

Halton Max MSB, slim airflow management damper (VAV) - Technical description

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1 Introduction

1.1 About this document

The purpose of this document is to give technical information and design examples for salespersons, technical support and designers.

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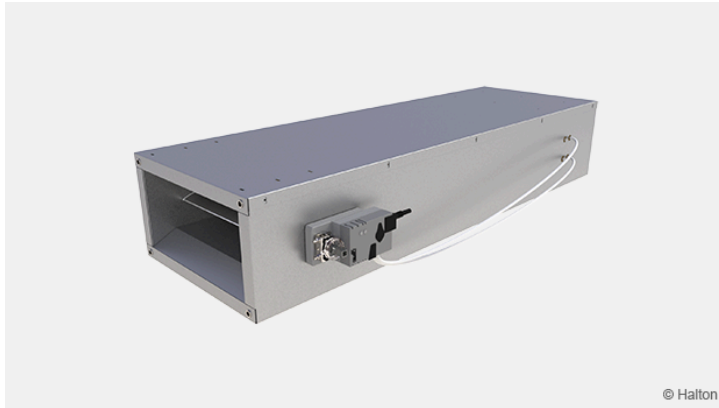
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1.3 Summary of changes

Release	Date	Description
1.0	23.10.2026	First published version from Heretto (Content moved from WordPress)

2 Product description

2.1 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)

2.2 Operating principle

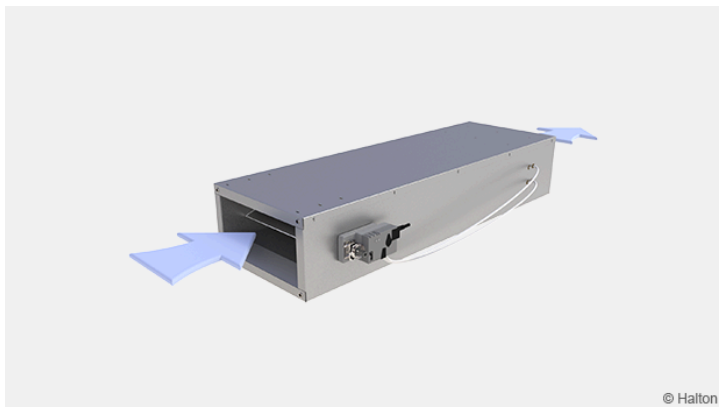


Fig. 1. Halton Max MSB, supply

The Halton Max MSB 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.

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. An analogue signal to alter the setpoint value can also be sent to the controller and the flow rate will then be adjusted to the new setpoint. Volume flow rates are regulated between the pre-set min. and max. values in the controller.

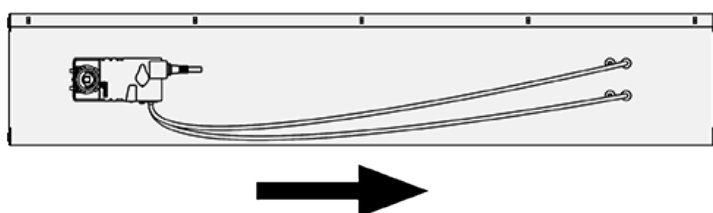


Fig. 2. Halton Max MSB, supply

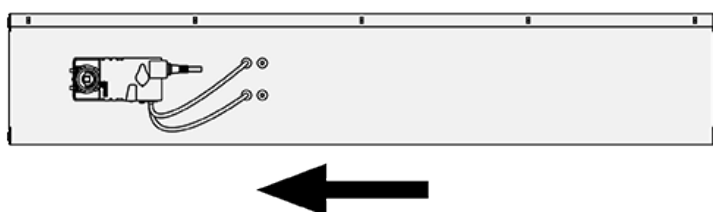


Fig. 3. Halton Max MSB, exhaust

The Halton Max MSB is used for the following applications:

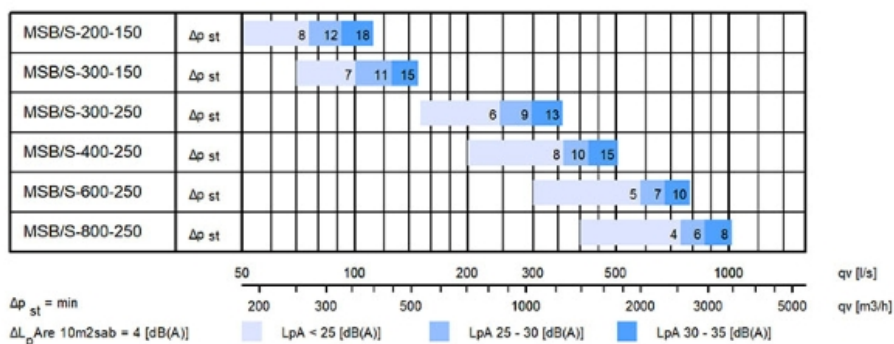
- **Constant airflow**
To get a stable airflow without influenced by the pressure variation ductwork
- **Variable airflow**
The airflow is managed according the CO₂ or occupancy in the room
- **Duct pressure**
To get a stable pressure in the ductwork for specific terminal like diffuser, chilled beam that can be required a constant pressure.

2.3 Key technical data

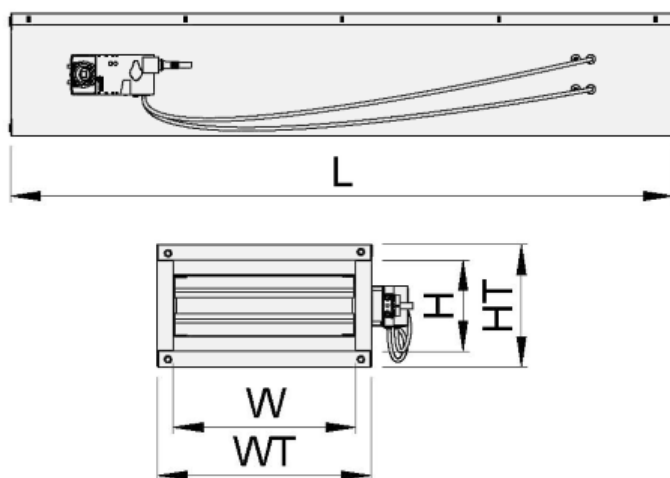
Description	Value
Duct connection sizes	W = 200, 300, 400, 600, 800 mm H = 150, 250 mm
Material	Galvanised steel
Air velocity range	1 – 10 m/s
Operating range (ambient temperature)	0-50 °C

Description	Value
Ambient relative humidity (non-condensing)	< 95%
Communication interface	Modbus RTU, analogue, MP-Bus, LON, BACnet MSTP
Maintenance	Maintenance-free

2.4 Quick selection

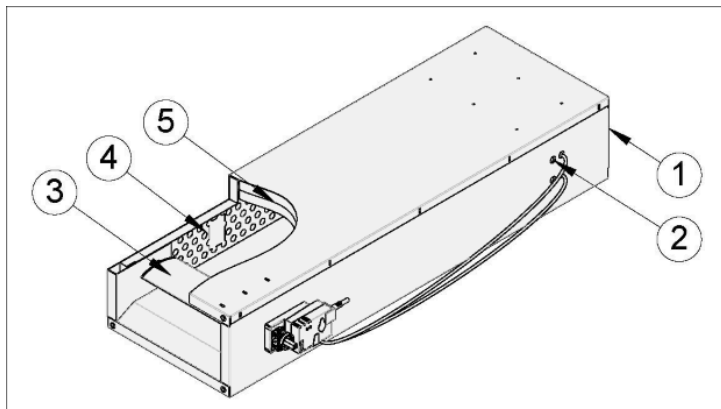


2.5 Dimensions and weight



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

2.6 Structure and Materials



No.	Part	Material	Note
1	Plenum	Galvanised steel	-
2	Measurement probe	Aluminium	-
3	Blade	Aluminium	-
4	Perforated sheet	Galvanised steel sheet	-
5	Insulation	Glasswool	With fire resistance class A2 s1 d0

2.7 Control units

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
EM	Analogue actuator Manufacturer: Belimo	5	(200-300) x 150	DC0..10V/ 2..10V	EM = LMV-D3-MF-F.1 HI (DC 0/2...10 V), 5 Nm
EK	Analogue actuator Manufacturer: Belimo	10	(300-800) x 250	DC0..10V/ 2..10V	EK = NMV-D3-MF-F.1 HI (DC 0/2...10 V), 10 Nm

Actuator	Notes	Torque [Nm]	Damper size	Communication interface	Order code
EC	Actuator with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	5	(200-300) x 150	Belimo MP bus or 0..10V/ 2..10V	<u><i>EC = LMV-D3-MP (MP bus), 5 Nm</i></u>
EE	Actuator with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	10	(300-800) x 250	Belimo MP bus or 0..10V/ 2..10V	<u><i>EE = NMV-D3-MP (MP bus), 10 Nm</i></u>
EH	Analogue actuator Manufacturer: Siemens	5	(200-300) x 150	DC0..10V/ 2..10V	<u><i>EH = GDB181.1E/3 (DC 0/2...10V), 5 Nm</i></u>
EG	Analogue actuator Manufacturer: Siemens	10	(300-800) x 250	DC0..10V/ 2..10V	<u><i>EG = GLB181.1E/3 (DC 0/2...10V), 10 Nm</i></u>
EV	Actuator with KNX Manufacturer: Siemens	5	(200-300) x 150	KNX communication	<u><i>EV = GDB181.1E/KN (KNX bus), 5 Nm</i></u>

Actuator	Notes	Torque [Nm]	Damper size	Communication interface	Order code
EW	Actuator with KNX Manufacturer: Siemens	10	(300-800) x 250	KNX communication	<u><i>EW = GLB181.1E/KNX bus), 10 Nm</i></u>
EB	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	5	(200-300) x 150	Modbus communication	<u><i>EB = GDB181.1E/MO (Modbus RTU), 5 Nm</i></u>
EF	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	10	(300-800) x 250	Modbus communication	<u><i>EF = GLB181.1E/MO (Modbus RTU), 10 Nm</i></u>
HM	Controller include actuator with LonWorks Manufacturer: Distech	5	(200-300) x 150	LonWorks communication	HM = ECL-VAV-S, HAV (LonWorks), 5Nm
HK	Modulating actuator from Belimo: Controller LonWorks Manufacturer: Distech	10	(300-800) x 250	LonWorks communication	HK = ECL-VAV-N, HAV + NM24A-SR (LonWorks), 10 Nm

2.8 Specification

Function

The Halton Max MSB airflow management unit is designed for supply and exhaust Variable Air Volume (VAV) applications. Its dynamic differential pressure measurement system enables accurate airflow measurement without the need for upstream straight duct lengths.

The differential pressure measurement probe measures the average pressure across the airflow and determines the unit's actual airflow. The controller compares the measured airflow with the required setpoint and continuously adjusts the damper blade position via the actuator.

The controller regulates airflow between the minimum and maximum values preset in the controller. Each unit is factory calibrated and preset according to the specified minimum and maximum airflow conditions.

Minimum and maximum airflow values are indicative and may vary depending on the control type or brand. Check with Halton before ordering.

Materials

- The plenum is made of galvanised steel.
- The measurement probe is made of aluminium.
- The damper blade is made of aluminium.
- The integrated silencer contains high-density mineral wool with a Euroclass A2-s1, d0 fire classification.

Structure

The Halton Max MSB has a compact, low-profile construction suitable for installations where available space, access, or false ceiling height is restricted.

The unit comprises:

- Airflow control damper blade
- Differential pressure measurement probe installed centrally inside the plenum
- Actuator and electronic controller
- Integrated silencer

The integrated sound attenuation is provided by a symmetrical attenuator containing high-density insulation.

2.9 Order code

MSB-M-W-H; CU-SE-TF-ZT

Main options	
M = Model	
S	Supply
E	Exhaust
W = Width, diameter of duct connection [mm]	200, 300, 400, 600, 800
H = Height, diameter of duct connection [mm]	150, 250

Other options and accessories	
CU = Control unit	
EM	LMV-D3-MF-F.1 HI (DC 0/2...10 V), 5 Nm
EK	NMV-D3-MF-F.1 HI (DC 0/2...10 V), 10 Nm
EC	LMV-D3-MP (MP bus), 5 Nm
EE	NMV-D3-MP (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

Other options and accessories	
EB	GDB181.1E/MO (Modbus RTU), 5 Nm
EF	GLB181.1E/MO (Modbus RTU), 10 Nm
ER	LMV-D3-KNX (KNX bus), 5 Nm
ES	NMV-D3-KNX (KNX bus), 10 Nm
ET	LMV-D3-MOD (Modbus RTU), 5 Nm
EU	NMV-D3-MOD (Modbus RTU), 10 Nm
HM	ECL-VAV-S, HAV (LonWorks), 5 Nm
HK	ECL-VAV-N + NM24A-SR, HAV (LonWorks), 10 Nm
SE = Sensors	
NA	Not assigned
DS1	Duct sensor (TCO ₂ , Duct CO ₂)
P1	Differential pressure transmitter (HDP-PE)
TF = Transformer	
NA	Not assigned
TF1	230/24 transformer (35VA)
ZT = Tailored product	
N	No
Y	Yes (ETO)

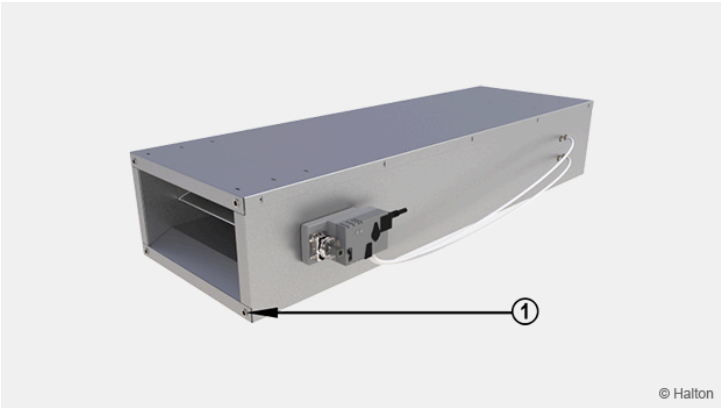
Order code example
MSB-S-200-150; CU=EM, SE=NA, TF=TF1, ZT=N

3 Design information

3.1 Installation

The Dynamic Measuring System within the Halton Max MSB 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.

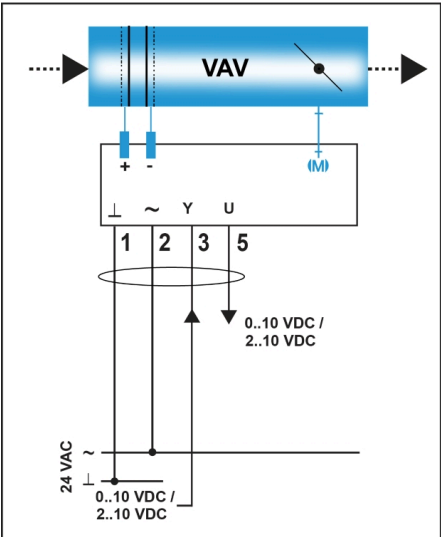


No.	Description
1	Rivet nut M8

The Halton Max MSB 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.



Code	Description
1	(G0) 24 VAC system neutral
2	(~) 24 VAC live

Code	Description
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 shall be carried out in accordance with local regulations and by professional technicians. For the power supply of all control options, a safety-isolating transformer shall be used.

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

Control units

1A & 1B

Example: MSB; CU = EM / EC (LMV-D3-MP/MF HI) or EK / EE (NMV-D3-MP/MF HI) – typical application and overriding controls

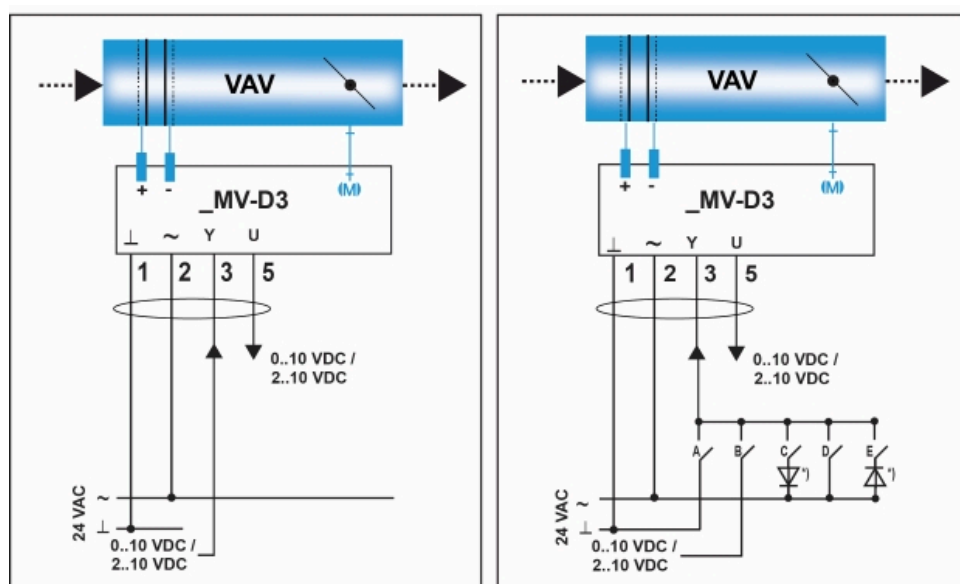


Fig. 4. 1A Typical variable airflow control application 1B Overrides All options

Code	Description
VAV	Halton Max MSB

Code	Description
1 (G0)	24 VAC system neutral
2(~)	24 VAC live
3 (Y)	2...10- or 0...10-VDC airflow setpoint signal input
5 (U5)	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	
NA	NA	ON	-	-	-	-	-
qv_min	qv_min	Off	Off	Off	Off	Off	Constant flow
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	Constant flow
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 Halton Max 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 Halton Max 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 & 1D

Example:MSB; 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

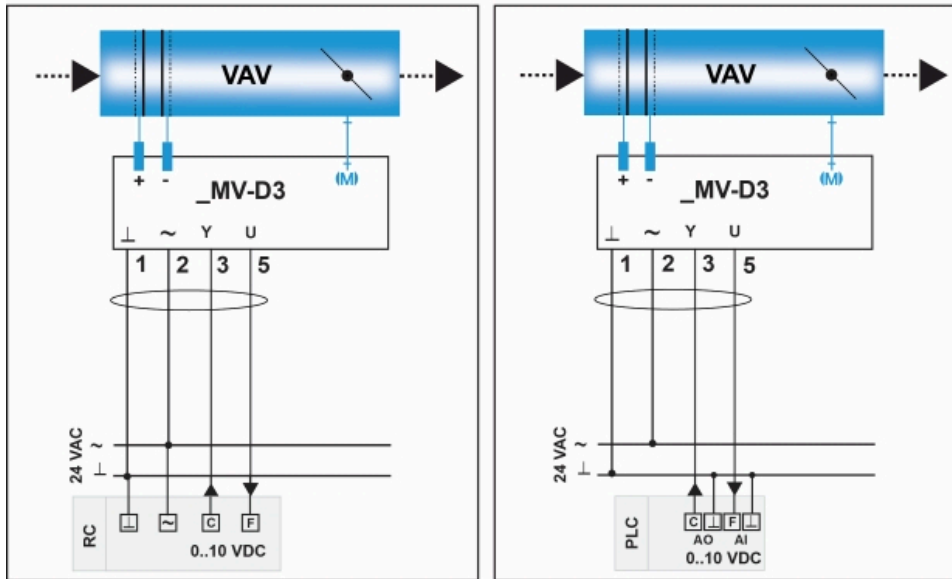


Fig. 5. 1C Room controller application 1D Building management system application application

Code	Description
VAV	Halton Max MSB
1 (G0)	24 VAC system neutral
2(~)	24 VAC live
3 (w)	0...10-VDC airflow setpoint signal input
5 (U5)	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

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

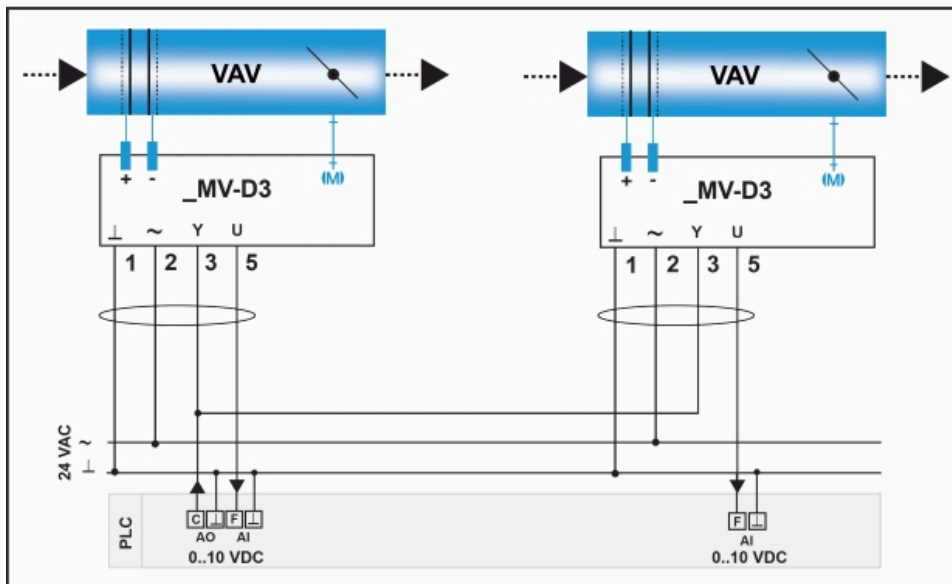


Fig. 6. 1E Parallel airflow control with building management system

Code	Description
VAV	Halton Max MSB
1 (G0)	24 VAC system neutral
2 (~)	24 VAC live
3 (w)	0...10-VDC airflow setpoint signal input
5 (U5)	0...10-VDC airflow feedback signal output
PLC	Building management system
C (AO)	Airflow setpoint control signal
F (AI)	Actual airflow feedback input

3A & 3B

Example:MSB; CU=EG (GLB181.1E/3) – typical variable airflow control and position & constant airflow control

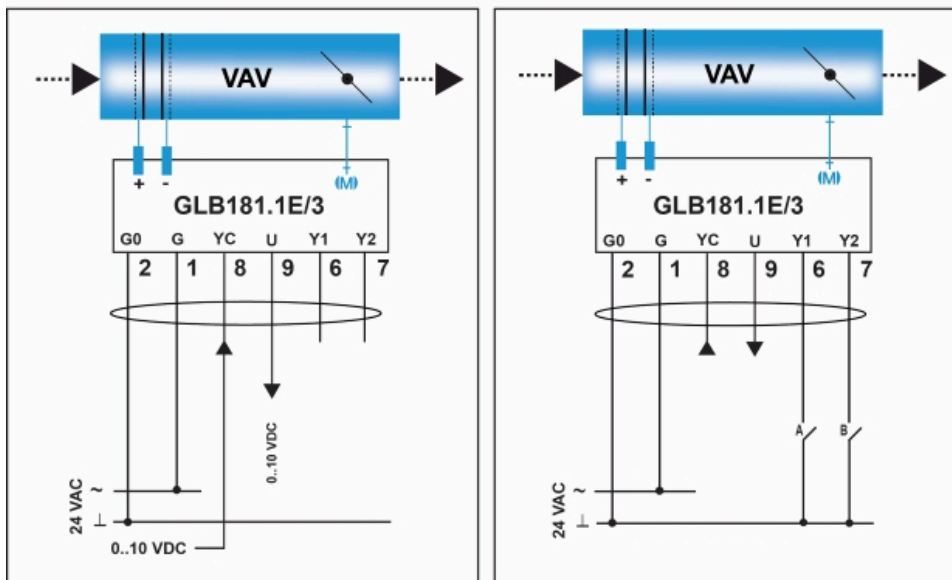


Fig. 7. 3A Typical airflow control application 3B Position & constant airflow control

Code	Description
VAV	Halton Max 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

3.2 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

Size	k factor (airflow in m ³ /h)	k factor (airflow in l/s)
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]