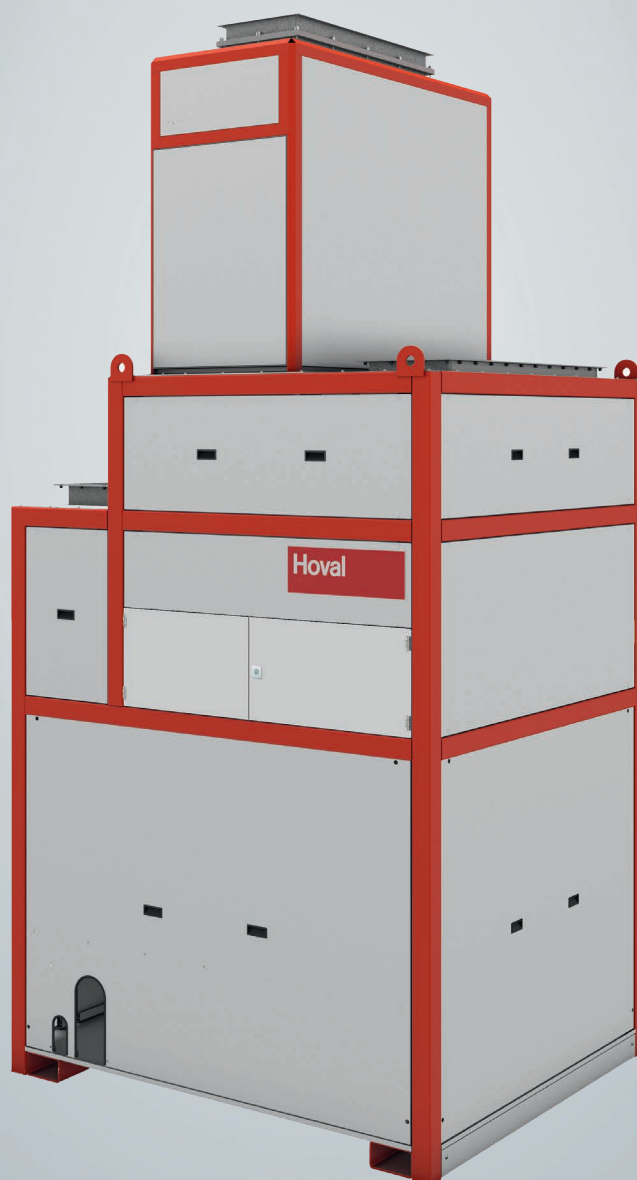


Hoval ProcessVent

Design handbook

Recovery of heat from the process air in production halls





ProcessVent heat PVH

3

Compact unit for ventilating and heating production halls with heat recovery from process air



ProcessVent cool PVC

15

Compact unit for ventilating, heating and cooling production halls with heat recovery from process air



ProcessVent PV

29

Compact unit for ventilating production halls with heat recovery from process air



Options

41



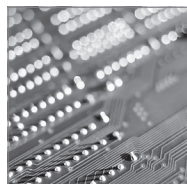
Transport and installation

49



System design

55



Control system

57

A
B
C
D
E
F
G



ProcessVent heat PVH

Compact unit for ventilating and heating production halls with heat recovery from process air

1 Use 4

2 Construction and operation 4

3 Technical data 8

4 Specification texts 11

A



1 Use

1.1 Intended use

The ProcessVent unit is used to recover heat from process air and supply fresh air to halls containing enclosed machine tools or welding plants. The extract air from the extract air purification plant flows through a plate heat exchanger in an oil-tight design and is routed to the outside via a duct; the heat it contains is transferred to the supply air. In addition, a heating coil is installed for supplemental heating of the supply air.

Intended use also includes compliance with the operating instructions. Any usage over and above this use is considered to be not as intended. The manufacturer can accept no liability for damage resulting from improper use.

1.2 User group

The units are only allowed to be installed, operated and maintained by authorised and instructed personnel who are well acquainted with the units and are informed about possible dangers.

2 Construction and operation

The ProcessVent unit forms one overall system with the extract air purification plant: The extract air purification plant draws off soiled air from machine tools or welding plants by means of a fan. It purifies this process air and transports it onwards through the extract air duct to the ProcessVent unit.

The ProcessVent unit fulfils the following functions:

- Heating with connection to a hot water supply
- Fresh air supply
- Extract air removal (with air conveyance via the extract air purification plant)
- Recovery of heat from the process air
- Recirculation operation
- Air filtration

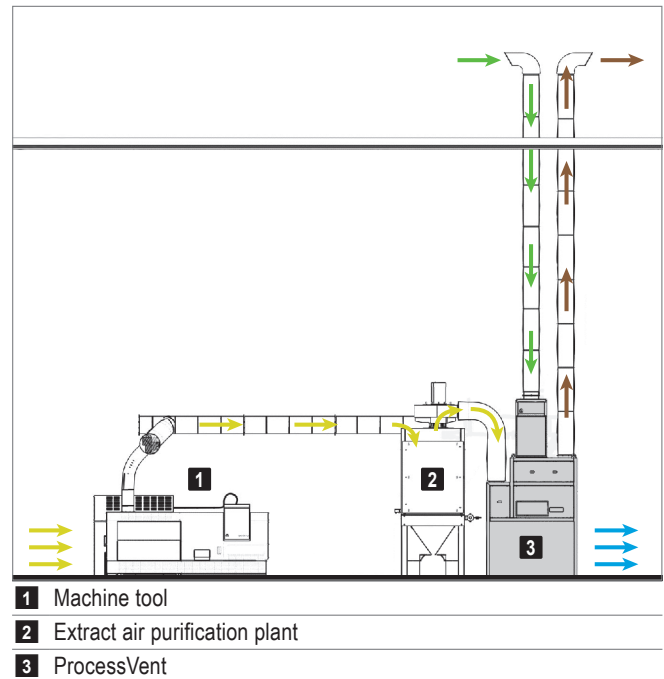
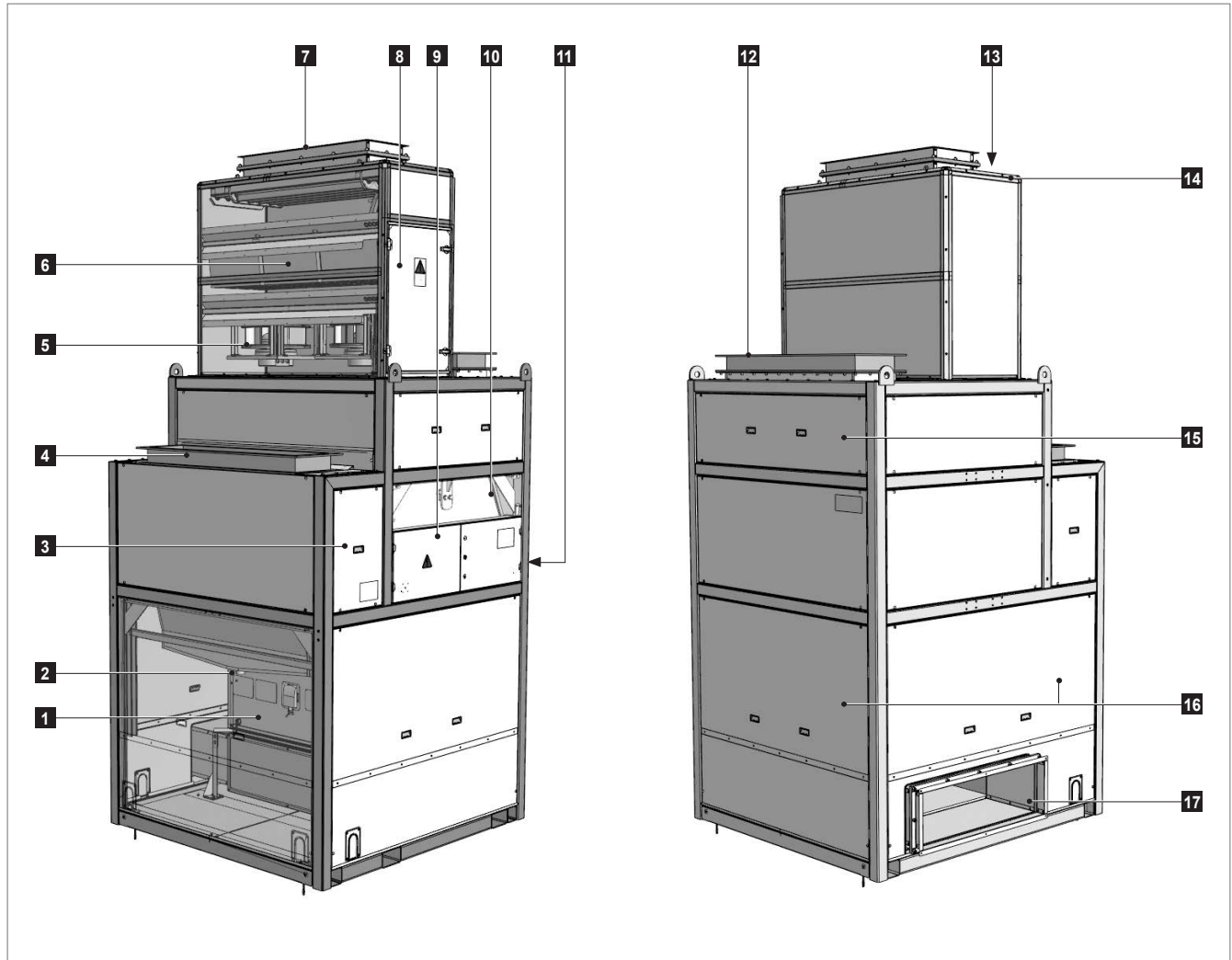


Fig. A1: The ProcessVent unit forms one overall system with the extract air purification plant.

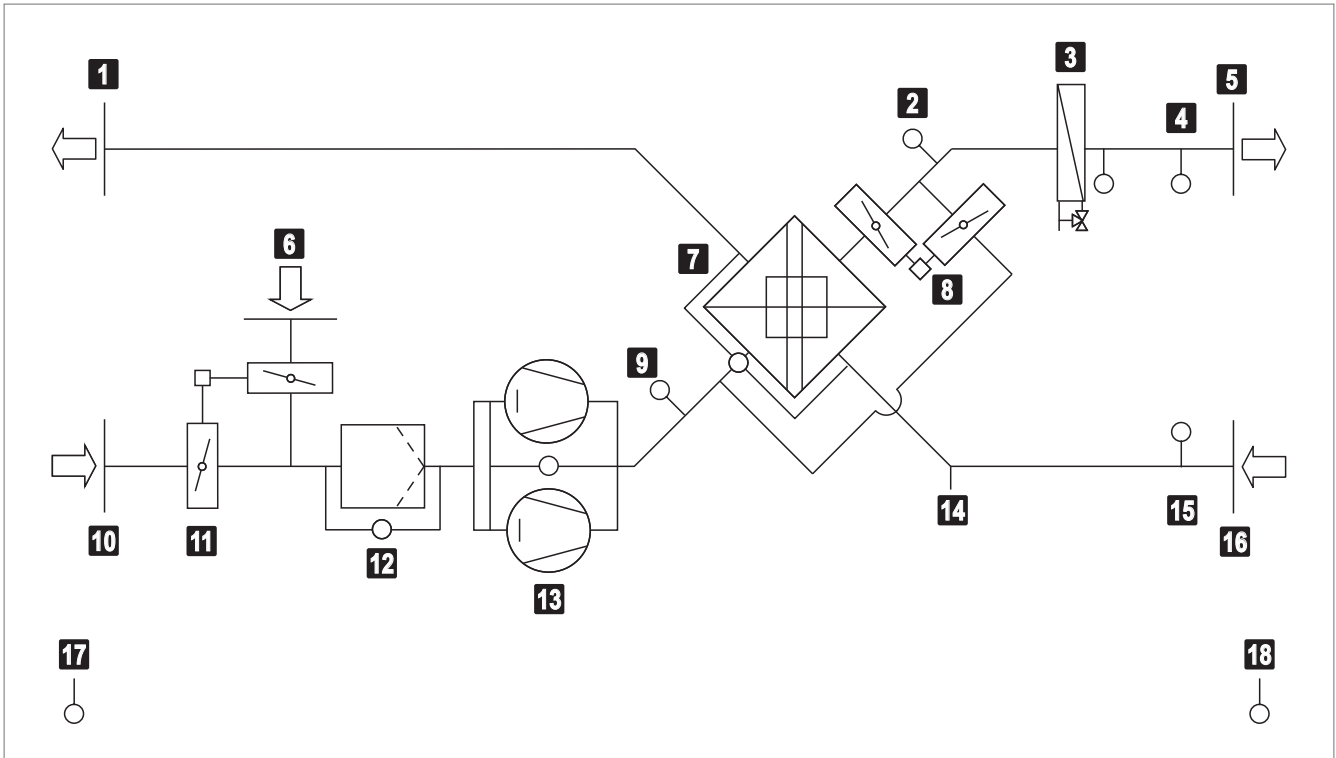
2.1 Construction



- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Heating coil 2 Plate heat exchanger condensate connection 3 Extract air access door 4 Extract air duct connection 5 Supply air fans 6 Fresh air filter with filter monitoring 7 Fresh air duct connection 8 Fresh air access door 9 Control box | <ul style="list-style-type: none"> 10 Plate heat exchanger with frost monitoring 11 ER and bypass damper with continuous actuator 12 Exhaust air duct connection 13 Recirculation air inlet 14 Fresh air/recirculation damper with continuous actuator 15 Exhaust air access door 16 Supply air access panels (on all sides) 17 Supply air duct connection, rear |
|--|--|

Fig. A2: Unit construction

2.2 Function diagram



- | | |
|---|--|
| 1 Exhaust air | 10 Fresh air |
| 2 Temperature sensor energy monitoring (optional) | 11 Fresh air/recirculation damper with actuator |
| 3 Heating coil with frost controller | 12 Fresh air filter with differential pressure switch |
| 4 Supply air temperature sensor | 13 Supply air fans with flow rate monitoring |
| 5 Supply air | 14 Condensate connection |
| 6 Recirculation | 15 Extract air temperature sensor |
| 7 Plate heat exchanger with differential pressure switch | 16 Extract air |
| 8 ER/bypass damper with actuator | 17 Fresh air temperature sensor |
| 9 Mixed air temperature sensor | 18 Room temperature sensor |

Fig. A3: Function diagram

2.3 Operating modes

The unit has the following operating modes:

- Ventilation
- Supply air
- Recirculation
- Recirculation night
- Night cooling summer
- Off

The ProcessNet control system or the higher-level building management system controls the overall plant automatically.

The operating mode of the ProcessVent units depends on the time programme and on the operating states of the machines from which the process air is to be drawn off. The following applies: When the machines are in operation, the ProcessVent unit always works in 'Ventilation' mode. The operating mode defined in the time programme is overridden. You can also control the operating mode of the ProcessVent unit manually and thus independently of the overall plant (e.g. for maintenance activities).

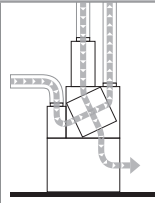
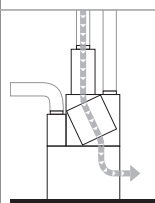
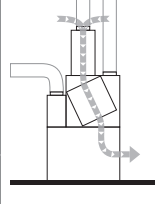
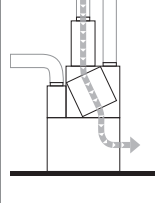
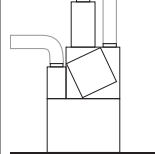
Code	Operating mode		Description
VE	Ventilation The unit blows fresh air into the room. The fresh air quantity is constant; it is dependent on the extract air volume flow. The extract air from the extract air purification plant flows through the plate heat exchanger into the open air. The room temperature set value day is active. The heater and energy recovery are controlled depending on the heat demand and temperature conditions.		Supply air fan on ¹⁾ Energy recovery 0-100 % Fresh air damper open Recirculation damper closed Heating 0-100 % ¹⁾ Nominal volume flow as per setting in the control system (adjusted to the extract air volume flow)
SA	Supply air The unit blows fresh air into the room. The fresh air quantity is constant. Room air flows into the open via open doors and windows or is drawn off via an external system. The room temperature set value day is active. The heating is controlled according to the heat demand.		Supply air fan on ¹⁾ Energy recovery 0 % Fresh air damper open Recirculation damper closed Heating 0-100 % ¹⁾ Nominal volume flow as per setting in the control system
REC	Recirculation If there is a heat demand, the unit draws in room air via the recirculation damper, warms it and blows it back into the room. The room temperature set value day is active. The recirculation volume flow depends on the heat demand.		Supply air fan 0-100 % ¹⁾ Energy recovery 0 % Fresh air damper closed Recirculation damper open Heating on ¹⁾ ¹⁾ Depending on heat demand
REC�	Recirculation night like REC, but with room temperature set value night		
NCS	Night cooling summer On/off operation with room temperature set value night ■ If current temperatures permit, the unit blows cool fresh air into the room and thus uses it for free cooling. ■ If current temperatures do not permit free cooling, the unit switches off.		Supply air fan on ¹⁾²⁾ Energy recovery 0 % Fresh air damper open ²⁾ Recirculation damper closed ²⁾ Heating off ¹⁾ Volume flow set in the control system ²⁾ Depending on temperature conditions
OFF	Off The unit is switched off. Frost protection remains active.		Supply air fan off Energy recovery 0 % Fresh air damper closed Recirculation damper open Heating off

Table A1: Operating modes ProcessVent heat

3 Technical data

3.1 Type code

PVH - 10 A / ...	
Unit type	ProcessVent heat
Unit size	10
Coil	A Heating coil type A B Heating coil type B C Heating coil type C
Further options	

Table A2: Type code

3.2 Application limits

Extract air temperature	max.	°C	50
Extract air relative humidity (incl. oil vapours)	max.	%	100
Dust content of extract air	max.	mg/m ³	5
Oil content of extract air ¹⁾	max.	mg/m ³	10
Fresh air temperature	min.	°C	-30
Ambient temperature		°C	4...40
Heating medium temperature	max.	°C	120
Operating pressure	max.	kPa	800
Supply air temperature	max.	°C	60
Condensate quantity ²⁾	max.	m ³ /h	1.2
Differential pressure fresh air/extract air	max.	Pa	2500
Pressure difference to outside	max.	Pa	1500

- The unit is not suitable for use in potentially explosive atmospheres.
- The unit is not suitable for use in rooms with active humidification.
- The unit is corrosion-protected, but only suitable for use in applications where the extract air contains very aggressive substances (sulphur, methanol, acetone, toluene, etc.) to a limited extent. Please contact Hoval application consulting.

¹⁾ Conventional mineral, synthetic and ester oils and emulsions from the field of machining

²⁾ At up to 10 m delivery head

Table A3: Application limits

3.3 Heat recovery system

Temperature efficiency, dry	%	61
Temperature efficiency, wet (max.)	%	95
Factory setting of differential pressure switch	Pa	250

Table A4: Heat recovery system

3.4 Air filtration

Fresh air filter	
Filter class acc. to ISO 16890	ePM ₁ 55 %
Filter class acc. to EN 779	F7
Factory setting of differential pressure switch	250 Pa

Table A5: Air filtration

3.5 Air flow rate

Unit type		PVH-10A	PVH-10B	PVH-10C
Nominal air flow rate	m ³ /h	10 000	10 000	10 000
Available fan pressure to compensate for external pressure drops	Pa	530	520	460

Table A6: Air flow rate

3.6 Electrical connection

Supply voltage	V AC	3 x 400
Permitted voltage tolerance	%	±10
Frequency	Hz	50
Nominal power consumption	kW	2 x 2.4
Current consumption	A	2 x 3.9

Table A7: Electrical connection

3.7 Sound level

Position		Sound power level	Sound pressure level
Fresh air duct connection	dB(A)	71	–
Supply air duct connection	dB(A)	66	–
Displacement flow diffuser	dB(A)	75	59 ¹⁾

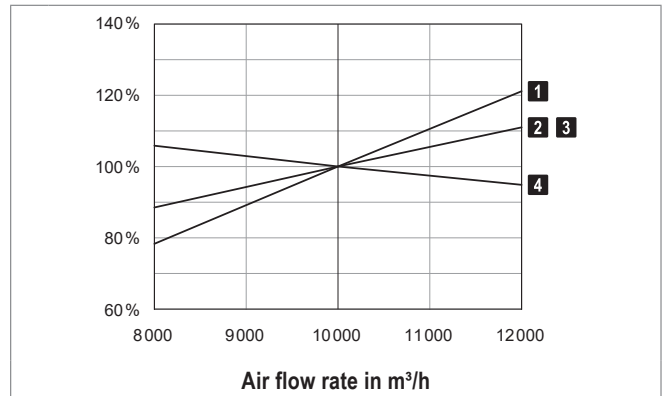
¹⁾ Applies at a distance of 1 m from the unit, measuring surface sound pressure level according to DIN 45636

Table A8: Sound level

3.8 Heat output

The following applies for the data provided in the tables:

- The data applies for the supply air temperatures specified. This requires the air to be blown into the room via a supply air duct and induction outlets. The supply air temperature must be restricted for units with displacement flow diffusers:
 - Reference value for heating operation: supply air max. 5 K warmer than room air
 The heat output also decreases accordingly. Please contact Hoval application consulting for a project-specific design.
- The total output of the unit is calculated from the heat output of the coil plus the output from energy recovery ($Q + Q_{ER}$).
- The data applies for the nominal air flow rate of 10000 m³/h. The actual values are dependent on the actual air flow rate. The percentage change in these values for volume flows in the range 8000...12000 m³/h is shown in Fig. A4. For air flow rates under 8000 m³/h contact Hoval application consulting.



- 1 Water pressure drop
- 2 Heat output
- 3 Water quantity
- 4 Supply air temperature

Fig. A4: Changes in output data depending on the air flow rate



Notice

Use the selection program 'HK-Select' to calculate the performance data. You can download 'HK-Select' free of charge on the Internet.

Fresh air	Type	t _{Ext} °C	rh _{Ext} %	Q _{ER} kW	Heating medium 80/60 °C				Heating medium 60/40 °C			
					Q kW	t _s °C	Δp _w kPa	m _w l/h	Q kW	t _s °C	Δp _w kPa	m _w l/h
-15 °C / 90 %	A	25	40	90	68	31	10	2983	42	23	5	1826
			60	99	63	33	9	2753	37	26	4	1603
			80	109	59	35	8	2582	33	28	3	1437
	B	25	40	90	86	37	16	3776	53	27	7	2285
			60	99	81	39	14	3553	48	29	6	2070
			80	109	76	40	13	3331	43	31	5	1854
	C	25	40	90	144	54	23	6294	90	38	10	3913
			60	99	135	55	20	5924	82	39	8	3557
			80	109	127	55	18	5558	74	40	7	3203
-5 °C / 90 %	A	25	40	65	63	33	9	2752	37	26	4	1603
			60	72	60	35	8	2638	34	27	3	1492
			80	81	58	36	8	2525	32	28	4	1382
	B	25	40	65	81	39	14	3552	48	29	6	2069
			60	72	78	40	13	3404	44	30	5	1926
			80	81	74	41	12	3186	41	31	4	1783
	C	25	40	65	135	53	20	5924	82	39	8	3556
			60	72	130	55	19	5679	77	40	7	3320
			80	81	124	56	17	5437	71	40	6	3085

Legend: Type = Type of coil Q_{ER} = Heat output of the energy recovery Δp_w = Water pressure drop
 t_{Ext} = Extract air temperature Q = Coil heat output m_w = Water quantity
 rh_{Ext} = Extract air humidity t_s = Supply air temperature

Table A9: Heat output of ProcessVent heat

3.9 Dimensions and weights

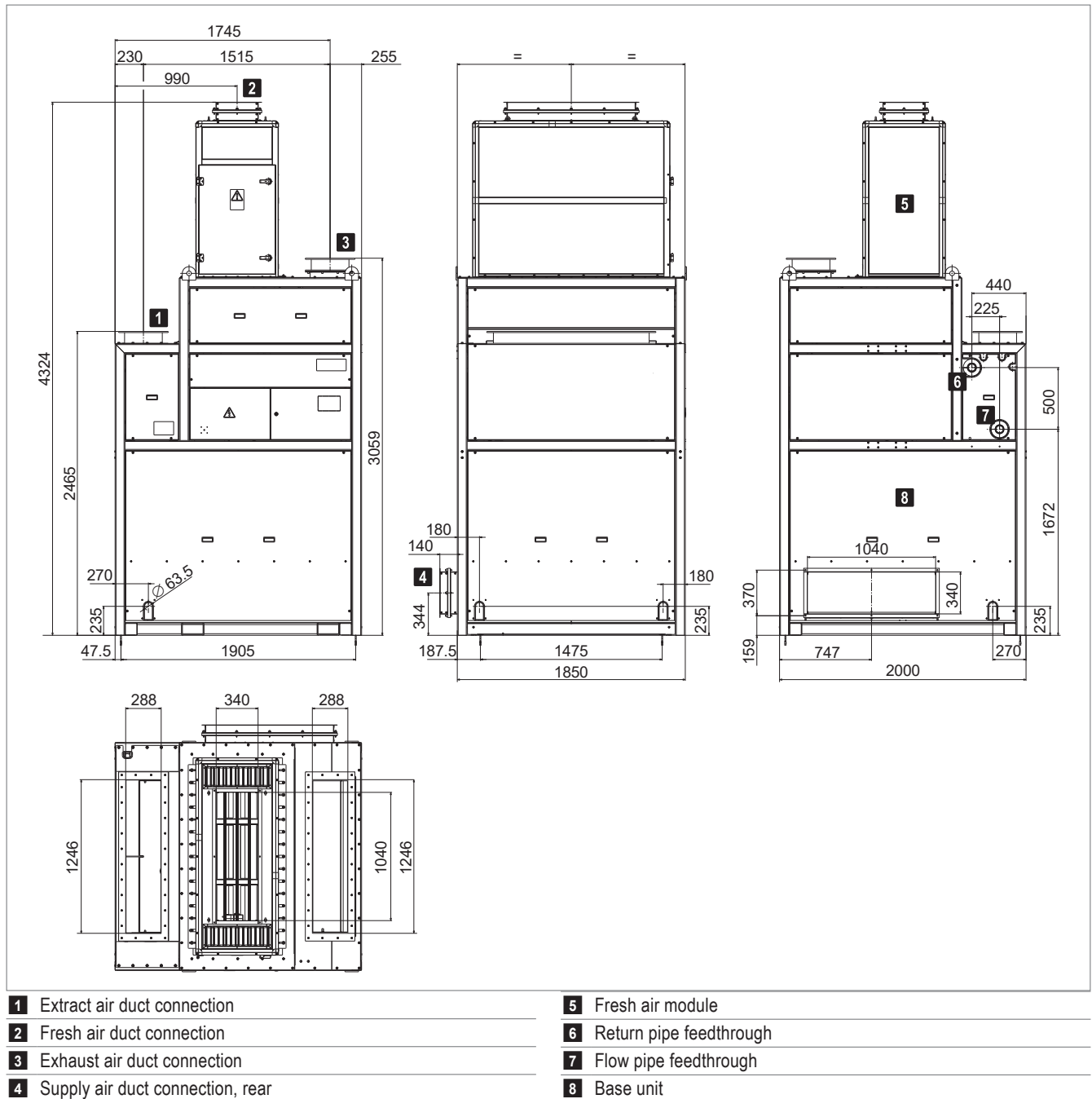


Fig. A5: Dimensional drawing (dimensions in mm)

Unit type			PVH-10A	PVH-10B	PVH-10C
Components	Base unit	kg	1449	1449	1459
	Fresh air module	kg	240	240	240
	Total	kg	1689	1689	1699
Options	Hydraulic assembly diverting system	kg	32	32	32

Table A10: Weights

4 Specification texts

ProcessVent heat PVH

Compact unit for ventilating and heating production halls with heat recovery from process air, consisting of:

- Fresh air module
- Base unit with heat recovery in an oil-tight design, air treatment and air introduction
- Control system
- Optional components

Fresh air module

Self-supporting, double-shell, foamed panel construction with insulation free of thermal bridges made of closed-cell polyurethane (PUR, building materials class B1 according to DIN 4102-1); equipped with jack rings for transport and installation on-site.

The fresh air module contains:

Fresh air/recirculation damper

Opposed dampers for switching between fresh air and recirculation operation, including continuous actuator with safety function in the event of a power failure.

Fresh air filter

Designed as a compact filter of class ePM₁ 55 % (F7), including differential pressure switch for filter monitoring.

Standard fans

Supply air fans designed as maintenance-free, direct-drive radial fans with high-efficiency EC motors, backwards-curved, 3D contoured blades and a free-running rotating wheel made of a high-performance composite material; infinitely variable (2 pieces).

High-pressure fans (variant)

Supply air fans designed as maintenance-free, direct-drive radial fans with high-efficiency EC motors, backwards-curved blades and a free-running rotating wheel made of aluminium; infinitely variable (2 pieces); in a high-pressure design to compensate for external pressure drops (e.g. through air ducts).

Fresh air duct connection

Compensator with ventilation flange, fits on flange S30, for connection to the on-site fresh air duct.

Fresh air access door

Large access opening for easily accessing the fresh air filter and the fans for maintenance purposes.

Fresh air module, upright

The fresh air module is intended for upright installation on the base unit and equipped with plug-in connections for easy electrical installation.

Fresh air module, horizontal (variant)

The fresh air module is intended for horizontal installation on the base unit and equipped with plug-in connections for easy electrical installation; including connection duct and transverse support made of sheet steel, welded, with high-quality anti-corrosion primer and paint finish.

Base unit with heat recovery in an oil-tight design, air treatment and air introduction

Supporting framework construction made of steel sections, welded, with high-quality anti-corrosion primer and paint finish; bottom tray made of sheet steel, water and oil-tight, with high-quality anti-corrosion primer and paint finish; cover panels made of magnesium zinc sheet; equipped with jack rings and fork-lift openings for transport and installation on-site.

The following components are painted in Hoval red (RAL 3000) as standard:

- Framework construction
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

The base unit contains:

Crossflow plate heat exchanger

In a water and oil-tight design to recover heat from process air. Exchanger package consists of epoxy-coated aluminium plates with pressed-in spacers. The plates have a keyed fold connection with one another, which multiplies the material strength for the air inlet and outlet. The corners of the exchanger package are stuck into the aluminium press-drawn hollow sections of the casing with a sealing compound to form a water and oil-tight seal. The side walls made of sheet steel with a high-quality anti-corrosion primer and paint finish are screwed flush with these corners and sealed so they are water and oil-tight. A bypass is positioned in the flow of supply air and sealed so it is air and oil-tight against the extract air side; leak test according to company standard. Opposed ER and bypass damper mounted on the casing to control the output of the cross-flow plate heat exchanger, including continuous actuator. Frost monitoring on the extract air side by means of differential pressure switch.

Condensate drip tray with drain

In a water and oil-tight design to remove oily condensate from the cross-flow plate heat exchanger, with high-quality anti-corrosion primer and paint finish.

Extract air and exhaust air duct section

Water and oil-tight welded construction made of steel for conveying air containing oil, insulated with closed-cell Polycell (building materials class B2 according to DIN 4102-1), equipped with media-resistant compensators (2 pieces) with DIN flanged connecting pieces for connection to the on-site extract air and exhaust air duct.

Fresh air duct section

Transition between the fresh air module and the cross-flow plate heat exchanger, made of magnesium zinc sheet, insulated with closed-cell Polycell (building materials class B2 according to DIN 4102-1).

Supply air duct section

Transition between the cross-flow plate heat exchanger and the air introduction section, made of magnesium zinc sheet.

Air treatment unit, heating

Casing made of magnesium zinc sheet, includes the heating coil made of copper tubes and aluminium fins and the frost controller.

Supply air duct connection, rear

Air outlet box with supply air duct section as connection to the on-site air distribution system, equipped with a compensator with ventilation flange, fits on flange S30, for connection to the on-site supply air duct (on the rear of the unit).

Supply air duct connection, left (variant)

Air outlet box with supply air duct section as connection to the on-site air distribution system, equipped with a compensator with ventilation flange, fits on flange S30, for connection to the on-site supply air duct (on the left of the unit).

Displacement flow diffuser (variant)

Cover panels towards the bottom of the base unit designed as a displacement flow diffuser for introducing the supply air into the occupied area in a low-pulse, duct-free manner; consisting of:

- Outlet panel designed as a perforated sheet
- Fabric mat for air distribution
- Spring rods for attaching the fabric mat

Access openings

- Exhaust air access door: large access opening for easily accessing the cross-flow plate heat exchanger for maintenance purposes; panel designed with a water and oil-tight closing system
- Extract air access door: large access opening for easily accessing the condensate drip tray with drain for maintenance purposes; panel designed with a water and oil-tight closing system
- Supply air access panel: large revision openings on all sides (4 pieces) with panels for easily accessing other components for maintenance purposes (depending

on equipment: ER and bypass damper, coil, hydraulic connections, return pump station, condensate drain)

Control box with control module as part of the Hoval ProcessNet control system

- Control box made of sheet steel, powder-coated with textured paint in light grey (RAL 7035), integrated flush with the framework construction
- Control module fully prewired with all I/O components:
 - Supply air fans
 - Actuator, fresh air/recirculation damper
 - Actuator, ER/bypass damper
 - Temperature sensor, mixed air
 - Temperature sensor, supply air
 - Frost monitoring, plate heat exchanger
 - Frost controller
 - Differential pressure switch, fresh air filter
 - Volume flow monitoring, supply air fans
 - Optional components as required
- Room and fresh air sensors supplied with plug, for on-site installation at a suitable location and wiring to the socket on the outside of the unit
- Power supply:
 - Mains power terminals
 - Circuit breaker to protect the supply air fans of the Hoval ProcessVent
 - 3-pin safety relay installed in the control box doors
 - In the design for injection system: circuit breaker to protect the heating pump
- Fuse for the electronics
- Transformer for control module and actuators
- Cable glands designed as cable feedthrough plates
- Connection via external signals: Electrical components and software interface for connecting one or more (maximum 4) extract air purification plants to the Hoval ProcessNet control system; visualisation via building management system or touchpanel on the unit. Connection via digital inputs and outputs:
 - Digital inputs, operating message, extract air purification plant 1 – 4
 - Digital input, emergency stop, extract air purification plant
 - Digital input, collective alarm
 - Digital outputs, enable, extract air purification plant 1 – 4

Options for the unit

Paint finish as desired

The following components are painted in the RAL colour of the customer's choice:

- Fresh air module and base unit (framework construction and covering panels)
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

Paint finish for frame as desired

The following components are painted in the RAL colour of the customer's choice:

- Framework construction of the base unit
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

Hydraulic assembly diverting system

Prefabricated assembly for the hydraulic diverting system, installed in the unit, consisting of:

- 3-way control ball valve designed with a continuous actuator
- Line balancing valve STAD with integrated drain valve
- Ball valve with extended spindle
- Connecting pipes with bypass designed as galvanised malleable cast-iron threaded pipes
- Screw joints for easy connection to the on-site distributor circuit

Assembly fully insulated with closed-cell insulating material to prevent energy loss and surface condensation on the assembly's components; 3-way control ball valve with plug-in connection fully prewired on the control box for easy maintenance; components adapted to the relevant heating/cooling coil and the ProcessNet control system.

The output is regulated via the 3-way control ball valve: the medium is routed through the coil or the bypass. The bypass is dimensioned such that it corresponds to the resistance of the coil. This ensures that the pressure in the load circuit remains constant.

The line balancing valve in the flow coordinates the total resistance of the load with the distribution circuit. In addition, the line balancing valve can also be used to shut the line off completely.

Technical data, line balancing valve:

- Max. pressure 800 kPa at 120°

Technical data, control ball valve:

- Supply voltage: 24 V DC
- Control voltage 0...10 VDC
- Operating range: 2...10 V DC
- Position response: 2...10 V DC
- Actuator run time: 9 s/90°
- Casing material: nickel-plated hot-pressed brass
- Closing element material: stainless steel

Return pump station water

Pump station for returning condensate for recycling or disposal; suitable for water-emulsion mixtures; installed in the unit, fully electrically prewired; consisting of:

- Hosing from condensate drains to pump receiver
- Pump receiver
- Submersible pump
- Check valve
- Level probe

Technical data:

- Pump output: 25 l/min
- Delivery head: 8 m
- Motor output: 0.14 kW
- Speed of rotation: 2700 rpm
- Voltage: 3 x 400 V AC
- Frequency: 50 Hz
- Protection rating: IP 55
- Pump material: PPS
- Pump shaft material: 1.4104
- Pump receiver material: SJ235R
- Piping material: Threaded pipe according to DIN 2440, seamlessly galvanised, including fittings; PVC fabric hoses
- Nominal diameter of the connections: ¾ "

Return pump station oil

Pump station for returning condensate for recycling or disposal; suitable for oily condensate from the plate heat exchanger (with an upstream oil separator); installed in the unit, fully electrically prewired; consisting of:

- Hosing from condensate drains to pump receiver
- Pump receiver
- Submersible pump
- Check valve
- Level probe

Technical data:

- Pump output: 25 l/min
- Delivery head: 8 m
- Motor output: 0.14 kW
- Speed of rotation: 2700 rpm
- Voltage: 3 x 400 V AC
- Frequency: 50 Hz
- Protection rating: IP 55
- Pump material: PPS
- Pump shaft material: 1.4104
- Pump receiver material: SJ235R
- Piping material: Threaded pipe according to DIN 2440, seamlessly galvanised, including fittings; PVC fabric hoses
- Nominal diameter of the connections: ¾ "

Control system

Control system for the energy-optimised operation of Hoval ProcessVent plants, designed as a decentralised I/O system, with the following main features:

- Control module integrated in every unit, for autonomous and individual regulation of the units, allowing for precise adaptation to the operating conditions
- Preprogrammed plug & play operator terminal with graphical user interface for using the Hoval ProcessVent:
 - Touchpanel with colour display installed in the doors of the control box
 - Facilitates monitoring and programming of Hoval ProcessNet (operating modes, temperature values, time programme, calendar, alarm handling, control parameters)
- Master-slave function for forming zones of several units being operated under the same conditions (e.g. same room temperature set values, same operating times)
- Operating mode switching via
 - Time programme, holiday and vacation calendar
 - Specification of a building management system
- The following control functions are performed by the control module:
 - Control of energy recovery depending on the temperature conditions
 - Control of supply air temperature via fixed value control or room air/supply air cascade control
 - Fixed value control of volume flow
 - Soft starting to protect the unit when switching over to operating states with fresh air
 - Defrosting if plate heat exchanger is iced up using the flow of extract air during plant operation
 - Messages relating to the plant's heat or cool demand for external heating and refrigerating systems
 - Fire control: Connection for an external signal to shut the plant down in the event of a fire
 - Signal for controlling external extract air systems when the plant is in an operating state where only fresh air is supplied to the hall and no extract air is removed from it (supply air/night cooling summer operating mode)
- Simple connection of the units to a building management system via an interface integrated in the control module by means of the Profinet protocol in order to exchange the following data:
 - Current operating mode
 - Temperature control strategy
 - Temperature set values
 - Temperature actual values
 - Damper positions
 - Alarms
 - Energy meter (energy monitoring option)
- Alarm handling via control module by means of collective alarm routed to terminal and transmission of alarm signals for visualisation
- Running time meter for each unit

- Back-up and restore function for easy saving of user settings and loading of factory settings
- Electrical documentation supplied in the control box

Options for the control system

Room temperature average value

3 additional room air sensors supplied for averaging; for on-site installation at a suitable location and wiring to the socket on the outside of the unit

Energy monitoring

Calculation of the energy saved with the cross-flow plate heat exchanger and display on the operator terminal; additional temperature sensor and analogue input installed in the unit; fully prewired.

Design for injection system

Components for controlling and protecting a heating/cooling pump integrated in the control box; digital output routed to terminals in the control box.

Requirements for the pump in the load circuit:

- Power supply: 230 VAC
- Power consumption: max. 1 kW
- Current consumption: max. 4 A
- Input signal for activation of control of pump ON
- Output signal for pump alarm

Control of supply air damper

Control of an on-site supply air damper depending on the operating state of the compact unit; consisting of:

- Digital output routed to terminals in the control box (0...10 V DC)
- Output terminals in the control box for supplying power to the actuator (24 V DC)
- Analogue input for position return signal from the actuator (2...10 V DC)

Control of exhaust air damper

Control of an on-site exhaust air damper depending on the operating state of the extract air purification plant; consisting of:

- Digital output routed to terminals in the control box (0...10 V DC)
- Output terminals in the control box for supplying power to the actuator (24 V DC)
- Analogue input for position return signal from the actuator (2...10 V DC)



ProcessVent cool PVC

Compact unit for ventilating, heating and cooling production halls with heat recovery from process air

1 Use	16
2 Construction and operation	16
3 Technical data	20
4 Specification texts	24



1 Use

1.1 Intended use

The ProcessVent unit is used to recover heat from process air and supply fresh air to halls containing enclosed machine tools or welding plants. The extract air from the extract air purification plant flows through a plate heat exchanger in an oil-tight design and is routed to the outside via a duct; the heat it contains is transferred to the supply air. In addition, a heating/cooling coil is installed for supplemental heating or cooling of the supply air.

Intended use also includes compliance with the operating instructions. Any usage over and above this use is considered to be not as intended. The manufacturer can accept no liability for damage resulting from improper use.

1.2 User group

The units are only allowed to be installed, operated and maintained by authorised and instructed personnel who are well acquainted with the units and are informed about possible dangers.

2 Construction and operation

The ProcessVent unit forms one overall system with the extract air purification plant: The extract air purification plant draws off soiled air from machine tools or welding plants by means of a fan. It purifies this process air and transports it onwards through the extract air duct to the ProcessVent unit.

The ProcessVent unit fulfils the following functions:

- Heating with connection to a hot water supply
- Cooling with connection to a water chiller
- Fresh air supply
- Extract air removal (with air conveyance via the extract air purification plant)
- Recovery of heat from the process air
- Recirculation operation
- Air filtration

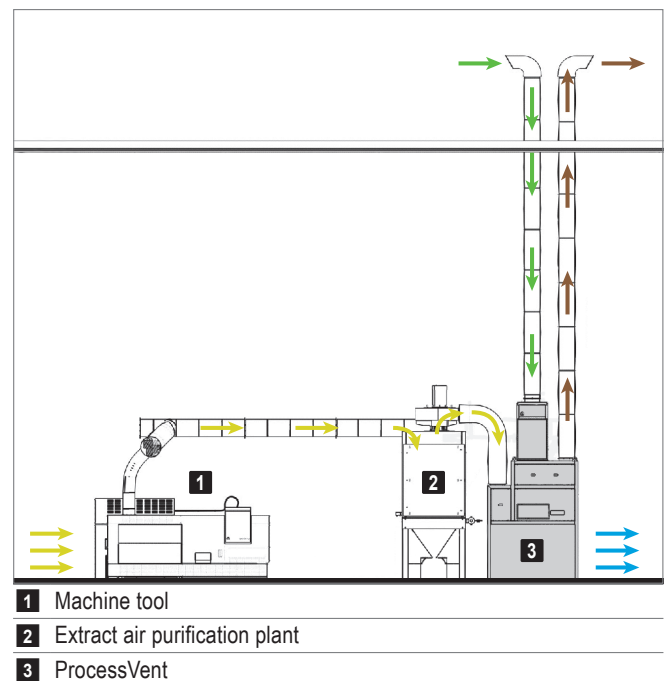
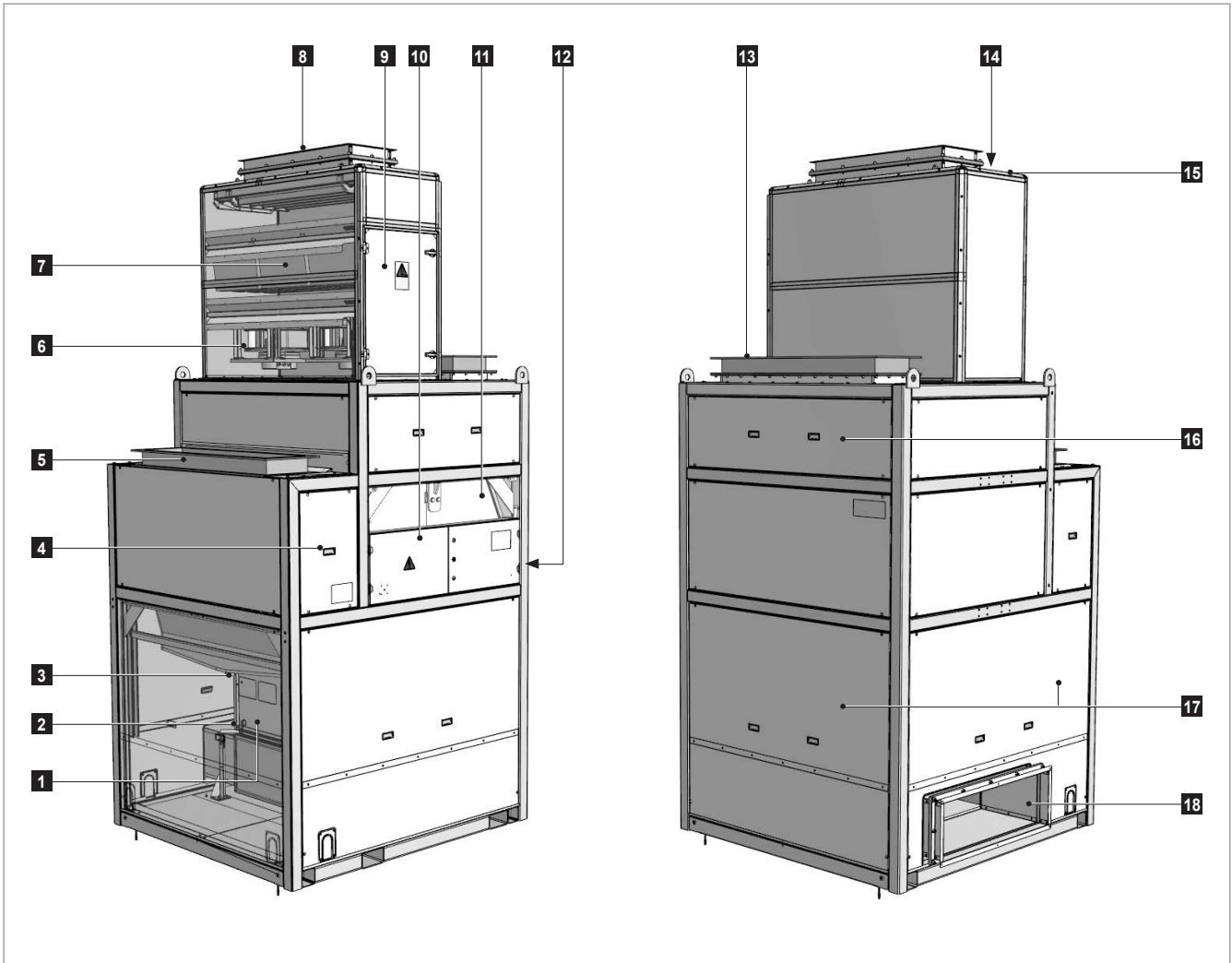


Fig. B1: The ProcessVent unit forms one overall system with the extract air purification plant.

2.1 Construction

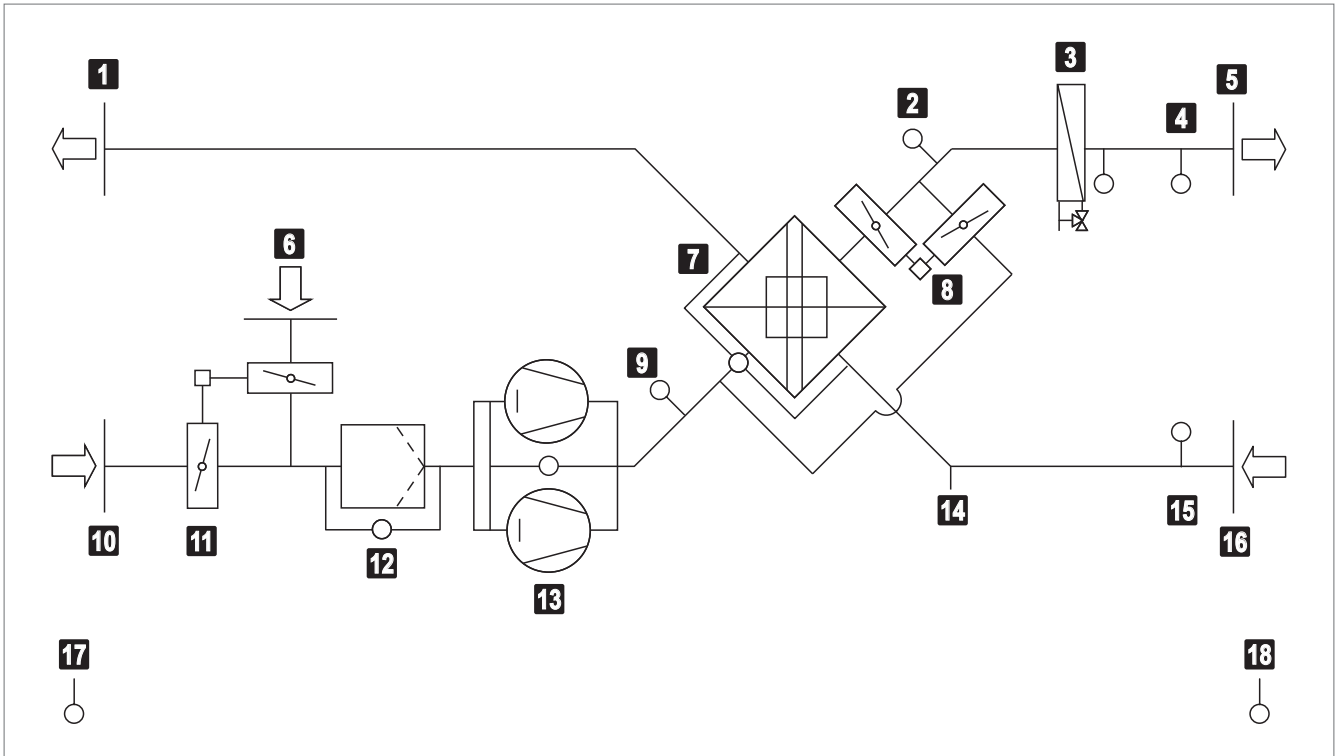


- 1** Heating/cooling coil with condensate separator
- 2** Heating/cooling coil condensate connection
- 3** Plate heat exchanger condensate connection
- 4** Extract air access door
- 5** Extract air duct connection
- 6** Supply air fans
- 7** Fresh air filter with filter monitoring
- 8** Fresh air duct connection
- 9** Fresh air access door

- 10** Control box
- 11** Plate heat exchanger with frost monitoring
- 12** ER and bypass damper with continuous actuator
- 13** Exhaust air duct connection
- 14** Recirculation air inlet
- 15** Fresh air/recirculation damper with continuous actuator
- 16** Exhaust air access door
- 17** Supply air access panels (on all sides)
- 18** Supply air duct connection, rear

Fig. B2: Unit construction

2.2 Function diagram



- | | |
|--|--|
| 1 Exhaust air | 10 Fresh air |
| 2 Temperature sensor energy monitoring (optional) | 11 Fresh air/recirculation damper with actuator |
| 3 Heating/cooling coil with frost controller and condensate separator | 12 Fresh air filter with differential pressure switch |
| 4 Supply air temperature sensor | 13 Supply air fans with flow rate monitoring |
| 5 Supply air | 14 Condensate connection |
| 6 Recirculation | 15 Extract air temperature sensor |
| 7 Plate heat exchanger with differential pressure switch | 16 Extract air |
| 8 ER/bypass damper with actuator | 17 Fresh air temperature sensor |
| 9 Mixed air temperature sensor | 18 Room temperature sensor |

Fig. B3: Function diagram

2.3 Operating modes

The unit has the following operating modes:

- Ventilation
- Supply air
- Recirculation
- Recirculation night
- Night cooling summer
- Off

The ProcessNet control system or the higher-level building management system controls the overall plant automatically.

The operating mode of the ProcessVent units depends on the time programme and on the operating states of the machines from which the process air is to be drawn off. The following applies: When the machines are in operation, the ProcessVent unit always works in 'Ventilation' mode. The operating mode defined in the time programme is overridden. You can also control the operating mode of the ProcessVent unit manually and thus independently of the overall plant (e.g. for maintenance activities).

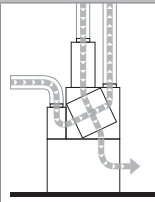
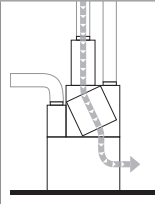
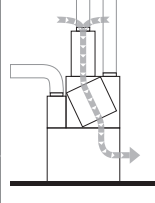
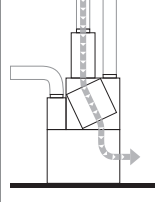
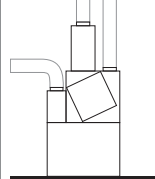
Code	Operating mode		Description
VE	<p>Ventilation</p> <p>The unit blows fresh air into the room. The fresh air quantity is constant; it is dependent on the extract air volume flow. The extract air from the extract air purification plant flows through the plate heat exchanger into the open air.</p> <p>The room temperature set value day is active. Heating/cooling and energy recovery are controlled depending on the heat or cool demand and the temperature conditions.</p>		<p>Supply air fan on ¹⁾</p> <p>Energy recovery 0-100 %</p> <p>Fresh air damper open</p> <p>Recirculation damper closed</p> <p>Heating/cooling 0-100 %</p> <p>¹⁾ Nominal volume flow as per setting in the control system (adjusted to the extract air volume flow)</p>
SA	<p>Supply air</p> <p>The unit blows fresh air into the room. The fresh air quantity is constant. Room air flows into the open via open doors and windows or is drawn off via an external system.</p> <p>The room temperature set value day is active. Heating/cooling is controlled according to the heat or cool demand.</p>		<p>Supply air fan on ¹⁾</p> <p>Energy recovery 0 %</p> <p>Fresh air damper open</p> <p>Recirculation damper closed</p> <p>Heating/cooling 0-100 %</p> <p>¹⁾ Nominal volume flow as per setting in the control system</p>
REC	<p>Recirculation</p> <p>During heat or cool demand, the unit draws in room air via the recirculation damper, heats or cools it and blows it back into the room.</p> <p>The room temperature set value day is active. The recirculation volume flow depends on the heat or cool demand.</p>		<p>Supply air fan 0-100 % ¹⁾</p> <p>Energy recovery 0 %</p> <p>Fresh air damper closed</p> <p>Recirculation damper open</p> <p>Heating/cooling on ¹⁾</p> <p>¹⁾ Depending on heat demand</p>
REC/N	<p>Recirculation night</p> <p>like REC, but with room temperature set value night</p>		
NCS	<p>Night cooling summer</p> <p>On/off operation with room temperature set value night</p> <ul style="list-style-type: none"> ■ If current temperatures permit, the unit blows cool fresh air into the room and thus uses it for free cooling. ■ If current temperatures do not permit free cooling, the unit switches off. 		<p>Supply air fan on ^{1) 2)}</p> <p>Energy recovery 0 %</p> <p>Fresh air damper open ²⁾</p> <p>Recirculation damper closed ²⁾</p> <p>Heating/cooling off</p> <p>¹⁾ Volume flow set in the control system</p> <p>²⁾ Depending on temperature conditions</p>
OFF	<p>Off</p> <p>The unit is switched off. Frost protection remains active.</p>		<p>Supply air fan off</p> <p>Energy recovery 0 %</p> <p>Fresh air damper closed</p> <p>Recirculation damper open</p> <p>Heating/cooling off</p>

Table B1: Operating modes ProcessVent cool

3 Technical data

3.1 Type code

PVC - 10 C / ...	
Unit type	ProcessVent cool
Unit size	10
Coil	C Heating/cooling coil type C D Heating/cooling coil type D
Further options	

Table B2: Type code

3.2 Application limits

Extract air temperature	max.	°C	50
Extract air relative humidity (incl. oil vapours)	max.	%	100
Dust content of extract air	max.	mg/m ³	5
Oil content of extract air ¹⁾	max.	mg/m ³	10
Fresh air temperature	min.	°C	-30
Ambient temperature		°C	4...40
Heating medium temperature	max.	°C	120
Operating pressure	max.	kPa	800
Supply air temperature	max.	°C	60
Condensate quantity ²⁾	max.	m ³ /h	1.2
Differential pressure fresh air/extract air	max.	Pa	2500
Pressure difference to outside	max.	Pa	1500

- The unit is not suitable for use in potentially explosive atmospheres.
- The unit is not suitable for use in rooms with active humidification.
- The unit is corrosion-protected, but only suitable for use in applications where the extract air contains very aggressive substances (sulphur, methanol, acetone, toluene, etc.) to a limited extent. Please contact Hoval application consulting.

¹⁾ Conventional mineral, synthetic and ester oils and emulsions from the field of machining

²⁾ At up to 10 m delivery head

Table B3: Application limits

3.3 Heat recovery system

Temperature efficiency, dry	%	61
Temperature efficiency, wet (max.)	%	95
Factory setting of differential pressure switch	Pa	250

Table B4: Heat recovery system

3.4 Air filtration

Fresh air filter	
Filter class acc. to ISO 16890	ePM ₁ 55 %
Filter class acc. to EN 779	F7
Factory setting of differential pressure switch	250 Pa

Table B5: Air filtration

3.5 Air flow rate

Unit type		PVC-10C	PVC-10D
Nominal air flow rate	m ³ /h	10 000	10 000
Available fan pressure to compensate for external pressure drops	Pa	420	320

Table B6: Air flow rate

3.6 Electrical connection

Supply voltage	V AC	3 x 400
Permitted voltage tolerance	%	±10
Frequency	Hz	50
Nominal power consumption	kW	2 x 2.4
Current consumption	A	2 x 3.9

Table B7: Electrical connection

3.7 Sound level

Position		Sound power level	Sound pressure level
Fresh air duct connection	dB(A)	71	–
Supply air duct connection	dB(A)	66	–
Displacement flow diffuser	dB(A)	75	59 ¹⁾

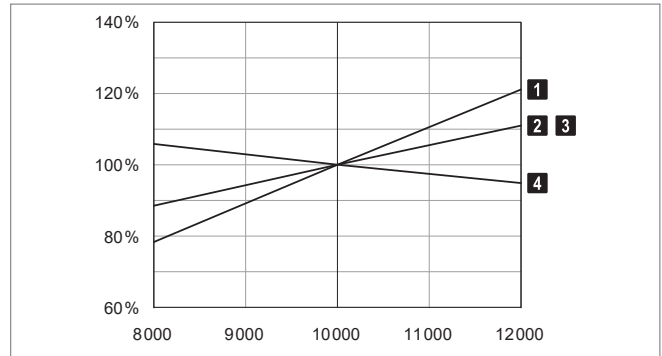
¹⁾ Applies at a distance of 1 m from the unit, measuring surface sound pressure level according to DIN 45636

Table B8: Sound level

3.8 Heat output

The following applies for the data provided in the tables:

- The data applies for the supply air temperatures specified. This requires the air to be blown into the room via a supply air duct and induction outlets. The supply air temperature must be restricted for units with displacement flow diffusers:
 - Reference value for heating operation: supply air max. 5 K warmer than room air
 The heat output also decreases accordingly. Please contact Hoval application consulting for a project-specific design.
- The total output of the unit is calculated from the heat output of the coil plus the output from energy recovery ($Q + Q_{ER}$).
- The data applies for the nominal air flow rate of 10000 m³/h. The actual values are dependent on the actual air flow rate. The percentage change in these values for volume flows in the range 8000...12000 m³/h is shown in Fig. B4. For air flow rates under 8000 m³/h contact Hoval application consulting.



- 1 Water pressure drop
- 2 Heat output
- 3 Water quantity
- 4 Supply air temperature

Fig. B4: Changes in output data depending on the air flow rate



Notice

Use the selection program 'HK-Select' to calculate the performance data. You can download 'HK-Select' free of charge on the Internet.

Fresh air	Type	t _{Ext} °C	rh _{Ext} %	Q _{ER} kW	Heating medium 80/60 °C				Heating medium 60/40 °C			
					Q kW	t _s °C	Δp _w kPa	m _w l/h	Q kW	t _s °C	Δp _w kPa	m _w l/h
-15 °C / 90 %	C	25	40	90	144	54	23	6294	90	38	10	3913
			60	99	135	55	20	5924	82	39	8	3557
			80	109	127	55	18	5558	74	40	7	3203
	D	25	40	90	166	60	19	7279	112	44	10	4840
			60	99	154	60	16	6753	102	45	8	4414
			80	109	142	60	14	6238	92	45	7	3991
-5 °C / 90 %	C	25	40	65	135	53	20	5924	82	39	8	3556
			60	72	130	55	19	5679	77	40	7	3320
			80	81	124	56	17	5437	71	40	6	3085
	D	25	40	65	154	60	16	6755	102	45	8	4414
			60	72	146	60	15	6410	90	45	7	4132
			80	81	139	60	14	6070	89	45	6	3851

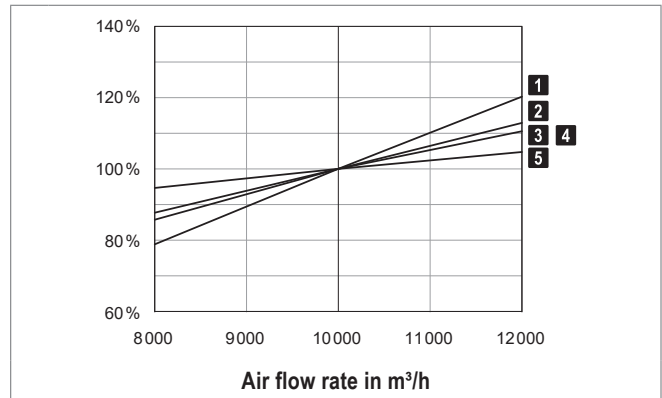
Legend: Type = Type of coil Q_{ER} = Heat output of the energy recovery Δp_w = Water pressure drop
 t_{Ext} = Extract air temperature Q = Coil heat output m_w = Water quantity
 rh_{Ext} = Extract air humidity t_s = Supply air temperature

Table B9: Heat output of ProcessVent cool

3.9 Cooling capacity

The following applies for the data provided in the tables:

- The data applies for the supply air temperatures specified. This requires the air to be blown into the room via a supply air duct and induction outlets. The supply air temperature must be restricted for units with displacement flow diffusers:
 - Reference value for cooling operation: supply air max. 6 K colder than room air
 The cooling capacity also decreases accordingly. Please contact Hoval application consulting for a project-specific design.
- The total sensitive cooling capacity of the unit is calculated from the sensitive cooling capacity of the coil plus the output from energy recovery ($Q_{sen} + Q_{ER}$).
- The data applies for the nominal air flow rate of 10000 m³/h. The actual values are dependent on the actual air flow rate. The percentage change in these values for volume flows in the range 8000...12000 m³/h is show in Fig. B5. For air flow rates under 8000 m³/h contact Hoval application consulting.



- 1 Water pressure drop
- 2 Sensitive cooling capacity
- 3 Total cooling capacity
- 4 Water quantity
- 5 Supply air temperature

Fig. B5: Changes in output data depending on the air flow rate



Notice

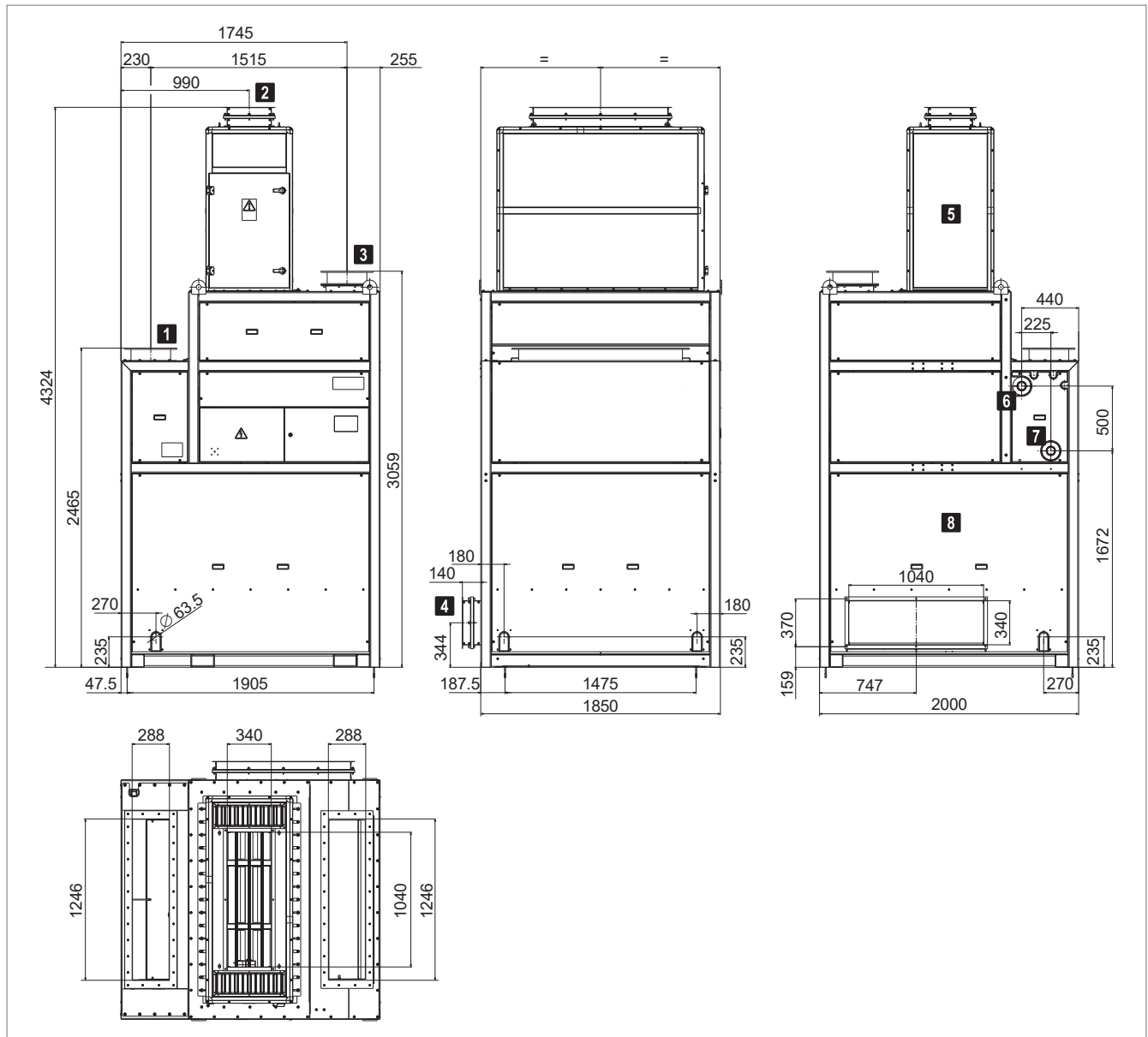
Use the selection program 'HK-Select' to calculate the performance data. You can download 'HK-Select' free of charge on the Internet.

Type	t _{Ext} °C	t _{Fre} °C	rh _{Fre} %	Q _{ER} kW	Cooling medium 6/12 °C						Cooling medium 8/14 °C					
					Q _{sen} kW	Q _{tot} kW	t _s °C	Δp _w kPa	m _w l/h	m _c l/h	Q _{sen} kW	Q _{tot} kW	t _s °C	Δp _w kPa	m _w l/h	m _c l/h
C	20	28	40	17	29	34	14	18	4872	7	26	27	15	11	3847	2
			60	17	26	57	15	45	8144	44	22	46	17	31	6623	35
		32	40	25	32	51	15	37	7276	27	28	40	17	24	5750	18
			60	25	28	79	17	82	11340	73	25	69	18	63	9820	63
	25	28	40	6	37	41	15	25	5854	6	33	34	16	17	4871	2
			60	6	33	62	16	53	8894	41	29	52	17	37	7378	32
32		40	15	39	56	16	43	7972	24	36	47	17	31	6664	16	
		60	15	35	87	17	98	12441	73	32	76	18	76	10914	64	
D	20	28	40	17	36	44	12	19	6336	13	31	35	14	12	4984	5
			60	17	33	74	99	46	10536	58	28	61	15	32	8682	47
		32	40	25	40	66	13	38	9449	38	34	53	15	25	7591	27
			60	25	37	101	14	83	14502	93	32	88	15	64	12661	81
	25	28	40	6	44	52	13	25	7509	12	40	43	14	18	6198	5
			60	6	41	80	14	54	11454	55	36	67	15	39	9612	44
		32	40	15	48	72	13	45	10301	35	43	60	15	32	8586	25
			60	15	45	111	14	98	15846	94	40	98	16	77	14018	83

Legend: Type = Type of coil Q_{ER} = Heat output of the energy recovery Δp_w = Water pressure drop
 t_{Ext} = Extract air temperature Q_{sen} = Sensible cooling capacity of the coil m_w = Water quantity
 t_{Fre} = Fresh air temperature Q_{tot} = Total cooling capacity of the coil m_c = Condensate quantity
 rh_{Fre} = Fresh air humidity t_s = Supply air temperature

Table B10: Cooling capacity of ProcessVent cool

3.10 Dimensions and weights



- 1 Extract air duct connection
- 2 Fresh air duct connection
- 3 Exhaust air duct connection
- 4 Supply air duct connection, rear
- 5 Fresh air module
- 6 Return pipe feedthrough
- 7 Flow pipe feedthrough
- 8 Base unit

Fig. B6: Dimensional drawing (dimensions in mm)

Unit type			PVC-10C	PVC-10D
Components	Base unit	kg	1495	1514
	Fresh air module	kg	240	240
	Total	kg	1735	1754
Options	Hydraulic assembly diverting system	kg	32	38
	4-pipe switching	kg	48	54

Table B11: Weights

4 Specification texts

ProcessVent cool PVC

Compact unit for ventilating, heating and cooling production halls with heat recovery from process air, consisting of:

- Fresh air module
- Base unit with heat recovery in an oil-tight design, air treatment and air introduction
- Control system
- Optional components

Fresh air module

Self-supporting, double-shell, foamed panel construction with insulation free of thermal bridges made of closed-cell polyurethane (PUR, building materials class B1 according to DIN 4102-1); equipped with jack rings for transport and installation on-site.

The fresh air module contains:

Fresh air/recirculation damper

Opposed dampers for switching between fresh air and recirculation operation, including continuous actuator with safety function in the event of a power failure.

Fresh air filter

Designed as a compact filter of class ePM₁ 55 % (F7), including differential pressure switch for filter monitoring.

Standard fans

Supply air fans designed as maintenance-free, direct-drive radial fans with high-efficiency EC motors, backwards-curved, 3D contoured blades and a free-running rotating wheel made of a high-performance composite material; infinitely variable (2 pieces).

High-pressure fans (variant)

Supply air fans designed as maintenance-free, direct-drive radial fans with high-efficiency EC motors, backwards-curved blades and a free-running rotating wheel made of aluminium; infinitely variable (2 pieces); in a high-pressure design to compensate for external pressure drops (e.g. through air ducts).

Fresh air duct connection

Compensator with ventilation flange, fits on flange S30, for connection to the on-site fresh air duct.

Fresh air access door

Large access opening for easily accessing the fresh air filter and the fans for maintenance purposes.

Fresh air module, upright

The fresh air module is intended for upright installation on the base unit and equipped with plug-in connections for easy electrical installation.

Fresh air module, horizontal (variant)

The fresh air module is intended for horizontal installation on the base unit and equipped with plug-in connections for easy electrical installation; including connection duct and transverse support made of sheet steel, welded, with high-quality anti-corrosion primer and paint finish.

Base unit with heat recovery in an oil-tight design, air treatment and air introduction

Supporting framework construction made of steel sections, welded, with high-quality anti-corrosion primer and paint finish; bottom tray made of sheet steel, water and oil-tight, with high-quality anti-corrosion primer and paint finish; cover panels made of magnesium zinc sheet; equipped with jack rings and fork-lift openings for transport and installation on-site.

The following components are painted in Hoval red (RAL 3000) as standard:

- Framework construction
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

The base unit contains:

Crossflow plate heat exchanger

In a water and oil-tight design to recover heat from process air. Exchanger package consists of epoxy-coated aluminium plates with pressed-in spacers. The plates have a keyed fold connection with one another, which multiplies the material strength for the air inlet and outlet. The corners of the exchanger package are stuck into the aluminium press-drawn hollow sections of the casing with a sealing compound to form a water and oil-tight seal. The side walls made of sheet steel with a high-quality anti-corrosion primer and paint finish are screwed flush with these corners and sealed so they are water and oil-tight. A bypass is positioned in the flow of supply air and sealed so it is air and oil-tight against the extract air side; leak test according to company standard. Opposed ER and bypass damper mounted on the casing to control the output of the cross-flow plate heat exchanger, including continuous actuator. Frost monitoring on the extract air side by means of differential pressure switch.

Condensate drip tray with drain

In a water and oil-tight design to remove oily condensate from the cross-flow plate heat exchanger, with high-quality anti-corrosion primer and paint finish.

Extract air and exhaust air duct section

Water and oil-tight welded construction made of steel for conveying air containing oil, insulated with closed-cell Polycell (building materials class B2 according to DIN 4102-1), equipped with media-resistant compensators (2 pieces) with DIN flanged connecting pieces for connection to the on-site extract air and exhaust air duct.

Fresh air duct section

Transition between the fresh air module and the cross-flow plate heat exchanger, made of magnesium zinc sheet, insulated with closed-cell Polycell (building materials class B2 according to DIN 4102-1).

Supply air duct section

Transition between the cross-flow plate heat exchanger and the air introduction section, made of magnesium zinc sheet.

Air treatment unit, heating/cooling

Magnesium zinc sheet casing, containing the heating/cooling coil made of copper tubes and aluminium fins, the condensate separator with collecting channel and the frost controller; trap supplied for connection to an on-site condensate line.

Supply air duct connection, rear

Air outlet box with supply air duct section as connection to the on-site air distribution system, equipped with a compensator with ventilation flange, fits on flange S30, for connection to the on-site supply air duct (on the rear of the unit).

Supply air duct connection, left (variant)

Air outlet box with supply air duct section as connection to the on-site air distribution system, equipped with a compensator with ventilation flange, fits on flange S30, for connection to the on-site supply air duct (on the left of the unit).

Displacement flow diffuser (variant)

Cover panels towards the bottom of the base unit designed as a displacement flow diffuser for introducing the supply air into the occupied area in a low-pulse, duct-free manner; consisting of:

- Outlet panel designed as a perforated sheet
- Fabric mat for air distribution
- Spring rods for attaching the fabric mat

Access openings

- Exhaust air access door: large access opening for easily accessing the cross-flow plate heat exchanger for maintenance purposes; panel designed with a water and oil-tight closing system
- Extract air access door: large access opening for easily accessing the condensate drip tray with drain for maintenance purposes; panel designed with a water and oil-tight closing system
- Supply air access panel: large revision openings on all sides (4 pieces) with panels for easily accessing other

components for maintenance purposes (depending on equipment: ER and bypass damper, coil, hydraulic connections, return pump station, condensate drain)

Control box with control module as part of the Hoval ProcessNet control system

- Control box made of sheet steel, powder-coated with textured paint in light grey (RAL 7035), integrated flush with the framework construction
- Control module fully prewired with all I/O components:
 - Supply air fans
 - Actuator, fresh air/recirculation damper
 - Actuator, ER/bypass damper
 - Temperature sensor, mixed air
 - Temperature sensor, supply air
 - Frost monitoring, plate heat exchanger
 - Frost controller
 - Differential pressure switch, fresh air filter
 - Volume flow monitoring, supply air fans
 - Optional components as required
- Room and fresh air sensors supplied with plug, for on-site installation at a suitable location and wiring to the socket on the outside of the unit
- Power supply:
 - Mains power terminals
 - Circuit breaker to protect the supply air fans of the Hoval ProcessVent
 - 3-pin safety relay installed in the control box doors
 - In the design for injection system: circuit breaker to protect the heating pump
- Fuse for the electronics
- Transformer for control module and actuators
- Cable glands designed as cable feedthrough plates
- Connection via external signals: Electrical components and software interface for connecting one or more (maximum 4) extract air purification plants to the Hoval ProcessNet control system; visualisation via building management system or touchpanel on the unit. Connection via digital inputs and outputs:
 - Digital inputs, operating message, extract air purification plant 1 – 4
 - Digital input, emergency stop, extract air purification plant
 - Digital input, collective alarm
 - Digital outputs, enable, extract air purification plant 1 – 4

Options for the unit

Paint finish as desired

The following components are painted in the RAL colour of the customer's choice:

- Fresh air module and base unit (framework construction and covering panels)
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

Paint finish for frame as desired

The following components are painted in the RAL colour of the customer's choice:

- Framework construction of the base unit
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

Hydraulic assembly diverting system

Prefabricated assembly for the hydraulic diverting system, installed in the unit, consisting of:

- 3-way control ball valve designed with a continuous actuator
- Line balancing valve STAD with integrated drain valve
- Ball valve with extended spindle
- Connecting pipes with bypass designed as galvanised malleable cast-iron threaded pipes
- Screw joints for easy connection to the on-site distributor circuit

Assembly fully insulated with closed-cell insulating material to prevent energy loss and surface condensation on the assembly's components; 3-way control ball valve with plug-in connection fully prewired on the control box for easy maintenance; components adapted to the relevant heating/cooling coil and the ProcessNet control system.

The output is regulated via the 3-way control ball valve: the medium is routed through the coil or the bypass. The bypass is dimensioned such that it corresponds to the resistance of the coil. This ensures that the pressure in the load circuit remains constant.

The line balancing valve in the flow coordinates the total resistance of the load with the distribution circuit. In addition, the line balancing valve can also be used to shut the line off completely.

- Technical data, line balancing valve:
- Max. pressure 800 kPa at 120°

Technical data, control ball valve:

- Supply voltage: 24 V DC
- Control voltage 0...10 VDC
- Operating range: 2...10 V DC
- Position response: 2...10 V DC
- Actuator run time: 9 s/90°
- Casing material: nickel-plated hot-pressed brass
- Closing element material: stainless steel

4-pipe switching, complete

Prefabricated assembly for simple switch-over between heating and cooling in plants with 2 separate hydraulic circuits; consisting of:

- 2-way switching valves (4 pieces), designed as a ball valve with OPEN/CLOSED actuator and auxiliary switch for signalling the end positions
- Shut-off ball valves with extended spindle (8 pieces)
- Pipes designed as galvanised malleable cast-iron threaded pipes
- Screw joints for easy connection to the on-site distributor circuit

Assembly fully insulated with closed-cell insulating material to prevent energy loss and surface condensation on the assembly's components; switching valves with plug-in connection fully prewired on the control box for easy maintenance; components adapted to the hydraulic assembly.

Electrical components for automatic switch-over between heating and cooling integrated in the control box:

- Digital outputs for controlling the 2-way switching valves (4 pieces)
 - Digital inputs for monitoring the end positions of the 2-way switching valves by means of auxiliary switches (8 pieces)
- Electrical components adapted to the ProcessNet control system

The switch-over is performed automatically depending on the heat/cool demand.

Technical data, 2-way switching valve:

- Supply voltage: 24 V DC
- Control voltage OPEN/CLOSED
- Actuator run time: 90 s/90°

Return pump station water

Pump station for returning condensate for recycling or disposal; suitable for water-emulsion mixtures; installed in the unit, fully electrically prewired; consisting of:

- Hosing from condensate drains to pump receiver
- Pump receiver
- Submersible pump
- Check valve
- Level probe

Technical data:

- Pump output: 25 l/min
- Delivery head: 8 m
- Motor output: 0.14 kW
- Speed of rotation: 2700 rpm
- Voltage: 3 x 400 V AC
- Frequency: 50 Hz
- Protection rating: IP 55
- Pump material: PPS
- Pump shaft material: 1.4104
- Pump receiver material: SJ235R
- Piping material: Threaded pipe according to DIN 2440, seamlessly galvanised, including fittings; PVC fabric hoses
- Nominal diameter of the connections: ¾ "

Return pump station oil

Pump station for returning condensate for recycling or disposal; suitable for oily condensate from the plate heat exchanger (with an upstream oil separator); installed in the unit, fully electrically prewired; consisting of:

- Hosing from condensate drains to pump receiver
- Pump receiver
- Submersible pump
- Check valve
- Level probe

Technical data:

- Pump output: 25 l/min
- Delivery head: 8 m
- Motor output: 0.14 kW
- Speed of rotation: 2700 rpm
- Voltage: 3 x 400 V AC
- Frequency: 50 Hz
- Protection rating: IP 55
- Pump material: PPS
- Pump shaft material: 1.4104
- Pump receiver material: SJ235R
- Piping material: Threaded pipe according to DIN 2440, seamlessly galvanised, including fittings; PVC fabric hoses
- Nominal diameter of the connections: ¾ "

Control system

Control system for the energy-optimised operation of Hoval ProcessVent plants, designed as a decentralised I/O system, with the following main features:

- Control module integrated in every unit, for autonomous and individual regulation of the units, allowing for precise adaptation to the operating conditions
- Preprogrammed plug & play operator terminal with graphical user interface for using the Hoval ProcessVent:
 - Touchpanel with colour display installed in the doors of the control box
 - Facilitates monitoring and programming of Hoval ProcessNet (operating modes, temperature values, time programme, calendar, alarm handling, control parameters)
- Master-slave function for forming zones of several units being operated under the same conditions (e.g. same room temperature set values, same operating times)
- Operating mode switching via
 - Time programme, holiday and vacation calendar
 - Specification of a building management system
- The following control functions are performed by the control module:
 - Control of energy recovery depending on the temperature conditions
 - Control of supply air temperature via fixed value control or room air/supply air cascade control
 - Fixed value control of volume flow
 - Soft starting to protect the unit when switching over to operating states with fresh air
 - Defrosting if plate heat exchanger is iced up using the flow of extract air during plant operation
 - Messages relating to the plant's heat or cool demand for external heating and refrigerating systems
 - Fire control: Connection for an external signal to shut the plant down in the event of a fire
 - Signal for controlling external extract air systems when the plant is in an operating state where only fresh air is supplied to the hall and no extract air is removed from it (supply air/night cooling summer operating mode)
- Simple connection of the units to a building management system via an interface integrated in the control module by means of the Profinet protocol in order to exchange the following data:
 - Current operating mode
 - Temperature control strategy
 - Temperature set values
 - Temperature actual values
 - Damper positions
 - Alarms
 - Energy meter (energy monitoring option)
- Alarm handling via control module by means of collective alarm routed to terminal and transmission of alarm signals for visualisation
- Running time meter for each unit

- Back-up and restore function for easy saving of user settings and loading of factory settings
- Electrical documentation supplied in the control box

Options for the control system

4-pipe switching, electrical

Electrical components for automatic switch-over between heating and cooling integrated in the control box; for controlling an assembly created on-site for 4-pipe switching via 2-way switching valves:

- Digital outputs for controlling the 2-way switching valves (4 pieces)
- Digital inputs for monitoring the end positions of the 2-way switching valves by means of auxiliary switches (8 pieces)

Electrical components adapted to the ProcessNet control system

Technical requirements for the 2-way switching valves:

- Supply voltage: 24 V DC
- Control voltage OPEN/CLOSED
- Actuator run time: 90 s/90°

Room temperature average value

3 additional room air sensors supplied for averaging; for on-site installation at a suitable location and wiring to the socket on the outside of the unit

Energy monitoring

Calculation of the energy saved with the cross-flow plate heat exchanger and display on the operator terminal; additional temperature sensor and analogue input installed in the unit; fully prewired.

Design for injection system

Components for controlling and protecting a heating/cooling pump integrated in the control box; digital output routed to terminals in the control box.

Requirements for the pump in the load circuit:

- Power supply: 230 VAC
- Power consumption: max. 1 kW
- Current consumption: max. 4 A
- Input signal for activation of control of pump ON
- Output signal for pump alarm

Control of supply air damper

Control of an on-site supply air damper depending on the operating state of the compact unit; consisting of:

- Digital output routed to terminals in the control box (0...10 V DC)
- Output terminals in the control box for supplying power to the actuator (24 V DC)
- Analogue input for position return signal from the actuator (2...10 V DC)

Control of exhaust air damper

Control of an on-site exhaust air damper depending on the operating state of the extract air purification plant; consisting of:

- Digital output routed to terminals in the control box (0...10 V DC)
- Output terminals in the control box for supplying power to the actuator (24 V DC)
- Analogue input for position return signal from the actuator (2...10 V DC)



ProcessVent PV

Compact unit for ventilating production halls
with heat recovery from process air

1 Use 30

2 Construction and operation 30

3 Technical data 34

4 Specification texts 37



1 Use

1.1 Intended use

The ProcessVent unit is used to recover heat from process air and supply fresh air to halls containing enclosed machine tools or welding plants. The extract air from the extract air purification plant flows through a plate heat exchanger in an oil-tight design and is routed to the outside via a duct; the heat it contains is transferred to the supply air.

Intended use also includes compliance with the operating instructions. Any usage over and above this use is considered to be not as intended. The manufacturer can accept no liability for damage resulting from improper use.

1.2 User group

The units are only allowed to be installed, operated and maintained by authorised and instructed personnel who are well acquainted with the units and are informed about possible dangers.

2 Construction and operation

The ProcessVent unit forms one overall system with the extract air purification plant: The extract air purification plant draws off soiled air from machine tools or welding plants by means of a fan. It purifies this process air and transports it onwards through the extract air duct to the ProcessVent unit.

The ProcessVent unit fulfils the following functions:

- Fresh air supply
- Extract air removal (with air conveyance via the extract air purification plant)
- Recovery of heat from the process air
- Recirculation operation
- Air filtration

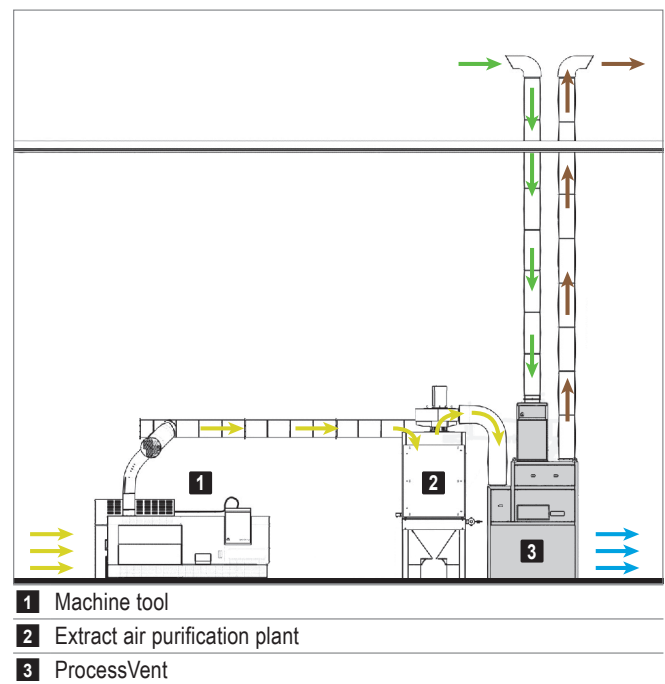


Fig. C1: The ProcessVent unit forms one overall system with the extract air purification plant.

2.1 Construction

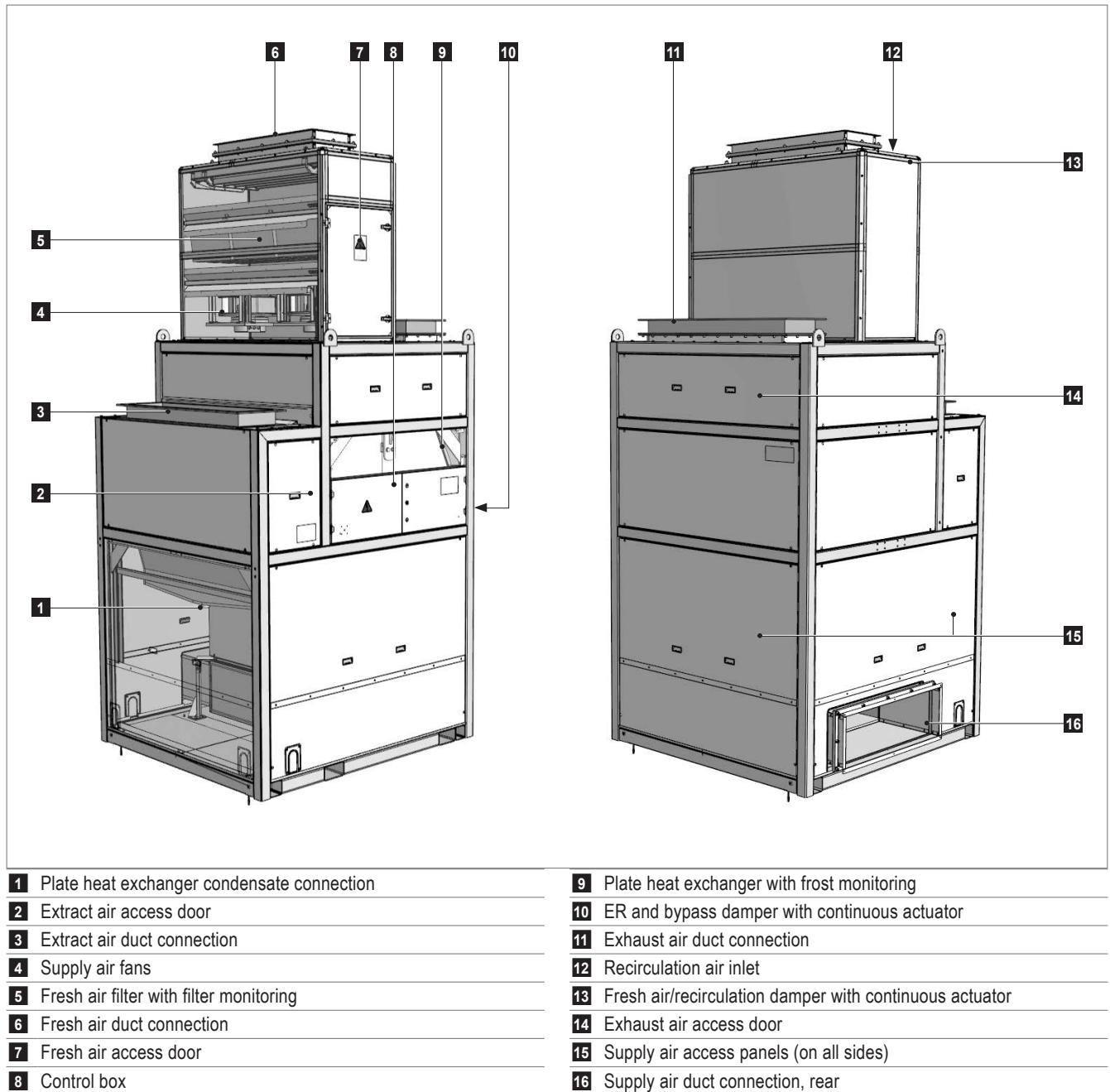
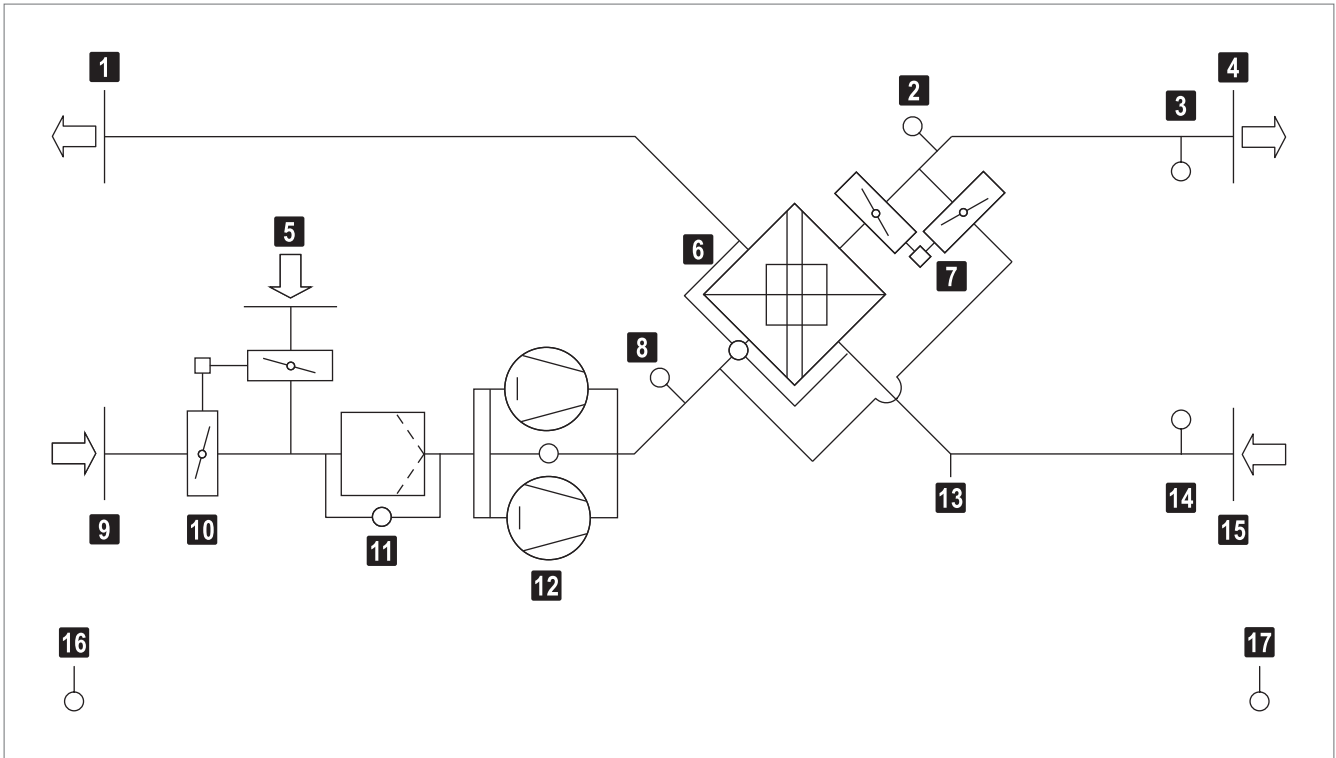


Fig. C2: Unit construction

2.2 Function diagram



- | | |
|---|--|
| 1 Exhaust air | 10 Fresh air/recirculation damper with actuator |
| 2 Temperature sensor energy monitoring (optional) | 11 Fresh air filter with differential pressure switch |
| 3 Supply air temperature sensor | 12 Supply air fans with flow rate monitoring |
| 4 Supply air | 13 Condensate connection |
| 5 Recirculation | 14 Extract air temperature sensor |
| 6 Plate heat exchanger with differential pressure switch | 15 Extract air |
| 7 ER/bypass damper with actuator | 16 Fresh air temperature sensor |
| 8 Mixed air temperature sensor | 17 Room temperature sensor |
| 9 Fresh air | |

Fig. C3: Function diagram

2.3 Operating modes

The unit has the following operating modes:

- Ventilation
- Supply air
- Night cooling summer
- Off

The ProcessNet control system or the higher-level building management system controls the overall plant automatically.

The operating mode of the ProcessVent units depends on the time programme and on the operating states of the machines from which the process air is to be drawn off. The following applies: When the machines are in operation, the ProcessVent unit always works in 'Ventilation' mode. The operating mode defined in the time programme is overridden. You can also control the operating mode of the ProcessVent unit manually and thus independently of the overall plant (e.g. for maintenance activities).

Code	Operating mode		Description
VE	<p>Ventilation</p> <p>The unit blows fresh air into the room. The fresh air quantity is constant; it is dependent on the extract air volume flow. The extract air from the extract air purification plant flows through the plate heat exchanger into the open air.</p> <p>The room temperature set value day is active. Energy recovery is controlled depending on the heat demand and temperature conditions.</p>		<p>Supply air fan on ¹⁾</p> <p>Energy recovery 0-100 %</p> <p>Fresh air damper open</p> <p>Recirculation damper closed</p> <p>¹⁾ Nominal volume flow as per setting in the control system (adjusted to the extract air volume flow)</p>
SA	<p>Supply air</p> <p>The unit blows fresh air into the room. The fresh air quantity is constant. Room air flows into the open via open doors and windows or is drawn off via an external system.</p>		<p>Supply air fan on ¹⁾</p> <p>Energy recovery 0 %</p> <p>Fresh air damper open</p> <p>Recirculation damper closed</p> <p>¹⁾ Nominal volume flow as per setting in the control system</p>
NCS	<p>Night cooling summer</p> <p>On/off operation with room temperature set value night</p> <ul style="list-style-type: none"> ■ If current temperatures permit, the unit blows cool fresh air into the room and thus uses it for free cooling. ■ If current temperatures do not permit free cooling, the unit switches off. 		<p>Supply air fan on ¹⁾²⁾</p> <p>Energy recovery 0 %</p> <p>Fresh air damper open ²⁾</p> <p>Recirculation damper closed ²⁾</p> <p>¹⁾ Volume flow set in the control system</p> <p>²⁾ Depending on temperature conditions</p>
OFF	<p>Off</p> <p>The unit is switched off.</p>		<p>Supply air fan off</p> <p>Energy recovery 0 %</p> <p>Fresh air damper closed</p> <p>Recirculation damper open</p>

Table C1: Operating modes ProcessVent

3 Technical data

3.1 Type code

	PV - 10 - / ...
Unit type	ProcessVent
Unit size	10
Coil	Without coil
Further options	

Table C2: Type codes

3.2 Application limits

Extract air temperature	max.	°C	50
Extract air relative humidity (incl. oil vapours)	max.	%	100
Dust content of extract air	max.	mg/m ³	5
Oil content of extract air ¹⁾	max.	mg/m ³	10
Fresh air temperature	min.	°C	-30
Ambient temperature		°C	4...40
Supply air temperature	max.	°C	60
Condensate quantity ²⁾	max.	m ³ /h	1.2
Differential pressure fresh air/extract air	max.	Pa	2500
Pressure difference to outside	max.	Pa	1500

- The unit is not suitable for use in potentially explosive atmospheres.
- The unit is not suitable for use in rooms with active humidification.
- The unit is corrosion-protected, but only suitable for use in applications where the extract air contains very aggressive substances (sulphur, methanol, acetone, toluene, etc.) to a limited extent. Please contact Hoval application consulting.

¹⁾ Conventional mineral, synthetic and ester oils and emulsions from the field of machining

²⁾ At up to 10 m delivery head

Table C3: Application limits

3.3 Heat recovery system

Temperature efficiency, dry	%	61
Temperature efficiency, wet (max.)	%	95
Factory setting of differential pressure switch	Pa	250

Table C4: Heat recovery system

3.4 Air filtration

Fresh air filter	
Filter class acc. to ISO 16890	ePM ₁ 55 %
Filter class acc. to EN 779	F7
Factory setting of differential pressure switch	250 Pa

Table C5: Air filtration

3.5 Air flow rate

Unit type	PV-10	
Nominal air flow rate	m ³ /h	10 000
Available fan pressure to compensate for external pressure drops	Pa	570

Table C6: Air flow rate

3.6 Electrical connection

Supply voltage	V AC	3 x 400
Permitted voltage tolerance	%	±10
Frequency	Hz	50
Nominal power consumption	kW	2 x 2.4
Current consumption	A	2 x 3.9

Table C7: Electrical connection

3.7 Sound level

Position		Sound power level	Sound pressure level
Fresh air duct connection	dB(A)	71	–
Supply air duct connection	dB(A)	66	–
Displacement flow diffuser	dB(A)	75	59 ¹⁾

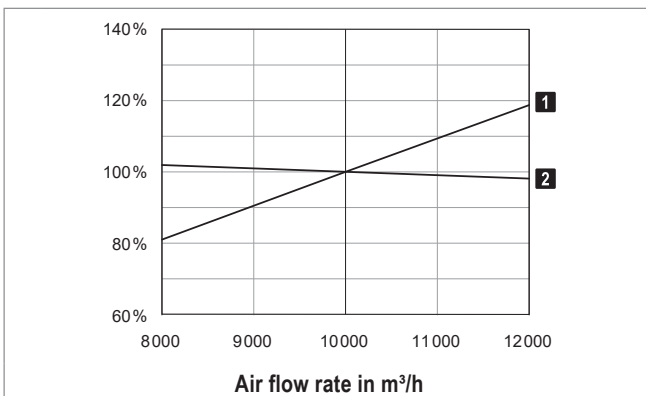
¹⁾ Applies at a distance of 1 m from the unit, measuring surface sound pressure level according to DIN 45636

Table C8: Sound level

3.8 Energy recovery

The following applies for the data provided in the tables:

- The data applies for the nominal air flow rate of 10000 m³/h. The actual values are dependent on the actual air flow rate. The percentage change in these values for volume flows in the range 8000...12000 m³/h is shown in Fig. C4. For air flow rates under 8000 m³/h contact Hoval application consulting.



1 Energy recovery

2 Supply air temperature

Fig. C4: Changes in output data depending on the air flow rate



Notice

Use the selection program 'HK-Select' to calculate the performance data. You can download 'HK-Select' free of charge on the Internet.

Fresh air		-15 °C / 90 %		-5 °C / 90 %	
t _{Ext}	rh _{Ext}	Q _{ER}	t _s	Q _{ER}	t _s
°C	%	kW	°C	kW	°C
15	40	65	4	42	8
	60	70	6	45	8
	80	77	8	50	10
20	40	77	8	53	11
	60	85	10	58	12
	80	93	13	65	15
25	40	90	12	65	15
	60	99	15	72	17
	80	109	18	81	19
30	40	104	16	78	18
	60	115	19	86	21
	80	126	23	97	24

Legend: t_{Ext} = Extract air temperature
 rh_{Ext} = Extract air humidity
 Q_{ER} = Heat output of the energy recovery
 t_s = Supply air temperature

Table C9: Energy recovery output of the ProcessVent

3.9 Dimensions and weights

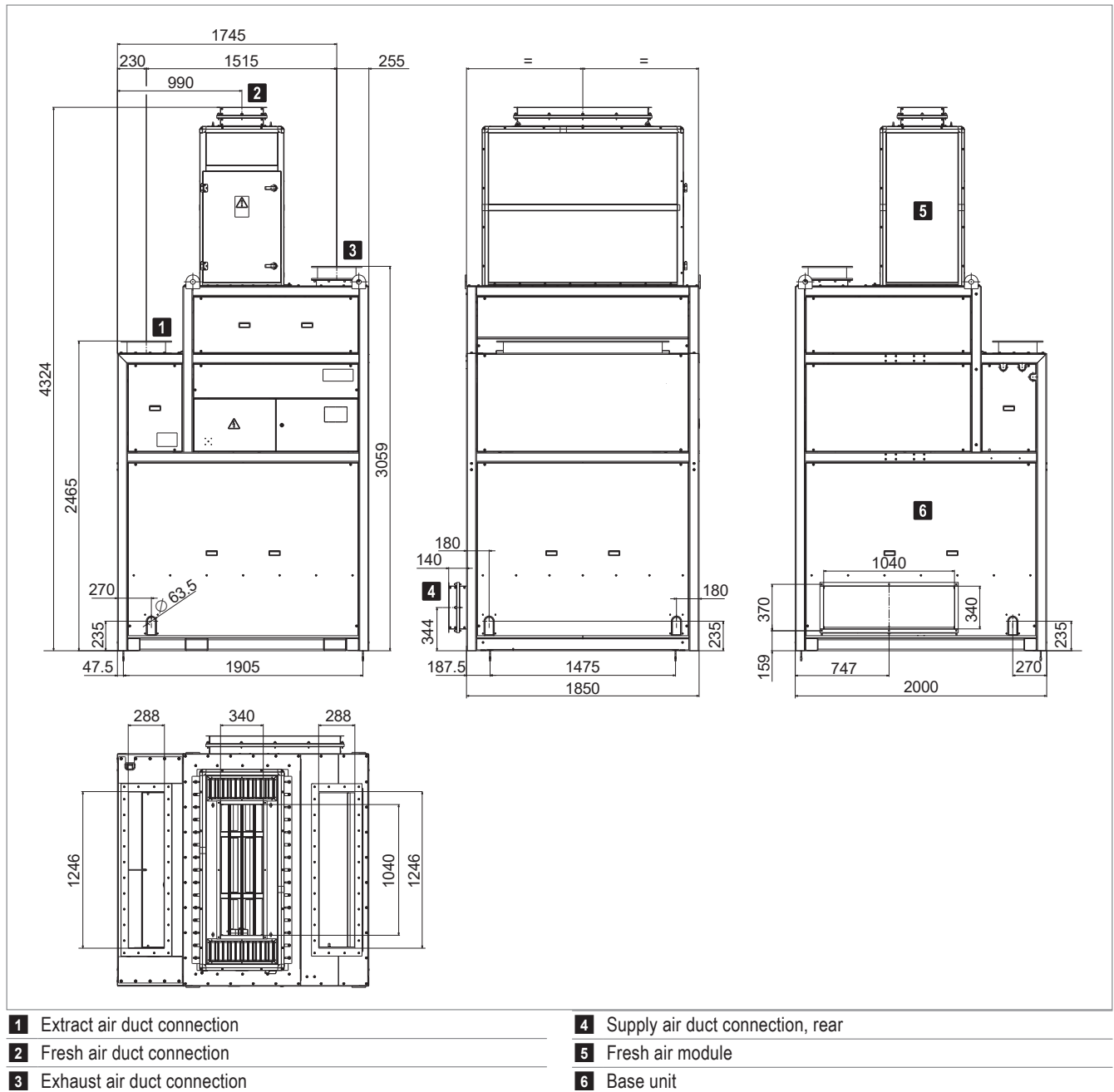


Fig. C5: Dimensional drawing (dimensions in mm)

Unit type			PV-10
Components	Base unit	kg	1417
	Fresh air module	kg	240
	Total	kg	1657

Table C10: Weights

4 Specification texts

ProcessVent PV

Compact unit for ventilating production halls with heat recovery from process air, consisting of:

- Fresh air module
- Base unit with heat recovery in an oil-tight design, air treatment and air introduction
- Control system
- Optional components

Fresh air module

Self-supporting, double-shell, foamed panel construction with insulation free of thermal bridges made of closed-cell polyurethane (PUR, building materials class B1 according to DIN 4102-1); equipped with jack rings for transport and installation on-site.

The fresh air module contains:

Fresh air/recirculation damper

Opposed dampers for switching between fresh air and recirculation operation, including continuous actuator with safety function in the event of a power failure.

Fresh air filter

Designed as a compact filter of class ePM₁ 55 % (F7), including differential pressure switch for filter monitoring.

Standard fans

Supply air fans designed as maintenance-free, direct-drive radial fans with high-efficiency EC motors, backwards-curved, 3D contoured blades and a free-running rotating wheel made of a high-performance composite material; infinitely variable (2 pieces).

High-pressure fans (variant)

Supply air fans designed as maintenance-free, direct-drive radial fans with high-efficiency EC motors, backwards-curved blades and a free-running rotating wheel made of aluminium; infinitely variable (2 pieces); in a high-pressure design to compensate for external pressure drops (e.g. through air ducts).

Fresh air duct connection

Compensator with ventilation flange, fits on flange S30, for connection to the on-site fresh air duct.

Fresh air access door

Large access opening for easily accessing the fresh air filter and the fans for maintenance purposes.

Fresh air module, upright

The fresh air module is intended for upright installation on the base unit and equipped with plug-in connections for easy electrical installation.

Fresh air module, horizontal (variant)

The fresh air module is intended for horizontal installation on the base unit and equipped with plug-in connections for easy electrical installation; including connection duct and transverse support made of sheet steel, welded, with high-quality anti-corrosion primer and paint finish.

Base unit with heat recovery in an oil-tight design, air treatment and air introduction

Supporting framework construction made of steel sections, welded, with high-quality anti-corrosion primer and paint finish; bottom tray made of sheet steel, water and oil-tight, with high-quality anti-corrosion primer and paint finish; cover panels made of magnesium zinc sheet; equipped with jack rings and fork-lift openings for transport and installation on-site.

The following components are painted in Hoval red (RAL 3000) as standard:

- Framework construction
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

The base unit contains:

Crossflow plate heat exchanger

In a water and oil-tight design to recover heat from process air. Exchanger package consists of epoxy-coated aluminium plates with pressed-in spacers. The plates have a keyed fold connection with one another, which multiplies the material strength for the air inlet and outlet. The corners of the exchanger package are stuck into the aluminium press-drawn hollow sections of the casing with a sealing compound to form a water and oil-tight seal. The side walls made of sheet steel with a high-quality anti-corrosion primer and paint finish are screwed flush with these corners and sealed so they are water and oil-tight. A bypass is positioned in the flow of supply air and sealed so it is air and oil-tight against the extract air side; leak test according to company standard. Opposed ER and bypass damper mounted on the casing to control the output of the cross-flow plate heat exchanger, including continuous actuator. Frost monitoring on the extract air side by means of differential pressure switch.

Condensate drip tray with drain

In a water and oil-tight design to remove oily condensate from the cross-flow plate heat exchanger, with high-quality anti-corrosion primer and paint finish.

Extract air and exhaust air duct section

Water and oil-tight welded construction made of steel for conveying air containing oil, insulated with closed-cell Polycell (building materials class B2 according to DIN 4102-1), equipped with media-resistant compensators (2 pieces) with DIN flanged connecting pieces for connection to the on-site extract air and exhaust air duct.

Fresh air duct section

Transition between the fresh air module and the cross-flow plate heat exchanger, made of magnesium zinc sheet, insulated with closed-cell Polycell (building materials class B2 according to DIN 4102-1).

Supply air duct section

Transition between the cross-flow plate heat exchanger and the air introduction section, made of magnesium zinc sheet.

Supply air duct connection, rear

Air outlet box with supply air duct section as connection to the on-site air distribution system, equipped with a compensator with ventilation flange, fits on flange S30, for connection to the on-site supply air duct (on the rear of the unit).

Supply air duct connection, left (variant)

Air outlet box with supply air duct section as connection to the on-site air distribution system, equipped with a compensator with ventilation flange, fits on flange S30, for connection to the on-site supply air duct (on the left of the unit).

Displacement flow diffuser (variant)

Cover panels towards the bottom of the base unit designed as a displacement flow diffuser for introducing the supply air into the occupied area in a low-pulse, duct-free manner; consisting of:

- Outlet panel designed as a perforated sheet
- Fabric mat for air distribution
- Spring rods for attaching the fabric mat

Access openings

- Exhaust air access door: large access opening for easily accessing the cross-flow plate heat exchanger for maintenance purposes; panel designed with a water and oil-tight closing system
- Extract air access door: large access opening for easily accessing the condensate drip tray with drain for maintenance purposes; panel designed with a water and oil-tight closing system
- Supply air access panel: large revision openings on all sides (4 pieces) with panels for easily accessing other components for maintenance purposes (depending on equipment: ER and bypass damper, return pump station, condensate drain).

Control box with control module as part of the Hoval ProcessNet control system

- Control box made of sheet steel, powder-coated with textured paint in light grey (RAL 7035), integrated flush with the framework construction
- Control module fully prewired with all I/O components:
 - Supply air fans
 - Actuator, fresh air/recirculation damper
 - Actuator, ER/bypass damper
 - Temperature sensor, mixed air
 - Temperature sensor, supply air
 - Frost monitoring, plate heat exchanger
 - Differential pressure switch, fresh air filter
 - Volume flow monitoring, supply air fans
 - Optional components as required
- Room and fresh air sensors supplied with plug, for on-site installation at a suitable location and wiring to the socket on the outside of the unit
- Power supply:
 - Mains power terminals
 - Circuit breaker to protect the supply air fans of the Hoval ProcessVent
 - 3-pin safety relay installed in the control box doors
- Fuse for the electronics
- Transformer for control module and actuators
- Cable glands designed as cable feedthrough plates
- Connection via external signals: Electrical components and software interface for connecting one or more (maximum 4) extract air purification plants to the Hoval ProcessNet control system; visualisation via building management system or touchpanel on the unit. Connection via digital inputs and outputs:
 - Digital inputs, operating message, extract air purification plant 1 – 4
 - Digital input, emergency stop, extract air purification plant
 - Digital input, collective alarm
 - Digital outputs, enable, extract air purification plant 1 – 4

Options for the unit

Paint finish as desired

The following components are painted in the RAL colour of the customer's choice:

- Fresh air module and base unit (framework construction and covering panels)
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

Paint finish for frame as desired

The following components are painted in the RAL colour of the customer's choice:

- Framework construction of the base unit
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

Return pump station water

Pump station for returning condensate for recycling or disposal; suitable for water-emulsion mixtures; installed in the unit, fully electrically prewired; consisting of:

- Hosing from condensate drains to pump receiver
- Pump receiver
- Submersible pump
- Check valve
- Level probe

Technical data:

- Pump output: 25 l/min
- Delivery head: 8 m
- Motor output: 0.14 kW
- Speed of rotation: 2700 rpm
- Voltage: 3 x 400 V AC
- Frequency: 50 Hz
- Protection rating: IP 55
- Pump material: PPS
- Pump shaft material: 1.4104
- Pump receiver material: SJ235R
- Piping material: Threaded pipe according to DIN 2440, seamlessly galvanised, including fittings; PVC fabric hoses
- Nominal diameter of the connections: ¾ "

Return pump station oil

Pump station for returning condensate for recycling or disposal; suitable for oily condensate from the plate heat exchanger (with an upstream oil separator); installed in the unit, fully electrically prewired; consisting of:

- Hosing from condensate drains to pump receiver
- Pump receiver
- Submersible pump
- Check valve
- Level probe

Technical data:

- Pump output: 25 l/min
- Delivery head: 8 m
- Motor output: 0.14 kW
- Speed of rotation: 2700 rpm
- Voltage: 3 x 400 V AC
- Frequency: 50 Hz
- Protection rating: IP 55
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Control system for the energy-optimised operation of Hoval ProcessVent plants, designed as a decentralised I/O system, with the following main features:

- Control module integrated in every unit, for autonomous and individual regulation of the units, allowing for precise adaptation to the operating conditions
- Preprogrammed plug & play operator terminal with graphical user interface for using the Hoval ProcessVent:
 - Touchpanel with colour display installed in the doors of the control box
 - Facilitates monitoring and programming of Hoval ProcessNet (operating modes, temperature values, time programme, calendar, alarm handling, control parameters)
- Master-slave function for forming zones of several units being operated under the same conditions (e.g. same room temperature set values, same operating times)
- Operating mode switching via
 - Time programme, holiday and vacation calendar
 - Specification of a building management system
- The following control functions are performed by the control module:
 - Control of energy recovery depending on the temperature conditions
 - Control of supply air temperature via fixed value control or room air/supply air cascade control
 - Fixed value control of volume flow
 - Soft starting to protect the unit when switching over to operating states with fresh air
 - Defrosting if plate heat exchanger is iced up using the flow of extract air during plant operation
 - Messages relating to the plant's heat or cool demand for external heating and refrigerating systems
 - Fire control: Connection for an external signal to shut the plant down in the event of a fire
 - Signal for controlling external extract air systems when the plant is in an operating state where only fresh air is supplied to the hall and no extract air is removed from it (supply air/night cooling summer operating mode)
- Simple connection of the units to a building management system via an interface integrated in the control module by means of the Profinet protocol in order to exchange the following data:
 - Current operating mode
 - Temperature control strategy
 - Temperature set values
 - Temperature actual values
 - Damper positions
 - Alarms
 - Energy meter (energy monitoring option)
- Alarm handling via control module by means of collective alarm routed to terminal and transmission of alarm signals for visualisation
- Running time meter for each unit

- Back-up and restore function for easy saving of user settings and loading of factory settings
- Electrical documentation supplied in the control box

Options for the control system

Room temperature average value

3 additional room air sensors supplied for averaging; for on-site installation at a suitable location and wiring to the socket on the outside of the unit

Energy monitoring

Calculation of the energy saved with the cross-flow plate heat exchanger and display on the operator terminal; additional temperature sensor and analogue input installed in the unit; fully prewired.

Control of supply air damper

Control of an on-site supply air damper depending on the operating state of the compact unit; consisting of:

- Digital output routed to terminals in the control box (0...10 V DC)
- Output terminals in the control box for supplying power to the actuator (24 V DC)
- Analogue input for position return signal from the actuator (2...10 V DC)

Control of exhaust air damper

Control of an on-site exhaust air damper depending on the operating state of the extract air purification plant; consisting of:

- Digital output routed to terminals in the control box (0...10 V DC)
- Output terminals in the control box for supplying power to the actuator (24 V DC)
- Analogue input for position return signal from the actuator (2...10 V DC)



Options

1	Type code	42
2	High-pressure fans (HV).	44
3	Air outlet	44
4	Fresh air module, horizontal (AH).	45
5	Paint finish	46
6	Hydraulic assembly diverting system (HY).	46
7	4-pipe switching	47
8	Return pump station	48
9	Room temperature averaging (MR)	48
10	Energy monitoring (EM)	48
11	Design for injection system (ES)	48
12	Control of supply air damper (ZK)	48
13	Control of exhaust air damper (FK).	48

1 Type code

PVH - 10 A / SV . K1 . AS . SL / HY . U1 . RW / PN . IO . MR / EM . ES . ZK . FK / TP . LV

Unit type

- PV ProcessVent
- PVH ProcessVent heat (with heating coil)
- PVC ProcessVent cool (with heating/cooling coil)

Unit size

10

Coil

- A, B, C Heating coil type A, B or C
- C, D Heating/cooling coil type C or D
- without

Fans

- SV Standard fans
- HV High-pressure fans

Air outlet

- K1 Supply air duct connection, rear (standard)
- K2 Supply air duct connection, left
- QL Diffuser air outlet

Fresh air module

- AS Fresh air module, upright (standard)
- AH Fresh air module, horizontal

Paint finish

- SL Standard paint finish
- AL Paint finish as desired
- HL Paint finish for frame as desired

Hydraulic assembly diverting system

- Without (standard)
- HY Hydraulic assembly diverting system

4-pipe switching

- Without (standard)
- U1 4-pipe switching, complete
- U2 4-pipe switching, only electrical components

Return pump station

- Without (standard)
- RW Return pump station water
- RO Return pump station oil
- R2 Return pump station water and oil

PVH - 10 A / SV . K1 . AS . SL / HY . U1 . RW / PN . IO . MR / EM . ES . ZK . FK / TP . LV

Control

PN Design for ProcessNet (standard)

Connection extract air purification

IO Connection via external signals (standard)

Room temperature average value

-- Without (standard)

MR Room temperature average value

Energy monitoring

-- Without (standard)

EM Energy monitoring

Injection system

-- Without (standard)

ES Design for injection system

Control of supply air damper

-- Without (standard)

ZK Control of supply air damper

Control of exhaust air damper

-- Without (standard)

FK Control of exhaust air damper

Visualisation

TP Touchpanel on the unit

Power supply

LV Power supply (standard)

Table D1: Type code

2 High-pressure fans (HV)

High-pressure fans are EC fans with a higher available pressure to compensate for external pressure drops (e.g. through air ducts). They replace the standard fans.

2.1 Air flow rate

Unit type		PV	PVH				PVC	
Coil		-	A	B	C	C	D	
Nominal air flow rate	m ³ /h	12 000						
Available fan pressure to compensate for external pressure drops	Pa	810	760	740	670	580	500	

Table D2: Air flow rate of the units with high-pressure fans

2.2 Electrical connection

Supply voltage	V AC	3 x 400
Permitted voltage tolerance	%	±10
Frequency	Hz	50
Nominal power consumption	kW	2 x 4.1
Current consumption	A	2 x 6.5

Table D3: Electrical connection of the units with high-pressure fans

2.3 Sound level

Position		Sound power level	Sound pressure level
Fresh air duct connection	dB(A)	81	-
Supply air duct connection	dB(A)	88	-
Displacement flow diffuser	dB(A)	87	65 ¹⁾

1) Applies at a distance of 1 m from the unit, measuring surface sound pressure level according to DIN 45636

Table D4: Sound level of the units with high-pressure fans

3 Air outlet

3.1 Supply air duct connection, left (K2)

The compensator for the supply air duct is mounted on the left side of the unit.

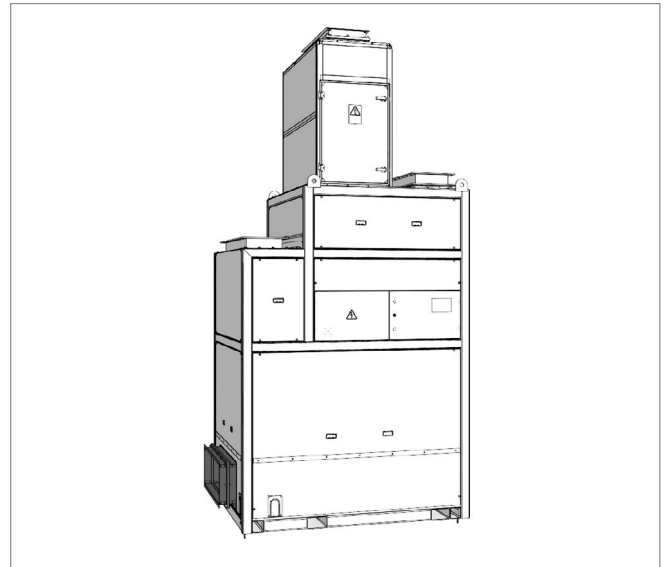


Fig. D1: Unit with supply air duct connection, left

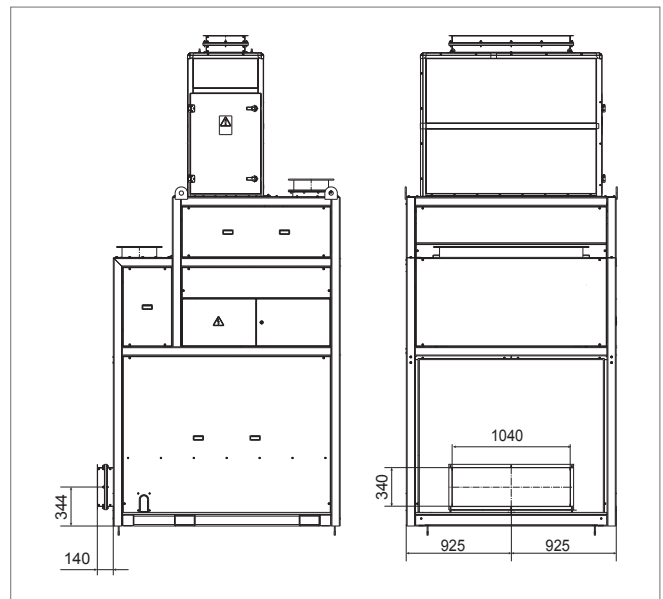


Fig. D2: Dimensional drawing for supply air duct connection, left (dimensions in mm)

3.2 Displacement flow diffuser (QL)

Units with a displacement flow diffuser introduce the supply air into the occupied area in a low-pulse, duct-free manner. The bottom section of the base unit is covered with perforated sheets on all sides. Behind these sheets is a fabric mat, which is attached with spring rods, for air distribution.



Fig. D3: Unit with displacement flow diffuser

4 Fresh air module, horizontal (AH)

For reasons of space, it can make sense to install the fresh air module on the base unit horizontally, rather than upright. To achieve this, the unit can be supplied complete with a connection duct and a support made of sheet steel. The connection duct must be insulated on-site (30 mm with heat transfer coefficient $\lambda = 0.04$ W/mK).

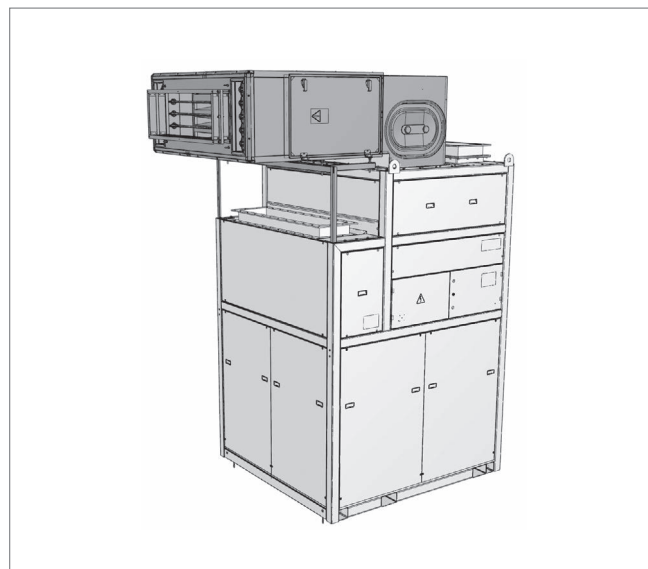


Fig. D4: Unit with fresh air module installed horizontally

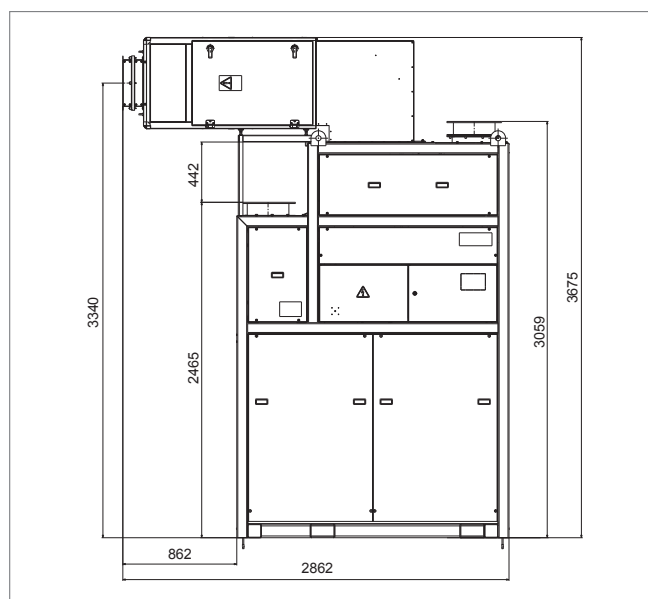


Fig. D5: Dimensional drawing for fresh air module, horizontal (dimensions in mm)

5 Paint finish

5.1 Paint finish as desired

The following components are painted in the RAL colour of the customer's choice:

- Fresh air module and base unit (framework construction and covering panels)
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

5.2 Paint finish for frame as desired

The following components are painted in the RAL colour of the customer's choice:

- Framework construction of the base unit
- Bottom tray
- Side walls of the plate heat exchanger
- Extract air and exhaust air duct section

6 Hydraulic assembly diverting system (HY)

There is an assembly for the hydraulic diverting system installed in the unit. It is fully insulated and comprises the following components:

- 3-way control ball valve
- Balancing valve STAD
- Ball valve
- Pipes
- Screw joints for easy connection to the on-site distributor circuit (on the back of the unit)

Coil	3-way control ball valve		Flow/return connection
	DN	Kvs	
A B C	25	10 m³/h	Internal thread 1½ "
D	32	16 m³/h	Internal thread 2 "

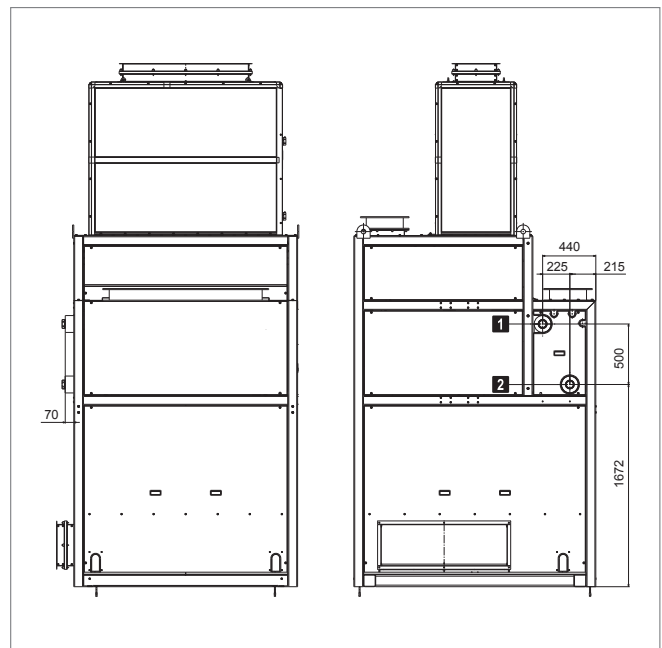
Table D5: Technical data of the hydraulic assembly for diverting system

Supply voltage	V DC	24
Control voltage	V DC	0...10
Operating range	V DC	2...10
Position response	kW	2...10
Actuator run time	s	9

Table D6: Technical data of the 3-way control ball valve



Fig. D6: Connection of the hydraulic assembly for diverting system



1 Return

2 Flow

Fig. D7: Dimensional drawing for hydraulic connections (dimensions in mm)

7 4-pipe switching

The 4-pipe switching allows automatic switch-over between heating and cooling in systems with 2 separate hydraulic circuits.

7.1 4-pipe switching, complete (U1)

An assembly for automatic switch-over is attached to the unit. It is fully insulated and comprises the following components:

- 2-way switching valves with auxiliary switch
- Shut-off ball valves
- Piping to the hydraulic assembly for diverting system
- Screw joints for easy connection to the on-site distributor circuit

The electrical components for automatic switch-over are installed and prewired in the control box.

Coil	DN	Flow/return connection	Stroke/force
C	25	Internal thread 1½ "	10 Nm
D	32	Internal thread 2 "	10 Nm

Table D7: Technical data of the 4-pipe switching assembly

Supply voltage	V DC	24
Control voltage	OPEN / CLOSED	
Actuator run time	s	90

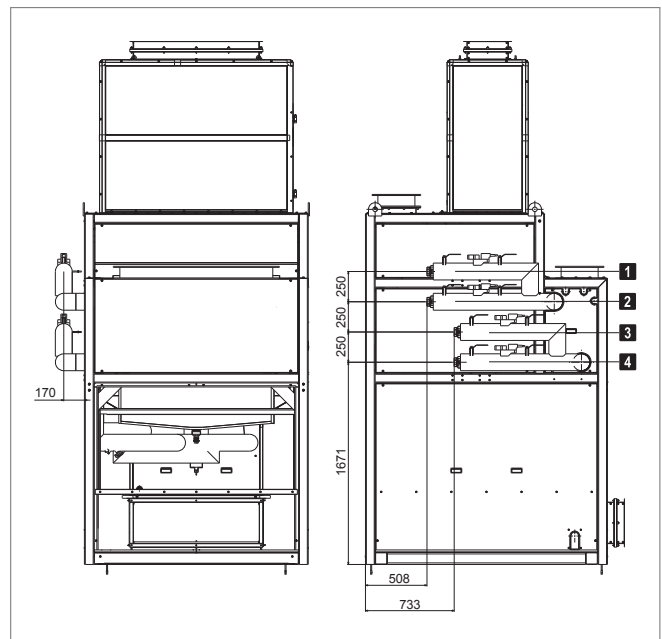
Table D8: Technical data of the 2-way switching valves

7.2 4-pipe switching, only electrical components (U2)

The electrical components for automatic switch-over are installed in the terminal box (4-pipe switching assembly and wiring on-site; see electrical schematic for connections).



Fig. D8: Unit with 4-pipe switching



- 1 Return heating
- 2 Return cooling
- 3 Flow heating
- 4 Flow cooling

Fig. D9: Dimensional drawing for 4-pipe switching (dimensions in mm)

8 Return pump station

8.1 Return pump station water (RW)

The return pump station water is used for the removal of condensate in applications where connection to the waste water system via a simple condensate line is not possible. It drains the following media or returns them to the process for recycling:

- Water-emulsion mixtures from the plate heat exchanger (with an upstream emulsion separator, wet separator or dry filter)
- Condensate from the cooling coil

The return pump station is installed and prewired in the unit.

8.2 Return pump station oil (RO)

The return pump station oil is used for the removal of condensate in applications where connection to the waste water system via a simple condensate line is not possible. It drains the following media or returns them to the process for recycling:

- Oily condensate from the plate heat exchanger (with an upstream oil separator)

The return pump station is installed and prewired in the unit.

Pump output	l/min	25
Delivery head	m	8
Supply voltage	V AC	3 x 400
Frequency	Hz	50
Condensate drain connection	¾" (internal thread)	

Table D9: Technical data of the return pump stations (water and oil)

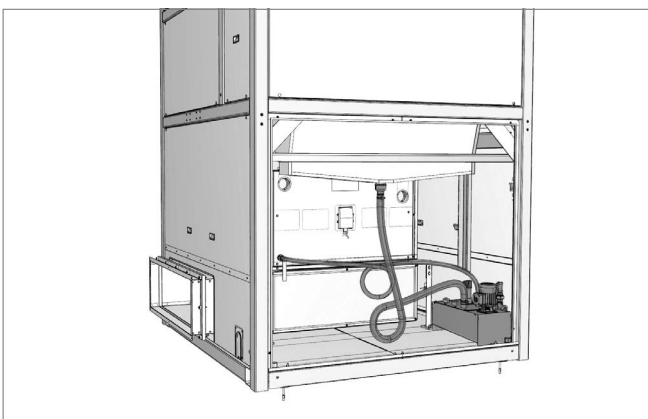


Fig. D10: Return pump station installed in the unit

9 Room temperature averaging (MR)

4 room air sensors for averaging in the occupied area are supplied (wiring to be provided on-site).

10 Energy monitoring (EM)

Energy monitoring determines the amount of energy recovered in the plate heat exchanger (separate counters for heating and cooling energy) and displays it on the operator terminal. For this reason, there is an additional temperature sensor installed and prewired in the unit.

11 Design for injection system (ES)

Instead of the diverting circuit, an injection circuit can also be installed in the load circuit. In the design for injection system, additional components for control of the pumps in the load circuit are installed in the control box.

Requirements for the pump in the load circuit:

- Power supply: 230 VAC
- Power consumption: max. 1 kW
- Current consumption: max. 4 A
- Input signal for activation of control of pump ON
- Output signal for pump alarm

12 Control of supply air damper (ZK)

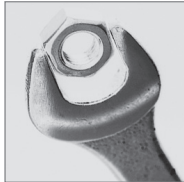
Hoval ProcessNet can control an on-site supply air damper. This control is performed dependent on an adjustable threshold value for the supply air volume flow.

13 Control of exhaust air damper (FK)

Hoval ProcessNet can control an on-site exhaust air damper. This control is performed dependent on the operating state of the extract air purification plant(s).

Supply voltage	V DC	24
Control voltage	V DC	0...10
Feedback	V DC	2...10

Table D10: Control of supply air damper / exhaust air damper



Transport and installation

1 Installation	50
2 Hydraulic installation	52
3 Electrical installation	53

1 Installation

The unit is delivered in 2 or 3 sections on pallets:

- Base unit
- Fresh air module
- Connection duct and support for horizontal installation of the fresh air module (option)

The following guidelines are important when preparing for installation:

- A heavy-duty forklift truck is required to transport the unit to the installation site and assemble it:
 - Load capacity . . . min. 2000 kg
 - Fork length min. 1.50 m
- The unit is supplied with 4 fixing anchors for attaching it to the floor.
- Follow the assembly instructions included.

1.1 Installation site

- The unit must be erected at an inside location that is protected against frost.
- Install the unit horizontally.
- Ensure that the installation surface is of sufficient load-bearing capacity. The weight of the unit is distributed over 4 points (see Fig. E2).
- Position the unit in accordance with the position of the air ducts.
- If the unit is equipped with a displacement flow diffuser, ensure unhindered dispersion of the supply air stream (approx. 1 m clear space all-round, up to 1.8 m height).
- The unit must be accessible and connecting lines must be able to be dismantled for maintenance and servicing work.

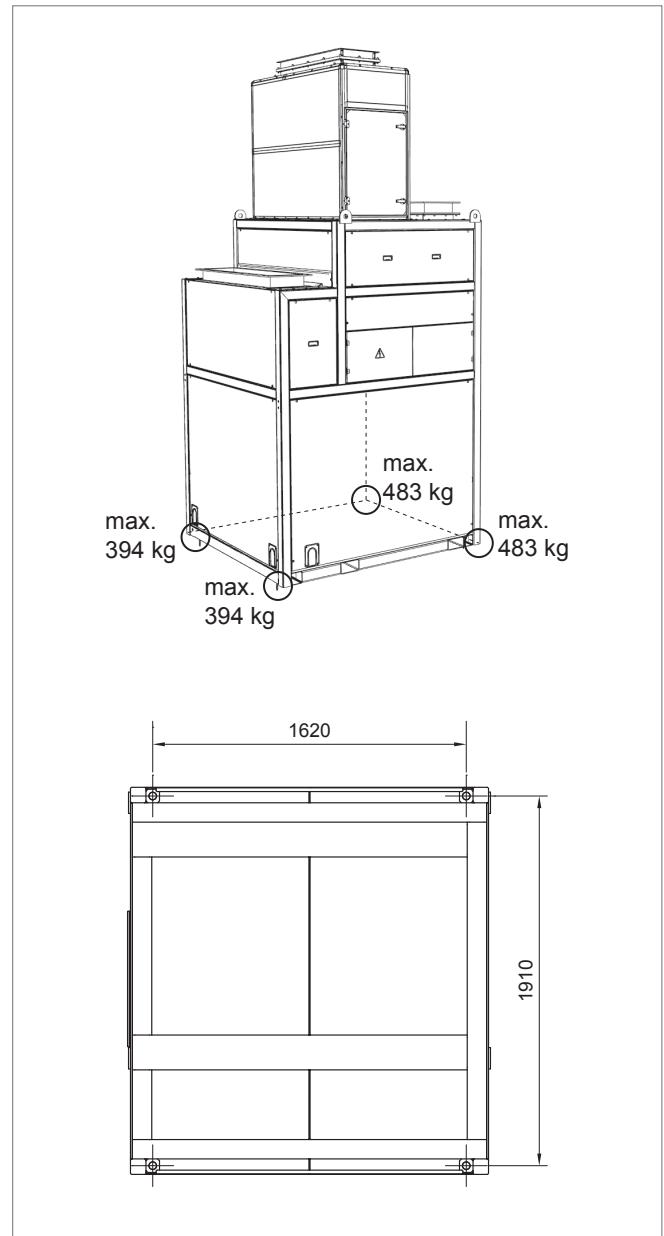
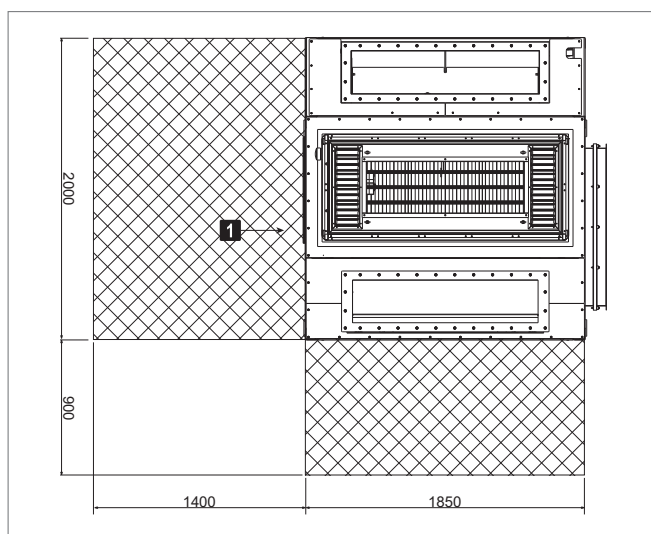


Fig. E2: Load distribution



1 Control box

Fig. E1: Space requirements for maintenance and servicing (dimensions in mm)

1.2 Connecting the air ducts

- The extract air and exhaust air duct is designed according to plant-specific conditions:
 - In plants with an upstream oil/emulsion separator or with minimal quantity lubrication (MQL), the ducts must have an oil-tight design.
 - In plants with an upstream dry filter or wet separator, the ducts must be designed in galvanised sheet steel.
- The unit must not be subjected to the weight of the ducts. Suspend the ducts from the ceiling or support them on the floor.
- Connect the air ducts via the compensators so they are free of tension and vibrations.
- Insulate the fresh air and exhaust air duct, including the compensator, right up to the point where it leaves the building (30 mm with heat transfer coefficient $\lambda = 0.04 \text{ W/mK}$).
- Arrange the fresh air suction and the exhaust air outlet via the roof in the opposite direction to prevent a short circuit.

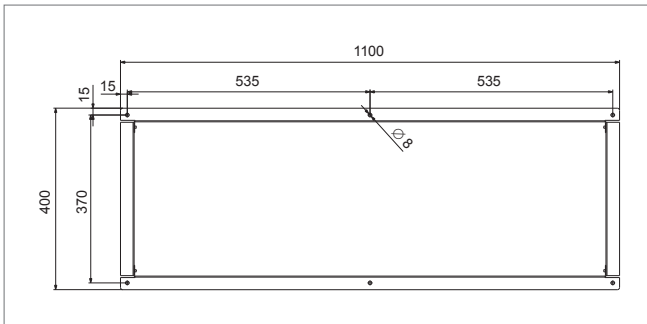


Fig. E3: Dimensional drawing for fresh air and supply air duct (dimensions in mm)

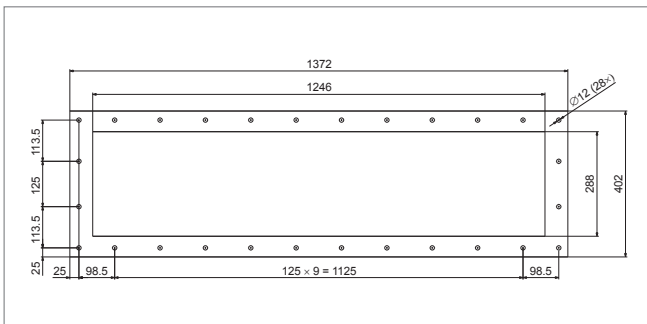


Fig. E4: Dimensional drawing for extract air and exhaust air duct (dimensions in mm)

2 Hydraulic installation

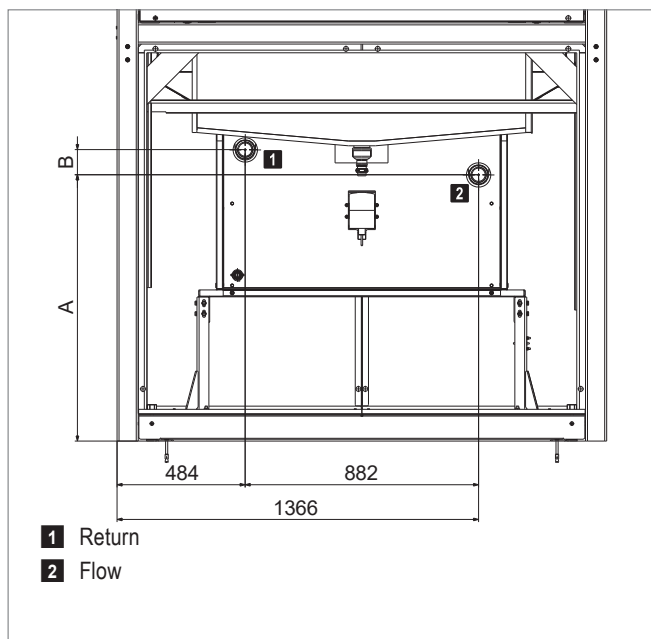
2.1 Heating/cooling coil

- Warm or hot water up to a max. temperature of 120 °C can be used as a heating medium.
- Connect the heating/cooling coil in accordance with the hydraulic diagram.
- Depending on local conditions, check whether compensators for linear expansion are required for the supply and return lines and/or articulated connections are required for the units.
- Insulate the hydraulic lines.
- Hydraulically balance the pipework for the individual units within a control zone to ensure even distribution.
- Do not fasten any loads to the coil, e.g. by means of the flow or return lines.
- The condensate separator in cooling units only functions while the fan is running. No coolant must be allowed to circulate in the heating/cooling coil when the unit is switched off.



Notice

Use the options 'Hydraulic assembly' and '4-pipe switching' options for quick and easy hydraulic installation.



Dimension	PVH-10ABC	PVC-10C	PVC-10D
A	1015	1015	1006
B	78	78	95
Flow/return connection	1½" (internal)	1½" (internal)	2" (internal)

Fig. E5: Dimensional drawing for hydraulic connections (dimensions in mm)

2.2 Condensate connection

Condensate arising in the plate heat exchanger and possibly in the cooling section must be removed via a condensate line.

- Adequately size the slope and cross section of the condensate line to prevent a condensate backwash.
- Make sure that the condensate can drain off freely.
- Depending on the specific application, the condensate may contain residue of oil, emulsions and cooling lubricants. Ensure that the condensate is disposed of or recycled in accordance with local regulations.

Nominal sizes	
Plate heat exchanger condensate connection	2"
Cooling section condensate connection	¾"

Table E1: Nominal sizes of the condensate connections

To prevent air escaping via the condensate line, the line must be connected via a trap (pipe trap or hose trap). The height of the trap depends on the maximum overpressure of the extract air purification plant fan (p_{max}):

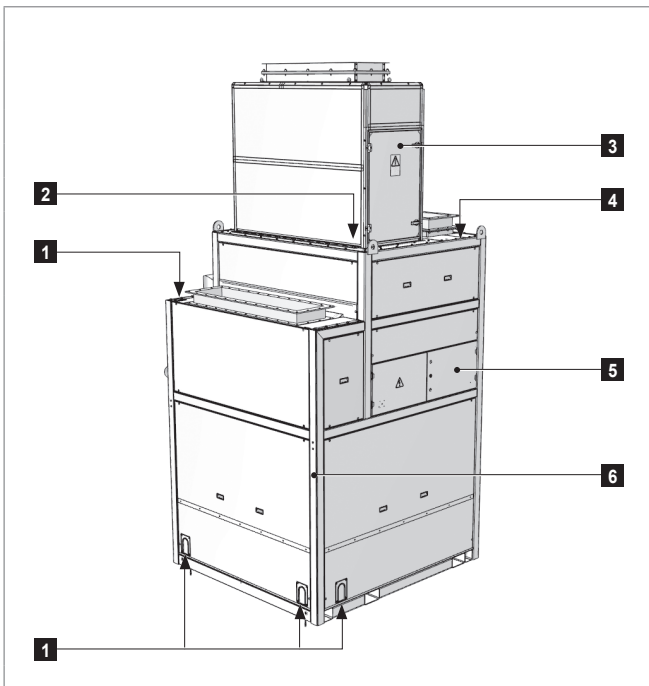
Pipe trap	
	<p>Example:</p> $p_{max} = 1000 \text{ Pa}$ $H = 0.1 \cdot 1000 = 100 \text{ mm}$ $H_u = 100 + 75 = 175 \text{ mm}$
$H = 0.1 \cdot p_{max}$ $H_u = H + 75$	
Hose trap	
	<p>Example:</p> $p_{max} = 1000 \text{ Pa}$ $BR = 0.1 \cdot 1000 + 25 = 125 \text{ mm}$ $H_u = 0.2 \cdot 1000 + 150 = 350 \text{ mm}$
$BR = 0.1 \cdot p_{max} + 25$ $H_u = 0.2 \cdot p_{max} + 150$	
Legend: p_{max} = Fan overpressure in Pa BR = Bending radius of the hose in mm (depending on the hose used)	

Table E2: Calculation of the effective height for the trap

- Connect the trap directly at the condensate connection.
- Fill the trap with water before commissioning, after each cleaning operation and after an extended downtime.

3 Electrical installation

- Observe all relevant regulations (e.g. EN 60204-1).
- For long supply lines, select cable cross-sections in accordance with the technical regulations.
- Electrical installation to be carried out according to wiring diagram.
- Route the cables for the control systems separately from mains cables.
- Establish the plug-in connection between the base unit and the fresh air module (see Fig. E6):
- Open the fresh air access door.
- Establish plug-in connections as shown in the wiring diagram.
- The room air and the fresh air temperature sensor are supplied loose in the control box. Install the temperature sensors at a suitable location and wire them to the plug-in connections on the unit.
- Connect the unit frame with the foundation earth electrode and label it with an earthing label.
- Secure all connections against working loose.



- | | |
|---|--|
| 1 | Cable feedthroughs ¹⁾ |
| 2 | Plug-in connection, base unit – fresh air module |
| 3 | Fresh air access door |
| 4 | Plug-in connections, temperature sensors |
| 5 | Control box |
| 6 | Equipotential bonding on the unit frame |

1) On the unit design with a displacement flow diffuser, no cable feedthroughs are provided at the bottom near to the floor.

Fig. E6: Electrical installation

Designation	Reference	Voltage	Cable	Comments
Power supply		3 × 400 VAC	5 × 4.0 mm ²	
Connection extract air purification	External signals			
	Operating signal, extract air purification 1		2 × 1.0 mm ²	
	Operating signal, extract air purification 2		2 × 1.0 mm ²	
	Operating signal, extract air purification 3		2 × 1.0 mm ²	
	Operating signal, extract air purification 4		2 × 1.0 mm ²	
	Enable, extract air purification 1	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
	Enable, extract air purification 2	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
	Enable, extract air purification 3	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
	Enable, extract air purification 4	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
	Emergency stop, extract air purification		2 × 1.0 mm ²	
	Collective alarm, extract air purification		2 × 1.0 mm ²	
Enable heating	PVH/PVC	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
Enable cooling	PVC	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
Heating/cooling changeover	PVC	Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
Mixing valve	PVH/PVC with field-supplied mixing valve	24 VDC	4 × 0.75 mm ²	With 'Hydraulic assembly' option installed and prewired in the unit
Fresh air temperature sensor			2 × 0.5 mm ²	Plug supplied
Room temperature sensor			2 × 0.5 mm ²	Plug supplied
Control of external extract air system		Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
Options				
Room temperature averaging			3 × 0.5 mm ²	Plug supplied
4-pipe switching, only electrical components	Changeover valve, heating flow	24 VDC	3 × 0.75 mm ²	Power supply
			6 × 0.75 mm ²	Control line
	Changeover valve, heating return	24 VDC	3 × 0.75 mm ²	Power supply
			6 × 0.75 mm ²	Control line
	Changeover valve, cooling flow	24 VDC	3 × 0.75 mm ²	Power supply
			6 × 0.75 mm ²	Control line
	Changeover valve, cooling return	24 VDC	3 × 0.75 mm ²	Power supply
			6 × 0.75 mm ²	Control line
Pump in the load circuit (injection system)	230 VAC	4 × 1.5 mm ²	Power supply	
	24 VDC	4 × 0.5 mm ²	Control line	
Control of supply air damper		24 VDC	4 × 0.75 mm ²	
Control of exhaust air damper		24 VDC	4 × 0.75 mm ²	
Collective alarm		Volt-free	3 × 1.5 mm ²	max. 6 A, 250 V, 1500 VA
Fire alarm		Volt-free	2 × 1.0 mm ²	max. 6 A, 250 V, 1500 VA
BMS integration			CAT5e RJ45	System bus

Table E3: Cable list for on-site connections



System design

1 Location of the temperature sensors 56

2 Maintenance schedule 56

3 General checklist. 56



F

1 Location of the temperature sensors

1.1 Room temperature sensor

Install the sensor at a height of about 1.5 m at a representative location in the occupied area. The measured values must not be distorted by the presence of sources of heat or cold (machines, direct sunlight, windows, doors, etc.). Normally, there is 1 room air sensor for each control zone. It is also possible to install 4 sensors to determine the average temperature value.

1.2 Fresh air temperature sensor

Install the sensor at least 3 m above the ground on a north-facing wall, so that it is protected from direct sunlight. Provide additional cover for the sensor and thermally insulate it from the building. Only 1 fresh air sensor is needed per control zone.

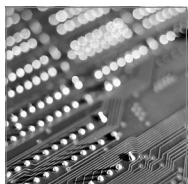
2 Maintenance schedule

Activity	Interval
Changing the filter	When the 'Filter' alarm is displayed, at least annually
Cleaning the plate heat exchanger and condensate drip tray	When the 'PHE dirty' alarm is displayed
Visually check the heating/cooling coil for dirt build-up and clean if necessary (PVH and PVC unit types only)	Every 3 months
Clean the return pump station (option)	Every 3 months
Comprehensive functional check and cleaning of the unit	Annually by the manufacturer's customer service technicians

Table F1: Maintenance schedule

3 General checklist

- Does the installation surface have sufficient load-bearing capacity?
- Is the available fan pressure sufficient to compensate for pressure drops in the duct network?
- Is there enough space to carry out maintenance and servicing work? Are the access doors accessible without obstacles?
- Are there any installation obstacles in the hall, such as craneways, false ceilings or similar?
- Does the air quantity balance in the hall – that is, between the extract air purification plant and the ventilation system – need to be equalised?
- Are the application limits complied with?
- Does the extract air contain corrosive media?
- Which heating/cooling medium is being used?
- Are unit options required?
- Are control system options required?
- How are the control zones subdivided?
- Where should the control panel, which contains the operating options, be positioned?
- Do the units need to be connected to a central building management system?

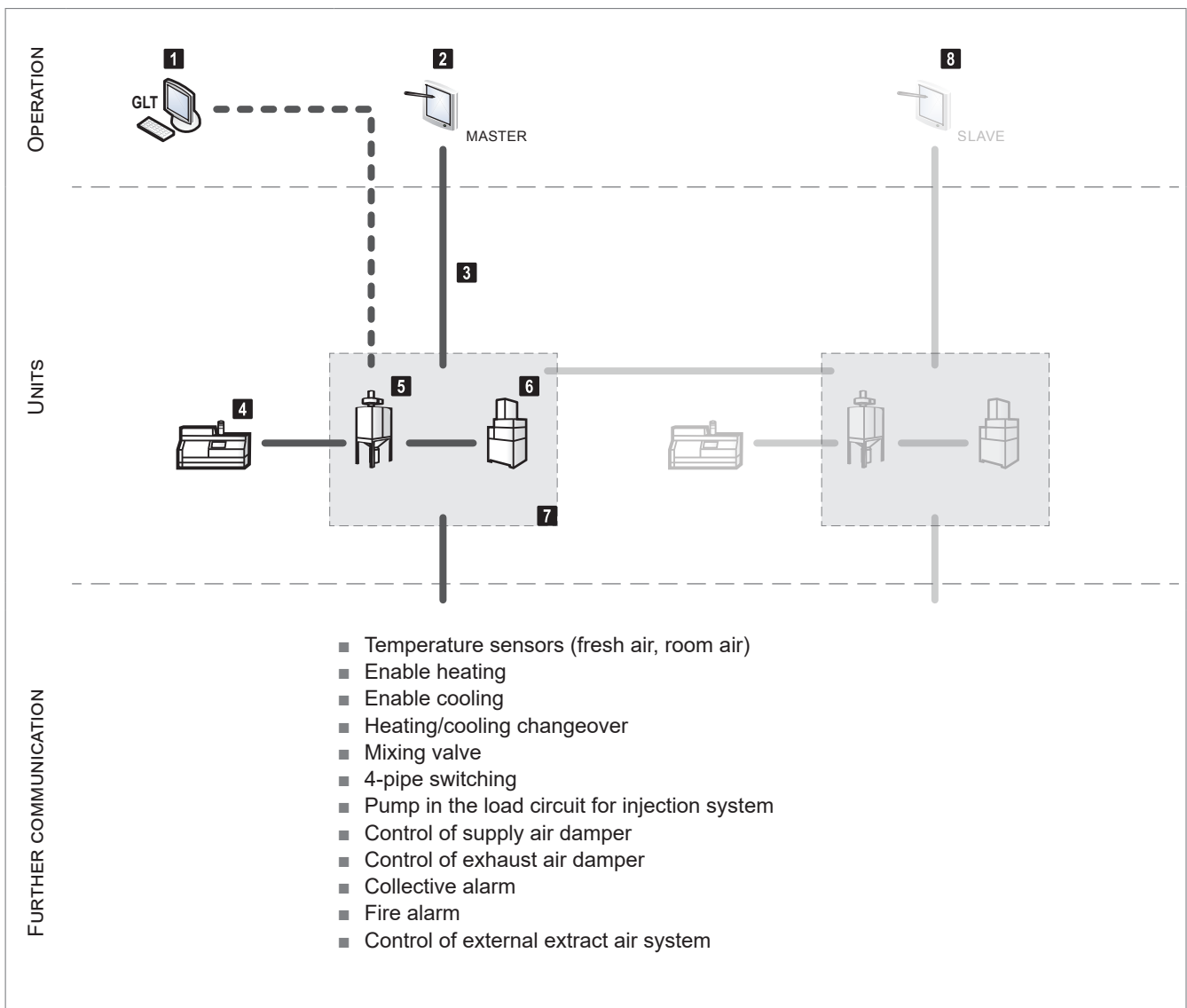


Control system

- 1 ProcessNet system set-up 58
- 2 Control functions. 61
- 3 Safety functions 61
- 4 Alarms and monitoring 62
- 5 BMS parameter list 63

1 ProcessNet system set-up

The Hoval ProcessNet control system regulates and controls the overall plant automatically and ensures that all components are operated in an energy-efficient manner according to need. It is set up as a decentralised I/O system.



- | | |
|---|--|
| 1 Building management system (optional) | 5 Extract air purification plant |
| 2 ProcessMaster operator terminal | 6 ProcessVent |
| 3 System bus | 7 Overall system, extract air purification and indoor climate control |
| 4 Machines (machine tool, welding plant) | 8 Further plants |

Fig. G1: ProcessNet system set-up

1.1 Basic principles

Overall system, extract air purification and indoor climate control
A control module is installed in every ProcessVent to allow for autonomous and individual control. This module communicates with the assigned extract air purification plant, forming an overall system with said plant. The operating mode for this overall system is defined via the time programme or by the building management system. The actual operating state also depends on whether the extracting machines are operational or shut down.

Connection via external signals (IO)
One or more (max. 4) extract air purification plants are connected to the unit via external signals. The fresh air quantity of the ProcessVent unit depends on the extract air volume flow of the individual plants. Where several plants are operated in parallel, the values are added up accordingly.

- Visualisation via building management system or touch-panel on the unit

Digital inputs	<ul style="list-style-type: none"> ■ Operating signal, extract air purification plant 1 – 4 ■ Emergency stop, extract air purification plant ■ Collective alarm
Digital outputs	<ul style="list-style-type: none"> ■ Enabling, extract air purification plant 1 – 4

Table G1: Digital inputs and outputs with connection via external signals

Zone formation
In plants with several such overall systems, control zones are formed according to the master-slave concept.

- The master defines the current set values for room control.
- The slaves adopt the set values which apply to them, depending on their current operating mode. Therefore, they continue to work autonomously, according to the extracting machines and the time programme or the building management system.

Power supply
The power supply for the unit is integrated in the control box (with safety relay).

1.2 Operation

ProcessMaster operator terminal
The ProcessMaster operator terminal is a touch panel with a colour display, making it simple and clear to operate the system. It gives trained users access to all necessary information and settings:

- Display and setting of operating modes
- Display of temperatures and setting of the room temperature set values
- Display and program the time programme and the calendar
- Display and handling of alarms
- Display and setting of control parameters

The ProcessMaster is installed in the door of the control box.

Integration into the building management system (BMS)
ProcessNet can be easily integrated into the building management system via an integrated interface. Data is exchanged via Profinet with the following data blocks:

- DB320 (receive)
- DB321 (send)

You will find a full parameter list in section 5.

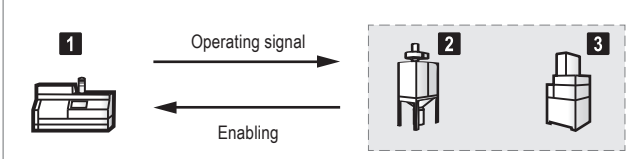
1.3 Control mode

3 different control modes are available in ProcessNet:

Auto BMS	The building management system defines the operating mode; it also depends on the operating states of the machines.
AUTO TIME PROGRAMME	The time programme defines the operating mode; it also depends on the operating states of the machines.
LOCAL	The user defines the operating mode manually; it is not overridden by the machines (e.g. during maintenance). The machines and the extract air purification plant are usually shut down.

The required control mode is selected on the ProcessMaster.

Operating modes in control mode Auto BMS and in control mode AUTO TIME PROGRAMME

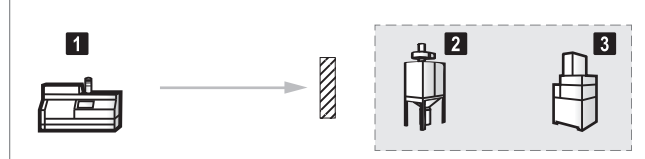


1	Operating mode specification	2	3	
On	VE	On	VE	Ventilation
	SA	On	VE	Ventilation
	REC	On	VE	Ventilation
	RECN	On	VE	Ventilation
	NCS	On	VE	Ventilation
Off	VE	Off	OFF	Off
	SA	Off	SA	Supply air
	REC	Off	REC	Recirculation
	RECN	Off	RECN	Recirculation night
	NCS	Off	NCS	Night cooling summer

Legend: **1** Operating state of the machine
2 Operating state of the extract air purification plant
3 Operating state of ProcessVent

Table G2: Operating states of the extract air purification plant and the ProcessVent in control mode Auto BMS and control mode AUTO TIME PROGRAMME

Operating modes in control mode LOCAL



1	Operating mode specification	2	3	
Off	VE	Off	VE	Ventilation
	SA	Off	SA	Supply air
	REC	Off	REC	Recirculation
	RECN	Off	RECN	Recirculation night
	NCS	Off	NCS	Night cooling summer
	OFF	Off	OFF	Off

Legend: **1** Operating state of the machine
2 Operating state of the extract air purification plant
3 Operating state of ProcessVent

Table G3: Operating states of the extract air purification plant and the ProcessVent in control mode LOCAL

2 Control functions

2.1 Room temperature control in fresh air operation

The room temperature can be controlled in 2 different ways in fresh air operation, that is, in the ventilation (VE) and supply air (SA) operating modes. The control strategy can be selected via the software:

- **Room air/supply air cascade control:**
A set value is defined for the room temperature. Dependent on the actual value of the room temperature and the current control deviation, the PI controller defines a set value for the supply air temperature.
- **Supply air temperature control:**
A set value is defined for the supply air temperature. The supply air temperature is regulated to this set value; the room temperature is not taken into account here.

To reach the set value, ProcessNet controls the components in the following order:

- The ER damper is opened.
- The heating or cooling mixing valve is opened.
- The supply air volume flow is reduced to an adjustable minimum volume flow.

2.2 Room temperature control in recirculation operation

In recirculation operation – that is, in the REC (recirculation) and RECn (recirculation night) operating modes – ProcessNet controls the room temperature via the patented TempTronic algorithm; this ensures that heating and/or cooling is performed in the most cost-effective manner possible.

A set value is defined for the room temperature. The air is blown into the room at the maximum permitted supply air temperature in heating operation or at the minimum permitted supply air temperature in cooling operation. The supply air volume flow is controlled dependent on the actual value of the room temperature and the current control deviation.

2.3 Control of the supply air volume flow

The supply air volume flow is controlled and thus adapted to the extract air volume flow. The set value (= nominal volume flow) is defined via the ProcessMaster or the building management system.

3 Safety functions

3.1 Soft start

The soft start function prevents the coil from freezing when switching from recirculation to extract air operation. The coil is preheated and the fresh air damper is initially opened only as much as is necessary for the mixed air temperature to be in the frost-free range. Only once the supply air temperature has reached the set value is the fresh air damper opened fully.

3.2 Defrost switch

When fresh air temperatures are very low, condensate in the extract air may freeze. To protect against icing up, the pressure drop in the plate heat exchanger is monitored. If this becomes too large, the unit switches to defrost operation automatically:

- **ProcessVent heat/cool:** The fresh air flows through the bypass. The warm extract air defrosts the exchanger.
- **ProcessVent:** The unit switches to recirculation operation.

3.3 Frost protection switch

- If the supply air temperature drops below a defined value (6 K above the set frost protection temperature), the heating mixing valve is opened continuously.
- If the supply air temperature drops below the frost protection temperature, the frost alarm is displayed and the device switches off.

The frost protection temperature can be regulated.

3.4 Fan follow-on

The fan follow-on is used to cool the coil down or dry it out when heating or cooling operation is being switched off. The required time is defined via the ProcessMaster.



Notice

To avoid underpressure or overpressure arising in the building, set the overrun time for the extract air fan of the extract air purification plant to the same value.

3.5 Control of external extract air system

In the operating modes 'Supply air' and 'Night cooling summer' fresh air is supplied to the hall but no extract air is removed. To avoid overpressure in the building, ProcessNet provides a signal for controlling an external extract air system (e.g. extract air fan, damper, window).

4 Alarms and monitoring

The Hoval ProcessNet monitors itself. All alarms are entered in the alarm list and displayed on the operator terminal. Priority A alarms are also displayed via a collective alarm indicator installed on site as required.

Alarm	Priority	Cause	System reaction ¹⁾	Troubleshooting
Fire alarm	A	Signal for fire alarm active	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Check external fire alarm signal.
Emergency stop, extract air purification	A	Emergency stop signal for extract air purification plant active	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Check extract air purification, switch off emergency stop if required.
Communication fault, extract air purification	A	Communication between extract air purification and ProcessVent interrupted or faulty	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Call customer service.
Fault accessing analogue input module	A	Internal PLC fault	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Call customer service.
Fault accessing analogue output module	A	Internal PLC fault	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Call customer service.
Fan 1 not ready	A	Fan 1 defective or control faulty	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Call customer service.
Fan 2 not ready	A	Fan 2 defective or control faulty		
Plate heat exchanger soiled (plant off)	A	Differential pressure of the plate heat exchanger too high for an extended period	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Clean the plate heat exchanger.
Coil frost alarm	A	Supply air temperature lower than frost protection temperature	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. ■ The mixing valve opens 100%. 	Call customer service.
Maximum supply air temperature exceeded	A	Current supply air temperature higher than maximum permitted supply air temperature	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Call customer service.
Supply air sensor (incorrect parameter settings)	A	Supply air sensor defective	<ul style="list-style-type: none"> ■ The fresh air damper closes. ■ The unit switches off. 	Call customer service.
Supply air sensor (cable break/short circuit)	A			
Supply air sensor (outside measuring range)	A			

¹⁾ If ProcessNet is also controlling on-site supply air or exhaust air dampers, these are closed too.

Table G4: Alarm list

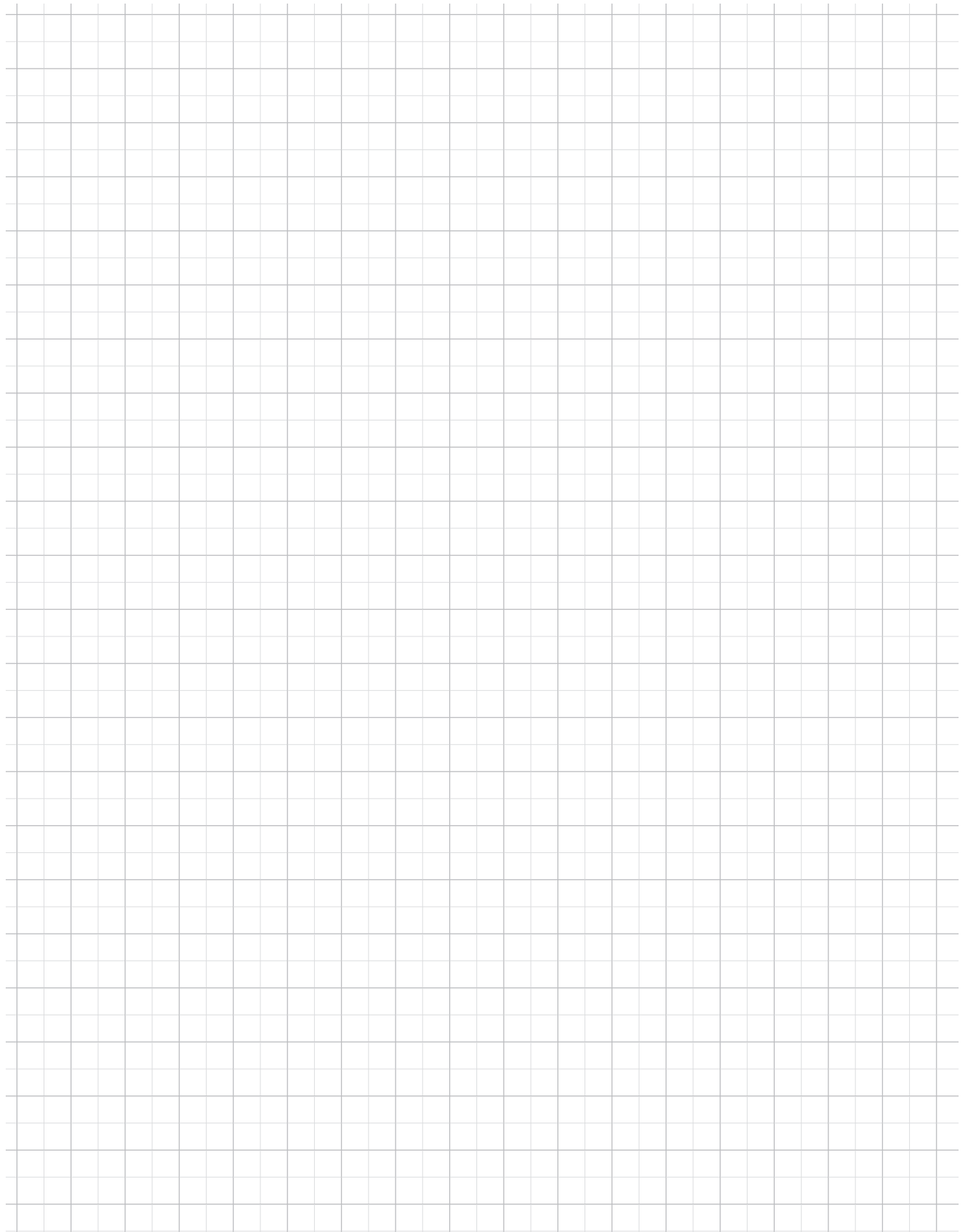
5 BMS parameter list

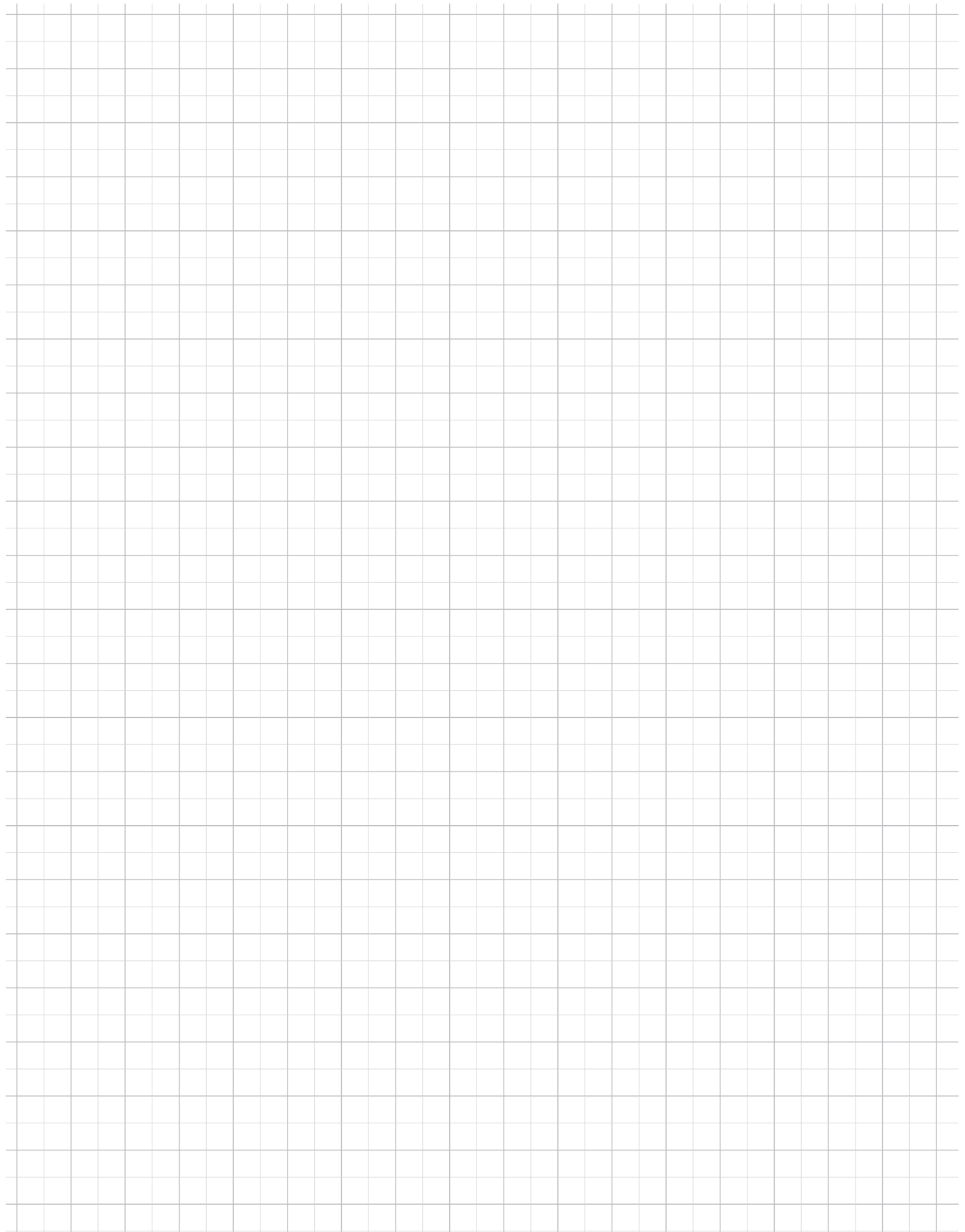
Address	Offset	Symbol name	Type	Default	Lower limit	Upper limit	Unit	Comment
GLT_Rcv (DB 320)								
Communication								
0,0		GLT_Rcv.LifeBit	BOOL	FALSE				Communication monitoring: life bit from BMS
Operating modes								
2,0		GLT_Rcv.OpMode.CurrentMode	INT	1	1	5		Operating mode (1 = VE; 2 = REC; 3 = RECN; 4 = SA; 5 = NCS)
Control strategy								
4,0		GLT_Rcv.TempCtrlStrategy	BOOL	FALSE				Temperature control strategy (0 = supply air temp. control; 1 = room air/supply air cascade control)
Set values								
6,0		GLT_Rcv.SP.RoomTempDay	REAL	18	5	40	°C	Set value, room temperature day: ventilation (VE), recirculation (REC), supply air (SA)
10,0		GLT_Rcv.SP.RoomTempNight	REAL	16	5	40	°C	Set value, room temperature night: recirculation night (RECN), night cooling summer (NCS)
14,0		GLT_Rcv.SP.SupplyAirTemp	REAL	19	5	40	°C	Set value, supply air temperature: ventilation (VE), supply air (SA)
External value specifications								
18,0		GLT_Rcv.External.TempFreshAir	REAL	-60	-50	100	°C	External value, fresh air temperature
22,0		GLT_Rcv.External.TempRoom	REAL	-60	-50	100	°C	External value, room temperature
26,0		GLT_Rcv.External.MediumIndication	BOOL	FALSE				External value, heating/cooling switch-over (0 = heating; 1 = cooling)
GLT_Send (DB 321)								
Communication								
0,0	0,0	GLT_Send.LifeBit	BOOL	FALSE				Communication monitoring: toggling life bit to BMS (BMS writes back bit 1:1)
Operating mode selector								
2,0	0,0	GLT_Send.OpMode.Selector	INT	0	0	2		Operating mode selector, control mode (0 = Local; 1 = Auto time programme; 2 = Auto BMS)
Operating modes								
4,0	0,0	GLT_Send.OpMode.CurrentMode	INT	0	0	9		Current operating mode (0 = OFF; 1 = VE; 2 = REC; 3 = RECN; 4 = SA; 5 = NCS)
Operating status, extract air purification								
6,0	0,0	GLT_Send.SeparatorRun	BOOL	FALSE				Current operating status, extract air purification (0 = not active; 1 = active)
Collective alarm								
8,0	0,0	GLT_Send.CollectiveAlarm.PrioA	BOOL	FALSE				Collective alarm, priority A (0 = no alarm; 1 = alarm active) → plant stops running
8,1	0,1	GLT_Send.CollectiveAlarm.PrioB	BOOL	FALSE				Collective alarm, priority B (0 = no alarm; 1 = alarm active) → plant continues to run
Control strategy								
10,0	0,0	GLT_Send.TempCtrlStrategy	BOOL	FALSE				Temperature control strategy (0 = supply air temp. control; 1 = room air/supply air cascade control)
Set values								
12,0	0,0	GLT_Send.SP.RoomTempDay	REAL	18	5	40	°C	Set value, room temperature day: ventilation (VE), recirculation (REC), supply air (SA)
16,0	4,0	GLT_Send.SP.RoomTempNight	REAL	16	5	40	°C	Set value, room temperature night: recirculation night (RECN), night cooling summer (NCS)
20,0	8,0	GLT_Send.SP.SupplyAirTemp	REAL	19	5	40	°C	Set value, supply air temperature: ventilation (VE), supply air (SA)
Actual values								
24,0	0,0	GLT_Send.PV.TempSupplyAir	REAL	0	-60	250	°C	Actual value, supply air temperature
28,0	4,0	GLT_Send.PV.TempFreshAir	REAL	0	-60	250	°C	Actual value, fresh air temperature

Address	Offset	Symbol name	Type	Default	Lower limit	Upper limit	Unit	Comment
32,0	8,0	GLT_Send.PV.TempExhaustAir	REAL	0	-60	250	°C	Actual value, extract air temperature
36,0	12,0	GLT_Send.PV.TempRoom	REAL	0	-60	250	°C	Actual value room temperature
40,0	16,0	GLT_Send.PV.SupplyAir	REAL	0	0	Max.	m³/h	Actual value, supply air volume flow
44,0	20,0	GLT_Send.PV.DamperPosOutsideAir	REAL	0	0	100	%	Actual value, fresh air damper position
48,0	24,0	GLT_Send.PV.DamperPosRecirculationAir	REAL	0	0	100	%	Actual value, recirculation damper position
52,0	28,0	GLT_Send.PV.DamperPosERG	REAL	0	0	100	%	Actual value, ER damper position
56,0	32,0	GLT_Send.PV.DamperPosBypass	REAL	0	0	100	%	Actual value, bypass damper position
60,0	36,0	GLT_Send.PV.ValvePosRegister	REAL	0	0	100	%	Actual value, mixing valve
64,0	40,0	GLT_Send.PV.DemandHeating	BOOL	FALSE				Actual value, enable heating (0 = no heat demand; 1 = heat demand)
64,1	40,1	GLT_Send.PV.DemandCooling	BOOL	FALSE				Actual value, enable cooling (0 = no cool demand; 1 = cool demand)
64,2	40,2	GLT_Send.PV.MediumIndication	BOOL	FALSE				Actual value, heating/cooling switch-over (0 = heating; 1 = cooling)
64,3	40,3	GLT_Send.PV.DemandExtractAirSystem	BOOL	FALSE				Actual value, external extract air system demand (0 = no demand; 1 = demand active)
Energy monitoring								
66,0	0,0	GLT_Send.Monitoring.HeatFlow	REAL	0			kW	Current heat flow
70,0	4,0	GLT_Send.Monitoring.CoolFlow	REAL	0			kW	Current cool flow
74,0	8,0	GLT_Send.Monitoring.HeatEnergy	REAL	0			kWh	Energy savings, heating
78,0	12,0	GLT_Send.Monitoring.CoolEnergy	REAL	0			kWh	Energy savings, cooling
External value specifications								
82,0	0,0	GLT_Send.External.TempFreshAir	REAL	20	-50	100	°C	External value, fresh air temperature
86,0	4,0	GLT_Send.External.TempRoom	REAL	20	-50	100	°C	External value, room temperature
90,0	8,0	GLT_Send.External.MediumIndication	BOOL	FALSE				External value, heating/cooling switch-over (0 = heating; 1 = cooling)
Switch-over value specifications								
92,0	0,0	GLT_Send.SourceSelection.TempFreshAir	BOOL	FALSE				Fresh air temperature switch-over (0 = internal sensor; 1 = external specification)
92,1	0,1	GLT_Send.SourceSelection.TempRoom	BOOL	FALSE				Room temperature switch-over (0 = internal sensor; 1 = external specification)
92,2	0,2	GLT_Send.SourceSelection.MediumIndication	BOOL	FALSE				Heating/cooling switch-over (0 = internal sensor; 1 = external specification)
ALM_UM								
ALM_UM.ALM_General								
100,0	0,0	ALM_UM.ALM_General.Alm[0]	BOOL	0		No. 9	Pr.A	A009: Fire alarm
	0,1	ALM_UM.ALM_General.Alm[1]	BOOL	0		No. 10	Pr.A	A010: Emergency stop, extract air purification
	0,2	ALM_UM.ALM_General.Alm[2]	BOOL	0		No. 11	Pr.A	A011: Communication fault, extract air purification (life bit fault)
	0,3	ALM_UM.ALM_General.Alm[3]	BOOL	0		No. 12	Pr.A	A012: Fault accessing analogue input module
	0,4	ALM_UM.ALM_General.Alm[4]	BOOL	0		No. 13	Pr.A	A013: Fault accessing analogue output module
	1,0	ALM_UM.ALM_General.Alm[8]	BOOL	0		No. 1	Pr.B	B001: Communication fault, BMS (life bit fault)
	1,1	ALM_UM.ALM_General.Alm[9]	BOOL	0		No. 2	Pr.B	B002: Actual value from BMS, fresh air temperature, limit value fault
	1,2	ALM_UM.ALM_General.Alm[10]	BOOL	0		No. 3	Pr.B	B003: Actual value from BMS, room temperature, limit value fault
	2,0	ALM_UM.ALM_General.Alm[16]	BOOL	0		No. 25	Pr.B	B025: Master/slave zone: communication fault alarm
	2,1	ALM_UM.ALM_General.Alm[17]	BOOL	0		No. 26	Pr.B	B026: Master/slave zone: no data received alarm
	2,4	ALM_UM.ALM_General.Alm[20]	BOOL	0		No. 29	Pr.B	B029: Master/slave fresh air temperature: communication fault alarm

Address	Offset	Symbol name	Type	Default	Lower limit	Upper limit	Unit	Comment
	2,5	ALM_UM.ALM_General.Alm[21]	BOOL	0		No. 30	Pr.B	B030: Master/slave fresh air temperature: no data received alarm
	3,0	ALM_UM.ALM_General.Alm[24]	BOOL	0		No. 17	Pr.B	B017: Master/slave room temperature: communication fault alarm
	3,1	ALM_UM.ALM_General.Alm[25]	BOOL	0		No. 18	Pr.B	B018: Master/slave room temperature: no data received alarm
	3,4	ALM_UM.ALM_General.Alm[28]	BOOL	0		No. 21	Pr.B	B021: Return pump station water: motor circuit breaker
	3,5	ALM_UM.ALM_General.Alm[29]	BOOL	0		No. 22	Pr.B	B022: Return pump station water: max. level does not decrease
	3,6	ALM_UM.ALM_General.Alm[30]	BOOL	0		No. 23	Pr.B	B023: Return pump station oil: motor circuit breaker
	3,7	ALM_UM.ALM_General.Alm[31]	BOOL	0		No. 24	Pr.B	B024: Return pump station oil: max. level does not decrease
ALM_UM.ALM_EM_ExtractAirGroup								
104,0	0,0	ALM_UM.ALM_EM_ExtractAirGroup.Alm[0]	BOOL	0		No. 41	Pr.B	B041: Extract air sensor (incorrect parameter settings)
	0,1	ALM_UM.ALM_EM_ExtractAirGroup.Alm[1]	BOOL	0		No. 42	Pr.B	B042: Extract air sensor (cable break/short circuit)
	0,2	ALM_UM.ALM_EM_ExtractAirGroup.Alm[2]	BOOL	0		No. 43	Pr.B	B043: Extract air sensor (outside measuring range)
	1,2	ALM_UM.ALM_EM_ExtractAirGroup.Alm[10]	BOOL	0		No. 35	Pr.B	B035: Exhaust air damper (position is not reached)
	1,3	ALM_UM.ALM_EM_ExtractAirGroup.Alm[11]	BOOL	0		No. 36	Pr.B	B036: Exhaust air damper (incorrect parameter settings)
	1,4	ALM_UM.ALM_EM_ExtractAirGroup.Alm[12]	BOOL	0		No. 37	Pr.B	B037: Exhaust air damper (cable break/short circuit)
	1,5	ALM_UM.ALM_EM_ExtractAirGroup.Alm[13]	BOOL	0		No. 38	Pr.B	B038: Exhaust air damper (outside measuring range)
ALM_UM.ALM_EM_MixingBox								
108,0	0,0	ALM_UM.ALM_EM_MixingBox.Alm[0]	BOOL	0		No. 73	Pr.B	B073: Fresh air sensor (incorrect parameter settings)
	0,1	ALM_UM.ALM_EM_MixingBox.Alm[1]	BOOL	0		No. 74	Pr.B	B074: Fresh air sensor (cable break/short circuit)
	0,2	ALM_UM.ALM_EM_MixingBox.Alm[2]	BOOL	0		No. 75	Pr.B	B075: Fresh air sensor (outside measuring range)
	0,3	ALM_UM.ALM_EM_MixingBox.Alm[3]	BOOL	0		No. 76	Pr.B	B076: Mixed air sensor (incorrect parameter settings)
	0,4	ALM_UM.ALM_EM_MixingBox.Alm[4]	BOOL	0		No. 77	Pr.B	B077: Mixed air sensor (cable break/short circuit)
	0,5	ALM_UM.ALM_EM_MixingBox.Alm[5]	BOOL	0		No. 78	Pr.B	B078: Mixed air sensor (outside measuring range)
	1,2	ALM_UM.ALM_EM_MixingBox.Alm[10]	BOOL	0		No. 67	Pr.B	B067: Fresh air/recirculation damper (position is not reached)
	1,3	ALM_UM.ALM_EM_MixingBox.Alm[11]	BOOL	0		No. 68	Pr.B	B068: Fresh air/recirculation damper (incorrect parameter settings)
	1,4	ALM_UM.ALM_EM_MixingBox.Alm[12]	BOOL	0		No. 69	Pr.B	B069: Fresh air/recirculation damper (cable break/short circuit)
	1,5	ALM_UM.ALM_EM_MixingBox.Alm[13]	BOOL	0		No. 70	Pr.B	B070: Fresh air/recirculation damper (outside measuring range)
ALM_UM.ALM_EM_AirSupply								
112,0	0,0	ALM_UM.ALM_EM_AirSupply.Alm[0]	BOOL	0		No. 105	Pr.B	B105: Volume flow measurement (incorrect parameter settings)
	0,1	ALM_UM.ALM_EM_AirSupply.Alm[1]	BOOL	0		No. 106	Pr.B	B106: Volume flow measurement (cable break/short circuit)
	0,2	ALM_UM.ALM_EM_AirSupply.Alm[2]	BOOL	0		No. 107	Pr.B	B107: Volume flow measurement (outside measuring range)
	1,0	ALM_UM.ALM_EM_AirSupply.Alm[8]	BOOL	0		No. 97	Pr.B	B097: Filter soiled
	1,1	ALM_UM.ALM_EM_AirSupply.Alm[9]	BOOL	0		No. 98	Pr.B	B098: Controller, supply air volume flow set value not reached
	1,2	ALM_UM.ALM_EM_AirSupply.Alm[10]	BOOL	0		No. 99	Pr.A	A099: Fan 1 not ready
	1,3	ALM_UM.ALM_EM_AirSupply.Alm[11]	BOOL	0		No. 100	Pr.A	A100: Fan 2 not ready
	2,0	ALM_UM.ALM_EM_AirSupply.Alm[16]	BOOL	0		No. 121	Pr.B	B121: Supply air damper (position is not reached)
	2,1	ALM_UM.ALM_EM_AirSupply.Alm[17]	BOOL	0		No. 122	Pr.B	B122: Supply air damper (incorrect parameter settings)
	2,2	ALM_UM.ALM_EM_AirSupply.Alm[18]	BOOL	0		No. 123	Pr.B	B123: Supply air damper (cable break/short circuit)
	2,3	ALM_UM.ALM_EM_AirSupply.Alm[19]	BOOL	0		No. 124	Pr.B	B124: Supply air damper (outside measuring range)

Address	Offset	Symbol name	Type	Default	Lower limit	Upper limit	Unit	Comment
ALM_UM.ALM_EM_EnergyRecovery								
116,0	0,0	ALM_UM.ALM_EM_EnergyRecovery.Alm[0]	BOOL	0		No. 137	Pr.B	B137: ER damper (position is not reached)
	0,1	ALM_UM.ALM_EM_EnergyRecovery.Alm[1]	BOOL	0		No. 138	Pr.B	B138: ER damper (incorrect parameter settings)
	0,2	ALM_UM.ALM_EM_EnergyRecovery.Alm[2]	BOOL	0		No. 139	Pr.B	B139: ER damper (cable break/short circuit)
	0,3	ALM_UM.ALM_EM_EnergyRecovery.Alm[3]	BOOL	0		No. 140	Pr.B	B140: ER damper (outside measuring range)
	1,0	ALM_UM.ALM_EM_EnergyRecovery.Alm[8]	BOOL	0		No. 129	Pr.B	B129: Plate heat exchanger soiled (plant running)
	1,1	ALM_UM.ALM_EM_EnergyRecovery.Alm[9]	BOOL	0		No. 130	Pr.A	A130: Plate heat exchanger soiled (plant off)
ALM_UM.ALM_EM_HeatingCoil								
120,0	0,0	ALM_UM.ALM_EM_HeatingCoil.Alm[0]	BOOL	0		No. 169	Pr.B	B169: Mixing valve (position is not reached)
	0,1	ALM_UM.ALM_EM_HeatingCoil.Alm[1]	BOOL	0		No. 170	Pr.B	B170: Mixing valve (incorrect parameter settings)
	0,2	ALM_UM.ALM_EM_HeatingCoil.Alm[2]	BOOL	0		No. 171	Pr.B	B171: Mixing valve (cable break/short circuit)
	0,3	ALM_UM.ALM_EM_HeatingCoil.Alm[3]	BOOL	0		No. 172	Pr.B	B172: Mixing valve (outside measuring range)
	1,0	ALM_UM.ALM_EM_HeatingCoil.Alm[8]	BOOL	0		No. 161	Pr.A	A161: Coil frost alarm
	1,1	ALM_UM.ALM_EM_HeatingCoil.Alm[9]	BOOL	0		No. 162	Pr.B	B162: Coil frost protection
	1,2	ALM_UM.ALM_EM_HeatingCoil.Alm[10]	BOOL	0		No. 163	Pr.B	B163: Heating medium not available
	1,3	ALM_UM.ALM_EM_HeatingCoil.Alm[11]	BOOL	0		No. 164	Pr.B	B164: Cooling medium not available
	1,4	ALM_UM.ALM_EM_HeatingCoil.Alm[12]	BOOL	0		No. 165	Pr.B	B165: Flow valve, heating medium: open return signal missing
	1,5	ALM_UM.ALM_EM_HeatingCoil.Alm[13]	BOOL	0		No. 166	Pr.B	B166: Flow valve, heating medium: closed return signal missing
	1,6	ALM_UM.ALM_EM_HeatingCoil.Alm[14]	BOOL	0		No. 167	Pr.B	B167: Flow valve, heating medium: both position messages simultaneously
	1,7	ALM_UM.ALM_EM_HeatingCoil.Alm[15]	BOOL	0		No. 168	Pr.B	B168: Return valve, heating medium: open return signal missing
	2,0	ALM_UM.ALM_EM_HeatingCoil.Alm[16]	BOOL	0		No. 185	Pr.B	B185: Return valve, heating medium: closed return signal missing
	2,1	ALM_UM.ALM_EM_HeatingCoil.Alm[17]	BOOL	0		No. 186	Pr.B	B186: Return valve, heating medium: both position messages simultaneously
	2,2	ALM_UM.ALM_EM_HeatingCoil.Alm[18]	BOOL	0		No. 187	Pr.B	B187: Flow valve, cooling medium: open return signal missing
	2,3	ALM_UM.ALM_EM_HeatingCoil.Alm[19]	BOOL	0		No. 188	Pr.B	B188: Flow valve, cooling medium: closed return signal missing
	2,4	ALM_UM.ALM_EM_HeatingCoil.Alm[20]	BOOL	0		No. 189	Pr.B	B189: Flow valve, cooling medium: both position messages simultaneously
	2,5	ALM_UM.ALM_EM_HeatingCoil.Alm[21]	BOOL	0		No. 190	Pr.B	B190: Return valve, cooling medium: open return signal missing
	2,6	ALM_UM.ALM_EM_HeatingCoil.Alm[22]	BOOL	0		No. 191	Pr.B	B191: Return valve, cooling medium: closed return signal missing
	2,7	ALM_UM.ALM_EM_HeatingCoil.Alm[23]	BOOL	0		No. 192	Pr.B	B192: Return valve, cooling medium: both position messages simultaneously
ALM_UM.ALM_EM_TempCtrl								
124,0	0,0	ALM_UM.ALM_EM_TempCtrl.Alm[0]	BOOL	0		No. 201	Pr.A	A201: Maximum supply air temperature exceeded
	0,1	ALM_UM.ALM_EM_TempCtrl.Alm[1]	BOOL	0		No. 202	Pr.B	B202: Supply air temperature controller does not reach set value
	1,0	ALM_UM.ALM_EM_TempCtrl.Alm[8]	BOOL	0		No. 193	Pr.B	B193: Supply air sensor (incorrect parameter settings)
	1,1	ALM_UM.ALM_EM_TempCtrl.Alm[9]	BOOL	0		No. 194	Pr.B	B194: Supply air sensor (cable break/short circuit)
	1,2	ALM_UM.ALM_EM_TempCtrl.Alm[10]	BOOL	0		No. 195	Pr.B	B195: Supply air sensor (outside measuring range)
	1,3	ALM_UM.ALM_EM_TempCtrl.Alm[11]	BOOL	0		No. 196	Pr.B	B196: Room air sensor (incorrect parameter settings)
	1,4	ALM_UM.ALM_EM_TempCtrl.Alm[12]	BOOL	0		No. 197	Pr.B	B197: Room air sensor (cable break/short circuit)
	1,5	ALM_UM.ALM_EM_TempCtrl.Alm[13]	BOOL	0		No. 198	Pr.B	B198: Room air sensor (outside measuring range)





Hoval quality. You can count on us.

As a specialist in heating and climate technology, Hoval is your experienced partner for system solutions. For example, you can heat water with the sun's energy and your rooms with oil, gas, wood or a heat pump. Hoval ties together the various technologies and also integrates room ventilation into the system. So you can save energy while looking after the environment and your costs – and still enjoy the same level of comfort.

Hoval is one of the leading international companies for indoor climate solutions. More than 75 years of experience continuously motivate us to design innovative system solutions. We manufacture complete systems for heating, cooling and ventilation to more than 50 countries.

We take our responsibility for the environment seriously. Energy efficiency is at the heart of the heating and ventilation systems we design and develop.

Responsibility for energy and environment

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