HEAT PUMP COMBI UNIT PKOM⁴

PATENT

AUSTRIA

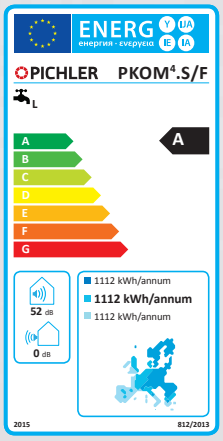
CERTIFIED COMPONENT
Passive House Institute

250 m³/h

1.300 Watt

1.300 Watt

4 – 5 persons



COMFORT VENTILATION

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PICHLER

Systematic ventilation.

Optimum room climate on all 365 days of the year

Residential living will always be changing and developing with the times. Apart from architectural considerations, the total energy balance is of increasing importance. Legislators, ongoing development of building materials and the quality of construction are consistently raising the standard of residential construction, thereby reducing energy consumption. Whether Passive House, EnerPHit or Near Zero Energy Building – ventilation of the living quarters is deemed essential and at the core of modern residential building design. Extension of the functionalities of a ventilation unit to include heating, cooling and hot water supply is a natural consequence!

Product description

One device, 4 benefits:
Ventilating – heating – cooling – hot water
The PKOM⁴ heat pump combi unit unites these four functions on a footprint of less than 0.75 m². Controlled ventilation of living rooms will constantly ensure fresh and filtered outside air in the rooms and ensure hygienic exchange of air. The highly efficient heat recovery system is also optionally available as a design with recovery of waste air humidity. To prevent overly high summer temperatures in the living rooms, heat recovery may also be bypassed during cooler night hours by means of a bypass flap.

We differentiate between 2 versions:
- PKOM⁴ classic: Version with household hot water.
- PKOM⁴ trend: Version without household hot water.

PKOM⁴ classic

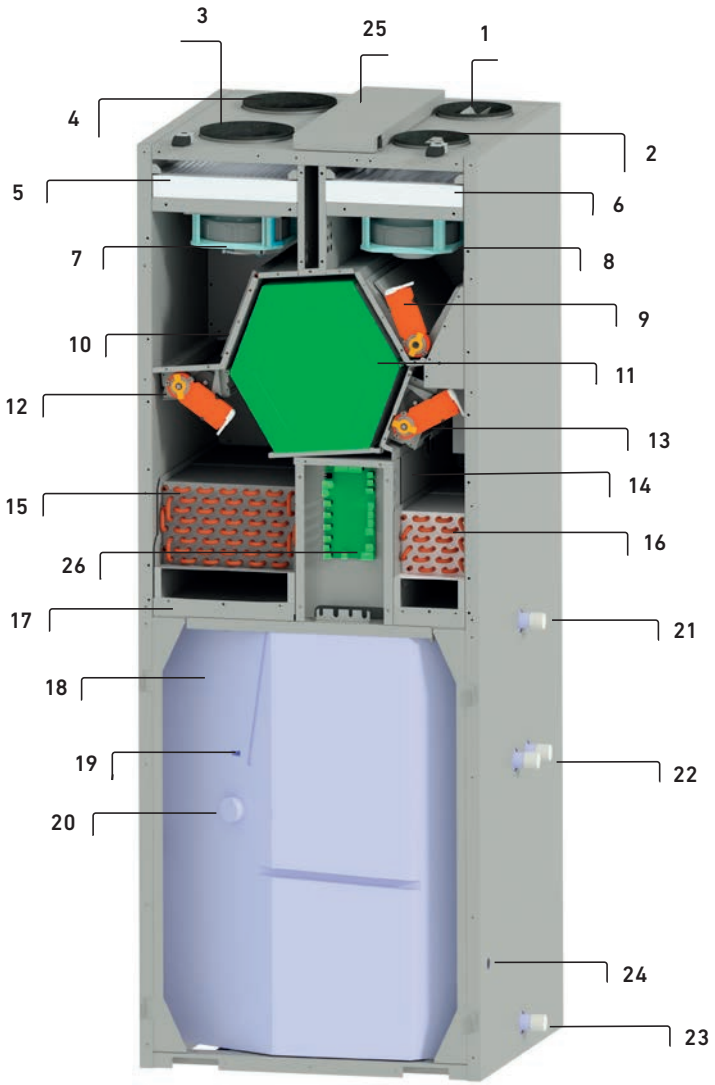
The PKOM⁴ classic heat pump combi unit is the preferred compact overall solution for passive house construction homes with up to 130 m² living area. The volume of household hot water will comfortably provide for a family of 4 – 5.
A controlled heat pump will in addition condition the supply air, i.e. heated or cooled on demand.
Another heat pump is used for efficient provision of household hot water. Both heat pumps may be operated in parallel to ensure uninterrupted provision of air and water.

PKOM⁴ trend

Household hot water storage and the associated heat pump are omitted in the PKOM⁴ trend unit version.
The PKOM⁴ trend heat pump combi unit is the best alternative to conventional living room ventilation units. The supply air into the living rooms will be cooled and dehumidified during summer, as needed.
The supplied air will be heated in the colder months.

Layout sketch

PKOM⁴ CLASSIC (RIGHT-HANDED VERSION)



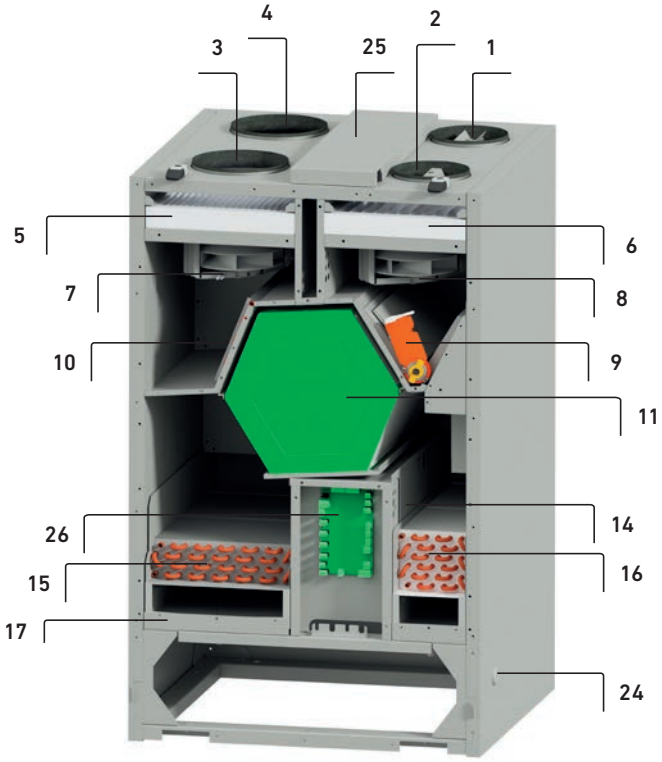
PATENT

REFERRING TO ITEM 15
Patented two-circuit heat pump system

- Allows for especially efficient operation
- Both heat pumps can be operated in parallel
- Due to its large surface, it increases the efficiency of the heat pump in basic operation and increases the Seasonal Performance Factor and the *COP of both the service water and the heat pump
- Allows for especially efficient cooling operation while generating hot water at the same time
- The waste heat that is generated during the cooling operation is recovered for the purpose of heating the service water

*) Coefficient of Performance

PKOM⁴ TREND (RIGHT-HANDED VERSION)



1 Supply air (SUP)
2 Extract air (ETA)
3 Outdoor air (ODA)
4 Exhaust air (EHA)
5 Filter ODA ISO ePM1 55%
6 Filter ETA ISO ePM10 75%
7 Outdoor air fan
8 Extract air fan
9 Bypass flap with servo motor
10 Pre-heater battery for outdoor air
11 Counterflow heat exchanger
12 ODA/EHA flap with servo motor
13 ODA/SUP flap with servo motor
14 Compressor in housing
15 Heat exchanger in exhaust air
16 Heat exchanger in supply air
17 Condensate tray
18 Household hot water tank
19 Sacrificial anode
20 Electrical heating element with thermal cut-out
21 Hot water connection 1“AG
22 Heat exchanger connection 1“AG
23 Cold water connection 1“AG
24 Condensate drain
25 Electrical connection box with main PCB
26 Heat pump PCB

Dimensions

PKOM⁴ CLASSIC

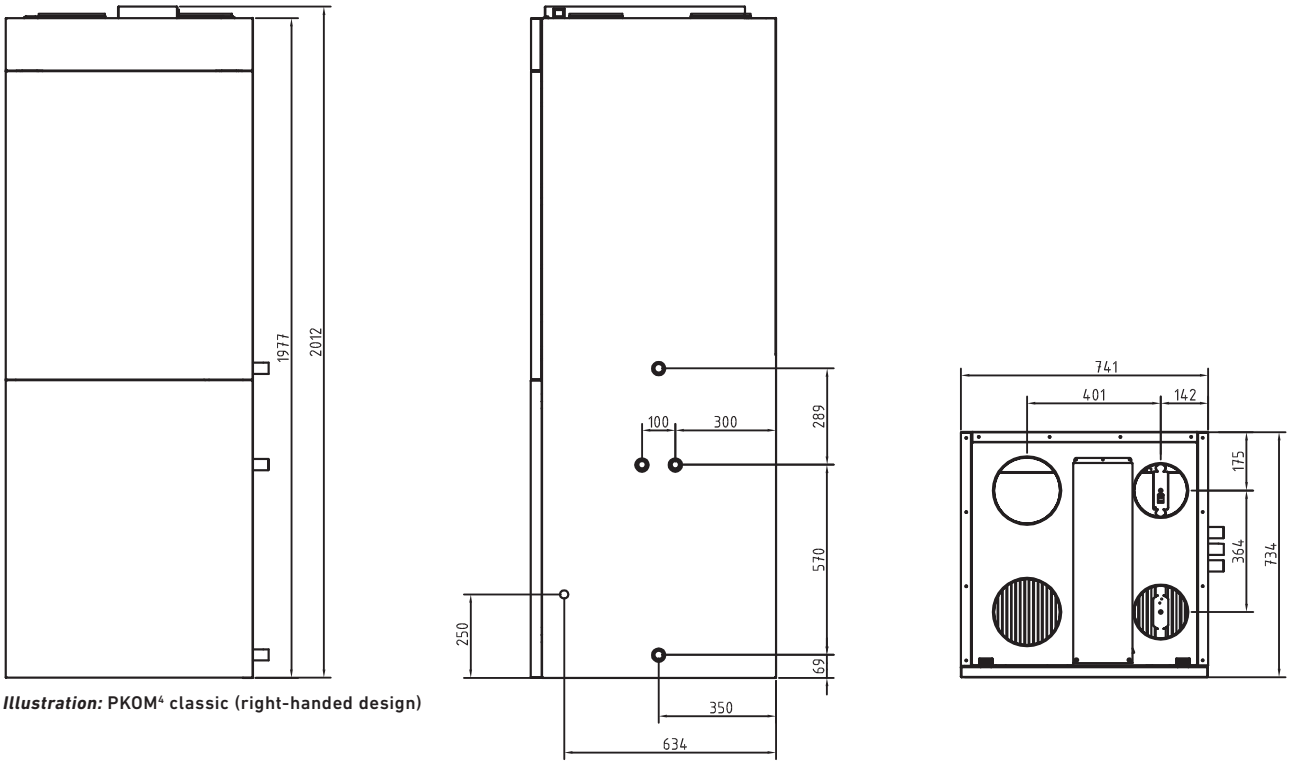


Illustration: PKOM⁴ classic (right-handed design)

Dimensions

PKOM⁴ TREND

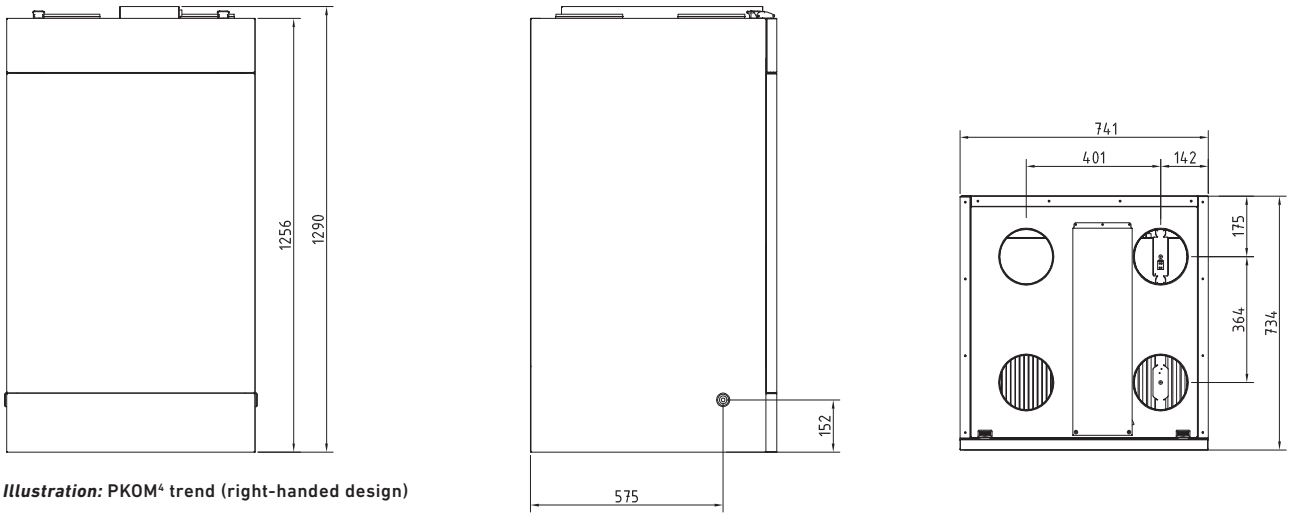
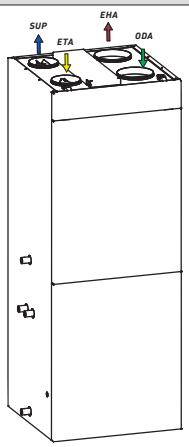
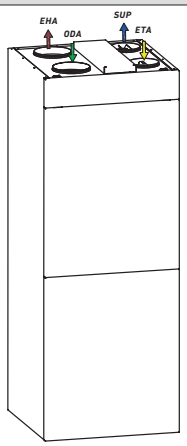
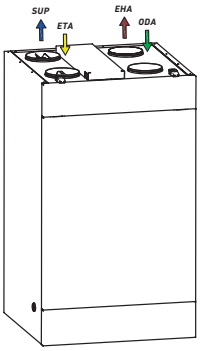
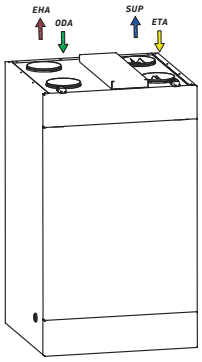


Illustration: PKOM⁴ trend (right-handed design)

Versions

The PKOM⁴ heat pump combi unit is available in several versions.

Article PKOM⁴ classic	Left-handed version	Right-handed version
with standard heat exchanger and heating exchanger in the storage tank	08PKOM4LSW	08PKOM4RSW
with enthalpy exchanger* and heating exchanger in the storage tank	08PKOM4LFW	08PKOM4RFW
		
Article PKOM⁴ trend	**Left-handed version**	**Right-handed version**
with standard heat exchanger	08PKOM4LSO	08PKOM4RSO
with enthalpy exchanger*	08PKOM4LFO	08PKOM4RFO
		

*) **TIP!** Compared to the standard heat exchanger, the enthalpy exchanger will recover not only heat from the extract air, but also a large percentage of the humidity. This humidity-heat exchanger will therefore ensure a pleasant indoor climate especially in cold months.

Technical specifications

VENTILATION PART WITH HEAT PUMP

	PKOM⁴ classic	PKOM⁴ trend
Air volume per stage	85 – 250 m^3/h variable	85 – 250 m^3/h variable
Ventilation stages	4	4
Max. external compression at V_{max}	> 200 Pa	> 200 Pa
Permissible outdoor air temperature	-15 bis +40 °C	-15 bis +40 °C
Max. heating power, heat pump with A2 and V_{max}	1.300 W	1.300 W
Max. cooling power, heat pump with A35 and V_{max}	1.300 W	1.300 W
Refrigerant	R134a	R134a
Fill volume	1.000 g	1.000 g

VALUES AS PER EN13141-7		
Nominal air volume	175 m^3/h	175 m^3/h
Percent temperature change η_t (standard/enthalpy)	88 / 84 %	88 / 84 %
Specific input power SEL (standard/enthalpy)	0,31 / 0,27 W/(m^3/h)	0,31 / 0,27 W/(m^3/h)
Leakage external / internal	1,64% / 0,48%	1,64% / 0,48%
COP heating at A7 incl. WRG	6,8	6,8
EER cooling at A35 incl. WRG	4,2	4,2

VALUES AS PER PHI		
Nominal air volume	157 m^3/h	157 m^3/h
Degree of heat provision $\eta_{WRG,eff}$ (standard/enthalpy)	88 / 85 %	88 / 85 %
Electrical efficiency	0,33 W/(m^3h)	0,33 W/(m^3h)
Air tightness external/internal	1,4% / 0,8%	1,4% / 0,8%

HOT WATER PART WITH HEAT PUMP

	PKOM⁴ classic
Storage tank volume	212 l
Heating exchanger (optional)	0,8 m^2
Max. household hot water temperature with heat pump	55°C
Max. heating power, heat pump	1.600 W
Max. household hot water temperature with EHP	65°C
Electric-heating EHP	1.500 W
Legionella protection	yes
Refrigerant	R134a
Fill volume	1.000 g
Consumption pattern	L (Large)
Energy efficiency class	A
Energy efficiency	95 %

ELECTRICAL

	PKOM⁴ classic	PKOM⁴ trend
Electrical connection	230V ~ 1/50 Hz	230V ~ 1/50 Hz
Max. power consumption [W]	2.800	750
Max. current consumption [A]	12,8	3,8
Earth leakage circuit breaker	Type A – current impulse sensitive	Type A – current impulse sensitive
Line fuse	C16A	C16A

HOUSING

	PKOM⁴ classic	PKOM⁴ trend
Material	Powder coated sheet steel	Powder coated sheet steel
Duct connections supply air / extract air	Ø 160 mm	Ø 160 mm
Duct connections outdoor air / exhaust air	Ø 200 mm	Ø 160 mm
Dimensions (W x H x D)	741 x 2012 x 734 mm	741 x 1290 x 734 mm
Weight	240 kg	140 kg

ACOUSTIC DATA

The acoustic measurements pursuant to EN 12102 refer to an airflow of 250 m³/h with 100 Pa external compression and activated heat pump.

	Measuring point		Supply air connecting piece	Outdoor air connecting piece	Extract air connecting piece	Exhaust air connecting piece	Housing emission
100 Pa	63 Hz	L_W	74,8	75,3	72,1	73,8	68,8
	125 Hz		46,4	67,9	66,2	52,0	55,2
	250 Hz		51,7	69,0	70,5	53,5	58,3
	500 Hz		43,6	56,6	58,2	45,1	47,9
	1000 Hz		33,9	52,8	56,6	40,4	35,7
	2000 Hz		25,6	53,4	52,3	27,2	30,7
	4000 Hz		14,9	43,5	47,2	14,1	12,9
	8000 Hz		1,2	26,8	33,9	1,5	13,2
	Total L_{WA} in dB (A)		**50,3**	**63,1**	**64,4**	**50,8**	**51,9**

Remark: Tolerances ± 2 dB for acoustic data

PASSIVE HOUSE CERTIFIED TO PHI CRITERIA

Certificate

Passive House Suitable Component
For cool temperate climates, valid until 31. December 2019

Passivhaus Institut
Dr. Wolfgang Feist
64283 Darmstadt
GERMANY

Category: **Compact Heat Pump System**
Manufacturer: **Pichler G.m.b.H.**
9021 Klagenfurt, AUSTRIA
Product name: **PKOM 4**

This certificate was awarded based on the following criteria (limit values*):

Thermal Comfort:	$\theta_{supply\ air} \geq 16.5°C$
Heat Recovery of ventilation system:	$\eta_{WRG,eff} \geq 75\%$
Electric efficiency ventilation system:	$P_{el} \leq 0.45$ Wh/m³
Air tightness (internal/external):	$V_{Leakage} \leq 3\%$
Total Primary Energy Demand (**):	$PE_{total} \leq 55$ kWh/(m²a)
Control and calibration (*)	
Air pollution filters (*)	
Anti freezing strategy (*)	
Noise emission and reduction (*)	

Measured values to be used in PHPP useful air flow rates 121 to 192 m³/h

Heating

		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	-15	-7	2	7	°C
Thermal Output Heating Heat Pump	$P_{WP,Heiz}$	0.612	0.933	0.771	0.776	kW
COP number Heating Heat Pump	COP_{Heiz}	1.53	2.61	3.15	3.86	-
Maximum available supply air temperature with Heat Pump only(*)		33				°C

Hot water

		Test point 1	Test point 3	Test point 3	Test point 4	
Outside Air Temperature	T_{amb}	-7	2	7	20	°C
Thermal Output Heat Pump for heating up storage tank.	$P_{DHW\ heating\ up}$	0.84	1.15	1.38	1.67	kW
Thermal Output Heat Pump for reheating storage tank	$P_{DHW\ reheating}$	0.80	1.19	1.35	1.66	kW
COP Heat Pump for heating up storage tank	$COP_{DHW,\ heating\ up}$	2.28	2.97	3.34	3.94	-
COP Heat Pump for reheating storage tank	$COP_{DHW\ reheating}$	2.02	2.88	3.10	3.76	-
Average storage tank temperature		45				°C
Specific storage heat losses		1.51				W/K
Exhaust air addition (if applicable)		200				m³/h

(*) detailed description of criteria and key values see attachment.
(**) for heating, domestic hot water (DHW), ventilation, auxiliary electricity in the reference building, explanation see attachment.
(***) All key values of heat pump were measured with enthalpy (humid) heat exchanger. The dry heat recovery was measured, too and is shown here alternatively. All other key values are valid respectively for dry heat recovery, too.

0875ch03

www.passivehouse.com

Heat Recovery by enthalpy heat exchanger(***)
$\eta_{WRG,eff}$ = 85%

alternative:
Dry Heat Recovery by heat exchanger(***)
$\eta_{WRG,eff}$ = 88%

Electric efficiency
0.33 Wh/m³

Air tightness
$V_{leak,\ internal}$ = 0.8%
$V_{leak,\ external}$ = 1.4%

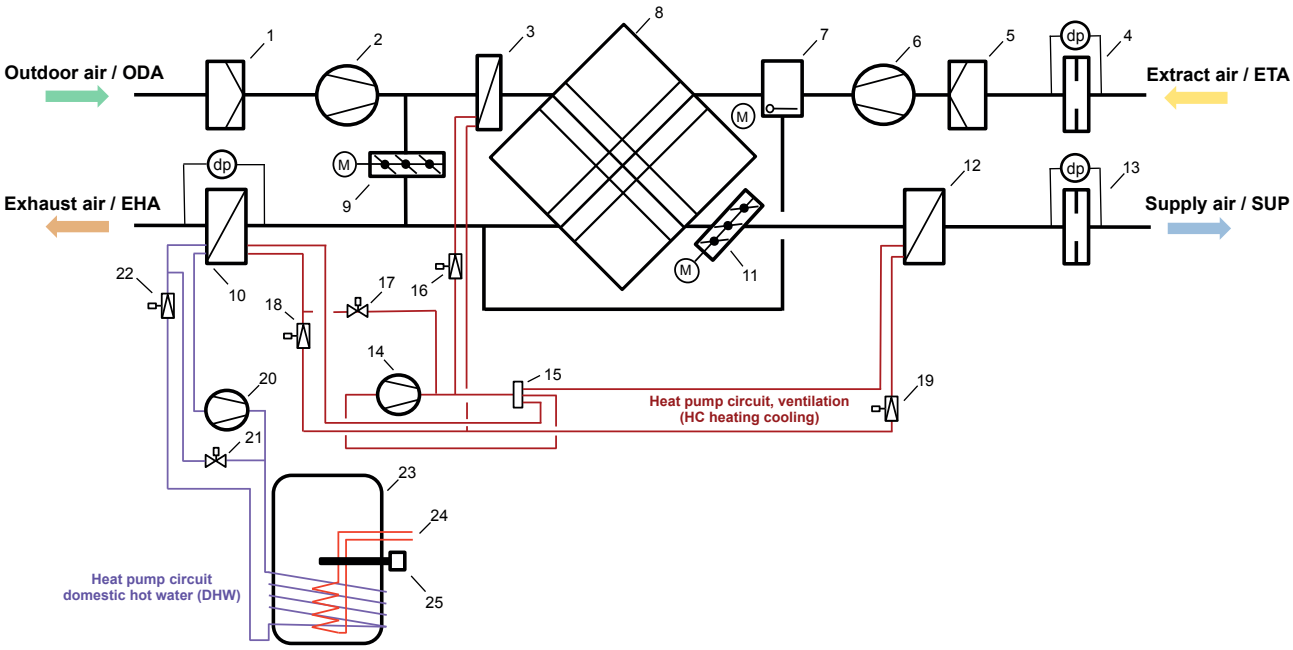
Frost protection
down to -15 °C

Total Primary Energy Demand (**)
45 kWh/(m²a)

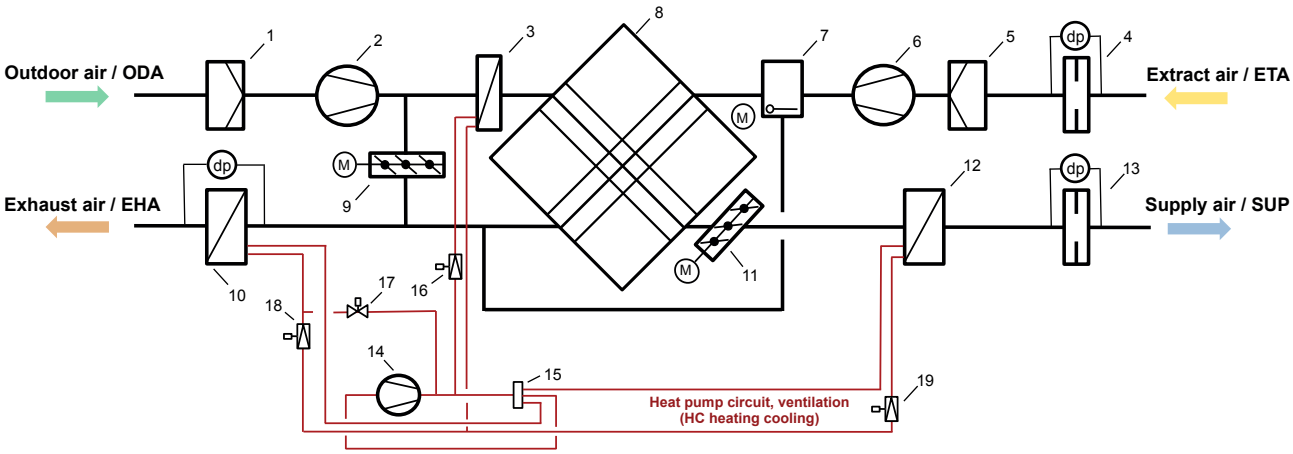
CERTIFIED COMPONENT
Passive House Institute

The current certificate can be downloaded at:
www.pichlerluft.at/heat-pump-combination-unit.html

Functional diagram PKOM⁴ classic



Functional diagram PKOM⁴ trend

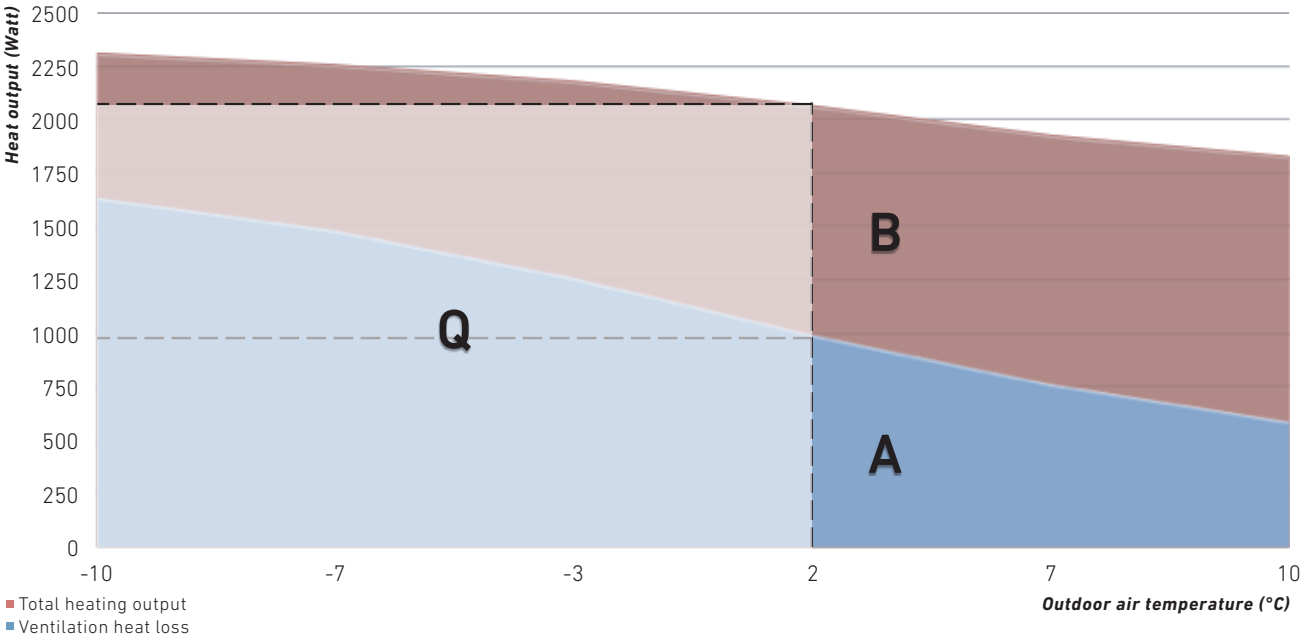


1 Filter ODA ISO ePM1 55%
2 Outdoor air fan
3 Pre-heater battery for outdoor air
4 Air volume measurement, extract air
5 Filter ETA ISO ePM10 75%
6 Extract air fan
7 Bypass flap with servo motor
8 Counterflow heat exchanger
9 Outdoor air/exhaust air flap with servo motor
10 Heat exchanger in exhaust air
11 Outdoor air/exhaust air flap with servo motor
12 Heat exchanger in supply air
13 Air volume measurement, supply air
14 Compressor with frequency converter (HC circuit)
15 4-way switching valve (HC circuit)
16 Control valve pre-heating battery (HC circuit)
17 Solenoid valve, defrosting (HC circuit)
18 Expansion valve, heating (HC circuit)
19 Expansion valve, cooling (HC circuit)
20 Compressor circuit (DHW circuit)
21 Solenoid valve, defrosting (DHW circuit)
22 Expansion valve (DHW circuit)
23 Domestic hot water storage tank
24 Heating battery in domestic hot water storage tank
25 Electrical heating, domestic hot water

DHW = Circuit for domestic hot water
HC = Circuit for supply air (heating / cooling)

Total heating output

AT 160 M³/H



The full heating output Q (share A + B) will be released into the outdoor air at the given air volume flow.

The ventilation heat loss (share A) corresponds to the power required to return the outdoor air to indoor air conditions.

Share B is additionally available for actively heating the supply air.

Data in accordance with EU Regulations

HOUSEHOLD HOT WATER HEAT PUMP PKOM⁴ CLASSIC

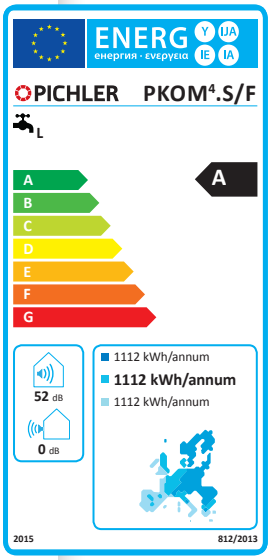
The heat pump fulfills the requirements of the Ecodesign Directive, in accordance with EU Regulations 812/813-2013.

Specific energy consumption: Efficiency class A is achieved with an outdoor air temperature of +7°C (+6°C wet bulb).

Product fiche

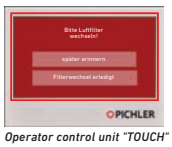
Heat pump combi unit: PKOM⁴.S/F

supplier's name or trade mark	J. Pichler GmbH
model identifier	PKOM⁴.S/F
declared load profile	L
water heating energy efficiency class	A
water heating energy efficiency class	95%
the annual electricity consumption in kWh in terms of final energy	1112 kWh
temperature settings, as placed on the market	55 °C
the sound power level LWA in dB, indoors	52 dB(A)
able to work only during off-peak hours	no
precautions when assembled, installed or maintained	see operating and installation instructions
Storage volume in litres	212 l



Filter change
The filters are to be replaced as soon as the command to replace the filters appears on the display of the operator control unit (marked red in the picture alongside).

CAUTION:
If the filters are not changed regularly, the system can not work efficiently and the power consumption increases.



Operator control unit "TOUCH"

Waste disposal
Units that are no longer in working order have to be dismantled and properly disposed of by a specialized company via suitable collection centres and in compliance with the waste electrical and electronic equipment ordinance (WEEE), which provides for ratification of community law, directive 202/95/EC (RoHS) and the directive 2002/96/EC (the WEEE directive).

Information based on the current state of knowledge of EU Regulation 812/2013
Download from: www.pichlerluft.at

Responsible for the content: J. Pichler Gesellschaft m.b.H.
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PICHLER
Systematic ventilation.

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Sales partners in Germany, Switzerland and Italy.

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TOUCH control unit

MODBUS/KNX-Gateway

Operation

The PKOM⁴ heat pump combi unit can offer the user many different configurations. Switch-over from summer to winter and back may be manually or automatic. Scheduled operation depending on time of day or week will allow setting of different air volumes and room temperatures. Active cooling with the heat pump may be activated or deactivated as desired. The electrical heater may also be switched on should the requirement for hot water increase on occasion.

TOUCH CONTROL UNIT

Operation is simple and intuitive via touch display. The most important settings and readings are very easy to make. The integrated room sensor is also used to monitor and control the room temperature.

Advantages of controlling:
- Automatic summer and winter adjustment
- Holiday function
- Individually adjustable air volumes
- Programs based on time of day and day of the week
- Legionella protection
- Additional functions for solar and additional heater
- Energy balancing
- CO_2 and humidity control
- Eco-Mode (Smart Grid Ready / PV Ready)

Control unit dimensions:
(w x h x d) 110 x 84 x 25 mm
Cable: Telephone installation wiring JY(ST)Y 2x2x0.8
Max. installation length < 100 m

EASY OPERATION WITH THE PICHLER APP

User-friendly: the heat pump combination unit can be operated easily with our free smartphone app for iOS and Android, whether you are at home or out and about:

GET IT ON Google Play

Download on the App Store

REMOTE ACCESS / PICHLER CONNECT

Operational safety: Pichler customer service automatically receives information on your heat pump combination unit in the event of a malfunction. Remote access faciliates a prompt response with minimal effort.

PICHLER connect.

BUILDING AUTOMATION

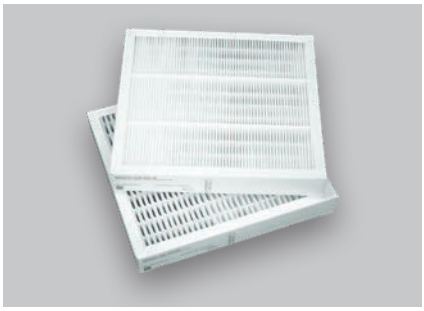
Connection to a building automation via integrated Modbus RTU interface. Optionally, a gateway for the KNX bus system is also available.

MODBUS/KNX GATEWAY

The Modbus/KNX gateway allows for the connection of the heat pump combi unit PKOM⁴ to a KNX bus system. In this process, the gateway serves as a connective link between the two bus systems. It is provided with a Modbus RTU and TCP interface and is always the master on the Modbus. On the KNX side, however, it responds like a common KNX TP-1 unit. This makes it possible to centrally control and monitor the heat pump combi unit by a KNX system. The configuration is implemented via the IP or USB interface.

Dimensions: W x H x L = 88 x 56 x 90 mm
Mounting: Top hat rail or wall
Permissible ambient temperature: 0 – 60 °C
Permissible humidity: 5 – 95% non-condensing
Protection class: IP20
Voltage: 24V AC/DC
Interfaces: Ethernet, EIA-485, KNX-TP1

Item	Item number
MODBUS/KNX-Gateway	08KNXGAPKOM4A



Spare filter

Duct heating exchanger

Heating circuit module DN20

Accessories

SPARE FILTER

will ensure perfect hygiene and air quality given regular replacement, also proper functionality and efficient operation of the unit.

Item		Item number
Filter ETA ISO ePM10 75% (Extract air)	synthetic	40LG050280
Filter ODA ISO ePM1 55% (Outdoor air)	glass fibre	40LG050290

DUCT HEATING EXCHANGER

with integrated temperature limiter and thermal protection. The controller is the PKOM⁴ heat pump combi unit. It will only be activated if the heat pump fails to achieve the desired supply air temperature for extended periods.

Item	Item number
Duct heating exchanger PKOM⁴	08CV16121MTXL
Duct temperature sensor NTC	40LG041920

Max. power	1200 W
Output control	0 – 10 V
Minimum air volume	110 m³/h
Duct connection	Ø 160 mm
Installation length	375 mm

HEATING CIRCUIT MODULE DN20

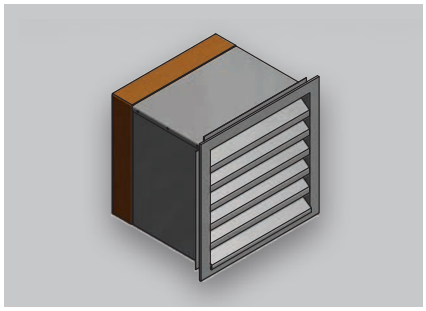
for connecting a small heating circuit (e.g. towel dryer) to the household hot water storage tank of the PKOM⁴ classic heat pump combi unit.

Item	Item number
PKOM⁴ heating circuit module	08PKOM4HBK33
Wall bracket set	08PKOM4WHHBK33

Pump	Wilo-Yonos PARA RS15/6
Gravity reverse brake	200 mmWs
3-way mixer	Setting range 20 – 50°C
Connections, Inlet (bottom)	1" AG, flat seal
Connections, outlet (top)	3/4" IG
Centre spacing	90 mm
W x H	180 x 385 mm

Temperature sensor and Humidity sensor

CO_2 sensor



Wall duct

TEMPERATURE SENSOR

for the temperature measurement and heating control of an additional room in connection with the heating circuit module. The sensor in the surface-mounted housing is suitable for wall mounting.

Item	Item number
Room-temperature sensor	07RTF49357

Colour	white
Type	NTC 10 kOhm
Reference signal	0-10 V
Dimensions W x H x D	85 x 85 x 35 mm

CO_2 SENSOR

for ventilation control to suit requirements. The heat pump combi unit will automatically increase or reduce the air volumes depending on the quality of the air in the room. The sensor in the surface-mounted housing is suitable for wall mounting.

Item	Item number
CO_2 sensor	07RCO248330

Colour	white
Measuring range	0 – 2000 ppm
Reference signal	0-10 V
Dimensions W x H x D	85 x 85 x 35 mm

HUMIDITY SENSOR

for ventilation control to suit requirements. The heat pump combi unit will automatically increase or reduce the air volumes depending on the humidity of the air in the room. The sensor in the surface-mounted housing is suitable for wall mounting.

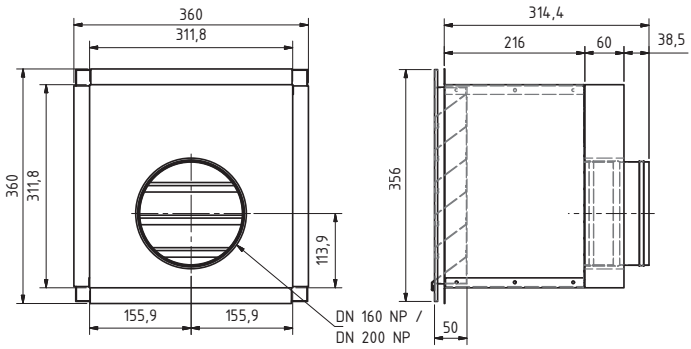
Item	Item number
Humidity sensor	07RHF49360

Colour	white
Measuring range	0-100 % RH
Reference signal	0-10 V
Dimensions W x H x D	85 x 85 x 35 mm

WALL DUCT

The thermally insulated and soundproof wall duct with a stainless steel weather protection grille and insulation in the rear area is used as an acoustically optimised outdoor or exhaust air element. A 10 x 10 mm mesh grille is integrated into the wall duct. The A-evaluated sound pressure level is reduced by app. 6 dB(A) on the outdoor and exhaust air connecting piece. An approximate cut-out of 350 x 350 mm has to be established for the installation.

Item	Dimensions W x H x D	Item number
Wall duct Ø 200 mm	360 x 360 x 314,4 mm	08PKOMMLA200
Wall duct Ø 160 mm	360 x 360 x 314,4 mm	08PKOMMLA160

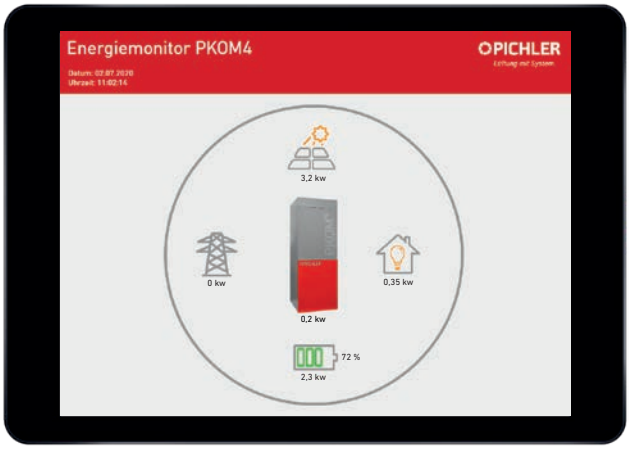


Mounting example

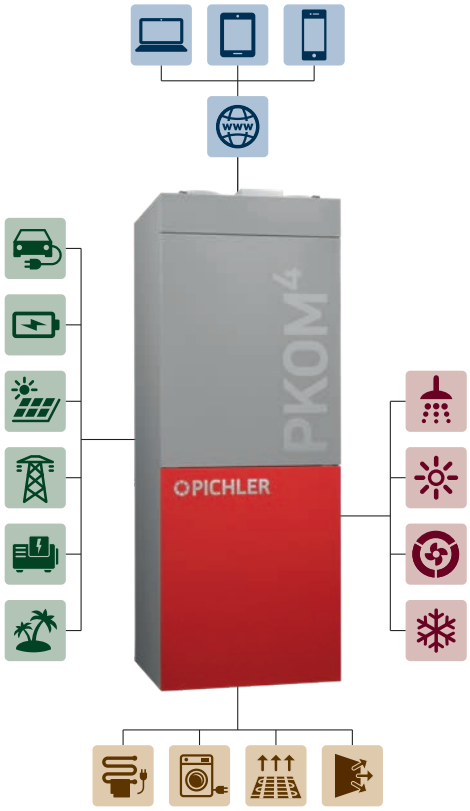
PKOM⁴ system solution

System solution with renewable energy

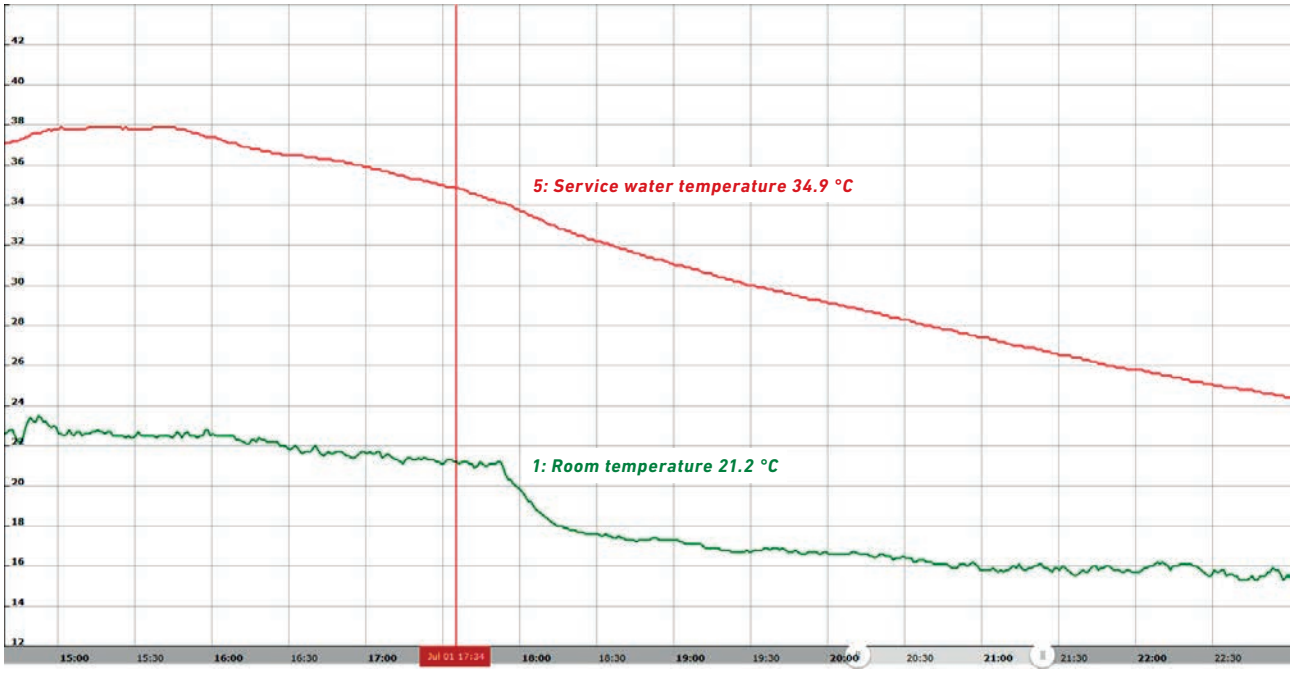
As compact ventilation unit, the heat pump combi unit PKOM⁴ replaces a full-featured heating/cooling/service water system. By combination with renewable energy such as photovoltaics and energy management, the PKOM⁴ presents an efficient, cost-effective system solution, by means of which operating costs are reduced to a minimum, thus making it possible to implement a zero-energy building, or even a "plus energy" building.



Operation and visualisation on terminal devices

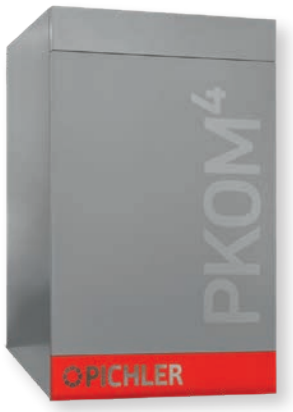


Data monitoring



Data monitoring example

PKOM⁴ trend at a glance!



- EC radial fans, speed controlled
- Filter ETA ISO ePM10 75% / Filter ODA ISO ePM1 55%
- Plastic counterflow heat exchanger or enthalpy exchanger
- Summer bypass flap to bypass the heat recovery (free cooling)
- Integrated heater using heat pump hot gas for protection against freezing
- Reversible cooling circuit design
- Frequency controlled rotating piston compressor for heating and cooling the supply air
- Electronic expansion valves
- TFT touch display with integrated room temperature sensor
- Integrated WEB server and LAN interface to local networks
- Smart Grid Ready (PV Ready)

PKOM⁴ classic at a glance!

PROPERTIES IN ADDITION TO PKOM⁴ TREND VERSION

- Additional cooling circuit with rotating piston compressor for household hot water heating
- Household hot water tank with PU hard foam insulation
- Optionally with additional heating exchanger (e.g. for solar connection, heating circuit connection)
- Corrosion protection through high quality enamelling in accordance with DIN 4753 and sacrificial Magnesium anode
- Electrical heater for emergency operation or to assist in times of increased demand for hot water
- Patented two-circuit heat pump system

Your partner/installer:

klimaaktiv Partner | PASSIVHAUS Austria | Mitglied NETZWERK PASSIVHAUS www.passivhaus.at

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