1 ELECTRICAL SYSTEMS

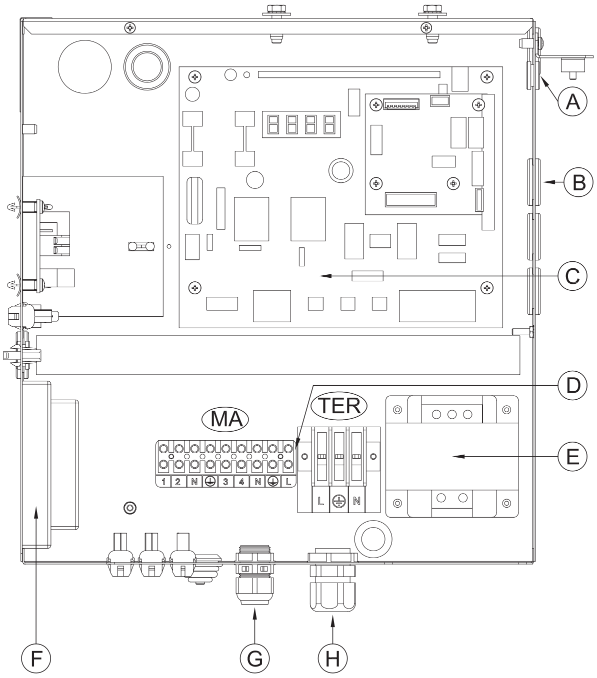
Electrical connections must provide:

- power supply (Paragraph 3 *p. 2*)
- control system (Paragraph 4 *p. 4*)
- water pump (Paragraph 5 *p. 17*)

2 ELECTRICAL PANEL

2.1 GAHP/GA

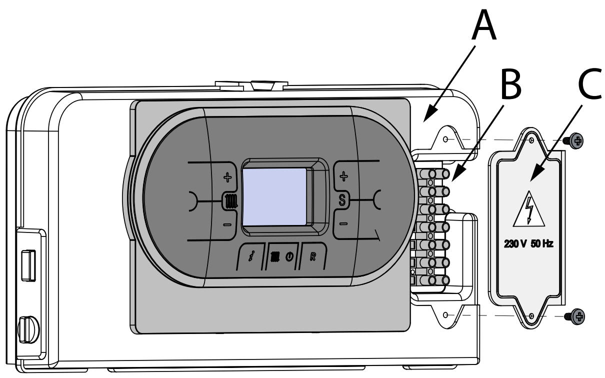
Figure 2.1 *GAHP/GA electrical panel*



A CAN bus cable gland
B Cable gland for 0-10 V signal of water pump
C Electronic boards
D Terminal blocks
E Transformer 230/24 V AC
F Flame control box
G Pump power supply and control cable gland
H GAHP/GA power supply cable gland
Terminals:
TER terminal block
L-(PE)-N Phase/earth/neutral of GAHP/GA power supply
MA terminal block
N-(PE)-L Neutral/earth/phase of water pump power supply
3-4 Water pump request

2.2 AY

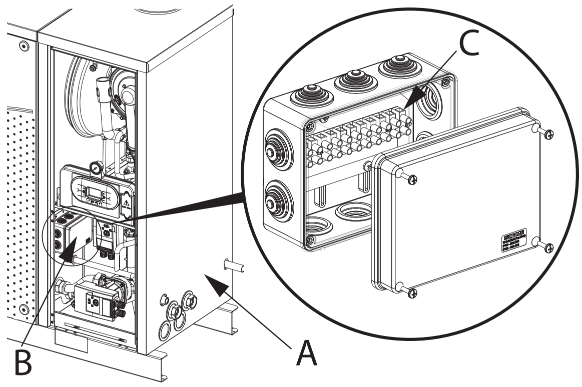
Figure 2.2 *Access to AY terminal block*



A Electrical panel
B Terminal block
C Plate

2.3 GITIÉ

Figure 2.3 *Gitié electrical panel position and terminal block access*

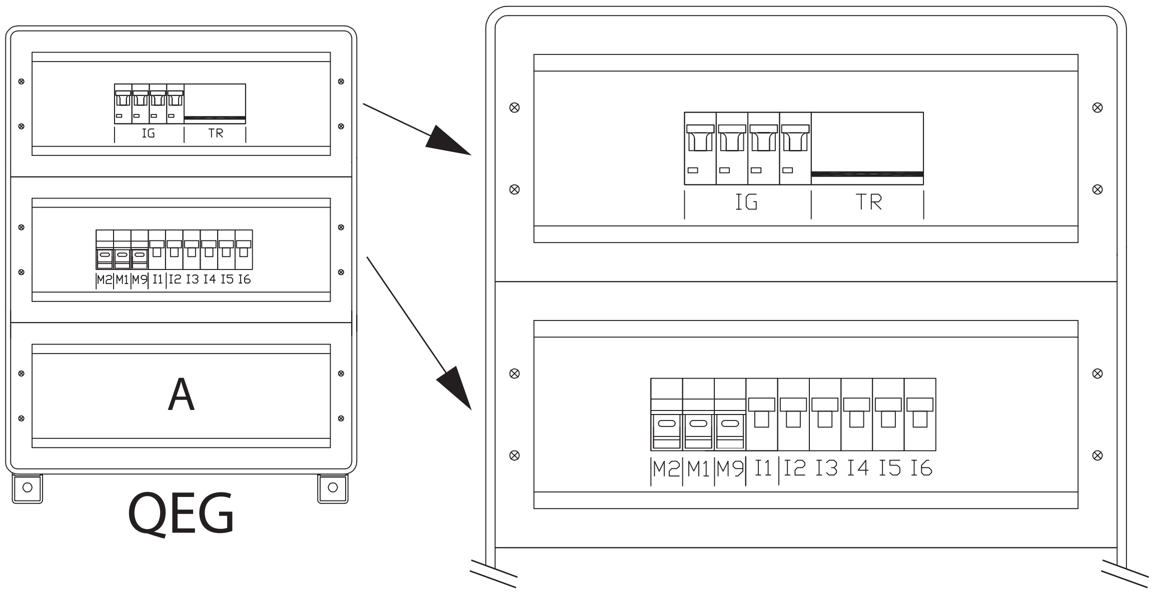


A AY boiler
B Gitié 2.0 electrical panel
C Gitié 2.0 terminal block

2.4 LINK

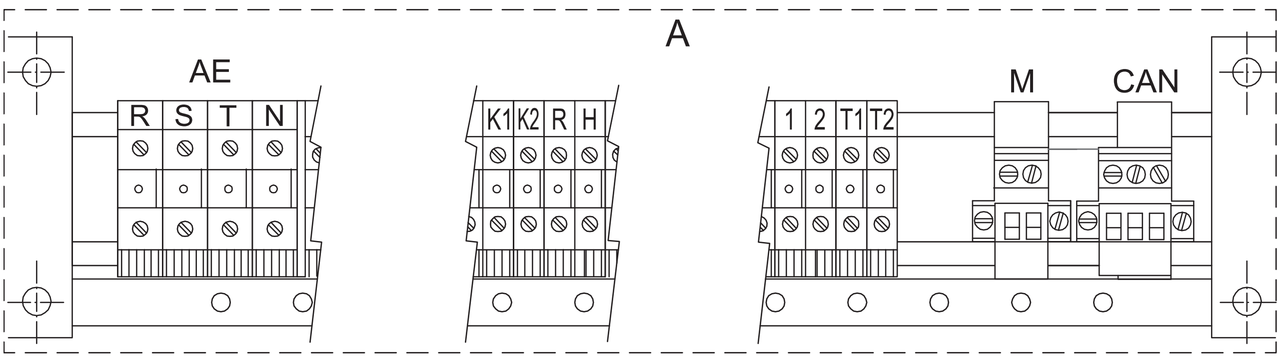
Up to 6 GAHP/GA/AY modules on the Link there is only one electrical panel, detailed in Figure 2.4 *p. 2* below. In the presence of more than 6 GAHP/GA/AY modules on the Link there are two electrical panels, of which the main one (the one in which the electrical connections for power supply and control are to be made) is the one on the left, while the one on the right is dedicated to the AY boilers.

Figure 2.4 *Electrical panel of the Link*



A Blind panel (Figure 2.5 *p. 2* for detail of internal terminal blocks)
I1 "ID00" unit magnetothermic breaker
I2 "ID01" unit magnetothermic breaker
I3 "ID02" unit magnetothermic breaker
I4 "ID03" unit magnetothermic breaker
I5 "ID04" unit magnetothermic breaker
I6 "ID05" unit magnetothermic breaker
IG Electrical panel switch disconnector
TR Transformer 230/24 Vac
M9 Transformer primary fuse
M2 Condensate heating resistance protection fuse
M9 Transformer secondary fuse
QEG Link electrical panel
Note: the components within the electrical panel may have an order and/or position other than the one shown in the figure

Figure 2.5 *Blind panel: detail of internal terminal blocks on DIN rail*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
AE Power supply input terminals
K1-K2 24 V coil terminals for water pump request (hot/cold circuit side)
R-H Condensate heating resistor terminals
1-2 24 V coil terminals for water pump request (HR recovery circuit side)
T1-T2 DHW buffer tank thermostat terminals (HR recovery circuit side)
M 2-pole 24 Vac connector for service use
CAN 3-pole connector for CAN bus network connection

3 ELECTRICAL POWER SUPPLY

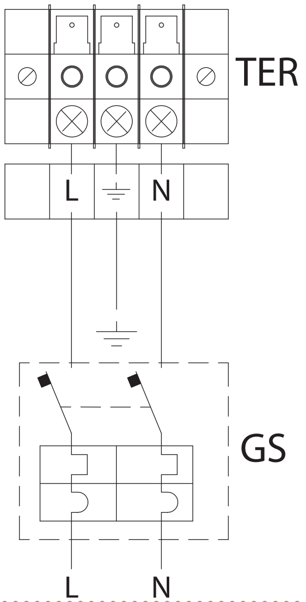
3.1 GAHP/GA

Provide (by the installer) a protected single phase line (230 V 1-N 50 Hz) with:

- 1 three-pole cable type FG7(O)R 3Gx1,5
- 1 two-pole switch (GS) with two 5 A type T fuses, or one 10 A magnetothermic breaker

The switches must also provide disconnector capability, with min contact opening 4 mm.

Figure 3.1 *Power supply connection*



TER Terminal block
L Phase
N Neutral

Components NOT SUPPLIED
GS Main switch

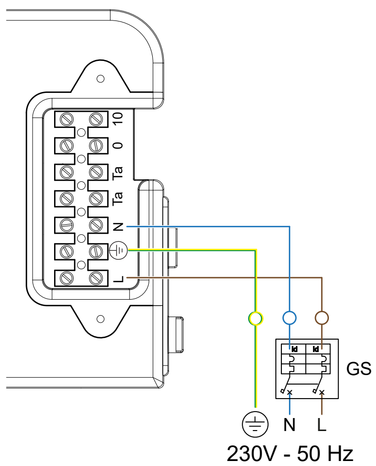
3.2 AY

Provide (by the installer) a protected single phase line (230 V 1-N 50 Hz) with:

- ► 1 three-pole cable type FG7(O)R 3Gx1,5
- ► 1 two-pole switch with 2 2 A type T fuses, (GS) or 1 4 A magnetothermic breaker.

The switches must also provide disconnect capability, with min contact opening 3 mm.

Figure 3.2 *Power supply connection*



L Phase
N Neutral

Components NOT SUPPLIED
GS Two-pole switch

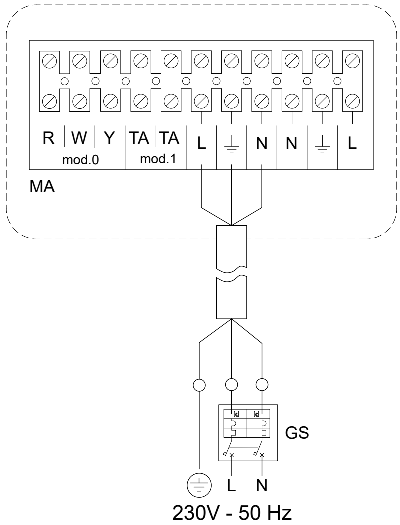
3.3 GITIÉ

Provide (by the installer) a protected single phase line (230 V 1-N 50 Hz) with:

- ► 1 three-pole cable type FG7(O)R 3Gx1,5
- ► 1 two-pole switch with 2 8 A type T fuses (GS), or 1 10 A magnetothermic breaker.

The switches must also provide disconnector capability, with min contact opening 4 mm.

Figure 3.3 *Power supply connection*



L Phase
N Neutral
MA Gitié 2.0 terminal block

Components NOT SUPPLIED
GS Main switch

3.4 LINK

Electrical protection

A <u>4-pole (three-phase) disconnector</u> GS (Figure 3.4 *p. 3*) or bipolar (single-phase) GS (Figure 3.5 *p. 4*) must be provided by the installer in the external power supply electrical panel, with suitable fuses for phases, minimum contact opening 3 mm. No fuse on the neutral is allowed.
Indirect contact protection by means of differential switch and overload must be guaranteed by means of a sufficiently dimensioned automatic switch or fuse.

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

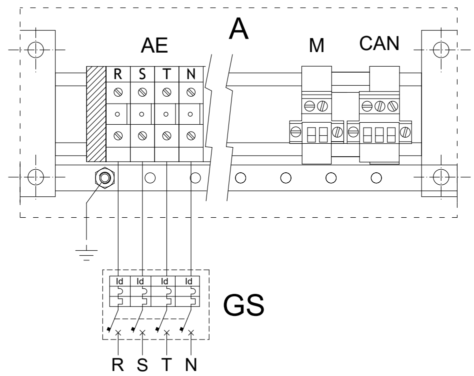
Provide a protected line (by the installer), which may be:

- ► three phase 400 V 3N - 50 Hz (Figure 3.4 *p. 3*)

or as an alternative,

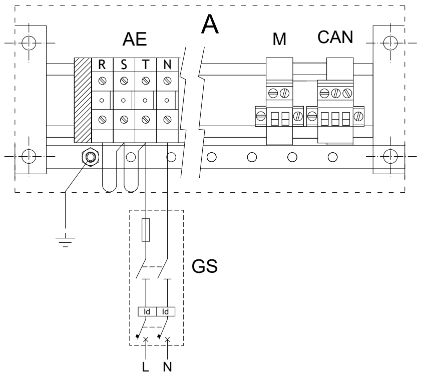
- ► single phase 230 V 1N - 50 Hz (Figure 3.5 *p. 4*)

Figure 3.4 *Three phase power supply electrical connection 400 V 3N - 50 Hz*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
AE Power supply input terminals
GS Three-phase magnetothermic switch
RST Phases
N Neutral

Figure 3.5 *Single phase power supply electrical connection 230 V 1N - 50 Hz*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
AE Power supply input terminals
GS Bipolar disconnector with suitable fuse and minimum contact opening of 3 mm
L Phase
N Neutral

4 ADJUSTMENT AND CONTROL

Correct and efficient operation of the heating/cooling system cannot be achieved without proper control.
In Section C01.11 the characteristics and operating logic of the control devices available as Robur optional are detailed.

Switching for reversible units

Use that entails frequent switching between heating/conditioning operating modes are to be avoided for reversible units.

4.1 CONTROL SYSTEMS

Separate control systems are provided, each with specific features, components and diagrams:

1. DDC control (with CAN bus connection).
2. CCI control (with CAN bus connection), only for GAHP A, GAHP GS/WS.
3. External request.

Please refer to Section C01.11 for a description of the functionality of DDC and CCI controls.
For external requests, please refer to Paragraph 4.6 *p. 13*.

4.2 CAN BUS COMMUNICATION NETWORK

The CAN bus communication network, implemented with the cable of the same name, makes it possible to connect and remotely control one or more Robur appliances with the DDC or CCI control devices.
It entails a certain number of serial nodes, distinguished in:

- ► intermediate nodes, in variable number
- ► terminal nodes, always and only two (beginning and end)

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

4.3 CAN BUS SIGNAL CABLE

The DDC or CCI controls are connected to individual appliances or the Link via the CAN bus cable, shielded, in accordance with Table 4.1 *p. 4* (types and maximum permissible distances).
For lengths ≤200 m and up to 4 nodes (e.g. 1 DDC + 3 GAHP), a simple 3x0,75 mm² shielded cable may be used.

Table 4.1 *CAN bus cables type*

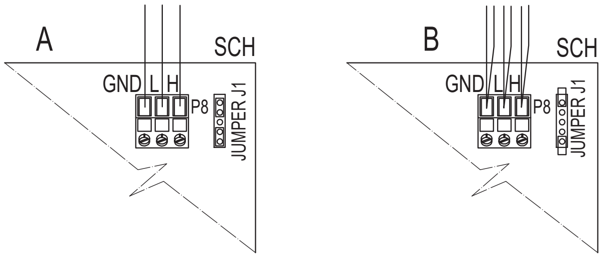
Cable name	Signals / Color			Maximum length	Note
Robur					Optional code OCVO008
ROBUR NETBUS	H = BLACK	L = WHITE	GND = BROWN	450 m	
Honeywell SDS 1620					In all cases the fourth conductor should not be used
BELDEN 3086A	H = BLACK	L = WHITE	GND = BROWN	450 m	
TURCK type 530					
DeviceNet Mid Cable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

4.4 CAN BUS CONNECTION

4.4.1 GAHP/GA

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

Figure 4.1 *Connection of the CAN bus cable to the electronic board of GAHP/GA units*

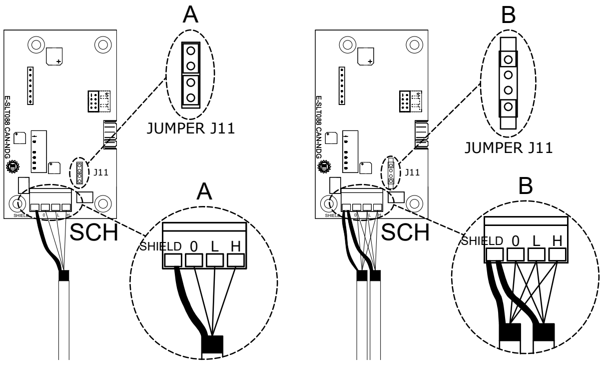


SCH Electronic board of GAHP/GA units
GND Common data
L Data signal LOW
H Data signal HIGH
J1 Onboard CAN bus jumper
A Detail of "terminal node" case (3 wires; J1 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J1 = jumper "open")
P8 CAN port/connector

4.4.2 AY

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

Figure 4.2 *Connection of the CAN bus cable to the CAN-NDG electronic board*

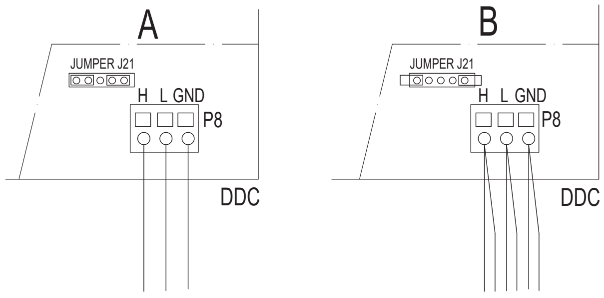


SCH CAN-NDG electronic board of AY units
0 Common data
L Data signal LOW
H Data signal HIGH
J11 CAN bus jumper on CAN-NDG board
A Detail of "terminal node" case (3 wires; J11 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J11 = jumper "open")

4.4.3 DDC/CCI panel

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

Figure 4.3 *Connection of the CAN bus cable to the control panel*

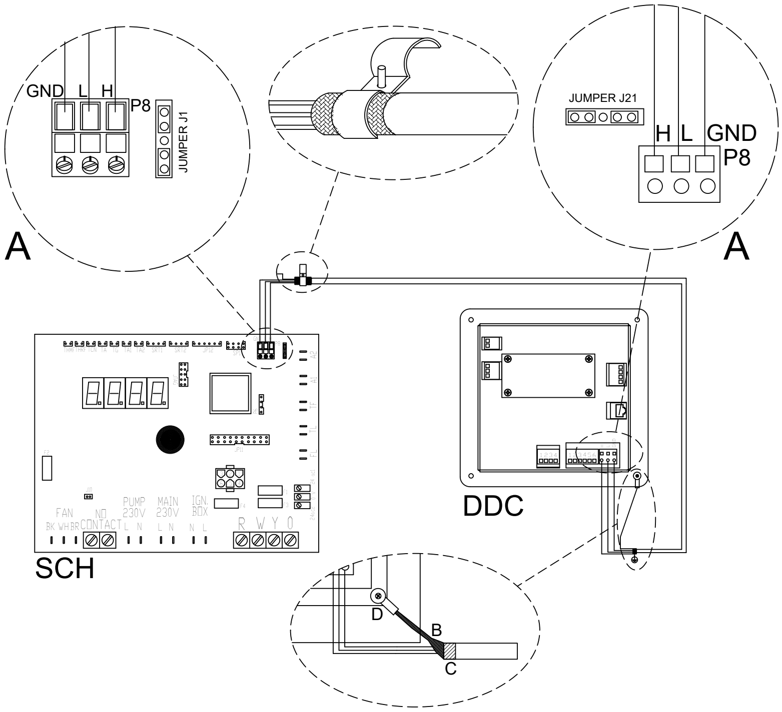


DDC Direct Digital Controller
GND Common data
L Data signal LOW
H Data signal HIGH
J21 CAN bus jumper on DDC board
A Detail of "terminal node" case (3 wires; J21 = jumper "closed")
B Detail of "intermediate node" case (6 wires; J21 = jumper "open")
P8 CAN port/connector

4.5 DDC/CCI CONNECTION

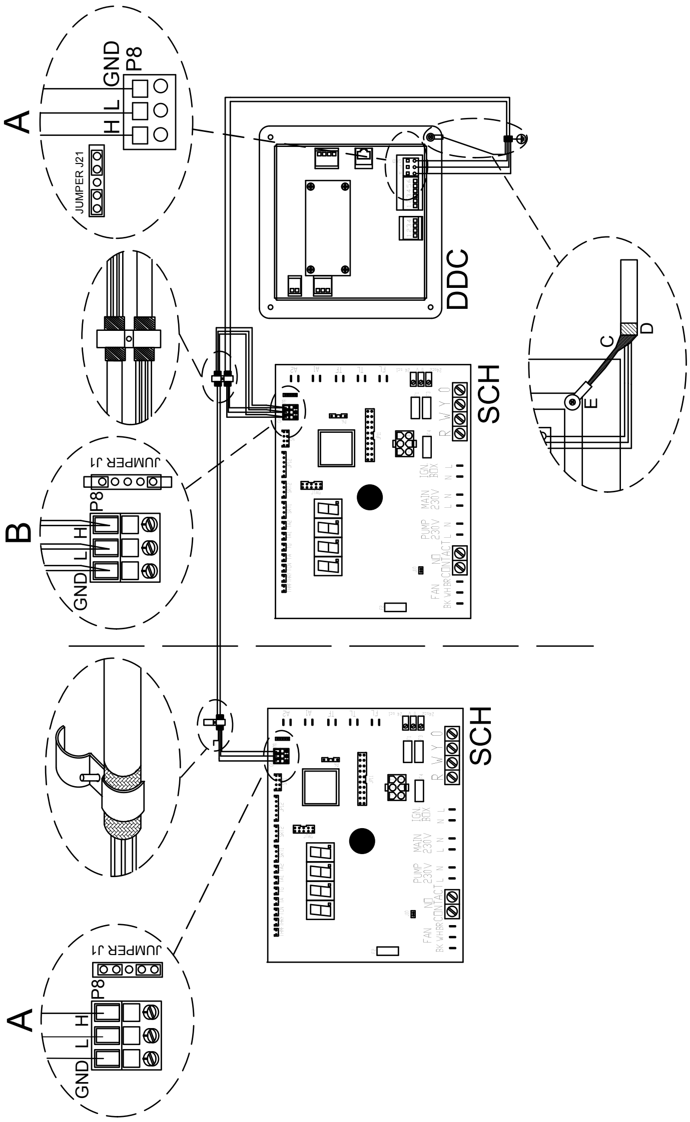
4.5.1 GAHP/GA

Figure 4.4 *CAN bus connection for systems with one unit*



DDC	Direct Digital Controller
SCH	S61 electronic board
J1	CAN bus jumper onboard S61
J21	CAN bus jumper on DDC board
H,L,GND	Data signal wires (ref. cables table)
A	Terminal node connection - (3 wires; J1 and J21 = "closed")
B	CAN bus cable shield
C	Insulating tape to protect the shield of the CAN bus cable
D	Eyelet terminal and fixing screw

Figure 4.5 *CAN bus connection for systems with multiple single units*



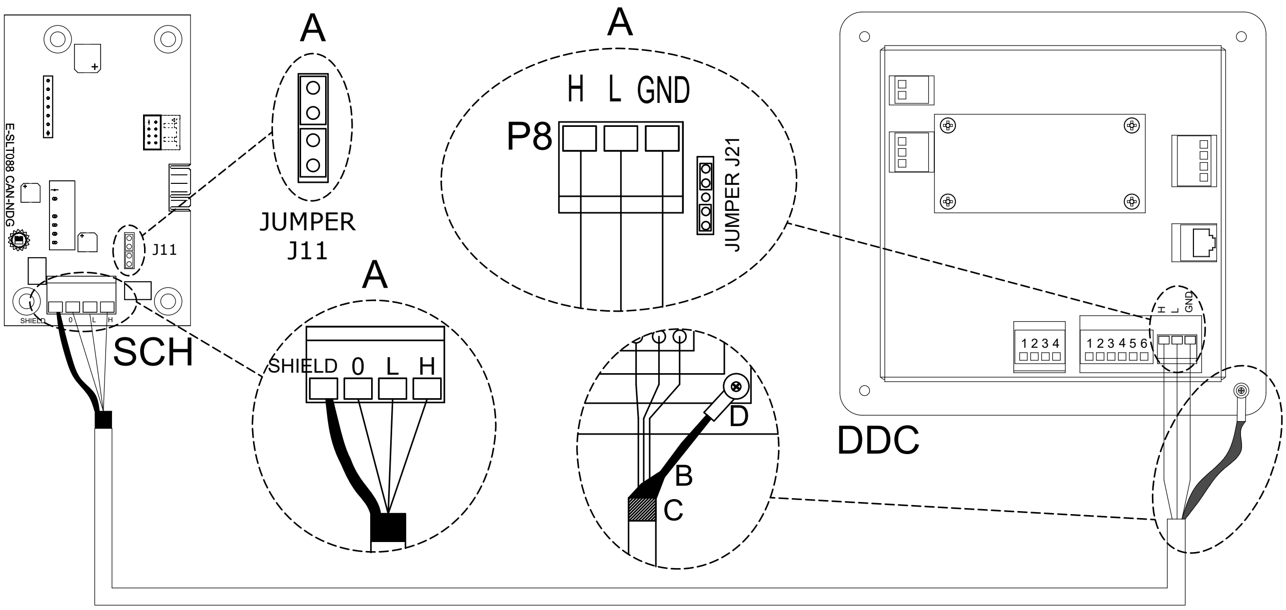
DDC Direct Digital Controller
SCH S61 electronic board
J1 CAN bus jumper onboard S61
J21 CAN bus jumper on DDC board
H,L,GND Data signal wires (ref. cables table)
A Terminal node connection - (3 wires; J1 and J21 = "closed")
B Intermediate node connection - (6 wires; J1 and J21 jumpers = "open")
C CAN bus cable shield
D Insulating tape to protect the shield of the CAN bus cable
E Eyelet terminal and fixing screw

4.5.2 AY

The AY boilers leave the factory with the jumpers already positioned for connecting the individual appliance as a terminal node.

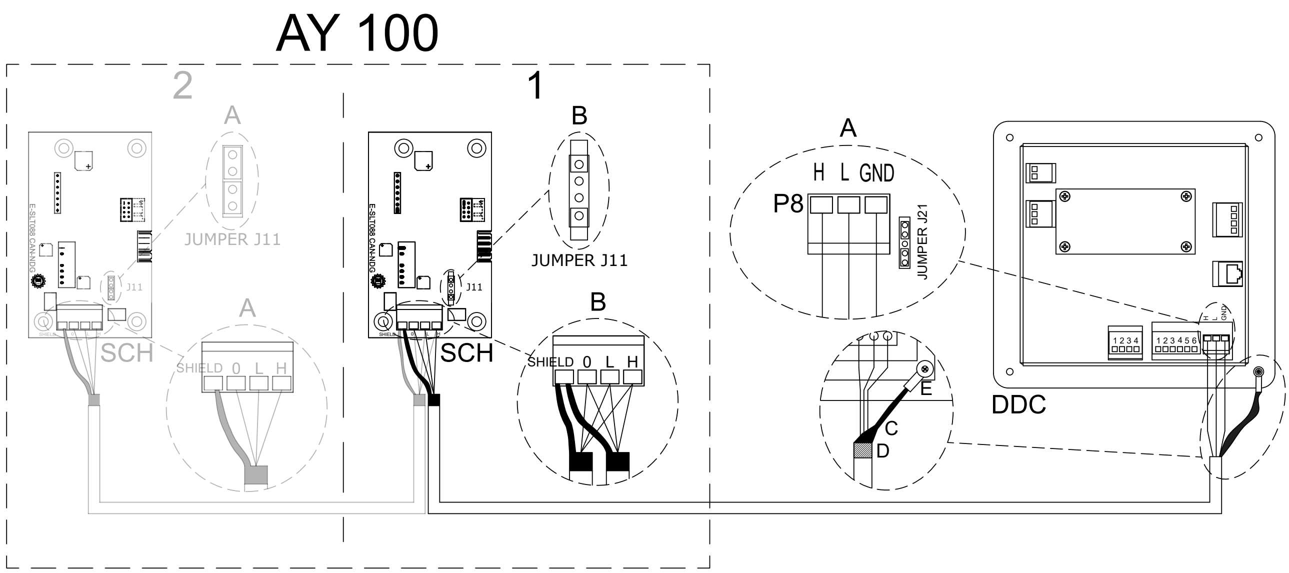
For the AY 100 appliance, the CAN bus connection between the two modules is already factory-made. Consequently, if an individual AY 100 appliance is connected as a terminal node, the connection should only be made on module 1 (right), Figure 4.7 *p. 9*, without changing the position of the J11 jumpers. If one or more AY 100 appliances are to be connected as Intermediate nodes, the CAN-NDG board of module 1 (right) is to be connected to the previous CAN bus node, without changing the position of the J11 jumpers, while the CAN-NDG board of module 2 (left) is to be connected to the next CAN bus node and the J11 jumpers are to be opened accordingly.

Figure 4.6 *CAN bus connection for systems with a single AY 35/AY 50 unit*



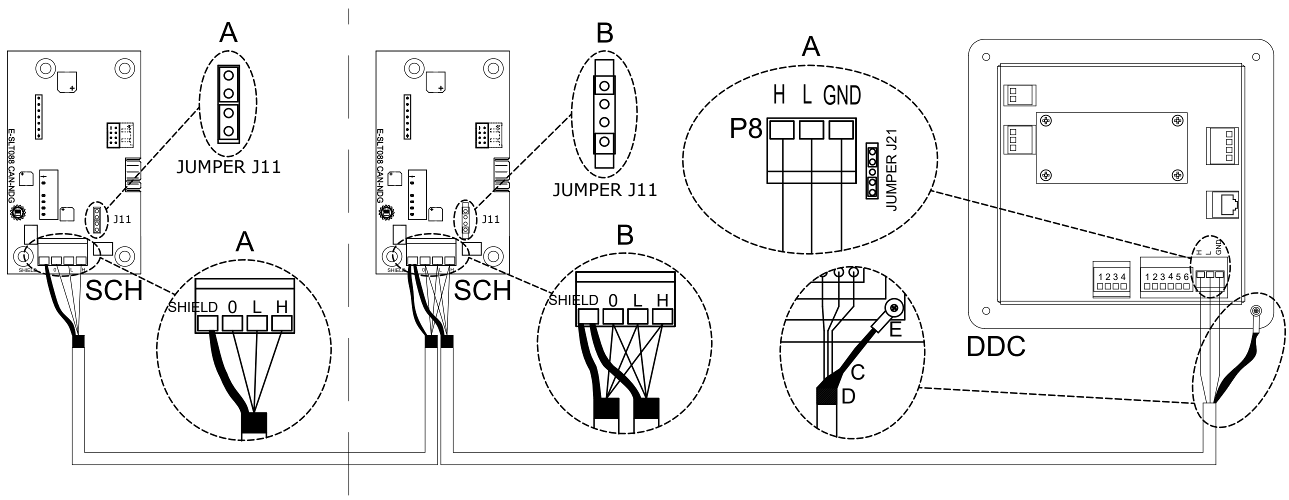
DDC	Direct Digital Controller	0	Common data	B	CAN bus cable shield
SCH	CAN-NDG board	H	Data signal HIGH	C	Insulating tape to protect the shield of the CAN bus cable
J11	CAN bus jumper on CAN-NDG board	L	Data signal LOW	D	Eyelet terminal and fixing screw
J21	CAN bus jumper on DDC panel	A	Terminal node connection - (3 wires; J11 and J21 = "closed")	P8	CAN port/connector
GND	Common data				

Figure 4.7 *CAN bus connection for systems with a single AY 100 unit*



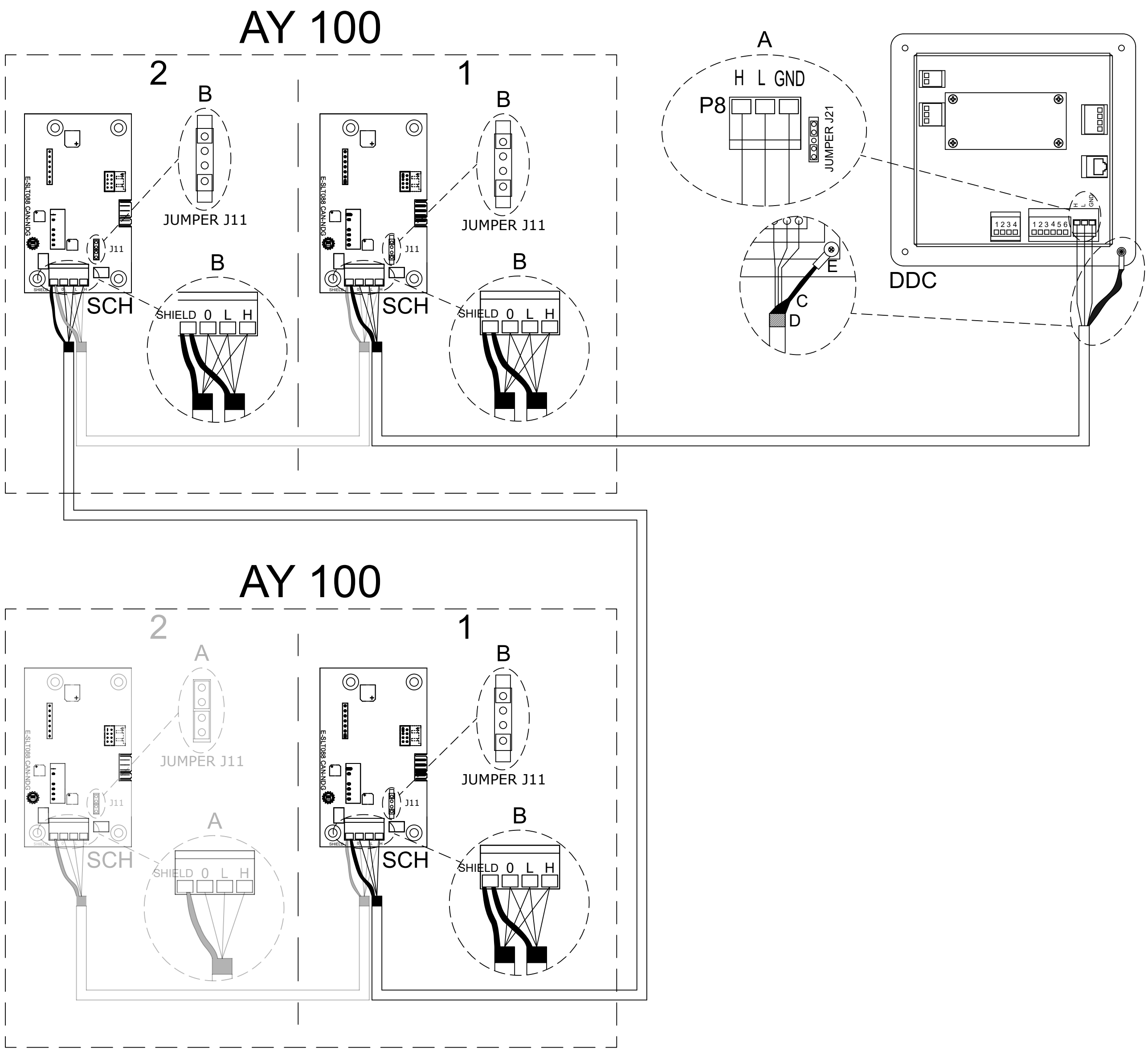
1	Module 1 (right)	0	Common data	C	CAN bus cable shield
2	Module 2 (left)	H	Data signal HIGH	D	Insulating tape to protect the shield of the CAN bus cable
DDC	Direct Digital Controller	L	Data signal LOW	E	Eyelet terminal and fixing screw
SCH	CAN-NDG board	A	Terminal node connection - (3 wires; J11 and J21 = "closed")	P8	CAN port/connector
J11	CAN bus jumper on CAN-NDG board	B	Intermediate node connection - (6 wires; J11 and J21 jumpers = "open")		
J21	CAN bus jumper on DDC panel				
GND	Common data				

Figure 4.8 *CAN bus connection for systems with several individual AY 35/AY 50 units*



DDC	Direct Digital Controller	H	Data signal HIGH	C	CAN bus cable shield
SCH	CAN-NDG board	L	Data signal LOW	D	Insulating tape to protect the shield of the CAN bus cable
J11	CAN bus jumper on CAN-NDG board	A	Terminal node connection - (3 wires; J11 and J21 = "closed")	E	Eyelet terminal and fixing screw
J21	CAN bus jumper on DDC panel	B	Intermediate node connection - (6 wires; J11 and J21 jumpers = "open")	P8	CAN port/connector
GND	Common data				
0	Common data				

Figure 4.9 *CAN bus connection for systems with several individual AY 100 units*

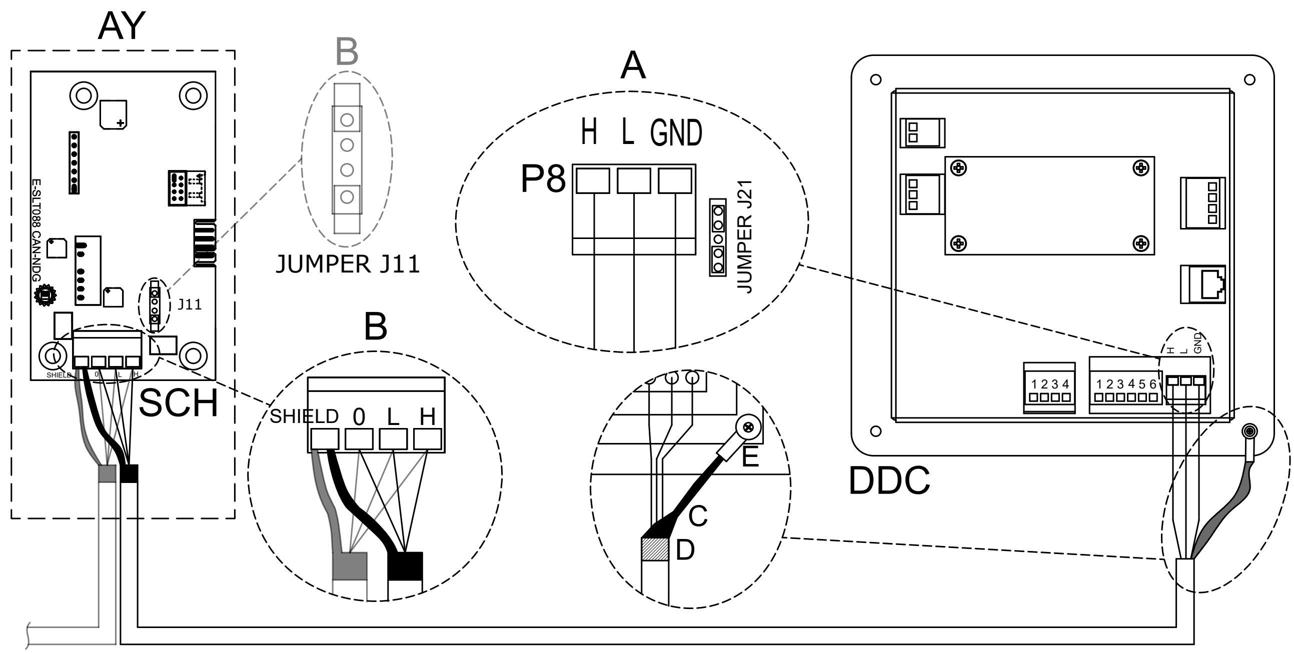


1	Module 1 (right)		0	Common data		C	CAN bus cable shield
2	Module 2 (left)		H	Data signal HIGH		D	Insulating tape to protect the shield of the CAN bus cable
DDC	Direct Digital Controller		L	Data signal LOW		E	Eyelet terminal and fixing screw
SCH	CAN-NDG board		A	Terminal node connection - (3 wires; J11 and J21 = "closed")		P8	CAN port/connector
J11	CAN bus jumper on CAN-NDG board		B	Intermediate node connection - (6 wires; J11 and J21 jumpers = "open")			
J21	CAN bus jumper on DDC panel						
GND	Common data						

4.5.3 Gitié

The CAN bus connection between the AY module and the GAHP/GA module is factory wired.

Figure 4.10 *CAN bus connection between Gitié and DDC*



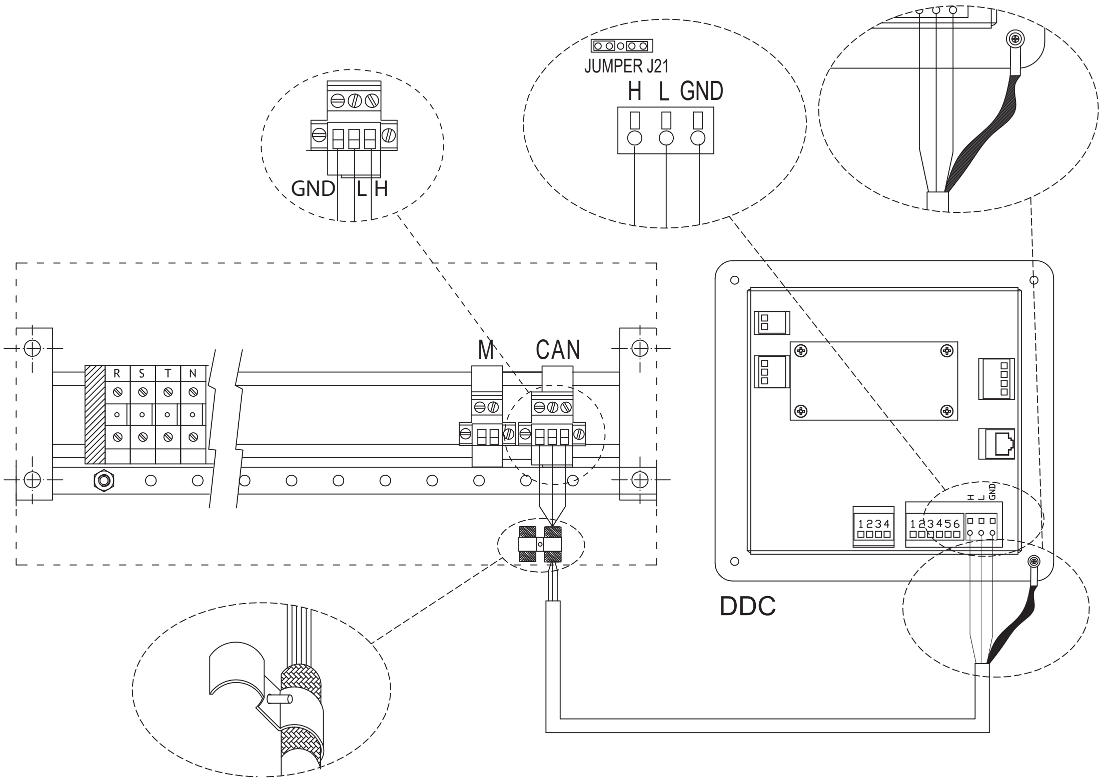
DDC	Direct Digital Controller	H	Data signal HIGH	C	CAN bus cable shield
SCH	CAN-NDG board of the AY module	L	Data signal LOW	D	Insulating tape to protect the shield of the CAN bus cable
J11	CAN bus jumper on CAN-NDG board	A	Terminal node connection - (3 wires; J21 = "closed")	E	Eyelet terminal and fixing screw
J21	CAN bus jumper on DDC panel	B	Intermediate node connection - (6 wires; J11 = "open")	P8	CAN port/connector
GND	Common data				
0	Common data				

4.5.4 Link

The CAN bus connections between the boards of the individual GAHP/GA/AY modules that make up the individual Link are already factory-made.

Take care in the case of AY 100 (which has two thermal modules inside) to always operate on internal module 2 (left) as the internal CAN connection between module 1 and module 2 is already factory-made and should not be changed.

Figure 4.11 *CAN bus cable connection between 1 DDC/CCI and the Link electrical panel*

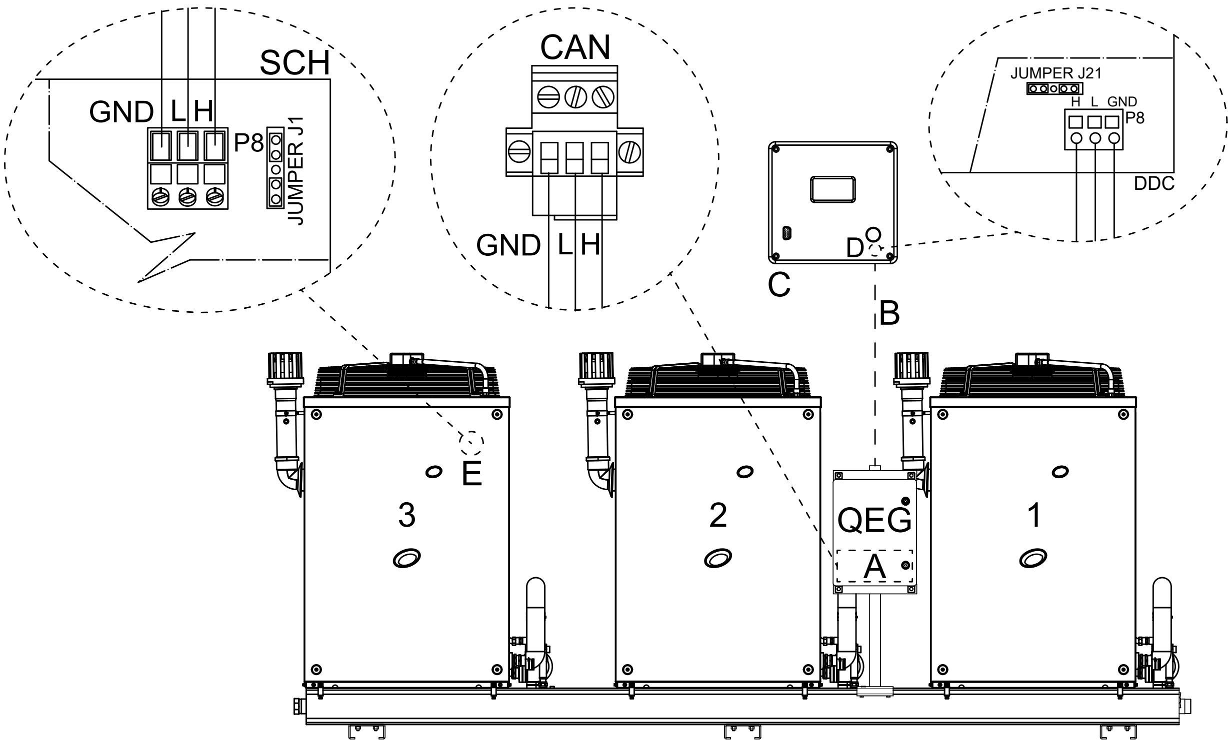


CAN 3-pole connector for CAN bus network connection
DDC CCI/DDC (rear view)

4.5.4.1 1 Link + DDC/CCI configuration

Refer to Figure 4.11 *p. 12* for the connection diagram of the CAN bus cable.

Figure 4.12 *CAN bus connection for systems with a single Link*



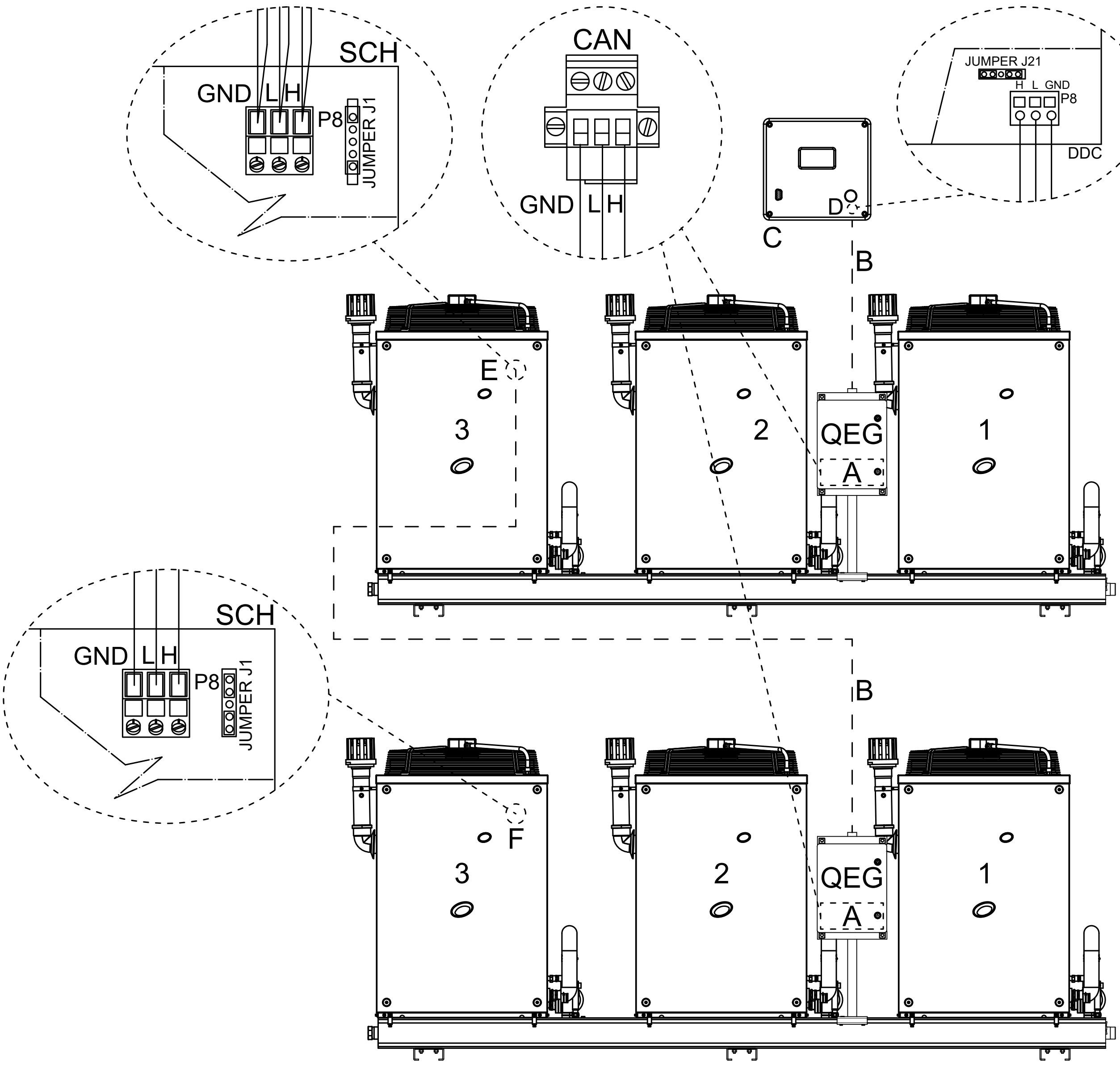
A	Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
B	CAN bus cable (not supplied, Table 4.1 *p. 4*)
C	DDC/CCI panel
D	Terminal node connection on DDC/CCI (Figure 4.3 *p. 5*, case A)
E	Pre-wired terminal node on the last unit of the Link (Figure 4.1 *p. 5*, case A)
QEG	Link electrical panel
3	Last unit of the Link (with "ID00")

4.5.4.2 2 Link + DDC configuration

The DDC panel is connected to the first Link as a terminal node (connection diagram in Figure 4.11 *p. 12*).

In the last unit of the first Link (which must be connected to the electrical panel of the next Link) the jumper J1 must be open, as shown in detail B of Figure 4.1 *p. 5*.

Figure 4.13 *Example of CAN network with 7 nodes (1 DDC + 2 Links connected on a single hydraulic circuit)*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
B CAN bus cable (not supplied, Table 4.1 *p. 4*)
C DDC panel
D Terminal node connection on DDC (Figure 4.3 *p. 5*, case A)
E Intermediate node on the last unit of the Link (Figure 4.1 *p. 5*, case B)
F Pre-wired terminal node on the last unit of the Link (Figure 4.1 *p. 5*, case A)
QEG Link electrical panel
3 Last unit of the Link (with "ID00")

4.6 EXTERNAL REQUEST

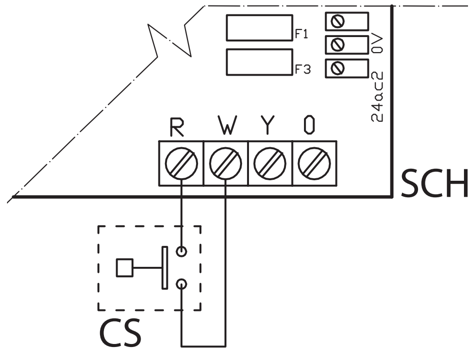
It is required to arrange:

- ► Request devices (e.g. thermostats, timers, buttons, ...) fitted with voltage-free NO contacts.
- ► Winter/Summer switching device (only for reversible appliances).

The external request is connected to the electronic board located in the electrical panel inside the appliance (Paragraph 2 *p. 1*).

4.6.1 GAHP A

Figure 4.14 *External heating request connection*

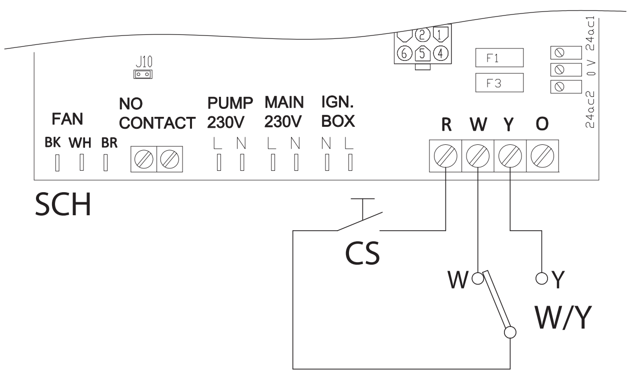


SCH Electronic board
R Common 24 V AC
W Heating request terminal

Components NOT SUPPLIED
CS External request

4.6.2 GAHP-AR

Figure 4.15 *External operation requests connection*



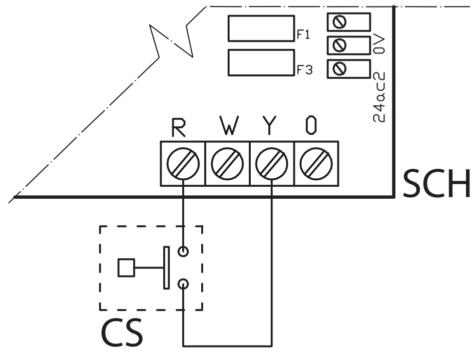
SCH Electronic board
R Common 24 V AC
W Heating request terminal
Y Cooling request terminal

Components NOT SUPPLIED
CS External request
W/Y Heating/Cooling switch (winter/summer)

4.6.3 GAHP GS/WS

See Figure 4.14 *p. 14* for connection of heating request.
See Figure 4.16 *p. 14* below for connection of cooling request.

Figure 4.16 *External cooling request connection*



SCH Electronic board
R Common
Y Cooling request terminal

Components NOT SUPPLIED
CS External request

4.6.4 GA

See Figure 4.16 *p. 14* for connection of cooling request.

4.6.5 AY

The following Table 4.2 *p. 14* summarizes the features associated with the different control devices.

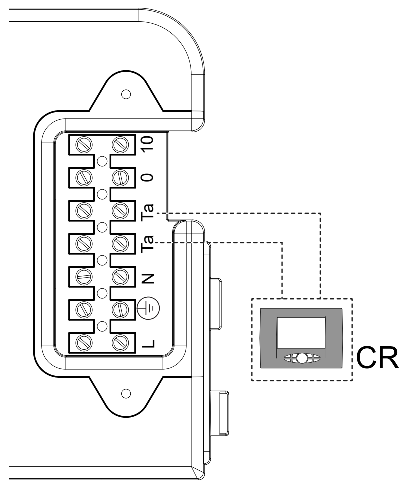
Table 4.2 *Available features depending on controls*

Control devices	Description
External request	Heating at fixed temperature, based on the parameters set on the control panel onboard the boiler. Activation/deactivation based on an external request, connected to the Ta-Ta terminals.
Room thermostat	Heating at fixed temperature, based on the parameters set on the control panel onboard the boiler. Activation/deactivation based on the temperature detected by the room thermostat and its settings.

Use a cable with a cross-section between 0,5 and 1,5 mm², with a maximum length of 50 metres.

For the AY 100 appliance, two separate requests must be provided, one for each of the Ta1-Ta2 contacts in the electrical panel, which correspond to the two separate thermal modules of the appliance.

Figure 4.17 *External request connection*

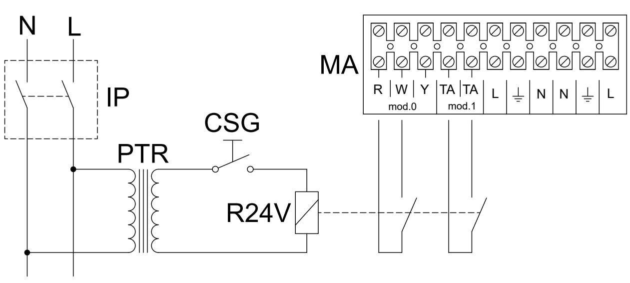


CR External request/room thermostat

4.6.6 Gitié AHAY

If you wish the heating requests of the two units to be simultaneous, follow the connection diagram shown in Figure 4.18 *p. 15*.
If you wish the heating requests of the two units to be independent, follow the connection diagram shown in Figure 4.19 *p. 15*.

Figure 4.18 *Connection of simultaneous external requests*

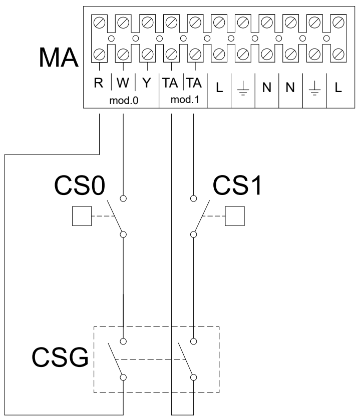


MA Gitié 2.0 terminal block

Components NOT SUPPLIED
IP Two-pole switch

PTR SELV safety transformer
CSG General request
R24V 24V relay

Figure 4.19 *Connection of separate external requests*



MA Gitié 2.0 terminal block

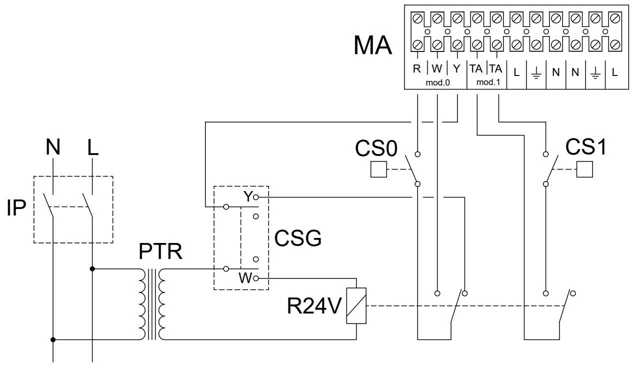
Components NOT SUPPLIED

CSG General request
CS0 GAHP A heating request
CS1 AY heating request

4.6.7 Gitié ARAY

If you wish the requests of the two units to be simultaneous follow the connection diagram shown in Figure 4.20 *p. 15*.
If you wish the heating requests of the two units to be independent, follow the connection diagram shown in Figure 4.21 *p. 15*.
The cooling request only applies to the GAHP-AR module and is an alternative to the heating request. In the case of simultaneous requests, activating the cooling request will deactivate the AY boiler. In the case of independent requests, the GAHP-AR module's heating/cooling operation mode can be selected by means of an appropriate selector switch, while the AY boiler can still operate in heating mode by closing the appropriate contact.

Figure 4.20 *Connection of simultaneous external requests*

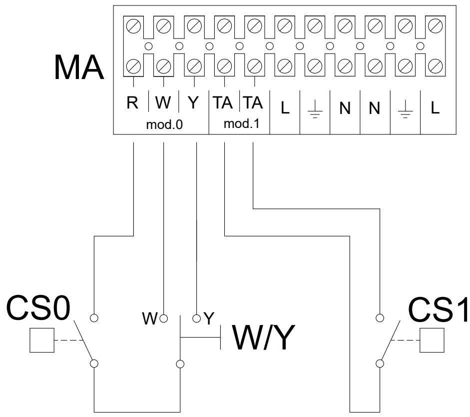


W Heating request terminal
Y Cooling request terminal
MA Gitié 2.0 terminal block

Components NOT SUPPLIED
IP Two-pole switch

PTR SELV safety transformer
CSG General request with operating mode selector switch
CS0 GAHP-AR request
CS1 AY heating request
R24V 24V relay

Figure 4.21 *Connection of separate external requests*



W Heating request terminal
Y Cooling request terminal
MA Gitié 2.0 terminal block

Components NOT SUPPLIED

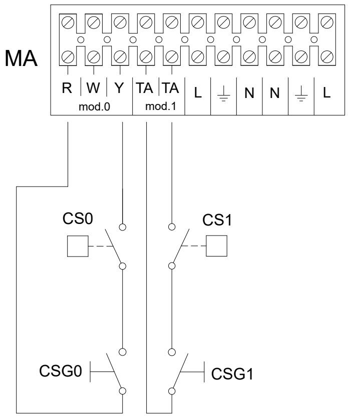
CS0 GAHP-AR request
CS1 AY heating request
W/Y Heating/Cooling switch (winter/summer)

4.6.8 Gitié ACAY

4.6.8.1 ACAY /4

In the case of a 4-pipe unit, the consents of the two units can be independent or alternate.
Should you wish the enables of the two units to be independent follow the connection diagram shown in Picture 4.22 *p. 16*.

Figure 4.22 *Connection of independent external requests (ACAY /4)*



MA Gitié 2.0 terminal block

Components NOT SUPPLIED

CS0 GA ACF cooling request

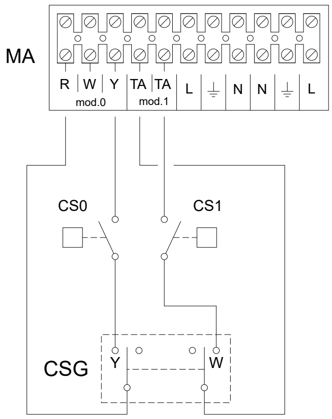
CS1 AY heating request

CS0 General cooling request

CS1 General heating request

Should you wish the enables of the two units to be alternative follow the connection diagram shown in Figure 4.23 *p. 16*.

Figure 4.23 *Connection of alternated external requests*



W Heating request terminal

Y Cooling request terminal

MA Gitié 2.0 terminal block

Components NOT SUPPLIED

CS0 GA ACF cooling request

CS1 AY heating request

CSG General request with operating mode selector switch

4.6.8.2 ACAY /2

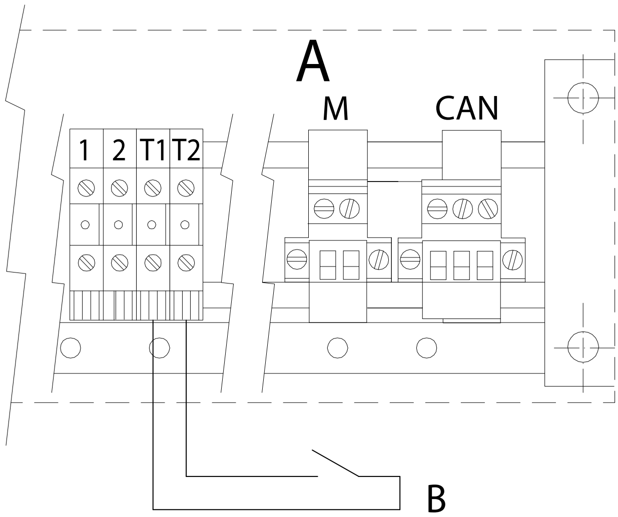
In the case of the 2-pipe unit, the unit requests can only be alternatives. In this case, follow the connection diagram in Figure 4.23 *p. 16*.

4.6.9 Recovery circuit activation request (Link with HR)

In order to activate the request for recovery heat output (only available if at least one GA ACF HR module is present on the Link), it is necessary to connect the contact from a suitable thermostat with adjustable differential located on the DHW buffer tank to terminals T1-T2 of the Link electrical panel.

The recovery heat output (and consequently the activation of the relevant water pump) will only be available when the GA ACF HR chiller is actually active for cooling service. It is not possible to activate the GA ACF HR chiller due to the request for recovery heat output.

Figure 4.24 *Connection of DHW thermostat for heat recovery circuit activation (Link with HR)*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)

B DHW thermostat with adjustable differential for heat recovery circuit activation

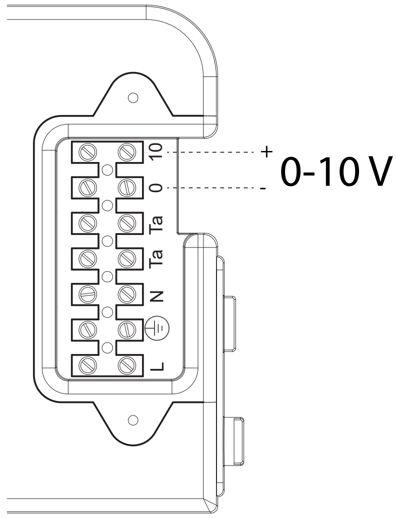
T1-T2 DHW buffer tank thermostat terminals (HR recovery circuit side)

4.7 0-10 V INPUT

Control via 0-10 V signal is alternative to control via DDC panel or external request.

The 0-10 V signal connection is only available on AY 35 and AY 50 models.
Either the water temperature setpoint or the power value can be communicated alternatively via a 0-10 V analogue signal.
The 0-10 V signal should be connected to the 0-10 terminals as shown in Figure 4.25 *p. 16*.
The cable may not be longer than 30 metres.

Figure 4.25 *0-10 V input connection*



5 WATER PUMP

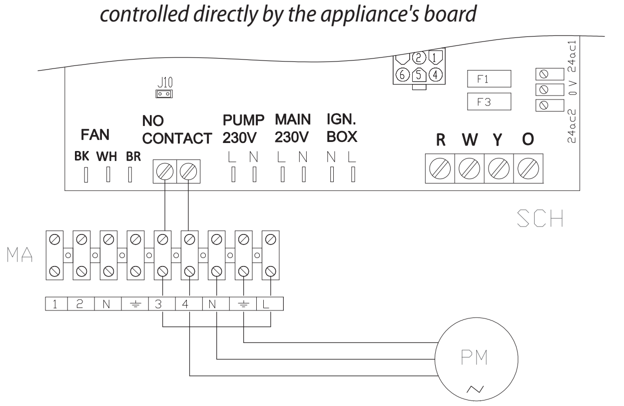
For GAHP/GA single units, water pumps are always optionally supplied and are all of the high-efficiency modulating type (F02). For the single AY appliances, the water pumps are the high-efficiency fixed-flow type (F01) and are already mounted and wired inside the appliance. In the AY 100 appliance there are two water pumps, one for each heating module.
The Link can already be fitted with high-efficiency fixed-flow pumps (F01) or without water pumps.

5.1 GAHP A

5.1.1 Constant flow pump

The diagram in Figure 5.1 *p. 17* is for pumps < 700 W. For pumps > 700 W it is required to add a control relay and arrange jumper J10 OPEN.

Figure 5.1 *Water pump connection (power absorption less than 700W) controlled directly by the appliance's board*

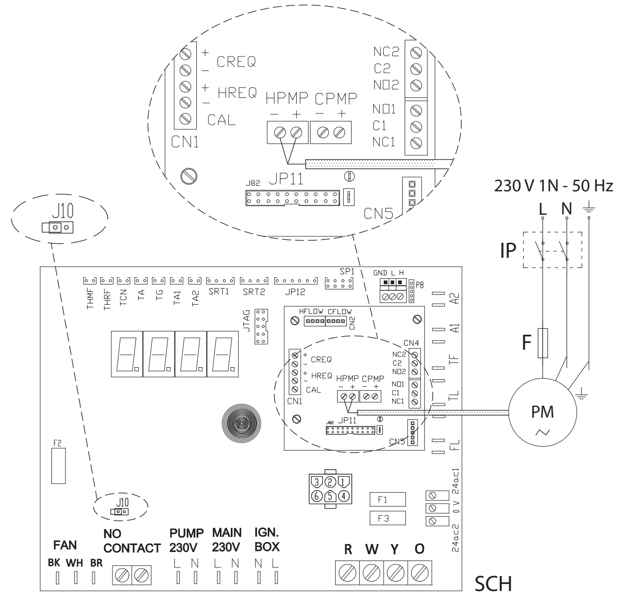


SCH Electronic board
J10 Jumper (1)
N.O. CONTACT NO voltage-free contacts
MA Appliance terminal block
L Phase
N Neutral

Components NOT SUPPLIED
PM Water pump < 700 W

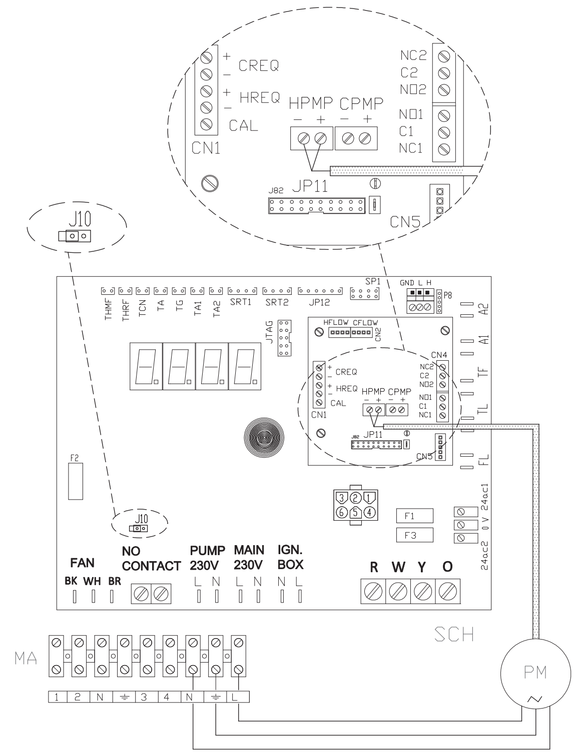
Note
1 Jumper J10 must be closed if the installed pump is not a Wilo electronic pump.
Jumper J10 must be opened if the installed pump is a Wilo electronic pump.

Figure 5.2 *F02 variable flow pump connection*



IP Two-position pump power switch
F Fuse
PM Hot water pump (primary circuit)
Pump signal 0-10 V wire colours
black connect to terminal -
red connect to terminal +

Figure 5.3 *F02 variable flow pump connection when powered by the appliance*



PM Hot water pump (primary circuit)
MA Appliance terminal block
Pump signal 0-10 V wire colours
black connect to terminal -
red connect to terminal +

5.1.2 Variable flow pump

The variable-flow pump F02, available as OPMP010 optional, is already standard supplied with the power supply cable and signal cable, both 1,8 m long.
For longer distances, use FG7 3Gx1,5 mm² cable for the power supply and 2x0,75 mm² shielded cable suitable for 0-10 V signal for the signal cable (maximum length of the signal cable 30 m).

5.2 GAHP-AR

5.2.1 Constant flow pump

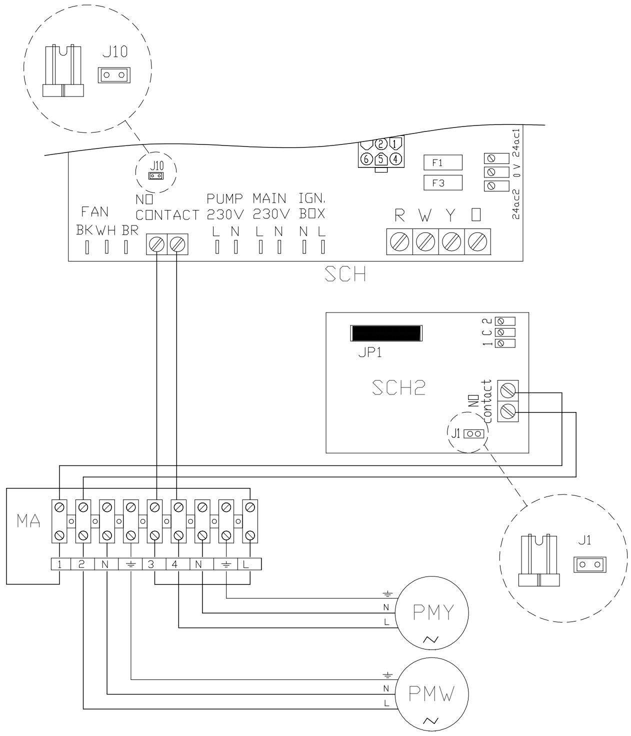
See Paragraph 5.1.1 *p. 17*.

5.3 GAHP GS/WS

5.3.1 Constant flow pump

The diagram in Figure 5.4 *p. 18* is for pumps < 700 W. For pumps > 700 W it is necessary to add a control relay and arrange jumper J1 (hot side pump) and J10 (cold side pump) OPEN.

Figure 5.4 *Connection of constant flow pumps*



SCH Electronic board
SCH2 Electronic board
J10 Cold side pump jumper (1)
J1 Hot side pump jumper (1)
N.O. CONTACT NO voltage-free contacts
MA Appliance terminal block
L Phase
N Neutral

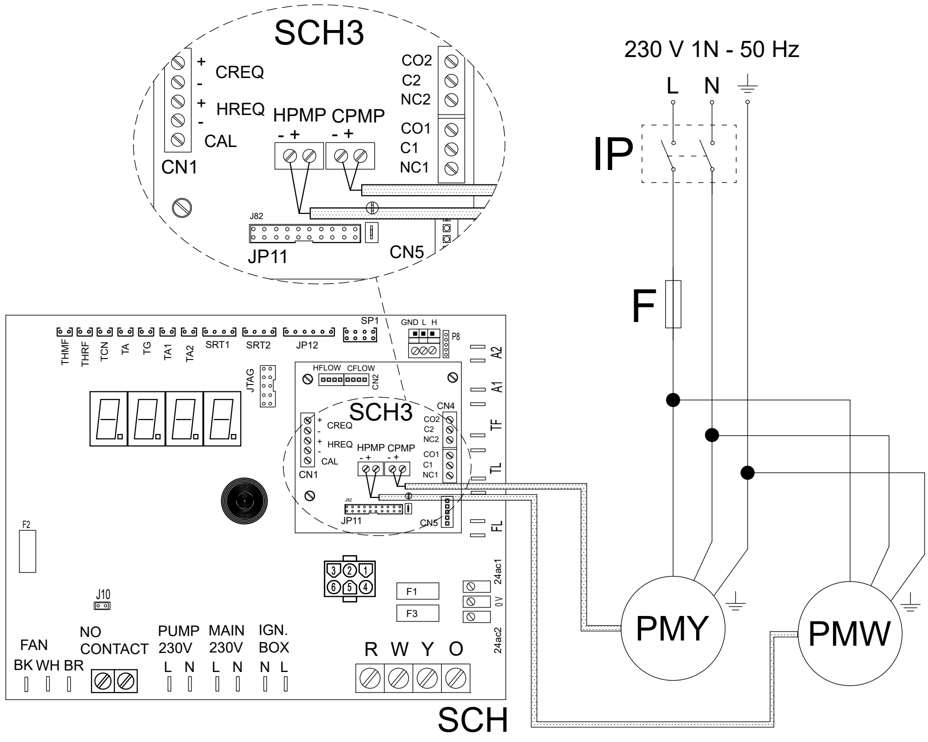
Components NOT SUPPLIED
PMW Hot side water pump < 700 W
PMY Cold side water pump < 700 W

Note
1 Jumpers J10 and J1 must be closed if the installed pump is not a Wilo electronic pump.
Jumpers J10 and J1 must be opened if the installed pump is a Wilo electronic pump.

5.3.2 Variable flow pump

The variable-flow pump F02, available as OPMP010 optional, is already standard supplied with the power supply cable and signal cable, both 1,8 m long.
For longer distances, use FG7 3Gx1,5 mm² cable for the power supply and 2x0,75 mm² shielded cable suitable for 0-10 V signal for the signal cable (maximum length of the signal cable 30 m).
Only the hot side pump will actually be controlled with variable flow. The cold side pump will in any case be controlled with constant flow.

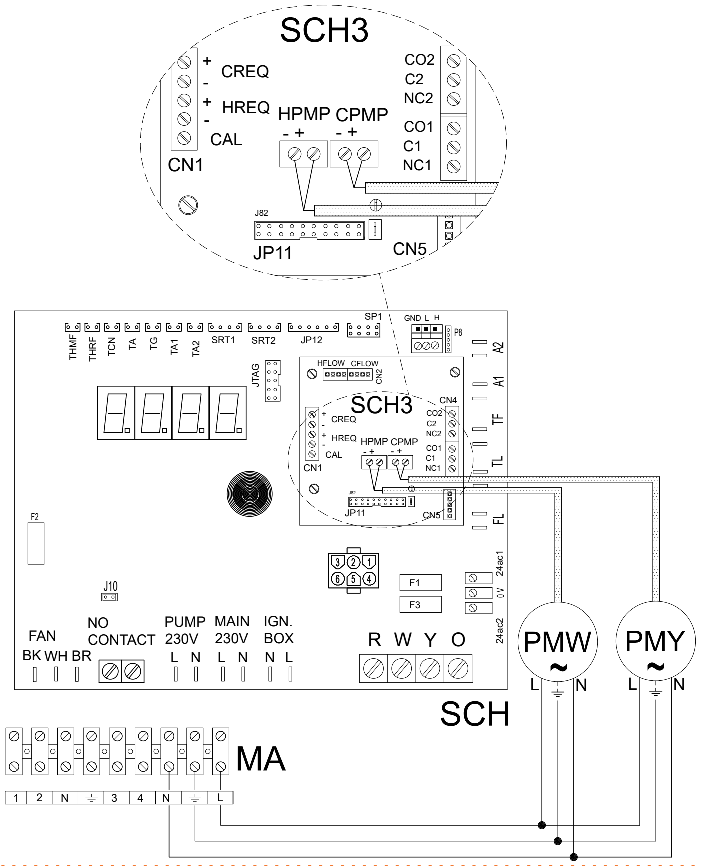
Figure 5.5 *F02 variable flow pump connection*



IP Two-position pump power switch
F Fuse
PMW Hot side water circulation pump (primary circuit)
PMY Cold side water circulation pump

Pump signal 0-10 V wire colours
black connect to terminal -
red connect to terminal +

Figure 5.6 *F02 variable flow pump connection when powered by the appliance*



PMW Hot side water circulation pump (primary circuit)
PMY Cold side water circulation pump
MA Appliance terminal block
Pump signal 0-10 V wire colours
black connect to terminal -
red connect to terminal +

5.4 GA

5.4.1 Constant flow pump

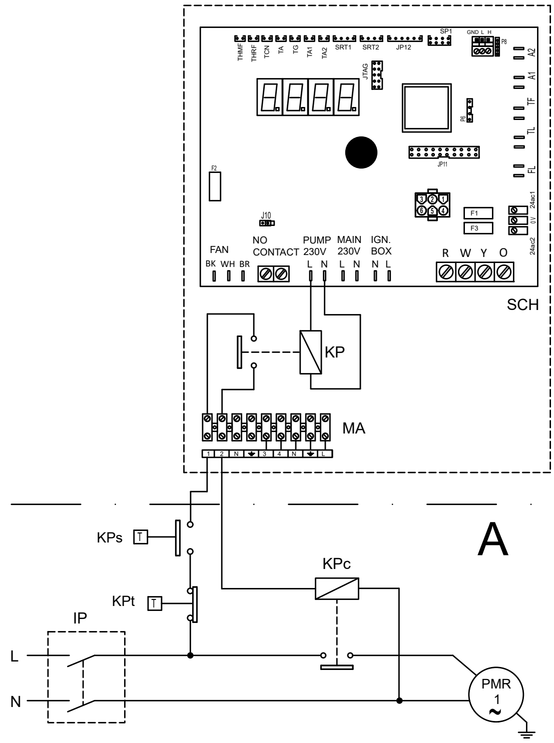
See Paragraph 5.1.1 *p. 17*.

5.4.2 Heat recovery exchanger water pump (only for GA ACF HR)

To be controlled through contacts 1-2 on terminal block MA (Figure 5.7 *p. 20*).

The recovery heat output (and consequently the activation of the relevant water pump) will only be available when the GA ACF HR chiller is actually active for cooling service. It is not possible to activate the GA ACF HR chiller due to the request for recovery heat output.

Figure 5.7 *Recovery exchanger pump connection*



A Connections to be made by the installer
KP Relay on the unit for recovery exchanger pump request
KPt Thermostat with setpoint calibration of DHW tank (not supplied)
KPs Thermostat calibrated at 35 °C with capillary tube in the lower part of the DHW tank (not supplied) [to be provided in the event the water flow rate on the recovery circuit exceeds the nominal value of 1000 l/h]
KPc Two-pole relay for recovery exchanger pump request (not supplied)
IP Two-pole isolation switch for recovery exchanger pump power supply (not supplied)
PMR Recovery exchanger pump (not supplied)

5.5 AY

Appliances in the AY range are equipped with high head water pumps, already mounted and wired.

5.6 GITIÉ

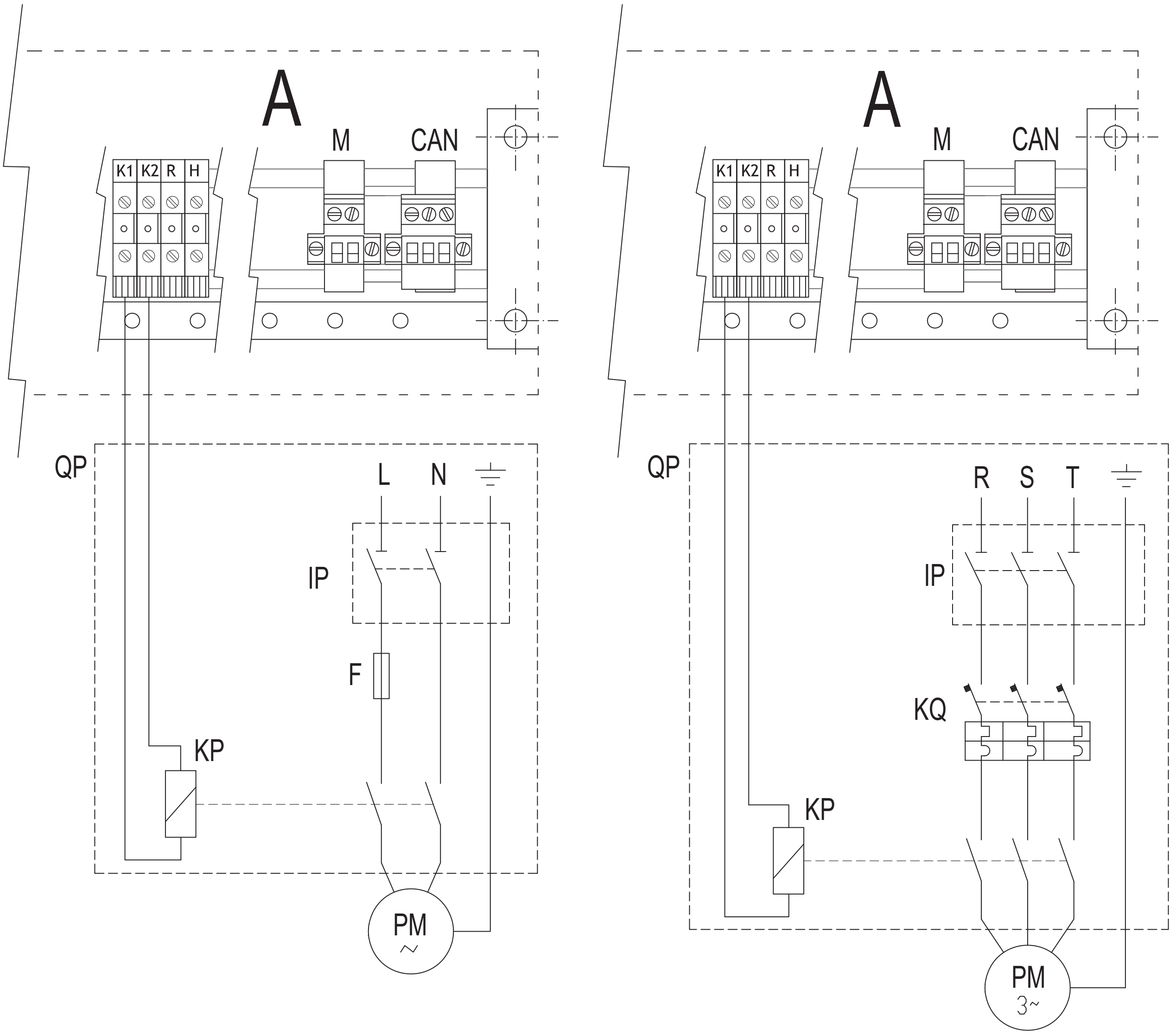
Appliances in the Gitié 2.0 range are equipped with high head water pumps, already mounted and wired.

5.7 LINK

In Link with water pumps, the individual independent water pumps (1 or 2 for each GAHP/GA/AY module) are already mounted and pre-wired on board the Link.
In Link without water pumps, electrical connections must be made (both for power supply and control) of the common water water pump of the primary water circuit, as shown in the diagrams in Figures 5.8 *p. 21*, 5.9 *p. 22*.

5.7.1 Common water pump of a link without water pumps

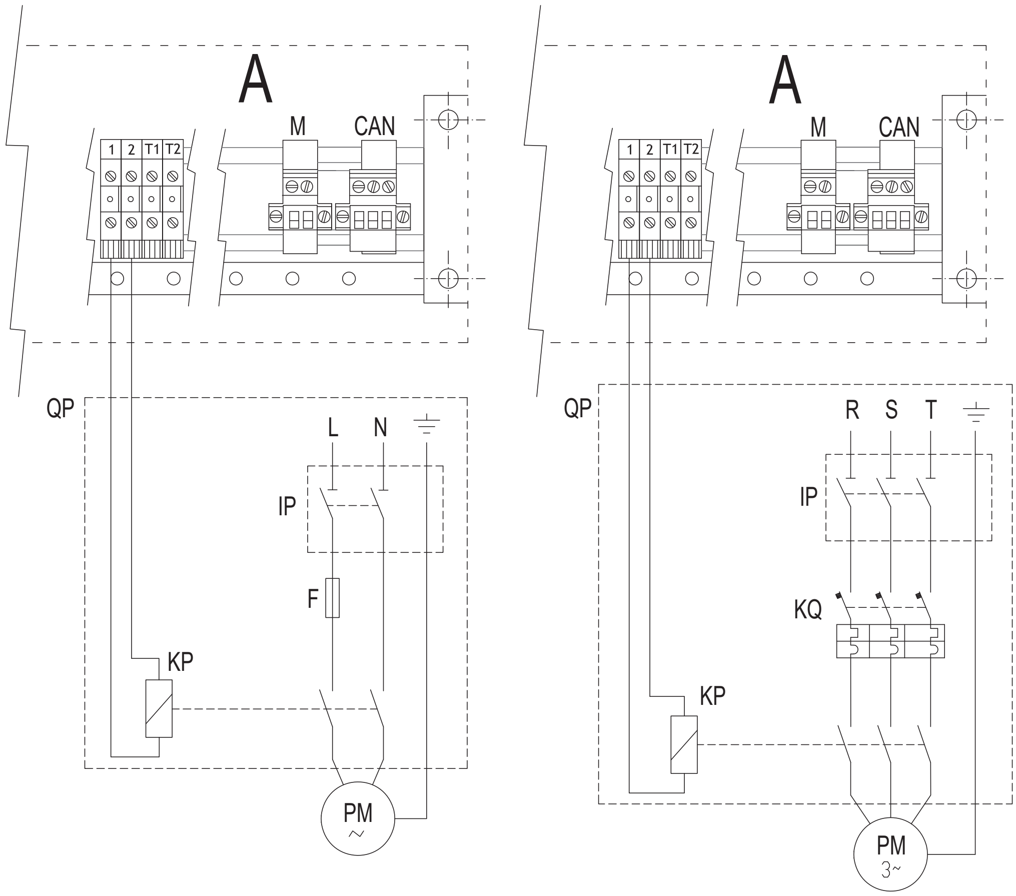
Figure 5.8 *Connection of single- or three-phase water pump directly controlled by the Link (configurations "without water pumps")*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
F Appropriate fuse for protecting the water pump used
IP Water pump disconnector (not supplied)
K1-K2 24 Vac coil terminals for the common water pump request of the hot/cold circuit of the Link
KP NO relay for controlling the water pump (not supplied)
KQ Appropriate motor protection switch for the water pump used
L Phase of single-phase water pump power supply
N Neutral
PM Primary system water pump (not supplied)
QP Water pump electrical panel (external)
RST Three-phase water pump power supply phases

The terminals for controlling the heat recovery circuit water pump, described in Figure 5.9 *p. 22* below, are only present if at least one GA ACF HR module is present on the Link.

Figure 5.9 *Heat recovery circuit: connection of single- or three-phase water pump directly controlled by the Link (configurations "without water pumps")*



A Blind panel of the Link electrical panel (Figure 2.4 *p. 2*)
1-2 24 Vac coil terminals for the common water pump request of the heat recovery circuit of Link with HR
F Appropriate fuse for protecting the water pump used
IP Water pump disconnector (not supplied)
KP NO relay for controlling the water pump (not supplied)
KQ Appropriate motor protection switch for the water pump used
L Phase of single-phase water pump power supply
N Neutral
PM Primary system water pump (not supplied)
QP Water pump electrical panel (external)
RST Three-phase water pump power supply phases

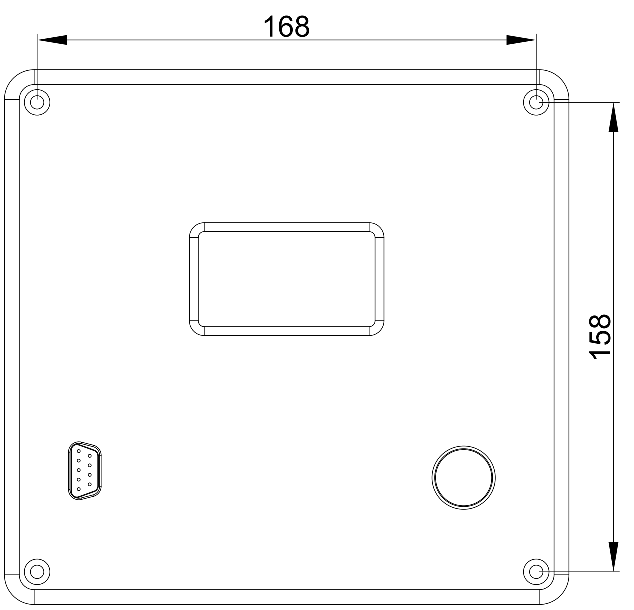
6 DDC PANEL

Please refer to Section C01.11 for a description of the functionality of the DDC panel.

6.1 INSTALLATION

The DDC panel is suitable for indoor installation and must be fixed onto an electrical panel, into which a 155 x 151 mm rectangular opening must be made.
Figure 6.1 *p. 23* indicates the position of the fixing holes.

Figure 6.1 *DDC/CCI front view with fixing dimensions*

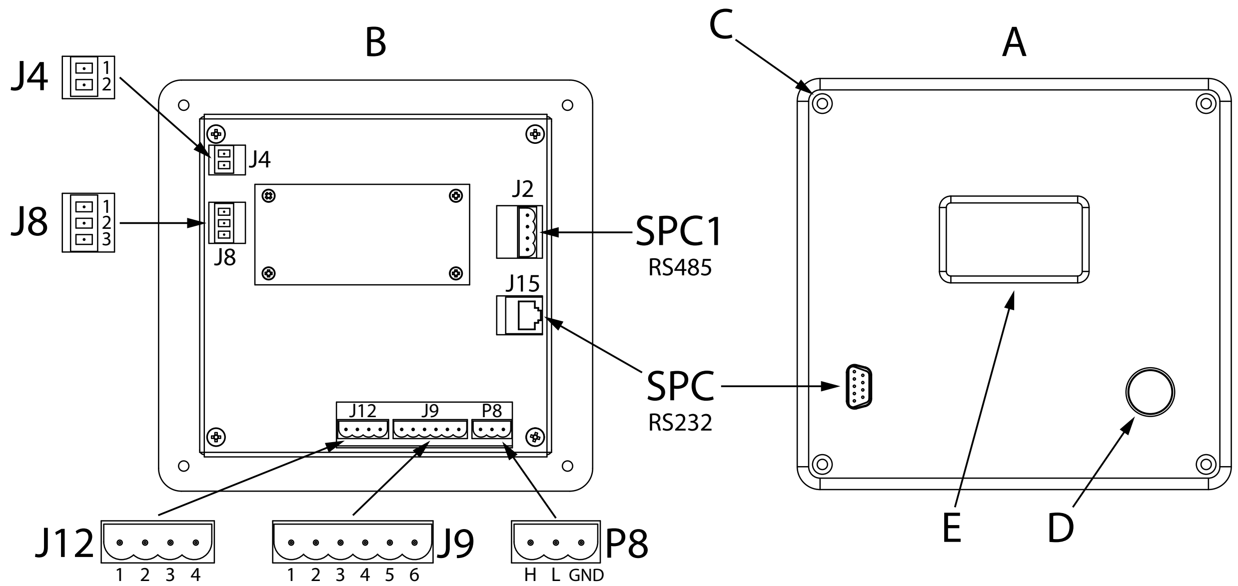


The DDC panel has an IP20 protection rating and should be installed in premises with ambient air temperature between 0 °C and 50 °C, away from direct exposure to sunlight.

6.2 CONNECTIONS

The DDC panel provides the connection terminals shown in Figure 6.2 *p. 23*.

Figure 6.2 *Detail of DDC connectors*



A Front view
B Rear view
C Mounting holes
D Knob
E Display
J4 Outdoor (or ambient) temperature probe NTC 10 kΩ - 2-pin terminal block
J8 Output for external alarm systems - 3-pole terminal block, max voltage 24 V AC
1 COM
2 NO
3 NC

J12 24 Vac electrical power supply - 4 pole connector
1 24 Vac
2 0 V AC
3 Safety earthing
J9 External requests - 6-pin socket
1 R (24 V AC output)
2 W (heating request)
3 YY (cooling request)
4 0 (0 V AC)
5 NA (not connected)
6 R (24 V AC output)

P8 CAN bus network socket (orange)
SPC RS232 serial port
- J15, RJ45 port (Modbus / supervision system / monitoring connection)
- DB9 (connection Modbus / BMS / monitoring)

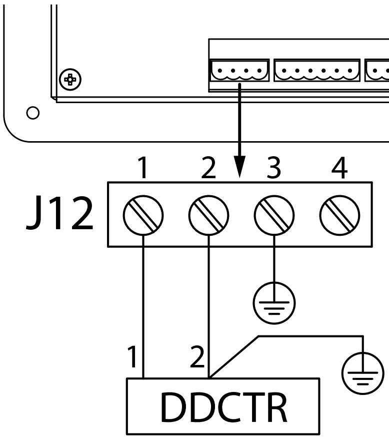
SPC1 J2 port (Modbus RS485 serial connection)
1 A (TXD/RXD +)
2 B (TXD/RXD -)
3 Common (earth and GND)
4 Cable shielding (earth and GND)

6.2.1 Electrical power supply

The DDC panel must be supplied by a 230/24 V AC - 50/60 Hz safety transformer with a power rating of no less than 20 VA (not supplied); in particular, this transformer must comply with EN 61558-2-6 standard.
Use a 3x0,75 mm^2 electrical cable and make the connections on

the terminals of J12 terminal block on the lower left (rear side), respecting the polarity shown in Figure 6.3 *p. 24*.
The maximum specified length for this cable is 1m.

Figure 6.3 *DDC/CCI power supply*



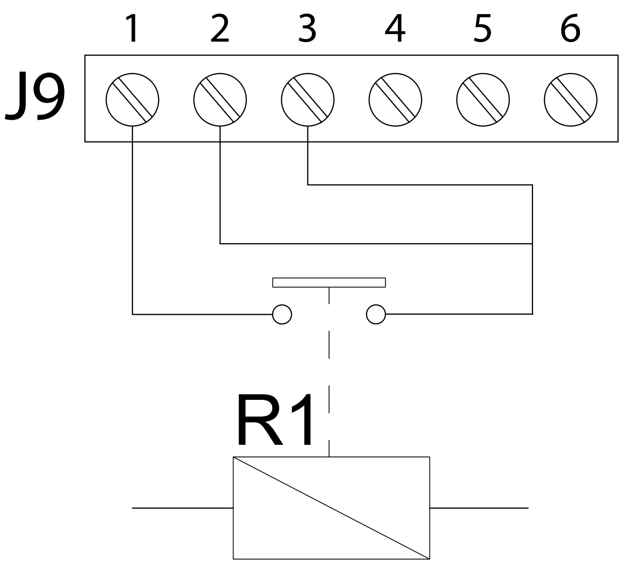
J12 24 Vac electrical power supply - 4 pole connector
1 24 Vac
2 0 V AC
3 Safety earthing
DDCTR Safety transformer 240/24 V AC - 50/60 Hz - min 20 VA (not supplied)

6.2.2 Inputs/Outputs

6.2.2.1 External requests

Switching on/off of the appliances controlled by the DDC panel can be managed via a general external request.
To use this function, the DDC panel must be properly configured and electrical connections made as detailed in the following Figures.
Figure 6.4 *p. 24* shows the case of the connection of an external request for a 2-pipe system (alternative heating/cooling).

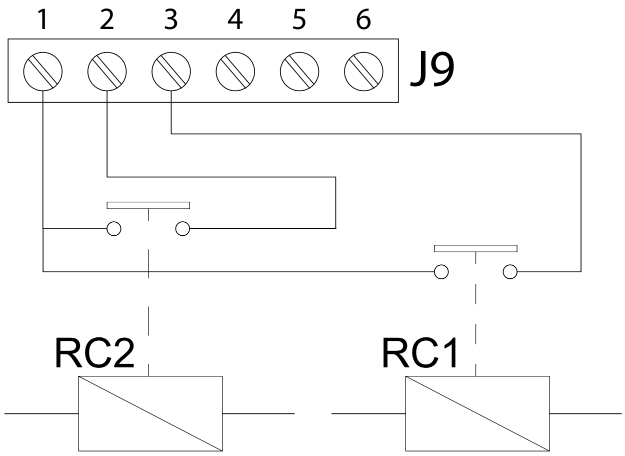
Figure 6.4 *2-pipe system single DDC external request*



Details of J9 socket (Figure 6.2 *p. 23*)
R1 Relay with double insulation for external request for system activation (not supplied)

Figure 6.5 *p. 24* shows the case of the connection of two external requests for a 2-/4-pipe system (alternative or simultaneous heating/cooling).

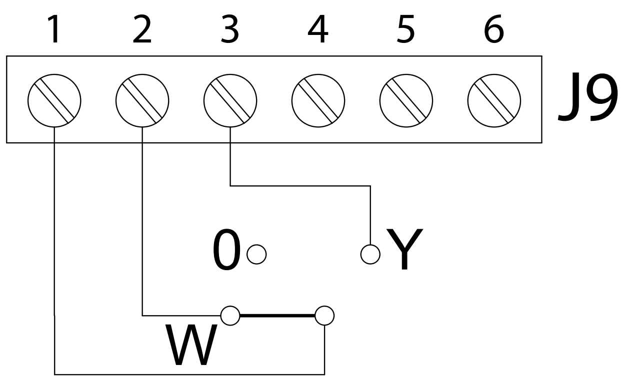
Figure 6.5 *Double DDC external request*



Details of J9 socket (Figure 6.2 *p. 23*)
RC1 Relay for external request for cooling system activation (not supplied)
RC2 Relay for external request for heating system activation (not supplied)

Figure 6.6 *p. 24* shows the case of connecting a 3-position external selector switch for a 2-pipe system (alternative heating/cooling).

Figure 6.6 *DDC 2 pipe external request selector switch*



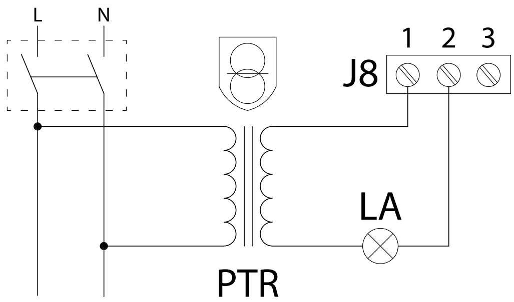
Details of J9 socket (Figure 6.2 *p. 23*)
Operating mode external selector switch (not supplied)
- Position W to turn heating on
- Position Y to turn cooling on
- Position 0 for system off

6.2.2.2 External alarm signal output

The DDC panel provides a SELV-type digital output for the activation of an external alarm signal (such as a warning light, siren or other) of the NO/NC type in the event of an alarm condition (on the appliances or water temperature):
- ► NO is closed if an alarm condition occurs
- ► NC is opened if an alarm condition occurs

Maximum applicable voltage 24 Vac.
Maximum applicable current 1 A.
Figure 6.7 *p. 25* below shows a connection diagram for SELV type external alarm connected to the NO terminal.
If the connected alarm device is not SELV type, a control relay must be installed.

Figure 6.7 *DDC external alarm signal*

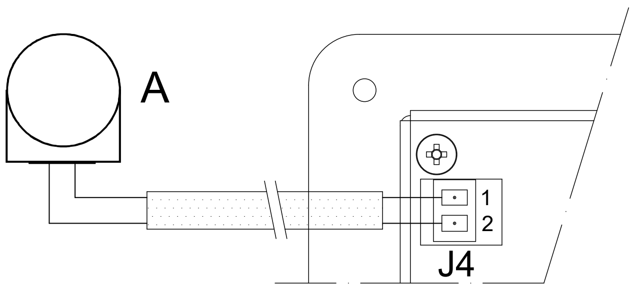


L-N	Phase/neutral 230 V 1N - 50Hz
PTR	Safety transformer (240/24 V AC - 50 Hz)
LA	External alarm signalling device (lamp, siren, etc.)
J8	Output for external alarm systems, max voltage 24 V AC, max current 1 A
1	Common
2	NO
3	NC

6.2.2.3 Outdoor/Ambient temperature probe

Analogue input J4 (Figure 6.2 *p. 23*) is used for the outdoor (or ambient) temperature probe, of the resistive type NTC 10 kΩ. Maximum length of the connecting cable is 100 m.
Figure 9.3 *p. 37* shows the connection diagram.

Figure 6.8 *Outdoor probe connection*



A	Outdoor (or ambient) temperature probe NTC 10 kΩ
J4	Outdoor (or ambient) temperature probe NTC 10 kΩ - 2-pin terminal block

6.2.3 CAN bus connections

For the CAN bus connection of the DDC panel to the appliances, please refer to Paragraph 4.5 *p. 6*.

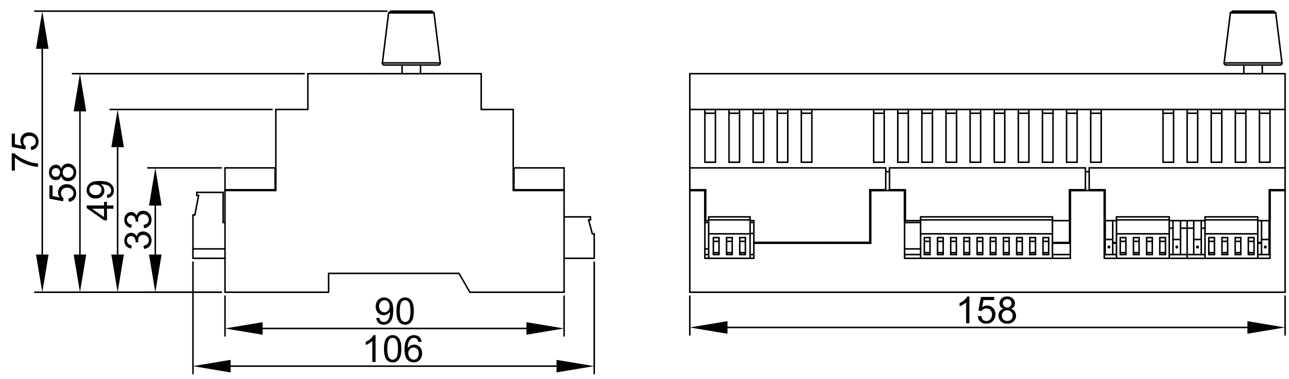
7 RB100

Please refer to Section C01.11 for a description of the functionality of the RB100 device.

7.1 INSTALLATION

The RB100 device is suited to internal installation and must be fitted on 35 mm DIN rail in an electrical panel (EN 60715).
The space requirement is equal to 9 modules, as shown in Figure 7.1 *p. 25*.

Figure 7.1 *RB100 device dimensions*

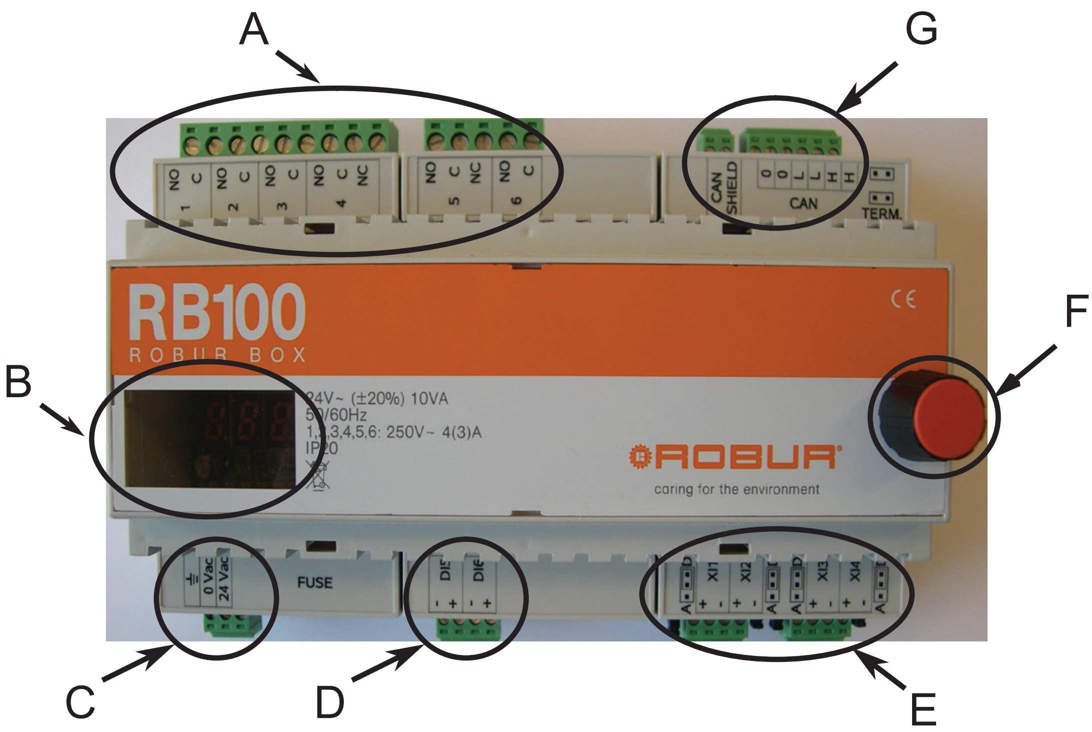


The RB100 device has an IP20 protection rating and must be installed in premises with ambient air temperature between 0 °C and 50 °C.

The RB100 device provides the connection terminals shown in 7.2 *p. 26*.

7.2 CONNECTIONS

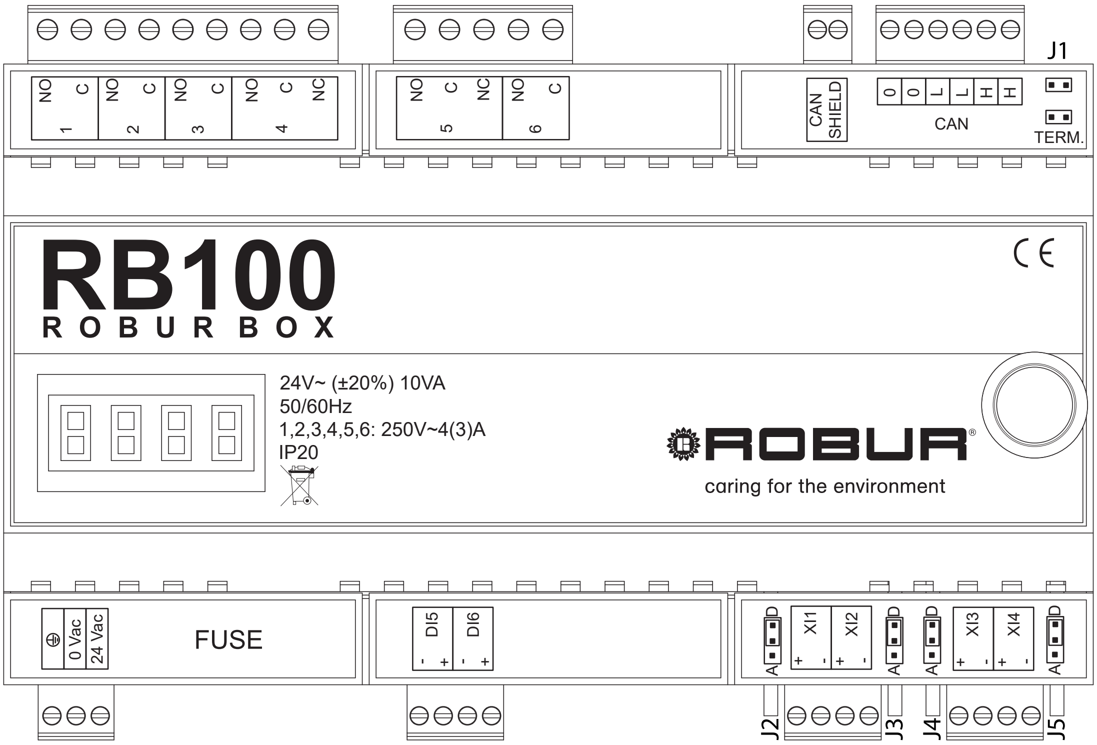
Figure 7.2 *RB100 device connections*



A	Output relay		D	Limit switch auxiliary contacts input		G	CAN bus connection
B	Display		E	Service requests analogue/digital inputs			
C	24 V AC power supply		F	Knob			

Figure 7.3 *p. 27* shows the detail of connection terminals.

Figure 7.3 *Detail of RB100 device connections*



A terminals
4 NO/NC contact for valve service

C terminals
Device power supply connector

E terminals
XI1 Analogue/digital input for cooling service request
XI2 Analogue/digital input for heating service request
XI3 Analogue/digital input for DHW0 service request
XI4 Analogue/digital input for DHW1 service request
J2 Input type (analogue/digital) selection jumper for cooling service request
J3 Input type (analogue/digital) selection jumper for heating service request
J4 Input type (analogue/digital) selection jumper for DHW0 service request
J5 Input type (analogue/digital) selection jumper for DHW1 service request

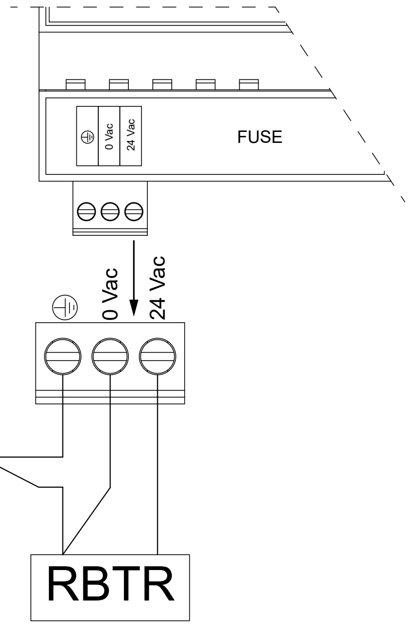
G terminals
CAN SHIELD CAN bus cable shielding terminal block
CAN CAN bus cable terminal block
J1 CAN bus jumpers

Each of the four inputs XI1...XI4 may be configured as either analogue or digital. Configuration must be done both by correctly positioning the jumpers on the board as well as by correctly setting the device configuration parameters.

7.2.1 Electrical power supply

The RB100 device must be supplied by a 230/24 V AC - 50/60 Hz safety transformer with power no less than 10 VA (not supplied); in particular, this transformer must comply with standard EN 61558-2-6.
Use a 3x0,75 mm^2 cable and make the connections on terminals C (Figure 7.2 *p. 26*) respecting the polarity indicated in Figure 7.4 *p. 27*.
The maximum specified length for this cable is 1m.

Figure 7.4 *RB100 power supply*



RBTR Safety transformer 230/24 V AC - 50/60 Hz - min 10 VA (not supplied)

7.2.2 Inputs/Outputs

7.2.2.1 Service requests analogue inputs

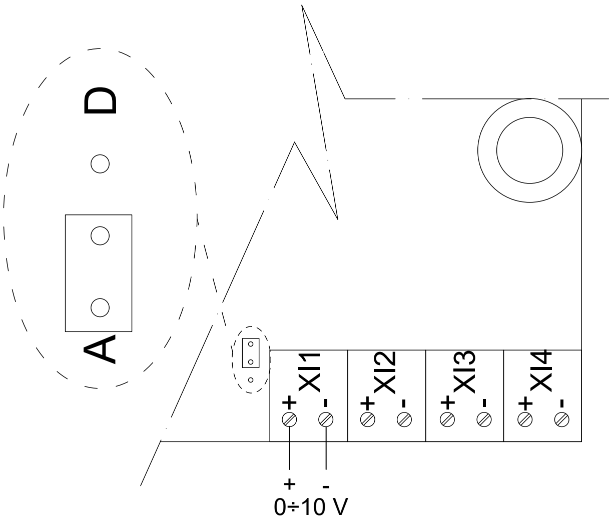
For service request analogue inputs the input voltage must be between 0 and 10 Vdc.
The maximum length of the connecting cables and their section are detailed in Table 7.1 *p. 28* below.
The cable must be shielded and with shield earthed at one end.

Table 7.1 *RB100/RB200 analogue input cables*

Maximum cable length (m)	Wire cross section (mm²)
300	1,5
100	0,5

Figure 7.5 *p. 28* details the connecting diagram for input XI1, valid for any analogue input XI1...XI4.

Figure 7.5 *RB100 services requests analogue inputs*



7.2.2.2 Service requests digital inputs

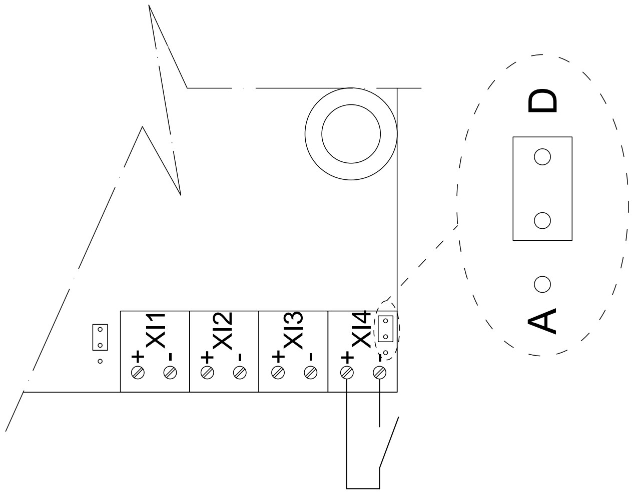
For service requests digital inputs the external request must have operating voltage of at least 12 Vdc and must assure closing with minimum current of 5 mA.
The maximum length of the connecting cables and their resistance are detailed in Table 7.2 *p. 28* below.
The cable must be shielded and with shield earthed at one end.

Table 7.2 *RB100/RB200 digital input cables*

Max resistance for On (Ω)	Min resistance for Off (Ω)	Maximum cable length (m)
200	50	300

Figure 7.6 *p. 28* details the connecting diagram for input XI4, valid for any digital input XI1...XI4.

Figure 7.6 *RB100 services requests digital inputs*



7.2.2.3 Diverter valves output

The digital output to control the diverter valves is a NO/NC diverter voltage-free contact:

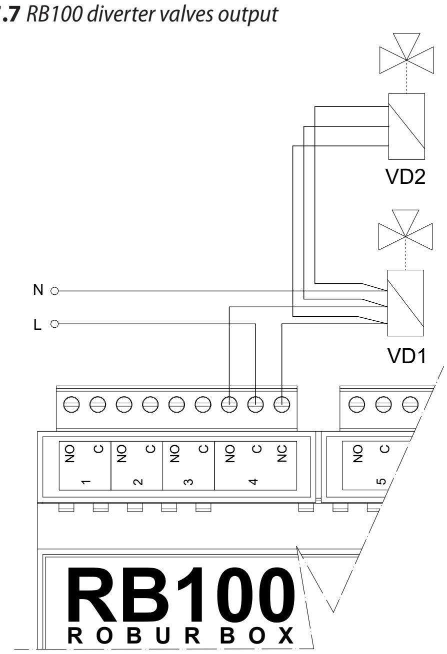
- NO is closed when the valves are towards the heating circuit or the separable group
- NC is closed when the valves are towards the cooling circuit or the base group

The relay retains its position even in the event of power supply interruption.
Maximum applicable voltage 250 Vac.
Maximum applicable current:

- 4 A for resistive loads
- 3 A for inductive loads

Maximum cable length 300 m.
Figure 7.7 *p. 28* details the connection diagram for diverter valves.
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.

Figure 7.7 *RB100 diverter valves output*



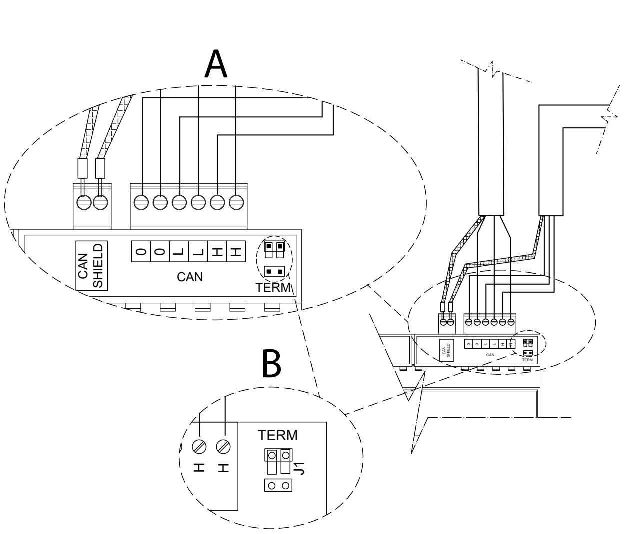
VD1 Motorised 3-way valve system flow pipes
VD2 Motorised 3-way valve system return pipes

7.2.3 CAN bus connections

For general concepts on the CAN bus communication network, Paragraph 4.2 *p. 4*.
For CAN bus cable characteristics, Paragraph 4.3 *p. 4*.
The RB100 device may be an intermediate or terminal node of the CAN bus network.
If the RB100 device is an **intermediate node**, make the connection as shown in the Figure 7.8 *p. 29*.

If the RB100 device is an intermediate node, jumpers J1 (detail B in Figure 7.8 *p. 29*) must be **open**.

Figure 7.8 *RB100/RB200 CAN bus connection for an intermediate node*

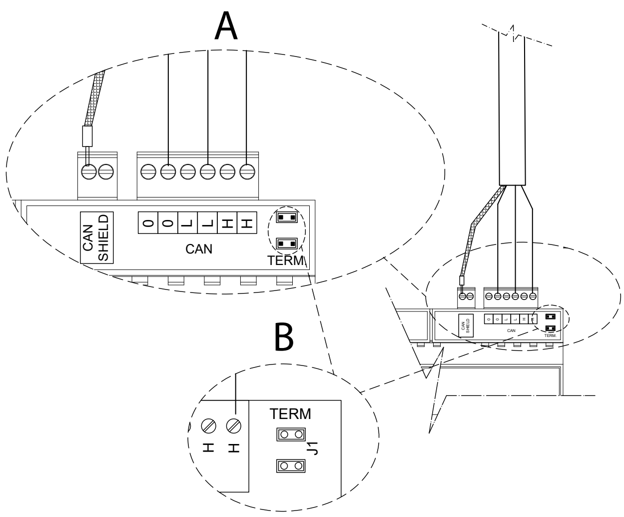


A CAN bus screen connection detail
B Detail of J1 jumpers position

If the RB100 device is a **terminal node**, make the connection as shown in the Figure 7.9 *p. 29*.

If the RB100 device is a terminal node, jumpers J1 (detail B in Figure 7.9 *p. 29*) must be **closed**.

Figure 7.9 *RB100/RB200 CAN bus connection for a terminal node*



A CAN bus screen connection detail
B Detail of J1 jumpers position

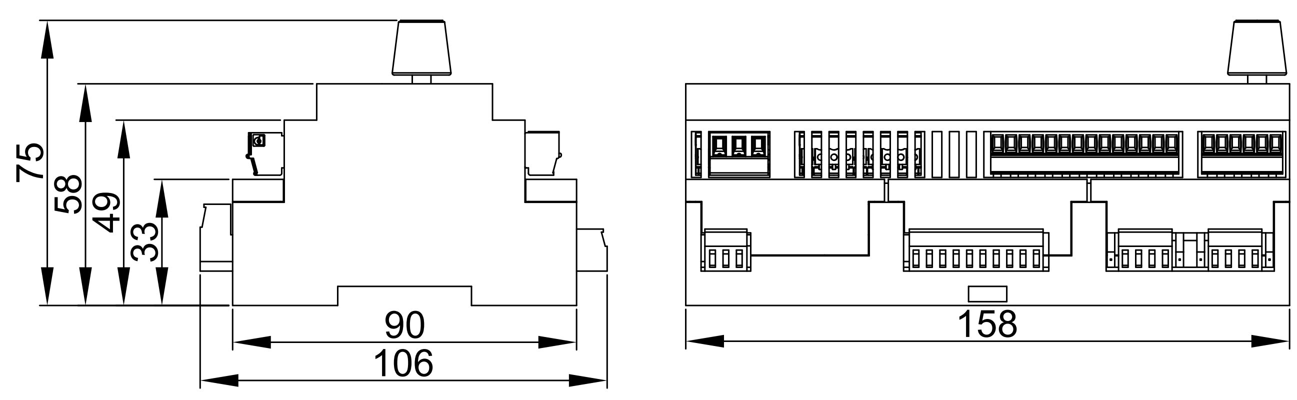
8 RB200

Please refer to Section C01.11 for a description of the functionality of the RB200 device.

8.1 INSTALLATION

The RB200 device is suited to internal installation and must be fitted on 35 mm DIN rail in an electrical panel (EN 60715).
The space requirement is equal to 9 modules, as shown in Figure 8.1 *p. 29*.

Figure 8.1 *RB200 device dimensions*



The RB200 device has protection rating IP20, and must be installed in premises with ambient air temperature between 0

°C and 50 °C.

8.2 CONNECTIONS

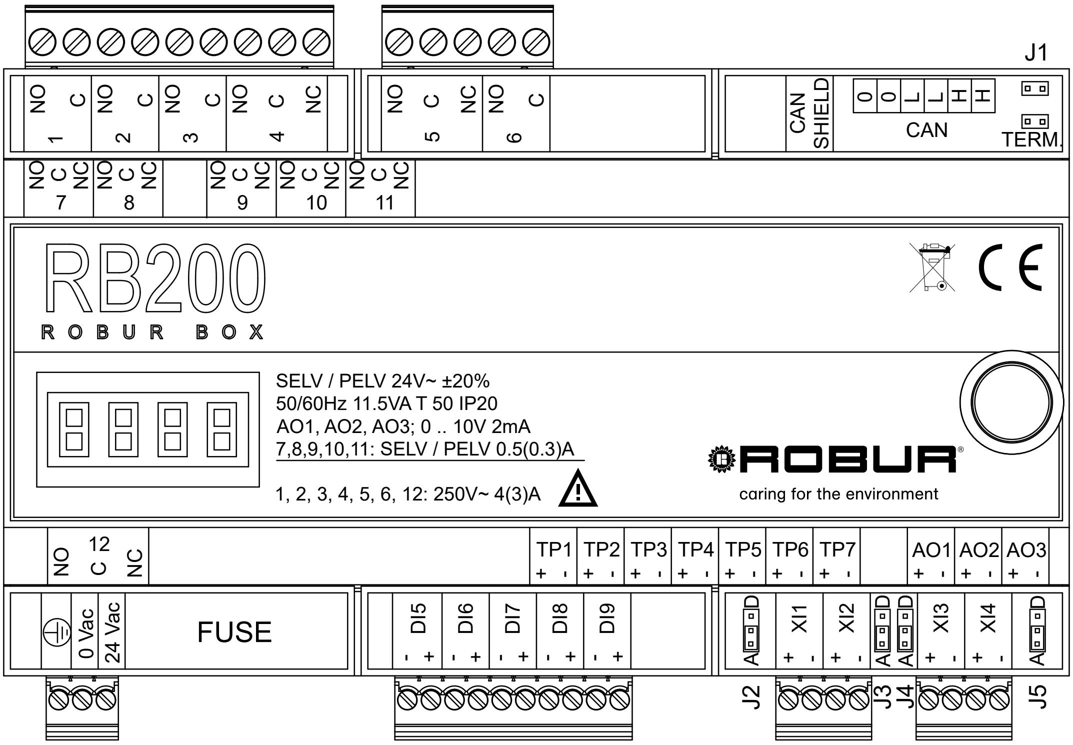
The RB200 device provides the connection terminals shown in Figure 8.2 *p. 30*.

Figure 8.2 *RB200 device connections*

A Output relay
B Display
C 24 V AC power supply
D Limit switch auxiliary contacts input
E Service requests analogue/digital inputs
F Knob
G CAN bus connection
H Digital inputs for signalling third party generators unavailability
J Inputs of temperature probes
K Third party generator setpoint analogue outputs

The following Figures show in detail the connection terminals, divided by lower level (Figure 8.3 *p. 31*) and upper level (Figure 8.4 *p. 32*).

Figure 8.3 *Detail of RB200 device connections lower level*



A terminals
1 NO contact for generator 1 water pump or water pump 1 service
2 NO contact for generator 2 water pump or water pump 2 service
3 NO contact for water pump 3 service
4 NO/NC contact for valve 1 service or water pump 4 service
5 NO/NC contact for generator 1 start-up
6 NO contact for generator 2 start-up

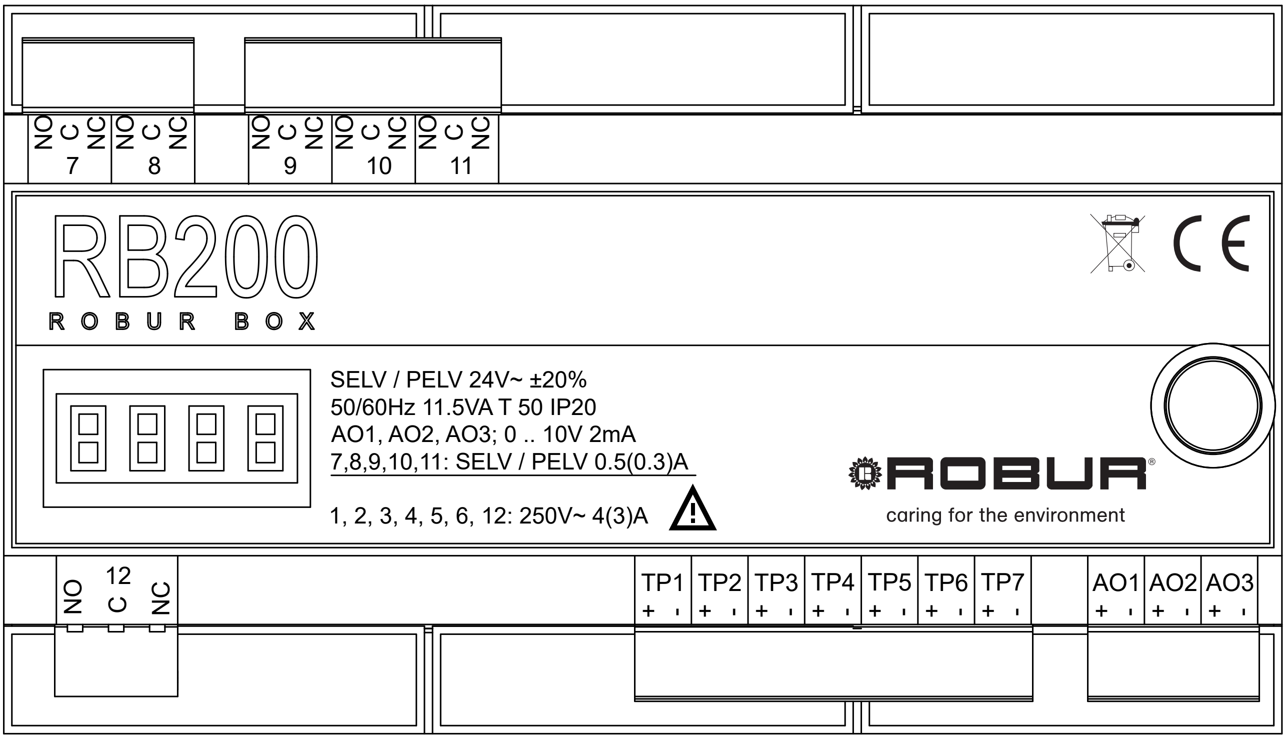
C terminals
Device power supply connector

E terminals
XI1 Analogue/digital input for cooling service request
XI2 Analogue/digital input for heating service request
XI3 Analogue/digital input for DHW0 service request
XI4 Analogue/digital input for DHW1 service request
J2 Input type (analogue/digital) selection jumper for cooling service request
J3 Input type (analogue/digital) selection jumper for heating service request
J4 Input type (analogue/digital) selection jumper for DHW0 service request
J5 Input type (analogue/digital) selection jumper for DHW1 service request

G terminals
CAN SHIELD CAN bus cable shielding terminal block
CAN CAN bus cable terminal block
J1 CAN bus jumpers

H terminals
DI7 Generator 1 alarm input
DI8 Generator 2 alarm input

Figure 8.4 *Detail of RB200 device connections upper level*



A terminals
12 NO/NC contact for valve 2 service or water pump 5 service

J terminals
TP1 Temperature probe input for cooling inlet
TP2 Temperature probe input for cooling outlet
TP3 Temperature probe input for heating inlet
TP4 Temperature probe input for heating outlet
TP5 Temperature probe input for separable DHW inlet
TP6 Temperature probe input for separable DHW outlet
TP3 Temperature probe input for GAHP inlet

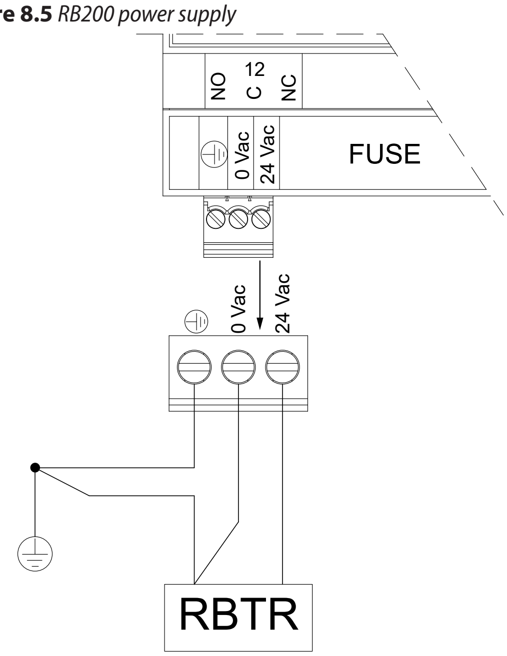
K terminals
AO1 0-10 V output for generator 1 setpoint
AO2 0-10 V output for generator 2 setpoint

Each of the four inputs XI1...XI4 may be configured as either analogue or digital. Configuration must be done both by correctly positioning the jumpers on the board as well as by correctly setting the device configuration parameters.

8.2.1 Electrical power supply

The RB200 device must be supplied by a 230/24 V AC - 50/60 Hz safety transformer with power no less than 12 VA (not supplied); in particular, this transformer must comply with standard EN 61558-2-6.
Use a 3x0,75 mm² cable and make the connections on terminals C (Figure 8.2 *p. 30*) respecting the polarity indicated in Figure 8.5 *p. 32*.
The maximum specified length for this cable is 1m.

Figure 8.5 *RB200 power supply*



RBTR Safety transformer 230/24 V AC - 50/60 Hz - min 12 VA (not supplied)

8.2.2 Inputs/Outputs

The digital outputs (voltage-free contacts) have these features:
- maximum voltage 250 V AC
- maximum current for resistive loads 4 A

► maximum current for inductive loads 3 A

8.2.2.1 Service requests analogue inputs

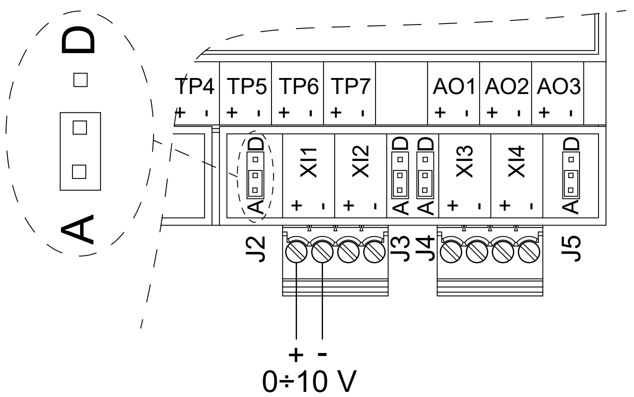
For service request analogue inputs the input voltage must be between 0 and 10 Vdc.
The maximum length of the connecting cables and their section are detailed in Table 7.1 *p. 28* below.
The cable must be shielded and with shield earthed at one end.

Table 8.1 *RB100/RB200 analogue input cables*

Maximum cable length (m)	Wire cross section (mm²)
300	1,5
100	0,5

Figure 8.6 *p. 33* details the connecting diagram for input XI1, valid for any analogue input XI1...XI4.

Figure 8.6 *RB200 services requests analogue inputs*



8.2.2.2 Service requests digital inputs

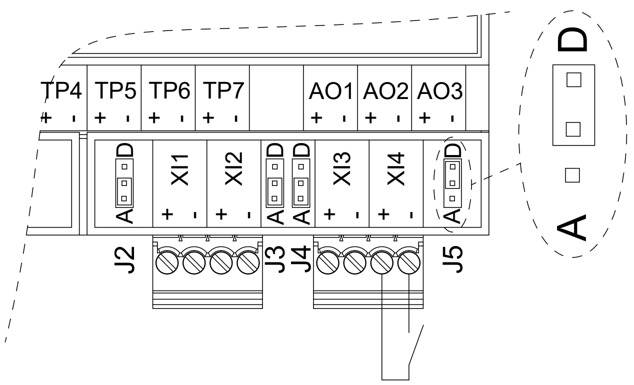
For service requests digital inputs the external request must have operating voltage of at least 12 Vdc and must assure closing with minimum current of 5 mA.
The maximum length of the connecting cables and their resistance are detailed in Table 7.2 *p. 28* below.
The cable must be shielded and with shield earthed at one end.

Table 8.2 *RB100/RB200 digital input cables*

Max resistance for On (Ω)	Min resistance for Off (Ω)	Maximum cable length (m)
200	50	300

Figure 8.7 *p. 33* details the connecting diagram for input XI4, valid for any digital input XI1...XI4.

Figure 8.7 *RB200 services requests digital inputs*



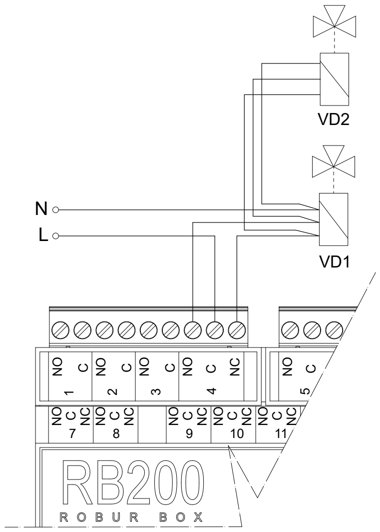
8.2.2.3 Diverter valve outputs

The digital outputs (contact 4 in Figure 8.3 *p. 31* and contact 12 in Figure 8.4 *p. 32*) to control the diverter valves are NO/NC diverter voltage-free contacts:

► NO is closed when the valves are towards the heating circuit or the separable group
► NC is closed when the valves are towards the cooling circuit or the base group

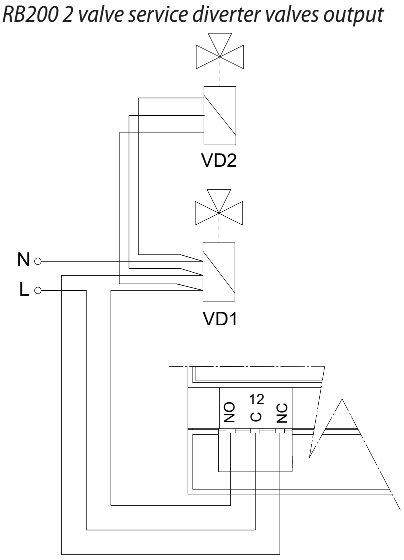
The relay retains its position even in the event of power supply interruption.
Maximum cable length 300 m.
Figures 8.8 *p. 33* and 8.9 *p. 33* show in detail the connection diagram of the diverter valves to each of the two available digital outputs.
Diverter valves can be either the on/off type with spring return (in which case only one of the two NO/NC contacts needs to be connected) or the 3-point type.

Figure 8.8 *RB200 1 valve service diverter valves output*



VD1 Motorised 3-way valve system flow pipes
VD2 Motorised 3-way valve system return pipes

Figure 8.9 *RB200 2 valve service diverter valves output*



VD1 Motorised 3-way valve system flow pipes
VD2 Motorised 3-way valve system return pipes

8.2.2.4 Third party generators services

To control third party generators, the following outputs are available for each generator:

- One voltage-free NO contact for ON/OFF generator control (contact 5 for generator 1, contact 6 for generator 2, Figure 8.3 *p. 31*).
- One voltage-free NO contact for ON/OFF generator water pump control (contact 1 for generator 1, contact 2 for generator 2, Figure 8.3 *p. 31*).
- One analogue 0-10 V output for the generator temperature set-point (output AO1 for generator 1, output AO2 for generator 2, see Figure 8.4 *p. 32*).

NO contacts are closed when the system requires switching on the generator or water pump.

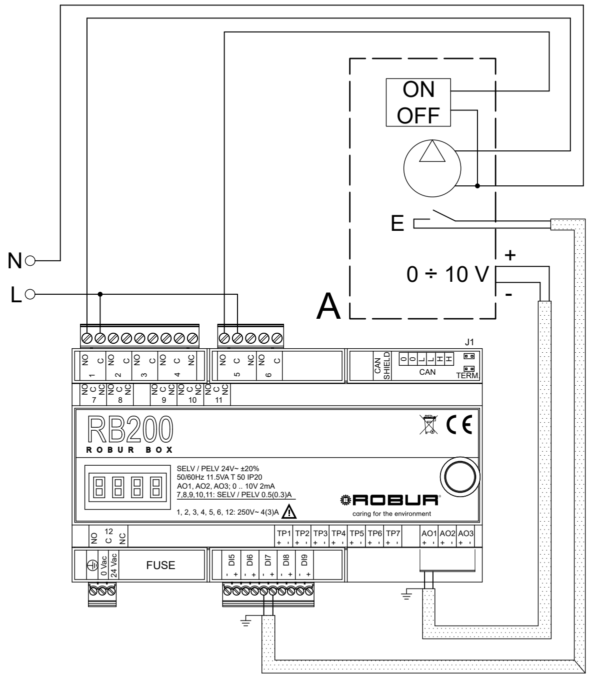
When controlling the switching on/off of third-party appliances, it is always advisable to avoid interrupting the electrical power supply to the appliance. There is often a dedicated input for an on/off signal from an external device, which should be used for connection to the RB200, checking in advance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

For the analogue output the features of the cable to be used are set out in Table 8.1 *p. 33*.
The cable of the analogue output must be shielded with shield earthed at one end.
The following are available for signalling the alarm status of each generator:

- One digital input (voltage-free contact) (contact DI7 for generator 1, contact DI8 for generator 2, Figure 8.3 *p. 31*).

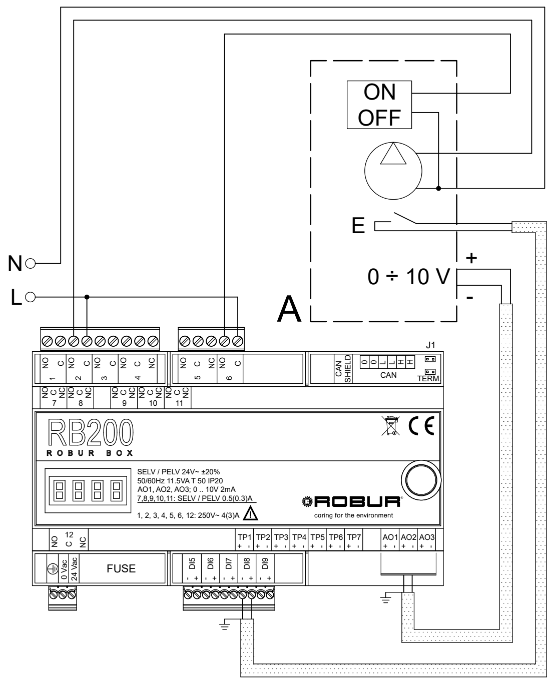
The alarm signal is on with closed contact.
The cable of the digital input must be shielded with shield earthed at one end.
For the digital input the features of the cable to be used are set out in Table 8.2 *p. 33*.
Maximum input/ouput cable length 300 m.
Figure 8.10 *p. 34* shows the connection diagram for the signals relating to generator 1, whereas Figure 8.11 *p. 34* shows the connection diagram for the signals relating to generator 2.

Figure 8.10 *RB200 1 generator service connection*



A Third-party generator 1 output
E Third-party generator alarm

Figure 8.11 *RB200 2 generator service connection*



A Third-party generator 2 output
E Third-party generator alarm

8.2.2.5 Water pumps service outputs

The water pump control outputs are voltage-free NO contacts (contacts 1, 2, 3, 4, 12 for water pump services 1, 2, 3, 4, 5, Figure 8.3 *p. 31*).
NO contacts are closed when the system requires switching on the water pump.
Maximum cable length 300 m.

Some contacts are common for two types of services, which therefore cannot be configured simultaneously on the RB200 device.

Figure 8.12 *p. 35* shows the connection diagram for the water pump 3 service.
For the other water pump services, only the contact to be connected changes.

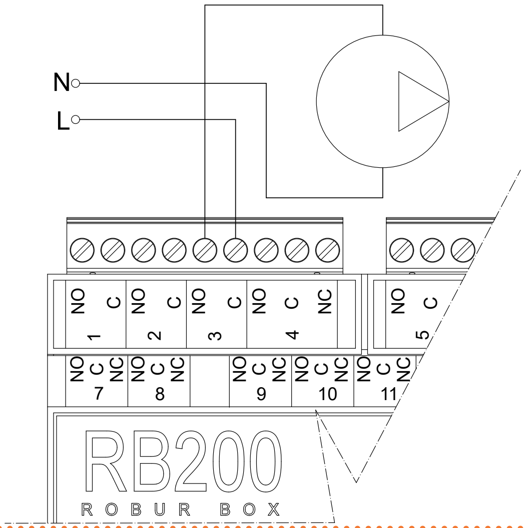


Figure 8.12 *RB200 3 water pump service connection*

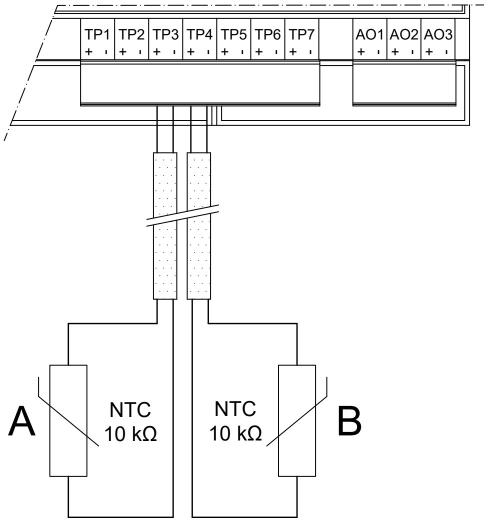
8.2.2.6 Temperature probes inputs

The analogue inputs TP1 - TP7 (Figure 8.4 *p. 32*) are intended for resistive type temperature probes NTC 10 kΩ:

- TP1-TP2: Cooling only or 2 pipes cooling/heating manifold probes
- TP3-TP4: Heating only manifold probes
- TP5-TP6: Separable DHW manifold probes
- TP7: GAHP inlet manifold probe

Table 8.1 *p. 33* sets out the features of the connecting cables for the temperature probes.
Figure 8.13 *p. 35* shows an example connection for the heating manifold probes.
For the other temperature probes, only the contact to be connected changes.

Figure 8.13 *RB200 heating temperature probes connection*



A Heating return probe
B Heating delivery probe

8.2.3 CAN bus connections

For general concepts on the CAN bus communication network, Paragraph 4.2 *p. 4*.
For CAN bus cable characteristics, Paragraph 4.3 *p. 4*.
The RB200 device may be an intermediate or terminal node of the CAN bus network.
If the RB200 device is an **intermediate node**, make the connection as shown in the Figure 7.8 *p. 29*.

If the RB200 device is an intermediate node, jumpers J1 (detail B in Figure 7.8 *p. 29*) must be **open**.

If the RB200 device is a **terminal node**, make the connection as shown in the Figure 7.9 *p. 29*.

If the RB200 device is a terminal node, jumpers J1 (detail B in Figure 7.9 *p. 29*) must be **closed**.

9 CCI PANEL

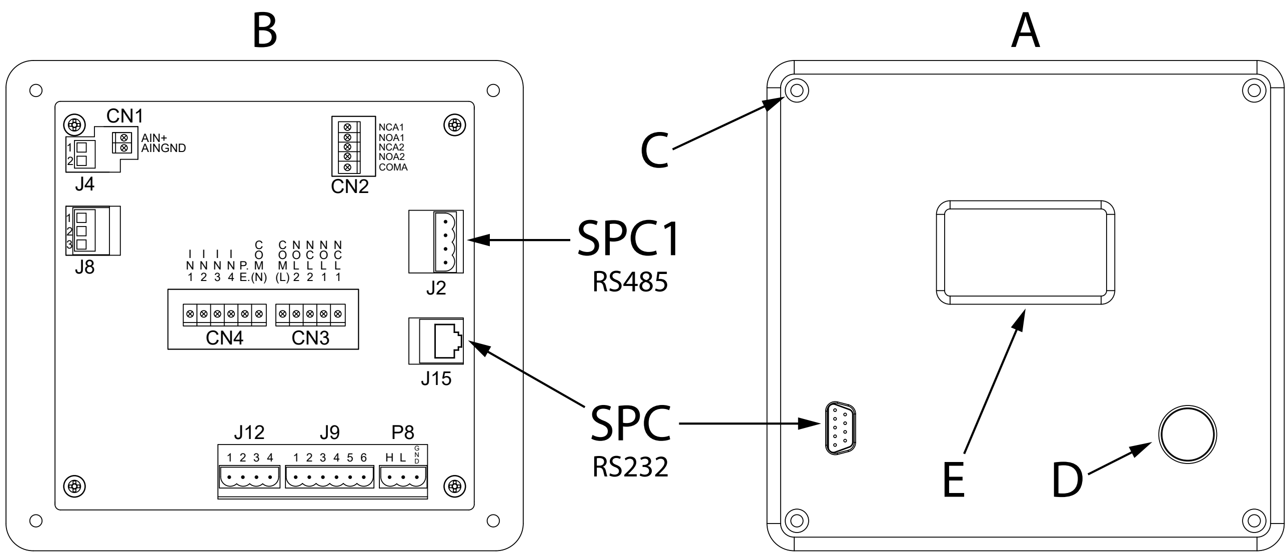
9.1 INSTALLATION

The CCI panel is suitable for indoor installation and must be fixed onto an electrical panel, into which a 155 x 151 mm rectangular opening must be made.
Figure 6.1 *p. 23* indicates the position of the fixing holes.
The CCI panel has an IP20 protection rating and should be installed in premises with ambient air temperature between 0 °C and 50 °C, away from direct exposure to sunlight.

9.2 CONNECTIONS

The CCI panel provides the connection terminals shown in Figure 9.1 *p. 36*.

Figure 9.1 *CCI panel connections*



A Front view
B Rear view
C Mounting holes
D Knob
E Display
CN1 Setpoint request connections
- AIN+ 0-10 V input for setpoint request
- AINGND Ground reference for AIN+

J4 Delivery or return manifold temperature probe input
CN4 Service request inputs
- IN1 Input (phase 230 V) GAHP start-up request
- IN2 Input (phase 230 V) DHW service request
- IN3 Not used
- IN4 Input (phase 230 V) free cooling request
- P.E. Safety earthing
- COM(N) Reference (neutral 230 V) for inputs IN1-IN4

J9 Auxiliary boiler start-up signal
1 Reference for contact 2
2 Auxiliary boiler active signal input
CN3 Service alarms signal outputs
- COM(L) Common contact
- NOL2 NO contact for impossibility to continue DHW service with GAHP
- NCL2 NC contact for impossibility to continue DHW service with GAHP
- NOL1 NO general alarm contact
- NCL1 NC general alarm contact

J8 First GAHP appliance alarm signal outputs
1 Common contact
2 NC alarm contact for first GAHP
3 NO alarm contact for first GAHP
CN2 Second and third GAHP appliances alarm signal outputs
- COMA Common contact
- NOA2 NO alarm contact for third GAHP
- NCA2 NC alarm contact for third GAHP
- NOA1 NO alarm contact for second GAHP
- NCA1 NC alarm contact for second GAHP

J12 24 Vac electrical power supply - 4 pole connector
1 24 Vac
2 0 V AC
3 Safety earthing
P8 CAN bus network socket (orange)
SPC RS232 serial port
- J15, RJ45 port (Modbus / supervision system / monitoring connection)
- DB9 (connection Modbus / BMS / monitoring)

SPC1 J2 port (Modbus RS485 serial connection)
1 A (TXD/RXD +)
2 B (TXD/RXD -)
3 Common (earth and GND)
4 Cable shielding (earth and GND)

9.2.1 Electrical power supply

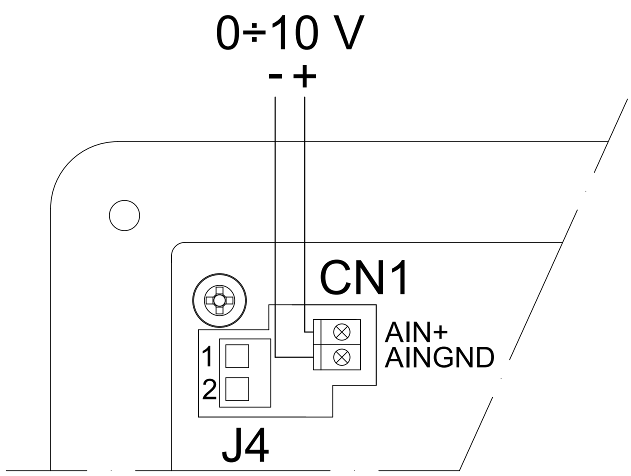
The CCI panel must be supplied by a 230/24 V AC - 50/60 Hz safety transformer with a power rating of no less than 20 VA (not supplied); in particular, this transformer must comply with EN 61558-2-6 standard.
Use a 3x0,75 mm² electrical cable and make the connections on the terminals of J12 terminal block on the lower left (rear side), respecting the polarity shown in Figure 6.3 *p. 24*.
The maximum specified length for this cable is 1m.

9.2.2 Inputs/Outputs

9.2.2.1 Setpoint request analogue input

CN1 terminal block (Figure 9.1 *p. 36*) is used to connect the 0-10 V DC analogue setpoint request signal from the external control system.
Maximum length of the connecting cables is 10 m.
Figure 9.2 *p. 36* shows the connection diagram.

Figure 9.2 *CCI setpoint request connection*

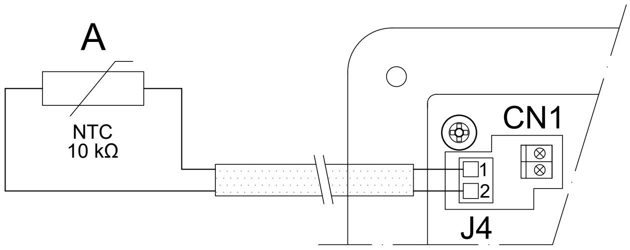


9.2.2.2 Temperature probe input of heating manifold

Analog input J4 (Figure 9.1 *p. 36*) is used for the heating manifold temperature probe, located on the outlet (or inlet), of the

resistive type NTC 10 kΩ.
Maximum length of the connecting cable is 100 m.
Figure 9.3 *p. 37* shows the connection diagram.

Figure 9.3 *CCI manifold probe connection*



A Temperature probe of the heating manifold (outlet or inlet)

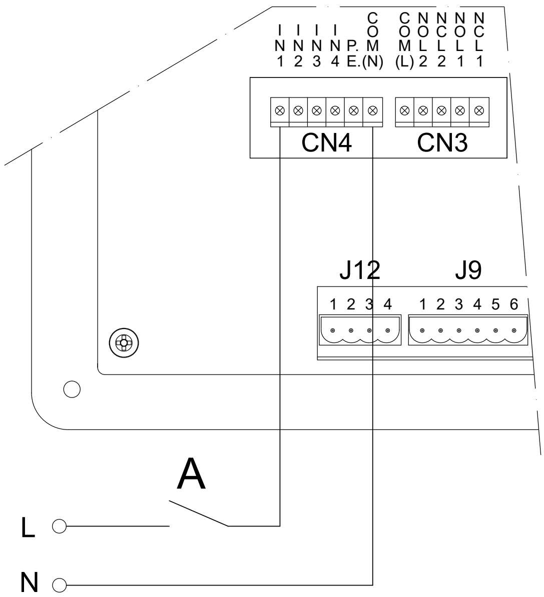
9.2.2.3 External request digital inputs

CN4 terminal block (Figure 9.1 *p. 36*) is used to connect the digital service request signal from the external control system.
The inputs have the following features:

- ► IN1: phase 230 V AC, value 0 V if GAHP is off, value 230 V if GAHP is ON.
- ► IN2: phase 230 V AC, value 0 V if heating service, value 230 V if DHW service.
- ► IN3: not used.
- ► IN4: phase 230 V AC, value 0 V if free cooling OFF, value 230 V if free cooling ON.
- ► P.E.: safety earthing.
- ► COM(N): neutral 230 Vac from mains.

Maximum length of the connecting cables is 10 m.
Figure 9.4 *p. 37* shows a connection example for the GAHP start-up contact IN1.
For the other start-up requests, only the contact to be connected changes.

Figure 9.4 *CCI services digital input connections*

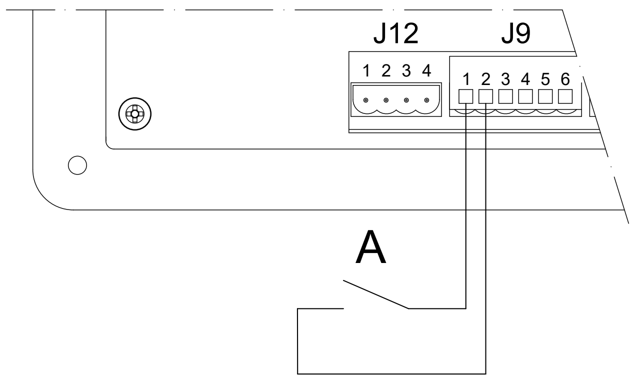


A Request activation from the external control system

9.2.2.4 Auxiliary generator start-up digital input

J9 socket (Figure 9.1 *p. 36*) is used to connect the auxiliary boiler start-up digital signal from the external control system.
The purpose of this contact is to force the GAHP to full power when the external control system activates an auxiliary boiler.
Maximum length of the connecting cables is 10 m.
Figure 9.5 *p. 37* shows the connection diagram.

Figure 9.5 *CCI auxiliary generator digital input connection*



A Auxiliary boiler activation signal from an external control system

9.2.3 CAN bus connections

For the CAN bus connection of the CCI panel to the appliances, please refer to Paragraph 4.5 *p. 6*.

The CCI Panel cannot be connected:

- ► to GAHP units other than the GAHP A and GAHP GS/WS
- ► to RB100/RB200 devices
- ► to DDC panel

10 OSND007 OUTDOOR TEMPERATURE PROBE

The outdoor temperature probe (available as OSND007 optional) is a passive type remote outdoor temperature probe used as a

reference for climate compensation control.
The probe must be used in conjunction with the DDC panel.

10.1 TECHNICAL SPECIFICATIONS

Figure 10.1 *OSND007 outdoor temperature probe dimensions*

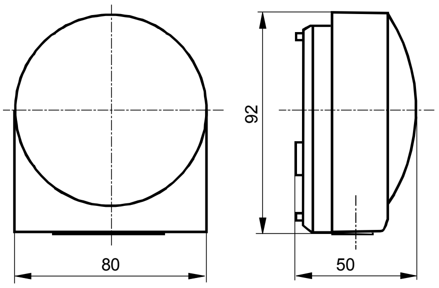
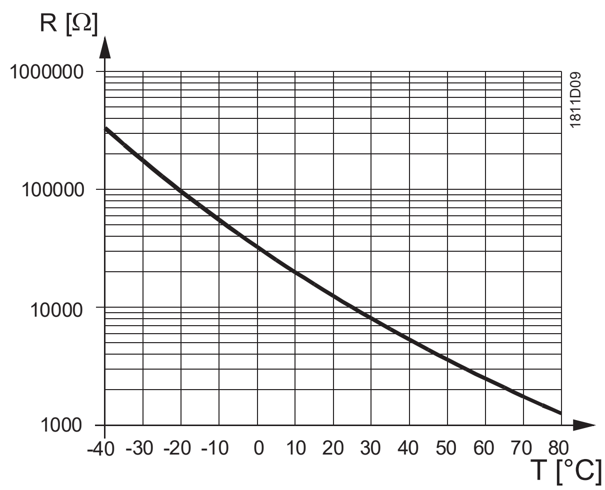


Table 10.1 *OSND007 outdoor temperature probe technical data*

Sensing element	NTC 10k @ 25 °C
Range of use	-40 ÷ +70 °C
Time constant	Ca. 14 min
Protection rating	IP 54

Figure 10.2 *OSND007 resistance values*



R Resistance T Temperature

10.2 INSTALLATION

Fix the OSND007 outdoor temperature probe on a wall facing north.
Observe a distance of at least 2 metres from heat sources.
Observe a distance of at least 20 meters from sources of electrical noise (power plants, distribution boards, etc.).

10.2.1 Use as outdoor temperature probe

Fix the OSND007 outdoor temperature probe on a wall facing north.
Observe a distance of at least 2 metres from heat sources.
Observe a distance of at least 20 meters from sources of electrical noise (power plants, distribution boards, etc.).

10.2.2 Use as room temperature probe

Install the OSND007 probe according to the following guidelines:

- ► Place it inside the heated room, in an area that is representative of the room temperature, at about 1,5 m from the floor, protected from draughts, direct exposure to sunlight, influence by direct heating sources (lamps, hot air flows, etc.).
- ► Avoid installation on walls bordering the outside, to avoid distortion on the detected temperature and therefore affect system operation. Otherwise, shield the control system by placing a sheet of insulating material (cork, polystyrene or other) between it and the wall.

By following the above guidelines, unwanted starting and stopping of the system can be avoided and optimal comfort in the heated space can be guaranteed.

10.3 CONNECTION

For connection of the OSND007 outdoor probe to the DDC panel, see Paragraph 6.2.2.3 *p. 25*.

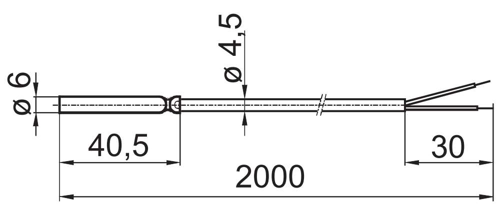
11 OSND004 IMMERSION TEMPERATURE PROBE

11.1 TECHNICAL SPECIFICATIONS

Table 11.1 *OSND004 immersion temperature probe technical data*

Sensing element	NTC 10k @ 25 °C
Range of use	0 ÷ 95 °C
Tolerance	± 0,5 K
Time constant	30 s
Cable length	2 m

Figure 11.1 *OSND004 immersion temperature probe dimensions*



11.2 INSTALLATION

The probe must be fixed in a dedicated thermowell, with a length suitable to result immersed in water mass, using thermal paste to ensure a good heat transfer.

11.3 CONNECTION

For connection of the OSND004 probe to the RB200 device, see Paragraph 8.2.2.6 *p. 35*.
For connection of the OSND004 probe to the CCI panel, see Paragraph 9.2.2.2 *p. 36*.