system

The concentric connection is provided standard initially.
The boiler concentric connection diameter is 3"/5" (80/125 mm), to which the venting and air supply system can be fitted, with or without elbow pieces. The maximum permissible pipe length is displayed in table 9, chapter 6.7.7.

- Parallel system

The boiler can be converted to a parallel system with supplied adapters.
It is possible to use a parallel pipe connection of 2x 3". In this case a separate supplied kit, with 2 vent adapters 3" (ø80mm), cover 5" (ø125mm), vent exhaust pipe and gaskets should be fitted instead of the concentric vent adapter on top of the boiler. See chapter 6.7.3.1 for installation. The maximum permissible pipe length is set out in table 9, chapter 6.7.7.

- Room Air System (indoor combustion air)

The boiler can use room air for combustion. If this option is selected the boiler must first be converted to the parallel system. A single exhaust pipe can then be fitted. It is required to use a room air filter (Part nr. 808000025) when using indoor air for combustion. See chapter 6.7.3.2 for installation. The maximum permissible pipe length is set out in table 9, chapter 6.7.7.

NOTICE

Rinnai strongly recommends the use of the room air filter when a Room Air System (indoor combustion air) is used.

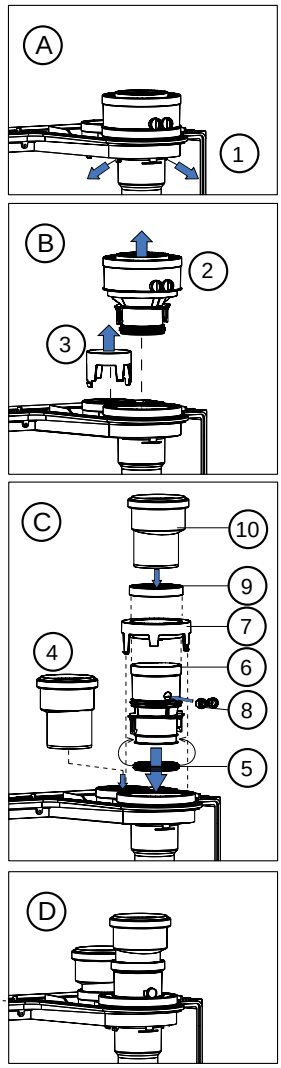
NOTICE

When the boiler is installed in any of the areas listed in chapter 5.1, "Areas likely to have contaminants" or any area exposed to the contaminants listed in chapter 5.1, then sealed combustion is required.

NOTICE

We advise to install a vent system out of the venting system program supplied by Rinnai (See chapter 19 Parts list Vent system). For further information about the available components of the venting and air supply system we recommend you consult Rinnai and the Installation instructions and parts list documentation.

6.7.3.1 Boiler conversion from concentric to parallel



A. 1. Push the 2 clips slightly outwards

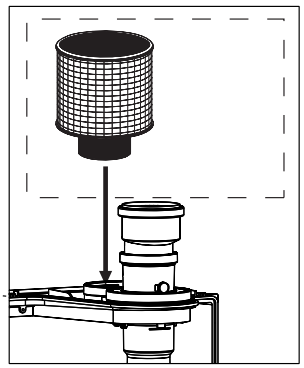
B. 2. Pull the concentric adaptor out of the boiler
3. Press the cover in the connection at the back from inside out

C. 4. Push the 3" adapter into the connection at the back of the boiler (= air intake)
5. Pull the rubber seal around the bottom of the exhaust connector
6. Push the exhaust connector in the boiler, in the boiler exhaust pipe until 'CLICK'
7. Push the 5" cover over the exhaust connector in the 5" opening until 'CLICK'
8. Push the rubber plug in open position in the O_2 measuring opening and close the stop.
9. Push the gasket around the top of the exhaust connector
10. Push the 3" exhaust adaptor in the exhaust connector.

D. Connect the parallel vent system.

boiler conversion from concentric to parallel
figure 19

6.7.3.2 Installing air filter



Push the air filter into the air intake on top of the boiler. See figure 20.

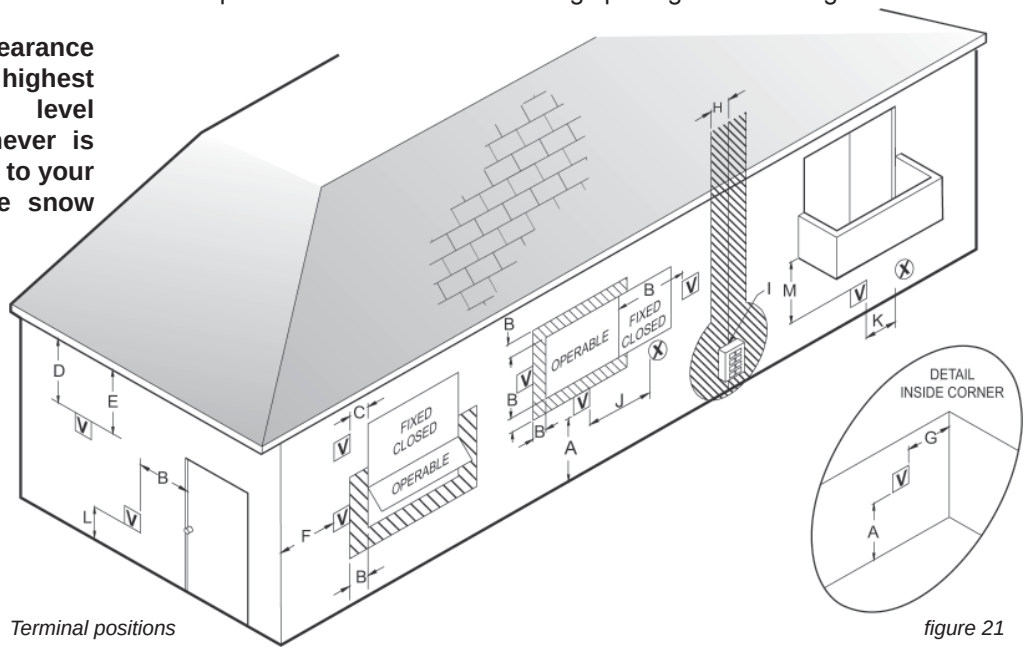
The equivalent length of the combustion room air filter is 12ft (3.66m).

placing air filter on air intake
figure 20

6.7.4 Recommended vent/air intake terminal position

Terminals should be positioned as to avoid products of combustion entering openings into buildings or other vents.

Maintain 12” of clearance above the highest anticipated snow level or grade or, whichever is greater. Please refer to your local codes for the snow level in your area.



Terminal positions *figure 21*

Ref	Description	Canadian Installations - Direct Vent and non Direct Vent	US Installations Direct Vent	US Installations non Direct Vent
A	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)	12 inches (30 cm)
B	Clearance to window or door that may be opened	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kW)	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 inches (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (30 kW), 12 inches (91 cm) for appliances > 50,000 Btuh (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening
C	Clearance to permanently closed window	*	*	*
D	Vertical clearance to ventilated soffit, located above the terminal within a horizontal distance of 2 feet (61 cm) from the center line of the terminal	*	*	*
E	Clearance to unventilated soffit	*	*	*
F	Clearance to outside corner	*	*	*
G	Clearance to inside corner	*	*	*
H	Clearance to each side of center line extended above meter/regulator assembly	3 feet (91 cm) within a height 15 feet (4.5 m) above the meter/regulator assembly	*	*
I	Clearance to service regulator vent outlet	36 inches (91 cm)	*	*
J	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 12 inches (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 100,000 Btuh (30 kW), 36 inches (91 cm) for appliances > 100,000 Btuh (30 kW)	6 inches (15 cm) for appliances ≤ 10,000 Btuh (3 kW), 9 inches (30 cm) for appliances > 10,000 Btuh (3 kW) and ≤ 50,000 Btuh (30 kW), 12 inches (91 cm) for appliances > 50,000 Btuh (30 kW)	4 feet (1.2 m) below or to side of opening; 1 foot (300 mm) above opening
K	Clearance to a mechanical air supply inlet	6 feet (1.83 m)	3 feet (91 cm) above if within 10 feet (3 m) horizontally	3 feet (91 cm) above if within 10 feet (3 m) horizontally
L	Clearance above paved sidewalk or paved driveway located on public property	7 feet (2.13 m) [1]	*	7 feet (2.13 m)

[1] A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.
[2] Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
* For clearances not specified in ANSI Z223.1/NFPA 54 or CSA B149.1, clearances are in accordance with local installation codes and the requirements of the gas supplier.

clearances of venting system terminals *table 6*

NOTICE — **See Boiler Applications manual for additional venting information.**

NOTICE — **The termination shall be at least 4 feet (1,220 mm) for the US and 6 feet (1,830 mm) for Canada distance from electric meters, gas meters, regulators and relief equipment. (for room air application only)**

CAUTION — **Horizontal vent systems should always be installed sloping towards the boiler (min. 1/4"/ feet, 21 mm/m), in order to avoid condensate retaining in the vent system. With the condensate running back to the boiler the risk of ice forming at the terminal is reduced.**

CAUTION — **The whole route of the vent system must be installed upwards, never downwards, completely nor partly.**

NOTICE — **Place pipe supports every 4 feet (1,219 mm) of horizontal run, beginning with support near the boiler to prevent movement in fittings and allow boiler to be free from any strain or weight on boiler or fittings.**

NOTICE — **The terminal should be located where dispersal of combustion products is not impeded and with due regard for the damage or discoloration that might occur to building products or vegetation in the vicinity (see fig 21 and 22).**
In certain weather conditions condensation may also accumulate on the outside of the air inlet pipe. Such conditions must be considered and where necessary insulation of the inlet pipe may be required.
In cold and/or humid weather water vapor may condense on leaving the vent terminal. The effect of such 'water condensation' must be considered.

NOTICE — **The terminal must be located in a place not likely to cause a nuisance.**

Use the Instructions of the Rinnai venting system for installation and service.

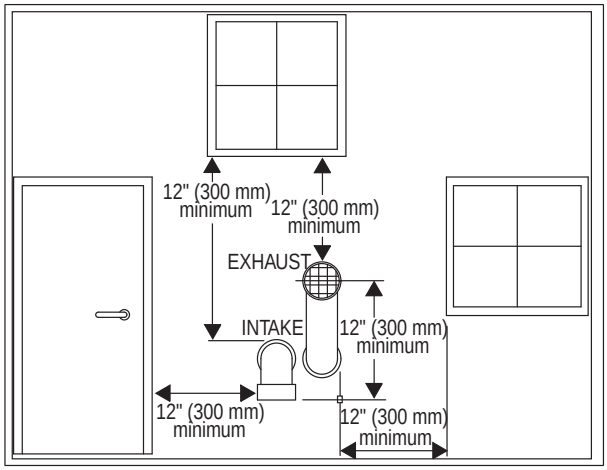
NOTICE — **Cellular or Foam core PVC, CPVC and Radel is not permitted for use with the boiler.**

NOTICE — **The application of any type of insulation is prohibited for use with any Plastic venting system.**

		Approval Codes for Installation	
Item Description	**Flue Material**	**United States**	**Canada**
Plastic Vent and/or air pipes and fittings	PVC Schedule 40	ANSI/ASTM D1785	ULC S636
	PVC - DWV	ANSI/ASTM D2665	
	CPVC Schedule 40	ANSI/ASTM F441	
Plastic Pipe cement and primer	PVC	ANSI/ASTM D2564	
	CPVC	ANSI/ASTM F493	

Item Description	Flue Material	Manufacturer	Approval code US/CAN	Flue system
Stainless steel vent systems	Stainless Steel	Heat Fab	UL1738 Concentric twin pipe	Saf-T Vent SC Saf-T Vent EZ Seal
Stainless steel vent systems	Stainless Steel	Simpson Dura-Vent	UL1738 Flexible liner UL1738 Concentric twin pipe	FastNSeal Flex FastNSeal
Stainless steel vent systems	Stainless Steel	Ubbink		Rolux Condensing Vent System
Plastic Vent System	PPS	Ubbink	ULC S636	Rolux Condensing Vent System
Plastic Vent System	PVC/CPVC	IPEX	ULC S636	System 636
Plastic Vent System	PPS	Centrotherm	ULC S636 and UL 1738	InnoFlue

Approval codes for installation of venting system *table 7*



Terminal positions PVC *figure 22*

Fittings or Piping Equivalent PVC	feet	m
45 degree elbow	3	0.91
90 degree elbow	6	1.83
plastic pipe per foot	1	0.30
concentric vent kit	3	0.91

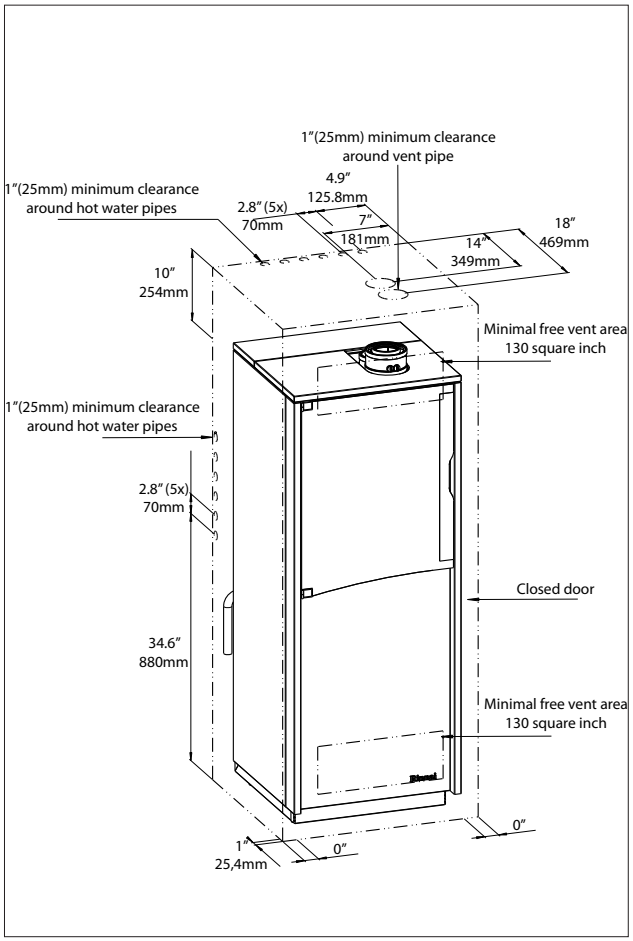
Equivalent friction loss of PVC/CPVC *table 8*

6.7.5 Direct vent closet and alcove installation

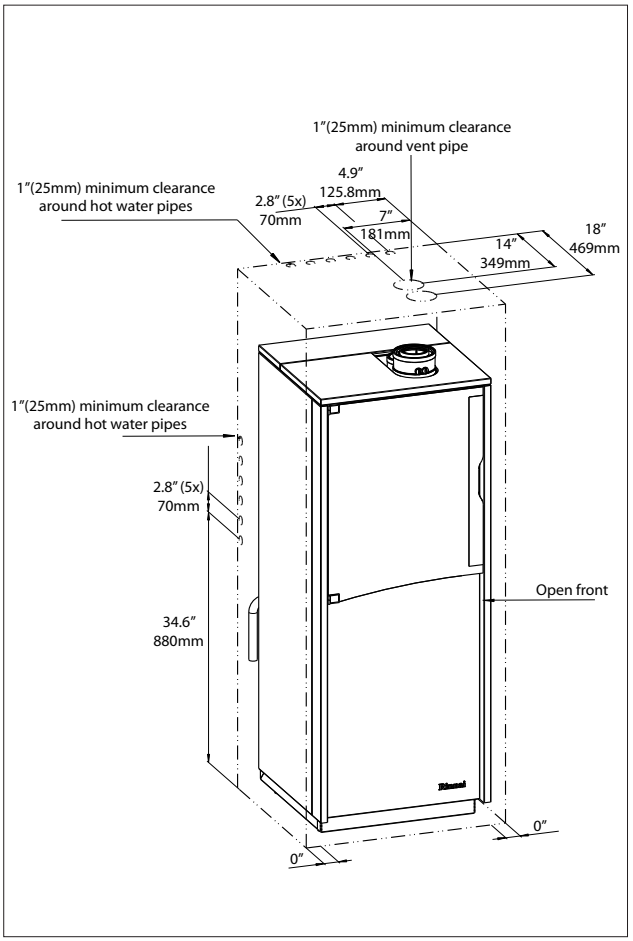
WARNING

For closet and alcove installation, CPVC material, instead of PVC, must be used in a closet/alcove structure. Failure to follow this warning could result in fire, personal injury, or death.

Rinnai strongly suggests the use of concentric venting for all closet and alcove installations. For non direct vent room air applications see sections 6.7.6 and 6.7.9.



Closet installation *figure 23a*



Alcove installation *figure 23b*

6.7.6 Dimensioning of the exhaust and air intake duct

DANGER

The boiler must be vented and supplied with combustion and ventilation air as described in this section.
Ensure the vent and air piping and the combustion air supply comply with these instructions regarding vent system, air system, and combustion air quality.

Inspect finished vent and air piping thoroughly to ensure all are airtight and comply with the instructions provided and with all requirements of applicable codes.

Failure to provide a properly installed vent and air system may cause severe personal injury or death.

WARNING

Use only the material listed in Rinnai's vent documentation for vent pipe, and fittings. Failure to comply could result in severe personal injury, death or substantial property damage.

NOTICE

Installation must comply with local requirements and with the National Fuel Gas Code, ANSI Z223.1 for U.S installations or CSA B 149.1 for Canadian installations.

WARNING

For closet and alcove installation, CPVC material, instead of PVC, must be used in a closet/alcove structure. Failure to follow this warning could result in fire, personal injury, or death.

NOTICE

All vent pipes must be connected and properly supported, and the exhaust must be pitched a minimum of a 1/4"/foot (21 mm/m) back to the boiler (to allow drainage of condensate). Please refer to the venting manufacturer's manual to see if a larger pitch is required for specific venting systems. The venting system manufacturer's required venting pitch must always be followed if larger than 1/4" (21 mm). Ubbink concentric condensing venting requires a pitch of ¾"/ foot (6mm/m).

NOTICE

Combustion air piping from the outside MUST comply to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest edition of the National Fuel Gas Code, ANSI Z223.1/NFPA 54. In Canada, installation must be in accordance with the requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code.

NOTICE

See the Rinnai Boiler Applications Manual for further information on venting.

6.7.7 Combustion air and vent piping lengths.

In the table below you will find the maximum equivalent pipe length of the vent/air system based on 3" diameter. These lengths are for single pipe (room air), twin pipe, and concentric venting systems.

Boiler type	3” Max Vent equivalent length	3” Max Air equivalent l
QP85N	100 feet	100 feet
QP130N	100 feet	100 feet

Equivalent vent length *table 9*

Calculation of equivalent length vent system

Choose the vent type and fill out the corresponding table.

* When determining equivalent combustion air and vent length, add 6 feet for each 90° elbow, 3 feet for each 45° elbow, 5 feet for the concentric terminal in the Parallel System, 2 feet for the concentric terminal in the Concentric System and 12 feet for the combustion room air filter .

Parallel system

Length tube	Number of elbows 90° x 6*	Number of elbows 45° x 3*	Concentric terminal Add 5 ft.*	Total	Multiply with factor	Equivalent length
Combustion air						
ft	ft	ft	ft	ft	0.5	ft
Vent						
ft	ft	ft	ft	ft	0.5	ft
					Total equivalent length	ft

Concentric system

Length concentric tube, boiler to roof horizontal	Number of elbows 90° x 6*	Number of elbows 45° x 3*	Concentric terminal Add 2 ft.*	Total	Multiply with factor	Total equivalent length
ft	ft	ft	ft	ft	1.0	ft

Example of calculation:
Twin tube (parallel) with terminal
Combustion air length : 24 ft with elbow 3 x 90°
Vent length : 24 ft with elbow 2 x 90°, elbow 2 x 45°

Calculation:
Equivalent Air Length : (24+3x6+2) x 0.5 = 23 ft
Equivalent Vent Length : (24+2x6+2x3+2) x 0.5 = 23 ft +
Total = 46 ft.

6.7.8 Calculation of compensation factor

The compensation factor eliminates or reduces the natural effect of derate of maximum input caused by the resistance of the vent system and/or the impact of the altitude.

1. Determine the Compensation Factor Vent System CF(V) in the table below.

Eq. length (ft)		Boiler type	
		QP85N	QP130N
min	max	CF (V)	
0	10	0	0
11	20	0	0
21	30	0	2
31	40	1	4
41	60	2	6
61	80	3	8
81	100	4	10

Compensation factor vent system CP(V) *table 10*

2. Determine the Compensation Factor Altitude CF(A) in the table below.

Altitude (ft)		Boiler type	
		QP85N	QP130N
min	max	CF (A)	
0	1	0	
1,000	2,000	6	
2,000	3,000	12	
3,000	4,000	18	
4,000	5,000	24	
5,000	6,000	30	
6,000	7,000	36	
7,000	8,000	42	
8,000	9,000	48	
9,000	10,000	54	

Compensation factor altitude CP(A) *table 11*

NOTICE

Any application or installation above 10,000 must be reviewed by Rinnai's Engineering group. This is to ensure the product is installed and the overall system is designed properly and that the units are commisioned properly. Not involving of Rinnai's Engineering group would result in no support of the product and no warranty.

3. Calculate the Compensation Factor Total CF(T):

$$CF(T) = CF(V) + CF(A)$$

The result is the setting for Parameter 73.

Change parameter 73 according to this result. See Chapter 11.1 how to change parameters.

Example of calculation:
QP130N

Eq. lenth vent system (taken from previous example)	46 ft	CF(V) = 6
Altitude	7,200ft	CF(A) = 42 +
		CF(T) = 48

Parameter setting (Par. 73) = 48

WARNING

Do not overcompensate the boiler by setting a higher value than calculated, otherwise the boiler could be damaged.

6.7.9 Room Air System (indoor combustion air)

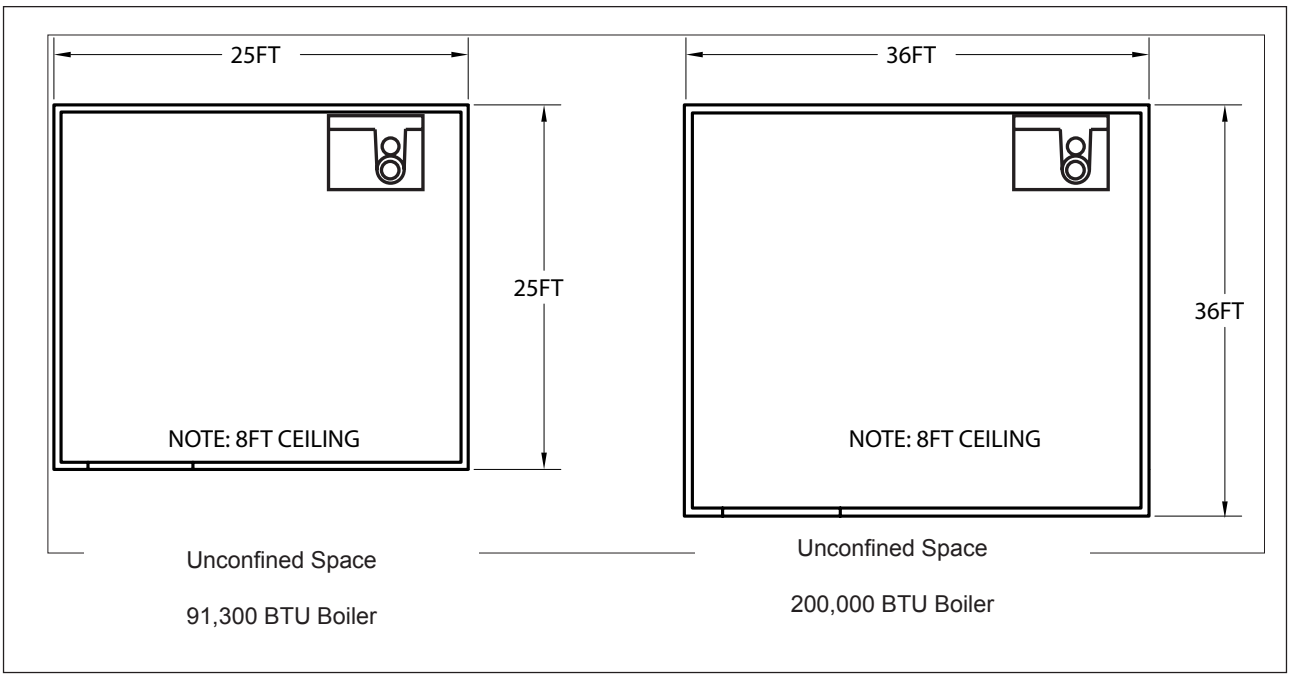
When using indoor air, Rinnai strongly recommends the use of an indoor air filter, P/N 808000025.

WARNING

This boiler requires adequate combustion air for ventilation and dilution of flue gases. Failure to provide adequate combustion air can result in unit failure, fire, explosion, serious bodily injury or death. Use the following methods to ensure adequate combustion air is available for correct and safe operation of this boiler.

Important: Combustion air must be free of corrosive chemicals. Do not provide combustion air from corrosive environments. Appliance failure due to corrosive air is not covered by the limited warranty.
Combustion air must be free of acid forming chemical such as sulfur, fluorine and chlorine. These chemicals have been found to cause rapid damage and decay and can become toxic when used as combustion air in gas appliances. Such chemicals can be found in, but not limited to bleach, ammonia, cat litter, aerosol sprays, cleaning solvents, varnish, paint and air fresheners. Do not store these products or similar products in the vicinity of this boiler.

Unconfined Space:
An unconfined space is defined in NFPA #54 "as a space whose volume is not less than 50 cubic feet per 1000 Btu/hr (4.8 m3 per kW per hour) of the aggregate input rating of all appliances installed in that space. Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the unconfined space." If the “unconfined space” containing the appliance(s) is in a building with tight construction, outside air may still be required for proper operation. Outside air openings should be sized the same as for a confined space.



Unconfined space *figure 24*

Confined Space:
(Small Room, Closet, Alcove, Utility Room, Etc.)
A confined space is defined in the NFPA #54 as "a space whose volume is less than 50 cubic feet per 1000 Btu/hr (4.8 m3 per kW per hour) of the aggregate input rating of all appliances installed in that space." A confined space must have two combustion air openings. Size the combustion air openings based on the BTU input for all gas utilization equipment in the space and the method by which combustion air is supplied:

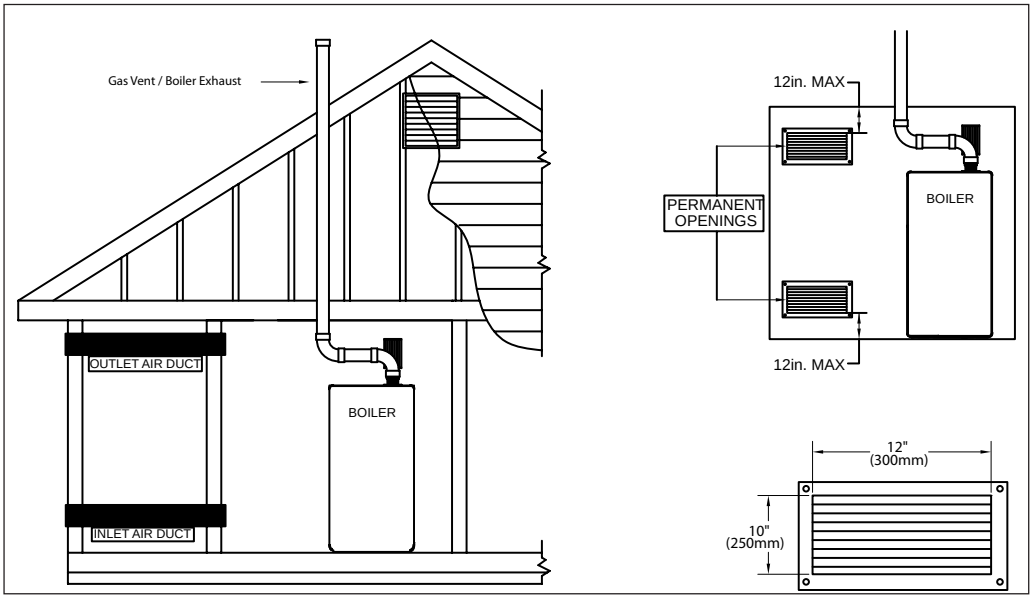
Using indoor air for combustion
Using outdoor air for combustion

Louvers and Grills
When sizing the permanent opening as illustrated in figure 25, consideration must be taken for the design of the louvers or grills to maintain the required free area required for all gas utilizing equipment in the space. If the free area of the louver or grill design is not available, assume wood louvers will have 25% free area and metal louvers or grills will have 75% free area. Under no circumstance should the louver, grill or screen have openings smaller than ¼".

Example:
Wood: 10 in x 12 in x 0.25 = 30 in2
Metal: 10 in x 12 in x 0.75 = 90 in2

Location
To maintain proper circulation of combustion air two permanent openings (one upper, one lower) must be positioned in confined spaces. The upper shall be within 12 inches of the confined space and the lower opening shall be within 12 inches of the bottom of the confined space. Openings must be positioned as to never be obstructed.

Combustion air provided to the boiler should not be taken from any area of the structure that may produce a negative pressure (i.e. exhaust fans, powered ventilation fans).



Louvers and grills *figure 25*

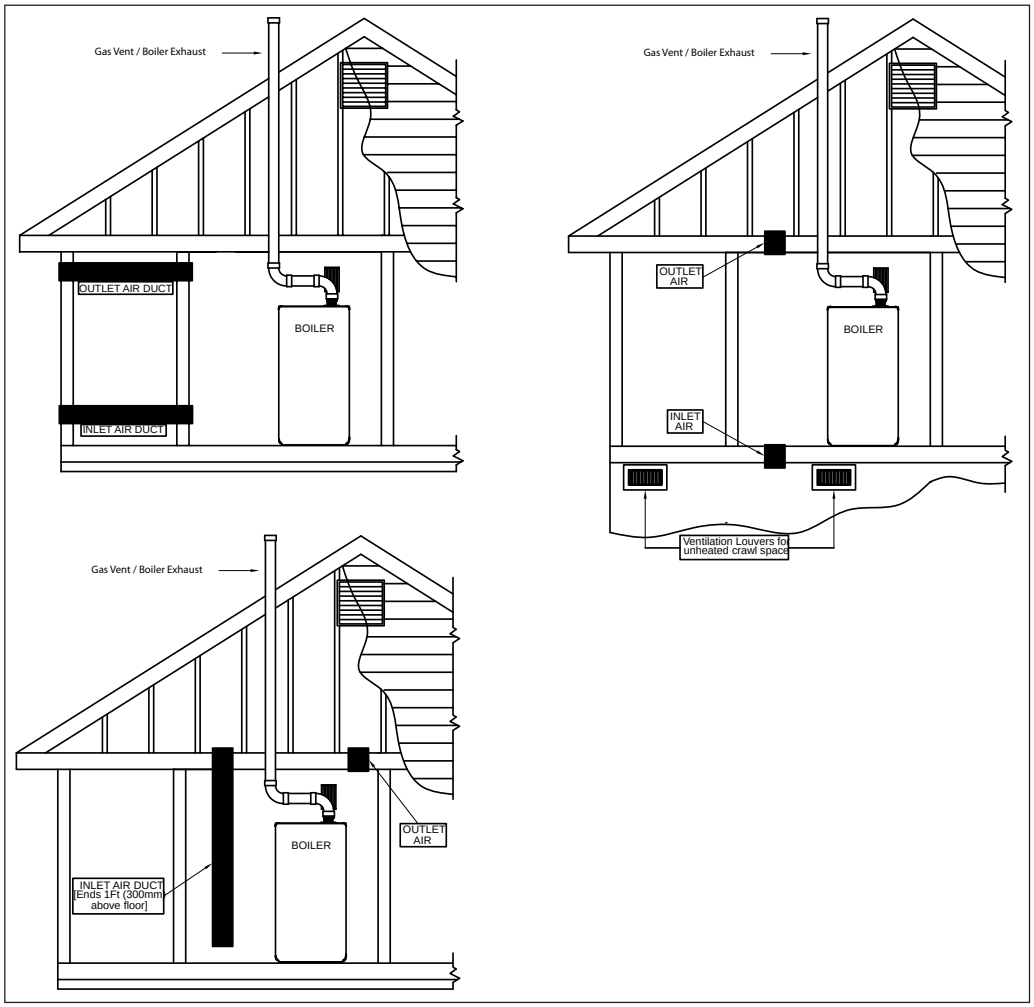
Using Indoor Air For Combustion
When using air from other room(s) in the building, the total volume of the room(s) must be of adequate volume (Greater than 50 cubic feet per 1000 Btu/hr). Each combustion air opening must have at least one square inch of free area for each 1000 Btuh, but not less than 100 square inches each.

Using Outdoor Air For Combustion
Outdoor air can be provided to a confined space through two permanent openings, one commencing within 12 in. (300mm) of the top and one commencing within 12" (300mm) of the bottom, of the confined space. The openings shall communicate to the outside by one of two ways:

directly through horizontal ducts
indirectly through vertical ducts

When communicating directly with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 in^2/2000 Btu/hr (1100 mm^2/kW) of total input rating of all appliances in the confined space.
Note: If ducts are used, the cross sectional area of the duct must be greater than or equal to the required free area of the openings to which they are connected.

When communicating indirectly with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 in^2/4000 Btu/hr (550 mm^2/kW) of total input rating of all appliances in the confined space. Combustion air to the appliance can be provided from a well ventilated attic or crawl space.



Louvers and grills *figure 26*

7 Electrical connections

The electrical connections to the boiler must be electrically grounded in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI/NFPA-70. Installations should also conform with CSA C22.1 Canadian Electrical Code Part 1 if installed in Canada.

Devices such as, outdoor sensor, room thermostat or temperature control and temperature sensor or thermostat are all connected to the internal connection terminal. The connection terminal is situated in the Control Tower.

Connecting incoming power
Lead the cable through the back part of the boiler using a strain relief and lead the cable through the cable supports to the Control Tower. A number of predrilled holes can be enlarged to fit different strain relief and conduit connections.
Connect a power supply cable to the cable harness terminal strip that connects to both the power switch on the front of the Control Tower and the terminal strip with positions 1,2, and 3 on the inside of the Control Tower.

CAUTION

The boiler must be electrically grounded in accordance with local codes, or in absence of local codes, with the National Electrical Code, ANSI/INFPA 70 and/ or the CSA C22.1, Electrical Code.

RISK OF ELECTRIC SHOCK.
Once the main power supply is on then there is 120V on terminals 1 to 12 when the main switch at the front of the Control Tower is switched on.

CAUTION

- **No changes may be made to the wiring of the boiler;**
- **All connections should be designed in accordance with the applicable regulations.**

CAUTION

- **Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.**

CAUTION

- **Verify proper operation after operation servicing.**

8 Controls

NOTICE

The Rinnai room thermostat and controls must be connected to their allocated connections. All other types or makes of room thermostats or controls which are used must have a Volt free contact.

When using an on/off thermostat or control, it may be necessary to calibrate the anticipating resistance to prevent too high temperature fluctuations. As a standard rule this means mercury thermostats. This resistance wire is present in the Control Tower and must be connected to terminals 23 and 27. The anticipating resistance in the room thermostat has to be set at 0.11 A.
For more detailed questions regarding the components which are not supplied, the distributor should be contacted.

NOTICE

When wiring an RS100 it is suggested that a jumper be placed on terminals 22 and 23 so that in the event the control is damaged the boiler will still fire based on outdoor reset.
A jumper should also be used when commissioning or trouble shooting the boiler.

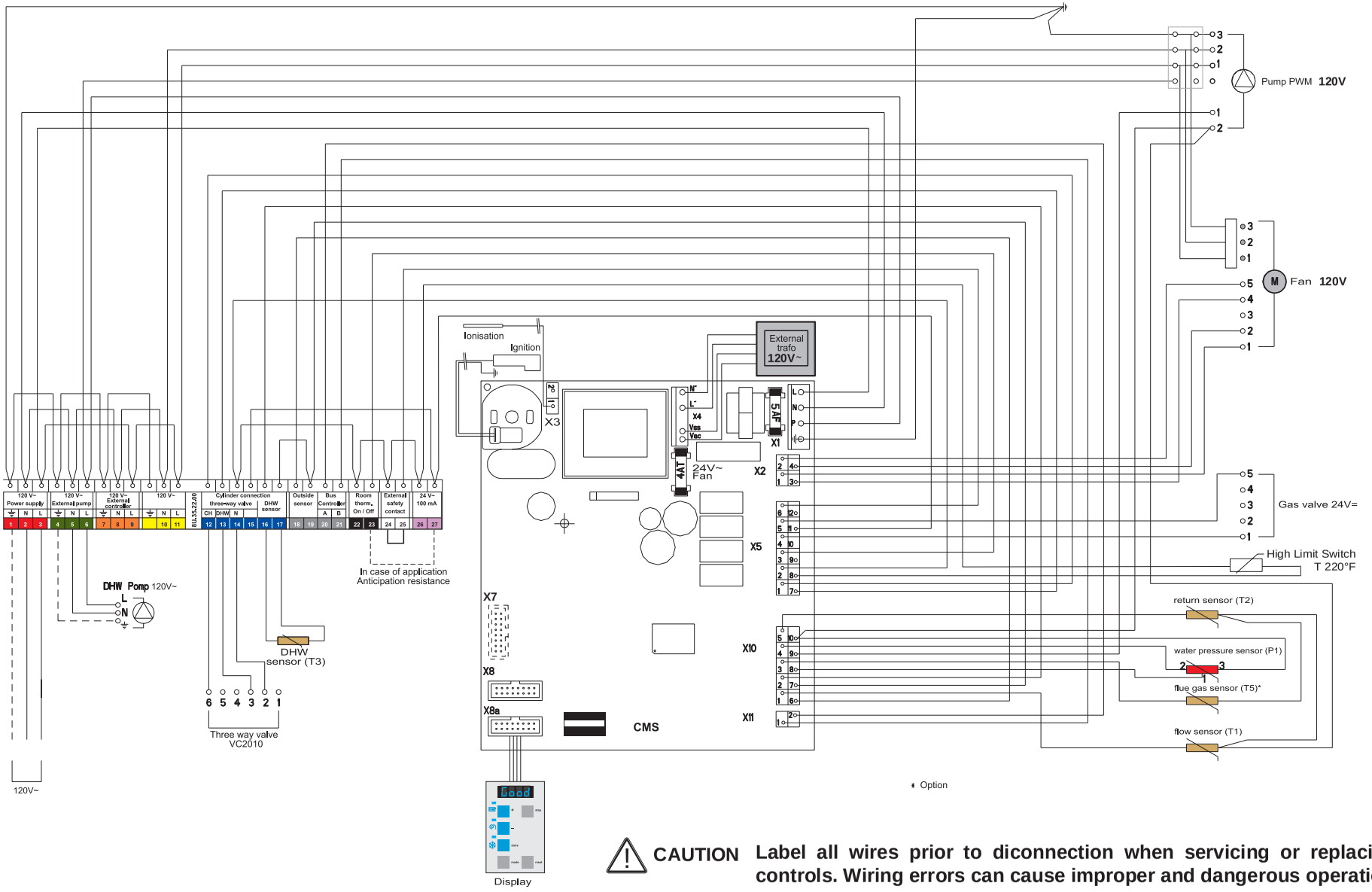
NOTICE

Power stealing thermostats cannot be connected to terminals 22 and 23.

Connection terminal Q Premier

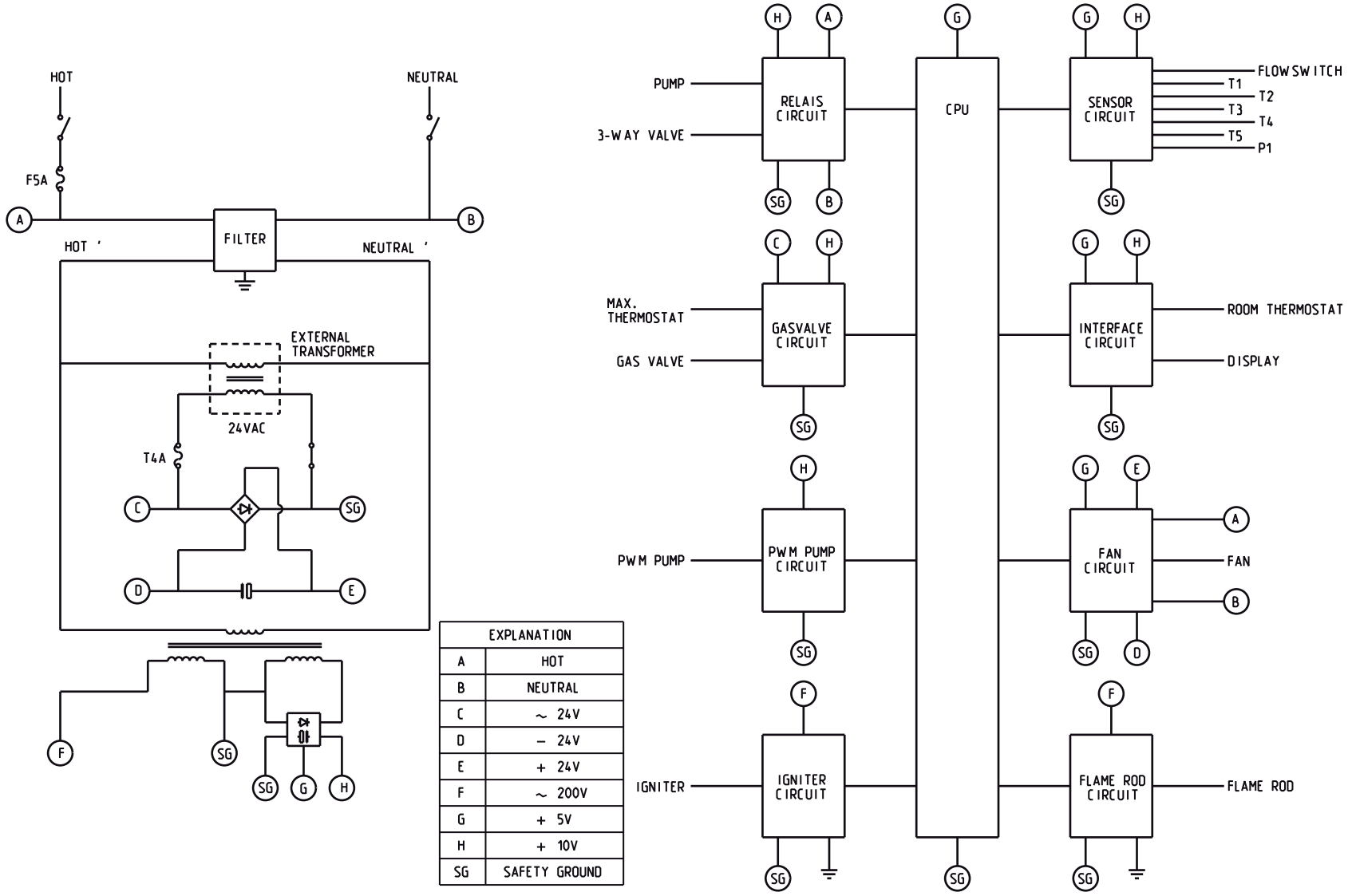
120 V~ Power supply			120 V~ External pump			120 V~ Ext. controller			120 V~			8U352200	Cylinder connection three-way valve				DHW sensor		Outside sensor		Bus Controller		Room therm. On / Off		External safety contact		24 V~ 100 mA	
⏚	N	L	⏚	N	L	⏚	N	L	⏚	N	L		CH	DHW	N						A	B							
1	2	3	4	5	6	7	8	9		10	11		12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
main power supply			internal DHW pump			120 Volts Rinnai only			120 Volts Rinnai only			internal three-way valve motor and tank sensor							ARV12 outdoor sensor		Bus room thermostat RS100 only		On/off thermostat or control (Volt free)		External safety contact		24 Volts maximum 100 mA	

Connection terminal *figure 27*



electrical diagram

figure 28



EXPLANATION	
A	HOT
B	NEUTRAL
C	~ 24V
D	– 24V
E	+ 24V
F	~ 200V
G	+ 5V
H	+ 10V
SG	SAFETY GROUND

electrical ladder diagram

figure 28a

9 Boiler controls

The boiler is provided with a fully automatic microprocessor control, called CMS Control Management System. This control simplifies operation by undertaking all major control functions. Initially when power to the unit is switched on it will remain on standby. There is no indication LED on, until one of the program buttons is pressed. The control panel display will show the relevant state. When the boiler installation is empty the display will show FILL.
The various parameters can be called up in two ways:

The Good-state or standard read out
The first way shows a simple display read out.
The boiler in operation will always show 'Good'. When a message is necessary this will be shown instead of Good.

Technical read out
The second way is a technical read out. In normal situations the following will be shown:
- on the left the status in which the boiler is active;
- on the right the supply temperature in °F;

alternately indicated by:
- the water pressure in the installation in PSI.

When a message (error or blocking code) is necessary this will be shown instead of the technical read out.

Example 

Example 

NOTICE

To switch over from the Good-state to the Technical read out (and vice versa):
- Press the STEP-button for 5 seconds.

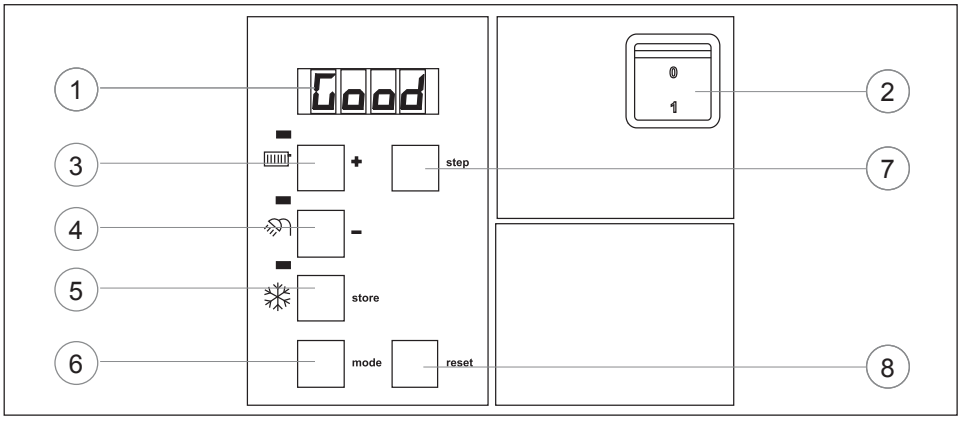
When the system has been filled the automatic de-aeration program starts, when a program has been selected, by pressing the button for Central Heating, DHW or pump program (, of). The program takes 17 minutes and stops automatically. After this the unit will function normally. (See also 'Filling and de-aerate the boiler and installation, chapter 10).

On a call for heating or hot water the control system will select the required water control temperature. This water temperature is called the T-set value. On a call for central heating the boiler ignites first at low input. The input is then changed slowly to match the load required. The boiler operates in this way to avoid excessive water noises and temperature overshoot. On a call for domestic hot water supply the T-set value of central heating return water temperature is monitored. Depending on the amount of domestic water which is withdrawn from the DHW tank, the central heating return water temperature, from which the input is adjusted, will vary.

Operation indication
(in the first display position by technical read out)

- 0 No heat demand
- 1 Fan pre/post purge
- 2 Ignition phase
- 3 Burner active on central heating
- 4 Burner active on DHW
- 5 Fan check
- 6 Burner off when room thermostat is demanding or burner off when DHW is calling
- 7 Pump overrun phase for central heating
- 8 Pump overrun phase for hot water
- 9 Burner off because of to high flow temperature
- A Automatic de-aeration program

9.1 Explanation of the function buttons



Boiler control panel *figure 29*

NOTICE

Only licensed professionals who are trained for servicing these boilers are permitted to make alterations in the controller to calibrate the boiler to the installation.

1. **Display**. See previous page for further information.
2. **ON-OFF Switch**
   This switch turns the power supply to the boiler on or off.

CAUTION

Only turn the boiler off using this switch, when the burner is off.

3. **Central Heating program button.**
   Switching the Central Heating on or off (LED on/off);
4. **Hot Water program button.**
   Switching the Domestic Hot Water (DHW) facility on or off (LED on/off);
5. **Pump program button.**
   adjusts the pump to continuous water circulation in the central heating system (LED on), or according to the pump overrun times on the relevant programs (LED off);

NOTICE

When the pump is switched on continuously it can lead to undesired heating up of the central heating system during the summer.

6 Mode-button.
After briefly pressing, a selection of the data chapters can be retrieved.
After pressing for 5 seconds it is possible to enter the code as described in chapter 11.3;

7 Step-button.
After briefly pressing, the water pressure can be retrieved and pages per chapter can be retrieved.
After pressing for 5 seconds it switches from the Good-state to technical read out and vice versa;

8 Reset-button.
After briefly pressing, for:
- unlocking errors;
- ending the access code;
After pressing for 5 seconds an operating stop is made, for example, for activating the automatic venting program.

Some buttons have other functions.These functions are only active according to the procedure described in chapter 11, adjustment has to be changed or data must be retreived from the CMS. The other functions are:

3. Central Heating program button :	+ function;
4. Hot Water program button:	- function;
5. Pump program button :	store-function, which means that by means of this button a modified setting is confirmed;
7. Step-button:	scrolling in a data chapter.

10 Starting up: Filling and de-aerating the boiler and installation

CAUTION

CAUTION
Observe the following rules of safety:
- All work on the unit must take place in a dry environment.
- Rinnai units may never be in operation without their housing, except in connection with maintenance or adjustments (see Chapter 13 and 14).
- Never allow electrical or electronic components to come into contact with water.

NOTICE

NOTICE
Carry out the following tasks in connection with maintenance, etc. to an already-installed unit:
- Shut down all programs
- Close the gas shut off valve
- Shut off the power at the main power switch
- Close the service valves (supply and return)

NOTICE

NOTICE
Take note of the following when maintenance or adjustments are needed:
- The unit must be able to function during these activities; for this reason, the unit's supply voltage, gas pressure and water pressure must be maintained. Ensure that this is not a source of potential danger during these activities.

WARNING

Following maintenance or other activities; always check the installation of all parts through which gas flows (with bubble test using leak-search spray).

10.1 Requirements of the water system

Before filling the heating system, the complete system, including all zones, must be thoroughly cleaned and flushed to remove sediment. Flush until clean water runs free of sediment. Rinnai suggests using an approved system cleaner to flush the system, but not the boiler. Always use Rinnai approved antifreezes. See the list at the end of this chapter. Never use reverse osmosis, D.I., or distilled water for filling the heating system.

WARNING

Do not use petroleum-based cleaning or sealing compounds in the boiler system. Damage of seals and gaskets in boiler and system could occur, resulting in property damage.

The central heating installation needs to be filled with potable water.

WARNING

Use only potable water or approved glycol for filling the heating system.
When the water hardness of the filling water exceeds > 10.5 gpg (200 mg/L) and the volume of the installation > 20L/kW (5.2 gallons/3,412 BTU) the water has to be treated until below the maximum value of 10.5 gpg (200 mg/L).
The pH value of the installation water must be between 6.5 and 8.5.

Check the pH value using proper equipment or by having the water analyzed by a water treatment company.
If pH differs from above, contact Rinnai engineering for further assistance.

NOTICE

Component or product damage as a result of failing to adhere to the water quality requirements will not be covered by the limited warranty.

Freeze protection

Freeze protection for new or existing systems must use glycol that is specially formulated for this purpose. This includes inhibitors, which prevent the glycol from attacking the metallic components. This should be for multi-metallic components.
Make certain to check that the system fluid is correct for the glycol concentration and inhibitor level. The system should be tested at least once a year and as recommended by the producer of the glycol solution. The allowed maximum concentration is 50%.

NOTICE **Use only Rinnai approved inhibitors. See below for an approved list of inhibitors.**

WARNING **Use only inhibited propylene glycol solutions, which are specially formulated for central heating systems. Ethylene glycol is toxic and can attack gaskets and seals used in the boiler and system. Approved glycols are listed below.**

NOTICE **Additives in the installation water are not permitted.**

Approved antifreeze: (max. concentration 50%)	• Rhomar RhoGard Mutli-Metal (AL safe) • Noble Noburst AL	• Sentinel X500 • Fernox Alphi 11
Approved system cleaner:	• Noble Noburst Hydronic System Cleaner • Rhomar Hydro-Solv 9100	• Fernox F3 Cleaner • Sentinel X400

NOTICE **The system cleaners from NoBurst, Rhomar, and Fernox are not to be used in the boiler. The boiler must be closed off (valved off) from the rest of the system or not connected while the cleaners are in the system. The system should then be drained and then thoroughly flushed with clean water to remove all the system cleaner.**

Approved inhibitors:	• Rhomar Pro-tek 922 • Noble Noburst AL inhibitor	• Sentinel X100

10.2 Filling the heating system

For filling or topping off the installation you use the filling loop according to the following procedure:

1 Switch on the power supply;

FILL 2 The display will show FILL;

3 All functions off (heating, DHW and pump);

step 4 Push briefly the 'STEP'-button: P XX (XX = water pressure in PSI);

5 Open the filling loop (Indication on display increases);

P 22 6 Fill up slowly to 16 to 18 PSI;

StoP 7 STOP appears on the display;

8 Close the filling loop;

9 De-aerate the complete installation, start at the lowest point;

10 Check the water pressure and if necessary top it off;

11 Close the filling loop;

12 Activate the functions in use (heating, DHW and/or pump);

A XX

13 If A XX appears on the display, wait for 17 minutes;

14 Check the water pressure and if necessary top it up to 16 to 18 PSI

15 Close the filling loop;

step

16 Press the ‘STEP’-button;

17 Be sure that the filling loop is closed.

A XX

Good 0 XX

18 After the automatic de-aeration program (A XX) is finished the boiler will return to the Good state or Technical read out.

Check the water pressure regularly and top off the installation when necessary.
The typical working pressure of the installation should be between 16 and 18 PSI when the system is cold.

NOTICE

It can take a while before all air has disappeared from a filled installation. Especially in the first week noises may be heard which indicate the presence of air. The automatic air vent in the boiler will remove the air, which means the water pressure can reduce during this period and therefore topping off with water will have to be done.

During normal use the following messages can occur with the necessary follow up:

FILL

Water pressure is too low (<10 PSI), FILL indication remains continuously visible, the boiler is taken out of operation. The installation needs to be topped off.

FILL

Water pressure is too low (<12 PSI), flashing FILL will alternate with indication of water pressure, boiler power of 50% is possible. The installation needs to be topped off.

HIGH

Water pressure is too high (>42 PSI), if HIGH indication remains continuously visible, the boiler is taken out of operation. The installation pressure needs to be decreased by draining water.

10.3 Hot water supply

Apply the water pipe pressure to the tank (open main valve and/or stop valve of the safety group).

Vent the tank and the hot water installation by opening a hot water shut off valve. Leave the tap open for as long as required until all air has disappeared from the tank and the pipes and only water is flowing from the shut off valve.

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

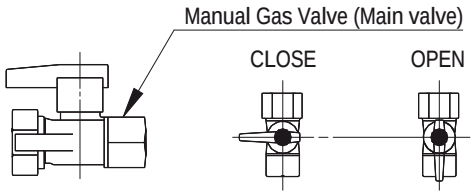
- **Do NOT try to light any appliance.**
- **Do NOT touch any electrical switch.**
- **Do NOT use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a licensed professional. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any parts have been under water. Immediately call a licensed professional to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP! Read the safety information above this label.**
2. **Turn off al electrical power of the appliance.**
3. **Set the thermostat or other operating control to the lowest setting.**
4. **This appliance is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.**
5. **Close main gas shut off valve.**
6. **Wait (5) minutes to clear out any gas. Then smell for gas. Including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.**
7. **Open main shut off valve.**
8. **Set the thermostat or other operation control to desired setting.**
9. **Turn on all electric power to the appliance.**
10. **If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.**



TO TURN OFF GAS TO APPLIANCE

1. **Turn off all electric power to the appliance if service is to be performed.**
2. **Set the thermostat or other operating control to the lowest setting.**
3. **Close main gas shut off valve.**

8U.34.01.01 / 11.12

11 Adjustments

When the boiler is installed the software has already been pre-programmed at the factory. All software adjustments of the boiler control are already pre-programmed for a heating system with radiators/convectors with a supply temperature of 176°F. The adjustments are described in the Parameter chapter on the following page.
In certain cases parameters have to be altered in case of :

- Lower supply temperature
- High altitude/long vent length

CAUTION

The venting / altitude calculation must always be performed during commissioning of the boiler.

Read through the Parameter chapter to adjust the boiler to its installation.
Contact Rinnai in case of doubt.

NOTICE

Only licensed professionals who are trained for servicing these boilers are permitted to make alterations in the controller to calibrate the boiler to the installation.

11.1 Altering adjustments

STEP 1 **Press the Mode-button for 5 seconds.**
The display shows COdE followed by an arbitrary number;

STEP 2 **Press by means of the + or the - button until the code C123 is shown;**

STEP 3 **Press the STORE-button to confirm the code (code blinks1 x).**
Now you have acces to the installer level. There are 4 chapters:

- PARA *Parameters*
- INFO *Information chapter (no adjustments possible)*
- SERV *Service chapter*
- ERRO *Error-chapter (no adjustments possible)*

The content of the chapters is described on the following pages.

STEP 4 **Press briefly the MODE-button to select one of the 4 chapters, i.e. PARA;**

STEP 5 **Press briefly and release the STEP-button to select a Parameter**
(parameter visible on the left, value on the right) ;

STEP 6 **Alter the value, if necessary/possible, by means of the + or the - button**

STEP 7 **Press briefly on the STORE-button to confirm the alteration.**
When you have to change more values, repeat from step 5.

STEP 8 **Press once or more on the MODE-button until StBY or Good is shown:**
After a few seconds the text StBY will be replaced by the technical read-out or Good-state (Depending from the position the acces code is entered)

When you want to return from an arbitrary position to the original read out press once or more on the MODE-button until StBY is shown.

NOTICE

If no single button is used within 20 minutes the display will return automatically to its original read-out (Good state or technical read out)

Parameter Mode

PARA	FACTORY	DESCRIPTION	RANGE
1	176°F	maximum supply temperature CH	68 - 176°F
2*	00	type of CH installation:	00 - 04
		No pre-selection made. Radiators, air heating, or convectors: T max. supply 176°F K factor heating curve 2.3; gradient 10°F/min; gear differential 10°F	00
			01 DO NOT USE
		radiators with large surface areas or underfloor heating as additional heating: T max. supply 158°F K factor heating curve 1.8; gradient 10°F/min; gear differential 10°F	02
		under floor heating with radiators as additional heating: T max. supply 140°F; K factor heating curve 1.5; gradient 8°F/min; gear differential 8°F	03
		full under floor heating: T max. supply 122°F; K factor heating curve 1.0; gradient 6°F/min; gear differential 6°F	04
3	max.	maximum power CH in kW (.. x3415 = .. BTU/hr)	min-max
4*	00	control principal with on / off thermostat:	
		100 % on / off thermostat	00
		constant water circulation 22&23 closed contact day curve operation, open contact night curve operation	01
5*	2.3	heating curve K-factor (see also heating curve graph)	0.2 - 3.5
6*	1.4	heating curve exponent (see also heating curve graph)	1.1 - 1.4
7*	14°F	heating curve climate zone (see also heating curve graph)	-4 - 32°F
10*	0°F	fine adjustment heating curve day temperature	-8 to 10°F
11*	0°F	fine adjustment heating curve night temperature	-8 to 10°F
14	10°F/min.	gradient speed °F/min.	0 - 28°F/min.
15*	00	Booster after night decrease*:	
		no	00
		yes	01
23	26°F	Frost Temperature	-4 to 50°F
27	32°F	Minimum T-set CH	0 - 158°F
36	10	Type of three way valve and DHW fascility	
		VC 2010 / VC 8010	x0
		Warming function plate heat exchanger ON	1x
		Warming function plate heat exchanger OFF	2x
43	max.	Maximum power DHW in kW (.. x3415 = .. BTU/hr)	min-max
49	100%	Maximum pump capacity heating	100 %
73	0	Altitude and venting CFT. See chapter 6.7.7	0 - 100
89	00	Address	
		No function	-01
		Bus thermostat	00
90	01	Display reading	
		°C and Bar	00
		°F and PSI	01

Info Mode

INFO	FACTORY	DESCRIPTION	RANGE
1	°F	supply water temperature T1	
4	°F	return water temperature T2	
5	°F	DHW temperature T3	
7	°F	outdoor temperature T4	
8	°F	flue gas temperature T5 (optional sensor)	
16	%	actual power in %	
17	kW	actual power in kW (.. x3415 = .. BTU/hr)	
18	kW	actual load in kW (.. x3415 = .. BTU/hr)	
20		indication bus communication	
21	GJ	consumption total in GJ (.. x 33 = .. m3)	
22	GJ	consumption CH in GJ (.. x 33 = .. m3)	
23	GJ	consumption DHW in GJ (.. x 33 = .. m3)	
24	h	total number of burner run hours	
25	h	number of burner run hours CH	
26	h	number of burner run hours DHW	

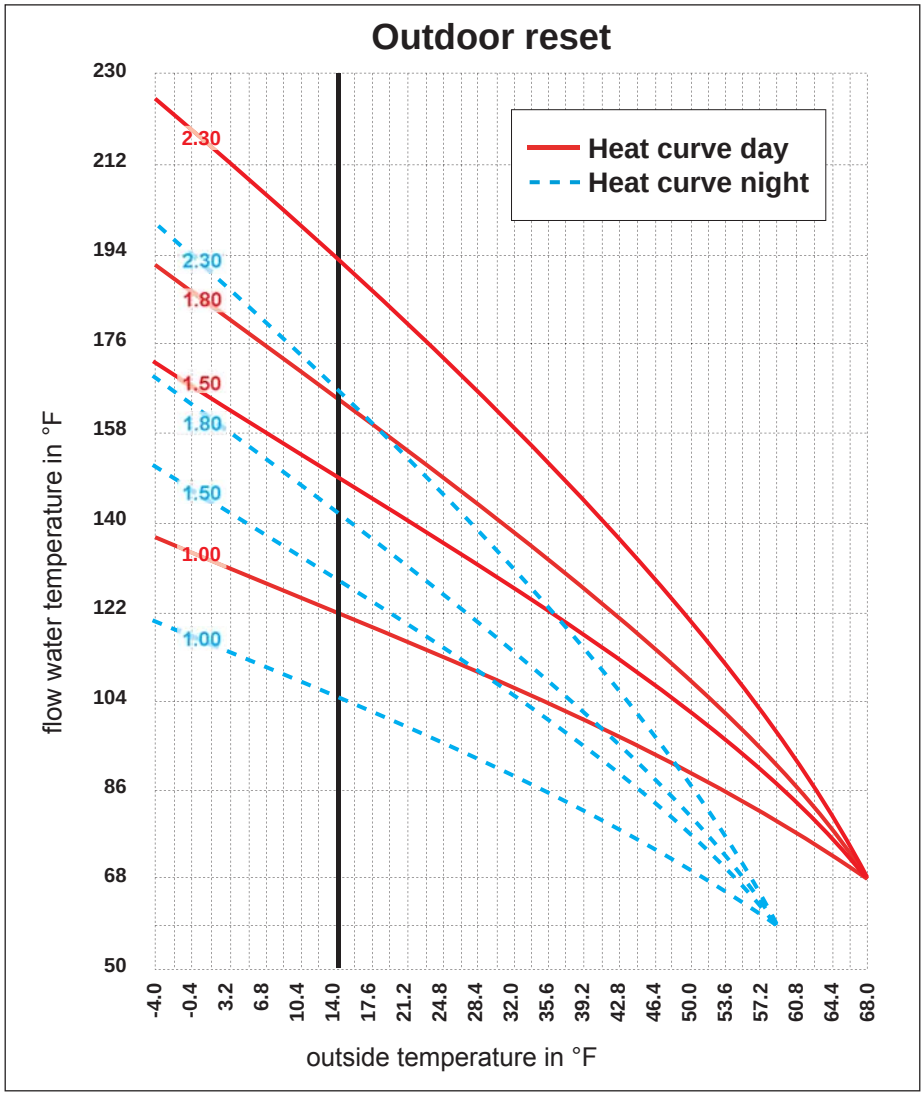
Service Mode			
SERV	VALUE	DESCRIPTION	RANGE
1	OFF	boiler in operation with burner function on	OFF - max.
2	OFF	fan adjustable and burner off	OFF - max.
3	OFF	pump adjustable with burner on	OFF - max.
4	OFF	showroom position ON = active and OFF = non active	ON - OFF
.	.	.	.

Error Mode		
ERRO	VALUE	DESCRIPTION
Err.L - Err.5		Last saved error until 5 last previous errors
1		error code
2		operation status boiler
3	°F	supply water temperature T1
4	°F	return water temperature T2
5	kW	load (.. x3415 = .. BTU/hr)
6	%	pump capacity

Parameter-, Info-, Service- and Error-chapters Table 12

NOTICE

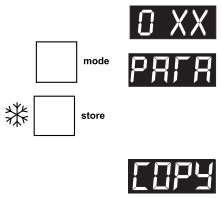
*** Most of the data in this table can be requested by the RS100. Most of the adjustments which are stated in this table are unnecessary when in combination with the Rinnai RS100 thermostat and will be taken care of by the RS100 itself and do not have to be adjusted. For further information regarding to the RS100 thermostat refer to the Rinnai RS100 installation manual.**



heating line adjustments Parameter Step 6 and 7 graph 2

11.2 Activating factory settings (green button function)

To activate the factory settings again please follow the next procedure (Note: all altered adjustments will be set back to the original factory settings that are accessible in the current service level the boiler is in either user or 123):



- Select, when necessary, the technical read out;
- Select with the MODE-button chapter PARA;
- Press the STORE-button.

The word "Copy" will appear and factory settings are active again.

12 Isolating the boiler

Some situations require turning the entire boiler off.
By switching off the three buttons with the LED's for central heating, hot water and pump program (, or), the boiler is switched off. Do not shut off the power of the boiler, which means the circulation pump and the three-way valve are activated once every 24 hours in order to prevent these parts from seizing up.

CAUTION

In the event of freezing danger with an isolated boiler it is advisable to drain the boiler and/or the installation.

13 Commissioning

NOTICE

Work on the boiler must be carried out by a licensed professional, using correctly calibrated instruments with current test certification.
These installation instructions are intended for licensed professionals, who have the necessary knowledge and are approved for working on heating and gas systems.

Before the boiler is fired, ensure that the boiler and the system are well de-aerated and free of air. Purge the gas line between the gas meter and the boiler.

WARNING

Failure to properly commission the boiler as described in section 13 may result unreliable burner operation, reduced component life, and unsafe boiler operation.

NOTICE

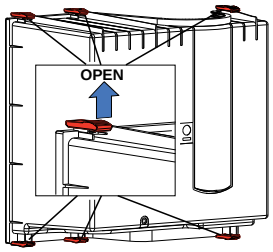
The boiler and its individual shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 PSI (3.5kPa).

Removing casing parts Q Premier

To commission the boiler parts of the casing has to be removed. (figure 30).

1. Open the smoke glass door;
2. Remove the 2 screws just below the upper edge;
3. Lift the front top part at the front;
4. Close the smoke glass door and pull the complete front panel at the top towards you;
5. Remove the screw in the black frame around the control panel and take away the black frame;
6. Pull down the bottom slide lock on the left side of the Control Tower;
7. Turn the Control Tower to the left;
   Behind the casing you see the transparant air box.
   Remove this airbox only in case for service or maintenance.
   See figure 30a.
8. Remove the transparant air box by unlocking the 6 snap locks.

Store all removed parts during commissioning in a safe place.



Removing casing figure 30a

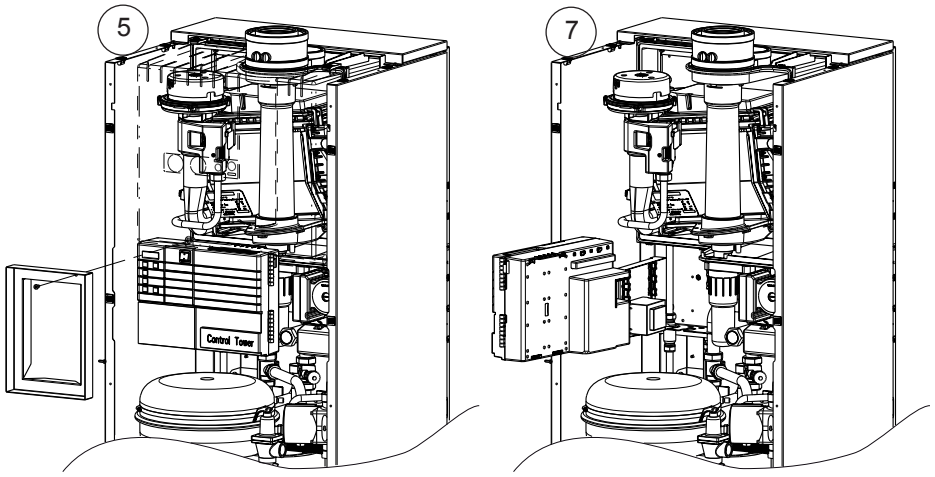


figure 30

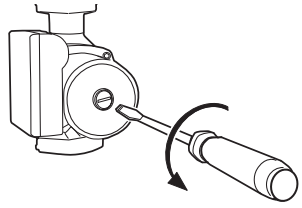
The boiler settings, such as burner pressure and adjustment of the air quantity are unnecessary in most cases, due to the fact that the boiler operates with a zero pressure control. This means the correct gas quantity is controlled by the suction operation of the fan. The fine adjustment of the zero pressure, which is carried out at the factory is once-only, which means that adjusting of this value is unnecessary. Only in case of replacing of the gas valve, venturi and/or fan will the zero pressure adjustment have to be checked and, if necessary, adjusted to the right value.

WARNING

The venturi must always be checked and adjusted when it is out of range see section 13.3 on O_2 adjustment.

DANGER

Always check the installation of all parts through which gas flows (by bubble test using leak-search spray).



Pump commissioning
figure 31

Pump commissioning procedure should be followed before the boiler is fired for the first time:

1. Remove the vent pump screw
2. Use a small flat head screw driver to ensure the impeller spins freely.
3. When the impeller spins freely and water exits though the vent port the pump is ready for operation.
4. Replace the vent screw

During the commissioning of the boiler the Rinnai Installation, Commissioning, and Service card must be filled out.

13.1 Testing for gas leaks

Prior to start-up of the boiler you must check the external tightness of the gas supply valve and confirm this in the start-up report.

WARNING

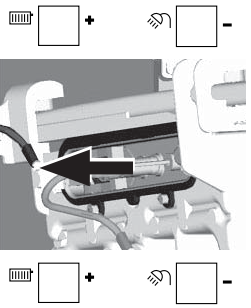
- **Before leak testing the boiler, ensure all parts of the boiler such as electronics and wiring are properly covered and protected from the leak testing agent.**
- **Do not spray the leak testing agent onto cables, plugs, electrical connection lines or electronic circuit boards. Do not allow it to drip onto them either.**

DANGER

Leaks may be caused to pipes and screw connections during commissioning and maintenance activities.

- **Carry out a proper leak test.**
- **Only use approved leak detection agents for leak detection.**
- Disconnect the heating system from the power supply.
- Check the exterior tightness of new conduit sections up to and including the direct sealing point on the gas burner fitting. The maximum test pressure allowed on the input of the gas burner fitting is 14 inch W.C. (35mbar).

13.2 Testing the Ignition Safety shut off device



- Switch off system using the Central Heating button and the DHW button
- Disconnect the plug and socket connection of the ionization cable.
- Switch on the sytem using the Central Heating button and the DHW button.
- Press the MODE-button for 5 seconds.
- The display will show COdE followed by an arbitrary number;
- Select by means of the + or the - button the code C123;
- Press the Store-button to confirm the code (code blinks 1 x);
- Press the MODE-button until SERV is shown;
- Press the STEP-button once until 1 is shown;
  alternately 1 and OFF will be shown.
- Press the + button once;
  Check if the boiler does one start-up attempt and four restart attempts.
  After the last start-up attempt, the boiler will lock out. The gas valve is shut off.
  The E02 code is blinking in the display.
- Connect the plug and socket connection of the ionization cable.
- Press the reset button.
- Check if the boiler starts-up.

CAUTION

Do not touch the inside of the ignition cable while it is disconnected during start up of the boiler.

13.3 Checking the O_2

NOTICE

The O_2 percentage setting is required to be checked at commissioning, maintenance and faults and adjusted if needed.

WARNING

The O_2 percentage is required to be checked and adjusted after a conversion from NG to LP or from LP to NG. This process must be done with a calibrated combustion analyzer that has been set to the correct gas type.

This can be checked by means of the following procedure:

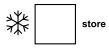
- Remove the black cover of the gas valve by unscrewing the sealed screw.
- Put the boiler into operation and take care that it can deliver its heat;

Tip: If there is no demand for heat on CH, turn the hot water tap completely open and measure the O_2.

- Press the MODE-button for 5 seconds.

- The display will show COdE followed by an arbitrary number;

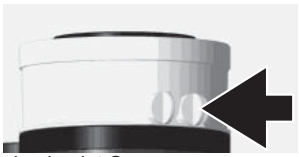
- Select by means of the + or the - button the code C123;



- Press the Store-button to confirm the code (code blinks 1 x);

- Press the MODE-button until SERV is shown;

- Press the STEP-button once until 1 is shown;
  alternately 1 and OFF will be shown.
- Calibrate the O_2 meter ;



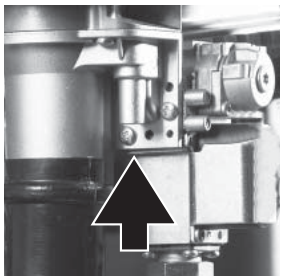
checkpoint O_2

figure 32

- Place the probe of the O_2 meter into the check point (see fig. 32);
- Press the + button until the maximum value (in kW) is achieved;
  The boiler will burn on full load (value on display in kW)
  value in BTU/hr = x3415

NOTICE

When adjusting from max. to min. load it is advisable to stop at medium load to allow the boiler to stabilize. Adjusting quickly from max. to min. could force the boiler into an error state.



adjustment screw O_2 fig. 33

- Check the O_2 percentage:

Natural Gas:	full load:	between 4.4% and 4.7%
	min. load:	setting of full load +0.2% or greater
Propane:	full load:	between 4.8% and 5.1%
	min. load:	setting of full load +0.2% or greater

Example:Full load set on 4.6% O_2 (natural gas) then the minimum load setting should be 4.8% or greater.

NOTICE

Choose the right O_2 value according the kind of gas (Natural Gas or Propane Gas). Wrong adjustment may result causing property damage, personal injury or death.

- Let the O_2 meter do its measuring procedure.
- Adjust, if necessary, the adjustment screw to correct the O_2 value (see fig. 33). Allow boiler to stabilize before reading the new value.

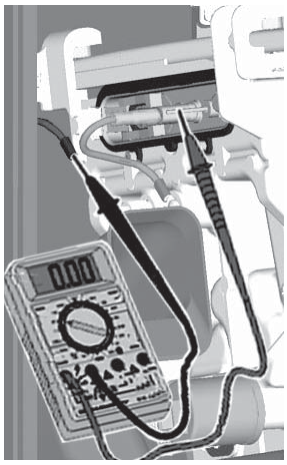
Ending the O_2 measuring procedure:

- Press the - button until OFF is shown (keep button pressed).
  With this the procedure has ended.

- Replace the black cover on the gas valve and secure it with the screw.

13.4 Measuring the ionization current

- Switch off the system using the Central Heating button and the DHW button



Ionization test figure 34

- Disconnect the plug and the socket connection on the probe and connect the measuring device in series. See figure 34. Select the µA direct current range on the measuring device. The measuring device must have a resolution of at least 1 µA.

- Switch on the sytem using the Central Heating button and the DHW button.

- Press the MODE-button for 5 seconds.

- The display will show COdE followed by an arbitrary number;

- Select by means of the + or the - button the code C123;

- Press the Store-button to confirm the code (code blinks 1 x);

- Press the MODE-button until SERV is shown;

- Press the STEP-button once until 1 is shown;
  alternately 1 and OFF will be shown.

- Press the + button until the maximum value (in kW) is achieved;
  The boiler will burn on full load (value on display in kW)
  value in BTU/hr = x3415

- Measure the ionization. When the boiler is in full load the ionization current must be > 4 µA and write down this value in the log book.

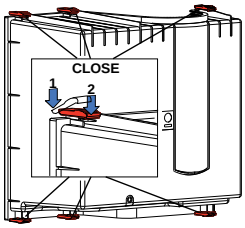
- Press the - button until OFF is shown (keep button pressed).

- Switch off the system using the Central Heating button and the DHW button

- Disconnect the measuring device and restore the plug and the socket connection on the probe.

- Switch on the sytem using the Central Heating button and the DHW button.

13.5 Installing the casing



Installing air box figure 35

- Install the airbox and close all snap locks. See figure 35;

- Install the metal casing on the boiler in reverse order as described in chapter 13;

NOTICE **Make sure the pins are positioned correctly in the snap locks.**

NOTICE **Make sure the casing is secured by the 2 screws behind the door. See figure 30.**

14 Maintenance

NOTICE **Maintenance or changes to the boiler may only be carried out by a licensed professional.**

To protect yourself from harm, before performing maintenance:

- Turn off the electrical power supply by switching off the boiler at the mains power switch or by turning off the electricity at the circuit breaker.
- Turn off the gas at the manual gas valve, usually located on the side or top of the boiler.
- Turn off the incoming water supply. This can be done at the isolation valve usually located on the side or top of the boiler or by turning off the water supply to the building.

14.1 Periodic examination of venting systems and boiler

The inspection of the boiler and venting system should be done every 2 years or 4000 hours and full maintenance every 4 years or 8000 hours of operation, whichever occurs first. When doing this the circumstances of the boiler's location must be taken into account. From this one can determine whether to deviate from this advice.

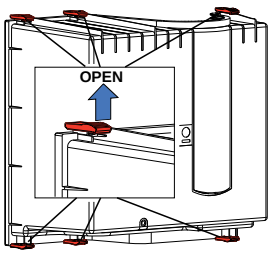
NOTICE **Please contact Rinnai for further guidance on the frequency and service requirements. Contact details can be found on the back page of this manual.**

14.2 Inspection

Preparing the boiler for inspection

To carry out the inspection and maintenance activities please follow the next procedure:

- Switch off the power supply;
- Shut off the gas;
- Remove the metal casing from the boiler as described in chapter 13;
- Valve off the boiler from the system using the boiler isolation valves.



Opening air box figure 37

The air box

- Remove the transparant air box (figure 37);
- Clean the box with a cloth with a simple (non-abrasive) cleaning agent;

14.2.1 Visual inspection for general signs of corrosion

- Check all gas and water pipes for signs of corrosion.
- Replace any pipes that are corroded.

14.2.2 Measuring the ionization current

See subsection 13.5 “Measuring the ionization current”.

14.2.3 Measuring the inlet gas pressure

See subsection 6.4.1 and .2 “Gas connection with natural gas" and "Gas connection with propane”.

14.2.4 Testing for gas leaks

See subsection 13.1 “Testing for gas leaks”.

14.2.5 Carrying out a pressure test of the heating system

See chapter 10.2 “Filling the heating system”.

14.2.6 Checking venting systems

Check the following points:
- Is the prescribed combustion air/flue system used?
- Have the instructions for configuring the flue system as specified in the relevant Installation instruction for the flue gas system been observed?
- Check air intake and/or air filter and flue gas for obstruction, pollution or damage.

NOTICE

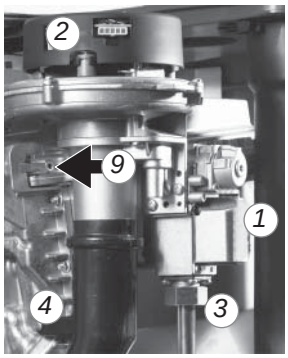
When an air filter is used the air filter must be replaced yearly on boilers operating in normal circumstances.
The conditions (eg. supply air quality) in which the boiler is installed should be taken into account. This will show whether the frequency of replacement should be reduced or increased. If in doubt, contact RINNAI.

14.3 Maintenance activities

The fan unit and burner cassette (figure 38 to 40) (every 4 year maintenance)

- Remove the electrical connection plug from the gas valve (1) and fan motor (2);
- Loosen the nut (3) of the gas pipe under the gas valve;
- **Replace the gasket with a new one**;
- Loosen the front cross head screw (4) of the black plastic silencer;
- After this turn the two clamping rods (9 and 10) ¼ turn and remove them by pulling them forward. **Note the correct turning direction (red indicator, fig. 40)**;
- Slightly lift the fan unit and remove it towards the front of the heat exchanger;
- Remove the burner cassette out of the fan unit;
- Check the burner cassette for wear, pollution and possible cracks. Clean the burner cassette with a soft brush and vacuum cleaner.

NOTICE



fan unit and gas valve
figure 38

NOTICE

If burners are cracked replace the complete burner cassette;

- **Replace the gaskets between burner and fan unit and the gasket between fan unit and heat exchanger**;
- Check the venturi and the gas-air distribution plate for pollution and clean this part, if necessary with a soft brush and vacuum cleaner. If the air box contains a lot of dirt it is plausible that the fan itself is dirty as well. To clean this, the fan has to be removed from the hood and the venturi. Clean the fan with a soft brush and a vacuum cleaner. Replace the gasket and ensure that all gaskets of the fan parts are mounted correctly.

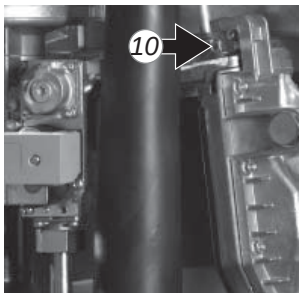


figure 39

Heat exchanger (every 4 year maintenance)

- Check the heat exchanger for contamination. Clean this if necessary with a soft brush and a vacuum cleaner. Prevent debris from falling down into the heat exchanger.

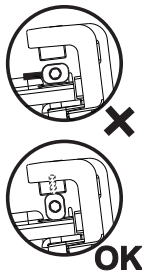
NOTICE

Flushing the heat exchanger from the top down is not permitted

Refitting of the components is done in reverse order.

DANGER

Make sure that during refitting the clamping rods are put in the right position. They should be turned vertical.
If the boiler should activate with clamping rods in the wrong position it will cause property damage, personal injury or loss of life.



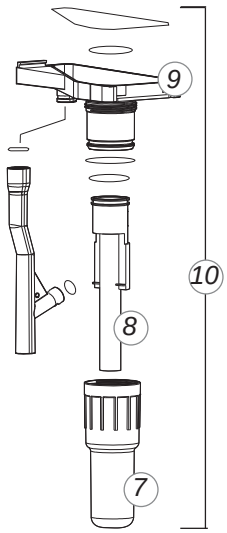
Clamping rods figure 40

Ignition electrode (every 4 year maintenance)

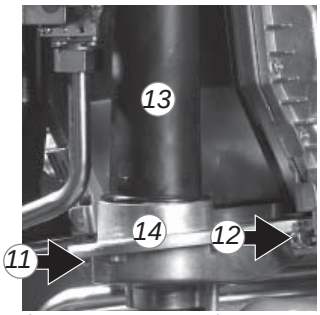
This can be checked by measuring the ionization current. The minimum ionization current has to be higher than 4µA on full load.
If the inspection glass is damaged the complete electrode must be replaced.
Replace the ignition assembly after every 4 year, whichever occurs first.
Replacement goes as follows:

- Remove the electrical connections of the electrode;
- Press the clips on both sides of the electrode to both sides and remove the complete electrode;
- Remove and replace the gasket;

Refitting of the components is done in reverse order.

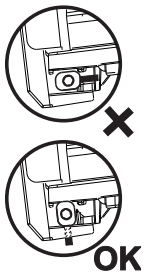


Siphon figure 41



Condensate tray figure 42

DANGER



Clamping rods figure 43

DANGER

WARNING

WARNING

Condensate trap and condensate tray (figure 41-43) (2 and 4 year maintenance)

Step 1: Condensate trap

- First remove the condensation cup (7);
  Check this for impurities. If there is not a lot of impurities it is not necessary to clean the condensate tray (Go to Step 3). If there is a lot of impurities in the cup it is necessary to remove and clean the condensate tray according Step 2;
- Remove the inner trap pipe (8) which remains in the condensate tray;
- Check the O-rings of the cup as well as those from the pipe and replace if necessary;
- Clean both parts by flushing with clean water;
- Grease the O-rings again with acid free O-ring grease to make fitting easier;
- If there is a leak at the condensation cup (7) or tray (9) the complete condensate trap unit (10) has to be replaced by # 809000054;

Step 2: Condensate tray

- Remove the plug from the flue gas sensor if present;
- Turn the two short clamping rods (11 and 12) ¼ turn and remove them by pulling them forward; **Note the correct turning direction (red indicator, fig. 43)**;
- Lift the exhaust pipe (13) out of the condensate tray (14);
- Press the condensate tray (14) carefully downwards and remove it by pulling it forward;
- Replace the gasket between condensate tray and heat exchanger with a new one;
- Clean the condensate tray with water and a hard brush;
- Check the condensate tray for leaks.

Step 3: Refitting is done in reverse order.
Note that all gaskets seal completely.

Make sure that during refitting the clamping rods are put in the right position. They should be turned vertical.
If the boiler should activate with clamping rods in the wrong position it will cause property damage, personal injury or loss of life.

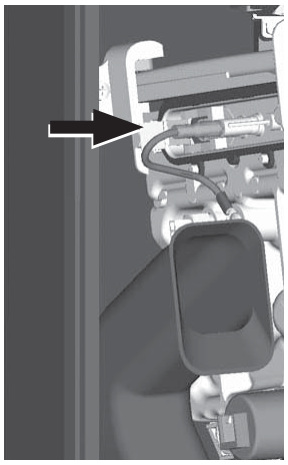
Put the boiler into operation and check the O_2 (see chapter 13.3).

If replacement of new gaskets and burner mentioned in this chapter is not done within the service interval subscribed by Rinnai the boiler can be damaged and may cause property damage, personal injury or loss of life.

Use only original spare parts supplied by Rinnai. If non approved parts are used the boiler can be damaged and may cause property damage, personal injury or loss of life. Use of non-Rinnai parts will result in the voiding of the limited warranty.

Do not use substitute materials. Use only parts certified with the appliance.

Visual inspection of the flame (2 and 4 year maintenance)

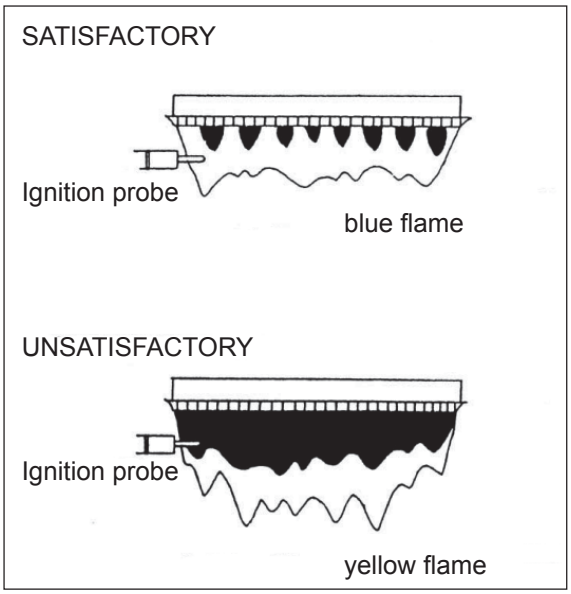


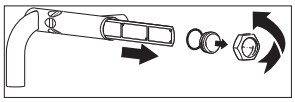
Inspection glass figure 44

The burner must flame evenly over the entire surface when operating correctly. The flame must burn with a clear, blue, stable flame.

Check the flame through the inspection glass in the ignition probe (fig. 44).

The flame pattern should be as shown in the figures below.





Water filter figure 44a

Further checks:
- Inspect the pressure relief valve
- Clean the water filter in the return pipe (see fig. 44a)
- Check the pH of the water or glycol/water mixture.

NOTICE

The combustion must be checked and adjusted if required at both the 2 year/4000 hour and 4 year/8000 hour service intervals with a properly working combustion analyzer.

Verify proper operation after servicing. Always reset the service interval counter after full maintenance interval (every 4 years or 8000 hours of operation).

14.3.1 Reset service interval counter

At 8000 hours of use, “SERVICE” will scroll across the display. “Good” will display as well alternatively.
To reset the 8000 hour service notification:

- Enter the 1st Tier Settings: 123 Code

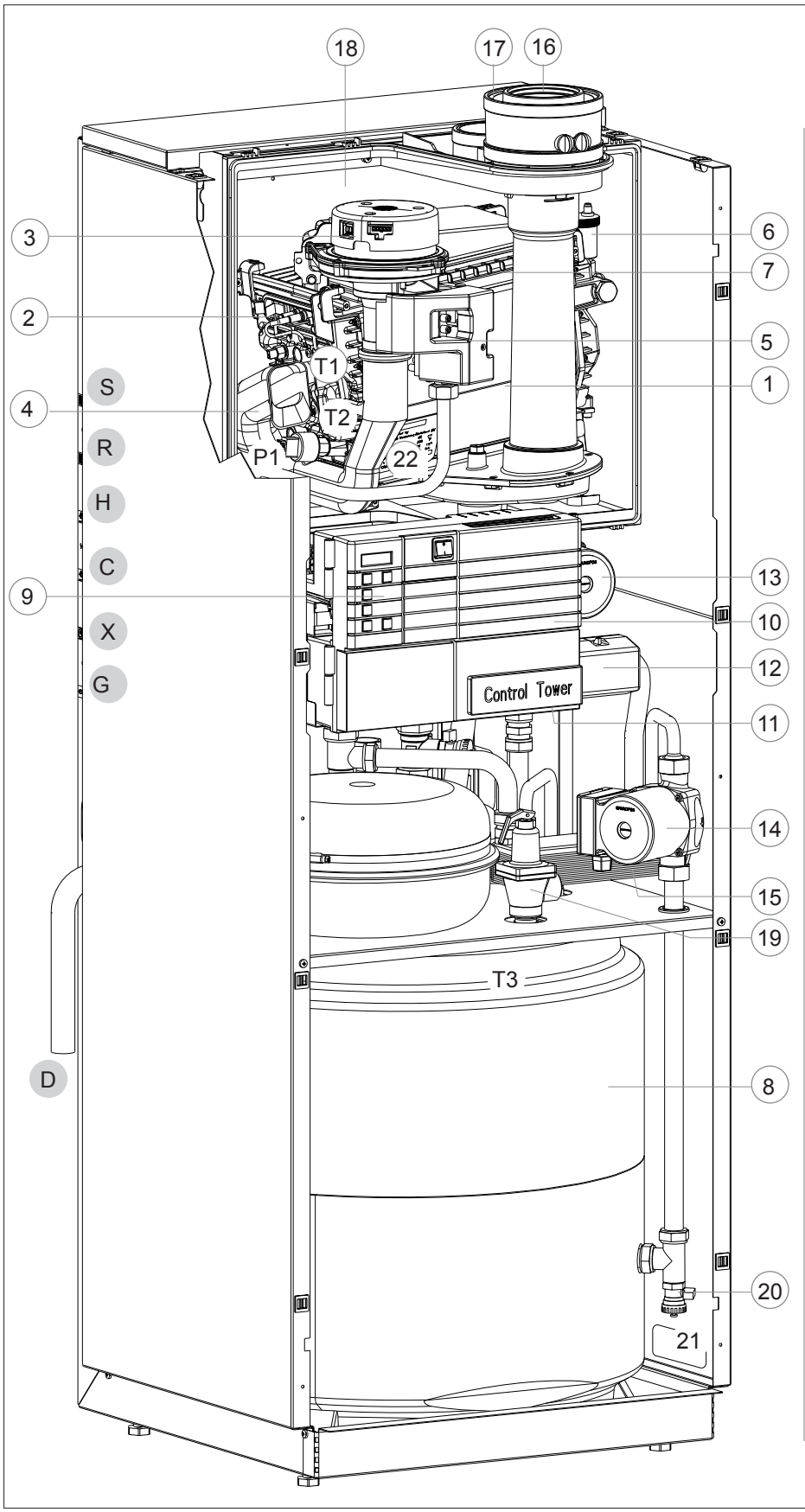
- Briefly press “Mode” again until the Service Chapter is displayed (SERV)

- Hold the “Store” button until SERV flashes once—the service notification will no longer show during normal operation and the countdown to service will reset to 8000.

14.4 Limited warranty

For warranty conditions refer to the warranty supplied with the boiler.

15 Parts of the boiler



1 heat exchanger
2 ignition unit
3 fan unit
4 air inlet damper
5 gas valve
6 automatic de-aerator
7 ceramic burner cassette
8 DHW tank
9 operating panel
10 Control Tower (CMS)
11 water filter return CH
12 three-way valve
13 circulation pump
14 DHW pump
15 plate frame heat exchanger
16 exhaust
17 combustion air supply
18 air box
19 temperature and pressure relief valve
20 DHW flush and drain valve
21 CSA Data Plate (serial number)
22 ASME / NB / CRN data plate

T1 flow sensor
T2 return sensor
T3 DHW tank sensor

P1 water pressure sensor
G gas pipe
S supply connection heating
R return connection heating
D condensate pipe
X DHW circulation return pipe
C cold water pipe
H hot water pipe

16 Blocks and Errors

16.1 Error indication (short reference)

A detected error is indicated on the display by means of blocking or error messages. A distinction should be made between these two messages due to the fact that blocking can be of a temporary nature, however, error messages are fixed lockings. The control will try its utmost to prevent locking and will temporarily switch off the unit by blocking it. The following is a list of some messages.

Blocks bL with a number in the last 2 positions.

bL01 Block 01:
External safety contact cut off

bL05 Block 05:
Outdoor sensor not connected

bL60 Block 60:
Incorrect parameter setting of the minimum or maximum power.

bL67 Block 67:
A ΔT has been detected between flow and return sensor whereas the burner is not in operation. After the ΔT has disappeared the block will clear.

bL85 Block 85:
The control has not detected a water flow. The venting cycle is started.
If during this cycle water flow is detected, the venting cycle is ended and the burner is released.

Error E with a number in the last two positions.

E 00	Error 00:	Poor flame-forming
E 02	Error 02:	no flame-forming
E 04	Error 04:	adjustment or error for voltage interruption
E 05	Error 05:	adjustment
E 12	Error 12:	high limit stat
E 18	Error 18:	maximum flow temperature exceeded
E 19	Error 19:	maximum return temperature exceeded
E 28	Error 28:	number of revolutions not reported back from fan
E 69	Error 69:	no or incorrect display
FUSE	FUSE:	24V fuse defective

NOTICE

The following pages describes more detailed follow up instructions for solving blockings, errors and practical circumstances. These instructions are only for licensed professionals.

16.2 Blocks

An error, which has been detected, is indicated on the display by a block message. Blocks can be temporary in nature. The controller will do everything possible to prevent a system lock and temporarily switching off the boiler as a result of a block. Please see below for a summary of blocks.
Blocks bL with a figure on the last 2 characters.

Code	Description	Solution
bL01	External safety contact open	Rectify error as a result of which by determining contact is open. Or repair interconnection between 24/25
bL05	Outdoor sensor contact open (not connected)	Rectify error as a result of which by determining contact is open or outdoor sensor is not connected. Connect outdoor sensor or repair wiring (position 18/19) or replace outdoor sensor.
bL11	Maximum average ΔT of supply and return sensor for central heating is repeatedly exceeded. Operation is normally possible for the hot water supply during the block. The pump continues to operate at minimum capacity during the block.	Check flow through the installation. See the installation instructions for the hydraulic connections to the boiler (3-Way-Thermostatic valve, Plumbing Kit installed?) Possible causes: (radiator) shut-off valves closed or blocked water filter Activeted room sensor (RS101) in non leading room (closed thermostatic radiator valves?) Check pump height. Check minimum and maximum Temperature difference in Parameter Step 46 + 47.
bL12	Maximum average ΔT of supply and return sensor for hot water is repeatedly exceeded. Operation is normally possible for the central heating installation during the block. The pump continues to operate at minimum capacity during the block.	Check flow through the boiler and DHW tank See the installation instructions for the hydraulic connections to the boiler Possible causes: (radiator) shut-off valves closed or blocked water filter resistance (coil) in tank to high (see pump height) Check 3-way-valve on function and pollution.
bL60	Incorrect parameter setting for the minimum or maximum power	Call Rinnai
bL67	A temperature difference has been detected between the supply and return sensor whilst the burner is not in operation. After the average ΔT has disappeared, the block will disappear.	Check the supply and return sensor for the resistance value and replace the defective sensor Check the installation for any external heat source and rectify this
bL80	flue sensor temperature too high	Check vent system
bL81	flue sensor or thermostat contact open	Call Rinnai
bL82	flue sensor or thermostat contact closed	Call Rinnai
bL84	flue gas thermostat contact open	Check vent system or check parameter 84 for default
bL85	no water flow can be detected through the controller. De-aeration cycle is started. When water flow is detected during this cycle, the de-aeration cycle is terminated and the burner is released. The controller checks the water pressure during static and dynamic situation.	- check the installation for the presence of air;If there is a secondary pump installed and it is not hydraulicly separated, it could cause pressure differences. - check the use of balancing valves check if the pump is functioning and/or that the water pressure sensor is working properly; Polluted pump; Polluted water pressure sensor; Polluted water filter; Wiring of pump.
bL86	The frequence of the power supply deviates more than + or -1.5Hz	check the main power supply

16.3 Errors

Code	Description	Solution
E 00	Incorrect flame formation. boiler has not been burning but an ionization flow (flame) has still been detected	Check whether the ionization cable and/or the electrode are responsible for a possible short-circuit. Remove the plugs from the ionization cable connected to the control unit and to the electrode. Now using a universal meter take a measurement between the ionization connection and the ground, now refit it part by part until a short-circuit takes place.
		Rectify the short-circuit and if necessary replace this part.
E 01	24 Volt short-circuit	Check the 24 Volt connection. Remove all plugs with 24 Volt connections such as: fan, pump, any three-port valve and 24 Volt plug to the connecting block.
		Check short circuit of disconnected components. Switch on power again to the control unit with the components disconnected. Reconnect the components, which have been checked and are working.
		Rectify the short-circuit or replace the short-circuited component.
E 02	No flame formation	Check the data in Error mode. Boiler data during error. 1 error = 02 2 operational status = 02 3 supply temp. = xx* 4 return temp. = xx* 5 kW burner = xx** 6 % pump = xx* * = variable value **= x 3451 = BTU/hr
1	No temperature difference between supply (3) and return (4)	Boiler has not been able to ignite any gas or has not received any gas. Boiler tries to start 6 times with an increasing starting load after the safety time Check whether: - the gas valve is open; - there is power to the gas valve; - that the gas valve opens The minimum gas pre-pressure during the start must be a minimum of 7"W.C. (17 mbar), check the 24 Volts in the gas during ignition block's open position
2	There is a temperature difference between supply (3) and return (4)	Boiler has gone out after ignition. Due to insufficient ionization the burner has gone out after ignition Ionization flow, ionization cable or the O_2 setting. The minimum ionization current should be 4 µA, the O_2 should be a minimum of 4.4% for NG or 4.8% for LP
E 03	Control unit error	Connector not plugged into the gas valve or defect in the wiring of the gas valve.
		Software error control unit. Replace the control unit. The display will automatically load the program into the new controller.
E 04	The controller has detected a program error	Reset the boiler. the boiler automatically indicates this message if during an error read-out the electrical power to the boiler is shut off. After the power has once again switched on, if the error causing the interference is no longer present, this message is given.
		Rectify the preceding error, If Error 04 persists, and preceding errors do not occur, replace controller.
E 05	Control unit error	Check 120V stability. If voltage is deviating more between +10% and -15% the electrical power supply needs to stabilised.
		Check the ribbon cable between the control unit and the display. Incorrect data will be detected in case of a poor connection between the control unit and the display. If necessary, replace the ribbon cable between these two components.
	The error persists after reset	Software error control unit. replace the control unit. The controller will automatically load the program into the new control unit.
E 06	Control unit error	Moisture on the PCB. Check if there is water leaking on or in the boiler.
		Stop leak and replace MCBA controller

Code	Description	Solution
E 07	Control unit error	
1	Anticipation resistance wire not present	When a power stealing room stat device is placed the connection terminal needs to be provided with the special anticipation resistance wire.
2	Software error control unit.	Replace the control unit. The controller will automatically load the program into the new control unit.
E 11	Control unit error	Incorrect data will be detected in case of a poor connection between the control unit and the display. If necessary, replace the ribbon cable between these two components.
	The error persists after reset	Replace the control unit. The controller will automatically load the program into the new control unit.
E 12	High limit stat open	Supply temperature too high. Caused by - presence of air - possible polluted impeller of the circulation boiler pump - polluted internal filter
		Check de-aerator. Replace when necessary the automatic de-aerator and restart boiler for de-aerating programm (17min.)
		Check water flow over system. Clean when necessary the pump and or filter. Flush complete system
		Check adjustment of balancing valves
E 13	Control unit error	Replace the control unit. The controller will automatically load the program into the new control unit.
E 14	- T3 flow sensor ground connection - T3 flow sensor failure - controller failure	Check the data in Error mode. Boiler data during error: 1 Error = 14 2 Operational status = 00 3 Flow temp. = -22 4 Return temp. = xx* 5 kW burner = 00** 6 % pomp = xx* * = variable values **= x3415=BTU/hr
		A temperature of - 36 is displayed at position 3. Check the wiring and/or measure the resistance of the flow sensor. The resistance should be approx. 12 kOhm at 77°F. (See table in Appendix B)
		If necessary, replace the flow sensor
	- Thermostat indirect tank failure	Replace thermostat by sensor T3 (with cable) for indirect tank
E 18	Signal maximum flow water temperature exceeded (T_1 > 212°F).	check actual flow temperature. suddenly increase caused by completely hydraulic shut off of the boiler (filter, pump, thermostat valve, service valve)
		check flow sensor NTC1. measure the resistance value (see Appendix B)
		exchange defective part if necessary. Change control unit when error persists
E 19	Signal maximum return water temperature exceeded (T_2>212°F).	check actual return temperature. Increase of temperature cause by external heating source?
		check return sensor NTC 2. measure the resistance value (see Appendix B)
		exchange defective part if necessary. Change control unit when error persists
E 24	T1 and T2 (swapped).	T2 temperature is measured to be higher than T1. Check resistance value of T1 and T2 (See Appendix B) and replace T1 or T2.
E 26	Controller failure	Replace controller

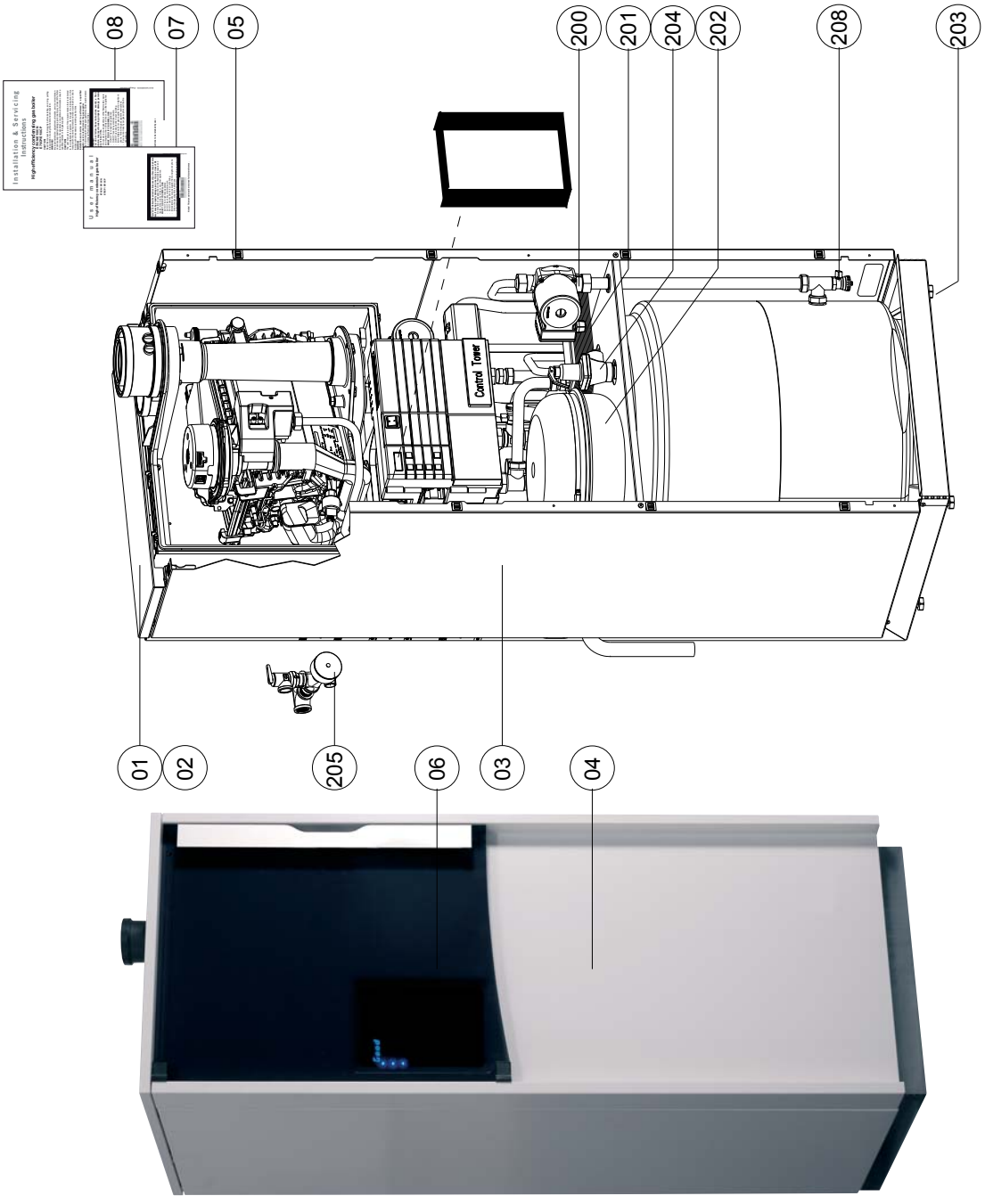
Code	Description	Solution
E 28	No signal from the fan	The fan is not running. Check the wiring to the fan and the control unit and/ or the 24 volt power supply to the fan
		Wiring and voltage are OK and error is repeated. Replace the fan
E 29	Negative pressure on vent system (pressure difference)	Check vent system. Vent system and air intake system must be installed according installation instructions.
		IF vent system is OK: Replace fan
E 31	internal shut down of supply sensor T1	Check the data in Error mode. Boiler data during error: 1 Error = 31 2 Operational status = 00 3 Flow temp. = 230 4 Return temp. = xx* 5 kW burner = 00** 6 % pomp = xx* * = variable values **= x3415=BTU/hr
		Check the wiring. check the wiring for the sensor
		The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 36 occurs
		Replace the sensor.
E 32	Shut down of return sensor T2	Check the data in Error mode. Boiler data during error: 1 Error = 32 2 Operational status = 00 3 Flow temp. = xx* 4 Return temp. = 230 5 kW burner = 00** 6 % pomp = xx* * = variable values **= x3415=BTU/hr
		Check the wiring. check the wiring for the sensor
		The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 37 occurs
		Replace the sensor.
E 36	contact for supply sensor T1 open	Check the data in Error mode. Boiler data during error: 1 Error = 36 2 Operational status = 00 3 Flow temp. = -22 4 Return temp. = xx* 5 kW burner = 00** 6 % pomp = xx* * = variable values **= x3415=BTU/hr
		Check the wiring. check the wiring for the sensor
		The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 31 occurs
		Replace the sensor.

Code	Description	Solution
E 37	contact for return sensor T2 open	Check the data in Error mode. Boiler data during error: 1 Error = 37 2 Operational status = 00 3 Flow temp. = xx* 4 Return temp. = -22 5 kW burner = 00** 6 % pomp = xx* * = variable values **= x3415=BTU/hr
		Check the wiring. check the wiring for the sensor
		The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 32 occurs
		Replace the sensor.
E 41	Control unit error	Software error control unit. Replace the control unit. The display will automatically load the program into the new control unit.
E 42	Control unit error	Software error control unit. Replace the control unit. The display will automatically load the program into the new control unit.
E 44	Electrical leakage to ground.	Moisture on controller PCB. Check if there is water leaking on or in the boiler.
		Stop water leak and replace controller
E 68	No software present	Control unit and display don't have a programm. There are a new display and a new control unit installed at the same time. Exchange the parts and the loading will start automatically and COPY appears on the display.
E 69	Ribbon cable problem	Replace ribbon cable
E 80	Flue gas temperature to high (adjustment parameter 84 - default 212°F)	Replace flue sensor or adjust parameter 84 to default
FUSE	Fuse on controller PCB defective or Cable transformer not connected	Replace fuse. A 4A and 5A spare fuse can be found inside the Control Tower just above the circuit board.

16.4 Other Errors

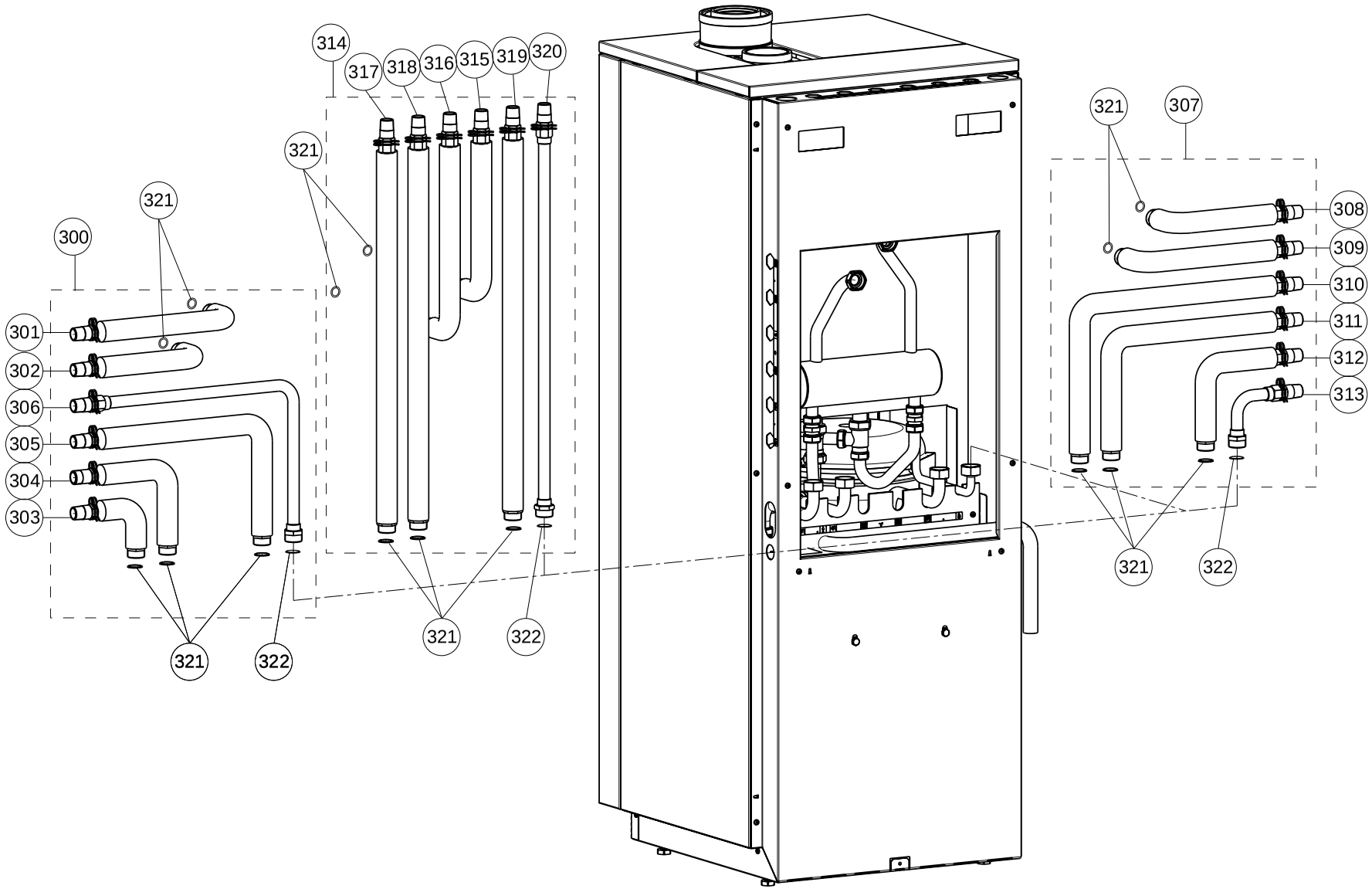
Complaint	Description	Solution
Central heating but no domestic hot water	1. -Key of the DHW program is not switched on	Switch on DHW program on the Control Tower
	2. T3 DHW sensor defective.	Replace DHW sensor
	3. When using RS100	- Check timer times for DHW program, if necessary reset - RS100 does not respond to DHW program - See RS100 installation instructions
	4. Three-port valve is not circulating to DHW	- Check wiring. - If necessary replace the three-port valve motor.
Hot water but no central heating	1. -Key of the central heating program is not switched on.	Switch on central heating program
	2. Room thermostat (on/off) is not giving any signal to the boiler.	Check room thermostat
	3. RS100 with outdoor sensor (Room sensor-On)	- Outdoor temperature is higher than 70°F, depending upon the Eco-temperature set (70°F is the default). Check Info chapter Step 7 or temperature is higher than the Eco temperature set (see RS100 installation instructions). - Check timer program and set room temperature.
	4. Three-port valve is not circulating to central heating position.	Check wiring, replace the three-port valve motor.
Central heating installation gets hot without being requested	1. -Key pump program is on.	Switch off.
	2. Dirt in three-port valve or three-port valve cartridge is binding.	Clean or replace.
Insufficient quantity of hot water	1. Hot and cold water connection to the boiler mixed up.	Check pipe connections
	2. Incorrect flow reducing valve.	- Check for the type and for contamination, if necessary replace (Combi) and/or clean. - Check the comfort synchronising valve for the correct setting in accordance with the installation instructions.
	3. In the absence of positive results	Check for lime scale. If necessary descale or replace
Temperature drop of the DHW (Combi)	1. Flow reducing valve	Check flow reducing valve for the correct type in accordance with the installation instructions
	2. Thermostatic mixing valve incorrectly set.	Adjust (by measuring the temperature)
	3. DHW power for the boiler is set too low.	-Check PARA chapter Step No. 43 - Check the functioning and wiring of the DHW sensor T3.
radiators do not get hot enough or warming them up takes too long	1. Check setting of room thermostat or RS100	See installation and user manual RS100
	2. Supply water temperature too low.	Check setting PARA chapter Step No. 1 and increase if necessary
	3. Incorrect choice of installation	PARA chapter Step No. 2 if necessary change.
	4. Installation resistance too high (given an average T > 36°F the boiler decreases the load).	- See installation instructions. - Check / clean water filter check dimensions of pipes. - If necessary, increase pump rpm Para 48.

Parts casing Q Premier



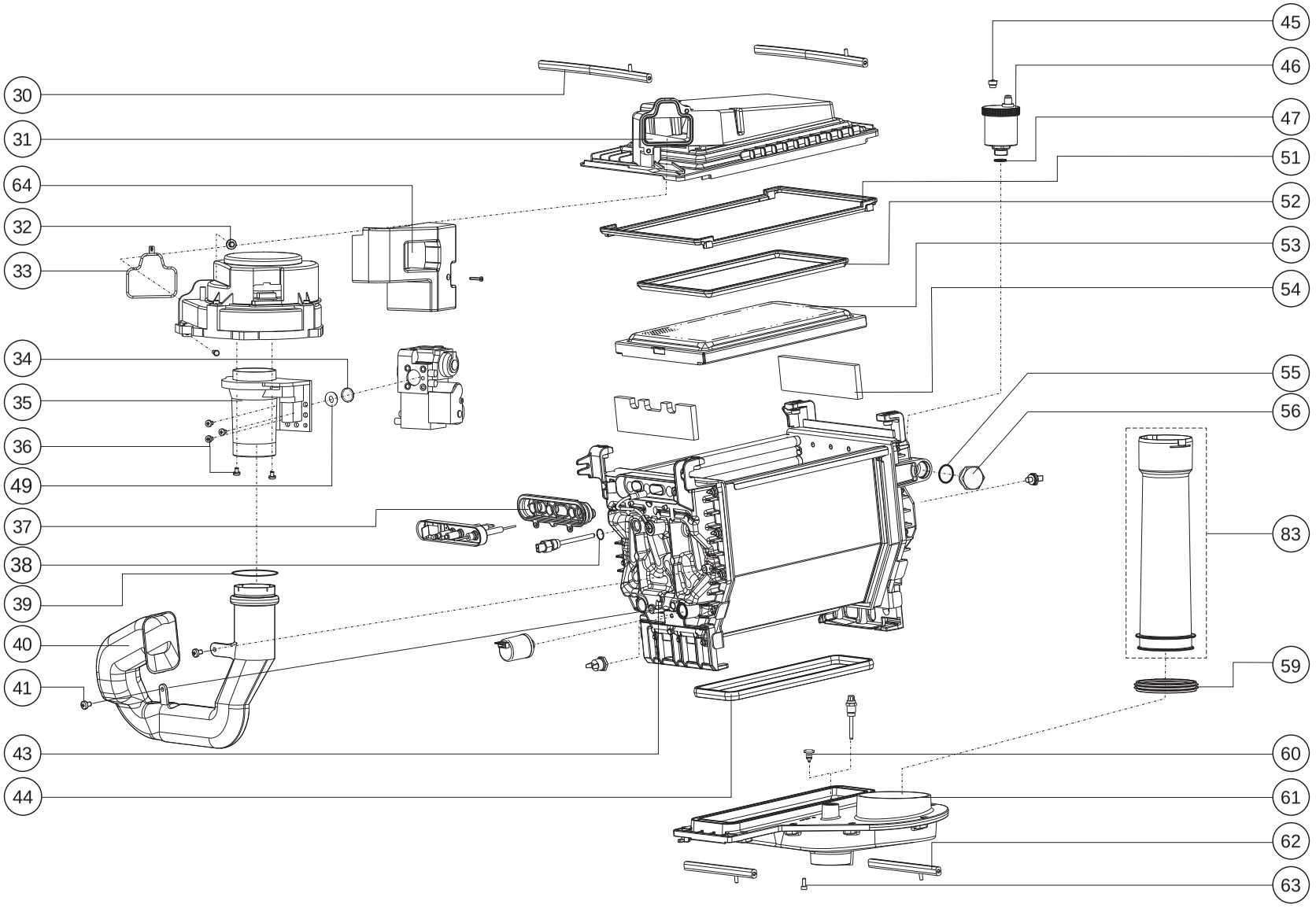
Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
1	TOP PART CASING QP BACK	809000130	X	X	X	X
1	TOP PART CASING QP FRONT	809000131	X	X	X	X
2	SCREW (5x)	809000132	X	X	X	X
3	SIDE PANEL CASING QP	809000133	X	X	X	X
4	FRONT PANEL CASING QP	809000134	X	X	X	X
6	SNAP LOCK CASING QP	809000136	X	X	X	X
7	DOOR CASING Q CPL.	809000137	X	X	X	X
8	USER MANUAL QP	800000039	X	X	X	X
9	INSTALLATION MANUAL QP	800000040	X	X	X	X
200	DHW PUMP	807000098	X	X	X	X
200	GASKET PUMP (2 PER PACKAGE)	807000099	X	X	X	X
201	PLATE HEAT EXCHANGER QP	807000100	X	X	X	X
202	EXPANSION VESSEL 3.17 GALLONS/ 12 LITRES	807000101	X	X	X	X
203	ADJUSTMENT FEET	809000138	X	X	X	X
204	T&P VALVE DHW TANK	807000102	X	X	X	X
205	T/P GAUGE WITH WATER LOCK	807000081	X	X	X	X
208	DRAIN VALVE	807000118	X	X	X	X

Parts pre-bend plumbing kits Q Premier



Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
300	RIGHT PRE-BEND KIT	804000080	X	X	X	X
301	RIGHT SIDE PRE-BEND PIPE HEATING WATER SUPPLY	807000103	X	X	X	X
302	RIGHT SIDE PRE-BEND PIPE HEATING WATER RETURN	807000104	X	X	X	X
303	RIGHT SIDE PRE-BEND PIPE DHW OUTLET	807000105	X	X	X	X
304	RIGHT SIDE PRE-BEND PIPE DOMESTIC COLD WATER INLET	807000106	X	X	X	X
305	RIGHT SIDE PRE-BEND PIPE DHW RECIRCULATION	807000107	X	X	X	X
306	RIGHT SIDE PRE-BEND PIPE GAS	806000027	X	X	X	X
307	LEFT PRE-BEND KIT	804000079	X	X	X	X
308	LEFT SIDE PRE-BEND PIPE HEATING WATER SUPPLY	807000108	X	X	X	X
309	LEFT SIDE PRE-BEND PIPE HEATING WATER RETURN	807000109	X	X	X	X
310	LEFT SIDE PRE-BEND PIPE DHW OUTLET	807000110	X	X	X	X
311	LEFT SIDE PRE-BEND PIPE DOMESTIC COLD WATER INLET	807000111	X	X	X	X
312	LEFT SIDE PRE-BEND PIPE DHW RECIRCULATION	807000112	X	X	X	X
313	LEFT SIDE PRE-BEND PIPE GAS	806000028	X	X	X	X
314	TOP PRE-BEND KIT	804000081	X	X	X	X
315	TOP SIDE PRE-BEND PIPE HEATING WATER SUPPLY	807000113	X	X	X	X
316	TOP SIDE PRE-BEND PIPE HEATING WATER RETURN	807000114	X	X	X	X
317	TOP SIDE PRE-BEND PIPE DHW OUTLET	807000115	X	X	X	X
318	TOP SIDE PRE-BEND PIPE DOMESTIC COLD WATER INLET	807000116	X	X	X	X
319	TOP SIDE PRE-BEND PIPE DHW RECIRCULATION	807000117	X	X	X	X
320	TOP SIDE PRE-BEND PIPE GAS	806000029	X	X	X	X
321	GASKETS HYDRAULIC PIPE WORK EPDM (2 PER PACKAGE)	809000139	X	X	X	X
322	GASKET GAS LINE QP FIBER (3x)	806000025	X	X	X	X

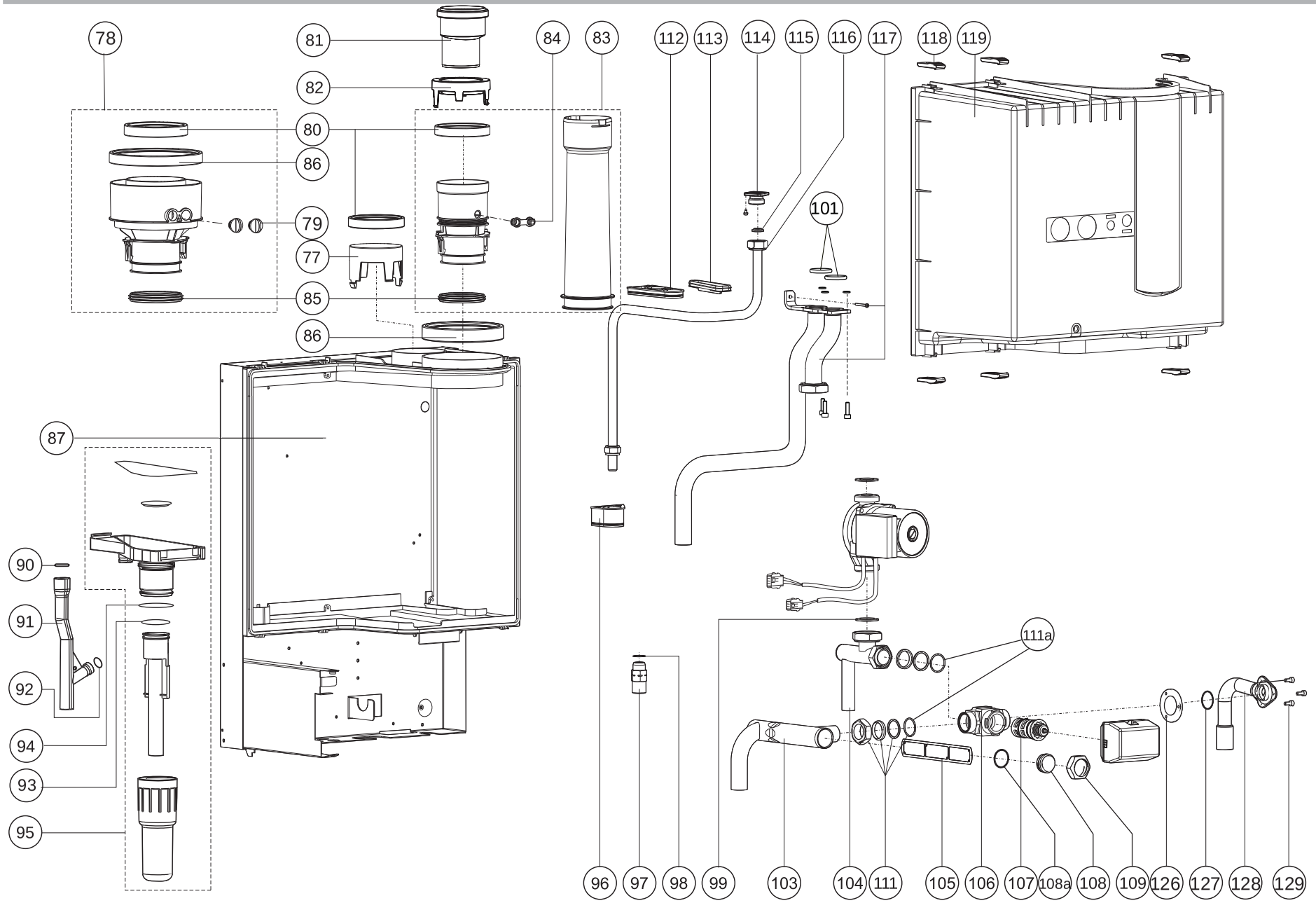
Parts heat exchanger Q Premier



Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
30	CLAMP BAR TOP PART HEX. LONG	809000014	X	X	X	X
31	TOP PART HEAT EXCH. SET OSS1	807000010	X	X		
31	TOP PART HEAT EXCH. SET OSS2	807000011			X	X
32	BOLT M 5X16 (5 PER PACKAGE)	809000015	X	X	X	X
33	GASKET FAN/TOP PART H.EX.	809000016	X	X	X	X
34	GASKET GAS VALVE - VENTURI	809000017	X	X	X	X
34	GASKET VENTURI - FAN	809000018	X	X	X	X
35	VENTURI OSS1	807000013	X	X		
35	VENTURI OSS2	807000014			X	X
36	BOLT M5X12GR FASE ZSDIN7985 (5 PER PACKAGE)	809000019	X	X	X	X
37	GASKET IONISATION/IGNITION OSS	809000020	X	X	X	X
38	O-RING ø5,00X2,00 FLOW SENSOR (5 PER PACKAGE)	809000080	X	X	X	X
39	GASKET SILENCER-VENTURI	809000021	X	X	X	X
40	DAMPER OSS1	807000016	X	X		
40	DAMPER OSS2	807000017			X	X
41	SCREW TAPTITE M5X8 CK-PD (3 PER PACKAGE)	809000022	X	X	X	X
43	HEAT EXCHANGER OSS1 ASME	807000019	X	X		
43	HEAT EXCHANGER OSS2 ASME	807000020			X	X
	BOILER TOOL KIT	809000024	X	X	X	X
44	GASKET CONDENSATE TRAY OSS1	809000025	X	X		
44	GASKET CONDENSATE TRAY OSS2	809000026			X	X

Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
45	CAP DE-AERATOR SHR (3 PER PACKAGE)	807000023	X	X	X	X
46	DE-AERATOR CHROME	807000024	X	X	X	X
47	O-RING ø13,94X2,62 DE-AER. (2 PER PACKAGE)	809000028	X	X	X	X
48	BOLT M 3X30 VERZ.DIN84/4.8 (3 PER PACKAGE)	809000029	X	X	X	X
51	GASKET H.E./TOP PART OSS1	809000030	X	X		
51	GASKET H.E./TOP PART OSS2	809000031			X	X
52	GASKET BURNER/TOP PART OSS1	809000033	X	X		
52	GASKET BURNER/TOP PART OSS2	809000034			X	X
53	BURNER CASSETTE SET OSS1	806000010	X	X		
53	BURNER CASSETTE SET OSS2	806000011			X	X
54	SET INSOLATION PIPE PLATE L+R	809000036	X	X	X	X
55	O-RING ø17,12X2,62 PLUG HEATEXCH. (3 PER PACKAGE)	809000103	X	X	X	X
56	METAL PLUG HEAT EXCH 1/2"	809000115	X	X	X	X
59	LIP-RING ø63 AMGAS	809000038	X	X		
59	LIP-RING ø80 AMGAS	809000039			X	X
60	PLUG FLUE GAS SENSOR	809000040	X	X	X	X
61	CONDENSATE TRAY OSS1	809000041	X	X		
61	CONDENSATE TRAY OSS2	809000042			X	X
62	CLAMP BAR COND.TRAY	809000044	X	X	X	X
63	BOLT M 5X12 IMBUS VERZ. (3 PER PACKAGE)	809000045	X	X	X	X
64	COVER GAS VALVE	809000046	X	X	X	X

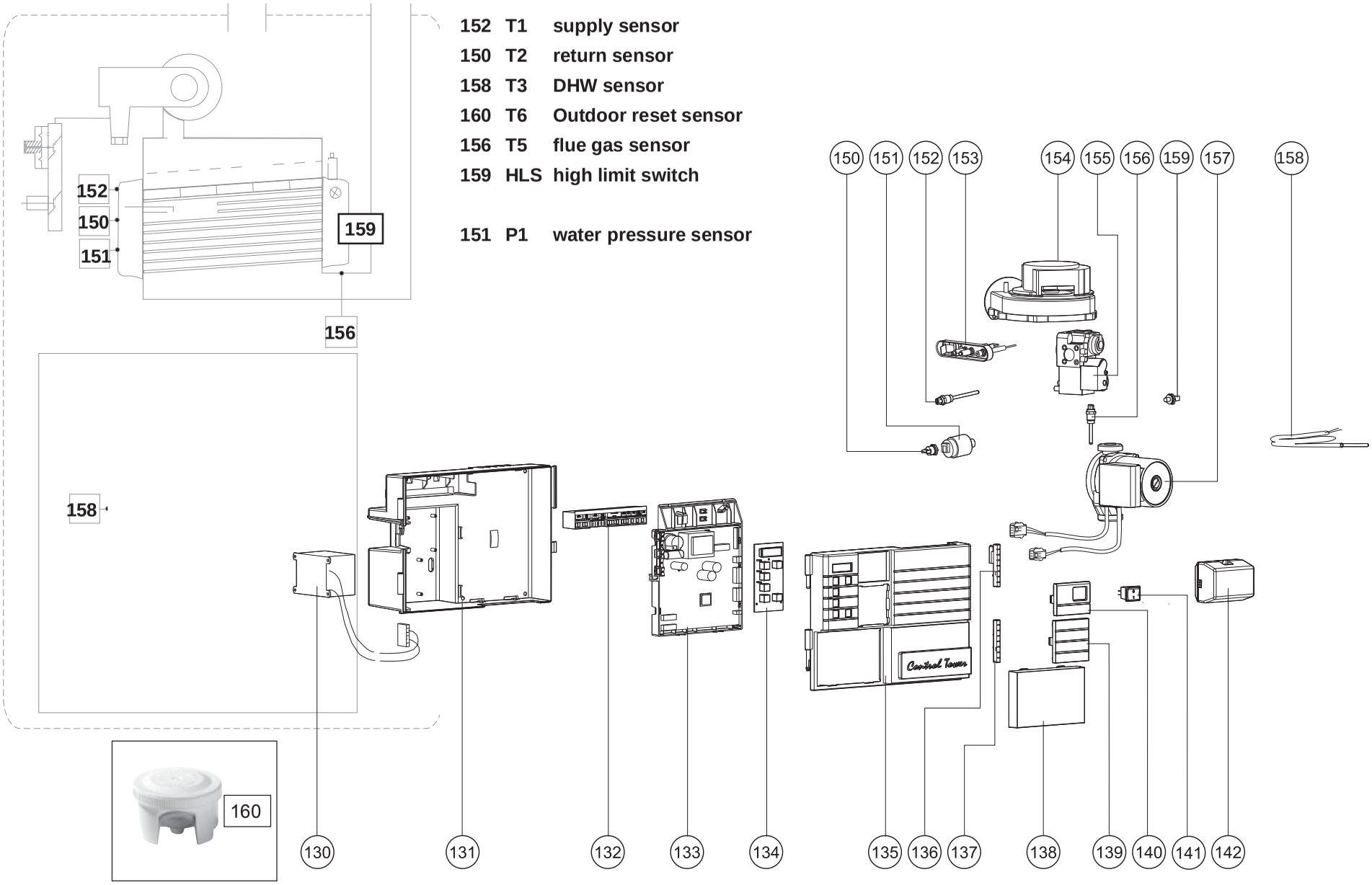
Parts rear wall Q Premier



Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
77	COVER AIR SUPPLY Ø80mm	807000075	X	X	X	X
78	CONCENTRIC FLUE ADAPTOR 80/125"MM	808000023	X	X	X	X
79	PLUGS CONCENTRIC FLUE ADAPTER	809000140	X	X	X	X
80	GASKET AIR INTAKE ø80 SHR	809000047	X	X	X	X
81	FLUE ADAPTER 80mm x 3"	808000022	X	X	X	X
82	COVER AIR SUPPLY Ø125mm	808000029	X	X	X	X
83	FLUE GAS SYSTEM PP SET OSS1	808000010	X	X		
83	FLUE GAS SYSTEM PP SET OSS2	808000011			X	X
84	PLUG MEASURING POINT PARALLEL FLUE PIPE	808000028	X	X	X	X
85	GASKET FLUE GAS PIPE PP	809000048	X	X	X	X
86	GASKET AIR SUPPLY 5"	809000049	X	X	X	X
87	AIR BOX BACK Q85S 7 Q130S	808000013	X	X	X	X
90	O-RING ø19.50X1.80 TRAP TRAY	809000050	X	X	X	X
91	CONDENSATE DRAIN PIPE Q	809000051	X	X	X	X
92	O-RING Ø12.42X1.78	809000082	X	X	X	X
93	O-RING ø40X3,53 TRAP TRAY Q	809000052	X	X	X	X
94	O-RING ø50,39X3,53 TRAP Q	809000053	X	X	X	X
95	TRAP PP Q COMPLETE	809000054	X	X	X	X
96	FEED THROUGH GAS LINE AIRBOX	808000017	X	X	X	X
97	GAS FITTING OSS1/2 QP	806000026	X	X	X	X
98	O-RING ø13,94X2,62 YELLOW SILI Q	809000055	X	X	X	X
99	GASKET PUMP (2 PER PACKAGE)	809000056	X	X	X	X

Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
101	O-RING ø29.74X3.53 FLOW/RET.(2 PER PACKAGE)	809000064	X	X	X	X
103	PIPE RETURN-PUMP FILT Q85S 7 Q130S	807000025	X	X	X	X
104	PIPE 3WV-PUMP EXT. EXP.VESSEL Q	807000028	X	X	X	X
105	FILTER RETURN PIPE Q	807000029	X	X	X	X
106	THREE WAY V. HOUSING VC O-RING	809000057	X	X	X	X
107	CARTRIDGE 3WV	807000030	X	X	X	X
108	FILTER CAP	807000031	X	X	X	X
108a	O-RING ø25,07 X 2,62 3WV	809000058	X	X	X	X
109	NUT M35 ø30	809000059	X	X	X	X
111	FITTINGS SET CYL. COMBI	807000033	X	X	X	X
	NUT M35 ø30	809000059	X	X	X	X
111a	O-RING ø26.70 X 1.78 (3 PER PACKAGE)	809000091	X	X	X	X
112	AIRBOX GASKET FLOW/ RETURN Q	809000060	X	X	X	X
113	SERVICE CAP AIRB. Q	808000018	X	X	X	X
114	FITTING GAS VALVE 3/4"	806000016	X	X	X	X
	O-RING ø21.89X2.62 GASLINE	809000061	X	X	X	X
115	GASKET FITTING 3/4" GASV.	809000062	X	X	X	X
116	GASLINE Q85S	806000017	X	X		
116	GASLINE Q130S	806000018			X	X
117	PIPE FLOW Q85S	807000034	X	X		
117	PIPE FLOW Q130S	807000035			X	X
	SCREW (5 PER PACKAGE)	809000063	X	X	X	X
118	SNAP LOCK AIR BOX	808000019	X	X	X	X
119	AIR BOX FRONT Q85S 7 Q130S	808000015	X	X	X	X
126	FLANGE 3WV	807000063	X	X	X	X
127	O-RING ø26.70 X 1.78 (3 PER PACKAGE)	809000091	X	X	X	X
128	PIPE PL.EXCH-3WV E	809000141	X	X	X	X
129	BOLT M 5X12 IMBUS VERZ. (3 PER PACKAGE)	809000045	X	X	X	X

Parts electrical components Q Premier



152	T1	supply sensor
150	T2	return sensor
158	T3	DHW sensor
160	T6	Outdoor reset sensor
156	T5	flue gas sensor
159	HLS	high limit switch
151	P1	water pressure sensor

Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
130	TRAFO 120V/24V	805000010	X	X	X	X
	SCREW 3,5X 9,5 VERZ.D7983 (5 PER PACKAGE)	805000011	X	X	X	X
131	CONTROL TOWER COMPLETE	805000045	X	X	X	X
132	HARNESS Q RAC	805000012	X	X	X	X
	STICKER CONNECTION TERMINAL	805000014	X	X	X	X
	HARNESS Q 120V + MAINS SWITCH	805000013	X	X	X	X
	CONNECTOR 2-POLE PURPLE	805000015	X	X	X	X
	CONNECTOR 2-POLE BLACK	805000016	X	X	X	X
	CONNECT. 3-POLE GREEN EXT.PUMP	805000017	X	X	X	X
	CONNECTOR 3-POLE GRAY	805000018	X	X	X	X
	CONNECTOR 4-POLE BROWN	805000021	X	X	X	X
	CONNECTOR 6-POLE BLUE	805000022	X	X	X	X
	CABLE HARNESS Q 3WV	805000023	X	X	X	X
133	CONTROL UNIT MCBA 5417 Q RAC	805000024	X	X	X	X
	FUSE 5AF (3 PER PACKAGE)	805000026	X	X	X	X
	FUSE 4 AT (250v) (3 PER PACKAGE)	805000027	X	X	X	X
134	DISPLAY MCBA ATAG Q	805000028	X	X	X	X
	FLAT CABLE DISPLAY L=240 SHR	805000029	X	X	X	X
141	HARNESS Q 120V + MAINS SWITCH	805000013	X	X	X	X
	MAINS SWITCH 120V	805000048	X	X	X	X
142	3WAY VALVE ACTUATOR VC6940	805000031	X	X	X	X
	CABLE HARNESS Q 3WV	805000023	X	X	X	X

Item	Description	Art. No. / Référence	QP85		QP130	
	* P= Propane after conversion		N	P*	N	P*
			OSS1		OSS2	
150	NTC T2/T3	805000032	X	X	X	X
151	WATERPRESSURE SENSOR	805000034	X	X	X	X
	WATER PRESSURE SENSOR CABLE	805000050	X	X	X	X
152	NTC T1/T3	805000035	X	X	X	X
153	IGNITION ELECTRODE+GASKET OSS	805000036	X	X	X	X
	IGNITION CABLE SHR	805000037	X	X	X	X
	HARNESS FAN 120V	805000038	X	X	X	X
	IONISATION WIRE SHR	805000039	X	X	X	X
154	FAN NRG 118 OSS1/2	808000020	X	X	X	X
	HARNESS FAN Q 120V	805000044	X	X	X	X
155	GAS VALVE	806000019	X	X	X	X
156	FLUE GAS SENSOR INCL.CABLE	805000040	X	X	X	X
157	PUMP UPER PWM 20-58 120V	807000040	X	X		
157	PUMP UPER PWM 20-78 120V	807000041			X	X
158	NTC DHW T3 ø6/ø8 CLIP 5M	809000142	X	X	X	X
159	HIGH LIMIT SWITCH	805000033	X	X	X	X
160	OUTDOOR RESET SENSOR ARV12	805000047	X	X	X	X

18 Parts list vent system

Vent Products

Listed and Tested Vent Products for E75C, E110C, Q85S, QP85, Q130S, QP130, Q175S, Q175C and Q205S

Manufacturer	Descriptions	Parts #
Heatfab	DGV 3"/5" Conc Air Intake Tee 3"	DGV03TAD3
	DGV 3"/5" Conc X 12" Length	DGV03L12
Concentric	DGV 3"/5" Conc X 31" Length	DGV03L36
	DGV 3"/5" Conc Horz Term Adapter	DGV03HT
	DGV 3"/5" Conc Vert Term Adapter	DGV03VT
	Rain Cap	SGV300
	3"- Adapter to fit into 80 mm Flue Collar	adapter
	3"- 12 Length	SGV302
	3"- 31" Length	SGV307
Twin Pipe	3"- 90 Deg Tr Elbow	SGV314
	3"- Screen Termination	SGV392
	3"- Round Wall Thimble Pate	SGV393
	3"- Tall Cone Flashing, Flat- 2/12 Pitch	SGV3TCF
Manufacturer	**Descriptions**	**Parts #**
IPEX	Concentric Vent Termination	1CT0303
	PVC - FGV Concentric Kit	196006
	PVC - FGV Wall Termination Kit	81219
	CPVC - FGV Concentric Vent Kit	197009
	Termination Vent Screen	196051
Manufacturer	**Descriptions**	**Parts #**
Simpson Dura-Vent	3" (76mm) SS flexible lining system	3SFLEX-XX 294590
	3" (76mm) FasNSeal Flex-to-FasNSeal Adapter female	304003
	3" (76mm) FasNSeal-to-FasNSeal Adapter Flexible male	304103
	80mm to 3" Appliance Adapter	FSA-80MM3
	Vertical termination	300325
	3" (76mm) Bend 90 Degree	300160
	3x5 AL294C Concentric (12" Straight Pipe)	35CVS-12
	3x5 AL294C Concentric (36" Straight Pipe)	35CVS-36
	3x5 AL294C Concentric (48" Staight Pipe)	35CVS-48
	3x5 AL294C Concentric (90° Elbow)	35CVS-E90
	3x5 AL294C Concentric (45° Elbow)	35CVS-E45
	3x5 AL294C Concentric (Wall Strap)	35CVS-WS
	3x5 AL294C Concentric (Horizontal Cap)	35CVS-HC
	3x5 AL294C Concentric (Vertical Cap)	35CVS-VC
	3x5 Sealed Combustion 6" Vent Length	SC-0603
	3x5 Sealed Combustion 12" Vent Length	SC-1203
	3x5 Sealed Combustion 18" Vent Length	SC-1803
	3x5 Sealed Combustion 24" Vent Length	SC-2403
	3x5 Sealed Combustion 36" Vent Length	SC-36-3
	3x5 Sealed Combustion Adjustable Vent Length	SC-AVL3
	3x5 Sealed Combustion 94° Elbow	SC-94033
	Wall Kit (w/Cap)	FSSCWMK35
	Roof Kit (w/cap)	FSSCTRK35
Manufacturer	**Descriptions**	**Parts #**
Rinnai/ Ubbink	1 Meter Sections of PP/PVC, 3"/5"	224080
	90 Degree, Male x Female, PP/PVC, 3"/5"	224078
	Horizontal PP Termination, 21 inch	223175
	Vertical PP Termination	184162
	Condensing Raised Horizontal Termination Snorkel Kit	224047PP
	Condensing 45 Deg. Vent Pipe Elbow 2 pcs	224077PP
Stainless Steel:	1 Meter Sections of SS/PVC, 3"/5"	224204SS
	90 Degree, Male x Female, SS/PVC, 3"/5"	224201SS
	Horizontal SS Termination, 21 inch	223178SS
	Vertical SS Termination	184221SS

Manufacturer	Descriptions	Parts #
York International	3” PVC Concentric Vent Termination	1CT0303

Manufacturer	Descriptions	Parts #
CentroTherm	3"/4" B-Vent Chimney Cover	IABC0304
	3"/5" B-Vent Chimney Cover	IABC0305
	3"/6" B-Vent Chimney Cover	IABC0306
	3"/7" B-Vent Chimney Cover	IABC0307
	3" Connector Ring	IANS03
	3" Support Clamp	IASC03
	3" Spacer	IASP03
	3" Screens PPs-UV Black	IASPP03
	3" Bird Screen SS	IASSS03
	3" Wall Plate Black	IAWP03B
	3" Wall Plate White	IAWP03W
	3" Twin Pipe to 3"/5" Concentric Adaptor	ICTC0335
	3" Base Support	ISBS0387
	3" Chimney Cover SS w/PPs-UV End Pipe	ISCM03
	3" Chimney Cover PPs-UV Black	ISCP03
	3" Chimney Cover SS w/SS End Pipe	ISCS03
	3" x 45 Elbow	ISEL0345
	3" x 87 Elbow	ISEL0387
	3" x 45 Elbow Long	ISELL0345
	3" x 45° Elbow Long PPs-UV Black	ISELL0345UV
	3" x 87 Elbow Long	ISELL0387
	3" x 87° Elbow Long PPs-UV Black	ISELL0387UV
	3" x 87° Sweep Elbow	ISELR0387
	3" x 20" End Pipe PPs-UV Black	ISEP03
	3" x 39" End Pipe PPs-UV Black	ISEP0339
	3" Single Wall EDPM Gasket	ISGE03
	3" Horizontal Drain Tee	ISHDT03
	3" Low Profile Wall Termination	ISLPT0303
	3" Tee	IST03
	3" Test Port	ISTP03
	3" Termination Tee Long	ISTT0320
	3" x 12" Vent Length	ISVL031
	3" x 24" Vent Length	ISVL032
	3" x 24" Vent Length PPs-UV Black	ISVL032UV
	3" x 36" Vent Length	ISVL033
	3" x 39" Vent Length UV Black	ISVL0339UV
	3" x 72" Vent Length	ISVL036
	3"/5" Concentric Roof Termination PPs-UV	ICRT3539
	3"/5" Concentric Wall Termination PPs-UV	ICWT352
	3" to 2" Velocity Cone	ISVC0302

Miscellaneous	
Terminal	General PVC 1120 3” SCH 40 DWV ASTM D 2665 900 Elbow
Air Intake Pipe	PVC 1120 3” SCH 40 DWV ASTM D 2665
Vent Pipe	PVC 1120 3” SCH 40 DWV ASTM D 2665

Vent Manufacturer Contact Information for Installation Instructions and Parts Lists:

Heat-Fab
Telephone: 800-772-0739
Fax: 413-863-4803
cystsvc@heat-fab.com
www.heatfab.com

IPEX
Telephone: 800-463-9572
905-403-0264
Fax: 905-403-9195
www.ipexamerica.com

Simpson Dura-Vent
Telephone: 518-463-7284
Fax: 518-463-5271
sales@duravent.com
www.protechinfo.com

Rinnai/Ubbink
Telephone: 800-621-9419
Fax: 678-829-1666
www.rinnai.us

York International
Telephone: 405-364-4040
877-874-7378
www.york.com/products/unitary/

CENTROTHERM Eco System
Telephone: 877-434-3432
Fax: 518-618-3166
info@centrotherm.us.com
www.centrotherm.us.com

19 Common venting guidelines

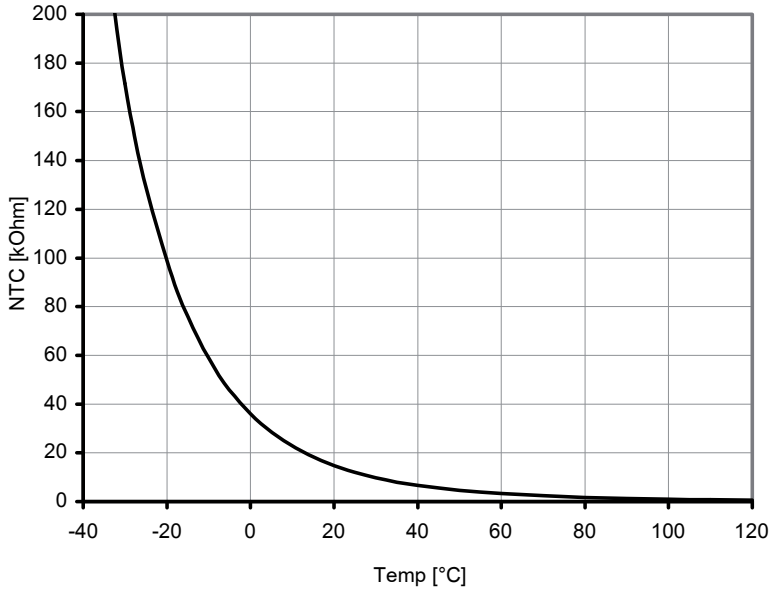
Do not common vent with the vent pipe of any other boiler or appliance. However, when an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it. At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation:

(a) Seal any unused openings in the common venting system.
(b) Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and otherdeficiencies which could cause an unsafe condition.
(c) Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to thecommon venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
(d) Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously
(e) Test for spillage at the draft hood relief opening after 5 minutes of mainburner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
(f) After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above,return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous condition of use."
(g) Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/ or CAN/CSA B149.1, Natural Gas and Propane Installation Code. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

Appendix A - Outoor Reset Sensor Data

R 25 °C	12 kΩ
R 100 ° C	950 Ω
$B_{25/85}$	3750 K
Temperature coefficient	-4,2 %/K

Temp [°C]	NTC [kOhm]
-30	171.70
-20	98.82
-10	58.82
0	36.10
10	22.79
20	14.77
25	12.00
30	9.81
40	6.65
50	4.61
60	3.25
70	2.34
80	1.71
90	1.27
100	0.95
110	0.73
120	0.56



Appendix B - Resistance table NTC sensors

Temp °F	NTC 12K (12kΩ/77°F) supply sensor T1 return sensor T2 DHW sensor T3 outside sensor T4 flue gas sensor T5
-4	98,000
-0.4	90,000
3.2	82,000
6.8	74,000
10.4	66,000
14	58,000
17.6	53,500
21.2	49,000
24.8	45,000
28.4	40,500
32	36,000
35.6	33,500
39.2	30,900
42.8	28,200
46.4	25,600
50	23,000
53.6	21,400
57.2	19,900
60.8	18,100
64.4	16,600
68	15,000
71.6	14,000
75.2	12,900
78.8	11,900
82.4	10,850
86	9,800
89.6	9,100
93.2	8,500
96.8	7,900
100.4	7,200
104	6,500
113	5,600
122	4,600
131	4,000
140	3,400
158	2,300
176	1,700
194	1.300

Resistance table NTC-Sensors

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