Private: Halton HFS – Static pressure control damper

Overview

Terminated as of 1st December 2021 -> replaced with Halton Max One Circular (MOC)

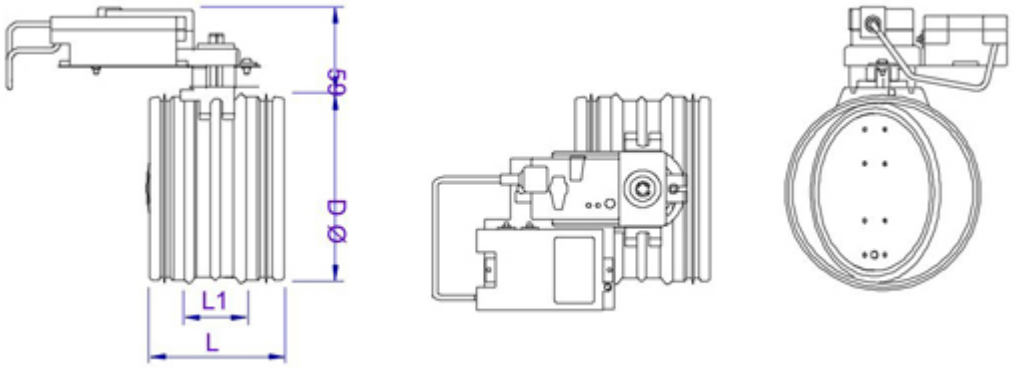
- Duct pressure control application
- The static pressure control damper HFS is designed to be used in combination with static pressure measurement unit MSS to maintain the desired constant duct pressure
- Circular duct connection equipped with integrated rubber gaskets
- Shut-off operation available, tightness fulfills EN 1751, class 4 requirements
- Casing tightness classification: EN 1751, Class C
- Galvanized steel design

Product models and accessories

- Model with extended actuator platform to allow insulation work on site
- Insulated model with external metal sheet cover
- Integrated flow measurement unit (manual or with 0...10 V output signal) as an accessory
- Several sound attenuator models

Dimensions and weight

Halton HFS/G, without measurement unit (MU=NA)

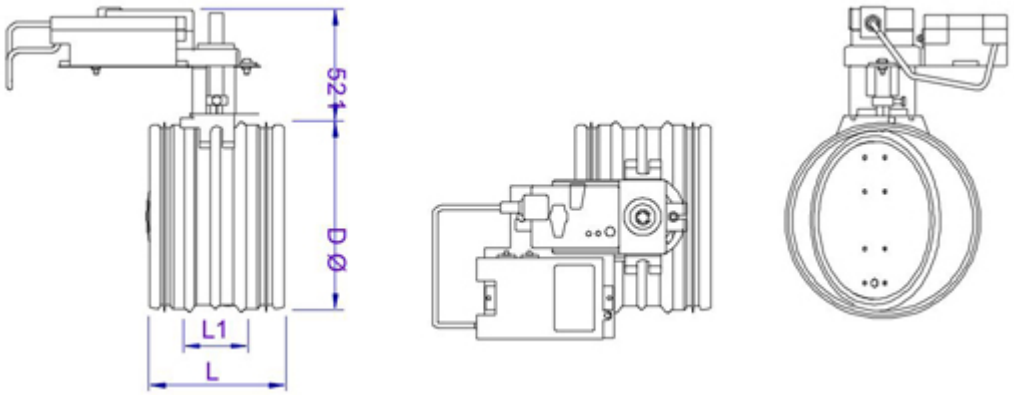


NS	L	L1	ØD
200	145	70	199
250	145	70	249
315	145	70	314
400	245	175	399
500	245	175	499

Weight

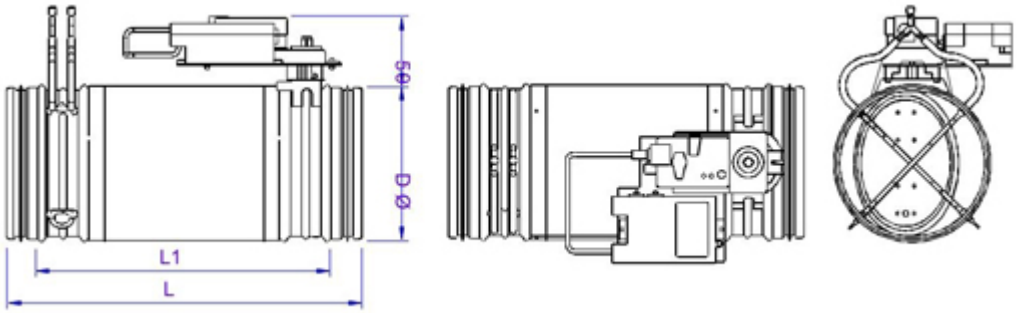
NS	kg
200	2,36
250	2,74
315	3,35
400	4,58
500	6,14

Halton HFS/E, without measurement unit, with extended actuator plattform (MU=NA)



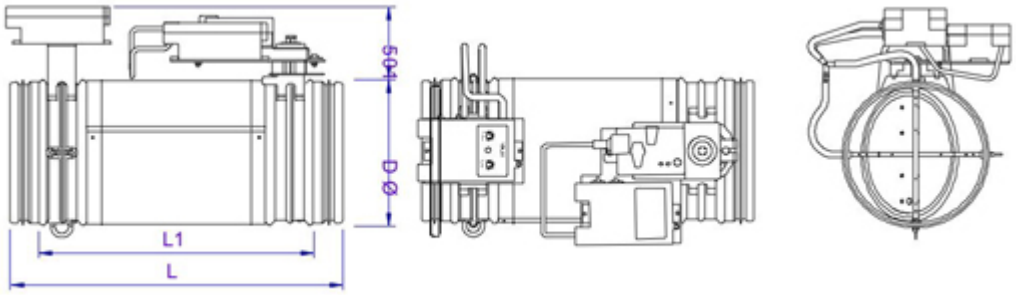
NS	L	L1	ØD
200	145	70	199
250	145	70	249
315	145	70	314
400	245	175	399
500	245	175	499

Halton HFS/G, with manual measurement (MU=A)



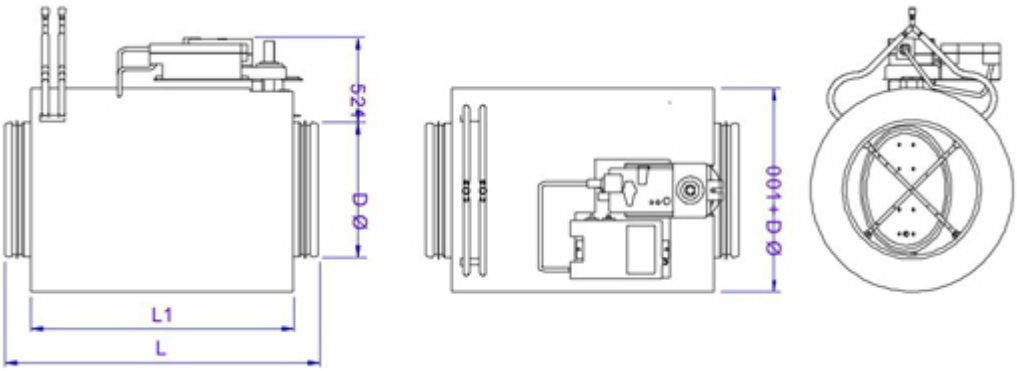
NS	L	L1	ØD
200	470	398	199
250	470	398	249
315	470	398	314
400	625	553	399
500	625	553	499

Halton HFS/G, with electrical measurement unit 0...10 V (MU=B)



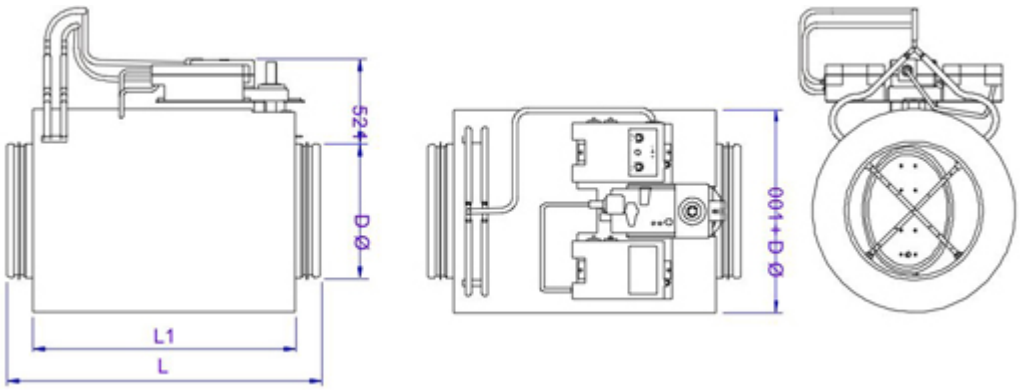
NS	L	L1	ØD
200	470	398	199
250	470	398	249
315	470	398	314
400	625	553	399
500	625	553	499

Halton HFS/I, with manual measurement unit and insulation (MU=A)



NS	L	L1	ØD
200	465	393	199
250	465	393	249
315	465	393	314
400	675	603	399
500	675	603	499

Halton HFS/I, with electrical measurement unit 0...10 V and insulation (MU=B)



NS	L	L1	ØD
200	465	393	199
250	465	393	249
315	465	393	314
400	675	603	399
500	675	603	499

Material

Part	Material	Note
Casing	Galvanised steel	
Damper blade	Galvanised steel	
Shaft	Zinc coated steel	
Bearings	Plastic	
Blade gasket	EPDM rubber	
Duct gasket	1C-polyurethane hybrid	
Measurement probe	Aluminium	
External insulation	Mineral wool	Model HFS/I
Additional casing	Galvanised steel	Model HFS/I

Duct connection gaskets are vulcanised to the casing.

Function

The static pressure control damper Halton HFS maintains the desired constant duct pressure based on a static pressure measurement signal from Halton MSS unit (0...10 VDC).

Halton HFS features:

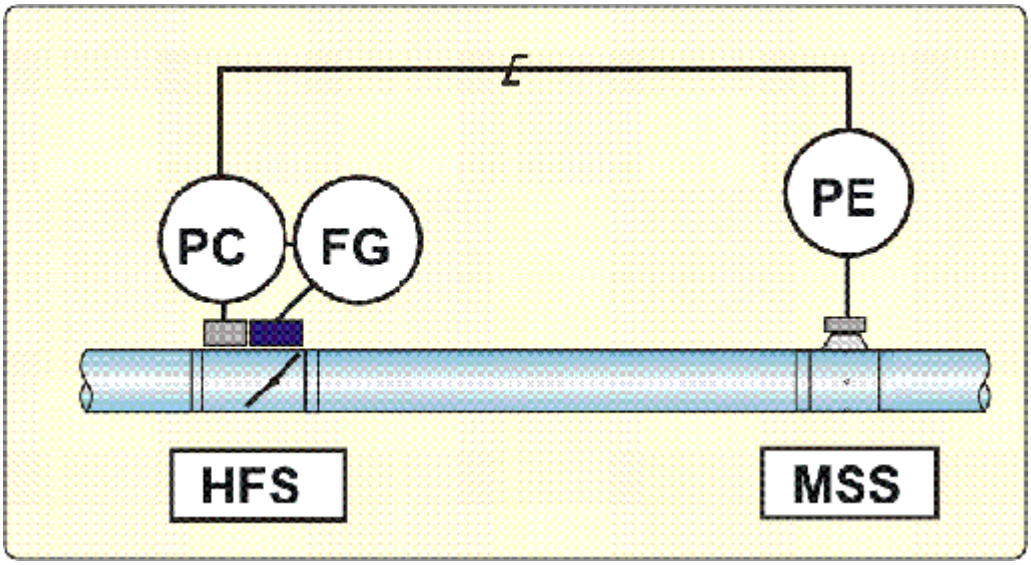
- For supply and exhaust installations
- Complete shut-off function
- Static pressure set point range of 0...1000 Pa (see MSS specifications)
- Maximum differential pressure over the damper of 500 Pa
- Operating range: ambient temperature of 0 to 50 °C
- Ambient relative humidity < 95%, non-condensing

Optimal and steady operation is ensured by using the Halton MSS static pressure measurement unit. The given safety distances shall be applied. Do not use any other pressure measurement units in order to ensure proper control accuracy.

The Halton MSS has several pressure measurement ranges, 0...100 Pa, 0...200 Pa (default), 0...500 Pa and 0...1000 Pa.

Airflow measurement may be done manually using model HFS-A and manometer.
Using model Halton HFS-B actual airflow rate is available as 0...10 VDC or 2...10 VDC signal.

The Halton HFS control damper contains a pressure controller (PC), which controls the damper actuator (FG) based on the feedback signal from the Halton MSS pressure transmitter (PE) so that the set value is realised.



Product models

Halton HFS static pressure control damper is available in several versions.
The blade gasket enables airtight shut-off operation, and external insulation is used to attenuate

radiated sound into the space and reduce heat transfer. Insulation model is covered with metal casing.

Model	Feature	Tightness
HFS/G NA	Static pressure control with blade gasket	EN 1751, class 4 and C
HFS/E NA	Static pressure control with extended actuator rack to allow insulation work on site	EN 1751, class 4 and C
HFS/G A	Static pressure control and manual air flow measurement unit with blade gasket	EN 1751, class 4 and C
HFS/I A	Static pressure control and manual air flow measurement unit with blade gasket and 50 mm insulation	EN 1751, class 4 and C
HFS/G B	Static pressure control with air flow measurement unit (output signal 0...10 VDC) and blade gasket	EN 1751, class 4 and C
HFS/I B	Static pressure control with air flow measurement unit (output signal 0...10 VDC), blade gasket and 50 mm insulation	EN 1751, class 4 and C

The Halton HFS control damper contains a pressure controller (PC), which controls the damper actuator (FG) based on the feedback signal from the MSS pressure transmitter (PE) so that the set value is realised.

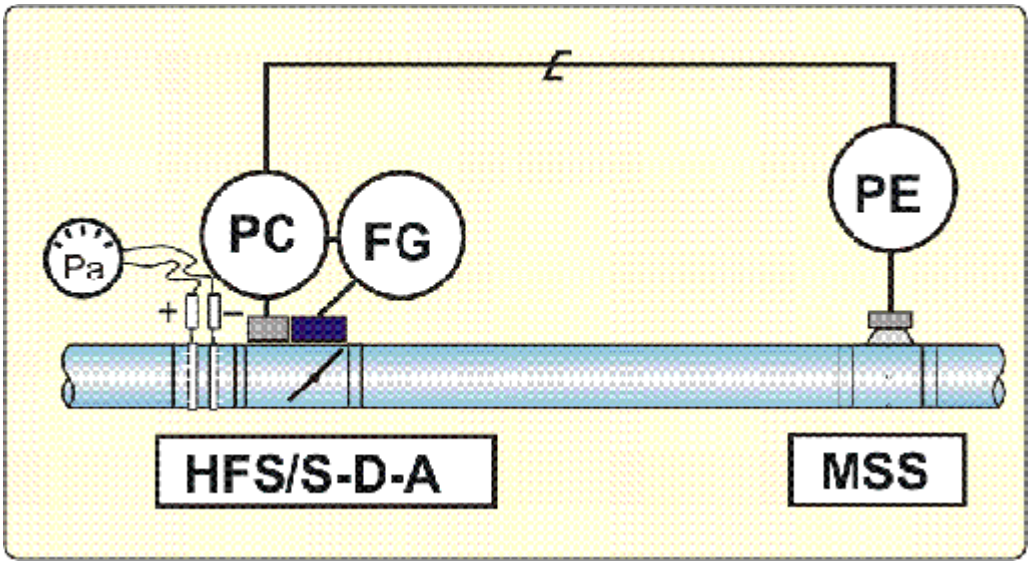


Fig.1. Pressure control damper with manual air flow measurement

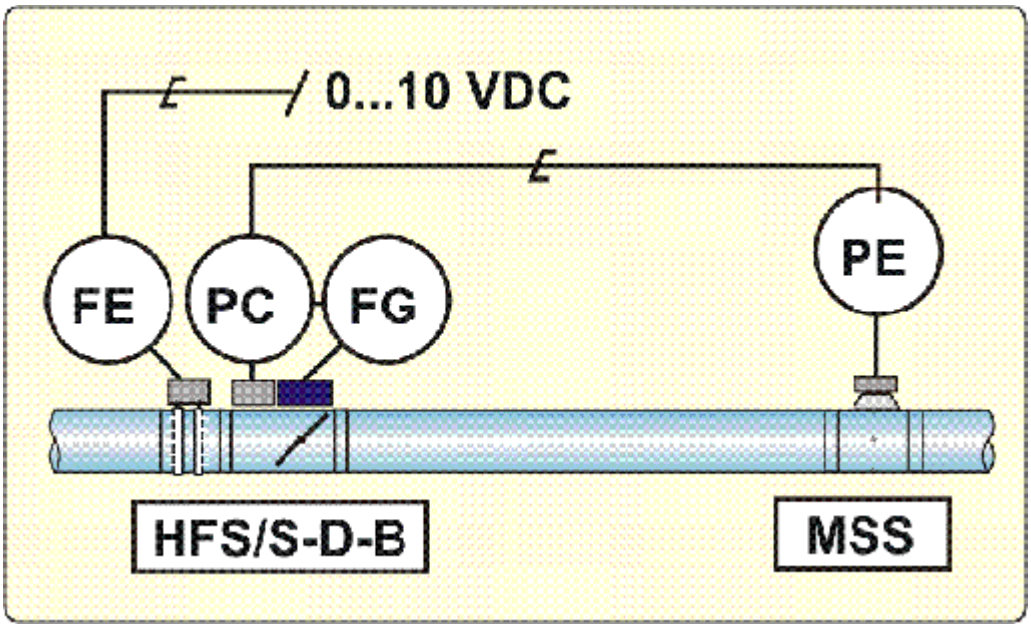


Fig.2. Pressure control damper with air flow measurement unit

Control unit (CU)

All HFS models are equipped with pressure controller Belimo VRP-STP and actuator NM24A-V (CU=EP). When model Halton HFS/S-D-B is chosen, Halton HFS has an integrated flow measurement unit (Halton MSD) and an analog signal transmitter for measured flow.

Set point can be adjusted locally by set point potentiometer or remotely using 2-10Vdc signal.

See Halton MSS and Halton MSD technical data from HIT section for those in question.

Sound attenuators

Sound attenuators are available with optional outlet diameters with mineral wool (MW) or polyester fibre (PEF) insulation materials and with 600 mm and 1000 mm lengths. Optionally the attenuator can be equipped with an access panel for cleaning and inspection purposes.

H1...H8 Attenuator without access panel
H11...H18 Attenuator with access panel

The connection (D1) is female type for direct connection to the Halton HFS pressure control damper. The duct connection (D2) is male type and either damper size or one size larger. Technical information is based on bigger of the duct connections (D2).

	Diameter D1<= D2	Material	Length (mm)	Access panel
H1	D1 = D2	MW	600	No
H2	D1 = D2	MW	1000	No
H3	D1 = D2	PEF	600	No
H4	D1 = D2	PEF	1000	No
H5	D1 < D2	MW	600	No
H6	D1 < D2	MW	1000	No
H7	D1 < D2	PEF	600	No
H8	D1 < D2	PEF	1000	No
H11	D1 = D2	MW	600	Yes
H12	D1 = D2	MW	1000	Yes
H13	D1 = D2	PEF	600	Yes
H14	D1 = D2	PEF	1000	Yes
H15	D1 < D2	MW	600	Yes
H16	D1 < D2	MW	1000	Yes
H17	D1 < D2	PEF	600	Yes
H18	D1 < D2	PEF	1000	Yes

Attenuator dimensions

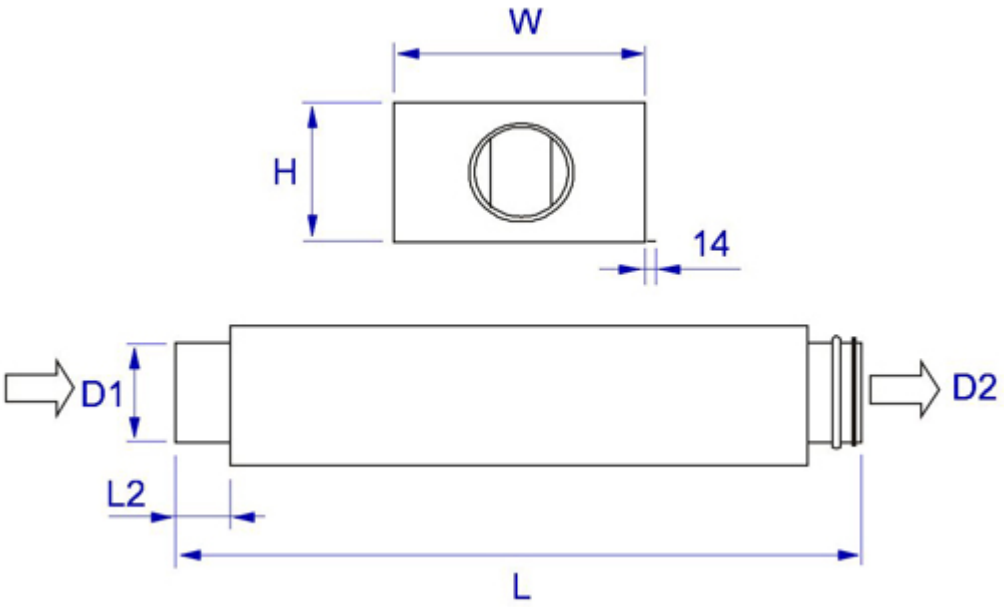


Fig.1. Supply air installation. In exhaust installation the airflow direction is vice versa, from D2 to D1.

D1/D2	D1/D2	Nominal length	L (mm)	L2 (mm)	W (mm)	H (mm)	MW Weight (kg)	PEF Weight (kg)
160/160	125/160	600	626	22	282	214	6.5	5.7
		1000	1036	22	282	214	9.8	8.6
200/200	160/200	600	626	22	341	254	8.2	7.2
		1000	1036	22	341	254	12.3	10.7
250/250	200/250	600	626	32	392	304	10.0	8.8
		1000	1036	32	392	304	14.8	12.8
315/315	250/315	600	626	32	458	369	12.3	10.7
		1000	1036	32	458	369	18.0	15.4
400/400	315/400	600	626	57	519	455	18.9	16.9
		1000	1036	57	519	455	27.6	24.1
500/500	400/500	600	626	57	702	555	28.6	24.2
		1000	1036	57	702	555	39.1	36.1
500/630		600	626	67	832	685	32.3	28.4
		1000	1036	67	832	685	50.3	43.8

Attenuation data

Material: Mineral wool (MW), frequency band (Hz)

	L = 600								L = 1000							
D2	63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k
160	8	10	13	25	37	39	28	20	9	12	21	35	44	50	46	30
200	9	15	13	22	33	34	25	17	9	11	21	36	45	50	33	19
250	6	7	11	18	27	27	18	14	8	9	19	29	41	40	21	16
315	5	5	11	15	19	15	12	8	7	7	18	25	38	28	18	12
400	3	2	9	14	20	15	9	7	4	6	15	22	34	22	13	12
500	4	6	7	10	15	11	8	5	5	8	13	28	44	40	25	18
630	2	3	8	17	25	20	16	12	4	6	16	22	27	22	19	11

Material: Polyester fibre (PEF), frequency band (Hz)

	L = 600								L = 1000							
D2	63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k
160	8	10	12	17	30	24	26	20	12	13	17	25	37	40	39	30
200	6	8	10	18	28	26	23	17	9	12	17	28	40	41	34	23
250	6	7	9	16	22	22	18	12	9	10	15	24	34	36	27	19
315	5	6	10	17	20	17	13	8	8	10	15	25	31	28	20	13
400	2	3	8	11	17	13	8	6	4	6	12	19	27	21	11	10
500	4	6	7	10	14	11	8	5	5	8	10	17	24	19	10	9
630	2	3	6	9	12	10	7	5	4	6	9	14	21	17	10	9

Installation

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.
The pressure control damper is installed taking into account the recommended safety distances for accurate and stable control.

Minimum safety distances of all Halton HFS models

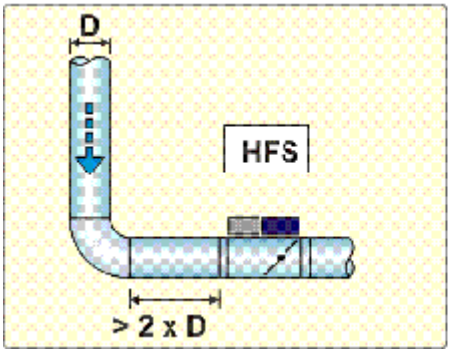


Fig.1. Bended duct

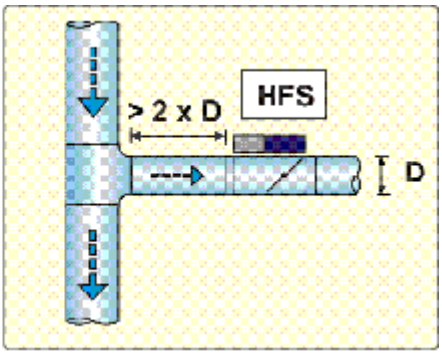


Fig.2. T-branch; supply

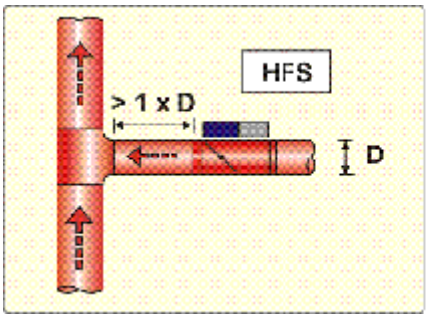


Fig.3. T-branch; exhaust

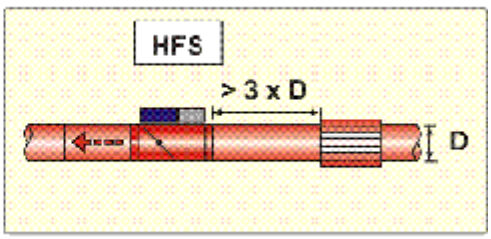


Fig.4. Installation with sound attenuator

Static pressure measurement unit MSS should be installed in a ductwork in a place where static pressure is most suitable. Usually the place is in supply and exhaust duct 3/4 of ductwork length. Also safety distance before MSS unit must be observed.

Minimum safety distance between Halton HFS and Halton MSS

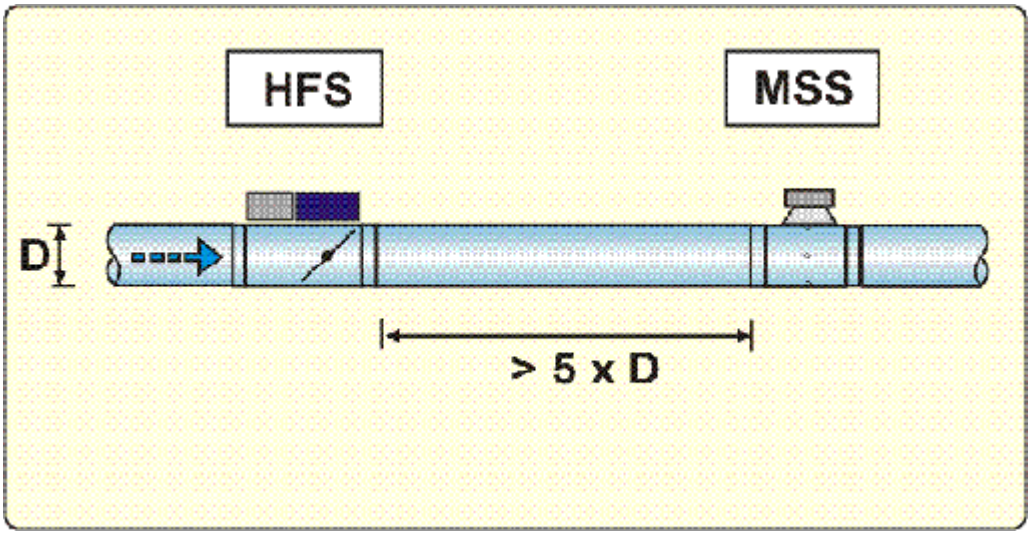


Fig.5. Supply air

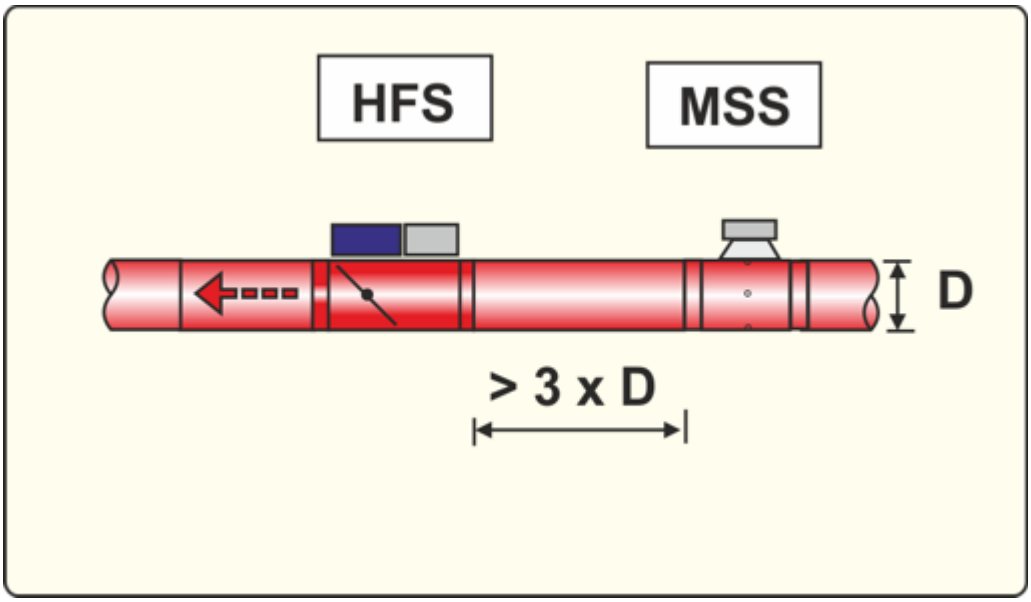


Fig.6. Exhaust air

Airflow measurement with Halton MSD

The pressure control damper with air flow measurement unit 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.

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.

Degree of protection

- Actuator NM24A-V: IP54
- Pressure controller VRP-STP: IP40
- Flow controller VRD3: IP40

The wiring instructions are presented for following applications

1A HFS; CU=EP Constant zone pressure control, set point adjusted locally
1B HFS; CU=EP Constant zone pressure control, set point adjusted remotely
1C HFS; CU=EP Overriding controls
2A HFS-B; CU=EP Constant zone pressure control with air flow measurement unit

Control unit (CU)
EP Belimo VRD2 + NM24A-V (10 Nm)

Model	Wire sizing
HFS/x-NA, HFS/x-A	8.1 VA
HFS/x-B	11.6 VA

1. Halton HFS; CU=EP – duct pressure control

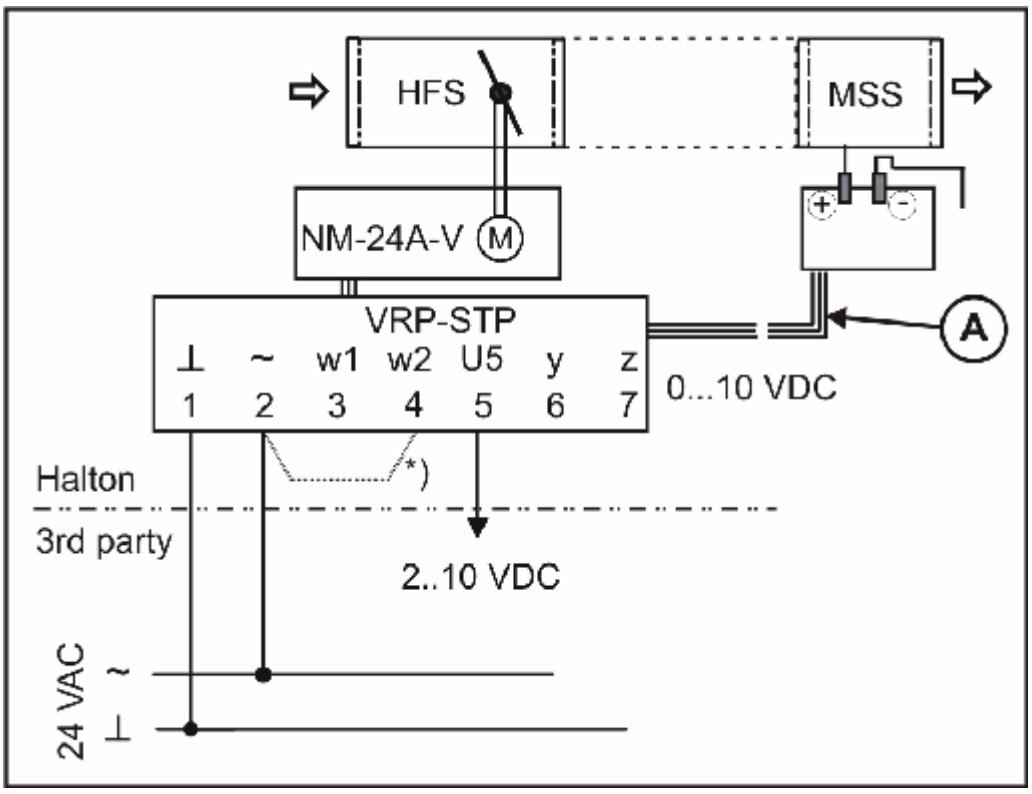


Fig. 7. 1A = Typical duct pressure control local pressure set point.

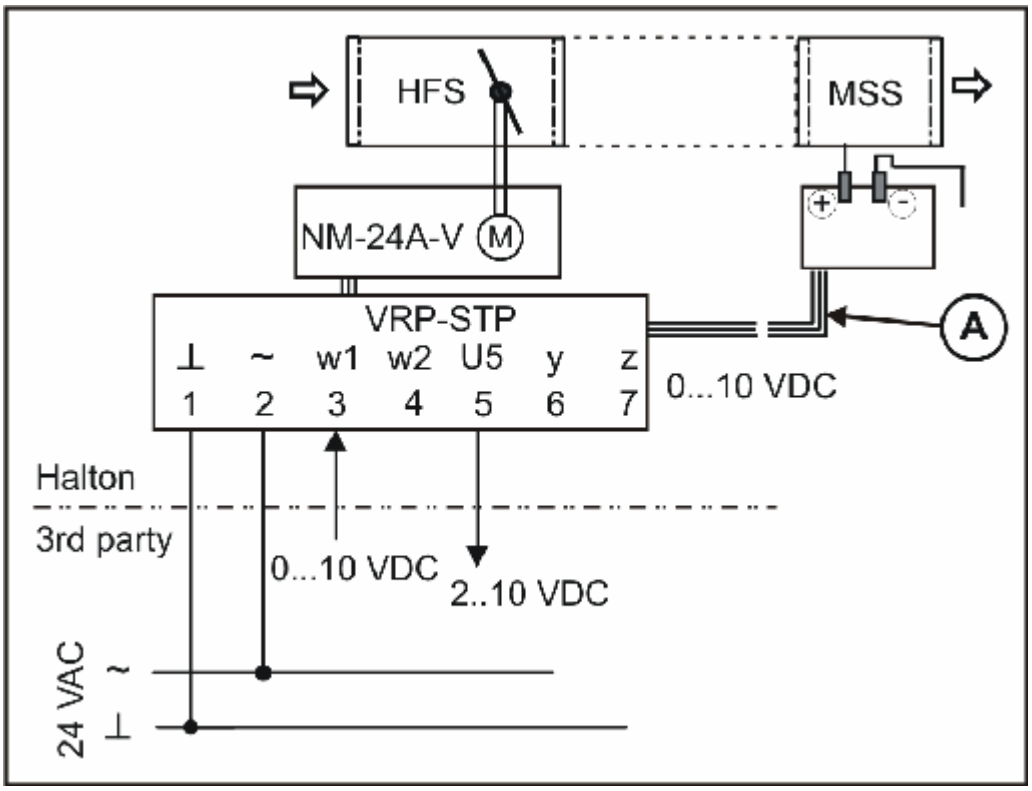


Fig.8. 1B = Set point adjusted externally

1. Halton HFS; CU=EP – duct pressure control with override controls

Override	**A**	**B**
CLOSED	Off	On
Pressure control	Off	Off
OPEN	On	Off

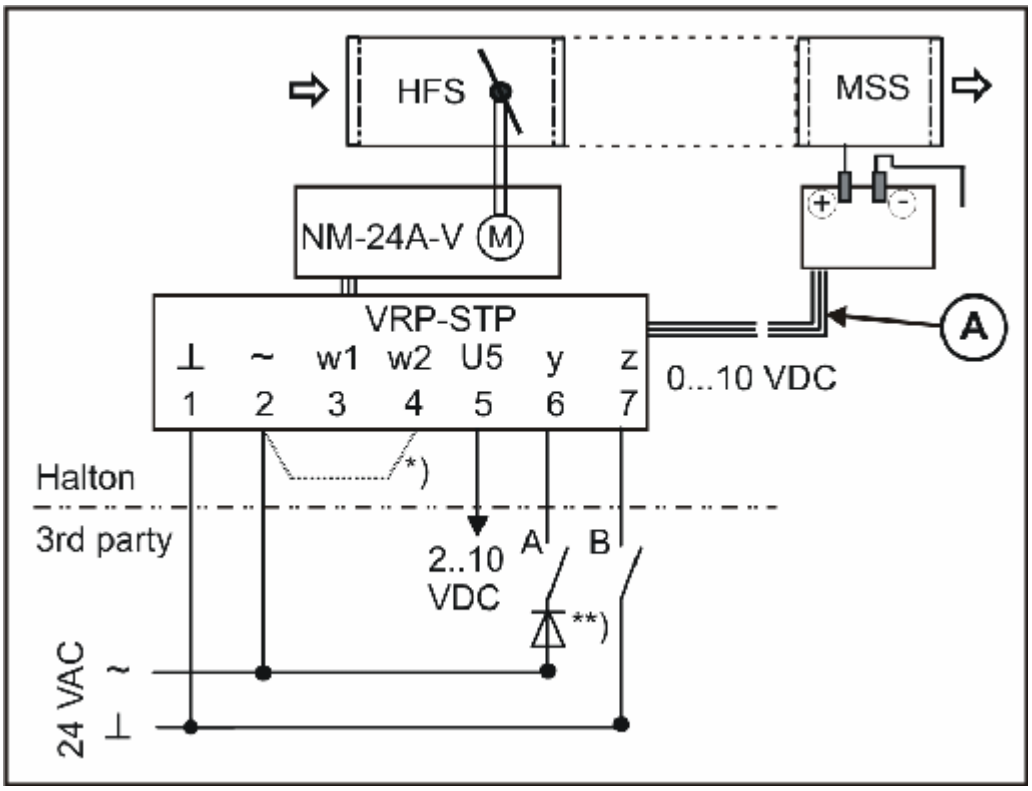


Fig.9. 1C = Duct pressure control with over-riding controls

Code description

Halton Delivered by Halton
3rd party Delivered by a third party

1 (^) 24 VAC system neutral
2 (~) 24 VAC live
3 (w1) 2...10 VDC pressure set point signal input, when set point adjusted remotely
5 (U5) 2...10 VDC pressure feedback signal output
6 y Override input
7 z Override input
*) Jumper 2-4 factory-fitted for potentiometer set point; remove if 2...10-VDC input w1 is used
**) Diode 1N 4007

2. HFS-B; CU=EP – duct pressure control with air flow measurement unit

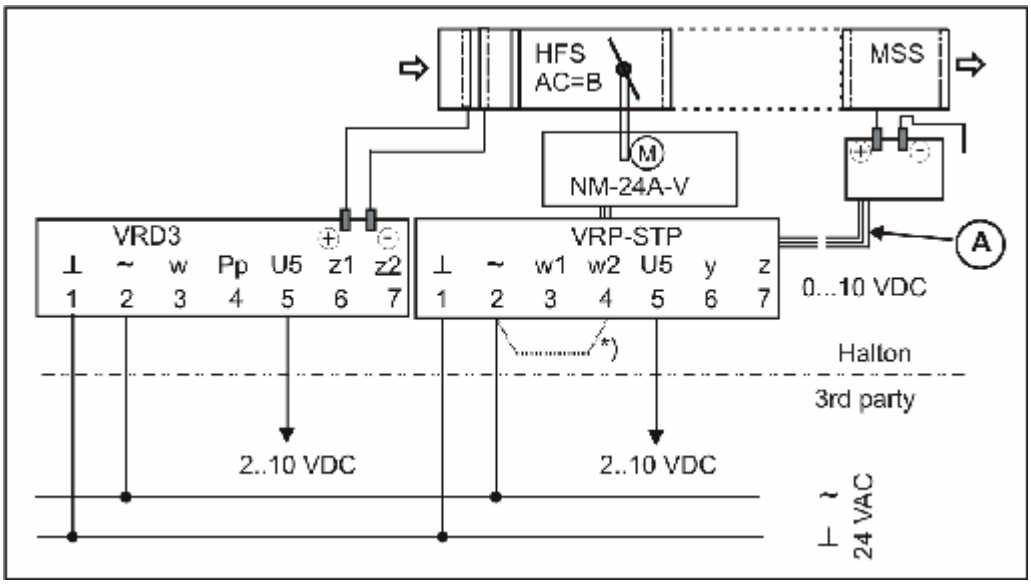


Fig.10. 2A = Duct pressure control with air flow measurement

Code description

Halton Delivered by Halton
3rd party Delivered by a third party

VRP-STP Pressure controller
1 (^) 24 VAC system neutral
2 (~) 24 VAC live
3 (w1) 2...10 VDC pressure set point signal input.
when set point adjusted remotely
5 (U5) 2...10 VDC pressure feedback signal output
6 y Override input
7 z Override input
*) Jumper 2-4 factory-fitted for potentiometer set point;
remove if 2...10-VDC input w1 is used
**) Diode 1N 4007

VRD3 Air flow measurement
1 (^) 24 VAC system neutral
2 (~) 24 VAC live
5 (U5) ...10 VDC pressure feedback signal output (actual airflow rate)

The output signal 5 (U5) can be used to control an eventual exhaust airflow control damper.

Pressure transmitter connection between Halton HFS and MSS

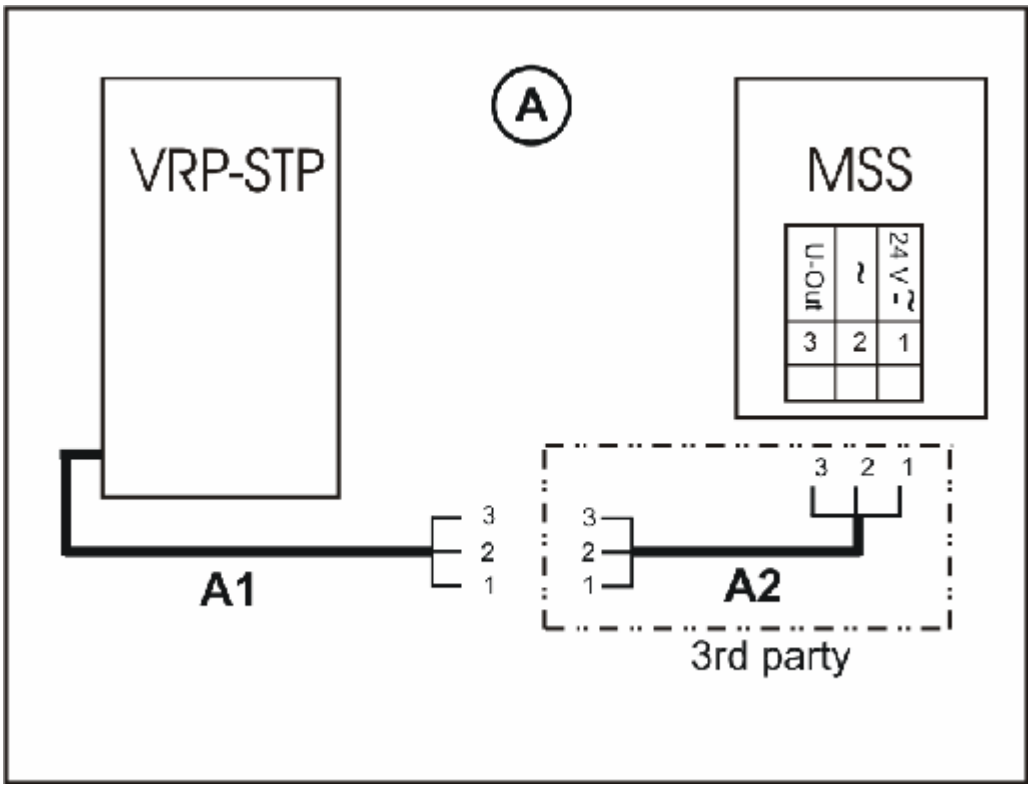


Fig.11. Connector cable between Halton HFS (VRP-STP) and Halton MSS

Length of the cable for pressure measurement unit Halton MSS provided with Halton HFS is 0.7 m. Needed extension connection cable is supplied by 3rd party.

Wire code description
1 24 VAC system voltage
2 Neutral
3 0...10 VDC pressure measurement signal

Commissioning

Setting duct pressure

The pressure controller has a set point potentiometer for pressure set point adjustment.

Local setting
The pressure controller VRP-STP includes a potentiometer for static pressure set point adjustment (range: 30...100% of the selected Halton MSS unit pressure range).

An example:

- Needed constant pressure set point is 120 Pa
- Choose pressure range of 0...200 Pa in MSS
- Adjust the set point potentiometer Dp% to 60% (=120 Pa / 200 Pa)

Remote setting

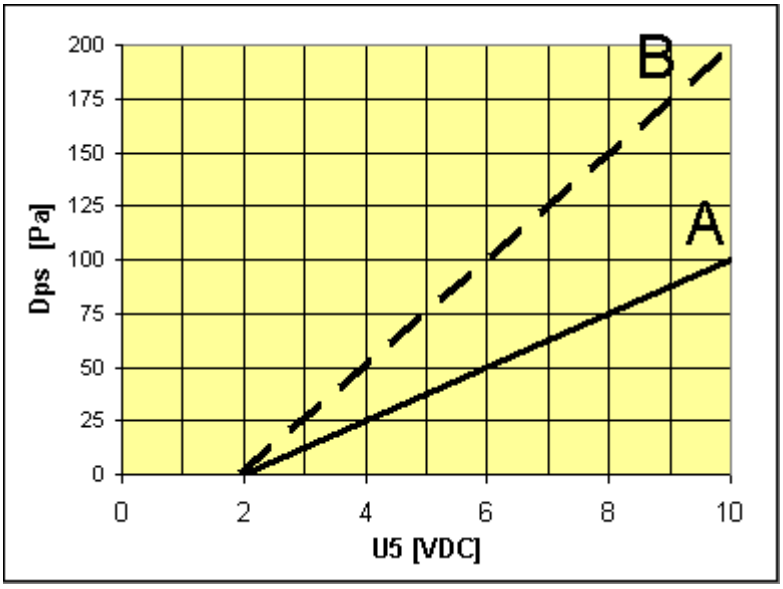
Set point can be set externally from building management system, air pressure range 0-100% corresponding to control signal range of 2-10 Vdc. Local set point potentiometer shall be set to 100%.

Defining measured duct pressure level

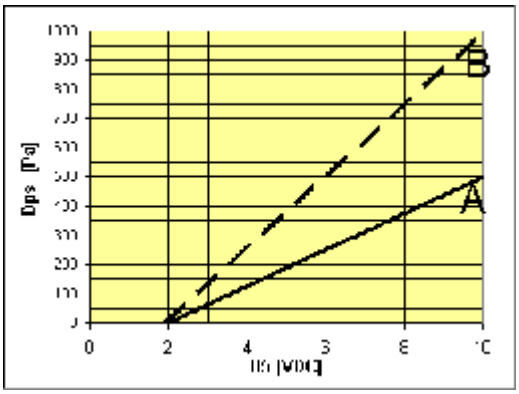
The actual measured static pressure level can be defined by the controller feedback signal (U5).

Signal	Formula	Pressure transmitter range
2...10 VDC	Pst = 100 Pa * (U5-2) / 8	100 Pa
	Pst = 200 Pa * (U5-2) / 8	200 Pa
	Pst = 500 Pa * (U5-2) / 8	500 Pa
	Pst = 1000 Pa * (U5-2) / 8	1000 Pa

The actual duct static pressure can also be read from the picture:



Static pressure and output signal:
A = Pressure transmitter range 0...100 Pa
B = Pressure transmitter range 0...200 Pa



Static pressure and output signal:
A = Pressure transmitter range 0...500 Pa
B = Pressure transmitter range 0...1000 Pa

Defining the measured airflow

With model Halton HFS,MU=A airflow can be defined manually using integrated airflow measurement unit Halton MSD.

Connect the measurement tubes to the manometer and read the pressure difference. The airflow rate is calculated using the formula below or by reading the airflow rate directly from the diagram:

$$q_v = k * \sqrt{\Delta P\_m}$$

The k factor

D	k
200	27.8
250	43.98
315	72.3
400	127.0
500	200

With model Halton HFS/B air flow can be defined using integrated air flow measurement unit (Halton MSD + VRD3). The actual measured airflow rate (qv) can be defined by the controller feedback signal (U5) and the nominal airflow (qv_nom) of the airflow measurement unit (VRD3).

Signal	Formula	Controller type and mode	Terminals system neutral	Terminals signal
0...10 VDC	qv = qv_nom * U5 / 10	HFS / B Mode 0 ... 10 V	1 (GND)	5 (U5)
2...10 VDC	qv = qv_nom * (U5 – 2) / 8	HFS / B Mode 2 ... 10 V	1 (GND)	5 (U5)

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

NS	qv_nominal
200	340 l/s (1226 m3/h)
250	538 l/s (1936 m3/h)
315	885 l/s (3188 m3/h)
400	1555 l/s (5600 m3/h)
500	2449 l/s (8818 m3/h)

Specification

The static pressure control damper shall be made of galvanised steel. An additional airflow measurement probe is made of aluminium.

The tightness of the control damper in closed position shall conform to standard EN1751 class 4 and casing tightness to EN1751 class C.
Duct connection shall include integral airtight rubber gaskets.

The control damper section shall contain pressure controller and damper actuator and optionally airflow measurement. The damper shall be used in combination with Halton MSS pressure measurement unit.

The damper shall be equipped with a sound attenuator in order to meet the sound level requirement for the room. As an optional extra, the sound attenuator shall have an access panel for cleaning purposes.

Order code

HFS/S-D;MU-CU-SA-ZT

S = Construction
G Standard unit with blade gasket
E Standard unit with blade gasket and extended motor platform

(for on-site insulation work)
I Unit with blade gasket and 50 mm insulation
(only for models MU=A or MU=B)

D = Size of duct connection (mm)
200, 250, 315, 400, 500

Other options and accessories

MU= Measurement unit
NA Not assigned
A Airflow measurement unit MSD (manual)
B Airflow measurement unit MSD+VRD3, electrical (0...10V)

CU= Control unit
EP VRP-STP+NM24A-V

SA = Sound attenuator, connection sizes
NA Not assigned
H1 L = 600 mm; Outlet = inlet; Mineral wool
H2 L = 1000 mm; Outlet = inlet; Mineral wool
H3 L = 600 mm; Outlet = inlet; Polyester fibre
H4 L = 1000 mm; Outlet = inlet; Polyester fibre
H5 L = 600 mm; Outlet > Inlet; Mineral wool
H6 L = 1000 mm; Outlet > inlet; Mineral wool
H7 L = 600 mm; Outlet > inlet; Polyester fibre
H8 L = 1000 mm; Outlet > inlet; Polyester fibre
H11 L = 600 mm; Outlet = inlet; Mineral wool; Access panel
H12 L = 1000 mm; Outlet = inlet; Mineral wool; Access panel
H13 L = 600 mm; Outlet = inlet; Polyester fibre; Access panel
H14 L = 1000 mm; Outlet = inlet; Polyester fibre; Access panel
H15 L = 600 mm; Outlet > Inlet; Mineral wool; Access panel
H16 L = 1000 mm; Outlet > inlet; Mineral wool; Access panel
H17 L = 600 mm; Outlet > inlet; Polyester fibre; Access panel
H18 L = 1000 mm; Outlet > inlet; Polyester fibre; Access panel

ZT = Tailored product
N No
Y Yes (ETO)

Code example

HFS/G-200-B, CU=EP, SA=NA , ZT=N