

# Installation & Servicing Instructions

## High efficiency condensing gas boiler Q85SN/Q130SN/Q175SN/Q205SN/Q175CN Q85SP/Q130SP/Q175SP/Q205SP/Q175CP



Pictured: Q85SN, Q130SN  
Q85SP, Q130SP

### 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 qualified installer, 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 he or she is familiar with all necessary operating instructions.

### NOTICE!

**Installation and service must be performed by a qualified installer, 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.

# Rinnai®

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These instructions to be retained by user.

**Contents of instructions**

These installation instructions contain important information for the safe installation, start-up and maintenance of boilers with capacities 85,000 through 205,000 BTU/hr.

These installation instructions are intended for professional installers, 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.

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**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 boiler complies with the State of California Lead Law (AB1953).

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# 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 frost.**



**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, whilst 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 must 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 only be performed by trained professionals.
- 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 laid down 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.



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



**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.



### **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.



**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.**

## 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 frost 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:** • Rhomar RhoGard Mutli-Metal (AL safe)  
(max. concentration 50%) • Noble Noburst AL

**Approved system cleaner:** • Noble Noburst Hydronic System Cleaner  
• Fernox F3 Cleaner  
• Rhomar Hydro-Solv 9100



**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

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



**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 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

## 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 and maintenance every 4 years or 4000 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.



**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 retrieves 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**  
Steps higher or lower burning according to the heat demand.

The Rinnai Q boiler is a room sealed, condensing and modulating central heating boiler, with an optional integrated DHW cylinder (integrated DHW on the Q175C only). The QxxS boiler models have the ability to control a domestic hot water indirect tank.

The boiler is provided with a compact stainless steel heat exchanger with smooth tubes. This design is a well thought out 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 condensate collector trap.

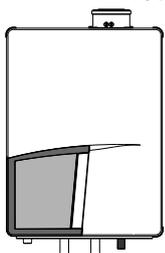
The boiler is provided with an intelligent control system (CMS Control Management System). The boiler anticipates the heat demand of the central heating system or the domestic hot water facility system.

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.

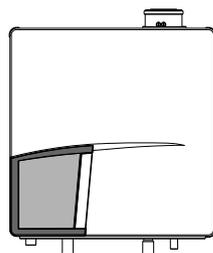
Explanation of the type indication: Rinnai Q205SN

Q = Type \_\_\_\_\_  
 205 = Nominal load in (x1,000) BTU \_\_\_\_\_  
 S = System/Solo (C = Combi) \_\_\_\_\_  
 N = Natural Gas (P = Propane Gas) \_\_\_\_\_

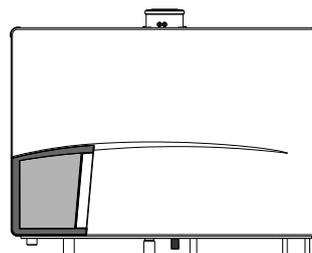
Different boiler types:



System/Solo boilers:  
Q85SN, Q130SN  
Q85SP, Q130SP



Q175SN, Q205SN  
Q175SP, Q205SP



Combi boiler with integrated DHW cylinder  
Q175CN  
Q175CP

## 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:

Description	Amount		
	Q85S Q130S	Q175S Q205S	Q175C
<b>Boiler with:</b>			
Outdoor reset sensor ARV12	1	1	1
Compression ring Ø15 brass			4
Compression ring Ø22 brass			2
Compression ring Ø28 brass	2		
Compression ring Ø35 brass		2	2
Bolt M5X16mm	1	1	1
Cover air supply Ø120/Ø80	1	1	1
Gasket vent system ø80	1	1	1
Power cable pull safety Q-Series	1	1	1
Flue pipe Ø 80 PP	1	1	1
Nut 15mm compression fitting			2
Nut W1.1/8x1/14 22 Compression fitting			1
Nut W1.3/8"x1/14 28 compression fitting	2		
Nut W1.610x1/14 35 compression fitting		2	2
Screw 6X60mm	5	5	5
Lip-ring flue pipe ø80	1	1	1
Feed through + plug flue gas	1	1	1
Cap de-aerator	1	1	1
Adapter fitting 15mm x 3/4"NPT ext.			2
Adapter fitting 22mm x 3/4"NPT ext.			1
Flue adapter Ø80/Ø3" pps UL appr.	2	2	2
Flow restriction MR01 FG 21,0L red			1
Wall mounting suspension bracket	1	1	1
Plumbing kit Q85S/Q130S	1	1	
Plumbing kit Q175S/Q175C/Q205S			1
3/4" Gas valve	1	1	1
Template on inside of package	1	1	1
Installation & Service Instructions	1	1	1
User information manual	1	1	1
Warranty document	1	1	1
ICSL book	1	1	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.

### 5.1 Requirements for the installation room



#### DANGER

- The room where the boiler will be placed must always be frost free.
- 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-/fluorocarbons  
 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.
- **Do not tear the packaging. Take notice of the presence of the mounting template at the inside of the carton wrapper.**
- **Lay the boiler on its back during unpacking. When unpacking, the casing can be removed from the boiler. This part can be kept apart during installation. It must be placed on the boiler and fixed with the screw behind the door before the boiler is started up.**



**Turn the boiler to its side and remove the wall bracket from the back of the boiler by removing the 2 screws.**

The boiler can be mounted practically to any wall with the suspension bracket and the enclosed mounting equipment.

- The wall 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 venting system, pipework and servicing. See drawings in section 5.3.

The location of the boiler can be determined by using the template which is printed on the inside the boiler package wrapping. Remember to account for the spacing of the plumbing kit.

- Drill the necessary holes using the template
- Install the mounting bracket to the wall using the supplied mounting materials



**Lifting and carrying precautions.**

**To avoid personal injury please follow these recommendations:**

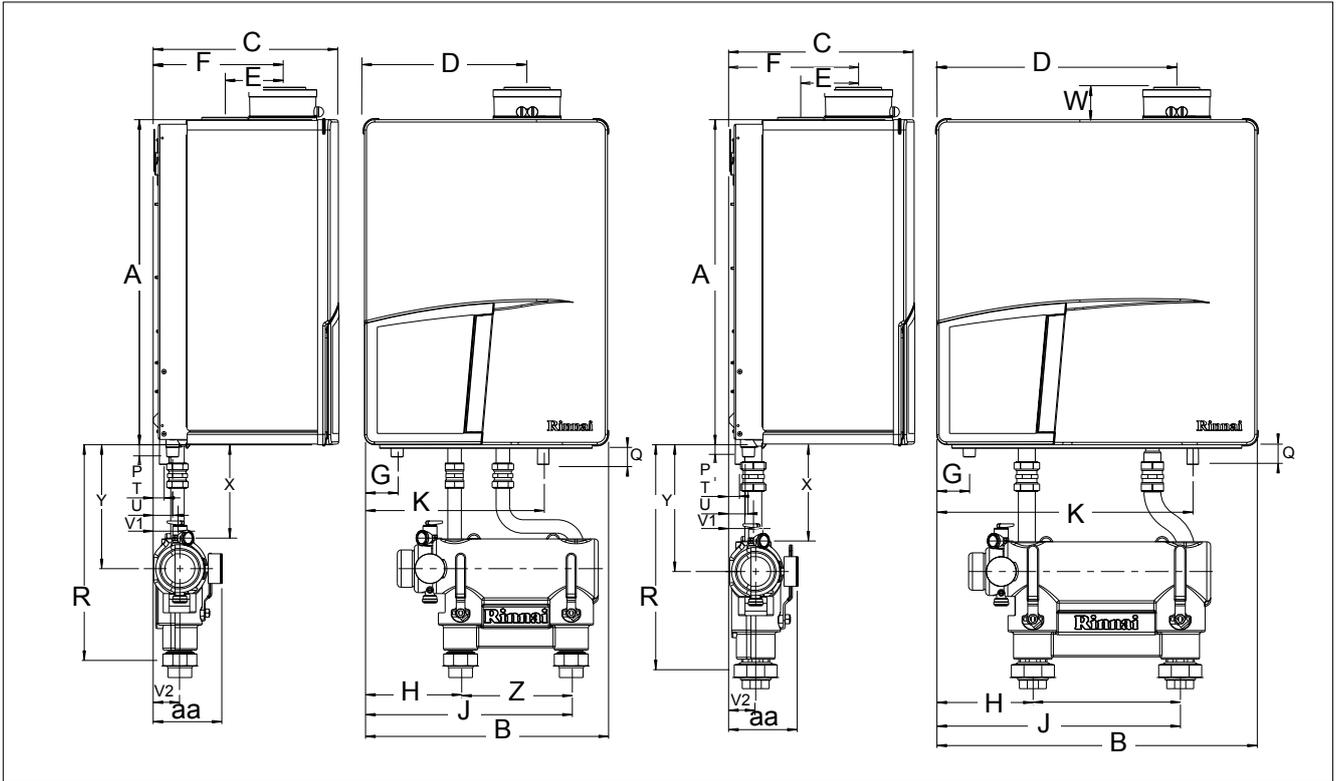
- **Always lift the boiler with 2 people or use special equipment.**
- **When lifting the boiler, bend the knees, and keep the back straight and feet apart.**
- **Do not lift and twist at the same time.**
- **Lift and carry the boiler close to the body.**
- **Wear protective clothing and gloves to protect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



**Lift the boiler only by the boiler's rear wall.**

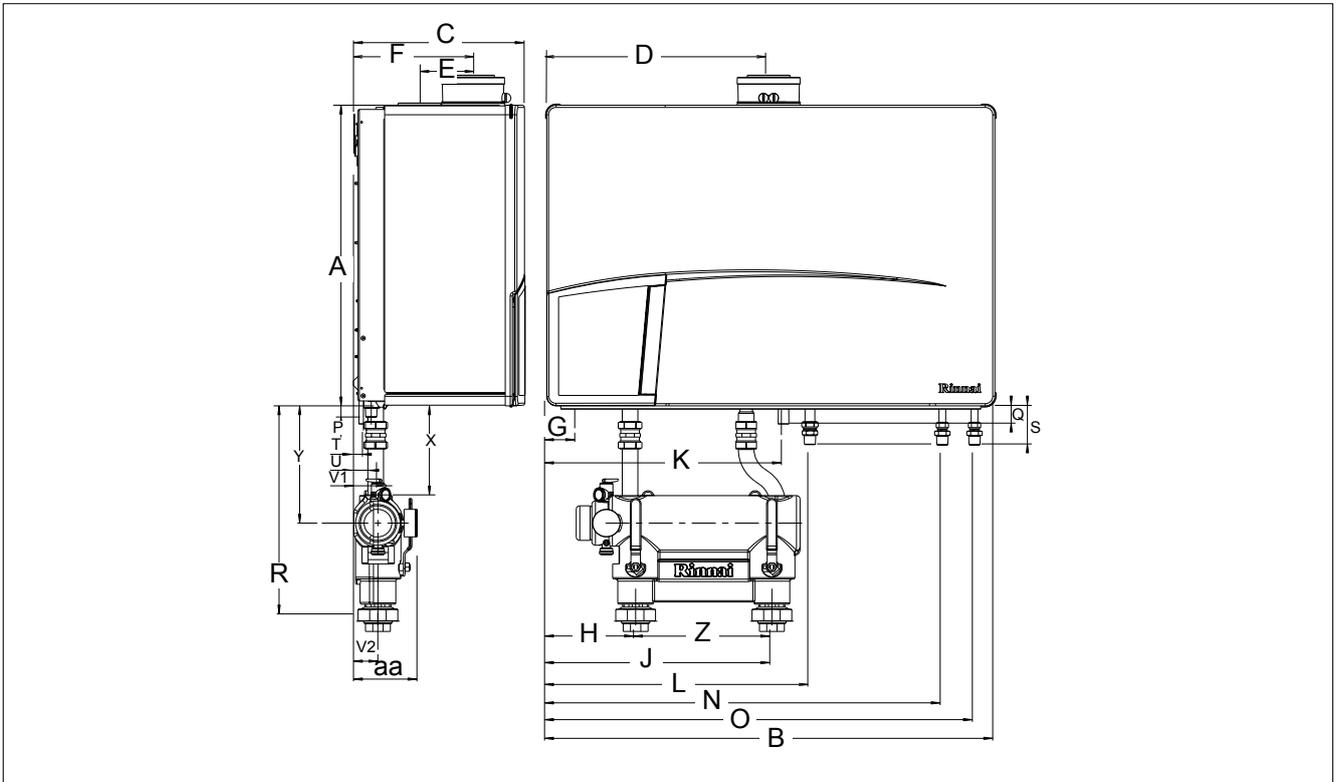
- Dispose the packaging materials.

### 5.3 Dimensions



dimensions Q85S, Q130S, Q175S and Q205S

figure 1



dimensions Q175C

figure 2

## Dimensions

	Boiler type	Solo		Combi
		Q85SN/Q85SP Q130SN/Q130SP	Q175SN/Q175SP Q205SN/Q205SP	Q175CN/Q175CP
		inch / mm	inch / mm	inch / mm
A	Height	26.8" / 680	26.8" / 680	26.8" / 680
B	Width	19.7" / 500	26" / 660	39.4" / 1000
C	Depth	15.2" / 385	15.2" / 385	15.2" / 385
D	Left side / vent	13.2" / 335	19.5" / 495	19.5" / 496
E	Center to center / vent and air supply	4.7" / 120	4.7" / 121	4.7" / 122
F	Back / vent	10.6" / 270	10.6" / 270	10.6" / 270
G	Left side / gas pipe	2.6" / 65	2.6" / 65	2.6" / 65
H	Left side / supply pipe	7.8" / 199	7.8" / 199	7.8" / 199
J	Left side / return pipe	16.8" / 428	19.8" / 504	19.8" / 504
K	Left side / condensate pipe	14.6" / 370	20.9" / 530	20.9" / 530
L	Left side / expansion pipe			23.2" / 590
N	Left side / cold water pipe			34.8" / 885
O	Left side / hot water pipe			37.6" / 955
P	Pipe length of g*	0.7" / 18	0.7" / 18	0.7" / 18
Q	Pipe length of c*	2" / 50	2" / 50	2" / 50
R	Pipe length of f and r*	17.7" / 450	18.5" / 470	18.5" / 470
S	Pipe length of e, k and w*			3.5" / 89
T	Back / Center of pipe c*	1" / 25	1" / 25	1" / 25
U	Back / Center of pipe g*	1.6" / 40	1.6" / 40	1.6" / 40
V1	Back / Center of pipe f, r, e, k and w*	2" / 50	2" / 50	2" / 50
V2	Back / Center of pipe f and r*	2.1" / 54	2.1" / 54	2.1" / 54
W	Pipe length vent co-axial	2.6" / 65	2.6" / 65	2.6" / 65
	Pipe length vent parallel	5.8" / 147	5.8" / 147	5.8" / 147
X	Bottom side boiler to center safety valve	7.7" / 195	8" / 200	8" / 200
Y	Bottom side boiler to center header	10.2" / 260	10.4" / 265	10.4" / 265
Z	Center to center of f and r*	9" / 229	12" / 305	12" / 305
aa	Depth plumbing kit	5.6" / 142	5.6" / 142	5.6" / 142

\*) See figure 3

dimensions

table 1

## Dimensions

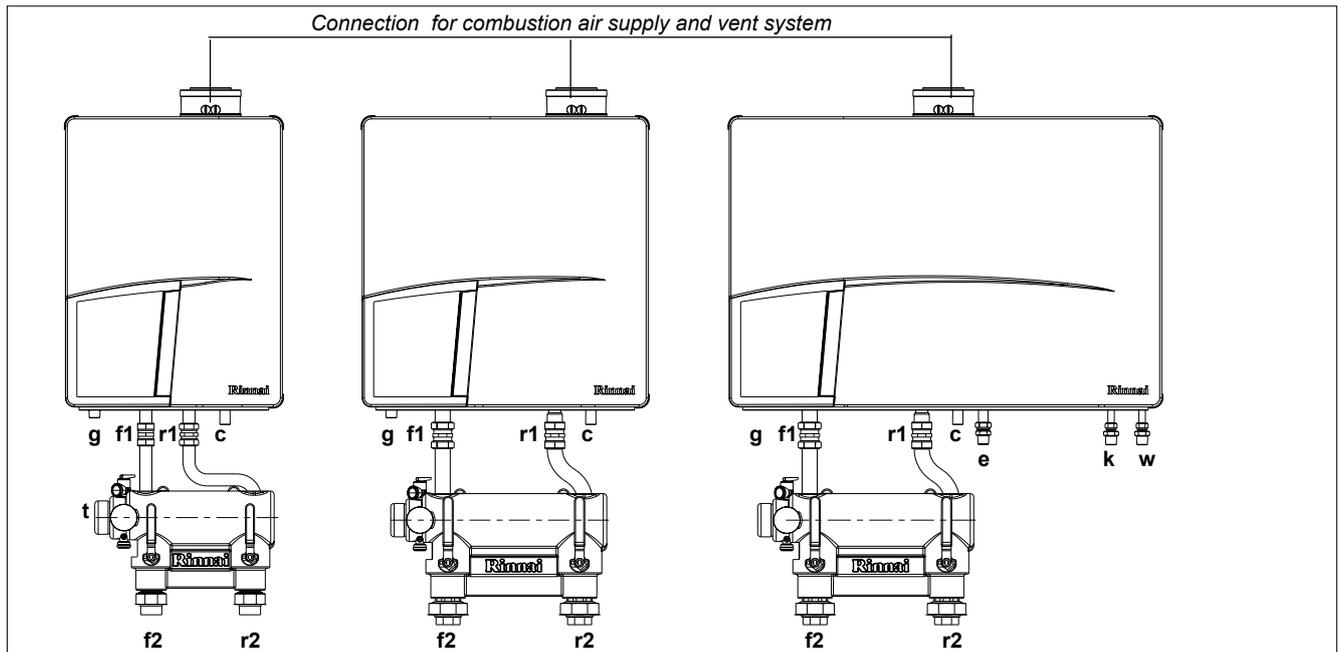


figure 3

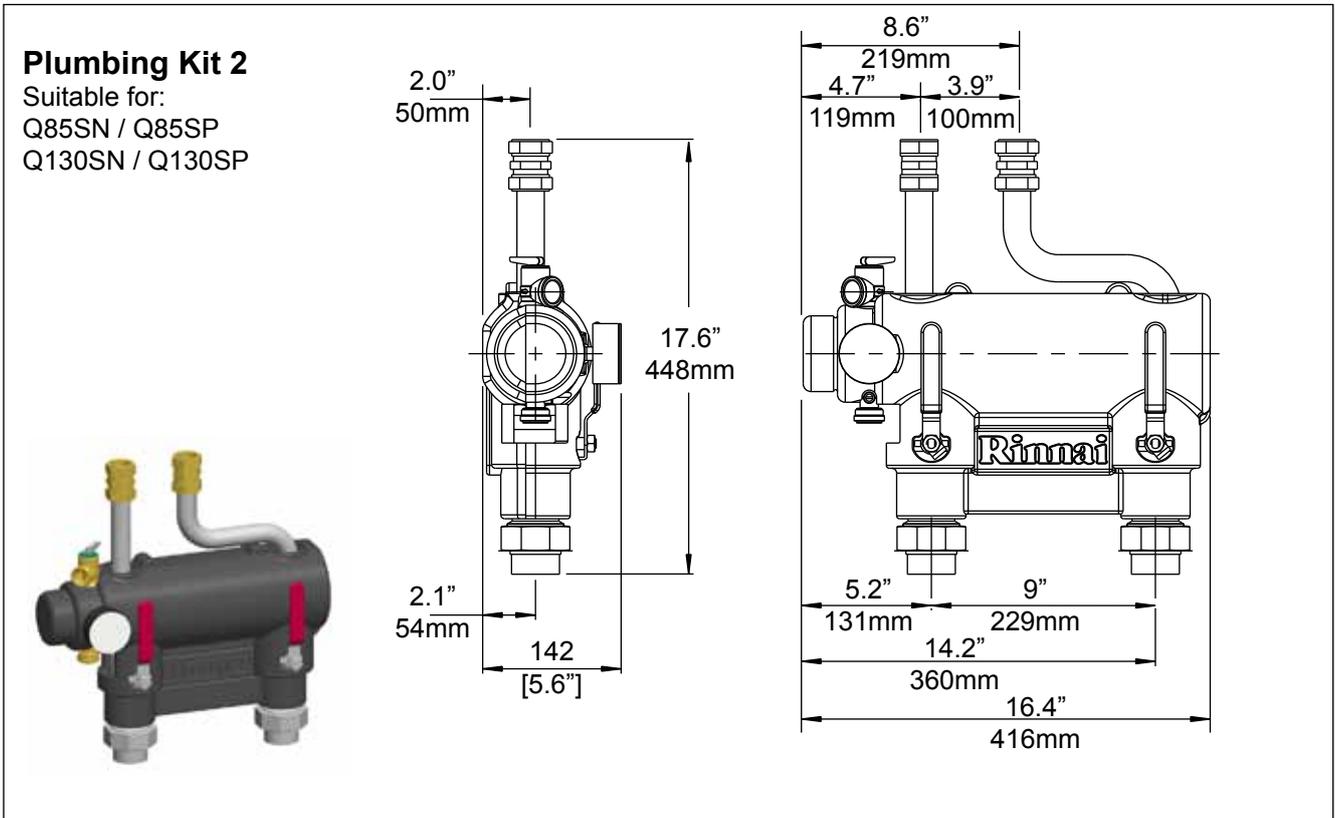
	Boiler type	Solo		Combi
		Q85SN/Q85SP Q130SN/Q130SP	Q175SN/Q175SP Q205SN/Q205SP	Q175CN/Q175CP
Vent system / Combustion air supply		80/125mm	80/125mm	80/125mm
Gas pipe	g	3/4"M-NPT	3/4"M-NPT	3/4"M-NPT
Supply pipe	boiler side - f1	28mm	35mm	35mm
	system side - f2	1¼"M-NPT	1½"M-NPT	1½"M-NPT
Return pipe	boiler side - r1	28mm	35mm	35mm
	system side - r2	1¼"M-NPT	1½"M-NPT	1½"M-NPT
Condensate pipe	c	0.95" / 24mm	0.95" / 24mm	0.95" / 24mm
Expansion pipe	e			0.87"x ¾"M-NPT / 22mm
Cold water pipe	k			0.6"x ¾"M-NPT / 15mm
Hot water pipe	w			0.6"x ¾"M-NPT / 15mm
Supply pipe indirect tank. <i>In case of optional internal 3 way valve.</i>	t	1"M-NPT		

connection diameters

table 2

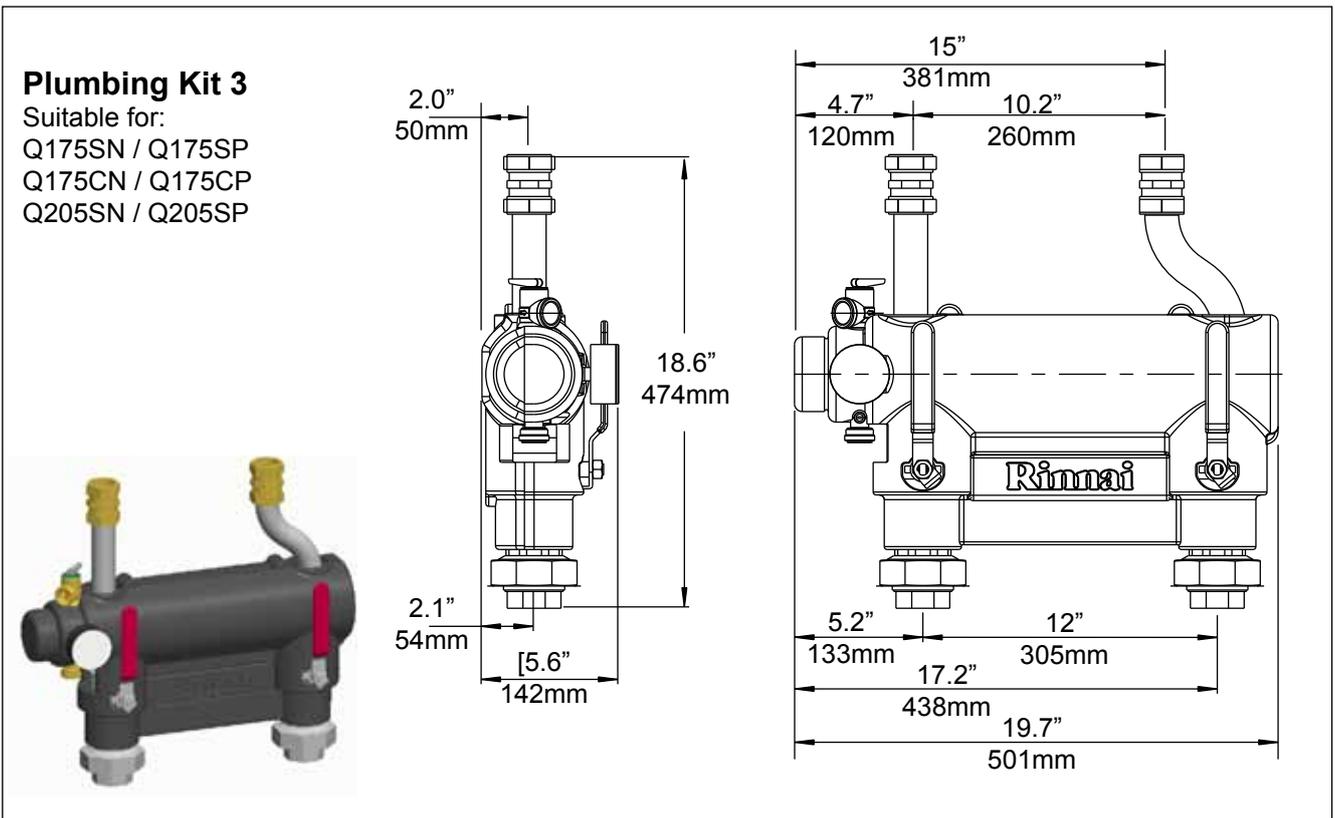
### 5.3.1 Plumbing Kits

Rinnai boilers are supplied with a Plumbing kit from factory. Find below the dimensions. See chapter 6.1 for additional information.



Plumbing kit 2

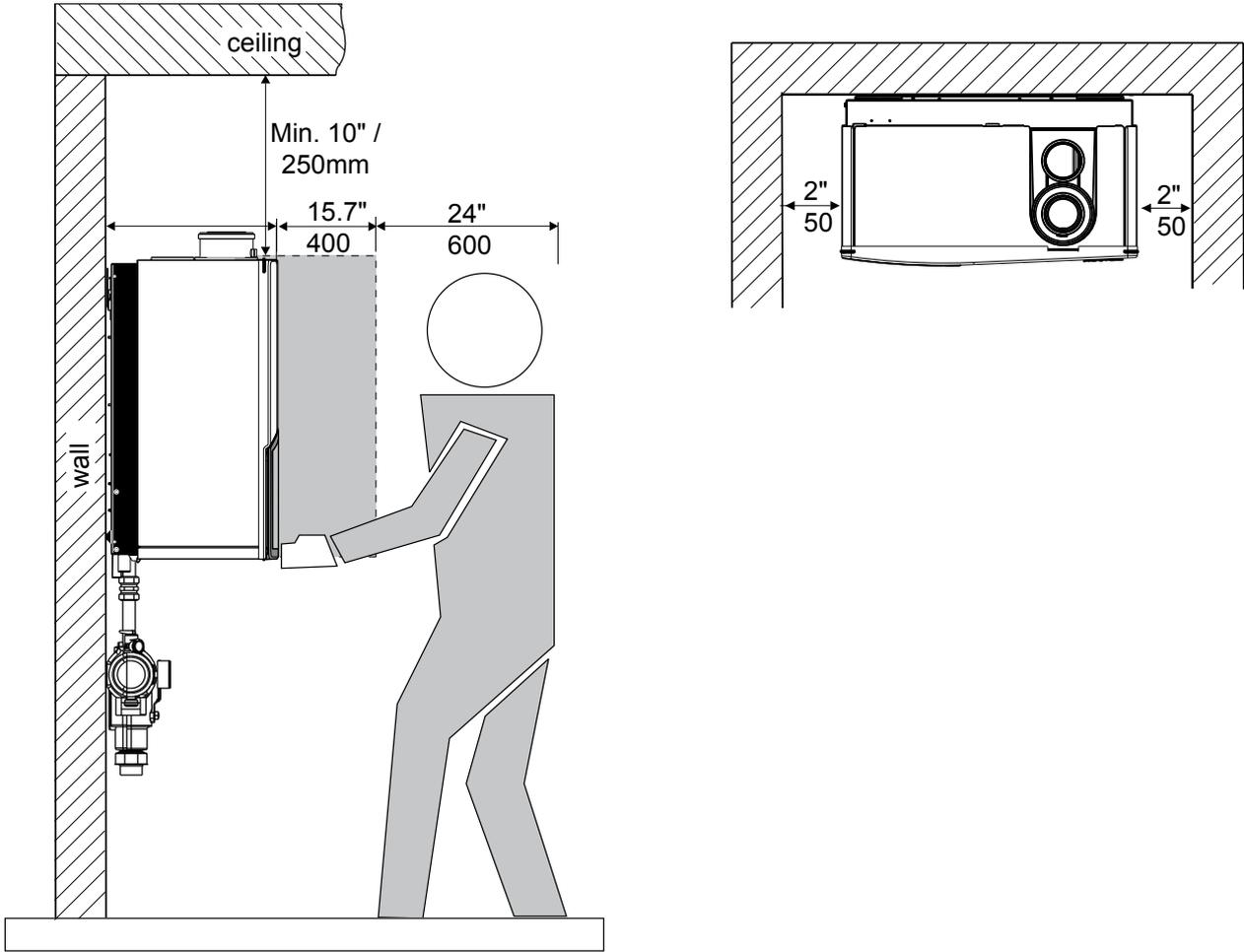
figure 4



Plumbing kit 3

figure 5

### 5.3.2 Clearances from the boiler



service clearances to the boiler

figure 6

	Minimum required clearances to combustibles All types inch / mm	Minimum required clearances to non-combustibles All types inch / mm	Recommended service clearances All types inch / mm
Top of boiler	2" / 50	2" / 50	10" / 250
Back of boiler	0"	0"	0
Front of boiler	6" / 150	6" / 150	24" / 600
Left side of boiler	2" / 50	2" / 50	2" / 50
Right side of boiler	2" / 50	2" / 50	2" / 50
Floor / Ground to bottom of boiler	12" / 300	12" / 300	30" / 762
Floor/ Ground to bottom Low loss header	0"	0"	12" / 300
Vent	0"	0"	0"

clearances to the boiler

table 3

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

#### Low Loss Header

Clearances to combustible and non-combustible is 0 inch for sides, top, front and floor/ground. The recommended service clearance to the bottom of the low loss header is 12 inches.

## 5.4 Technical specifications

Boiler type		Q-Series				
		Combi Q175CN Q175CP	Q85SN Q85SP	Q130SN Q130SP	Q175SN Q175SP	Q205SN Q205SP
Input Hs CH	BTU/hr	175,000	85,000	130,000	175,000	205,000
	kW	51	25	38	51	60
Q <sub>n</sub> Output non-condensing CH	BTU/hr	157,000	77,000	117,000	157,000	184,000
	kW	45.9	22.5	34.2	45.9	54.0
Q <sub>n</sub> Output EN677 efficiency CH	BTU/hr	172,400	84,000	127,600	172,400	202,200
	kW	50.2	24.7	37.3	50.2	59.1
Q <sub>n</sub> Output AFUE CH	BTU/hr	167,500	82,000	117,000	167,500	184,000
	kW	48.8	24.1	36.5	48.8	57.4
Efficiency at 98.6/86°F (36/30°C) part load, Hs, EN677 CH	%	98.5	98.8	98.2	98.5	98.5
AFUE according IBR	%	95.7	96.5	96.1	95.7	95.7
O <sub>2</sub> (at full load)	%	Natural gas: 4.4 - 4.7 (Propane: 4.8 - 5.1)				
Electr. power consumption max.	W	210	137	144	210	234
Electr. power consumption stand by	W	14				
Current	V/Hz	120Vac/60Hz				
Fuse rating	A	5AF & 4AT				
Degree of protection acc. EN 60529		IPX0D				
Weight (empty)	lbs / kg	196 / 89	110 / 50	117 / 53	141 / 64	141 / 64
Water content CH	gallon / liter	1.8 / 7	0.9 / 3.5	1.3 / 5	1.8 / 7	1.8 / 7
Water content DHW	gallon / liter	3.7 / 14				
Water content Plumbing Kit	gallon / liter	0.74 / 2.8	0.58 / 2.2		0.74 / 2.8	
After run time pump CH	min	5				
After run time pump DHW	min	1				
P <sub>MS</sub> Water pressure min.-max.	PSI / bar	14-43 / 1-3				
P <sub>MW</sub> Water pressure DHW max.	PSI / bar	150 / 10	n.a.	n.a.	n.a.	n.a.
Flow temperature max.	°F / °C	176 / 80				
Pump type		UPER 20-78	UPER 20-58	UPER 20-78	UPER 20-78	UPER 20-78
Available pump height CH (ΔT = 25K)	PSI / kPa	2.9 / 20	5.2 / 36	3.0 / 21	2.9 / 20	5.5 / 38
Approvals		ASME, CSA	ASME, CSA	ASME, CSA	ASME, CSA	ASME, CSA
DHW flow (at ΔT50°F)	gallon/min	6.2				
DHW flow (at ΔT27.8°C)	liter/min	23.5				
DHW flow (at ΔT75°F)	gallon/min	4.1				
DHW flow (at ΔT41.7°C)	liter/min	15.5				
Max. DHW flow rate	gallon/min	6.2				
	liter/min	23.5				
Pressure difference DHW	PSI / bar	4.3 / 0.3				
CSA number		2183087				
CRN number		8101.7CL				

Technical specifications

Table 4

The boiler has the following connection pipes;

- The central heating circuit pipes.  
*These must be connected to the Plumbing Kit by means of adapter fittings. See further chapter 6.1;*
- The expansion tank connection.  
**Combi boilers only:** *It consists of a 3/4" (22 mm) steel pipe and can be connected to the expansion tank by means of 3/4" M-NPT adapter fitting. See further chapter 6.2;*
- The gas supply pipe.  
*It is provided with a 3/4" male thread into which the tail piece of the gas valve can be screwed. See further chapter 6.4;*
- The condensation drain pipe.  
*It consists of an oval 1" (24 mm) plastic pipe. The drain pipe can be connected to this by means of an open connection. If the open connection is fitted in a different location, then the pipe can be lengthened by means of a 1 1/4" (32 mm) PVC sleeve. 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.*
- Cold and hot water pipes for domestic hot water (DHW).  
**Combi boilers only:** *These consist of 3/4" (15 mm) copper pipe and can be connected to the installation by means of 3/4" M-NPT adapter fittings. See further chapter 6.5;*



#### NOTICE

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

## 6.1 Central heating system

Connect the central heating system according to its instructions.

The boiler pipes can be connected to the installation by means of compression fittings. Reducers should be used for connecting to thick-walled pipe (welded or threaded).



#### NOTICE

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



#### NOTICE

A Plumbing Kit must be fitted to the boiler.



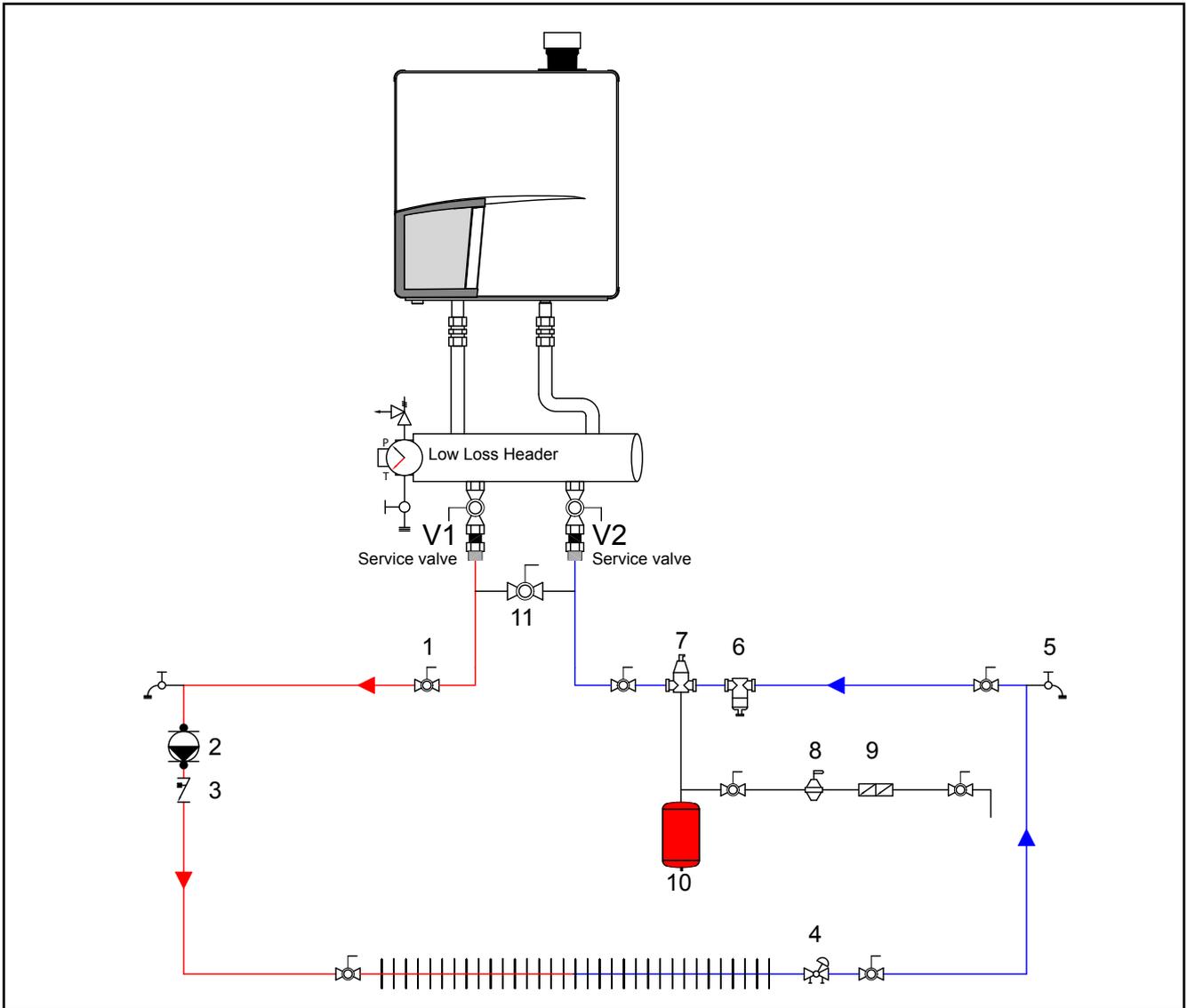
#### NOTICE

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.



#### NOTICE

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.



Boiler basic piping

figure 7

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
11. bypass for system cleaning

## 6.1.1 Plumbing Kits and installation

Rinnai supplies specific Plumbing Kits with each boiler type, which must be fitted directly underneath the boiler on the supply and return pipe. Find in chapter 5.3 the dimensions. Use of the Rinnai boiler without the plumbing kit will void the warranty.

### **i** 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.**

- Install shut-off valves immediately before and after the dirt particle filter to allow the trap to be cleaned.
- Position 3 (figure 8) is 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.
- Position 4 (figure 8) is the supply connection for an indirect tank when used with the optional 3-way valve kit.
- For information on locating the expansion tank and system fill, please see the Rinnai Boiler Applications Manual.

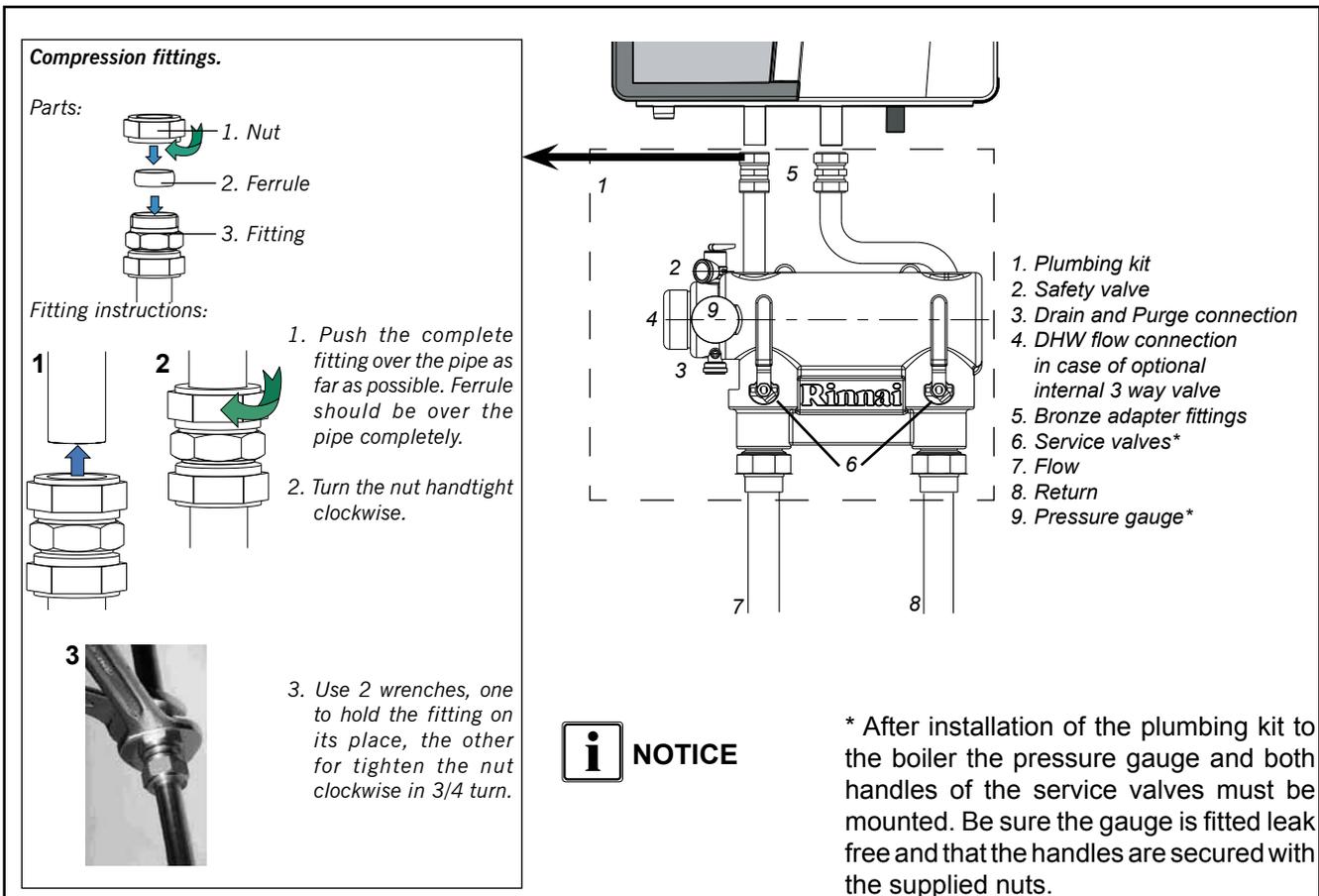
### **i** NOTICE

**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.

### **i** NOTICE

**The plumbing kit is not intended to support the weight of the piping. Appropriate piping supports should be used to support all attached piping to the boiler and plumbing kit.**

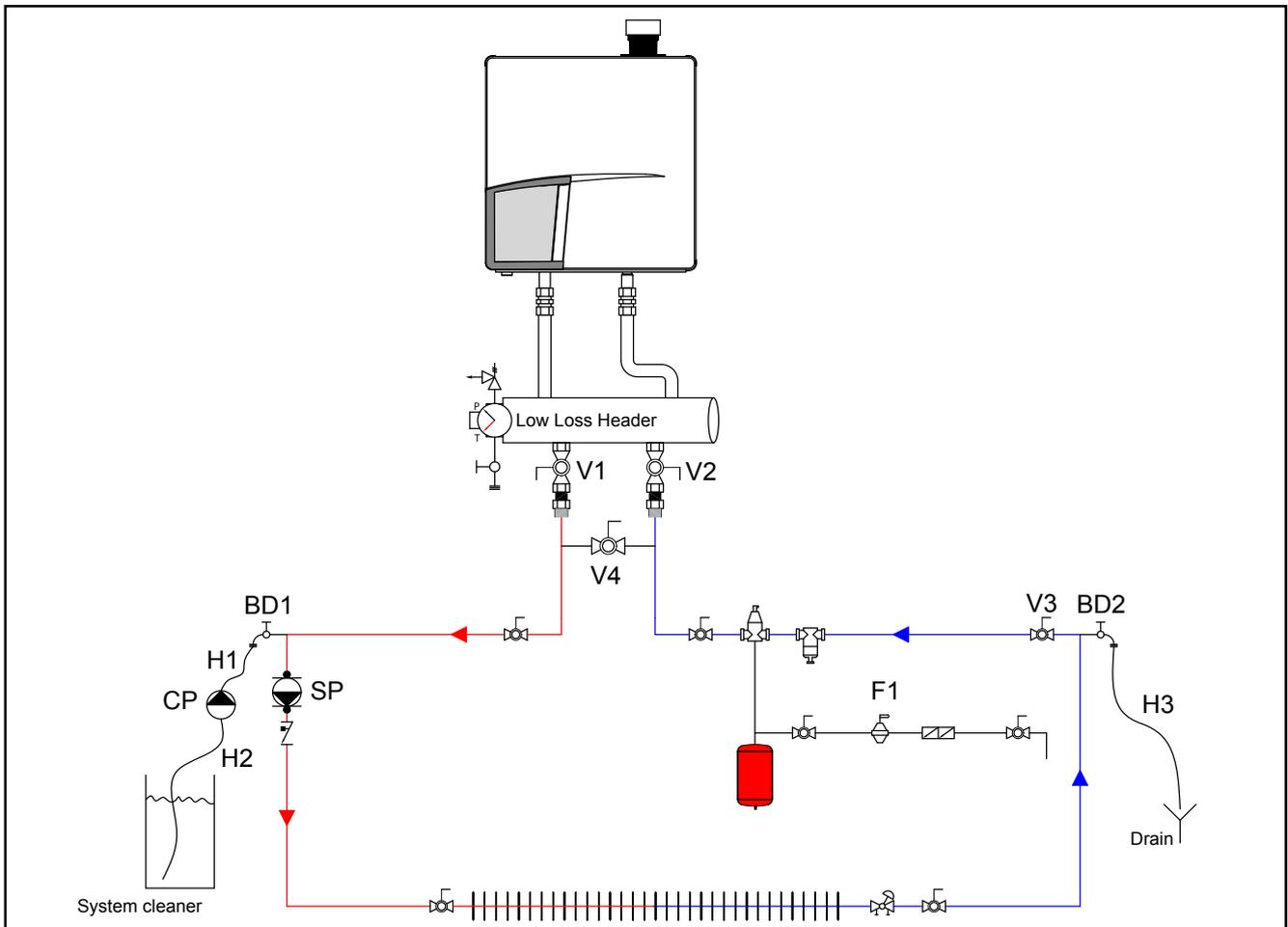


- Boiler system flushing (Not Boiler heat exchanger)

**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 because of its caustic nature it could damage the heat exchanger.**

1. Close the shutoff valves on both the supply and return connections on the plumbing kit (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 about 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 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 9

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 below the plumbing kit (V4).
18. Open shutoff valves on both the supply and return connections on the plumbing kit (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

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

**Approved antifreeze:**

- Rhomar RhoGard Mutli-Metal (AL safe)
- Noble Noburst AL

**Approved system cleaner:**

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

**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



**NOTICE**

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

**Connecting boiler with DHW tank**

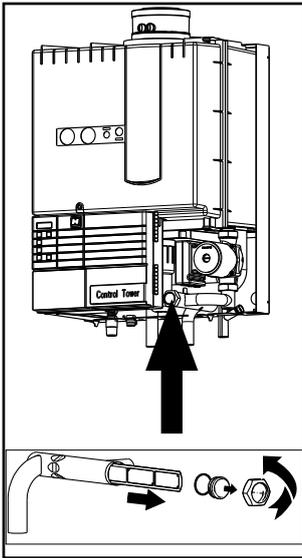
- Connect the external DHW tank according to the installation instructions of the DHW tank and fittings concerned. See chapter 7 and the Rinnai Boiler Applications Manual for additional information.

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

**Connecting boiler with DHW tank**

- Connect the external DHW tank according to the installation instructions of the DHW tank and fittings concerned. See chapter 7 and the Rinnai Boiler Applications Manual for additional information.

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 9a

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.

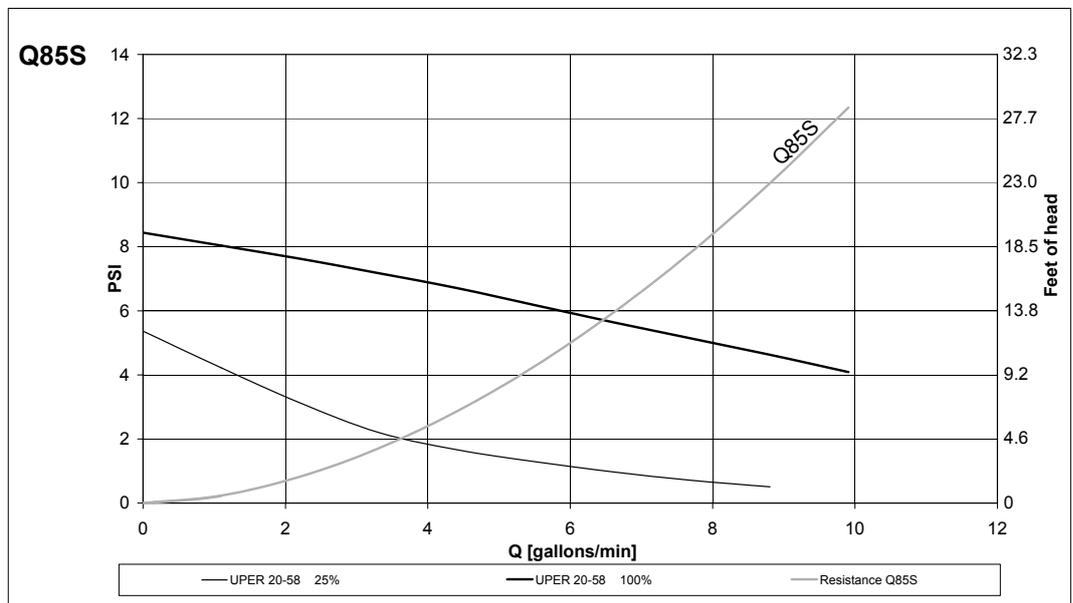
The electrical side of the external circulation pump (fig. 7, pos. 2) can be connected to the Control Tower. This pump thus switches simultaneously to the boiler pump.

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 the installation resistance and required flow.

As standard the boiler is provided with a water filter in the return pipe of the boiler (fig. 9a), so that debris of the central heating water is prevented from affecting the boiler.

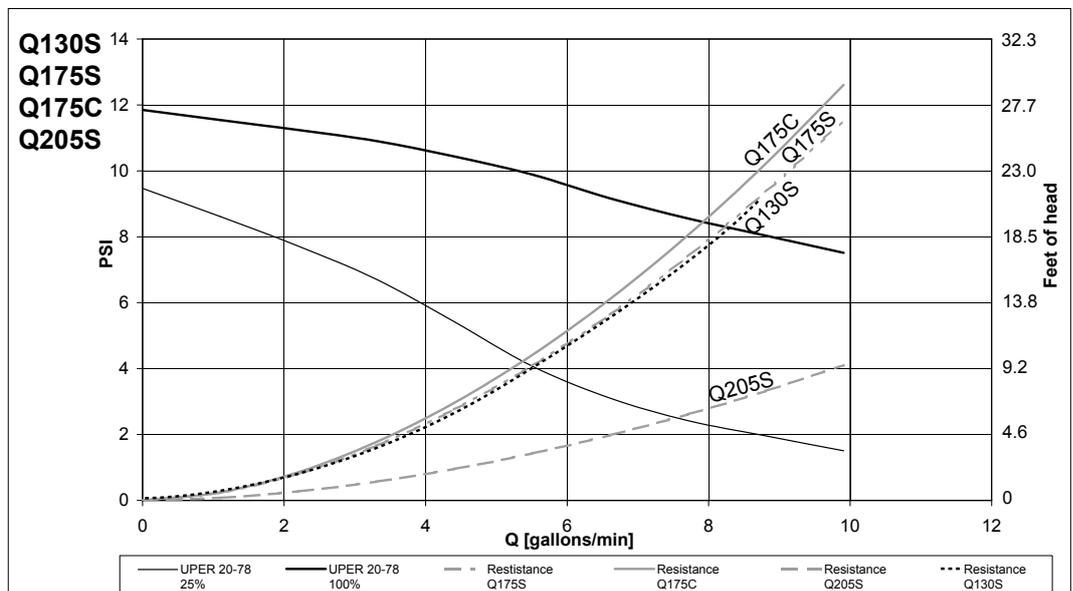
**i NOTICE**

The boiler is designed to be used on pressurized heating systems only.



pump index lines UPER 20-58

graph 1a



pump index lines UPER 20-78

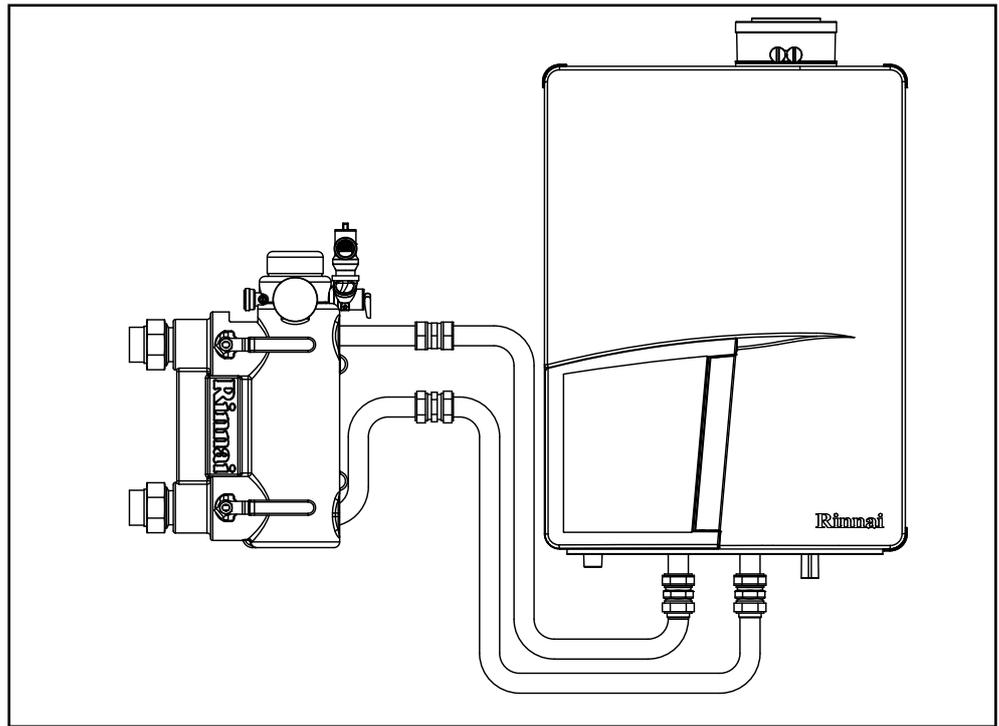
graph 1b

## 6.1.2 Side mounting kit for the Low Loss header

A side mounting kit for the low loss header is available as an accessory. This kit relocates the low loss header from directly below the boiler to the left side of the boiler only. The kit includes all the parts required to relocate the low loss header including all mounting brackets and material. This kit provides an alternative to for installations with height limitations and allows for an alternative piping installation.

Kit 2 for boiler models Q85S and Q130S Rinnai part number: 804000072

Kit 3 for boiler models Q175S, Q175C, and Q205S Rinnai part number: 804000073.



Side mounting kit

figure 11

## 6.1.3 Safety valve



### NOTICE

An ASME 30 psi pressure relief valve is installed on the plumbing kit included with the boiler.

## 6.1.4 Low water cut off



### NOTICE

The Rinnai Q 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.

The Low water cut off is not serviceable.

## 6.2 Expansion tank

An expansion tank must be part of the central heating system. 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. The expansion tank is NOT a part of the delivery and should be sourced locally. Please refer to the expansion tank manufacturer for further information. The Combi boiler Q175C is equipped with an expansion tank connection. This pipe is connected with the three way valve and boiler pump.



**Fill expansion tank to a minimum of 14.5 psi.**



**For the boiler to function correctly, it is necessary to connect the expansion tank to the expansion tank connection on the boiler. If the expansion tank is not connected to the supplied connection damage to the boiler may occur.**

Note:

The solo boilers Q85S, Q130S, Q175S and Q205S can be provided with an optional internal three way valve. When this valve is installed in the boiler, the boiler is provided with an expansion tank connection. This pipe is connected with the three way valve and boiler pump.



**For the boiler to function correctly, it is necessary to connect the expansion tank to the expansion tank connection on the boiler. If the expansion tank is not connected to the supplied connection damage to the boiler may occur.**

See the Rinnai Boiler Applications Manual for further information regarding placement of the expansion tank in the system. See the Rinnai 3-way valve indirect tank installation manual for further information regarding the installation of the 3-way valve indirect tank kit.



**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.



**No recourse can be made to the terms of the 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 wall mounted 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

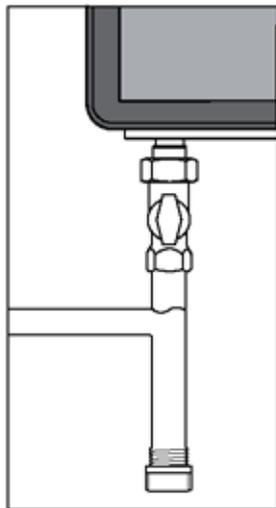
Propane gas: refer to chapter 6.4.2

### 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 10

#### 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 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

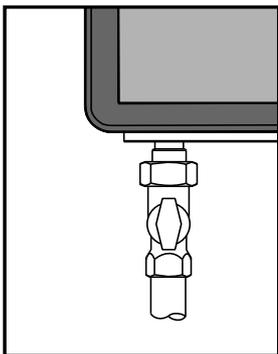
- Contact gas supplier to size pipes, tanks, and 100% lockup gas pressure regulator.

#### 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).

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

### DANGER



Gas shut off valve onto boiler  
figure 11

#### Gas piping

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

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.

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

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

**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).**

**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

### DANGER

### NOTICE

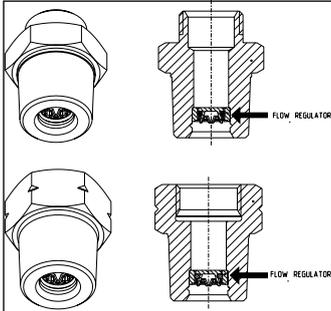
### NOTICE

## 6.5

## Hot water supply (Combi boiler Q175CN/Q175CP)

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

### DANGER



flow regulator valve figure 12

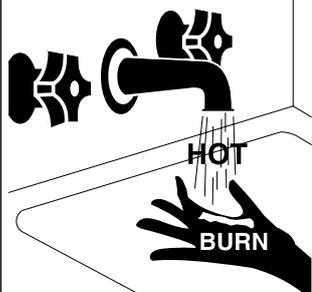
**Do NOT use toxic chemicals, such as those used for boiler treatment in potable water heating systems used for space heating.**

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

A flow regulator valve is supplied with the boiler. The flow regulator valve ensures that a quantity of water is supplied which has an outlet temperature of 120°F (assuming a cold water temperature of 45°F). The quantity of water is virtually unaffected by the water pressure. The 3/4" NPT adapter fitting with the flow reducing valve must be fitted in the cold water connection (see Dimensions 5.3, cold water pipe -k).

### NOTICE

**When there is a water pressure lower than 22PSI / 1.5 bar it is advisable to remove the inside mechanism of the flow reducing valve. Contact Rinnai for removal instructions.**

 <b>DANGER</b>	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 125° F (51° 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 140° F (60° C)
	20 seconds at 130° F (54° C)
	8 minutes at 120° F (48° 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 is used 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 sediment filter or other suitable device should be used to remove it before the water enters the indirect tank water heater.

### 6.5.2

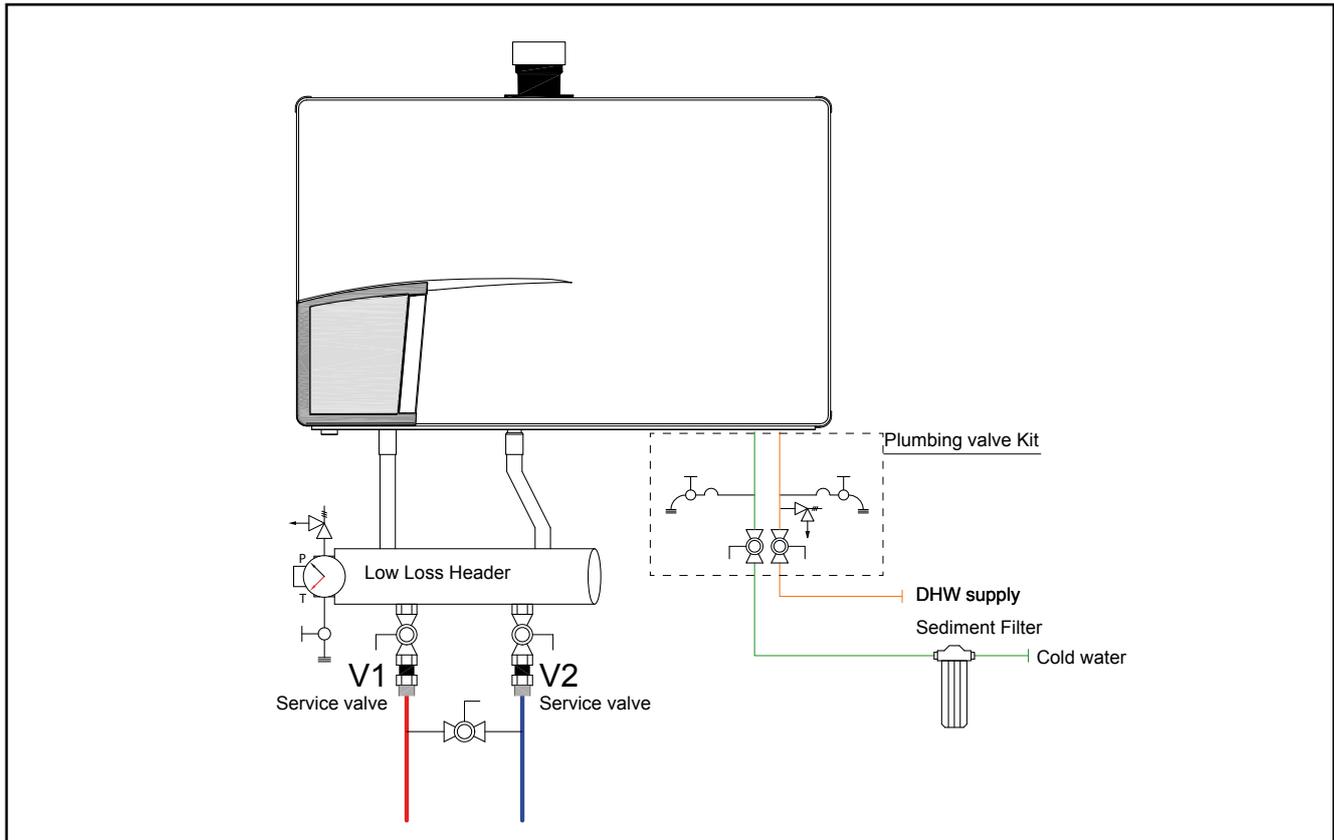
### Domestic water treatment Accessory

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 on contact Rinnai.

### 6.5.3 Installing a valve kit

A means to isolate the domestic indirect tank water heater for cleaning must be provided at installation. Refer to figure 13 for proper piping layout. A Rinnai valve kit can be used on domestic water connections for all combi boilers to allow for cleaning of indirect tank water heater and installation of domestic hot water pressure relief valve.

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



Boiler DHW piping

figure 13

### 6.5.4 Pressure relief Valve for Combi boilers

- An approved pressure relief valve is required by Rinnai for all water heating systems.
- The relief valve must comply with the standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems ANSI Z21.22 and/or the standard Temperature, Pressure, Temperature and Pressure Relief Valves and Vacuum Relief Valves, CAN1-4.4.
- The relief valve must be rated up to 150 psi and to at least the maximum BTU/hr of the appliance.
- 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.
- The pressure relief valve must be manually operated once a year to check for correct operation.

- The relief valve should be added to the hot water outlet line according to the manufacturer instructions. DO NOT place any other type valve or shut off device between the relief valve and the water heater.
- 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.
- Rinnai does not require a combination temperature and pressure relief valve for this appliance. However local codes may require a combination temperature and pressure relief valve.

## 6.6 Condensate drain pipe

This boiler produces condensate. Condensate must be drained otherwise the boiler will not function and can cause 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 the 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 the 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 vegetable 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 10.**
- 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 qualified service agency.**

### 6.7.1 Intake / Exhaust Guidelines

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

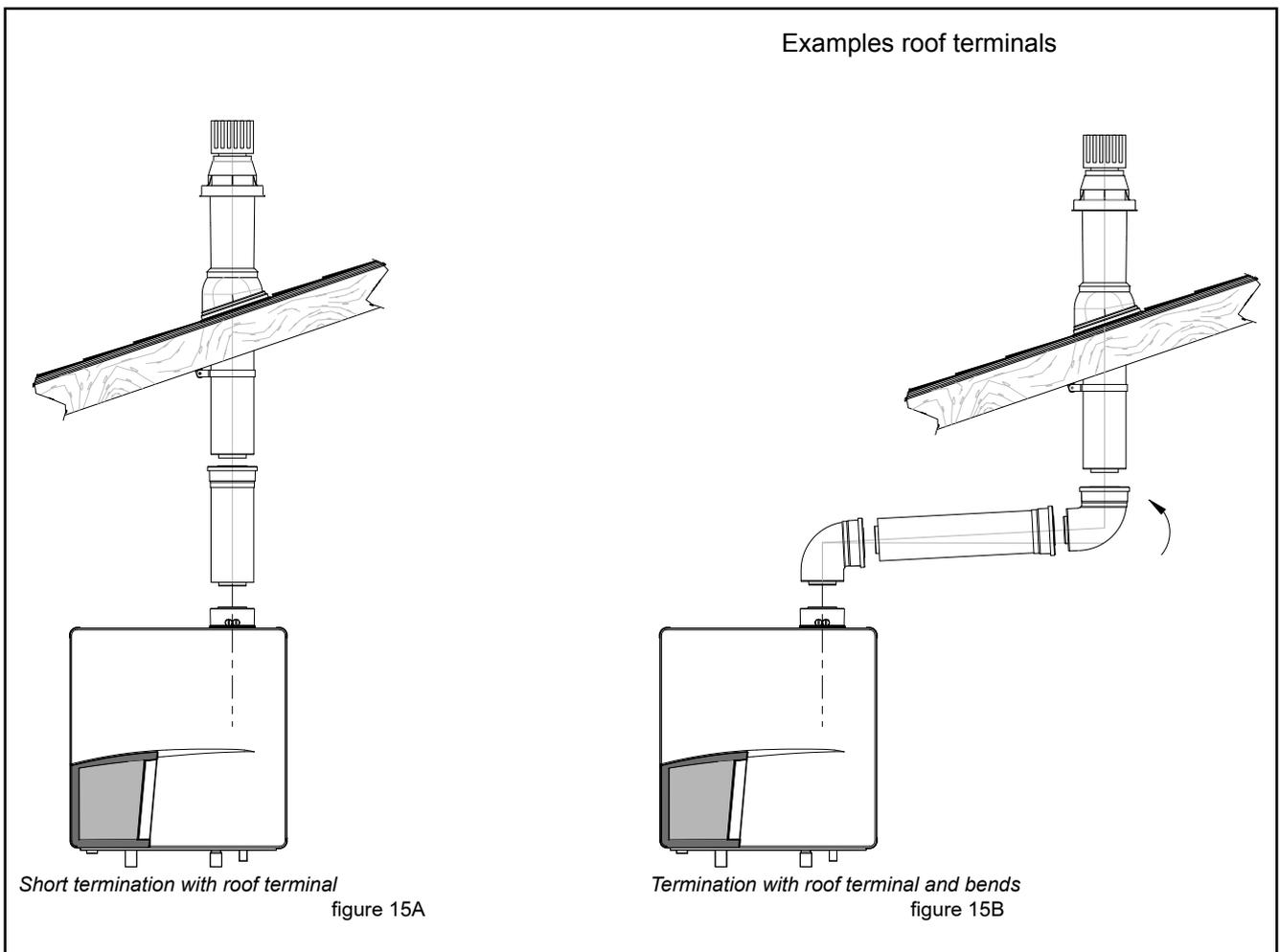
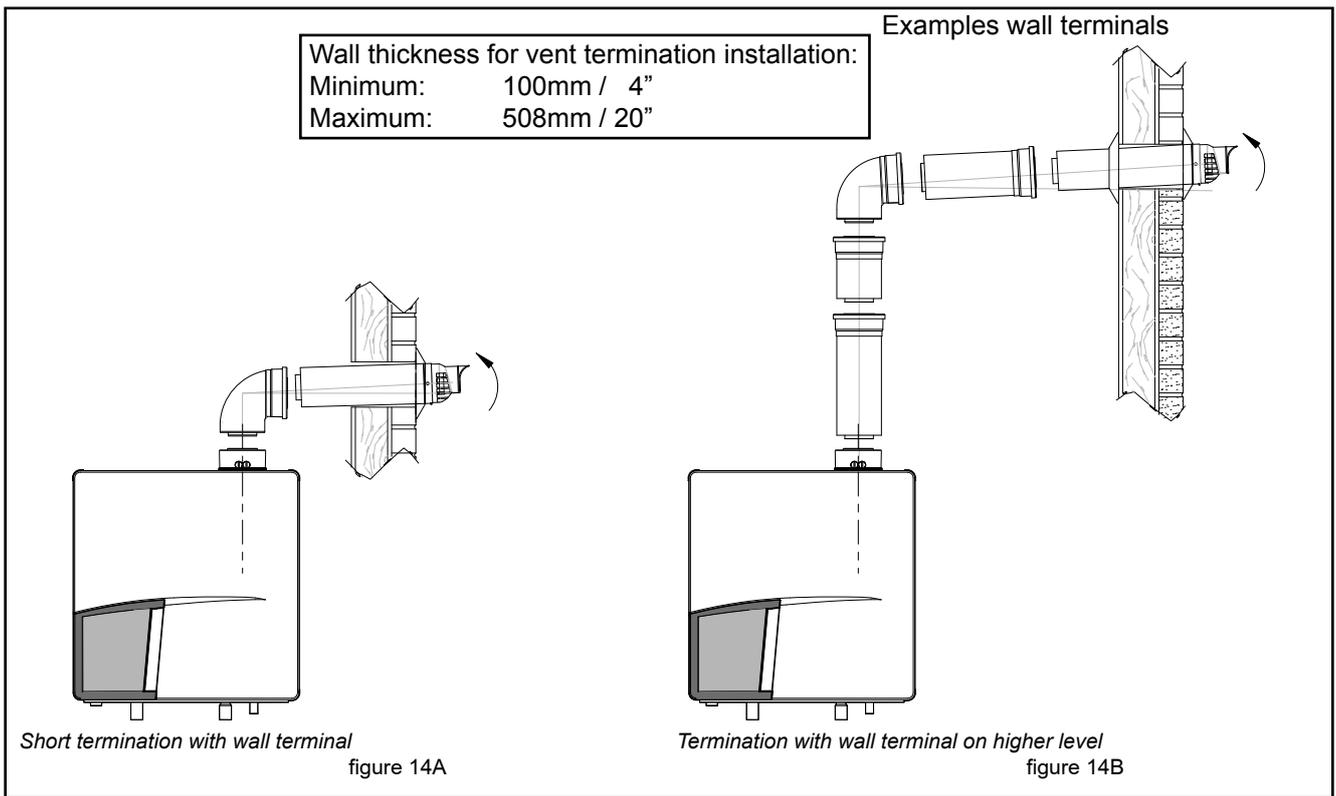
- For direct vent boilers, proper reassembly and resealing of the vent-air intake system.
- You must use vent components that are certified and listed with this model.
- Do not combine vent components from different manufacturers.
- Venting should be as direct as possible with a minimum number of pipe 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 water heater 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. Warranty does not cover obtaining access to an enclosed vent system.**

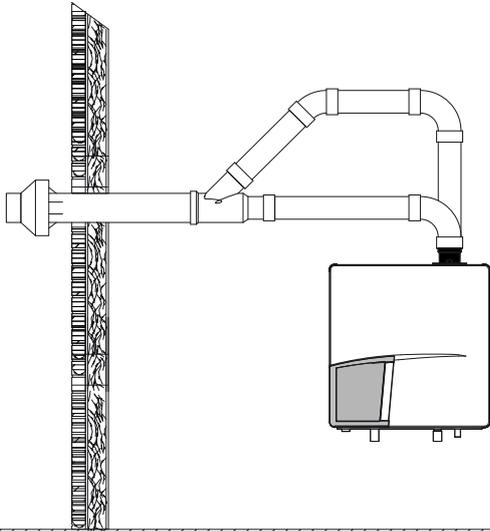
## 6.7.2a Examples vent and air supply systems (concentric)



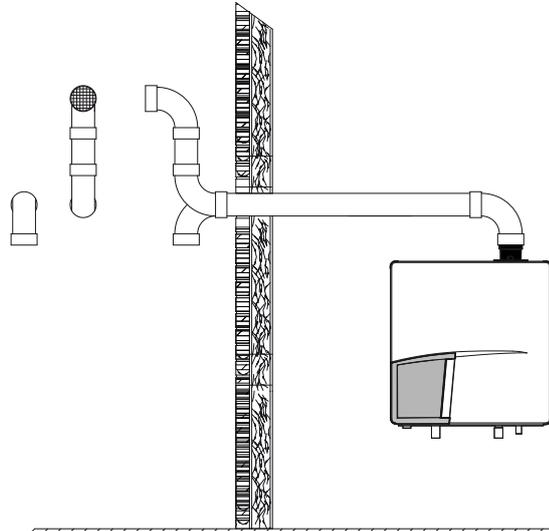
## 6.7.2b Examples vent and air supply systems (parallel)

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

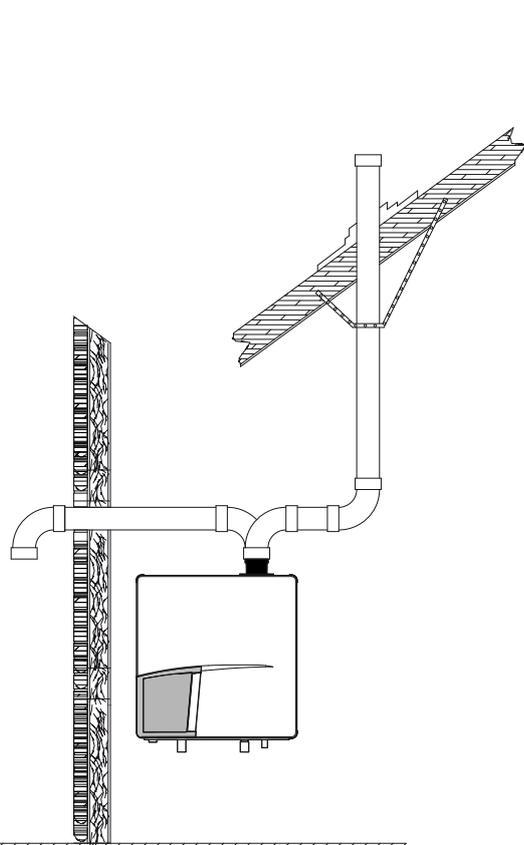
Examples sealed combustions



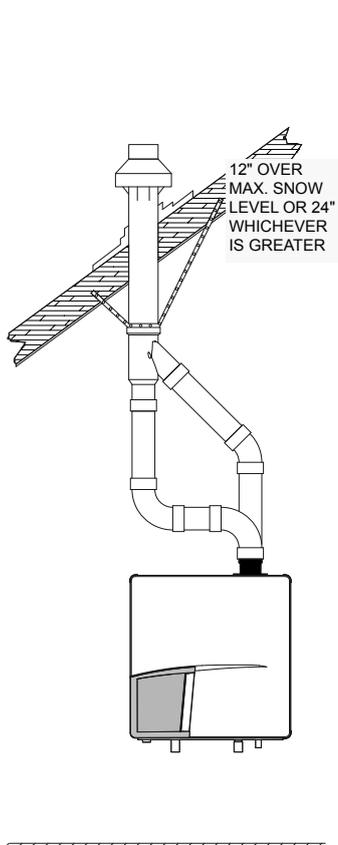
Horizontal with concentric termination figure 16A



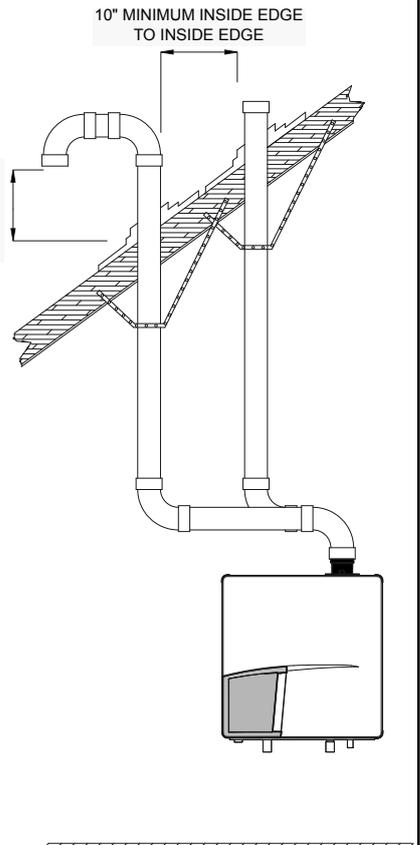
Horizontal with parallel termination figure 16B



Vertical vent and horizontal air intake figure 16C



Vertical with concentric termination figure 16D



Vertical with parallel termination figure 16E

## 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 in case of Room Air System (indoor combustion air).



### NOTICE

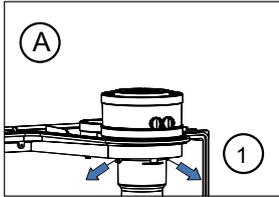
When the boiler is installed in any of the areas listed in chapter 5.1, "Areas likely to have contaminants" or any area exposed to the contaminants listed in chapter 5.1, then sealed combustion is required.



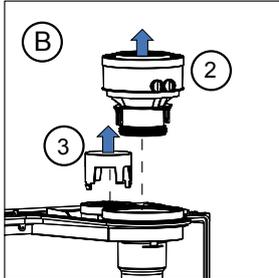
### NOTICE

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.

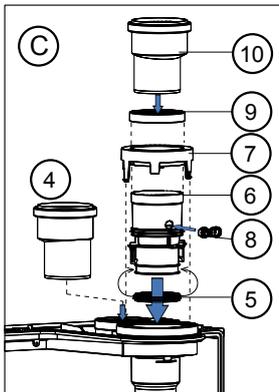
### 6.7.3.1 Boiler conversion from concentric to parallel



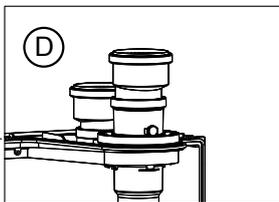
A. 1. Push the 2 clips slightly outwards



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



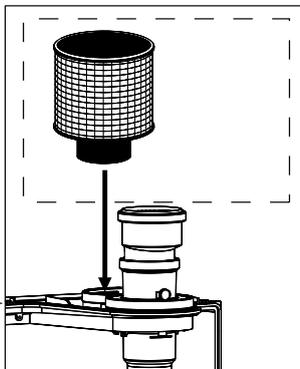
C. 4. Push the 3" adapter into the connection at the back of the boiler (= air intake)  
5. Pull the rubber seal around the bottom of the exhaust connector  
6. Push the exhaust connector in the boiler, in the boiler exhaust pipe until 'CLICK'  
7. Push the 5" cover over the exhaust connector in the 5" opening until 'CLICK'  
8. Push the rubber plug in open position in the O<sub>2</sub> 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 17

### 6.7.3.2 Placing air filter



Push the air filter into the air intake on top of the boiler. See figure 18.

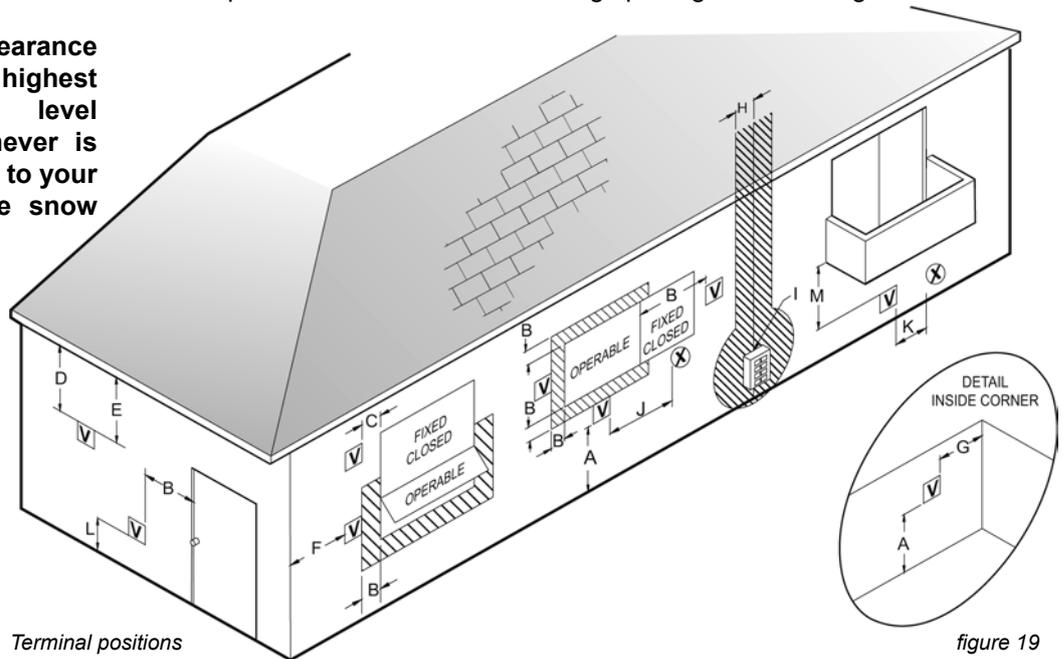
The equivalent length of the combustion room air filter is 12ft (3.66m).

placing air filter on air intake  
figure 18

## 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 19

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 in the vicinity (see fig 19 and 20).

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**

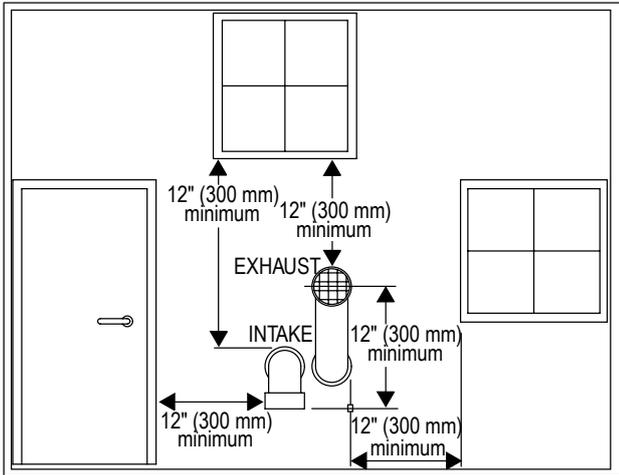
Cellular or Foam core PVC is not permitted for use with the boiler.

Item Description	Flue Material	Approval Codes for Installation	
		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		Flue system
			US/CAN		
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	FastNSeal Flex FastNSeal
			UL1738	Concentric twin pipe	
Stainless steel vent systems	Stainless Steel	Ubbink			Rolux Condensing Vent System
Plastic Vent System	PPS	Ubbink			Rolux Condensing Vent System
Plastic Vent System	PVC/CPVC	IPEX	ULC S636		System 636

Approval codes for installation of venting system

table 7



Terminal positions PVC

figure 20

**Fittings or Piping Equivalent**

	feet	m
45 degree elbow	3	0.91
90 degree elbow	6	1.83
plastic pipe per foot	1	0.30
concentric vent kit	5	1.52

Equivalent friction loss of PVC/CPVC

table 8

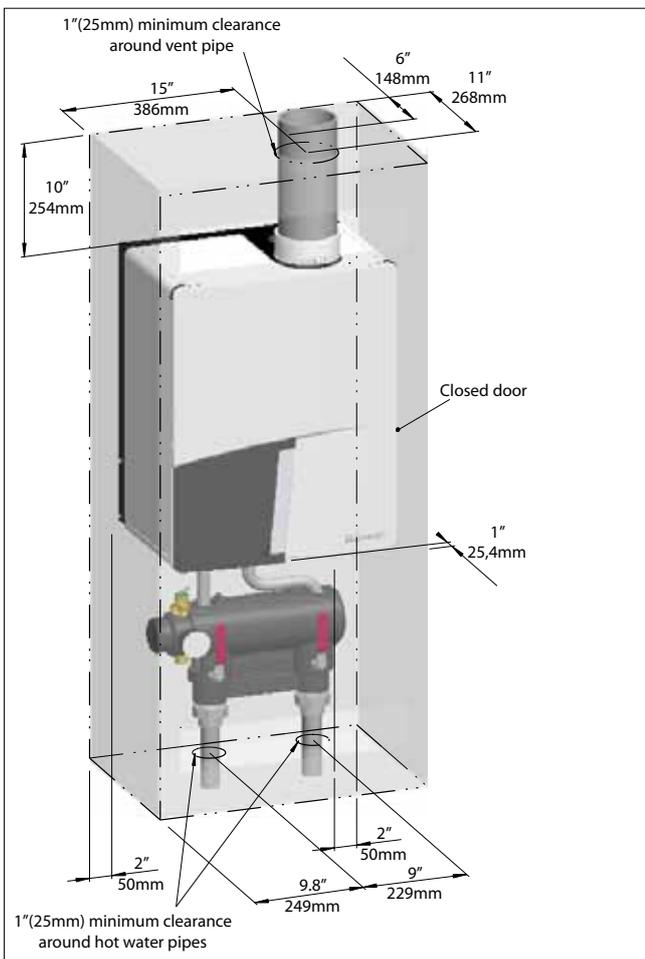
### 6.7.5 Direct vent closet and alcove installation



**WARNING**

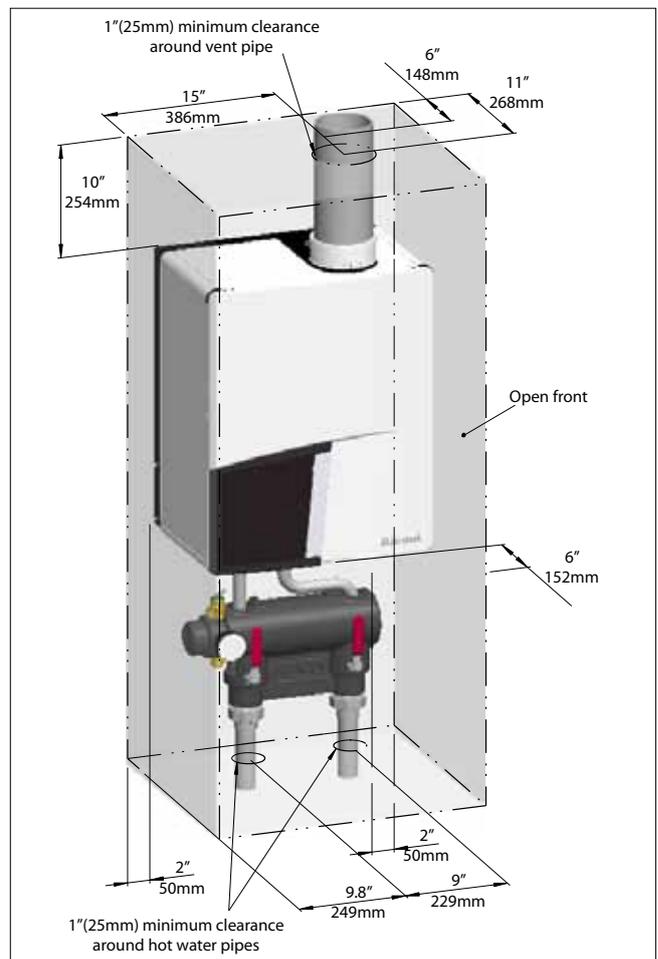
For closet and alcove installation, CPVC material, instead of PVC, must be used in a closet/alcove structure. Failure to follow this warning could result in fire, personal injury, or death.

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 21



Alcove installation

figure 22

**DANGER**

The wall mounted 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 3/4"/foot (6mm/m).

**NOTICE**

Combustion air piping from the outside **MUST** 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 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
Q85	100 feet	100 feet
Q130	100 feet	100 feet
Q175	80 feet	80 feet
Q205	40 feet	40 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
<b>Combustion air</b>						
ft	ft	ft	ft	ft	0.5	ft
<b>Vent</b>						
ft	ft	ft	ft	ft	0.5	ft
<b>Total equivalent length</b>						<u>ft</u>

#### 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 :  $(24+3 \times 6+2) \times 0.5 = 23 \text{ ft}$

Equivalent Vent Length :  $(24+2 \times 6+2 \times 3+2) \times 0.5 = 23 \text{ ft} +$

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			
min	max	Q85	Q130	Q175	Q205
0	10	0	0	0	0
11	20	0	0	2	3
21	30	0	2	4	6
31	40	1	4	6	10
41	60	2	6	10	n.a.
61	80	3	8	15	n.a.
81	100	4	10	n.a.	n.a.

Compensation factor vent system CP(V)

table 10

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

Altitude (ft)		Boiler type
min	max	Q85, Q130, Q175, Q205
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 commissioned 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:

Q175

Eq. length vent system (taken from previous example)

46 ft

CF(V) = 10

Altitude

7,200ft

CF(A) = 42 +

CF(T) = 52

Parameter setting (Par. 73) = 52



### WARNING

Do not overcompensate the boiler by setting a higher value than calculated, otherwise the boiler could be seriously 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 80800025.**

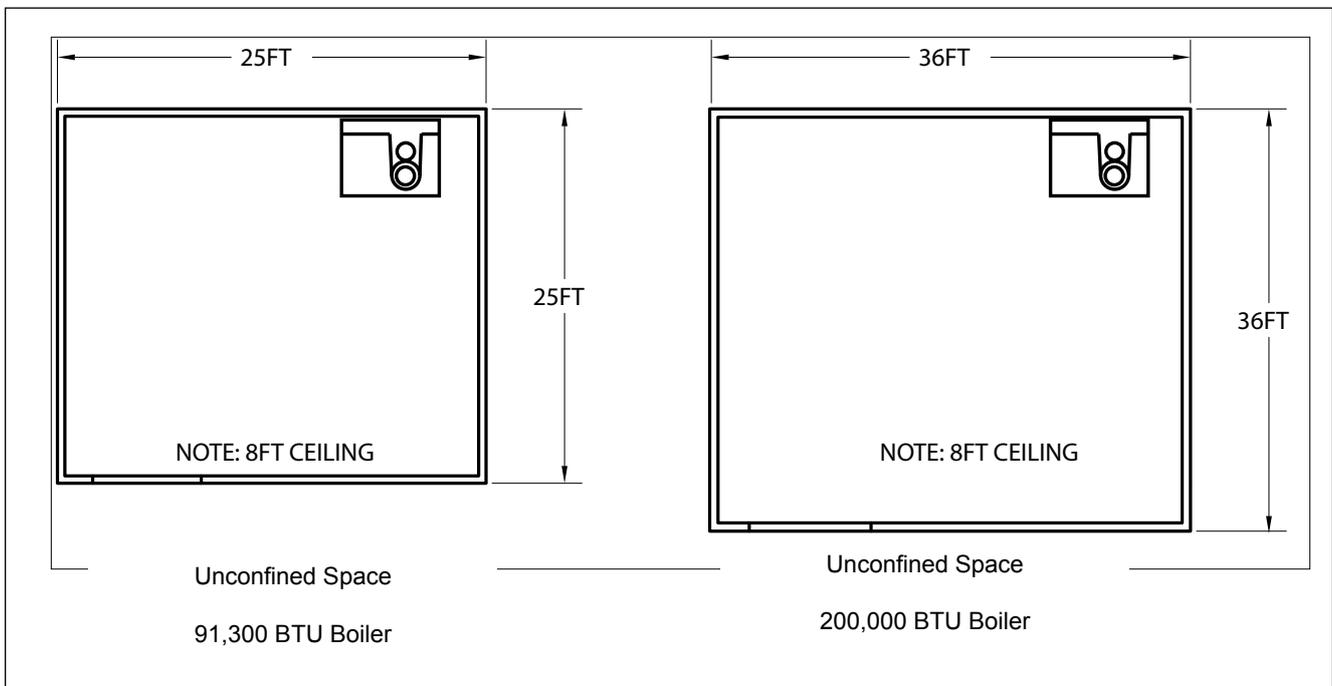
This boiler requires adequate combustion air for ventilation and dilution of flue gases. Failure to provide adequate combustion air can result in unit failure, fire, explosion, serious bodily injury or death. Use the following methods to ensure adequate combustion air is available for correct and safe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

**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 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 m<sup>3</sup> 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 23*

### 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 m<sup>3</sup> 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 24, 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 1/4".

Example:

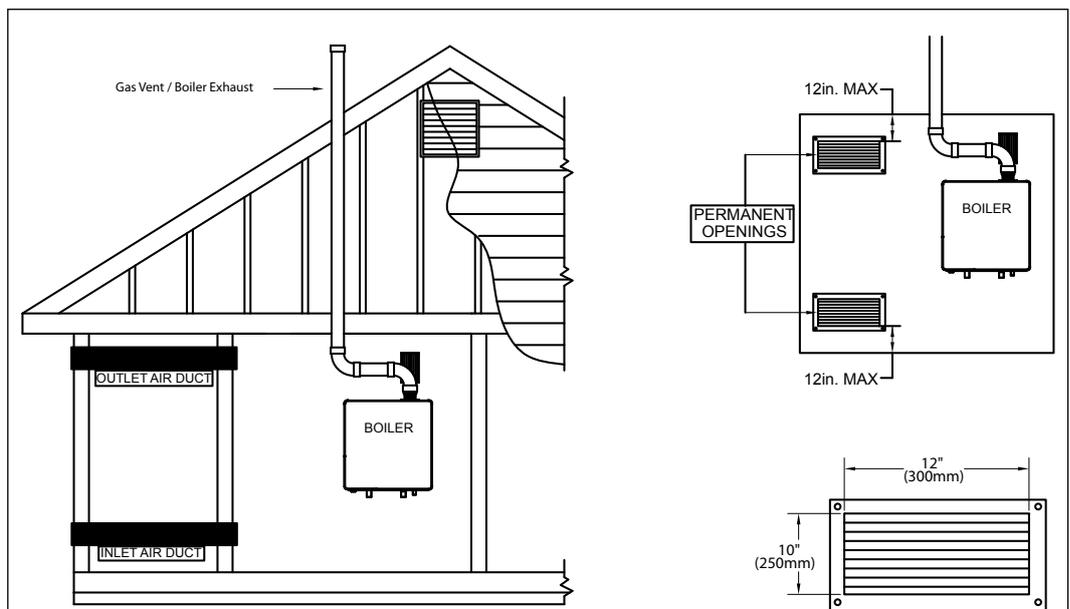
Wood: 10 in x 12 in x 0.25 = 30 in<sup>2</sup>

Metal: 10 in x 12 in x 0.75 = 90 in<sup>2</sup>

### 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 appliance 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 24

### 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 Btu/h, but not less than 100 square inches each.

### Using Outdoor Air For Combustion

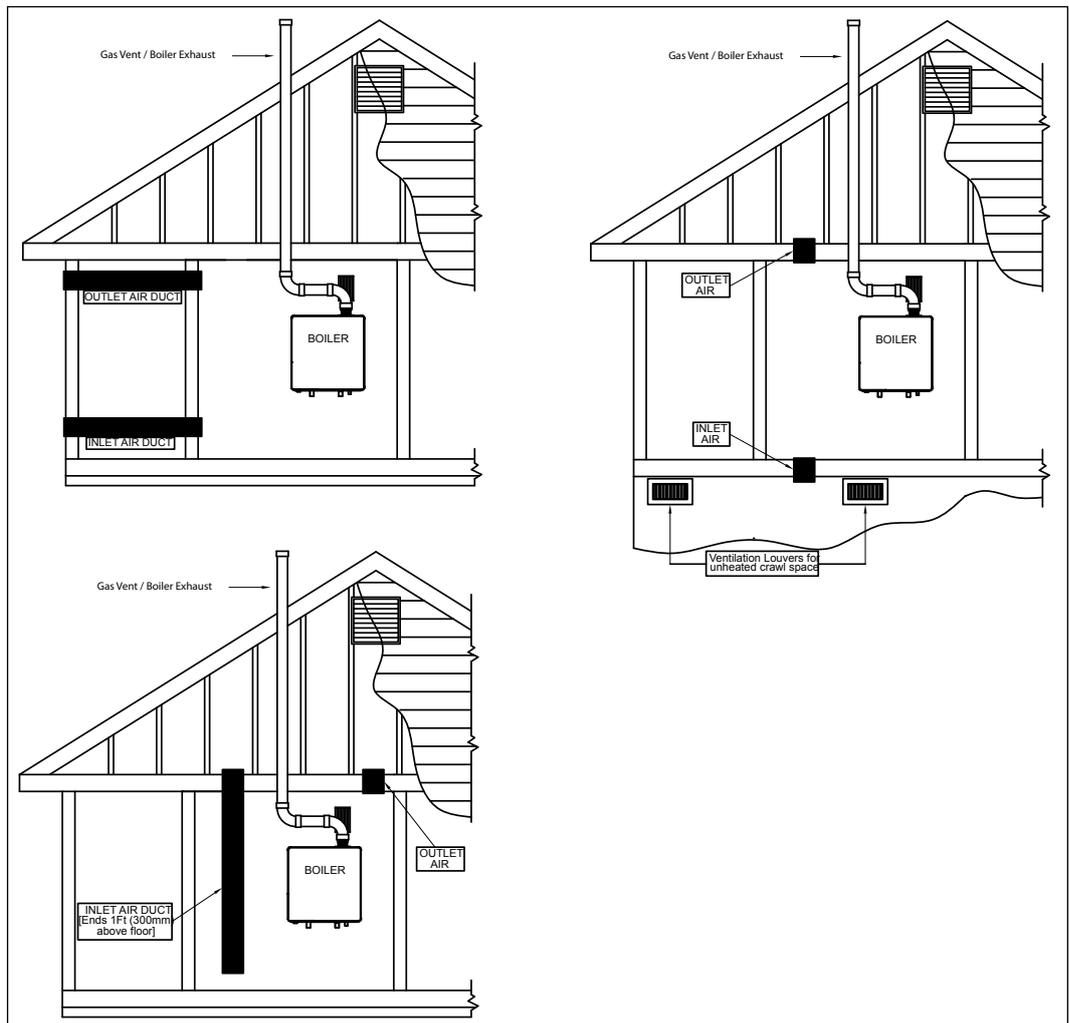
Outdoor air can be provided to a confined space through two permanent openings, one commencing within 12 in. (300mm) of the top and one commencing within 12" (300mm) of the bottom, of the confined space. The openings shall communicate to the outside by one of two ways:

- 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<sup>2</sup>/2000 Btu/hr (1100 mm<sup>2</sup>/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<sup>2</sup>/4000 Btu/hr (550 mm<sup>2</sup>/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 25

## 7 External domestic hot water tanks

### WARNING

**Note the local codes for requirements for connecting an external hot water cylinder to the boiler. The installation must comply to these codes.**

Depending on the domestic hot water requirements and comfort preferences various external hot water tanks can be connected to the boiler.

Connecting an external hot water tank to the Q175C is NOT possible.

Connecting an external hot water tank to the Q-Series solo boilers can be done in 2 ways:

1. For Q85S, Q130S, Q175S, Q205S:  
Using an optional three-way valve installed in the return line under the boiler between boiler and plumbing kit and directly controlled by the boiler control. For the Q-Series Solo boilers a special internal three-way valve conversion kit is available (fig. 26).
  - **Part.no. 80400013:** For the Q85S and Q130S
  - **Part.no. 80400014:** For the Q175S and Q205S

2. For Q85S, Q130S, Q175S, Q205S :  
An external hot water tank connected on the secondary side of the plumbing kit, separately controlled by another device.

The capacity of the boiler must be defined by the installer.

The choice of the tank depends on the coil output.

**The coil output of the tank must comply with the boiler output.**

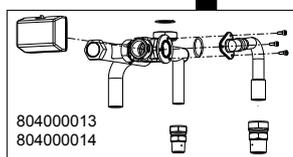
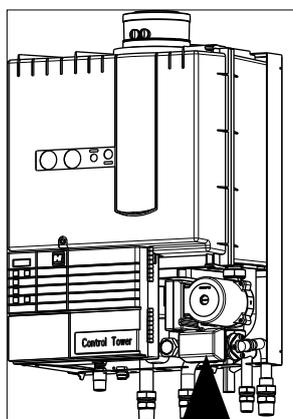
For the Q85S or Q130S the minimum coil output must be 85,000 BTU/hr. This to prevent the boiler for short cycling.

**The Q175S and the Q205S have limited outputs with the 3 way valve kit. Both boilers are limited to 130,000 BTU/hr for the DHW output when using the 3 way valve kit. Please take this into account when sizing the indirect hot water tank.**

**For additional information on piping and control of indirect tanks, please see the Rinnai Boiler Applications Manual.**

**For additional information on the Rinnai 3-way valve indirect tank kit, please see the installation manual for the kit.**

**Rinnai recommends the use of a thermostatic mixing valve on all indirect tanks used with Q boilers on the domestic hot water side to prevent scalding. This valve will regulate the water temperature leaving the indirect tank.**



3 way valve conversion kit  
figure 26

### NOTICE

### NOTICE

### NOTICE

### NOTICE

### NOTICE

## 8 Electrical connections

The electrical connections to the boiler must be made 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, 3-way valve (except Q175CN/Q175CP), temperature sensor or thermostat and an external pump 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. Use a step drill bit to create a knockout in the black steel on the bottom of the boiler for a strain relief. A number of predrilled wholes 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.



**The boiler must be electrically grounded in accordance with local codes, or in absence of local codes, with the National Electrical Code, ANSI/INFA 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 if the main switch at the front of the Control Tower is switched on.



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



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



- Verify proper operation after operation servicing.



**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.



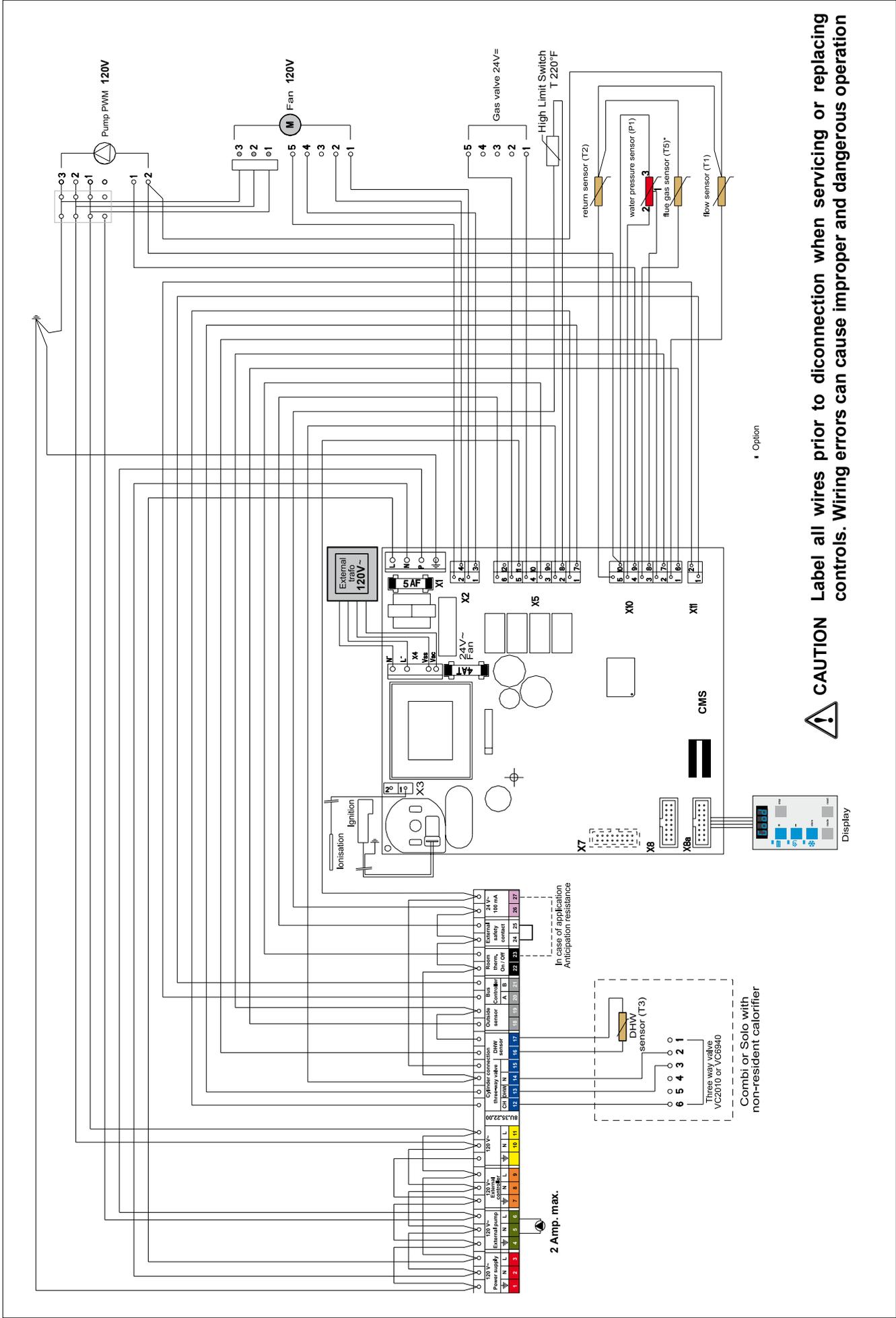
**When wiring an RS100 it is suggested that a jumper be placed on terminals 22 and 23 so that in the event the control is damaged the boiler will still fire based on outdoor reset.**

**A jumper should also be used when commissioning or trouble shooting the boiler.**



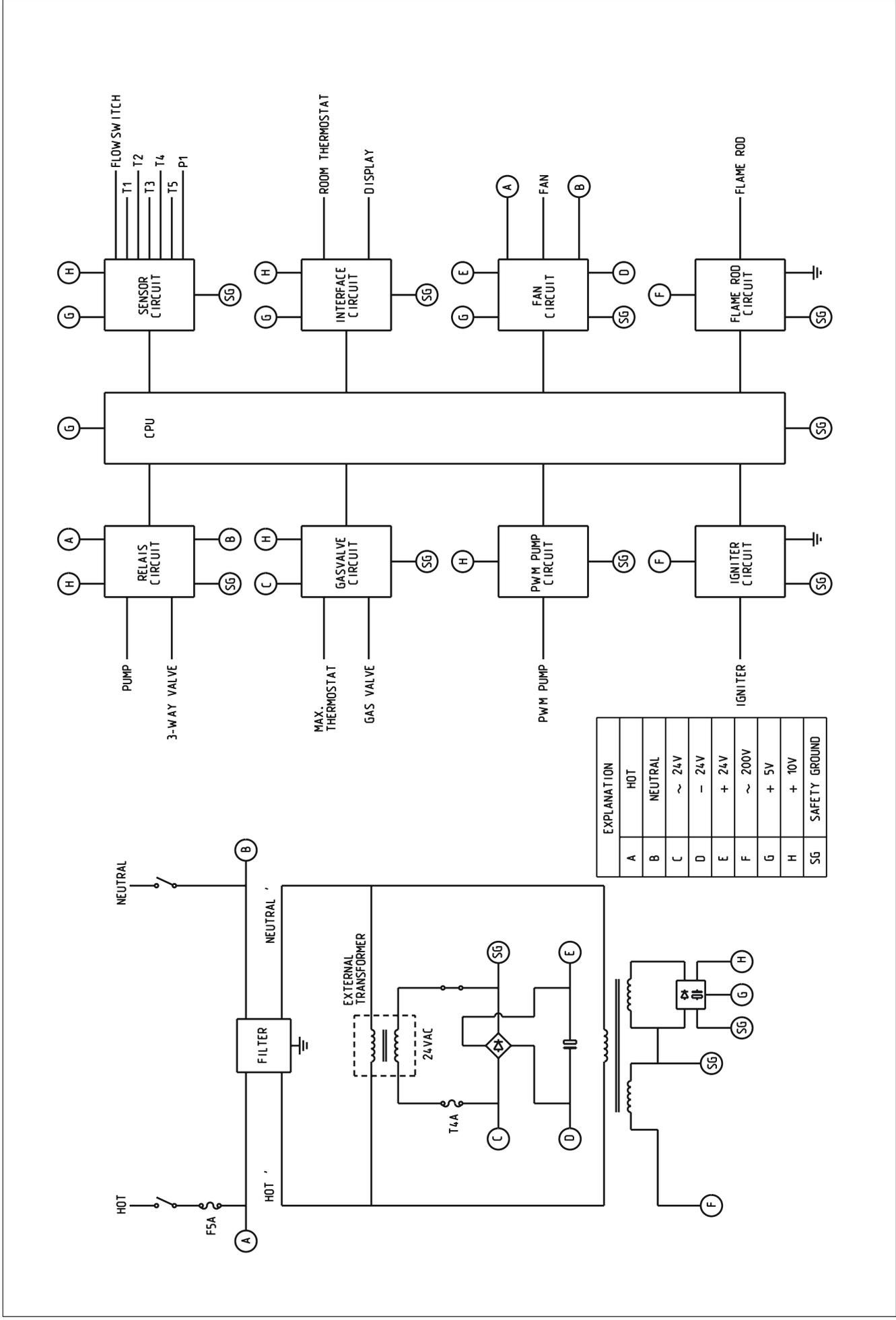
**Power stealing thermostats cannot be connected to terminals 22 and 23.**

Connection terminal Q-Series																											
120 V~ Power supply			120 V~ External pump			120 V~ Ext. controller			120 V~			8U352200	Cylinder connection				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
main power supply			120 Volts for external pump			120 Volts Rinnai only			120 Volts Rinnai only			internal or external 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			
			<b>CAUTION</b>			Make sure that the power consumption of each of the terminals 4-5-6 does not exceed 230W or 2 Amp.																					



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

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

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 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.

Example

Example

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

### 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 ( or or ). 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).

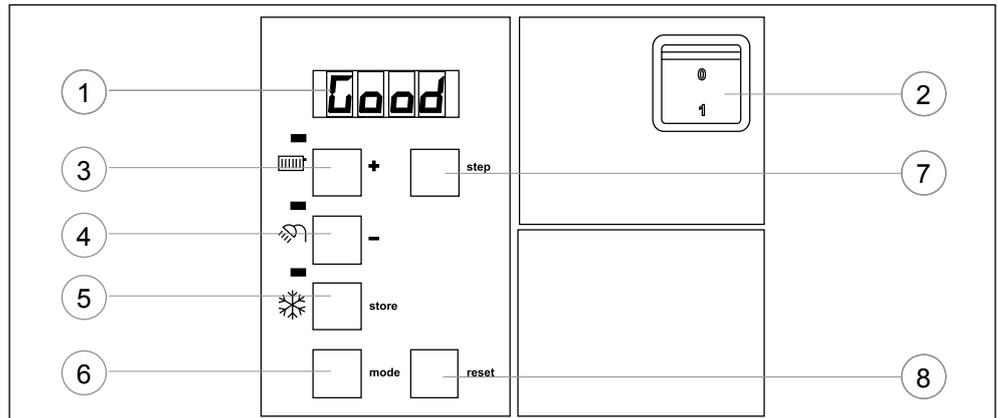
On a call for heating or hot water the control system will select the required water control temperature. This water temperature is called the T-set value. On a call for central heating the boiler ignites first at low input. The input is then changed slowly to match the load required. The boiler operates 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)

- |  |  |
|--|--|
|  | No heat demand                                 |
|  | Fan pre/post purge                             |
|  | Ignition phase                                 |
|  | Burner active on central heating               |
|  | Burner active on DHW                           |
|  | Fan check                                      |
|  | Burner off when room thermostat is demanding   |
|  | Pump overrun phase for central heating         |
|  | Pump overrun phase for hot water               |
|  | Burner off because of to high flow temperature |
|  | Automatic de-aeration program                  |

## 9.1 Explanation of the function buttons



Boiler control panel

figure 29

### NOTICE

**Only qualified personnel 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 when according to the procedure described in chapter 11, adjustment has to be changed or data must be retrieved 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; scrolling in a data chapter.
- 7. Step-button:

## 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 substantial 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

**Failure to adhere to the water quality requirements will void the 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:** • Rhomar RhoGard Mutli-Metal (AL safe)  
(max. concentration 50%) • Noble Noburst AL

**Approved system cleaner:** • Noble Noburst Hydronic System Cleaner  
• Fernox F3 Cleaner  
• Rhomar Hydro-Solv 9100



**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

## 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 



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;



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.



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 (only Q175C)

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.**

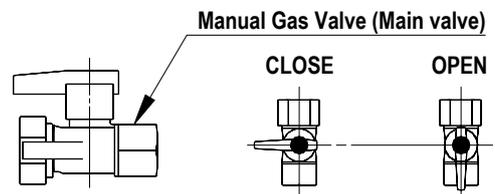
- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do **NOT** try to light the burner by hand.
- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than 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 qualified service technician. 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 qualified service technician 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 all 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. 

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## 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 qualified personnel 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 blinks 1 x).**

*Now you have access to the installer level. There are 4 chapters:*

- **PARA** Parameters
- **INFO** Information chapter (no adjustments possible)
- **SERV** Service chapter
- **ERR** 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 access 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.	00
		Radiators, air heating, or convectors:	
		T max. supply 176°F K factor heating curve 2.3; gradient 10°F/min; gear differential 10°F	01 DO NOT USE
		radiators with large surface areas or underfloor heating as additional heating:	02
		T max. supply 158°F K factor heating curve 1.8; gradient 10°F/min; gear differential 10°F	
		under floor heating with radiators as additional heating:	03
		T max. supply 140°F; K factor heating curve 1.5; gradient 8°F/min; gear differential 8°F	
		full under floor heating:	04
		T max. supply 122°F; K factor heating curve 1.0; gradient 6°F/min; gear differential 6°F	
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	32 - 158°F
31**	146°F (154°F)	DHW tank temperature with external tank sensor	104 - 176°F
36	01	Type of three way valve DHW tank	
		VC 2010 / VC 8010	00
		VC 6940	01
43	max.	Maximum power DHW in kW (.. x3415 = .. BTU/hr)	min-max
49	100%	Maximum pump capacity heating	40-100 %
73	0	Altitude and venting CFT. See chapter 6.7.7	0 - 100
89	00	Address of boiler in cascade	
		No function	-01
		Bus thermostat	00
		Cascade boiler 2 to 8	01 - 07
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	
6	°F	T3-set from RS100	
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	
32	h	total number of hours counter	
37	h	total number of run hours pump CH and DHW	
46	h	within how many hours is service required	

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

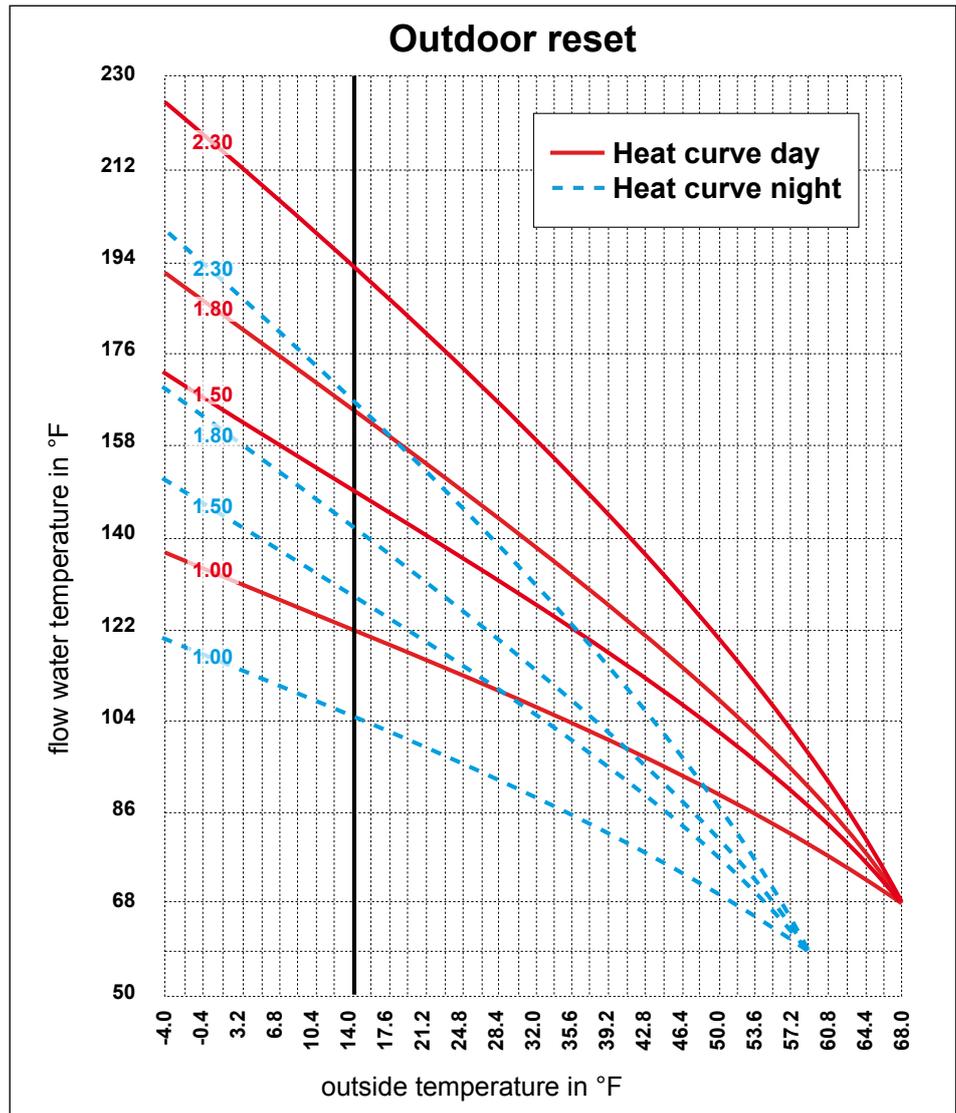
Table 12



**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.

\*\* Not available on Q175C.

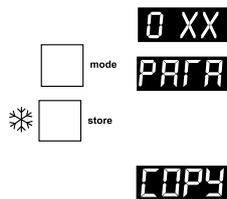


heating line adjustments Parameter Step 6 and 7

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.



**In the event of frost danger during 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 competent person, using correctly calibrated instruments with current test certification.

These installation instructions are intended for professional installers, 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.

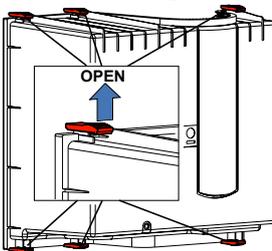
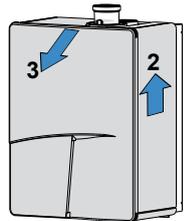
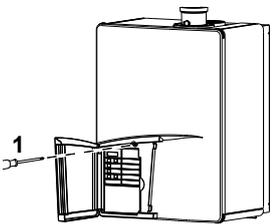
### WARNING

Failure to properly commission the boiler as described in section 13 may result in 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).

To commission the boiler the casing has to be removed. The casing is locked with a screw behind the door on the front (figure 30) and the top of the casing is hooked behind a locking edge. After removing this screw the casing must be lifted at the bottom by which means it is released from the locking edge. Then the casing can be removed forward.



Removing casing figure 30

Behind the casing you see the transparent air box.

Remove this airbox only in case for service or maintenance. See 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 the zero pressure adjustment has to be checked and, if necessary, adjusted to the right value.

### WARNING

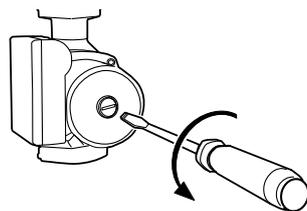
The venturi must always be checked and adjusted when it is out of range see section 13.3 on O<sub>2</sub> adjustment.

### DANGER

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

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 through the vent port the pump is ready for operation.
4. Replace the vent screw



Pump commissioning figure 30a

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 leaking 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**

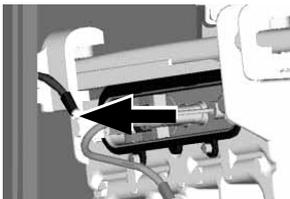
Leaks may be caused to pipes and screw connections during commissioning and maintenance activities.

- 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 system 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<sub>2</sub>

**i** NOTICE

The O<sub>2</sub> percentage setting has to be checked at commissioning, maintenance and faults and adjusted if needed.

**!** WARNING

The O<sub>2</sub> percentage always must 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;

**i**

Tip: If there is no demand for heat on CH, turn the hot water tap completely open and measure the O<sub>2</sub>.

mode

- Press the MODE-button for 5 seconds.

**COdE**

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

**C123**

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

store

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

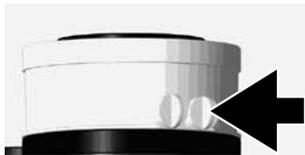
mode

- Press the MODE-button until SERV is shown;

step **1** **OFF**

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

- Calibrate the O<sub>2</sub> meter ;



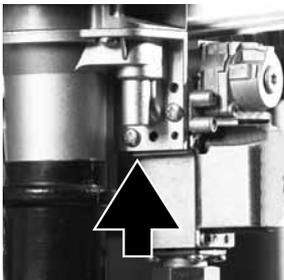
checkpoint O<sub>2</sub>

figure 31

- Place the probe of the O<sub>2</sub> meter into the check point (see fig. 31);
- 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

**i** 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<sub>2</sub> fig. 32

- Check the O<sub>2</sub> 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<sub>2</sub> (natural gas) then the minimum load setting should be 4.8% or greater.*

**Choose the right O<sub>2</sub> value according the kind of gas (Natural Gas or Propane Gas). Wrong adjustment may result causing property damage, personal injury or death.**

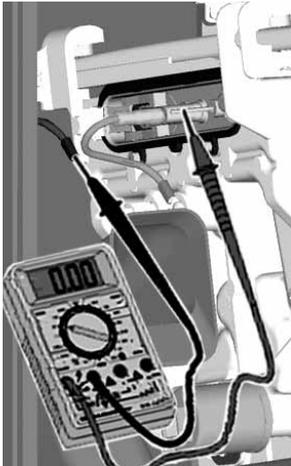
**i** NOTICE

- Let the O<sub>2</sub> meter do its measuring procedure.
- Adjust, if necessary, the adjustment screw to correct the O<sub>2</sub> value (see fig. 32). Allow boiler to stabilize before reading the new value.

Ending the O<sub>2</sub> 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



Ionization test

figure 33



- Switch off the system using the Central Heating button and the DHW button
- Disconnect the plug and the socket connection on the probe and connect the measuring device in series. See figure 33. Select the  $\mu$ A direct current range on the measuring device. The measuring device must have a resolution of at least 1  $\mu$ A.



- Switch on the system 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  $\mu$ A and write down this value in the log book.

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



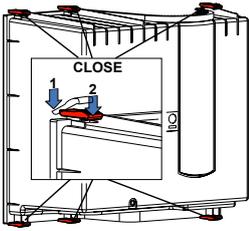
- Switch off the system using the Central Heating button and the DHW button

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



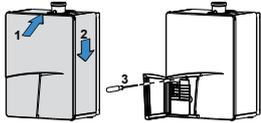
- Switch on the system using the Central Heating button and the DHW button.

## 13.5 Installing the casing



Installing air box figure 34

- Install the airbox and close all snap locks. See figure 34;



Installing casing figure 35

- Install the metal casing on the boiler;
- lock the casing by using the screw behind the door. See figure 35.

## 14 Maintenance



### NOTICE

Maintenance or changes to the boiler may only be carried out by a qualified technician.

### 14.1 Periodic examination of venting systems and boiler

The inspection of the boiler and venting system should be done every 2 years or 2000 hours and full maintenance every 4 years or 4000 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

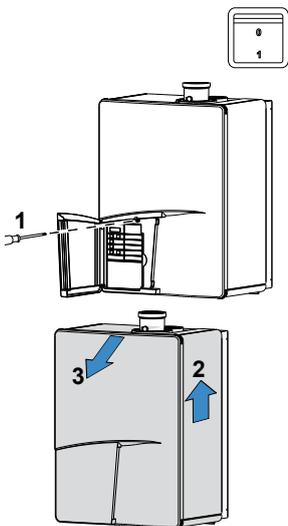
**Please contact Rinnai for further guidance on the frequency and service requirements. Contact details can be found on the back page of this manual.**

### 14.2 Inspection

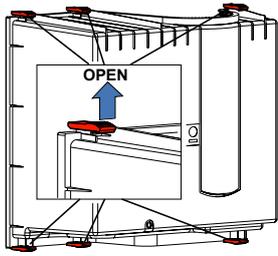
Preparing the boiler for inspection

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

- Switch off the power supply;
- Shut off the gas;
- Remove the screw behind the door on the front of the casing (figure 36);
- Lift the casing and remove it towards the front;
- Valve off the boiler from the system using the boiler isolation valves in the plumbing kit.



Removing casing figure 36



Opening air box figure 37

#### The air box

- Remove the transparent 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.



**When an air filter is used the air filter must be replaced yearly on boilers operating in normal circumstances.**

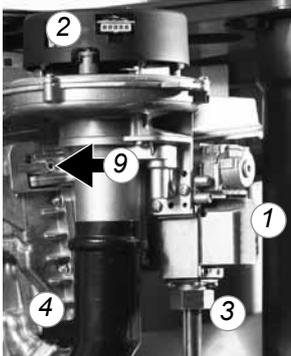
**The conditions (eg. supply air quality) in which the boiler is installed should be taken into account. This will show whether the frequency of replacement should be reduced or increased. If in doubt, contact RINNAI.**

## 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

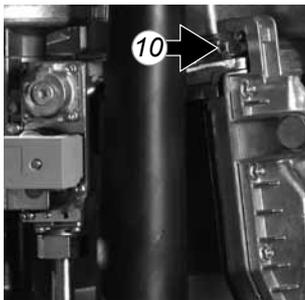


figure 39

### **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.

### 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 dirt 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.

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

### 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.**

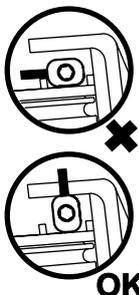
Replace the ignition assembly after every 4 year, whichever occurs first.

Replacement goes as follows:

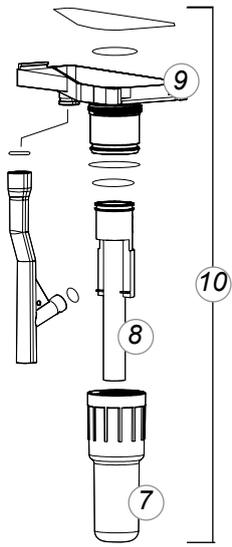
- Remove the electrical connections of the electrode;
- Press the clips on both sides of the electrode to both sides and remove the complete electrode;
- Remove and replace the gasket;

Refitting of the components is done in reverse order.

#### DANGER



Clamping rods  
figure 40



Siphon figure 41

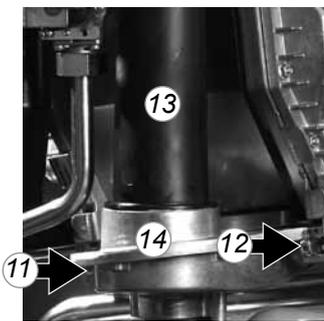
Condensate trap and condensate tray (figure 41-43) (2 and 4 year maintenance)

**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 it 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 by a new one;
- Clean the condensate tray with water and a hard brush;
- Check the condensate tray on leaks.



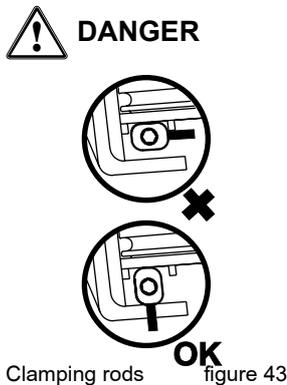
Condensate tray figure 42

**Step 3:** Refitting is done in reverse order.

Note that all gaskets seals completely.

**Make sure that during refitting the clamping rods they are put in the right position. They should be turned vertical.**

**If the boiler should activated with clamping rods in the wrong position it will cause serious property damage, personal injury or loss of life.**



Put the boiler into operation and check the O<sub>2</sub> (see chapter 13.3).

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

**Use only original spare parts supplied by Rinnai. If other parts will be used the boiler can be damaged and will cause serious property damage, personal injury or loss of life. Use of non-Rinnai parts will result in the void of warranty.**

**DANGER**

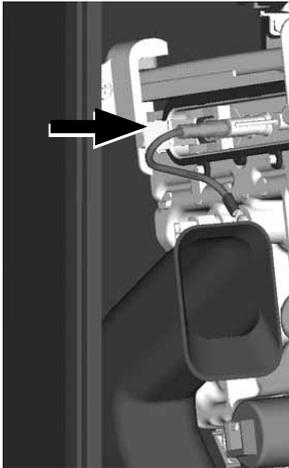
**WARNING**

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

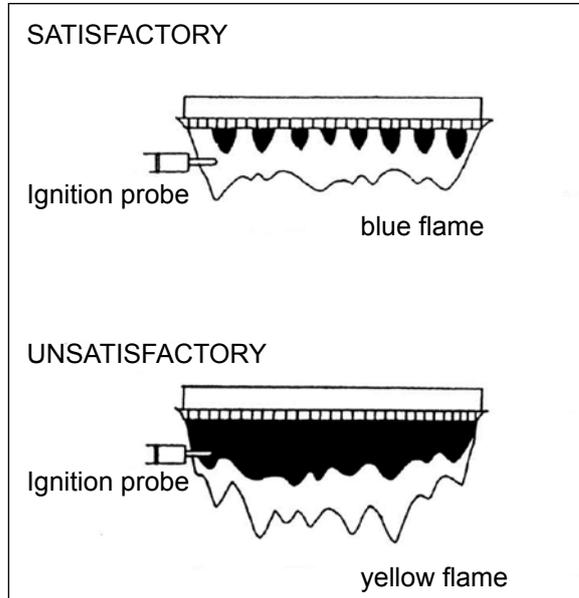
The burner must flame evenly over the entire surface when operating correctly. The flame must burn with a clear, blue, stable flame.

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

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

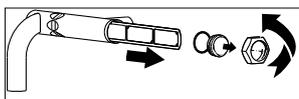


Inspection glass figure 44



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.



Water filter figure 44a



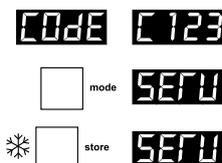
**The combustion must be checked and adjusted if required at both the 2 year/2000 hour and 4 year/4000 hour service intervals with a properly working combustion analyzer.**

Verify proper operation after servicing. Always reset the service interval counter after full maintenance interval (every 4 years or 4000 hours of operation).

## 14.3.1 Reset service interval counter

At 4000 hours of use, "SERVICE" will scroll across the display. "Good" will display as well alternatively.

To reset the 4000 hour service notification:

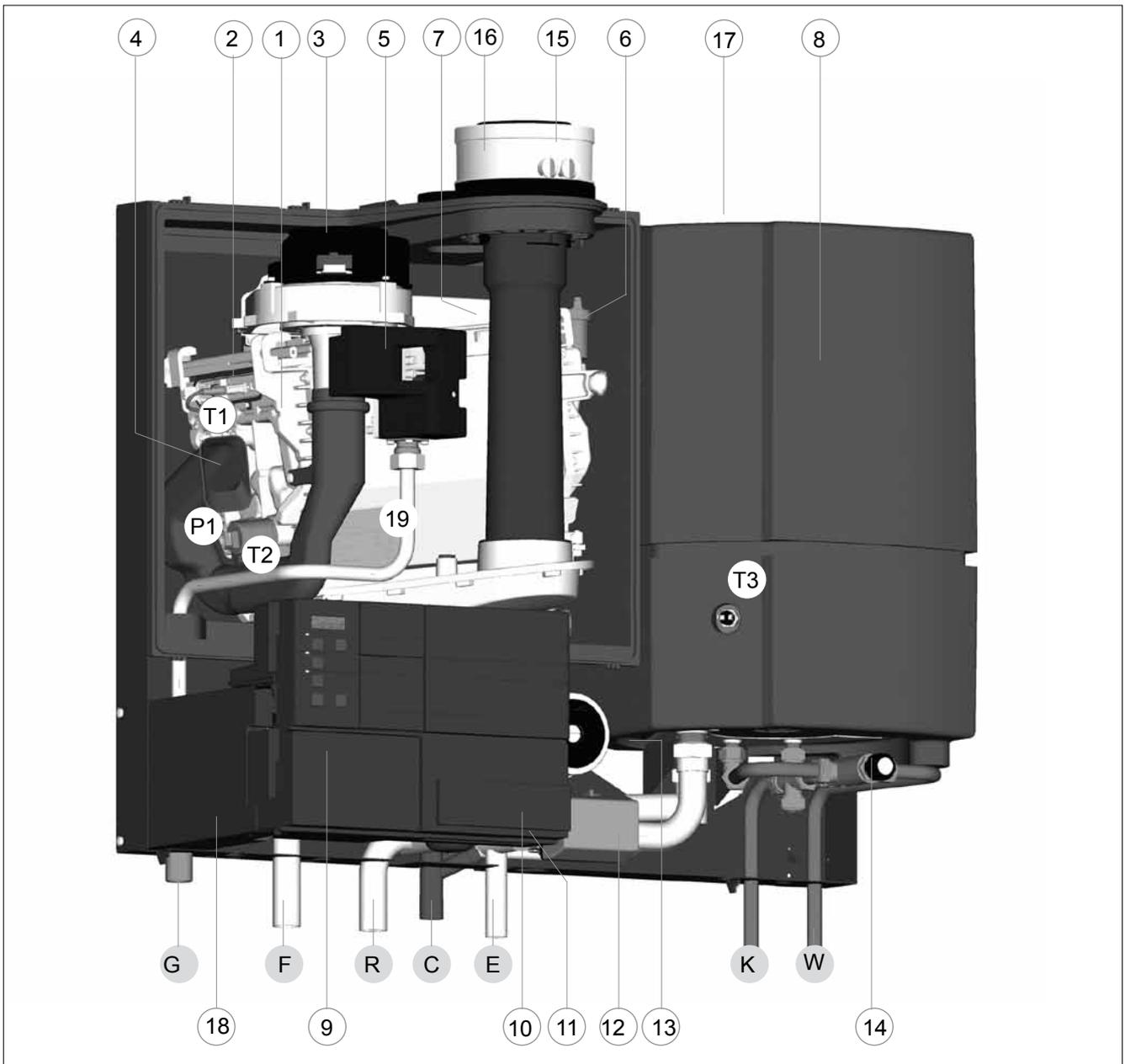


- Enter the 1st Tier Settings: 123 Code
- Briefly press "Mode" again until the Service Chapter is displayed (SERV)
- Hold the "Store" button until SERV flashes once—the service notification will no longer show during normal operation and the countdown to service will reset to 4000.

## 14.4 Warranty

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

## 15 Parts of the boiler



ATAG Q

figure 45

1 heat exchanger	9 operating panel	16 combustion air supply
2 ignition unit	10 Control Tower (CMS)	17 air box
3 fan unit	11 water filter return CH	18 CSA Data Plate (serial number)
4 air inlet damper	12 three-way valve (Q175C)	19 ASME / NB / CRN data plate
5 gas valve	13 circulation pump	
6 automatic de-aerator	14 thermostatic mixing valve (Q175C)	
7 ceramic burner cassette	15 exhaust	
8 DHW tank (Q175C)		

T1 flow sensor
T2 return sensor
T3 DHW tank sensor (Q175C)
P1 water pressure sensor

G gas pipe
F flow connection central heating
R return connection central heating
C condensate pipe
E expansion tank pipe (Q175C)

K cold water pipe (Q175C)
W hot water pipe (Q175C)

### 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. Hereunder is a list of some messages.

Blocks **bL** with a number in the last 2 positions.

- bL01** Block 01:  
External safety contact cut off
- bL60** Block 60:  
Incorrect parameter setting of the minimum or maximum power.
- bL67** Block 67:  
A  $\Delta T$  has been detected between flow and return sensor whereas the burner is not in operation.  
After the  $\Delta T$  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



The following pages describes more detailed follow up instructions for solving blockings, errors and practical circumstances. These instructions are only for by Rinnai trained installers and technicians.

## 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
<b>bL01</b>	External safety contact open	Rectify error as a result of which by determining contact is open. Or repair interconnection between 24/25
<b>bL11</b>	Maximum average $\Delta T$ 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.
<b>bL12</b>	Maximum average $\Delta T$ 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.
<b>bL60</b>	Incorrect parameter setting for the minimum or maximum power	Call Rinnai
<b>bL67</b>	A temperature difference has been detected between the supply and return sensor whilst the burner is not in operation. After the average $\Delta T$ 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
<b>bL80</b>	flue sensor temperature too high	Check vent system
<b>bL81</b>	flue sensor or thermostat contact open	Call Rinnai
<b>bL82</b>	flue sensor or thermostat contact closed	Call Rinnai
<b>bL84</b>	flue gas thermostat contact open	Check vent system or check parameter 84 for default
<b>bL85</b>	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 hydraulically 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.
<b>bL86</b>	The frequency of the power supply deviates more than + or -1.5Hz	check the main power supply

## 16.3 Errors

Code	Description	Solution
<b>E 00</b>	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. <hr/> Rectify the short-circuit and if necessary replace this part.
<b>E 01</b>	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. <hr/> 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. <hr/> Rectify the short-circuit or replace the short-circuited component.
<b>E 02</b>	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 <sub>2</sub> setting. The minimum ionization current should be 4 µA, the O <sub>2</sub> should be a minimum of 4.4% for NG or 4.8% for LP
<b>E 03</b>	Control unit error	Connector not plugged into the gas valve or defect in the wiring of the gas valve. <hr/> Software error control unit. Replace the control unit. The display will automatically load the program into the new controller.
<b>E 04</b>	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. <hr/> Rectify the preceding error, If Error 04 persists, and preceding errors do not occur, replace controller.
<b>E 05</b>	Control unit error	Check 120V stability. If voltage is deviating more between +10% and -15% the electrical power supply needs to be stabilised. <hr/> 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. <hr/> 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.
<b>E 06</b>	Control unit error	Moisture on the PCB. Check if there is water leaking on or in the boiler. <hr/> Stop leak and replace MCBA controller

Code	Description	Solution
<b>E 07</b>	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.
<b>E 11</b>	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.
<b>E 12</b>	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
<b>E 13</b>	Control unit error	Replace the control unit. The controller will automatically load the program into the new control unit.
<b>E 14</b>	- 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
<b>E 18</b>	Signal maximum flow water temperature exceeded ( $T_1 > 212^\circ\text{F}$ ).	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
<b>E 19</b>	Signal maximum return water temperature exceeded ( $T_2 > 212^\circ\text{F}$ ).	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
<b>E 24</b>	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.
<b>E 26</b>	Controller failure	Replace controller

Code	Description	Solution
<b>E 28</b>	No signal from the fan	<p>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</p> <hr/> <p>Wiring and voltage are OK and error is repeated. Replace the fan</p>
<b>E 29</b>	Negative pressure on vent system (pressure difference)	<p>Check vent system. Vent system and air intake system must be installed according installation instructions.</p> <hr/> <p>IF vent system is OK: Replace fan</p>
<b>E 31</b>	internal shut down of supply sensor T1	<p>Check the data in Error mode. Boiler data during error:</p> <p>1 Error = 31  2 Operational status = 00  3 Flow temp. = 230  4 Return temp. = xx*  5 kW burner = 00**  6 % pump = xx*</p> <p>* = variable values  **= x3415=BTU/hr</p> <hr/> <p>Check the wiring. check the wiring for the sensor</p> <hr/> <p>The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 36 occurs</p> <hr/> <p>Replace the sensor.</p>
<b>E 32</b>	Shut down of return sensor T2	<p>Check the data in Error mode. Boiler data during error:</p> <p>1 Error = 32  2 Operational status = 00  3 Flow temp. = xx*  4 Return temp. = 230  5 kW burner = 00**  6 % pump = xx*</p> <p>* = variable values  **= x3415=BTU/hr</p> <hr/> <p>Check the wiring. check the wiring for the sensor</p> <hr/> <p>The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 37 occurs</p> <hr/> <p>Replace the sensor.</p>
<b>E 36</b>	contact for supply sensor T1 open	<p>Check the data in Error mode. Boiler data during error:</p> <p>1 Error = 36  2 Operational status = 00  3 Flow temp. = -22  4 Return temp. = xx*  5 kW burner = 00**  6 % pump = xx*</p> <p>* = variable values  **= x3415=BTU/hr</p> <hr/> <p>Check the wiring. check the wiring for the sensor</p> <hr/> <p>The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 31 occurs</p> <hr/> <p>Replace the sensor.</p>

Code	Description	Solution
<b>E 37</b>	contact for return sensor T2 open	<p>Check the data in Error mode. Boiler data during error:</p> <p>1 Error = 37  2 Operational status = 00  3 Flow temp. = xx*  4 Return temp. = -22  5 kW burner = 00**  6 % pomp = xx*</p> <p>* = variable values  **= x3415=BTU/hr</p> <hr/> <p>Check the wiring. check the wiring for the sensor</p> <hr/> <p>The wiring is OK but the error is repeated. Remove the plug from the flow sensor as a result of which Error 32 occurs</p> <hr/> <p>Replace the sensor.</p>
<b>E 41</b>	Control unit error	Software error control unit. Replace the control unit. The display will automatically load the program into the new control unit.
<b>E 42</b>	Control unit error	Software error control unit. Replace the control unit. The display will automatically load the program into the new control unit.
<b>E 44</b>	Electrical leakage to ground.	<p>Moisture on controller PCB. Check if there is water leaking on or in the boiler.</p> <hr/> <p>Stop water leak and replace controller</p>
<b>E 68</b>	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 <b>E 68</b> appears on the display.
<b>E 69</b>	Ribbon cable problem	Replace ribbon cable
<b>E 80</b>	Flue gas temperature to high (adjustment parameter 84 - default 212°F)	Replace flue sensor or adjust parameter 84 to default
<b>FUSE</b>	<p>Fuse on controller PCB defective</p> <p>or</p> <p>Cable transformer not connected</p>	<p>Replace fuse.</p> <p>A 4A and 5A spare fuse can be found inside the Control Tower just above the circuit board.</p>

## 16.4 Other Errors

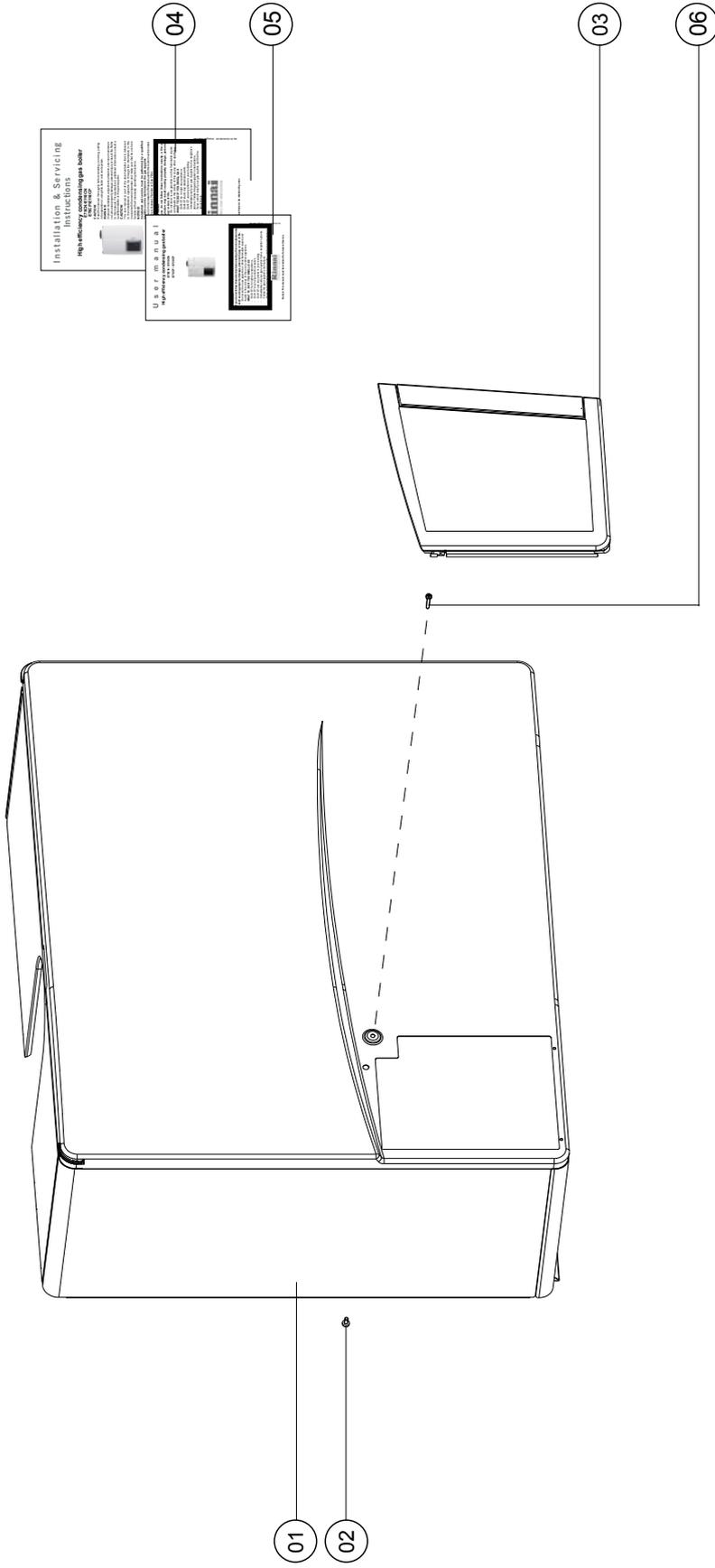
Complaint	Description	Solution
<b>Central heating but no domestic hot water</b>	1.  -Key of the DHW program is not switched on	Switch on DHW program on the Control Tower
	2. Cylinder sensor or thermostat defective.	Replace cylinder sensor or thermostat
	3. When using RS100	- Check timer times for DHW 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.
<b>Hot water but no central heating</b>	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.
<b>Central heating installation gets hot without being requested</b>	1.  -Key pump program is on.	Switch off.
	2. Dirt in three-port valve or three-port valve cartridge is binding.	Clean or replace.
	3. Expansion tank incorrectly fitted.	Connect expansion tank between three-port valve and pump (for Combi boiler or Solo with external DHW tank this pipe connection is present as standard).
<b>Insufficient quantity of hot water</b>	1. Hot and cold water connection to the boiler mixed up.	Check left = cold, right = hot
	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
<b>Temperature drop of the DHW (Combi)</b>	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.

Complaint	Description	Solution
<b>temperature drop of the Solo hot water with the DHW cylinders</b>	1. Synchronising valve	Check the setting in accordance with the illustrated DHW cylinder installation instructions
	2. Thermostatic mixing valve incorrectly set	Adjust by measuring the temperature
	3. Hot water temperature too low	Check PARA chapter Step No. 31 or RS100 is set too low. Check the functioning and wiring of the DHW sensor T3
	4. Hot water power for the boiler is set too low.	Check PARA chapter Step No. 43
<b>radiators do not get hot enough or warming them up takes too long</b>	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).	<ul style="list-style-type: none"> <li>- See installation instructions.</li> <li>- Check / clean water filter check dimensions of pipes.</li> <li>- If necessary, increase pump rpm Para 48.</li> </ul>



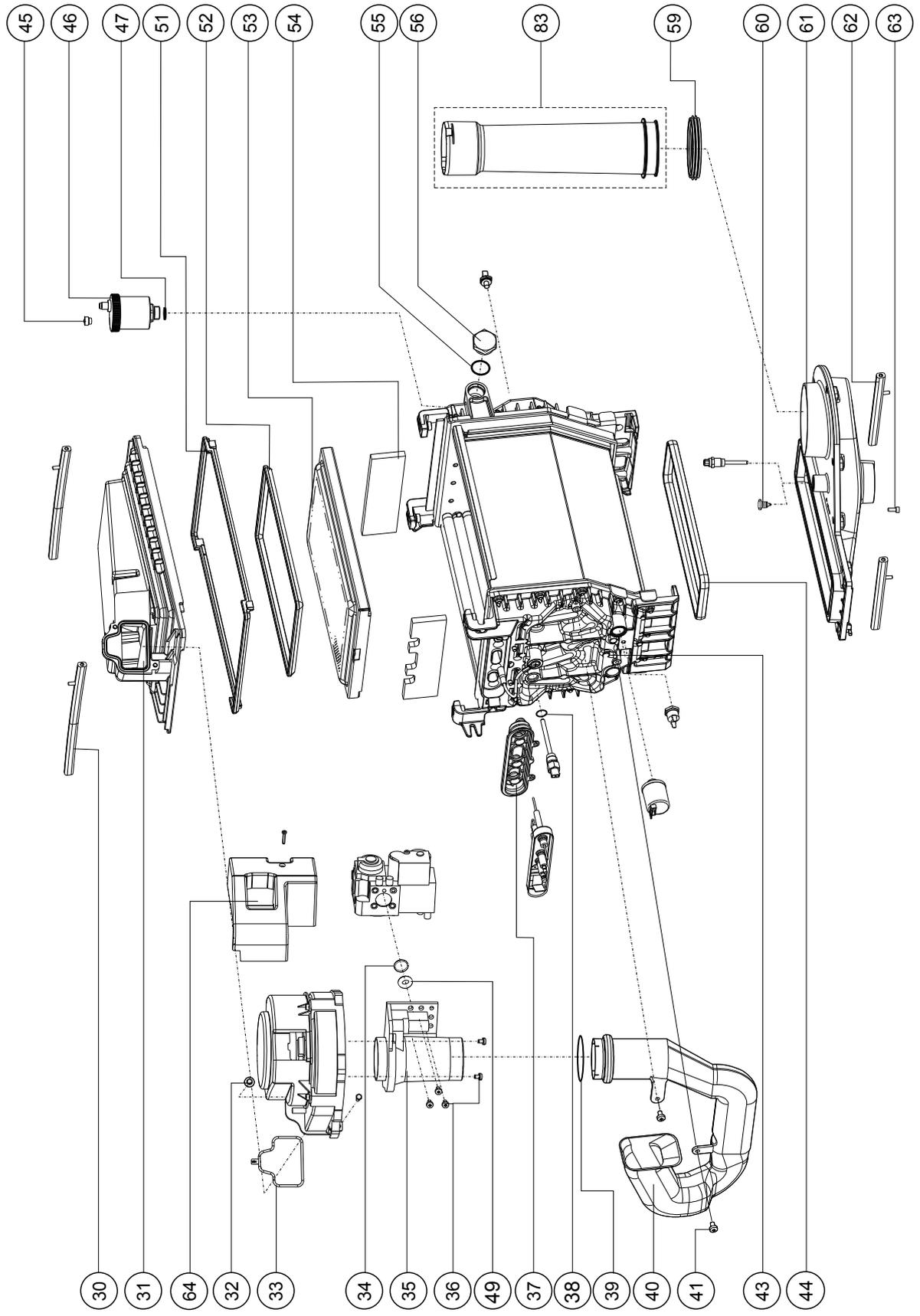
**Parts casing Q-Series**

**17 Spare parts**



Item	Description	Part No.	Q175C			O85S			O130S			O175S			O205S		
			N	P	OSS3	N	P	OSS1	N	P	OSS2	N	P	OSS3	N	P	OSS4
1	CASING 25/38	809000011				X	X	X	X								
1	CASING 51/60	809000012										X	X	X	X	X	X
1	CASING 51C	809000013	X	X													
3	DOOR CASING Q CPL.	809000010	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	USER MANUAL Q-SERIES	800000010	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	INSTALLATION MANUAL Q-SERIES	800000011	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	BOILER COVER BOLT M5X16 (SET OF 5 BOLTS)	809000126	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

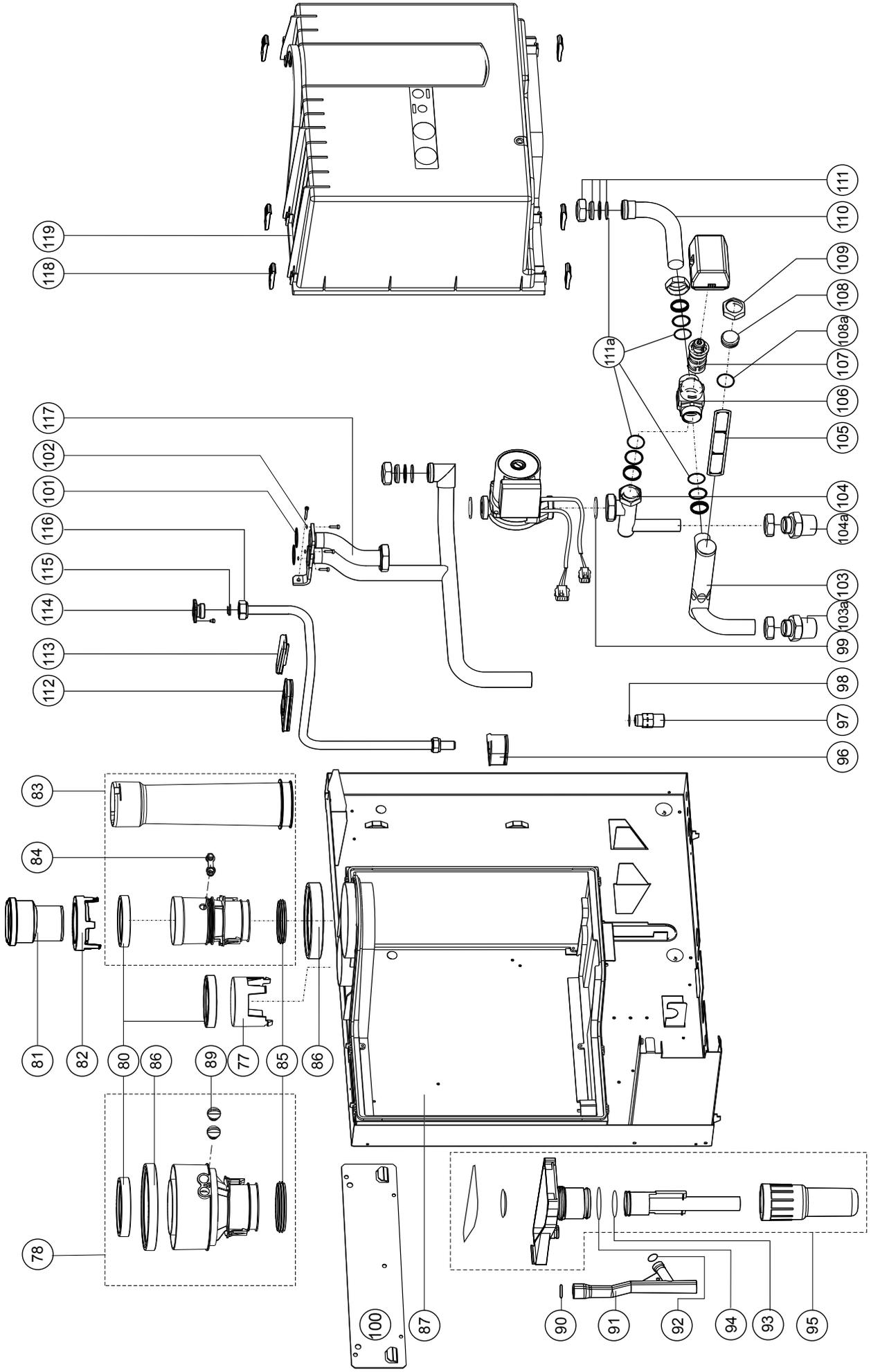
**Parts heat exchanger Q-Series**



Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	OSS	N	P	OSS1	N	P	OSS2	N	P	OSS3	N	P	OSS4
30	CLAMP BAR TOP PART HEX. LONG	809000014	X	X		X	X	X	X	X	X	X	X	X	X		
31	TOP PART HEAT EXCH. SET OSS1	807000010															
31	TOP PART HEAT EXCH. SET OSS2	807000011								X	X	X	X	X	X		
31	TOP PART HEAT EXCH. SET OSS3/4	807000012	X	X													
32	BOLT M 5X16 (5 PER PACKAGE)	809000015	X	X		X	X	X	X	X	X	X	X	X	X		
33	GASKET FAN/TOP PART HEX.	809000016	X	X		X	X	X	X	X	X	X	X	X	X		
34	GASKET GAS VALVE - VENTURI	809000017	X	X		X	X	X	X	X	X	X	X	X	X		
34	GASKET VENTURI - FAN	809000018	X	X		X	X	X	X	X	X	X	X	X	X		
35	VENTURI OSS1	807000013				X	X										
35	VENTURI OSS2	807000014						X									
35	VENTURI OSS3/4	807000015	X	X						X	X	X	X	X	X		
36	BOLT M5X12GR FASE ZSDIN7985 (5 PER PACKAGE)	809000019	X	X		X	X	X	X	X	X	X	X	X	X		
37	GASKET IONISATION/IGNITION OSS	809000020	X	X		X	X	X	X	X	X	X	X	X	X		
38	O-RING ø5.00X2.00 FLOW SENSOR (5 PER PACKAGE)	809000080	X	X		X	X	X	X	X	X	X	X	X	X		
39	GASKET SILENCER-VENTURI	809000021	X	X		X	X	X	X	X	X	X	X	X	X		
40	DAMPER OSS1	807000016				X	X										
40	DAMPER OSS2	807000017						X									
40	DAMPER OSS3/4	807000018	X	X						X	X	X	X	X	X		
41	SCREW TAPTITE M5X8 CK.PD (3 PER PACKAGE)	809000022	X	X		X	X	X	X	X	X	X	X	X	X		
43	HEAT EXCHANGER OSS1 ASME	807000019				X	X										
43	HEAT EXCHANGER OSS2 ASME	807000020						X									
43	HEAT EXCHANGER OSS3 ASME	807000021	X	X						X	X	X	X	X	X		
43	HEAT EXCHANGER OSS4 ASME	807000022															
	BOILER TOOL KIT	809000024	X	X		X	X	X	X	X	X	X	X	X	X		
44	GASKET CONDENSATE TRAY OSS1	809000025				X	X	X	X	X	X	X	X	X	X		
44	GASKET CONDENSATE TRAY OSS2	809000026				X	X										
44	GASKET CONDENSATE TRAY OSS3	809000027	X	X				X				X	X	X	X		

Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	OSS	N	P	OSS1	N	P	OSS2	N	P	OSS3	N	P	OSS4
45	CAP DE-AERATOR SHR (3 PER PACKAGE)	807000023	X	X		X	X	X	X	X	X	X	X	X	X		
46	DE-AERATOR CHROME	807000024	X	X		X	X	X	X	X	X	X	X	X	X		
47	O-RING ø13.94X2.62 DE-AER. (2 PER PACKAGE)	809000028	X	X		X	X	X	X	X	X	X	X	X	X		
48	BOLT M 3X30 VERZ.DIN84/4.8 (3 PER PACKAGE)	809000029	X	X		X	X	X	X	X	X	X	X	X	X		
51	GASKET H.E./TOP PART OSS1	809000030				X	X										
51	GASKET H.E./TOP PART OSS2	809000031								X	X						
51	GASKET H.E./TOP PART OSS3/4	809000032	X	X								X	X	X	X		
52	GASKET BURNER/TOP PART OSS1	809000033				X	X										
52	GASKET BURNER/TOP PART OSS2	809000034								X	X						
52	GASKET BURNER/TOP PART OSS3/4	809000035	X	X								X	X	X	X		
53	BURNER CASSETTE SET OSS1	806000010								X							
53	BURNER CASSETTE SET OSS2	806000011								X							
53	BURNER CASSETTE SET OSS3/4	806000012	X	X								X	X	X	X		
54	SET INSULATION PIPE PLATE L+R	809000036	X	X		X	X	X	X	X	X	X	X	X	X		
55	O-RING ø17.12X2.62 PLUG HEATEXCH. (2 PER PACKAGE)	809000103	X	X		X	X	X	X	X	X	X	X	X	X		
56	METAL PLUG HEAT EXCH 1/2"	809000115	X	X		X	X	X	X	X	X	X	X	X	X		
59	LIP-RING ø63 AMGAS	809000038				X	X										
59	LIP-RING ø80 AMGAS	809000039	X	X						X	X	X	X	X	X		
60	PLUG FLUE GAS SENSOR	809000040	X	X		X	X	X	X	X	X	X	X	X	X		
61	CONDENSATE TRAY OSS1	809000041				X	X										
61	CONDENSATE TRAY OSS2	809000042								X	X						
61	CONDENSATE TRAY OSS3/4	809000043	X	X								X	X	X	X		
62	CLAMP BAR COND.TRAY	809000044	X	X		X	X	X	X	X	X	X	X	X	X		
63	BOLT M 5X12 IMBUS VERZ. (3 PER PACKAGE)	809000045	X	X		X	X	X	X	X	X	X	X	X	X		
64	COVER GAS VALVE	809000046	X	X		X	X	X	X	X	X	X	X	X	X		

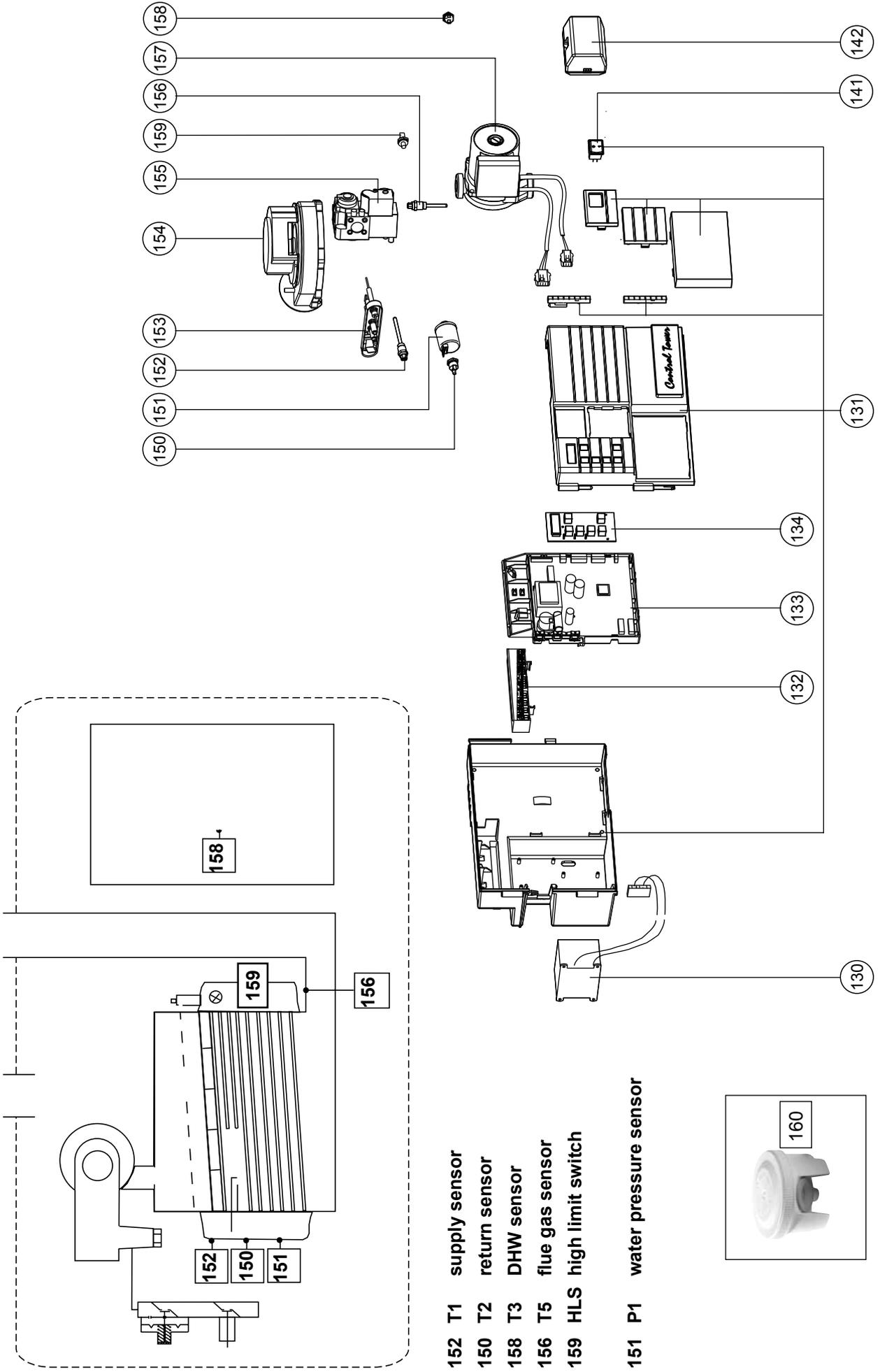
**Parts rear wall Q-Series**



Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	I	N	P	I	N	P	I	N	P	I	N	P	I
77	COVER AIR SUPPLY Ø80mm	807000075	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
78	CONCENTRIC FLUE ADAPTOR 80/125"MM	808000023	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
80	GASKET AIR INTAKE Ø80 SHR	809000047	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
81	FLUE ADAPTER 80mm x 3"	808000022	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
82	COVER AIR SUPPLY Ø125mm	808000029	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
83	FLUE GAS SYSTEM PP SET OSS1	808000010				X	X										
83	FLUE GAS SYSTEM PP SET OSS2	808000011						X	X								
83	FLUE GAS SYSTEM PP SET OSS3/4	808000012	X	X							X	X	X	X	X	X	
84	PLUG MEASURING POINT PARALLEL FLUE PIPE	808000028	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
85	GASKET FLUE GAS PIPE PP	809000048	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
86	GASKET AIR SUPPLY 5"	809000049	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
87	AIR BOX BACK Q85S 7 Q130S	808000013				X	X	X									
87	AIR BOX BACK Q175S, Q175C & Q205S	808000014	X	X							X	X	X	X	X	X	
89	PLUG MEASURING POINT CONCENTRIC FLUE PIPE	808000030	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
90	O-RING Ø19.50X1.80 TRAP TRAY	809000050	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
91	CONDENSATE DRAIN PIPE Q	809000051	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
92	O-RING Ø12.42X1.78	809000082	X	X													
93	O-RING Ø40X3.53 TRAP TRAY Q	809000052	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
94	O-RING Ø60.39X3.53 TRAP Q	809000053	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
95	TRAP PP Q COMPLETE	809000054	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
96	FEED THROUGH GAS LINE AIRBOX	808000017	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
97	GAS FITTING OSS1/2 Q	806000013				X	X	X									
97	GAS FITTING OSS3/4 Q	806000014	X	X							X	X	X	X	X	X	
98	O-RING Ø13.94X2.62 YELLOW SILI Q	809000055	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
99	GASKET PUMP (2 PER PACKAGE)	809000056	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
100	BRACKET E75C, E110C, Q85S & Q130S	809000065				X	X	X									
	BRACKET Q175S & Q205S	809000066									X	X	X	X	X	X	
	BRACKET Q175C	809000067	X	X													
101	O-RING Ø29.74X3.53 FLOW/RET. (2 PER PACKAGE)	809000064	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
102	O-RING 4.8X1.8 LOCK HE Q (3 PER PACKAGE)	809000090	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
103	PIPE RETURN-PUMP FILT Q85S 7 Q130S	807000025				X	X	X									
103	PIPE RET-PUMP FILT Q175S, Q175C & Q205S	807000026									X	X	X	X	X	X	
103	PIPE RET-3WV FILTER Q175C	807000027	X	X													

Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	I	N	P	I	N	P	I	N	P	I	N	P	I
						OSS3	OSS1	OSS2									
103A	CONNECTION SET 28 X 1" NPT	807000070									2X 2X 2X 2X						
103A	CONNECTION SET 35 X 1 1/4" NPT	807000071	2X	2X										2X 2X 2X 2X			
104	PIPE 3WV-PUMP EXT. EXP.VESSEL Q	807000028	X	X													
104A	CONNECTION SET 22 X 3/4" NPT	807000069	X	X													
105	FILTER RETURN PIPE Q	807000029	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
106	THREE WAY V. HOUSING VC O-RING	809000057	X	X													
107	CARTRIDGE 3WV	807000030	X	X													
108	FILTER CAP	807000031	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
108a	O-RING Ø25.07 X 2.62 3WV	809000058	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
109	NUT M35 Ø30	809000059	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
110	PIPE CYLINDER-3WV Q	807000032	X	X													
111	FITTINGS SET CYL. COMBI	807000033	X	X													
	NUT M35 Ø30	809000059	X	X													
111a	O-RING Ø26.70 X 1.78 (3 PER PACKAGE)	809000091	X	X													
112	AIRBOX GASKET FLOW/RETURN Q	809000060	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
113	SERVICE CAP AIRB. Q	808000018	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
114	FITTING GAS VALVE 3/4"	806000016	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	O-RING Ø21.89X2.62 GASLINE	809000061	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
115	GASKET FITTING 3/4" GASV.	809000062	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
116	GASLINE Q85S	806000017				X	X	X									
116	GASLINE Q130S	806000018	X	X							X	X	X	X	X	X	
117	PIPE FLOW Q85S	807000034				X	X										
117	PIPE FLOW Q130S	807000035									X	X					
117	PIPE FLOW Q175S/Q205S	807000036															
	PIPE CYLINDER - CH Q175C	807000037	X	X													
	SCREW (5 PER PACKAGE)	809000063	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
117A	CONNECTION SET 28 X 1" NPT	807000070									X	X	X	X	X	X	
117A	CONNECTION SET 35 X 1 1/4" NPT	807000071															
118	SNAP LOCK AIR BOX	808000019	X	X													
119	AIR BOX FRONT Q85S 7 Q130S	808000015									X	X	X	X	X	X	
	AIR BOX FRONT Q175S, Q175C & Q205S	808000016	X	X													

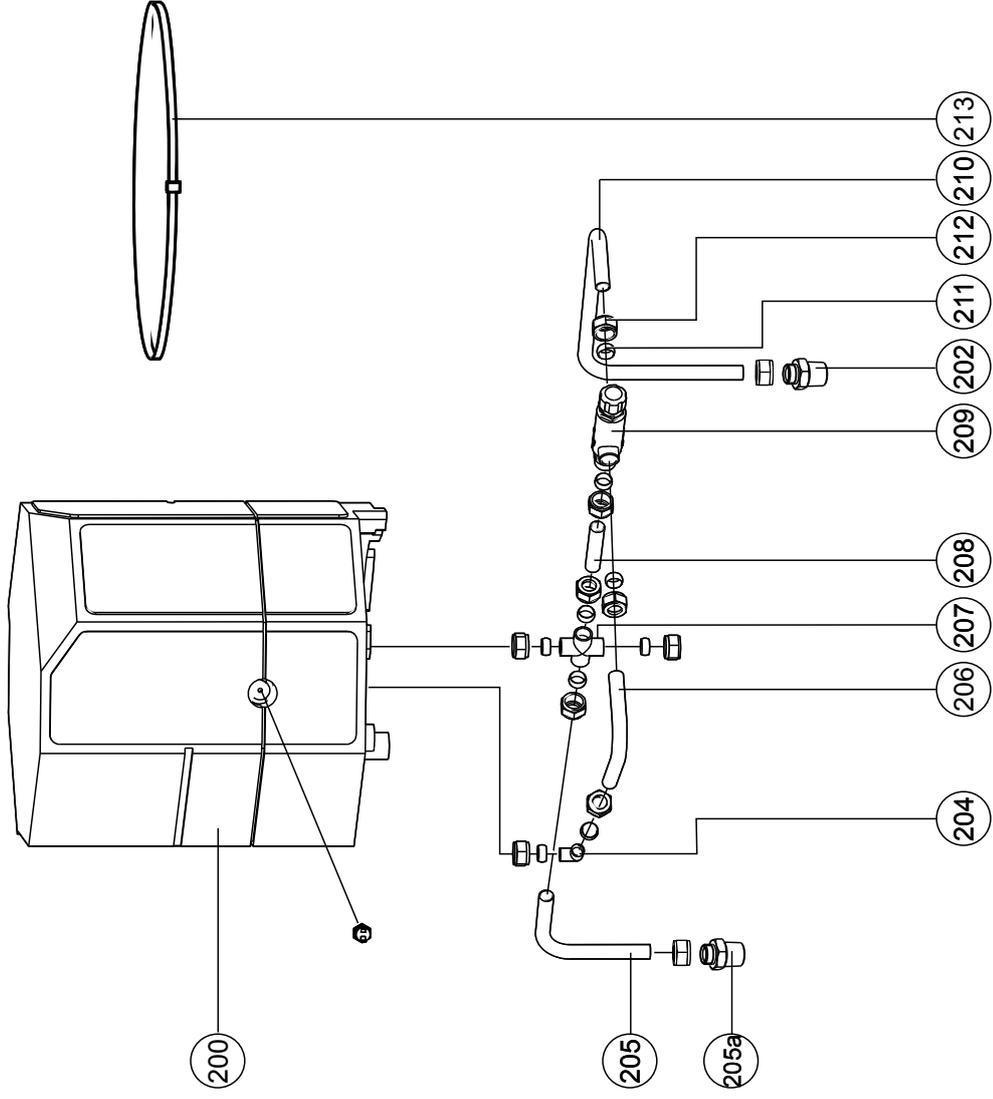
**Parts electrical components Q-Series**



Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	OSS3	N	P	OSS1	N	P	OSS2	N	P	OSS3	N	P	OSS4
130	TRAF0 120V/24V	805000010	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	SCREW 3.5X 9.5 VERZ.D7983 (5 PER PACKAGE)	805000011	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
131	CONTROL TOWER COMPLETE	805000045	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
132	HARNESS Q RAC	805000012	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	STICKER CONNECTION TERMINAL	805000014	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	HARNESS Q 120V + MAINS SWITCH	805000013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CONNECTOR 2-POLE PURPLE	805000015	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CONNECTOR 2-POLE BLACK	805000016	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CONNECT. 3-POLE GREEN EXT.PUMP	805000017	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CONNECTOR 3-POLE GRAY	805000018	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CONNECTOR 4-POLE BROWN	805000021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CONNECTOR 6-POLE BLUE	805000022	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CABLE HARNESS Q 3WW	805000023	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
133	CONTROL UNIT MCBA.5417 Q RAC	805000024	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	FUSE 5AF (3 PER PACKAGE)	805000026	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	FUSE 4 AT (250V) (3 PER PACKAGE)	805000027	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
134	DISPLAY MCBA ATAG Q	805000028	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	FLAT CABLE DISPLAY L=240 SHR	805000029	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
141	HARNESS Q 120V + MAINS SWITCH	805000013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	MAINS SWITCH 120V	805000048	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
142	3WAY VALVE ACTUATOR VC6940	805000031	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	CABLE HARNESS Q 3WW	805000023	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

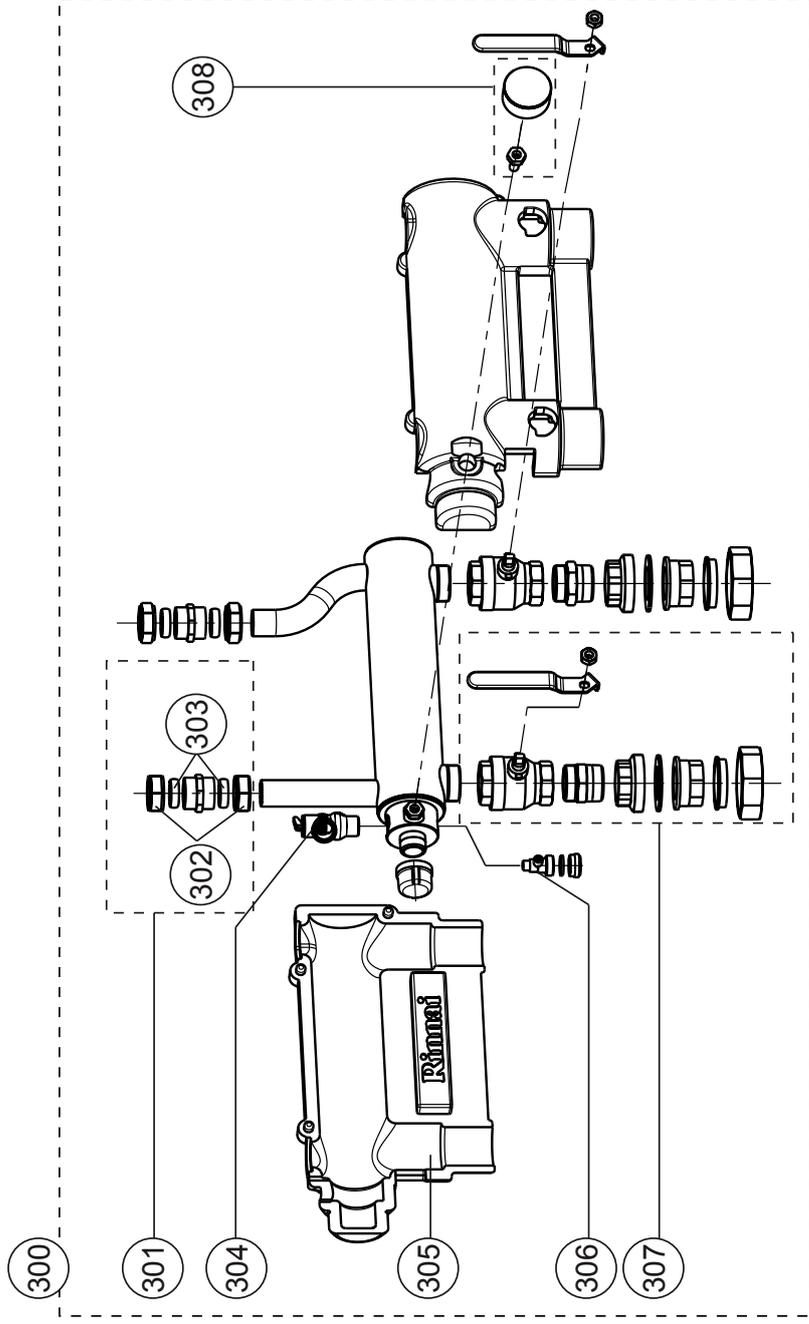
Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	OSS3	N	P	OSS1	N	P	OSS2	N	P	OSS3	N	P	OSS4
150	NTC T2/T3	805000032	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
151	WATERPRESSURE SENSOR	805000034	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	WATER PRESSURE SENSOR CABLE	805000050	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
152	NTC T1/T3	805000035	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
153	IGNITION ELECTRODE+GASKET OSS	805000036	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	IGNITION CABLE SHR	805000037	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	HARNESS FAN 120V	805000038	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	IONISATION WIRE SHR	805000039	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
154	FAN NRG 118 OSS1/2	808000020	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	FAN G1G126 OSS3/4	808000021	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	HARNESS FAN Q 120V	805000044	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
155	GAS VALVE	806000019	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
156	FLUE GAS SENSOR INCL.CABLE	805000040	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	PUMP UPER PWM 20-58 120V	807000040	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
157	PUMP UPER PWM 20-78 120V	807000041	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
158	NTC T2/T3	805000032	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
159	HIGH LIMIT SWITCH	805000033	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
160	OUTDOOR RESET SENSOR ARV12	805000047	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

### Parts tank (Combi boilers) Q-Series



Item	Description	Part No.	Q175C		Q85S		Q130S		Q175S		Q205S	
			N	P	N	P	N	P	N	P	N	P
200	MINI-TANK 6.6 GLN Q175C	807000067	X	X								
202	ADAPT.FITT.+DOS.VLVE 4.75 GLN/MIN RED	807000074	X	X								
204	KNEE FITTING 15MM	809000068	X	X								
205	PIPE Ø15 COLD Q	807000042	X	X								
205A	CONNECTION SET 15 X 3/4" NPT	807000068	X	X								
206	PIPE ø15 HOT-MIXING VALVE Q	807000043	X	X								
207	CROSS COMPR.FITTING 15MM Q	807000044	X	X								
208	PIPE Ø15 COLD MIXING VALVE Q	807000045	X	X								
209	THERM. MIX VALVE ø15 COMPR. Q	807000046	X	X								
210	PIPE Ø15 MIX Q	807000047	X	X								
211	FERRULE COMPR FITTING 15MM BRASS	809000069	X	X								
212	NUT 1/2" GBRASS COMPR. 15	809000070	X	X								
213	STRAP CYLINDER/EXP.VESSEL	809000071	X	X								
	FITTING SET CYLINDER COMBI	809000072	X	X								

## Parts plumbing kit Q-Series



Item	Description	Part No.	Q175C			Q85S			Q130S			Q175S			Q205S		
			N	P	OSS3	N	P	OSS1	N	P	OSS2	N	P	OSS3	N	P	OSS4
300	PLUMBING KIT #2 FOR Q85S/Q130S	804000062				X	X	X	X								
	PLUMBING KIT #3 FOR Q175S/Q175C/Q205S	804000063	X	X						X	X	X	X	X	X	X	
301	COMPRESSION FITTING 28MM	804000065				X	X	X	X								
	COMPRESSION FITTING 35MM	804000066	X	X						X	X	X	X	X	X	X	
302	NUT COMPR FITTING 28MM	804000057	X	X													
	NUT COMPR FITTING 35MM	804000058	X	X								X	X	X	X	X	
303	FERRULE COMPR FITTING 28MM	804000053				X	X	X	X								
	FERRULE COMPR FITTING 35MM	804000054	X	X						X	X	X	X	X	X	X	
304	SAFETY VALVE PLUMBING KIT	807000077	X	X		X	X	X	X	X	X	X	X	X	X	X	
305	INSULATION PACK PL. KIT 1/2	809000101				X	X	X	X								
	INSULATION PACK PL. KIT 3	809000102	X	X								X	X	X	X	X	
306	DRAIN VALVE PLUMBING KIT	807000078	X	X		X	X	X	X	X	X	X	X	X	X	X	
307	SERVICE VALVE+ FITTING 1/4"NPT	807000079				X	X	X	X								
	SERVICE VALVE+FITTING 1/2"NPT	807000080	X	X								X	X	X	X	X	
308	T/P GAUGE WITH WATER LOCK	807000081	X	X		X	X	X	X	X	X	X	X	X	X	X	

## 18 Parts list vent system

### Vent Products

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

Manufacturer	Descriptions	Parts #	
Heatfab	DGV 3"/5" Conc Air Intake Tee 3"	DGV03TAD3	
	Concentric	DGV 3"/5" Conc X 12" Length	DGV03L12
		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
	Twin Pipe	3"- Adapter to fit into 80 mm Flue Collar	adapter
		3"- 12 Length	SGV302
		3"- 31" Length	SGV307
		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" Straight 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
	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/

## 19 Common venting guidelines

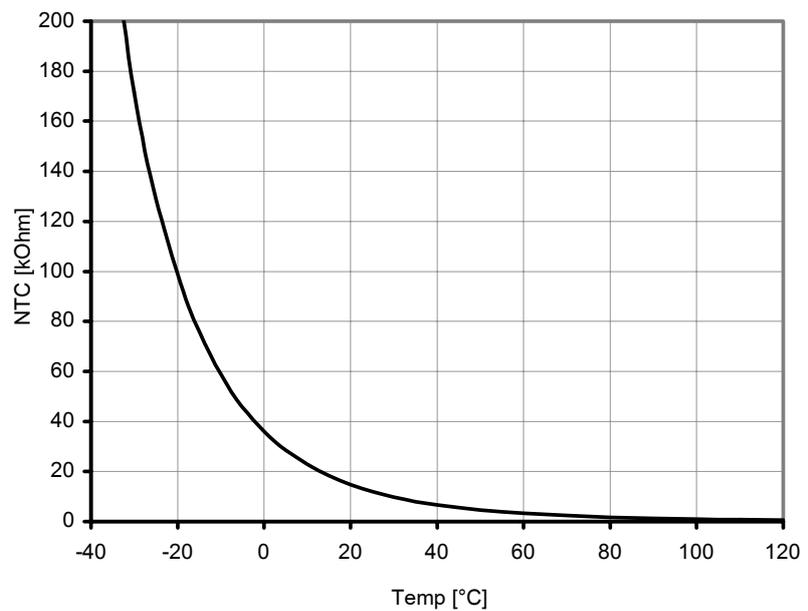
Do not common vent with the vent pipe of any other boiler or appliance. However, when an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it. At the time of removal of an existing boiler, 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 other deficiencies 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 the common 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 main burner 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 - Outdoor Reset Sensor Data

R 25 °C	12 kΩ
R 100 ° C	950 Ω
B <sub>25/85</sub>	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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E. & O. E.

This renewed publication cancels all previous installation instructions. The company reserves the right to change the specifications and dimensions without prior notice.