Pure competence in air.

SCHAKO

THE SCHAKO VKM

volumetric flow limiter

Precise and energy-efficient volumetric flow control

PRECISE

SUSTAINABLE

RELIABLE

INTRODUCTION AND OVERVIEW OF THE SCHAKO VKM – Where precision meets efficiency

The mechanical **VKM volumetric flow limiter** controls the setpoint volumetric flow in the range of approx. 0.8 to 5.5 m/s at 30 to 300 Pa. The machinery located outside the air flow stays clean and hygienic, lasts a long time and requires no maintenance. Thanks to its compact design and flexible installation variants (insertion into spiral ducts using duct sleeves), the VKM is ideal for both new and existing systems. A minimum distance of 1 × D behind moulded parts is required for stable control accuracy. **The optional locking device enables defined damper positioning and therefore partial load operation and night lowering.** Its sturdy housing makes mounting easier: Airtightness class C in accordance with DIN EN 1751 is also achieved without a plug seal when installed in the duct sleeve from the factory. The setpoint volumetric flow can be set easily and precisely without any tools using a slide bar. The VKM supports energy-efficient system control and a layout in accordance with Section 67 of the German Building Energy Act (GEG). With total volume flows or volume flow reductions of 4,000 m³/h or more per system and 9 m³/m² or more of room area (approx. a threefold air change), lowering of the air volume must be taken into account – in particular in large offices, open space zones and other offices if the thermal load discharge does not occur via cooling ceilings or recirculating air cooling devices.

Air conditioning systems and other systems in ventilation technology

Section 65: Limitation of electrical power

When installing an air conditioning system with a rated power of more than 12 kilowatts for cooling and a ventilation system with a supply and return air function designed for a supply air volumetric flow of at least 4,000 cubic metres per hour into a building or when replacing a central unit or air duct system of such a system, the system must be designed in such a way that the designed volumetric flow limit value for the specific fan power according to DIN EN 16798-3:2017-11 Category 4 is not exceeded.

Section 67: Regulation of volumetric flows

(1) When installing a system into a building according to Section 65 Paragraph 1 and when replacing a central unit or air duct system of such a system, this system must be equipped with a device for automatic regulation of the volumetric flows depending on the thermal and material loads or for setting the volumetric flows depending on the time if the supply air volumetric flow of this system is higher than nine cubic metres per hour for each square metre of supplied net floor area of a non-residential building or nine cubic metres per hour for each square metre of supplied usable space of a residential building.

(2) Paragraph 1 is not to be applied if increased supply air volumetric flows are required or load changes cannot be measured, either using measurement equipment or with regard to progression over time, in the supplied rooms for occupational health and safety reasons.

Version: 2025
Source: The German Building Energy Act (GEG)

Common areas of use include office buildings, schools and educational facilities, residential buildings and public buildings.

The functional principle of the preset volumetric flow of the **SCHAKO VKM** is based on mechanical control without auxiliary power that keeps the preset air volume constant. Aerodynamic forces resulting from the air speed and system pressure act on the flow-optimised housing and damper blade of the VKM in the closing direction.

The damper blade automatically responds to changes in the duct system, and the preset volumetric flow is adjusted within the control tolerance limits. Rising or falling system pressures and flow speeds are compensated for by the control unit located entirely outside the air flow.

Installation situation

The VKM can be integrated into all common round duct systems and can be installed regardless of the position. The required straight blower stream length is only 1 × D, which makes the VKM ideal for renovation and new construction projects.

Installation in round duct systems is possible either as an insertable controller or with a duct sleeve from the factory (galvanised sheet steel).

Insertion into a spiral duct:
Easy, compact integration

Optional on-site opening for access to the volumetric flow setting after installation.

Installation using a duct sleeve:
Flexible and exchangeable

Opening from the factory for access to the volumetric flow setting after installation.

TECHNICAL DATA

View: Front with volumetric flow setting

View: Rear with optional blade lock

View: Isometric view

Control ranges and acoustic data:

NW	V		L_{WA} in dB(A)	
	m³/h	l/s	Δp = 50 Pa	Δp = 100 Pa
80	24	7	28	35
	36	10	30	38
	66	18	34	42
100	30	8	26	36
	42	12	28	36
	80	22	30	38
125	61	17	31	41
	95	26	33	42
	175	49	35	42

Function of the optional locking device:

Unlocked: Limiter function active, dynamic blade behaviour.

Locked: Damper function active, damper blade secured in last blade position, static blade behaviour.

A.) Operating mode: Constant volumetric flow limitation with dynamic blade behaviour

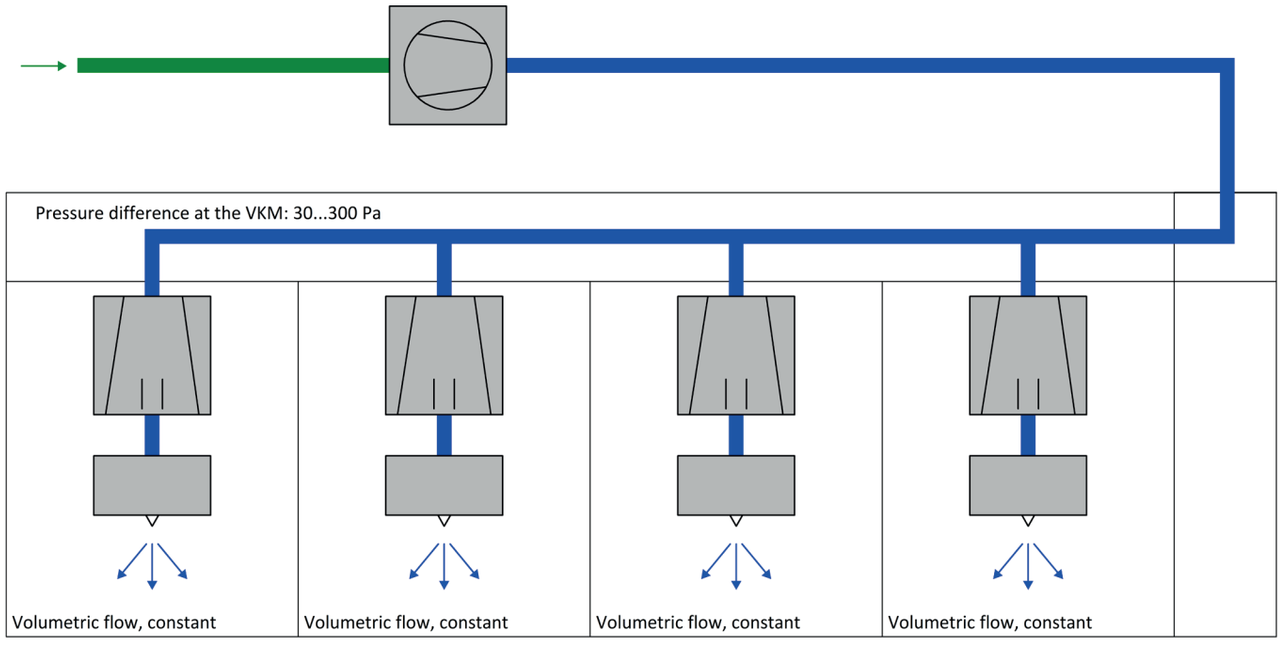
In this operating mode, the VKM functions like a volumetric flow limiter. Regardless of the system pressure (within the control limits of the VKM), the limiter controls the setpoint volumetric flow with its dynamic blade behaviour.

This prevents extensive and time-consuming adjustment operations.

A.1.) Ventilation systems with constant applications only

A.1.1) Use of the VKM limiters for ventilation applications with a static pressure up to the control limit of the VKM (300 Pa or less).

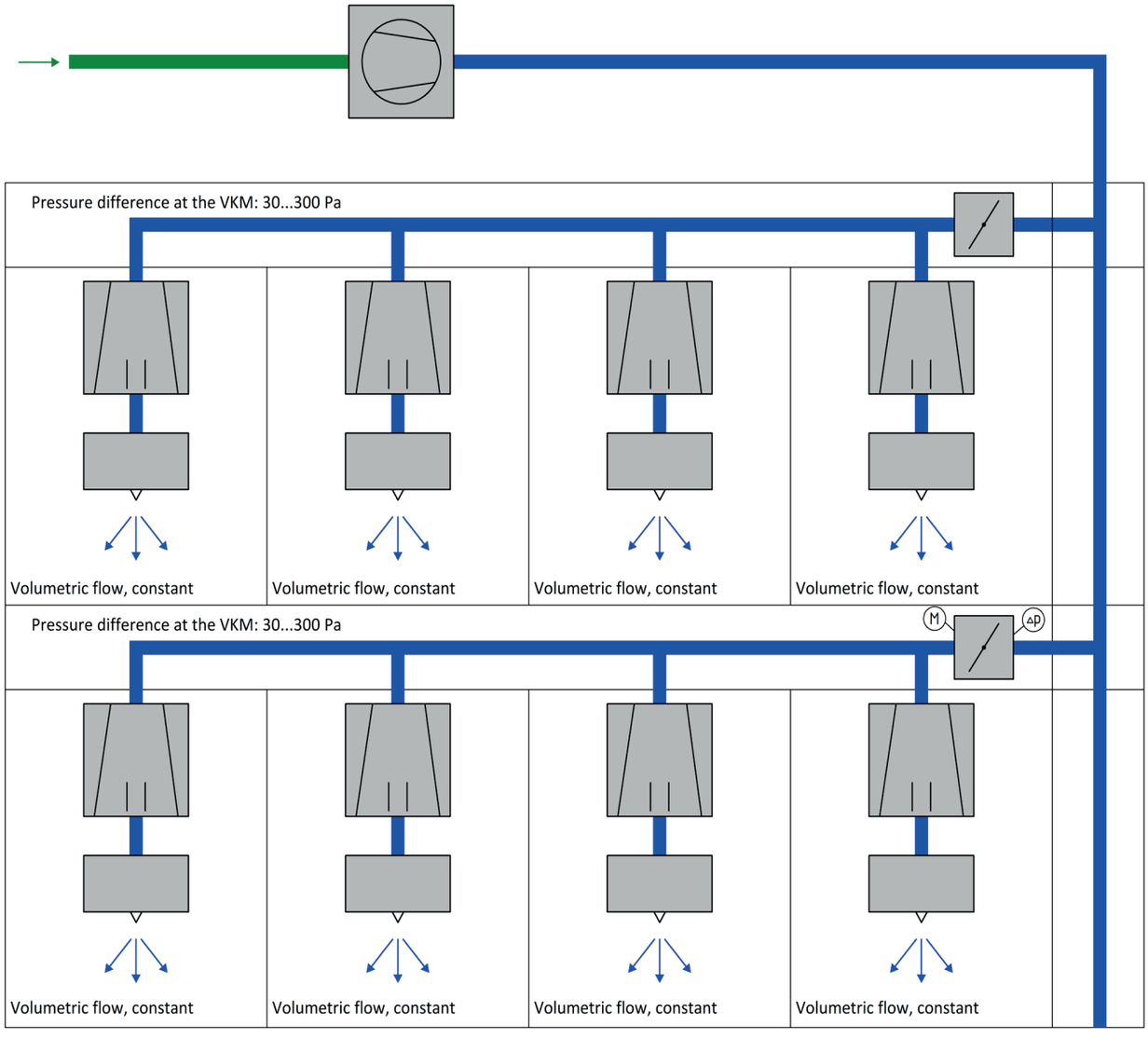
No additional control units are needed. Please observe the minimum pressure difference (approx. 30 Pa) and the upper control limit of the VKM. If the minimum pressure difference is undershot, the setpoint volumetric flow will not be reached and increased control deviations will occur.



CONTROL DIAGRAM A

A.1.2) Use of the VKM limiters for ventilation applications with a static pressure above the control limits of the VKM (300 Pa)

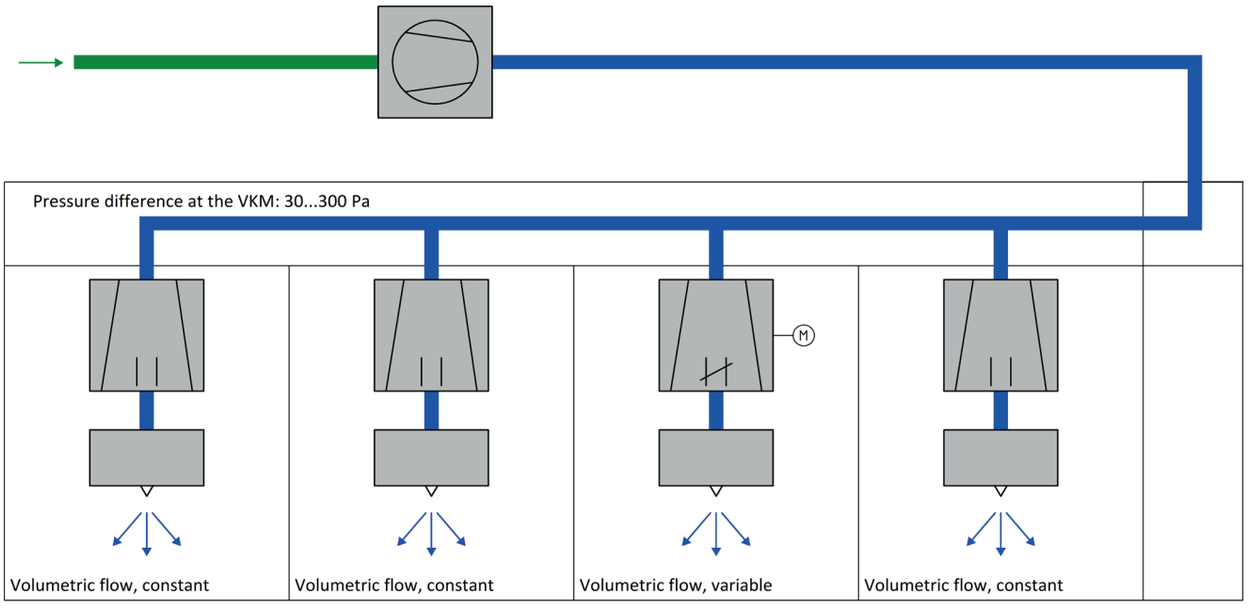
In these cases, we recommend taking duct pressure control within the control limits of the VKM (30 to 300 Pa) into account. Pre-control must ensure that the permissible control limits of the VKM are not exceeded. If the upper control limit is exceeded, damage to the VKM cannot be ruled out.



A.2.) Ventilation systems with constant and/or variable volumetric flow

A.2.1) Use of the VKM limiters for ventilation applications with a static pressure up to the control limit of the VKM (300 Pa or less).

No additional control units are needed. Please observe the minimum pressure difference (approx. 30 Pa) and the upper control limit of the VKM. If the minimum pressure difference is undershot, the setpoint volumetric flow will not be reached and increased control deviations will occur. If the upper control limit is exceeded, damage to the VKM cannot be ruled out.



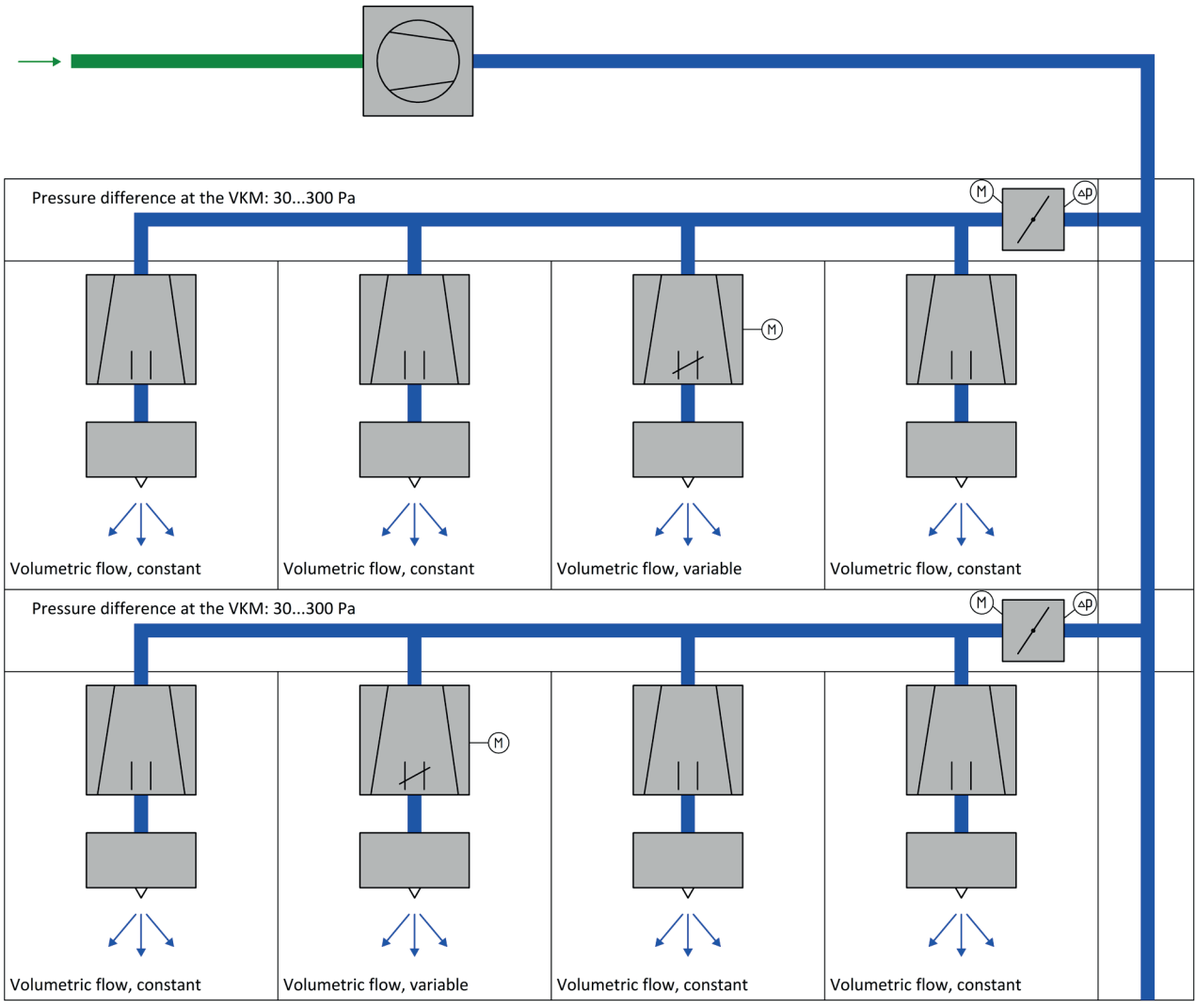
CONTROL DIAGRAM A

A.2.2.) Use of the VKM limiters for ventilation applications with a static pressure above the control limits of the VKM (300 Pa).

In these cases, we recommend taking duct pressure control with a pressure difference within the control limits of the VKM (30 to 300 Pa) into account.

Each duct in which the VKM is used should be equipped with pre-control via an electronic duct pressure controller here.

If the upper control limit is exceeded, damage to the VKM cannot be ruled out.



B.) Operating mode: Constant volumetric flow limiting with dynamic blade behaviour (only during adjustment) followed by static behaviour as a damper

In this operating mode, the VKMs only serve as volumetric flow limiters during commissioning. Regardless of the system pressure (within the control limits of the VKMs), the limiter controls the setpoint volumetric flow with its dynamic blade behaviour. This prevents extensive and time-consuming adjustment operations.

The operating point of the ventilation system must be set to the standard case (daytime operation) during adjustment.

All damper blades automatically (dynamically) set themselves to the blade setting required for ensuring the setpoint volumetric flow and the required pressure differences using the control unit on the VKM.
If a system continues running unchanged, the VKMs are then switched to the damper function (static damper blade behaviour) via the locking device at the control unit (slide switch). From this point on, the adjusted blade position will be permanently fixed; the devices therefore function like immovable dampers. This means that centralised raising and lowering of the volumetric flow (daytime/nighttime operation) is possible.

Depending on the system size and equipment, this centralised volumetric flow adjustment can occur either by changing the fan power or through an upstream volumetric flow (electronically variable) or duct pressure controller.

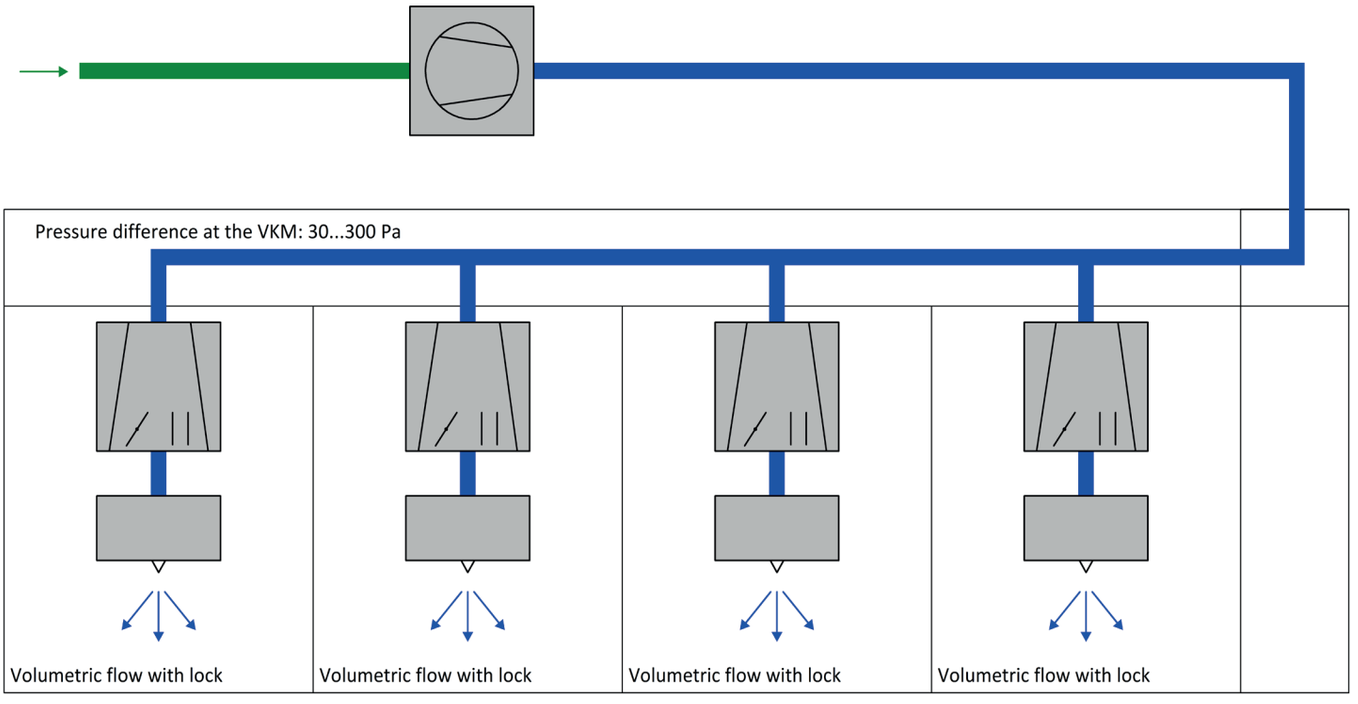
Thanks to this special equipment, frequent lowering operation (night operation) for energy-related reasons can be implemented with a minimum number of cost-intensive electronic regulation components. Volumetric flow distribution is approximately proportional, depending on the duct route. The monetary and energy-related savings potential is very high in direct comparison to conventional limiters without a damper function (locking device), and a consistently proportional reduction of the volumetric flow cannot be ensured there. Rooms with a favourable location in the duct route would still adjust the full volumetric flow, while unfavourably located rooms would remain under-supplied.

CONTROL DIAGRAM B

B.1.) Ventilation systems with only constant operation and lowering operation (night operation)

B.1.1.) Use of the VKM limiters for ventilation applications with a static pressure up to the control limit of the VKM (300 Pa or less)

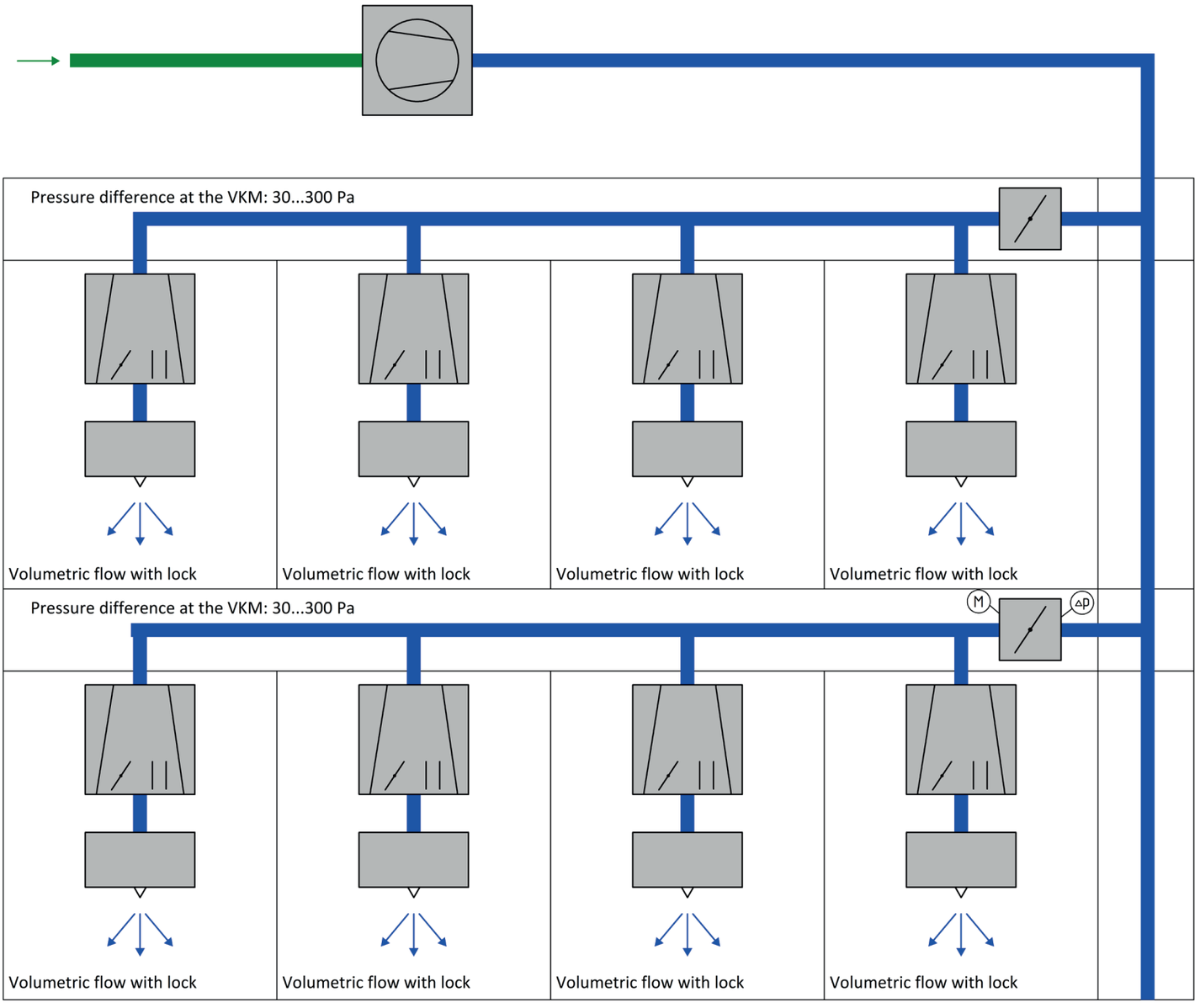
No additional control units are needed. Please observe the minimum pressure difference (approx. 30 Pa) and the upper control limit of the VKM. If the minimum pressure difference is undershot, the setpoint volumetric flow will not be reached and increased control deviations will occur.



B.1.2.) Use of the VKM limiters for ventilation applications with a static pressure above the control limit of the VKM (less than 300 Pa)

In these cases, we recommend taking duct pressure control with a static pressure within the control limits of the VKM (30 to 300 Pa) and with lowering operation (nighttime operation) into account. Pre-control must ensure that the permissible control limits of the VKM are not exceeded.

If the upper control limit is exceeded, damage to the VKM cannot be ruled out.



CONTROL DIAGRAM B

B.2.) Ventilation systems with constant and/or variable air volumes

In these cases, it is only possible to use the VKM damper function in conjunction with a separation of the supply ducts.

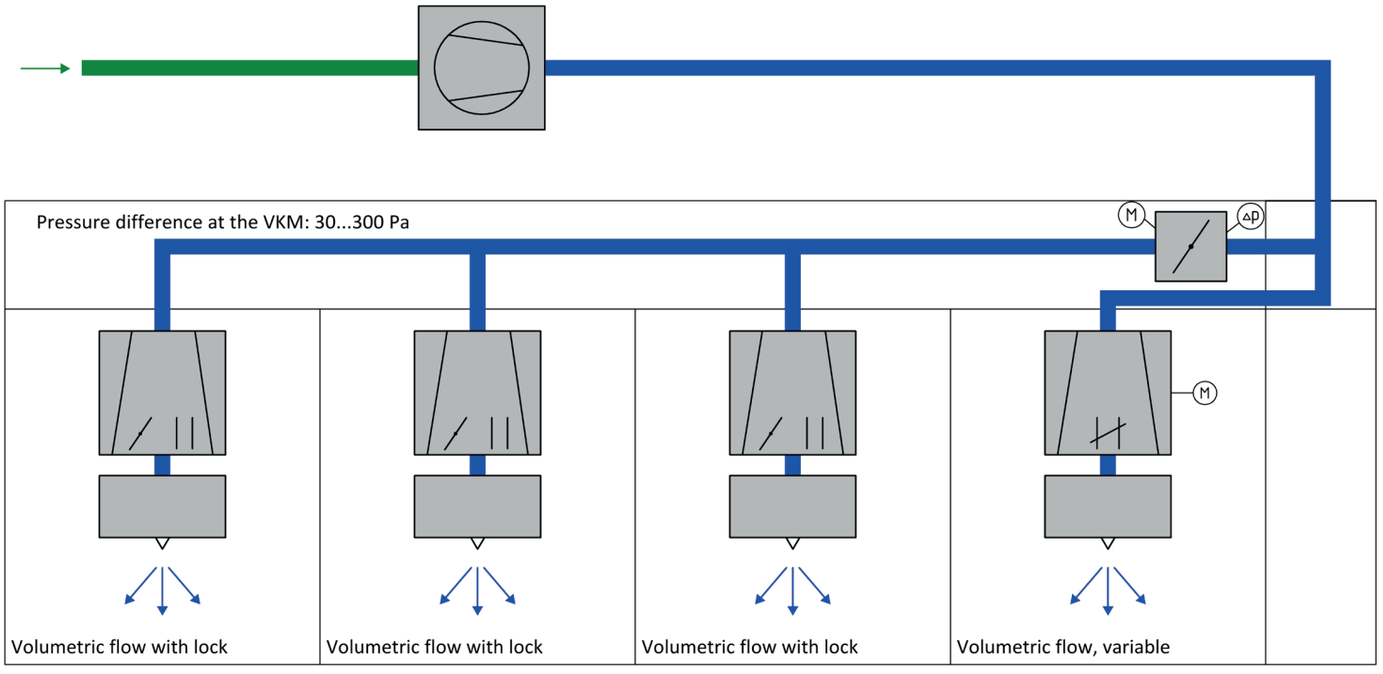
Rooms with variable air volumes in daytime operation (e.g. meeting rooms) therefore cannot be supplied by the same duct as the VKM with damper function (e.g. office rooms).

B.2.1) Use of the VKM limiters for ventilation applications with a static pressure up to the control limit of the VKM (300 Pa or less)

All limiters with damper function are to be supplied via a pressure-controlled/volumetric flow-controlled duct.

Please observe the minimum pressure difference (approx. 30 Pa) and the upper control limit of the VKM.

If the minimum pressure difference is undershot, the setpoint volumetric flow will not be reached and increased control deviations will occur.

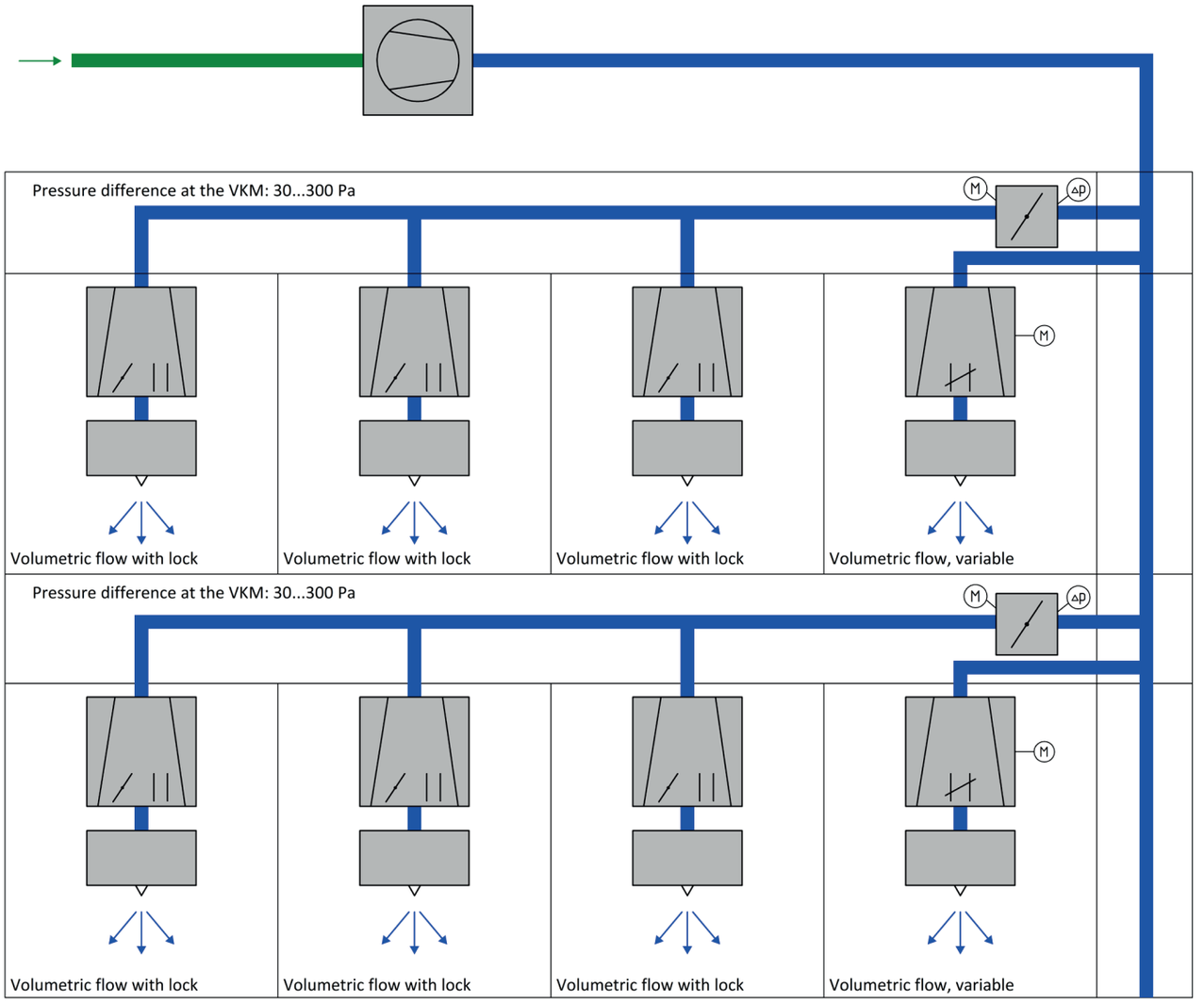


B.2.2.) Use of the VKM limiters for ventilation applications with a static pressure above the control limit of the VKM (less than 300 Pa)

All limiters with damper function are to be supplied via a pressure-controlled duct.

Lowering operating can be implemented via pre-control. This also ensures that the permissible control limits are not exceeded and that the amount of noise generated is kept to a moderate level.

If the upper control limit is exceeded, damage to the VKM cannot be ruled out.



Notes

Notes

SCHAKO stand for competence in ventilation and air conditioning technology. The high quality standard and reliability of our products are well known throughout Europe. At our own test laboratories for acoustics and fluid mechanics, as well as at a centre of excellence for simulations, we develop solutions which sustainably optimise the indoor climate in work environments and public spaces.

With production sites in Germany, Spain and Hungary, we deliver quickly and flexibly throughout Europe.

We carry a wide standard range and are ideally positioned to meet special air demands with individual and smart solutions as well.

Pure competence in air – The companies of the SCHAKO Group

- **ADMECO**
- **NOVENCO Building & Industry**
- **REVEN**
- **SCHAKO**
- **SCHNEIDER Elektronik**
- **SIROCCO**
- **SMITSAIR**

offer a unique portfolio of ventilation, air conditioning, smoke extraction & fire protection products and system solutions for operating theatres, commercial construction, public buildings, canteen kitchens, laboratories, the process industry, stairwells, underground car parks, tunnel systems and data centres.

SCHAKO KG
Steigstrasse 25-27

78600 Kolbingen, Germany info@schako.de
schako.com

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