INSTALLER REFERENCE

From wiring to warmth.

The installation and commissioning manual for the Ampernova plant controller and wall thermostats. Work through the steps, then keep a copy with the system.

HeatingMain + WallThermostat Board map + 8 sections · Printable checklist Updated 13 September 2026

SEE THE WHOLE INSTALLATION

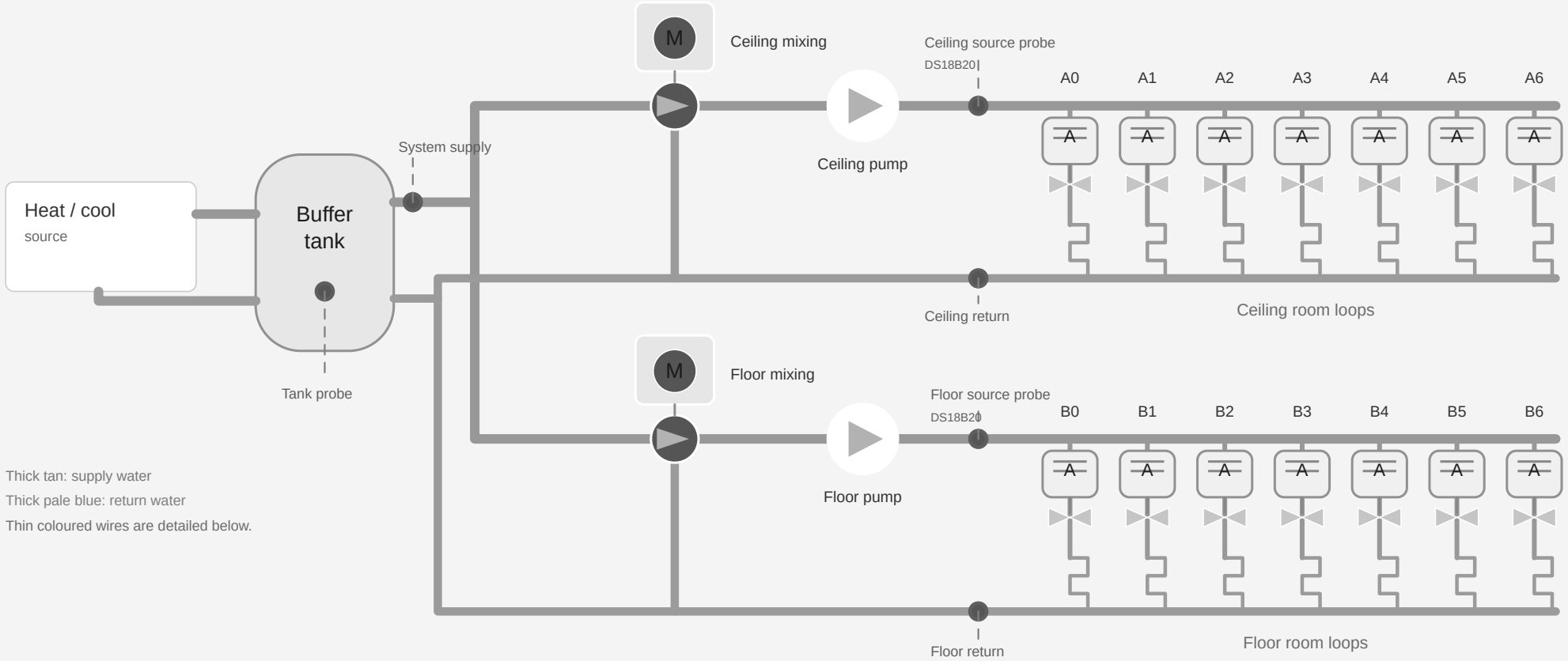
WATER + CONTROL

One system. Two circuits.

Follow the water through the buffer, mixing valves and room loops. Then follow the control connections back to the board.

01 / The water circuits

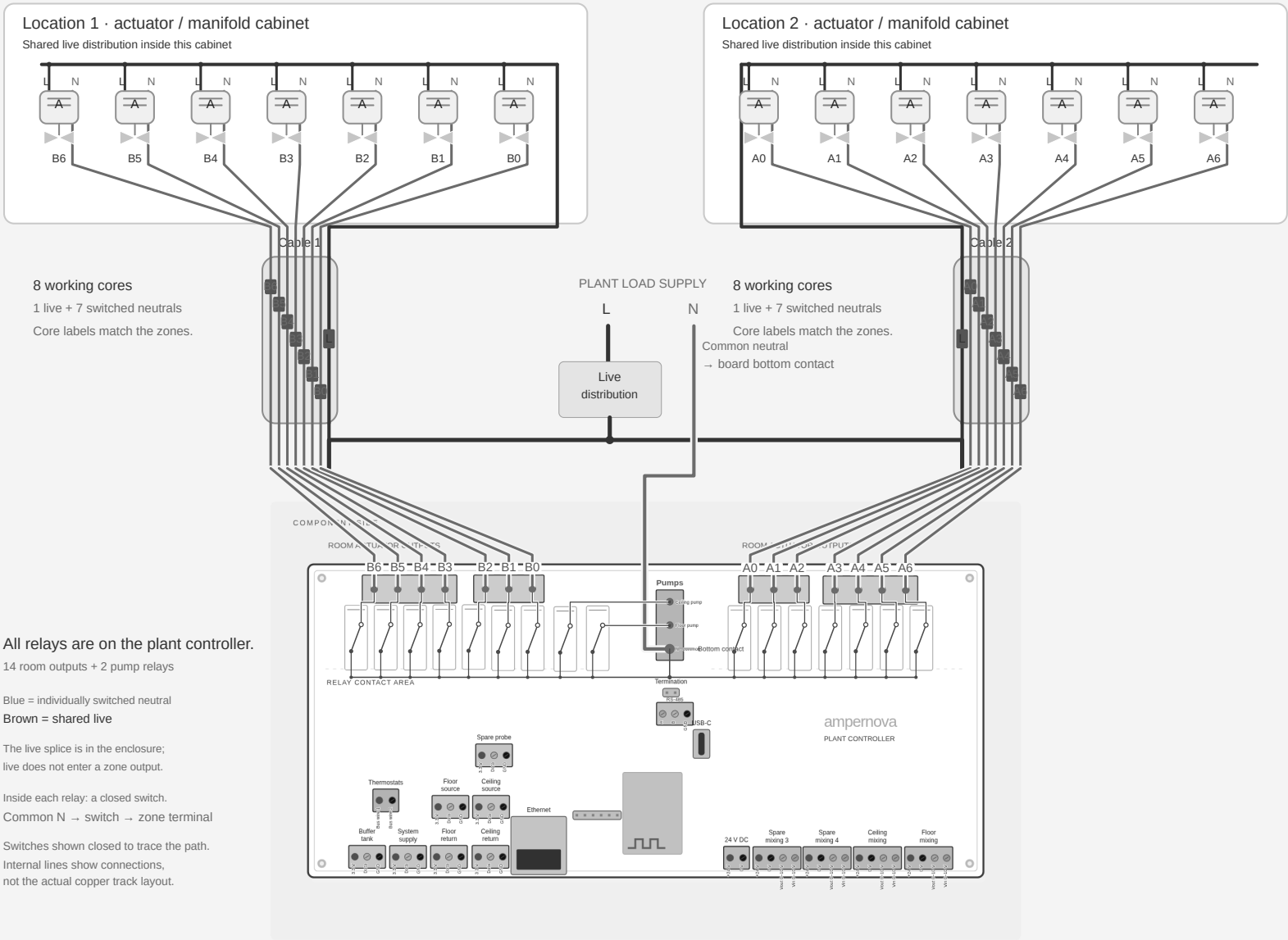
Example schedule: seven rooms, each with ceiling A0–A6 and floor B0–B6. Assign zones to match the actual installation.



Water pipes, mixing valves, pumps and room loops. Electrical connections are shown in the plant controller wiring views.

02 / Two actuator locations. Two multicore cables.

One live core fans out to seven actuators at each location. Each actuator returns through its own zone core to a relay on the board.



All relays are on the plant controller.

14 room outputs + 2 pump relays

Blue = individually switched neutral

Brown = shared live

The live splice is in the enclosure;
live does not enter a zone output.

Inside each relay: a closed switch.

Common N → switch → zone terminal

Switches shown closed to trace the path.
Internal lines show connections,
not the actual copper track layout.

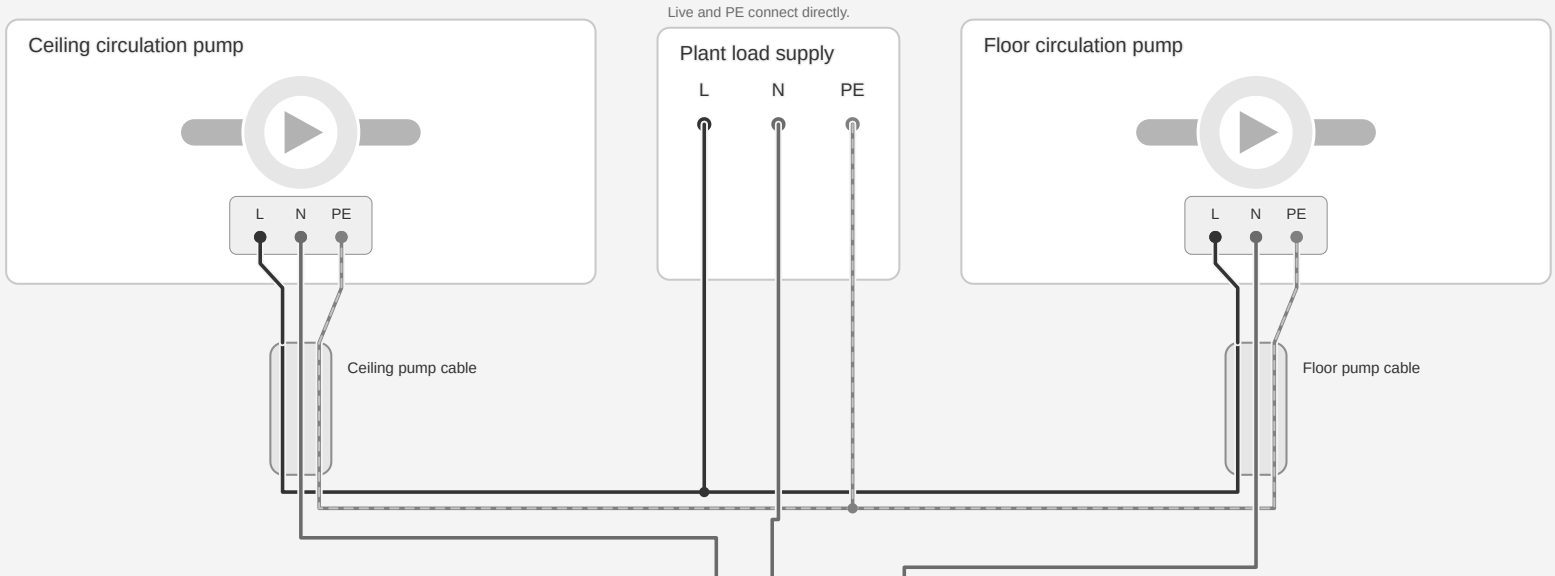
Example grouping follows the board's two sets of seven room outputs. Add a separate PE core to each cable where the installed equipment requires it.

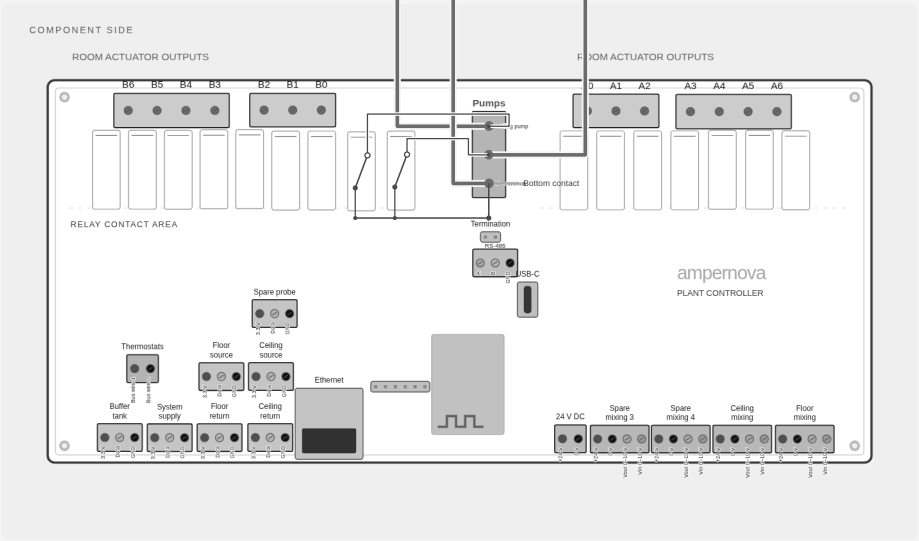
Colours show electrical function; identify actual cable cores by zone. Crossings without dots are not joined. Relay off leaves live connected at the actuator.

All relays stay on the plant controller. Each location receives one live and seven separate switched neutrals in its own multicore cable.

03 / Two circulation pumps. Wired to the plant controller.

Top contact: ceiling pump. Middle contact: floor pump. Bottom contact: common neutral for all relays.





All pump relays are on the board.

Blue: switched neutral

Brown: live

Green/yellow: protective earth

Common N → relay switch → pump

Switches shown closed to trace the path.

Common N also feeds the room relays shown in section 02.

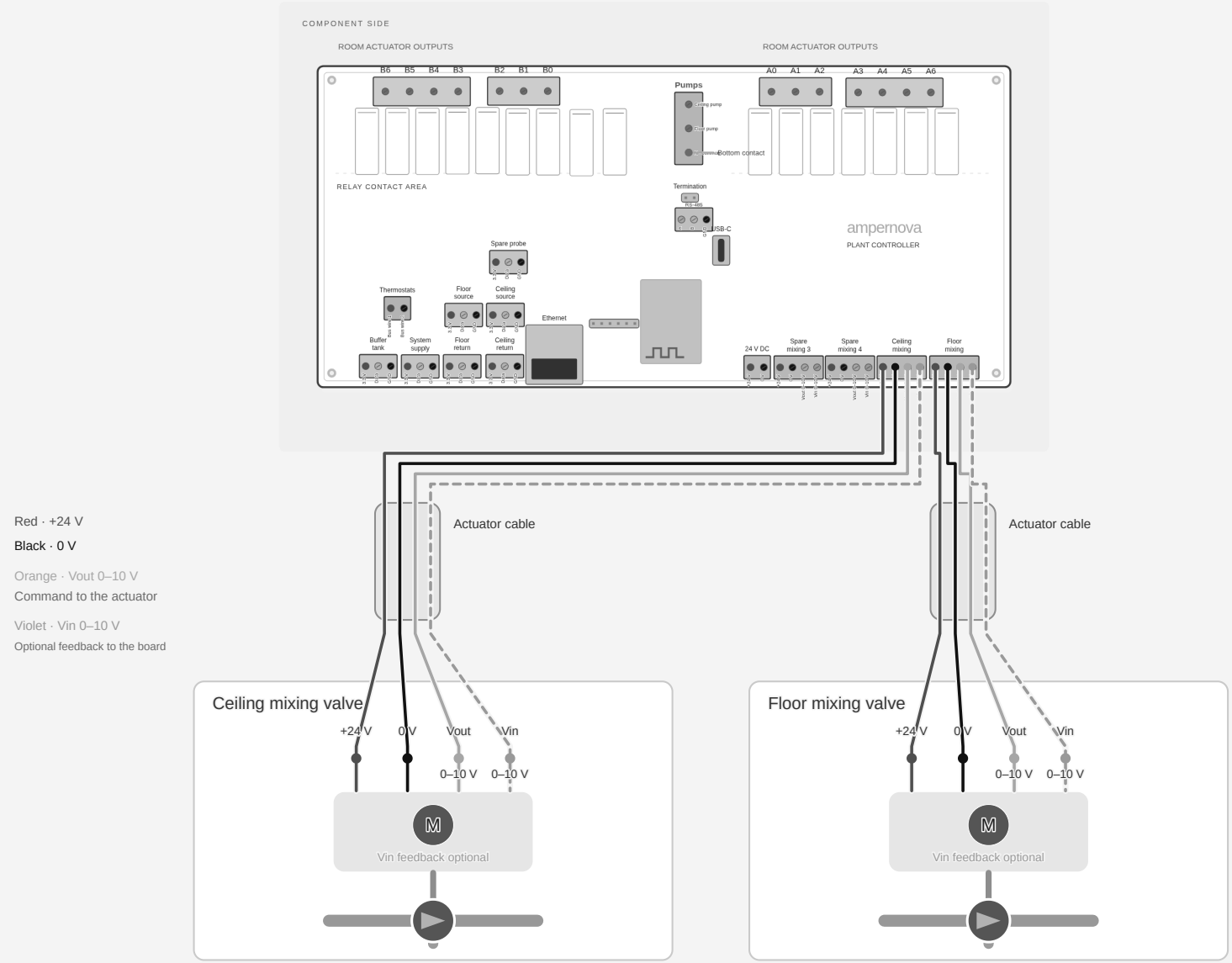
Thin lines show internal connections, not the actual copper track layout.

Use the plant supply specified for the pumps. Crossings without dots are not joined.

Common neutral enters the bottom contact. A relay opening disconnects neutral; the live conductor remains connected.

04 / Two mixing valves. Wired to the plant controller.

Each actuator receives 24 V, 0 V and a Vout 0–10 V command. Vin 0–10 V feedback is optional.



Both cables connect to the actual ceiling and floor mixing contacts at the bottom of the board.

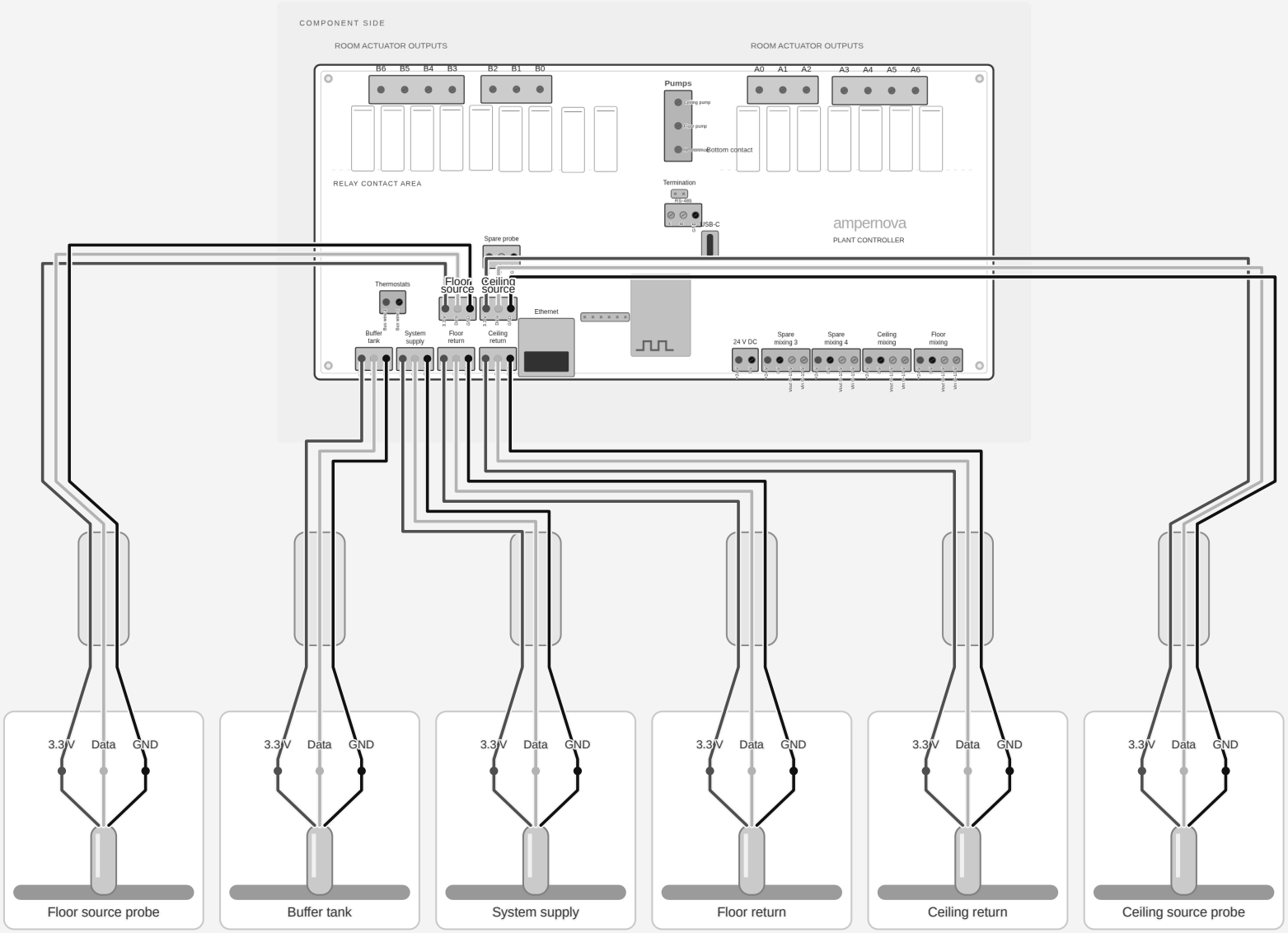
Dashed violet is optional. Leave Vin unconnected when feedback is not used. Wire colours indicate function.

Fit the mixing valve and actuator: step-by-step guide →

05 / Six temperature probes. Wired to the plant controller.

A separate three-wire cable runs from each DS18B20 probe to the board input for its pipe or tank location.

Red: 3.3 V supply · Yellow: data · Black: ground

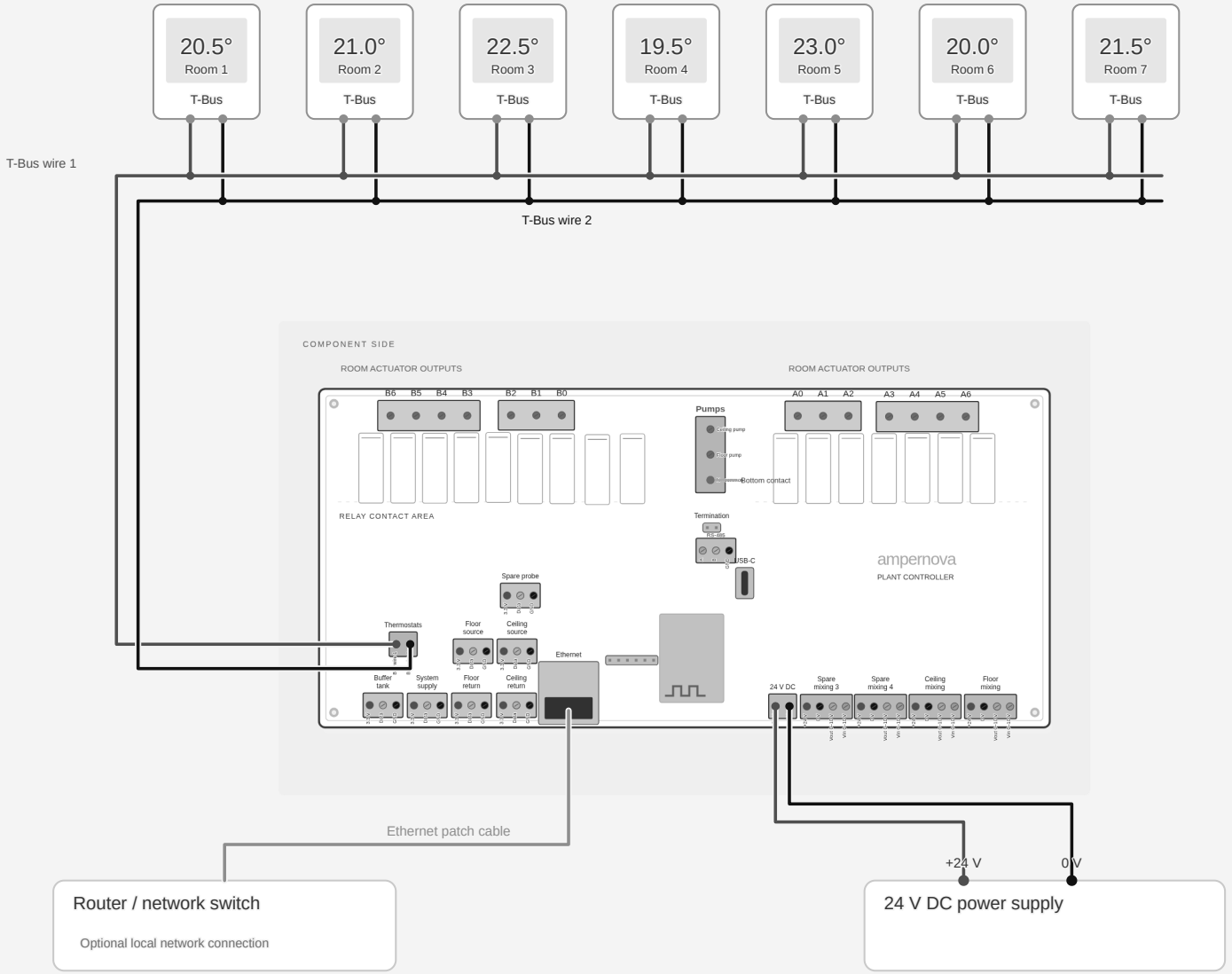


Upper-row supply inputs are routed around the lower-row contacts. Each coloured wire ends on its own actual board pin.

The spare temperature input remains available. Match real probe lead markings; cable colours in this drawing identify function.

06 / Power, wall thermostats and Ethernet.

Seven wall thermostats share one powered T-Bus pair. At each thermostat, either wire can connect to either terminal.



Thermostat terminals have no polarity: connect the pair either way round. Controller power uses the separate 24 V DC input.

Wire colours identify function; match terminal markings. The separate probe view shows all six temperature cables.

Every contact carries its own function — 3.3 V, Data, GND, Vout and the rest. Zoom in on any connector to read them. Select the zone printed on the board in the thermostat menu: A0 is A0 and B6 is B6. Thermostat terminals work either way round. DC return, bus return and neutral are separate; actual cable colours can differ.

01 / GET READY

Before you start

This guide covers system planning and the controls used to commission installed Ampernova hardware. The plant controller manages the actuators, circulation pumps and mixing valves; each wall thermostat supplies room temperature, humidity and demand over the T-Bus.

> **Have the hardware wiring sheet to hand.**
>
> The plant controller connector map identifies the supplied board's connectors, pin functions and zone labels. Relay load ratings, external relay-common wiring, cable limits and analogue signal ranges still need a matching electrical specification. Confirm those before making electrical connections. Installation and electrical checks should be carried out by a qualified installer with the supplies isolated.

Controller & thermostats

The plant controller, wall thermostats, specified supplies and matching firmware for the installed hardware.

Plant equipment

The designed heating/cooling source, actuators, mixing valves, circulation pumps and pipe/buffer temperature probes.

Installation records

Hydraulic plan, board wiring sheet, relay schedule and a room-by-room list of ceiling and floor circuits.

For optional integration

A compatible Matter controller and its required network, or the network configuration for the portal or local MQTT.

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02 / PUT EVERY CIRCUIT ON THE PLAN

Plan the circuits

Record the physical relay that drives each room's ceiling and floor actuator. Use the zone pin callouts for wiring and the same zone name for the thermostat selection. An address consists of a bank, `A` or `B`, and a channel, `0` to `6`.

Controller output allocation

Address	Purpose	On a thermostat?
`A0–A6`	Seven actuator relay outputs	Yes, for a connected circuit
`B0–B6`	Seven actuator relay outputs	Yes, for a connected circuit
`A7`	Ceiling circulation pump	No — reserved for the pump
`B7`	Floor circulation pump	No — reserved for the pump
`NC`	Circuit not connected	Use for the unused ceiling or floor

There are 14 actuator outputs and up to 14 thermostat identities. Separate ceiling and floor actuators in one room use two outputs. Seven rooms with two separate circuits each, for example, use all 14 outputs.

Plan one coordinating thermostat

A thermostat's identity is the smaller non-zero of its two circuit addresses. The unit assigned `A0` on either circuit becomes the **leader**. Its menu includes the system-wide Mode, Fabric and Dew settings. Plan exactly one leader and avoid assigning an output to more than one thermostat.

Example only — match your actual relay wiring

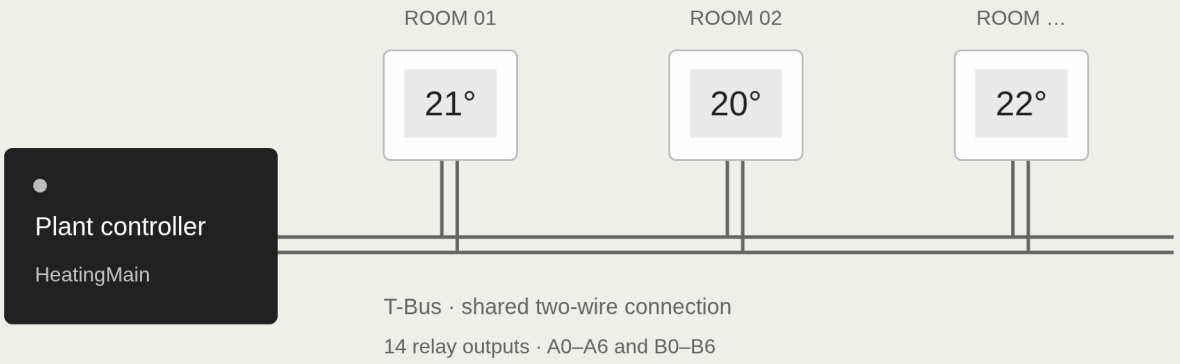
Room	Ceiling	Floor	Role
Living room	`A0`	`B0`	Leader; both circuits
Bedroom	`A1`	`B1`	Follower; both circuits
Bathroom	`NC`	`B2`	Follower; floor heating only

The Ceiling and Floor menus identify the circuit's purpose; the bank and channel identify its physical relay. Do not infer a circuit's function from the bank letter alone.

● 03 / BRING IT TOGETHER

Connect the system

Start with the whole-system schematic, then use the equipment wiring callouts for the 24 V supply, thermostat bus, probes and mixing valves. Follow the zone assignments for room actuators and the pump and neutral callout for the relay common.



Logical connection overview. This is not a terminal wiring diagram; branch layout must follow the hardware wiring sheet.

1. **Check the installed plant.** Confirm the hydraulic circuits, actuators, mixing valves, pumps and temperature probes match the design. Follow the equipment instructions for filling, venting and electrical checks.
2. **Connect and label the controller outputs.** With supplies isolated, follow the board wiring sheet and relay schedule. The pump connector's bottom contact takes the common neutral feed for all relays. Connect the two pump outputs by their numbered pin assignments in the pump callout. Mixing-valve return-voltage feedback is optional. For fitting, left/right pipe layouts and polarity checks, use the mixing valve and actuator installation guide.
3. **Connect the thermostats to the T-Bus.** Connect either bus wire to either thermostat terminal; the thermostat connection works in both directions. Follow the specified cable, supply and termination requirements for your boards. The T-Bus uses a custom protocol; a generic Modbus controller is not a substitute for HeatingMain.
4. **Fit the room thermostats and plant probes.** Use the hardware mounting instructions and planned sensor locations. Label each thermostat with its room and each actuator with its output.
5. **Inspect before applying power.** Complete the hardware-specific electrical checks, then power the system according to its wiring sheet. Verify the thermostats refresh and respond to touch.

> **An e-paper image is not a power indicator.**
>
> The display retains its last image without power. Confirm a fresh display update and touch response rather than relying on a visible temperature alone.

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04 / SET UP EACH ROOM

Assign the thermostats

Use the thermostat's own screen. Tap the hamburger icon to open the menu at **Info**. Use **Up** and **Down** in the left navigation column to move between screens; the adjacent item icons show your position. Tap **Home** to return to the room temperature.

> **Select the zone printed on the board**
>
> Choose the same bank and channel on the thermostat: board A0 is thermostat A0, and board B6 is thermostat B6.

☰ Menu → Up / Down → Ceiling or Floor

1. **Open Ceiling.** Select the bank and channel printed on the board for the room's ceiling output. For example, select `A` and then `3` for `A3`. Select `NC` if no ceiling circuit is connected.
2. **Open Floor.** Select the zone printed on the board for the room's floor circuit, or `NC` if it is not connected.
3. **Check the displayed address after each change.** A complete bank/channel selection writes immediately. A bank selected with no channel does not save a new address; NC takes effect immediately. If a channel is already selected, switching banks changes the complete address immediately.
4. **Confirm the leader.** On the thermostat with A0 assigned, check that Mode, Fabric and Dew appear in the menu. The leader's home-screen top band is inverted. Other thermostats have Info, Version, Ceiling and Floor.
5. **Record the room details.** Open Version to read the firmware version, relay address pair and hardware UID. Record them with the room and actuator labels, then repeat for each thermostat.

> **A duplicate needs an installer's correction.**
>
> The controller reports conflicting addresses; it does not choose replacement relay assignments. Check both circuit addresses on the affected thermostats and correct the duplicate to match the physical wiring.

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05 / PROVE THE OPERATION

Commission the plant

Set the operating mode on the leader

On the A0 thermostat, open **Mode** and choose Heat, Cool, Auto or Off to suit the installed plant and commissioning task. This is a system-wide choice: follower thermostats follow the plant's season. Each room retains its own temperature targets.

Verify the readings and each circuit

1. **Check room and plant readings.** Confirm plausible temperature and humidity in each room. Open Info to inspect the buffer tank and both mixing valves. Resolve missing or implausible probe readings before testing heating or cooling.
2. **Request heat in one room.** In Heat mode, tap the temperature or the bottom-right setpoint to open the setpoint dial. Raise the target enough to create demand. Confirm the intended actuator responds and that another room's output is not being driven.
3. **Allow the system time to respond.** Thermostats communicate in a 60-second bus round. Each circuit's pump starts only after one of its valves has been commanded open continuously for three minutes. Demand changes also have an anti-chatter hold, so repeated rapid setpoint changes are not a useful test.
4. **Check both circuits where fitted.** The floor carries the primary heating demand; the ceiling joins at higher demand. Confirm that actuator labels, thermostat assignments and actual flow agree for each circuit.
5. **Check cooling where supported.** With a cooling-capable plant, select Cool on the leader and lower a ceiling-equipped room's target to create demand. Verify ceiling operation. The floor pump must remain off; floor-only rooms do not cool.
6. **Restore the intended settings.** Return to the agreed operating mode and room targets. Check for active errors before moving to handover.

> **Keep condensation protection in the commissioning checks.**
>
> The leader's Dew menu sets the safety margin; the documented default is 1.5 °C. The plant may raise the ceiling water target or veto a room's cooling request when the dew limit is reached. A veto remains in effect for 10 minutes. Do not reduce the margin simply to force a cooling test through.

Use the thermostat's bottom-left circuit indicators to inspect valve and pump state. Tapping them cycles between the normal view, relay addresses and the 48-hour open-percentage view.

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06 / OPTIONAL CONNECTIONS

Add the connected extras

Local operation does not require these steps. Complete the plant and room checks first. The wall thermostats communicate over the T-Bus; the plant controller provides the Matter bridge.

Matter smart-home setup

Leader menu → Fabric → MASTER → START COMMISSIONING

1. Prepare the compatible Matter controller and the network it requires for the installed plant controller.
2. On the A0 thermostat, select **Fabric**, then the **MASTER** tab. Tap **START COMMISSIONING** in the content area. Selecting the tab alone does not start pairing.
3. Wait for the plant controller's QR code and manual pairing code, then follow the smart-home app's add-device flow. The request has a 70-second timeout; if it expires, use **TAP TO RETRY**.
4. Check that the expected physical thermostats appear, and label their rooms. System mode remains controlled through the leader; other rooms follow the plant.

Owner portal

On the leader's Fabric screen, select **PORTAL**, then tap **GET PORTAL QR**. When the QR arrives, scan it or open the displayed `apnv.cc/p/…` address and follow the portal flow. This online service needs the relevant network connectivity. Keep the portal access link with the owner's records, rather than in a public installation photo.

Local Home Assistant integration

The controller also supports MQTT with Home Assistant discovery on the local network. This requires a reachable MQTT broker and controller network/broker configuration. Use the configuration for the

installed firmware; the thermostat's Fabric screen does not configure MQTT.

07 / FIND THE CAUSE

Troubleshooting on site

Record the room, both relay addresses, firmware version and hardware UID from Version, together with the displayed error. An error QR on the home screen links to the corresponding diagnostic address.

The screen is visible but does not respond

E-paper can show an old image with power removed. Verify supply and bus connections against the hardware wiring sheet and confirm a fresh refresh. If an update is in progress, let it finish before diagnosing the touch controls.

The thermostat shows NO CON or a Nocom QR

The thermostat has lost communication with the plant controller. Check controller power, the T-Bus connection and the thermostat's circuit addresses. Confirm compatible firmware on both ends and allow a full 60-second communication round after correcting the cause.

Mode, Fabric or Dew is missing

These menus are only on the A0 leader. Check the Ceiling and Floor assignments: the unit's identity is the smaller non-zero address. Plan one thermostat with A0 assigned to its actual circuit, then verify the expanded menu on that device.

A duplicate address is reported

Error bit 7 indicates an address conflict (displayed as ERROR:128 when it is the only error). Check both ceiling and floor addresses across the affected units, including shared secondary outputs. Correct the assignments manually. Conflict indications can take 3–10 minutes to clear depending on the detection path; record persistent errors rather than assuming a new address is enough.

The pump has not started

First confirm that the correct circuit has an open-valve command and real demand. Its pump waits until a valve has been commanded open continuously for three minutes. The floor pump is disabled during cooling. If the command is present after the delay but the pump does not run, inspect the output and plant wiring using the hardware procedure.

Cooling pauses or a condensation marker appears

The plant can raise the ceiling water target or pause cooling at the dew limit. Check room humidity, ceiling pipe temperature and the configured safety margin; a cooling veto lasts 10 minutes. Floor-only rooms cannot cool. Do not bypass the protection to restore demand.

The wrong room heats, or a circuit stays off

Compare the physical actuator wiring with both relay selections on each thermostat. Verify that NC is only used for an absent circuit and no output is claimed by another unit. In a combined room, a modest heat request may run only the floor; the ceiling is added at higher demand.

The pairing or portal QR does not arrive

Use the leader thermostat. Open Fabric, choose MASTER or PORTAL, then press the separate action button. Check bus communication and the controller's required network connection. Wait for the 70-second request timer, then use TAP TO RETRY if needed.

08 / LEAVE IT READY TO LIVE WITH

The handover checklist

Work through these checks with the homeowner and retain the completed printout with the room schedule. Checks are for this page session only; they are not saved as an installation record.

0 of 7 checks complete

- [ ] Hardware wiring and hydraulic checks completed; equipment and probe labels recorded.
- [ ] Ceiling and floor relay assignments verified in every room, with exactly one A0 leader and no duplicate claims.
- [ ] Room temperatures, humidity and plant readings checked; active errors resolved.
- [ ] Heating, supported cooling and the three-minute pump delay verified against the installed circuit layout.
- [ ] Condensation protection reviewed and the agreed mode and room targets restored.
- [ ] Homeowner shown how to change a target, return Home, identify the leader and read an error.

- [ ] Room schedule, firmware versions, hardware UIDs and optional integration details handed over with this manual.

Connector reference

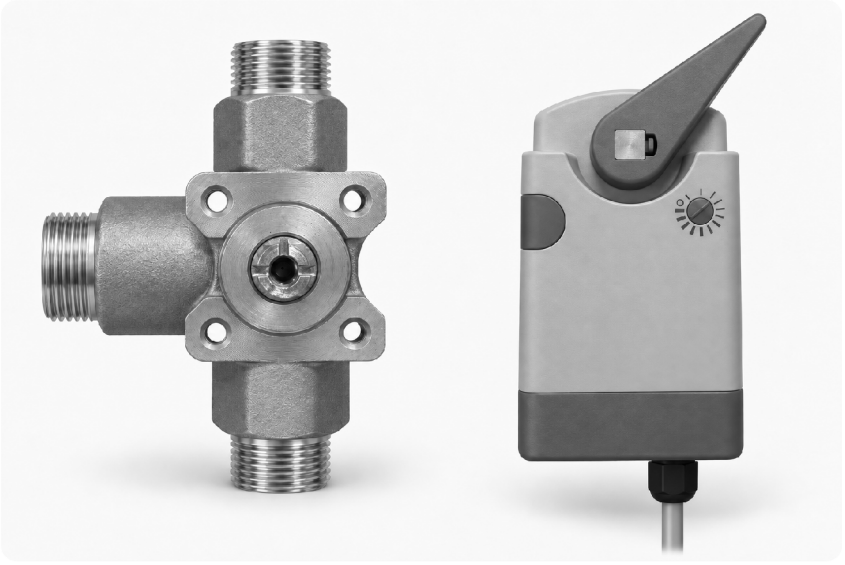
Every contact on the plant controller, by connector. The schematic sheets show where each one sits.

REFERENCE	EQUIPMENT	CONTACTS
CN38	24 V DC input	**1** +24 V **2** 0 V
CN68	T-Bus pair	**1** Bus wire 1 **2** Bus wire 2
CN1	T1 · floor return	**1** 3.3 V **2** Data **3** GND
CN82	T2 · ceiling source probe	**1** 3.3 V **2** Data **3** GND
CN83	T3 · buffer tank	**1** 3.3 V **2** Data **3** GND
CN84	T4 · ceiling return	**1** 3.3 V **2** Data **3** GND
CN85	T5 · spare	**1** 3.3 V **2** Data **3** GND
CN2	T6 · floor source probe	**1** 3.3 V **2** Data **3** GND
CN86	T7 · system supply	**1** 3.3 V **2** Data **3** GND
CN64	Ceiling mixing valve	**1** +24 V **2** 0 V **3** Vout 0–10 V **4** Vin 0–10 V
CN63	Floor mixing valve	**1** +24 V **2** 0 V **3** Vout 0–10 V **4** Vin 0–10 V
CN90	Spare channel 3	**1** +24 V **2** 0 V **3** Vout 0–10 V **4** Vin 0–10 V
CN91	Spare channel 4	**1** +24 V **2** 0 V **3** Vout 0–10 V **4** Vin 0–10 V
CN3	Upper left outer actuator block	**4** B6 **3** B5 **2** B4 **1** B3
CN4	Upper left inner actuator block	**3** B2 **2** B1 **1** B0
CN5	Upper right outer actuator block	**4** A3 **3** A4 **2** A5 **1** A6
CN6	Upper right inner actuator block	**3** A0 **2** A1 **1** A2
CN77	Pumps / common	**1** Ceiling pump **2** Floor pump **3** N · common
CN89	RS-485 · not T-Bus	**1** A **2** B **3** GND
H2	Programming header	**6** GND **5** BOOT **4** EN **3** RX **2** TX **1** 3.3 V

MIXING VALVE INSTALLATION

Set the position.
Fit. Connect.

Start with the valve on the right: unnotched side down, actuator fully left at 0%, CW mode. Fit them together, then connect the cable. The left-hand layout mirrors this setup.

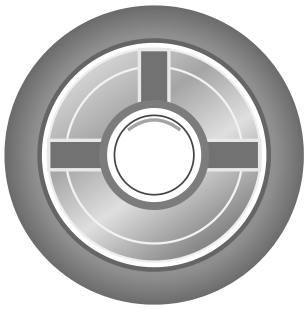


Valve and actuator · component identification

01 / POSITION THE VALVE

Start with the unnotched side down.

Turn the valve spindle so its **three notches point up, left and right**. The side with **no notch points down**, toward the source inlet. This is **0%: maximum recirculation**.



0% starting position · no notch at the bottom.

Read it from the front.

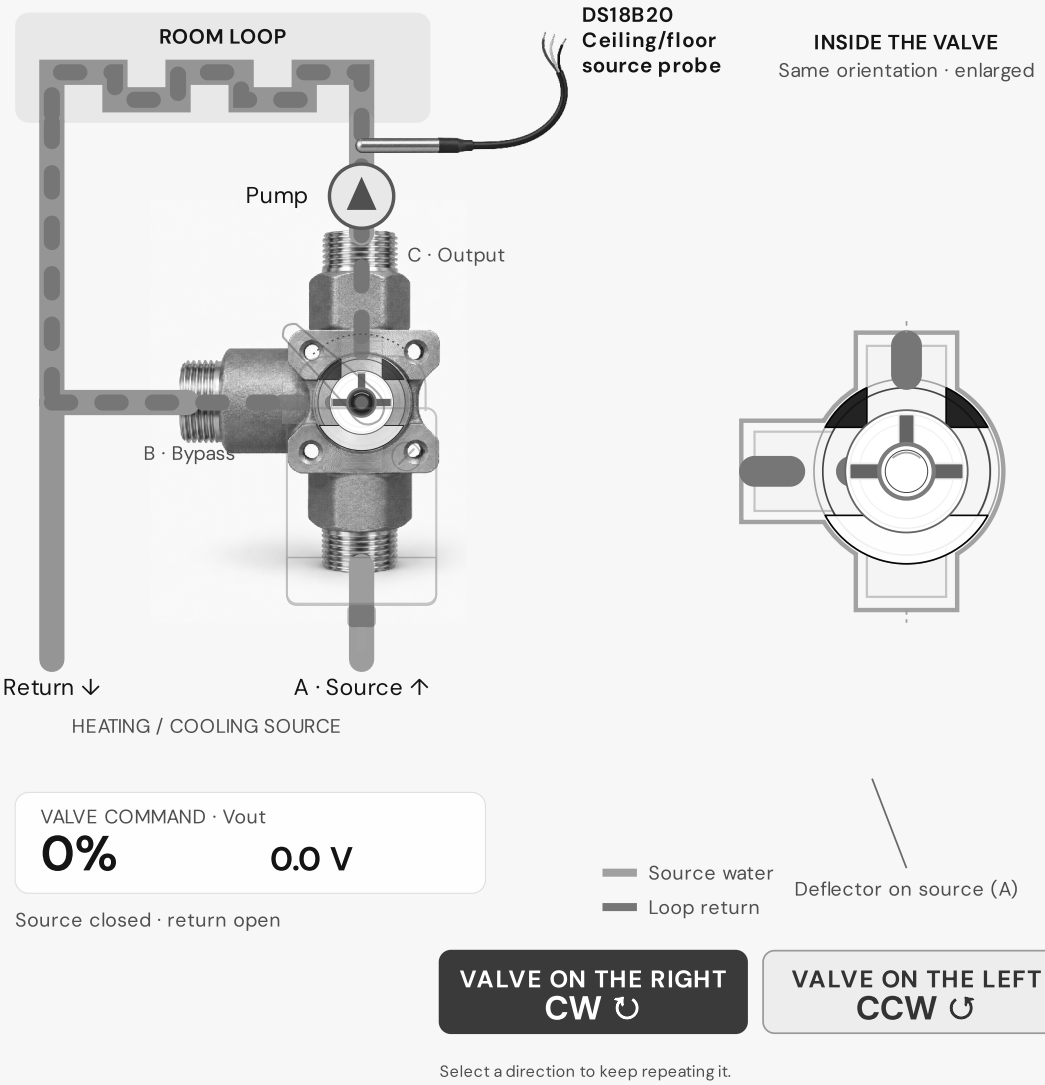
Look straight at the exposed spindle. Keep the room loop above and the source supply and return below.

Keep this valve position while fitting the actuator. For the first setup below, the valve is on the right and the actuator turns clockwise as the command increases.

CW ↻ / CCW ↺ · BOTH SETUPS

Watch the valve and spindle move.

Watch the valve turn and compare the view looking into each port.

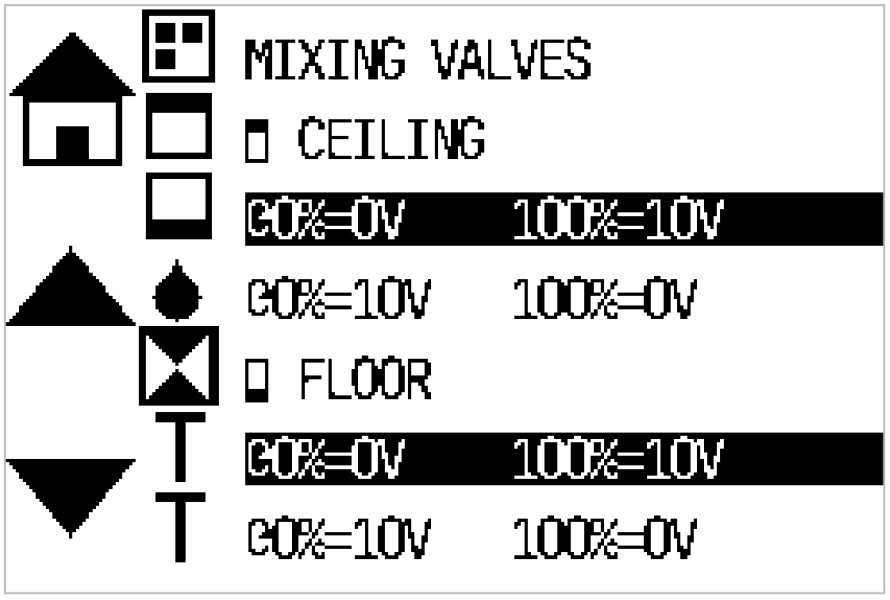


No CW / CCW switch on the actuator?

Set its direction on the **A0 leader thermostat**. Open **Mixing valves**, then find **Ceiling** or **Floor**.

To reverse that plant output, tap **0% = 10 V · 100% = 0 V**, the second row under the circuit name. Ceiling and floor are set independently.

The highlighted row is the active setting. Use the reversed mapping when the actuator needs to turn in the opposite direction.



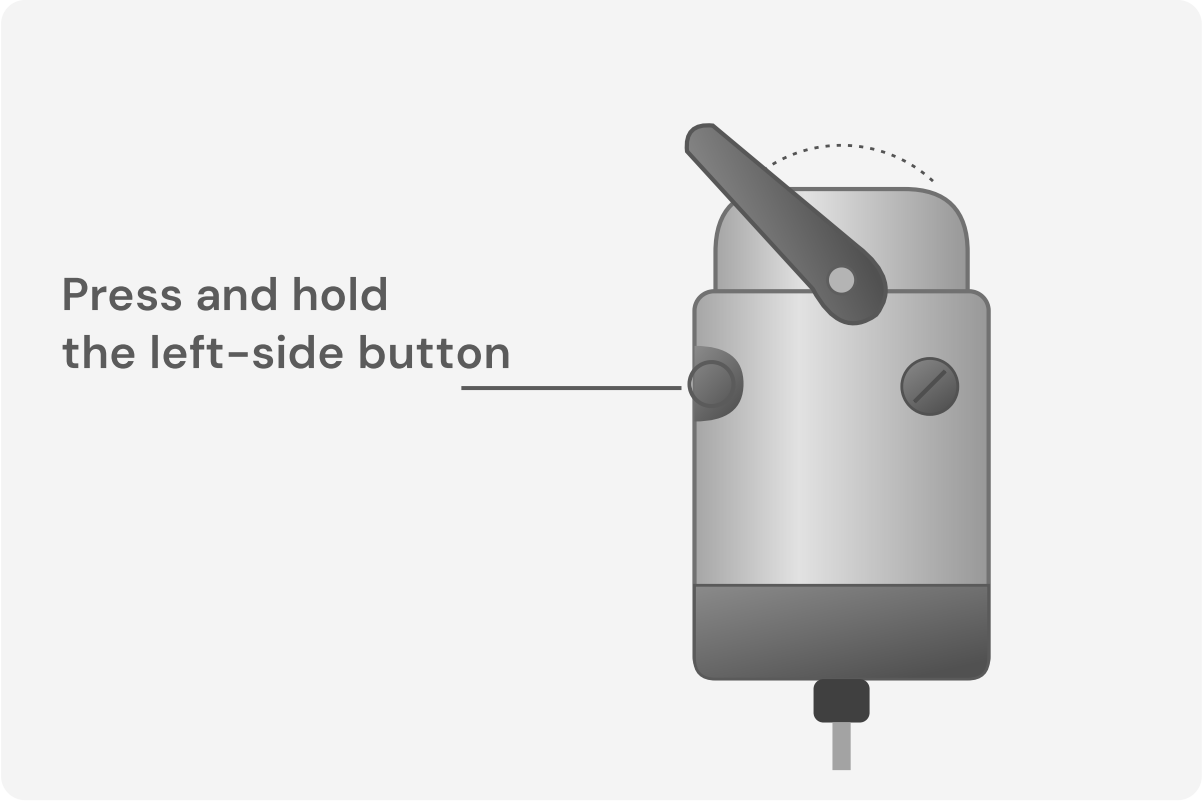
Leader thermostat · Mixing valves. Normal mappings shown; tap the second row for the circuit to invert it.

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02 / POSITION THE ACTUATOR

Use the manual-release button.

Press and hold the button on the actuator's left side to release the drive, then move the lever to the starting position. Release the button to restore motor operation.



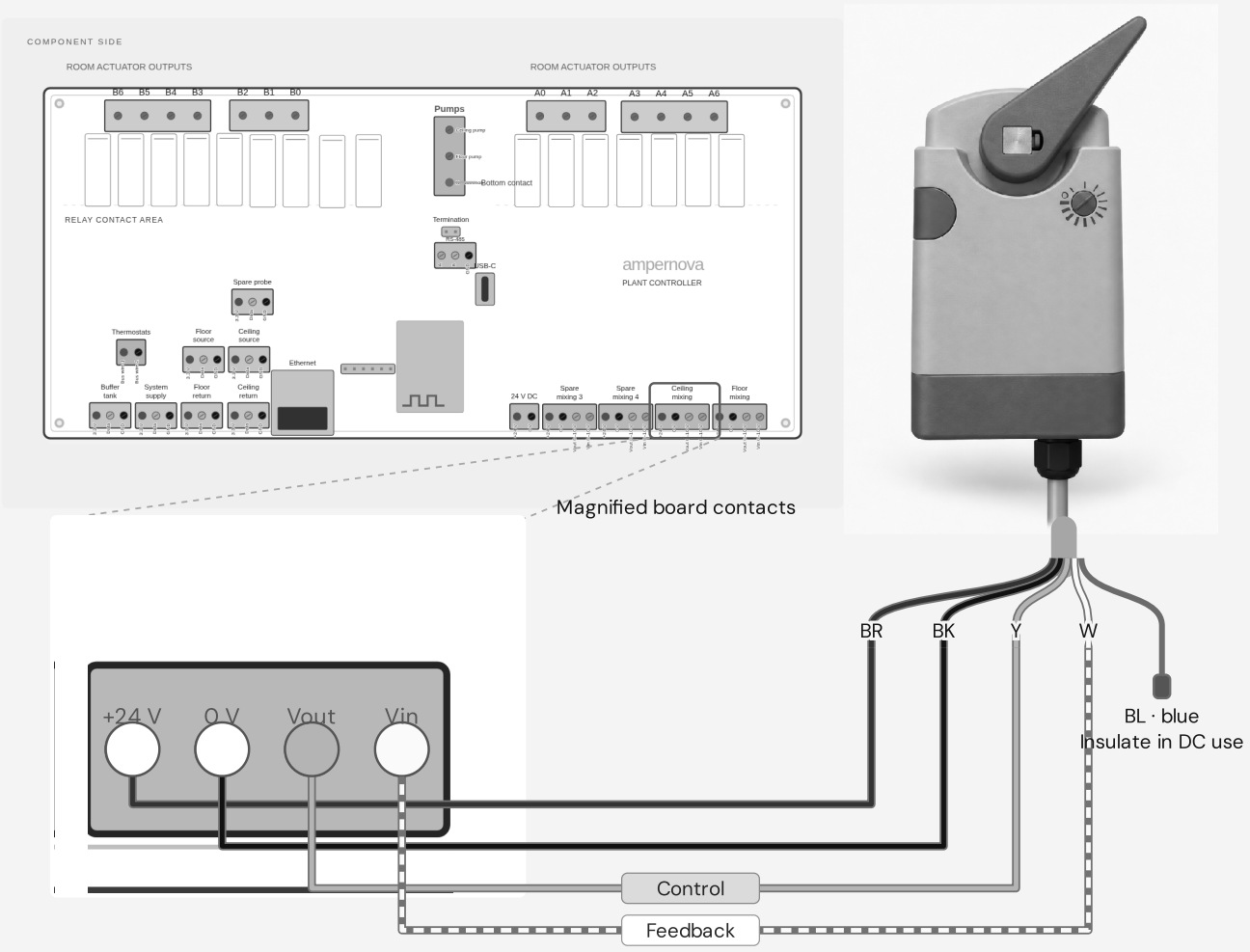
03 / CONNECT THE CABLE

Three wires to run. Feedback is optional.

With power isolated, connect the pictured actuator to **Ceiling mixing** or **Floor mixing** on the plant controller. This example uses its **24 V DC** wiring.

Controller → rotary actuator

24 V DC example · Ceiling mixing block



Dashed white = optional feedback. Same contact order on the Floor mixing block.

Pictured actuator · 24 V DC connection

Actuator lead	Controller contact	What it does
● Brown · BR	**24 V**	Positive DC supply
● Black · BK / COM	**0 V**	DC and signal common
● Yellow · Y / input	**Vout 0–10 V**	Command: board → actuator
○ White · W / FB	**Vin 0–10 V** · optional	Feedback: actuator → board
● Blue · BL	**Not connected in DC use**	AC supply lead; insulate separately

Insulate the unused blue lead separately. If feedback is not fitted, also insulate the white lead and leave Vin empty. Match the colours to the label on the fitted actuator.

One final check.

On the leader, open **Test mixing valves**. Check the fitted circuit at **0%: maximum recirculation**, then **100%: maximum source flow**. Allow the actuator to finish moving, then select **Exit test** to restore automatic control.

Entering the mixing test initially commands both mixing valves to 0%. Repeat the fitting sequence for the other circuit.