Halton Max MUC – Ultrasound airflow management damper

Overview

Circular airflow management damper using the ultrasound technique for airflow measurement.

Application areas

- Variable (VAV) and constant (CAV) airflow control applications
- Supply and exhaust installations
- Available also for Halton Workplace applications

Key features

- Insensitive to dust collection
- Enables flexibility in terms of space layout
- Individually calibrated for higher accuracies
- Low pressure loss for reducing the noise level
- Can be connected to Buildings Management System (BMS)

Halton reserves the right to alter products without notice.

Operating principle

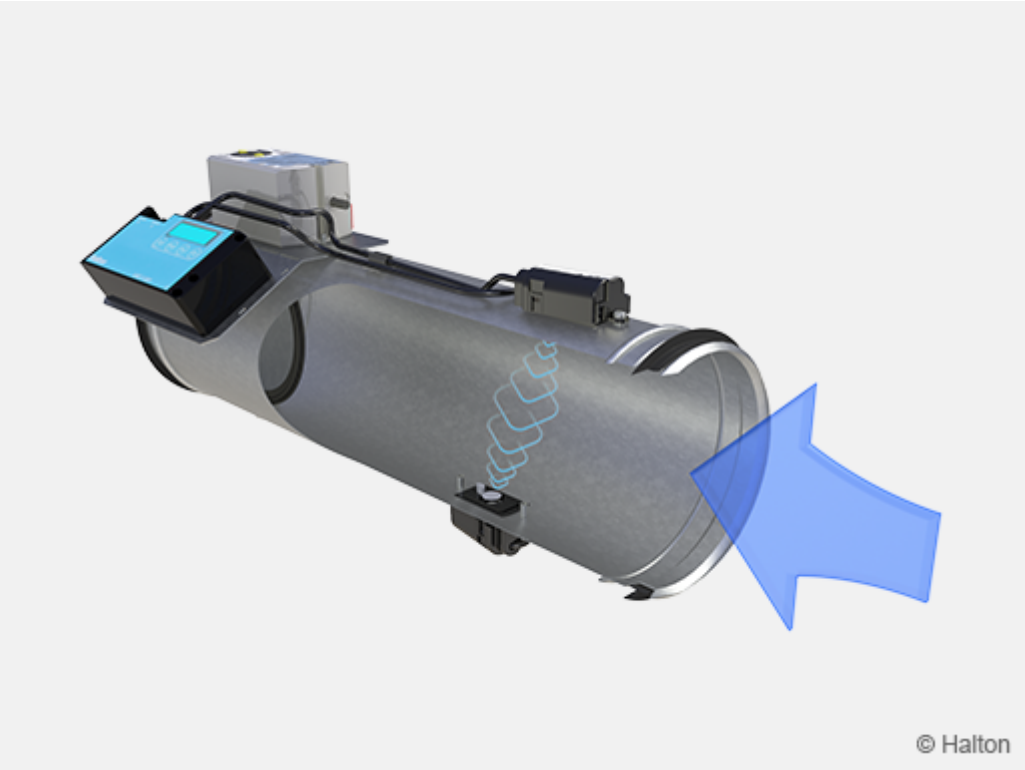


***Fig.1**. Halton Max MUC has two ultrasound sensors for airflow measurement.*

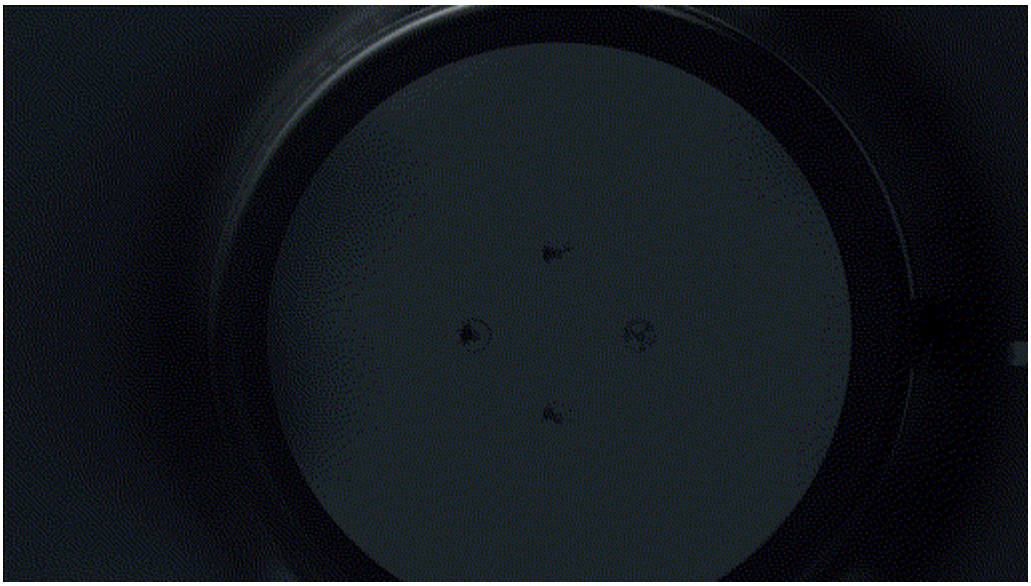
The damper can function either as a supply or an exhaust unit. It maintains the required airflow through ultrasound measurement, regardless of airflow and pressure variations in the ductwork.

The damper has an airflow controller, two ultrasound sensors for airflow measurement, airflow temperature sensor and an actuator for controlling the damper blade. The airflow controller has a control panel for displaying the measurement values and setting the operation parameters.

The airflow controller can receive the airflow control signal via

- Modbus RTU network variable,
- the control panel input,
- an analogue standard signal.

All three control modes are synchronized between each other. The airflow measurement includes temperature and duct type compensations, providing accurate and reliable airflow measurements even at short distances from airflow disturbances in the ductwork.



Key technical data

Description	Value
Duct connection sizes	ø100-630
Material	Galvanised steel or stainless steel (EN 14404 / AISI 316L)
Air velocity range	0.5 – 10 m/s
Operating range (ambient temperature)	0-50°C
Ambient relative humidity (non-condensing)	< 95%
Communication interface	Modbus RTU, analogue
Accessories	• Attenuator: several size and material options available • Reheat coil: models with or without internal heating controller available
Standards and certifications	• CE marking, ISO9001 compliance • Fire separation performance, smoke tightness • Corrosivity class, pressure class, air tightness class • Building material declaration, declaration of conformity • Environmental standards
Maintenance	Maintenance-free

Quick selection

The operable airflow range for Halton Max MUC corresponds to duct air velocities 0.5 – 15 m/s.

The below example shows the airflow ranges and noise levels with air velocity 1-10 m/s.

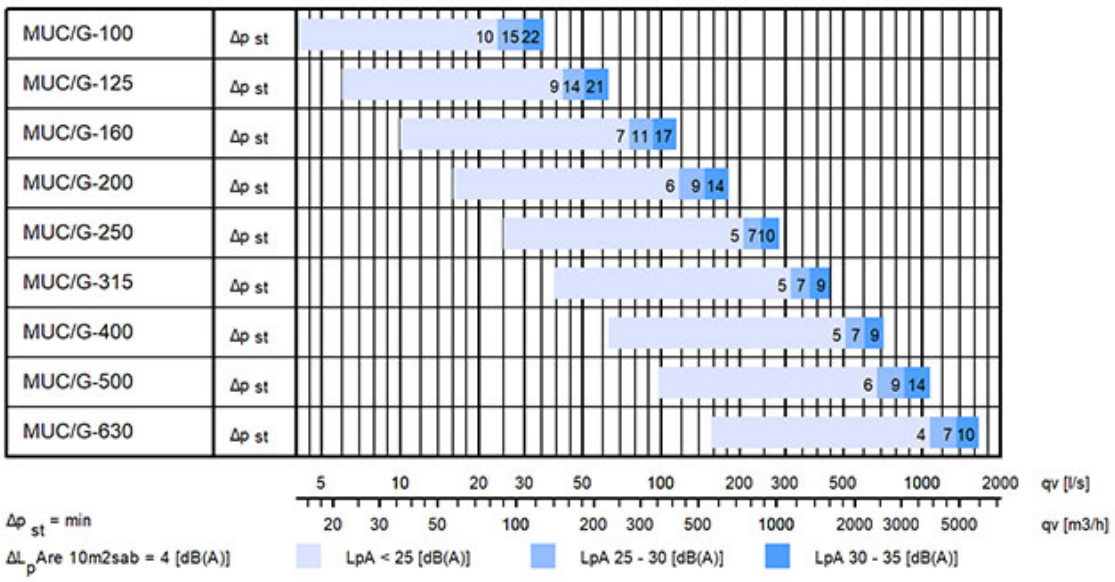


Fig.2. *Quick selection for Halton Max Ultra MUC within air velocity range 0.5-10 m/s*

NS	q_v min-max [l/s]	q_v min-max [m^3/h]
100	4 – 79	14 – 283
125	6 – 123	22 – 442
160	10 – 201	36 – 724
200	16 -315	55 – 1131
250	25 – 491	88 – 1767
315	39 – 779	140 – 2806
400	63 – 1257	226 – 4524
500	98 – 1963	353 – 7068
630	156 – 3117	561 – 11222

System package

Halton Workplace WRA room automation system package for Halton Max MUC airflow management damper

Halton Workplace WRA is part of the Halton Workplace solution offering.

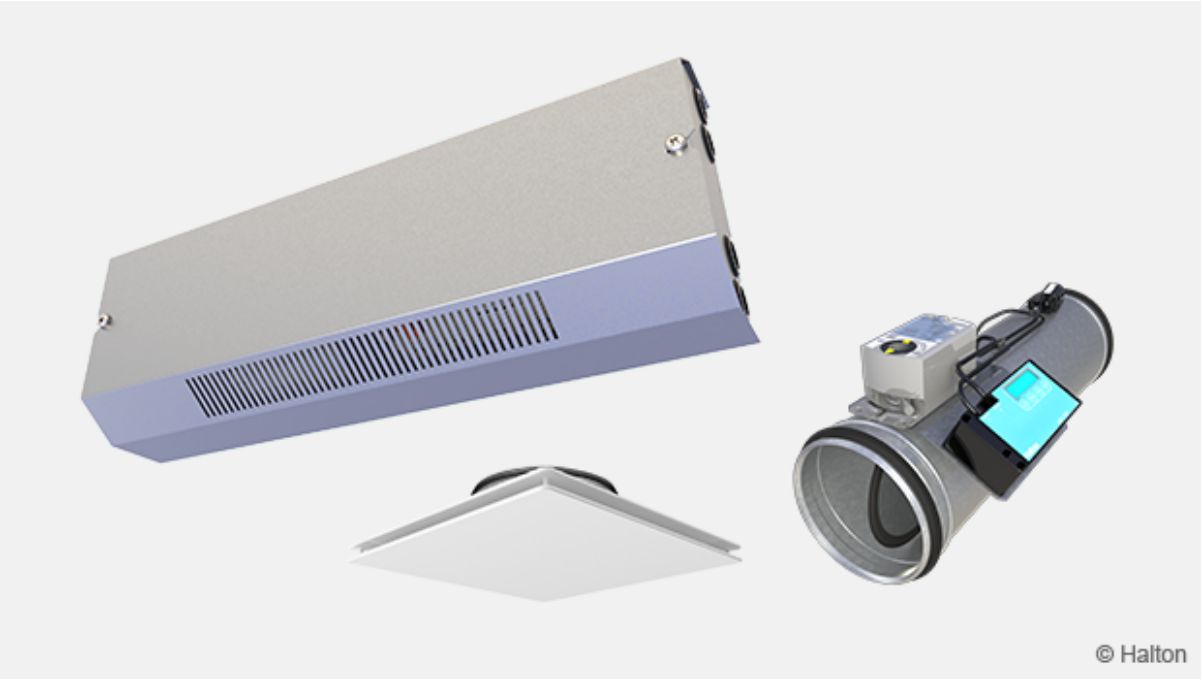


Fig.3. *Halton Jaz JDA static diffuser and Halton Max MUC VAV damper combined with a Halton Workplace room automation controller.*

Halton Workplace WRA is a controller especially designed for controlling the automation system of office spaces and meeting rooms. It is used for controlling the ventilation airflow, room temperature, and indoor air quality.

The Halton Workplace WRA room automation package consists of a controller unit and optional components depending on customer needs: a wall panel and sensors for temperature, CO_2, occupancy, pressure, and condensation.

There are options available for the controller unit and wall panel, depending on the number of controls and sensors required. The Halton Workplace WRA room automation controller is always combined with other Halton products for adaptable and high-level indoor climate.

Application area

- Controlling the ventilation airflow, room temperature, and indoor air quality in office spaces and meeting rooms
- The Halton Workplace WRA room automation controller is an important part of the Halton Workplace system, controlling room units and airflow control dampers

- Overall Halton Workplace System includes:
    - Room air conditioning applications with Halton Workplace WRA room automation controller:
        - Active chilled beams
        - Exhaust units
        - VAV dampers
        - Active VAV diffusers
- Halton Max MDC zone control damper
- Halton Workplace WSO system optimiser

Key features

- Factory-tested controller and wiring, easy to install
- Pre-installed project-specific parameters, quick to commission
- Several operating modes based on occupancy, thermal comfort, and indoor air quality
- Enables fully flexible layout solutions for changing needs in office environments
- Highly energy-efficient and reliable system operation

Operating principle

The Halton Workplace WRA room automation controller operates with Variable Air Volume (VAV) dampers and active chilled beams of the Halton Workplace system. These are used for adjusting the ventilation airflow, room temperature, and indoor air quality in office spaces.

Each room unit in an office space can have its own dedicated Halton Workplace WRA room automation controller, or a single controller can control multiple room units. The Halton Workplace WRA room automation controller can automatically adjust the system according to the indoor environment level preferred by users. Each room unit having its own dedicated controller brings maximum flexibility.

Room automation: Halton Jaz JDA and Halton Max MUC VAV damper controlled with Halton Workplace WRA room automation controller

Fig.4. *Halton Jaz JDA diffuser and Halton Max Ultra Circular VAV damper, controlled with Halton Workplace WRA room automation controller in a single office room*

Room automation description

In this configuration, the Halton Workplace WRA room automation controller (type DXR2.E12P-102A) controls a Halton Jaz JDA diffuser that is combined with a Halton Max MUC VAV damper. External CO_2 and occupancy sensors are installed in the room. The temperature sensor is integrated into the wall panel (type QMX3.P34). The system also includes an exhaust VAV damper and radiator heating water valve control. One Halton Workplace WRA room automation controller can individually control up to four room units, and there can be several Halton Workplace WRA room automation controllers in the room.

Design criteria for room automation

- Supply airflow control
- Exhaust airflow control
- Window switch control
- External CO_2 and occupancy sensors
- Wall panel with temperature sensor and display

- Radiator heating water valve control

Schematic drawing

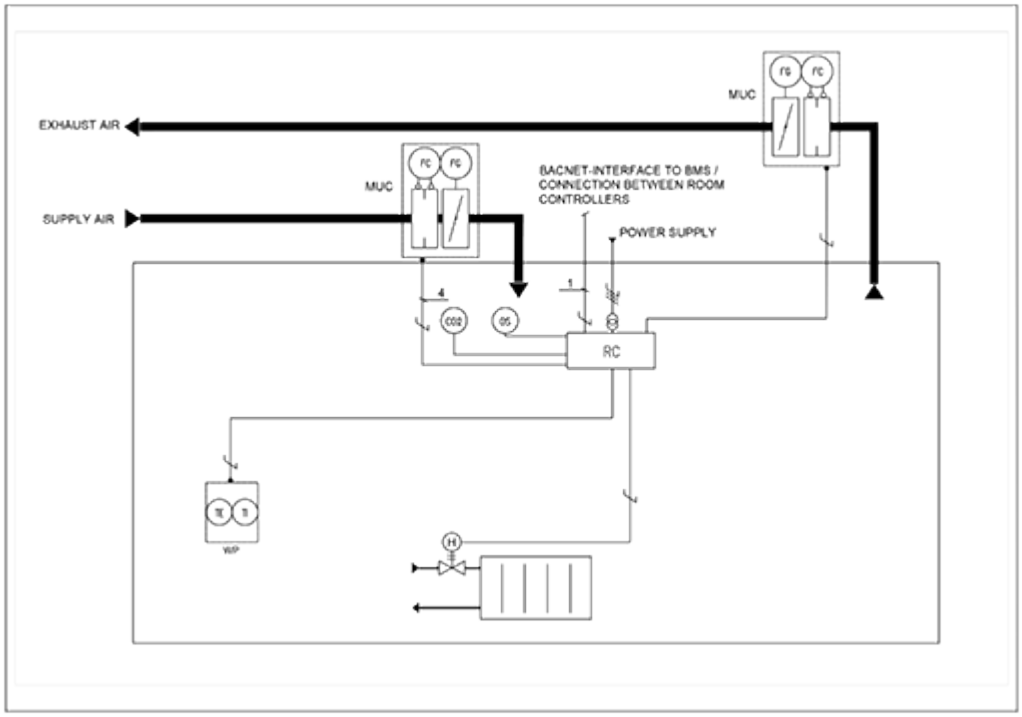


Fig.5. *Schematic drawing: Halton Jaz JDA diffuser and Halton Max MUC VAV damper, controlled with Halton Workplace WRA room automation controller*

Equipment list

Code	Equipment
RC	Controller unit
FG	Airflow damper actuator
FC	Airflow measurement
H	Water valve actuator
OS	Occupancy sensor
CO2	CO_2 sensor
WP	Wall panel
TE	Temperature sensor
TI	Temperature display

Wiring diagram

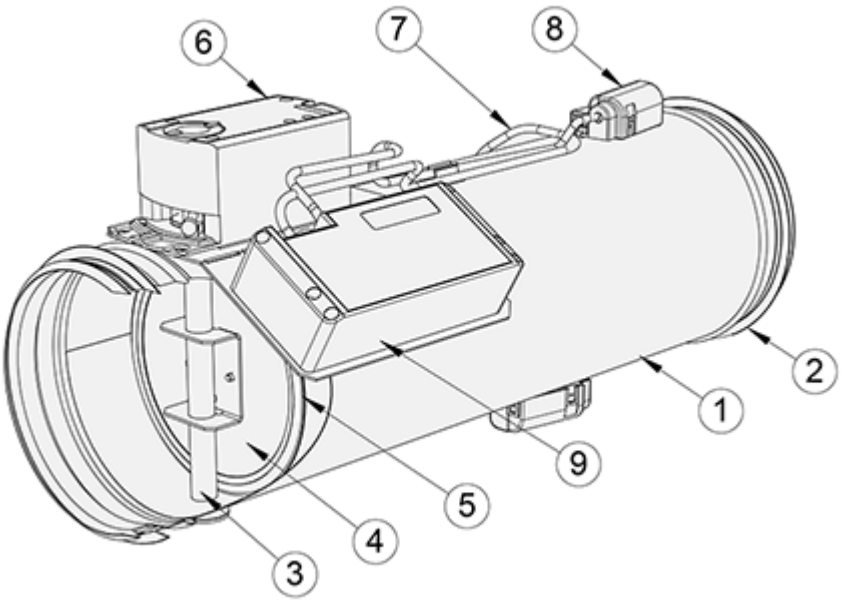
For the wiring diagram of similar configuration, see the product pages of the Halton Workplace WRA room automation controller.

Components and order code examples for the system

- 1 x Passive diffuser: Halton Jaz JDA
  – JDA/S-125(R4) WS=NA, CO=W, ZT=N + TRI/S-125-125(N)
- 1 x VAV damper: Halton Max Ultra Circular (MUC) or Halton Max MOC
  – MUC/G-125, MA=CS
- 1 x Exhaust unit: Halton AGC Exhaust grille + Halton PRL Plenum for grilles
  – AGC/N-400-100 FS=CL, ME=A, FI=PN, CO=W, ZT=N+PRL/F-400-100-160
- 1 x VAV damper: Halton Max Ultra Circular (MUC) or Halton Max MOC
  – MUC/G-160, MA=CS
- Automation package: 1 x Halton Workplace WRA room automation controller unit with related components
  – WRA/MUC-E21-MU -EX4, WP=34, LC=NA, SE=NA, SW=NA, ST=NA, SL=OE, PM=NA, TC=NA, CV=NA, RV=RA, ZT=N

Note: For more information, see the product pages of the Halton Workplace WRA room automation controller.

Structure and materials



No.	Part	Material
1	Casing	Galvanised steel or stainless steel (EN 14404/ AISI316L)
2	Duct seal gasket	Rubber
3	Shaft	Galvanised steel or stainless steel (EN 14404/ AISI316L)
4	Blade	Galvanised steel or stainless steel (EN 14404/ AISI316L)
5	Blade gasket	EPDM rubber
6	Actuator	Plastic, steel, PVC cable
7	Cable	LSZH
8	Ultrasound sensor and temperature sensor	Plastic ABS
9	Airflow controller	Plastic ABS

Control unit

Airflow control unit

The Halton Max MUC airflow controller LAC-1.UO1-controls the airflow using ultrasound technology. It provides accurate airflow measurements with two ultrasound sensors.

Technical data

Feature	Description
Control concept	• Modbus RTU • Airflow controller user interface • Analog signal
Power supply	• 18...32 V DC • 20...26.4 V AC
Cables	• Length (sensors): 1000 mm
Dimensions	• Controller: 73 x 150 x 40 mm • Sensors: 42 x 76 x 37 mm
Protection class	• Controller: IP52 • Sensors inside duct: IP65 • Sensors outside duct: IP52

Actuator

Code	Notes	Torque	Damper size	Communication interface	Order code
G2	Siemens actuator	5	100-315	Siemens GDB 161.1E 0..10V/ 2..10V	G2=GDB 161.1E
G3	Siemens actuator	10	400 – 500	Siemens GLB 161.1E	G3=GLB 161.1E
G4	Belimo actuator	5	100-315	Belimo LM24A-SR 0..10V/ 2..10V	G4=LM24A-SR
G5	Belimo actuator	10	400 – 500	Belimo NM24A-SR	G5=NM24A-SR

Dimensions and weight

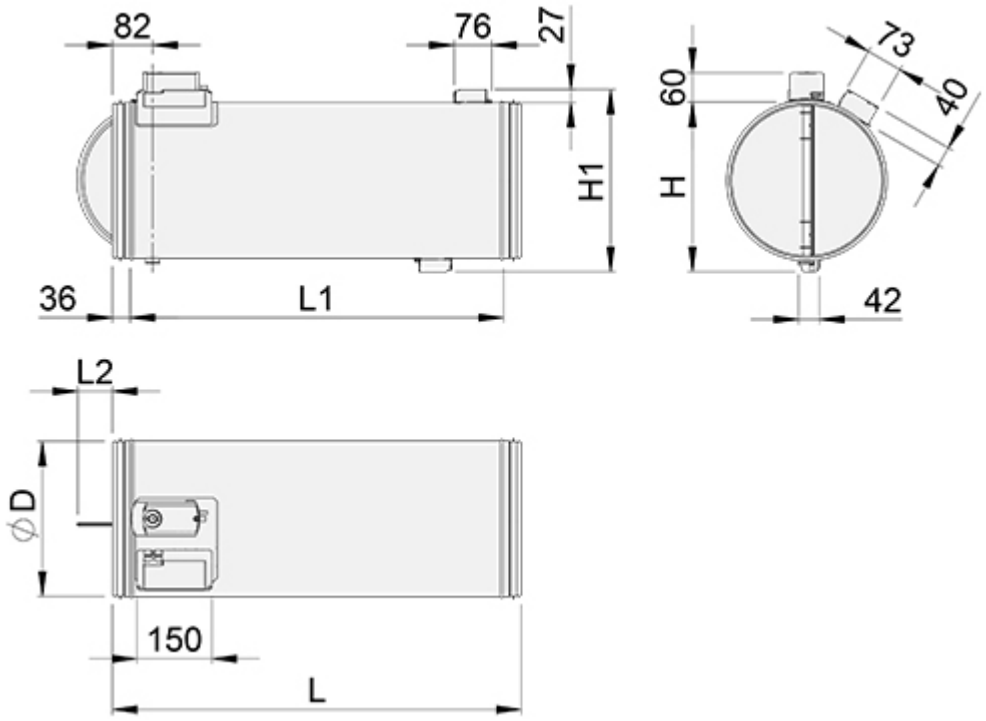


Fig.6. *Halton Max MUC, D=100-315 mm*

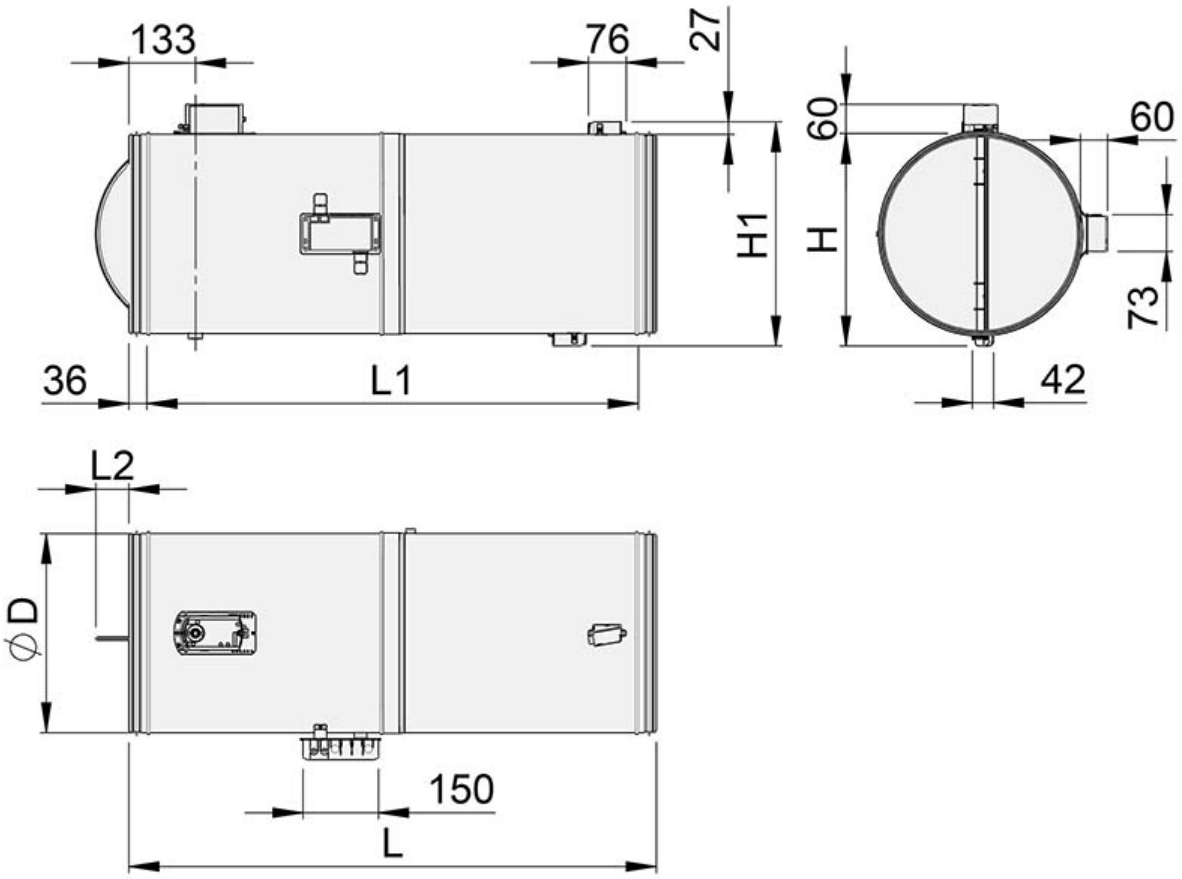


Fig.7. *Halton Max MUC, D=400 mm*

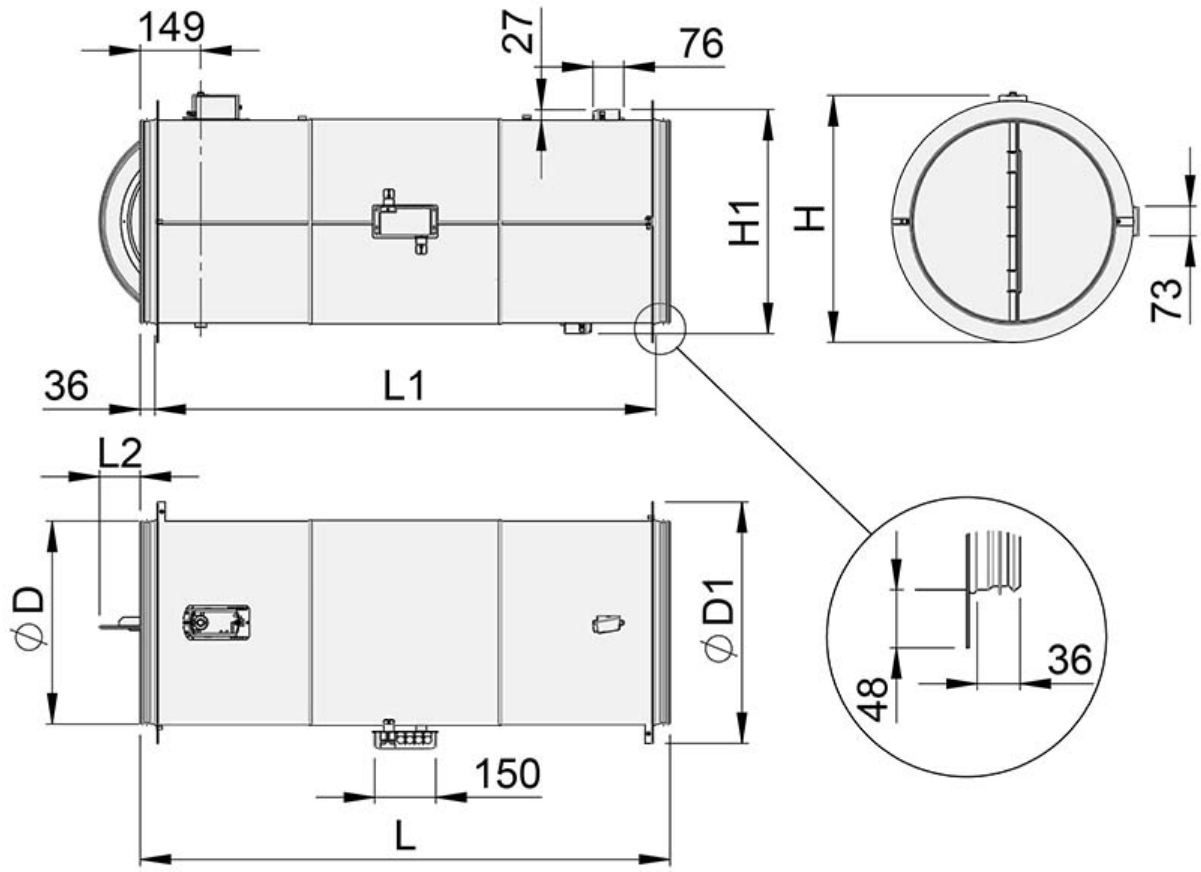


Fig.8. *Halton Max MUC, D=500 and 630 mm*

NS	ØD	ØD1	L	L1	L2	H	H1	Weight [kg]
100	99	–	427	355	–	127	153	1.9
125	124	–	474	402	–	153	178	2.2
160	159	–	540	468	–	187	213	2.7
200	199	–	612	540	15	227	253	3.3
250	249	–	705	633	38	277	303	4.3
315	314	–	825	753	70	342	368	5.8
400	398	–	1054	982	65	424	447	9.6
500	499	595	1300	1228	100	552	608	20.5
630	629	725	1532	1476	167	740	682	27.0

Specification

Pressure-independent variable airflow control damper for supply and exhaust installations.

Construction

- Damper includes airflow controller with the control panel, two airflow ultrasound measurement sensors, temperature sensors and damper actuator.
- Duct connection includes integral airtight rubber gaskets.

- Damper with blade gasket: the tightness of the control damper in closed position conforms to standard *EN1751* class 4 and casing tightness to *EN 1751 class C*.

Material

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

Electrical data

- Modbus connection or analogue
- 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 selected control signal range 0...10 VDC or 2 ...10 VDC
- Power supply voltage 24 V DC/AC

Parameter setting

- Designed airflow range can be set at the factory.
- Controller settings are adjustable on site with Modbus connection or manually from the control panel

Accessories

- Sound attenuator for noise reduction. Model with access panel available for easy maintenance.
- Electric reheat coil with an internal heating controller. Power supply 230 VAC, less than 16A. A safety overheat thermostat with both automatic and manual reset, as well as an alarm relay with the possibility of remote alarm monitoring, are incorporated in the heater. A room controller is required to control the duct heater with a 0...10 VDC control signal.
- Electric reheat coil without an internal heating controller. Power supply 230 VAC. A safety overheat thermostat with both automatic and manual reset is incorporated in the heater. A room controller is required to control the duct heater with a 0...10 VDC control signal.

Installation

Installation options

There are three possibilities to position the damper. Sensors can be directed outwards, side or inwards.

Safety distances and accuracy

Disturbances in the ductwork such as duct bends, T-branches and sound attenuators cause turbulence and an uneven airflow. This can lead to fluctuation and inaccuracy in measurement values.

Note: The recommended safety distance is longer or equal to three duct diameters' distance, to ensure optimal accuracy.

Halton Max MUC technical performance:

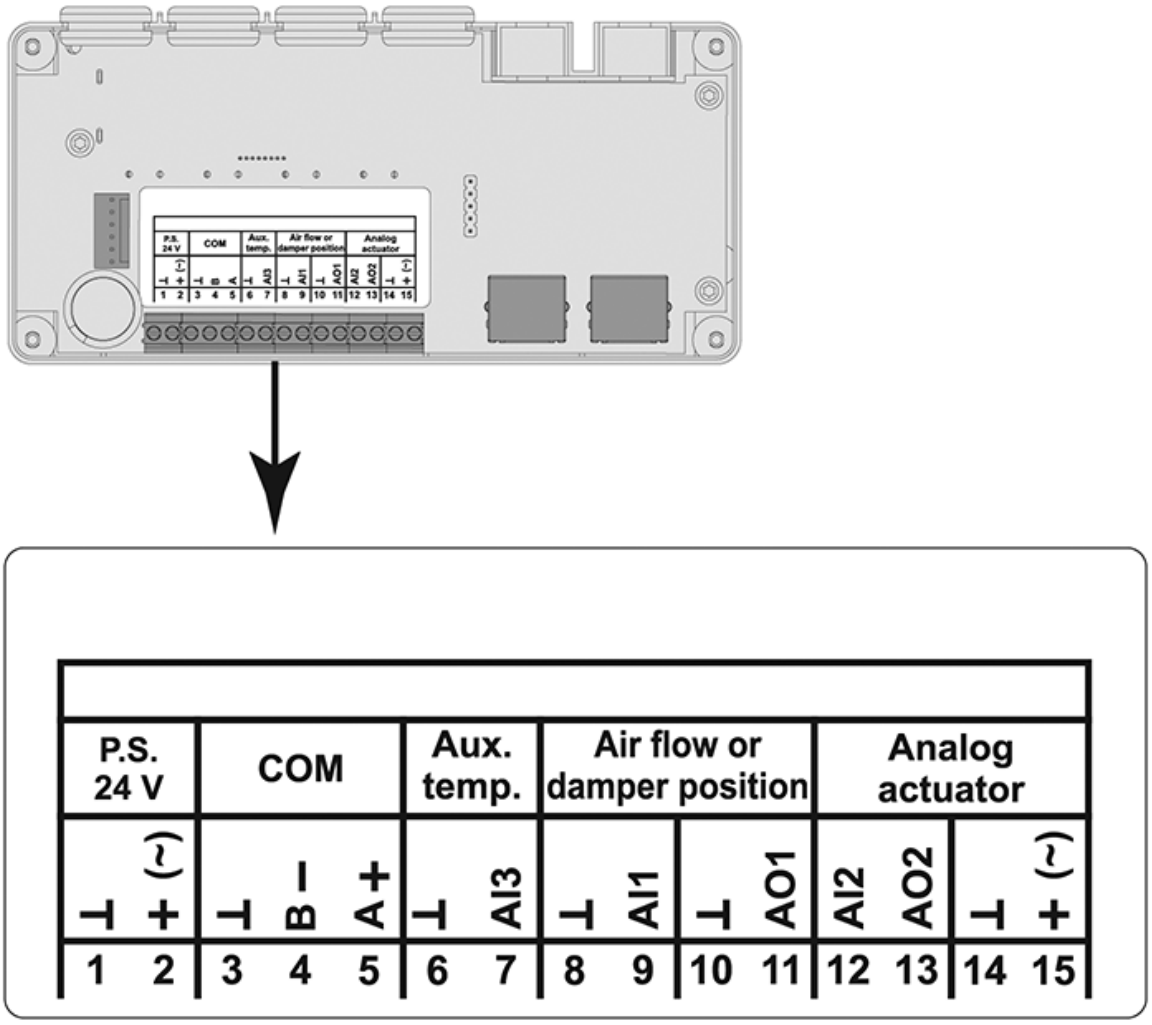
- Velocity range 0,5 — 10,0 m/s
- General measurement uncertainty
    - Accuracy ±5 %
    - Minimum safety distances: Sizes 100-315 = 1D / Sizes 400-630 = 3D
- **Expected measurement uncertainty**, when correct installation parameter is applied ± % or l/s depending, which is the greatest of the percentage or the absolute value for the specific product size.
  Dim. 100 = ±5 % or ±1,00 l/s
  Dim. 125 = ±5 % or ±1,25 l/s
  Dim. 160 = ±5 % or ±2,5 l/s
  Dim. 200 = ±5 % or ±4,0 l/s
  Dim. 250 = ±5 % or ±6,5 l/s
  Dim. 315 = ±10 % or ±10 l/s
  Dim. 400 = ±10 % or ±15 l/s
  Dim. 500 = ±10 % or ±25 l/s
  Dim. 630 = ±15 % or ±93 l/s *

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.
* Dim. 630 velocity range 0.5 – 8.0 m/s

Wiring

The wiring must be carried out by professional technicians following local regulations. For the power supply, a safety-isolating transformer must be used.

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



P.S. 24 V		COM			Aux. temp.		Air flow or damper position				Analog actuator			
⊥	+ (~)	⊥	B −	A +	⊥	AI3	⊥	AI1	⊥	AO1	AI2	AO2	⊥	+ (~)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Controller connections

Terminal	Name	Description
1	GND	Ground
2	24 V DC/AC	Power supply input
3	GND	Ground
4	Standard RS-485 B	Data receive/send line B
5	Standard RS-485 A	Data receive/send line A
6	GND	Ground
7**	AI3	Input for NTC 10k temperature sensor
8	GND	Ground
9	AI1	Input for airflow or damper reference signal
10	GND	Ground
11	AO1	Output for airflow or damper feedback signal
12*	AI2	Analogue actuator feedback signal
13*	AO2	Analogue actuator reference signal
14*	GND	Ground
15*	24 V DC/AC	Power supply output for the analogue actuator

* Connected to Siemens GDB 161.1E or Belimo LM24A-SR actuator
** Not included in delivery

Controller settings

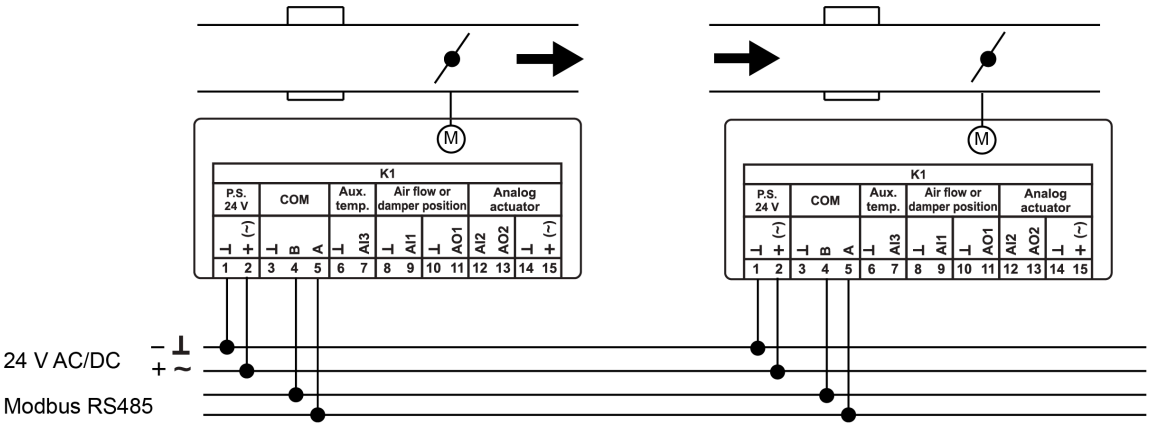


Fig.9. *Wiring diagram: Modbus RTU commucation*

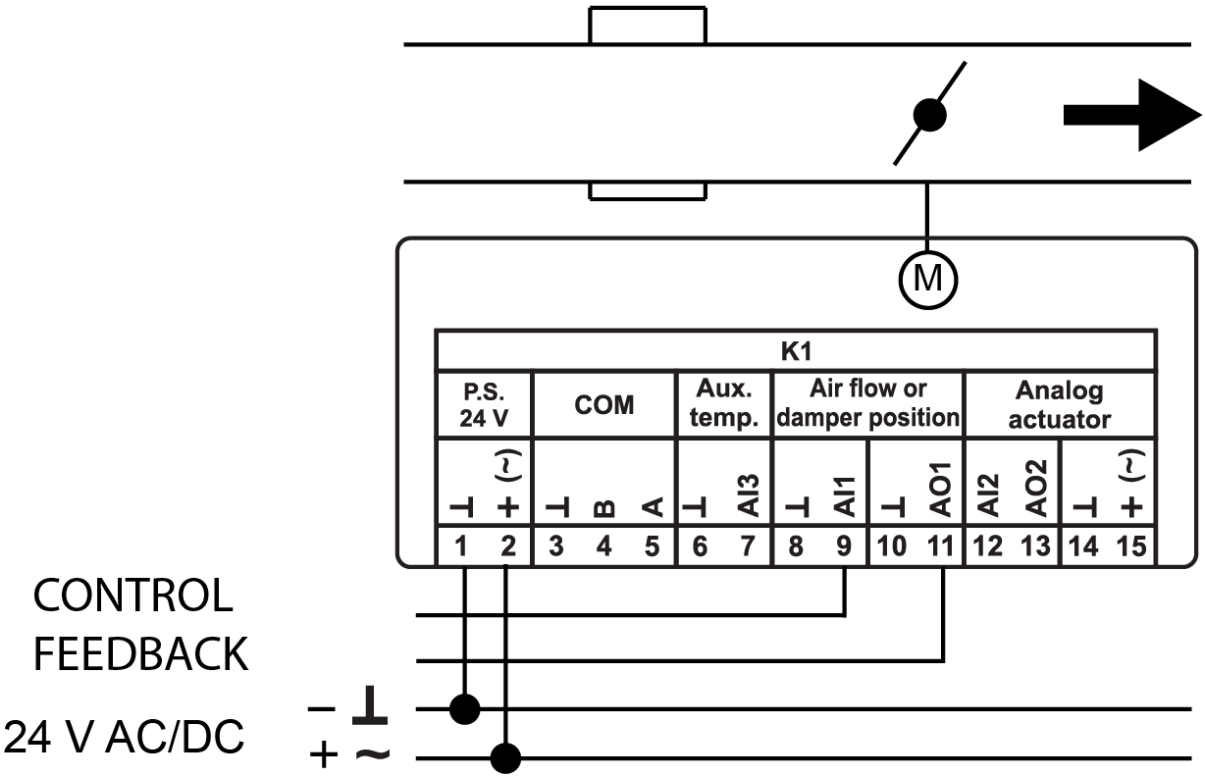
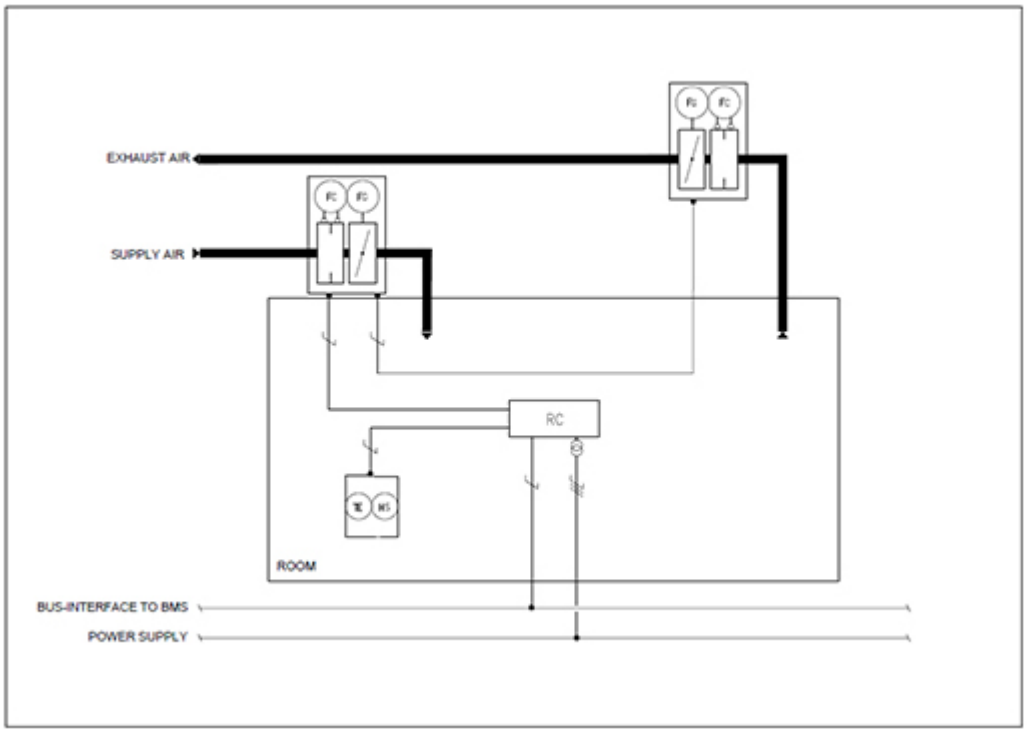
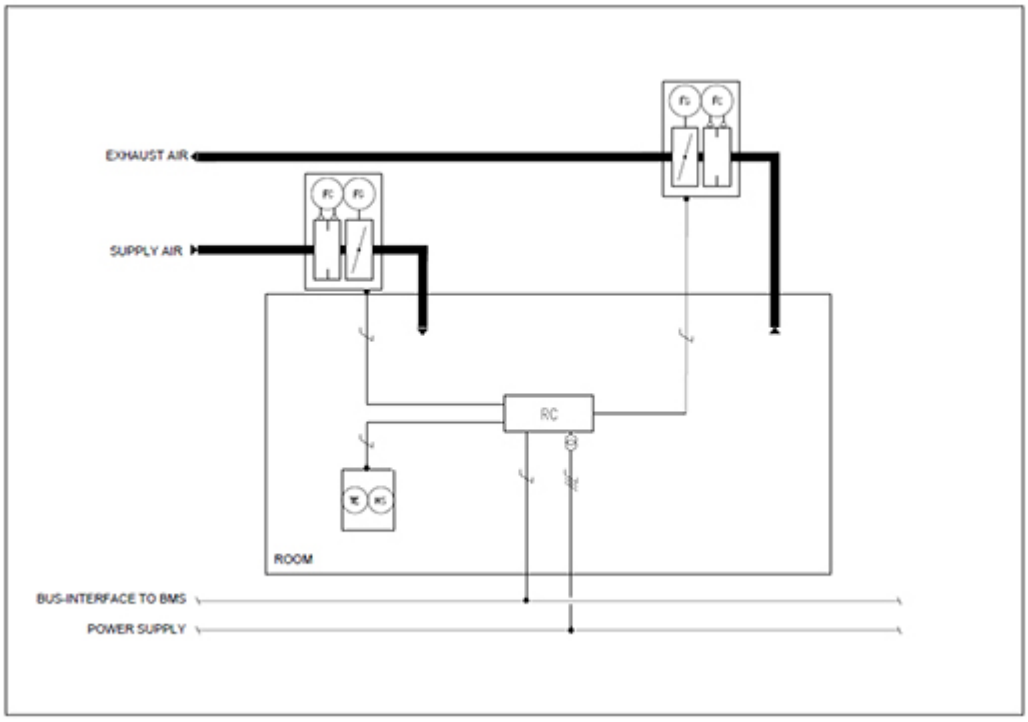


Fig.10. *Wiring diagram: Analog control*



Control scheme for Halton Max MUC with a master-slave configuration
In the following example, the supply unit is controlling the exhaust unit.



Control scheme for Halton Max Ultra Circular with a parallel configuration

Commissioning

Before the system start-up, the controller settings (including the correct installation case) and optionally the Modbus communication parameters have to be set.

Factory settings

The airflow range for Halton Max MUC is preset at the factory. The factory settings for the control signal and feedback signal are the same, but they can be configured individually. If the airflow range is not specified by the customer, the default factory settings are the following: The airflow rates for Halton Max MUC are preset at the factory. If the airflow rates are not specified by the customer, the default factory settings are:

- 0 l/s for the minimum airflow rate
- the maximum airflow rate corresponds to 10 m/s airflow velocity

The maximum airflow (Vnom) rates in the following table are given with an airflow velocity of 10 m/s.

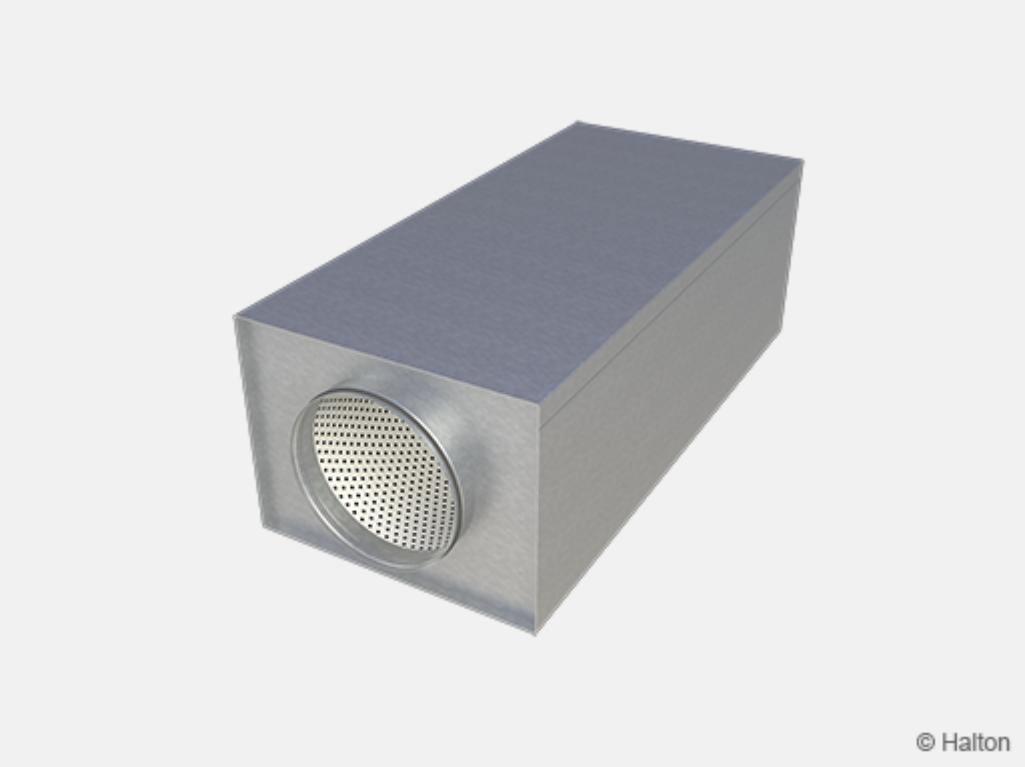
NS	Maximum airflow [l/s] @ 10 m/s	Maximum airflow [m^3/h] @ 10 m/s
100	79	283
125	123	441
160	201	723
200	314	1130
250	491	1767
315	779	2805
400	1257	4524
500	1963	7068
630	3117	11222

Table 1. Halton Max MUC factory settings

Note: Step-by-step instructions on how to perform the commissioning can be found in the Halton Max MUC Installation, commissioning and maintenance guide (see section Downloads).

Accessories

Sound attenuators

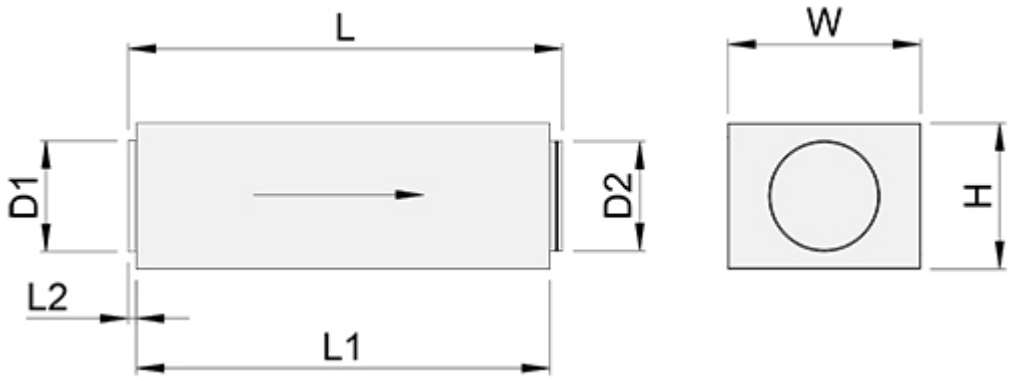


Description

Halton offers high-quality rectangular sound attenuators with round duct connection for reducing noise levels in the duct. Sound attenuators are available as accessory and the following options are available:

- Three lengths: 600, 1000 and 1250 mm
- Connection types
  - D2=D1
    The duct (D2) and damper (D1) connections are the same size
  - D2>D1
    The duct connection (D2) is one size larger than the damper (D1) connection
- Insulation material options:
  - Polyester fibre (PEF), tested according to ISO 7235, class C tightness level
  - Mineral wool (MW), class C tightness level
- Available with or without access panel for maintanance purposes

Technical data



D1 is connected directly to the damper with female-type connection. D2 is attached to the duct with male-type connection. The above picture depicts supply air installations. In exhaust installations, the airflow direction is from D2 to D1. The damper is always connected to D1.

Dimensions (mm) and weights

D1	D2	W	H	L	L1	L2	kg
H1 (MW)							
100	100	252	154	626	600	22	6,2
125	125	263	177	626	600	22	6,7
160	160	280	212	626	600	22	7,5
200	200	361	253	626	600	22	9,5
250	250	431	303	626	600	32	11,9
315	315	458	368	626	600	32	14,6
400	400	518	453	626	600	57	18,3
500	500	702	555	626	600	57	26,0
H3 (PEF)							
100	100	252	154	626	600	22	5,7
125	125	263	177	626	600	22	6,1
160	160	280	212	626	600	22	6,7
200	200	361	253	626	600	22	8,6
250	250	431	303	626	600	32	10,7
315	315	458	368	626	600	32	13,1
400	400	518	453	626	600	57	18,3
500	500	702	555	626	600	57	26,0
H5 (MW)							
100	125	263	177	626	600	22	6,7
125	160	280	212	626	600	22	7,5
160	200	361	253	626	600	22	9,5
200	250	431	303	626	600	32	11,9
250	315	458	368	626	600	32	14,6
315	400	518	453	626	600	57	18,3
400	500	702	555	626	600	57	26,0
500	630	851	684	626	600	67	33,7
H7 (PEF)							
100	125	263	177	626	600	22	6,1
125	160	280	212	626	600	22	6,7
160	200	361	253	626	600	22	8,6
200	250	431	303	626	600	32	10,7
250	315	458	368	626	600	32	13,1
315	400	518	453	626	600	57	18,3
400	500	702	555	626	600	57	26,00
500	630	851	684	626	600	67	33,7
H11 (MW)							
100	100	252	154	626	600	22	6,2
125	125	263	177	626	600	22	6,7
160	160	280	212	626	600	22	7,5
200	200	361	253	626	600	22	9,5
250	250	431	303	626	600	32	11,9
315	315	458	368	626	600	32	14,6
400	400	518	453	626	600	57	18,3
500	500	702	555	626	600	57	26,0
H13 (PEF)							
100	100	252	154	626	600	22	5,7
125	125	263	177	626	600	22	6,1
160	160	280	212	626	600	22	6,7
200	200	361	253	626	600	22	8,6
250	250	431	303	626	600	32	10,7
315	315	458	368	626	600	32	13,1
400	400	518	453	626	600	57	18,3
500	500	702	555	626	600	57	26,0
H15 (MW)							
100	125	263	177	626	600	22	6,7
125	160	280	212	626	600	22	7,5
160	200	361	253	626	600	22	9,5
200	250	431	303	626	600	32	11,9
250	315	458	368	626	600	32	14,6
315	400	518	453	626	600	57	18,3
400	500	702	555	626	600	57	26,0
500	630	851	684	626	600	67	33,7
H17 (PEF)							
100	125	263	177	626	600	22	6,1
125	160	280	212	626	600	22	6,7

D1	D2	W	H	L	L1	L2	kg
H2 (MW)							
100	100	252	154	1036	1000	22	9,7
125	125	263	177	1036	1000	22	10,5
160	160	280	212	1036	1000	22	11,4
200	200	361	253	1036	1000	22	13,9
250	250	431	303	1036	1000	32	16,6
315	315	458	368	1036	1000	32	20,5
400	400	518	453	1036	1000	57	26,4
500	500	702	555	1286	1250	57	37,4
H4 (PEF)							
100	100	252	154	1036	1000	22	8,9
125	125	263	177	1036	1000	22	9,5
160	160	280	212	1036	1000	22	10,1
200	200	361	253	1036	1000	22	12,3
250	250	431	303	1036	1000	32	14,6
315	315	458	368	1036	1000	32	18,0
400	400	518	453	1036	1000	57	26,4
500	500	702	555	1286	1250	57	37,4
H6 (MW)							
100	125	263	177	1036	1000	22	10,5
125	160	280	212	1036	1000	22	11,4
160	200	361	253	1036	1000	22	13,9
200	250	431	303	1036	1000	32	16,6
250	315	458	368	1036	1000	32	20,5
315	400	518	453	1036	1000	57	26,4
400	500	702	555	1286	1250	57	37,4
500	630	851	684	1286	1250	67	48,1
H8 (PEF)							
100	125	263	177	1036	1000	22	9,5
125	160	280	212	1036	1000	22	10,1
160	200	361	253	1036	1000	22	12,3
200	250	431	303	1036	1000	32	14,6
250	315	458	368	1036	1000	32	18,00
315	400	518	453	1036	1000	57	26,4
400	500	702	555	1286	1250	57	37,4
500	630	851	684	1286	1250	67	48,1
H12 (MW)							
100	100	252	154	1036	1000	22	9,7
125	125	263	177	1036	1000	22	10,5
160	160	280	212	1036	1000	22	11,4
200	200	361	253	1036	1000	22	13,9
250	250	431	303	1036	1000	32	16,6
315	315	458	368	1036	1000	32	20,5
400	400	518	453	1036	1000	57	26,4
500	500	702	555	1286	1250	57	37,4
H14 (PEF)							
100	100	252	154	1036	1000	22	8,9
125	125	263	177	1036	1000	22	9,5
160	160	280	212	1036	1000	22	10,1
200	200	361	253	1036	1000	22	12,3
250	250	431	303	1036	1000	32	14,6
315	315	458	368	1036	1000	32	18,0
400	400	518	453	1036	1000	57	26,4
500	500	702	555	1286	1250	57	37,4
H16 (MW)							
100	125	263	177	1036	1000	22	10,5
125	160	280	212	1036	1000	22	11,4
160	200	361	253	1036	1000	22	13,9
200	250	431	303	1036	1000	32	16,6
250	315	458	368	1036	1000	32	20,5
315	400	518	453	1036	1000	57	26,4
400	500	702	555	1286	1250	57	37,4
500	630	851	684	1286	1250	67	48,1
H18 (PEF)							
100	125	263	177	1036	1000	22	9,5
125	160	280	212	1036	1000	22	10,1

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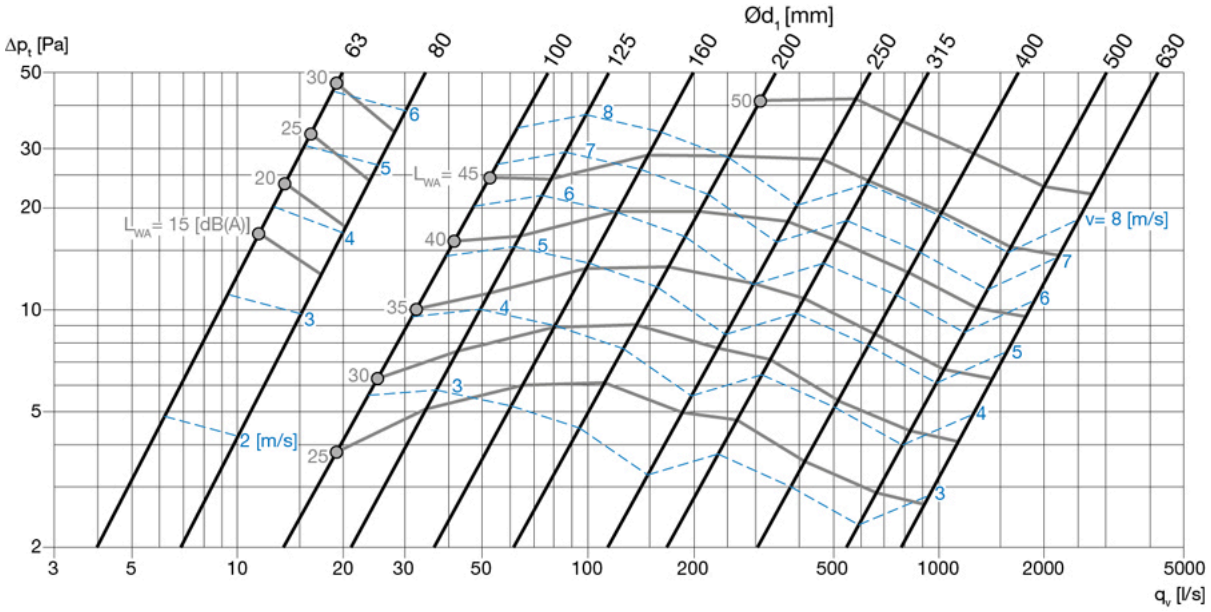
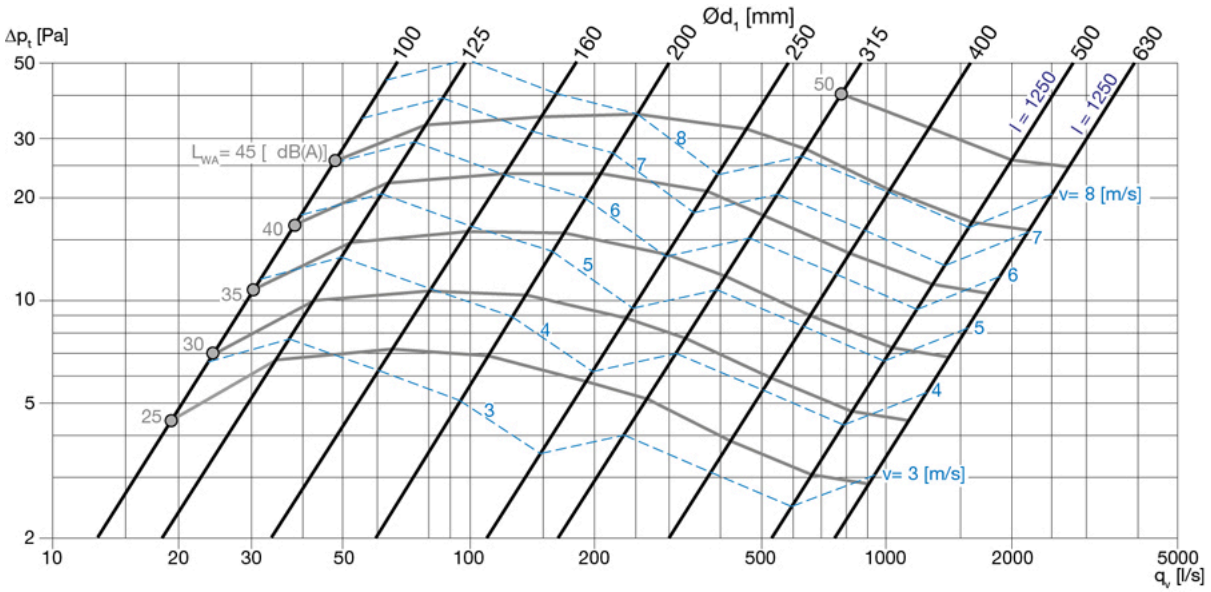
Fig.11. *Sound attenuators dimensions and weight*

Examples of attenuation data:



Attenuation data, L = 600 mm, material = PEF



Attenuation data, L = 1000 mm, material = PEF

Note: For further information, contact Halton Sales.

Reheat coils

Description

Reheat coils are available as accessory. Main features:

- Product models:
  - Model RM
    Without internal heating controller, PWM control signal input
  - Model RC
    With internal heating controller, 0...10-VAC control signal input. Built-in alarm relay with potential-free changeover contact for remote alarm monitoring. The alarm is triggered by manual overheating protection or heater power loss.
- Sinlge-phase heater with 230 VAC, less than 16 A
- Increased heater safety with two internal overheating protection devices (automatic and manual), connected in series.
- EN 15727 class C tightness level
- Available for duct sizes 100 – 400 mm
- Power 600 – 3000 W

Technical data

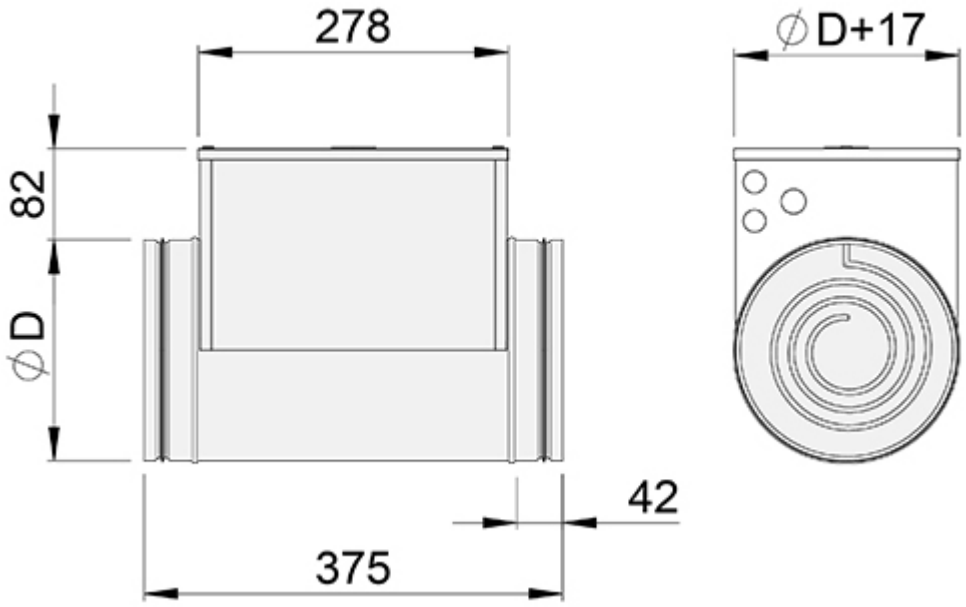


Fig.12. *Reheat coil dimensions*

Note: Reheat coil is not available for sizes over 400 mm

The heater can be installed in vertical or horizontal ducts. The safety distance is 2xD.

The heater must always be interlocked towards the fan or towards the airflow going through the heater. The interlocking function is connected to the duct heater power supply or, if the heater has an internal heating controller (model RC), it can also be connected directly to the controller.

The power supply to the duct heater must be switched off when the fan is switched off or when the airflow rate is too low.

When selecting the airflow control damper and reheat coil, ensure that the airflow velocity is above 2 m/s in order to guarantee a proper control function.

Heating capacity with low air velocity of 2 m/s

NS	Power (W)	qv l/s	qv m^3/h	dT(max) K
100	600	16	57	32
125	900	25	88	31
160	1500	40	145	31
200	2100	63	226	28
250	3000	98	353	25
315	3000	156	561	16
400	3000	251	905	10

Heating capacity with an air velocity of 6 m/s

NS	Power (W)	qv l/s	m^3/h	dT(max) K
100	600	47	170	11
125	900	74	265	10
160	1500	121	434	10
200	2100	188	679	9
250	3000	295	1060	8
315	3000	468	1683	5
400	3000	754	2714	3

Note: For further information, contact Halton Sales.

Order code

MUC/S-D, MA-CU-FS-SA-RH-ZT

S = Model
G With blade gasket

D = Size of duct connection [mm]
100, 125, 160, 200, 250, 315, 400, 500, 630

Other options and accessories

SP = System package
N No
Y Yes

MA = Material
GS Galvanised steel
AS Stainless steel (EN 14404/AISI 316L)

CU = Control unit
G2 GDB 161.1E, 5 Nm
G3 GLB 161.1E, 10 Nm
G4 LM24A-SR, 5 Nm
G5 NM24A-SR, 10 Nm

FS = Factory-set airflow limits
DS Default factory settings (Vnom)
DC Customer specified settings

SA = Sound attenuator
-> only available from Kausala, Finland
NA Not assigned
H1 L = 600 mm; Outlet = Inlet; Mineral wool
H2 L = 1000/1250 mm; Outlet = Inlet; Mineral wool
H3 L = 600 mm; Outlet = Inlet; Polyester fibre
H4 L = 1000/1250 mm; Outlet = Inlet; Polyester fibre
H5 L = 600 mm; Outlet > Inlet; Mineral wool
H6 L = 1000/1250 mm; Outlet > Inlet; Mineral wool
H7 L = 600 mm; Outlet > Inlet; Polyester fibre
H8 L = 1000/1250 mm; Outlet > Inlet; Polyester fibre
H11 L = 600 mm; Outlet = Inlet; Mineral wool; Access panel
H12 L = 1000/1250 mm; Outlet = Inlet; Mineral wool; Access panel
H13 L = 600 mm; Outlet = Inlet; Polyester fibre; Access panel
H14 L = 1000/1250 mm; Outlet = Inlet; Polyester fibre; Access panel
H15 L = 600 mm; Outlet > Inlet; Mineral wool; Access panel
H16 L = 1000/1250 mm; Outlet > Inlet; Mineral wool; Access panel
H17 L = 600 mm; Outlet > Inlet; Polyester fibre; Access panel
H18 L = 1000/1250 mm; Outlet > Inlet; Polyester fibre; Access panel

RH = Electric reheat coil
-> only available from Kausala, Finland
NA Not assigned
RM No internal heating controller, PWM control signal input (230 VAC, pulse width modulation)
RC With internal heating controller (0...10-VAC control signal input)

ZT = Tailored product
N No
Y Yes (ETO)

Code example

MUC/G-100, SP=N, MA=GS, CU=G2, FS=DC, SA=NA, RH=NA, ZT=N