Halton Max Slim Box (MSB) – Airflow management damper

Overview

Slim damper, ideal for renovation, corridors and other spaces where the height of damper is critical. Easy to install as no safety distance is required.

Applications

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

Key features

- Rectangular low-profile airflow management damper
- Suitable for VAV supply or exhaust applications
- Can be installed without the need for straight duct lengths
- Highly accurate airflow measurement
- Can be used in both air volume or air pressure control applications
- Integrated sound attenuation
- Can be connected to Buildings Management System (BMS)

Operating principal

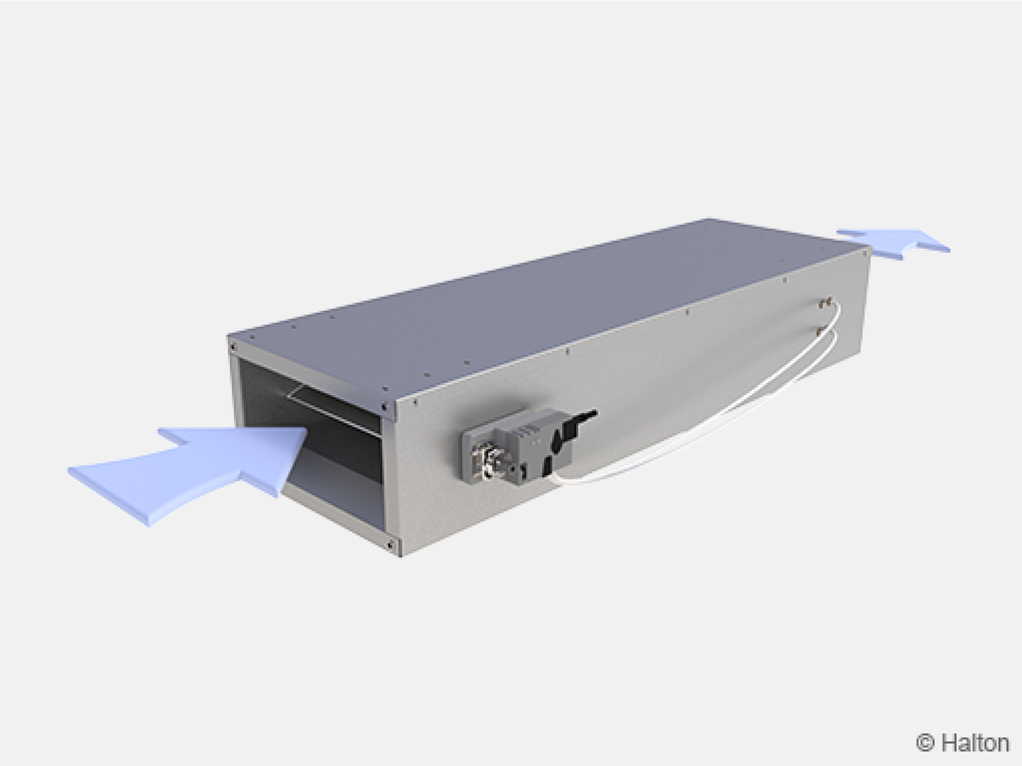

Fig.1. *Halton Max Slim Box, supply*

The Halton Max Slim Box includes a closed loop controller, comprising an aluminium differential pressure measuring probe, an actuator mounted on the damper blade spindle and a controller. This system allows the air volume to be accurately regulated independently of variations in upstream pressure. It can be used in a supply or exhaust application. Measurements made by the differential pressure sensor are sent to the controller which compares these values with the required room setpoint value. The controller compares the actual values with the setpoint value and sends a signal to the actuator which adjusts the position of the damper to compensate for the difference.

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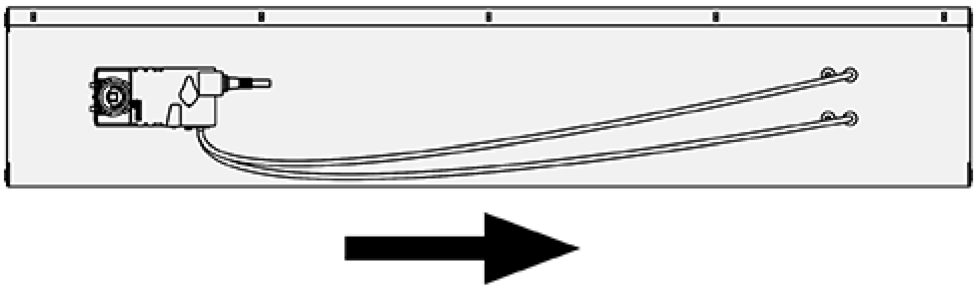


Fig.2. *Halton Max Slim Box, supply*

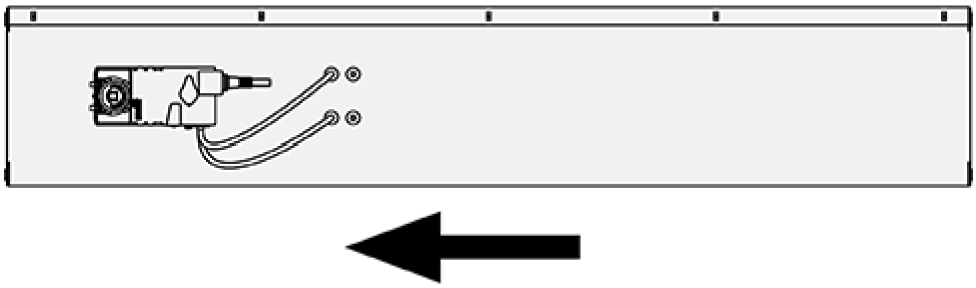


Fig.3. *Halton Max Slim Box, exhaust*

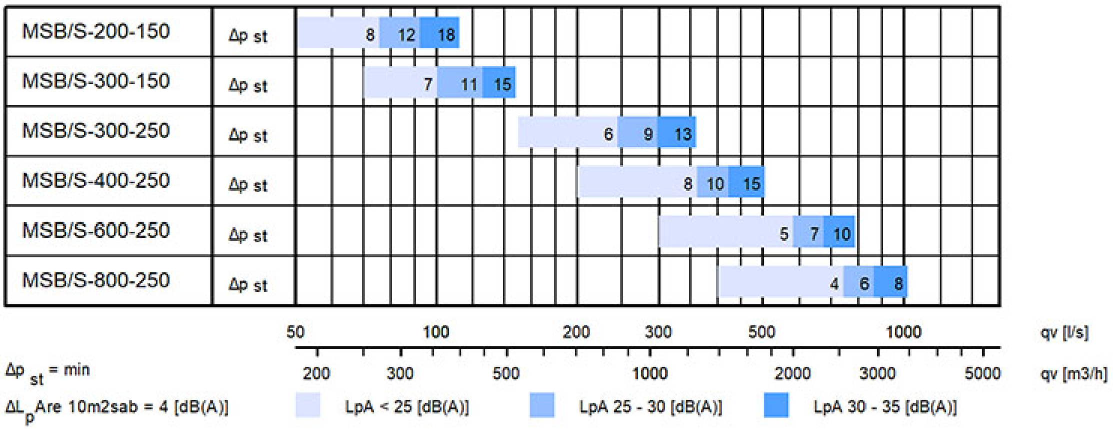
The Halton Max Slim Box is used for the following applications:

- **Constant airflow**
  To get a stable airflow without influenced by the pressure variation ductwork
- **Variable airflow**
  The airflow is managed according the CO_2 or occupancy in the room
- **Duct pressure**
  To get a stable pressure in the ductwork for specific terminal like diffuser, chilled beam that can be required a constant pressure.

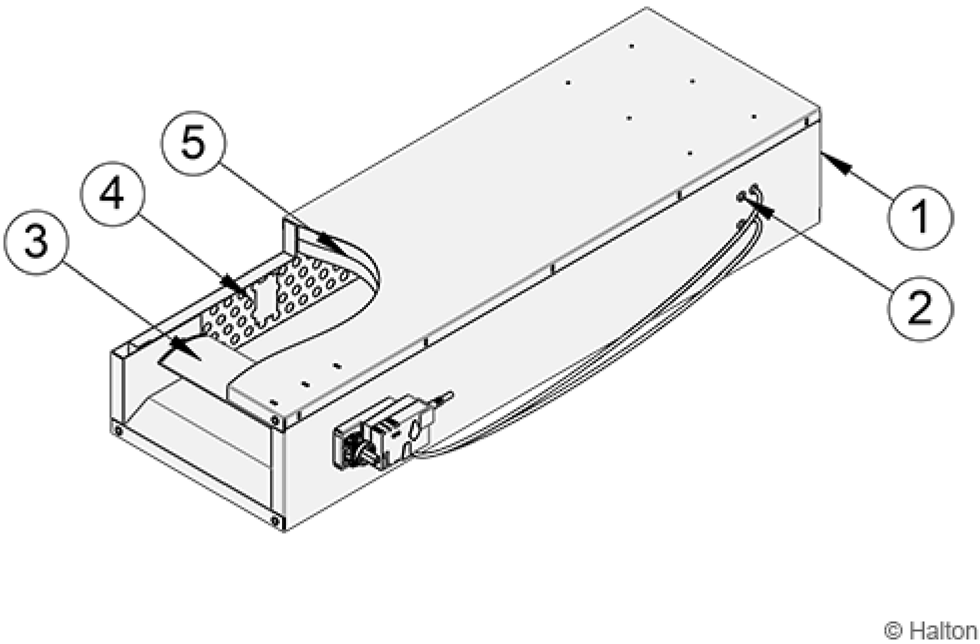
Key technical data

Description	Value
Duct connection sizes (mm)	W = 200, 300, 400, 600, 800 H = 150, 250
Material	Galvanised steel
Air velocity range	1 – 10 m/s
Operating range (ambient temperature)	0-50 °C
Ambient relative humidity (non-condensing)	< 95%
Communication interface	Modbus RTU, analogue, MP-Bus, LON, BACnet MSTP
Maintenance	Maintenance-free

Quick selection



Structure and materials



No.	Part	Material
1	Plenum	Galvanised steel
2	Measurement probe	Aluminium
3	Blade	Aluminium
4	Perforated sheet	Perforated sheet
5	Insulation	Glasswool

Actuators

A range of actuators are available for various application needs.

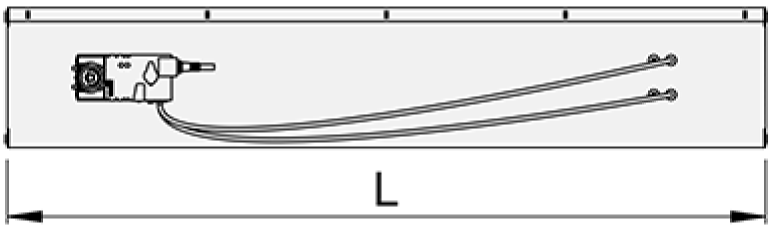
All actuators include an integrated dynamic differential pressure sensor with a low bypass airflow rate through the sensor element. Therefore not to be used in highly contaminated environments. Airflow rate limits are set at the factory.

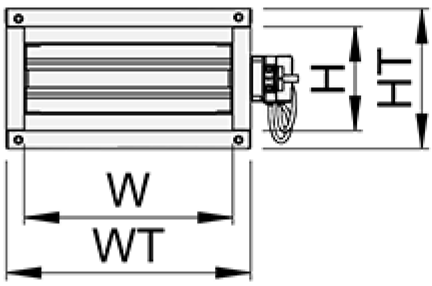
Actuator	Notes	Torque Nm	Damper size	Communication interface	Order code
Halton EM	Analogue actuator Manufacturer: Belimo	5	(200-300)x150	DC0..10V/ 2..10V	EM = LMV-D3-MF-F.1 HI (DC 0/2...10 V), 5 Nm
Halton EK	Analogue actuator Manufacturer: Belimo	10	(300-800)x250	DC0..10V/ 2..10V	EK = NMV-D3-MF-F.1 HI (DC 0/2...10 V), 10 Nm
Halton EC	Actuator with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	5	(200-300)x150	Belimo MP bus or 0..10V/2..10V	EC = LMV-D3-MP (MP bus), 5 Nm
Halton EE	Actuator with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	10	(300-800)x250	Belimo MP bus or 0..10V/2..10V	EE = NMV-D3-MP (MP bus), 10 Nm
Halton EH	Analogue actuator Manufacturer: Siemens	5	(200-300)x150	DC0..10V/ 2..10V	EH = GDB181.1E/3 (DC 0/2...10 V), 5 Nm

Halton EG	Analogue actuator Manufacturer: Siemens	10	(300-800)x250	DC0..10V/ 2..10V	EG = GLB181.1E/3 (DC 0/2...10V), 10 Nm
Halton EV	Actuator with KNX Manufacturer: Siemens	5	(200-300)x150	KNX communication	EV = GDB181.1E/KN (KNX bus), 5 Nm
Halton EW	Actuator with KNX Manufacturer: Siemens	10	(300-800)x250	KNX communication	EW = GLB181.1E/KN (KNX bus), 10 Nm
Halton EB	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	5	(200-300)x150	Modbus communication	EB = GDB181.1E/ MO (Modbus RTU), 5 Nm
Halton EF	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	10	(300-800)x250	Modbus communication	EF = GLB181.1E/ MO (Modbus RTU), 10 Nm
Halton LK	Actuator with LonWorks Manufacturer: Belimo	5	(200-300)x150	LonWorks communication	LK = LMV-D3-LON (LonWorks), 5 Nm
Halton LM	Actuator with LonWorks Manufacturer: Belimo	10	(300-800)x250	LonWorks communication	LM = NMV-D3-LON (LonWorks), 10 Nm
Halton HM	Controller include actuator with LonWorks Manufacturer: Distech	5	(200-300)x150	LonWorks communication	HM = ECL-VAV-S, HAV (LonWorks), 5Nm

Halton HK	Modulating actuator from Belimo: Controller LonWorks Manufacturer: Distech	10	(300-800)x250	LonWorks communication	HK = ECL-VAV-N, HAV + NM24A-SR (LonWorks), 10 Nm

Dimensions and weight





Size	W	H	WT	HT	L	Weight (kg)
200×150	200	150	255	205	1100	15.0
300×150	300	150	355	205	1100	21.0
300×250	300	250	355	305	1200	38.0
400×250	400	250	455	305	1200	40.0
600×250	600	250	655	305	1500	46.0
800×250	800	250	855	305	1500	57.0

Specification

The Halton Max Slim Box airflow management unit can be applied in both supply and exhaust Variable Air Volume applications. Its compact, low profile design permits installation into challenging spaces where access is limited or where room and false ceiling heights are restricted.

The dynamic pressure measurement system allows an accurate measurement of the airflow without upstream safety distances.

The Halton Max Slim Box comprises:
• an airflow control damper blade
• an aluminium airflow differential pressure measurement probe installed centrally inside the plenum
• an integrated silencer

The pressure differential probe measures the average pressure across the whole surface, and from that accurately determines the actual volume of air passing through the unit. The position of the damper blade is then constantly calculated and adjusted by the actuator mounted on the spindle of the damper blade, in response to the measurements from the dynamic pressure sensor and electronic controller.

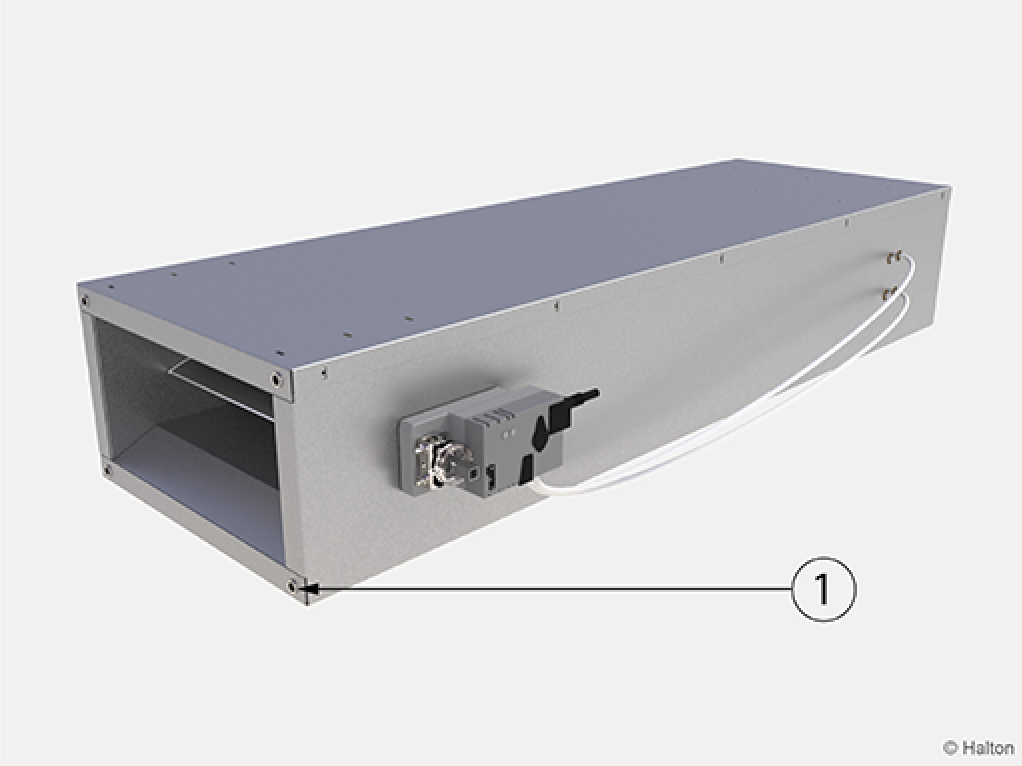
The selection of the VAV box is done according to the range of airflow it is designed to control based on performance data compiled from results of performance tests carried out in our Innovation Hubs and Laboratories. Each plenum is calibrated and the controls are pre-set at our factory to the minimum and maximum airflow conditions specified by the client. Factory pre-set parameters and project reference identification information are clearly marked on each unit. The acoustic properties of the Halton Max Slim Box are improved by the inclusion of a symmetrical attenuator containing Euroclass A2 s1 d0 high density mineral wool.

Minimum and maximum airflow values stated are indicative only and can differ by control type or brand, so please check with Halton prior to ordering.

Installation

The Dynamic Measuring System within the Halton Max Slim Box allows it to be installed directly after a T, elbow or reduction or even on to a main riser duct without affecting the accuracy of the air volume measurement.

Therefore, there is no requirement for safety distances.

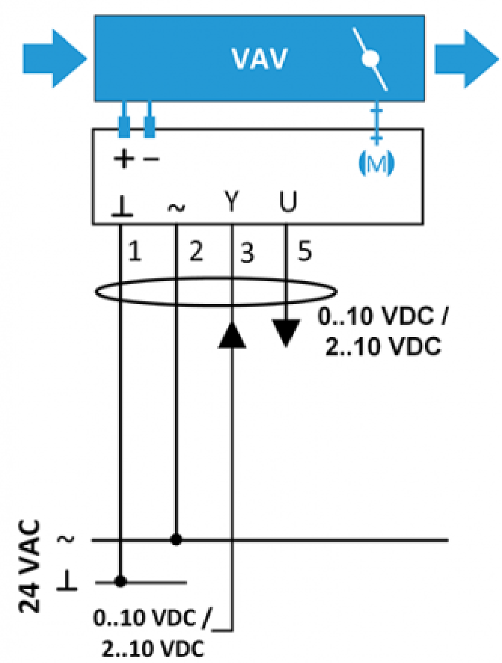


Key
1. Rivet nut M8

The Halton Max Slim Box is connected to the ductwork thank to the rivet nut M8 (1).

Wiring

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

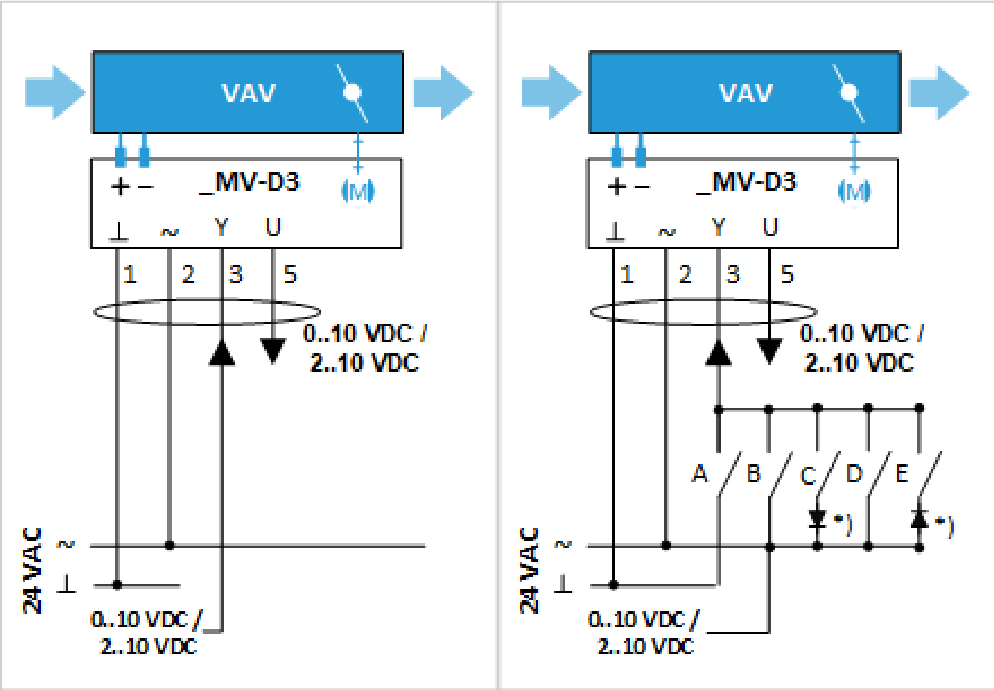


Key
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (Y) 2...10- or 0...10-VDC airflow setpoint signal input
5 (U) 2...10- or 0...10-VDC airflow feedback signal output

The wiring instructions are presented following applications

Example	Actuator	Application
1A	CU=EM / EK / EC / EE	Typical variable airflow control application
1B	CU=EM / EK / EC / EE	Overriding controls
1C	CU=EM / EK / EC / EE	Example; variable airflow control with a room controller
1D	CU=EM / EK / EC / EE	Example; variable airflow control with a building management system
1E	CU=EM / EK / EC / EE	Example: parallel airflow control with a building management system
3A	CU=EG	Typical variable airflow controll
3B	CU=EG	Position and constant airflow control

1A and 1B
CU = EM/EC (LMV-D3-MP/MF HI) or EK/EE (NMV-D3-MP/MF HI)
– typical application and overriding controls



1A Typical variable airflow control application ***1B*** *Overrides All options*

Key
VAV Halton Max Slim Box (MSB)
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (Y) 2...10- or 0...10-VDC airflow setpoint signal input
5 (U) 2...10- or 0...10-VDC airflow feedback signal output
*) Diode 1N 4007

Operating mode

2...10 VAC	0...10 VAC	A	B	C	D	E
Closed	qv_min	ON				
qv_min	qv_min	Off	Off	Off	Off	Off
Variable qv_min...qv_max	Variable qv_min...qv_max	Off	ON	Off	Off	Off
CLOSED	CLOSED	Off	Off	ON	Off	Off
qv_max	qv_max	Off	Off	Off	ON	Off
OPEN	OPEN	Off	Off	Off	Off	ON

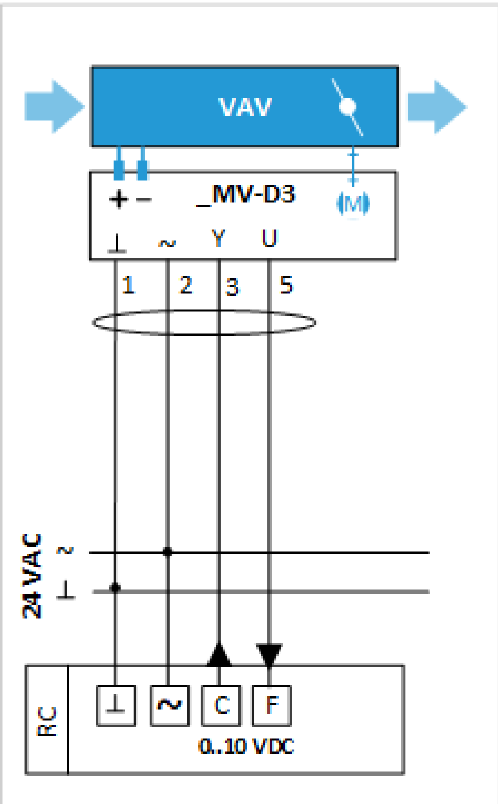
Shut-off with control signal w:
In addition to relay override command situations, the damper will be fully closed if:

- **0...10 VDC:** the MSB minimum airflow is set to 0% (0 l/s or 0 m3/h) and control signal w falls below 0.45 VDC
- **2...10 VDC** : the MSB control signal w falls below 0.5 VDC
- **Both 0...10 VDC and 2...10 VDC:** the airflow setpoint voltage falls below a value

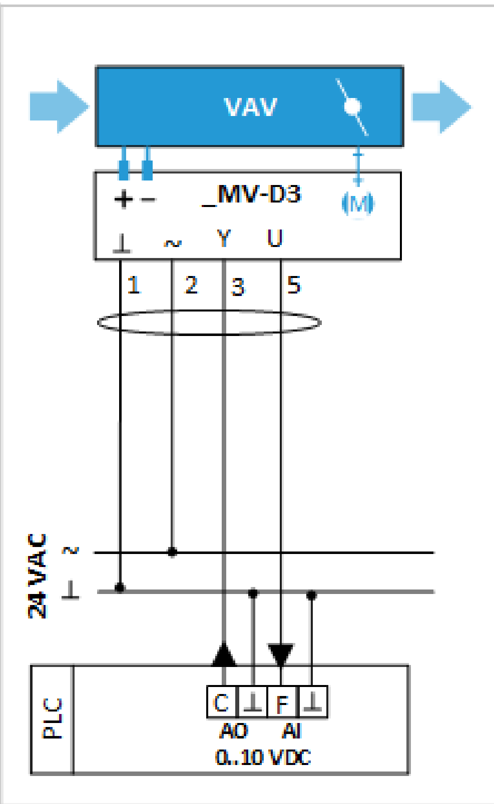
corresponding to an air velocity of less than 0.5 m/s

Mode	Voltage of w, VDC	Function
0...10 VDC	0.0...0.45	Minimum airflow (closed if qv_min = 0%)
	0.5...10.0	Modulating, qv_min ... qv_max
	10.0	Maximum airflow
2...10 VDC	0.0...0.5	Damper closed
	0.5...2.0	Minimum airflow
	2.0...10.0	Modulating, qv_min...qv_max
	10.0	Maximum airflow

1C and 1D
CU = EM/EC (LMV-D3-MP/MF HI) or EK/EE (NMV-D3-MP/MF HI)
– variable airflow control with a room controller or a building management system



1C Room controller application

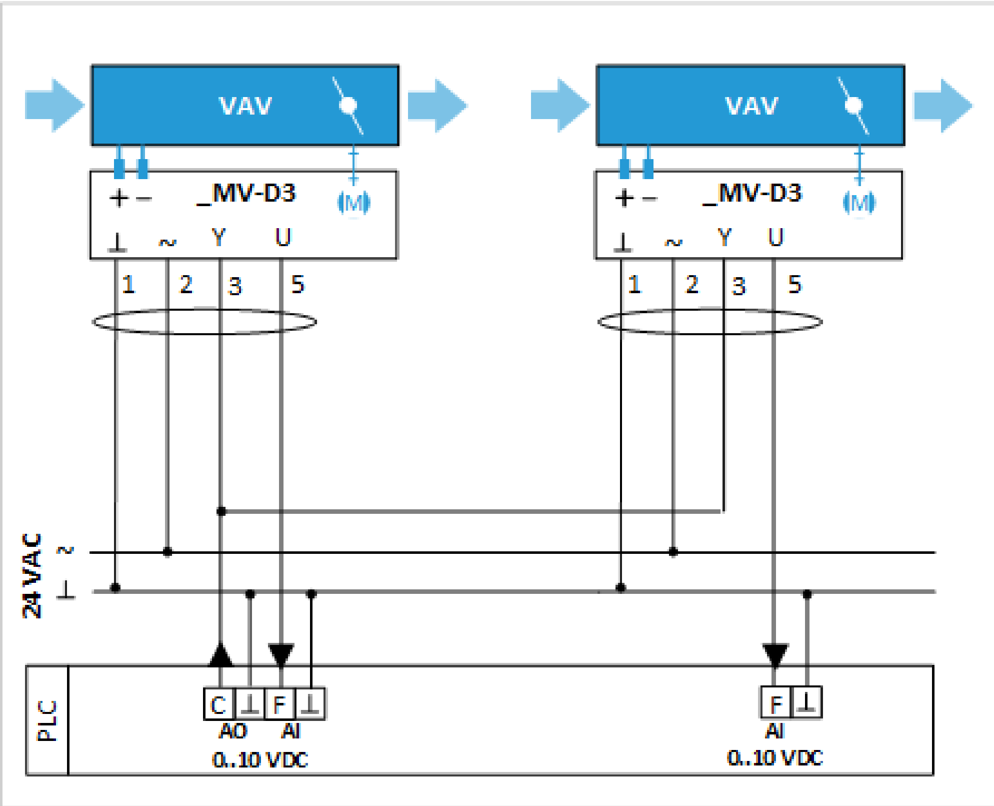


1D Building management system application

Key
VAV Halton Max Slim Box (MSB)
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (Y) 0...10-VDC airflow setpoint signal input
5 (U) 0...10-VDC airflow feedback signal output

RC Room controller
PLC Building management system
C (AO) Airflow setpoint control signal
F (AI) Actual airflow feedback input

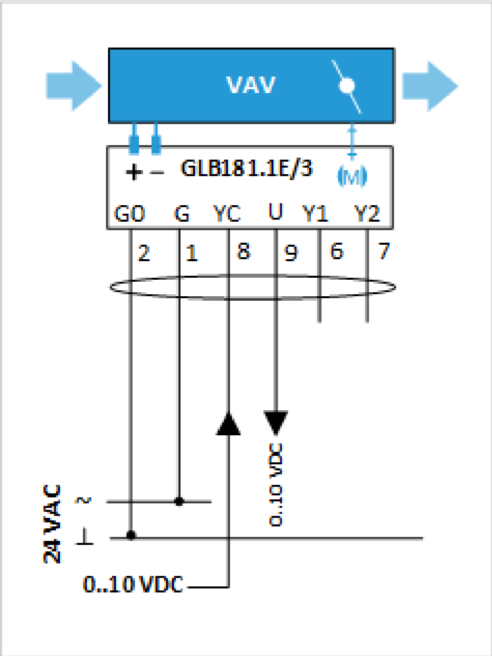
1E
CU = EM/EC (LMV-D3-MP/MF HI) or EK/EE (NMV-D3-MP/MF HI)
– parallel airflow control with a building management system

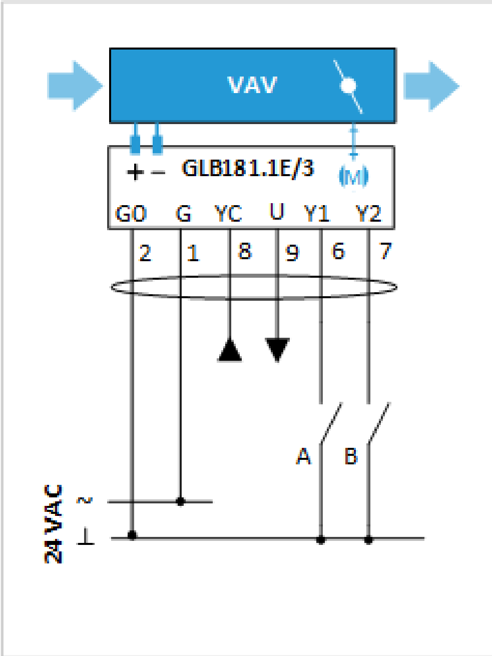


1E Parallel airflow control with building management system

Key
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (Y) 0...10-VDC airflow setpoint signal input
5 (U) 0...10-VDC airflow feedback signal output
PLC Building management system
C (AO) Airflow setpoint control signal
F (AI) Actual airflow feedback input

3A and 3B
CU=EG (GLB181.1E/3)
– typical variable airflow control and position and constant airflow control





3A Typical airflow control application   *3B Position and constant airflow control*

Key

VAV	Halton Max Slim Box (MSB)
2	(G0) 24 VAC system neutral
1	(G) 24 VAC live
8	(YC) 2...10- or 0...10-VDC airflow setpoint signal input
9	(U) 2...10- or 0...10-VDC airflow feedback signal output
6	(Y1) Override input
7	(Y2) Override input

Constant flow	A	B
CLOSED	Off	ON
Min. flow	Off	Off
Max. flow	ON	ON
OPEN	ON	Off

Commissioning

The actual airflow rate can be calculated as a function of differential pressure at the measurement probe and the measurement probe k factor. The proper k factor can be found in the documentation supplied with the product and in the table below (supply and exhaust).

Size	k factor (airflow in m^3/h)	k factor (airflow in l/s)
200 x 150	67	18.5
300 x 150	100	28.0
300 x 250	225	62.5
400 x 250	300	83.5
600 x 250	450	125.0
800 x 250	600	166.5

$$q_v = k * \sqrt{\Delta p_m}$$

q_v Actual airflow rate [l/s]
k k factor value
Δp_m Differential pressure of measurement probe [Pa]

Order code

MSB-W-H, CU-SE-TF-ZT

M = Model
S Supply
E Exhaust

W = Width of duct connection (mm)
200, 300, 400, 600, 800

H = Height of duct connection (mm)
150, 250

Other options and accessories

CU = Control Unit
EM LMV-D3-MF-F.1 HI (analogue), 5 Nm
EK NMV-D3-MF-F.1 HI (analogue), 10 Nm
EC LMV-D3-MP-F. HI (MP bus), 5 Nm
EE NMV-D3-MP-F. HI (MP bus) 10 Nm
EH GDB181.1E/3 (DC 0/2...10 V), 5 Nm
EG GLB181.1E/3 (DC 0/2...10V), 10 Nm
EV GDB181.1E/KN (KNX bus), 5 Nm

EW GLB181.1E/KN (KNX bus), 10 Nm
EB GDB181.1E/MO (Modbus RTU), 5 Nm
EF GLB181.1E/MO (Modbus RTU), 10 Nm
LK LMV-D3-LON (LonWorks), 5 Nm
LM NMV-D3-LON (LonWorks), 10 Nm
HM ECL-VAV-S, HAV (LonWorks), 5Nm
HK ECL-VAV-N + NM24A-SR, HAV (LonWorks),10Nm

SE = Sensors
NA Not assigned
DS1 Duct sensor, TCO_2, Duct CO_2
P1 Differential pressure transmitter, HDP-PE

TF = Transfomer
NA Not assigned
TF1 230/24 transformer (35VA)

ZT = Tailored product
N No
Y Yes (ETO)

Code example

MSB/S-200-150,CU=EM, SE=NA, TF=TF1, ZT=N