

Function summary

- The RRV856 controller is designed for ducted HVAC systems.
- The AC system is divided into zones (2-6 zones) by the on/off control of the damper actuators. The default unit for zone 1 is the QAX850 master room unit with QAW850 zone room units used for additional zone.
- Wall units measure zone temperatures and evaluate the demand for each zone based on the corresponding zone setpoint. The zone damper opens on demand from its corresponding zone room unit and closes when there is no demand.
- Heating/cooling output and fan speed is determined based on total demand from all zones.

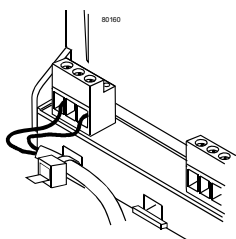
Installation

Place of installation

- Mounting choices:
 - Control cabinet
 - Control panel
 - Side of FCU
 - Wall, ceiling space, cupboard
- Easy access is required for service personnel.
- The controller should not be freely accessible by building occupants.
- Do not install outside without suitable weather protection.
- Permissible ambient temperature: 0...50°C.

Electrical installation

- The local regulations for electrical installations must be observed.
- Cable restraints must be used for the wires to terminals L, N, Q... (AC230V).
- Cable restraints should be used for all wiring to avoid disconnection (see diagram below).



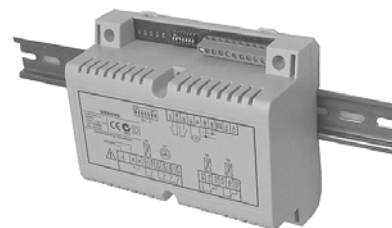
Permissible cable lengths

- For all field devices: room unit, sensors
 - max. 60 m where $A \geq 0.5 \text{ mm}^2$
 - max. 100 m where $A \geq 1.0 \text{ mm}^2$
- Signal cable type
 - 2-wire standard installation cable (unshielded)
 - Bus topology is free configuration. Ring, star etc.
 - Twisted pair (unshielded) is recommended for enhanced immunity to external electromagnetic interference, for example, in the vicinity of radio transmitters or frequency converters.

- RRV856 controller can be mounted in any orientation.
- Ensure adequate air circulation to dissipate heat generated during operation.

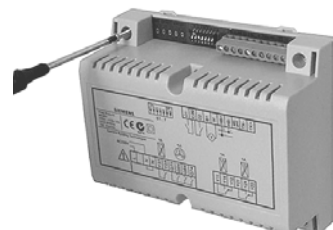
DIN rail mounting

1. The housing rail is designed for snap mounting on DIN rails, type EN50022-35 X 7.5



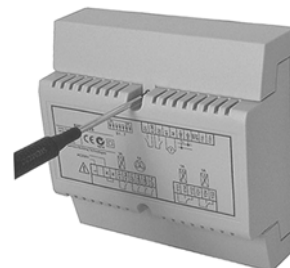
Surface mounting

1. Hold controller against the surface.
2. Mark fixing holes on the wall.
3. Drill holes.
4. Screw controller to the surface.
5. When mounting controller to a FCU, take care not to damage internal components. E.g. Drilling through coils.



Terminal covers

- The covers will provide IP30 protection when surface mounting on wall or FCU. IP20 without terminal covers.
- The terminal covers include screws for fixing to controller and knock-out holes for cable entry.

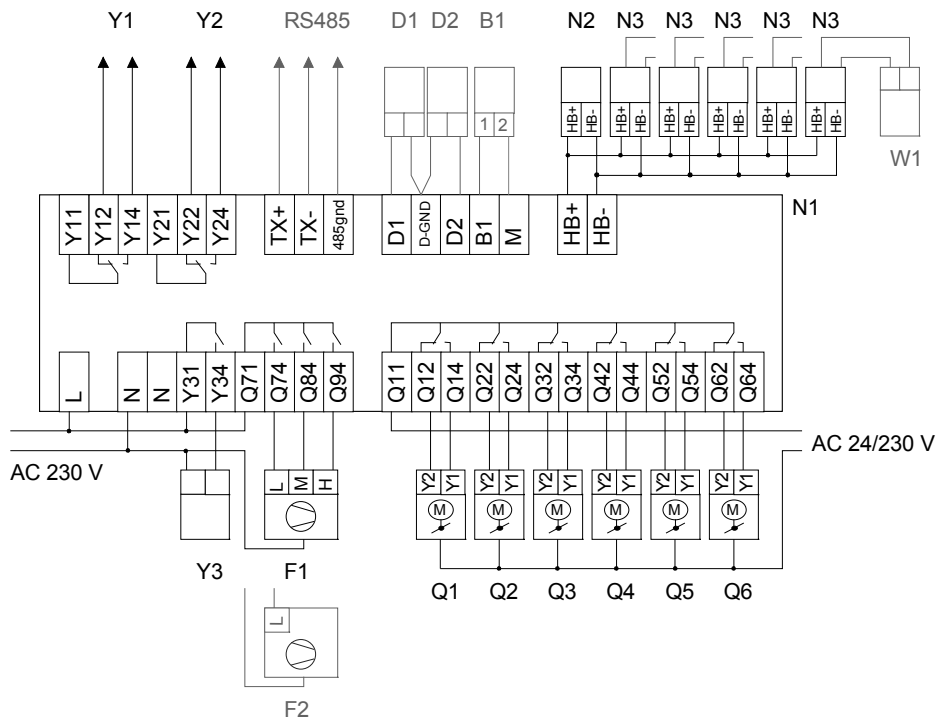


Connection diagrams

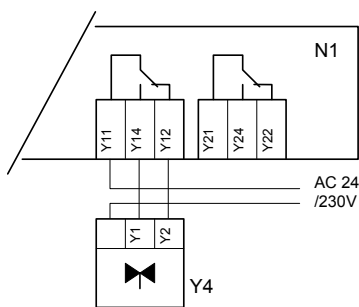
RRV856 terminals

B1	Signal input (ext. sensor NTC)	L, N	AC 230V supply
M	Signal ground	Q7..., Q84, Q94	Digital outputs, AC24...230V, 6(4) A
D1, D2	Digital inputs	Q1..., Q6...	Digital outputs, AC24...230V, (0.5) A
D_GND	Digital ground	Y...	Digital outputs, AC24...230V, 3(1) A
HB+, HB-	Communication bus		

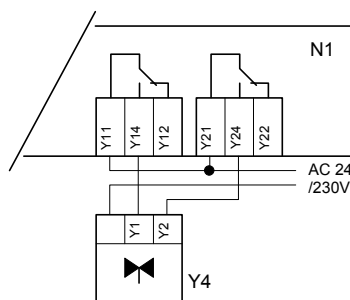
RRV856 - Typical connection



- | | | | |
|----|--|-----|---|
| N1 | RRV856 controller | Y3 | Auxiliary heat, emergency heat or 2 nd stage cooling |
| N2 | QAX850 master room unit | W1 | Optional window zone off input |
| N3 | QAW850 zone room unit | F1 | Three speed fan |
| B1 | External zone 1 temp sensor (optional) or pipe changeover sensor, appl. A8 | F2 | Single speed fan |
| D1 | Remote activation of comfort mode | RV | Reversing valve |
| D2 | Fault or emergency heat | CR1 | Compressor relay stage 1 |
| Y1 | Cooling output | CR2 | Compressor relay stage 2 |
| Y2 | Heating output | Y4 | Valve actuator, AC24/ 230V |

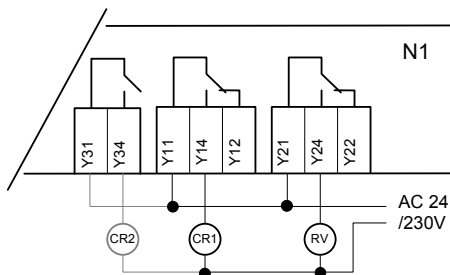


2-pipe FCU, 2-position control (appl. A8)



Optional 3-position control (appl. A1, A2 & A8)

(For single compressor heat pumps, CR2 is not connected)



Heat pumps (appl. A5)

Note:
Contact your local Siemens Building Technologies representatives for application specific wiring diagrams and information.

Note!

- All Input and bus terminals are not protected against connection to AC 230 V.
- Observe the technical data for fan relay outputs: Max. AC 250 V, 6(4) A.
- All output cables used must satisfy the insulation requirements with regard to mains potential.
- AC 24 V outputs must be segregated from AC 250 V outputs.
- Care should be taken when cables pass through sharp metal openings, conduits or ducts.
- Double insulation on output cables is recommended.
- Local installation regulations must be observed.

Commissioning

Preparatory checks

1. DO NOT switch on power.
2. Check wiring according to the plant connection diagram.
3. Ensure correct position of Dip switch settings to match the HVAC equipment.
4. The pre-configured application is selected by the Dip switch located at the top of the RRV856 controller.
5. Set zone addresses via Dip switches on the back of each zone controller.
6. Zone damper positions must be set so that they are in the closed position when zone damper Q... outputs are de-energised.
7. Verify output operation after power has been connected to controller, by adjusting setpoints until there is demand for heating or cooling.
8. Ensure all motorized zone dampers are open for system air balancing.
9. When switching on power.

RRV856 Dip settings

Function	Selections	1	2	3	4	5	6	7
Y3 Aux. output	Auxiliary heat 20 min delay	off	off	-	-	-	-	-
	Auxiliary heat 10 min delay	on	off	-	-	-	-	-
	Emergency heat via D2	off	on	-	-	-	-	-
	2 nd stage cool or compressor	on	on	-	-	-	-	-
Fan speed	Single speed	-	-	off	-	-	-	-
	Three speed	-	-	on	-	-	-	-
Application	A1 – Heat only	-	-	-	off	off	off	off
	A2 – Cool only	-	-	-	on	off	off	off
	A3 – Cool / Heat (HHW)	-	-	-	off	on	off	off
	A4 – Cool / Heat (EDH)	-	-	-	on	on	off	off
	A5 – Heat pump (comp + RV)	-	-	-	off	off	on	off
	A6 – Heat pump (heat/cool)	-	-	-	on	off	on	off
	A7 – 4 pipe FCU	-	-	-	off	on	on	off
	A8 – 2 pipe FCU	-	-	-	on	on	on	off

Installer level parameter settings

- Default parameter values are suitable for basic system operation. If default values are not suitable for a particular installation, then adjustment can be made. Refer to application sheets for default values or follow the instructions below:
 1. Simultaneously press together the ▲ and ▼ buttons on the QAX850 for 3 seconds, release, within 2 seconds press the ▲ button for 3 seconds.
 2. P00 will appear on the LCD.
 3. Press ◀ to view the parameter.
 4. Press ▲ or ▼ for adjustment.
 5. Press ◀ to save the adjustment.

- The power LED on the RRV856 will be on
 - The QAX850 will display all LCD icons for 3 seconds and then the software version number for another 3 seconds. It will then revert to normal mode. Time segments on the QAX850 will be blinking if time needs to be set.
 - The LED on the QAX850/QAW850 will be flashing if there is a communication error between the RRV856 and QAX850/QAW850.
10. Power must be switched off to reset application
 11. An adhesive label is included in the packaging for final recording of Dip switch positions.

Digital inputs (D1, D2)

- A potential free contact closed across the D1 and D_GND terminals will override to comfort when mode selector is set to Auto timer mode only.
- D2 can be configured for an emergency heat enable signal or an external fault lockout signal. Either of these functions can be selected via the configuration Dip switches.
- When emergency heat is selected, a potential free contact closed across the D2 and D_GND terminals will disable the primary heating output and enable the emergency heat output. The emergency heat output will only activate when there is demand for heating. Not available on applications A2, A3, A4 and A5.
- When external fault (default) is selected, a potential free contact closed across the D2 and D_GND terminals will de-activate all outputs and the standby icon on the QAX850 LCD will flash to indicate the fault. Fault will disappear after contact is opened.

QAW850 digital input

A digital input (D1, M) on the back of the QAW850 is available for connection to a window contact or switch. When activated the zone will override to zone off mode. Default is normally closed (NC) and can be adjusted via parameter P16.

6. Continue through all the parameter list to return to normal mode.
7. If all zone room units will not change from zone off mode; check for correct setting of parameter P16.

Time out

- If no adjustment is made within 20 seconds while changing parameter values, the controller will exit and return to normal mode.

Setting elements on QAX850 master room unit



- 1 Navigation buttons: adjusting or searching values
- 2 OK button: confirming values

Zone set-up

- The individual zone weight for each zone must be selected based on the zone load (i.e.: zone air outlet flow

Parameter list

Line	Function, display	Range	Explanations, notes and tips
P00	Temperature scale	°C/ F°	
P01	Frost protection limit in OFF mode	Off/5..8°C	If temp is below the set limit, heating will be activated.
P02	Over-temperature limit in OFF mode	Off/30..35°C	If temp is above the set limit, cooling will be activated.
P03	Min. OFF time delay	0..600s	Min off time is used to prevent short cycling of compressor.
P04	Min. ON time delay	0..600s	Min on time is used to prevent short cycling of compressor.
P05	Dead band between cool and heat OFF points	0.5..6K	Zero energy band. When actual temp is in dead band, outputs are off.
P06	RV ON in heat or cool mode	Heat/Cool	The reversing valve (RV) can be energized in cooling or heating demand. Dependent on the internal equipment circuitry.
P07	Fan run ON after heat output turns Off	0..300s	Fan run ON delay is used to remove the residual heat and to prevent the high limit electric heater thermostat from tripping off.
P08	Fan run ON after cool output turns Off	0..300s	Fan run ON delay can be used to make use of residual cooling and to remove condensation.
P09	FCU flush pipe time	120..600s	On start up, the controller will open the valve (flush time) and the sensor will detect for hot or chilled water in the system. Only for 2-pipe FCU, appl. A8.
P10	Zone heat/cool inhibit	Heat/Cool/No	Heating or cooling mode can be disabled for individuals zones.
P11	Water temp heat mode changeover	22..32 °C	Only for 2-pipe FCU appl A8. This is the water temp setpoint for heating.
P12	Water temp cool mode changeover	10..21 °C	Only for 2-pipe FCU appl A8. This is the water temp setpoint for cooling.
P13	Fan auto-speed high range	H:80..100%	Switching point for high speed fan.
P14	Fan auto-speed medium range	M:30..75%	Switching point for medium speed fan.
P15	Fan auto-speed low range	L:1..15%	Switching point for low speed fan is only applicable for 3-position modulating control. For 2-position control, low speed fan synchronizes with the first stage heating/cooling switch on and switch off points.
P16	Window contact zone off activation	NO/NC	Digital input on QAW850. Overrides zone to off mode.
P17	2-p or 3-p control selection	2-p/3-p	3-position modulation control is possible for appl. A1, A2 and A8.
P18	Heating demand P-band/Switching differential	0.5..10K	Heating demand proportional band for zone and total demand calculations. Applicable to 3P modulating and on/off applications.
P19	Cooling demand P-band/Switching differential	0.5..10K	Cooling demand proportional band for zone and total demand calculations. Applicable to 3P modulating and on/off applications.
P20	Demand integration time	0..60.0 min in 0.5 min steps	Heating/cooling demand integration time for zone and total demand calculations. Applicable to 3P modulating and on/off applications.
P21	3-p valve actuator running time	50..300s	Valve actuator run time. Refer to the technical data of the actuator for this value.
P22	Zone capacity weight The (zone weighted) total system heat/cool demand is calculated by the RRV856 controller for plant heating/cooling and fan speed output control	None Small Medium Large	None – Local damper control only. Zone has no effect on plant heat/cool and fan speed control. Small – Smaller zone with low air outlet flow rate compared to other zones (i.e.: 2 nd bedroom). Medium – Medium sized zone compared to other zones (i.e.: Master bedroom). Large – Large zone with higher air outlet flow rate compared to other zones (i.e.: Main living/dining area).
P23	Ventilation in dead zone	Off, H/C, C only	When the temp is in dead zone, the fan can be set to run continuously. When C only is selected, fan turns off with the heating output but continues to run after cooling output turns off.

*Default values and available parameters are dependent on application selected.

*Refer to application sheets for further details if required.

rate) in comparison to other zones. Zone weight parameter P22 can be applied to each zone as per the following.

- None – Local damper control only. Zone has no effect on plant heat/cool and fan speed control.
- Small – Smaller zone with low air outlet flow rate compared to other zones (i.e.: 2nd bedroom).
- Medium – Medium sized zone compared to other zones (i.e.: Master bedroom).
- Large – Large zone with higher air outlet flow rate compared to other zones (i.e.: Main living/dining area).

Sensor calibration

- Generally there is no need to calibrate sensor, however the displayed room temperature on the QAX850 and QAW850 LCD can be calibrated if there is any discrepancy from the actual temperature measured with a certified thermometer. Calibration function can be accessed by pressing the ▲ and ▼ buttons simultaneously for 5 seconds. Displayed value can then be adjusted via the same buttons in 0.1K steps. Range is +/- 3K.

QAW850 Dip switches

The QAW850 includes dip switches for zone addressing. Up to 6 zones can be connected to an RRV856 controller.

Dip switches on the back of QAW850.



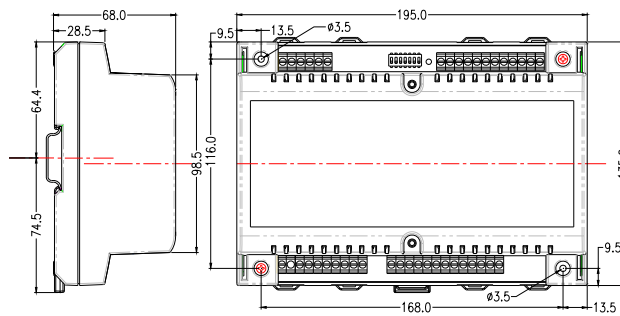
They allow setting the address in cases where several room units are connected to one RRV856 controller. The room units are delivered with default positions = zone 2 (address = 3).

The master room unit QAX850 is normally zone 1 although a QAW850 can be addressed as zone 1 if required. In this case the QAX850 would serve as a master control unit only.

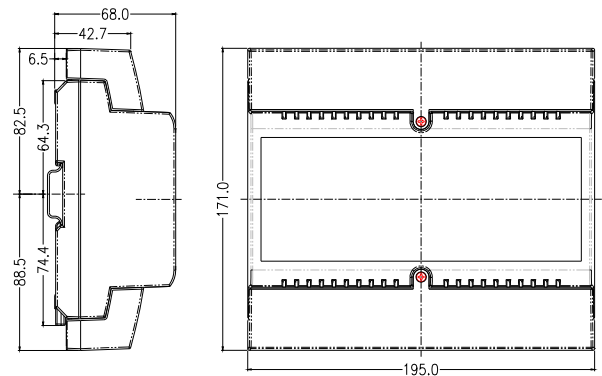
Dip No.	Function	Pos.3	Pos. 2	Pos. 1	Zone
1-3	Zone identity	OFF	OFF	OFF	1
		OFF	OFF	ON	2
		OFF	ON	OFF	3
		OFF	ON	ON	4
		ON	OFF	OFF	5
		ON	OFF	ON	6

Dimensions

Without terminal covers



With terminal covers



Dimension in mm.