



Temperature controller Ducted systems

RRV851

Standard model without zoning functions

Multifunctional controller used for central control of ducted HVAC systems in combination with a QAX850 master room unit.

Use

Use Comfort control of ducted HVAC systems via fan, heating and cooling output regulation:

- Residential apartments
- Residential single house
- Autonomous light commercial applications

Applications

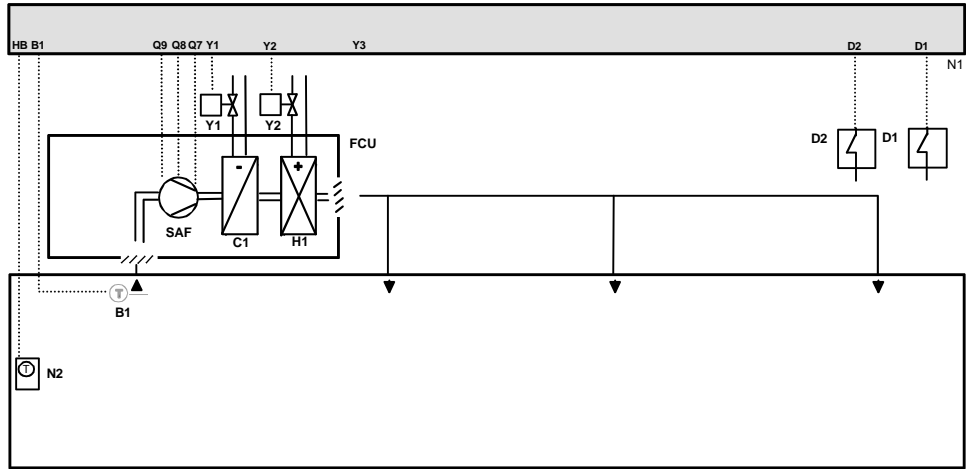
The RRV851 controller is designed for central ducted HVAC systems that require easy operation by the building occupant. The MMI required to be connected to the controller is the QAX850 master room unit. Fan, heating and/or cooling outputs control the temperature within the building. The RRV851 controller can be configured for various types of HVAC equipment. These include:

- Heating only ducted systems
- Cooling only ducted systems
- DX cooling and heating (single speed fan on heating)
- DX cooling and heating (3 speed fan)
- Air to air heat pumps
- Water to air heat pumps
- 4 pipe FCU
- 2 pipe FCU
- Single or 3 speed fan

Functions

Controller functionality is determined by the Dip switch selected application, parameter settings and mode selection via the QAX850 master room unit.

**Example application:
4-pipe FCU system**



- | | | | |
|-----|------------------------------|----|-------------------------------|
| N1 | RRV851 controller | H1 | Heating coil |
| N2 | QAX850 master room unit | C1 | Cooling coil |
| FCU | Fan coil unit | D1 | Remote comfort mode input |
| B1 | Optional remote temp. sensor | D2 | Fault or emergency heat input |
| SAF | Supply air fan | Y1 | Cooling control valve |
| | | Y2 | Heating control valve |

Type summary

<i>ASN</i>	<i>Type reference</i>	<i>Compatible with</i>
RRV851	Temperature controller	QAX850, QAA32, QAH11.1

Note

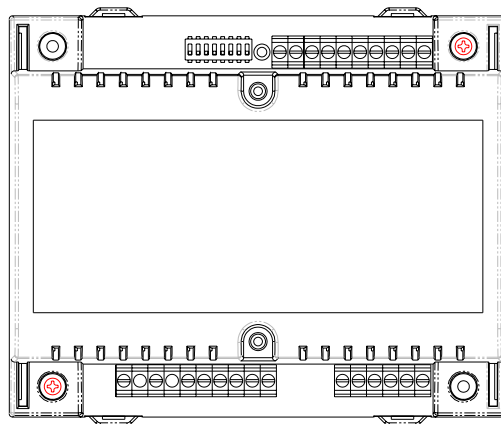
The QAX850 is the master MMI for the RRV851 and must be ordered separately. Any additional remote temperature sensors must also be ordered separately. Terminal covers are included in the RRV851 box.

Not usable with Desigo RX range wall units.

Mechanical design

Type of unit

The RRV851 is a temperature controller providing connection of power supply, inputs/outputs and QAX850 master room unit.



The unit consists of the following components:

- Base for DIN or screwed surface mounting
- Cable restraints
- IP30 covers (when mounted directly to wall or FCU without DIN rail)
- PCB and internal transformer
- PCB cover
- Input/output terminals
- RS485 terminals
- MMI bus terminals
- LED for power supply indication
- Configuration Dip switches

Connection terminals

Bus interface (HB+, HB-)

Low voltage power supply (12VDC) and communication transfer is supplied via two wires to the QAX850 from terminals HB+ and HB-. The LED on the QAX850 will flash if a communication error exists between RRV851 and QAX850 for longer than 5 seconds.

RS485 (TX+, TX-)

The RS485 connections are only suitable for downloading manufacturer specific parameter sets. This is for factory use only.

Digital inputs (D1, D2)

Two digital inputs are provided. A potential free contact closed across the D1 and D_GND terminals will override to comfort mode, only when mode selector is set to Auto timer mode. 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.

Temperature sensor input (B1, M)

An NTC temperature sensor can be connected to B1 and M terminals for the following functions:

- Remote room temperature sensing: The QAX850 can be used as a master control unit without using the internal temperature sensor. A separate room sensor (QAA32) can be mounted in a location more convenient for accurate temperature measuring.
- Return air temperature sensing: A temperature sensor (QAH11.1) can be mounted in the return air path of the FCU if measuring temperature accurately in the room is not possible.
- 2 pipe application heating/cooling changeover: For application A8 (2 pipe FCU) a temperature sensor (QAH11.1/ARG86.3) is clamped to the water pipe in order to activate heating/cooling mode changeover.

Fan speed outputs

The RRV851 controller can be configured for a single or three speed fan. Volt-free (SPST) relay outputs Q74, Q84 and Q94 can switch loads up to AC250V, 6 (4) A. Power is supplied via terminal Q71. The low speed terminal is used when single speed fan is configured. On fan start-up the high speed will activate first for approximately 3

seconds and then resume to selected speed. During Auto fan operation the fan speeds will be activated automatically depending on demand.

For further details on auto fan speed control refer to application sheets.

Heat/cool outputs

Output Y1: Cooling or compressor output.

Output Y2: Heating or reversing valve output

Output Y3: Auxiliary output that can be configured for auxiliary heat, emergency heat, 2nd stage cool or dual compressor.

Output control is two position. Three position modulating can be selected via parameter P17 for applications A1, A2 and A8 only.

Configuration

Dip switches

Initial application set-up of RRV controller to match the connected HVAC equipment is made by the selection of dip switch positions. Dip switches are located on the top of the RRV controller. An adhesive label is included in RRV851 packaging box for final recording of Dip switch positions. This can be placed on the Dip switch block to avoid un-authorized changes. Further parameter settings can be made via the QAX850 if required.

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	-	-	-	-
Applic.	A1 - Heat only	-	-	-	off	off	off	off
	A2 - Cool only	-	-	-	on	off	off	off
	A3 - Cool / (heat 3 speed fan)	-	-	-	off	on	off	off
	A4 - Cool / (heat 1 speed fan)	-	-	-	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

Default (as delivered) positions are in bold text.

Commissioning notes

Response on start-up

When powering up, the QAX850 will display all LCD icons for approximately 3 seconds and then the software version number for another 3 seconds. It will then revert to normal display. The time segments will be blinking if time needs to be set. Set time as per operation instructions. There will be a delay before operation commences due to polling of all values.

User operation

User should not have access to dip switches or parameter settings. User operation is via the QAX850 master room unit. For user operation details refer to operating instructions included in packaging box, document AP1B2725en01.

Sensor calibration

Generally there is no need to calibrate sensor; however the displayed room temperature on the QAX850 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.

Commissioning

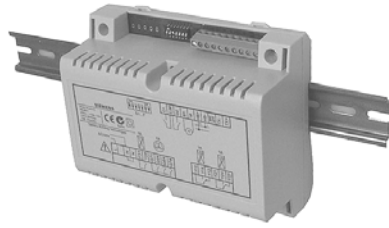
RRV851 controller should be operational after dip switch settings have been made and power is connected. Default parameter settings are based on the application selected and may be modified if required. Refer to list below. Parameters cannot be accessed if system is in off mode. Refer to installation/commissioning guide for set-up details and application sheets for default parameter values.

Set-up parameters

No	Parameter	Range
P00	Temperature scale	°C/ F°
P01	Frost protection limit in OFF mode	Off/5...8°C
P02	Over-temperature limit in OFF mode	Off/30...35°C
P03	Min. OFF time delay	0...600s
P04	Min. ON time delay	0...600s
P05	Dead band between cool and heat OFF points	0.5...6K
P06	RV ON in heat or cool mode	Heat/Cool
P07	Fan run ON after heat output turns Off	0...300s
P08	Fan run ON after cool output turns Off	0...300s
P09	FCU flush pipe time	120...600s
P11	Water temp heat mode changeover	22...32 °C
P12	Water temp cool mode changeover	10...21 °C
P13	Fan auto-speed high range	H:80...100%
P14	Fan auto-speed medium range	M:30...75%
P15	Fan auto-speed low range	L:1...15%
P17	2-p or 3-p control selection	2-p/3-p
P18	P-band in heat mode /Switching differential	0.5...10K
P19	P-band in cool mode /Switching differential	0.5...10K
P20	Integration time	0...60.0 min in 0.5 min steps
P21	3-p valve actuator running time	50...300s
P23	Ventilation in dead zone	Off, H/C, C only

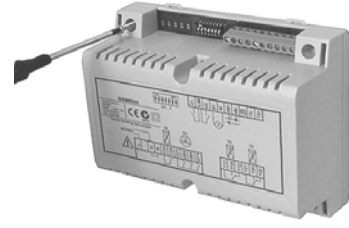
Mounting and installation notes

The RRV851 controller can be mounted in any orientation using the following fixing options:



DIN Rail mounting

The housing base is designed for snap-mounting on DIN rails, type EN50022-35 x 7.5 (can be released with a screwdriver).



Surface mounting

There are two drill holes for screw-mounting (see “Dimensions”).
Screws: Max. diameter 3.5 mm, min. length 38 mm

When mounting note the following:

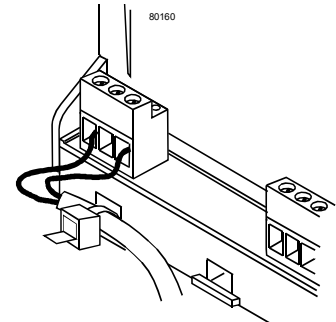
- The controller should not be freely accessible after mounting.
- Ensure adequate air circulation to dissipate heat generated during operation.
- Easy access is required for service personnel
- Local installation regulations must be observed.

The mounting instructions are included in the RRV851 controller packaging.

Note!

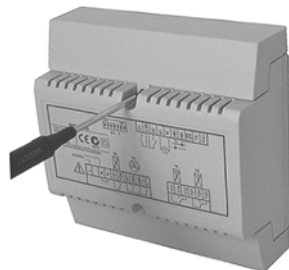
When not mounting within a panel, cable restraints **must** be used for all wiring to (AC 230 V) terminals. The conductors must be secured with cable ties (see diagram).

Cable restraints should be used for all wiring to avoid disconnection.



Terminal cover

Terminal covers are provided in the RRV851 packaging box. The covers include screws for fixing to controller and knock-out holes for cable entry. Covers should only be used where suitable access is restricted to authorized personnel and there is protection from ambient conditions. The covers will provide IP30 protection when surface mounted on wall or FCU.



Removing the terminal cover

Technical data

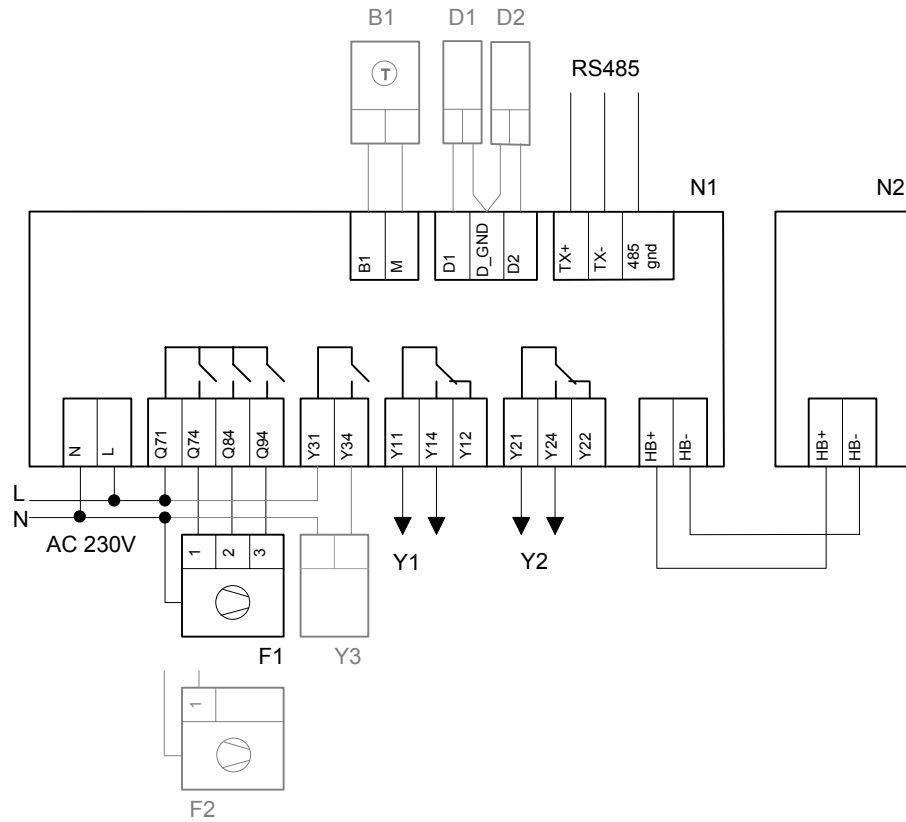
Power supply L, N	Working voltage	AC 230V, +10%, -15%
	Frequency	50/60 Hz
	Power consumption	12VA
Analog input B1	Passive	NTC resistor
	Measuring range	0...49°C
Digital inputs, D1 & D2 (voltage free contacts)	Contact sensing	
	Voltage	DC 5V max.
Interface	Current	Typically 8mA
	HCC bus	Proprietary
	Baud rate	9.6 kbit/s
	Permissible cable length	Max. 60m where A ≥ 0.5mm ²
		Max. 100m where A ≥ 1mm ²
	Cable type	2-wire standard installation cable (unshielded)
Note: Twisted pair (unshielded) is recommended for enhanced immunity to external electromagnetic interference, for example, in the vicinity of radio transmitters or frequency inverters		
Outputs for Q...(Fan outputs)	Relay contacts (potential free)	
	Switching voltage	Max. AC 250V, 6(4)A
Outputs for Y...	Relay contacts (potential free)	
	Switching voltage	Max. AC 250V , 3(1)A
Protection	Protection standard to EN 60529	IP30 with terminal covers IP20 without terminal covers
	Operation	IEC721-3-3 Class 3K5
Environmental conditions	Temperature	0...+50°C
	Humidity	<85% r.h. (non condensing)
	Transport	IEC721-3-2 Class 2K3
	Temperature	-25...+65°C
	Humidity	<95% r.h. (non condensing)
	Storage	IEC721-3-1 Class 1K3
Standards	Temperature	-25...+65°C
	Humidity	<95% r.h. (non condensing)
	CE-conformity	
	EMC directive	89/336/EEC
	Immunity and Emissions	EN 60730-1, EN 50081-1, EN61000-6-2
	Low voltage directive	73/23/EEC
Others features	Electrical safety	EN 60730-1, EN 60730-2-9
	N474 conformity to	
	Australian EMC Framework Radio Interference Emission Standard	Radio communication act 1992 AS/NZS 4251.1
Others features	Software class	A to EN 60730
	Weight (excluding packaging)	0.735Kg

Connection diagrams

RRV851 terminals

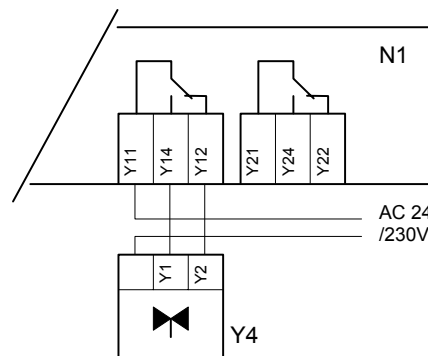
B1	Signal input (ext. sensor NTC)	HB+ HB-	Communication bus
M	Signal ground	L, N	AC 230V supply
D1,D2	Digital inputs	Q...	Digital outputs, AC24...230V, 6(4) A
D_GND	Digital ground	Y...	Digital outputs, AC24...230V, 3(1) A

RRV851 – typical connection

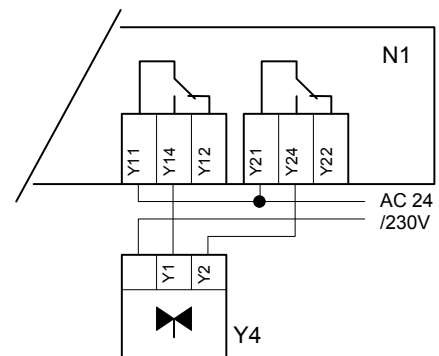


N1	RRV851 controller	Y3	Auxiliary heat, emergency heat or 2 nd stage cooling
N2	QAX850 master room unit	F1	Three speed fan
B1	External temperature sensor (optional) or pipe changeover sensor, appl. A8	F2	Single speed fan
D1	Remote activation of comfort mode	RV	Reversing valve
D2	Fault or emergency heat	CR1	Compressor relay stage 1
Y1	Cooling output	CR2	Compressor relay stage 2
Y2	Heating output	Y4	Valve actuator, AC24/ 230V

Output connections

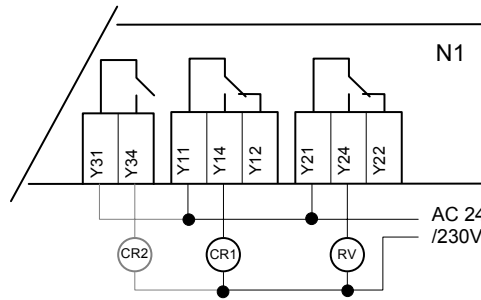


2-pipe FCU, 2-position control (appl. A8)



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

Output connections



(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.

Notes

Product liability

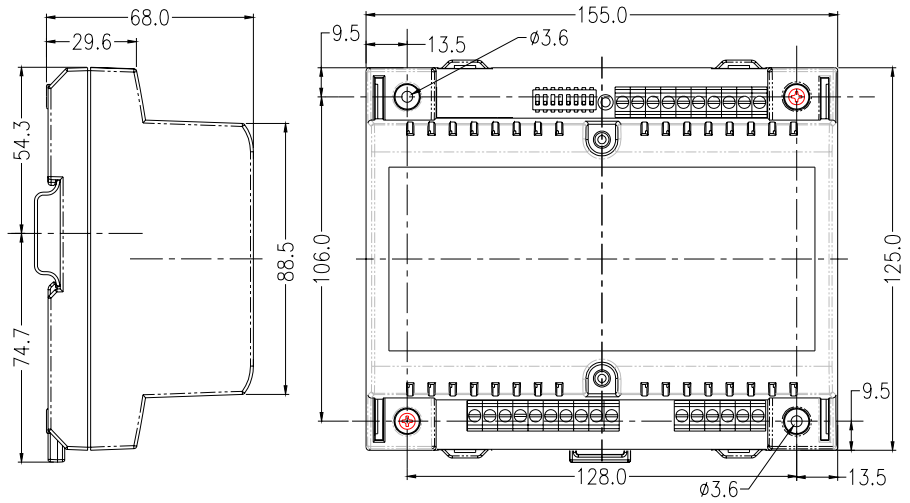
The products may only be used in building services plant and applications as described above. When using the products, all requirements specified under "Technical data" must be observed.

Supporting documentation

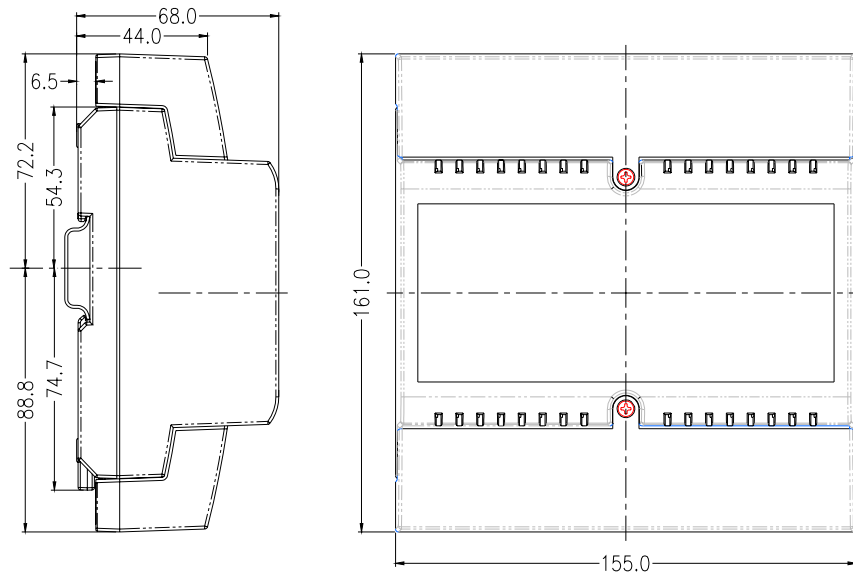
- QAX850 technical data, document number AP1N2722en
- QAX850 mounting instructions, document number AP1M2721
- RRV851 Installation/commissioning guide, document number AP1G2725en
- RRV851 user operating instructions, document number AP1B2725en
- RRV851 applications sheets

Dimensions

Without terminal covers



With terminal covers



Dimensions in mm