



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 Ni 1000, Pt 1000 or active DC0...10V
Four 2-position (On/Off) outputs
Suitable for 1, 2 and 3-stage compressor
Adjustable compressor delay times
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 intended for Heating, Ventilating, Air-conditioning and Refrigeration systems including 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-position (On/Off) outputs

- Universal input X1 for the main temperature sensor.

- Universal input X2 for the following auxiliary functions.
 - On/Off (Standby)
 - Remote setpoint
 - Alarm
 - Filter alarm
 - Setpoint compensation
 - Sensor averaging
 - Winter/Summer setpoint changeover
 - Sensor select

- Digital input D1 for the following functions.
 - Day/night changeover setpoint
 - On/Off (Standby)
 - Alarm
 - Filter alarm

Type summary

<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 (30VA)	SEM62.1 & SEM62.2

Equipment combinations

The following units can be connected to RWD34 & RWD44 controllers.

<i>Units</i>	<i>Data sheet no.</i>
Sensors with Ni 1000 temperature sensing element	17... to 18...
Sensors with Pt 1000 temperature sensing element	1846
Sensors with DC0...10V measuring signal	17...to 19...
Room temperature sensor with setpoint adjuster QAA25 or QAA25/AP	1721/1748
Remote setpoint adjuster, FZA21.11 & FZA61.11	19...
Air damper actuators with 2-position input	46...
Valve actuators with 2-position input	45...
Other equipment with 2-position input Examples: compressors, electric heaters, fans...	

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

Functions

Main function

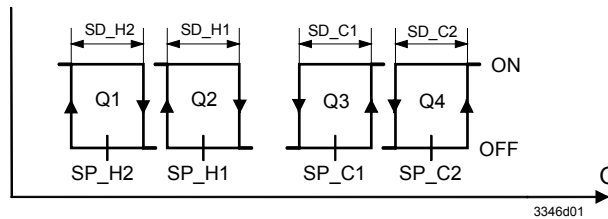
The RWD34 and RWD44 controllers perform both primary and auxiliary functions. The input X1 detects the actual temperature and compares it with the setpoints. Depending on the deviation, the controller acts with its outputs to achieve the desired setpoints.

Applications

The controller has standard pre-configured applications. The respective application and setting parameters are entered via push buttons on the controller or a software tool. Refer to page 13 or the Installation & Commissioning guide for application numbers.

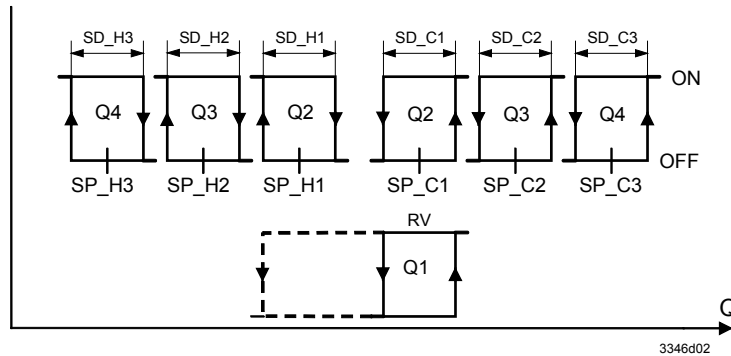
The RWD34 and RWD44 controllers can be programmed as follows:

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



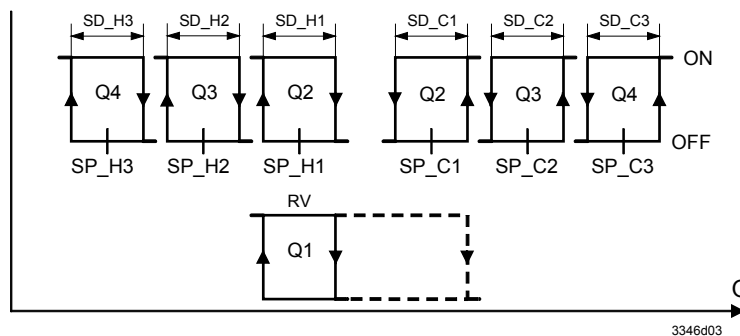
SP_H...	Setpoint heating stage...	Q2	Heating stage 1
SP_C...	Setpoint cooling stage...	Q1	Heating stage 2
SD_...	Switching differential...	Q3	Cooling stage 1
Q	Load	Q4	Cooling stage 2

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



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

3-stage compressor with reversing valve in heating demand 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 in cooling or heating demand. It depends on the heat pump internal equipment circuitry. The reversing valve can be set to switch ON or OFF during no demand as shown on the above diagrams.

- Universal input X1** The universal input X1 is used as the primary input for Ni 1000 sensor, Pt 1000 sensor or a DC0...10V active input.
- Universal input X2** The universal input X2 is used as the secondary input for Ni 1000 sensor, Pt 1000 sensor, digital input, active/passive remote setpoint transmitter or a DC0...10V active input.
- Digital input D1** The digital input D1 is used to enable the digital functions. Changeover occurs via potential-free contact between terminals D1-GND.
- Delay times** The controller has adjustable output delay times to protect equipment from switching on/off too frequently.

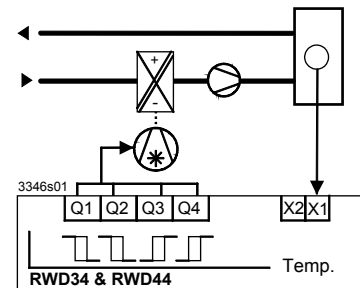
<i>Delay</i>	<i>Range</i>
Minimum On time	0...4096sec
Minimum Off time	0...4096sec
Inter-stage delay (stage 1 ⇒ stage 2 ⇒ stage 3)	0...4096sec
Changeover delay (heating demand ⇔ cooling demand)	0...4096sec
Winter ⇔ Summer setpoint changeover	0...23Hours 59min

Applications

Example: Main loop

Air conditioning plant with temperature control.
2-stage heating and 2-stage cooling.

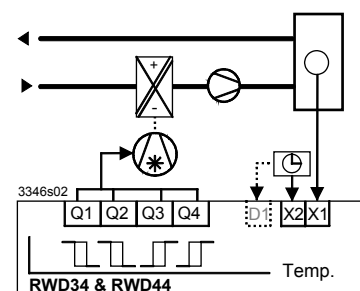
- X1 Room temperature
- Q1 Heating stage 2
- Q2 Heating stage 1
- Q3 Cooling stage 1
- Q4 Cooling stage 2



Auxiliary and digital functions

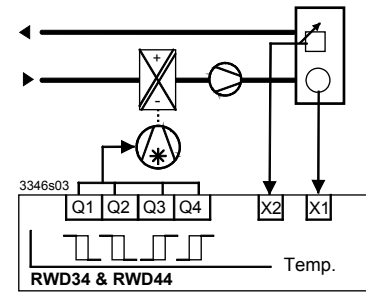
Standby ⏻

A switch contact (via time clock, thermostat) between X2-M or digital input D1-GND is used to enable the standby mode. During standby mode, all Q outputs are OFF.
If X2 is used as a standby function then D1 can be set as a day/night, filter alarm or an alarm.



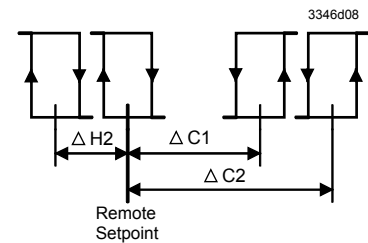
Remote setpoint

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



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

The example shown is the remote setpoint parameters for a 2-stage compressor.

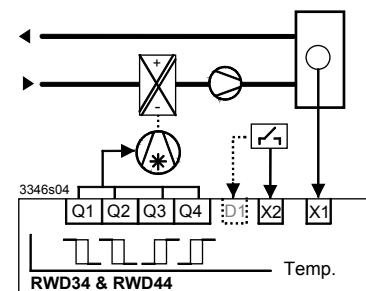


Alarm

A switch contact between X2-M or D1-GND is used to enable the alarm function. When the contact is closed, all Q outputs are off and the alarm icon flashes on the LCD.

The alarm function overrides all the other auxiliary and digital functions.

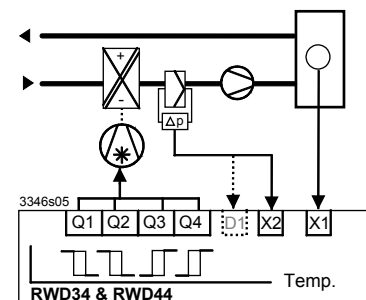
If X2 is used as an alarm function then D1 can be set as a day/night, standby or a filter alarm.



Filter alarm

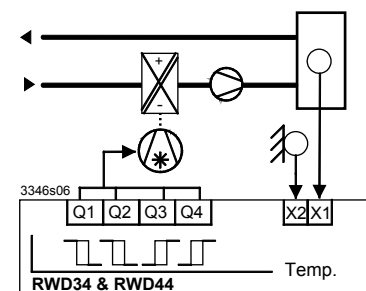
A switch contact (via air pressure switch) between X2-M or D1-GND is used to implement a filter alarm indication. All Q outputs are not affected by filter alarm function.

If X2 is used as a filter alarm function then D1 can be set as a day/night, standby or an alarm.



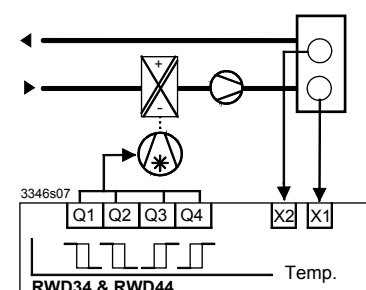
Setpoint compensation

The main setpoints are shifted over a range corresponding to a range measured by input X2. The most common application is to shift the main setpoints according to outside air temperature.



Sensor averaging

Two signals are connected to X1 and X2. The average between both is the controlling signal used by controller.



Winter/Summer setpoint changeover

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

Digital changeover (X2 = Digital input)

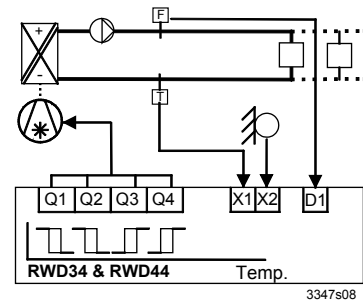
When X2 is closed, summer setpoints are selected and only cooling is active.

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

Analog changeover (X2 = Outside air temperature sensor)

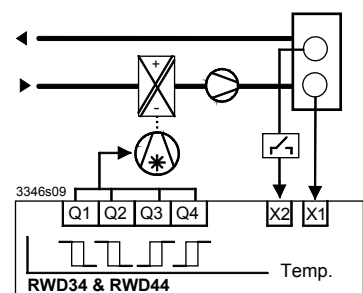
When the $X2 >$ summer changeover setpoint, summer setpoints are selected and only cooling is active. When the $X2 <$ winter changeover setpoint, winter setpoints are selected and only heating is active.

The above application, D1 is set as an Alarm. If the flow switch detects no flow, the RWD34 & RWD44 outputs will be OFF.



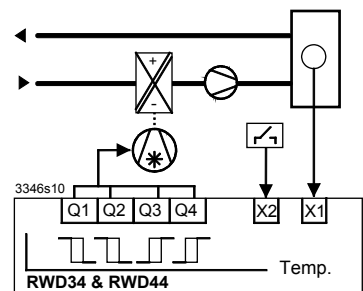
Sensor select

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.



Main loop active

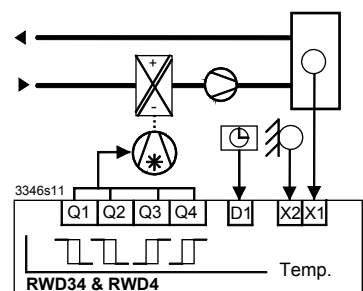
Default value for X1 is active DC0...10V and X2 is the standby mode input.



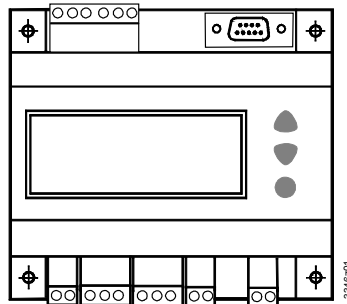
Day/night setpoint

A switch contact between D1-M can be used to implement setpoint changeover for day/night operation. When contact is open, the setpoints for day operation are selected. When contact is closed, the setpoints for night operation are selected.

During night operation, the remote setpoint and setpoint compensation functions are not applicable.



Housing	The RWD34 and RWD44 controllers are as per DIN 43 880 Gr. 1 requirements.
Protective housing ARG62.21/ARG62.22	<p>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.</p> <p>The RWD34 and RWD44 clip into the protective housing.</p> <p>The cable entries are located at the top and the bottom of the protective housing.</p> <p>The front has an opening for the LCD display and the programming buttons.</p>
Mounting options	<p>The RWD34 and RWD44 universal controllers can be mounted as follows:</p> <ul style="list-style-type: none">• 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	<p>The LCD shows the following information for normal operation:</p> <ul style="list-style-type: none">• Current operating values (maximum 4 digits)• Current setpoints (day/night)• Application number• Output 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.
Software Tool	A software tool for controller application selection and parameter adjustment is available. It is a user-friendly Windows® 95 (or above) based software tool which provides you a printout of the controller settings

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".

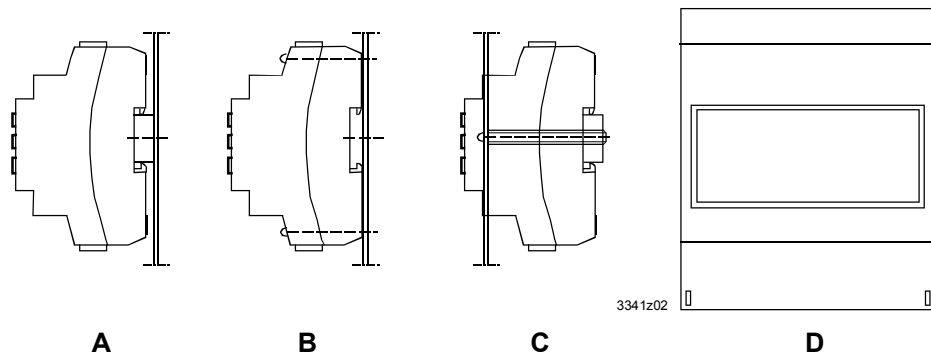


The sections marked with a warning symbol contain technical safety requirements and restrictions. Observe all of these warnings as they directly relate to the protection of personnel and equipment.

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 AC 230V 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 are retained after lost of power.

Technical data

General data

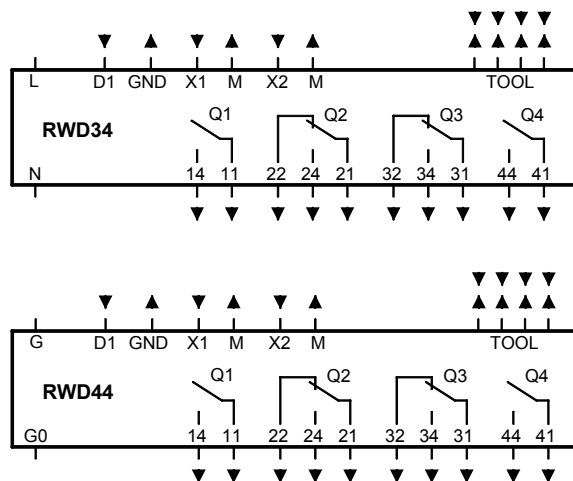
 Power supply	Operating voltage RWD34	AC 230 V +10% -15%
	Operating voltage RWD44	AC 24 V ±20 %
	Safety extra-low voltage (SELV) as per	EN 60730
	Frequency RWD34 & RWD44	50 Hz/60 Hz
Power consumption	RWD34	6 VA
	RWD44	4 VA
LCD	Actual and nominal values	4 digits
Display resolution for (these values do 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	IP 20 as per EN 60529
	Front and with ARG62.21	IP 30 as per EN 60529
Product standards	Front and with ARG62.22	IP 30 as per EN 60529
	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
Safety		EN 60730
Other international approval	C tick compliance	 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. cable length for dia. 0.6 mm	max. 300 m
Remote setpoints X2	Range	0...1000 Ω corresponding to adjust- able 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	< 10 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)
		DC 30 V, 4 A
	Minimum rating	AC 19.2 V, 20 mA
		DC 5 V, 100 mA

Diagrams

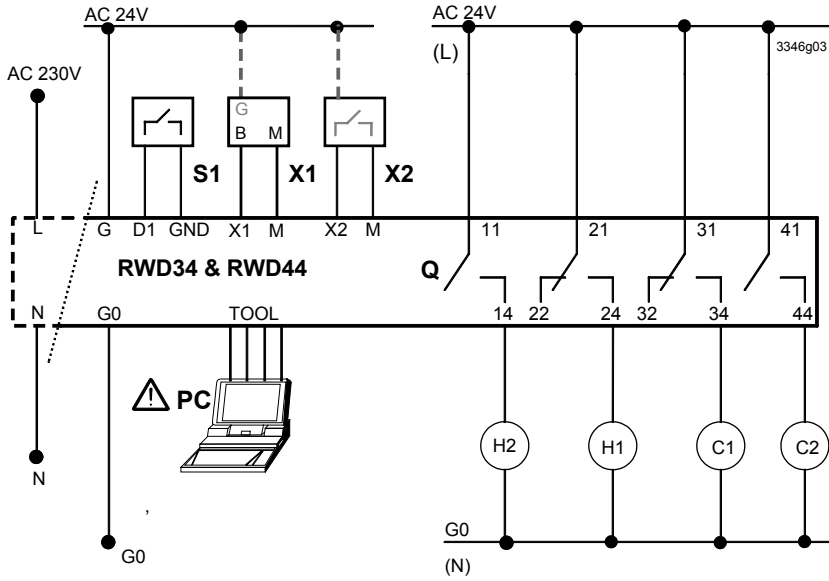
Internal diagrams



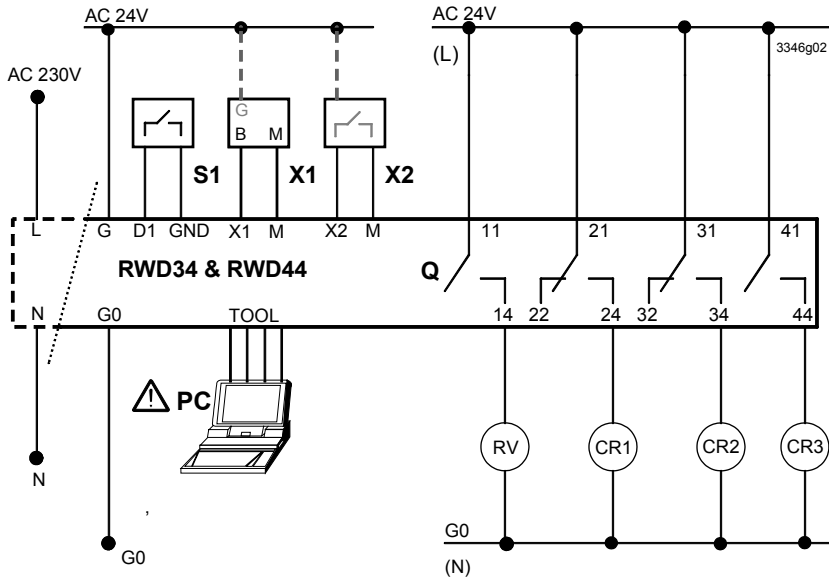
D1	Digital Input
G, G0	AC24V supply ( SELV AC 24 V Power supply)
L, N	AC230 V supply
M	Ground (G0) for signal inputs and universal inputs
Q...	Relay outputs, various voltages permissible
X1	Signal input (main input: Ni 1000, Pt 1000 and DC0 ...10 V)
X2	Signal input (aux. Input: Ni 1000, Pt 1000, DC0 ...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

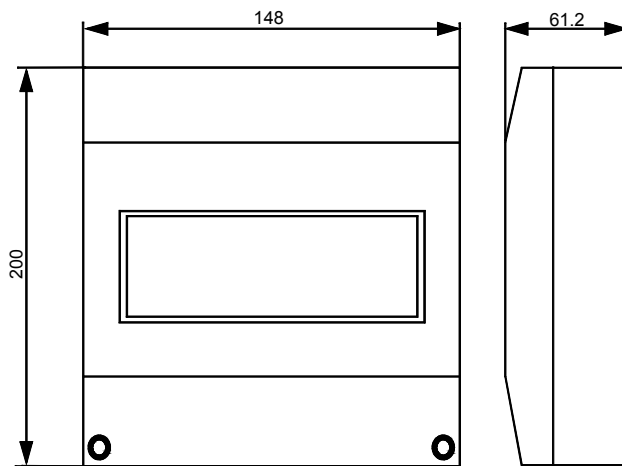
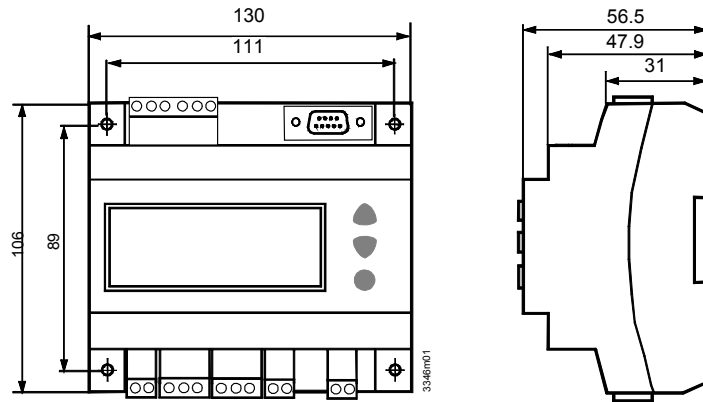


- CR1 Compressor 1
- CR2 Compressor 2
- CR3 Compressor 3
- RV Reversing valve
- H1 Heat 1
- H2 Heat 2
- C1 Cool 1
- C2 Cool 2
- X1 Main temperature sensor
- X2 Auxiliary sensor or switch
- S1 Switch or time clock
- PC Personal computer

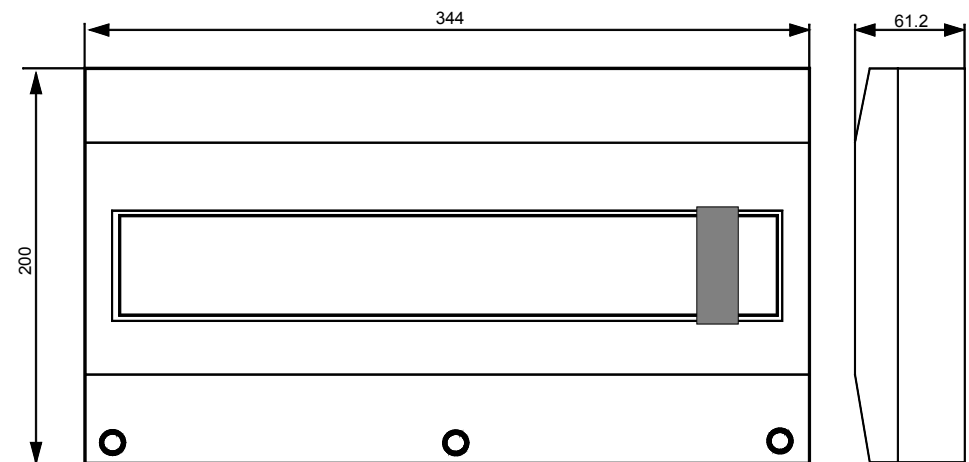
Note: For a single compressor, CR2 & CR3 are not connected
For a dual compressor, CR3 is not connected

⚠ Please note that the TOOL signal ground is galvanically connected to G0 inside the controller. If the signal line of the computer is grounded to Earth, the G0 line after TOOL connection will be earthed as well. This will change the SELV to a PELV.

Dimensions

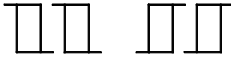
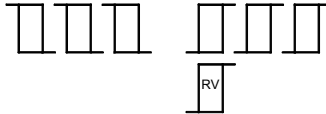
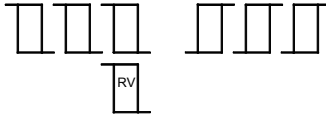


ARG62.21



ARG62.22

Appendix- RWD34 & RWD44 Application numbers

H = Heating C = Cooling Cr = Compressor RV = Reversing valve	Main Loop		
			
Auxiliary Loop	#1x (2H & 2C)	#2x (3stage Cr + RV cool)	# 3x (3stage Cr + 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