

Halton UKV, VAV airflow management damper - 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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1.3 Summary of changes

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

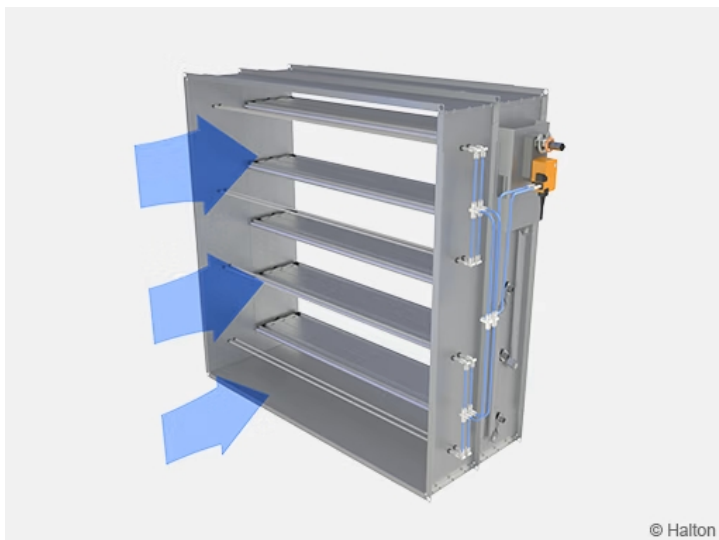
2 Product description

2.1 Overview



- Control damper for different airflow and duct pressure control applications
- Model with shut-off operation; tightness fulfils EN 1751, class 1 requirements
- Casing tightness fulfils EN 1751, class B requirements
- Two extra models with external insulation 15 mm and 30 mm
- Several airflow controller options
- Factory-set airflow range limits (min./max. airflow rates) as an option
- Pressure-independent operation
- Galvanised steel design
- Suitable for large air flow rates, from 1 m/s up-to 11 m/s on some models

2.2 Operating principle

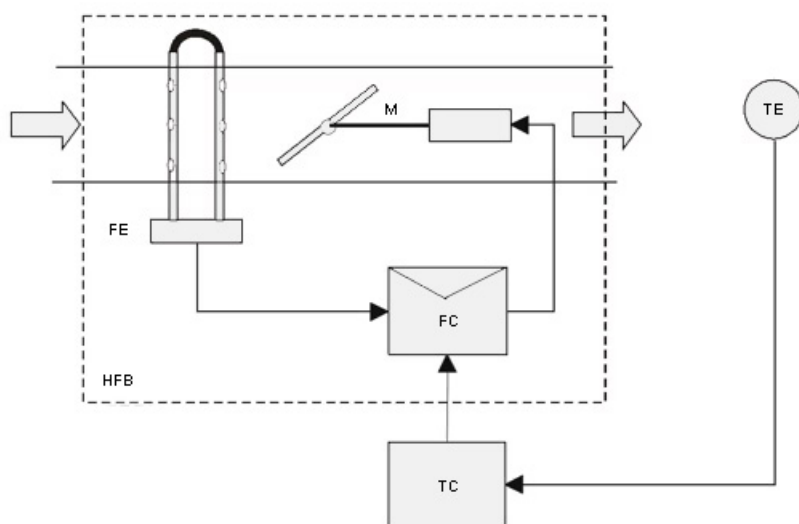


The Halton UKV is a variable air volume control damper for ventilation systems. The damper can operate electrically, with factory-preset maximum and minimum set values for volume flow rate. The damper can also be used as a constant air volume control damper. The damper maintains airflow in a duct branch at the set value, independent of upstream duct pressure variations. The set value is achieved by a room-temperature controller with an output (0...10VDC or 2...10VDC) that resets the airflow rate to the required value.

Changes in upstream pressure will affect the measurement system; it will detect a difference between the set point and the measured value. The volume controller sends a signal to the actuator to restore the set value.

The dampers can be connected to a building management system, allowing remote control. In that case, the system can also monitor volume flow rates in different spaces of the building.

The Halton UKV meets the requirements of EN 1751 tightness class 1



2.3 Product models

The Halton UKV airflow control damper is available in several versions.

Model	Description
UKV, MD=N	No external frame insulation
UKV, MD=I1	No external frame insulation
UKV, MD=I2	No external frame insulation

Control units (CU)

The Halton UKV airflow control damper can be equipped with several different control units for either airflow or duct pressure control.

Airflow controller options:

Controller	Notes	Torque	Damper size [mm]	Communication interface	Order code (link to datasheet)
EM	Analogue controller Manufacturer: Belimo	5	100-250	DC0..10V/2..10V	EM = LMV-D3-MF-F.1 HI (DC 0/2...10 V), 5 Nm

Controller	Notes	Torque	Damper size [mm]	Communication interface	Order code (link to datasheet)
EK	Analogue controller Manufacturer: Belimo	10	100-250	DC0..10V/2..10V	EK = NMV-D3-MF-F.1 HI (DC 0/2...10 V), 10 Nm
EC	Controller with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	5	100-250	Belimo MP bus or 0..10V/2..10V	<u>EC = LMV-D3-MP (MP bus), 5 Nm</u>
EE	Controller with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	10	100-630	Belimo MP bus or 0..10V/2..10V	<u>EE = NMV-D3-MP (MP bus), 10 Nm</u>
ER	Controller with KNX Manufacturer: Belimo	5	100-250	KNX	<u>ER = LMV-D3-KNX (KNX bus), 5 Nm</u>
ES	Controller with KNX Manufacturer: Belimo	10	100-630	KNX	<u>ES = NMV-D3-KNX (KNX bus), 10 Nm</u>
ET	Controller with Modbus Manufacturer: Belimo	5	100-250	Modbus	<u>ET = LMV-D3-MOD (Modbus RTU), 5 Nm</u>
EU	Controller with Modbus Manufacturer: Belimo	10	100-630	Modbus	<u>EU = NMV-D3-MOD (Modbus RTU), 10 Nm</u>

Controller	Notes	Torque	Damper size [mm]	Communication interface	Order code (link to datasheet)
EH	Analogue controller Manufacturer: Siemens	5	100-250	DC0..10V/ 2..10V	<u>EH = GDB181.1E/3 (DC 0/2...10V), 5 Nm</u>
EG	Analogue controller Manufacturer: Siemens	10	100-630	DC0..10V/2..10V	<u>EG = GLB181.1E/3 (DC 0/2...10V), 10 Nm</u>
EV	Controller with KNX Manufacturer: Siemens	5	100-250	KNX	<u>EV = GDB181.1E/KN (KNX bus), 5 Nm</u>
EW	Actuator with KNX Manufacturer: Siemens	10	100-630	KNX	<u>EW = GLB181.1E/KN (KNX bus), 10 Nm</u>
EB	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	5	100-250	Modbus	<u>EB = GDB181.1E/MO (Modbus RTU), 5 Nm</u>
EF	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	10	100-630	Modbus	<u>EF = GLB181.1E/MO (Modbus RTU), 10 Nm</u>
V1	Analogue controller Manufacturer: Belimo	5	100-250	DC0..10V/2..10V	<u>V1 = LM24A-VST, (DC 0/2...10 V), 5 Nm + VRU-D3-BAC</u>
V2	Analogue controller Manufacturer: Belimo	10	100-630	DC0..10V/2..10V	<u>V2 = NM24A-VST, (DC 0/2...10 V), 10 Nm + VRU-D3-BAC</u>
V3	Analogue controller Manufacturer: Belimo	4	100-250	DC0..10V/2..10V	<u>V3 = LMQ24A-VST, 2.5 sec (DC 0/2...10 V), 4 Nm + VRU-D3-BAC</u>

Controller	Notes	Torque	Damper size [mm]	Communication interface	Order code (link to datasheet)
V4	Analogue controller Manufacturer: Belimo	8	100-630	DC0..10V/2..10V	V4 = <u>NMQ24A-VST, 4 sec (DC 0/2...10 V), 8 Nm + VRU-D3-BAC</u>

Controllers EM, EK, EC and EE include a dynamic differential pressure sensor with a low bypass airflow rate through the sensor element. Therefore, do not use these controllers in highly contaminated environments. The EG unit's pressure sensor uses a membrane with no flow through the sensor element. Controllers EC and EE include Belimo's MP-bus connection.

The table below shows the adjustable airflow control range. For airflow controllers EM, EK, EC, EE and EG, the highest available minimum airflow rate equals the specified maximum airflow rate. The minimum and maximum airflow rates are calculated as a percentage of the damper's nominal airflow.

Minimum airflow rate of 1 m/s – with controller models of EM, EK, EC, EE

l/s	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	40	80	120	160	200	240	280	320
300	60	120	180	240	300	360	420	480
400	80	160	240	320	400	480	560	640
500	100	200	300	400	500	600	700	800
600	120	230	360	480	600	720	840	960
700	140	280	420	560	700	840	980	1120
800	160	320	480	640	800	960	1120	1280
900	180	360	540	720	900	1080	1260	1440
1000	200	400	600	800	1000	1200	1400	1600

m ³ /h	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	144	288	432	576	720	864	1008	1152
300	216	432	648	864	1080	1296	1512	1728
400	288	576	864	1152	1440	1728	2016	2304
500	360	720	1080	1440	1800	2160	2520	2880
600	432	864	1296	1728	2160	2592	3024	3456
700	504	1008	1512	2016	2520	3024	3528	4032
800	576	1152	1728	2304	2880	3456	4032	4608

m ³ /h	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
900	648	1296	1944	2592	3240	3888	4536	5184
1000	720	1440	2160	2880	3600	4320	5040	5760

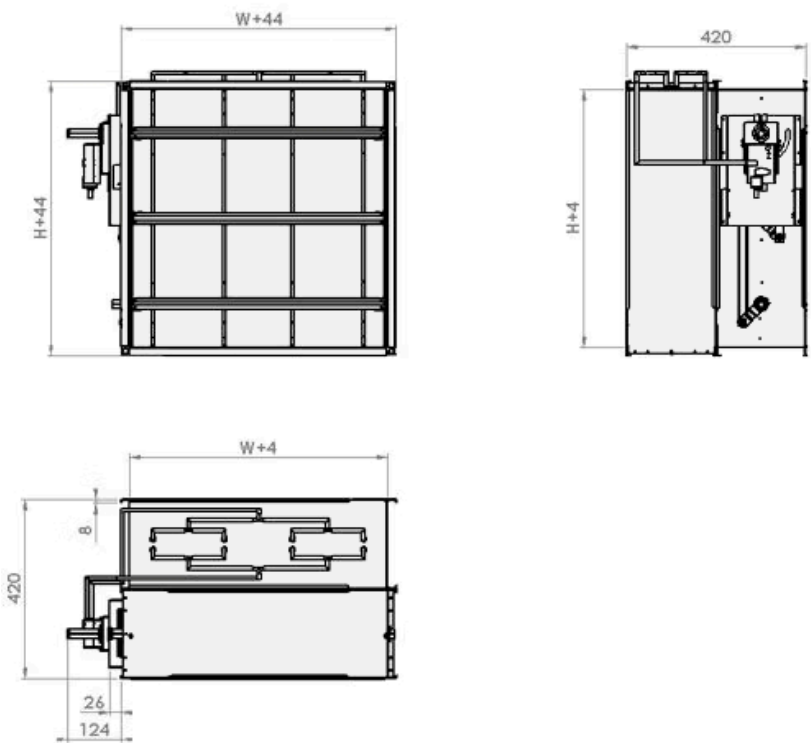
Minimum airflow rate of 2 m/s – with controller models of EG

l/s	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	80	160	240	320	400	480	560	640
300	120	240	360	480	600	720	840	960
400	160	320	480	640	800	960	1120	1280
500	200	400	600	800	1000	1200	1400	1600
600	240	480	720	960	1200	1440	1680	1920
700	280	560	840	1120	1400	1680	1960	2240
800	320	640	960	1280	1600	1920	2240	2560
900	360	720	1080	1440	1800	2160	2520	2880
1000	400	800	1200	1600	2000	2400	2800	3200

m ³ /h	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	288	576	864	1152	1440	1728	2016	2304
300	432	864	1296	1728	2160	2592	3024	3456
400	576	1152	1728	2304	2880	3456	4032	4608
500	720	1440	2160	2880	3600	4320	5040	5760
600	864	1728	2592	3456	4320/	5184	6048	6912
700	1008	2016	3024	4032	5040	6048	7056	8064
800	1152	2304	3456	4608	5760	6912	8064	9216
900	1296	2592	3888	5184	6480	7776	9072	10368
1000	1440	2880	4320	5760	7200	8640	10080	11520

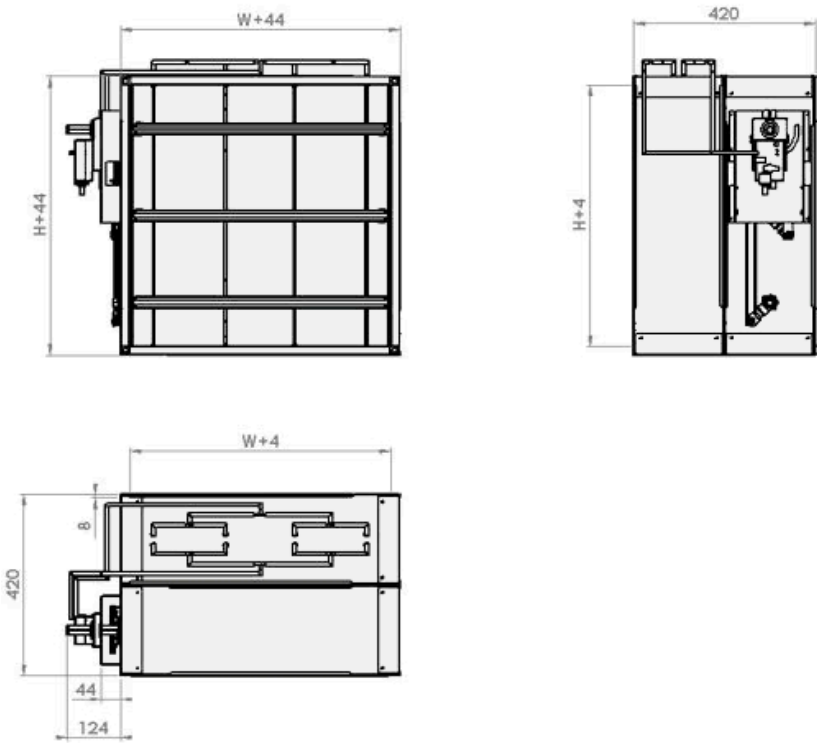
2.4 Dimensions

Halton UKV, dimensions without insulation



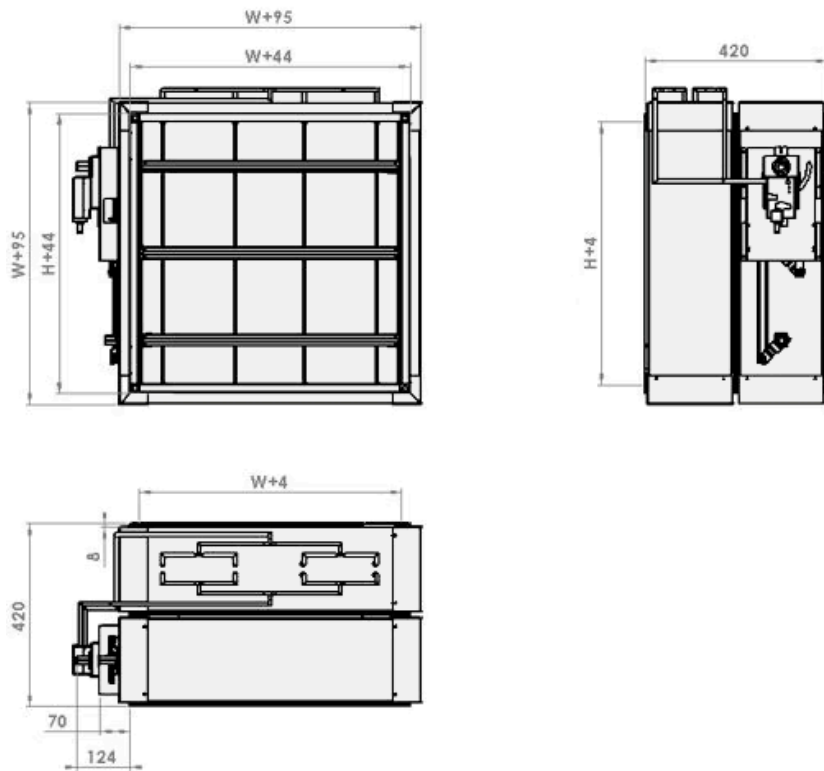
W = Width (Diameter of duct connection)	200, 250, 300 ... 1550, 1600, with increment of 50 mm
H = Height (Diameter of duct connection)	200, 250, 300 ... 950, 1000, with increment of 50 mm

Halton UKV, dimensions with 15 mm insulation



W = Width, Diameter of duct connection	200, 250, 300 ... 1550, 1600, with increment of 50 mm
H = Height, Diameter of duct connection	200, 250, 300 ... 950, 1000, with increment of 50 mm

Halton UKV, dimensions with 30 mm insulation



W = Width, Diameter of duct connection	200, 250, 300 ... 1550, 1600, with increment of 50 mm
H = Height, Diameter of duct connection	200, 250, 300 ... 950, 1000, with increment of 50 mm

2.5 Materials

No.	Part	Material	Note
1	Casing	Galvanised steel	-
2	Blades	Galvanised steel	Sandwich design
3	Damper blade insulation	Polyurethane	When width > 1 300 mm
4	Damper blade gaskets	Silicon	-
5	Slide bearings	Alloy of polyamide and molybdenum sulphide	-
6	Measurement probe	Aluminium	-
7	External insulation	Mineral wool	-
8	Rectangular drive shaft	Galvanised steel	15 x 15 mm

2.6 Specification

Function

- Design airflow range limits shall be calibrated at the factory.
- Controller settings shall be adjustable on site with a PC or a handheld tool.
- The airflow controller shall have control signal input 0...10 VDC or 2 ...10 VDC and output 0...10 VDC or 2...10VDC for airflow feedback.
- Supply power shall be 24 VAC.

Materials

- The pressure-independent variable airflow control damper shall be made of galvanised steel, with an airflow measurement probe of aluminium.

Structure

- The management damper section shall contain airflow measurement, flow controller and damper actuator.

Standards

- The tightness of the control damper in closed position shall conform to standard EN1751 class 1 and casing tightness to EN 1751/C..

2.7 Order code

UKV-W-H; MA-MD-MO-ZT

Main options	
W = Width, diameter of duct connection [mm]	200, 250,300, ... 1600, with increment of 50 mm
H = Height, diameter of duct connection [mm]	200, 250, 300, ... 1000, with increment of 50 mm

Other options and accessories	
MA = Material	
CS	Galvanized steel
MD = Model	
N	No insulation
I1	Insulated 15 mm
I2	Insulated 30 mm
MO = Controller	
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

Other options and accessories	
EE	NMV-D3-MP (MP bus), 10 Nm
EG	GLB181.1E/3 (DC 0/2...10V), 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
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
V1	LM24A-VST, (DC 0/2...10 V), 5 Nm+VRU-D3-BAC
V2	NM24A-VST, (DC 0/2...10 V), 10Nm+VRU-D3-BAC
V3	LMQ24A-VST, 2.5 sec (DC 0/2...10 V), 4 Nm+VRU-D3-BAC
V4	NMQ24A-VST, 4 sec (DC 0/2...10 V), 8 Nm+VRU-D3-BAC
ZT = Tailored product	
N	No
Y	Yes (ETO)

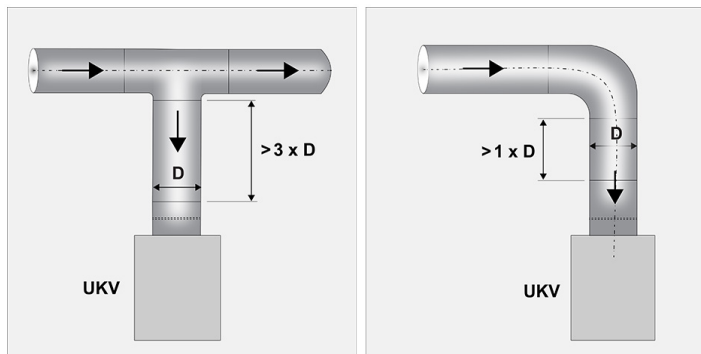
Order code example
UKV-400-200; MA=CS, MD=I1, MO=EE, ZT=N

3 Design information

3.1 Installation

Safety distances

The airflow control damper is installed taking into account the required safety distances. Install the unit into ductwork in such a way that the air flow direction through the unit is as indicated with the arrow in the unit casing.



For the pressure control damper the minimum safety distance for the static measurement tab after the control damper is $5 \times D$. Please refer to job drawings.

Wiring

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.

1A	UKV; 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	UKV; CU=EG	Typical variable airflow control
3B		Position & constant airflow control

Control units

CU	Description	Note
EM	LMV-D3-MF-F.1 HI	5 Nm
EK	NMV-D3-MF-F.1 HI	10 Nm
EC	LMV-D3-MP-F.1 HI	5 Nm, with MP-bus
EE	NMV-D3-MP-F.1 HI	10 Nm, with MP-bus

CU	Description	Note
EG	GLB181.1E/3	1o Nm

1A & 1B

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

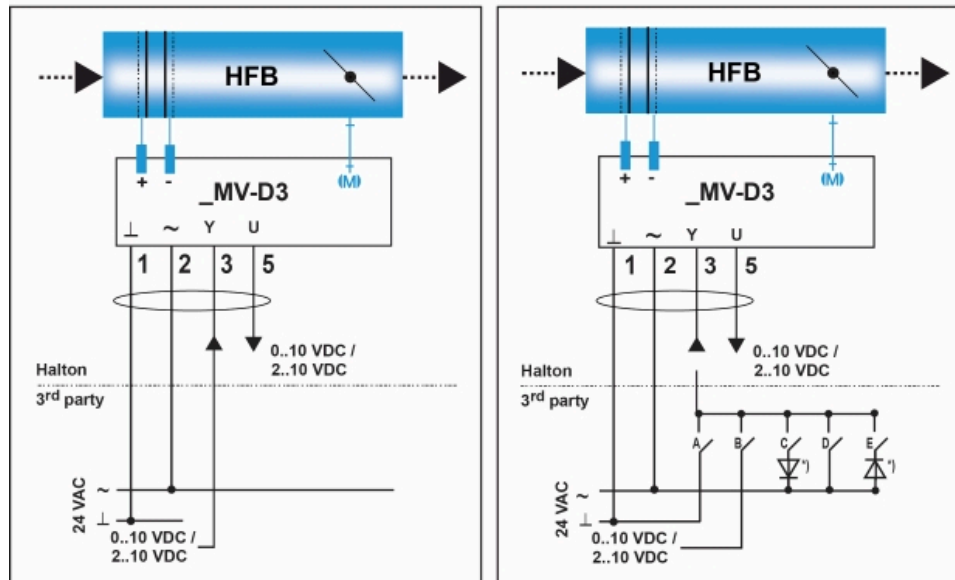


Fig. 1. 1A Typical variable airflow control application 1B Overrides All options

Code	Description
Halton	Delivered by Halton
3 rd party	Delivered by a third party
ACD	UKV
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

2...10 VAC	0...10 VAC	A	B	C	D	E	
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 UKV 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 UKV 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: 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

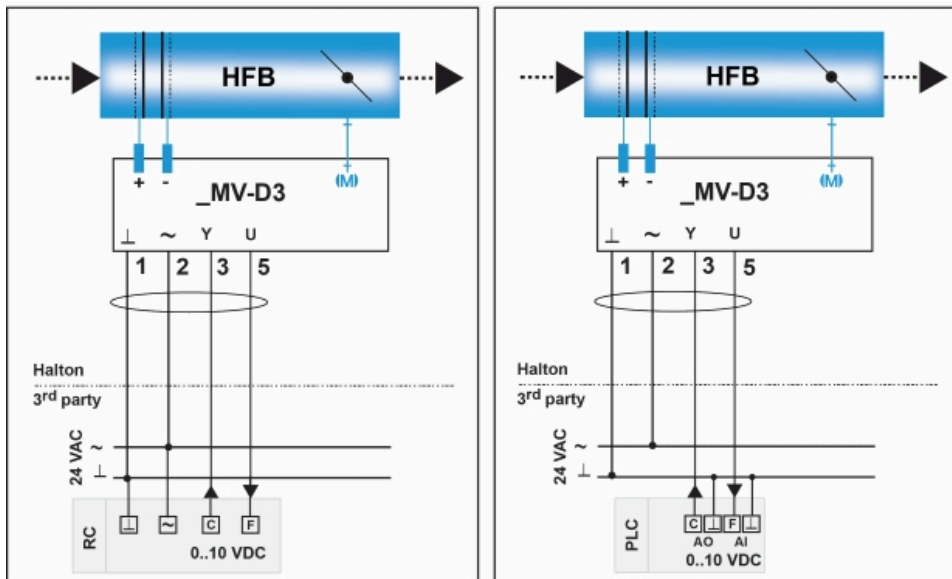


Fig. 2. 1C Room controller application 1D Building management system application application

Code	Description
Halton	Delivered by Halton
3 rd party	Delivered by a third party
ACD	UKV
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: CU = EM / EC (LMV-D3-MP/MF HI) or EK / EE (NMV-D3-MP/MF HI) – parallel airflow control with a building management system

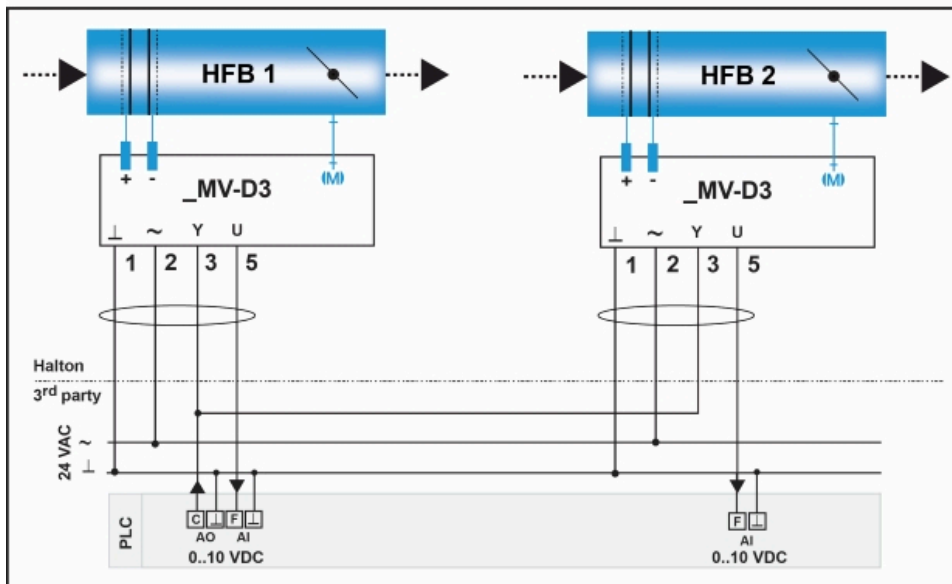


Fig. 3. 1E Parallel airflow control with building management system

Code	Description
Halton	Delivered by Halton
3 rd party	Delivered by a third party
ACD1	UKV supply
ACD3	Exhaust
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: CU=EG (GLB181.1E/3) – typical variable airflow control and position & constant airflow control

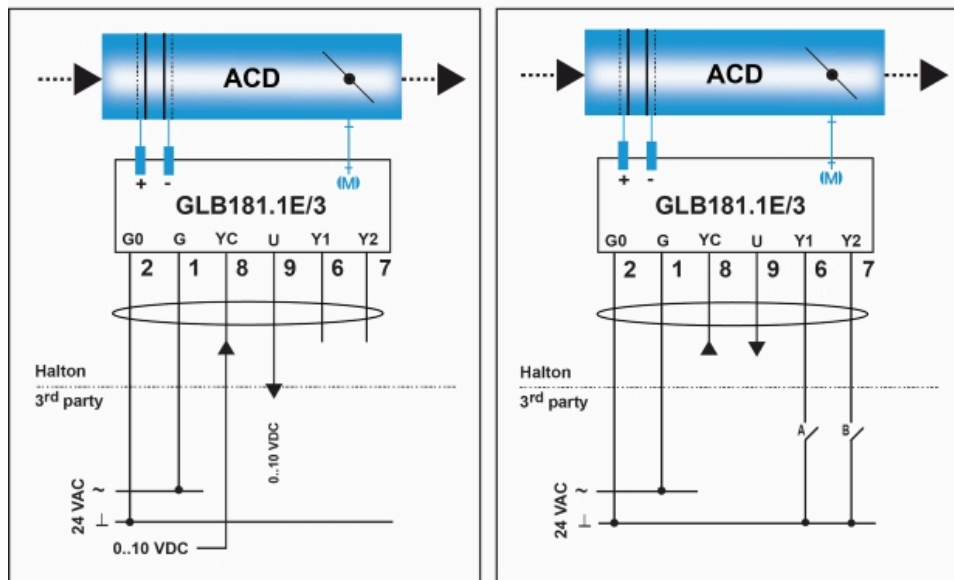


Fig. 4. 3A Typical airflow control application 3B Position & constant airflow control

Code	Description
Halton	Delivered by Halton
3 rd party	Delivered by a third party
ACD	UKV
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

Nominal airflow rates of the Halton UKV are presented in the table below.

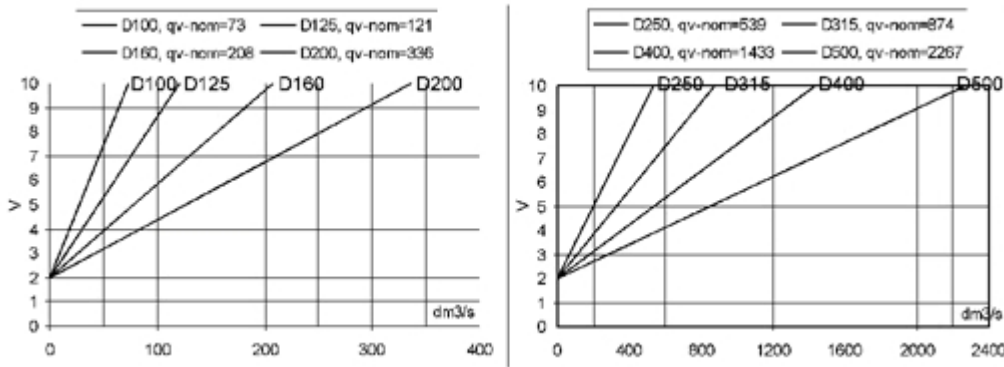
l/s	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	516	1033	1549	2065	2582	3098	3614	4131
300	775	1549	2324	3098	3873	4647	5422	6196
400	1033	2065	3098	4131	5164	6196	7229	8262
500	1291	2582	3873	5164	6454	7745	9036	10327
600	1549	3098	4647	6196	7745	9294	10843	12392
700	1087	3614	5422	7229	9036	10843	12651	14458
800	2065	4131	6196	8262	10327	12392	14458	16523
900	2324	4647	6971	9294	11618	13942	16265	18589
1000	2582	5164	7745	10327	12909	15491	18072	20654

l/s	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	1859	3718	5577	7435	9294	11153	13012	14871
300	2788	5577	8365	11153	13942	16730	19518	22306
400	3718	7436	11153	14871	18598	22306	26024	29742
500	4647	9294	13942	18589	23236	27883	32530	37177
600	5577	11153	16730	22306	27883	33460	39036	44613
700	6506	13012	19518	26024	32530	39036	45542	52048
800	7435	14871	22306	29742	37177	44613	52048	59484
900	8365	16730	25095	33460	41825	50189	58554	66919
1000	9294	18589	27883	37177	46472	55766	65060	74355

The actual measured airflow rate (qv) can be defined by the controller feedback signal (U or U5) and airflow controller nominal airflow (qv_nom).

Signal	Formula	Controller type and mode	Terminals system neutral	Terminals signal
0...10 VDC	$qv = qv_nom * U / 10$	UKV;CU=EM, EK, EC or EE (LMV-D3-MP/MF HI or NMV-D3-MP/MF HI), mode 0...10 VUKV;CU=EG (GLB181.1E/3)	1 (GND) 2(G0)	5 (U5) 9(U)
2...10 VDC	$qv = qv_nom * (U - 2) / 8$	UKV;CU=EM, EK, EC or EE (LMV-D3-MP/MF HI or NMV-D3-MP/MF HI), mode 2...10 V	1 (GND)	5 (U5)

The actual airflow rate can also be determined from the pictures below.



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 an attachment for the product.

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

q _v	Actual airflow rate [l/s]
k	k factor value: W [mm] x H [mm] x 0,001054
Δp _m	Differential pressure of measurement probe [Pa]

The Halton UKV airflow controller is equipped with a pressure sensor, and there is a very low airflow through the differential pressure sensor of the controller. Therefore, a manual differential measurement manometer can be connected in parallel to the airflow controller (for example with tube T-branches) and both measurements can operate in parallel with continuous control.

If Halton UKV is ordered without factory pre-set minimum and maximum flow values (FS=NA), minimum flow value will be set to 0 and maximum flow value is equal to nominal flow value.