Product description

Microprocessor based system for control and monitoring of fume hood exhaust air volume flow or face velocity in relation to the front sash and slide window opening. Depending on the configuration the following operating modes for fume hood control are possible:

- fully variable control **FC500-V**
- constant control (1, 2 or 3 point) **FC500-K**
- face velocity control **FC500-F**
- face velocity control with limitation to V_{MIN} and V_{MAX} **FC500-FP**
- position sensor control **FC500-W**

The integrated functional monitoring in accordance with **EN 14175** offers maximum safety for laboratory staff. When the exhaust air setpoint that is to be regulated is underrun, an acoustic and optical alarm is activated.

Suitable for all fume hood constructions and extraction units. Standard model with differential pressure transmitter.

Functional description

In order to calculate the exhaust air volume flow that is to be regulated, the vertical (sash position sensor) and horizontal (air flow sensor) adjustment of the sash opening is determined. The calculated sash opening serves as a command variable and setpoint value for the air volume flow that is to be regulated. A high-speed control algorithm constantly compares the setpoint with the actual value measured by a differential pressure transmitter and regulates the exhaust air volume flow quickly, precisely and steadily, independent of pressure fluctuations in the duct system. The precalculated exhaust air requirement developed by SCHNEIDER is calculated immediately and is available as a setpoint. This considerably improves the control time of the room air controller (e.g. SCHNEIDER VAV supply air volume flow controller).

Advantages of the sash dependent variable fume hood controller

The containment-safety of the fume hood is guaranteed in all sash opening positions while at the same time ensuring minimal air consumption. Ventilatory robustness of fume hood operation is achieved by appropriate programming of the volume flow values V1 (sash = SHUT), V2 (sash < 50 cm open) and V3 (sash ≥ 50 cm open) and can be individually adapted to any type of fume hood construction. The FC500 controller uses three independent sensors (sash position sensor, static differential pressure transmitter and air flow sensor) and checks these three sensors for mutual plausibility. The logical context of the actual values of the differential pressure and air flow sensors in relation to the actual value of the sash is constantly checked and validated. This represents a considerable increase in the safety potential for the entire control system and for the user. Measurement errors and discrepancies are recognized and signalled immediately.

Performance features

- Microprocessor based variable control system
- Integrated power supply 230V AC
- All system data are saved mains voltage failure-safe in the EEPROM
- Separate terminal board for for simple cable connection and fast commissioning
- Pluggable mainboard for easy setup and servicing
- Programming and retrieval of all system values via the service module SVM100 or software PC2000
- Monitoring of supply air and exhaust air systems
- Static differential pressure transmitter 3...300 pa (optionally 8...800 pa) with high long-term stability for measuring the exhaust air actual value (volume flow)
- Linear sash position sensor for stable, error-free measurement of the vertical front sash opening
- Air flow sensor for measuring the face velocity
- Air volume flow range 10:1
- Compact design (e.g. DN250, overall length=400mm)
- Integrated functional monitoring of fume hood operation in accordance with EN 14175 with acoustic and optical alarm
- Maintenance-free measuring tube with two ring chambers and self-cleaning effect
- High-speed, predictive control algorithm
- Rapid, stable, precise control through direct activation of the servo motor with feedback potentiometer
- Control parameters are adaptively optimized online
- Reaction time and upward regulation of the exhaust air volume flow ≤ 2 sec ($V_{MIN} \rightarrow V_{MAX}$)
- Programming of the downward regulation control time for the exhaust air volume flow ≤ 2...24 sec ($V_{MAX} \rightarrow V_{MIN}$)
- Closed loop control
- Internal functional monitoring of all sensors for plausibility
- Emergency operation (override) = $V_{OVERRIDE}$
- Night-time operation (reduced operation) = V_{NIGHT}
- Optical and optionally acoustic alarm for the operating status “Sash position > 50cm”
- Emergency power pack (optional) for mains voltage failure-safe operation
- Control behaviour after a power failure freely programmable
- Integrated battery pack charging connection with low voltage safety circuit
- Retrofitting of LON field bus module FTT-10A possible
- Suitable for all fume hood constructions

Functional description

LON netwerk

The LON network offers maximum flexibility and security. Connection to the building management system (BMS) enables comprehensive ventilation control and monitoring of all laboratories.

The LonMark specifications are fulfilled, which guarantees easy connection of different subsections. All SCHNEIDER LabSystem products can be retrofitted at any time with the LON interface board FTT-10A.

Building management system

The building management system (BMS) balances the ventilation requirements of the entire building and can also check all room controllers for plausibility. Daytime/night-time operation, visualization of malfunction notifications and actual values as well as remote maintenance and error diagnostics can easily be integrated. Determination of room-related air consumption and individual billing is also possible.

Function display and control panel

The function and control panel is available in surface-mounted housing or as a fitted version in various designs (see the separate data sheet Functional displays standard versions).

Client-specific designs can be implemented quickly and cost-effectively when needed.

Functions:

- Acoustic and optical alarm (red LED) for insufficient exhaust/supply air
- Optical display (green LED) for sufficient exhaust/supply air
- RESET button for acknowledgement of the acoustic alarm
- Plug for programming via the service module SVM100 or laptop (program PC2000)

Options:

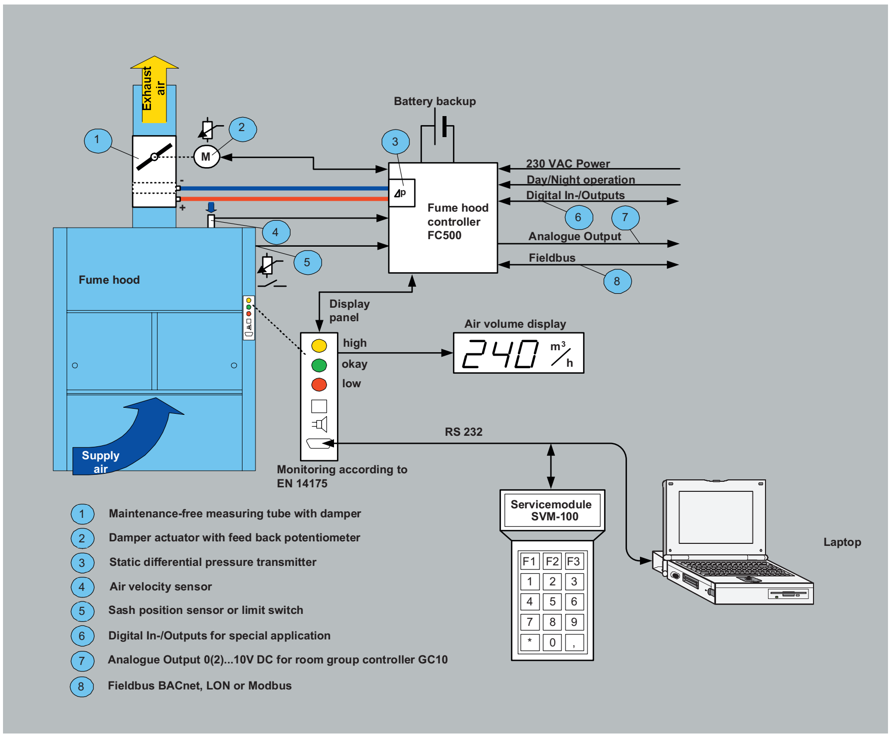
- Button Control ON/OFF with LED status display
- Button Light ON/OFF (fume hood interior lighting)
- Optical display (yellow LED) for exceedance of the maximum exhaust air
- Yellow blinking LED as an optical warning signal for the operating status “Sash position > 50cm”
- Button V_{MAX} with LED status display for emergency operation (override)
- Button V_{MIN} with LED status display for night-time reduction (reduced operation)

Fume hood controller operating modes

Depending on the configuration and the area of application, various modes of operation are possible. The following control types are implemented:

- **constant control** (1, 2 or 3 point) — **FC500-K**
- **face velocity control** — **FC500-F**
- **face velocity control** with limitation to V_{MIN} and V_{MAX} — **FC500-FP**
- **sash position control** — **FC500-W**
- **fully variable control** — **FC500-V**

Schematic diagram: Fume hood controller FC500



Constant 1, 2 or 3 setpoint controllers

The **FC500-K** controller regulates the exhaust air volume flow in relation to the sash position of the fume hood. The fume hood exhaust air is regulated either by a motor-driven damper (for hoods that are connected to a central exhaust air system) or by an integrated exhaust air motor with a frequency inverter.

Pressure fluctuations in the duct system are regulated quickly, precisely and steadily. The exhaust air volume flows V1, V2 and V3 are freely programmable.

1 point constant controllers

In 1 point constant controllers the exhaust air volume flow is constantly regulated at V1, independent of the sash position.

2 point constant controllers

A 2 point constant controller regulates the exhaust air volume flow at V1 (sash = SHUT) or V2 (sash = NOT SHUT), depending on the sash position.

The sash position (SHUT) is recognized by a limit switch. It is also possible to switch to reduced operating mode (night-time operation and work-free time) manually or via a remote control input.

3 point constant controllers

A 3 point constant controller regulates the exhaust air volume flow at V1 (sash = SHUT), V2 (sash < 50 cm OPEN) and V3 (sash > 50 cm OPEN), depending on the sash position. The sash positions (SHUT and > 50 cm) are both signalled by a limit switch. Switching to night-time operation is also possible.

If the fume hood has a slide window, the slide window position (SHUT) must also be determined and in the 2 point or 3 point operating mode allowance must be made for the slide window position so that the exhaust air volume flow is increased accordingly when the slide window is opened.

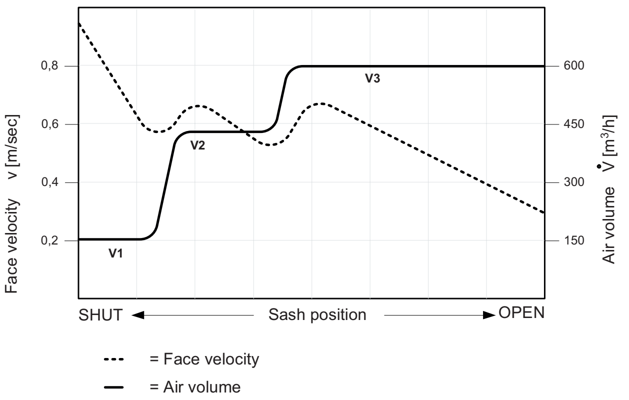


Figure 1: 3 point constant control

Constant face velocity

The **FC500-F/FC500-FP** regulates at a constant face velocity (e.g. v = 0,3...0,5 m/s), independent of the sash position. The exhaust air volume flow is changed in relation to the fume hood sash position so that the face velocity remains constant. The fume hood exhaust air volume flow is regulated either by a motor-driven damper (in hoods connected to a central exhaust air system) or by an integrated exhaust air motor with a frequency inverter.

Pressure fluctuations in the duct system are regulated quickly, precisely and steadily. The face velocity v and additional with FC500-FP the exhaust air volume flows V_{MIN} und V_{MAX} are freely programmable.

V_{MIN} und V_{MAX}

When the sash is closed, the face velocity is increased v > 0,3 m/sec. To ensure the security of the laboratory staff, a minimum exhaust air volume flow $\mathbf{V_{MIN}}$ is guaranteed. Regulation now takes plac e to a constant minimum exhaust air volume flow.

When the sash is opened, the face velocity is reduced v < 0,3 m/sec. When the safe exhaust air volume flow $\mathbf{V_{MAX}}$ for the specific fume hood is reached, this value is constantly regulated. Thus the fume hood is within the safe range and definitely containment-safe. The restriction of the exhaust air volume flow to $\mathbf{V_{MAX}}$ ensures an energy saving effect and guarantees maximum safety for the laboratory staff. The load on the ventilation system is only as high as is absolutely necessary for the operating status of the particular fume hood.

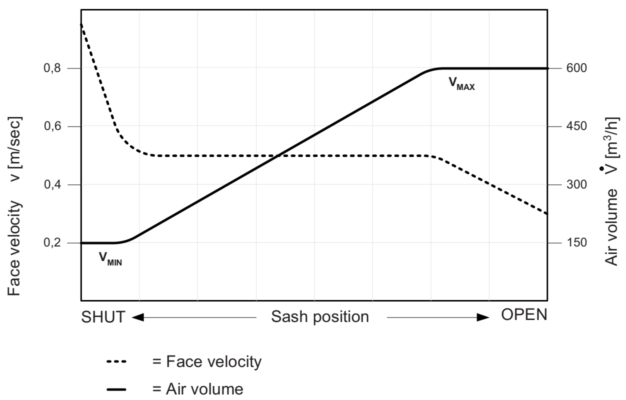


Figure 2: face velocity control

Air flow sensor

With the air flow sensor developed by SCHNEIDER a change in position of the sash and/or slide window is automatically detected and integrated in the control algorithm.

Operating modes

Sash position dependent control

In fume hoods without a slide window, only one sash position sensor is needed to for exact measurement of the vertical sash position.

The specification of setpoints by the sash position sensor enables stable, fast and accurate control. If turbulent and indefinable air flows are present in the laboratory that may affect the measuring accuracy and stability of the air flow sensor, a sash position sensor is always a better choice than a flow sensor.

The sash position measured by the sash position sensor is the setpoint for the **FC500-W** controller, which calculates the required exhaust air volume flow and and regulates it as needed. Volume flow is always linear in relation to the position sensor.

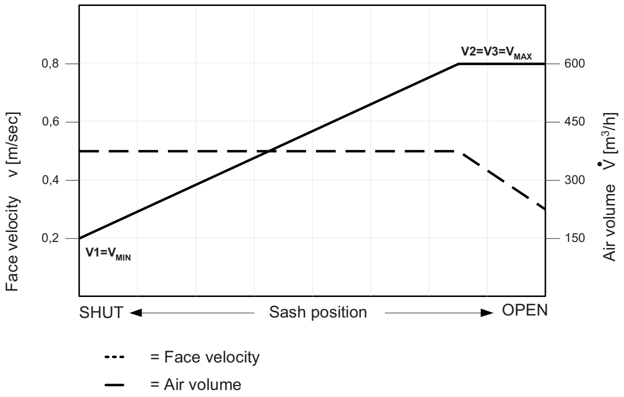


Figure 3: Linear sash position control

Fully variable volume flow control

In terms of energy efficiency, this mode of operation is the most expedient and the best method of fume hood control. A very fast and yet stable control algorithm is the most notable technical feature of this control mode.

The **FC500-V** controller seamlessly regulates the exhaust air volume flow in relation to the fume hood sash position. The fume hood exhaust air flow is regulated either by a motor-driven damper (in hoods that are connected to a manifold air system) or by an integrated exhaust air motor with a frequency inverter.

Pressure fluctuations in the duct system are regulated quickly, precisely and steadily. The exhaust air volume flows V1, V2 and V3 are freely programmable and define the vertices of the control curve.

V1 = V_{MIN}

When the sash is closed (SHUT) regulation takes place according to a programmable V1 exhaust air flow (minimum exhaust air flow). The containment-safety of the fume hood is guaranteed at all times while air consumption remains at a minimum.

V2 = V_{50cm}

The second vertex of the volume air flow is V2, which represents the exhaust air volume flow when the sash is partly open (e.g. sash = 50 cm). Seamless regulation of the required exhaust air volume flow takes place independent of the sash opening between V1 and V2 (SHUT ≤ sash ≤ 50 cm). The vertices V1, V2 and V3 are freely programmable and can be assigned to any sash opening, e.g. V2 at sash = 50 cm.

V3 = V_{MAX}

The third vertex of the exhaust air volume flow is V3, which represents the exhaust air volume flow when the sash is fully open (e.g. sash = 90 cm). Seamless regulation of the required exhaust air volume flow takes place between V2 and V3 (50 cm ≤ sash ≤ 90 cm) and is dependent on the sash opening.

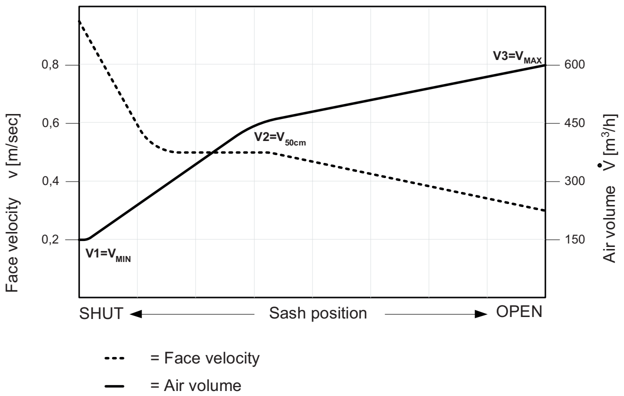


Figure 4: Fully variable control

Fast upward regulation and slow downward regulation

In all operating modes regulation is always upwards and at maximum velocity, i.e. when the front sash or slide window is opened, the calculated required volume flow follows and is increased without delay.

When the front sash or slide window is closed, downwards regulation can be done at adjustable speed of 2...24 s. Slow downwards regulation has the advantage that there is sufficient time for the required room supply air and the laboratory always remains in a state of negative presssure in all operating conditions.

Slow downwards regulation of the volume flow increases work safety for the laboaratory staff and eliminates the tendency towards oscillation of the entire control system.

Plausibility check with three different sensors

The **FC500** controller uses **three different sensors** (sash position sensor, static differential pressure transmitter and air flow sensor) to constantly check the mutual plausibility of the sensors, i.e. it is checked whether the actual values of the sensors (differential pressure transmitter and air flow sensor) are logically in line with the sash position sensor setpoint. This offers additional security for the entire control system and for the user.

Control parameters

All project-specific control parameters, such as the upper and lower limits for maximum and minimum volume flow, can easily be retrieved, changed and monitored on site via the service module or a laptop. Cyclic, sequential retrieval and verification of the control actual and setpoint values guarantees fast, stable, demand-related volume flow control.

Teach-in mode

A software controlled, automatic self-learning mode (teach in) facilitates and optimizes setup. The **FC500** controller determines and programs all necessary system data and control parameters fully automatically in teach in mode.

Test and diagnostic functions

A comprehensive, accurate overview of the measured actual values is essential for setup, diagnostics and troubleshooting.

With a special test and diagnostics program, SCHNEIDER provides service and setup staff with the following actual values in the service module SVM100 or PC software PC3000.

Actual value	Unit
Exhaust air	m^3/h
Supply air	m^3/h
Face velocity	m/s
Sash position (with position sensor)	%
Exhaust air pressure (measured by venturi tube)	pa
Damper position	%
Temperature (with PT-1000 measuring element)	°C

The following tests can be carried out:

- **Show digital inputs**
  Shows the current status of all digital inputs
- **Analogue inputs**
  Shows all analogue inputs with the current signal voltages
- **Analogue outputs**
  Shows all analogue outputs with the current signal voltages
- **Motor/damper test**
  With this test function the motor/damper can be set to OPEN and SHUT

These test and diagnostic functions greatly facilitate and simplify system setup and troubleshooting.

Operating modes

Measuring and control components

Accurate design of the measuring and control components is crucial for the speed, stability and accuracy of the entire control process. SCHNEIDER products are developed with the best available technology and fulfill these requirements.

Maintenance-free measuring tube with integrated damper

SCHNEIDER always uses the patended measuring principle, which has the following advantages:

- Very high measuring accuracy (better than 3%)
- Integrated annulus measuring process
- Very good sound levels due to favourable inflow
- Maintenance-free operation due to self-cleaning measuring system
- Compact design (e.g. DN250, overall length=400mm)
- Independent of the inlet and outlet route

Due to the compact design and the insensitiveness from a inlet route the system can be mounted directly on the fume hood exhaust air outlet.

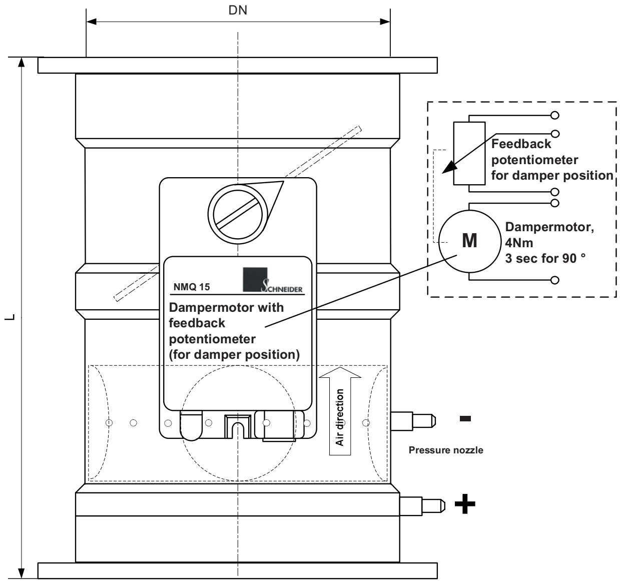


Figure 5: Schematic diagram connection of servo motor with feedback potentiometer

VD-250-P-FF-1

Figure 6: Damper with integrated maintenance-free tube and fast servo motor, running time 3 s for 90° Model: flange/flange

Compact design

In consideration of structural conditions in laboratories, we have developed a compact venturi tube that can be mounted directly on the fume hood exhaust air outlet. A special inlet route is not necessary. For a pipe diameter of DN200 the compact maintenance-free tube with integrated damper requires a length of just 350 mm (optionally 235 mm).

Table 1 shows the relationships between the nominal diameter (DN), overall length (L), minimum volume flow V_{MIN} and the maximum volume flow V_{MAX} at a flow velocity of 6 m/s.

Nominal diameter DN [mm]	Overall length L [mm]	Minimum volume flow V_{MIN} [m³/h]	Maximum volume flow V_{MAX} [m³/h]
160	340	59	434
200	350 optionally 235	100	679
250	400	163	1060
315	490	267	1683

Table 1: Nominal diameters of the venturi measuring tube with integrated damper

Fast servo motor with feedback potentiometer

The required exhaust air volume flow is adjusted via the damper. The very fast servo motor (3 s running time for 90 °) specially developed for SCHNEIDER is mounted directly on the damper shaft and has a torque of 3 Nm. The servo motor is operated directly by the control electronics (Fast Direct Drive), which guarantees fast, stable control behaviour. This operating mode has considerable advantages over analogue motor operation (0...10V DC), because the internal control electronics of the analogue (continuously) controlled servo motor have a hysterisis which can lead to control fluctuations if the volume flow differences that are to be regulated are small.

A feedback potentiometer reports the actual value of the current damper position to the control electronics. A special control algorithm quickly and directly “starts up” the required exhaust air volume flow without undefined overshoot.

When the servo motor is activated, a damper control concurrently checks whether the damper position is actually changed. This control concept with integrated servo motor monitoring functionality exceeds the stringent safety criteria for fume hood controllers.

Static differential pressure transmitter

Static differential pressure measurement is suitable for contaminated or abrasive air, because the air does not flow through the static differential pressure transmitter.

Measuring volume flow with a static differential pressure transmitter

The basis for determining the volume flow is the differential pressure on the damming body, which may take the form of a venturi tube, a measuring orifice or a measuring cross. SCHNEIDER always uses the venturi measuring principle due to its very high measuring accuracy and especially due to the fact that it is not dependent on a inlet and outlet route.

Air flow that occurs on a damming body generates resistance pressure proportional to flow velocity, which results in differential pressure. Measurement over the entire measuring range 3...300 pa (optional 8...800 pa) is very precise and stable, which means that a volume flow range of 10:1 can be regulated.

The volume flow is calculated using the following formula:

$$\dot{V} = c \cdot \sqrt{\frac{\Delta p}{\rho}}$$

$\dot{V}$ = Air volume
c = geometric constant of the measuring system
Δp = Differential pressure
ρ = Density of the air

Dynamic air flow sensor

Using a air flow sensor developed by SCHNEIDER a change in position of both the slide window (horizontal) and the front sash (vertical) is registered on the fume hood and provided as a standardized output signal 0...5 V DC.

A measuring principle devised by SCHNEIDER recognizes the direction of the air flow and enables very precise, fast measurements in the range 0...1 m/s. This measuring range is particularly suitable for determining the face velocity speed in fume hoods (e.g. 0,3..0,5 m/s).

The air flow sensor **AFS100** is mounted on the fume hood in a suitable position and measures the flow of air in the bypass into the fume hood.

The air flow measured in the bypass corresponds exactly to the face velocity in the sash area, both in the open and shut positions. If the sash is opened, the face velocity drops and is thus directly dependent on the sash opening. The face velocity (e.g. 0,3...0,5 m/s) is regulated stable within < 2 s.

Figure 7: Air flow sensor

Detection of thermal loads

Thermal loads must be detected quickly and safely and dissipated by increased exhaust air volume flow. The face velocity sensor is not suited to the additional task of detecting thermal loads. It must be temperature compensated in order to generate a safe air velocity value that is independent of the room temperature as a command variable for the fume hood controller.

For this purpose, SCHNEIDER offers a **PT-1000** thermal element in V4A casing for precise, safe measurement of the interior temperature of the fume hood. As soon as the interior temperature increases and a freely programmable value is exceeded, the exhaust air volume flow is increased instantly and safely.

Sash position sensor

A sash position sensor (cable potentiometer) determines the vertical sash position with an absolute accuracy of more than 2 mm (0,2%). The reproducible and seamless linear determination of the sash position enables very fast, precise, stable control. With this technique overshoot or undershoot are largely avoided.

The sash position sensor is easy to mount and ensures an absolutely safe and stable actual value signal for the vertical sash position.

The sash position sensor cable has an ejection length of 1m and can easily be hooked into the front sash counterweight.

The **SPS100** position sensor developed by SCHNEIDER is specially designed for precise, reproducible determination of the vertical sash opening height.

SPS100

Figure 8: Linear position sensor for determining the sash position

Notes on control dimensioning (dimensions and volume flow)

Due to the control accuracy, care must be taken to ensure that at minimum volume flow V_{MIN} the flow velocity in the fume hood controller does not fall below 1,05 m/s.

Due to noise radiation, in laboratory applications care must be taken to ensure that at maximum volume flow V_{MAX} the flow velocity in the volume flow controller does not exceed 7,5 m/s.

VAV dimensions for room application

The volume flows V_{MIN}, V_{MED} and V_{MAX} are freely programmable within the range 50...25.000 m^3/h, but care must be taken that the dimensions of the VAV for room supply and room exhaust air are appropriate in relation to the volume flow range while at the same time taking the flow velocity into account.

Determining volume flow for laboratory applications with regard to the flow velocity v

Volume flow	Flow velocity v
V_{MIN}	v ≥ app. 1 m/s
V_{MAX}	v ≤ 6 m/s

Planning values for sound and exhaust air volume flow

The tables on pages 15 to 17 should be consulted when planning a system, in order to project an optimal ratio between exhaust air volume flow, control behaviour and minimum sound values.

Planning values for duct pressure

The duct pressure on the fume hood controller is calculated to the given air volume flow and is the addition of the controller pressure loss (∆pv•factor 3) plus the pressure loss of the connected fume hood (controller pressure loss ∆pv see table 3 on page 17).

Example:

Given: Venturi tube DN250
max. air volume flow = 720 m^3/h
fume hood pressure loss acc. to manufacturer e.g. 40 Pa

Calculated: air velocity = 4,08 m/s

Table 3 : ∆pv = 14 Pa
∆pv•3 = 14•3 = 42 Pa

The multipilcation with factor 3 guarantees a save and stable air volume control over the whole range and a sufficient damperposition

Calculated minimum duct pressure: 42 + 40 = 82 Pa

Choosen minimum duct pressure with controller DN250 and maximum air volume flow = 720 m^3/h:	**ca. 100 Pa**

Ordering code: Fume hood controller / Venturi measuring tube with damper

Order code: **Fume hood controller**

FC500 - V - A - 0 - 0010 - 3 - 0 - T

Important:
Order the DK damper or the MD maintenance-free measuring tube with damper and and servo motor as well.

Type

Control type

Fully variable	**V**
Constant (2/3 point)	**K**
Face velocity	**F**
Face velocity with V_{MIN} and V_{MAX} limitation	**FP**
Position sensor	**W**

Housing

Standard	**A**
Supply air and exhaust air	**F**
Ex-protected design	**Ex**
Client-specific designs	**G···Z**

LON field bus module, FT-X1 (FTT-10A)

with = L   without = **0**

Internal transformer 230V AC

T = with   **0** = without

Emergency power pack 12V/1.2Ah

0 = without   **N** = with

Function display cable length

3 = 3 m   **5** = 5 m

Function display type

0010 ··· 0999	various SCHNEIDER standard models (see data sheet Function displays and control panels standard versions)
1000 ··· 9999	client-specific designs (see data sheet Function displays and control panels client-specific designs)

Control type	Sensors included with delivery and customer supplied limit switches
V = fully variable	position sensor, air flow sensor, differential pressure sensor
K = constant (1 point up to 3 point)	differential pressure sensor and 1 limit switch (2 point control) or 2 limit switches (3 point control). Limit switches customer supplied
F = face velocity	air flow sensor
FP = face velocity with V_{MIN} and V_{MAX} limitation	air flow sensor, differential pressure sensor
W = position sensor	sash position sensor, differential pressure sensor

Ordering example:
Fume hood controller FC500

fully variable, housing = standard, without LON module, 4 relays, function display and control panel type = 0010 with 3m cable, without emergency power pack, with internal transformer (power supply).

Make: SCHNEIDER

Type: FC500-V-A-0-0010-3-0-T

Order code: **Round damper with maitenance-free tube and actuator**

MD - 250 - P - MM - 1

Important:
Air volumes and dimensions on page 15. Order the fume hood controller FC500 as well.

Measuring system

Maitenance-free measuring tube	**MD**
Venturi tube	**VD**

Damper niminal diameter [mm]

DN160, DN200, DN250, DN315	**160 ··· 315**

Material

Polypropylene (PPs)	**P**
Electrically conductive PPs (Ex-Version)	**Pel**
Polyvinyl chloride (PVC)	**PV**
Stainless steel 1.4301	**V**

Actuator

1	SCHNEIDER standard 12V, 3sec for 90°
2	Analogue linear drive 24V, 5sec for 90°
Ex	Ex-protected drive 24V, 20sec for 90°

Pipe connections

	Air inflow	Air outflow
MM	Socket	Socket
FF	Flange	Flange
MF	Socket	Flange
FM	Flange	Socket

Ordering example: Round damper with maitenance-free measuring tube and actuator

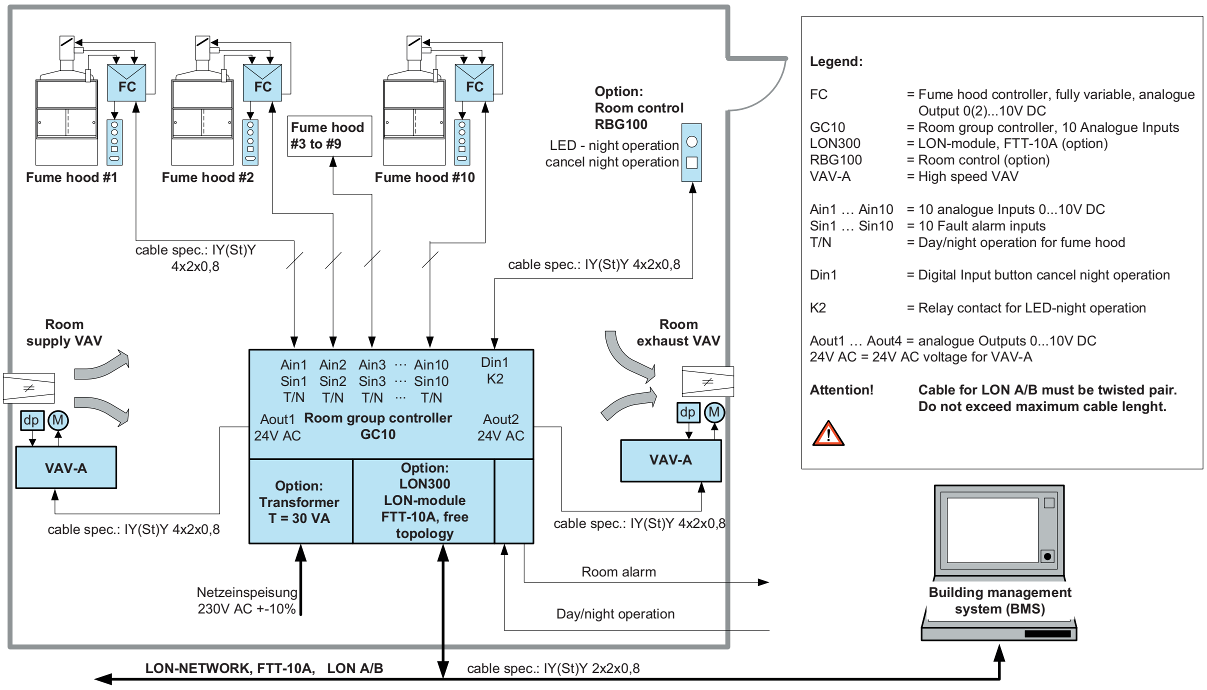
DN250, PPs, socket/socket, fast actuator 3 s for 90° (Fast Direct Drive SCHNEIDER).

Make: SCHNEIDER   **Type: MD-250-P-MM-1**

Room plan 1 • Fume hood controller FC500 with analogue output and room group controller GC10

Room plan 1 shows the interconnection of up to 10 fume hood controllers (Ain1 to Ain10) with the group controller GC10. The group controller can operate up to four freely configurable VAV variable air volume controllers for room supply/exhaust air (Aout1 to Aout4). The internal transformer (optional) provides the supply voltage for the VAV controllers 24V AC, which simplifies planning and reduces construction costs. The analogue inputs Ain1 to Ain10 are summated and can be combined in any number of groups on the analogue outputs Aout1 to Aout4. Optionally, a room by room LON connection to the building services management system is also possible.

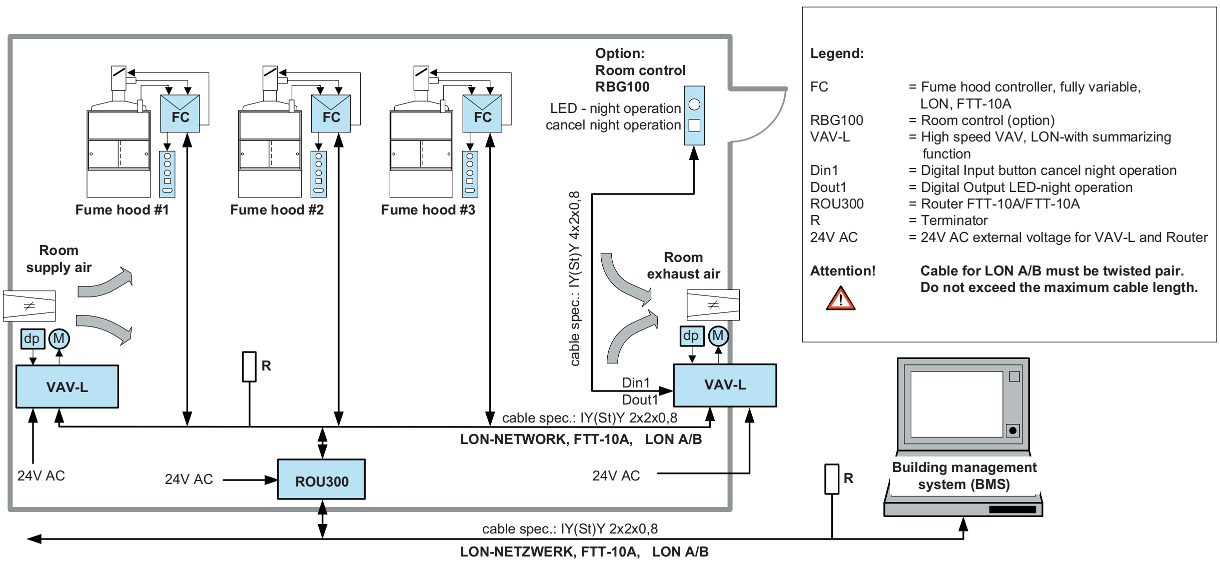
For a detailed description see the data sheet GC10.



Room plan 2 • Fume hood controller FC500 with LON network, FTT-10A and router ROU300

Room plan 2 shows the interconnection of up to 30 fume hood controllers with the LON network and a router. For > 30 LON nodes we recommend the installation of a subnet with a router, which guarantees satisfactory data transfer speeds. The variable air volume controllers VAV-L automatically balance the necessary room supply and exhaust air and regulate the calculated value. The 24V AC supply voltage for the VAV-L controllers and the router is provided by the customer.

The room by room LON connection to the building management system (BMS) is done via the router. All implemented functions can be controlled and accessed via the LonMark standard variables (SNVT).



Pipe-in-pipe controller

If higher volume flows are required, such as in walk-in hoods, and an even air distribution is desired, this can be achieved by the use of a pipe-in-pipe system.

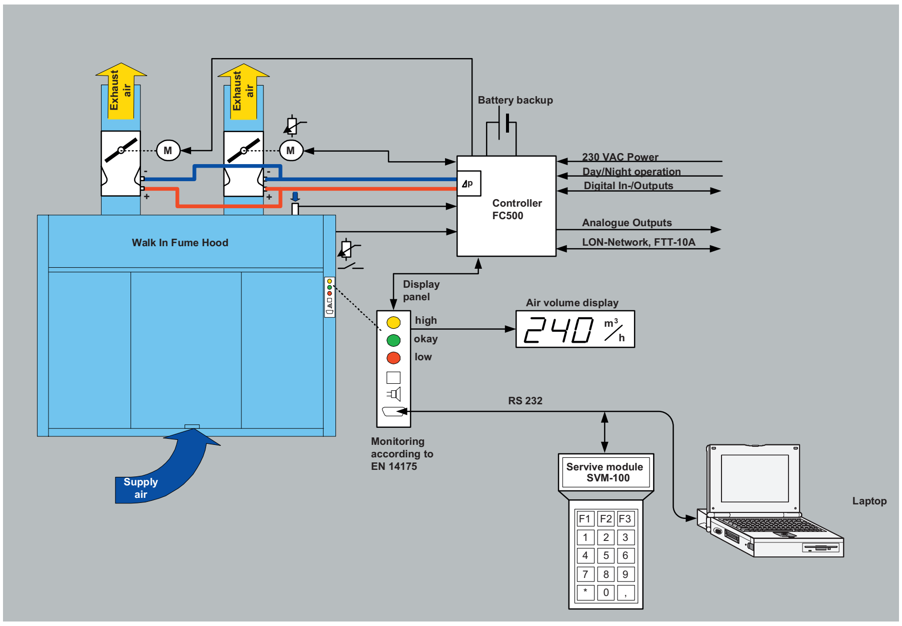
The FC500 fume hood controller can actuate up to two venturi measuring tubes with damper (e.g. MD-250-P-MM-1 and MD-250-P-MM-2). The servo motors are actuated in parallel, ensuring an even distribution of air over both volume flow controllers.

The volume flow actual value is determined via both venturi measuring tubes. The shield factor to be programmed is multiplied by 2.

Calculation example:

Given: Shield factor B at DN250 = 92

Shield factor in pipe-in-pipe applications:
B•2 = 92•2 = 184



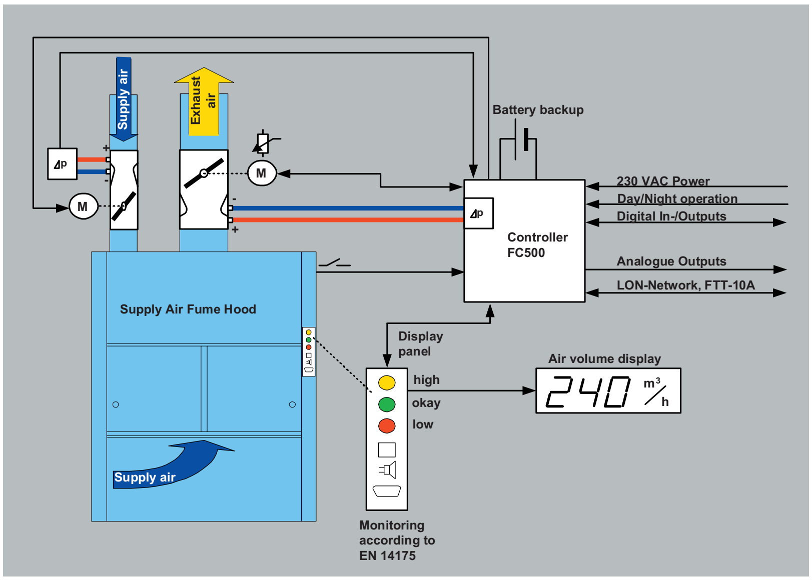
Control of a supply air fume hood

With a supply air fume hood, approximately 50% of the exhaust air is fed into the fume hood as supply air and the remaining supply air is extracted from the laboratory. With this type of fume hood, the direct supply air does require processing with energy (cooling or warming) and thus reduces running costs. In constant operating mode (1 point or 2 point), the FC500 fume hood controller also actuates the measuring device (venturi measuring tube, measuring tube or measuring cross) and the servo motor for the damper of the supply air controller.

Ordering codes of the measuring devices with damper:

Exhaust air, e.g. MD-250-P-MM-1
Supply air, e.g. MD-160-S-MM-2

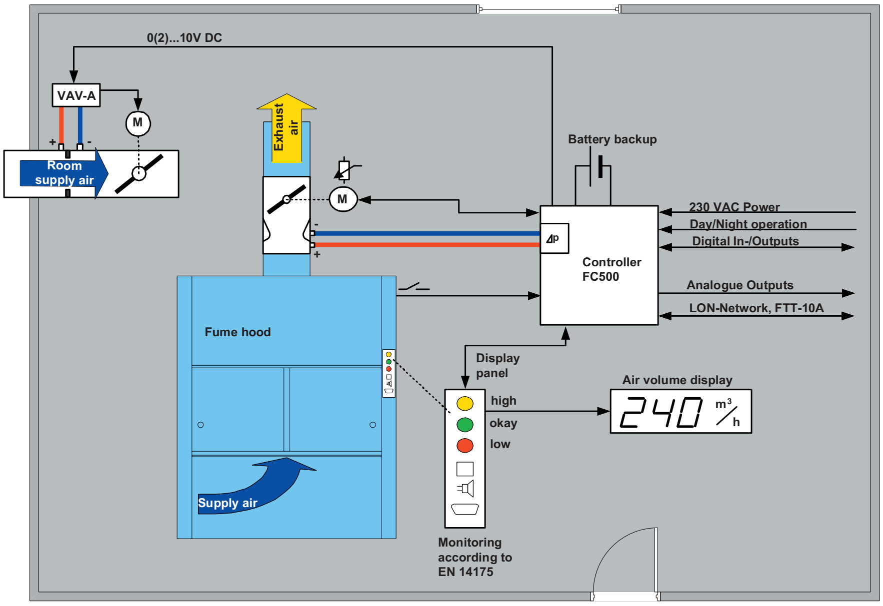
In order to maintain negative air pressure in the fume hood interior in all operating modes, a special regulation algorithm must be applied in supply air fume hoods. If the exhaust air is increased (e.g. by opening the sash), the supply air must follow the exhaust air. If the exhaust air is decreased (e.g. by closing the sash), the exhaust air must follow the supply air, i.e., the supply air is reduced first. When swtiching the fume hood controller on and off, this special on-off procedure is covered.



Direct actuation of the room supply air controller

In laboratory applications with a fume hood in the room, the FC500 fume hood controller can actuate the room supply air controller directly with 0(2)...10V DC, i.e. room pressure management (e.g. negative pressure in the laboratory) is taken into account for all operating modes of the fume hood.

The FC500 fume hood controller provides the 24V AC supply voltage for the room supply air controller (model with internal transformer). The direct actuation of the room supply air controller means that room pressure management can be achieved cost-effectively.



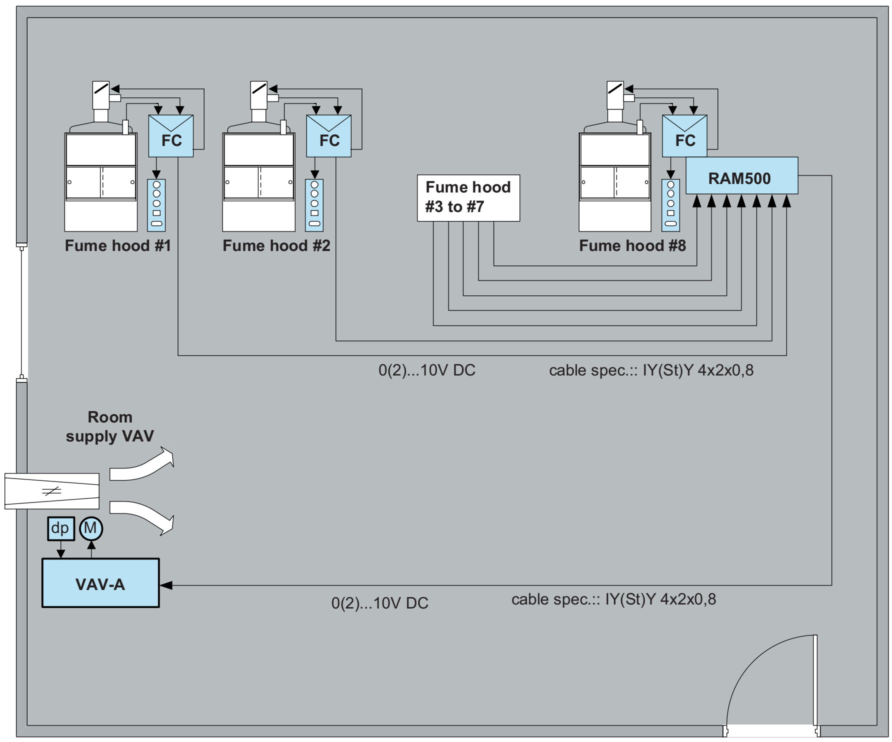
Room addition module RAM500

The RAM500 room addition module can be connected to any FC500 fume hood controller. Up to 8 analog inputs (exhaust air actual values of up to 8 different fume hoods) and up to 8 digital inputs (e.g. switchable consumer loads) can be connected.

The FC500 fume hood controller also takes over management of the room pressure, whereby all actual values are summated and available as a percentage weighted room supply air setpoint 0(2)...10V DC.

In small and middle-sized laboratory applications the RAM500 room controller module replaces the GC10 room group controller and thus represents a cost-saving alternative.

The FC500 fume hood controller provides the 24V AC supply voltage for the room supply air controller (model with internal transformer).



SNVT list

The following table gives an overview of the network interface. For a detailed description of the network interface, please request a copy of the SNVT description VAV-L or download it from the website: www.schneider-elektronik.com

Pos.	Name	No.	Type	Direc-tion	Value range	Unit	Data type	Description
1	nciMinOutTm	96	SCPTdelayTime	Input	0,0 ... 6553,5	[sec]	2 Bytes	Minimum transmission interval for all ouptut variables
2	nciSendOnDltFlow	54	SCPTminFlow	Input	0 ... 65534	[l/s]	2 Bytes	Value by which the flow output variables must change before transmission takes place
3	nciSendOnDltPerc	81	SNVT_lev_per-cent	Input	-163,840 ... 163,830	[%]	2 Bytes	Value by which the percentage output variables must change before transmission takes place
4	nciSendOnDltVelo	35	SNVT_speed_mil	Input	0,0 ... 65,535	[m/s]	2 Bytes	Value by which the velocity output variables must change before transmission takes place
5	nciSendOnDltTemp	39	SNVT_temp	Input	-274,0 ... 6279,5	[°C]	2 Bytes	Value by which the temperature output variables must change before transmission takes place
6	nciLocation	17	SCPTlocation	Input	Text		31 Bytes	Contains the position of the device
7	nciCtrlNormRedu	95	SNVT_switch	Input	0 ... 200, 0 ... 1		2 Bytes	Controls the LON connection of nviNormal-Redu
8	nciCtrlOnOff	95	SNVT_switch	Input	0 ... 200, 0 ... 1		2 Bytes	Controls the LON connection of nviOnOff
9	nciSendHrtBt	96	SCPTdelayTime	Input	0,0 ... 6553,5	[sec]	2 Bytes	Heartbeat interval
10	nciHeartbeatnvo	83	SNVT_state	Input	0 ... 1		2 Bytes	Delivers the selection for the variables sent during heartbeat
11	nciFixFlowNorm	51	SCPTmaxFlow	Input	0 ... 65534	[l/s]	2 Bytes	Value for constant loads during normal operation
12	nciFixFlowRedu	54	SCPTminFlow	Input	0 ... 65534	[l/s]	2 Bytes	Value for constant loads during reduced operation
13	nciPercentFlow	8	SNVT_count	Input	0 ... 65535		2 Bytes	Percentage weighting total
14	nciTempOffset	51	SCPTmaxFlow	Input	0 ... 65534	[l/s]	2 Bytes	Offset per °C due to increasing setpoint air volume via temperature
15	nciTempLimit	39	SNVT_temp_p	Input	-273,17... 327,66	[°C]	2 Bytes	Limit for increasing of the setpoint air volume
16	nciVAVType	8	SNVT_count	Input	0 ... 65535		2 Bytes	Selection of the control type
17	nciRoomFlowNorm	51	SCPTmaxFlow	Input	0 ... 65534	[l/s]	2 Bytes	Value for room air replacement during normal operation
18	nciRoomFlowRedu	54	SCPTminFlow	Input	0 ... 65534	[l/s]	2 Bytes	Value for room air replacement during redu-ced operation
19	nviExtFlow[0]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 1
20	nviExtFlow[1]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 2
21	nviExtFlow[2]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 3
22	nviExtFlow[3]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 4
23	nviExtFlow[4]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 5
24	nviExtFlow[5]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 6
25	nviExtFlow[6]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 7
26	nviExtFlow[7]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 8
27	nviExtFlow[8]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 9
28	nviExtFlow[9]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 10
29	nviExtFlow[10]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 11
30	nviExtFlow[11]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 12
31	nviExtFlow[12]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 13
32	nviExtFlow[13]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 14
33	nviExtFlow[14]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 15
34	nviExtFlow[15]	15	SNVT_flow	Input	0 ... 65534	[l/s]	2 Bytes	External actual value 16

SNVT list

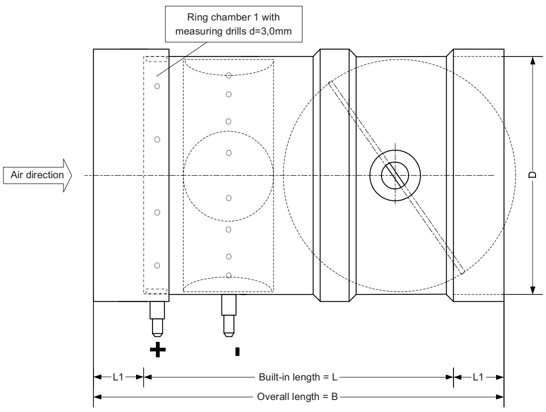
Pos.	Name	No.	Type	Direc-tion	Value range	Unit	Data type	Description
35	nviFlowTempAddon	15	SNVT_flow	Input	0..65534	[l/s]	2 Bytes	Direct preset of setpoint increasing via LON
36	nviRoomTempAct	39	SNVT_temp_p	Input	-273,17.. 327,66	[°C]	2 Bytes	Actual value room temperature
37	nviOnOff	95	SNVT_switch	Input	0 ... 200, 0 ... 1		2 Bytes	Activation On / Off
38	nviNormalRedu	95	SNVT_switch	Input	0 ... 200, 0 ... 1		2 Bytes	Activation normal operation / reduced operation
39	nvoOnOff	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Confirmation On / Off
40	nvoNormalRedu	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Confirmation normal operation / reduced operation
41	nvoAlarmLow	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Alarm insufficient air
42	nvoDigIn1	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Image of digital input 1
43	nvoDigIn2	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Image of digital input 2
44	nvoDigIn3	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Image of digital input 3
45	nvoDigIn4	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Image of digital input 4
46	nvoPowerFail	95	SNVT_switch	Output	0 ... 200, 0 ... 1		2 Bytes	Alarm mains voltage failure
47	nvoBoxFlowFC	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Current actual value exhaust air
48	nvoNomFlowActFc	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Current setpoint exhaust air
49	nvoBoxFlowVAV	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Current actual value supply air
50	nvoNomFlow ActVAV	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Current setpoint supply air
51	nvoNomFlowMax	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Setpoint maximum
52	nvoNomFlowMin	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Setpoint minimum
53	nvoNomFlowRedu	15	SNVT_flow	Output	0..65534	[l/s]	2 Bytes	Setpoint night-time operation
54	nvoSashPosition	81	SNVT_lev_percent	Output	-163,840 ... 163,830	[%]	2 Bytes	Actual value sash position
55	nvoFaceVelocity	35	SNVT_speed_mil	Output	0,0 ... 65,535	[m/s]	2 Bytes	Actual value face velocity
56	nvoDamperPos	81	SNVT_lev_percent	Output	-163,840 ... 163,830	[%]	2 Bytes	Actual value damper position
57	nvoTemperature	39	SNVT_temp	Output	-274,0 ... 6279,5	[°C]	2 Bytes	Actual value temperature sensor
58	nciMaxStsSendT	87	SNVT_elapsed_tm	Input			7 Bytes	Time for periodic transfer of nvoStatus
59	nviRequest	92	SNVT_obj_request	Input			3 Bytes	Status request
60	nvoStatus	93	SNVT_obj_status	Output			6 Bytes	Object status

Maintenance-free measuring tube with damper and servo motor, PPs (polypropylene, flame resistent), round model

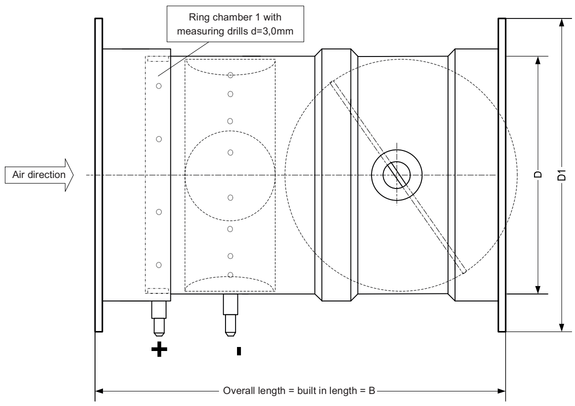
- Control unit: analogue, LON, LON balancing
- Fast, stable volume flow control (< 2 s)
- High control accuracy and response sensitivity
- Static differential pressure transmitter 3...300 pa
- Measuring system with integrated ring chamber
- Option: tightly closing damper in accordance with DIN

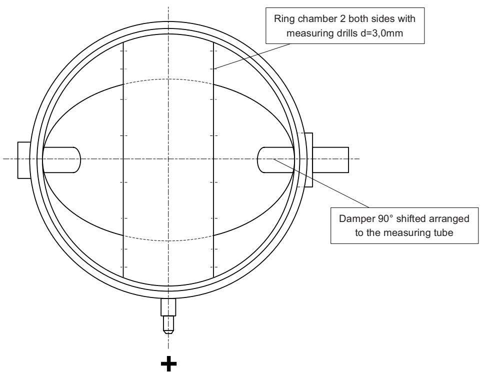
Nominal dia-meter	Inner-Ø	Volume flow V_{MIN}, V_{MAX}, V_{NOM} at airflow velocity v			Length			Dimension flange			
NW [mm]	D [mm]	v ≈ 1 m/s V_{MIN} [m³/h]	v = 6 m/s V_{MAX} [m³/h]	v ≈ 10m/s V_{NOM} [m³/h]	L [mm]	L1 [mm]	B [mm]	Outer-Ø D1 [mm]	K [mm]	d [mm]	No.
160	161	**59**	**434**	589	**340**	40	**260**	230	200	7	8
200	201	**100**	**679**	1005	**350**	50	**250**	270	240	7	8
250	251	**163**	**1060**	1628	**400**	50	**300**	320	290	7	12
315	316	**267**	**1683**	2667	**490**	50	**390**	395	350	9	12

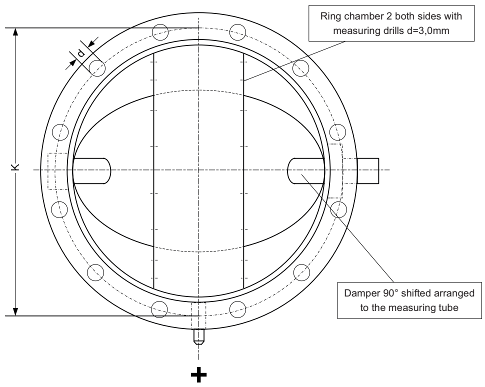
Model: MD-XXX-P-MM-1 (socket/socket)



Model: MD-XXX-P-FF-1 (flange/flange)







Planning notes for determining volume flow:

Bear in mind the volume flow in relation to airflow velocity v

V_{MIN} = volume flow at airflow velocity v ≈ 1 m/s
V_{MAX} = volume flow at airflow velocity v = 6 m/s (recommended)
V_{NOM} = volume flow at airflow velocity v ≈ 10 m/s

For laboratory applications (exhaust and supply air) the airflow velocity v = 6 m/s at V_{MAX} should not be exceeded due to the sound levels. If this value is exceeded the sound pressure level of < 52 dB(A) stipulated by DIN1946, Part 7 can only be achieved with very extensive sound absorption. The maximum volume flow V_{MAX} that is to be regulated should therefore always be less than app. 40% below V_{NOM}.

Sound values ● PPs venturi measuring tube with damper, circular model

Table 1: Flow noise

Nominal diameter in mm	v in m/s	V in m³/h	Δp_g = 100 pa										Δp_g = 250 pa										Δp_g = 500 pa									
			L_W in dB/octave, f_m in Hz										L_W in dB/octave, f_m in Hz										L_W in dB/octave, f_m in Hz									
			63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	L_{WA} in dB(A)	**L in dB(A)**	63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	L_{WA} in dB(A)	**L in dB(A)**	63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	L_{WA} in dB(A)	**L in dB(A)**
160	2	148	50	47	44	46	45	46	33	22	50	**42**	53	54	53	53	51	50	56	42	60	**52**	56	58	55	60	59	57	58	54	65	**57**
	4	290	55	51	48	51	47	42	35	27	52	**44**	64	61	58	57	55	53	49	43	60	**52**	67	67	64	63	60	58	60	58	67	**59**
	6	434	62	58	53	56	50	46	41	35	56	**48**	67	65	61	61	58	54	50	45	63	**55**	72	72	69	67	63	60	59	57	69	**61**
	8	579	62	60	57	59	55	51	49	45	61	**53**	71	67	64	64	60	56	53	48	66	**58**	75	73	71	69	65	62	59	56	71	**63**
	10	724	67	66	62	58	59	55	54	51	64	**56**	73	70	66	68	62	59	55	51	69	**61**	76	76	72	72	67	64	61	58	73	**65**
200	2	226	47	50	47	47	47	46	49	39	54	**46**	50	53	52	56	57	58	57	59	65	**57**	55	57	54	59	63	67	67	66	73	**65**
	4	452	56	57	53	51	53	60	56	42	63	**55**	59	62	60	60	59	59	60	62	67	**59**	61	64	64	66	66	67	66	66	73	**65**
	6	679	59	61	56	55	58	58	52	45	63	**55**	65	66	64	63	63	63	63	64	70	**62**	68	70	70	70	69	69	67	70	76	**68**
	8	905	61	64	60	57	59	58	52	46	64	**56**	69	72	67	66	67	68	66	61	73	**65**	70	74	72	73	72	71	69	69	78	**70**
	10	1131	63	65	62	59	62	60	55	50	66	**58**	74	72	70	68	69	69	65	61	75	**67**	75	77	74	74	74	73	71	70	80	**72**
250	2	353	50	47	44	46	45	46	33	22	50	**42**	53	54	53	53	51	50	56	42	60	**52**	56	58	55	60	59	57	58	54	65	**57**
	4	707	55	51	48	51	47	42	35	27	52	**44**	64	61	58	57	55	53	49	43	60	**52**	67	67	64	63	60	58	60	58	67	**59**
	6	1060	62	58	53	56	50	46	41	35	56	**48**	67	65	61	61	58	54	50	45	63	**55**	72	72	69	67	63	60	59	57	69	**61**
	8	1414	62	60	57	59	55	51	49	45	61	**53**	71	67	64	64	60	56	53	48	66	**58**	75	73	71	69	65	62	59	56	71	**63**
	10	1767	67	66	62	58	59	55	54	51	64	**56**	73	70	66	68	62	59	55	51	69	**61**	76	76	72	72	67	64	61	58	73	**65**
315	2	561	42	47	45	43	38	35	33	32	45	**37**	47	47	49	51	54	52	50	50	57	**49**	52	52	54	56	59	57	55	55	62	**54**
	4	1122	52	55	50	49	43	38	31	29	50	**42**	60	61	57	55	55	51	47	48	59	**51**	65	66	62	60	60	56	52	53	64	**56**
	6	1683	54	57	52	51	45	40	33	31	52	**44**	62	63	59	57	57	53	49	50	61	**53**	67	68	64	62	62	58	54	55	66	**58**
	8	2244	59	57	56	55	47	43	38	33	55	**47**	67	68	64	61	58	55	51	50	64	**58**	72	73	69	66	63	60	56	55	69	**61**
	10	2806	61	59	58	57	49	45	40	35	57	**49**	69	70	66	63	60	57	53	52	66	**58**	74	75	71	68	65	62	58	57	71	**63**

Definitions:

f_m	in Hz:	Centre frequency of the octavos
L_W	in dB/octave:	Sound power level measured in the echo chamber
L_{WA}	in dB(A):	Total sound power level , A-weighted
L	in dB(A):	Sound pressure level, A-weighted, room insulation of 8dB/octave taken into account
Δp_g	in Pa:	Total pressure difference (measured in front of and behind the volume flow controller)
V	in m3/h:	Volume flow
v	in m/s:	Flow velocity

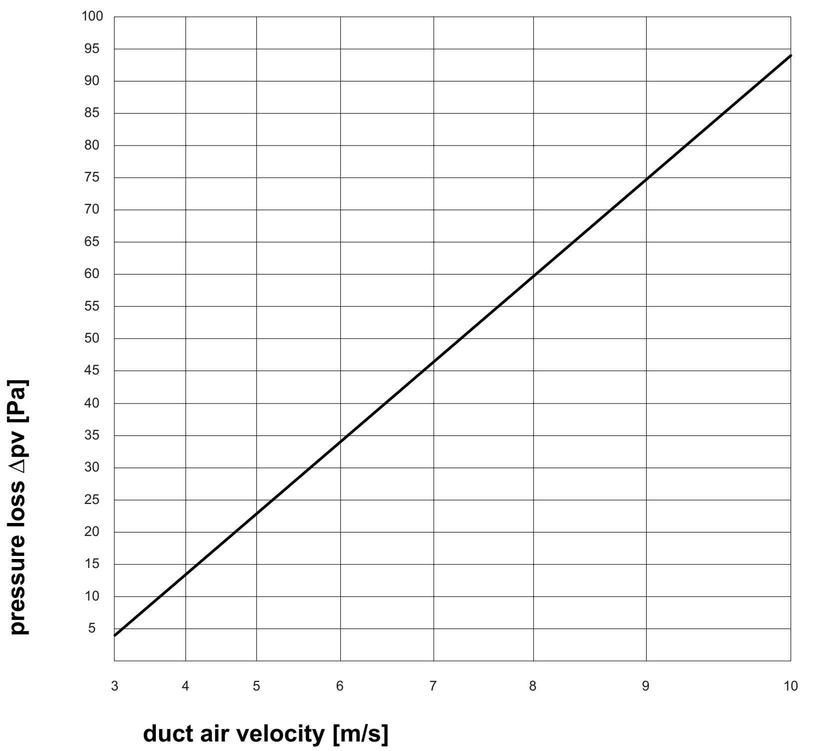
Sound values ● PPs venturi measuring tube with damper, circular model

Table 2: Sound emission

Nominal diameter in mm	v in m/s	V in m³/h	Δpg = 100 pa										Δpg = 250 pa										Δpg = 500 pa									
			Lw in dB/octave, fm in Hz										Lw in dB/octave, fm in Hz										Lw in dB/octave, fm in Hz									
			63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	L_{WA} in dB(A)	**L in dB(A)**	63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	L_{WA} in dB(A)	**L in dB(A)**	63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	L_{WA} in dB(A)	**L in dB(A)**
160	2	148	30	28	21	20	26	28	15	9	31	**23**	33	26	24	25	36	38	31	20	42	**34**	33	25	26	31	42	47	41	33	50	**42**
	4	290	38	32	27	23	27	27	20	7	32	**24**	43	36	32	29	36	38	30	22	41	**33**	42	37	36	34	42	45	39	32	49	**41**
	6	434	41	34	32	29	30	29	22	9	35	**27**	47	41	38	33	37	38	33	23	43	**35**	48	44	42	38	44	46	40	33	49	**41**
	8	579	46	41	40	39	35	31	22	10	41	**33**	49	43	42	38	40	40	35	26	45	**37**	54	48	47	41	46	47	41	34	51	**43**
	10	724	51	45	46	46	41	37	28	18	47	**39**	52	46	45	42	43	42	36	26	48	**40**	54	50	49	44	47	48	43	35	53	**45**
200	2	226	24	22	20	19	20	20	20	6	26	**18**	28	30	27	27	26	28	27	22	34	**26**	37	31	28	32	34	37	32	33	41	**33**
	4	452	31	33	27	23	23	27	20	6	31	**23**	38	37	33	30	30	30	29	29	37	**29**	53	39	37	42	39	38	34	34	45	**37**
	6	679	38	37	32	28	28	28	20	12	33	**25**	44	43	38	34	33	35	31	29	40	**32**	47	46	42	44	41	40	35	34	47	**39**
	8	905	39	39	35	33	33	30	22	14	37	**29**	45	44	41	39	38	38	32	26	43	**35**	47	47	46	45	44	43	41	37	50	**42**
	10	1131	43	43	39	37	38	33	26	19	41	**33**	52	49	45	41	40	40	34	30	46	**38**	54	52	49	47	44	44	41	38	51	**43**
250	2	353	30	28	21	20	26	28	15	9	31	**23**	33	26	24	25	36	38	31	20	42	**34**	33	25	26	31	42	47	41	33	50	**42**
	4	707	38	32	27	23	27	27	20	7	32	**24**	43	36	32	29	36	38	30	22	41	**33**	42	37	36	34	42	45	39	32	49	**41**
	6	1060	41	34	32	29	30	29	22	9	35	**27**	47	41	38	33	37	38	33	23	43	**35**	48	44	42	38	44	46	40	33	49	**41**
	8	1414	46	41	40	39	35	31	22	10	41	**33**	49	43	42	38	40	40	35	26	45	**37**	54	48	47	41	46	47	41	34	51	**43**
	10	1767	51	45	46	46	41	37	28	18	47	**39**	52	46	45	42	43	42	36	26	48	**40**	54	50	49	44	47	48	43	35	53	**45**
315	2	561	34	34	31	29	25	24	24	24	33	**25**	39	34	35	37	41	41	41	42	45	**37**	44	39	40	42	46	46	46	47	50	**42**
	4	1122	44	42	36	35	30	27	22	21	38	**30**	52	48	43	41	42	40	38	40	47	**39**	57	53	48	46	47	45	43	45	52	**44**
	6	1683	46	44	38	37	32	29	24	23	40	**32**	54	50	45	43	44	42	40	42	49	**41**	59	55	50	48	49	47	45	47	54	**46**
	8	2244	51	44	42	41	34	32	29	25	43	**35**	59	55	50	47	45	44	42	42	52	**44**	64	60	55	52	50	49	47	47	57	**49**
	10	2806	53	46	44	43	36	34	31	27	45	**37**	61	57	52	49	47	46	44	44	54	**46**	66	62	57	54	52	51	49	49	59	**51**

Pressure loss table ● PPs venturi measuring tube with damper, circular model

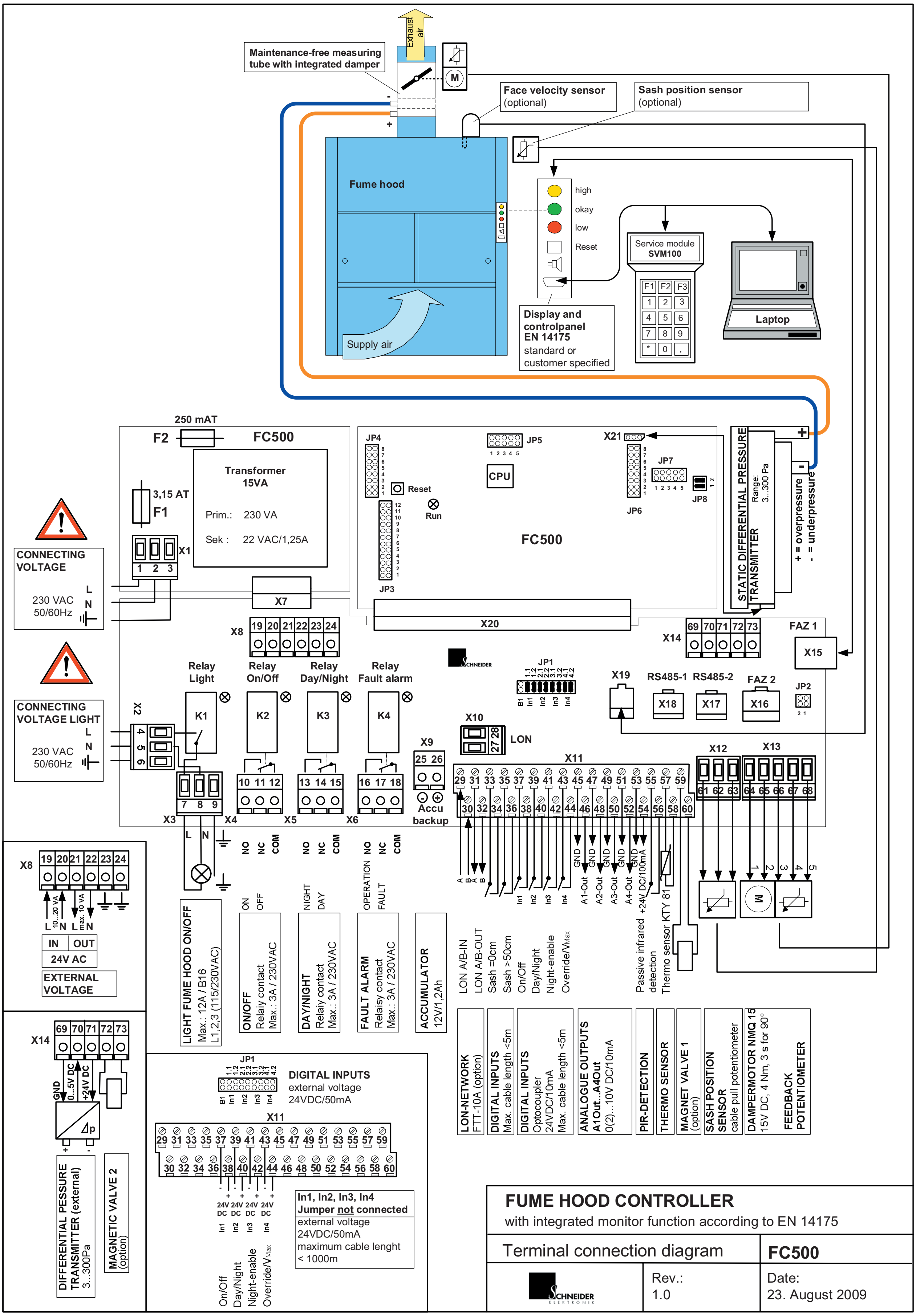
Table 3: Pressure loss



Definitions:

Δpv	in Pa:	Total pressure loss with fully open damper (measured in front of and behind the volume flow controller)

Terminal diagram: Fume hood controller FC500



■ General	
Nominal voltage	230V AC/50/60Hz/+-15%
Max. charging rate	200 mA
Max. power input	25 VA
Reactivation time	600ms
Operating temperature	0 °C to +55 °C
Humidity	max. 80 % relative, non-condensing

■ Case	
Protection type	IP 20
Material	sheet steel
Colour	white, RAL 9002
Dimensions (LxWxH)	(290 x 208 x 100) mm
Weight	approx. 2.8 kg
Terminals	screw terminal 1.5 mm^2

■ Relay outputs	
Number	1 relay (K1)
Contact type	front contact
Max. switching voltage	250V AC
Max. continuous current	16A
Number	3 relays (K2 to K4)
Contact type	changeover contact
Max. switching voltage	250V AC
Max. continuous current	12A

■ Digital inputs	
3 inputs	24V DC, 5mA

■ Digital inputs (galvanically separated)	
Number	4 optocouplers
Max. input voltage	24V DC +-15%
Max. continuous current	10mA (per input)

■ Analogue outputs (galvanically separated)	
4 outputs	0(2)...10VDC, 10mA

■ Analogue inputs	
1 input	0(2)...10VDC, 1mA

■ Sash position sensor SPS100	
Measuring principle	static, cable pull potentiometer
Measuring range	0...1000 mm
Response time	< 1 ms

■ Differential pressure transmitter	
Measuring principle	static
Pressure range	3...300 pascal 8...800 pascal optional
Response time	< 10 ms
Overpressure	500 mbar

■ Air flow sensor AFS100	
Measuring principle	dynamic, heat wire anemometric principle
Flow range	0...1 m/s
Response time	< 100 ms

■ Maitenance-free measuring tube MD with damper	
Material	polypropylene (PPs)
Measuring system	integrated measuring system with ring chamber

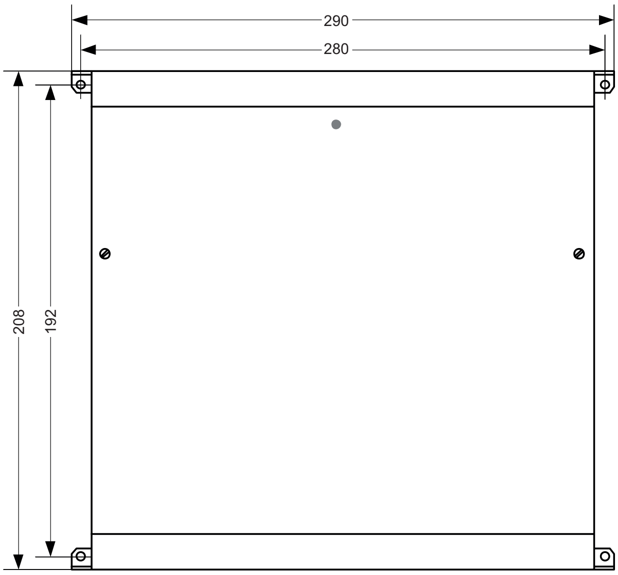
■ Optional to MD: Venturi measuring tube VD with damper	
Material	polypropylene (PPs)
Measuring system	integrated venturi tube

■ Servo motor	
Torque	3 Nm
Running time	3 sec. for 90 degrees
Activation	directly drive with integrated current monitor
Resolution	< 0,5°
Angle feedback	< 0,5° via potentiometer

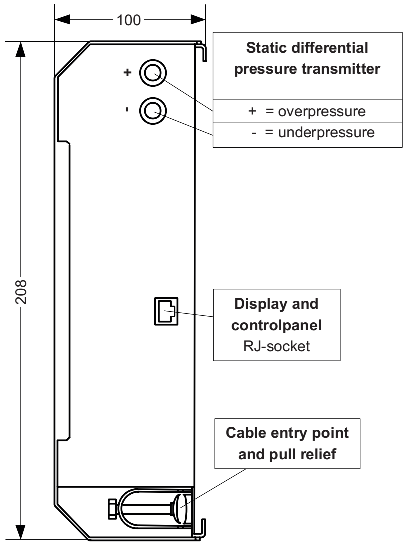
■ LON specification	
Transceiver	FTT-10A, free topology
Network variables	Standard network variable (SNVT) to LonMark

Dimensions ● Dimensional diagrams ● Tender specification

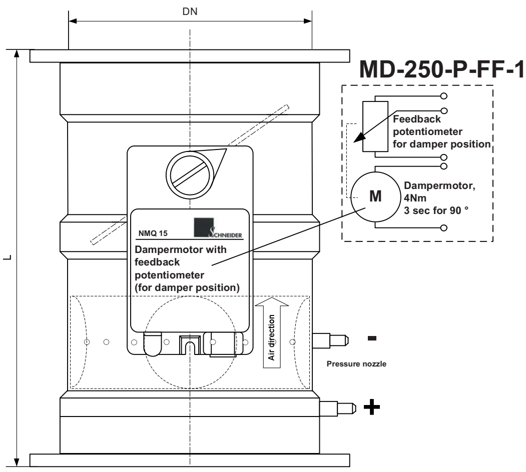
Case FC500: Top view



Case FC500: Side view



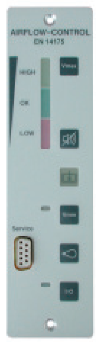
Maintenance-free measuring tube with integrated damper, model: flange/flange



Sash position sensor

SPS100

SCHNEIDER standard function display



FAZ0010

Air flow sensor

AFS100

Nominal diameter [mm]	Length [mm]	Shield factor B	V_{MIN} [m³/h]	V_{MAX} [m³/h]
DN 160	340	34	59	434
DN 200	350	58	100	679
DN 250	400	94	163	1060
DN 315	495	154	267	1683

Shield factor B related to air density 1,2 kg/m^3

Tender specification FC500-V

Fume hood controller with integrated microprocessor, two independent watchdog circuits, sash position sensor, air flow sensor and static differential pressure transmitter. Variable fume hood control depending on the sash position with integrated safe operation monitoring function in accordance with EN 14175 with acoustic and optical alarm. Optical and optionally acoustic alarm for the operating status "Sash position > 50cm". Integrated battery pack charging connection with low voltage safety circuit. System data storage in mains voltage failure-safe EEPROM. Separate terminal board for fast, simple cable connection. Suitable for all fume hood constructions. The LON connection is done via the transceiver FTT-10A, free topology. Standard network variables (SNVT) in accordance with the LonMark specification.

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