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Universal Controllers



RWD68U Universal Controller.

Description

The RWD family of Universal Controllers are intended for heating, air conditioning, ventilation and refrigeration in HVAC control applications.

Features

- Stand-alone electronic temperature controller with P or P+I response (RWD62U/68U)
- 24 Vac operating voltage
- Control application selectable via Application Number
- Active (0 to 10 Vdc) input scale can be selectable
- Limit and direction of the output scale can be freely assigned (RWD62U/68U)
- 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
- Two modulating 0 to 10 Vdc signal outputs, direct or reverse action (RWD62U/68U)
- One digital input for day/night changeover
- Entering or changing of all data via operating buttons on the controller, possible without additional tools
- PC connection for downloading canned applications and adjusting parameters via the software tool
- One floating output or two two-position outputs, normally open or normally closed (RWD82U)

Applications

RWD62U/68U/82U 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 reset
- 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.

RWD Universal Controllers Specifications

General

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 to +302°F (-50 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 -13 to +158°F (-25 to +70°C)
Humidity <95% RH
Operation
Temperature 32 to 122°F (0 to 50°C)
Humidity <95% RH

Regulatory Approvals Conforms to CE Requirements
UL 916 Energy Management Equipment

Terminals Screw Terminals for Cables with
min. 20 AWG; Max. 2 x16 or 1 x 14 AWG

Shipping Weights

RWD62U 10.4 oz. (295 grams)
RWD68U 10.72 oz. (304 grams)
RWD82U 11.12 oz. (315 grams)

Analog Inputs x1, x2 Siemens Ni 1000 Ohm @ 32°F (0°C)
Controller Measuring Range -58 to +302°F (50 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 to +356°F (-20 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)

Inputs and Outputs

RWD62U/68U/82U

Digital Input D1
Polling Voltage for Control Commands (D...M) 15 Vdc
Current Consumption <15 mA

RWD68U

Analog Outputs Y1
Range 0 to 10 Vdc
Maximum Current +1 mA
Digital Output (Q1)
Relay Contacts (potential-free)
Voltage 24 Vac to 230 Vac
6A Res/5A Ind/5 FLA/ 30 LRA/
1/2 HP
30 Vdc, 4A

RWD82U

Digital Outputs Q1, Q2
Relay Contacts (potential-free)
Voltage 24 Vac to 230 Vac
6A Res/5A Ind/5 FLA/ 30 LRA/
1/2 HP
30 Vdc, 4A

RWD Universal Controllers Product Ordering

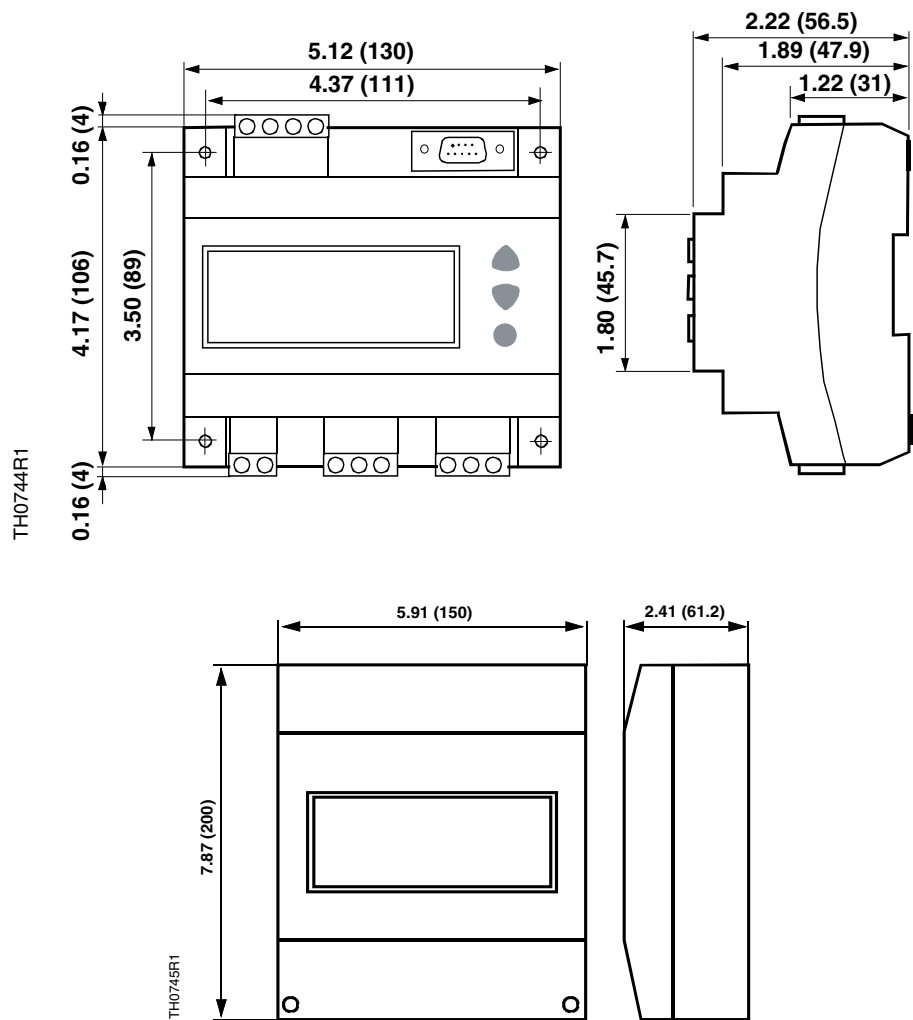
Outputs		Operating Voltage	Part No.
0 to 10 Vdc	Digital		
2	—	24 Vac	RWD62U
1	1	24 Vac	RWD68U
—	2	24 Vac	RWD82U

Sensors for this product can be found on pages B-9, B-15, and B-21.

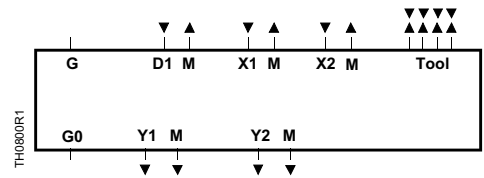
Accessories & Service Kits

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RWD Controller and Enclosure

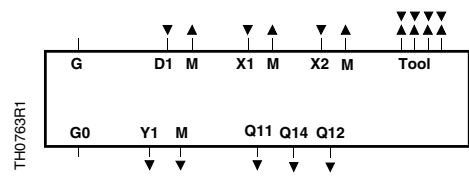


Dimensions shown in inches (mm).



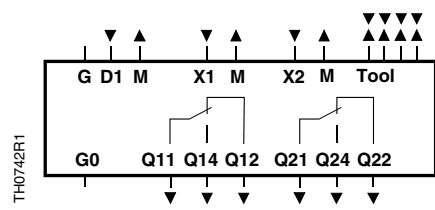
RWD62U

Key	
D1	Digital input
G, G0	24 Vac supply
M	Ground (G0) for signal inputs and universal inputs and analog outputs
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)
Y1, Y2	Analog outputs
Tool	Communication port for PC (9-pin plug)



RWD68U

Key	
D1	Digital input
G, G0	24 Vac supply
M	Ground (G0) for signal inputs and universal inputs and analog outputs
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)
Y1, Y2	Analog outputs
Tool	Communication port for PC (9-pin plug)



RWD82U

Key	
D1	Digital input
G, G0	24 Vac supply
M	Ground (G0) for signal inputs and universal inputs and analog outputs
Q11	Common for digital contact
Q12	NC Digital Contact
Q14	NO Digital 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)
Y1, Y2	Analog outputs
Tool	Communication port for PC (9-pin plug)

Temperature Controllers for Refrigeration and Heat Pumps



RWD44U Temperature Controller.

Description

The RWD Family of Temperature Controllers are standalone, electronic, programmable controllers with pre-configured temperature control applications. The Temperature Controllers are intended for heating, ventilating, and air conditioning systems, including one, two or three-stage compressors, heat pumps or single or dual stage heating and/or cooling equipment. The 24 Vac operating voltage controller switches four on/off outputs and has two universal inputs for Siemens Nickel 1000, Platinum 1000 or active 0 to 10 Vdc signals.

Features

- Standalone electronic controller with pre-configured applications
- Two or three universal inputs for Ni1000, Pt1000 or active 0 to 10 Vdc sensors
- Four 2-position (On/Off) outputs and one modulating 0 to 10 Vdc output (RWD45)
- Modulating 0 to 10 Vdc for economizer or second independent control loop (RWD45)
- Suitable for 1, 2, or 3-stage compressors
- Adjustable compressor delay times
- Keypad is used to enter or change data – no need for tools
- Download pre-programmed applications via software tool using PC connection

Applications

The RWD45U Controller is intended for HVAC systems, including heat pumps:

- Single, dual or triple compressor heat pump units
- Single or dual stage heating and cooling equipment
- Single or dual stage cooling equipment
- Single or dual stage heating equipment
- Equipment with 0 to 10 Vdc input

Universal input X2 is used for the following auxiliary functions:

- On/Off (standby)
- Remote setpoint
- Alarm
- Filter alarm
- Setpoint compensation
- Sensor averaging
- Summer/Winter setpoint changeover
- Sensor selection

Universal input X3 is used (RWD45U) for the following functions:

- Economizer sensor
- Sensor for second, independent control loop

RWD Temp Controllers Specifications

General

Power Supply

Operating Voltage	24 Vac $\pm$ 20%
Frequency	50/60 Hz
Power Consumption	4.0 VA

LCD

Actual and Nominal Values	Maximum Four Digits
Display Resolution (not related to controller accuracy)	
Ni 1000 Ω	1.0°F (0.5°C)
Pt 1000 Ω	1.0°F (0.5°C)
Active Sensor	Depends on Setting Range

Environmental Conditions

Storage and Transport

Temperature	-13 to +158°F (-25 to +70°C)
Humidity	<95% RH

Operation

Temperature	32 to 122°F (0 to 50°C)
Humidity	<95% RH

Regulatory Approvals

Housing	NEMA 1
CE	Conforms to CE Requirements
UL	UL Listed to 916

Terminals.....Screw Terminals for Cables
with min. 20 AWG; Max. 2 x 16 or 1 x 14 AWG

Shipping Weight

RWD44U	0.75 lb. (0.300 kg)
RWD45U	11.64 oz. (0.320 kg)

Inputs and Outputs

RWD44

Analog Inputs x1, x2

(Siemens Ni 1000 Ω at 32°F [0°C])	
Controller Setpoint Range	-58 to +302°F (-50 to +150°C)
Maximum Cable Length for 14 AWG	984 ft. (300 m)

Pt 1000 Ω at 32°F (0°C)

Controller Setpoint Range	4 to 356°F (-20 to +180°C)
Maximum Cable Length for 14 AWG	984 ft. (300 m)

Analog Voltages (for measured variables in °F, °C, % or without unit)

Range	0 to 10 Vdc Corresponding to Adjustable Range from -100 to +2400
Max. Cable Length for 14 AWG	984 ft. (300 m)

Remote Setpoints x2 (for measured variables

in °F, °C, % or without unit)

Range	0 to 10 Vdc Corresponding to Adjustable Range from -100 to +2400
Max. Cable Length for 14 AWG	984 ft. (300 m)

Digital Input D1

Polling Voltage for Control Commands (D – M)	15 Vdc
Current Consumption	<10 mA

Digital Output Q1 through Q4

Relay Contacts (potential-free)

Voltage	24 Vac
Maximum Rating	24V to 230V, 5A Res/5 FLA/30LRA/ 1/2 HP
Minimum Rating	19.2 Vac, 20 mA 5 Vdc, 100 mA

RWD45

Analog Inputs

x1, x2, x3
1000 Ohm at 32°F (0°C)

Controller Setpoint Range	-58 to +302°F (-50 to +150°C)
Maximum Cable Length for 14 AWG	Maximum 984 ft. (300 m)

Analog Inputs

x1, x2, x3
Pt 1000 Ohm

Controller Setpoint Range	-58 to +302°F (-50 to +150°C)
Maximum Cable Length for 14 AWG	Maximum 984 ft. (300 m)

Analog Voltages (for measured variables in °C, % or without unit)

Range	0 to 10 Vdc Corresponding to Adjustable Range from -100 to +2400
Maximum Cable Length for 14 AWG	Max. 984 ft. (300 m)

Remote Setpoint x2

Range	0 to 1000 Ohm Corresponding to Adjustable Range from -100 to +2400
-------------	---

Max. Cable Length for 14 AWG

Digital Input D1

Polling Voltage for Control Commands (D – GND)	15 Vdc
Current Consumption	<10 mA

Analog Output Y1

Range	0 to 10 Vdc
Maximum Current	$\pm$ 1 mA

Digital Output Q1 through Q4

Relay Contacts (potential-free)

Voltage	24 to 230 Vac
Maximum Rating	5A Resistive, 5 FLA 30 LRA/1/2 HP 30 Vdc, 4A
Minimum Rating	19.2 Vac, 20 mA 5 Vdc, 100 mA

 Sensors for this product can be found on pages B-9, B-15, and B-21.

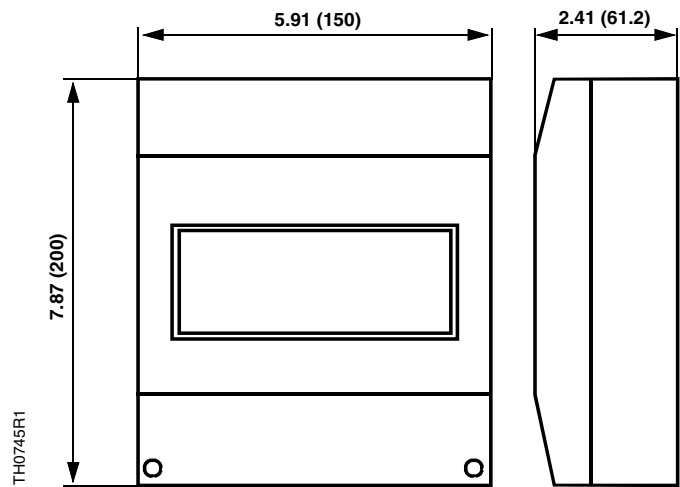
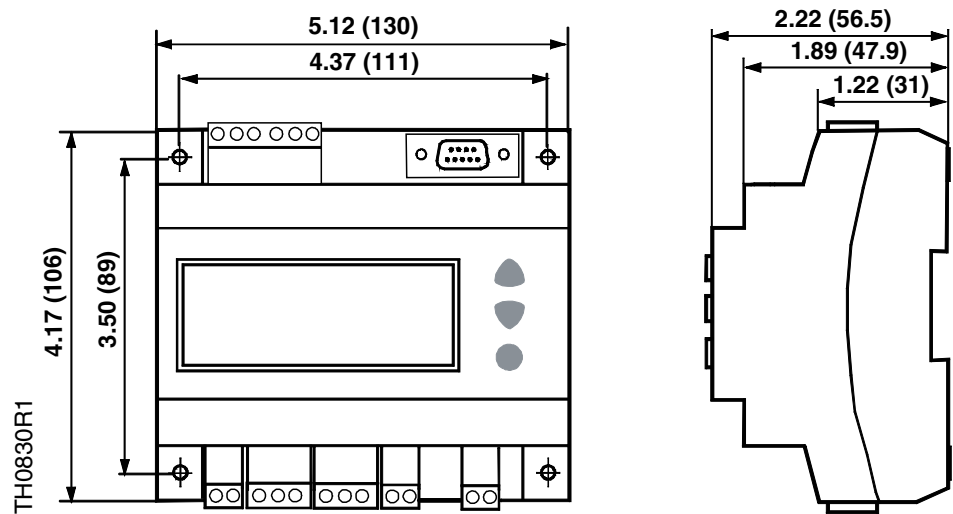
RWD Temp Controllers Product Ordering

Inputs		Output Two-position	0 to 10 V	Operating Voltage	Part No.
0 to 10 Vdc	Digital				
2	1	4		24 Vac	RWD44U
3	1	4	1	24 Vac	RWD45U

Accessories & Service Kits

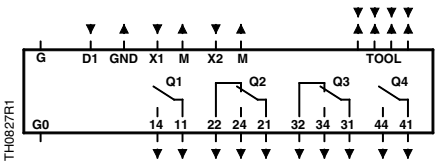
C-37

RWD Controller and Enclosure

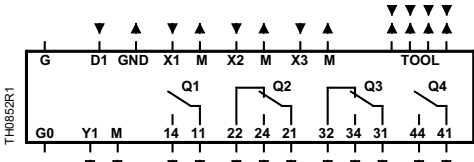


Dimensions shown in inches (mm).

RWD Temp Controllers Wiring Diagrams



RWD44U



RWD45U

- Key**
- D1 Digital input
 - G, G0 24 Vac supply
 - M Ground (G0) for signal inputs
 - Q1-Q4 Relay outputs; various voltages permissible
 - X1 Signal input (Main Input: Siemens Ni 1000, Pt 1000 and 0 to 10 Vdc)
 - X2 Signal input (Aux. Input: Siemens Ni 1000, Pt 1000 and 0 to 10 Vdc)
 - X3 Signal input (Eco. Sensor or second ind. Input: Siemens Ni 1000, Pt 1000 and 0 to 10 Vdc)
 - Y1 Analog output (0 to 10 Vdc)
 - Tool Communication port with PC (9 pin plug)

Note
M, GND and G0 are internally connected.

Time Clock



Time Clock for RWD Temperature Controllers.

Description

The digital Time Clock is used to switch an HVAC system on and off, or for the control of setback periods at night and weekends.

Features

- Integrated countdown timer for after-programmed-hours operation
- Countdown timer only option
- Suitable for mounting on DIN rails
- Simple programming with large, clear LCD screen
- Manual on/off control
- Quick Daylight Savings time (DS) adjustment
- Power reserve of 72 hours

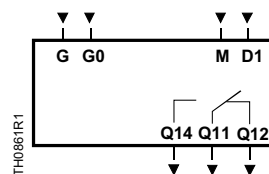
Function

The microprocessor automatically stores the programmed times in chronological order. The time clock operates in one of four modes:

- Manual, continuously On
- Manual, continuously Off
- Adjustable Countdown Timer On
- Automatically via the time program

A momentary contact close switch across M and D1 activates the Countdown Timer. The power supply is buffered by a memory back-up capacitor. In the event of a power failure, the clock will continue to run, with the program retained, for 72 hours. However, the output will go to (or remain in) the normal position.

Wiring Diagram



Time Clock

- | | |
|--------------|--|
| G, GO | 24 Vac input |
| M, D1 | Digital input (momentary close switch) |
| Q... | Digital output (24 Vac to 240 Vac). |

CAUTION: Do not connect external power to terminals M, D1.

C-11

Controllers & Transmitters

RWD Time Clock Specifications

Power Supply

Operating Voltage..... 24 Vac, -15 to +10%
 Frequency..... 50 Hz/60 Hz
 Power Consumption 3.0 VA

Ambient Conditions

Operation..... 32 to 122°F (0 to 50°C)
 Storage..... -13 to +158°F (-25 to +70°C)
 Humidity < 95% RH
 General..... For Internal Use, in Control Panels, etc.

Regulatory Approvals

UL UL Listed to 916
 cUL C22.2 No. 205-M1983

Color

Housing Top Light Gray
 Housing Bottom..... Silver Gray

Mounting Snap-mounted on a Rail or Screwed to a Flat Surface

Terminals

Screw Terminals for Cables with Min. 20 AWG; Max. 2 x 16 or 1 x 14 AWG

Shipping Weight 0.66 lb. (0.3 kg)

Dimensions 3.07" H x 4.17" W x 2.20" D
 (78 mm H x 106 mm W x 56 mm D)

Digital Input D1

Polling Voltage for Control Commands (D to M) 24 Vdc
 Current Consumption 8 mA

Digital Output Q

Relay Contacts (potential-free)
 Voltage..... 24 Vac to 240 Vac
 Contact Rating..... 6A Resistive, 5 FLA, 30 LRA

Time Clock

Time Basis..... Quartz
 Memory Locations 8 for 7-day Clock, with Grouping into 12 Blocks for 24-hour Clock
 Power Reserve..... Nominal 72 hours, after 24 hours of Operation
 Accuracy..... ±1 second/day @ 68°F (20°C)
 Display..... 1.5 in (40 mm) LCD

C-12

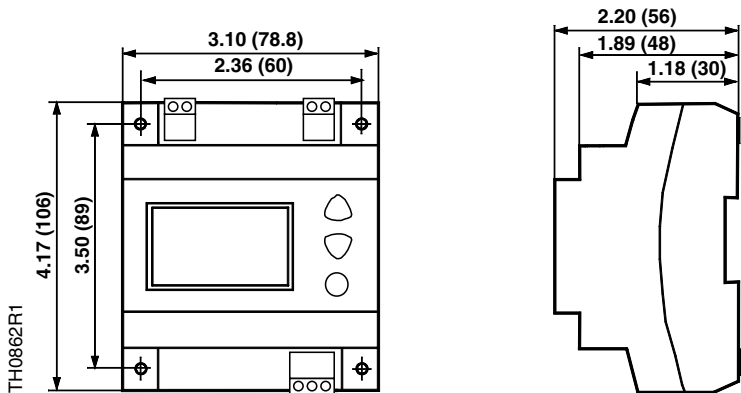
RWD Time Clock Product Ordering

Description	Part No.
Time Clock	SEH62.1U

Accessories & Service Kits

C-37

Dimensions



Dimensions shown in inches (mm).

Transformer



RWD Transformer.

Description

The SEM62.2U Transformer reduces voltage from 120 Vac to 24 Vac.

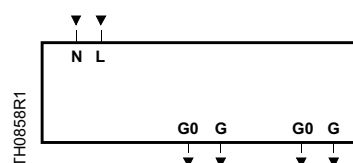
Features

- Output power 30 VA
- Suitable for mounting on DIN rails
- Secondary power supply indication via LED
- Integral self-resetting primary fuse
- Secondary power supply on/off switch with replaceable fuse

Applications

This power Transformer (with housing) reduces a 120 Vac supply voltage to the 24 Vac supply voltage required by controllers. The transformer has output power ratings of 30 VA, and an integral self-resetting fuse on the primary side that protects the transformer from overheating. It includes an on/off switch with replaceable fuse, which eliminates the need for additional 24V circuit on/off switch and fuse (or circuit breaker).

Wiring Diagram



Transformer

N, L 120 Vac input
G, G0 24 Vac output

Note: Total transformer output power is 24 VA. Two sets of G0 and G terminals are provided to enable easier wiring.

RWD Transformer Specifications

Input Power Supply

Voltage 120 Vac, 0.4A
Frequency 60 Hz

Output

Voltage 24 Vac
Total Output Power 30 VA
Fuse Rating Time Delay 1.6A
Fuse Dimension 5 mm x 20 mm Glass Type

Ambient Conditions

Operation 32 to 122°F (0 to 50°C)
Storage -13 to +158°F (-25 to +70°C)
Humidity Maximum 65% RH, Non-condensing
General For Internal Use, in Control Panels, etc.

Regulatory Approvals UL Listed to 916

CULC22.2 No. 205-M1983

Terminals Screw Terminals for Cables
with min.20 AWG; Max. 2 x 16 or 1 x 14 AWG

Shipping Weight (including packaging) 2 lb. (0.910 kg)

Dimensions 4.48" W x 4.17" H x 2.22" D
(113.8 mm W x 106 mm H x 56.4 mm D)

Mounting Snap-mounted on a Rail or Screwed to a Flat Surface

Mounting Orientation Any

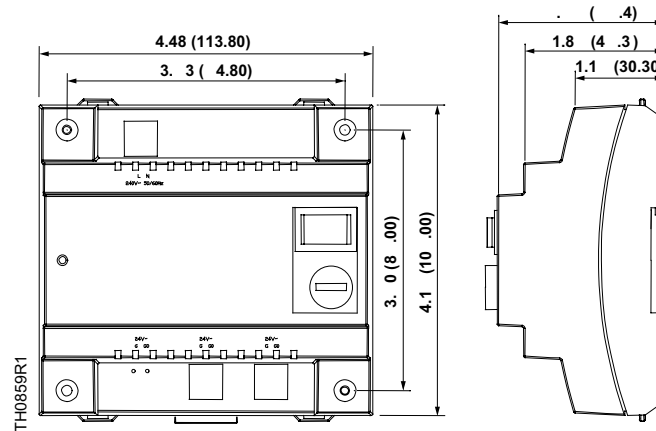
RWD Transformer Product Ordering

Description	Part No.
Transformer	SEM62.2U

Accessories & Service Kits

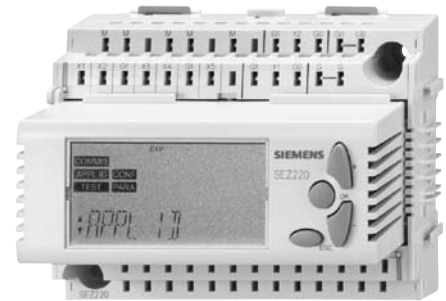
C-37

Dimensions



Dimensions shown in inches (mm).

Signal Converter



SEZ220 Signal Converter.

Applications

The signal converter is for use in HVAC plants to:

- Provide minimum / maximum selection or averaging of up to 5 passive or active input signals
- Calculate enthalpy, enthalpy differentials, absolute humidity or dew points from passive temperature and active humidity signals
- Convert 1 passive input signal into 2 active signals
- Double signals for the sequential control of pumps, valves and fans

Features

- Preprogrammed standard applications
- Freely programmable
- Menu-driven operation
- Spring cage wire terminals
- 13 pre-configured applications already programmed
- DIN rail back mount
- Front panel mount option

Function Modes

- Minimum / maximum / average (MIN-MAX-AVR)
 - Selection of maximum input signal from the inputs
 - Selection of minimum input signal from the inputs
 - Calculation of average value of the inputs
 - For calculating the average value, input can be weighted. This means the number of input signals can be increased several times over

If, in addition, configuration parameter SPLIT is activated, the functions will be assigned to the inputs X1 – X2 and X3 – X5. This means, e.g.:

- Selection of maximum input signal from the inputs X1 – X2
- Selection of maximum input signal from the inputs X3 – X5
- Selection of minimum input signal from the inputs X1 – X2
- Selection of minimum input signal from the inputs X3 – X5
- Calculation of average value of the inputs X1 – X2
- Calculation of average value of the inputs X3 – X5
- Enthalpy processor (ENTHALPY)
 - Calculation of enthalpy from 1 passive temperature signal and 1 active humidity signal
 - Calculation of absolute humidity from 1 passive temperature signal and 1 active humidity signal
 - Calculation of enthalpy differential from 2 signal groups each delivering 1 passive temperature signal and 1 active humidity signal
 - Calculation of dew point temperature from 1 passive temperature signal and 1 active humidity signal
- Signal doubling / signal inversion (2X-INV)
 - Signal doubling for the sequential control of pumps, valves and fans
 - Signal conversion from 1 passive temperature signal into 2 active temperature signals

The functions can be combined as required by the application.

SEZ220 Specifications

Power Supply (G, G0)

Rated Voltage	24 Vac ±20%
Frequency	50/60 Hz
Power Consumption	5 VA
Supply Line Fusing	Max. 10 A

Universal Inputs

Measured Value Inputs (X1 to X5)

Number	5
--------------	---

Signal Sources

Passive	Siemens Ni 1000, T1, Pt 1000, 0 to 1000 Ω 2x Siemens Ni 1000 (averaging)
Active	DC 0 to 10 V

Outputs

Positioning Outputs (Y...)

Number	2
Output Voltage	0 to 10 Vdc
Output Current	±1 mA
Max. Load	Continuous Short-Circuit

Power Supply External Devices (G1)

Voltage	AC 24 V
Current	Max. 4 A

Perm. Cable Lengths

For Passive Measuring and Positioning Signals
(Measuring Errors Can Be Corrected)

Type of Signal	Max. 300 m
Siemens Ni 1000, T1	Max. 300 m
Pt 1000	Max. 300 m
	0 to 1000 Ω
	Max. 300 m
	Max. 300 m

For DC 0 to 10 V Measuring And Control Signals

Refer To Data Sheet Of The Signal Delivering Device

Connection Terminals	Spring Cage Terminals
For Wires	0.6 mm dia...2.5 mm2
For Stranded Wires Without Ferrules	0.25...2.5 mm2
For Stranded Wires With Ferrules	0.25...1.5 mm2

Operation to IEC 60 721-3-3

Climatic Conditions Class 3K5

Temperature (Housing and Electronics) 0 to 50 °C

Humidity 5 to 95% RH (non-condensing)

Mechanical conditions Class 3M2

Materials and Colors

Terminal Base	Polycarbonate, RAL 7035 (light-grey)
Controller Insert	Polycarbonate, RAL 7035 (light-grey)

Shipping Weight (Excl. Packaging) 0.65 lbs.

C-16

Controllers & Transmitters

SEZ220 Product Ordering

Description	Part No.
Signal Converter	SEZ220

SIEMENS

www.usa.siemens.com/hvac



Controllers & Transmitters



The SEZ220 Signal Converter has not been submitted for UL rating in through-the-door (ARG62.201) applications.

Dimensions shown in inches (mm).

Go Green!

With the growing interest in maximizing energy savings in buildings, we've developed icons to help you identify products that can help contribute to achieving LEED credits.

Look for these icons throughout this catalog:



Sustainable
Sites



Water
Efficiency



Energy &
Atmosphere



Materials &
Resources



Indoor
Environmental
Quality



Innovation in
Design/Operations

For more information about these icons, turn to page 4.

Single Input Receiver-Controller

RETROLINE®

easily replaces:

- Barber-Coleman
- Johnson Controls
- Honeywell
- Robertshaw
- Seibe



195 Single Input Receiver-Controller.

Description

The 195 Single Input Receiver-Controller is a pneumatic controller which receives one pneumatic input, and produces a pneumatic output signal based on the net pneumatic input and the mechanical settings of the setpoint and percent proportional band. This controller can be easily changed from direct to reverse acting.

Retroline Receiver-Controller (195-1000) includes decals and installation instructions to replace competitive models.

Features

- Rugged proven design
- Plug-in air connections for ease of installation, calibration, and service
- Internal restrictors for transmitter inputs
- Stick-on scales included for setpoint dial in standard transmitter ranges
- Large, easy-to-read scales on all adjustments
- Calibration card for converting transmitter range to 3 to 15 psi (21 to 103 kPa) signal
- Tamper-resistant cover

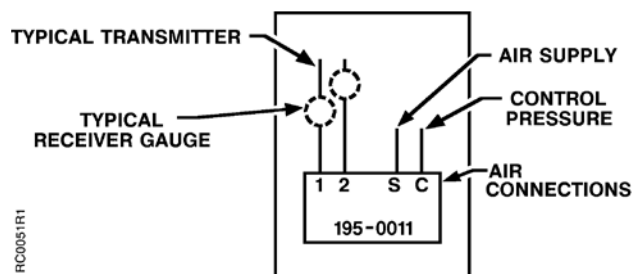
Options

- Retroline products for replacing competitive products
- Pressure Gauge (order separately, see page C-40)

Applications

The 195 Single Input Receiver-Controller is a one-input, direct/reverse acting instrument used to control temperatures, humidity, and pressure of mechanical equipment in commercial and industrial facilities.

Typical Connections



C-19

Controllers & Transmitters

195 Specifications

Action

Input #1 Direct
Input #2 Reverse

Pneumatic Inputs 3 to 15 psi (21 to 103 kPa)

Control Output 0 psi (0 kPa) to supply pressure 22 psi (152 kPa)

Operating Ambient

Temperature Range 40 to 120°F (4 to 49°C)

Supply Pressure

Operating..... 22 psi (152 kPa)
Maximum Safe 30 psi (207 kPa)

% Proportional Band

Adjustment Range 2 to 20% for a 5 psi (34 kPa)
control pressure change

Air Consumption 60 scim (17 ml/s), *not including transmitters*

Air Capacity 2 psi (14 kPa) Pressure Change at
9 psi (62 kPa) control pressure

Supply 640 scim (175 ml/s)

Exhaust 590 scim (161 ml/s)

Mounting Surface

Air Connections

Barb fittings for 1/4" (6 mm) OD polyethylene tubing. Two plug-in connectors are provided; one for the direct acting and the reverse acting transmitter inputs and one for supply and control lines. 1/8" NPT connection provided for control pressure gauge (gauge not included).

Case Material Lexan, 20% glass-filled

Dimensions 6.75" W x 5.69" H x 3.5" D
(171 mm W x 144 mm H x 89 mm D)

Shipping Weight 3.1 lb. (1.4 kg)

195 Product Ordering

Description	Part No.
Single Input Receiver-Controller	195-0011

RETROLINE®

Manufacturer	Manufacturer Part No.	Part No. ¹
Barber-Coleman	RKS-1001	195-1000
Barber-Coleman	RKS-2001	195-1000
Barber-Coleman	RKS-5001	195-1000
Honeywell	RP908A	195-1000
Honeywell	RP920A	195-1000
Johnson Controls	T-5800-1	195-1000

Ordering Note

- Includes **195-0011** plus decals to replace any competitive single input receiver-controller.

Accessories & Service Kits

C-37

C-20

Controllers & Transmitters

Multiple Input Receiver-Controller

RETROLINE®

easily replaces:

- Barber-Coleman
- Johnson Controls
- Honeywell
- Robertshaw
- Seibe



195 Multiple Input Receiver-Controller with Control Pressure Gauge.

Description

The 195 Multiple Input Receiver-Controller is a pneumatic controller that receives up to three pneumatic inputs and produces a pneumatic output signal based on the net pneumatic input and the setpoint, percent proportional band, and authority settings. The Controller can be easily changed from direct to reverse acting.

Retroline Receiver-Controller (195-1000) includes decals and installation instructions to replace competitive models.

Features

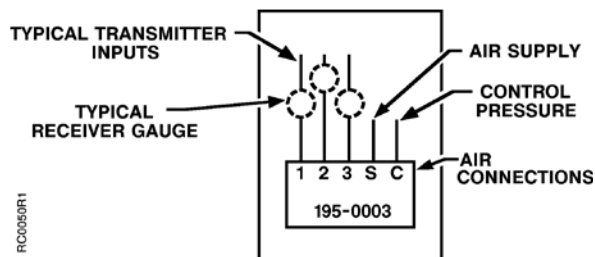
- Rugged proven design
- Plug-in air connections for ease of installation, calibration, and service
- Internal restrictors for transmitter inputs
- Stick-on scales included for setpoint dial in standard transmitter ranges
- Large, easy-to-read scales on all adjustments
- Calibration card for converting transmitter range to 3 to 15 psi (21 to 103 kPa) signal
- 0 to 30 psi (0 to 200 kPa) Pressure Gauge
- Retroline products for replacing competitive products

Applications

The 195 Multiple Input Receiver-Controller is commonly used when the setpoint needs to be automatically reset based on a separate input; can also be used as a single input device.

Example: Change hot water supply temperature setpoint based on outside air temperature.

Typical Connections



C-21

Controllers & Transmitters

195 Specifications

Action

Input #1 Direct
Input #2 Reverse

Reset

Input #3 Direct reset relative to Input #2
Reverse reset relative to Input #1

Pneumatic Inputs 3 to 15 psi (21 to 103 kPa)

Control Output 0 psi (0 kPa) to supply pressure 22 psi (152 kPa)

Operating Ambient

Temperature Range 40 to 120°F (4 to 49°C)

Supply Pressure

Operating..... 22 psi (152 kPa)
Maximum Safe 30 psi (207 kPa)

% Proportional Band

Adjustment Range 2 to 20% for a 5 psi (34 kPa) control pressure change

% Authority Adjustment Range 20 to 200%

Air Consumption 60 scim (17 ml/s), *not including transmitters*

Air Capacity @ 2 psi (14 kPa) Pressure Change and
9 psi (62 kPa) control pressure

Supply 640 scim (175 ml/s)
Exhaust 590 scim (161 ml/s)

Mounting Surface, vertical

Air Connections

Barb fittings for 1/4" (6 mm) OD polyethylene tubing. Two plug-in connectors are provided; one for the three transmitter inputs and one for supply and control lines. 1/8" NPT connection provided for control pressure gauge.

Case Material Lexan, 20% glass-filled

Dimensions 6.75" W x 5.69" H x 3.5" D
(171 mm W x 144 mm H x 89 mm D)

Shipping Weight 3.1 lb. (1.4 kg)

195 Product Ordering

Description	Part No.
Multiple Input Receiver-Controller	195-0003

RETROLINE®

Manufacturer	Manufacturer Part No.	Part No. ¹
Barber-Coleman	RKS-3002	195-2000
Barber-Coleman	RKS-4002	195-2000
Johnson Controls	T-5800-3	195-2000
Robertshaw	P-341	195-2000
Robertshaw	P-541	195-2000
Honeywell	RP908B	195-2000
Honeywell	RP920B	195-2000

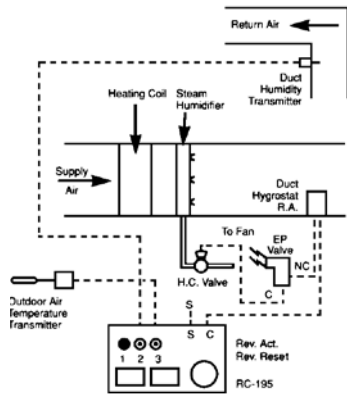
Ordering Note

- Includes **195-0003** plus decals to replace competitive receiver-controllers.

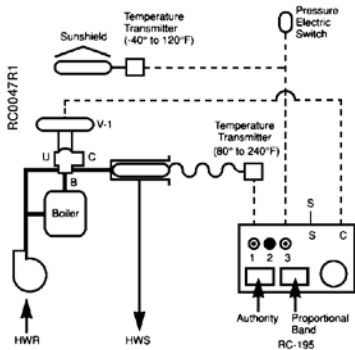
Accessories & Service Kits

C-37

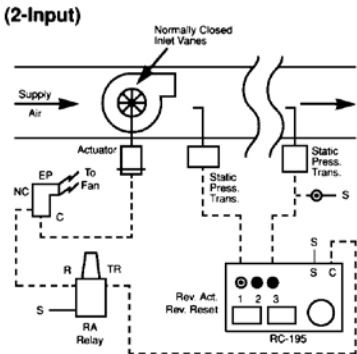
Dimensions/Engineering Drawings



Humidity Control



Temperature Control



Static Pressure Control

Temperature Transmitters

RETROLINE®

easily replaces:

- Barber-Coleman
- Johnson Controls
- Honeywell
- Robertshaw
- Seibe



184-0340 Room Temperature Transmitter.



184-0005 Temperature Transmitter with remote bulb.



184 Temperature Transmitter with averaging bulb.



184 Temperature Transmitter with rigid bulb.

Description

The 184 Temperature Transmitters are direct acting, one-pipe instruments that sense temperature and transmit a proportional 3 to 15 psi (21 to 103 kPa) pneumatic signal to a remotely located receiver gauge and/or receiver controller. Temperature Transmitters operate on the force-balance principle, using internal feedback for excellent linearity and accuracy.

Retroline transmitters easily replace any competitive model. Refer to the appropriate product to locate the Retroline replacement.

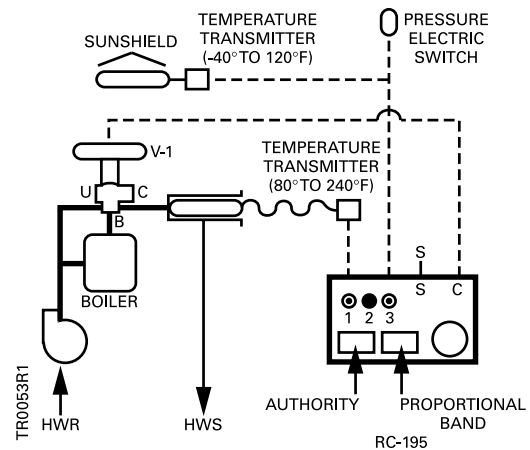
Features

- 1-pipe, direct acting
- Rapid response to temperature changes over their full range
- Available in a variety of sensing elements and temperature ranges
- Available with rigid bulb, remote averaging bulb, and room transmitter
- Internal feedback for excellent linearity and accuracy

Applications

The 184 Temperature Transmitters can be used for a variety of applications to monitor temperature and are ideal for those requiring indication with a receiver-controller.

Application Drawing



Hot water temperature setpoint reset.

C-23

Controllers & Transmitters

Retroline® 184 Temperature Transmitters Specifications

Action	Direct
Output Air Pressure	3 to 15 psi (21 to 103 kPa)
Ambient Temperature Range	40 to 120°F (4.4 to 49°C)
Input (supply) Air Pressure	
Restrictor Size	40 scim (11 ml/s)
Calibration Pressure	22± 1.0 psi (152± 6.9 kPa)
Maximum	30 psi (207 kPa)
Thermal System	
Room	Bimetal
Rigid Bulb	Rod and tube
Remote Bulb	Liquid-filled
Air Consumption	35 scim (10 ml/s)
Air Connections	1/8" NPT (Except for room type)
Mounting	
Room	Wall terminal
Rigid Bulb	Mounting flange
Remote Bulb	Mounting flange or well bracket mounting kit
Averaging Bulb	Mounting flange

Cover Finish	
Room	Desert Beige, plastic
Rigid, Averaging and Remote Bulb	Gray
Dimensions	
Room	2.16" W x 3.35" H x 1.59" D (55 mm W x 85 mm H x 40 mm D)
Rigid Bulb/Remote Bulb	1.875" W x 3" H x 1.69" D (48 mm W x 76 mm H x 33 mm D)
Shipping Weights	
Room	0.83 lb. (0.38 kg)
Rigid Bulb	1.5 lb. (0.68 kg)
Remote Bulb	2.0 lb. (0.91 kg)
Averaging Bulb with Armored Capillary	3.0 lb. (1.36 kg)
Averaging Bulb	2.0 lb. (0.91 kg)

RETROLINE® Product Ordering

Manufacturer Part No.	Description	Temperature Range	Part No.
Honeywell			
LP914A1003	Rigid Bulb Transmitter 12" (255 mm)	-40 to +160°F (-40 to +371°C)	184-0120
LP914A1052	Rigid Bulb Transmitter 6" (152 mm)	40 to 240°F (4 to 116°C)	184-0121
TP974A2000	Room Temperature Transmitter	50 to 100°F (10 to 38°C)	184-0126
T5002-201	Room Temperature Transmitter	50 to 100°F (10 to 38°C)	184-0127
Johnson Controls			
T5210-1002	Remote Bulb Transmitter 1/4" x 7-5/8" bulb (6.4 mm x 194 mm) w/ 8" (203 mm) capillary	0 to 100°F (-18 to 38°C)	184-0123
T5210-1004	Remote Bulb Transmitter 1/4" x 7-5/8" bulb (6 mm x 194 mm) w/ 8" (203 mm) capillary	40 to 240°F (4 to 116°C)	184-0122
T5210-1007	Averaging Bulb Transmitter 3/32" x 8-3/4" bulb 2.4 mm x 5.7 m) w/ 12" (0.305 m) capillary	50 to 150°F (10 to 38°C)	184-0129
T5210-1009	Averaging Bulb Transmitter 3/32" x 18-3/4" bulb (2 mm x 5.7 m) w/ 12" (0.305 m) capillary	0 to 100°F (-18 to +38°C)	184-0125
T5210-1113	Remote Bulb Transmitter 1/4" x 7-5/8" bulb (6 mm x 194 mm) w/ 50" (1.27 m) capillary	-40 to +160°F (-40 to +71°C)	184-0124
Robertshaw			
2220-053	Room Temperature Transmitter	50 to 90°F (10 to 32°C)	184-0128

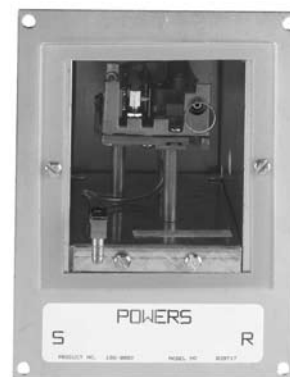
Accessories & Service Kits

C-37

Room and Duct Humidity Transmitters



186-0043 Room Humidity Transmitter.



186-0089 Duct Humidity Transmitter.

Description

The 186 Room and Duct Transmitters are one-pipe, direct acting pneumatic instruments that sense space humidity and transmit a 3 to 15 psi (21 to 103 kPa) pneumatic signal to a remote receiver gauge and/or receiver-controller to read percent relative humidity.

Features

- Inorganic sensing element for rapid response to humidity changes
- Bimetal temperature compensation minimizes temperature effects
- Cover included with Room Transmitter
- Available for room mounting (vertical) and duct mounting that is at least 6-inches (152 mm) high and 6-1/2-inches (165 mm) deep

Applications

The 186 Room and Duct Humidity Transmitters operate on a force-balance principle with internal feedback to obtain linearity to accurately sense relative humidity.

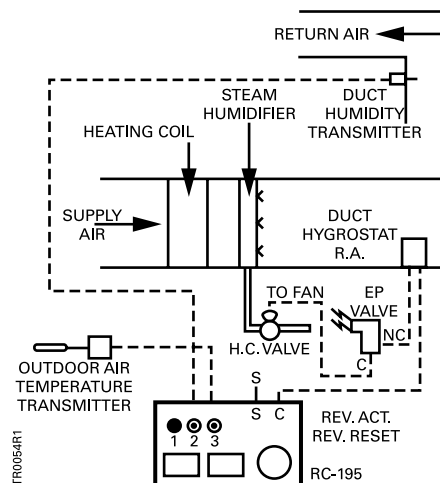
The transmitter output can be sent to a receiver-controller for control of an air conditioning or process control system.

Recommendation

Room: Air velocity must be at least 30 FPM (0.15m/s) and the transmitter should be located where it senses actual *room conditions* (away from doors, equipment, etc.).

Duct: Duct transmitters should be used whenever possible in the return air duct.

Application Drawing



Typical Application of Return Air Duct

C-25

Controllers & Transmitters

186 Humidity Transmitters Specifications

Action Direct
RH Range 20 to 80% RH
Maximum Operating Temperature 135°F (57°C)
Supply Pressure
Maximum..... 30 psi (207 kPa)
Normal Operating..... 22± 1.0 psi (152± 6.89 kPa)
Effect of 10°F (5.6°C)
Temperature Change Shift of 1% RH
Air Consumption 35 scim (9.6 ml/s)
Output Pressure 3 to 15 psi (21 to 103kPa)
Air Connections 1/8" (3 mm)

Mounting
Room..... Wall terminal
Duct Duct at least 6" H x 6.5" D
(152 mm H x 165 mm D)
Standard Room Cover Finish Desert Beige, plastic
Duct Box
Material..... Galvanized Steel
Air Connections 1/4" (6 mm) barbed connection
Dimensions
Room..... 2.06" W x 3.19" H x 1.37 D
(53 mm W x 81 mm H x 35 mm D)
Duct..... 4.5" W x 5.87" W x 6" D
(114 mm W x 149 mm W x 152 mm D)
Shipping Weights
Room..... 0.84 lb. (0.38 kg)
Duct..... 3.14 lb. (1.42 kg)

186 Humidity Transmitters
Product Ordering

Description	Part No.
Duct Humidity Transmitter	186-0089
Room Humidity Transmitter	186-0043

Low Differential Pressure Transmitters



141 Low Differential Pressure Transmitter.

Description

The 141 Low Differential Pressure Transmitter is a compact, direct acting, one-pipe device that converts a differential pressure input into a proportional air signal. The input can be either static or velocity pressure differentials of a positive or negative type.

Features

- 1-pipe
- Two input ports (HI and LO)
- One supply pressure port (SIG)
- Rugged construction

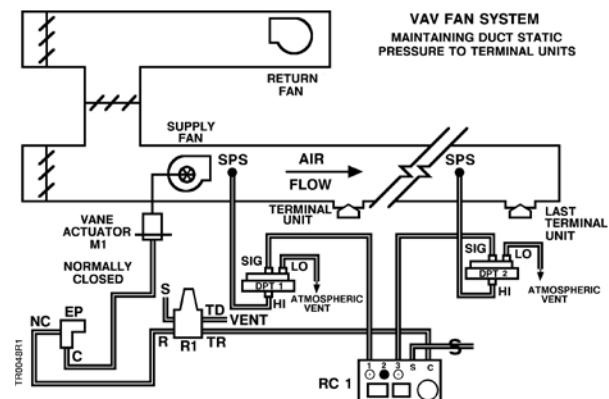
Applications

The 141 Low Differential Pressure Transmitter operates on the force-balance principal and can be used to indicate and/or control static or velocity differential pressures in ducts, across fans, coils, filters, and between any two reference points; can also indicate velocity pressure in duct work. The output signal can be sent to a remotely located, receiver-controller, receiver gauge, and/or sensitive switching pneumatic relay and pressure switch.

Recommendation

Use both of the HI and LO ports for differential pressure applications; either the HI or LO port can be used for static pressure applications.

Application Drawing



Typical Application of Duct Static Pressure Control

C-27

Controllers & Transmitters

141 Specifications

Action	Direct
Input (Supply) Air Pressure	
Normal.....	20 psi (138 kPa)
Maximum.....	30 psi (207 kPa)
Overpressure in HI and LO Ports	30" W.G. (7.5 kPa)
Output Pressure ¹	3 to 15 psi (21 to 103 kPa)
Air Consumption	35 scim (9.6 ml/s)
Operating Ambient Temperature	
Minimum.....	40°F (4°C)
Maximum.....	140°F (60°C)

1. Linear for differential pressure inputs. Nonlinear for velocity.
Refer to the velocity conversion chart on the following page
for more details.

Calibration	Zero adjust
Accuracy	
Full Range.....	±5% full scale
Mid Range.....	±2% full scale
Air Connections	
Sensing Line.....	3/8" (10 mm) OD polyethylene
Supply Air	1/4" (6 mm) OD polyethylene
Maximum Sensing Line Length	
1/4" (6 mm) OD polyethylene	200 ft. (61 m)
3/8" (10 mm) OD polyethylene	500 ft. (152 m)
Materials	ABS plastic body and rubber diaphragm
Mounting	Horizontal only
Dimensions	2.69" H x 5.31" W x 5.56" D (68 mm H x 135 mm W x 141 mm D)
Shipping Weight	0.5 lb. (0.23 kg)

141 Product Ordering

Differential Input Pressure	Part No.
-0.05 to +0.2" W.G. (-12 to +50 Pa)	141-0590
-0.5 to +0.5" W.G. (-125 to +125 Pa)	141-0591
0 to 3" W.G. (0 to 750 Pa)	141-0592
0 to 10" W.G. (0 to 2.5 kPa)	141-0593

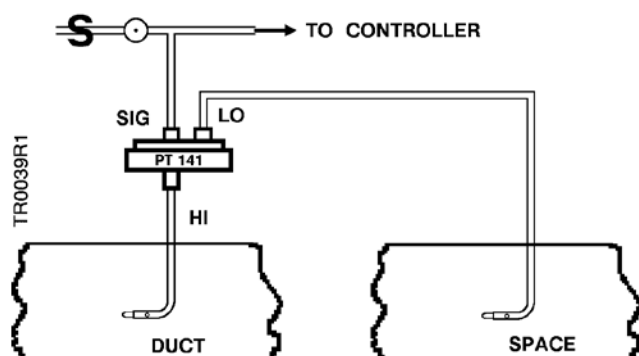
141 Accessories Product Ordering

Control Symbol	Description	Part No.
DPT1	141 Low Differential Pressure Transmitter 0 to 10" W.G. (0 to 2.5 kPa)	141-0593
DPT2	141 Low Differential Pressure Transmitter 0 to 3" W.G. (0 to 750 kPa)	141-0592
SPS	Static Pressure Sensor (2 required)	269-062
RC1	195 Receiver-Controller	195-0003
G2	2-1/2" Receiver Gauge - 0 to 3" W.G.	142-0266
M1	Fan Vane Actuator	as req.
R1	Multi-purpose (reversing) Relay	243-0009

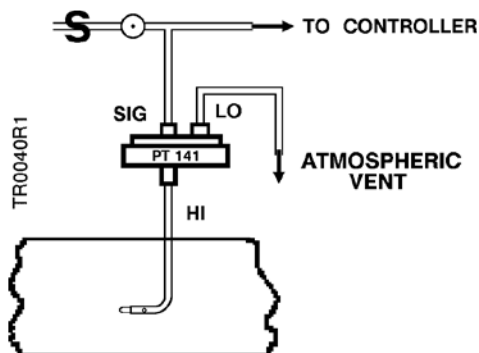
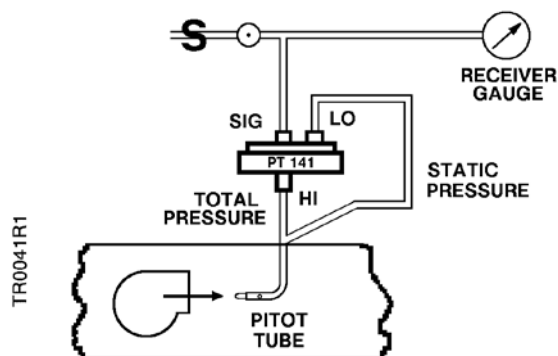
Accessories & Service Kits

C-37

Typical Static Pressure Differential Control



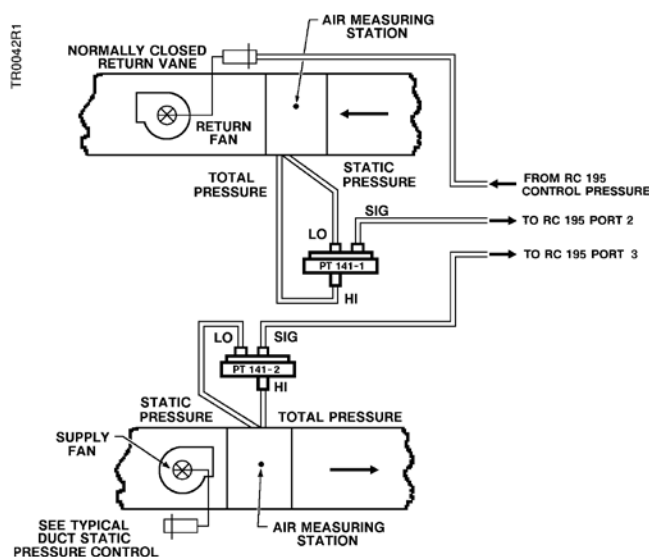
Typical Static Pressure Control


Typical Velocity Pressure¹ Indication


$$\text{VELOCITY PRESSURE} = \text{TOTAL PRESSURE} - \text{STATIC PRESSURE}$$

1. Allow 10 duct diameters of straight duct before (and 4 duct diameters after) the pitot tube to provide laminar air flow.

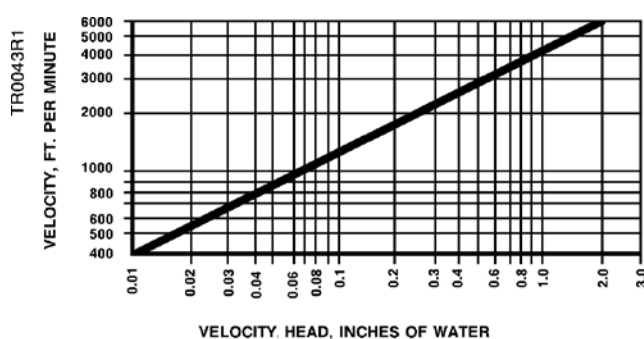
Typical Differential Velocity Pressure Control



Velocity Pressure Control is recommended when the supply fan does not exceed 25,000 CFM (11,800 l/s) and the downturn ratio (min./max. return fan CFM) does not exceed 0.5 (0.2 l/s).

Example: If the return fan CFM varies from 8,000 to 20,000 CFM (3,776 to 9,440 l/s), the turndown ratio is 0.4 (0.2 l/s). The 141 Velocity Pressure Transmitter, with square root extractor, is recommended for these conditions.

Standard Pitot Tube



This chart illustrates the relationship between velocity and velocity head for standard air.

Need an additional Catalog?

Request an additional paper Master HVAC Catalog through your Siemens Account Executive or by calling Inside Sales at 1-888-593-7876.

Receiver Gauges



142 Pneumatic Receiver Gauges.

Description

Used for visual indication of the value of a variable required to report system or functional operating status, Receiver Gauges are available as 1-1/2-inch (38 mm), 2-1/2-inch (64 mm), and 3-1/2-inch (89 mm) diameter gauges with a barb fitting for 1/4-inch (6 mm) OD polyethylene tubing.

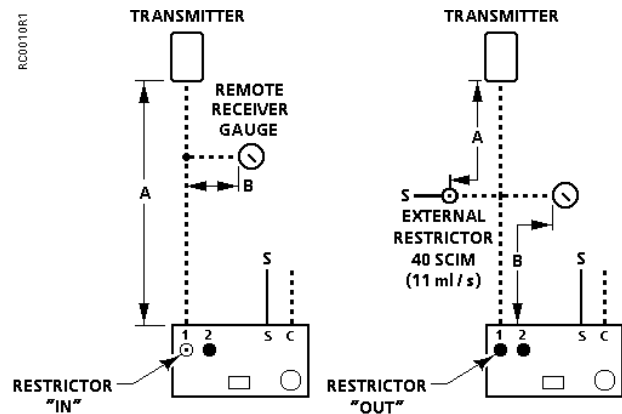
Features

- Easy-to-read dials
- Available in variety of control ranges

Applications

Receiver Gauges are mounted on a central control panel and respond to pneumatic signals from a remotely located transmitter used to measure temperatures, humidity, and pressures of mechanical equipment.

Application Drawing



DISTANCE "A" NOT TO EXCEED 300 FEET (92 m)
DISTANCE "A" + "B" NOT TO EXCEED 1000 FEET (306 m)

C-31

Controllers & Transmitters

Static Pressure and Liquid Level Regulators



269 Static Pressure and Liquid Level Regulator.

Description

The 269 Static Pressure and Liquid Level Regulator is a direct acting, pneumatic differential controller that measures static or head pressure, and is used to directly control inlet vanes, damper actuators, or similar devices.

Features

- Removable restriction for ease of servicing
- Integral mounting bracket for horizontal mounting
- Adjustable setpoint
- Many models available covering a wide range of pressures

Applications

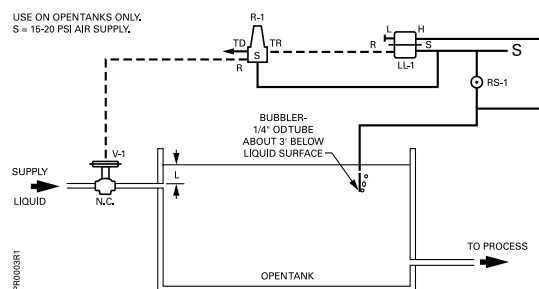
269 Static Pressure Regulator

The 269 Static Pressure Regulator can be used to control velocity, static, or differential pressure to pneumatically control a damper or similar device.

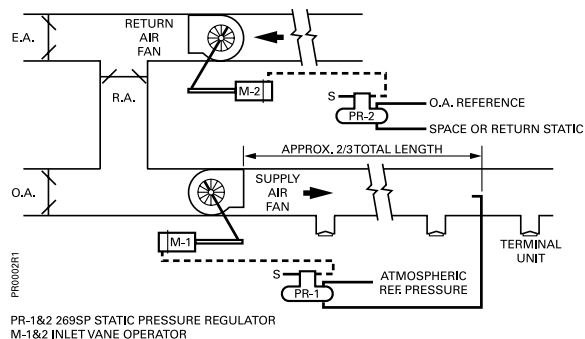
269 Liquid Level Regulator

The 269 Liquid Level Regulator is used to maintain liquid level in an industrial process by pneumatically controlling a valve.

Application Drawings



Typical Application of Liquid Level Regulation



Typical Application of Static Pressure

C-33

Controllers & Transmitters

269 Regulators Specifications

Control Action Direct

Supply Pressure

Normal 20 psi (140 kPa)

Maximum 30 psi (207 kPa)

Maximum Ambient Temperature 120°F (50°C)

Maximum Allowable Pressure

"H" and "L" Port 10" W.G. (2.5 kPa) Differential

Number of Turns for Setpoint Change of 1" W.G.

269-1066 approx. 6 turns

269-1067 approx. 1/2 turn

269-1068 approx. 6 turns

269-1069 approx. 1/4 turn

Response

269-1066, 269-1067, 269-1068 0.005" W.G. (1.2 Pa)

269-1069 0.01" W.G. (2.5 Pa)

Air Connections Barb fitting for 1/4" (6 mm) OD polyethylene tubing

Dimensions 3.125" H x 3.25" W x 3.31" D
(79 mm H x 83 mm W x 84 mm D)

Shipping Weight 1.5 lb. (0.07 kg)

269 Regulators Product Ordering

Differential Range	Sensitivity (Fixed)	Mounting Position	Part No.
0.05 to 1.00" W.G. (12 to 249 Pa)	2.25 psi/0.01" W.G. (6.2 kPa/Pa)	Upright	269-1066
0.20 to 1.00" W.G. (50 to 249 Pa)	40 scim restrictor	Upside Down	
0.05 to 3.00" W.G. (12 to 746 Pa)	1 psi/0.01" W.G. (2.8 kPa/Pa)	Upright	269-1067
0.20 to 3.00" W.G. (50 to 746 Pa)	40 scim restrictor	Upside Down	
0.05 to 1.00" W.G. (12 to 249 Pa)	2.25 psi/0.01" W.G. (6.2 kPa/Pa)	Upright	269-1068
0.20 to 1.00" W.G. (50 to 249 Pa)	80 scim restrictor	Upside Down	
Liquid Level ¹ 1.00 to 8.00" W.G. (250 to 1990 Pa)	1 psi/0.1" W.G. (0.3 kPa/Pa)	Upright	269-1069
	40 scim restrictor	Upside Down	

Ordering Note

1. This is not a differential range; "H" and "L" ports are internally connected.

C-34

Controllers & Transmitters

Pneumatic Step Controller



256 Pneumatic Step Controller.

Description

The 256 Pneumatic Step Controller is a pressure-electric device that converts a proportional pneumatic input signal into a series of ten (10) electric ON-OFF contact closures.

Features

- Switches can be easily adjusted in field
- All components mounted on rigid base
- Metal snap-on cover protects electric components
- External pointer indicates shaft position

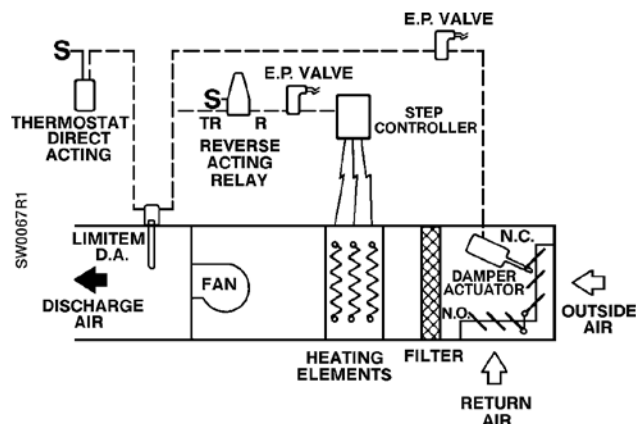
Applications

A single input type, the 256 Pneumatic Step Controller is used to control electric heating elements. The normally open switch contacts are used to provide fail-safe operation.

The application drawing shows the unit controlling electric resistance heating elements in unit ventilators. On a decrease in room temperature, the direct acting thermostat closes the outside air damper, opens return air damper and passes air to the step controller which energizes the electric heating coil steps in sequence to raise the fan discharge air temperature. **Note:** A reversing relay is used to reverse the air signal passed from the direct acting thermostat to the step controller. On fan shutdown, an EP valve opens the step switches to prevent overheating.

The Pneumatic Step Controller may also be used in industrial processes requiring sequential control and for sequence control of pumps and refrigeration equipment.

Application Drawing



C-35

Controllers & Transmitters

256 Controller Specifications

Actuator

Effective Diaphragm Area	11 in. ² (71 cm ²)
Normal Air Pressure	0 to 15 psi (0 to 103 kPa)
Maximum Air Pressure	30 psi (207 kPa)
Ambient Temperature	0 to 160°F (-18 to +71°C)
Spring Range (factory setting).....	8 to 13 psi (55 to 90 kPa)
Diaphragm.....	Neoprene

Switches

Differential	Fixed, 5 angular degrees min.
Rating	20 amps. @ 120, 240 & 480 Vac 1 hp at 125 V; 2 hp at 240 V

Switch Action	SPDT
Air Connections	1/8" NPT Female
Conduit Knockouts	Two -1/2" (13 mm); Five -3/4" (20 mm)
Shipping Weight	9.2 lb. (4.2 kg)

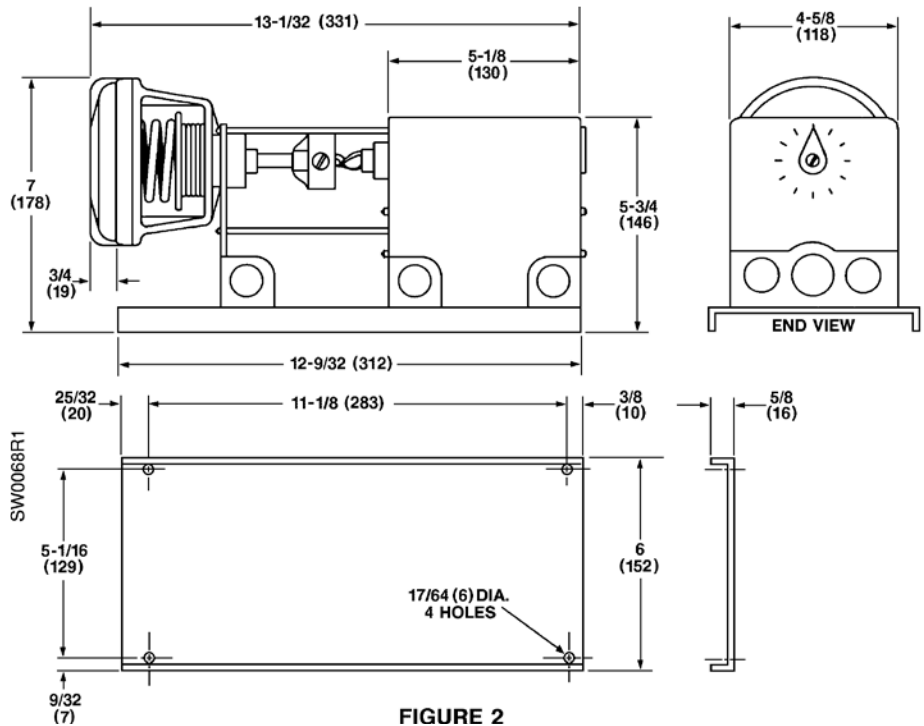
Switch Settings (closing points)

Switch Number	Air Pressure	Pointer Rotation
1	8.0 psi (55 kPa)	25°
2	8.5 psi (58.6 kPa)	39.5°
3	9.0 psi (62 kPa)	54°
4	9.5 psi (65.5 kPa)	68°
5	10 psi (69 kPa)	83°
6	10.5 psi (72.4 kPa)	97°
7	11 psi (76 kPa)	112°
8	11.5 psi (79.3 kPa)	126°
9	12 psi (83 kPa)	140.5°
10	12.5 psi (86.2 kPa)	155°

256 Controller Product Ordering

Differential Input Pressure	Part No.
Pneumatic Step Controller (10 contacts)	256-1015

Dimensions



Dimensions shown in inches (mm).