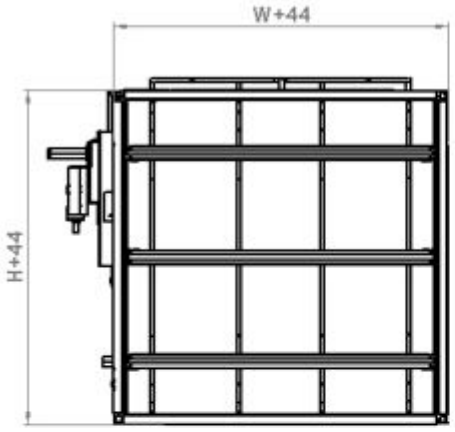
Halton UKV – Airflow management damper (VAV)

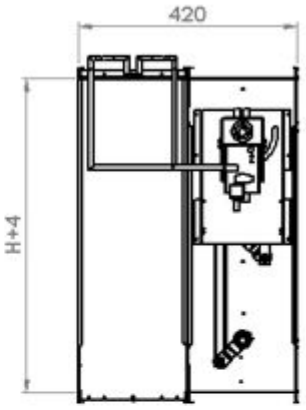
Overview

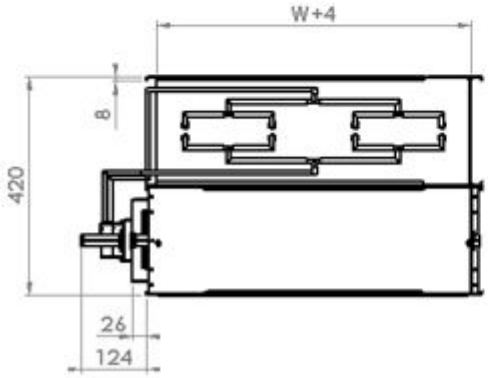
- Control damper for different airflow and duct pressure control applications
- Model with shut-off operation; tightness fulfils EN 1751, class 1 requirements
- Casing tightness fulfils EN 1751, class B requirements
- Two extra models with external insulation 15 mm and 30 mm
- Several airflow controller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

Dimensions

Without insulation



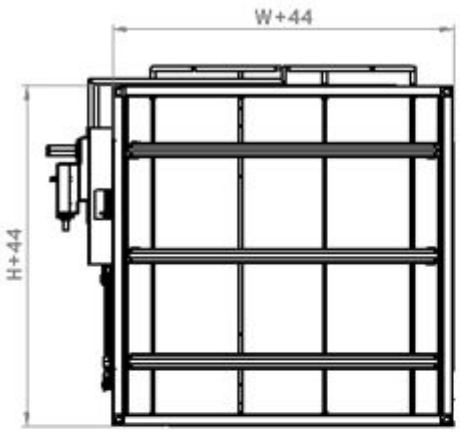


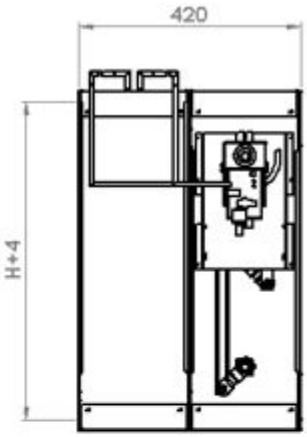


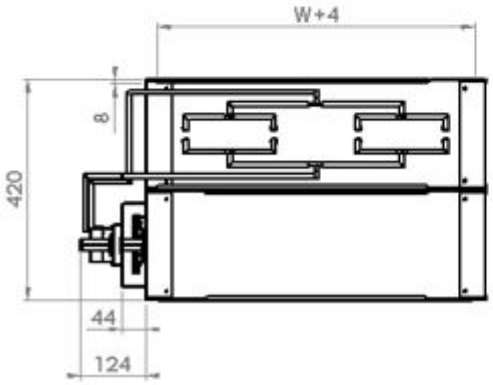
W = Width (Diameter of duct connection)
200, 250, 300 ... 1550, 1600, with increment of 50 mm

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

With 15 mm insulation



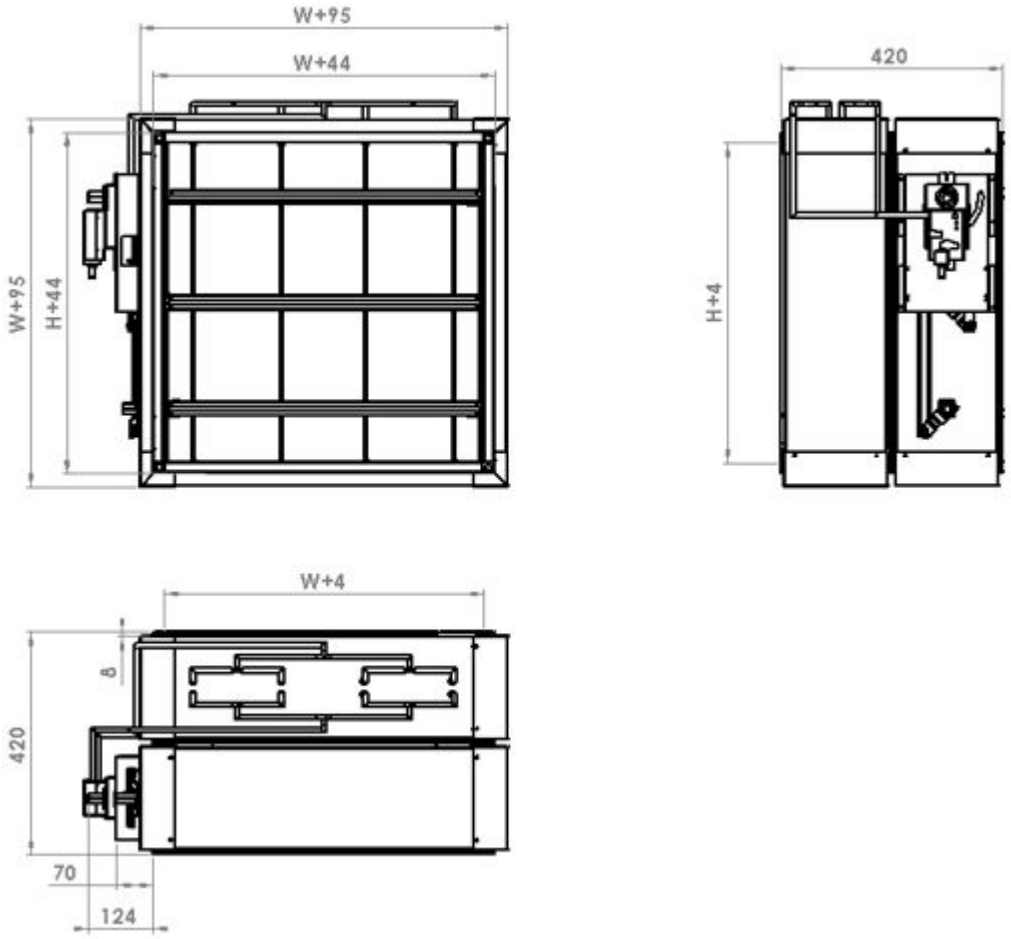




W = Width, Diameter of duct connection
200, 250, 300 ... 1550, 1600, with increment of 50 mm

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

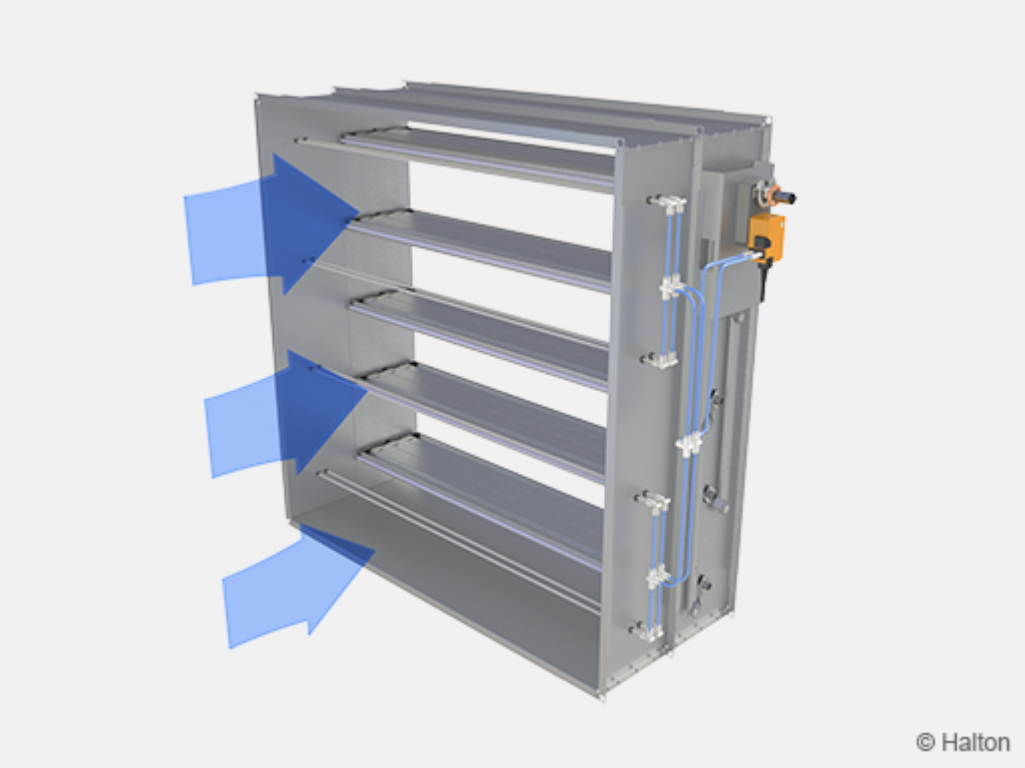
H = Height, Diameter of duct connection
200, 250, 300 ... 950, 1000, with increment of 50 mm

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 suphide	–
Measurement probe	Aluminium	–
External insulation	Mineral wool	–
Rectangular drive shaft	Galvanised steel	15x15mm

Function

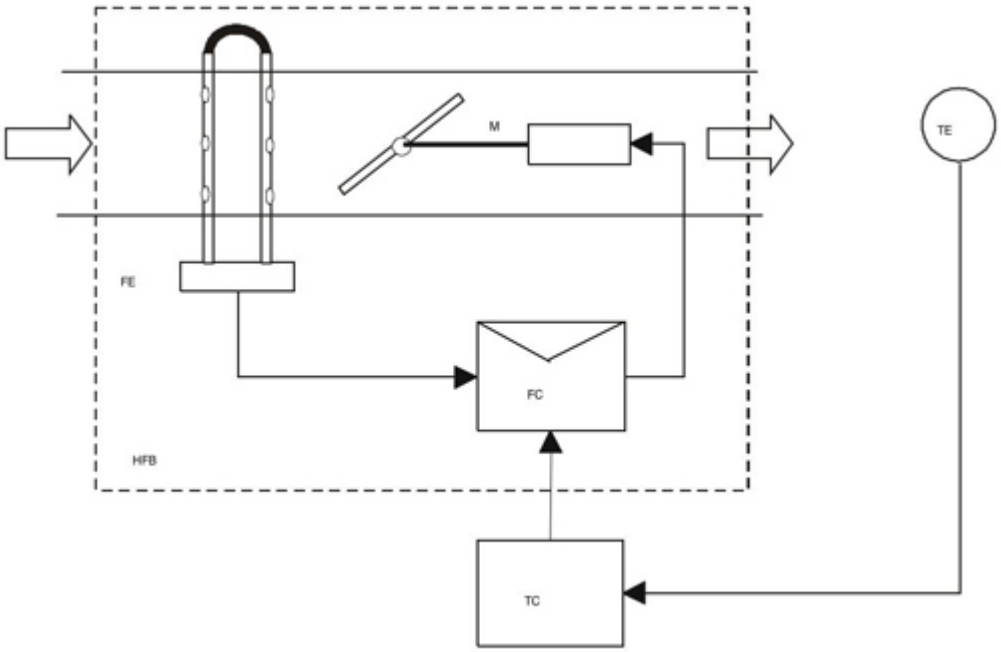
The Halton UKV is a variable air volume control damper for ventilation systems. The damper can function electrically, with maximum and minimum set values for volume flow rate, factory preset. The damper can also be used as constant air volume control damper. The damper maintains an airflow rate in a 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.



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

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

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

Airflow controller options:

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
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

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.

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	240	360	480	600	720	840	960
700	140	280	420	560	700	840	980	1 120
800	160	320	480	640	800	960	1 120	1 280
900	180	360	540	720	900	1 080	1 260	1 440
1000	200	400	600	800	1 000	1 200	1 400	1 600

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

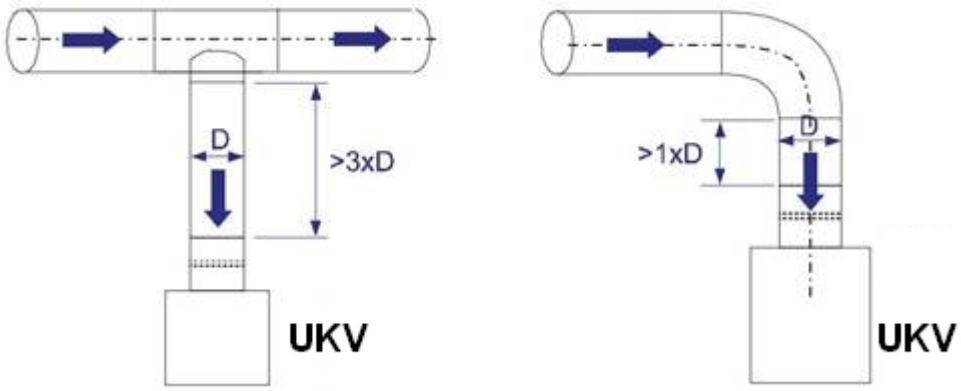
l/s	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	80	160	240	320	400	480	560	640
300	120	240	360	480	600	720	840	960
400	160	320	480	640	800	960	1 120	1 280
500	200	400	600	800	1 000	1 200	1 400	1 600
600	240	480	720	960	1 200	1 440	1 680	1 920
700	280	560	840	1 120	1 400	1 680	1 960	2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

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

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 5xD. 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:

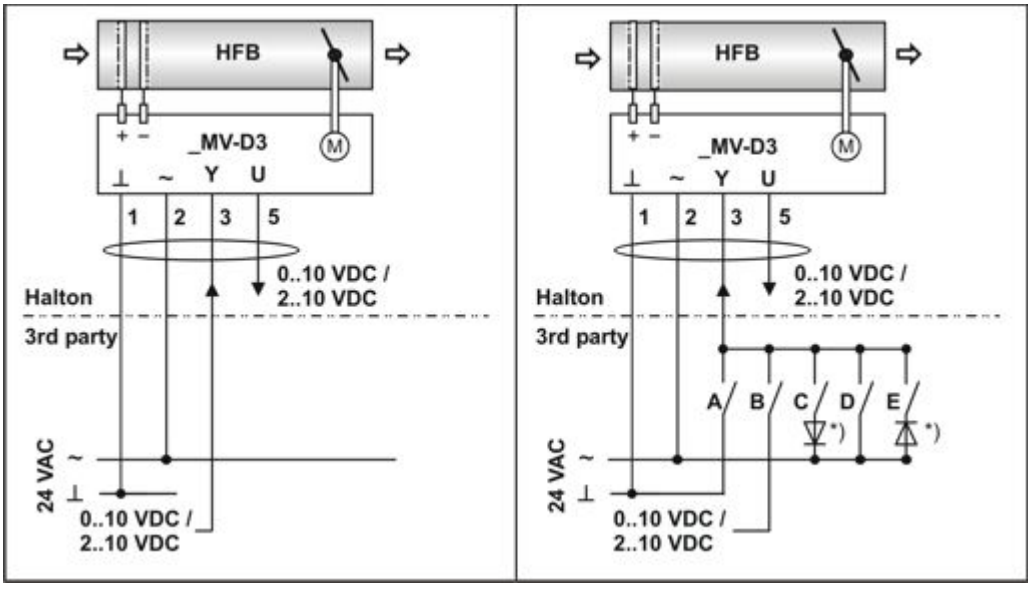
1 A UKV; CU=EM / EK / EC / EE Typical variable airflow control application
1 B UKV; CU=EM / EK / EC / EE Overriding controls
1 C UKV; CU=EM / EK / EC / EE Example; variable airflow control with a room controller
1 D UKV; CU=EM / EK / EC / EE Example; variable airflow control with a building management 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	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
EG	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

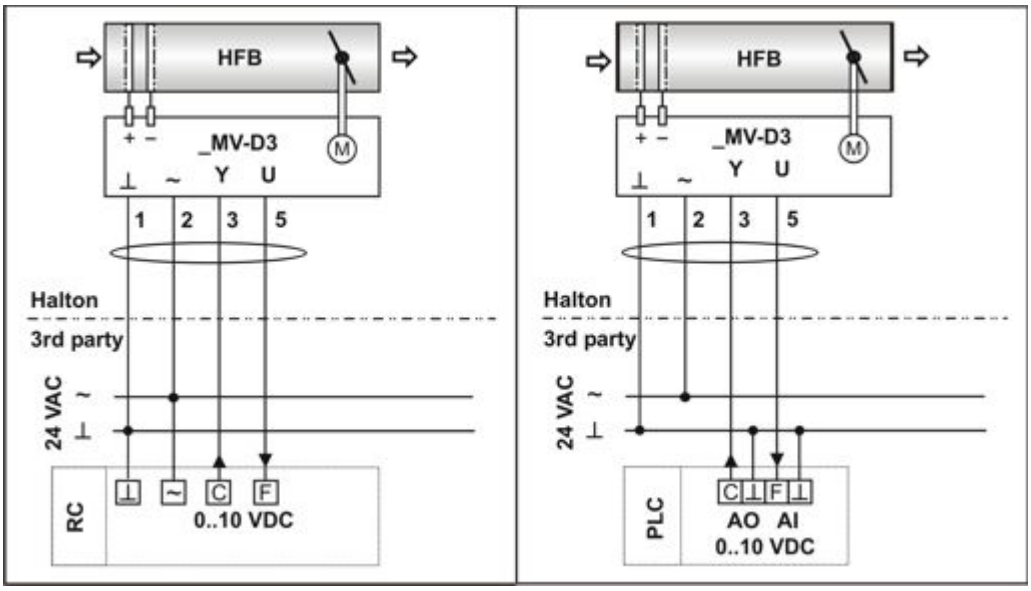
2...10 VAC	0...10 VAC	A	B	C	D	E	
NA	NA	ON					
qv_min	qv_min	Off	Off	Off	Off	Off	Constant flow
Variable qv_min...qv_max	Variable qv_min...qv_max	Off	ON	Off	Off	Off	
CLOSED	CLOSED	Off	Off	ON	Off	Off	
qv_max	qv_max	Off	Off	Off	ON	Off	Constant flow
OPEN	OPEN	Off	Off	Off	Off	ON	

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 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: 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

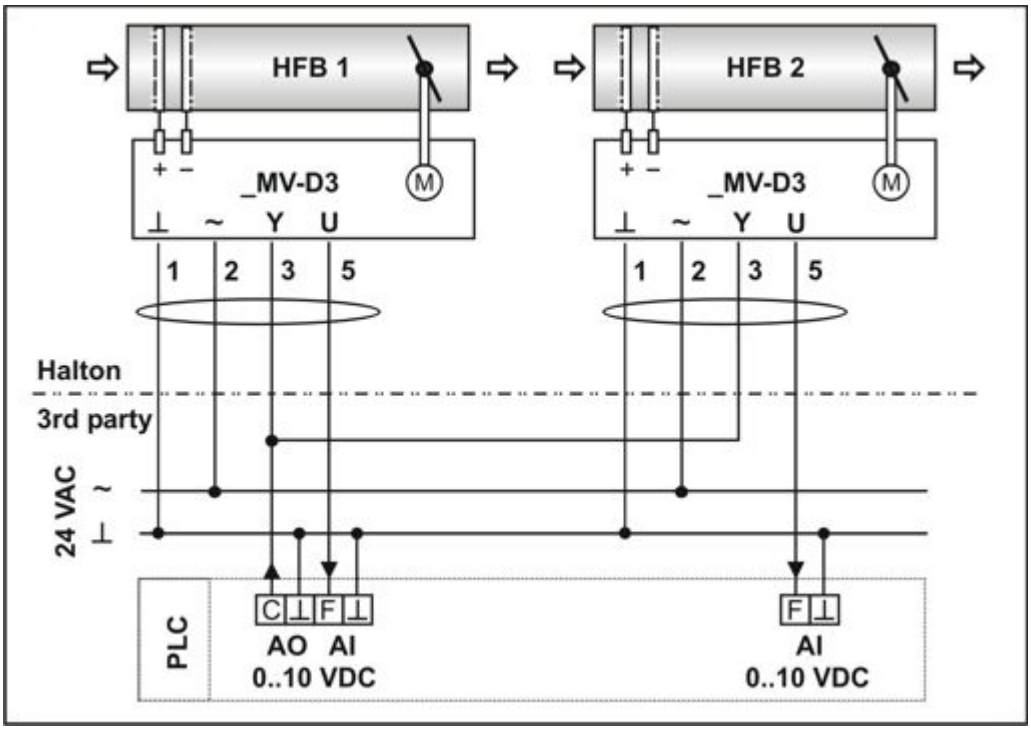
Code description

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

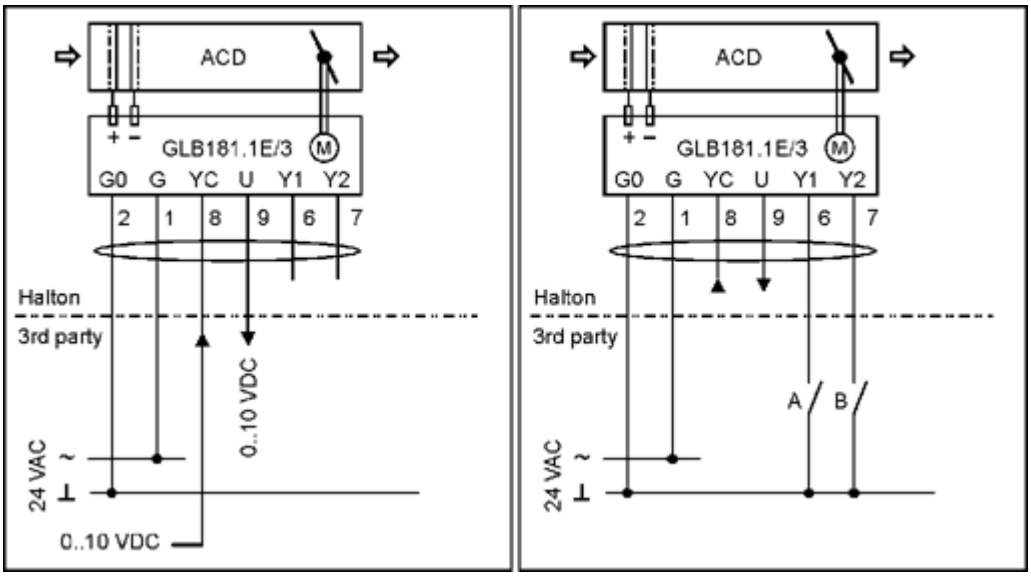


1E Parallel airflow control with building management system

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.

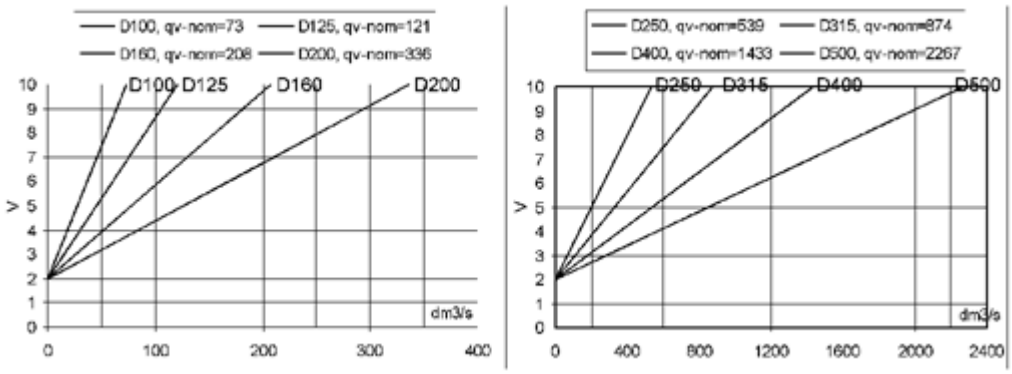
l/s	W [mm]							
H [mm]	200	400	600	800	1000	1200	1400	1600
200	516	1033	1549	2065	2582	3098	3614	4131
300	775	1549	2324	3098	3873	4647	5422	6196
400	1033	2065	3098	4131	5164	6196	7229	8262
500	1291	2582	3873	5164	6454	7745	9036	10327
600	1549	3098	4647	6196	7745	9294	10843	12392
700	1807	3614	5422	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

m^3/h	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.

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

qv 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.

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-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
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