



Temperature Controller (Heat Pumps)

RWD34
RWD44

For comfort control in HVAC & R-Systems

Stand alone electronic controller
Programmable controller with pre-configured applications
Two universal inputs for Ni1000, Pt1000 or active 0...10VDC
Four 2-position (On/Off) outputs
Suitable for 1, 2 and 3-stage compressor
Entering or changing of parameters via push buttons or software tool
PC connection for downloading canned applications via software tool
DIN rail or Panel mount

Use

The RWD34 and RWD44 controllers are primarily designed for controlling Heat Pumps.

Control equipment

- Single, dual or triple compressor Heat Pumps
- Single, dual stage heating and cooling equipment
- Single, dual stage cooling equipment
- Single, dual stage heating equipment

Functions summary

- Controller
 - Stand alone controller with four 2-pos (On/Off) outputs.
- Universal input X1 for the main temperature sensor.
- Universal input X2 for the following auxiliary functions.
 - On/Off (Standby)
 - Remote setting unit
 - Alarm
 - Filter Alarm
 - Setpoint compensation
 - Averaging sensor
 - Winter/Summer setpoint changeover
 - Sensor select
 - Active input
- Digital input D1 for the following functions.
 - Day/night change over setpoint
 - On/Off (Standby)
 - Alarm
 - Filter Alarm

Controller type

<i>Input</i>		<i>Outputs</i>	<i>Supply Voltage</i>	<i>Type</i>
Analog	Digital	Digital		
2	1	4	AC 230V	RWD34
2	1	4	AC 24V	RWD44

Accessories

<i>Name</i>	<i>Type</i>
Protective single enclosure for wall mounting	ARG62.21
Protective multiple enclosure for wall mounting	ARG62.22
Time Clock	SEH62.1
Transformer	SEM62.1 & SEM62.2

Equipment combinations

The following units can be connected to RWD34/44 controllers.

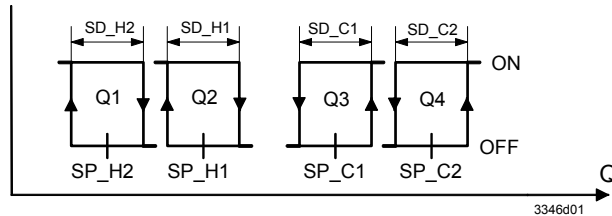
<i>Units</i>	<i>Product type</i>
Sensors with Ni1000 temperature sensing element	QAA24, QAM2120, QAE2120 or FGT-PT1000
Sensors with PT1000 temperature sensing element	QAA2012
Sensors with DC0...10V measuring signal	QAA2061 or QAA2061D
Room temperature sensor with setpoint adjuster	QAA25 or QAA25/AP
Remote setpoint adjuster	BSG21.2 or BSG61
Other equipment with 2 position inputs Examples: compressors, electric heaters, fans	

Other combinations with third party units are possible, provided input and output specifications match the controller.

Functions

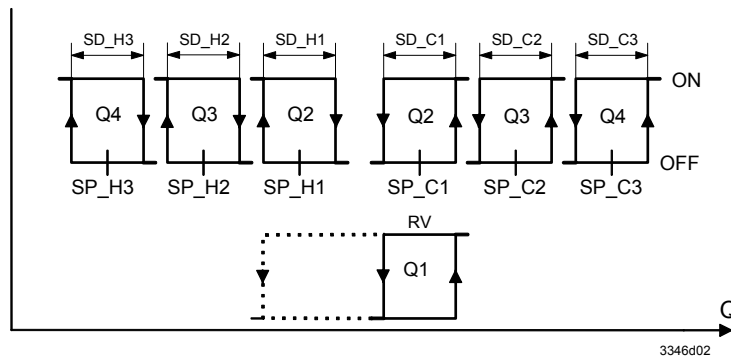
- Main Function** The RWD34 and RWD44 controllers execute primary and auxiliary functions. The X1 input detects the actual temperature and compares it with the setpoints. Depending on the deviation, the controller acts with its output to achieve the desired setpoints.
- Applications** The controller has standard pre-configured applications. For application numbers refer to page 14 or the commissioning guide.
- Outputs** The outputs Q are configured as per application type.

2-stage heating and cooling
Applications #10...#19

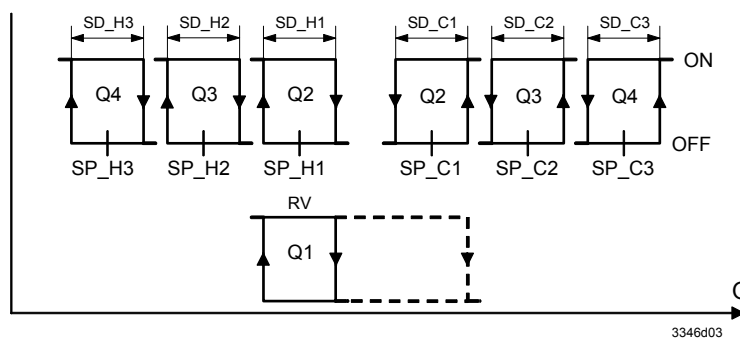


SP_H...	Setpoint heating stage...	Q2	Heating stage 1
SP_C...	Setpoint cooling stage...	Q1	Heating stage 2
SD_...	Switching differential	Q3	Cooling stage 1
Q	Load	Q4	Cooling stage 2

3-stage compressor with reversing valve on cooling.
Applications #20..#29



3-stage compressor with reversing valve on heating
Applications #30..#39



SP_H...	Setpoint heating stage...	Q1	Reversing valve
SP_C...	Setpoint cooling stage...	Q2	Compressor 1
SD_...	Switching differential	Q3	Compressor 2
Q	Load	Q4	Compressor 3

Reversing valve (RV) Reversing valve can be energised on cooling or heating demand. It depends on the internal equipment circuitry. The reversing valve can be set to switch ON or OFF during no demand as shown on the above diagrams.

Compressor Outputs

Q2, Q3, Q4 outputs response to cooling and heating demand. The controller can be configured for single, dual or triple stage compressor.

Delay functions

In order to prevent the equipment from switching on/off frequently, the controller has adjustable time delays for the Q outputs.

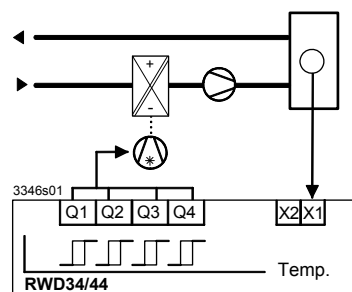
Delay	Range
Minimum On time (Q.. stay on)	0...4096sec
Minimum Off time (Q.. stay off)	0...4096sec
Inter-stage delay (stage 1 ⇒ stage 2 ⇒ stage 3)	0...4096sec
Changeover delay (heating ⇔ cooling)	0...4096sec
Winter ⇔ Summer Setpoint changeover	23Hours 59min

Applications

Example

Room temperature control with a 3-stage compressor

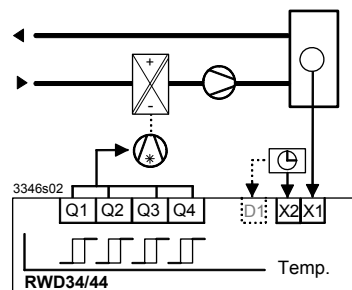
- X1 Room temperature
- Q1 Reversing valve
- Q2 Compressor 1
- Q3 Compressor 2
- Q4 Compressor 3



Auxiliary and digital functions

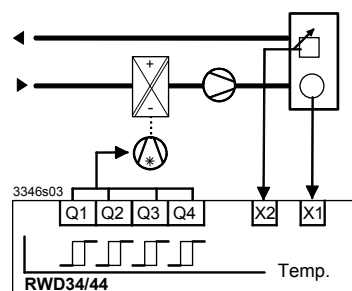
Standby

Standby operation is enabled by closing (via time clock, switch) the universal input X2-M or digital input D1-GND. When controller in standby mode, the output relays are inactive. If X2 is used as standby then D1 can be set as a filter alarm or an alarm.



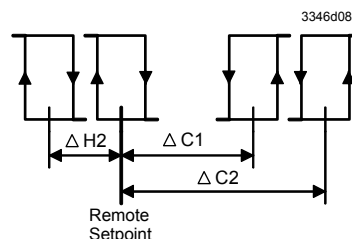
Remote setting unit

A remote setpoint transmitter (BSG21) or an integrated sensor with setpoint (QAA25/AP), connected to X2 enables remote adjustment.



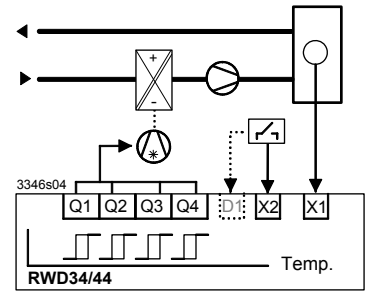
Heating stage 1 is the remote setpoint and the reference setpoint. A Shift setpoint (Δ) is set between the stages.

Example: 2 stage compressor



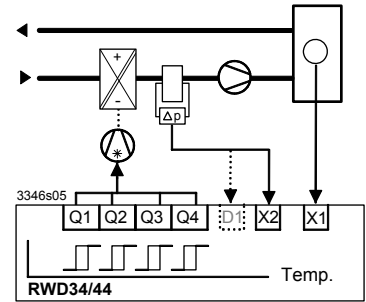
Alarm

A switch contact between X2–M or D1–GND is used to enable the alarm function. When the contact is closed, the output relays are inactive and the alarm icon flashes on the LCD. The alarm function overrides all other auxiliary and digital functions.



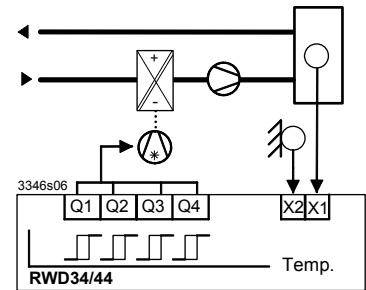
Filter Alarm

A switch contact (via air pressure switch) between X2–M or D1–GND is used to implement a filter alarm signal. The control outputs are not affected by filter alarm. Example: The filter alarm is used for dirty filter indication.



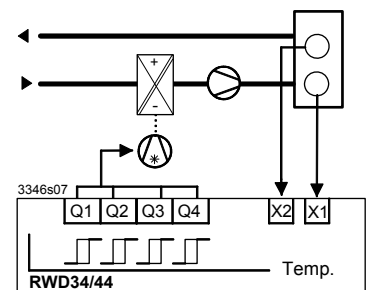
Setpoint Compensation

Setpoint compensation is based on the difference between the outdoor temperature (X2) and setpoint. The current setpoint will be shifted depending on the outdoor temperature.



Averaging sensors

Two signals are connected to X1 and X2. The average between both is the controlling signal used by controller. Example: Averaging sensors are used for large zones



Winter/Summer Setpoint change-over

This application is used mainly on water heat pumps supplying to two-pipe FCU systems.

Digital changeover (X2 = Digital input)

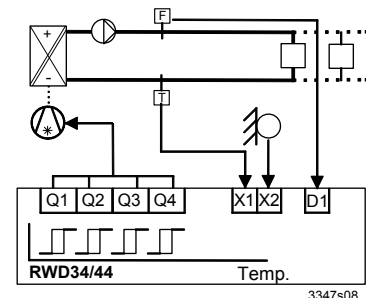
When X2 is closed, summer setpoints are selected and only cooling is active.

When X2 is open, winter setpoints are selected and only heating is active.

Analog changeover (X2 = outside air sensor)

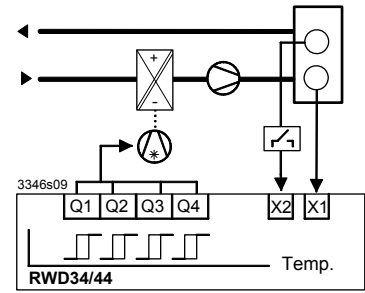
When the X2 > summer changeover setpoint, summer setpoints are selected and only cooling is active. When the X2 < winter changeover setpoint, winter setpoints are selected and only heating is active.

The above application, D1 is set as an Alarm. If the flow switch detects no flow, the RWD34/44 outputs will be inactive.



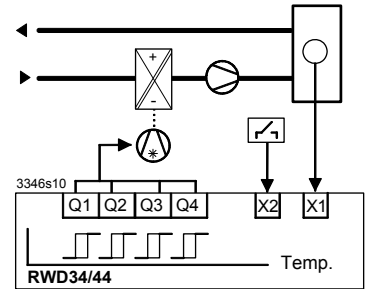
Two-sensor select

Two sensors connected to X1 and X2. A switch on the wall is used to select the controlling sensor. When the switch breaks, the controller selects X1 as the controlling signal.
Example: System serving two meeting rooms. One permanently occupied office and a training room



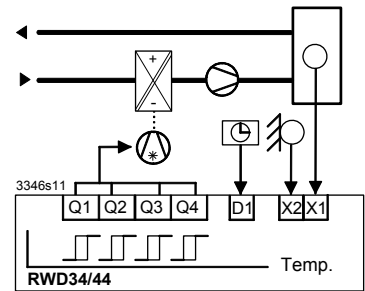
Main loop active

X1 to be 0-10V and X2 to be on/off input.



Day/night setpoint

A contact between terminals D1-M can be used to implement setpoint changeover for day/night operation. When contact is open, the setpoints for day operation is selected. During night mode, the following auxiliary functions are inactive: remote setpoint and setpoint compensation.



Mechanical Design

Housing

The RWD34 and RWD44 controllers are as per DIN 43 880 Gr. 1 requirements.

Protective housing ARG62.21/ARG62.22

A protective housing is used to protect the controller when mounted outside a control panel, such as on ducts, walls and in plant rooms. Furthermore, the protective housing prevents inadvertent contact with voltage supplying parts such as the connecting terminals.

The RWD34 and RWD44 clip into the protective housing.

The cable entries are located at the top and the bottom of the protective housing.

The front has an opening for the LCD display and the programming buttons.

Mounting options

The RWD34 and RWD44 universal controllers can be mounted as follows:

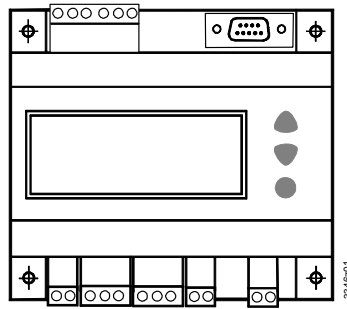
- In a standard electrical control cabinet as per DIN 43 880
- Wall mounted in a protective housing
- Front mounting with standard available installation elements

Terminals

Plug-in screw terminals

Operating and display elements

The RWD34 and RWD44 are operated by the buttons on the controller front. Additional tools are not necessary. A 9-pin port is provided for optional programming via the software tool.



LCD

The LCD shows the following information for normal operation:

- Current operating values (maximum 4 digits)
- Current setpoints (day/night)
- Application number
- Compressor status
- Auxiliary input value
- Selected auxiliary function

Operating buttons

The controller has three operating buttons for the following functions:

SELECT ●

The SELECT ● button is used to enter or save the value adjustment.



The ▲▼ operating buttons are used for viewing and adjusting parameters.

Parameter setting

To configure the controller, follow the instructions supplied with the controller.

Engineering notes

Intended use

Use this controller only for applications as described in the description on the title page (bold print) and the section "Use". Additionally, observe all conditions and restrictions imposed in this section and in "Technical data".

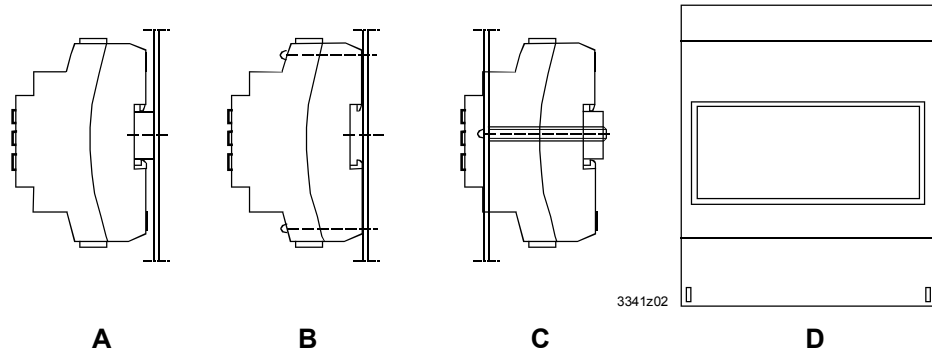


The sections marked with a warning symbol contain technical safety requirements and restrictions. Observe all of these warnings as they directly relate to the protection of personnel and equipment.

Installation notes

The RWD34 and RWD44 controllers can be mounted as follows:
Observe all local installation and mounting regulations.

- A On a DIN rail (EN 50 022-35 x 7.5) at least 120 mm long
- B Wall mounted with 2 screws
- C Front mounted using standard elements.
e.g. 1x DIN rail 150 mm long
2x hexagonal placeholders 50 mm, washers and screws
- D In the ARG62.21/ARG62.22 protective housing



Electrical installation

Standard cables can be used for the controller. However, when mounting in an environment greatly exposed to EMC, use only shielded cables.



- The RWD34 is designed for AC230V operating voltage
- The RWD44 is designed for AC 24 V operating voltage.

The low voltage must comply with the requirements for safety extra-low voltage (SELV) as per EN 60730.

Use safety insulating transformers with double insulation as per EN 60742; they must be designed for 100 % on-time.

When using several transformers in one system, the connection terminals G0 must be galvanically connected.

Supplying voltages above AC 24 V to low voltage connections may damage or destroy the controller or any other connected devices. Additionally, connections to voltages exceeding AC 42 V endanger personnel safety.

Commissioning notes




A booklet is supplied with the RWD34 and RWD44 controllers for commissioning.

Observe the following:

- The controller must be configured for plant-specific operation using standard application number.
- Plant specific fine tuning can be performed if required (refer to the commissioning booklet).
- Power supply to the controller and the connected devices must be guaranteed
- Values and settings entered remain available even on power failure.

Technical data

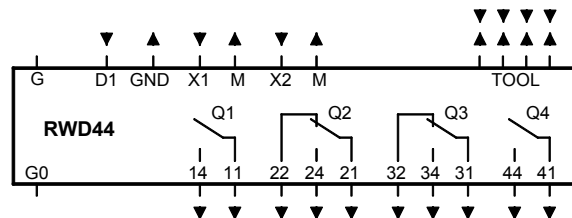
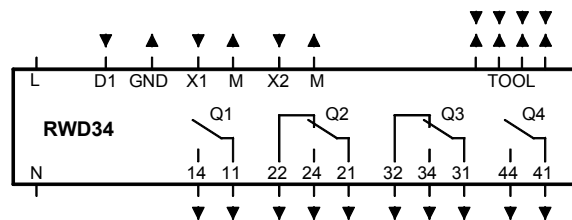
General data


 Power supply	Operating voltage RWD34	AC 230 V +10% -15%
	Operating voltage RWD44	AC 24 V ±20 %
	Safety extra-low voltage (SELV) as per Frequency RWD34 & RWD44	EN 60730 50 Hz/60 Hz
Power consumption	RWD34	6 VA
	RWD44	4 VA
LCD	Actual and nominal values	4 digits
Display resolution for (these values do not relate to the controller accuracy)	Ni 1000 Ω	0.5 °C
	Pt 1000 Ω	0.5 °C
	Active sensor	Depends on the setting range
Environmental conditions	Transport	IEC721-3-2
	Climatic conditions	Class 2K3
	Temperature	-25...+70 °C
	Humidity	<95 % r.h.
Environmental conditions	Mechanical conditions	Class 2M2
	Operation	IEC721-3-3
	Climatic conditions	Class 3K5
	Temperature	0...+50 °C
IP code	Humidity	<95 % r.h.
	Housing	
	Front and with ARG62.21	IP 30 as per EN 60529
	Front and with ARG62.22	IP 30 as per EN 60529
Product standards	Automatic electrical controls for household and similar use	EN 60730
 Conformity	In accordance with European Union directives	
	Electromagnetic compatibility EMC	89/336 EEC
	Low voltage directive	73/23 EEC
	Emissions	EN 50081-1
	Immunity	EN 50082-1
Other international approval	Safety	EN 60730
		 N474
Terminals	Screw terminals for cables with	min. 0.5 mm dia. max. 2 x 1.5 mm ² or 2.5 mm ²
Weight without packaging	RWD34	0.360 kg
	RWD44	0.300 kg
Analog inputs X1, X2		
Ni 1000 Ω at 0 °C	Controller Measuring Range	-50...+150 °C
	Max. cable length for dia. 0.6 mm	max. 300 m
Pt 1000 Ω at 0 °C	Controller Measuring Range	-20...+180 °C
	Max. cable length for dia. 0.6 mm	max. 300 m
Analog voltages (for measured variables in °C, % or without unit)	Range	DC 0...10 V corresponding to adjustable range from -100 to 2400 (°C, % or no unit) max. 300 m

	Max. cable length for dia. 0.6 mm	
Remote setpoints X2	Range	0...1000 Ω corresponding to adjustable range from -100 to 2400 (°C, % or no unit)
	Max. cable length for dia. 0.6 mm	max. 300 m
Digital input D1	Polling voltage for control commands (D...M)	DC 15 V
	Current consumption	<15 mA
Digital outputs Q..	Relay contacts (potential-free)	
	Voltage	AC 24...230 V
	Maximum rating	AC 230 V, 4 A resistive, 3 A ind. (per relay terminal)
	Minimum rating	DC 30 V, 4 A AC 19.2 V, 20 mA DC 5 V, 100 mA

Diagrams

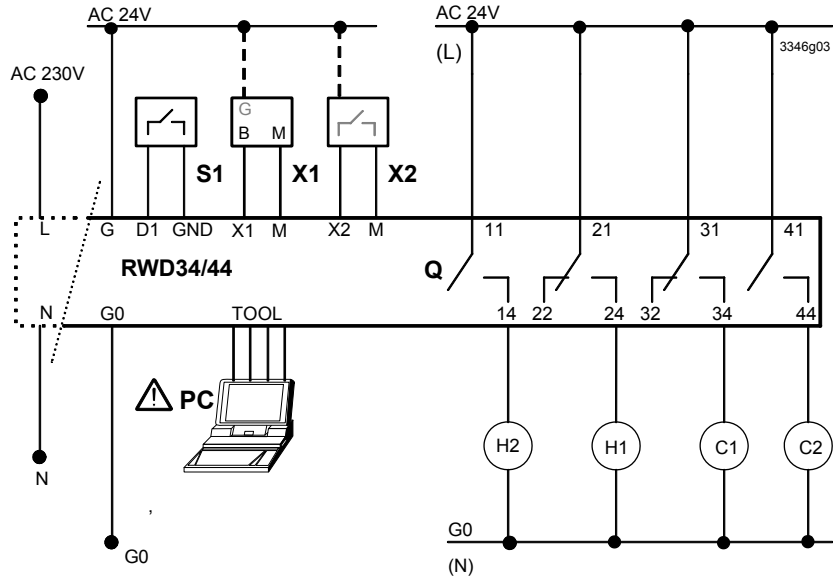
Internal Diagram



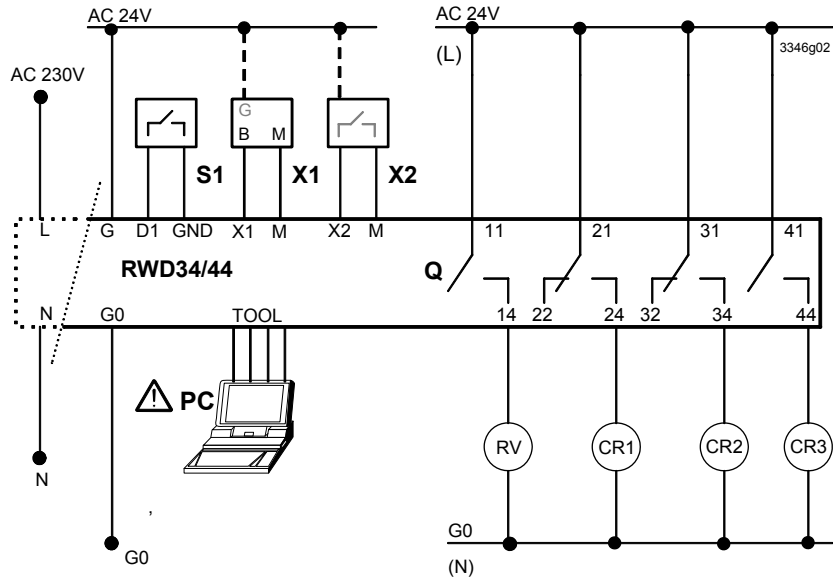
D1	Digital Input
G, G0	AC24V supply ( SELV AC 24 V Power supply)
L, N	AC230 V supply
M	Ground (G0) for signal inputs and universal inputs
Q	Relay outputs, various voltages permissible
X1	Signal input (main input: Ni 1000, Pt 1000 and DC0 ...10 V)
X2	Signal input (aux. Input: Ni 1000, Pt 1000, DC0 ...10 V and remote setting unit)
Tool	communication port with PC (9-pin plug)

Connection diagrams

2-stage heating and cooling Applications #10...#19



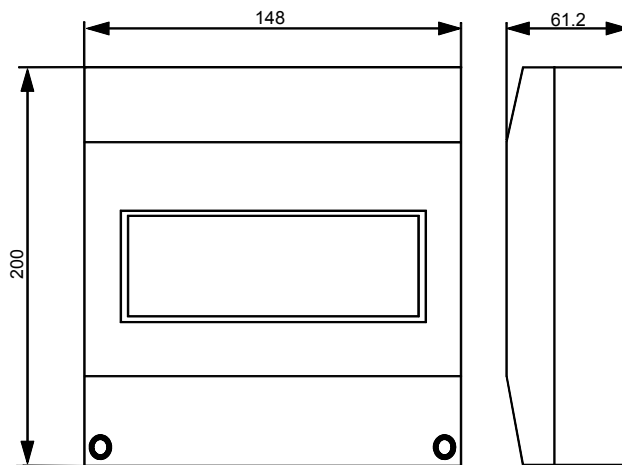
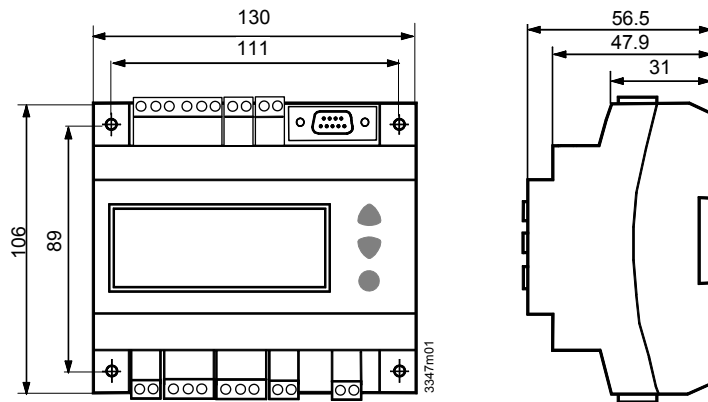
3-stage compressor Applications #20...#39



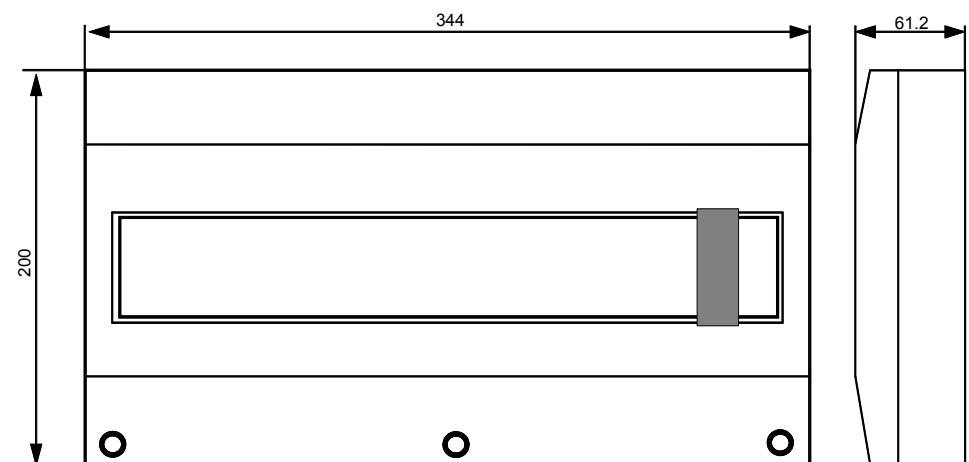
CR1	Compressor 1
CR2	Compressor 2
CR3	Compressor 3
RV	Reversing valve relay
H1,H2	Heat 1 & Heat 2
C1,C2	Cool 1 & Cool 2
X1	Main temperature sensor
X2	Auxiliary sensor & switch
X3	Outside air sensor or 2 nd loop universal sensor
S1	Switch or time clock
PC	Personal computer

Note: For a single compressor, CR2 & CR3 are not connected.
For a dual compressor, CR3 is not connected

Dimensions



ARG62.21



ARG62.22

Appendix – RWD34/44 Application numbers

	Main Loop		
H = heating C = Cooling Cr = Compressor RV = Reversing valve Eco = Economy			
Auxiliary Loop	#1x (2H & 2C)	#2x (3Cr + RV cool)	# 3x (3Cr + RV heat)
#x0 (Standby)	#10*	#20	#30
#x1 (Remote setpoint)	#11	#21	#31
#x2 (Alarm)	#12	#22	#32
#x3 (Filter Alarm)	#13	#23	#33
#x4 (Comp. Shift)	#14	#24	#34
#x5 (Avg X1, X2)	#15	#25	#35
#x6 (Win/Sum digital)	#16	#26	#36
#x7 (Win/Sum analog)	#17	#27	#37
#x8 (Sensor Select)	#18	#28	#38
#x9 (Active input)	#19	#29	#39

*: Application 10 is configured as default application in production line already. All default parameters setting will be lost if you change the application number.

Default parameter setting for application 10 in factory is:

-Parameter Setting 2 (PS 2) -- Defining Unit X1 and X2

Unit setting	C	<input checked="" type="checkbox"/>
	X1	X2
Sensor function	main	On/Off
Sensor type	Ni 1000 ohm	<input checked="" type="checkbox"/>
Calibration offset Δ X	0 K	<input checked="" type="checkbox"/>
Sensor range low	-50 C	<input checked="" type="checkbox"/>
Sensor range high	150 C	<input checked="" type="checkbox"/>

-Parameter Setting 4 (PS 4) -- Main Control Loop Setting

	H2	H1	C1	C2
SD	1 K <input checked="" type="checkbox"/>	1 K <input checked="" type="checkbox"/>	1 K <input checked="" type="checkbox"/>	1 K <input checked="" type="checkbox"/>
Min ON time	0 s <input checked="" type="checkbox"/>	0 s <input checked="" type="checkbox"/>	0 s <input checked="" type="checkbox"/>	0 s <input checked="" type="checkbox"/>
Min OFF time	60 s <input checked="" type="checkbox"/>	60 s <input checked="" type="checkbox"/>	60 s <input checked="" type="checkbox"/>	60 s <input checked="" type="checkbox"/>
Time Delay for next stage ON		30 s <input checked="" type="checkbox"/>		
Time Delay from heat <=> cool		120 s <input checked="" type="checkbox"/>		

-Parameter Setting 5 (PS 5) -- Setpoint Set up

	H2	H1	C1	C2
Day Setpoint	20 C <input checked="" type="checkbox"/>	21 C <input checked="" type="checkbox"/>	23 C <input checked="" type="checkbox"/>	24 C <input checked="" type="checkbox"/>
Night Setpoint	14 C <input checked="" type="checkbox"/>	15 C <input checked="" type="checkbox"/>	29 C <input checked="" type="checkbox"/>	30 C <input checked="" type="checkbox"/>

-Parameter Setting 3 (PS 3) -- Auxiliary Function

D1 function	Day/Night <input checked="" type="checkbox"/>
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