ROBUR
caring for the environment

Installation, use and maintenance manual

Link

Modular heating unit and heater/chiller

powered by gas and renewable energy

DISPOSAL
The appliance and all its accessories must be disposed of separately in accordance with the regulations in force.

Use of the WEEE symbol (Waste Electrical and Electronic Equipment) indicates that this product cannot be disposed of as household waste. Proper disposal of this product helps to prevent potential negative consequences for the environment and human health.

Revision: K
Code: D-LBR563

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I INTRODUCTION

Installation, use and maintenance manual

This Manual is an integral part of the Link appliance and must be handed to the end user together with the appliance.

I.1 RECIPIENTS

This Manual is intended for:

- End user, for appropriate and safe use of the appliance.
- Qualified installer, for correct appliance installation.
- Planner, for specific information on the appliance.

I.2 CONTROL DEVICE

In order to work, the Link appliance requires a control device to be connected by the installer.

II SYMBOLS AND DEFINITIONS

II.1 KEY TO SYMBOLS

DANGER

WARNING

NOTE

PROCEDURE

REFERENCE (to other document)

II.2 TERMS AND DEFINITIONS

DHW = domestic hot water.
Aerothermal appliances/units = equivalent terms, both used to designate gas-fired heat/chiller appliances that require proper heat exchange with the outdoor air to operate (GAHP A/AR gas absorption heat pumps or GA ACF/HR/TK/HT/LB gas absorption chiller).
Appliance/Module/Unit GAHP/GA/AY = equivalent terms, both used to designate single gas-fired heat/chiller appliance (GAHP A/AR/GS/WS gas absorption heat pump, or GA ACF/HR/TK/HT/LB gas absorption chiller or AY condensing boiler), part of the link together with other modules/appliances.
Appliance/Preassembled group/Link = equivalent terms, both used to designate the generic heat/chiller hydronic group consisting of GAHP/GA/AY modules.
TAC = Technical Assistance Centre authorised by Robur.
CCI Controller (Comfort Controller Interface) = optional Robur control device which lets you manage up to three consistent modulating GAHP units (GAHP A, GAHP GS/WS) only for heating.
DDC Control (Direct Digital Controller) = optional Robur control device to manage one or more Robur appliances in ON/OFF mode (GAHP heat pumps, GA chillers) or in modulating mode (AY boilers).
RB100/RB200 Devices (Robur Box) = optional interface devices complementary to DDC, which may be used to broaden its functions (heating/cooling/DHW production service demands and control of system components such as third party generators, adjustment valves, circulators, probes).
RTAR/RTCF/RTY/RTA/RTAY/RTYR/... Link = acronyms (initials) to designate a specific heat/chiller preassembled group, consisting of a specific combination of GAHP/GA/AY heat/chiller modules.
First start-up = appliance commissioning operation which may only and exclusively be carried out by a TAC.

III WARNINGS

III.1 GENERAL AND SAFETY WARNINGS

GAHP/GA/AY modules

As far as the individual GAHP/GA/AY modules making up the link are concerned, please read the warnings in their respective manuals, with particular regard to the following aspects (where applicable):

- Poisoning
- Moving parts
- Burn hazard
- Pressure vessels
- Water-ammonia solution
- Limescale and corrosion
- Chloride concentration
- Aggressive substances in the air

Installer's qualifications

Installation must exclusively be performed by a qualified firm and by qualified personnel, with specific knowledge on heating, cooling, electrical systems and gas appliances, in compliance with the

laws in force in the Country of installation.

Declaration of conformity

Upon completing installation, the installing firm shall issue to the owner/client the appliance's workmanlike conformity declaration, according to national/local regulations in force and the manufacturer's instructions/provisions.

Misuse

The appliance must only be used for the purposes for which it has been designed. Any other use is deemed hazardous. Incorrect use may affect operation, duration and safety of the appliance. Adhere to the manufacturer's instructions.

Use of the appliance by children

The appliance can be used by children over 8 years old, and by people with reduced physical, sensory or mental capabilities, or lack of experience or knowledge, only if they are under surveillance or after they have received instructions regarding safe use of the appliance and understanding the dangers inherent in it. Children should not play with the appliance.

Hazardous situations

- Do not start the appliance in hazardous conditions, such as: gas smell, problems with the plumbing/electrical/gas system, parts of the appliance under water or damaged, malfunctioning, disabling or bypassing control and safety devices.
- In case of danger, request intervention by qualified personnel.
- In case of danger, switch off the electrical power and gas supplies only if this can be done in total safety.

Gas component tightness

- Before performing any operation on gas ducting components, close the gas valve.
- Upon completing any procedure, perform the tightness test according to regulations in force.

Gas smell

If you smell gas:
- Do not use electrical devices such as telephones, multimeters or other equipment that may cause sparks next to the appliance.
- Shut off the gas supply by turning the valve off.
- Switch off the power supply via the external disconnect switch in the power supply electrical panel.
- Use a telephone away from the appliance to ask for intervention from qualified personnel.

Electrocution hazard

- Disconnect the electrical power supply before any operation on appliance components.
- For electrical connections exclusively use compliant components and according to the specifications provided by the manufacturer.
- Ensure the appliance cannot be accidentally switched back on.

Connection and disconnection

For the link electrical connection and disconnection operations follow the procedure described in Paragraph 7.1 *p. 45*.

Earthing

Electrical safety depends on effective earthing system, correctly connected to the appliance and installed according to the regulations in force.

Distance from combustible or flammable materials

Do not deposit flammable materials (paper, diluents, paints, etc.) near the appliance.

Acid flue gas condensate

If condensing units are present in the link:
- Discharge the acid condensate of combustion flue gas in compliance with current exhaust regulations.

Switching the appliance off

Disconnecting the power supply while the appliance is running may cause permanent damage to internal components.
- Except in the event of danger, do not disconnect the power supply to switch off the appliance, but always and exclusively act through the provided control device.

In the event of failure

Operations on internal components and repairs may exclusively be carried out by a TAC, using only original spare parts.
- In the event of a failure of the link, or of one or more of the individual modules that make it up and/or break parts of it, refrain from any repair or restoration attempt and contact the TAC immediately.

Routine maintenance

Proper maintenance assures the efficiency and good operation of the appliance over time.
- Maintenance must be performed according to the manufacturer's instructions (see Chapter 7 *p. 45*) and in compliance with current regulations.

- Appliance maintenance and repairs may only be entrusted to firms legally authorised to work on gas appliances and systems.
- Enter into a maintenance contract with an authorised specialised firm for routine maintenance and for servicing in case of need.
- Use only original parts.

Maintenance of GAHP/GA/AY modules

For the maintenance of the individual GAHP/GA/AY modules making up the link, refer to their respective manuals.

Decommissioning and disposal

If the link, or even one or more of the individual GAHP/GA/AY modules that make it up, is to be disposed of, contact the manufacturer for its disposal.

Keep the Manual

This Installation, use and maintenance manual, including all the documents relating to the individual GAHP/GA/AY modules that make it up, must always accompany the appliance and must be handed to the new owner or installer in the event of sale or removal.

III.2 COMPLIANCE

III.2.1 EU directives and standards

The GAHP/GA/AY modules that make up the link, namely the GAHP series gas absorption heat pumps, GA series gas absorption chillers, and AY series condensing boilers comply with the essential requirements of the following standards and directives, each as applicable:

- ► Efficiency Directive 92/42/EEC and subsequent modifications and additions.
- ► 2016/426/EU "Gas Appliances Regulation" as amended and added.
- ► 2014/30/EC "Electromagnetic Compatibility Directive" as amended and added.
- ► 2014/35/EC "Low Voltage Directive" as amended and added.
- ► 2006/42/EC "Machine Directive" as amended and added.
- ► 2014/68/EU "Pressure Equipment Directive" as amended and added.
- ► 811/2013/EU "Energy-Related Products regulation" as amended and added.
- ► 813/2013/EU "Ecodesign requirements regulation" as amended and added.
- ► EN 12309 appliances for gas-fired heating and/or cooling absorption.
- ► EN 378 Refrigerating systems and heat pumps.
- ► EN 15502 Gas-fired central heating boilers.

III.2.2 Other applicable provisions and standards

The design, installation, operation and maintenance of the systems shall be carried out in compliance with current applicable regulations, depending on the Country and location, and in accordance with the manufacturer's instructions. In particular, regulations regarding the following shall be complied with:

- ► Gas systems and equipment.
- ► Electrical systems and equipment.
- ► Heating and air conditioning systems, heat pumps and chillers.
- ► Environmental protection and combustion products exhaust.
- ► Fire safety and prevention.
- ► Any other applicable law, standard and regulation.

III.3 EXCLUSIONS OF LIABILITY AND WARRANTY

Any contractual or extra-contractual liability of the manufacturer for any damage caused by incorrect installation and/or improper use and/or failure to comply with regulations and with the manufacturer's directions/instructions shall be disclaimed.

In particular, the warranty on the appliance may be rendered void by the following conditions:

- Incorrect installation.
- Misuse.
- Failure to comply with the manufacturer's indications on installation, use and maintenance.
- Alteration or modification of the product or any part thereof.
- Extreme operational conditions or however outside of the operational ranges set forth by the manufacturer.
- Damages caused by external agents such as salts, chlorine, sulphur or other chemical substances contained in the installation water or present in the air of the installation site.
- Abnormal actions transmitted to the appliance by the system or installation (mechanical stresses, pressure, vibrations, thermal expansion, electrical surges...).
- Accidental damages or due to force majeure.

1 FEATURES AND TECHNICAL DATA

For the characteristics of the individual GAHP/GA/AY modules that make up the link, and of the control devices, please refer to their respective manuals.

1.1 FEATURES

1.1.1 Links

The link are gas-fired (natural gas or LPG) heating/cooling groups, to supply hot and/or chilled water. Each link consists of a number of individual gas-fired heating/cooling modules (GAHP/GA/AY modules). The set of appliances and components is preassembled at the factory, forming a complete hydronic group already prepared to be connected to the system.

1.1.2 Application

Each link, according to its configuration (RTAR, RTCF, RTY, RTAY, RTYR, RTA, ... Link) is able to simultaneously or alternatively deliver heating, cooling, DHW production and heat recovery, according to the needs of each single installation, with a considerable extension of heating and cooling output. The various hydronic models are suitable for all heating and cooling systems operating with hot and/or chilled water, with common terminals (e.g. radiators, fan coils, radiant panels, fan heaters, air handling units, DHW buffer tanks, swimming pool heat exchangers...), including process plants (industrial heat exchangers).

1.1.3 Manufacturing features

Each link, in addition to the GAHP/GA/AY gas-fired heating/cooling modules, consists of:

- delivery/return stainless steel hydraulic manifolds, insulated with rigid cups lined with aluminum sheet
- galvanized steel gas outlet manifold
- flexible connecting couplings of individual units to hydraulic and gas manifolds
- condensate drain manifold (only if there are at least two condensing appliances GAHP A/GAHP GS/WS/AY)
- electrical panel with protection devices (2 electrical panels with more than 6 modules)
- bearing structure with galvanized steel sections

1.1.4 Composition (GAHP/GA/AY modules)

The gas heating/cooling modules that make up a link can be:

- GAHP units, versions A/AR/GS/WS, gas absorption heat pumps
- GA units, versions ACF/HR/TK/HT/LB, gas absorption chillers
- AY units, versions AY 35/AY 50/AY 100, condensing boilers

distinguished in:

- aerothermal units (A, AR, ACF, HR, TK, HT, LB)
- hydrothermal (WS) and geothermal (GS) units

in variable number:

- from 2 to 5 in the case of GAHP/GA only
- from 2 to 7 in the case of GAHP/GA and AY

The link with aerothermal units must be installed exclusively outdoors, while others may be installed either indoors or outdoors.

The aerothermal modules of links may be in configuration:

- with standard fans
- with silenced fans (S or S1)

1.1.5 Configurations

- without circulators or with circulators (standard or oversize circulators)
- 2, 4 or 6 pipes, ie 1, 2 or 3 pairs of delivery/return hydraulic collectors/connections for hot and/or cold water, connected as needed.

1.1.6 INAIL safety appliances

The kit is only available on appliances intended for the Italian market.

1.2 CIRCULATING PUMPS

1.2.1 Link without water pumps

If the link is without circulators, It must be installed on the hydraulic/primary circuit at least one circulation pump, suitably selected and rated (by the designer/installer).

If the link also includes AY boilers, it is not possible to implement the link without independent water pumps for each of the modules.

1.2.2 Link with water pumps

In the link already equipped with water pumps, each individual GAHP/GA/AY module that makes up the link has (at least) a single independent water pump.

The water pumps are installed externally to the GAHP/GA units, and are provided with a suitable protection cover (Figure 1.28 *p. 23*), while for AY units the water pumps are installed internally to the unit itself.

The available head at the hydraulic connections of the link is considered net of the internal pressure drops of the appliances and hydraulic manifolds.

Table 1.1 *p. 7* provides the minimum residual head at the nominal flow in the largest configuration.

Table 1.1 *Minimum residual head*

	residual head [bar]
Standard water pumps	0,20
Oversize water pumps	0,34

See the design manual for more detailed flow, head and pressure drop data.

1.3 CODING

Each link is encoded with a series of letters and digits that

distinguish its composition and configuration. In order:

1. first (3 or 4 letters) = type of link (e.g. RTAR, RTCF, RTAY, RTA, RTY, ...), based on the modules that make it up (GAHP/GA/AY)
2. first (2 or 3 digits) = cooling power, given by the sum of the cooling powers of the individual modules
3. next (2 or 3 digits) = heat output, given by the sum of the heat outputs of the individual modules
4. (_, /4 or /6) = number of pipes, i.e. outlet/inlet manifold pairs (1, 2 or 3)
5. next (2 letters) = module type (TK/LB/HR/HT/LT)
6. (_, S, S1) = fans, standard, silenced or silenced brushless (only for aerothermal units)
7. (MET/NAT, G25, GPL/LPG) = fuel gas (natural gas or LPG)
8. next (2 or 3 letters) = country of destination
9. next (2 letters) = water pumps (with or without) and type (standard or oversize)
10. last (1 letter) = any special versions

Table 1.2 *p. 9* exemplifies the meaning of the encoding in detail, providing the key for reading any possible composition and configuration, starting from an example. It should be noted that the number of modules of a specific type on the link is determined indirectly via the heating and cooling output value, which always identifies only one possible module combination.

The example shows a link RTRH118/313 /6 HR S MET/NAT ITA VW which is decoded as follows:

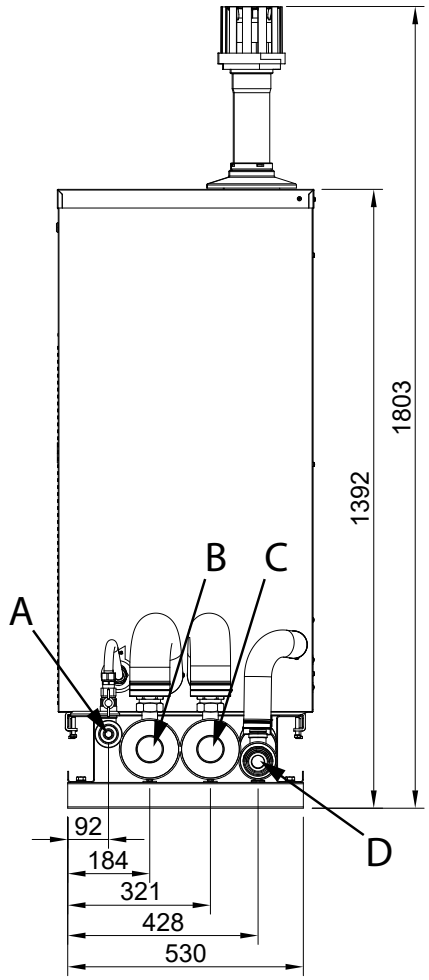
1. first 4 letters (RTRH) = link composed of GAHP-AR, GA ACF HR and AY modules
2. first 3 digits (118) = cooling output expressed in thousands BTU/h, resulting from the sum of 58 for the GAHP-AR module and 60 for the GA ACF HR module
3. next 3 digits (313) = heat output expressed in thousands of BTU/h, resulting from the sum of 120 for the GAHP-AR module, 121 for the AY 35 module and 72 for the GA ACF HR chiller heat recovery
4. number of pipes (/6) = hydraulic circuit with three separate pipe pairs (heating/cooling, DHW and heat recovery)
5. next 2 letters (HR) = on the link there is at least one GA ACF HR module
6. fans (S) = GAHP/GA modules are equipped with a silenced fan
7. fuel (MET/NAT) = the link is preset for natural gas supply
8. next 3 letters (ITA) = the country of destination is Italy
9. next 2 letters (VW) = the link is equipped with standard water pumps for each module on the heating/cooling/DHW circuit and oversize water pumps on the heat recovery circuit
10. last letter () = the link has no special characteristics

Figure 1.2 *Link encoding matrix*

RTRH										Series	Code	Composition
1										**RTA**	F-GAA	multiples of A
										RTAR	F-GAR	multiples of AR
										RTCF	F-GCF	multiples of ACF
										RTY	F-EEC	multiples of AY
										RTRH	F-HRE	HR-AR-AY
										RTAH	F-HAR	HR-AR
										RTRC	F-FRE	AR-ACF-AY
										RTCR	F-ARC	AR-ACF
										RTYR	F-ARE	AR-AY
										RTYH	F-HFE	HR-ACF-AY
										RTHF	F-HCF	HR-ACF
										RTYF	F-GFE	ACF-AY
										RTWS	F-GWS	WS
										RTGS	F-GGS	GS
										RTAY	F-AAE	A-AY
	118								**Cooling output**	**Unit**	**kBTU/h**	
	2									GA ACF	60	
										GA ACF HR	60	
										GAHP-AR	58	
										GAHP A HT	0	
										GAHP A LT	0	
										AY	0	
		313							**Heating output**	**Unit**	**kBTU/h**	
		3								GA ACF	0	
										GA ACF HR	72	
										GAHP-AR	120	
										GAHP A HT	133	
										GAHP A LT	141	
										AY 35	121	
										AY 50	175	
										AY 100	350	
										GAHP WS	142	
										GAHP GS HT	128	
										GAHP GS LT	145	
			/6							**Pipes**	**Description**	
			4							2 pipes		
										4 pipes	**/4**	
										4+2 (HR+AY)	**/6**	
				HR						**Unit type**	**Description**	
				5						GAHP-AR		
										AY		
										GA ACF		
										GA ACF TK	**TK**	
										GA ACF LB	**LB**	
										GA ACF HR	**HR**	
										GA ACF HT	**HT**	
										GAHP A HT	**HT**	
										GAHP A LT	**LT**	
					S					**Version**	**Description**	
					6					standard		
										low-noise	**S**	
										brushless	**S1**	
						MET/NAT				**Gas type**	**Description**	
						7				MET/NAT	**MET/NAT**	
										G25	**G25**	
										GPL/LPG	**GPL/LPG**	
							ITA			**Description**	**Country of destination**	
							8			**ITA**	**Italy**	
										DE	**Germany**	
										CH	**Switzerland**	
										AT	**Austria**	
										DK	**Denmark**	
										HU	**Hungary**	
										RO	**Romania**	
										RU	**Russia**	
										FRAIR	**France AIR**	
										FR	**France**	
										KR	**Croatia**	
										ES	**Spain**	
										CZ	**Czech Republic**	
										PL	**Poland**	
										UK	**Generic**	
										BE	**Belgium**	
										NL	**Netherlands**	
										GB	**United Kingdom**	
								VW	**Water pumps**	**Type**	**Description**	
								9			**Link without HR**	**Link with HR or GS/WS**
											hot/cold	**hot/cold** / **recovery/source**
										without pumps	SC	N / N
										standard	CV	V / V
										oversize	CW	W / W
1	2	3	4	5	6	7	8	9		= FIELD		
RTRH	118	313	/6	HR	S	MET/NAT	ITA	VW		= NAME		

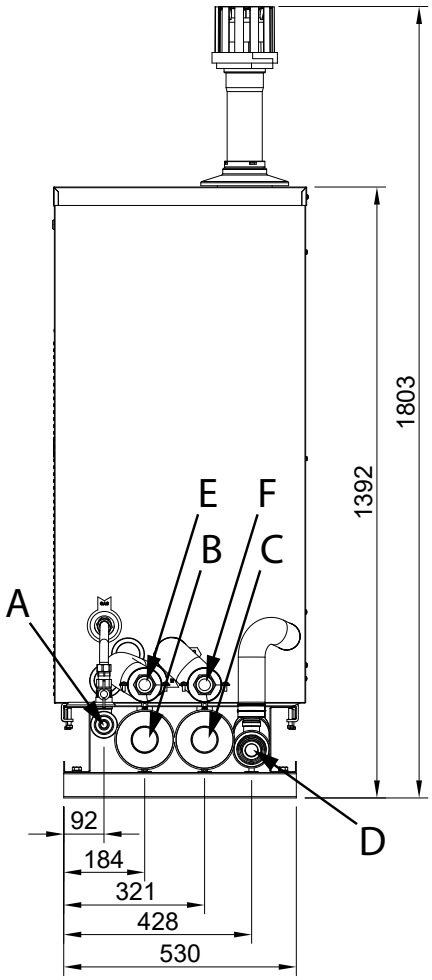
1.4 HYDRAULIC/GAS CONNECTIONS

Figure 1.3 *Position of connections for 2-pipe RTY link - Right-hand side view*



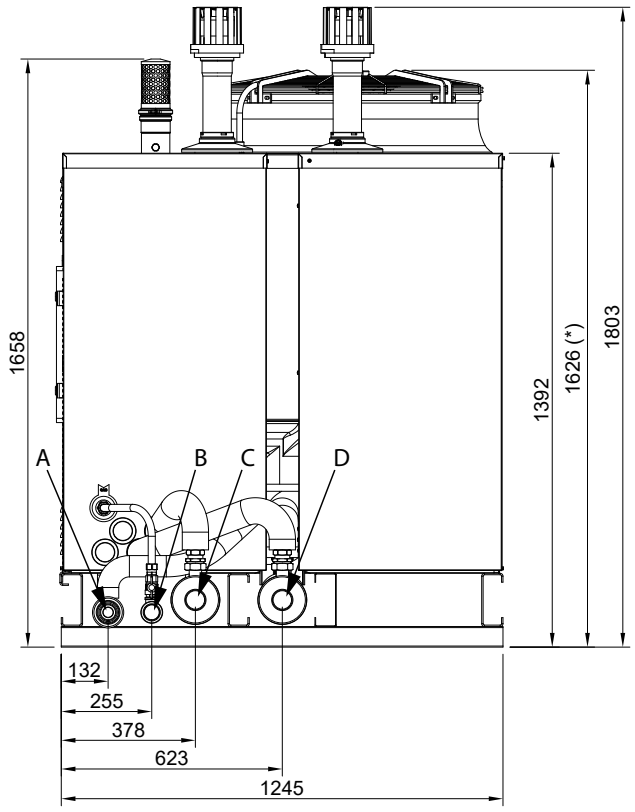
A Gas connection [1 1/2" F]
B Hot return [2" M]
C Hot delivery [2" M]
D Condensation drain connection [1 " F]

Figure 1.4 *Position of connections for 4-pipe RTY link - Right-hand side view*



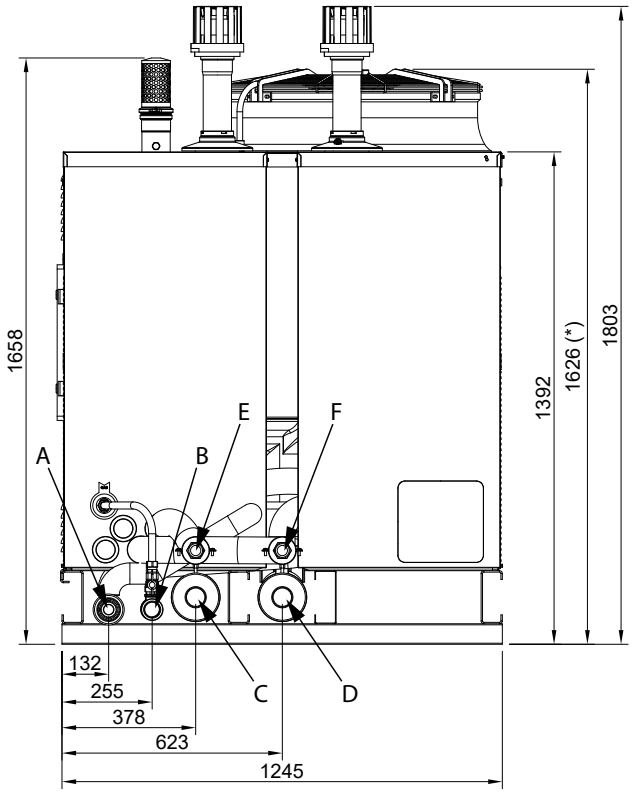
A Gas connection [1 1/2" F]
B Hot return [2" M]
C Hot delivery [2" M]
D Condensation drain connection [1 " F]
E Separate boiler hot water inlet [1 1/4" M for AY 35 and AY 50, 1 1/2" M for AY 100]
F Separate boiler hot water outlet [1 1/4" M for AY 35 and AY 50, 1 1/2" M for AY 100]

Figure 1.5 *Position of connections for 2-pipe link - Right-hand side view*



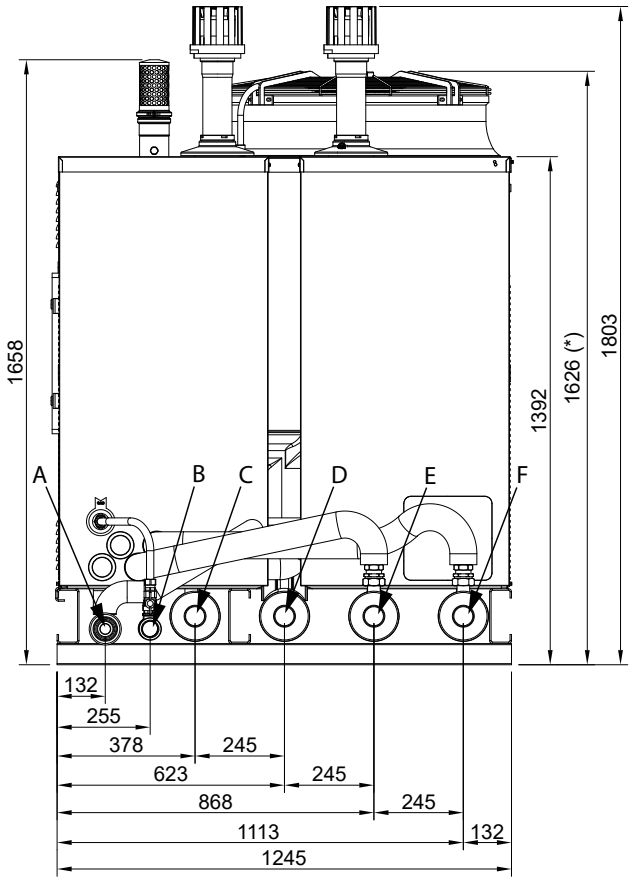
A Condensate drain connection [1" F] (only for link with more than one condensing unit)
B Gas connection [1 1/2" F]
C Hot delivery [2" M]
D Hot return [2" M]
* The height of standard models is 1562 mm

Figure 1.6 *Position of connections for 4-pipe link with a single AY boiler on the separate circuit - Right-hand side view*



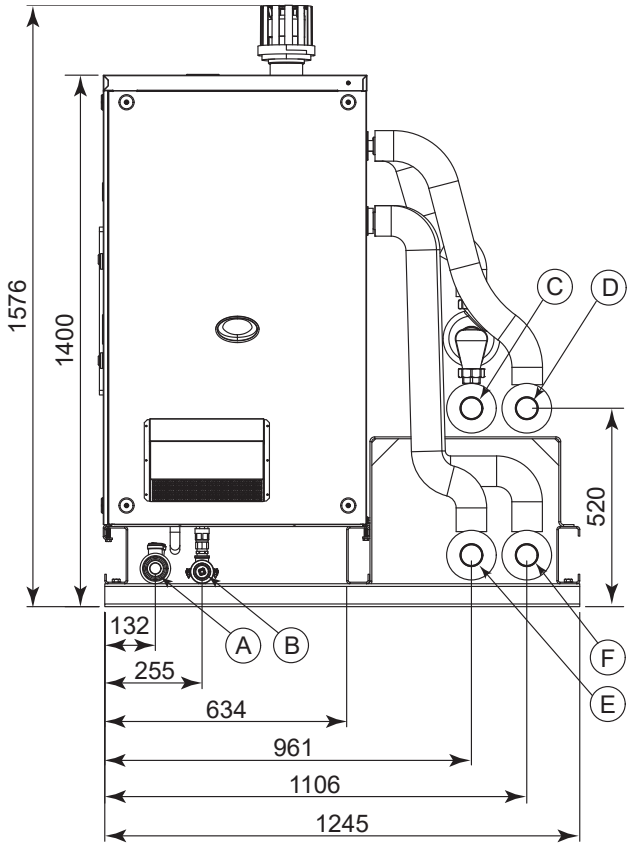
A Condensate drain connection [1" F] (only for link with more than one condensing unit)
B Gas connection [1 1/2" F]
C Cold/hot water outlet [2" M]
D Cold/hot water inlet [2" M]
E Separate boiler hot water outlet [1 1/4" M for AY 35 and AY 50, 1 1/2" M for AY 100]
F Separate boiler hot water inlet [1 1/4" M for AY 35 and AY 50, 1 1/2" M for AY 100]
* The height of standard models is 1562 mm

Figure 1.7 *Position of connections for 4-pipe link with several AY boilers on the separate circuit - Right-hand side view*



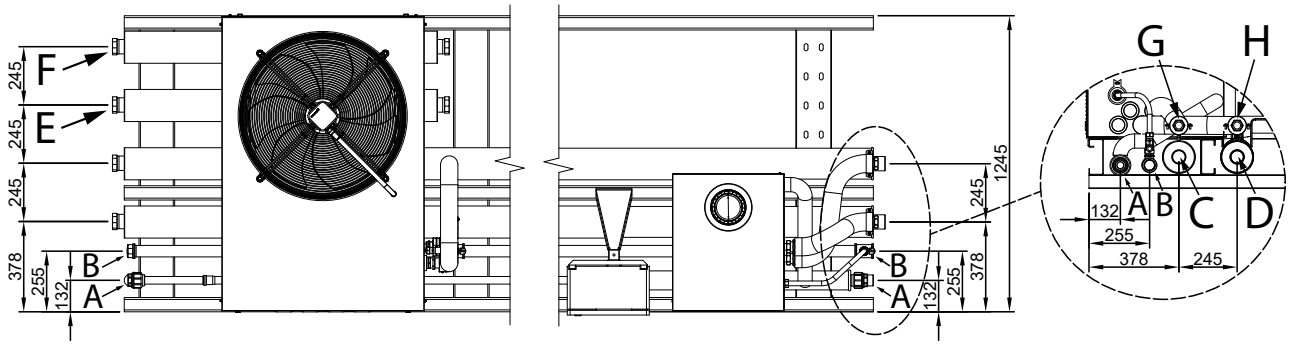
A Condensate drain connection [1" F] (only for link with more than one condensing unit)
B Gas connection [1 1/2" F]
C Cold/hot water outlet [2" M]
D Cold/hot water inlet [2" M]
E Separate boilers hot water inlet [2" M]
F Separate boilers hot water outlet [2" M]
* The height of standard models is 1562 mm

Figure 1.8 *Position of connections for RTGS/WS link - Right-hand side view*



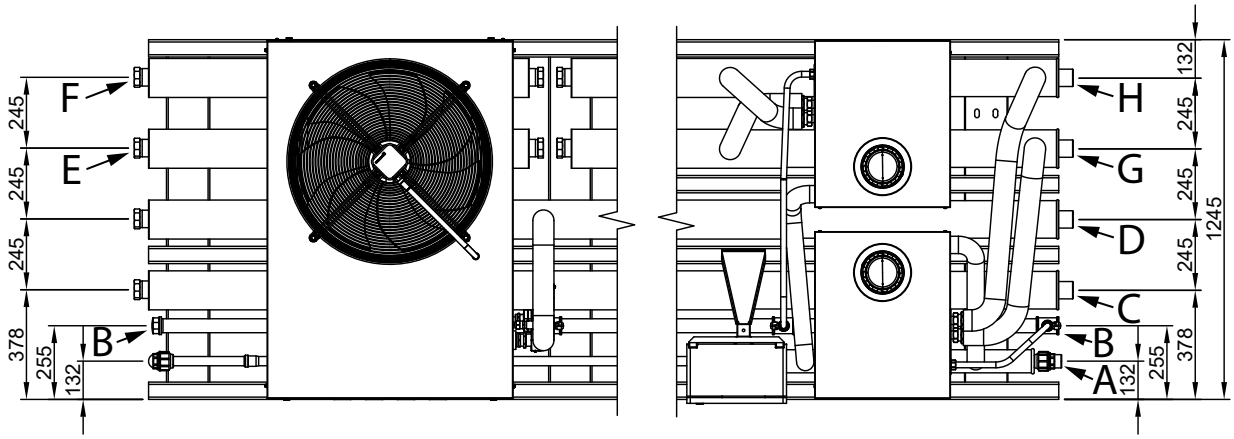
A Condensation drain connection [1 " F]
B Gas connection [1 1/2" F]
C Hot return [2" M]
D Cold return [2" M]
E Hot delivery [2" M]
F Cold delivery [2" M]

Figure 1.9 *Position of connections for 6-pipe link with a single AY boiler on the separate circuit - Upper view*



A Condensate drain connection [1" F] (only for link with more than one condensing unit). Sloping manifold, strictly connect on right side
B Gas connection [1 1/2" F]
C Cold/hot water outlet [2" M]
D Cold/hot water inlet [2" M]
E ACF HR recovery hot return (only left connection) [2" M]
F ACF HR recovery hot delivery (only left connection) [2" M]
G Separate boiler hot water inlet [1 1/4" M for AY 35 and AY 50, 1 1/2" M for AY 100]
H Separate boiler hot water outlet [1 1/4" M for AY 35 and AY 50, 1 1/2" M for AY 100]

Figure 1.10 *Position of connections for 6-pipe link - Upper view*



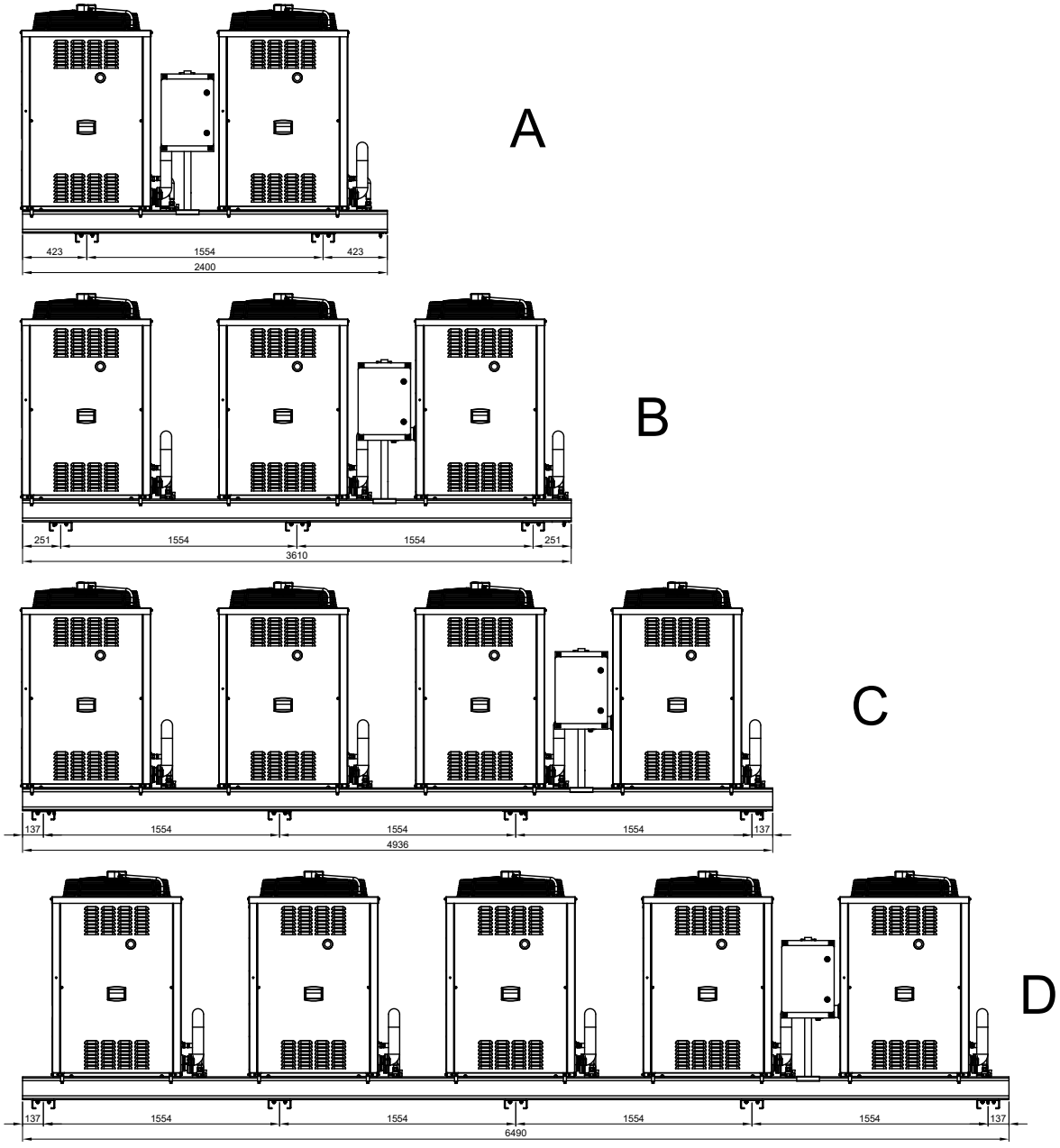
A Condensate drain connection [1" F] (only for link with more than one condensing unit). Sloping manifold, strictly connect on right side
B Gas connection [1 1/2" F]
C Cold/hot water outlet [2" M]
D Cold/hot water inlet [2" M]
E ACF HR recovery hot return (only left connection) [2" M]
F ACF HR recovery hot delivery (only left connection) [2" M]
G Separate boilers hot water inlet (right-hand connection only) [2" M]
H Separate boilers hot water outlet (right-hand connection only) [2" M]

1.5 DIMENSIONS AND WEIGHTS

The dimensions are given for the maximum footprint configuration.

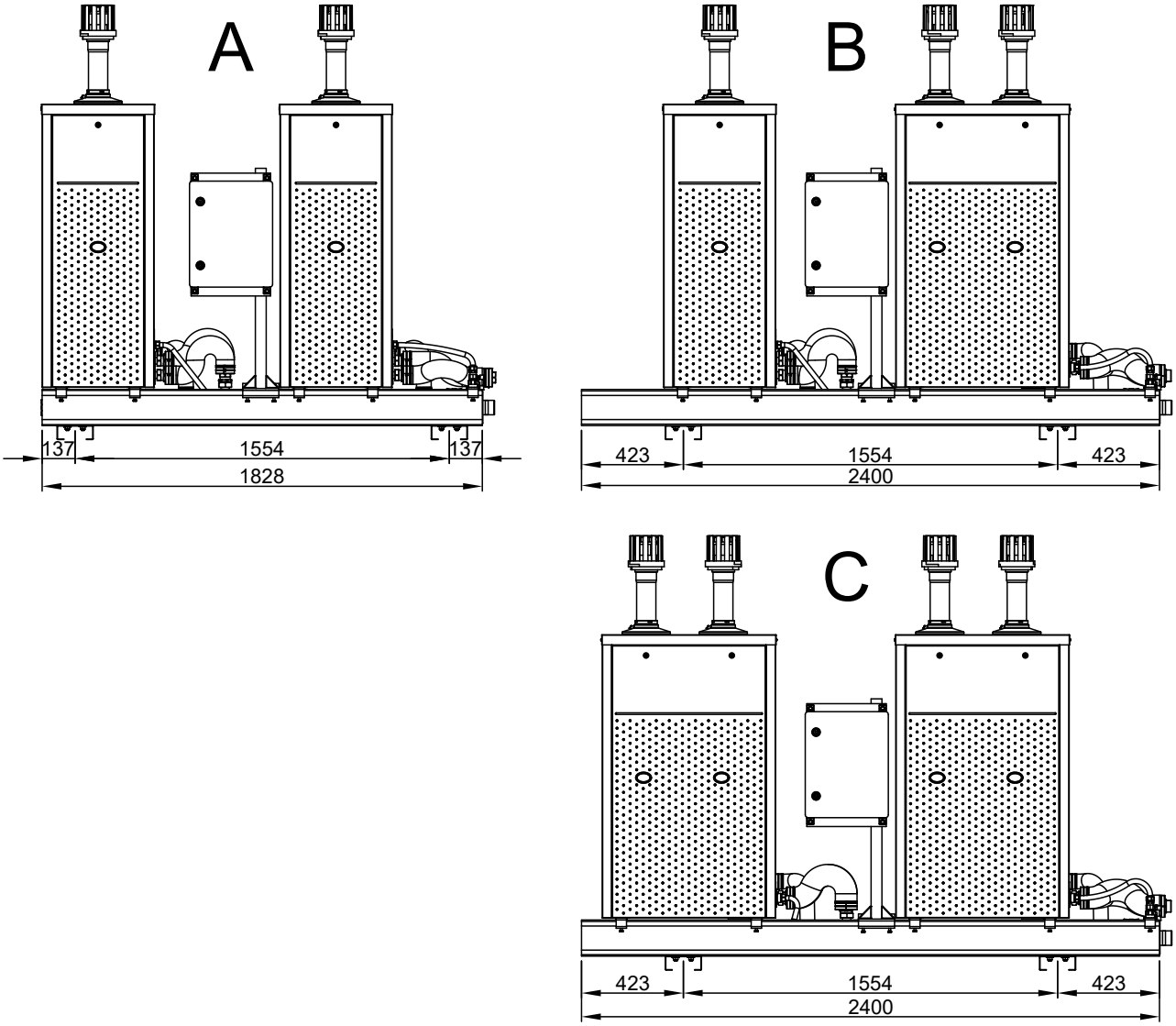
The weights are given for the maximum weight configuration.

Figure 1.11 *Dimensions and weights of a link with ACF/A/AR (with 2, 3, 4 and 5 units) - front view*



A 980 kg
B 1440 kg
C 1920 kg
D 2410 kg

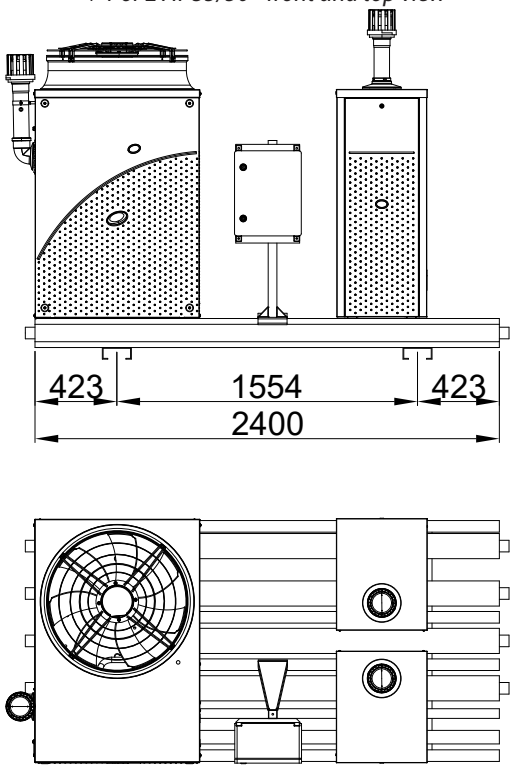
Figure 1.12 *Dimensions and weights of a link with AY (with 2 units) - front view*



A 335
B 420
C 470

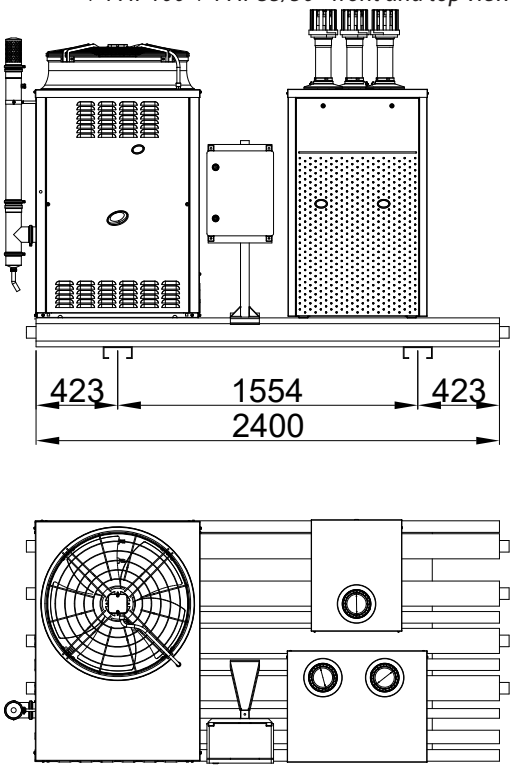
Configurations 1 GAHP A + 1 AY 35/AY 50 can be replaced by Gitié AHAY35/AHAY50 appliances. Configurations 1 GAHP-AR + 1 AY 35/AY 50 can be replaced by Gitié ARAY35/ARAY50 appliances. Configurations 1 GA ACF + 1 AY 35/AY 50 can be replaced by Gitié ACAY35/ACAY50 appliances.

Figure 1.13 *Dimensions and weights of a link with 1 ACF/A/AR + 1 or 2 AY 35/50 - front and top view*



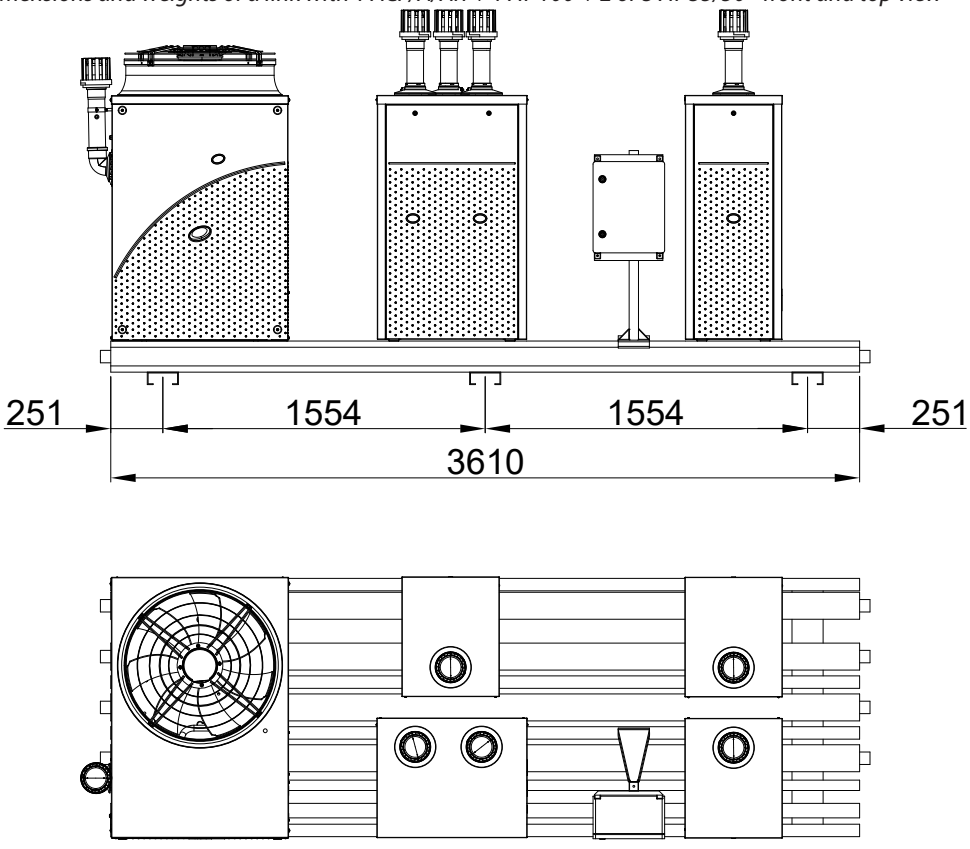
780 kg

Figure 1.14 *Dimensions and weights of a link with 1 ACF/A/AR + 1 AY 100 + 1 AY 35/50 - front and top view*



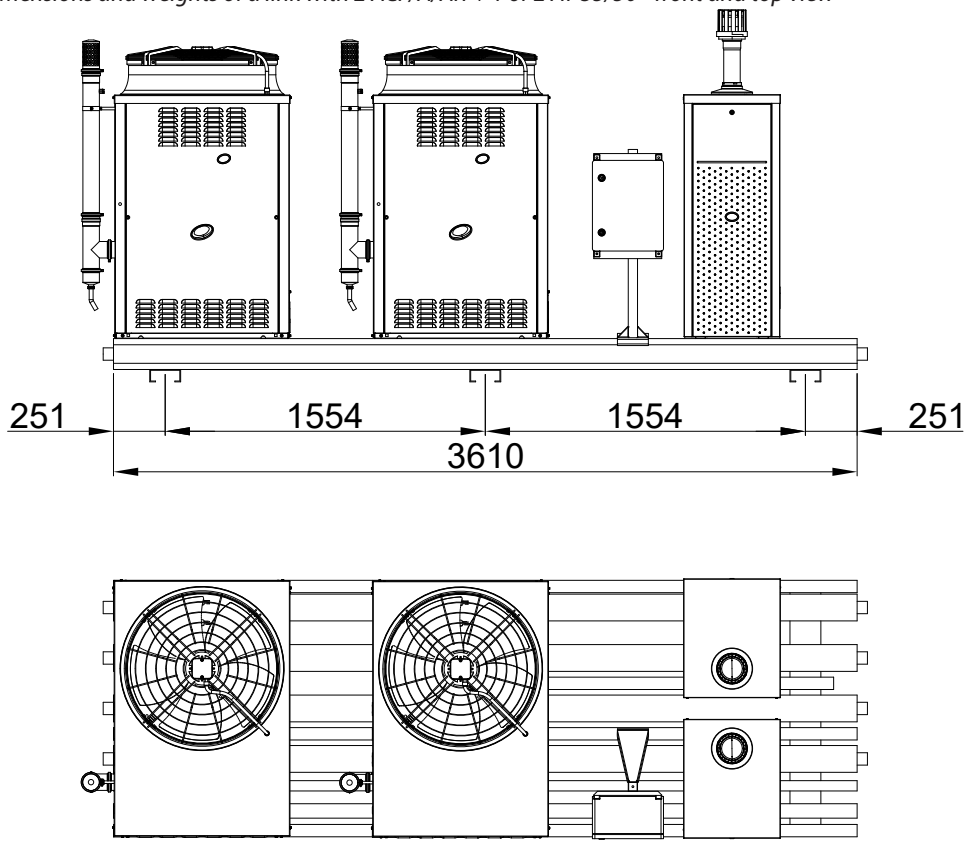
830 kg

Figure 1.15 *Dimensions and weights of a link with 1 ACF/A/AR + 1 AY 100 + 2 or 3 AY 35/50 - front and top view*



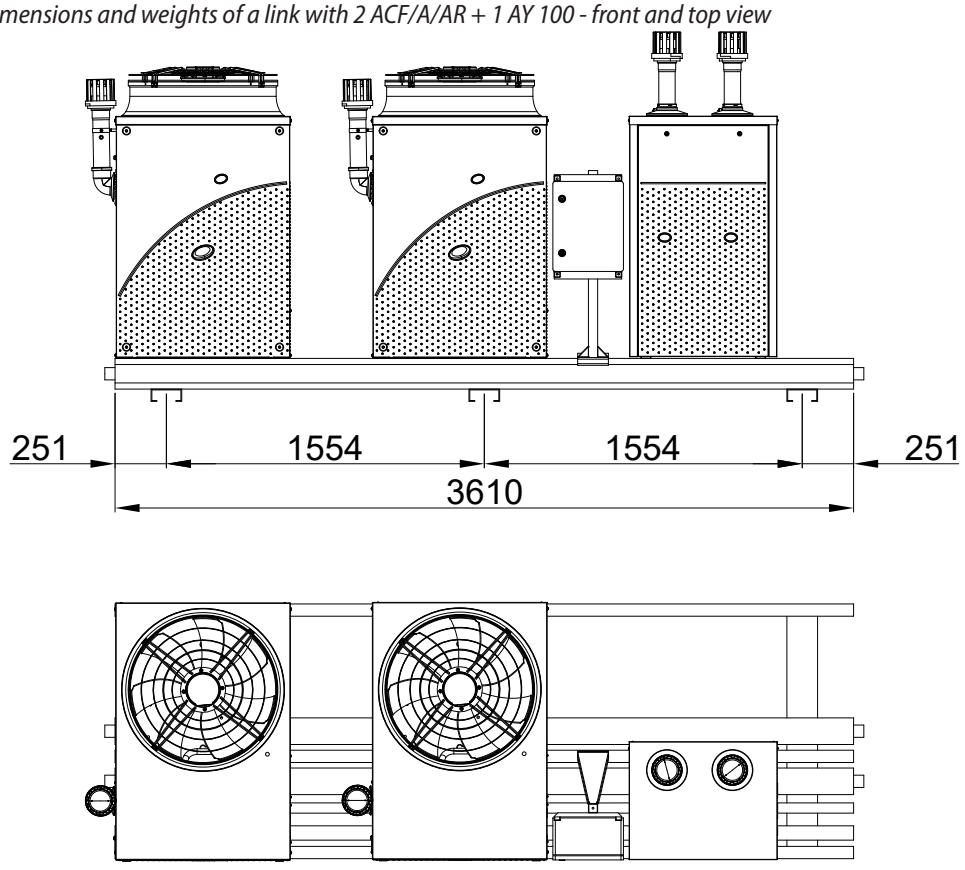
1090 kg

Figure 1.16 *Dimensions and weights of a link with 2 ACF/A/AR + 1 or 2 AY 35/50 - front and top view*



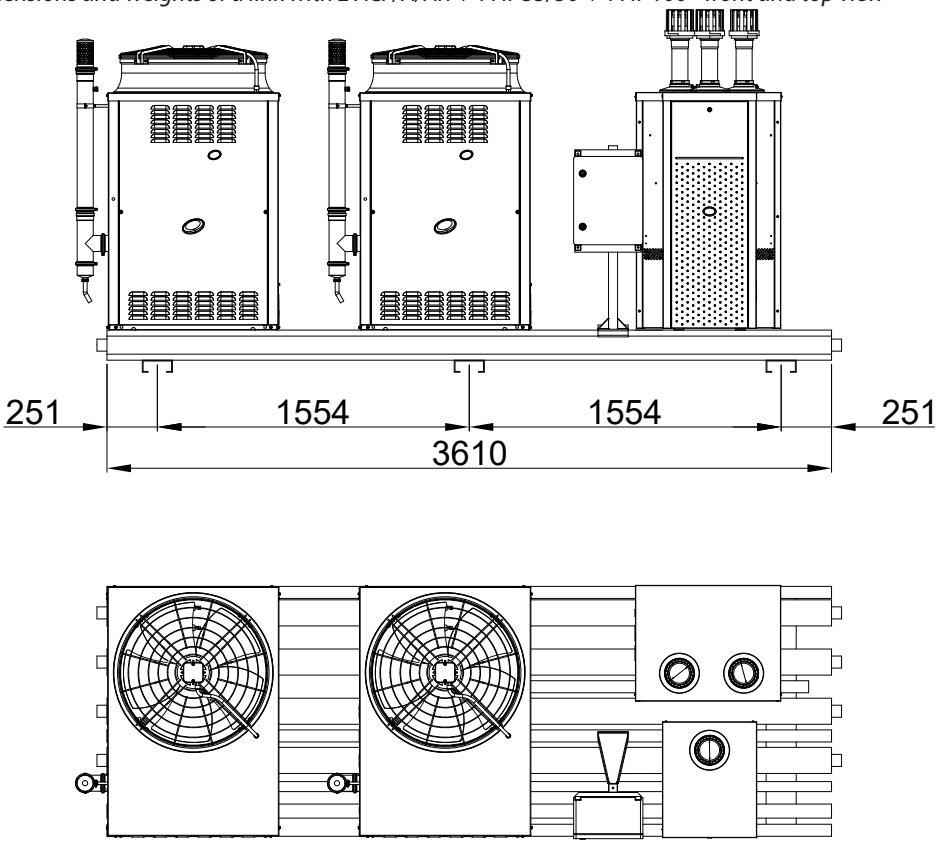
1240 kg

Figure 1.17 *Dimensions and weights of a link with 2 ACF/A/AR + 1 AY 100 - front and top view*



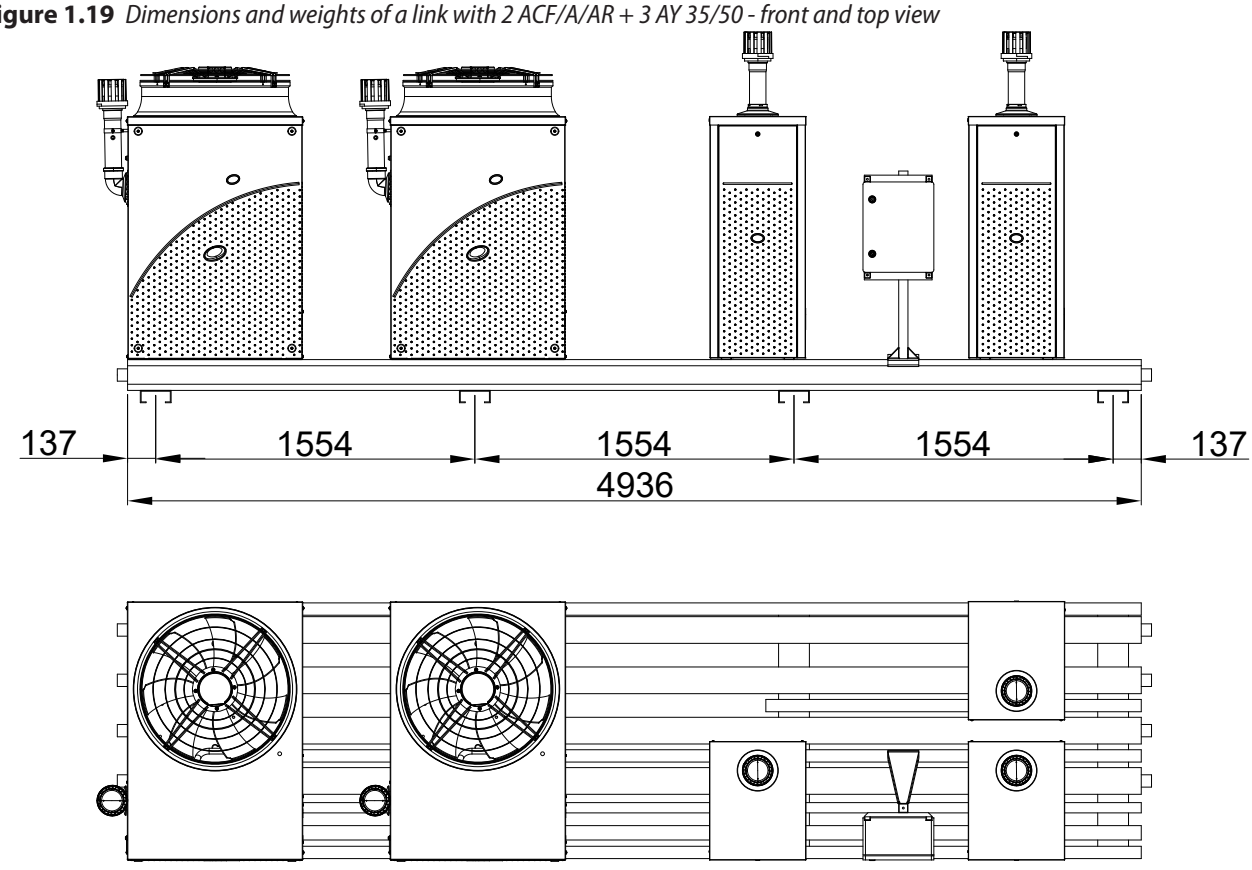
1190 kg

Figure 1.18 *Dimensions and weights of a link with 2 ACF/A/AR + 1 AY 35/50 + 1 AY 100 - front and top view*



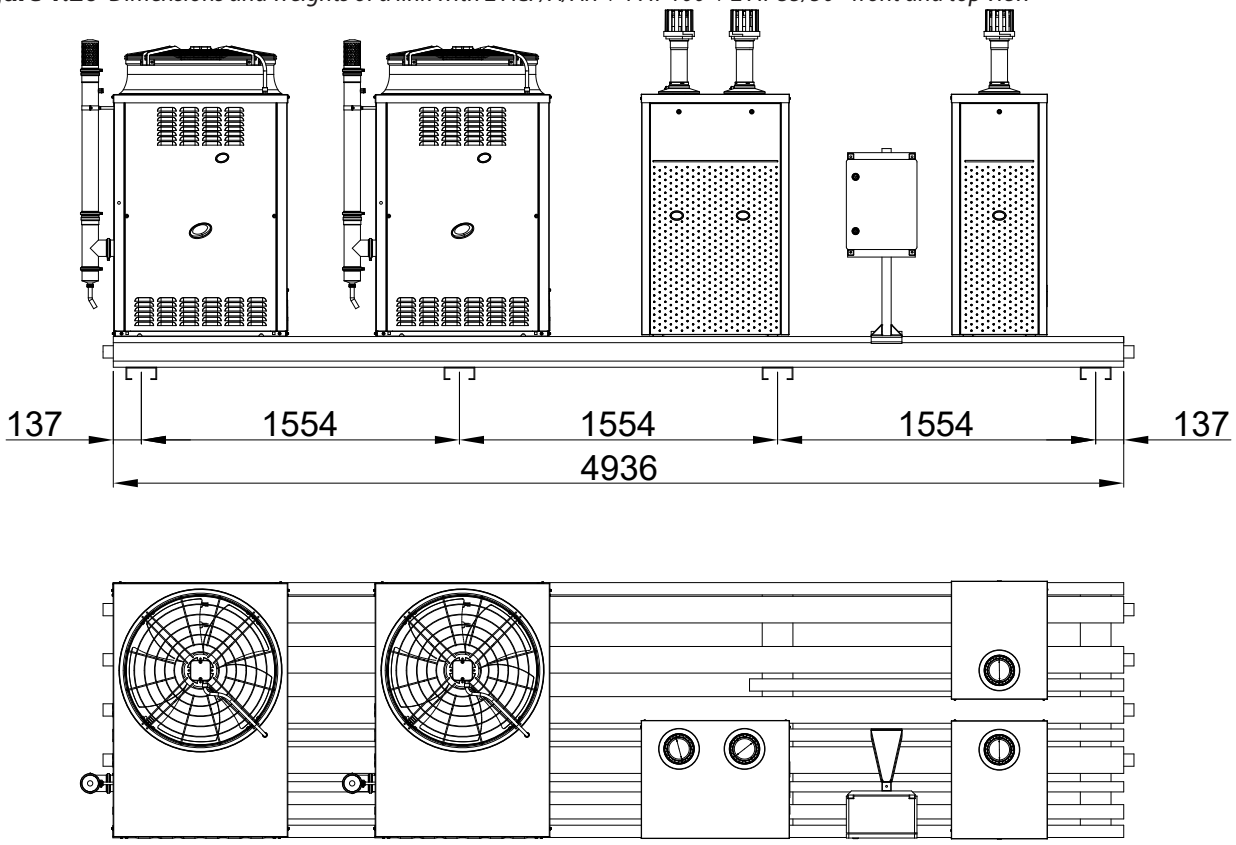
1290 kg

Figure 1.19 *Dimensions and weights of a link with 2 ACF/A/AR + 3 AY 35/50 - front and top view*



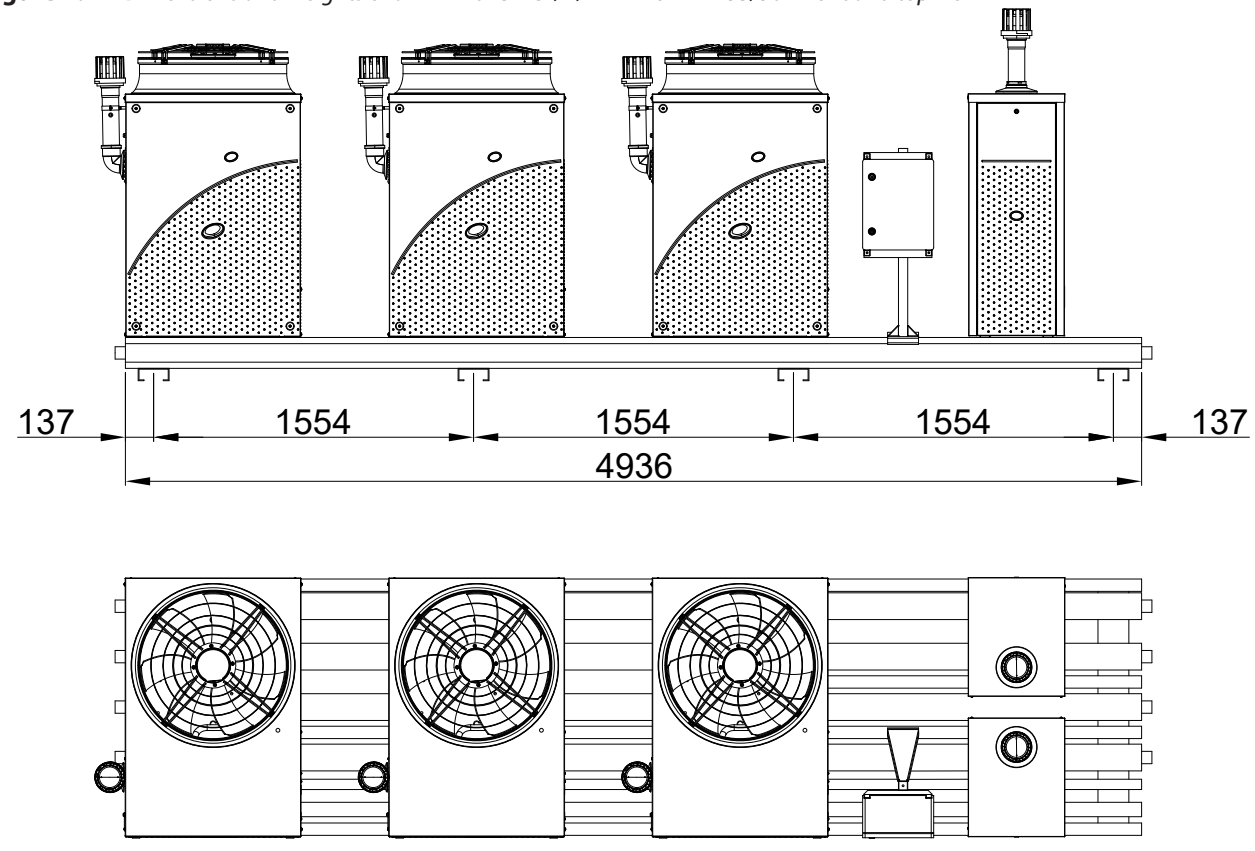
1420 kg

Figure 1.20 *Dimensions and weights of a link with 2 ACF/A/AR + 1 AY 100 + 2 AY 35/50 - front and top view*



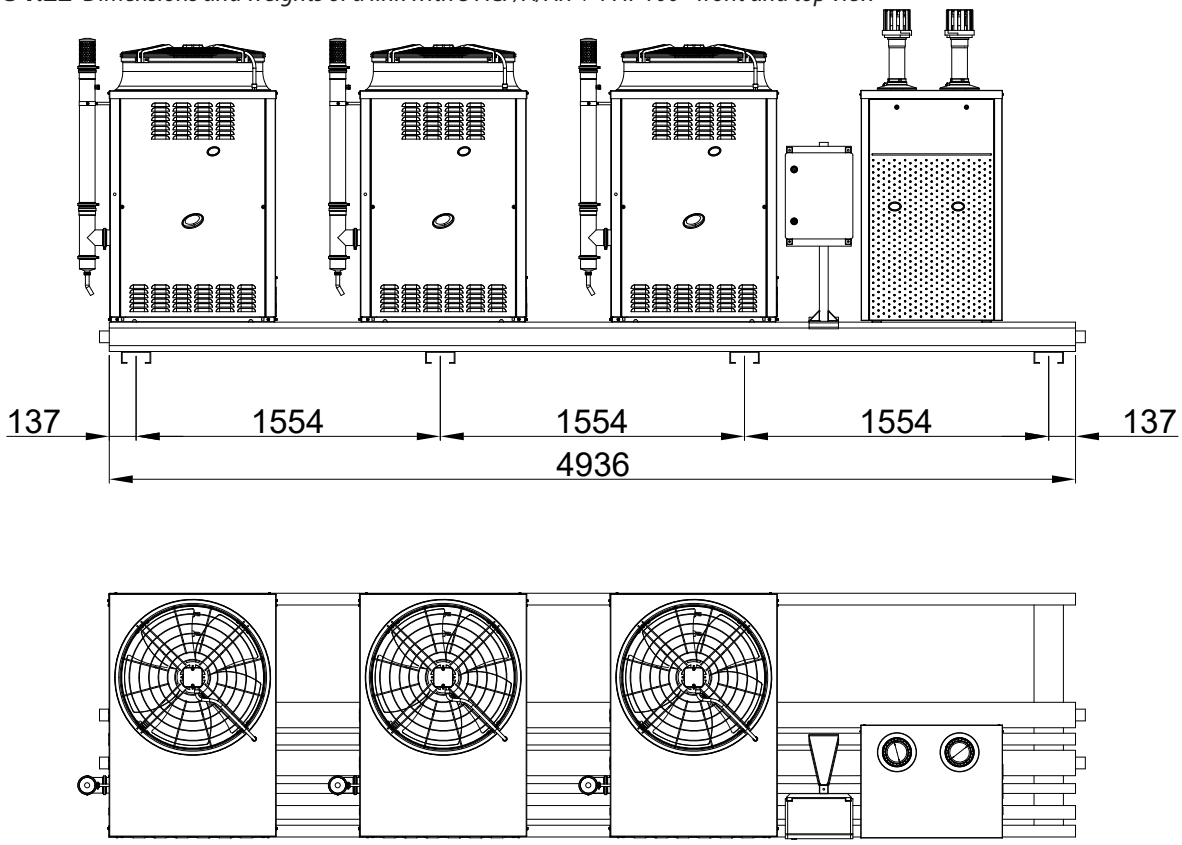
1470 kg

Figure 1.21 *Dimensions and weights of a link with 3 ACF/A/AR + 1 or 2 AY 35/50 - front and top view*



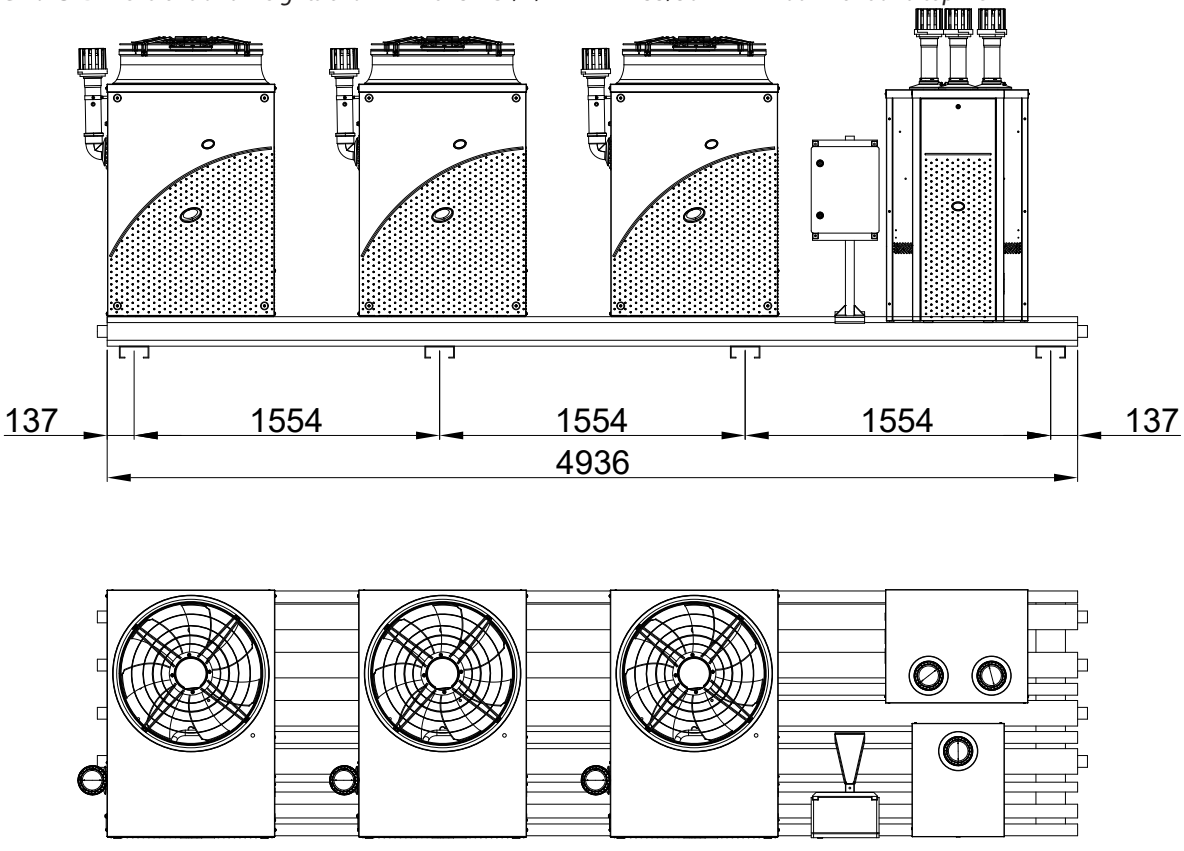
1720 kg

Figure 1.22 *Dimensions and weights of a link with 3 ACF/A/AR + 1 AY 100 - front and top view*



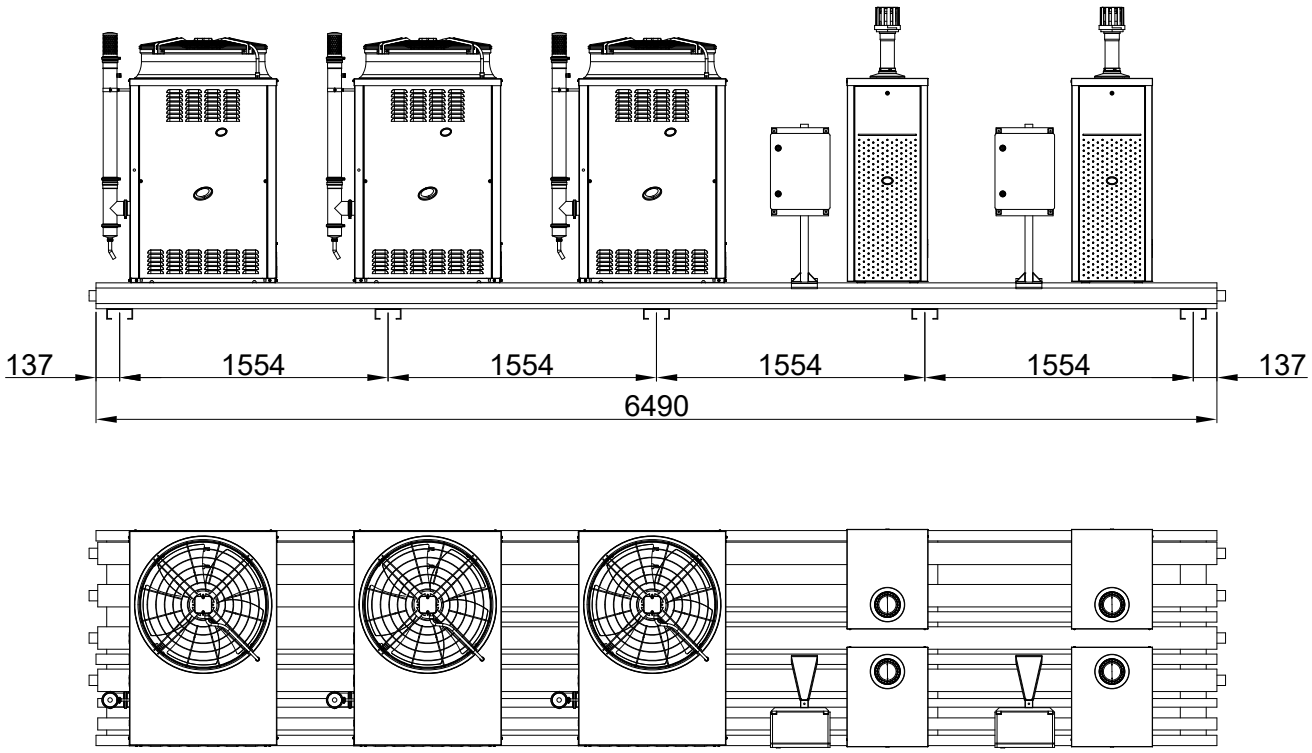
1670 kg

Figure 1.23 *Dimensions and weights of a link with 3 ACF/A/AR + 1 AY 35/50 + 1 AY 100 - front and top view*



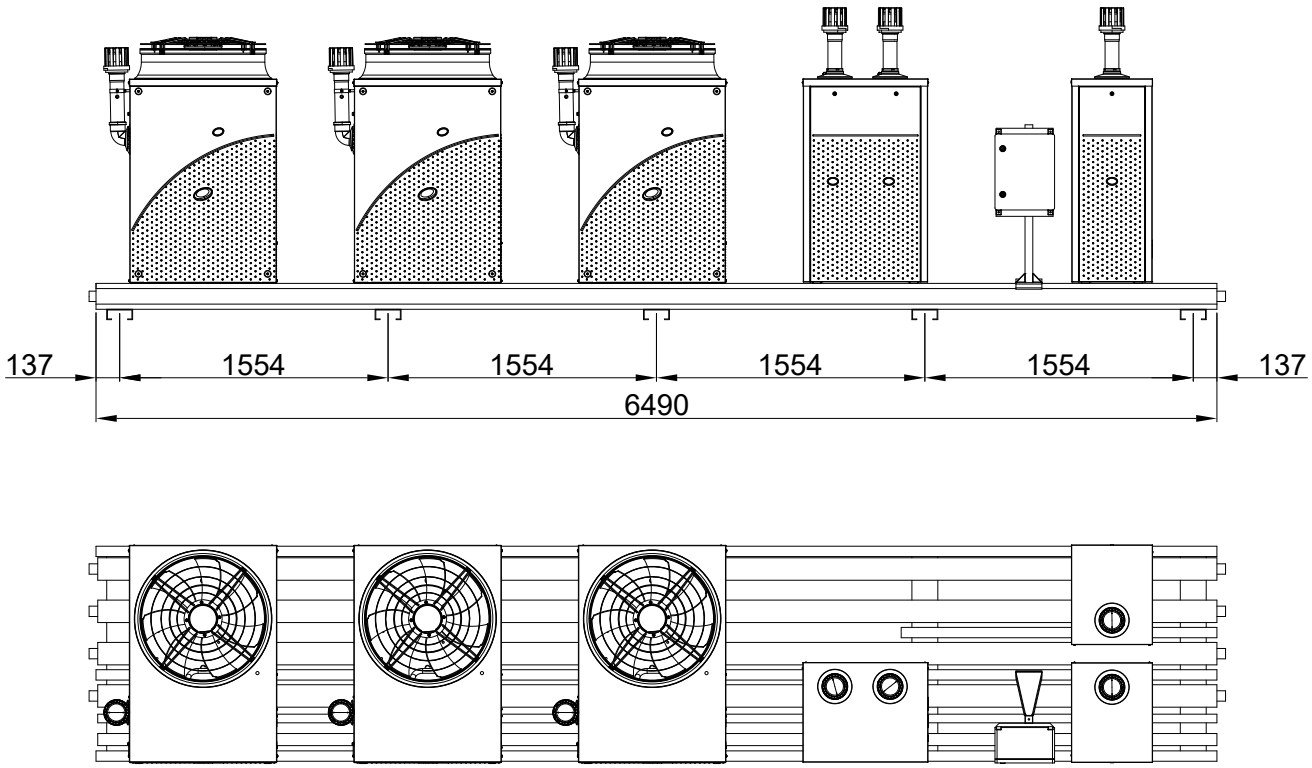
1770 kg

Figure 1.24 *Dimensions and weights of a link with 3 ACF/A/AR + 3 or 4 AY 35/50 - front and top view*



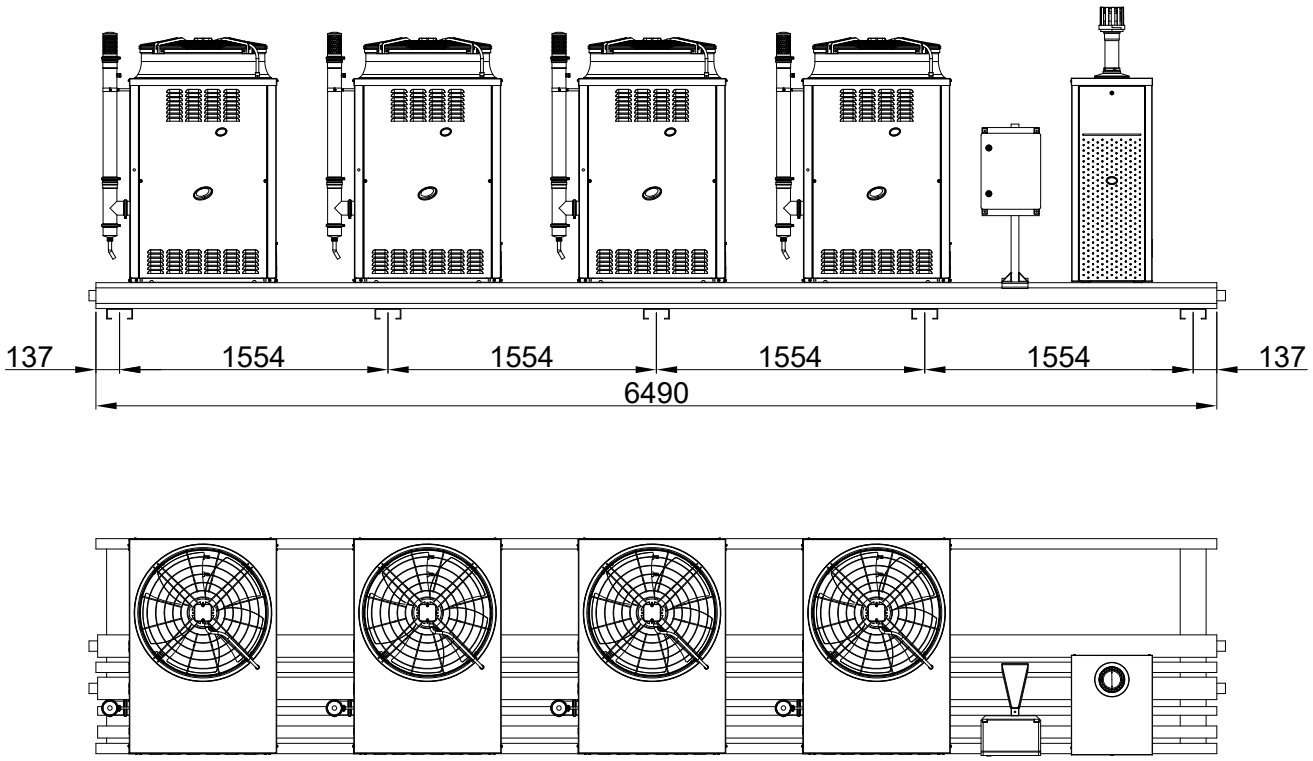
2010 kg

Figure 1.25 *Dimensions and weights of a link with 3 ACF/A/AR + 1 AY 100 + 2 AY 35/50 - front and top view*



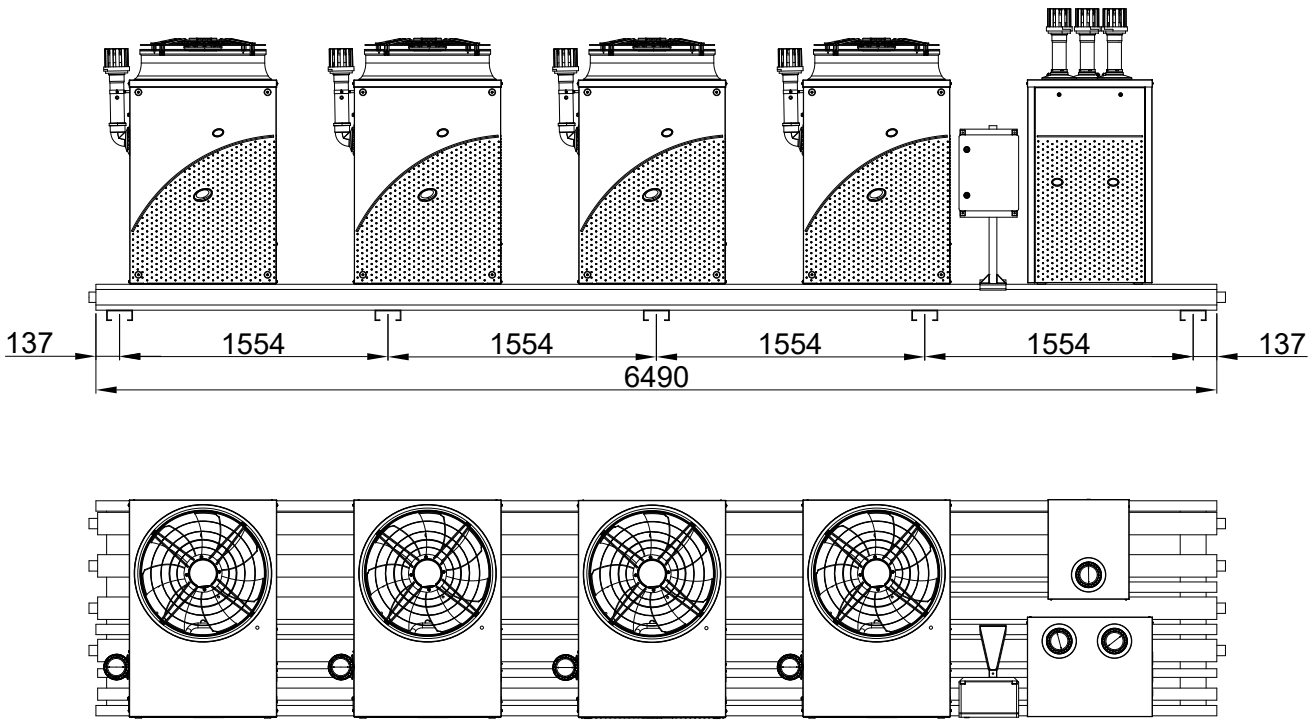
1960 kg

Figure 1.26 *Dimensions and weights of a link with 4 ACF/A/AR + 1 AY 35/50 - front and top view*



2110 kg

Figure 1.27 *Dimensions and weights of a link with 4 ACF/A/AR + 1 AY 100 + 1 AY 35/50 - front and top view*



2260 kg

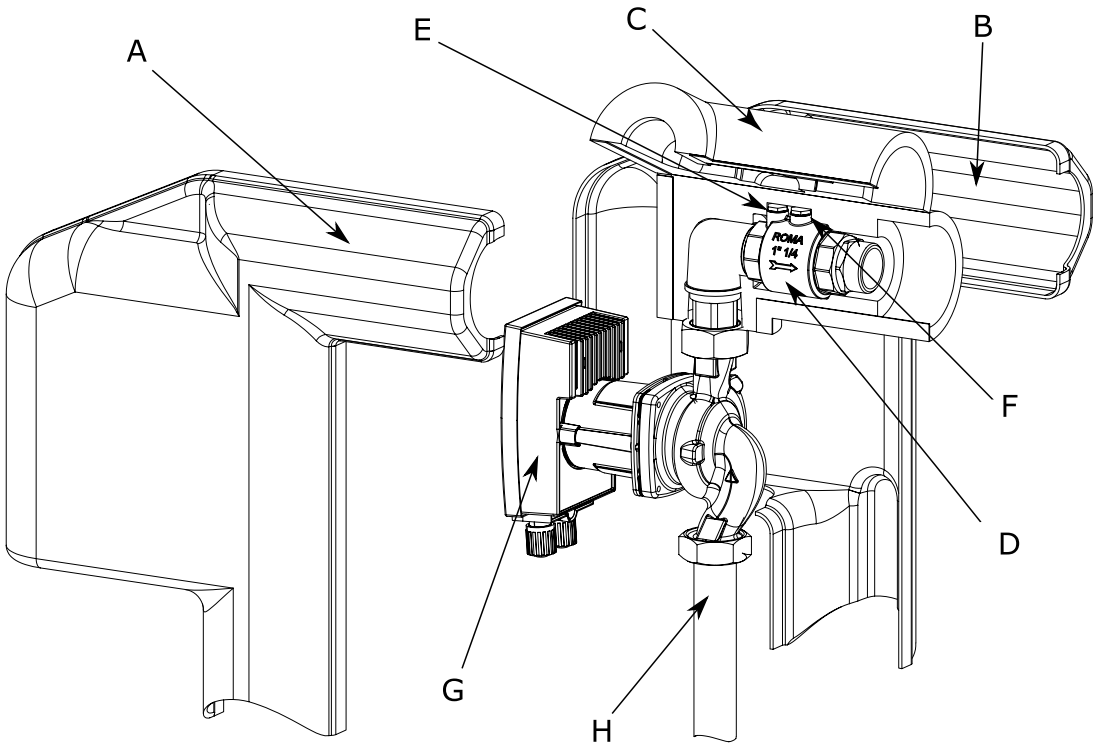
1.6 EQUIPMENT OF LINK WITH WATER PUMPS

The link equipped with water pumps are also equipped with a check valve, mounted downstream of each water pump, and a protection for the pump body.

1.6.1 "Roma" check valve

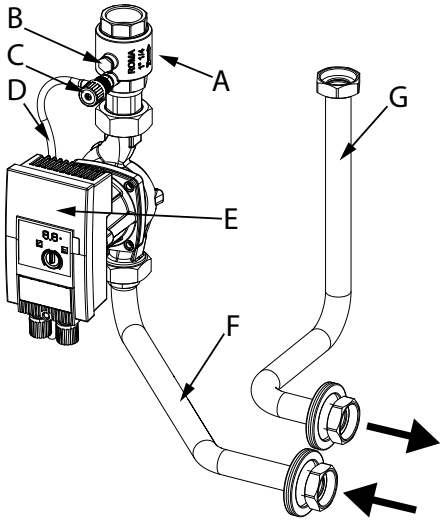
The link equipped with water pumps are also equipped with a check valve, mounted downstream of each water pump, which includes air vent valves, as detailed in the following Figure 1.28 *p. 23* for the GAHP/GA units and in the following Figure 1.29 *p. 23* for the AY units.
Exceptions are some link for which the "Oventrop" check valve is used (Paragraph 1.6.2 *p. 23*).

Figure 1.28 *Roma valve GAHP/GA units*



A Protection cover
B Protection cover
C Valve insulation
D Roma valve
E Air-vent valve
F Air-vent valve
G Pump
H Connection to return manifold

Figure 1.29 *Pump/Roma valve assembly on AY appliances*

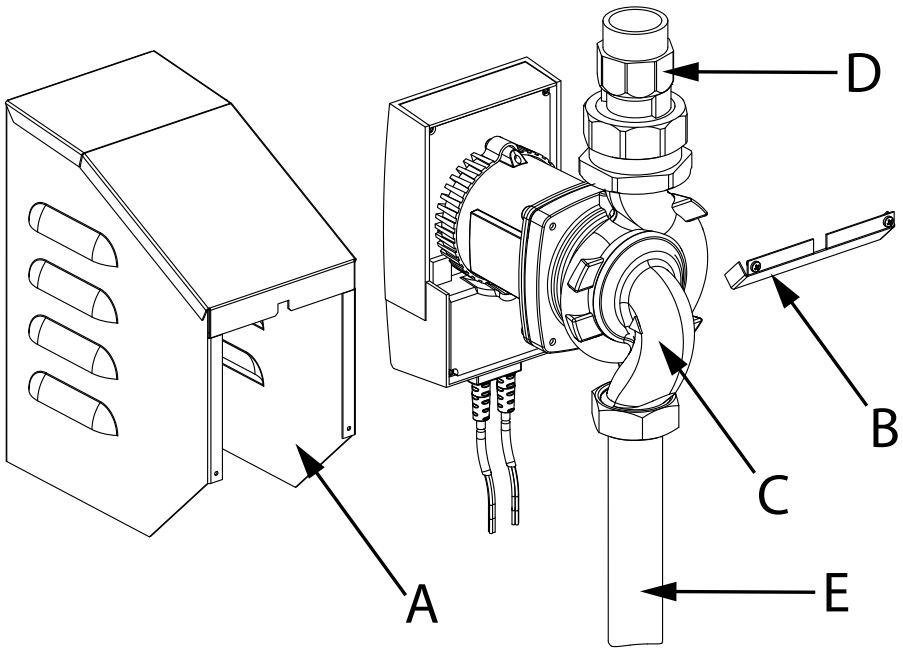


A Roma valve
B Air vent (internal circuit)
C Air vent (system)
D Flexible hose
E Circulator
F Return pipe
G Delivery pipe

1.6.2 "Oventrop" check valve

On link of GAHP GS/WS units and on homogeneous link with up to 4 ACF 60-00 HR units the "Oventrop" check valve with metal pump protection is fitted, as detailed in Figure 1.30 *p. 24* below.

Figure 1.30 *Oventrop valve*



A Protection cover
B Protection cover closing element
C Pump
D Oventrop valve
E Return pipe

1.7 INDEPENDENT CIRCULATORS SELECTOR SWITCH SETTINGS

In the links already provided with circulators, each circulator is provided with a selector switch to determine the driving mode of the circulator itself.
For Wilo Stratos Para water pumps the selector switch is set as shown in Figure 1.31 *p. 24*, depending on the type of unit to which the water pump is connected.

Figure 1.31 *Wilo Stratos Para circulator selector switch setting*

A GAHP A, GAHP GS/WS
B GAHP-AR, GA ACF

For Wilo Yonos Para water pumps (standard on the link already equipped with water pumps and on AY boilers) the selector is set as in Figure 1.32 *p. 24* for GAHP/GA units and as in Figure 1.33 *p. 24* for AY boilers.

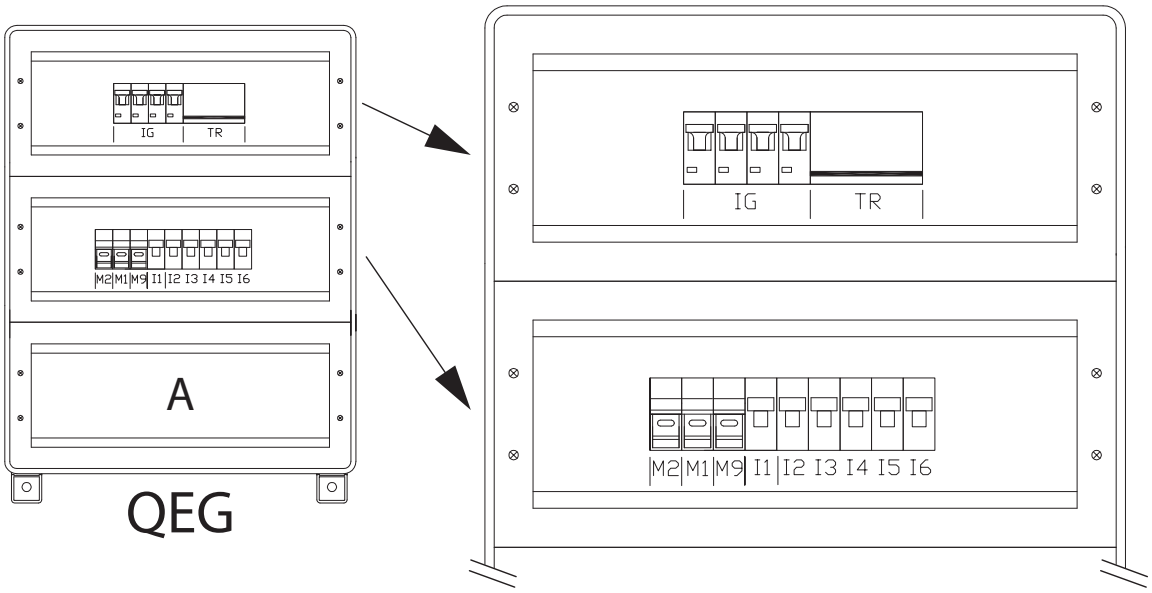
Figure 1.32 *Wilo Yonos circulator selector switch setting*

Figure 1.33 *AY pump selector switch setting*

1.8 ELECTRICAL SPECIFICATIONS

1.8.1 Electrical panel of the link

Figure 1.34 *Electrical panel of the link*



A Blind panel (Figure 4.1 *p. 37* for detail of internal terminal blocks)
I1 "ID00" unit magnetothermic breaker
I2 "ID01" unit magnetothermic breaker
I3 "ID02" unit magnetothermic breaker
I4 "ID03" unit magnetothermic breaker
I5 "ID04" unit magnetothermic breaker
I6 "ID05" unit magnetothermic breaker
IG Electrical panel switch disconnector
TR Transformer 230/24 Vac
M9 Transformer primary fuse
M2 Condensate heating resistance protection fuse
M9 Transformer secondary fuse
QEG link electrical panel
Note: the components within the electrical panel may have an order and/or position other than the one shown in the figure

1.8.2 Power supply

The power supply of the link is 400 V three-phase or 230 V single-phase.

1.8.3 Protection rating

The link have degree of protection IP X5D.

1.9 ELECTRONIC BOARDS

Each GAHP/GA/AY module belonging to the link has one or more electronic boards inside. The boards are pre-wired, interconnected and connected to the electrical panel of the link via a CAN bus signal cable. For the characteristics of the boards, see the manuals of the individual GAHP/GA/AY units.

1.10 OPERATION MODE

Depending on the type, the GAHP/GA/AY modules in a link can operate in one of the two following modes:

1. ON/OFF, i.e. on (at full power) or off, with water pump at constant or variable flow.
2. MODULATING, i.e. at variable load, with water pump at constant or variable flow.

The GAHP A, GAHP GS/WS modules can operate in both mode 1 and mode 2 and can modulate the heat input from 50% to 100%.

The AY modules can only operate in mode 2 and can modulate with a ratio of 1:9 (AY 35), 1:10 (AY 50), 1:20 (AY 100). The GAHP-AR and GA ACF modules can only operate in mode 1.
For each mode, specific control systems and devices are provided (Paragraph 1.11 *p. 25*).

1.11 CONTROLS

1.11.1 Control device

The link may only work if it is connected to a control device, selected from:

- ► DDC control
- ► CCI control

1.11.2 DDC Controller

The DDC control is able to manage one or more Robur appliances in ON/OFF mode (GAHP heat pumps, GA chillers) or modulating mode (AY boilers).
The main functions are:

- ► Adjustment and control of one (or more) Robur units of the absorption line (GAHP, GA, AY).
- ► Data display and parameters setting.
- ► Time programming.
- ► Climatic curve control.
- ► Diagnostics.

► Errors reset.
► Possibility to interface with a BMS.

DDC functionality may be extended with auxiliary Robur devices RB100 and RB200 (e.g. service requests, DHW production, third party generator control, probe control, system valves or circulating pumps, ...).

For further details refer to the DDC, RB100, RB200 manuals and the design manual.

1.11.3 CCI control

The CCI control allows you to manage up to 3 GAHP units in modulating mode (i.e. only GAHP A/GAHP GS/WS for heating only).
The main functions are:

► Adjustment and modulation control of up to 3 homogeneous GAHP A/GAHP GS/WS units for heating only.
► Data display and parameters setting.
► Manifold water temperature probe interface.
► Diagnostics.
► Errors reset.
► Possibility to interface with a BMS.

For further details refer to the CCI manual and the design manual.

1.12 TECHNICAL DATA

Together with the link a datasheet dedicated to the specific configuration chosen will be provided.
Please refer to the technical data of the individual GAHP/GA/AY modules that make up the link for more details on the characteristics of each individual module.

2 TRANSPORT AND POSITIONING

2.1 WARNINGS

Damage from transport or installation

The manufacturer shall not be liable for any damage during appliance transport and installation.

On-site inspection

- Upon arrival at the site, ensure there is no transport damage on packing, link, metal panels or finned coils of the appliances that make it up.
- After removing the packing materials, ensure the appliance is intact and complete.

Packing

- Only remove the packing after placing the appliance on site.
- Do not leave parts of the packing within the reach of children (plastic, polystyrene, nails...) since they are potentially dangerous.

Weight

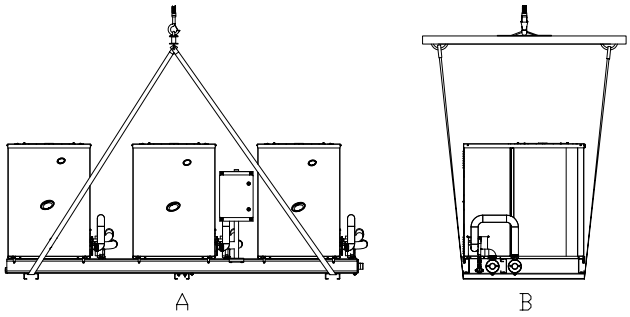
- The crane and lifting equipment must be suitable for the load.
- Do not stand under suspended loads.

For weight refer to Paragraph 1.5 *p. 14*.

2.2 HANDLING AND LIFTING

► Always handle the appliance in a horizontal position.
► To lift the appliance use straps or slings inserted in the holes of the base (Figure 2.1 *p. 26*).
► Use lifting beams to avoid damaging the outer panels and the finned coils (Figure 2.1 *p. 26*)
► Comply with safety regulations at the installation site.

Figure 2.1 *Instruction for lifting*



A Front view B Side view

In the event of handling with forklift or pallet truck, comply with the handling instructions shown on the packing.

2.3 APPLIANCE POSITIONING

Do not install the aerothermal appliances indoors

Aerothermal appliances include devices equipped with finned coils and fan, approved for outdoor installation.

- Do not install inside a room, not even if it has openings.
- In no event start the appliance inside a room.

Ventilation of aerothermal appliances

- Aerothermal appliances require a large space, ventilated and free from obstacles, to enable smooth

flow of air to the finned coils and free air outlet above the mouth of the fan, with no air recirculation.
- Incorrect ventilation may affect efficiency and cause damage to the appliance.
- The manufacturer shall not be liable for any incorrect choices of the place and setting of installation.

2.3.1 Defrosting water drainage of aerothermal link

In winter, in the aerothermal link with GAHP A/GAHP-AR units, frost may form on the finned coils and the appliance perform defrosting cycles.

► To prevent overflowing and damage provide for a drainage system.

2.3.2 Where to install the link for outdoor versions

In general:

► The appliance may be installed at ground level, on a terrace or on a roof, compatibly with its dimensions and weight.

► It must be out of the dripping line from gutters or similar. It does not require protection from atmospheric agents.

► No obstruction or overhanging structure (protruding roofs, eaves, balconies, ledges, trees) shall obstruct the exhaust fumes.

► The flue gas exhaust of the appliances of the link must not be immediately close to openings or air intakes of buildings, and must comply with environmental regulations.

In particular, for aerothermal appliances:

► They must be installed outside buildings, in an area of natural air circulation.

► No obstruction or overhanging structure (e.g. protruding roofs, canopies, balconies, ledges, trees) must interfere with the air flowing out from the top of the appliance.

► Do not install near the exhaust of flues, chimneys or hot polluted air. In order to work correctly, the appliance needs clean air.

2.3.3 Acoustic issues

Pre-emptively assess the appliance's sound effect in connection to the site, taking into account that building corners, enclosed courtyards, restricted spaces may amplify the acoustic impact due to the reverberation phenomenon.

2.3.4 Technical room requirements for hydrothermal or geothermal links or boiler-only links

Hydrothermal and geothermal link (composed of GAHP GS/WS modules) and AY boiler-only RTY link can be installed indoors as well as outdoors.
In the event of indoor installation, the installation premises must comply with the applicable local standards.

Do not install inside a room that has no aeration openings.

Please refer to the manuals of the individual units suitable for indoor installation for further important prescriptions on the technical room.

2.4 MINIMUM CLEARANCE DISTANCES

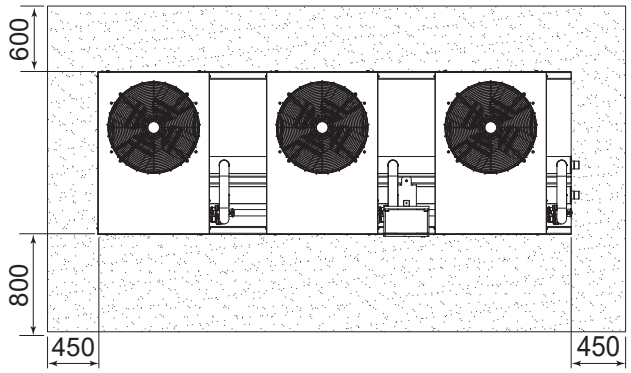
2.4.1 Distances from combustible or flammable materials

Keep the appliance away from combustible or flammable materials or components, in compliance with applicable regulations.

2.4.2 Clearances around the appliance

The minimum clearance distances shown in Figure 2.2 *p. 27* (bar any stricter regulations) are required for safety, operation and maintenance.

Figure 2.2 *Clearances*



2.5 MOUNTING BASE

2.5.1 Mounting base constructive features

Place the appliance on a level flat surface made of fireproof material and able to withstand its weight.

2.5.2 Installation at ground level

Failing a horizontal supporting base, make a flat and level concrete base, at least 150 mm larger than the appliance size per side.

2.5.3 Installation on terrace or roof

► The structure of the building must support the total weight of the appliance and the supporting base.

► If necessary, provide a maintenance walkway around the appliance.

2.5.4 Anti vibration connections and mountings

Although the appliance's vibrations are minimal, resonance phenomena might occur in roof or terrace installations.

► Use anti-vibration mountings.

► Also provide anti-vibration joints between the appliance and water and gas pipes.

3 HEATING ENGINEER

3.1 WARNINGS

General warnings

Read the warnings in Chapter III.1 *p. 4*, providing important information on regulations and on safety.

Compliance with installation standards

Installation must comply with applicable regulations in force, based on the installation Country and site, in matters of safety, design, implementation and maintenance of:

- heating systems
- cooling systems
- gas systems
- flue gas exhaust
- flue gas condensate discharge

Installation must also comply with the manufacturer's provisions.

3.2 HYDRAULIC SYSTEM

3.2.1 Design and implementation

The system must be designed and realized in a congruent way with the features and functionality of the link.
For the appropriate system design, the following must be considered:

► the properties of the individual heating/cooling appliances (GAHP/GA/AY modules) that make up the link
► the configuration of manifolds and hydraulic connections
► the presence (or not) of water pumps

For detailed information, please refer to the Design Manual and/or contact the Robur technical service.

3.2.2 Primary and secondary circuit

In many cases it is advisable to divide the hydraulic system into two parts, primary and secondary circuit, uncoupled by a hydraulic separator, or possibly by a tank that also acts as inertial tank/buffer.

3.2.3 Water flow

The link can be:

► already fitted with circulating pumps for each individual appliance/module (preferrable configuration in a number of applications)

or

► without water pumps, in which case it is required to install at least one common water pump, on the primary circuit (this choice should be carefully evaluated, discussing it in advance with Robur technical service)

If there is at least one AY boiler, it is mandatory to provide link with oversize water pumps.

3.2.4 Minimum water content

High thermal inertia of the system favours efficient appliance operation. Very short ON/OFF cycles are to be avoided.

► If necessary, provide for an inertial volume, to be suitably sized (see design manual).

3.2.5 Hydraulic connections

3.2.5.1 Hydraulic connections

The configuration of the hydraulic connections depends on the composition of the link. Refer to Paragraph 1.4 *p. 10*.
The following Table 3.1 *p. 28* shows the dimensions of the hydraulic and condensate drain connections.

Table 3.1 *Connections diameters*

Gas connection	1 1/2" F
Cold/hot water connections	2" M
Condensate drain connection	1" F
Connection of a single AY on the separate circuit	1 1/4" M for AY 35 and AY 50 1 1/2" M for AY 100
Connection of more AY on the separate circuit	2" M
Recovery circuit connection	2" M
AY safety valve drain	external Ø 20 mm, internal Ø 14 mm

The hydraulic connections are only provided on the right-hand side of the link, as is any condensate drain.
Gas connection is always possible on both sides of the link.

Connect the outlet of each safety valve of any boiler on the link to a suitable drain. The manufacturer is not liable for any damage caused by the opening of the safety valve in the event of system overpressure.

3.2.5.2 Hydraulic pipes, materials and features

Use pipes for heating/cooling installations, protected from weathering, insulated for thermal losses, with vapour barrier to prevent condensation.

Pipe cleaning

Before connecting the appliance,accurately wash the water and gas piping and any other system component, removing any residue.

3.2.5.3 Minimum components of primary plumbing circuit

Always provide, near the appliance:

► on water piping, both outlet and inlet
  - 2 antivibration joints on water fittings

- 2 pressure gauges
- 2 isolation ball valves

► on the inlet water piping
- 1 separator filter
- 1 flow regulation valve, if the water pump is with constant flow (only for link without water pumps)
- 1 water pump, towards the appliance (only for link without water pumps)

► on the water outlet pipe (in the absence of AY boilers on the same pipe pair)
- 1 safety valve (3 bar)
- 1 expansion tank

3.2.6 Hydraulic diagrams

Some hydraulic diagrams are given below as examples.

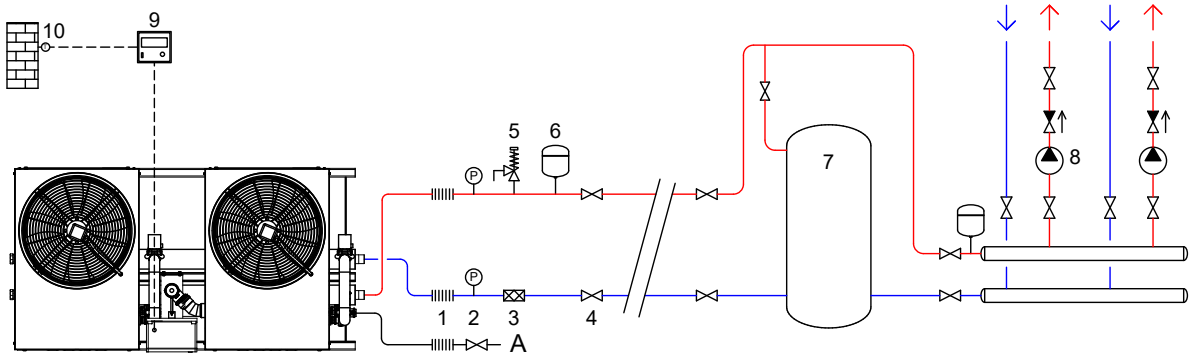
For further hydraulic diagrams illustrating the many installation possibilities in which the link can be used, please refer to the design manual.

3.2.6.1 Hydraulic diagrams link with water pumps

Preferable in many applications. Some examples are shown in the figures 3.1 *p. 29* and 3.2 *p. 30*.
For the maximum available pressure head see Table 1.1 *p. 7*.

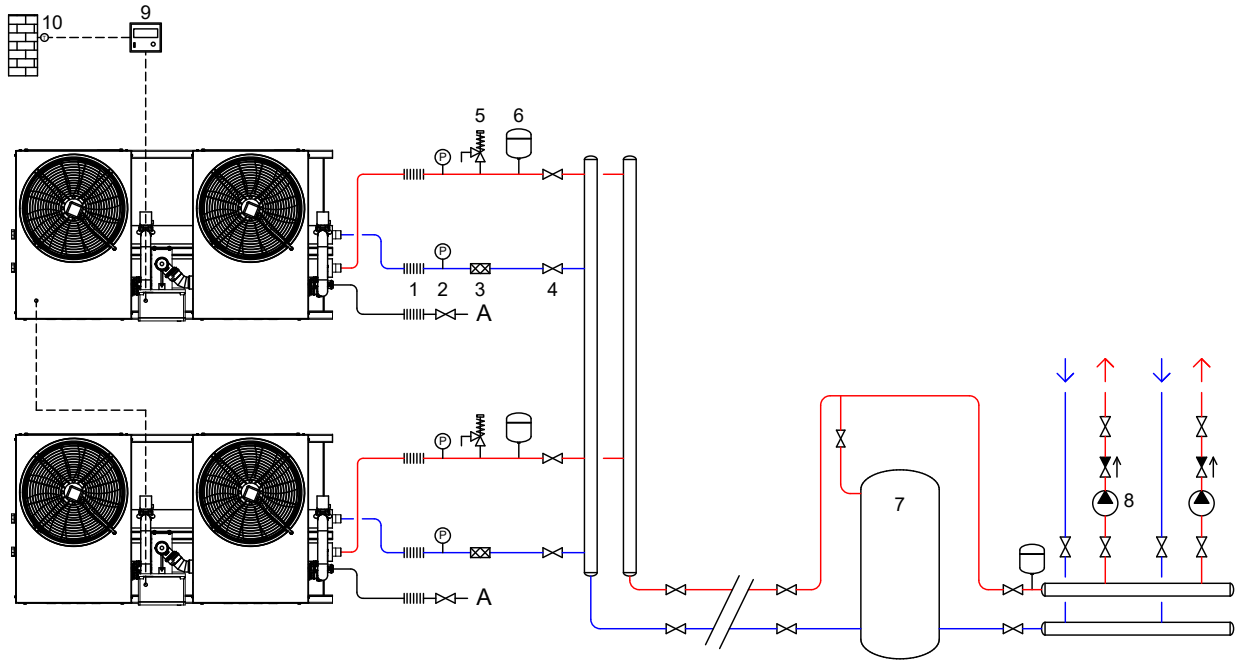
If there is at least one AY boiler, it is mandatory to provide link with oversize water pumps.

Figure 3.1 *Example of hydraulic system diagram for connection of 1 RTCR, version with circulating pumps*



1 Anti-vibration connections
2 Pressure gauge
3 Sludge filter
4 Shut-off valve
5 Safety valve
6 Expansion tank
7 Buffer tank (and hydraulic separator)
8 Conditioning circuit water pump
9 DDC panel
10 Outdoor temperature probe
A Gas connection

Figure 3.2 *Example of hydraulic system diagram for connection of 2 RTCR, version with circulating pumps*



1	Anti-vibration connections	5	Safety valve	9	DDC panel
2	Pressure gauge	6	Expansion tank	10	Outdoor temperature probe
3	Sludge filter	7	Buffer tank (and hydraulic separator)	A	Gas connection
4	Shut-off valve	8	Conditioning circuit water pump		

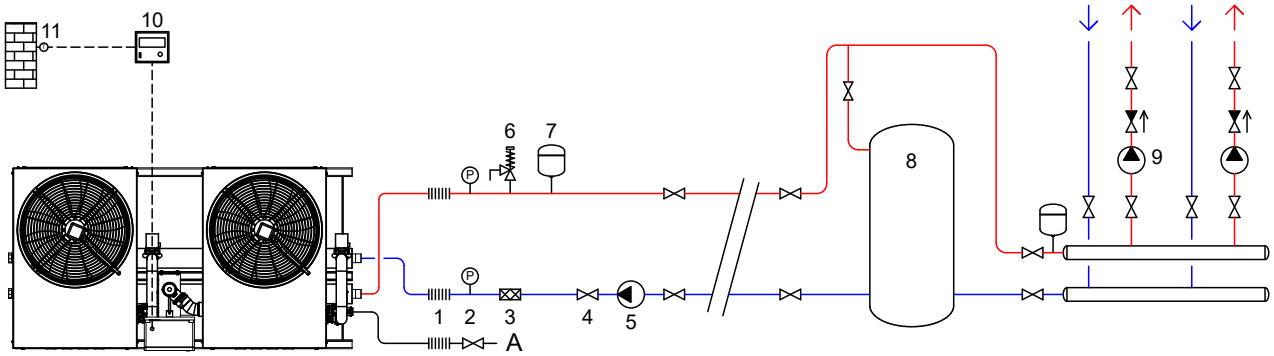
3.2.6.2 Hydraulic diagrams link without water pumps

This choice needs to be carefully considered in advance with Robur technical service.

The common water pump is not supplied with the link. Examples can be found in Figures 3.3 *p. 30* and 3.4 *p. 31*.

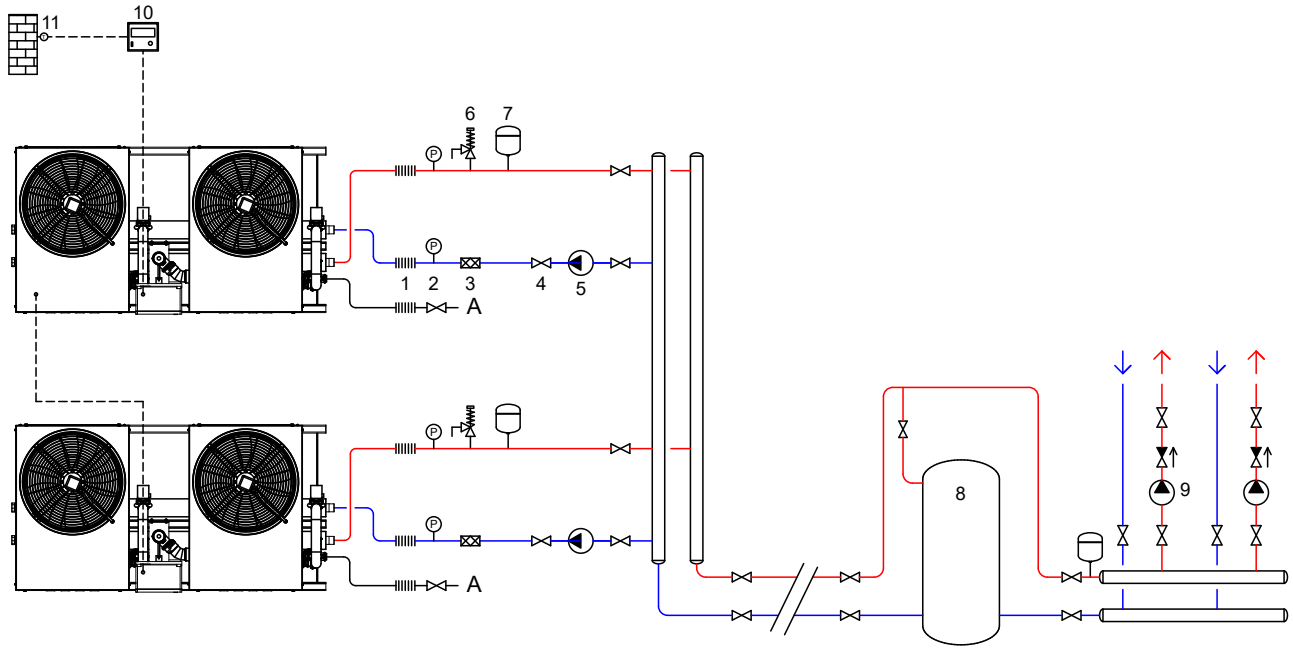
The link without water pumps are not available if at least one AY boiler is present.

Figure 3.3 *Example of hydraulic system diagram for connection of 1 RTCR, version without circulating pumps*



1	Anti-vibration connections	5	Water pump (primary circuit)	9	Conditioning circuit water pump
2	Pressure gauge	6	Safety valve	10	DDC panel
3	Sludge filter	7	Expansion tank	11	Outdoor temperature probe
4	Shut-off valve	8	Buffer tank (and hydraulic separator)	A	Gas connection

Figure 3.4 *Example of hydraulic system diagram for connection of 2 RTCR, version without circulating pumps*



1	Anti-vibration connections	5	Water pump (primary circuit)	9	Conditioning circuit water pump
2	Pressure gauge	6	Safety valve	10	DDC panel
3	Sludge filter	7	Expansion tank	11	Outdoor temperature probe
4	Shut-off valve	8	Buffer tank (and hydraulic separator)	A	Gas connection

3.2.7 Antifreeze function

The modules that make up the link are equipped with an antifreeze active self-protection system to prevent freezing. The antifreeze function automatically starts the primary water pumps, and if necessary also the burners (heat pumps and boilers only), when the outdoor temperature approaches zero. The antifreeze function is enabled by default for hot units and deactivated for cold units.

Electrical and gas continuity

The active antifreeze self-protection is only effective if the power and gas supplies are assured. Otherwise, antifreeze liquid might be required.

3.2.8 Antifreeze liquid

Precautions with glycol

The manufacturer disclaims any liability for any damage caused by improper glycol use.

- Always check product suitability and its expiry date with the glycol supplier. Periodically check the product's preservation state.
- Do not use car-grade antifreeze liquid (without inhibitors), nor zinc-coated piping and fittings (incompatible with glycol).
- Glycol modifies the physical properties of water (density, viscosity, specific heat...). Size the piping, circulation pump and thermal generators accordingly.
- With automatic system water filling, a periodic check of the glycol content is required.

With high glycol percentage (> 20…30%)

If the glycol percentage is ≥30% (for ethylene glycol) or ≥20% (for propylene glycol) the TAC must be alerted before first start-up.

When producing DHW by DHW buffer tank, use propylene glycol only.

3.2.8.1 Type of antifreeze glycol

Inhibited type glycol is recommended to prevent oxidation phenomena.

3.2.8.2 Glycol effects

Tables 3.2 *p. 32* (GAHP/GA) and 3.3 *p. 32* (AY) show, indicatively, the effects of using a glycol depending on its %.

Table 3.2 *Glycol effects (GAHP/GA)*

Glycol %	Water-glycol mixture freezing temperature	Percentage of increase in pressure drops	Loss of efficiency of unit
10	-3 °C	-	-
15	-5 °C	6,0%	0,5%
20	-8 °C	8,0%	1,0%
25	-12 °C	10,0%	2,0%
30	-15 °C	12,0%	2,5%
35	-20 °C	14,0%	3,0%
40	-25 °C	16,0%	4,0%

Table 3.3 *Glycol effects (AY)*

Glycol %	Water-glycol mixture freezing temperature	Percentage of increase in pressure drops	Loss of efficiency of unit
10	-3 °C	7%	-
15	-5 °C	10%	0,5%
20	-8 °C	13%	1,0%
25	-12 °C	15%	2,0%
30	-15 °C	18%	2,5%
35	-20 °C	21%	3,0%
40	-25 °C	24%	4,0%

3.2.9 System water quality

Responsibility of the user/operator/installer

The installer, operator and user must assure system water quality (Table 3.4 *p. 32*). Failure to comply with the manufacturer's guidelines may affect operation, integrity and life of the appliance, voiding the warranty.

3.2.9.1 System water characteristics

In order to avoid any scale or deposits on the primary exchanger, the water in the system must be treated in accordance with the applicable standards. This treatment is absolutely essential in cases where there are frequent episodes of water supply or partial or total emptying of the system.

The filling and top-up water brings a certain amount of calcium into the system. This is attached to the hot parts including the heat exchanger, thus creating pressure drops and thermal insulation on the active parts. This can lead to damage.
If the filling and top-up water of the system is outside the values indicated below, it must be softened and/or chemically treated. Additives may also be added to keep the calcium in solution. Hardness should be checked regularly and recorded on the system logbook.
The choice of the type of treatment must be made according to the characteristics of the water to be treated, the type of plant and the limits of purity required.
Free chlorine or water hardness may damage the appliance.
Adhere to the chemical-physical parameters in Table 3.4 *p. 32* and the regulations on water treatment for residential and industrial heating systems.

Table 3.4 *Chemical and physical parameters of water*

Chemical and physical parameters of water in heating/cooling systems		
Parameter	**Measurement unit**	**Required value**
pH	/	> 7 (1)
Chlorides	mg/l	< 125 (2)
Total hardness ($CaCO_3$)	°f	< 15
	°d	< 8,4
Iron	mg/kg	< 0,5 (3)
Copper	mg/kg	< 0,1 (3)
Aluminium	mg/l	< 1
Langelier's index	/	0-0,4
Harmful substances		
Free chlorine	mg/l	< 0,2 (3)
Fluorides	mg/l	< 1
Sulphides		ABSENT

1 With aluminium or light alloys radiators, pH must also be lower than 8 (in compliance with applicable rules)
2 Value referred to the maximum water temperature of 80 °C
3 In compliance with applicable rules

3.2.9.2 Water topping up

The chemical-physical properties of the system's water may alter over time, resulting in poor operation or excessive topping up.

► Ensure there are no leaks in the installation.
► Periodically check the chemical-physical parameters of the water, particularly in case of automatic topping up.

Chemical conditioning and washing

Water treatment/conditioning or system washing carried out carelessly may result in risks for the appliance, the system, the environment and health.

- Contact specialised firms or professionals for water treatment or system washing.
- Check compatibility of treatment or washing products with operating conditions.
- Do not use aggressive substances for stainless steel

or copper.
- Do not leave washing residues.

3.2.10 System filling

How to fill up the system

After completing all water, electrical and gas connections:
1. Pressurise (at least 1,5 bar) and vent the hydraulic circuit.
2. In link with water pumps, vent the water pumps through the vent valves in the body of the respective check valves (see procedure below).
3. Let water flow (with burners off). For the procedure refer to the manual of the individual units that make up the link.
4. Check and clean the filter(s) on the inlet pipe.
5. Repeat items 1, 2, 3 and 4 until the pressure has stabilised (at least 1,5 bar).

How to vent the GAHP/GA unit water pumps (for link with independent water pumps)

1. Turn off the system by means of provided control devices and wait for the water pumps to stop.
2. Remove the pump group protection cover (Figure 1.28 *p. 23*, details A and B).
3. Open the insulation (Figure 1.28 *p. 23*, detail C).
4. Close the isolation valve on the outlet of the link and open the first vent valve (Figure 1.28 *p. 23*, detail E).
5. When the air is all out, replaced by a constant flow of water, close the first vent valve and open the shut-off valve on the outlet of the link.
6. Close the isolation valve on the inlet of the link and open the second vent valve (Figure 1.28 *p. 23*, detail F).
7. When the air is all out, replaced by a constant flow of water, close the second vent valve and open the shut-off valve on the inlet of the link.
8. Reactivate the system and let water flow (with burners off). For the procedure refer to the manual of the individual units that make up the link.
9. If the air vent has been properly completed, close the insulation and reassemble the protective covers. If not, repeat the procedure from step 4.

How to vent the AY unit water pumps (for link with independent water pumps)

1. Turn off the system by means of provided control devices and wait for the water pumps to stop.
2. Disassemble the front panel of the unit.
3. Close the isolation valve on the outlet of the link and open the first vent valve (Figure 1.29 *p. 23*, detail B).
4. When the air is all out, replaced by a constant flow of water, close the first vent valve and open the shut-off valve on the outlet of the link.
5. Close the isolation valve on the inlet of the link and open the second vent valve (Figure 1.29 *p. 23*, detail C).
6. When the air is all out, replaced by a constant flow of water, close the second vent valve and open the shut-off valve on the inlet of the link.
7. Reactivate the system and let water flow (with burners off). For the procedure refer to the manual of the individual units that make up the link.
8. If the air vent has been properly completed, reassemble the front panel of the unit. If not, repeat the procedure from step 4.

The correct filling and air venting of the hydraulic system are fundamental to ensure reliability over time of the mechanical components, in particular the circulation pumps.

3.3 FUEL GAS SUPPLY

3.3.1 Gas connection

► 1 1/2" F
on the right side of the link, at the bottom (Paragraph 1.4 *p. 10*).
It can be moved to the left side by moving the blind cap from the left to the right side.
► Install an anti-vibration connection between the link and the gas piping.

3.3.2 Mandatory shut-off valve

► Provide a gas shut-off valve (manual) on the gas supply line, next to the link, in a visible and easy accessible position, to exclude it when required.
► Perform connection in compliance with applicable regulations.

3.3.3 Gas pipes sizing

The gas pipes must not cause excessive pressure drops and, consequently, insufficient gas pressure to the modules of the link.

3.3.4 Supply gas pressure

This appliance is equipped for a maximum gas supply pressure of 50 mbar.

The gas supply pressure to the modules of the link, both static and dynamic, must comply with Table 3.5 *p. 34* with a tolerance of ± 15%.

Non compliant gas pressure (Table 3.5 *p. 34*) may damage the appliance and be hazardous.

Table 3.5 *Network gas pressure*

Product category	Country of destination	Gas supply pressure [mbar]							
		G20	G25	G25.1 (1) (2) (3)	G25.3 (1) (2)	G2.350 (2) (3)	G27 (2) (3)	G30	G31
$II_{2H3B/P}$	AL, BG, CY, CZ, DK, EE, FI, GR, HR, IT, LT, MK, NO, RO, SE, SI, SK, TR	20						30	30
	AT, CH	20						50	50
II_{2H3P}	BG, CH, CZ, ES, GB, GR, HR, IE, IT, LT, MK, PT, SI, SK, TR	20							37
	RO	20							30
	AT	20							50
$II_{2ELL3B/P}$	DE	20	20					50	
II_{2Esi3P}	FR	20	25						37
II_{2Er3P}		20	25						37
$II_{2HS3B/P}$	HU	25		25				30	30
II_{2E3P}	LU	20							50
$II_{2EK3B/P}$	NL	20			25			30	30
$II_{2E3B/P}$	PL	20						37	37
$II_{2ELwLs3B/P}$		20				13	20	37	37
$II_{2ELwLs3P}$		20				13	20		37
$I_{2E(R)}$	BE	20							
$I_{2E(S)}$		20							
I_{3P}	BE								37
	IS								30
I_{2H}	LV	20							
$I_{3B/P}$	MT, CY							30	30
I_{3B}								30	

The appliance gas supply pressure, both static and dynamic, must comply with the values in the Table, with a tolerance of ± 15%.
1 GAHP-AR not approved for G25.1, G25.3 gases.
2 GA ACF not approved for G25.1, G25.3, G2.350, G27 gases.
3 Gas not available for AY 35.

Before proceeding with the construction of the system, the installer must:

- ► Check that the gas used corresponds to that for which the appliance has been designed (see nameplate).
- ► Check that the flow rate of the gas meter is such as to ensure the simultaneous use of all the devices connected to it.

Although it is normal for the inlet pressure to decrease during the operation of the appliance, it is important to check that there are no excessive fluctuations in the inlet pressure. In order to limit the extent of these variations, it is necessary to appropriately define the diameter of the gas inlet pipe to be adopted based on the length and pressure drop of the pipe itself, from the gas meter to the appliance.

If fluctuations in the gas distribution pressure happen, it is advisable to insert a special pressure stabiliser upstream of the gas inlet to the appliance. In case of LPG supply, all necessary precautions must be taken to avoid freezing of the combustible gas in case of very low external temperatures.

If it is necessary to change the type of gas supply to the appliance, contact the TAC that will make the necessary changes.

Under no circumstances shall the installer be authorised to carry out such operations.

3.3.5 Vertical pipes and condensate

- ► If needed, vertical gas pipes must be fitted with siphon and discharge of the condensate that may form inside the pipe.
- ► If needed, insulate the piping.

3.3.6 LPG pressure reducers

With LPG the following must be installed:

- ► A first stage pressure reducer, close to the liquid gas tank.
- ► A second stage pressure reducer, close to the appliance.

3.4 COMBUSTION PRODUCTS EXHAUST

Compliance with standards

The modules that make up a link are approved for connection to a flue gas exhaust for the types listed in their respective manuals.

3.4.1 Flue gas exhaust connection

The diameters (mm) of the connections, the residual head (Pa), the flow rate (kg/h), the temperature (°C) and other flue gas exhaust properties of the individual GAHP/AY modules making up the link are indicated in their

respective manuals.
For further informations, see also the design manual.

3.4.2 Flue gas exhaust kit

The individual GAHP/AY modules making up the link are fitted as standard with a flue gas exhaust kit, to be installed by the installer (refer to the instructions in the manuals of the modules making up the link).

3.4.3 Possible flue

If necessary, the link can be connected to one or more flue(s).

- ► To size the flue(s) refer to the data and information in the GAHP/AY individual module manuals and to the design manual.
- ► GAHP/AY modules with different flue gas exhaust characteristics cannot be connected to the same flue, but must be connected to different and separate flues.
- ► If several appliances are connected to a single flue, a clapet valve is required on each outlet, with the exception of GAHP-AR modules whose residual head is used up at the outlet of the chimney supplied.
- ► The flues must be designed, sized, verified and realized by a qualified firm, with materials and components in accordance with regulations in force in the country of installation.
- ► Always provide the necessary sockets for smoke analysis in an accessible position.

In case the check valves are installed outside, an appropriate UV ray protection must be assured (if the valve is in plastic) as well as protection from potential winter freezing of condensate backflow into the siphon.

To avoid corrosion, convey the acid condensate drain to the base of the flue gas exhaust duct.

3.5 FLUE GAS CONDENSATE DRAIN

If condensing appliances (GAHP A, GAHP GS/WS, AY) are included in the link, condensation water is produced from flue gases, which must be evacuated in compliance with current regulations.
The system must be designed in such a way as to prevent condensation from freezing. Before commissioning the appliance, check that the condensate is drained correctly.

Condensate acidity and exhaust regulations

The flue gas condensate contains aggressive acid substances. Refer to applicable regulations in force for condensate exhaust and disposal.
If required, install an acidity neutraliser of adequate capacity.

Do not use gutters to discharge the condensate

Do not discharge the flue condensate in gutters, due to the risk of materials corrosion and ice formation.

3.5.1 Flue gas condensate connection

The connection for flue gas condensate drain is located on the right side of the link (Paragraph 1.4 *p. 10*).
The connection of the discharge to the sewerage system should be made at atmospheric pressure, i.e. by dripping into a siphoned container connected to the sewerage system.

The condensate drain cap can not be moved on the opposite side as the condensate manifold is sloping towards the right side.

3.5.2 Flue gas condensate evacuation duct

To make the condensate evacuation duct:

- ► Size the ducts for the maximum condensation flow rate, which is equal to the sum of the condensation flow rates of the individual GAHP/AY modules.
- ► Use plastic materials resistant to acidity pH 3-5.
- ► Provide for min. 1% slope, i.e. 1 cm for each m of the length (otherwise a booster pump is required).
- ► Prevent freezing.
- ► Dilute, if possible, with domestic waste water (bathrooms, washing machines, dish washers...), basic and neutralising.

3.5.3 Condensate drain siphon filling

During the first start-up, the condensate siphon of the AY modules must be filled to prevent the combustion gases from backflowing through the siphon.
For GAHP GS/WS indoor modules, Robur uses condensate collection siphons with float, which blocks the passage of flue gases and odours deriving therefrom in case the appliance remains turned off for a long time and the liquid contained in the siphon evaporates or in case of the first start-up.
Thanks to this system, for GAHP GS/WS indoor modules, it is not necessary to fill the siphon during the first start-up.
It is advisable, after the first few months of operation of the appliance, to clean the siphon, which collects also any deposits resulting from the first passage of the condensate inside the components of the appliance. These deposits could cause the siphon itself to malfunction.

3.6 DEFROSTING WATER DRAINAGE

Aerothermal units defrosting

In winter, in the aerothermal link with GAHP A/GAHP-AR units, frost may form on the finned coils and the aerothermal appliances perform defrosting cycles.

3.6.1 Collection basin and drainage system

Provide for a collection basin or containment rim and a discharge system of the defrosting water, to avoid overflowing, freezing and damage.

3.7 SAFETY VALVE DRAIN

In the event of indoor installation (only for link of GAHP GS/WS in the indoor version), provide for external ducting of the safety valve drain of the sealed circuit, proceeding as described in the relative Paragraph of the manuals supplied with the individual units.

The safety valve drain must be mandatorily ducted outside. Failure to comply with this provision jeopardizes first start-up.

Do not install any shut off device on the drain duct between the safety valve and the outside vent.

4 ELECTRICAL INSTALLER

4.1 WARNINGS

General warnings

Read the warnings in Chapter III.1 *p. 4*, providing important information on regulations and on safety.

Compliance with installation standards

Installation must comply with applicable regulations in force, based on the installation Country and site, in matters of safety, design, implementation and maintenance of electrical systems.

Installation must also comply with the manufacturer's provisions.

Live components

After placing the appliance in the final position, and prior to making electrical connections, ensure not to work on live components.

Earthing

- The appliance must be connected to an effective earthing system, installed in compliance with regulations in force.
- It is forbidden to use gas pipes as earthing.

Cable segregation

Keep power cables physically separate from signal ones.

Do not use the power supply switch to turn the appliance on/off

- Never use the external isolation switch (GS) to turn the appliance on and off, since it may be damaged in the long run (occasional blackouts are tolerated).
- To turn the appliance on and off, exclusively use the suitably provided control device.

Control of water pump

In the case of links without circulators:

- The common hydraulic/primary circuit water pump must be controlled by the electrical panel of the appliance (terminals KK, PP, 12, Figure 4.1 *p. 37*).
- Water pump start/stop is not allowed without the request of the appliance.

4.2 ELECTRICAL SYSTEMS

Electrical connections must provide:

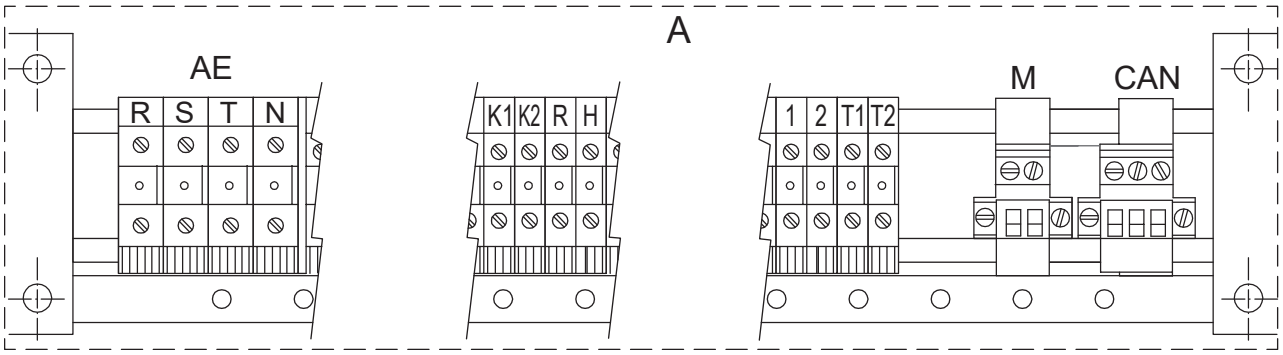
► power supply (Paragraph 4.3 *p. 37*)
► control system (Paragraph 4.4 *p. 38*)

How to make connections

All electrical connections must be made in the link electrical panel (Figures 1.34 *p. 25* and 4.1 *p. 37*):

1. Ensure the electrical panel is not live.
2. Open the electric panel with the appropriate key and remove the lower blind panel to access the terminal blocks.
3. Insert the wires through the suitable holes.
4. Make the connections.
5. Made the connections, reposition the blind panel and reclose the electrical panel.

Figure 4.1 *Blind panel: detail of internal terminal blocks on DIN rail*



A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
AE Power supply input terminals
K1-K2 24 V coil terminals for circulator request (hot/cold circuit side)
R-H Condensate heating resistor terminals
1-2 24 V coil terminals for circulating pump request (HR recovery circuit side)
T1-T2 DHW tank thermostat terminals (HR recovery circuit side)
M 2-pole 24 Vac connector for service use
CAN 3-pole connector for CAN bus network connection

4.3 ELECTRICAL POWER SUPPLY

Electrical protection

A 4-pole (three-phase) disconnector GS (Figure 4.2 *p. 37*) or bipolar (single-phase) GS (Figure 4.3 *p. 38*) must be provided by the installer in the external power supply electrical panel, with suitable fuses for phases, minimum contact opening 3 mm. No fuse on the neutral is allowed.
Indirect contact protection by means of differential switch and overload must be guaranteed by means of a sufficiently dimensioned automatic switch or fuse.

Do not modify the link electric panel, or add components inside it (relays, ...).

4.3.1 Power supply line (three-phase or single-phase)

Provide a protected line (by the installer), which may be:
► three phase 400 V 3N - 50 Hz (Figure 4.2 *p. 37*)
or as an alternative,
► single phase 230 V 1N - 50 Hz (Figure 4.3 *p. 38*)

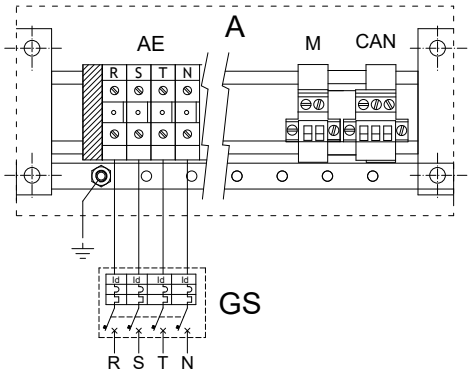
How to connect the power supply

To connect the multipole power cable (Figures 4.2 *p. 37* and 4.3 *p. 38*):

1. Access the terminal blocks in the electrical panel of the link (Paragraph 4.2 *p. 36*).
2. Locate the "AE" terminal block; with the "R-S-T-N" terminals.
3. Connect the conductors (five/three-phase or three/single-phase), providing the longest for the grounding (last to break in case of accidental traction), to R-S-T-N three-phase 400 V 3N - 50 Hz terminals, Figure 4.2 *p. 37*, or to (RST)-N terminals (phase L connected to all R,S,T terminals) for single phase 230 V 1N - 50 Hz, Figure 4.3 *p. 38*.
4. Made the connections, reposition the blind panel and reclose the electrical panel.

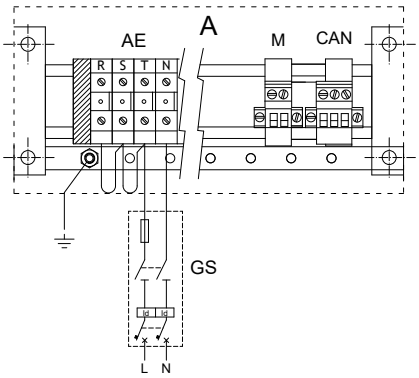
A cabling error, as well as affecting the operation, could also damage the electrical components of the link. In particular, in case of three-phase power supply, be sure not to connect one of the phases to terminal N.

Figure 4.2 *Three phase power supply electrical connection 400 V 3N - 50 Hz*



A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral

Figure 4.3 *Single phase power supply electrical connection 230 V 1N - 50 Hz*



A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
AE Power supply input terminals
GS Bipolar disconnector with suitable fuse and minimum contact opening of 3 mm
L Phase
N Neutral

4.4 ADJUSTMENT AND CONTROL

Switching for reversible units

Use that entails frequent switching between heating/cooling operation modes for reversible units (GAHP-AR) is to be avoided.

4.4.1 Control systems

Two separate adjustment systems are provided, each with specific features, components and diagrams:
1. DDC control (with CAN bus connection).
2. CCI control (with CAN bus connection).

4.4.2 CAN bus communication network

The CAN bus communication network, implemented with the cable of the same name, makes it possible to connect and remotely control one or more Robur appliances with the DDC or CCI control devices.
It entails a certain number of serial nodes, distinguished in:
- ► intermediate nodes, in variable number
- ► terminal nodes, always and only two (beginning and end)

Each component of the Robur system, appliance (GAHP, GA, AY, ...) or control device (DDC, RB100, RB200, ...), corresponds to a node, connected to two more elements (if it is an intermediate node) or to just one other element (if it is a terminal node) through two/one CAN bus cable section/s, forming an open linear communication network (never star- or loop-shaped).

4.4.3 CAN bus signal cable

The DDC or CCI controls are connected to the link through the CAN bus signal cable, shielded, compliant with Table 4.1 *p. 38* (admissible types and maximum distances).
For lengths ≤200 m and up to 4 nodes (e.g. 1 DDC + 3 GAHP), a simple 3x0,75 mm² shielded cable may be used.

Table 4.1 *CAN bus cables type*

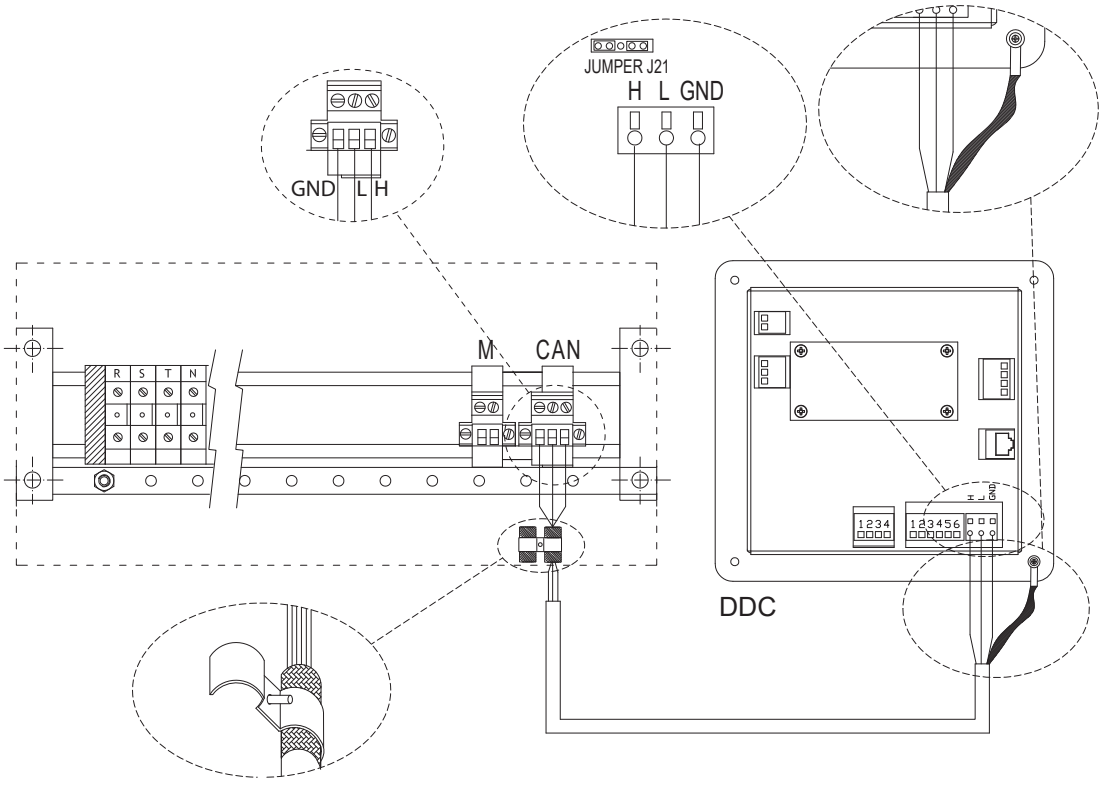
Cable name	Signals / Color			Maximum length	Note
Robur					Optional code OCVO008
ROBUR NETBUS	H = BLACK	L = WHITE	GND = BROWN	450 m	
Honeywell SDS 1620					In all cases the fourth conductor should not be used
BELDEN 3086A	H = BLACK	L = WHITE	GND = BROWN	450 m	
TURCK type 530					
DeviceNet Mid Cable					
TURCK type 5711	H = BLUE	L = WHITE	GND = BLACK	450 m	
Honeywell SDS 2022					
TURCK type 531	H = BLACK	L = WHITE	GND = BROWN	200 m	

How to connect the CAN bus cable to the link

To connect the CAN bus cable to the electrical panel of the link, hence to the pre-wired boards of the modules that make it up (Figure 4.4 *p. 39*):
1. Access the terminal blocks in the electrical panel of the link (Paragraph 4.2 *p. 36*).
2. Locate the "CAN" terminal block with the "GND-L-H" terminals.
3. Connect the CAN bus cable to the GND (shielding/earthing) + L and H terminals (two signal wires).
4. Block the cable with the earthing terminal located behind the DIN bar, ensuring a good electrical contact is made with the shielding braid and the bare conductor (if any); see detail in Figure 4.4 *p. 39*.
5. Position the J1 jumpers of the board of the last GAHP/GA module on the left of the link closed if the node is terminal (case of one link only) or open if the node is intermediate (case of several links in the same system), Figure 4.9 *p. 41*.
6. In the case of RTY link of AY only, place jumper J11 of the CAN-NDG board of the last module on the left of the link closed if the node is terminal (case of one link only) or open if the node is intermediate (case of more than one link on the same system), Figure 4.6 *p. 39*. Take care in the case of AY 100 (which has two thermal modules inside) to always operate on internal module 2 (left) as the internal CAN connection between module 1 and module 2 is already factory-made and must not be changed.
7. Connect the CCI or the DDC (and possibly the RB100 or the RB200) via the CAN bus cable according to the instructions in the relevant device manuals.
8. Made the connections, reposition the blind panel and

reclose the electrical panel.

Figure 4.4 *CAN bus cable connection between 1 DDC/CCI and the link electrical panel*



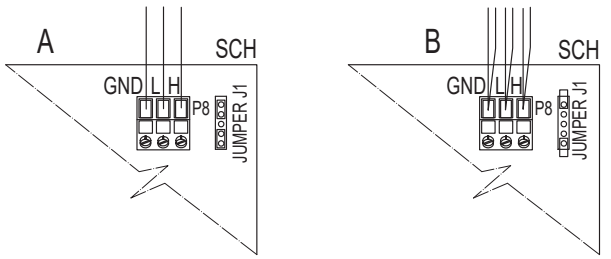
CAN 3-pole connector for CAN bus network connection

DDC CCI/DDC (rear view)

CAN bus connection to GAHP/GA modules

Place the J1 Jumpers of the electronic board of the GAHP/GA unit CLOSED (detail A) if the node is terminal (one connected CAN bus cable section only), or OPEN (detail B) if the node is intermediate (two connected CAN bus cable sections).

Figure 4.5 *Connection of the CAN bus cable to the electronic board of GAHP/GA units*

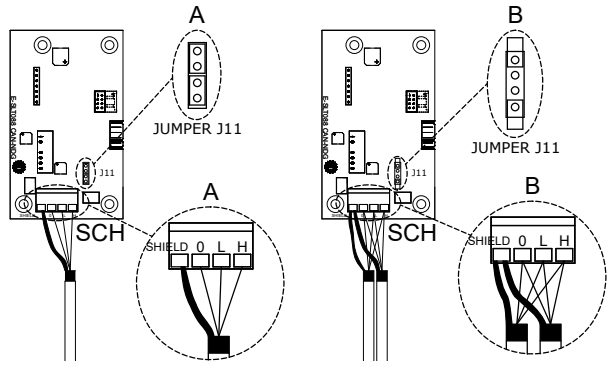


SCH Electronic board of GAHP/GA units
GND Common data
L Data signal LOW
H Data signal HIGH
J1 Onboard CAN bus jumper
A Detail of "terminal node" case (3 wires; J1 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J1 = jumper "open")
P8 CAN port/connector

CAN bus connection to AY modules

Place the J11 Jumpers of the CAN-NDG electronic board of the AY unit CLOSED (detail A) if the node is terminal (one connected CAN bus cable section only), or OPEN (detail B) if the node is intermediate (two connected CAN bus cable sections).

Figure 4.6 *Connection of the CAN bus cable to the CAN-NDG electronic board*

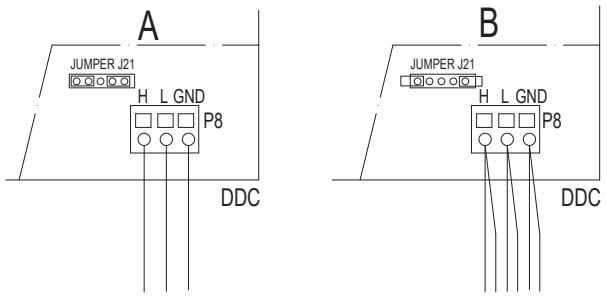


SCH CAN-NDG electronic board of AY units
0 Common data
L Data signal LOW
H Data signal HIGH
J11 CAN bus jumper on CAN-NDG board
A Detail of "terminal node" case (3 wires; J11 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J11 = jumper "open")

CAN bus connection to the control panel

Place the J21 Jumpers of the control panel CLOSED (detail A) if the node is terminal (one connected CAN bus cable section only), or OPEN (detail B) if the node is intermediate (two connected CAN bus cable sections).

Figure 4.7 *Connection of the CAN bus cable to the control panel*

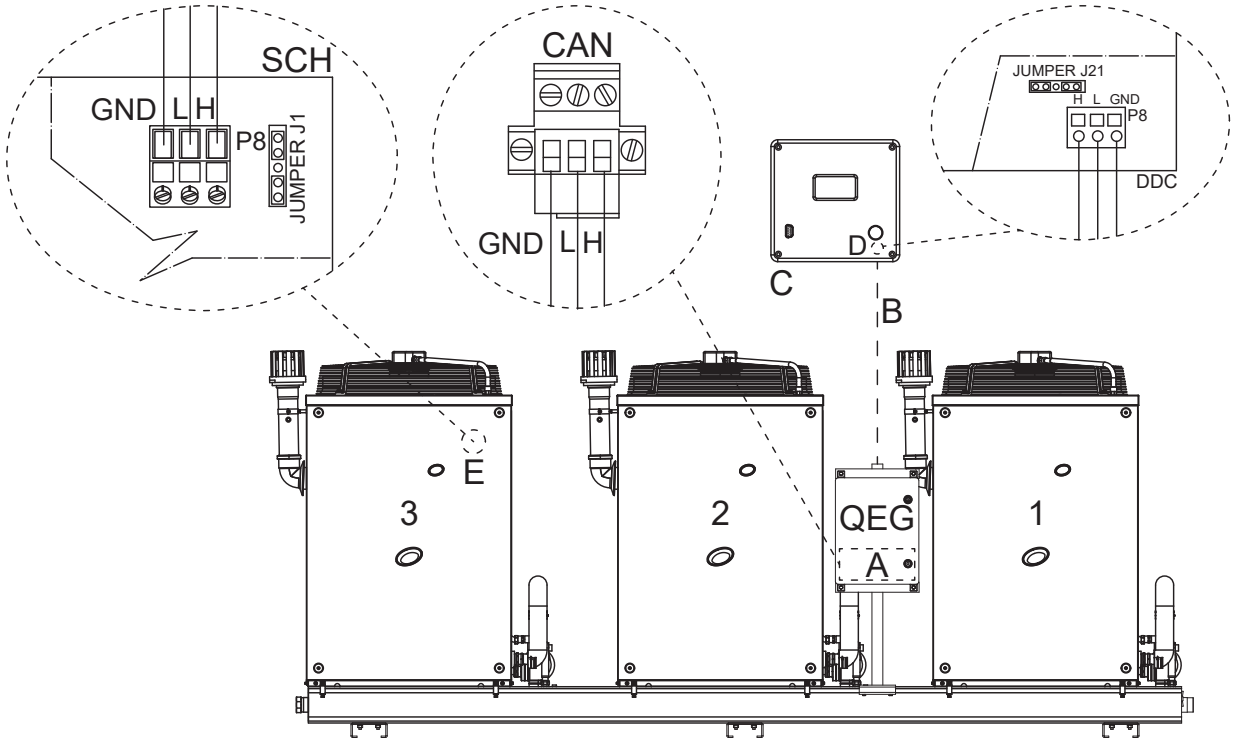


DDC Direct Digital Controller
GND Common data
L Data signal LOW
H Data signal HIGH
J21 CAN bus jumper on DDC board
A Detail of "terminal node" case (3 wires; J21 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J21 = jumper "open")
P8 CAN port/connector

4.4.4 1 Link + DDC/CCI configuration

Refer to Figure 4.4 *p. 39* for the connection diagram of the CAN bus cable.

Figure 4.8 *CAN bus connection for systems with one unit*



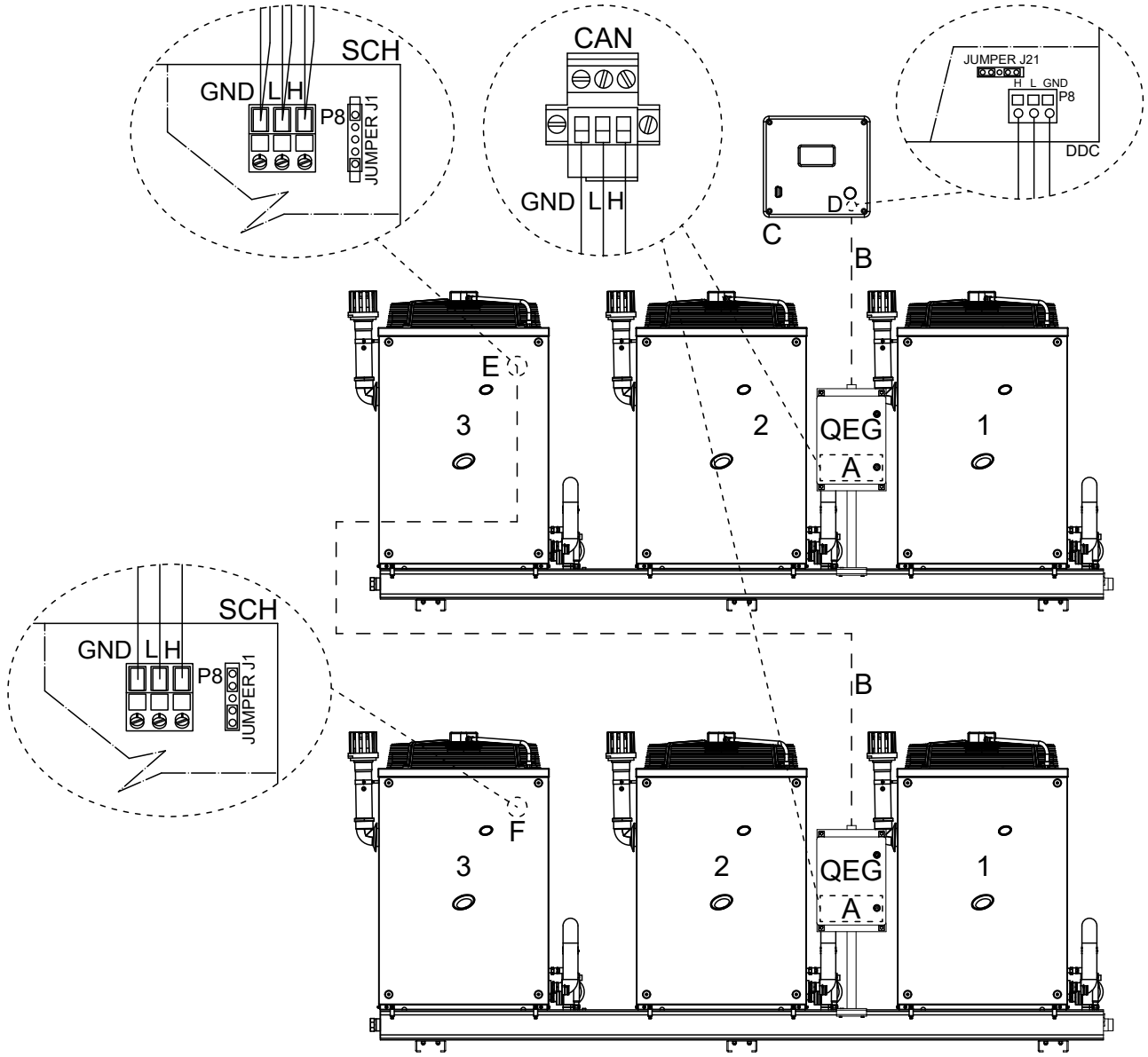
A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
B CAN bus cable (not supplied, Table 4.1 *p. 38*)
C DDC/CCI panel
D Terminal node connection on DDC/CCI (Figure 4.7 *p. 40*, case A)
E Pre-wired terminal node on the last unit of the link (Figure 4.5 *p. 39*, case A)
QEG link electrical panel
3 Last unit of the link (with "ID00")

4.4.5 2 Link + DDC configuration

The DDC panel is connected to the first link as a terminal node (connection diagram in Figure 4.4 *p. 39*).

In the last unit of the first link (which must be connected to the electrical panel of the next link) the jumper J1 must be open, as shown in detail B of Figure 4.5 *p. 39*.

Figure 4.9 *Example of CAN network with 7 nodes (1 DDC + 2 appliances connected on a single hydraulic circuit)*



A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
B CAN bus cable (not supplied, Table 4.1 *p. 38*)
C DDC panel
D Terminal node connection on DDC (Figure 4.7 *p. 40*, case A)
E Intermediate node on the last unit of the link (Figure 4.5 *p. 39*, case B)
F Pre-wired terminal node on the last unit of the link (Figure 4.5 *p. 39*, case A)
QEG link electrical panel
3 Last unit of the link (with "ID00")

4.5 WATER CIRCULATION PUMPS

In link with water pumps, the individual independent water pumps (1 or 2 for each GAHP/GA/AY module) are already mounted and pre-wired on board the link.
In link without circulating pumps, electrical connections must be made (both for power supply and control) of the common water circulation pump of the primary water circuit, as shown in the diagrams in Figures 4.10 *p. 42*, 4.11 *p. 43*.

4.5.1 Common water pump of a link without water pumps

How to connect the common circulation pump

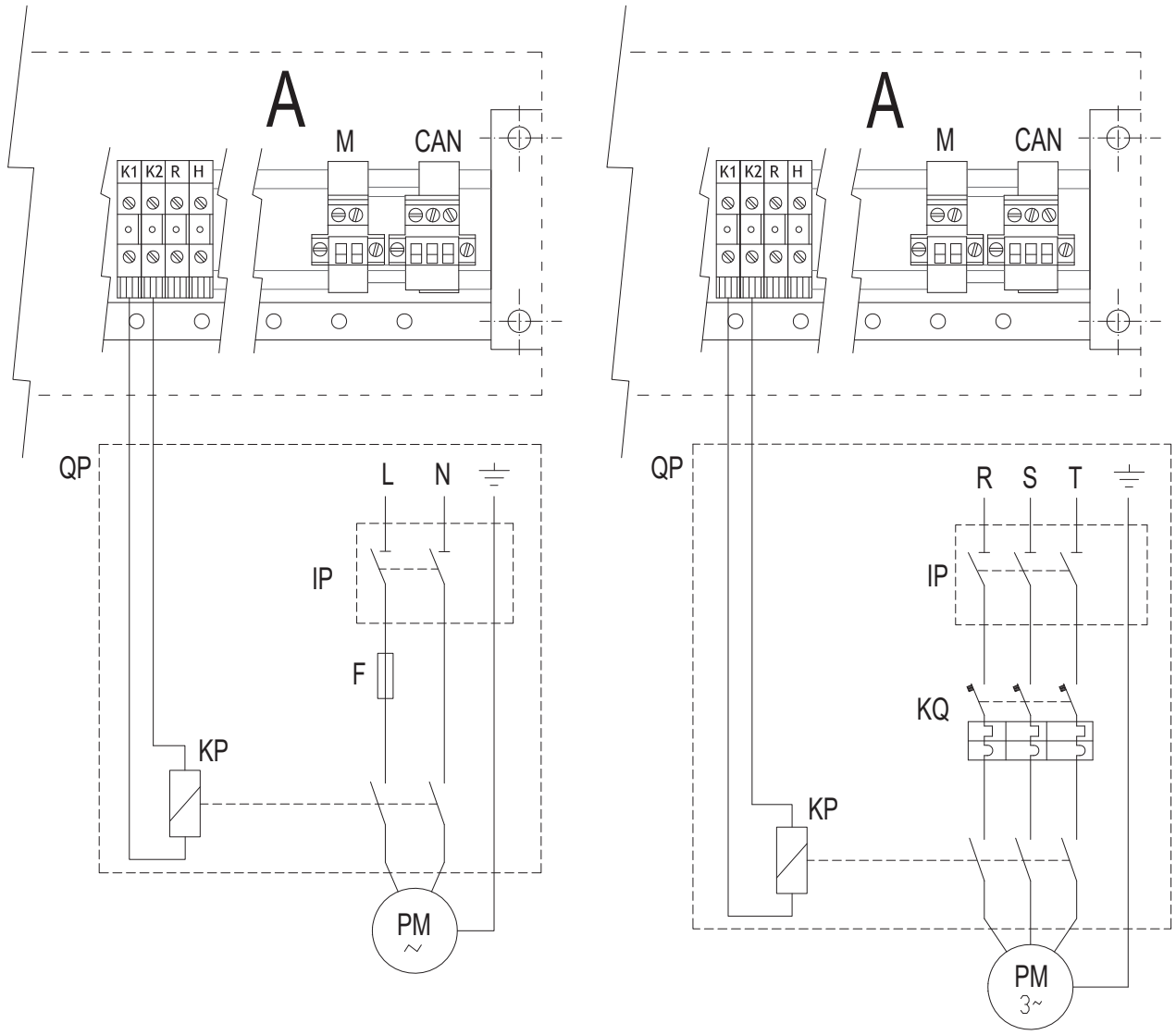
To connect the common circulation pump (single-phase or three-phase) of a link without any circulating pumps fitted on (Figure 4.10 *p. 42* or 4.11 *p. 43*):

1. Access the terminal blocks in the electrical panel of the link (Paragraph 4.2 *p. 36*).
2. Connect the two enable conductors to the

appropriate terminals K1-K2 or 1-2.

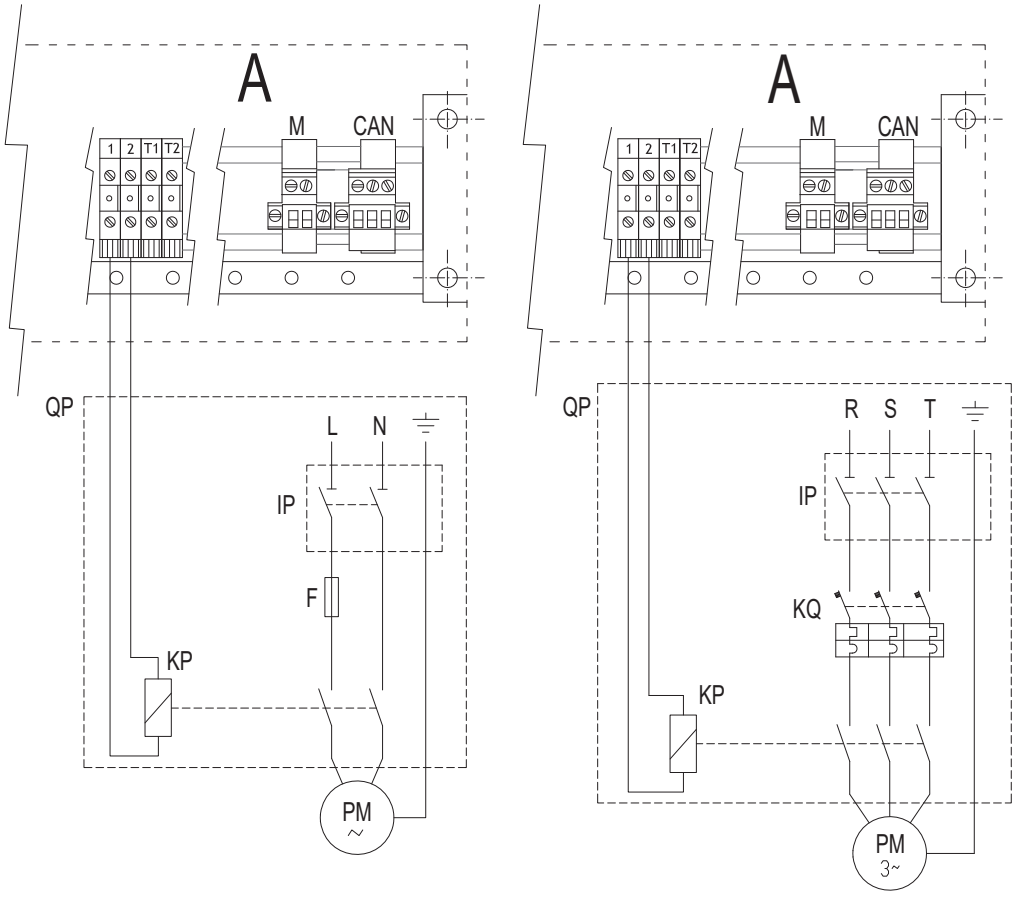
3. Made the connections, reposition the blind panel and reclose the electrical panel.

Figure 4.10 *Electrical connection of single- or three-phase circulator directly controlled by the group (configurations "without circulators")*



A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
F Appropriate fuse for protecting the circulation pump used
IP Circulation pump disconnector (not supplied)
K1-K2 24 Vac coil terminals for the common circulation pump request of the hot/cold link circuit
KP NO relay for controlling the circulating pump (not supplied)
KQ Appropriate motor protection switch for the circulation pump used
L Phase of single-phase water pump power supply
N Neutral
PM Primary system water circulator (not supplied)
QP Circulator electrical panel (external)
RST Three-phase circulator power supply phases

Figure 4.11 *Heat recovery exchanger: electrical connection of single- or three-phase circulator directly controlled by the group (configurations "without circulators")*



A Blind panel of the link electrical panel (Figure 1.34 *p. 25*)
1-2 24 Vac coil terminals for the common circulation pump request of the heat recovery circuit of a link with HR
F Appropriate fuse for protecting the circulation pump used
IP Circulation pump disconnector (not supplied)
KP NO relay for controlling the circulating pump (not supplied)
KQ Appropriate motor protection switch for the circulation pump used
L Phase of single-phase water pump power supply
N Neutral
PM Primary system water circulator (not supplied)
QP Circulator electrical panel (external)
RST Three-phase circulator power supply phases

5 FIRST START-UP

First start-up entails checking/setting up the combustion parameters and may exclusively be carried out by a Robur TAC. NEITHER the user NOR the installation technician is authorised to perform such operations, under penalty of voiding the warranty.

5.1 PRELIMINARY CHECKS

5.1.1 Preliminary checks for first start-up

Upon completing installation, before contacting the TAC the installer must check:

- ► Water, electrical and gas systems suitable for the required capacities and equipped with all safety and control devices required by the regulations in force.
- ► Absence of leaks in the water and gas systems.
- ► Type of gas for which the preassembled group is designed (natural gas or LPG).
- ► Supply gas pressure complying with the values of Table 3.5 *p. 34*.
- ► Correct operation of the flue exhaust duct.
- ► Power supply mains complying with the appliance's rating plate data.
- ► Appliance correctly installed, according to the manufacturer's provisions.
- ► System installed in a workmanlike manner, according to national and local regulations.

5.1.2 Abnormal or hazardous installation situations

Should any abnormal or hazardous installation situations be found, the TAC shall not perform first start-up and the appliance shall not be commissioned.
These situations may be:

- ► Outdoor aerothermal link installed within a room.
- ► Failed compliance with minimum clearances.
- ► Insufficient distance from combustible or flammable materials.
- ► Conditions that do not warrant access and maintenance in safety.
- ► Starting/stopping the link with the main switch, rather than with the provided control device.
- ► Appliance defects or faults caused during transport or installation.
- ► Gas smell.
- ► Non-compliant mains gas pressure.
- ► Non-compliant flue gas exhaust.
- ► All situations that may involve operation abnormalities or are potentially hazardous.

5.1.3 Non-compliant system and corrective actions

Should the TAC find any non conformities, the user/installer is bound to perform any corrective procedures required by the TAC.
After performing the remedial actions (the installer's responsibility), if the TAC deems that safety and conformity conditions are in place, first start-up may be effected.

5.2 ELECTRONIC ADJUSTMENT ON THE APPLIANCE – MENUS AND PARAMETERS

5.2.1 Electronic boards on the appliances

For instructions on the on-board electronic boards of the individual GAHP/GA/AY modules that make up the link, please refer to their respective manuals.

5.2.2 DDC or CCI control devices

For information on DDC or CCI control devices, please refer to their respective manuals.

5.3 MODIFYING SETTINGS

To change the settings of the link use the provided control device. Please refer to the manual of the device for instructions.

6 NORMAL OPERATION

This section is for the end user.

The use of the device by the end user is only permitted after the Robur authorised TAC has completed the first start-up.

6.1 WARNINGS

General warnings

Prior to using the appliance carefully read the warnings in Chapter III.1 *p. 4*, providing important information on regulations and on safety.

First startup by TAC

First start-up may exclusively be carried out by a Robur TAC (Chapter 5 *p. 43*).

Never power the appliance off while it is running

NEVER power the appliance off while it is running (except in the event of danger, Chapter III.1 *p. 4*), since the appliance or system might be damaged.

6.2 SWITCH ON AND OFF

Routine switching on/off

The appliance may exclusively be switched on/off by means of the suitably provided control device.

Do not switch on/off with the power supply switch

Do not switch the appliance on/off with the power supply switch. This may be harmful and dangerous for the appliance and for the system.

Checks before switching on

Before switching on the appliance, ensue that:

- gas valve open
- appliance electrical power supply (main switch ON)
- flue gas exhaust ducts (if provided, according to the GAHP/GA/AY module type) are free and correctly connected to the flue gas exhaust system, if any
- DDC or CCI power supply (if any)
- water circuit filled and at the correct water pressure

6.2.1 How to switch on/off

To turn on/off the link see the manual of the suitably provided control device.

Once switched on with the control device, under normal operating conditions, the link modules automatically start/stop according to the heating and/or cooling requirements and the logic defined in the control device, providing hot/chilled water at the programmed temperature.

The modules of the link will not necessarily be activated immediately, but will only start when there is an actual demand for heating or cooling.

6.3 MODIFYING SETTINGS

To change the settings of the link use the provided control device. Please refer to the manual of the device for instructions.

Do not modify complex settings

Specific technical and system knowledge is required for complex settings. Contact a TAC.

6.4 EFFICIENCY

For increased appliance efficiency:
- ► Keep the finned coil of the aerothermal appliances clean.
- ► Set water temperature to the actual system requirement.
- ► Reduce repeated switch-ons to the minimum (low loads).
- ► Program appliance activation for actual periods of use.
- ► Keep water and air filters on plumbing and ventilation systems clean.

7 MAINTENANCE

7.1 WARNINGS

Correct maintenance prevents problems, assures efficiency and keeps running costs low.

Maintenance operations described herein may exclusively be performed by the TAC or skilled maintenance technician.

Any operation on the internal components of the GAHP/GA/AY modules that make up the link may only be performed by the TAC.

Before performing any operation, switch off the appliance by means of the control device and wait for the end of the shutdown cycle of all the modules, then disconnect the gas supply, by closing the gas valve. Finally, disconnect the electrical power supply as described in Paragraph 7.1.1.2 *p. 45*.

The efficiency checks and every other "check and maintenance operation" (Paragraph 7.2 *p. 46* and 7.3 *p. 46*) must be performed with a frequency according to current regulations or, if more restrictive, according to the provisions set forth by the manufacturer, installer or TAC.

Responsibility for efficiency checks, to be carried out for the aims of restricting energy consumption, lies with the system manager.

Environmental or operational heavy conditions

In environmental or operational conditions particularly heavy (for example: heavy-duty use of the appliance, salty environment, etc.), maintenance and cleaning operations must be more frequent.

7.1.1 Link electrical connection and disconnection operations

7.1.1.1 Electrical connection

The electrical connection must take place by doing the following sequence of operations:
1. Close any switches/disconnectors located upstream of the three-phase supply line of the link.
2. Close the 4-pole switch in the electrical panel of the link.
3. Close one at a time the single-phase (magnetothermic) breakers of each unit, located in the electrical panel of the link.

In the case of first start-up, replace step 3 with the following steps:

1. (3 '.) Close ONLY ONE of the single-phase automatic (magnetothermic) breakers of the modules, located in the general electrical panel of the link, and verify that the corresponding unit is actually powered; otherwise, investigate and resolve the problem before proceeding to the next step.
2. (4'.) Close the remaining single-phase automatic breakers of the modules.

7.1.1.2 Electrical disconnection

The electrical disconnection must take place by doing the following sequence of operations:
1. Open the single-phase automatic (magnetothermic) breakers of each unit, located in the electrical panel of the link.
2. Open the 4-pole switch in the electrical panel of the link.
3. If required, open any switches/disconnectors located upstream of the three-phase supply line of the link.

7.2 PRE-EMPTIVE MAINTENANCE

For pre-emptive maintenance, comply with the recommendations in Table 7.1 *p. 46*.

Table 7.1

		GAHP A	GAHP GS/WS	GA ACF	GAHP-AR
Guidelines for the preventive maintenance operations					
Check of the unit	visually check of the general condition of the unit and of its finned coil	√ (1)	-	√ (1)	√ (1)
	check the correct operation of the device used for monitoring the water flow	√	√	√	√
	check the % value of CO_2	√	√	-	-
	check gas pressure to the burners	-	-	√	√
	check that the condensate discharge is clean (If necessary, frequency of the maintenace operation must be increased)	√	√	-	-
	replace the belts after 6 years or 12000 hours of operation	√	√	√	√
	check/restore the pressure of the primary hydronic circuit	-	-	-	-
	check/restore the air pressure inside of the expansion vessel of the primary hydronic circuit	-	-	-	-
	replace the oil pump motor condenser every 3 years or every 10000 operating hours or whenever the condenser capacity is less than 95% of the nominal value	√	√	√	√
Check for every DDC or CCI	check that the plant is able to achieve the setpoint temperature	√	√	√	√
	download the event history	√	√	√	√

(1) It is suggested to clean the finned coil once every 4 years (optimal frequency of the cleaning operation is in any case strongly affected by the installation site). Avoid excessively aggressive cleaning of the finned coil (e.g. high-pressure washer).

7.3 SCHEDULED ROUTINE MAINTENANCE

7.3.1 GAHP/GA

For scheduled routine maintenance, perform the operations in Table 7.2 *p. 46*, at least once every 2 years.

Table 7.2

		GAHP A	GAHP GS/WS	GA ACF	GAHP-AR
Ordinary scheduled maintenance					
Check of the unit	clean the combustion chamber	√ (1)	√ (1)	√	√ (1)
	clean the burner	√ (1)	√ (1)	√	√ (1)
	clean the ignition and flame sensor electrodes	√	√	√	√
	check that the condensate discharge is clean	√	√	-	-

(1) Only in case the analysis of combustion products is non-compliant.

7.3.2 AY

It is recommended that the following operations and checks be carried out each year:

- ► Combustion circuit functionality and heat exchange control:
  - ■ Burner and flue exhaust duct inspection
  - ■ Cleaning of burner and water/flue exchanger (if applicable)
  - ■ Flame ignition/detection system control
- ► Hydraulic circuit and internal components functionality check:
  - ■ Hydraulic circuit control (pipes, gaskets)
  - ■ Expansion tank
  - ■ Control and safety devices
  - ■ Water temperature probes
- ► Periodic analysis of combustion, in accordance with regulations in force

7.4 MESSAGES ON THE DISPLAY

7.4.1 Display on GAHP/GA modules

The electronic boards on board the GAHP/GA/AY modules that make up the link are equipped with a display, visible through the sight glass on the front panel of the relevant appliance.

7.4.2 Signals in the event of fault

In case of fault to one (or more) module(s), the relative display(s) flashes indicating an operating code. Simultaneously, the relative display of the connected control flashes (DDC or CCI).
If it is a permanent error or warning the appliance stops.

For diagnostics refer to the operating code tables in the individual module manuals or DDC/CCI control manuals.

7.5 RESTARTING A LOCKED-OUT UNIT

7.5.1 Fault signals on the displays

In case of fault to one (or more) module(s), the relative display(s) flashes indicating an operating code. Simultaneously, the relative display of the connected control flashes (DDC or CCI).

- ► To restart the appliance you must know and perform the procedure concerning the issue reported and identified by the code.
- ► Only act if you are familiar with the issue and with the procedure (technical expertise and professional qualifications might be required).
- ► If you do not know the code, the problem, or the procedure, or you do not have sufficient skills, and in any case of doubt, contact the TAC.

For diagnostics refer to the operating code tables in the individual module manuals or DDC/CCI control manuals.

7.5.2 Locked-out appliance

An external intervention (reset or repair) is required due to an appliance fault or problem with the system.

- ► A reset may be enough for a temporary and provisional fault.
- ► For a fault or breakdown, alert the maintenance technician or TAC.

7.5.3 Reset

There are two options for resetting a fault:

1. If the appliance is connected to a DDC/CCI, you may act through the control device, as described in the relevant manual.
2. You may act directly from the board of the individual module, as described in the module manual.

7.6 PERIODS OF INACTIVITY

Avoid emptying the installation

Emptying the system may cause damage due to corrosion of the water pipes.

Deactivate the group in winter

Should you intend to stop the appliance in the winter season, ensure at least one of the following conditions:

1. antifreeze function active (Paragraph 3.2.7 *p. 31*)
2. sufficient antifreeze glycol (Paragraph 3.2.8 *p. 31*)

7.6.1 Prolonged periods of inactivity

Should you foresee to leave the appliance inactive for a long period of time, disconnect it from the electrical and gas mains. These operations must be performed by qualified personnel.

How to deactivate the appliance for long periods of time

1. Switch off the appliance by means of the provided control device (Paragraph 6.2 *p. 44*).
2. Only when all the modules of the link are completely powered off, disconnect the power supply as described in Paragraph 7.1.1.2 *p. 45*.
3. Close the gas valve.
4. If necessary, add water with glycol (if the appliance is disconnected from the power and gas mains, the active antifreeze protection is missing, Paragraph 3.2.7 *p. 31*).

How to reactivate the appliance after long periods of inactivity

Before reactivating the appliance, the operator/maintenance technician of the system must first of all:

- ■ Check whether any maintenance operations are required (contact the TAC; see Paragraphs 7.2 *p. 46* and 7.3 *p. 46*).
- ■ Check content and quality of the water in the system, and if necessary top it up (Paragraphs 3.2.10 *p. 33*, 3.2.9 *p. 32* and 3.2.8 *p. 31*).
- ■ Ensure the flue gas exhaust duct is not obstructed, and that the condensate drain is clean.

After completing the above checks:

1. Open the gas valve and ensure there are no leaks; should gas smell be noticed, close the gas valve again, do not switch any electrical devices on and request intervention by qualified personnel.
2. Connect the electrical power supply as described in Paragraph 7.1.1.1 *p. 45*.
3. Switch on the appliance by means of the provided control device (Paragraph 6.2 *p. 44*).

8 DIAGNOSTICS

8.1 APPLIANCES/CONTROLLERS

For diagnostics refer to the operating code tables in the individual module manuals or DDC/CCI control manuals.

8.2 CIRCULATING PUMPS

To access the water pumps, remove the plastic cover (for GAHP/GA modules, Figure 1.28 *p. 23*), or remove the front panel of the AY modules.

Table 8.1 *Wilo Yonos pump block signalings*

Code	Fault	Cause	Remedial action
E04	Insufficient mains voltage	Supply voltage too low on the mains side	Check that power supply voltage is correct.
E05	Excessive mains voltage	Supply voltage too high on the mains side	Check that power supply voltage is correct.
E09 (1)	Turbine operation	The pump is driven backwards (pump flow from the delivery side to the suction side)	Check the flow rate. If necessary, fit the check valves.
E10	Locking	The rotor is locked	Ask for TAC intervention.
E21 (2)	Overload	The motor runs with difficulty	Ask for TAC intervention.
E23	Short circuit	Motor current too high	Ask for TAC intervention.
E25	Contact/winding	Defective motor winding	Ask for TAC intervention.
E30	Over temperature of the module	Module inside vane too hot	Improve ventilation of the environment, check the conditions of use. If necessary, ask for TAC intervention.
E31	Power module overtem-perature	Ambient temperature too high	Improve ventilation of the environment, check the conditions of use. If necessary, ask for TAC intervention.
E36	Electronic system error	Defective electronic system	Ask for TAC intervention.

1 Only for pumps with P1 ≥ 200 W.
2 In addition to the LED indicator, the fault LED turns red with fixed light. See also message E21.

Table 8.2 *Wilo Yonos pump warning messages*

Code	Fault	Cause	Remedies
E07	Turbine operation	With the pump off the impeller remains in operation	Check the flow rate. If necessary, fit the check valves.
E11	Dry operation	Air in the pump	Check the amount/pressure of the water.
E21 (1)	Overload	The motor runs with difficulty	Ask for TAC intervention.

1 See also blocking signal E21.

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Robur is dedicated to dynamic progression
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