# Private: Halton HFB – Airflow management damper (terminated)


# Overview

**Terminated as of 1st September 2023**
**-> replaced with Halton Max MOC**

- Control damper for different airflow and duct pressure control applications
- Pressure-independent operation
- Galvanized steel design
- Circular duct connection equipped with integrated rubber gaskets
- Minimum airflow is related to 1 m/s on specific product models

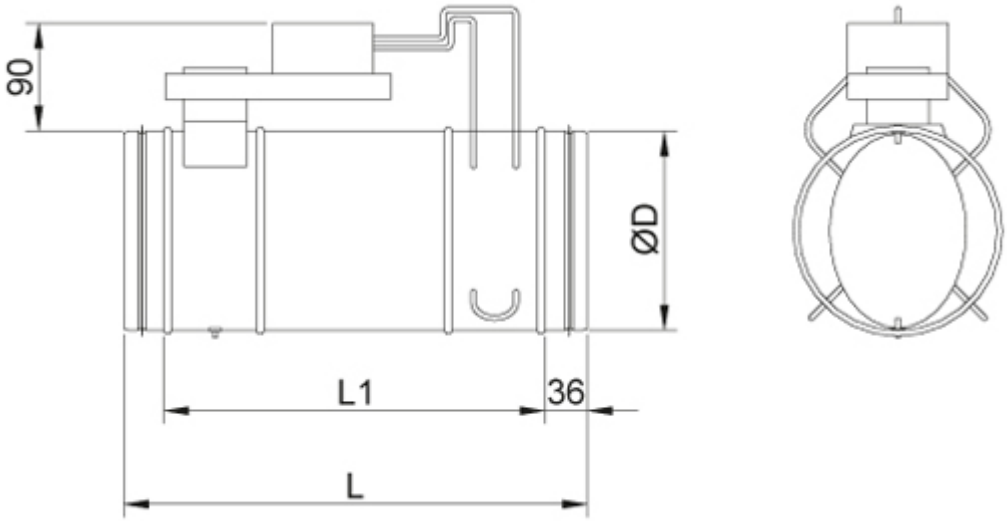
## Product models and accessories

- Model with shut-off operation; tightness fulfills EN 1751, class 4 requirements (HFB/G and HFB/I)
- Casing tightness fulfills EN 1751, class C requirements
- Model with external insulation
- Several sound attenuator models
- Several airflow controller options
- 1 m/s – minimum airflow – the HFB/G and HFB/I with one of following controller options of EM, EK, EC, EE
- 2 m/s – minimum airflow – any HFB models with controller option of EM, EK, EC, EE, ED, EG
- Electric reheat coil options

- Factory-set airflow range limits (min./max. airflow rates) as an option

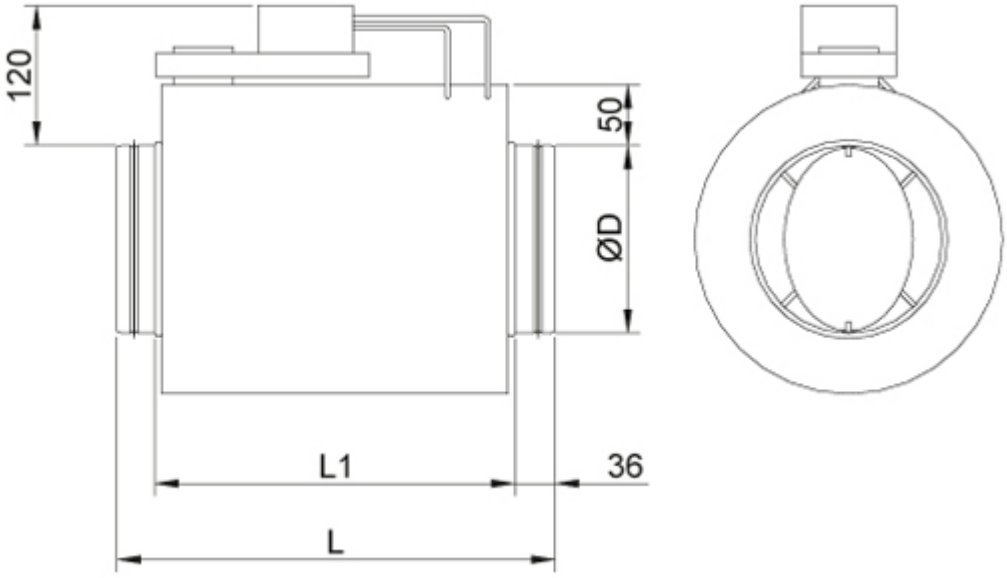
# Dimensions

## Halton HFB/G, HFB/H




| NS | L | L1 | ØD |
|---|---|---|---|
| **100** | 370 | 298 | 99 |
| **125** | 370 | 298 | 124 |
| **160** | 370 | 298 | 159 |
| **200** | 470 | 398 | 199 |
| **250** | 470 | 398 | 249 |
| **315** | 470 | 398 | 314 |
| **400** | 625 | 553 | 399 |
| **500** | 625 | 553 | 499 |

# Halton HFB/I, HFB/J




| NS | L | L1 | ØD |
|---|---|---|---|
| **100** | 365 | 293 | 99 |
| **125** | 365 | 293 | 124 |
| **160** | 365 | 293 | 159 |
| **200** | 465 | 393 | 199 |
| **250** | 465 | 393 | 249 |
| **315** | 465 | 393 | 314 |
| **400** | 675 | 603 | 399 |
| **500** | 675 | 603 | 499 |

# Material

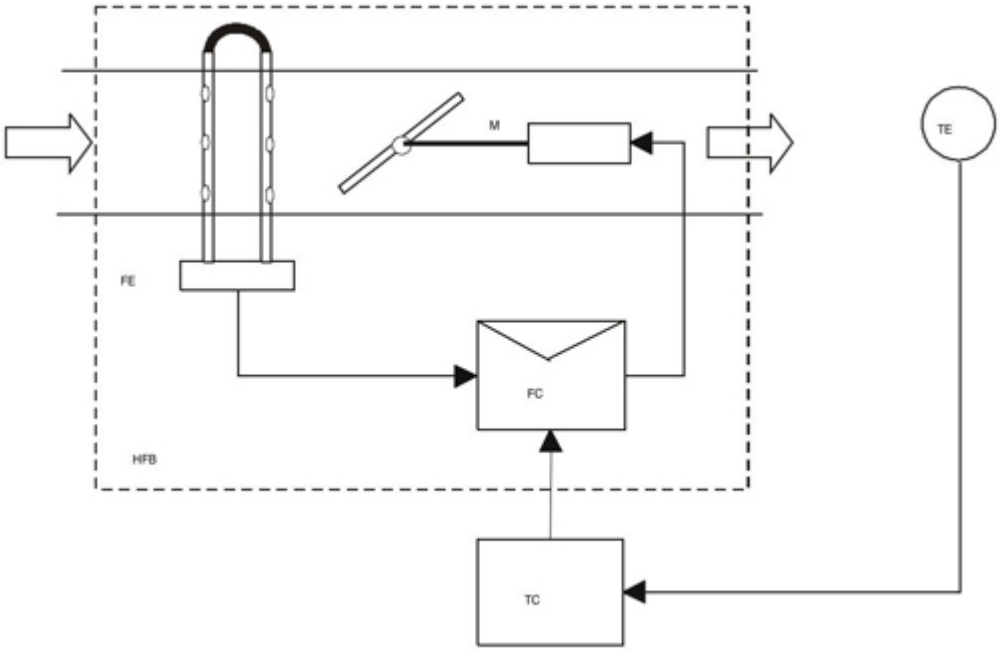
| Part | Material |
|---|---|
| Casing | Galvanised steel |
| Damper blade | Galvanised steel |
| Shaft | Zinc coated steel |
| Bearings | Plastic |
| Blade gasket | EPDM Rubber |
| Duct gaskets | 1C-polyurethane hybrid |
| Measurement probe | Aluminium |
| External insulation | Mineral wool (models HFB/I, HFB/J) |

Duct connection gaskets are vulcanised to the casing.

# Function

The variable airflow damper Halton HFB contains an averaging airflow measurement probe, airflow controller and actuator. Airflow is controlled based on actual flow measurement by changing the damper blade position. The airflow setpoint can be modified between minimum and maximum settings by, e.g., a room controller with an analogue signal (0...10 or 2...10 VDC). Flow control damper Halton HFB maintains the required airflow independent of duct pressure variation.

The static pressure control damper option maintains the desired constant duct pressure based on a static pressure measurement.




# Product Models

The Halton HFB airflow 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.

| Model | Feature | Tightness |
|---|---|---|
| **HFB/G** | With blade gasket | EN 1751, class C and class 4 |
| **HFB/ I** | With blade gasket<br>and 50 mm external insulation | EN 1751, class C and class 4 |
| **HFB/H** | No blade gasket | EN 1751, class C |
| **HFB/J** | No blade gasket,<br>with 50 mm external insulation | EN 1751, class C |

**Minimum torque for different Halton HFB models:**

| Product | 5 Nm | 10 Nm |
|---|---|---|
| HFB/G and HFB/I 100...250 | x | |
| HFB/G and HFB/I 315...500 | | x |
| HFB/H and HFB/J 100...500 | x | |

# Control units (CU)

The Halton HFB 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 shut-off function (HFB/G and HFB/I).
- Maximum differential pressure over the damper of 1000 Pa.
- Operating range: ambient temperature of 0 to 50 °C.
- Ambient relative humidity < 95%, non-condensing.

**Airflow controller options:**
EM Halton LMV-D3-MF-F.1 HI (5 Nm – for sizes 100...250)
EK Halton NMV-D3-MF-F.1 HI (10 Nm)
EC Halton LMV-D3-MP-F.1 HI (5 Nm – for sizes 100...250)
EE Halton NMV-D3-MP-F.1 HI (10 Nm)
ED Belimo VRD3 + NM24A-V (10 Nm)
EG Siemens GLB181.1E/3 (10 Nm)

Controller ED includes two potentiometers for minimum and maximum airflow setpoint adjustment (ranges: minimum = 0...80% and maximum = 30...100%).

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.

For the ED controller, the highest minimum airflow rate is 80% of the specified maximum airflow rate.
Maximum airflow is calculated as percentage of nominal airflow and minimum airflow as percentage of maximum airflow.

**Remarks regarding table above :**

Minimum airflows

For EM, EK, EC, EE with HFB/G and HFB/I, the minimum airflows are given for 1m/s
For EM, EC with HFB/H and HFB/J, the minimum airflows are given for 2 m/s
For ED, EG with all HFB types, the minimum airflows are given for 2 m/s

Maximum airflows

Maximum airflows are given for 9 m/s
For offices applications, maximum airflows adviced as general selection are given for 6m/s
Maximum airflows possible (sensor range limit) are given for 12 m/s

## Pressure control for supply and exhaust installations

- Complete shut-off function (HFB/G and HFB/I).
- Static pressure setpoint range of 30...100 Pa or 90...300 Pa.
- Maximum differential pressure over the damper of 500 Pa.
- Operating range: ambient temperature of 0 to 50 °C.
- Ambient relative humidity < 95%, non-condensing

# Sound Attenuators

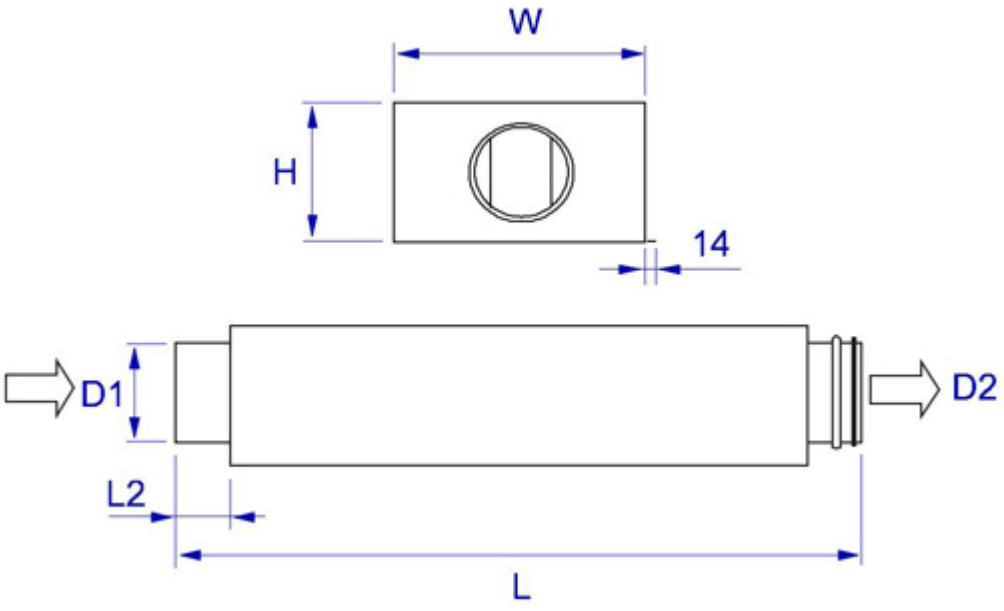
Sound attenuators are available with optional outlet diameters with mineral wool (MW) or polyester fibre (PEF) insulation materials and with 600 mm and 1000 mm lenghts. Optionally the attenuator can be equipped with an access panel for cleaning and inspection purposes.

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

The connection (D1) is female type for direct connection to the Halton HFB airflow 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 | Lenght 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




The picture above describes supply air installation. In exhaust installation the airflow direction is

vice versa, from D2 to D1.

| D1/D2 | D1/D2 | L nominal | L mm | L2 mm | W mm | H mm | MW Weight kg | PEF Weight kg |
|---|---|---|---|---|---|---|---|---|
| **100/100** | | 600 | 626 | 22 | 252 | 154 | 5.1 | 4.6 |
| | | 1000 | 1036 | 22 | 252 | 165 | 7.8 | 7.0 |
| **125/125** | 100/125 | 600 | 626 | 22 | 265 | 179 | 5.7 | 5.1 |
| | | 1000 | 1036 | 22 | 265 | 179 | 8.6 | 7.6 |
| **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 |
| **100** | 8 | 14 | 18 | 30 | 46 | 47 | 41 | 33 | 12 | 20 | 27 | 42 | 50 | 50 | 50 | 50 |
| **125** | 6 | 12 | 16 | 27 | 47 | 46 | 40 | 27 | 13 | 15 | 23 | 41 | 50 | 50 | 50 | 35 |
| **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 |
| **100** | 9 | 12 | 15 | 20 | 33 | 34 | 37 | 29 | 15 | 17 | 24 | 32 | 43 | 40 | 41 | 40 |
| **125** | 9 | 11 | 14 | 18 | 33 | 29 | 32 | 24 | 14 | 16 | 23 | 29 | 43 | 43 | 44 | 37 |
| **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 |

# Reheat Coils

The Halton HFB electric reheat coil is available for duct sizes 100...400 mm, and it is always a single-phase heater (230 VAC, less than 16 A).

Two electric reheater options are available:

- RM = Electric reheater without internal heating controller, PWM control signal input (230 VAC, pulse width modulation)
- RC = Electric reheater with internal heating controller, 0...10-VAC control signal input

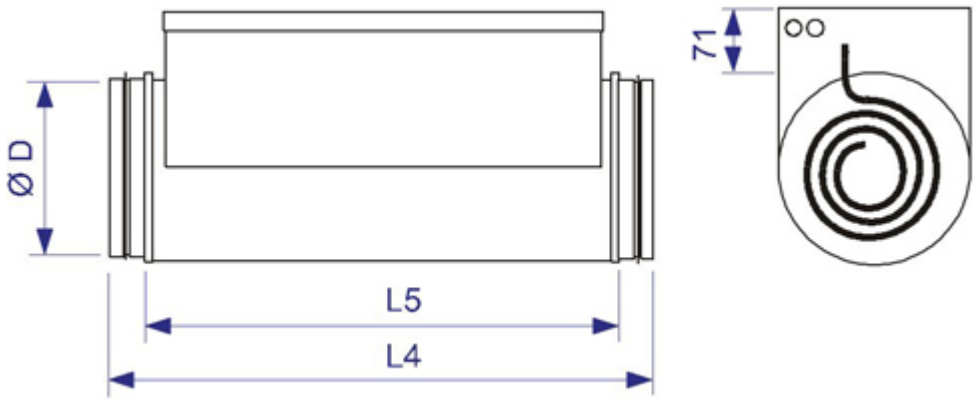
Both heaters (RM and RC) have two internal overheating protection devices connected in series, one automatic and one with manual reset. This increases heater safety.

The RC heater also includes a built-in alarm relay with potential-free changeover contact for remote alarm monitoring. The alarm is triggered by manual overheating protection or heater power loss.

Ensure that the airflow velocity is above 2 m/s to guarantee proper control function when selecting the airflow control damper and reheat coil.

Electric duct heater operation shall always be interlocked with the fan or with airflow rate measurement through the heater. The power supply to the duct heater must be switched off if the fan is switched off or airflow rate is too low. This function can be connected to the duct heater power supply (switch I for both heaters RM and RC), or in the case of the RC heater, also with potential-free contact P.

## Dimensions

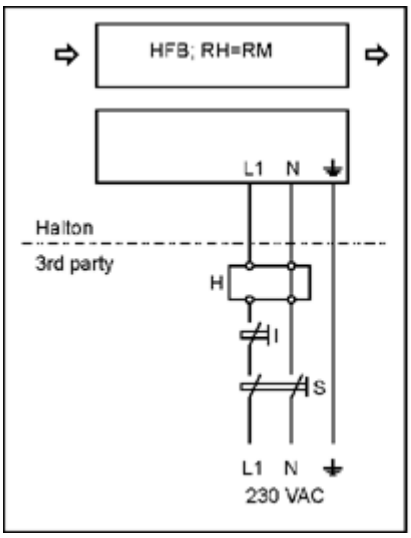


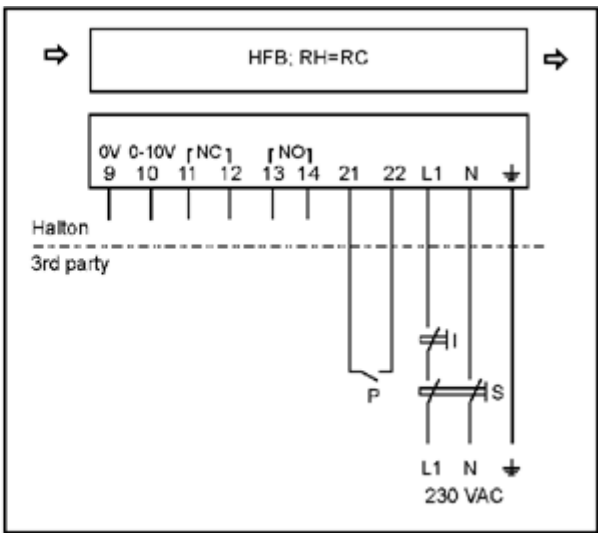

| Size | D (mm) | L (mm) | L1 (mm) |
|---|---|---|---|
| **100** | 99 | 375 | 291 |
| **125** | 124 | 375 | 291 |
| **160** | 159 | 375 | 291 |
| **200** | 199 | 375 | 291 |
| **250** | 249 | 375 | 291 |
| **315** | 314 | 375 | 291 |
| **400** | 399 | 375 | 291 |

## Heating capacity

| NS | Power W | qv_min v m/s | qv l/s | qv m3/h | dT (max) K | qv_max example v m/s | qv l/s | qv m3/h | dT (max) K |
|---|---|---|---|---|---|---|---|---|---|
| **100** | 600 | 2.0 | 16 | 57 | 32 | 6.0 | 47 | 170 | 11 |
| **125** | 900 | 2.0 | 25 | 88 | 31 | 6.0 | 74 | 265 | 10 |
| **160** | 1500 | 2.0 | 40 | 145 | 31 | 6.0 | 121 | 434 | 10 |
| **200** | 2100 | 2.0 | 63 | 226 | 28 | 6.0 | 188 | 679 | 9 |
| **250** | 3000 | 2.0 | 98 | 353 | 25 | 6.0 | 295 | 1060 | 8 |
| **315** | 3000 | 2.1 | 156 | 561 | 16 | 6.0 | 468 | 1683 | 5 |
| **400** | 3000 | 2.0 | 251 | 905 | 10 | 6.0 | 754 | 2714 | 3 |

## Electrical information




**Code description**

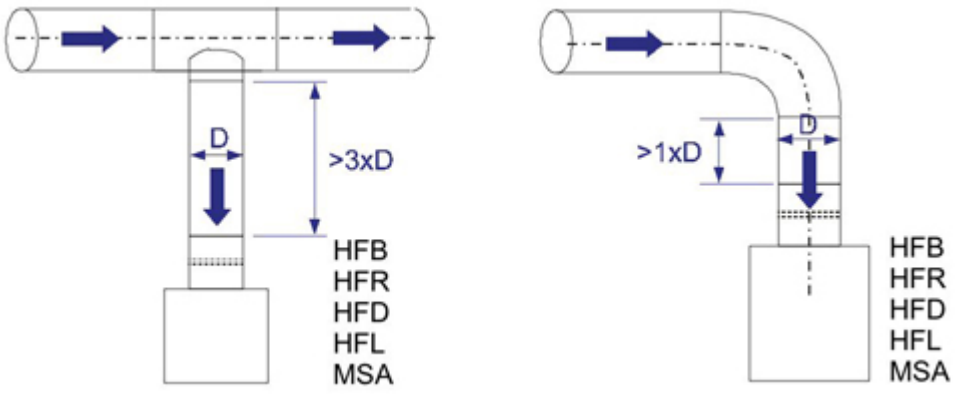
| | |
|---|---|
| Halton | Delivered by Halton |
| 3rd party | Delivered by a third party |
| S | All-pole switch for power supply |
| I | Fan interlock switch |
| P | Airflow or duct pressure interlock switch |
| H | Heating power controller |
| L1 | 230 VAC live |
| N | Neutral |
| 0 | Protective earthing |

| | |
|---|---|
| **Heater power supply switch (S)** | All-pole switch, 230 VAC, max. 16 A |
| **Fan interlock function (I)** | 230 VAC, max. 16 A |
| **Airflow or duct pressure interlock (P)**<br>**– Indication**<br>**– Contact open**<br>**– Contact closed** | Potential-free contact<br>10 V, max. 500 mA<br>Heating disabled<br>Heating enabled |
| **Heating power controller H**<br>**– Voltage**<br>**– On/off cycle** | PWM<br>230 VAC, max. 16 A, according to heater power<br>60 s recommended |
| **Control signal input 9, 10**<br>**– Voltage**<br>**– Internal impedance** | 0...10 VDC<br>100 ohms |
| **Alarm output 11, 12 (NC) and 13, 14 (NO)**<br>**– Max. indication voltage**<br>**– Max. current**<br>**– NC**– NO | Potential-free contact<br>230 VAC<br>500 mA<br>Contact closed if manual overheating protection is triggered or in the event of power failure<br>Contact open if manual overheating protection is triggered or in the event of power failure |
| **Overheating protection**<br>**– Automatic reset**<br>**– Manual reset** | Triggered at 60 °C, reset at 48 °C<br>Triggered at 120 °C |

# Installation

## Safety distances

The Halton HFB 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 x 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 HFB; CU=EM / EK / EC / EE Typical variable airflow control application
1 B HFB; CU=EM / EK / EC / EE Overriding controls
1 C HFB; CU=EM / EK / EC / EE Example;
Variable airflow control with a room controller
1 D HFB; CU=EM / EK / EC / EE Example;
Variable airflow control with a building management system
1 E HFB; CU=EM / EK / EC / EE Example:
Parallel airflow control with a building management system

2 A HFB; CU=ED Typical variable airflow control application
2 B HFB; CU=ED Overriding controls
2 C HFB, CU=ED Constant airflow control

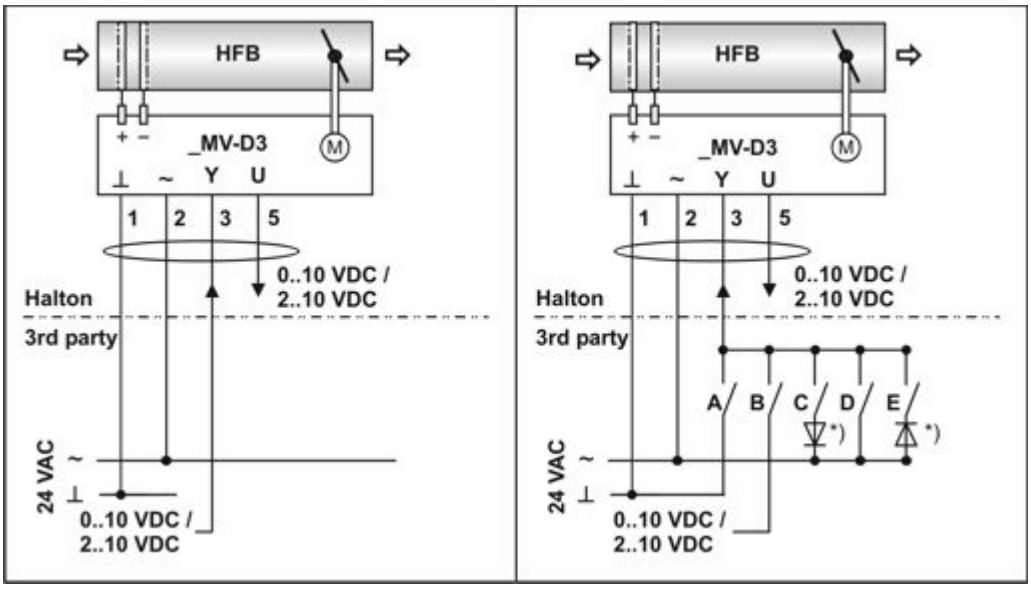
3 A HFB; CU=EG Typical variable airflow controll
3 B HFB; CU=EG Position & constant airflow control

4 A HFB; CU=EM / EK / EC / EE, RH=RM Cooling with airflow and heating with electric heater, pulse width modulation (PWM)
4 B HFB; CU=EM / EK / EC / EE, RH=RC Cooling with airflow and heating with electric heater

**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) |
| ED | Belimo VRD3 + NM24A-V | (10 Nm) |
| EG | Siemens GLB181.1E/3 | (10 Nm) |
| ES | Belimo VRP-STP + VFP-100 + NM24A-V | (10 Nm, 30...100 Pa) |
| ER | Belimo VRP-STP + VFP-300 + NM24A-V | (10 Nm, 90...300 Pa) |

**1A & 1B: HFB; 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 | HFB |
| 1 | (G0) 24 VAC system neutral |
| 2 | (~) 24 VAC live |
| 3 | (w) 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**

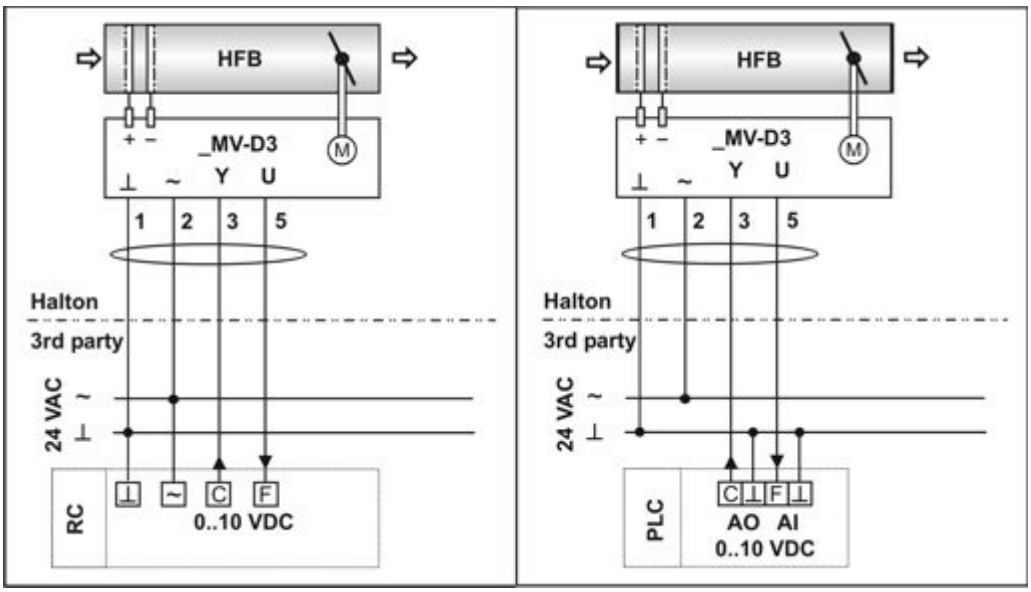
| 2...10 VAC | 0...10 VAC | A | B | C | D | E | |
|---|---|---|---|---|---|---|---|
| NA | NA | *On* | Off | Off | Off | Off | |
| qv_min | qv_min | Off | Off | Off | Off | Off | Constant flow |
| Variable qv_min...qv_max | Variable qv_min...qv_max | Off | *On* | Off | Off | Off | |
| CLOSED | CLOSED | 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 HFB 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** : HFB 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:**
**HFB; CU = EM / EC (LMV-D2-MP/MF HI) or EK / EE (NMV-D2-MP/MF HI)**
**– variable airflow control with a room controller or a building management system**



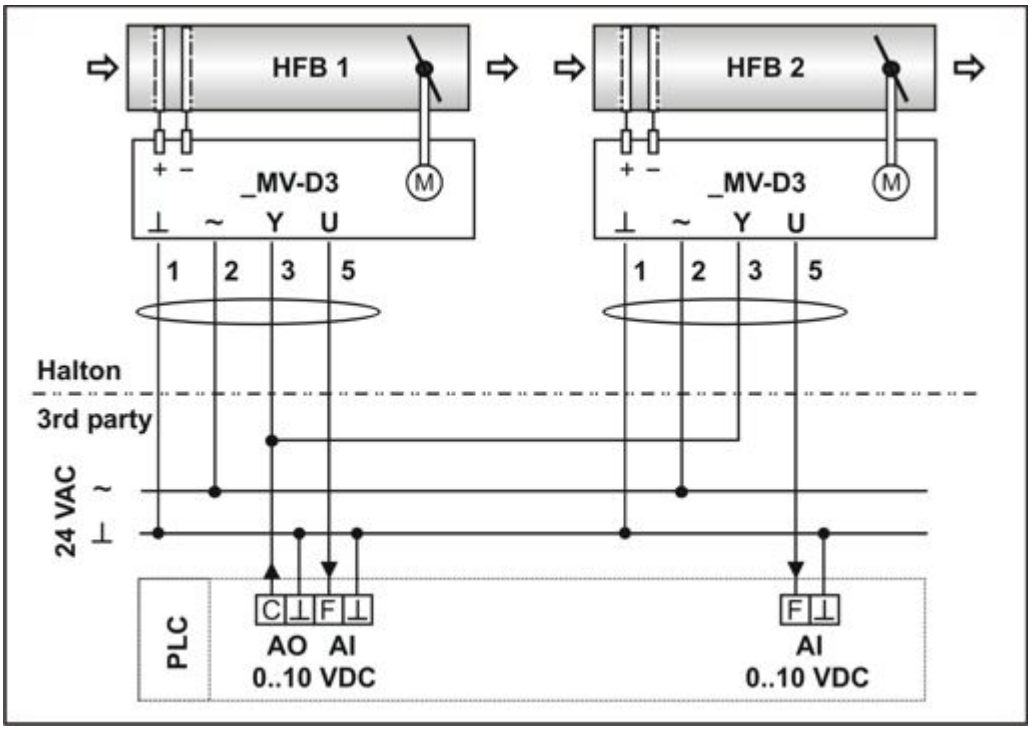

**1C**. Room controller application **1D.** Building management system application

**Code description**

| | |
|---|---|
| Halton | Delivered by Halton |
| 3rd party | Delivered by a third party |
| ACD | HFB |
| 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:**
**HFB; CU = EM / EC (LMV-D2-MP/MF HI) or EK / EE (NMV-D2-MP/MF HI)**

**– parallel airflow control with a building management system**

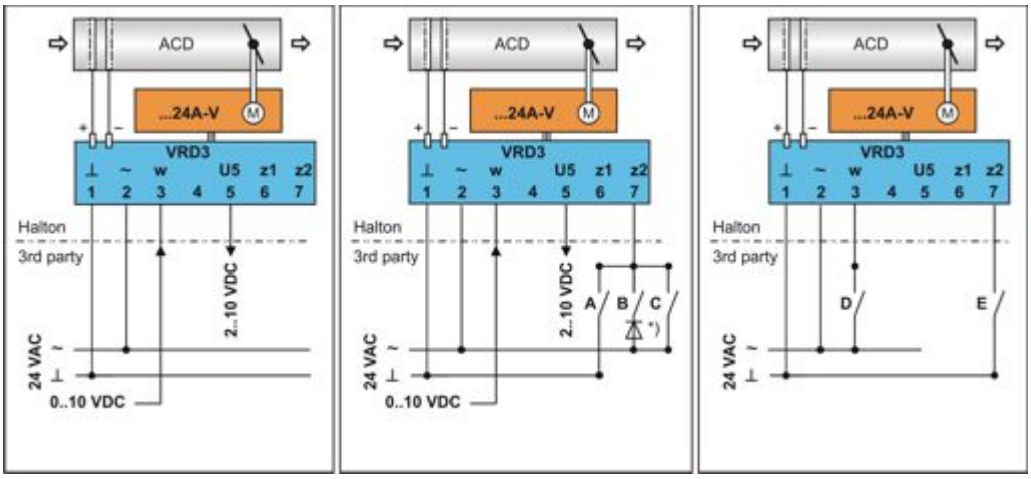



**1D.** Parallel airflow control with building management system

**Code description**

| | |
|---|---|
| Halton | Delivered by Halton |
| 3rd party | Delivered by a third party |
| ACD1 | HFB supply |
| ACD2 | 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 |

**2A, 2B & 2C:**
**HFB; CU=ED (VRD3 + NM24A-V)**
**– typical, overriding controls and constant airflow control**



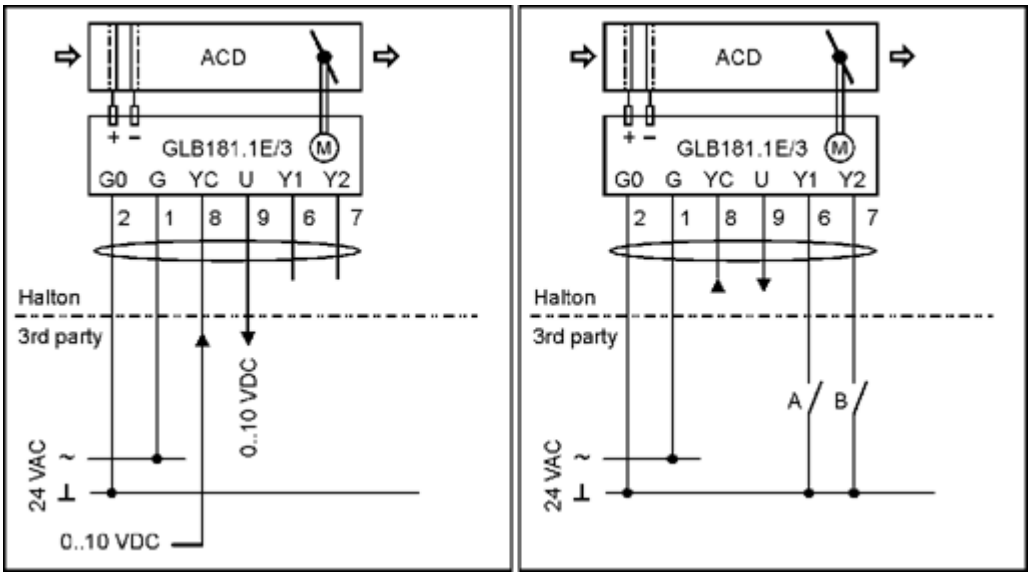

**2A.** Typical application **2B.** Overriding controls **2C.** Constant airflow control

**Code description**

Halton Delivered by Halton
3rd party Delivered by a third party
ACD HFB
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (w) 2...10- or 0...10-VDC airflow setpoint signal input
5 (U5) 2...10- or 0...10-VDC airflow feedback signal output
6 y Actuator signal
7 z Override input
*) Diode 1N 4007

| **Override** | **A** | **B** | **C** |
|---|---|---|---|
| CLOSED | ON | Off | Off |
| Variable flow | Off | Off | Off |
| Min. flow | Off | ON | Off |
| Max. flow | Off | Off | ON |
| | | | |
| **Constant flow** | **D** | **E** | |
| CLOSED | Off | ON | |
| Min. flow | Off | Off | |
| Max. flow | ON | Off | |

**3A & 3B: HFB; CU=EG (GLB181.1E/3)**
**– typical variable airflow control and position & constant airflow control**



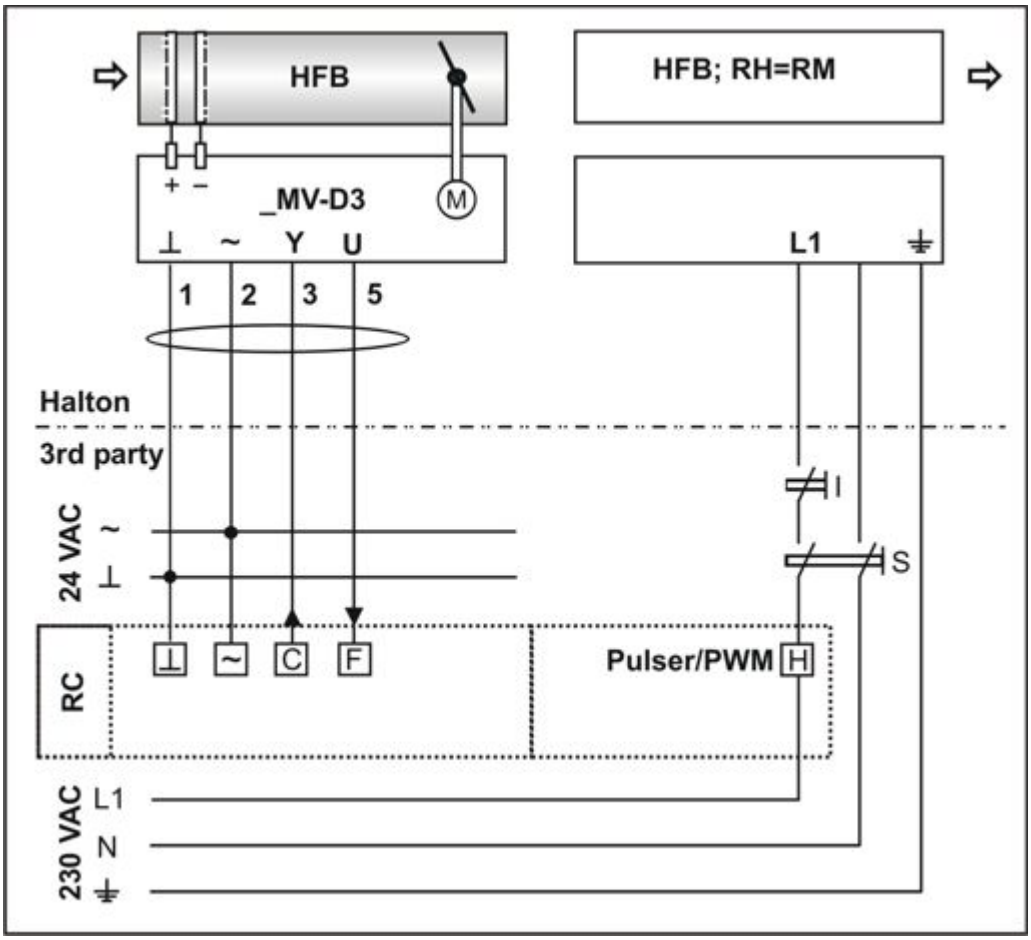

**3A.** Typical airflow control application **3B.** Position & constant airflow control

**Code description**

| | |
|---|---|
| Halton | Delivered by Halton |
| 3rd party | Delivered by a third party |
| ACD | HFB |
| 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 |

**4A: HFB; CU=EM, EK, EC or EE, RH=RM**
**– cooling with airflow and heating with electric heater**

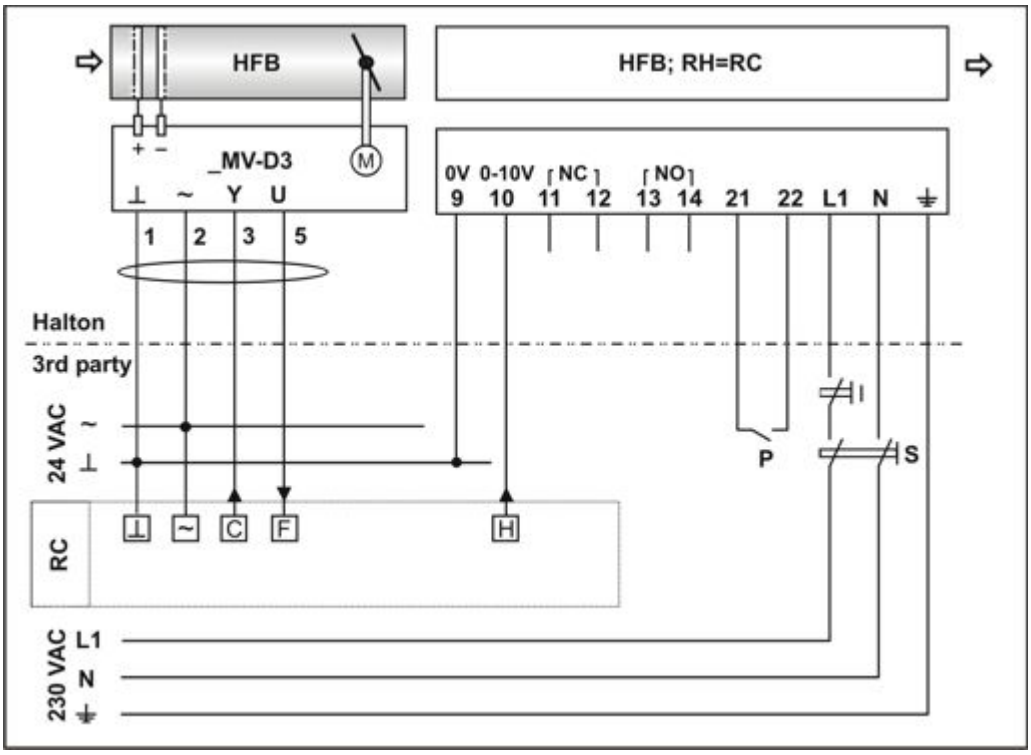



**4A.** Cooling with airflow and heating with electric heater

**Code description**

Halton Delivered by Halton
3rd party Delivered by a third party
RH RM electric reheater
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (w) 2...10- or 0...10-VDC airflow setpoint signal input
5 (U5) 2...10- or 0...10-VDC airflow feedback signal output
RC Room controller
C Airflow setpoint control signal for cooling
F Actual airflow feedback input
S All-pole switch for power supply
I Fan interlock switch
H Heating power output, 230 VAC PWM,
60-second cycle time recommended
L1 230 VAC live
N Neutral
0 Protective earthing

**4B: HFB; CU=EM, EK, EC or EE, RH=RC**
**– cooling with airflow and heating with electric heater**

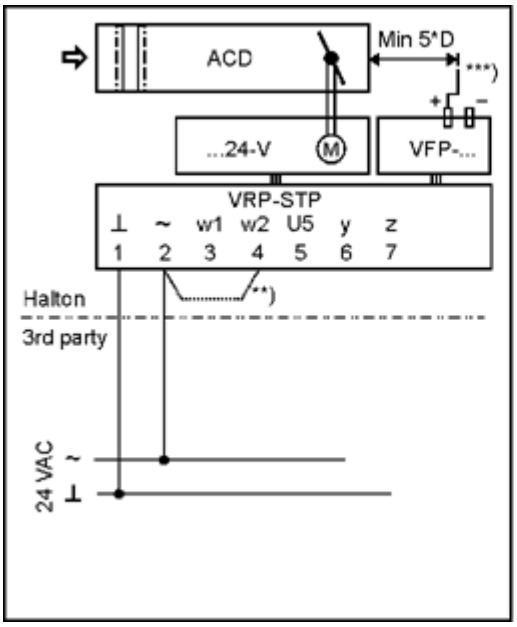



**4B.** Cooling with airflow and heating with electric heater

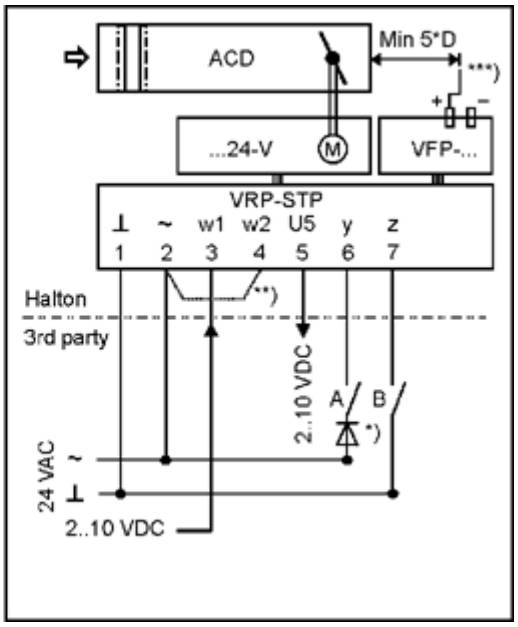
**Code description**

| | |
|---|---|
| Halton | Delivered by Halton |
| 3rd party | Delivered by a third party |
| RH | RC electric reheater |
| 1 (G0) | 24 VAC system neutral |
| 2 (~) | 24 VAC live |
| 3 (w) | 2...10- or 0...10-VDC airflow setpoint signal input |
| 5 (U5) | 2...10- or 0...10-VDC airflow feedback signal output |
| RC | Room controller |
| C | Airflow setpoint control signal for cooling |
| F | Actual airflow feedback input |
| S | All-pole switch for power supply |
| I | Fan interlock switch |
| H | Heating power output, 0...10 VDC |
| P | Airflow or duct pressure interlock switch |
| L1 | 230 VAC live |
| N | Neutral |
| 0 | Protective earthing |
| 9 | 24 VAC system neutral |
| 10 | Heating power input, 0...10 VAC |
| 11,12 | Alarm output (NC), potential-free, contact closed in alarm |
| 13,14 | Alarm output (NO), potential-free, contact open in alarm |
| 21,22 | Airflow or duct pressure interlock indication |

**5A & 5B: HFB; CU=ES or CU=ER**
**– Typical duct pressure control and overriding controls**




**5A**. Typical duct pressure control




**5C**. Overriding controls

**Code description**

Halton Delivered by Halton
3rd party Delivered by a third party
ACD HFB
1 (G0) 24 VAC system neutral
2 (~) 24 VAC live
3 (w1) 0...10 VDC pressure setpoint signal input
5 (U5) 2...10 VDC pressure feedback signal output
6 y Actuator signal
7 z Override input
*) Diode 1N 4007
**) Jumper 2-4 factory-fitted for potentiometer setpoint; remove if 0...10-VDC input w1 is used
**) Minimum safety distance for pressure tab after pressure control damper: 5 x D

| Override | A | B |
|---|---|---|
| CLOSED | Off | On |
| Pressure control | Off | Off |
| OPEN | On | Off |

The pressure controller has a setpoint potentiometer for pressure setpoint adjustment.

# Commissioning

## Airflow control

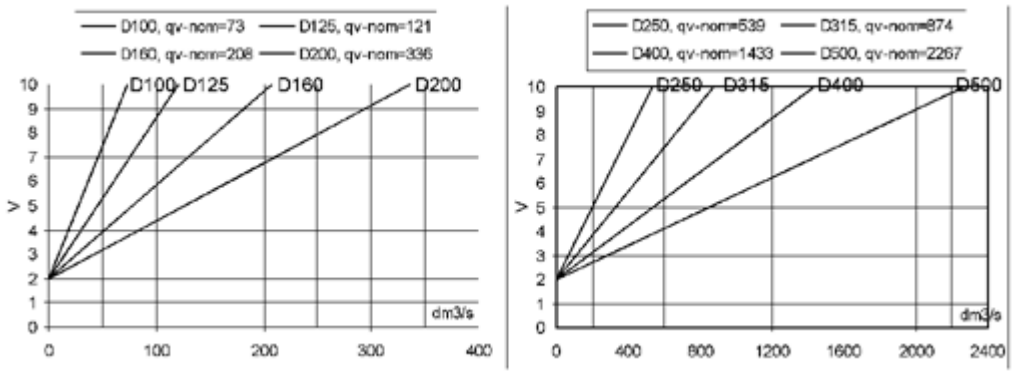
Nominal airflow rates of the Halton HFB are presented in the table below:

| NS | qv_nominal l/s | qv_nominal m3/h | | NS | qv_nominal l/s | qv_nominal m3/h |
|---|---|---|---|---|---|---|
| 100 | 70 | 251 | | 250 | 538 | 1936 |
| 125 | 115 | 414 | | 315 | 885 | 3188 |
| 160 | 211 | 758 | | 400 | 1555 | 5600 |
| 200 | 340 | 1226 | | 500 | 2449 | 8818 |

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 | HFB;CU=EM, EK, EC or EE (LMV-D2-MP/MF HI or NMV-D2-MP/MF HI), mode 0...10 V<br>HFB;CU=EG (GLB181.1E/3) | 1 (GND)<br>2(G0) | 5 (U5)<br>9(U) |
| 2...10 VDC | qv=qv_nom*(U-2)/8 | HFB;CU=EM, EK, EC or EE (LMV-D2-MP/MF HI or NMV-D2-MP/MF HI), mode 2...10 V<br>HFB;CU=ED (VRD2+NM24A-V) | 1 (GND)<br>1 (^) | 5 (U5)<br>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 value of the product

$\Delta p_m$ Differential pressure of measurement probe [Pa]

The Halton HFB 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 HFB 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.

## Duct pressure control

The actual measured airflow rate can be defined by the controller feedback signal and airflow controller nominal airflow.

| Signal | Formula | Controller type and mode | Terminals system neutral | Terminals signal |
|---|---|---|---|---|
| 2...10 VDC | Pst=100 Pa * (U-2)/8<br>Pst=300 Pa * (U-2)/8 | HFB;CU=ES (VRP-STP+VFP-100)<br>HFB;CU=ER (VRP-STP+VFP-300) | 1 (GND)<br>1 (GND) | 5 (U5)<br>5(U5) |

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