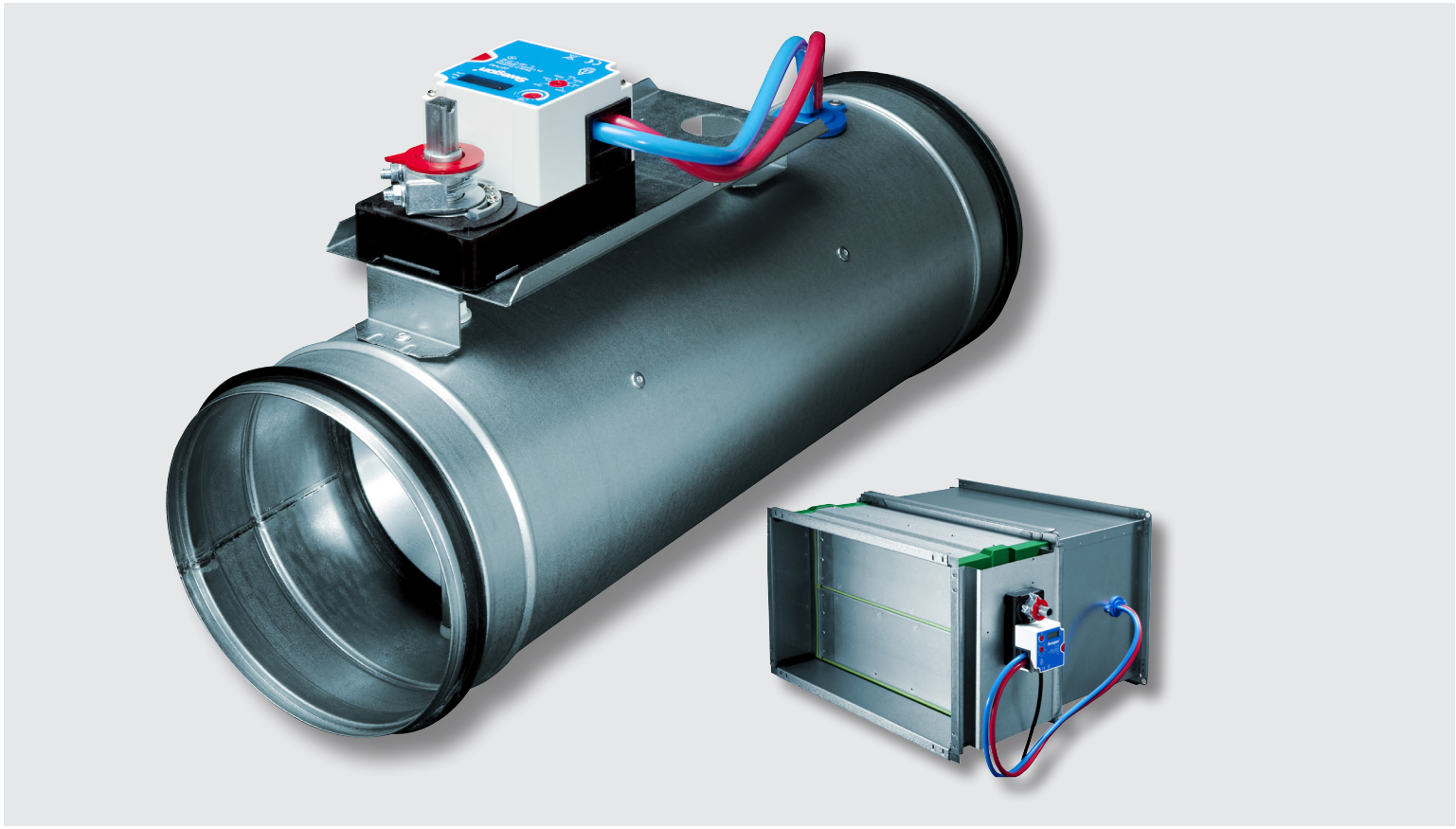
Overview

REACT Damper NA



Variable-flow damper

Swegon

Contents

Specifications

- Variable airflow based on temperature, CO_2, humidity, occupancy
- Rapid access to readings via the controller display
- Constant airflow regardless of upstream pressure
- Simple to commission
- Can be easily insulated in the duct system
- A factory-insulated model is available for round duct connection
- Round connections: 4 – 24 in. diameter
- Rectangular connections: 8 x 8 – 48 x 28 (in. x in.)
- Other rectangular sizes are also available on request
- Master/slave control has to have the same dimension
- Options:
  - Standard analogue signal
  - Modbus control
  - Spring return type motor

SELECTION CHARTS				
REACT	Min.*		Max. (nom.)	
Size	l/s	cfm	l/s	cfm
100	5	11	62	131
125	9	19	102	216
160	16	34	176	373
200	25	53	280	593
250	40	85	456	966
315	63	134	730	1547
400	102	216	1200	2543
500	164	347	1850	3920
630	300	530	2892	6128

The minimum flow varies, see page 7 for more information

Technical Description

Design

- Variable-flow damper with control and measurement function
- Equipped with a compact regulator (motor included)
  – REACT and REACT MB with compact controller
  – REACT GUAC with spring return actuator and separate controller
- The controller has a display enabling direct reading
- Easy commissioning without the need for a separate hand unit
- Available in the following designs:
  – Round version
  – Rectangular version
  – REACT MB with Modbus (Optional)
  – REACT GUAC with spring return actuator

Features

- Ductwork Leakage Classes in accordance with SS-EN 1751
  – Leakage class C to the surroundings
  – Round version: class 4, closed damper
  – Rectangular version: class 3, closed damper
- Air flow is measured over one or more measuring tubes
- Pressure independent (requires minimum airflow equivalent to open damper pressure drop)
- All settings are displayed in actual values
- Changes of min. and max flows are made directly in the controller
- Distance in-between the motor shelf and the damper (1 1/4 in) is dimensioned for easy field installed insulation in duct systems
- Running time open/close (90 degrees):
  44 lbf. in.- 100 s
  88 lbf. in. - 150 s
  133 lbf. in. - 150 s
- Spring return actuator, close time (90 degrees):
  44 lbf. in. - 20 s
  88 lbf. in. - 20 s

Materials and Surface Treatment

- All sheet metal parts are made of galvanized sheet steel
- Measurement rods are of extruded aluminum

Accessories

- RTC – Room thermostat for temperature control of a room, (connects to the REACT regulator)
- DETECT Quality – Carbon dioxide sensor with integrated temperature sensor, for either room or duct installation
- DETECT Occupancy – Presence detector for switching to minimum air flow when a room is unoccupied or two-flow control min-max
- REACT CU – Sensor unit for slave control of one or more REACT units 0-10 V signal only
- RC-1 – Passive House controller, controls airflow for economizer, boost, normal, setback and Hi humidity modes
- DETECT RH – Humidity sensor, for either room or duct installation

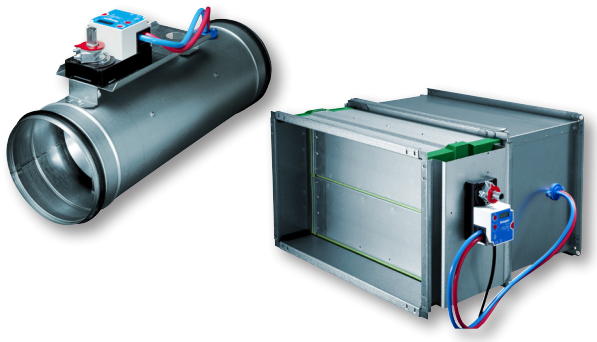


Figure 1. REACT, round and rectangular design

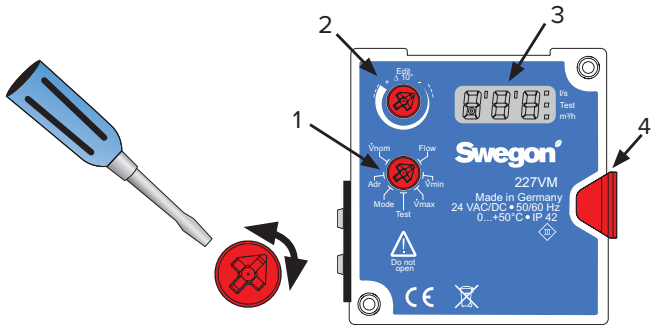


Figure 2. REACT, rectangular design. Explanations *of figure 2:*
1. Mode wheel, 2. Edit wheel, 3. Display, 4. Gear release button

Figure 3. REACT CU, for slave control of REACT 0-10 V signal

Figure 4. Accessories.

1. RTC – room thermostat
2. DETECT Quality – carbon dioxide- and temperature sensor
3. DETECT Occupancy – occupancy sensor
4. RC-1 – Passive House controller
5. DETECT RH – Humidity sensor

Planning

General

- Designed for comfort applications
- Damper is pressure independent within operating range
- Minimum airflow must be considered when selecting damper
- Damper must be located in clean environment with a temperature range of 31 to 122˚F (-0.5 to 50°C)
- Damper can be located in either supply or return air ducts
  - Return duct damper can be slaved to supply duct damper to maintain space air balance
  - Dampers must be same size for Master-Slave arrangement

Control

- Designed to vary airflow based on one of the following;
  - Space temperature
  - Space humidity level
  - Space CO_2 level
  - Space occupancy
  - Passive House occupant control
- Controls configuration is accomplished through keypad on controller and sensor
- Digital display shows settings
- Factory setting is 0–100% where;
  - 0 = 0 cfm
  - 100% = Q_{nom}
- Minimum and maximum airflow settings are field adjustable at the damper controller
- Can be controlled by external signal (BAS) via 0-10Vdc signal
- Can be controlled digitally via Modbus (Optional)

Electrical Data

NOTE: To obtain the correct functionality of the control and regulating equipment it is of great importance that all interconnected regulating equipment has the same polarity.

Supply voltage	24 VDC/24 VAC , 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 NA 100, 125, 160, 200 and 250	6.5 W (standby 2 W)	7.5 VA
Spring return actuator for REACT NA 315, 400 and 500	5 W (standby 2 W)	8 VA

Demand Control Ventilation - Example

Below, a couple of examples are shown of how REACT can work in a demand-controlled ventilation system. When regulation via a CO_2 sensor is chosen, the room thermostat is excluded as DETECT Q has an integrated temperature sensor that combines its output with the value from the CO_2 sensor. The greatest signal from DETECT Q is sent to REACT to regulate the air flow. With the help of the presence detector DETECT O, the 0-10 V signal can be suspended so that the REACT unit regulates down to a minimum air flow when a room is unoccupied. DETECT O can also be connected so that REACT shuts down completely.

Slave Control - Example

A REACT unit can be slave controlled from another REACT or from REACT CU. Slave control can also be achieved by parallel connection, i.e. by connecting the room thermostat signal to both the return and supply air units. Parallel connection is recommended because the control signals are sent to both units at the same time and air flow can be freely set within the working range of REACT. Slave control is limited as the slave unit cannot have a greater air flow than the master unit and because lower flows can only be obtained as a percentage of the master unit air flow. In systems with REACT CU as sensor unit, the slave control principle is always applicable.

Legend to figures 5-6:

R = RTC or DETECT Q	M = Damper
K = Controller	BF = Flow sensor

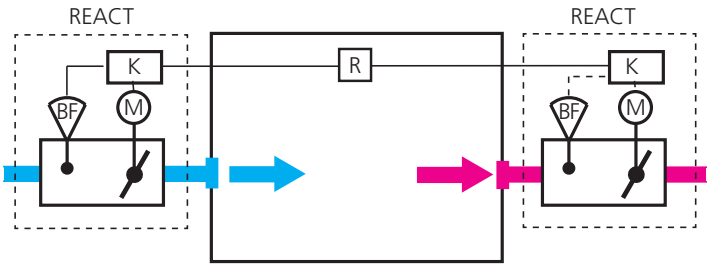


Figure 5. Air flow control with temperature sensor or CO_2 sensor (supply and return air controlled in parallel by the temperature sensor)

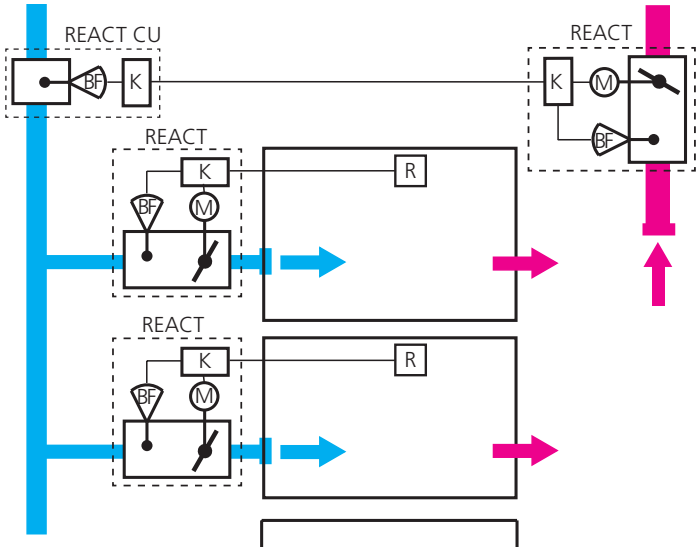


Figure 6. Individual room control with overflow air. Return air is slave controlled by the total supply air volume

Installation

- Air flow measuring of REACT requires a straight section of duct before the unit (in air flow direction), according to installation figures.
- Assembly instructions are included with the product on delivery but can also be downloaded from www.swegonnorthamerica.com.

Installation – Round Version

Legend to figures 7-9:
1. REACT Round Variable-flow damper
2. Sound attenuator with baffle

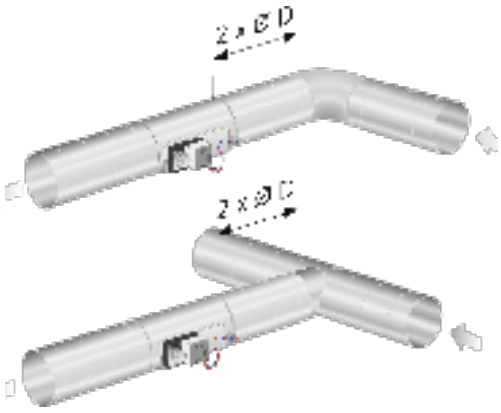


Figure 7. Straight section requirements, round ducts.

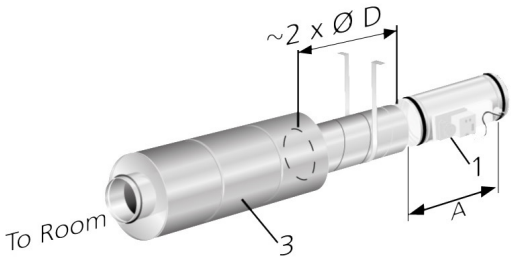


Figure 8. REACT requires a duct of ~2 x ØD between the damper and a sound attenuator fitted with baffles.

Installation Measurements – Round Version

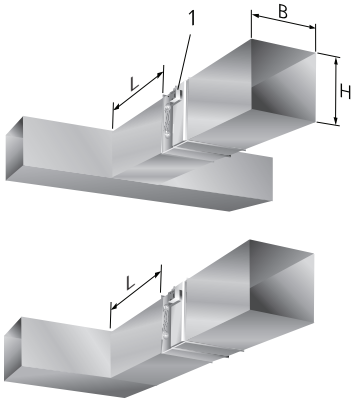
Size	A (in)
100	18.75
125	18.75
160	20.75
200	18.75
250	20.50
315	23.75
400	27.50
500*	32.50
630*	49.25

Installation – Rectangular Version

Measurement B in the figure and table below can be found on page 11, in the table; "Air flows and measures – 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 10. Straight section requirements, rectangular ducts.

Straight Sections Before/After REACT – Sound Attenuator with Baffles

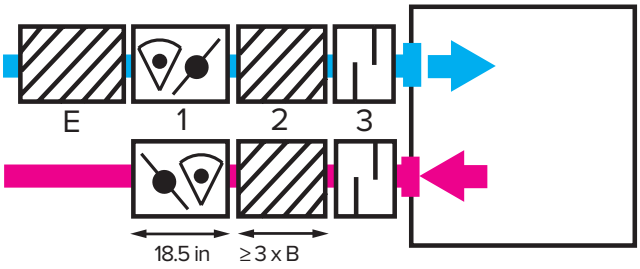


Figure 11. Straight section requirements, rectangular REACT and sound attenuator with baffles. Installation with a length of straight duct applies to both the supply air and the return air.
1 – REACT Rectangular Variable-flow damper.
2 – > = 3 x B length of straight duct.
3 – Sound attenuator with baffles.

Technical data

Air Flows – All Versions

- REACT has a nominal air flow, Q_{nom}, for each size.
- Maximum air flow can be set between 30 and 100 % of Q_{nom}.
- Minimum air flow is adjusted in relation to Q_{nom} and can be set between 0 and 100% of Q_{nom}.

Measurement Accuracy – All Versions

- At Q_{min} a measurement pressure of 0.004 in. w.c. is obtained with a measurement accuracy of ± 5-20%
- A minimum measuring pressure of 0.02 in. w.c. is recommended which corresponds to about 335 FPM in the duct with an accuracy of ± 5-10%.
- At duct speeds between 492 – 1771 FPM, ± 5% measurement accuracy of flow is achieved.
- For rectangular dampers recommended minimum air flow Q = 0.02 in. w.c.
- Maximum air flow is Q_{nom}. On request, Q_{nom} can be increased to obtain increased Q_{max}. The consequence of an increased Q_{nom} is less accuracy in the lower flow area.
- NOTE: Increased Q_{nom} gives higher duct speeds and thereby generates higher sound levels.

Sound Data – Round Version

Sound Power Level

- Graphs show the total sound power (L_{Wtot}dB), as a function of the velocity and pressure drop across the damper.
- By correcting L_{Wtot} with the correction factors from the tables, the sound power levels for respective octave bands will be obtained($L_W = L_{Wtot} + K_{OK}$).

Air Flows – Round Version

Size	Airflow (cfm)		k-factor $\left(\frac{cfm}{in.\ w.c.^2}\right)$	Torque (lbf. in.)
	Q_{min}	Q_{nom}		
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

Correction factors for conversion to sound power in octave bands

L_{Wtot} = Sound level in the sizing diagram for duct products

K_{ok} = Correction factor in octave bands

K_{trans} = Correction factor in octave bands for transmitted sound

K_{IR} = Correction factor in octave bands for sound transmitted through casing in insulated version

Sound Power in Octave Bands

$$L_W = L_{Wtot} + K_{ok}$$

Correction Factor K_{ok}

Size	Mid-frequency (Octave band) Hz							
	63	125	250	500	1000	2000	4000	8000
100	-6	-5	-9	-16	-18	-25	-33	-39
125	-6	-5	-9	-18	-19	-26	-33	-41
160	-5	-5	-10	-17	-19	-24	-30	-39
200	-5	-4	-10	-16	-17	-22	-29	-39
250	-5	-5	-9	-13	-17	-21	-27	-37
315	-4	-5	-9	-11	-14	-19	-26	-36
400	-4	-6	-8	-11	-13	-17	-25	-32
500	-3	-5	-7	-12	-13	-17	-26	-36
630	-3	-4	-6	-11	-13	-16	-25	-35
Tol ±	6	3	2	2	2	2	2	2

Transmitted Sound Through Uninsulated Casing

$$L_W = L_{Wtot} + K_{trans}$$

Correction Factor K_{trans}

Size	Mid-frequency (Octave band) Hz							
	63	125	250	500	1000	2000	4000	8000
100	-14	-28	-30	-34	-26	-26	-37	-42
125	-15	-30	-33	-39	-31	-28	-37	-44
160	-16	-33	-37	-42	-35	-27	-34	-45
200	-17	-34	-40	-44	-37	-27	-37	-48
250	-19	-38	-42	-45	-41	-27	-39	-49
315	-19	-40	-45	-46	-42	-27	-42	-51
400	-21	-44	-47	-50	-45	-26	-45	-50
500	-21	-45	-52	-54	-49	-28	-50	-57
630	-21	-43	-51	-54	-48	-26	-49	-56
Tol±	6	3	2	2	2	2	2	2

Transmitted Sound Through Insulated Casing - IR

$$L_W = L_{Wtot} + K_{IR}$$

Correction Factor $K_{isolated}$

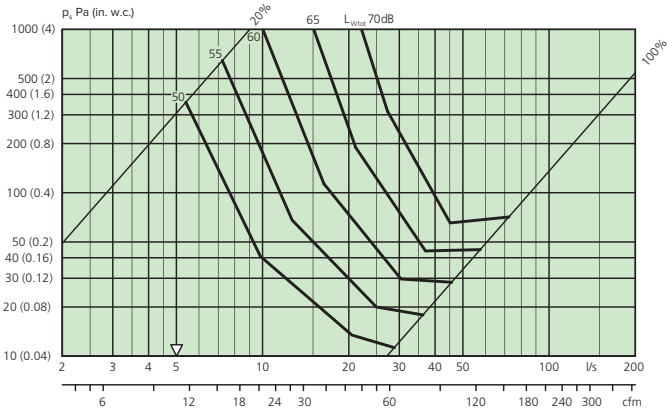
Size	Mid-frequency (Octave band) Hz							
	63	125	250	500	1000	2000	4000	8000
100	-16	-29	-32	-36	-30	-30	-43	-48
125	-17	-31	-35	-41	-35	-32	-43	-50
160	-18	-34	-39	-44	-39	-31	-40	-51
200	-19	-35	-42	-46	-41	-31	-43	-54
250	-21	-39	-44	-47	-45	-31	-45	-55
315	-21	-41	-47	-48	-46	-31	-48	-57
400	-23	-45	-49	-52	-49	-30	-51	-56
500	-23	-46	-54	-56	-53	-32	-56	-63
630	-23	-44	-53	-56	-52	-30	-55	-62
Tol±	6	3	2	2	2	2	2	2

Engineering Graphs – Round, All Versions

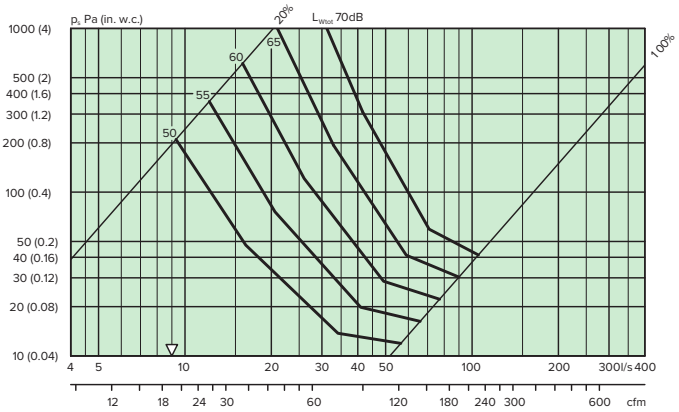
Air flow – Pressure drop – Sound level

- Presented sound levels, L_{wtot}: 50, 55, 60, 65 and 70 dB.
- Data applies for sound generated in ducts.
- ∇ = Min. airflow required for obtaining sufficient commissioning pressure.
- Pressure shown is pressure drop across the damper

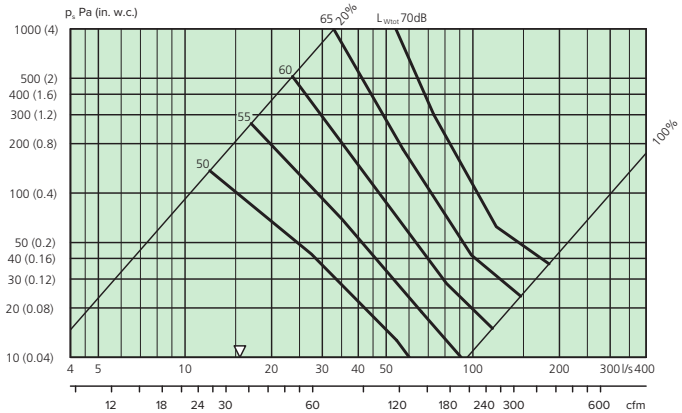
REACT NA 100



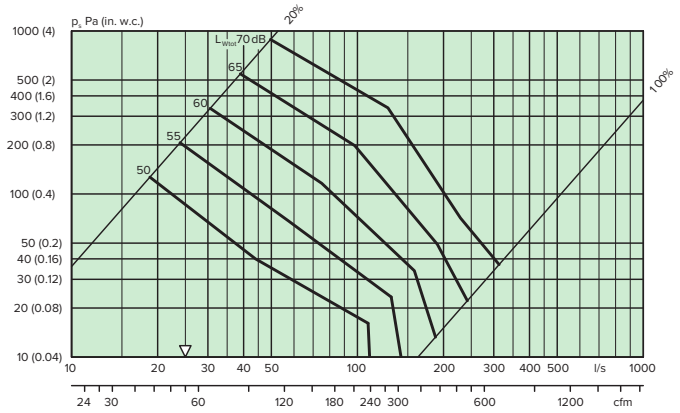
REACT NA 125



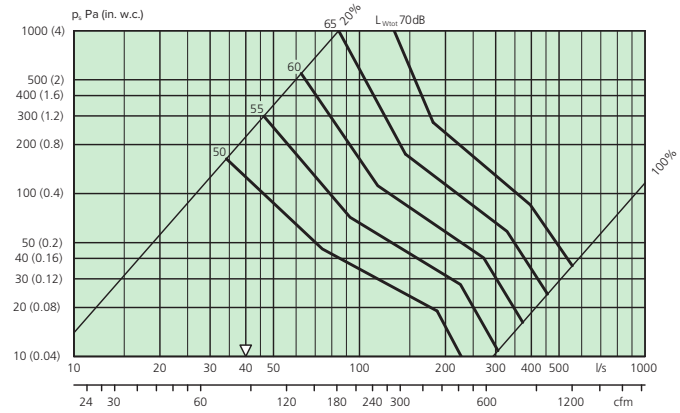
REACT NA 160



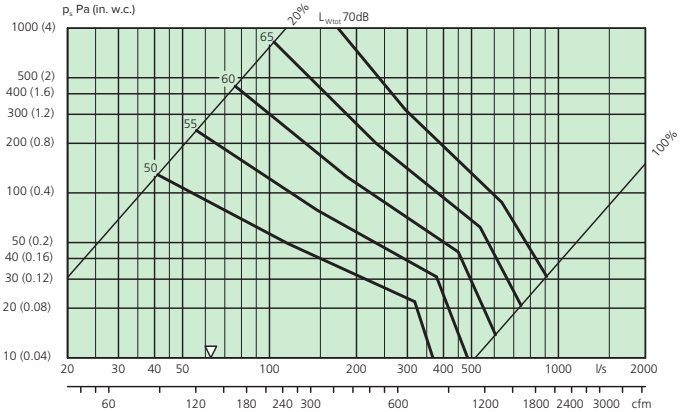
REACT NA 200



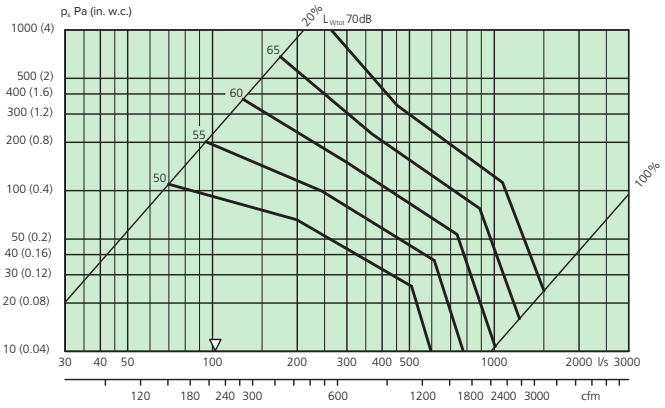
REACT NA 250



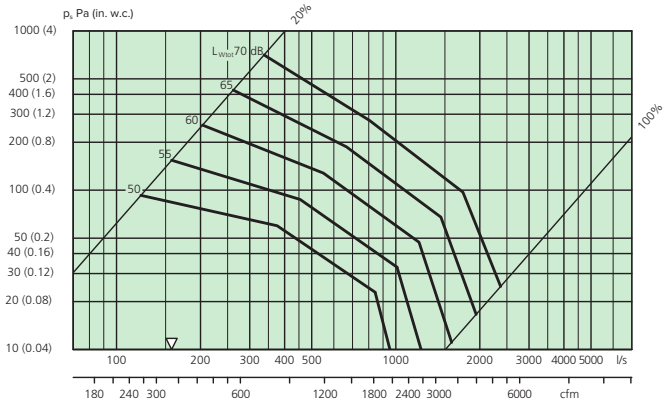
REACT NA 315



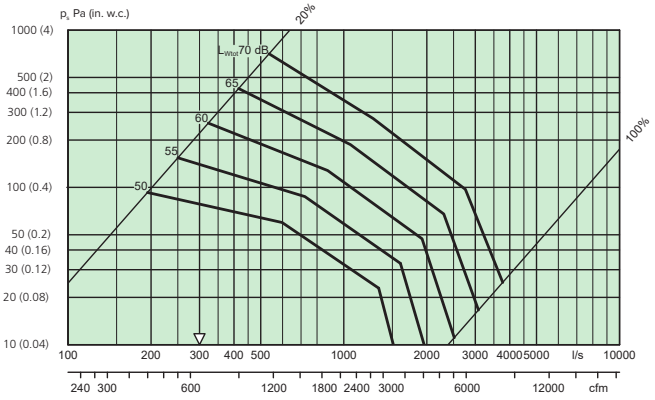
REACT NA 400



REACT NA 500



REACT NA 630



Air Flows and Dimensions – 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

*At P_i = 0.02 in. w.c.

Other sizes upon request

Sound data – rectangular version

Sound power level

- Graph shows the total sound power (L_{Wtot}dB), as a function of the velocity and pressure drop across the damper.
- By correcting L_{Wtot} with the correction factors from each table below, sound power levels for respective octave bands will be obtained($L_W = L_{Wtot} + K_{OK} + K_k$).

Correction factor K_{ok}

Size	Mid-frequency (Octave band) Hz							
	63	125	250	500	1000	2000	4000	8000
All	-1	-5	-7	-8	-13	-22	-31	-30
Tol. ±	4	4	3	2	2	2	2	2

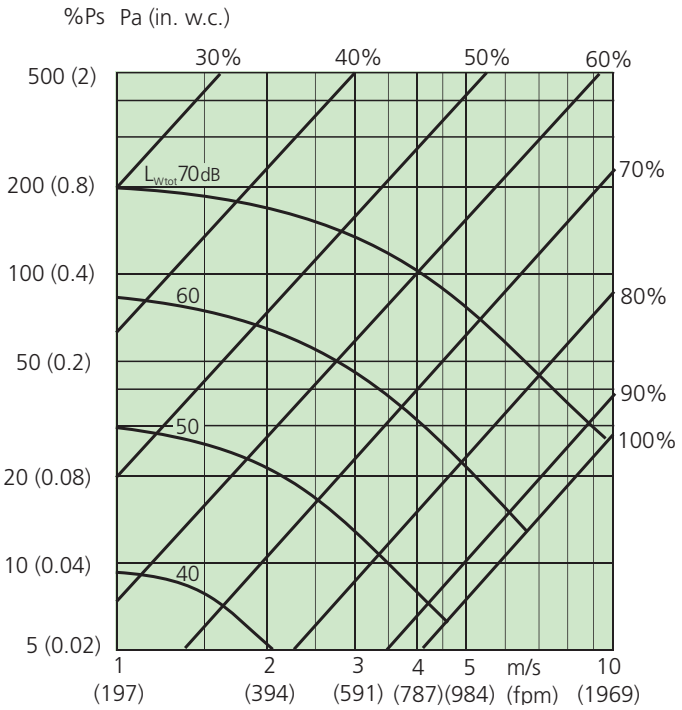
Correction factor K_k for the front face of the damper

Correction factor – area in ft^2 of the front face								
Area ft^2	1.1	1.6	2.7	4.3	6.5	10.8	17.2	26.9
K_k	-3	-2	0	2	4	6	8	10

Engineering graphs – rectangular version

Air flow – Pressure drop – Sound level

- Data applies for sound generated in ducts.
- Minimum flow applies at 295 – 394 fpm in the duct, minimum 0.02 in. w.c. measurement pressure.
- Calculate the face velocity across the damper and read the sound data and pressure drop at an appropriate damper position.
- 100% corresponds to fully open damper.

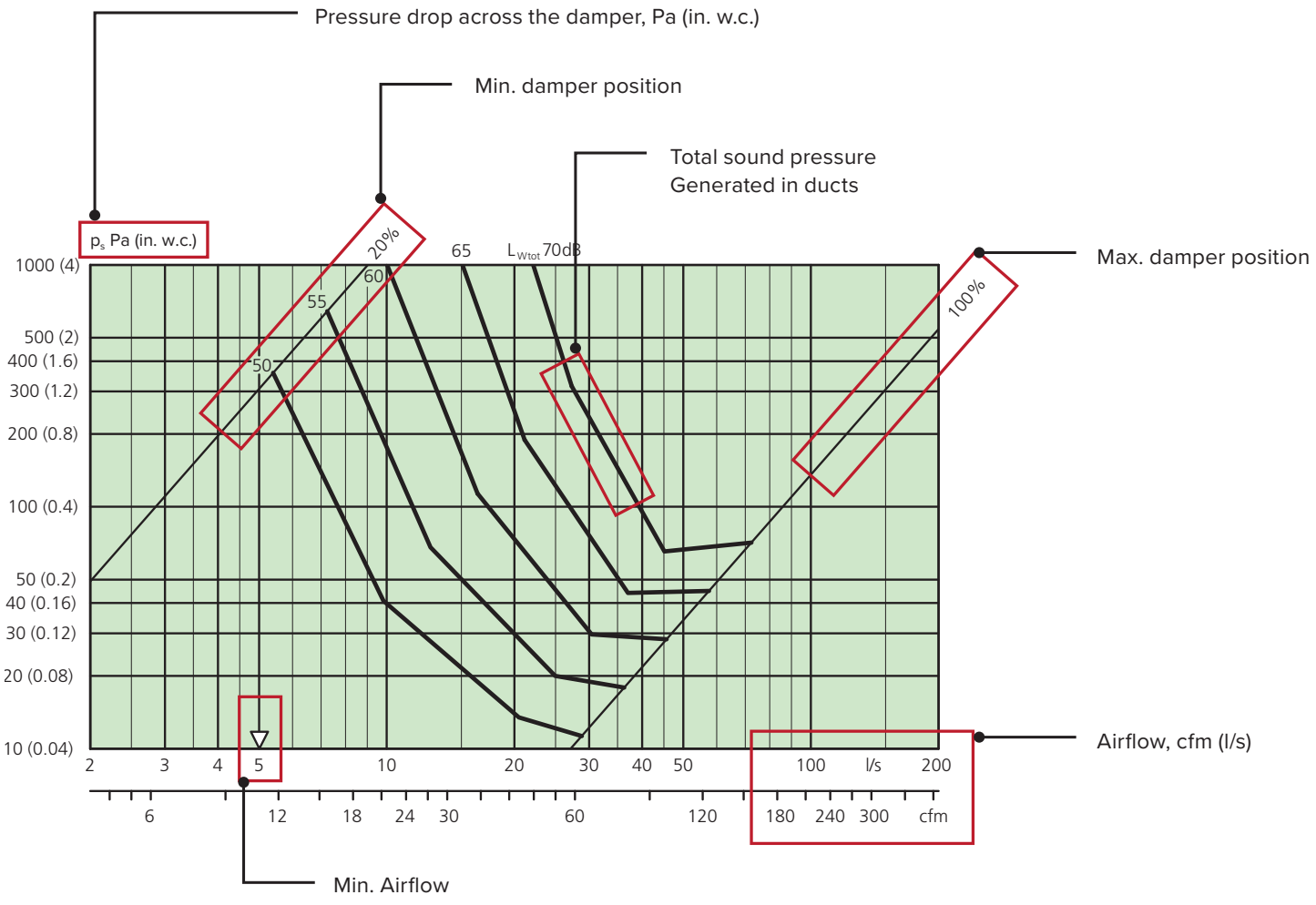


Control Damper Selection Example

Below is the performance chart for a REACT NA size 100 round damper. The flowing information can be gathered from the chart;

- Minimum airflow where that damper can read airflow (10.6 cfm)
- Horizontal axis shows supply airflow (l/s or cfm) based on damper position and pressure drop
- Vertical axis shows damper pressure drop (Pa or in. w.c.) based on damper position and airflow.
- Base sound pressure levels (L_{wtot}) based on airflow and pressure drop across damper

REACT NA 100

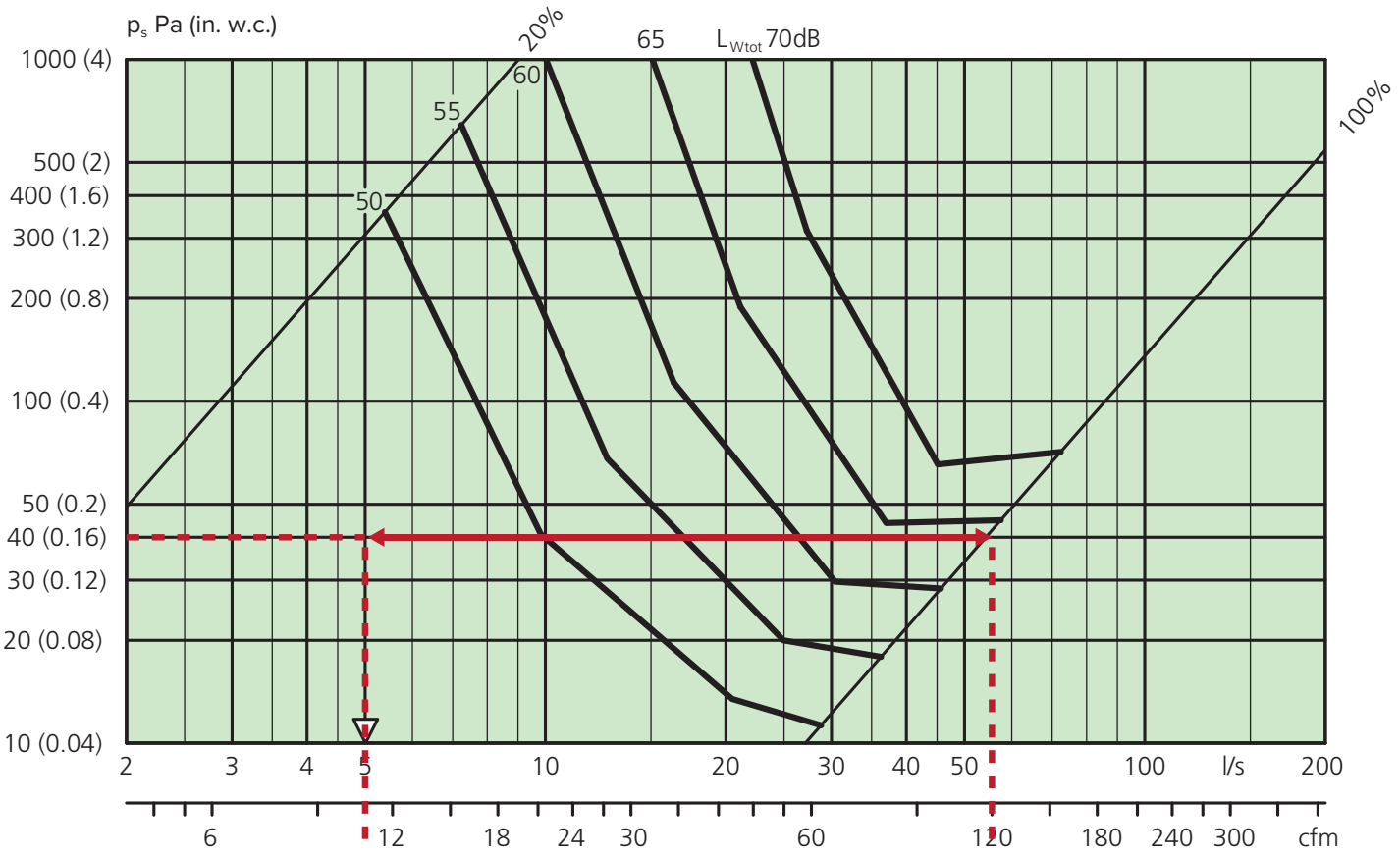


Example

Select a round damper that can deliver 120 cfm prioritizing low damper pressure drop. Provide, design and minimum airflow, design pressure drop across the damper, airflow turndown, transmitted and radiated sound pressure levels.

Solution

Referring to the engineering graphs on page 8 and using where the 120 cfm design airflow meets the 100% open damper position, both REACT NA 100 and REACT NA 125 are possible candidates. The damper is always partially closed for the REACT NA 160 so the damper is oversized.



Step 1: Try REACT NA 100 Damper

Follow up the red dotted line from 120 cfm until the 100% open damper position is found.

Read across horizontally to see the required damper pressure drop to deliver the required airflow rate is 0.16 in. w.c.

Note the minimum airflow rate for a REACT NA 100 damper is 10.6 cfm. This damper can deliver 120/10.6=11.3 to 1 turndown.

Note highest sound pressure level is at design airflow rate and the L_{wtot} is 65 dB.

To calculate the sound pressure, K_{ok} correction factors for duct borne sound and the K_{trans} correction factors for transmitted (radiated) sound can be found on page 7.

Sound Pressure Level in db re 20 µPa	Mid-frequency (Octave band) Hz							
	63	125	250	500	1000	2000	4000	8000
L_{wtot} from engineering graphs	65	65	65	65	65	65	65	65
K_{ok} duct borne correction factors	-6	-5	-9	-16	-18	-25	-33	-39
L_{wtot} + K_{ok} Sound Pressure generated in the duct	59	60	56	49	47	40	32	26
K_{trans} transmitted correction factor	-14	-28	-30	-34	-36	-26	-37	-42
L_{wtot} + K_{trans} Transmitted sound through uninsulated casing	51	37	25	21	13	13	24	29

Step 2: Try REACT NA 125 damper

Repeating the same steps following above, the table below compares the results. Both dampers will work but have different advantages. The REACT NA 100 offers greater turndown and thus better flow control. The REACT NA 125 damper has a lower pressure drop and sound level. Since the request was to prioritize pressure drop, the REACT NA 125 should be selected.

Model	Max. Airflow	Min. Airflow	Turn down	Pressure Drop	Sound Pressure	63	125	250	500	1000	2000	4000	8000
	(cfm)	(cfm)		(in. w.c.)									
REACT NA 100	120	10.6	11.3	0.16	In duct	59	60	56	49	47	40	32	26
					Radiated	51	37	25	21	13	13	24	29
REACT NA 125	120	20	6	0.12	In duct	59	60	56	47	46	39	32	24
					Radiated	46	31	28	22	30	33	24	17

Dimensions and Weights

REACT NA – Round version

Size	Ød**	A	C	Weight (lb) REACT	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

** Diameter showing is a nominal dimension. Each React damper size is designated to fit inside the same nominal duct size.

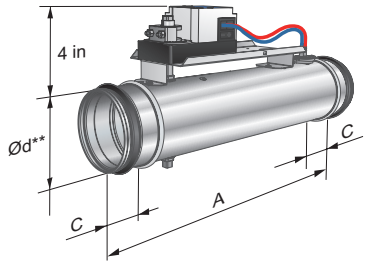


Figure 11. Round REACT NA and REACT MB.

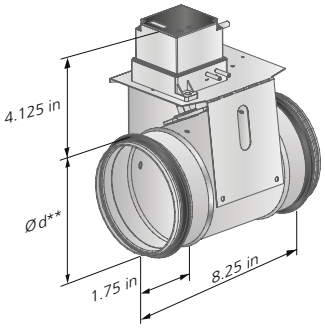


Figure 12. REACT CU, round version.

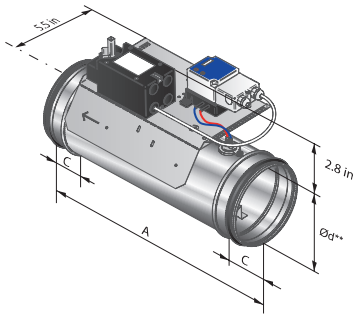


Figure 13. Round REACT GUAC with spring return actuator.

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 11.

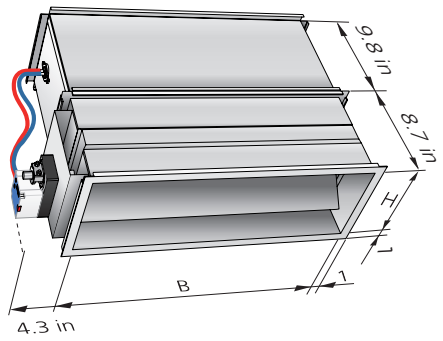


Figure 14. REACT NA and REACT MB, rectangular version.

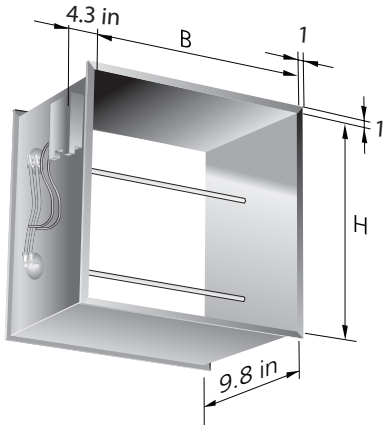


Figure 15. REACT CU, rectangular version.

Ordering key

Product designation

Round design

Variable-flow damper in round design	REACT NA	a	-bbb	-cc
Version				
Dimensions: 100, 125, 160, 200, 250, 315, 400, 500, 630				
Variant: No code = Uninsulated				

REACT NA is delivered with the settings max 100% = nom cfm and min = 0%.

Rectangular design

Variable-flow damper in rectangular design	REACT NA	a	-bbb-ccc
Version			
Dimensions: B x H (see table, page 11)			

REACT is delivered with the settings max 100% = nom cfm and min = 0%.

Modbus version (Optional)

Round design

Variable-flow damper in round design	REACT NA	a	MB-bbb	-cc
Version				
Dimensions: 100, 125, 160, 200, 250, 315, 400, 500, 630				
Variant: No code = Uninsulated				

Rectangular design

Variable-flow commissioning damper in rectangular design	REACT NA	a	MB-bbb-ccc
Version			
Dimensions: B x H (see table, page 11)			

REACT MB is delivered with the settings max 100% = nom cfm and min = 0%.

Version with spring return actuator (Optional)

Round design

Variable-flow damper in round design	REACT NA	a	GUAC-bbb	-cc
Version				
Dimensions: 100, 125, 160, 200, 250, 315, 400, 500, 630				
Variant: No code = Uninsulated				

REACT GUAC is delivered with the settings:
Disconnecting REACT from power supply will close the damper
max 100% = nom cfm and min = 0%.

Accessories

Sensor unit for slave control of REACT in round design	REACT CU	b	-bbb
Version			
Dimensions: 200, 250, 315, 400, 500, 630			

REACT CU analog signal only

Sensor unit for slave control of REACT in rectangular design	REACT CU	b	-bbb-ccc
Version			
Dimensions: B x H (see table, page 11)			

REACT CU analog signal only

Room thermostat	RTC
Carbon dioxide/temperature sensor for room	DETECT Q 1
Carbon dioxide/temperature sensor for duct	DETECT Q 2
Humidity sensor for room	DETECT RH W
Humidity sensor for duct	DETECT RH D
Occupancy sensor for wall installation	DETECT O V110
Occupancy sensor for ceiling installation	DETECT O T360
Passive House Controller	RC1