

# Halton UKV – Airflow management damper



## Overview

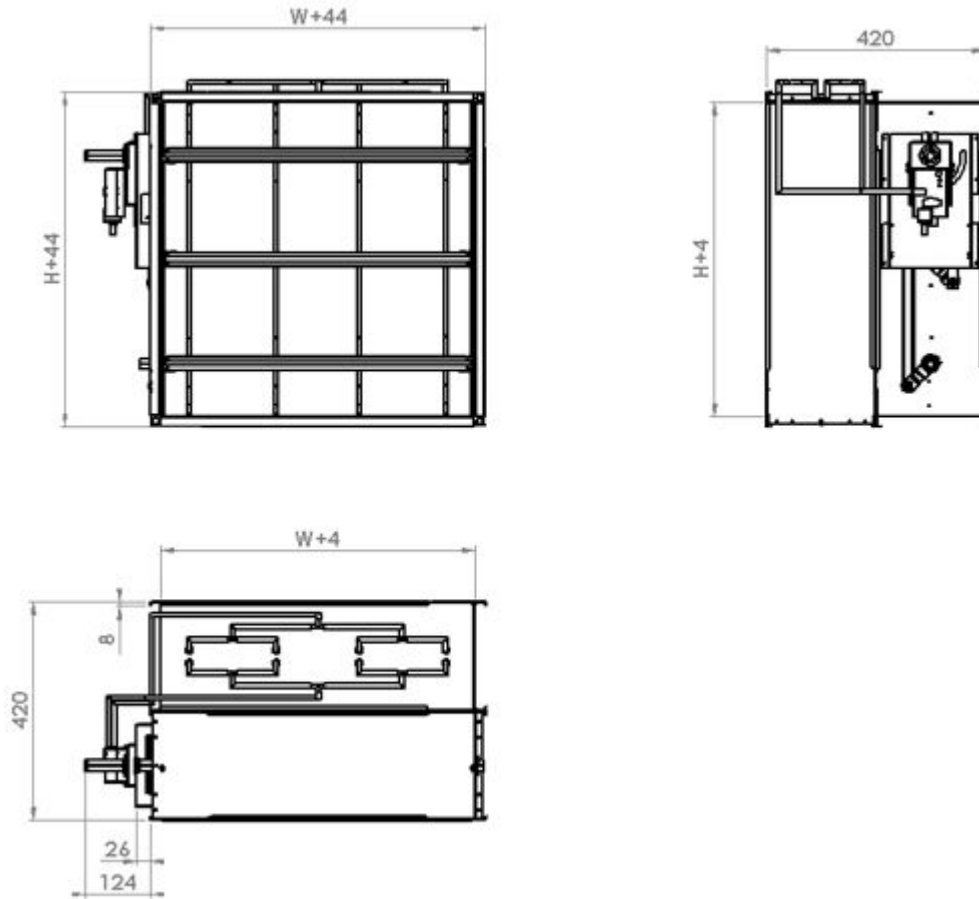
- Control damper for different airflow and duct pressure control applications
- Model with shut-off operation; tightness fulfils EN 1751, class 1 requirements
- Casing tightness fulfils EN 1751, class B requirements
- Two extra models with external insulation 15 mm and 30 mm
- Several airflow controller 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

## Product models and accessories

- Three external insulation options are available:
  - No insulation
  - 15 mm insulation thickness of mineral wool
  - 30 mm insulation thickness of mineral wool
- Fast running actuators, when the UKV is used in combination with Halton Laboset laboratory system

# Dimensions

## Without insulation



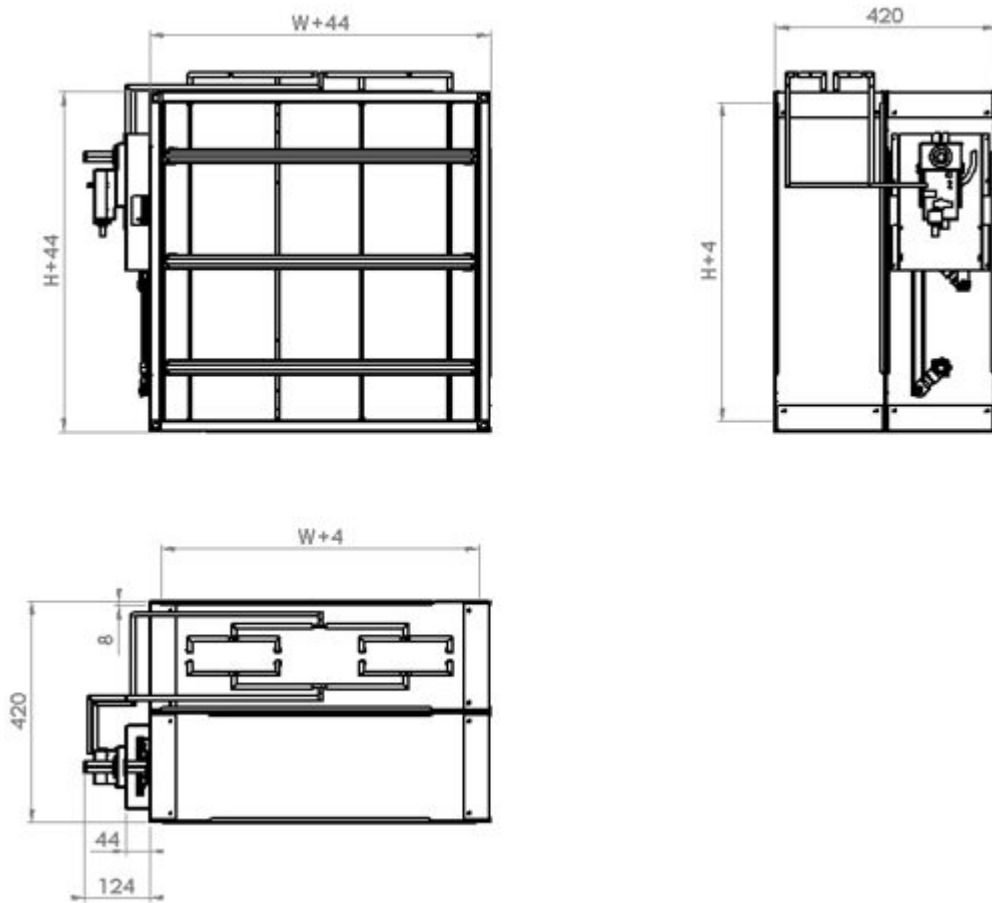
**W = Width (Diameter of duct connection)**

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

## With 15 mm insulation



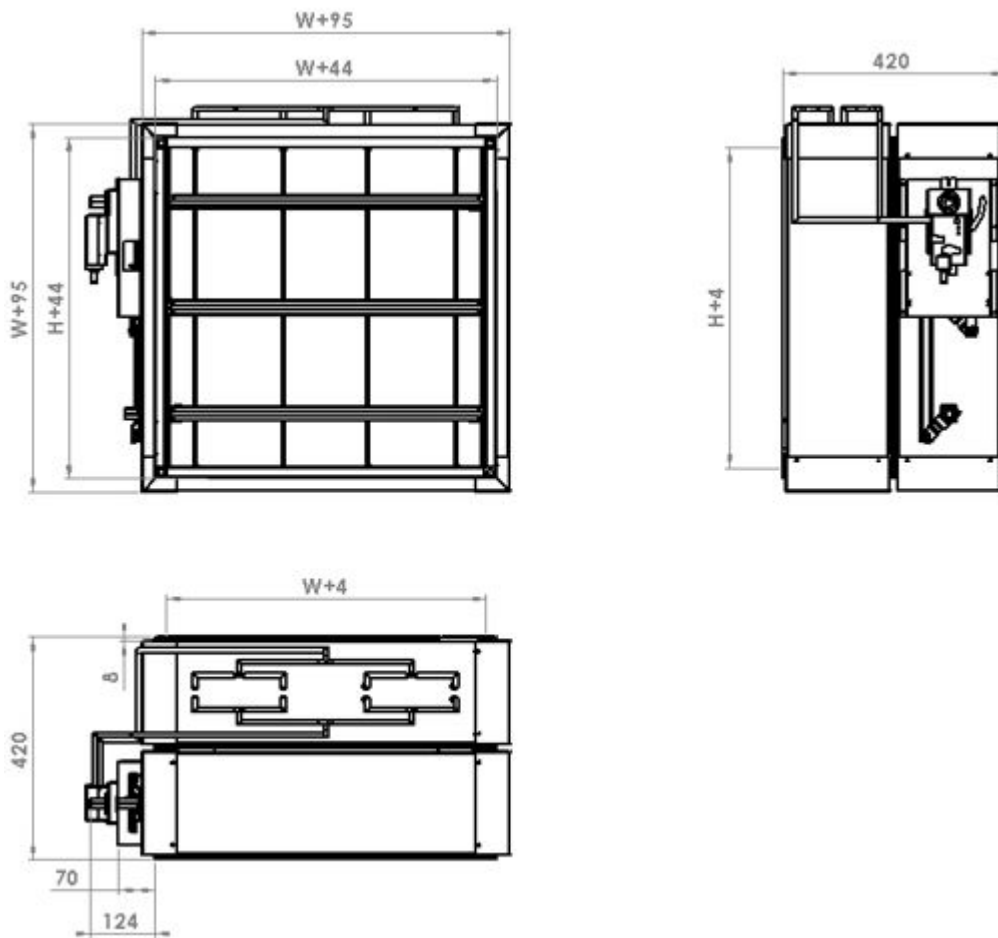
**W = Width, Diameter of duct connection**

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

## 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**

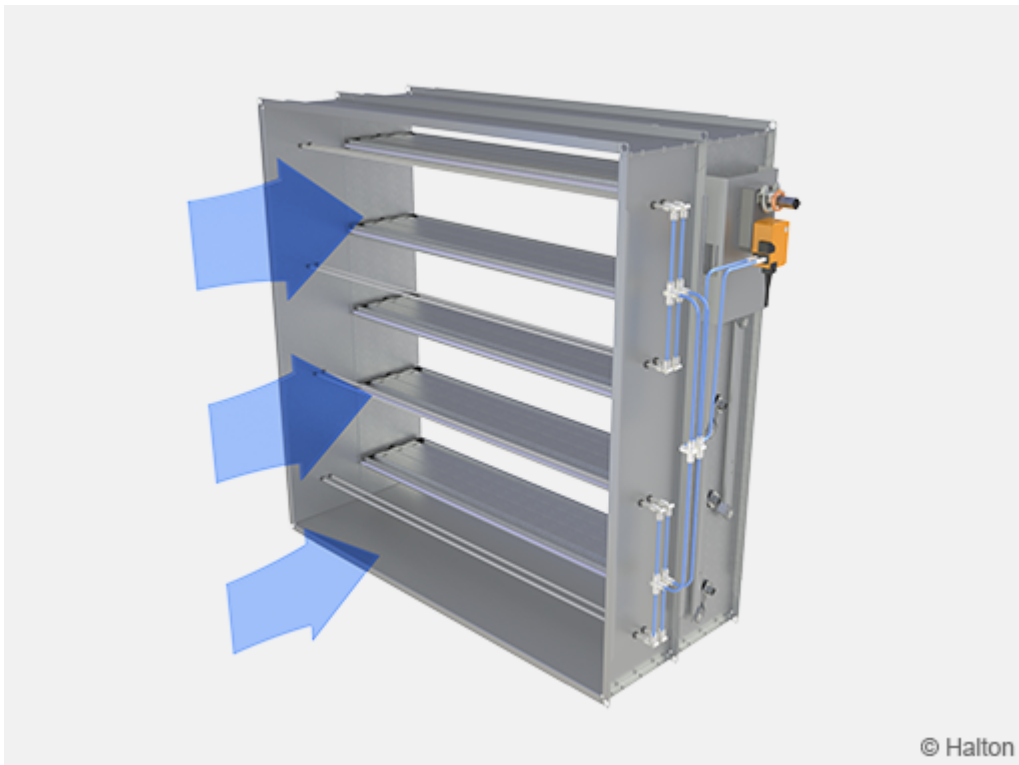
200, 250, 300 ... 950, 1000, with increment of 50 mm

# Material

Part	Material	Note
Casing	Galvanised steel	
Blades	Galvanised steel	Sandwich design
Damper blade insulation	Polyurethane	When width > 1 300 mm
Damper blade gaskets	Silicon	
Slide bearings	Alloy of polyamide and molybdenum sulphide	
Measurement probe	Aluminium	
External insulation	Mineral wool	
Rectangular drive shaft 15x15mm	Galvanised steel	

# Function

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

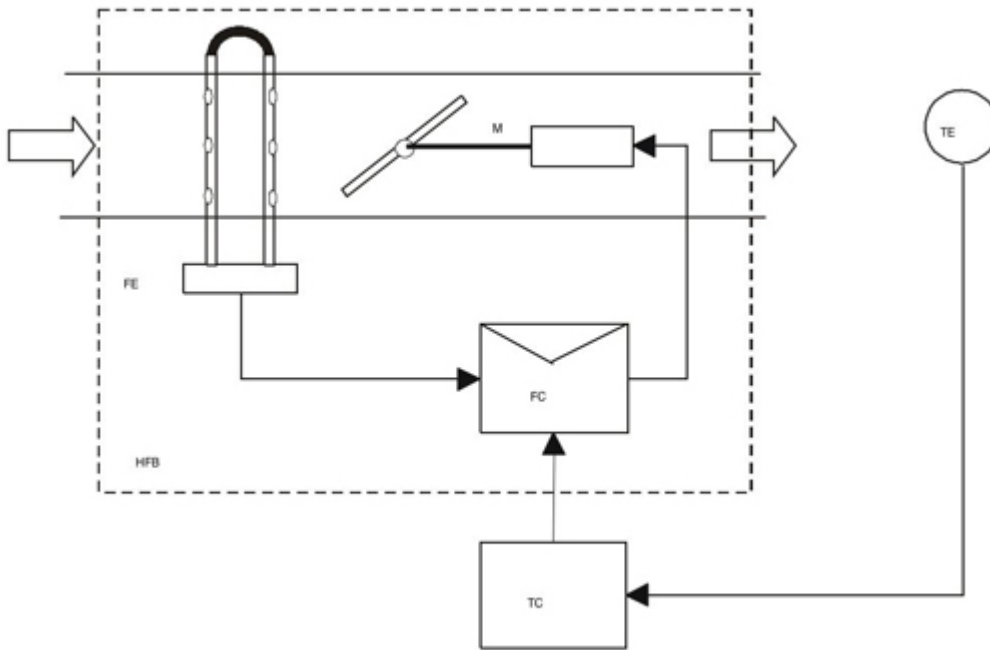


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Variation of upstream pressure will affect the measurement system; it will notice a difference between the set point and measured value. Volume controller will send a signal to the actuator to recover the set value.

The dampers can be connected to a building management system, whereupon they can be remotely controlled. In such a case, the volume flow rates in different spaces of the building can also be monitored.

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



## Product Models

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

<b>l/s</b>	<b>W</b>							
<b>H</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>800</b>	<b>1000</b>	<b>1200</b>	<b>1400</b>	<b>1600</b>
<b>200</b>	40	80	120	160	200	240	280	320
<b>300</b>	60	120	180	240	300	360	420	480
<b>400</b>	80	160	240	320	400	480	560	640
<b>500</b>	100	200	300	400	500	600	700	800
<b>600</b>	120	240	360	480	600	720	840	960
<b>700</b>	140	280	420	560	700	840	980	1 120
<b>800</b>	160	320	480	640	800	960	1 120	1 280
<b>900</b>	180	360	540	720	900	1 080	1 260	1 440
<b>1000</b>	200	400	600	800	1 000	1 200	1 400	1 600

<b>m3/h</b>	<b>W</b>							
<b>H</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>800</b>	<b>1000</b>	<b>1200</b>	<b>1400</b>	<b>1600</b>
<b>200</b>	144	288	432	576	720	864	1 008	1 152
<b>300</b>	216	432	648	864	1 080	1 296	1 512	1 728
<b>400</b>	288	576	864	1 152	1 440	1 728	2 016	2 304
<b>500</b>	360	720	1 080	1 440	1 800	2 160	2 520	2 880
<b>600</b>	432	864	1 296	1 728	2 160	2 592	3 024	3 456
<b>700</b>	504	1 008	1 512	2 016	2 520	3 024	3 528	4 032
<b>800</b>	576	1 152	1 728	2 304	2 880	3 456	4 032	4 608
<b>900</b>	648	1 296	1 944	2 592	3 240	3 888	4 536	5 184
<b>1000</b>	720	1 440	2 160	2 880	3 600	4 320	5 040	5 760

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

<b>l/s</b>	<b>W</b>							
<b>H</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>800</b>	<b>1000</b>	<b>1200</b>	<b>1400</b>	<b>1600</b>
<b>200</b>	80	160	240	320	400	480	560	640
<b>300</b>	120	240	360	480	600	720	840	960
<b>400</b>	160	320	480	640	800	960	1 120	1 280
<b>500</b>	200	400	600	800	1 000	1 200	1 400	1 600
<b>600</b>	240	480	720	960	1 200	1 440	1 680	1 920
<b>700</b>	280	560	840	1 120	1 400	1 680	1 960	2 240
<b>800</b>	320	640	960	1 280	1 600	1 920	2 240	2 560
<b>900</b>	360	720	1 080	1 440	1 800	2 160	2 520	2 880
<b>1000</b>	400	800	1 200	1 600	2 000	2 400	2 800	3 200

<b>m3/h</b>	<b>W</b>							
<b>H</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>800</b>	<b>1000</b>	<b>1200</b>	<b>1400</b>	<b>1600</b>
<b>200</b>	288	576	864	1 152	1 440	1 728	2 016	2 304
<b>300</b>	432	864	1 296	1 728	2 160	2 592	3 024	3 456
<b>400</b>	576	1 152	1 728	2 304	2 880	3 456	4 032	4 608
<b>500</b>	720	1 440	2 160	2 880	3 600	4 320	5 040	5 760
<b>600</b>	864	1 728	2 592	3 456	4 320	5 184	6 048	6 912
<b>700</b>	1 008	2 016	3 024	4 032	5 040	6 048	7 056	8 064
<b>800</b>	1 152	2 304	3 456	4 608	5 760	6 912	8 064	9 216
<b>900</b>	1 296	2 592	3 888	5 184	6 480	7 776	9 072	10 368
<b>1000</b>	1 440	2 880	4 320	5 760	7 200	8 640	10 080	11 520

**Nominal airflow rate – with all airflow controller models of EM, EK, EC, EE, EG**



l/s	W							
	200	400	600	800	1000	1200	1400	1600
200	443	886	1 329	1 771	2 214	2 657	3 100	3 543
300	664	1 329	1 993	2 657	3 322	3 986	4 650	5 314
400	886	1 771	2 657	3 543	4 429	5 314	6 200	7 086
500	1 107	2 214	3 322	4 429	5 536	6 643	7 750	8 857
600	1 329	2 657	3 986	5 314	6 643	7 972	9 300	10 629
700	1 550	3 100	4 650	6 200	7 750	9 300	10 850	12 400
800	1 771	3 543	5 314	7 086	8 857	10 629	12 400	14 172
900	1 993	3 986	5 979	7 972	9 965	11 957	13 950	15 943
1000	2 214	4 429	6 643	8 857	11 072	13 286	15 500	17 715

m3/h	W							
	200	400	600	800	1000	1200	1400	1600
200	1 594	3 189	4 783	6 377	7 972	9 566	11 160	12 755
300	2 391	4 783	7 174	9 566	11 957	14 349	16 740	19 132
400	3 189	6 377	9 566	12 755	15 943	19 132	22 321	25 509
500	3 986	7 972	11 957	15 943	19 929	23 915	27 901	31 886
600	4 783	9 566	14 349	19 132	23 915	28 698	33 481	38 264
700	5 580	11 160	16 740	22 321	27 901	33 481	39 061	44 641
800	6 377	12 755	19 132	25 509	31 886	38 264	44 641	51 018
900	7 174	14 349	21 523	28 698	35 872	43 047	50 221	57 396
1000	7 972	15 943	23 915	31 886	39 858	47 830	55 801	63 773

## The UKV airflow control damper is available in several versions

Model	Feature
UKV, MD=N	No external frame insulation
UKV, MD=I1	with 15 mm external insulation
UKV, MD=I2	with 30 mm external insulation

## Control units (CU)

The UKV airflow control damper can be equipped with several different control units for either

airflow or duct pressure control.

### Airflow controller options:

EM	Halton LMV-D3-MF-F.1 HI (5 Nm)
EK	Halton NMV-D3-MF-F.1 HI (10 Nm)
EC	Halton LMV-D3-MP-F.1 HI (5 Nm)
EE	Halton NMV-D3-MP-F.1 HI (10 Nm)
EG	Siemens GLB181.1E/3 (10 Nm)

Controllers EM, EK, EC and EE include a dynamic differential pressure sensor with a low bypass airflow rate through the sensor element. Therefore, these controllers are not to be used in highly contaminated environments. The pressure sensor of the EG unit is based on a membrane with no flow through the sensor element. Controllers EC and EE include Belimo's MP-bus connection.

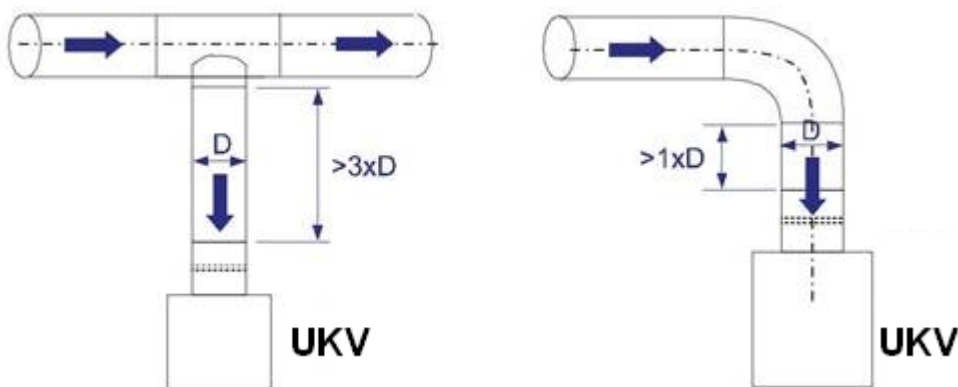
The adjustable airflow control range is presented in the table below. For airflow controllers EM, EK, EC, EE and EG, the highest available minimum airflow rate equals the specified maximum airflow rate.

Minimum and maximum airflow rates are calculated as percentage of damper's nominal airflow.

## 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.

**The wiring instructions are presented following applications:**

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

**Control units**

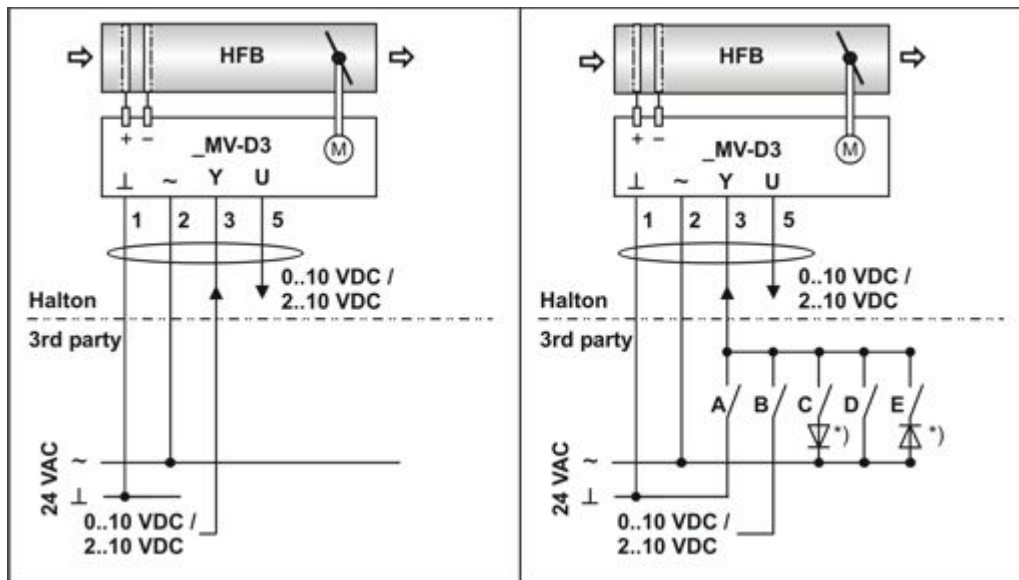
CU	Description	Note
EM	Halton LMV-D3-MF-F.1 HI	(5 Nm)
EK	Halton NMV-D3-MF-F.1 HI	(10 Nm)
EC	Halton LMV-D3-MP-F.1 HI	(5 Nm, with Belimo MP-bus)
EE	Halton NMV-D3-MP-F.1 HI	(10 Nm, with Belimo MP-bus)
EG	Siemens GLB181.1E/3	(10 Nm)

**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



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

**Code description**

- Halton Delivered by Halton
- 3rd 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
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 m<sup>3</sup>/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

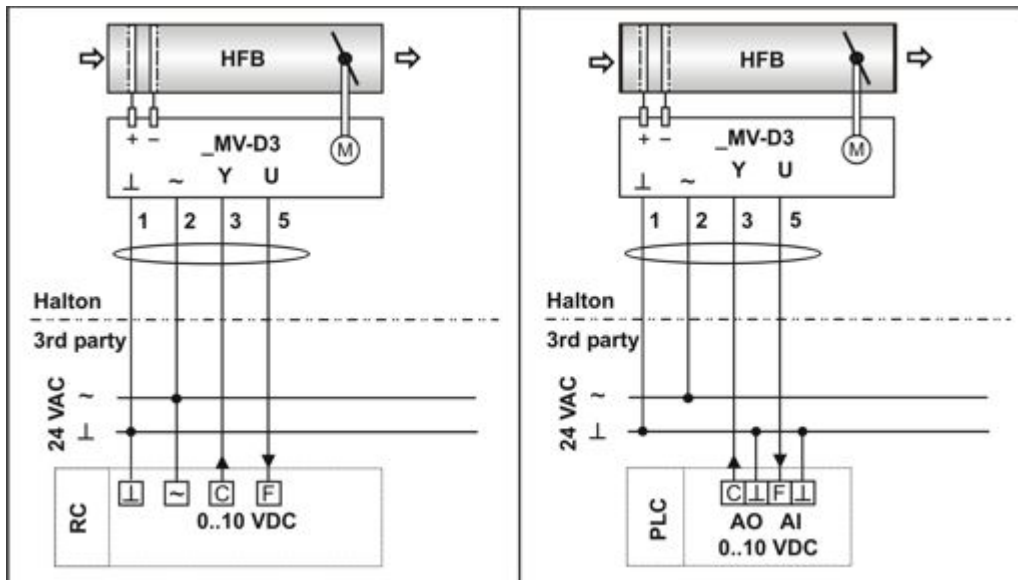
Mode	Voltage of w, VDC	Function
<b>0...10 VDC</b>	0.0...0.45	Minimum airflow (closed if qv_min = 0%)
	0.5...10.0	Modulating, qv_min ... qv_max
	10.0	Maximum airflow
<b>2...10 VDC</b>	0.0...0.5	Damper closed
	0.5...2.0	Minimum airflow
	2.0...10.0	Modulating, qv_min...qv_max
	10.0	Maximum airflow

### 1C & 1D

Example: UKV;

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



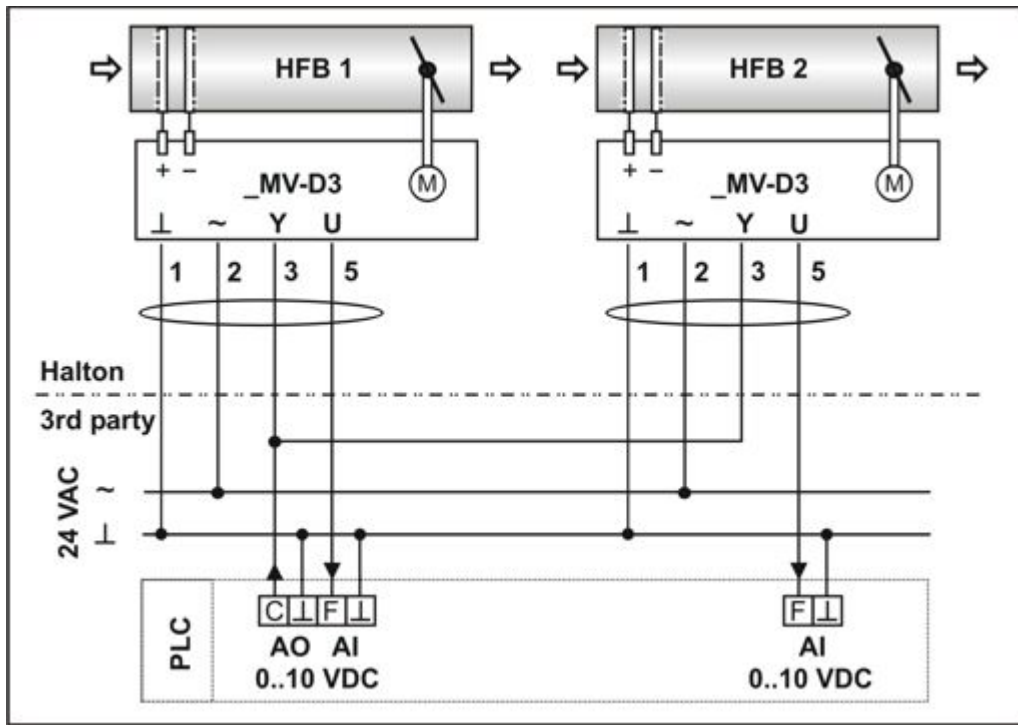
**1C** Room controller application

**1D** Building management system application application

### Code Description

Halton	Delivered by Halton
3rd 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: UKV;**  
**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

### Code Description

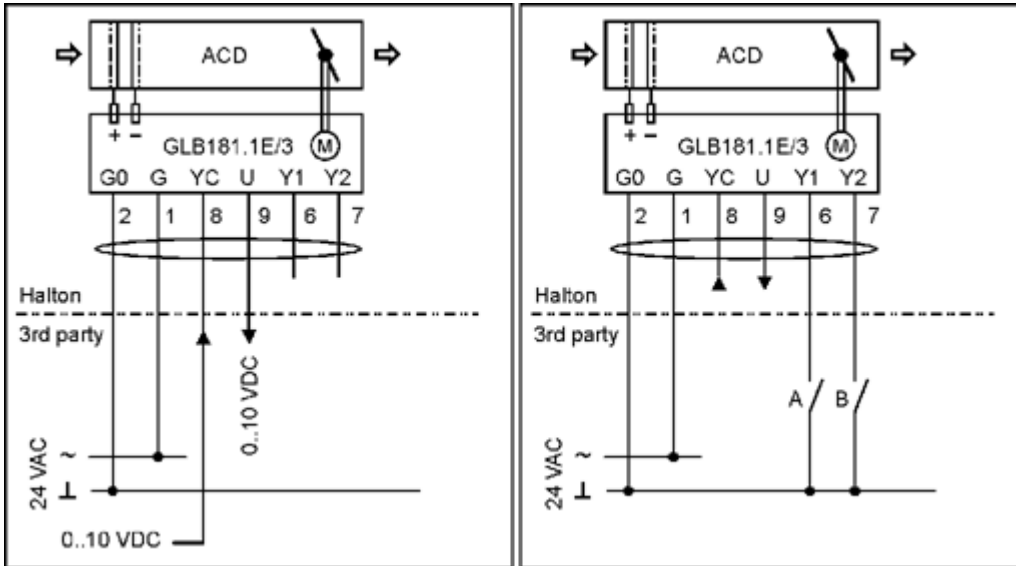
Halton	Delivered by Halton
3rd party	Delivered by a third party
ACD1	UKV supply
ACD3	exhaust
1 (G0)	24 VAC system neutral
2 (~)	24 VAC live
3 (w)	0...10-VDC airflow setpoint signal input
5 (U5)	0...10-VDC airflow feedback signal output
PLC	Building management system
C (AO)	Airflow setpoint control signal
F (AI)	Actual airflow feedback input

### 3A & 3B

Example: UKV;

CU=EG (GLB181.1E/3)

– typical variable airflow control and position & constant airflow control



**3A** Typical airflow control application

**3B** Position & constant airflow control

### Code Description

Halton	Delivered by Halton
3rd 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

## Commissioning

### Airflow control

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

<b>l/s</b>	<b>W</b>							
<b>H</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>800</b>	<b>1000</b>	<b>1200</b>	<b>1400</b>	<b>1600</b>
<b>200</b>	516	1033	1549	2065	2582	3098	3614	4131
<b>300</b>	775	1549	2324	3098	3873	4647	5422	6196
<b>400</b>	1033	2065	3098	4131	5164	6196	7229	8262
<b>500</b>	1291	2582	3873	5164	6454	7745	9036	10327
<b>600</b>	1549	3098	4647	6196	7745	9294	10843	12392
<b>700</b>	1807	3614	5422	7229	9036	10843	12651	14458
<b>800</b>	2065	4131	6196	8262	10327	12392	14458	16523
<b>900</b>	2324	4647	6971	9294	11618	13942	16265	18589
<b>1000</b>	2582	5164	7745	10327	12909	15491	18072	20654

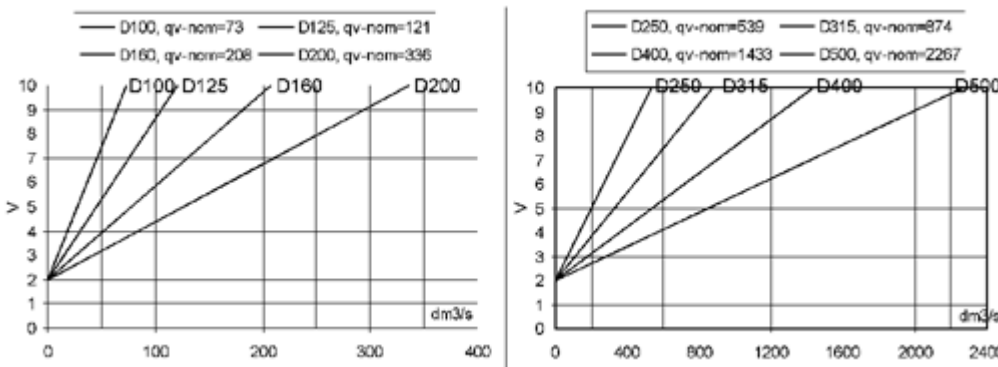
<b>m<sup>3</sup>/h</b>	<b>W</b>							
<b>H</b>	<b>200</b>	<b>400</b>	<b>600</b>	<b>800</b>	<b>1000</b>	<b>1200</b>	<b>1400</b>	<b>1600</b>
<b>200</b>	1859	3718	5577	7435	9294	11153	13012	14871
<b>300</b>	2788	5577	8365	11153	13942	16730	19518	22306
<b>400</b>	3718	7436	11153	14871	18598	22306	26024	29742
<b>500</b>	4647	9294	13942	18589	23236	27883	32530	37177
<b>600</b>	5577	11153	16730	22306	27883	33460	39036	44613
<b>700</b>	6506	13012	19518	26024	32530	39036	45542	52048
<b>800</b>	7435	14871	22306	29742	37177	44613	52048	59484
<b>900</b>	8365	16730	25095	33460	41825	50189	58554	66919
<b>1000</b>	9294	18589	27883	37177	46472	55766	65060	74355

The actual measured airflow rate ( $q_v$ ) can be defined by the controller feedback signal (U or U5) and airflow controller nominal airflow ( $q_{v\_nom}$ ).



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:  $W \text{ (mm)} \times H \text{ (mm)} \times 0,001054$
- $\Delta p_m$  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.

# Specification

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

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

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

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.

## Order Code

### UKV/W-H; MA-MD-MO-VR-ZT

**W = Width, diameter of duct connection**

200, 250, 300, ... 1600, with increment of 50 mm

**H = Height, diameter of duct connection**

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 HI

EK NMV-D3-MF HI

EC LMV-D3-MP HI (includes Belimo MP-bus)

EE NMV-D3-MP HI (includes Belimo MP-bus)

EG GLB181.1E/3 (Siemens)

**VR = VRD3 (only from France)**

NA Not assigned

Y Yes

**ZT = Tailored product**

N No

Y Yes (ETO)

**Code example**

UKV-400-200, MA=CS, MD=I1, MO=EE, VR=NA