REACT a NA

Installation – Commissioning – Maintenance

20180225

Installation

Air flow measuring of REACT requires a straight section of duct before the unit (in air flow direction), according to installation figures. Modbus tables are available in a separate document (REACTa_Modbus-m).

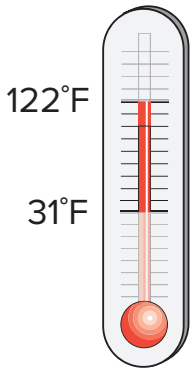


Figure 1. Permissible ambient temperature.

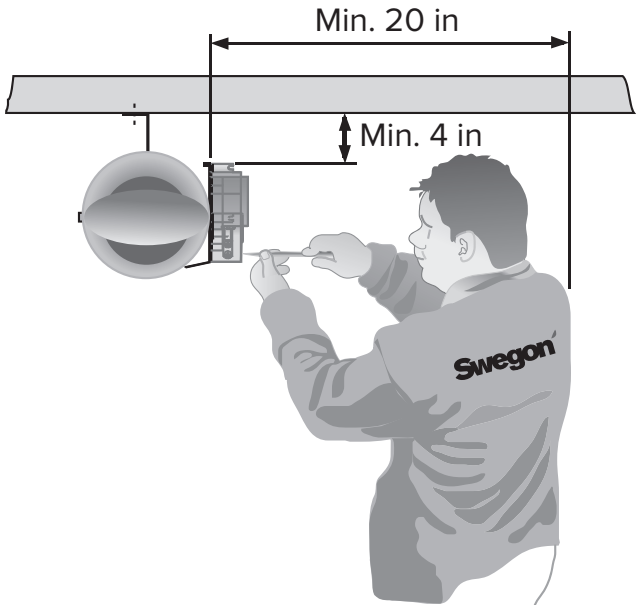


Figure 2. Space required for installation.

Installation – Round Version

Legend to figures 3-5:

1. Round Variable-flow damper REACT
2. Sound attenuator with baffle

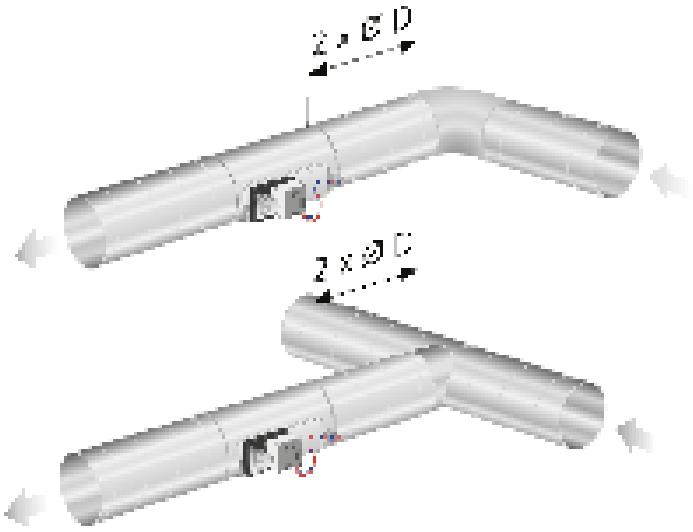


Figure 3. Straight section requirements, round ducts.

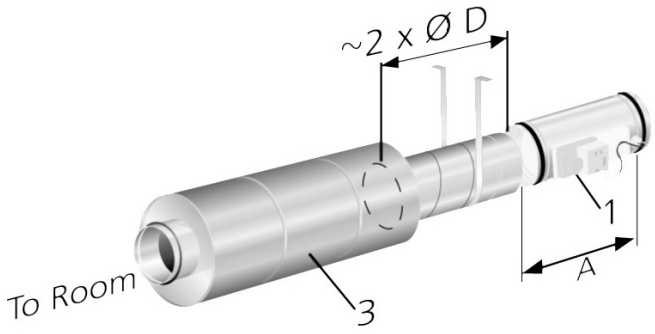


Figure 4. REACT requires a duct of ~2 x ØD between the REACT and a sound attenuator fitted with baffles. NOTE: Ducts must be fixed on both sides of REACT.

Swegon

Installation Measurements – Round Version

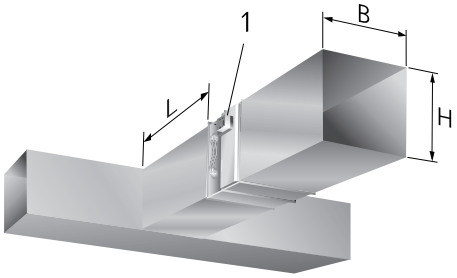
Size	A (in)
100	18.75
125	18.75
160	20.75
200	18.75
250	20.50
315	23.75
400	27.50
500*	32.50
630*	49.25

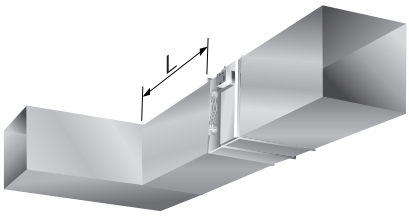
Installation – Rectangular Version

Measurement B in the figure and table below can be found on page 11, in the table; "Dimension, air-flow and k-factors – rectangular version".

Straight sections before REACT for rectangular ducts

Type of obstruction	L (m_2=5%)	L (m_2=10%)
One 90°-bend	L = 3 x B	L = 2 x B
One T-piece	L = 3 x B	L = 2 x B





L = Straight section.
B = Width, duct.
H = Height, duct.

Figure 5. Straight section requirements, rectangular ducts. Dimensions B and H (B = Width, H = Height) can be read off the label on the delivered product.

Straight Sections Before/After REACT – Sound Attenuator with Baffles

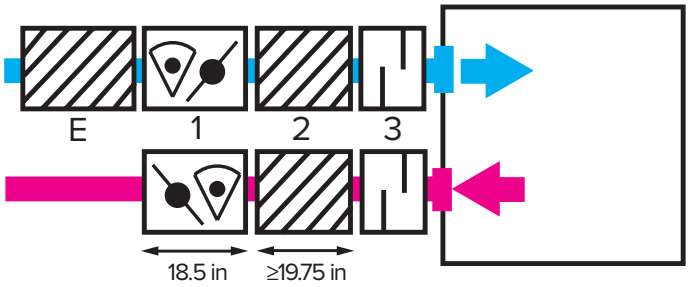


Figure 6. Straight section requirements, rectangular REACT and sound attenuator with baffles. Installation with a length of straight duct applies to both the supply air and the return air.

1 = Rectangular Variable-flow damper REACT.
2 = ≥ 3 x B in length of straight duct.
3 = Sound attenuator with baffles.

Dimensions and Weights

REACT NA – Round Version

Size	Ød	A	C	Weight (lb) REACT NA	Weight (lb) REACT GUAC
100	4	18.75	1.75	4.2	6.4
125	5	18.75	1.75	4.4	6.6
160	6	20.75	1.75	4.6	6.8
200	8	18.75	1.75	5.1	7.3
250	10	20.50	1.75	7.5	9.7
315	12	23.75	1.75	9.7	13.2
400	16	27.50	2.25	13.2	16.8
500	20	32.50	2.25	19.8	23.4
630	24	49.25	2.25	37.5	41.9

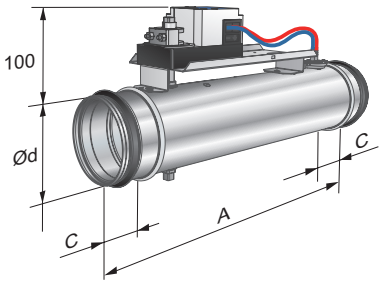


Figure 7. Round REACT NA and REACT MB.

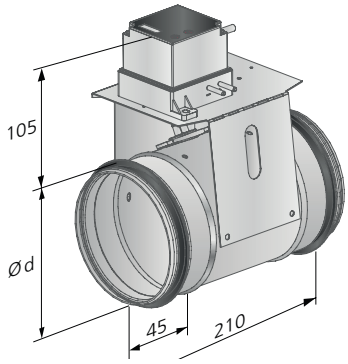


Figure 8. REACT CU, round version.

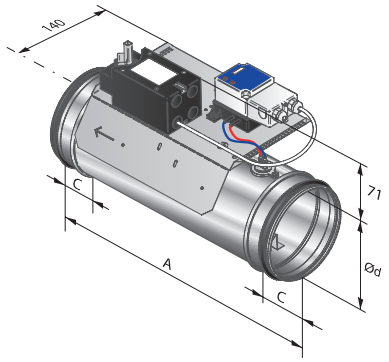


Figure 9. Round REACT GUAC with spring return actuator.

REACT NA – Rectangular Version

Dimensions B and H (B = Width, H = Height), can be found in the table; "Air flows and measures – rectangular version", see page 9.

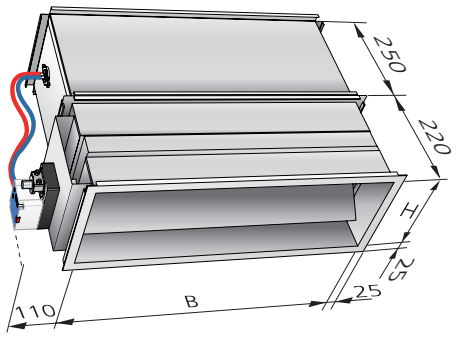


Figure 10. REACT NA and REACT MB, rectangular version.

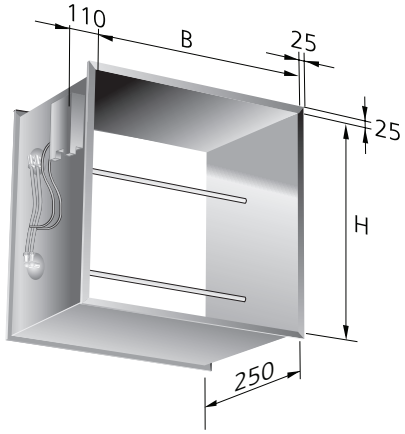


Figure 11. REACT CU, rectangular version.

Technical Data

To obtain the correct functionality. it is very important that the following is taken into account:

- REACT may only be installed in spaces with an ambient temperature in the range 31–122°F (0 – 50°C).
- All interconnected regulating equipment must have the same polarity. i.e. the neutral wire must be correctly connected.
- The product should always be installed with its flow meter facing downstream, see air direction arrows on the product label.
- REACT is not suitable for use in explosive environments.
- All service must be carried out with the power supply disconnected.

Operating Data

Ambient air temperature:	31° – 122°F
Air-flow temperature:	31° – 122°F
Running time open/close (90 degrees):	
REACT NA 100, 125, 160, 200 and 250	100s
REACT NA 315, 400, 500 and 630	150s
Spring return actuator, running time electricity:	
REACT NA 100, 125, 160, 200 and 250	100s
REACT NA 315, 400, 500 and 630	150s
Running time spring max:	20 s (90 °)

Storage and Transport

Ambient temperature:	-4 – 176°F

Electrical Data

Supply voltage	24 V AC/DC +-20%, 50/60 Hz	
Power consumption. for transformer rating:		
REACT NA 100, 125, 160, 200 and 250	2.5 W	4 VA
REACT NA 315, 400 and 500	2.5 W	4.5 VA
REACT NA 630	3 W	4.5 VA
GUAC DM3 controller	0.6 W	1.3 VA
Spring return actuator for REACT 100, 125, 160, 200 and 250	6.5 W (standby 2 W)	7.5 VA
Spring return actuator for REACT 315, 400 and 500	5 W (standby 2 W)	8 VA
REACT CU flow unit	0.6 W	1.3 VA

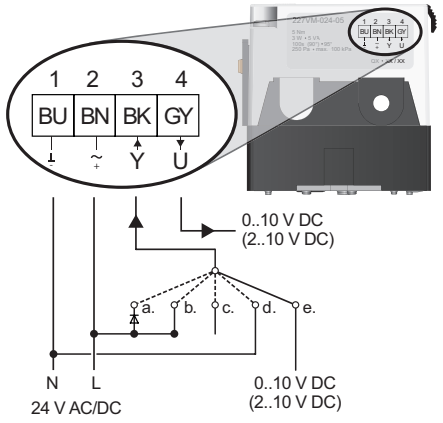
Mechanical Opening/Closing of the Spring Return Actuator

Mechanical handling of dampers can only be performed if the actuator is de-energized. The supplied key (attached to the motor cable) or a 0.1 in. hex key, is used for mechanical handling.

Spring return actuators on REACT GUAC are supplied as standard from the factory with the spring return of the damper set to de-energized/closed.

Wiring, REACT a NA Version

BU-BN – Operating voltage	24 V AC/DC
BU-BK – Control signal	0..10/(2..10) V
BU-GY – Feedback signal	0..10/(2..10) V
Load for output GY: max 0.5 mA	

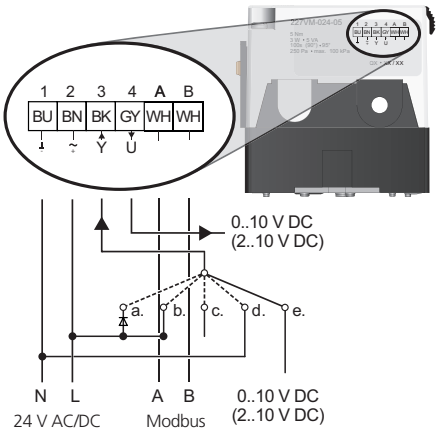


BU = Blue (1)
BN = Brown (2)
BK = Black (3)
GY = Grey (4)

Figure 13. Wiring diagram, REACT a NA Version

Wiring, Modbus Version

BU-BN – Operating voltage	24 V AC/DC
BU-BK – Control signal	0..10/(2..10) V
BU-GY – Feedback signal	0..10/(2..10) V
Load for output GY: max 0.5 mA	



BU = Blue (1)
BN = Brown (2)
BK = Black (3)
GY = Grey (4)
WH = White (A, B)

Figure 14. Wiring diagram, Modbus version.

Connection GUAC version

Connections are made in accordance with the left-hand circuit diagram GUAC, see label on the inside of the cover.

1-2 – Operating voltage	24 V AC/DC
1-3 – Control signal	0..10/(2..10) V
1-4 – Feedback signal	0..10/(2..10) V
Load for output GY: max 0.5 mA	

NOTE! Electrical connection of the spring-return actuator installed at the factory.

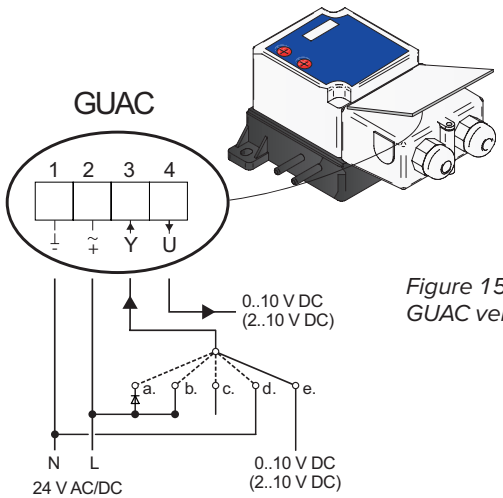


Figure 15. Wiring diagram, GUAC version.

Override control and control signal

Various options for control can be preset.

See the relevant wiring diagram in figure 17-19.

a. Damper opens fully, 24 V AC (positive rectified half-wave).
b. V_{max}, 24 V AC/DC.
c. V_{min}, no signal, Mode: 0..10 V.
d. Damper closes fully, ground/earth (-): 0..10 V – CLOSED if V_{min} = 0. 2..10 V – CLOSED.
e. Regulation with the control signal, default 0..10 V (alt. 2..10 V).

Connection REACT CU

1-2 – Operating voltage:	24 V AC/DC
1-4 – Feedback signal:	0..10/(2..10) V
Load for output GY:	max 0.5 mA

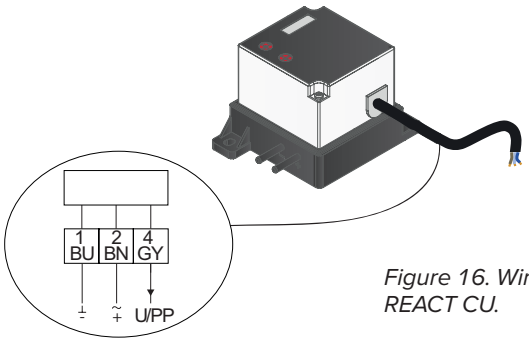


Figure 16. Wiring diagram, REACT CU.

Handling

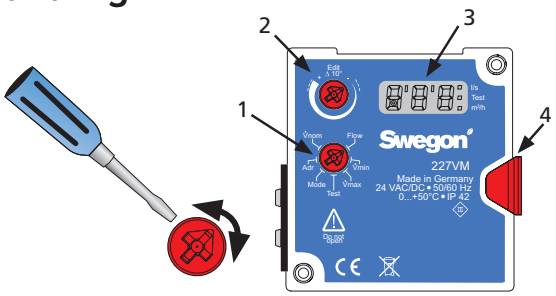


Figure 17. The REACT interface.
1 – Select desired mode by turning the "Mode" wheel.
2 – Set values and select sub-settings by turning the "Edit" wheel.
3 – The displayed value blinks twice when a new value is accepted.
4 – "Gear release" button

Menus

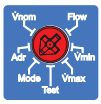
Flow
- Toggle between l/s and m^3/h using the edit wheel.
- Illuminated "dot" in the display indicates the selected mode.

Vmin
- Select new value for Vmin with the edit wheel.
- Vmin value should be lower than Vmax.

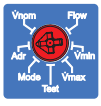
Vmax
- Select new value for Vmax with the edit wheel.
- Vmax value should be greater than Vmin

Test
- Automatic disconnection after 10 hours.
- Turn the edit wheel to select between:

oFF – Test mode is off, actuator resumes control.
on– Test mode is on, damper stays in current position.
oP – Opens the damper fully.
cL – Closes the damper fully.
Lo– Low flow, forces the actuator to Vmin.
Hi – High flow, forces the actuator to Vmax.
123 – Displays current software version.



Mode
- Displays selected input and reference signal.
- Toggle between 0-10 and 2-10 V using the edit wheel.



Adr
- Used for Modbus. for particulars on how to use Modbus, see next page.

Vnom
- Used for factory configuration, for particulars on how to use Modbus, see next page.

Maintenance

REACT is maintenance-free. Cleaning should only be done by vacuuming with a brush nozzle or dry wiping with a damp cloth. When cleaning the duct system, REACT must be dismounted, unless cleaning hatches are situated near the unit. Cleaning tools, such as feather dusters or soft brushes and the like must not be drawn through the damper.

Commissioning – Flows

- REACT is factory-calibrated and preset for a nominal airflow.
- The set values can be read off the product, see label on the product.
- It is extremely important that the requirement for the lengths of straight duct upstream or downstream are complied with.
- Providing only half the required length of straight duct, may result in up to 20% lower accuracy in flow calculations.

Control Signals

- REACT is preset for a signal range of 0-10 V DC (can be reset to 2-10 V DC).
- The Control of the air-flow, using a direct-wired room thermostat, is regulated by a control voltage of <0.5V for min. airflow and 10 V for max. airflow.
- When controlled from a HVAC central/controller, min/max air-flow settings are controlled by limiting the control signal, i.e. 2.3 - 7.6 V DC.
- If wired to a controller, the REACT is normally set to 0-100% of its operating range.
- At 2-10 V control the following applies:
  – 0 - 0.8 V closes the damper.
  – 0.8 - 2 V controls the the damper to min. air-flow.

Airflows

- REACT has a nominal air-flow, Q_{nom} for each size.
- Max. air-flow: 30-100% of Q_{nom}.
- Min. air-flow: 0-100% of Q_{nom}.
  NOTE: Min. value must always be lower than max value.
- At Q_{min} a measured pressure of 0.004 in w.c. Pa is obtained and a measurement accuracy of ±5-20 % of the flow.

Wiring Examples

When REACT is used for constant-flow regulation, only 24 AC is connected to the controller. Below and on page 9-10, different wiring examples are given, showing different types of control configuration.

CAV – Constant-Flow Regulation

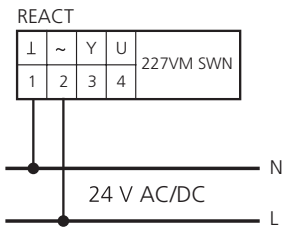
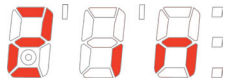


Figure 18. The wiring diagram shows the connections for constant-flow regulation. Q_{min} = required constant-flow and Q_{max}= 0 cfm.

How to Use Modbus

Modbus tables are available in a separate document (REACTa_Modbus-m).

Function	Description	
Adr (Modbus only)		Enables you to set the actuator's Modbus address, by turning the "edit wheel". It is possible to set the address from 1 till 247. If you turn the value selector to end stop "+", the display will show a "2". This makes it possible to select the second level. If you select the second level, this is indicated in the display by a small circle.
	The following functions are available at the second level:	
	Flow	Return to previous level
	V_{min}	Not used
	V_{max}	Normally shows "OFF"
	Test	To start a test run, you must turn the Edit wheel until "ON" appears in the display.
	Mode	Shows the angle of the rotation (0...255 digital 0....100%).
	Adr.	Used for selecting communication settings for Modbus. See table below.
	V_{nom}	Used for setting response delay for the Modbus communication (see separate documents)
V_{nom}		Set Vnom according to the preset values for circular dampers and rectangular dampers according to the table on page 11 where $Q_{nom}=V_{nom}$. If 999 is shown in the display, it is possible to enter a user-specific V_{nom}. The V_{nom} value can only be set by Swegon using the Gruner winVAV Software (applies to the 15 Nm version only). No password is required when entering the first settings. After entering the first settings, you must set the password to 201 and wait until the display flashes; then enter another password.

Display number	EEPROM value	Communcation speed	Parity	Stopbits
1[3]	0	1200	None	2
2[3]	1	1200	Even	1
3[3]	2	1200	Odd	1
4	3	2400	None	2
5	4	2400	Even	1
6	5	2400	Odd	1
7	6	4800	None	2
8	7	4800	Even	1
9	8	4800	Odd	1
10	9	9600	None	2
11	10	9600	Even	1
12	11	9600	Odd	1
13	12	19200	None	2
14[4]	13	19200	Even	1
15	14	19200	Odd	1
16	15	38400	None	2
17	16	38400	Even	1
18	17	38400	Odd	1
*) 19[2/3]	18	1200	None	1
*) 20[2]	19	2400	None	1
*) 21[2]	20	4800	None	1
*) 22[2]	21	9600	None	1
*) 23[2]	22	19200	None	1
*) 24[1/2]	23	38400	None	1

[1] Default setting 309C-024-150-MB/SL8/ST15/SWE
[2] Not Modbus standard, but commonly used
[3] Limited data length per reading of max. 8 register
[4] Default setting 227VM-024-**-MB/SWE

* Parameter list expanded to 24 numbers from 1160984 – 01 - 17/20, (year 17 week 20).
The number is evident from the silver label on the side of the actuator.

Room Thermostat

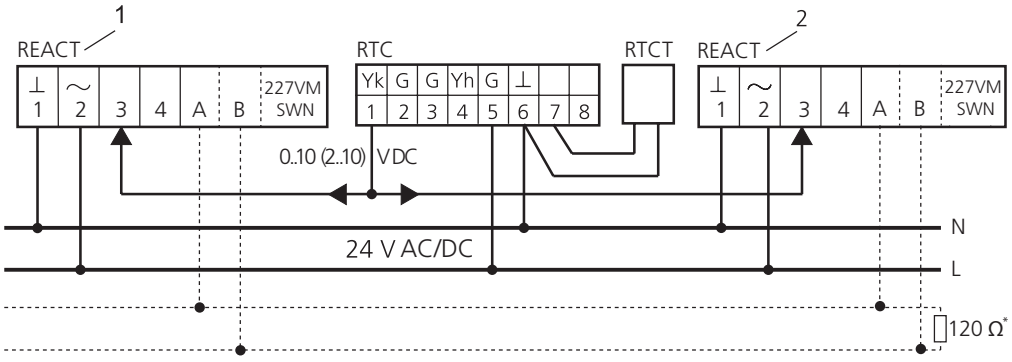


Figure 19. The diagram shows how to wire a RTC room unit with simultaneous control of the return air. The figure also shows an alternative with RTCT duct temperature sensor.

CO_2 and Temperature Control

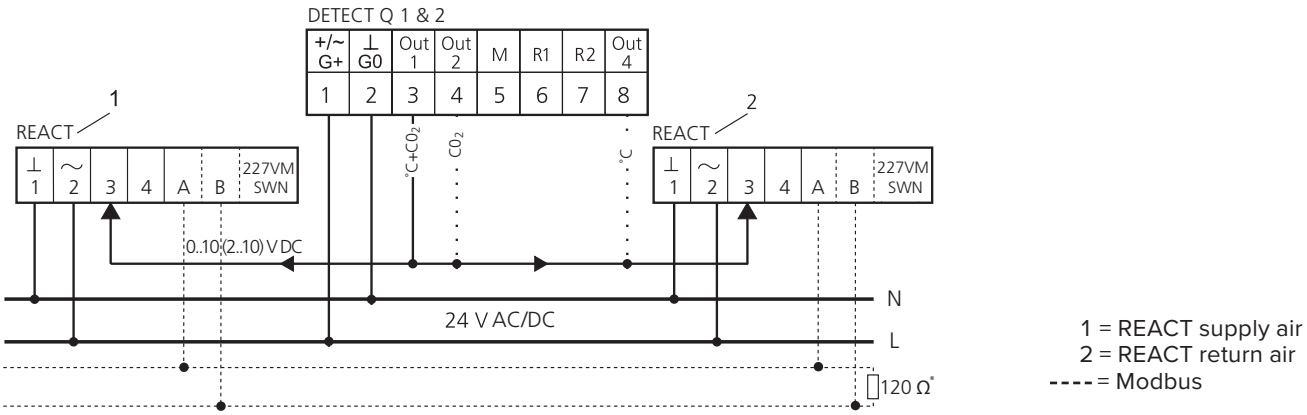


Figure 20. The diagram shows how to wire the CO2 sensor with combined DETECT Q temperature control and simultaneous control of the return air.

Relative Humidity Control

Consult Factory

Airflow Control with Passive House Controller

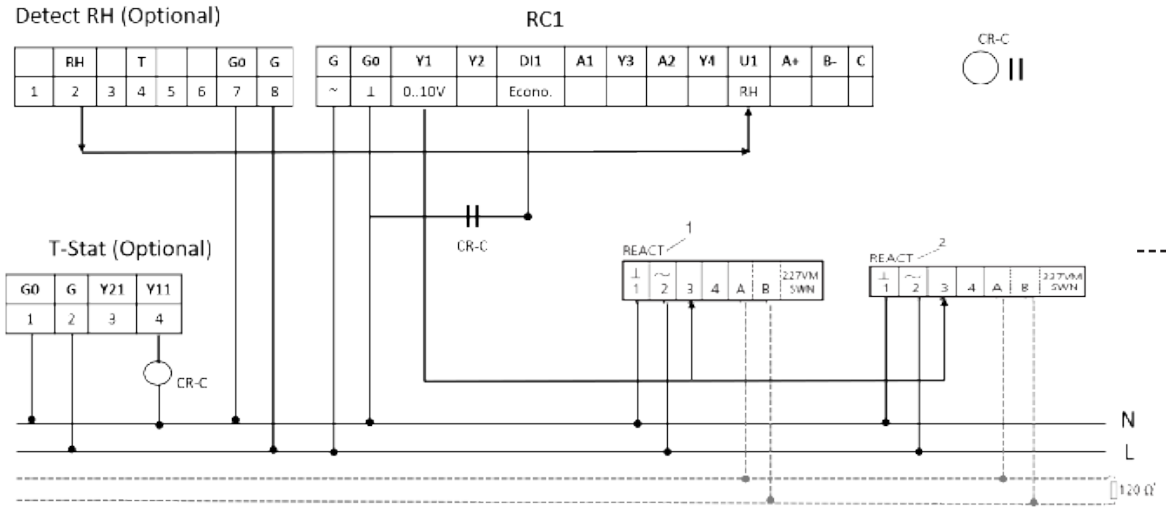


Figure 21. The diagram shows how to wire a Passive House RC1 controller with simultaneous control of return air. The diagram also shows also how to enabling humidity control (Detect RH) and economizer option beside having 3 basic modes of airflow (Setback, Normal, and Boost)

Two-Flow Control with Occupancy Sensor

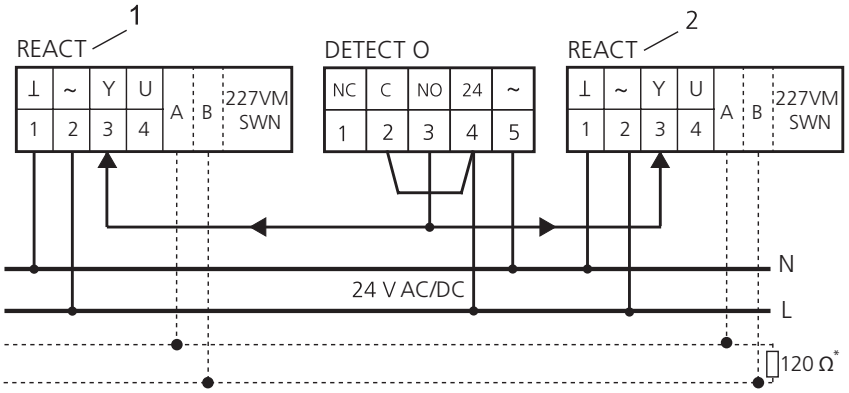
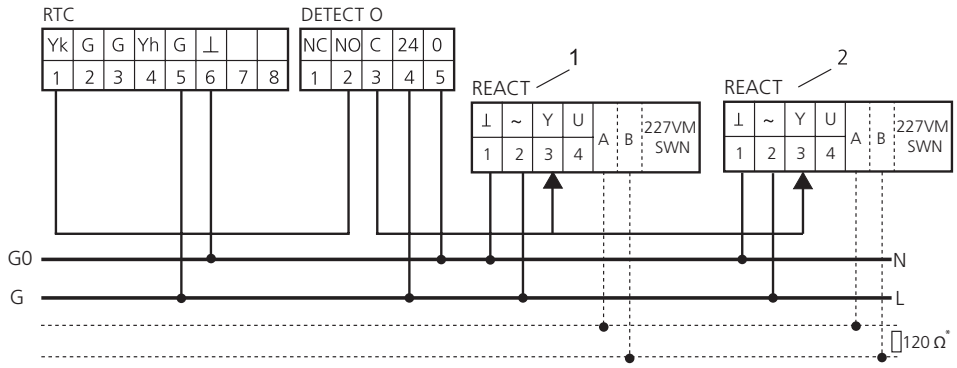


Figure 22. The diagram shows how to wire the DETECT O presence detector with simultaneous control of the return air. Two-flow control, min. or max. airflow.

**Should only be used on the last REACT MB in the Modbus loop*

VAV Regulation with Room Thermostat and Occupancy Sensor

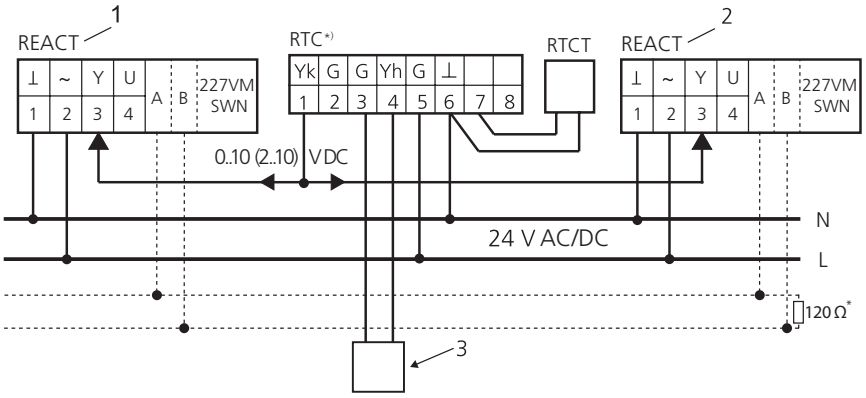


1 = REACT supply air.
2 = REACT return air.
---- = Modbus.

Figure 23. The diagram shows how to wire a RTC room unit and DETECT O with simultaneous control of the return air. VAV is used for occupancy, otherwise min. airflow. The figure also shows the alternative with RTCT duct temperature sensor.

**Should only be used on the last REACT MB in the Modbus loop*

VAV Regulation and Heat Regulation with Thermo-actuators



1 = REACT supply air
2 = REACT return air
3 = Thermo-actuator, heat
---- = Modbus

*) The jumper connection in the RTC must be changed when wiring the thermo-actuator (3) to the system. More information is available in the Installation/Commissioning documentation for RTC.

NOTE: The unit must be de-energized before reconnecting any jumpers!

Figure 24. The diagram shows how to wire and refit jumpers of the RTC room thermostat enabling operation of the on/off 24 V VAC thermo-actuator on output YH (4).

**Should only be used on the last REACT MB in the Modbus loop*

Slave Control with REACT CU as a Master

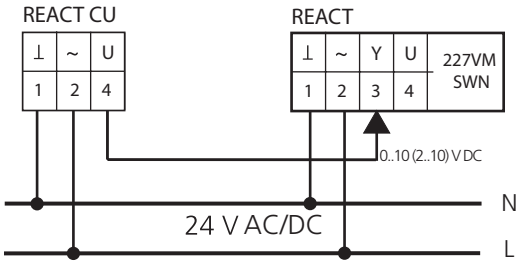
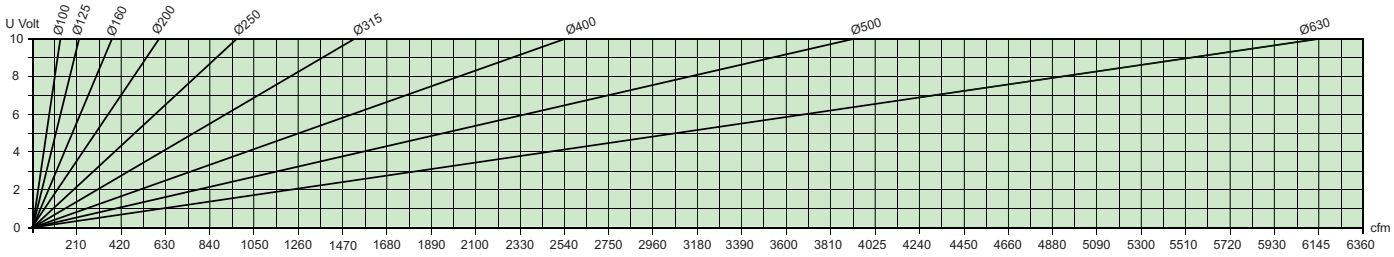


Figure 25. The diagram shows the connections between master – slave unit.. In this wiring configuration, the REACT slave controller should be set to a flow range of 0-100% of the nominal airflow.

Diagram, true value voltage/airflow

The diagram only applies to factory-calibrated products for nominal air-flow, according to the Air-flow and K-factor table. U always refers to Q_{nom}. NOTE! Does not indicate damper position.



Dimension, air-flow and k-factors

All REACT variants - REACT a NA, REACT MB, REACT GUAC

Round Version

Size	Airflow (cfm) Q_{min}	Airflow (cfm) Q_{nom}	k-factor $\left(\frac{cfm}{in.\ w.c.^2}\right)$	Torque (lbf. in.)
100	11	131	177.6	44
125	19	216	291.5	44
160	34	373	519.3	44
200	53	593	830.8	44
250	85	966	1340	44
315	134	1547	2123.9	88
400	216	2547	3417	88
500	347	3920	5494	88
630	530	6128	8712	133

*At Q_{min} a measurement pressure of 0.004 in w.c. is obtained with a measurement accuracy of ± 5-20%

Rectangular version

B = Width, H = Height

Size (B x H mm)	Size (B x H in)	Airflow (CFM) Q_{min}*	Airflow (CFM) Q_{nom}	k-factor $\left(\frac{cfm}{in.\ w.c.^2}\right)$	Torque (lbf. in)
200 x 200	8 x 8	160	778	1122.3	44
300 x 200	12 x 8	237	1160	1675	44
400 x 200	16 x 8	315	1540	2227.8	44
500 x 200	20 x 8	400	1940	2797.3	44
600 x 200	24 x 8	475	2320	3350	44
500 x 300	20 x 12	600	2950	4254.5	44
600 x 300	24 x 12	720	3530	5092	44
700 x 300	28 x 12	840	4130	5963	88
600 x 400	24 x 16	970	4760	6867.5	88
700 x 400	28 x 16	1130	5550	8006.5	88
800 x 400	32 x 16	1290	6340	9145.5	88
800 x 500	32 x 20	1625	7960	11490.5	88
1000 x 500	40 x 20	2030	9960	14371.5	133
1200 x 500	48 x 20	2435	11930	17219	133
1000 x 600	40 x 20	2440	11955	17252.5	133
1200 x 600	48 x 20	2928	14345	20703	133
1000 x 700	40 x 28	2856	13997	20200.5	133
1200 x 700	48 x 28	3425	16782	24220.5	133

Checking performance – REACT a NA

Checking the min. airflow

The easiest way to do this is by disconnecting the white cable marked 3. The damper will then move to the closed position. Measure the voltage U (between cables 1 and 4)and calculate the airflow using the formulas on this page.

Checking the max. airflow

Use the room thermostat, or some other control equipment, to override the system so the control voltage will be a 10 V input on the white cable 3. As an alternative, you can short circuit between cables 2 and 3. This will command the controller to go to the preset max. airflow setting. Before short circuiting, you must disconnect the cable from the room controller. If this is not done, you will destroy the output on the control equipment. The damper will move to the open position. Measure the voltage U (between cables 1 and 4) and calculate the airflow using the formulas on this page.

Gear release

The controller of the 227VM SWN has a gear release button, enabling the damper shaft to be turned manually. Spring return actuators on REACT GUAC are supplied as standard from the factory with the spring return of the damper set to de-energized/closed.

Mechanical opening/closing of the spring return actuator

Mechanical handling of dampers can only be performed if the actuator is de-energized. The supplied key (attached to the motor cable) or a 0.01 in hex key, is used for mechanical handling.

REACT as a constant-flow controller

When REACT is used as a constant-flow controller, the min. flow setting is used as the set point for the constant airflow. Only 24 V AC, should be connected to cable pair 1 and 2.

Troubleshooting – REACT

Incorrect polarity on control signal zero conductor

It is important that the neutral conductor follows the entire chain of connections from thermostat to controller. Check this, by measuring the control voltage between cables 1 and 3 on the REACT. Correctly wired it should be possible to vary the signal between 0-10 V DC. Incorrectly wired, the delivered signal is ~ 27.4 - 29.1 V DC.

Airflow does not correspond

Inaccurate air-flow is primarily due to disruptions in the duct system. Above all, the straight duct length requirements should be checked. If the ducting deviates from these requirements, the error can be as large as 20%. In systems with dusty air (mostly return air systems) the unit's sensors can become soiled.

The sensor can be cleaned by blowing it with clean air in the opposite direction to the air-flow, i.e. in the tube connection. We recommend compressed air in a low-pressure aerosol tube. The duct must also be cleaned, to keep the measurement flange and the pressure tappings from blocking up.

Checking performance – REACT CU

Checking signals

Since the REACT CU only uses the controller's airflow measurement feature, no settings are needed. It is the true value signal from terminal 4 that must be wired further to the slave unit. This is not affected by the settings on the min./max. potentiometers.

Measure the voltage, U (between cables 1 and 4), and calculate the airflow using the formulas below for the relevant signal system; 0-10 or 2-10 V DC. REACT CU is normally supplied with a 0-10 true value signal. Check the marking, to see if it should be set for 2-10 V. For Qnom see the tables on page 11.

REACT CU supplied factory set with 0-10 V actual value signal.

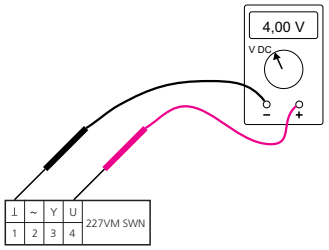


Figure 26. How to connect a voltmeter to check the true value.

Formulas for calculating airflows.

A control signal of 0..10 V DC, gives the following formulas:

- To calculate the current actual flow (Q_{act}) when you know the value of the control signal (Y):

$$Q_{act} = Q_{min} + \frac{Y}{10\ V\ DC} \bullet (Q_{max} - Q_{min})$$

- To calculate the current true value (U) when you know the value of the actual flow (Q_{act}):

$$U = 10\ V\ DC \bullet \frac{Q_{act}}{Q_{nom}}$$

A control signal of 2..10 V DC gives the following formulas:

- To calculate the current actual flow (Q_{act}) when you know the value of the control signal (Y):

$$Q_{act} = Q_{min} + \frac{Y - 2\ V\ DC}{8\ V\ DC} \bullet (Q_{max} - Q_{min})$$

- To calculate the current true value (U) when you know the value of actual flow (Q_{act}):

$$U = 2\ V\ DC + 8\ V\ DC \quad \bullet \frac{Q_{act}}{Q_{nom}}$$

Explanations of the formulas above:

Y = Control signal in [V] DC
U* = True value signal in [V] DC
Q_{act} = Actual flow in [cfm]
Q_{min} = Required min. airflow in [cfm]
Q_{max} = Required max. airflow in [cfm]
Q_{nom} = Nominal flow in [cfm], see tables page 11.

*Always refers to Q_{nom}.
NOTE! Does not indicate damper position.