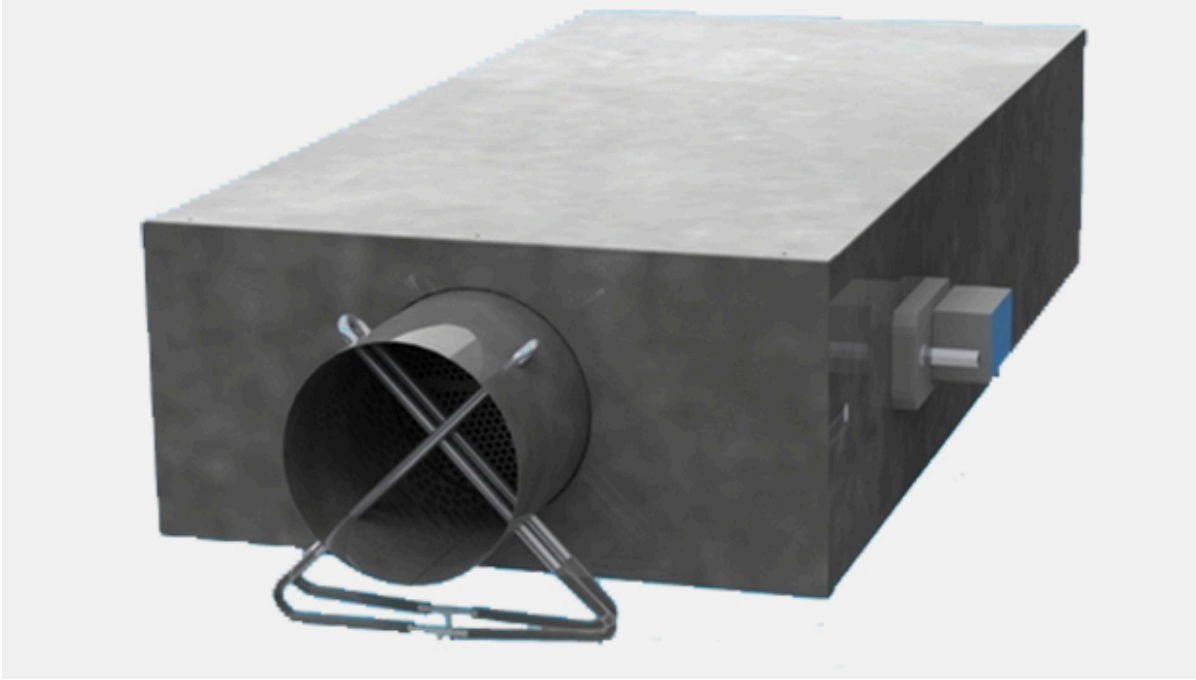


# Halton BOX – Airflow management unit (VAV)



## Overview

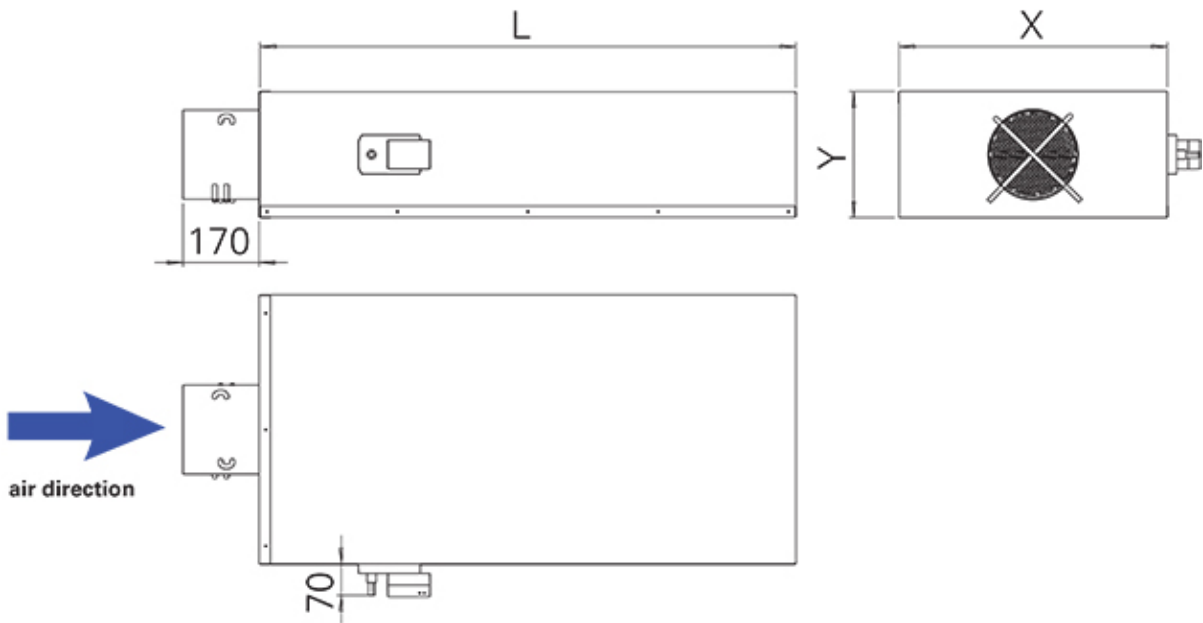
- Airflow management and control unit
- Variable or constant airflow rate operation
- Pressure-independent operation
- Galvanised steel construction
- Airflow management plenum with acoustic attenuation (high density mineral wool)
- Factory set airflow range limit

## Product models and accessories

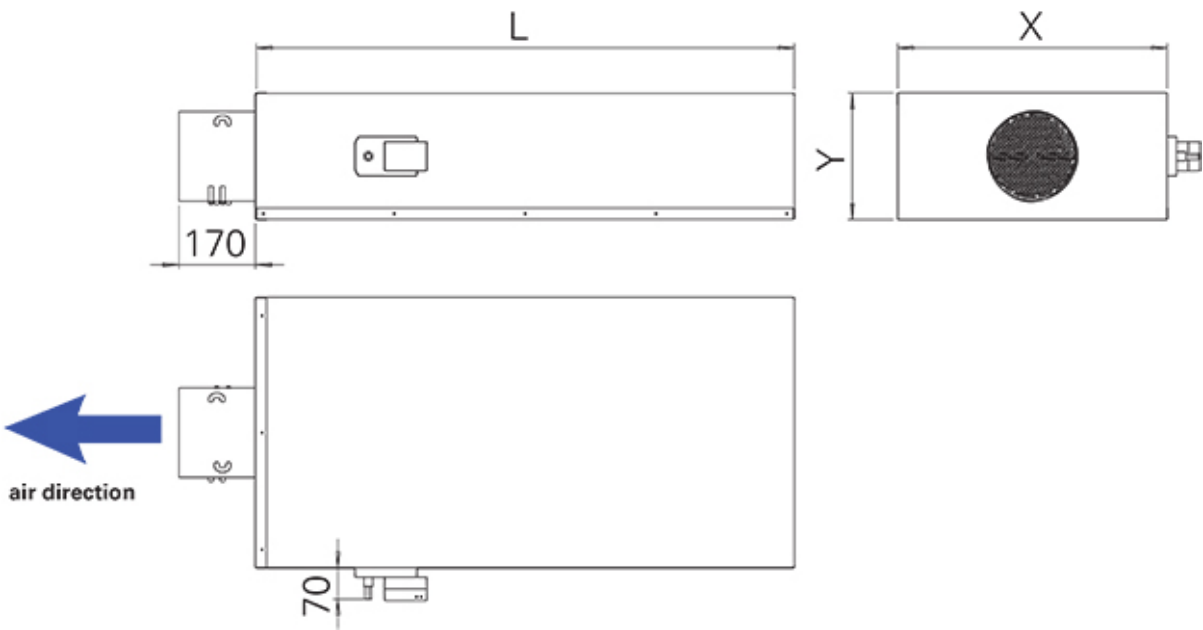
- Electrical or hot water reheating unit
- Outlet plenum with one or more circular connections

# Dimensions

## Halton BOX, supply



## Halton BOX, exhaust



Actuator on right side of the damper as standard. Available on left side as tailored product. Ask your sales.

## Long version: BOX/L-D

Description	Diameter [mm]	Length [mm]	Height [mm]	Depth [mm]
	D	X	Y	L
25 mm Insulation, I1	100	400	250	1000
	125	400	250	1000
	160	400	250	1000
	200	600	280	1200
	250	700	320	1400
	315	800	400	1600*
	355	1000	450	1600*
	400	1000	450	1600*
	500	1300	550	1800
40 mm Insulation, I2	100	430	280	1000
	125	430	280	1000
	160	430	280	1000
	200	630	310	1200
	250	730	350	1400
	315	830	430	1600
	355	1030	480	1600*
	400	1030	480	1600*
	500	1330	580	1800*

\* in 2 parts

## Short version: BOX/S-D

Description	Diameter [mm]	Length [mm]	Height [mm]	Depth [mm]
	D	X	Y	L
25 mm Insulation, I1	100	400	250	600
	125	400	250	600
	160	400	250	600
	200	600	280	600
	250	700	320	900
	315	800	400	900
	355	1000	450	900
	400	1000	450	900
	500	1300	550	1000
40 mm Insulation, I2	100	430	280	600
	125	430	280	600
	160	430	280	600
	200	630	310	600
	250	730	350	900
	315	830	430	900
	355	1030	480	900
	400	1030	480	900
	500	1330	580	1000

## Material

Part	Material
Plenum	Galvanised steel
Measurement probe	Aluminium
Acoustic insulation	High density mineral wool
Blade	Galvanised steel
Perforated sheet steel	Galvanised steel
External insulation	Mineral wool protected by galvanised steel frame

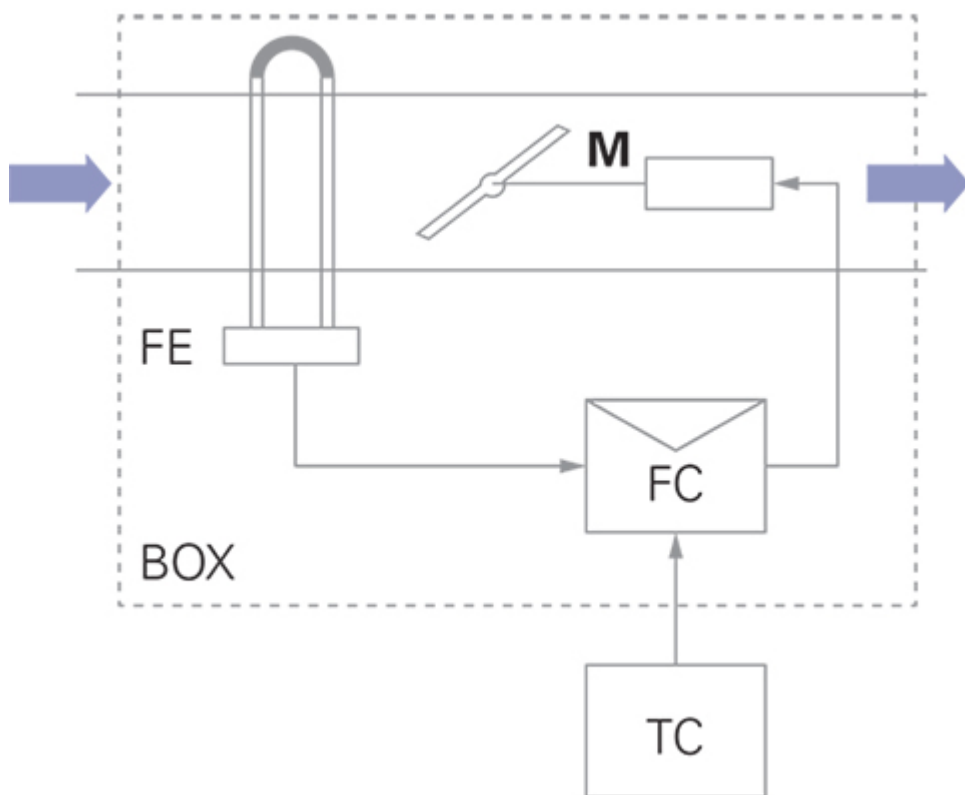
# Function

The Halton BOX variable airflow rate management unit contains a complete regulation loop. This includes an aluminium probe measurement system to take the average value measured over the whole crossing surface, an activator mounted on the blade axis and a controller.

The measurements made are sent to the controller which compares these values with the required setpoint value; depending on the measured difference, a signal is then sent to the actuator so that the unit compensates for this difference.

An analogue signal that enables the setpoint to be shifted may also be sent to the controller. The flow rate is regulated between the min and max rate values programmed into the controller.

The regulation loop is closed and operates independently of the variations in upstream pressure. The regulation may also be static pressure regulation (in the duct or in the premises).



- M** Actuator
- PE** Dynamic pressure measurement probe
- FC** Airflow controller
- TC** Thermostat or room sensor

## Product models

The Halton BOX airflow management unit is available in several versions.

The long version is used to reduce the air flow noise; the version with exterior sound proofing is

used to reduce the noise emitted by the unit.

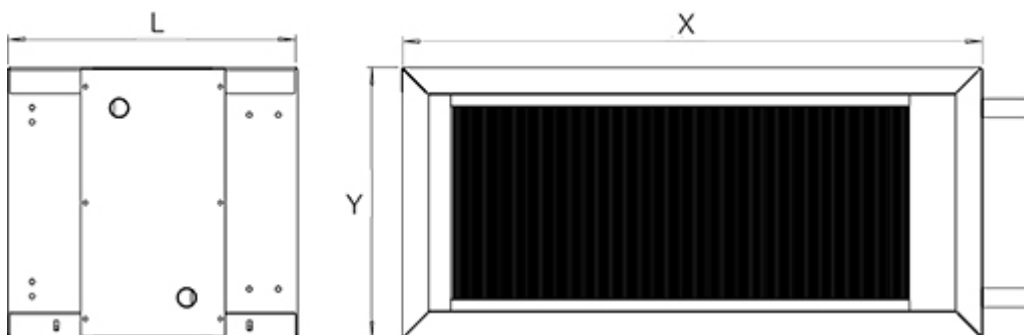
Model	Application	Execution
BOX/S-S; IN=I1	Supply	Short version. 25 mm insulation
BOX/L-S; IN=I1	Supply Low noise level to be complied	Long version. Integrated sound attenuator 25 mm insulation
BOX/S-E; IN=I1	Exhaust	Short version. 25 mm insulation
BOX/L-E; IN=I1	Exhaust Low noise level to be complied	Long version. 25 mm insulation
BOX/S-S; IN=I2	Supply	Short version. 40 mm insulation
BOX/L-S; IN=I2	Supply Low noise level to be complied	Long version. Integrated sound attenuator 40 mm insulation
BOX/S-E; IN=I2	Exhaust	Short version. 40 mm insulation.
BOX/L-E; IN=I2	Exhaust Low noise level to be complied	Long version. 40 mm insulation.

## Accessories

### Water reheating unit WBO

- Rectangular water reheating to be mounted downstream of the airflow management unit Halton BOX
- Lateral water connection
- Fixing on the Halton BOX by toggle latches
- Cooling coil with condensate tray can be manufactured upon request.

#### WBO Dimensions



Description	D	X	Y	L
25 mm Insulation, I1	100	400	250	300
	125	400	250	300
	160	400	250	300
	200	600	280	300
	250	700	320	300
	315	800	400	500
	355	1000	450	600
	400	1000	450	600
	500	1300	550	600
40 mm Insulation, I2	100	430	280	300
	125	430	280	300
	160	430	280	300
	200	630	310	300
	250	730	350	300
	315	830	430	500
	355	1030	480	600
	400	1030	480	600
	500	1330	580	600

**Water reheating power**

Size	Airflow [m <sup>3</sup> /h]	Airflow [l/s]	Power	ΔP [Pa]
100	58	16	425	2
	97	27	641	3
	136	38	824	5
	175	49	986	7
	214	59	1129	10
	251	70	1255	13
125	90	25	603	3
	155	43	904	6
	220	61	1149	10
	285	79	1363	15
	350	97	1555	21
	414	115	1727	28
160	144	40	859	6
	254	71	1266	13
	364	101	1593	23
	474	132	1877	35
	584	162	2115	49
	695	193	2326	65
200	227	63	1440	4
	427	119	2238	10
	627	174	2882	18
	827	230	3424	28
	1027	285	3889	40
	1226	341	4315	54
250	360	100	2320	4
	675	188	3611	11
	990	275	4644	19
	1305	363	5512	30
	1620	450	6288	43
	1936	538	6953	58

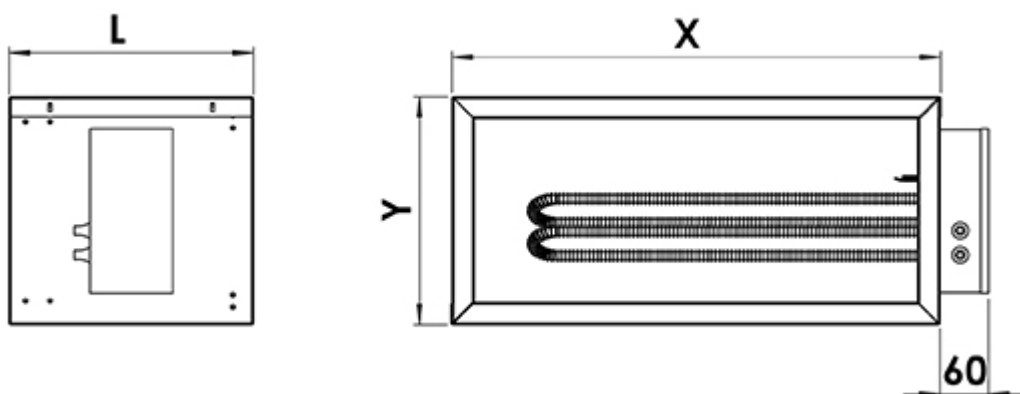


315	569	158	3530	5
	1039	289	5378	12
	1509	419	6849	22
	1979	550	8086	34
	2449	680	9145	49
	2920	811	10120	65
355	736	204	4577	4
	1395	388	7205	10
	2054	571	9286	19
	2713	754	11036	29
	3372	937	12535	42
	4032	1120	13856	56
400	900	250	5330	5
	1600	444	7899	13
	2300	639	9964	22
	3000	833	11702	34
	3700	1028	13188	49
	4400	1222	14557	65
500	1404	390	8749	5
	2643	734	13611	12
	3882	1078	17480	22
	5121	1423	20724	34
	6360	1767	23493	48
	7600	2111	25923	65

## Electrical reheating unit WBF

- Electrical reheating with electrical supply 230 V single phase (1 or 2 resistances), 230/400 V three phase (3 resistances)
- Safety thermostat with manual reset
- Minimum air velocity: 2 m/s.

### WBF Dimensions

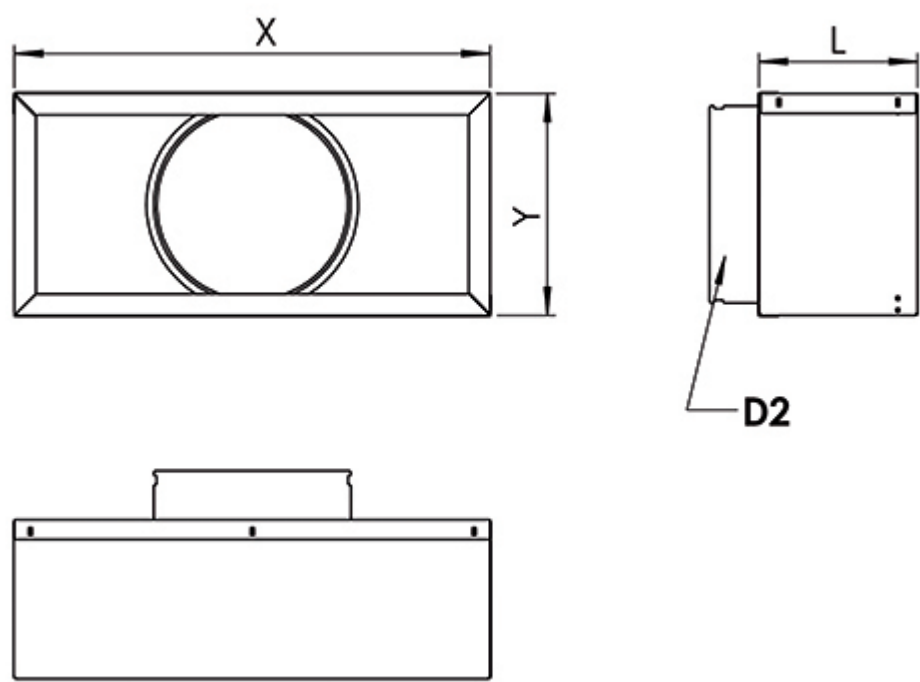


Description	D	X	Y	L
25 mm Insulation, I1	100	400	250	300
	125	400	250	300
	160	400	250	300
	200	600	280	300
	250	700	320	300
	315	800	400	500
	355	1000	450	600
	400	1000	450	600
	500	1300	550	600
40 mm Insulation, I2	100	430	280	300
	125	430	280	300
	160	430	280	300
	200	630	310	300
	250	730	350	300
	315	830	430	500
	355	1030	480	600
	400	1030	480	600
	500	1330	580	600

## Plenum PBO

Plenum with 1 circular outlet to be mounted downstream of the airflow management unit Halton BOX.

PBO dimensions



Description	D	X	Y	D2	L
25 mm insulation, I1	100	400	250	125	200
	125	400	250	160	200
	160	400	250	200	200
	200	600	280	250	200
	315	800	400	355	200
	355	1000	450	400	200
40 mm insulation, I2	100	430	280	125	200
	125	430	280	160	200
	160	430	280	200	200
	200	630	310	250	200
	315	830	430	355	200
	355	1030	480	400	200

Upon request, outlet plenum PBO:

- with side connection
- with several connections.

# Control

## Control units (CU)

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

### Airflow control

- For supply and exhaust installations
- Complete damper shutt off
- Operating ambient temperature range from 0 to 50°C
- Ambient relative humidity < 95%, non condensing
- Analog command signal: 0-10 V or 2-10 V.

#### Available airflow controllers:

EE	NMV-D3-MP (MP bus), 10 Nm
EC	LMV-D3-MP (MP bus), 5 Nm
EK	NMV-D3-MF.1 HI (DC 0/2...10 V), 10 Nm
EM	LMV-D3-MF.1 HI (DC 0/2...10 V), 5 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
HM	ECL-VAV-S. HAV (LonWorks), 5Nm
HK	ECL-VAV-N. HAV + NM24A-SR (LonWorks), 10 Nm

The EE, EC, EM and EK airflow controllers feature a differential pressure sensor crossed by a low rate. Therefore these airflow controllers must not be used in a highly contaminated environment. The EG airflow controller pressure sensor is a model with membrane and is therefore sealed and no flow can cross it.

The table below provides the nominal airflow control ranges for standard controls (nominal pressure: 150 Pa):

Size	Nominal rate		Minimal rate (standard)		Minimal rate (special)	
	m <sup>3</sup> /h	l/s	m <sup>3</sup> /h	l/s	m <sup>3</sup> /h	l/s
100	287	80	58	16	28	8
125	469	130	90	25	46	13
160	808	224	144	40	84	23
200	1210	336	227	63	136	38
250	1940	539	360	100	214	59
315	3145	874	569	158	353	98
355	4031	1120	736	204	444	123
400	5159	1433	900	250	617	171
500	8160	2267	1404	390	971	270

**Nominal rate:** Maximal admissible airflow for the Halton BOX

**Minimal airflow std:** Minimal airflow, value for standard controls

**Minimal airflow special:** Minimal airflow, value for control with static or quasi-static pressure sensor

## Pressure regulation

- Used for supply and exhaust
- Static pressure range depends on the probe (for example, EG control: adjustment from 0 to 300 Pa)
- Operating ambient temperature range from 0 to 50°C
- Ambient relative humidity < 95%, non condensing

**Available airflow controllers:**

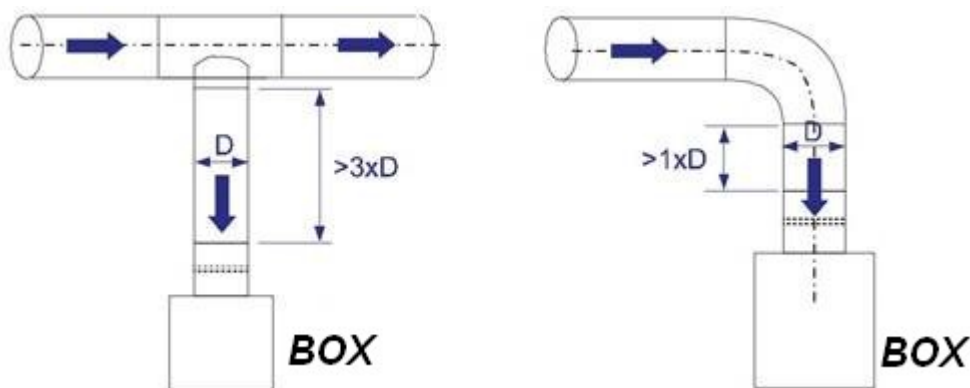
EG GLB181.1E/3 (DC 0/2...10V), 10 Nm

## Installation

### Safety distance

The Halton BOX airflow control damper is installed taking into account the required safety distances

(see figure). These distances are valid for supply and exhaust. If the safety distances below are not respected, the dynamic pressure measurement can be false.



For the supply, in static pressure control, the minimum safety distance for the static measurement unit after the control damper is  $5 \times D$  in supply air applications. However, the pressure sensor position is typically halfway along or in the last third of in the last third of the duct branch length.

## 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.

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

$q_v$  Actual airflow rate [l/s]

$k$  k factor of the product

$\Delta P_m$  Differential pressure of the measurement probe [Pa]

NS	k [l/s]	k [m <sup>3</sup> /h]
100	6,5	23,5
125	10,6	38,2
160	18,3	65,8
200	27,4	98,8
250	44	158,4
315	71,4	256,9
400	117	421,2
500	185,1	666,4

The EE, EC, EK and EM airflow controllers are equipped with a dynamic pressure differential sensor which is subjected to a low airflow. Therefore, a manual manometer cannot be connected in parallel with the airflow controller for differential pressure measurement. If a manual manometer is used, the airflow controller power supply shall be switched off in order to stop damper movement during measurement of the airflow probe differential pressure. Note that the duct pressure might

vary during the measurement.

The EG airflow controller is equipped with a static membrane pressure sensor including an automatic zero point calibration, and there is no 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.

## Specification

The Halton BOX airflow management unit is used for airflow adjustment in variable air volume installations, in supply as well as exhaust.

It is composed of:

- a circular inlet spigot equipped with an aluminium airflow measurement probe,
- a damper blade
- a rectangular part equipped with a sound attenuator, allowing air expansion.

The airflow measurement probe measures the average differential pressure across the whole surface of the inlet spigot, thus it allows the correct measurement of the airflow crossing the unit.

The damper actuator is made of two blades with a kinematic link, it enables the reduction of airborne noise as soon as the air enters the unit.

When closed, the damper is air tight.

The main blade is equipped with a gasket to reduce the friction and thus the needed torque of the actuator. The electric power consumption of the regulation loop is also reduced.

The Halton BOX casing airtightness is optimised by a construction with limited cuttings. The acoustic part of the unit shall be equipped with an asymmetric sound attenuator, enabling an additional acoustic attenuation, particularly in the low frequency-range.

The Halton BOX selection is carried out according to its airflow range.

The minimum and maximum airflow values are indicative and can differ by control type or brand. The Halton BOX is delivered factory-set according to the customer demand.

Factory parameters values as well as identification of the unit in the installation are marked on each unit.

This inside facing constitutes a smooth and washable surface thus limits the microbial development. Thus the unit can be used in areas such as hospitals, laboratories, electronic industries,... The unit is made of galvanised steel and measurement probes of aluminium.

The unit sound attenuation is made of Euroclass A2 s1 d0 high density mineral wool with coating to avoid tearing, even at high velocities. The insulating material is also inert to bacterial development and can be used in demanding spaces such as hospitals, laboratories, electronic

environment.

The unit can be equipped with a 40 mm thick insulation to reduce radiated noise emission.

For supply application, the unit can be equipped with a hot water reheater or an electric reheater.

## Order code

### BOX-V-M-D; CU-SE-TF-IN-ZT

Main options	
<b>V = Version</b>	
L	Long
S	Short
<b>M = Model</b>	
S	Supply
E	Exhaust
<b>D = Duct connection size [mm]</b>	100, 125, 160, 200, 250, 315, 355, 400, 500



Other options and accessories	
<b>CU = Control units</b>	
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
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
HM	ECL-VAV-S, HAV (LonWorks), 5Nm
HK	ECL-VAV-N, HAV + NM24A-SR (LonWorks), 10 Nm
<b>SE = Sensors</b>	
NA	Not assigned
DS1	Duct sensor (CO <sub>2</sub> G, Duct CO <sub>2</sub> )
P1	Differential pressure transmitter (HDP-PE)
<b>TF = Transformer</b>	
NA	Not assigned
TF1	230/24 transformer (35VA)
<b>IN = Insulation</b>	
I1	25 mm (standard)
I2	40 mm

<b>ZT = Tailored product</b>	
N	No
Y	Yes (ETO)

## Order code example

BOX-L-S-200; CU=EM, SE=DS1, TF=NA, IN=I1, ZT=N