1 PREMISE

Some example plumbing and electrical diagrams of possible applications of the Robur appliances and their controls are shown below.

The diagrams shown are for design purposes only and are not valid for installation purposes.

For more details on plumbing design please refer to Section C01.03. For more details on electrical design refer to Section C01.10.

The Robur technical service is available for customised advice on specific plumbing and control configurations.

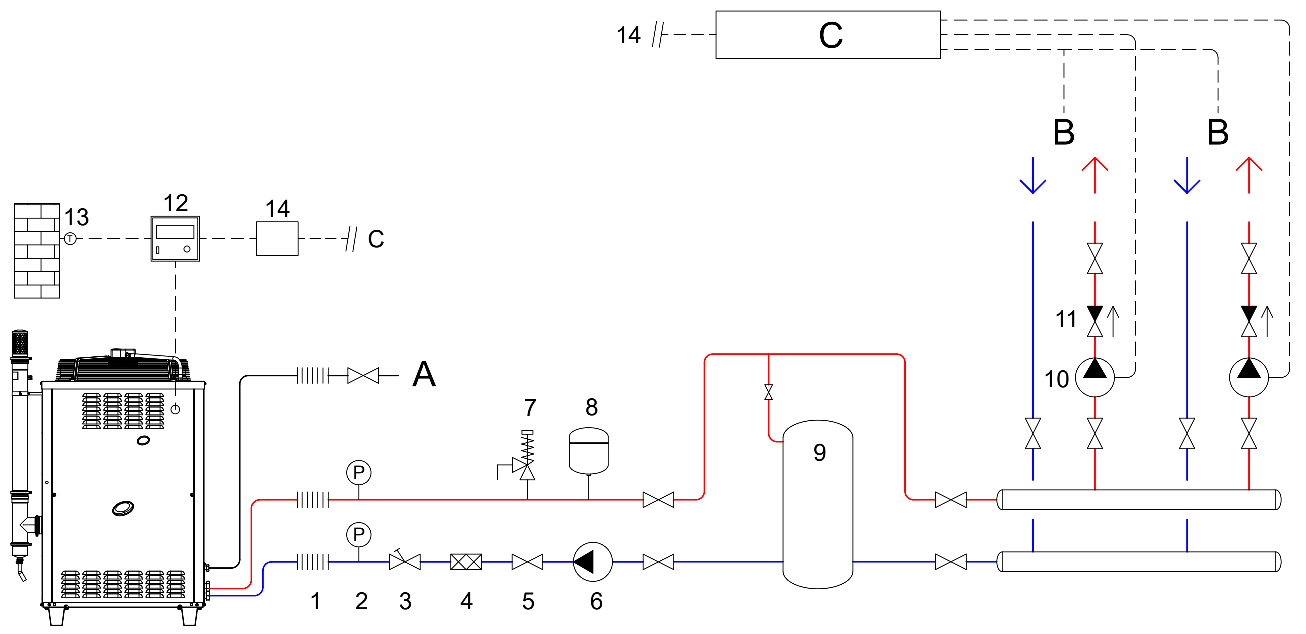
2 HEATING/COOLING WITH GAHP-AR

2.1 DESCRIPTION

The plumbing diagram in Figure 2.1 *p. 1* shows the use of a single GAHP-AR for heating and cooling, coupled to a primary/secondary system with a 3-pipe hydraulic separator.
The control system also includes a secondary circuit management system capable of transmitting a heating/cooling service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.
The activation signal goes through a summer/winter selector switch as the GAHP-AR is a reversible heat pump and it is therefore necessary that the request comes alternately for either heating or cooling. The DDC configuration must be consistent with this management.

2.2 PLUMBING DIAGRAM

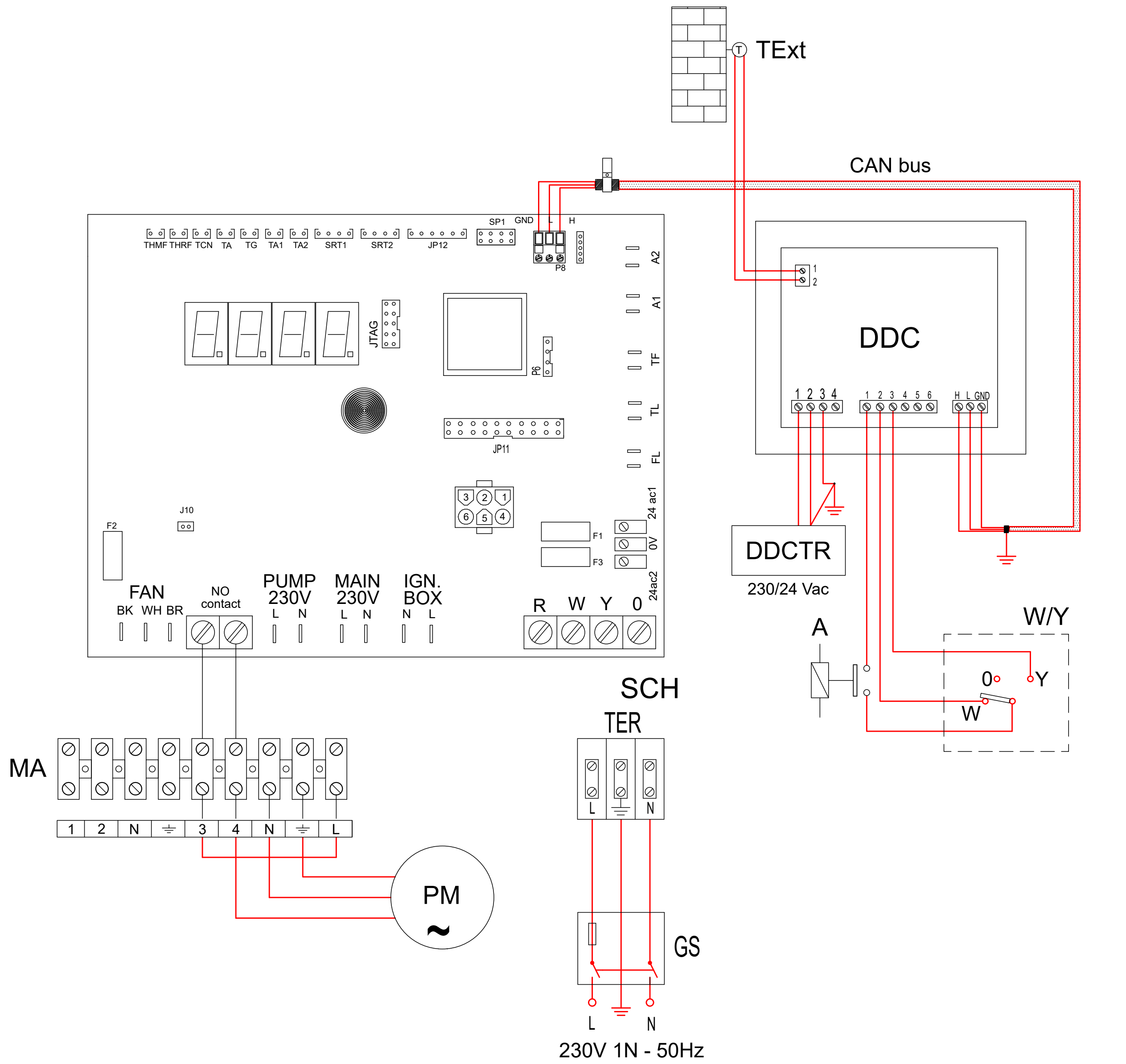
Figure 2.1 *Plumbing diagram for a single GAHP-AR for heating and cooling*



The flow regulation valve must only be used if the pump in the primary circuit is the fixed flow type
A Gas connection
B Heating/Cooling circuit
C Secondary circuit management system
1 Anti-vibration connection
2 Pressure gauge
3 Flow regulation valve
4 Sludge filter
5 Shut-off valve
6 Primary circuit water pump
7 Safety valve
8 Expansion tank
9 Buffer tank (and hydraulic separator)
10 Heating/Cooling circuit water pump
11 Check valve
12 DDC panel
13 Outdoor temperature probe
14 Summer/winter selector switch

2.3 ELECTRICAL WIRING DIAGRAM

Figure 2.2 *Wiring diagram for a single GAHP-AR for heating and cooling*



A External request
DDC DDC panel
SCH GAHP electronic board
TER terminal block
L-(PE)-N Phase/earth/neutral GAHP power supply
MA terminal block
N-(PE)-L Neutral/earth/phase of water pump power supply
3-4 Water pump request
CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
PM Water pump < 700 W
TExt Outdoor temperature probe
W/Y Heating/Cooling switch (winter/summer)
- Position W to turn heating on
- Position Y to turn cooling on
- Position 0 for system off

3 HEATING WITH GAHP GS WITH GEOTHERMAL PROBES

3.1 DESCRIPTION

The plumbing diagram in Figure 3.1 *p. 3* shows the use of a single GAHP GS HT for heating, coupled to a primary/secondary system with a 3-pipe hydraulic separator and geothermal probes.
If required by local regulations, a heat exchanger may be placed before the geothermal exchange system to avoid sending any glycol water into the ground.
The geothermal exchange system can be realised with either vertical probes, horizontal exchange systems or energy piles.
The correct design of the geothermal exchange system is critical to the operation and performance of the geothermal heat pump. It is recommended to refer to technicians specialised in the design and implementation of geothermal exchange systems for heat pump applications.

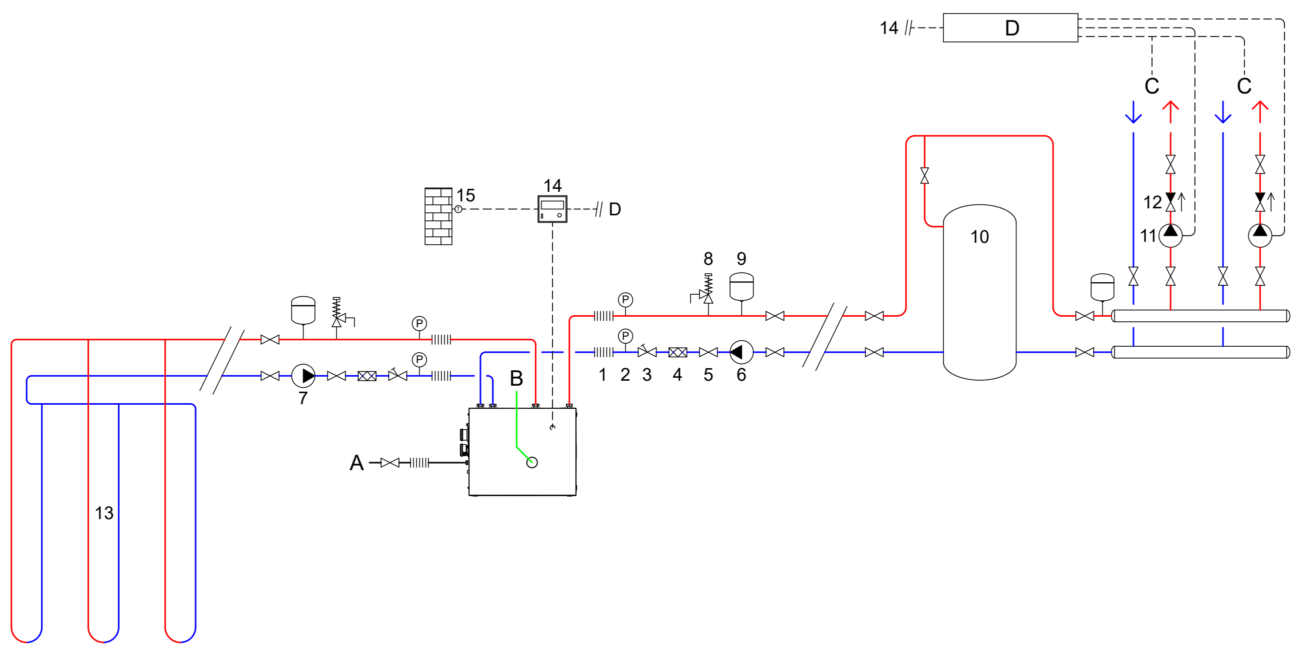
The Robur technical service is available to provide designers of the geothermal system with any information about the GAHP GS HT appliance that may be needed for design purposes.

In the wiring diagram, the water pumps are operated at constant flow. If you wish to operate the water pump at variable flow on the system side (on the renewable source side the water pump is always operated at constant flow) refer to Section C01.10 for the relevant electrical connections.

The control system also includes a secondary circuit management system capable of transmitting a heating service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.

3.2 PLUMBING DIAGRAM

Figure 3.1 *GAHP GS plumbing diagram*



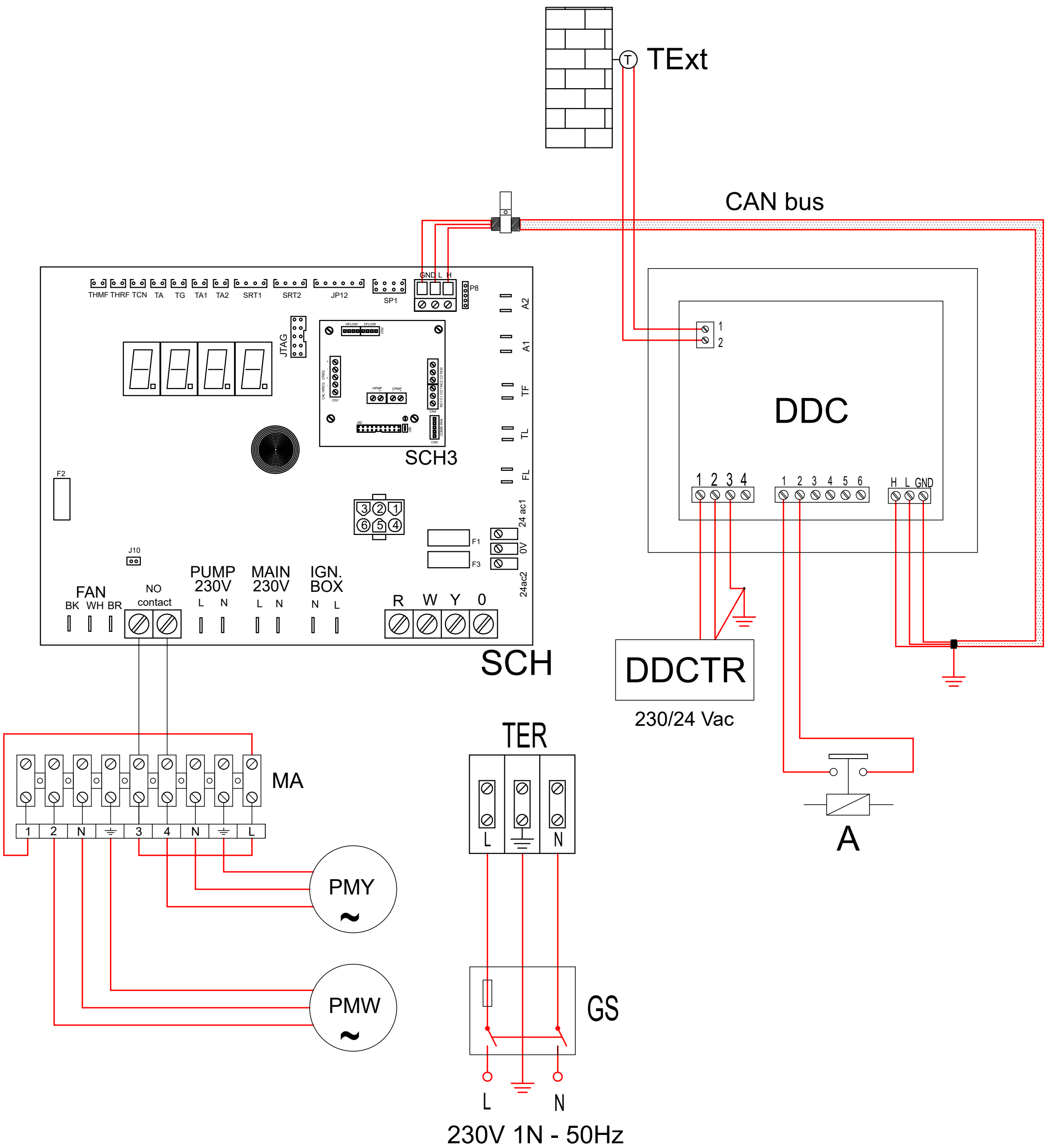
The flow regulation valve must only be used if the pump in the primary circuit is the fixed flow type
A Gas connection
B Safety valve drain ducting connection (indoor version only)
C Heating circuit
D Secondary circuit management system

1 Anti-vibration connection
2 Pressure gauge
3 Flow regulation valve
4 Sludge filter
5 Shut-off valve
6 Primary circuit water pump on system side
7 Primary circuit water pump on renewable source side

8 Safety valve
9 Expansion tank
10 Buffer tank (and hydraulic separator)
11 Heating/Cooling circuit water pump
12 Check valve
13 Geothermal field probes
14 DDC panel
15 Outdoor temperature probe

3.3 ELECTRICAL WIRING DIAGRAM

Figure 3.2 *Wiring diagram for a single GAHP GS/WS for heating*



A External heating request
DDC DDC panel
SCH GAHP electronic board
TER terminal block
L-(PE)-N Phase/earth/neutral GAHP power supply
MA terminal block
N-(PE)-L Neutral/earth/phase of water pump power supply
1-2 Water pump request on system side
3-4 Water pump request on renewable source side
CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH

Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
TExt Outdoor temperature probe
PMW System-side water pump < 700 W
PMY Renewable source side water pump < 700 W

4 HEATING WITH GAHP WS WITH GROUND WATER

4.1 DESCRIPTION

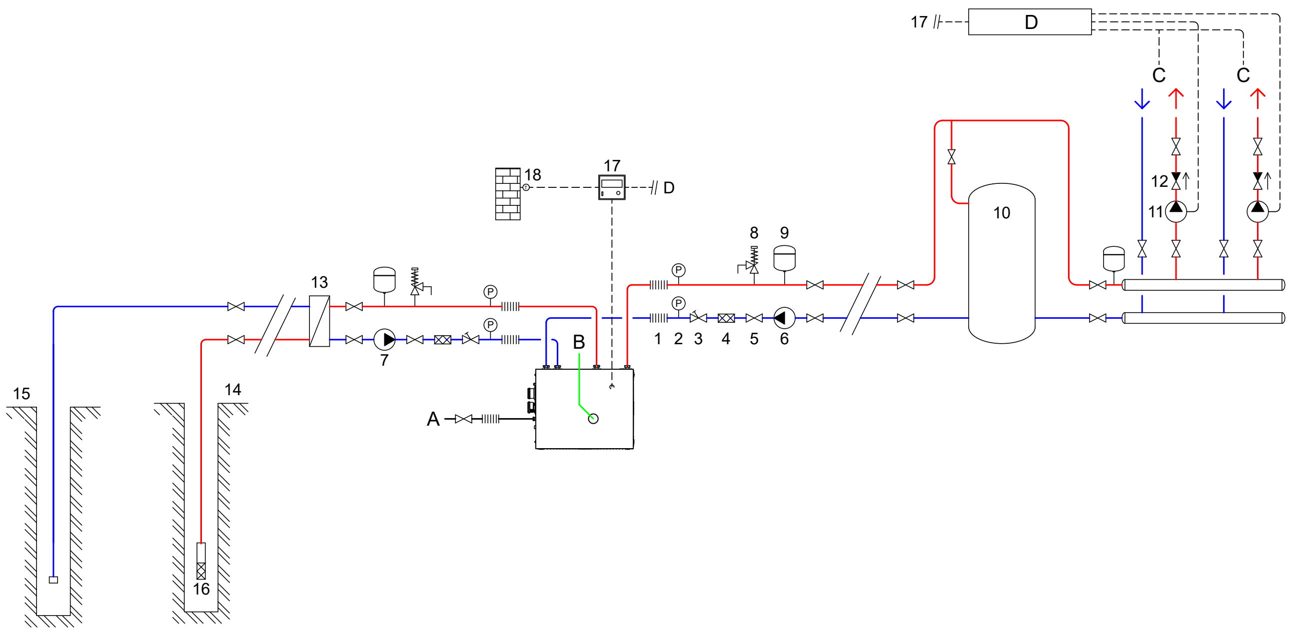
The plumbing diagram in Figure 4.1 *p. 5* shows the use of a single GAHP WS for heating, coupled to a primary/secondary system with a 3-pipe hydraulic separator and energy recovery from ground water with a heat exchanger (mandatory) with water return well.
The exchange system with the hydrothermal energy source can be realised either by means of wells or surface aquifer systems (lakes, rivers). The use of the interposed heat exchanger is however mandatory.
In the case of the construction of extraction wells, check that the well has the authorisation to draw the required flow for the operation of the GAHP WS heat pump.
The water return well is generally not compulsory, unless otherwise specified in local regulations, which must be complied with. The Robur technical service is available to provide designers of the exchange system (wells, heat exchangers) with any information about the GAHP WS appliance that may be needed for design purposes.

In the wiring diagram, the water pumps are operated at constant flow. If you wish to operate the water pump at variable flow on the system side (on the renewable source side the water pump is always operated at constant flow) refer to Section C01.10 for the relevant electrical connections.

The control system also includes a secondary circuit management system capable of transmitting a heating service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.

4.2 PLUMBING DIAGRAM

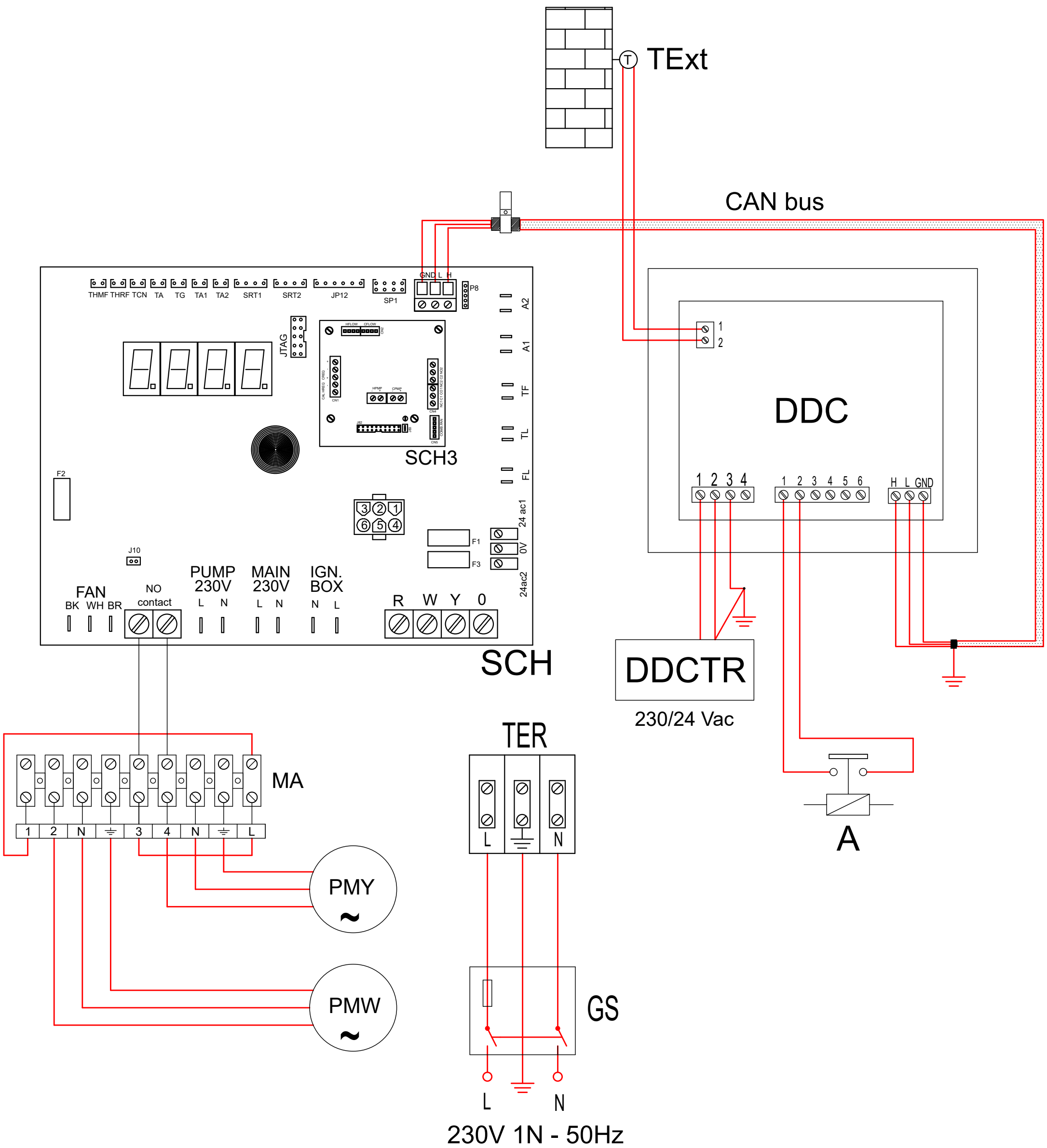
Figure 4.1 *GAHP WS plumbing diagram*



The flow regulation valve must only be used if the pump in the primary circuit is the fixed flow type
A Gas connection
B Safety valve drain ducting connection (indoor version only)
C Heating circuit
D Secondary circuit management system
1 Anti-vibration connection
2 Pressure gauge
3 Flow regulation valve
4 Sludge filter
5 Shut-off valve
6 Primary circuit water pump on system side
7 Primary circuit water pump on renewable source side
8 Safety valve
9 Expansion tank
10 Buffer tank (and hydraulic separator)
11 Heating/Cooling circuit water pump
12 Check valve
13 Heat exchanger
14 Extraction well
15 Water return well
16 Submersible pump
17 DDC panel
18 Outdoor temperature probe

4.3 ELECTRICAL WIRING DIAGRAM

Figure 4.2 *Wiring diagram for a single GAHP GS/WS for heating*



A External heating request
DDC DDC panel
SCH GAHP electronic board
TER terminal block
L-(PE)-N Phase/earth/neutral GAHP power supply
MA terminal block
N-(PE)-L Neutral/earth/phase of water pump power supply
1-2 Water pump request on system side
3-4 Water pump request on renewable source side
CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH

Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
TExt Outdoor temperature probe
PMW System-side water pump < 700 W
PMY Renewable source side water pump < 700 W

5 HEATING AND DHW WITH GAHP A

5.1 DESCRIPTION

The plumbing diagram in Figure 5.1 *p. 8* shows the use of a single GAHP A for heating, cooling and base DHW production (with possible solar integration), coupled to a primary/secondary system with a 3-pipe hydraulic separator.
DHW production is done via the base circuit, diverting hot water to the DHW buffer tank via diverter valves based on the DHW service request from a thermostat with adjustable differential, conveniently located in the DHW buffer tank.
Positioning DHW immersion thermostat correctly is important for the proper operation of the system. Positioning the thermostat at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the thermostat at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the thermostat reaches the switch-off temperature.
The correct setting of the thermostat and its differentials is critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, preventing the heating system from delivering service. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

In the presence of the solar system (not supplied), it is important that this is upstream of the DHW production system with the GAHP A and can work on the colder inlet water to the buffer tank, in order to optimise its exploitation and ensure that, if the solar system is able to achieve the required temperature on thermostat 13 on its own, there are no activation requests for DHW at the GAHP A.
If DHW and heat output demand are high, a separate preheating tank may be considered.
The presence of the RB100 device allows DHW service requests from the thermostat in the DHW buffer tank to be interfaced with the DDC panel and diverter valves to be switched.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

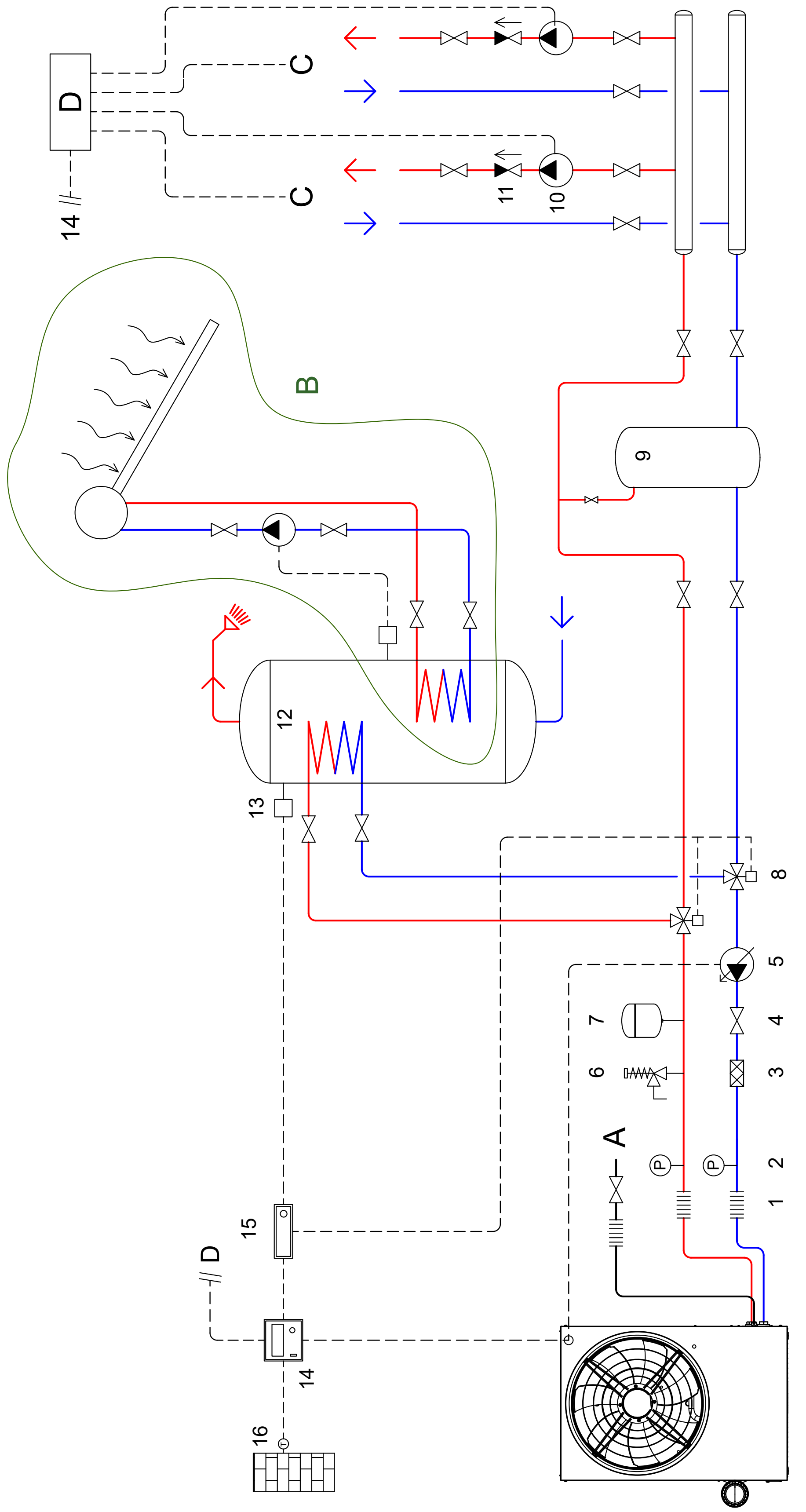
For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

In the wiring diagram, the water pump is of the variable flow type. If you wish to operate the water pump at constant flow, please refer to Section C01.10 for the relevant electrical connections.

The control system also includes a secondary circuit management system capable of transmitting a heating service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.

5.2 PLUMBING DIAGRAM

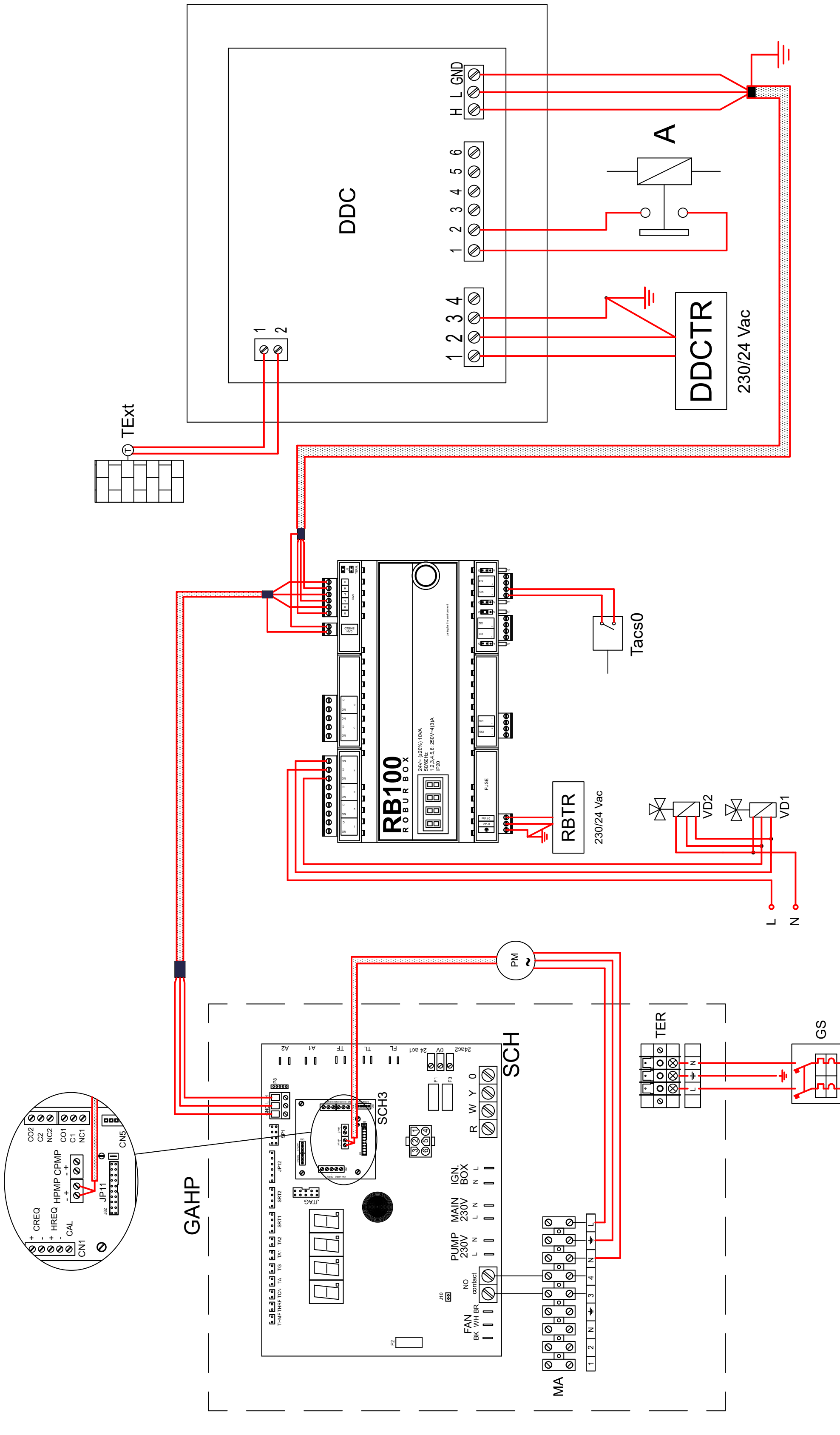
Figure 5.1 *Plumbing diagram for a single GAHP A for heating and base DHW*



A Gas connection
B Solar thermal integration (not supplied)
C Heating circuit
D Secondary circuit management system
System components:
1 Anti-vibration connection
2 Pressure gauge
3 Sludge filter
4 Shut-off valve
5 Primary circuit water pump (variable flow)
6 Safety valve
7 Expansion tank
8 3-way diverter valves for DHW
9 Buffer tank (and hydraulic separator)
10 Heating circuit water pump
11 Check valve
12 DHW buffer tank
13 Thermostat with adjustable differential for DHW
14 DDC panel
15 RB100 device
16 Outdoor temperature probe

5.3 ELECTRICAL WIRING DIAGRAM

Figure 5.2 *Wiring diagram for a single GAHP A for heating and base DHW*



A External heating request
DDC DDC panel
RB100 RB100 device
SCH GAHP electronic board
SCH3 GAHP electronic board
Terminals:
TER terminal block
L-(PE)-N Phase/earth/neutral GAHP power supply
MA terminal block

N-(PE)-L Neutral/earth/phase of water pump power supply
CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
PM Water pump
RBTR Safety transformer 230/24 V AC - 50/60 Hz - 10 VA min

Tacs0 DHW request thermostat with adjustable differential
TExt Outdoor temperature probe
VD1 3-way diverter valve
VD2 3-way diverter valve
0-10 V signal wire colour for OPMP010 (F02) pump
black connect to terminal -
red connect to terminal +

6 HEATING/COOLING AND SEPARABLE DHW

6.1 DESCRIPTION

The plumbing diagram in Figure 6.1 *p. 11* shows the use of a Link RTYR (consisting of 2 reversible GAHP-AR S heat pumps and 2 AY 50 boilers that are both connected to the rear manifold pair) for heating, cooling and separable DHW production, coupled to a primary/secondary system with a 3-pipe hydraulic separator.
Although there are boilers in the generation system, there is no need to use the RB200 device, as the AY boilers are also Robur and consequently can be controlled directly from the DDC panel via the CAN bus network.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating service, the "complement" and "complement and replacement" modes are available. For cooling and separable DHW production services, only "complement" mode is available.

For further information on integration modes, please refer to Section C01.11.

On the separable DHW circuit, there is no safety valve as this is already present inside the AY boiler and also acts on this circuit branch.
DHW production is done by boiler separation, diverting hot water to the DHW buffer tank by means of diverter valves based on the DHW service request from the thermostats in the DHW buffer tank, distinguished between normal DHW request and DHW request for thermal anti-legionella disinfection.
Preheating pump 9, which is only useful if DHW consumption is high and for systems always active for heating, will only be activated if the temperature difference between the buffer tank and manifold is sufficient for correct heat exchange, and must be switched off in the summer season.
If there is a separable DHW request from thermostat 13, the boilers will be activated with the DHW service setpoint (set on the DDC panel or RB100 device) and the diverter valves 16 will be switched.
The diagram also supports anti-legionella thermal disinfection, also by activating a separable DHW request from thermostat 15, with a dedicated setpoint (set on the DDC panel or RB100), with a dedicated schedule on the DDC panel.
If DHW and heat output demand are high, a separate preheating tank may be considered.
DHW production will also be possible while the cooling system is active, thanks to the separation of the boilers, which in the summer season will be permanently separated from the system and dedicated only to DHW production
Positioning DHW immersion thermostats correctly is important for the proper operation of the system. Positioning the thermostat at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the thermostat at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the thermostat reaches the switch-off temperature.
The correct setting of the thermostat and its differentials is critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, preventing the heating system from delivering service. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

The presence of the RB100 device allows DHW service requests from thermostats in the DHW buffer tank to be interfaced with the DDC panel and diverter valves to be switched.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

The control system also includes a secondary circuit management system capable of transmitting a heating/cooling service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.
The activation signal goes through a summer/winter selector switch as the GAHP-AR is a reversible heat pump and it is therefore necessary that the request comes alternately for either heating or cooling. The DDC configuration must be consistent with this management.
Separable DHW production will always be available, whatever the position of the summer/winter selector switch.

6.2 PLUMBING DIAGRAM

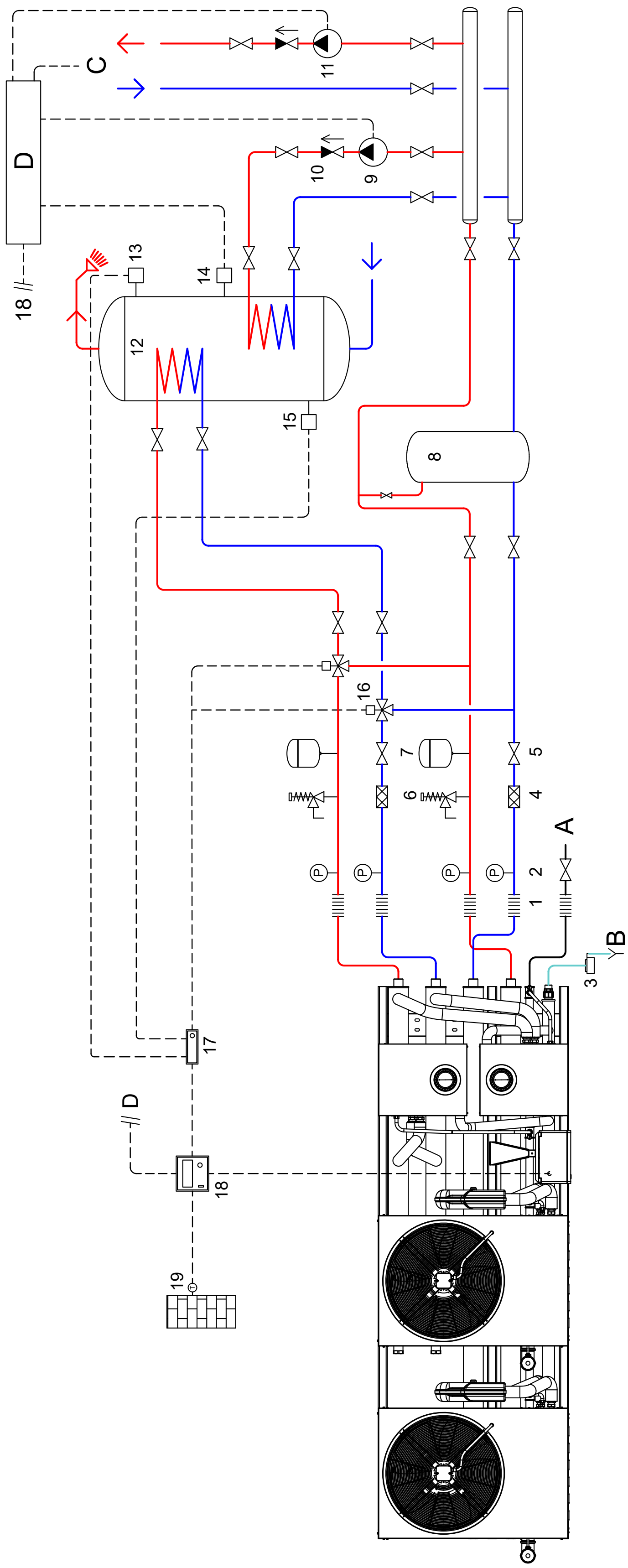


Figure 6.1 *Plumbing diagram for separable DHW*

A Gas connection
B Condensate drain
C Heating/Cooling circuit
D Secondary circuit management system

System components:

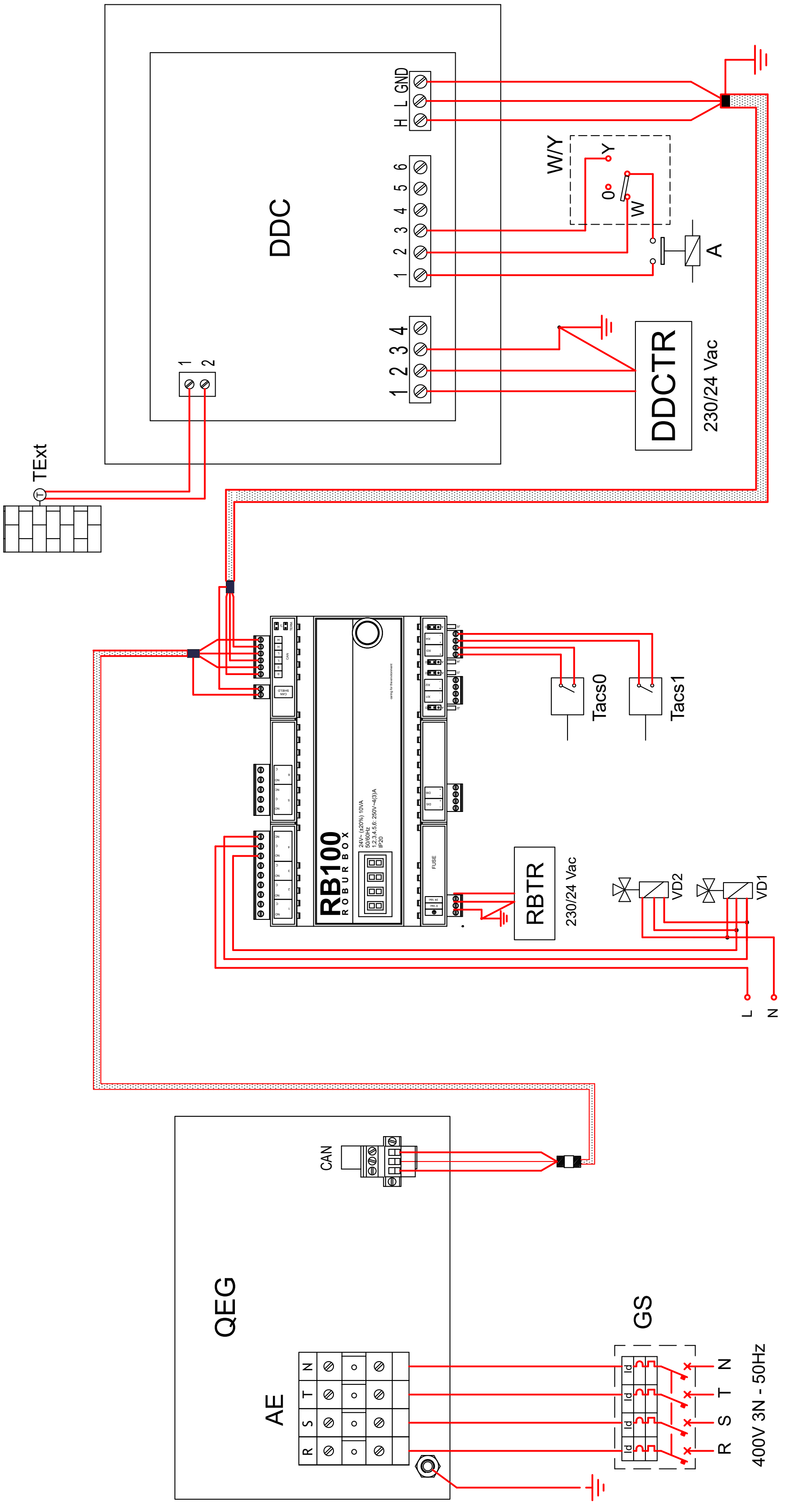
1 Anti-vibration connection
2 Pressure gauge
3 Condensate neutralizer
4 Sludge filter
5 Shut-off valve
6 Safety valve
7 Expansion tank
8 Buffer tank (and hydraulic separator)
9 DHW winter preheating water pump
10 Check valve
11 Heating/Cooling circuit water pump
12 DHW buffer tank
13 Thermostat with adjustable differential for DHW
14 Thermostat with adjustable differential for DHW preheating
15 Thermostat with adjustable differential for Legionella function
16 3-way diverter valves for DHW
17 RB100 device
18 DDC panel
19 Outdoor temperature probe

Notes:

- Pump 9 of DHW preheating must only turn on if the temperature difference between manifold and buffer tank is sufficient for correct heat exchange on the preheating coil
- DHW preheating pump 9 must be turned off in summer

6.3 ELECTRICAL WIRING DIAGRAM

Figure 6.2 *Wiring diagram for heating/cooling and separable DHW*



A External request
DDC DDC panel
RB100 RB100 device
QEG Link electrical panel
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral

CAN CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
RBTR Safety transformer 230/24 V AC - 50/60 Hz - 10 VA min
Tacs0 DHW request thermostat with adjustable differential

Tacs1 Legionella DHW request thermostat with adjustable differential
TExt Outdoor temperature probe
VD1 3-way diverter valve
VD2 3-way diverter valve
W/Y Heating/Cooling switch (winter/summer)
- Position W to turn heating on
- Position Y to turn cooling on
- Position 0 for system off

7 HEATING/COOLING AND SEPARABLE DHW WITH HEAT RECOVERY

7.1 DESCRIPTION

The plumbing diagram in Figure 7.1 *p. 14* shows the use of a Link RTRH (consisting of 2 reversible GAHP-AR S heat pumps, 2 ACF60-00 HR chiller-heaters with heat recovery, a AY 50 boiler connected to the primary circuit and a AY 100 boiler with its own independent connections) for heating, cooling and production separable DHW, with summer heat recovery, coupled to a primary/secondary system with a 3-pipe hydraulic separator.
Although there are boilers in the generation system, there is no need to use the RB200 device, as the AY boilers are also Robur and consequently can be controlled directly from the DDC panel via the CAN bus network.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating service, the "complement" and "complement and replacement" modes are available. For cooling and separable DHW production services, only "complement" mode is available.

For further information on integration modes, please refer to Section C01.11.

On the separable DHW circuit, there is no safety valve as this is already present inside the AY boiler and also acts on this circuit branch.
DHW production is done by separating the AY 100 boiler only, diverting hot water to the DHW buffer tank via diverter valves based on the DHW service request from the thermostats in the DHW buffer tank, distinguishing between normal DHW request and anti-legionella thermal disinfection request. In this way, the AY 50 boiler remains available for integration to the heating system even when there is a DHW production request.
Preheating pump 9, which is only useful if DHW consumption is high and for systems always active for heating, will only be activated if the temperature difference between the buffer tank and manifold is sufficient for correct heat exchange, and must be switched off in the summer season.
If there is a separable DHW service request from thermostat 14, the AY 100 boiler will be activated with the setpoint for separable DHW service (set on the DDC panel or RB100 device) and diverter valves 12 will be switched.
The diagram also supports anti-legionella thermal disinfection, also by activating a separable DHW request from thermostat 17, with a dedicated setpoint (set on the DDC panel or RB100), with a dedicated schedule on the DDC panel.
Manual switching of selector switch 15 when switching from heating to cooling will activate the request to the heat recovery exchanger via thermostat 16 and thus carry out preheating with free heat from the heat recovery.
The winter preheating must be designed to work with a thermal leap greater than 10 °C, so as not to risk excessive heating of the inlet to GAHP, which would result in switching them off due to exceeded operational limit.
If the DHW demand and the power available for heat recovery are high, a separate preheating tank should be used.
DHW production will also be possible while the cooling system is active, thanks to the separation of the boilers, which in the summer season will be permanently separated from the system and dedicated only to DHW production, being able to count on the contribution of heat recovery to achieve preheating
Positioning DHW immersion thermostats correctly is important for the proper operation of the system. Positioning the thermostat at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the thermostat at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the thermostat reaches the switch-off temperature.
The correct setting of the thermostat and its differentials is critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, preventing the heating system from delivering service. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

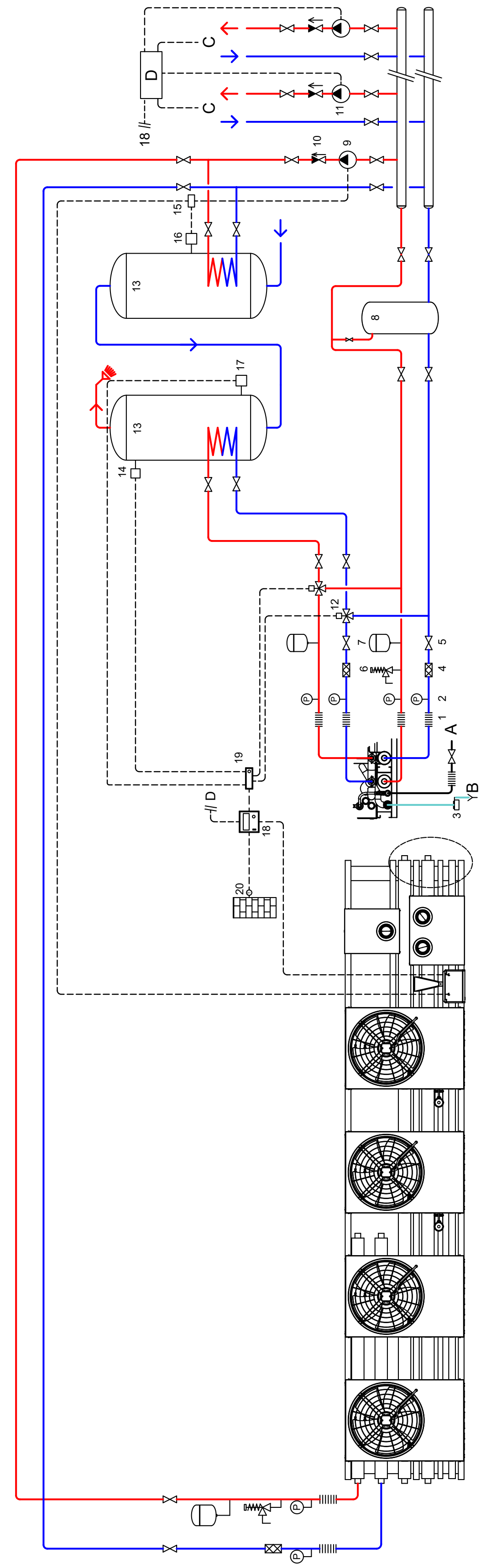
The presence of the RB100 device allows DHW service requests from thermostats in the DHW buffer tank to be interfaced with the DDC panel and diverter valves to be switched.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

The control system also includes a secondary circuit management system capable of transmitting a heating/cooling service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.
The activation signal goes through a summer/winter selector switch as the GAHP-AR is a reversible heat pump and it is therefore necessary that the request comes alternately for either heating or cooling. The DDC configuration must be consistent with this management.
Separable DHW production will always be available, whatever the position of the summer/winter selector switch.

7.2 PLUMBING DIAGRAM

Figure 7.1 *Plumbing diagram for separable DHW with heat recovery*



A Gas connection
B Condensate drain
C Heating/Cooling circuit
D Secondary circuit management system

System components:

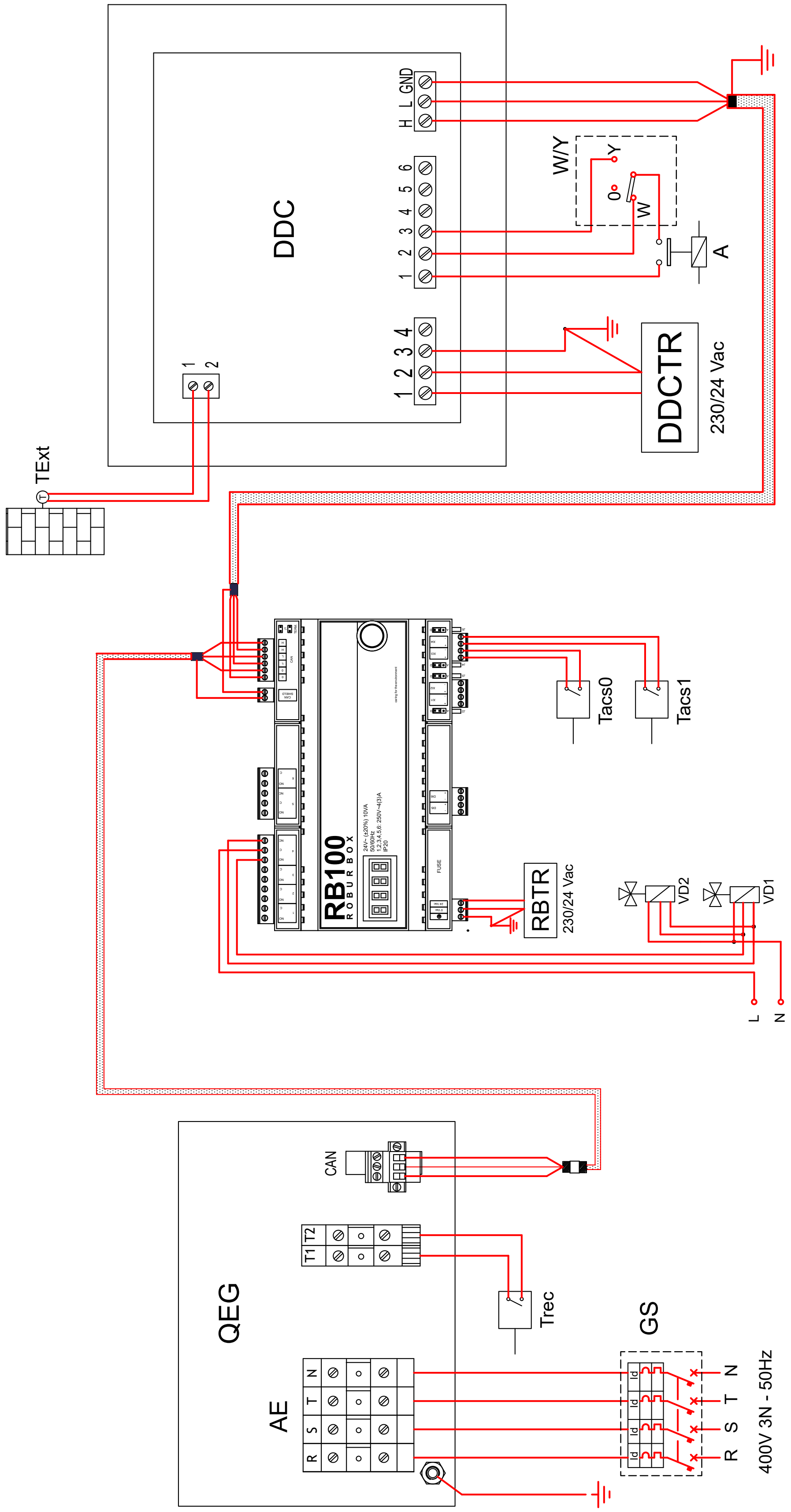
1 Anti-vibration connection
2 Pressure gauge
3 Condensate neutralizer
4 Sludge filter
5 Shut-off valve
6 Safety valve
7 Expansion tank
8 Buffer tank (and hydraulic separator)
9 DHW winter preheating water pump
10 Check valve
11 Heating/Cooling circuit water pump
12 3-way diverter valves for DHW
13 DHW buffer tank
14 Thermostat with adjustable differential for DHW
15 Summer/winter selector switch
16 Thermostat with adjustable differential for DHW preheating
17 Thermostat with adjustable differential for Legionella function
18 DDC panel
19 RB100 device
20 Outdoor temperature probe

Notes:

- Pump 9 of DHW preheating must only turn on if the temperature difference between manifold and buffer tank is sufficient for correct heat exchange on the preheating coil
- DHW preheating pump 9 must be turned off in summer
- The summer/winter selector switch 15 will enable thermostat 16 to activate the heat recovery exchanger request to ACF60-00 HR chiller-heaters in summer.

7.3 ELECTRICAL WIRING DIAGRAM

Figure 7.2 *Wiring diagram for separable DHW with heat recovery*



A External request
DDC DDC panel
RB100 RB100 device
QEG Link electrical panel
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral
T1-T2 DHW buffer tank thermostat terminals (HR recovery circuit side)

CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
RBTR Safety transformer 230/24 V AC - 50/60 Hz - 10 VA min
Tacs0 DHW request thermostat with adjustable differential
Tacs1 Legionella DHW request thermostat with adjustable differential

TExt Outdoor temperature probe
Trec DHW thermostat with adjustable differential for heat recovery circuit activation
VD1 3-way diverter valve
VD2 3-way diverter valve
W/Y Heating/Cooling switch (winter/summer)
- Position W to turn heating on
- Position Y to turn cooling on
- Position 0 for system off

8 HEATING/COOLING WITH MORE THAN 16 MODULES

8.1 DESCRIPTION

The plumbing diagram in Figure 8.1 *p. 17* shows the use of 3 Link RTAR290-600 (consisting of 5 GAHP-AR each) and one Link RTY00-700 (consisting of 2 AY 100) for heating and cooling, coupled to a primary/secondary system with a 3-pipe hydraulic separator.
The number of modules is greater than 16 (15 GAHP-AR modules and 4 AY 50 modules, as the DDC panel considers each AY 100 as consisting of two independent AY 50 modules) and consequently two DDC panels are needed to control the system, one of which will be the master of the system and the other will be a slave. By using two slave DDC panels and one master, it will be possible to manage up to a maximum of 32 modules.
Although there are boilers in the generation system, there is no need to use the RB200 device, as the AY boilers are also Robur and consequently can be controlled directly from the DDC panel via the CAN bus network.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating service, the "complement" and "complement and replacement" modes are available, while only the "complement" mode is available for cooling service.

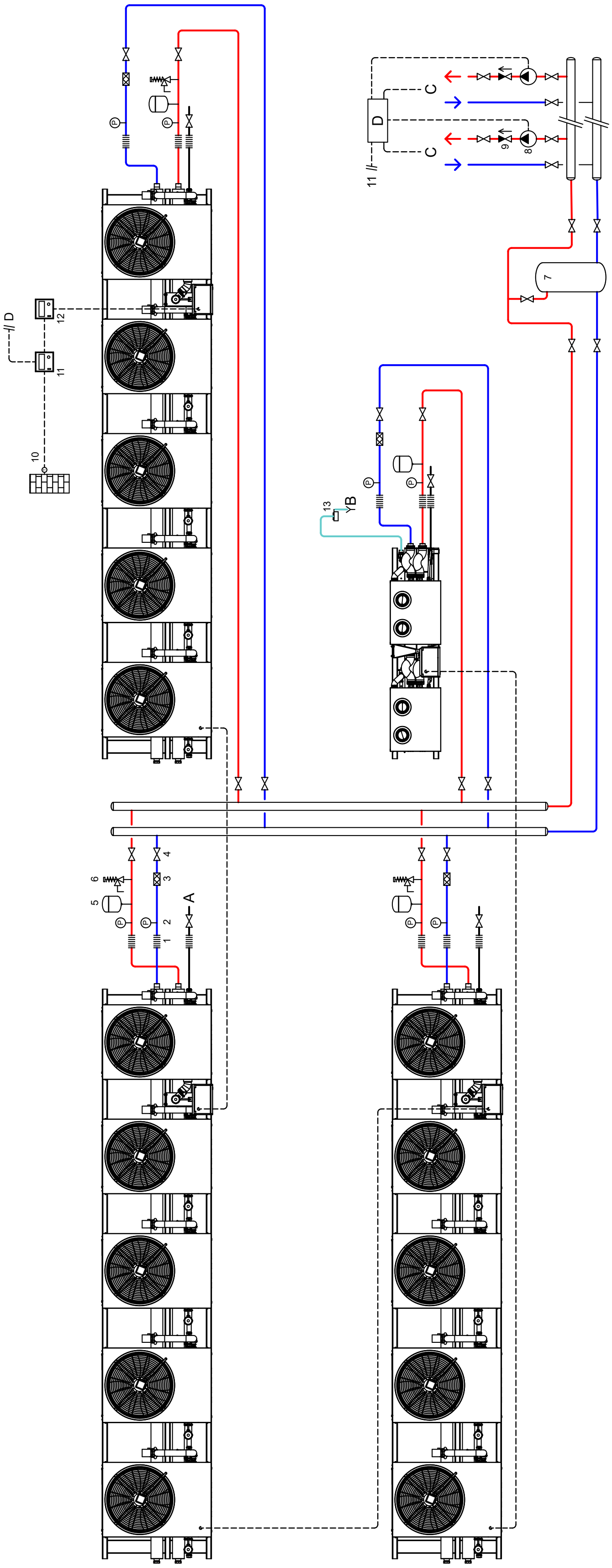
For further information on integration modes, please refer to Section C01.11.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

The control system also includes a secondary circuit management system capable of transmitting a heating/cooling service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.
The activation signal goes through a summer/winter selector switch as the GAHP-AR is a reversible heat pump and it is therefore necessary that the request comes alternately for either heating or cooling. The DDC configuration must be consistent with this management.

8.2 PLUMBING DIAGRAM

Figure 8.1 *Plumbing diagram for heating/cooling with more than 16 modules*



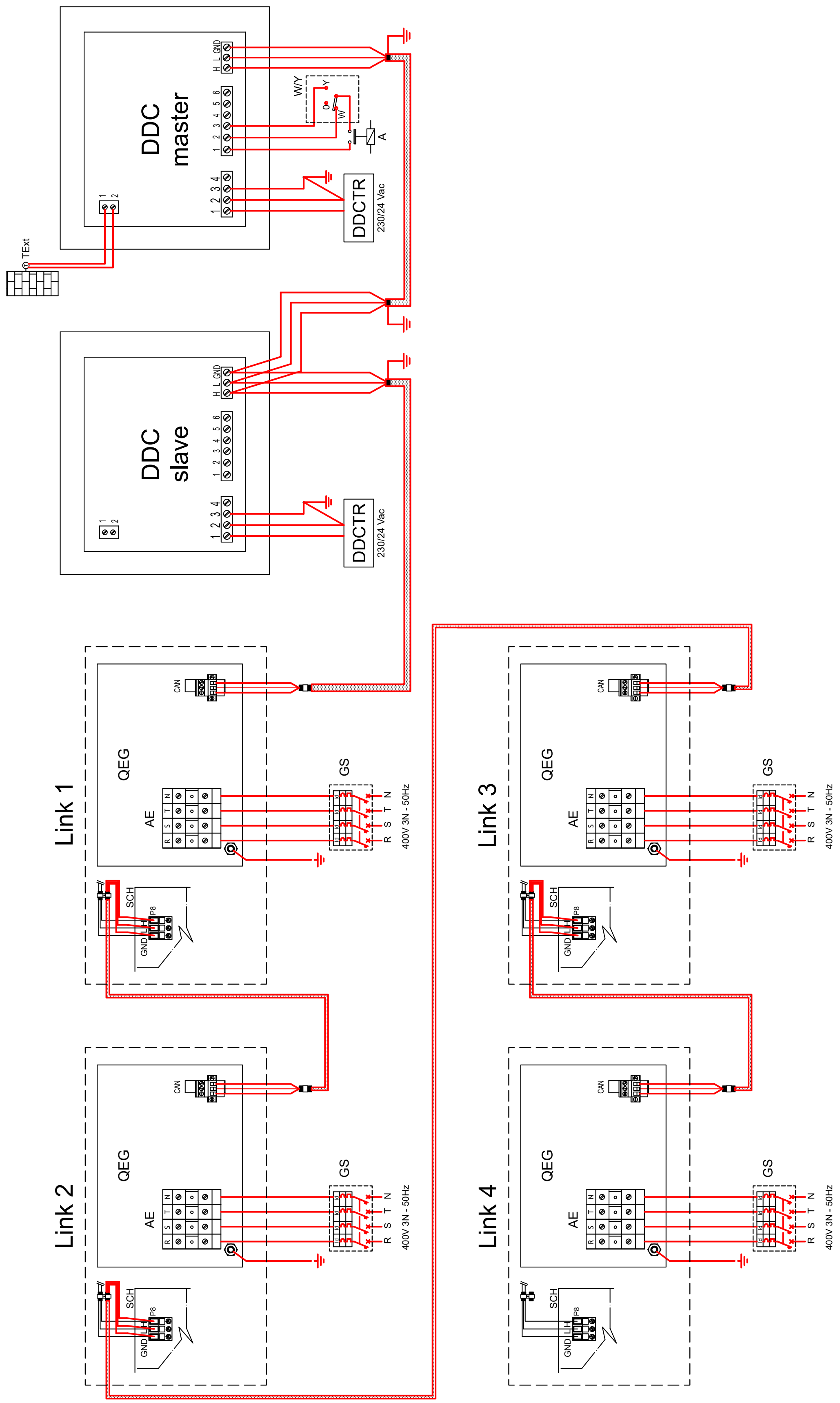
A Gas connection
B Condensate drain
C Heating/Cooling circuit
D Secondary circuit management system

System components:

1 Anti-vibration connection
2 Pressure gauge
3 Sludge filter
4 Shut-off valve
5 Expansion tank
6 Safety valve
7 Buffer tank (and hydraulic separator)
8 Heating/Cooling circuit water pump
9 Check valve
10 Outdoor temperature probe
11 Master DDC panel
12 Slave DDC panel
13 Condensate neutralizer

8.3 ELECTRICAL WIRING DIAGRAM

Figure 8.2 *Wiring diagram for heating/cooling with more than 16 modules*



- A External request
- DDC master DDC master panel
- DDC slave DDC slave panel
- QEG Link electrical panel
- AE Power supply input terminals
- GS Three-phase magnetothermic switch
- RST Phases
- N Neutral
- CAN terminal block
- GND Common data
- L Data signal LOW
- H Data signal HIGH
- Components NOT SUPPLIED
- DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
- TExt Outdoor temperature probe
- W/Y Heating/Cooling switch (winter/summer)
- . Position W to turn heating on
- . Position Y to turn cooling on
- . Position 0 for system off

9 HEATING/COOLING WITH THIRD-PARTY INTEGRATION

9.1 DESCRIPTION

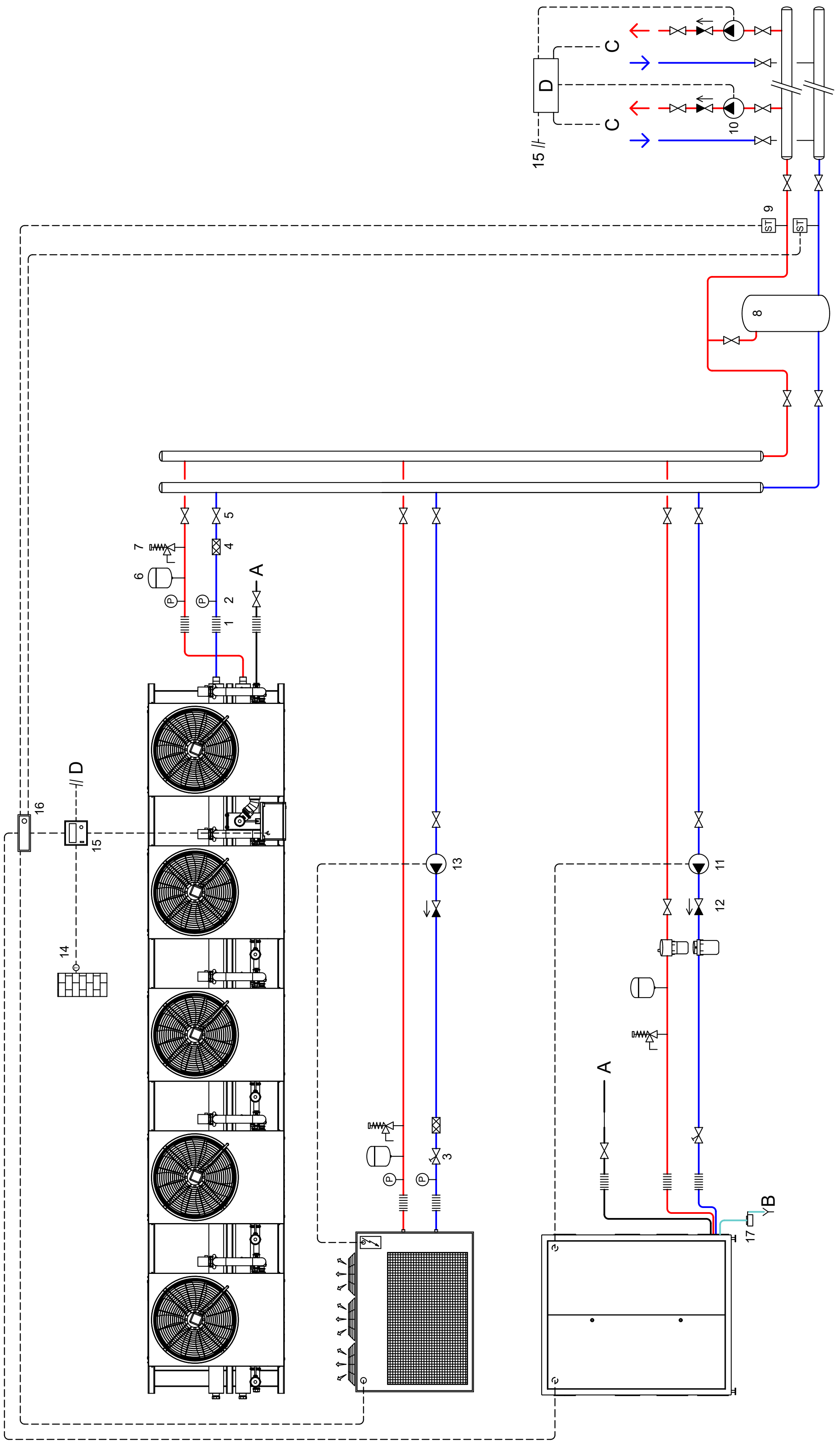
The plumbing diagram in Figure 9.1 *p. 20* shows the use of a Link RTAR (consisting of GAHP-AR) and third-party appliances (boiler and chiller) for heating and cooling, coupled to a primary/secondary system with a 3-pipe hydraulic separator.
Using the RB200 device allows the third-party appliances and secondary circuit temperature to be controlled.
The water pumps of third-party appliances are controlled independently by the appliances themselves, which will also provide antifreeze protection of their own circuit branch, if needed.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating service, the "complement" and "complement and replacement" modes are available, while only the "complement" mode is available for cooling service.

For further information on integration modes, please refer to Section C01.11.

When controlling the switching on/off of third-party appliances, it is always advisable to avoid interrupting the electrical power supply to the appliance. There is often a dedicated input for an on/off signal from an external device, which should be used for connection to the RB200, checking in advance in the documentation of the third-party appliance whether this signal is mains voltage or a voltage-free contact.
The control system also includes a secondary circuit management system capable of transmitting a heating/cooling service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.
The activation signal goes through a summer/winter selector switch as the GAHP-AR is a reversible heat pump and it is therefore necessary that the request comes alternately for either heating or cooling. The DDC configuration must be consistent with this management.

9.2 PLUMBING DIAGRAM

Figure 9.1 *Plumbing diagram for heating/cooling with third-party integration*



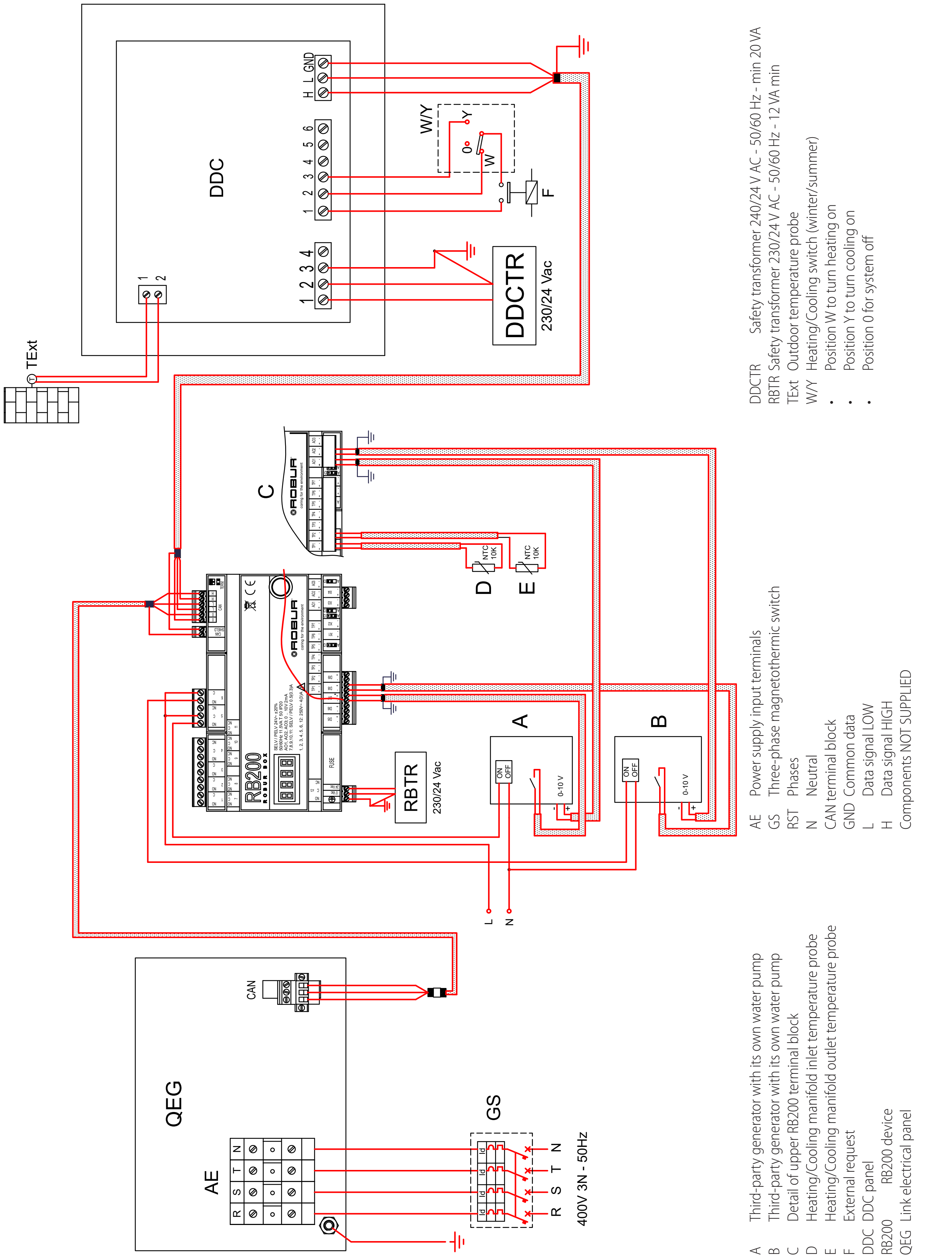
- A Gas connection
- B Condensate drain
- C Heating/Cooling circuit
- D Secondary circuit management system

System components:

- 1 Anti-vibration connection
- 2 Pressure gauge
- 3 Flow regulation valve
- 4 Sludge filter
- 5 Shut-off valve
- 6 Expansion tank
- 7 Safety valve
- 8 Buffer tank (and hydraulic separator)
- 9 Secondary manifold temperature probes
- 10 Heating/Cooling circuit water pump
- 11 Third-party appliance water pump (boiler)
- 12 Check valve
- 13 Third-party appliance water pump (chiller)
- 14 Outdoor temperature probe
- 15 DDC panel
- 16 RB200 device
- 17 Condensate neutralizer

9.3 ELECTRICAL WIRING DIAGRAM

Figure 9.2 *Wiring diagram for heating/cooling with third-party integration*



10 HEATING AND BASE AND SEPARABLE DHW WITH THIRD-PARTY INTEGRATION

10.1 DESCRIPTION

The plumbing diagram in Figure 10.1 *p. 23* shows the use of a Link RTA (consisting of GAHP A) and third-party units (boilers) for heating and both base and separable DHW, coupled to a primary/secondary system with a 3-pipe hydraulic separator.
Using the RB200 device makes it possible to control the third party units, including the circulating pump of the third party unit on the separable circuit, as well as secondary circuit and separable circuit temperature. The use of the RB200 device allows the control of third-party appliances, including the water pump of the third-party appliance on the separable circuit, and the temperature of both the secondary circuit and the separable circuit.
For third-party appliances whose water pump is controlled by the RB200 device, attention must be paid to the antifreeze protection, as the RB200 is not able to activate the appliance or its water pump for the antifreeze function.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating and base DHW services, the "complement" and "complement and replacement" modes are available. For separable DHW production, only the "complement" mode is available.

For further information on integration modes, please refer to Section C01.11.

DHW production is possible either through the base system, by means of a delivery from the heating manifold, managed by the secondary circuit management system via pump 14 and a temperature probe in the relevant DHW buffer tank, or through the separation of one of the third-party boilers, diverting the hot water to the DHW buffer tank downstream of the preheating by means of diverter valves.
Preheating pump 14, which is only useful if DHW consumption is high and for systems always active for heating, will only be activated by the secondary circuit management system if the temperature difference between the buffer tank and manifold is sufficient for correct heat exchange, and must be switched off in the summer season.
When there is a base DHW request from thermostat 13, the whole generation system will adjust its setpoint to meet the higher temperature demand between heating and DHW.
If there is a separable DHW service request from thermostat 12, the third-party boiler on the separable circuit will be activated with the setpoint for separable DHW service (set on the DDC panel or RB200 device) and diverter valves 10 will be switched.
For anti-Legionella disinfection in a system in which preheating takes place in a buffer tank separate from the one served by the separable system, it is even more recommended to use methods other than thermal shock (such as chemical methods, UV Lamps or the addition of ozone).
The separate DHW preheating tank has been foreseen in the event that the thermal load for DHW is high and it is therefore advisable to use at least part of the heating circuit's thermal output for this service, being able to count on the contribution of renewable energy offered by the heat pumps.
DHW production will also be possible with the space heating system switched off thanks to the separation of the third-party boiler.
Positioning DHW immersion thermostats correctly is important for the proper operation of the system. Positioning the thermostat at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the thermostat at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the thermostat reaches the switch-off temperature.
The correct setting of the thermostat and its differentials is critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, preventing the heating system from delivering service. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

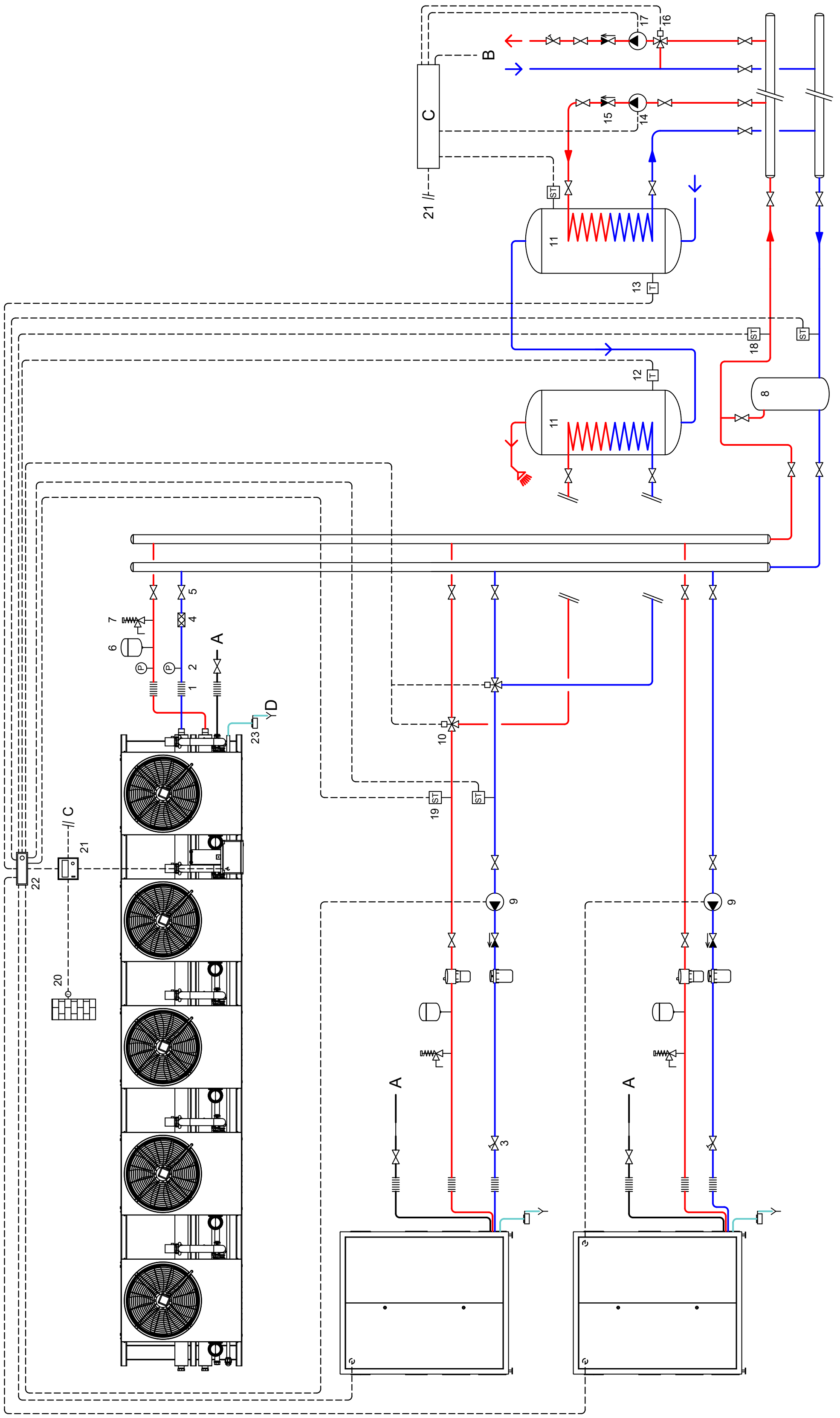
The RB200 device also allows DHW service requests from the thermostats in the DHW buffer tanks to be interfaced with the DDC panel and diverter valves to be switched.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

When controlling the switching on/off of third-party appliances, it is always advisable to avoid interrupting the electrical power supply to the appliance. There is often a dedicated input for an on/off signal from an external device, which should be used for connection to the RB200, checking in advance in the documentation of the third-party appliance whether this signal is mains voltage or a voltage-free contact.
The control system also includes a secondary circuit management system capable of transmitting a heating service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.
DHW production will always be available, regardless of the activation status of the heating service request.

10.2 PLUMBING DIAGRAM

Figure 10.1 *Plumbing diagram for heating and base and separable DHW*

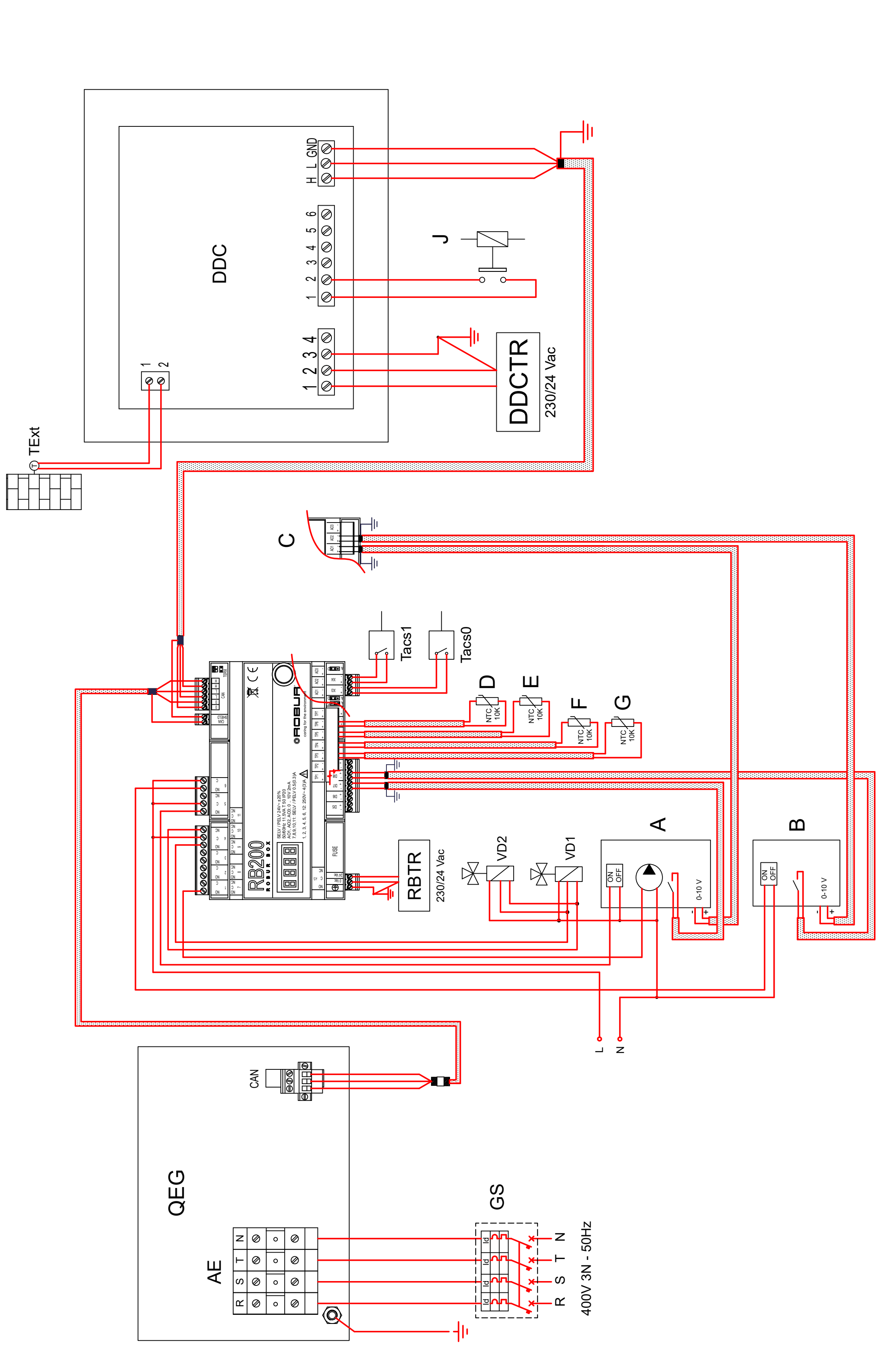


A Gas connection
B Heating circuit
C Secondary circuit management system
D Condensate drain
System components:
1 Anti-vibration connection
2 Pressure gauge
3 Flow regulation valve
4 Sludge filter
5 Shut-off valve
6 Expansion tank
7 Safety valve
8 Buffer tank (and hydraulic separator)
9 Third-party appliance water pump
10 3-way diverter valves for DHW
11 DHW buffer tank
12 Thermostat with adjustable differential for separable DHW
13 Thermostat with adjustable differential for DHW preheating
14 DHW preheating water pump
15 Check valve
16 3-way mixing valve
17 Heating circuit water pump
18 Secondary manifold temperature probes
19 Separable manifold temperature probes
20 Outdoor temperature probe
21 DDC panel
22 RB200 device
23 Condensate neutralizer

Notes:
- DHW preheating pump 14 must be turned off when the heating system is off, or if the temperature difference between manifold and buffer tank is not sufficient for correct heat exchange on the preheating coil

10.3 ELECTRICAL WIRING DIAGRAM

Figure 10.2 *Wiring diagram for heating and base and separable DHW*



A Third-party generator with water pump controlled by RB200
B Third-party generator with its own water pump
C Detail of upper RB200 terminal block
D Separable manifold outlet temperature probe
E Separable manifold inlet temperature probe
F Heating manifold outlet temperature probe
G Heating manifold inlet temperature probe
J External heating request
DDC DDC panel
RB200 RB200 device

QEG Link electrical panel
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral
CAN CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED

DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
RBTR Safety transformer 230/24 V AC - 50/60 Hz - 12 VA min
Tacs0 Base DHW request thermostat with adjustable differential
TACS1 Separable DHW request thermostat with adjustable differential
TExt Outdoor temperature probe
VD1 3-way diverter valve
VD2 3-way diverter valve

11 SIMULTANEOUS HEATING AND COOLING AND BASE AND SEPARABLE DHW WITH THIRD-PARTY INTEGRATION

11.1 DESCRIPTION

The hydraulic diagram in Figure 11.1 *p. 27* shows the use of a Link RTGS/RTWS (consisting of GAHP GS/WS) and third-party appliances (boilers and chillers) for process applications or applications involving the simultaneous use of hot water and chilled water with the possibility of producing both base and separable DHW, coupled to a primary/secondary system with hydraulic separator and common water pump on the secondary circuit for both the heating circuit and the cooling circuit.
The use of the RB200 device allows the control of third-party appliances, including the third-party appliance water pump on the separable circuit, the temperature of all three circuits (heating, cooling, separable) and the common water pumps on the secondary circuit.
For third-party appliances whose water pump is controlled by the RB200 device, attention must be paid to the antifreeze protection, as the RB200 is not able to activate the appliance or its water pump for the antifreeze function.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating and base DHW services, the "complement" and "complement and replacement" modes are available, while only the "complement" mode is available for separable DHW production and cooling services.
For further information on integration modes, please refer to Section C01.11.
The main advantage of this type of system lies in the possibility of exploiting the simultaneous production of hot water and chilled water by a Link formed by GAHP GS/WS, consequently obtaining very high efficiency values (up to 248%), being able to manage the temperature on both the heating and cooling manifold at the same time, thanks to the presence of a third-party appliance integrating each of the two circuits. In fact, the GAHP GS/WS appliances can only control one of the two temperatures in the absence of integration.
As a result, this same system can operate all year round providing both services, with the Link of GAHP GS/WS providing the base load in heating and cooling and third-party appliances stepping in if an integration is required.
If the heating and cooling loads are unbalanced in such a way that it is not possible to dissipate (to the heating circuit) or recover (from the cooling circuit) the energy required for the simultaneous operation of all the GAHP GS/WS, the DDC will autonomously switch off the appliances for which load balancing is not possible, activating if necessary the third-party appliances for the service for which there is an energy deficit. This avoids the need for expensive and complex heat exchange systems such as dry-coolers.
DHW production is possible either through the base system, by means of a delivery from the heating manifold, managed by the secondary circuit management system via pump 14 and a temperature probe in the relevant DHW buffer tank, or through the separation of the third-party boiler, diverting the hot water to the DHW buffer tank downstream of the preheating by means of diverter valves.
Preheating pump 14, which is only useful if DHW consumption is high, will only be activated by the secondary circuit management system if the temperature difference between the buffer tank and manifold is sufficient for correct heat exchange.
When there is a base DHW request from thermostat 13, the whole generation system will adjust its setpoint to meet the higher temperature demand between heating and DHW.
If there is a separable DHW service request from thermostat 12, the third-party boiler on the separable circuit will be activated with the setpoint for separable DHW service (set on the DDC panel or RB200 device) and diverter valves 10 will be switched.
For anti-Legionella disinfection in a system in which preheating takes place in a buffer tank separate from the one served by the separable system, it is even more recommended to use methods other than thermal shock (such as chemical methods, UV Lamps or the addition of ozone).
The separate DHW preheating tank has been foreseen in the event that the thermal load for DHW is high and it is therefore advisable to use at least part of the heating circuit's thermal output for this service, being able to count on the contribution of renewable energy offered by the heat pumps.
DHW production will also be possible with the space heating system switched off thanks to the separation of the third-party boiler.
Positioning DHW immersion thermostats correctly is important for the proper operation of the system. Positioning the thermostat at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the thermostat at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the thermostat reaches the switch-off temperature.
The correct setting of the thermostat and its differentials is critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, preventing the heating system from delivering service. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

The RB200 device also allows DHW service requests from the thermostats in the DHW buffer tanks to be interfaced with the DDC panel and diverter valves to be switched.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

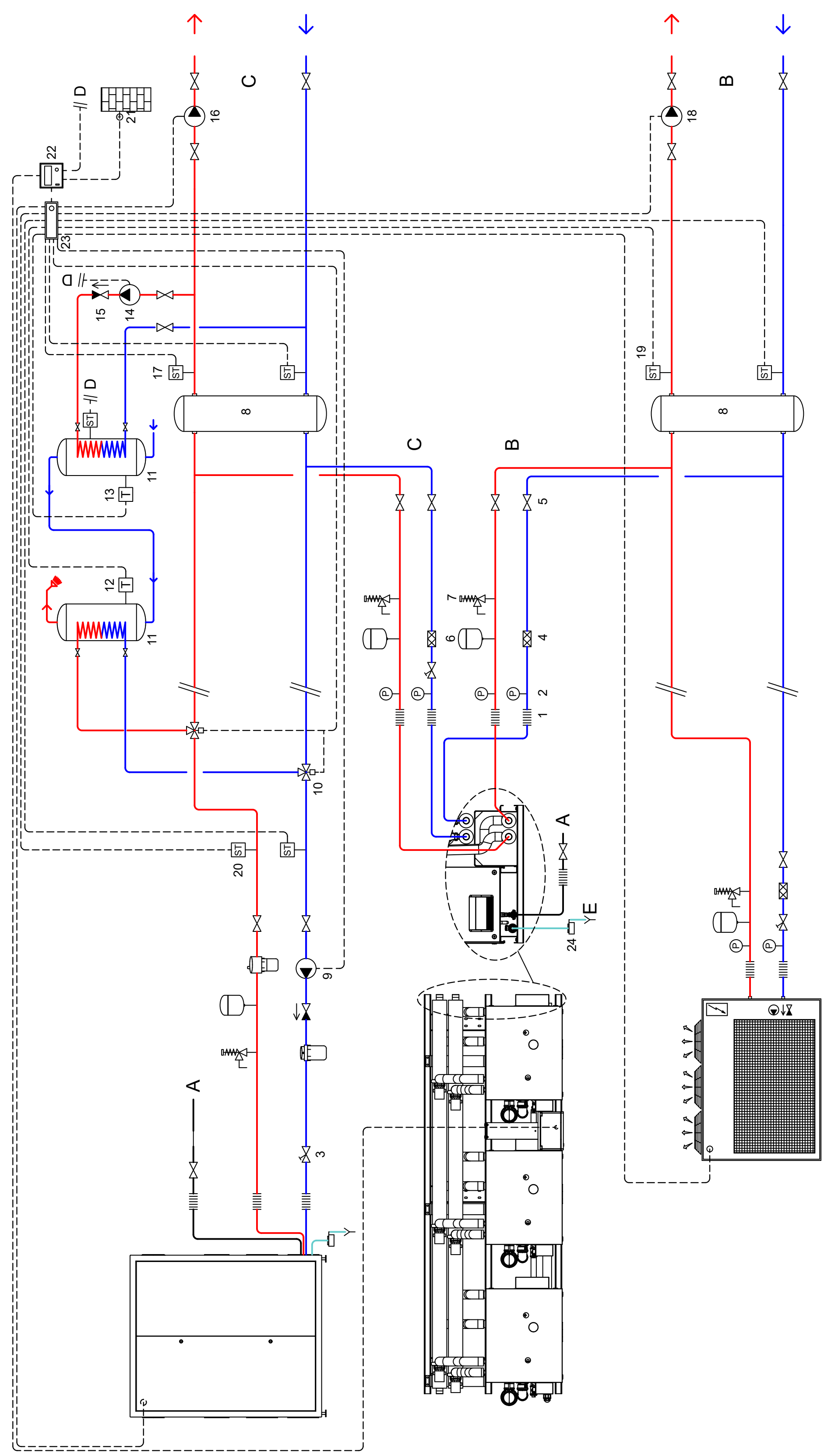
When controlling the switching on/off of third-party appliances, it is always advisable to avoid interrupting the electrical power supply to the appliance. There is often a dedicated input for an on/off signal from an external device, which should be used for connection to the RB200, checking in advance in the documentation of the third-party appliance whether this signal is mains voltage or a voltage-free contact.
The control system also includes a secondary circuit management system capable of transmitting a heating/cooling service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.

Two separate and independent requests have been provided because the two heating/cooling circuits can be switched on independently (bearing in mind the considerations regarding simultaneous load shedding already outlined above).

Separable DHW production will always be available, whatever the status of the heating/cooling request contacts.

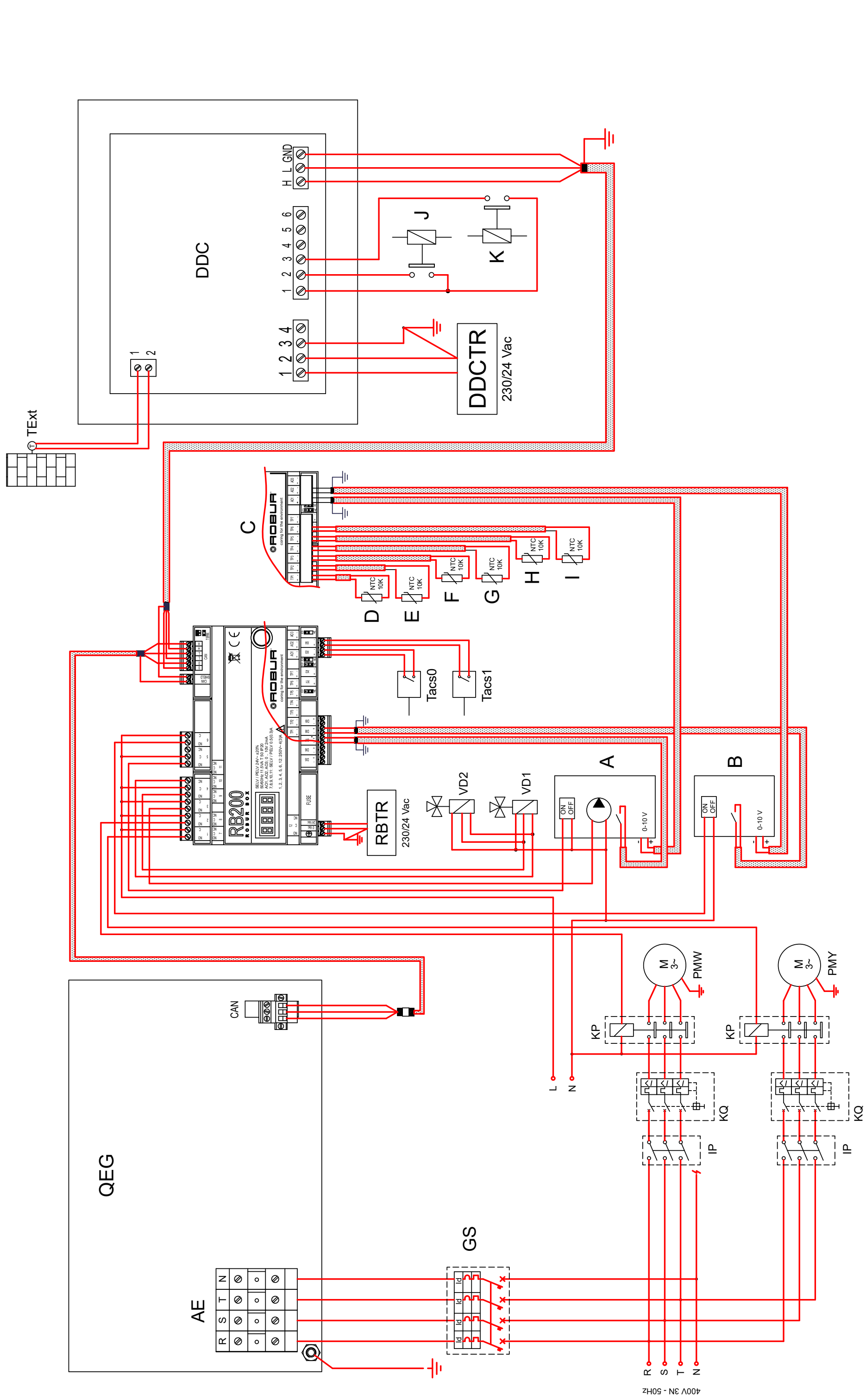
11.2 PLUMBING DIAGRAM

Figure 11.1 *Plumbing diagram for simultaneous heating and cooling and base and separable DHW with third-party integration*



11.3 ELECTRICAL WIRING DIAGRAM

Figure 11.2 *Wiring diagram for simultaneous heating and cooling and base and separable DHW with third-party integration*



A Third-party generator with water pump controlled by RB200
B Third-party generator with its own water pump
C Detail of upper RB200 terminal block
D Cooling manifold inlet temperature probe
E Cooling manifold outlet temperature probe
F Heating manifold inlet temperature probe
G Heating manifold outlet temperature probe
H Separable manifold inlet temperature probe
I Separable manifold outlet temperature probe
J External heating request
K External cooling request
DDC DDC panel

RB200 RB200 device
QEG Link electrical panel
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral
CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA

IP Four-pole pump supply disconnector
KP Water pump control relay
KQ 400 V AC pump motor protector
PMW Common water pump of the heating circuit
PMY Common water pump of the cooling circuit
RBTR Safety transformer 230/24 V AC - 50/60 Hz - 12 VA min
Tacs0 Base DHW request thermostat with adjustable differential
TACS1 Separable DHW request thermostat with adjustable differential
TExt Outdoor temperature probe
VD1 3-way diverter valve
VD2 3-way diverter valve

12 SERIES HEATING (TYPE P4) AND BASE AND SEPARABLE DHW WITH THIRD-PARTY INTEGRATION

12.1 DESCRIPTION

The plumbing diagram in Figure 12.1 *p. 30* shows the use of a Link RTA (consisting of GAHP A) and third-party appliances (boilers) for heating and both base and separable DHW, coupled to a series heating system (type P4, Section C01.11), with the heating loop fitted with a common water pump controlled by RB200 and a 3-pipe hydraulic separator.
Only if the complement and progressive replacement mode is to be used, the GAHP inlet probe must also be installed.
The series installation allows the GAHP to be used on the low-temperature return from the system, even only on a part of the water flow passing through the system, realising an initial increase in temperature with maximum efficiency and then completing the heating up to the required setpoint (which could also be, under the right conditions, beyond the operating limit of the GAHP) thanks to the contribution of the third-party appliances.
The use of the RB200 device allows the control of third-party appliances, including the third-party appliance's water pump on the separable circuit and the heating loop water pump, and of the manifold temperature of both the secondary circuit and the separable circuit, as well as any additional GAHP inlet temperature probe.
For third-party appliances whose water pump is controlled by the RB200 device, attention must be paid to the antifreeze protection, as the RB200 is not able to activate the appliance or its water pump for the antifreeze function.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating and base DHW services, the "complement" and "complement and replacement" modes are available and, if the GAHP inlet probe is also installed, also the "complement and progressive replacement" mode. For separable DHW production, only the "complement" mode is available.

For further information on integration modes, please refer to Section C01.11.

DHW production is possible either through the base system, by means of a delivery from the heating manifold, managed by the secondary circuit management system via pump 14 and a temperature probe in the relevant DHW buffer tank, or through the separation of one of the third-party boilers, diverting the hot water to the DHW buffer tank downstream of the preheating by means of diverter valves.
Preheating pump 14, which is only useful if DHW consumption is high and for systems always active for heating, will only be activated by the secondary circuit management system if the temperature difference between the buffer tank and manifold is sufficient for correct heat exchange, and must be switched off in the summer season.
When there is a request for base DHW from temperature probe 13, the secondary circuit management system will communicate the new setpoint to the generation system to meet the higher temperature request between heating and DHW.
If there is a separate DHW service request by the temperature probe 13, the secondary circuit management system will communicate the request to RB200 and the DDC will switch on the third-party boiler on the separable circuit with the setpoint transmitted by the secondary circuit management system for the separable DHW service and the diverter valves 10 will be switched.

For anti-Legionella disinfection in a system in which preheating takes place in a buffer tank separate from the one served by the separable system, it is even more recommended to use methods other than thermal shock (such as chemical methods, UV Lamps or the addition of ozone).
The separate DHW preheating tank has been foreseen in the event that the thermal load for DHW is high and it is therefore advisable to use at least part of the heating circuit's thermal output for this service, being able to count on the contribution of renewable energy offered by the heat pumps.
DHW production will also be possible with the space heating system switched off thanks to the separation of the third-party boiler.
Positioning DHW temperature probes correctly is important for the proper operation of the system. Positioning the probe at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the probe at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the probe reaches the setpoint temperature.
The correct setting of the probe setpoints and their differentials are critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, preventing the heating system from delivering service. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

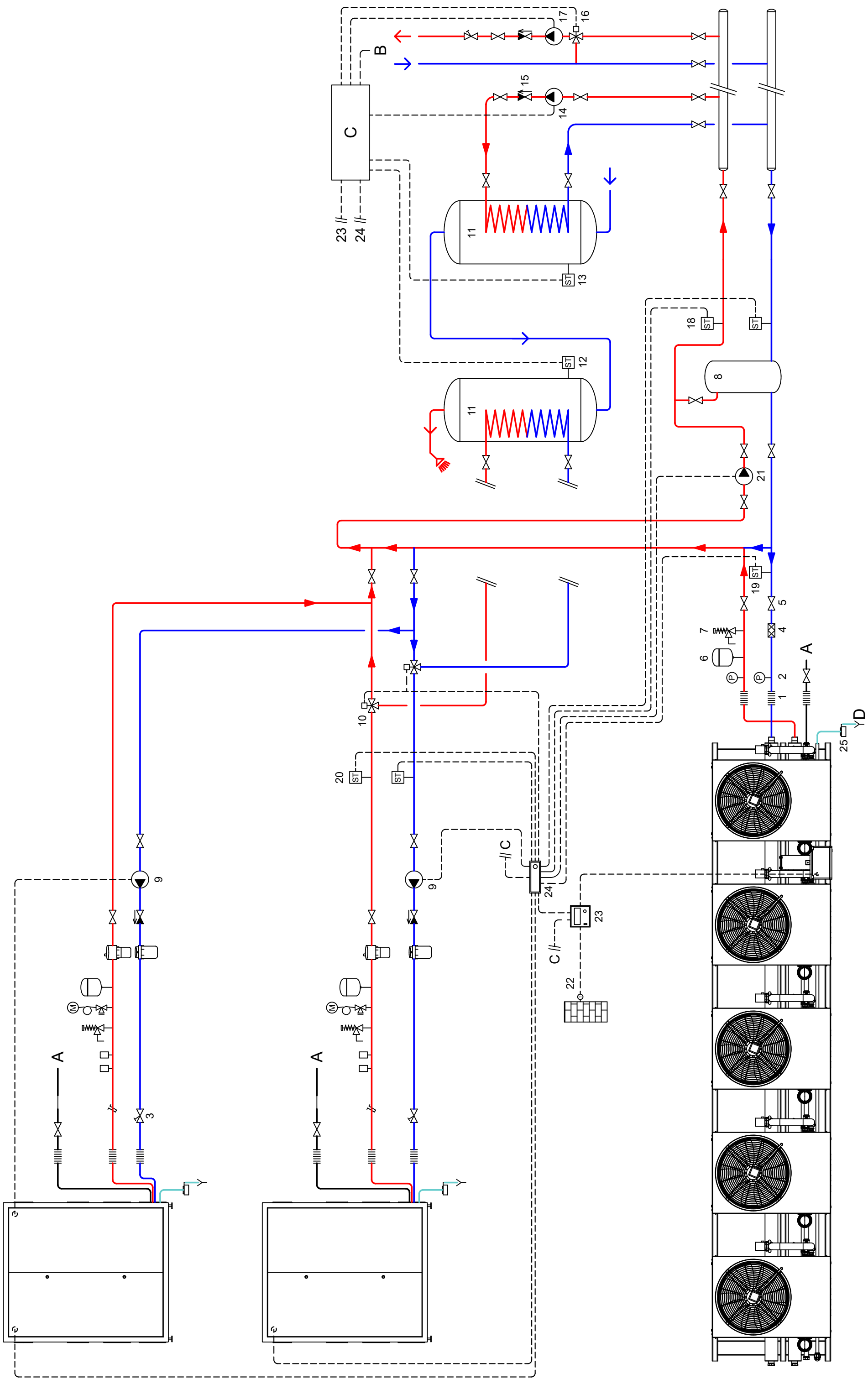
The setpoints for the heating and DHW services (base and separable) are communicated to the RB200 device by the secondary circuit management system via 0-10 V analogue signals. It is possible to configure the RB200 device so that below a certain threshold the signal counts as off of the relevant service, or alternatively to transmit a heating service request on/off signal to the DDC panel based on the request status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits off. The RB200 device will also switch diverter valves in the presence of a separable DHW demand.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

When controlling the switching on/off of third-party appliances, it is always advisable to avoid interrupting the electrical power supply to the appliance. There is often a dedicated input for an on/off signal from an external device, which should be used for connection to the RB200, checking in advance in the documentation of the third-party appliance whether this signal is mains voltage or a voltage-free contact.
DHW production will always be available, regardless of the activation status of the heating service request.

12.2 PLUMBING DIAGRAM

Figure 12.1 *Plumbing diagram for series heating (type P4) and base and separable DHW*



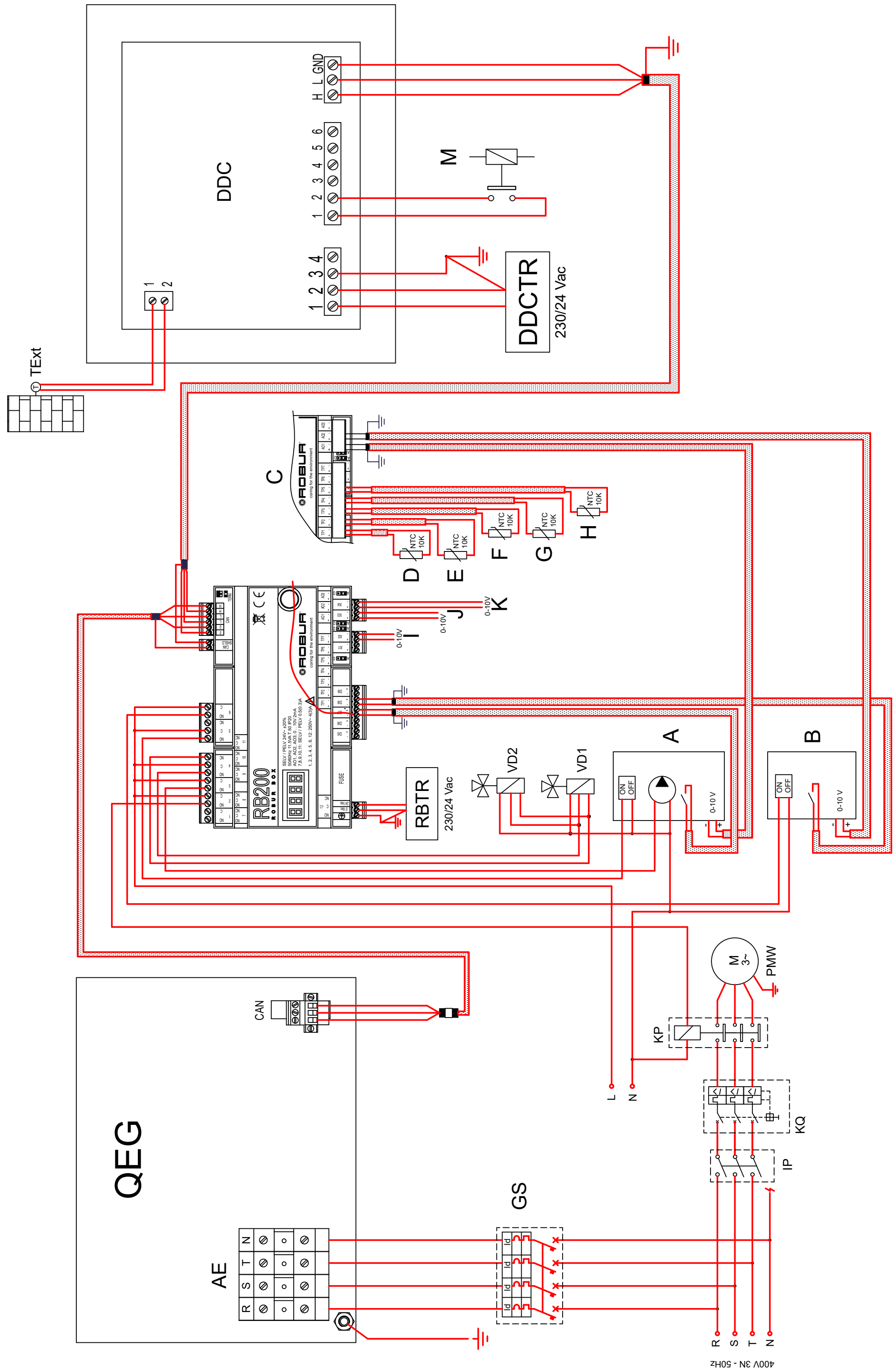
A Gas connection
B Heating system
C Secondary circuit management system
D Condensate drain
System components:
1 Anti-vibration connection
2 Pressure gauge
3 Flow regulation valve
4 Sludge filter
5 Shut-off valve
6 Expansion tank
7 Safety valve
8 Buffer tank (and hydraulic separator)
9 Third-party appliance water pump
10 3-way diverter valves for DHW
11 DHW buffer tank
12 Thermostat with adjustable differential for separable DHW
13 Thermostat with adjustable differential for DHW preheating
14 DHW preheating water pump
15 Check valve
16 3-way mixing valve
17 Heating circuit water pump
18 Secondary manifold temperature probes
19 GAHP inlet temperature probe
20 Separable manifold temperature probes
21 Heating loop water pump
22 Outdoor temperature probe
23 DDC panel
24 RB200 device
25 Condensate neutralizer

Notes:

- DHW preheating pump 14 must be turned off when the heating system is off, or if the temperature difference between manifold and buffer tank is not sufficient for correct heat exchange on the preheating coil

12.3 ELECTRICAL WIRING DIAGRAM

Figure 12.2 *Wiring diagram for series heating (type P4) and base and separable DHW*



A Third-party generator with water pump controlled by RB200
B Third-party generator with its own water pump
C Detail of upper RB200 terminal block
D Separable manifold outlet temperature probe
E Separable manifold inlet temperature probe
F Heating manifold outlet temperature probe
G Heating manifold inlet temperature probe
H GAHP inlet temperature probe
I 0-10 V heating setpoint input
J 0-10 V DHW0 setpoint input
K 0-10 V DHW1 setpoint input
M Heating request

DDC DDC panel
RB200 RB200 device
QEG Link electrical panel
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral
CAN terminal block
GND Common data
L Data signal LOW
H Data signal HIGH
Components NOT SUPPLIED

DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
IP Four-pole pump supply disconnector
KP Water pump control relay
KQ 400 V AC pump motor protector
PMW Common water pump of the heating circuit
RBTR Safety transformer 230/24 V AC - 50/60 Hz - 12 VA min
Tacs0 Base DHW request thermostat with adjustable differential
TACS1 Separable DHW request thermostat with adjustable differential
TExt Outdoor temperature probe
VD1 3-way diverter valve
VD2 3-way diverter valve

13 SERIES HEATING (TYPE P5) AND BASE DHW WITH THIRD-PARTY INTEGRATION

13.1 DESCRIPTION

The plumbing diagram in Figure 13.1 *p. 33* shows the use of a Link RTA (consisting of GAHP A) and third-party appliances (boilers) for heating and base DHW, coupled to a series heating system (type P5, Section C01.11) and a large 4-pipe buffer tank (e.g. suitable for small district heating networks).
Only if the complement and progressive replacement mode is to be used, the GAHP inlet probe must also be installed.
The series installation allows the GAHP to be used on the low-temperature water withdrawal in the lower part of the buffer tank (the size of which must be such as to allow reasonable stratification of the water, even with the generation system in operation), even only on a part of the water flow that is then processed by the system, realising an initial increase in temperature with maximum efficiency and then completing the heating up to the required setpoint (which could also be, under the right conditions, beyond the operating limit of the GAHP) thanks to the contribution of the third-party appliances that draw precisely from a higher point and deliver into the upper part of the buffer tank.
Using the RB200 device allows the third-party appliances and secondary circuit temperature to be controlled.
Pay attention to the appropriate neutralisation and drainage of condensate in accordance with the applicable standards.
For this type of system, for heating and base DHW services, the "complement" and "complement and replacement" modes are available and, if the GAHP inlet probe is also installed, also the "complement and progressive replacement" mode.

For further information on integration modes, please refer to Section C01.11.

DHW production is done from the heating circuit via the loading pump 12, which will only be activated by the secondary circuit management system if the temperature difference between the DHW buffer tank and the manifold is sufficient for correct heat exchange.
When there is a base DHW request from thermostat 10, the whole generation system will adjust its setpoint to meet the higher temperature demand between heating and DHW.
The diagram also supports anti-legionella thermal disinfection, also by activating a base DHW request from thermostat 11, with a dedicated setpoint (set on the DDC panel or RB200), with a dedicated schedule on the DDC panel.

Since DHW production is carried out exclusively by delivery from the heating manifold, this must be maintained heated for as long as the DHW service is expected to be used.
Positioning DHW immersion thermostats correctly is important for the proper operation of the system. Positioning the thermostat at the top of the buffer tank will result in shorter operation for DHW production service, as the heat stratifying at the top will deactivate the thermostat more quickly. Positioning the thermostat at the bottom of the buffer tank will result in a longer operation for DHW production service, but the average temperature in the DHW will be higher when the thermostat reaches the switch-off temperature.
The correct setting of the thermostat and its differentials is critical for the system to function properly. Setting the temperature too high means leaving the system permanently blocked on the DHW request, altering the temperature from that set for the heating system. A too reduced differential will in turn lead to numerous service requests of very short duration, with a significant reduction in overall performance.

Also critical is the correct sizing of the DHW buffer tank and its exchange coil, for which reference should be made to Section C01.12.

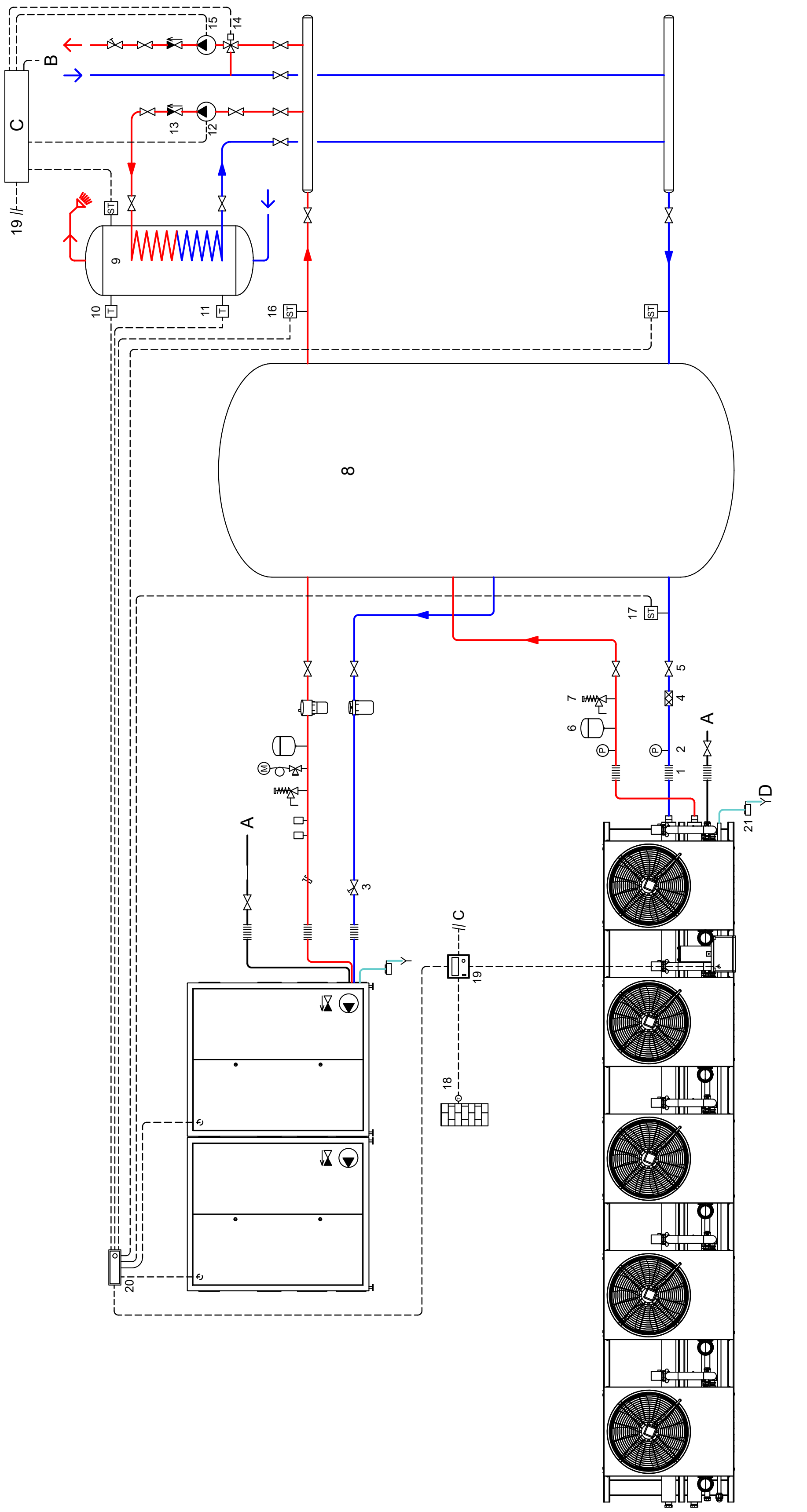
The RB200 device also allows base DHW service requests from thermostats in the DHW buffer tank to be interfaced with the DDC panel.

For details on the configuration of CAN bus jumpers on terminal nodes and intermediate nodes of the CAN bus network, please refer to Section C01.10.

When controlling the switching on/off of third-party appliances, it is always advisable to avoid interrupting the electrical power supply to the appliance. There is often a dedicated input for an on/off signal from an external device, which should be used for connection to the RB200, checking in advance in the documentation of the third-party appliance whether this signal is mains voltage or a voltage-free contact.
The control system also includes a secondary circuit management system capable of transmitting a heating service request activation/deactivation signal to the DDC panel based on the demand status of the consumers. This is extremely useful to prevent the generation system from operating with the distribution circuits switched off.

13.2 PLUMBING DIAGRAM

Figure 13.1 *Plumbing diagram for series heating (type P5) and base DHW*



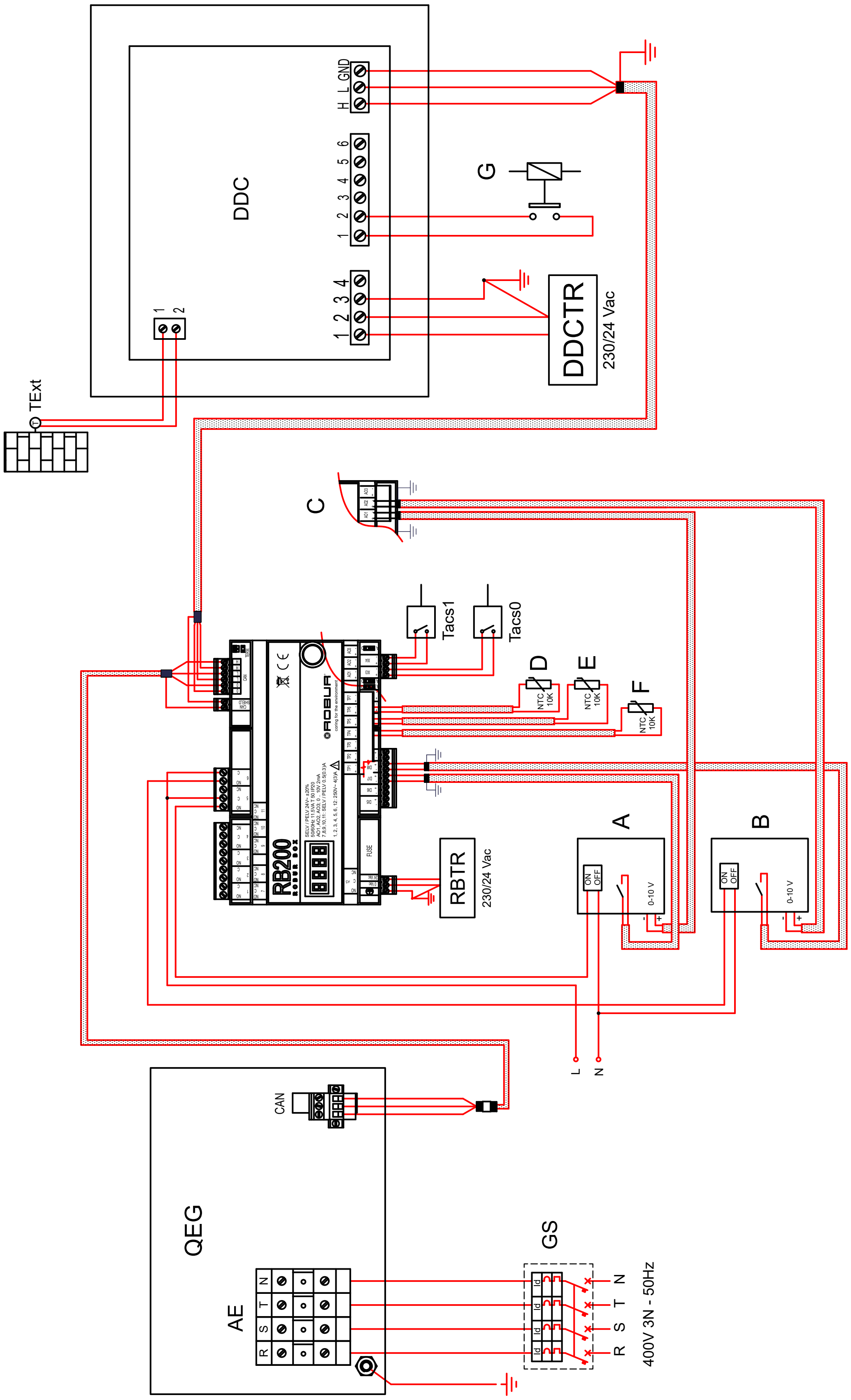
A Gas connection
B Heating system
C Secondary circuit management system
D Condensate drain

System components:

1 Anti-vibration connection
2 Pressure gauge
3 Flow regulation valve
4 Sludge filter
5 Shut-off valve
6 Expansion tank
7 Safety valve
8 Buffer tank (and hydraulic separator)
9 DHW buffer tank
10 Thermostat with adjustable differential for DHW
11 Thermostat with adjustable differential for Legionella function
12 DHW water pump
13 Check valve
14 3-way mixing valve
15 Heating circuit water pump
16 Secondary manifold temperature probes
17 GAHP inlet temperature probe
18 Outdoor temperature probe
19 DDC panel
20 RB200 device
21 Condensate neutralizer

13.3 ELECTRICAL WIRING DIAGRAM

Figure 13.2 *Wiring diagram for series heating (type P5) and base DHW*



A	Third-party generator with its own water pump
B	Third-party generator with its own water pump
C	Detail of upper RB200 terminal block
D	Heating manifold outlet temperature probe
E	Heating manifold inlet temperature probe
F	GAHP inlet temperature probe
G	External heating request
DDC	DDC panel
RB200	RB200 device
QEG	Link electrical panel
AE	Power supply input terminals
GS	Three-phase magnetothermic switch
RST	Phases
N	Neutral
CAN	CAN terminal block
GND	Common data
L	Data signal LOW
H	Data signal HIGH

Components NOT SUPPLIED

DDCTR	Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA
RBTR	Safety transformer 230/24 V AC - 50/60 Hz - 12 VA min
Tacs0	DHW request thermostat with adjustable differential
Tacs1	Legionella DHW request thermostat with adjustable differential
TExt	Outdoor temperature probe