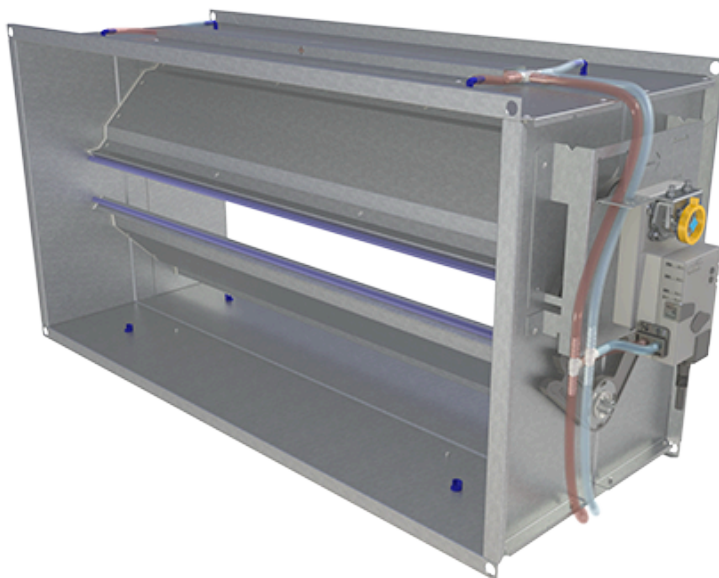


# Halton Max MOS – Régulateur à débit d'air variable (VAV)



## Overview

Halton Max MOS is a rectangular airflow management damper that needs no safety distances. This airflow management damper is also designed to function at very low air velocity.

It uses advanced and patented airflow measurement based on the combination of the blade opening and the pressure difference between the blades.

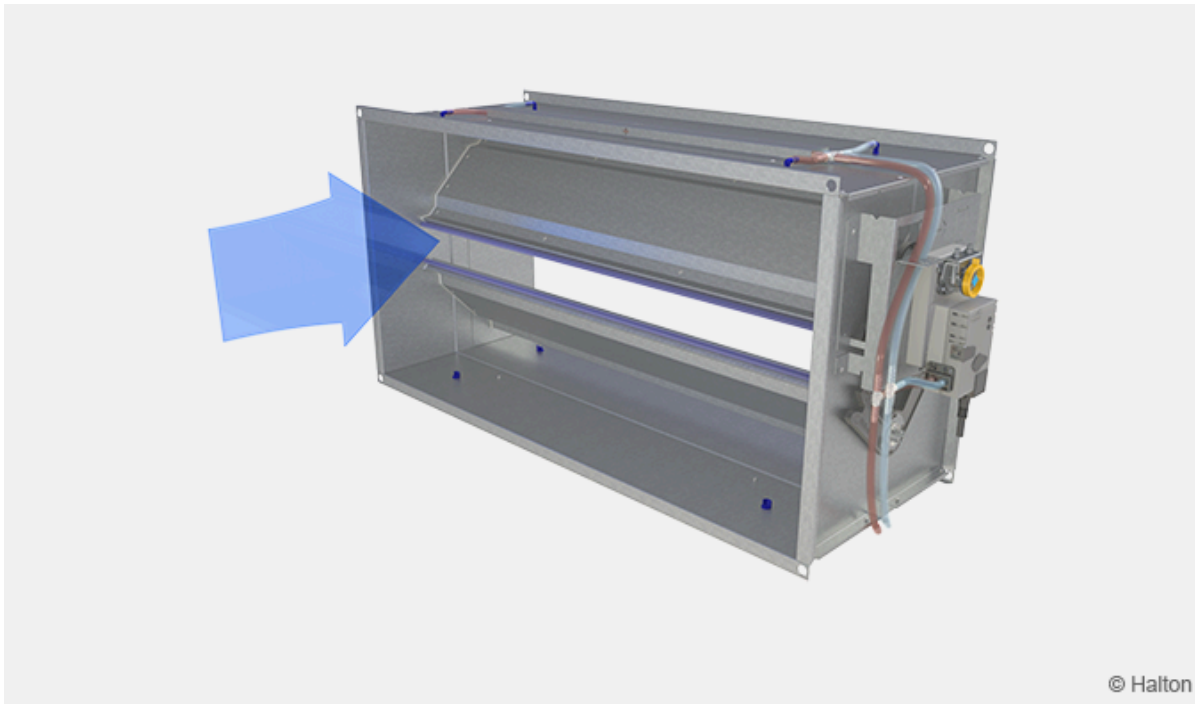
## Application areas

- Variable (VAV) and constant (CAV) airflow control applications
- Supply and exhaust installations

## Key features

- 0.5-8 m/s airflow velocity
- Maximum differential pressure: 500 Pa over the damper
- Can be connected to Building Management System (BMS)

# Operating principle



**Fig. 1.** Halton Max MOS measuring pressure difference between blades.

Thanks to short (<330mm) and smooth damper casing and uniquely positioned walled measurement probes therein, the flow measurement is based on amplified pressure difference of the damper which enables accurate ( $\pm 10\%$ ) and undisturbed flow control even at low flow velocity ( $\geq 0,5\text{m/s}$ ).

It also enables challenging flow conditions without the need for in-duct structures, which would cause unnecessary initial pressure losses and challenges for damper cleaning or additional duct sections for safety distance (0-distance). These would cause high additional costs and challenge for damper positioning and installation in other dampers. Also, eventual cleaning of the measurement probes may be done with pressurized air outside of the unit without the need to access measurement tubes or damper blades inside the damper.

Depending on the selected airflow controller, it can receive the airflow control signal via

- Modbus RTU network variable
- BACnet MSTP network variable
- An analog standard signal

The airflow setpoint can be modified between the minimum and maximum settings from the room controller interface or a BMS. The VAV controller can also send the actual value data back to the room interface controller. The communication protocol used for the signal between the room control interface and the VAV controller depends on the actuator model.

# Key technical data

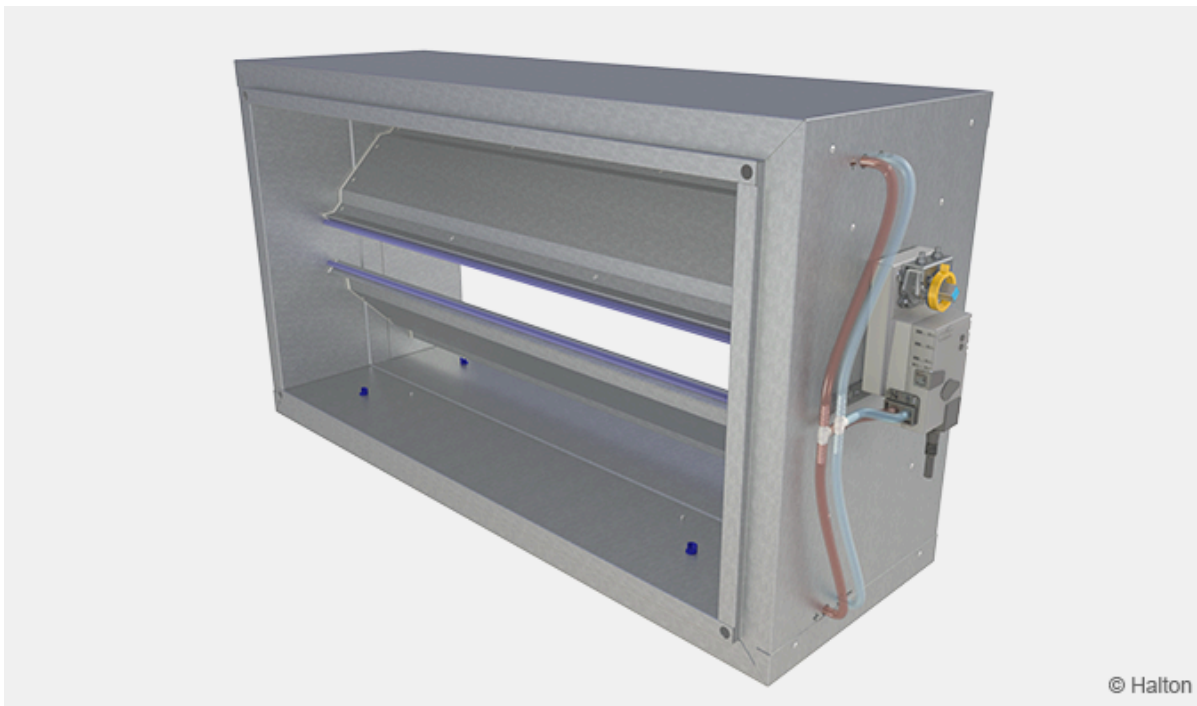
| Features                                   | Description  |
|--|--|
| Duct connection sizes                      | 200×150 mm up to 800×400 mm  |
| Material                                   | Galvanised steel or stainless steel (EN 1.4404/ AISI 316L)   |
| Air velocity range                         | 0.5 – 8 m/s  |
| Operating range (ambient temperature)      | 0-50°C   |
| Ambient relative humidity (non-condensing) | < 95%  |
| Communication interface                    | Modbus RTU, BACnet MST, analog   |
| Accessories                                | <ul style="list-style-type: none"> <li>• Attenuator: several size and material options available</li> <li>• Reheat coil: models with or without internal heating controller available</li> </ul>                         |
| Standards and certifications               | <ul style="list-style-type: none"> <li>• Building material declaration, declaration of conformity</li> <li>• Casing tightness EN 1751 class C</li> <li>• Shut-off operation tightness fulfils EN 1751 class 3</li> </ul> |
| Maintenance                                | According to the building maintenance program  |

# Features and options

| Category                           | Feature (order code)             | Option (order code)               | Description   |
|------------------------------------|----------------------------------|-----------------------------------|---|
| Size                               | Width of duct connection size W  | 200, 250, 300, 400, 500, 600, 800 | Seven nominal width sizes. Units are in millimetres.          |
|                                    | Height of duct connection size H | 150, 200, 250, 300, 400           | Five nominal height sizes. Units are in millimetres.          |
| Options                            | System package SP                | N                                 | No  |
|                                    | Material MA                      | GS                                | Galvanised steel  |
|                                    |                                  | AS                                | Stainless steel (EN 1.4404/AISI 316L)                         |
|                                    | Insulation IN                    | NA                                | No insulation material on the damper body                     |
|                                    |                                  | I3                                | Damper body is insulated with 50 mm mineral wool (see Fig.2.) |
|                                    | Control unit CU                  | EX                                | Control unit with analog signal (0...10V or 2...10V)          |
|                                    |                                  | EY                                | Control unit with Modbus RTU or BACnet MSTP                   |
|                                    | Factory-set airflow limits FS    | DC                                | Customer specific settings                                    |
| DS                                 |                                  | Default factory settings (Vnom)   |   |
| Transformer TF                     | NA                               | Not assigned                      |   |
|                                    | TF1                              | 230/24 transformer (35V)          |   |
| Sound attenuator, SA (subproduct*) | Sound attenuator material AT     | W                                 | Mineral wool  |
|                                    |                                  | P                                 | Polyester fibre   |

|                               |                                   |    |  |
|-------------------------------|-----------------------------------|----|--|
| Reheater, RH<br>(subproduct*) | Model type<br>RT                  | E  | Electrical heater  |
|                               |                                   | W  | Water coil for heating or cooling                                      |
|                               | Control type,<br>electrical<br>RE | NA | Not assigned   |
|                               |                                   | 1  | Own room panel to adjust setpoint and measure temperature              |
|                               |                                   | 2  | On/off controller, need external controller to switch heater on or off |
|                               |                                   | 3  | External 0-10V control signal to adjust heating element power          |
|                               | Control type,<br>water<br>RW      | 4  | External PWM control signal to adjust heating element power            |
|                               |                                   | NA | Not assigned   |
|                               |                                   | H  | Coil for heating   |
|                               |                                   |    | C  |

\* Ordered separately



**Fig. 2.** Halton Max MOS, insulated model (IN=I3).

# Control units

A range of control units are available for various application needs.

The control unit includes an integrated dynamic differential pressure sensor. The pressure sensor has a low bypass airflow rate through the sensor element. Depending on the model, airflow rate limits are adjusted on site with a mobile application or a dial for manual adjustment.

| Code | Actuator | Torque | Damper size              | Communication interface          | Order code   |
|------|----------|--------|--------------------------|----------------------------------|--|
| EX   | Belimo   | 10 Nm  | 200 x 150 –<br>800 x 400 | Analog<br>0..10V/2..10V          | EX = NMVD3W- MP.1<br>(DC 0/2...10 V), 10 Nm                  |
| EY   | Belimo   | 10 Nm  | 200 x 150 –<br>800 x 400 | Bus<br>Modbus RTU<br>BACnet MSTP | EY = NMVD3W-<br>MOD.1<br>(Modbus RTU/ BACnet<br>MSTP), 10 Nm |

## Quick selection

The operable airflow range for the Halton Max MOS corresponds to the duct air velocities of 0.5-8 m/s.

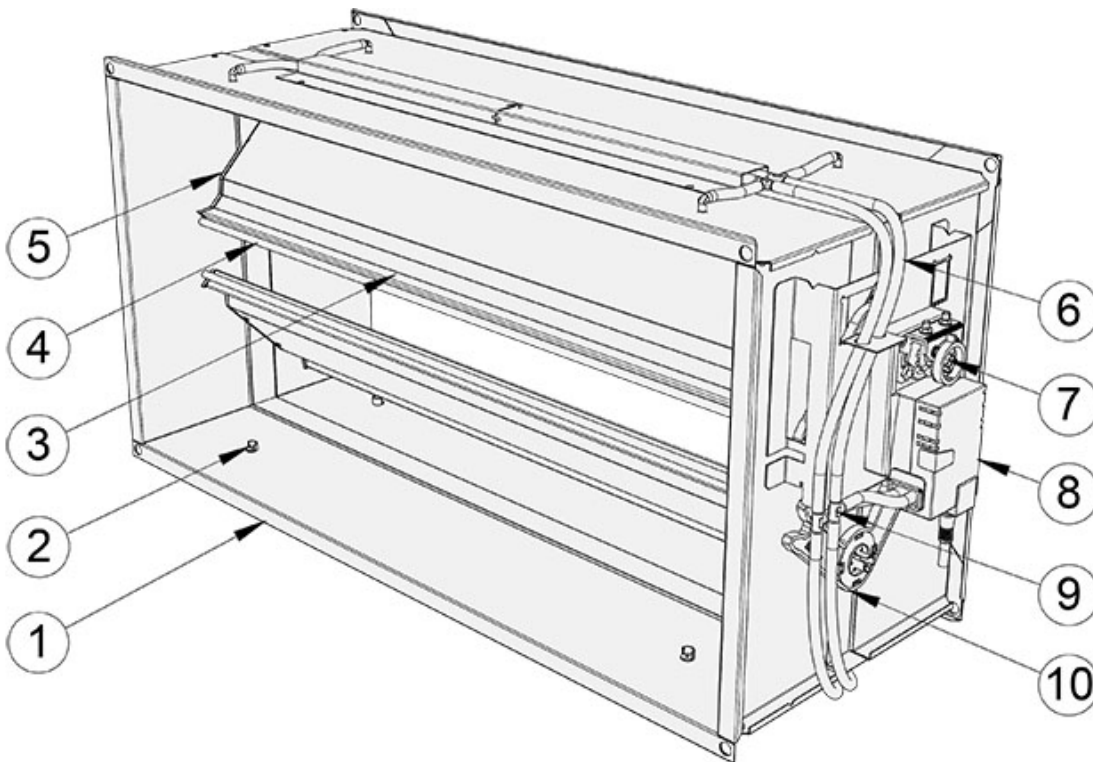
|             |     | Operating range [l/s] |        |        |         |          |          |          |
|-------------|-----|-----------------------|--------|--------|---------|----------|----------|----------|
| Width [mm]  |     | 200                   | 250    | 300    | 400     | 500      | 600      | 800      |
| Height [mm] | 150 | 15-240                | 19-300 | 23-360 | 30-480  | 38-600   | 45-715   | –        |
|             | 200 | 20-320                | 25-400 | 30-480 | 40-640  | 50-800   | 60-960   | 80-1280  |
|             | 250 | –                     | 31-500 | 38-600 | 50-800  | 63-1000  | 75-1200  | 100-1600 |
|             | 300 | –                     | –      | 45-664 | 60-948  | 75-1200  | 90-1440  | 120-1920 |
|             | 400 | –                     | –      | –      | 80-1280 | 100-1600 | 120-1920 | 160-2560 |

**Table 1.** Operating range, min – max [l/s]

| Width [mm]  |     | Operating range [m <sup>3</sup> /h] |          |          |          |          |          |          |
|-------------|-----|-------------------------------------|----------|----------|----------|----------|----------|----------|
|             |     | 200                                 | 250      | 300      | 400      | 500      | 600      | 800      |
| Height [mm] | 150 | 54-864                              | 68-1080  | 81-1296  | 108-1728 | 135-2160 | 162-2574 | –        |
|             | 200 | 72-1152                             | 90-1440  | 108-1728 | 144-2304 | 180-2880 | 216-3456 | 288-4608 |
|             | 250 | –                                   | 113-1800 | 135-2160 | 180-2880 | 225-3600 | 270-4320 | 360-5760 |
|             | 300 | –                                   | –        | 162-2390 | 216-3413 | 270-4320 | 324-5184 | 432-6912 |
|             | 400 | –                                   | –        | –        | 288-4608 | 360-5760 | 432-6912 | 576-9216 |

*Table 2. Operating range, min – max [m<sup>3</sup>/h]*

## Structure and materials



*Fig. 3. Structure of Halton Max MOS*



| No. | Part                    | Description                          | Note   |
|-----|-------------------------|--------------------------------------|--|
| 1   | Casing                  | Galvanised steel                     | Stainless steel (EN 1.4404/ AISI 316L) also available.                 |
| 2   | Measurement probe       | Polyurethane                         | –  |
| 3   | Blade                   | Galvanised steel                     | Sandwich design. Stainless steel (EN 1.4404/AISI 316L) also available. |
| 4   | Blade gasket            | Silicone                             | Heat-proof model: LTE silicone   |
| 5   | Blades end gasket       | Silicone                             | –  |
| 6   | Measurement tube        | Silicone                             | –  |
| 7   | Rectangular drive shaft | Stainless steel ( <i>AISI 316L</i> ) | 12×12 mm   |
| 8   | Control unit            | Plastic, steel                       | PVC cable  |
| 9   | Tube connector          | Plastic                              | POM  |
| 10  | Gear sector             | Plastic                              | –  |

# Dimensions and weight

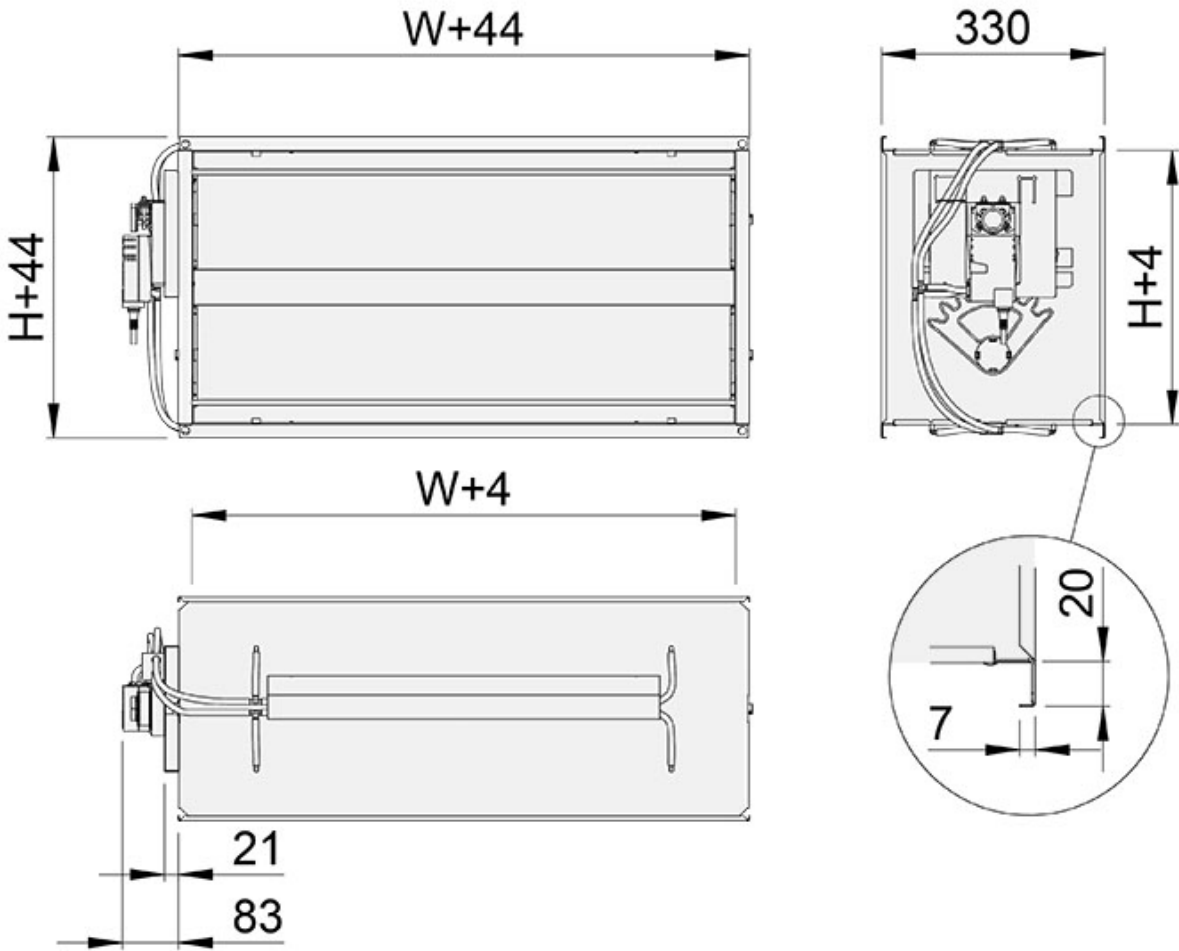


Fig. 4. Dimensions of Halton Max MOS

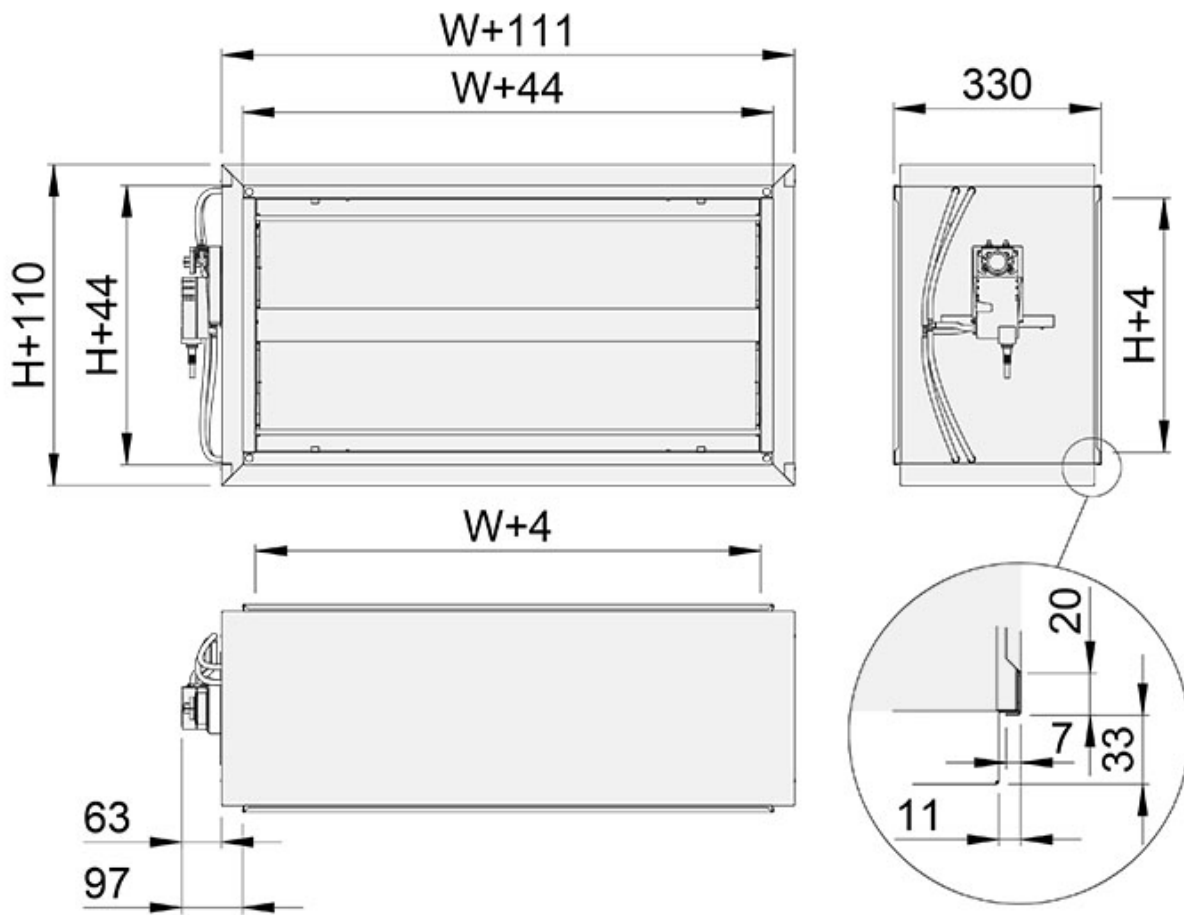


Fig. 5. Dimensions of Halton Max MOS, insulated model

| WxH<br>[mm] | Weight<br>[kg] | Weight, insulated<br>[kg] |
|-------------|----------------|---------------------------|
| 200×150     | 4.0            | 6.4                       |
| 200×200     | 4.4            | 7.0                       |
| 250×150     | 5.4            | 8.1                       |
| 250×200     | 4.7            | 7.6                       |
| 250×250     | 5.1            | 8.3                       |
| 300×150     | 4.8            | 7.6                       |
| 300×200     | 5.2            | 8.3                       |
| 300×250     | 5.7            | 9.0                       |
| 300×300     | 6.3            | 9.9                       |
| 400×150     | 5.5            | 8.7                       |
| 400×200     | 6.0            | 9.4                       |
| 400×250     | 6.5            | 10.2                      |
| 400×300     | 7.4            | 11.4                      |
| 400×400     | 8.4            | 13.0                      |
| 500×150     | 6.2            | 9.9                       |
| 500×200     | 6.8            | 10.6                      |
| 500×250     | 7.3            | 11.5                      |
| 500×300     | 8.3            | 12.8                      |
| 500×400     | 9.5            | 14.5                      |
| 600×150     | 6.8            | 11.0                      |
| 600×200     | 7.4            | 11.7                      |
| 600×250     | 8.0            | 12.6                      |
| 600×300     | 9.0            | 13.9                      |
| 600×400     | 10.2           | 15.7                      |
| 800×200     | 9.3            | 14.5                      |
| 800×250     | 9.9            | 15.4                      |
| 800×300     | 11.3           | 17.0                      |
| 800×400     | 12.9           | 19.1                      |

# Specification

Rectangular pressure-independent variable multiblade airflow control damper for supply and exhaust installations, fulfilling the following requirements:

## Construction

- Short (<330mm) and smooth damper casing and uniquely positioned walled measurement probes therein.
- The flow measurement is based on amplified pressure difference of the damper. Accurate ( $\pm 10\%$ ) and undisturbed flow control even at low flow velocity ( $\geq 0,5\text{m/s}$ ) and challenging flow conditions. Control range at least 1:15
- Closed damper blade air leakage according to EN 1751 class 3.
- Casing air leakage according to EN 1751 class C.
- No internal structures that would cause unnecessary initial pressure losses and challenges for damper cleaning. Eventual cleaning of the measurement probes to be done with pressurized air outside of the unit without the need to access measurement tubes/vanes or damper blades inside the damper.
- No need to install additional duct sections for safety distance (zero safety distance).

## Material

- Galvanised or stainless steel (EN 1.4404, AISI 316L)

## Electrical data

- Modbus RTU, BACnet MSTP, or analogue connection
- Control signal range of analogue control mode is for input 0...10 VDC or 2 ...10 VDC
- Feedback signal range of analogue control mode for output follows the selected control signal range 0...10 VDC
- Power supply voltage 24 V DC/AC

## Parameter settings

- Designed airflow range can be set at the factory.
- Controller settings are adjustable on site with bus communication or external service tool.

## Accessories

- Sound attenuator for noise reduction. Model with access panel available for easy maintenance.
- Electric reheat coil with an internal heating controller.
- Water coil for heating and cooling

# Order code

## MOS-W-H; SP-MA-IN-CU-FS-TF-ZT

| Main options                              |                                   |
|---|-----------------------------------|
| <b>W = Width of duct connection [mm]</b>  | 200, 250, 300, 400, 500, 600, 800 |
| <b>H = Height of duct connection [mm]</b> | 150, 200, 250, 300, 400           |

| Other options and accessories          |   |
|--|---|
| <b>SP = System package</b>             |   |
| N                                      | No  |
| <b>MA = Material</b>                   |   |
| GS                                     | Galvanised steel                              |
| AS                                     | Stainless steel (EN 1.4404/AISI 316L)         |
| <b>IN = Insulation</b>                 |   |
| NA                                     | Not assigned                                  |
| I3                                     | Insulated, 50 mm                              |
| <b>CU = Control unit</b>               |   |
| EX                                     | NMV-D3W-MP.1 (DC 0/2...10V), 10 Nm            |
| EY                                     | NMV-D3W-MOD.1 (Modbus RTU/BACnet MSTP), 10 Nm |
| <b>FS = Factory-set airflow limits</b> |   |
| DC                                     | Customer specified settings                   |
| DS                                     | Default factory settings (Vnom)               |
| <b>TF = Transformer</b>                |   |
| NA                                     | Not assigned                                  |
| TF1                                    | 230/24 transformer (35V)                      |
| <b>ZT = Tailored product</b>           |   |
| N                                      | No  |
| Y                                      | Yes (ETO)                                     |

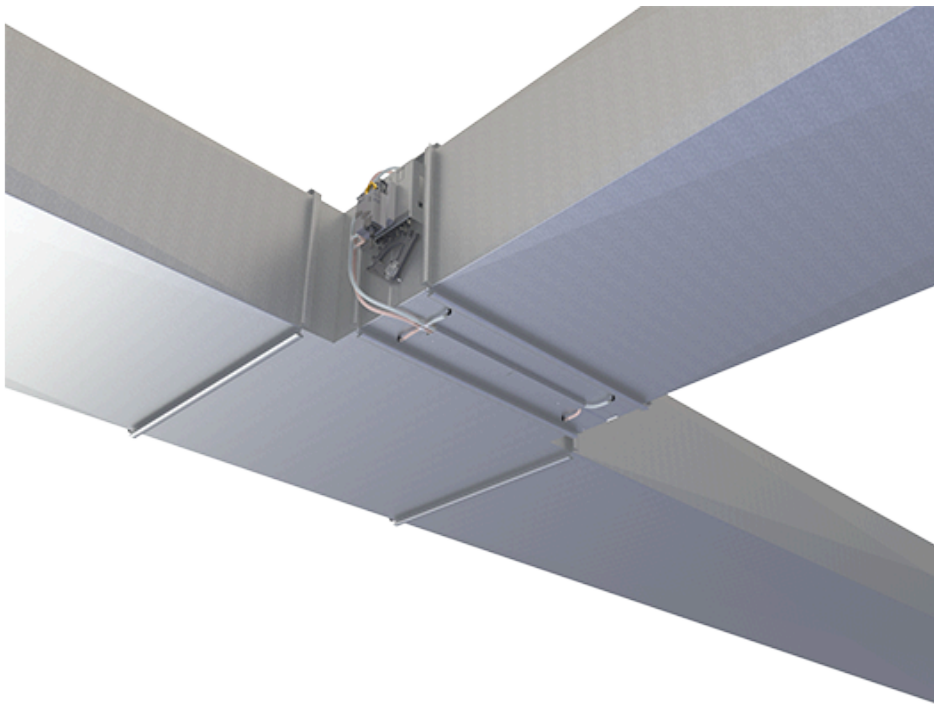
| Sub products and accessories (ordered separately) |                  |
|---|------------------|
| SA  | Sound attenuator |
| RH  | Reheat coil      |

## Order code example

MOS-400-200; SP=N, MA=GS, IN=NA, CU=EX, FS=DS, TF=TF1, ZT=NA

## Installation

The Halton Max MOS airflow control damper can be installed to T-branch and curve, without safety distances. The accuracy of the measured airflow is given in a table below. Install the unit into the ductwork in such a way that the airflow direction through the unit is as indicated with the arrow label in the unit casing.



*Fig. 6. Example of Halton Max MOS installed to duct with no safety distances*

## Technical performance

- Velocity range 0.5– 8.0 m/s
- General Measurement Uncertainty
  - Accuracy  $\pm 10\%$
  - The minimum allowed safety distance is  $0 \times D$ .

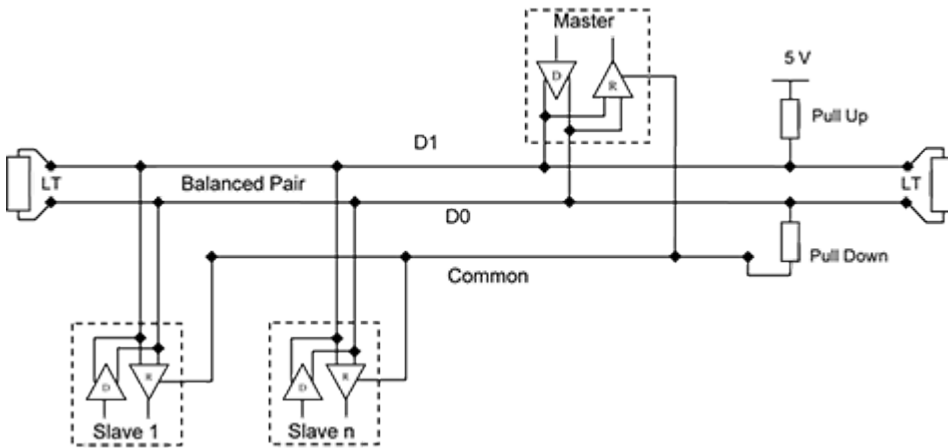
**Note:** The measurement uncertainty is defined in laboratory conditions and may be greater in practical installations, where non-optimal installation situations or multiple consequent disturbances may exist.

## Wiring

The wiring must only be carried out by qualified personnel following the local regulations. For the

power supply, a safety isolating transformer must be used.

The bus must be implemented according to standard EIA/TIA-485.



**Fig. 6.** Example: General RS-485 2-wire Topology

For connection and wiring diagrams, see Controller connections and Wiring diagrams in Technical reference data.

## Cabling requirements

Field devices:

- The wires connected to the terminals have a cross-sectional area of at least  $0.5 \text{ mm}^2$ .
- Twisted-pair cables, shielding recommended.

Modbus RTU or BACnet MSTP cable:

- Shielding twisted-pair. For example, Belden 3105A or Nomak  $2 \times 2 \times 0.5 + 0.5$ .
- Max. bus length 1000 m.
- To avoid signal reflections, a 120 Ohm termination resistance must be added at the end of the main cable line.

## Commissioning

### Airflow control

The airflow rates for the Halton Max MOS are preset at the factory. If the airflow rates are not specified by the customer, the default factory settings are 0 for the minimum airflow rate and the nominal value ( $V_{nom}$ ) for the maximum rate.

The nominal airflow rates in the following table are given with a pressure level of 200 Pa.



|             |     | Vnom [l/s] |     |     |      |      |      |      |
|-------------|-----|------------|-----|-----|------|------|------|------|
| Width [mm]  |     | 200        | 250 | 300 | 400  | 500  | 600  | 800  |
| Height [mm] | 150 | 275        | 330 | 385 | 495  | 605  | 715  | –    |
|             | 200 | 386        | 478 | 570 | 754  | 937  | 1121 | 1488 |
|             | 250 | –          | 500 | 605 | 815  | 1026 | 1236 | 1657 |
|             | 300 | –          | –   | 664 | 948  | 1232 | 1516 | 2084 |
|             | 400 | –          | –   | –   | 1452 | 1817 | 2182 | 2912 |

**Table 3.** Vnom [l/s]

|             |     | Vnom [m <sup>3</sup> /h] |      |      |      |      |      |       |
|-------------|-----|--------------------------|------|------|------|------|------|-------|
| Width [mm]  |     | 200                      | 250  | 300  | 400  | 500  | 600  | 800   |
| Height [mm] | 150 | 990                      | 1188 | 1386 | 1782 | 2178 | 2574 | –     |
|             | 200 | 1390                     | 1721 | 2052 | 2714 | 3373 | 4036 | 5357  |
|             | 250 | –                        | 1800 | 2178 | 2934 | 3694 | 4450 | 5965  |
|             | 300 | –                        | –    | 2390 | 3413 | 4435 | 5458 | 7502  |
|             | 400 | –                        | –    | –    | 5227 | 6541 | 7855 | 10483 |

**Table 4.** Vnom [m<sup>3</sup>/h]

The actual airflow rate is calculated as a function of different of differential pressure at the measurement probe, blade opening angle and the correct size k factor.

## Maintenance

The product is easy to maintain. Normally, the electrical parts do not need maintenance. It is recommended to clean the internal parts of the product when cleaning the ductwork. Refer to the building maintenance program for the maintenance cycle.

## Design examples

### Office room design example

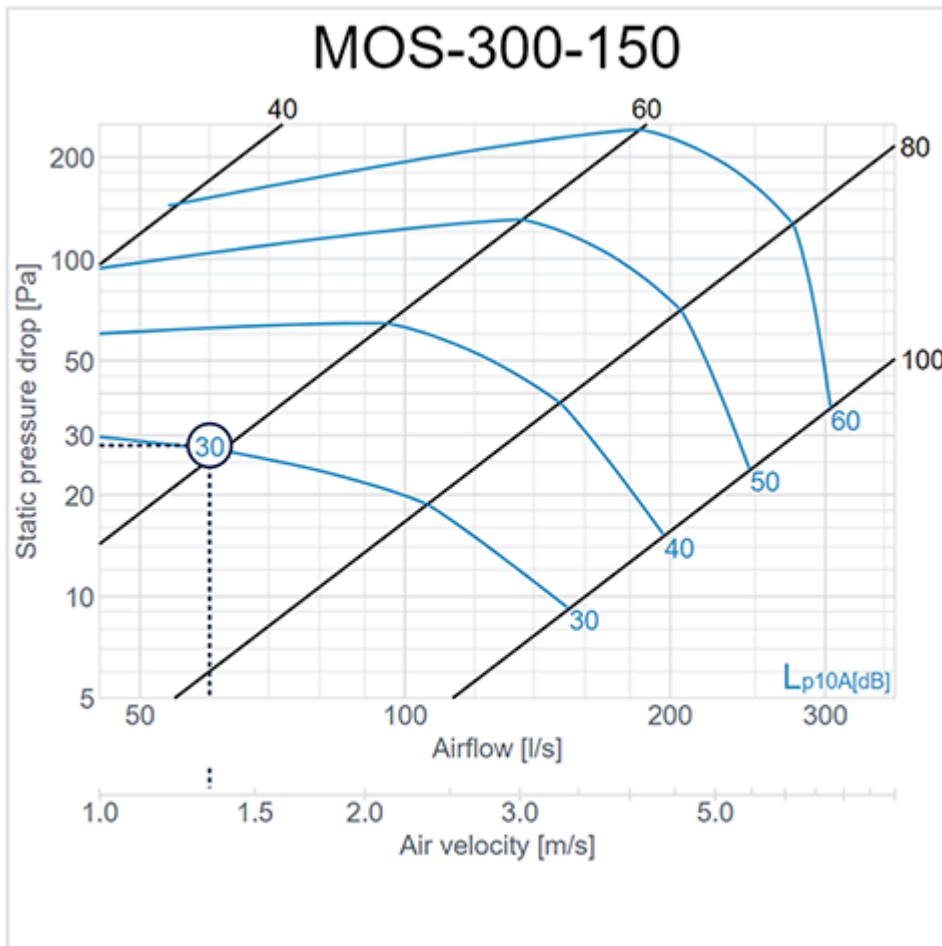
#### Description

Office environments place high demands on the ventilation and air quality. Halton Max MOS is perfect for air management in spaces where wide airflow ranges are needed. Silent ventilation

system guarantees good working conditions. Minimum maintenance needs prevent creating disturbances in the daily activities.

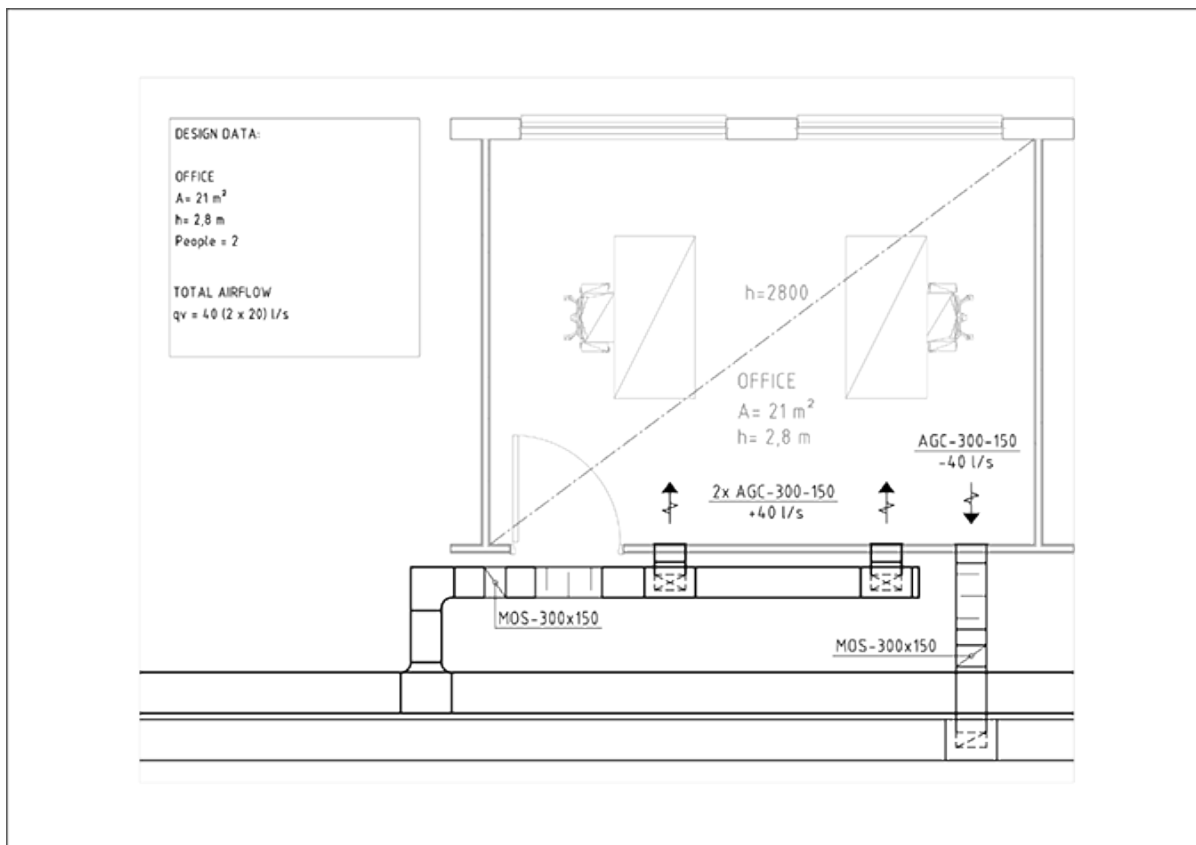
### Design data

- Office/meeting room area 14 m<sup>2</sup>
- Room minimum airflow 30 l/s
- Room maximum airflow 60 l/s
- Cooling load 500W, 36W/m<sup>2</sup>



**Fig. 7.** Halton Max MOS performance

### Ventilation design

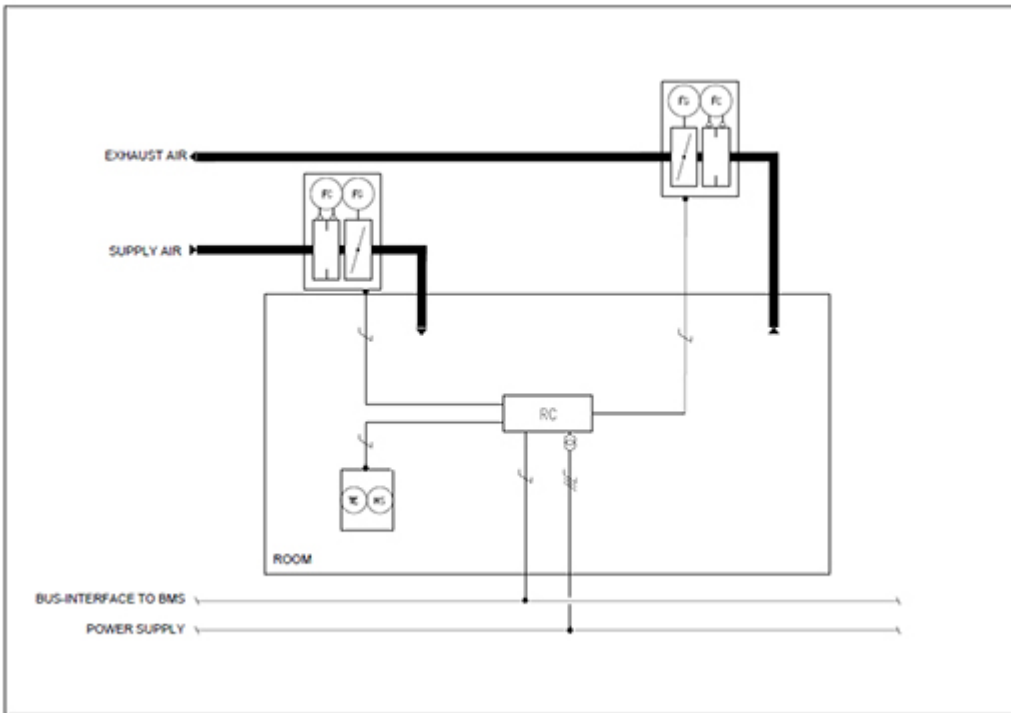


**Fig. 8.** Halton Max MOS ventilation design

### Components

- MOS with attenuator 600 length
- AGC-500-100
- PRL/F-500-100-200
- 2 x JDS/S-160

### Schematic drawing



**Fig. 9.** Wiring example for Halton Max MOS with a master-slave configuration

In this example, the supply unit is controlling the exhaust unit.

## Accessories

### Reheat coils (RH)



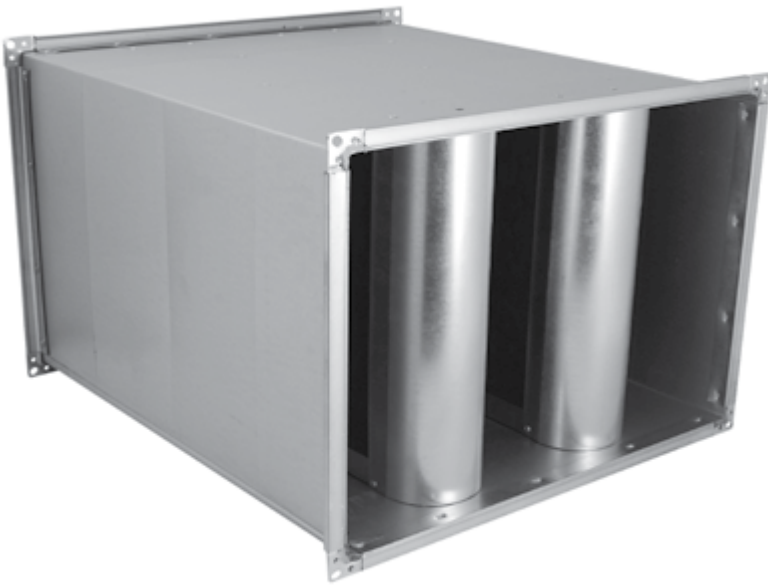
**Fig. 10.** Rectangular duct heater, electrical

Halton offers two models of reheater for ducts:

- Water heater/cooler coils are designed for cooling the ventilation air in a ventilation system. The reheater/cooler can also be used for heating or cooling individual rooms or zones.
- Electrical heaters, circular and rectangular, are designed to heat fresh air in a ventilation system.

For more information on the available reheat coils, see section Downloads.

## Sound attenuators (SA)



**Fig. 11.** Rectangular sound attenuator

Halton offers high-quality rectangular and circular sound attenuators for reducing noise levels in the duct.

For more information on the available sound attenuators, see section Downloads.