

Installation, user and maintenance manual

Multiple preassembled groups

Heating and Cooling/Heating modular group

powered by gas and renewable energy



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1 PREFACE

This document is a guide to the installation and operation of the Heating and Cooling/ Heating modular group.

This manual is specifically intended for:

- final users for the operation of the appliance according to their own requirements;
- installation technicians (hydraulic and electrical) for the carrying out of a correct installation of the appliance and of the Direct Digital Controller (DDC) or Comfort Control Interface device (CCI).

For all operations necessary for the "first activation", "gas change" and routine maintenance refer to the manual supplied with each unit.

Summary

The manual has 5 sections:

SECTION 1 is a brief introduction to the use of the manual itself.

SECTION 2 is intended for use by the final user, hydraulic and electrical installation technicians and the Robur TAC; it gives general warnings, operating instructions and constructional specifications. This section also contains technical data and dimensional drawings of the appliance.

SECTION 3 is intended for use by the final user; it provides the information necessary to use the appliance correctly according to the user's own requirements.

SECTION 4 is intended for use by the hydraulic installation technician; it provides the indications necessary for the technician for the creation of the hydraulic plant and gas supply system.

SECTION 5 is intended for use by the electrical installation technician; it provides the information required to hook up the appliance electrically.



For all other informations refer to the manual supplied with each unit.

Definitions, terms and icons

UNIT (or MUDULE): single unit of the appliance.

APPLIANCE/LINK: the entire modular heating/chiller unit composed of the individual units (or modules) already assembled together and connected on supporting beams, complete with general electrical panel. The appliance may be composed of 2 to 8 units.

CCI: "Comfort Control Interface" device.

DDC: digital control panel (Direct Digital Controller).

QEG: general electrical panel of the appliance (in presence of 2 panels: that marked with the written MAIN).

TAC: Technical Assistance Centre (authorised by Robur S.p.A.).

ACS: sanitary (domestic) hot water.

UTA: air handler.

References

The CCI/DDC is also supplied as standard with the appliance for the management and operation of the appliance. For instructions regarding the installation and use of the CCI/DDC, refer to the manuals supplied with it.

The **icons** used in the manual have the following meanings:



= DANGER



= WARNING



= NOTE



= START OF OPERATING PROCEDURE



= REFERENCE to another part of the manual or other document

2 OVERVIEW AND TECHNICAL FEATURES

In this section, for all users, you will find the operating principle of the appliance and its manufacturing characteristics. This section also contains technical data and dimensional drawings of the appliance.

2.1 GENERAL INFORMATION



The appliance is powered by 400 V 3N - 50 Hz electrical power, or, alternatively, a 230 V 1N - 50 Hz supply.

Control and operation of the appliance occur by means of the CCI/DDC (see Figure 2.1 CCI/DDC → 6), supplied as standard with the appliance.



For instructions regarding the use, configuration and programming of the CCI/DDC, refer to the manuals supplied with it.

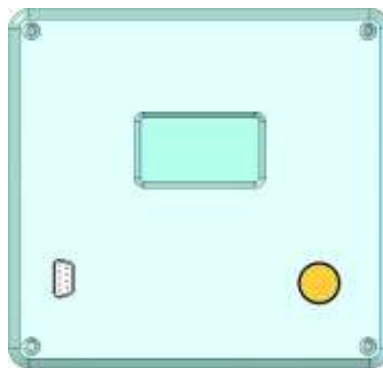


CCI/DDC configuration/programming operations must be carried out by an authorised Robur Technical Assistance Centre (TAC) during initial activation procedures and according to the instructions supplied by the manufacturer.



For all MAINTENANCE requirements, refer to the handbooks for the units composing the link.

Figure 2.1 – CCI/DDC



Heating or Cooling/Heating Group: description and general characteristics

The appliances are characterized by a minimum of 2 up to a maximum of 8 units. The units are already assembled and connected hydraulically and electrically on a single base made of steel beams, so as to comprise a single Heating or Cooling/Heating Unit complete with hydraulic manifolds and general electrical panel (see dimensional drawings in the following Paragraph).

The appliance, which can produce hot or cold water, is suited to installation in all hot/cold water production systems for heating/cooling, sanitary use (DHW), process needs, air handlers, etc..

Single unit. The units composing the various types of link belong to the GA, GAHP or AY lines.

GA line units belong to the **ACF** SERIES in all its VERSIONS: **Standard**, **HR** (with heat recovery), **TK** (technological), **LB** (low water temperature) and **HT** (high ambient temperature).

GAHP line units belong to the **A SERIES** in the two VERSIONS: **HT** (high water temperature) and **LT** (low water temperature); or the **GS SERIES** in the two VERSIONS: **HT** (high water temperature) and **LT** (low water temperature); or the **WS SERIES** or **AR SERIES**.

AY line units belong to the **AY Condensing SERIES**.

The individual units may be **2 pipe** (shared water inlet and outlet) or **4 pipe** (separate water inlet and outlet) TYPES.

Some models (ACF, A, AR) are supplied with a standard helical fan (**standard VENTILATION**) or an oversize blade helical fan (**silent VENTILATION**).



The description, general characteristics, "operating hints" and type of application **for each specific unit of the link** are given in the units' handbooks (supplied).

Single Appliance (or Link). Links are composed of uniform units (same series and version) or mixed units.

All links may be supplied as standard with a "Tank" kit (200 or 300 litres).

In the factory, all links may be configured for future installation, on a beam, of the "tank" kit or as "single unit".

All links belong to the "**MULTIPLE PREASSEMBLED GROUPS**" SERIES.

The combination of possible configurations characterises the SERIES (and VERSIONS) of available links.



Some available series of links are listed in Figure 2.2 LINK CODING MATRIX → 9.

The LINKS of all series (and versions) are distinguished by:

1) type of hydraulic circuit, "TYPE"

- 2 pipe (shared hot/cold water inlet and outlet); see Figure 2.9 Water, gas and condensate discharge fittings position → 15.
- 4 pipe (separate hot/cold water inlet and outlet); see Figure 2.10 Water, gas and condensate discharge fittings position → 16.
- 6 pipe (separate hot/cold water inlet and outlet + recovery circuit water inlet and outlet). See Figure 2.11 Water, gas and condensate discharge fittings position → 17.

2) type of "VENTILATION" (standard or silent, "S");

3) "CONFIGURATION" and type of independent circulators (see paragraph "INDEPENDENT CIRCULATOR CONFIGURATIONS" below).

4) type of "control" (CCI or DDC).

INDEPENDENT CIRCULATOR CONFIGURATIONS

All the appliances are available in the configurations:

1. without independent circulators, identified with the code (see Tables 2.1 Link without HR/GS/WS: code "with/without circulators" independent → 8 and 2.2 Link with HR/GS/WS: code "with/without circulators" independent → 8); a shared circulator must thus be installed on each primary circuit, rated for the appliance's nominal flow rate;
2. with independent circulators, identified with the code (see Tables 2.1 Link without HR/GS/WS: code "with/without circulators" independent → 8 and 2.2 Link with HR/GS/WS: code "with/without circulators" independent → 8); in this case each unit in the link is equipped with a dedicated circulation pump to provide the unit's nominal flow rate.

The appliances in the configuration with independent circulation pump maybe equipped with:

- fixed speed, low head circulation pumps: called "standard circulators" below (see Figure 2.3 Characteristic diagrams of WILO TOP S 30/7 pump → 11);
- fixed speed, high head circulation pumps: called "oversize circulators" below (see Figure 2.4 Characteristic diagrams of WILO TOP S 30/10 pump → 12);
- variable speed, low head circulation pumps: called "standard modulating circulators" below (see Figure 2.5 Characteristic curves of WILO Stratos Para 25/1-11 pump → 12);
- variable speed, high head circulation pumps: called "oversize modulating circulators" below (see Figure 2.6 Characteristic curves of WILO Stratos Para 30/1-12 pump → 13);

Table 2.1 – Link without HR/GS/WS: code "with/without circulators" independent

LINK CONFIGURATION WITHOUT HR, GS, WS unit		CODE	[**]
Hot/Cold Side [*]			
without circulators		SC	
with standard circulators		CC	
with oversize circulators		CM	
with standard modulating circulators [for modulating links]		CV	
with oversize modulating circulators [for modulating links]		CW	

[*] - Links, di tipo a 2 o 4 o 6 tubi, costituiti da soli circuiti "caldo e/o freddo".

[**] - La configurazione (sigla identificativa) è unica ed è riferita a tutti i circuiti "caldo e/o freddo": TUTTI i circuiti CON o TUTTI i circuiti SENZA (circulatori).

Table 2.2 – Link with HR/GS/WS: code "with/without circulators" independent

LINK CONFIGURATION WITH HR, GS, WS unit			CODE	[**]
Hot/Cold Side [*]	Recovery/Renewable Side	[*]		
no circulator (N)	no circulator (N)		NN	
no circulator (N)	standard circulator (S)		NS	
no circulator (N)	oversize circulator (M)		NM	
standard circulator (S)	no circulator (N)		SN	
standard circulator (S)	standard circulator (S)		SS	
standard circulator (S)	oversize circulator (M)		SM	
oversize circulator (M)	no circulator (N)		MN	
oversize circulator (M)	standard circulator (S)		MS	
oversize circulator (M)	oversize circulator (M)		MM	
with standard modulating circulator (V) [for modulating links]	no circulator (N)		VN	
with standard modulating circulator (V) [for modulating links]	standard circulator (S)		VS	
with standard modulating circulator (V) [for modulating links]	oversize circulator (M)		VM	
with oversize modulating circulator (W) [for modulating links]	no circulator (N)		WN	
with oversize modulating circulator (W) [for modulating links]	standard circulator (S)		WS	
with oversize modulating circulator (W) [for modulating links]	oversize circulator (M)		WM	

[*] - Links, di tipo a 4 o 6 tubi, costituiti da uno ovvero due circuiti "caldo e/o freddo" + un circuito "recupero" o "rinnovabile".

[**] - La configurazione (sigla identificativa) è doppia: la prima lettera è riferita al circuito (o a entrambi i circuiti) "caldo e/o freddo"; la seconda, al circuito "recupero" o "rinnovabile".



For the graphs of the circulators' characteristic curves, refer to the figures in paragraph 2.2 TECHNICAL CHARACTERISTICS → 10 (section "CHARACTERISTIC CURVES OF INDEPENDENT CIRCULATORS").

How to read the code associated with the links

The information about the characteristics of the links, including the series and versions of the units of which it is composed, are given in the "code contained in the appliance's name".

Figure 2.2 LINK CODING MATRIX → 9 is a guide to reading the appliance name code.

Figure 2.2 – LINK CODING MATRIX

Serie/Codice Serie/Code										SERIE	Codice/Code	Composizione	
1 ^(*)	RTRH									RTAR	F-GAR	multiple di AR	
										RTCF	F-GCF	multiple di ACF	
										RTY	F-YYC	multiple di AY	
										RTRH	F-HRY	HR-AR-AY	
										RTAH	F-HAR	HR-AR	
										RTRC	F-FRY	AR-ACF-AY	
										RTCR	F-ARC	AR-ACF	
										RTVR	F-ARY	AR-AY	
										RTYH	F-HFY	HR-ACF-AY	
										RTHF	F-HCH	HR-ACF	
										RTYF	F-GFY	ACF-AY	
										RTAY	F-AAY	A-AY	
										... (*)	... (*)	... (*)	
2	118	Calorie Freddo								UNITA/UNIT	calorie		
										ACF	60		
										HR	60		
										AR	58		
										A-HT	0		
										A-LT	0		
										AY	0		
										WS	0		
										GS HT	0		
										GS LT	0		
3	312	Calorie Caldo								UNITA/UNIT	calorie		
										ACF	0		
										HR	72		
										AR	120		
										A-HT	133		
										A-LT	141		
										AY	120		
										WS	142		
										GS HT	128		
										GS LT	145		
4	/6	Tipo Type								N° Tubi	descrizione/description		
										2 tubi			
										4 tubi	/4		
										4+2 (HR+AY)	/6		
5	HR	Versione Version								Tipo Unità/Unit	descrizione/description		
										AR			
										AY			
										ACF STD			
										ACF TK	TK		
										ACF LB	LB		
										ACF HR	HR		
										ACF HT	HT		
										GAHP-A HT	HT		
										GAHP-A LT	LT		
6	S	Ventilazione								Motoventilante	descrizione/description		
										standard			
										silenziosa	S		
7	MET/NAT	Alimentazione Gas supply								Tipo Gas	descrizione/description		
										Metano (G20)	MET/NAT		
										Metano (G25)	G25		
										GPL/LPG	GPL/LPG		
8	ITA	Mercato/Destinazione								Paese			
										ITA	Italia/Italy		
										DE	Germania/Germany		
										CH	Svizzera		
										AT	Austria		
										FR	Francia/France		
										KR	Croazia		
										ES	Spagna/Spain		
										UK	Inghilterra/United Kingdom		
										BE	Belgio		
										NL	Olanda		
9 (**)	SM	Configurazione Configuration								Tipo circolatore	descrizione/description		
											link senza HR	link con HR/GS,WS	
											lato Caldo/Freddo	lato Caldo/Freddo	lato II*
										SENZA Circolatori	SC	N	N
										circol. standard	CC	S	S
										circol. maggiorato	CM	M	M
										circol. modulante	CV	V	(**)
										circol. mod. magg.	CW	W	(**)
10		Predisposizione								unità e/o serbatoio	descrizione description		
										NESSUNA Predisposizione			
										A	A		
										ACF	B		
										AR	B		
										ACF HR	C		
										AY	D		
										HR+AY	E		
										ACF+AY	F		
										AR+AY	F		
										A+AY	G		
										SERB.200	J		
										SERB.300	K		
										OUTDOOR GS/WS	O		
1	2	3	4	5	6	7	8	9	10	CAMPO/FIELD			
RTRH	118	312	/6	HR	S	MET/NAT	ITA	SM		← NOME/LINK NAME			

LEGEND

* There are other link compositions and respective series.

** For further details on field "9", see par. "circulator configuration".

Example: appliance (composed of n.1 GAHP-AR S unit, n.1 ACF version HR S unit and n.1 AY Condensing unit), 6 pipe, configured with independent "standard" circulators on the

hot and cold circuits and "oversize" circulators on the recovery circuit. The AR and ACF-HR units are equipped with "silent" ventilation.

The code for the preassembled group in this example is then: **RTRH 118-312 /6 HR S SM.**

2.2 TECHNICAL CHARACTERISTICS

The appliance consists of:

- hot galvanised steel beams (base);
- stainless steel manifolds isolated by a rigid coppella with aluminium sheet housing;
- galvanised steel gas pipes;
- flexible couplings connecting the individual units to the manifolds;
- independent fixed speed circulators (one per unit) for the system circuit. Present only on configurations with circulators. See par. 2.1 GENERAL INFORMATION → 6 (section "INDEPENDENT CIRCULATOR CONFIGURATIONS");
- independent modulating circulators (one per unit) for the system circuit. Present only on configurations with circulators and only for links composed of 2 and 3 uniform units (series A, GS, WS). See par. 2.1 GENERAL INFORMATION → 6 (section "INDEPENDENT CIRCULATOR CONFIGURATIONS");
- external power electrical panel (GEP) with breakers (n.2 GEP per link with more than 6 units).
- condensation drain manifold (only on appliances with at least 2 condensation units).



For the technical manufacturing characteristics and for the control and safety components of the single unit, refer to the manual supplied with it.



For further information or technical support, or to request the DATA SHEET for a given link configuration, contact Robur S.p.A. Presales. (tel. +39 035.888.111).

TECHNICAL DATA

Table 2.3 – Technical data common to all models of link

LINK TECHNICAL CHARACTERISTICS	Unit Measurement	LINK COMPOSITION					
INSTALLATION DATA ⁽¹⁾							
Number of GA / GAHP units	n.	0	1	2	3	4	5
Number of AY units	n.	2 to 5	1 to 5	0 to 5	0 to 5	0 to 4	0
NUM. OF TOTAL LINK UNITS	n.	2 to 5	2 to 6	2 to 7	3 to 8	4 to 8	5
Power supply (voltage, type - frequency)		400 V 3N - 50 Hz					
Degree of protection		IP X5D					
Gas fitting dia. ⁽²⁾	"	1 ½" F					
Water fitting (out/in) dia. ⁽²⁾	"	2" M					
Condensation discharge fitting dia. ⁽²⁾	"	1" F					

1 - Data applicable to all models of link (2, 4 and 6 pipes). Excluding "GS" and "WS" units

2 - For details of unions, see figure "hydraulic unions".



For the "characteristic" technical data for the specific link configuration supplied, refer to the DATA SHEET supplied with the appliance.



Measurements (including approx. weight of link) are given at the bottom of the paragraph.

The technical data given in Table 2.4 Installation technical characteristics → 11 apply to all RTGS series links (composed exclusively of GAHP-GS units) and RTWS series links (composed exclusively of GAHP-WS units), in other words:

Table 2.4 – Installation technical characteristics

LINK TECHNICAL CHARACTERISTICS RTGS-HT/LT and RTWS		Unit Measurement	LINK COMPOSITION			
INSTALLATION DATA ⁽¹⁾			RTGS / RTWS	RTGS / RTWS	RTGS / RTWS	RTGS / RTWS
NUM. OF TOTAL LINK UNITS		n.	2	3	4	5
Power supply (voltage, type - frequency)			400 V 3N - 50 Hz			
Degree of protection			IP X5D			
Gas fitting diameter		"	1 ½" F			
Water fitting diameter (outlet/inlet)		"	2" M			
Operating weight (2)						
• max (configuration "MM")		kg	800	1200	1600	2000
• min (configuration "NN")		kg	768	1150	1540	1930
Size	width	mm	2314	3610	4936	6490
	depth	mm	1245			
	height	mm	1400			

1 - Data applicable to series: RTGS HT, RTGS LT, RTWS

2 - The weight refers to the links configured, on both circuits (hot/cold side and renewable side) with: oversize circulators ("MM") or without circulators ("NN").

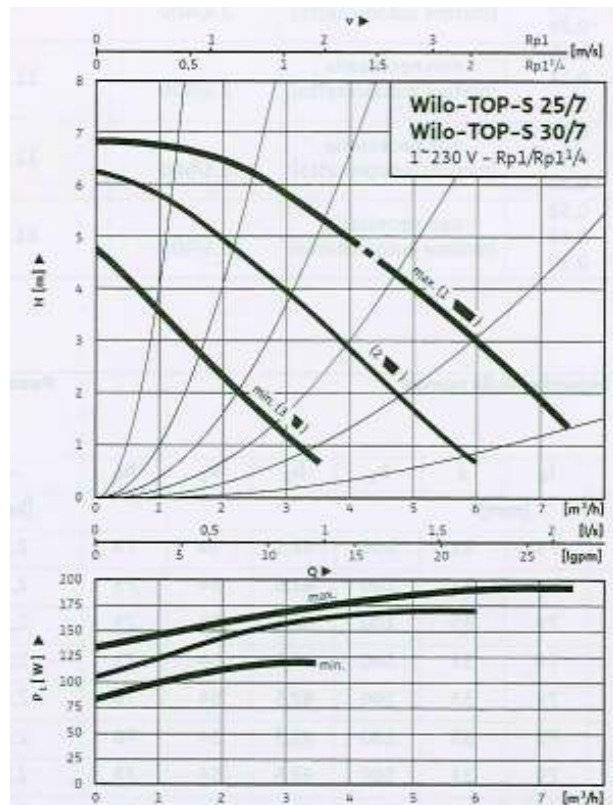


For all other "characteristic" technical data for the specific link configuration, refer to the DATA SHEET supplied with the appliance.

CHARACTERISTIC CURVES OF INDEPENDENT CIRCULATORS

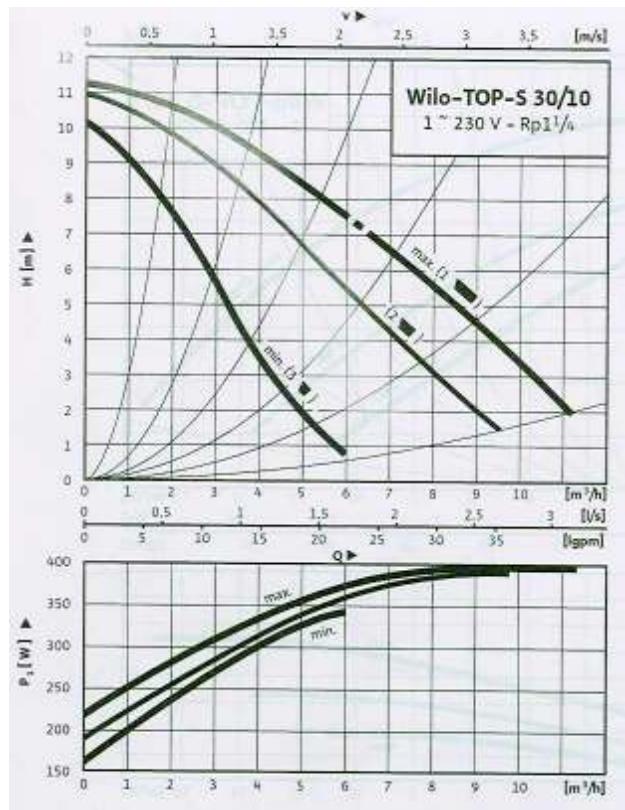
The graph in Figure 2.3 Characteristic diagrams of WILO TOP S 30/7 pump → 11 gives the data regarding the useful head and power draw of a single standard circulator.

Figure 2.3 – Characteristic diagrams of WILO TOP S 30/7 pump



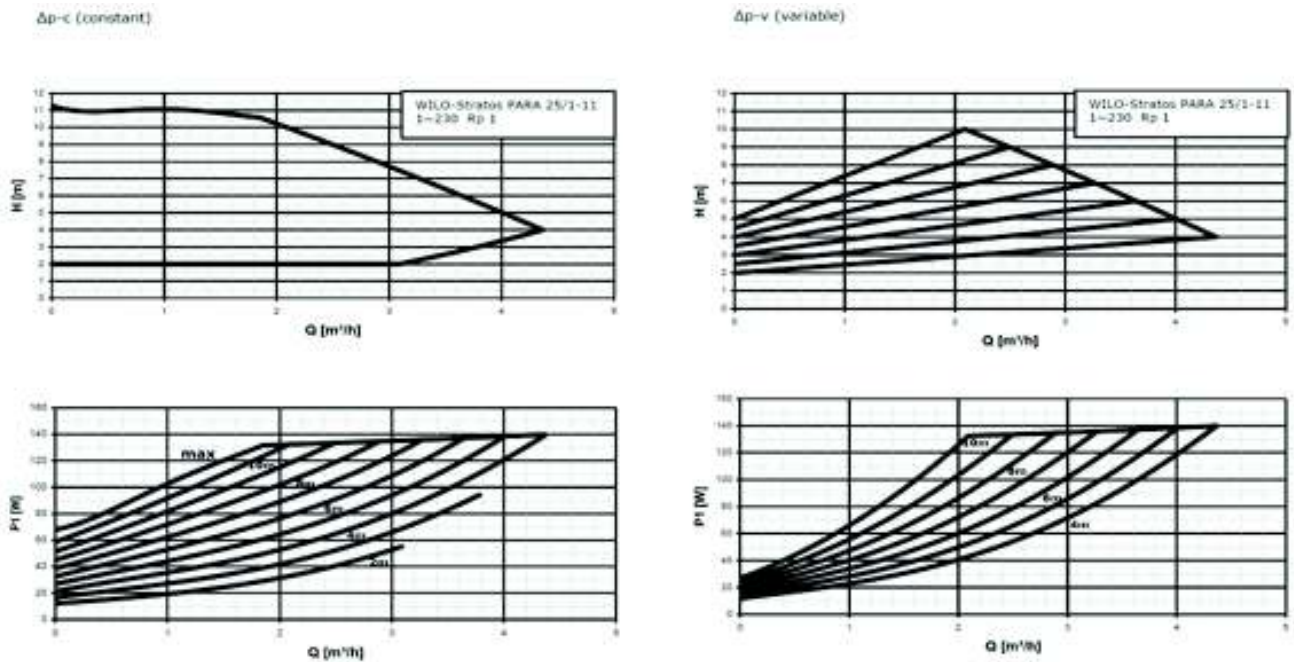
The graph in Figure 2.4 Characteristic diagrams of WILO TOP S 30/10 pump → 12 gives the data regarding the useful head and power draw of a single oversize circulator.

Figure 2.4 – Characteristic diagrams of WILO TOP S 30/10 pump



The graph in Figure 2.5 Characteristic curves of WILO Stratos Para 25/1-11 pump → 12 gives the data regarding the useful head and power draw of a single standard modulating circulator.

Figure 2.5 – Characteristic curves of WILO Stratos Para 25/1-11 pump



The graph in Figure 2.6 Characteristic curves of WILO Stratos Para 30/1-12 pump → 13 gives the data regarding the useful head and power draw of a single oversize modulating circulator.

Figure 2.6 – Characteristic curves of WILO Stratos Para 30/1-12 pump

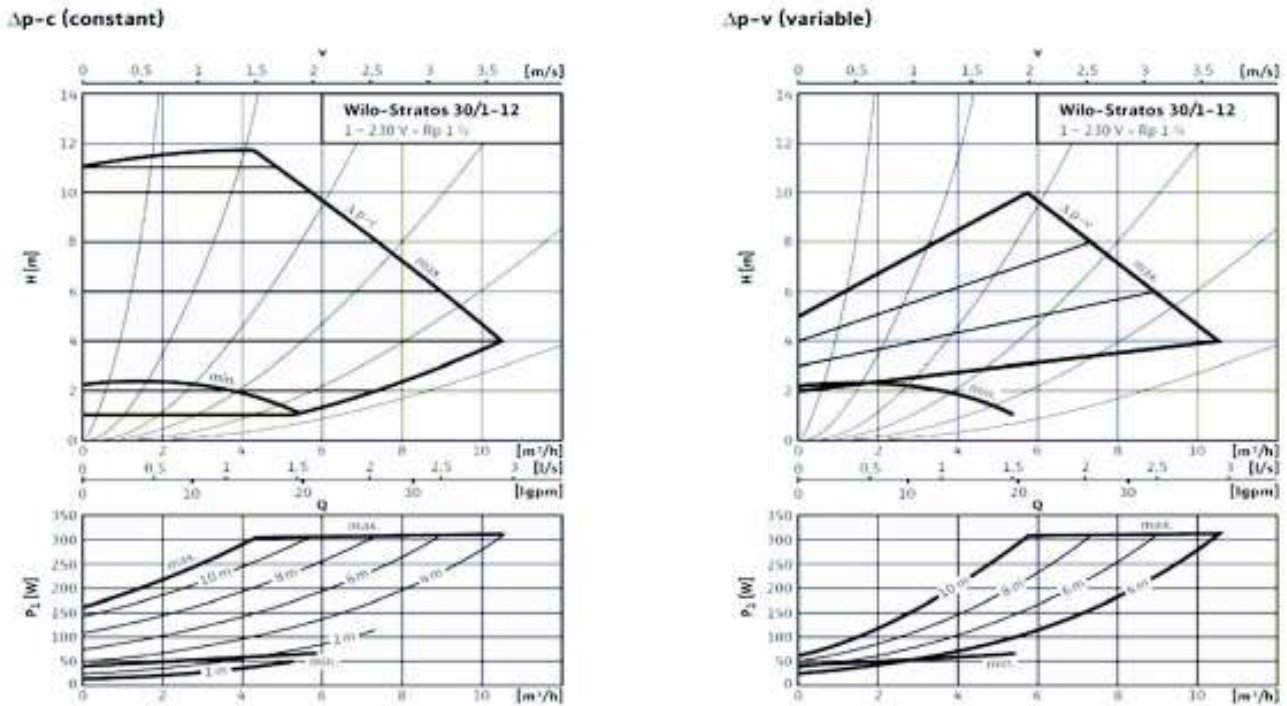
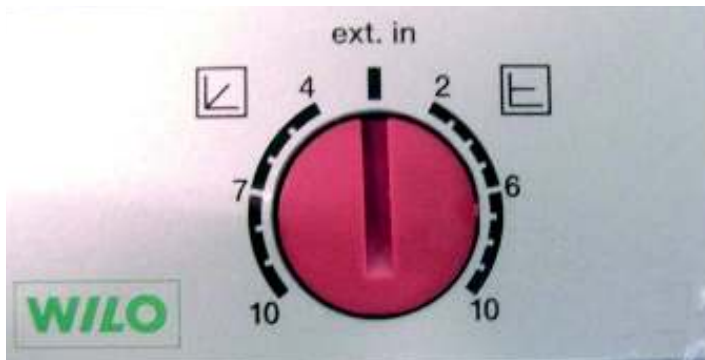


Figure 2.7

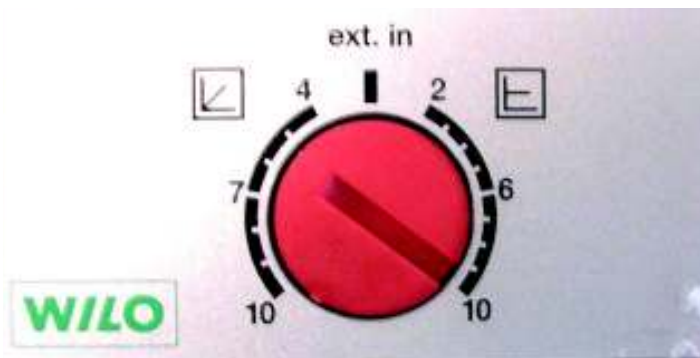
WILO Stratos Para 25/1-11

LEGEND

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



A



B

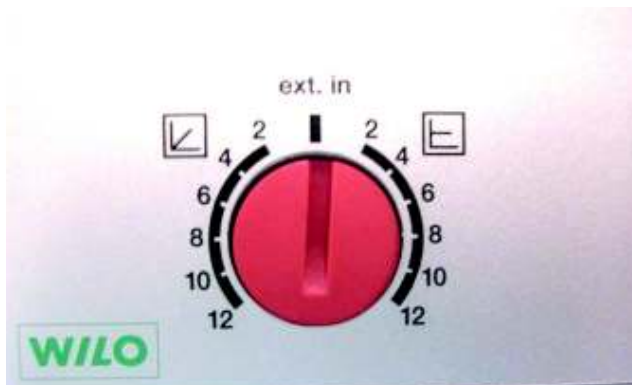
WILO Stratos Para 25/1-11

Figure 2.8

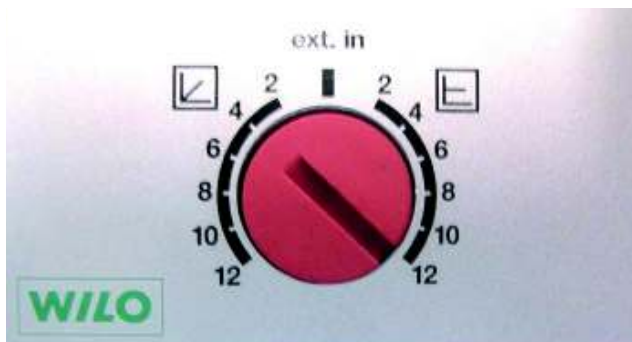
WILO Stratos Para 30/1-12

LEGEND

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



A



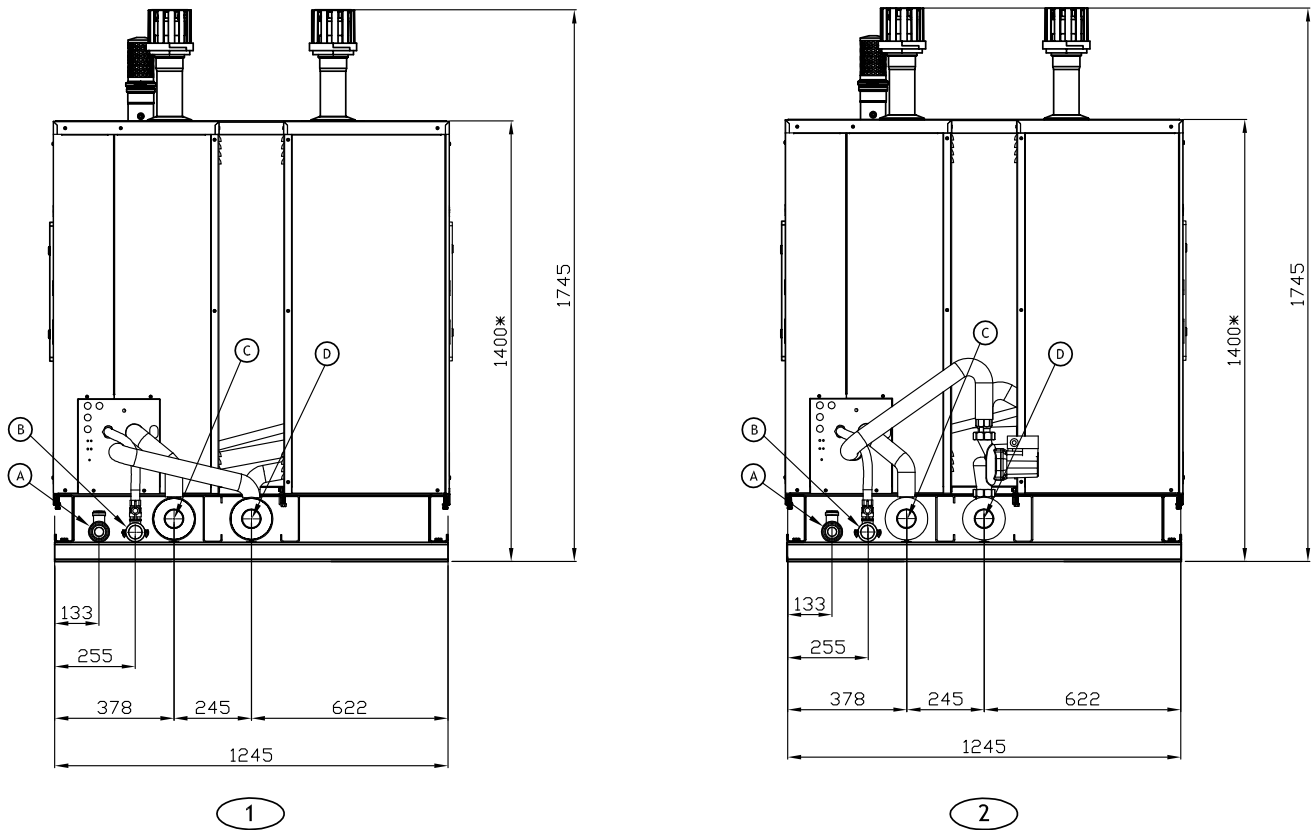
B

WILO Stratos Para 30/1-12



For further information, contact Robur S.p.A. directly. (tel. +39 035 888111).

Figure 2.9 – Water, gas and condensate discharge fittings position

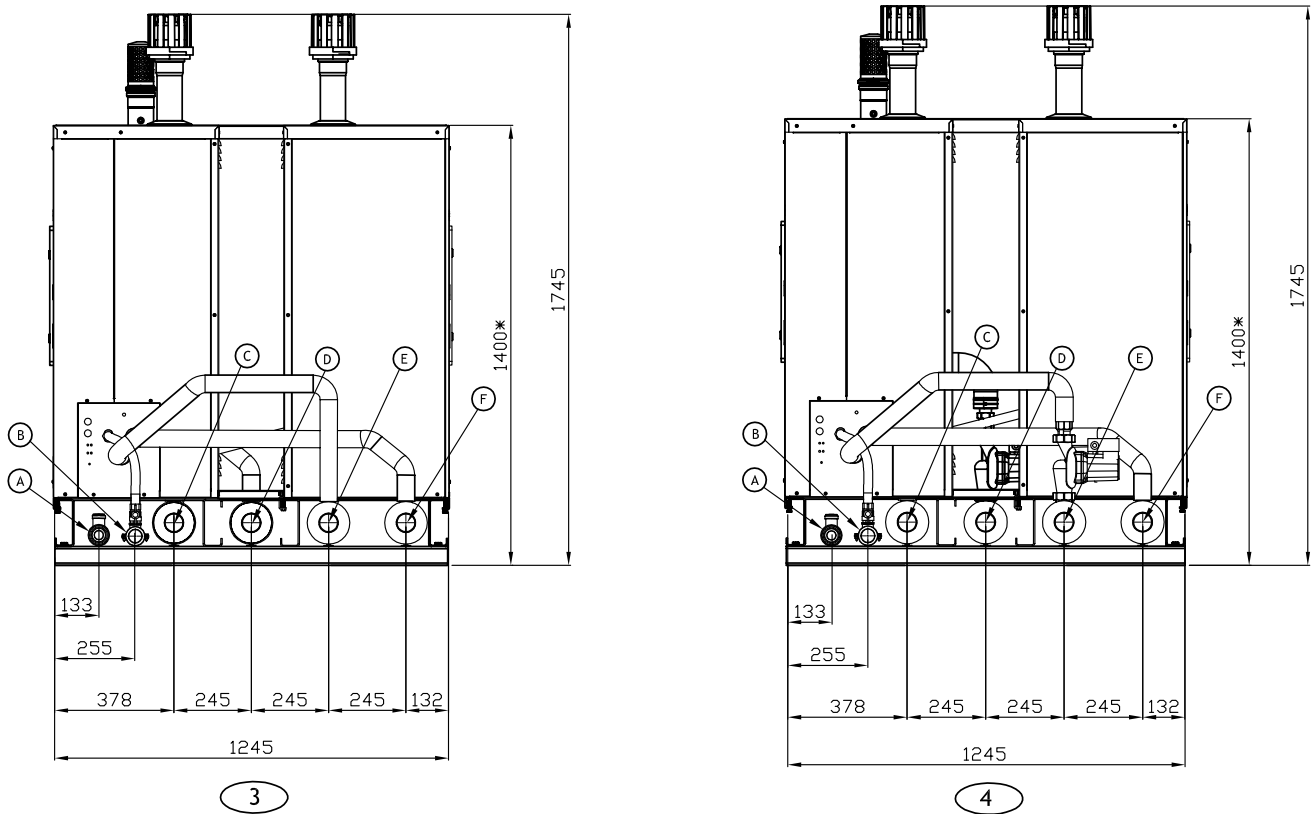


LEGEND

- 1 Configuration 2 pipes, without circulators
- 2 Configuration 2 pipes, with circulators
- A Condensation drain fitting ["G 1 F] (only for appliances with more than one condensation model)
- B Gas union ["G 1 1/2 F]
- C Cold/hot delivery [dia. 2" M]
- D Cold/hot return [dia. 2" M]
- * silenced models, including nozzle, are 1650 mm high

Right side view (dimensions in mm)

Figure 2.10 – Water, gas and condensate discharge fittings position

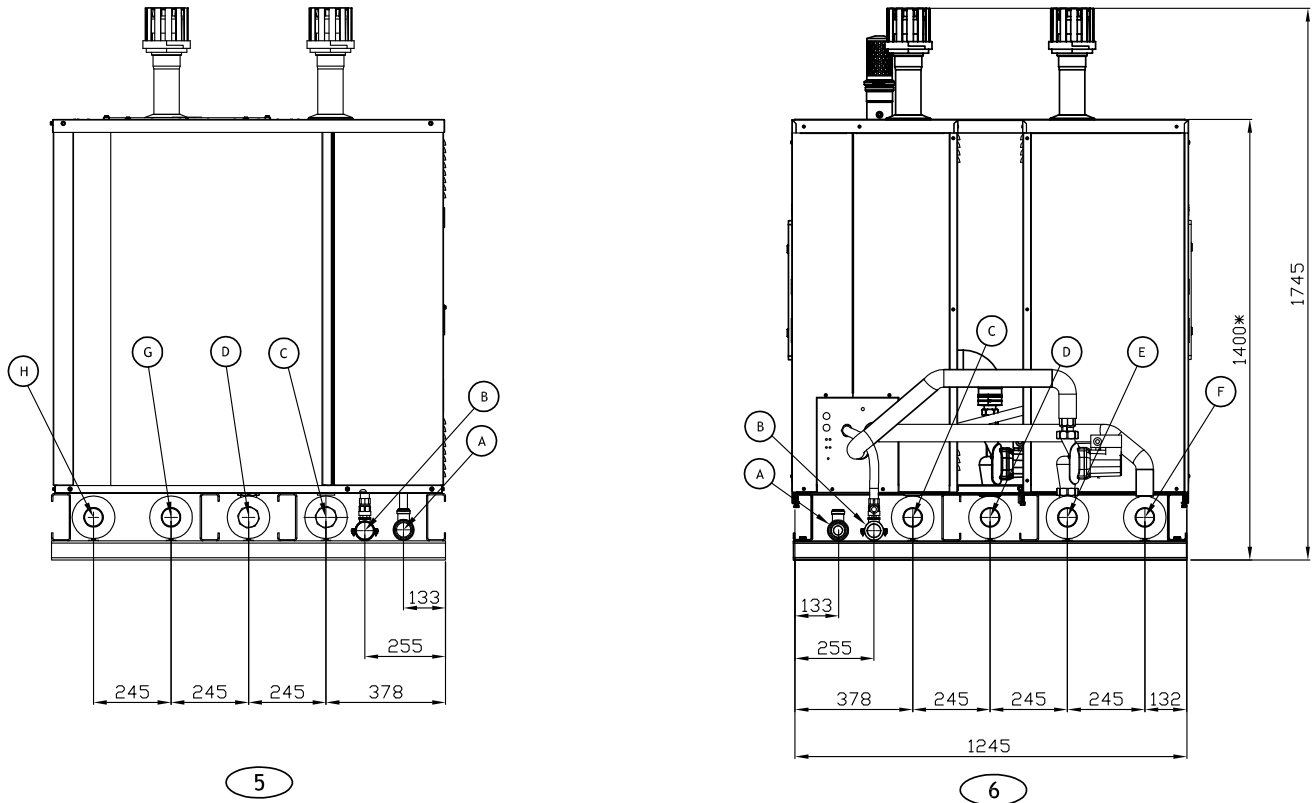


LEGEND

- 3 Configuration 4 pipes, without circulators
- 4 Configuration 4 pipes, with circulators
- A Condensation drain fitting [“G 1 F] (only for appliances with more than one condensation model)
- B Gas union [“G 1 1/2 F]
- C Cold/hot delivery [dia. 2" M]
- D Cold/hot return [dia. 2" M]
- E Hot return [dia. 2" M]
- F Cold delivery [dia. 2" M]
- * silenced models, including nozzle, are 1650 mm high

Right side view (dimensions in mm)

Figure 2.11 – Water, gas and condensate discharge fittings position

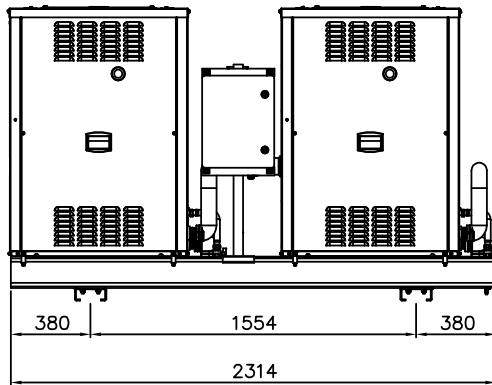


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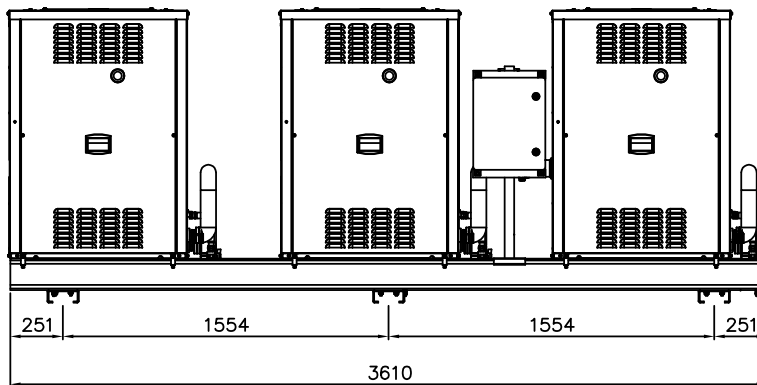
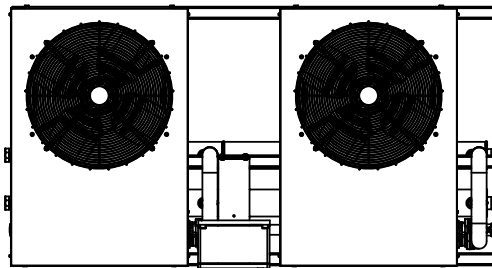
- 5 Left side view
- 6 Right side view
- A Condensation drain fitting [“G 1 F] (only for appliances with more than one condensation model)
- B Gas union [“G 1 1/2 F]
- C Cold/hot delivery [dia. 2" M]
- D Cold/hot return [dia. 2" M]
- E Hot return (union on right only) [dia. 2" M]
- F Hot delivery (union on right only) [dia. 2" M]
- G Hot delivery recovery ACF60-00 HR (union on left only) [dia. 2" M]
- H Hot return recovery ACF60-00 HR (union on left only) [dia. 2" M]
- * silenced models, including nozzle, are 1650 mm high

Right side view (dimensions in mm)

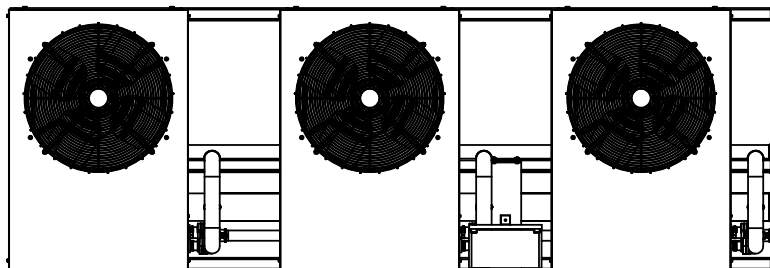
Figure 2.12 – Preassembled ACF/A/AR group (with 2 and 3 units)



A



B



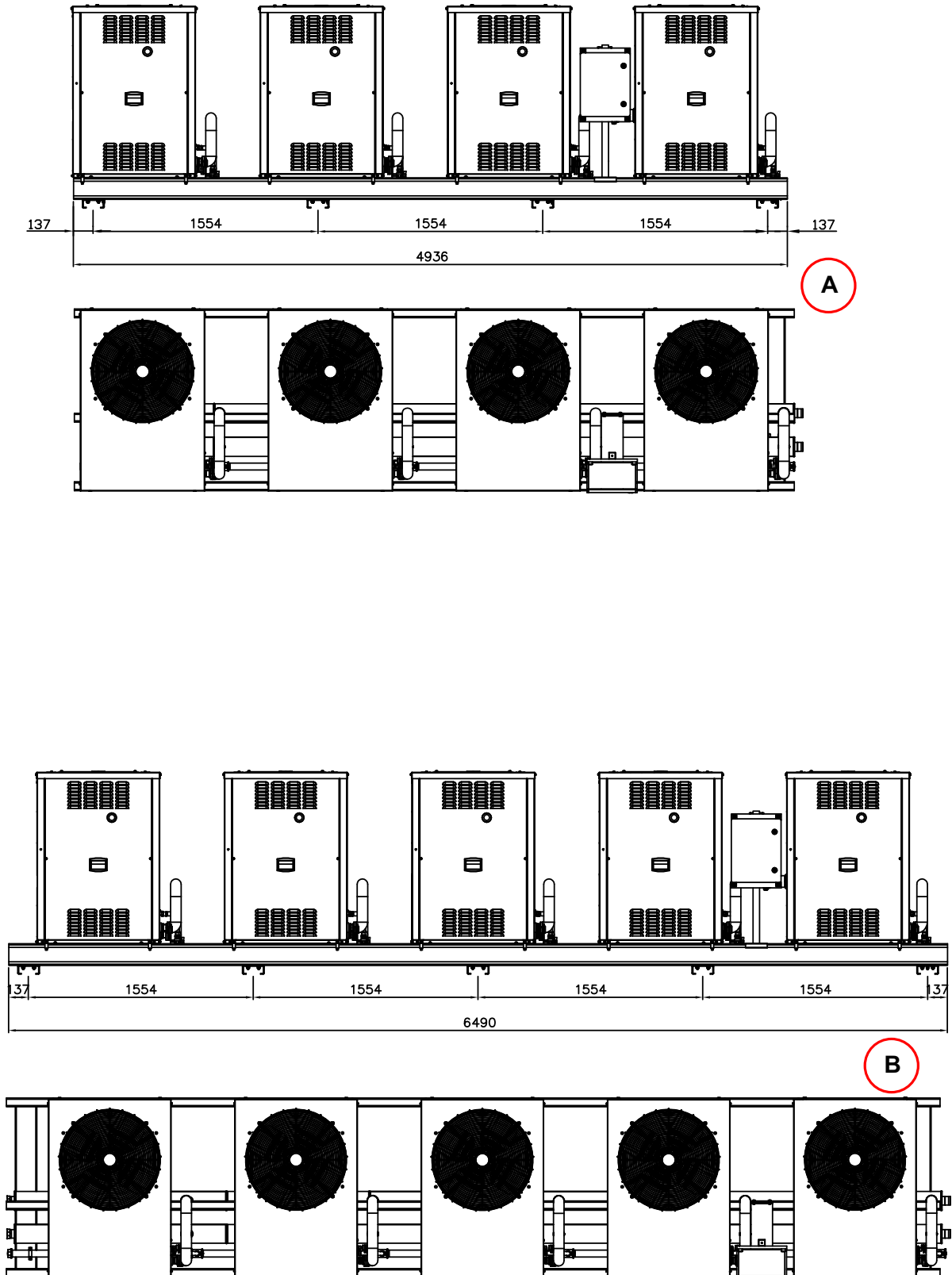
LEGEND

- A 950 kg
- B 1410 kg

NOTE: The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

Figure 2.13 – Preassembled ACF/A/AR group (with 4 and 5 units)



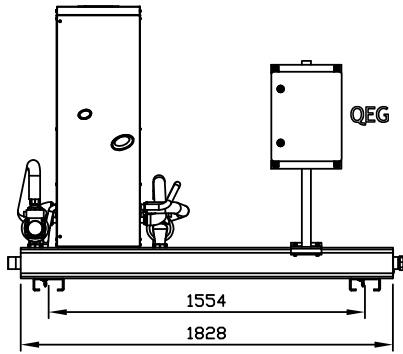
LEGEND

- A 1890 kg
- B 2370 kg

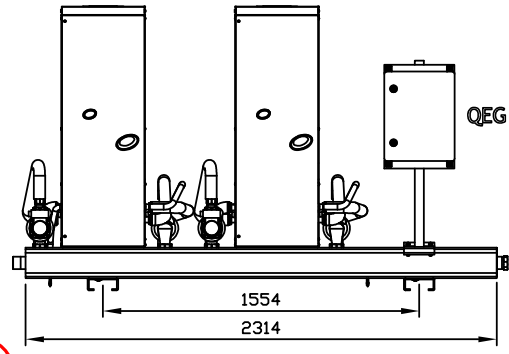
NOTE: The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

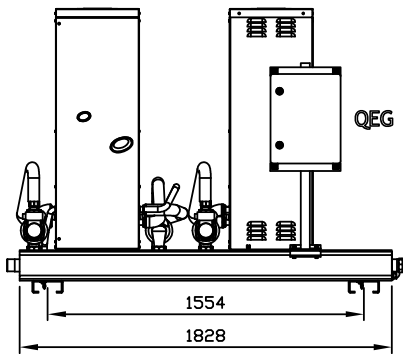
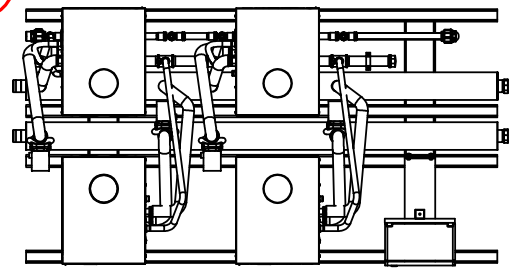
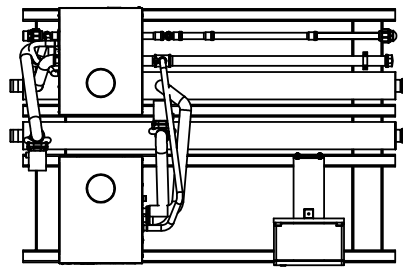
Figure 2.14 – Preassembled AY group (with 2, 3, 4 and 5 units)



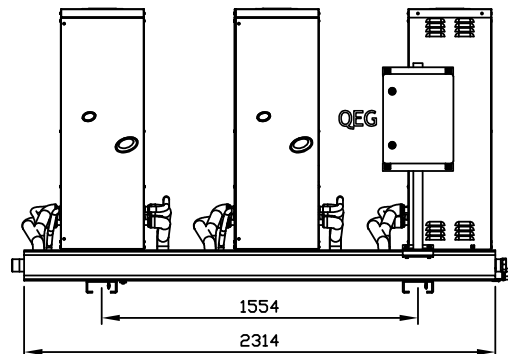
A



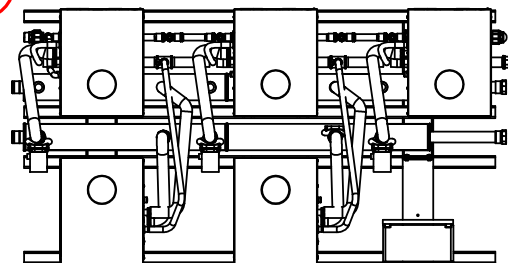
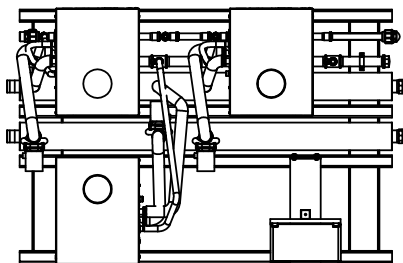
C



B



D



LEGEND

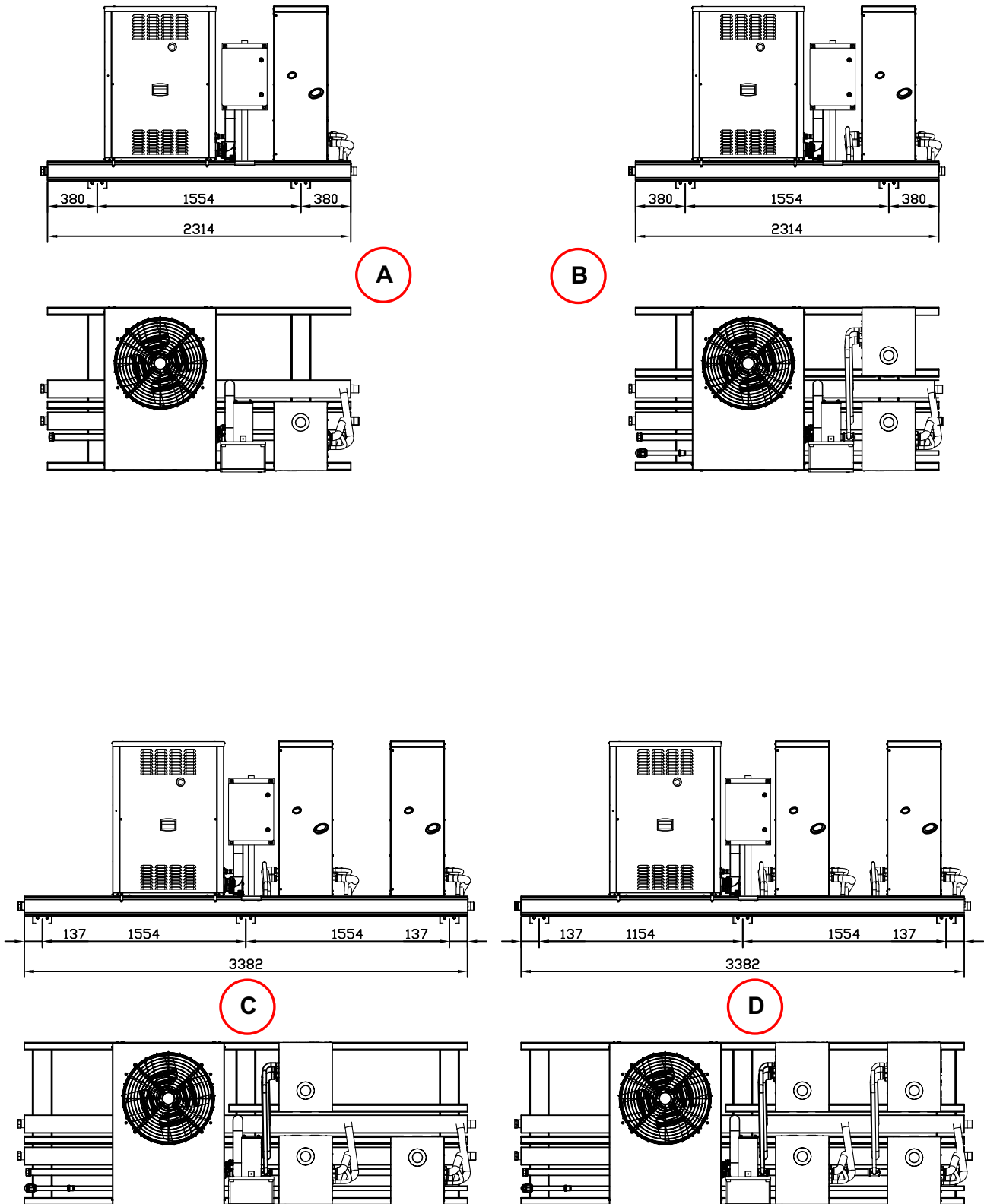
- A** 310 kg
- B** 415 kg
- C** 510 kg

D 640 kg

NOTE: The weight refers to links configured with oversize circulators ("CM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

Figure 2.15 – Preassembled ACF or A or AR + AY group (with 1+1, 1+2, 1+3 and 1+4 units)



LEGEND

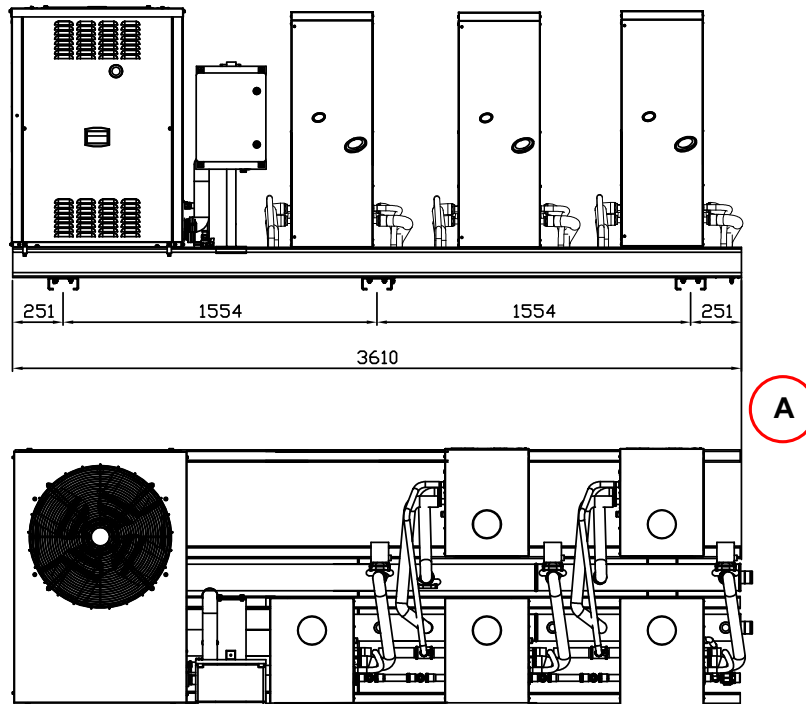
- A 640 kg
- B 750 kg
- C 910 kg

D 1000 kg

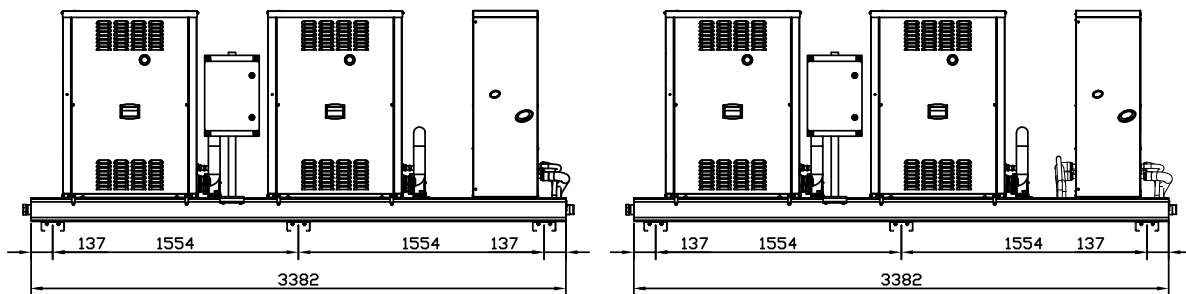
NOTE: The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

Figure 2.16 – Preassembled ACF/A/AR + AY group (with 1+5, 2+1 and 2+2 units)

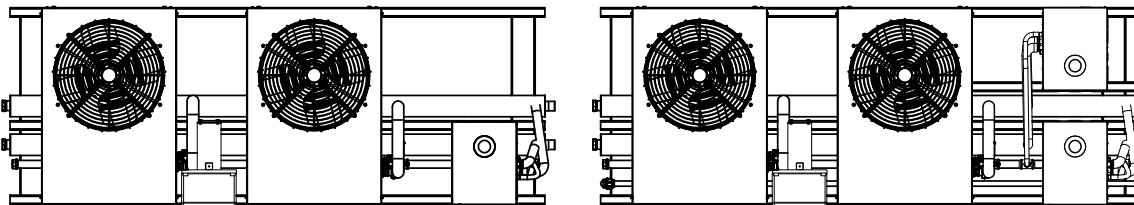


A



B

C



LEGEND

- A** 1155 kg (**)
- B** 1100 kg (*)
- C** 1210 kg (*)

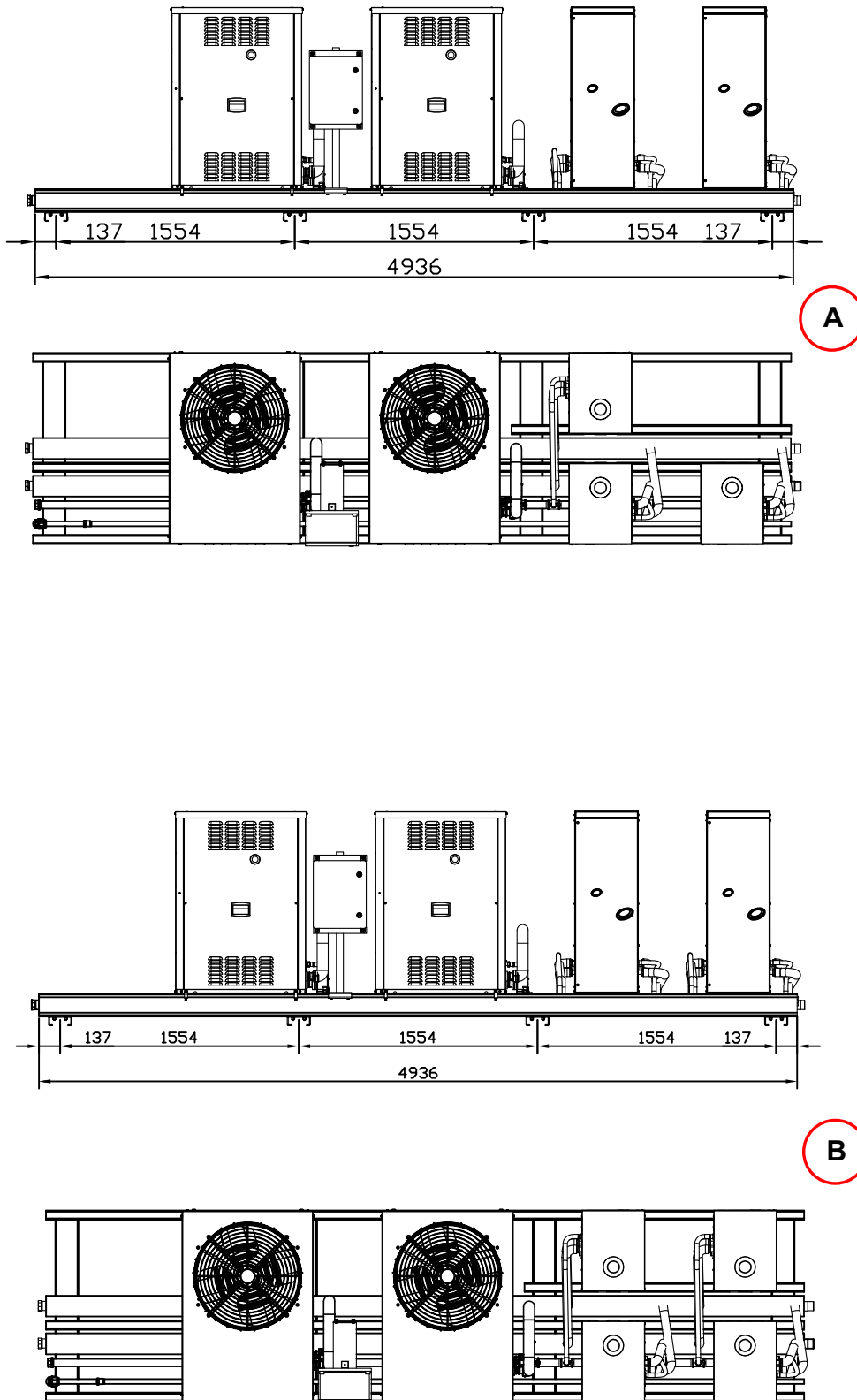
NOTES:

(*) The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

(**) The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

Figure 2.17 – Preassembled ACF/A/AR + AY group (with 2+3 and 2+4 units)



LEGEND

- A 1390 kg (*)
- B 1520 kg (**)

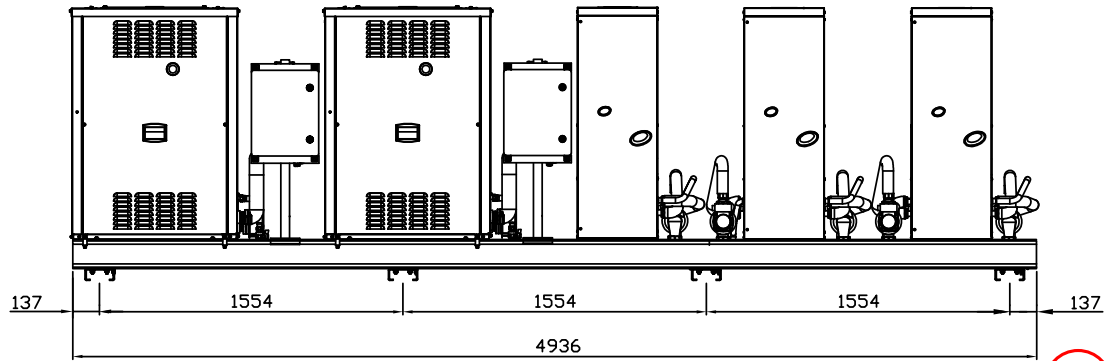
NOTES:

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

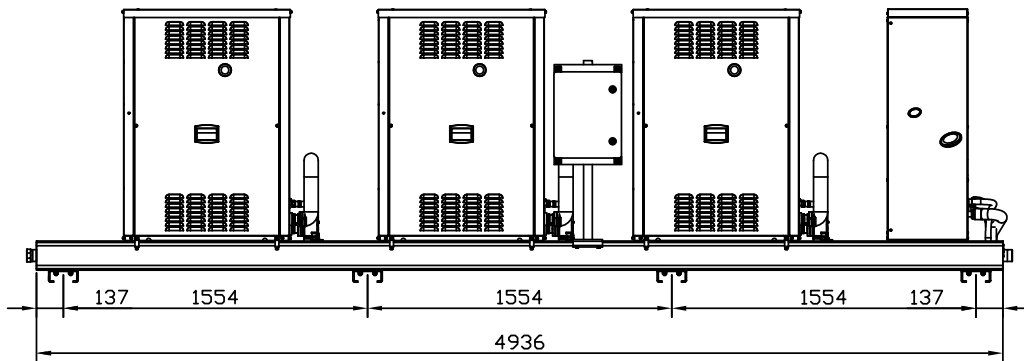
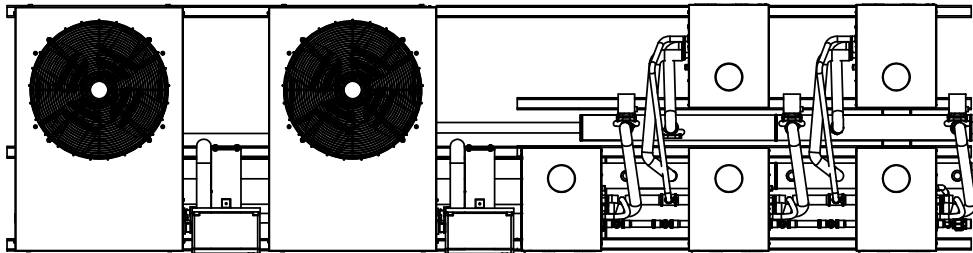
(*) The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

(**) The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

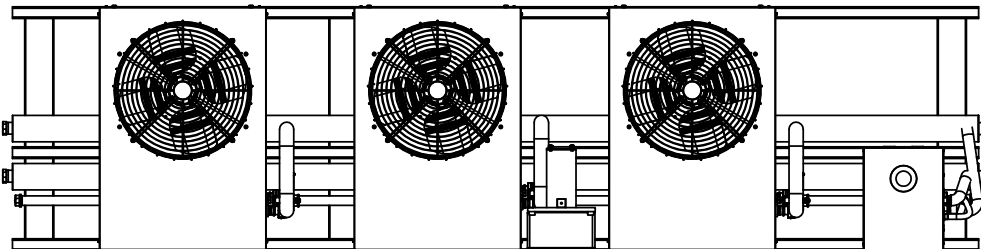
Figure 2.18 – Preassembled ACF/A/AR + AY group (with 2+5 and 3+1 units)



A



B



LEGEND

- A 1650 kg (**)
- B 1580 kg (*)

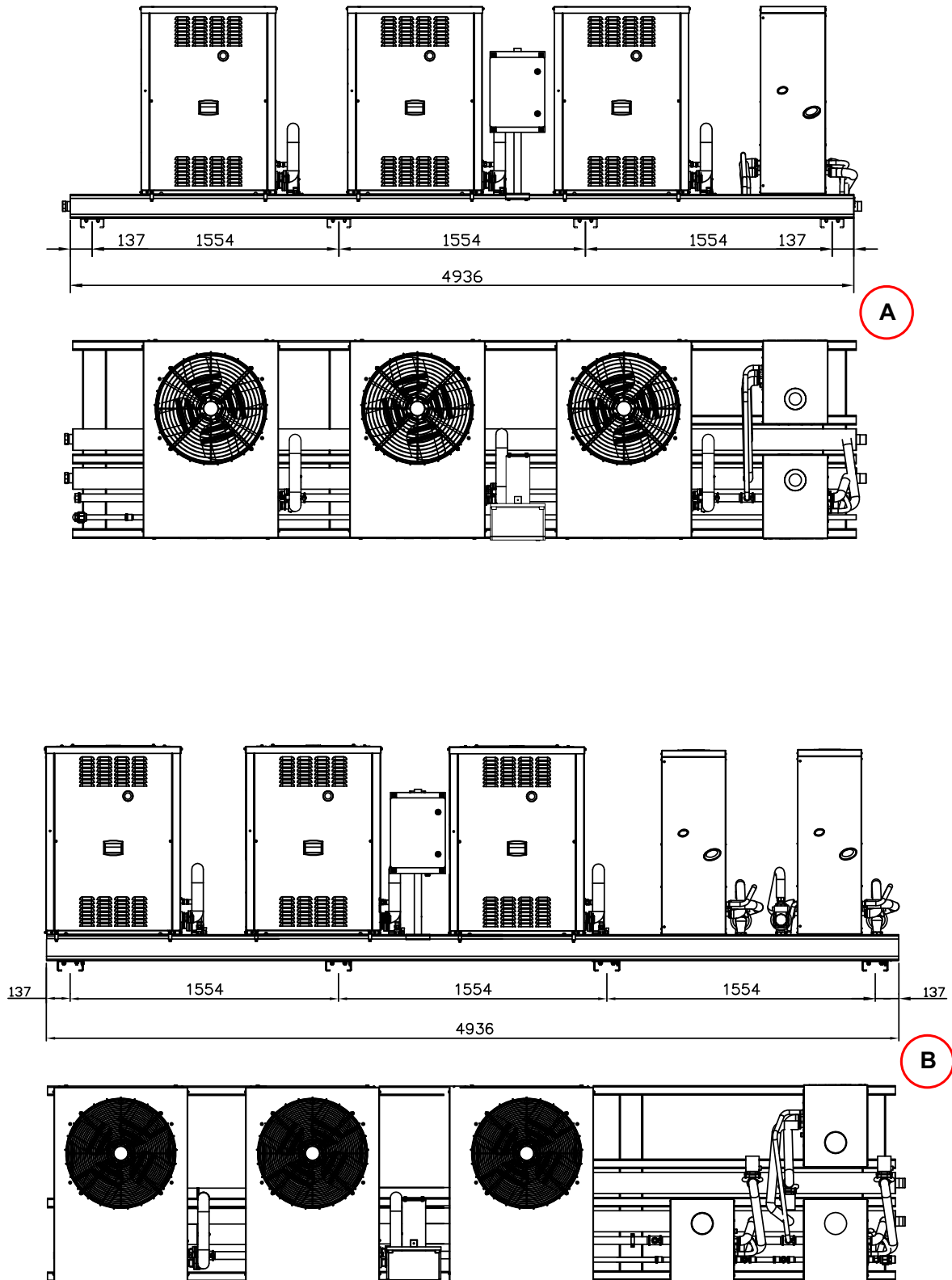
NOTES:

(*) The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

(**) The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

Figure 2.19 – Preassembled ACF/A/AR + AY group (with 3+2 and 3+3 units)



LEGEND

- A 1690 kg (*)
- B 1850 kg (**)

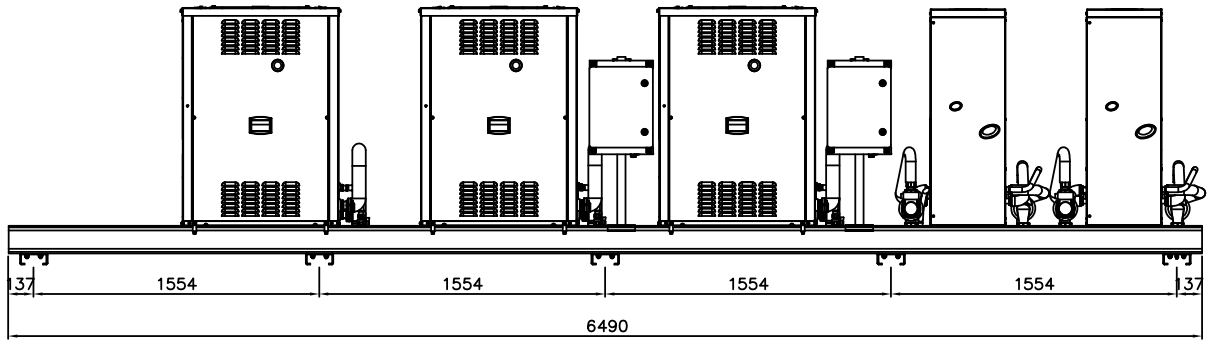
NOTES:

(*) The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

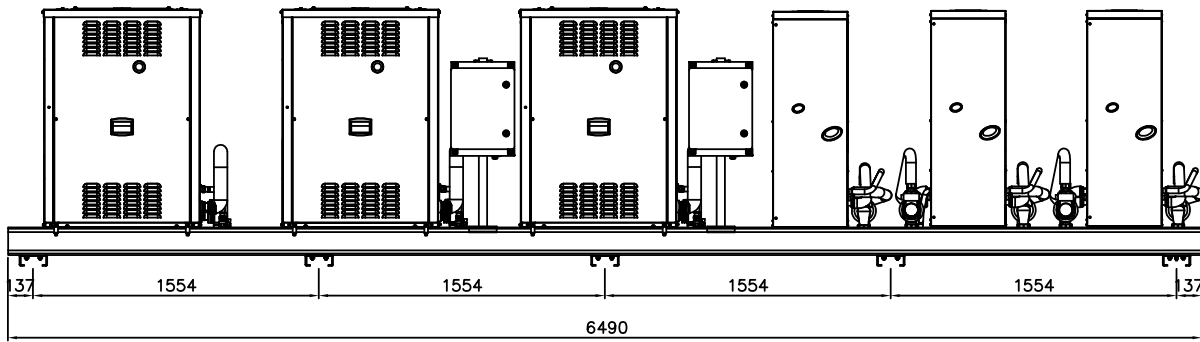
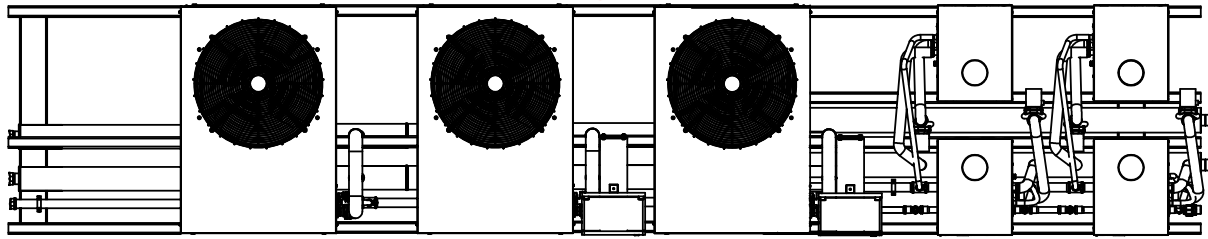
(**) The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

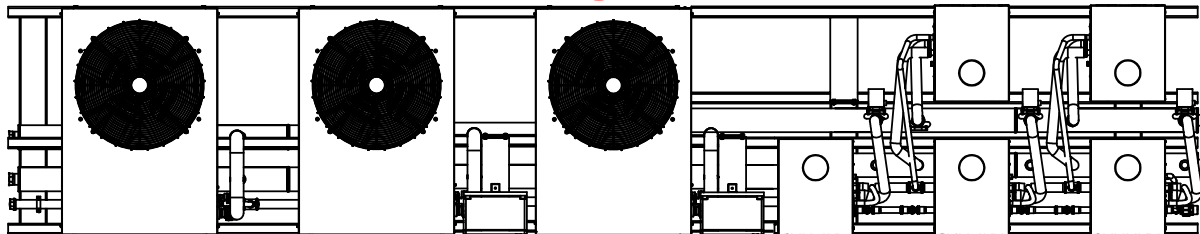
Figure 2.20 – Preassembled ACF/A/AR + AY group (with 3+4 and 3+5 units)



A



B



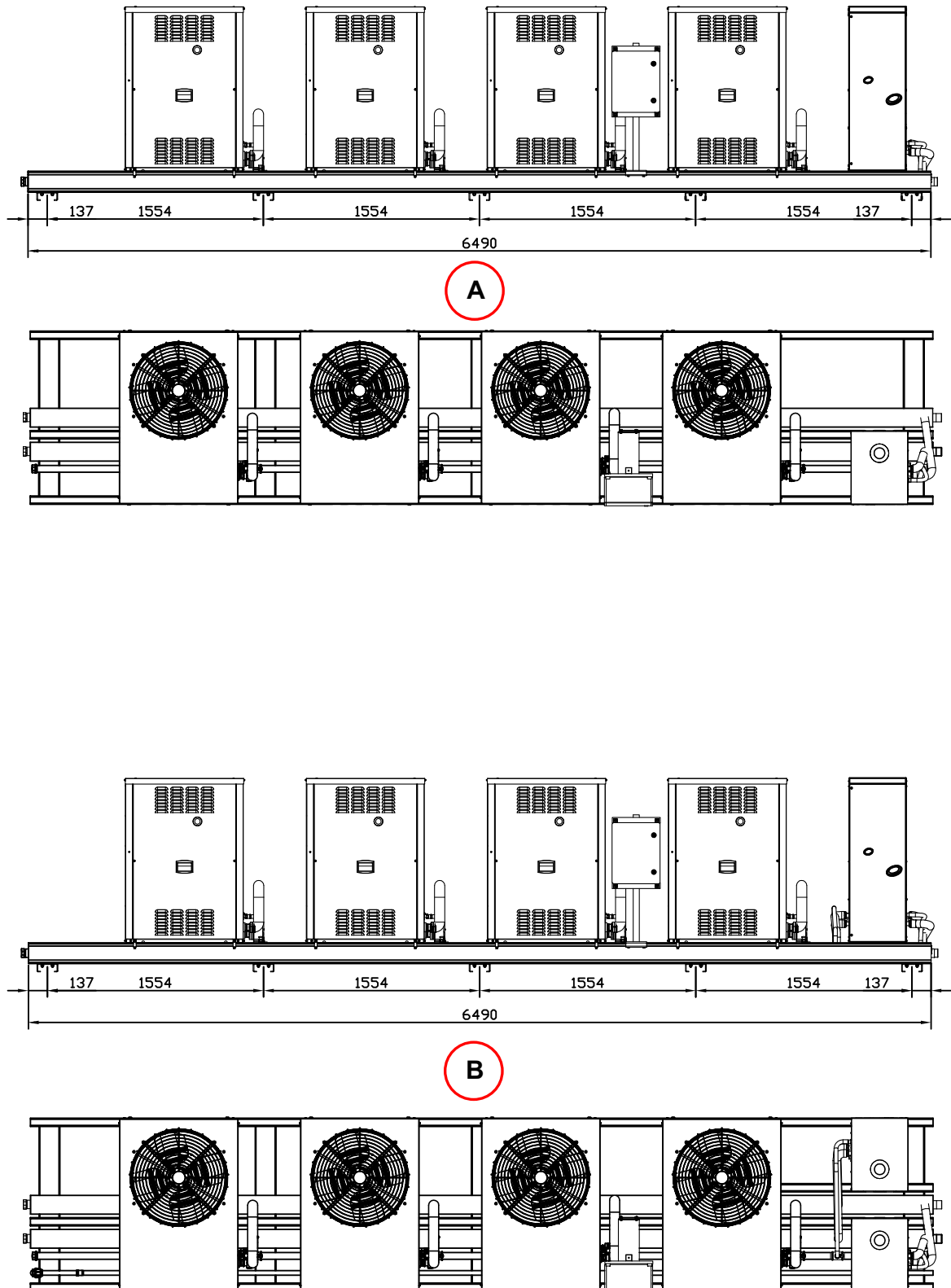
LEGEND

- A 2020 kg
- B 2130 kg

NOTE: The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

Figure 2.21 – Preassembled ACF/A/AR + AY group (with 4+1 and 4+2 units)



LEGEND

- A 2060 kg (*)
- B 2220 kg (**)

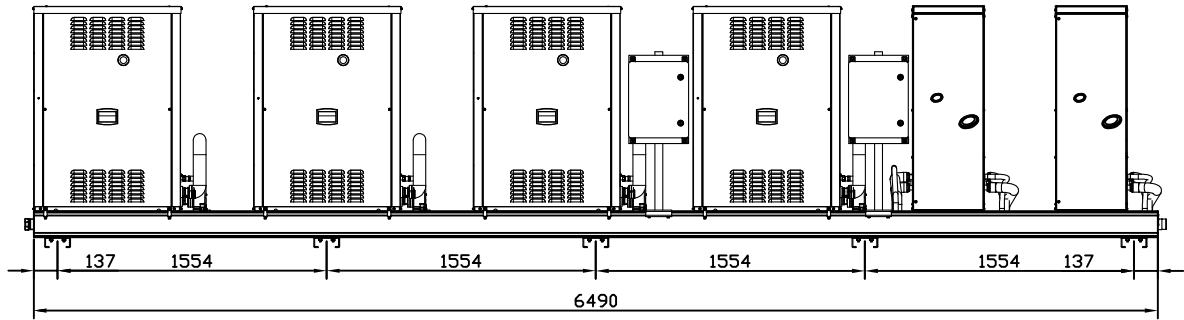
NOTES:

(*) The weight refers to a 2 pipe link (silent ventilation, "S"), configured with oversize circulators ("CM").

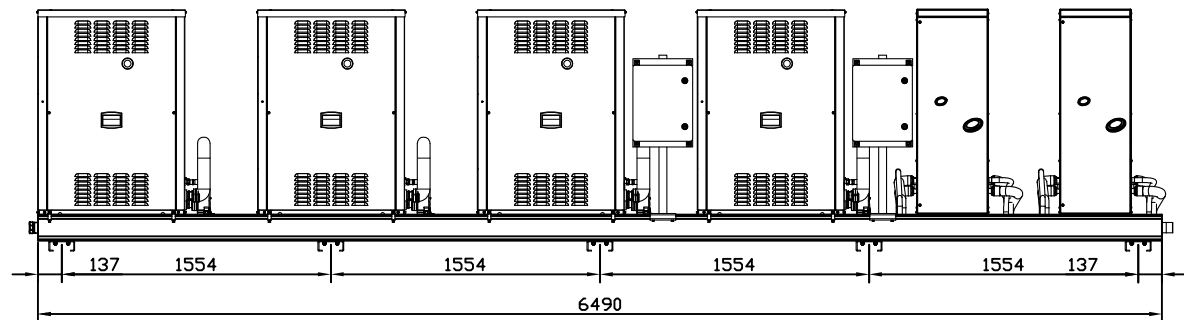
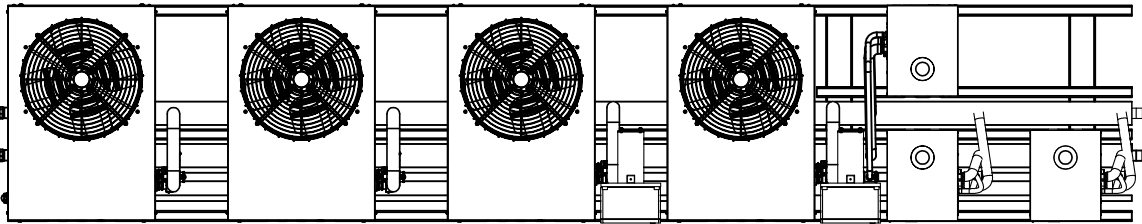
(**) The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

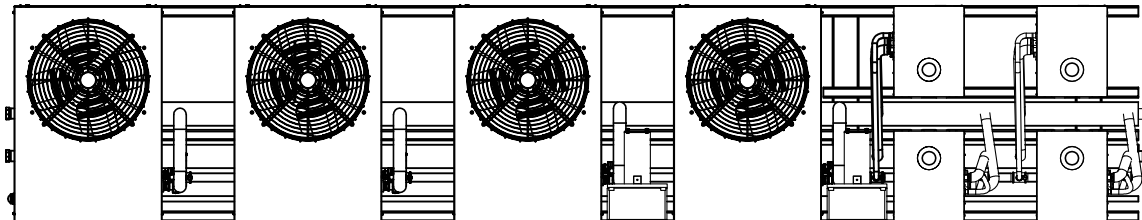
Figure 2.22 – Preassembled ACF/A/AR + AY group (with 4+3 and 4+4 units)



A



B



LEGEND

- A 2350 kg
- B 2440 kg

NOTE: The weight refers to a 4 pipe link (silent ventilation, "S"), configured on both circuits: with oversize circulators ("MM").

Dimensions and weights of preassembled units - front and top view (dimensions in mm).

3 NORMAL OPERATION

3.1 USE OF THE APPLIANCE



Efficient operation and long life of the appliance depend largely on its correct use!

Control of switching on and off of the appliance, as well as management and control of operation of the appliance, occurs via the CCI/DDC.

The CCI, capable of controlling up to 3 uniform modulating units ("RTA", "RTGS" or "RT-WS"), enables:

- control of *modulating* power stages of the units;

The DDC, which can control up to 16 units (e.g.: 4 appliances with 4 units each), handles:

- connection to another 2 DDCs, allowing up to 32 units (with a total of 2 DDCs) or 48 units (with a total of 3 DDCs) to be supported and managed;
- control of *on/off* power stages of the units;
- programming of the operating times of the appliance;
- use in "controller" mode and "monitor" mode (i.e. non-controller).

Furthermore, the CCI/DDC enables:

- control of the water inlet and outlet temperature with relation to the appliance;
- visualisation on the LCD display of operating conditions and parameters of each unit of the appliance (temperature, description of any Machine Codes arising, operation time, etc.);
- resetting, where possible, operating codes.



For correct use of the appliance and CCI/DDC, refer to the latter's documentation, supplied with the appliance.

Visualising and clearing of operating codes

Operating codes can be generated by the CCI/DDC or by the on board controller of the unit to which the code refers.

The Machine Codes generated by the CCI/DDC may only be viewed on the display of the CCI/DDC and may be cleared only through the CCI/DDC.



For the description and resetting of the operating codes generated by the CCI/DDC, refer to the CCI/DDC handbook and the list of codes contained therein.

The operating codes generated by the on board controller are visualised on its display and may also be visualised on the display of the CCI/DDC. Operating codes can be reset with the controller itself or from the CCI/DDC (where possible).



For the description and resetting of operating codes generated by the controller, refer to the manual supplied with single unit.

3.2 PROLONGED PERIODS OF DISUSE

When the appliance is to be inactive for a long period, it is necessary to disconnect the appliance before the period of disuse and reconnect it before it is used again.

To carry out these operations, contact a reputable hydraulic system installation technician.

Disconnecting the appliance before the period of disuse



You will need: the appliance connected to the power/gas supply. Necessary equipment and materials.

1. If the appliance is in operation, switch it off with the CCI/DDC (or other enable switches) and wait for the shutdown cycle to terminate completely.
2. Close the gas valve, depending on antifreeze function settings (see hydraulic installer section of respective handbook).
3. Deactivate the CCI/DDC electrically if it is not powered by the transformer present in the general electrical panel.
4. Disconnect the appliance from the power supply, depending on antifreeze function settings, by setting the external breaker (IR - see par. 5.1 CONNECTING THE APPLIANCE TO THE MAINS → 42) installed in the cabinet to "OFF".



Do not leave the appliance connected to the power and gas supply if it is expected to remain inactive for a long period.



If the appliance is disconnected in the run up to winter, make sure that there is a sufficient glycol concentration in the internal (for each unit) and system circuits.

Connecting the appliance before it is used again (to be carried out by the installation technician)

Before starting this procedure, the hydraulic system installation technician must:

- ascertain whether the appliance requires any maintenance (contact your authorised Robur Technical Assistance Centre or refer to the respective unit handbook);
- check that the water content of the plant is correct; if necessary, top up the circuit to at least the minimum quantity (see Paragraph 4.6 FILLING THE SYSTEM CIRCUIT (APPLIANCE) → 41);
- if necessary, add inhibited monoethylene glycol antifreeze (free of impurities) in a quantity in proportion to the MINIMUM winter temperature in the area of installation (see Table in respective unit handbooks, supplied with appliance);
- bring the plant to the correct pressure, making sure that the pressure of the water in the plant is not less than 1 bar and not over 2 bar.



In case of winter seasonal switch-off or long period of stopping, we suggest to not empty the hydraulic circuit: in that case possible oxidation process can occur. This oxidation process could damage both the hydraulic system and also the Robur heat pump. It's important to verify that no leakages occur in the hydraulic circuit that may empty part of the system. The above recommendation is necessary in order to avoid to fill continuously with water that may imply the additional introduction of oxygen and the consequent dilution of the used inhibitor, for ex glycol. In case of presence of glycol, Robur advises to use inhibited glycol. Galvanized pipes are not recommended, as they are not compatible with glycol.



You will need: the appliance disconnected from the electricity and gas supply. Necessary equipment and materials.

1. Open the gas supply tap to the plant and ascertain that there is no smell of gas (indicating possible leaks);



if you smell gas, close the gas valve again immediately without operating any other electrical device and, from a safe place, request the assistance of professionally qualified personnel.

1. If no smell of gas is detected, connect the appliance to the electricity supply mains via the external circuit breaker provided by the installation technician in the appropriate panel (set the "IR" circuit breaker to the "ON" position - see Paragraph 5.1 CONNECTING THE APPLIANCE TO THE MAINS → 42).
2. Check that the magnetothermic switches (I1, I2, etc) and the internal circuit breaker "IG" of the general electrical panel are in the "ON" position (see Paragraph 5.1 CONNECTING THE APPLIANCE TO THE MAINS → 42).
3. Power up the CCI/DDC electrically if it is not powered by the transformer present in the general electrical panel.
4. Check that the hydraulic plant is suitably sized to guarantee the correct water flow.
5. Switch the appliance on with the CCI/DDC (or other enable switches).
6. Check if the appliance requires maintenance: consult the paragraph in the book (supplied) relative to the specific unit. Particularly check the complete functionality of the condensate drain trap (for condensation units only).



Icing of condensate during the period of disuse can lead to a permanent locked condition. In this case, the first symptom would be a lack of condensate draining in condensation mode (outlet water temperature less than 50 °C).

4 HYDRAULIC INSTALLATION

In this section you will find all the instructions necessary for the hydraulic installation.

4.1 GENERAL INSTALLATION PRINCIPLES



Before proceeding with operations to create the hydraulic and gas supply plant of the appliance, the professionally qualified personnel concerned are advised to read, on the specific unit manual, the Paragraph "Warnings": it provides important information regarding installation safety and references to current regulations.



Prior to installation, carry out careful internal cleaning of all pipes and every other component to be used both on the hydraulic plant and the fuel supply plant, in order to remove any residues that may compromise operation of the appliance.

Installation of the appliance must be carried out in compliance with current regulations regarding design, installation and maintenance of heating and cooling plants and must be undertaken by professionally qualified personnel in accordance with the manufacturer's instructions.

During the installation stage, observe the following indications:

- Check that there is sufficient gas supply, as indicated by the Manufacturer; for supply pressures, refer to the respective unit handbooks.
- The appliance must be installed on the outside of buildings, in an area in which air circulates naturally and which does not require any particular protection from weather phenomena. **In no case must the appliance be installed inside a room.**
- No obstruction or overhanging structure (protruding roofs, eaves, balconies, ledges, trees) may obstruct the exhaust fumes outlet at the top of the appliance.
- Do not install the appliance in the immediate vicinity of flue outlets, chimneys or other such features, so as to prevent warm or polluted air from being drawn in by the combustion fan.
- If the appliance is installed near buildings, make sure it is not on the dripping line from gutters or similar.
- A cut-off valve and vibration damping coupling must be fitted on the gas supply.
- For other indications refer to specific unit manual.

4.2 POSITION OF THE APPLIANCE

Lifting the appliance and placing it in position

Do not remove packaging during handling on the installation site.



Packing must only be removed upon final installation.



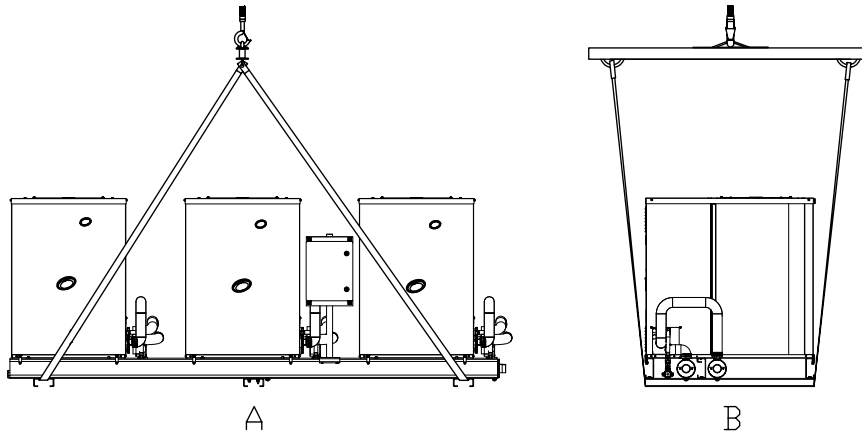
When unpacking the appliance - links composed of AY units - do not remove the sticker protecting the flue hole from the units' top panels. **The protective sticker**, to prevent water and foreign matter entering the appliance, **may be removed only when the flue kit is being installed.**

If the appliance has to be lifted, connect two cables to the holes provided on the base and use suspension and spacer bars to prevent the cables of the hoist from damaging the panels while the appliance is moved (see Figure 4.1 → 33).



The hoist and all accessory equipment (braces, cables, bars) must be of adequate dimensions in relation to the load to be lifted. For the weight of the appliance, see the technical data tables in Section 2 OVERVIEW AND TECHNICAL FEATURES → 6. **The manufacturer cannot be held responsible for any damage that occurs during the setting up of the appliance.**

Figure 4.1



LEGEND

- A Front view
- B Side view

Handling/moving the appliance

The appliance can be installed at ground level, or on a terrace or roof (if they are able to sustain its "dimensions" and "weight"). **The appliance must be installed in an area which is always accessible.**



For the dimensions and weight of the appliance, see the technical data tables in Section 2 OVERVIEW AND TECHNICAL FEATURES → 6.

Supporting base

Always place the appliance on a levelled flat surface made of fireproof material and able to support the weight of the appliance.

- **Installation at ground level**

If a horizontal base is not available (see also "Supports and levelling"), it is necessary to create a flat level base in concrete at least 100-150 mm larger than the dimensions of the base of the appliance on each side.

For the dimensions of the appliance, see the technical data tables in Section 2 OVERVIEW AND TECHNICAL FEATURES → 6.

- **Installation on a terrace or roof**

Position the appliance on a levelled flat surface made of fireproof material (see also "Supports and levelling").

The structure of the building must be able to sustain the weight of the appliance added to that of the supporting base.

For the weight of the appliance, see the technical data tables in Section 2 OVERVIEW AND TECHNICAL FEATURES → 6.

In addition, it is advisable to use flexible connections (anti-vibration joints) between the appliance and the hydraulic and gas supply pipes.



Avoid placing the appliance on the roof directly above locals requiring quietness.

Supports and levelling

The appliance must be correctly levelled by placing a spirit level on the upper part. If necessary, level the appliance with metal shimming; do not use wooden spacers as these deteriorate quickly.

Clearances

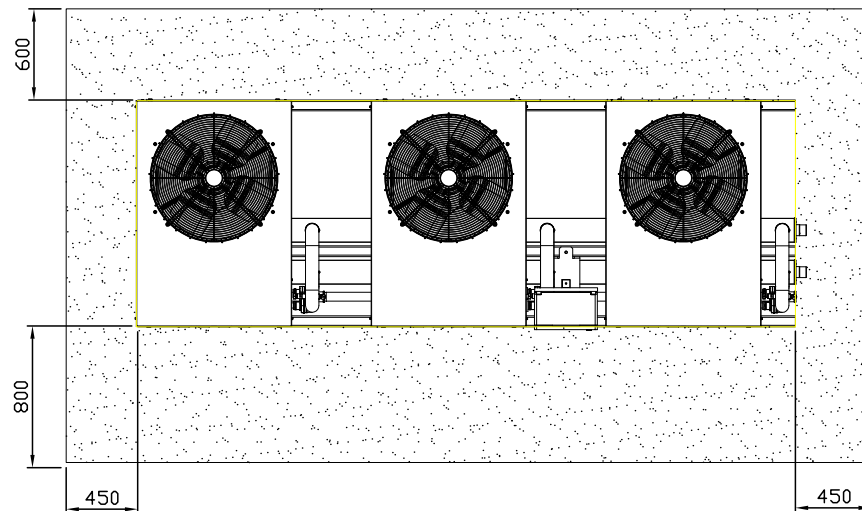
Position the appliance so as to maintain **minimum clearances** from combustible surfaces, walls or other appliances, as illustrated in Figure 4.2 → 34.



Minimum clearances are necessary in order to be able to carry out maintenance operations and to be able to guarantee the correct flow of air required for combustion: install a walkway around the appliance if necessary.

Position the appliance preferably out of range of rooms and/or environments where strict silence is required, such as bedrooms, meeting rooms, etc.

Figure 4.2



Minimum clearances (dimensions in mm)

4.3 HYDRAULIC CONNECTIONS

General indications

- The hydraulic plant may be created using pipes in stainless steel, black steel, copper or crosslinked polyethylene suitable for heating and cooling plants. All water pipes and connections must be adequately insulated in accordance with current norms, to prevent heat dispersion and the formation of condensate.
- If glycol antifreeze is to be used (see Paragraph 4.6 FILLING THE SYSTEM CIRCUIT (APPLIANCE) → 41), DO NOT USE galvanised pipes or pipe fittings as these are subject to potential corrosion phenomena when glycol is present.
- When rigid pipes are used, in order to prevent the transmission of vibrations, we recommended connecting the water inlet and outlet of the appliance with anti-vibration joints.



As regards the SYSTEM WATER QUALITY, see the paragraph "Hydraulic Unions" in the handbooks of the link units (supplied).

The components described below, to be fitted in proximity to the appliance, are illustrated in the typical hydraulic plant schemes in Figures 4.3 → 37, 4.4 → 38, 4.5 → 39 and 4.6 → 40.

- FLEXIBLE JOINTS on water and gas connections of the appliance.
- PRESSURE GAUGES installed in the water inlet and outlet pipes (for LINKS in the "SC" configuration).
- FLOW REGULATOR VALVE (shutter or balancing) at the appliance's water inlet (for LINKS in the "SC" configuration).
- WATER FILTER installed in the appliance water inlet pipe with a mesh of minimum 0,7 mm, maximum 1 mm.
- ISOLATION BALL VALVE on the water and gas pipes of the installation.
- EXPANSION TANK (for individual appliance) installed in the appliance water outlet pipe.
- PLANT EXPANSION TANKS installed in the appliance water outlet pipe.



The system circuit requires a separate expansion tank, sized in relation to the maximum temperature range and maximum operating pressure of the water in the plant (see the figures mentioned above).

- 3 BAR SAFETY VALVE installed on the outlet water pipe.
- HYDRAULIC SEPARATOR complete with air bleeder valve and drain tap.
- Plant WATER CIRCULATION PUMP (or circulator - "secondary side"): located on the water delivery to the plant (secondary side), rated to suit the plant.
- WATER CIRCULATION PUMP (or shared circulator for LINKS "without circulators" - "primary side"): located on the water return pipe (primary side), delivery towards appliances, rated to suit the plant.
- PLANT FILLING SYSTEM: if automatic filling systems are used, a seasonal check of the percentage of monoethylene glycol in the plant is recommended.



Antifreeze

To prevent icing inside the circuit, the modules are equipped with an antifreeze function.

If previously enabled, the antifreeze function will only work on "active" modules. The active module antifreeze function, starts the external water circulation pump (if the pump is controlled by the appliance) and if necessary, for hot modules, can also start the corresponding burner (if necessary and where requested: see Paragraph MACHINE OPERATING CODES of the manuals supplied with the single unit: ex. code u51, u651 e u679).



Active and passive modules

If the appliances are not controlled by a DDC:

in the "only cold", "only hot" and 4 pipe type (hot and cold) appliances, modules are always "Active" modules;

In the 2 pipe type (hot or cold), the "Active" module is the one that operated the last shutting-off cycle; the other module will be the "Passive" module.

If the appliances are controlled by a DDC:

if the DDC manages a 2 pipe type plant (only hot, or only cold), or a 4 pipe type plant (hot and cold): the modules of the appliance are always all "Active" modules;

if the DDC manages a 2 pipe type plant (hot or cold): the "Active" module of the appliances is determined by the function set on the DDC. As an example, if on the DDC is set the heating function, all the hot modules managed by the DDC will be the "Active" modules of the appliance. All the cold modules managed by the same DDC will instead be the "Passive" modules of the appliance.



It is therefore necessary to ensure a continuous supply of electricity and gas to the appliance throughout the whole of the winter period. If it is not possible to ensure a continuous supply of electricity and gas to the appliance, use glycol antifreeze of the inhibited monoethylene type.

If glycol antifreeze is to be used in the hydraulic circuit, DO NOT USE galvanised pipes and connections.

Consult the notes on "Possible use of glycol antifreeze" contained in Paragraph 4.6 FILLING THE SYSTEM CIRCUIT (APPLIANCE) → 41 and in any case the technical specifications of the glycol to be used).

The sizing of the tubes and of the pump must guarantee the nominal water flow rate necessary for the correct operation of the appliance (for calculation of internal pressure drops of the appliance refer to the technical data tables in Section 2 OVERVIEW AND TECHNICAL FEATURES → 6).



The operations necessary for the First Activation or Regulation of the appliance and of the DDC must be carried out exclusively by an authorised Robur Technical Assistance Centre (TAC). These operations are described in Paragraph "INITIAL ACTIVATION AND MAINTENANCE" of the manual supplied with the specific unit.



The products' guarantee is void if initial activation is not carried out by a Robur TAC.

Figure 4.3 → 37 and Figure 4.4 → 38 below show two typical examples of hydraulic plants for a single appliance and for 2 appliances ("CC" configuration, with pump).

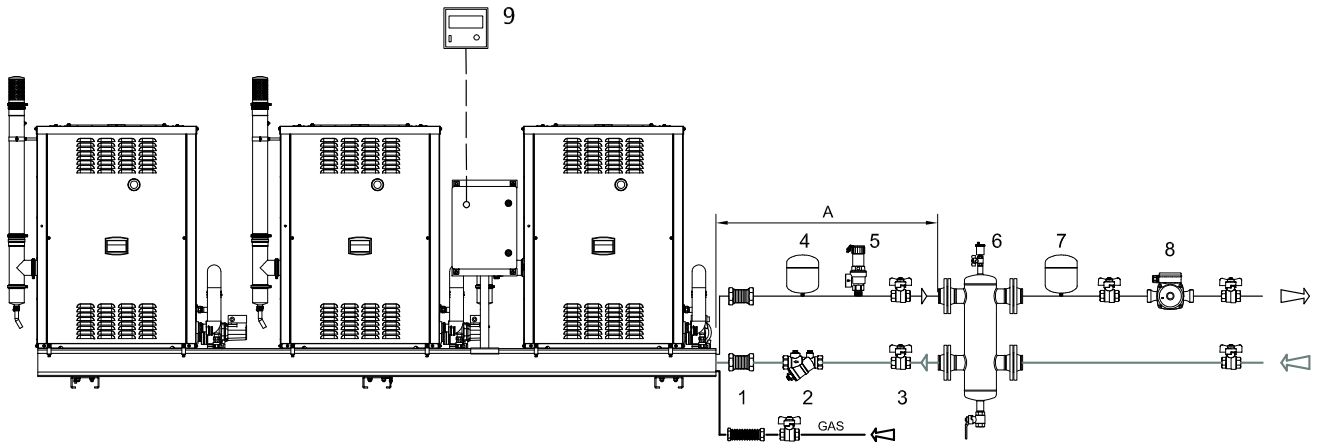
Figure 4.5 → 39 and Figure 4.6 → 40 shows, by way of example, hydraulic plant diagram for the utilisation of one or several appliances - "SC" configuration, without pump.

Naturally with appliances in "CC" configuration (with circulators) and in "SC" configuration (without circulators) it is possible to set up other plant solutions.



For information or technical support in this regard, contact Robur S.p.A.'s Presales office (tel. +39 035.888.111).

Figure 4.3

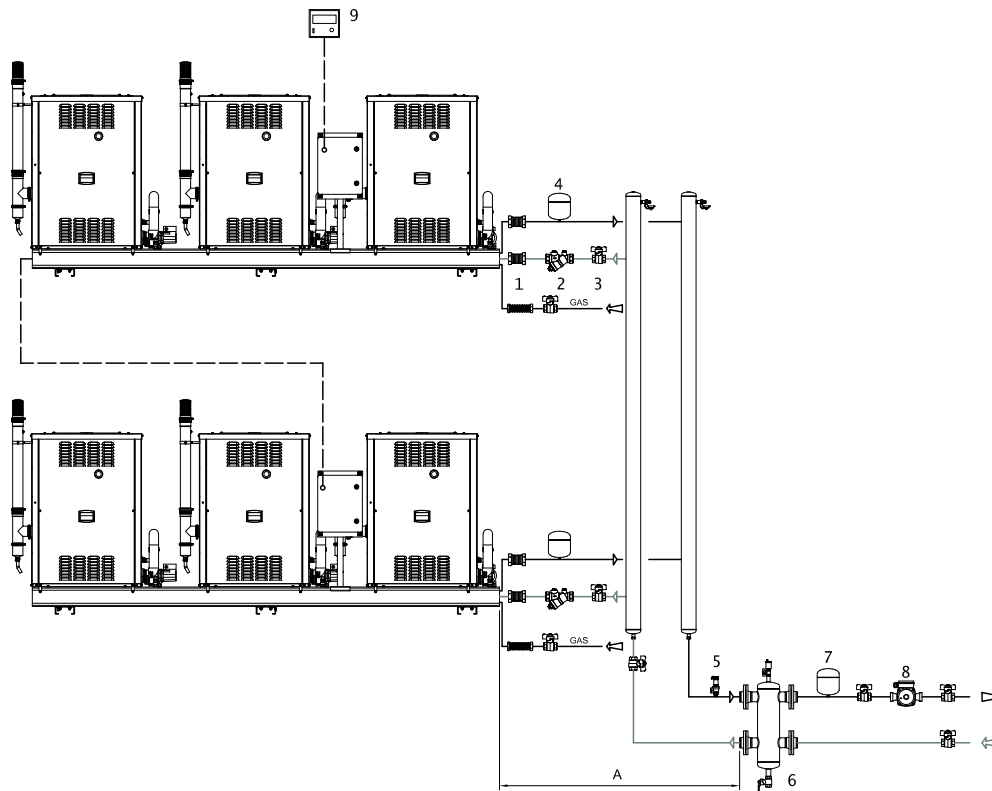


LEGEND

- 1 antivibration joints
- 2 water filter (mesh min. 0,7 - max. 1 mm)
- 3 shut-off valve
- 4 expansion tank primary circuit
- 5 safety valve 3 bar
- 6 hydraulic separator (with air valve and drainage tap)
- 7 expansion tank secondary circuit
- 8 secondary circuit pump
- 9 Direct Digital Controller (DDC)
- A max. useful head 0,2 bar

Typical hydraulic diagram for connection of n. 1 RTCR "CC" configuration

Figure 4.4

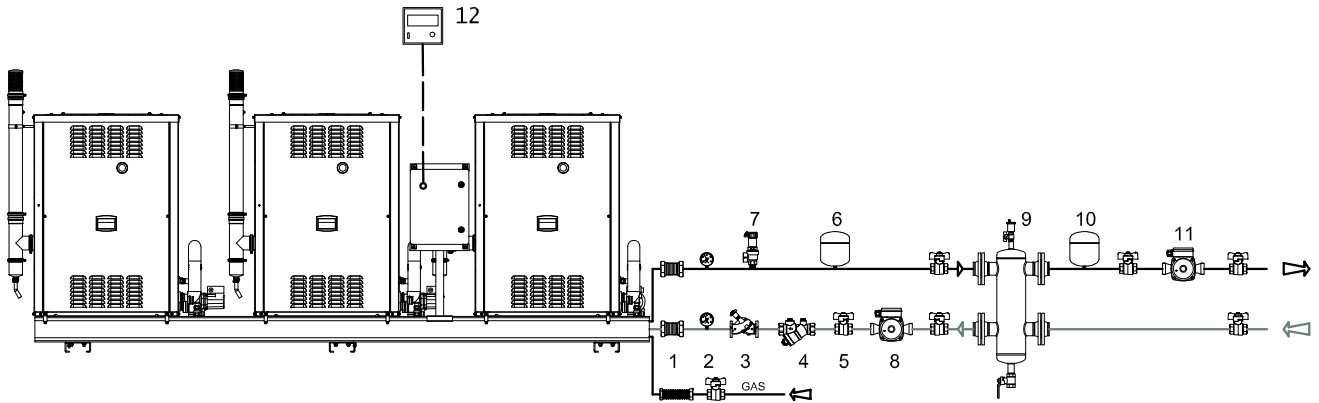


LEGEND

- 1 antivibration joints
- 2 water filter (mesh min. 0,7 - max. 1 mm)
- 3 shut-off valve
- 4 expansion tank primary circuit
- 5 safety valve 3 bar
- 6 hydraulic separator (with air valve and drainage tap)
- 7 expansion tank secondary circuit
- 8 secondary circuit pump
- 9 Direct Digital Controller (DDC)
- A max. useful head 0,2 bar

Typical hydraulic diagram for connection of n. 2 RTCR "CC" configuration

Figure 4.5

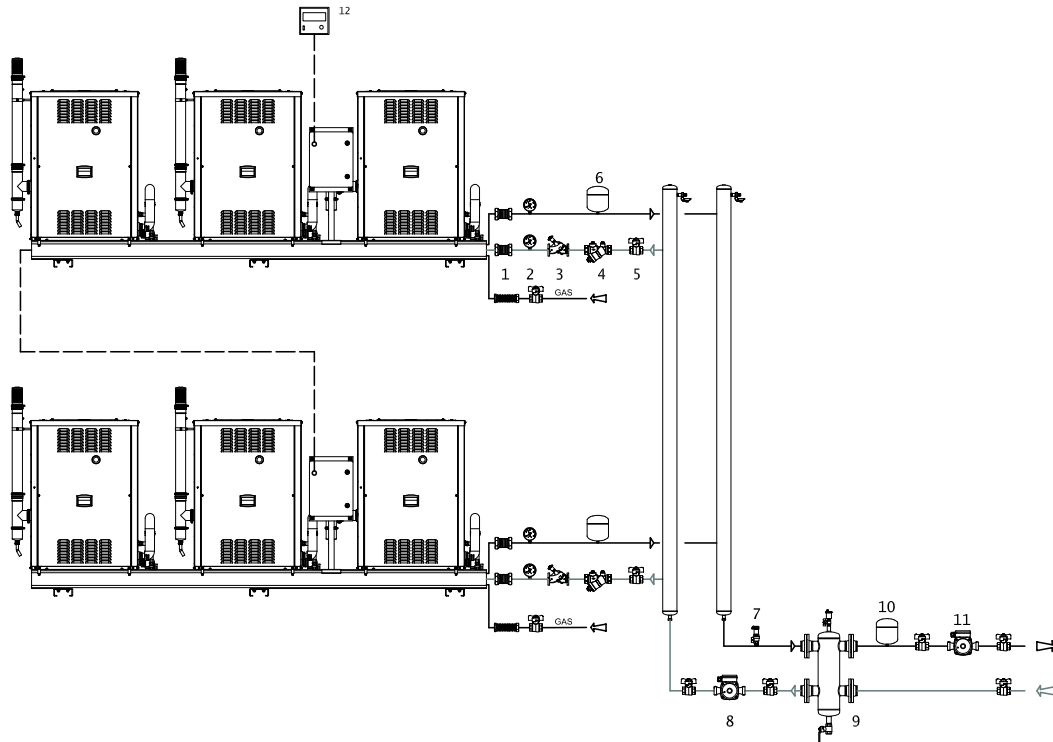


LEGEND

- 1 antivibration joints
- 2 manometer
- 3 Flow regulator valve
- 4 water filter (mesh min. 0,7 - max. 1 mm)
- 5 shut-off valve
- 6 expansion tank primary circuit
- 7 safety valve 3 bar
- 8 primary circuit pump
- 9 hydraulic separator (with air valve and drainage tap)
- 10 expansion tank secondary circuit
- 11 secondary circuit pump
- 12 Direct Digital Controller (DDC)

Typical hydraulic diagram for connection of n. 1 RTCR "SC" configuration

Figure 4.6



LEGEND

- 1 antivibration joints
- 2 manometer
- 3 Flow regulator valve
- 4 water filter (mesh min. 0,7 - max. 1 mm)
- 5 shut-off valve
- 6 expansion tank primary circuit
- 7 safety valve 3 bar
- 8 primary circuit pump
- 9 hydraulic separator (with air valve and drainage tap)
- 10 expansion tank secondary circuit
- 11 secondary circuit pump
- 12 Direct Digital Controller (DDC)

Typical hydraulic diagram for connection of n. 2 RTCR "SC" configuration

4.4 GAS SUPPLY

The installation of gas supply pipes must be compliant with current regulations and norms.

The gas supply pressure must correspond to the specification of the gas supply pressure table (see respective unit handbooks).



Supplying gas to the appliance at pressures higher than those indicated above can damage the gas valve, resulting in dangerous situations.

LPG plants must be equipped with a first pressure reducer in the vicinity of the liquid gas tank, to reduce the pressure to 1.5 bar and a second reducer, in the vicinity of the appliance itself, to reduce it further from 1.5 bar to the utility supply pressure used in the country of installation (see Table of gas pressures in respective unit handbooks).



Example: AY00-120 unit, in Italy: for G30, 1.5 bar to 0.030 bar (30mbar); for G31, 1.5 bar to 0.037 bar (37mbar).



LPG may cause corrosion; piping and fitting materials must be resistant to this corrosion.

Vertical gas pipes must be equipped with a siphon and provided with a drain for the condensate that may form inside the pipe during cold periods. It may also be necessary to insulate the gas pipe to prevent the formation of excessive condensate.



In any case, provide an isolation valve (ball valve) on the gas supply line, to isolate the appliance when required.

For hourly fuel consumption rates, refer to the appliance's DATA SHEET, supplied with it.

4.5 CONDENSATE DISCHARGE

The condensate discharge collector is on right side of the appliance (only for condensing models) near the gas and hydraulic fittings (see detail "A" in Figures of Paragraph 2.2 TECHNICAL CHARACTERISTICS → 10).

To install/connect the condensate discharge pipe, proceed as follows:

The condensate discharge to the sewer must be:

- made of materials resistant to acidity with pH 3 to 5;
- sized to ensure a slope of 10 mm per metre of length; if this slope cannot be achieved, a condensate pump must be installed near to the discharge;
- realized in such a way as to prevent icing of the condensate;
- mixed, for example, with domestic effluent (washing machine, dishwasher, etc.), usually of base pH, so as to form a buffer solution before discharge into the sewer.



Do not discharge the condensate into the gutter drains, given the risk of icing and degradation of the materials usually used for such drains.

In case of indoor installation, to prevent an initial discharge of combustion products from the condensate drain, charge the siphon itself as described in the relative paragraph of the manuals supplied with the single units.

4.6 FILLING THE SYSTEM CIRCUIT (APPLIANCE)



For filling the hydraulic circuit and the use of glycol antifreeze, refer to the corresponding paragraph in the handbooks for the specific units.



For the amount of water contained in the appliance, refer to the DATA SHEET supplied with the appliance itself.

5 ELECTRICAL INSTALLATION

In this section you will find all the instructions necessary to connect electrically the appliance.

The procedures to follow in order to complete the entire process of electrical installation of the appliance are the following:

- 5.1 CONNECTING THE APPLIANCE TO THE MAINS → 42.
- 5.2 ELECTRICAL CONNECTIONS FOR THE SYSTEM CIRCULATOR → 45 (only for configurations "without circulators").
- 5.3 CONNECTING UP THE CCI/DDC → 50.



Before proceeding with operations to create the electrical plant of the appliance, the professionally qualified personnel concerned are advised to read Paragraph "Warnings", in the manual of the specific unit: it provides important information regarding installation safety and references to current regulations.

Par. 5.4 INTERNAL ELECTRICAL WIRING DIAGRAMS → 65 gives the assembly wiring diagrams (factory precabled) for the appliance.



For the wiring diagrams for the units composing the link (e.g.: AY00-120, ACF60-00, ACF60-00 HR, GAHP-A, GAHP-AR, GAHP-GS, GAHP-WS), refer to the diagrams given in their respective handbooks.



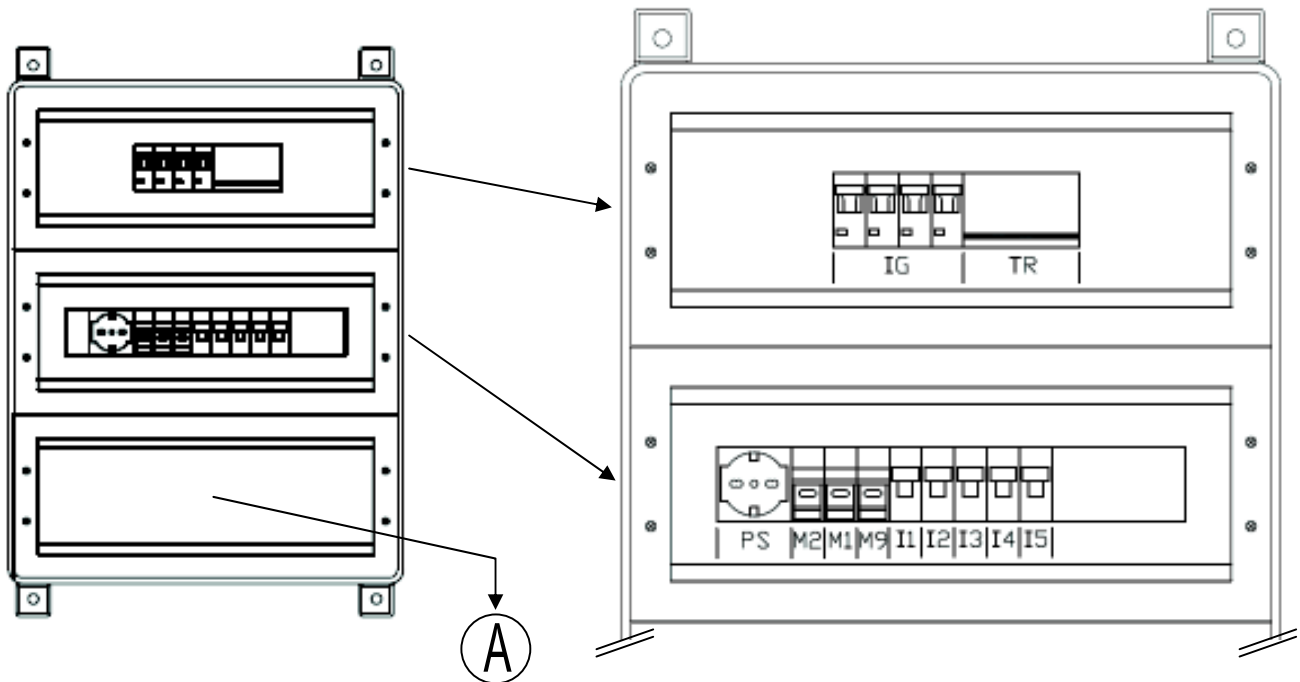
Before making the electrical connections or any checks, make sure that work is not carried out on live elements.

5.1 CONNECTING THE APPLIANCE TO THE MAINS

The connection required to supply electrical power to the appliance must be made inside its General Electrical Panel.

The GEP contains three panels (see Figures 5.1 → 43 and 5.2 → 43).

Figure 5.1



LEGEND

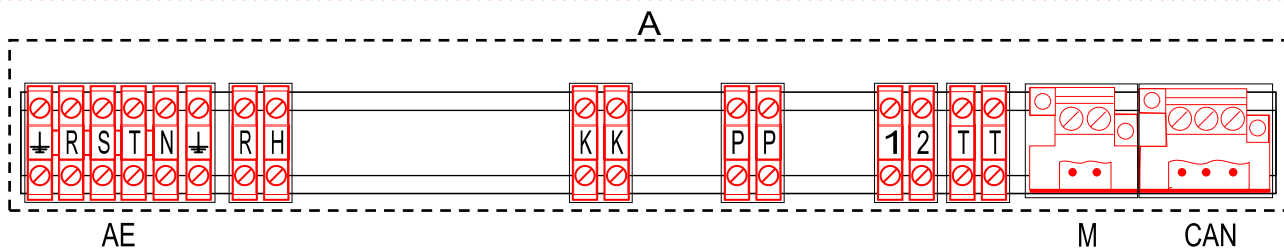
- IG electrical panel breaker (GEP)
- TR 230/24 V AC transformer
- M1 transformer primary fuse
- M2 service socket fuse
- M9 transformer secondary fuse
- (A) blind panel (for details of internal terminal block, see figure)

- PS service socket
- I1 "ID00" unit thermal cutout
- I2 "ID01" unit thermal cutout
- I3... "ID02" unit thermal cutout

Note: components inside the GEP may have a different order or position from that shown in the figure.

Detail of components in QEG (general electrical panel).

Figure 5.2



LEGEND

- A GEP blind panel
- AE electrical power terminals (three-phase - neutral-ground)
- RH condensation heating element terminals
- KK 24 V AC coil terminals for circulator enable (hot/cold circuit side)
- PP 24 V AC coil terminals for circulator enable (hot circuit side)
- 1-2 24 V AC coil terminals for circulator enable (HR recovery circuit side)

- T-T DHW tank thermostat terminals (HR recovery circuit side)
- M 2-pole connector for DDC power
- CAN 3-pole connector for CAN connection

Note: some terminals/components may not be present; actual components may be arranged differently from the figure.

Blind panel: detail of internal terminal blocks on DIN rail.

The appliance must be connected to a 400 V 3N - 50 Hz mains or, alternatively, 230 V 1N - 50 Hz, as follows:



You will need: the appliance connected hydraulically; external electrical panel configured by the installation technician. Necessary equipment and materials.



Make sure that the electrical panel configured by the technician is equipped with a 2- or 4-pole circuit breaker with fuses with minimum air gap of 3 mm.



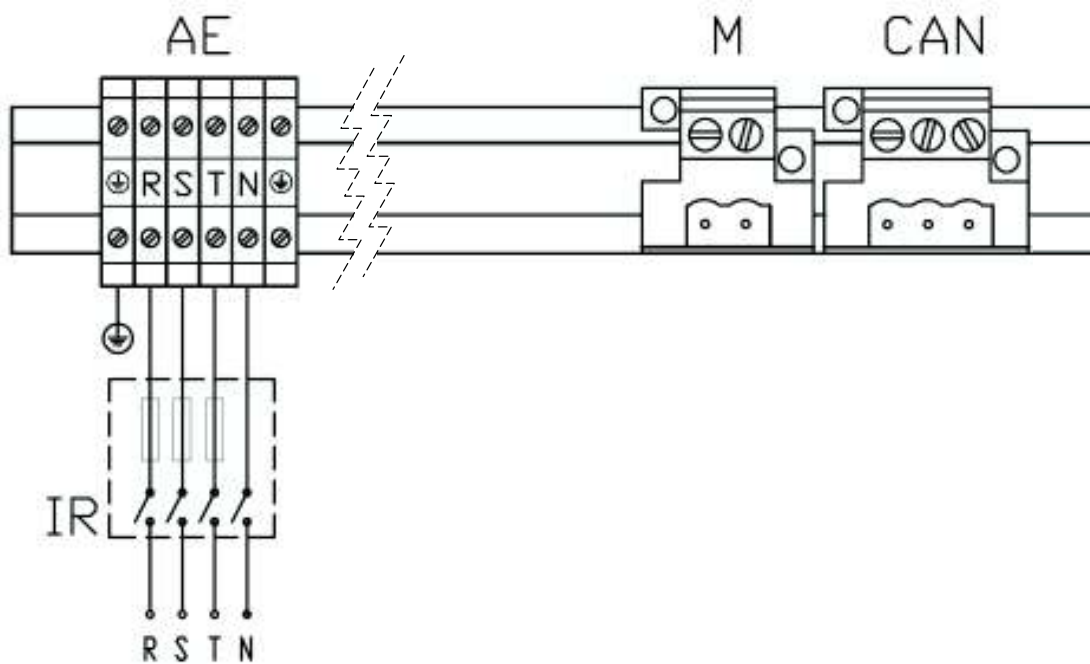
A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

1. Check that the electrical power supply is 400 V 3N - 50 Hz or 230 V 1N - 50 Hz.
2. Open the general electrical panel with the provided key; remove the lower blind panel to access the terminal blocks shown in Figure 5.2 → 43.
3. Identify the "AE" terminal board that has the terminals "R-S-T-N" (see Figure 5.2 → 43);
4. If the power voltage is 400V 3N - 50 Hz, connect to the terminals as shown in Figure 5.3 → 44.
5. If the power voltage is 230V 1N - 50 Hz, connect to the terminals as shown in Figure 5.4 → 45.
6. On completion, restore the appliance to its fully assembled condition.



The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled.**

Figure 5.3



LEGEND

AE electrical power in terminals

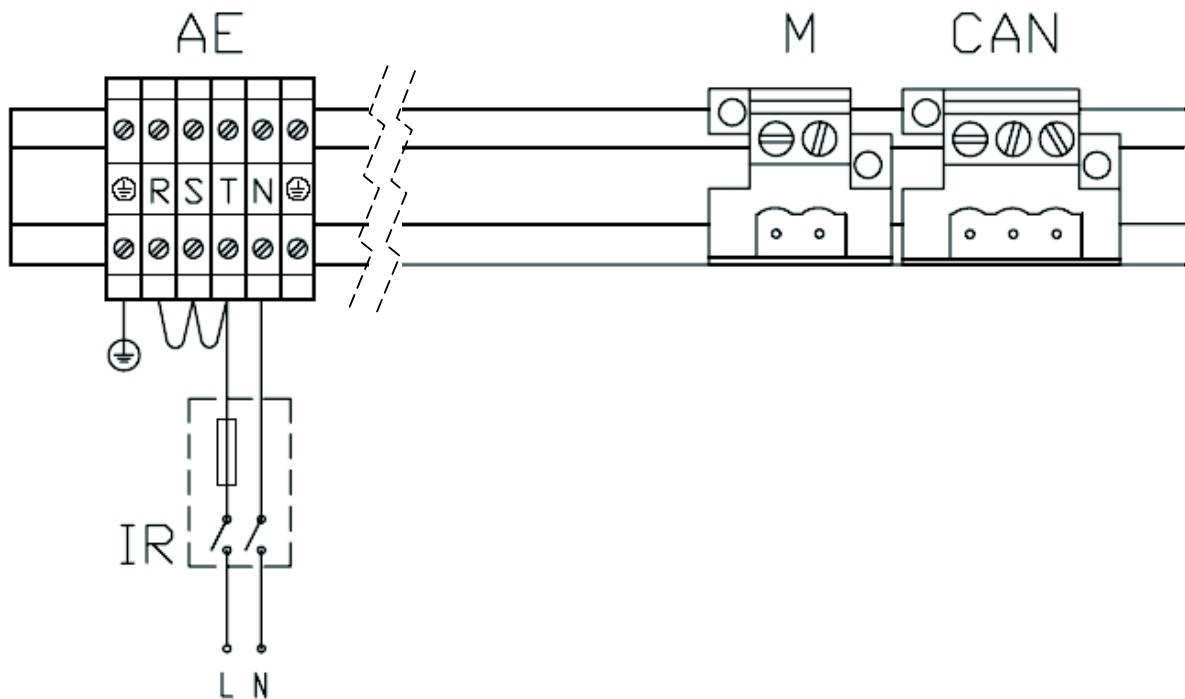
IR

RST/N

4-pole circuit breaker with fuses and minimum contact gap 3 mm phases/neutral

Electrical connection diagram for three-phase 400V 3N - 50Hz installations.

Figure 5.4



LEGEND

AE electrical power in terminals

IR

2-pole circuit breaker with fuse and minimum contact gap 3 mm

L/N

phase/neutral

Electrical connection diagram for single-phase 230V 1N - 50Hz installations.



Disconnect the appliance from the electrical power supply via the external circuit breaker only after having performed the shutdown cycle (via the CCI/DDC) and having waited for it to terminate.



Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances.**

5.2 ELECTRICAL CONNECTIONS FOR THE SYSTEM CIRCULATOR

The electrical connection between the circulator and appliance must be done only in case of appliances configured "without circulators" as standard supply (on at least one side of the appliance's hydraulic circuits).

The primary plant water circulator can be controlled directly by the appliance's on-board electronics.

SITUATION A: CIRCULATOR SERVING A SINGLE APPLIANCE

This connection is valid for direct control of a "shared" water circulator serving the hydraulic circuit (generic) of a single appliance.

For example (see Figure 4.5 → 39 and detail 8): 1 circulator/1 appliance; 5 circulators/5 appliances; etc..



Use a circulator (single-phase/230 V AC or three-phase/400V AC), rated for the system's specifications. For the technical specifications, refer to Paragraph 2.1 GENERAL INFORMATION → 6 (section "INDEPENDENT CIRCULATOR CONFIGURATIONS").



For the link's specifications, refer to the supplied DATA SHEET, or for the specific data for the individual units composing the link (e.g.: AY00-120, ACF60-00, ACF60-00 HR, GAHP-A, GAHP-AR, GAHP-GS, GAHP-WS), refer to the technical tables given in their respective handbooks.

To connect the "shared" circulator, proceed as follows:



You will need: the appliance connected hydraulically; single-phase water circulator (230 V AC - example in Figure 5.5 → 47) or three-phase circulator (400 V AC - example in Figure 5.6 → 47); external electrical panel configured by the installation technician. Necessary equipment and materials.



Make sure that the external electrical panel is equipped with a power switch (4-pole or 2-pole) with suitable protection equipment (fuses or motor thermal switch) and circulator control relay.



A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

1. Check that the power supply voltage is 230 V 1N - 50 Hz (example in Figure 5.5 → 47) or 400 V 3N - 50 Hz (example in Figure 5.6 → 47).
2. Provide an external disconnecting switch and suitable protection for the type of pump to be installed: a fuse for a single phase pump (Figure 5.5 → 47) or motor protector for a three-phase pump (Figure 5.6 → 47).
3. Provide a relay that is normally open for control of the pump.
4. Open the general electrical panel with the provided key; remove the lower blind panel to access the terminal blocks shown in Figure 5.2 → 43.
5. Depending on the model of link and the hydraulic circuit to which it is being connected, identify the terminals "K-K" or "P-P" or "1-2" (see Figure 5.2 → 43) powered at 24 V AC for the circulator relay coil and make the hookup as shown in Figure 5.5 → 47 or 5.6 → 47.
6. On completion, restore the appliance to its fully assembled condition.

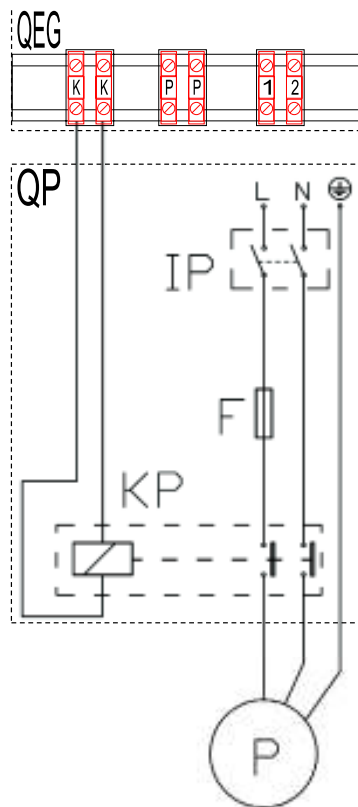


Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances.**



The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled.**

Figure 5.5



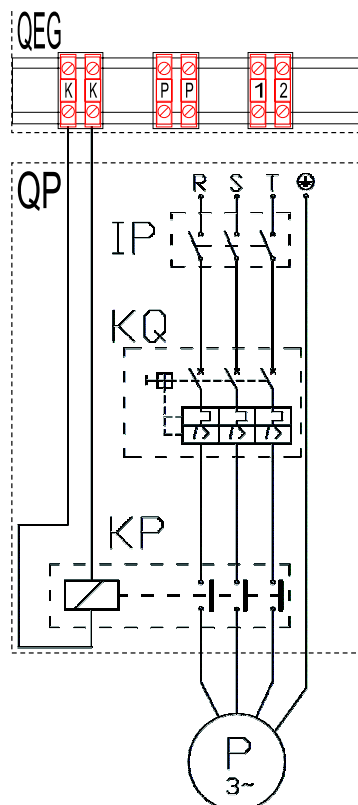
LEGEND

- P primary circuit water circulator (not supplied)
- QP circulator panel (external)
- N/L neutral/single phase line (230V 1N - 50Hz circulator power)
- IP circulator breaker (not supplied)
- F circulator fuse (suited to unit employed)
- KP NO circulator control relay (not supplied)
- GEP electrical panel
- K.K 24V AC coil terminals for common circulator enable for link hot/cold circuit
- P.P 24V AC coil terminals for common circulator enable for link hot circuit, 4 pipe/without HR or 6 pipe*
- 1.2 24V AC coil terminals for common circulator enable for link (with HR) RECOVERY circuit

* For 4 and 6 pipe units (2 or 3 distinct circuits): repeat the circulator/GEP connection for each water circuit (if controlled by a common circulator) to "P.P" and/or "1.2" terminals.

Single-phase directly controlled circulator (230V AC) electrical connection diagram (configuration "without circulators")

Figure 5.6



LEGEND

- P primary circuit water circulator (not supplied)
- QP circulator panel (external)
- N/L three phase line (400V 3N - 50Hz circulator power)
- IP circulator breaker (not supplied)
- KQ thermal cutout (or peak current breaker) suited to circulator employed
- KP NO circulator control relay (not supplied)
- GEP electrical panel
- K.K 24V AC coil terminals for common circulator enable for link hot/cold circuit
- P.P 24V AC coil terminals for common circulator enable for link hot circuit, 4 pipe/without HR or 6 pipe*
- 1.2 24V AC coil terminals for common circulator enable for link (with HR) RECOVERY circuit

Three-phase directly controlled circulator (400 V AC) electrical connection diagram (configuration "without circulators")

> IF THE PRIMARY WATER CIRCULATOR CONTROL IS NOT TO BE HANDLED BY THE APPLIANCE BUT RATHER BY AN EXTERNAL DEVICE:

- the electrical system installation technician must make the electrical connection in such a way that, after the appliance is switched off, the circulator remains in operation for at least another 7 minutes.



The electrical parts required for the connection (relay, fuses, motor thermal switches, power switches, etc.) must be installed inside the external panel provided by the technician.



The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled.**

SITUATION B: CIRCULATOR SERVING A SINGLE SYSTEM CIRCUIT SHARED BY MULTIPLE APPLIANCES

This connection is valid for direct control of a "shared" water circulator serving the hydraulic circuit of multiple appliances on a single primary circuit.

For example (see Figure 4.6 → 40 and detail 8): 1 circulator/2 appliances; 1 circulator/3 appliances; etc..



The choice of water circulator depends on the number of appliances being served as the specifications of the system (water flow rate, head, etc.) which are determined during the design process. Always follow the specifications of the system design documentation.



The following procedure refers to Figure 5.7 → 49, which gives an example of a three-phase circulator (400 V AC) connection.

To make the circulator-appliance connection, proceed as follows (references to Figure 5.7 → 49):



You will need: the appliances hydraulically connected; water circulator in line with the system specifications (e.g.: three-phase/400 V AC); external electrical panel configured by the installation technician. Necessary equipment and materials.



Make sure that the external electrical panel is equipped with a power switch (4-pole) with suitable protection equipment (motor thermal switch) and control relay.



A wiring error, as well as impeding the correct operation of the appliance, could also damage the electrical apparatus that it contains.

1. Check that the electrical power supply is 400 V 3N - 50 Hz (see example) or 230 V 1N - 50 Hz.
2. Provide an external circuit breaker and suitable protection for the type of circulator being installed: fuse if the unit is single-phase or motor thermal switch for three-phase units (see example).
3. Provide a relay that is normally open for control of the pump.
4. Open the general electrical panel with the provided key; remove the lower blind panel to access the terminal blocks shown in Figure 5.2 → 43.

5. Depending on the model of link and the hydraulic circuit to which it is being connected, identify the terminals "K-K" or "P-P" or "1-2" (see Figure 5.2 → 43) powered at 24 V AC for the circulator relay coil and make the hookup as shown in Figure 5.7 → 49 (example with three phase circulator).
6. On completion, restore the appliance to its fully assembled condition.

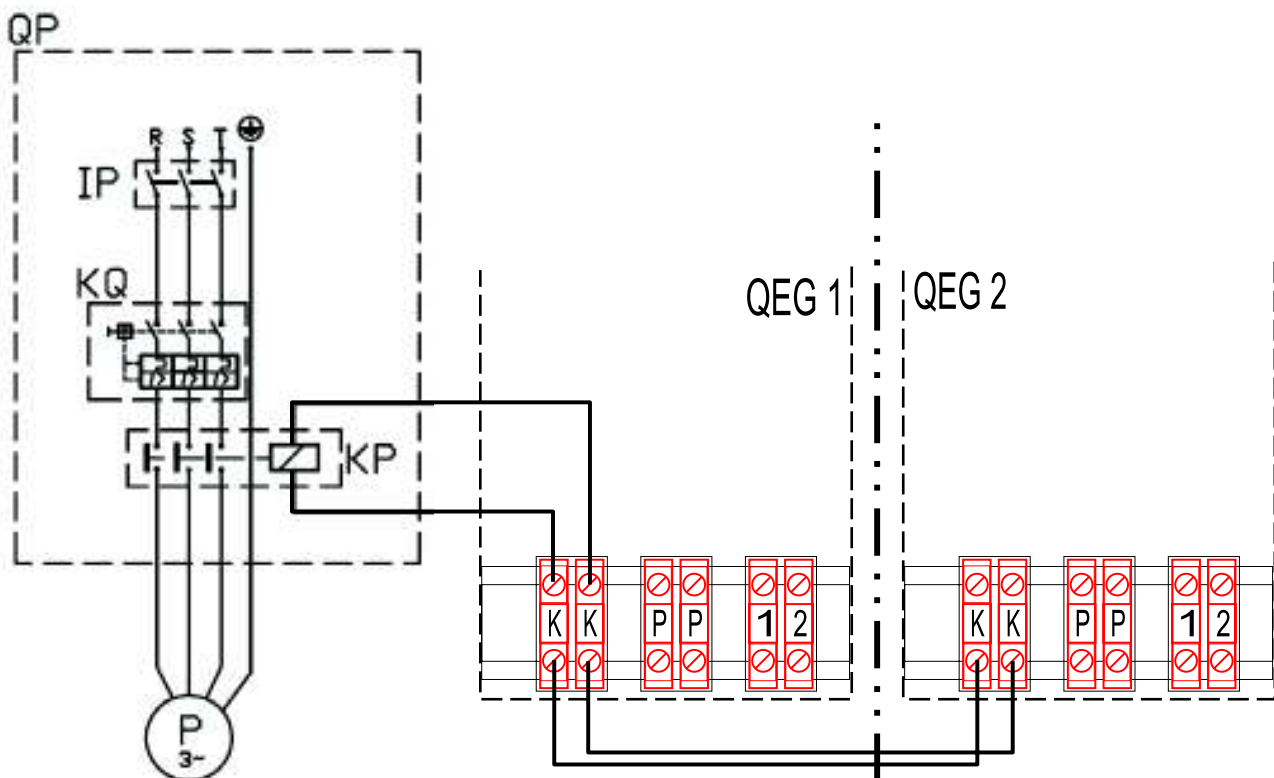


Make sure the ground cable is longer than the live cables. In this way it will be the last wire to be pulled away if the mains cable should accidentally be pulled, and will thus guarantee the ground connection. **Do not use gas pipes to ground electrical appliances.**



The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled.**

Figure 5.7



LEGEND

P	primary circuit water circulator (not supplied)
QP	circulator panel (external)
N/L	three phase line (400V 3N - 50Hz circulator power)
IP	circulator breaker (not supplied)
KQ	thermal cutout (or peak current breaker) suited to circulator employed
KP	NO circulator control relay (not supplied)
GEP	electrical panel

K.K	24V AC coil terminals for common circulator enable for link hot/cold circuit
P.P	24V AC coil terminals for common circulator enable for link hot circuit, 4 pipe/without HR or 6 pipe*
1.2	24V AC coil terminals for common circulator enable for link (with HR) RECOVERY circuit

* For 4 and 6 pipe units (2 or 3 distinct circuits): repeat the circulator/GEP connection for each water circuit (if controlled by a common circulator) to "P.P" and/or "1.2" terminals.

Three-phase circulator controlled by multiple appliances (400 V AC) electrical connection diagram (configuration "without circulators")

> IF THE PRIMARY WATER CIRCULATOR CONTROL IS NOT TO BE HANDLED BY THE APPLIANCES BUT RATHER BY AN EXTERNAL DEVICE:

- the electrical system installation technician must make the electrical connection in such a way that, after the appliance is switched off, the circulator remains in operation for at least another 7 minutes.

i The electrical parts required for the connection (relay, fuses, motor thermal switches, power switches, etc.) must be installed inside the external panel provided by the technician.

i The insertion of relays or other electrical components inside the General Electrical Panel of the appliance is not permitted. **Do not activate the appliance if the hydraulic plant has not been filled.**

5.3 CONNECTING UP THE CCI/DDC

This paragraph is dedicated to the installation of the CCI/DDC. It gives full information on the installation and connection of the device to the appliances.

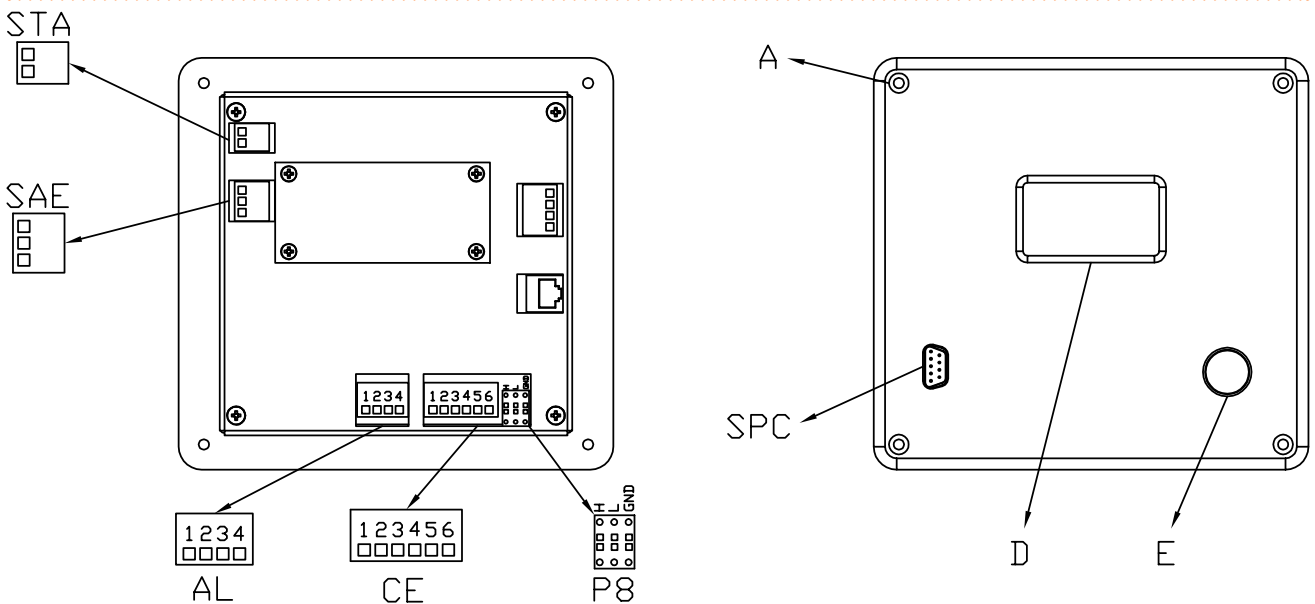
Proceed as follows (qualified installation technician only):

- 1) How to mount the CCI/DDC
- 2) How to power the CCI/DDC electrically
- 3) How to connect the DDC

Figure 5.8 CCI/DDC → 50 gives rear and front views of the CCI/DDC along with its electrical connections. The following connectors are used for the electrical connections:

- 4 pole connector (part reference "AL") for 24 V AC power.
- 6 pole CAN BUS connector (part reference "P8") for connecting the CCI/DDC with the appliance.

Figure 5.8 – CCI/DDC



LEGEND

STA	ambient temperature probe - 2-pole connector	P8	CAN network connector (orange)
SAE	external alarm systems - 3-pole connector	SPC	232 serial connection to PC - 9-pole connector
AL	power supply 24 V AC - 4-pole connector	A	mounting holes CCI/DDC
CE	external consents - 6-pole connector	E	Encoder
		D	Display

Front and rear views with detail of electrical connections.

➡ For the other connections (optional: to be done by the electrical installation technician in accordance with the user's requirements) and, in general, for the CCI/DDC installation and user instructions, see the booklets in question.

⚠ Before installing the CCI/DDC, disconnect the appliance from its power supply with the power switch in its electrical panel.

1) How to mount the CCI/DDC

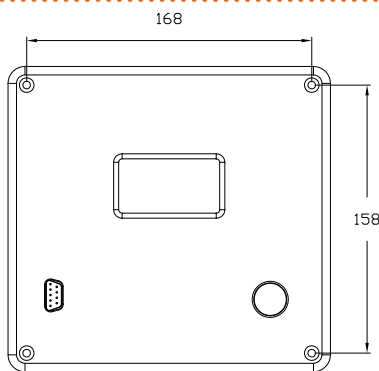
The CCI/DDC in indoor installations must be applied to a panel as follows (see Figure 5.9 → 51)



Requirements: the appliance and the DDC are disconnected from the electricity supply. Necessary equipment and materials.

1. Make a rectangular opening 155 mm wide and 151 mm high;
2. Locate the CCI/DDC on this hole and mark the locations of the 4 mounting hole. See the figure
3. Drill no. 4 holes of dia. 4 mm.
4. Secure the CCI/DDC to the opening in the panel using the provided bolts and nuts.

Figure 5.9



LEGEND

Holes for mounting CCI/DDC's to panel

horizontal: 168 mm
vertical: 158 mm

Centre distances of mounting holes for CCI/DDC.



The DDC operates at 0 - 50 °C. If the temperature of the room where the CCI/DDC is installed falls below zero, it continues to operate correctly to -10 °C. However, its LCD display may not be able to display data.

2) How to power the CCI/DDC electrically



The CCI/DDC requires a low voltage power supply (24 V) with 230/24 V AC, 50/60 Hz safety transformer; its minimum power draw is 20 VA.



The safety transformer for the CCI/DDC power supply is already installed in the electrical panel (GEP)

In this case, the connection may be made in two ways:

- by drawing power from the transformer on the appliance's GEP (see Figure 5.10 → 52);
- by drawing power from a transformer located in an external panel (see Figure 5.11 CCI/DDC - electric supply → 53):

TO TAKE POWER FROM THE TRANSFORMER ON THE APPLIANCE'S "GEP"

To power up the CCI/DDC, proceed as follows (references to Figure 5.10 → 52):



You will need: the appliance disconnected from the power supply. Necessary equipment and materials.

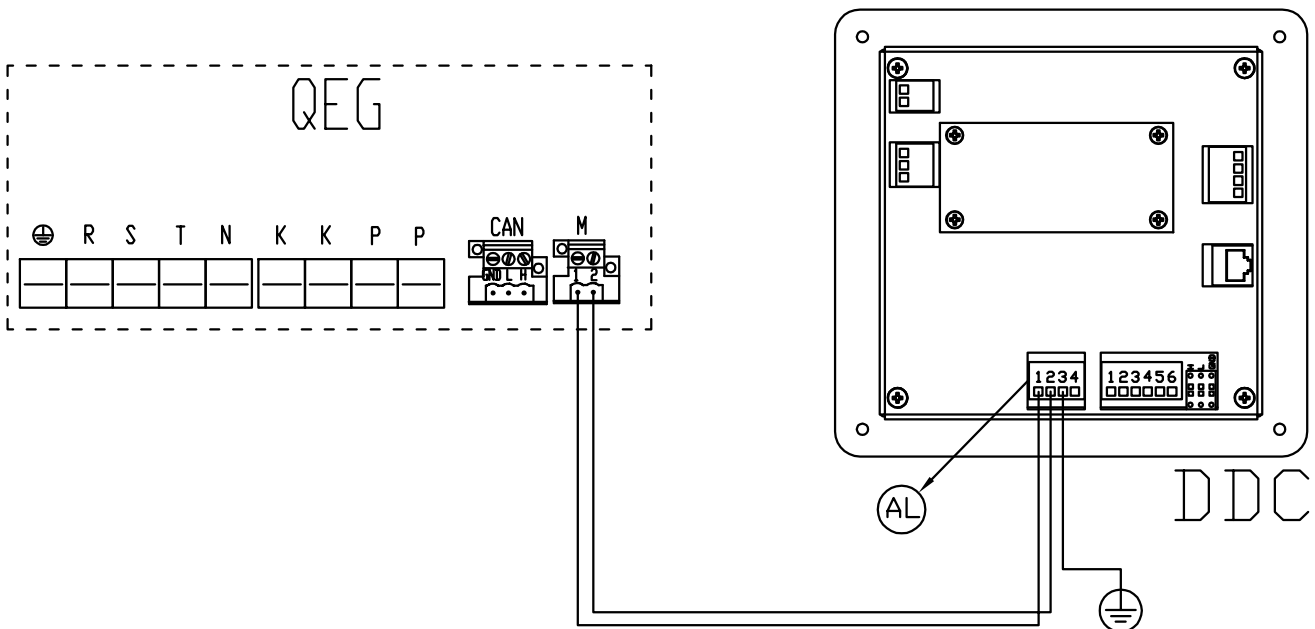
1. Open the GEP and remove the lower blind panel to access the terminal blocks in Figure 5.2 → 43. Remove the CCI/DDC's back panel by undoing the 4 bolts securing it (detail "A" - Figure 5.8 CCI/DDC → 50).
2. Use an electrical power cord (minimum cross section: 2x0.75 mm²).
3. Pass the power cord (CCI/DDC side) through the hole in the CCI/DDC's cover and hook up as shown in the example, with the following polarities: terminal 1 = 24 V, terminal 2 = 0 V, terminal 3 = GND.
4. From the other side (on the GEP, between the terminal blocks of Figure 5.2 → 43): locate the 2-pole connector (detail "M") and connect the power cable, as shown in the example, to terminals 1 and 2, in the correct polarity.



Terminal 3 of the CCI/DDC's 4-pole connector (AL) must be connected to a ground plant ($r \leq 0,1\Omega$). Terminal 2 of the CCI/DDC is connected internally to terminal 3, and is thus also connected to ground.

5. On completion, close the CCI/DDC's back panel with the 4 bolts.

Figure 5.10



LEGEND

DDC CCI/DDC
QEG general electrical panel

AL 24V AC CCI/DDC power supply - 4-pole connector
M 24V AC QEG power terminal - 2-pole connector

CCI/DDC power supply from QEG transformer.



If the CAN BUS cable has already been connected to the CCI/DDC (procedure "3) How to connect the DDC" below), secure the 4 mm eyelet (or two eyelets) in the CAN BUS cable's shielding with the bolts next to the CAN BUS socket (top right) as shown in Figure 5.15 Connection from CAN BUS to connector P8 → 57.



The CCI/DDC is equipped with a backup battery which retains the memory settings in case of power failure. **The battery has a service life of around 7 years**, after which it must be replaced by the Robur TAC.

TO TAKE POWER FROM A TRANSFORMER TO PROVIDE IN APPROPRIATE EXTERNAL PANEL



You will need: the appliance disconnected from the electricity supply; external electrical panel configured by the installation technician. Necessary equipment and materials.



Make sure that the external electrical panel is equipped with a 230/24 V AC - 50/60 Hz safety transformer, of at least 20 VA power.

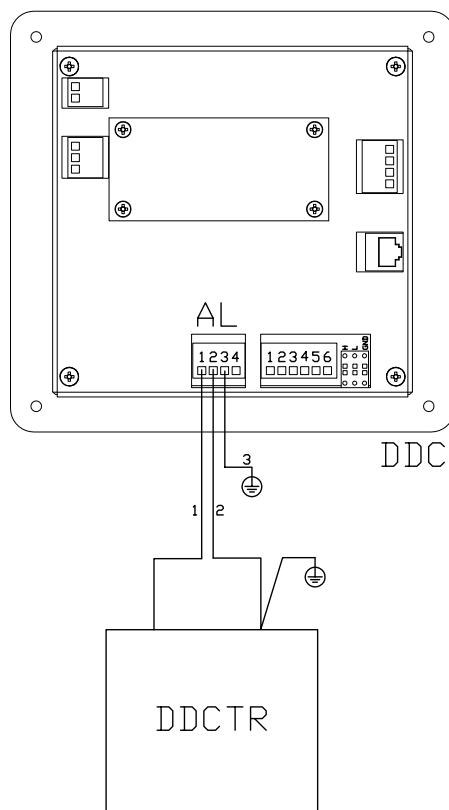
1. Remove the CCI/DDC's back panel by undoing the 4 bolts securing it (detail "A" - Figure 5.8 CCI/DDC → 50).
2. Use an electrical power cord (minimum cross section: 2x0.75 mm²).
3. Pass the power cord (CCI/DDC side) through the hole in the CCI/DDC's cover and hook up as shown in the example, with the following polarities: terminal 1 = 24 V, terminal 2 = 0 V, terminal 3 = GND.



Terminal 3 of the CCI/DDC's 4-pole connector (AL) must be connected to a ground plant ($r \leq 0,1\Omega$). Terminal 2 of the CCI/DDC is connected internally to terminal 3, and is thus also connected to ground. Make the grounding connection on the transformer terminal connected to terminal 2 of the CCI/DDC; if the transformer already has one wire grounded, it must be connected to this terminal.

4. On completion, close the CCI/DDC's back panel with the 4 bolts.

Figure 5.11 – CCI/DDC - electric supply



LEGEND

DDC	CCI/DDC
AL	supply 4 poles connector
1	clamp and wire for 24 Vac supply
2	clamp and wire for 0 Vac supply
3	clamp and wire for ground contact (required connection)
DDCTR	safety transformer
- (230/24 Vac	50/60 Hz)

CCI/DDC electric supply from external transformer.



If the CAN BUS cable has already been connected to the CCI/DDC (procedure "3) How to connect the DDC" below), secure the 4 mm eyelet (or two eyelets) in the CAN BUS cable's shielding with the bolts next to the CAN BUS socket (top right) as shown in Figure 5.15 Connection from CAN BUS to connector P8 → 57.



The CCI/DDC is equipped with a backup battery which retains the memory settings in case of power failure. **The battery has a service life of around 7 years**, after which it must be replaced by the Robur TAC.

3) How to connect the DDC

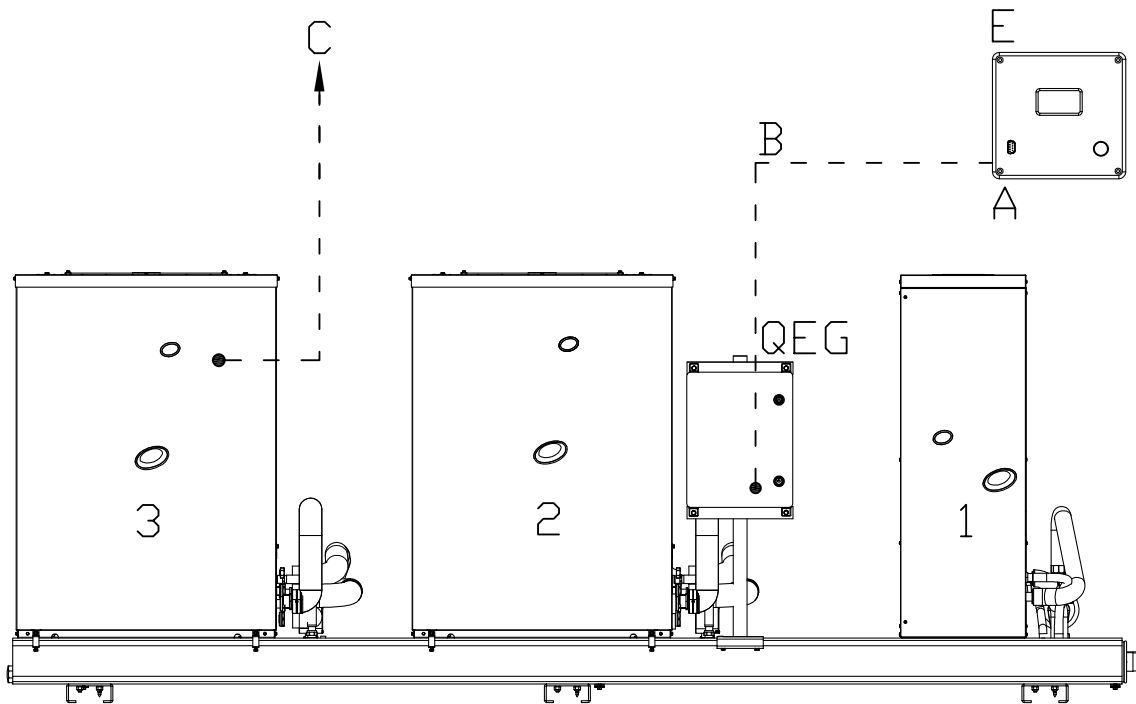
The appliance and the CCI/DDC communicate with each other via the **CAN network** (data network), which is characterised by a number of nodes, connected by the CAN BUS cable.



By a node of the data network we mean any device (CCI/DDC, individual module) connected to it. A CAN network consists of 2 terminal nodes and, if required, a certain number of intermediate nodes. A device is considered to be a terminal node when it is connected to only one other device. A device is considered to be an intermediate node when it is connected to two other devices. The CCI/DDC or individual modules may act equally as terminal or intermediate nodes. See Figures 5.12 → 54 and 5.13 → 55.

The CAN network can link together a maximum of 3 CCI/DDC's, each of which is in turn connected to 16 hot only modules + 16 cold only modules or 16 hot/cold modules. All of the units that comprise the appliance come pre-wired to the General Electrical Panel (GEP) via a CAN bus cable. each unit is thus a node on the CAN network. See Figures 5.12 → 54 and 5.13 → 55.

Figure 5.12



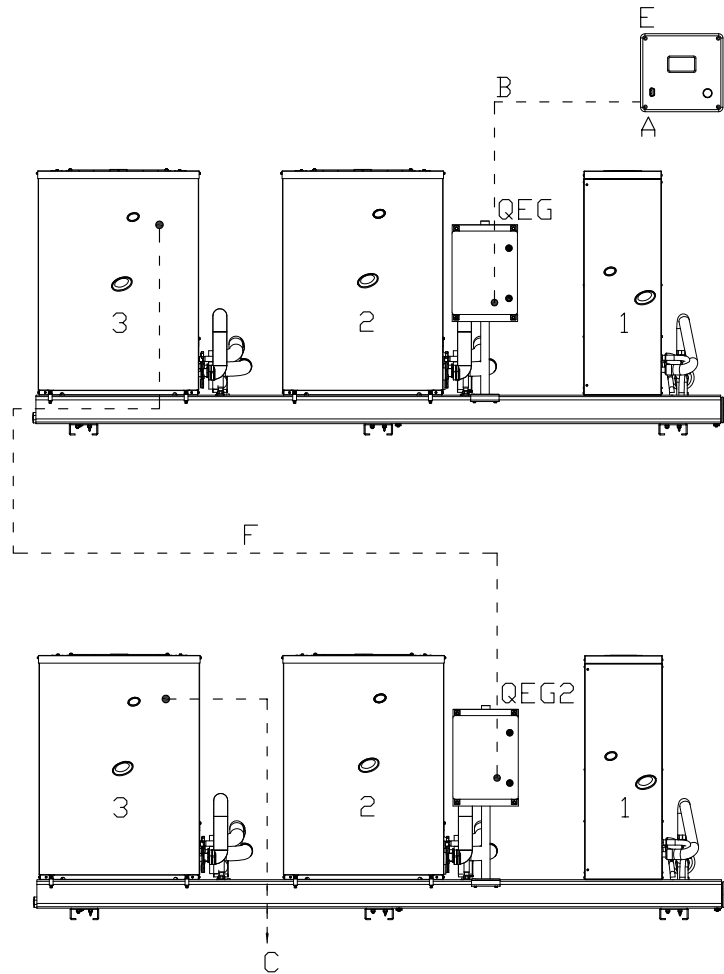
LEGEND

- A terminal node connection to CCI/DDC
- B CAN-BUS cable (not supplied - see table)
- C terminal node on last unit (prewired)

- QEG general electrical panel
- E CCI/DDC
- 3 last unit of appliance (with "ID00")

Example of CAN network with 4 nodes (1 CCI/DDC + 1 appliance).

Figure 5.13



LEGEND

- A terminal node connection to CCI/DDC
- B CAN-BUS cable (not supplied - see table)
- C terminal node on last unit (prewired)
- QEG1 appliance 1 general electrical panel
- QEG2 appliance 2 general electrical panel
- E CCI/DDC
- F CAN-BUS cable (not supplied - see table)
- 3 last unit of appliances (with "ID00")

Example of CAN network with 7 nodes (1 CCI/DDC + 2 appliances connected on a single hydraulic circuit).

CHARACTERISTICS OF THE CAN BUS CABLE

The cable to be used must be suitable for CAN BUS applications.

The following table gives details of some types of CAN bus cable, grouped according to the maximum distance covered by each single type.

Table 5.1 – CAN BUS cables type

CABLE NAME	SIGNAL / COLOR			MAX LENGTH	Note	
Robur						
ROBUR NETBUS	H= BLACK	L= WHITE	GND= BROWN	450 m	Ordering Code O-CV0008	
Honeywell SDS 1620						
BELDEN 3086A	H= BLACK	L= WHITE	GND= BROWN	450 m	In all cases the fourth conductor should not be used	
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		

Example types of cables used to connect the CAN network.



The lengths give in table 5.1 CAN BUS cables type → 55, **also include the sections of precabled CAN-BUS cable** in the appliance.

The CAN-BUS cable already cabled into the appliance is equal to (approx.):

- 12 m for 2 unit links (3AY only);
- 18 m for 3 unit links (4AY only);
- 24 m for 4 unit links (5AY only or 4AY+1GA/GAHP);
- 30 m for 5 unit links (5AY+1GA/GAHP);



For a total cable run of ≤ 200 m and a CAN network with max. 6 nodes (typical example: 1 CCI/DDC + 1 appliance with 5 units), a simple **3 x 0.75 mm²** shielded cable may be used.

As shown in Table 5.1 CAN BUS cables type → 55, the CAN connection requires a CAN bus cable with 3 wires. If the available cable has more than 3 coloured wires, use the wires with the colours indicated in 5.1 CAN BUS cables type → 55 and cut the remaining ones.



The ROBUR NETBUS cable is available as an accessory.

CONNECTION PROCEDURE

Instructions for the specific operations to be carried out for the connection of the CAN bus cable follow:

- Phase A: connect CAN-BUS cable to CCI/DDC.
- Step B: Connect the CAN BUS cable to the General Electrical Panel of the appliance.
- Step C: connect the CAN BUS to the on-board controller of the last unit in the appliance (only in case of multiple appliances on the network).

If connecting 1 CCI/DDC to 1 appliance (see CAN network example in Figure 5.12 → 54 and wiring diagram in Figure 5.23 → 64) the installation technician need only make:

- the connection between the CCI/DDC and the appliance GEP. In other words, execute Step A and Step B.

If connecting 1 CCI/DDC to multiple appliances (see CAN network example in Figure 5.13 → 55 and wiring diagram in Figure 5.24 → 65) the installation technician must make:

- the connection between the CCI/DDC and the GEP of the first appliance (in the example: 1st appliance). In other words, execute Step A and Step B;
- the connection between the last unit of the 1st appliance and the GEP of the 2nd appliance. In other words, execute Step C and Step B;
- (for other appliances, if installed): the connection between the last unit of the 2nd appliance and the GEP of the 3rd appliance; and so on until the last unit of the penultimate appliance has been connected to the GEP of the last appliance.

Phase A: connect CAN-BUS cable to CCI/DDC

The CAN BUS cable connects to the specific orange connector supplied with the CCI/DDC, as shown in Figure 5.14 → 56.

Figure 5.14



Orange connector for CAN-BUS connection to CCI/DDC (supplied with CCI/DDC).


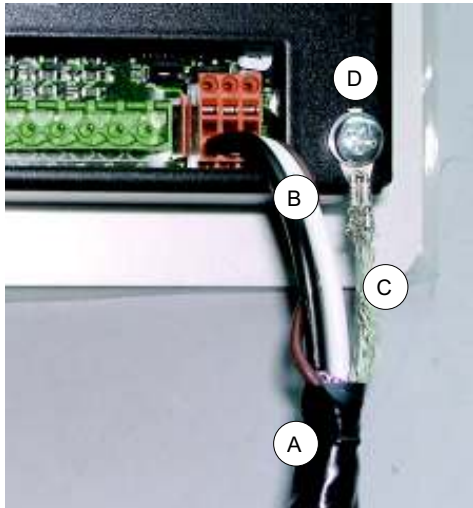
 The CCI/DDC, like the electronic board of the units, has jumpers that must be moved in order to take on the configurations of terminal node and intermediate node (Figure 5.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 58). The CCI/DDC is supplied with the jumpers CLOSED (detail "A" Figure 5.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 58).

Figure 5.15 – Connection from CAN BUS to connector P8



LEGEND

A	Insulating tape to protect board/shield
B	CAN BUS cable wires
C	CAN bus cable shield
D	terminal and screw for fixing

Connection detail of cable CAN BUS.

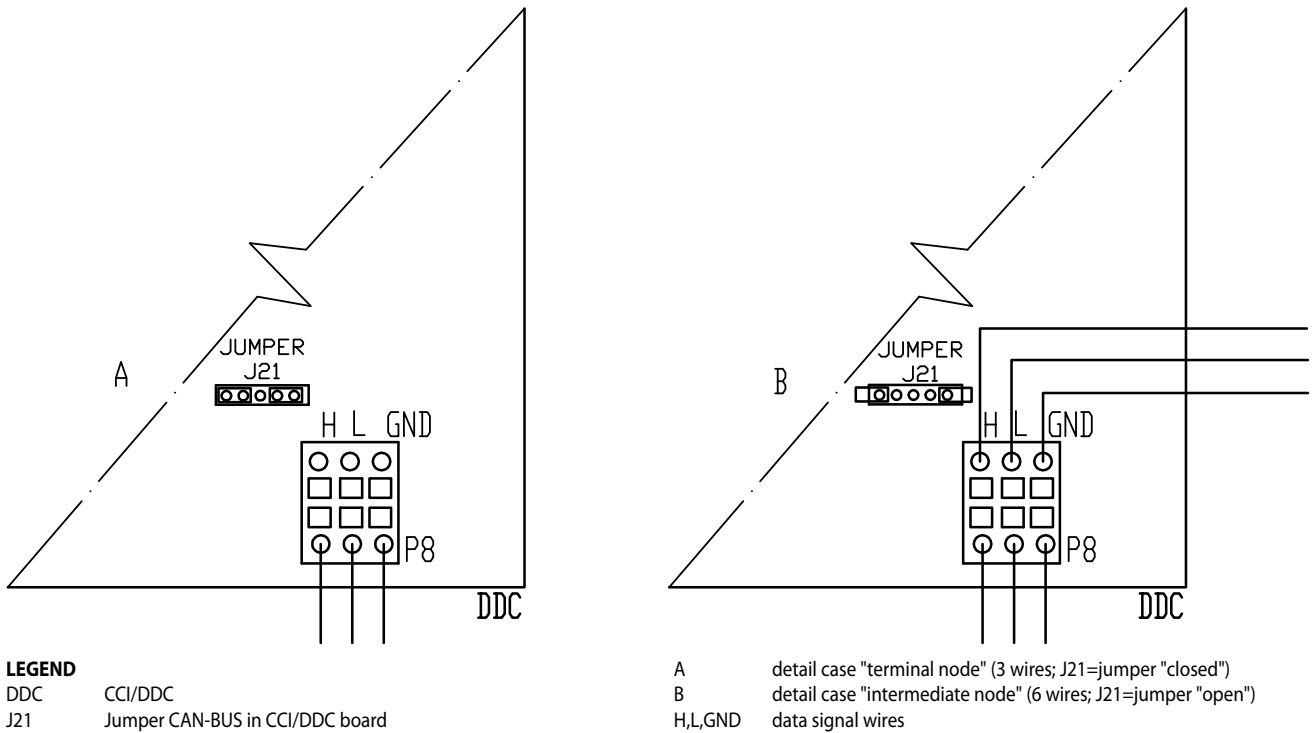
To connect a CAN BUS cable to a CCI/DDC, proceed as follows (references in Figure 5.16 detail wires and jumpers J21 - terminal/intermediate node CCI/DDC → 58):



Requirements: CCI/DDC not powered up. Necessary equipment and materials.

1. Depending on the type of node being configured, set the CCI/DDC's jumpers as shown in detail "A" or detail "B" in the example. If necessary, open the CCI/DDC's rear panel by undoing the four bolts; set the jumpers and restore the panel:
 - if the CCI/DDC is an **intermediate node** (n. 6 wires in the orange connector): set the jumpers as shown in detail "B" in the example: Jumpers OPEN;
 - if the CCI/DDC is a **terminal node** (n. 3 wire in the orange connector): set the jumpers as shown in detail "A" in the example: Jumpers CLOSED.

Figure 5.16 – detail wires and jumpers J21 - terminal/intermediate node CCI/DDC



Detail terminal and intermediate node: jumpers position J21: "closed" - "open".

2. Prepare the orange connector (remove from envelope).
3. Cut a length of cable long enough to allow installing it without kinking.
4. Remove the sheath for a length of approximately 70-80 mm, taking care not to cut the shielding (metallic shield and/or aluminium sheet and, if present, the bare connector in contact with the shield) and wires contained inside.
5. Roll the shielding and connect it to a 4-mm eyelet terminal, as illustrated in Figure 5.15 Connection from CAN BUS to connector P8 → 57, details C and D. Now proceed as follows:
6. Connect the three coloured wires to the orange connector, as shown in detail "A" in the example. Observe the terminal markings L, H, GND (on the CCI/DDC board at the base of socket "P8") which are given both in Table 5.1 CAN BUS cables type → 55, and in the example:
 - if the CCI/DDC is an **intermediate node**, also do step "7";
 - if the CCI/DDC is a **terminal node**, do not do step "7" but go directly to step "8".
7. **Intermediate nodes only:** repeat the operations from step "1" to step "4" for the other length of CAN bus cable required. Now proceed with step "5" and, to connect the cable to orange connector, refer to detail "B" in the figure. Then proceed to point "8".
8. Fit the orange connector, with the wires attached, first through the slot in the CCI/DDC's cover and then into the socket on the CCI/DDC itself.
9. Use the rear panel bolts located near the CAN BUS socket to secure the 4 mm eyelet (or 2 eyelets) (detail D, Figure 5.15 Connection from CAN BUS to connector P8 → 57). This secures the cable against pulling out when tested.

Step B: Connect the CAN BUS cable to the General Electrical Panel of the appliance
The CAN BUS cable must be connected to the 3-pole CAN connector on the appliance's GEP.

To connect a CAN BUS cable to the appliance's GEP, proceed as follows:



You will need: the appliance disconnected from the power supply. Necessary equipment and materials.

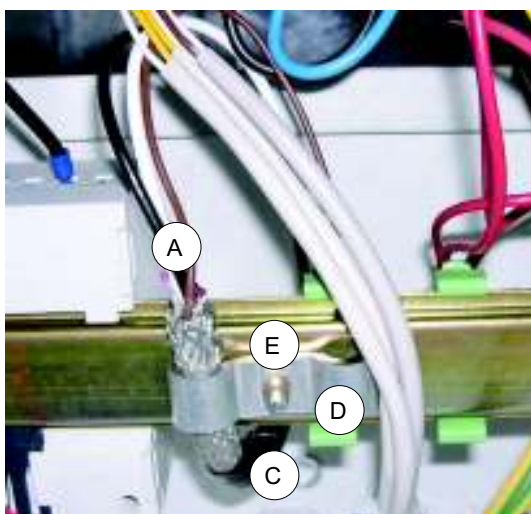
1. Open the General Electrical Panel (GEP) of the appliance with the key supplied and remove the blind rear panel by unscrewing the 4 fixing screws (see Figure 5.1 → 43).
2. Cut a length of cable long enough to allow installing it without kinking.
3. Remove the sheath for a length of approximately 70-80 mm, taking care not to cut the shielding (metallic shield and/or aluminium sheet and, if present, the bare connector in contact with the shield) and wires contained inside.
4. if the cable used is too thin to be held in place in the cable holder bracket (detail E in 5.17 → 59), make it thicker by wrapping insulating tape around it on the sheath in the area adjacent to the stripped part (to an approximate diameter of 12-13 mm).
5. Loosen the screws of the cable holder bracket where the CAN bus is to be fixed.
6. Pull the shielding back over the sheathe and fix it to the provided bracket (Figure 5.17 → 59 details D, E) through the other eyelet of the bracket itself (Figure 5.17 → 59 detail D). The cable must be fixed to the cable holder bracket in such a way that, if pulled, it is held firmly in position by the bracket.



Isolate all the part of the shield in excess in relation to the cable holder bracket (as shown in detail D) so as to prevent any parts of the shield from coming into contact with the electronic board.

7. Tighten the screw that has been loosened, ensuring that the device is grounded.
8. Connect the three coloured wires of the cable to the other three terminals (inputs H, L, GND) of the 3-pole connector (see detail of connectors and of CAN in Figure 5.18 → 60). Respect the correct indications L, H, GND provided in Table 5.1 CAN BUS cables type → 55, on the figure and on the diagram at the base of the female connector P8.

Figure 5.17

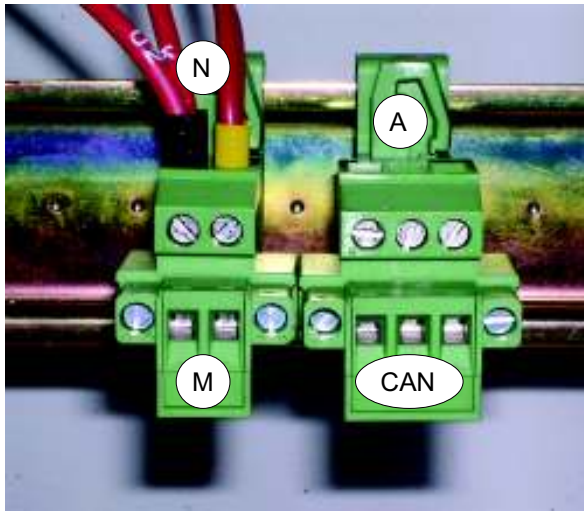


LEGEND

- A prewired CAN BUS cable wires
- C CAN BUS cable shielding isolating tape
- D cable retainer eyelet
- E cable retainer bolt

Connections to the General Electrical Panel (QEG) of the appliance: rear view of DIN rail.

Figure 5.18



LEGEND

- CAN GND, L, H terminals (3-pole connector)
- A prewired CAN BUS cable terminals
- M terminals 1, 2 (2-pole connector)
- N power cable wires

Connections to the General Electrical Panel (QEG) of the appliance: front view of DIN rail.

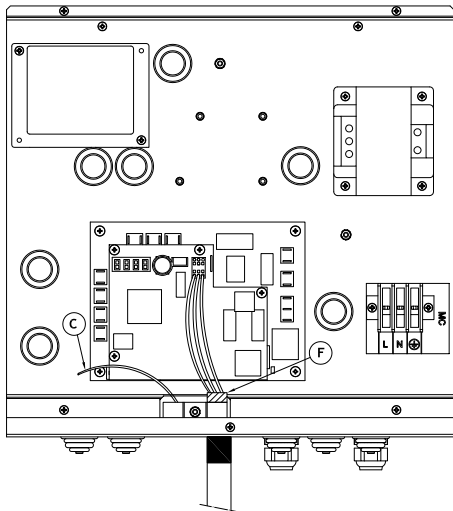
Step C: connect the CAN BUS to the on-board controller of the last unit in the appliance (only in case of multiple appliances on the network).



The last unit of each appliance (see Figure 5.12 → 54 – detail 3) is precabled in the factory as a terminal node and is configured for connection to a CAN BUS running to another appliance (see Figures 5.19 → 60 and 5.20 → 61).

The operation to carry out, in this case, consists of transforming the terminal node (of the last unit of the 1st appliance: Figure 5.12 → 54 – detail C) into an intermediate node (see Figure 5.13 → 55 - detail 3 and detail B of Figure 5.22 detail of wires and jumpers J1 - appliance terminal/intermediate node → 63).

Figure 5.19



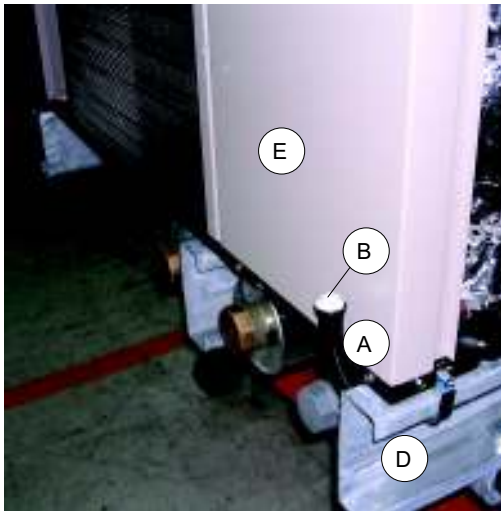
LEGEND

- C pull wire
- F cable sheath outlet

* Example for AY units of the Appliances

CAN BUS cable sheath and internal pull wire (last unit of appliance set up for further connection of CAN bus cable to other appliance).

Figure 5.20



LEGEND

A	CAN BUS cable sheath
B	sheath closing cap
D	appliance support beam
E	last unit of appliance

CAN BUS cable sheath and pull wire: detail of last unit.



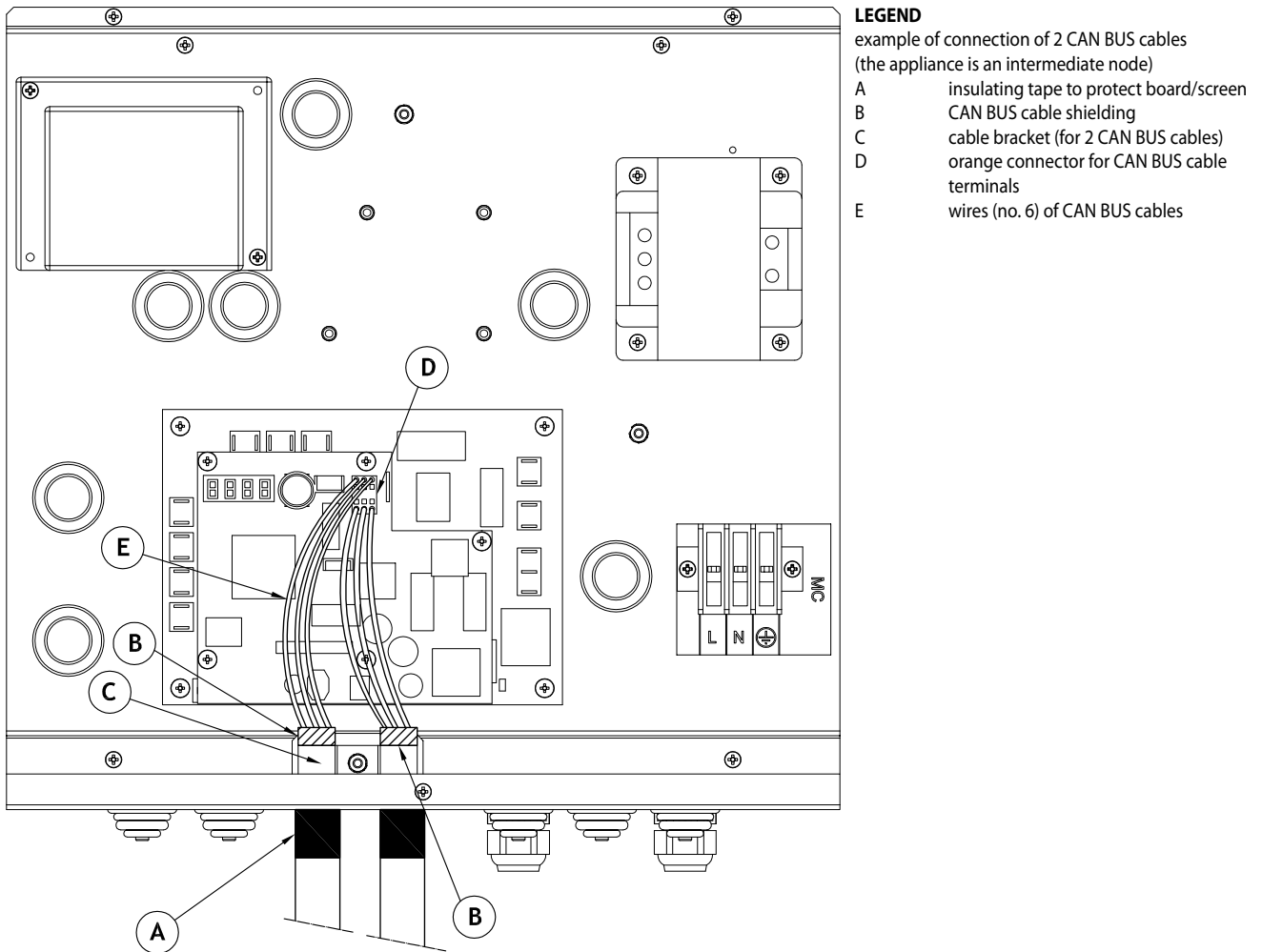
You will need: the appliance disconnected from the power supply. Necessary equipment and materials.

1. Remove the front panel and electrical panel of the last unit of the 1st appliance (see Figure 5.13 → 55 - detail 3). Under the last unit (see Figure 5.20 → 61 - detail E), behind beam D, is a sheath A closed with cap B. Open the cap to use the pull wire inside it (see Figure 5.19 → 60 - detail C).
2. Cut a length of CAN BUS cable long enough to allow it to be installed without kinking.
3. Choose one end of the cable, open the cap B (Figure 5.20 → 61), fix the cable to the pull wire and pull it from its other end (Figure 5.19 → 60 - detail C).
4. (Figure 5.19 → 60) Pull the pull wire C, so that the cable fixed to it protrudes by at least 50-60 cm from the other end of the sheath (detail F).
5. Remove the pull wire and connect the CAN BUS cable to the controller, as indicated below (see Figure 5.21 Connection of CAN BUS cable to connector P8 on controller AY10 → 62):
6. Remove the sheath for a length of approximately 70-80 mm, taking care not to cut the wires contained inside, the shielding (metallic shield and/or aluminium sheet) and, if present, the bare connector in contact with the shield;
7. If the cable is too thin to be held in place in the cable holder bracket (detail C), make it thicker by wrapping insulating tape around it on the sheath in the area adjacent to the stripped part (to an approximate diameter of: 12-13 mm).
8. Roll the shielding onto the sheath (as in detail B) and fix it (as in details A, B and C) in the cable holder bracket, passing it through the other eyelet of the bracket itself (detail C). The cable must be fixed to the metal bracket in such a way that, if pulled, it is held firmly in position by the bracket.



Isolate all the part of the shield in excess in relation to the cable holder bracket (as shown in detail A) so as to prevent any parts of the shield from coming into contact with the electronic board.

Figure 5.21 – Connection of CAN BUS cable to connector P8 on controller AY10



Detail of cabling of CAN BUS cable to controller AY10.

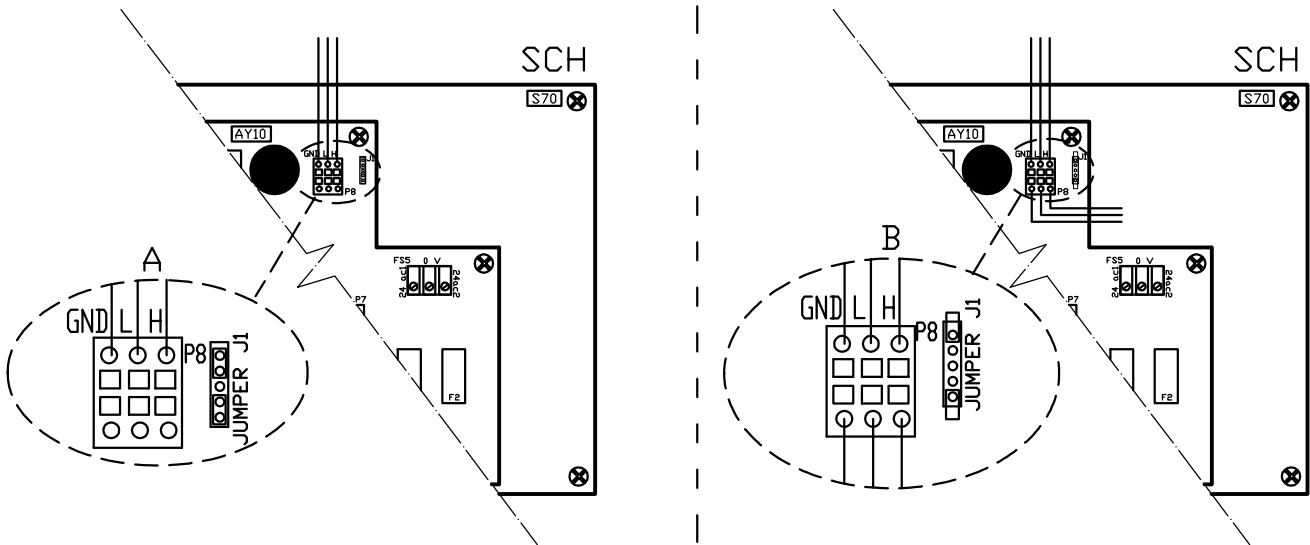
9. Extract the orange connector (detail D) from the CAN port on the controller;
10. Connect the three coloured wires (detail E) of the cable to the other three inputs H, L, GND of the orange connector (detail D), according to detail B in Figure 5.22 detail of wires and jumpers J1 - appliance terminal/intermediate node → 63. Respect the correct indications L, H, GND provided in Table 5.1 CAN BUS cables type → 55, on the figure and on the diagram at the base of the connector.
11. Since this connection becomes an intermediate node on the CAN network (2 CAN BUS wires connected, 6 wires total), set the JUMPERS (J1) to OPEN as shown in detail B of Figure 5.22 detail of wires and jumpers J1 - appliance terminal/intermediate node → 63.



The controller (S60) of the last unit of an appliance may be connected in two different ways. See following specifications:

- as shown in detail "B" of Figure: no operation is required, as the jumpers must be left closed as preset at the factory (see Figure 5.19 → 60 and detail A of Figure 5.22 detail of wires and jumpers J1 - appliance terminal/intermediate node → 63);
- connection of several appliances: the connector has 6 wires (3 in and 3 out) in this case too. In this situation, it is necessary to open the jumpers (see detail B in Figure 5.22 detail of wires and jumpers J1 - appliance terminal/intermediate node → 63).

Figure 5.22 – detail of wires and jumpers J1 - appliance terminal/intermediate node



LEGEND

SCH controller (AY10+S70)

J1 CAN BUS jumper on AY10 controller

A detail of "terminal node" case (3 wires; J1=jumper "closed")

B detail of "intermediate node" case (6 wires; J1=jumper "open")

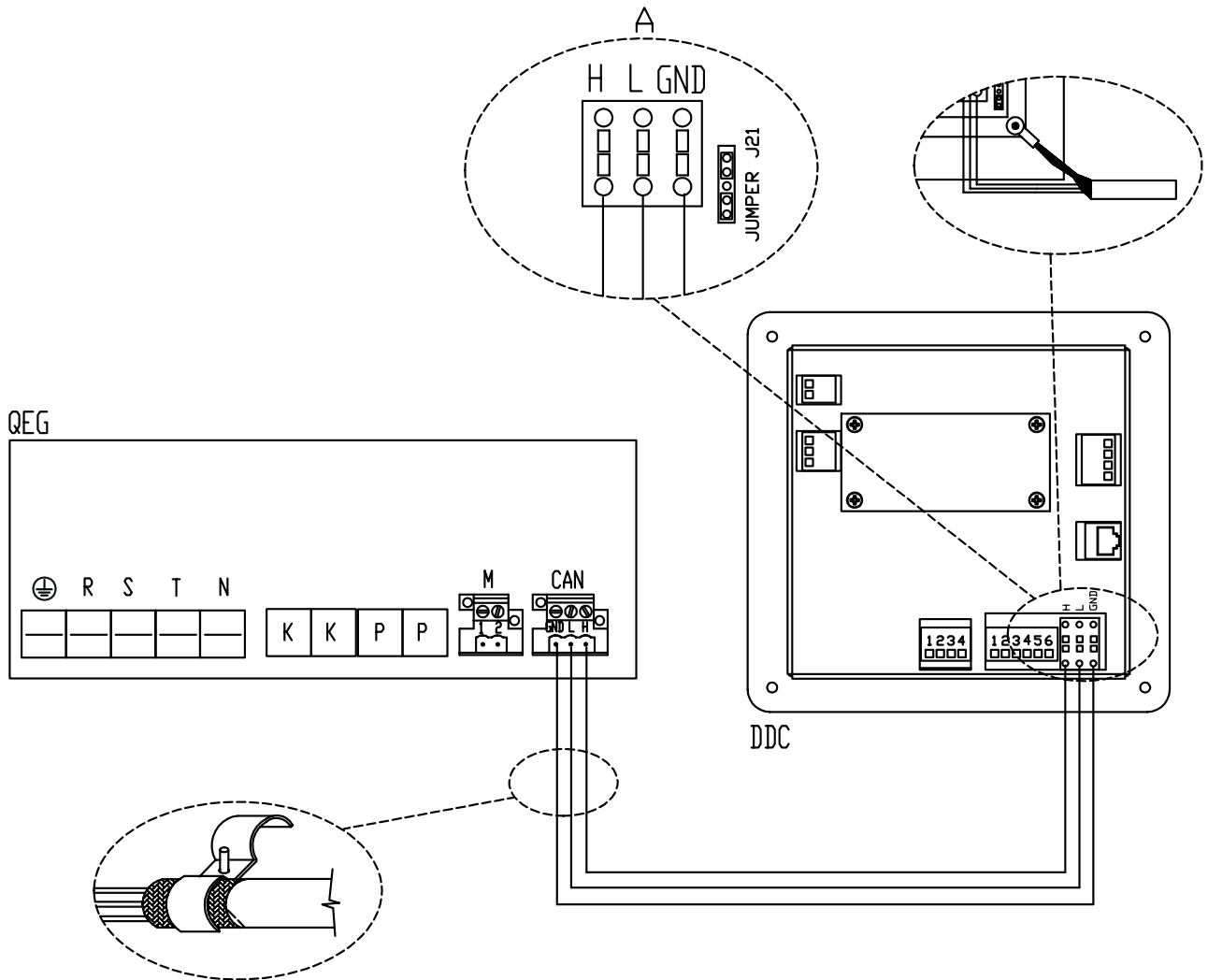
H,L,GND data signal wires

Detail of terminal and intermediate node, jumper position J1: "closed" - "open".



The lengths of CAN bus cable (to be connected by the electrical installation technician) must be protected along their length by a CABLE SHEATH that has the following characteristics: nominal diameter 17 mm; "T" profile; operating temperature 105 °C; fire retarding, acid, oil, solvent and fuel resistant. An example is the TEAFLEX PAS T 17 S type sheath.

Figure 5.23



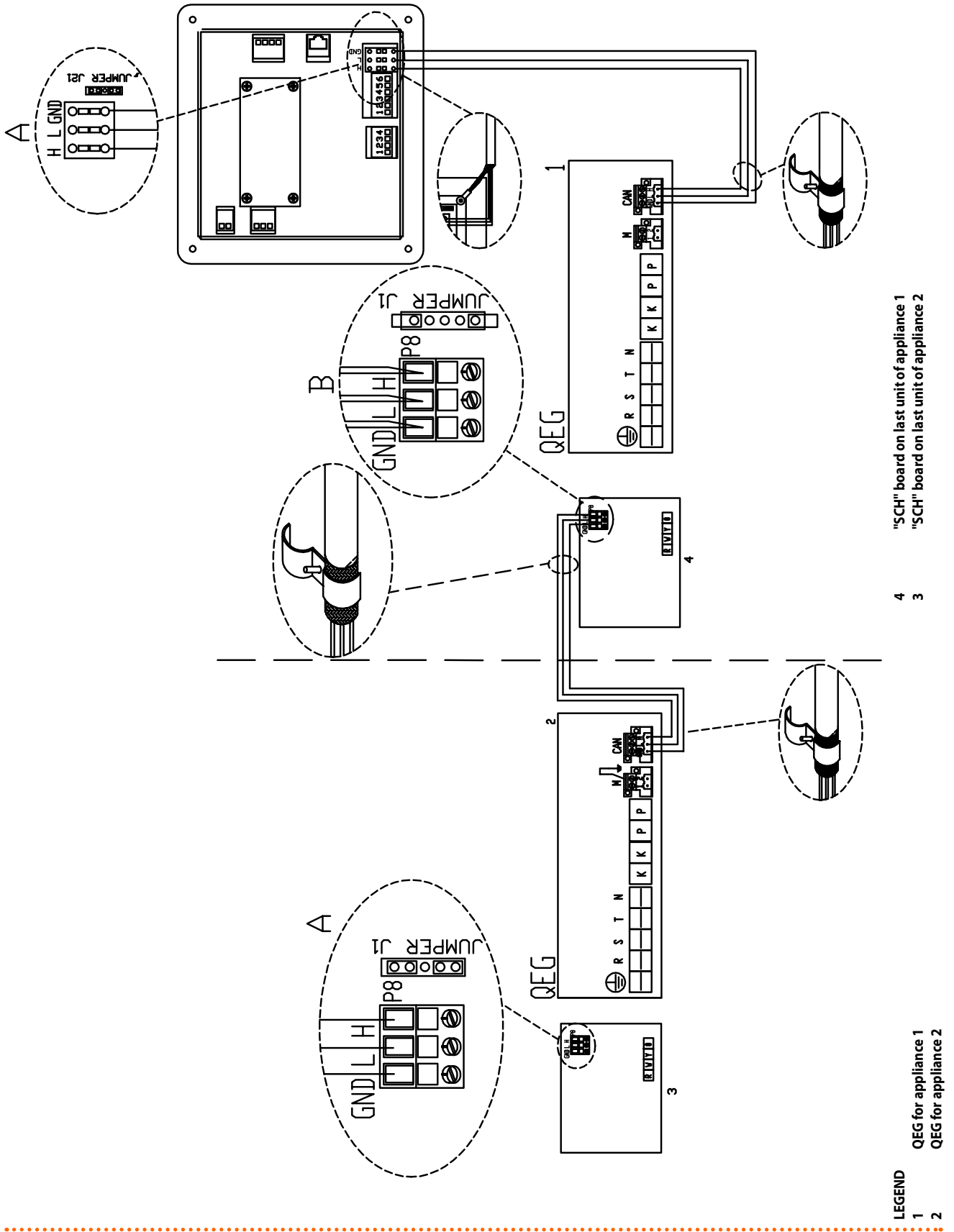
LEGEND

DDC CCI/DDC (rear view)

QEG general electrical panel

Detail of CAN-BUS cable connection between 1 CCI/DDC and 1 appliance.

Figure 5.24



Detail of CAN-BUS cable connection between 1 CCI/DDC and 2 appliances.

5.4 INTERNAL ELECTRICAL WIRING DIAGRAMS

This paragraph gives the following assembly wiring diagrams (factory precabled) for the appliance.

ASSEMBLY DIAGRAMS FOR LINK "WITH CIRCULATORS" (INDEPENDENT)

A) GEP (electrical panel) wiring

DIAGRAM 1 shows an assembly wiring diagram (GEP wiring) for all links without "HR". Example of 5 unit link.

DIAGRAM 2 shows an assembly wiring diagram (GEP wiring) for all links with "HR". Example of 5 unit link.



For DIAGRAM 1: see Figure 5.25 DIAGRAM 1 → 68. For DIAGRAM 2: see Figure 5.26 DIAGRAM 2 → 69.

B) Cabling between GEP and individual units/standard supply circulators

DIAGRAM 3 shows an assembly wiring diagram (circulators/units/GEP connections) for the HOT/COLD SIDE for links with circuits connected to ACF, A, AR, AY and the "conditioning" side of HR units. Example of 5 unit link.

DIAGRAM 4 shows an assembly wiring diagram (circulator/units/GEP connections) for the RECOVERY SIDE of links with "HR" units. Example of 5 unit link.

DIAGRAM 5 shows an assembly wiring diagram (circulators/units/GEP connections) for the HOT and COLD SIDES of 4 pipe links, with uniform non-modulating GS or WS units (configured with NON MODULATING circulators). Example non modulating "RTGS" or "RTWS" 4 unit link.

DIAGRAM 6 shows an assembly wiring diagram (circulators/units/GEP connections) for the HOT and COLD SIDES of 4 pipe links (RTGS/RTWS) or HOT SIDE of 2 pipe links (RTA), composed of up to 3 uniform GS or WS or A modulating units (configured with MODULATING circulators). Example non modulating "RTGS" or "RTWS" or "RTA" 3 unit link.



For DIAGRAM 3: see Figure 5.27 DIAGRAM 3 → 70. For DIAGRAM 4: see Figure 5.28 DIAGRAM 4 → 71. For DIAGRAM 5: see Figure 5.29 DIAGRAM 5 → 72. For DIAGRAM 6: see Figure 5.30 DIAGRAM 6 → 73.

ASSEMBLY DIAGRAMS FOR LINK "WITHOUT CIRCULATORS"

C) GEP (electrical panel) wiring

DIAGRAM 7 shows an assembly wiring diagram (GEP wiring) for the HOT/COLD SIDE of 2 pipe links, or specific to the (1st) "COLD / HOT" circuit of a 4 (or 6) pipe link. Example of 5 unit link.

DIAGRAM 8 shows an assembly wiring diagram (GEP wiring) for the COLD or HOT/COLD SIDE (1st circuit - terminals "K-K") and HOT SIDE (2nd circuit - terminals "P-P") of 4 pipe links without HR unit. Example of 5 unit link.

DIAGRAM 9 shows an assembly wiring diagram (GEP wiring) for the COLD or HOT/COLD SIDE (1st circuit - terminals "K-K") and RECOVERY SIDE (2nd "recovery" circuit - terminals "1-2") of 4 pipe links with HR unit. Example 3 unit link with 2 "HR" units.



For DIAGRAM 7: see Figure 5.31 DIAGRAM 7 → 74. For DIAGRAM 8: see Figure 5.32 DIAGRAM 8 → 75. For DIAGRAM 9: see Figure 5.33 DIAGRAM 9 → 76.

D) Cabling between GEP and individual units

DIAGRAM 10 shows an assembly wiring diagram (unit/GEP connections) for the COLD or HOT/COLD SIDE (1st circuit - pump terminals CPf/"K-K") and HOT SIDE (2nd circuit - pump terminals CPc/"P-P") of 4 pipe links without HR unit. Example of 5 unit link.

DIAGRAM 11 shows an assembly wiring diagram (unit/GEP connections) for the COLD or HOT/COLD SIDE (1st circuit - pump terminals CPf/"K-K") and RECOVERY SIDE (2nd circuit

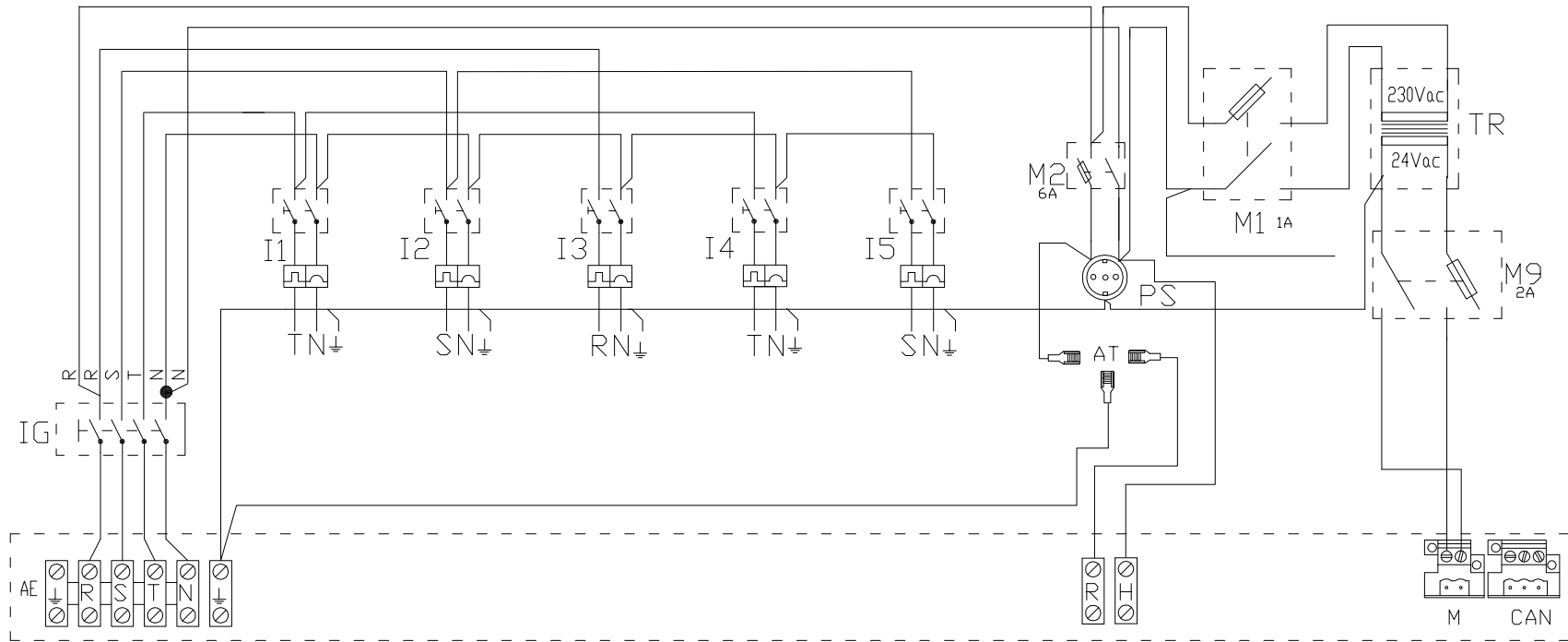
- pump terminals CPhr/"1-2") of 4 pipe links with HR unit. Example 5 unit link with 2 "HR" units.

DIAGRAM 12 shows an assembly wiring diagram (unit/GEP connections) for all circuits: HOT7COLD and RECOVERY SIDES of 6 pipe links (1st circuit - pump terminals CPf/"K-K"; 2nd circuit - pump terminals CPc/"P-P"; 3rd circuit "RECOVERY" - pump terminals CPhr/"1-2"). Example of 5 unit link. 2 AY + 1 GA/GAHP + 2 GA-HR.

DIAGRAM 13 shows an assembly wiring diagram (unit/GEP connections) for the COLD SIDE (1st circuit - pump terminals CPf/"K-K") and HOT SIDE (2nd circuit - pump terminals CPc/"P-P") of 4 pipe links with non modulating GS/WS units. Example of 4 unit link.



For DIAGRAM 10: see Figure 5.34 DIAGRAM 10 → 77. For DIAGRAM 11: see Figure 5.35 DIAGRAM 11 → 78. For DIAGRAM 12: see Figure 5.36 DIAGRAM 12 → 79. For DIAGRAM 13: see Figure 5.37 DIAGRAM 13 → 80.

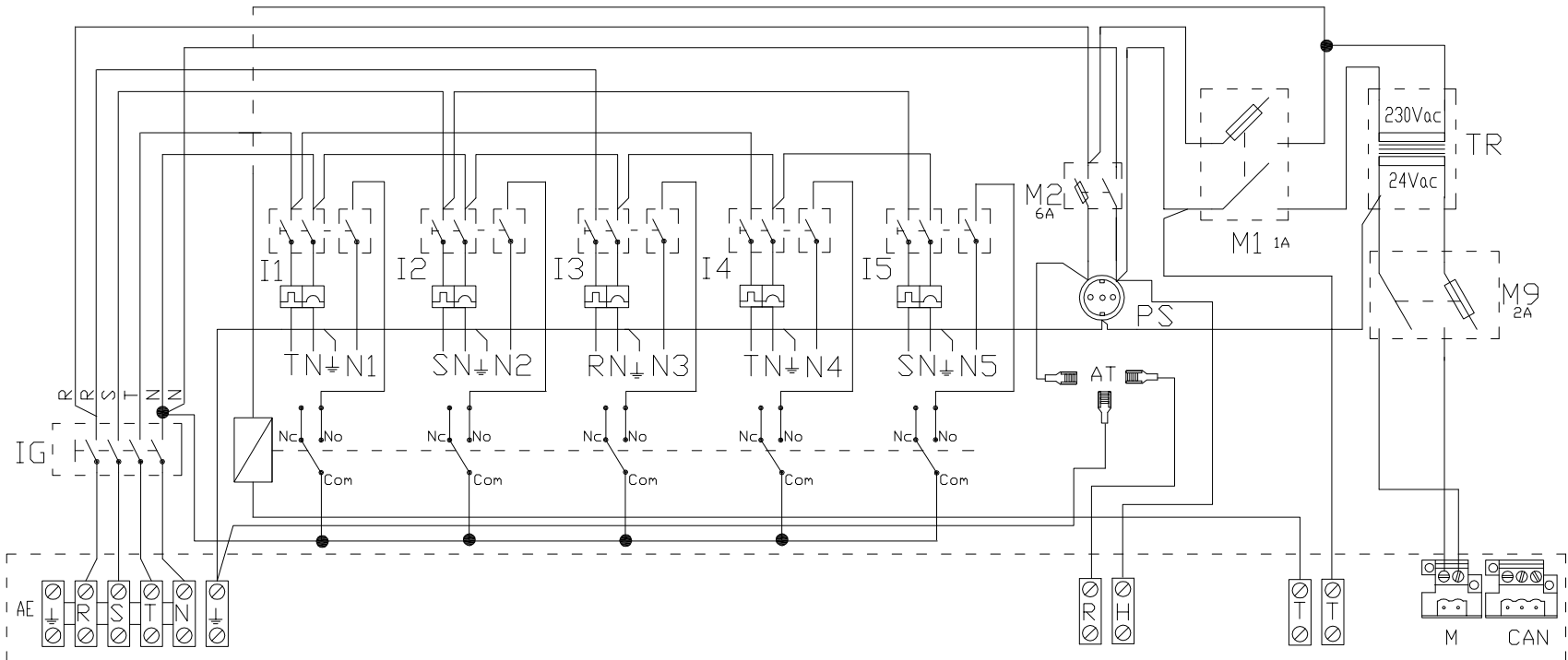
**LEGEND**

AE electrical power terminals (RST/phases - N/neutral)
 IG QEG circuit breaker
 M2 load socket fuse
 PS load socket (230 V AC)
 M1 phase/neutral fuses
 TR 230/24 V AC transformer
 M9 secondary transformer fuse

I1 thermal cut-out "ID00"
 I2 thermal cut-out "ID01"
 I3 thermal cut-out "ID02"
 I4 thermal cut-out "ID03"
 I5 thermal cut-out "ID04"
 AT antifreeze thermostat
 RH resistance heating

Figure 5.25 - DIAGRAM 1

Figure 5.26 – DIAGRAM 2



LEGEND

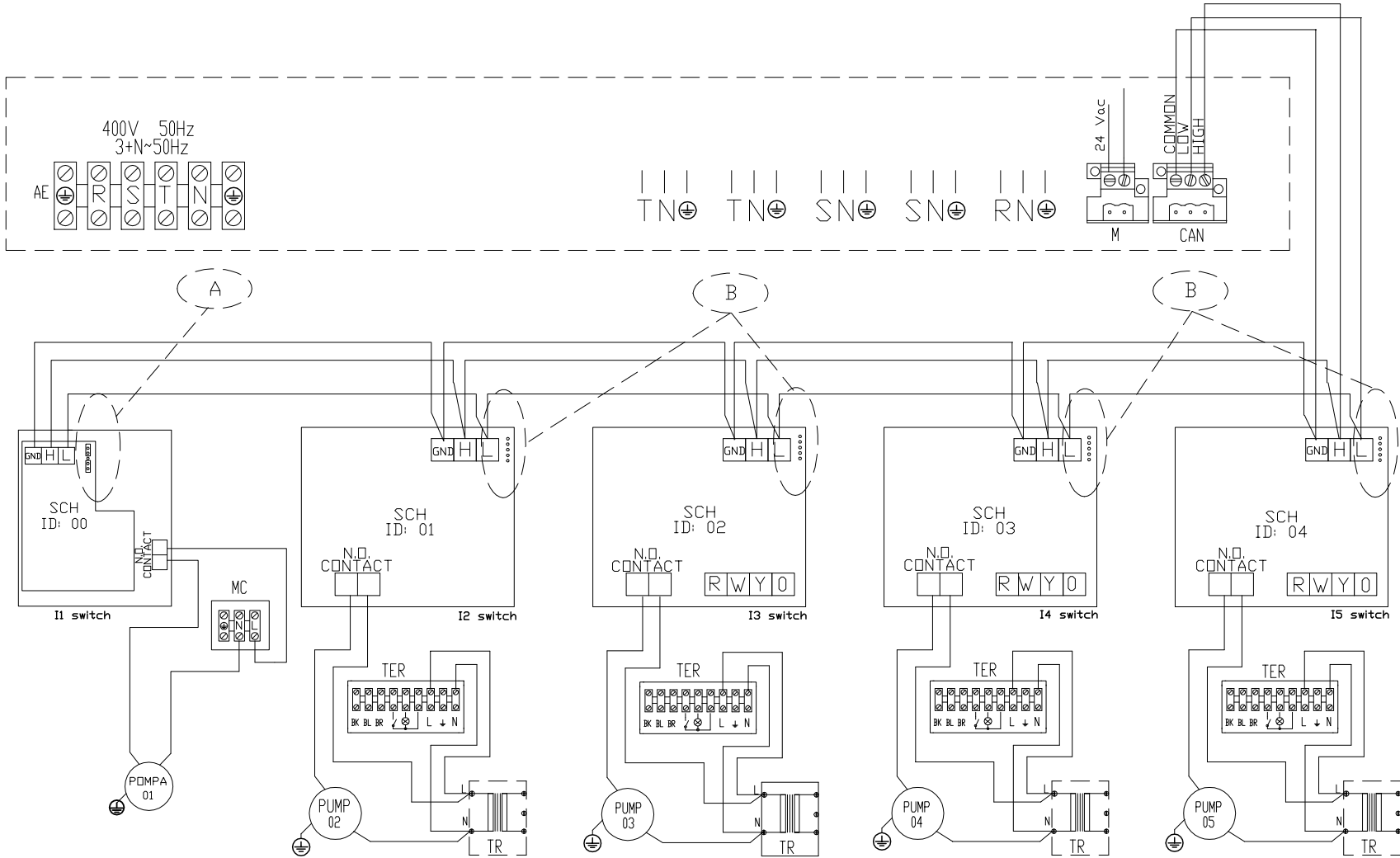
- AE electrical power terminals (R/S/T/phases - N/neutral)
- IG electrical panel breaker
- M2 service socket fuse
- PS service socket (230 V AC)
- M1 phase/neutral fuses
- TR 230/24 V AC transformer
- M9 transformer secondary fuse
- I1 "ID00" unit thermal cutout

- I2 "ID01" unit thermal cutout
- I3 "ID02" unit thermal cutout
- I4 "ID03" unit thermal cutout
- I5 "ID04" unit thermal cutout
- T-T thermostat/accumulation tank connection terminals *
- AT antifreeze thermostat
- RH condensation heating element

* terminals and pre-cabling only present on links with HR

Figure 5.27 - DIAGRAM 3

Wiring diagram of groups with 5 mixed "CC," with circulators" units. Links with mixed GA/GAHP/AV units

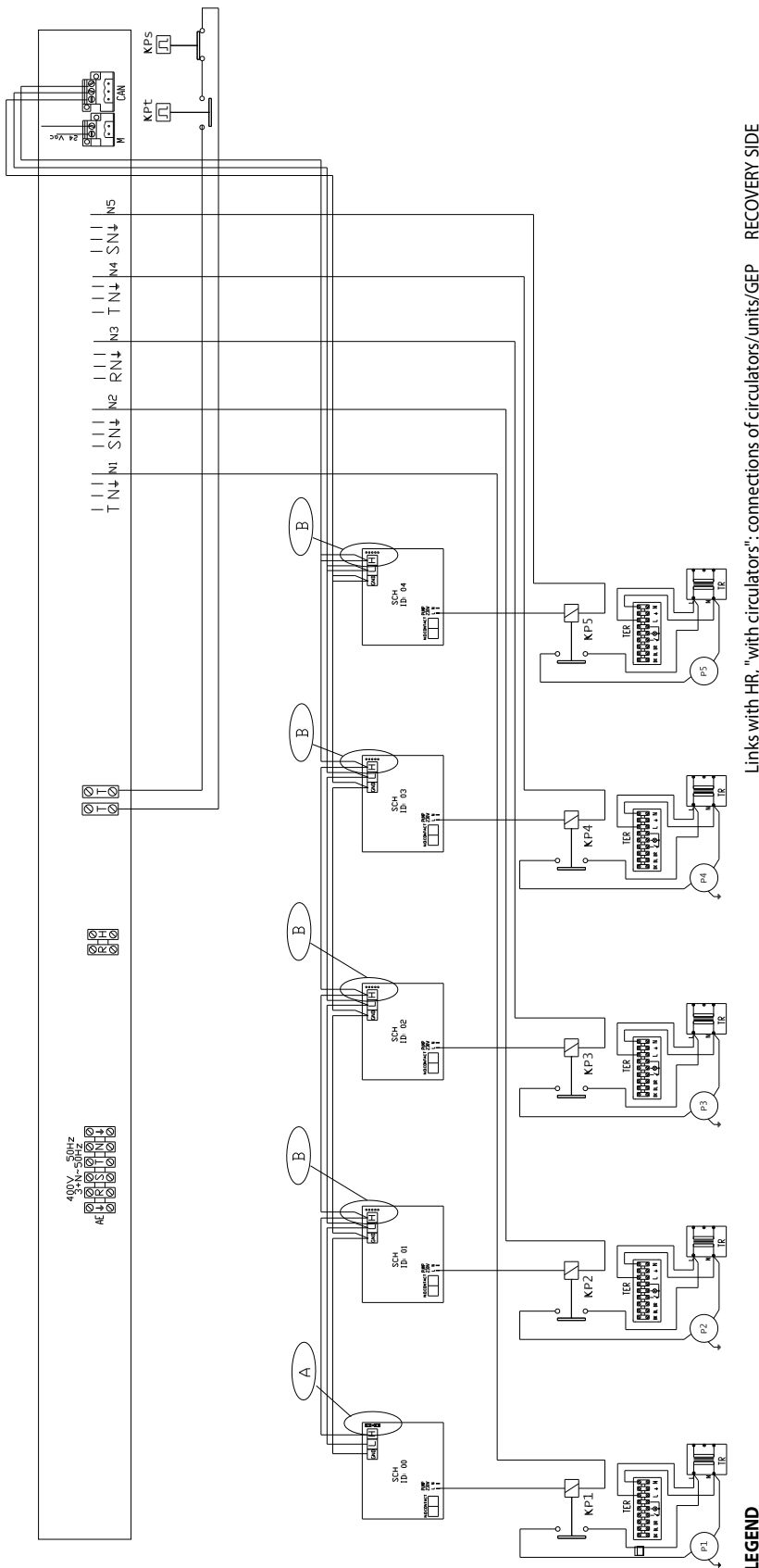


LEGEND

- A jumpers CLOSED (factory setting): keep CLOSED only if the ID00 is a TERMINAL node on the CAN network
- B jumpers OPEN (factory setting): do not change
- NOTE IF "ID00" IS AN INTERMEDIATE NODE:
- The electrical installation technician MUST OPEN the jumpers on the ID00;

- the TAC MUST reset, in sequence, with the controller ID's of all units from the controller
- * on appliances with 2 units only the ID00 + ID01 are installed (with jumpers set as in the example)
- ** on appliances with 3 units only the ID00 + ID01 + ID03 are installed (with jumpers set as in the example)
- *** on appliances with 4 units only the ID00 + ID01 + ID03 + ID04 are installed (with jumpers set as in the example)

Figure 5.28 – DIAGRAM 4

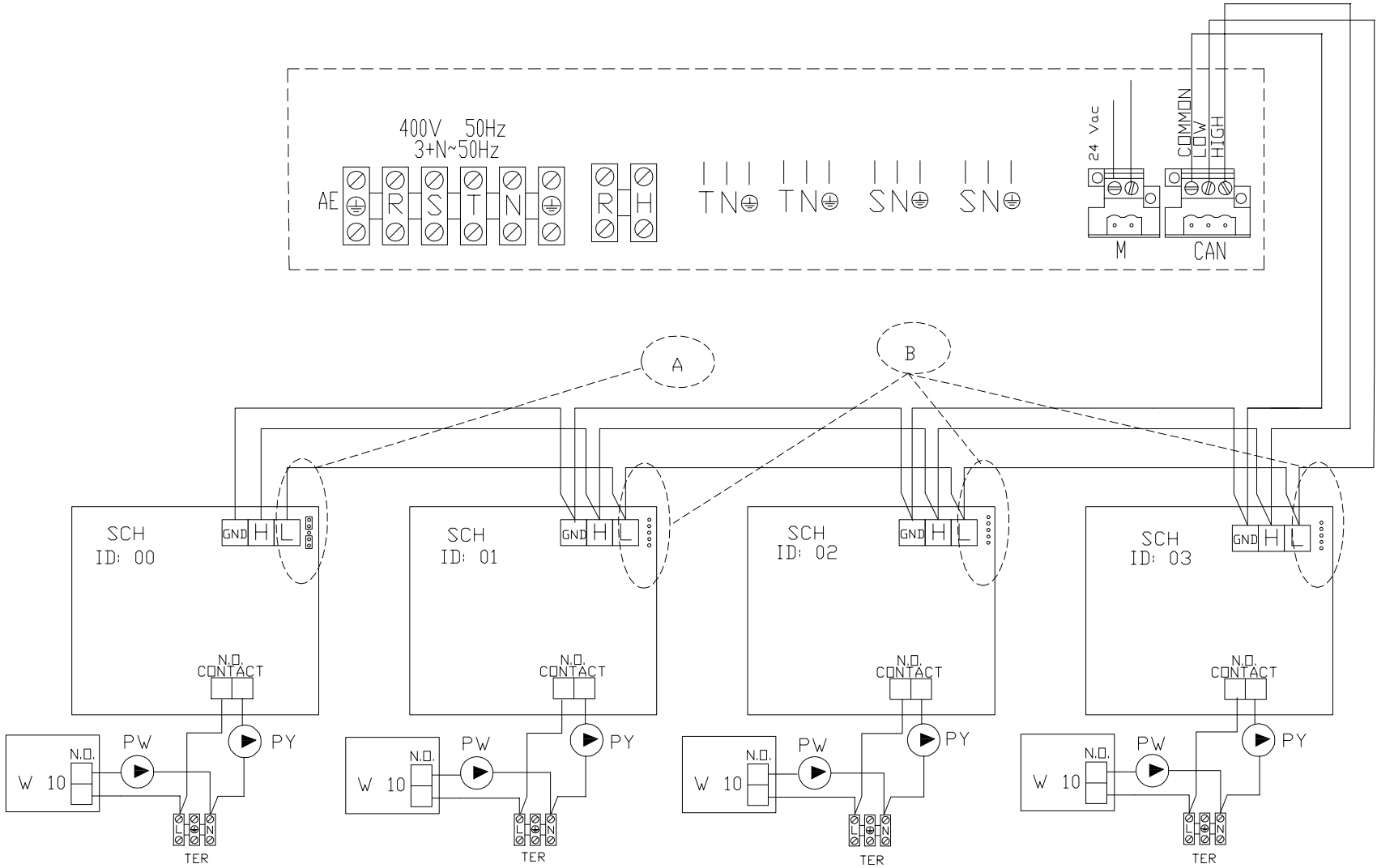


Links with HR, "with circulators": connections of circulators/units/GEP RECOVERY SIDE

LEGEND

Link of "n" units (AY/GA/GAHP) of which 3 are HR.

Figure 5.29 – DIAGRAM 5



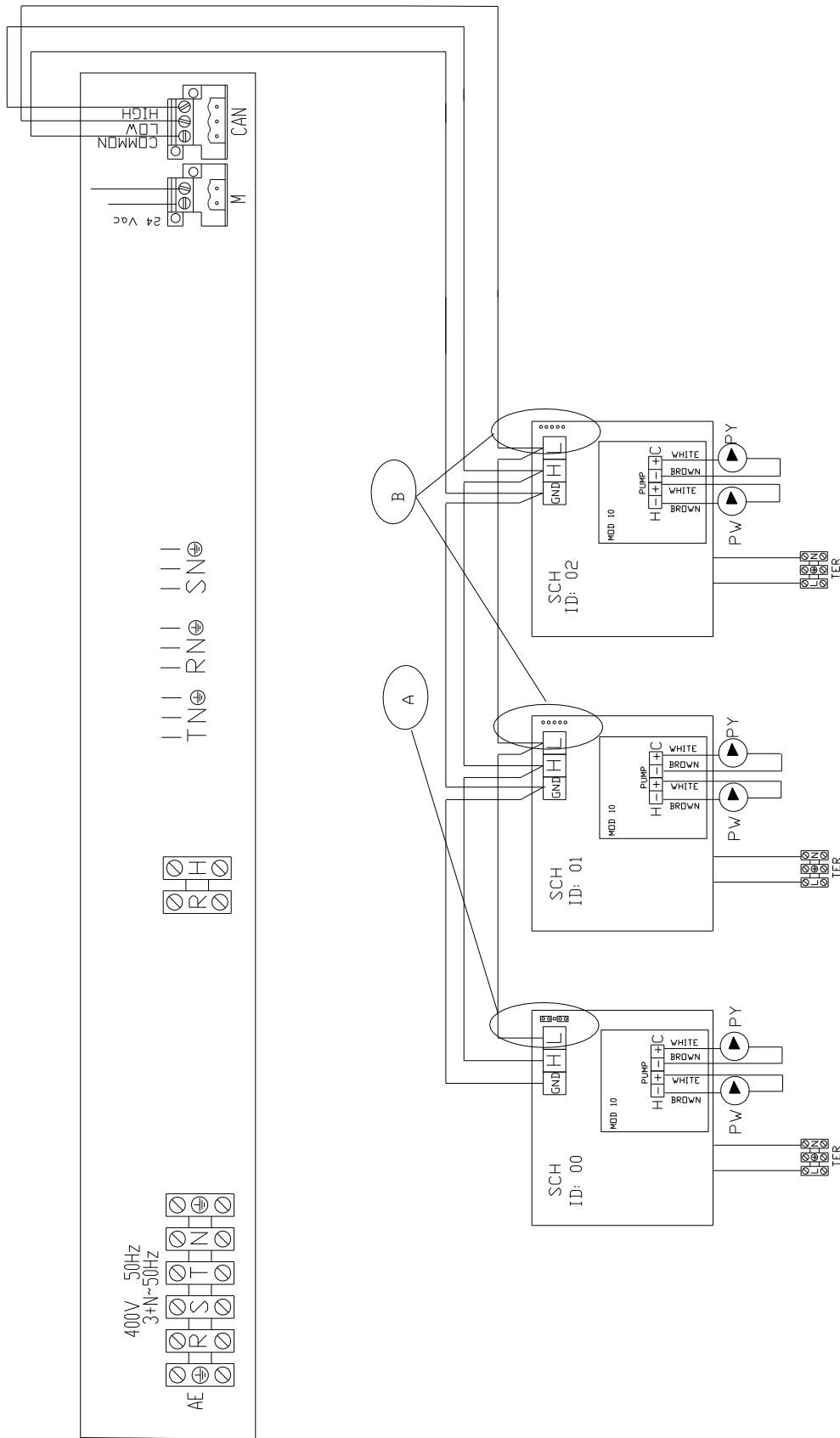
LEGEND

Links with GS/WS, "with circulators": connections of circulators/units/GEP

Hot/Cold SIDE

5 GS/WS links. Non-modulating link

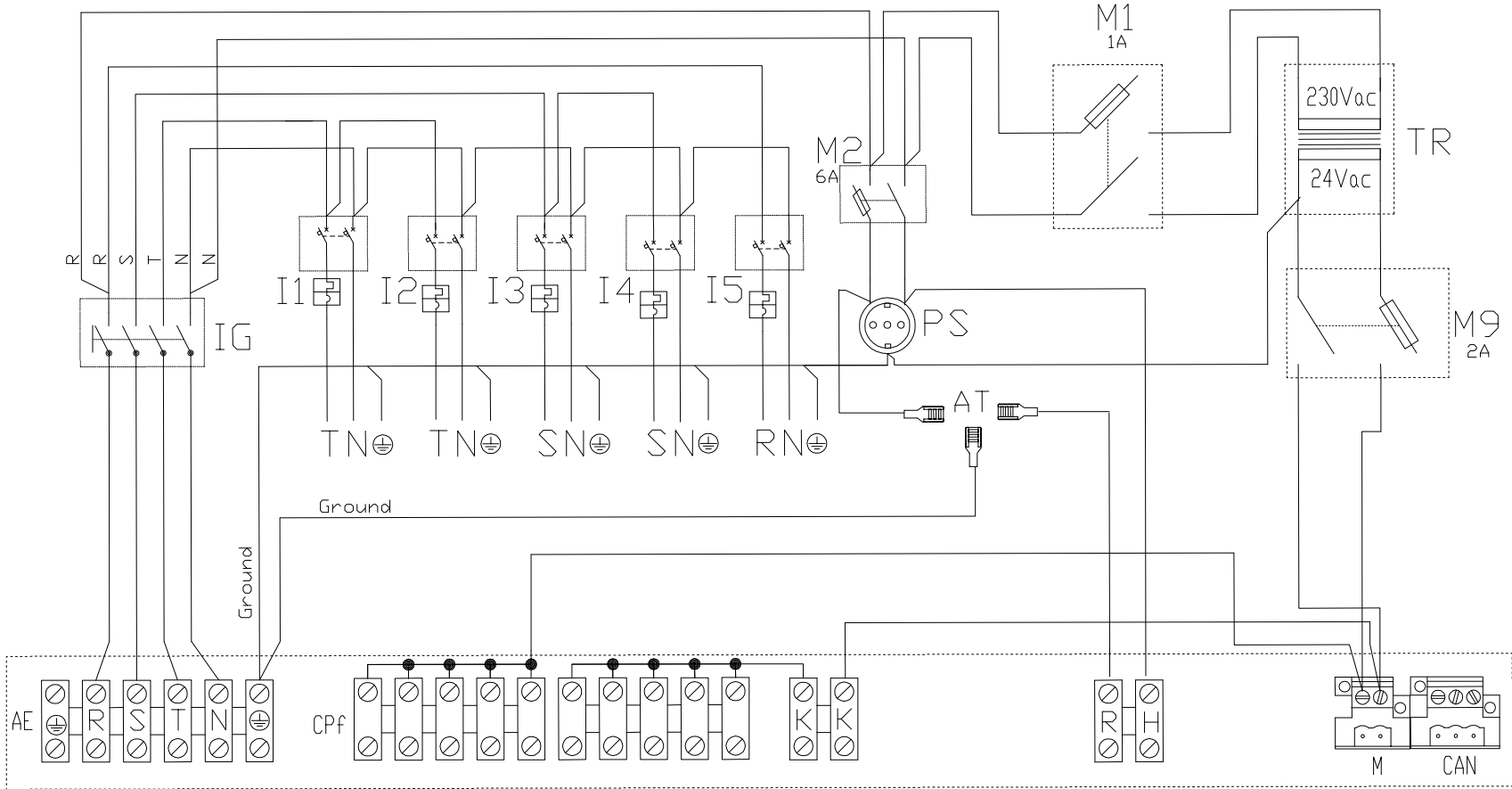
Figure 5.30 – DIAGRAM 6



LEGEND
 Links with GS/WS/A, "with circulators": connections of circulators/units/GEP. Hot/Cold SIDES

3 GS/WS or A links. Modulating link..

Figure 5.31 - DIAGRAM 7



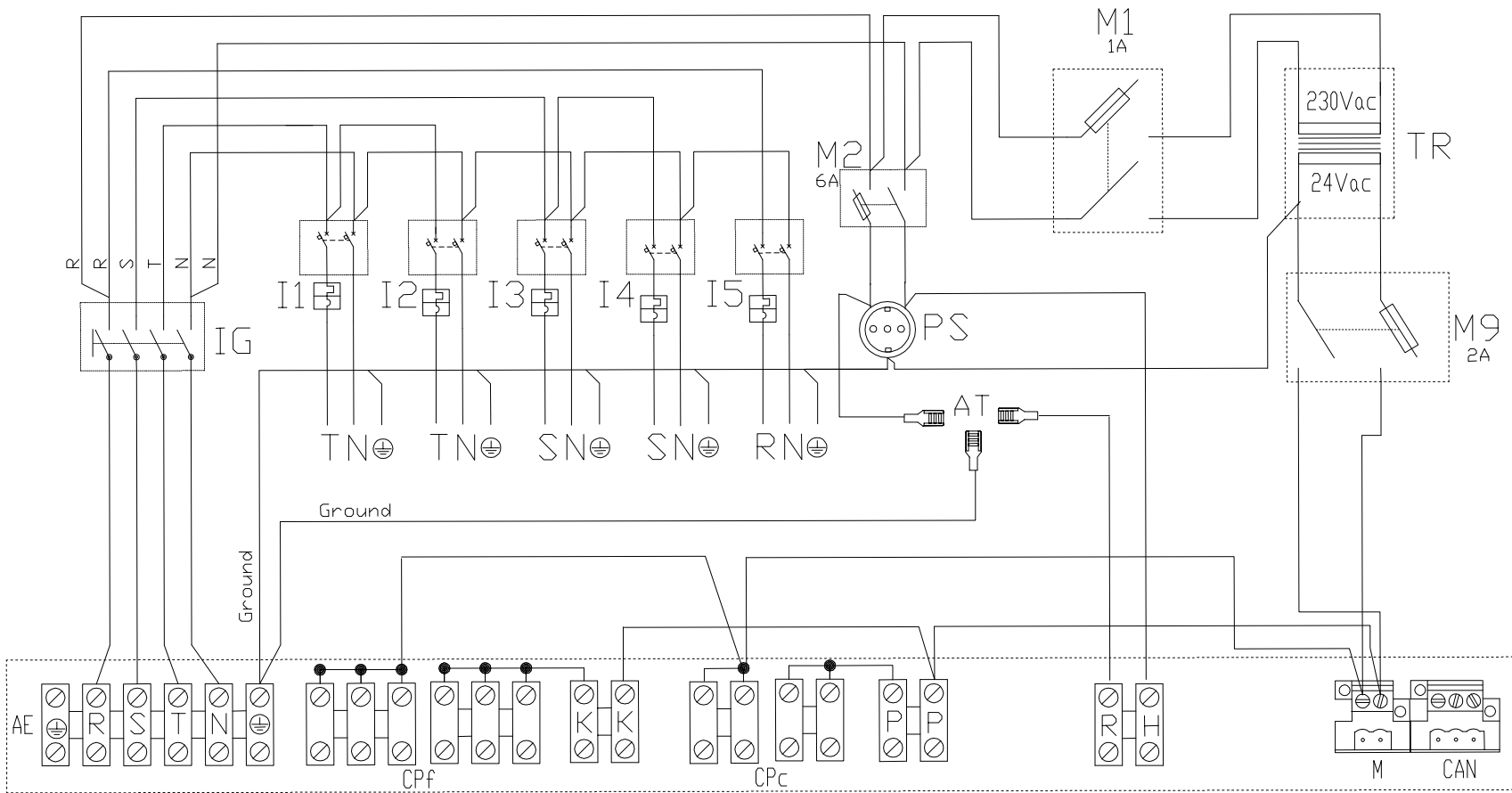
Electrical assembly diagram (interior of general electrical panel) for appliances with 5 "SC, units without pumps".

LEGEND

- AE electrical power terminals (RST/phases - N/neutral)
- IG QEG circuit breaker
- M2 load socket fuse
- PS load socket (230 V AC)
- M1 phase/neutral fuses
- TR 230/24 V AC transformer
- M9 secondary transformer fuse

- I1 thermal cut-out "ID00"
- I2 thermal cut-out "ID01"
- I3 thermal cut-out "ID02"
- I4 thermal cut-out "ID03"
- I5 thermal cut-out "ID04"
- KK 24 V AC circulator enabling terminals
- CPf N.O. contact terminals for 5 units

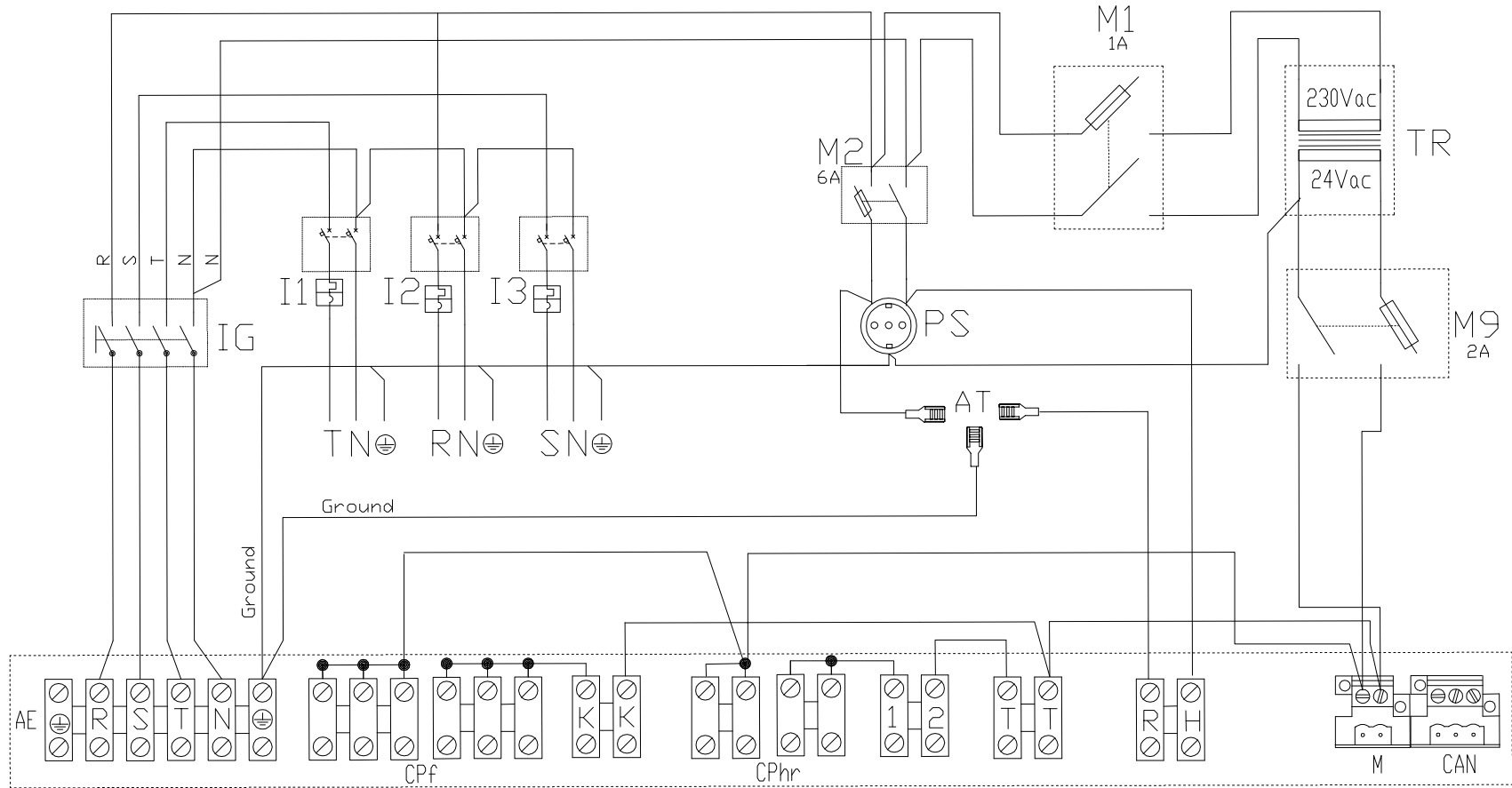
Figure 5.32 – DIAGRAM 8



LEGEND

- AE electrical power terminals (R/S/T/phases - N/neutral)
- IG electrical panel breaker
- M2 service socket fuse
- PS service socket (230 V AC)
- M1 phase/neutral fuses
- TR 230/24 V AC transformer
- M9 transformer secondary fuse
- I1 "ID00" unit thermal cutout
- I2 "ID01" unit thermal cutout

- I3 "ID02" unit thermal cutout
- I4 "ID03" unit thermal cutout
- I5 "ID04" unit thermal cutout
- AT antifreeze thermostat
- RH condensation heating element
- CPf circulator enable contacts (cold circuit side)
- K.K 24 V AC coil terminals for circulator enable (cold circuit side)
- CPc circulator enable contacts (hot circuit side)
- P.P 24 V AC coil terminals for circulator enable (hot circuit side)

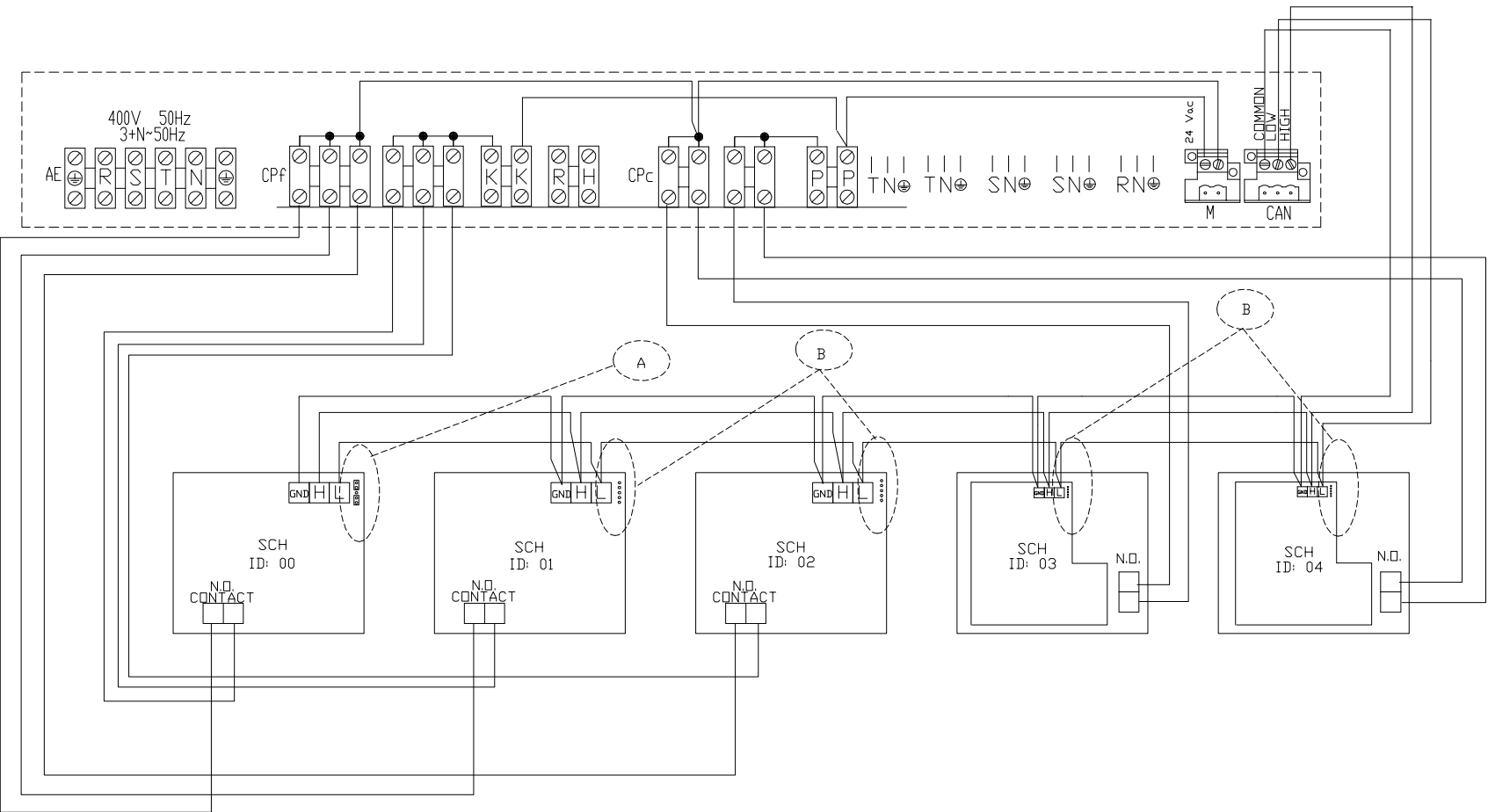

LEGEND

AE	electrical power terminals (RST/phases - N/neutral)
IG	electrical panel breaker
M2	service socket fuse
PS	service socket (230 V AC)
M1	phase/neutral fuses
TR	230/24 V AC transformer
M9	transformer secondary fuse
I1	"ID00" unit thermal cutout
I2	"ID01" unit thermal cutout

I3	"ID02" unit thermal cutout
I4	"ID03" unit thermal cutout
I5	"ID04" unit thermal cutout
AT	antifreeze thermostat
RH	condensation heating element
CPf	circulator enable contacts (cold circuit side)
K-K	24 V AC coil terminals for circulator enable (cold circuit side)
CPhr	circulator enable contacts (HR recovery circuit side)
1-2	24 V AC coil terminals for circulator enable (HR recovery circuit side)
T-T	DHW tank thermostat terminals (HR recovery circuit side)

Figure 5.33 - DIAGRAM 9

Figure 5.34 – DIAGRAM 10



Wiring diagram of groups with 5 mixed "SC" with circulators" units. Links with mixed GA/GAHP/AV units

LEGEND

- SCH single unit circuit board
- ID:00 circuit board of last unit of link
- NOContact pump contact, NO
- A jumpers CLOSED (factory setting): keep CLOSED only if ID00 is a TERMINAL node of the CAN network
- B jumpers OPEN (factory setting): do not change

NOTE

IF "ID00" IS AN INTERMEDIATE NODE:

- the electrical installation technician MUST OPEN the jumpers on the ID00;
- the TAC MUST reset, in sequence, the controller ID's of all units from the controller on appliances with 2 units only ID00 + ID01 are present (with jumpers set as per the example)
- * on appliances with 3 units, only ID00 + ID01 + ID02 are present (with jumpers set as per the example). Etc.
- **

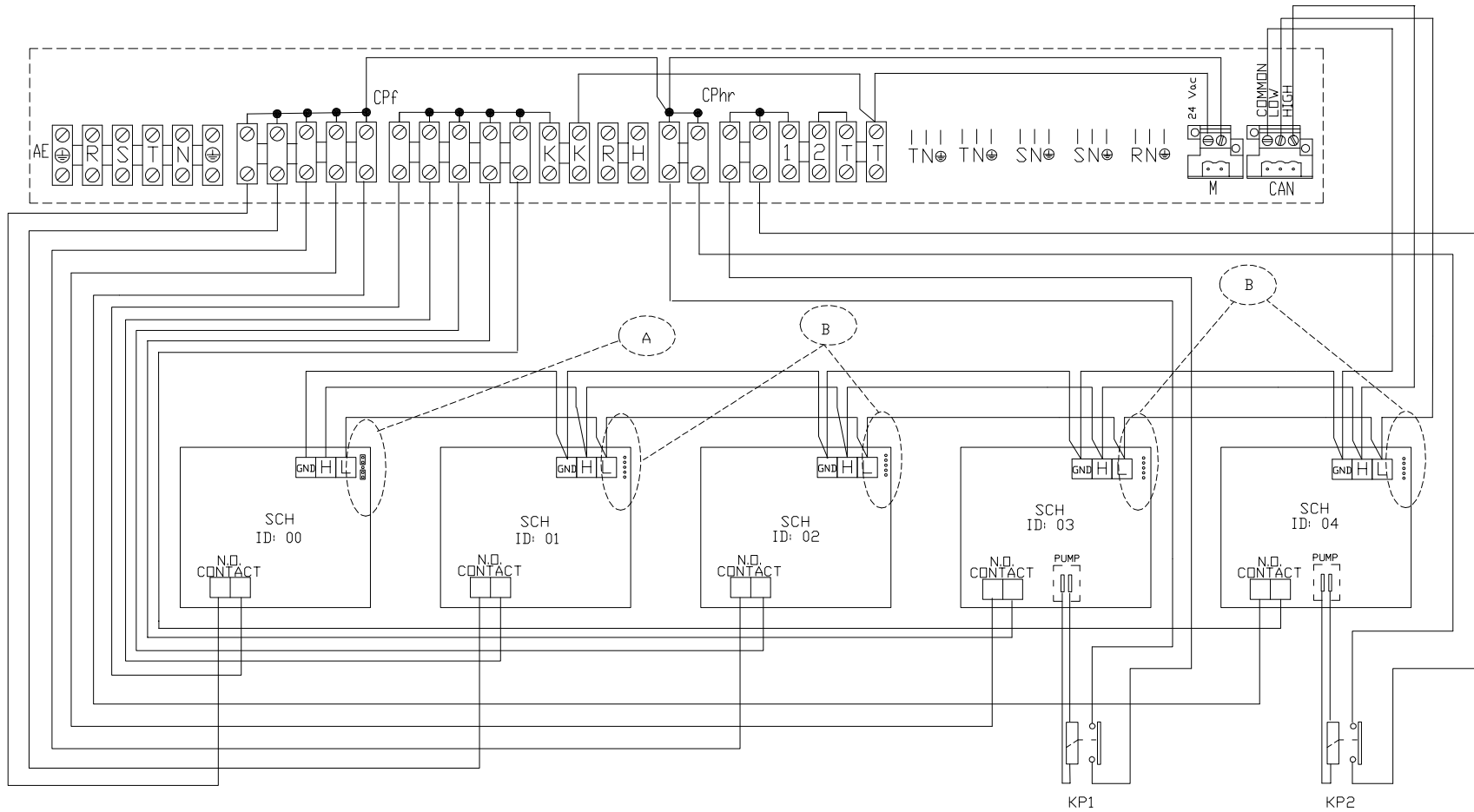


Figure 5.35 - DIAGRAM 11

LEGEND

SCH	single unit circuit board
ID:00	circuit board of last unit of link
NOContact	pump contact, NO
PUMP	230 V AC output
KP1/2	recovery pump enable relay
A	jumpers CLOSED (factory setting): keep CLOSED only if ID00 is a TERMINAL node of the CAN network
B	jumpers OPEN (factory setting): do not change

NOTE

IF "ID00" IS AN INTERMEDIATE NODE:

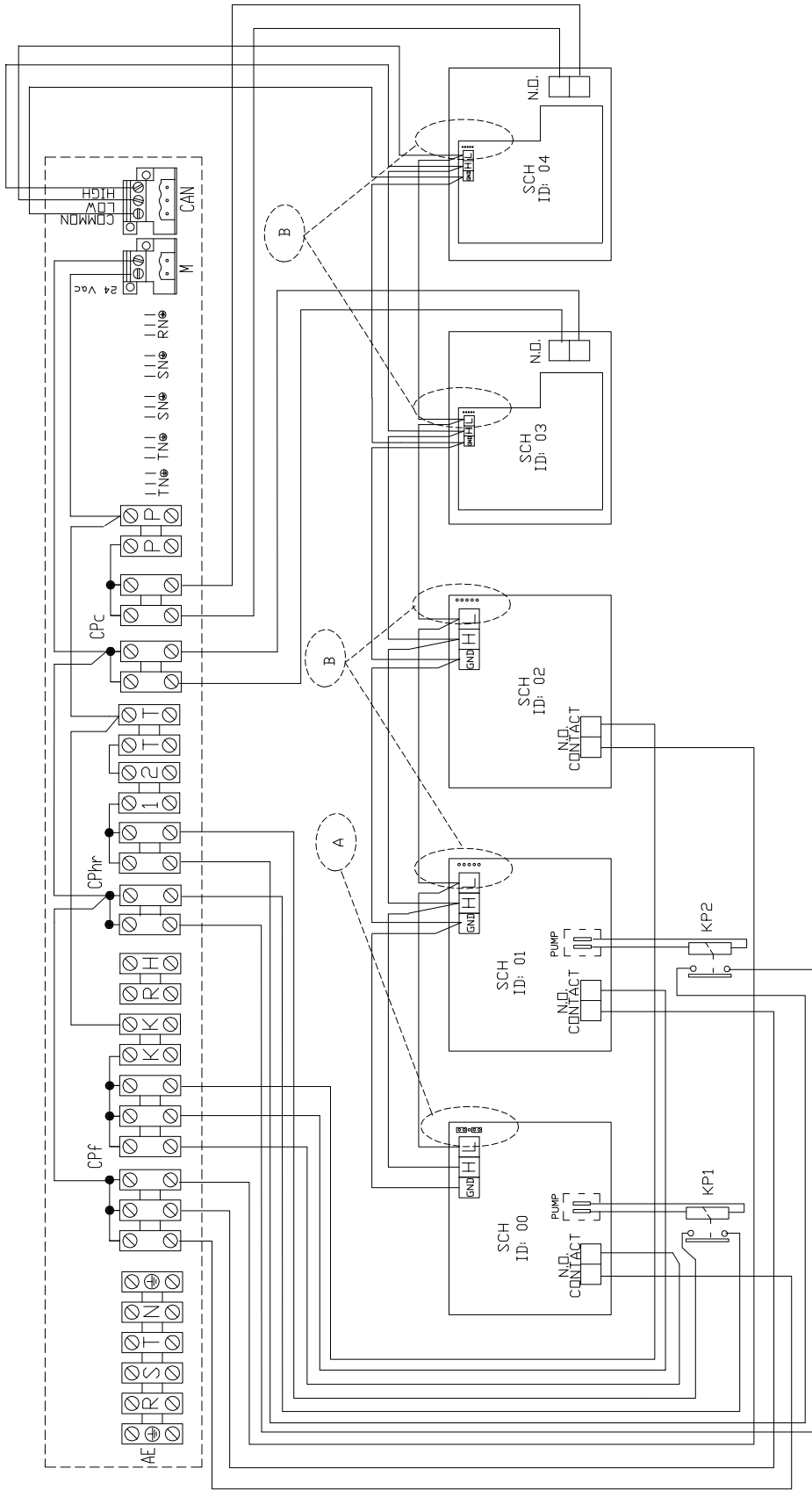
- the electrical installation technician MUST OPEN the jumpers on the ID00;

- the TAC MUST reset, in sequence, the controller ID's of all units from the controller on appliances with 2 units only ID00 + ID01 are present (with jumpers set as per the example)

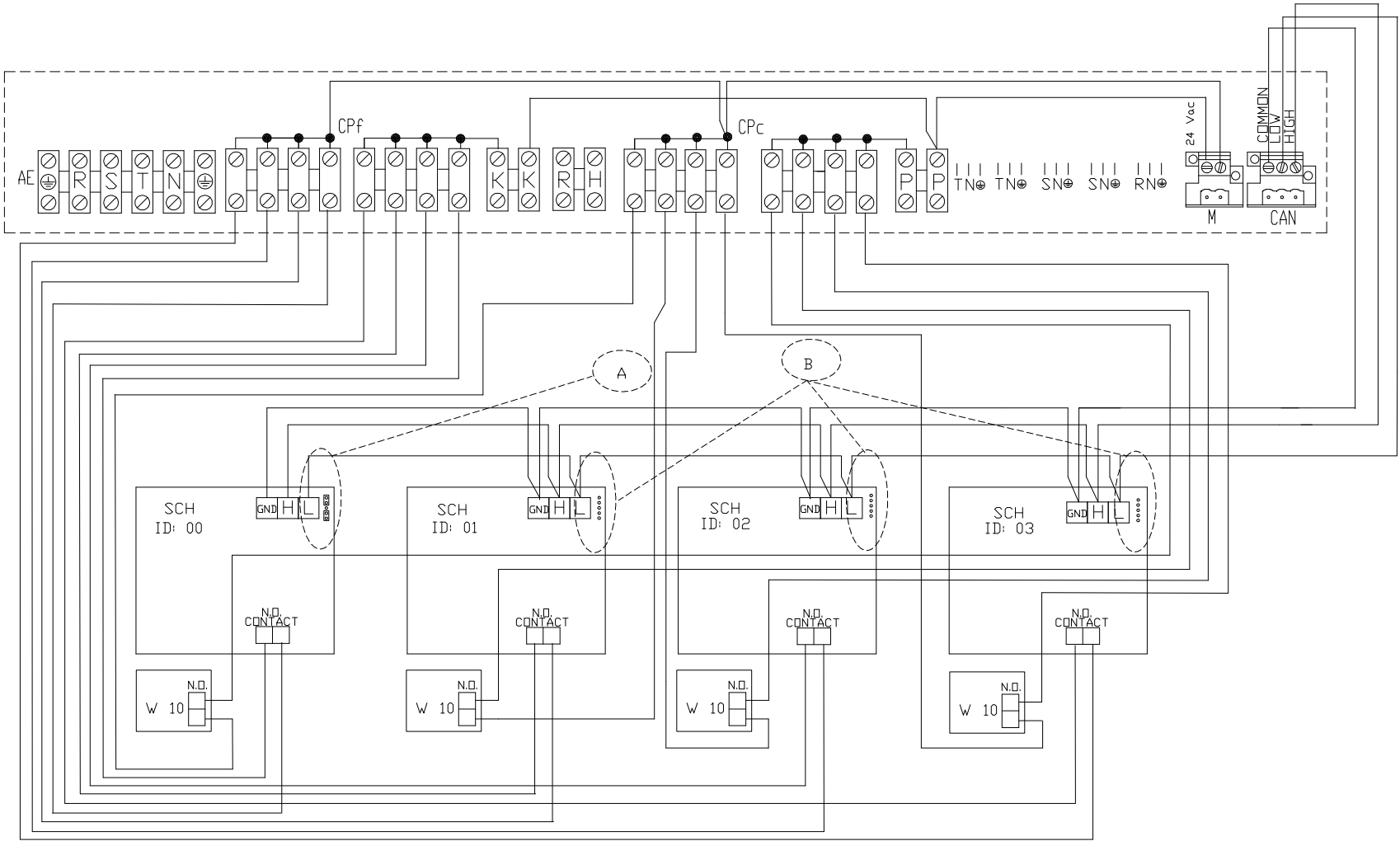
*

** on appliances with 3 units, only ID00 + ID01 + ID02 are present (with jumpers set as per the example). Etc.

Figure 5.36 – DIAGRAM 12



connections of unit/GEP - HOT + COLD SIDE: Non-modulating link



LEGEND

Links with GS/WS, "without circulators": connections of circulators/units/GEP Hot + Cold SIDES

Figure 5.37 - DIAGRAM 13



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