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

Contents

1 Introduction

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1.2 About this document

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

1.3 Summary of changes

Release	Date	Description
1.1	07.04.2026	2.8 Control unit and 2.10 Order code: Added two new actuators T9 and T11.
1.0	13.01.2026	First approved version in Heretto (the content is moved from WordPress)

2 Product description

2.1 Overview

Fig. 1. Halton Max MLC, overview

The Halton Max MLC airflow management damper can be installed without safety distances in all installation cases. It can operate either in duct static pressure control mode or duct airflow control mode depending on chosen control unit. The airflow management damper is designed to function also at very low air velocity and pressure.

Applications

- For demanding and flexible office space requirements as minimal need of safety distance
- Supply and exhaust installations

Key features

- Air velocity range 0.5 — 6 m/s
- Airflow is measured with calibrated orifice plate
- Pressure-independent operation
- Duct static pressure control and airflow rate control modes are available
- For duct static pressure control used with the Halton MSS
- Insensitive to dust collection in ductwork
- Project specific settings are preset at the factory
- Wide range of control units available (analog, Modbus, BACnet/IP, LON,...).
- Can be connected to Buildings Management System (BMS)

Standards

- Casing tightness EN 1751 class C
- Shut-off operation tightness fulfils EN 1751 class 4

2.2 Operating principle

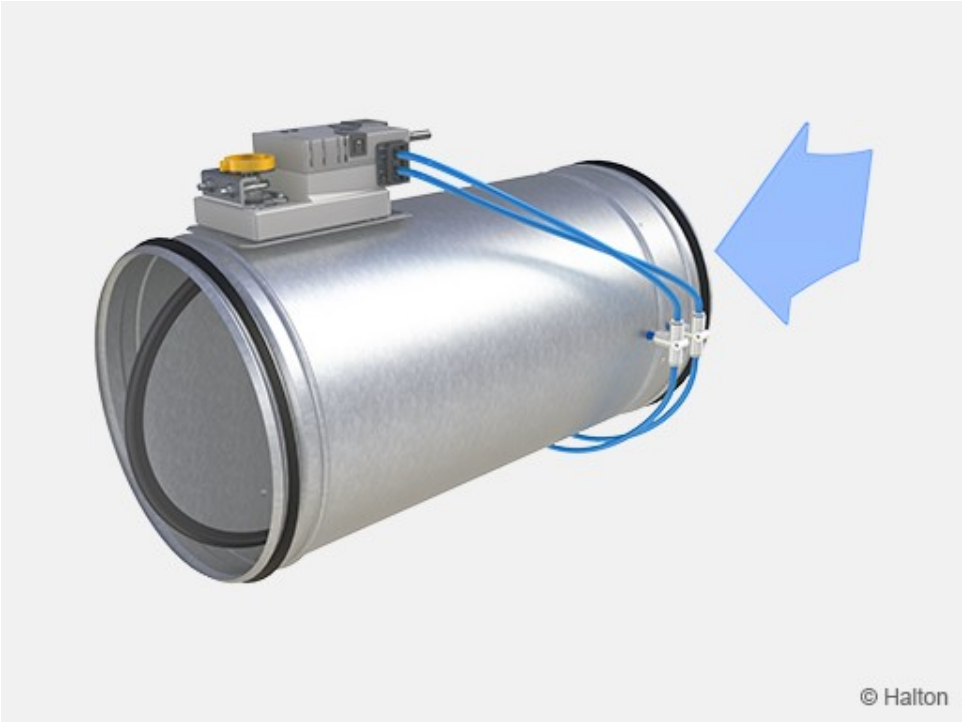


Fig. 2. Halton Max MLC, operating principle

The damper contains airflow measurement with orifice plate, a VAV airflow controller, an actuator and a blade with gasket. Depending on the actuator model, the VAV controller is a separate unit or integrated into the actuator.

The damper can operate either as a supply or an exhaust unit. It maintains the required airflow level or pressure level through static pressure measurement. For ductwork static pressure control, static pressure measurement unit (MSS) with pressure transmitter is used for zone ductwork static pressure measurement.

Changes in room conditions can be adjusted manually from an end-user interface or by different sensors such as occupancy or room pressure sensors, thermostats or timers. The conditions can also be managed remotely from a building management system (BMS). The control signal and the airflow measurement data from the pickup tubes are processed in the VAV controller. The VAV controller gives the actuator a command to change the position of the damper blade, in order to keep the airflow at the predefined setpoint.

The airflow setpoint can be modified between minimum and maximum settings from the room controller interface or a BMS. The VAV controller can also send actual value data back to the room interface controller. The communication protocol used for the signal between the room control interface and the VAV controller depends on the actuator model.

For more information about the available actuator models, see section ***Control units***.

2.3 Key technical data

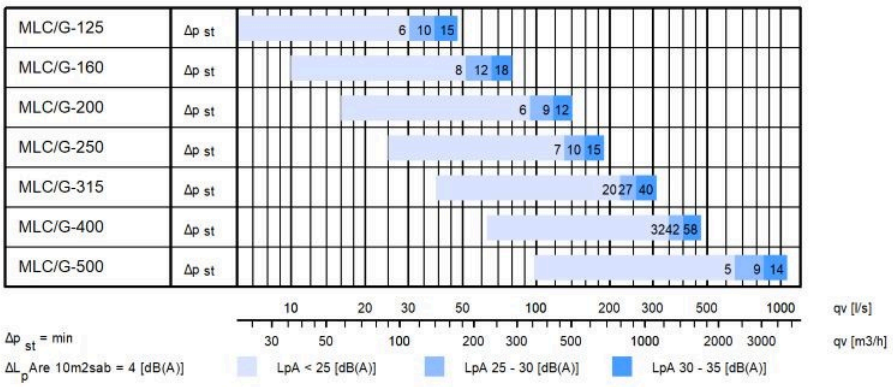
Feature	Value
Duct connection sizes	ø125-500 mm
Material	Galvanised steel

Feature	Value
Air velocity range	▪ 0.5 - 6 m/s for airflow control ▪ 0.5 – 5 m/s for static pressure control (up to 4 m/s for most optimal operation)
Operating range (ambient temperature)	0-50 °C
Ambient relative humidity (non-condensing)	< 95%
Operating modes ▪ Static pressure control ▪ Airflow control	▪ Complete shut off function ▪ Maximum differential pressure over the damper 500 Pa ▪ Static pressure setpoint range 40 to 200 Pa in static pressure control mode
Accessories	▪ Insulation 50 mm mineral wool for air radiated sound and condensation purposes
Standards and certifications	▪ Building material declaration, declaration of conformity ▪ Casing tightness EN 1751 class C ▪ Shut-off operation tightness fulfils EN 1751 class 4

2.4 Quick selection

The operable airflow range for Halton Max MLC corresponds to duct air velocities 0.5 - 6 m/s.

The below example shows the airflow ranges and noise levels with damper blade fully open.



2.5 Dimensions and weight

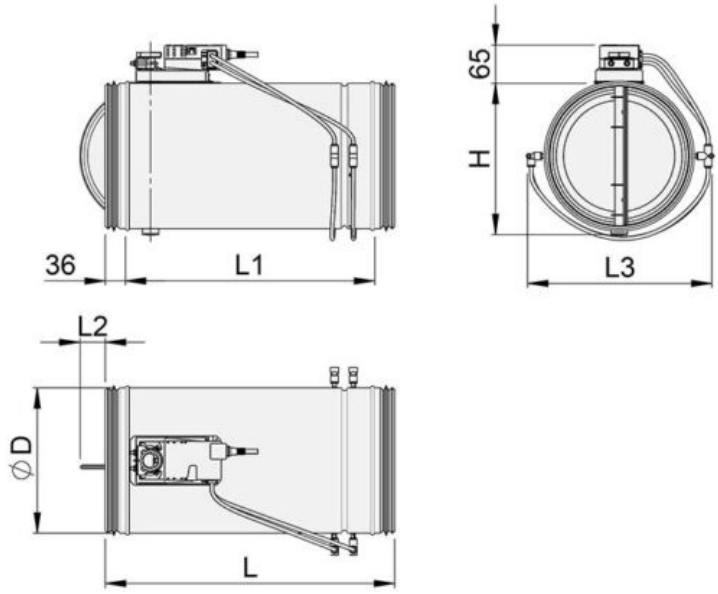


Fig. 3. Halton Max MLC, model without insulation

NS [mm]	øD [mm]	L [mm]	L1 [mm]	L2 [mm]	L3 [mm]	H [mm]	Weight [kg
125	124	329	257	-	184	134	2.3
160	159	329	257	-	219	169	2.6
200	199	494	422	15	259	209	3.3
250	249	494	422	38	309	259	3.9
315	314	494	422	70	374	324	-
400	399	620	545	115	459	409	-
500	499	620	545	95	559	509	-

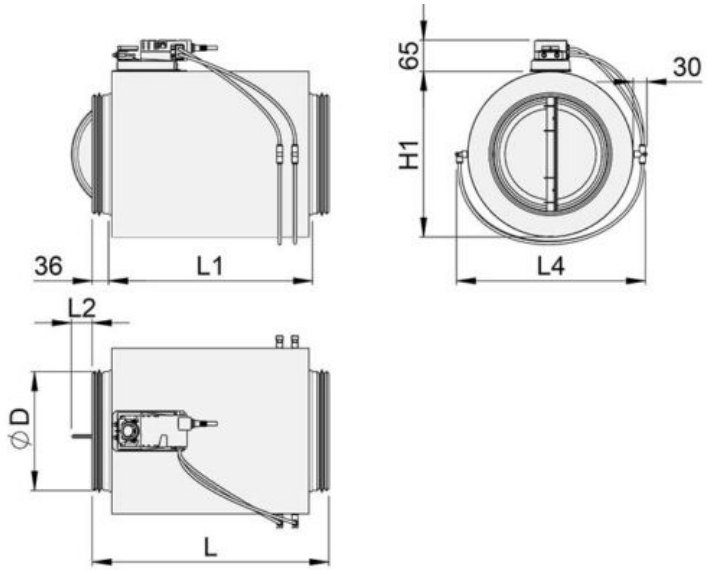
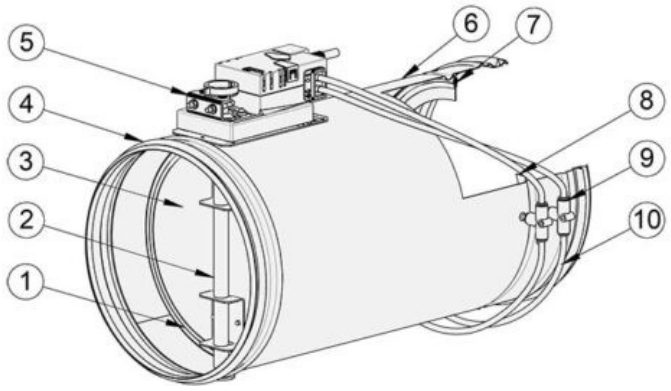


Fig. 4. Halton Max MLC, model with insulation [50 mm]

NS [mm]	øD [mm]	L [mm]	L1 [mm]	L2 [mm]	L4 [mm]	H [mm]	Weight [kg
125	124	329	257	-	305	225	2.7
160	159	329	257	-	340	260	3.6
200	199	494	422	15	380	300	4.4
250	249	494	422	38	430	350	5.3
315	314	494	422	70	495	415	-
400	399	620	545	115	580	500	-
500	499	620	545	95	680	600	-

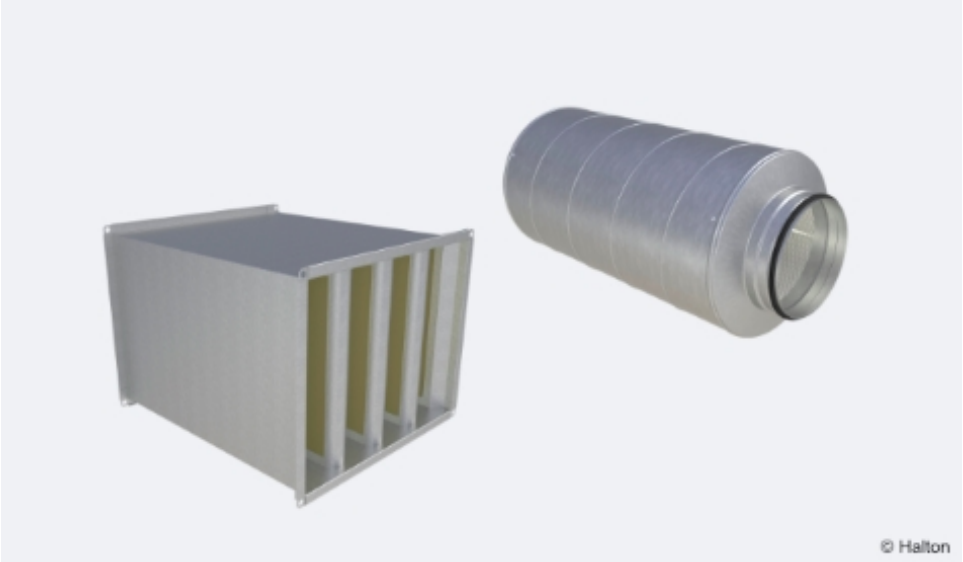
2.6 Structure and materials



No.	Part	Description	Note
1	Blade gasket	EPDM rubber	-
2	Shaft	Galvanised steel	-
3	Blade	Galvanised steel	-
4	Duct seal gasket	Rubber	-
5	Control unit	Plastic, steel, PVC cable	-
6	Casing	Galvanised steel	-
7	Orifice plate gasket	EPDM rubber	-
8	Orifice plate	Galvanised steel	-
9	Tube connectors	Polyacetal	-
10	Measurement tabs	Polyurethane	-

2.7 Features and options

Sound attenuator (SA)



Halton SA's rectangular and circular sound attenuators are constructed from high-quality materials They are made from galvanized steel and incorporate sound-absorbing materials such as mineral wool and polyester fibre, enhancing their noise absorption capacity. These sound attenuators are available as an accessory.

More information: *Link to technical description*

Duct sensor (DS1 = CO_2G, Duct CO_2)

The transmitter designed to be installed in HVAC return air ducts. The size of the board and the dimensions of the case have been optimized to place the transmitter in small, i.e. 160 mm diameter, return air ducts. This product offers a sleek design, a simple analog output, and it is easy to install. The transmitter includes mounting hardware and installation instructions.

More information: *Link to technical description*

Differential pressure transmitter (P1 = HDP-PE)

The Halton HDP-PE differential pressure sensor is a pressure-measuring device, used to measure differential pressures in the duct. It gives an accurate measurement of the airflow. The influence of process disturbances can be filtered by increasing the time constant.

More information: ***Link to technical description***

Transformer (TF1 = 230/24 transformer (35VA)

Transmitter 35 VA for DIN rail installation.

More information: ***Link to technical description***

2.8 Control units

A range of control units are available for various application needs.

All control units 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.

Controller	Notes	Torque [Nm]	Damper size	Communication interface	Order code (with link to datasheet)
Halton EM	Analogue controller Manufacturer: Belimo	5	125-250	DC0..10V/ 2..10V	EM = LMV-D3-MF-F.1 HI (DC 0/2...10 V), 5 Nm
Halton EK	Analogue controller Manufacturer: Belimo	10	125-500	DC0..10V/ 2..10V	EK = NMV-D3-MF-F.1 HI (DC 0/2...10 V), 10 Nm
Halton EC	Controller with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	5	125-250	Belimo MP bus or 0..10V/2..10V	EC = *LMV-D3-MP (MP bus), 5 Nm*
Halton EE	Controller with NFC connectivity for mobile onsite parameter adjustment (Belimo Assistant App). Analogue or MPbus. Manufacturer: Belimo	10	125-500	Belimo MP bus or 0..10V/2..10V	EE = *NMV-D3-MP (MP bus), 10 Nm*
Halton ER	Controller with KNX Manufacturer: Belimo	5	125-250	KNX	ER = *LMV-D3-KNX (KNX bus), 5 Nm*
Halton ES	Controller with KNX Manufacturer: Belimo	50	125-500	KNX	ES = *NMV-D3-KNX (KNX bus), 10 Nm*
Halton ET	Controller with Modbus Manufacturer: Belimo	5	125-250	Modbus	ET = *LMV-D3-MOD (Modbus RTU), 5 Nm*

Controller	Notes	Torque [Nm]	Damper size	Communication interface	Order code (with link to datasheet)
Halton EU	Controller with Modbus Manufacturer: Belimo	10	125-500	Modbus	EU = *NMV-D3-MOD (Modbus RTU), 10 Nm*
Halton EH	Analogue controller Manufacturer: Siemens	5	125-250	DC0..10V/ 2..10V	EH = *GDB181.1E/3 (DC 0/2...10 V), 5 Nm*
Halton EG	Analogue controller Manufacturer: Siemens	10	125-500	DC0..10V/ 2..10V	EG = *GLB181.1E/3 (DC 0/2...10V), 10 Nm*
Halton EV	Controller with KNX Manufacturer: Siemens	5	125-250	KNX communication	EV = *GDB181.1E/KN (KNX bus), 5 Nm*
Halton T9	Controller with Modbus Manufacturer: Halton	5	125-250	DC0-10V and Modbus	T9 = NSVA-MOD-5H (DC 0-10 V and Modbus RTU), 5 Nm
Halton T11	Controller with Modbus Manufacturer: Halton	10	125-500	DC0-10V and Modbus	T9 = NSVA-MOD-10H (DC 0-10 V and Modbus RTU), 10 Nm
Halton V1	Analogue controller Manufacturer: Belimo	5	125-250	DC0..10V/ 2..10V	V1 = *LM24A-VST, (DC 0/2...10 V), 5 Nm* + *VRU-D3-BAC*
Halton V2	Analogue controller Manufacturer: Belimo	10	125-500	DC0..10V/ 2..10V	V2 = *NMQ24A-VST, (DC 0/2...10 V), 10 Nm* + *VRU-D3-BAC*
Halton V3	Analogue controller Manufacturer: Belimo	4	125-250	DC0..10V/ 2..10V	V3 = *LMQ24A-VST, 2.5 sec (DC 0/2...10 V), 4 Nm* + *VRU-D3-BAC*

Controller	Notes	Torque [Nm]	Damper size	Communication interface	Order code (with link to datasheet)
Halton V4	Analogue controller Manufacturer: Belimo	8	125-500	DC0..10V/ 2..10V	V4 = *NMQ24A-VST, 4 sec (DC 0/ 2...10 V), 8 Nm* + *VRU-D3-BAC*
Halton EW	Actuator with KNX Manufacturer: Siemens	10	125-500	KNX communication	EW = *GLB181.1E/ KN (KNX bus), 10 Nm*
Halton EB	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	5	125-250	Modbus communication	EB = *GDB181.1E/ MO (Modbus RTU), 5 Nm*
Halton EF	Actuator with Modbus RTU (RS-485) Manufacturer: Siemens	10	125-500	Modbus communication	EF = *GLB181.1E/ MO (Modbus RTU), 10 Nm*
Halton HM	Controller include actuator with LonWorks Manufacturer: Distech	5	125-250	LonWorks communication	HM = ECL-VAV-S, HAV (LonWorks), 5Nm
Halton HK	Modulating actuator from Belimo: Controller LonWorks Manufacturer: Distech	10	125-500	LonWorks communication	HK = ECL-VAV-N, HAV + NM24A-SR (LonWorks), 10 Nm

2.9 Specification

The pressure-independent variable airflow management damper is made of galvanised steel, airflow measurement with orifice plate. Duct connection shall include integral airtight rubber gaskets.

The management damper shall contain airflow measurement, flow controller and damper actuator. It can operate either in duct static pressure control mode or duct airflow control mode.

The airflow management damper can be installed without safety distances.

Construction

- Damper includes airflow measurement with orifice plate and damper control unit.
- Duct connection includes integral airtight rubber gaskets.

- Damper with blade gasket: the tightness of the control damper in closed position conforms to standard EN1751 class 4 and casing tightness to EN 1751 class C.
- Damper with optional external insulation include a 50 mm mineral wool insulation layer
- Closing blade with gasket ensure complete shut-off function

Material

- Galvanised steel

Parameter settings

- Project specific parameters are preset at the factory according to customer specific requirements.

2.10 Order code

MLC-S-D; MA-CU-SE-TF-ZT

Main options	
S = Model	
G	Damper with blade gasket
I	Damper with blade gasket, insulation 50 mm
D = Duct connection size [mm]	125, 160, 200, 250, 315, 400, 500

Other options and accessories	
MA = Material	
GS	Galvanised steel
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
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
T9	T9 = NSVA-MOD-5H (DC 0-10 V and Modbus RTU), 5 Nm

Other options and accessories	
T11	T9 = NSVA-MOD-10H (DC 0-10 V and 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
EW	GLB181.1E/KN (KNX bus), 10 Nm
EB	GDB181.1E/MO (Modbus RTU), 5 Nm
EF	GLB181.1E/MO (Modbus RTU), 10 Nm
HM	ECL-VAV-S, HAV (LonWorks), 5Nm
HK	ECL-VAV-N, HAV + NM24A-SR (LonWorks), 10 Nm
SE = Sensors	
NA	Not assigned
DS1	Duct sensor (CO_2G, 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)

Sub-products amd accessories (order separately)	
SA	Sound attenuator

Order code example
MLC-G-160, MA=GS, CU=ER, SE=P1, TF=NA, ZT=N

3 Design information

3.1 Installation

Installation option

The Halton Max MLC airflow control damper can be installed without safety distances. Accuracy of the measured airflow is given in a table below. Install the unit into ductwork in such a way that the airflow direction

through the unit is as indicated with the arrow label in the unit casing.

Space requirements

Disturbances in the ductwork such as duct bends, T-branches and sound attenuators cause turbulence and an uneven airflow. This can lead to fluctuation and inaccuracy in measurement values.

The space between airflow damper and above mentioned disturbance can be set to 0D. Picture below demonstrates what 0D means (Fig. 5.). The accuracy varies according airflow and unit size (see chapter below: Accuracy of measurement with different airflows).

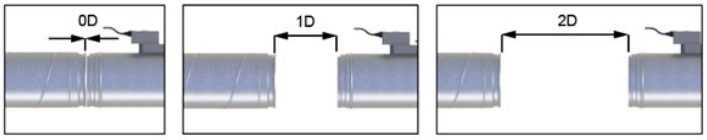


Fig. 5. Safety distance examples

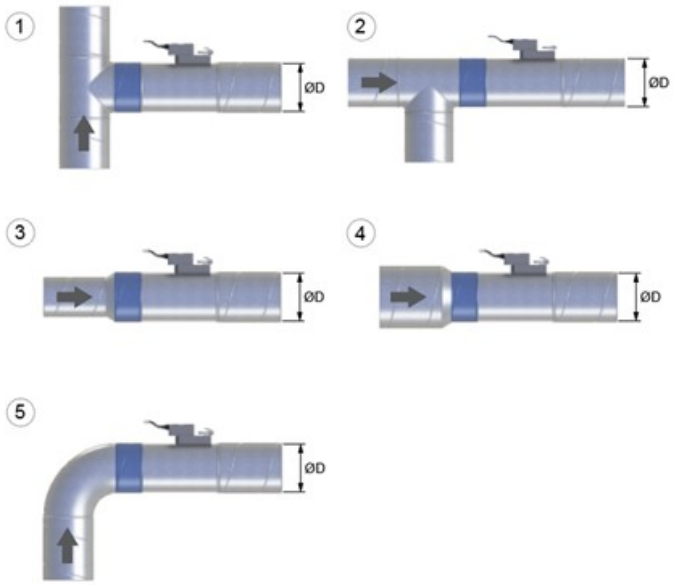


Fig. 6. Installation cases

Safety distances of Halton Max MLC

Nr.	Installation cases	Safety distance
1	T-branch, side duct	0D
2	T-branch, main duct	0D
3	Reducer, < D	0D
4	Reducer, > D	0D
5	Bend, elbow 90°	0D

Accuracy of measurement with different airflows

Size	Airflow [l/s]	Airflow [m3/h]	Accuracy of measurement with øD [%]
125	7	24.8	15

Size	Airflow [l/s]	Airflow [m3/h]	Accuracy of measurement with øD [%]
	28	100	10
	53	190	8
	74	266	5
160	10	36	15
	40	145	10
	81	290	8
	121	434	5
200	16	56.5	15
	63	226	10
	126	452	8
	188	678	5
250	25	19	15
	98	354	10
	197	710	8
	294	1060	5
315	39	140	15
	153	562	10
	312	1123	8
	468	1685	5
400	63	227	15
	251	904	10
	503	1811	8
	754	2714	5
500	98	353	15
	393	1415	10
	785	2826	8
	1178	4241	5

Pressure control

In pressure control operation, the recommended safety distance between Halton Max MLC airflow damper and Halton MSS measuring unit is min. 5D (Fig.7.)

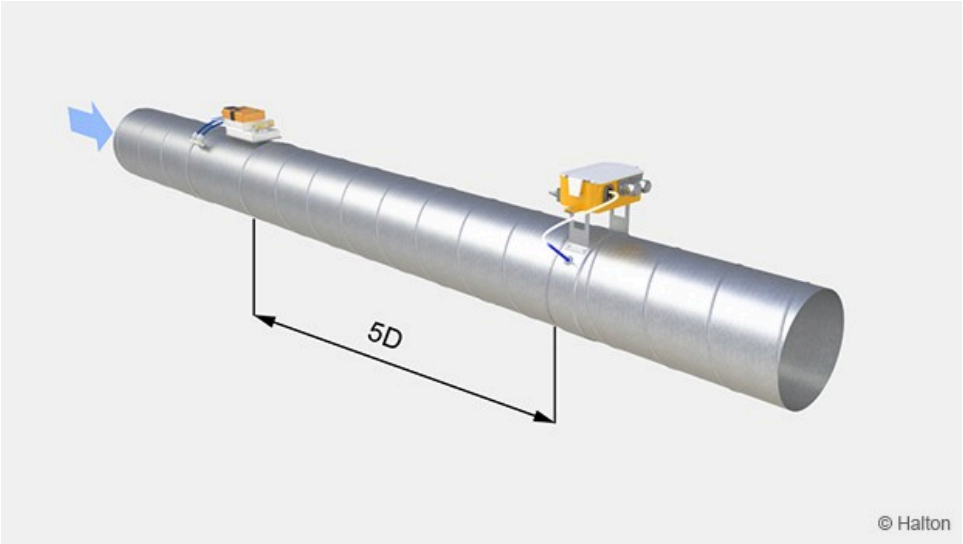
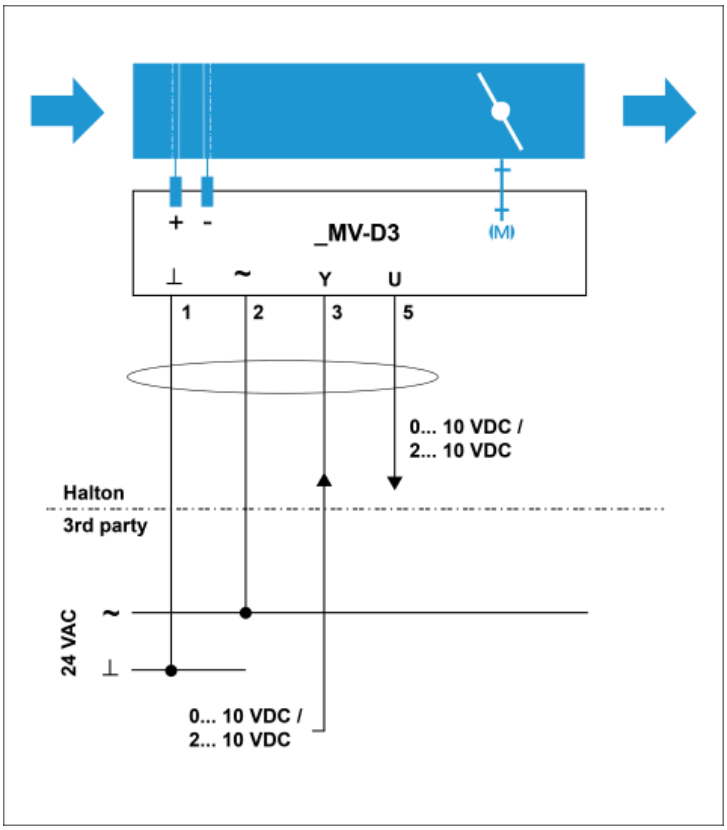


Fig. 7. Halton Max MLC and Halton MSS, safety distance min. 5D

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.

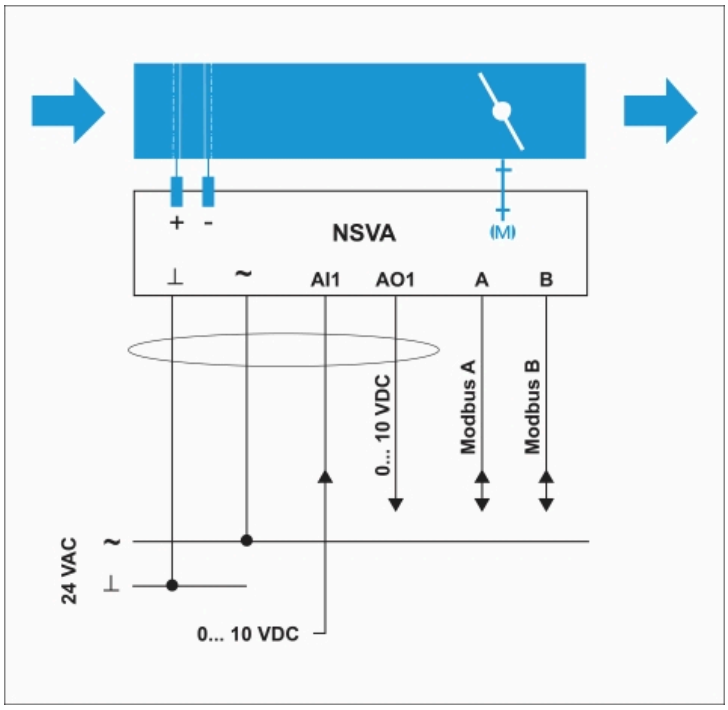
The responsibilities between Halton and 3rd party are specified in the following example wiring diagram for a typical variable airflow control application:



No.	Key	Description
1	⊥	24 VAC system neutral
2	~	24 VAC live

No.	Key	Description
3	Y	2...10- or 0...10-VDC airflow setpoint signal input
5	U5	2...10- or 0...10-VDC airflow feedback signal output

The following picture shows a typical variable airflow control application without cables.



Wire colour	Key	Description
Black	⊥	24 VAC system neutral
Red	~	24 VAC live
Gray	AI1	Analog input
Purple	AO1	Output for airflow feedback signal
Yellow	A	Data receive/send line A
Green	B	Data receive/send line B

3.2 Commissioning

Airflow control

Airflow rate ranges of the Halton Max MLC are presented in the table below. The airflow rate range is valid both for pressure and airflow control applications.

NS [mm]	l/s min @ 0.5 m/s	l/s max @ 6 m/s	m^3/h min @ 0.5 m/s	m^3/h max @ 6 m/s
125	6.9	74.0	24.8	266.0

NS [mm]	l/s min @ 0.5 m/s	l/s max @ 6 m/s	m^3/h min @ 0.5 m/s	m^3/h max @ 6 m/s
160	10.0	121.0	36.0	434.0
200	15.9	188.4	56.5	678.0
250	25.0	294.4	90.0	1060.0
315	39.0	468.0	140.0	1683.0
400	63.0	754.0	226.0	2714.0
500	98.0	1178.0	353.0	4241.0

The actual airflow rate can be calculated as a function of differential pressure at the Halton Max MLC 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] or [m3/h]
Δp_m	Differential pressure of measurement probe [Pa]
k	k-factor (see table below)

NS [mm]	k-factor [l/s]	k-factor [m^3/h]
125	7.5	27.0
160	11.3	40.7
200	21.7	78.1
250	27.7	99.7
315	44.1	158.8
400	67.3	242.3
500	101.8	366.5

Duct pressure control

The actual measured static pressure can be read from the LED display of the Halton MSS static pressure measurement unit with pressure transmitter. Pressure values can be read as network variables.