

RWD82U

Universal Controller



Description

The Universal Controller is intended for heating, air conditioning, ventilation and refrigeration in comfort control applications. RWD82U main loop control applications are designed for temperature, static pressure, humidity, air pressure, fluid pressure, refrigeration, air quality and air fluid velocity control. The controller contains pre-programmed applications.

Auxiliary control functions include:

- Day/night setpoints
- Remote setpoint control
- Limiter control
- Cascade control
- Maximum priority
- Setpoint compensation
- Summer/winter operation

Control parameters are adjusted for maximum comfort control via three buttons on the face of the device, or with a laptop computer and Siemens Building Technologies program software.

NOTE: For complete supporting technical documentation, including training presentations, see www.us.sbt.siemens.com/hvp/components.



Features

- Stand-alone electronic temperature controller with P or PI response
- 24 Vac operating voltage
- Control application selectable via Application Number
- Active input scale can be selectable
- Two universal inputs for Siemens 1000 ohm nickel (Ni 1000), 1000 ohm platinum (Pt 1000) temperature sensors and 0 Vdc to 10 Vdc signals
- Unit can be set as °F, °C, % or no specified unit
- One three-position, floating output or two two-position outputs, direct or reverse action
- One digital input for day/night changeover
- Entering or changing of all data via operating buttons on the controller, is possible without additional tools
- Computer connection for downloading canned applications via the software tool

Product Number

RWD82U

Warning/Caution Notations

WARNING:		Personal injury or loss of life may occur if you do not follow a procedure as specified.
CAUTION:		Equipment damage may occur if you do not follow a procedure as specified.

Specifications Power Supply	Operating voltage	24 Vac \pm 20%
	Frequency	50/60 Hz
	Power consumption	3.5 VA
LCD	Actual and nominal values	Four digits
Setpoint adjustment range		-58°F to 302°F (-50°C to 150°C)
Display Resolution (does not relate to controller accuracy)	Siemens Ni 1000 ohm	1°F (0.5°C)
	Pt 1000 ohm	1°F (0.5°C)
	Active sensor	Depends on setting range
Environmental Conditions	Storage and transport Temperature Humidity	-13°F to 158°F (-25°C to 70°C) <95% rh
	Operation Temperature Humidity	32°F to 122°F (0°C to 50°C) <95% rh
Regulatory Approvals	CE UL	Conforms to CE requirements UL listed to 916 Energy Management Equipment
Terminals	Screw terminals, min./max. conductors	Minimum: 24 AWG (1) Maximum: 16 AWG (2), or 14 AWG (1)
Weight	RWD82U Controller	11.12 oz (315 grams)
	With packaging	13 oz (368 grams)
Analog Inputs X1, X2 Siemens Ni 1000 ohm @ 32°F (0°C)	Controller measuring range	-58°F to 302°F (50°C to 150°C)
	Maximum cable length for 14 AWG	984 ft (300 m)
Pt 1000 ohm at 32°F (0°C)	Controller measuring range	-4°F to 356°F (-20°C to 180°C)
	Maximum cable length for 14 AWG	984 ft (300 m)
Analog voltages (For measured variable in °F, °C, % or without unit)	Range	0 to 10 Vdc corresponding to adjustable range from -100 to 8000 (°F, °C, % or no unit)
	Maximum cable length for 14 AWG	984 ft (300 m)
Remote setpoint X2	Range	0 to 1000 ohm corresponding to adjustable range from -100 to 8000 (°F, °C, % or no unit)
	Maximum cable length for 14 AWG	984 ft (300 m)
Digital input D1	Polling voltage for control commands (D...M)	15 Vdc
	Current consumption	<15 mA
Digital outputs Q1, Q2	Relay contacts (potential-free) Voltage: Maximum rating:	24 Vac 24 Vac to 240 Vac 6A RES/5 FLA/30 LRA/1/2 HP 30 Vdc, 4A

Accessories	ARG62.21	Protective enclosure for wall mounting.
	SEH62.1U	Program Clock
	SEM62.2U	24/120 Vac Transformer
	125-3481	RWD Controller Programming Tool (CD)
	RWDTKU	Tool Kit

- Function Summary**
- Controller
 Stand-alone controller with one three-position or two two-position (ON/OFF) outputs with independent adjustment on each sequence for direct acting and/or reverse acting. In three-position operation, the controller exhibits PI response.
 - Auxiliary selectable function
 - Universal input X2 for one of the following auxiliary functions:
 - PI limiter (Absolute and Relative)
 - Remote setpoint
 - Cascade control
 - Setpoint compensation
 - Winter/summer operation
 - Maximum priority
 - Digital input D1 for setpoint changeover day/night

Equipment Combinations

The following Siemens devices can be connected to RWD82U Universal Controllers. Other combinations with units from third-party manufacturers are possible, if the input and output specifications match the RWD82U.

Table 1.

Description	Document Number
Sensor with Siemens Ni 1000 temperature sensing element	155-330
QAA25U Room temperature sensor with setpoint adjuster	
GIB Series 310 lb-in Non Spring Return Actuators	155-176P25
GBB Series 177 lb-in Non Spring Return Actuators	155-177P25
GEB Series 132 in-lb Non Spring Return Actuators	155-318P25
GCA Series 142 in-lb Spring Return Actuators	155-173P25 155-174P25 155-175P25
GMA Series 62 in-lb Spring Return Actuators	155-315P25
SKD Valve Actuator with three-position input	155-181P25
SKB/SKC Valve Actuator with three-position input	155-171P25
SQX Valve Actuator with three-position input	155-186P25
SQS Floating Valve Actuators	155-191P25
SSB Floating Valve Actuator	155-195P25
SSC Floating Valve Actuators	155-314P25
Electric Rack and Pinion two-position actuator	155-541P25
SFA/SFP Two-position Actuators	155-321P25
1/2 to 2-inch two-way globe valves	155-184P25
1/2 to 2-inch three-way globe valves	155-185P25
2-12 to 6-inch two-way flange valves	155-159P25
2-1/2 to 6-inch three-way flange valves	155-160P25
MT Series 1/2 to 1-1/2-inch two-way globe valves	155-196P25
MT Series 1/2 to 1-1/2-inch three-way globe valves	155-197P25
MZ Series 1/2 to 1-inch two-way globe valves	155-198P25
MZ Series 1/2 to 1-inch three-way globe valves	155-199P25
1/2 to 1-inch zone valves	155-320P25
Differential Pressure Sensor	155-719

Software Tool

An optional, user-friendly, Windows® 95 (or later) based software tool for controller application selection and parameter adjustment is available. It provides you with a printout of the controller settings. This tool allows controller programming prior to installation.

Functions

Controller Type

The RWD82U is a stand-alone universal controller, which performs both primary and auxiliary control functions. The respective mode is defined by entering the corresponding configuration and setting parameters via the push buttons on the controller or the software tool.

Main Functions

The RWD82U controller can be programmed as follows:

- Two-position controller: Q1 or Q2 Reverse and/or direct acting on each step
- Three-position controller: Q1 and Q2 Reverse or direct acting.

NOTE: To program as a three-position controller, outputs Q1 and Q2 are combined to form one, three-position, floating output.

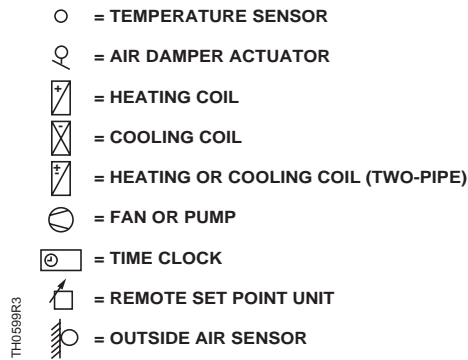


Figure 1. Frequently Used Symbols in Application Drawings.

Dependent Control Loops

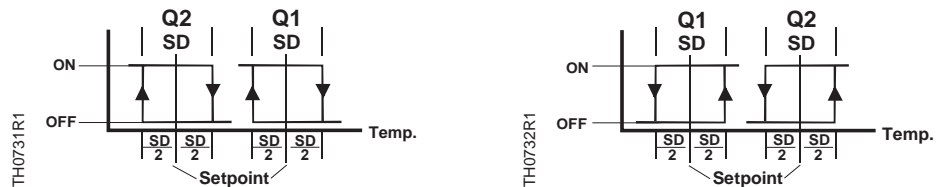


Two Reverse Acting Sequences
 (Dependent loops)
 (Application 10 to 19)

Two Direct Acting Sequences
 (Dependent loops)
 (Application 50 to 59)

Figure 2. Dependent Control Loops.

Independent Control Loops

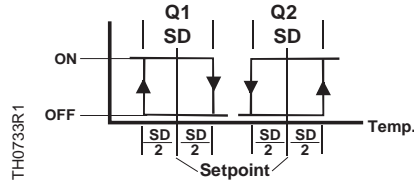


Two Reverse Acting Sequences
 (Independent loops)
 (Application 20 to 29)

Two Direct Acting Sequences
 (Independent loops)
 (Application 60 to 69)

Figure 3. Independent Control Loops.

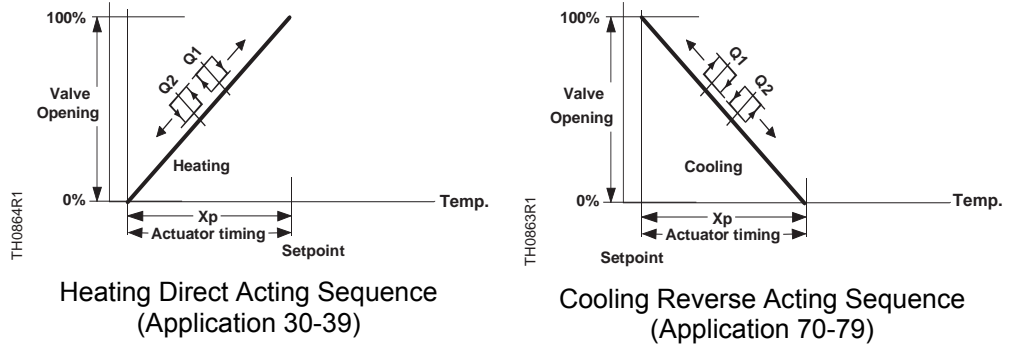
Reverse and Direct Acting Control Loops



Reverse and Direct Acting Sequences
 (Application 40 to 49)

Figure 4. Reverse and Direct Acting Control Loops.

Three-point Control Loop



Heating Direct Acting Sequence
 (Application 30-39)

Cooling Reverse Acting Sequence
 (Application 70-79)

Figure 5. Three-point Control Loops.

Universal Input X1

The primary input for a Siemens Ni 1000 temperature sensor, a Pt 1000 temperature sensor or a 0 to 10 Vdc active input.

Universal Input X2

The secondary input for a Siemens Ni 1000 temperature sensor, a Pt 1000 temperature sensor, an active/passive remote setpoint transmitter or a 0 to 10 Vdc active input.

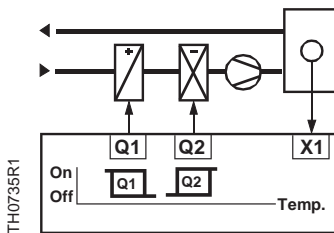
Digital Input D1

Selects the day/night changeover. Changeover occurs via potential-free dry contacts between D1 and M. Typically, a time clock controls D1 input.

Digital Outputs Q

Each output Q (Q1, Q2) can be configured for either reverse or direct acting.

Example



- X1 Room temperature
- Q1 Heating, reverse action
- Q2 Cooling, direct action

Figure 6. Constant Volume with Temperature Control.

Auxiliary Functions

One of the following auxiliary functions can be selected:

- P+I limiter (Absolute, #x2 and Relative, #x3)
- Remote setpoint, #x1
- Cascade control, #x5
- Setpoint compensation, #x4
- Winter/summer operation, Digital #x6, Analog #x7
- Maximum priority, #x8
- Main loop 0 to 10V input, #x9

Day and night operation mode is also available.

PI Limiter Function

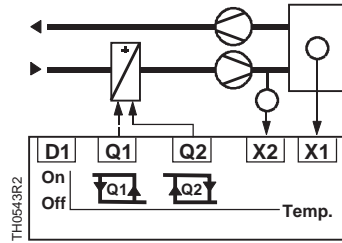


Figure 7. PI Limiter Function.

The limiter function with PI control enables absolute (or relative) maximum or minimum limitation of the supply air temperature (X2).

When the value drops below or exceeds the limiter setpoint, the limiter function controls and takes priority over the main setpoint.

Remote Setpoint

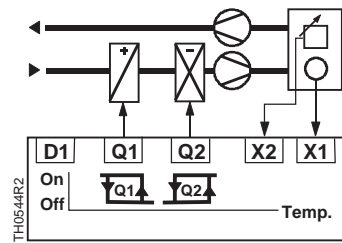


Figure 8. Remote Setpoint.

Transmitter (QAA25U), connected to X2 and configured accordingly, enables setpoint adjustment.

Active measurement from 0 to 10 Vdc corresponding adjustable range from -100 to 8000 units

Passive measurement from 0 to 1000 Ω corresponding adjustable range from -100 to 8000 units

When using the remote setpoint auxiliary function in conjunction with heating and cooling main loop, application #41, setpoint is for heating. The second setpoint is XDZ or Free Energy Band for cooling.

NOTE: You cannot select the remote setpoint auxiliary function in Night mode.

Cascade Control

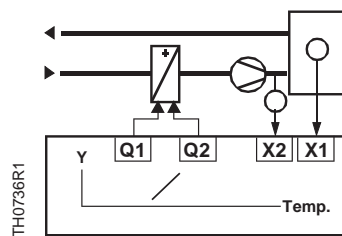


Figure 9. X2 Supply Air Temperature Sensor.

The PI/PI room/supply air temperature cascade control can be selected. In this case, the virtual PI room temperature controller determines the setpoint within the limiter setpoints for the PI supply air temperature controller.

Maximum Priority

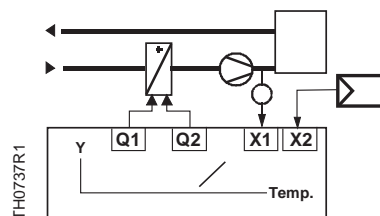


Figure 10. Maximum Priority, Cooling.

If the value (0 to 10V) of the input X2 is greater than the calculated output of the three-point cooling sequence, the output will use the X2 input value as output value.

NOTE: You cannot select the maximum priority auxiliary function in Night mode.

Setpoint Compensation

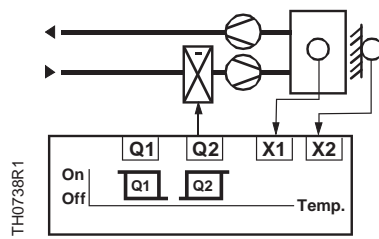


Figure 11. Setpoint Compensation.

The temperature setpoint X1 is shifted by the temperature as measured at sensor X2.

Configuration of the RWD82U defines the influence on setpoint X1.

The example shows the room air temperature setpoint as shifted by the outside temperature.

Winter/Summer Operation

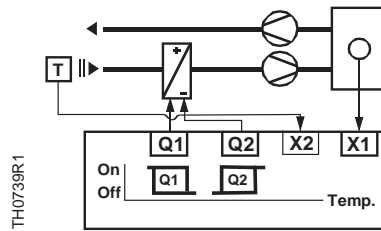


Figure 12. Winter/Summer Operation.

A digital switch or analog input between terminals X2 and M will implement winter/summer changeover.

When adjusting setpoints, the heating setpoint must be less than the cooling setpoint.

Digital changeover

When the contact is closed, summer operation is selected. Reverse acting output (Q1 only) is set to direct action (cooling).

Analog changeover

Summer operation is selected when the X2 input exceeds the setpoint Reverse acting output (Q1 only) is set to direct action (cooling).

Day/Night Setpoint

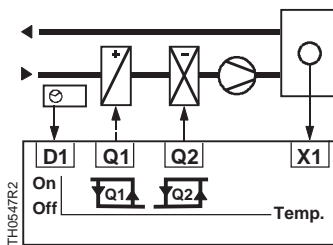


Figure 13. Day/Night Setpoint.

A contact between terminals D1 and M can be used to implement setpoint changeover for day/night operation.

When the contact is open, the setpoints for day operation are selected.

When the contact is closed, the setpoints for night operation are selected.

During the night mode, the following auxiliary functions are disabled: remote setpoint, absolute/relative limiter, setpoint compensation and maximum priority.

Mechanical Design

**Protective Housing
 ARG62.21**

- This UL-approved plastic housing protects the controller when mounted outside a control panel, such as on ducts, walls and in mechanical rooms. This housing also prevents inadvertent contact with voltage supplying parts such as the connecting terminals. The RWD82U clips into the housing.
- The cable entries are located at the top and the bottom of the ARG62.21 housing.
- The front has an opening for the LCD display and the programming buttons.

Terminals

Plug-in screw terminals

Operating and Display Elements

The RWD82U is operated by the buttons on the controller front. Additional tools are not necessary. The controller can also be programmed via the software tool, which plugs into the nine-pin port.

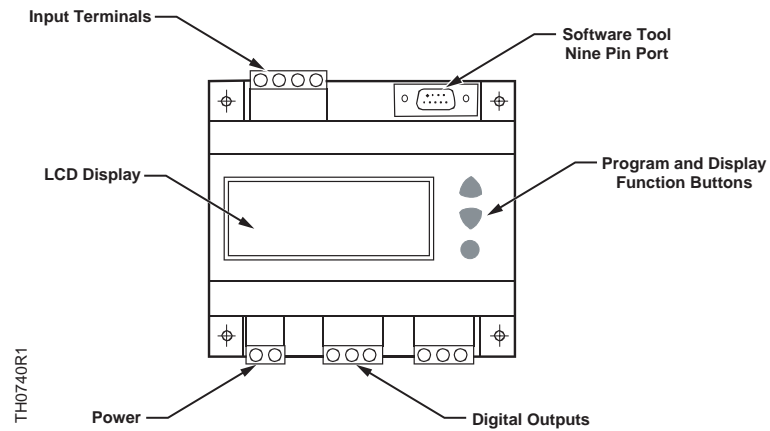


Figure 14. RWD82U Universal Controller.

LCD

The LCD shows the following information for normal operation:

- Current operating values (maximum four digits)
- Current setpoints (day/night)
- Application number
- Control sequencing diagram
- Auxiliary input value
- Selected auxiliary function

Operating Buttons

The controller has three operating buttons for the following functions:

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

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

Configuration

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

Installation Notes

The RWD82U controller can be mounted as follows:

NOTE: Observe all local installation regulations and building codes.

- A On a DIN rail at least 4.7 inches (120 mm) long
- B Wall-mounted with two #6 screws
- C Front-mounted using standard hardware:
 - One DIN rail 5.9 inches (150 mm) long
 - Two hexagonal blocks 1.97 inches (50 mm)
 - Washers and screws
- D In the ARG62.21 protective housing

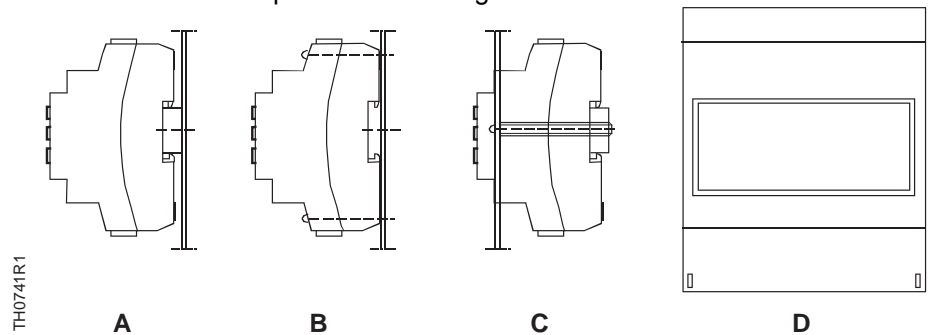


Figure 15. Mounting Options.

Electrical Installation Notes



CAUTION:

- Standard cables can be used for the controller. However, when mounting in an environment greatly exposed to Electrical Magnetic Interface (EMI), use only shielded cables.
- The RWD82U is designed for 24 Vac operating voltage.
- Use safety insulating transformers with double insulation; they must be designed for 100% duty.
- When using several transformers in one system, the connection terminals G0 (ground) must be galvanically connected.
- Supplying voltages above 24 Vac to low voltage connections may damage or destroy the controller or any other connected devices.
- Connections to voltages exceeding 24 Vac endanger personal safety.
- The ARG62.21 Protective Housing does not provide grounding between conduit connections. Use grounding bushings and jumper wires or equivalent.

Commissioning Notes

A commissioning booklet is included with the RWD82U controller.

Observe the following:

- The controller must be configured for application-specific operation using the standard application number.
- Application-specific fine tuning can be performed if required (see 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.

Wiring Diagrams

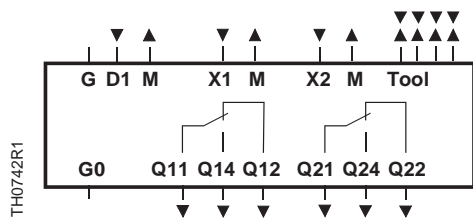
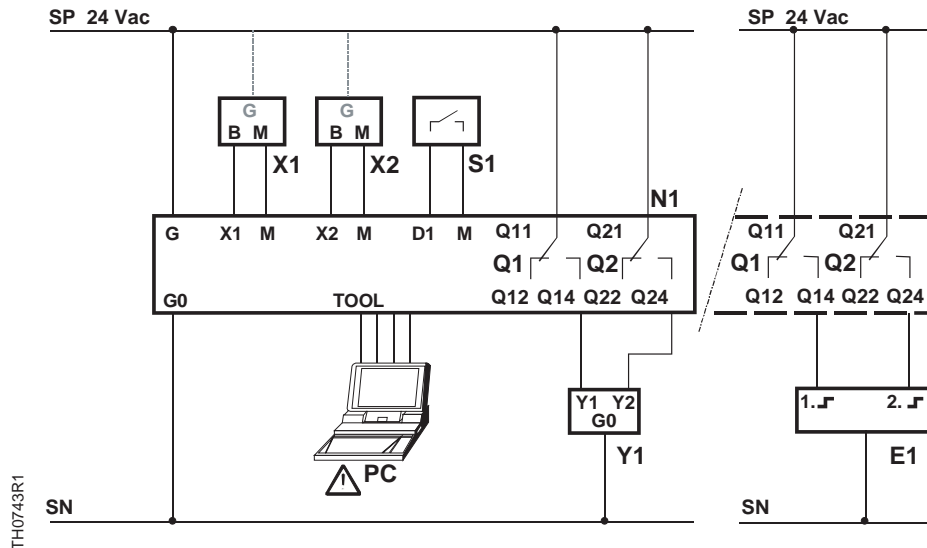


Figure 16. RWD82U Wiring Diagram.

D1	Digital input
G, G0	24 Vac supply
M	Ground (G0) for signal inputs and universal inputs
Q11, Q21	NC Contact
Q12, Q22	Neutral
Q14, Q24	NO Contact
X1	Signal input (main input: Siemens Ni 1000, Pt 1000 and 0 to 10 Vdc)
X2	Signal input (aux. Input: Siemens Ni1000, Pt 1000, 0 to 10 Vdc and 0 to 1000 Ω or 0 to 10 Vdc remote setpoint)
Tool	Communication port for PC (9-pin plug)



E1	Electrical load 2-position control
N1	RWD82U controller
PC	Personal computer
Q1/Q2	Potential-free relay contacts for 3-position or 2-position control in 2 steps
S1	Time clock or switch
SN	System neutral
SP	System potential
X1	Main input (Termination G appears when X1 is an active sensor)
X2	Auxiliary input or remote setpoint (Termination G appears when X2 is an active sensor)
Y1	Actuator with 3-position control 24 Vac

Figure 17. Connection Diagram.



CAUTION:

If you use a DESKTOP computer, the TOOLS 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 TOOLS connection will be grounded as well.

Dimensions

In Inches (Millimeters)

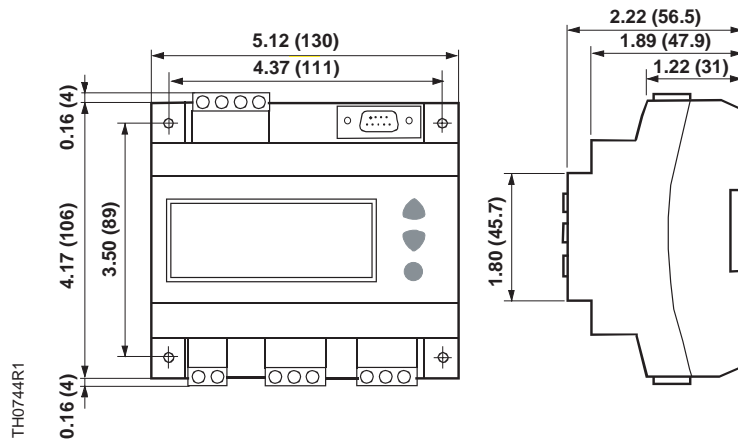


Figure 18. RWD82U Controller Dimensions.

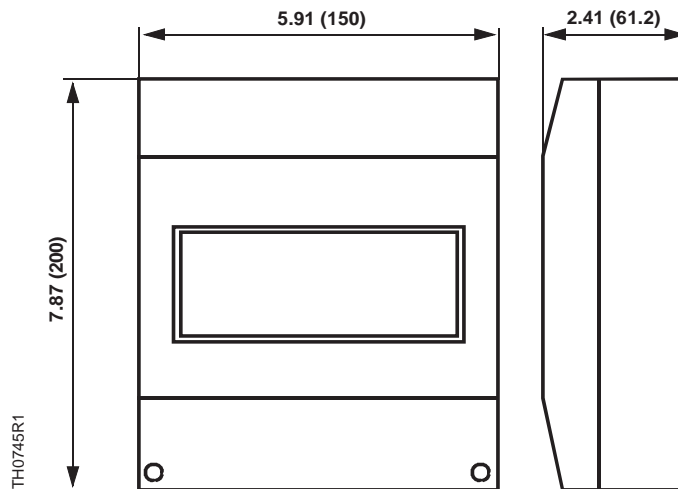


Figure 19. ARG62.21 Enclosure Dimensions.

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