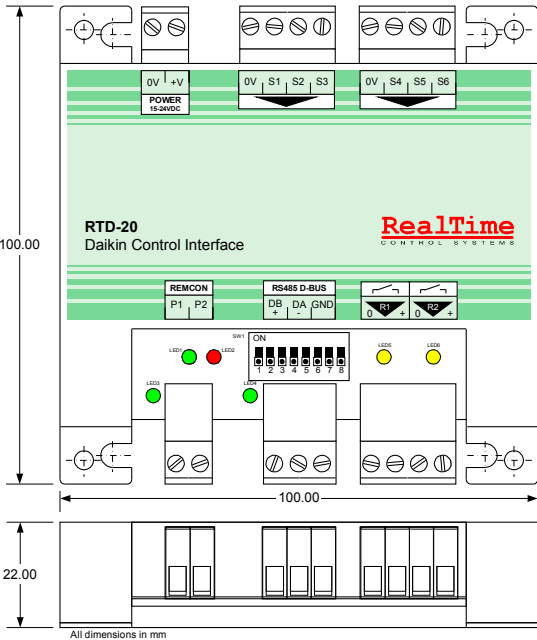


RTD-20 Control Interface v1.06

Installation and Operating Instructions



RTD-20 Description

The RTD-20 is a monitoring and control interface for Daikin VRV and Skyair ranges of air-conditioners; and VAM ventilation units. The interface is compatible with all units that have a P1,P2 remote controller network connection and allows control of up to 16 units in a single group.

Control Functions

Retail Mode: Up to 16 RTD-20s can operate as a coordinated Retail Control System. Multiple Shop Floor and User Control Zones can be controlled with global or zone level settings. Zone setpoints can be limited or locked to restrict staff control of the system. Energy Efficient unit control minimises operating costs.

VAM Control: Advanced control of VAM Units with energy efficient operation of heat-recovery and 3 speed fan control with optional CO₂ sensor speed control. Supports integration with Retail Mode.

Air Curtain Control: Advanced control of Daikin Air Curtains Units with energy efficient operation, Outside Air compensated operation Supports integration with Retail Mode including optional cooling interlock.

Partitioned Room Control: Up to 4 zones can be operated as stand-alone systems that automatically group together when connecting partitions are opened.

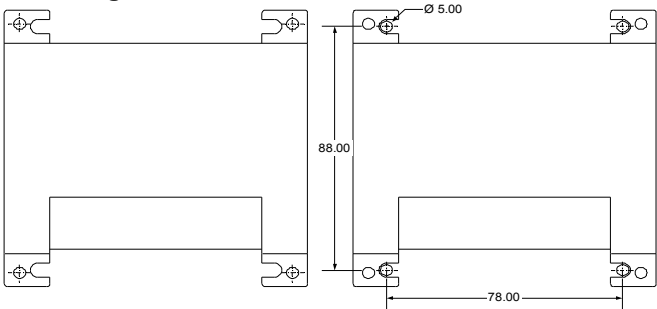
Warnings and Cautions



Do not exceed the specified fault relay ratings

Observe precautions for handling Electrostatic Sensitive Devices

Mounting



MOUNTING PILLARS

The RTD-20 is supplied with 4 mounting pillars that can be used to mount the interface within units with compatible mounting holes

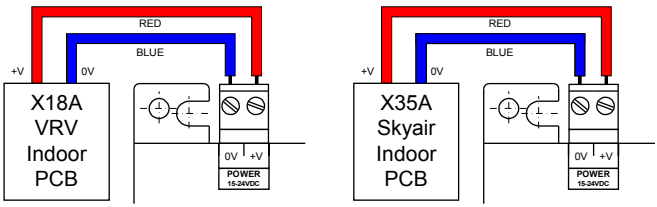
SCREW MOUNTING

The RTD-20 can be mounted using screws of up to 5mm diameter.

The RTD-20 can be mounted horizontally or vertically.

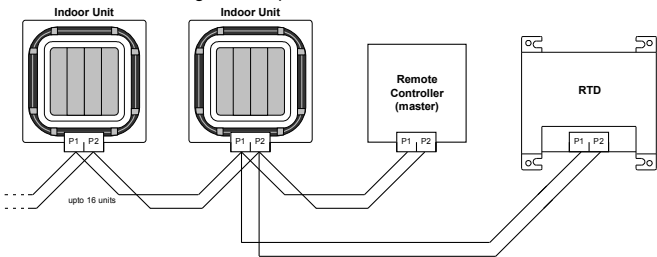
Power Supply

The RTD-20 requires a 15V to 24VDC power connection. Power can be supplied from VRV indoor unit PCB X18A connection, a Skyair indoor unit PCB X35A connection or VAM PCB X11A connection . A 1m cable and connector is supplied with the RTD-20.



P1,P2 Network

Terminals P1, P2 connect to the Daikin P1, P2 network. P1,P2 installation should follow Daikin installation specifications. The RTD-20 can operate in MAIN or SUB mode with any Daikin remote controller. Operation is also possible without a remote controller being connected. Note that infra-red receivers must be configured to operate in slave mode.



Retail Mode – Primary Shop Floor Zone

S

A Primary Shop Floor Zone is the primary control zone in Retail Mode. The Primary zone is always Modbus Address 0. Additional Retail Zones can be networked to the Primary Zone and will receive control signals from the Primary Zone. The Remote Controller must be configured as a SUB in this mode.

DIP Switch Settings	Setpoint Limit	Setpoint Limit
	19 to 23°C	20 to 24°C

Input	Name	Range (default)
S1	PIR	Open Circuit: No Activity Short Circuit: Activity
S2	Spare	
S3	Trade Extension	Momentary Action Volt Free Contact
S4	Trade	Open Circuit = Not Trade , Closed Circuit = Trade,
S5	Occupied	Open Circuit = Unoccupied , Closed Circuit = Occupied
S6	Engineers Mode	Momentary Action Volt Free Contact

Output	Name	Operation
R1	Trade	Closed on Trade:AUTO or Extend Trade
R2	Fault	Closed on any unit fault

Store Modes

Inputs S4 and S5 define the Store Mode of the site, this is transmitted to all Secondary zones to determine their modes of operation.

S5 Occupancy	S4 Trade	Store Mode
OPEN	OPEN	UNOCCUPIED
OPEN	CLOSED	UNOCCUPIED, (6 hour Post-Trade Extend window)
CLOSED	OPEN	PRE-TRADE (Before Trade Occurred)
CLOSED	CLOSED	TRADE
CLOSED	OPEN	POST-TRADE (After Trade Occurred)

When **UNOCCUPIED** all systems are switched off and locked. At the start of the **OCCUPIED** period the system initially operates in the **PRE-TRADE** mode until **TRADE** operation, after which the system enters the **POST-TRADE** mode.

If only one signal is available, then S4 should be linked CLOSED. In this configuration the mode will switch between **UNOCCUPIED** and **TRADE**.

Start-up Operation

At the start of the **OCCUPIED** period the Shop Floor units will run in at high speed with Louvers at 90° for a minimum of 15 minutes, even if the store enters **TRADE** during this period. The startup period is used to destratify the shop floors and purge any heat build-up. For the first 3 minutes the system will run in FAN mode, followed by a Restricted AUTO mode for 12 minutes during which HEAT is enabled if required but cooling is prohibited. This operation will occur in both **PRE-TRADE** and **TRADE**. During this period the Fan and Louvre buttons on the Remote Controller are locked.

During **PRE-** and **POST-TRADE** the shop floor is controlled to minimum comfort conditions (17°C to 26°C), if the temperature is within the minimum comfort limit then the units will run in FAN at high speed. During **TRADE** the system will be controlled to the specified setpoint with a deadband of +/-2°C.

Trade Extension (S3)

During the **POST-TRADE** mode, a momentary closed circuit on input S3 will cause all Shop Floor Zones to revert to **TRADE** operation for a 2 hour period before reverting to **POST-TRADE** mode. If the store is **UNOCCUPIED** but S4 is linked then an extension is allowed for 6 hours after the end of occupancy. An additional pulse will cancel the extension.

Engineers/Commissioning Mode (S6)

Input S6 is used to unlock the system control to allow maintenance and commissioning operations. The following modes are available using S6.

Engineers Mode	Momentary Input on S6 enters Engineers Mode Remote Controllers Totally Unlocked (lock symbol disappears) Setpoint Limits Removed
Commissioning Mode	Firstly Enter Engineers Mode Hold S6 closed for 5 seconds to enter Commissioning Mode LED1 and LED2 are both illuminated on all RTDs. System operates as Normal Mode , but all setpoint limits are removed, mode change timers are not used, Trade Extension Timer is reduced to 60 seconds.

To revert to Normal Operation apply an additional momentary input to S6. Normal Operation will also be revert to after 2 hours.

Low Temperature Protection (Requires Activation using Modbus)

If activated, when the site is **UNOCCUPIED** The Primary Zone Space temperature is monitored and if it falls below the Low Temperature Limit (default 15°C) then all RTD zones will run in heating mode until the condition is cleared. Each secondary zone will also monitor local temperatures and will run if a local Low Temperature condition is detected. If Input S2 is wired then this is used, otherwise the A/C unit return air sensor is used.

Intelligent Demand Prediction (IDP)

The Primary Zone monitors the operating demand from the Indoor Units and predicts future system demand to minimise unnecessary heating and cooling operation. Under conditions where the site is predicted to have a dominant cooling load the IDP will prevent unnecessary heating occurring, if a dominant heating load is predicted then unnecessary cooling will be prevented.

Secondary Retail Zones use the primary IDP mode by default to determine their operation. Secondary zones can be configured to use their own local IDP, or can have their IDP operation disabled completely. Secondary User Control zones are not affected by the Demand Prediction and will allow heating and cooling on demand.

Retail Mode – Secondary Shop Floor Zone

S

A Secondary Shop Floor Zone provides control of additional Shop Floor zones. The Primary Zone determines the overall operating conditions of the shop, the secondary zone can be configured to operate with local control of the secondary zone during trading conditions, or to slave its control from the Primary Zone. The Remote Controller must be configured as a SUB in this mode.

DIP Switch Settings		Setpoint Limit 19 to 23°C		Setpoint Limit 20 to 24°C
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The RTD-20 inputs are used to configure the operation of the Secondary Shop Floor Zone.

Input	Name	Range (default)
S1	PIR	Open Circuit: No Activity Short Circuit: Activity
S2	Setpoint	Open Circuit: RC Unlocked Short Circuit: Setpoint from Primary
S3	Local IDP	Open Circuit: Use Primary Zone IDP Closed Circuit: Use Local Zone IDP
S4	Spare	
S5	Spare	
S6	Spare	

Outputs are the same as for the Primary Shop Floor Zone

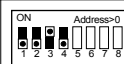
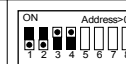
Setpoint S2

Input S2 can be configured to allow local control of the zone setpoint from the remote controller, or the value can be slaved to the Primary Ship Floor Zone.

Retail Mode – Secondary User Control Zone

M S

A Secondary User Control Zone allows users to alter unit operation during the occupied period. The primary zone co-ordinates the User Control Zone and ensures the zone is shut down when **UNOCCUPIED**. User Control zones can be configured to support areas with permanent or temporary occupancy.

DIP Switch Settings		Setpoint Limit 19 to 23°C		Setpoint Limit 20 to 24°C
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The RTD-20 inputs are used to configure the operation of the Secondary User Control Zone

Input	Name	Range (default)
S1	PIR	Open Circuit: No Activity Short Circuit: Activity
S2	Setpoint Reset	Open Circuit: Not Active Closed Circuit: Reset Setpoint at start of user operation
S3	User Zone Type	Open: Staff Zone Closed: Customer Zone
S4	Timed/Std	Standard Timed User Control Zone
S5	Timed/PIR	Timed User Control Zone with Minimum Comfort
S6	Spare	

When the primary zone is **UNOCCUPIED** the remote controller is locked and the A/C unit is switched off. When unlocked the Remote Controller is restricted to allow only AUTO and FAN modes. If other modes are selected the mode will be overridden. At the start of occupancy the mode is always reset to AUTO.

if S2 is short-circuit then the setpoint will reset to the default setpoint at the start of the occupied period (the default setpoint is Setpoint Limit - 2).

	S4	S5	
Standard User Control Zone	Open Circuit	Open Circuit	Remote Controller is unlocked and unit switched ON at start of OCCUPIED.
Standard Timed User Control Zone	Closed Circuit	Open Circuit	Unit is unlocked and OFF at start of OCCUPIED. If the unit is switched ON from the remote controller the unit runs for 1 hour and then switch OFF If S1 is linked and the site is OCCUPIED but before TRADE, the RTD will maintain minimum comfort conditions in the room of setpoint range +/-1°C.
Timed User Control Zone with Minimum Comfort	Open Circuit	Closed Circuit	Unit is unlocked and OFF at start of OCCUPIED. If movement is detected on input S6 or the unit is switched ON from the remote controller the unit will run for a minimum of 1 hour or until no motion is detected and then switch OFF. When OCCUPIED but no motion is detected, the RTD will maintain minimum comfort conditions in the room of setpoint limit range +/-1°C. E.g. for a setpoint range of 19 to 23°C, minimum comfort control ensures that room temperature remains within the limits 18°C to 24°C

VAM Control S

VAM Control mode allows VAM units to be operated either stand-alone or as part of a retail control group. A wired remote controller is optional, and if used should be configured as a SUB.

DIP Switch Settings	Resistance Mode (S1,S2,S3)	Voltage Mode (S1,S2,S3)
ON 1 2 3 4 5 6 7 8	ON 1 2 3 4 5 6 7 8	ON 1 2 3 4 5 6 7 8

Inputs S1 to S3 can be configured in either Resistance or Voltage mode. In Retail mode the inputs can be left unwired, in which case unit operation will be determined by the Primary Retail Zone. In Retail mode inputs S4 and S6 can be wired to provide hardwired control.

Input	Name	Resistance Mode	Voltage Mode
S1	Setpoint 16..32°C	0.3..10kΩ : 16..32°C Open Circuit: 22°C/AC Unit Short Circuit: Retail Primary SP	1..10V Open Circuit: 22°C Short Circuit: Retail Primary SP
S2	VAM Fanspeed	Low<=1.1kΩ, High=2.2kΩ, HighHigh=3.3kΩ Open Circuit: Unlocked	Unit Off=0V..0.9V , Low=1V..4.4V High=4.5V..7.4V, HighHigh=7.5..10V
S3	VAM Damper	Open: Auto Damper Heat Recovery=2.2kΩ, Bypass=3.3kΩ Short Circuit: Auto Damper, Trade Operation Only.	Auto<=1.75V , Heat Recovery=3.25V, Bypass=4.75V
S4	SPARE		
S5	Unit Disable (Fire)	Open Circuit = Unit Disabled Closed Circuit = Unit Enabled	
S6	Fresh Air High Volume	Open Circuit = Normal Closed Circuit = HH Fan / Damper Bypass Mode	

Output	Name	Operation
R1	Trade	Supply Fan DISABLE (Open circuit = Fan Enable)
R2	Fault	Closed on any unit fault

Input S1 (Setpoint) can be used to specify a fixed setpoint or slave the VAM to an external setpoint. If S1 is short circuit then the VAM will control to the Primary Retail Zone setpoint. If Open Circuit then if A/C units are present on the same network then the VAM will pickup the setpoint from the unlocked Remote Controller setpoint, otherwise the VAM setpoint is fixed at 22°C.

Input S2 (VAM Fanspeed) can be used to program the VAM fanspeed, or if left open circuit allows the fanspeed to be adjusted from the VAM fanspeed button on a Remote Controller. In voltage mode a CO2 sensor with suitable output scaling can be used to control the fanspeed, if the CO2 sensor voltage is below the minimum 1V threshold the unit will be switched off.

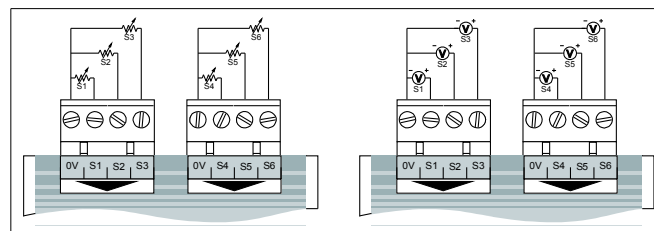
Input S3 (VAM Damper) should be left Open circuit unless external control of the bypass damper is required. In the default AUTO mode the damper will be controlled to ensure the most energy efficient operation under all conditions. If S3 is short circuited in Retail Mode then the Damper will operate in AUTO, and the VAM will only run during the **TRADE** period.

Input S5 (Unit Enable) must be linked for the unit to run. If open circuit then the VAM will be forced OFF unless input S4 overrides the unit to Extract Only. In stand-alone operation the S5 input can also be used for on/off functionality. In Retail Control the unit will be switch on/off by the **OCCUPIED** state of the Retail Primary Zone. If input S3 is Short Circuited then the unit will only run during the **TRADE** condition.

Input S6 (Fresh-Air/High Volume) Operates the system at HH fan damper in bypass mode. Input S5 must be Closed circuit for the unit to run.

RTD-20 Standard Inputs

Inputs S1 to S6 are wired between the labelled Sensor terminal and the 0V terminal on the same connector block.



Input S1 Setpoint Configuration:

Setpoint	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
S1 kΩ	0.3	0.9	1.5	2.1	2.6	3.2	3.8	4.4	5.0	5.6	6.2	6.8	7.4	7.9	8.5	9.1	9.7
S1 Volts	1.3	1.8	2.3	2.9	3.4	3.9	4.4	5.0	5.5	6	6.6	7.1	7.6	8.1	8.7	9.2	9.7

Resistances should be within +/-250 ohms of the quoted value. Open circuit is R>200kΩ. S1 in resistance mode is designed to be operated using a *linear* 10kΩ variable resistance.

It is recommended that volt-free contacts or switch mechanisms have gold plated contacts to ensure a low resistance circuit when the switch is made.

S1 to S6 cables should be 0.5 to 1.0 mm² multi-stranded screened twisted pair. The screen should be earthed at one end only. The maximum distance from the RTD-10 to the input source is 200m.

RTD-20 Standard Outputs

Unless specified otherwise Relay Outputs are configured as follows

Output	Name	Operation
R1	Run	Unit Running
R2	Fault	Closed on any unit fault

Relays rated for maximum 1A, 24VAC/30VDC

Air-Curtain Control M S

Air-Curtain control allows Daikin Air-Curtains to be manually or automatically controlled. Control can be stand-alone or coordinated by a Primary Retail Zone.

DIP Switch Settings	Setpoint Limit 19 to 23°C	Setpoint Limit 20 to 24°C
ON 1 2 3 4 5 6 7 8	ON 1 2 3 4 5 6 7 8	ON 1 2 3 4 5 6 7 8

M Standard Control is selected by configuring the Remote Controller in MAIN mode, in this mode the unit can be switched on and off from the remote controller, input S5 or a Primary Retail Zone. If Outside Air Sensor S3 is not wired then the user can manually select the unit mode using the remote controller, otherwise unit Mode is locked.

S Advanced Control is selected by configuring the Remote Controller as a SUB, or omitting it altogether. In this mode the unit can be switched on and off from the remote controller, input S5 or a Primary Retail Zone. All other remote controller keys are locked except for Setpoint if input S1 is open circuit, in which case a limited setpoint range is allowed.

Input	Name	Range (default)
S1	Setpoint	0.3..10kΩ : 16..32°C (Remote Controller Setpoint Locked) Open Circuit: Remote Controller Setpoint Unlocked Short Circuit: Lock Setpoint Setpoint Limit -1 Primary Setpoint if Retail Secondary Zone
S2	Auxiliary Space Temp / Primary Interlock	10kΩ NTC Thermistor <i>Recommended part: RS Stock No. 813-806</i> Open Circuit: Control from Indoor Unit Sensor Closed Circuit : Control Interlock with Primary Zone
S3	Outside Temp	10kΩ NTC Thermistor <i>Recommended part: RS Stock No. 813-828</i>
S4	Door Closed	Door Closed = Closed Circuit, Door Open = Open Circuit
S5	On/Off	On = Closed Circuit, Off = Open Circuit (last touched)
S6	Commission	Open Circuit: Normal Short Circuit: Commission Mode

In Advanced Control, when the unit is in HEAT mode the Return Air temperature is used to determine a heat demand based on the setpoint. If there is no demand the unit will run at minimum heat capacity with LOW fan, otherwise the fan will run in HIGH and the unit will increase heat output. In FAN mode the speed will be LOW if the inside air is below the control setpoint, and HIGH otherwise.

Input S2 (Space Temp / Interlock) If a 10kΩ NTC Thermistor is wired then the RTD will use this sensor instead of the unit return air sensor for control. If the input is Closed Circuit then the input acts as an Interlock and Heating will be inhibited if the Primary Retail Zone is in cooling, or if the Demand Prediction inhibits heating.

Input S3 (Outside Temp) monitors the outside air conditions and determines when the air curtain will operate in FAN or HEAT. The sensor samples over a 24 hour period and is not affected by direct sunlight. This input is required when the Remote controller is a SUB, when the Remote Controller is configured as a MAIN the input is optional and the Mode button will be unlocked if S3 is open circuit.

Input S4 (Door Closed) switches the air curtain to setback mode after the door has been closed for 3 minutes, after which the door must open and remain open for 1 minute before the setback is cancelled.

Input S6(Commission) If linked will cause the door close timers to be reduced to 10 seconds and the Outside Air sample window to be reduced to 10 seconds.

