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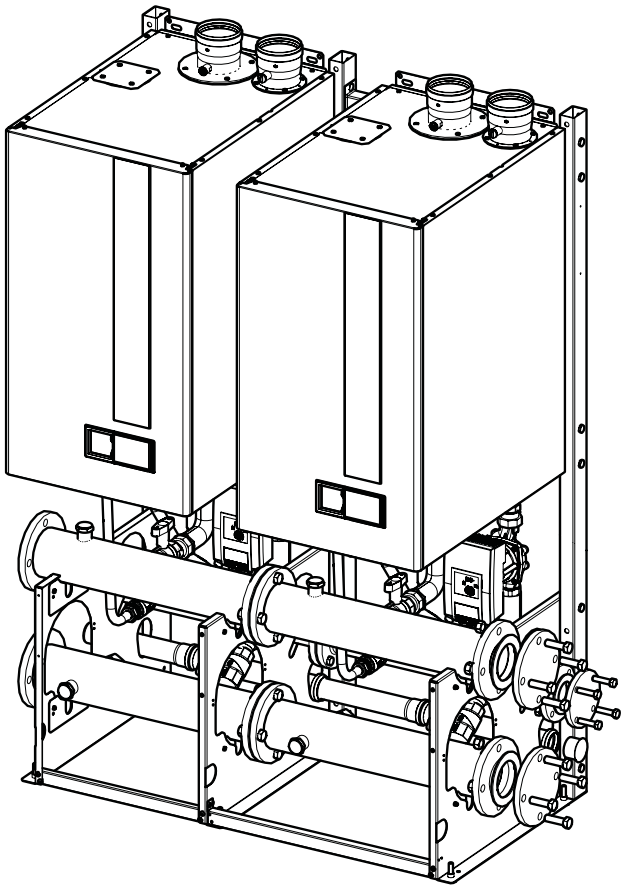
BE INNOVATIVE

MODULAR HEAT GENERATORS
ITACA CH KR
MODULE ON FRAME
INDOOR INSTALLATION ONLY

IST 03 C 1321 - 02

INSTALLATION, USE



It is compulsory to read this manual before proceeding with the product installation, use and maintenance operations.

This system is intended for production of hot technical water only:

- **For heating of residential, commercial and industrial rooms.**
- **For heating of industrial process water.**
- **For indirect production of domestic hot water.**

Any other use is forbidden.

EN

Dear Sirs,
thank You for choosing and buying one of our products. Please read these instructions carefully in order to properly install, operate, and maintain the product.

WARNING

We inform users that:

- **Boilers shall be installed by an authorised company under the requirements set forth by the prevailing rules, in full compliance with the prevailing regulations and standards.**
- **Anyone entrusting installation to an unqualified installer will be subject to administrative sanctions.**
- **Boilers must be maintained by qualified personnel only, under the requirements set forth by the prevailing rules.**

We hereby inform you that certain models, versions and/or accessories relevant to the products this manual refers to, might not be available in some countries.

Therefore, it is recommended to contact the manufacturer or the importer in order to get the necessary information about the actual availability of such models, versions and/or accessories.

The manufacturer reserves the right to modify the products and/or its components as deemed necessary, in any moment and without prior notice.

This instruction manual is available in two languages, Italian and English, without prejudice to the prevalence of Italian language in case of differences in translation and/or dispute on construction of the text.

General notes for installing and maintenance technicians, and users

This instruction manual is an integral and essential part of the product. It shall be supplied by the installer to the user who shall keep it carefully to consult it whenever necessary.

This document shall be supplied together with the equipment in case the latter is sold or transferred to others.

WARNING

This boiler is intended for production of hot technical water only:

- **For heating of residential, commercial and industrial rooms.**
- **For heating of industrial process water.**
- **For indirect production of domestic hot water.**

Any other use is forbidden.

DANGER

This boiler must be installed by qualified personnel.

The installation by unqualified personnel is forbidden.

DANGER

This boiler must be installed in compliance with the requirements of the technical standards and legislation in force relating to gas appliances, particularly with reference to ventilation of the premises.

Any installation that does not comply with the requirements of the technical standards and legislation in force is forbidden.

DANGER

This boiler must be installed according to the manufacturer's instructions given in this manual. Incorrect installation may cause injury to persons and/or animals and damage to property. The manufacturer shall not be held liable for any such injury and/or damage.

WARNING

This boiler must be installed inside the building or in a partially sheltered place.

A partially sheltered place is a place which is not directly exposed to atmospheric agents.

Any installation in a place that is not partially sheltered is forbidden.

DANGER

This boiler must be correctly and safely connected to an electrical system compliant with the existing technical standards.

Any incorrect and unsafe connection to the electrical system is forbidden.

It is forbidden to connect the boiler to an electrical system lacking a differential switch to protect the boiler power line.

Any connection to an electrical system lacking a proper grounding system is forbidden.

WARNING

The boiler is supplied with a three-pole power cable, already connected to the electronic board and it is provided with a safety clamp.

This boiler must be connected to a 230V power supply network, as indicated on the label affixed to the power cable.

DANGER

Carefully read the instructions relating to air intake and flue gas venting systems in the specific section of this manual.

DANGER

This boiler must be connected to a gas distribution system which complies with the existing technical standards.
Check the gas system state of conservation before installing the boiler.
Any connection to a gas system which does not comply with the existing technical standards is forbidden.
When connecting the boiler to gas supply network, it is compulsory to install an appropriately sized gasket made from suitable material.
The boiler gas inlet coupling is not suitable for hemp, teflon tape or similarly made gaskets.
After connecting the boiler, check the connection for tightness.
Once gas is in the pipes, leak test by a naked flame is forbidden; use specific products available on the market.

DANGER

With gas fired boilers, take the following measures if you smell gas:
- **Do not turn on or off electric switches and do not turn on electric appliances.**
- **Do not ignite flames and do not smoke.**
- **Close the main gas cock.**
- **Open doors and windows.**
- **Contact a Service Centre, a qualified installer or the gas supply company.**

Never use a flame to locate a gas leak.
The boiler is designed for installation in the countries indicated on the technical data plate applied both to the package and to the boiler itself: installation in any other country may be a source of danger for people, animals and/or property.
The manufacturer will bear no contractual and tortious liability for failure to comply with all the instructions above.

Before installing the boiler, check that the technical data correspond to the requirements for its correct use in the system.
Check that the boiler is intact and it has not been damaged during transport and handling. Do not install equipment which is clearly damaged and/or faulty.

Damage and/or injury caused by incorrect installation or use and/or damage and/or injury due to non-observance of the manufacturer's instructions shall release the manufacturer from any and all contractual and extra-contractual liability.

Do not obstruct the air intake openings.

Only original accessories or optional kits (including the electric ones) are to be installed.
Properly dispose of the packaging as all the materials can be recycled. The packaging must therefore be sent to specific waste management sites.
After removing the packaging, make sure that its elements (clips, plastic bags, foam polystyrene etc.) are not left within the reach of children as they are potential hazard sources.
In the event of failure and/or faulty functioning, switch off the boiler. Do not attempt to make repairs: contact qualified technicians.
Original parts must be used for all repairs to the boiler.
Non-observance of the above requirements may affect the safety of the boilers and endanger people, animals and/or property.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
Children should be supervised to ensure that they do not play with the appliance.

DANGER

Before starting the boiler, and each time it is at a standstill for several days, make sure the trap is full of water.
If the trap is empty, fill it by pouring water into the boiler through the flue gas venting duct.

WARNING

The boiler must be serviced periodically as indicated in the relevant section of this manual.
Appropriate boiler maintenance ensures efficient operation, environment preservation, and safety for people, animals and objects.
Incorrect and irregular maintenance can be a source of danger for people, animals and property.

The user is strongly advised to have the system serviced and repaired by qualified personnel, satisfying all prevailing law requirements, and trained to properly carry out these operations.

In the event of long periods of inactivity of the boiler, disconnect it from the electrical power mains and close the gas cock.

WARNING

With the electrical power disconnected and the gas cock closed, the device's electrical anti-freeze function does not work.

Should there be a risk of freezing, add antifreeze: it is not advisable to drain the system as this may result in damage; use specific anti-freeze products suitable for multi-metal heating systems.

DANGER

Damage and/or injury caused by incorrect installation and/or incorrect use and/or unauthorized changes to the boiler and/or non-observance of the manufacturer’s instructions and/or of the relative standards/laws in force in the country of installation, shall release the manufacturer from any and all liability.

WARNING

MODULAR GENERATORS ON LOAD-BEARING FRAME DESCRIBED IN THIS MANUAL ARE ONLY INTENDED FOR INDOOR, INSTALLATIONS, OUTDOOR INSTALLATIONS ARE NOT PERMITTED.

1.1 Load-bearing frame overall dimensions

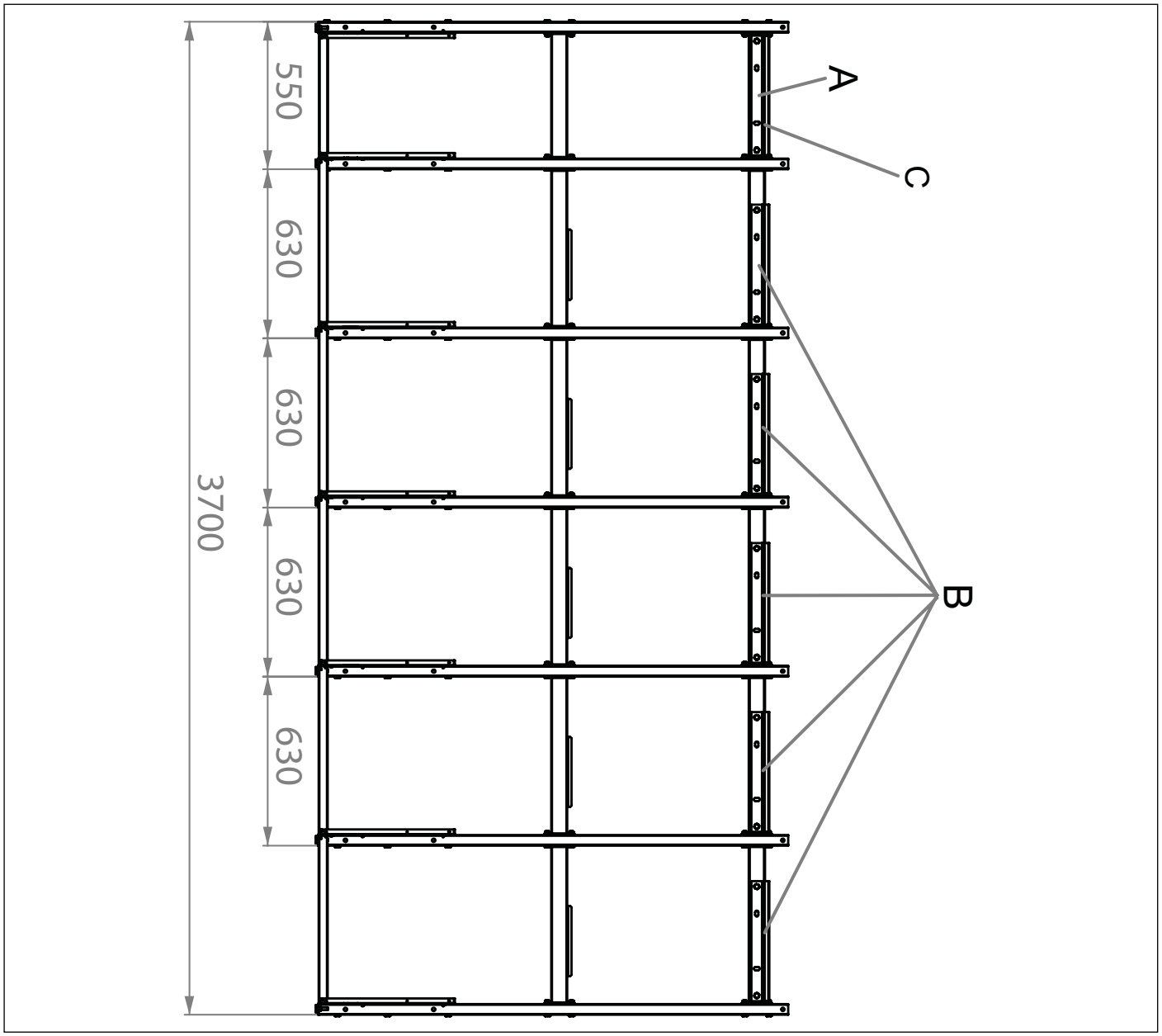


Fig. 1 Load-bearing frame image with values

A = starting frame
B = expansion frames to always be positioned to the right of the head frame regardless of the cascade direction
C = first frame to be positioned

1.2 Warning on modular generator configuration

The installation configuration of modular heat generators allows to install:

- A maximum number of 6 modules in series.
- Combine modules with the same output.
- As an alternative, combine modules with ‘adjacent’ outputs, i.e. module combinations as follows
  - » (45 - 60)
  - » (60 - 85)
  - » (85 - 120)
  - » (120 - 150)

1.3 Direct left/right collector configuration

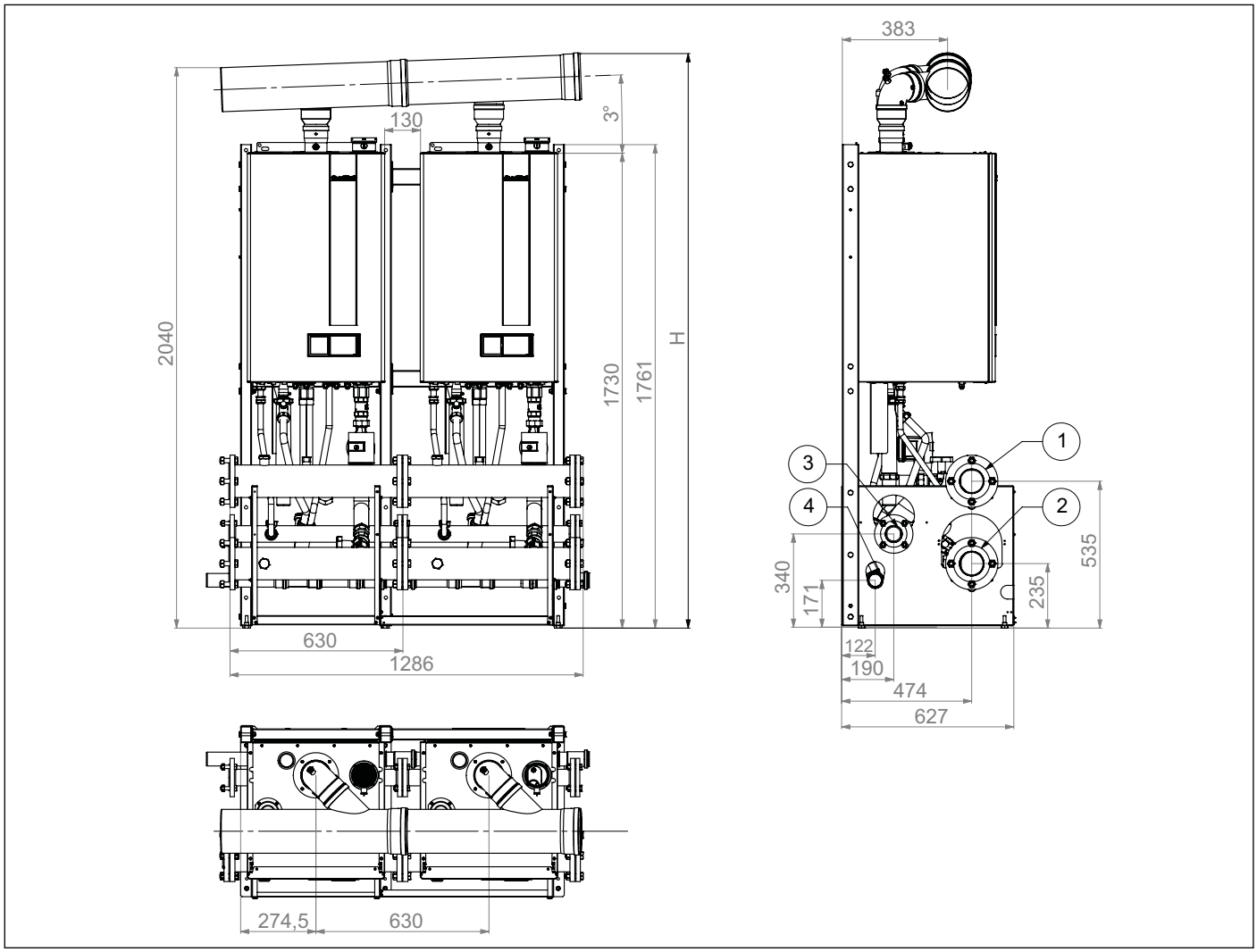


Fig. 2 Combination of left 45-60 direct collectors

Ref	Description
1	DN 80 PN 6 flanged primary circuit flow
2	DN 80 PN 6 flanged primary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	45	60			
-	-	-	bar	mm	mm
45	x1	-	3	160	2075
60	-	x1			
105	x1	x1			2095

WARNING

FOR ALL 'DIRECT COLLECTOR' CONFIGURATIONS, IT IS MANDATORY TO SEPARATE THE PRIMARY CIRCUIT FROM THE SECONDARY CIRCUIT USING A HYDRAULIC SEPARATOR OR A PLATE EXCHANGER, AFTER CHECKING THAT HYDRAULIC CONNECTIONS AND FLOW RESISTANCES ARE NOT GREATER THAN THOSE INDICATED IN PARAGRAPH *Pressure loss* **ON PAGE** *83*

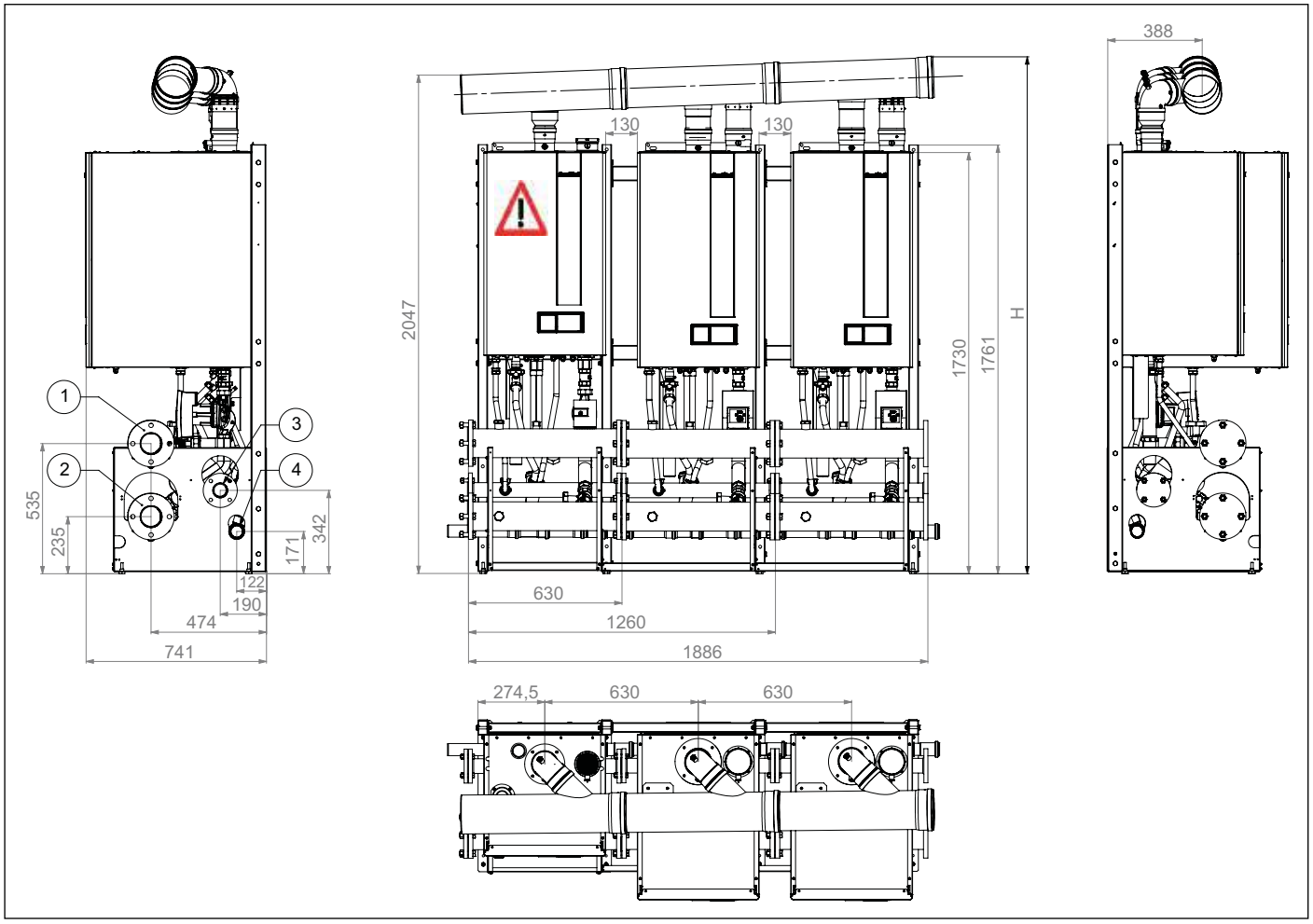


Fig. 3 Combination of left 85-120 direct collectors

Ref	Description
1	DN 80 PN 6 flanged primary circuit flow
2	DN 80 PN 6 flanged primary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	85	120			
-	-	-	bar	mm	mm
85	x1	-	5	160	2075
120	-	x1			
170	x2	-			2095
205(*)	x1	x1			
240	-	x2			
325(*)	x1	x2	5	200	2135

WARNING

(*) For these models the 85 boiler must be installed as head module.

FOR ALL 'DIRECT COLLECTOR' CONFIGURATIONS, IT IS MANDATORY TO SEPARATE THE PRIMARY CIRCUIT FROM THE SECONDARY CIRCUIT USING A HYDRAULIC SEPARATOR OR A PLATE EXCHANGER, AFTER CHECKING THAT HYDRAULIC CONNECTIONS AND FLOW RESISTANCES ARE NOT GREATER THAN THOSE INDICATED IN PARAGRAPH *Pressure loss* **ON PAGE** *83*

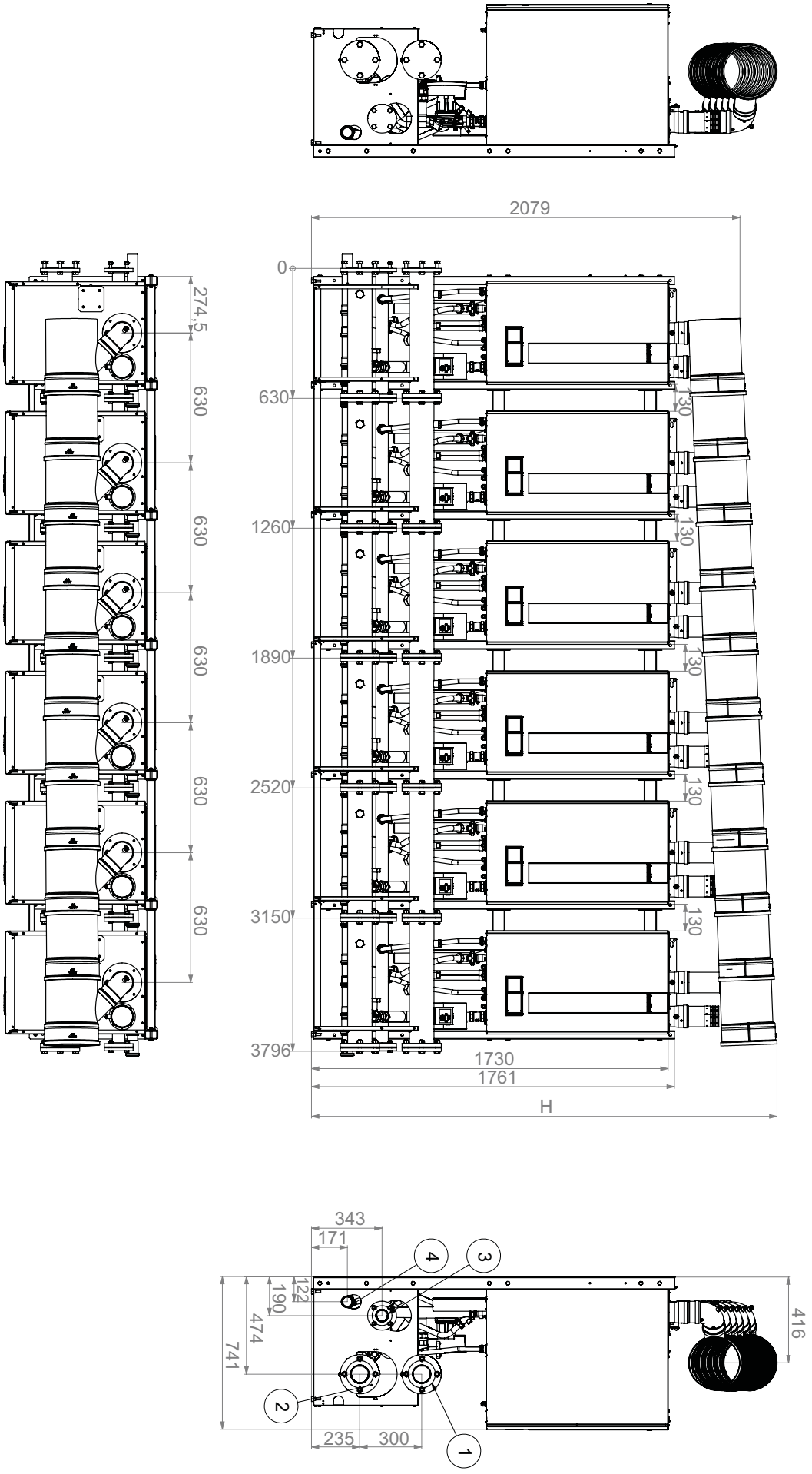


Fig. 4 Combination of left 120-150 direct collectors

Ref	Description
1	DN 80 PN 6 flanged primary circuit flow
2	DN 80 PN 6 flanged primary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	120	150			
-	-	-	bar	mm	mm
150	-	x1	5	160	2075
270	x1	x1			2095
300	-	x2			
360	x3	-	5	200	2135
390	x2	x1			
420	x1	x2			
450	-	x3			
480	x4	-			2170
510	x3	x1			
540	x2	x2			
570	x1	x3			
600	-	x4			
630	x4	x1	5	250	2230
660	x3	x2			
690	x2	x3			
720	x1	x4			
750	-	x5			
780	x4	x2			2260
810	x3	x3			
870	x1	x5			
900	-	x6			

WARNING

FOR ALL 'DIRECT COLLECTOR' CONFIGURATIONS, IT IS MANDATORY TO SEPARATE THE PRIMARY CIRCUIT FROM THE SECONDARY CIRCUIT USING A HYDRAULIC SEPARATOR OR A PLATE EXCHANGER, AFTER CHECKING THAT HYDRAULIC CONNECTIONS AND FLOW RESISTANCES ARE NOT GREATER THAN THOSE INDICATED IN PARAGRAPH *Pressure loss* **ON PAGE** *83*

1.4 Left/right hydraulic separator configuration

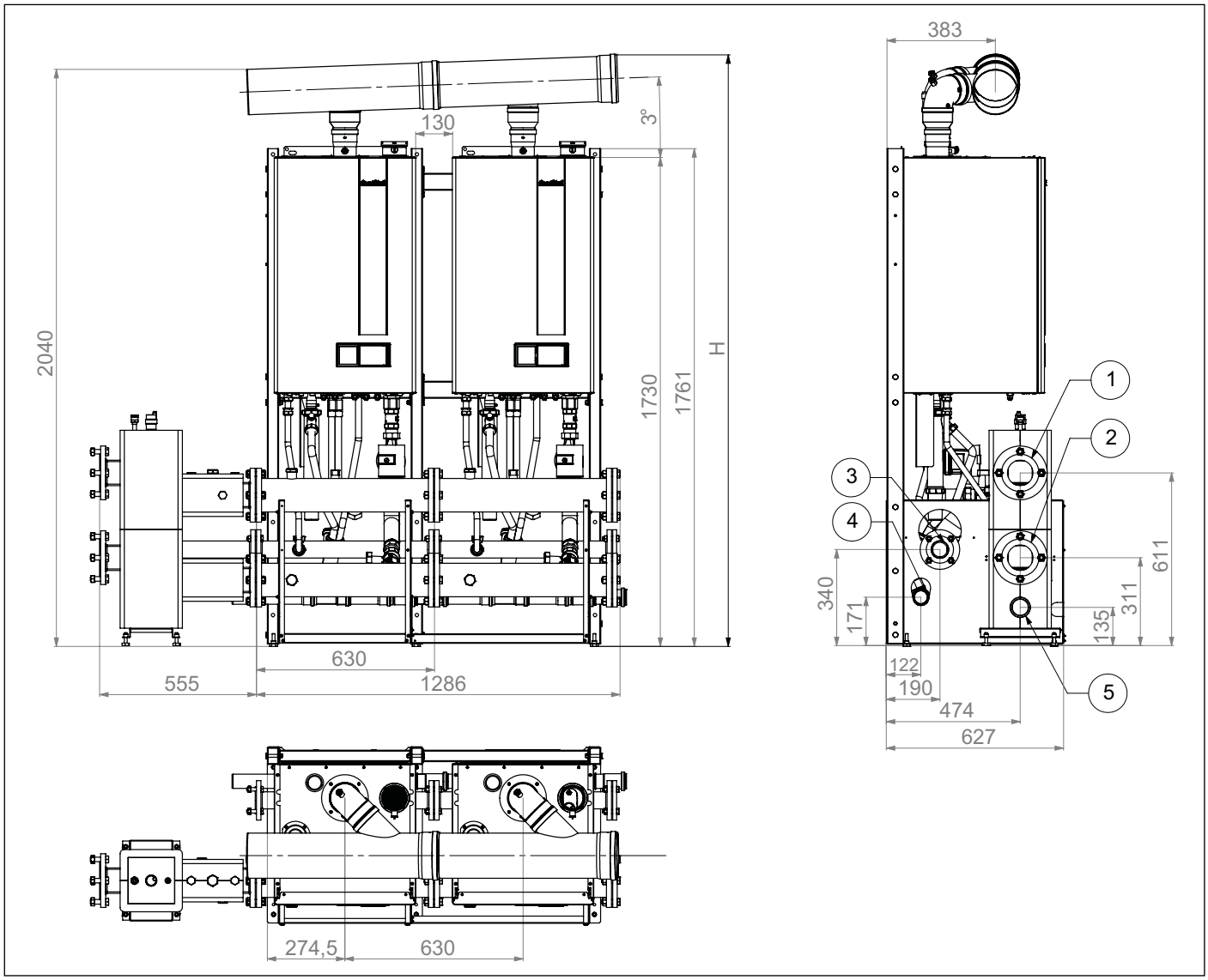


Fig. 5 Combination of left 45-60 hydraulic separator

Ref	Description
1	DN 80 PN 6 flanged secondary circuit flow
2	DN 80 PN 6 flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
5	Circuit breaker drain G 1 1/2 F

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	45	60			
-	-	-	bar	mm	mm
45	x1	-	3	160	2075
60	-	x1			
105	x1	x1			2095

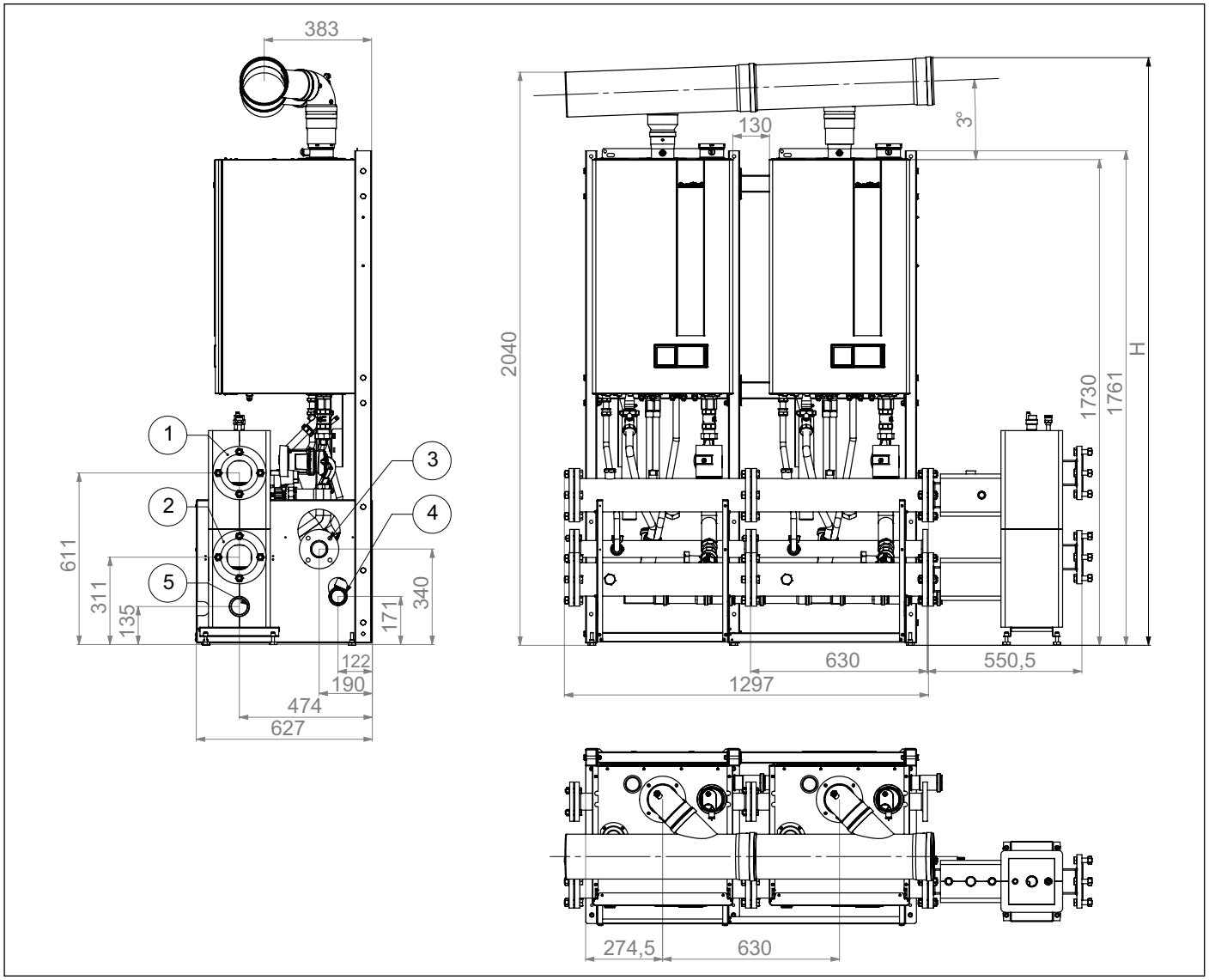


Fig. 6 Combination of right 45-60 hydraulic separator

Ref	Description
1	DN 80 PN 6 flanged secondary circuit flow
2	DN 80 PN 6 flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
5	Circuit breaker drain G 1 1/2 F

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	45	60			
-	-	-	bar	mm	mm
45	x1	-	3	160	2075
60	-	x1			
105	x1	x1			2095

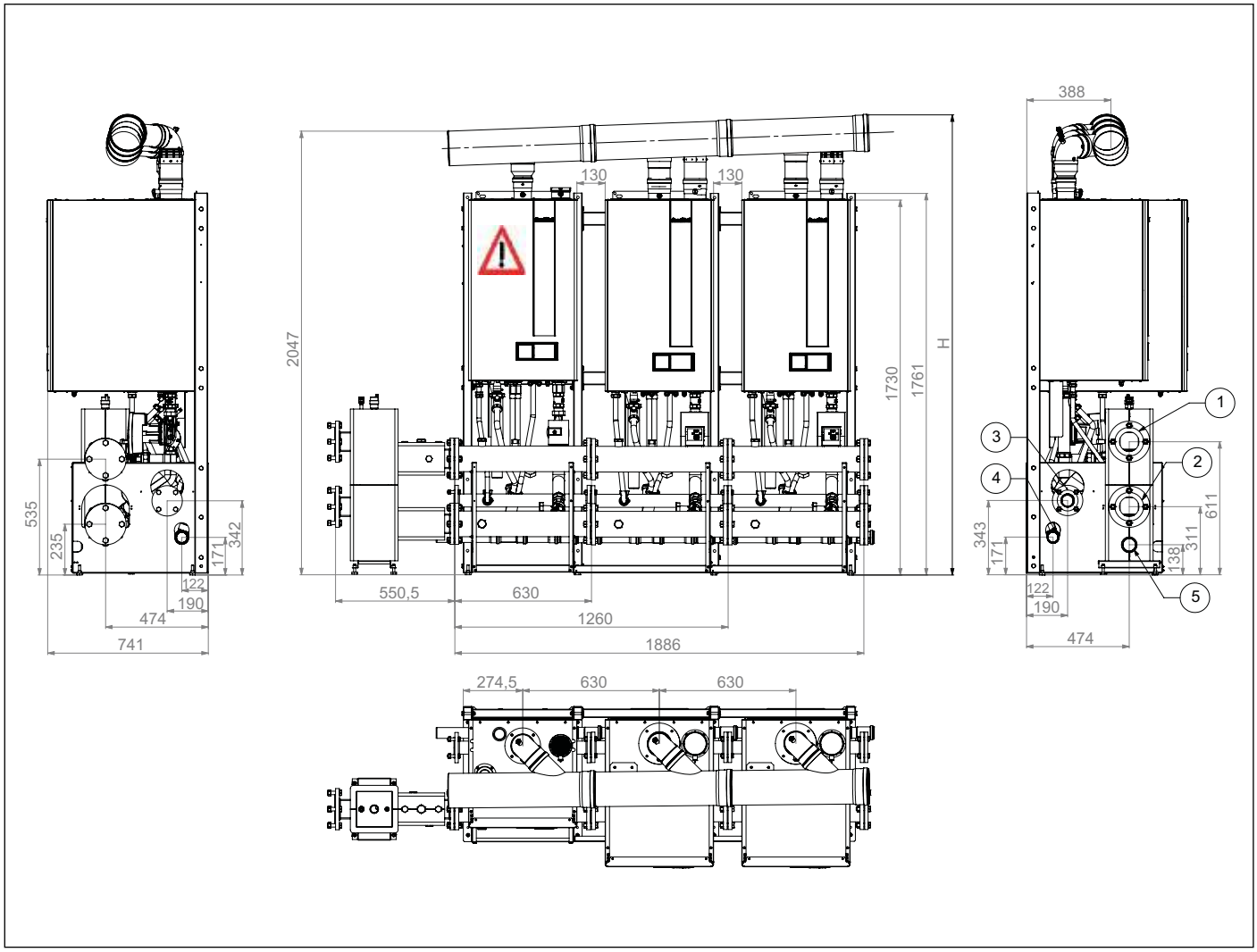


Fig. 7 Combination of left 85-120 hydraulic separator

Ref	Description
1	DN 80 PN 6 flanged secondary circuit flow
2	DN 80 PN 6 flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
5	Circuit breaker drain G 1 1/2 F

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	85	120			
-	-	-	bar	mm	mm
85	x1	-	5	160	2075
120	-	x1			
170	x2	-			2095
205(*)	x1	x1			
240	-	x2			
325(*)	x1	x2	5	200	2135

WARNING

(*) For these models the 85 boiler must be installed as head module.

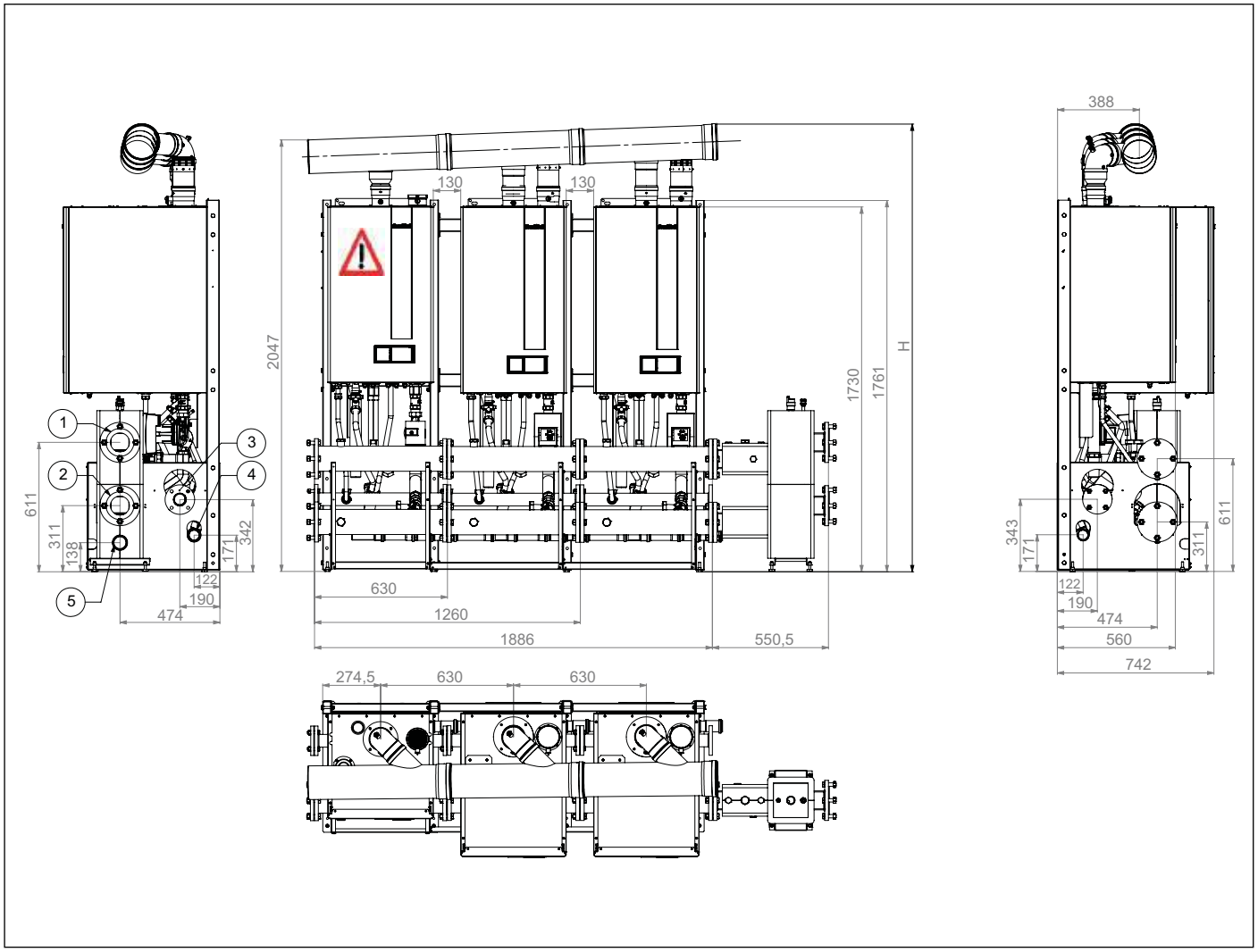


Fig. 8 Combination of right 85-120 hydraulic separator

Ref	Description
1	DN 80 PN 6 flanged secondary circuit flow
2	DN 80 PN 6 flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
5	Circuit breaker drain G 1 1/2 F

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	85	120			
-	-	-	bar	mm	mm
85	x1	-	5	160	2075
120	-	x1			
170	x2	-			2095
205(*)	x1	x1			
240	-	x2			
325(*)	x1	x2	5	200	2135

WARNING

(*) For these models the 85 boiler must be installed as head module.

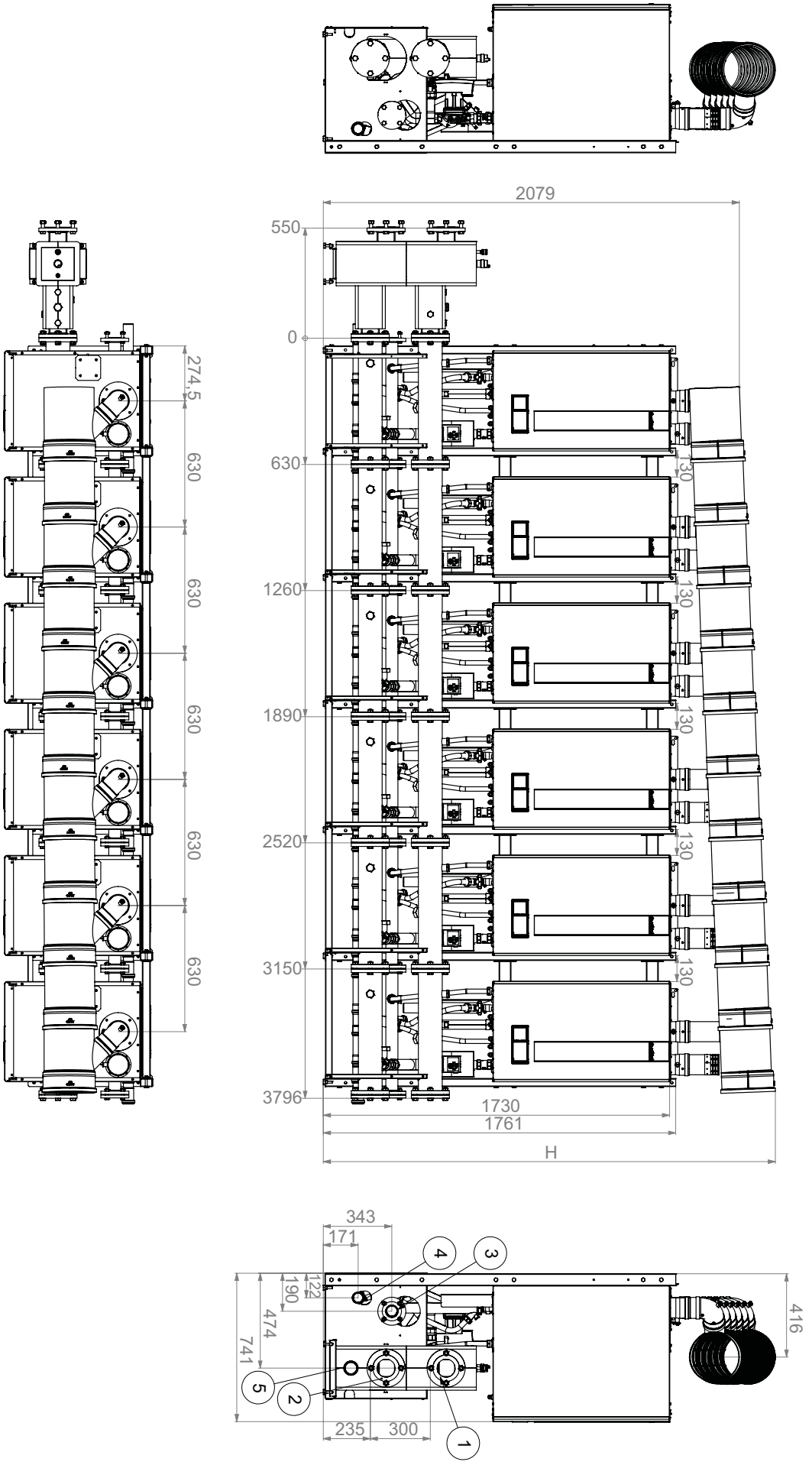


Fig. 9 Combination of left 120-150 hydraulic separator

Ref	Description
1	DN 80 PN 6 flanged secondary circuit flow
2	DN 80 PN 6 flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
5	Circuit breaker drain G 1 1/2 F

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	120	150			
-	-	-	bar	mm	mm
150	-	x1	5	160	2075
270	x1	x1			2095
300	-	x2			
360	x3	-	5	200	2135
390	x2	x1			
420	x1	x2			
450	-	x3			
480	x4	-			2170
510	x3	x1			
540	x2	x2			
570	x1	x3			
600	-	x4			
630	x4	x1	5	250	2230
660	x3	x2			
690	x2	x3			
720	x1	x4			
750	-	x5			
780	x4	x2			2260
810	x3	x3			
870	x1	x5			
900	-	x6			

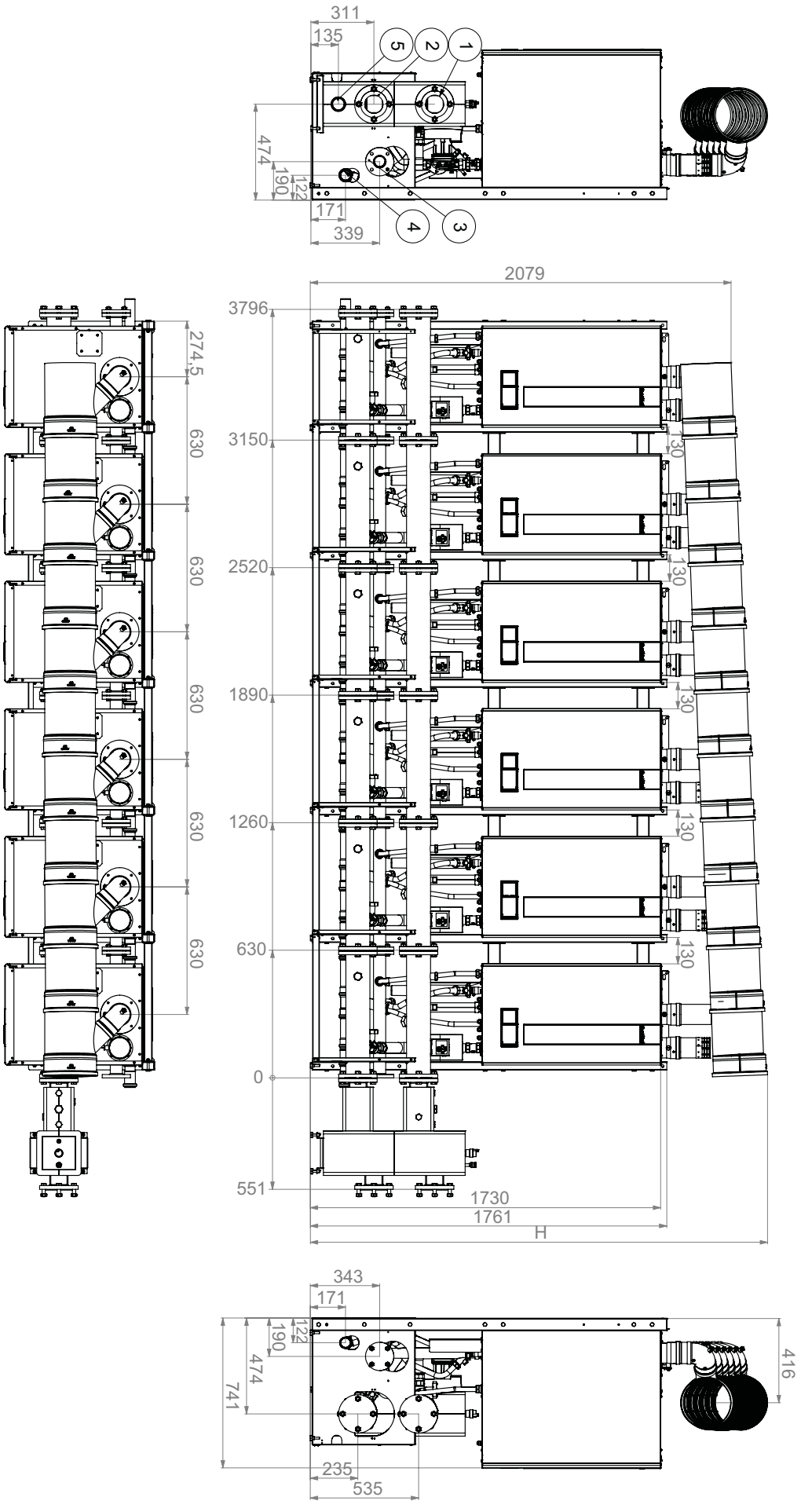


Fig. 10 Combination of right 120-150 hydraulic separator

Ref	Description
1	DN 80 PN 6 flanged secondary circuit flow
2	DN 80 PN 6 flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
5	Circuit breaker drain G 1 1/2 F

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	120	150			
-	-	-	bar	mm	mm
150	-	x1	5	160	2075
270	x1	x1			2095
300	-	x2			
360	x3	-	5	200	2135
390	x2	x1			
420	x1	x2			
450	-	x3			
480	x4	-			2170
510	x3	x1			
540	x2	x2			
570	x1	x3			
600	-	x4			
630	x4	x1	5	250	2230
660	x3	x2			
690	x2	x3			
720	x1	x4			
750	-	x5			
780	x4	x2			2260
810	x3	x3			
870	x1	x5			
900	-	x6			

1.5 Left/right plate exchanger configuration

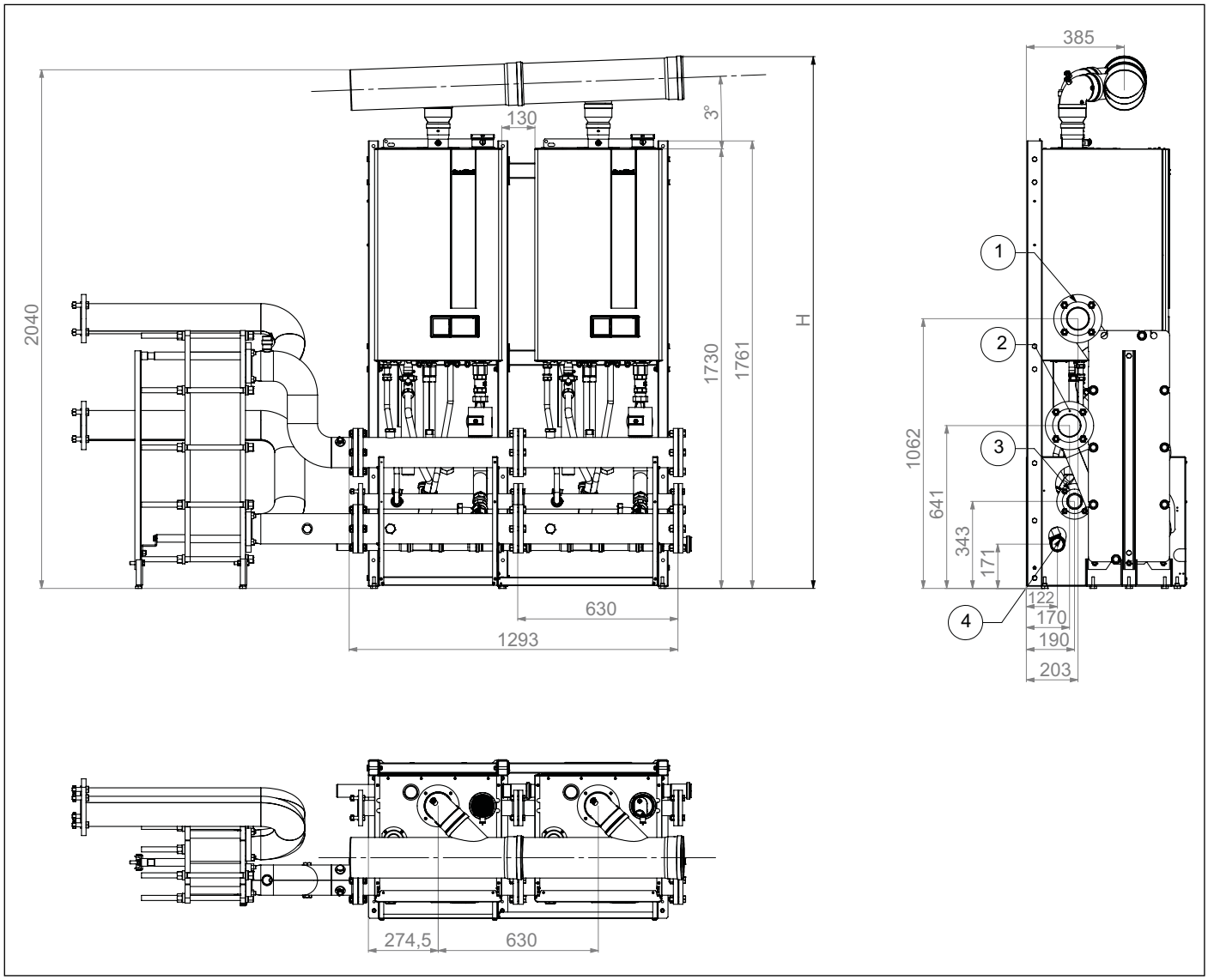


Fig. 11 Combination of left 45-60 plate exchanger

Ref	Description
1	DN 80 PN 6 (**) flanged secondary circuit flow
2	DN 80 PN 6 (**) flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
(**)	**ATTENTION: flow and return manifolds to be connected to the secondary circuit of the plate exchanger are optional**

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	45	60			
-	-	-	bar	mm	mm
45	x1	-	3	160	2075
60	-	x1			
105	x1	x1			2095

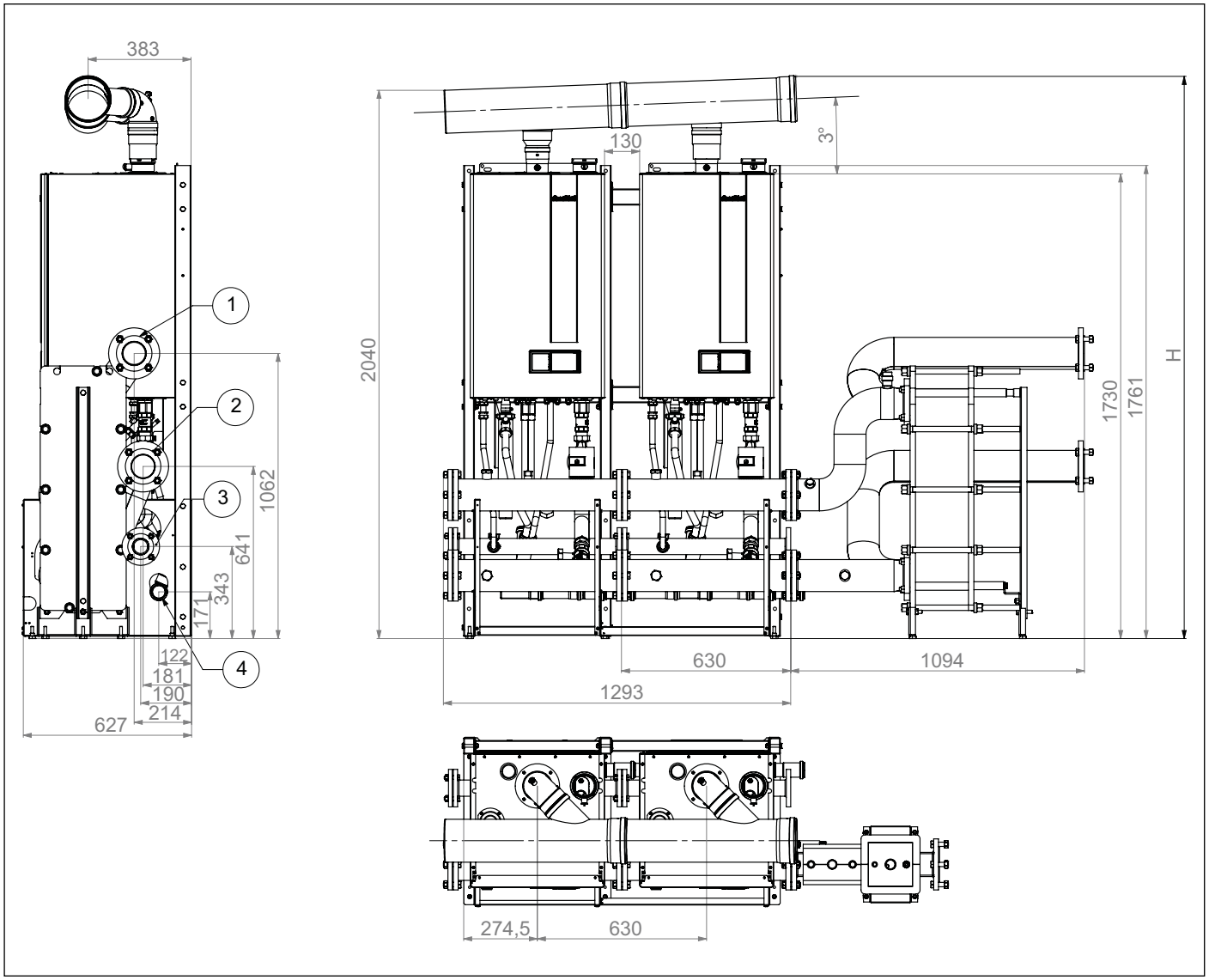


Fig. 12 Combination of right 45-60 plate exchanger

Ref	Description
1	DN 80 PN 6 (**) flanged secondary circuit flow
2	DN 80 PN 6 (**) flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
(**)	**ATTENTION: flow and return manifolds to be connected to the secondary circuit of the plate exchanger are optional**

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	45	60			
-	-	-	bar	mm	mm
45	x1	-	3	160	2075
60	-	x1			
105	x1	x1			2095

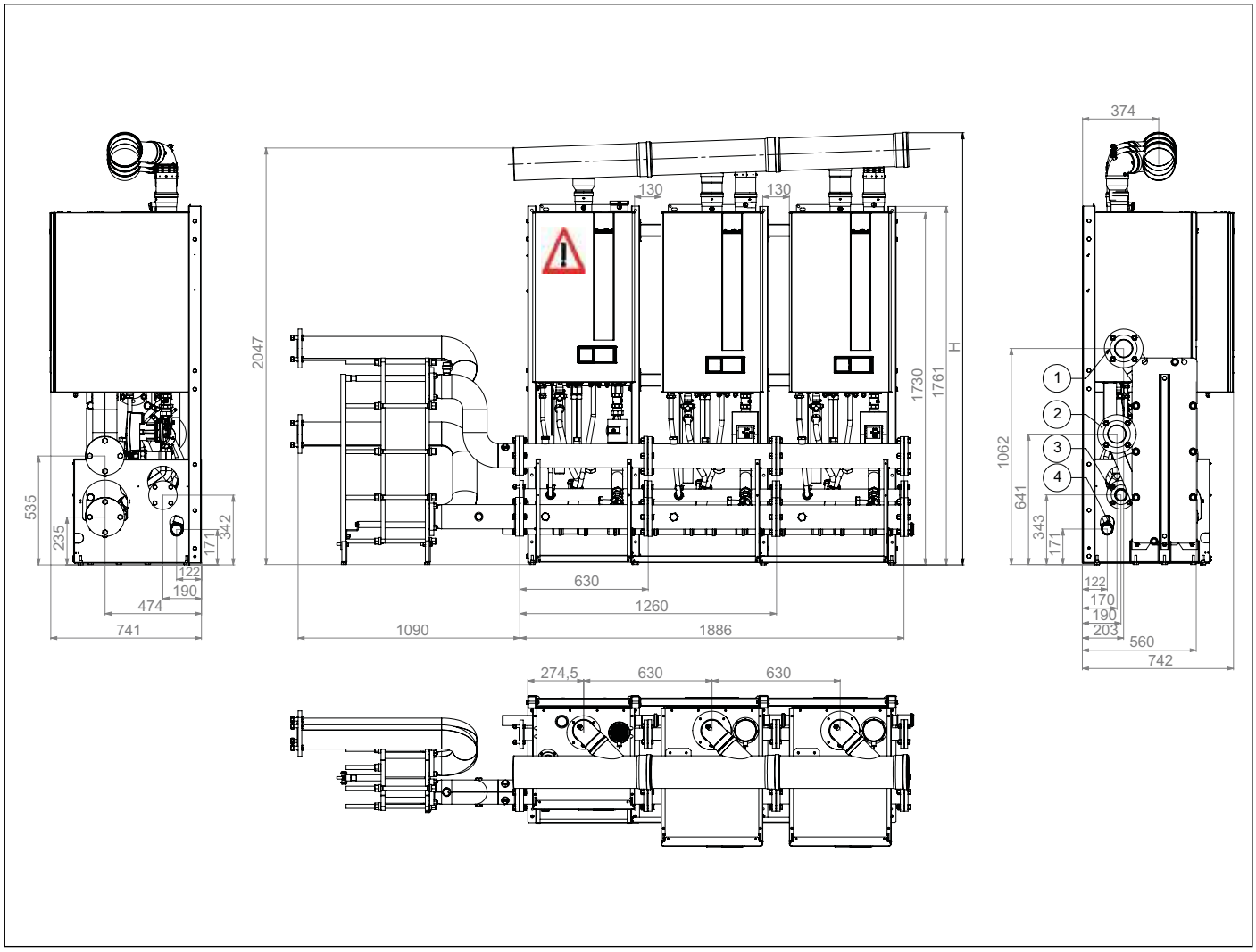


Fig. 13 Combination of left 85-120 plate exchanger

Ref	Description
1	DN 80 PN 6 (**) flanged secondary circuit flow
2	DN 80 PN 6 (**) flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
(**)	**ATTENTION: flow and return manifolds to be connected to the secondary circuit of the plate exchanger are optional**

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	85	120			
-	-	-	bar	mm	mm
85	x1	-	5	160	2075
120	-	x1			
170	x2	-			2095
205(*)	x1	x1			
240	-	x2			
325(*)	x1	x2	5	200	2135

WARNING

(*) For these models the 85 boiler must be installed as head module.

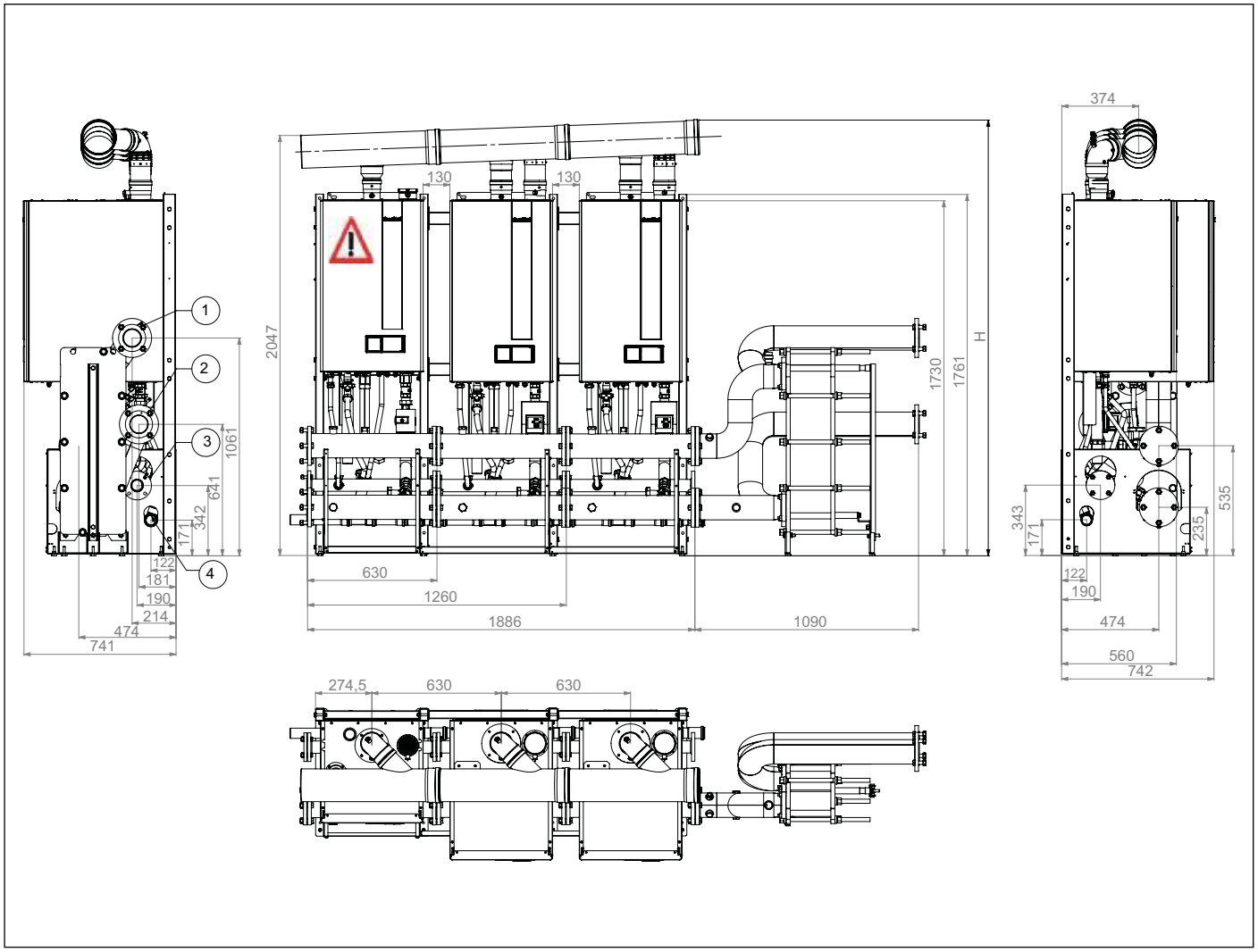


Fig. 14 Combination of right 85-120 plate exchanger

Ref	Description
1	DN 80 PN 6 (**) flanged secondary circuit flow
2	DN 80 PN 6 (**) flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
(**)	**ATTENTION: flow and return manifolds to be connected to the secondary circuit of the plate exchanger are optional**

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	85	120			
-	-	-	bar	mm	mm
85	x1	-	5	160	2075
120	-	x1			
170	x2	-			2095
205(*)	x1	x1			
240	-	x2			
325(*)	x1	x2	5	200	2135

WARNING

(*) For these models the 85 boiler must be installed as head module.

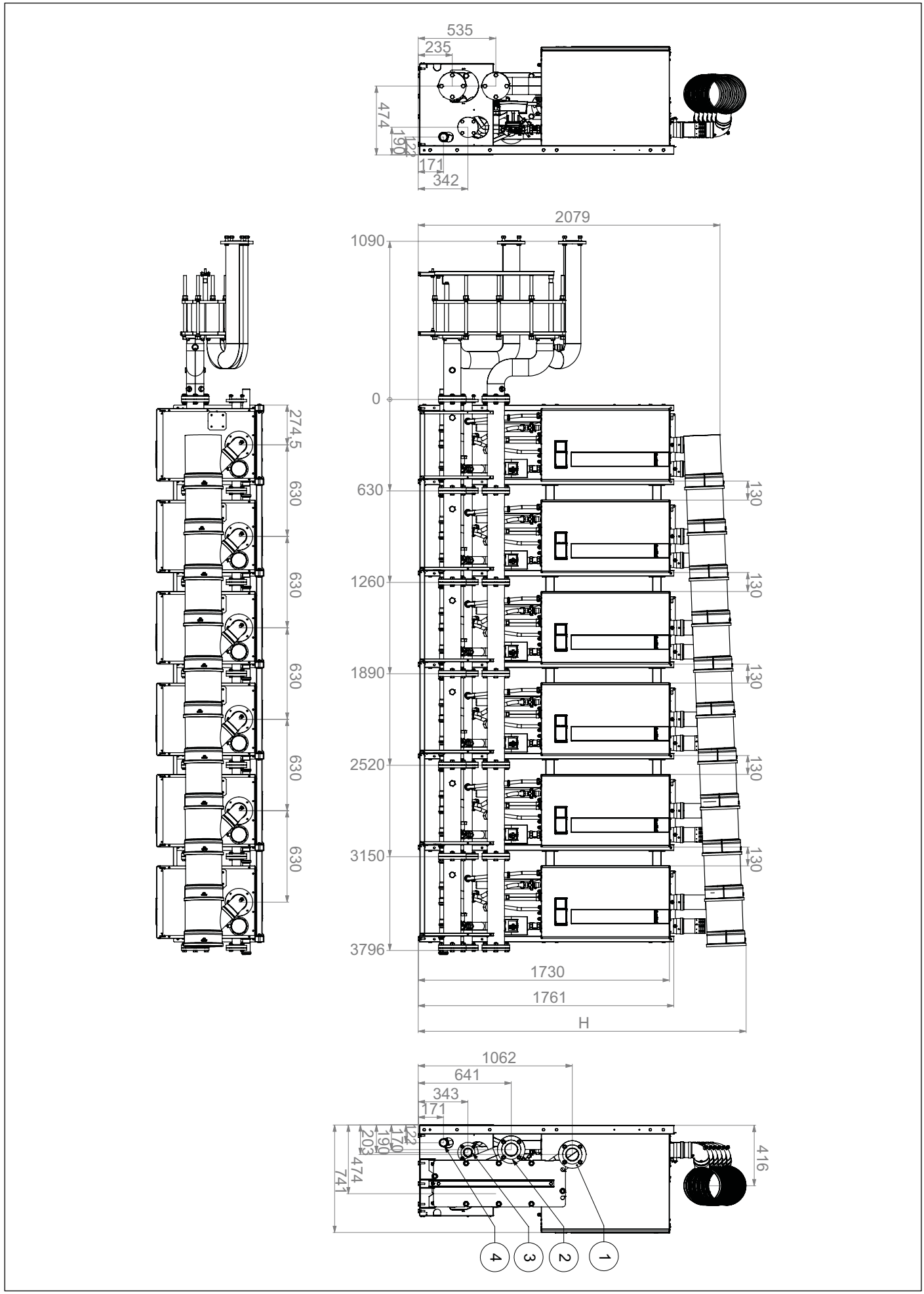


Fig. 15 Combination of left 120-150 plate exchanger

Ref	Description
1	DN 80 PN 6 (**) flanged secondary circuit flow
2	DN 80 PN 6 (**) flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
(**)	**ATTENTION: flow and return manifolds to be connected to the secondary circuit of the plate exchanger are optional**

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	120	150			
-	-	-	bar	mm	mm
150	-	x1	5	160	2075
270	x1	x1			2095
300	-	x2			
360	x3	-	5	200	2135
390	x2	x1			
420	x1	x2			
450	-	x3			
480	x4	-			2170
510	x3	x1			
540	x2	x2			
570	x1	x3			
600	-	x4			
630	x4	x1	5	250	2230
660	x3	x2			
690	x2	x3			
720	x1	x4			
750	-	x5			
780	x4	x2			2260
810	x3	x3			
870	x1	x5			
900	-	x6			

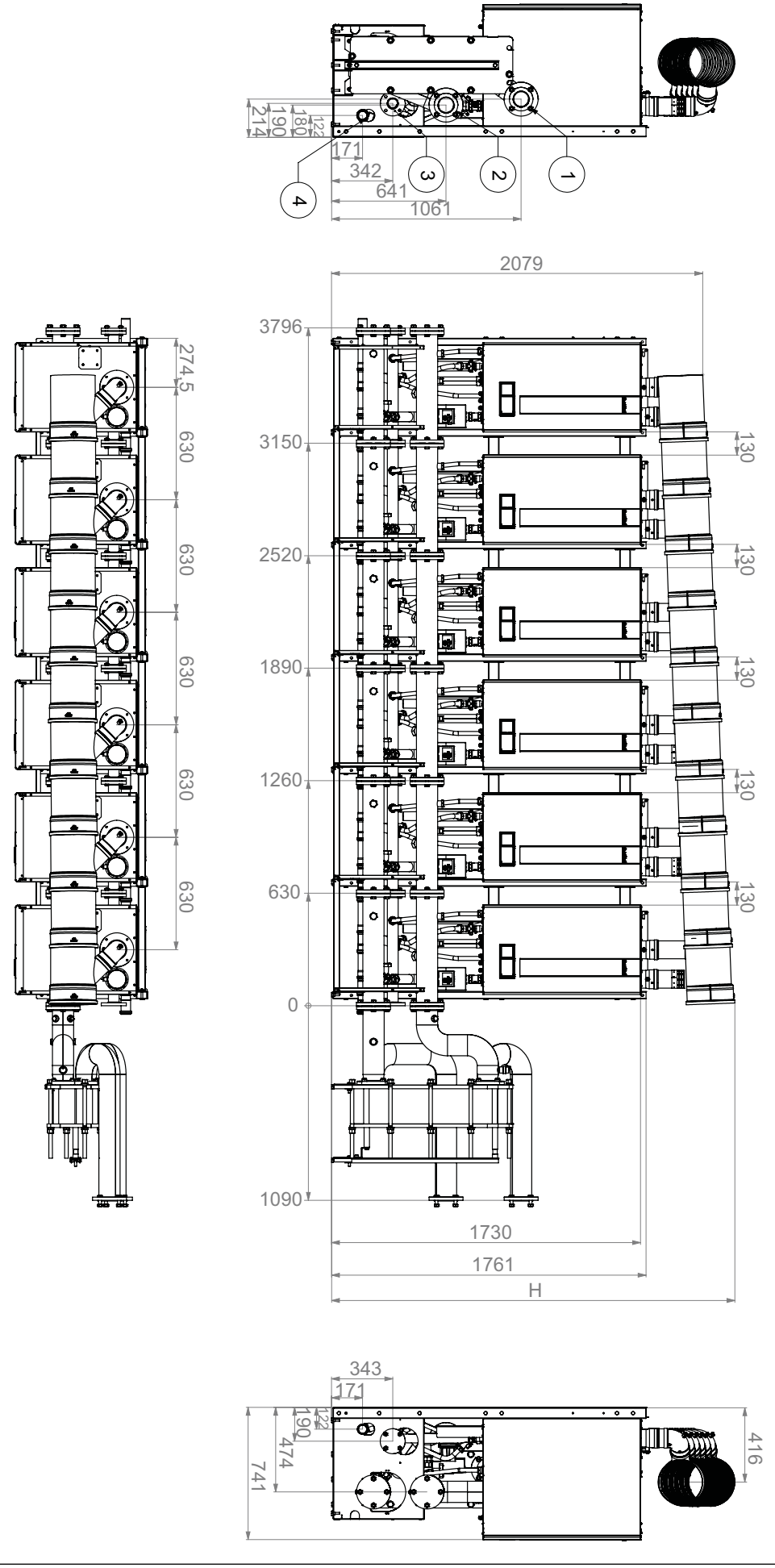
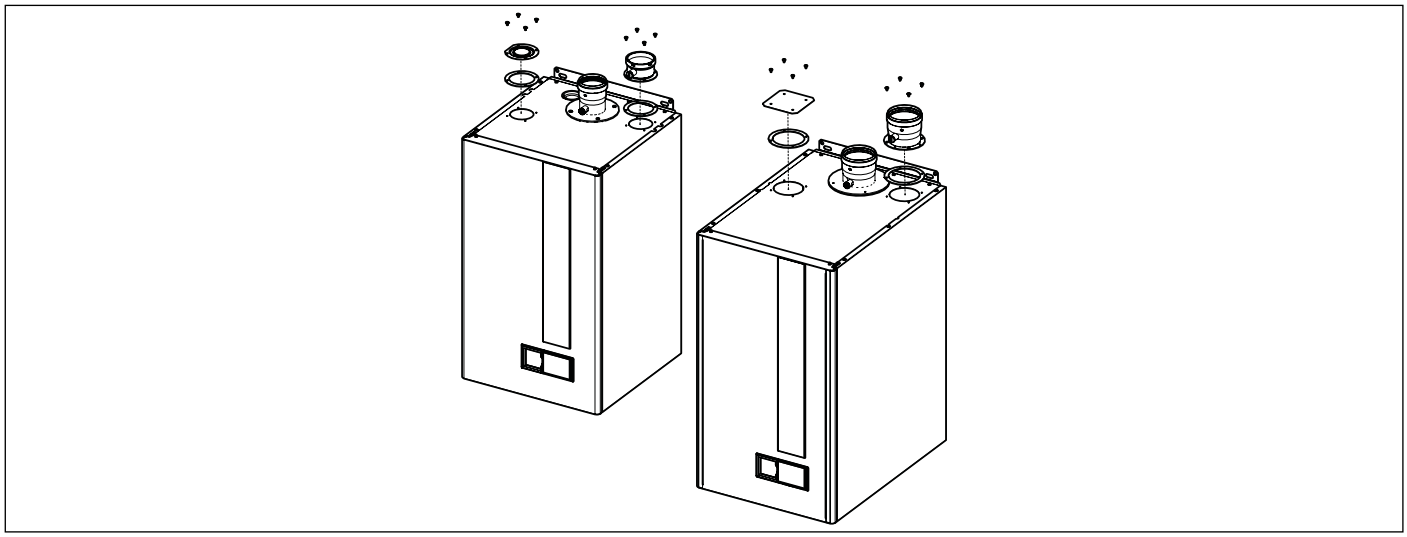


Fig. 16 Combination of right 120-150 plate exchanger

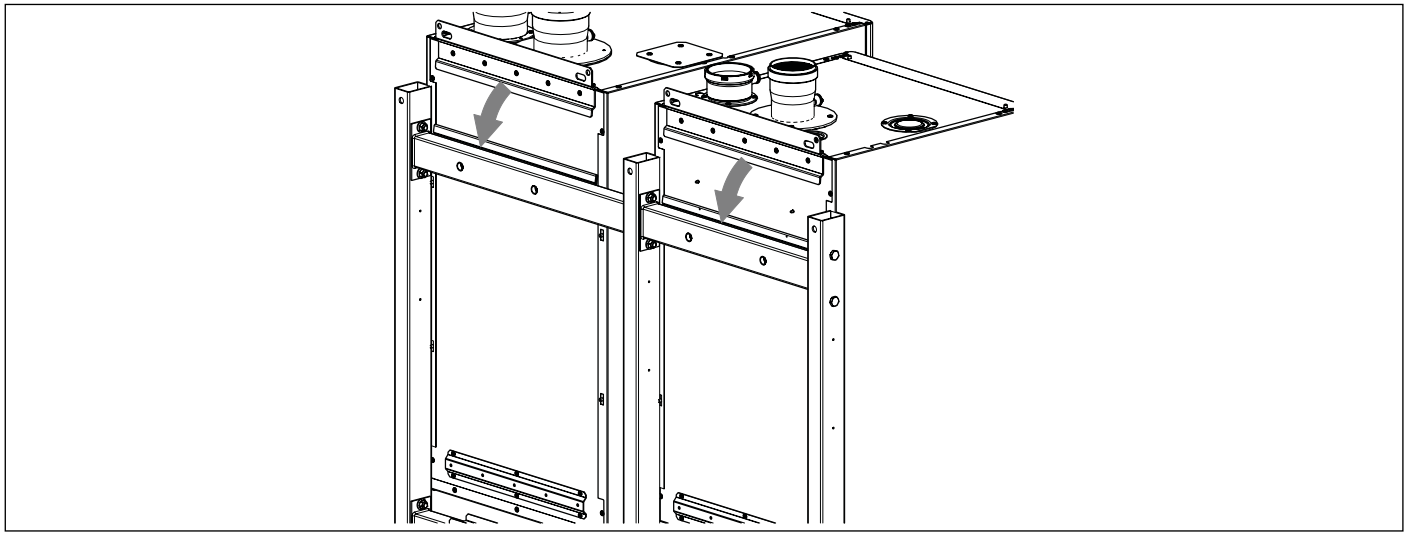
Ref	Description
1	DN 80 PN 6 (**) flanged secondary circuit flow
2	DN 80 PN 6 (**) flanged secondary circuit return
3	DN 50 PN 6 flanged gas inlet
4	DN 50 condensate drain
(**)	**ATTENTION: flow and return manifolds to be connected to the secondary circuit of the plate exchanger are optional**

MODULAR GENERATOR MODEL	CH KR HEAT GENERATORS		MAXIMUM SYSTEM PRESSURE	FLUE GAS VENT MINIMUM DIAMETER	FLUE GAS VENT HEIGHT [H]
	120	150			
-	-	-	bar	mm	mm
150	-	x1	5	160	2075
270	x1	x1			2095
300	-	x2			
360	x3	-	5	200	2135
390	x2	x1			
420	x1	x2			
450	-	x3			
480	x4	-			2170
510	x3	x1			
540	x2	x2			
570	x1	x3			
600	-	x4			
630	x4	x1	5	250	2230
660	x3	x2			
690	x2	x3			
720	x1	x4			
750	-	x5			
780	x4	x2			2260
810	x3	x3			
870	x1	x5			
900	-	x6			

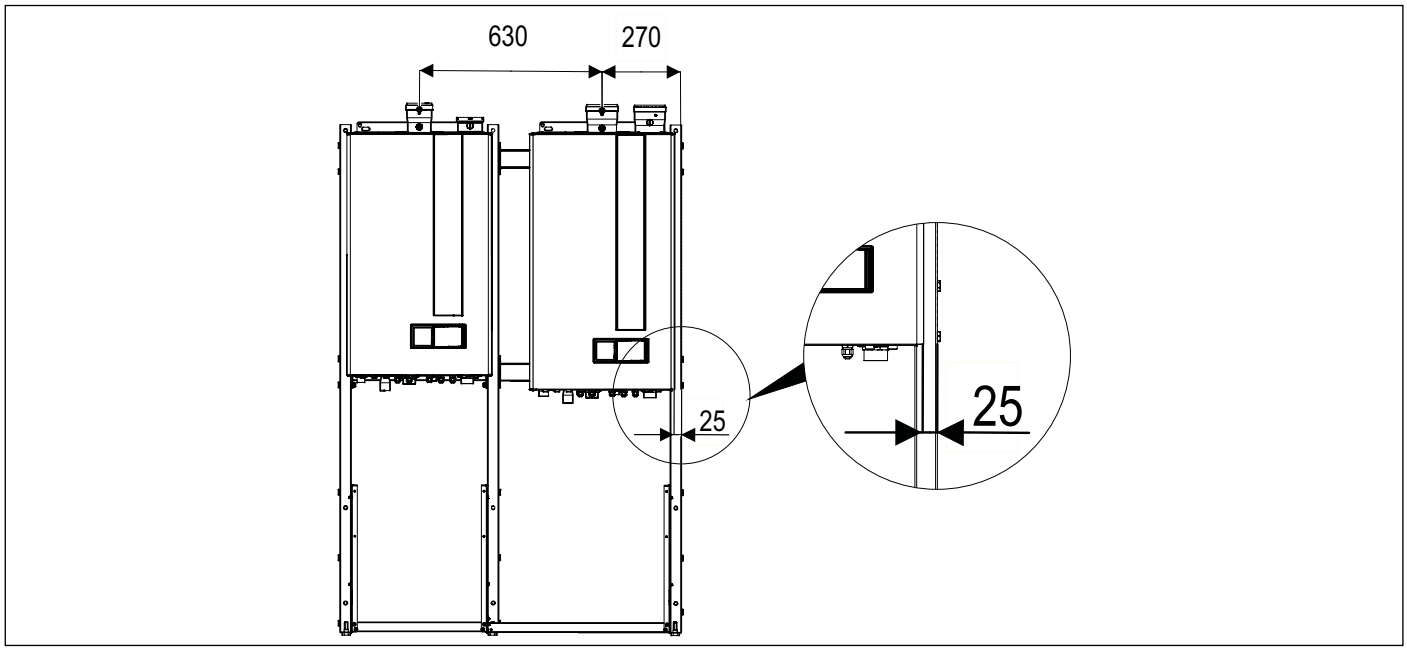
1.6 Positioning of generators on the frame



Fit the vent stub pipes and the relevant flue gas caps on all generators, as shown in the figure.

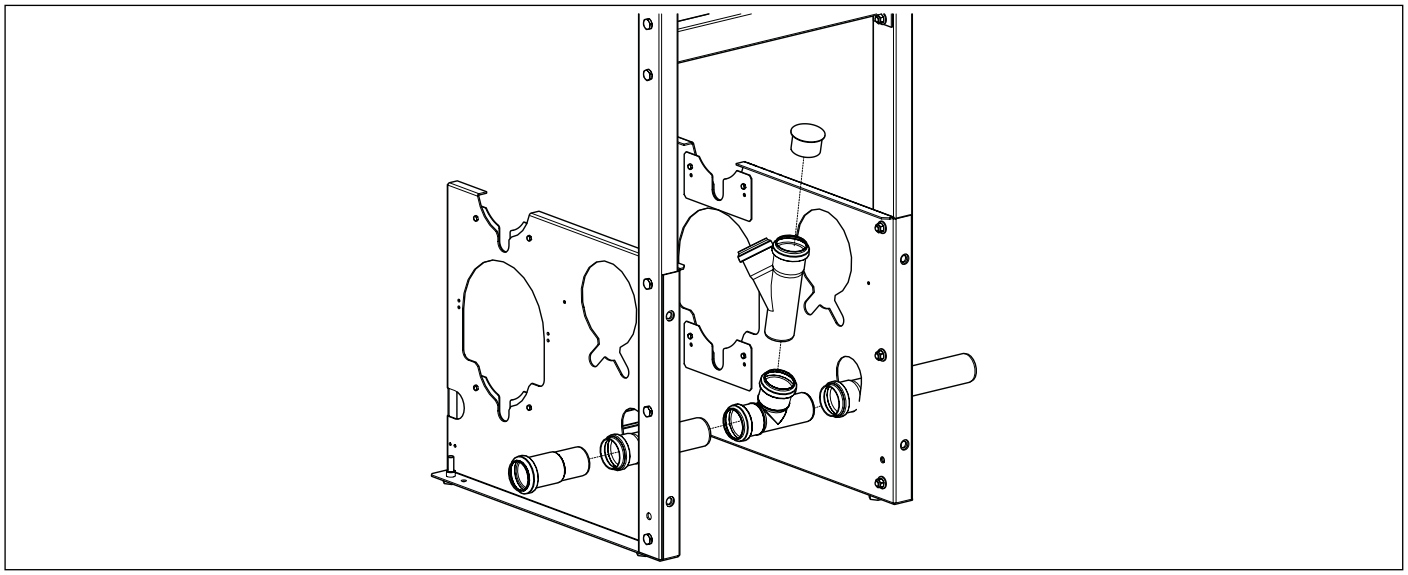


Fasten the generators to the rack as shown in the figure.

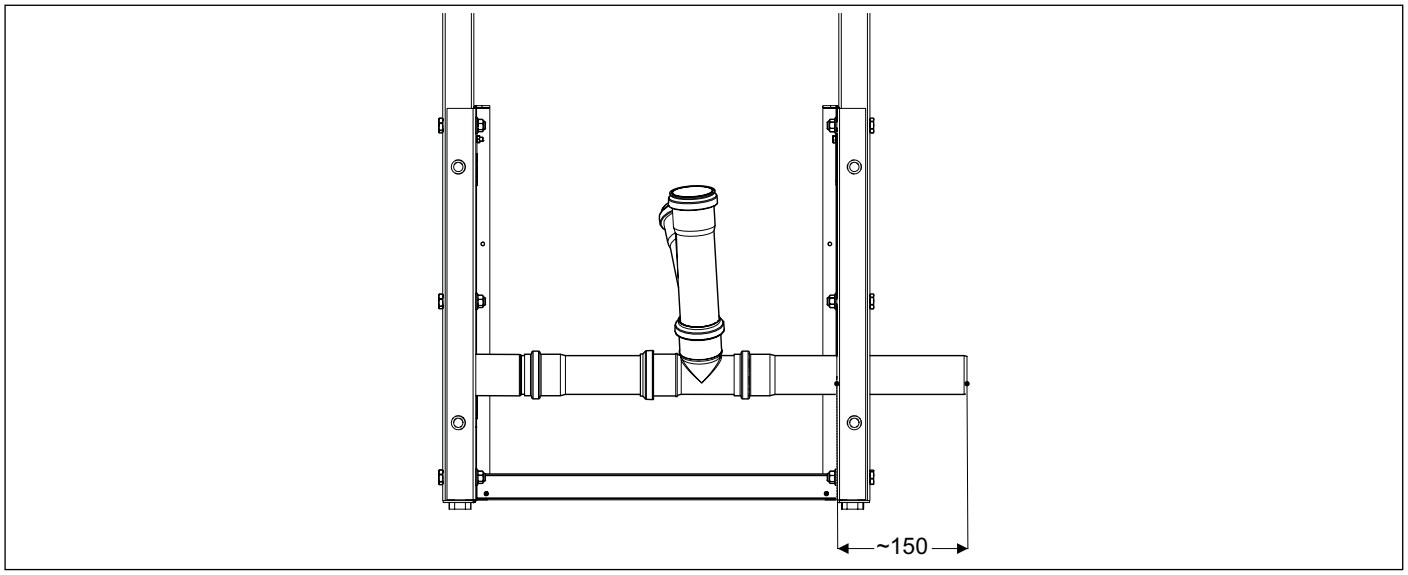


Check that the two generators are positioned on the rack according to the values indicated in the figure.

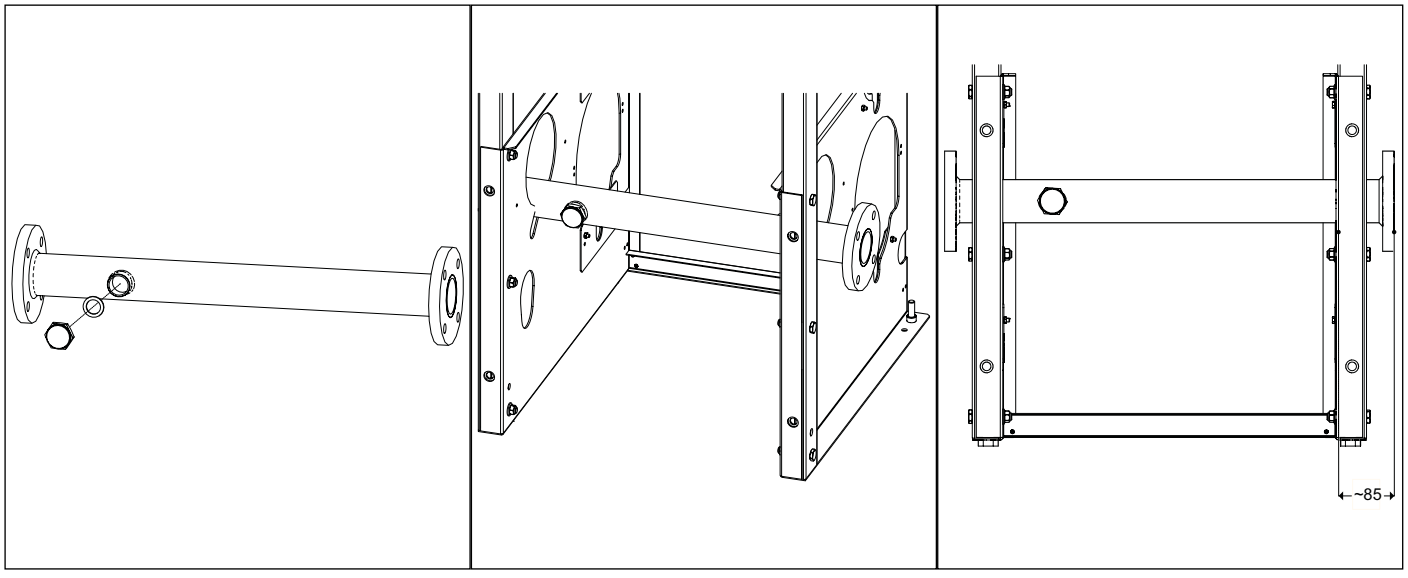
1.7 Assembling the hydraulic and gas components of the head module



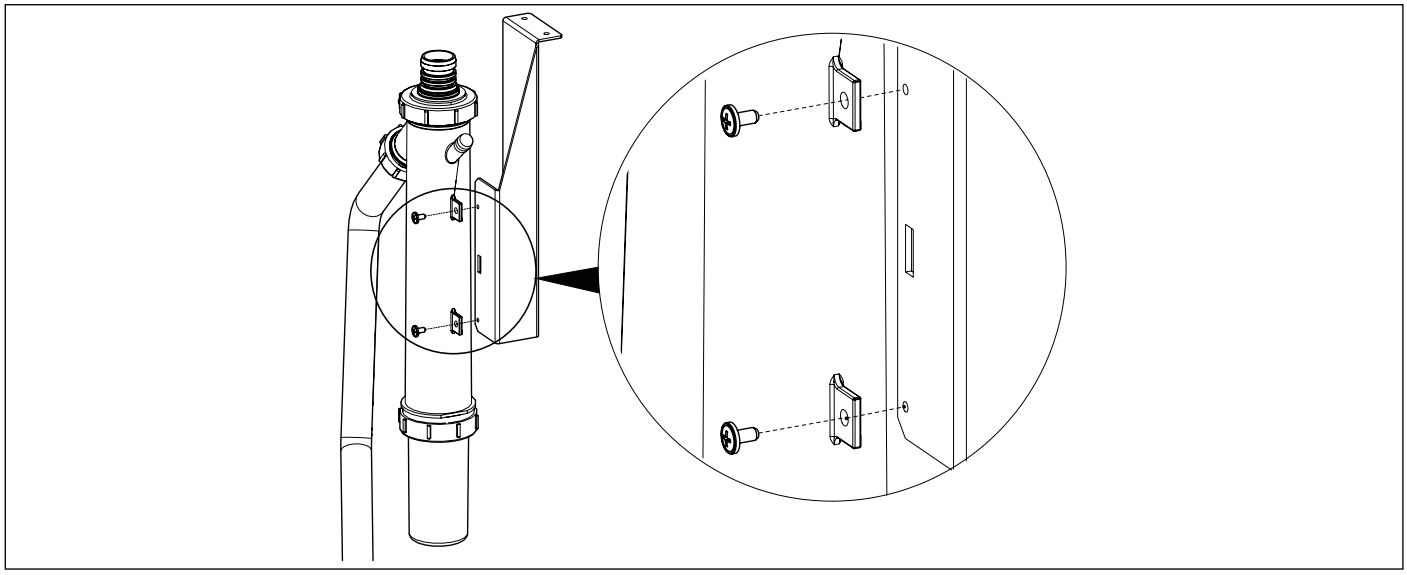
Assemble the condensate drain following the instructions in the figure above.



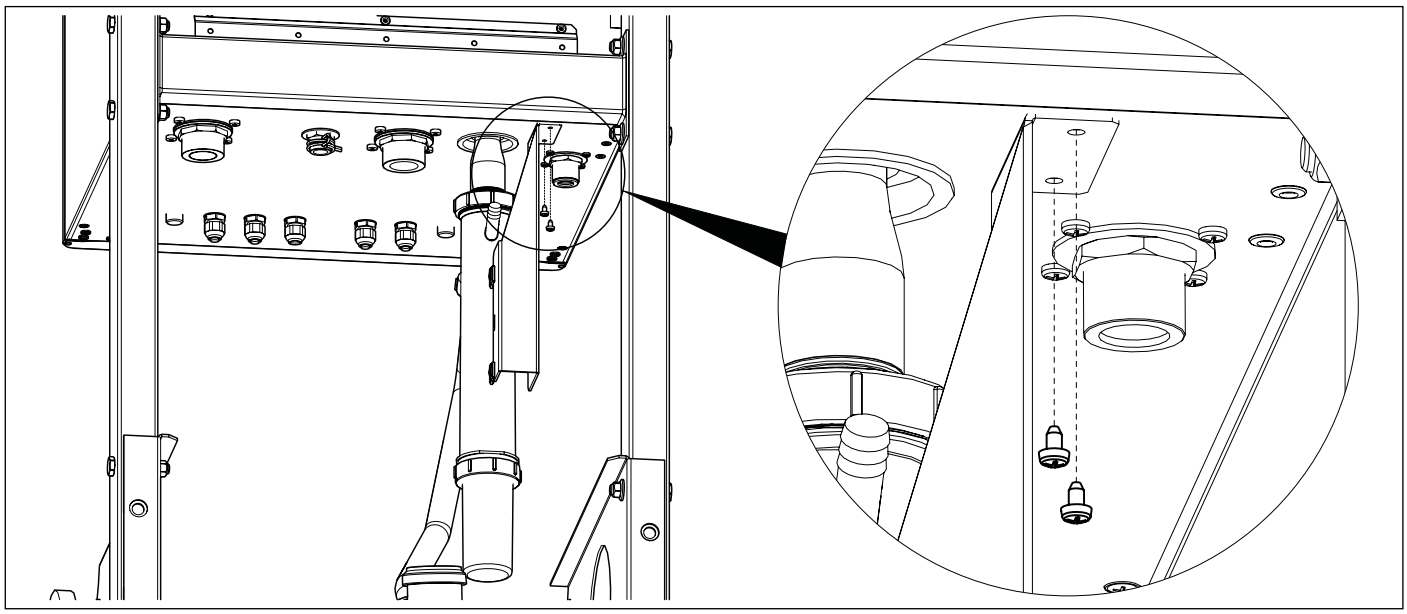
Check that the condensate drain is approximately positioned according to the value indicated in the figure.



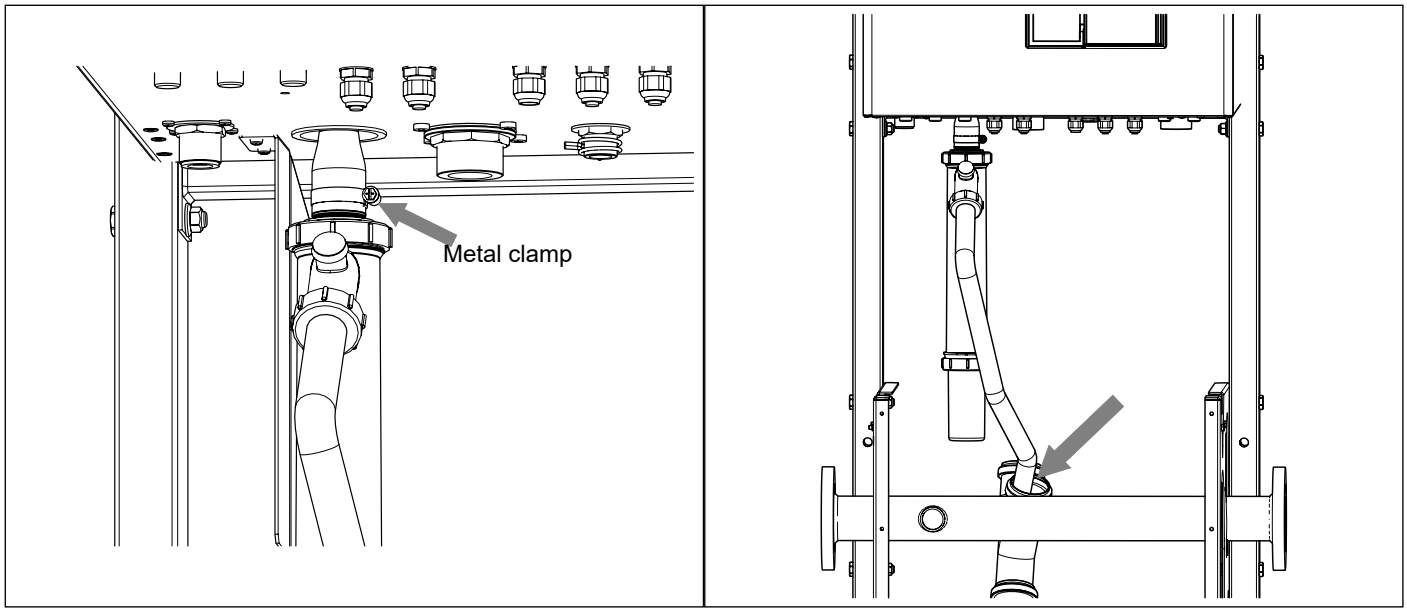
Fasten the cap to the gas collector using the gasket supplied. Position the gas collector as shown in the figure above.
Check that the gas collector is approximately positioned according to the value indicated in the figure.



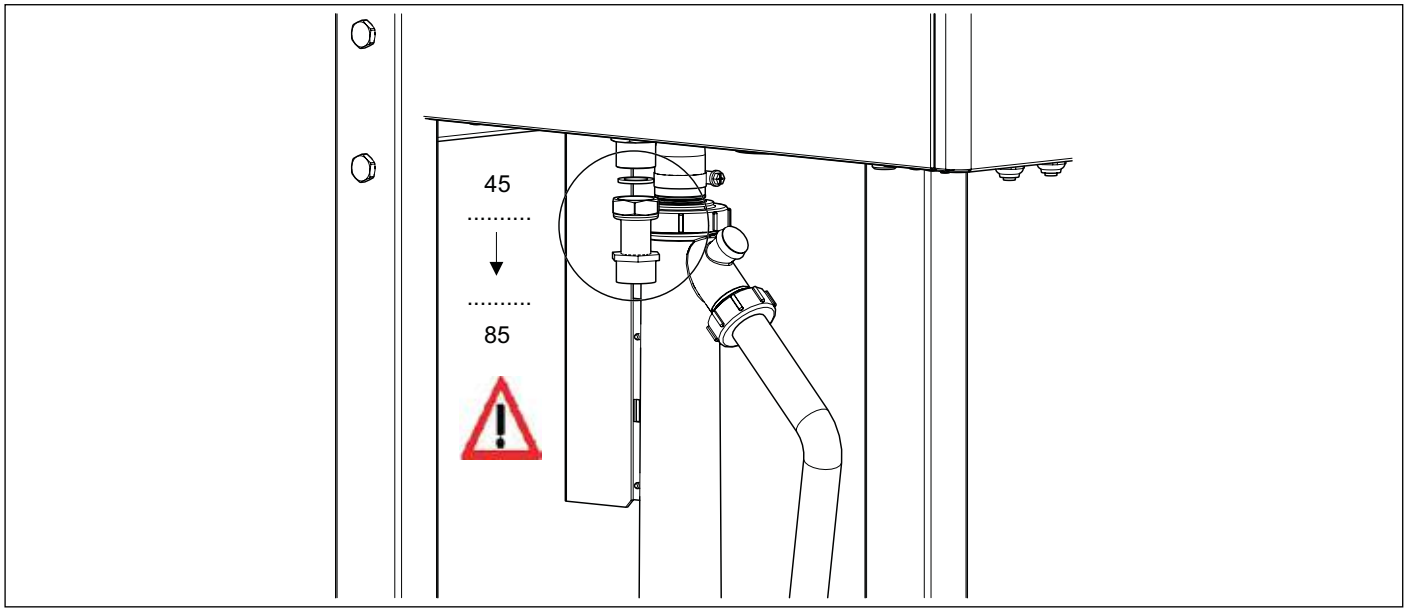
Using screws, fasten the bracket to the condensate trap.



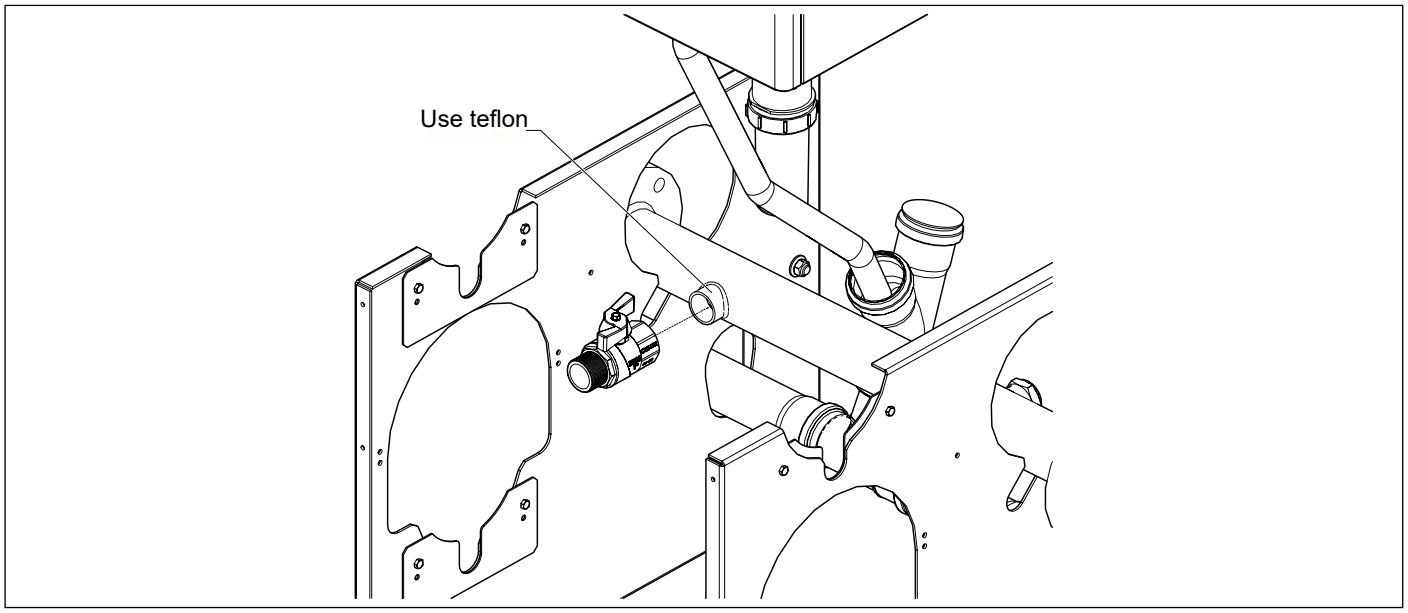
Using screws, fasten the bracket with the trap to the lower part of the boiler as shown in the figure.



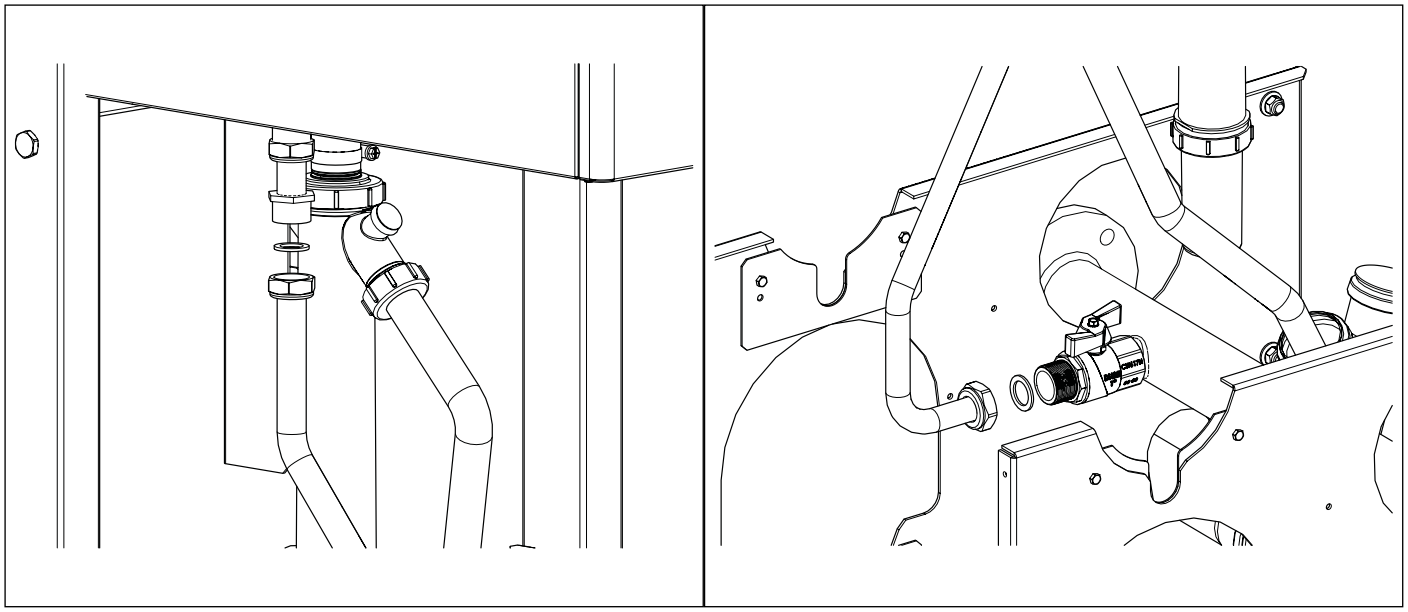
Fasten the trap with the metal clamp as shown in the figure. Connect the trap drain to the drain pipe.



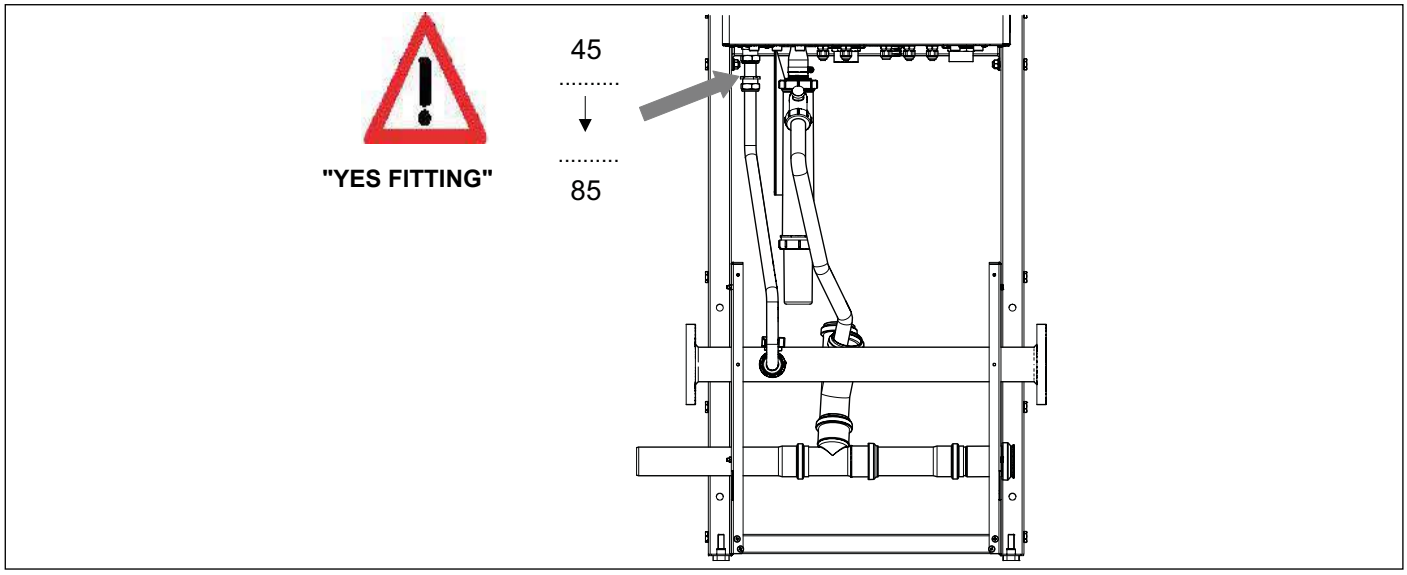
Fit the gasket and the gas fitting only for boiler models from 45 to 85.



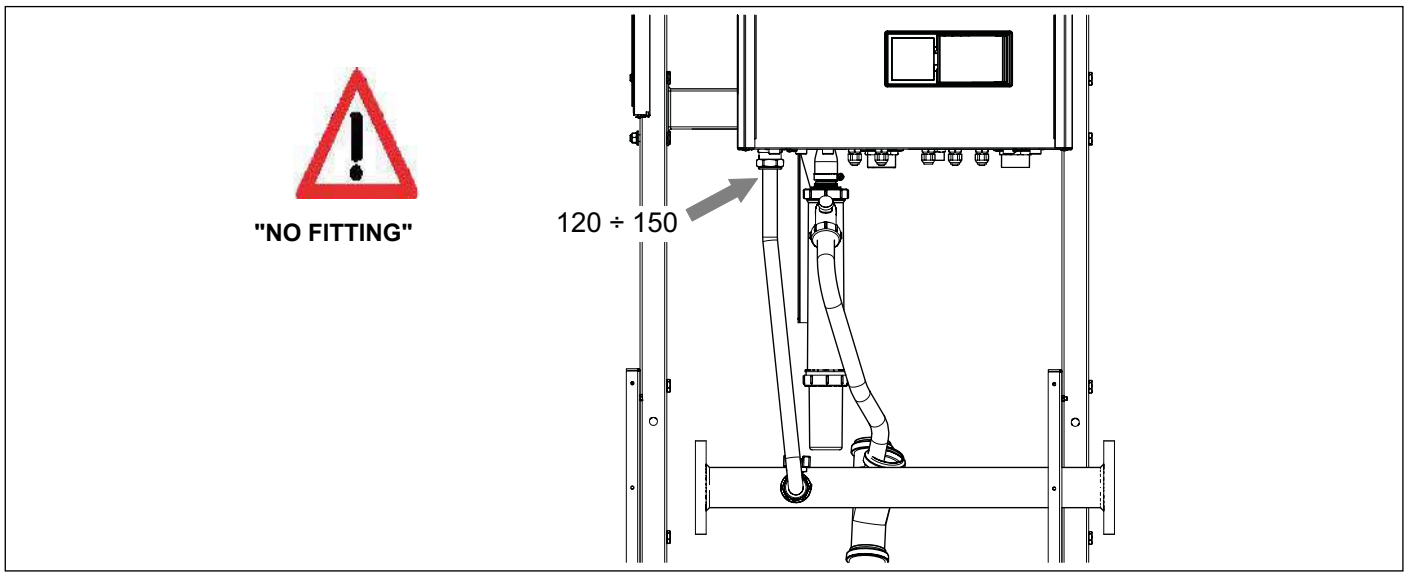
Fit the gas tap.



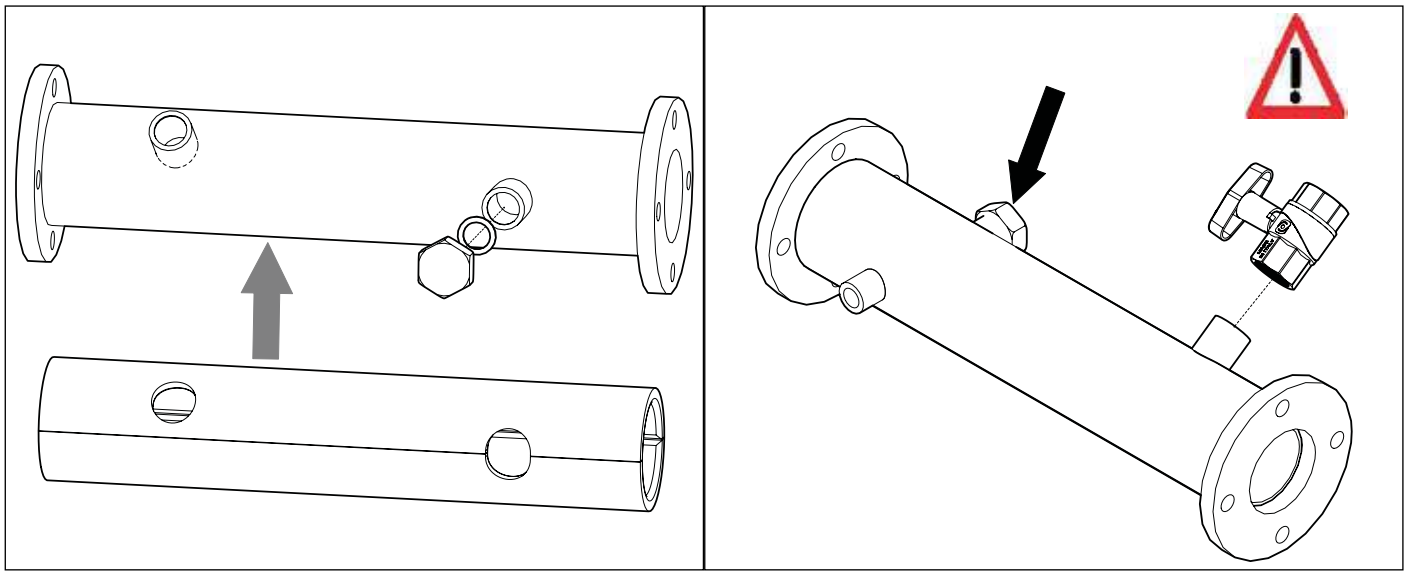
Fasten the gas pipe by placing the gaskets supplied in-between.



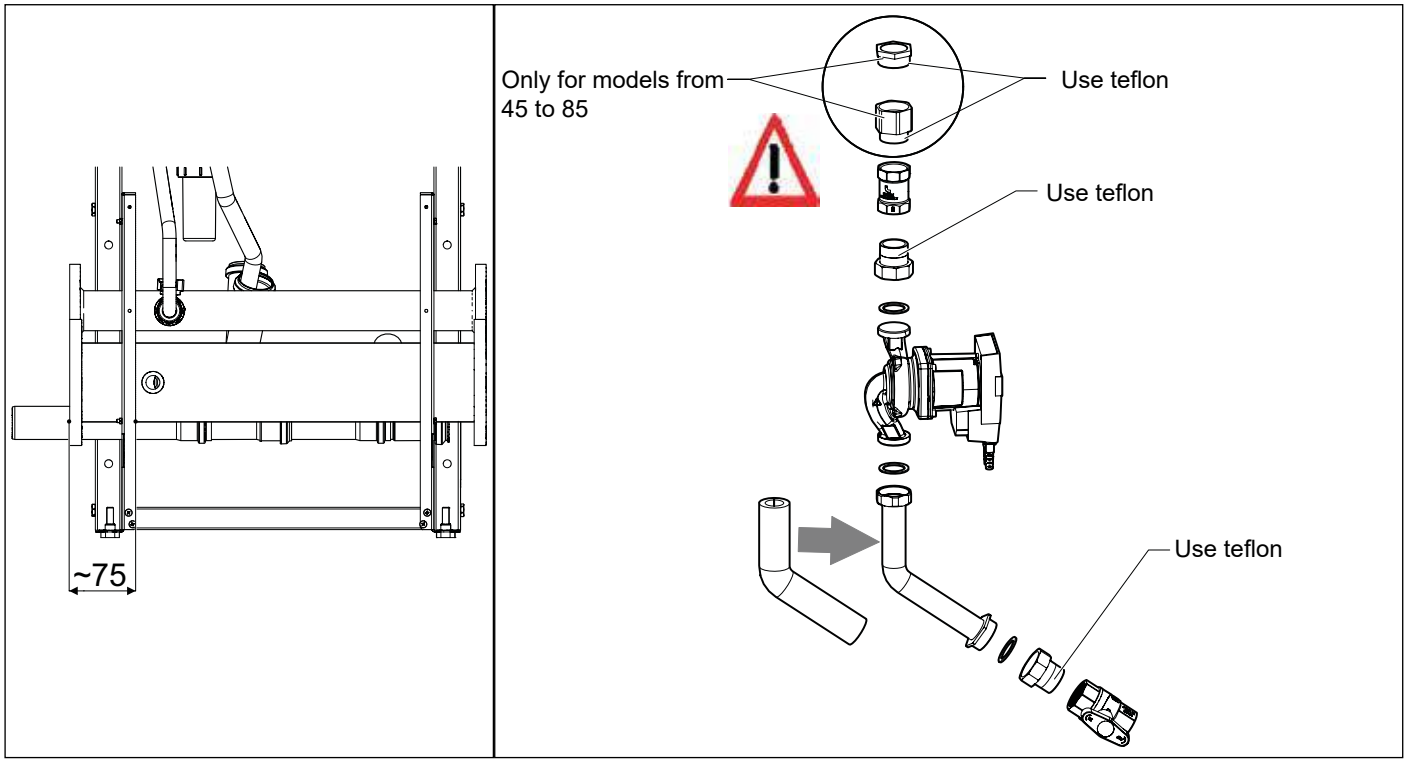
Fitting the gas pipe in case of boiler models from 45 to 85.



Fitting the gas pipe in case of models from 120 to 150.
In case of boilers models from 120 to 150, it is not necessary to install the gas fitting.



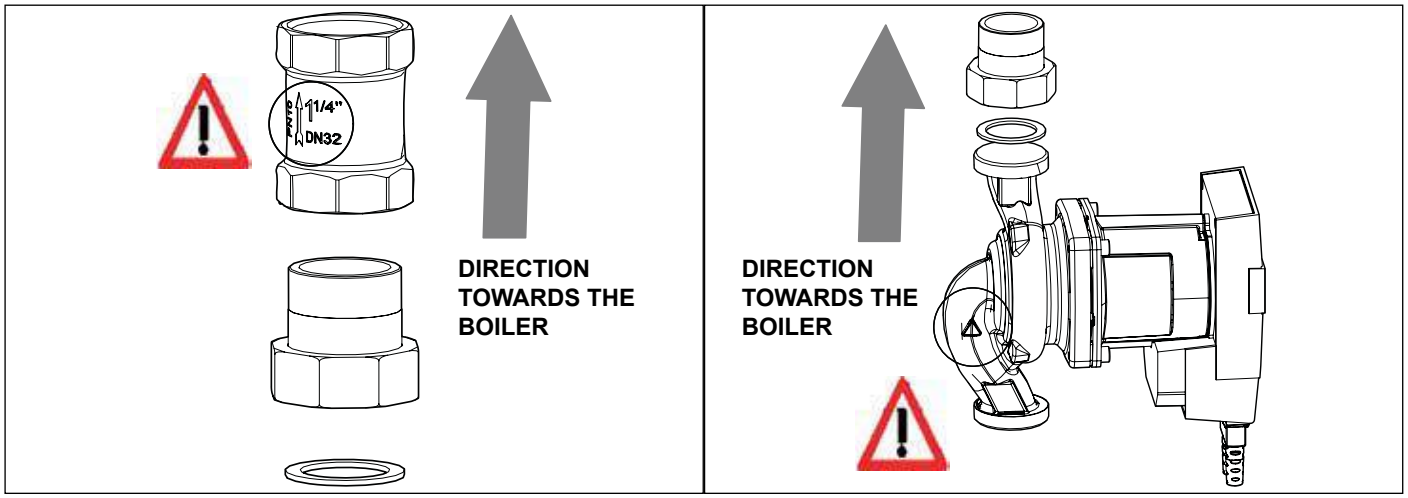
Fasten the insulating material and the cap to the return collector by placing the proper gasket supplied in-between.
Fix the tap on the return collector before positioning it on the structure.



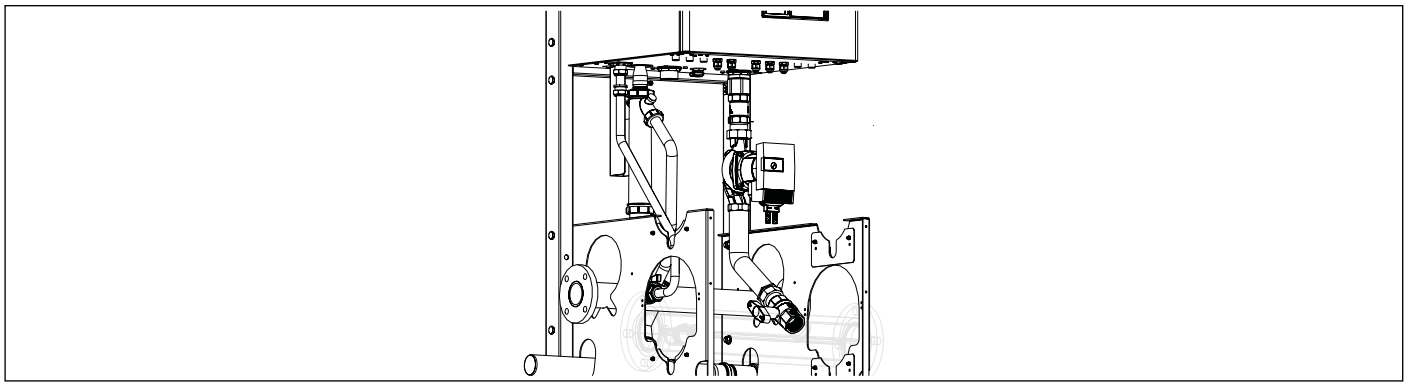
Check that the return collector is approximately positioned according to the value indicated in the figure.

WARNING

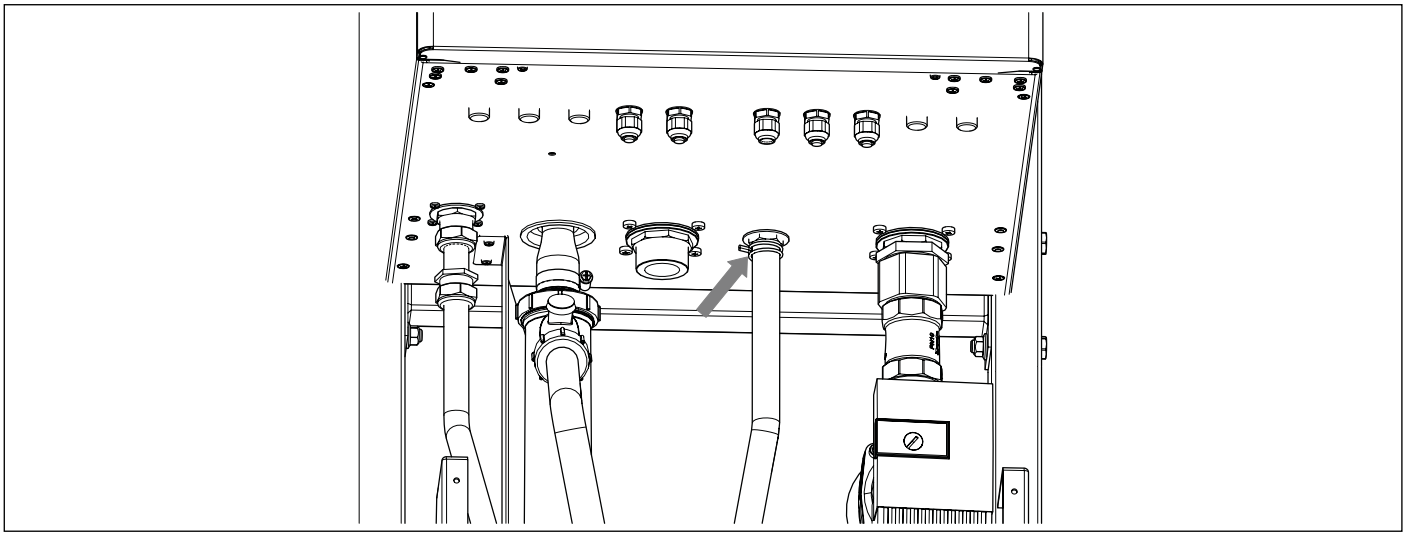
For 120 and 150 boiler models: before mounting the pump under the boiler it is necessary to mount the supplied wiring to the pump.



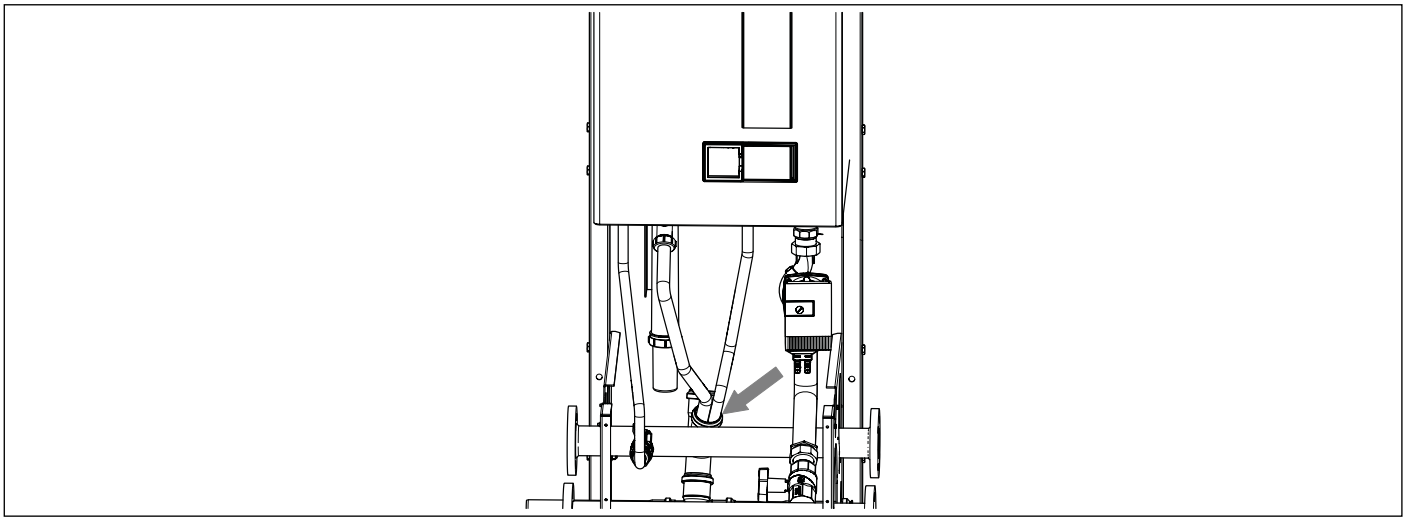
Fasten the components of the hydraulic part paying attention to the installation direction of the non return valve and the installation direction of the circulation pump.



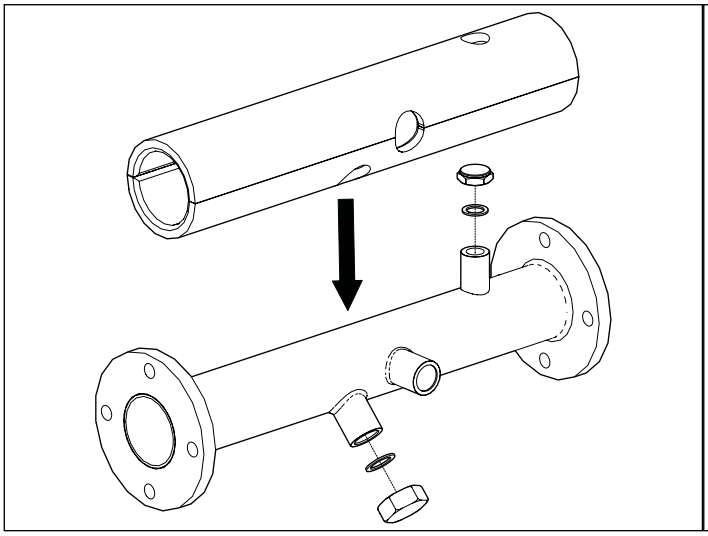
Fasten the hydraulic components between the boiler and the return collector.

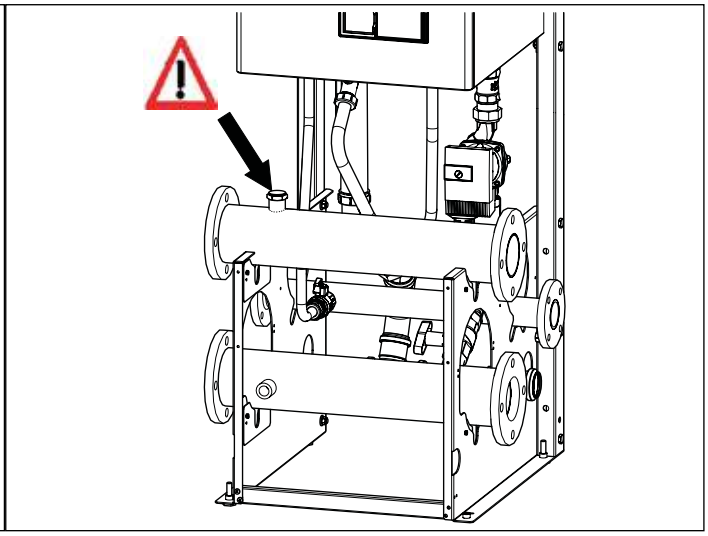


Using a clip, fasten the safety valve drain pipe to the boiler.



Insert the pipe in the condensate drain branch.

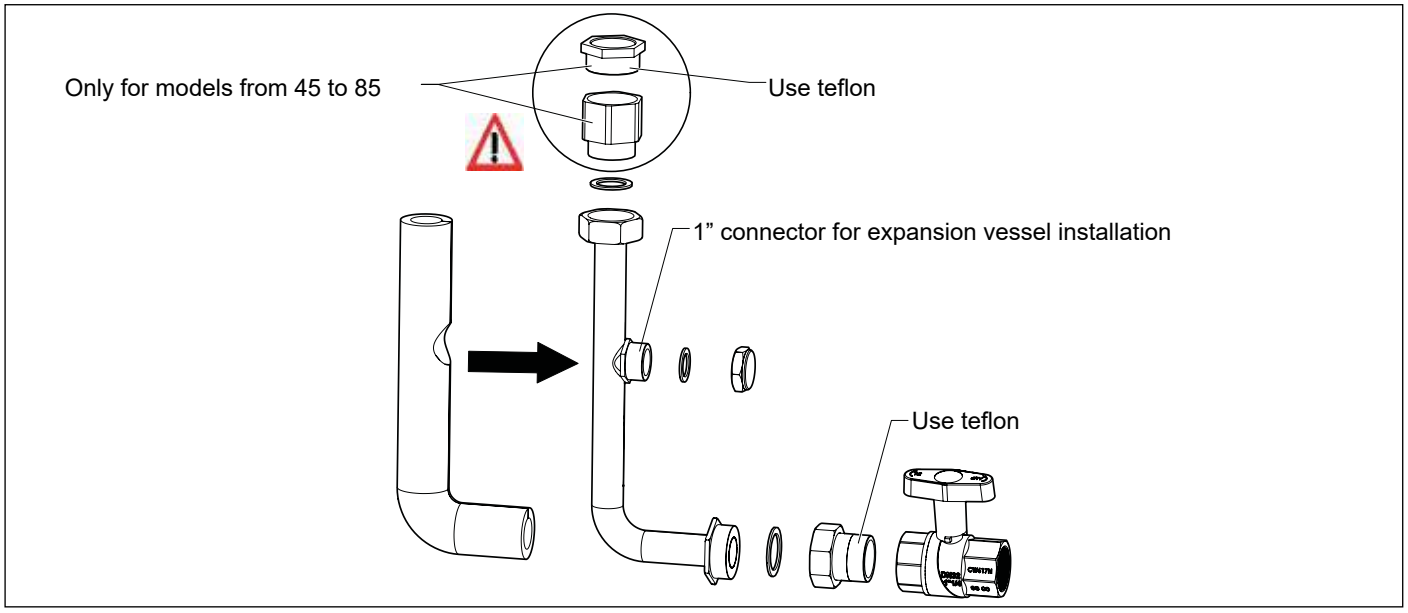




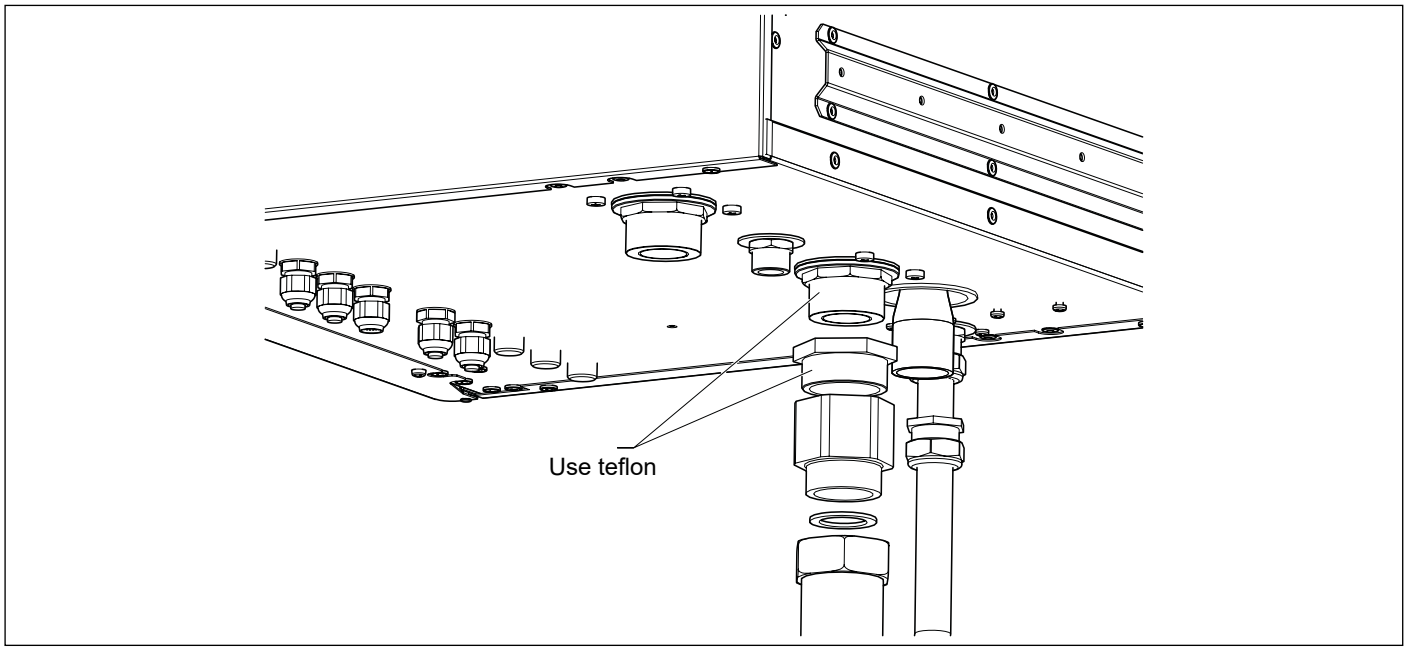
Fasten the insulating material and the caps in the rear part of the flow collector.
Place the flow collector in the position shown in the figure.
The direction does not change according to the expansion direction of the right or left cascade.

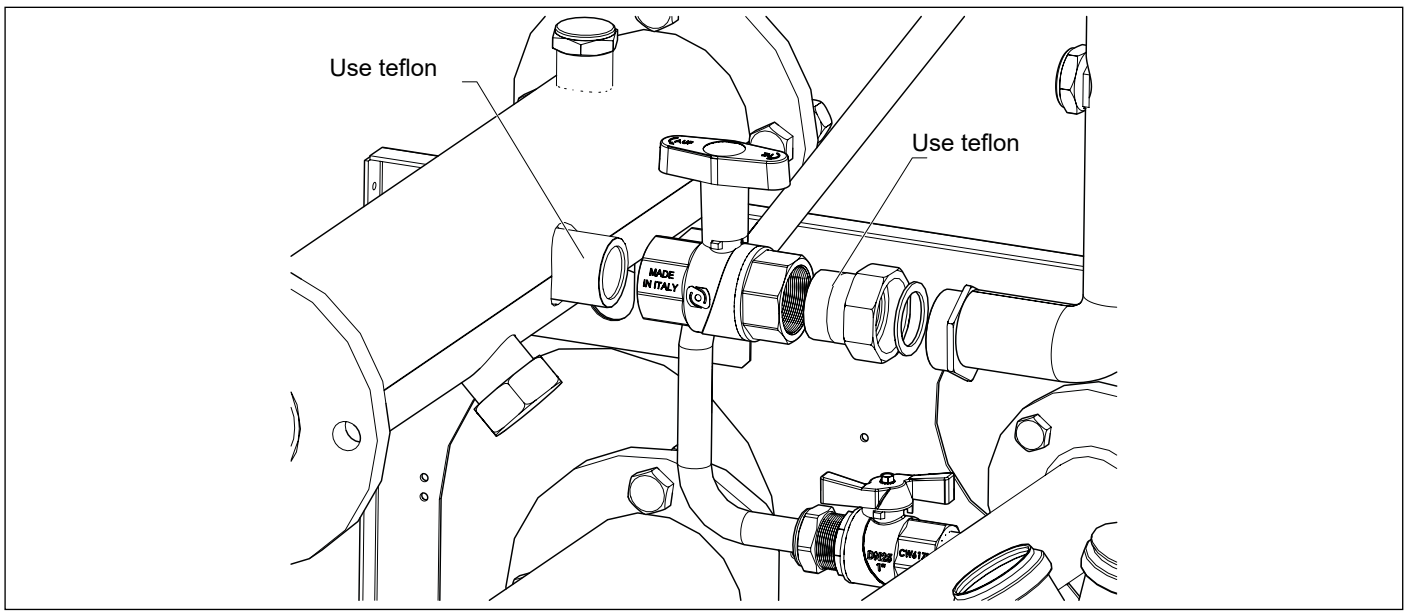
WARNING

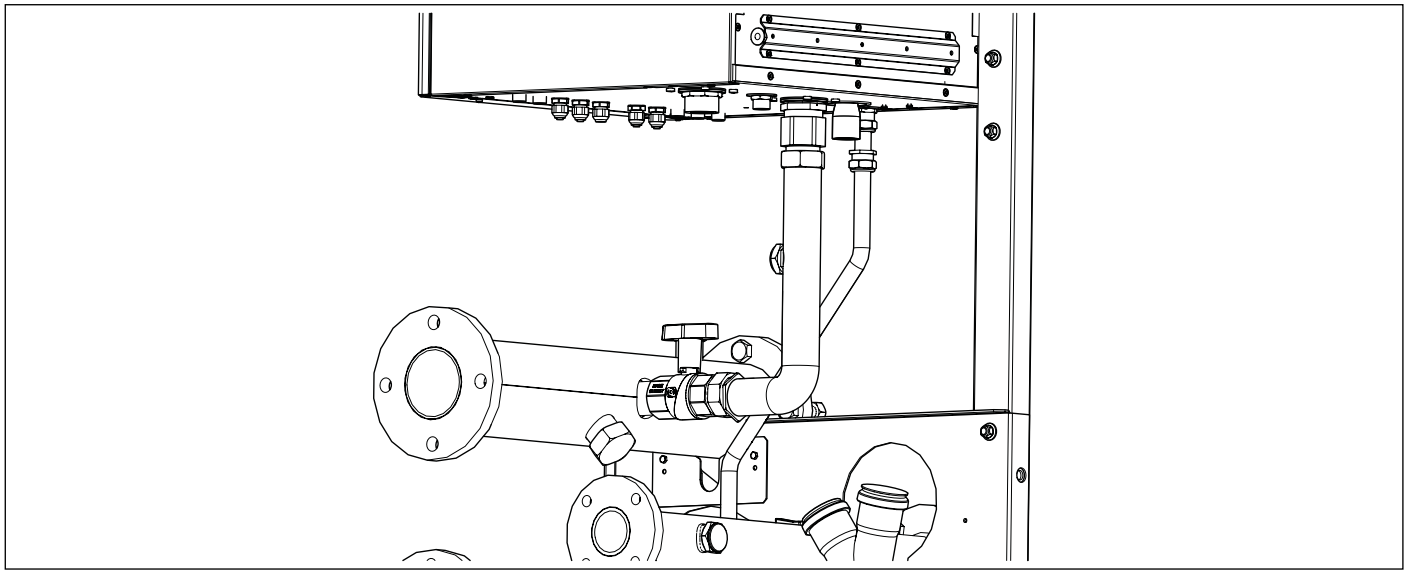
1” fitting for connection of expansion tank and/or system filler/drain cock. In case of hydraulic separator installation, the drain can be made on the pre-arranged connection on the hydraulic separator.

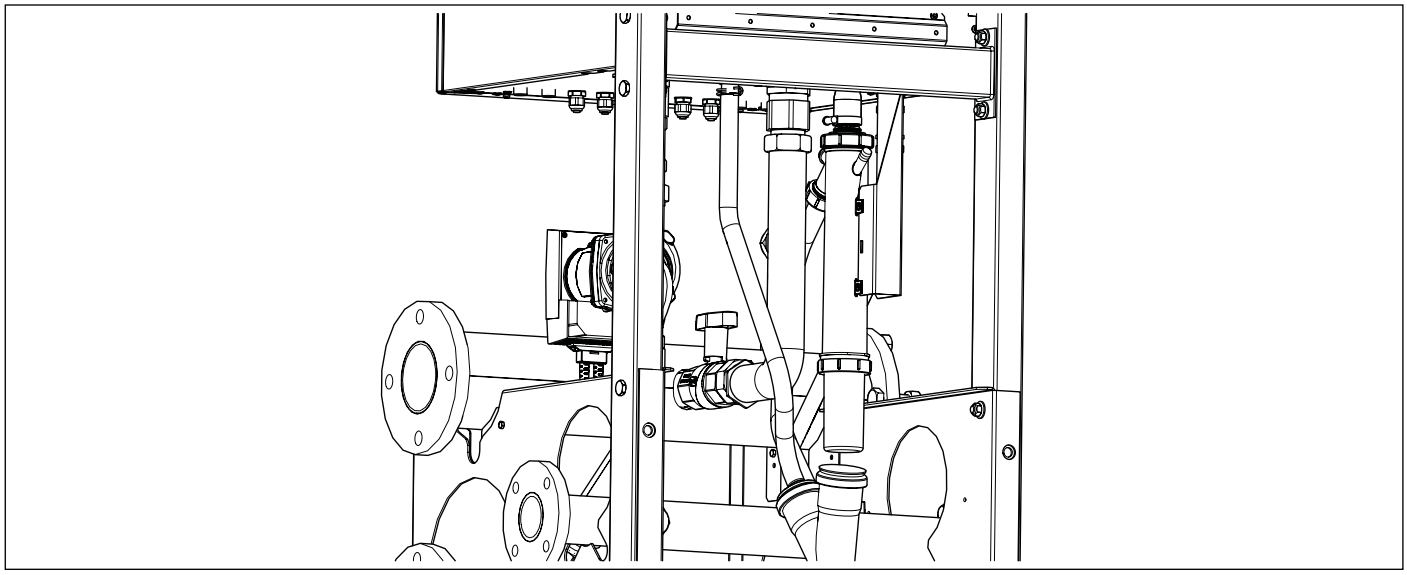


Fasten the components shown in the figure.

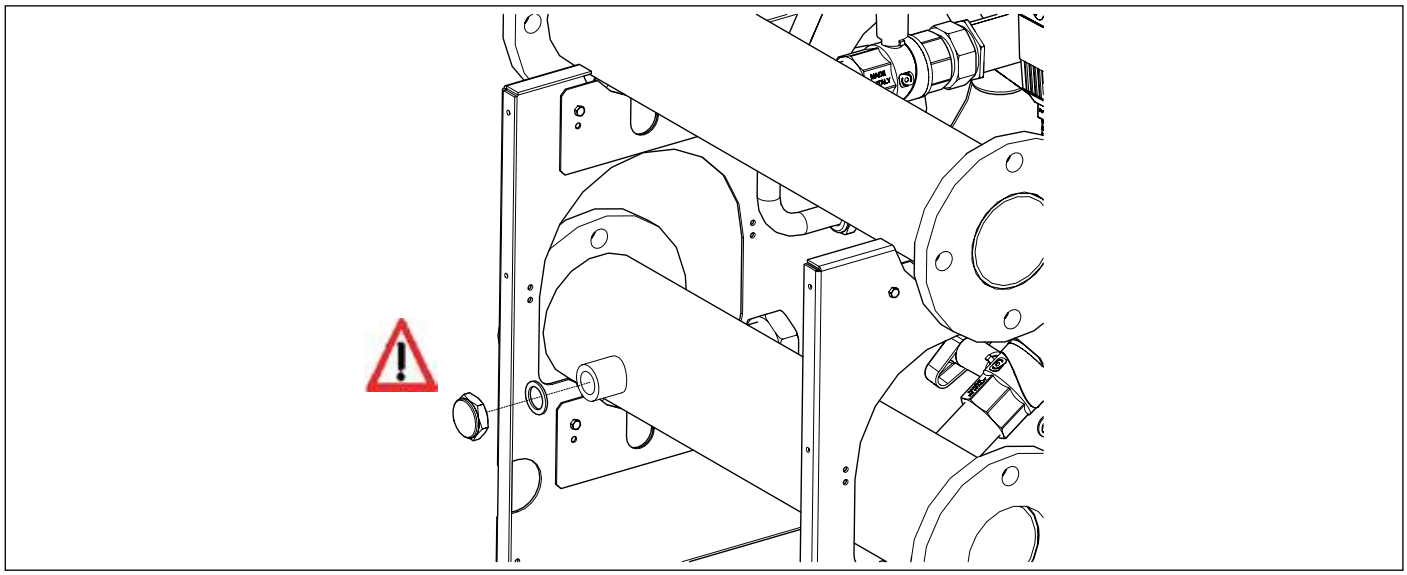








Fit the just-assembled unit to the boiler and the flow collector.

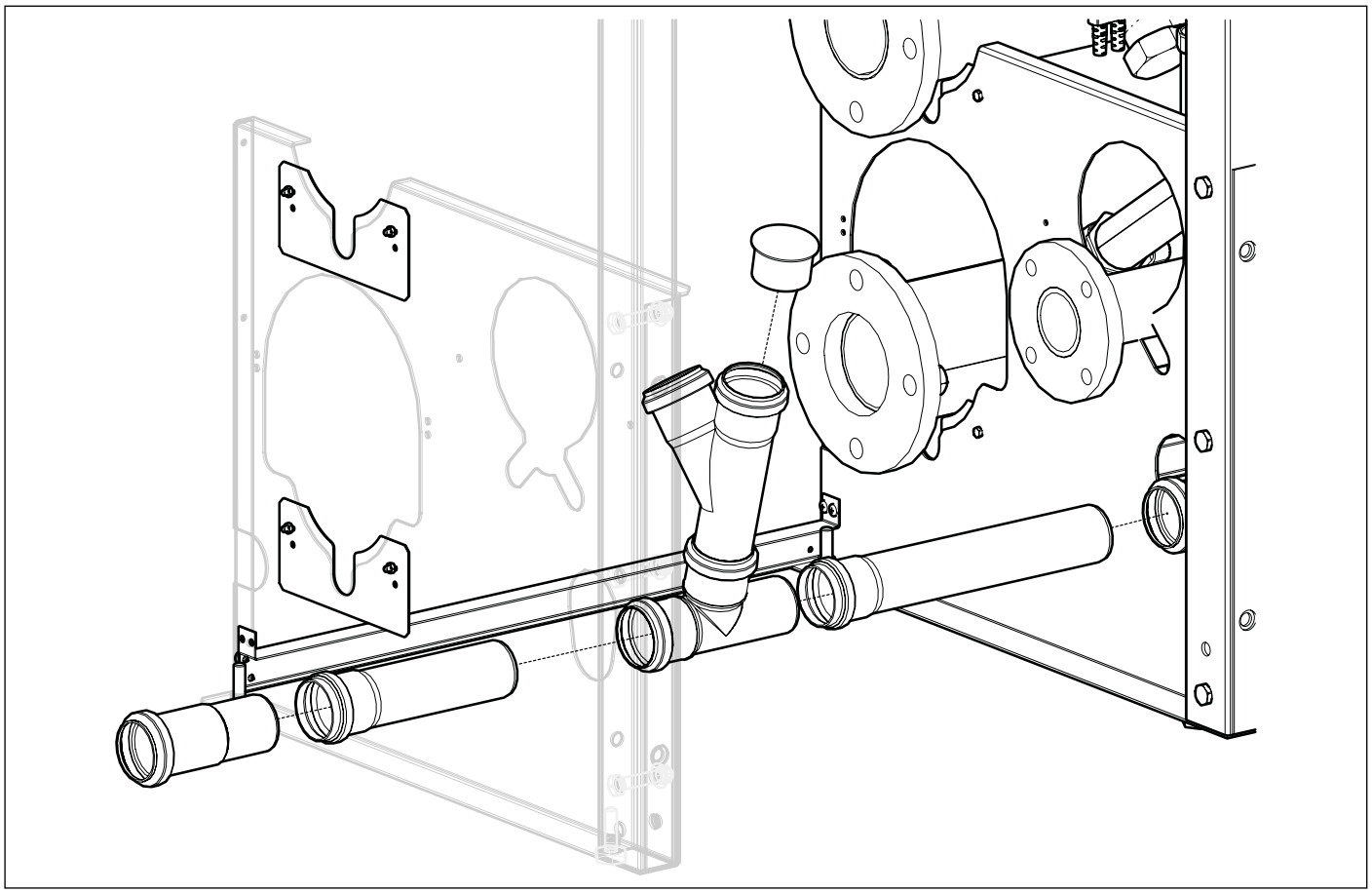


Fasten the cap to the return collector.

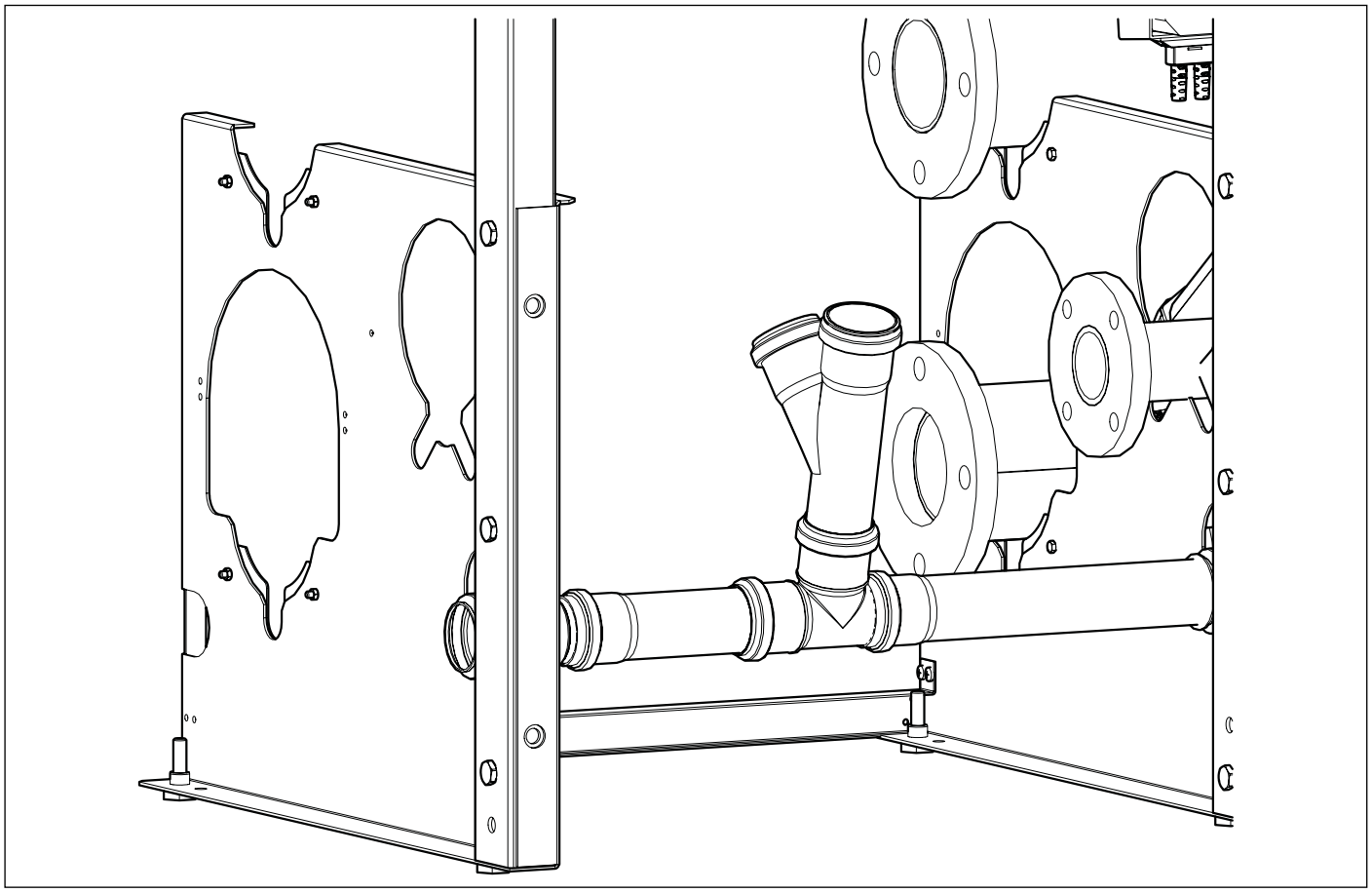
WARNING

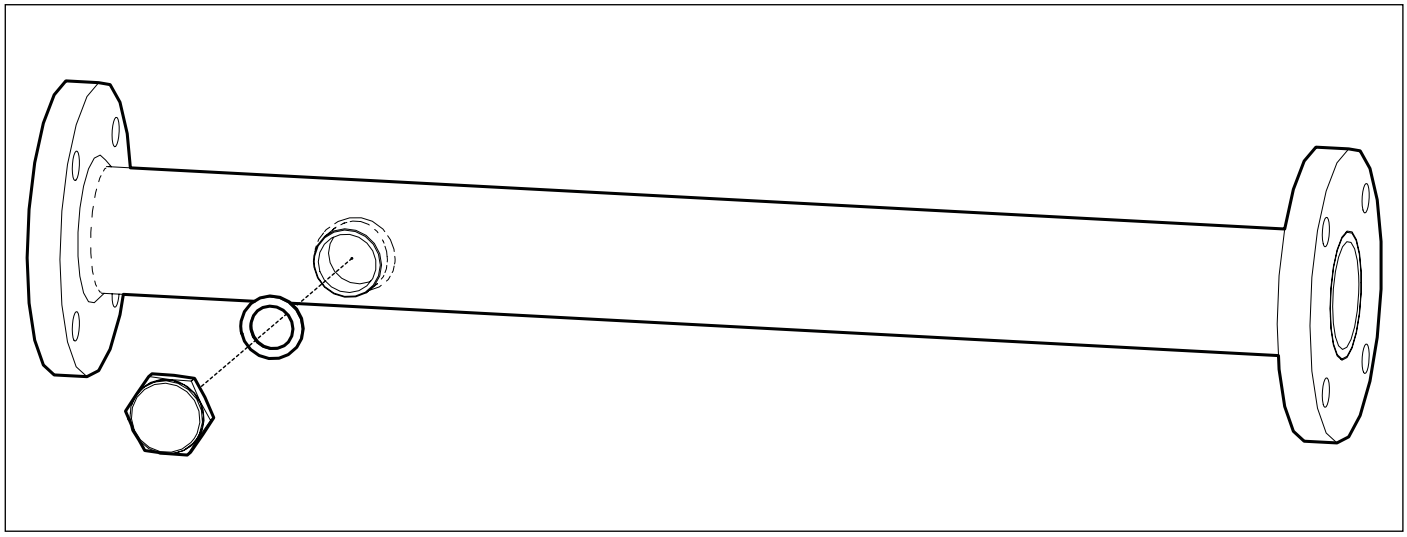
Fitting for connection of expansion tank and/or filler/drain cock. In case of hydraulic separator installation, the drain can be made on the pre-arranged connection on the hydraulic separator.

1.8 Assembling the hydraulic and gas components of the expansion module

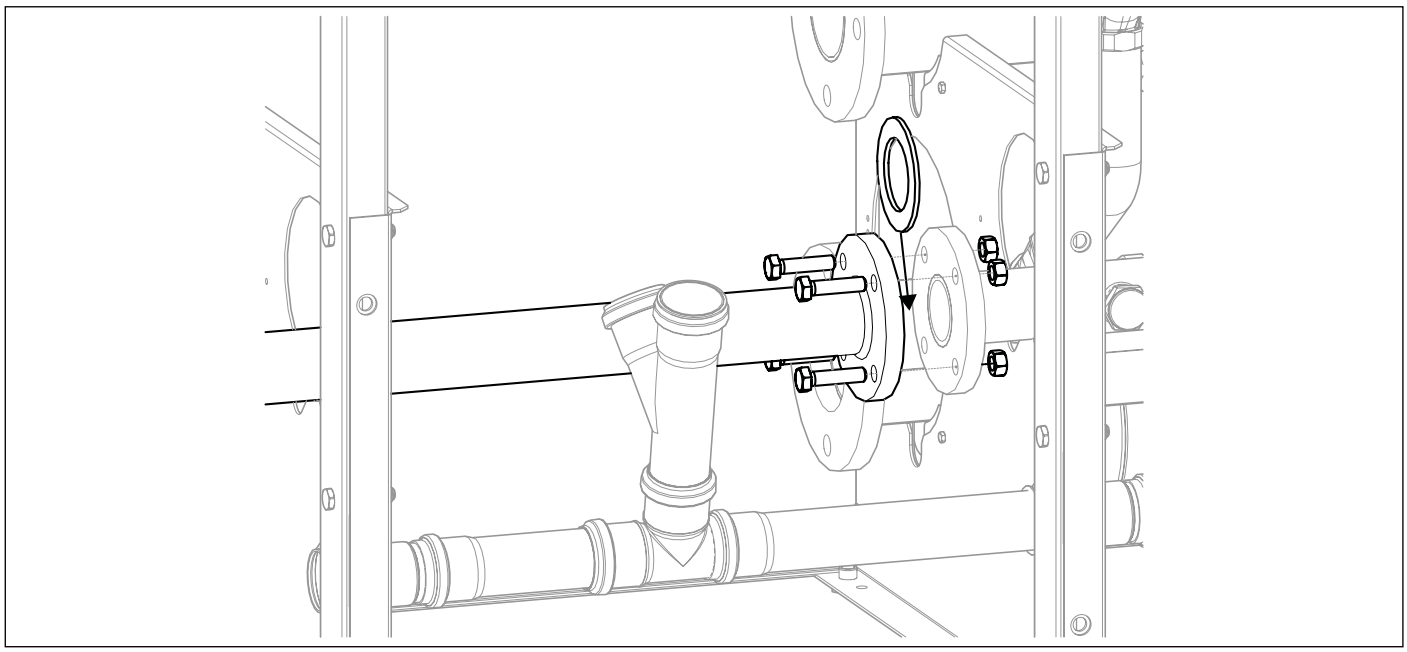


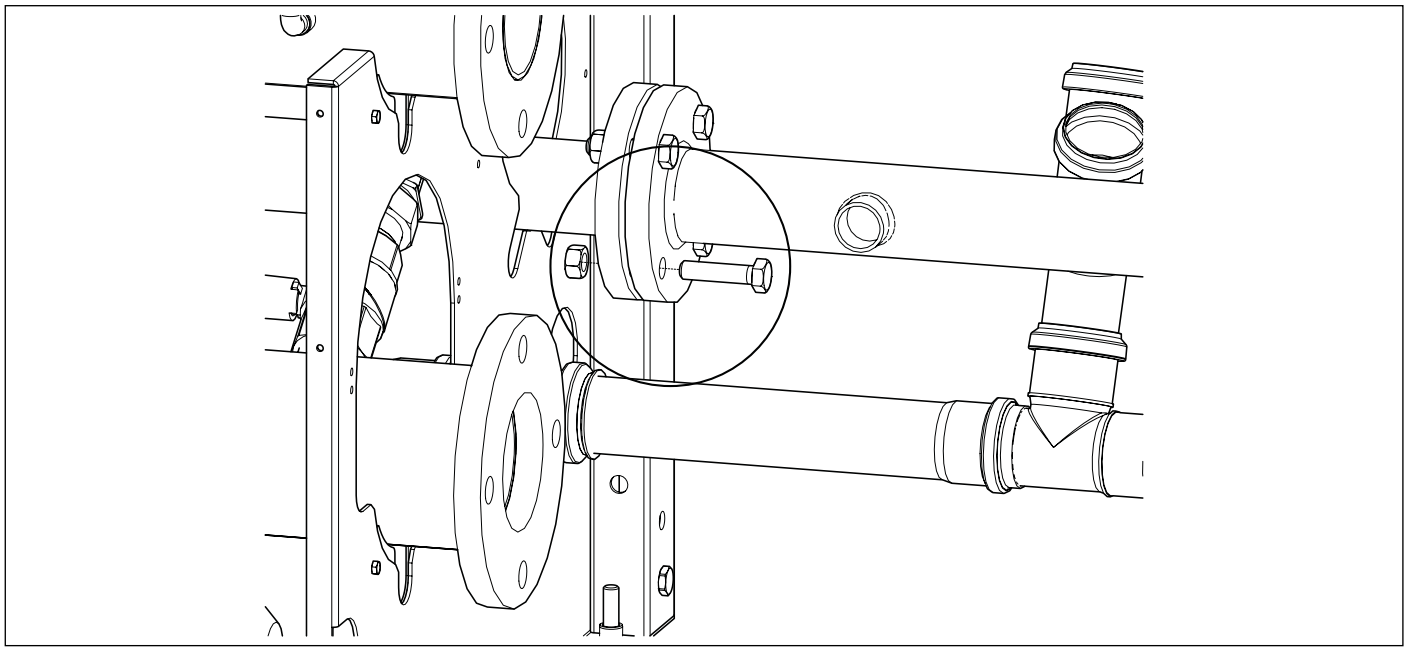
Assemble the condensate drain following the instructions in the figure above.





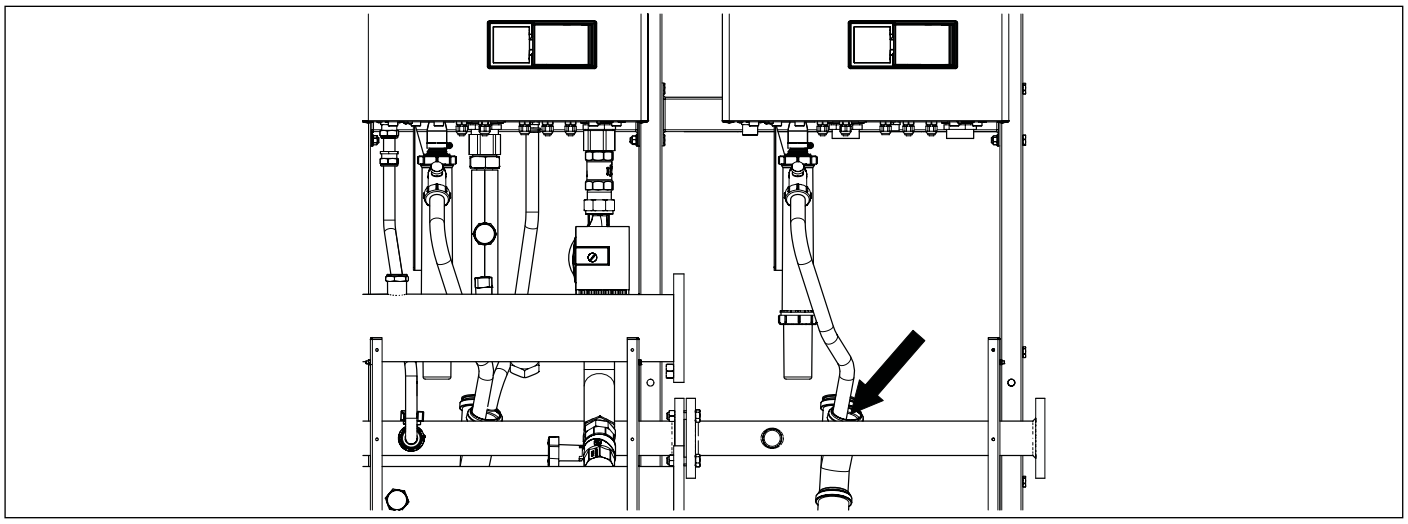
Fasten the cap to the gas collector with the gasket supplied.



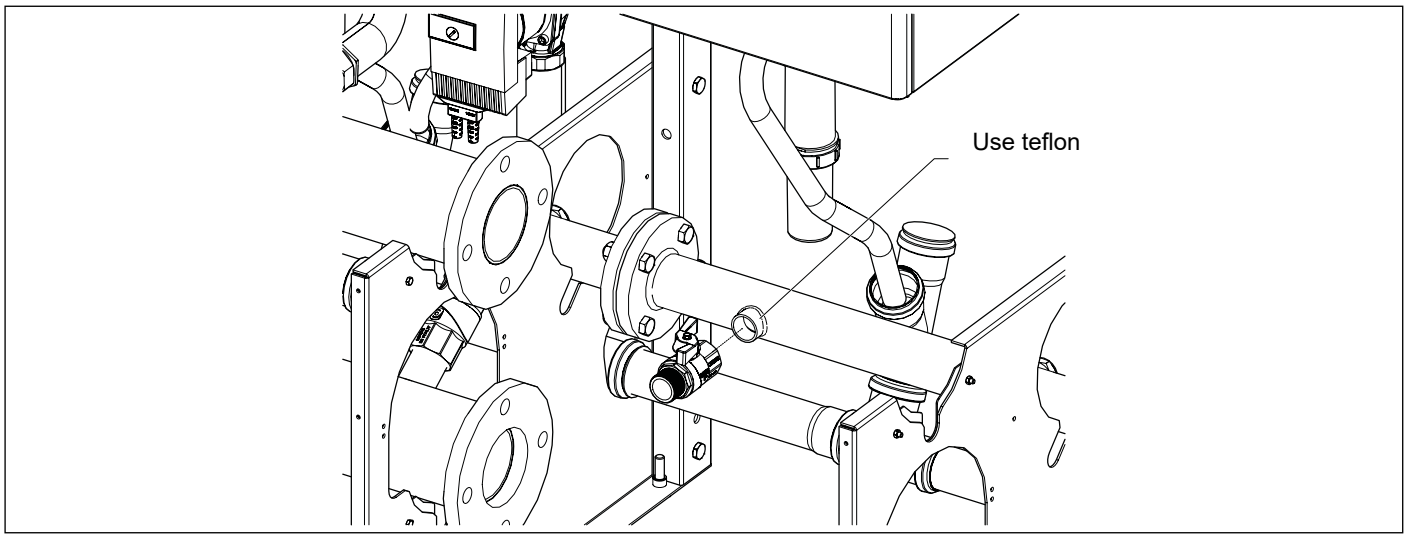


Fasten the gas collector with screws and nuts by placing the gasket between the two collectors.

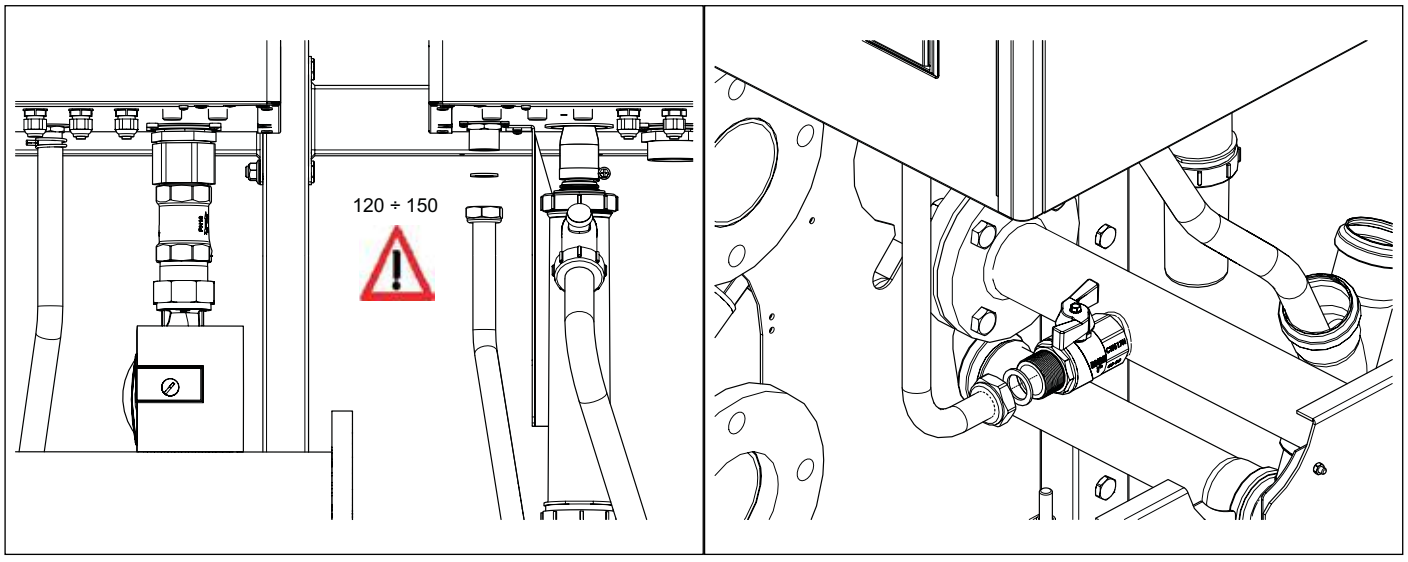
Fit the trap on the boiler as described on page 32.



Connect the boiler condensate drain to the drain pipe.



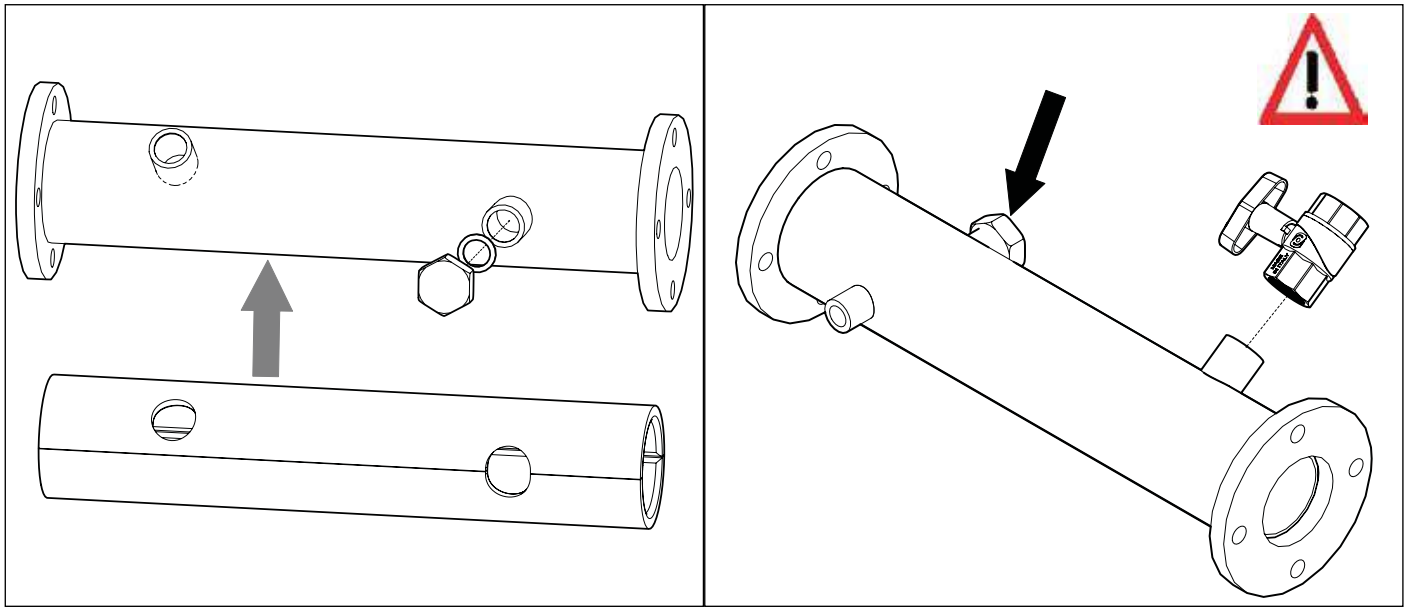
Fit the gas tap.
The fitting operations of an hydraulic unit for 120 - 150 boiler model are described below. If a boiler with output up to 85 is installed, refer to the figures above.



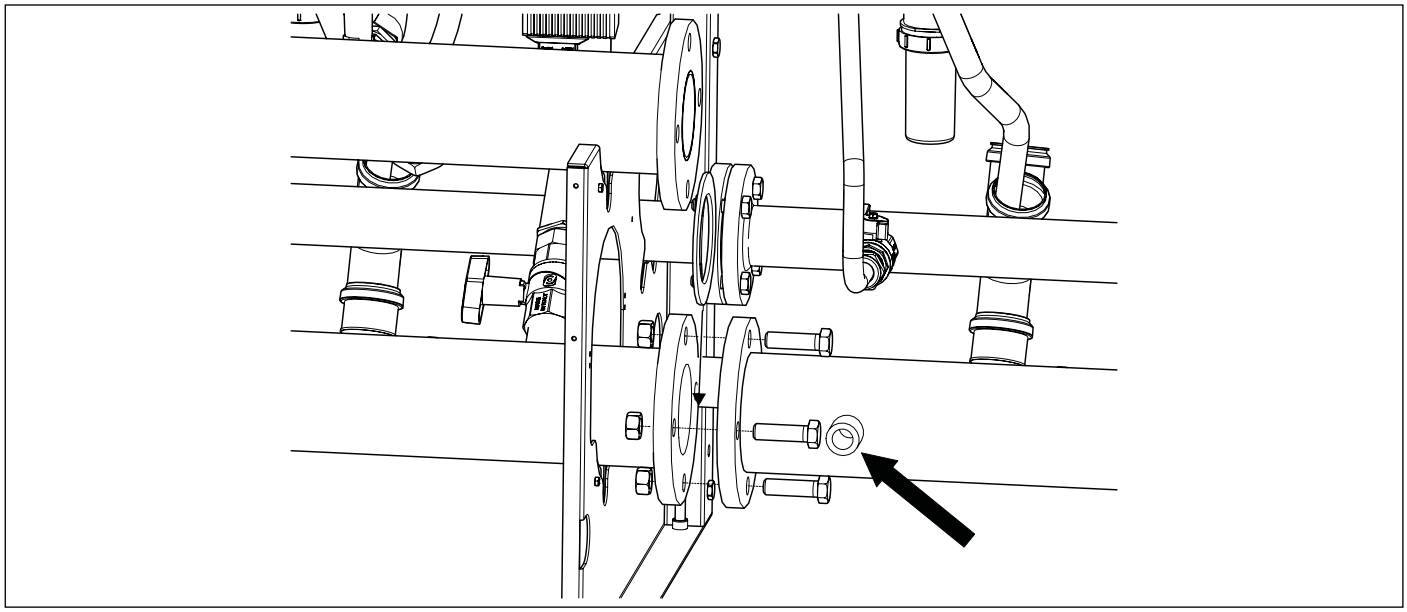
Fasten the gas pipe by placing the gaskets supplied in-between.

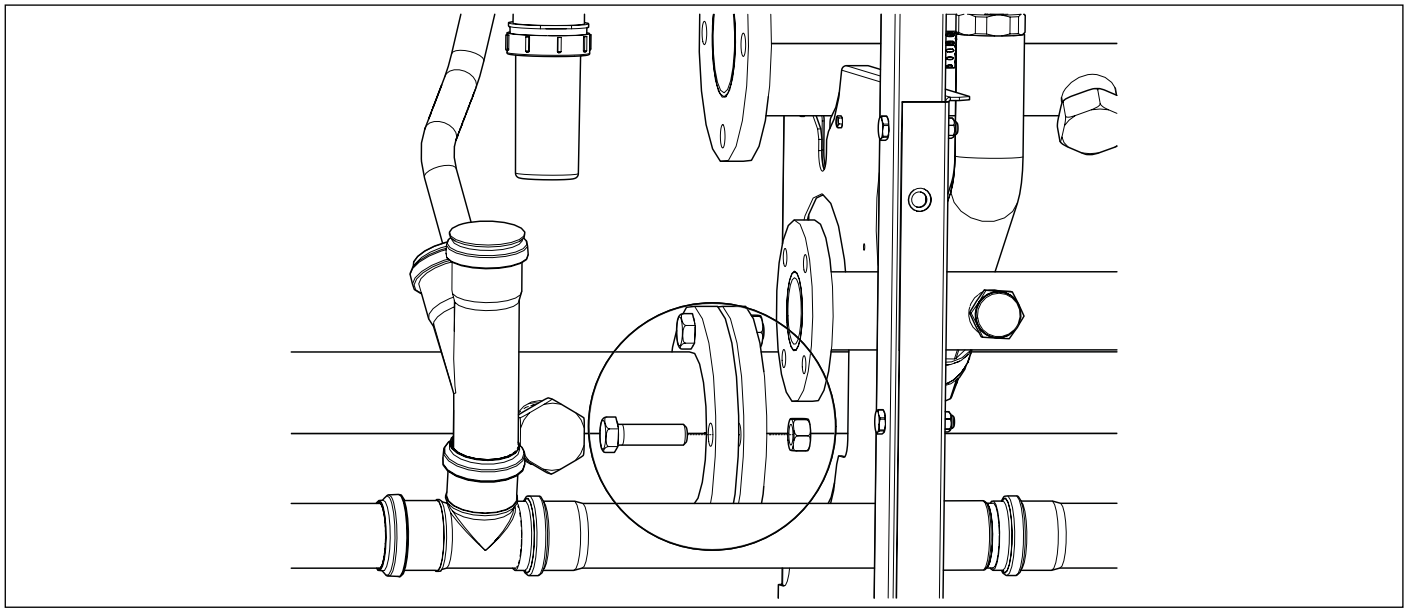
WARNING

For models from 45 to 85, add the fitting under the boiler.

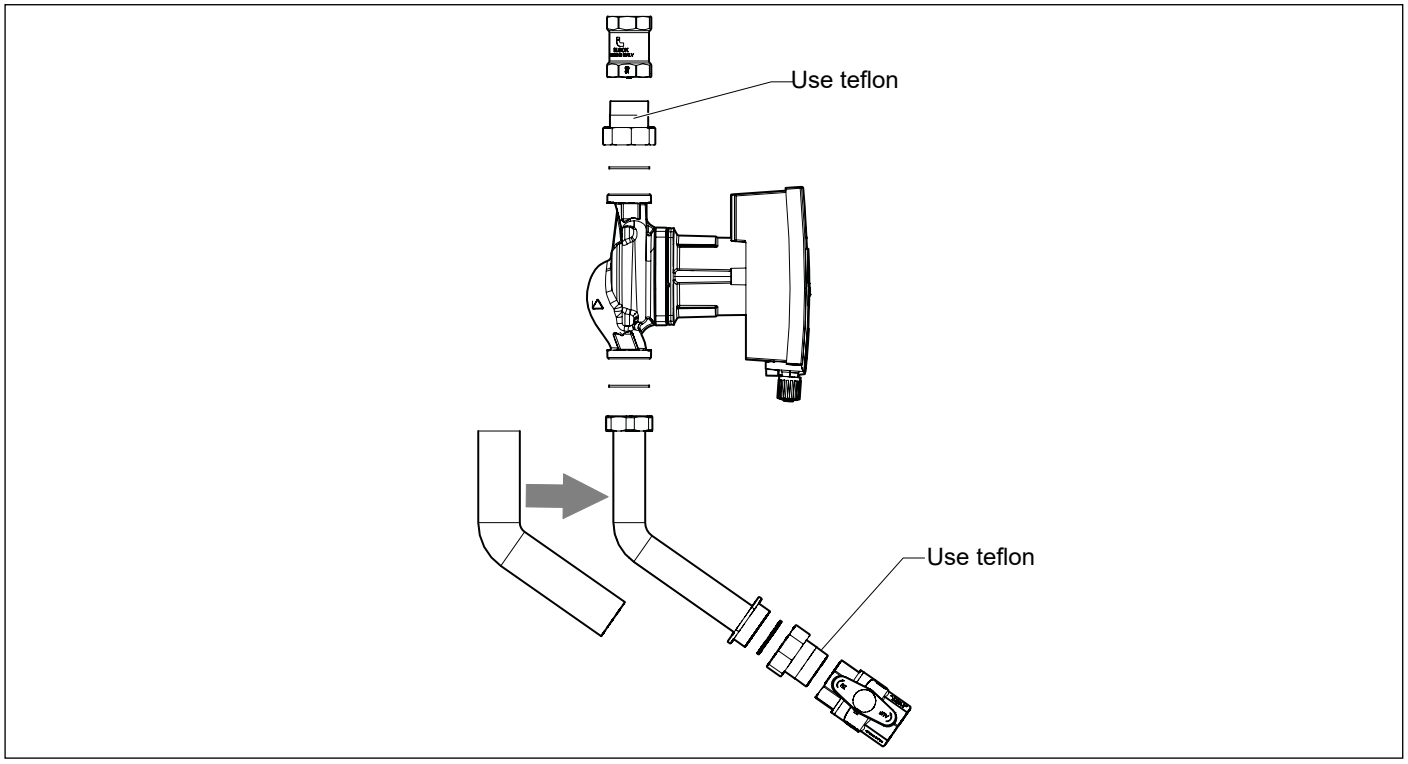


Fasten the insulating material and the cap to the return collector by placing the proper gasket supplied in-between.
Fix the tap on the return collector before positioning it on the structure.



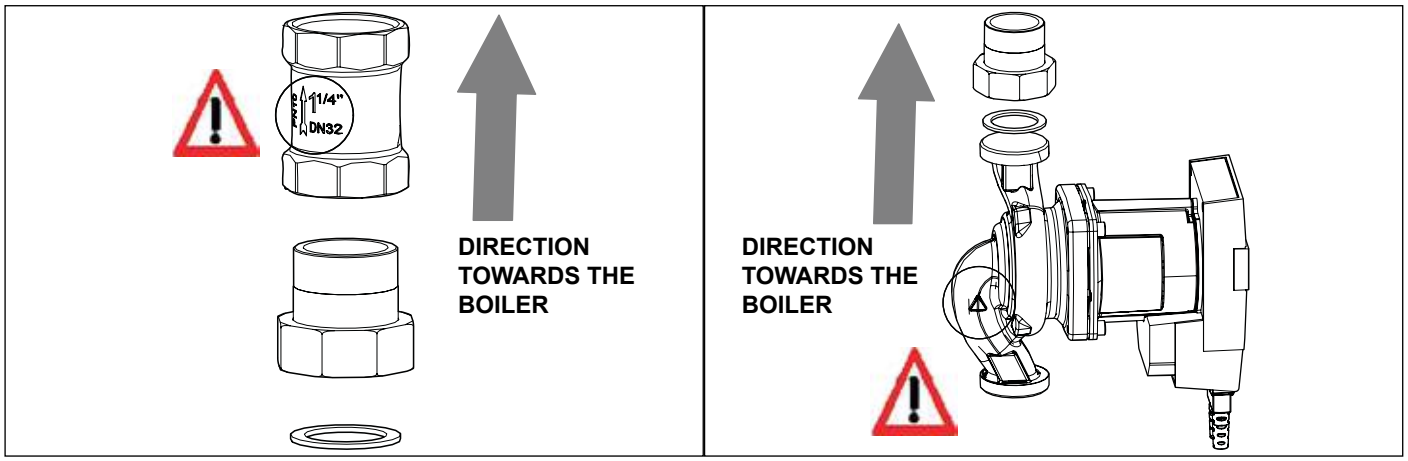


Fasten the return collector with screws and nuts by placing the gasket between the two collectors.

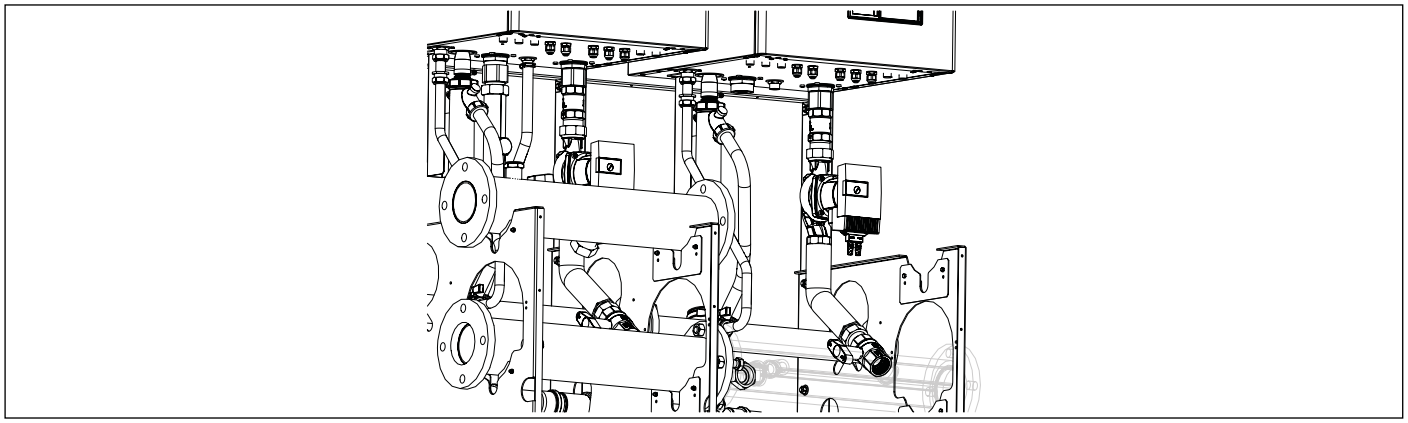


WARNING

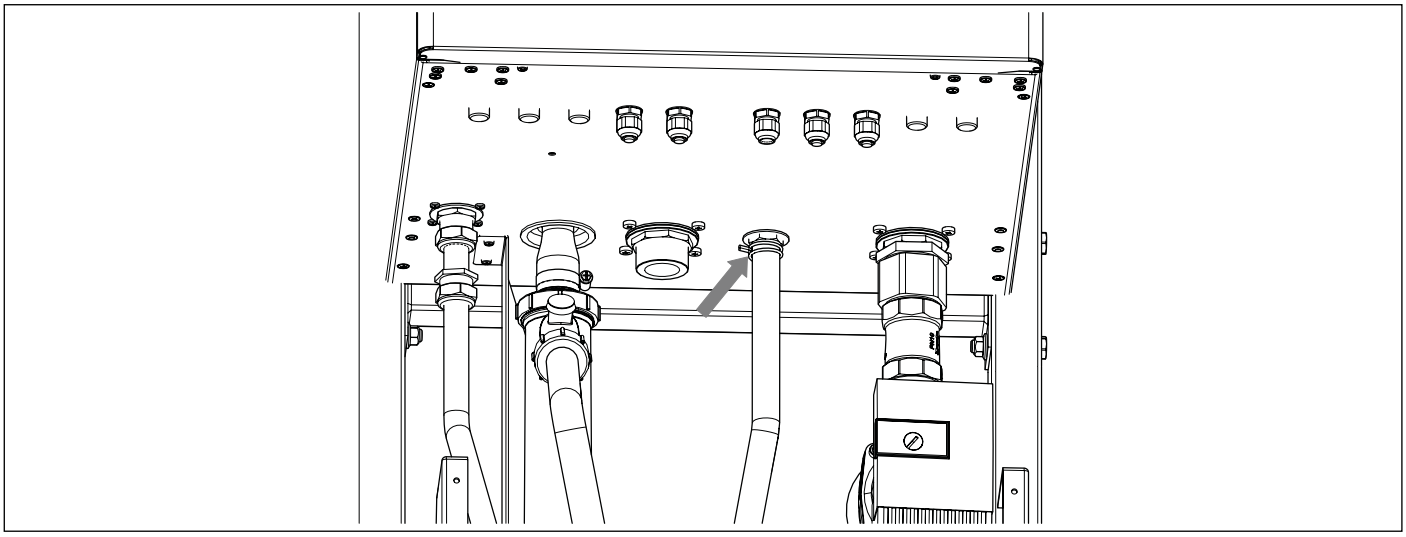
For 120 and 150 boiler models: before mounting the pump under the boiler it is necessary to mount the supplied wiring to the pump.



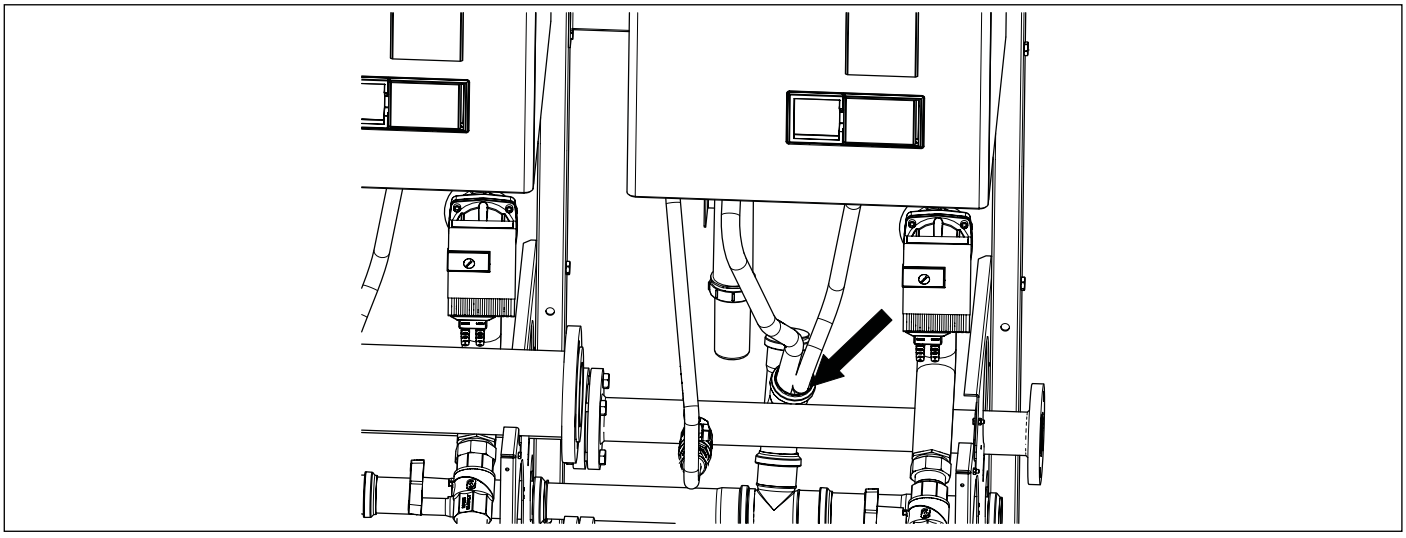
Fasten the components of the hydraulic part paying attention to the installation direction of the non return valve and the installation direction of the circulation pump.



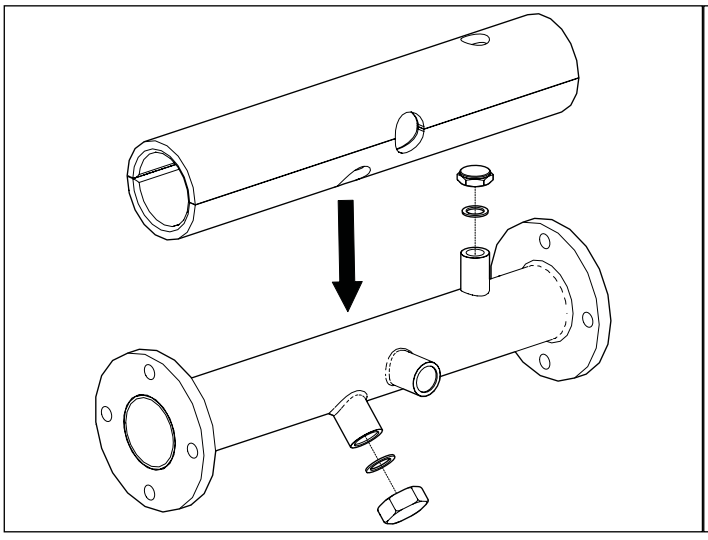
Fasten the hydraulic components between the boiler and the return collector.

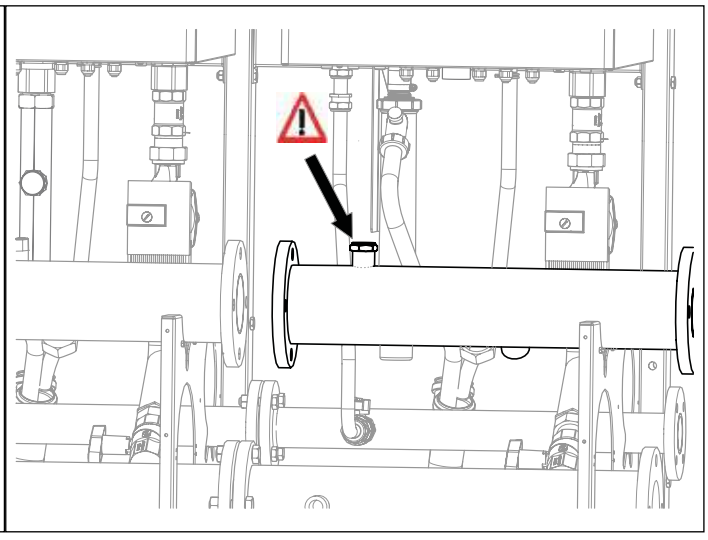


Using a clip, fasten the safety valve drain pipe to the boiler.



Insert the pipe in the condensate drain branch.

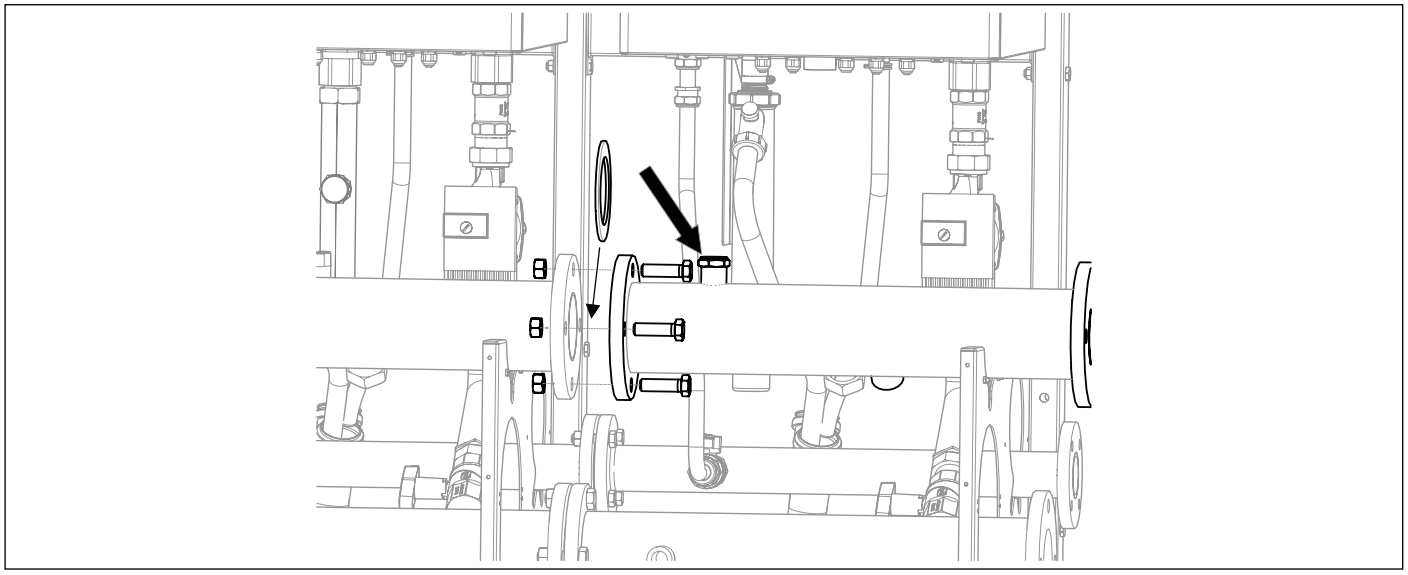


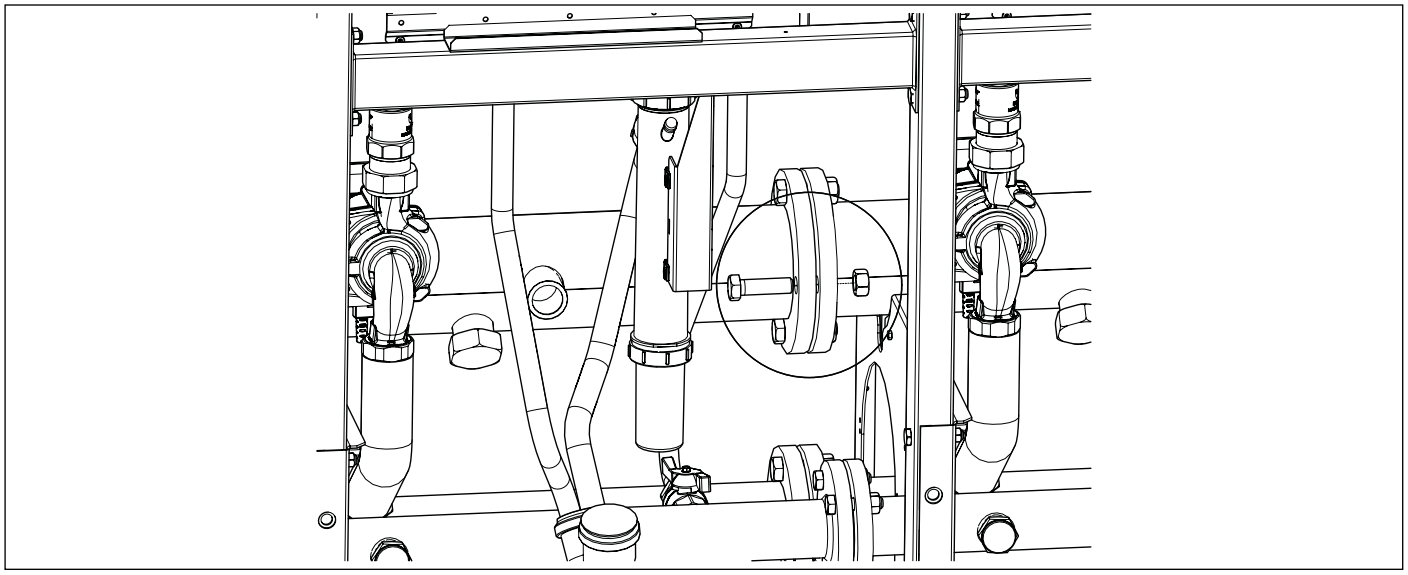


Fasten the insulating material and the caps in the upper and rear part of the flow collector.
Place the flow collector in the position shown in the figure.

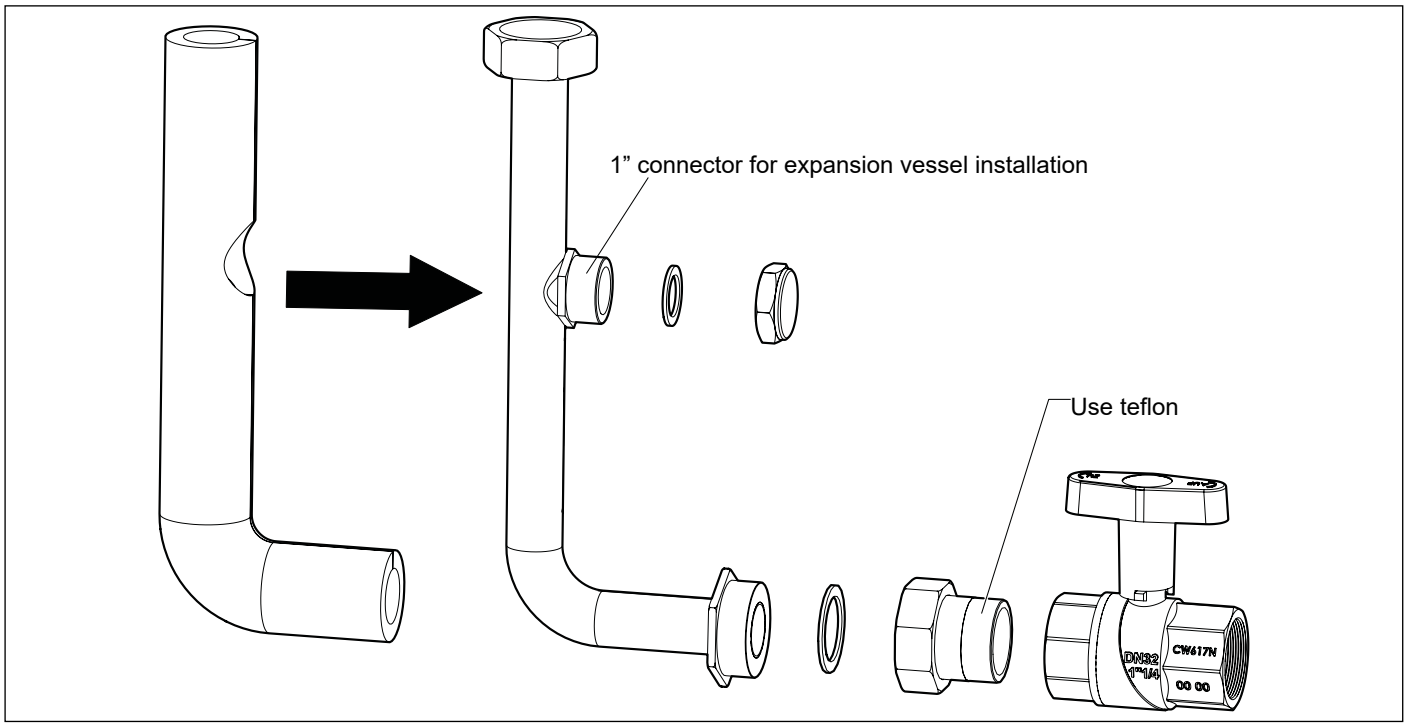
WARNING

1” fitting for connection of expansion tank and/or system filler/drain cock. In case of hydraulic separator installation, the drain can be made on the pre-arranged connection on the hydraulic separator.

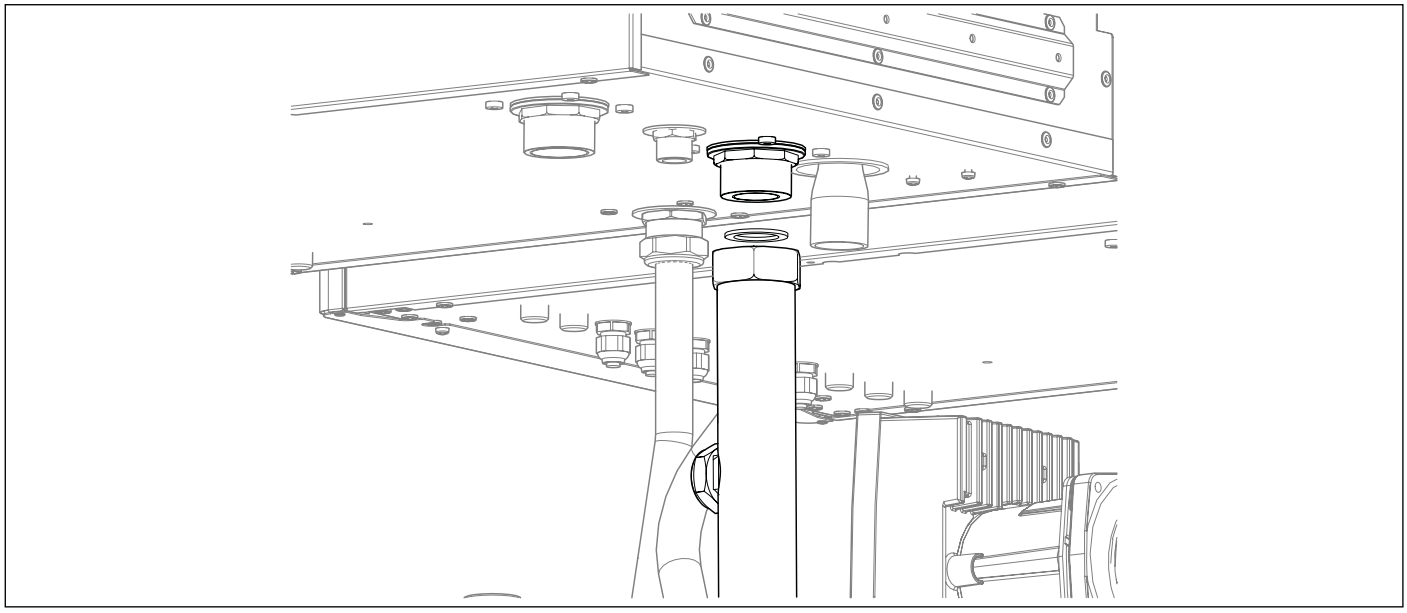


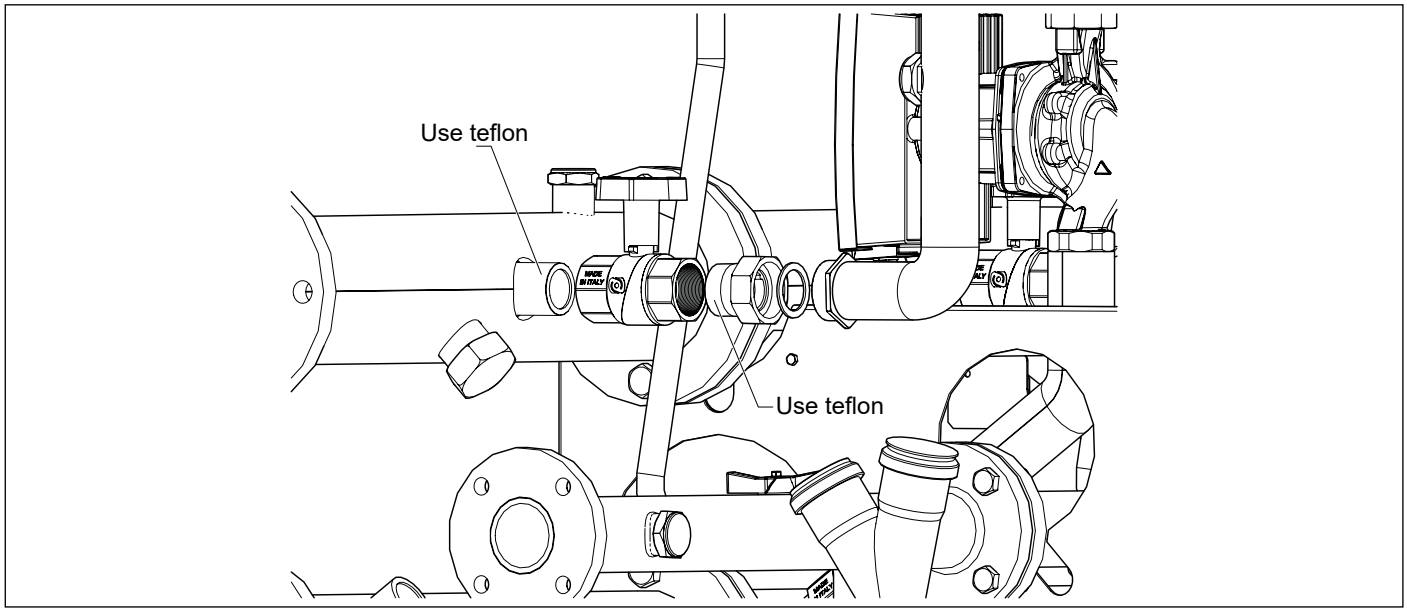


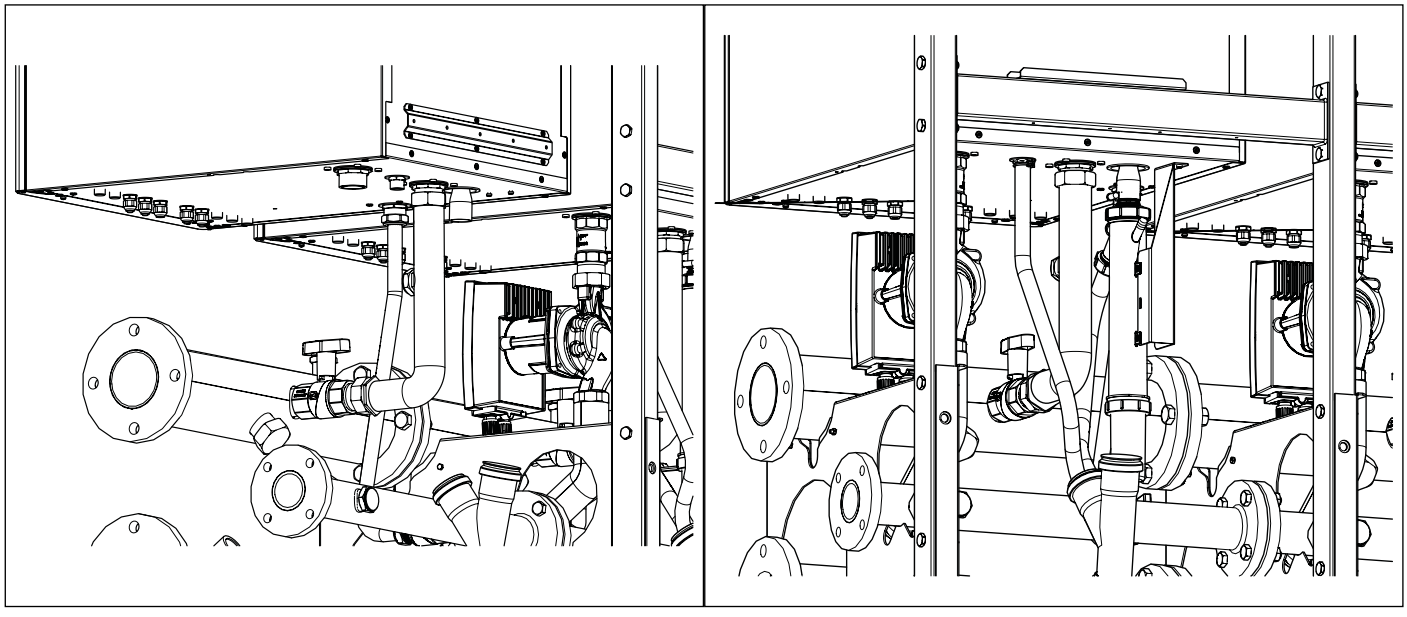
Fasten the flow collector with screws and nuts by placing the gasket between the two collectors.



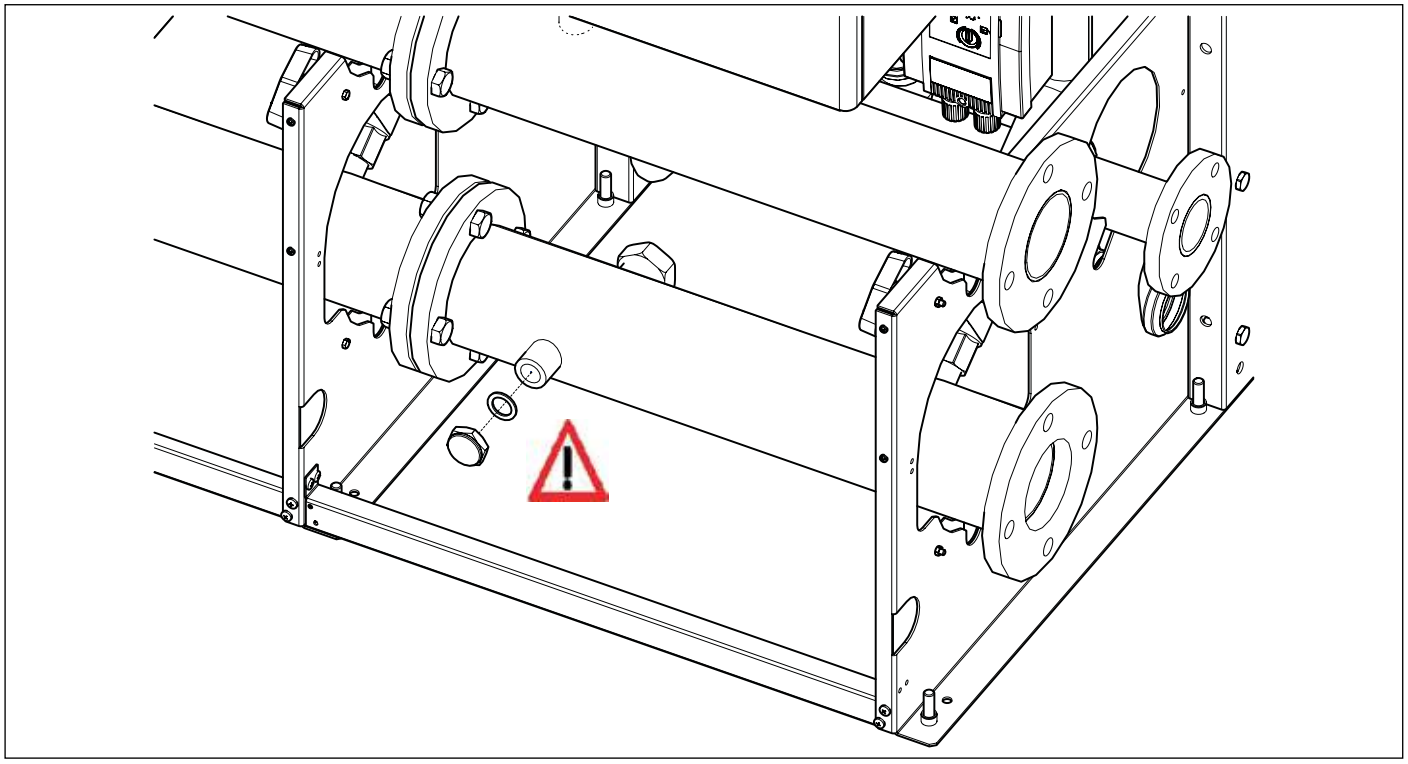
Fasten the components shown in the figure.







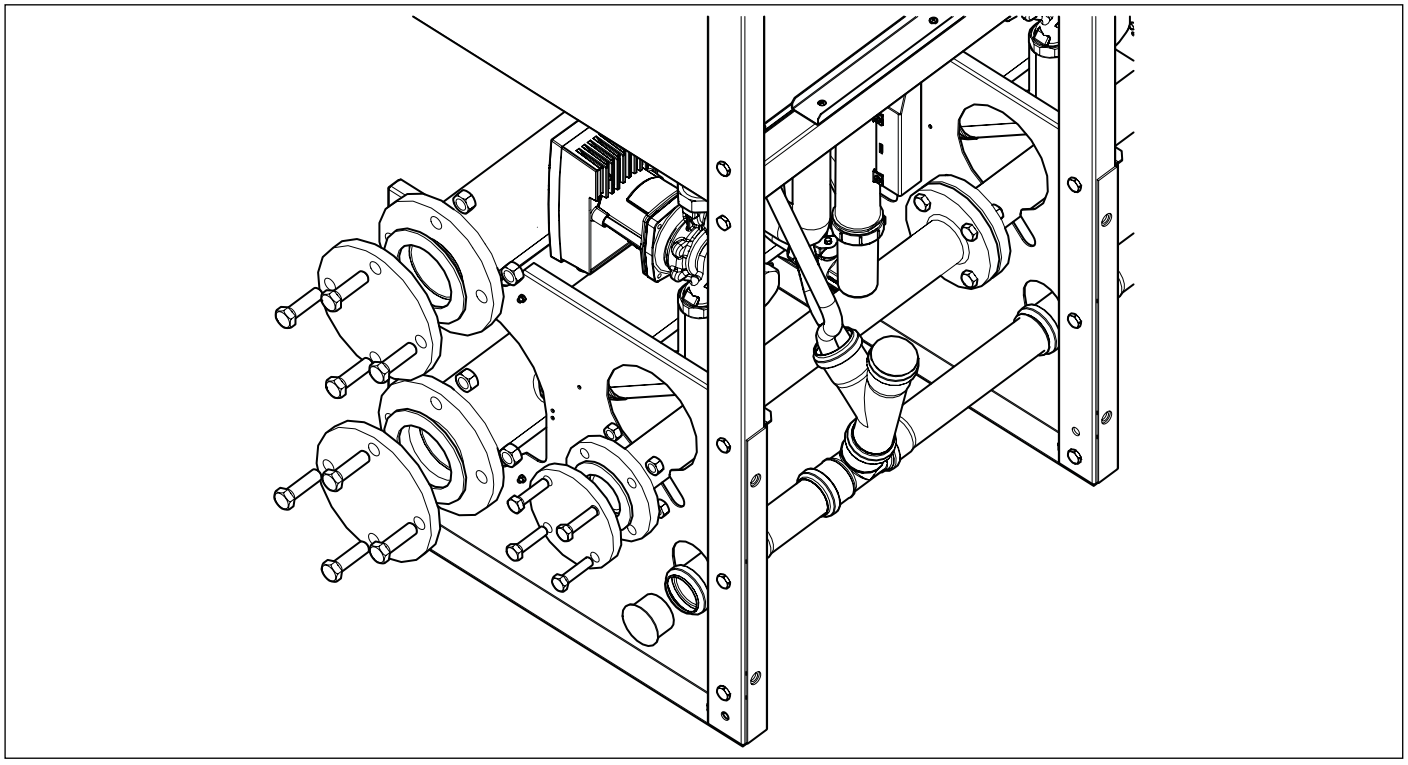
Fit the just-assembled unit to the boiler and the flow collector.



Fasten the cap to the return collector.

WARNING

Fitting for connection of expansion tank and/or filler/drain cock. In case of hydraulic separator installation, the drain can be made on the pre-arranged connection on the hydraulic separator.

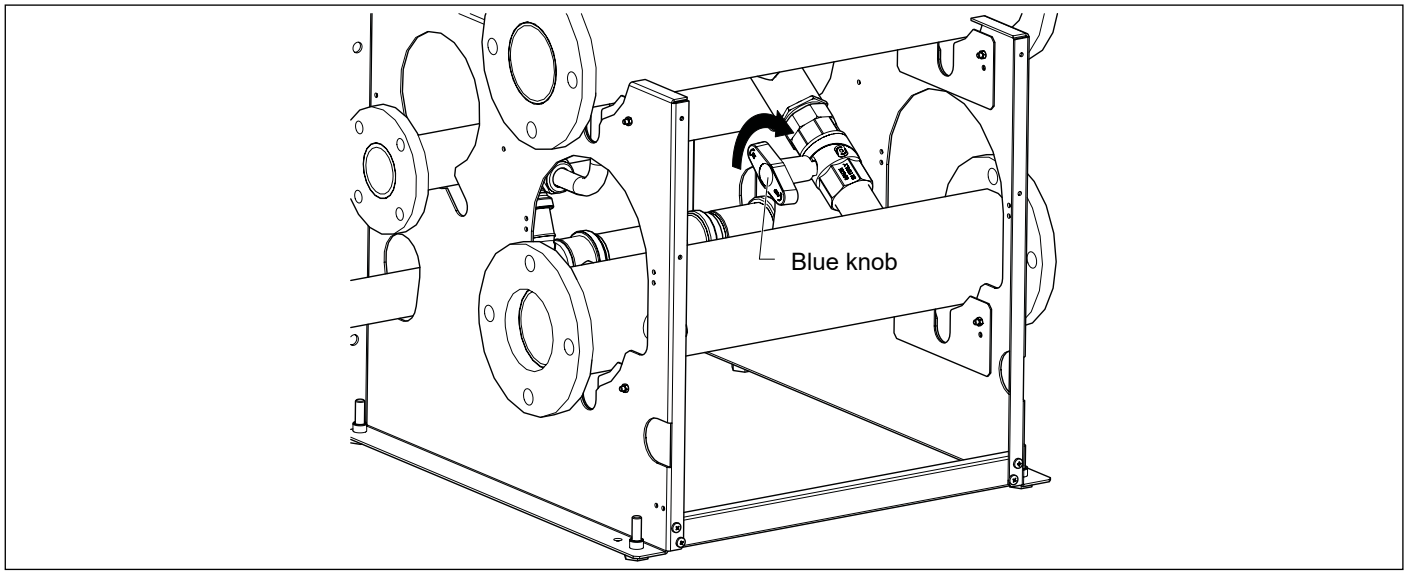


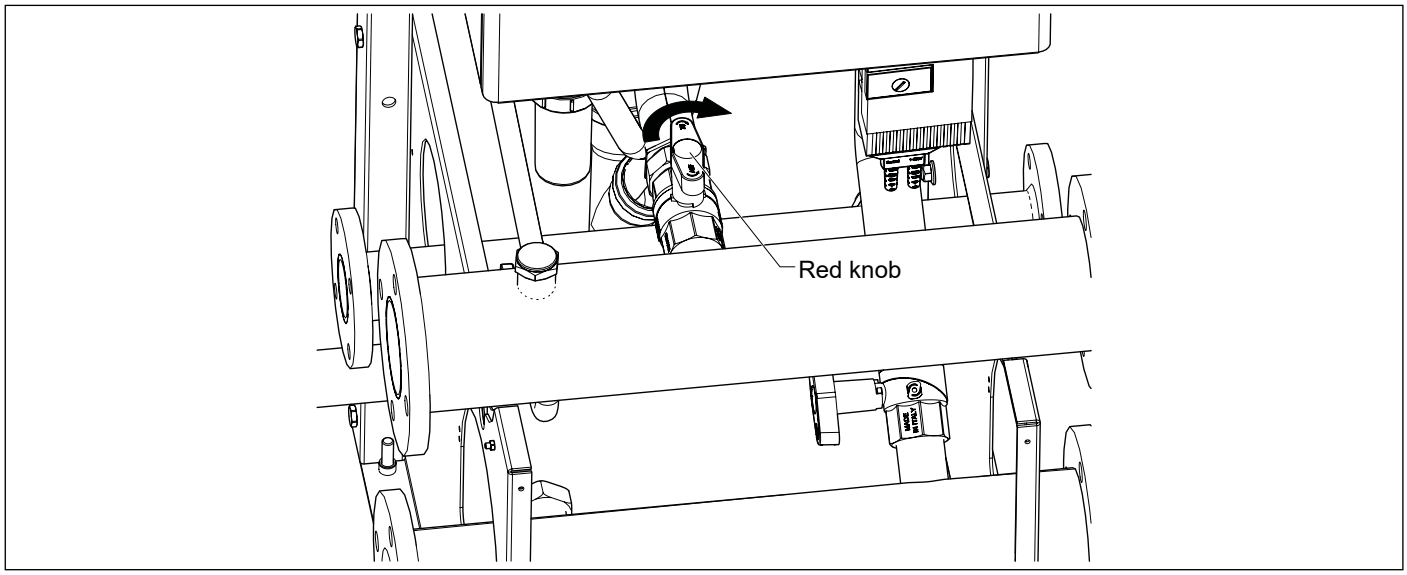
If expansion modules are not installed, it is necessary to close the flow and return collectors, the gas collector and the drain with the components shown in the figure.

1.9 Operations to close flow and return taps

To close the flow-return circuit between collectors and boiler, proceed as follows:

- Reach the control panel of the 'Master' boiler of the cascade.
- Set the system to 'OFF' to turn off the boiler burner.
- Close the gas tap.
- Wait the end of the post-circulation step of the pumps.
- With pumps stopped, turn the tap with blue knob on the return collector - boiler return section clockwise.
- With pumps stopped, turn the tap with red knob on the flow collector - boiler flow section clockwise.
- **The knobs must be fully rotated**.
- Now the system between collectors and boiler can be considered as disconnected.





1.10 Pump matching

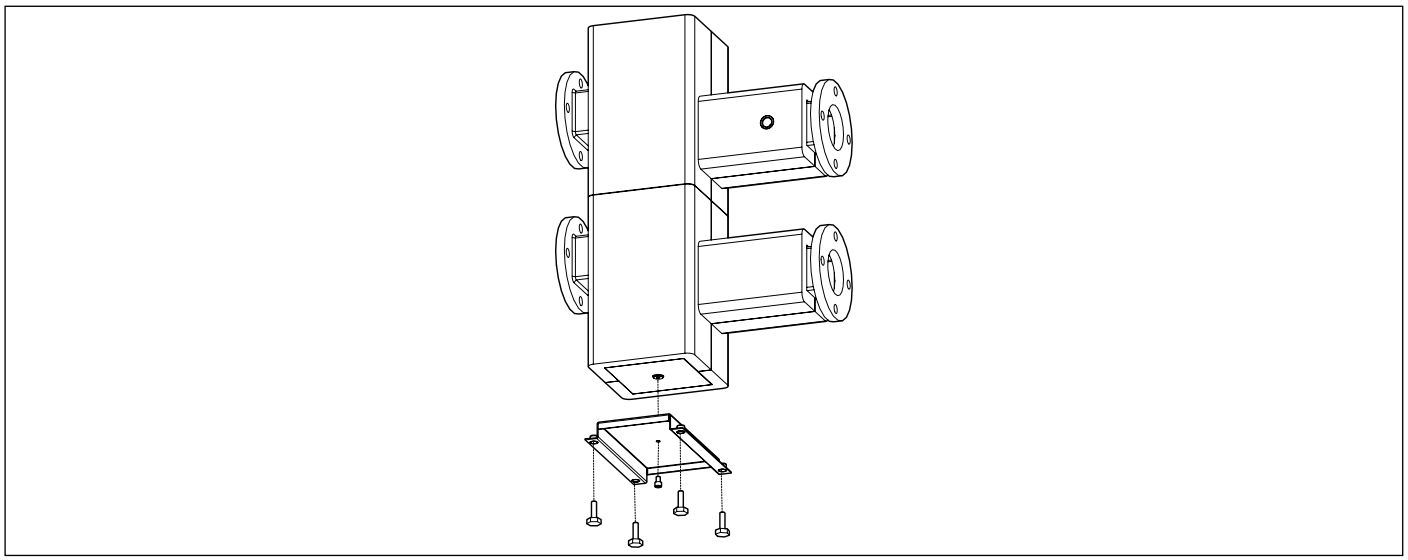
-	Generator model				
-	45	60	85	120	150
Yonos para RS 25/7.5 PWM - 7.5 m	**X**	-	-	-	-
Stratos para 25-1 / 8 T10 PWM - 8 m	ok	**X**	-	-	-
Stratos para 25 1-11 PWM - 11 m	ok	ok	**X**	-	-
Yonos para HF 25 - 12 AUTO - 12 m	ok	ok	ok	**X**	**X**

Tab. 1 Pump matching

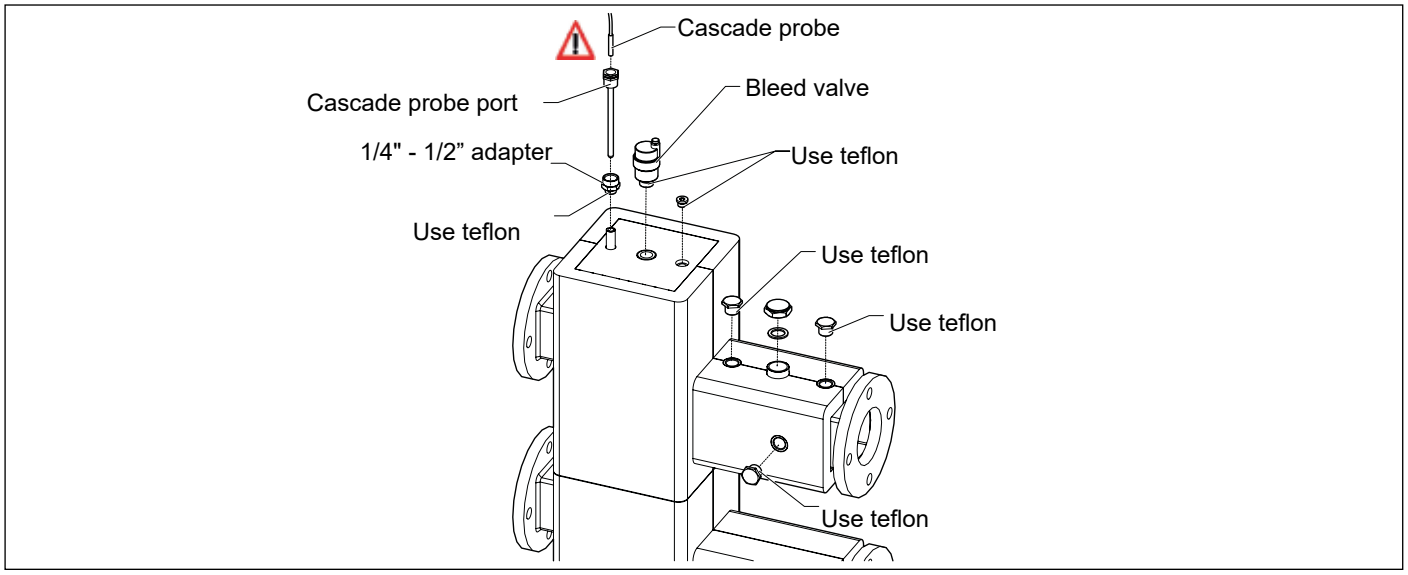
X = **minimum recommended matching (standard supply with the hydraulic unit)**

ok = possible matching

1.11 Assembling the hydraulic separator

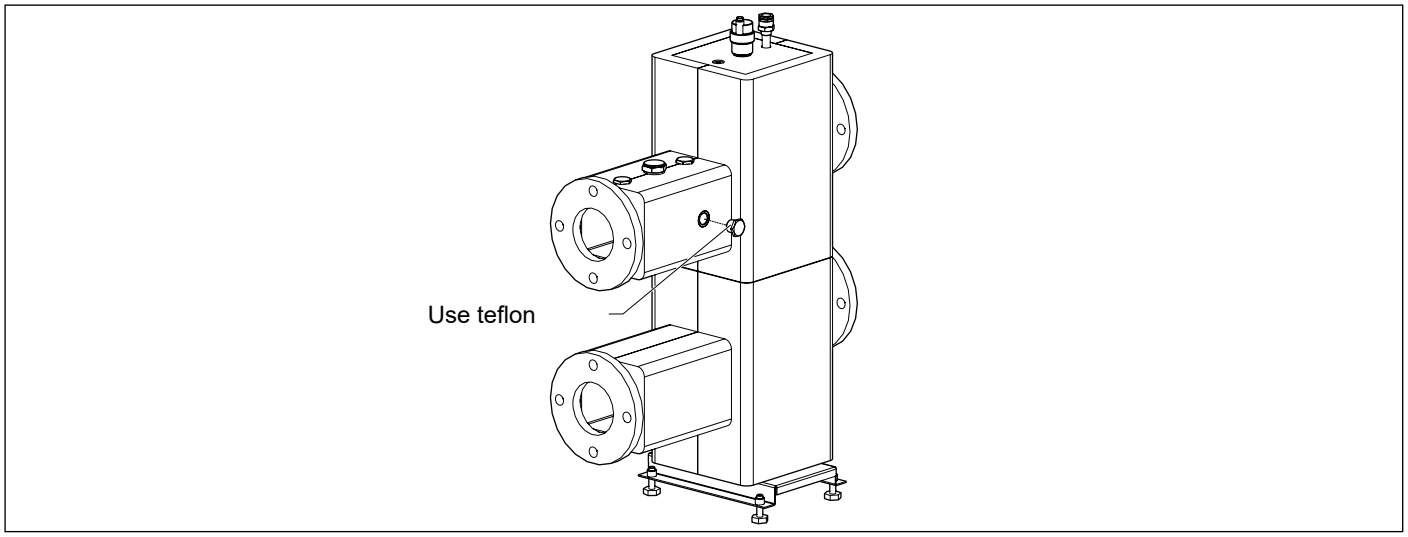


Fasten the plate with the proper screw. Screw the feet to the lower part of the hydraulic separator.

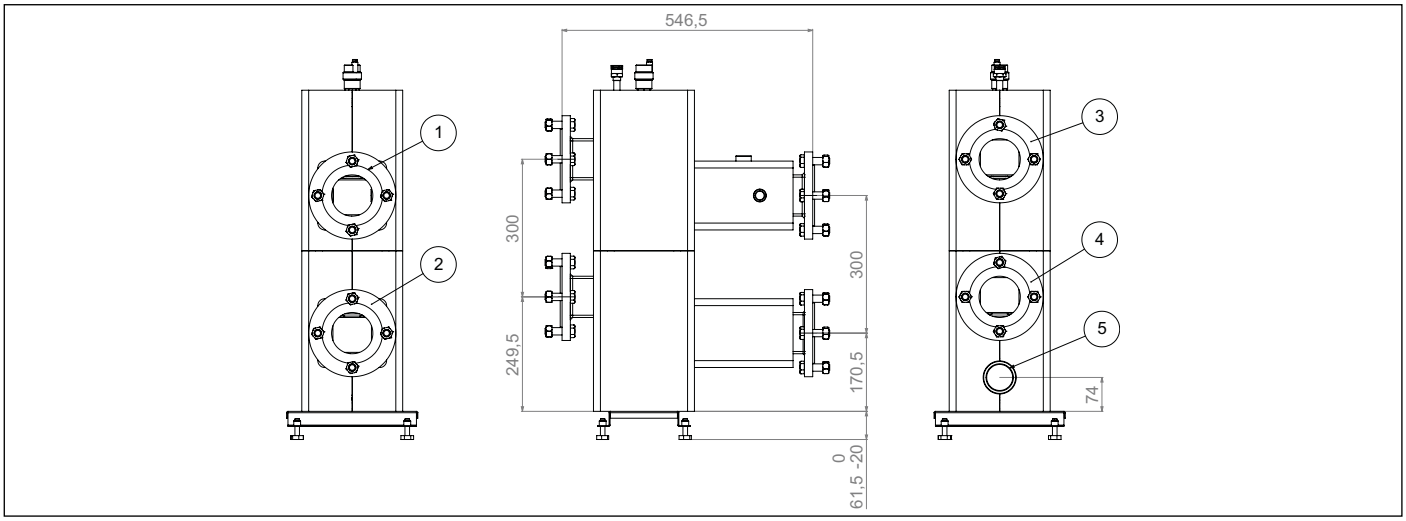


WARNING

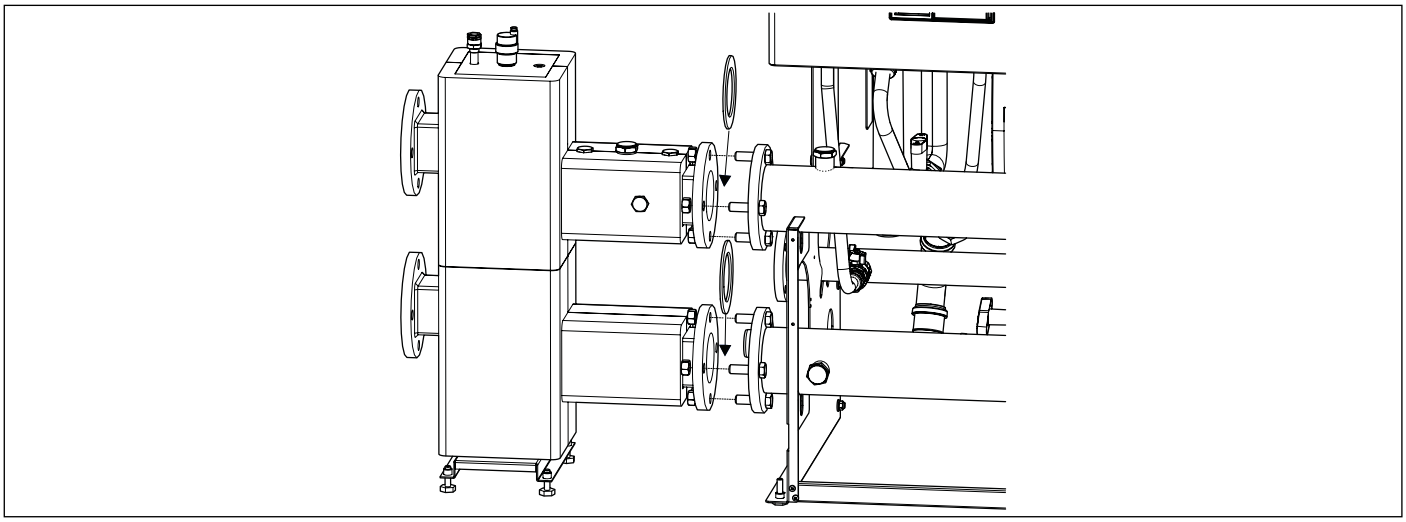
Apply conductive paste to the surface of the component sensitive element.

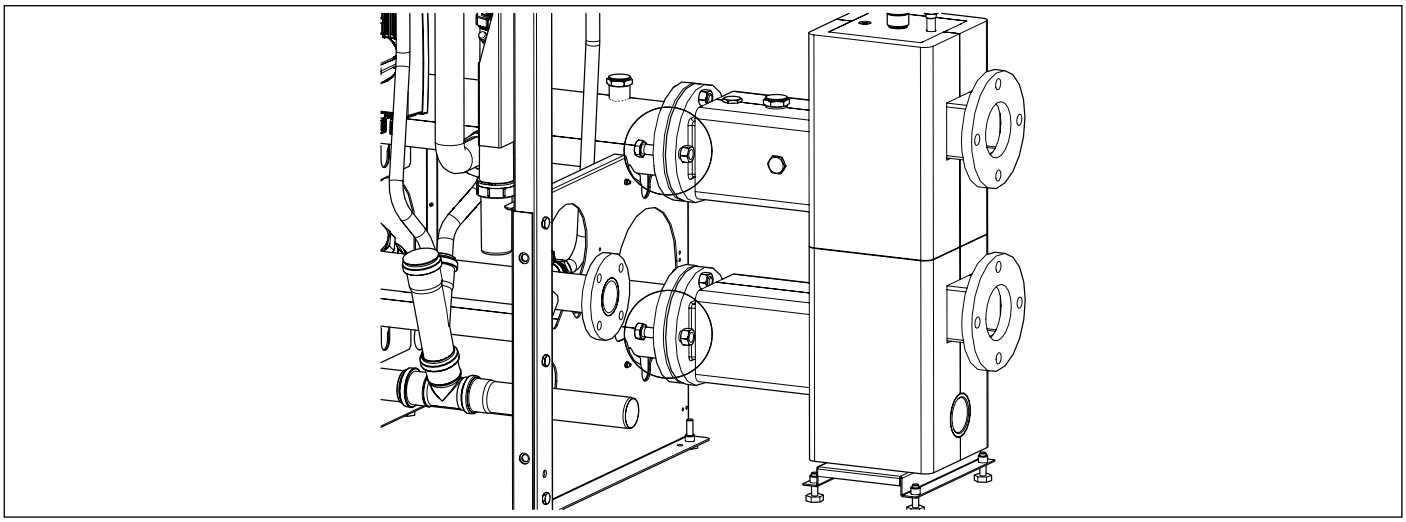


Fasten the components shown in the figure to the upper part of the hydraulic separator. Fasten the cap in the rear part of the hydraulic separator.



Ref	Description
1	DN 80 PN 6 CASCADE FLOW CONNECTION
2	DN 80 PN 6 CASCADE RETURN CONNECTION
3	DN 80 PN 6 SECONDARY CIRCUIT FLOW CONNECTION
4	DN 80 PN 6 SECONDARY CIRCUIT RETURN CONNECTION
5	CONNECTION FOR 1 1/2 " F DRAIN

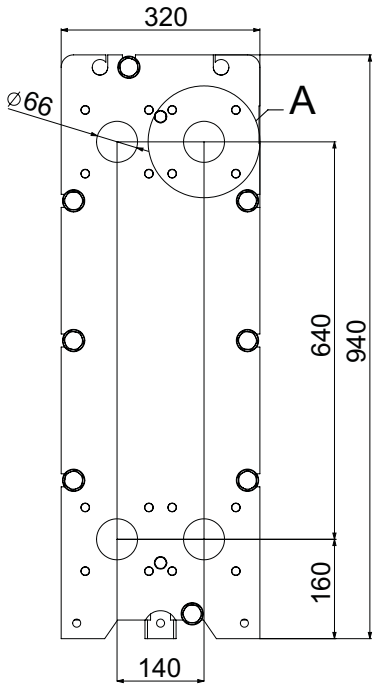


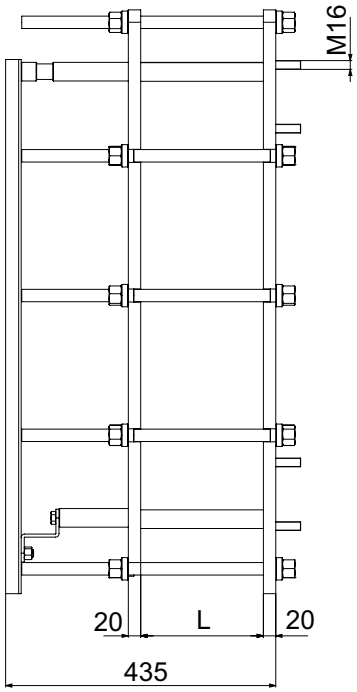


Fasten the hydraulic separator with screws and nuts by placing the gaskets between the two flow and return collectors of the head unit.

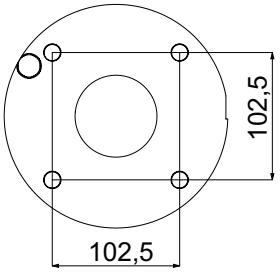
To align the hydraulic separator with the flow and return collector, adjust the feet fastened to its lower part.

1.12 Plate exchanger technical data





POSITION FOR CONNECTION DN 65 FLANGED

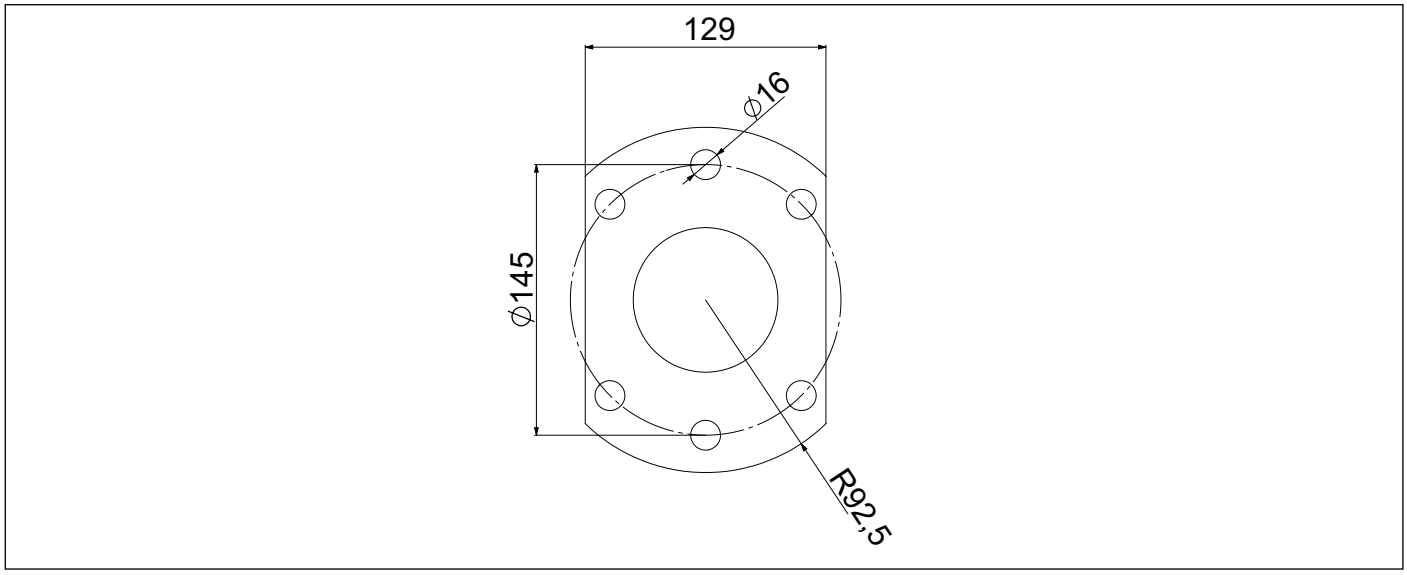


A (2 : 5)

ACCESSORY CODE	PLATE EXCHANGER	PLATES	TIGHTENING L VALUE	PN	PRIMARY WATER VOLUME	SECONDARY WATER VOLUME	EMPTY WEIGHT	WEIGHT AT FULL LOAD
		No.	mm	bar	l	l	kg	kg
0SCAMPIA27	UP TO 120 KW	11	27,5	10	1,4	1,4	110	115
0SCAMPIA28	UP TO 205 KW	21	52,5		2,79	2,79	117	124
0SCAMPIA29	UP TO 300 KW	27	67,5		3,63	3,63	121	130
0SCAMPIA30	UP TO 360 KW	35	87,5		4,74	4,74	128	140
0SCAMPIA31	UP TO 450 KW	41	102,5		5,58	5,58	133	146
0SCAMPIA32	UP TO 540 KW	51	127,5		6,98	6,98	141	157
0SCAMPIA33	UP TO 600 KW	57	142,5		7,81	7,81	145	163
0SCAMPIA34	UP TO 690 KW	63	157,5		8,65	8,65	151	171
0SCAMPIA35	UP TO 780 KW	71	177,5		9,76	9,76	157	179
0SCAMPIA36	UP TO 900 KW	79	197,5		10,88	10,88	163	187

ACCESSORY CODE	PLATE EXCHANGER	EXCHANGE SURFACE	PRIMARY		SECONDARY		ΔP	
			IN	OUT	IN	OUT	PRIMARY	SECONDARY
		m²	°C	°C	°C	°C	kPa	kPa
0SCAMPIA27	UP TO 120 KW	1,35	80	60	50	70	20	20
0SCAMPIA28	UP TO 205 KW	2,85						
0SCAMPIA29	UP TO 300 KW	3,75						
0SCAMPIA30	UP TO 360 KW	4,95					21	21
0SCAMPIA31	UP TO 450 KW	5,85						
0SCAMPIA32	UP TO 540 KW	7,35						
0SCAMPIA33	UP TO 600 KW	8,25						
0SCAMPIA34	UP TO 690 KW	9,15					25	25
0SCAMPIA35	UP TO 780 KW	10,35					27	27
0SCAMPIA36	UP TO 900 KW	11,55					34	34

Tab. 2 Plate exchanger dimensions

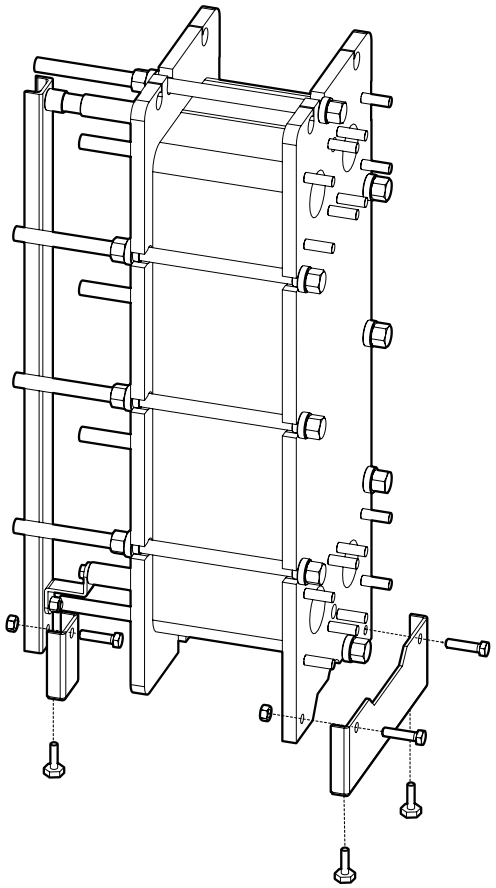


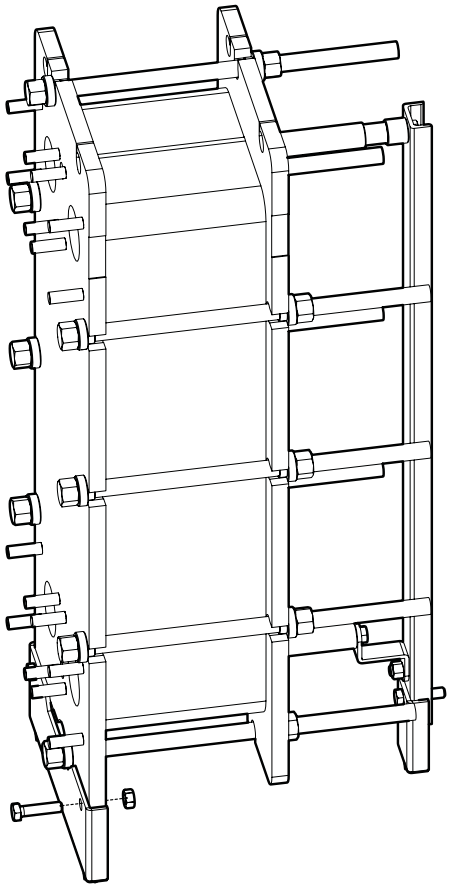
WARNING

DUE TO THE COMPACT DIMENSIONS, TO CONNECT THE FLANGES TO THE EXCHANGER IT IS NECESSARY TO LATERALLY CUT THE FLANGES AS SHOWN IN THE FIGURE ABOVE, FONDITAL CONNECTION ACCESSORIES ARE PRESET TO THIS PURPOSE.

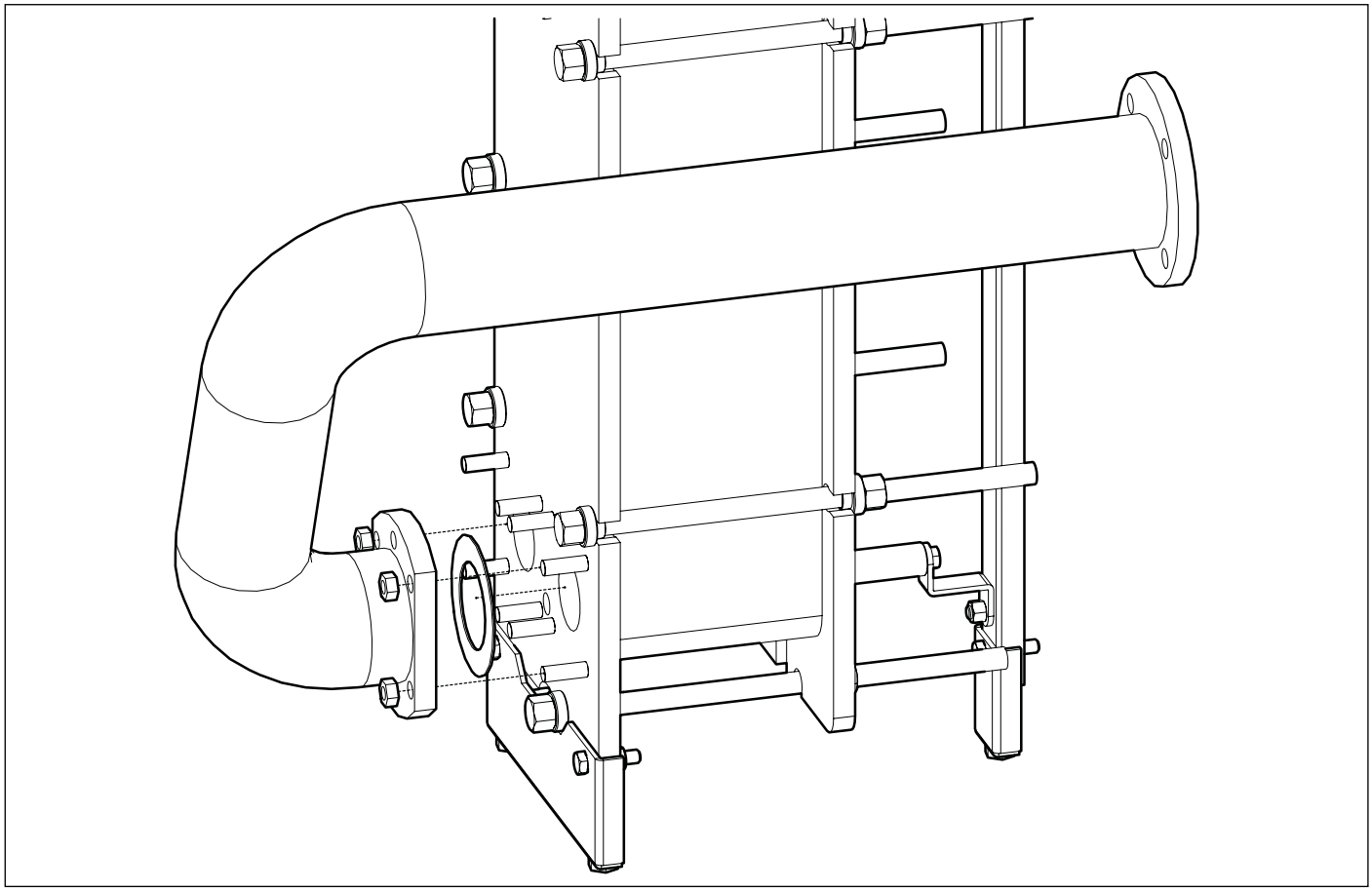
MATERIALS AND CONNECTIONS	
Frame	P355NH
Plates	AISI304
Gaskets	EPDM
Primary connections	P355NH
Secondary connections	P355NH
Tie rods	A193B7
Plate thickness [mm]	0,5
Primary and secondary connections	Flanged DN 65 – M16 tie rods

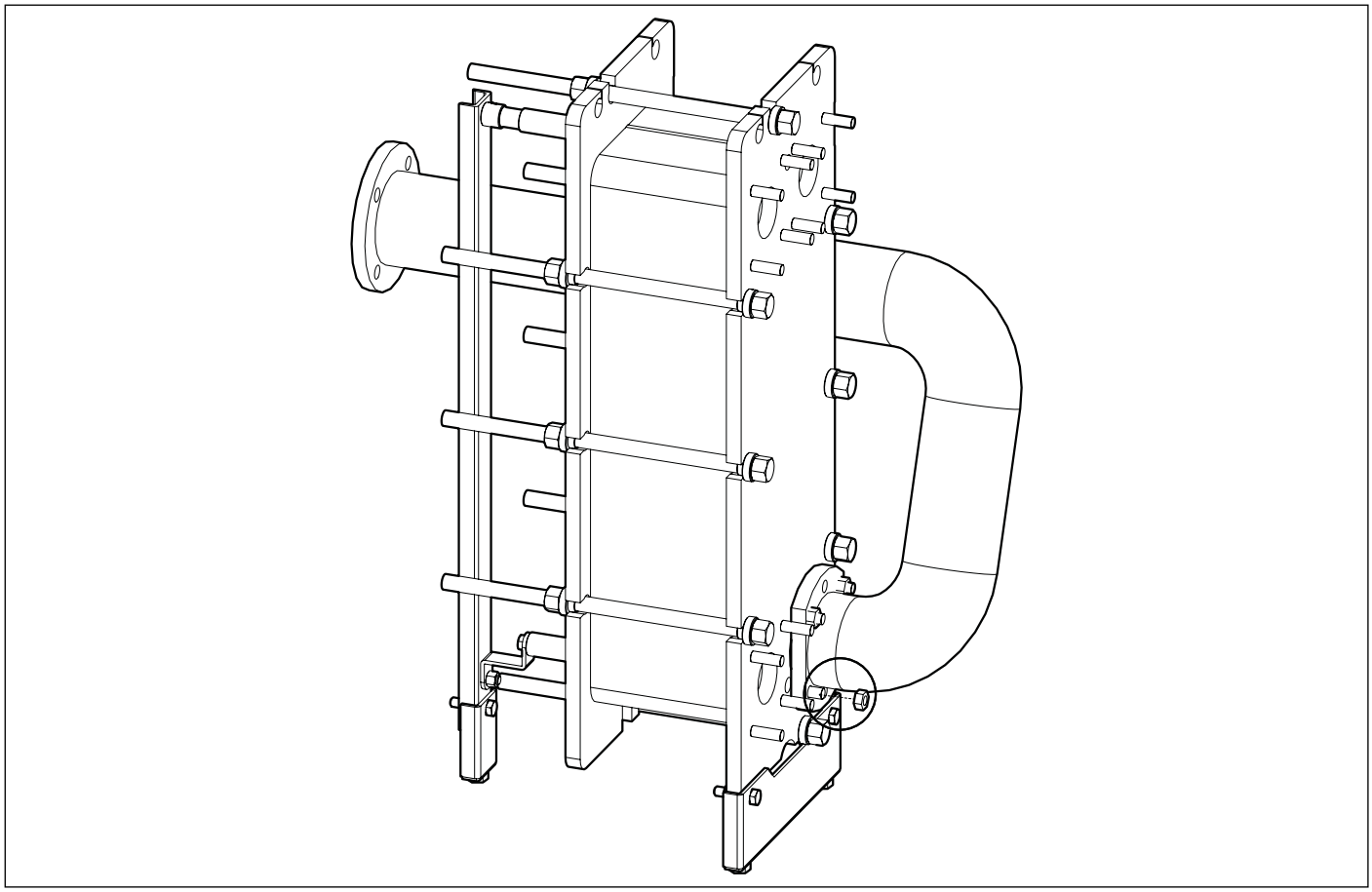
1.13 Assembling the plate exchanger



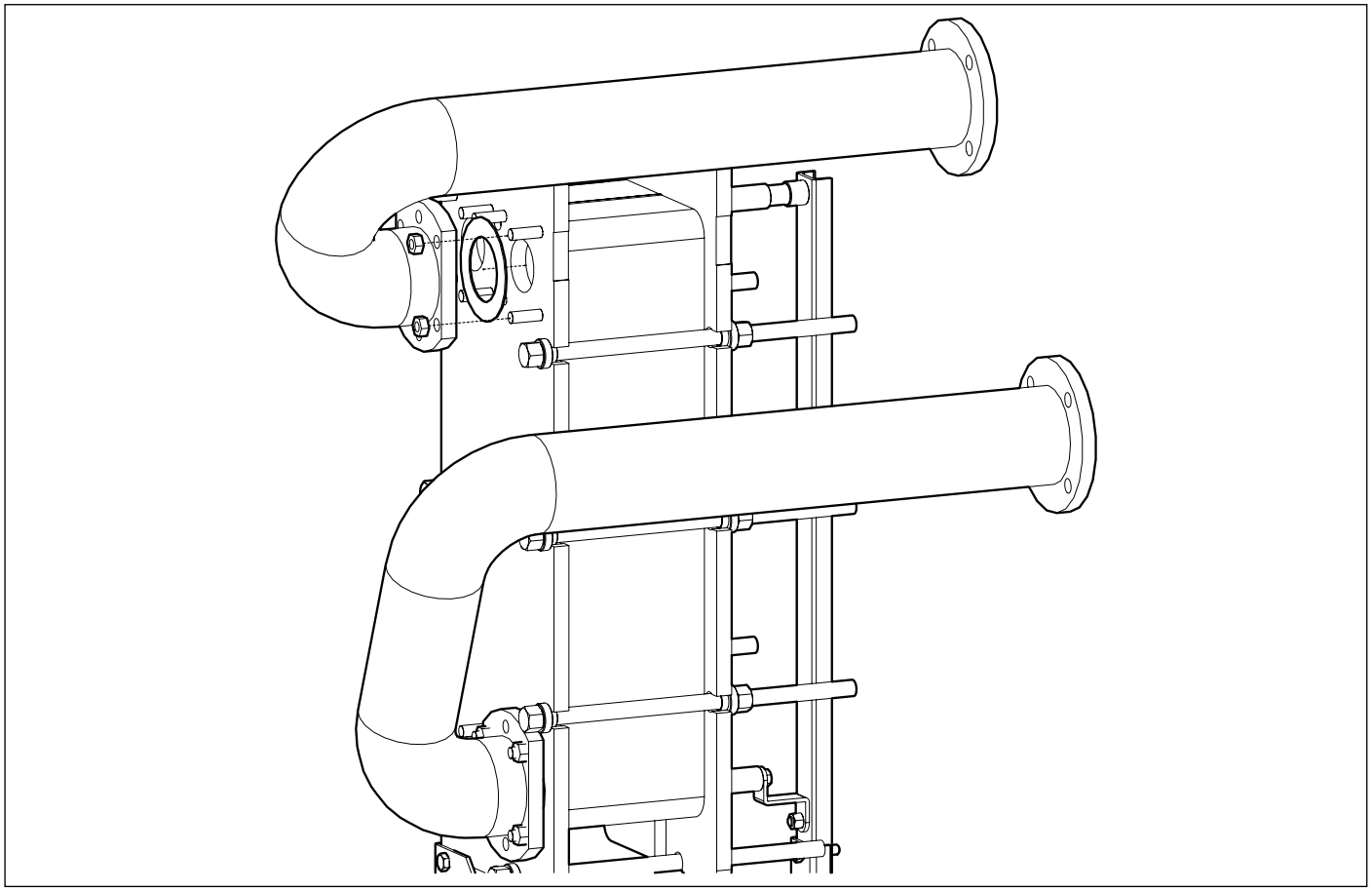


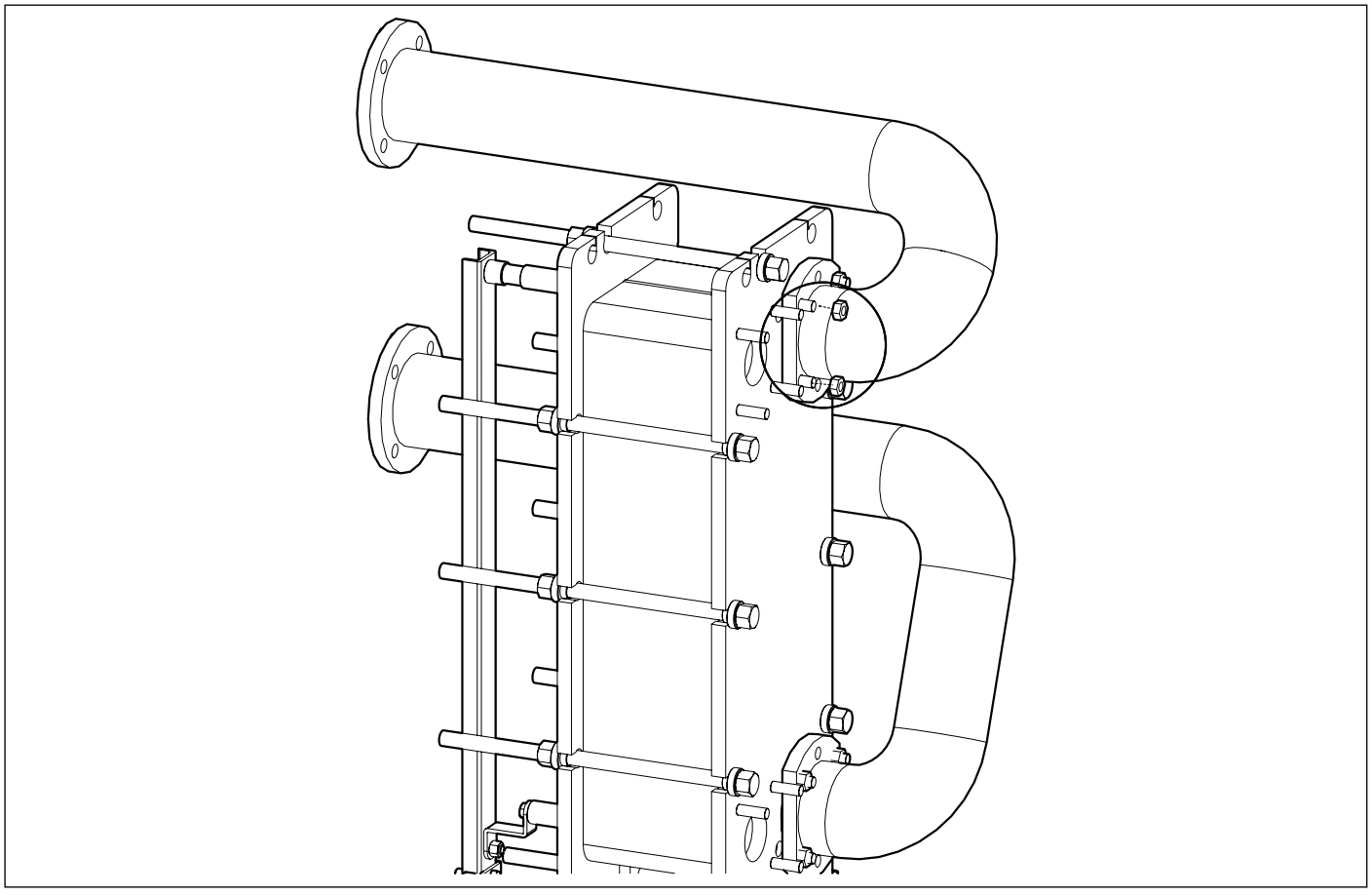
Fasten the plates with screws and nuts. Screw the feet to the lower part of the exchanger.



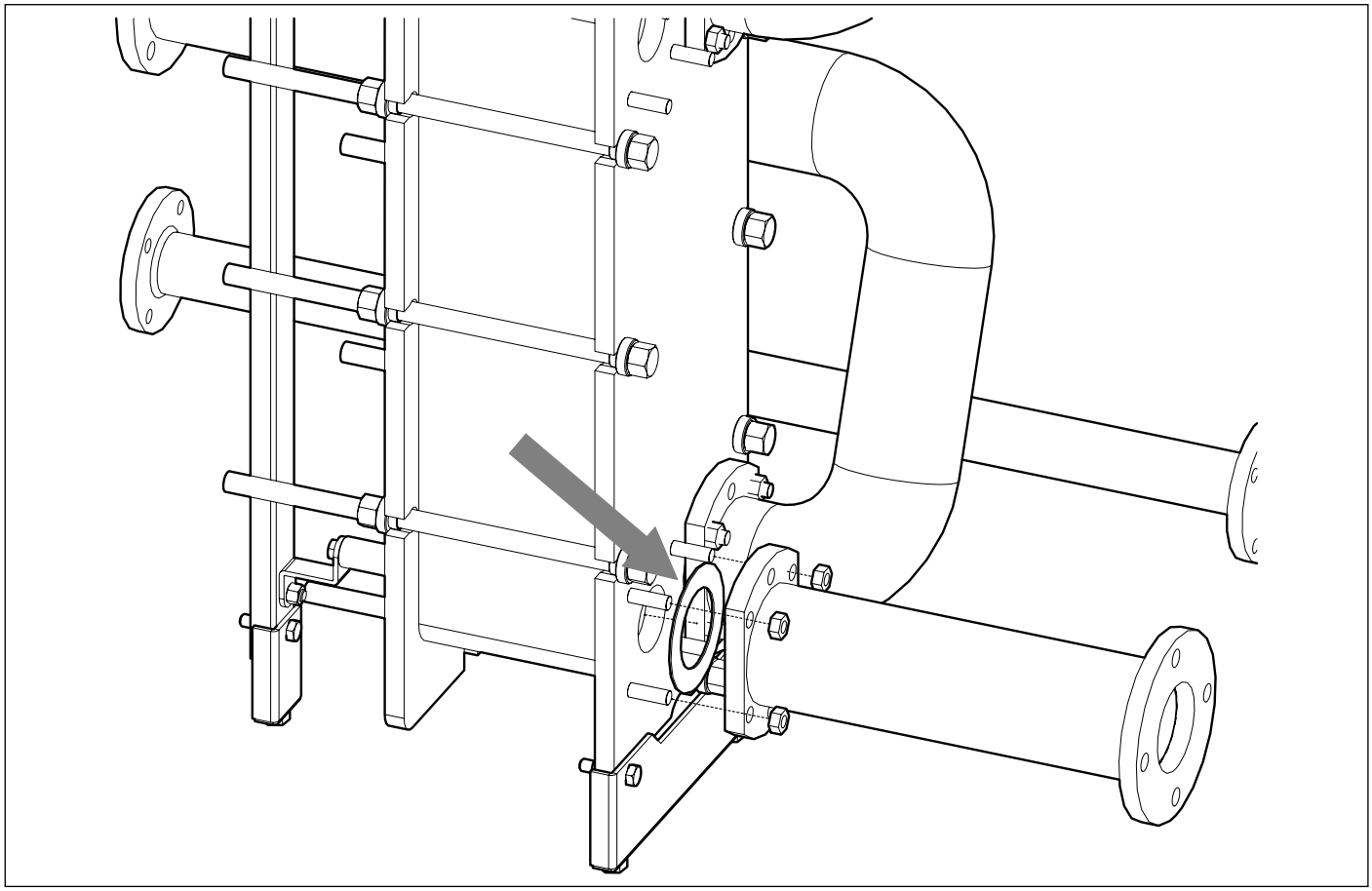


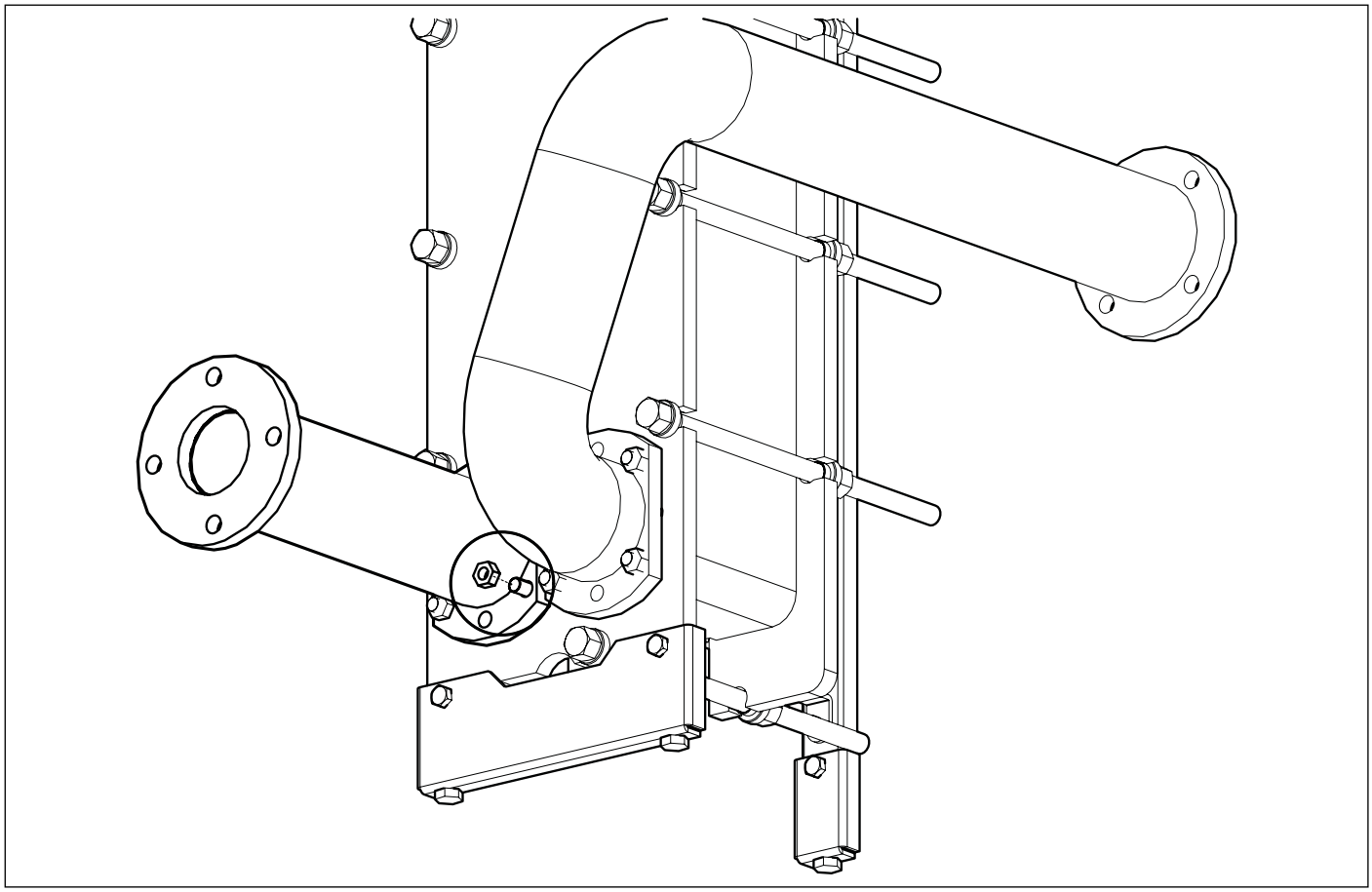
Fasten the secondary system return collector (optional) with screws and nuts by placing the gasket between collector and plate exchanger.



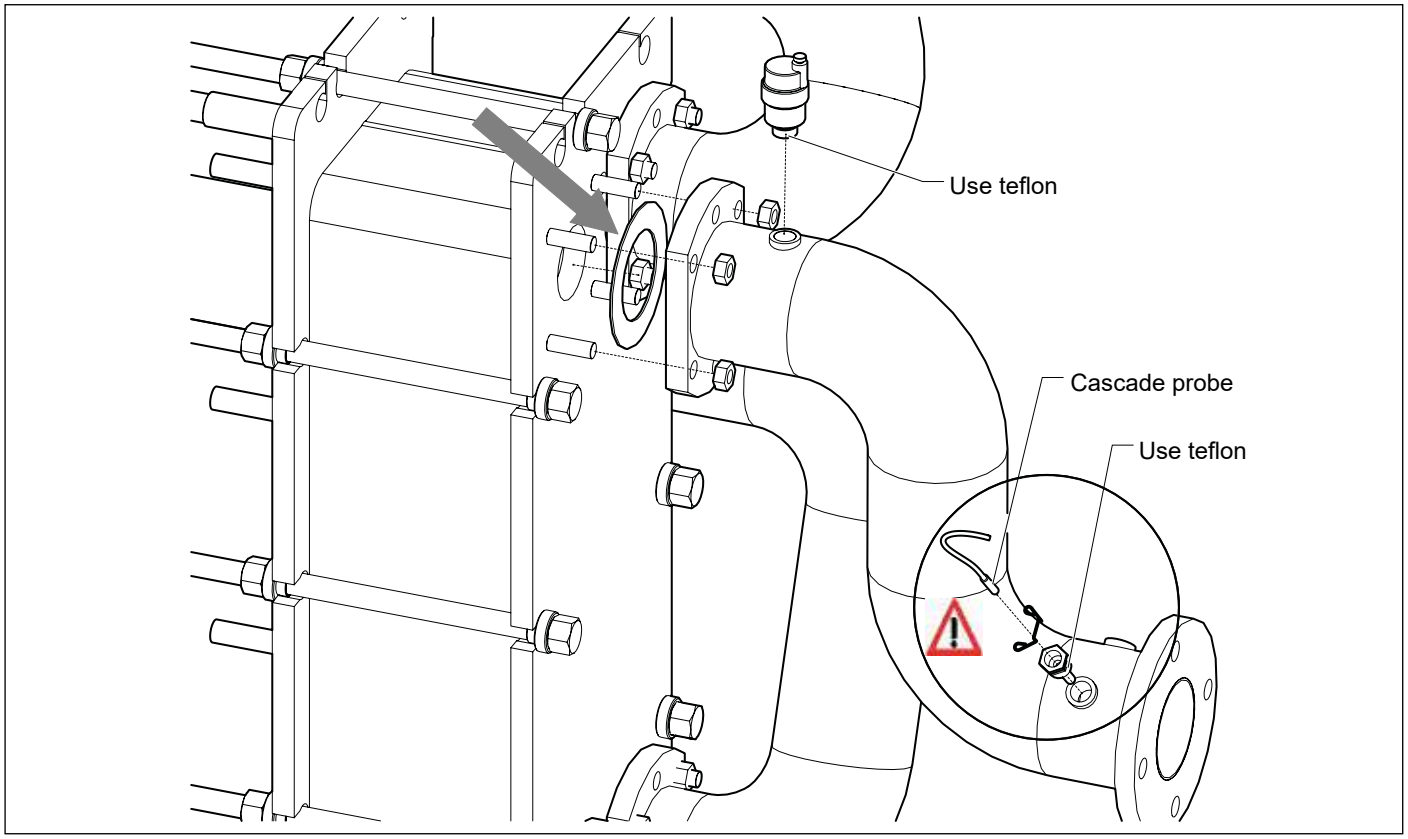


Fasten the secondary system flow collector (optional) with screws and nuts by placing the gasket between collector and plate exchanger.



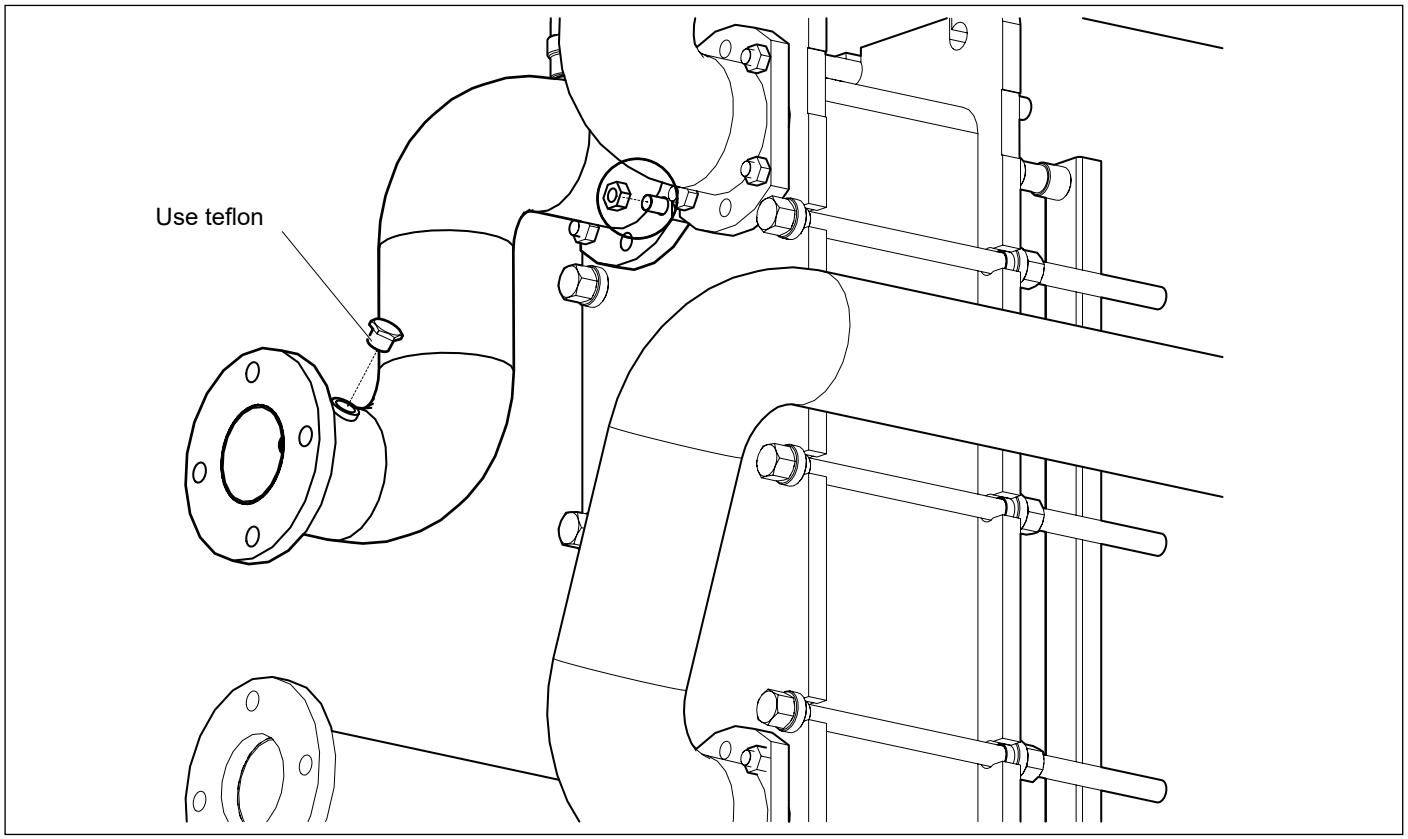


Fasten the boiler return collector with screws and nuts by placing the gasket between collector and plate exchanger.

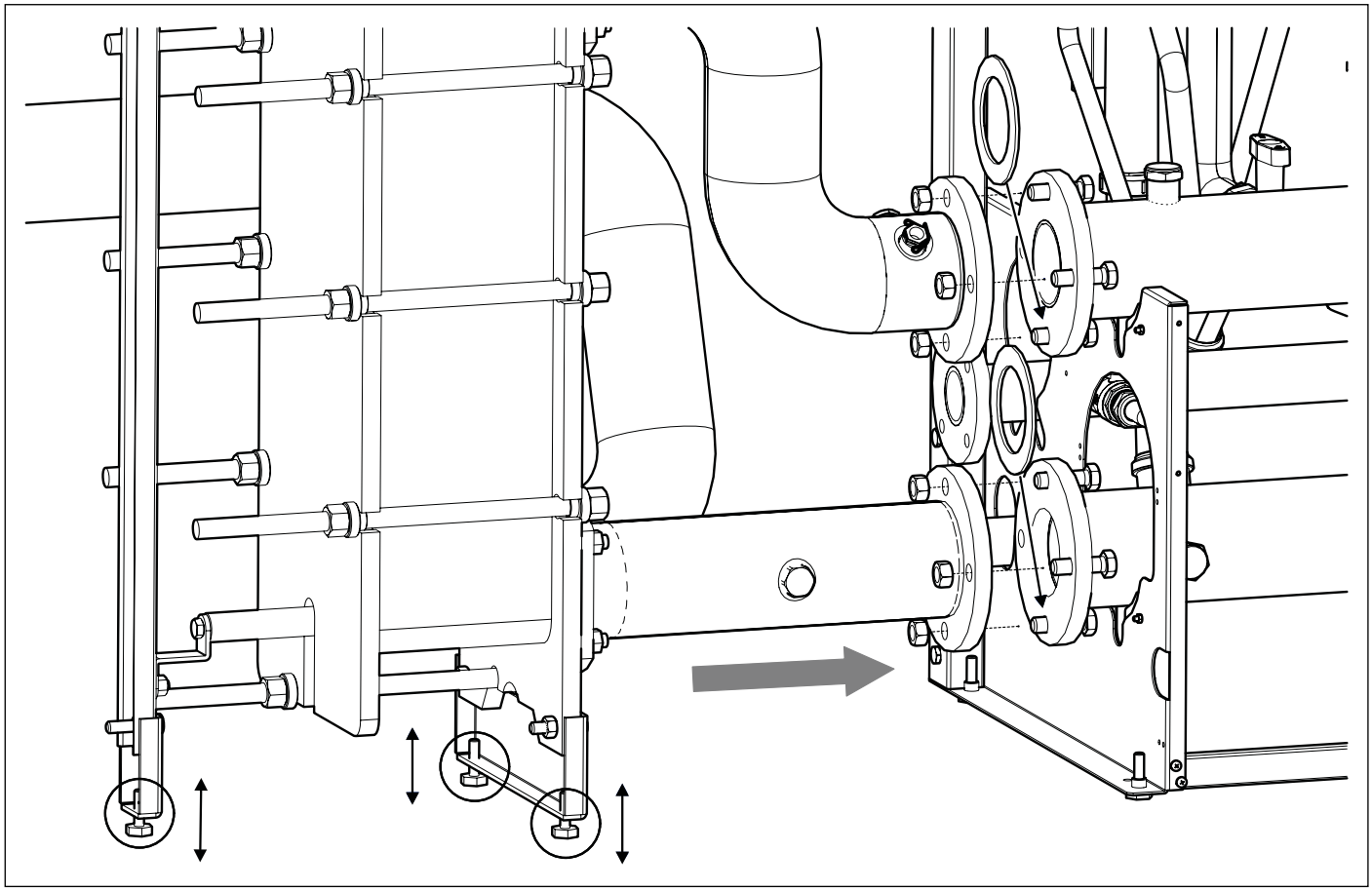


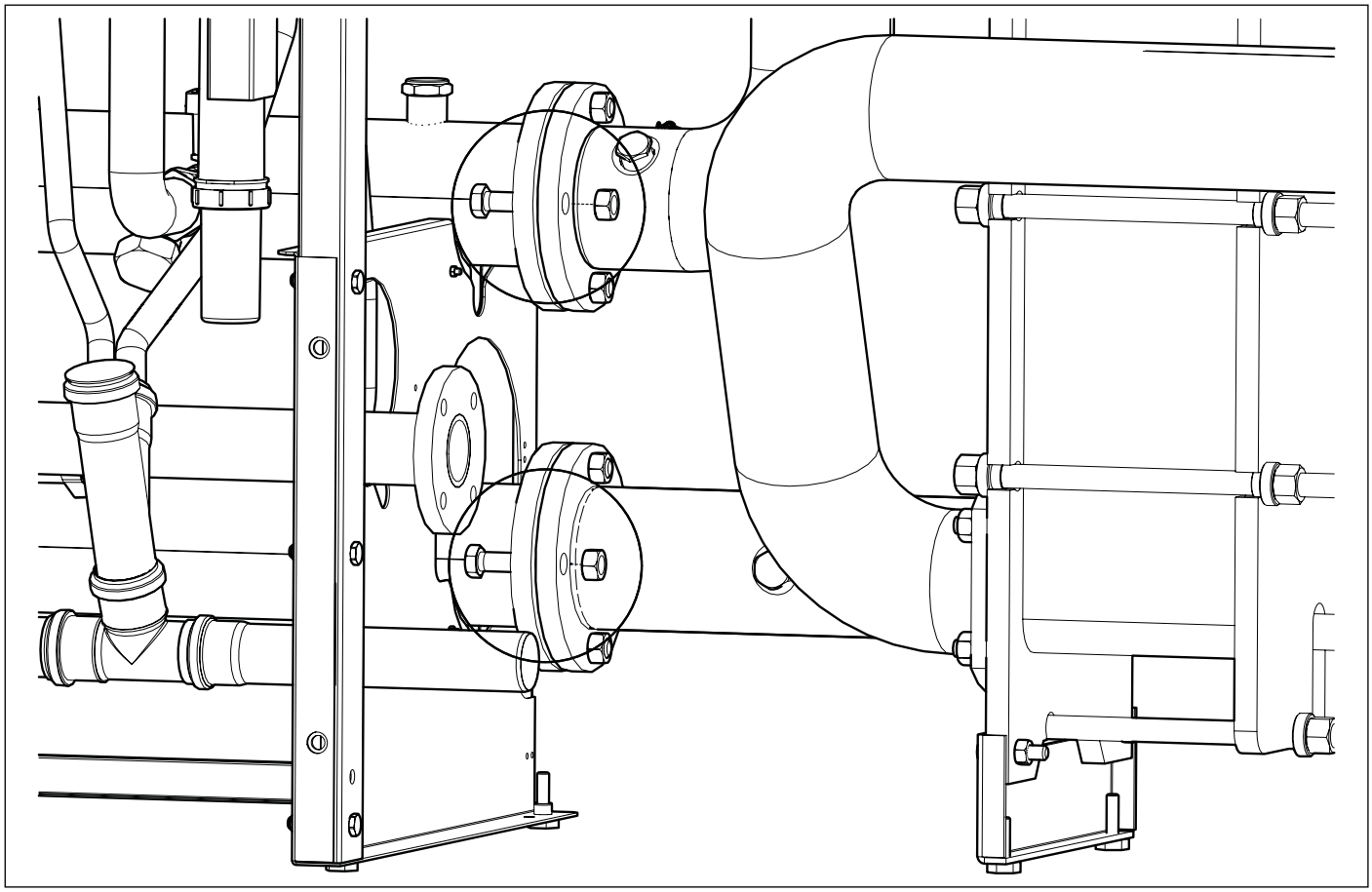
WARNING

APPLY CONDUCTIVE PASTE TO THE SURFACE OF THE COMPONENT SENSITIVE ELEMENT



Fasten the boiler flow collector with screws and nuts by placing the gasket between collector and plate exchanger.
Fasten the components shown in the figure to the upper part of the collector.
Fasten the cap in the rear part of the collector.





Fasten the collectors with screws and nuts by placing the gasket between collectors of the hydraulic unit and collectors of the plate exchanger.
To align collectors of the plate exchanger and collectors of the head hydraulic unit, adjust the feet fastened to the lower part of the exchanger.

1.14 Flue gas collector assembly and configuration tables

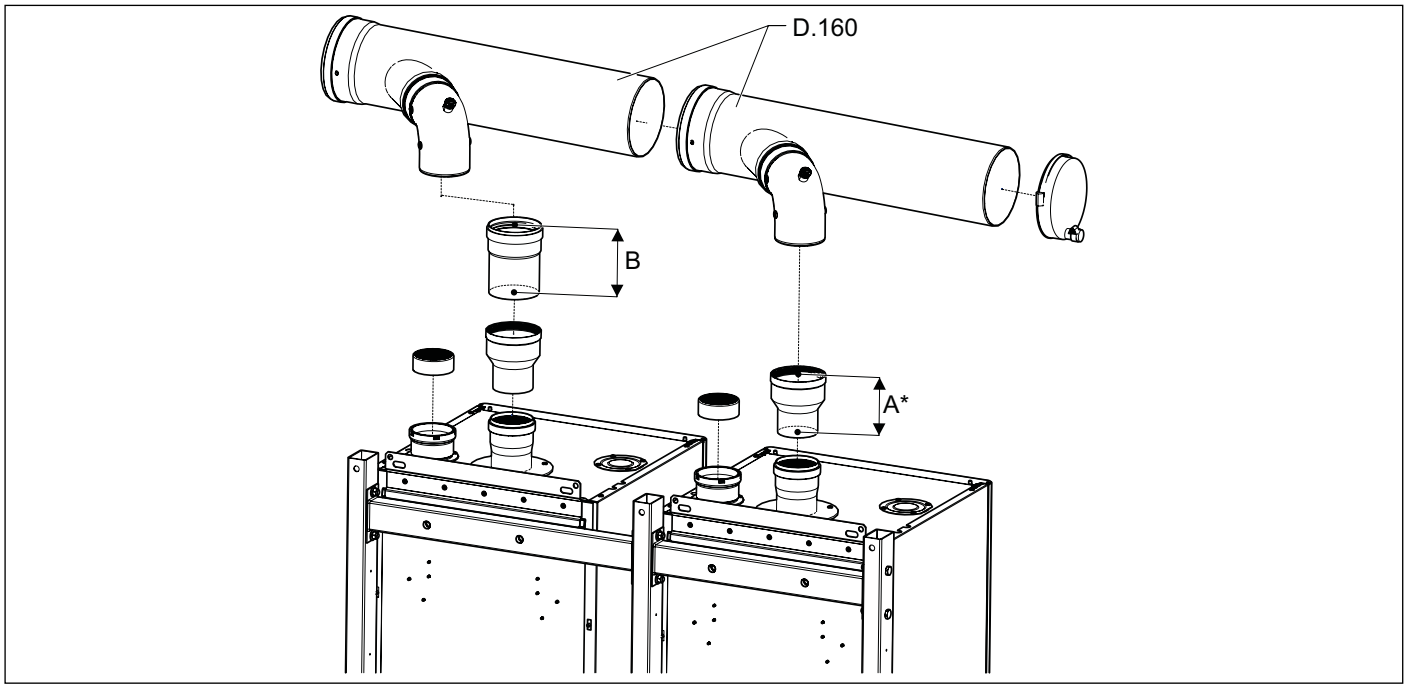


Fig. 17 45-60 flue gas collector assembly

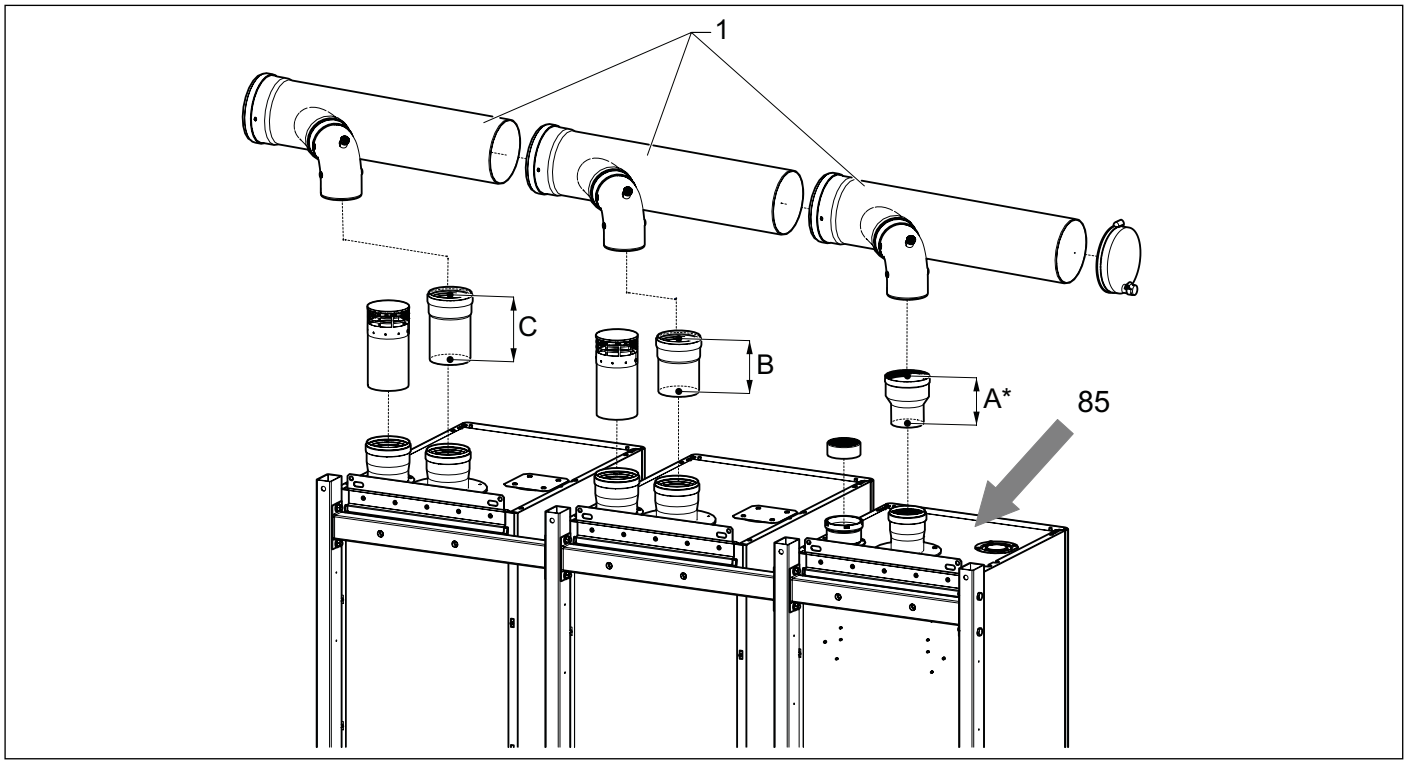


Fig. 18 85-120 flue gas collector assembly

1 = D.200/160 flue gas collector depending on battery power. In case of D.200 collector, a D.200 connection extension between the two adjacent collectors is required.

* value A of D100 extension to tilt the flue gas collector is ensured by the height of D80-100 fitting. Therefore, it is not necessary to install the D100 extension when the 45-60-85 boiler is in head position of the cascade.

WARNING

In case of 325 installations and in all cases where a 85 boiler is matched with a 120 boiler, the 85 boiler with lower output must be positioned on the head rack to keep the flue gas collector slope according to the values shown on the initial diagrams.

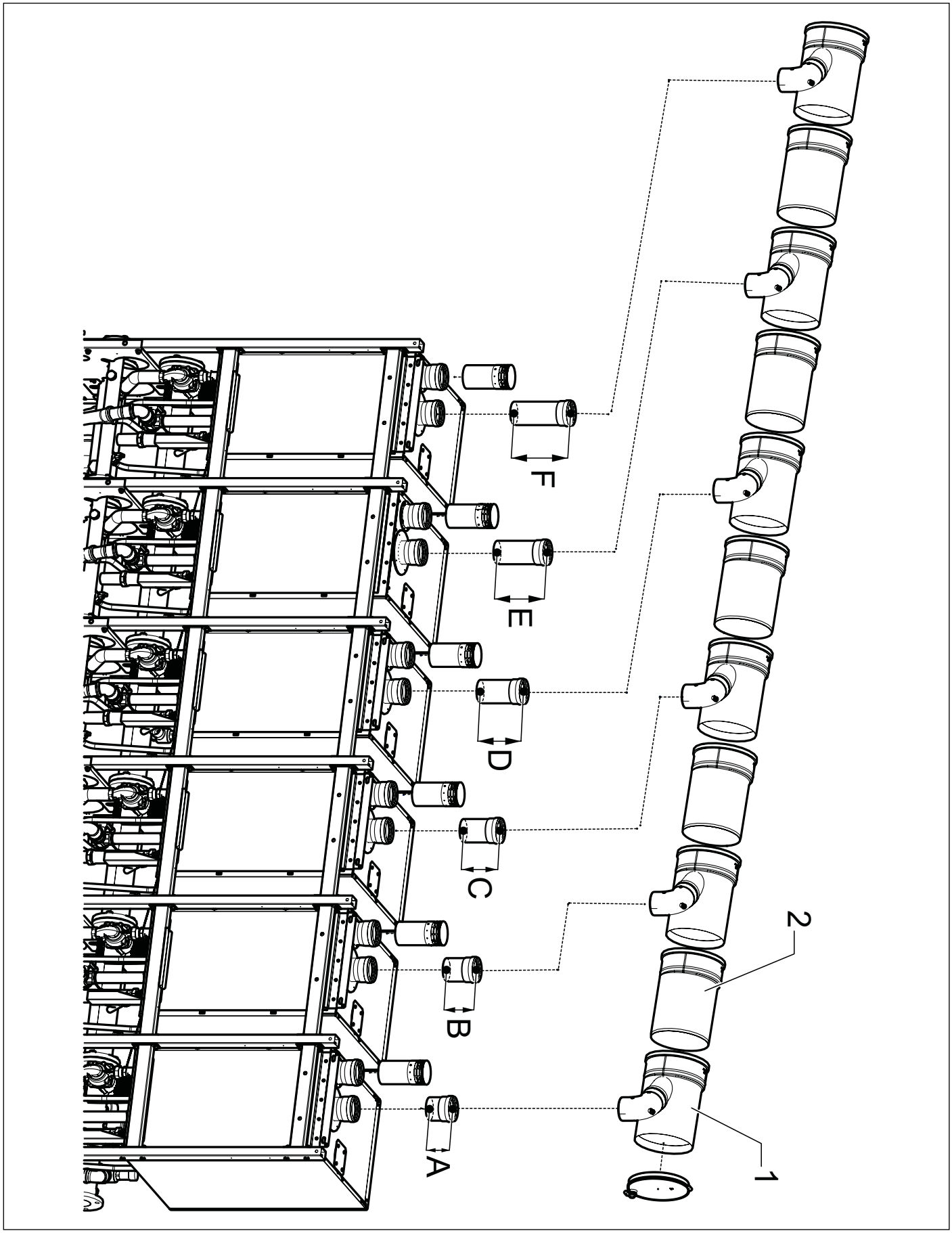


Fig. 19 120-150 flue gas collector assembly

1 = D.250/200 flue gas collector depending on the battery power
2 = D.250/200 connection extension depending on the battery power

WARNING

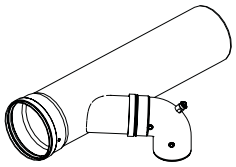
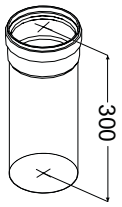
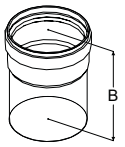
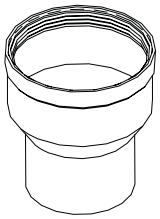
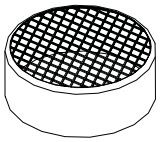
To connect the collectors to the flue gas vent of the boilers in series and provide a slope of approx. 3°, it is necessary to use a D100 extension to be cut according to increasing height values shown in the table below, where A is the minimum value and F the maximum value.

-	A	B	C	D	E	F
L [mm]	110	140	170	200	230	260

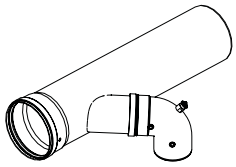
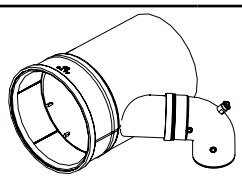
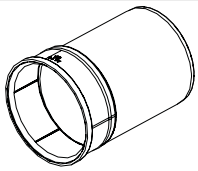
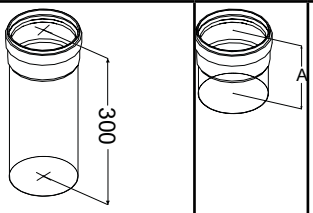
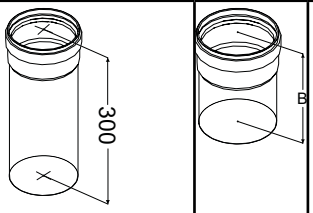
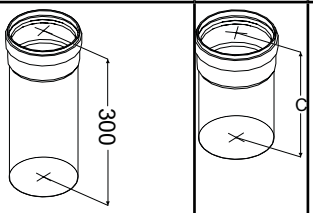
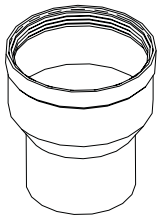
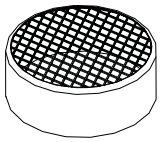
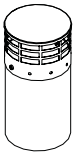
Tab. 3 Stub pipe lengths

For boiler models from 45 to 85 , it is necessary to use a D80-100 flue gas fitting.

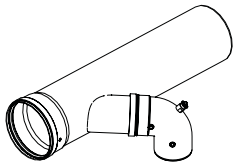
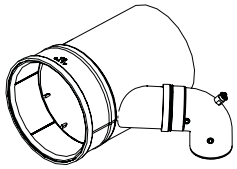
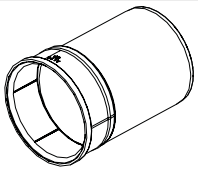
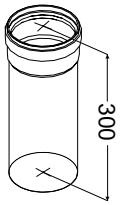
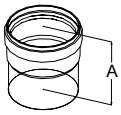
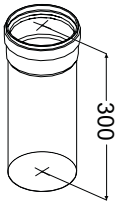
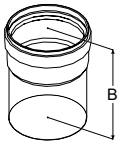
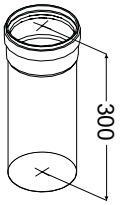
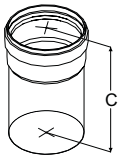
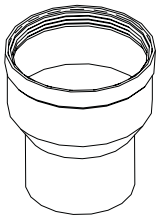
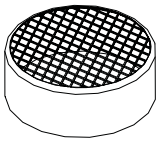
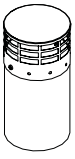
For boiler matching in the modular generator, when a 45, 60, 85 model boiler is installed and positioned in the first position in the cascade, the D80-100 adapter has the same height as value A, therefore it is not necessary to use the D100 connection extension.

Code	Image	45	60	105
0COLLFUM03	 D.160	1	1	2
0PROLUNG28 *	 	-	-	1
0RIDUZIO13		1	1	2
0GRIGASP01		1	1	2

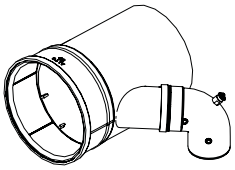
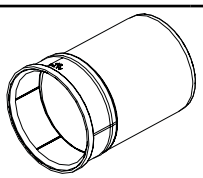
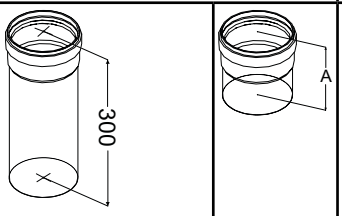
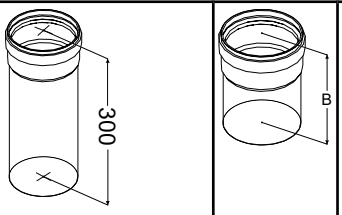
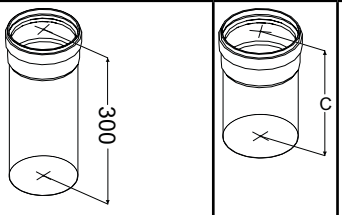
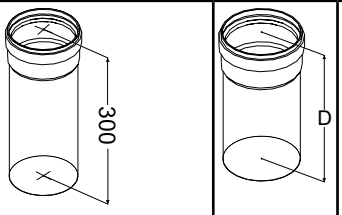
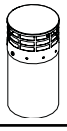
Tab. 4 45-60 range generator configurations

Code	Image	85	120	170	205	240	325	360
0COLLFUM03	 D.160	1	1	2	2	2	-	-
0COLLFUM02	 D.200	-	-	-	-	-	3	3
0PROLUNG25	 D.200	-	-	-	-	-	2	2
0PROLUNG28 *		-	1	-	-	1	-	1
0PROLUNG28 *		-	-	1	1	1	1	1
0PROLUNG28 *		-	-	-	-	-	1	1
0RIDUZIO13		1	-	2	1	-	1	-
0GRIGASP01		1	-	2	1	-	1	-
0GRIGASP02		-	1	-	1	2	2	3

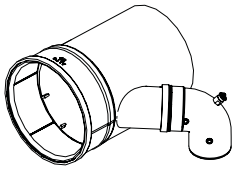
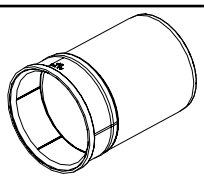
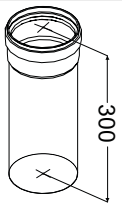
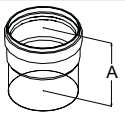
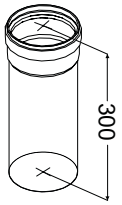
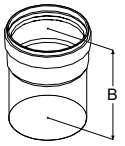
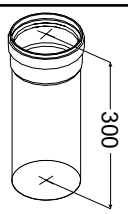
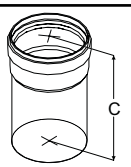
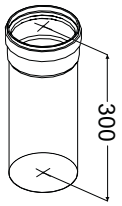
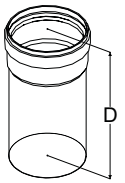
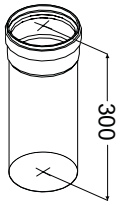
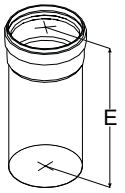
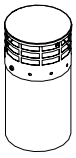
Tab. 5 85-120 range generator configurations

Code	Image	150	270	300	390	420
0COLLFUM03	 D.160	1	2	2	-	-
0COLLFUM02	 D.200	-	-	-	3	3
0PROLUNG25	 D.200	-	-	-	2	2
0PROLUNG28 *	 	1	1	1	1	1
0PROLUNG28 *	 	-	1	1	1	1
0PROLUNG28 *	 	-	-	-	1	1
0RIDUZIO13		-	-	-	-	-
0GRIGASP01		-	-	-	-	-
0GRIGASP02		1	2	2	3	3

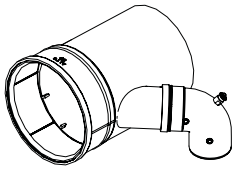
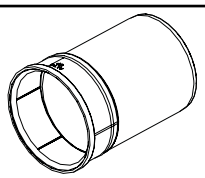
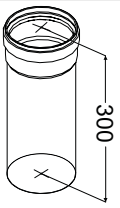
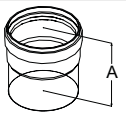
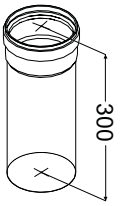
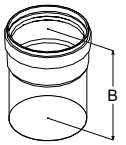
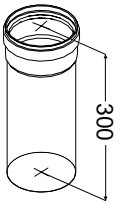
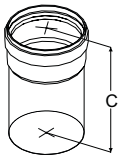
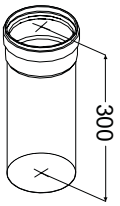
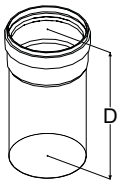
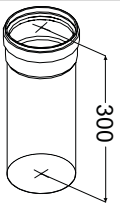
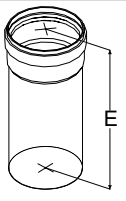
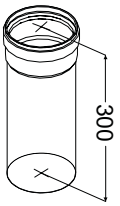
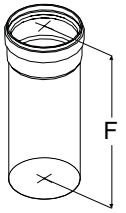
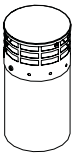
Tab. 6 120-150 range generator configurations

Code	Image	450	480	510	540	570	600
0COLLFUM02	 D.200	3	4	4	4	4	4
0PROLUNG25	 D.200	2	3	3	3	3	3
0PROLUNG28 *		1	1	1	1	1	1
0PROLUNG28 *		1	1	1	1	1	1
0PROLUNG28 *		1	1	1	1	1	1
0PROLUNG28 *		-	1	1	1	1	1
0GRIGASP02		3	4	4	4	4	4

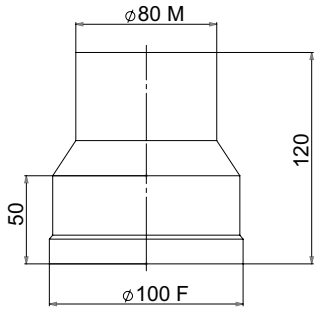
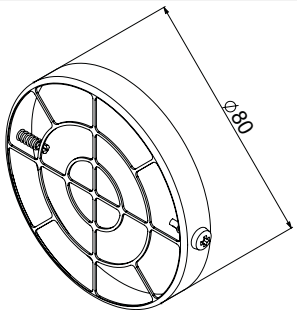
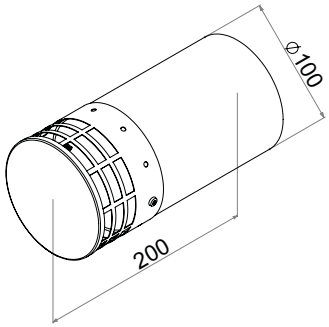
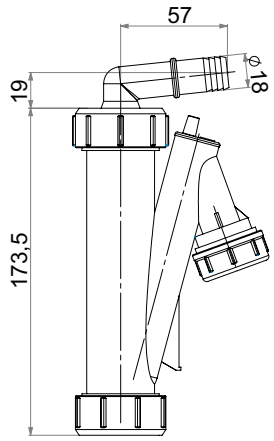
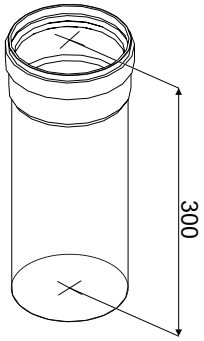
Tab. 7 120-150 range generator configurations

Code	Image	630	660	690	720	750
0COLLFUM04	 D.250	5	5	5	5	5
0PROLUNG26	 D.250	4	4	4	4	4
0PROLUNG28 *	 	1	1	1	1	1
0PROLUNG28 *	 	1	1	1	1	1
0PROLUNG28 *	 	1	1	1	1	1
0PROLUNG28 *	 	1	1	1	1	1
0PROLUNG28 *	 	1	1	1	1	1
0GRIGASP02		5	5	5	5	5

Tab. 8 120-150 range generator configurations

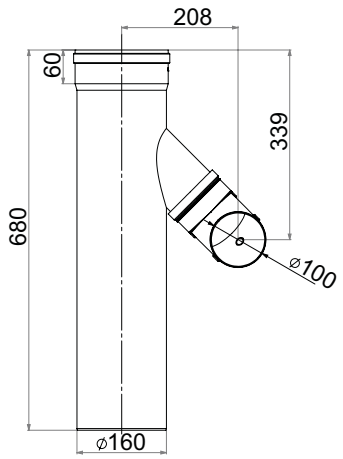
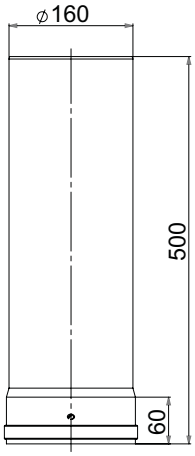
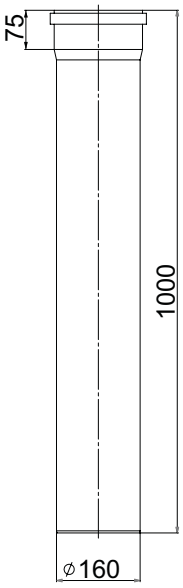
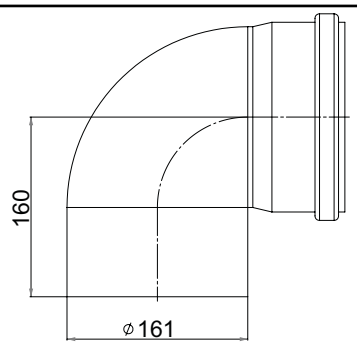
Code	Image	780	810	870	900
0COLLFUM04	 D.250	6	6	6	6
0PROLUNG26	 D.250	5	5	5	5
0PROLUNG28 *	 	1	1	1	1
0PROLUNG28 *	 	1	1	1	1
0PROLUNG28 *	 	1	1	1	1
0PROLUNG28 *	 	1	1	1	1
0PROLUNG28 *	 	1	1	1	1
0PROLUNG28 *	 	1	1	1	1
0GRIGASP02		6	6	6	6

Tab. 9 120-150 range generator configurations

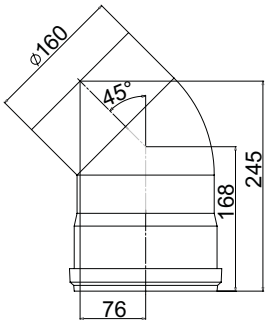
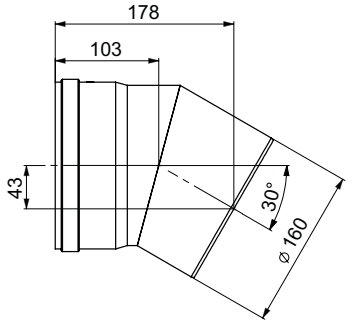
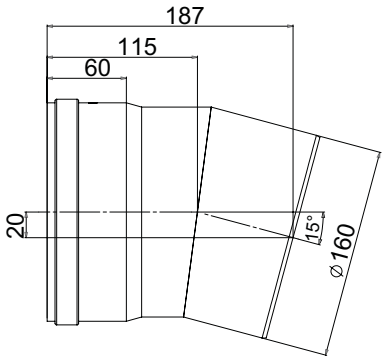
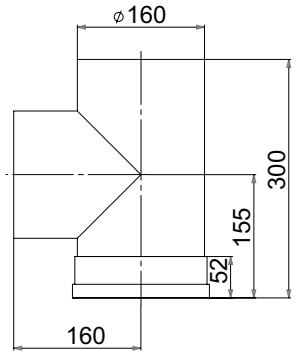
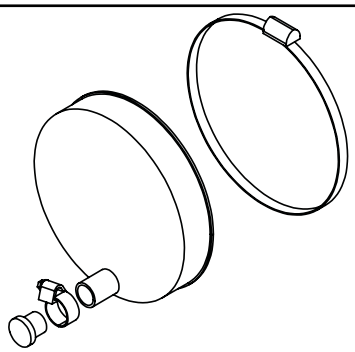
Code	Image	Description
0RIDUZIO13		M - F adapter diameter 80 - 100
0GRIGASP01		D 80 suction opening
0GRIGASP02		D 100 suction opening
0SIFCOND00		Trap for flue gas collector condensate drain
0PROLUNG28*		D 100 L 300 extension (to be cut)

Tab. 10 Various accessories

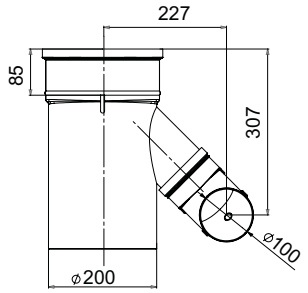
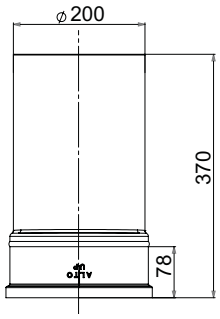
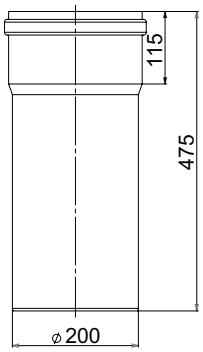
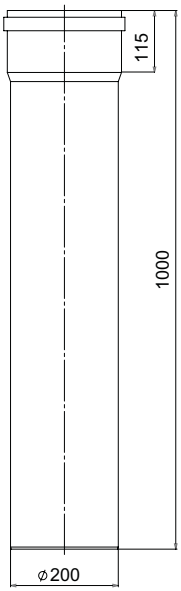
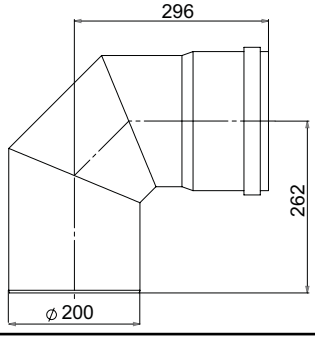
* D.100 extension to be cut according to the indications in the table Tab. 17 Stub pipe lengths on page 74.

Code	Image	Description
0COLLFUM03		Flue gas collector for D 160 heat module
0PROLUNG31		L 500 D 160 extension
0PROLUNG10		L 1000 D 160 extension
0CURVAXX12		90° elbow M/F D 160

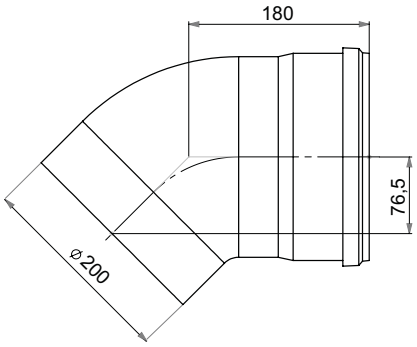
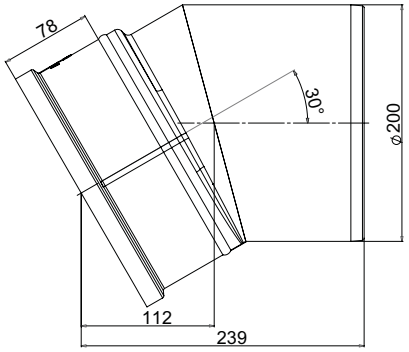
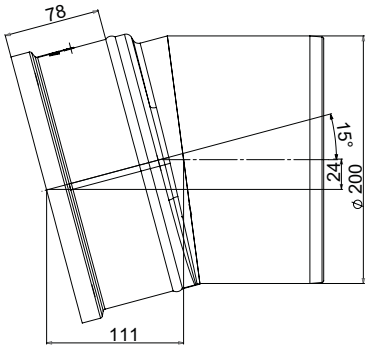
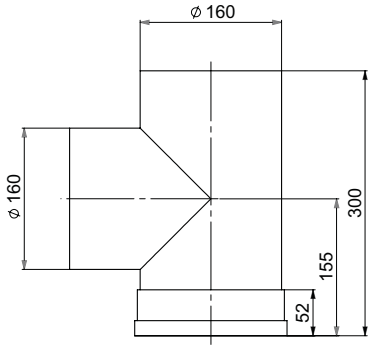
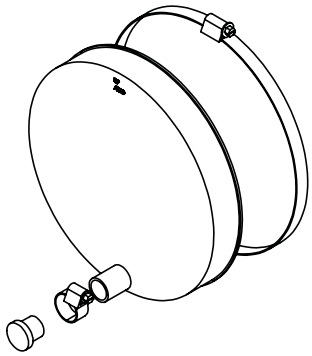
Tab. 11 D.160 accessories (I)

Code	Image	Description
0CURVAXX14		45° elbow M/F D 160
0CURVAXX28		30° elbow M/F D 160
0CURVAXX30		15° elbow M/F D 160
0RACCORT04		T-shaped fitting M/M/F D 160
0SCARCON01		Cap for D 160 collector with condensate drain hole

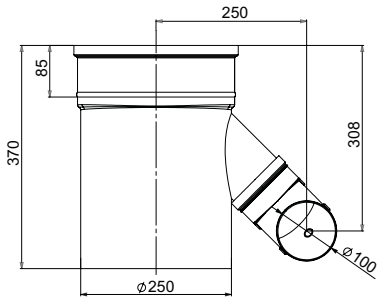
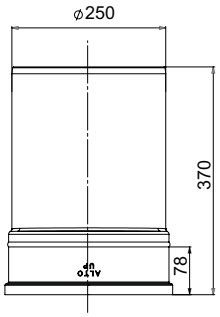
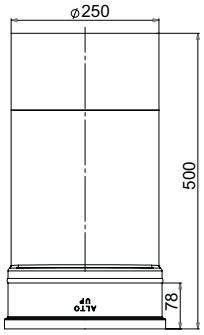
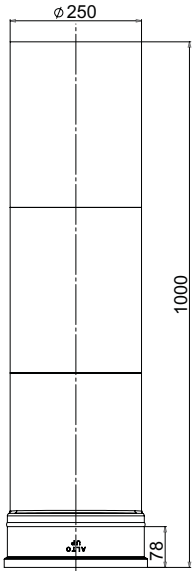
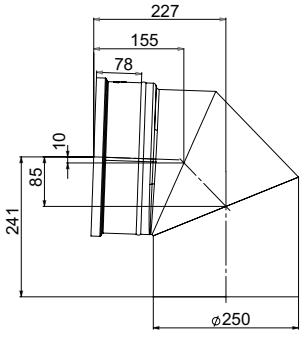
Tab. 12 D.160 accessories (II)

Code	Image	Description
0COLLFUM02		Flue gas collector for D 200 heat module
0PROLUNG25		Connection extension D 200 L 370 mm
0PROLUNG15		D 200 L 475 m extension
0PROLUNG13		D 200 L 1000 m extension
0CURVAXX13		90° elbow M/F D 200

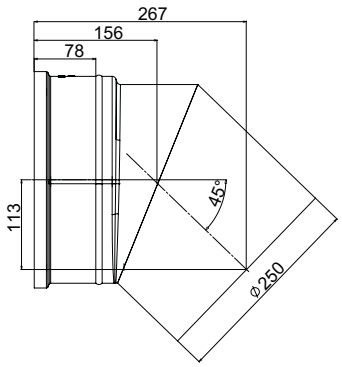
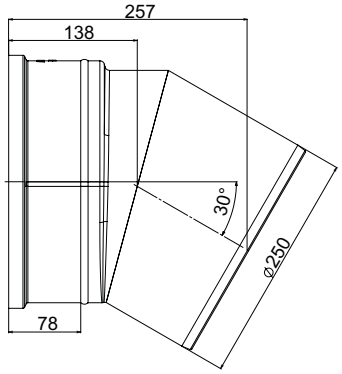
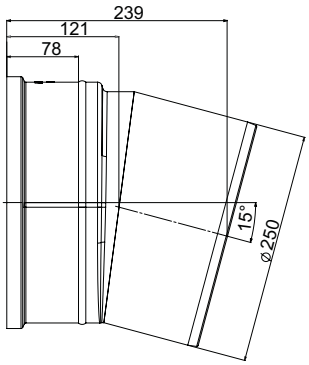
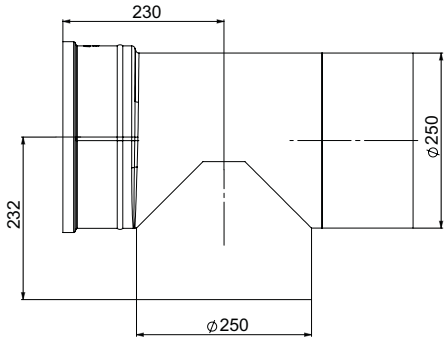
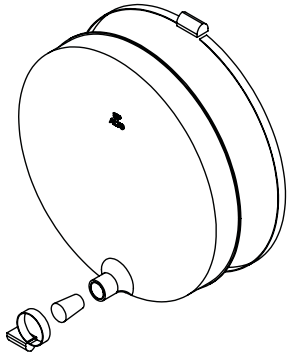
Tab. 13 D.200 accessories (I)

Code	Image	Description
0CURVAXX15		45° elbow M/F D 200
0CURVAXX27		30° elbow M/F D 200
0CURVAXX29		15° elbow M/F D 200
0RACCORT05		T-shaped fitting M/M/F D 200
0SCARCON02		Cap for D 200 collector with condensate drain hole

Tab. 14 D.200 accessories (II)

Code	Image	Description
0COLLFUM04		Flue gas collector for D 250 heat module
0PROLUNG26		Connection extension D 250 L 370 mm
0PROLUNG29		D 250 L 500 mm extension
0PROLUNG30		D250 L 1000 mm extension
0CURVAXX26		D250 90° elbow

Tab. 15 D.250 accessories (I)

Code	Image	Description
0CURVAXX25		D250 45° elbow
0CURVAXX24		D250 30° elbow
0CURVAXX23		D250 15° elbow
0RACCORD28		T-shaped fitting M/M/F D 250
0SCARCON04		Cap for D 250 collector with condensate drain

Tab. 16 D.250 accessories (II)

* it is necessary to cut the number of stub pipes as defined in the previous tables according to the measures indicated below

-	A	B	C	D	E	F
L [mm]	110	140	170	200	230	260

Tab. 17 Stub pipe lengths

1.15 Nominal data tables

NOMINAL DATA						
-		45	60	85	90	105
Type of installation	-	C13-C33-C43-C53-C63-C83-C93-C13X-C33X-C43X-C63X-C93X-B23-B23P-C(10)-C(11)				
Nominal heat input Qn	kW	40	60	81	80	100
Nominal heat output (80 – 60 °C) Pn	kW	38,5	58,3	78,5	77	96,8
Nominal heat output (50 – 30 °C) Pn	kW	41,5	62,8	84,8	83	104,3
Reduced heat input Qr	kW	4	6	9	4	4
Reduced heat output (80 – 60 °C) Pr	kW	3,8	5,8	8,5	3,8	3,8
Reduced heat output (50 – 30 °C) Pr	kW	4,3	6,5	9,7	4,3	4,3
Efficiency at 100% (80 – 60 °C)	%	97,1	97,1	96,9	97,1	97,1
Efficiency at 100% (50 – 30 °C)	%	105,3	104,6	104,8	105,3	105
Efficiency at 30% Qn - 30 °C Return	%	108,2	108,4	108,3	108,2	108,3
Efficiency at reduced heat input (80 – 60 ° C)	%	96,8	97	94,8	96,8	96,8
Efficiency at reduced heat input (50 – 30 ° C)	%	108,2	108,5	107,6	108,2	108,2
Central heating setting range	°C	20 ÷ 80				
CH maximum temperature	°C	80 + 3				
Exchanger maximum temperature (TMS)	°C	110				
NOx class (EN 15502-1:2012+A1:2015)	1..6	6	6	6	6	6
Heating water max hydraulic pressure (PMS)	bar	3,6	4,2	6	3,6	3,6
Safety valve calibration pressure	bar	3	3,5	5	3	3
Heating water minimum pressure	bar	0,8	0,8	0,8	0,8	0,8
DHW temperature setting range	°C	65 ÷ 35				
DHW maximum temperature	°C	65				

Tab. 18 Nominal data for configurations from 45 to 105

NOMINAL DATA								
-		120	150	170	205	240	270	300
Type of installation	-	C13-C33-C43-C53-C63-C83-C93-C13X-C33X-C43X-C63X-C93X-B23-B23P-C(10)-C(11)						
Nominal heat input Qn	kW	115	140	162	196	230	255	280
Nominal heat output (80 – 60 °C) Pn	kW	112	136,3	157	190,5	224	248,3	272,6
Nominal heat output (50 – 30 °C) Pn	kW	122	148,7	169,6	206,8	244	270,7	297,4
Reduced heat input Qr	kW	11,5	22,5	9	9	11,5	11,5	22,5
Reduced heat output (80 – 60 °C) Pr	kW	11,1	21,6	8,5	8,5	11,1	11,1	21,6
Reduced heat output (50 – 30 °C) Pr	kW	12,4	23,9	9,7	9,7	12,4	12,4	23,9
Efficiency at 100% (80 – 60 °C)	%	97,4	97,3	96,9	97,2	97,4	97,4	97,3
Efficiency at 100% (50 – 30 °C)	%	106,1	106,2	104,8	105,5	106,1	106,2	106,2
Efficiency at 30% Qn - 30 °C Return	%	108,6	108,4	108,3	108,5	108,6	108,5	108,4
Efficiency at reduced heat input (80 – 60 ° C)	%	96,2	96	94,8	94,8	96,2	96,2	96
Efficiency at reduced heat input (50 – 30 ° C)	%	108,2	106,3	107,6	107,6	108,2	108,2	106,3
Central heating setting range	°C	20 ÷ 80						
CH maximum temperature	°C	80 + 3						
Exchanger maximum temperature (TMS)	°C	110						
NOx class (EN 15502-1:2012+A1:2015)	1..6	6	6	6	6	6	6	6
Heating water max hydraulic pressure (PMS)	bar	6	6	6	6	6	6	6
Safety valve calibration pressure	bar	5	5	5	5	5	5	5
Heating water minimum pressure	bar	0,8	0,8	0,8	0,8	0,8	0,8	0,8
DHW temperature setting range	°C	65 ÷ 35						
DHW maximum temperature	°C	65						

Tab. 19 Nominal data for configurations from 120 to 300

NOMINAL DATA								
-		325	360	390	420	450	480	510
Type of installation	-	C13-C33-C43-C53-C63-C83-C93-C13X-C33X-C43X-C63X-C93X-B23-B23P-C(10)-C(11)						
Nominal heat input Qn	kW	311	345	370	395	420	460	485
Nominal heat output (80 – 60 °C) Pn	kW	302,5	336	360,3	384,6	408,9	448	472,3
Nominal heat output (50 – 30 °C) Pn	kW	328,8	366	392,7	419,4	446,1	488	514,7
Reduced heat input Qr	kW	9	11,5	11,5	11,5	22,5	11,5	11,5
Reduced heat output (80 – 60 °C) Pr	kW	8,5	11,1	11,1	11,1	21,6	11,1	11,1
Reduced heat output (50 – 30 °C) Pr	kW	9,7	12,4	12,4	12,4	23,9	12,4	12,4
Efficiency at 100% (80 – 60 °C)	%	97,2	97,4	97,4	97,3	97,3	97,4	97,4
Efficiency at 100% (50 – 30 °C)	%	105,7	106,1	106,1	106,2	106,2	106,1	106,1
Efficiency at 30% Qn - 30 °C Return	%	108,5	108,6	108,5	108,5	108,4	108,6	108,6
Efficiency at reduced heat input (80 – 60 ° C)	%	94,8	96,2	96,2	96,2	96	96,2	96,2
Efficiency at reduced heat input (50 – 30 ° C)	%	107,6	108,2	108,2	108,2	106,3	108,2	108,2
Central heating setting range	°C	20 ÷ 80						
CH maximum temperature	°C	80 + 3						
Exchanger maximum temperature (TMS)	°C	110						
NOx class (EN 15502-1:2012+A1:2015)	1..6	6	6	6	6	6	6	6
Heating water max hydraulic pressure (PMS)	bar	6	6	6	6	6	6	6
Safety valve calibration pressure	bar	5	5	5	5	5	5	5
Heating water minimum pressure	bar	0,8	0,8	0,8	0,8	0,8	0,8	0,8
DHW temperature setting range	°C	65 ÷ 35						
DHW maximum temperature	°C	65						

Tab. 20 Nominal data for configurations from 325 to 510

NOMINAL DATA								
-		540	570	600	630	660	690	720
Type of installation	-	C13-C33-C43-C53-C63-C83-C93-C13X-C33X-C43X-C63X-C93X-B23-B23P-C(10)-C(11)						
Nominal heat input Qn	kW	510	535	560	600	625	650	675
Nominal heat output (80 – 60 °C) Pn	kW	496,6	520,9	545,2	584,3	608,6	632,9	657,2
Nominal heat output (50 – 30 °C) Pn	kW	541,4	568,1	594,8	636,7	663,4	690,1	716,8
Reduced heat input Qr	kW	11,5	11,5	22,5	11,5	11,5	11,5	11,5
Reduced heat output (80 – 60 °C) Pr	kW	11,1	11,1	21,6	11,1	11,1	11,1	11,1
Reduced heat output (50 – 30 °C) Pr	kW	12,4	12,4	23,9	12,4	12,4	12,4	12,4
Efficiency at 100% (80 – 60 °C)	%	97,4	97,3	97,3	97,4	97,4	97,3	97,3
Efficiency at 100% (50 – 30 °C)	%	106,2	106,2	106,2	106,1	106,1	106,2	106,2
Efficiency at 30% Qn - 30 °C Return	%	108,5	108,5	108,4	108,6	108,5	108,5	108,4
Efficiency at reduced heat input (80 – 60 ° C)	%	96,2	96,2	96	96,2	96,2	96,2	96,2
Efficiency at reduced heat input (50 – 30 ° C)	%	108,2	108,2	106,3	108,2	108,2	108,2	108,2
Central heating setting range	°C	20 ÷ 80						
CH maximum temperature	°C	80 + 3						
Exchanger maximum temperature (TMS)	°C	110						
NOx class (EN 15502-1:2012+A1:2015)	1..6	6	6	6	6	6	6	6
Heating water max hydraulic pressure (PMS)	bar	6	6	6	6	6	6	6
Safety valve calibration pressure	bar	5	5	5	5	5	5	5
Heating water minimum pressure	bar	0,8	0,8	0,8	0,8	0,8	0,8	0,8
DHW temperature setting range	°C	65 ÷ 35						
DHW maximum temperature	°C	65						

Tab. 21 Nominal data for configurations from 540 to 720

NOMINAL DATA						
-		750	780	810	870	900
Type of installation	-	C13-C33-C43-C53-C63-C83-C93-C13X-C33X-C43X-C63X-C93X-B23-B23P-C(10)-C(11)				
Nominal heat input Qn	kW	700	740	765	815	840
Nominal heat output (80 – 60 °C) Pn	kW	681,5	720,6	744,9	793,5	817,8
Nominal heat output (50 – 30 °C) Pn	kW	743,5	785,4	812,1	865,5	892,2
Reduced heat input Qr	kW	22,5	11,5	11,5	11,5	22,5
Reduced heat output (80 – 60 °C) Pr	kW	21,6	11,1	11,1	11,1	21,6
Reduced heat output (50 – 30 °C) Pr	kW	23,9	12,4	12,4	12,4	23,9
Efficiency at 100% (80 – 60 °C)	%	97,3	97,4	97,4	97,3	97,3
Efficiency at 100% (50 – 30 °C)	%	106,2	106,1	106,2	106,2	106,2
Efficiency at 30% Qn - 30 °C Return	%	108,4	108,5	108,5	108,4	108,4
Efficiency at reduced heat input (80 – 60 ° C)	%	96	96,2	96,2	96,2	96
Efficiency at reduced heat input (50 – 30 ° C)	%	106,3	108,2	108,2	108,2	106,3
Central heating setting range	°C	20 ÷ 80				
CH maximum temperature	°C	80 + 3				
Exchanger maximum temperature (TMS)	°C	110				
NOx class (EN 15502-1:2012+A1:2015)	1..6	6	6	6	6	6
Heating water max hydraulic pressure (PMS)	bar	6	6	6	6	6
Safety valve calibration pressure	bar	5	5	5	5	5
Heating water minimum pressure	bar	0,8	0,8	0,8	0,8	0,8
DHW temperature setting range	°C	65 ÷ 35				
DHW maximum temperature	°C	65				

Tab. 22 Nominal data for configurations from 750 to 900

1.16 Nominal electrical data tables

NOMINAL ELECTRICAL DATA						
-		45	60	85	90	105
Input voltage	V	230				
Frequency	Hz	50				
Module power consumption	W	94	119	156	188	213
Module power consumption in standby condition	W	2	2	3,5	4	4
Degree of electrical protection of rack modules	IP	X4D				

Tab. 23 Nominal electrical data for configurations from 45 to 105

NOMINAL ELECTRICAL DATA								
-		120	150	170	205	240	270	300
Input voltage	V	230						
Frequency	Hz	50						
Module power consumption	W	251	310	312	407	502	561	620
Module power consumption in standby condition	W	3,5	3,5	7	7	7	7	7
Degree of electrical protection of rack modules	IP	X4D						

Tab. 24 Nominal electrical data for configurations from 120 to 300

NOMINAL ELECTRICAL DATA								
-		325	360	390	420	450	480	510
Input voltage	V	230						
Frequency	Hz	50						
Module power consumption	W	658	753	812	871	930	1004	1063
Module power consumption in standby condition	W	10,5	10,5	10,5	10,5	10,5	14	14
Degree of electrical protection of rack modules	IP	X4D						

Tab. 25 Nominal electrical data for configurations from 325 to 510

NOMINAL ELECTRICAL DATA								
-		540	570	600	630	660	690	720
Input voltage	V	230						
Frequency	Hz	50						
Module power consumption	W	1122	1181	1240	1314	1373	1432	1491
Module power consumption in standby condition	W	14	14	14	17,5	17,5	17,5	17,5
Degree of electrical protection of rack modules	IP	X4D						

Tab. 26 Nominal electrical data for configurations from 540 to 720

NOMINAL ELECTRICAL DATA						
-		750	780	810	870	900
Input voltage	V	230				
Frequency	Hz	50				
Module power consumption	W	1550	1624	1683	1801	1860
Module power consumption in standby condition	W	17,5	21	21	21	21
Degree of electrical protection of rack modules	IP	X4D				

Tab. 27 Nominal electrical data for configurations from 750 to 900

1.17 Tables of dimensions, weights, connections and volumes

DIMENSIONS – WEIGHTS – CONNECTIONS – VOLUMES						
-		45	60	85	90	105
Height of modules in the rack (without flue gas vent)	mm	1761				
Depth of modules in the rack	mm	745				
Width of modules in the rack with separator	mm	1211	1211	1211	1841	1841
Width of modules in the rack with exchanger	mm	1750	1750	1750	2380	2380
Total weight with direct collectors	kg	131	135	160	233	238
Total weight with separator	kg	162	166	191	264	269
Total weight with matched plates	kg	240	244	269	342	347
Total weight with matched plates and connection collectors	kg	289	293	318	391	396
Flow flange connection	-	DN 80 PN6				
Return flange connection	-	DN 80 PN6				
Gas flange connection	-	DN 50 PN6				
Hydraulic separator drain connection	-	1 ½” F				
Condensate drain connection	-	DN 50				
Total content with direct collectors	l	11	12	13	21	22
Total content with separator	l	31	32	33	41	42
Exchanger cut	kW	120	120	120	120	120
Total content with matched plates	l	12	13	14	22	23
Total content with matched plates and connection collectors	l	23	24	25	33	34

Tab. 28 Dimensions, weights, connections and volumes for configurations from 45 to 105

DIMENSIONS – WEIGHTS – CONNECTIONS – VOLUMES								
-		120	150	170	205	240	270	300
Height of modules in the rack (without flue gas vent)	mm	1761						
Depth of modules in the rack	mm	745						
Width of modules in the rack with separator	mm	1211	1211	1841	1841	1841	1841	1841
Width of modules in the rack with exchanger	mm	1750	1750	2380	2380	2380	2380	2380
Total weight with direct collectors	kg	170	191	291	301	311	333	354
Total weight with separator	kg	201	222	322	332	342	364	385
Total weight with matched plates	kg	279	307	407	417	432	454	475
Total weight with matched plates and connection collectors	kg	328	356	456	466	481	503	524
Flow flange connection	-	DN 80 PN6						
Return flange connection	-	DN 80 PN6						
Gas flange connection	-	DN 50 PN6						
Hydraulic separator drain connection	-	1 ½" F						
Condensate drain connection	-	DN 50						
Total content with direct collectors	l	15	18	26	28	30	33	35
Total content with separator	l	35	38	46	48	50	53	55
Exchanger cut	kW	120	205	205	205	300	300	300
Total content with matched plates	l	16	21	29	31	34	37	39
Total content with matched plates and connection collectors	l	27	31	39	41	44	47	49

Tab. 29 Dimensions, weights, connections and volumes for configurations from 120 to 300

DIMENSIONS – WEIGHTS – CONNECTIONS – VOLUMES								
-		325	360	390	420	450	480	510
Height of modules in the rack (without flue gas vent)	mm	1761						
Depth of modules in the rack	mm	745						
Width of modules in the rack with separator	mm	2471	2471	2471	2471	2471	3101	3101
Width of modules in the rack with exchanger	mm	3010	3010	3010	3010	3010	3640	3640
Total weight with direct collectors	kg	442	452	474	495	517	594	615
Total weight with separator	kg	473	483	505	526	548	625	646
Total weight with matched plates	kg	571	581	607	628	650	739	760
Total weight with matched plates and connection collectors	kg	620	630	656	677	699	788	809
Flow flange connection	-	DN 80 PN6						
Return flange connection	-	DN 80 PN6						
Gas flange connection	-	DN 50 PN6						
Hydraulic separator drain connection	-	1 ½" F						
Condensate drain connection	-	DN 50						
Total content with direct collectors	l	43	46	48	51	53	61	63
Total content with separator	l	63	66	68	71	73	81	83
Exchanger cut	kW	360	360	450	450	450	600	600
Total content with matched plates	l	48	51	54	57	59	69	71
Total content with matched plates and connection collectors	l	58	61	65	68	70	79	81

Tab. 30 Dimensions, weights, connections and volumes for configurations from 325 to 510

DIMENSIONS – WEIGHTS – CONNECTIONS – VOLUMES								
-		540	570	600	630	660	690	720
Height of modules in the rack (without flue gas vent)	mm	1761						
Depth of modules in the rack	mm	745						
Width of modules in the rack with separator	mm	3101	3101	3101	3731	3731	3731	3731
Width of modules in the rack with exchanger	mm	3640	3640	3640	4270	4270	4270	4270
Total weight with direct collectors	kg	637	658	680	757	778	800	821
Total weight with separator	kg	668	689	711	788	809	831	852
Total weight with matched plates	kg	782	803	825	909	930	952	978
Total weight with matched plates and connection collectors	kg	831	852	874	958	979	1001	1027
Flow flange connection	-	DN 80 PN6						
Return flange connection	-	DN 80 PN6						
Gas flange connection	-	DN 50 PN6						
Hydraulic separator drain connection	-	1 ½" F						
Condensate drain connection	-	DN 50						
Total content with direct collectors	l	66	68	71	79	81	84	86
Total content with separator	l	86	88	91	99	101	104	106
Exchanger cut	kW	600	600	600	690	690	690	780
Total content with matched plates	l	74	76	79	88	90	93	96
Total content with matched plates and connection collectors	l	84	86	89	98	100	103	106

Tab. 31 Dimensions, weights, connections and volumes for configurations from 540 to 720

DIMENSIONS – WEIGHTS – CONNECTIONS – VOLUMES						
-		750	780	810	870	900
Height of modules in the rack (without flue gas vent)	mm	1761				
Depth of modules in the rack	mm	745				
Width of modules in the rack with separator	mm	3731	4361	4361	4361	4361
Width of modules in the rack with exchanger	mm	4270	4900	4900	4900	4900
Total weight with direct collectors	kg	843	919	941	984	1005
Total weight with separator	kg	874	950	972	1015	1036
Total weight with matched plates	kg	1000	1076	1103	1146	1167
Total weight with matched plates and connection collectors	kg	1049	1125	1152	1195	1216
Flow flange connection	-	DN 80 PN6				
Return flange connection	-	DN 80 PN6				
Gas flange connection	-	DN 50 PN6				
Hydraulic separator drain connection	-	1 ½" F				
Condensate drain connection	-	DN 50				
Total content with direct collectors	l	89	96	99	104	106
Total content with separator	l	109	116	119	124	126
Exchanger cut	kW	780	780	900	900	900
Total content with matched plates	l	99	106	110	115	117
Total content with matched plates and connection collectors	l	109	116	120	125	127

Tab. 32 Dimensions, weights and volumes for configurations from 750 to 900

1.18 Tables of flue - shared collector dimensioning

FLUE - SHARED COLLECTOR DIMENSIONING						
-		45	60	85	90	105
Drain rating	-	B23P				
Qn - CO2	%	9,2	9,1	9	9,2	9,1
Qn - Flue gas temperature - Air temperature	°C	57	57,0	45,3	57	57
Qn - Flue mass flow	g/sec	19	27,3	37,2	38	46,2
Qn - Residual head available	Pa	30	30	30	30	30
Qr - CO2	%	8,9	8,9	9	8,9	8,9
Qr - Flue gas temperature - Air temperature	°C	42	39	31,2	42	39
Qr - Flue mass flow	g/sec	1,9	2,8	4,1	1,9	1,9
Qr - Residual head available	Pa	5	5	5	5	5
Connection diameter to flue gas collector	mm	160	160	160	160	160

Tab. 33 Flue - shared collector dimensioning for configurations from 45 to 105

FLUE - SHARED COLLECTOR DIMENSIONING								
-		120	150	170	205	240	270	300
Drain rating	-	B23P						
Qn - CO2	%	9	9	9	9	9	9	9
Qn - Flue gas temperature - Air temperature	°C	54,0	52,6	45,3	50,4	54,0	53,2	52,6
Qn - Flue mass flow	g/sec	52,7	64,2	74,4	89,9	105,4	116,9	128,4
Qn - Residual head available	Pa	30	30	30	30	30	30	30
Qr - CO2	%	9	9	9	9	9	9	9
Qr - Flue gas temperature - Air temperature	°C	35,4	35,4	31,2	31,2	35,4	35,4	35,4
Qr - Flue mass flow	g/sec	5,3	10,3	4,1	4,1	5,3	5,3	10,3
Qr - Residual head available	Pa	5	10	5	5	5	5	10
Connection diameter to flue gas collector	mm	160	160	160	160	160	160	160

Tab. 34 Flue - shared collector dimensioning for configurations from 120 to 300

FLUE - SHARED COLLECTOR DIMENSIONING								
-		325	360	390	420	450	480	510
Drain rating	-	B23P						
Qn - CO2	%	9	9	9	9	9	9	9
Qn - Flue gas temperature - Air temperature	°C	51,7	54,0	53,5	53,0	52,6	54,0	53,6
Qn - Flue mass flow	g/sec	142,6	158,1	169,6	181,1	192,6	210,8	222,3
Qn - Residual head available	Pa	30	30	30	30	30	30	30
Qr - CO2	%	9	9	9	9	9	9	9
Qr - Flue gas temperature - Air temperature	°C	31,2	35,4	35,4	35,4	35,4	35,4	35,4
Qr - Flue mass flow	g/sec	4,1	5,3	5,3	5,3	10,3	5,3	5,3
Qr - Residual head available	Pa	5	5	5	5	10	5	5
Connection diameter to flue gas collector	mm	200	200	200	200	200	200	200

Tab. 35 Flue - shared collector dimensioning for configurations from 325 to 510

FLUE - SHARED COLLECTOR DIMENSIONING								
-		540	570	600	630	660	690	720
Drain rating	-	B23P						
Qn - CO2	%	9	9	9	9	9	9	9
Qn - Flue gas temperature - Air temperature	°C	53,2	52,9	52,6	53,7	53,4	53,1	52,8
Qn - Flue mass flow	g/sec	233,8	245,3	256,8	275	286,5	298	309,5
Qn - Residual head available	Pa	30	30	30	30	30	30	30
Qr - CO2	%	9	9	9	9	9	9	9
Qr - Flue gas temperature - Air temperature	°C	35,4	35,4	35,4	35,4	35,4	35,4	35,4
Qr - Flue mass flow	g/sec	5,3	5,3	10,3	5,3	5,3	5,3	5,3
Qr - Residual head available	Pa	5	5	10	5	5	5	5
Connection diameter to flue gas collector	mm	200	200	200	250	250	250	250

Tab. 36 Flue - shared collector dimensioning for configurations from 540 to 720

FLUE - SHARED COLLECTOR DIMENSIONING						
-		750	780	810	870	900
Drain rating	-	B23P				
Qn - CO2	%	9	9	9	9	9
Qn - Flue gas temperature - Air temperature	°C	52,6	53,5	53,2	52,8	52,6
Qn - Flue mass flow	g/sec	321	339,2	350,7	373,7	385,2
Qn - Residual head available	Pa	30	30	30	30	30
Qr - CO2	%	9	9	9	9	9
Qr - Flue gas temperature - Air temperature	°C	35,4	35,4	35,4	35,4	35,4
Qr - Flue mass flow	g/sec	10,3	5,3	5,3	5,3	10,3
Qr - Residual head available	Pa	10	5	5	5	10
Connection diameter to flue gas collector	mm	250	250	250	250	250

Tab. 37 Flue - shared collector dimensioning for configurations from 750 to 900

1.19 Design data tables

DESIGN DATA						
-		45	60	85	90	105
Qn - Casing heat loss with burner on	%	0,15	0,25	0,33	0,15	0,21
Qn - Casing heat loss with burner off	%	0,21	0,17	0,14	0,21	0,19
Qn - Flue system heat loss with burner on	%	2,8	2,65	2,8	2,8	2,71
Qn - Flue system heat loss with burner off	%	---	---	---	---	---
Qn - WILO pump absorption with hydraulic separator	W	75	130	120	150	205
Qn - WILO pump absorption with plate exchanger	W	75	130	120	150	205
Qr - Casing heat loss with burner on	%	1,05	1,06	3,31	1,05	1,05
Qr - Casing heat loss with burner off	%	0,21	0,17	0,141	0,21	0,17
Qr - Flue system heat loss with burner on	%	2,19	1,98	1,87	2,19	1,98
Qr - Flue system heat loss with burner off	%	---	---	---	---	---
Qr - WILO pump absorption with hydraulic separator	W	75	130	120	150	205
Qr - WILO pump absorption with plate exchanger	W	75	130	120	150	205

Tab. 38 Design data for configurations from 45 to 105

DESIGN DATA								
-		120	150	170	205	240	270	300
Qn - Casing heat loss with burner on	%	0	0,38	0,33	0,14	0	0,21	0,38
Qn - Casing heat loss with burner off	%	0,08	0,09	0,14	0,11	0,08	0,09	0,09
Qn - Flue system heat loss with burner on	%	2,59	2,27	2,8	2,68	2,59	2,41	2,27
Qn - Flue system heat loss with burner off	%	---	---	---	---	---	---	---
Qn - WILO pump absorption with hydraulic separator	W	260	260	240	380	520	520	520
Qn - WILO pump absorption with plate exchanger	W	260	260	240	380	520	520	520
Qr - Casing heat loss with burner on	%	2,06	2,17	3,31	2,06	2,06	2,06	2,17
Qr - Casing heat loss with burner off	%	0,084	0,09	0,141	0,084	0,084	0,084	0,09
Qr - Flue system heat loss with burner on	%	1,7	1,83	1,87	1,7	1,7	1,7	1,83
Qr - Flue system heat loss with burner off	%	---	---	---	---	---	---	---
Qr - WILO pump absorption with hydraulic separator	W	260	260	240	380	520	520	520
Qr - WILO pump absorption with plate exchanger	W	260	260	240	380	520	520	520

Tab. 39 Design data for configurations from 120 to 300

DESIGN DATA								
-		325	360	390	420	450	480	510
Qn - Casing heat loss with burner on	%	0,09	0	0,14	0,27	0,38	0	0,11
Qn - Casing heat loss with burner off	%	0,1	0,08	0,09	0,09	0,09	0,08	0,09
Qn - Flue system heat loss with burner on	%	2,64	2,59	2,47	2,36	2,27	2,59	2,5
Qn - Flue system heat loss with burner off	%	---	---	---	---	---	---	---
Qn - WILO pump absorption with hydraulic separator	W	640	780	780	780	780	1040	1040
Qn - WILO pump absorption with plate exchanger	W	640	780	780	780	780	1040	1040
Qr - Casing heat loss with burner on	%	2,06	2,06	2,06	2,06	2,17	2,06	2,06
Qr - Casing heat loss with burner off	%	0,084	0,084	0,084	0,084	0,09	0,084	0,084
Qr - Flue system heat loss with burner on	%	1,7	1,7	1,7	1,7	1,83	1,7	1,7
Qr - Flue system heat loss with burner off	%	---	---	---	---	---	---	---
Qr - WILO pump absorption with hydraulic separator	W	640	780	780	780	780	1040	1040
Qr - WILO pump absorption with plate exchanger	W	640	780	780	780	780	1040	1040

Tab. 40 Design data for configurations from 325 to 510

DESIGN DATA								
-		540	570	600	630	660	690	720
Qn - Casing heat loss with burner on	%	0,21	0,3	0,38	0,09	0,17	0,25	0,32
Qn - Casing heat loss with burner off	%	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Qn - Flue system heat loss with burner on	%	2,41	2,34	2,27	2,52	2,45	2,38	2,32
Qn - Flue system heat loss with burner off	%	---	---	---	---	---	---	---
Qn - WILO pump absorption with hydraulic separator	W	1040	1040	1040	1300	1300	1300	1300
Qn - WILO pump absorption with plate exchanger	W	1040	1040	1040	1300	1300	1300	1300
Qr - Casing heat loss with burner on	%	2,06	2,06	2,17	2,06	2,06	2,06	2,06
Qr - Casing heat loss with burner off	%	0,084	0,084	0,09	0,084	0,084	0,084	0,084
Qr - Flue system heat loss with burner on	%	1,7	1,7	1,83	1,7	1,7	1,7	1,7
Qr - Flue system heat loss with burner off	%	---	---	---	---	---	---	---
Qr - WILO pump absorption with hydraulic separator	W	1040	1040	1040	1300	1300	1300	1300
Qr - WILO pump absorption with plate exchanger	W	1040	1040	1040	1300	1300	1300	1300

Tab. 41 Design data for configurations from 540 to 720

DESIGN DATA						
-		750	780	810	870	900
Qn - Casing heat loss with burner on	%	0,38	0,14	0,21	0,33	0,38
Qn - Casing heat loss with burner off	%	0,09	0,09	0,09	0,09	0,09
Qn - Flue system heat loss with burner on	%	2,27	2,47	2,41	2,32	2,27
Qn - Flue system heat loss with burner off	%	---	---	---	---	---
Qn - WILO pump absorption with hydraulic separator	W	1300	1560	1560	1560	1560
Qn - WILO pump absorption with plate exchanger	W	1300	1560	1560	1560	1560
Qr - Casing heat loss with burner on	%	2,17	2,06	2,06	2,06	2,17
Qr - Casing heat loss with burner off	%	0,09	0,084	0,084	0,084	0,09
Qr - Flue system heat loss with burner on	%	1,83	1,7	1,7	1,7	1,83
Qr - Flue system heat loss with burner off	%	---	---	---	---	---
Qr - WILO pump absorption with hydraulic separator	W	1300	1560	1560	1560	1560
Qr - WILO pump absorption with plate exchanger	W	1300	1560	1560	1560	1560

Tab. 42 Design data for configurations from 750 to 900

1.20 Pressure loss

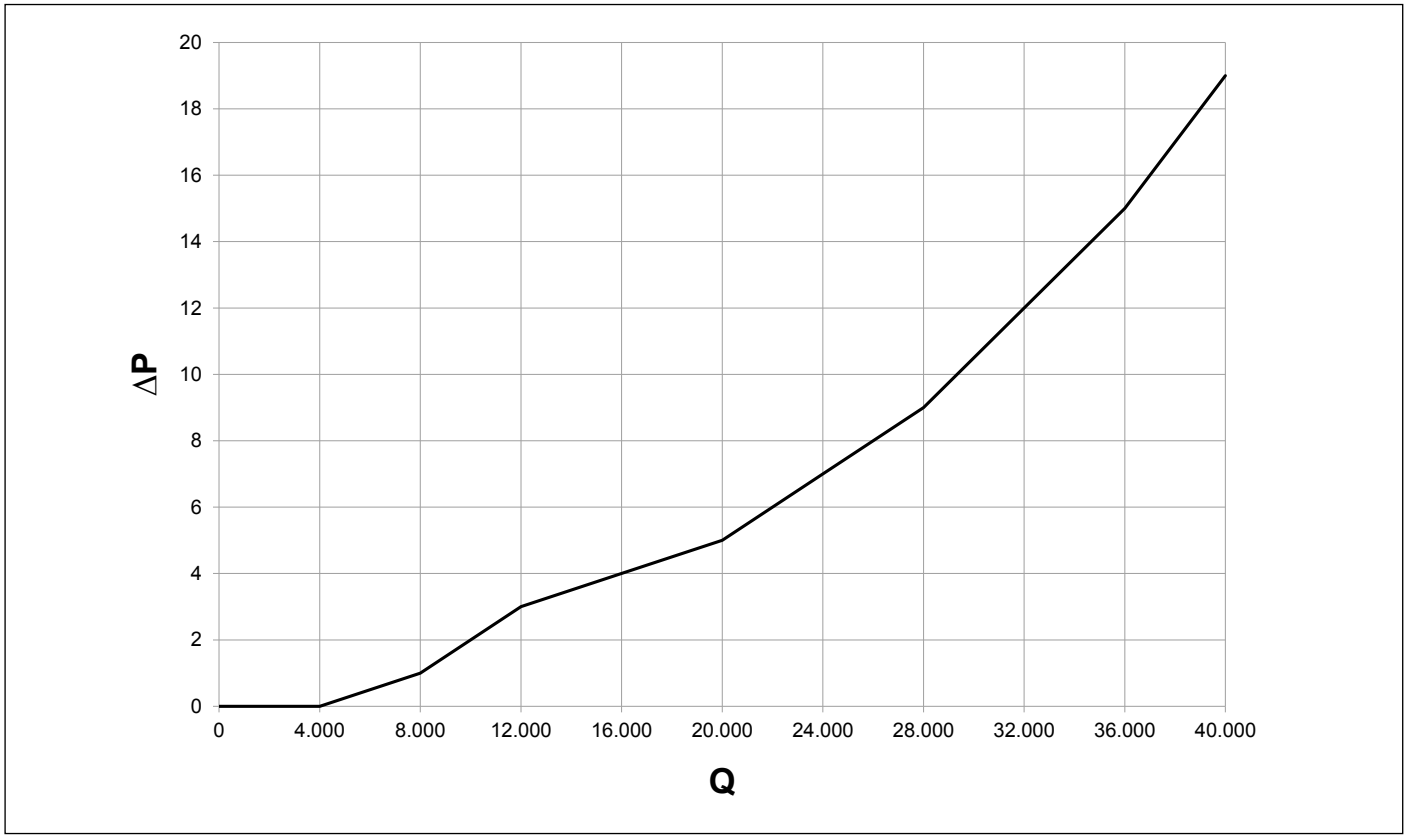


Fig. 20 Hydraulic separator flow resistance on system side

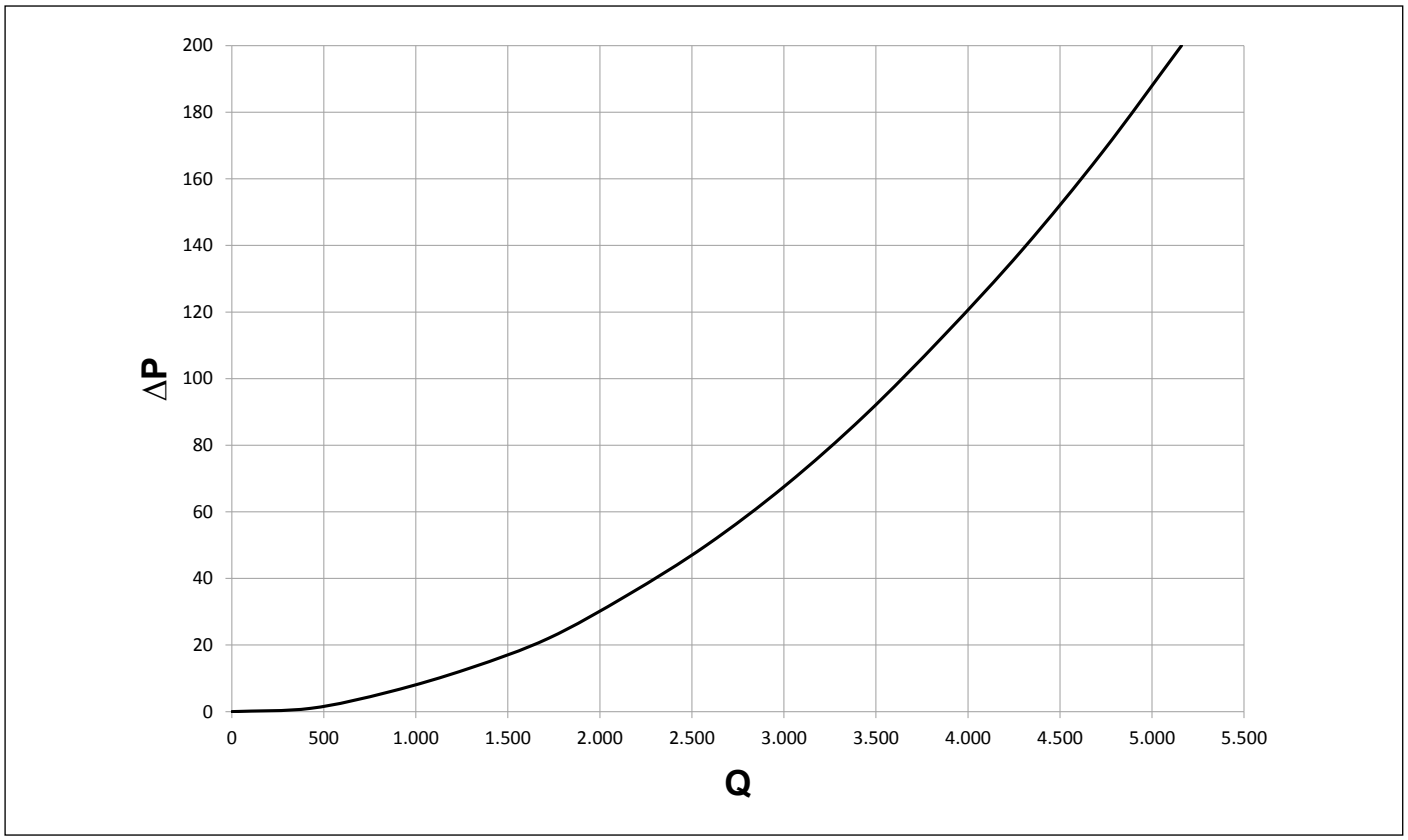


Fig. 21 120 kW plate exchanger flow resistance on primary side and secondary side

ΔP . . . . . Hydraulic resistance (mbar)
Q . . . . . Flow rate (dm³/h)

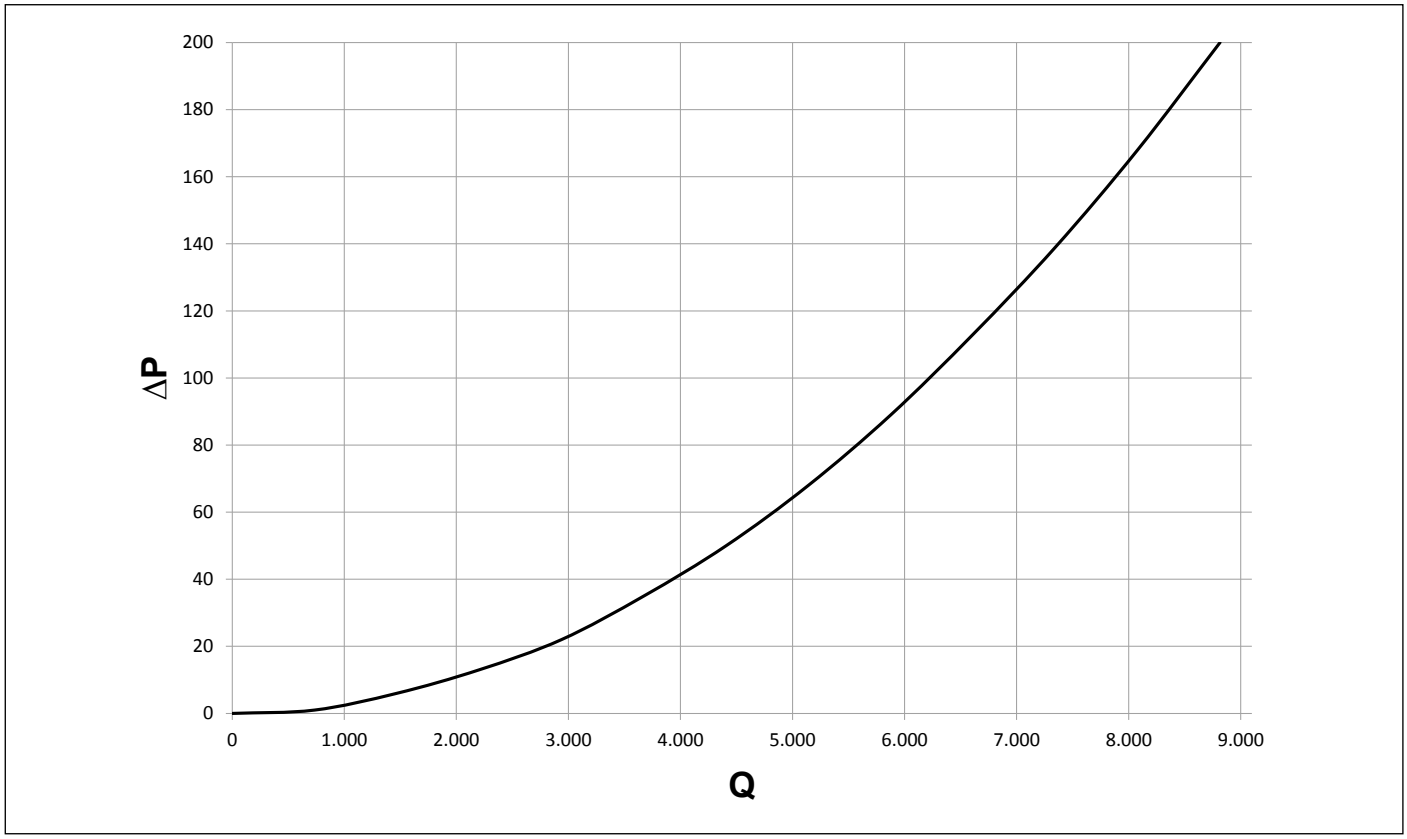


Fig. 22 205 kW plate exchanger flow resistance on primary side and secondary side

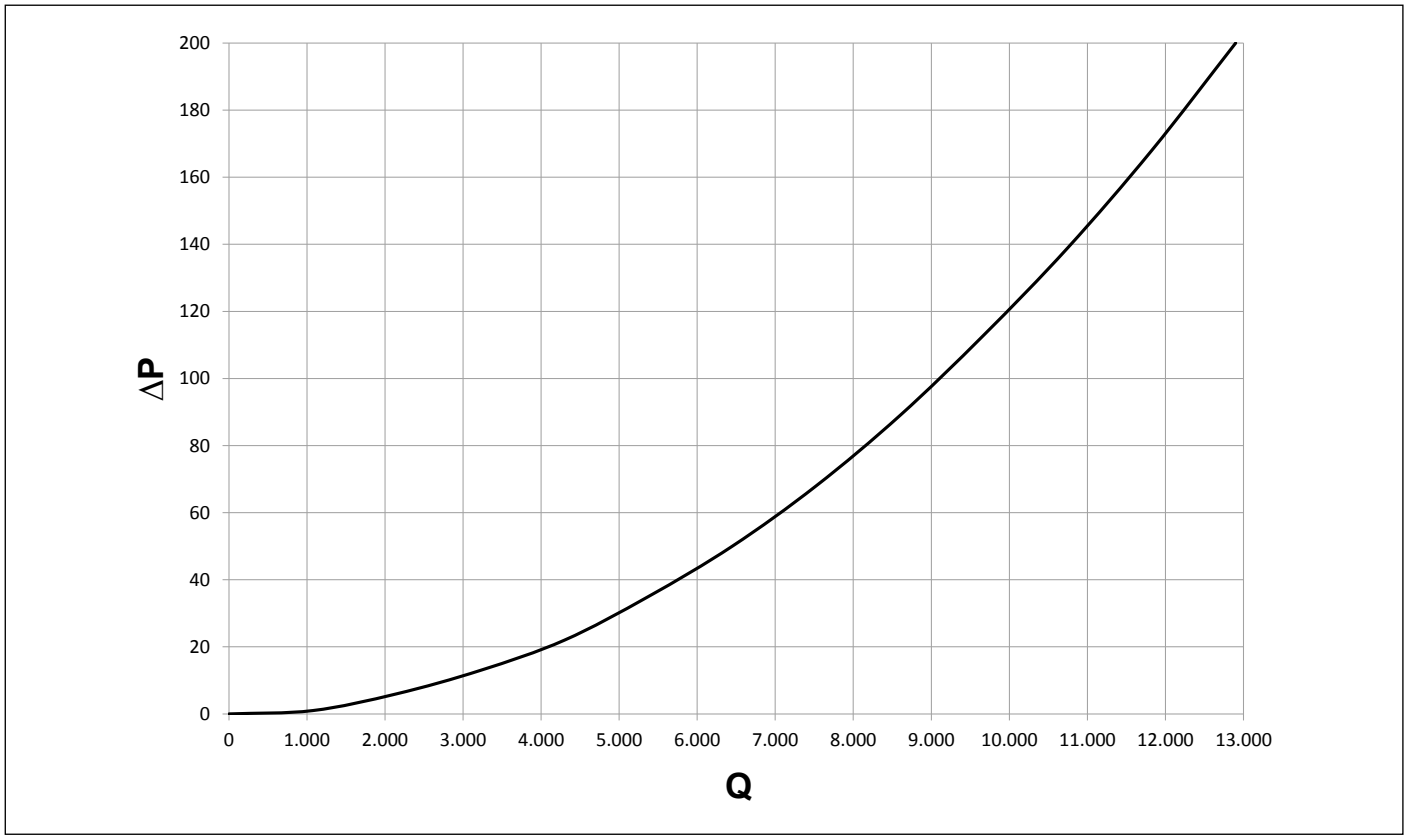


Fig. 23 300 kW plate exchanger flow resistance on primary side and secondary side

ΔP . . . . . Hydraulic resistance (mbar)
Q . . . . . Flow rate (dm³/h)

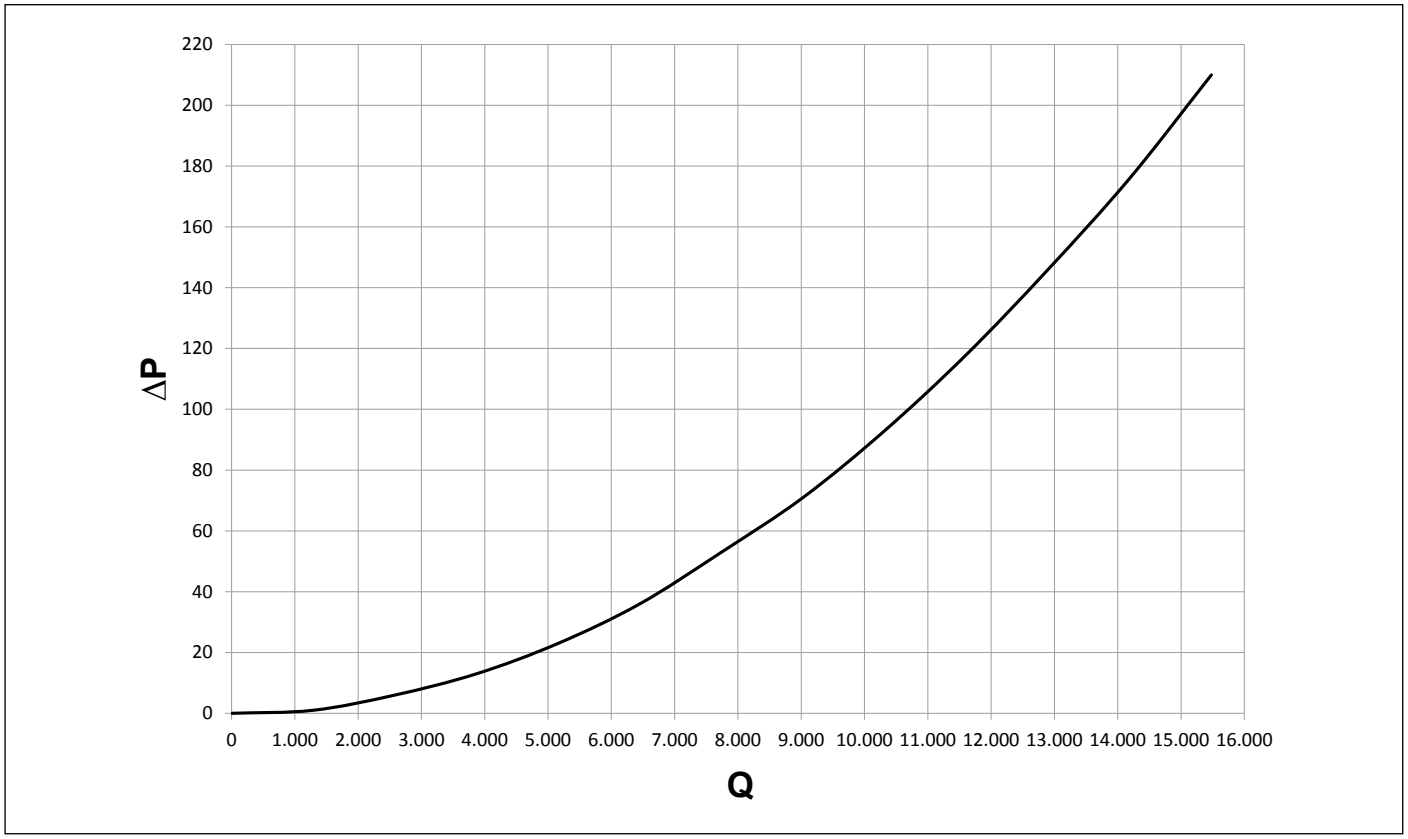


Fig. 24 360 kW plate exchanger flow resistance on primary side and secondary side

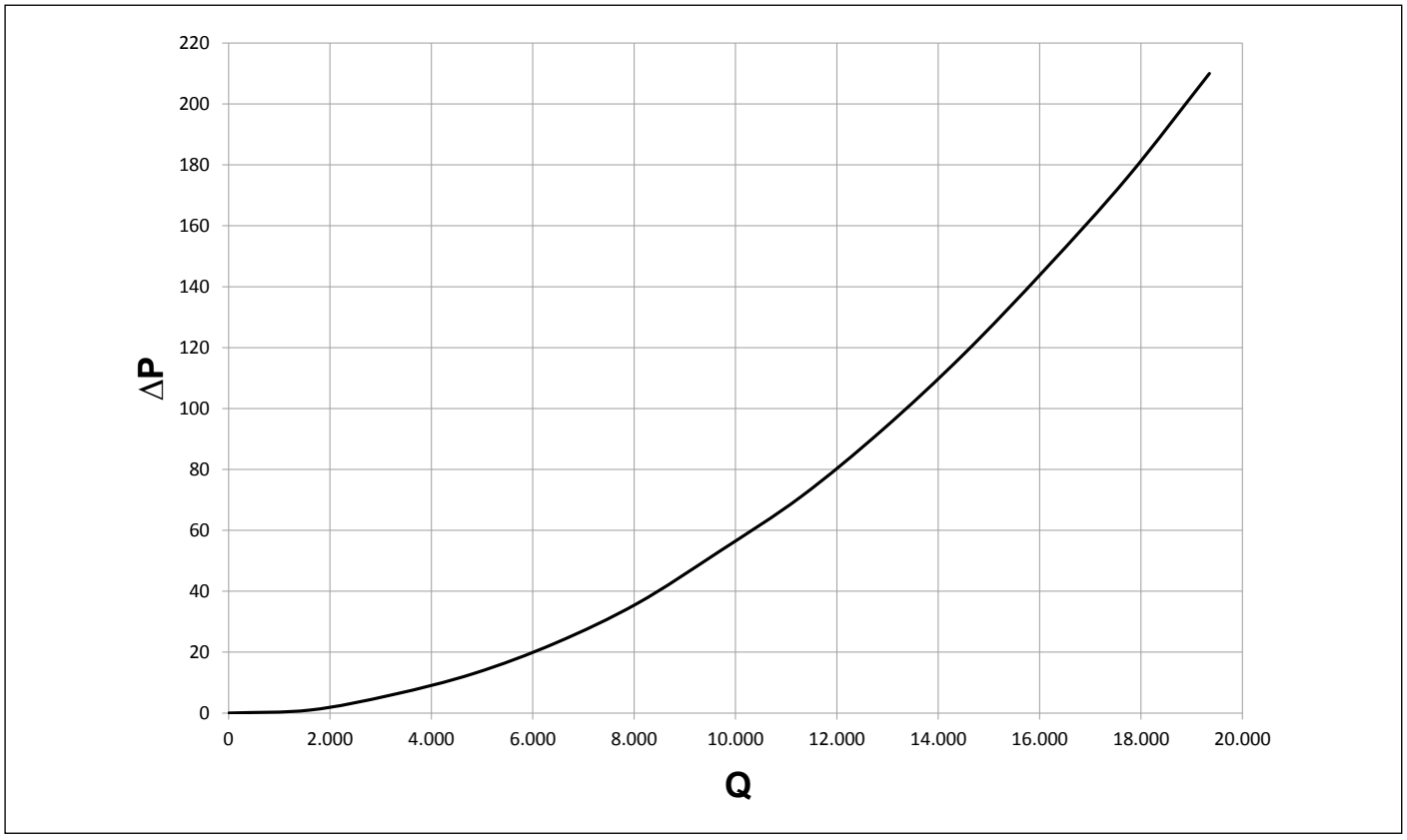


Fig. 25 450 kW plate exchanger flow resistance on primary side and secondary side

ΔP . . . . . Hydraulic resistance (mbar)
Q . . . . . Flow rate (dm³/h)

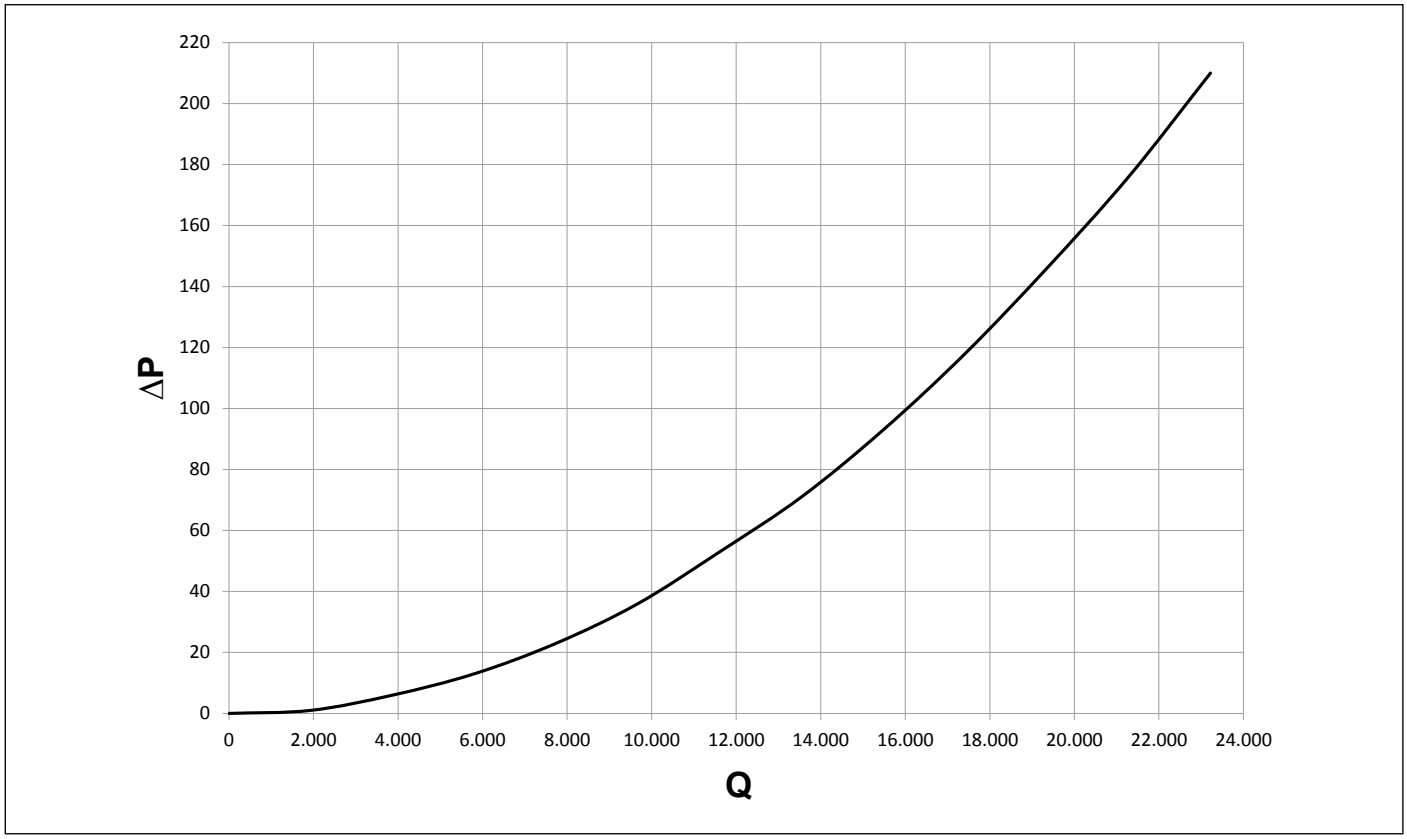


Fig. 26 540 kW plate exchanger flow resistance on primary side and secondary side

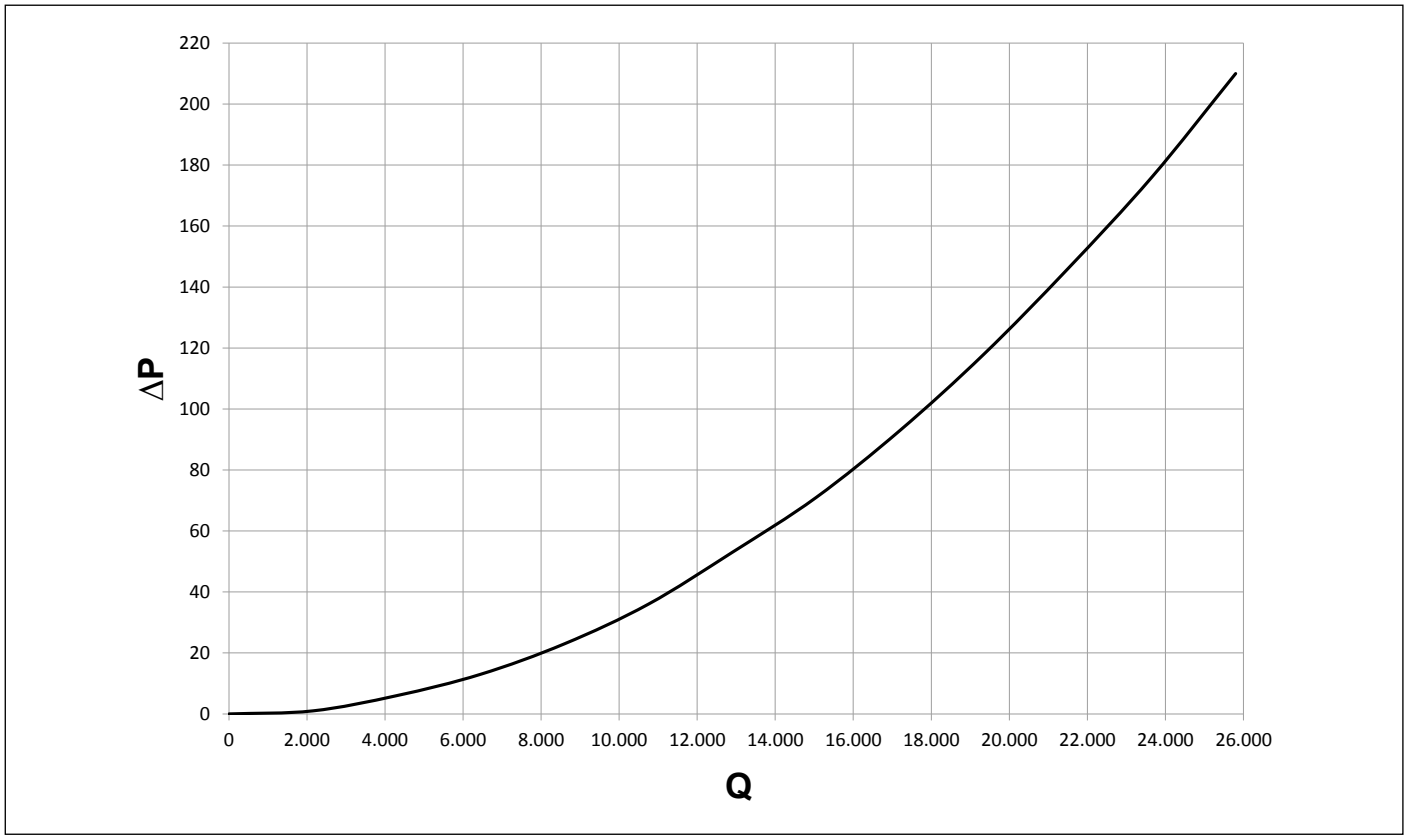


Fig. 27 600 kW plate exchanger flow resistance on primary side and secondary side

ΔP . . . . . Hydraulic resistance (mbar)
Q . . . . . Flow rate (dm³/h)

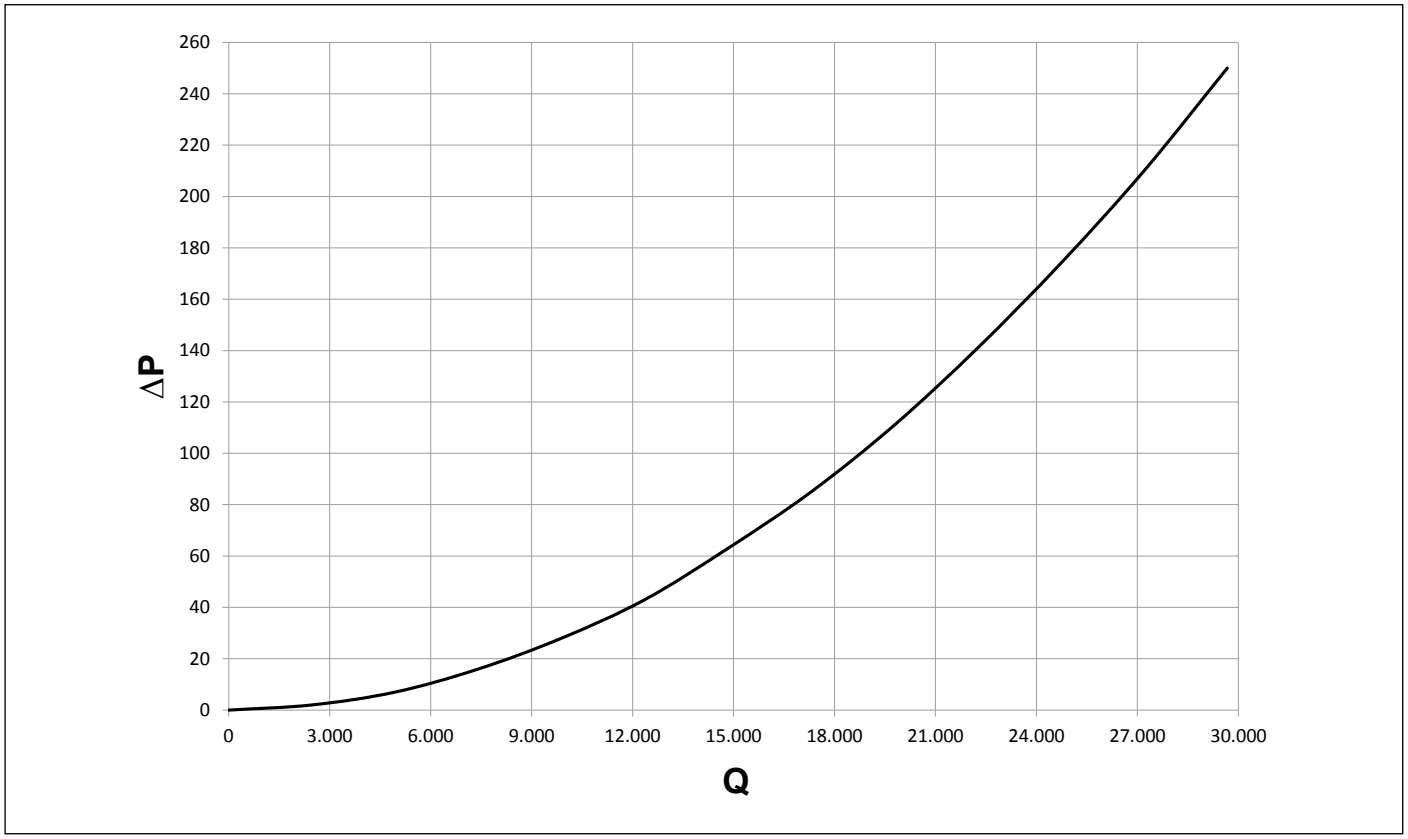


Fig. 28 690 kW plate exchanger flow resistance on primary side and secondary side

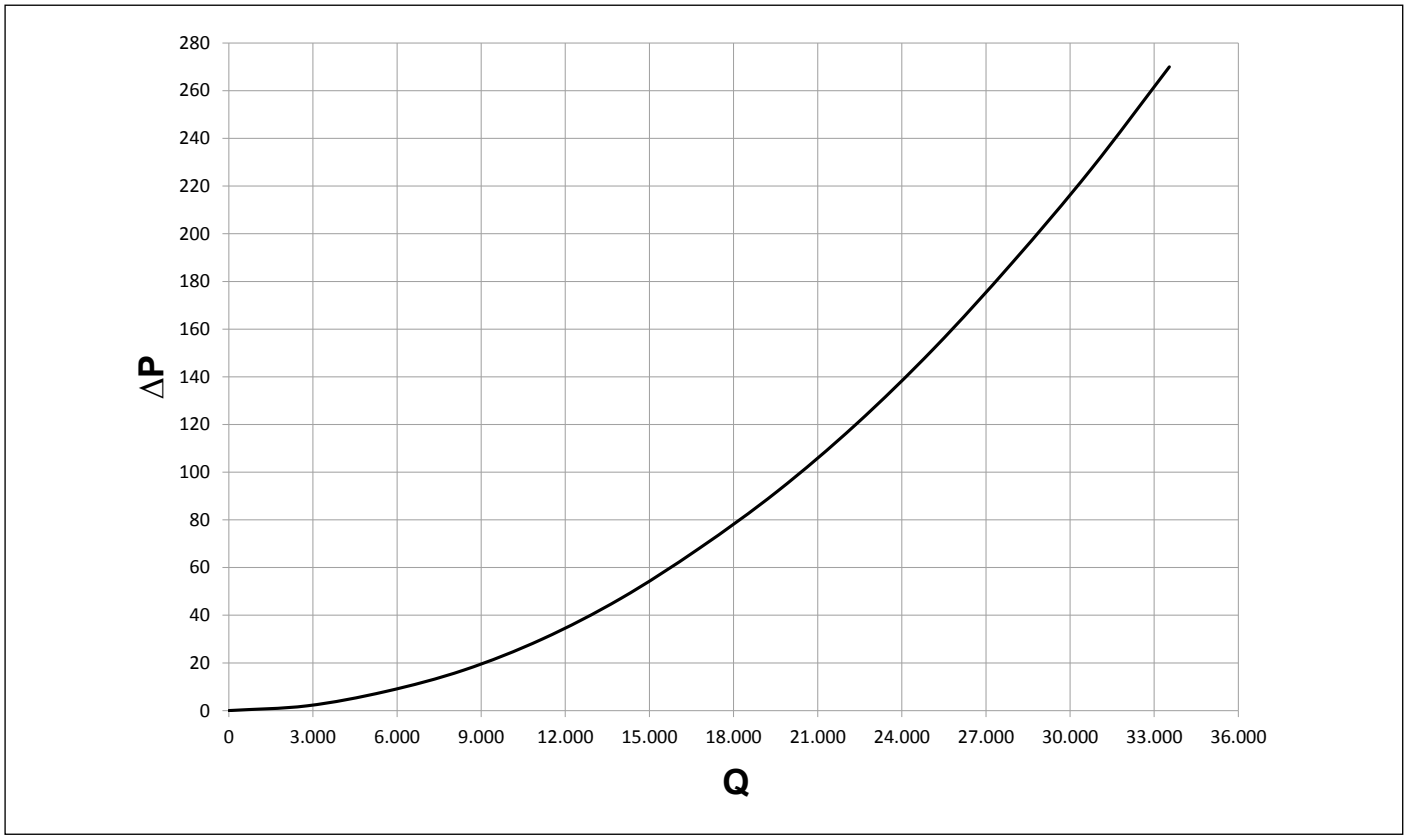


Fig. 29 780 kW plate exchanger flow resistance on primary side and secondary side

ΔP . . . . . Hydraulic resistance (mbar)
Q . . . . . Flow rate (dm³/h)

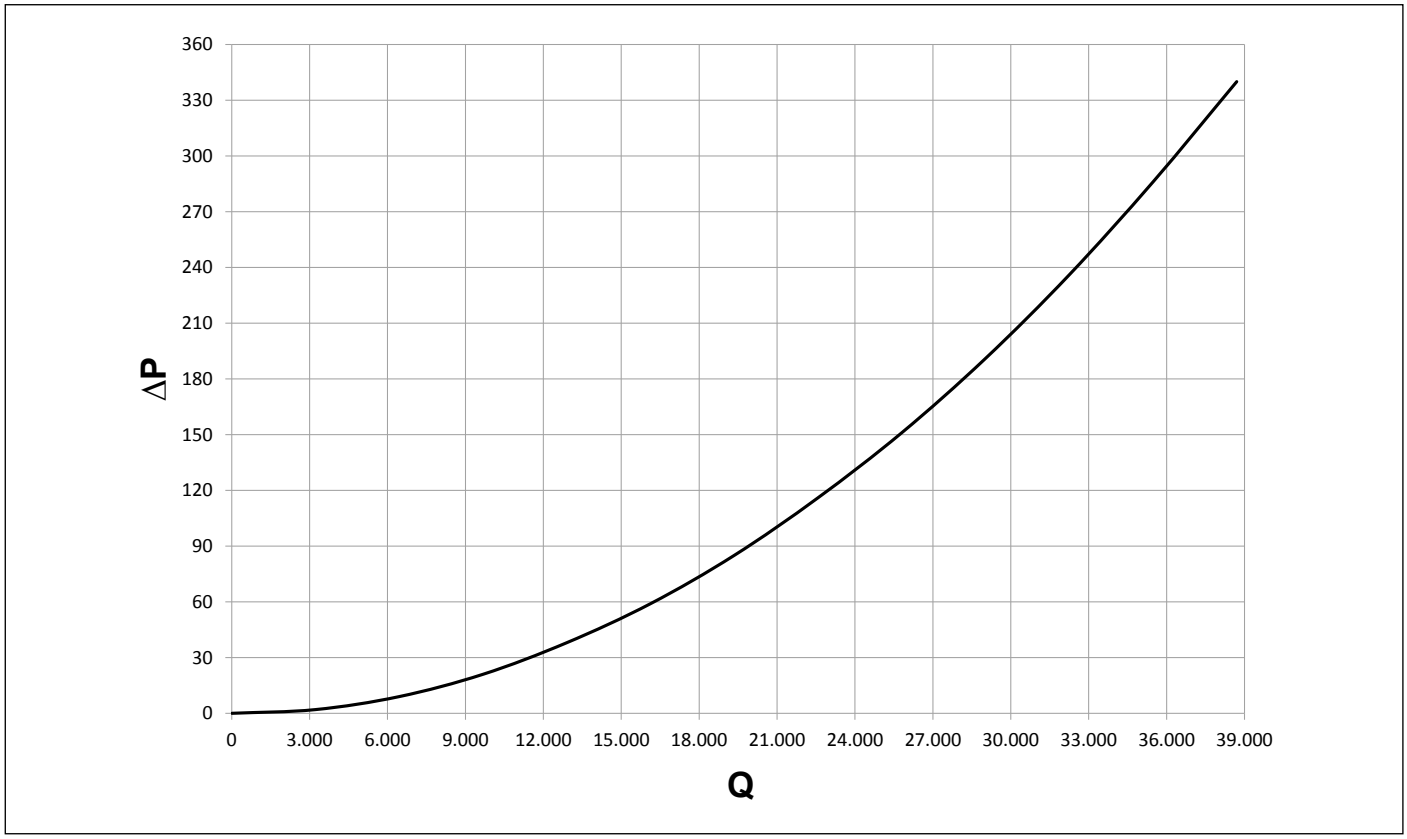


Fig. 30 900 kW plate exchanger flow resistance on primary side and secondary side

ΔP . . . . . Hydraulic resistance (mbar)
Q . . . . . Flow rate (dm³/h)

1.21 Wiring diagrams

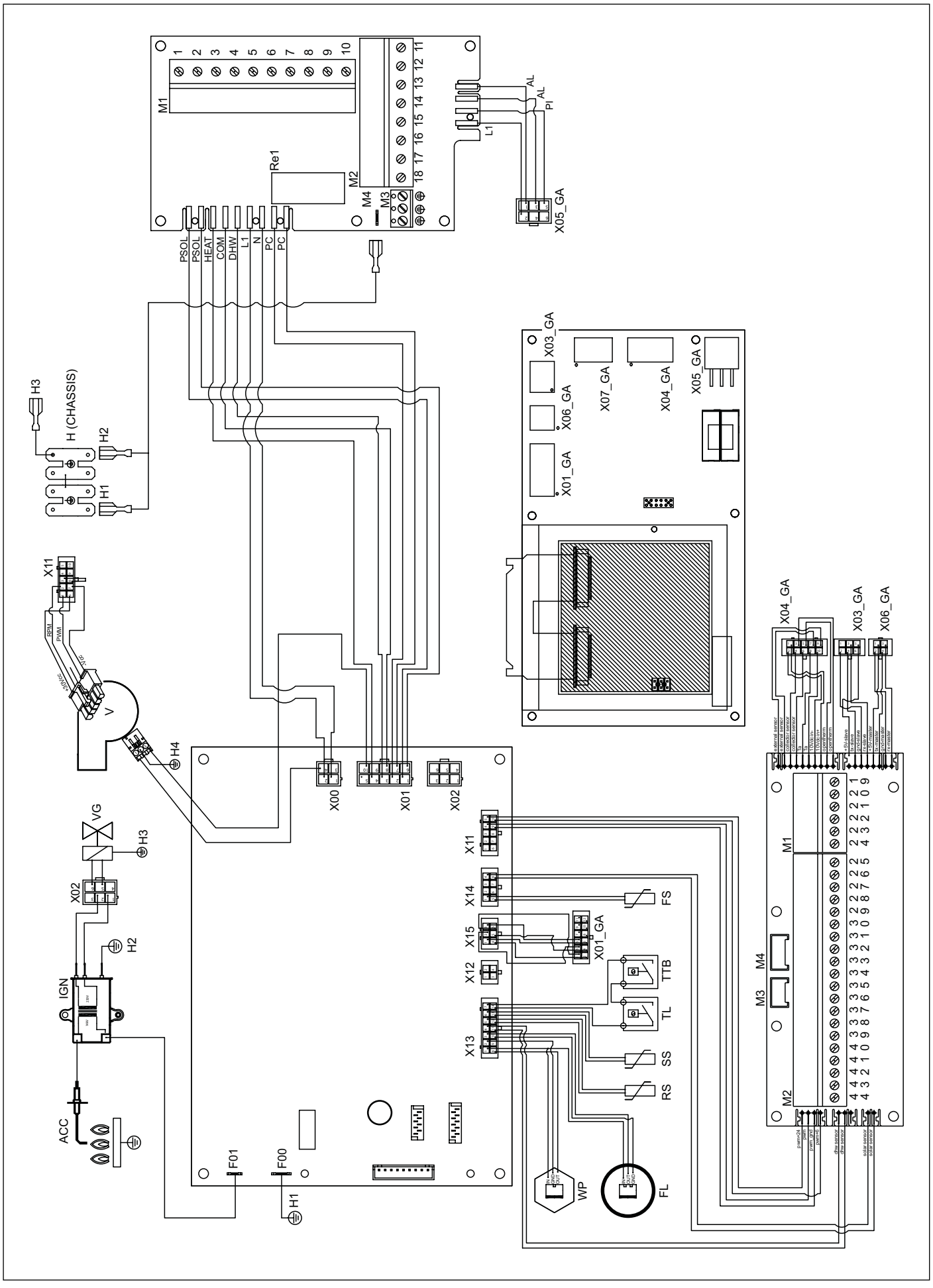


Fig. 31 Wiring diagram for models from 45 to 60

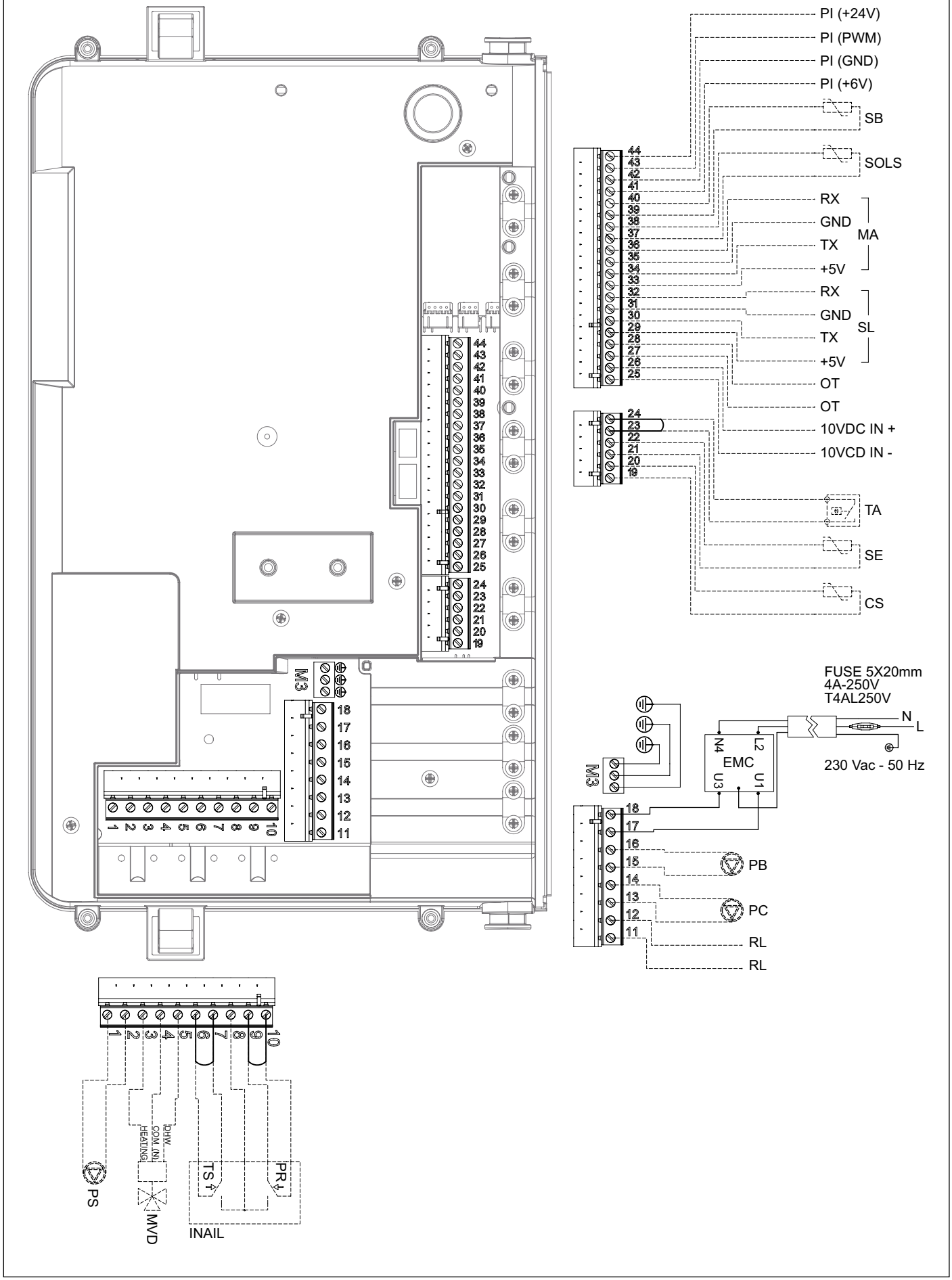


Fig. 32 Connections performed by the installer

Internal connections

ACC: . . . . . Ignition/detection electrode
IGN:. . . . . ignition transformer
VG: . . . . . gas valve
V:. . . . . Modulating fan
FS:. . . . . Flue gas probe on heat exchanger
TTB:. . . . . safety thermal fuse (115°C)
TL:. . . . . Safety thermostat on CH flow
FL:. . . . . Flow meter
WP: . . . . . Heating circuit pressure sensor
SS:. . . . . CH NTC flow probe 10k Ohm at 25°C B=3435
RS:. . . . . CH NTC return probe 10k Ohm at 25°C B=3435
EMC: . . . . . EMC filter
X00-X15: . . . . . Load/signal connectors
H0-H3:. . . . . ground connectors

Electrical connections to be made by the installer

1-2: . . . . . PS - Solar pump (max 0.8 A@cosφ>0.6)
3-4-5:. . . . . MDV - Electric 3-way valve
  3:. . . . . Heating (phase)
  4:. . . . . Common (neutral)
  5:. . . . . DHW (phase)
6-7-8-9-10:. . . . . INAIL safety devices
  6:. . . . . TS - Safety thermostat (NC)
  7:. . . . . TS - Safety thermostat (COM)
  8:. . . . . TS - Safety thermostat (NO) + PR - Safety pressure switch (NO) / [discretionary]
  9:. . . . . PR - Safety pressure switch (COM)
  10:. . . . . PR - Safety pressure switch (NC)
11-12:. . . . . RL - Auxiliary relay (remote alarm or external LPG valve manager)
13-14: . . . . . PC - Cascade pump (max 0.8 A@cosφ>0.6)
15-16: . . . . . PB - Boiler pump (max 1.5 A@cosφ>0.6)
17-18-M3: . . . . . Electric power supply 230V-50Hz (already connected)
  17:. . . . . Phase
  18:. . . . . Neutral
  M3: . . . . . Ground
19-20: . . . . . CS - Cascade probe
21-22: . . . . . SE - External probe
23-24: . . . . . TA – Ambient thermostat
25-26: . . . . . 10 VDC input
  25:. . . . . IN-
  26:. . . . . IN+
27-28: . . . . . OT - Remote Control (OpenTherm)
29-30-31-32: . . . SL - Slave (connections for cascade systems)
  29:. . . . . +5V
  30:. . . . . TX
  31:. . . . . GND
  32:. . . . . RX
33-34-35-36: . . . MA - Master (connections for cascade systems)
  33:. . . . . +5V
  34:. . . . . TX
  35:. . . . . GND
  36:. . . . . RX
37-38: . . . . . SOLS - Solar collector probe
39-40: . . . . . SB - Water heater probe
41-42-43-44: . . . PI - PMW signal (for system circulation pump)
  41:. . . . . +6V
  42:. . . . . GND
  43:. . . . . PWM
  44:. . . . . +24V

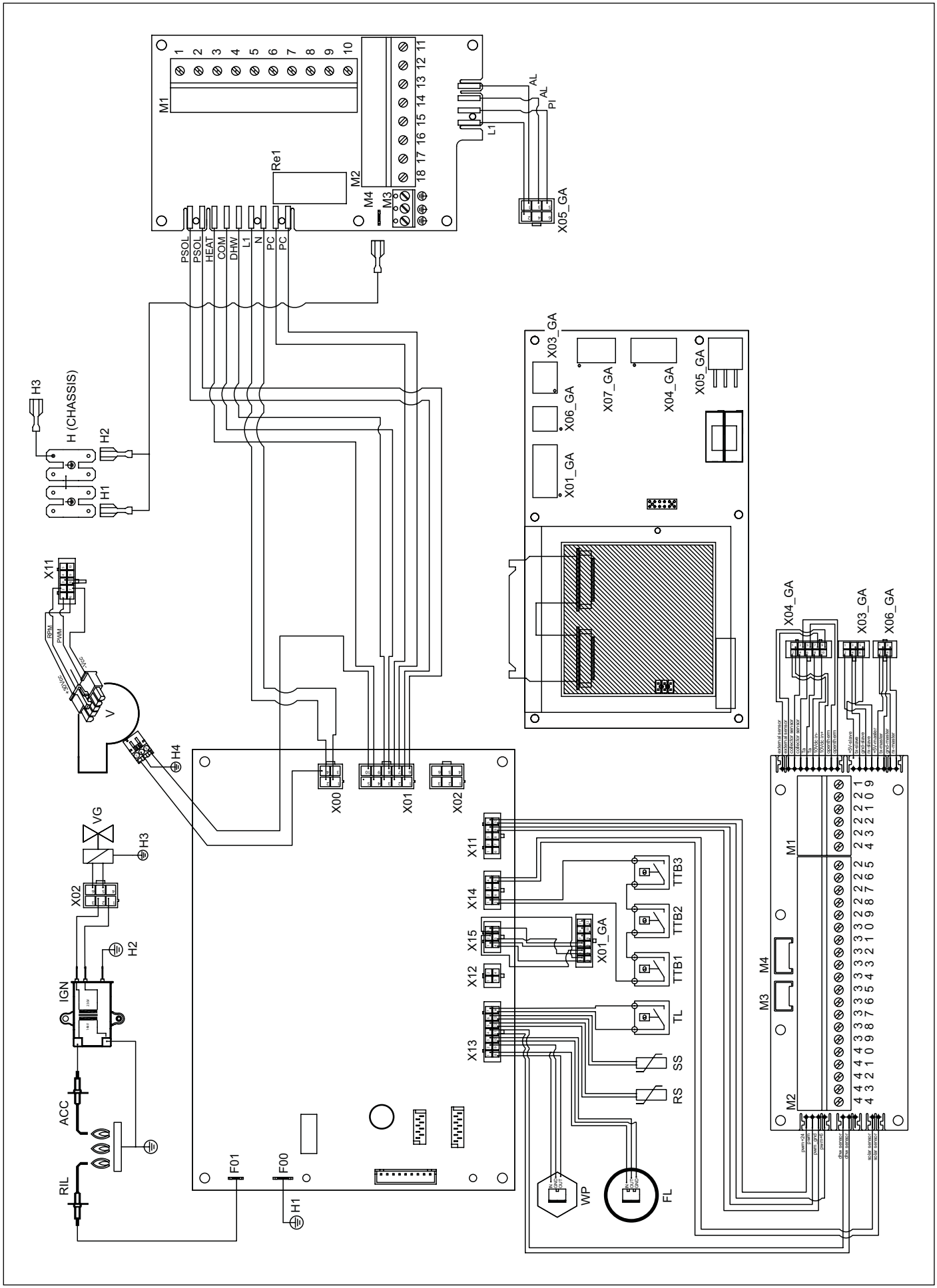


Fig. 33 Wiring diagram for models from 85 to 120

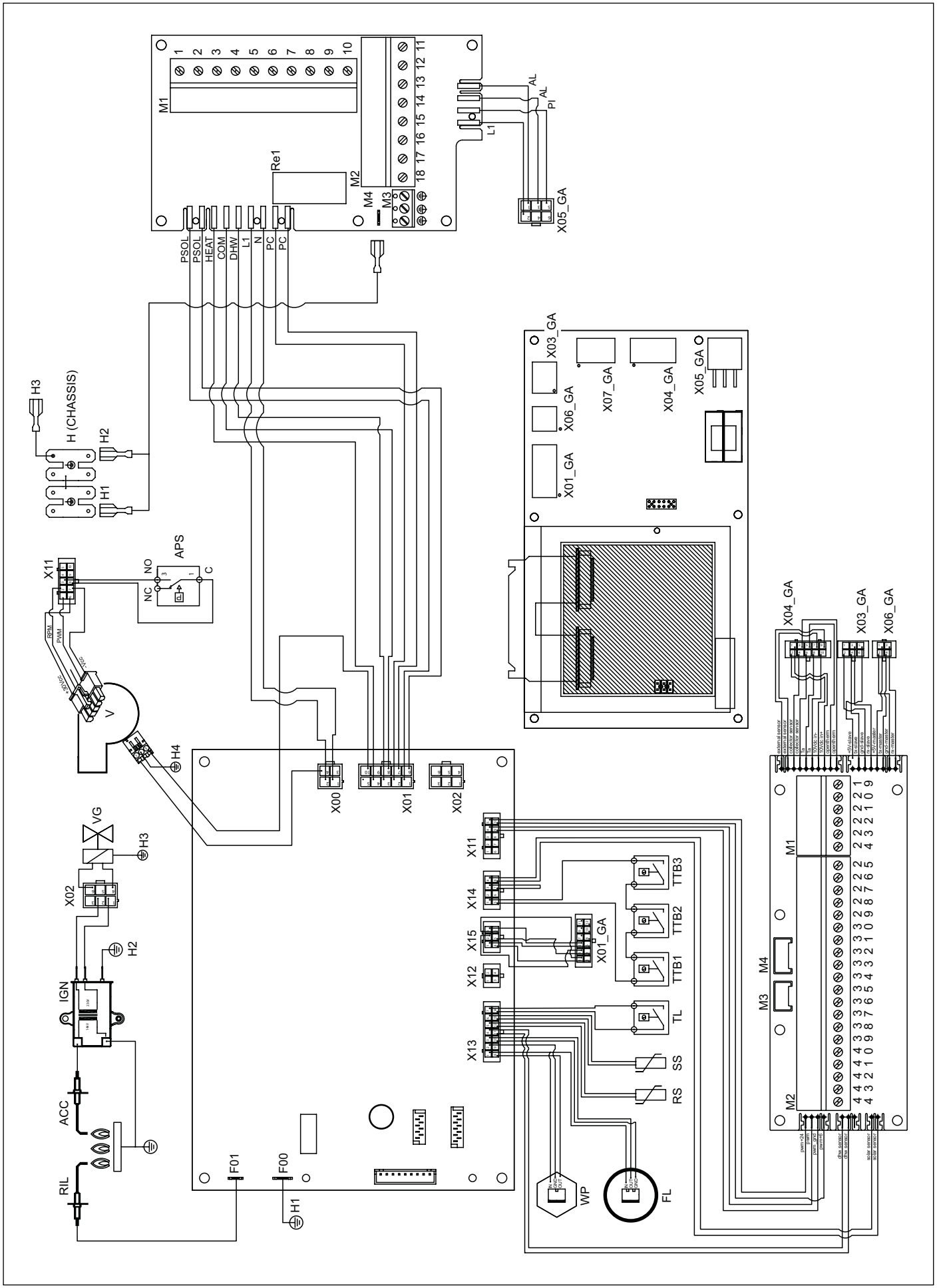


Fig. 34 Wiring diagram for models from 150

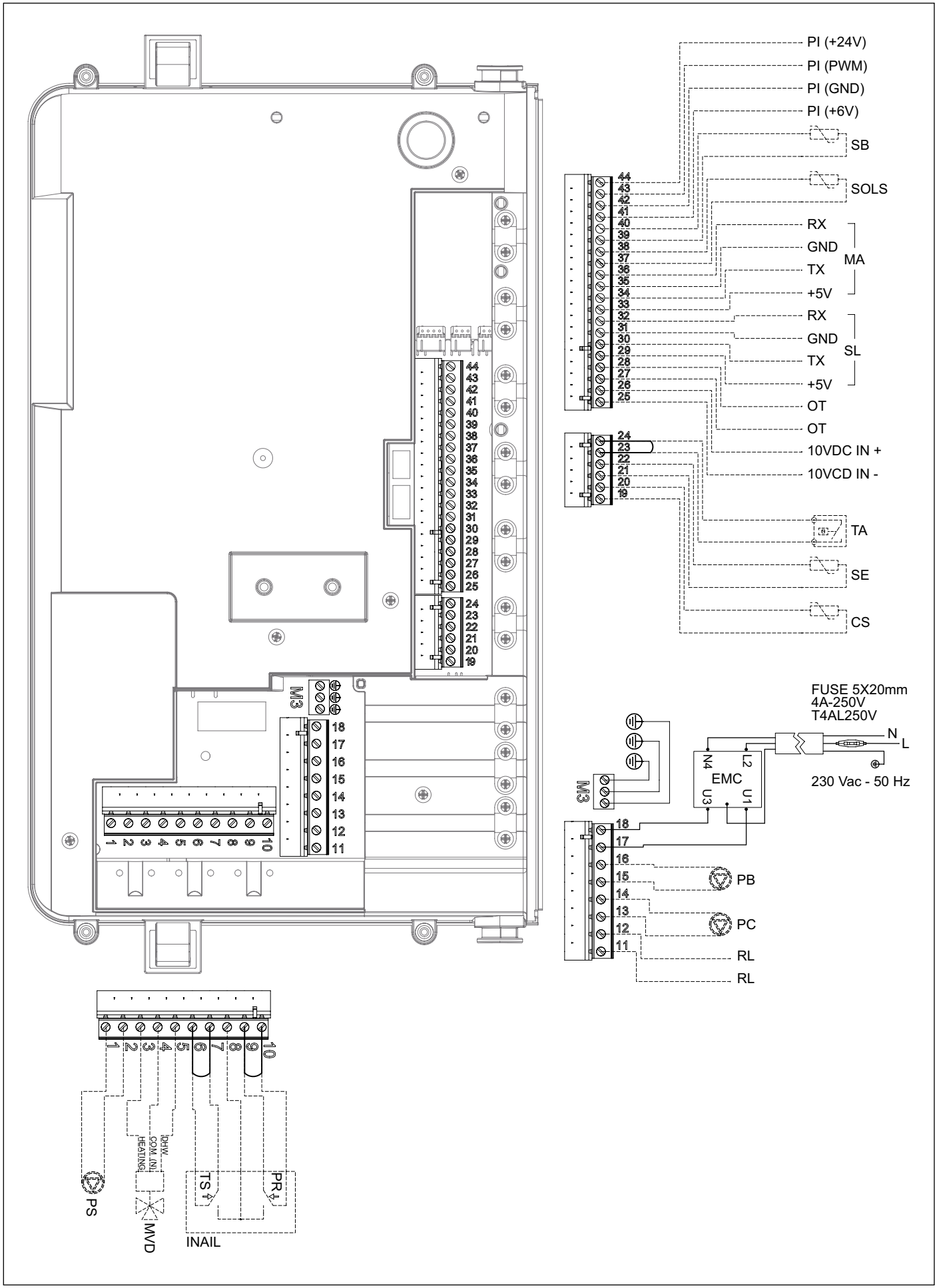


Fig. 35 Connections performed by the installer

Internal connections

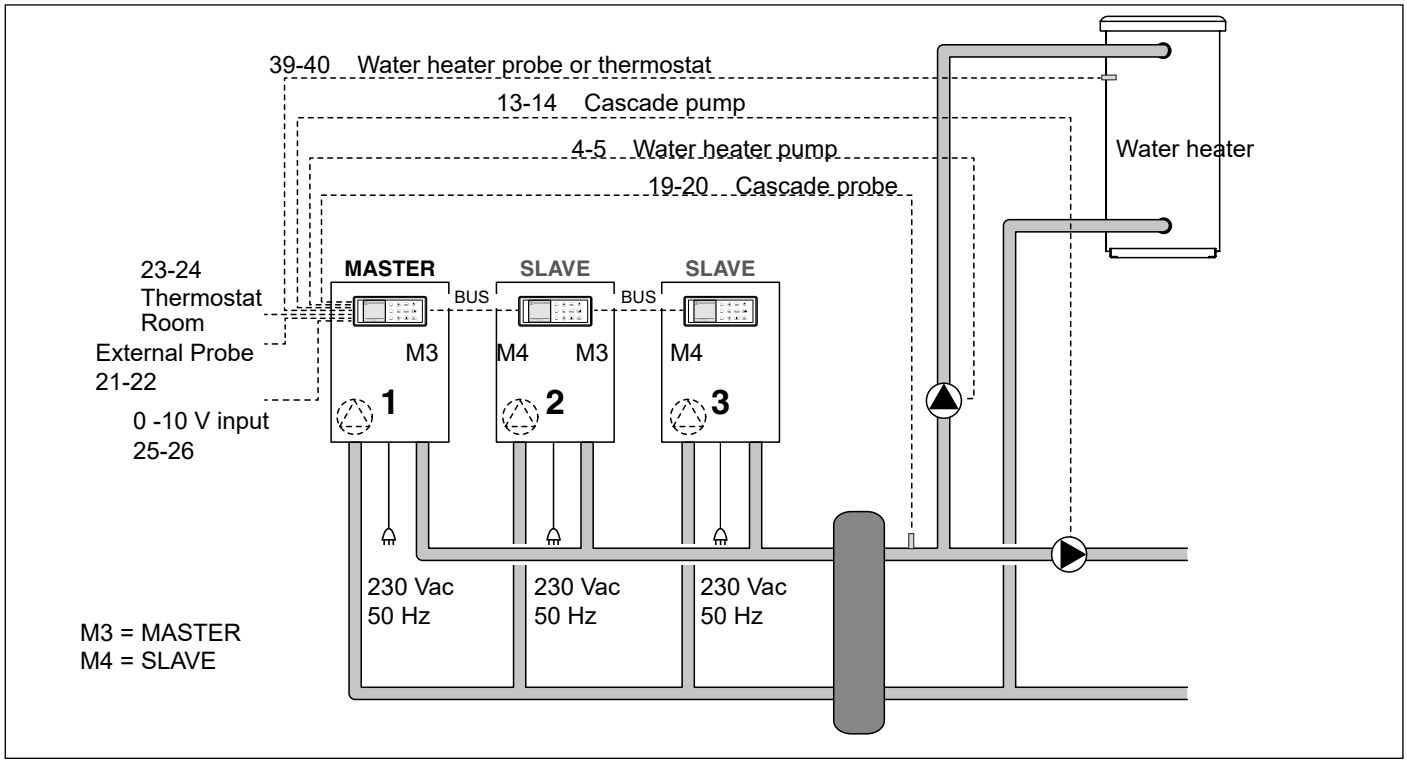
ACC: . . . . . Ignition electrode
RIL: . . . . . Detection electrode
IGN: . . . . . ignition transformer
VG: . . . . . gas valve
V: . . . . . Modulating fan
APS: . . . . . Air pressure switch (KR 150 only)
TTB1: . . . . . Limit thermostat (260 °C)
TTB2: . . . . . Thermofuse
TTB3: . . . . . Thermofuse
TL: . . . . . Safety thermostat on CH flow
FL: . . . . . Flow meter
WP: . . . . . Heating circuit pressure sensor
SS: . . . . . CH NTC flow probe 10k Ohm at 25°C B=3435
RS: . . . . . CH NTC return probe 10k Ohm at 25°C B=3435
EMC: . . . . . EMC filter
X00-X15: . . . . . Load/signal connectors
H0-H3: . . . . . ground connectors

Electrical connections to be made by the installer

1-2: . . . . . PS - Solar pump (max 0.8 A@cosφ>0.6)
3-4-5: . . . . . MDV - Electric 3-way valve
3: . . . . . Heating (phase)
4: . . . . . Common (neutral)
5: . . . . . DHW (phase)
6-7-8-9-10: . . . . . INAIL safety devices
6: . . . . . TS - Safety thermostat (NC)
7: . . . . . TS - Safety thermostat (COM)
8: . . . . . TS - Safety thermostat (NO) + PR - Safety pressure switch (NO) / [discretionary]
9: . . . . . PR - Safety pressure switch (COM)
10: . . . . . PR - Safety pressure switch (NC)
11-12: . . . . . RL - Auxiliary relay (remote alarm or external LPG valve manager)
13-14: . . . . . PC - Cascade pump (max 0.8 A@cosφ>0.6)
15-16: . . . . . PB - Boiler pump (max 1.5 A@cosφ>0.6)
17-18-M3: . . . . . Electric power supply 230V-50Hz (already connected)
17: . . . . . Phase
18: . . . . . Neutral
M3: . . . . . Ground
19-20: . . . . . CS - Cascade probe
21-22: . . . . . SE - External probe
23-24: . . . . . TA – Ambient thermostat
25-26: . . . . . 10 VDC input
25: . . . . . IN-
26: . . . . . IN+
27-28: . . . . . OT - Remote Control (OpenTherm)
29-30-31-32: . . . SL - Slave (connections for cascade systems)
29: . . . . . +5V
30: . . . . . TX
31: . . . . . GND
32: . . . . . RX
33-34-35-36: . . . MA - Master (connections for cascade systems)
33: . . . . . +5V
34: . . . . . TX
35: . . . . . GND
36: . . . . . RX
37-38: . . . . . SOLS - Solar collector probe
39-40: . . . . . SB - Water heater probe
41-42-43-44: . . . PI - PMW signal (for system circulation pump)
41: . . . . . +6V
42: . . . . . GND
43: . . . . . PWM
44: . . . . . +24V

1.22 Cascade connections

It is possible to connect up to 6 boilers in a cascade-type connection.
The boilers connected with a cascade-type connection work with the MASTER-SLAVE logic: the first boiler (MASTER) controls the entire cascade.
The cascade operating devices (optional) must be connected to the MASTER boiler: cascade pump, cascade probe, external probe, ambient thermostat, 0-10V input, water heater pump, water heater probe.



1.22.1 Electrical connections

For electrical connection of cascade boilers, use the cables supplied with the proper cable glands that must be fastened to the boiler bottom.
For the electric cascade connection of the boilers, refer to the following diagram:

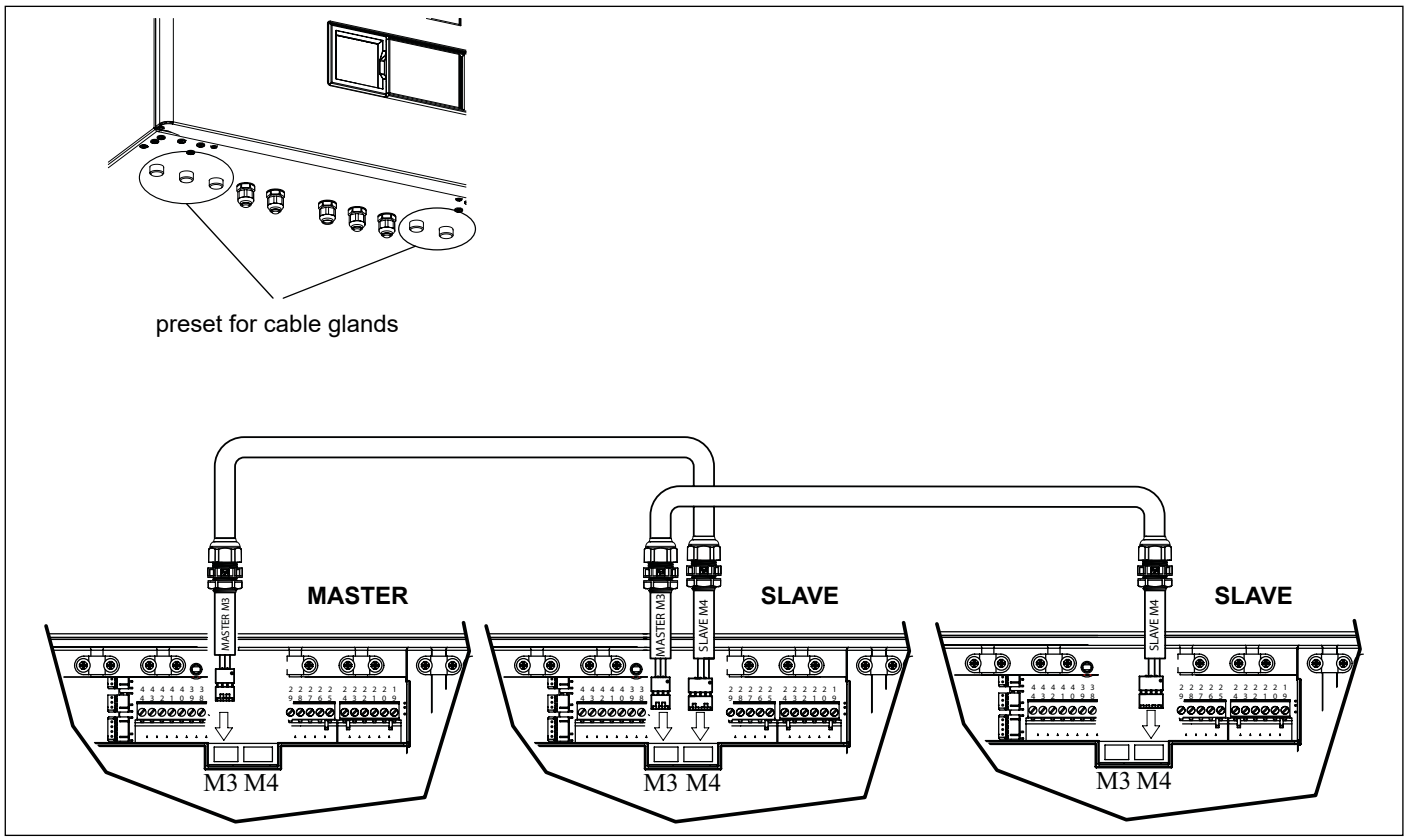


Fig. 36 Cascade connection

1.22.2 Cascade programming

Once the electrical connections are ready, proceed with the cascade system configuration.

- Reach the control panel of the MASTER boiler.
- Access the TECHNICIAN MENU (see TECHNICIAN MENU in the boiler manual).
- Select "6. CASCADE" and press ok.
- Select "1. Cascade settings" and press ok.

Technician menu	Sub-menu 1	Sub-menu 2	Factory value	Settable values
6. CASCADE	1. Cascade set	1. Cascade switch delay	30 sec	0 ÷ 255 sec
		2. Cascade min power	10% min	0 ÷ 100%
		3. Single burner power	According to the model	0 ÷ 2550 kW
		4. Boiler for DHW	0	0 ÷ 6
		5. PI loop time	5 sec	1 ÷ 15 sec
	2. Cascade info	Displaying the cascade system information. Where "*" symbol is present press ok to display the parameter time chart.		
	3. Cascade autodetect	Press ok to activate cascade system self-configuration.		

Description of TECHNICIAN MENU lines

Ref.	Description
6. CASCADE	
6.1. Cascade set	
6.1.1. Cascade switch delay	Time interval range between a boiler ignition and the following one.
6.1.2. Cascade min power	Minimum available cascade output.
6.1.3. Single burner power	Maximum heat output of an individual burner.
6.1.4. Boiler for DHW	Number of boilers in the cascade dedicated both to CH function and to DHW function.
6.1.5. PI loop period	Time range to recalculate the power required by the system.
6.2. Cascade info	Displaying the cascade system information. Where "*" symbol is present press ok to display the parameter time chart.
6.3. Cascade autodetect	Press ok to activate cascade system self-configuration.

It is recommended to set the parameter [6.1.2. Minimum modulation heat output] as defined in the table below.
Parameter [6.1.3. Individual burner heat output] must be equal to the greatest generator heat output value of the cascade.

Value of parameter 6.1.2 [%]	Cascade system heat configuration
10	45; 60; 90; 105; 120; 205; 240; 325; 360; 480
11	85; 170
16	150; 270; 300; 390; 420; 450; 510; 540; 570; 600; 630; 660; 690; 720; 750; 780; 810; 870; 900

Tab. 43 Minimum modulation head output setting

WARNING

IN CASE OF SYSTEM CASCADE-TYPE INSTALLATION WITH PLATE EXCHANGER IT IS NECESSARY TO SET THE 3.1.5 PARAMETER [BOILER PUMP MINIMUM SPEED] OF THE TECHNICAL MENU TO 30%.
IT MUST BE SET ON ALL MODULES OF THE CASCADE SYSTEM.

Access the technical menu, parameter 3.1.5:

Technician menu	Sub-menu 1	Sub-menu 2	Factory value	Settable values
3. SYSTEM SET-TINGS	1. Boiler parameters	5. Pump speed min	15%	15 ÷ 100%

Change the 3.1.5 parameter on each module of the cascade system according to the table:

-	CASCADE GENERATOR				
	45	60	85	120	150
PARAMETER 3.1.5	30%	30%	30%	30%	30%

1.22.3 Self-configuration

Once the parameter setting is ready, proceed with the cascade system self-configuration.

- Reach the control panel of the MASTER boiler.
- Access the TECHNICIAN MENU (see TECHNICIAN MENU in the boiler manual).
- Select "6. CASCADE” and press ok.
- Select “3. Autodetect cascade" and press ok.
- Press ok to activate cascade system self-configuration.

WARNING

At the end of this procedure, the MASTER boiler display will show an informative message about the number of boilers connected in cascade.
If this value does not correspond to the number of present generators, electrical connections must be checked and the auto-configuration procedure must be repeated.

WARNING

The auto-configuration procedure must be carried out upon first installation, after a change in the number of generators or in their order within the cascade sequence, or after a change in the MASTER generator parameter configuration.

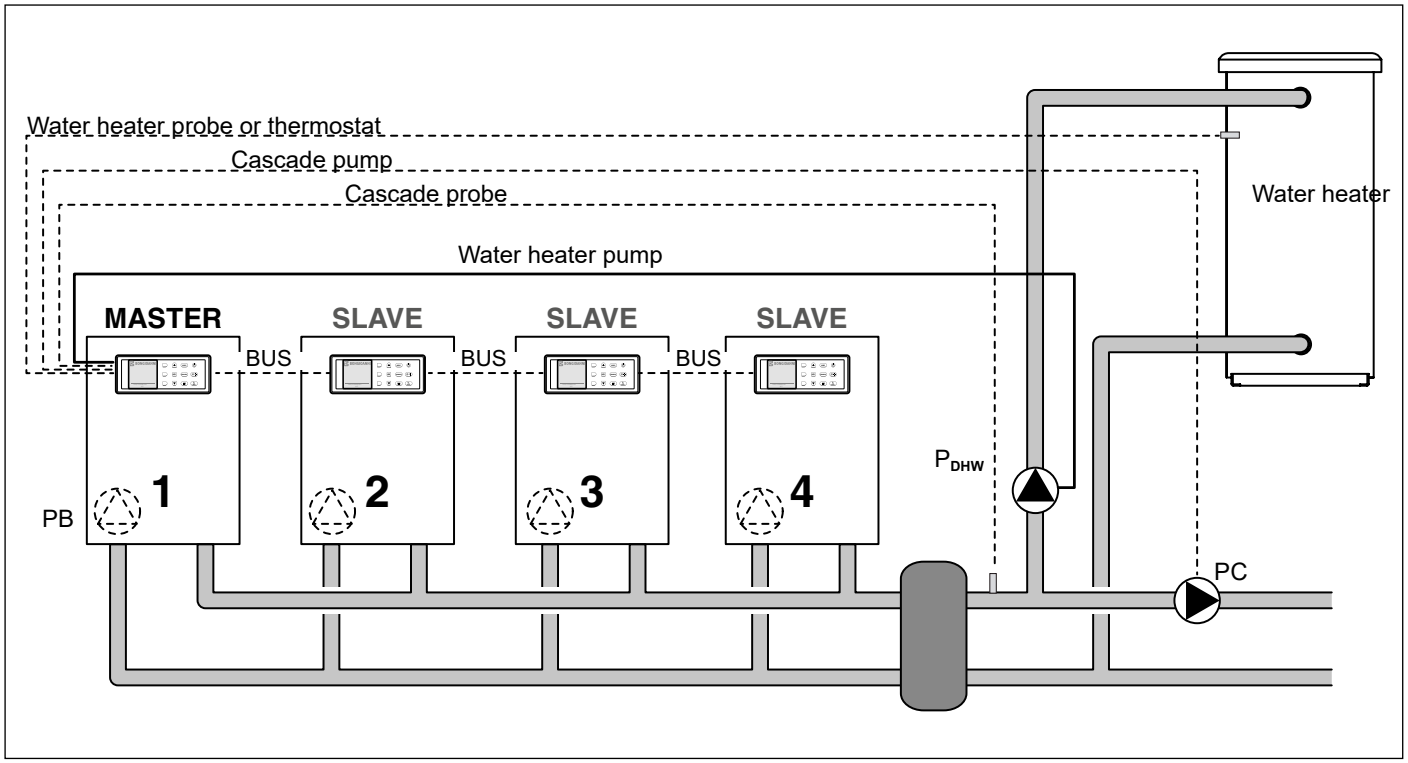
1.22.4 Examples of cascade systems

The operating logic of the cascade system is as follows: keep as many generators on as possible at the lowest possible heat output. To achieve this, ALL generators must be IDENTICAL (same Nominal Heat Output and Minimum Heat Output). In this case all generators in the cascade sequence respond to CH and DHW requests, with the suitable priority.

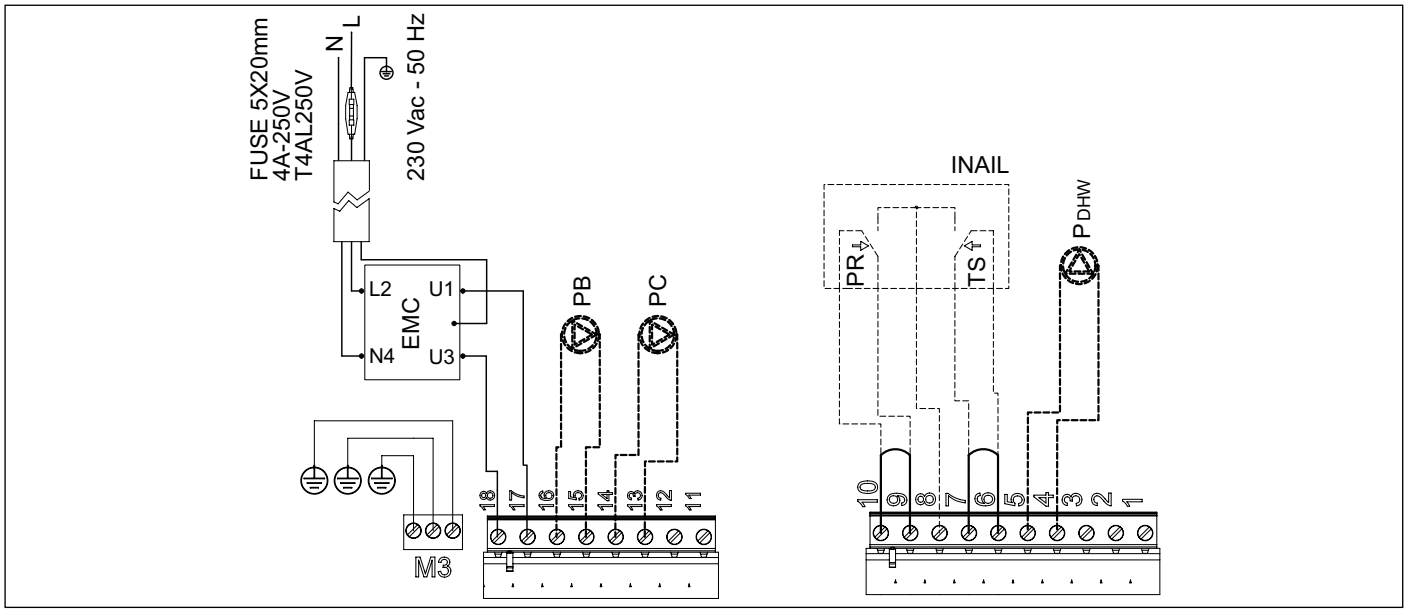
Below is an example of operation, considering a cascade sequence of 4 generators. The application of each operating logic requires that the relevant hydraulic configuration has been correctly implemented.

Example 1

4 generators having the same heat output (No 150 kW) and allocated to CH requests.



MASTER boiler electrical connections (loads):



Master boiler cascade configuration parameters:

- 6.1.2 Minimum modulation heat output: as defined in the table Tab. 43 Minimum modulation head output setting on page *97*
- 6.1.3 Individual burner heat output: 150
- 6.1.4 DHW boiler: 0

WARNING

In presence of boilers having different outputs, indicate the highest generator heat output in parameter 6.1.3.

1.22.5 Faulty cascade

In case of “failure” of one of the two SLAVE generators, which causes a lack of communication among the various boilers, it is necessary to exclude the generator from the cascade and restore the sequence by connecting the generator before the faulty one to the generator subsequent to the faulty one.

If MASTER generator needs to be excluded, disconnect the connection with the second generator (which is the first SLAVE), which will become the new MASTER.

All connections for cascade management (cascade thermostat and probe, water heater thermostat/probe etc.) must be moved onto it.

Once the electrical connections have been changed, proceed with the cascade system auto-configuration (see *Self-configuration*).

1.23 Decommissioning, disassembly and disposal

Warning

If you decide to definitively decommission the boiler, have decommissioning, disassembly and disposal procedures carried out by qualified personnel, only.
The user is not authorised to carry out such operations.

Decommissioning, disassembly and disposal operations must be performed with boiler cold and disconnected from gas and power mains.

The materials the boiler is made of can all be recycled.

Once disassembled, boiler must be disposed of in accordance with the national prevailing regulations.

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