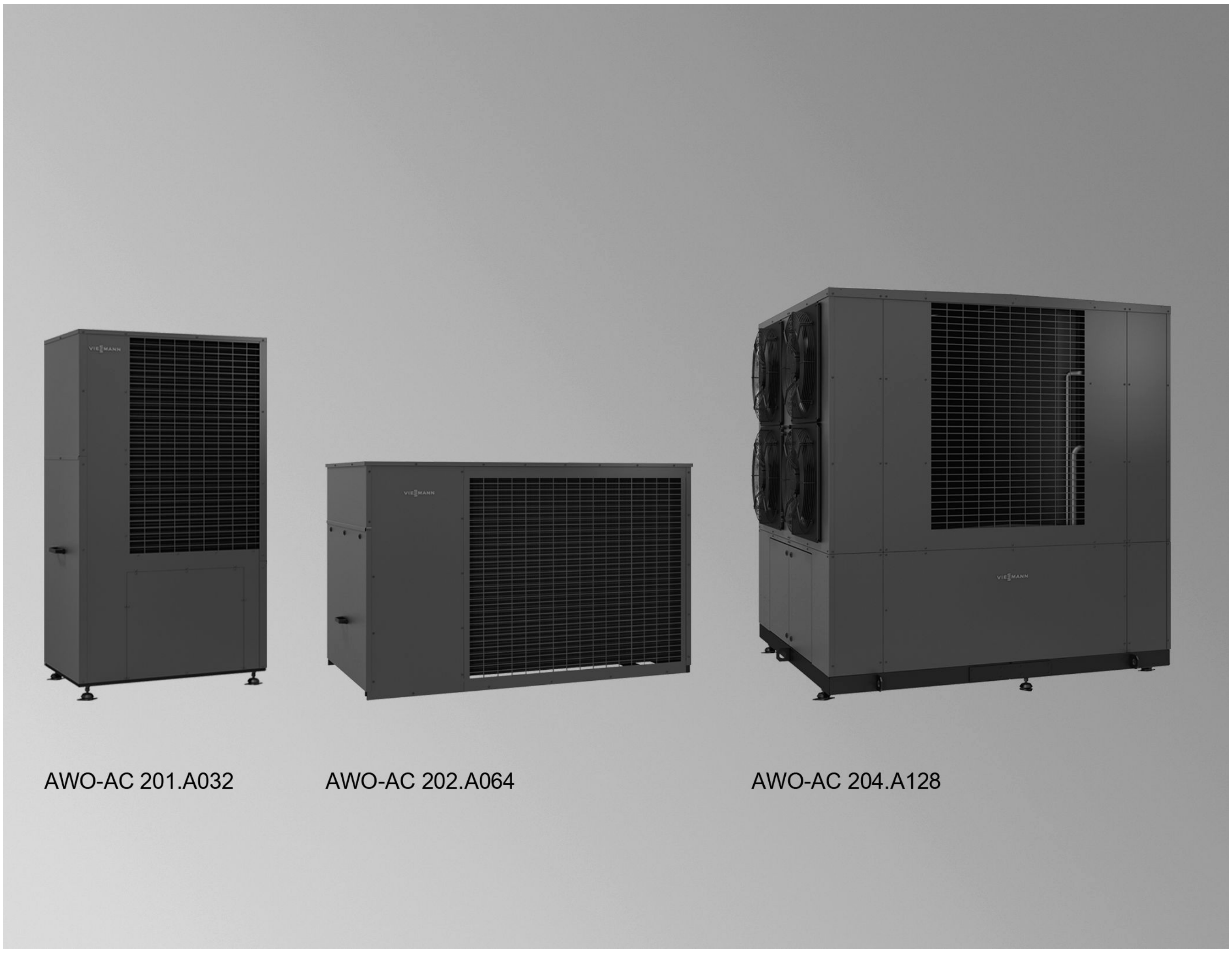
VIESSMANN

# VITOCAL

Air source heat pump for outdoor installation
Monoblock version, 32.2 to 128.7 kW

# Technical guide




## VITOCAL 200-A PRO Type AWO-AC 201.A032, AWO-AC 202.A064, AWO-AC 204.A128

**Air source heat pumps** for outdoor installation with electric drive for room heating/cooling and DHW heating in heating systems
- Up to 65 °C flow temperature
- With 1, 2 or 4 compressors depending on type
- With weather-compensated heat pump control unit and graphical programming unit for wall mounting

6216148 GB 2/2023

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## Product type designations

| Vitocal 200-A, type | A | W | O | | – | | – | | – | AC | 2 | 0 | 1 | . | A | 032 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ⓐ | Ⓑ | Ⓒ | Ⓓ | | Ⓔ | | Ⓕ | | Ⓖ | Ⓗ | Ⓚ | Ⓛ | | Ⓜ | Ⓝ | Ⓞ |

| Pos. | Value | Meaning |
|---|---|---|
| Ⓐ | Medium, primary circuit | |
| | **A** | **A**ir |
| | **B** | **B**rine |
| | **HA** | **H**ybrid **A**ir |
| | **W** | **W**ater |
| Ⓑ | Medium, secondary circuit | |
| | **W** | **W**ater |
| Ⓒ | Model, part 1 | |
| | **B** | Refrigerant circuit in split version (**B**i-block) |
| | **C** | Circulation pumps and/or 3-way diverter valve installed (**C**ompact) |
| | **H** | High temperature version (**H**igh temperature) |
| | **O** | Outdoor installation (**O**utdoor) |
| | **S** | Heat pump, stage 2 without heat pump control unit (**S**lave) |
| | **T** | Compact heat pump (**T**ower) |
| Ⓓ | Model, part 2 | |
| | **I** | Indoor installation (**I**ndoor) |
| | **T** | Compact heat pump (**T**ower) |
| Ⓔ | Power supply | |
| | **M** | 230 V/50 Hz (**M**onophase) |
| | Empty | 400 V/50 Hz |
| Ⓕ | Electric instantaneous heating water heater | |
| | **E** | **E**lectric heating built into heat pump |
| Ⓖ | Cooling function | |
| | **AC** | Active cooling |
| | **NC** | Natural cooling |

| Pos. | Value | Meaning |
|---|---|---|
| Ⓗ | Viessmann product segment | |
| | **1** | 100 |
| | **2** | 200 |
| | **3** | 300 |
| Ⓚ | DHW cylinder | |
| | **0** | Separate DHW cylinder required |
| | **1/2/3** | DHW cylinder installed, without solar utilisation |
| | **4** | DHW cylinder installed, with solar utilisation |
| Ⓛ | Heat pumps: Number of compressors in refrigerant circuit | |
| | **1** | 1 compressor |
| | **2** | 2 compressor |
| | **4** | 4 compressor |
| | Hybrid appliances: Number of heat sources | |
| | **2** | 2 heat sources, e.g. 1 compressor and 1 burner |
| Ⓜ | **A** to ... | Product generation |
| Ⓝ | Output size (kW) | |
| Ⓞ | Identification of special appliance versions, e.g. FR | |

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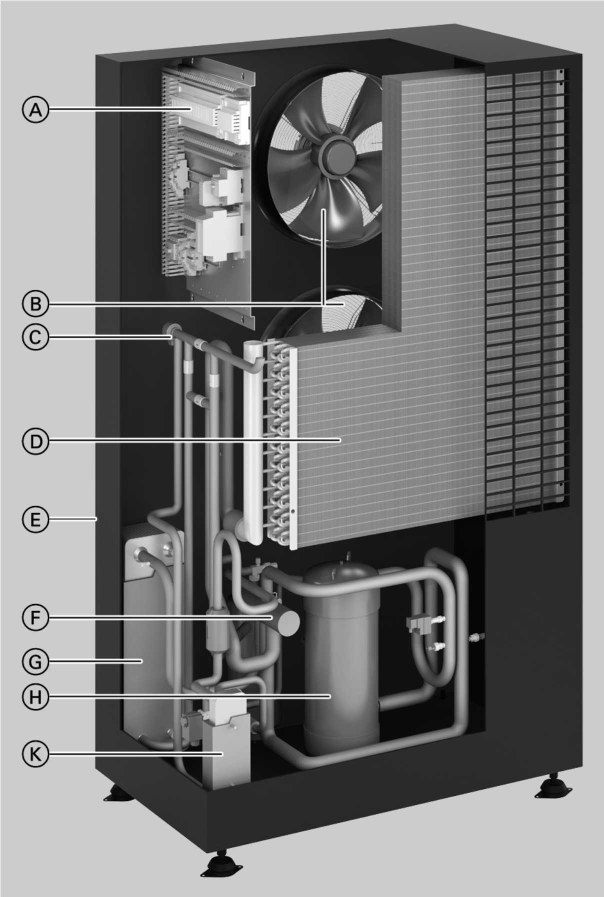
## 2.1 Product description

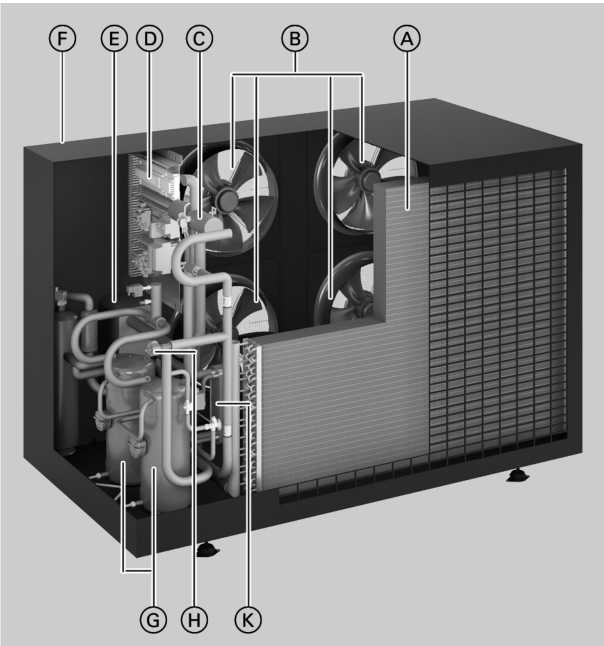
### Type AWO-AC 201.A032




Ⓐ Heat pump control unit
Ⓑ Fan
Ⓒ Electronic expansion valve
Ⓓ Evaporator
Ⓔ Secondary circuit flow/return
Ⓕ 4-way diverter valve
Ⓖ Condenser
Ⓗ Compressor
Ⓚ Refrigerant circuit internal heat exchanger



### Type AWO-AC 202.A064




Ⓐ Evaporator
Ⓑ Fan
Ⓒ 4-way diverter valve
Ⓓ Heat pump control unit
Ⓔ Condenser
Ⓕ Secondary circuit flow/return
Ⓖ Compressor
Ⓗ Electronic expansion valve
Ⓚ Refrigerant circuit internal heat exchanger

### Type AWO-AC 204.A128


Ⓐ Fan
Ⓑ Evaporator
Ⓒ Air baffle panel
Ⓓ Heat pump control unit
Ⓔ Electronic expansion valve
Ⓕ Compressor
Ⓖ 4-way diverter valve
Ⓗ Refrigerant circuit internal heat exchanger
Ⓚ Secondary circuit flow/return
Ⓛ Condenser

## Benefits

- Assembled at the factory, including switching, control and safety equipment, for fast installation and straightforward maintenance
- For connection to the Vitocontrol 200-M system control unit (Modbus clip-in accessory required)
- Ideal for modernisation projects due to 65 °C flow temperature
- Highest performance factors thanks to highly efficient scroll compressors with multi stage output adjustment and electronic expansion valve
- Compact dimensions for space saving outdoor installation
- Vibration isolation for low sound emissions
- Highly weatherproof casing thanks to high quality powder coating
- Easy to service: 1 refrigerant circuit design for 3 appliance types
- System monitoring online
- Attractive BAFA subsidies

## Delivered condition

Complete air source heat pump for outdoor installation
- Weather-compensated heat pump control unit
  - VIRVS heat pump controller (2 integral controllers for type AWO-AC 204.A128)
  - VIAVS function extension, 1 integral and 1 separate (2 integral and 1 separate for type AWO-AC 204.A128)
- Outside temperature sensor
- Flow switch JSF 1E
- Web server
- Wall mounted enclosure for the installation of electronic modules for mounting on top-hat rails
- Programming unit (2 for type AWO-AC 204.A128)
- Main switch set for load disconnect
- Colour: Vitographite

## 2.2 Specification

### Specification

| Type AWO-AC | | 201.A032 | 202.A064 | 204.A128 |
|---|---|---|---|---|
| **Heating performance data** to EN 14511 (A2/W35) | | | | |
| Rated heating output | kW | 28.10 | 56.20 | 112.40 |
| Power consumption | kW | 7.20 | 14.06 | 27.77 |
| Coefficient of performance ε (COP) | | 3.90 | 4.00 | 4.05 |
| **Heating performance data** to EN 14511 (A7/W35) | | | | |
| Rated heating output | kW | 32.20 | 64.40 | 128.70 |
| Power consumption | kW | 7.31 | 14.27 | 28.18 |
| Coefficient of performance ε (COP) | | 4.40 | 4.51 | 4.57 |
| **Heating performance data** to EN 14511 (A–7/W35) | | | | |
| Rated heating output | kW | 22.10 | 44.10 | 88.20 |
| Power consumption | kW | 7.01 | 13.69 | 27.04 |
| Coefficient of performance ε (COP) | | 3.15 | 3.22 | 3.26 |
| **Heating performance data for DHW heating** to EN 14511 (A20/W65) | | | | |
| Rated heating output | kW | 44.90 | 89.80 | 179.60 |
| Power consumption | kW | 14.56 | 28.40 | 56.20 |
| Coefficient of performance ε (COP) | | 3.08 | 3.16 | 3.20 |
| **Cooling performance data** to EN 14511 (A35/W7) | | | | |
| Rated cooling capacity | kW | 35.00 | 69.90 | 139.90 |
| Power consumption | kW | 16.70 | 16.90 | 17.10 |
| EER in cooling mode | | 4.20 | 4.83 | 5.23 |
| **Heat recovery** (primary circuit) | | | | |
| Max. fan rating | W | 2 x 500 | 4 x 500 | 8 x 500 |
| Nominal air flow rate | $m^3/h$ | 6700 | 13500 | 19100 |
| Air intake temperature | | | | |
| – Min. | °C | –20 | –20 | –20 |
| – Max. | °C | 35 | 35 | 35 |
| Condensate volume at 87 % relative humidity | l/h | 15 | 30 | 60 |
| **Heating water** (secondary circuit) | | | | |
| Capacity | l | 6.5 | 8.9 | 17.3 |
| Minimum flow rate (1 compressor in operation) | l/h | 1100 | 2100 | 2800 |
| Nominal flow rate | l/h | 4840 | 9690 | 19380 |
| Pressure drop | | | | |
| – At minimum flow rate | kPa | 2.6 | 1.6 | 2.9 |
| – At nominal flow rate | kPa | 14.1 | 14.7 | 7.1 |
| Max. flow temperature | °C | 65 | 65 | 65 |
| – At air intake temperature –20 °C | °C | 55 | 55 | 55 |
| – At air intake temperature –5 °C | °C | 65 | 65 | 65 |
| Min. return temperature | °C | 20 | 20 | 20 |
| **Electrical values, heat pump** | | | | |
| Compressor | | | | |
| – Rated voltage | | | 3/N/PE 400 V/50 Hz | |
| – Cos φ | | 0.8 | 0.76 | 0.75 |
| – Max. compressor power consumption (A2/W35, including fans) | kW | 7.3 | 14.6 | 2 x 14.6 |
| – Max. compressor starting current (without starting current limiter) | A | 96.0 | 122.7 | 2 x 122.7 |
| – Max. operating current | A | 26.7 | 53.4 | 2 x 53.4 |
| – Power supply fuse protection | | 3 x C32A combi | 3 x C63A combi | 6 x C63A combi |
| – Max. cable cross-section | $mm^2$ | 16 | 16 | 16 |
| IP rating | | IP X4 | IP X4 | IP X4 |
| Fan | | | | |
| – Max. power consumption per fan | W | 500 | 500 | 500 |
| – Rated voltage | | | 1/N/PE 230 V/50 Hz | |
| – Internal fuse protection | | B10A | B10A | B10A |
| Power consumption, oil sump heater | W | 90 | 2 x 90 | 4 x 90 |
| **Electrical values, heat pump control unit** | | | | |
| Rated voltage of control circuit | | | 1/N/PE 230 V/50 Hz | |
| Power supply fuse protection | | 1 x 10 A | 1 x 10 A | 1 x 16 A |
| Internal fuse protection | | | 6.3 A H (slow)/250 V~ | |

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| Type AWO-AC | | 201.A032 | 202.A064 | 204.A128 |
|---|---|---|---|---|
| **Refrigerant circuit** | | | | |
| Refrigerant | | R407C | R407C | R407C |
| – Safety group | | A1 | A1 | A1 |
| – Charge weight | kg | 14.0 | 18.0 | 43.0 |
| – Global warming potential (GWP) | | 1774 | 1774 | 1774 |
| – $CO_2$ equivalent | t | 24.8 | 31.9 | 76.3 |
| Compressor | | Scroll | Scroll | Scroll |
| – Oil in compressor | | Idemitsu FV68S | Idemitsu FV68S | Idemitsu FV68S |
| – Oil volume per compressor | l | 2.8 | 2.8 | 2.8 |
| **Dimensions** | | | | |
| Total length | mm | 775 | 1330 | 2130 |
| Total width | mm | 1260 | 2315 | 2280 |
| Total height | mm | 2115 | 1510 | 2265 |
| **Total weight** | | | | |
| – Excl. packaging | kg | 460 | 790 | 1850 |
| – Incl. packaging | kg | 480 | 850 | 2000 |
| **Permiss. operating pressure** secondary side | bar | 6 | 6 | 6 |
| | MPa | 0.6 | 0.6 | 0.6 |
| **Connections** | | | | |
| Heating water flow and return (male thread) | | G 1½ | G 2 | G 2½ |
| **Total sound power level** | | | | |
| Total sound power level at A7/W35 | dB(A) | 69.7 | 69.7 | 71.6 |
| **Energy efficiency class** to Commission Regulation (EU) No. 811/2013 | | | | |
| Heating, average climatic conditions | | | | |
| – Low temperature application (W35) | | $A^{++}$ | $A^{++}$ | - |
| – Medium temperature application (W55) | | $A^{+}$ | $A^{++}$ | - |
| **Heating performance data** as per Commission Regulation (EU) No. 813/2013 (average climatic conditions) | | | | |
| Low temperature application (W35) | | | | |
| – Energy efficiency $\eta_S$ | % | 167 | 152 | 173 |
| – Rated heating output $P_{rated}$ | kW | 25 | 51 | 99 |
| – Seasonal coefficient of performance (SCOP) | | 4.24 | 3.88 | 4.40 |
| Medium temperature application (W55) | | | | |
| – Energy efficiency $\eta_S$ | % | 124 | 130 | 129 |
| – Rated heating output $P_{rated}$ | kW | 27 | 54 | 108 |
| – Seasonal coefficient of performance (SCOP) | | 3.17 | 3.31 | 3.29 |

***Note***
*Total sound power level measured with reference to EN ISO 12102/ EN ISO 9614*

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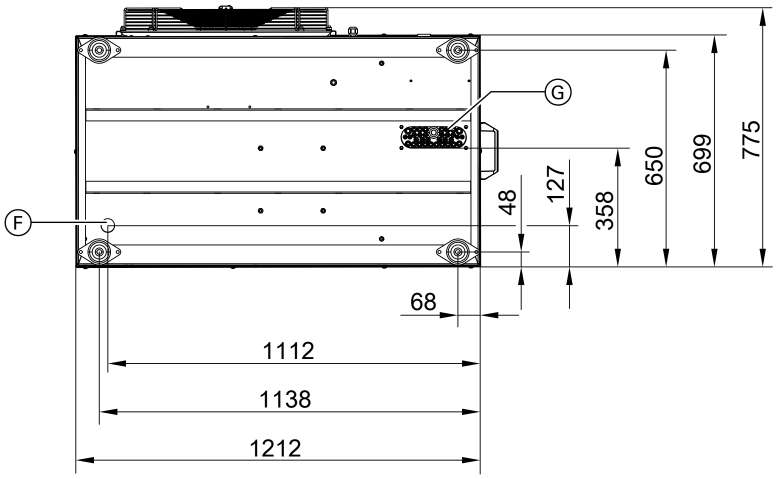
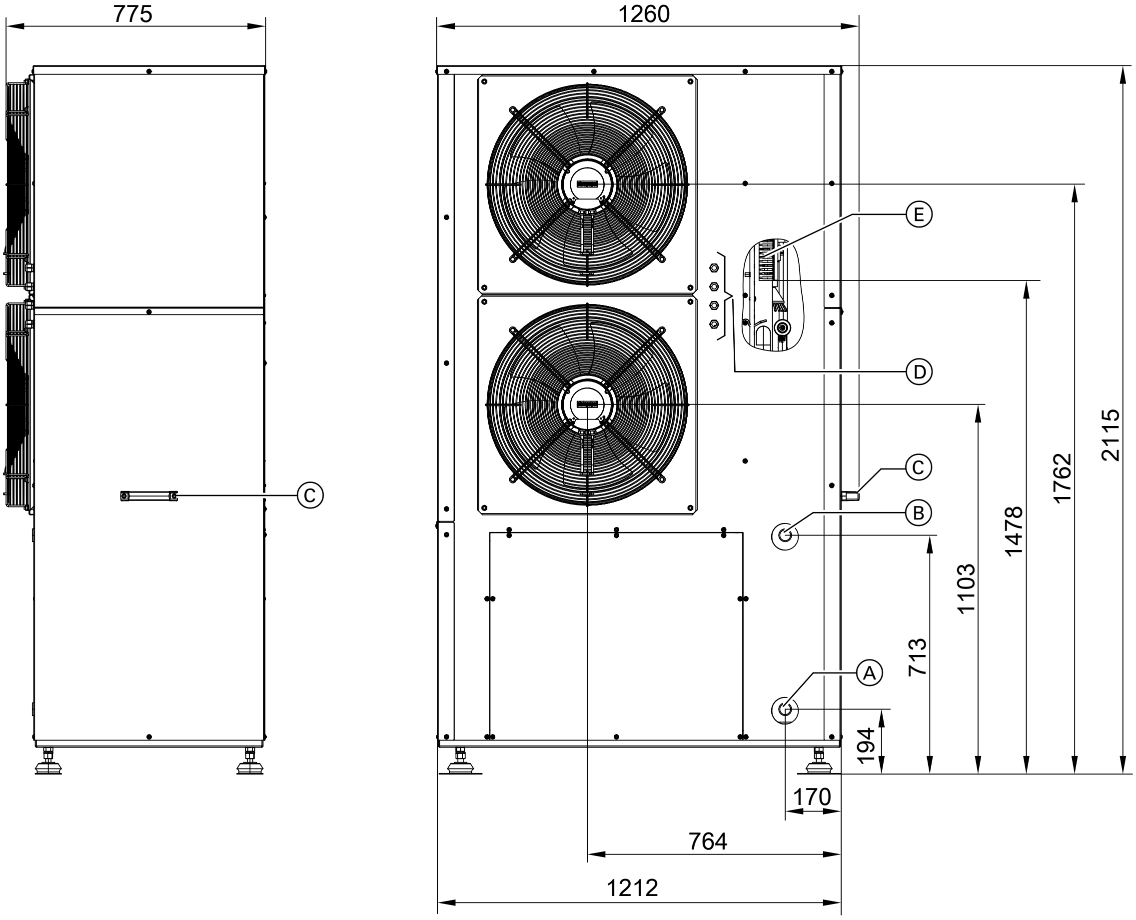
## Dimensions

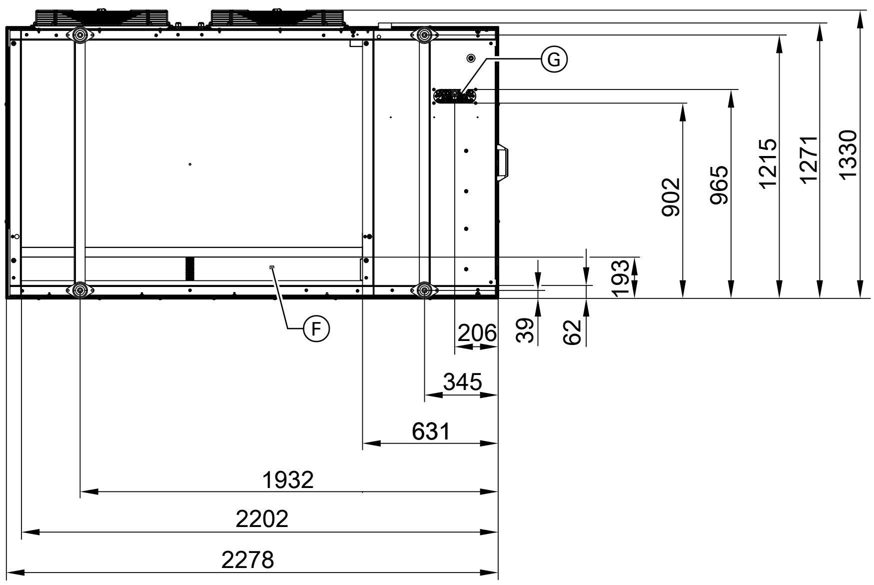
**Type AWO-AC 201.A032**

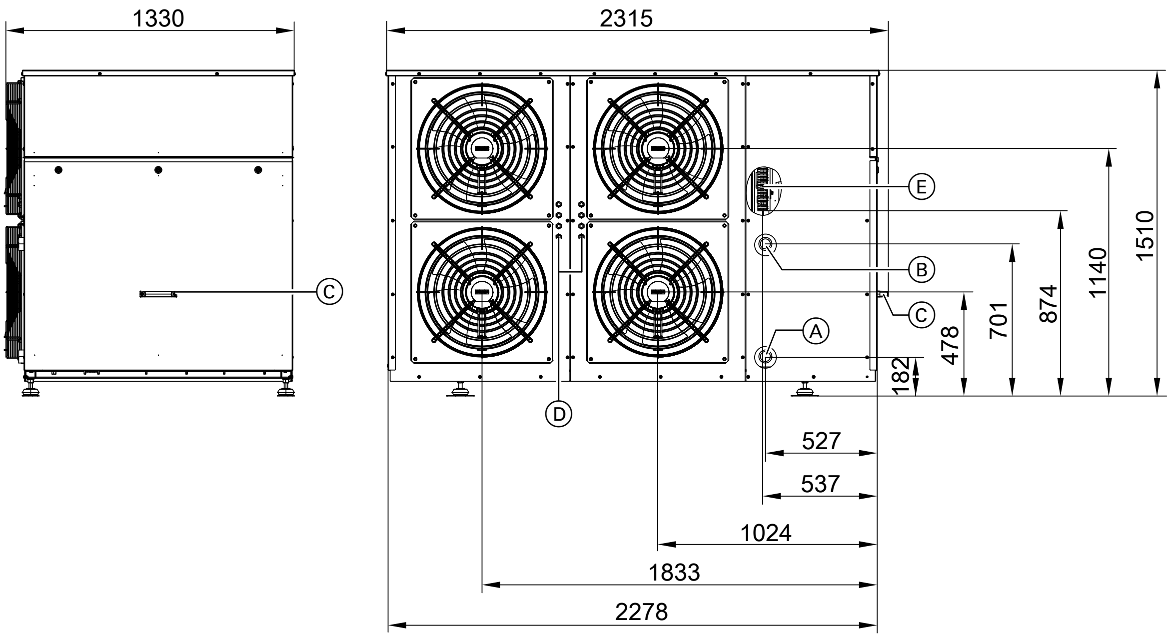



Ⓐ Heating water return G 1½ (male thread):
Ⓑ Heating water flow G 1½ (male thread):
Ⓒ Carrying handle
Ⓓ Cable entries (cable fittings)
Ⓔ Heat pump control unit
Ⓕ Condensate drain
Ⓖ Openings in the base plate for electric cables

**Type AWO-AC 202.A064**




Ⓐ Heating water return G 2 (male thread):
Ⓑ Heating water flow G 2 (male thread):
Ⓒ Carrying handle
Ⓓ Cable entries (cable fittings)
Ⓔ Heat pump control unit
Ⓕ Condensate drain
Ⓖ Openings in the base plate for electric cables

***Note***
*All resulting condensate must be drained off together.*

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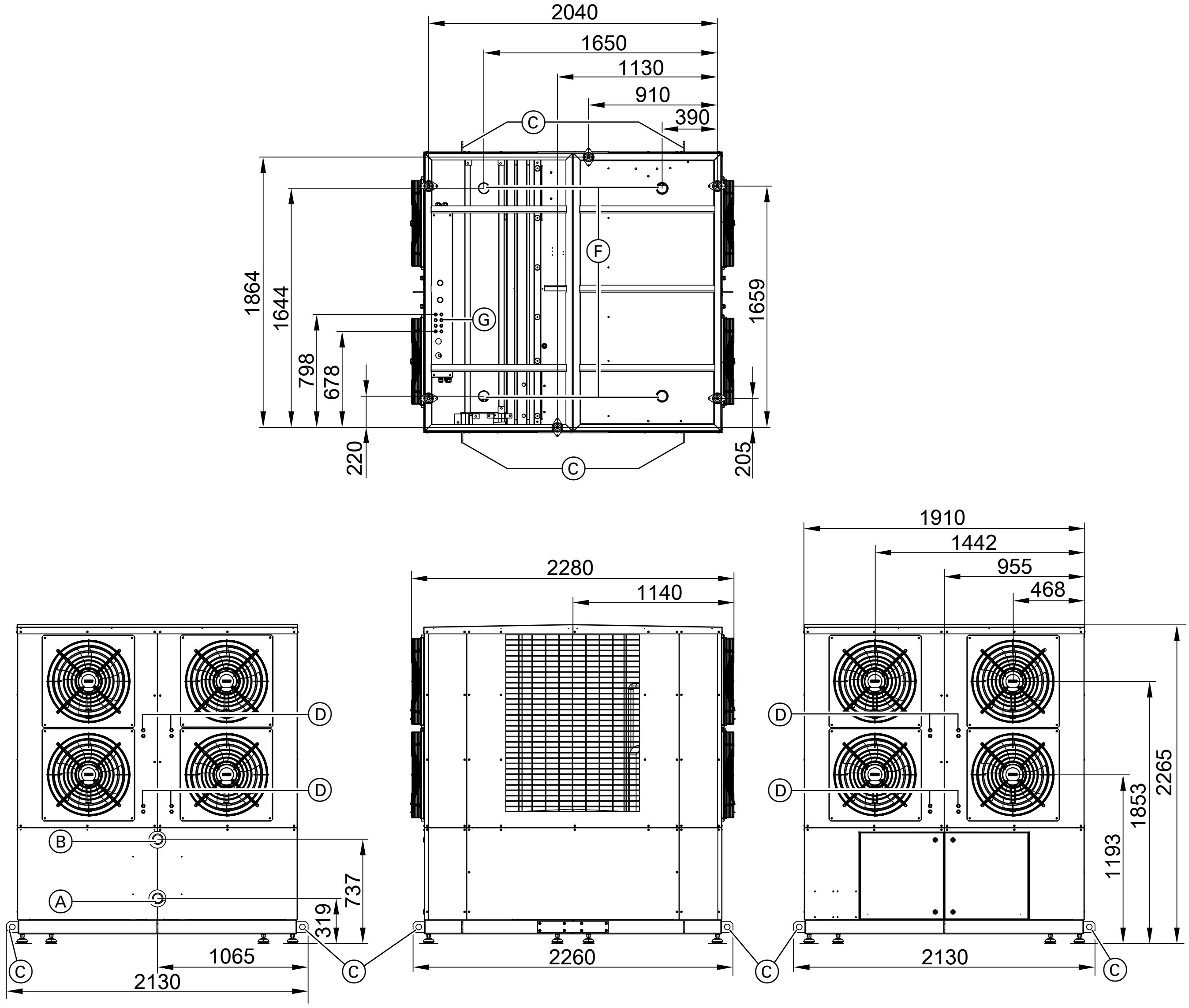
**Type AWO-AC 204.A128**

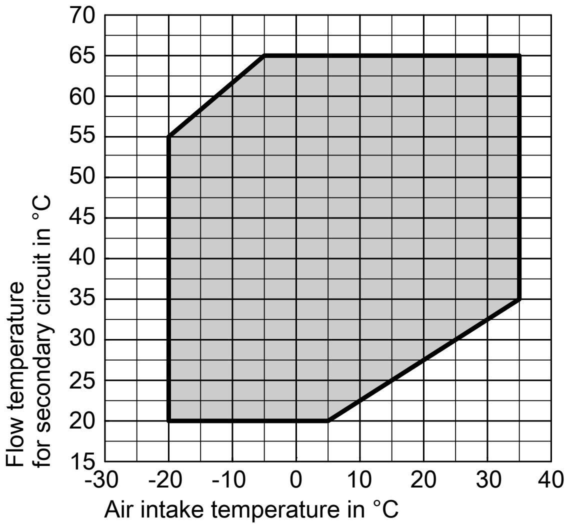



Ⓐ Heating water return G 2½ (male thread):
Ⓑ Heating water flow G 2½ (male thread):
Ⓒ Lifting eyes
Ⓓ Cable entries (cable fittings)
Ⓕ Condensate drain
Ⓖ Openings in the base plate for electric cables

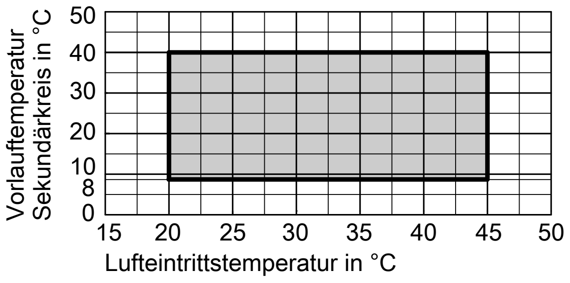
## Application limits - type AWO-AC 201.A032 to EN 14511

Secondary circuit spread: 5 K

**Heating**




**Cooling**



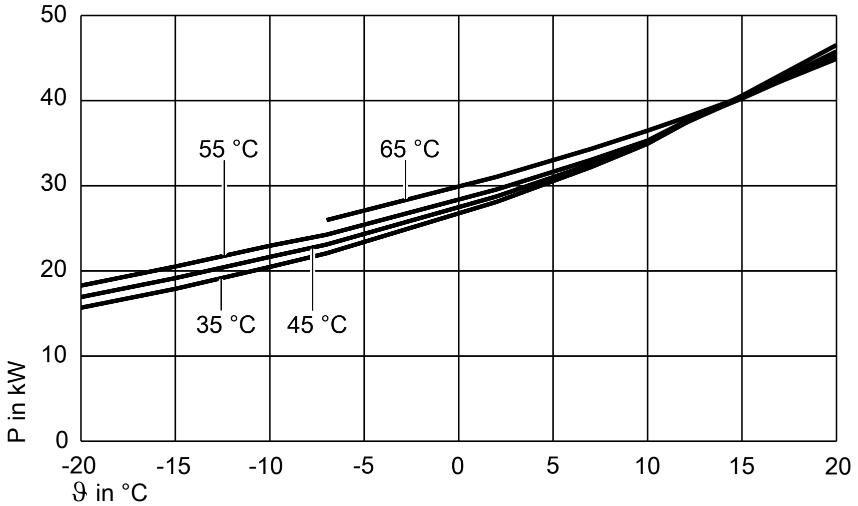

Application limits for room cooling with a flow temperature of approx. 20 °C. Higher flow temperatures in cooling mode for technical applications such as server cooling.

***Note***

- *The max. achievable flow temperature and the application limits vary by no more than ±2 K. When flow temperatures are low in the secondary circuit, the minimum flow rate must be maintained: See "Specification".*
- *The healing energy required to defrost the evaporator must be available at all times. The min. return temperature in the secondary circuit must therefore be above 18 °C in continuous operation.*

## Heating performance graphs - type AWO-AC 201.A032

**Heating output at flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C**

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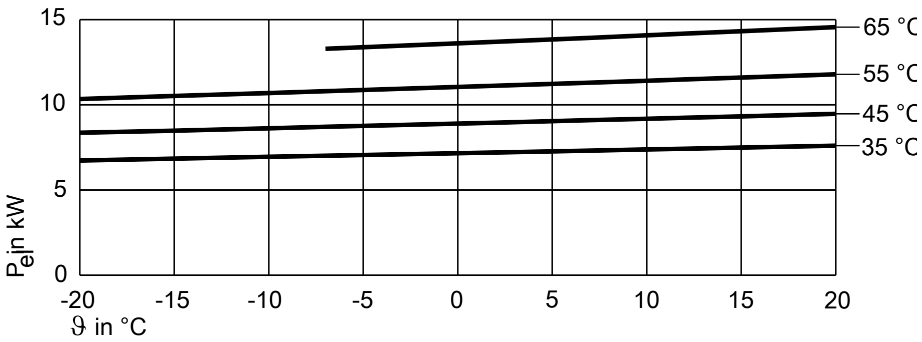
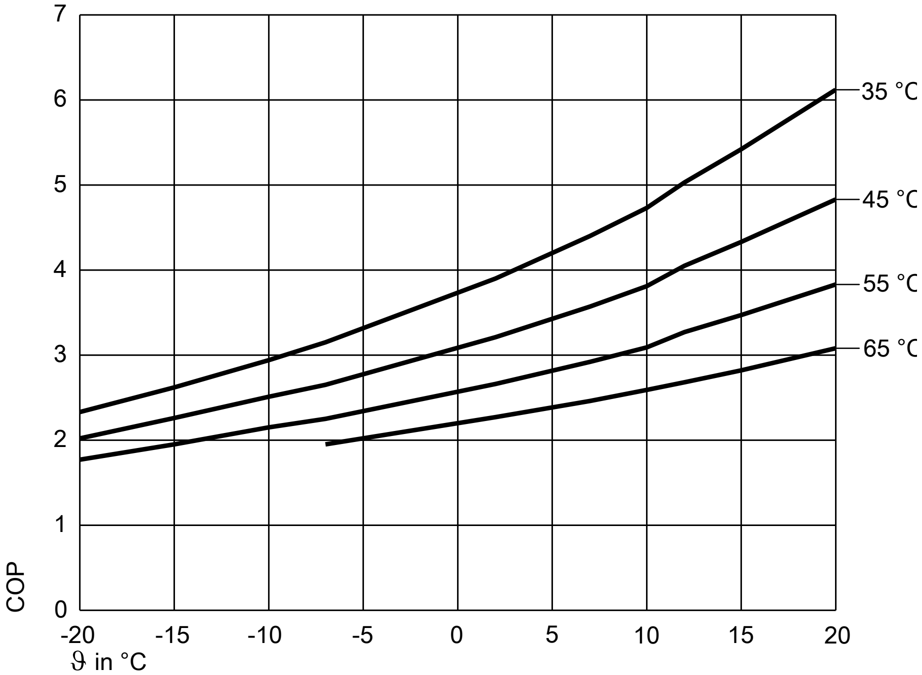
**Power consumption at flow temperatures 35 °C, 45 °C, 55 °C, 65 °C**




**Coefficient of performance COP at flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C**




ϑ Air intake temperature
P Heating output
$P_{el}$ Power consumption
COP Performance factor

***Note***
- *The COP data in the tables and graphs was calculated with reference to EN 14511.*
- *Performance characteristics apply to new appliances with clean plate heat exchangers.*

**Heating performance data**

| **Operating point** | **W** | **°C** | | | | | **35** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A** | **°C** | **–20** | **–15** | **–10** | **–7** | **2** | **7** | **10** | **12** | **15** | **20** |
| Heating output | | kW | 15.67 | 17.89 | 20.46 | 22.06 | 28.10 | 32.18 | 34.93 | 37.35 | 40.57 | 46.52 |
| Power consumption | | kW | 6.73 | 6.84 | 6.95 | 7.01 | 7.20 | 7.31 | 7.38 | 7.42 | 7.49 | 7.60 |
| Coefficient of performance ε (COP) | | | 2.33 | 2.62 | 2.94 | 3.15 | 3.90 | 4.40 | 4.73 | 5.03 | 5.42 | 6.12 |

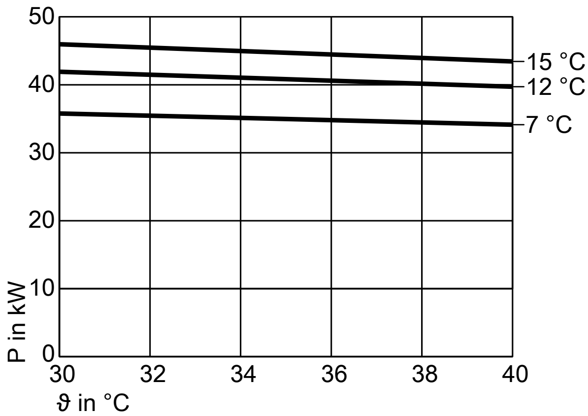
| **Operating point** | **W** | **°C** | | | | | **45** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **A** | **°C** | **–20** | **–15** | **–10** | **–7** | **2** | **7** | **10** | **12** | **15** | **20** |
| Heating output | | kW | 16.92 | 19.15 | 21.64 | 23.09 | 28.74 | 32.52 | 35.03 | 37.38 | 40.32 | 45.77 |
| Power consumption | | kW | 8.36 | 8.48 | 8.62 | 8.71 | 8.95 | 9.10 | 9.18 | 9.24 | 9.32 | 9.47 |
| Coefficient of performance ε (COP) | | | 2.02 | 2.26 | 2.51 | 2.65 | 3.21 | 3.57 | 3.81 | 4.05 | 4.33 | 4.83 |

| Operating point | W | °C | | | | | 55 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | °C | –20 | –15 | –10 | –7 | 2 | 7 | 10 | 12 | 15 | 20 |
| Heating output | | kW | 18.27 | 20.51 | 22.95 | 24.25 | 29.56 | 33.03 | 35.30 | 37.56 | 40.25 | 45.20 |
| Power consumption | | kW | 10.34 | 10.52 | 10.69 | 10.80 | 11.12 | 11.30 | 11.41 | 11.49 | 11.60 | 11.79 |
| Coefficient of performance ε (COP) | | | 1.77 | 1.95 | 2.15 | 2.25 | 2.66 | 2.92 | 3.09 | 3.27 | 3.47 | 3.83 |

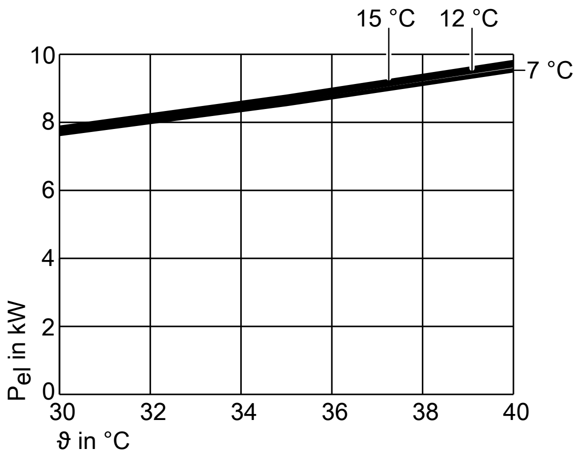
| Operating point | W | °C | | | | | 65 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | °C | –20 | –15 | –10 | –7 | 2 | 7 | 10 | 12 | 15 | 20 |
| Heating output | | kW | | | | 25.96 | 31.04 | 34.32 | 36.47 | 38.00 | 40.43 | 44.91 |
| Power consumption | | kW | | | | 13.29 | 13.70 | 13.93 | 14.08 | 14.18 | 14.32 | 14.56 |
| Coefficient of performance ε (COP) | | | | | | 1.95 | 2.27 | 2.46 | 2.59 | 2.68 | 2.82 | 3.08 |

## Cooling performance graphs - type AWO-AC 201.A032

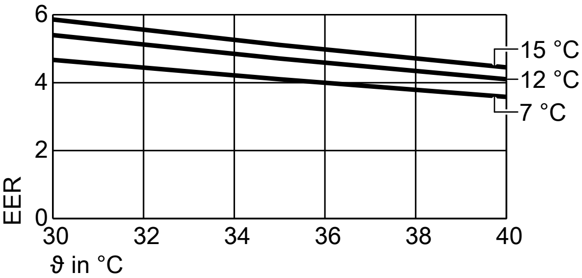
**Cooling capacity at flow temperatures 15 °C, 12 °C, 7 °C**




**Power consumption for cooling at flow temperatures 15 °C, 12 °C, 7 °C**




**Energy efficiency ratio EER at flow temperatures of 15 °C, 12 °C, 7 °C**




ϑ Air intake temperature
P Cooling capacity
$P_{el}$ Power consumption
EER Performance factor

***Note***

- *The EER data in the tables and graphs was calculated with reference to EN 14511.*
- *Performance characteristics apply to new appliances with clean plate heat exchangers.*

**Cooling performance data**

| Operating point | W | °C | | 15 | | | 12 | | | 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | °C | 30 | 35 | 40 | 30 | 35 | 40 | 30 | 35 | 40 |
| Cooling capacity | | kW | 45.96 | 44.71 | 43.43 | 41.91 | 40.82 | 39.71 | 35.77 | 34.96 | 34.12 |
| Power consumption | | kW | 7.84 | 8.75 | 9.77 | 7.76 | 8.66 | 9.68 | 7.66 | 8.54 | 9.53 |
| Energy efficiency ratio EER | | | 5.86 | 5.11 | 4.45 | 5.40 | 4.71 | 4.10 | 4.67 | 4.10 | 3.58 |

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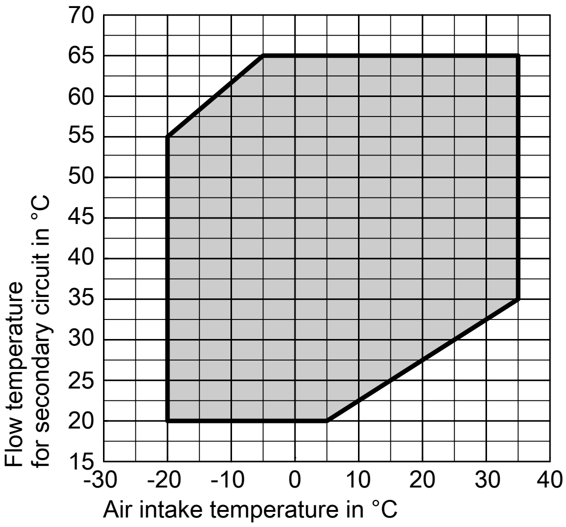
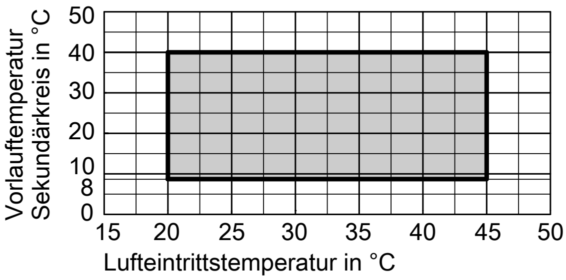
## Application limits - type AWO-AC 202.A064 to EN 14511

Secondary circuit spread: 5 K

**Heating**




**Cooling**




Application limits for room cooling with a flow temperature of approx. 20 °C. Higher flow temperatures in cooling mode for technical applications such as server cooling.

***Note***

- *The max. achievable flow temperature and the application limits vary by no more than ±2 K. When flow temperatures are low in the secondary circuit, the minimum flow rate must be maintained: See "Specification".*
- *The healing energy required to defrost the evaporator must be available at all times. The min. return temperature in the secondary circuit must therefore be above 18 °C in continuous operation.*

## Heating performance graphs - type AWO-AC 202.A064

***Note***

*The values shown apply to 2 active compressors.*

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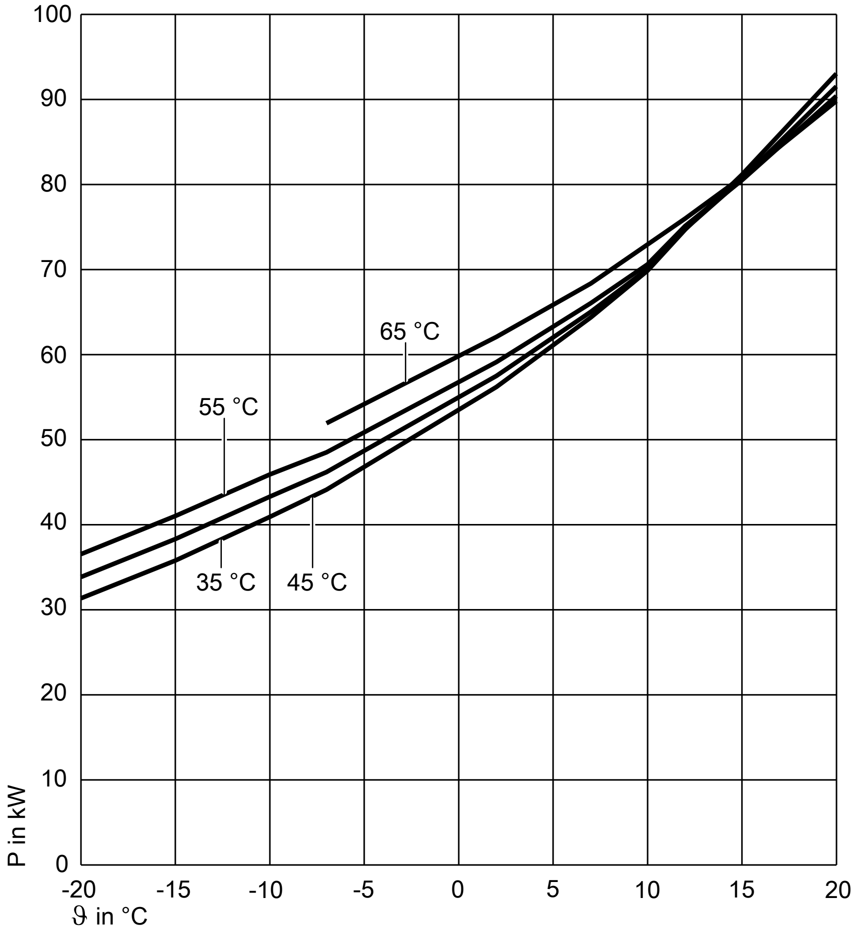
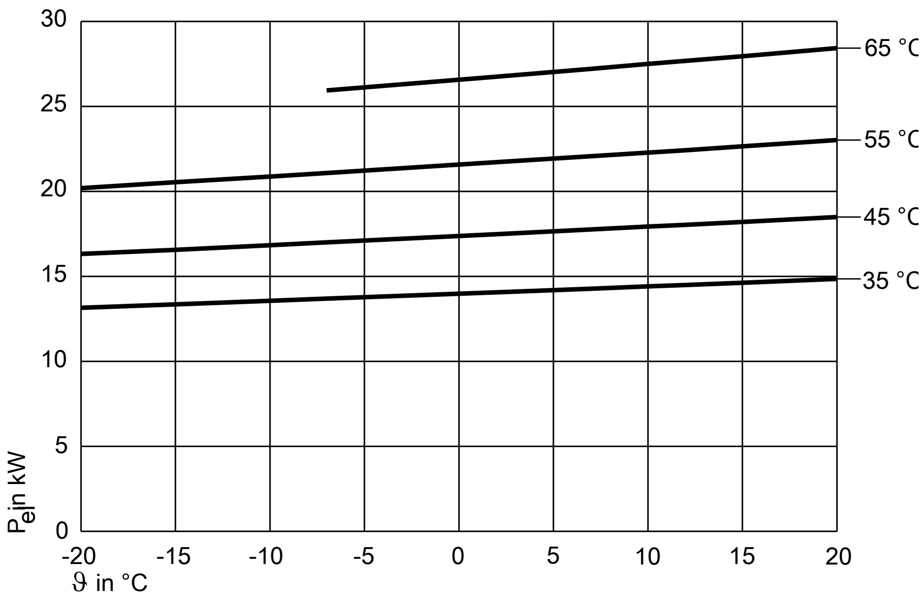
#### Heating output at flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C




#### Power consumption at flow temperatures 35 °C, 45 °C, 55 °C, 65 °C

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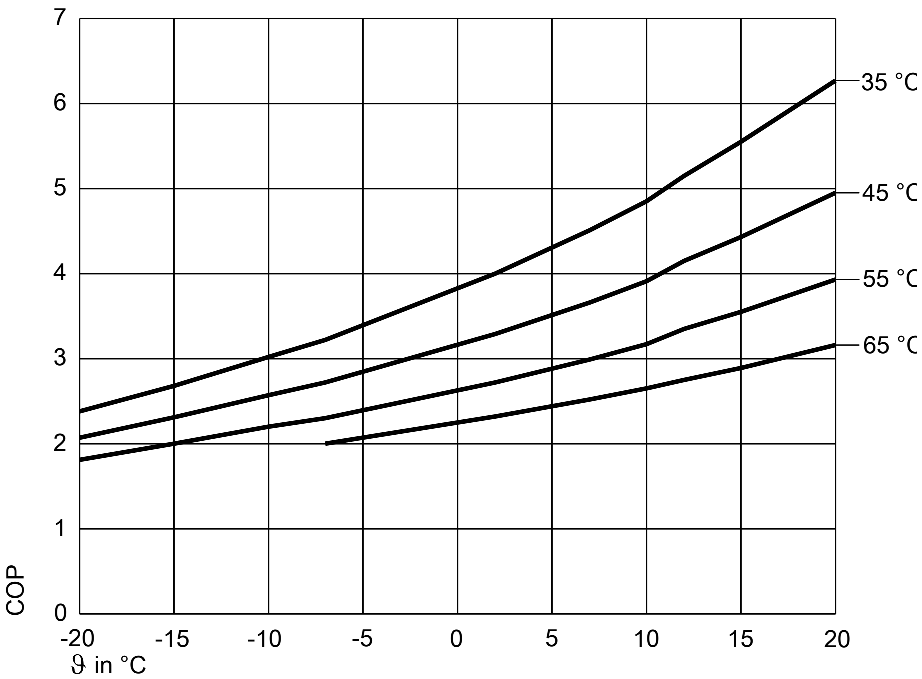
**Coefficient of performance COP at flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C**




| | |
|---|---|
| ϑ | Air intake temperature |
| P | Heating output |
| $P_{el}$ | Power consumption |
| COP | Performance factor |

***Note***
- *The COP data in the tables and graphs was calculated with reference to EN 14511.*
- *Performance characteristics apply to new appliances with clean plate heat exchangers.*

**Heating performance data**

| **Operating point** | | **W** | **°C** | | | | | **35** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A** | **°C** | **–20** | **–15** | **–10** | **–7** | **2** | **7** | **10** | **12** | **15** | **20** |
| Heating output | | | kW | 31.34 | 35.78 | 40.91 | 44.11 | 56.19 | 64.37 | 69.86 | 74.71 | 81.15 | 93.03 |
| Power consumption | | | kW | 13.15 | 13.35 | 13.56 | 13.69 | 14.06 | 14.27 | 14.41 | 14.49 | 14.62 | 14.85 |
| Coefficient of performance ε (COP) | | | | 2.38 | 2.68 | 3.02 | 3.22 | 4.00 | 4.51 | 4.85 | 5.15 | 5.55 | 6.27 |

| **Operating point** | | **W** | **°C** | | | | | **45** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A** | **°C** | **–20** | **–15** | **–10** | **–7** | **2** | **7** | **10** | **12** | **15** | **20** |
| Heating output | | | kW | 33.84 | 38.31 | 43.29 | 46.18 | 57.49 | 65.03 | 70.05 | 74.76 | 80.64 | 91.53 |
| Power consumption | | | kW | 16.32 | 16.56 | 16.83 | 17.00 | 17.48 | 17.76 | 17.93 | 18.03 | 18.20 | 18.49 |
| Coefficient of performance ε (COP) | | | | 2.07 | 2.31 | 2.57 | 2.72 | 3.29 | 3.66 | 3.91 | 4.15 | 4.43 | 4.95 |

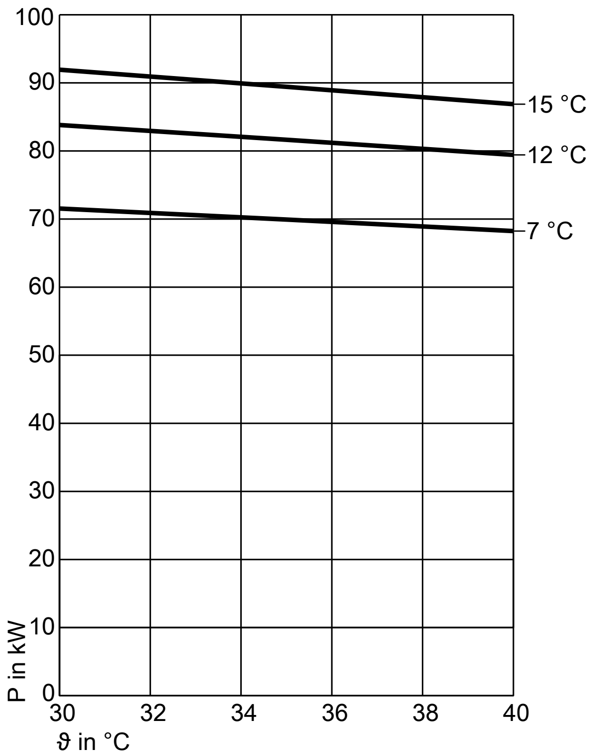
| **Operating point** | | **W** | **°C** | | | | | **55** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A** | **°C** | **–20** | **–15** | **–10** | **–7** | **2** | **7** | **10** | **12** | **15** | **20** |
| Heating output | | | kW | 36.53 | 41.02 | 45.90 | 48.50 | 59.12 | 66.05 | 70.60 | 75.13 | 80.50 | 90.40 |
| Power consumption | | | kW | 20.19 | 20.54 | 20.87 | 21.08 | 21.72 | 22.07 | 22.28 | 22.42 | 22.65 | 23.02 |
| Coefficient of performance ε (COP) | | | | 1.81 | 2.00 | 2.20 | 2.30 | 2.72 | 2.99 | 3.17 | 3.35 | 3.55 | 3.93 |

| **Operating point** | | **W** | **°C** | | | | | **65** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **A** | **°C** | **–20** | **–15** | **–10** | **–7** | **2** | **7** | **10** | **12** | **15** | **20** |
| Heating output | | | kW | | | | 51.92 | 62.08 | 68.36 | 72.94 | 76.00 | 80.87 | 89.81 |
| Power consumption | | | kW | | | | 25.94 | 26.75 | 27.21 | 27.50 | 27.68 | 27.95 | 28.43 |
| Coefficient of performance ε (COP) | | | | | | | 2.00 | 2.32 | 2.52 | 2.65 | 2.75 | 2.89 | 3.16 |

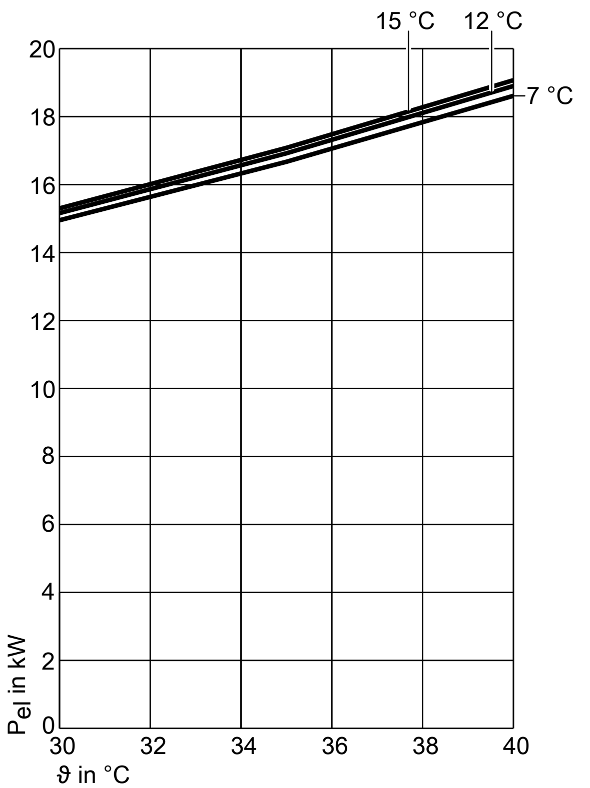
2

## Cooling performance graphs - type AWO-AC 202.A064

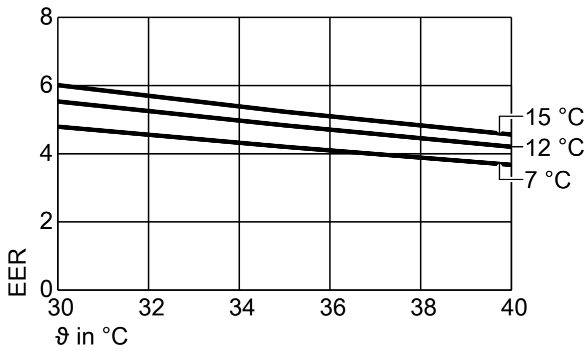
**Cooling capacity at flow temperatures 15 °C, 12 °C, 7 °C**




**Power consumption for cooling at flow temperatures 15 °C, 12 °C, 7 °C**




**Energy efficiency ratio EER at flow temperatures of 15 °C, 12 °C, 7 °C**




| | |
|---|---|
| ϑ | Air intake temperature |
| P | Cooling capacity |
| $P_{el}$ | Power consumption |
| EER | Performance factor |

***Note***

- *The EER data in the tables and graphs was calculated with reference to EN 14511.*
- *Performance characteristics apply to new appliances with clean plate heat exchangers.*

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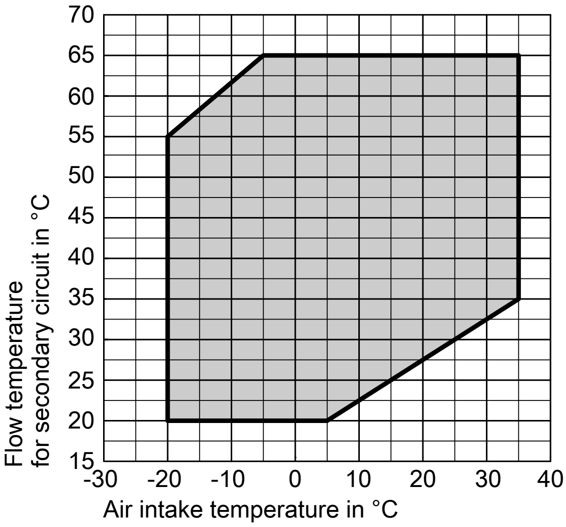
### Cooling performance data

| Operating point | W | °C | 15 | | | 12 | | | 7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | °C | 30 | 35 | 40 | 30 | 35 | 40 | 30 | 35 | 40 |
| Cooling capacity | | kW | 91.93 | 89.42 | 86.87 | 83.81 | 81.64 | 79.42 | 71.54 | 69.92 | 68.23 |
| Power consumption | | kW | 15.30 | 17.08 | 19.07 | 15.16 | 16.92 | 18.90 | 14.95 | 16.67 | 18.61 |
| Energy efficiency ratio EER | | | 6.01 | 5.23 | 4.56 | 5.53 | 4.83 | 4.20 | 4.79 | 4.20 | 3.67 |

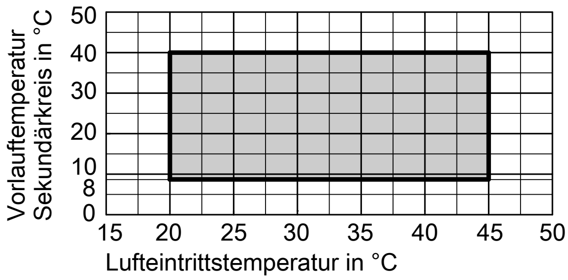
## Application limits - type AWO-AC 204.A128 to EN 14511

Secondary circuit spread: 5 K

### Heating




### Cooling




Application limits for room cooling with a flow temperature of approx. 20 °C. Higher flow temperatures in cooling mode for technical applications such as server cooling.

***Note***

- *The max. achievable flow temperature and the application limits vary by no more than ±2 K. When flow temperatures are low in the secondary circuit, the minimum flow rate must be maintained: See "Specification".*
- *The healing energy required to defrost the evaporator must be available at all times. The min. return temperature in the secondary circuit must therefore be above 18 °C in continuous operation.*

## Heating performance graphs - type AWO-AC 204.A128

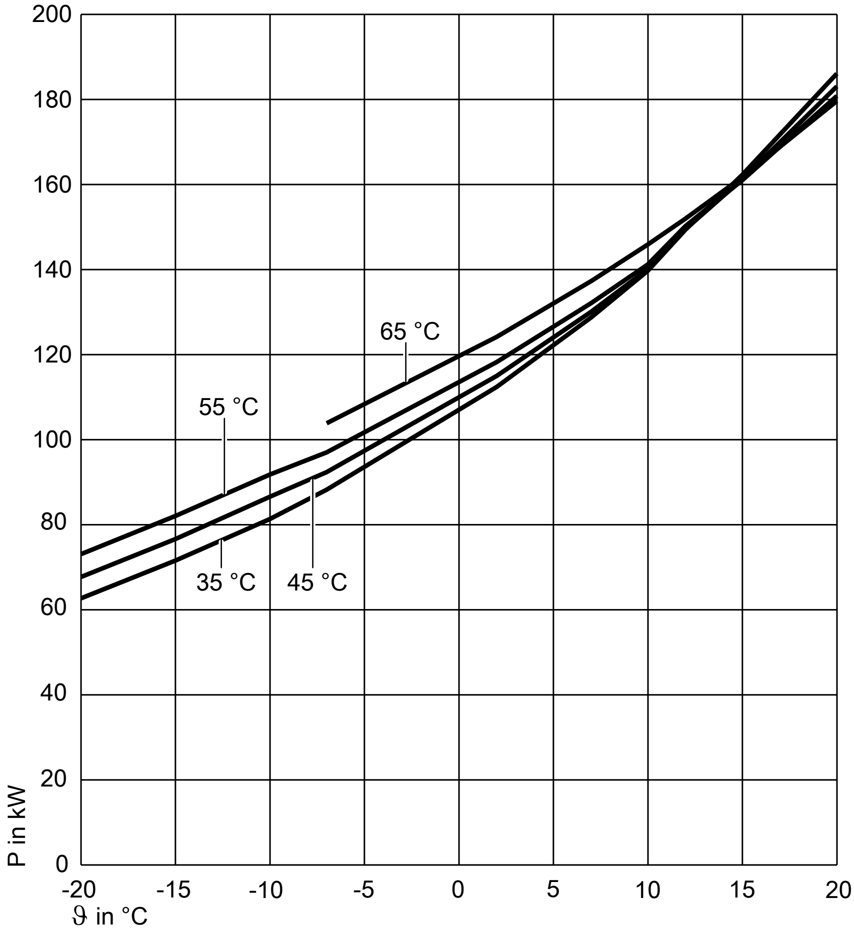
***Note***

*The values shown apply to 4 active compressors.*



2

**Heating output at flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C**



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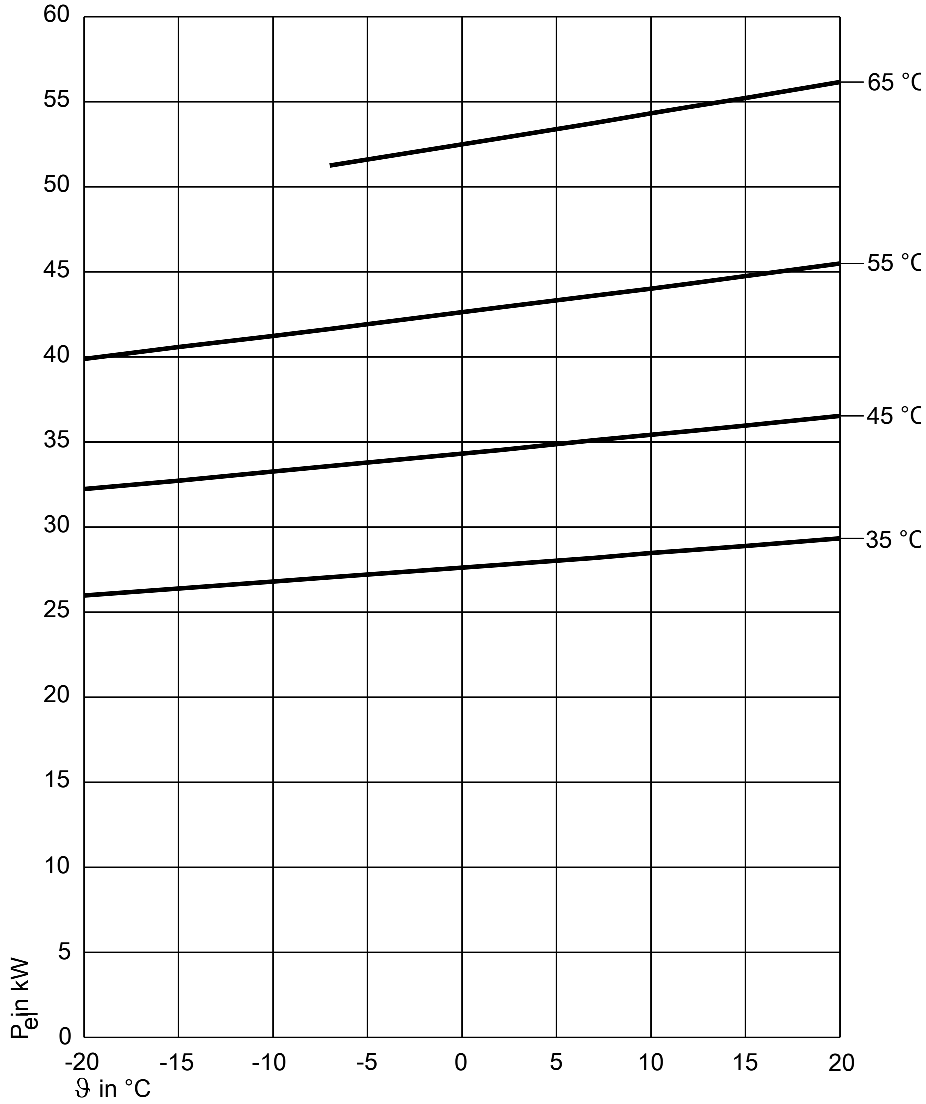
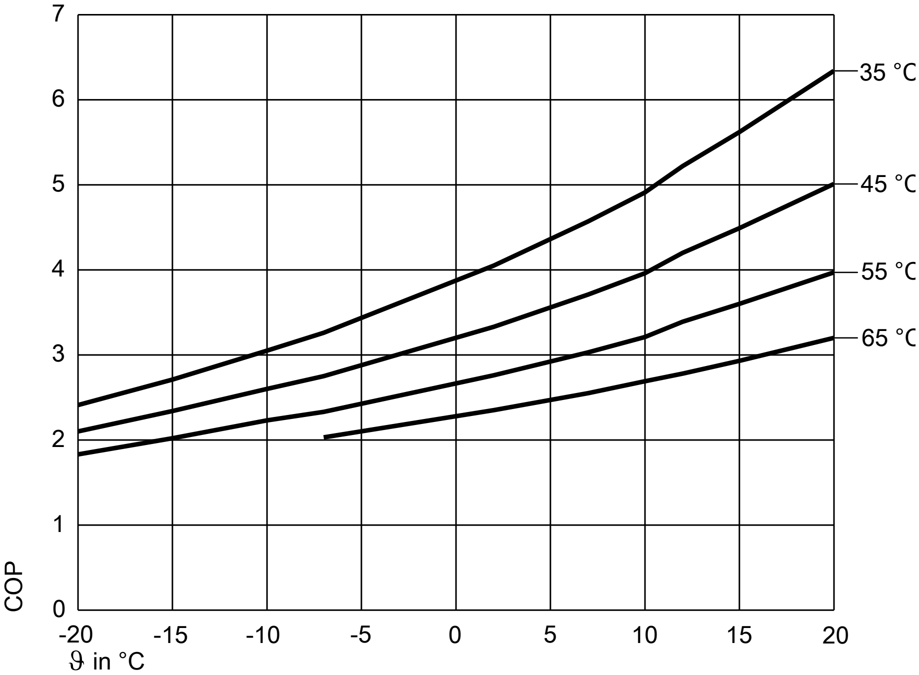
**Power consumption at flow temperatures 35 °C, 45 °C, 55 °C, 65 °C**



2

**Coefficient of performance COP at flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C**




ϑ Air intake temperature
P Heating output
$P_{el}$ Power consumption
COP Performance factor

***Note***
- *The COP data in the tables and graphs was calculated with reference to EN 14511.*
- *Performance characteristics apply to new appliances with clean plate heat exchangers.*

**Heating performance data**

| Operating point W | °C | 35 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | °C | –20 | –15 | –10 | –7 | 2 | 7 | 10 | 12 | 15 | 20 |
| Heating output | kW | 62.67 | 71.56 | 81.33 | 88.22 | 112.39 | 128.74 | 139.72 | 149.42 | 162.29 | 186.07 |
| Power consumption | kW | 25.97 | 26.38 | 26.79 | 27.04 | 27.77 | 28.18 | 28.47 | 28.63 | 28.88 | 29.33 |
| Coefficient of performance ε (COP) | | 2.41 | 2.71 | 3.05 | 3.26 | 4.05 | 4.57 | 4.91 | 5.22 | 5.62 | 6.34 |

| Operating point W | °C | 45 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | °C | –20 | –15 | –10 | –7 | 2 | 7 | 10 | 12 | 15 | 20 |
| Heating output | kW | 67.69 | 76.62 | 86.57 | 92.35 | 114.98 | 130.07 | 140.11 | 149.52 | 161.27 | 183.06 |
| Power consumption | kW | 32.23 | 32.72 | 33.26 | 33.58 | 34.52 | 35.10 | 35.42 | 35.63 | 35.96 | 36.53 |
| Coefficient of performance ε (COP) | | 2.10 | 2.34 | 2.60 | 2.75 | 3.33 | 3.71 | 3.96 | 4.20 | 4.49 | 5.01 |

| Operating point W | °C | 55 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | °C | –20 | –15 | –10 | –7 | 2 | 7 | 10 | 12 | 15 | 20 |
| Heating output | kW | 73.06 | 82.05 | 91.79 | 97.00 | 118.24 | 132.10 | 141.20 | 150.26 | 161.01 | 180.81 |
| Power consumption | kW | 39.88 | 40.58 | 41.23 | 41.64 | 42.91 | 43.60 | 44.01 | 44.30 | 44.75 | 45.49 |
| Coefficient of performance ε (COP) | | 1.83 | 2.02 | 2.23 | 2.33 | 2.76 | 3.03 | 3.21 | 3.39 | 3.60 | 3.97 |

| Operating point W | °C | 65 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | °C | –20 | –15 | –10 | –7 | 2 | 7 | 10 | 12 | 15 | 20 |
| Heating output | kW | | | | 103.84 | 124.16 | 137.28 | 145.89 | 152.00 | 161.74 | 179.63 |
| Power consumption | kW | | | | 51.25 | 52.85 | 53.75 | 54.32 | 54.69 | 55.22 | 56.16 |
| Coefficient of performance ε (COP) | | | | | 2.03 | 2.35 | 2.55 | 2.69 | 2.78 | 2.93 | 3.20 |

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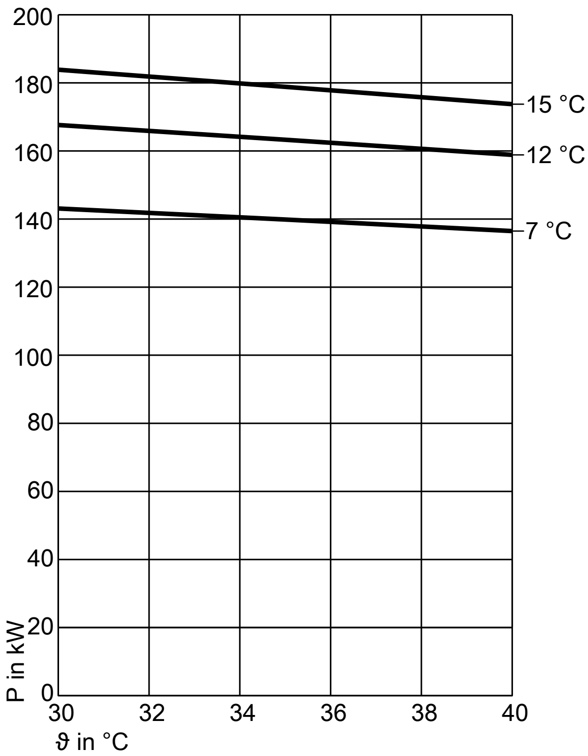
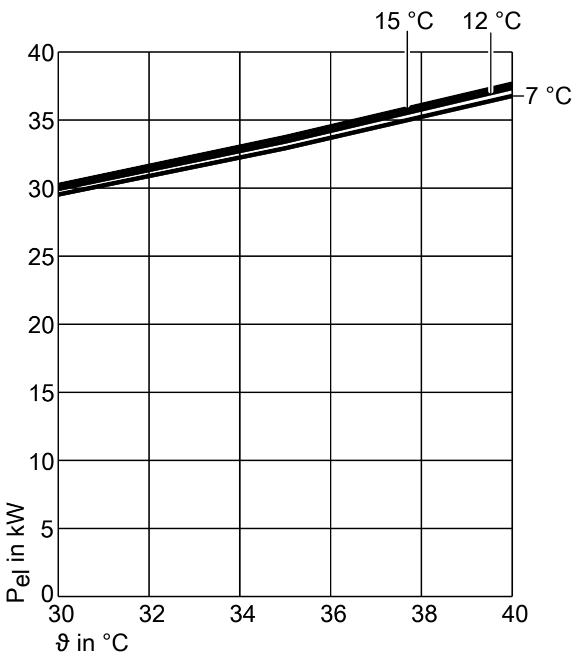
## Cooling performance graphs - type AWO-AC 204.A128

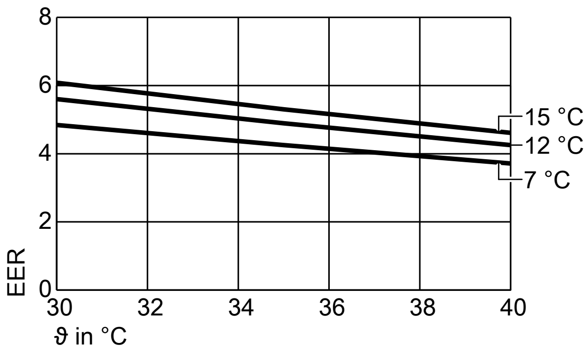
**Cooling capacity at flow temperatures 15 °C, 12 °C, 7 °C**




**Power consumption for cooling at flow temperatures 15 °C, 12 °C, 7 °C**




**Energy efficiency ratio EER at flow temperatures of 15 °C, 12 °C, 7 °C**




| | |
|---|---|
| ϑ | Air intake temperature |
| P | Cooling capacity |
| $P_{el}$ | Power consumption |
| EER | Performance factor |

***Note***
- *The EER data in the tables and graphs was calculated with reference to EN 14511.*
- *Performance characteristics apply to new appliances with clean plate heat exchangers.*

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**Cooling performance data**

| Operating point | W | °C | 15 | | | 12 | | | 7 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | °C | 30 | 35 | 40 | 30 | 35 | 40 | 30 | 35 | 40 |
| Cooling capacity | | kW | 183.86 | 178.83 | 173.74 | 167.62 | 163.29 | 158.85 | 143.09 | 139.85 | 136.46 |
| Power consumption | | kW | 30.23 | 33.75 | 37.67 | 29.94 | 33.42 | 37.35 | 29.53 | 32.93 | 36.77 |
| Energy efficiency ratio EER | | | 6.08 | 5.30 | 4.61 | 5.60 | 4.89 | 4.25 | 4.84 | 4.25 | 3.71 |

# Installation accessories

## 3.1 Overview

| Accessories | Part no. | Vitocal 200-A Pro, type AWO-AC | | |
|---|---|---|---|---|
| | | 201.032 | 202.064 | 204.128 |
| Installation accessories (standard delivery): See page 26. | | | | |
| Flow switch JSF-1E | - | X | X | X |
| Hydraulic accessories: See page 27 onwards. | | | | |
| Hydraulic connection set | | | | |
| – DN 1½ | 7967127 | X | | |
| – DN 2 | 7967128 | | X | |
| – DN 2½ | 7967130 | | | X |
| Circulation pump | | | | |
| – Wilo Stratos MAXO 40/0.5-8 | 7635543 | X | | |
| – Wilo Stratos MAXO 65/0.5-9 | 7635553 | | X | |
| – Wilo Stratos MAXO 80/0.5-6 | 7635556 | | | X |
| Motorised ball valve with actuator and male thread | | | | |
| – DN 40, G 2¼, PN 16, Kvs 25.0 $m^3$/h | 7377822 | X | | |
| – DN 50, G 2¾, PN 16, Kvs 25.0 $m^3$/h | 7973246 | | X | |
| Motorised ball valve with actuator and flange | | | | |
| – DN 65, PN 16, Kvs 63.0 $m^3$/h | 7377824 | | | X |
| 3-way valve with actuator and male thread | | | | |
| – DN 40, G 2¼, PN 25, Kvs 16.0 $m^3$/h | 7973252 | X | | |
| – DN 50, G 2¾, PN 25, Kvs 25.0 $m^3$/h | 7973253 | | X | |
| 3-way valve with actuator and flange | | | | |
| – DN 65, PN 6, Kvs 58.0 $m^3$/h | 7377834 | | | X |

| Optional accessories | Part no. |
|---|---|
| Hydraulic accessories: See page 27 onwards. | |
| Motorised ball valve with actuator and male thread | |
| – DN 15, G 1, PN 16, Kvs 2.5 $m^3$/h | 7377818 |
| – DN 20, G 1¼, PN 16, Kvs 6.3 $m^3$/h | 7377819 |
| – DN 25, G 1½, PN 16, Kvs 10.0 $m^3$/h | 7377820 |
| – DN 32, G 2, PN 16, Kvs 16.0 $m^3$/h | 7377821 |
| Motorised ball valve with actuator and flange | |
| – DN 80, PN 16, Kvs 100.0 $m^3$/h | 7377828 |
| – DN 100, PN 16, Kvs 160.0 $m^3$/h | 7377827 |
| – DN 125, PN 16, Kvs 250.0 $m^3$/h | 7973247 |
| 3-way valve with actuator and male thread | |
| – DN 15, G 1, PN 40, Kvs 2.5 $m^3$/h | 7973248 |
| – DN 20, G 1¼, PN 40, Kvs 6.3 $m^3$/h | 7973249 |
| – DN 25, G 1½, PN 40, Kvs 10.0 $m^3$/h | 7973250 |
| – DN 32, G 2, PN 25, Kvs 16.0 $m^3$/h | 7973251 |
| 3-way valve with actuator and flange | |
| – DN 80, PN 6, Kvs 90.0 $m^3$/h | 7377833 |
| – DN 100, PN 6, Kvs 145.0 $m^3$/h | 7377835 |
| – DN 125, PN 6, Kvs 220.0 $m^3$/h | 7377836 |
| Valve fitting | |
| – DN 15, G 1 | 7973240 |
| – DN 20, G 1¼ | 7973241 |
| – DN 25, G 1½ | 7973242 |
| – DN 32, G 2 | 7973243 |
| – DN 40, G 2¼ | 7973244 |
| – DN 50, G 2¾ | 7973245 |
| Vitocell 100-E heating water buffer cylinder, type SVPB | |
| – Capacity: 950 l, colour: Vitographite | Z024748 |
| – Capacity: 1500 l, colour: Vitographite | Z024749 |
| – Capacity: 2000 l, colour: Vitographite | Z024750 |
| Vitocell 050-E heating water buffer cylinder, type EC Pro | |
| – Capacity: 935 l, colour: Graphite | Z025368 |
| – Capacity: 2100 l, colour: Graphite | Z025369 |
| – Capacity: 5000 l, colour: Graphite | Z025370 |
| Temperature controller | 7151989 |
| Immersion heater EHE | Z012687 |

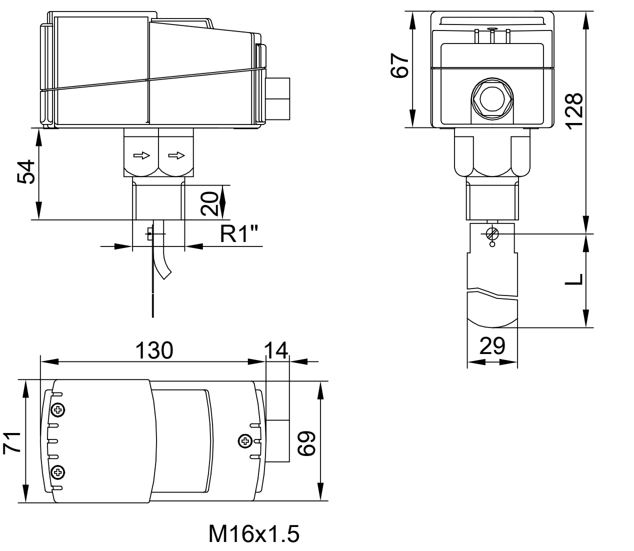
***Note***
*Vitocell 100-E is not suitable for Vitocal 200-A Pro, type AWO-AC 202.A064 and type AWO-AC 204.A128. For these heat pumps use the Vitocell 050-E, type EC Pro and Vitotrans 353 for wall mounting.*
*Do not use the Vitocal 200-A Pro in conjunction with DHW cylinders.*

## 3.2 Installation accessories (standard delivery)

### Flow switch JSF-1E

The flow switch monitors the flow rate in the secondary circuit (heat pump/heating water buffer cylinder).
- With floating changeover contact
- Accuracy
  – Typically: ±15 %
  – Max.: ±20 %

  The accuracy depends on the actual pipe diameter, the amount by which the additional paddle has been shortened and on the installed depth of the appliance.




L Shortened depending on the pipe diameter.

For further details regarding installation: See page 57.

**Specification**

| Type | | JSF-1E |
|---|---|---|
| Switching voltage at 50 Hz | V~ | 24 to 250 |
| Switching current | A | 15 (8) |
| – Min. at 24 V~ | mA | 150 |
| Connection cross-section | $mm^2$ | 1.0 to 2.5 |
| Max. operating pressure | bar | 8 |
| Pressure drop | mbar | 5 to 22 |
| | MPa | 0.5 to 2.2 |
| Protection class according to VDE 0100 | | I |
| IP rating to DIN EN 60529 for connection cable ∅ of 5 to 10 mm | | IP 65 |
| Ambient temperature | °C | –40 to +85 |
| Medium temperature | °C | –50 to +120 |
| Weight | g | 690 |
| Material | | |
| – Casing | | ABS plastic |
| – Threaded body | | Brass (R1) |

## 3.3 Hydraulic accessories

### Hydraulic connection set

For vibration isolation of the flow and return lines
- 2 x flexible hoses, length: 1 m
- Flat gasket (4 pce)
- Thermal insulation hose, diffusion-proof

| Connection | Part no. |
|---|---|
| DN 1½ | **7967127** |
| DN 2 | **7967128** |
| DN 2½ | **7967130** |

### Circulation pump

**Wilo Stratos MAXO**
- High efficiency glandless circulation pump with EC motor and electronic output adjustment
- Can be used for all heating, ventilation and air conditioning applications
- Glandless circulation pump with flange connection
- Speed control via 0 to 10 V signal from the heat pump control unit

| Type | Part no. |
|---|---|
| 40/0.5-8 | **7635543** |
| 65/0.5-9 | **7635553** |
| 80/0.5-6 | **7635556** |

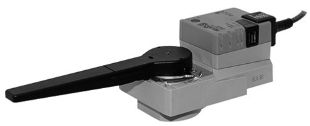


### Motorised ball valve with actuator

- Compact motorised ball valve
- Can be used for room heating and room cooling
- Max. operating temperature: 110 °C
- Max. operating temperature: –10 °C
- Angle of rotation: 95°
- Control: 3-point signal
- Power supply: 230 V/50 Hz
- Runtime: 90 s
- PN 16
- IP 54

Motorised ball valve with male thread

Motorised ball valve with flange



Actuator for motorised ball valve with male thread and flange

| Motorised ball valve with actuator and male thread | Kvs in $m^3/h$ | Part no. |
|---|---|---|
| DN 15, G 1 | 2.5 | **7377818** |
| DN 20, G 1¼ | 6.3 | **7377819** |
| DN 25, G 1½ | 10.0 | **7377820** |
| DN 32, G 2 | 16.0 | **7377821** |
| DN 40, G 2¼ | 25.0 | **7377822** |
| DN 50, G 2¾ | 25.0 | **7973246** |

| Motorised ball valve with actuator and flange | Kvs in $m^3/h$ | Part no. |
|---|---|---|
| DN 65 | 63.0 | **7377824** |
| DN 80 | 100.0 | **7377828** |

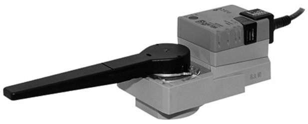
| Motorised ball valve with actuator and flange | Kvs in $m^3/h$ | Part no. |
|---|---|---|
| DN 100 | 160.0 | **7377827** |
| DN 125 | 250.0 | **7973247** |

## 3-way valve with actuator

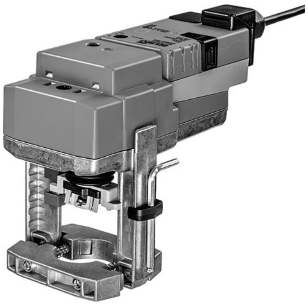
- Compact 3-way valve
- Can be used for room heating and room cooling
- Max. operating temperature: 120 °C
- Min. operating temperature: –10 °C
- Angle of rotation: 90°
- Control: 3-point signal
- Power supply: 230 V/50 Hz
- Runtime: 150 s
- IP 54

3-way valve with male thread

3-way valve with flange



Actuator for 3-way valve with male thread



Actuator for 3-way valve with flange

| 3-way valve with actuator and male thread | Kvs in $m^3/h$ | Part no. |
|---|---|---|
| DN 15, G 1, PN 40 | 2.5 | **7973248** |
| DN 20, G 1¼, PN 40 | 6.3 | **7973249** |
| DN 25, G 1½, PN 40 | 10.0 | **7973250** |
| DN 32, G 2, PN 25 | 16.0 | **7973251** |
| DN 40, G 2¼, PN 25 | 16.0 | **7973252** |
| DN 50, G 2¾, PN 25 | 25.0 | **7973253** |

| 3-way valve with actuator and flange | Kvs in $m^3/h$ | Part no. |
|---|---|---|
| DN 65, PN 6 | 58.0 | **7377834** |
| DN 80, PN 6 | 90.0 | **7377833** |
| DN 100, PN 6 | 145.0 | **7377835** |
| DN 125, PN 6 | 220.0 | **7377836** |

## Valve fitting

- Male to female thread adaptor with union nut and gasket
- Connection to motorised ball valve with actuator or to 3-way valve with actuator
- 2 valve fittings are required for each motorised ball valve and 3 for each 3-way valve

| Connection | Part no. |
|---|---|
| DN 15, G 1 | **7973240** |
| DN 20, G 1¼ | **7973241** |

| Connection | Part no. |
|---|---|
| DN 25, G 1½ | **7973242** |
| DN 32, G 2 | **7973243** |
| DN 40, G 2¼ | **7973244** |
| DN 50, G 2¾ | **7973245** |

## 3.4 Heating water buffer cylinder

### Vitocell 100-E, type SVPB

| Capacity in litres | Colour | Part no. |
|---|---|---|
| 950 | Vitographite | **Z024748** |
| 1500 | Vitographite | **Z024749** |
| 2000 | Vitographite | **Z024750** |

- For storing heating water in conjunction with solar thermal systems, heat pumps and solid fuel boilers
- With removable thermal insulation (standard) and clamping devices for fixing immersion temperature sensors to the cylinder jacket.
- For systems with the following operating data:
  – Heating water flow temperature up to 110 °C
  – Operating pressure on the heating water side up to 6 bar (0.6 MPa)

***Note***
*For DHW heating, the heating water buffer cylinders may only be combined with the Vitotrans 353 freshwater module.*
*Use Vitocal 200-A Pro only in conjunction with the Vitocell 100-E with 950 to 2000 l capacity.*

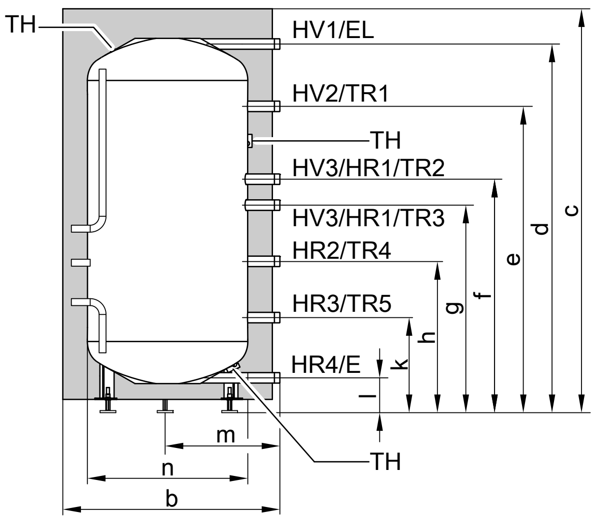
***Sizing entry points***
*The actual dimensions of the DHW cylinder may vary slightly due to manufacturing tolerances.*

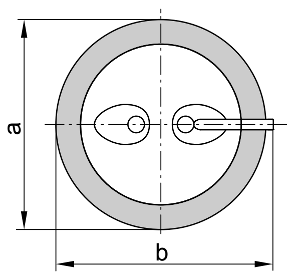
**Specification**

| **Type** | | **SVPB** | | |
|---|---|---|---|---|
| **Cylinder capacity (AT: Actual water capacity)** | l | **600** | **750** | **950** |
| **Permissible heating water flow temperature** | °C | 110 | 110 | 110 |
| **Permissible operating pressure on the heating water side** | bar | 6 | 6 | 6 |
| | MPa | 0.6 | 0.6 | 0.6 |
| **Dimensions** | | | | |
| Length a (∅) | | | | |
| – Incl. thermal insulation | mm | 1064 | 1064 | 1064 |
| – Excl. thermal insulation | mm | 790 | 790 | 790 |
| Width b | | | | |
| – Incl. thermal insulation | mm | 1119 | 1119 | 1119 |
| – Excl. thermal insulation | mm | 1042 | 1042 | 1042 |
| Height c | | | | |
| – Incl. thermal insulation | mm | 1645 | 1900 | 2200 |
| – Excl. thermal insulation | mm | 1520 | 1814 | 2120 |
| Height when tilted | | | | |
| – Excl. thermal insulation and adjustable feet | mm | 1630 | 1890 | 2195 |
| **Weight** | | | | |
| – Incl. thermal insulation | kg | 112 | 132 | 151 |
| – Excl. thermal insulation | kg | 89 | 104 | 119 |
| **Connections** (male thread) | | | | |
| Heating water flow and return | R | 2 | 2 | 2 |
| **Standby heat loss** | kWh/24 h | 2.10 | 2.25 | 2.45 |
| **Energy efficiency class** | | — | — | — |
| **Colour** | | | | |
| – Vitocell 100-E | | Vitographite<br>Vitosilver<br>Vitopearlwhite | | |

3

**Dimensions**




E Drain
EL Air vent valve

HR Heating water return
HV Heating water flow
TH Retainer for thermometer sensor or additional sensors (clamping bracket)
TR Clamping device for securing immersion temperature sensors to the cylinder jacket, with fixing points for 3 immersion temperature sensors per clamping device

**Dimensions**

| **Cylinder capacity** | | **l** | **600** | **750** | **950** |
|---|---|---|---|---|---|
| Length (∅) | a | mm | 1064 | 1064 | 1064 |
| Width | b | mm | 1119 | 1119 | 1119 |
| Height | c | mm | 1645 | 1900 | 2200 |
| | d | mm | 1497 | 1777 | 2083 |
| | e | mm | 1296 | 1559 | 1864 |
| | f | mm | 926 | 1180 | 1300 |
| | g | mm | 785 | 1039 | 1159 |
| | h | mm | 598 | 676 | 752 |
| | k | mm | 355 | 386 | 386 |
| | l | mm | 155 | 155 | 155 |
| | m | mm | 565 | 565 | 565 |
| ∅ excl. thermal insulation | n | mm | ∅ 790 | ∅ 790 | ∅ 790 |

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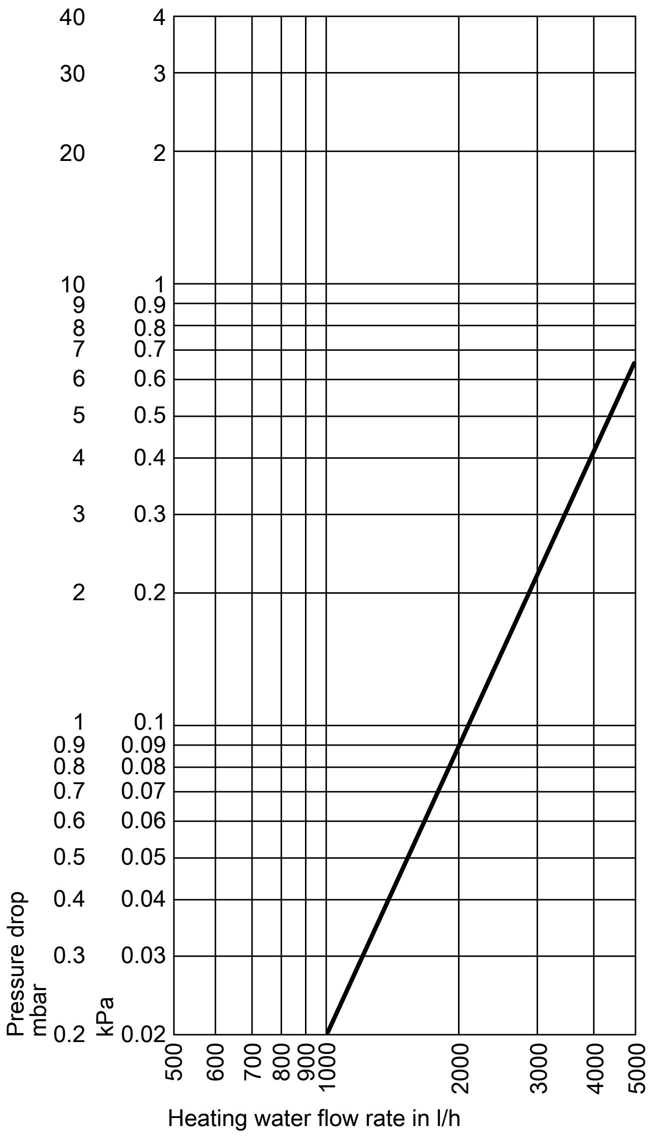
**Pressure drop on the heating water side**




***Sizing entry points***

*The actual dimensions of the DHW cylinder may vary slightly due to manufacturing tolerances.*



**Specification**

| **Type** | | **SVPB** | | | |
|---|---|---|---|---|---|
| **Cylinder capacity (AT: Actual water capacity)** | **l** | **1500** | | **2000** | |
| **Thermal insulation** | | Standard (2-part) | Highly efficient (3-part) | Standard (2-part) | Highly efficient (3-part) |
| **Permissible heating water flow temperature** | °C | 110 | 110 | 110 | 110 |
| **Permissible operating pressure on the heating water side** | bar<br>MPa | 6<br>0.6 | 6<br>0.6 | 6<br>0.6 | 6<br>0.6 |
| **Dimensions** | | | | | |
| Length a (∅) | | | | | |
| – Incl. thermal insulation | mm | 1310 | 1400 | 1310 | 1400 |
| – Excl. thermal insulation | mm | 1100 | 1100 | 1100 | 1100 |
| Width b | | | | | |
| – Incl. thermal insulation | mm | 1385 | 1430 | 1385 | 1430 |
| – Excl. thermal insulation | mm | 1280 | 1280 | 1280 | 1280 |
| Height c | | | | | |
| – Incl. thermal insulation | mm | 2051 | 2096 | 2479 | 2546 |
| – Excl. thermal insulation | mm | 1939 | 1939 | 2378 | 2378 |
| Height when tilted excl. thermal insulation and adjustable feet | mm | 1967 | 1967 | 2402 | 2402 |

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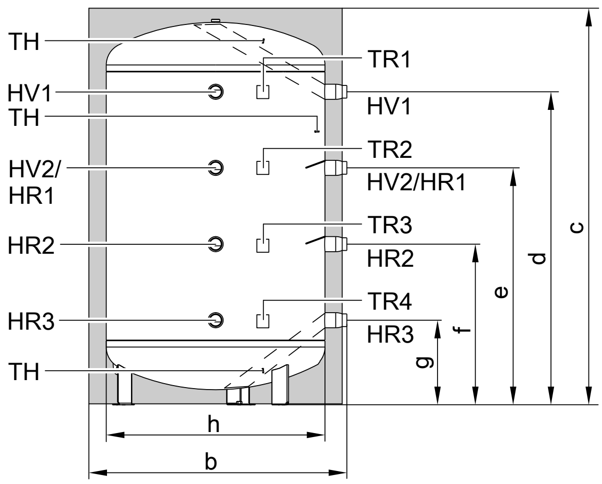
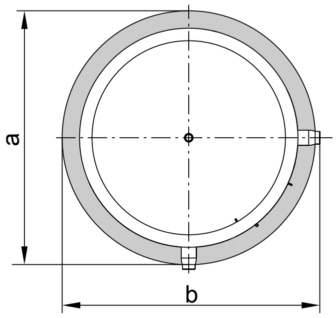
| Type | | SVPB | | | |
|---|---|---|---|---|---|
| **Cylinder capacity (AT: Actual water capacity)** | l | 1500 | | 2000 | |
| **Weight** | | | | | |
| – Incl. thermal insulation | kg | 217 | 224 | 253 | 265 |
| – Excl. thermal insulation | kg | 170 | 170 | 201 | 201 |
| **Connections** (male thread) | | | | | |
| Air vent valve | R | 1 | 1 | 1 | 1 |
| Heating water flow and return | R/G | 2 | 2 | 2 | 2 |
| **Standby heat loss** | kWh/24 h | 3.7 | 2.9 | 4.55 | 3.2 |
| **Colour** | | | | | |
| – Vitocell 100-E | | Vitographite | | | |

3

**Dimensions**




HR Heating water return (2 on each level)
HV Heating water flow (2 on each level)
TH Retainer for thermometer sensor or additional sensor (clamping bracket)
TR Clamping device for securing immersion temperature sensors to the cylinder jacket, with fixing points for 3 immersion temperature sensors per clamping device

**Dimensions**

| Cylinder capacity | | l | 1500 | | 2000 | |
|---|---|---|---|---|---|---|
| **Thermal insulation** | | | **Standard (2-part)** | **Highly efficient (3-part)** | **Standard (2-part)** | **Highly efficient (3-part)** |
| Length (∅) | a | mm | 1310 | 1400 | 1310 | 1400 |
| Width | b | mm | 1385 | 1430 | 1385 | 1430 |
| Height | c | mm | 2051 | 2096 | 2479 | 2546 |
| | d | mm | 1513 | 1513 | 1953 | 1953 |
| | e | mm | 1165 | 1165 | 1460 | 1460 |

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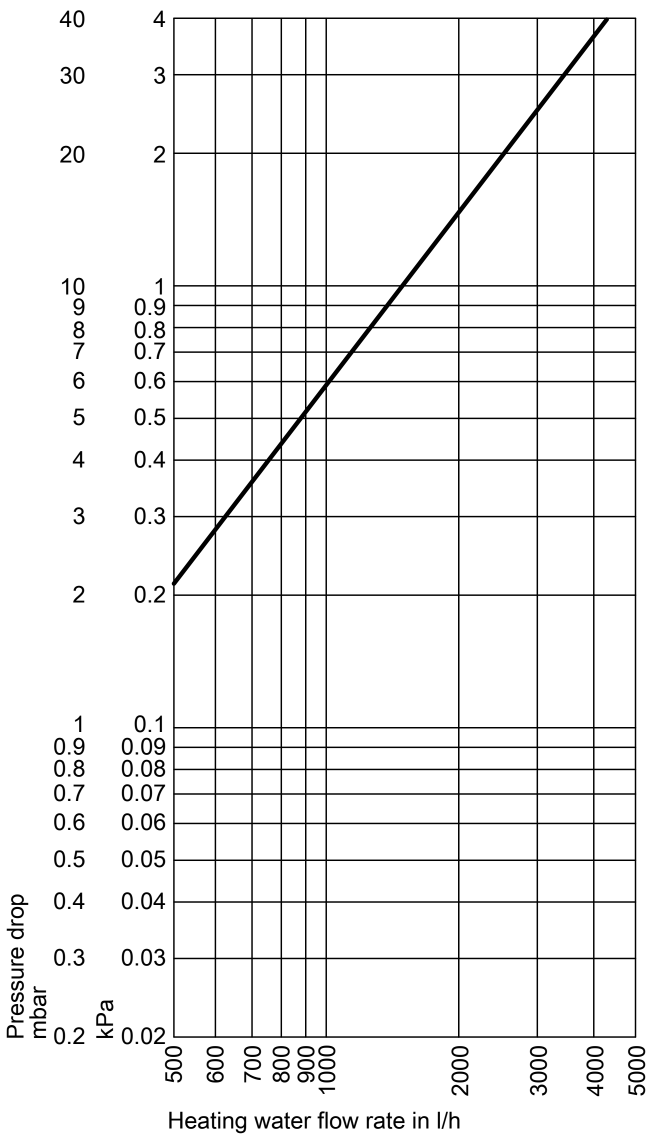
| Cylinder capacity | | l | 1500 | | 2000 | |
|---|---|---|---|---|---|---|
| Thermal insulation | | | Standard (2-part) | Highly efficient (3-part) | Standard (2-part) | Highly efficient (3-part) |
| | f | mm | 816 | 816 | 962 | 962 |
| | g | mm | 468 | 468 | 467 | 467 |
| ∅ excl. thermal insulation | h | mm | 1100 | 1100 | 1100 | 1100 |

**Pressure drop on the heating water side**




### Vitocell 050-E EC-Pro

| Capacity in litres | Colour | Part no. |
|---|---|---|
| 935 | Graphite | **Z025368** |
| 2100 | Graphite | **Z025369** |
| 5000 | Graphite | **Z025370** |

- Heating water buffer cylinder with 7 connections
- For use in systems with CHP units, heat pumps and biomass
- Max. permissible operating pressure: 6 bar

***Sizing entry points***
*The actual dimensions of the heating water buffer cylinder may vary slightly due to manufacturing tolerances.*

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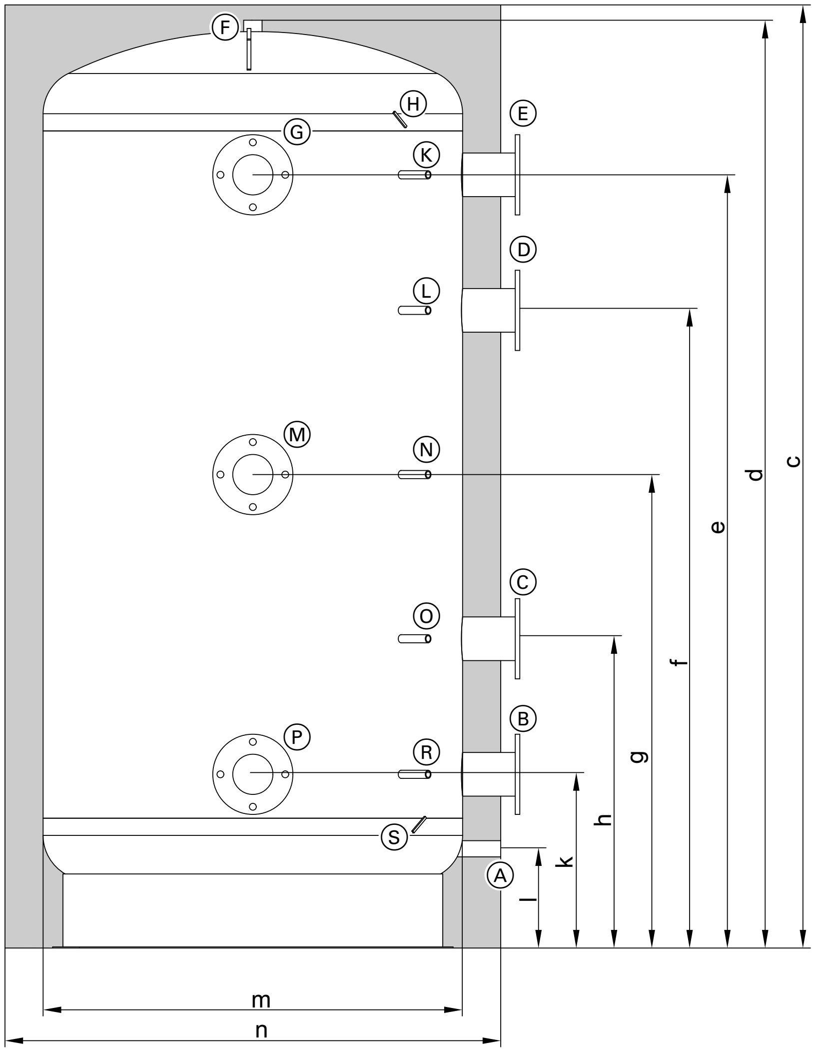
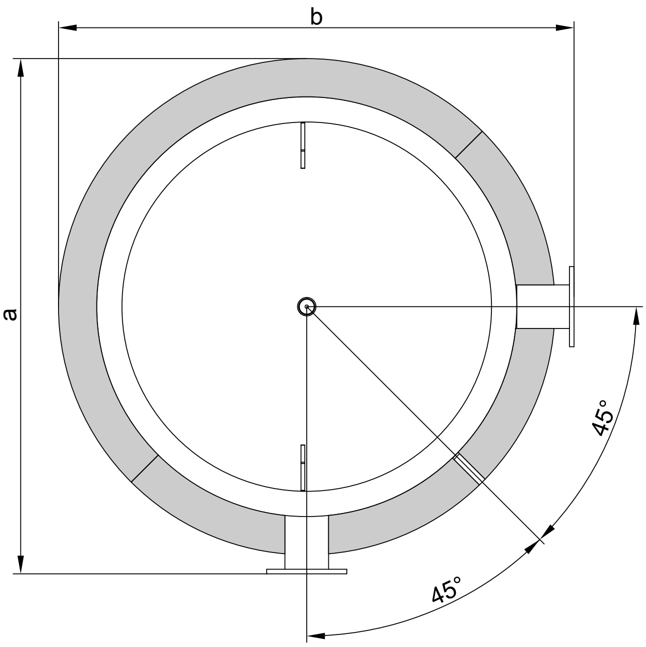
**Specification**

| | | | | |
|---|---|---|---|---|
| **Cylinder capacity (AT: Actual water capacity)** | **l** | **935** | **2010** | **5000** |
| **Permissible heating water flow temperature** | °C | 95 | 95 | 95 |
| **Permissible operating pressure on the heating water side** | bar<br>MPa | 6<br>0.6 | 6<br>0.6 | 6<br>0.6 |
| **Dimensions** | | | | |
| Length a (∅) | | | | |
| – Incl. thermal insulation | mm | 1090 | 1400 | 1800 |
| – Excl. thermal insulation | mm | 790 | 1100 | 1600 |
| Width b | | | | |
| – Incl. thermal insulation | mm | 1090 | 1400 | 1800 |
| – Excl. thermal insulation | mm | 790 | 1100 | 1600 |
| Handling dimension (clear width of the door opening) | mm | 900 | 1300 | 1700 |
| Height c | | | | |
| – Incl. thermal insulation | mm | 2190 | 2500 | 2890 |
| – Excl. thermal insulation | mm | 2120 | 2430 | 2820 |
| Height when tilted | | | | |
| – Excl. thermal insulation | mm | 2300 | 2700 | 3250 |
| **Weight** incl. thermal insulation | kg | 150 | 400 | 700 |
| **Connections** | | | | |
| Heating water flow and return | R/G | DN 50 female thread | DN 100, PN 6 | DN 150, PN 6 |
| Air vent valve | R | 1¼ | 1¼ | 1¼ |
| Drain outlet | R | DN 32 female thread | DN 32 female thread | DN 32 female thread |
| **Standby heat loss** | kWh/24 h | 3.4 | 4.5 | 15.5 |
| **Energy efficiency class** | | C | — | — |
| **Colour** | | Vitographite | Vitographite | Vitographite |

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Ⓐ Drain outlet
Ⓑ Base load generator return

Ⓒ Heating water return
And
Connection for heating lance
Ⓓ Base load generator flow
Ⓔ Heating water flow
Ⓕ Air vent valve
Ⓖ Peak load generator flow
And
Connection for heating lance
Ⓗ Terminal 1 for immersion temperature sensor as contact temperature sensor
Ⓚ Sensor well 1 with sensor retainer for max. 3 immersion temperature sensors
Ⓛ Sensor well 2 with sensor retainer for max. 3 immersion temperature sensors
Ⓜ Peak load generator return
Ⓝ Sensor well 3 with sensor retainer for max. 3 immersion temperature sensors
Ⓞ Sensor well 4 with sensor retainer for max. 3 immersion temperature sensors
Ⓟ Spare connection for cascade
Ⓡ Sensor well 5 with sensor retainer for max. 3 immersion temperature sensors
Ⓢ Terminal 2 for immersion temperature sensor as contact temperature sensor

**Connections**

| Cylinder capacity | 935 l | 2010 l | 5000 l |
|---|---|---|---|
| – Flow and return | DN 50 female thread | DN 100, PN 6 | DN 150, PN 6 |
| – Air vent valve | 1¼ | 1¼ | 1¼ |
| – Drain outlet | DN 32 female thread | DN 32 female thread | DN 32 female thread |
| – Immersion pipe for cylinder temperature sensors | DN 15 | DN 15 | DN 15 |

**Dimensions**

| Cylinder capacity | l | 935 | 2010 | 5000 |
|---|---|---|---|---|
| a | mm | 1090 | 1400 | 1800 |
| b | mm | 1090 | 1400 | 1800 |
| c | mm | 2190 | 2500 | 2890 |
| d | mm | 2120 | 2430 | 2820 |
| e | mm | 1860 | 2025 | 2305 |
| f | mm | 1465 | 1670 | 1885 |
| g | mm | 1070 | 1240 | 1470 |
| h | mm | 675 | 810 | 1055 |
| k | mm | 280 | 455 | 635 |
| l | mm | 170 | 260 | 102 |
| m | mm | 790 | 1100 | 1600 |
| n | mm | 1090 | 1400 | 1800 |

### Temperature controller

**Part no. 7151989**
- With a thermostatic system
- With top-hat rail to be fitted to the DHW cylinder or the wall
- Setting range 30 to 60 °C, adjustable up to 110 °C
- Length of capillary tube: 1400 mm
- Sensor: Ø 6 mm
- Without sensor well

### Immersion heater EHE

**Part no. Z012687**
- Selectable heating output: 4, 8 or 12 kW
- Only for use with soft to medium hard drinking water up to 14 °dH (average hardness level up to 2.5 mol/m$^3$)
- High limit temperature cut-out device
- Temperature controller

## Design information

## 4.1 Power supply and tariffs

According to current Federal tariffs [Germany], the electrical demand for heat pumps is considered domestic usage. Where heat pumps are used to heat buildings, the local power supply company must first give permission [check with your local power supply utility]. Check the connection conditions specified by your local power supply utility for the stated equipment details. It is crucial to establish whether mono mode and/or mono energetic heat pump operation is feasible in the supply area.

It is also important to obtain information about standing charges and energy tariffs, about the options for utilising off-peak electricity during the night and about any power-off times.
Address any questions relating to these issues to your customer's local power supply utility.

### Application procedure

The following details are required to assess the effect of the heat pump operation on the grid of your local power supply utility:
- User address
- Location where the heat pump is to be used
- Type of demand in accordance with general tariffs (domestic, agricultural, commercial, professional and other use)
- Intended heat pump operating mode
- Heat pump manufacturer

- Type of heat pump
- Connected load in kW (from rated voltage and rated current)
- Max. starting current in A
- Max. heat load of the building in kW

### Power-OFF

It is possible for the power supply utility to shut down the compressor and instantaneous heating water heater (if installed). The ability to carry out such a shutdown may be a power supply utility requirement for providing a lower tariff.

This must **not** shut down the power supply to the heat pump control unit.

## 4.2 Siting

The heat pumps are suitable for outdoor installation and have a UV-resistant coating that offers a high level of corrosion protection.

***Note***
*When the heat pump is installed in a corrosive atmosphere, the ambient air and the air drawn in by the heat pump contain substances such as ammonia, sulphur, chloride, salts, etc. These substances can cause internal and external damage to the heat pump.*
*Viessmann heat pumps for outdoor installation are designed for operation in moderately aggressive atmospheres. This makes them suitable for installation in urban and industrial environments as well as in coastal areas.*
*Higher corrosive loads can cause visual defects on the casing or affect operation. The service life of the heat pump may be shortened.*

**Installation in coastal areas: Distance < 1000 m**

In coastal areas salt and sand particles in the air increase the likelihood of corrosion:
- Site the heat pump where it is protected from direct onshore wind.
- If necessary provide a wind break on site. Observe the minimum clearances to the heat pump: See following chapters.

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### General siting requirements

- Provide a manual drain for the heating water flow and return lines in any area at risk from frost.
- If the heat pump control unit, secondary circuit pump and heating circuit pumps are ready for operation, the frost protection function of the heat pump control unit is enabled.
  In heat pump systems where a power failure cannot be recognised: operate the heating circuit with a suitable antifreeze or drain it.
- The VIRVS heat pump controller is integrated into the heat pump. The max. length of the bus cable between the VIRVS heat pump controller and the external VIAVS function extension is 200 m. The max. length of the bus cable between 2 VIRVS heat pump controllers is 1000 m.
- For the hydraulic and electrical connection lines and cables, install KG conduits below ground and protect from frost.

**Recommended KG conduits for cables and hydraulic lines**

| | **Type AWO-AC** | | |
|---|---|---|---|
| **Cable/lead/line** | **201.032** | **202.064** | **204.128** |
| Power circuit | DN 100 | DN 100 | DN 100 |
| Extra low voltage (ELV) | DN 50 to DN 100 | DN 50 to DN 100 | DN 50 to DN 100 |
| Flow | DN 125 | DN 200 | DN 200 |
| Return | DN 125 | DN 200 | DN 200 |

Adapt the KG conduits to the diameter of the hydraulic lines and the thermal insulation.

### Floorstanding installation

The heat pump **outside the building** must be sited on solid foundations: See page 40.
If this siting option is not possible, the heat pump can also be installed on a flat roof, giving due consideration to the specific conditions: See the following chapter.

- Lawn areas and vegetation can reduce noise generation. **Only** the heat pump foundations should therefore be made from reverberant material (concrete).
- Never install the heat pump next to living rooms or bedrooms.

### Flat roof installation

If floorstanding installation is not possible due to site conditions, the following engineering measures, amongst others, must be taken into account when installing on a flat roof.

***Note***
*Due to the higher static loads (roof/wind load) and the higher acoustic requirements for flat roof installation, the structural calculations and sound concept require input from specialist design engineers.*

**Installation location**

- Never install the heat pump on a flat roof immediately next to or above living rooms or bedrooms. Avoid siting in front of windows.
- As the heat pump is located higher up when installed on a flat roof, operating noise propagation is more intense than when the heat pump is installed on the ground. Roof surfaces are normally more reverberant than areas on the ground.
  To prevent noise nuisance, install the appliance at a sufficient distance from neighbouring buildings. If required, provide suitable noise reduction measures. Take into account sound reflection from the surfaces of buildings when analysing sound propagation: See chapter "Sound reflection and sound pressure level".
- Avoid installing in wind-exposed locations. Provide on-site wind protection measures if required, e.g. screens, walls, etc.
- Check to ensure that the installed height of the heat pump does not cause the permissible height of the building to be exceeded, e.g. as specified in outline planning restrictions.
- Provide adequate clearance from flue gas/ventilation outlets.
- Provide easy, year-round access to the heat pump for service and maintenance. Provide sufficient maintenance areas.
  Install suitable protection equipment, e.g. anchorage points.
- Incorporate the heat pump into the lightning protection system.

**Substructure**

- We recommend installing the heat pump on a steel-reinforced concrete ceiling.
- Installation on flat roofs with a low weight per unit area (e.g. roofs made from timber rafters or trapezoidal sheet metal) is **not permissible**.
- The higher roof and wind loads must be taken into account in the structural calculations and the fixture system.
- Where heat pumps are installed on a flat roof, considerable wind loads may occur, depending on the relevant wind zone and the height of the building. We recommend having the substructure designed to DIN 1991-1-4 by a specialist design engineer.
- The Vitocal 200-A Pro has adjustable feet, each with 2 drilled holes (spacing: 110 mm, ∅ 9 mm); these feet must be secured to the substructure with screws.

**Structure-borne noise insulation and vibration isolation**

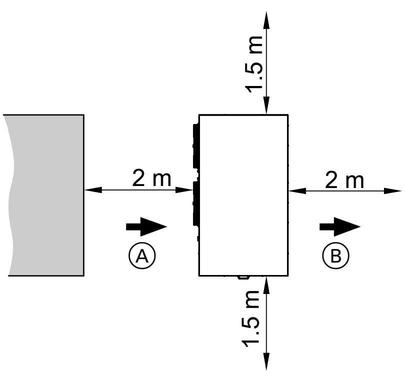
When installing heat pumps on roof surfaces, there is a risk of structure-borne noise and vibrations being transmitted to the building. Installing the heat pump on freestanding garages with inadequate structure-borne noise insulation and vibration isolation may create noise nuisance due to resonance amplification.
See chapter "Measures to reduce sound emissions".

## Frost protection

The flow and return temperatures are monitored to provide frost protection (factory set **"Frost protection temperature"**: 5 °C). If the flow or return temperature falls below the **"Frost protection temperature"**, the secondary circuit pump is switched on first. If, after the secondary circuit pump has been activated, the **"Frost protection temperature"** is not exceeded by 1 K within the **"Frost protection run-on time"**, the instantaneous heating water heater (on site) in the flow is switched on at the highest output stage (factory set **"Frost protection run-on time"**: 10 min). If the **"Frost protection run-on time"** elapses and the **"Frost protection temperature"** has still not been exceeded by 1 K, the heat pump starts operating with one compressor. If the **"Frost protection temperature"** has been exceeded by 1 K, all activated heat sources continue running until the **"Frost protection run-on time"** elapses.

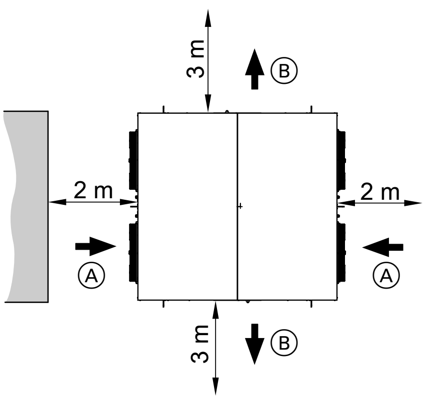
## Minimum clearances for one heat pump

Observe the minimum clearances in all directions, e.g. clearances from buildings, walls, large plants.




Type AWO-AC 201.A032 and type AWO-AC 202.A064

Ⓐ Air intake
Ⓑ Air discharge




Type AWO-AC 204.A128

Ⓐ Air intake
Ⓑ Air discharge



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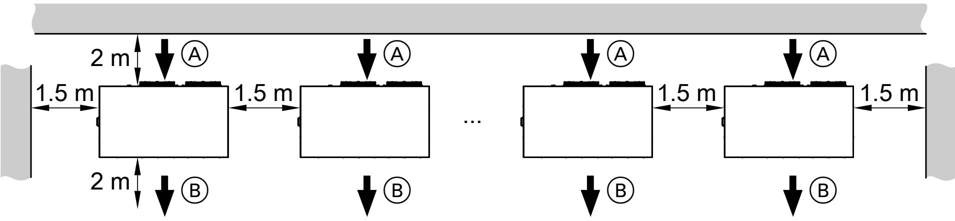
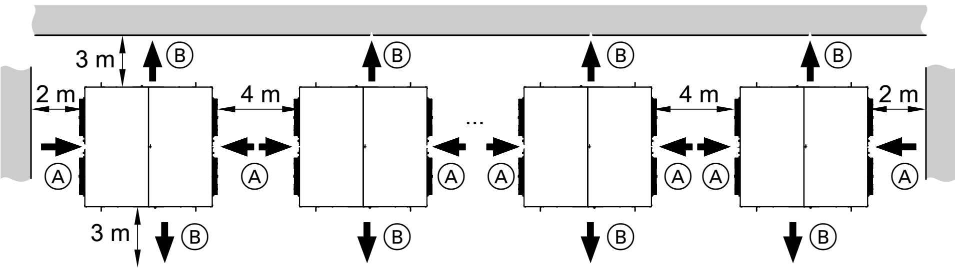
### Minimum clearances for heat pump cascade




Type AWO-AC 201.A032 and type AWO-AC 202.A064

Ⓐ Air intake
Ⓑ Air discharge



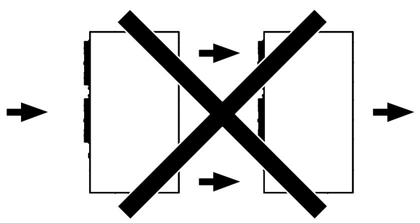

Type AWO-AC 204.A128

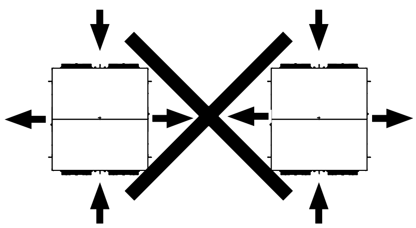
Ⓐ Air intake
Ⓑ Air discharge



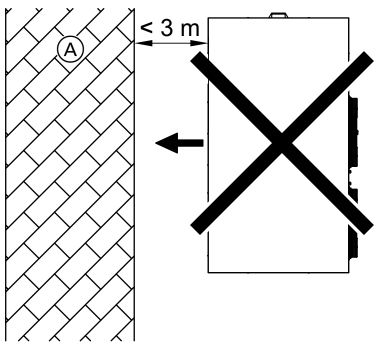
### Notes on siting

***Note***
*During defrosting, cool vapour escapes from the heat pump air discharge vents. This vapour discharge must be taken into consideration during installation (choice of installation location, orientation of the heat pump).*



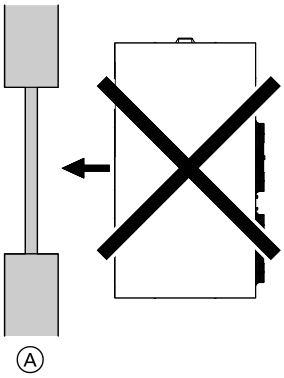


**Siting near pathways or patios**
The cooled air in the discharge area of the heat pump can cause the formation of black ice at outside temperatures as high as 10 °C. Therefore, site the appliance with the discharge side **no closer** than 3 m to pathways or patios.




Ⓐ Pathway or patio

**Flow onto buildings**
Do **not** allow the cold discharge air to flow onto buildings at short range.

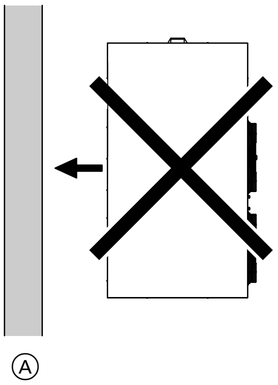



Do **not** turn the discharge side of the appliance towards the building.

Ⓐ Side of building with window

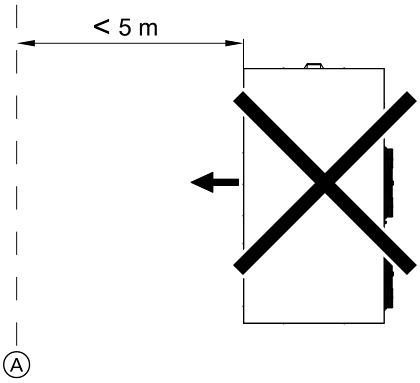
**Siting near buildings**

Installation close to a wall can have the following effects on the building structure:
- Increased deposits of dirt on the external wall
- Higher humidity in the external wall
- Higher heat losses from adjoining rooms



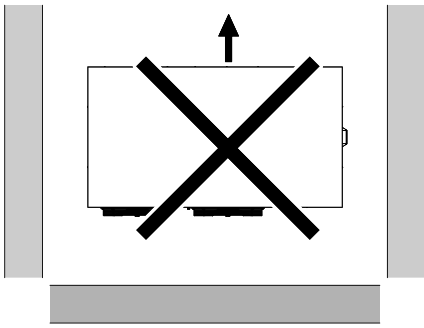

**Siting at property boundaries**
To prevent the noise disturbing neighbours, we recommend that the appliance is **not** sited within 5 m of the boundary of your property; alternatively appropriate noise attenuating measures should be taken.

***Note***
- *Observe the important information about noise development.*
- *Sound emission regulations (TA-Lärm in Germany) must be observed.*
- *When siting the heat pump, always take into account the distances to neighbouring properties in accordance with local building regulations.*




Ⓐ Property boundary

**Siting in areas surrounded by walls or buildings**
Do **not** site the appliance in areas surrounded by walls or buildings. The higher the number of reflective surfaces, the louder the noise generated by the appliance: See technical guide "Heat pump principles". Furthermore, an air short circuit can result.



## Foundations

Site the heat pump level on a durable and solid substrate. We recommend laying a concrete foundation as described in the following chapters. The thickness of cover represents an average value and should be matched to local conditions. Observe the standard rules of building engineering.
For connection to the heat pump, the hydraulic connection set lines inside the thermally insulated pipe must not be twisted together. Therefore lay the pipe in the area of the foundations only in the direction of the front or back of the heat pump.

***Note***
*Construct the foundations, the mounting surface and the ducts so that small animals cannot enter the heat pump or the ducts.*
*The size of the foundations must equate to **at least** the external dimensions of the heat pump.*
*Ensure that condensate is drained away: See page 43.*

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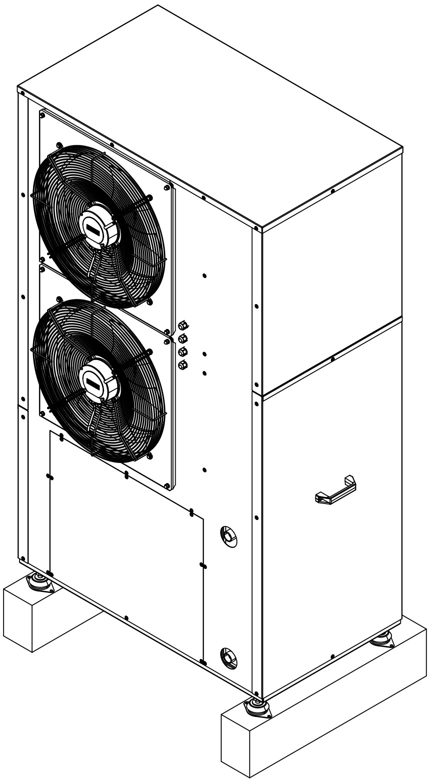
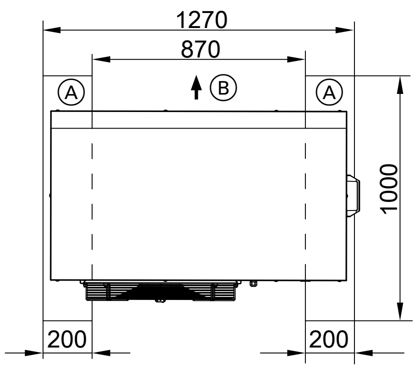
**Type AWO-AC 201.A032**

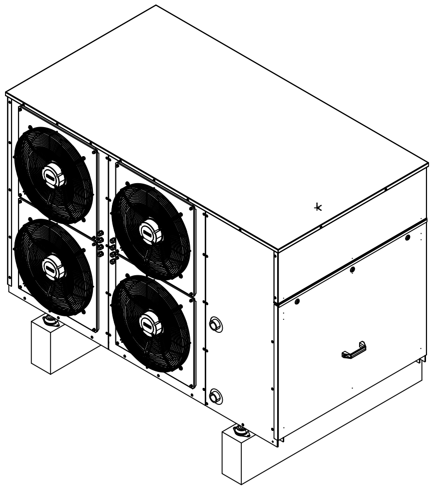


**Plan view**

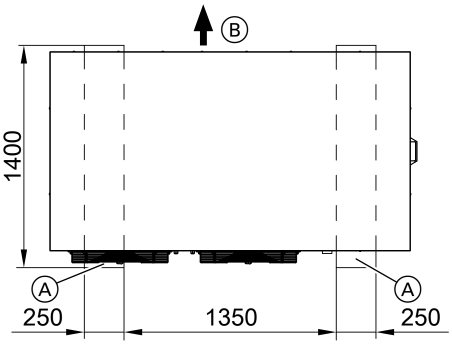



Ⓐ Foundation (minimum height: 300 mm)
Ⓑ Air discharge

**Type AWO-AC 202.A064**

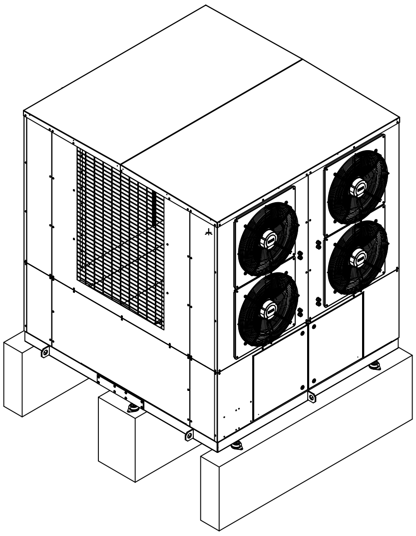


**Plan view**

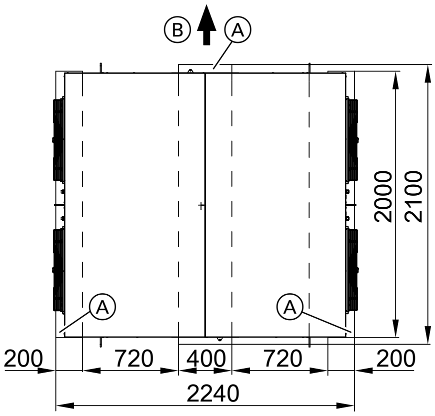



Ⓐ Foundation (minimum height: 300 mm)
Ⓑ Air discharge

**Type AWO-AC 204.A128**



**Plan view**




Ⓐ Foundation (minimum height: 600 mm)
Ⓑ Air discharge

## Cables and hydraulic lines: Laying cables/lines underground

**Frost protection**
If the heat pump control unit and heating circuit pump are ready for operation, the frost protection function of the heat pump control unit is active. Drain the system via the drain & fill facility when the heat pump is taken out of use or if the power fails for a long period.
In heat pump systems where a power failure would not be detected, the heating circuits can be operated with suitable antifreeze. To ensure trouble-free heat pump operation, use antifreeze based on glycol. Ready-mixed solutions ensure an even distribution of concentrate.
Recommendation: Use Viessmann "Tyfocor" heat transfer medium which is based on ethylene glycol (ready-mixed down to −19 °C, light green).

**Power cables and control cable**
- Route the power cables and control cable to the heat pump outside the building together in a shared DN 100 KG conduit, see page: 37.
- Observe the technical connection requirements imposed by your local power supply utility.

  Cable lengths required in the heat pump from top edge of foundation:
  – Power cables 230 V~ and 400 V~: Min. 0.9 m
  – Control cable 230 V~: Min. 0.9 m

**Recommended power cables to compressor/fan**

| Type | | Recommended power cable | |
|---|---|---|---|
| | | 230 V~ | 400 V~ |
| AWO-AC | 201.A032 | 3 x 1.5 mm$^2$ | 5 x 6.0 mm$^2$ |
| | 202.A064 | 3 x 1.5 mm$^2$ | 5 x 16.0 mm$^2$ |
| | 204.A128 | 2 cables with 3 x 2.5 mm$^2$ | 2 cables with 5 x 16 mm$^2$ |

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**Modbus cable**
Route the Modbus cable (< 42 V) outside the building in a DN 100 KG conduit, see page: 37.

***Note***
*We recommend using screened Modbus cables (tin-coated copper braiding).*

**Required cable length inside the heat pump**

| Type | | Required cable length |
|---|---|---|
| AWO-AC | 201.A032 | 1.5 m |
| | 202.A064 | 1.5 m |
| | 204.A128 | 0.3 m |

**Routing the KG conduits**
- Provide a wire pull for the cables.
- To facilitate the routing of cables through the KG conduit, avoid 90° bends; instead use 3 x 30° or 2 x 45°.
- Route the KG conduits with a fall towards the heat pump and provide a condensate drain if required.
- Ensure on site that external wall outlets are moisture-proof and waterproof.
- Seal the apertures of the KG conduit so that no animals or moisture can enter the building.

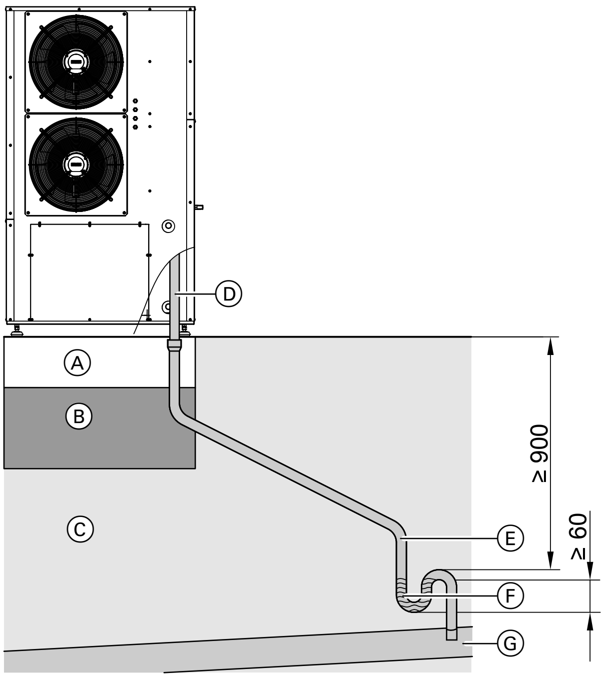
## Requirements for the installation location of the programming unit and the function extensions of the heat pump control unit

Install the UI400 programming unit and VIAVS function extensions in a dry indoor room (ambient temperatures 2 to 35 °C).
Further requirements of the installation location:
- Level, smooth wall
- Well illuminated and easily accessible
- For short connecting cables, install external VIAVS function extensions close to pumps, sensors, mixers, etc.
- Protect electronic components from dripping water and water splashes
- Max. length of the bus cable between the VIRVS heat pump control unit and the external VIAVS function extensions: 200 m
- Min. wire cross-section of bus cables: 1.5 mm$^2$

## Condensate drain of the heat exchanger

- The amount of condensate accumulating from the air is dependent on temperature and relative humidity.
- In normal operation, most of the condensate is carried away with the air flow; only a small proportion drains away via the condensate drains.
- During the defrost process, the amount of condensate increases for a short time; this is drained off via the condensate drains.
- In the case of the Vitocal 200-A Pro, type AWO-AC 204.A128, the evaporators are defrosted alternately one at a time. The max. amount of condensate is therefore the same as for type AWO-AC 202.A064.

**Draining condensate via a connection/drainage system, e.g. for floorstanding installation of heat pump**
The condensate from the heat exchanger runs through an on-site drain pipe and into the waste water system.




Ⓐ Foundation
Ⓑ Frost protection (compacted crushed stone)
Ⓒ Ground
Ⓓ Condensate drain of heat pump (type AWO-AC 201.A032)
Ⓔ Drain pipe, constant fall min. 2 %
Ⓕ Stench trap (siphon) in an area free from the risk of frost
Ⓖ Sewer or drainage system

For type AWO-AC 202.A064 and type AWO-AC 204.A128, use a condensate plate under the heat pump condensate drain to collect the condensate and route it to the drain pipe.
Draining the condensate via a sewer or waste water system requires the installation of a trap with a hydraulic seal of at least 60 mm in an area free from the risk of frost (min. depth 900 mm). The trap prevents the escape of drainage gases.

A maintenance shaft should be provided for the trap.

**Required diameter of drain pipe**

| Type | | Required diameters |
|---|---|---|
| AWO-AC | 201.A032 | DN 32 |
| | 202.A064 | DN 80 |
| | 204.A128 | DN 80 |

***Information about frost protection***
*The condensate drain may freeze if subjected to very low temperatures for prolonged periods.*
*For this reason, thermally insulate the condensate drain sufficiently or install an outside temperature-dependent supplementary heating facility on site.*

**Condensate drain above ground, e.g. when installing the heat pump on a flat roof**
- To drain the condensate, connect the condensate hose on the heat pump to an insulated condensate pipe.
  If necessary, insert the condensate hose via a trap insert.
- In regions where the outside temperature is often below 0 °C, provision of an on-site electrical ribbon heater for the condensate pipe **must** be included in the design.
- Allowing the condensate to drain freely onto the roof surface is not permissible, as this may result in the formation of layers of ice. Layers of ice on the roof may prevent further condensate from draining freely, resulting in increased roof loads.

## Cables and hydraulic lines: Laying cables/lines above ground level

The connecting cables and hydraulic connection lines can be routed above ground level in the following cases:
- Floorstanding installation near an external wall
- Installation on a flat roof with cable/line entry through the roof or an adjacent external wall

When routing cables/lines above ground level, observe the following:
- Keep cable/line lengths outside the building short.
- Make the cable/line entry into the building weatherproof.
- Provide suitably thick, frost-proof thermal insulation on the pipework exposed to the outdoor air.
  Min. thickness of thermal insulation layer with thermal conductivity λ = 0.035 W/(m·K) for pipework with an internal diameter > 22 mm: 60 mm
- Pipework and thermal insulation must be UV-resistant. Protect from attack by animals.

**Routing through the external wall**

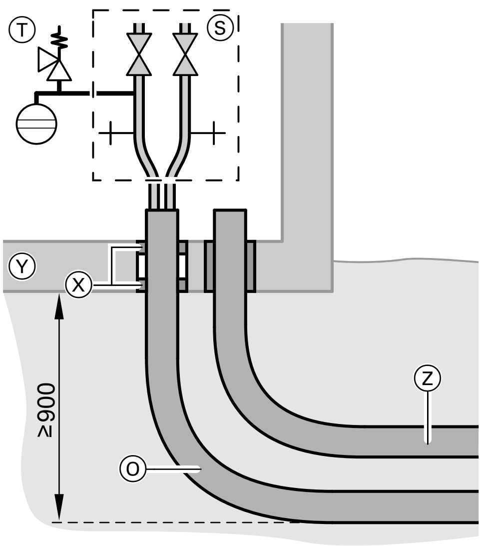
Observe the following:
- Maintain the minimum clearances for installation of the heat pump: See page 38.

## Cable/line entry through the wall

The cable/line entries through the wall are made on site.

## Cable entry through the floor plate

***Note***
*If the connections on the building side are positioned at ground level (see the diagram on the right) then we recommend that the required connection lines and inlets should be positioned **before** the foundation slab is constructed.*
*Any retrofitted installation will be very expensive.*




Connections on the building side at ground level

- Ⓞ KG conduit for external hydraulic connections of flow and return (on site and professionally sealed off from the building)
- Ⓢ Drain & fill facility (for draining with compressed air)
- Ⓣ Expansion vessel with safety assembly (accessories)
- Ⓧ Moisture-proof and waterproof external wall outlet (on site)

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Ⓨ Foundation slab of the building
Ⓩ KG conduit for external connections of control unit/heat pump (on-site and professionally sealed off from the building), see page: 37

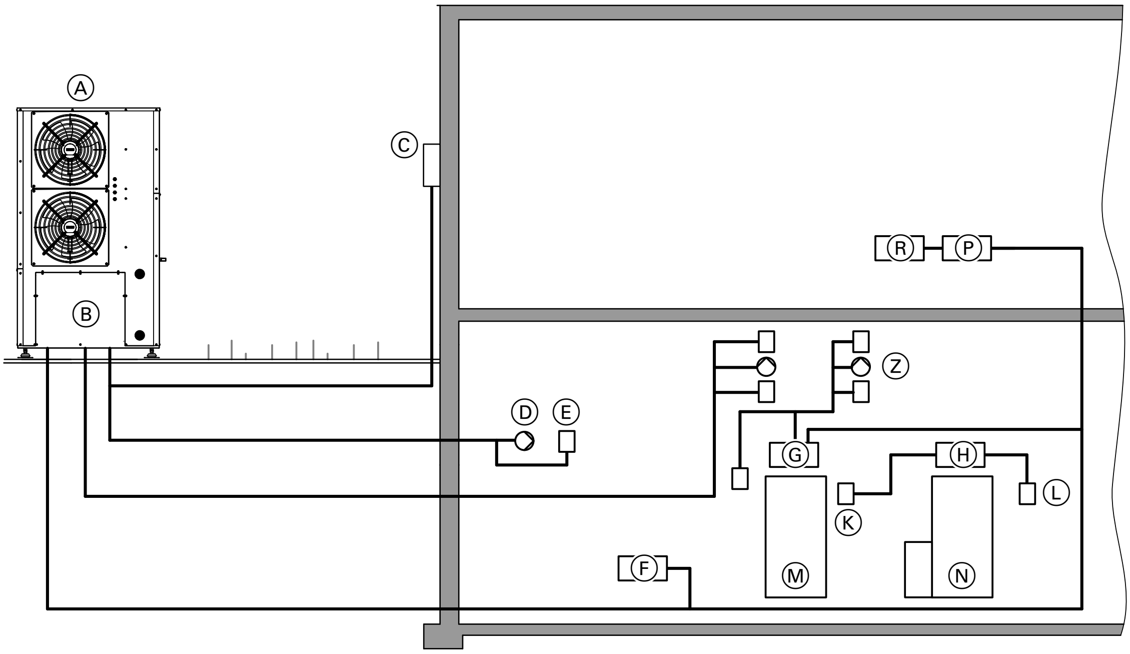
## Electrical connections

### Electrical installation requirements

- Observe the technical connection requirements specified by your local power supply utility.
- The local power supply utility will provide details regarding the required metering and switching equipment.
- We recommend the provision of a separate electricity meter for the heat pump.

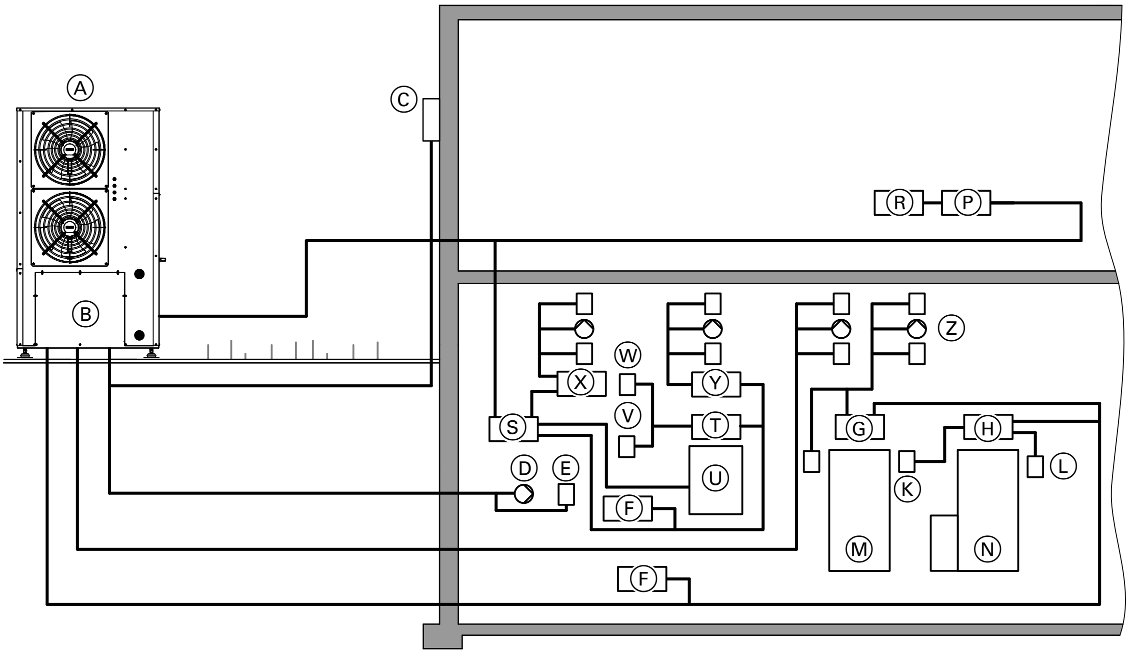
Viessmann heat pumps operate with 400 V~. The control circuit requires a power supply of 230 V~. The fuse for the control circuit (6.3 A) is located in the heat pump control unit. Do not install control current leads and power cables in the same KG conduit.

### Wiring diagram




Vitocal 200-A Pro with VIRVS heat pump controller and 3 VIAVS function extensions

Ⓐ Vitocal 200-A Pro
Ⓑ Heat pump control unit with VIRVS heat pump controller and VIAVS function extension
Ⓒ Outside temperature sensor
Ⓓ Secondary circuit pump
Ⓔ Flow switch
Ⓕ Programming unit UI400
Ⓖ VIAVS function extension (standard delivery)
Ⓗ VIAVS function extension (accessories)
Ⓚ 2-way motorised ball valve (2-point) - room heating
Ⓛ 2-way motorised ball valve (2-point) - DHW heating
Ⓜ Heating water buffer cylinder
Ⓝ Heating water buffer cylinder with freshwater module
Ⓟ Web server
Ⓡ Router for internet connection
ⓩ Circulation pump and actuators for heating circuit




Vitocal 200-A Pro with VIRVS heat pump controller and 3 VIAVS function extensions and a further VIRVS heat pump controller and 3 further VIAVS function extensions

Ⓐ Vitocal 200-A Pro
Ⓑ Heat pump control unit with VIRVS heat pump controller and VIAVS function extension
Ⓒ Outside temperature sensor
Ⓓ Secondary circuit pump
Ⓔ Flow switch
Ⓕ Programming unit UI400
Ⓖ VIAVS function extension (standard delivery)
Ⓗ VIAVS function extension (accessories)
Ⓚ 2-way motorised ball valve (2-point) - room heating
Ⓛ 2-way motorised ball valve (2-point) - DHW heating
Ⓜ Heating water buffer cylinder
Ⓝ Heating water buffer cylinder with freshwater module
Ⓟ Web server
Ⓡ Router for internet connection
Ⓢ VIRVS heat pump controller (for further functions)
Ⓣ VIAVS function extension for external heat generator
Ⓤ External heat generator
Ⓥ System flow mixer
Ⓦ System flow sensor
Ⓧ VIAVS function extension for additional heating circuit with mixer
Ⓨ VIAVS function extension for additional heating circuit with mixer
ⓩ Circulation pump and actuators for heating circuit

**Heating systems with heating water buffer cylinder**
When using hydraulic separation, a temperature sensor must be integrated in the heating water buffer cylinder: See page 67. This temperature sensor is connected to the VIAVS function extension.

**Electrical installation**

| | | AWO-AC 201.A032 | AWO-AC 202.A064 | AWO-AC 204.A128 |
|---|---|---|---|---|
| Heat pump control unit 230 V~ mains connection | | | | |
| – Fuse protection | A | 10 | 10 | 16 |
| – Recommended power cable | $mm^2$ | 3 x 1.5 | 3 x 1.5 | 3 x 2.5 |
| Compressor power supply 400 V~ | | | | |
| – Fuse protection | A | 3 x C32A combi | 3 x C63A combi | 2 x 3 x C63A combi |
| – Recommended power cable | $mm^2$ | 5 x 6.0 | 5 x 16.0 | 2 x 5 x 16.0 |
| – Max. cable length | m | 25 | 25 | 25 |
| BSB bus cable (programming units, extension modules) | | On site | On site | On site |
| Modbus cable | | On site | On site | On site |

| | Type AWO-AC 201.A032 | 202.A064 | 204.A128 |
|---|---|---|---|
| Recommended power cable for cable lengths up to 100 m and routing in electrical conduits | 5 x 6 $mm^2$ | 5 x 16 $mm^2$ | 2 x 5 x 16 $mm^2$ |
| Fuse protection | 3 x C32A combi | 3 x C63A combi | 2 x 3 x C63A combi |

***Note***
*The electrical installation must be engineered by a qualified heating contractor in accordance with country-specific regulations and the local conditions.*

## 4.3 Noise emissions

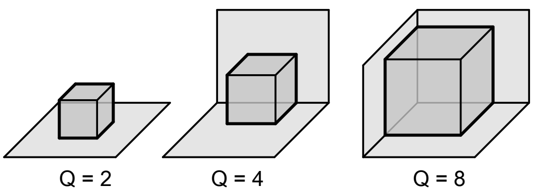
### Principles

**Sound power level $L_W$**
This describes the entire sound emissions in all directions emanating from the heat pump. It does **not** depend on the surrounding conditions (reflections) and is a value that can be used for direct comparisons of sound sources (heat pumps).

**Sound pressure level $L_P$**
The sound pressure level is a measure to assist orientation regarding the volume of noise perceived by the ear at a specific location. The sound pressure level is substantially influenced by the distance and ambient conditions. The sound pressure level is thus dependent on the measuring location, which is often at a distance of 1 m. Standard measuring microphones measure the sound pressure directly.
The sound pressure level is the variable that is used to assess immissions from individual systems.

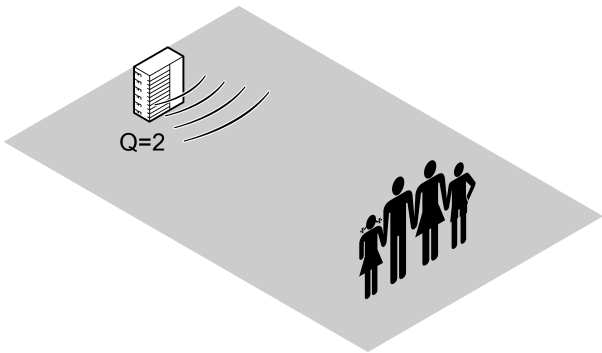
**Sound reflection and sound pressure level (directivity Q)**

The sound pressure level increases exponentially with the number of adjacent, vertical, fully reflective surfaces (e.g. walls) compared to installation in a free field (Q = directivity), as sound projection is restricted compared to installation in a free field.

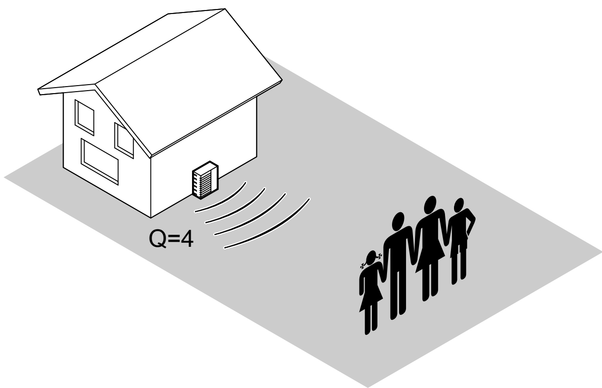



Q Directivity

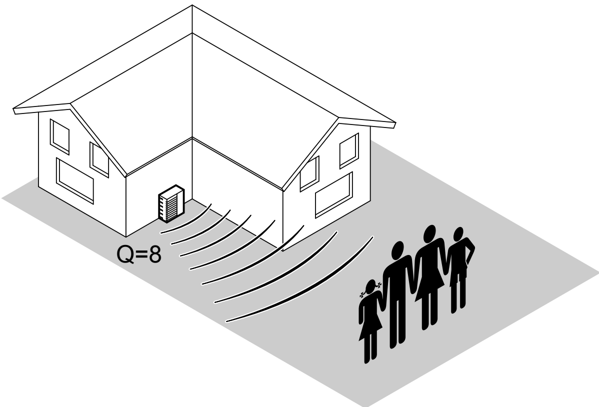
**Q=2: Freestanding heat pump far from the building**




**Q=4: Heat pump close to an external wall of the building**



**Q=8: Heat pump close to an external wall of the building, next to a projecting wall corner**




The following table shows the extent to which the sound pressure level $L_P$ changes according to directivity Q and the distance from the appliance in relation to the sound power level $L_W$ measured directly at the appliance or at the air diffuser.

The values listed in the table were calculated according to the following formula:

$$L = L_W + 10 \cdot \log\left(\frac{Q}{4 \cdot \pi \cdot r^2}\right)$$

L = Sound level at the receiver
$L_W$ = Sound power level at the sound source
Q = Directivity
r = Distance between receiver and sound source

The legal requirements concerning sound propagation apply under the following idealised conditions:
- The sound source is a point source of sound.
- Installation and operating conditions for the heat pump correspond to the conditions when determining the sound power.
- At Q = 2, sound is emitted in a free field, no surrounding reflective objects/buildings.
- At Q = 4 and Q = 8, full reflection on adjacent surfaces is assumed.
- Unrelated noise from other surrounding sources is not taken into account.

| Directivity Q, calculated on site | Distance from the sound source in m | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **4** | **5** | **6** | **8** | **10** | **12** | **15** |
| | **Energy-equivalent duration of sound pressure level $L_P$ of the heat pump in relation to the sound power level $L_W$ measured at the appliance/air duct in dB(A)** | | | | | | | | |
| 2 | –8.0 | –14.0 | –20.0 | –22.0 | –23.5 | –26.0 | –28.0 | –29.5 | –31.5 |
| 4 | –5.0 | –11.0 | –17.0 | –19.0 | –20.5 | –23.0 | –25.0 | –26.5 | –28.5 |
| 8 | –2.0 | –8.0 | –14.0 | –16.0 | –17.5 | –20.0 | –22.0 | –23.5 | –25.5 |

***Note***
- *In practice, actual values may differ from those shown here due to sound reflection or sound absorption as a result of local conditions. Therefore, the situations described for example by Q = 4 and Q = 8 often give only an approximate picture of the actual conditions at the emission site.*
- *If the heat pump sound pressure level as calculated approximately from the table is less than 3 dB(A) different from the permissible standard value given by the TA Lärm, a precise sound immissions prognosis must be produced (consult an acoustic engineer).*

**Standard values for assessing the sound pressure level to TA Lärm (measured outside the building)**

| **Area/object**: Determined according to outline planning restrictions; check with local authorities. | **Standard immissions value (sound pressure level) in dB(A)**: Valid for the sum of all sounds that have an influence | |
|---|---|---|
| | During the day | At night |
| Area with a mix of commercial installations and residential units where neither commercial installations nor residential units dominate. | 60 | 45 |
| Areas with predominantly residential units. | 55 | 40 |
| Areas with only residential units. | 50 | 35 |
| Residential units that are structurally connected to the heat pump system | 40 | 30 |

***Note***
- *Sound emission regulations (TA-Lärm in Germany) must be observed.*
- *When siting the heat pump, always take into account the distances to neighbouring properties in accordance with local building regulations.*

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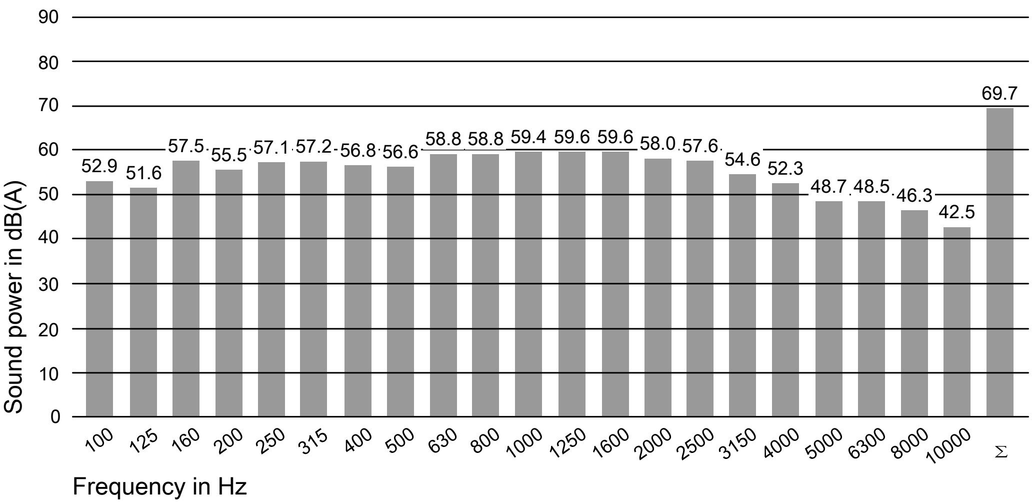
## Sound power in frequency spectrum

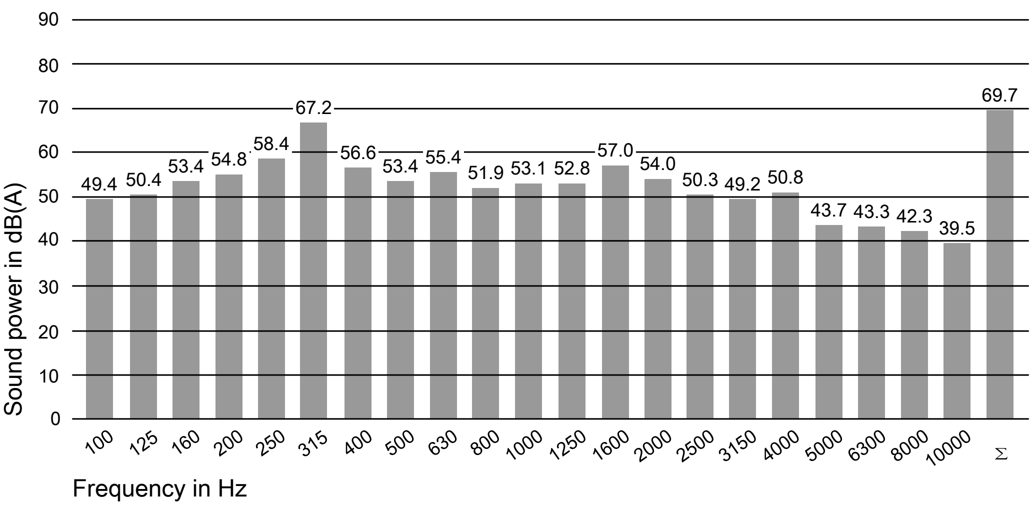
**Type AWO-AC 201.A032**

**A7/W35 with 1 compressor and 54 % of the max. speed**




Σ Total sound power level

**A7/W55 with 1 compressor and 39 % of the max. speed**




Σ Total sound power level

4

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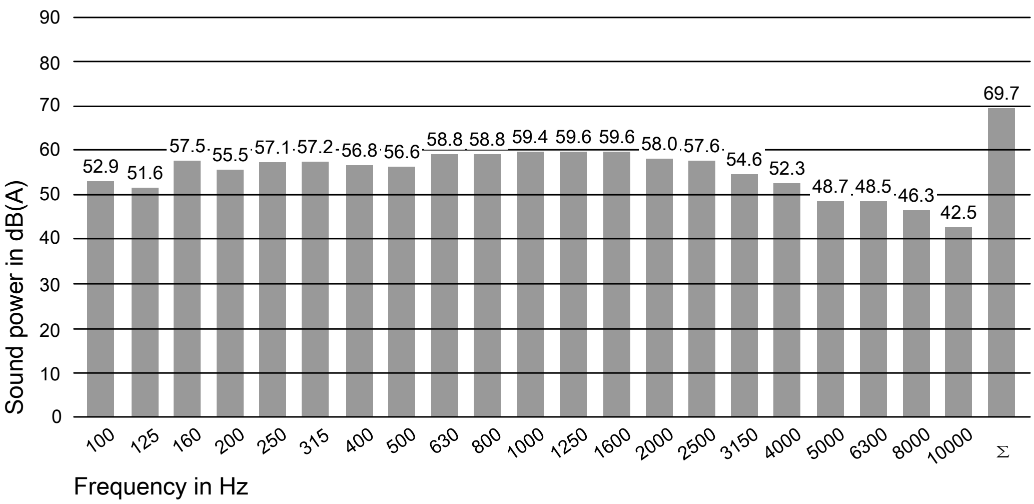
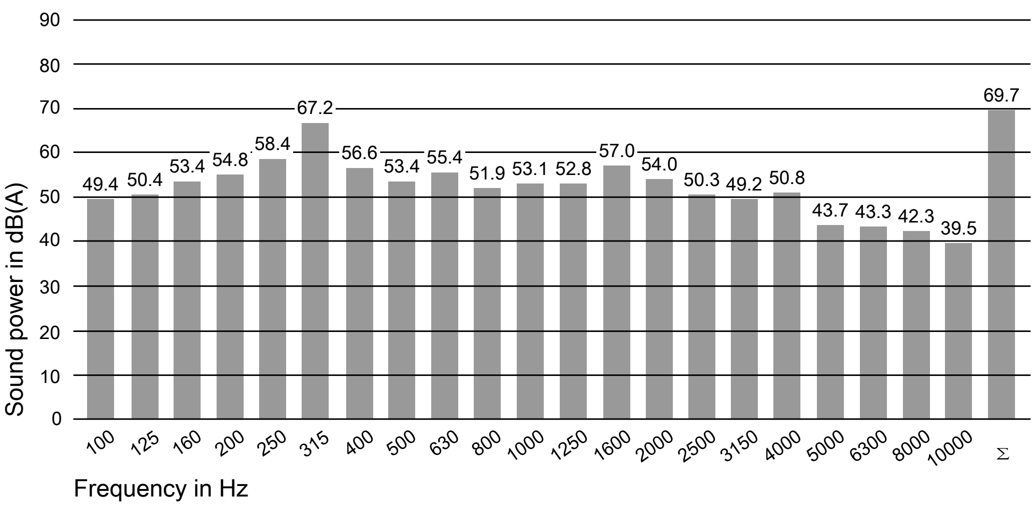
**Type AWO-AC 202.A064**

**A7/W35 with 1 compressor and 54 % of the max. speed**




Σ Total sound power level

**A7/W55 with 1 compressor and 39 % of the max. speed**




Σ Total sound power level

4

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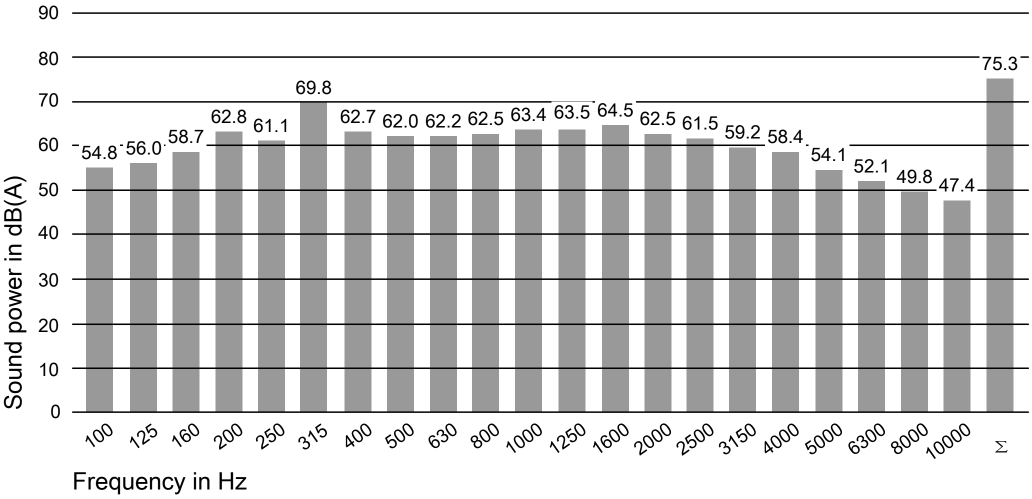
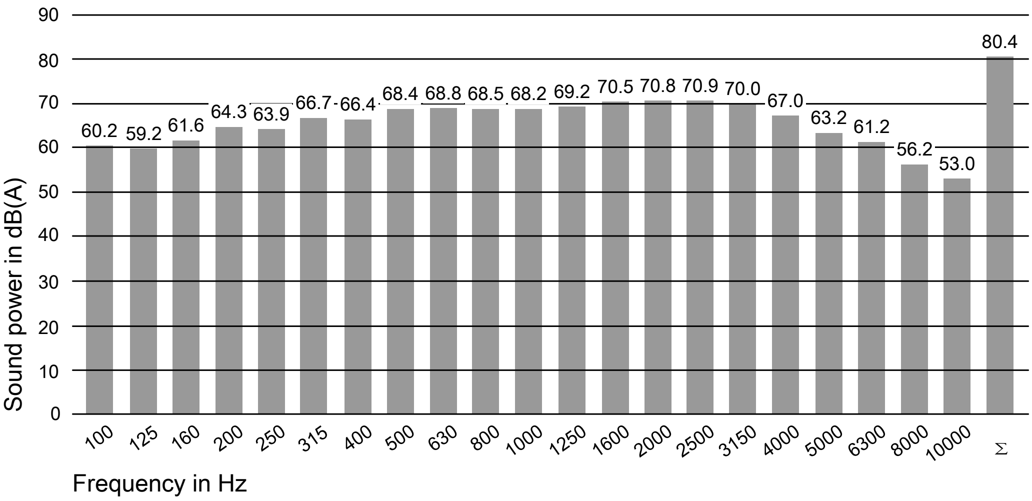
**A7/W55 with 2 compressors and 62 % of the max. speed**




Σ Total sound power level

**Type AWO-AC 204.A128**

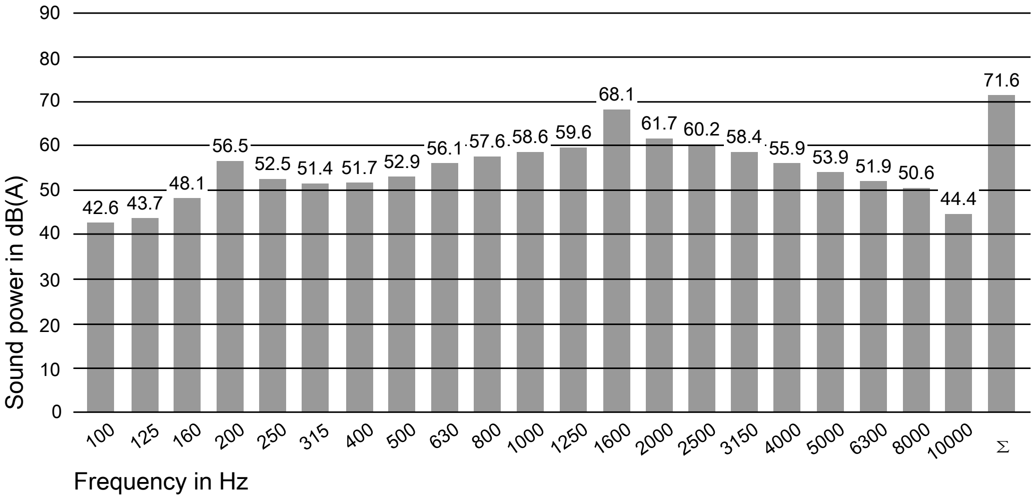
**A7/W55 with 2 compressors and 12 % of the max. speed**




Σ Total sound power level

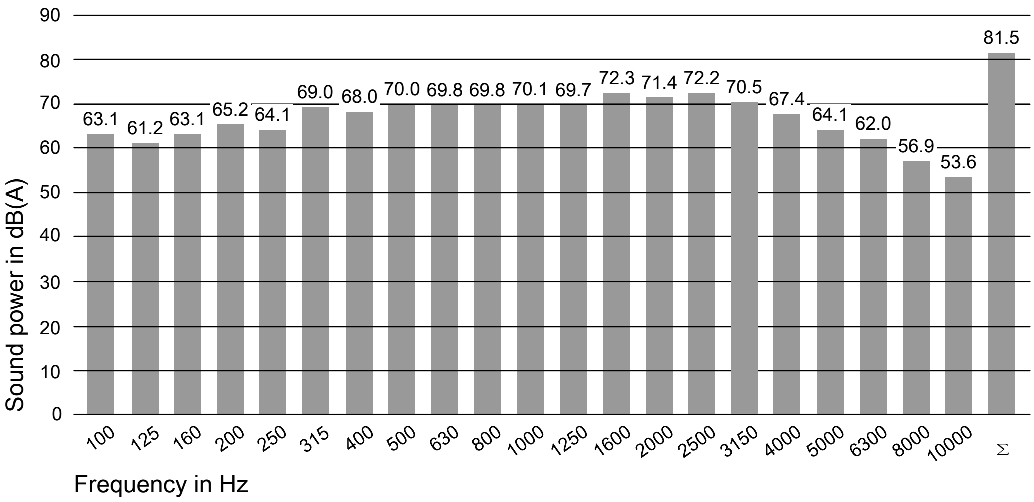
4

**A7/W55 with 2 compressors and 46 % of the max. speed**




Σ Total sound power level

**A7/W55 with 4 compressors and 38 % of the max. speed**




Σ Total sound power level

4

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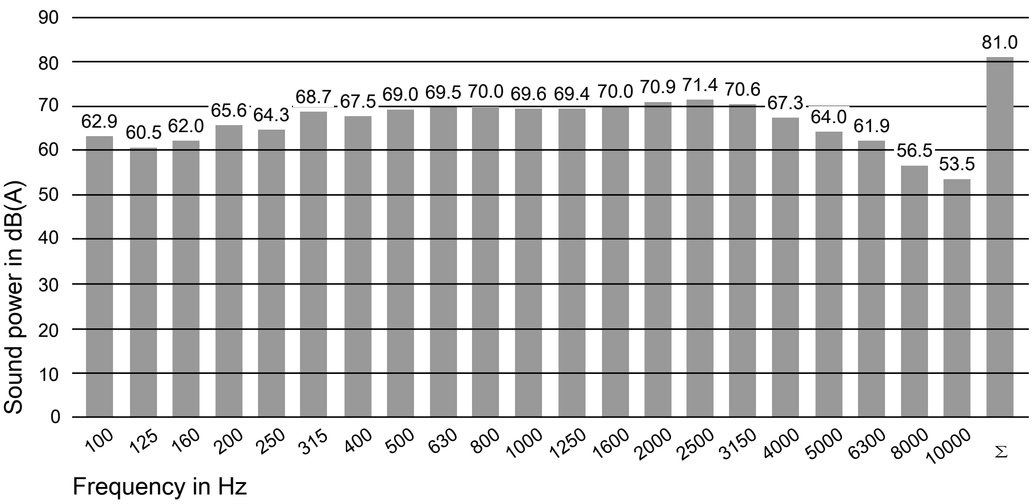
**A7/W55 with 4 compressors and 65 % of the max. speed**




Σ Total sound power level

### Information on reducing sound emissions

- Never site the heat pump directly next to living rooms, bedrooms or their windows.
- Implement on-site measures to prevent the transmission of structure-borne noise from the heat pump through the building fabric.
- Route the hydraulic lines and connecting cables free of tension and stress.
- Line entries through ceilings, walls and roofs must have sound insulation. Prevent the transmission of airborne and structure-borne noise through suitable insulation materials.
- Never install the heat pump in the immediate vicinity of neighbouring buildings or properties: See chapter "Notes on siting".
- The sound pressure level may increase if the heat pump is sited unfavourably.
  In this context, please observe the following:
  - Avoid surroundings with reverberant surfaces (e.g. concrete or paving), as the sound pressure level can be increased through reflection. Surroundings where the ground is covered with vegetation (e.g. a lawn) can noticeably reduce the sound pressure level.
  - Site the heat pump with as much space around it as possible: See chapter "Sound reflection and sound pressure level" on page 47.
- If the requirements of the TA Lärm [Germany] are not observed, suitable building measures (e.g. additional planting) must be employed to reduce the sound pressure level to acceptable levels: See page 47.

## 4.4 Sizing the heat pump

First establish the standard heat load $\Phi_{HL}$ of the building. For discussions with customers and for the preparation of a quotation, in most cases estimating the heat load is adequate.

As with all heating systems, determine the standard heat load of the building to EN 12831 before ordering the appropriate heat pump.

### Mono mode operation

According to EN 12831, the heat pump in a mono mode system, as the sole heat generator, must be able to cover the entire heat demand of the building.
For mono mode operation, the potential outside temperatures at the installation site and the heat pump application limits must be taken into account:
For minimum air inlet temperature and minimum flow temperature, see chapter "Application limits to EN 14511".
Please also note that, in mono mode, the heat pump heating output and the maximum secondary circuit flow temperature are influenced by the outside temperature. This can result in comfort losses, for DHW heating in particular.

Therefore please note the following design points:
- Check whether the maximum heat pump flow temperature, achieved at the prevailing outside temperatures, fulfils the local DHW heating requirements.
- During commissioning or service, the secondary circuit temperature may lie below the required minimum heat pump flow temperature. The heat pump compressor does not then start independently.

As a result, even with a mono mode heat pump design, an additional heat generator must always be included in the design; e.g. an instantaneous heating water heater.

***Note***
*Provide the instantaneous heating water heater on site.*

If the heat pump **cannot** meet the heat demand in mono mode, it must be operated in **mono energetic mode** (with instantaneous heating water heater) or in **dual mode** (with external heat generator). Otherwise there is a risk of the condenser freezing, causing significant damage to the heat pump.

Sizing is of particular relevance to heat pump systems that are to be operated in mono mode, since oversized equipment frequently incurs disproportionate system costs. Oversizing should therefore be avoided!

When sizing the heat pump, observe the following:
- Take into account supplements to the heat load of the building to cover power-OFF periods. [In Germany] the power supply utility may interrupt the power supply of heat pumps for up to 3 x 2 hours within a period of 24 hours.
  Observe additional individual arrangements for customers with special tariffs.
- The building inertia means that 2 hours of power-OFF time are generally not taken into consideration.

***Note***
*The ON periods between 2 power-OFF times must be at least as long as the preceding power-OFF time.*

**Estimate of the heat load based on the heated area**
The heated surface area (in $m^2$) is multiplied by the following specific heat demand:

| | |
|---|---|
| Passive house | 10 W/$m^2$ |
| Low energy house | 40 W/$m^2$ |
| New build (to GEG) | 50 W/$m^2$ |
| House (built prior to 1995 with standard thermal insulation) | 80 W/$m^2$ |
| Older house (without thermal insulation) | 120 W/$m^2$ |

**Theoretical sizing with power-OFF time of 3 × 2 hours or when used in the Smart Grid**
**Example:**
For new build with good thermal insulation (50 W/$m^2$) and a heated area of 600 $m^2$
- Estimated heat load: 30 kW
- Maximum power-OFF time of 3 × 2 hours at a minimum outside temperature in accordance with EN 12831

For a 24 h period this results in a daily heat demand of:
- 30 kW · 24 h = 720 kWh

To cover the maximum daily heat demand, only 18 h per day are available on account of the times when the power supply is off. The building inertia means that 2 hours are not taken into consideration.
- 720 kWh / (18 + 2) h = 36 kW

In other words, increase the heat pump output by 20 % if power-OFF periods of 3 × 2 h per day are to be applied.
Frequently, power-OFF times are only invoked if there is a need to do so. Please contact the customer's power supply utility to enquire about power-OFF times.

### Supplement for DHW heating in mono mode operation

***Note***
*In dual mode heat pump operation, the heating output available is generally so high that this supplement does not need to be taken into consideration.*

For a general residential building, a max. DHW demand of approx. 50 l per person per day at approx. 45 °C is assumed.
- This demand represents an additional heat load of approx. 0.25 kW per person given a heat-up time of 8 h.
- This supplement will only be taken into consideration if the sum total of the additional heat load exceeds 20 % of the heat load calculated to EN 12831.

| | **DHW demand at a DHW temperature of 45 °C in l per person/day** | **Specific available heat in Wh per person/day** | **Recommended heat load supplement for DHW heating*1 in kW/person** |
|---|---|---|---|
| Low demand | 15 to 30 | 600 to 1200 | 0.08 to 0.15 |
| Standard demand*2 | 30 to 60 | 1200 to 2400 | 0.15 to 0.30 |

**Or**

| | **DHW demand at a DHW temperature of 45 °C in l per person/day** | **Specific available heat in Wh per person/day** | **Recommended heat load supplement for DHW heating*1 in kW/person** |
|---|---|---|---|
| Apartment (billing according to demand) | 30 | approx. 1200 | approx. 0.150 |
| Apartment (flat rate billing) | 45 | approx. 1800 | approx. 0.225 |
| Detached house*2 (average demand) | 50 | approx. 2000 | approx. 0.250 |

*1 *With a DHW cylinder heat-up time of 8 h*
*2 *Select a higher supplement if the actual DHW demand exceeds the stated values.*

## Supplement for setback mode

As the heat pump control unit is equipped with a temperature limiter for setback mode, the supplement for setback mode to EN 12831 can be ignored.
In addition, the control unit is equipped with start optimisation, which means that there is also no need for a supplement for heating up from setback mode.

Both functions must be enabled in the control unit. If any of the supplements are omitted because of the activated control unit functions then this must be documented when the system is handed over to the operator.
If, irrespective of the above mentioned control options, these supplements are nevertheless to be taken into account, the calculation should be made with reference to EN 12831.

## Mono energetic operation

In heating mode, the heat pump system is supported by an electric booster heater. The control unit switches the instantaneous heating water heater on subject to the outside temperature (dual mode temperature) and heat load.

***Note***
*The proportion of the electric power drawn by the electric booster heater is **not** generally charged at special tariffs.*

Sizing for a typical system configuration:
- Size the heating output of the heat pump to approx. 70 to 85 % of the max. required building heat load to EN 12831.
- The heat pump covers approx. 95 % of the annual heat load.
- Power-OFF times do not need to be taken into consideration.

***Note***
*The reduced size of the heat pump, compared to mono mode operation, means that the runtime will increase.*

## Dual mode operation

**External heat generator**
The heat pump control unit enables dual mode operation of the heat pump with an external heat generator, e.g. oil boiler. For this, the heat demand is sent to the external heat generator via a 0-10 V signal and a floating enable signal.
For optimum heat pump operation, the external heat generator is integrated via a dual mode mixer into the system flow.
The control unit enables operation of the external heat generator if the outside temperature (long term average) is below the dual mode temperature. Above the dual mode temperature, the external heat generator only starts under the following conditions:
- The heat pump fails to start due to a fault.
- There is a special heat demand, e.g. frost protection.

The external heat generator can also be enabled for DHW heating.

***Note***
*The heat pump control unit does **not** contain any safety functions for the external heat generator. To prevent excessive temperatures in the heat pump flow and return in the case of a fault, high limit safety cut-outs must be provided to shut down the external heat generator (switching threshold 70 °C).*

Sizing the heat pump for **dual mode parallel** operation:
- Size the heating output of the heat pump to approx. 70 to 85 % of the maximum required building heat load to EN 12831.
- The heat pump covers approx. 95 % of the annual heat load.
- Power-OFF times do not need to be taken into consideration.

***Note***
*The reduced size of the heat pump, compared to mono mode operation, means that the runtime will increase.*

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## Determining the dual mode point

The dual mode point must be determined both for **mono energetic** and **dual mode** operation.
At very low outside temperatures, the heat pump heating output drops, whilst at the same time the heat demand rises.
For operation in mono mode, very large systems would be required and the heat pump would be oversized for the majority of the runtime.
Above the dual mode point (e.g. –5 °C), the heat pump will cover the entire heat load. Below the dual mode point, the heat pump raises the return temperature of the heating system, and any additional heat generators are enabled for heating operation.

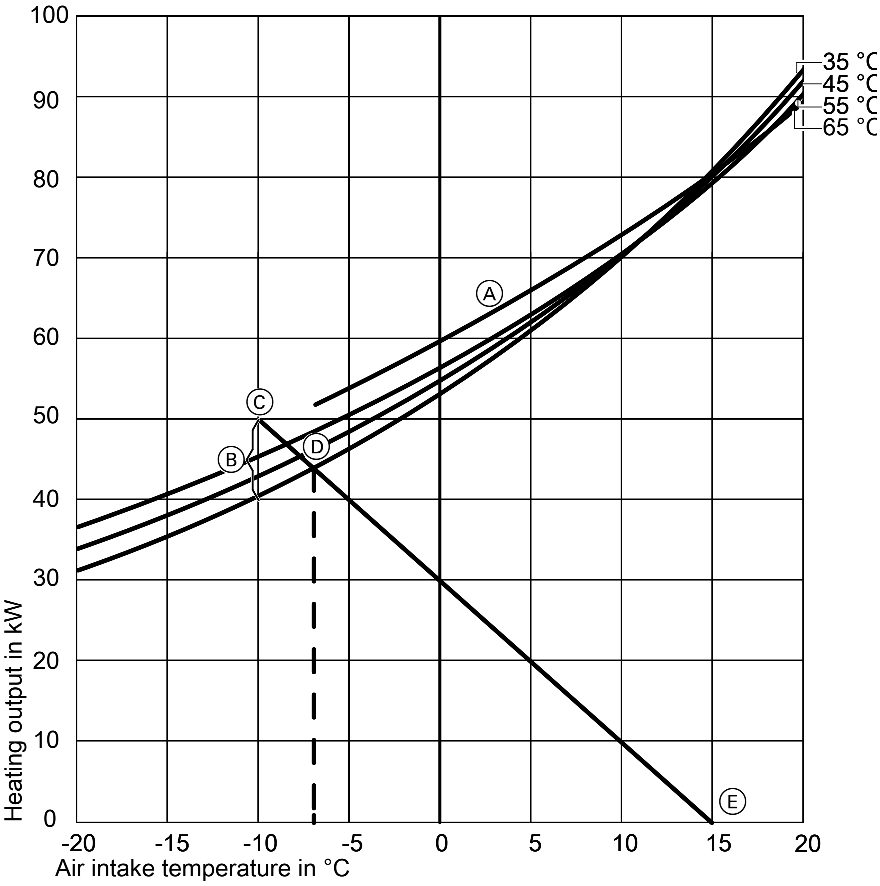
Mono energetic operation:
- Instantaneous heating water heater is enabled.

Dual mode operation:
- External heat generator, e.g. oil boiler, is enabled.

The dual mode point is determined using the heat pump output graphs.

***Note***
*DHW reheating by means of additional heat generators is also carried out where required above the dual mode point.*

**Example for Vitocal 200-A, type AWO-AC 202.A064**




Ⓐ Output curves for the heat pump at heating water flow temperatures 65 °C, 55 °C, 45 °C, 35 °C
Ⓑ Required heating output of the electric booster heater or external heat generator
Ⓒ Building heat load to EN 12831
Ⓓ Dual mode point for heating water flow temperature 35 °C
Ⓔ Heating limit temperature

| | |
|---|---|
| Building heat load to EN 12831: | 50 kW |
| Min. outside temperature to EN 12831: | –10 °C |
| Heating limit temperature: | 15 °C |
| Required flow temperature (for underfloor heating systems): | 35 °C |

As can be seen in the graph, the dual mode point is **–7 °C**.
At the minimum outside temperature, the heat pump has a heating output of 40 kW. In order to cover the building heat load, the electric booster heater or the external heat generator must have a heating output of at least 10 kW (Ⓑ).

## 4.5 Heating circuit and heat distribution

Different heating water flow temperatures are required depending on the heating system design.

The Vitocal 200-A Pro is suitable for the following applications (observe the maximum flow temperature of 65 °C):
- Radiators are used for central heating.
- Modernisation of the heating system: The heat pump replaces existing boilers.

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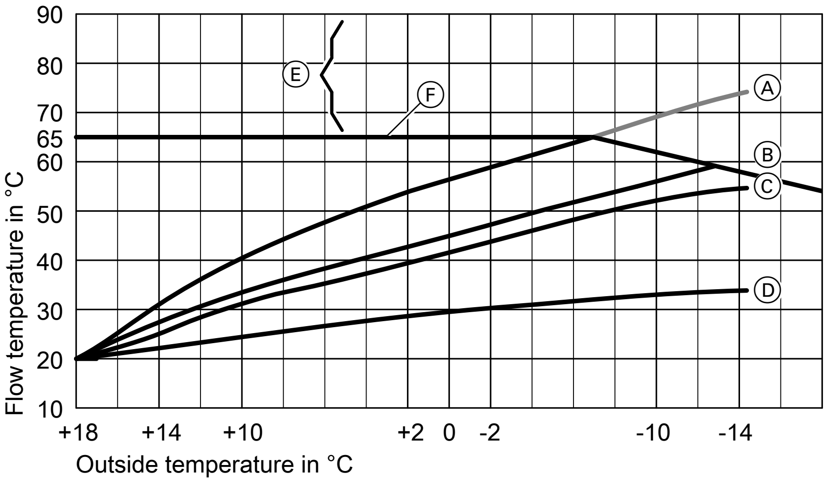


Relationship of the heating water flow temperatures to the outside temperature

Ⓐ Max. heating water flow temperature = 75 °C
Ⓑ Max. heating water flow temperature = 60 °C
Ⓒ Maximum heating water flow temperature = 55 °C, requirement for mono mode heat pump operation
Ⓓ Max. heating water flow temperature = 35 °C, ideal for mono mode heat pump operation
Ⓔ Heating systems that have limited suitability for dual mode heat pump operation
Ⓕ Max. heating water flow temperature for Vitocal 200-A Pro

***Note***
*The lower the selected maximum heating water flow temperature, the higher the seasonal performance factor of the heat pump.*

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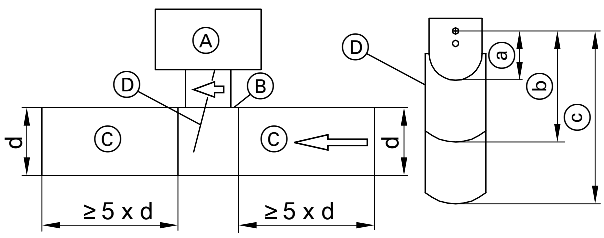
## 4.6 Hydraulic conditions for the secondary circuit

### Minimum flow rate and minimum system volume

For trouble-free operation, heat pumps require a **minimum flow rate** in the secondary circuit.
In order to ensure the minimum runtimes for the heat pump, a **minimum system volume** in the secondary circuit must also be considered. If the system volume is too small, the heat pump may switch on and off too frequently if heat consumption in the building is low (cycling).
There must be no means of shutting off the minimum system volume. The heating circuits that can be shut off via thermostatic valves must therefore not be included in the calculation.

***Values for minimum flow rate and minimum system volume***
*Values must be observed: See table on page 60.*

**Flow switch**
Included in the standard delivery of the Vitocal 200-A Pro is a flow switch JSF-1E. The flow switch monitors the flow rate in the secondary circuit. The flow switch is matched to the respective pipe diameter by installing different flow surfaces (paddles). For larger pipe diameters, the shorter paddles must also be secured in place for stability reasons. The flow switch is installed in a **horizontal pipe** by means of a tee with no reducer (installation location: see system examples **www.viessmann-schemes.com**. Upstream and downstream of the installation location, provide a calming stretch which must be at least 5 times pipe diameter d (1½", 2", 2½").




Ⓐ Flow switch
Ⓑ Tee (flow switch connection: 1 in.)
Ⓒ Calming stretch
Ⓓ Paddle
ⓐ Length of paddle for 1 in. pipe diameter
ⓑ Length of paddle for 2 in. pipe diameter
ⓒ Length of paddle for 3 in. pipe diameter
ⓓ Diameter of pipe

**Providing the necessary defrost energy**
Viessmann air/water heat pumps defrost efficiently by reversing the refrigerant circuit. The defrost energy is taken from the secondary circuit for a short period of time. To ensure the safe and long lasting operation of the heat pump, a sufficiently high system volume must be available to provide the defrost energy.

## Systems with a heating water buffer cylinder connected in parallel

Heating water buffer cylinders connected in parallel to the heat pump ensure a sufficient minimum system volume in the secondary circuit. Hydraulic separation of the heating circuits also ensures the minimum flow rate of the heat pump, regardless of the hydraulic conditions in the heating circuits.

**Benefits**
- Hydraulic separation of the heat pump from the heating circuits ensures a constant flow rate through the heat pump.
  For example, if the heating circuit flow rate is reduced via thermostatic valves, the flow rate through the heat pump remains constant.
- Due to the low pressure drop to the heating water buffer cylinder, the secondary pump can be made smaller.
- Heating circuits with mixer can be supplied with a different flow temperature to a heating circuit without mixer.
- Additional heat generators can be integrated into the system, e.g. solar central heating backup.
- Bridging power-OFF periods:
  Subject to the electricity tariff, heat pumps can be switched off at peak times by the power supply utility. The buffer cylinder supplies the heating circuits including during this power-OFF time.
- The large buffer volume is used to extend the runtime of the heat pump. This avoids frequently switching the heat pump on and off (cycles).
- Due to the high energy content, a heating water buffer cylinder always provides the required defrost energy for the heat pump.

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**Implementation instructions**
- When sizing the heating water buffer cylinder, note whether underfloor heating circuits and/or radiator heating circuits are connected.
- Due to the large volume of water and possible separate shut-off equipment for the heat generator, allow for a second or a larger expansion vessel.
- Set up the safety equipment for the system according to EN 12828.
- The volumetric flow rate of the secondary pump must be greater than that of the heating circuit pumps.
- In conjunction with an underfloor heating circuit, a temperature limiter must be installed to limit the maximum temperature of underfloor heating (part no. 7151728 or 7151729).

**Sizing a heating water buffer cylinder for runtime optimisation**

$V_{HP} = Q_{WP} \cdot (20 \text{ to } 25\ l)$

$Q_{WP}$ Rated heating output of the heat pump
$V_{HP}$ Heating water buffer cylinder volume in l

**Example:**
Type AWO-AC 202.A064

$Q_{WP}$ = 56.2 kW
$V_{HP}$ = 56.2 · 20.0 l = 1124 l cylinder capacity

**Selection**: See Viessmann or Vitoset pricelist.

**Sizing a heating water buffer cylinder for bridging power-OFF times**
This version is suitable for heat distribution systems without additional thermal mass, e.g. radiators, hot water air heaters.
Storing 100 % of the heating energy for the duration of the power-OFF times is feasible, but not recommended, otherwise the cylinder volume required would be too great.

**Example:**
$\Phi_{HL}$ = 56.2 kW = 56200 W
$t_{Sz}$ = 2 h (max. 3 x per day)
$\Delta\vartheta$ = 10 K
$c_P$ = 1.163 Wh/(kg·K) for water
$c_P$ Specific thermal capacity in Wh/(kg·K)
$\Phi_{HL}$ Heat load of the building in W
$t_{Sz}$ Power-OFF time in h
$V_{HP}$ Heating water buffer cylinder volume in l
$\Delta\vartheta$ System heat loss in K

**100 % sizing**
(subject to the available heating surfaces)

$$V_{HP} = \frac{\Phi_{HL} \cdot t_{SZ}}{c_P \cdot \Delta\vartheta}$$

$$V_{HP} = \frac{56200\ W \cdot 2\ h}{1.163\ \frac{Wh}{kg \cdot K} \cdot 10\ K} = 9665\ kg$$

9665 kg water represents a cylinder capacity of 9665 l.
**Selection:** Special heating water buffer cylinders with appropriately sized connections (≥ 2)

**Rough sizing**
(subject to the utilisation of the delayed building heat loss)
$V_{HP}$ = $\Phi_{HL}$ · (60 to 80 l)
$V_{HP}$ = 56.2 · 60 l
$V_{HP}$ = 3372 l cylinder capacity
**Selection:** Special heating water buffer cylinders with appropriately sized connections (≥ 2)

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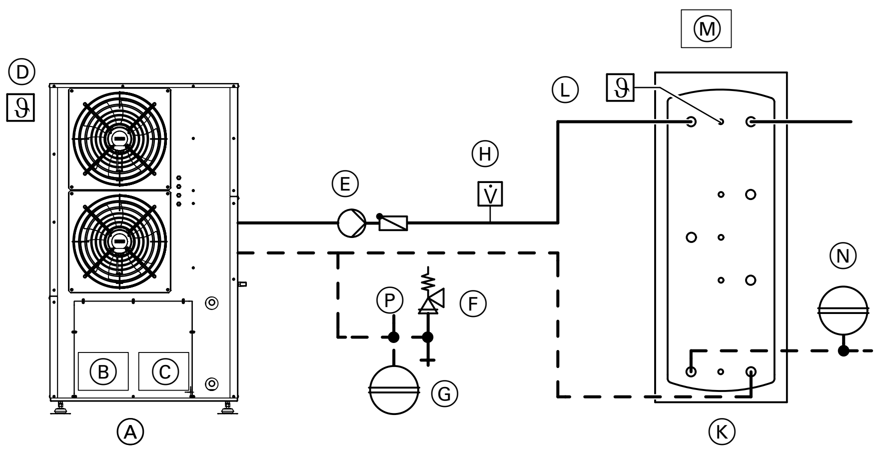
### Hydraulic connection of a heating water buffer cylinder




**Equipment required**

| Pos. | Description |
|---|---|
| Ⓐ | Heat pump |
| Ⓑ | VIRVS heat pump controller |
| Ⓒ | VIAVS function extension (internal) |
| Ⓓ | Outside temperature sensor |
| Ⓔ | Secondary circuit pump |
| Ⓕ | Safety assembly, secondary circuit |
| Ⓖ | Expansion vessel |
| Ⓗ | Flow switch |
| Ⓚ | Heating water buffer cylinder |
| Ⓛ | Buffer temperature sensor |
| Ⓜ | VIAVS function extension |
| Ⓝ | Expansion vessel |

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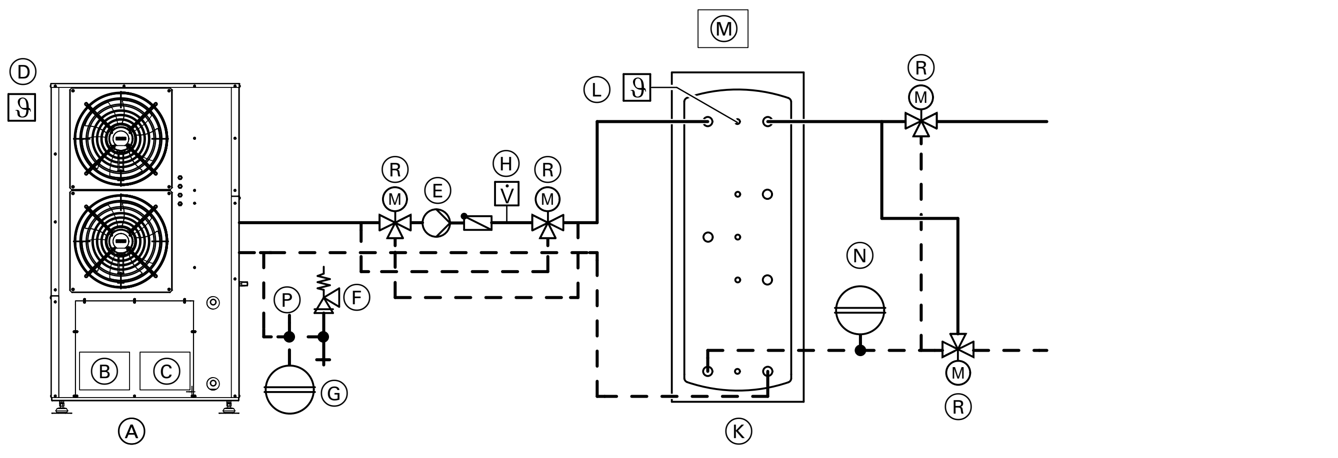
**Hydraulic connection of heating/cooling water buffer cylinder**




**Equipment required**

| Pos. | Description |
|---|---|
| Ⓐ | Heat pump |
| Ⓑ | VIRVS heat pump controller |
| Ⓒ | VIAVS function extension (internal) |
| Ⓓ | Outside temperature sensor |
| Ⓔ | Secondary circuit pump |
| Ⓕ | Safety assembly, secondary circuit |
| Ⓖ | Expansion vessel |
| Ⓗ | Flow switch |
| Ⓚ | Heating/cooling water buffer cylinder |
| Ⓛ | Buffer temperature sensor |
| Ⓜ | VIAVS function extension |
| Ⓝ | Expansion vessel |
| Ⓡ | 3-way valve with actuator |

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## 4.7 Design guide for the secondary circuit

Ensure the required minimum flow rate and the minimum system volume. The following table provides an overview of how the secondary circuit should be sized.

| Type | | $\dot{V}_{min}$ in l/h | $\varnothing_{pipes}$ | $V_{min}$ in l*3 | Buffer cylinder (recommended minimum) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Underfloor heating circuit | Radiator heating circuit | Underfloor + radiator |
| AWO-AC | 201.A032 | 1100 | 1½" | 400 | Individual sizing required | | |
| | 202.A064 | 2100 | 2" | 400 | Individual sizing required | | |
| | 204.A128 | 2800 | 2½" | 600 | Individual sizing required | | |

Symbols:
- $\dot{V}_{min}$ Minimum flow rate, secondary circuit
- $\varnothing_{pipes}$ Minimum diameter of pipes in secondary circuit
- $V_{min}$ Minimum volume of the heating system
- (underfloor symbol) Underfloor heating circuit
- ◎ Radiator heating circuit

***Note***

*In systems with power-OFF times, ensure that a sufficiently sized buffer cylinder is provided. We recommend sizing this according to VDI 4645: allow for a buffer cylinder volume of 30 to 40 l per kW of heat pump output and hour of power-OFF time.*

*The minimum diameter of the pipework can be varied under the following conditions:*
- *Carry out a pipework calculation using the selected pipe diameter.*
- *This calculation must prove that the required flow rate in relation to the residual head is maintained: See heat pump specification.*

*3 *Cannot be fitted with shut-off devices*

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**Pipework volume**

| Pipe | Nominal diameter | Dimension x wall thickness in mm | Volume in l/m |
|---|---|---|---|
| Copper pipe | DN 20 | 22 x 1 | 0.31 |
| | DN 25 | 28 x 1 | 0.53 |
| | DN 32 | 35 x 1 | 0.84 |
| | DN 40 | 42 x 1 | 1.23 |
| | DN 50 | 54 x 2 | 2.04 |
| | DN 60 | 64 x 2 | 2.83 |
| Threaded pipes | ¾ in. | 26.9 x 2.65 | 0.37 |
| | 1 in. | 33.7 x 3.25 | 0.58 |
| | 1¼ in. | 42.4 x 3.25 | 1.01 |
| | 1½ in. | 48.3 x 3.25 | 1.37 |
| | 2 in. | 60.3 x 3.65 | 2.21 |
| Composite pipes | DN 20 | 26 x 3.0 | 0.31 |
| | DN 25 | 32 x 3 | 0.53 |
| | DN 32 | 40 x 3.5 | 0.86 |
| | DN 40 | 50 x 4.0 | 1.39 |
| | DN 50 | 63 x 6.0 | 2.04 |

## 4.8 Water quality

### Heating water

Unsuitable fill and top-up water increases the level of deposits and corrosion. This can lead to system damage.
Observe VDI 2035 regarding quality and amount of heating water, including fill and top-up water.
- Flush the heating system thoroughly before filling.
- Only fill with water of potable quality.
- Fill and top-up water with a water hardness in excess of 11.2 °dH (2.0 mol/m$^3$) must be softened, e.g. with the small softening system for heating water: See Vitoset pricelist.

For further information about fill and top-up water: See technical guide "Heat pump principles".

**Dirt and magnetite separator**
Particularly with existing systems, contaminated heating water can lead to increased wear or faults with individual components, e.g. pumps and valves.
Particles of rust and dirt can reduce the efficiency of the heat pump and block the condenser. Consequently, the system cannot be guaranteed to operate without faults at all times.
The ingress of oxygen (for example via compression fittings) can also cause corrosion in new systems.
We therefore recommend installing a dirt separator with magnet in both existing and new heating systems: See "Installation accessories" or Vitoset pricelist.

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## 4.9 DHW heating

***Note***
*DHW heating with the Vitocal 200-A Pro must only be implemented with the Vitotrans 343 freshwater module. DHW cylinders are not suitable.*

### Function description for DHW heating with Vitotrans 353 freshwater module

**Draw-off rate 25 l/min, 48 l/min, 68 l/min**

***Note***
*Draw-off rate in line with SPF test procedure, performance factor 1 (PF 1): See Vitotrans 353 datasheet.*

Freshwater module for hygienic DHW heating in accordance with the instantaneous water heating principle.
Available for wall mounting as type PBSA, PBMA/PBMA-S and PBLA/PBLA-S or as type PZSA and PZMA/PZMA-S for installation on heating water buffer cylinder Vitocell 100-E.
- A DHW circulation pump and diverter valve for directed return stratification are available as accessories.
- All pumps are highly efficient.
- With types PBMA/PBMA-S (48 l/min) and PBLA/PBLA-S (68 l/min), cascades with up to 4 identical modules are possible.
- Types PBMA-S, PBLA-S and PZMA-S are equipped with a stainless steel brazed heat exchanger.

***Note***
*Vitocell 100-E is not suitable for Vitocal 200-A Pro, type AWO-AC 202.A064 and type AWO-AC 204.A128. For these heat pumps use the Vitocell 050-E, type EC Pro and Vitotrans 353 for wall mounting.*
*Do not use the Vitocal 200-A Pro in conjunction with DHW cylinders.*

### Application

For DHW heating systems operating according to the instantaneous water heating principle (e.g. freshwater modules), the DHW demand can be determined according to the peak flow rate principle.

For this, the assumption is made that the peak flow rate according to DIN 1988-300 determined for calculating the pipe dimensions for the DHW pipework will also have to be heated by the DHW heating system.

The peak flow rate is the sum of all connected individual consumers (total flow rate), reduced by a simultaneity factor. This is subject to the type of building.
Avoid oversizing. The calculated peak flow rate should be less than the sum of the two largest individual consumers. For systems with several independent consumers (e.g. in apartment buildings), also carry out this check with the total flow rate of the respective largest consumer, e.g. of all apartments.

See also the "DHW heating" technical guide and the "Vitotrans 353" datasheet.

**Extract from the "Vitotrans 353" datasheet, type PBLA, PBLA-S**

| Buffer temperature | Set DHW temperature | Max. Vitotrans 353 draw-off rate | Transfer output | Min. buffer volume per litre DHW | At 10 °C cold water inlet temperature: Max. draw-off rate at the mixing valve at | | | | Return temperature to buffer cylinder |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 40 °C | 45 °C | 50 °C | 55 °C | |
| in °C | in °C | in l/min | in kW | in l | in l/min | in l/min | in l/min | in l/min | in °C |
| 45 | 40 | 48 | 101 | 1.2 | — | — | — | — | 19 |
| 50 | 40 | 62 | 130 | 0.9 | — | — | — | — | 17 |
| | 45 | 46 | 113 | 1.2 | 53 | — | — | — | 21 |
| 55 | 40 | 74 | 154 | 0.8 | — | — | — | — | 16 |
| | 45 | 59 | 143 | 1.0 | 68 | — | — | — | 18 |
| | 50 | 45 | 124 | 1.3 | 59 | 50 | — | — | 23 |
| 60 | 40 | 83 | 174 | 0.7 | — | — | — | — | 15 |
| | 45 | 68 | 166 | 0.8 | 79 | — | — | — | 17 |
| | 50 | 56 | 156 | 1.0 | 74 | 63 | — | — | 20 |
| | 55 | 43 | 136 | 1.3 | 65 | 55 | 48 | — | 25 |
| 65 | 40 | 83[*4] | 174 | 0.3 | — | — | — | — | 14 |
| | 45 | 78 | 191 | 0.7 | 91 | — | — | — | 16 |
| | 50 | 65 | 182 | 0.9 | 86 | 74 | — | — | 18 |
| | 55 | 54 | 169 | 1.1 | 80 | 68 | 60 | — | 22 |
| | 60 | 42 | 148 | 1.3 | 70 | 60 | 52 | 46 | 27 |

## 4.10 Leak test on the refrigerant circuit

Heat pump refrigerant circuits containing a refrigerant with a $CO_2$ equivalent of 5 t or more must be tested regularly for tightness in accordance with EU Regulation No. 517/2014. In the case of hermetically sealed refrigerant circuits, this regular testing is required for a $CO_2$ equivalent of 10 t or more.
The intervals at which the refrigerant circuits will need to be tested depend on the level of $CO_2$ equivalent. If leak detection facilities are available on site, the test intervals are extended.

| Type | | Leak test |
|---|---|---|
| AWO-AC | 201.A032 | Every 12 months |
| | 202.A064 | Every 12 months |
| | 204.A128 | Every 12 months |

## 4.11 Intended use

The appliance is intended solely for installation and operation in sealed unvented heating systems that comply with EN 12828, with due attention paid to the associated installation, service and operating instructions.

Intended use presupposes that a fixed installation in conjunction with permissible, system-specific components has been carried out.



## Heat pump control unit

### 5.1 Design and functions

For heat pump management, a VIRVS heat pump controller is installed in the heat pump. To operate it, the UI400 programming unit is installed in the building.

*4 *Max. flow rate: 83 l/min ≙ pressure drop of 1000 mbar with Vitotrans. Higher values are only possible to a limited extent due to hydraulic factors.*

### Modular design

- VIRVS heat pump controller

  Functions
  – Controls all internal functions of the heat pump
  – Cascade function
- VIAVS function extensions

  Functions
  – Type AWO-AC 201.A032 and AWO-AC 202.A064
    – 1st extension (internal): Secondary circuit pump and heating circuit with mixer (factory setting: 3rd heating circuit with mixer)
    – 2nd extension (external, standard delivery): Heating water buffer cylinder and heating circuit with mixer (factory setting: 1st heating circuit with mixer)
    – 3rd extension (external, accessories); 2 of following functions:
      – DHW heating
      – Swimming pool heating
      – External heat generator
      – Heating circuit with mixer (factory setting: 2nd heating circuit with mixer)
  – Type AWO-AC 204.A128
    – 1st extension (internal): Secondary circuit pump and heating circuit with mixer (factory setting: 3rd heating circuit with mixer)
    – 2nd extension (external, standard delivery): Heating circuit with mixer (factory setting: 1st heating circuit with mixer)
    – 3rd extension (external, accessories): Heating water buffer cylinder and one heating circuit with mixer (factory setting: 2nd heating circuit with mixer)
    – 4th to 6th extension (external, accessories); 2 of following functions:
      – DHW heating
      – Swimming pool heating
      – 2nd external heat generator
      – Heating circuit with mixer
- Programming unit UI400
- Web server
  Remote control and remote monitoring of systems via internet and app.

For operating the Vitocal 200-A Pro in a cascade, several VIRVS heat pump controllers are connected to each other. The control functions are similar to those for type AWO-AC 204.A128.

## 5.2 Standard delivery

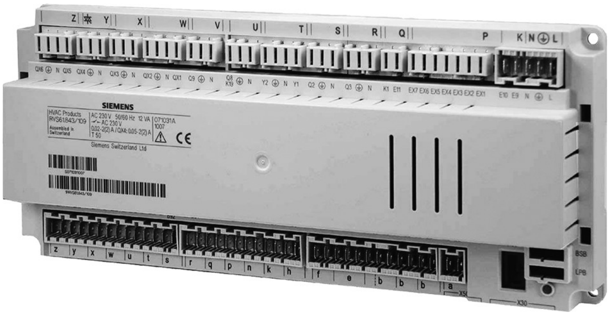
The components included in the standard delivery can also be ordered separately as accessories for further functions.

| Description | Number included in standard delivery of type AWO-AC | | | Part no. as accessory |
|---|---|---|---|---|
| | 201.A032 | 202.A064 | 204.A128 | |
| VIRVS heat pump controller (integrated into heat pump) | 1 | 1 | 2 | 7967135 |
| VIAVS function extension | | | | 7967136 |
| – Integrated into heat pump | 1 | 1 | 2 | |
| – Installed in wall mounted enclosure | 1 | 1 | 1 | |
| Programming unit UI400 | 1 | 1 | 2 | 7883558 |
| Web server | | | | |
| – For 1 VIRVS heat pump controller: OZW672.01 | 1 | 1 | – | 7967137 |
| – For up to 4 VIRVS heat pump controllers: OZW672.04 | – | – | 1 | 7967138 |
| Outside temperature sensor | 1 | 1 | 1 | – |

## 5.3 Control unit accessories

### VIRVS heat pump controller

**Part no. 7967135**
- For controlling the internal functions of the heat pump
- Max. number of VIRVS heat pump controllers per system: 16



| Specification | |
|---|---|
| Rated voltage | 230 V~ |
| Rated frequency | 50/60 Hz |
| Max. power consumption | 12 W |
| Protection class | I |
| Permissible ambient temperature | |
| – Operation | –20 to +50 °C |
| – Storage | –20 to +65 °C |
| – Transport | –25 to +70 °C |
| Setting range for heating curves | |
| – Slope | 0 to 4 |
| – Level | –15 to +40 K |
| Dimensions | |
| – Width | 281 mm |
| – Height | 121 mm |
| – Depth | 51.7 mm |
| Weight | 650 g |

For every additional VIRVS heat pump controller, a UI400 programming unit is required.

## VIAVS function extension

**Part no. 7967136**

For controlling other system components:
- Secondary circuit pump and circulation pump of a heating circuit with mixer
- Heating water buffer cylinder and circulation pump of a heating circuit with mixer
- Heating/cooling water buffer cylinder and secondary circuit heating/cooling changeover
- Two of following functions
  - DHW heating
  - Swimming pool heating
  - External heat generator
  - For circulation pump in further heating circuits with mixer

Installation/number
- Mounting on a top-hat rail
- 1 VIAVS function extension located in the heat pump control panel
- Up to 2 VIAVS function extensions can be installed in the wall mounted enclosure (part no. 7967350).
- Up to 3 VIAVS function extensions can be connected to 1 VIRVS heat pump controller.
  If further functions are required, an additional VIRVS heat pump controller (installation in wall mounted enclosure) is required.

| Specification | |
|---|---|
| Rated voltage | 230 V~ |
| Rated frequency | 50/60 Hz |
| Max. power consumption | 6 W |
| Permissible ambient temperature | |
| – Operation | –20 to +50 °C |
| – Storage | –20 to +65 °C |
| – Transport | –25 to +70 °C |
| Dimensions | |
| – Width | 109 mm |
| – Height | 121 mm |
| – Depth | 51.7 mm |
| Weight | 248 g |

## UI400 programming unit

**Part no. 7883558**
- For operating the heat pump
- Wall mounting

- Operating modes:
  - Weather-compensated mode
  - Room temperature-dependent mode
- Easy-to-understand control functions for room heating, room cooling and DHW heating

- Access levels
  – System operator
  – Contractor
- Commissioning assistant
- Systems button for switching the entire system
- Energy trend display
- Comprehensive and clearly presented information menu
- Straightforward time program adjustment

For every additional VIRVS heat pump controller, a UI400 programming unit is required.


**Dimensions**

| | |
|---|---|
| Width | 144 mm |
| Height | 96 mm |
| Depth | 20 mm |

## Web server

**Web server part no.**

| Description | Max. number of VIRVS heat pump controllers | Part no. |
|---|---|---|
| OZW672.01 | 1 | **7967137** |
| OZW672.04 | 4 | **7967138** |
| OZW672.16 | 16 | **7967139** |

- For the remote control and remote monitoring of systems via internet and app.
- User interfaces
  – Web browser with PC/laptop and smartphone
  – App (OS and Android)
  – Internet portal with additional functions
- Possible system overviews (display in internet browser)
  – Standard system circuit diagrams
  – User-definable system web pages
- Interface
  – USB
  – Ethernet
- 2 digital inputs for fault messages
- Display of fault messages in web browser
- Sending of fault messages to up to 4 email recipients. Periodic sending of system reports to up to 4 email recipients.
- Creation of trends, trend graphics and sending of trend data to 2 email recipients
- "Energy indicator" function for monitoring data points for energy-related limits ("Green limits") and sending to 2 email recipients
- Web services for external applications via Web API (Web Application Programming Interface)
- Encryption with https and email with TLS
- ACS790 functionality available
- Plug-in power supply unit included in standard delivery


**Specification**

| | |
|---|---|
| Rated voltage | 24 V⎓ |
| Max. power consumption (typical) | 2 W |
| Permissible ambient temperature | |
| – Operation | –0 to 50 °C |
| – Transport | –25 to +70 °C |
| Dimensions | |
| – Width | 88 mm |
| – Height | 121 mm |
| – Depth | 51.7 mm |
| Weight | 136 g |
| Plug-in power supply unit | |
| – Rated voltage | 230 V~/24 V⎓ |
| – Rated frequency | 50/60 Hz |
| – Max. power consumption (typical) | 3 W |

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## Outside temperature sensor

Installation location:
- North or north-west facing wall of the building
- 2 to 2.5 m above the ground; for multi storey buildings in the upper half of the second floor

Connection
- 2 x 1.5 mm² leads, max. lead length 120 m
- Never route this lead together with 230 V/400 V cables.

**Specification**

| | |
|---|---|
| IP rating | IP 54 to EN 60529; ensure through design/installation. |
| Sensor type | NTC at 25 °C |
| Permissible ambient temperature during operation, storage and transport | −50 to +70 °C |

## Modbus clip-in

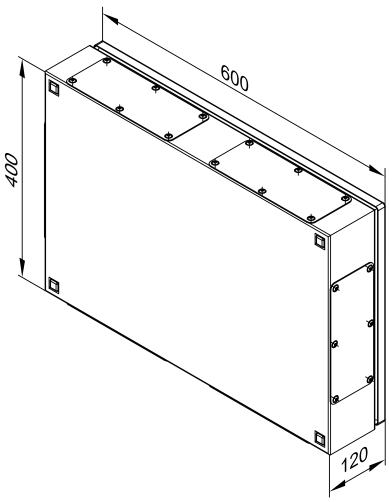
**Part no. 7967134**
- For communicating with building management systems using the Modbus RTU communication standard.
- Connecting lead to the VIRVS heat pump controller included in standard delivery.


**Specification**

| | |
|---|---|
| Operating voltage (via VIRVS heat pump controller) | 5 V⎓ |
| Temperature in operation | –20 to +50 °C |
| Dimensions | |
| – Width | 76 mm |
| – Height | 55 mm |
| – Depth | 20 mm |

## Wall mounted enclosure

**Part no. 7967350**
Used for installation of control unit components if no control panel or distribution boards are available.




**Dimensions**

| | |
|---|---|
| Width | 600 mm |
| Height | 400 mm |
| Depth | 120 mm |

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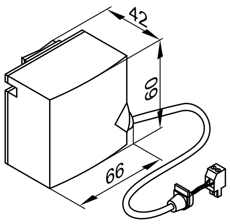
### Contact temperature sensor

**Part no. 7426463**
To capture the temperature on a pipe



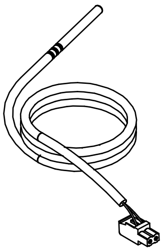

Secured with a tie.

**Specification**

| | |
|---|---|
| Lead length | 5.8 m, fully wired |
| IP rating | IP 32D to EN 60529; ensure through design/installation |
| Sensor type | Viessmann NTC 10 kΩ at 25 °C |
| Permissible ambient temperature | |
| – Operation | 0 to +120 °C |
| – Storage and transport | –20 to +70 °C |

### Immersion temperature sensor

**Part no. 7544848**
To capture the temperature in a sensor well



**Specification**

| | |
|---|---|
| Cable length | 5.8 m, fully wired |
| IP rating | IP 32 to EN 60529; ensure through design/installation. |
| Sensor type | Viessmann NTC 10 kΩ, at 25 °C |
| Permissible ambient temperature | |
| – Operation | 0 to +90 °C |
| – Storage and transport | −20 to +70 °C |

### Flow sensor

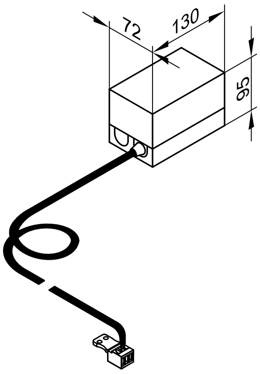
To comply with the requirements in Germany and with the stipulations of the Renewable Energies Heat Act, in conjunction with the seasonal performance factor check integrated into the heat pump control unit.

| Description | For type AWO-AC | Part no. |
|---|---|---|
| Flow sensor DN 50 | 201.A032<br>202.A064 | **7973485** |
| Flow sensor DN 65 | 204.A128 | **7986435** |

| Description | For type AWO-AC | Pressure drop in kPa at nominal flow rate |
|---|---|---|
| Flow sensor DN 50 | 201.A032<br>202.A064 | 0.9<br>3.5 |
| Flow sensor DN 65 | 204.A128 | 3.8 |

### Contact temperature limiter

**Part no. 7151729**
Can be used as a maximum temperature limiter for underfloor heating systems (only in conjunction with metal pipes).
The temperature limiter is fitted to the heating flow. If the flow temperature is too high, the temperature limiter switches off the heating circuit pump.

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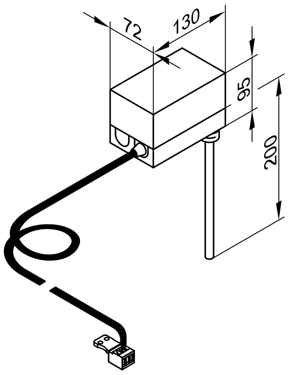
**Specification**

| | |
|---|---|
| Lead length | 4.2 m, fully wired |
| Setting range | 30 to 80 °C |
| Switching differential | Max. 14 K |
| Breaking capacity | 6(1.5) A, 250 V~ |
| Setting scale | Inside the enclosure |
| DIN reg. no. | DIN TR 1168 |

### Immersion temperature limiter

**Part no. 7151728**
May be used as a maximum temperature limiter for underfloor heating systems.
The temperature limiter is fitted to the heating flow. If the flow temperature is too high, the temperature limiter switches off the heating circuit pump.




**Specification**

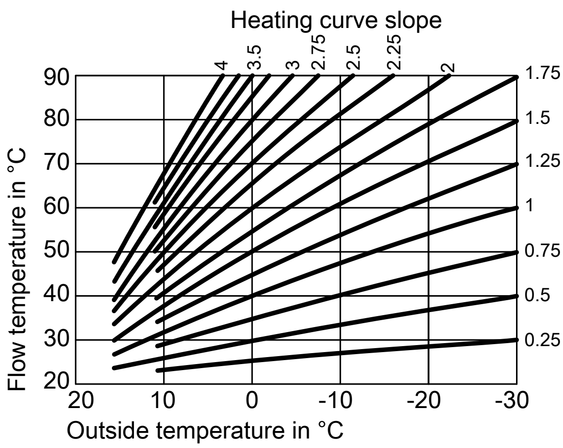
| | |
|---|---|
| Lead length | 4.2 m, fully wired |
| Setting range | 30 to 80 °C |
| Switching differential | Max. 11 K |
| Breaking capacity | 6(1.5) A, 250 V~ |
| Setting scale | Inside the enclosure |
| Stainless steel sensor well (male thread) | R ½ x 200 mm |
| DIN reg. no. | DIN TR 1168 |

## 5.4 Adjusting the heating curves (slope and level)

5

The heat pump control unit regulates the flow temperatures for the heating circuits in weather-compensated mode:
- System flow temperature or flow temperature of heating circuit without mixer
- Flow temperature of heating circuit with mixer:
  The mixer motor is controlled via the VIAVS function extension.

The flow temperature required to reach a specific room temperature depends on the heating system and the thermal insulation of the building to be heated.
Adjusting the heating curves matches the flow temperatures to these conditions.
The flow temperature of the secondary circuit is restricted at the upper end of the scale by the temperature limiter (if installed) and by the maximum temperature set at the heat pump control unit.

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# Keyword index

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# Keyword index

Subject to technical modifications.

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