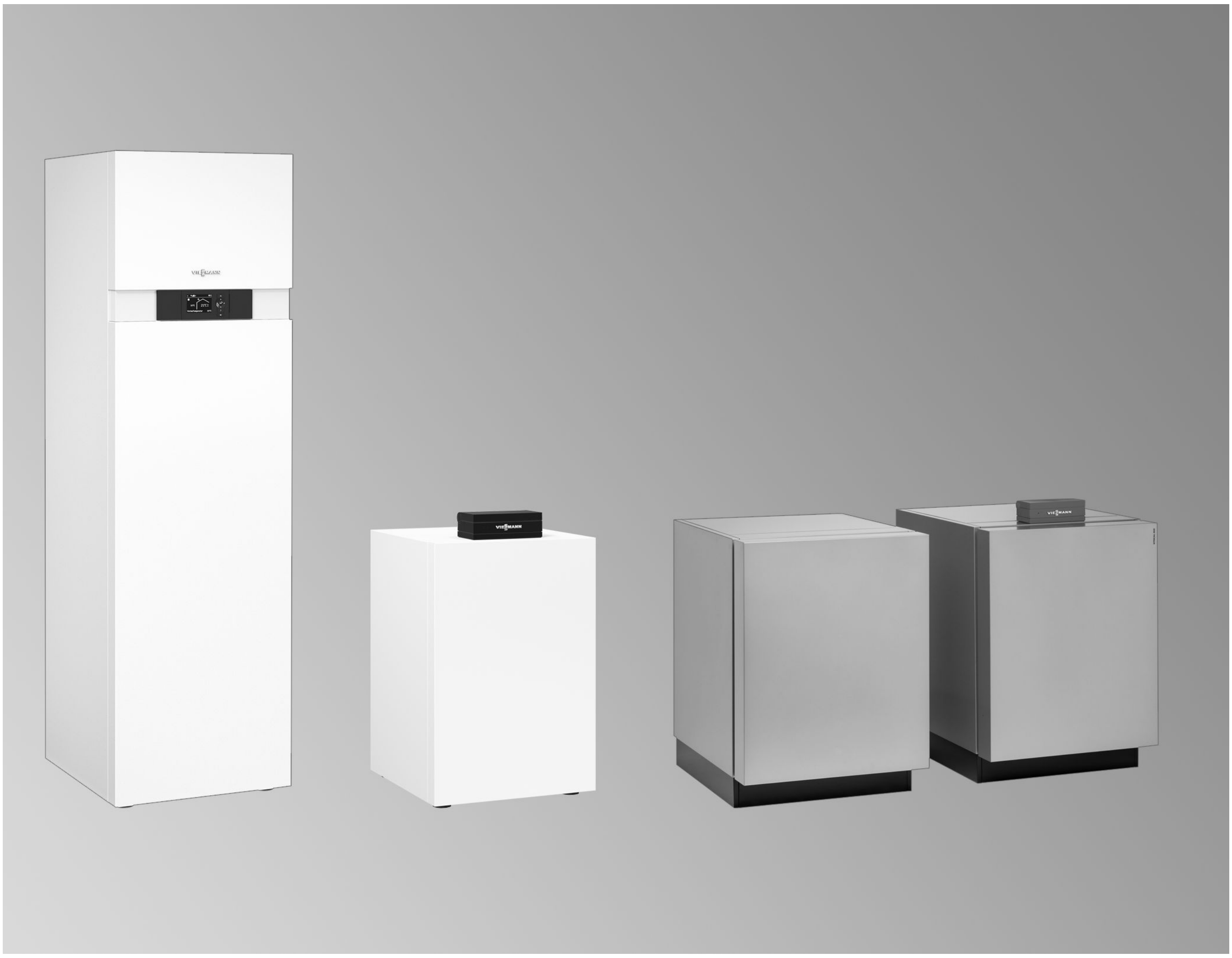
VIESSMANN

VITOCAL

Brine/water and water/water heat pump
1-stage and 2-stage, 1.7 to 117.8 kW

Technical guide



Heat pumps with electric drive for central heating and DHW heating in mono mode or dual mode heating systems

VITOCAL 200-G Type BWC(-M) 201.B

1-stage brine/water or water/water heat pump, 230 V~/ 400 V~

VITOCAL 300-G

Type BWC 301.C

1-stage brine/water or water/water heat pump, 400 V~

Type BW/BWS 301.A

1-stage or 2-stage brine/water or water/water heat pump, 400 V~

VITOCAL 350-G Type BW/BWS 351.B

1-stage or 2-stage brine/water or water/water heat pump, 400 V~

VITOCAL 222-G Type BWT(-M) 221.B

Compact heat pump with integral DHW cylinder, 230 V~/ 400 V~

VITOCAL 333-G Type BWT 331.C

Compact heat pump with integral DHW cylinder, 400 V~

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Product types designation

Vitocal 333-G , type

B	W	T		–		–		–		3	3	1	.	C	12
(A)	(B)	(C)	(D)		(E)		(F)		(G)	(H)	(K)	(L)		(M)	(N)

Pos.	Value	Meaning
(A)	Medium, primary circuit	
	B	**B**rine
	W	**W**ater
(B)	Medium, secondary circuit	
	W	**W**ater
(C)	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	Heat pump compact appliance (**T**ower)
(D)	Model, part 2	
	T	Heat pump compact appliance (**T**ower)
(E)	Power supply	
	M	230 V/50 Hz (**M**onophase)
	Not installed	400 V/50 Hz

Pos.	Value	Meaning
(F)	Not for use with brine/water heat pumps	
(G)	Not used in brine/water heat pumps	
(H)	Viessmann product segment	
	1	Not used in brine/water heat pumps
	2	200
	3	300
(K)	DHW cylinder	
	0	Separate DHW cylinder required
	1/2/3	DHW cylinder installed, without solar utilisation
	4	Not used in brine/water heat pumps
(L)	Heat pumps: Number of compressors in refrigerant circuit	
	1	1 compressor
	2	2 compressors (linked in parallel)
	Hybrid appliances: Number of heat sources	
	2	2 heat sources, e.g. 1 compressor and 1 burner
(M)	**A** to ...	Product generation
(N)	Output size (kW)	

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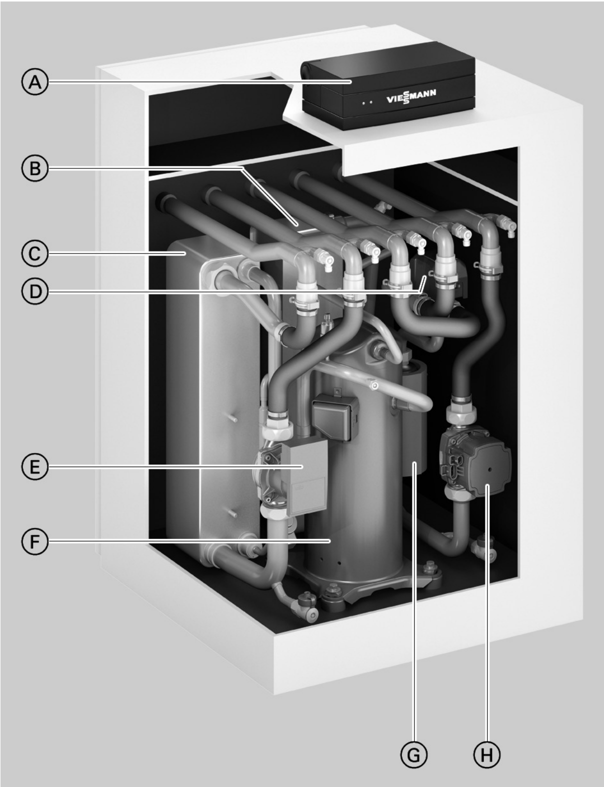
2.1 Product description

Benefits



- Ⓐ Vitotronic 200 weather-compensated, digital heat pump control unit
- Ⓑ Condenser
- Ⓒ Evaporator
- Ⓓ 3-way diverter valve
- Ⓔ Primary pump (brine), high efficiency circulation pump
- Ⓕ Compressor
- Ⓖ Instantaneous heating water heater
- Ⓗ Secondary pump (heating water), high efficiency circulation pump

- Low running costs thanks to high SCOP (seasonal coefficient of performance) to EN 14825: Up to 5.3 for average climatic conditions and low temperature application (W35)
- Especially quiet thanks to new sound insulation concept: Up to 49 dB(A) at B0/W55
- Mono mode operation for central heating and DHW heating
- Low running costs with high efficiency due to RCD (refrigerant cycle diagnostic) system with electronic expansion valve (EEV)
- Integral instantaneous heating water heater, e.g. for screed drying
- Easy handling as the heat pump module can be quickly removed thanks to push-fit connections
- Optimised utilisation of power generated on-site by photovoltaic systems
- Web-enabled through Vitoconnect (accessories) for operation and service via Viessmann apps

Delivered condition

- Brine/water heat pump in a compact casing
- Integral 3-way diverter valve "central heating/DHW heating"
- Integral high efficiency circulation pump for primary circuit (brine)
- Integral high efficiency circulation pump for secondary circuit (heating water)
- Integral instantaneous heating water heater
- Safety assembly for the heating circuit
- Vitotronic 200 weather-compensated heat pump control unit with outside temperature sensor
- Electronic starting current limiter and integral phase monitor
- Connection lines for flow and return of primary circuit (brine) flow, heating circuit and DHW flow (secondary circuit) for connection at the top

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2.2 Specification

Specification – brine/water heat pumps

400 V appliances

Type BWC		201.B06	201.B08	201.B10	201.B13	201.B17
Heating performance data to EN 14511 (B0/W35, 5 K spread)						
Rated heating output	kW	5.76	7.54	10.36	12.97	17.35
Cooling capacity	kW	4.44	6.06	8.32	10.52	13.79
Power consumption	kW	1.25	1.62	2.16	2.63	3.84
Coefficient of performance ε (COP)		4.60	4.64	4.81	4.93	4.51
Brine (primary circuit)						
Capacity	l	3.3	3.3	3.9	4.5	5.9
Minimum flow rate	l/h	860	1160	1470	1900	2500
Nominal flow rate	l/h	1100	1300	1720	—	—
Residual head						
– At minimum flow rate	mbar	635	570	650	869	745
	kPa	63.5	57.0	65.0	86.9	74.5
– At nominal flow rate	mbar	612	545	580	—	—
	kPa	61.2	54.5	58.0	—	—
Max. flow temperature (brine inlet)	°C	25	25	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10	–10	–10
Heating water (secondary circuit)						
Capacity	l	3.3	3.5	3.8	4.6	5.7
Minimum flow rate	l/h	600	710	920	1115	1500
Nominal flow rate	l/h	990	1250	1710	—	—
Residual head						
– At minimum flow rate	mbar	610	690	670	910	838
	kPa	61.0	69.0	67.0	91.0	83.8
– At nominal flow rate	mbar	576	620	430	—	—
	kPa	57.6	62.0	43.0	—	—
Max. flow temperature	°C	65	65	65	65	65
Instantaneous heating water heater						
Heating output	kW	9.0	9.0	9.0	9.0	9.0
Rated voltage		3/N/PE 400 V/50 Hz				
Fuse rating		3 x B16 A 1-pole				
Heat pump electrical values						
Rated voltage, compressor		3/N/PE 400 V/50 Hz				
Rated current, compressor	A	4.8	6.2	7.4	9.7	13
Cos φ		0.9	0.9	0.9	0.9	0.9
Starting current, compressor with starting current limiter	A	11	14	20	22	25
Starting current, compressor with stalled armature	A	28	43	51.5	62	75
Compressor fuse rating	A	1 x B16 A 3-pole	1 x B16 A 3-pole	1 x B16 A 3-pole	1 x B16 A 3-pole	1 x C20 A 3-pole
Protection class		I	I	I	I	I
Electrical values, heat pump control unit						
Rated voltage		1/N/PE 230 V/50 Hz				
Fuse rating		B16 A	B16 A	B16 A	B16 A	B16 A
Fuses		2.0 A (slow, H) / 250 V 6.3 A (slow, H) / 250 V				
IP rating		IP 20	IP 20	IP 20	IP 20	IP 20
Power consumption						
Primary pump (high efficiency circulation pump)	W	5 to 70	5 to 70	5 to 70	5 to 145	5 to 145
– Energy efficiency index EEI		≤ 0.21	≤ 0.21	≤ 0.21	≤ 0.21	≤ 0.21
Secondary pump (high efficiency circulation pump)	W	5.7 to 87	5.7 to 87	5.7 to 87	4 to 131	4 to 131
– Energy efficiency index EEI		≤ 0.21	≤ 0.21	≤ 0.21	≤ 0.21	≤ 0.21
Max. power consumption, control unit	W	1000	1000	1000	1000	1000
Rated output, control unit/PCB	W	12	12	12	12	12

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Type BWC		201.B06	201.B08	201.B10	201.B13	201.B17
Refrigerant circuit						
Refrigerant		R410A	R410A	R410A	R410A	R410A
– Safety group		A1	A1	A1	A1	A1
– Refrigerant charge	kg	1.40	1.95	1.95	2.15	2.40
– Global warming potential (GWP)*1		1924	1924	1924	1924	1924
– CO_2 equivalent	t	2.7	3.8	4.6	4.1	4.6
Permiss. operating pressure						
– High pressure side	bar	45	45	45	45	45
	MPa	4.5	4.5	4.5	4.5	4.5
– Low pressure side	bar	28	28	28	28	28
	MPa	2.8	2.8	2.8	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor				
Oil in compressor	Type	Emkarate RL32 3MAF				
Quantity of oil in compressor	l	0.74	1.24	1.24	1.24	1.89
Dimensions						
Total length	mm	680	680	680	680	680
Total width	mm	600	600	600	600	600
Total height (programming unit pivoted up)	mm	1081	1081	1081	1081	1081
Weight						
Total weight	kg	145	148	152	158	165
Heat pump module	kg	74	77	81	87	94
Permiss. operating pressure						
Primary circuit (brine)	bar	3.0	3.0	3.0	3.0	3.0
	MPa	0.3	0.3	0.3	0.3	0.3
Secondary circuit, heating water	bar	3.0	3.0	3.0	3.0	3.0
	MPa	0.3	0.3	0.3	0.3	0.3
Connections						
Primary circuit flow/return	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit flow (heating circuits)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit flow (DHW cylinder)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit return (heating circuits and DHW cylinder)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Sound power (tested with reference to EN 12102/EN ISO 9614-2) – weighted total sound power level at $B0^{\pm 3\,K}/W35^{\pm 5\,K}$						
– At rated heating output	dB(A)	40	42	44	44	47
Energy efficiency class to Commission Regulation (EU) No 813/2013						
Heating, average climatic conditions						
– Low temperature applications (W35)		A^{+++}	A^{+++}	A^{+++}	A^{+++}	A^{+++}
– Medium temperature applications (W55)		A^{++}	A^{++}	A^{++}	A^{++}	A^{++}
Heating performance data to Commission Regulation (EU) No 813/2013 (average climatic conditions)						
Low temperature applications (W35)						
– Energy efficiency η_S	%	186	201	204	204	185
– Rated heating output P_{rated}	kW	7	9	12	13	17
– Seasonal coefficient of performance (SCOP)		4.86	5.23	5.32	5.31	4.82
Medium temperature applications (W55)						
– Energy efficiency η_S	%	134	143	150	148	140
– Rated heating output P_{rated}	kW	6	8	11	12	16
– Seasonal coefficient of performance (SCOP)		3.56	3.79	3.97	3.90	3.71
Sound power level to ErP(B0/W55)	dB(A)	40	44	46	49	48

230 V appliances

Type BWC-M		201.B06	201.B08	201.B10
Heating performance data to EN 14511 (B0/W35, 5 K spread)				
Rated heating output	kW	5.71	7.47	10.29
Cooling capacity	kW	4.32	5.94	8.20
Power consumption	kW	1.36	1.78	2.32
Coefficient of performance ε (COP)		4.20	4.20	4.60

**1 Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

Vitocal 200-G, type BWC(-M) 201.B (cont.)

Type BWC-M		201.B06	201.B08	201.B10
Brine (primary circuit)				
Capacity	l	3.3	3.3	3.9
Minimum flow rate	l/h	860	1160	1470
Nominal flow rate	l/h	1100	1300	1720
Residual head				
– At minimum flow rate	mbar	635	570	650
	kPa	63.5	57.0	65.0
– At nominal flow rate	mbar	612	545	580
	kPa	61.2	54.5	58.0
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10
Heating water (secondary circuit)				
Capacity, heat pump	l	3.3	3.5	3.8
Capacity, total	l	226	227	228
Minimum flow rate	l/h	600	710	920
Nominal flow rate	l/h	990	1250	1710
Residual head				
– At minimum flow rate	mbar	610	690	670
	kPa	61.0	69.0	67.0
– At nominal flow rate	mbar	576	620	430
	kPa	57.6	62.0	43.0
Max. flow temperature	°C	65	65	65
Instantaneous heating water heater				
Heating output	kW	9.0	9.0	9.0
Rated voltage			1/N/PE 230 V/50 Hz	
Fuse rating		3 x B16 A 1-pole	3 x B16 A 1-pole	3 x B16 A 1-pole
Heat pump electrical values				
Rated voltage, compressor			1/N/PE 230 V/50 Hz	
Rated current, compressor	A	12.8	17.1	22.8
Cos φ		0.9	0.9	0.9
Starting current, compressor with starting current limiter	A	23.9	25.6	38.7
Starting current, compressor with stalled armature	A	60	83	108
Compressor fuse rating	A	B20 A	B20 A	B25 A
Rated voltage, heat pump control unit/PCB			1/N/PE 230 V/50 Hz	
Fuse rating, heat pump control unit/PCB (internal)			6.3 A (slow) / 250 V	
Protection class		I	I	I
Power consumption				
Primary pump (high efficiency circulation pump)	W	5 to 70	5 to 70	5 to 70
– Energy efficiency index EEI		≤ 0.21	≤ 0.21	≤ 0.21
Secondary pump (high efficiency circulation pump)	W	5.7 to 87	5.7 to 87	5.7 to 87
– Energy efficiency index EEI		≤ 0.21	≤ 0.21	≤ 0.21
Max. power consumption, control unit	W	1000	1000	1000
Rated output, control unit/PCB	W	5	5	5
Refrigerant circuit				
Refrigerant		R410A	R410A	R410A
– Safety group		A1	A1	A1
– Refrigerant charge	kg	1.4	1.95	1.95
– Global warming potential (GWP)*2		1924	1924	1924
– CO_2 equivalent	t	2.7	3.8	4.6
Permiss. operating pressure				
– High pressure side	bar	45	45	45
	MPa	4.5	4.5	4.5
– Low pressure side	bar	28	28	28
	MPa	2.8	2.8	2.8
Compressor	Type		Hermetically sealed scroll compressor	
Oil in compressor	Type		Emkarate RL32 3MAF	
Quantity of oil in compressor	l	0.74	1.24	1.24
Dimensions				
Total length	mm	680	680	680
Total width	mm	600	600	600
Total height	mm	1081	1081	1081
Weight				
Total weight	kg	145	148	152
Heat pump module	kg	74	77	81

*2 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

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Type BWC-M		201.B06	201.B08	201.B10
Permiss. operating pressure				
Primary circuit (brine)	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Secondary circuit, heating water	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Connections				
Primary circuit flow/return	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit flow (heating circuits)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit flow (DHW cylinder)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit return (heating circuits and DHW cylinder)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Sound power (tested with reference to EN 12102/ EN ISO 9614-2) – weighted total sound power level at $B0^{\pm 3 K}$/ $W35^{\pm 5 K}$				
– At rated heating output	dB(A)	40	42	44
Energy efficiency class to Commission Regulation (EU) No 813/2013				
Heating, average climatic conditions				
– Low temperature applications (W35)		A^{+++}	A^{+++}	A^{+++}
– Medium temperature applications (W55)		A^{++}	A^{++}	A^{++}
Heating performance data to Commission Regulation (EU) No 813/2013 (average climatic conditions)				
Low temperature applications (W35)				
– Energy efficiency η_S	%	201	214	194
– Rated heating output P_{rated}	kW	6	9	12
– Seasonal coefficient of performance (SCOP)		5.23	5.54	5.06
Medium temperature applications (W55)				
– Energy efficiency η_S	%	133	151	143
– Rated heating output P_{rated}	kW	6	8	11
– Seasonal coefficient of performance (SCOP)		3.52	3.98	3.76
Sound power level to ErP(B0/W55)	dB(A)	40	44	46

Specification – water/water heat pumps

400 V appliances

Type BWC in conjunction with "conversion kit for water/water heat pump"		201.B06	201.B08	201.B10	201.B13	201.B17
Heating performance data to EN 14511 (W10/W35, 5 K spread)						
Rated heating output	kW	7.53	9.80	13.41	16.89	22.59
Cooling capacity	kW	5.80	8.52	11.61	14.46	19.17
Power consumption	kW	1.23	1.57	2.11	2.61	3.68
Coefficient of performance ε (COP)		6.11	6.24	6.37	6.46	6.15
Brine (primary intermediate circuit)						
Capacity	l	3.3	3.3	3.9	4.5	5.9
Minimum flow rate	l/h	1440	2120	2880	3300	4450
Residual head at minimum flow rate	mbar	570	300	770	624	290
	kPa	57.0	30.0	77.0	62.4	29.0
Max. flow temperature (brine inlet)	°C	25	25	25	25	25
Min. flow temperature (brine inlet)	°C	7.5	7.5	7.5	7.5	7.5
Heating water (secondary circuit)						
Capacity	l	3.3	3.5	3.8	4.6	5.7
Minimum flow rate	l/h	650	850	1160	1450	1990
Residual head at minimum flow rate	mbar	610	680	625	660	540
	kPa	61.0	68.0	62.5	66.0	54.0
Max. flow temperature	°C	65	65	65	65	65

230 V appliances

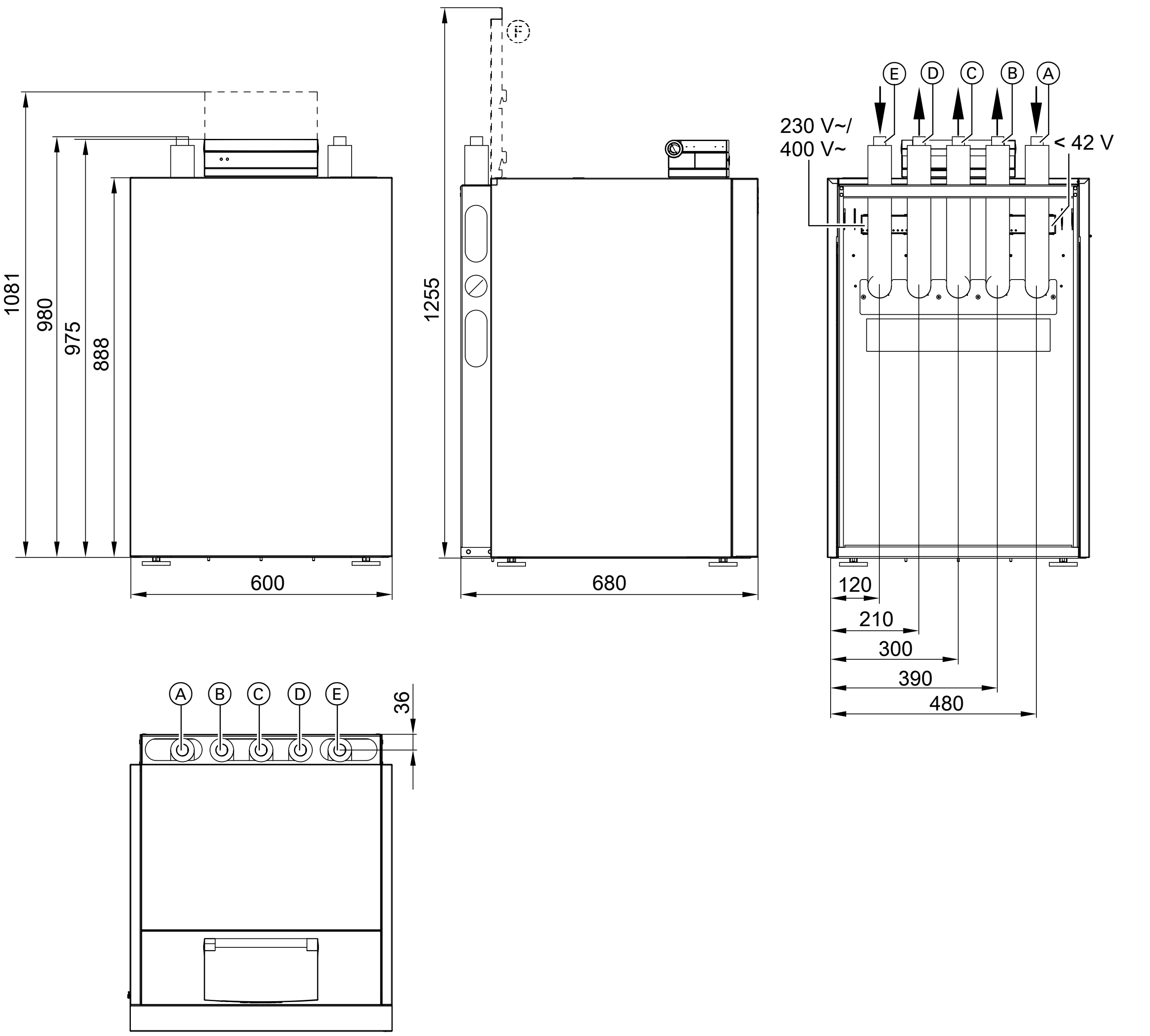
Type BWC-M in conjunction with "conversion kit for water/water heat pump"		201.B06	201.B08	201.B10
Heating performance data to EN 14511 (W10/W35, 5 K spread)				
Rated heating output	kW	7.62	9.95	13.44
Cooling capacity	kW	6.48	8.60	11.66
Power consumption	kW	1.36	1.64	2.27
Coefficient of performance ε (COP)		5.61	6.07	5.92

Vitocal 200-G, type BWC(-M) 201.B (cont.)

Type BWC-M in conjunction with "conversion kit for water/water heat pump"		201.B06	201.B08	201.B10
Brine (primary intermediate circuit)				
Capacity	l	3.3	3.3	3.8
Minimum flow rate	l/h	1600	2130	2890
Residual head at minimum flow rate	mbar	535	295	770
	kPa	53.5	29.5	77.0
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	7.5	7.5	7.5
Heating water (secondary circuit)				
Capacity	l	3.3	3.5	3.8
Minimum flow rate	l/h	660	860	1160
Residual head at minimum flow rate	mbar	608	675	625
	kPa	60.8	67.5	62.5
Max. flow temperature	°C	65	65	65

Note
Further specifications: See "Specification for brine/water heat pumps".

Dimensions



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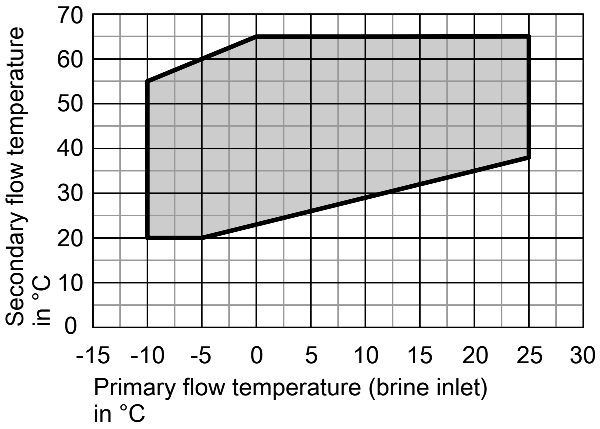
Ⓐ Primary circuit flow (heat pump brine inlet), connection Cu 28 x 1.5 mm
Ⓑ Primary circuit return (heat pump brine outlet), connection Cu 28 x 1.5 mm
Ⓒ Secondary circuit flow (DHW cylinder), connection Cu 28 x 1.5 mm
Ⓓ Secondary circuit flow (heating circuits), connection Cu 28 x 1.5 mm
Ⓔ Secondary circuit return (heating circuits DHW cylinder), connection Cu 28 x 1.5 mm
Ⓕ Rear top panel, pivoted open

Application limits to EN 14511

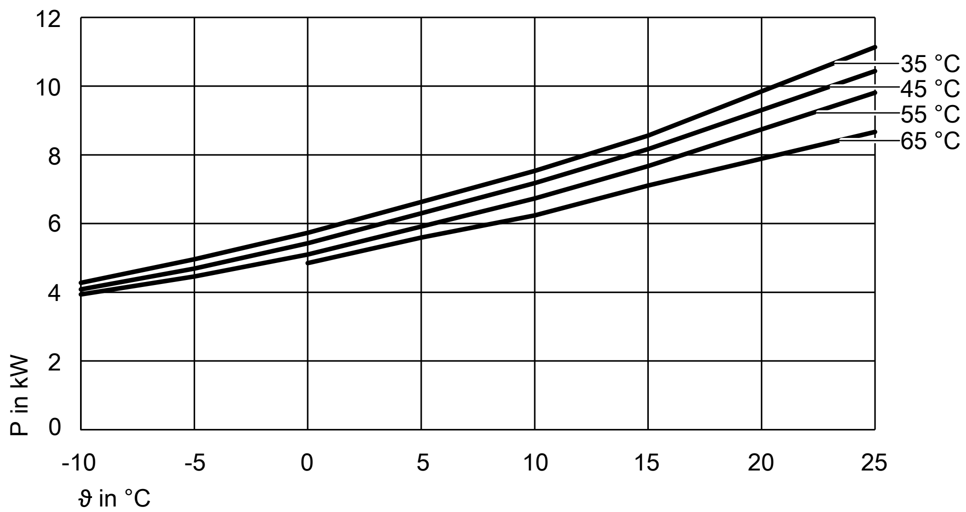


- Secondary side spread: 5 K
- Primary side spread: 3 K

Curves – 400 V appliances

Performance graphs – type BWC 201.B06

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



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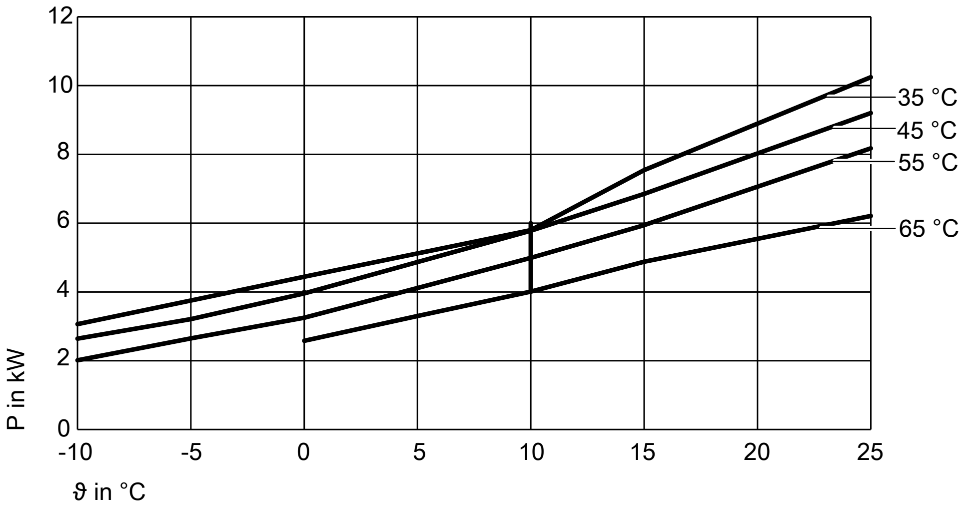
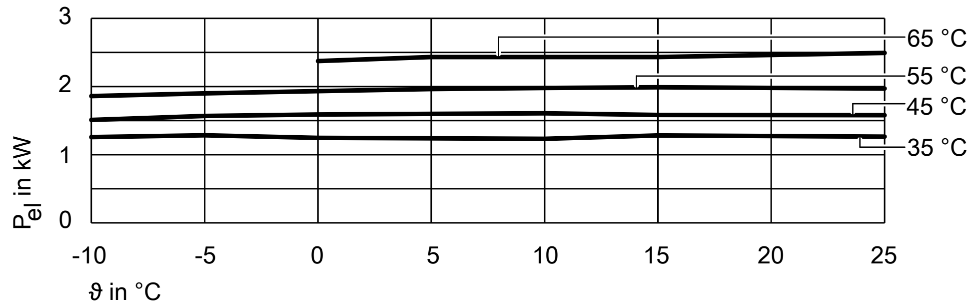
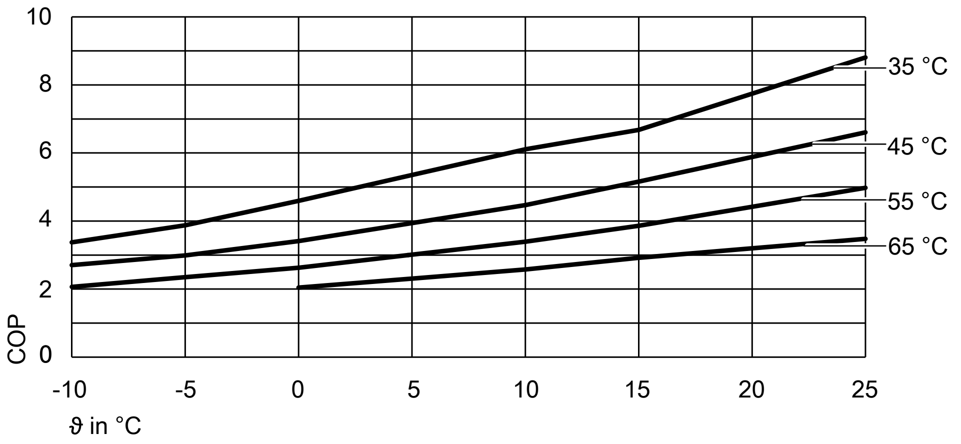
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

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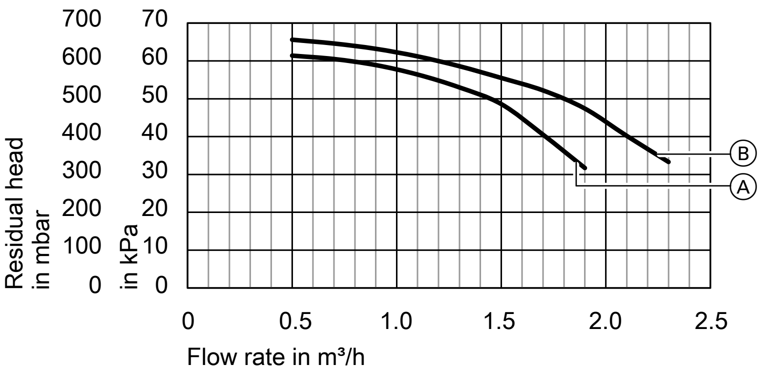
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	4.27	4.96	5.73	6.63	7.53	8.56	11.13
Cooling capacity		kW	3.06	3.75	4.44	5.12	5.80	7.54	10.24
Power consumption		kW	1.26	1.28	1.25	1.24	1.23	1.28	1.26
Coefficient of performance ε (COP)			3.37	3.87	4.60	5.35	6.11	6.68	8.81

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	4.08	4.69	5.43	6.30	7.18	8.16	10.44
Cooling capacity		kW	2.64	3.21	3.96	4.87	5.78	6.85	9.20
Power consumption		kW	1.51	1.57	1.59	1.60	1.61	1.58	1.58
Coefficient of performance ε (COP)			2.71	2.99	3.41	3.94	4.47	5.16	6.61

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	3.84	4.48	5.11	5.91	6.72	7.68	9.81
Cooling capacity		kW	2.03	2.65	3.28	4.11	4.94	5.94	8.18
Power consumption		kW	1.86	1.90	1.94	1.96	1.98	1.99	1.97
Coefficient of performance ε (COP)			2.07	2.35	2.63	3.01	3.39	3.86	4.98

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			4.84	5.55	6.25	7.11	8.67
Cooling capacity		kW			2.57	3.29	4.01	4.88	6.21
Power consumption		kW			2.37	2.40	2.43	2.43	2.49
Coefficient of performance ε (COP)					2.04	2.31	2.58	2.92	3.48

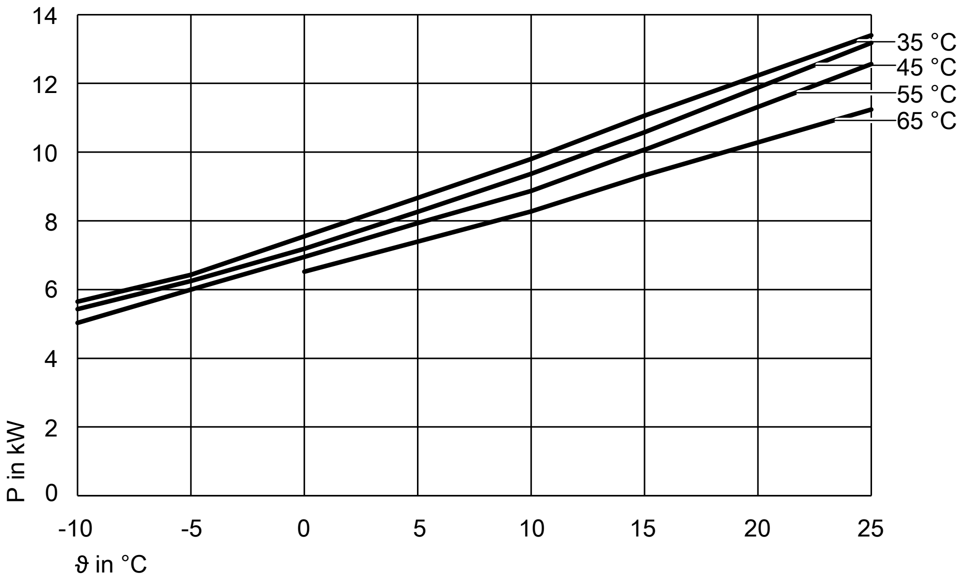
Residual heads of the integral circulation pumps, type BWC 201.B06



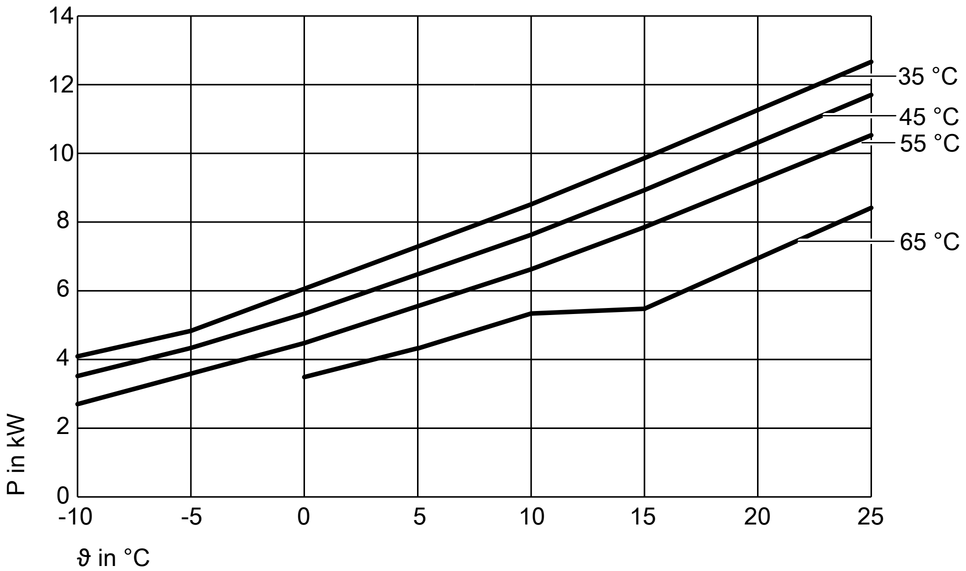
Ⓐ Secondary pump
Ⓑ Primary pump

Performance graphs – type BWC 201.B08

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



Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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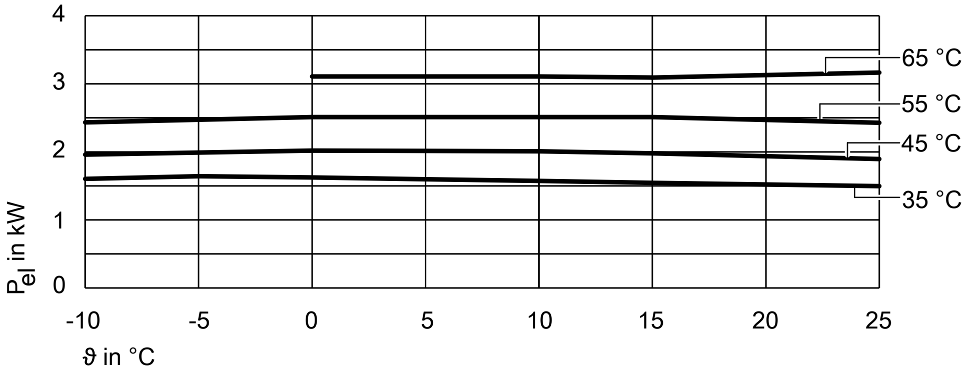
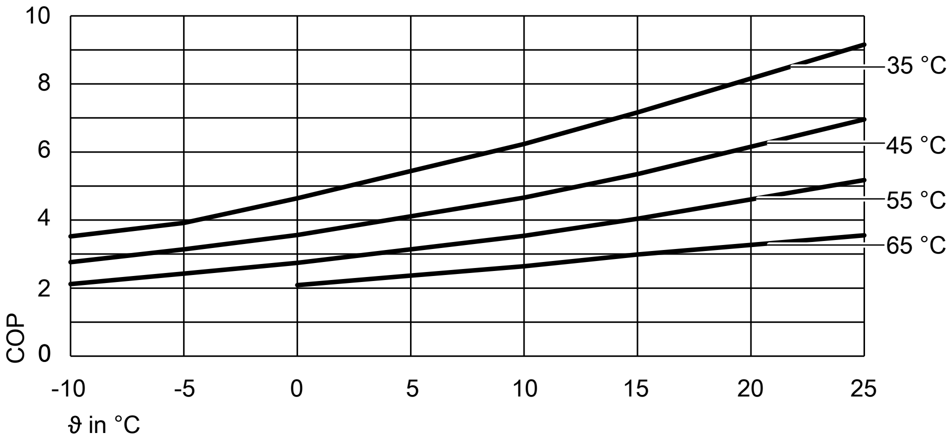
Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Note

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

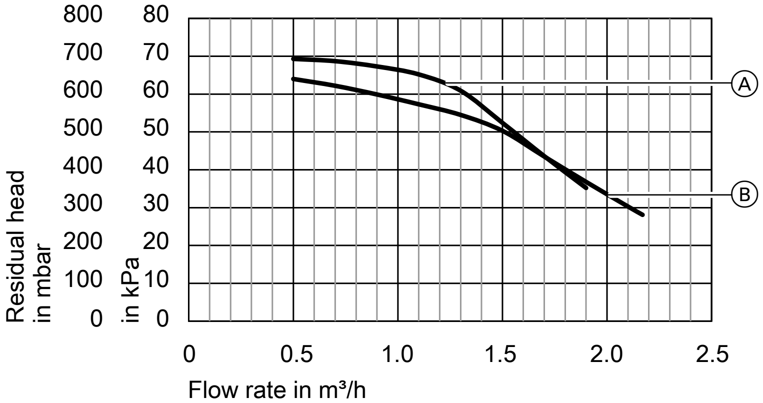
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.65	6.43	7.54	8.67	9.80	11.06	13.70
Cooling capacity		kW	4.09	4.83	6.06	7.29	8.52	9.86	12.66
Power consumption		kW	1.60	1.64	1.62	1.60	1.57	1.54	1.50
Coefficient of performance ε (COP)			3.52	3.91	4.64	5.44	6.24	7.16	9.16

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.42	6.25	7.19	8.27	9.36	10.59	13.18
Cooling capacity		kW	3.52	4.34	5.33	6.48	7.63	8.93	11.70
Power consumption		kW	1.96	1.99	2.02	2.01	2.01	1.98	1.89
Coefficient of performance ε (COP)			2.76	3.14	3.56	4.11	4.66	5.35	6.96

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.04	6.00	6.95	7.92	8.88	10.06	12.56
Cooling capacity		kW	2.70	3.59	4.48	5.55	6.63	7.85	10.53
Power consumption		kW	2.43	2.47	2.51	2.51	2.51	2.51	2.43
Coefficient of performance ε (COP)			2.11	2.43	2.74	3.14	3.54	4.04	5.18

Operating point	**W**	**°C**			**65**				
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			6.52	7.40	8.28	9.33	11.24
Cooling capacity		kW			3.49	4.42	5.34	5.48	8.41
Power consumption		kW			3.13	3.13	3.13	3.12	3.17
Coefficient of performance ε (COP)					2.09	2.37	2.64	2.99	3.55

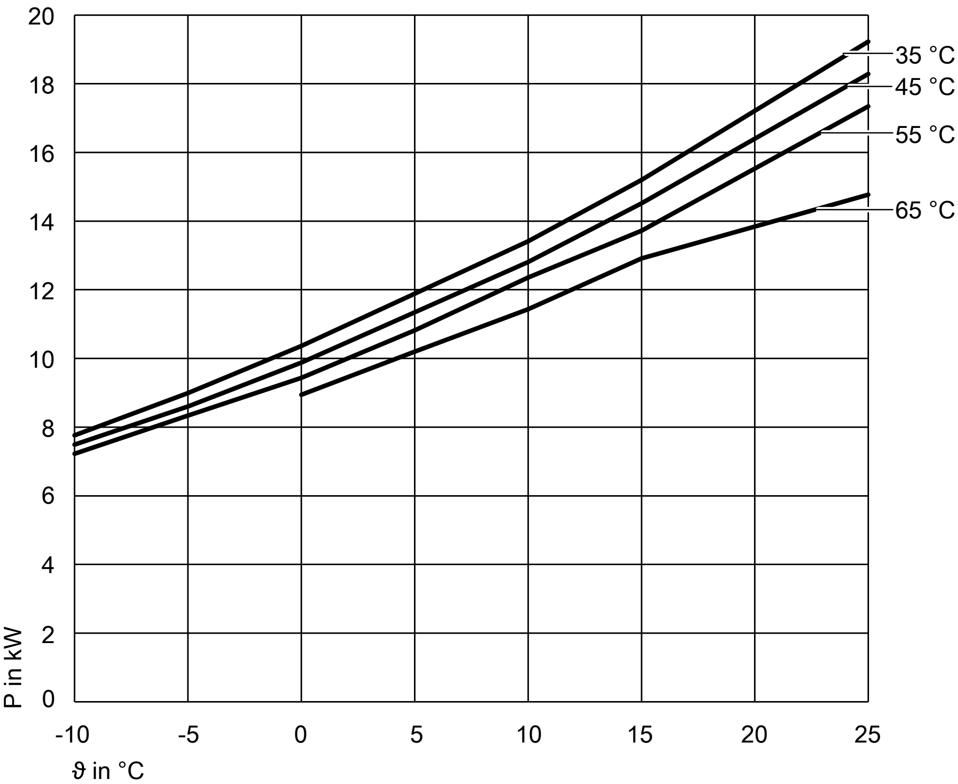
Residual heads of the integral circulation pumps, type BWC 201.B08



Ⓐ Secondary pump
Ⓑ Primary pump

Performance graphs – type BWC 201.B10

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



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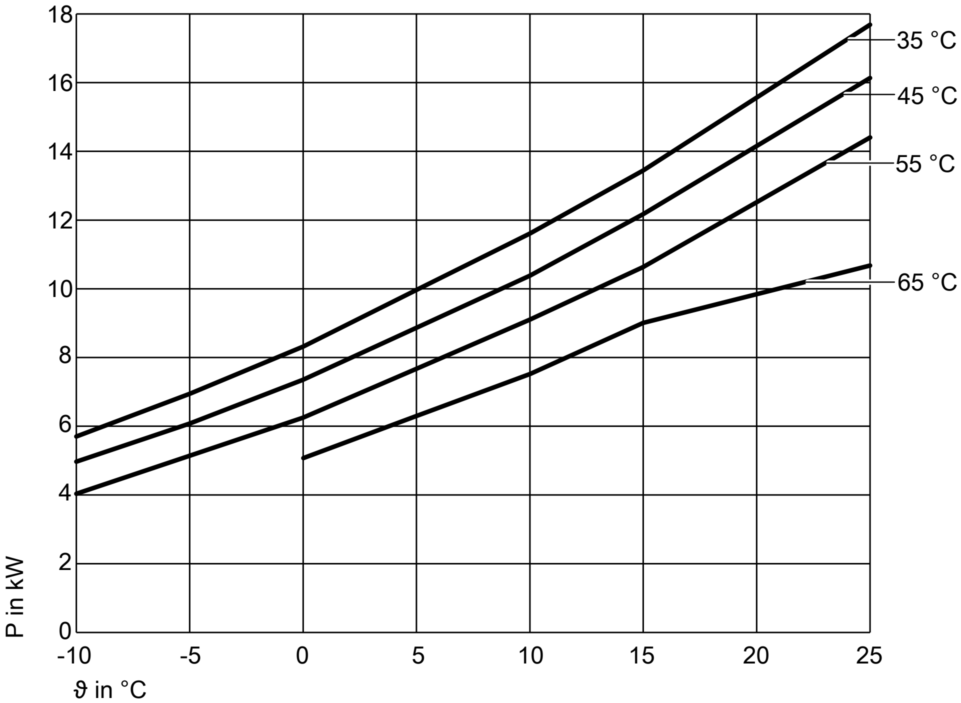
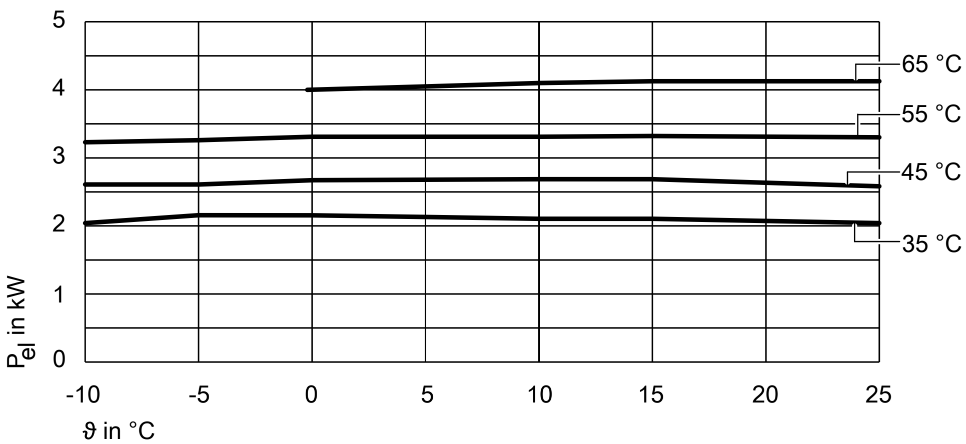
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



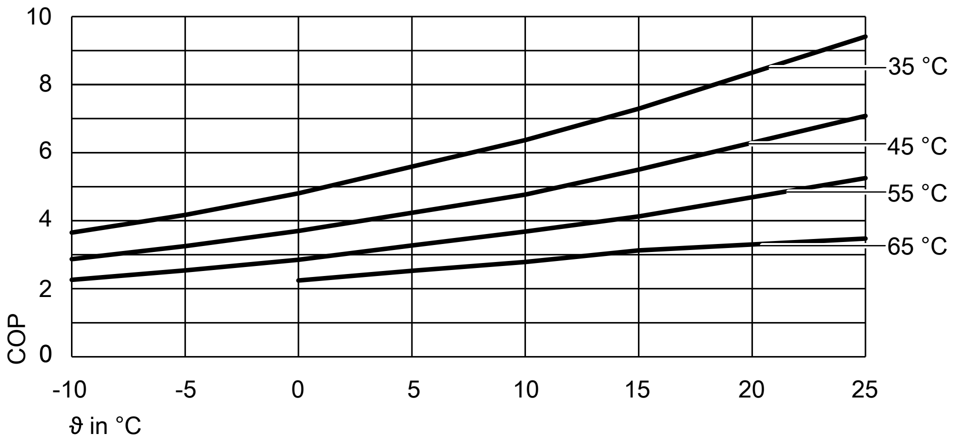
Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



2

2

Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.78	9.00	10.36	11.89	13.41	15.16	19.21
Cooling capacity		kW	5.70	6.94	8.32	9.96	11.61	13.44	17.69
Power consumption		kW	2.04	2.16	2.16	2.13	2.11	2.11	2.04
Coefficient of performance ε (COP)			3.65	4.17	4.81	5.59	6.37	7.29	9.41

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.49	8.60	9.88	11.34	12.81	14.52	18.29
Cooling capacity		kW	4.97	6.08	7.36	8.87	10.38	12.17	16.14
Power consumption		kW	2.61	2.61	2.67	2.68	2.69	2.69	2.58
Coefficient of performance ε (COP)			2.87	3.26	3.70	4.23	4.77	5.50	7.08

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.22	8.32	9.42	10.81	12.19	13.72	17.34
Cooling capacity		kW	4.03	5.14	6.25	7.67	9.10	10.64	14.40
Power consumption		kW	3.23	3.28	3.32	3.32	3.32	3.33	3.30
Coefficient of performance ε (COP)			2.23	2.54	2.85	3.26	3.67	4.13	5.25

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			8.96	10.20	11.44	12.91	14.77
Cooling capacity		kW			5.07	6.29	7.52	9.01	10.68
Power consumption		kW			4.00	4.05	4.10	4.13	4.13
Coefficient of performance ε (COP)					2.24	2.52	2.79	3.13	3.48

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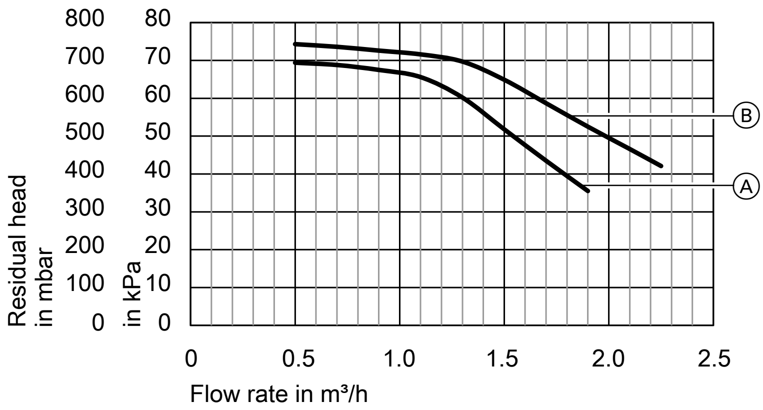
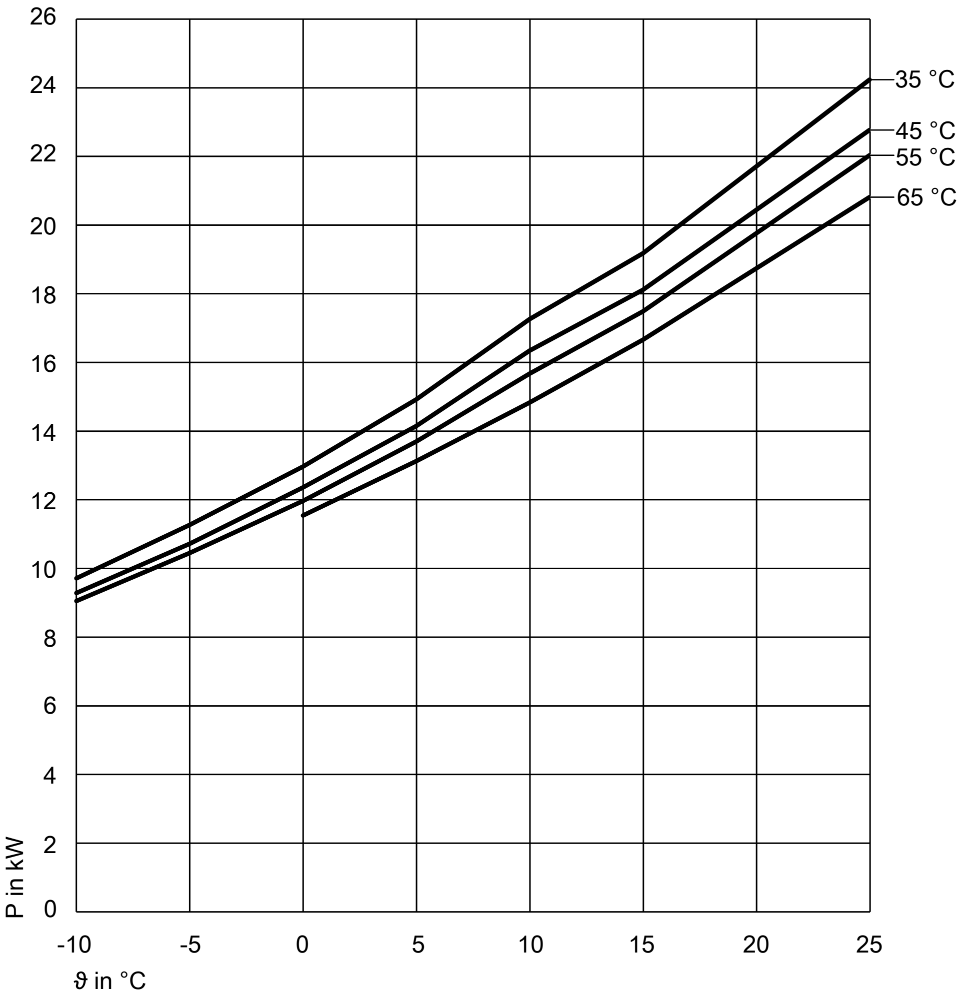
Residual heads of the integral circulation pumps, type BWC 201.B10



Ⓐ Secondary pump
Ⓑ Primary pump

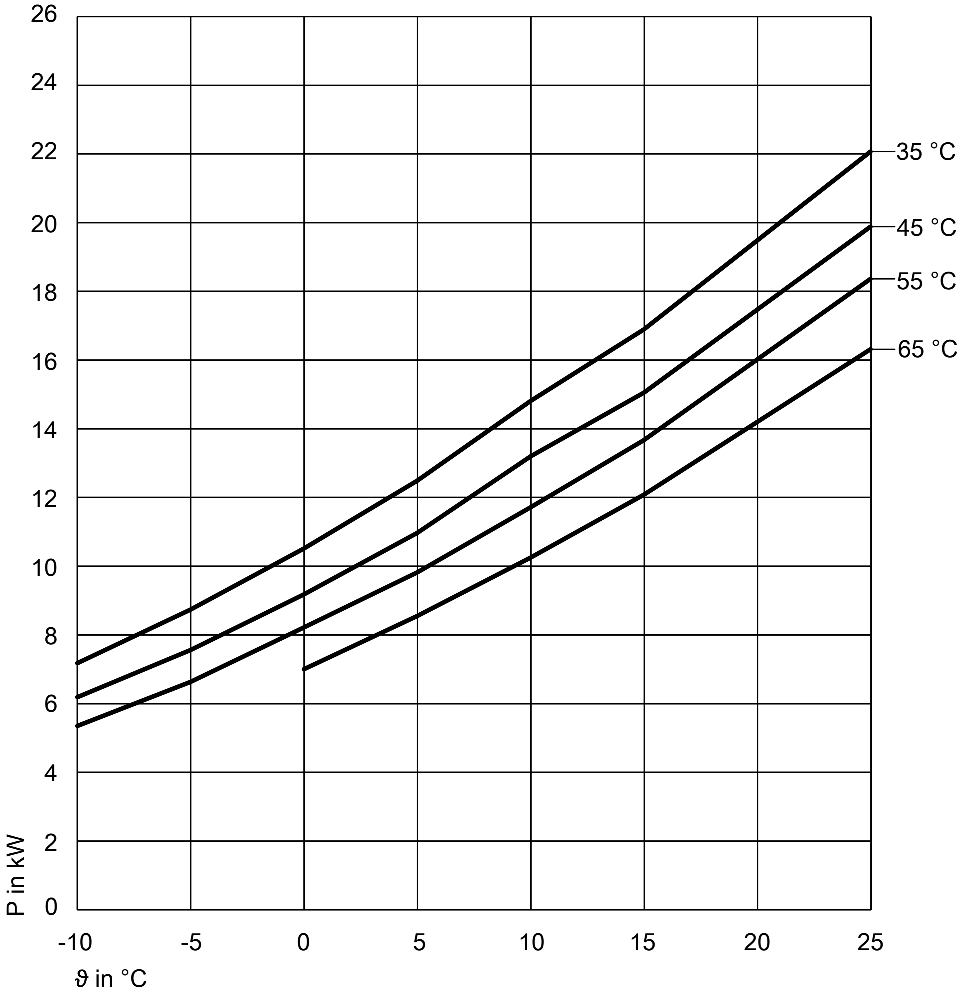
Performance graphs – type BWC 201.B13

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

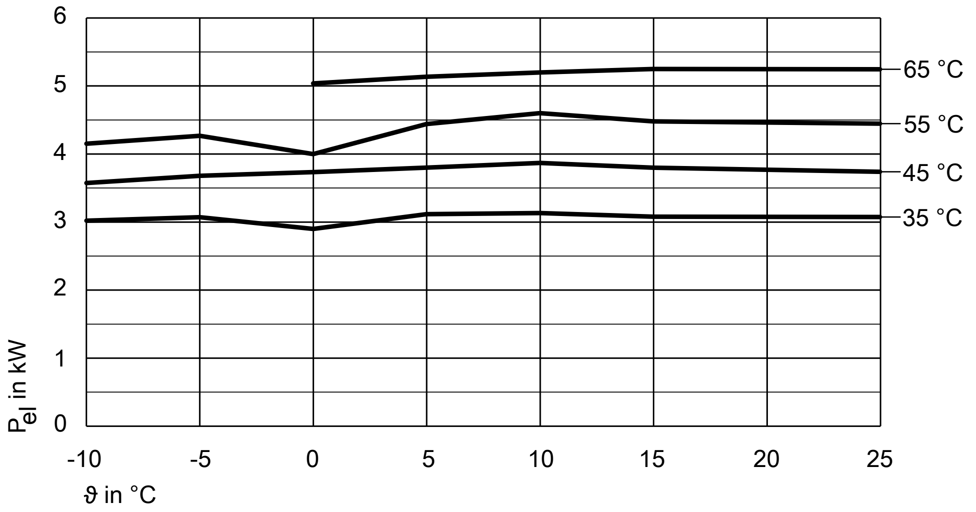


2

Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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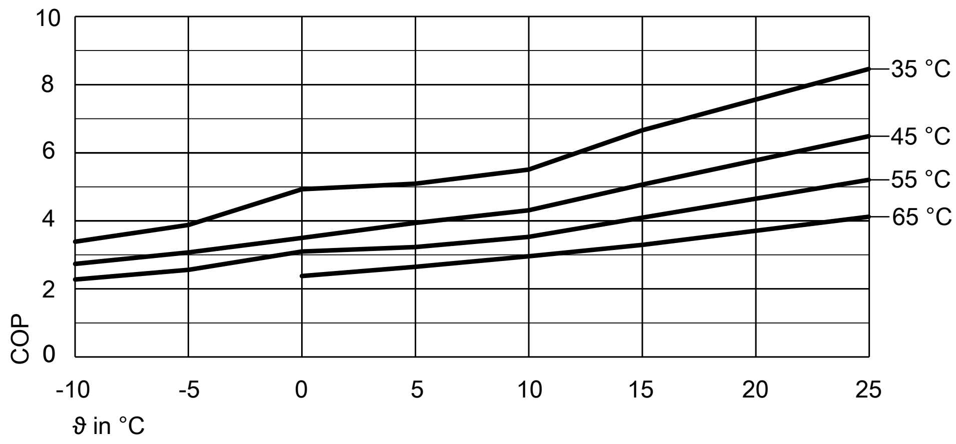
Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ	Primary circuit flow temperature (heat pump brine inlet)
P	Heating output or cooling capacity
P_{el}	Power consumption
COP	Coefficient of performance

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.*

Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	9.71	11.27	12.91	14.93	17.26	19.18	24.24
Cooling capacity		kW	7.18	8.74	10.45	12.49	14.81	16.90	22.07
Power consumption		kW	3.02	3.07	2.90	3.12	3.13	3.08	3.08
Coefficient of performance ε (COP)			3.39	3.88	4.44	5.09	5.51	6.66	8.46

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	9.29	10.72	12.36	14.15	16.35	18.12	22.77
Cooling capacity		kW	6.19	7.56	9.18	10.97	13.20	15.05	19.89
Power consumption		kW	3.58	3.68	3.74	3.80	3.87	3.80	3.74
Coefficient of performance ε (COP)			2.74	3.07	3.50	3.94	4.31	5.07	6.49

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	9.05	10.45	11.97	13.70	15.68	17.49	22.04
Cooling capacity		kW	5.35	6.63	8.22	9.82	11.72	13.67	18.37
Power consumption		kW	4.15	4.27	3.86	4.44	4.60	4.48	4.45
Coefficient of performance ε (COP)			2.28	2.56	3.10	3.23	3.53	4.09	5.21

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			11.54	13.13	14.83	16.66	20.82
Cooling capacity		kW			7.00	8.55	10.25	12.08	16.32
Power consumption		kW			5.04	5.14	5.20	5.25	5.25
Coefficient of performance ε (COP)					2.38	2.65	2.96	3.29	4.12

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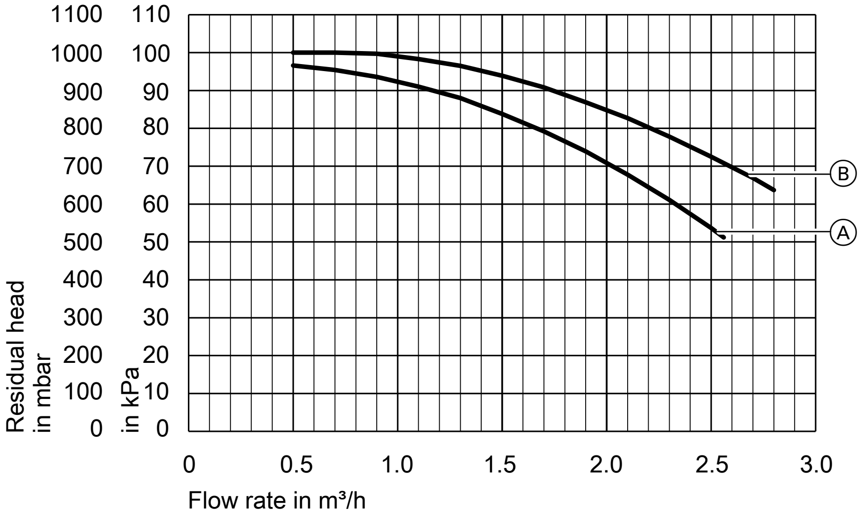
Residual heads of the integral circulation pumps, type BWC 201.B13



Ⓐ Secondary pump
Ⓑ Primary pump

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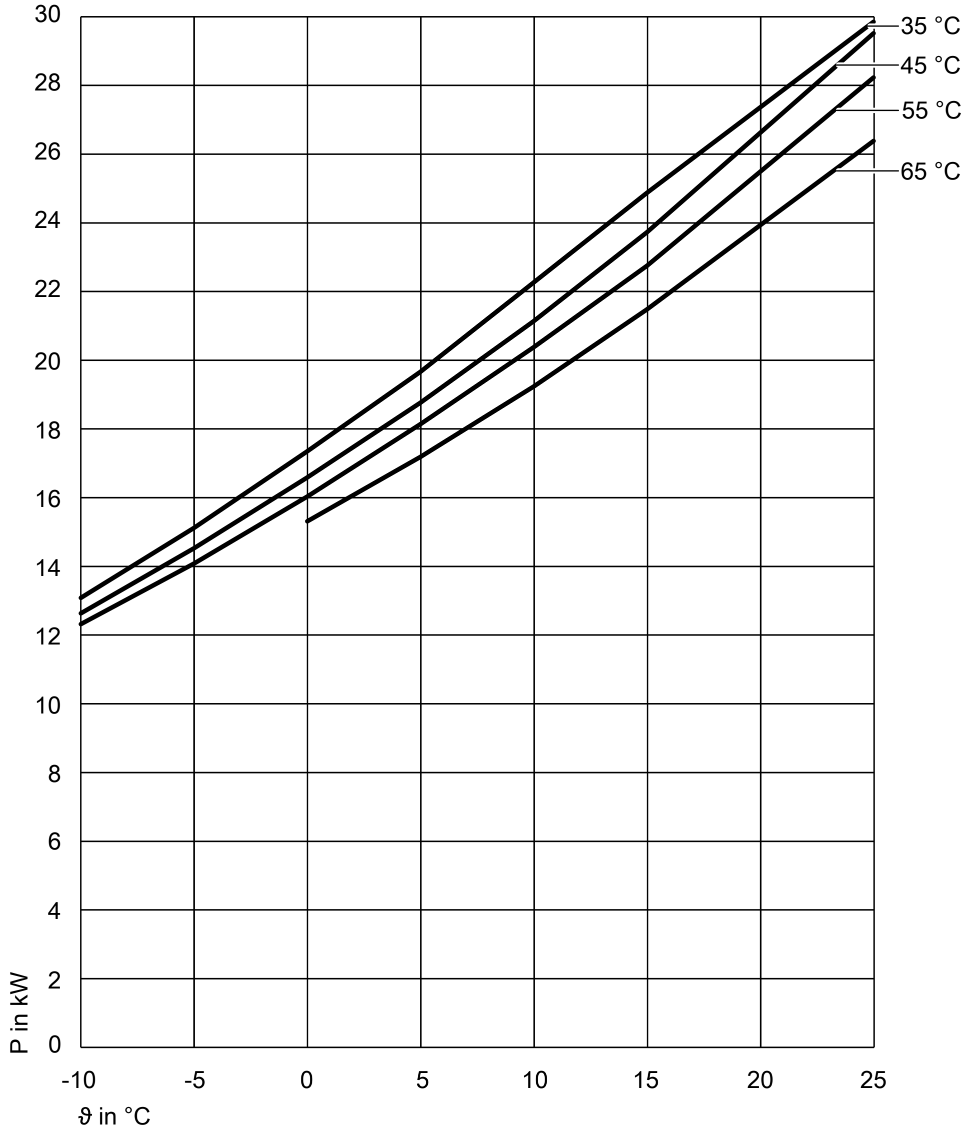
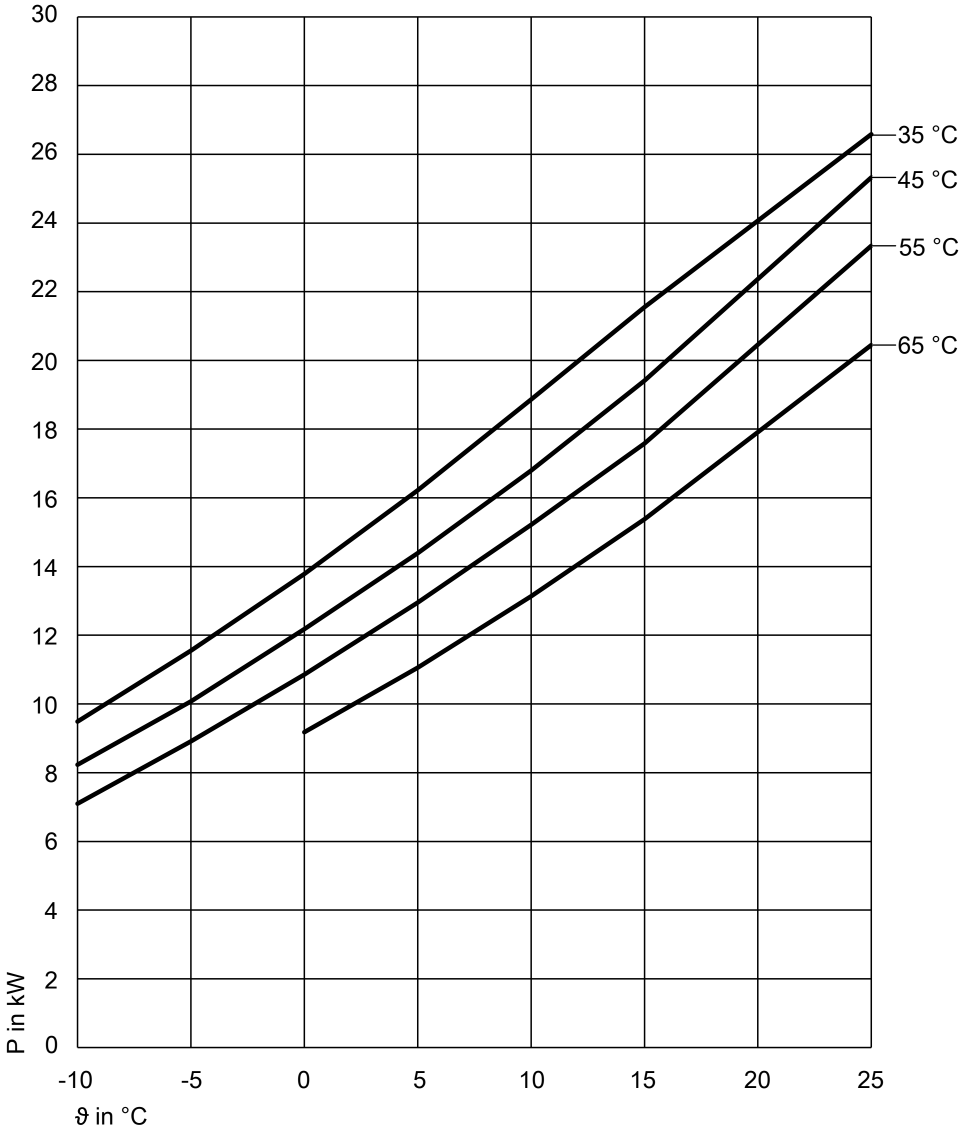
Performance graphs – type BWC 201.B17

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



Vitocal 200-G, type BWC(-M) 201.B (cont.)

Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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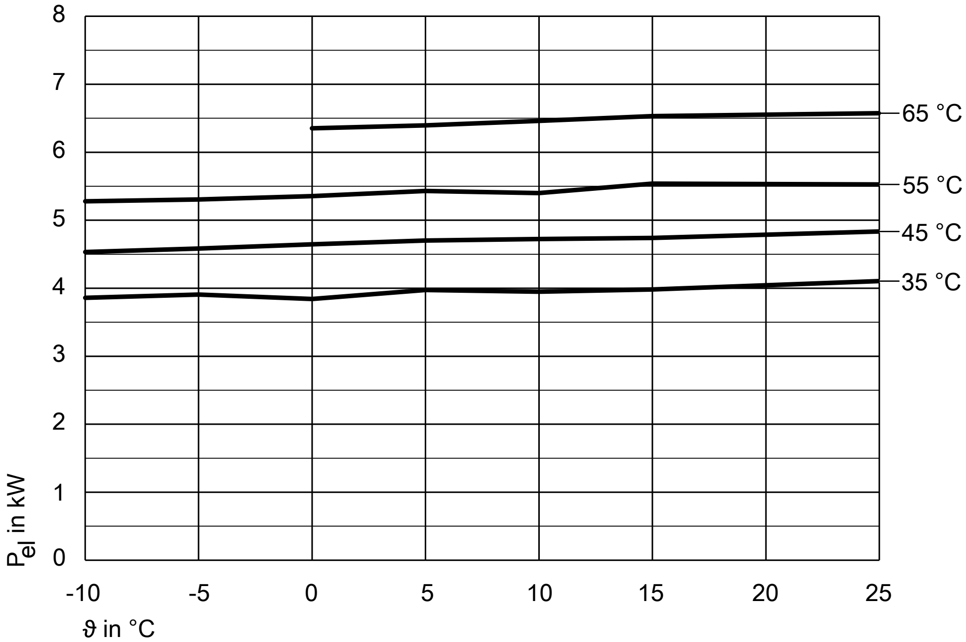
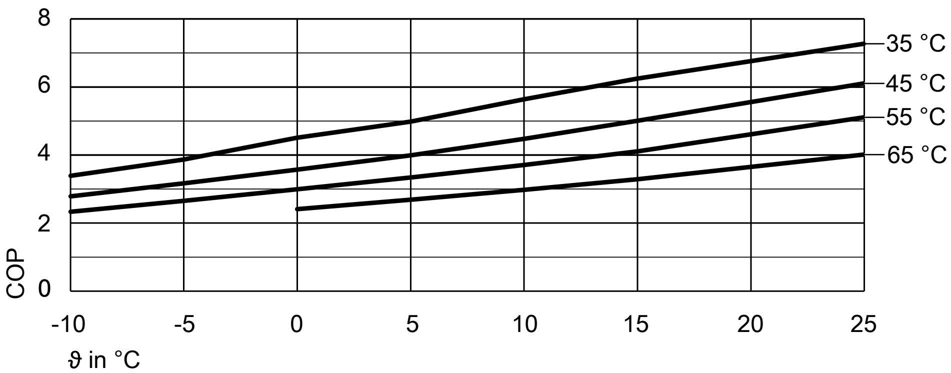
Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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.*

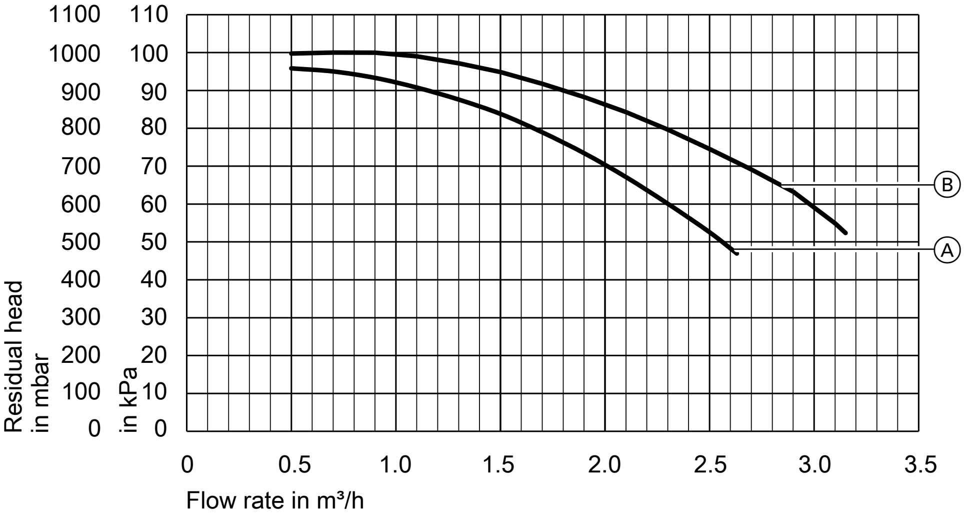
Operating point W	**°C**				**35**			
B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output	kW	13.08	15.12	17.35	19.67	22.27	24.88	29.85
Cooling capacity	kW	9.49	11.55	13.79	16.22	18.86	21.55	26.58
Power consumption	kW	3.86	3.91	3.84	3.97	3.95	3.98	4.11
Coefficient of performance ε (COP)		3.39	3.87	4.51	4.98	5.64	6.25	7.27

Operating point W	**°C**				**45**			
B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output	kW	12.63	14.53	16.59	18.77	21.14	23.73	29.52
Cooling capacity	kW	8.23	10.08	12.18	14.39	16.80	19.41	25.33
Power consumption	kW	4.53	4.58	4.65	4.70	4.72	4.74	4.84
Coefficient of performance ε (COP)		2.79	3.17	3.57	3.99	4.48	5.01	6.11

Operating point		°C	55						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	12.32	14.08	16.03	18.14	20.38	22.75	28.23
Cooling capacity		kW	7.10	8.91	10.86	12.95	15.22	17.58	23.34
Power consumption		kW	5.28	5.31	5.36	5.431	5.40	5.54	5.53
Coefficient of performance ε (COP)			2.33	2.65	2.99	3.34	3.71	4.11	5.11

Operating point	W	°C	65						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW			15.31	17.19	19.24	21.48	26.38
Cooling capacity		kW			9.18	11.06	13.14	15.38	20.45
Power consumption		kW			6.35	6.40	6.46	6.53	6.58
Coefficient of performance ε (COP)					2.41	2.69	2.98	3.29	4.01

Residual heads of the integral circulation pumps, type BWC 201.B17

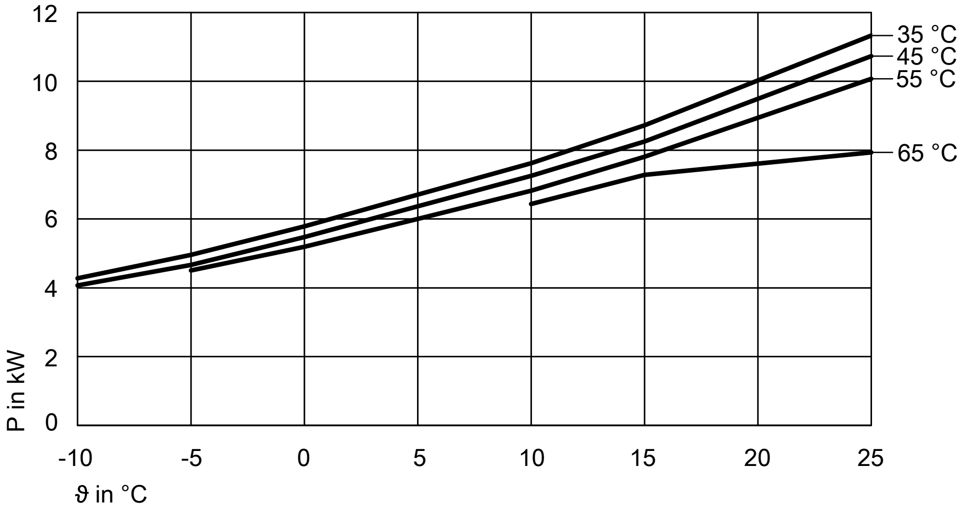


Ⓐ Secondary pump
Ⓑ Primary pump

Curves – 230 V appliances

Performance graphs – type BWC-M 201.B06

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



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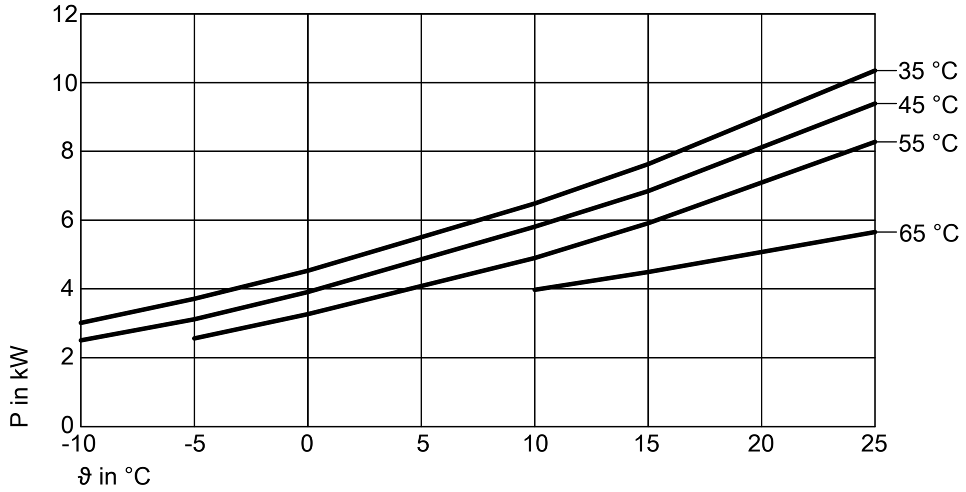
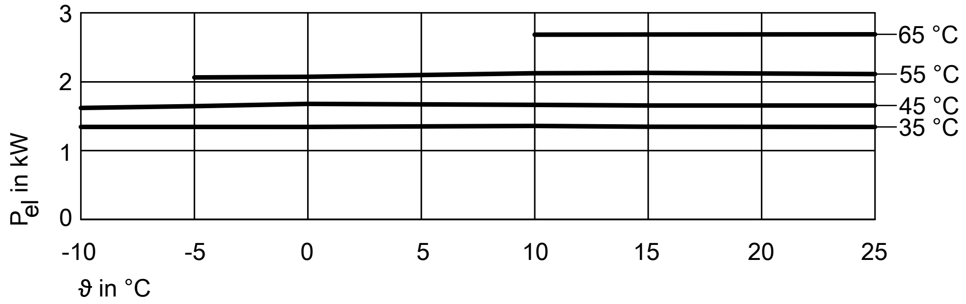
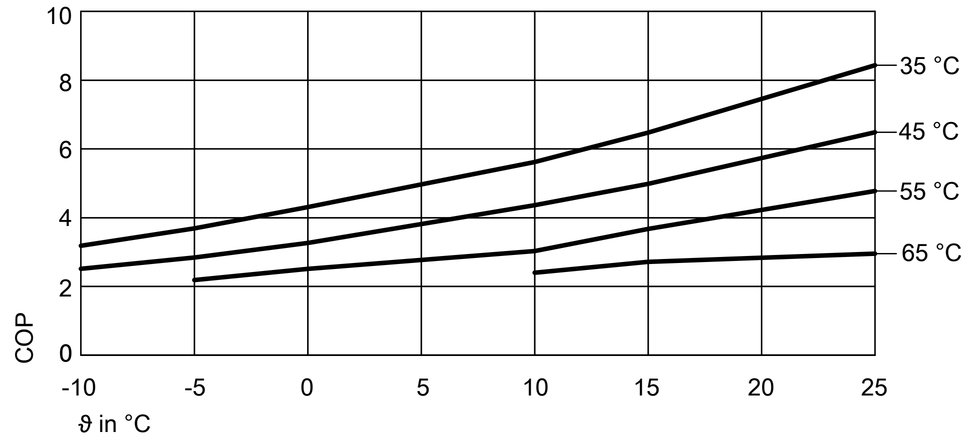
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ	Primary circuit flow temperature (heat pump brine inlet)
P	Heating output or cooling capacity
P_{el}	Power consumption
COP	Coefficient of performance

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

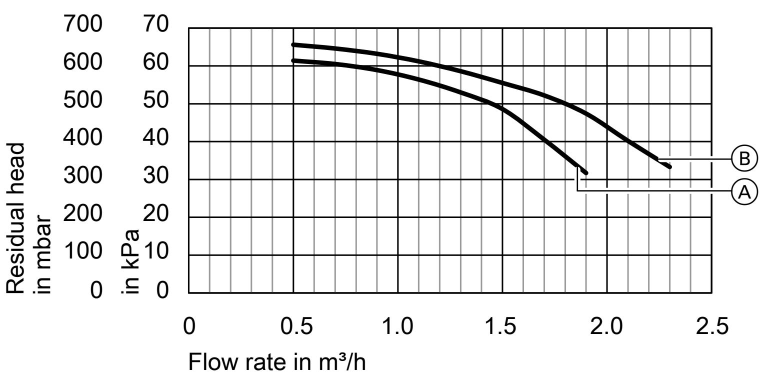
Operating point									
	W	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	4.28	4.96	5.79	6.71	7.62	8.72	11.33
Cooling capacity		kW	3.01	3.71	4.53	5.51	6.48	7.63	10.35
Power consumption		kW	1.34	1.34	1.34	1.35	1.36	1.35	1.34
Coefficient of performance ε (COP)			3.18	3.69	4.31	4.96	5.61	6.47	8.43

Operating point									
	W	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	4.07	4.67	5.47	6.36	7.26	8.25	10.73
Cooling capacity		kW	2.51	3.12	3.91	4.86	5.81	6.84	9.39
Power consumption		kW	1.62	1.64	1.68	1.67	1.66	1.66	1.66
Coefficient of performance ε (COP)			2.51	2.84	3.26	3.81	4.36	4.98	6.48

Operating point									
	W	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW		4.50	5.19	6.01	6.82	7.81	10.07
Cooling capacity		kW		2.56	3.27	4.08	4.90	5.91	8.28
Power consumption		kW		2.06	2.07	2.10	2.12	2.13	2.11
Coefficient of performance ε (COP)				2.18	2.51	2.77	3.03	3.67	4.77

Operating point									
	W	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW					6.43	7.29	7.94
Cooling capacity		kW					3.98	4.49	5.66
Power consumption		kW					2.68	2.69	2.69
Coefficient of performance ε (COP)							2.40	2.71	2.95

Residual heads of the integral circulation pumps, type BWC-M 201.B06



Ⓐ Secondary pump
Ⓑ Primary pump

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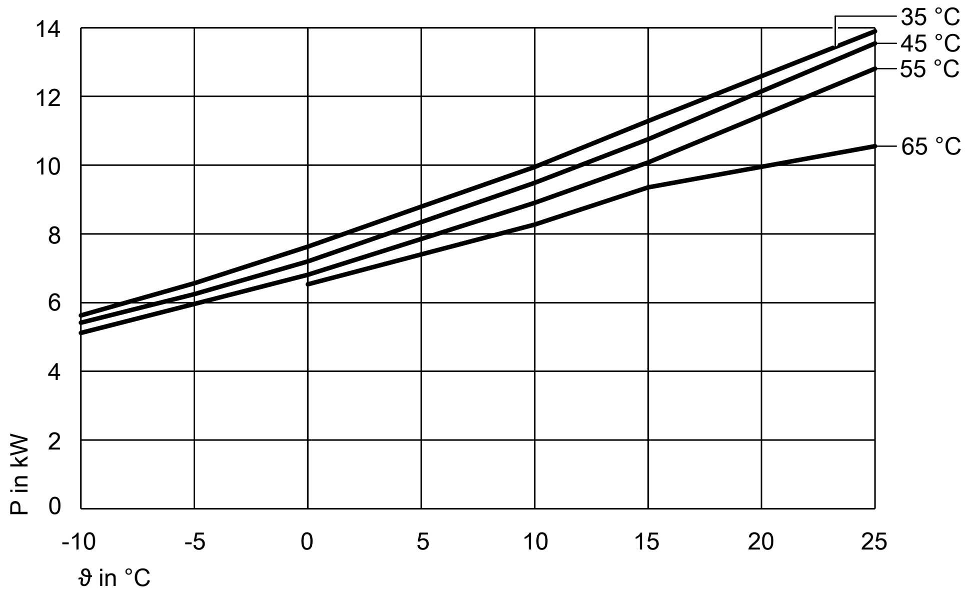
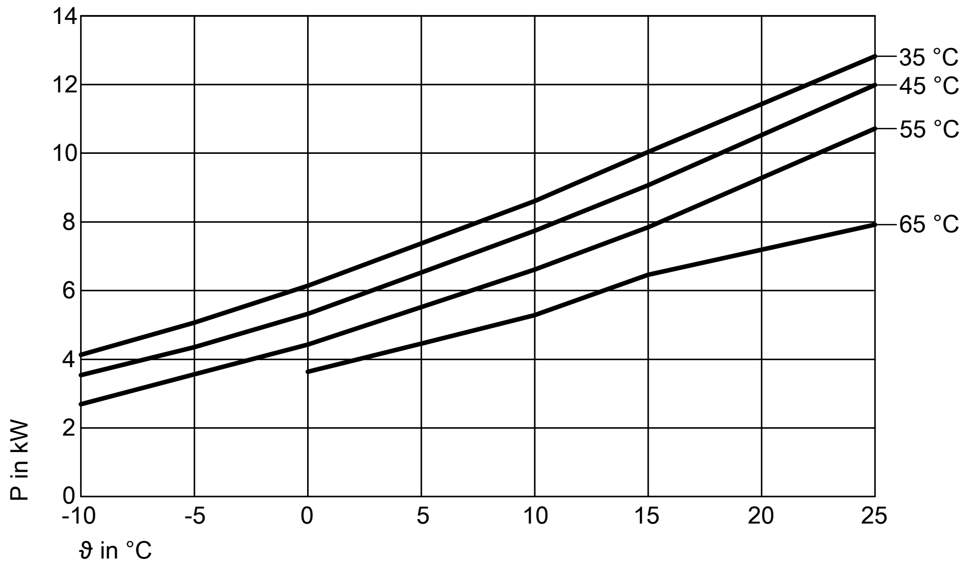
Performance graphs – type BWC-M 201.B08

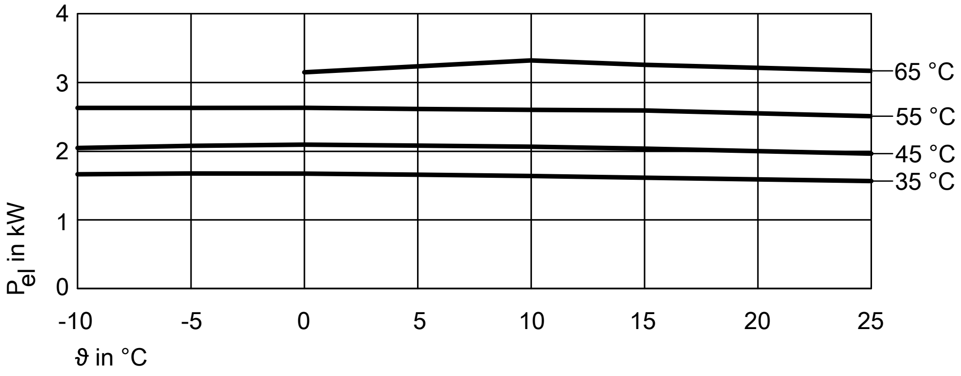
Heating output at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



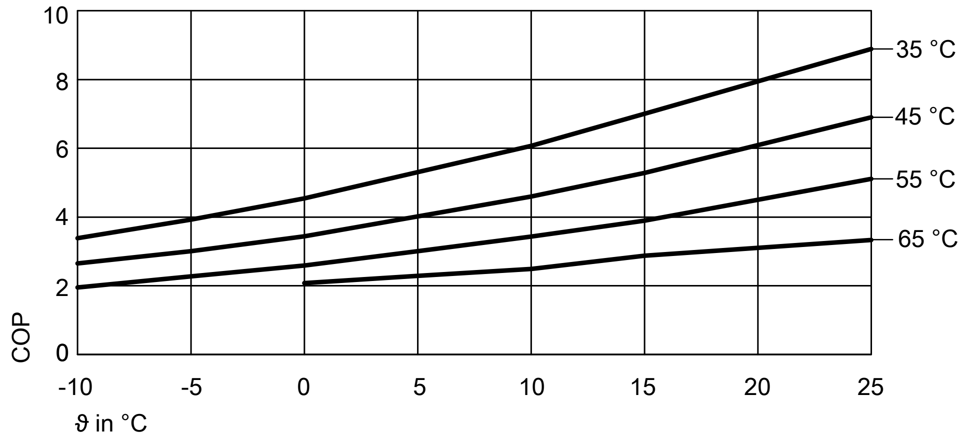
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

Operating point	W	°C	35						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	5.63	6.57	7.63	8.79	9.95	11.29	13.90
Cooling capacity		kW	4.13	5.07	6.15	7.37	8.60	10.03	12.83
Power consumption		kW	1.66	1.67	1.67	1.66	1.64	1.61	1.56
Coefficient of performance ε (COP)			3.38	3.92	4.54	5.31	6.07	7.00	8.89

Operating point	W	°C	45						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	5.42	6.24	7.20	8.34	9.48	10.75	13.55
Cooling capacity		kW	3.54	4.36	5.33	6.53	7.74	9.07	11.99
Power consumption		kW	2.05	2.08	2.09	2.08	2.07	2.04	1.96
Coefficient of performance ε (COP)			2.65	3.01	3.44	4.01	4.59	5.28	6.90

Operating point	W	°C	55						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	5.12	5.96	6.81	7.86	8.90	10.08	12.81
Cooling capacity		kW	2.69	3.56	4.43	5.52	6.61	7.84	10.72
Power consumption		kW	2.63	2.63	2.63	2.61	2.60	2.59	2.51
Coefficient of performance ε (COP)			1.95	2.27	2.59	3.01	3.43	3.89	5.11

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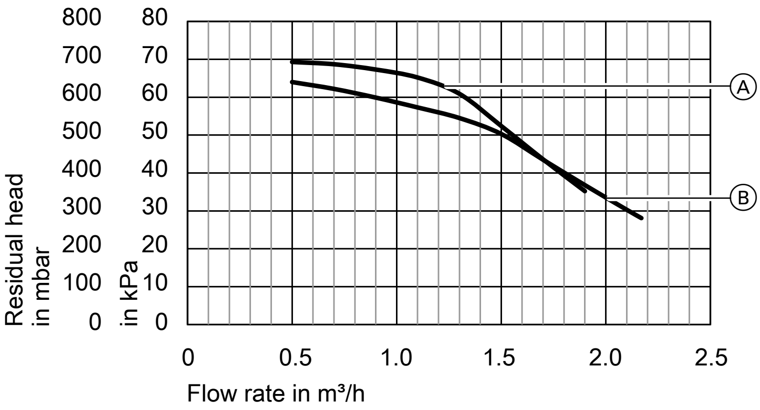
Operating point	W	°C	65						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW			6.53	7.40	8.27	9.36	10.56
Cooling capacity		kW			3.64	4.46	5.28	6.46	7.92
Power consumption		kW			3.15	3.23	3.32	3.26	3.17
Coefficient of performance ε (COP)					2.08	2.28	2.49	2.87	3.33

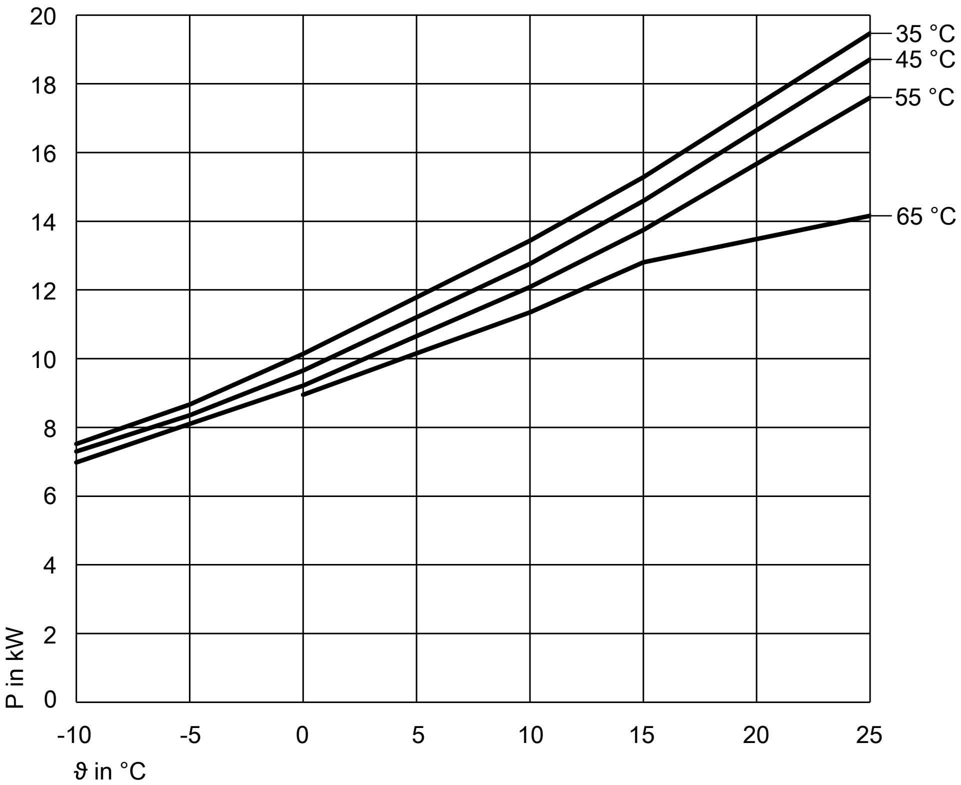
Residual heads of the integral circulation pumps, type BWC-M 201.B08



Ⓐ Secondary pump
Ⓑ Primary pump

Performance graphs – type BWC-M 201.B10

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



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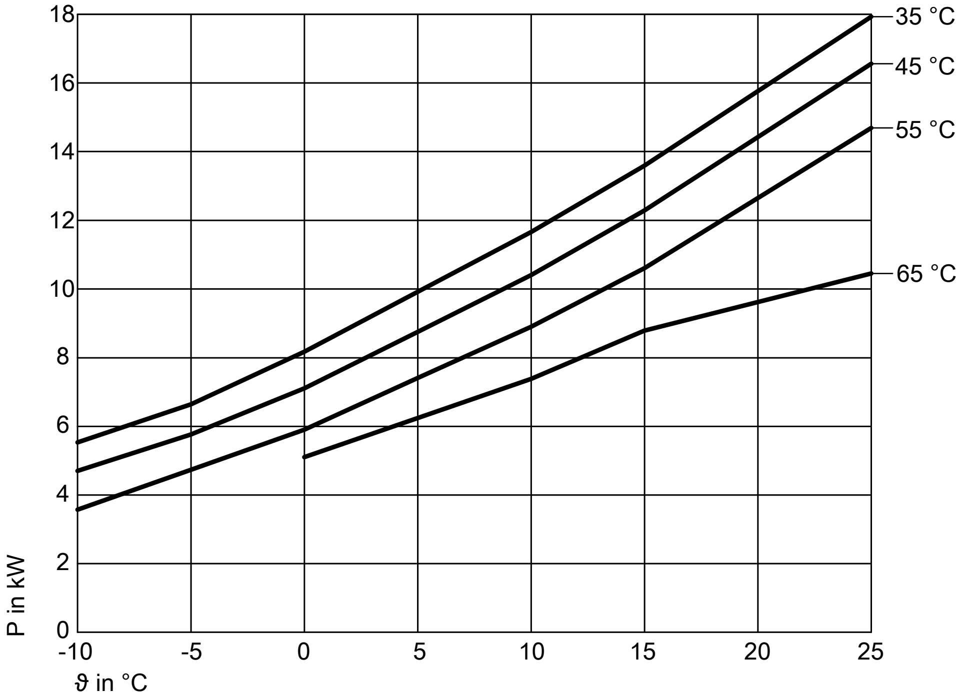
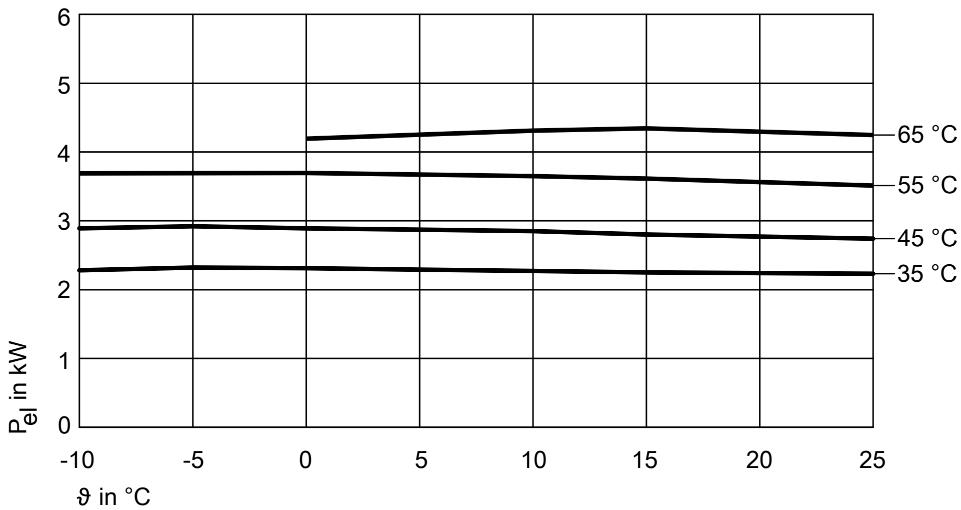
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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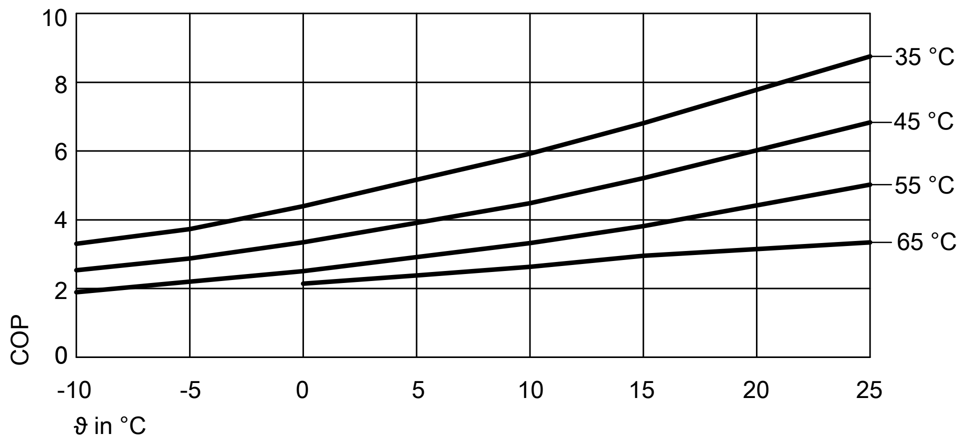
Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

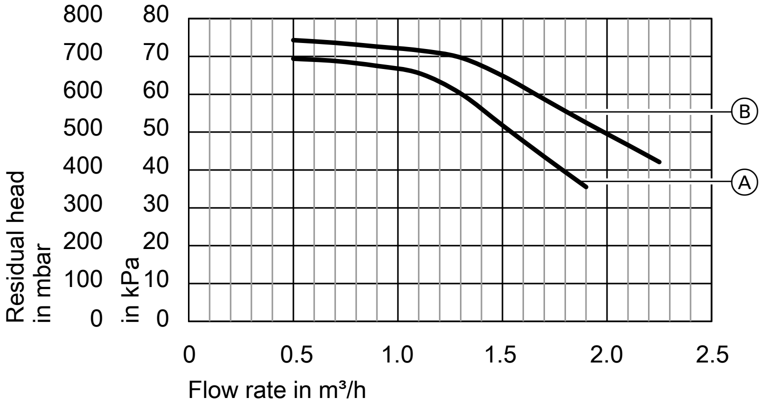
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.52	8.66	10.14	11.79	13.44	15.29	19.47
Cooling capacity		kW	5.53	6.64	8.17	9.92	11.66	13.59	17.93
Power consumption		kW	2.28	2.32	2.31	2.29	2.27	2.25	2.23
Coefficient of performance ε (COP)			3.30	3.73	4.39	5.16	5.92	6.81	8.75

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.30	8.36	9.65	11.20	12.76	14.59	18.71
Cooling capacity		kW	4.70	5.76	7.11	8.75	10.40	12.28	16.56
Power consumption		kW	2.89	2.92	2.89	2.87	2.85	2.80	2.74
Coefficient of performance ε (COP)			2.53	2.87	3.34	3.91	4.48	5.21	6.83

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	6.98	8.10	9.21	10.65	12.08	13.74	17.60
Cooling capacity		kW	3.57	4.73	5.90	7.40	8.90	10.61	14.69
Power consumption		kW	3.69	3.69	3.69	3.67	3.64	3.61	3.51
Coefficient of performance ε (COP)			1.89	2.20	2.50	2.91	3.32	3.81	5.02

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			8.95	10.15	11.34	12.81	14.16
Cooling capacity		kW			5.10	6.24	7.38	8.79	10.45
Power consumption		kW			4.19	4.25	4.31	4.34	4.24
Coefficient of performance ε (COP)					2.14	2.38	2.63	2.95	3.34

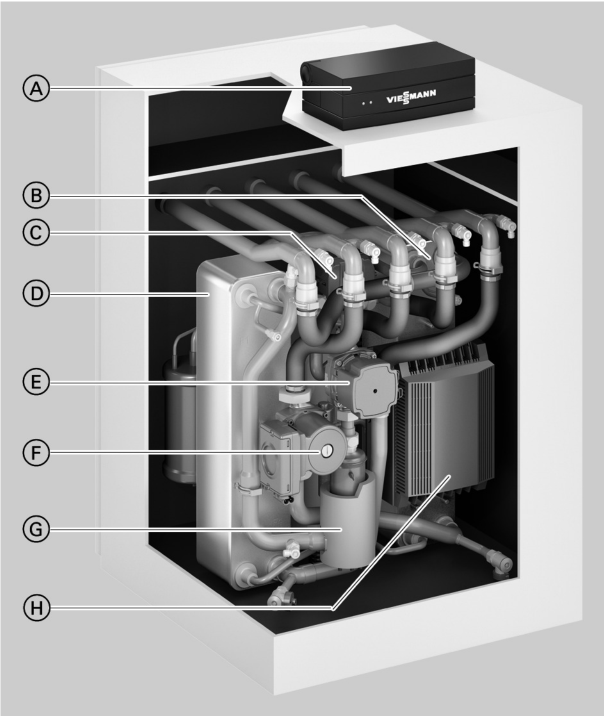
Residual heads of the integral circulation pumps, type BWC-M 201.B10



Ⓐ Secondary pump
Ⓑ Primary pump

3.1 Product description

Benefits



Ⓐ Weather-compensated, digital Vitotronic 200 heat pump control unit
Ⓑ Evaporator
Ⓒ 3-way diverter valve
Ⓓ Condenser
Ⓔ Secondary pump (heating water), high efficiency circulation pump
Ⓕ Primary pump (brine), high efficiency circulation pump
Ⓖ Instantaneous heating water heater
Ⓗ Inverter

- Low running costs thanks to high SCOP (seasonal coefficient of performance) to EN 14825: Up to 5.6 for average climatic conditions and low temperature applications (W35)
- Especially quiet thanks to new sound insulation concept: 33 dB(A) to 47 dB(A) at B0/W55
- Mono mode operation for central heating and DHW heating
- Very low running costs due to refrigerant circuit with output-dependent control and innovative inverter technology for the highest seasonal efficiency
- Integral instantaneous heating water heater, e.g. for screed drying
- Easy handling as the heat pump module can be quickly removed thanks to push-fit connections
- Optimised utilisation of power generated on-site by photovoltaic systems
- Web-enabled through Vitoconnect (accessories) for operation and service via Viessmann apps

Delivered condition

- Brine/water heat pump in a compact casing
- Integral diverter valve for central heating/DHW heating
- Integral high efficiency circulation pump for primary circuit (brine)
- Integral high efficiency circulation pump for secondary circuit (heating water)
- Integral instantaneous heating water heater
- Safety assembly for the heating circuit
- Vitotronic 200 weather-compensated heat pump control unit with outside temperature sensor
- Integral phase monitor
- Connection lines for flow and return of primary circuit (brine) flow, heating circuit and DHW flow (secondary circuit) for connection at the top

3.2 Specification

Specification for brine/water heat pumps

Type BWC		301.C06	301.C12	301.C16
Performance data to EN 14511 (B0/W35, 5 K spread)				
Rated heating output	kW	4.28	5.31	7.44
Cooling capacity	kW	3.45	4.35	5.84
Power consumption	kW	0.91	1.10	1.50
Coefficient of performance ε (COP)		4.70	4.80	4.95
Modulation range heating min. to max.	kW	1.7 to 8.6	2.4 to 11.4	3.8 to 15.9
Brine (primary circuit)				
Capacity	l	3.7	4.2	5.5
Minimum flow rate	l/h	900	1000	1800
Nominal flow rate	l/h	1070	1300	1840
Residual head				
– At minimum flow rate	mbar	800	800	590
	kPa	80.0	80.0	59.0
– At nominal flow rate	mbar	780	720	570
	kPa	78.0	72.0	57.0
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10
Heating water (secondary circuit)				
Capacity	l	4.5	5.3	6.7
Minimum flow rate	l/h	600	720	1100
Nominal flow rate	l/h	740	920	1270
Residual head				
– At minimum flow rate	mbar	710	700	650
	kPa	71.0	70.0	65.0
– At nominal flow rate	mbar	700	680	635
	kPa	70.0	68.0	63.5
Max. flow temperature	°C	65	65	65
Instantaneous heating water heater				
Heating output	kW	9.0	9.0	9.0
Rated voltage		3/N/PE 400 V/50 Hz		
Fuse rating		3 x B16 A 1-pole	3 x B16 A 1-pole	3 x B16 A 1-pole
Heat pump electrical values				
Rated voltage, compressor		3/N/PE 400 V/50 Hz		
Rated current, compressor	A	9.0	12.0	12.0
Cos φ		0.9	0.9	0.9
Starting current, compressor	A	< 5	< 5	< 5
Starting current, compressor with stalled armature	A	9	12	12
Compressor fuse rating	A	1 x B16 A 3-pole	1 x B16 A 3-pole	1 x B16 A 3-pole
Protection class		I	I	I
Electrical values, heat pump control unit				
Rated voltage		1/N/PE 230 V/50 Hz		
Fuse rating		B16A	B16A	B16 A
Fuses		2 x 6.3 A H (slow) / 250 V		
IP rating		IP 20	IP 20	IP 20
Power consumption				
Primary pump (high efficiency circulation pump)	W	5.7 to 87	5.7 to 87	5.7 to 87
– Energy efficiency index EEI		≤ 0.21	≤ 0.21	≤ 0.21
Secondary pump (high efficiency circulation pump)	W	4 to 60	4 to 60	4 to 60
– Energy efficiency index EEI		≤ 0.21	≤ 0.21	≤ 0.21
Max. power consumption, control unit	W	1000	1000	1000
Rated output, control unit/PCB	W	12	12	12

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Type BWC		301.C06	301.C12	301.C16
Refrigerant circuit				
Refrigerant		R410A	R410A	R410A
– Safety group		A1	A1	A1
– Refrigerant charge	kg	2.0	2.3	3.25
– Global warming potential (GWP)*3		1924	1924	1924
– CO_2 equivalent	t	3.9	4.6	6.3
Permiss. operating pressure				
– High pressure side	bar	45	45	45
	MPa	4.5	4.5	4.5
– Low pressure side	bar	28	28	28
	MPa	2.8	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor		
Oil in compressor	Type	Emkarate RL32-3MAF		
Oil volume in compressor	l	0.74	0.74	1.18
Oil volume in the oil separator	l	0.4	0.4	0.4
Dimensions				
Total length	mm	680	680	680
Total width	mm	600	600	600
Total height	mm	1081	1081	1081
Weight				
Total weight	kg	149	154	163
Heat pump module	kg	78	83	92
Permiss. operating pressure				
Primary circuit (brine)	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Secondary circuit, heating water	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Connections				
Primary circuit flow/return	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit flow (heating circuits)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit flow (DHW cylinder)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Secondary circuit return (heating circuits and DHW cylinder)	mm	Cu 28x1.5	Cu 28x1.5	Cu 28x1.5
Sound power (measured with reference to EN 12102/ EN ISO 9614-2)				
Weighted total sound power level at $B0^{\pm 3\,K}/W35^{\pm 5\,K}$				
– At rated heating output	dB(A)	39	40	44
Weighted total sound power level at $B0^{\pm 3\,K}/W55^{\pm 5\,K}$				
– Total sound power level min. to max.	dB(A)	30 to 47	33 to 46	39 to 47
– In quieter operation	dB(A)	34	39	40
Energy efficiency class to Commission Regulation (EU) No 813/2013				
Heating, average climatic conditions				
– Low temperature applications (W35)		A^{+++}	A^{+++}	A^{+++}
– Medium temperature applications (W55)		A^{++}	A^{+++}	A^{+++}
Heating performance data to Commission Regulation (EU) No 813/2013 (average climatic conditions)				
Low temperature applications (W35)				
– Energy efficiency η_S	%	204	205	217
– Rated heating output P_{rated}	kW	6	12	13
– Seasonal coefficient of performance (SCOP)		5.29	5.32	5.64
Medium temperature applications (W55)				
– Energy efficiency η_S	%	141	151	159
– Rated heating output P_{rated}	kW	6	12	15
– Seasonal coefficient of performance (SCOP)		3.72	3.97	4.18
Sound power level to ErP (B0/W55)	dB(A)	40	41	40

Water/water heat pump specification

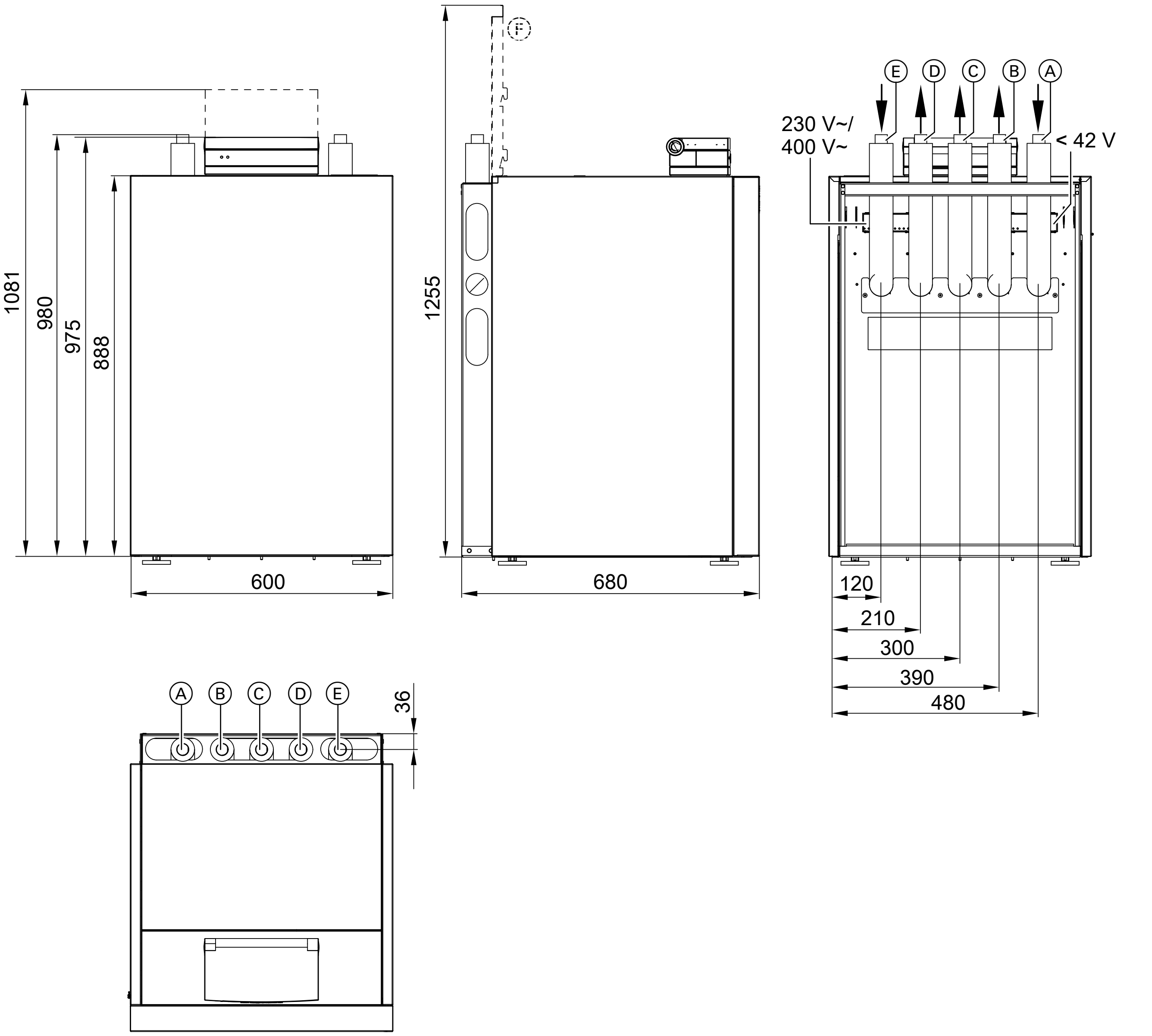
Type BWC in conjunction with "conversion kit for water/water heat pump"		301.C06	301.C12	301.C16
Performance data to EN 14511 (W10/W35, 5 K spread)				
Rated heating output	kW	5.62	6.96	9.96
Cooling capacity	kW	4.90	6.11	8.37
Power consumption	kW	0.89	1.09	1.51
Coefficient of performance ε (COP)		6.35	6.37	6.61

*3 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

Type BWC in conjunction with "conversion kit for water/water heat pump"		301.C06	301.C12	301.C16
Brine (primary intermediate circuit)				
Capacity	l	3.7	4.2	5.5
Minimum flow rate	l/h	1220	1520	1800
Residual head at minimum flow rate	mbar	750	660	590
	kPa	75.0	66.0	59.0
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	7.5	7.5	7.5
Heating water (secondary circuit)				
Capacity	l	4.5	5.3	6.7
Minimum flow rate	l/h	490	600	1100
Residual head at minimum flow rate	mbar	720	705	650
	kPa	72.0	70.5	65.0
Max. flow temperature	°C	65	65	65

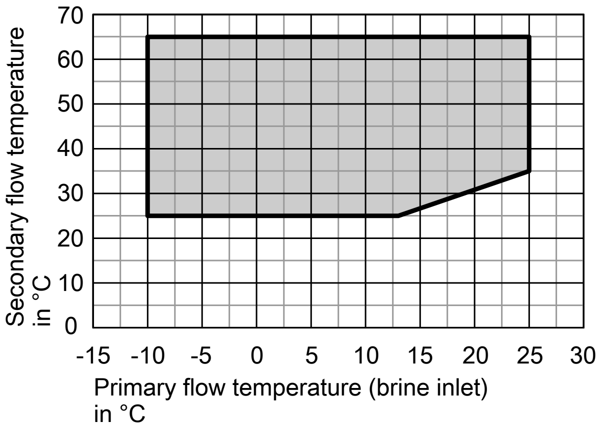
Note
Further specifications: See "Specification for brine/water heat pumps".

Dimensions



Ⓐ Primary circuit flow (heat pump brine inlet), connection Cu 28 x 1.5 mm
Ⓑ Primary circuit return (heat pump brine outlet), connection Cu 28 x 1.5 mm
Ⓒ Secondary circuit flow (DHW cylinder), connection Cu 28 x 1.5 mm
Ⓓ Secondary circuit flow (heating circuits), connection Cu 28 x 1.5 mm
Ⓔ Secondary circuit return (heating circuits DHW cylinder), connection Cu 28 x 1.5 mm
Ⓕ Rear top panel, pivoted open

Application limits to EN 14511

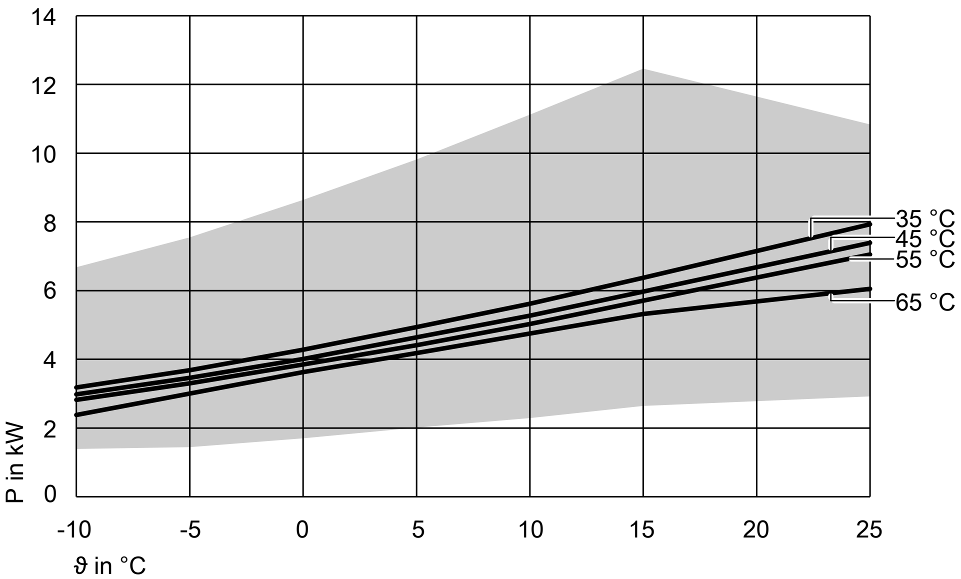


- Secondary side spread: 5 K
- Primary side spread: 3 K

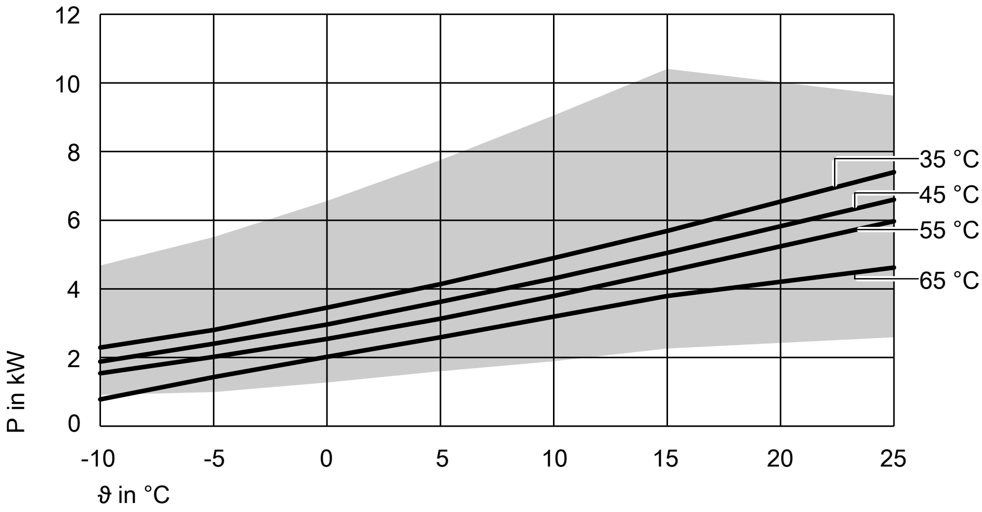
Curves

Performance graphs – type BWC 301.C06

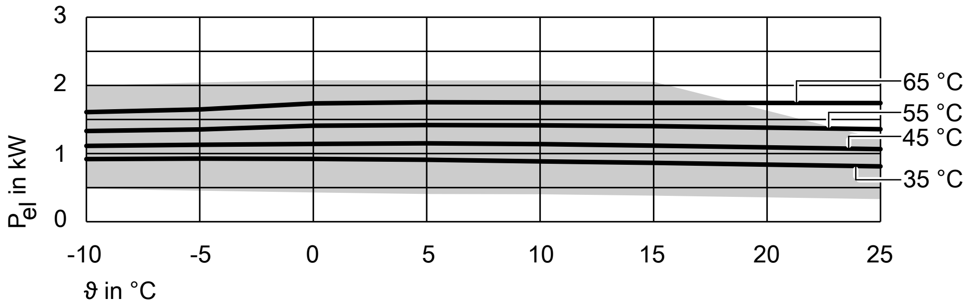
Heating output at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



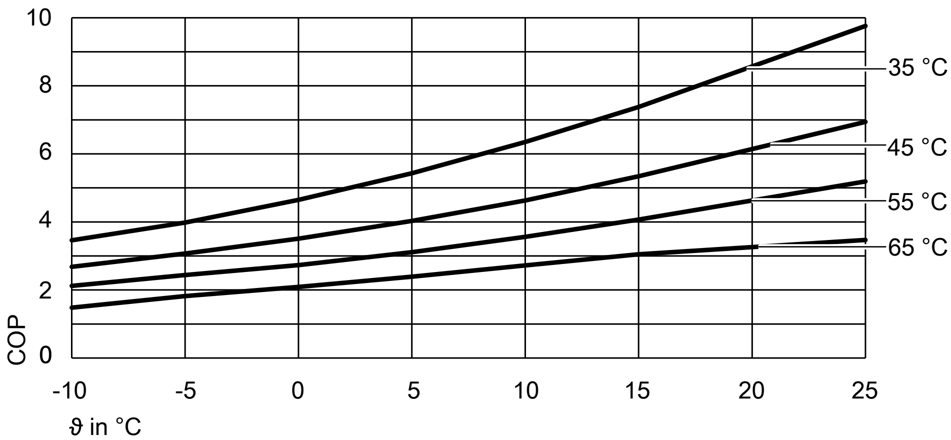
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Possible output range based on a primary circuit flow temperature of 35 °C (heat pump brine inlet)

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

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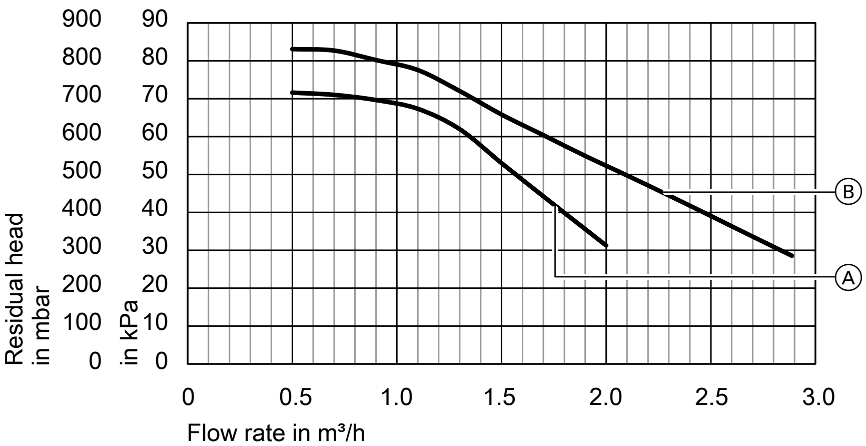
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Max. heating output		kW	6.68	7.55	8.64	9.82	11.12	12.46	10.84
Rated heating output		kW	3.18	3.68	4.28	4.94	5.62	6.37	7.93
Min. heating output		kW	1.39	1.44	1.70	2.01	2.29	2.64	2.92
Max. cooling capacity		kW	4.68	5.51	6.56	7.75	9.05	10.41	9.63
Rated cooling capacity		kW	2.29	2.80	3.45	4.14	4.90	5.69	7.40
Min. cooling capacity		kW	0.91	0.99	1.27	1.60	1.89	2.26	2.59
Max. power consumption		kW	2.00	2.04	2.08	2.07	2.07	2.05	1.21
Rated power consumption		kW	0.92	0.93	0.91	0.91	0.89	0.86	0.81
Min. power consumption		kW	0.48	0.46	0.43	0.41	0.40	0.38	0.33
Max. coefficient of performance ε (COP)			3.35	3.70	4.16	4.73	5.36	6.07	8.98
Rated coefficient of performance ε (COP)			3.46	3.98	4.70	5.43	6.35	7.38	9.76
Min. coefficient of performance ε (COP)			2.88	3.17	3.95	4.93	5.67	6.88	8.78

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	2.98	3.46	4.01	4.64	5.27	5.97	7.39
Cooling capacity		kW	1.88	2.40	2.96	3.62	4.30	5.05	6.60
Power consumption		kW	1.11	1.13	1.14	1.15	1.14	1.12	1.07
Coefficient of performance ε (COP)			2.68	3.07	3.51	4.03	4.63	5.34	6.94

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Max. heating output		kW	6.24		8.09		10.3		
Rated heating output		kW	2.82	3.30	3.85	4.41	5.03	5.71	7.05
Min. heating output		kW	2.01		2.48		3.16		
Max. cooling capacity		kW	3.69		5.26		7.81		
Rated cooling capacity		kW	1.54	2.02	2.54	3.13	3.79	4.51	5.97
Min. cooling capacity		kW	0.95		1.46		2.30		
Max. power consumption		kW	2.71		2.83		2.89		
Rated power consumption		kW	1.33	1.35	1.41	1.42	1.41	1.40	1.36
Min. power consumption		kW	1.10		1.02		0.99		
Max. coefficient of performance ε (COP)			2.31		2.34		3.58		
Rated coefficient of performance ε (COP)			2.12	2.44	2.73	3.11	3.56	4.07	5.19
Min. coefficient of performance ε (COP)			1.84		1.81		3.18		

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	2.38	3.00	3.63	4.18	4.75	5.32	6.05
Cooling capacity		kW	0.78	1.43	2.02	2.59	3.19	3.79	4.62
Power consumption		kW	1.61	1.65	1.74	1.75	1.75	1.75	1.74
Coefficient of performance ε (COP)			1.48	1.82	2.09	2.39	2.72	3.05	3.47

Residual heads of the integral circulation pumps, type BWC 301.C06



Ⓐ Secondary pump
Ⓑ Primary pump

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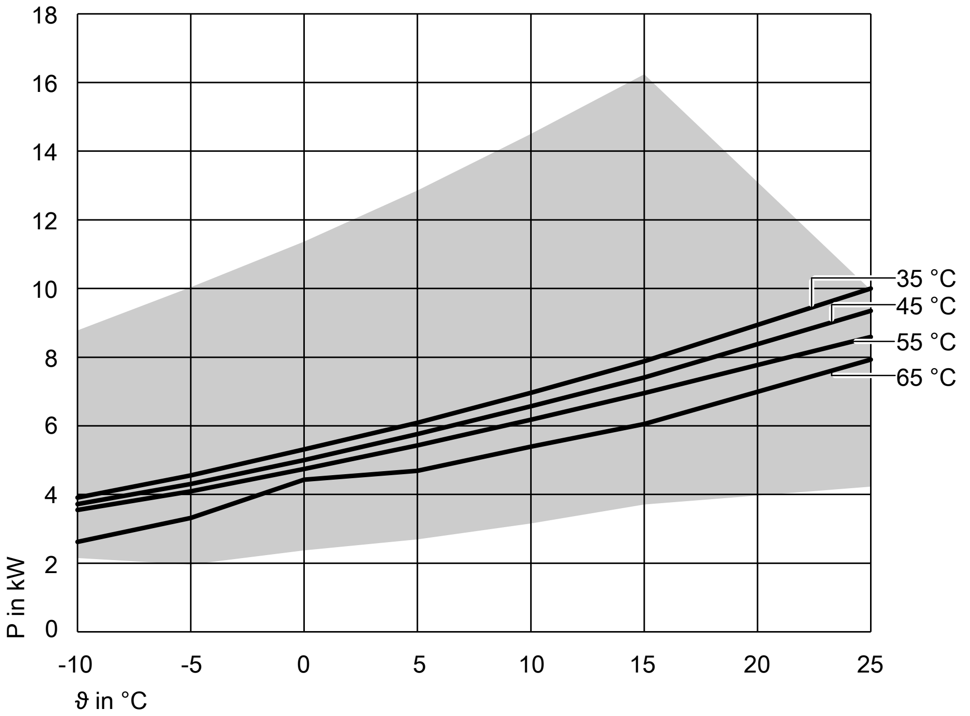
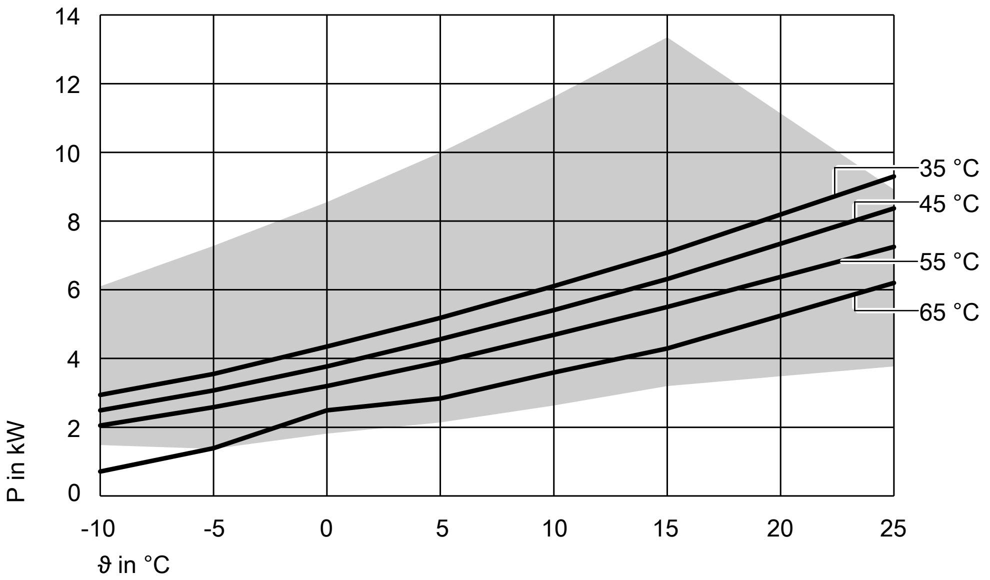
3

Performance graphs – type BWC 301.C12

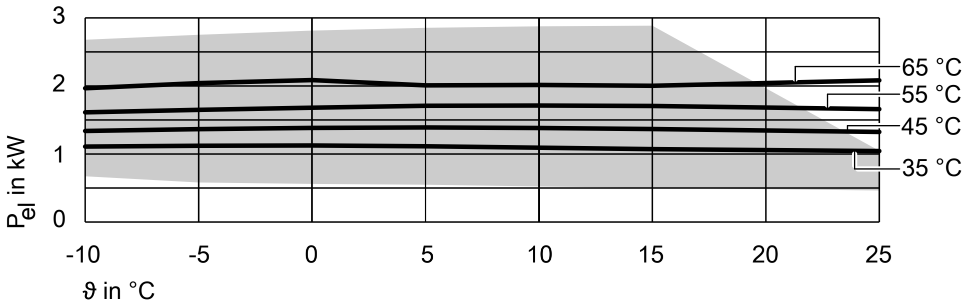
Heating output at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



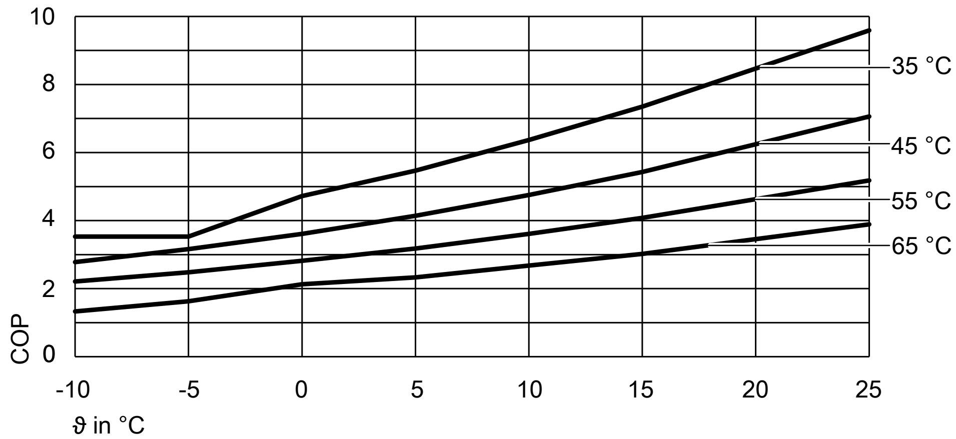
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Possible output range based on a primary circuit flow temperature of 35 °C (heat pump brine inlet)

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

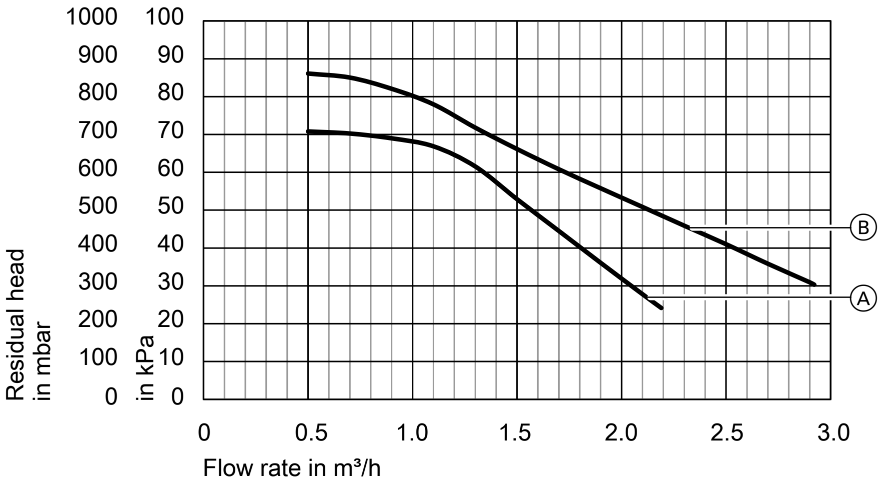
Operating point W	°C	35						
B	°C	–10	–5	0	5	10	15	25
Max. heating output	kW	8.78	10.04	11.37	12.85	14.50	16.24	10.00
Rated heating output	kW	3.91	4.56	5.31	6.09	6.96	7.88	10.00
Min. heating output	kW	2.15	1.96	2.37	2.69	3.16	3.71	4.23
Max. cooling capacity	kW	6.10	7.28	8.55	9.99	11.62	13.35	9.30
Rated cooling capacity	kW	2.94	3.55	4.35	5.18	6.11	7.08	9.30
Min. cooling capacity	kW	1.48	1.37	1.81	2.14	2.63	3.20	3.77
Max. power consumption	kW	2.68	2.75	2.81	2.85	2.88	2.89	1.04
Rated power consumption	kW	1.11	1.12	1.10	1.11	1.09	1.07	1.04
Min. power consumption	kW	0.67	0.58	0.56	0.55	0.52	0.50	0.46
Max. coefficient of performance ε (COP)		3.28	3.65	4.04	4.50	5.04	5.63	9.59
Rated coefficient of performance ε (COP)		3.53	3.53	4.80	5.47	6.37	7.35	9.59
Min. coefficient of performance ε (COP)		3.20	3.53	4.22	4.91	6.03	7.36	9.14

Operating point W	°C	45						
B	°C	–10	–5	0	5	10	15	25
Heating output	kW	3.72	4.31	5.00	5.76	6.57	7.41	9.35
Cooling capacity	kW	2.49	3.07	3.77	4.56	5.41	6.31	8.37
Power consumption	kW	1.34	1.37	1.38	1.39	1.38	1.37	1.32
Coefficient of performance ε (COP)		2.78	3.16	3.61	4.14	4.75	5.43	7.06

Operating point	W	°C	55						
	B	°C	–10	–5	0	5	10	15	25
Max. heating output		kW	8.52		10.83		13.43		
Rated heating output		kW	3.55	4.09	4.74	5.43	6.18	6.95	8.59
Min. heating output		kW	2.96		3.39		4.37		
Max. cooling capacity		kW	5.14		7.10		9.88		
Rated cooling capacity		kW	2.05	2.58	3.20	3.90	4.69	5.50	7.25
Min. cooling capacity		kW	1.63		2.10		3.22		
Max. power consumption		kW	3.62		3.73		3.90		
Rated power consumption		kW	1.61	1.65	1.68	1.71	1.71	1.71	1.66
Min. power consumption		kW	1.40		1.29		1.28		
Max. coefficient of performance ε (COP)			2.36		2.90		3.45		
Rated coefficient of performance ε (COP)			2.21	2.48	2.82	3.18	3.61	4.08	5.18
Min. coefficient of performance ε (COP)			2.11		2.63		3.41		

Operating point	W	°C	65						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	2.62	3.32	4.43	4.69	5.39	6.05	7.93
Cooling capacity		kW	0.71	1.39	2.49	2.84	3.59	4.29	6.20
Power consumption		kW	1.97	2.04	2.09	2.01	2.01	2.00	2.08
Coefficient of performance ε (COP)			1.33	1.63	2.13	2.33	2.68	3.02	3.89

Residual heads of the integral circulation pumps, type BWC 301.C12



Ⓐ Secondary pump
Ⓑ Primary pump

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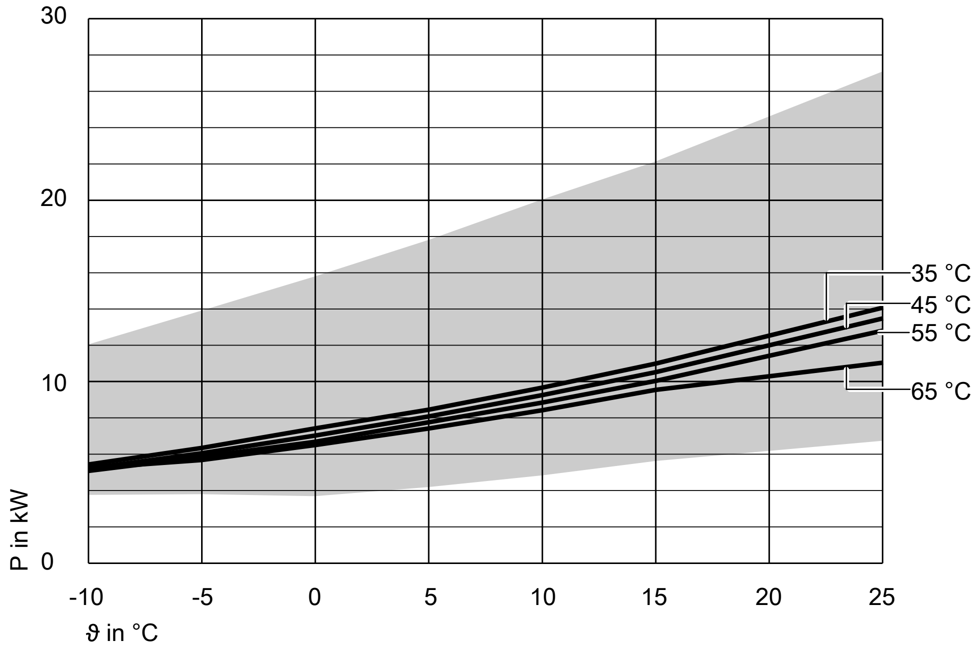
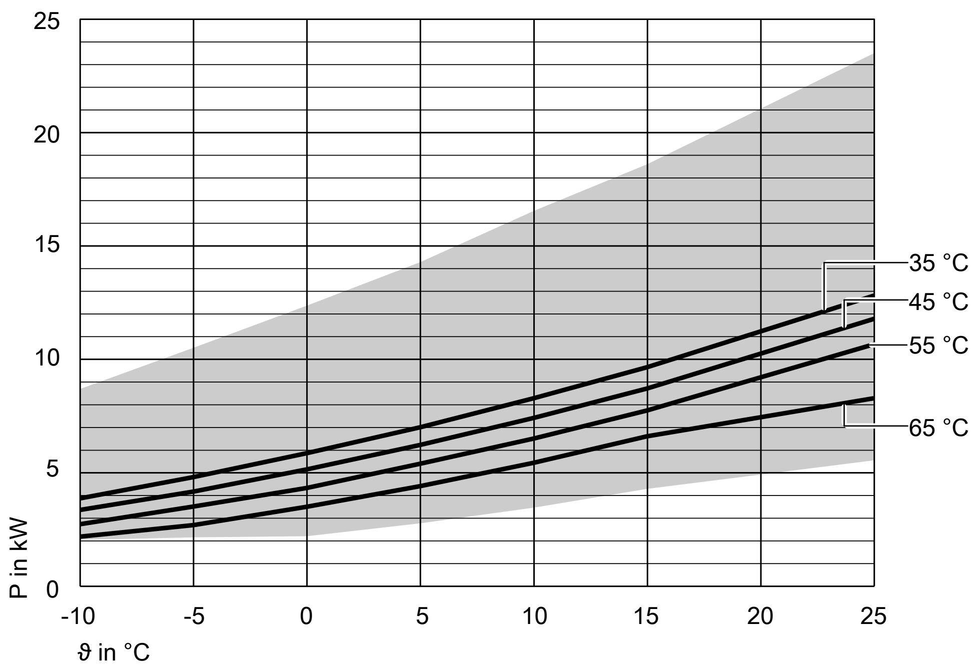
Performance graphs – type BWC 301.C16

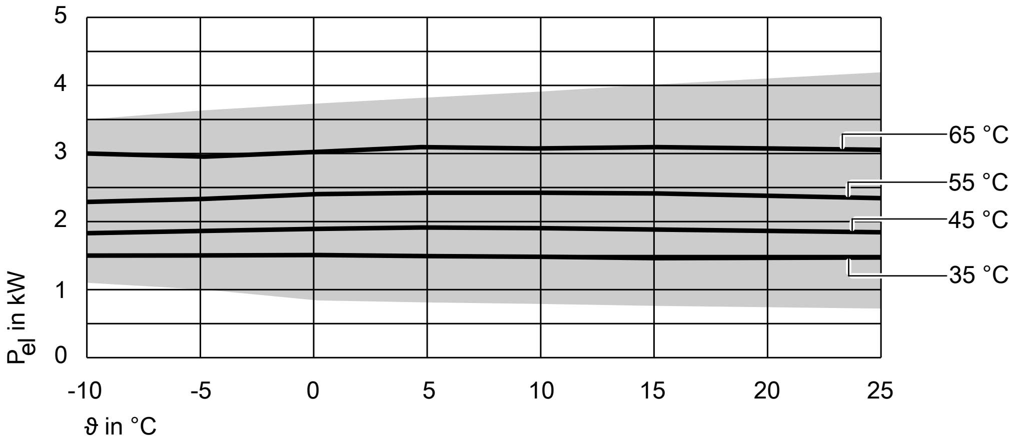
Heating output at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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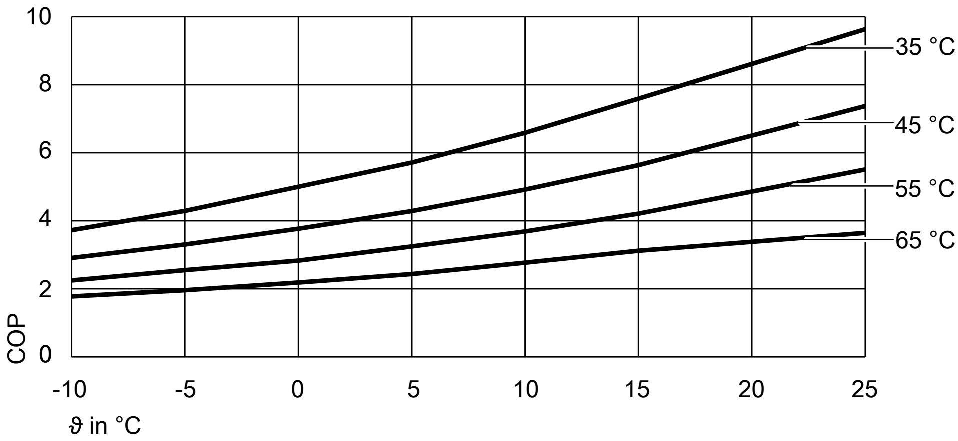
Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Possible output range based on a primary circuit flow temperature (heat pump brine inlet) of 35 °C

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.*

Operating point W	**°C**	**35**						
B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Max. heating output	kW	12.11	13.97	15.85	17.85	20.07	22.16	27.10
Rated heating output	kW	5.53	6.44	7.51	8.54	9.75	11.07	14.14
Min. heating output	kW	3.87	3.91	3.80	4.30	4.94	5.73	6.84
Max. cooling capacity	kW	8.67	10.49	12.35	14.27	16.53	18.59	23.49
Rated cooling capacity	kW	3.84	4.78	5.84	6.98	8.26	9.63	12.78
Min. cooling capacity	kW	2.56	2.67	2.72	3.29	3.98	4.81	6.06
Max. power consumption	kW	3.52	3.63	3.73	3.82	3.90	4.01	4.18
Rated power consumption	kW	1.48	1.50	1.51	1.49	1.48	1.46	1.47
Min. power consumption	kW	1.09	1.00	0.84	0.81	0.79	0.76	0.72
Max. coefficient of performance ε (COP)		3.44	3.85	4.25	4.68	5.15	5.53	6.48
Rated coefficient of performance ε (COP)		3.73	4.29	5.00	5.71	6.59	7.59	9.62
Min. coefficient of performance ε (COP)		3.55	3.93	4.52	5.28	6.22	7.53	9.57

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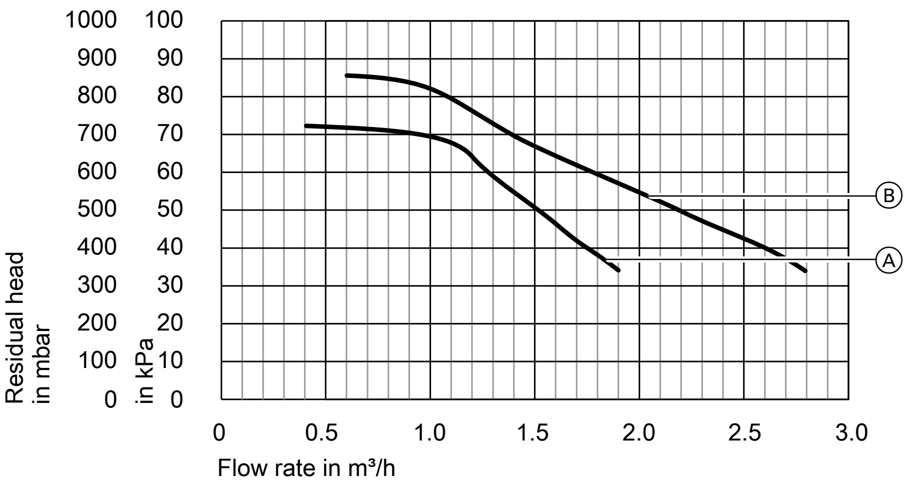
Operating point			45						
	W	°C							
	B	°C	–10	–5	0	5	10	15	25
Max. heating output		kW			15.43				
Rated heating output		kW	5.31	6.15	7.12	8.17	9.34	10.60	13.55
Min. heating output		kW			4.77				
Max. cooling capacity		kW			11.19				
Rated cooling capacity		kW	3.33	4.14	5.12	6.20	7.39	8.69	11.75
Min. cooling capacity		kW			3.20				
Max. power consumption		kW			4.40				
Rated power consumption		kW	1.83	1.86	1.89	1.91	1.90	1.88	1.84
Min. power consumption		kW			1.39				
Max. coefficient of performance ε (COP)					3.51				
Rated coefficient of performance ε (COP)			2.91	3.30	3.77	4.28	4.92	5.63	7.37
Min. coefficient of performance ε (COP)					3.44				

Operating point			55						
	W	°C							
	B	°C	–10	–5	0	5	10	15	25
Max. heating output		kW	11.71		15.28		19.09		27.22
Rated heating output		kW	5.18	5.95	6.78	7.85	8.93	10.12	12.88
Min. heating output		kW	4.96		5.94		7.69		10.98
Max. cooling capacity		kW	6.90		10.25		13.85		21.67
Rated cooling capacity		kW	2.70	3.48	4.30	5.37	6.48	7.72	10.64
Min. cooling capacity		kW	2.59		3.66		5.48		9.02
Max. power consumption		kW	4.86		5.16		5.46		5.86
Rated power consumption		kW	2.30	2.33	2.40	2.42	2.42	2.41	2.34
Min. power consumption		kW	2.23		2.17		2.13		2.04
Max. coefficient of performance ε (COP)			2.41		2.96		3.49		4.64
Rated coefficient of performance ε (COP)			2.25	2.55	2.83	3.24	3.68	4.21	5.50
Min. coefficient of performance ε (COP)			2.22		2.74		3.61		5.39

3

Operating point			65						
	W	°C							
	B	°C	–10	–5	0	5	10	15	25
Max. heating output		kW	5.33		14.85				19.60
Rated heating output		kW	5.33	5.78	6.60	7.51	8.51	9.63	11.12
Min. heating output		kW	5.32		6.62				11.15
Max. cooling capacity		kW	2.18		8.96				15.14
Rated cooling capacity		kW	2.15	2.66	3.47	4.38	5.41	6.58	8.26
Min. cooling capacity		kW	2.16		3.49				8.29
Max. power consumption		kW	2.99		6.07				4.78
Rated power consumption		kW	3.00	2.95	3.02	3.09	3.07	3.09	3.05
Min. power consumption		kW	2.99		3.01				3.05
Max. coefficient of performance ε (COP)			1.78		2.45				4.10
Rated coefficient of performance ε (COP)			1.78	1.96	2.18	2.43	2.77	3.12	3.64
Min. coefficient of performance ε (COP)			1.78		2.20				3.66

Residual heads of the integral circulation pumps, type BWC 301.C16



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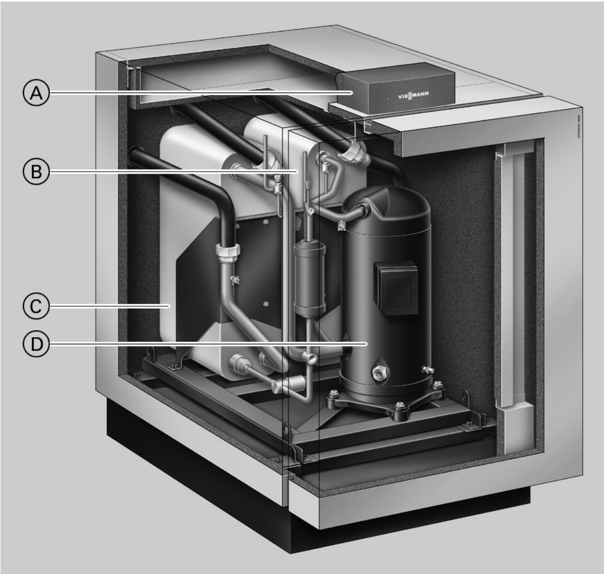
Ⓐ Secondary pump
Ⓑ Primary pump

4.1 Product description

Benefits



Ⓐ Vitotronic 200 weather-compensated, digital heat pump control unit
Ⓑ Condenser
Ⓒ Evaporator
Ⓓ Hermetically sealed Compliant scroll compressor

4

- Low running costs thanks to high COP (coefficient of performance) to EN 14511: Up to 4.8 (B0/W35)
- Mono mode operation for central heating and DHW heating
- Maximum flow temperatures of up to 60 °C for high DHW convenience
- Low noise and vibration levels thanks to sound-optimised appliance design – sound power level < 48 dB(A)
- Low running costs with the highest level of efficiency at any operating point through the innovative Refrigerant Cycle Diagnostic (RCD) system with electronic expansion valve (EEV)
- With the 2-stage version (type BW+BWS):
  Highly flexible due to option of combining modules of different outputs
  Easier handling through smaller and lighter modules

Only type BW:
- Easy to use Vitotronic control unit with plain text and graphic display for weather-compensated heating operation, with natural cooling and active cooling functions
- Higher output can be achieved through cascade arrangement: 21.2 to 428.0 kW
- Optimised utilisation of power generated by an on-site photovoltaic system
- Web-enabled through Vitoconnect (accessories) for operation and service via Viessmann apps

Delivered condition, type BW

- Complete compact heat pump as a 1-stage heat pump or as stage 1 (master) of a 2-stage heat pump
- Adjustable anti-vibration feet
- Weather-compensated Vitotronic 200 heat pump control unit with outside temperature sensor
- Electronic starting current limiter and integral phase monitor

Delivered condition, type BWS

- Compact heat pump as stage 2 (slave)
- Adjustable anti-vibration feet
- Electrical connecting cable for connection to stage 1 (master).
- Electronic starting current limiter

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4.2 Specification

Specification for brine/water heat pumps

Type BW/BWS		301.A21	301.A29	301.A45
Performance data to EN 14511 (B0/W35, 5 K spread)				
Rated heating output	kW	21.2	28.8	42.8
Cooling capacity	kW	17.0	23.3	34.2
Power consumption	kW	4.48	5.96	9.28
Coefficient of performance (COP)		4.73	4.83	4.60
Brine (primary circuit)				
Capacity	l	6.5	8.5	11.5
Minimum flow rate	l/h	3300	4200	6500
Pressure drop at minimum flow rate	mbar	70	95	154
	kPa	7	9.5	15.4
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10
Heating water (secondary circuit)				
Capacity	l	6.5	8.5	11.5
Nominal flow rate	l/h	3740	5050	7360
Pressure drop at nominal flow rate	mbar	120	130	210
	kPa	12	13	21
Minimum flow rate	l/h	1900	2550	3700
Pressure drop at minimum flow rate	mbar	38	38	65
	kPa	3.8	3.8	6.5
Max. flow temperature	°C	60	60	60
Electrical values, heat pump				
Rated voltage, compressor	V	3/PE 400 V/50 Hz		
Rated current, compressor	A	16	22	34
Cos φ		0.8	0.8	0.8
Starting current, compressor (with starting current limiter)	A	< 30	41	47
Starting current, compressor with stalled armature	A	95	118	174
Compressor MCB/fuse protection	A	1 x C16A 3-pole	1 x C25A 3-pole	1 x C40A 3-pole
Protection class		I	I	I
Electrical values, heat pump control unit				
Rated voltage, control unit/PCB	V	1/N/PE 230 V/50 Hz		
MCB/fuse protection, control unit/PCB		1 x B16A		
MCB/fuse, control unit/PCB	A	6.3 A (slow)/250 V		
IP rating		IP 20	IP 20	IP 20
Power consumption				
Max. power consumption, heat pump control unit/PCB, heat pump stage 1 (type BW 301.A)	W	25	25	25
Max. power consumption, PCB, heat pump stage 2 (type BWS 301.A)		20	20	20
Power consumption, heat pump control unit/PCB, heat pump stages 1 and 2	W	45	45	45
Refrigerant circuit				
Refrigerant		R410A	R410A	R410A
– Safety group		A1	A1	A1
– Refrigerant charge	kg	4.7	6.2	7.7
– Global warming potential (GWP)*4		1924	1924	1924
– CO_2 equivalent	t	9.0	11.9	14.8
Permiss. operating pressure, high pressure side	bar	43	43	43
	MPa	4.3	4.3	4.3
Permiss. operating pressure, low pressure side	bar	28	28	28
	MPa	2.8	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor		
Oil in compressor	Type	Emkarate RL32 3MAF		
Quantity of oil in compressor	l	2.65	3.25	3.38
Permiss. operating pressure				
Primary circuit	bar	3	3	3
	MPa	0.3	0.3	0.3
Secondary circuit	bar	3	3	3
	MPa	0.3	0.3	0.3

4

*4 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

Type BW/BWS		301.A21	301.A29	301.A45
Dimensions				
Total length	mm	1085	1085	1085
Total width	mm	780	780	780
Total height without programming unit	mm	1074	1074	1074
Total height (programming unit pivoted up, type BW 301.A only)	mm	1267	1267	1267
Weight				
Heat pump stage 1 (type BW 301.A)	kg	245	272	298
Heat pump stage 2 (type BWS 301.A)	kg	240	267	293
Connections (male thread)				
Primary circuit flow/return	G	2	2	2
Secondary circuit flow/return	G	2	2	2
Sound power (measured with reference to EN 12102/ EN ISO 9614-2)				
Weighted total sound power level for B0$^{\pm 3\ K}$/W35$^{\pm 5\ K}$				
– At rated heating output	dB(A)	42	48	46
Energy efficiency class to EU Regulation no. 813/2013				
Heating, average climatic conditions				
– Low temperature applications (W35)		A^{++}	A^{++}	A^{++}
– Medium temperature applications (W55)		A^{++}	A^{++}	A^{++}
Performance data as per EU Regulation no. 813/2013 (average climatic conditions)				
Low temperature applications (W35)				
– Energy efficiency η_S	%	201	211	199
– Rated heating output P_{rated}	kW	24	33	49
– Seasonal coefficient of performance (SCOP)		5.23	5.48	5.18
Medium temperature applications (W55)				
– Energy efficiency η_S	%	140	138	138
– Rated heating output P_{rated}	kW	22	30	45
– Seasonal coefficient of performance (SCOP)		3.70	3.65	3.65

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Specification for water/water heat pumps

Type BW/BWS in conjunction with conversion kit for water/water heat pump		301.A21	301.A29	301.A45
Performance data to EN 14511 (W10/W35, 5 K spread)				
Rated heating output	kW	28.1	37.1	58.9
Cooling capacity	kW	23.7	31.4	48.9
Power consumption	kW	4.73	6.2	10.7
Coefficient of performance ε (COP)		5.94	6.00	5.50
Brine (primary intermediate circuit)				
Content	l	6.5	8.5	11.5
Minimum flow rate	l/h	5200	7200	10600
Pressure drop at minimum flow rate	mbar	170	260	370
	kPa	17	26	37
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	7.5	7.5	7.5
Heating water (secondary circuit)				
Content	l	6.5	8.5	11.5
Minimum flow rate	l/h	2420	3200	5100
Pressure drop at minimum flow rate	mbar	50	55	110
	kPa	5	5.5	11
Max. flow temperature	°C	60	60	60

Note
Further specifications: See "Specification for brine/water heat pumps"

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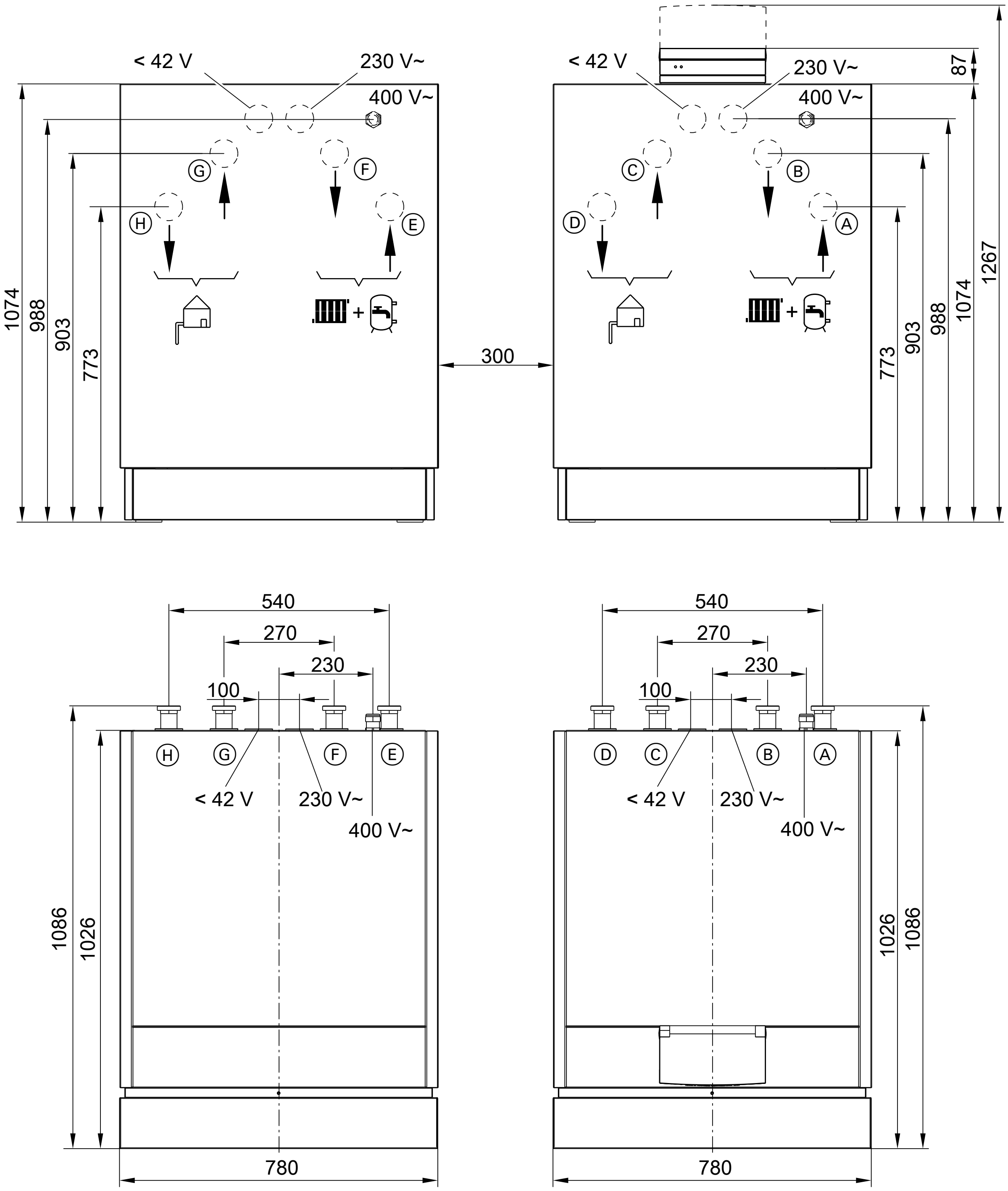
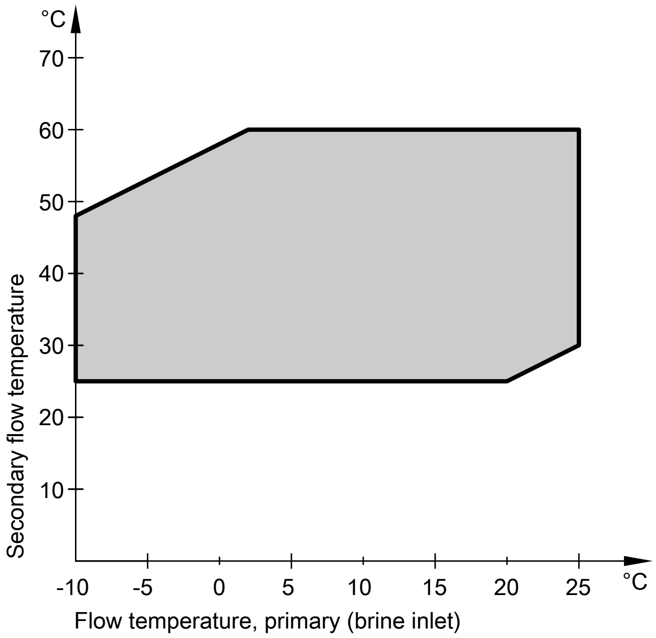
Dimensions



Type BWS on the left; type BW on the right

Ⓐ/Ⓔ Secondary circuit return
Ⓑ/Ⓕ Secondary circuit flow
Ⓒ/Ⓖ Primary circuit flow (heat pump brine inlet)
Ⓓ/Ⓗ Primary circuit return (heat pump brine outlet)

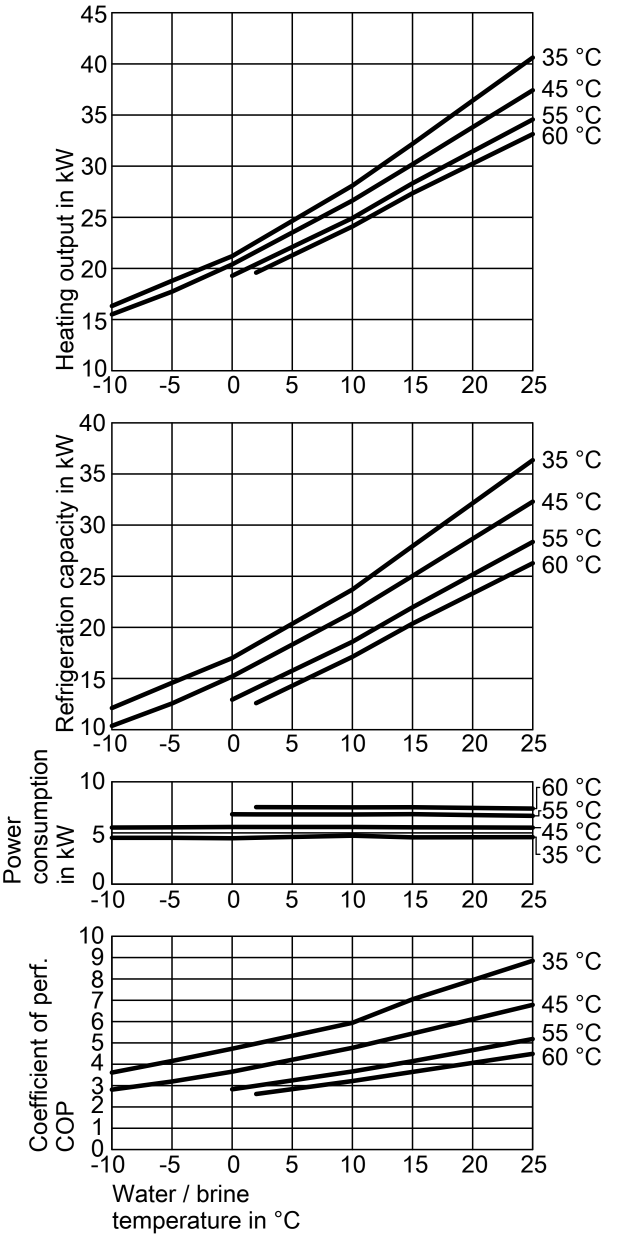
Application limits to EN 14511

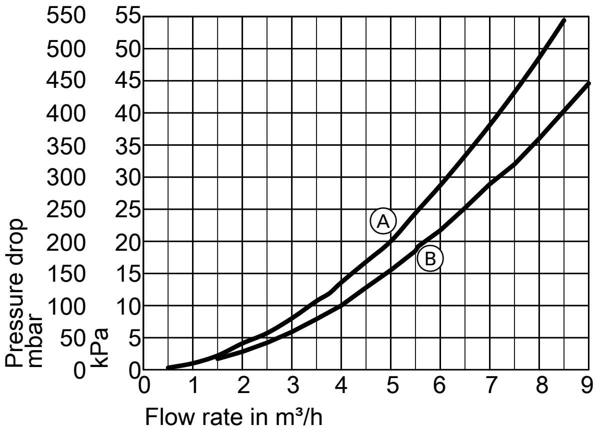


- Secondary side spread: 5 K
- Primary side spread: 3 K

Curves

Type BW 301.A21, BWS 301.A21





Ⓐ Secondary circuit
Ⓑ Primary circuit

Output data

Operating point	**W** / **B**	**°C** / **°C**	**35** / **-5**	**0**	**2**	**10**	**15**
Heating output		kW	18.79	21.20	22.58	28.10	32.19
Cooling capacity		kW	14.58	17.00	18.34	23.70	27.95
Power consumption		kW	4.52	4.48	4.53	4.73	4.57
Coefficient of performance ε (COP)			4.15	4.73	4.97	5.94	7.05

Operating point	**W** / **B**	**°C** / **°C**	**45** / **-5**	**0**	**2**	**10**	**15**
Heating output		kW	17.73	20.39	21.64	26.64	30.19
Cooling capacity		kW	12.57	15.20	16.45	21.44	25.03
Power consumption		kW	5.55	5.58	5.58	5.58	5.55
Coefficient of performance ε (COP)			3.19	3.65	3.88	4.77	5.44

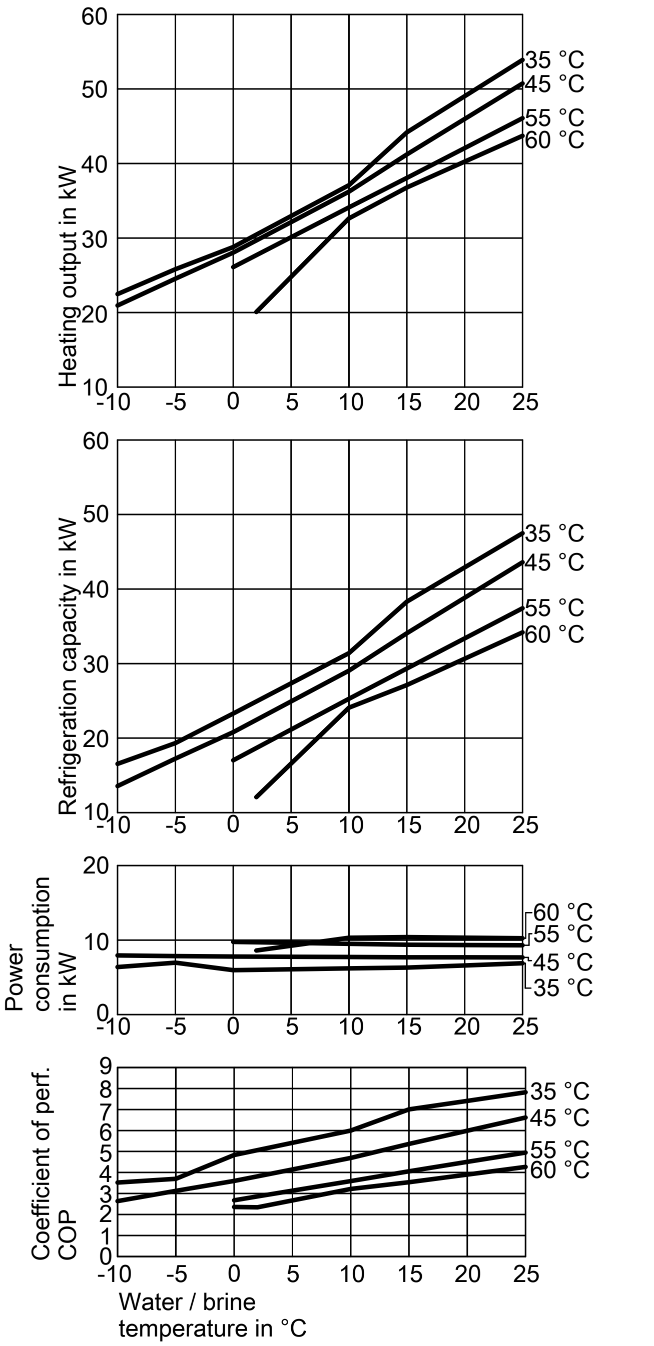
Operating point	**W** / **B**	**°C** / **°C**	**55** / **0**	**2**	**10**	**15**
Heating output		kW	19.28	20.41	24.92	28.32
Cooling capacity		kW	12.94	14.07	18.59	21.97
Power consumption		kW	6.82	6.82	6.80	6.83
Coefficient of performance ε (COP)			2.83	2.99	3.66	4.15

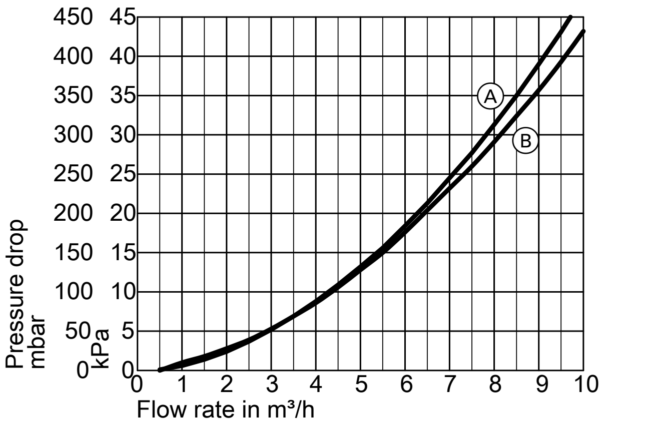
Operating point	**W** / **B**	**°C** / **°C**	**60** / **2**	**10**	**15**
Heating output		kW	19.59	24.10	27.36
Cooling capacity		kW	12.59	17.13	20.37
Power consumption		kW	7.52	7.50	7.52
Coefficient of performance ε (COP)			2.61	3.21	3.64

Note
COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:
- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

Type BW 301.A29, BWS 301.A29





Ⓐ Secondary circuit
Ⓑ Primary circuit

Output data

Operating point	W / B	°C / °C	35 / -5	35 / 0	35 / 2	35 / 10	35 / 15
Heating output		kW	25.03	28.80	30.46	37.10	44.18
Cooling capacity		kW	19.33	23.30	24.92	31.40	38.31
Power consumption		kW	6.97	5.96	6.01	6.20	6.31
Coefficient of performance ε (COP)			3.70	4.83	5.06	6.00	7.01

Operating point	W / B	°C / °C	45 / -5	45 / 0	45 / 2	45 / 10	45 / 15
Heating output		kW	24.54	28.04	29.68	36.23	41.21
Cooling capacity		kW	17.24	20.80	22.45	29.05	34.07
Power consumption		kW	7.85	7.79	7.78	7.73	7.69
Coefficient of performance ε (COP)			3.13	3.60	3.82	4.69	5.36

Operating point	W / B	°C / °C	55 / 0	55 / 2	55 / 10	55 / 15
Heating output		kW	26.09	27.70	34.11	38.06
Cooling capacity		kW	17.02	18.67	25.27	29.34
Power consumption		kW	9.75	9.70	9.50	9.38
Coefficient of performance ε (COP)			2.68	2.86	3.59	4.06

Operating point	W / B	°C / °C	60 / 2	60 / 10	60 / 15
Heating output		kW	20.07	32.81	36.78
Cooling capacity		kW	12.08	24.50	27.12
Power consumption		kW	8.60	10.30	10.39
Coefficient of performance ε (COP)			2.34	3.11	3.54

Note

COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:

- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

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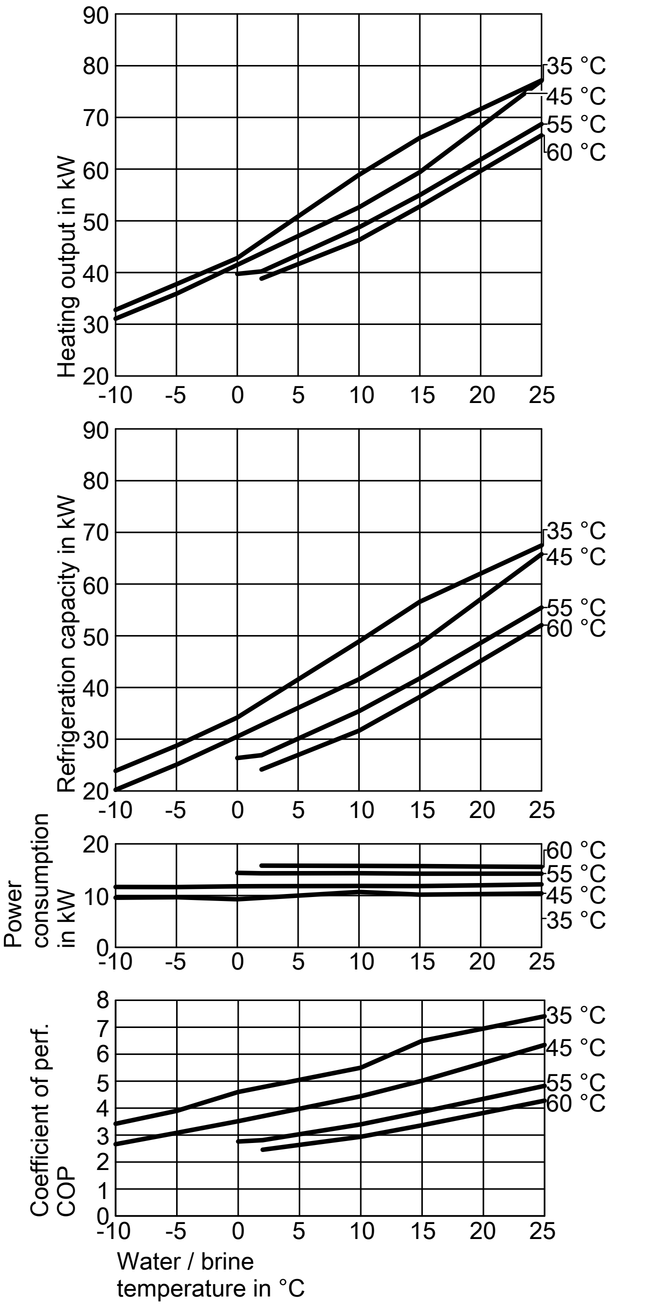
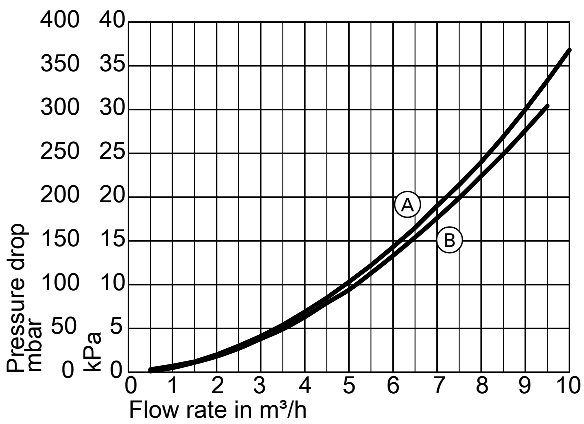
Type BW 301.A45, BWS 301.A45





Ⓐ Secondary circuit
Ⓑ Primary circuit

Output data

Operating point	**W** / **B**	**°C** / **°C**	**35**				
			-5	**0**	**2**	**10**	**15**
Heating output		kW	37.75	42.80	46.02	58.90	66.05
Cooling capacity		kW	28.75	34.20	37.14	48.90	56.59
Power consumption		kW	9.67	9.28	9.56	10.70	10.17
Coefficient of performance ε (COP)			3.90	4.60	4.78	5.50	6.49

Operating point	**W** / **B**	**°C** / **°C**	**45**				
			-5	**0**	**2**	**10**	**15**
Heating output		kW	35.90	41.49	43.72	52.62	59.42
Cooling capacity		kW	25.08	30.52	32.74	41.60	48.40
Power consumption		kW	11.64	11.80	11.81	11.85	11.85
Coefficient of performance ε (COP)			3.09	3.52	3.70	4.44	5.02

Operating point	**W** / **B**	**°C** / **°C**	**55**			
			0	**2**	**10**	**15**
Heating output		kW	39.75	40.23	48.74	55.00
Cooling capacity		kW	26.38	26.92	35.41	41.76
Power consumption		kW	14.38	14.31	14.33	14.23
Coefficient of performance ε (COP)			2.76	2.81	3.40	3.86

Operating point	**W** / **B**	**°C** / **°C**	**60**		
			2	**10**	**15**
Heating output		kW	38.82	46.28	52.79
Cooling capacity		kW	24.14	31.64	38.19
Power consumption		kW	15.79	15.75	15.69
Coefficient of performance ε (COP)			2.46	2.94	3.36

Note
COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:
- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

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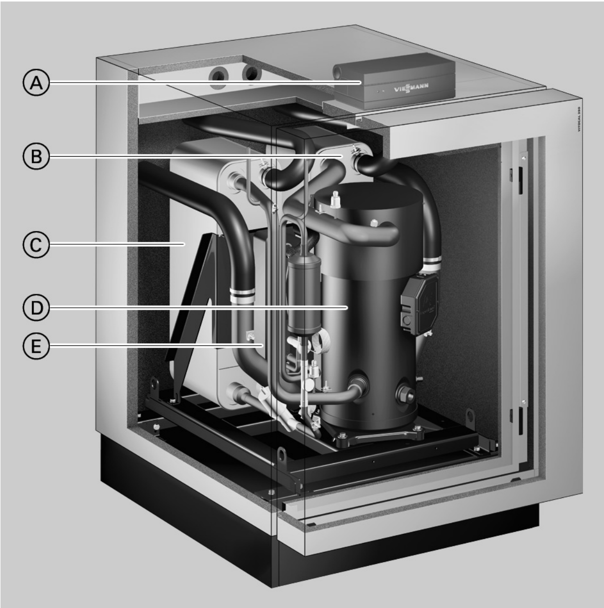
5.1 Product description

Benefits



(A) Vitotronic 200 weather-compensated, digital heat pump control unit
(B) Condenser
(C) Evaporator
(D) Hermetically sealed Compliant scroll compressor with enhanced vapour injection — EVI process
(E) Heat exchanger for enhanced vapour injection

- Low running costs thanks to high COP (coefficient of performance) to EN 14511: Up to 5.0 (B0/W35)
- Mono mode operation for central heating and DHW heating
- Flow temperatures up to 68 °C
- Achievable DHW temperature of up to 60 °C when using the specified cylinder combinations
- Low noise and vibration levels through sound-optimised appliance design – sound power level < 52 dB(A)
- Low running costs with the highest level of efficiency at any operating point through the innovative Refrigerant Cycle Diagnostic system (RCD) with electronic expansion valve (EEV)
- With the 2-stage version (type BW+BWS):
  Highly flexible due to option of combining modules of different outputs
  Easier handling through smaller and lighter modules

Only type BW:
- Easy to use Vitotronic control unit with plain text and graphic display for weather-compensated heating operation, with natural cooling and active cooling cooling functions
- Optimised utilisation of power generated by an on-site photovoltaic system
- Web-enabled through Vitoconnect (accessories) for operation and service via Viessmann apps

Delivered condition, type BW

- Complete compact heat pump as a 1-stage heat pump or as stage 1 (master) of a 2-stage heat pump
- Adjustable anti-vibration feet
- Weather-compensated Vitotronic 200 heat pump control unit with outside temperature sensor
- Electronic starting current limiter and integral phase monitor

Delivered condition, type BWS

- Compact heat pump as stage 2 (slave)
- Adjustable anti-vibration feet
- Electrical connecting cable for connection to stage 1 (master).
- Electronic starting current limiter

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5.2 Specification

Specification – brine/water heat pumps

Type BW/BWS		351.B20	351.B27	351.B33	351.B42
Performance data to EN 14511 (B0/W35, 5 K spread)					
Rated heating output	kW	20.5	28.7	32.7	42.3
Cooling capacity	kW	16.4	23.0	26.3	33.6
Power consumption	kW	4.30	5.90	6.50	8.70
Coefficient of performance (COP)		4.80	4.90	5.00	4.80
Brine (primary circuit)					
Capacity	l	9	11	14	14
Nominal flow rate (3 K spread)	l/h	5350	7200	8300	10500
Pressure drop at nominal flow rate	mbar	100	50	84	124
	kPa	10.0	5.0	8.4	12.4
Minimum flow rate (4 K spread)	l/h	4000	5400	6200	7900
Pressure drop at minimum flow rate	mbar	63	30	52	78
	kPa	6.3	3.0	5.2	7.8
Max. flow temperature (brine inlet)	°C	25	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10	–10
Heating water (secondary circuit)					
Capacity	l	8	9	13	13
Nominal flow rate (5 K spread)	l/h	3500	4800	5650	7000
Pressure drop at nominal flow rate	mbar	42	40	65	99
	kPa	4.2	4.0	6.5	9.9
Minimum flow rate (12 K spread)	l/h	1500	2050	2400	3000
Pressure drop at minimum flow rate	mbar	7	10	16	23
	kPa	0.7	1.0	1.6	2.3
Max. flow temperature (6 K spread)	°C	65	68	68	68
Electrical values, heat pump					
Rated voltage, compressor	V	3/PE 400 V/50 Hz			
Rated current, compressor	A	13.2	21	26	33
Cos φ		0.8	0.8	0.8	0.8
Starting current, compressor (with starting current limiter)	A	36	39	43	59
Starting current, compressor with stalled armature	A	101	118	140	174
Compressor MCB/fuse protection	A	1 x C25A 3-pole	1 x C32A 3-pole	1 x C32A 3-pole	1 x C40A 3-pole
Protection class		I	I	I	I
Electrical values, heat pump control unit					
Rated voltage, heat pump control unit/PCB	V	1/N/PE 230 V/50 Hz			
Fuse rating, heat pump control unit/PCB		1 x B16A			
Fuse, heat pump control unit/PCB	A	6.3 A (slow)/250 V			
IP rating		IP 20	IP 20	IP 20	IP 20
Power consumption					
Max. power consumption, heat pump control unit/PCB, heat pump stage 1 (type BW 351.B)	W	25	25	25	25
Max. power consumption, PCB, heat pump stage 2 (type BWS 351.B)		20	20	20	20
Power consumption, heat pump control unit/PCB, heat pump stages 1 and 2	W	45	45	45	45
Refrigerant circuit					
Refrigerant		R410A	R410A	R410A	R410A
– Safety group		A1	A1	A1	A1
– Refrigerant charge	kg	5.3	7.0	8.6	8.7
– Global warming potential (GWP)*5		1924	1924	1924	1924
– CO_2 equivalent	t	10.2	13.5	16.5	16.7
Permiss. operating pressure, high pressure side	bar	45	45	45	45
	MPa	4.5	4.5	4.5	4.5
Permiss. operating pressure, low pressure side	bar	28	28	28	28
	MPa	2.8	2.8	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor			
Oil in compressor	Type	Emkarate RL32 3MAF			
Quantity of oil in compressor	l	1.9	3.4	3.4	3.4
Permiss. operating pressure					
Primary circuit	bar	3	3	3	3
	MPa	0.3	0.3	0.3	0.3
Secondary circuit	bar	3	3	3	3
	MPa	0.3	0.3	0.3	0.3

*5 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

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Type BW/BWS		351.B20	351.B27	351.B33	351.B42
Dimensions					
Total length	mm	1085	1085	1085	1085
Total width	mm	780	780	780	780
Total height without programming unit	mm	1074	1074	1074	1074
Total height (programming unit pivoted up, type BW 351.B only)	mm	1267	1267	1267	1267
Weight					
Heat pump stage 1 (type BW 351.B)	kg	270	285	310	315
Heat pump stage 2 (type BWS 351.B)	kg	265	280	305	310
Connections (male thread)					
Primary circuit flow/return	G	2	2	2	2
Secondary circuit flow/return	G	2	2	2	2
Sound power (measured with reference to EN 12102/ EN ISO 9614-2)					
Weighted total sound power level for $B0^{\pm3\,K}/W35^{\pm5\,K}$					
– At rated heating output	dB(A)	50	52	50	50
Energy efficiency class to EU Regulation no. 813/2013					
Heating, average climatic conditions					
– Low temperature applications (W35)		A^{++}	A^{++}	A^{++}	A^{++}
– Medium temperature applications (W55)		A^{++}	A^{++}	A^{++}	A^{++}
Performance data as per EU Regulation no. 813/2013 (average climatic conditions)					
Low temperature applications (W35)					
– Energy efficiency η_S	%	196	203	213	203
– Rated heating output P_{rated}	kW	23	32	37	48
– Seasonal coefficient of performance (SCOP)		5.10	5.28	5.53	5.28
Medium temperature applications (W55)					
– Energy efficiency η_S	%	152	153	156	153
– Rated heating output P_{rated}	kW	23	34	38	49
– Seasonal coefficient of performance (SCOP)		4.00	4.03	4.10	4.03

Specification for water/water heat pumps

Type BW/BWS in conjunction with "conversion kit for water/water heat pump"		351.B20	351.B27	351.B33	351.B42
Performance data to EN 14511 (W10/W35, 5 K spread)					
Rated heating output	kW	25.4	34.7	42.2	52.3
Cooling capacity	kW	21.1	29.3	35.7	43.8
Power consumption	kW	4.50	5.70	6.80	9.00
Coefficient of performance (COP)		5.70	6.10	6.20	5.80
Brine (primary intermediate circuit)					
Capacity	l	9	11	14	14
Nominal flow rate (3 K spread)	l/h	6400	9500	10300	14000
Pressure drop at nominal flow rate	mbar	145	80	120	320
	kPa	14.5	8.0	12.0	32.0
Minimum flow rate (5 K spread)	l/h	4800	6500	7700	10500
Pressure drop at minimum flow rate	mbar	90	42	77	124
	kPa	9.0	4.2	7.7	12.4
Max. flow temperature (brine inlet)	°C	25	25	25	25
Min. flow temperature (brine inlet)	°C	7.5	7.5	7.5	7.5
Heating water (secondary circuit)					
Capacity	l	8	9	13	13
Nominal flow rate (5 K spread)	l/h	4300	5700	7300	9000
Pressure drop at nominal flow rate	mbar	68	53	105	154
	kPa	6.8	5.3	10.5	15.4
Minimum flow rate (12 K spread)	l/h	1800	2400	3050	3750
Pressure drop at minimum flow rate	mbar	11	13	23.0	33
	kPa	1.1	1.3	2.3	3.3
Max. flow temperature (6 K spread)	°C	65	68	68	68

Note
Further specifications: See "Specification for brine/water heat pumps".

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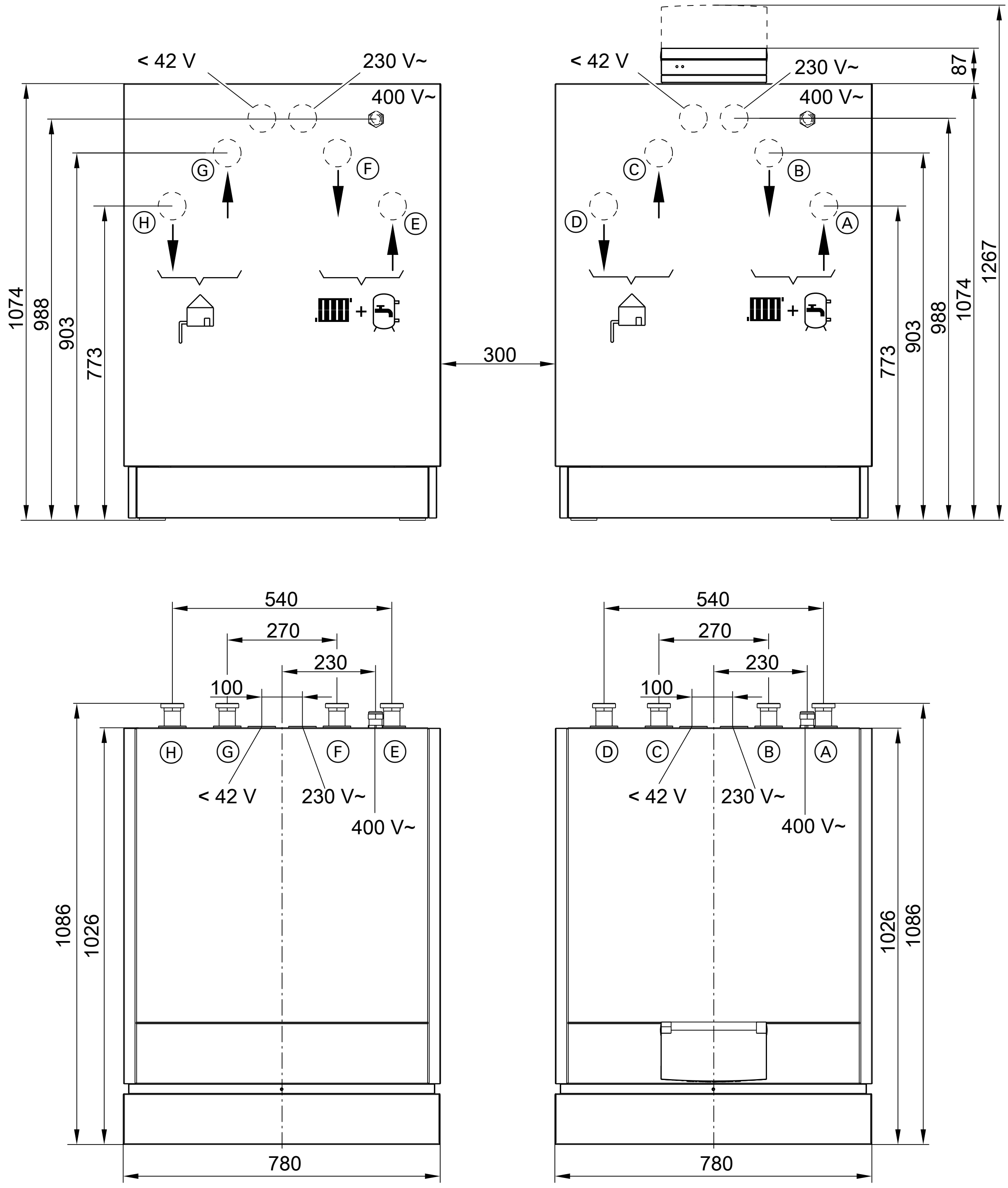
Dimensions

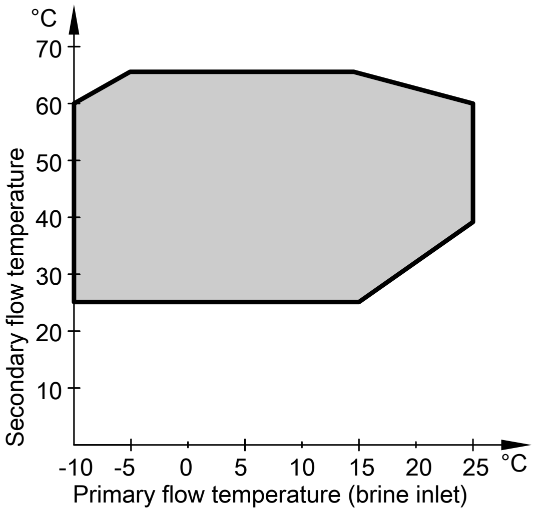


Type BWS on the left; type BW on the right

Ⓐ/Ⓔ Secondary circuit return
Ⓑ/Ⓕ Secondary circuit flow
Ⓒ/Ⓖ Primary circuit flow (heat pump brine inlet)
Ⓓ/Ⓗ Primary circuit return (heat pump brine outlet)

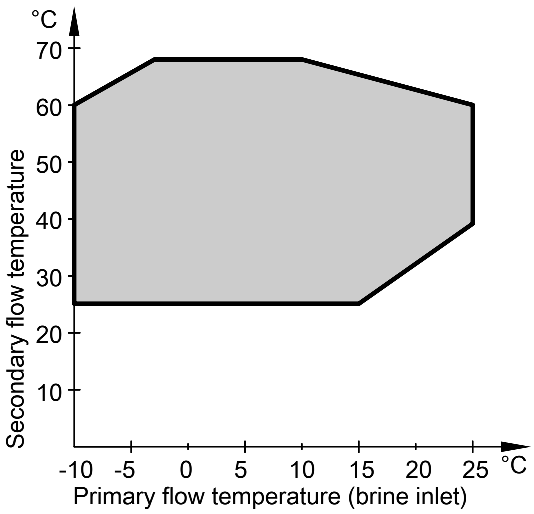
Application limits

Type BW/BWS 351.B20
Max. flow temperature 65 °C



- Secondary side spread: 6 K
- Primary side spread: 3 K

Type BW/BWS 351.B27, 351.B33, 351.B42
Max. flow temperature 68 °C



- Secondary side spread: 6 K
- Primary side spread: 3 K

DHW temperature of 60 °C in conjunction with Vitocell 100-L, type CVL and cylinder loading system
Only for type BW/BWS 351.B27, 351.B33, 351.B42.
- To achieve a DHW temperature of 60 °C, the temperature spread in the secondary circuit must be regulated to 6 K. This is done by adjusting the pump rates of all circulation pumps for DHW heating, e.g. secondary pump, cylinder loading pump, etc.
- Please observe the sizing information for the cylinder loading system: See page 193.
- If temperatures above +12 °C are expected from the primary source, a low end controller must be factored in for the primary circuit flow temperature (heat pump brine inlet).
  Otherwise the max. flow temperature of 68 °C cannot be provided via the heat pump and a DHW temperature of 60 °C cannot be achieved.

DHW temperature in conjunction with heating water buffer cylinder and freshwater module
If a DHW outlet temperature of more than 60 °C is required, an additional heat source must be provided. Either an immersion heater (accessories) can be installed in the heating water buffer cylinder or an additional heat generator can be integrated into the system. This additional heat generator should be sized to meet on-site requirements.

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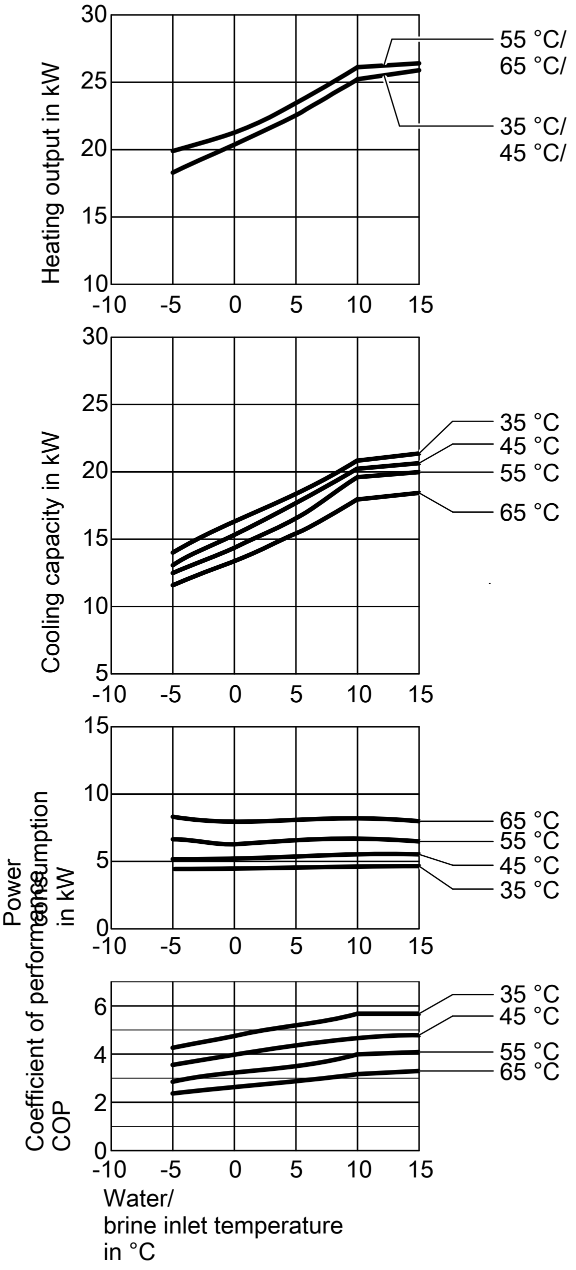
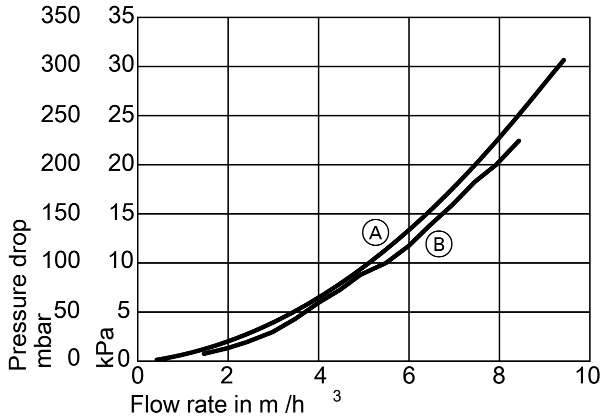
Curves

Type BW 351.B20, BWS 351.B20





Ⓐ Secondary circuit
Ⓑ Primary circuit

Performance data

Operating point	**W** / **B**	**°C** / **°C**	**35**				
			-5	**0**	**5**	**10**	**15**
Heating output		kW	18.4	20.5	22.7	25.4	26.0
Cooling capacity		kW	14.1	16.2	18.3	20.9	21.4
Power consumption		kW	4.30	4.30	4.40	4.50	4.60
Coefficient of performance (COP)			4.30	4.80	5.20	5.70	5.70

Operating point	**W** / **B**	**°C** / **°C**	**45**				
			-5	**0**	**5**	**10**	**15**
Heating output		kW	18.3	20.6	22.9	25.8	26.2
Cooling capacity		kW	13.2	15.4	17.7	20.3	20.7
Power consumption		kW	5.10	5.20	5.20	5.50	5.50
Coefficient of performance (COP)			3.60	4.00	4.40	4.70	4.80

Operating point	**W** / **B**	**°C** / **°C**	**55**				
			-5	**0**	**5**	**10**	**15**
Heating output		kW	19.1	20.6	23.1	26.2	26.6
Cooling capacity		kW	12.5	14.4	16.5	19.6	20.1
Power consumption		kW	6.60	6.20	6.60	6.60	6.50
Coefficient of performance (COP)			2.90	3.30	3.50	4.00	4.10

Operating point	**W** / **B**	**°C** / **°C**	**65**				
			-5	**0**	**5**	**10**	**15**
Heating output		kW	20.0	21.3	23.5	26.2	26.5
Cooling capacity		kW	11.7	13.4	15.4	18.0	18.5
Power consumption		kW	8.30	7.90	8.10	8.20	8.00
Coefficient of performance (COP)			2.40	2.70	2.90	3.20	3.30

Note
COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:
- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

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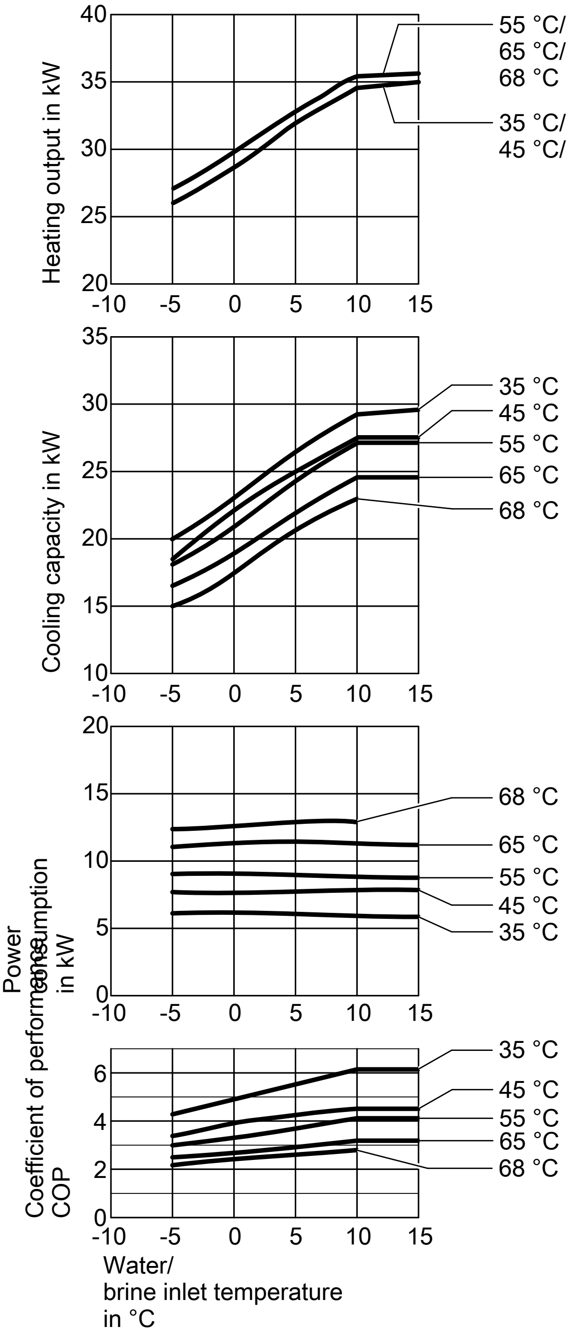
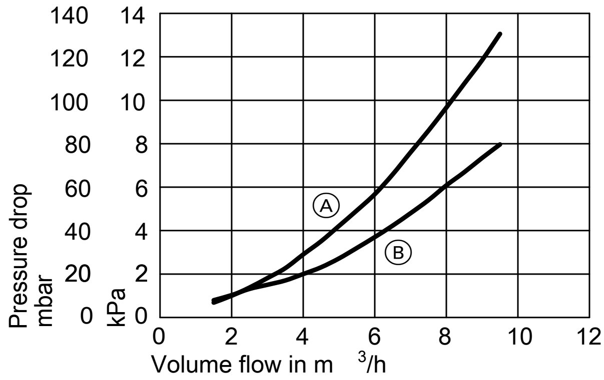
Type BW 351.B27, BWS 351.B27





Ⓐ Secondary circuit
Ⓑ Primary circuit

Performance data

Operating point	W	°C	35				
	B	°C	-5	0	5	10	15
Heating output		kW	26.0	28.7	32.1	34.7	35.2
Cooling capacity		kW	20.0	22.8	26.3	29.0	29.4
Power consumption		kW	6.00	5.90	5.80	5.70	5.80
Coefficient of performance (COP)			4.30	4.90	5.50	6.10	6.10

Operating point	W	°C	45				
	B	°C	-5	0	5	10	15
Heating output		kW	26.2	29.6	32.5	35.1	35.3
Cooling capacity		kW	18.5	22.0	24.9	27.3	27.5
Power consumption		kW	7.70	7.60	7.60	7.80	7.80
Coefficient of performance (COP)			3.40	3.90	4.30	4.50	4.50

Operating point	W	°C	55				
	B	°C	-5	0	5	10	15
Heating output		kW	27.1	29.9	33.0	35.7	35.8
Cooling capacity		kW	18.1	20.8	24.1	27.0	27.1
Power consumption		kW	9.00	9.10	8.90	8.70	8.70
Coefficient of performance (COP)			3.00	3.30	3.70	4.10	4.10

Operating point	W	°C	65				
	B	°C	-5	0	5	10	15
Heating output		kW	27.5	30.0	33.3	35.6	35.7
Cooling capacity		kW	16.5	18.9	21.8	24.5	24.5
Power consumption		kW	11.00	11.10	11.50	11.10	11.20
Coefficient of performance (COP)			2.50	2.70	2.90	3.20	3.20

Operating point	W	°C	68			
	B	°C	-5	0	5	10
Heating output		kW	27.3	29.7	33.5	35.8
Cooling capacity		kW	14.9	17.3	20.6	23.0
Power consumption		kW	12.40	12.40	12.90	12.80
Coefficient of performance (COP)			2.20	2.40	2.60	2.80

Note
COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:
- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

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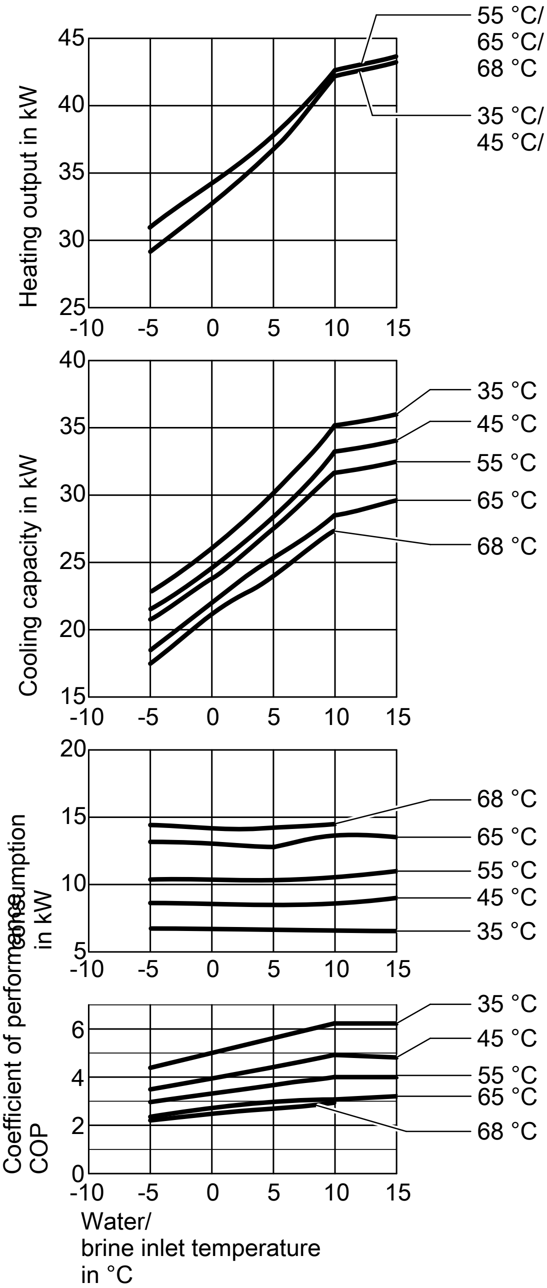
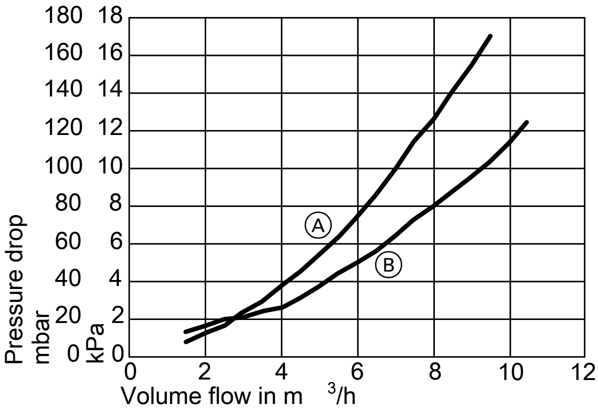
Type BW 351.B33, BWS 351.B33





Ⓐ Secondary circuit
Ⓑ Primary circuit

Performance data

Operating point	W / B	°C	-5	0	5	10	15
	W	°C	35				
	B	°C	-5	0	5	10	15
Heating output		kW	29.2	32.7	36.6	42.2	43.3
Cooling capacity		kW	22.6	26.2	30.1	35.4	36.3
Power consumption		kW	6.60	6.50	6.50	6.80	7.00
Coefficient of performance (COP)			4.40	5.00	5.60	6.20	6.20

Operating point							
	W	°C	45				
	B	°C	-5	0	5	10	15
Heating output		kW	30.0	33.3	36.7	42.0	43.3
Cooling capacity		kW	21.4	24.8	28.4	33.4	34.3
Power consumption		kW	8.60	8.50	8.30	8.60	9.00
Coefficient of performance (COP)			3.50	3.90	4.40	4.90	4.80

Operating point							
	W	°C	55				
	B	°C	-5	0	5	10	15
Heating output		kW	31.0	34.2	37.7	42.5	43.6
Cooling capacity		kW	20.7	23.8	27.5	31.9	32.7
Power consumption		kW	10.30	10.40	10.20	10.60	10.90
Coefficient of performance (COP)			3.00	3.30	3.70	4.00	4.00

Operating point							
	W	°C	65				
	B	°C	-5	0	5	10	15
Heating output		kW	31.5	35.0	38.2	42.3	43.2
Cooling capacity		kW	18.4	22.0	25.5	28.7	29.7
Power consumption		kW	13.10	13.00	12.70	13.60	13.50
Coefficient of performance (COP)			2.40	2.70	3.00	3.10	3.20

Operating point						
	W	°C	68			
	B	°C	-5	0	5	10
Heating output		kW	31.7	35.1	38.1	42.0
Cooling capacity		kW	17.3	21.1	24.0	27.5
Power consumption		kW	14.40	14.00	14.10	14.50
Coefficient of performance (COP)			2.20	2.50	2.70	2.90

Note
COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:
- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

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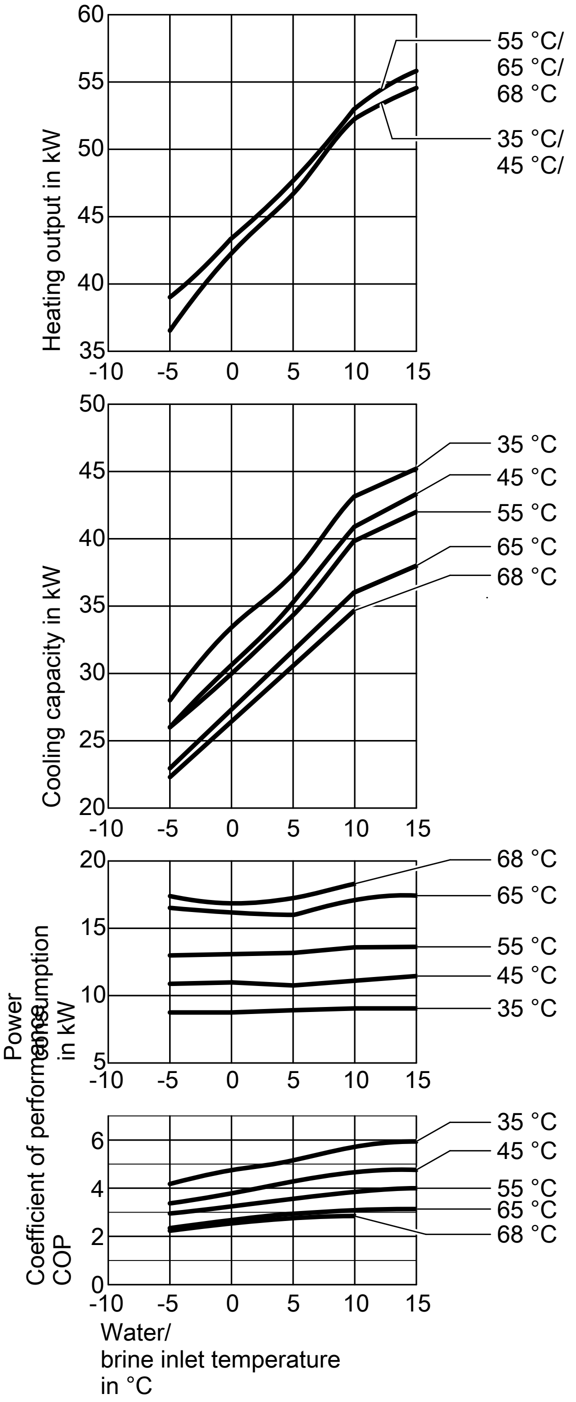
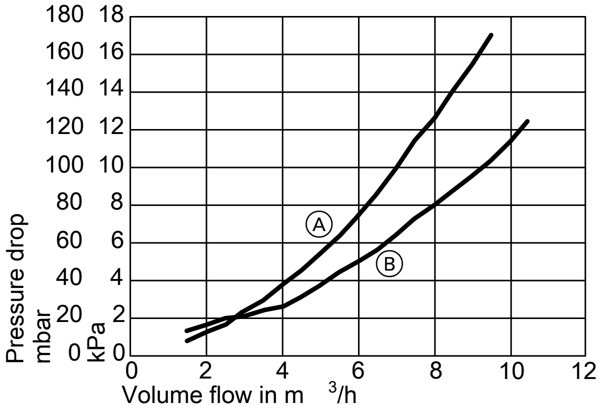
Type BW 351.B42, BWS 351.B42





Ⓐ Secondary circuit
Ⓑ Primary circuit

Performance data

Operating point W	**°C**	**35**				
B	**°C**	**-5**	**0**	**5**	**10**	**15**
Heating output	kW	36.7	42.3	46.4	52.3	54.4
Cooling capacity	kW	28.0	33.6	37.5	43.3	45.3
Power consumption	kW	8.70	8.70	8.90	9.00	9.10
Coefficient of performance (COP)		4.20	4.80	5.20	5.80	6.00

Operating point W	**°C**	**45**				
B	**°C**	**-5**	**0**	**5**	**10**	**15**
Heating output	kW	37.0	41.5	46.1	52.1	54.8
Cooling capacity	kW	26.1	30.6	35.4	41.0	43.4
Power consumption	kW	10.90	10.90	10.70	11.10	11.40
Coefficient of performance (COP)		3.40	3.80	4.30	4.70	4.80

Operating point W	**°C**	**55**				
B	**°C**	**-5**	**0**	**5**	**10**	**15**
Heating output	kW	39.0	43.1	47.4	52.9	55.7
Cooling capacity	kW	26.0	30.0	34.2	39.9	42.1
Power consumption	kW	13.00	13.10	13.20	13.60	13.60
Coefficient of performance (COP)		3.00	3.30	3.60	3.90	4.10

Operating point W	**°C**	**65**				
B	**°C**	**-5**	**0**	**5**	**10**	**15**
Heating output	kW	39.5	43.6	47.8	53.2	55.9
Cooling capacity	kW	23.0	27.4	31.5	36.0	38.0
Power consumption	kW	16.50	16.20	15.90	17.20	17.50
Coefficient of performance (COP)		2.40	2.70	3.00	3.10	3.20

Operating point W	**°C**	**68**			
B	**°C**	**-5**	**0**	**5**	**10**
Heating output	kW	39.7	43.4	48.1	53.0
Cooling capacity	kW	22.4	26.6	30.9	34.7
Power consumption	kW	17.30	16.80	17.20	18.30
Coefficient of performance (COP)		2.30	2.60	2.80	2.90

Note
COP calculated with reference to EN 14511.

Performance characteristics are determined under the following conditions:
- *New appliances with clean plate heat exchangers*
- *With high efficiency circulation pumps*
- *Primary circuit with Tyfocor heat transfer medium, 30 % by vol.*
- *Secondary circuit with water*

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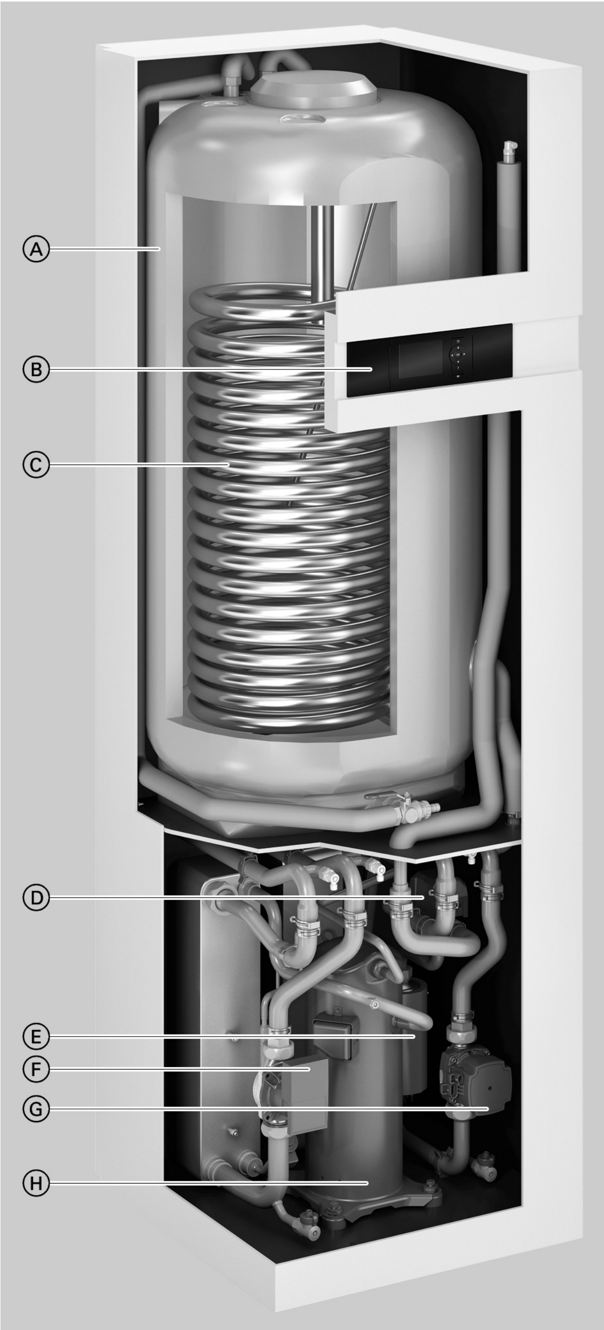
6.1 Product description

Benefits



Ⓐ DHW cylinder with 220 l capacity
Ⓑ Vitotronic 200 weather-compensated, digital heat pump control unit
Ⓒ Indirect coil for cylinder heating
Ⓓ 3-way diverter valve for central heating/DHW heating
Ⓔ Instantaneous heating water heater
Ⓕ Primary pump (brine), high efficiency circulation pump
Ⓖ Secondary pump (heating water), high efficiency circulation pump
Ⓗ Hermetically sealed Compliant scroll compressor

- Low running costs thanks to high SCOP (seasonal coefficient of performance) to EN 14825: Up to 5.3 for average climatic conditions and low temperature application (W35)
- Especially quiet thanks to new sound insulation concept: 46 dB(A) (B0/W55)
- Low running costs with high level of efficiency at any operating point through the innovative RCD (refrigerant cycle diagnostic) system with electronic expansion valve (EEV)
- High DHW convenience (A^{+} energy label) and very high draw-off rates (up to 306 l)
- Easy to operate Vitotronic control unit with plain text and graphic display
- Easy handling as the heat pump module can be quickly removed thanks to push-fit connections
- Optimised utilisation of power generated on-site by a photovoltaic system
- Web-enabled through Vitoconnect (accessories) for operation and service via Viessmann apps

Delivered condition

Type BWT 221.B

- Brine/water heat pump for central heating and DHW heating
- Integral steel DHW cylinder with Ceraprotect enamel coating, protected from corrosion by a protective magnesium anode, with thermal insulation
- Integral diverter valve "central heating/DHW heating"
- Integral high efficiency circulation pump for primary circuit (brine)
- Integral high efficiency circulation pump for secondary circuit (heating water)
- Integral instantaneous heating water heater
- Safety assembly for the heating circuit
- Vitotronic 200 weather-compensated heat pump control unit with outside temperature sensor
- Electronic starting current limiter and integral phase monitor
- Connection pipes for primary circuit (brine) flow and return can be connected on the left or right (supplied)
- Connection pies for secondary circuit (heating water) flow and return for connection at the top (supplied)

Type BWT-M 221.B

- Brine/water heat pump for central heating and DHW heating
- Integral steel DHW cylinder with Ceraprotect enamel coating, protected from corrosion by a protective magnesium anode, with thermal insulation
- Integral diverter valve "central heating/DHW heating"
- Integral high efficiency circulation pump for primary circuit (brine)
- Integral high efficiency circulation pump for secondary circuit (heating water)
- Integral instantaneous heating water heater
- Safety assembly for the heating circuit
- Vitotronic 200 weather-compensated heat pump control unit with outside temperature sensor
- Electronic starting current limiter
- Connection pipes for primary circuit (brine) flow and return can be connected on the left or right (supplied)
- Connection pies for secondary circuit (heating water) flow and return for connection at the top (supplied)

6.2 Specification

Specification

400 V appliances

Type BWT		221.B06	221.B08	221.B10
Performance data to EN 14511 (B0/W35, 5 K spread)				
Rated heating output	kW	5.76	7.54	10.36
Cooling capacity	kW	4.44	6.06	8.32
Power consumption	kW	1.25	1.62	2.16
Coefficient of performance ε (COP)		4.60	4.64	4.81
Brine (primary circuit)				
Capacity	l	3.3	3.3	3.9
Minimum flow rate	l/h	860	1160	1470
Residual head at minimum flow rate	mbar	610	620	580
	kPa	61.0	62.0	58.0
Residual head at nominal flow rate	mbar	586	620	580
	kPa	58.6	62.0	58.0
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10
Heating water (secondary circuit)				
Capacity, heat pump	l	3.3	3.5	3.8
Capacity, total	l	226	227	228
Minimum flow rate	l/h	600	710	920
Residual head at minimum flow rate	mbar	600	620	610
	kPa	60.0	62.0	61.0
Residual head at nominal flow rate	mbar	576	620	610
	kPa	57.6	62.0	61.0
Max. flow temperature	°C	65	65	65
Instantaneous heating water heater				
Heating output	kW	9.0		
Rated voltage		3/N/PE 400 V/50 Hz		
Fuse protection		3 x B16A 1-pole		
Heat pump electrical values				
Rated voltage, compressor		3/N/PE 400 V/50 Hz		
Rated current, compressor	A	4.8	6.2	7.4
Cos φ		0.9	0.9	0.9
Starting current, compressor with starting current limiter	A	11	14	20
Starting current, compressor with stalled armature	A	28	43	51.5
Compressor fuse rating	A	1 x C16A 3-pole	1 x B16A 3-pole	1 x B16A 3-pole
Rated voltage, heat pump control unit/PCB		1/N/PE 230 V/50 Hz		
Fuse rating, heat pump control unit/PCB (internal)		6.3 A (slow) / 250 V		
Power consumption				
Primary pump (high efficiency circulation pump)	W	5 to 70		
– Energy efficiency index EEI		≤ 0.21		
Secondary pump (high efficiency circulation pump)	W	5.7 to 87		
– Energy efficiency index EEI		≤ 0.21		
Max. power consumption, control unit	W	1000	1000	1000
Rated output, control unit/PCB	W	12	12	12
Refrigerant circuit				
Refrigerant		R410A	R410A	R410A
– Safety group		A1	A1	A1
– Refrigerant charge	kg	1.4	1.95	2.4
– Global warming potential (GWP)*6		1924	1924	1924
– CO_2 equivalent	t	2.7	3.8	4.6
Permiss. operating pressure				
– High pressure side	bar	45	45	45
	MPa	4.5	4.5	4.5
– Low pressure side	bar	28	28	28
	MPa	2.8	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor		
Oil in compressor	Type	Emkarate RL32 3MAF		
Oil volume in compressor	l	0.74	1.24	1.24

*6 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

Type BWT		221.B06	221.B08	221.B10
Integral DHW cylinder				
Capacity	l	220	220	220
Max. draw-off volume at DHW temperature 40 °C, storage temperature 54 °C and draw-off rate 10 l/min	l	293	293	293
Max. DHW temperature				
– Only with heat pump	°C	58	58	58
– With instantaneous heating water heater	°C	63	63	63
Max. permiss. DHW temperature	°C	95	95	95
Dimensions				
Total length	mm	680	680	680
Total width	mm	600	600	600
Total height	mm	2000	2000	2000
Weight				
Total weight	kg	277	282	288
Heat pump module	kg	74	77	81
Permiss. operating pressure				
Primary circuit (brine)	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Secondary circuit, heating water	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Secondary circuit, DHW	bar	10.0	10.0	10.0
	MPa	1.0	1.0	1.0
Connections				
Primary circuit flow/return	mm	Cu 28 x 1.5	Cu 28 x 1.5	Cu 28 x 1.5
Secondary circuit flow/return	mm	Cu 28 x 1.5	Cu 28 x 1.5	Cu 28 x 1.5
Cold water, DHW (female thread)	Rp	¾	¾	¾
DHW circulation (female thread)	Rp	¾	¾	¾
Sound power (tested with reference to EN 12102/ EN ISO 9614-2) – weighted total sound power level at B0$^{\pm 3\,K}$/ W35$^{\pm 5\,K}$				
– At rated heating output	dB(A)	40	42	45
Energy efficiency class to Commission Regulation (EU) No 813/2013				
Heating, average climatic conditions				
– Low temperature application (W35)		A+++	A+++	A+++
– Medium temperature application (W55)		A++	A++	A++
DHW heating				
– Draw-off profile XL		A+	A+	A+
Heating performance data to Commission Regulation (EU) No 813/2013 (average climatic conditions)				
Low temperature application (W35)				
– Energy efficiency η_S	%	186	201	204
– Rated heating output P_{rated}	kW	7.0	9.0	12.0
– Seasonal coefficient of performance (SCOP)		4.86	5.23	5.32
Medium temperature application (W55)				
– Energy efficiency η_S	%	134	143	150
– Rated heating output P_{rated}	kW	6.0	8.0	11.0
– Seasonal coefficient of performance (SCOP)		3.56	3.79	3.97
– DHW heating energy efficiency η_{wh}	%	130	130	130
Sound power level to ErP	dB(A)	40	44	46

230 V appliances

Type BWT-M		221.B06	221.B08	221.B10
Performance data to EN 14511 (B0/W35, 5 K spread)				
Rated heating output	kW	5.71	7.47	10.29
Cooling capacity	kW	4.32	5.94	8.20
Power consumption	kW	1.36	1.78	2.32
Coefficient of performance ε (COP)		4.20	4.20	4.60
Brine (primary circuit)				
Capacity	l	3.3	3.3	3.9
Minimum flow rate	l/h	860	1160	1470
Residual head at minimum flow rate	mbar	610	620	580
	kPa	61.0	62.0	58.0
Residual head at nominal flow rate	mbar	586	620	580
	kPa	58.6	62.0	58.0
Max. flow temperature (brine inlet)	°C	25	25	25
Min. flow temperature (brine inlet)	°C	–10	–10	–10

Type BWT-M		221.B06	221.B08	221.B10
Heating water (secondary circuit)				
Capacity, heat pump	l	3.3	3.5	3.8
Capacity, total	l	226	227	228
Minimum flow rate	l/h	600	710	920
Residual head at minimum flow rate	mbar	600	620	610
	kPa	60.0	62.0	61.0
Residual head at nominal flow rate	mbar	576	620	610
	kPa	57.6	62.0	61.0
Max. flow temperature	°C	65	65	65
Instantaneous heating water heater				
Heating output	kW	9.0		
Rated voltage		1/N/PE 230 V/50 Hz		
Fuse rating		3 x B16A 1-pole		
Heat pump electrical values				
Rated voltage, compressor		1/N/PE 230 V/50 Hz		
Rated current, compressor	A	12.8	17.1	22.8
Cos φ		0.9	0.9	0.9
Starting current, compressor with starting current limiter	A	23.9	25.6	38.7
Starting current, compressor with stalled armature	A	60	83	108
Compressor fuse rating	A	B16A	B20A	B25A
Rated voltage, heat pump control unit/PCB		1/N/PE 230 V/50 Hz		
MCB/fuse, heat pump control unit/PCB (internal)		6.3 A (slow) / 250 V		
Power consumption				
Primary pump (high efficiency circulation pump)	W	5 to 70		
– Energy efficiency index EEI		≤ 0.21		
Secondary pump (high efficiency circulation pump)	W	5.7 to 87		
– Energy efficiency index EEI		≤ 0.21		
Max. power consumption, control unit	W	1000	1000	1000
Rated output, control unit/PCB	W	12	12	12
Refrigerant circuit				
Refrigerant		R410A	R410A	R410A
– Safety group		A1	A1	A1
– Refrigerant charge	kg	1.4	1.95	2.4
– Global warming potential (GWP)*7		1924	1924	1924
– CO_2 equivalent	t	2.7	3.8	4.6
Permiss. operating pressure				
– High pressure side	bar	45	45	45
	MPa	4.5	4.5	4.5
– Low pressure side	bar	28	28	28
	MPa	2.8	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor		
Oil in compressor	Type	Emkarate RL32 3MAF		
Quantity of oil in compressor	l	0.74	1.24	1.24
Integral DHW cylinder				
Capacity	l	220	220	220
Max. draw-off volume at DHW temperature 40 °C, storage temperature 54 °C and draw-off rate 10 l/min	l	293	293	293
Max. DHW temperature				
– Only with heat pump	°C	58	58	58
– With instantaneous heating water heater	°C	63	63	63
Max. permiss. DHW temperature	°C	95	95	95
Dimensions				
Total length	mm	680	680	680
Total width	mm	600	600	600
Total height	mm	2000	2000	2000
Weight				
Total weight	kg	277	282	288
Heat pump module	kg	74	77	81
Permiss. operating pressure				
Primary circuit (brine)	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Secondary circuit, heating water	bar	3.0	3.0	3.0
	MPa	0.3	0.3	0.3
Secondary circuit, DHW	bar	10.0	10.0	10.0
	MPa	1.0	1.0	1.0

*7 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

Vitocal 222-G, type BWT(-M) 221.B (cont.)

Type BWT-M		221.B06	221.B08	221.B10
Connections				
Primary circuit flow/return	mm	Cu 28 x 1.5	Cu 28 x 1.5	Cu 28 x 1.5
Secondary circuit flow/return	mm	Cu 28 x 1.5	Cu 28 x 1.5	Cu 28 x 1.5
Cold water, DHW (female thread)	Rp	¾	¾	¾
DHW circulation (female thread)	Rp	¾	¾	¾
Sound power level (tested with reference to EN 12102/ EN ISO 9614-2) Weighted total sound power level at B0$^{\pm 3\ K}$/ W35$^{\pm 5\ K}$				
– At rated heating output	dB(A)	40	42	45
Energy efficiency class to EU Regulation no. 813/2013				
Heating, average climatic conditions				
– Low temperature applications (W35)		A^{+++}	A^{+++}	A^{+++}
– Medium temperature applications (W55)		A^{++}	A^{++}	A^{++}
DHW heating				
– Draw-off profile XL		A+	A+	A+
Heating performance data in accordance with EU Regulation No. 813/2013 (average climatic conditions)				
Low temperature applications (W35)				
– Energy efficiency η_S	%	201	214	194
– Rated heating output P_{rated}	kW	6.0	9.0	12.0
– Seasonal coefficient of performance (SCOP)		5.23	5.54	5.06
Medium temperature applications (W55)				
– Energy efficiency η_S	%	133	151	143
– Rated heating output P_{rated}	kW	6.0	8.0	11.0
– Seasonal coefficient of performance (SCOP)		3.52	3.98	3.76
– DHW heating energy efficiency η_{wh}	%	130	130	130
Sound power level to ErP	dB(A)	40	44	46

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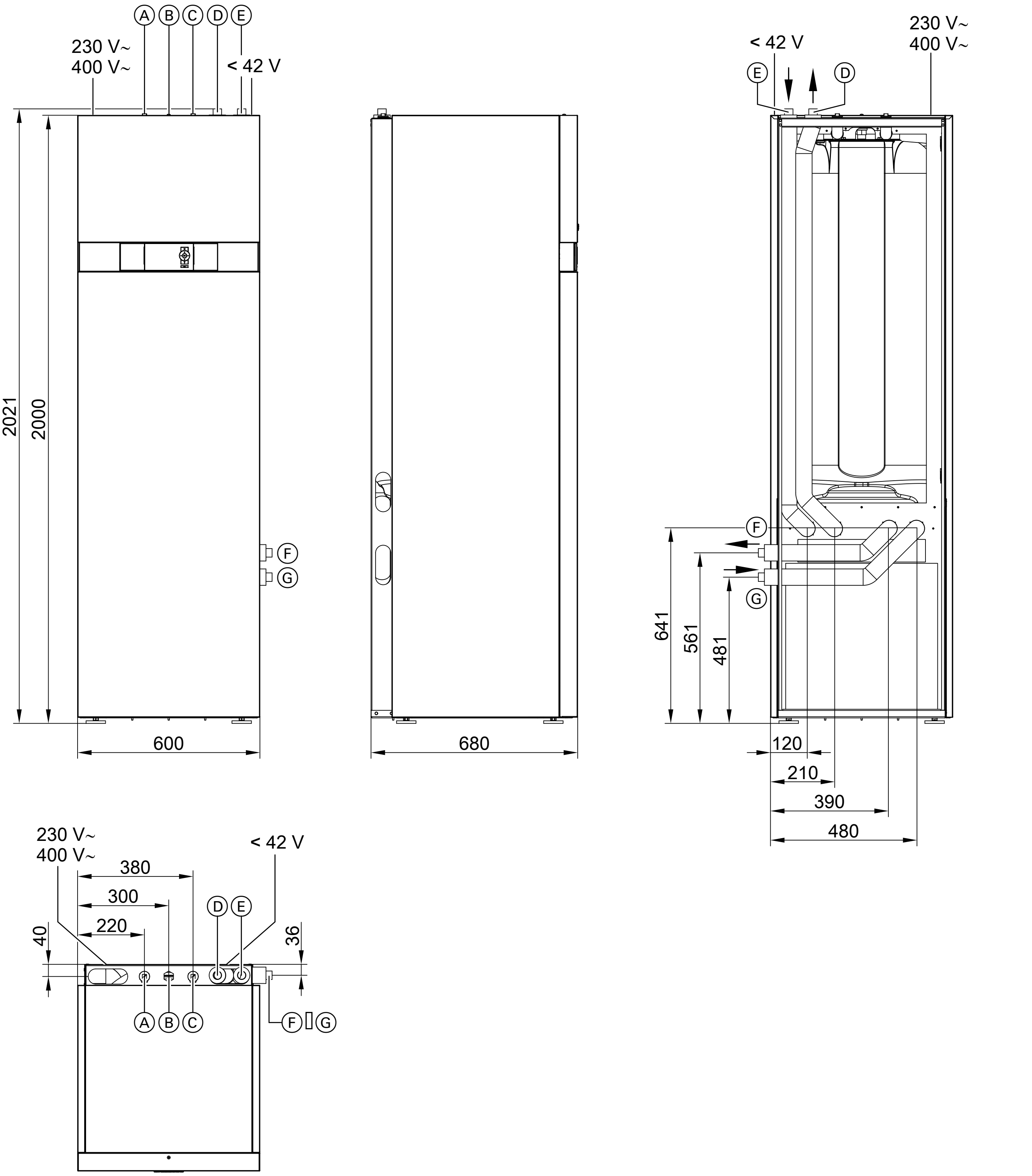
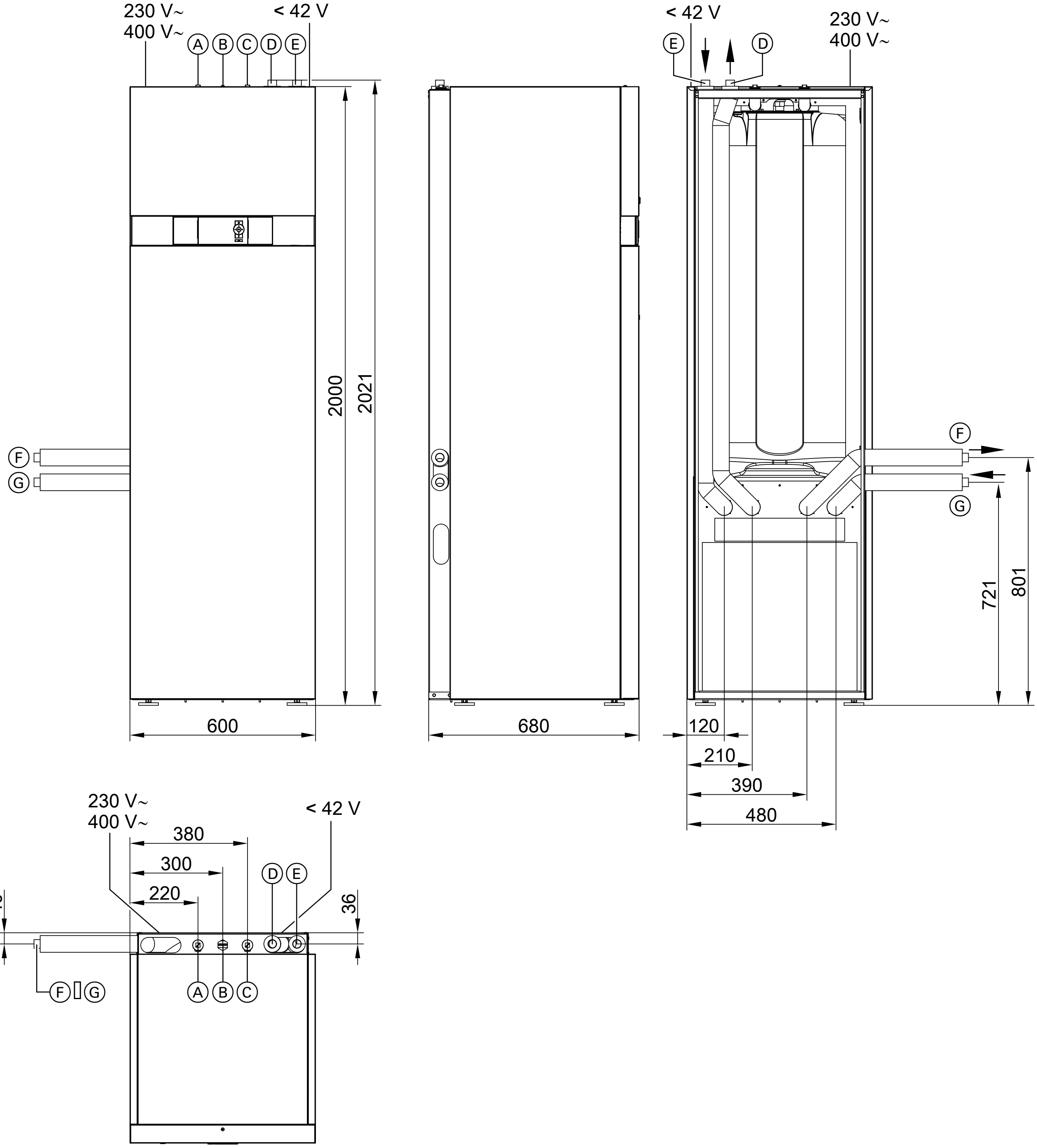
Dimensions

Primary circuit connections to the right



Ⓐ Cold water
Ⓑ DHW circulation
Ⓒ DHW
Ⓓ Secondary circuit flow (heating water)
Ⓔ Secondary circuit return (heating water)
Ⓕ Primary circuit return (heat pump brine outlet)
Ⓖ Primary circuit flow (heat pump brine inlet)

Primary circuit connections to the left



Ⓐ Cold water
Ⓑ DHW circulation
Ⓒ DHW
Ⓓ Secondary circuit flow (heating water)
Ⓔ Secondary circuit return (heating water)
Ⓕ Primary circuit return (heat pump brine outlet)
Ⓖ Primary circuit flow (heat pump brine inlet)

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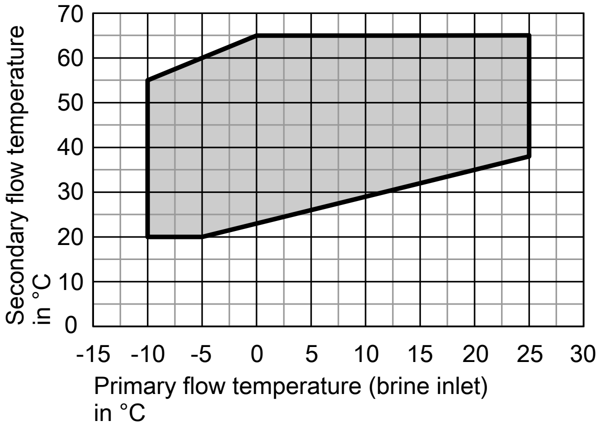
Application limits to EN 14511

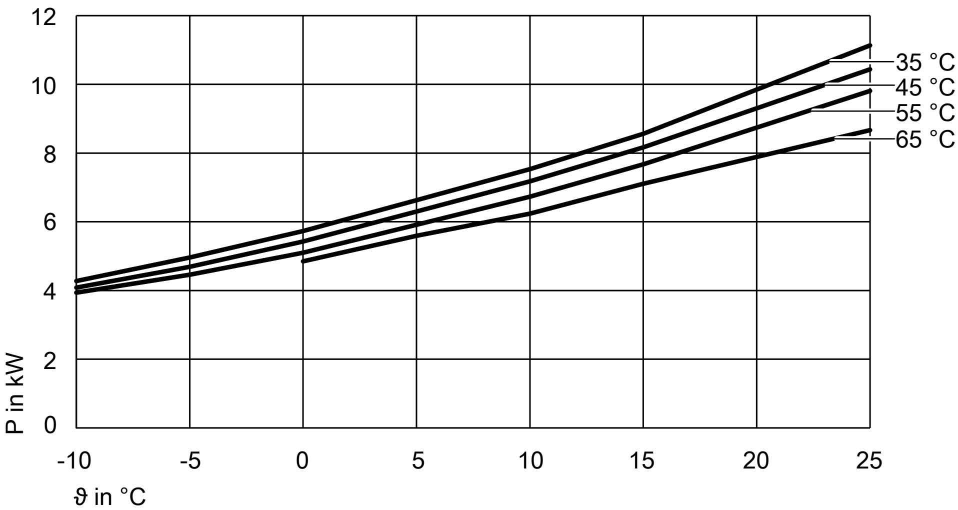


- Secondary side spread: 5 K
- Primary side spread: 3 K

Curves – 400 V appliances

Performance graphs – type BWT 221.B06

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



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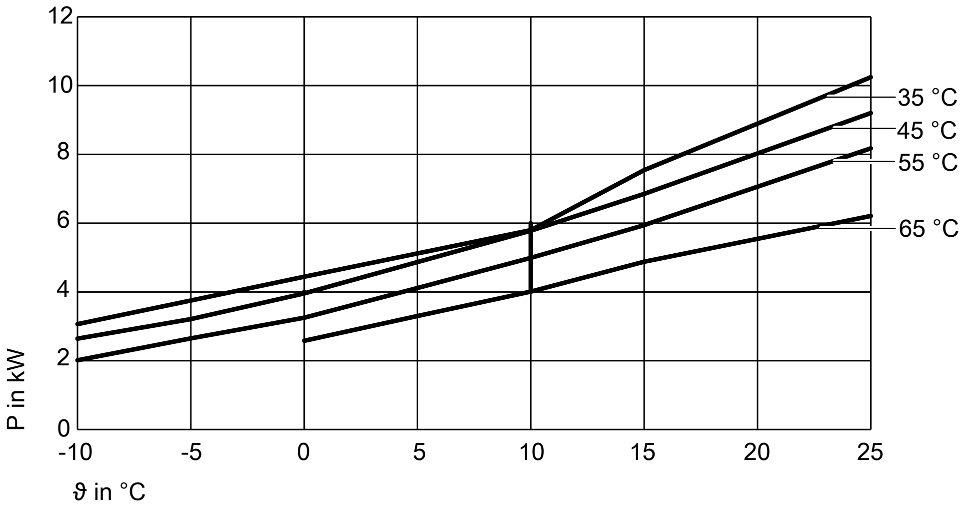
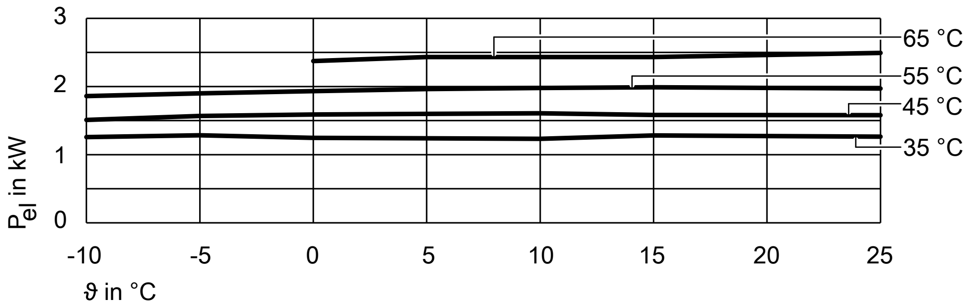
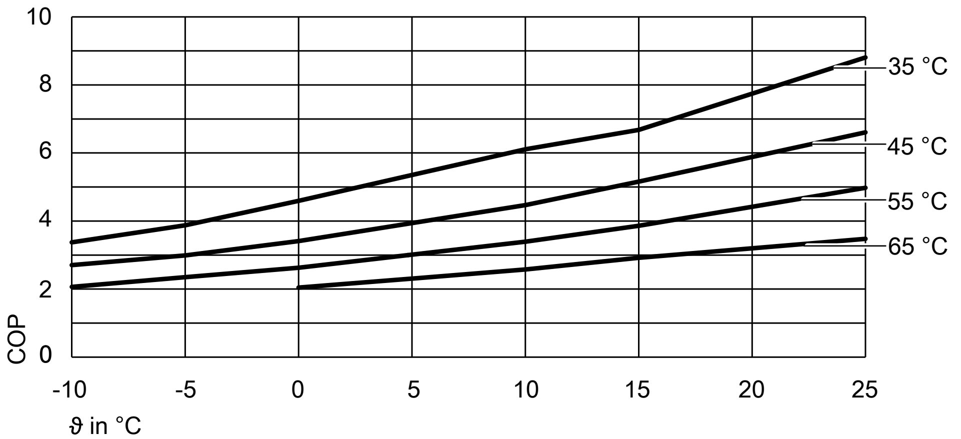
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

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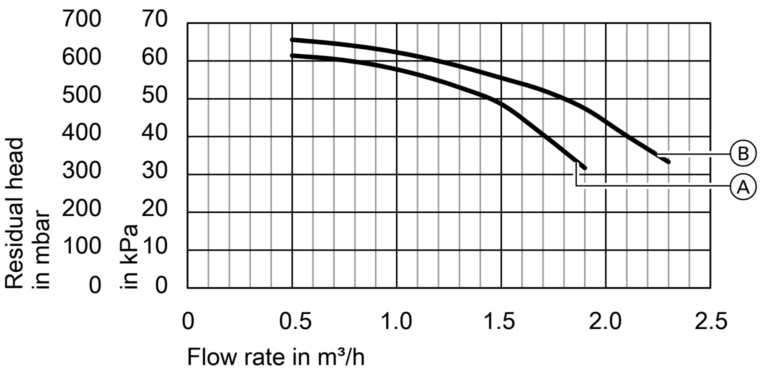
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	4.27	4.96	5.73	6.63	7.53	8.56	11.13
Cooling capacity		kW	3.06	3.75	4.44	5.12	5.80	7.54	10.24
Power consumption		kW	1.26	1.28	1.25	1.24	1.23	1.28	1.26
Coefficient of performance ε (COP)			3.37	3.87	4.60	5.35	6.11	6.68	8.81

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	4.08	4.69	5.43	6.30	7.18	8.16	10.44
Cooling capacity		kW	2.64	3.21	3.96	4.87	5.78	6.85	9.20
Power consumption		kW	1.51	1.57	1.59	1.60	1.61	1.58	1.58
Coefficient of performance ε (COP)			2.71	2.99	3.41	3.94	4.47	5.16	6.61

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	3.84	4.48	5.11	5.91	6.72	7.68	9.81
Cooling capacity		kW	2.03	2.65	3.28	4.11	4.94	5.94	8.18
Power consumption		kW	1.86	1.90	1.94	1.96	1.98	1.99	1.97
Coefficient of performance ε (COP)			2.07	2.35	2.63	3.01	3.39	3.86	4.98

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			4.84	5.55	6.25	7.11	8.67
Cooling capacity		kW			2.57	3.29	4.01	4.88	6.21
Power consumption		kW			2.37	2.40	2.43	2.43	2.49
Coefficient of performance ε (COP)					2.04	2.31	2.58	2.92	3.48

Residual heads of the integral circulation pumps, type BWT 221.B06



Ⓐ Secondary pump
Ⓑ Primary pump

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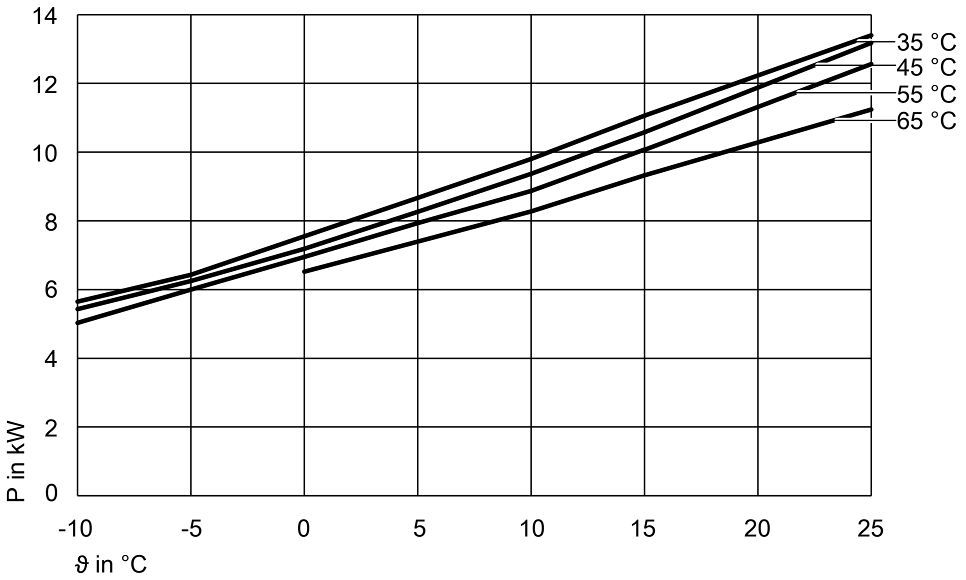
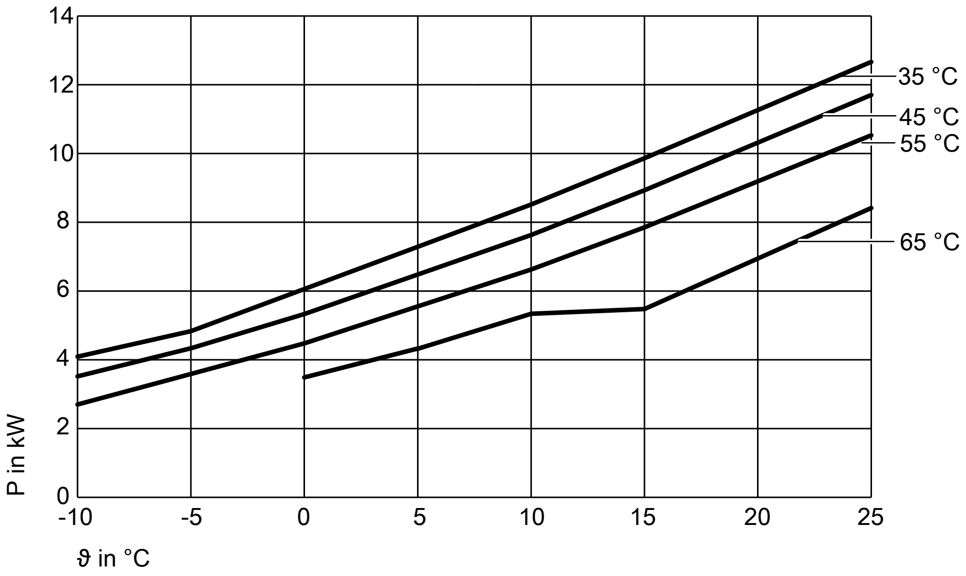
Performance graphs – type BWT 221.B08

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



Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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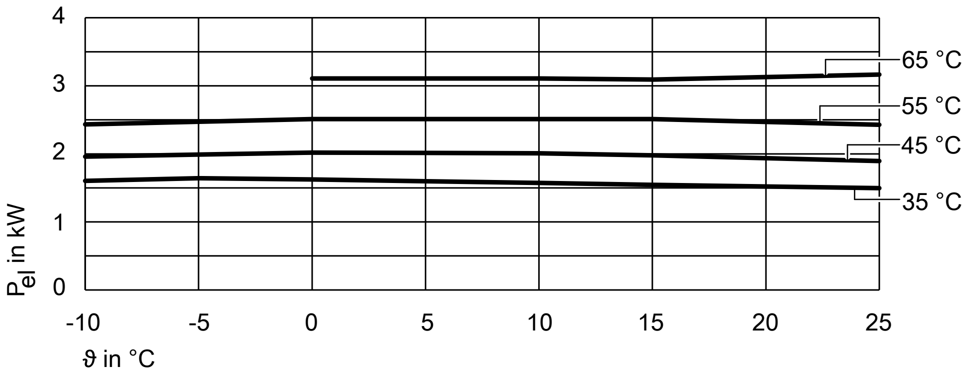
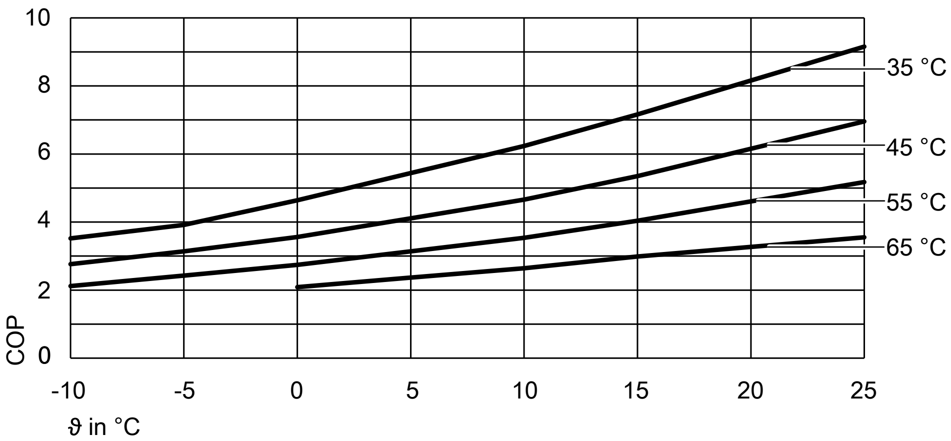
Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ	Primary circuit flow temperature (heat pump brine inlet)
P	Heating output or cooling capacity
P_{el}	Power consumption
COP	Coefficient of performance

Note

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

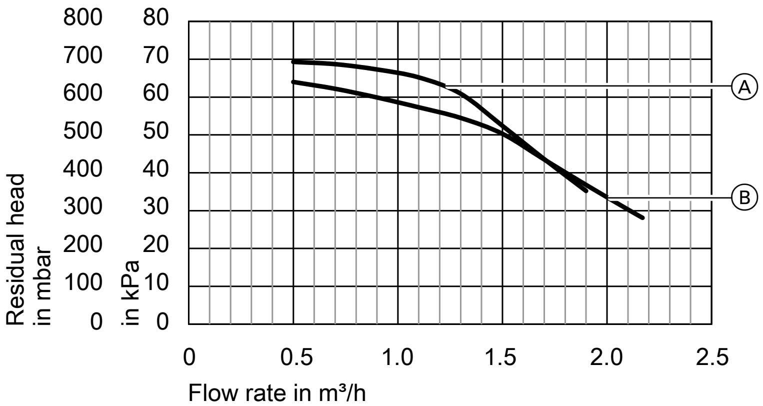
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.65	6.43	7.54	8.67	9.80	11.06	13.70
Cooling capacity		kW	4.09	4.83	6.06	7.29	8.52	9.86	12.66
Power consumption		kW	1.60	1.64	1.62	1.60	1.57	1.54	1.50
Coefficient of performance ε (COP)			3.52	3.91	4.64	5.44	6.24	7.16	9.16

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.42	6.25	7.19	8.27	9.36	10.59	13.18
Cooling capacity		kW	3.52	4.34	5.33	6.48	7.63	8.93	11.70
Power consumption		kW	1.96	1.99	2.02	2.01	2.01	1.98	1.89
Coefficient of performance ε (COP)			2.76	3.14	3.56	4.11	4.66	5.35	6.96

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.04	6.00	6.95	7.92	8.88	10.06	12.56
Cooling capacity		kW	2.70	3.59	4.48	5.55	6.63	7.85	10.53
Power consumption		kW	2.43	2.47	2.51	2.51	2.51	2.51	2.43
Coefficient of performance ε (COP)			2.11	2.43	2.74	3.14	3.54	4.04	5.18

Operating point		**W**	**°C**					**65**		
		B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output			kW			6.52	7.40	8.28	9.33	11.24
Cooling capacity			kW			3.49	4.42	5.34	5.48	8.41
Power consumption			kW			3.13	3.13	3.13	3.12	3.17
Coefficient of performance ε (COP)						2.09	2.37	2.64	2.99	3.55

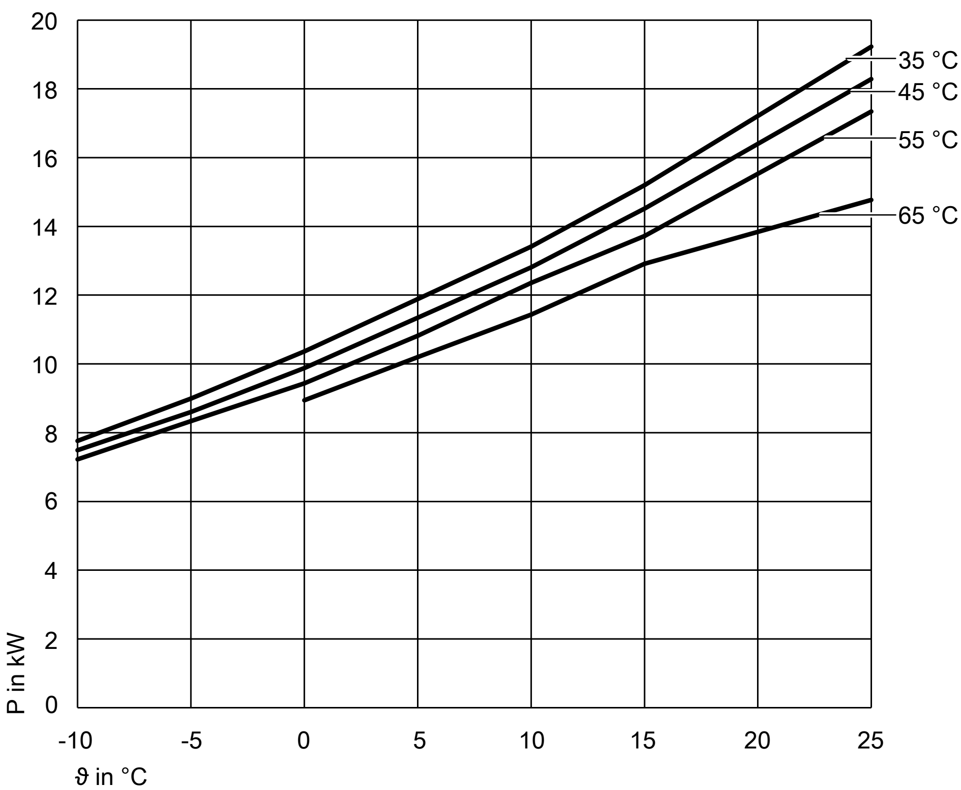
Residual heads of the integral circulation pumps, type BWT 221.B08



Ⓐ Secondary pump
Ⓑ Primary pump

Performance graphs – type BWT 221.B10

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



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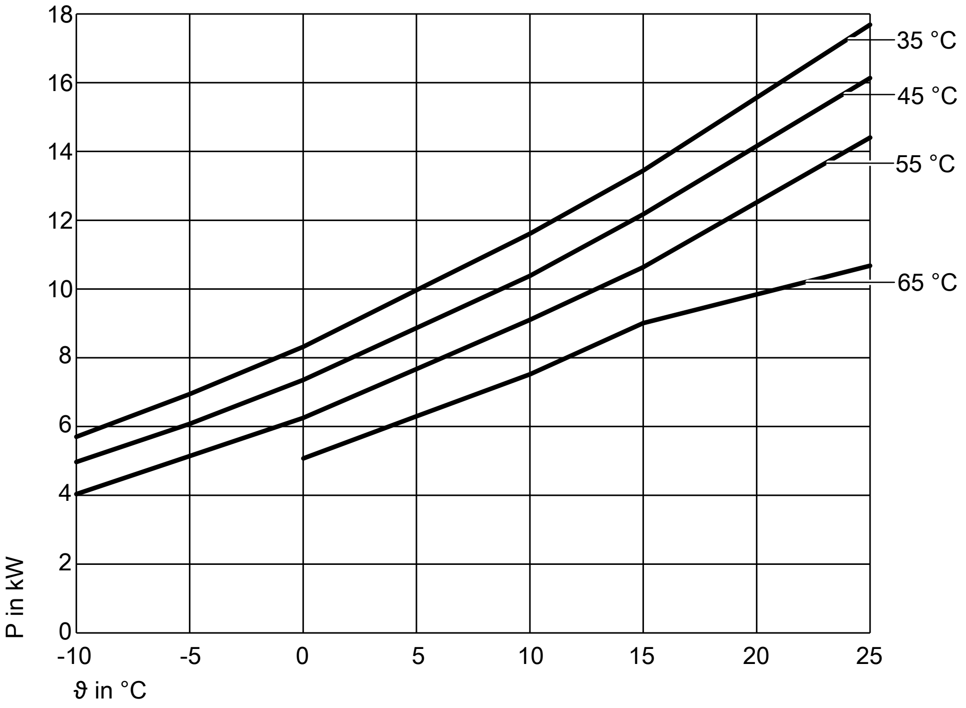
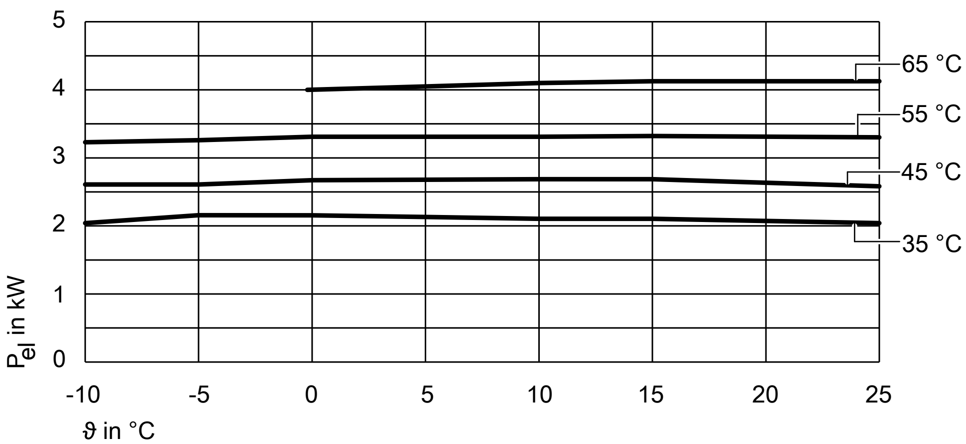
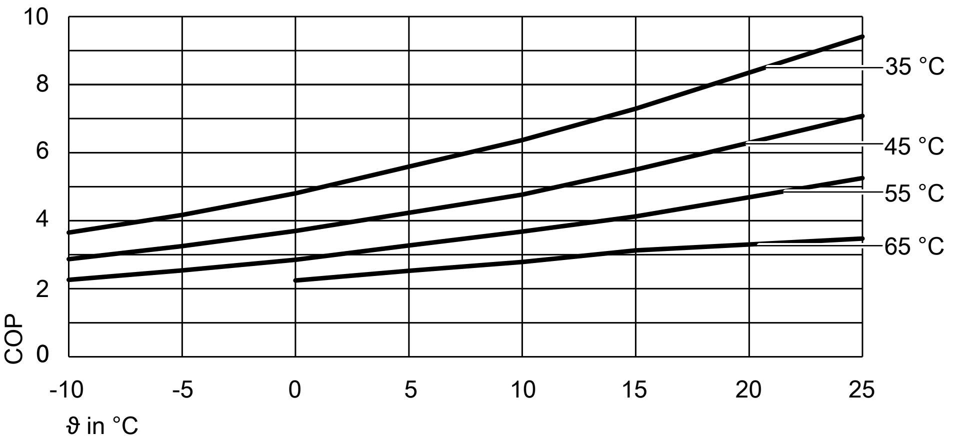
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

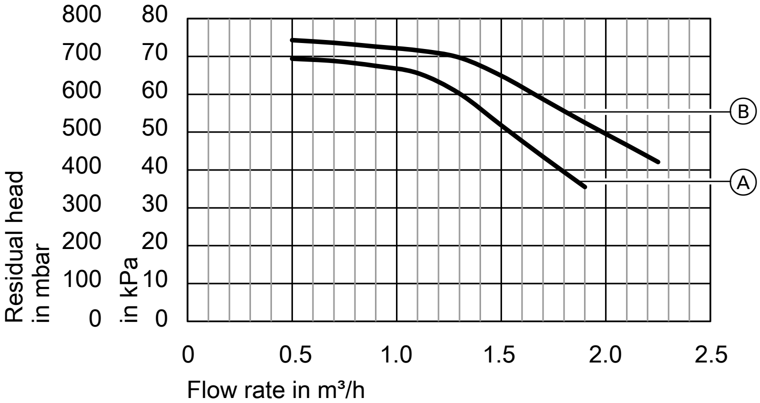
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.78	9.00	10.36	11.89	13.41	15.16	19.21
Cooling capacity		kW	5.70	6.94	8.32	9.96	11.61	13.44	17.69
Power consumption		kW	2.04	2.16	2.16	2.13	2.11	2.11	2.04
Coefficient of performance ε (COP)			3.65	4.17	4.81	5.59	6.37	7.29	9.41

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.49	8.60	9.88	11.34	12.81	14.52	18.29
Cooling capacity		kW	4.97	6.08	7.36	8.87	10.38	12.17	16.14
Power consumption		kW	2.61	2.61	2.67	2.68	2.69	2.69	2.58
Coefficient of performance ε (COP)			2.87	3.26	3.70	4.23	4.77	5.50	7.08

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.22	8.32	9.42	10.81	12.19	13.72	17.34
Cooling capacity		kW	4.03	5.14	6.25	7.67	9.10	10.64	14.40
Power consumption		kW	3.23	3.28	3.32	3.32	3.32	3.33	3.30
Coefficient of performance ε (COP)			2.23	2.54	2.85	3.26	3.67	4.13	5.25

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			8.96	10.20	11.44	12.91	14.77
Cooling capacity		kW			5.07	6.29	7.52	9.01	10.68
Power consumption		kW			4.00	4.05	4.10	4.13	4.13
Coefficient of performance ε (COP)					2.24	2.52	2.79	3.13	3.48

Residual heads of the integral circulation pumps, type BWT 221.B10

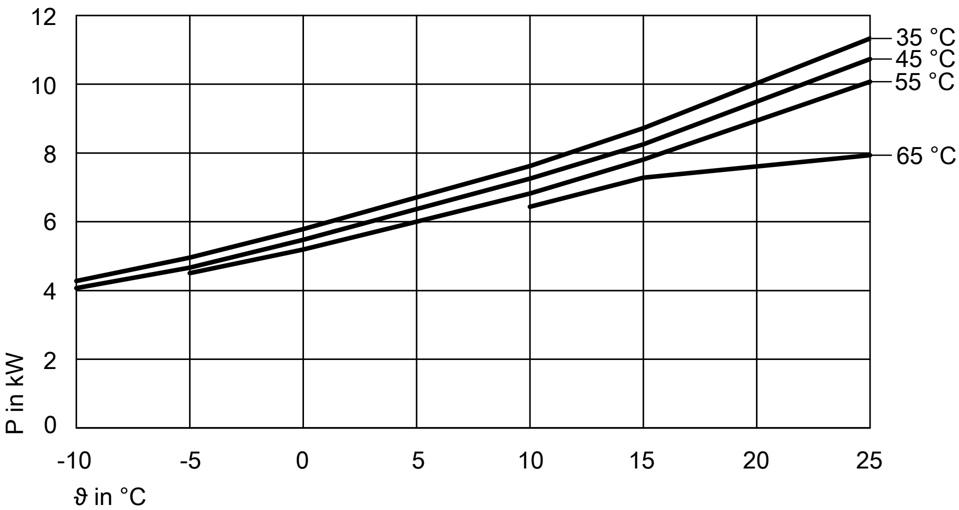


Ⓐ Secondary pump
Ⓑ Primary pump

Curves – 230 V appliances

Output diagrams for type BWT-M 221.B06

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



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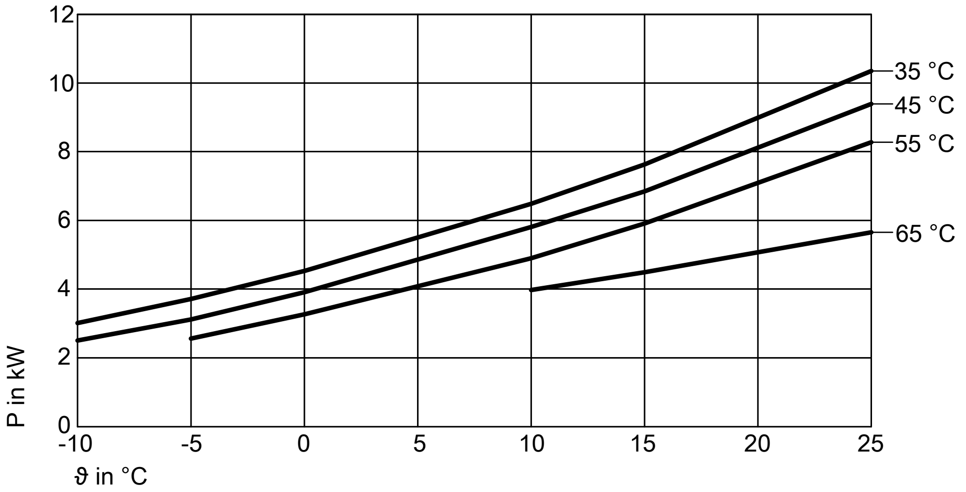
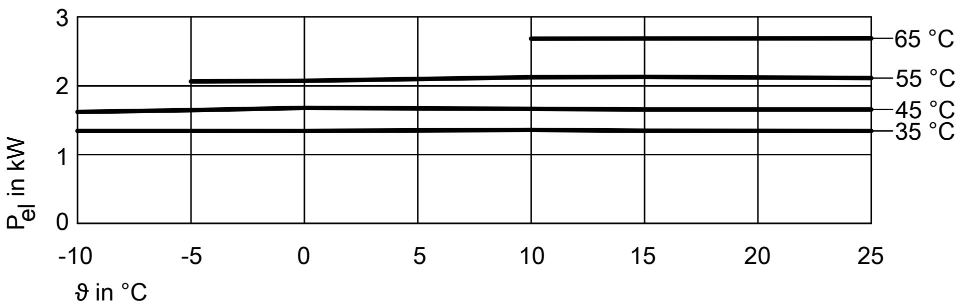
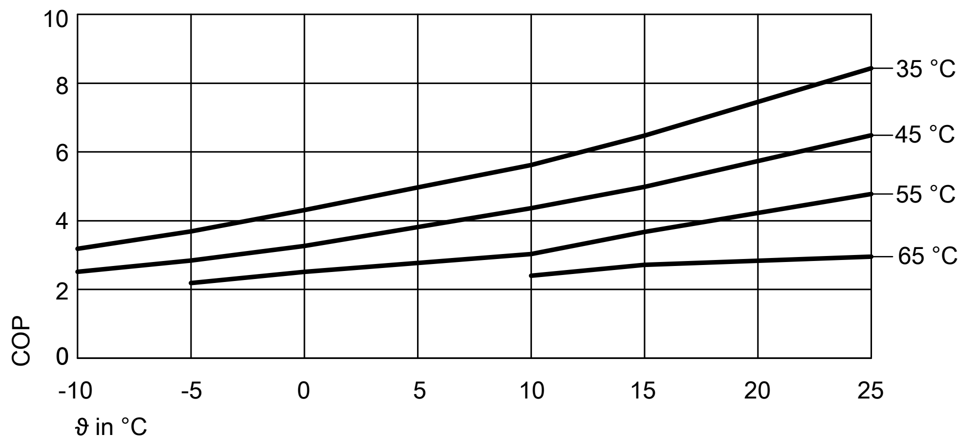
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Note

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

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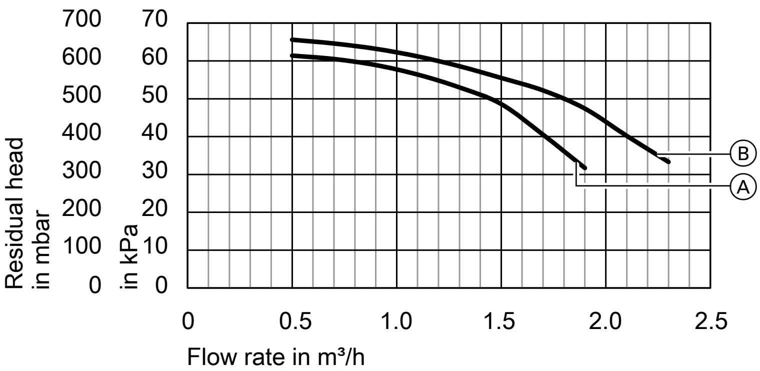
Operating point	W	°C	35						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	4.28	4.96	5.79	6.71	7.62	8.72	11.33
Cooling capacity		kW	3.01	3.71	4.53	5.51	6.48	7.63	10.35
Power consumption		kW	1.34	1.34	1.34	1.35	1.36	1.35	1.34
Coefficient of performance ε (COP)			3.18	3.69	4.31	4.96	5.61	6.47	8.43

Operating point	W	°C	45						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	4.07	4.67	5.47	6.36	7.26	8.25	10.73
Cooling capacity		kW	2.51	3.12	3.91	4.86	5.81	6.84	9.39
Power consumption		kW	1.62	1.64	1.68	1.67	1.66	1.66	1.66
Coefficient of performance ε (COP)			2.51	2.84	3.26	3.81	4.36	4.98	6.48

Operating point	W	°C	55						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW		4.50	5.19	6.01	6.82	7.81	10.07
Cooling capacity		kW		2.56	3.27	4.08	4.90	5.91	8.28
Power consumption		kW		2.06	2.07	2.10	2.12	2.13	2.11
Coefficient of performance ε (COP)				2.18	2.51	2.77	3.03	3.67	4.77

Operating point	W	°C	65						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW					6.43	7.29	7.94
Cooling capacity		kW					3.98	4.49	5.66
Power consumption		kW					2.68	2.69	2.69
Coefficient of performance ε (COP)							2.40	2.71	2.95

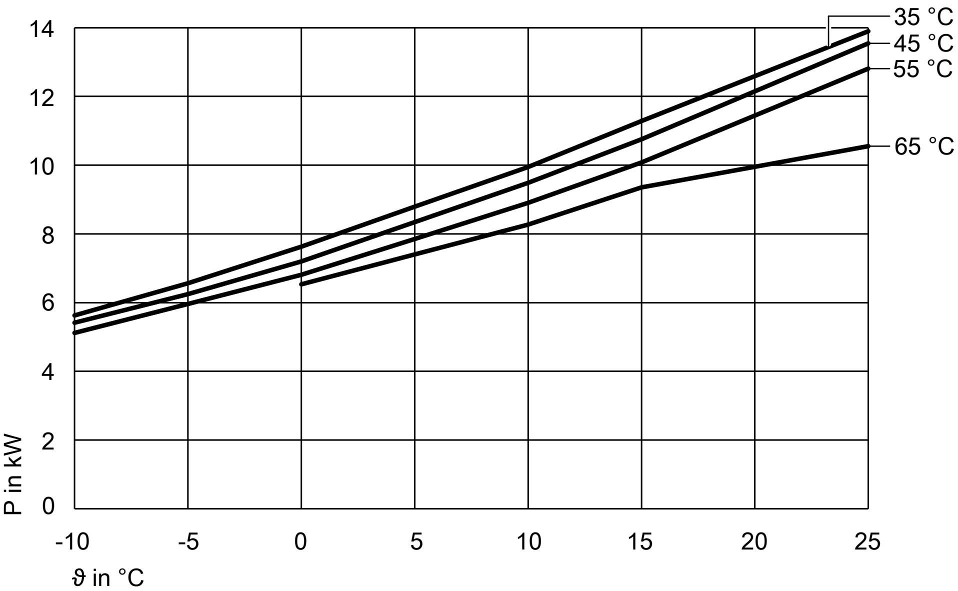
Residual heads of the integral circulation pumps, type BWT-M 221.B06



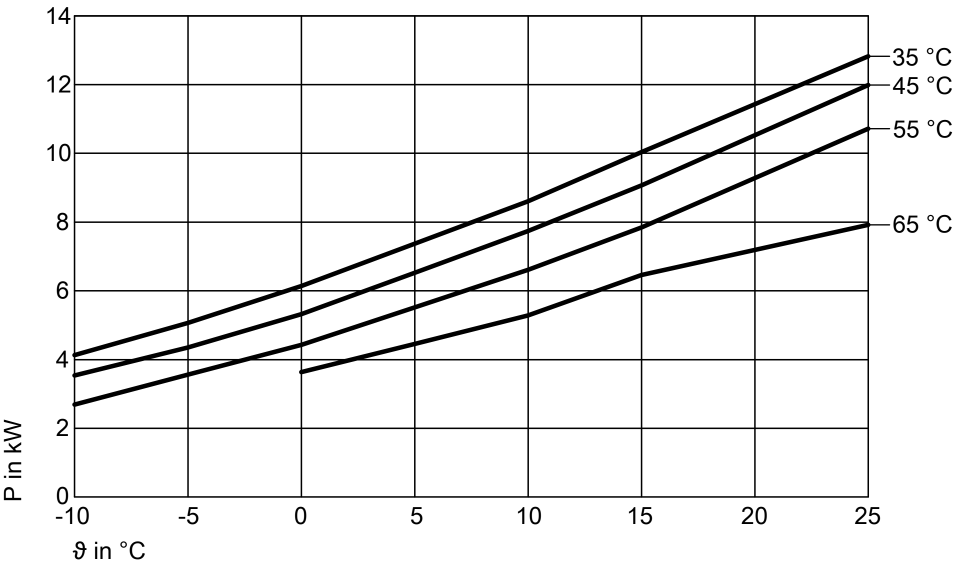
Ⓐ Secondary pump
Ⓑ Primary pump

Output diagrams for type BWT-M 221.B08

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



Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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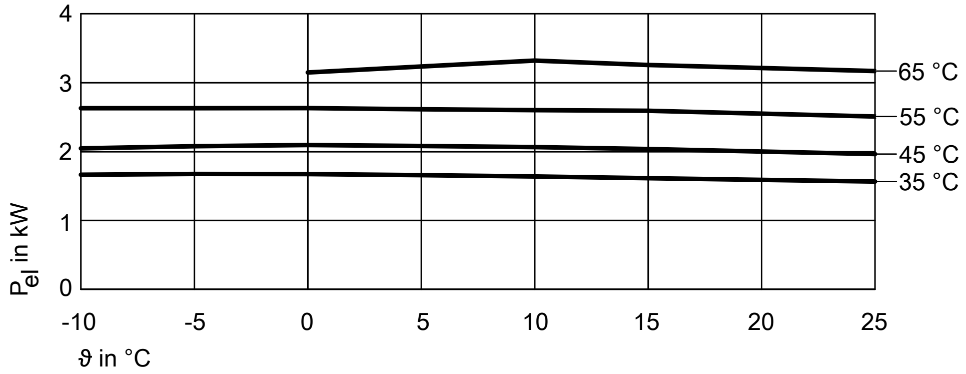
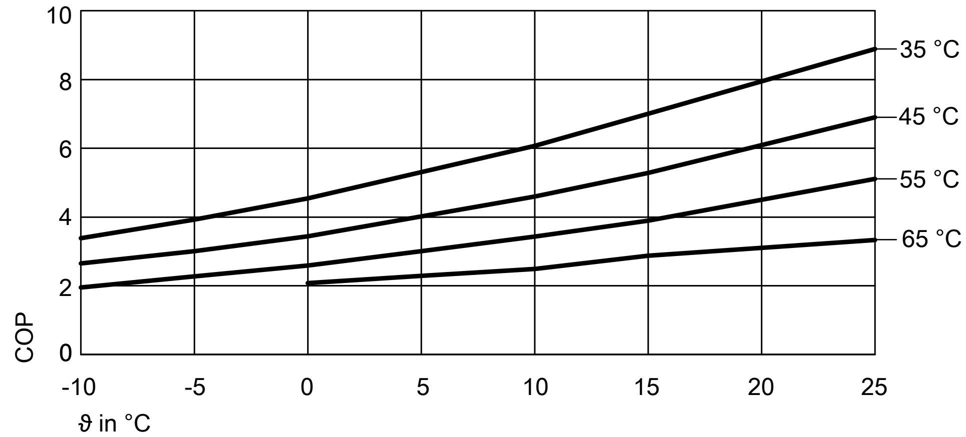
Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Note

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

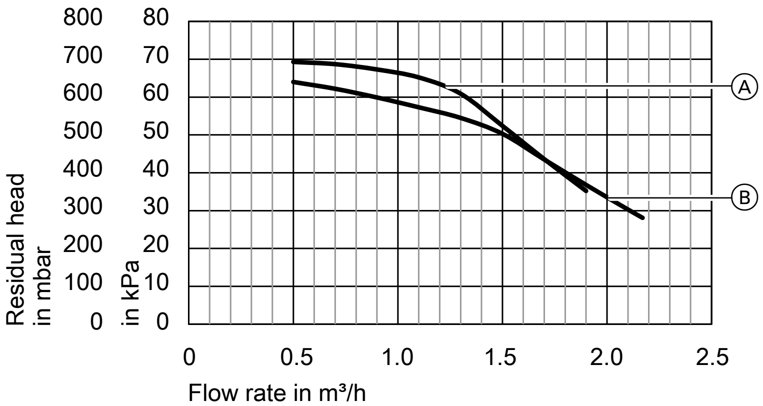
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.63	6.57	7.63	8.79	9.95	11.29	13.90
Cooling capacity		kW	4.13	5.07	6.15	7.37	8.60	10.03	12.83
Power consumption		kW	1.66	1.67	1.67	1.66	1.64	1.61	1.56
Coefficient of performance ε (COP)			3.38	3.92	4.54	5.31	6.07	7.00	8.89

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.42	6.24	7.20	8.34	9.48	10.75	13.55
Cooling capacity		kW	3.54	4.36	5.33	6.53	7.74	9.07	11.99
Power consumption		kW	2.05	2.08	2.09	2.08	2.07	2.04	1.96
Coefficient of performance ε (COP)			2.65	3.01	3.44	4.01	4.59	5.28	6.90

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	5.12	5.96	6.81	7.86	8.90	10.08	12.81
Cooling capacity		kW	2.69	3.56	4.43	5.52	6.61	7.84	10.72
Power consumption		kW	2.63	2.63	2.63	2.61	2.60	2.59	2.51
Coefficient of performance ε (COP)			1.95	2.27	2.59	3.01	3.43	3.89	5.11

Operating point	**W**	**°C**					**65**		
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			6.53	7.40	8.27	9.36	10.56
Cooling capacity		kW			3.64	4.46	5.28	6.46	7.92
Power consumption		kW			3.15	3.23	3.32	3.26	3.17
Coefficient of performance ε (COP)					2.08	2.28	2.49	2.87	3.33

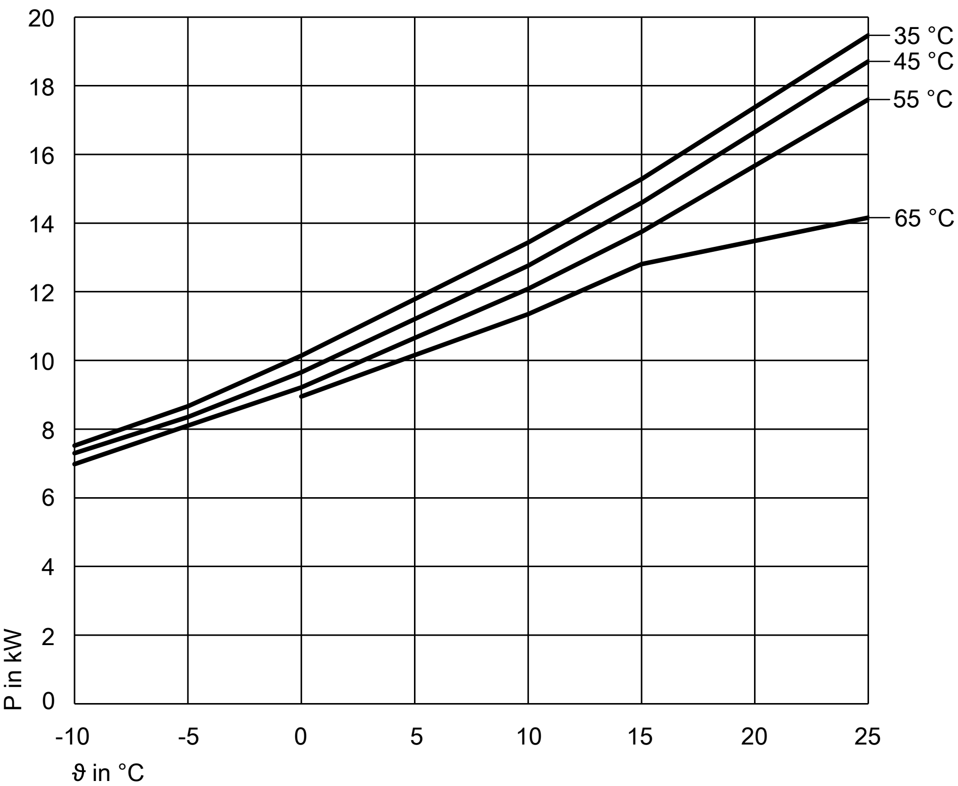
Residual heads of the integral circulation pumps, type BWT-M 221.B08



Ⓐ Secondary pump
Ⓑ Primary pump

Output diagrams for type BWT-M 221.B10

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



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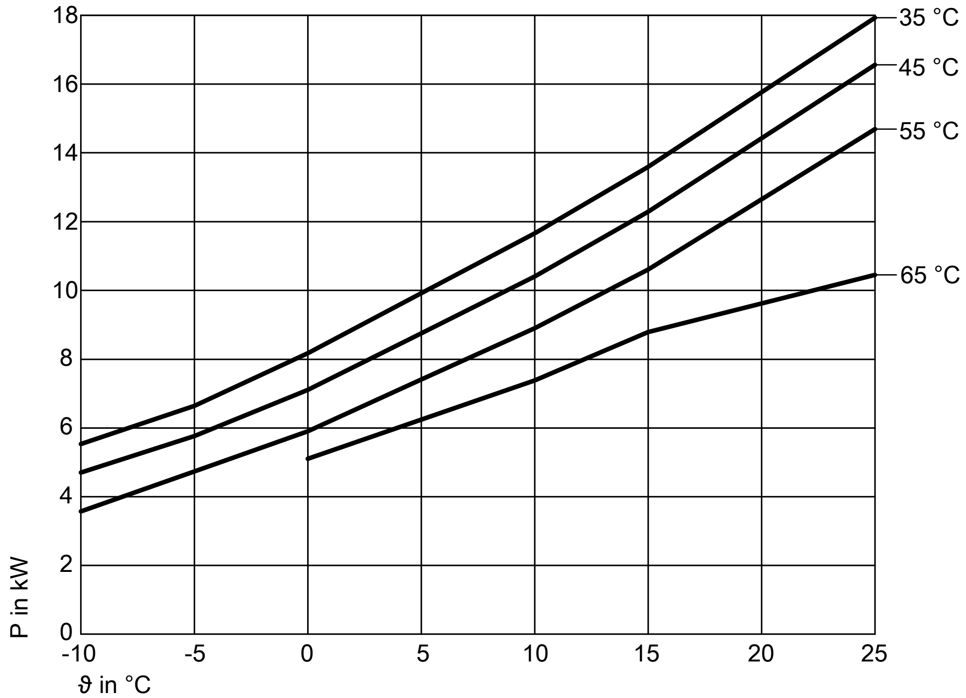
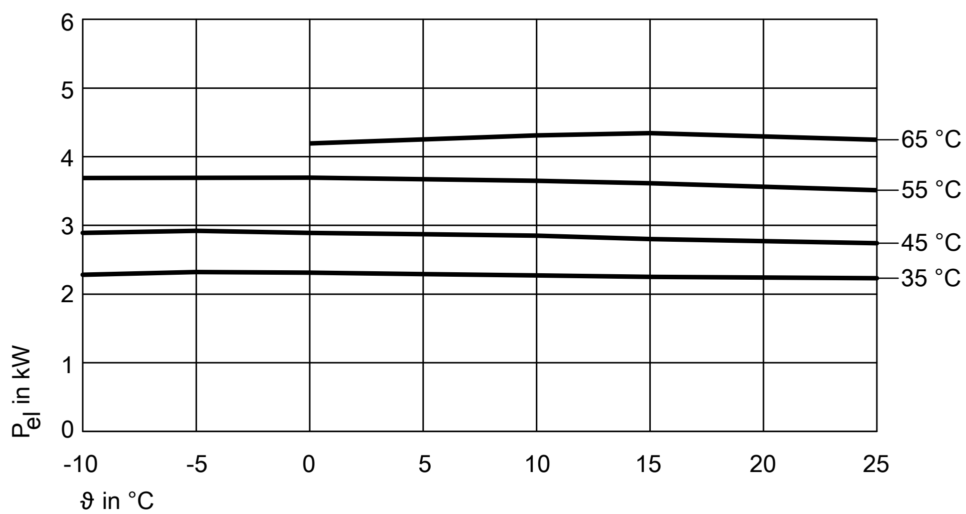
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



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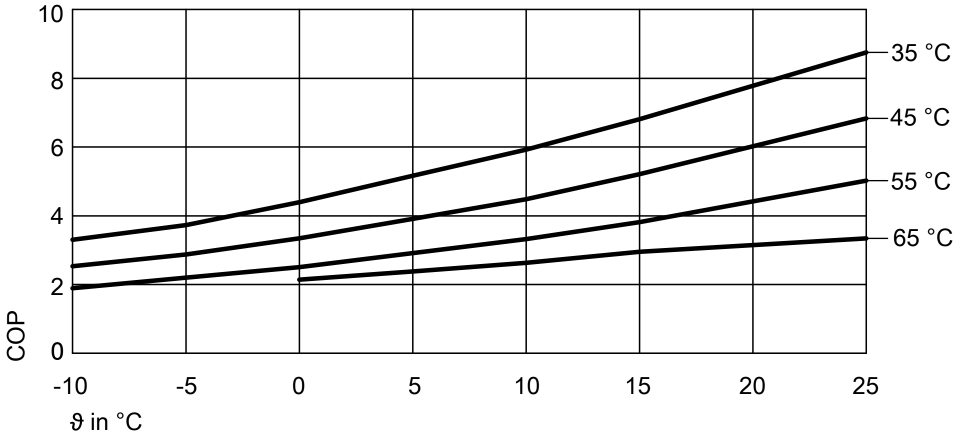
Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

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

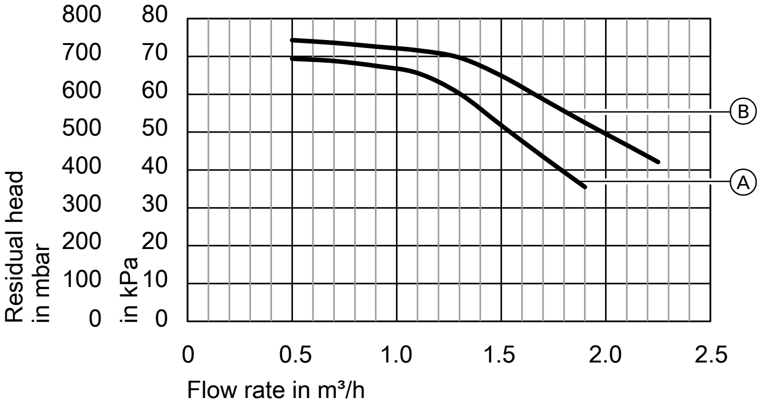
Operating point	**W**	**°C**				**35**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.52	8.66	10.14	11.79	13.44	15.29	19.47
Cooling capacity		kW	5.53	6.64	8.17	9.92	11.66	13.59	17.93
Power consumption		kW	2.28	2.32	2.31	2.29	2.27	2.25	2.23
Coefficient of performance ε (COP)			3.30	3.73	4.39	5.16	5.92	6.81	8.75

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	7.30	8.36	9.65	11.20	12.76	14.59	18.71
Cooling capacity		kW	4.70	5.76	7.11	8.75	10.40	12.28	16.56
Power consumption		kW	2.89	2.92	2.89	2.87	2.85	2.80	2.74
Coefficient of performance ε (COP)			2.53	2.87	3.34	3.91	4.48	5.21	6.83

Operating point	**W**	**°C**				**55**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	6.98	8.10	9.21	10.65	12.08	13.74	17.60
Cooling capacity		kW	3.57	4.73	5.90	7.40	8.90	10.61	14.69
Power consumption		kW	3.69	3.69	3.69	3.67	3.64	3.61	3.51
Coefficient of performance ε (COP)			1.89	2.20	2.50	2.91	3.32	3.81	5.02

Operating point	**W**	**°C**				**65**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW			8.95	10.15	11.34	12.81	14.16
Cooling capacity		kW			5.10	6.24	7.38	8.79	10.45
Power consumption		kW			4.19	4.25	4.31	4.34	4.24
Coefficient of performance ε (COP)					2.14	2.38	2.63	2.95	3.34

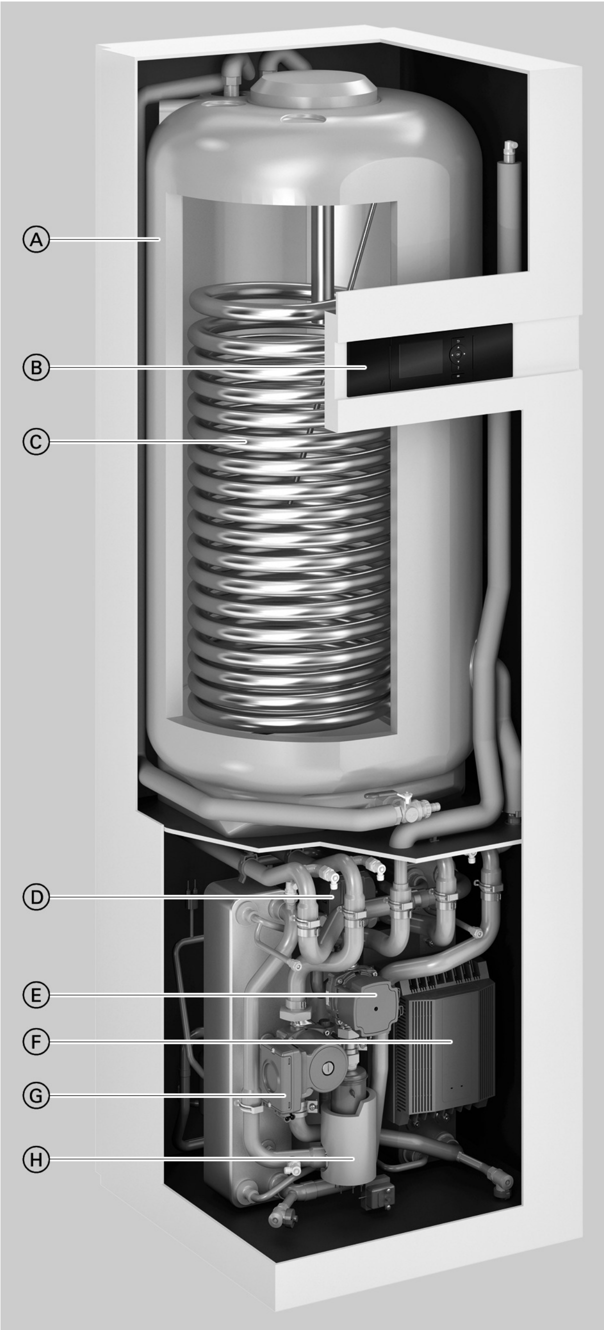
Residual heads of the integral circulation pumps, type BWT-M 221.B10



Ⓐ Secondary pump
Ⓑ Primary pump

7.1 Product description

Benefits



Ⓐ DHW cylinder with 220 l capacity
Ⓑ Vitotronic 200 weather-compensated, digital heat pump control unit
Ⓒ Indirect coil for cylinder heating
Ⓓ 3-way diverter valve for central heating/DHW heating
Ⓔ Secondary pump (heating water), high efficiency circulation pump
Ⓕ Compressor output control, switched via inverter
Ⓖ Primary pump (brine), high efficiency circulation pump
Ⓗ Instantaneous heating water heater

- Low running costs thanks to high SCOP (seasonal coefficient of performance) to EN 14825: Up to 5.5 for average climatic conditions and low temperature application (W35)
- Especially quiet thanks to new sound insulation concept: 33 to 46 dB(A) (B0/W55)
- Very low running costs due to refrigerant circuit with output-dependent control and innovative inverter technology for the highest SCOP
- DHW temperature in the DHW cylinder up to 60 °C (without use of the integral instantaneous heating water heater)
- High DHW convenience (A+ energy label) and very high draw-off rates (up to 306 l)
- Easy to operate Vitotronic control unit with plain text and graphic display
- Easy handling as the heat pump module can be quickly removed thanks to push-fit connections
- Optimised utilisation of power generated on-site by photovoltaic systems
- Web-enabled through Vitoconnect (accessories) for operation and service via Viessmann apps

Delivered condition

- Brine/water heat pump for central heating and DHW heating
- Integral steel DHW cylinder with Ceraprotect enamel coating, protected from corrosion by a protective magnesium anode, with thermal insulation
- Integral diverter valve for central heating/DHW heating
- Integral high efficiency circulation pump for primary circuit (brine)
- Integral high efficiency circulation pump for secondary circuit (heating water)
- Integral instantaneous heating water heater
- Safety assembly for the heating circuit
- Vitotronic 200 weather-compensated heat pump control unit with outside temperature sensor
- Integral phase monitoring
- Connection lines for primary circuit (brine) flow and return can be connected on the left or right (supplied)
- Connection lines for secondary circuit (heating water) flow and return for connection at the top (supplied)

7.2 Specification

Specification

Type BWT		331.C06	331.C12
Performance data to EN 14511 (B0/W35, 5 K spread)			
Rated heating output	kW	4.28	5.31
Cooling capacity	kW	3.45	4.35
Power consumption	kW	0.91	1.10
Coefficient of performance ε (COP)		4.70	4.80
Heating modulation range, min. to max.		1.7 to 8.6	2.4 to 11.4
Brine (primary circuit)			
Capacity	l	3.7	4.2
Minimum flow rate	l/h	900	1000
Nominal flow rate	l/h	1070	1300
Residual head at minimum flow rate	mbar	800	680
	kPa	80	68
Residual head at nominal flow rate	mbar	780	620
	kPa	78	62
Max. flow temperature (brine inlet)	°C	25	25
Min. flow temperature (brine inlet)	°C	–10	–10
Heating water (secondary circuit)			
Capacity, heat pump	l	4.5	5.3
Capacity, total	l	16.5	17.3
Minimum flow rate	l/h	600	720
Nominal flow rate	l/h	740	920
Residual head at minimum flow rate	mbar	710	700
	kPa	71	70
Residual head at nominal flow rate	mbar	700	680
	kPa	70	68
Max. flow temperature	°C	65	65
Instantaneous heating water heater			
Heating output	kW	9.0	
Rated voltage		3/N/PE 400 V/50 Hz	
Fuse rating		3 x B16 A 1-pole	
Heat pump electrical values			
Rated voltage, compressor		3/N/PE 400 V/50 Hz	
Rated current, compressor	A	9.0	12.0
Cos φ		0.9	0.9
Starting current, compressor	A	9	12
Starting current, compressor with stalled armature	A	9	12
Compressor fuse rating	A	1 x B16 A 3-pole	1 x B16 A 3-pole
Rated voltage, heat pump control unit/PCB		1/N/PE 230 V/50 Hz	
Fuse rating, heat pump control unit/PCB (internal)		6.3 A (slow) / 250 V	
Power consumption			
Primary pump (high efficiency circulation pump)	W	25 to 87	
– Energy efficiency index EEI		≤ 0.21	
Secondary pump (high efficiency circulation pump)	W	8 to 59	
– Energy efficiency index EEI		≤ 0.21	
Max. power consumption, control unit	W	1000	
Rated output, control unit/PCB	W	12	
Refrigerant circuit			
Refrigerant		R410A	R410A
– Safety group		A1	A1
– Refrigerant charge	kg	2.0	2.3
– Global warming potential (GWP)[*8]		1924	1924
– CO_2 equivalent	t	3.9	4.6
Permiss. operating pressure			
– High pressure side	bar	45	45
	MPa	4.5	4.5
– Low pressure side	bar	28	28
	MPa	2.8	2.8
Compressor	Type	Hermetically sealed scroll compressor	
Oil in compressor	Type	Emkarate RL32-3MAF	
Quantity of oil in compressor	l	0.74	0.74
Oil quantity in oil separator	l	0.4	0.4

*8 *Based on the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).*

Type BWT		331.C06	331.C12
Integral DHW cylinder			
Capacity	l	220	220
Max. draw-off volume at DHW temperature 40 °C, storage temperature 55 °C and draw-off rate 10 l/min	l	315	315
Max. DHW temperature			
– Only with heat pump	°C	60	60
– With instantaneous heating water heater	°C	65	65
Max. permiss. DHW temperature	°C	95	95
Dimensions			
Total length	mm	680	680
Total width	mm	600	600
Total height	mm	2000	2000
Weight			
Total weight	kg	277	282
Heat pump module	kg	78	83
Permiss. operating pressure			
Primary circuit (brine)	bar	3.0	3.0
	MPa	0.3	0.3
Secondary circuit, heating water	bar	3.0	3.0
	MPa	0.3	0.3
Secondary circuit, DHW	bar	10.0	10.0
	MPa	1.0	1.0
Connections			
Primary circuit flow/return	mm	Cu 28 x 1.5	Cu 28 x 1.5
Secondary circuit flow/return	mm	Cu 28 x 1.5	Cu 28 x 1.5
Cold water, DHW (female thread)	Rp	¾	¾
DHW circulation (female thread)	Rp	¾	¾
Sound power (measured with reference to EN 12102/EN ISO 9614-2)			
Weighted total sound power level for $B0^{\pm 3\,K}/W35^{\pm 5\,K}$			
– At rated heating output	dB(A)	39	40
Weighted total sound power level for $B0^{\pm 3\,K}/W55^{\pm 5\,K}$			
– Weighted total sound power level, min. to max.	dB(A)	30 to 47	33 to 46
– In quiet mode	dB(A)	34	39
Energy efficiency class to Commission Regulation (EU) No 813/2013			
Heating, average climatic conditions			
– Low temperature applications (W35)		A^{+++}	A^{+++}
– Medium temperature applications (W55)		A^{++}	A^{+++}
Heating performance data in accordance with Commission Regulation (EU) No 813/2013 (average climatic conditions)			
Low temperature applications (W35)			
– Energy efficiency η_S	%	204	205
– Rated heating output P_{rated}	kW	6	12
– Seasonal coefficient of performance (SCOP)		5.29	5.32
Medium temperature applications (W55)			
– Energy efficiency η_S	%	141	151
– Rated heating output P_{rated}	kW	6	12
– Seasonal coefficient of performance (SCOP)		3.72	3.97
– DHW heating energy efficiency η_{wh}	%	127	131
Sound power level to ErP (B0/W55)	dB(A)	40	41

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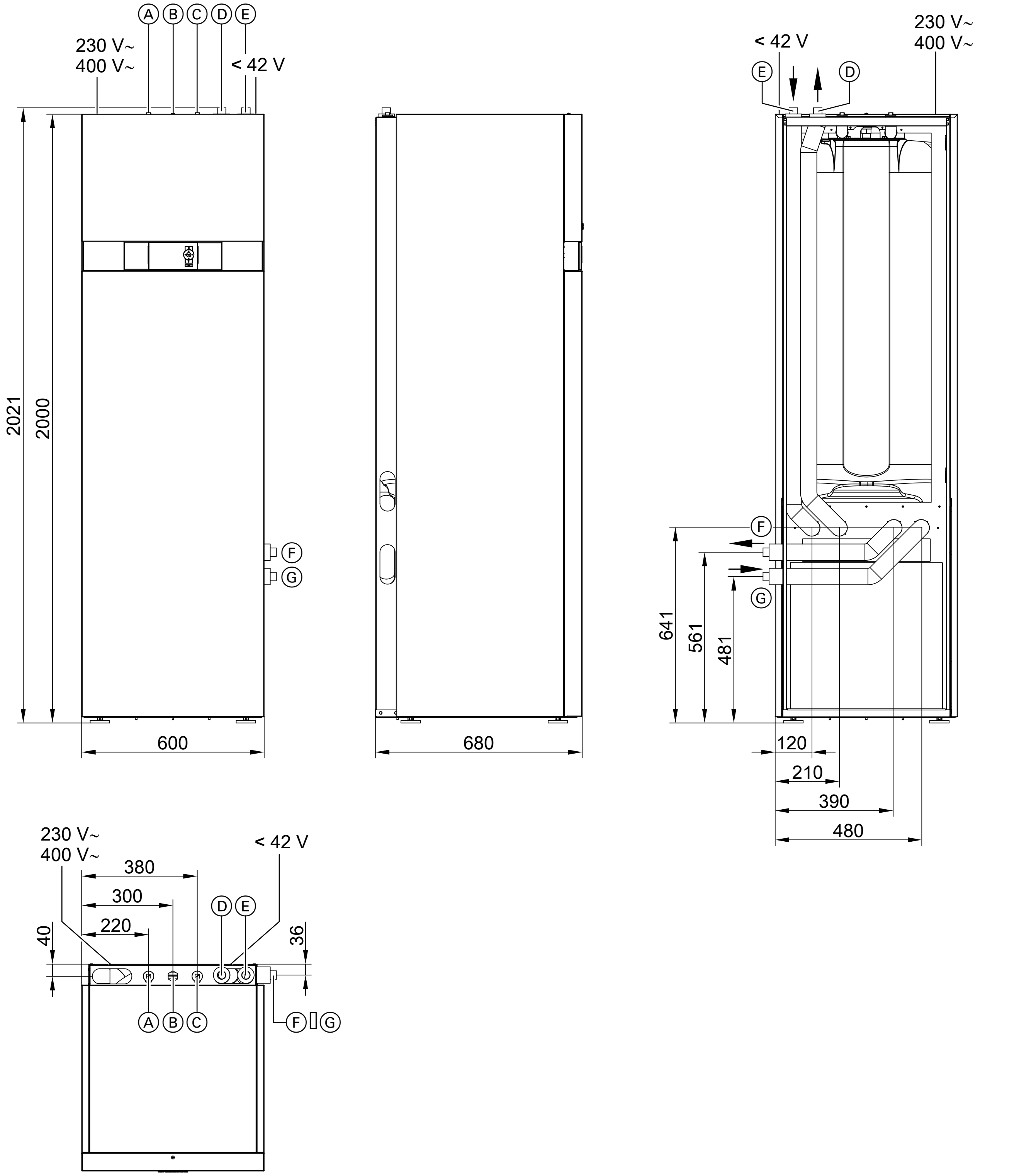
Dimensions

Primary circuit connections to the right



Ⓐ Cold water
Ⓑ DHW circulation
Ⓒ DHW
Ⓓ Secondary circuit flow (heating water)
Ⓔ Secondary circuit return (heating water)
Ⓕ Primary circuit return (heat pump brine outlet)
Ⓖ Primary circuit flow (heat pump brine inlet)

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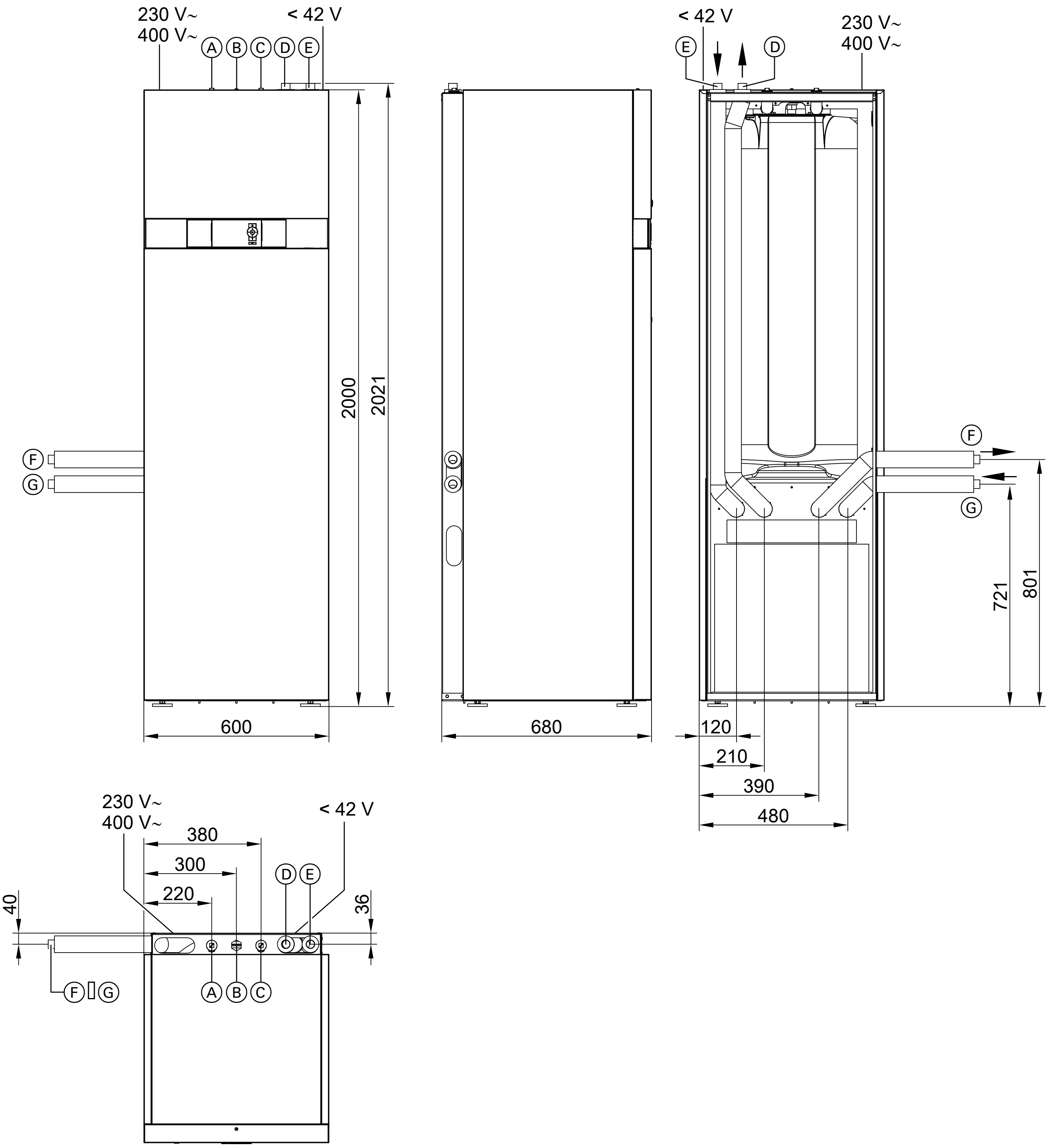
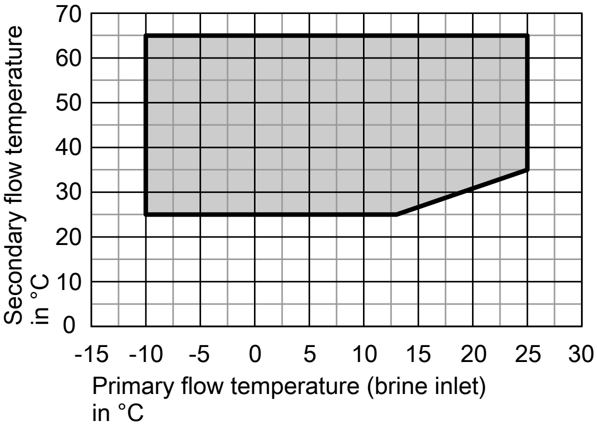
Primary circuit connections to the left



Ⓐ Cold water
Ⓑ DHW circulation
Ⓒ DHW
Ⓓ Secondary circuit flow (heating water)
Ⓔ Secondary circuit return (heating water)
Ⓕ Primary circuit return (heat pump brine outlet)
Ⓖ Primary circuit flow (heat pump brine inlet)

Application limits to EN 14511

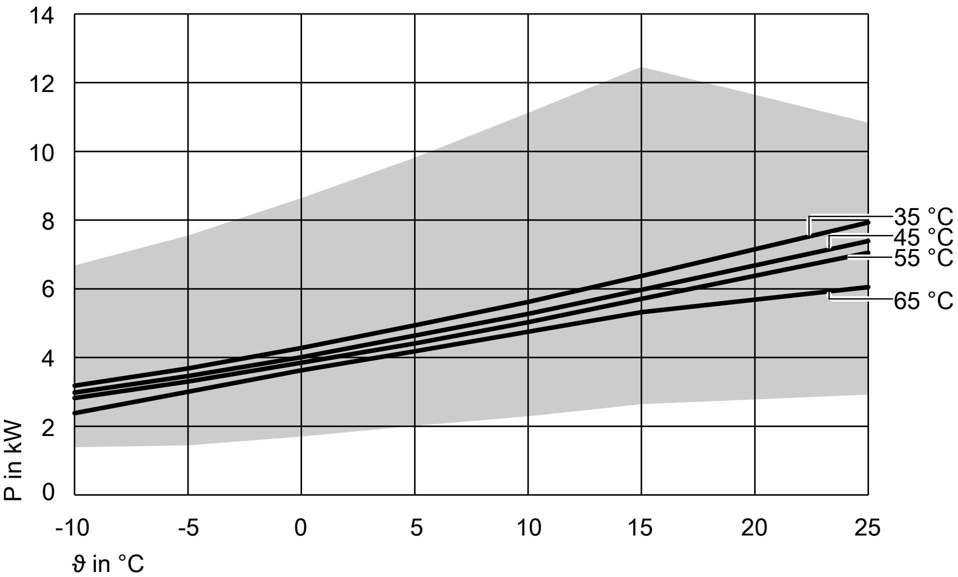


- Secondary side spread: 5 K
- Primary side spread: 3 K

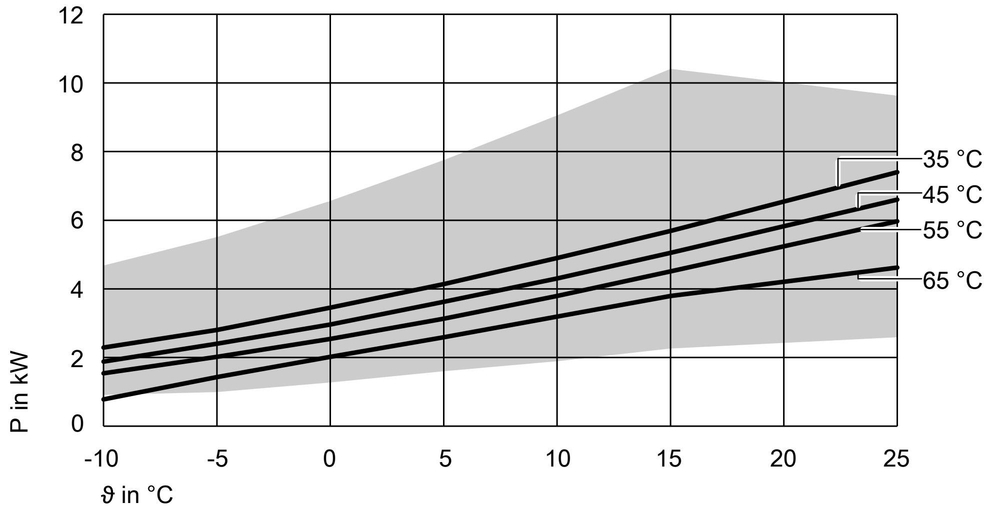
Curves

Output graphs, type BWT 331.C06

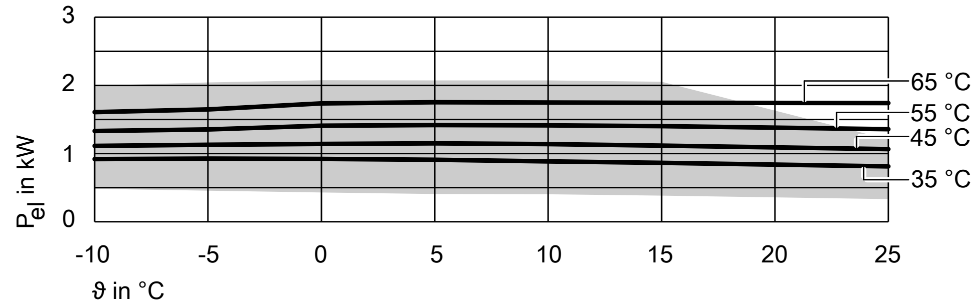
Heating output at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



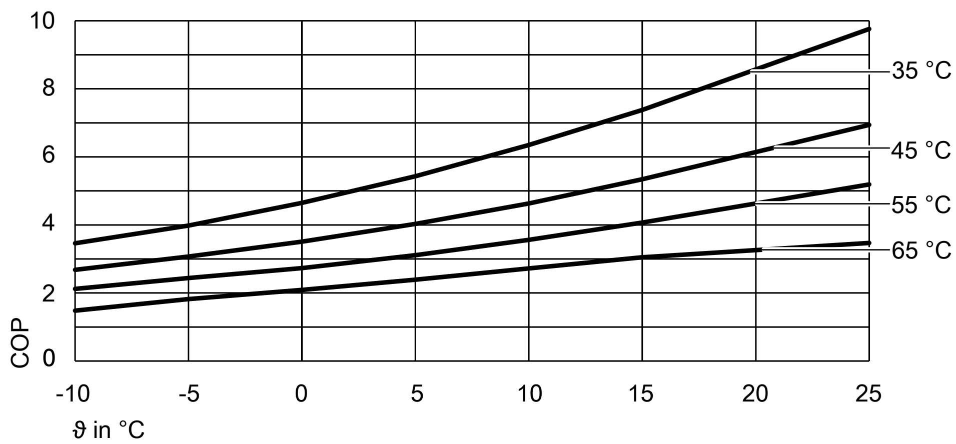
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ	Primary circuit flow temperature (heat pump brine inlet)
P	Heating output or cooling capacity
P_{el}	Power consumption
COP	Coefficient of performance

Possible output range based on a primary circuit flow temperature of 35 °C (heat pump brine inlet)

Note

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

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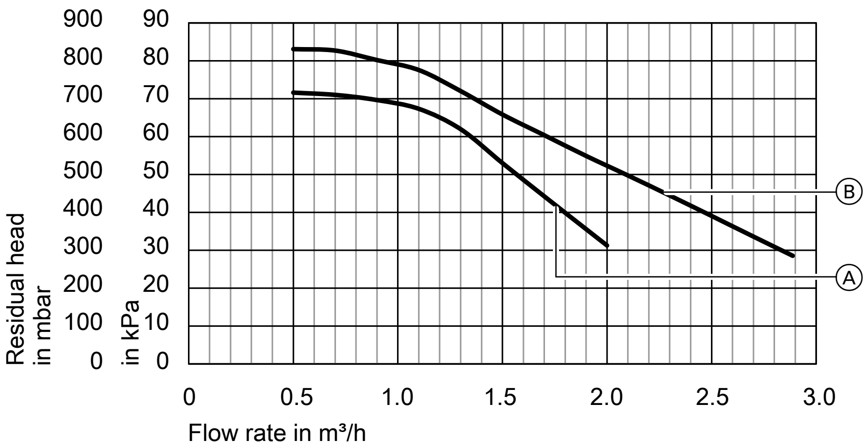
Operating point									
	W	°C	35						
	B	°C	–10	–5	0	5	10	15	25
Max. heating output		kW	6.68	7.55	8.64	9.82	11.12	12.46	10.84
Rated heating output		kW	3.18	3.68	4.28	4.94	5.62	6.37	7.93
Min. heating output		kW	1.39	1.44	1.70	2.01	2.29	2.64	2.92
Max. cooling capacity		kW	4.68	5.51	6.56	7.75	9.05	10.41	9.63
Rated cooling capacity		kW	2.29	2.80	3.45	4.14	4.90	5.69	7.40
Min. cooling capacity		kW	0.91	0.99	1.27	1.60	1.89	2.26	2.59
Max. power consumption		kW	2.00	2.04	2.08	2.07	2.07	2.05	1.21
Rated power consumption		kW	0.92	0.93	0.91	0.91	0.89	0.86	0.81
Min. power consumption		kW	0.48	0.46	0.43	0.41	0.40	0.38	0.33
Max. coefficient of performance ε (COP)			3.35	3.70	4.16	4.73	5.36	6.07	8.98
Rated coefficient of performance ε (COP)			3.46	3.98	4.70	5.43	6.35	7.38	9.76
Min. coefficient of performance ε (COP)			2.88	3.17	3.95	4.93	5.67	6.88	8.78

Operating point									
	W	°C	45						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	2.98	3.46	4.01	4.64	5.27	5.97	7.39
Cooling capacity		kW	1.88	2.40	2.96	3.62	4.30	5.05	6.60
Power consumption		kW	1.11	1.13	1.14	1.15	1.14	1.12	1.07
Coefficient of performance ε (COP)			2.68	3.07	3.51	4.03	4.63	5.34	6.94

Operating point									
	W	°C	55						
	B	°C	–10	–5	0	5	10	15	25
Max. heating output		kW	6.24		8.09		10.3		
Rated heating output		kW	2.82	3.30	3.85	4.41	5.03	5.71	7.05
Min. heating output		kW	2.01		2.48		3.16		
Max. cooling capacity		kW	3.69		5.26		7.81		
Rated cooling capacity		kW	1.54	2.02	2.54	3.13	3.79	4.51	5.97
Min. cooling capacity		kW	0.95		1.46		2.30		
Max. power consumption		kW	2.71		2.83		2.89		
Rated power consumption		kW	1.33	1.35	1.41	1.42	1.41	1.40	1.36
Min. power consumption		kW	1.10		1.02		0.99		
Max. coefficient of performance ε (COP)			2.31		2.34		3.58		
Rated coefficient of performance ε (COP)			2.12	2.44	2.73	3.11	3.56	4.07	5.19
Min. coefficient of performance ε (COP)			1.84		1.81		3.18		

Operating point									
	W	°C	65						
	B	°C	–10	–5	0	5	10	15	25
Heating output		kW	2.38	3.00	3.63	4.18	4.75	5.32	6.05
Cooling capacity		kW	0.78	1.43	2.02	2.59	3.19	3.79	4.62
Power consumption		kW	1.61	1.65	1.74	1.75	1.75	1.75	1.74
Coefficient of performance ε (COP)			1.48	1.82	2.09	2.39	2.72	3.05	3.47

Residual heads of the integral circulation pumps, type BWT 331.C06



Ⓐ Secondary pump
Ⓑ Primary pump

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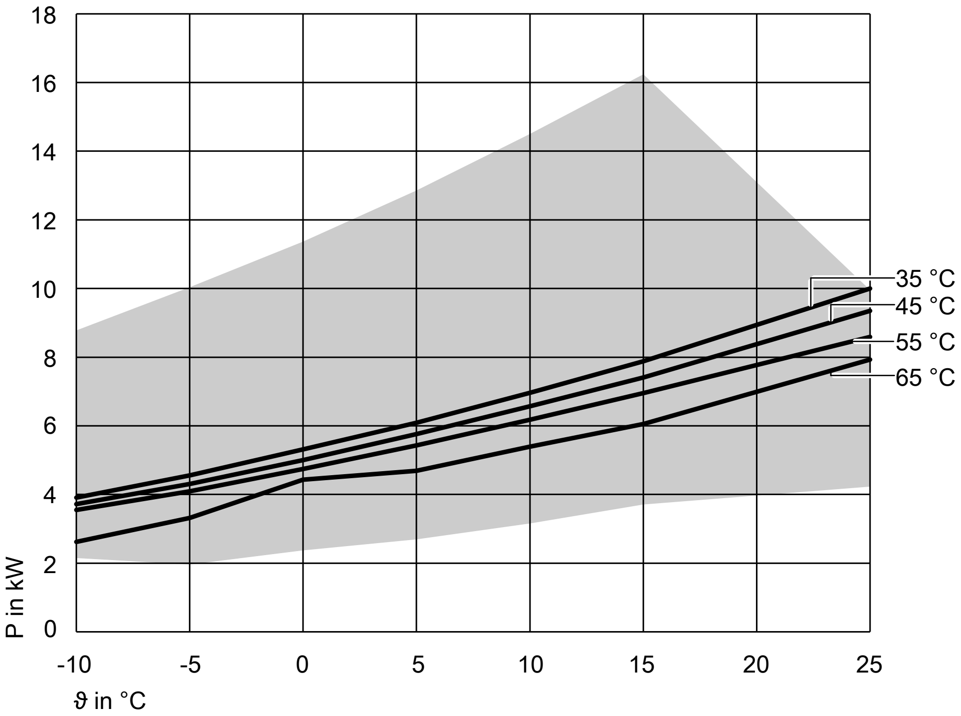
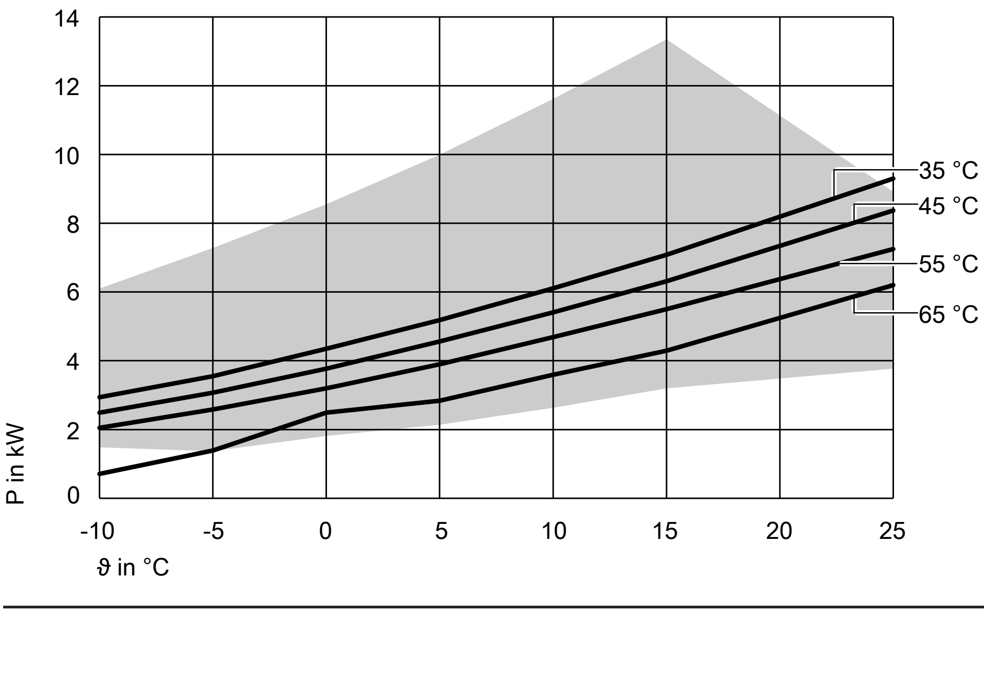
Output graphs, type BWT 331.C12

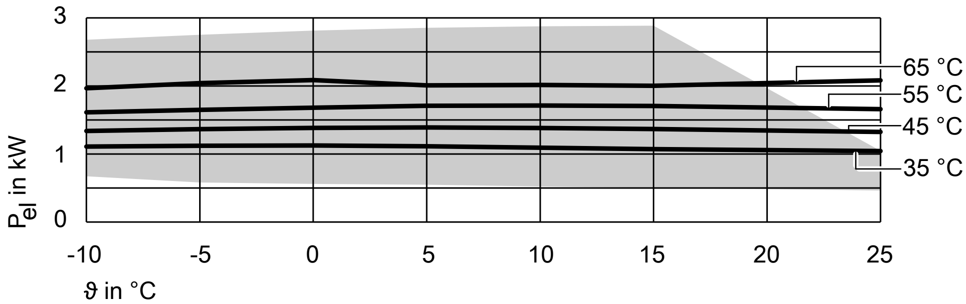
Heating output at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



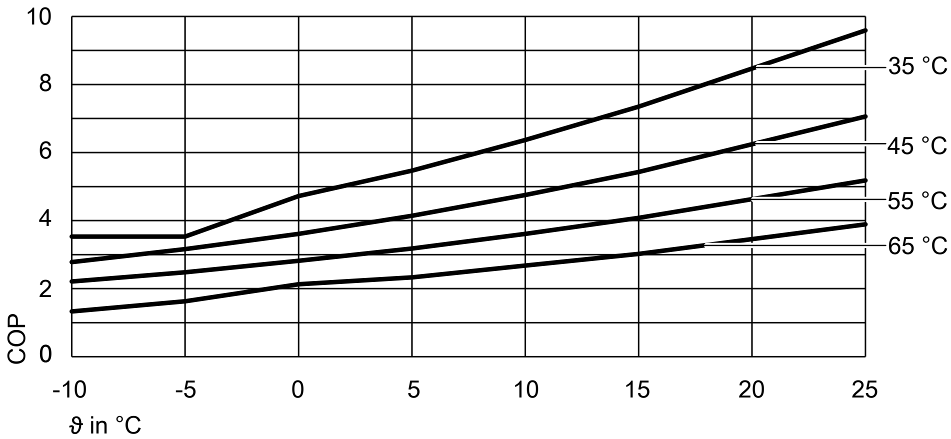
Cooling capacity at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Power consumption at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



Coefficient of performance (COP) at secondary circuit flow temperatures of 35 °C, 45 °C, 55 °C, 65 °C



ϑ Primary circuit flow temperature (heat pump brine inlet)
P Heating output or cooling capacity
P_{el} Power consumption
COP Coefficient of performance

Possible output range based on a primary circuit flow temperature of 35 °C (heat pump brine inlet)

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

Operating point	**W**	**°C**				**35**		
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Max. heating output		kW	8.78	10.04	11.37	12.85	14.50	16.24	10.00
Rated heating output		kW	3.91	4.56	5.31	6.09	6.96	7.88	10.00
Min. heating output		kW	2.15	1.96	2.37	2.69	3.16	3.71	4.23
Max. cooling capacity		kW	6.10	7.28	8.55	9.99	11.62	13.35	9.30
Rated cooling capacity		kW	2.94	3.55	4.35	5.18	6.11	7.08	9.30
Min. cooling capacity		kW	1.48	1.37	1.81	2.14	2.63	3.20	3.77
Max. power consumption		kW	2.68	2.75	2.81	2.85	2.88	2.89	1.04
Rated power consumption		kW	1.11	1.12	1.10	1.11	1.09	1.07	1.04
Min. power consumption		kW	0.67	0.58	0.56	0.55	0.52	0.50	0.46
Max. coefficient of performance ε (COP)			3.28	3.65	4.04	4.50	5.04	5.63	9.59
Rated coefficient of performance ε (COP)			3.53	3.53	4.80	5.47	6.37	7.35	9.59
Min. coefficient of performance ε (COP)			3.20	3.53	4.22	4.91	6.03	7.36	9.14

Operating point	**W**	**°C**				**45**			
	B	**°C**	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output		kW	3.72	4.31	5.00	5.76	6.57	7.41	9.35
Cooling capacity		kW	2.49	3.07	3.77	4.56	5.41	6.31	8.37
Power consumption		kW	1.34	1.37	1.38	1.39	1.38	1.37	1.32
Coefficient of performance ε (COP)			2.78	3.16	3.61	4.14	4.75	5.43	7.06

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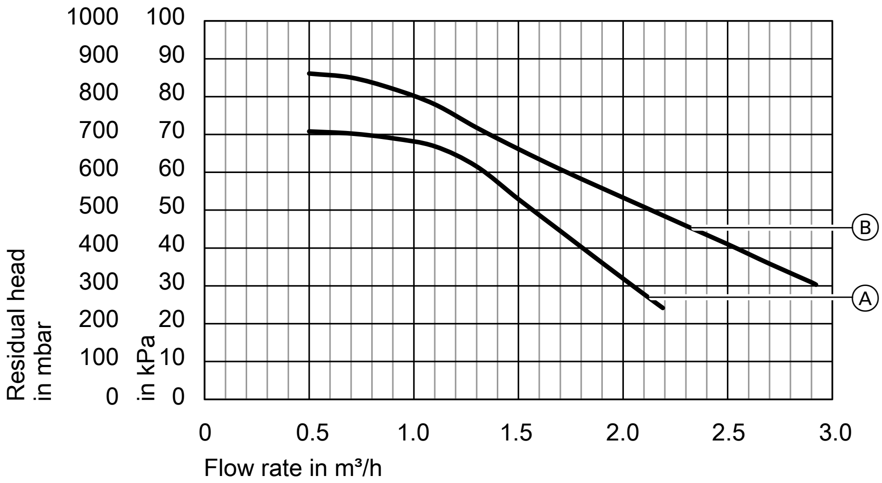
Operating point		**W** °C	55						
		B °C	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Max. heating output	kW		8.52		10.83		13.43		
Rated heating output	kW		3.55	4.09	4.74	5.43	6.18	6.95	8.59
Min. heating output	kW		2.96		3.39		4.37		
Max. cooling capacity	kW		5.14		7.10		9.88		
Rated cooling capacity	kW		2.05	2.58	3.20	3.90	4.69	5.50	7.25
Min. cooling capacity	kW		1.63		2.10		3.22		
Max. power consumption	kW		3.62		3.73		3.90		
Rated power consumption	kW		1.61	1.65	1.68	1.71	1.71	1.71	1.66
Min. power consumption	kW		1.40		1.29		1.28		
Max. coefficient of performance ε (COP)			2.36		2.90		3.45		
Rated coefficient of performance ε (COP)			2.21	2.48	2.82	3.18	3.61	4.08	5.18
Min. coefficient of performance ε (COP)			2.11		2.63		3.41		

Operating point		**W** °C	65						
		B °C	**–10**	**–5**	**0**	**5**	**10**	**15**	**25**
Heating output	kW		2.62	3.32	4.43	4.69	5.39	6.05	7.93
Cooling capacity	kW		0.71	1.39	2.49	2.84	3.59	4.29	6.20
Power consumption	kW		1.97	2.04	2.09	2.01	2.01	2.00	2.08
Coefficient of performance ε (COP)			1.33	1.63	2.13	2.33	2.68	3.02	3.89

Residual heads of the integral circulation pumps, type BWT 331.C12



Ⓐ Secondary pump
Ⓑ Primary pump

Installation accessories

8.1 Overview

Accessories	Part no.	Vitocal 200-G	300-G, type BWC	300-G, type BW/BWS	350-G	222-G	333-G
Ventilation unit: See page 106 onwards.							
Ventilation units and accessories: See "Vitovent" technical guide		X	X			X	X
Brine circuit (primary circuit): See page 108 onwards.							
Hydraulic connection set	ZK05344	X	X				
Primary circuit hydraulic connection set	ZK05345	X	X				
Brine accessory pack	ZK02447	X	X	X	X	X	X
Pump set for brine accessory pack: – With Grundfos high efficiency circulation pump UPM GEO 25/85 – With Grundfos high efficiency circulation pump UPMXL GEO 25/125	 ZK02448 ZK02449			 BW 301.A21 (1-stage) BW 301.A29 (1-stage)	 BW 351.B20 (1-stage)		
Brine expansion vessel: – 25 l – 40 l – 50 l – 80 l	 7248242 7248243 7248244 7248245	 X X X	 X X X	 X X X	 X X X	 X X	 X X
Pressure switch	9532663	X	X	X	X	X	X
Brine manifold for geothermal collectors/ probes (plastic): – PE 25 x 2.3 for 2 brine circuits – PE 25 x 2.3 for 3 brine circuits – PE 25 x 2.3 for 4 brine circuits – PE 32 x 2.9 for 2 brine circuits – PE 32 x 2.9 for 3 brine circuits – PE 32 x 2.9 for 4 brine circuits	 ZK01285 ZK01286 ZK01287 ZK01288 ZK01289 ZK01290	 X X X X X X	 X X X X X X	 X X X X X X	 X X X X X X	 X X X X X X	 X X X X X X
Heat transfer medium: – "Tyfocor" 30 l – "Tyfocor" 200 l	 9532655 9542602	 X X	 X X	 X X	 X X	 X X	 X X
Filling station	7188625	X	X	X	X	X	X
Heating circuit (secondary circuit): See page 117 onwards.							
Ball valve with filter (G 1¼)	ZK03206	X	X			X	X
Overflow valve (R ¾)	ZK05500	X	X			X	X
Vitocell 100-W heating water buffer cylinder, type SVPA	Z017685	X	X			X	X
Safety equipment block	7143779			X	X		
Service box	7334502	X	X	X	X		
Hydraulic connection accessories: See page 120 onwards.							
DHW circulation connection set	ZK04652					X	X
Divicon heating circuit distributor: See page 121 onwards. ***Note*** *The Divicon heating circuit distributor is not suitable for heating circuits also used for cooling mode.*							
Without mixer for heating circuit 1 (A1/HC1) – With high efficiency circulation pump Wilo Yonos PARA 25/6, DN 20 - ¾ – With high efficiency circulation pump Wilo Yonos PARA 25/6, DN 25 - 1 – With high efficiency circulation pump Wilo Yonos PARA Opt. 25/7.5, DN 32 - 1¼	 7521287 7521288 ZK01831	 X X X	 X X X	 X X X	 X X X	 X X X	 X X X
With mixer for heating circuit 2 (M2/HC2) – With high efficiency circulation pump Wilo Yonos PARA 25/6, DN 20 - ¾ – With high efficiency circulation pump Wilo Yonos PARA 25/6, DN 25 - 1 – With high efficiency circulation pump Wilo Yonos PARA Opt. 25/7.5, DN 32 - 1¼	 ZK00967 ZK00968 ZK01825	 X X X	 X X X	 X X X	 X X X	 X X X	 X X X

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Accessories	Part no.	Vitocal 200-G	300-G, type BWC	300-G, type BW/BWS	350-G	222-G	333-G
With mixer for heating circuit 3 (M3/HC3)							
– With high efficiency circulation pump Wilo Yonos PARA 25/6, DN 20 - ¾	7521285	X	X	X	X	X	X
– With high efficiency circulation pump Wilo Yonos PARA 25/6, DN 25 - 1	7521286	X	X	X	X	X	X
– With high efficiency circulation pump Wilo Yonos PARA Opt. 25/7.5, DN 32 - 1¼	ZK01830	X	X	X	X	X	X
Mixer extension kits: See control unit accessories on page 209		X	X	X	X	X	X
Bypass valve	7464889	X	X	X	X	X	X
Wall mounting bracket for individual Divicons	7465894	X	X	X	X	X	X
Manifold for 2 Divicons							
– DN 20 - ¾ and DN 25 - 1	7460638	X	X	X	X	X	X
– DN 32 - 1¼	7466337	X	X	X	X	X	X
Manifold for 3 Divicons							
– DN 20 - ¾ and DN 25 - 1	7460643	X	X	X	X	X	X
– DN 32 - 1¼	7466340	X	X	X	X	X	X
Wall mounting bracket for manifold	7465439	X	X	X	X	X	X
DHW heating with Vitocell 100-W, type CVWA: See page 126 onwards.							
Vitocell 100-W, type CVWA:							
– 300 l	Z017719	BWC 201.B06 to B10	X				
– 390 l	Z019215	X	X				
– 500 l	Z019216	X	X				
Immersion heater EHE:							
– For cylinder volume 300 l, 390 l, 500 l, installation in upper section	Z012684	X	X				
– For cylinder volume 300 l, installation in lower section	Z019217	X	X				
– For cylinder volume 390 l, 500 l, installation in lower section	Z019218	X	X				
Solar heat exchanger set for cylinder volume 390 l, 500 l	7186663	X	X				
Impressed current anode	Z004247	X	X				
Safety assembly	7180662 AT: 7179666	X	X				
DHW heating with a cylinder loading system and a Vitocell 100-L, type CVL/CVLA: See page 134 onwards.							
Vitocell 100-L, type CVL	Z002074	X	X	X	X		
Heating lance for Vitocell 100-L	ZK00037	X	X	X	X		
Impressed current anode	7265008			X	X		
Cylinder loading pump:							
– Grundfos UPS 25-60 B	7820403	X	X	X	X		
– Grundfos UPS 32-80 B	7820404	X	X	X	X		
2-way motorised ball valve	7180573	X	X	X	X		

Accessories	Part no.	Vitocal					
		200-G	300-G, type BWC	300-G, type BW/BWS	350-G	222-G	333-G
DHW heating with freshwater module/heating water storage: See page 139 onwards.							
Vitocell 120-E, type SVW, 600 l:							
– With Vitotrans 353, type PZSA (draw-off rate up to 25 l/min)	Z015393	X	X				
– With Vitotrans 353, type PZMA (draw-off rate up to 48 l/min)	Z015394	X	X				
Vitocell 120-E, type SVW, 950 l:							
– With Vitotrans 353, type PBSA (draw-off rate up to 25 l/min)	Z017686	X	X	X	X		
– With Vitotrans 353, type PBMA (draw-off rate up to 48 l/min)	Z017687	X	X	X	X		
– With Vitotrans 353, type PBLA (draw-off rate up to 68 l/min) ***Note*** *Accessories for Vitotrans 353: See separate datasheet.*	Z017688	X	X	X	X		
Immersion heater EHE:							
– Heating output 2, 4 or 6 kW	Z014468	X	X				
– Heating output 4, 8 or 12 kW	Z014469	X	X				
3-way diverter valve:							
– Connection G 1	ZK01343	X	X				
– Connection G 1½	ZK01344	X	X	X	X		
– Connection G 2	ZK01353	X	X	X	X		
DHW heating with integral DHW cylinder: See page 148 onwards.							
Safety assembly	7180662 AT: 7179666					X	X
Impressed current anode	7182008					X	X
Installation accessories: See page 149 onwards.							
Platform for unfinished floors	7417925					X	X
Drain outlet kit	7176014					X	X
Refrigerant circuit module transport aid	ZK04568	X	X			X	X
Cooling: See page 150 onwards.							
NC-Box with mixer	ZK01836	X	X			X	X
Contact humidistat 24 V	7181418	X	X	X	X		
Natural cooling extension kit	7179172	X	X	X	X		
Frost stat	7179164	X	X	X	X		
2-way motorised ball valve	7180573	X	X	X	X		
3-way diverter valve (R 1¼)	7165482	X	X	X	X		
Temperature sensors:							
– Contact temperature sensor (NTC 10 kΩ)	7426463	X	X	X	X	X	X
– Room temperature sensor (NTC 10 kΩ)	7438537	X	X	X	X	X	X
Solar: See page 152 onwards.							
Solar heat exchanger set (Divicon)	ZK04099					X	X
Solar-Divicon, type PS10 with integral SDIO/SM1A electronics module for solar control	Z017690					X	X
High limit safety cut-out for solar thermal system	7506168					X	X
Collector temperature sensor (NTC 20 kΩ)	7831913					X	X
Heat transfer medium "Tyfocor LS" 25 l	7159727					X	X

8.2 Ventilation unit

Vitovent ventilation units

Vitovent ventilation units
Vitovent mechanical ventilation systems with central ventilation unit can be fully controlled via the heat pump control unit. The heat pump control unit has the entire range of functions required for operation, control parameter configuration and diagnostics of the connected ventilation unit.

Note
For detailed information on designing a mechanical ventilation system with a central ventilation unit: See technical guide "Central mechanical ventilation systems with heat recovery".

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Vitovent	Type	Part no.	Colour	Heat exchanger		Max. air flow rate in m³/h	Max. residential unit area in m²
				Countercur-rent	Enthalpy		
200-C	H11S A200 (L)	**Z014599**	Black	X		200	120
	H11S A200 (R)	**Z015391**	Black	X		200	120
	H11E A200 (L)	**Z014584**	Black		X	200	120
	H11E A200 (R)	**Z015392**	Black		X	200	120
300-W	H32S C325 (L)	**Z019041**	Vitopearlwhite	X		325	320
	H32S C325 (R)	**Z019040**	Vitopearlwhite	X		325	320
	H32S C400 (L)	**Z019043**	Vitopearlwhite	X		400	440
	H32S C400 (R)	**Z019042**	Vitopearlwhite	X		400	440
300-C	H32S B150	**Z014591**	White	X		150	90
300-F	H32S B280	**Z011432**	White	X		280	230
		Z012121	Vitosilver	X		280	230
	H32E C280	**Z014585**	White		X	280	230
		Z014586	Vitosilver		X	280	230

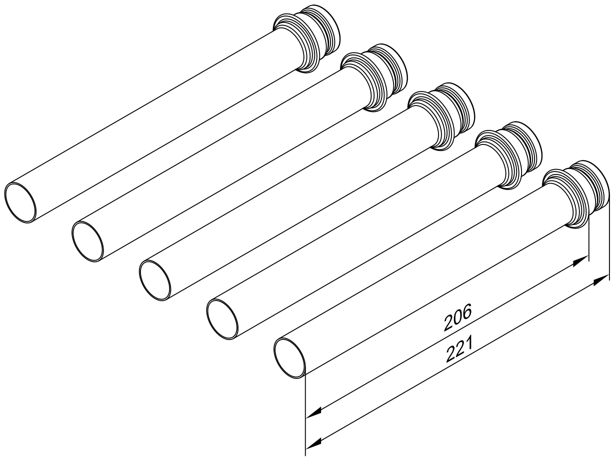
(L) Supply air connection, left
(R) Supply air connection, right

8.3 Brine circuit (primary circuit)

Hydraulic connection set

Part no. ZK05344
Pre-assembled pipe assembly for connection of heat pump from the rear

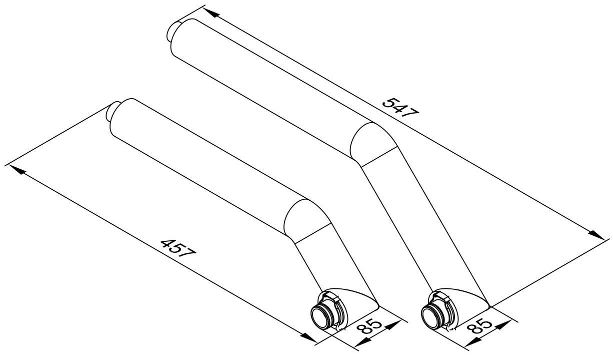
Components:
- Primary circuit flow and return (brine)
- Secondary circuit flow and return (heating water)
- DHW cylinder flow
- Thermal insulation
- All connections: Cu 28 x 1.5 mm



Primary circuit hydraulic connection set

Part no. ZK05345
Pre-assembled pipe assembly for connecting the heat pump to the primary circuit (brine) from the right or left

Components:
- Primary circuit flow and return (brine)
- Thermal insulation
- All connections: Cu 28 x 1.5 mm



Brine accessory pack

Part no.: ZK02447
- Connection set for connecting the heat pump to the primary circuit
- Suitable for Viessmann heat transfer medium "Tyfocor" based on ethylene glycol (see chapter "Heat transfer medium")

Components:
- Air separator with air vent valve
- Safety valve 3 bar (0.3 MPa)
- Pressure gauge
- Drain & fill valve
- 2 shut-off devices male/fem. 2 x 1½
- Wall mounting brackets
- Thermal insulation (vapour diffusion-proof)

2-stage heat pumps:
- *Heat pump stages 1 and 2 with the same rated heating output: One common brine accessory pack*
- *Heat pump stages 1 and 2 with different rated heating outputs: One brine accessory pack each for heat pump stages 1 and 2*

Max. flow rate in the primary circuit:
The maximum flow rate in the primary circuit should not exceed 6500 l/h; see pressure drop diagram.

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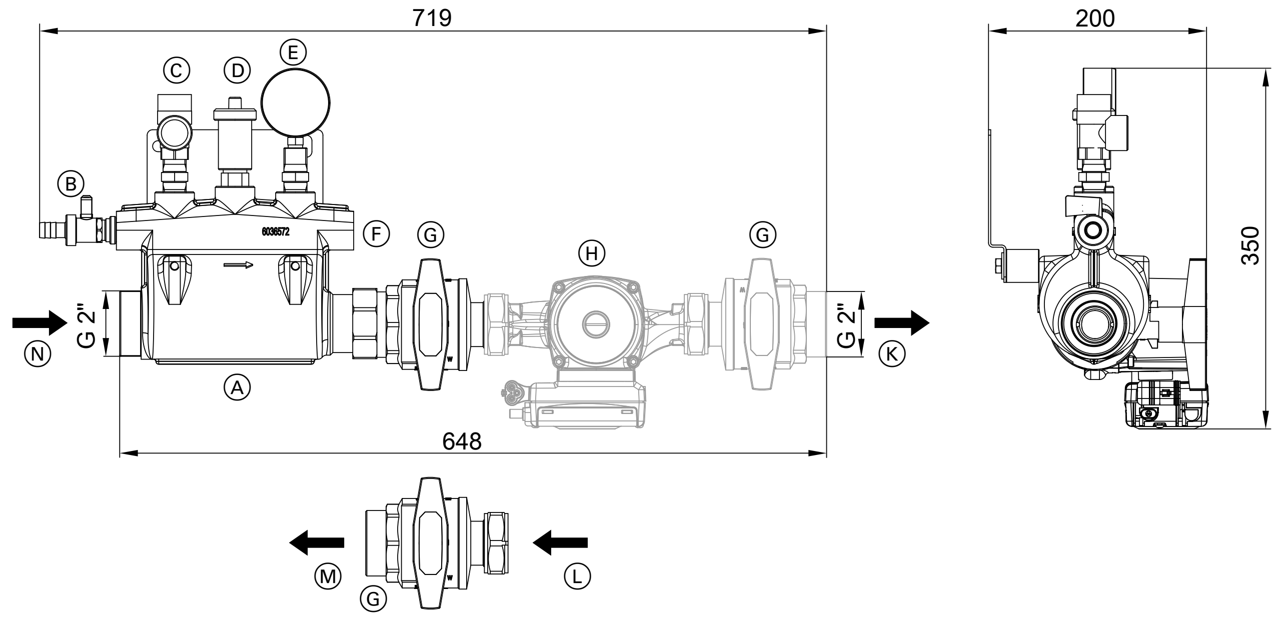


Diagram without thermal insulation

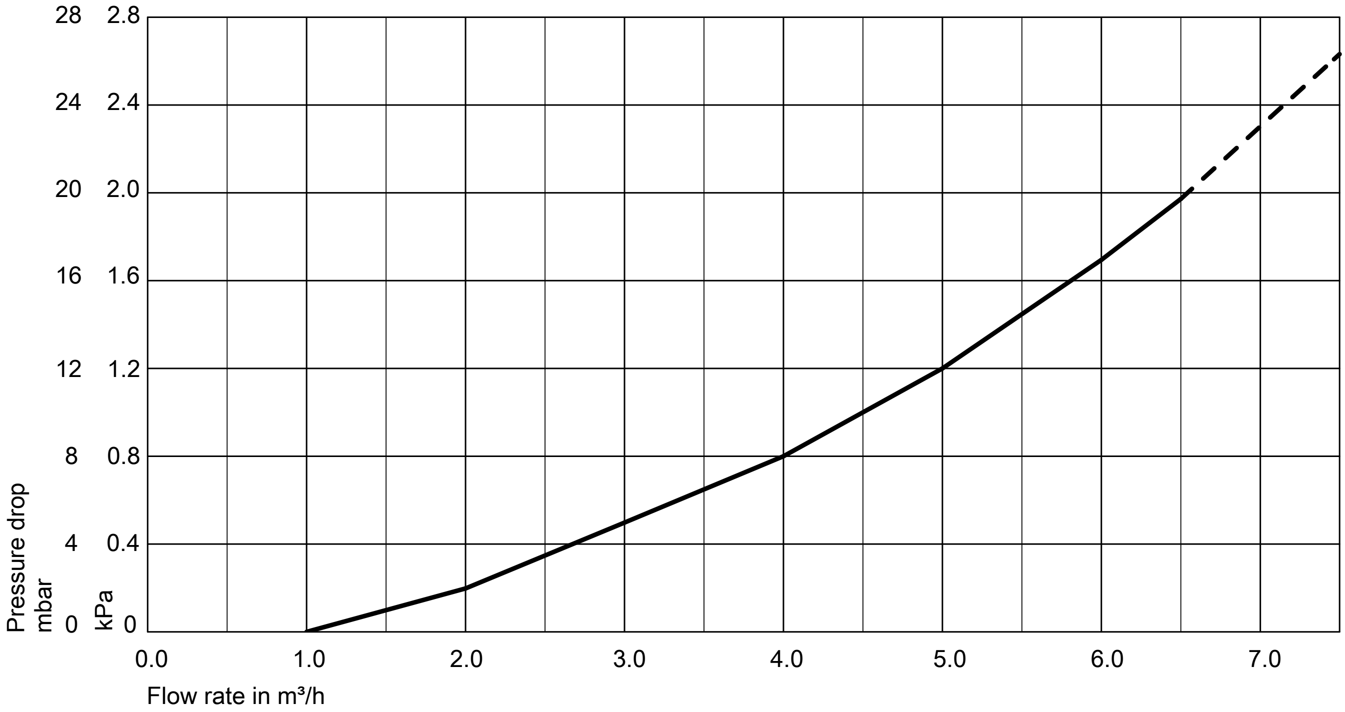
- Ⓐ Air separator
- Ⓑ Drain & fill valve
- Ⓒ Safety valve (3 bar)
- Ⓓ Air vent valve
- Ⓔ Pressure gauge (optional connection for pressure switch)
- Ⓕ Expansion vessel connection
- Ⓖ Ball valve
- Ⓗ Primary pump
- Ⓚ Primary circuit flow (heat pump brine inlet)
- Ⓛ Primary circuit return (heat pump brine outlet)
- Ⓜ Primary circuit return (brine outlet, brine accessory pack)
- Ⓝ Primary circuit flow (brine inlet, brine accessory pack)

Note
Ⓖ and Ⓗ are components of the pump set for the brine accessory pack.

Installation information
- Fit the brine accessory pack horizontally to ensure the correct function of the air separator.
- To adjust the flow direction, the base body can be turned horizontally through 180°.
- The safety components are included with the connection set and can be fitted on site depending on the installation direction of the base body.
- A pressure switch (part no. 9532663) can be fitted instead of the pressure gauge.
- Check the circulation pump for an adequate residual head: See curves.

Note
All components are thermally insulated with vapour diffusion-proof material.

Pressure drop graph



Pump set for brine accessory pack

Part no.: ZK02448, ZK02449
Required if the primary pump is not integrated into the heat pump.

Components:
- Grundfos high efficiency circulation pump UPM/UPMXL GEO, 230 V: See following table.
- Connection G 1½
- Shut-off device male/fem. 2 x 1½
- Thermal insulation for the circulation pump and shut-off device (vapour diffusion-proof)
- Energy efficiency index EEI:
  UPM GEO 25/85: ≤ 0.23
  UPMXL GEO 25/125: ≤ 0.23

Pump set for brine accessory pack	Vitocal 300-G	Vitocal 350-G
With Grundfos **high efficiency** circulation pump		
ZK02448 – UPM GEO 25/85	Type BW 301.A21 (1-stage)	—
ZK02449 – UPMXL GEO 25/125	Type BW 301.A29 (1-stage)	Type BW 351.B20 (1-stage)

The table is intended as a sizing aid only. When designing, observe the pressure drops in the primary circuit and the pump set delivery heads: See pages 112 and 113.

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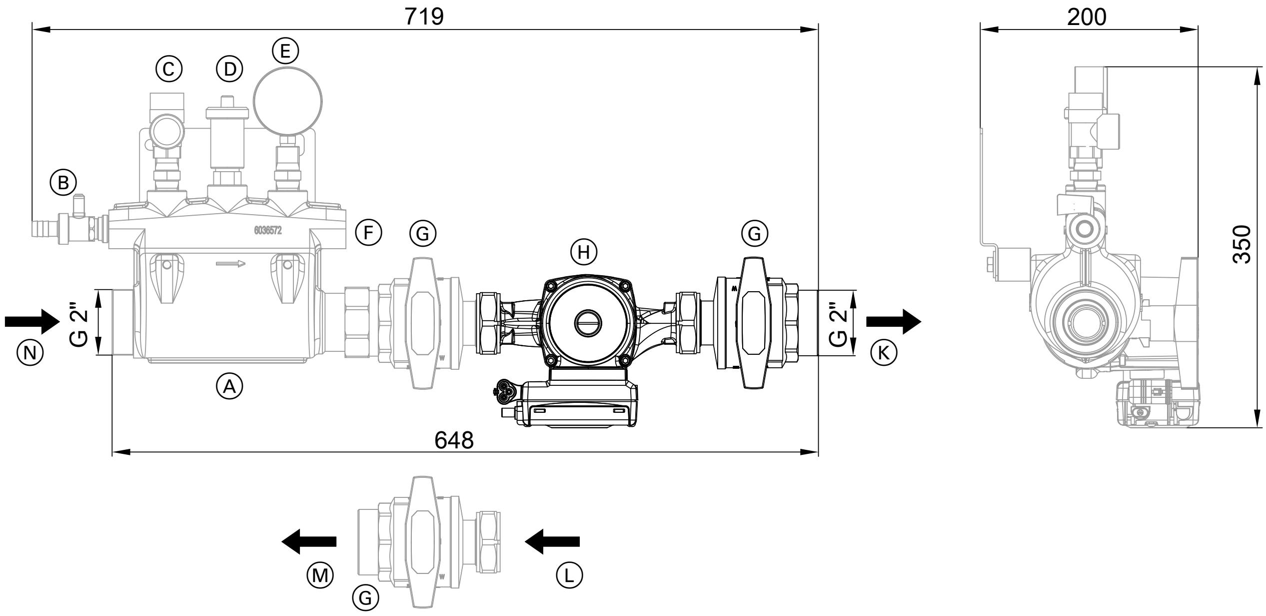
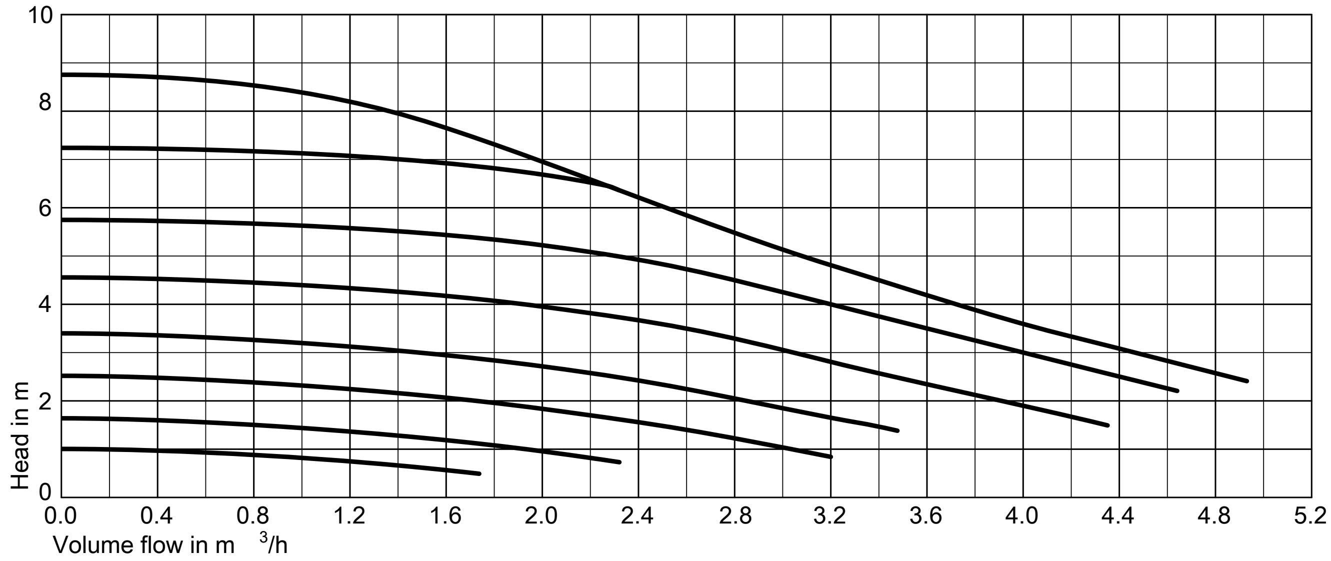


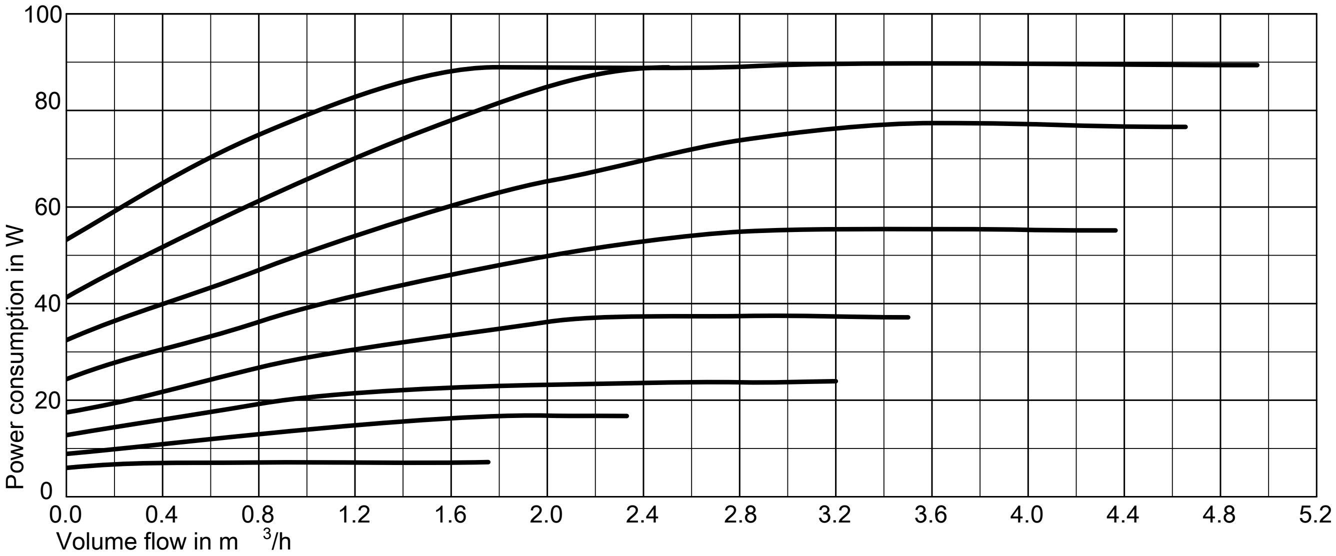
Diagram without thermal insulation

- Ⓐ Air separator
- Ⓑ Drain & fill valve
- Ⓒ Safety valve (3 bar)
- Ⓓ Air vent valve
- Ⓔ Pressure gauge (optional connection for pressure switch)
- Ⓕ Expansion vessel connection
- Ⓖ Ball valve
- Ⓗ Primary pump
- Ⓚ Primary circuit flow (heat pump brine inlet)
- Ⓛ Primary circuit return (heat pump brine outlet)
- Ⓜ Primary circuit return (brine outlet, brine accessory pack)
- Ⓝ Primary circuit flow (brine inlet, brine accessory pack)

Note
Ⓐ to Ⓖ are components of the brine accessory pack.

Curve for type UPM GEO 25/85





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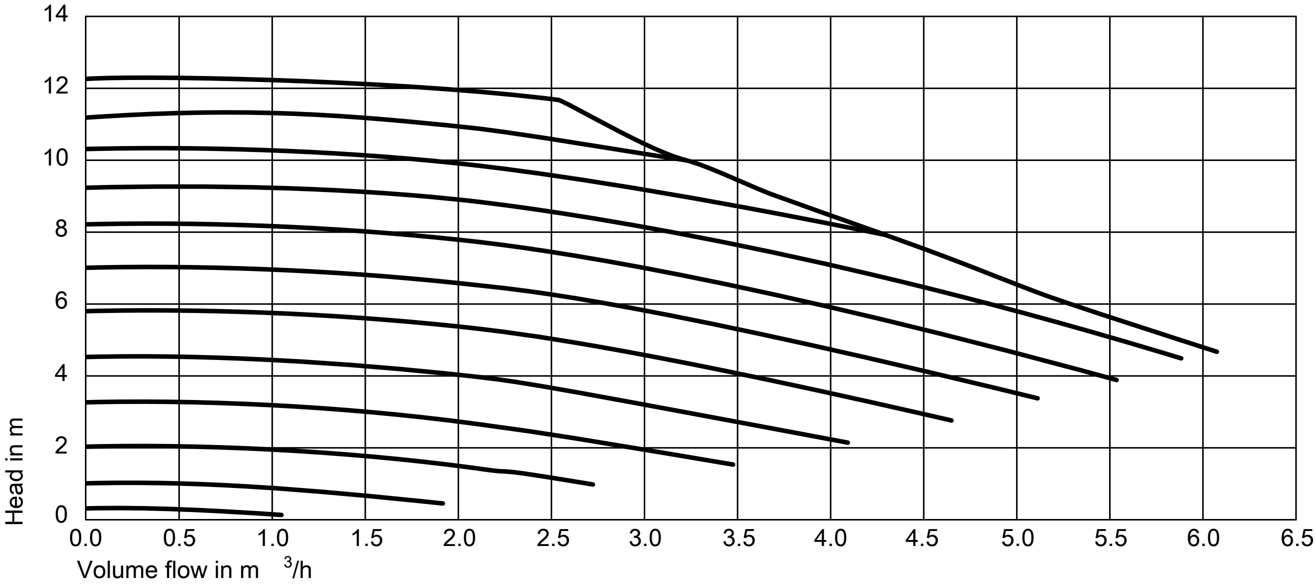
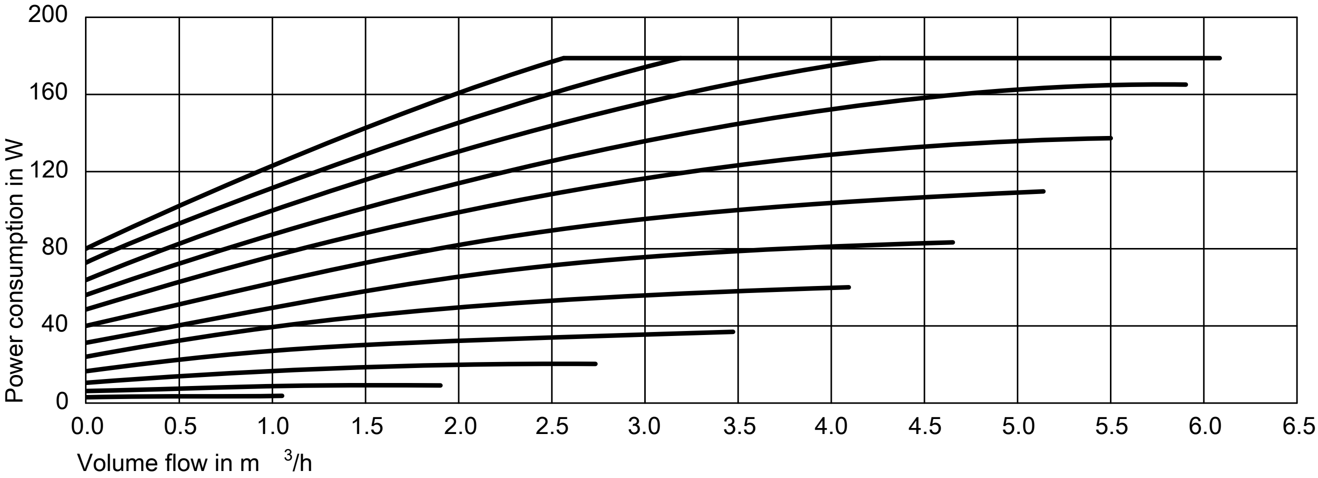
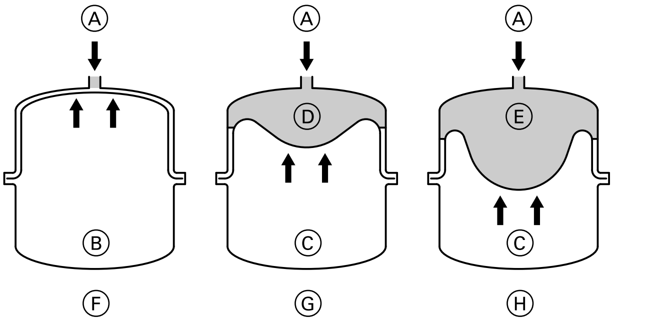
Curve for type UPMXL GEO 25/125





Brine expansion vessel

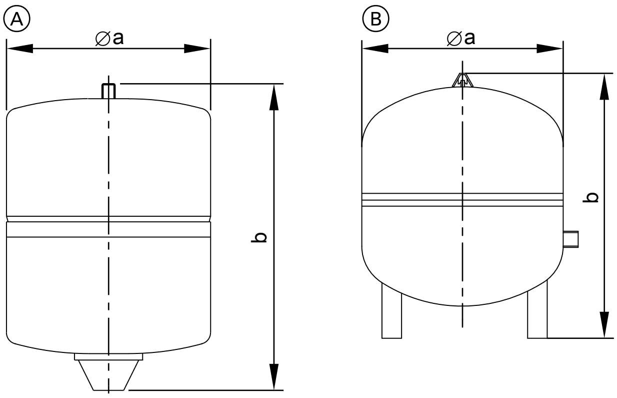
Part no.: 7248242, 7248243, 7248244, 7248245
With shut-off valve and fixings



Ⓐ Heat transfer medium
Ⓑ Nitrogen charge
Ⓒ Nitrogen buffer
Ⓓ Minimum safety seal 3 l
Ⓔ Safety seal
Ⓕ Delivered condition (pre-charge pressure 4.5 bar, 0.45 MPa)
Ⓖ Primary circuit filled, without heat effect
Ⓗ At maximum pressure and the highest heat transfer medium temperature

The brine expansion vessel is a sealed vessel where the gas space (nitrogen charge) is separated from the space containing liquid (heat transfer medium) by a diaphragm and the pre-charge pressure is subject to the system height.

Specification

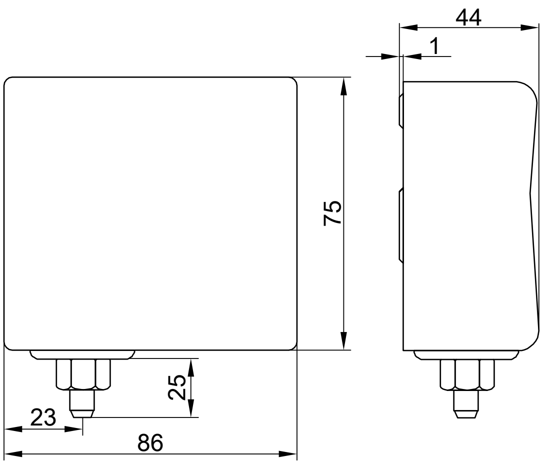


Expansion vessel	Part no.	Capacity l	Pre-charge pressure bar/Pa	Ø a mm	b mm	Connection	Weight kg
Ⓐ	7248242	25	4.5/0.45	280	490	R ¾	9.1
	7248243	40	4.5/0.45	354	520	R ¾	9.9
Ⓑ	7248244	50	4.5/0.45	409	505	R 1	12.3
	7248245	80	4.5/0.45	480	566	R 1	18.4

Note
For sizing the brine expansion vessel for geothermal probes: See the design information on page 176.

Pressure switch (primary circuit)

Part no. 9532663
Switches off the primary pump in the event of a pressure drop in the primary circuit.



Note
- *Cannot be used in conjunction with potassium carbonate-based heat transfer medium.*
- *Observe the statutory requirements when using a pressure switch in the primary circuit.*

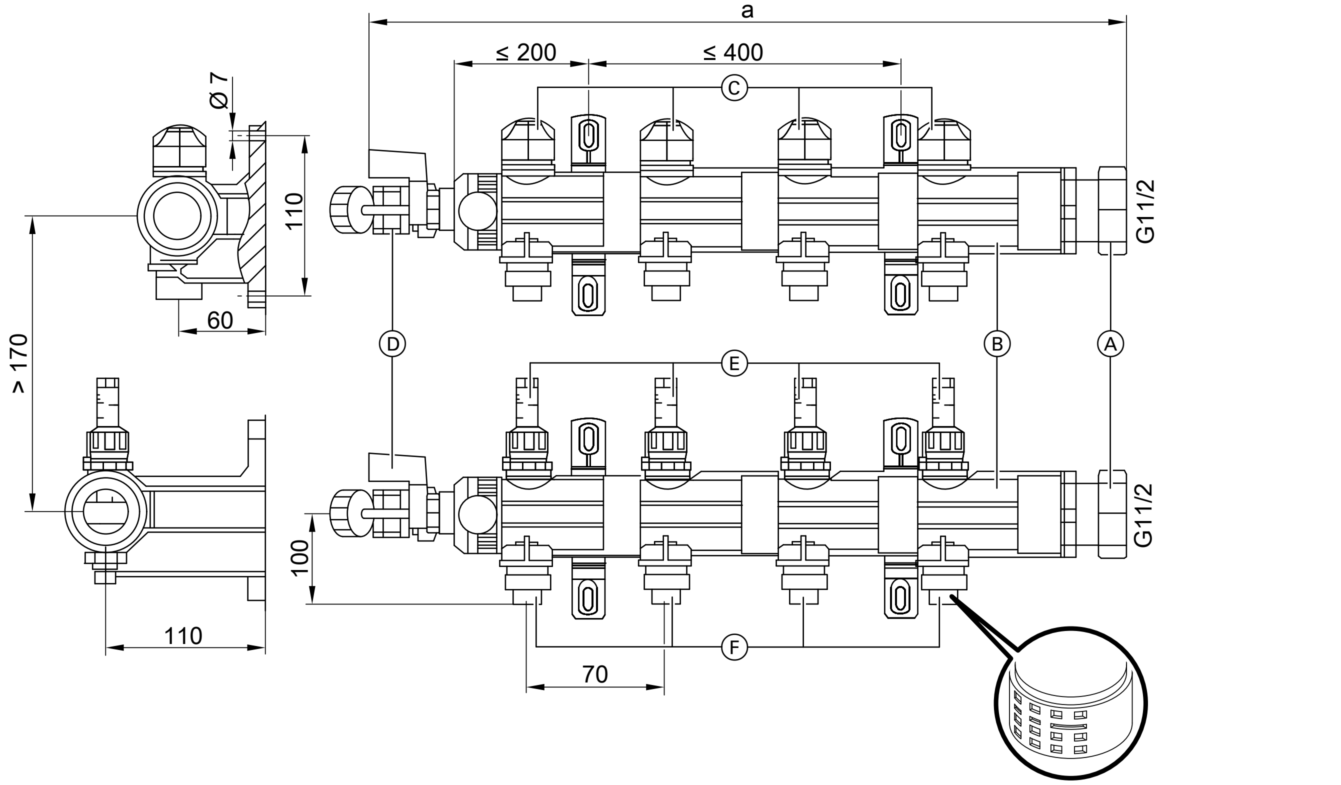
Brine manifold for geothermal probes/geothermal collectors

Locking ring fittings	Number of brine circuits	Part no.
PE 25 x 2.3	2	ZK01285
	3	ZK01286
	4	ZK01287
PE 32 x 2.9	2	ZK01288
	3	ZK01289
	4	ZK01290

Brine manifold for geothermal probes/geothermal collectors
Plastic brine manifold. Can be fitted to the house wall, in the cellar duct or in the central service duct.

Components:
- Flow and return connectors G 1½
- Locking ring fittings with plug-in connection onto the brine manifold
- Each brine circuit can be shut off individually
- 2 drain & fill valves
- Installation accessories

Up to 10 brine circuits can be connected in series to a single flow or return; up to 20 brine circuits can be connected in a parallel circuit. Brine manifolds for 2, 3 and 4 brine circuits can be combined in any order.

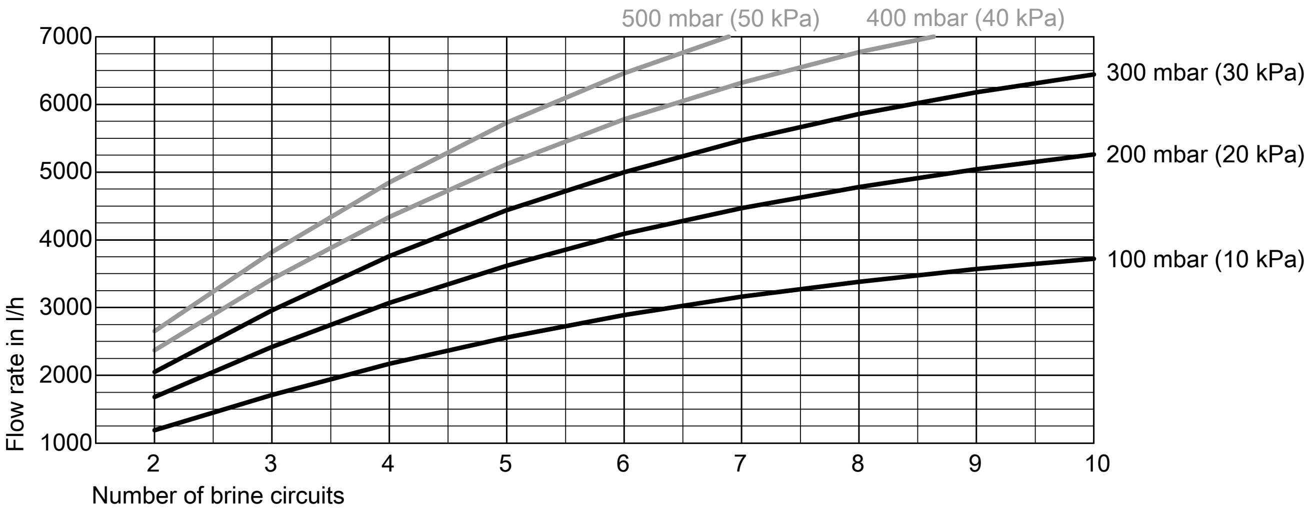


- (A) G 1½ union nut for connecting a ball valve or an additional module
- (B) G 1½ header
- (C) Brine circuit shut-off damper
- (D) Drain & fill valves
- (E) Flow limiter with integral brine circuit shut-off valve
- (F) Locking ring fittings for PE 32 x 2.9 mm or PE 25 x 2.3 mm with plug-in connection onto the brine manifold

Brine manifold length

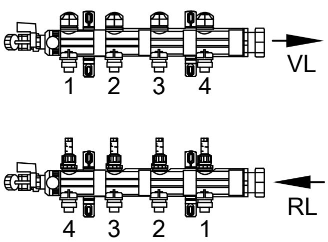
Number of brine circuits	2	3	4	5	6	7	8	9	10
Dimension a in mm	270	340	410	480	550	620	690	760	830

Brine manifold pressure drop



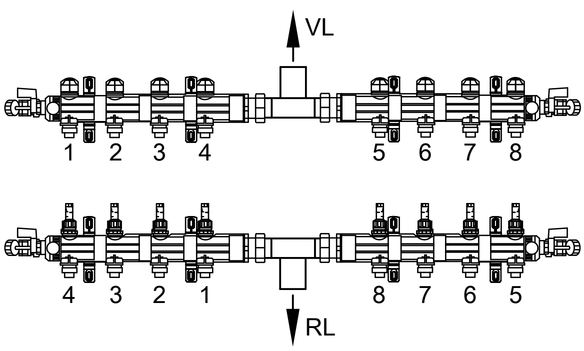
Pressure drop:
- Observe the primary pump residual head.
- Recommendation:
  Maximum brine manifold pressure drop: 300 mbar

Connection versions



Example for 4 brine circuits in series

RL Brine return
VL Brine flow



Example for 8 brine circuits in parallel

RL Brine return
VL Brine flow

Heat transfer medium "Tyfocor"

- 30 l in a disposable container
  Part no. 9532655
- 200 l in a disposable container
  Part no. 9542602

Light green ready mixed medium for the primary circuit, down to –16 °C, based on ethylene glycol with corrosion inhibitors

Filling station

Part no. 7188625
For filling the primary circuit

Components:
- Self-priming impeller pump (30 l/min)
- Dirt filter, inlet side
- Hose, inlet side (0.5 m)
- Connection hose (2 pce, each 2.5 m)
- Packing crate (can be used as flushing tank)

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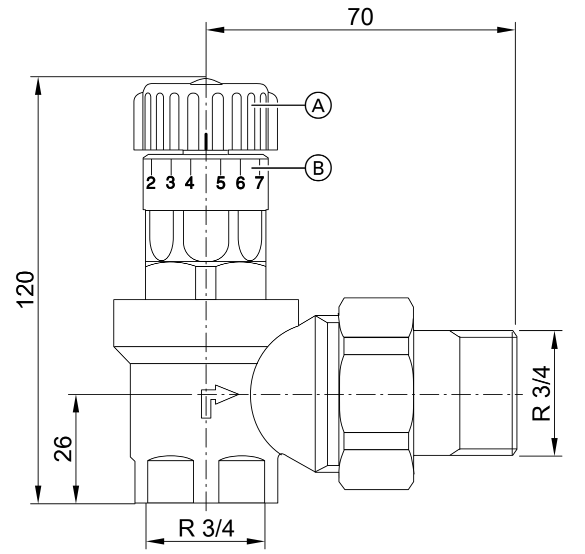
8.4 Heating circuit (secondary circuit)

Ball valve with filter (G 1¼)

Part no. ZK03206
- Ball valve with integral stainless steel water filter
- For installation in the heating water return and protection of the condenser against contamination

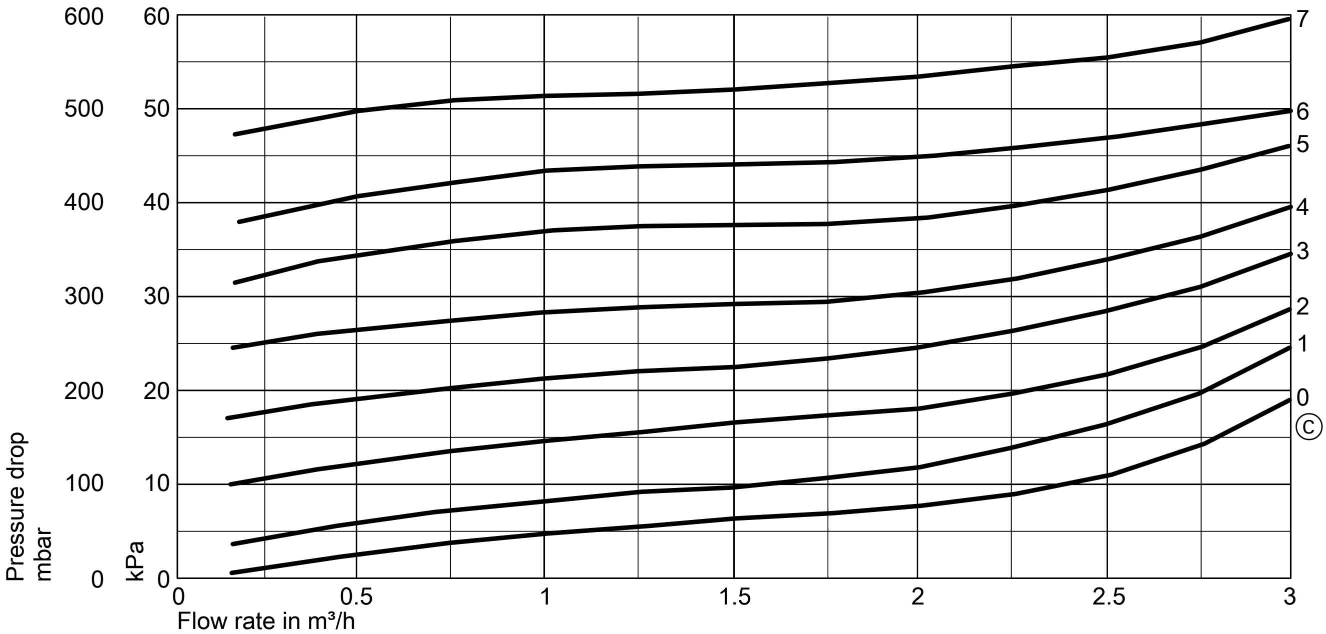
Overflow valve (R ¾)

Part no. ZK05500
- For installation in the secondary circuit
- To ensure the minimum flow rate
- For heat pumps with a secondary circuit flow rate of ≤ 2000 l/h



Ⓐ Setting wheel
Ⓑ Setting scale

Pressure drop graph



Ⓒ Valve position:
Position adjustment wheel Ⓐ on setting scale Ⓑ: See previous diagram.

Heating water buffer cylinder

Vitocell 100-W, type SVPA

Part no.: Z017685

Wall mounted heating water buffer cylinder for installation in the secondary circuit return
- For storing heating water in conjunction with heat pumps with up to 17 kW heating output
- For ensuring the minimum system volume

Standard delivery:
- Heating water buffer cylinder with EPS thermal insulation and sheet steel casing
- Wall mounting bracket
- Overflow valve

Vitocell 100-E, colour: Vitosilver
Vitocell 100-W, colour: Vitopearlwhite

Specification

Cylinder capacity (AT: Actual water capacity)	**l**	**46**
Max. flow temperature	°C	95
Max. operating pressure	bar MPa	3 0.3
Weight	kg	18
Connections (male thread) Heating water flow and return	G	1¼
Standby heat loss	kWh/24 h	0.94
Energy efficiency class		B

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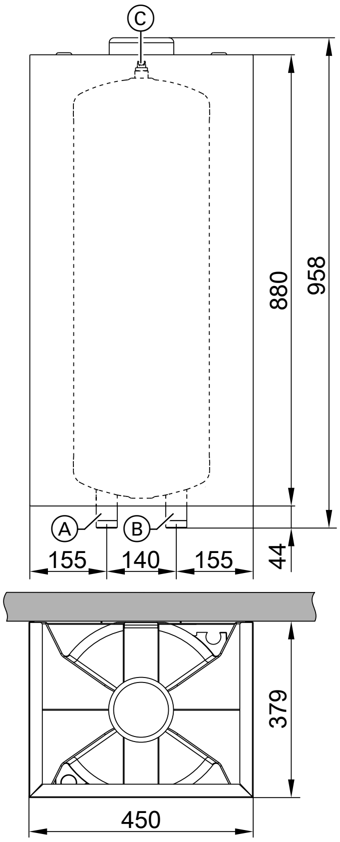
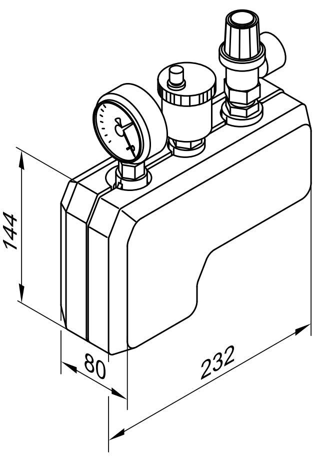


Ⓐ Heating water flow or heating water return R 1, as required
Ⓑ Heating water return or heating water flow R 1, as required
Ⓒ Air vent valve

Safety equipment block

Part no. 7143779

Components:
- Safety valve R ½ (discharge pressure 3 bar)
- Pressure gauge
- Automatic air vent valve with automatic shut-off facility
- Thermal insulation



Service box

Part no. 7334502
- Protective box for service folder with system documentation
- Can be secured on the heat generator or on the wall
- Colour: Vitosilver

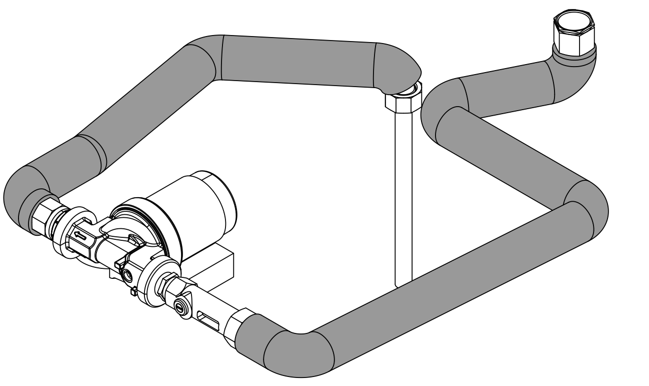
8

8.5 Hydraulic connection accessories

DHW circulation connection set

Part no. ZK04652

Components:
- DHW circulation pump
- Pipe assembly with thermal insulation
- For installation in the heat pump casing



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8.6 Divicon heating circuit distributor

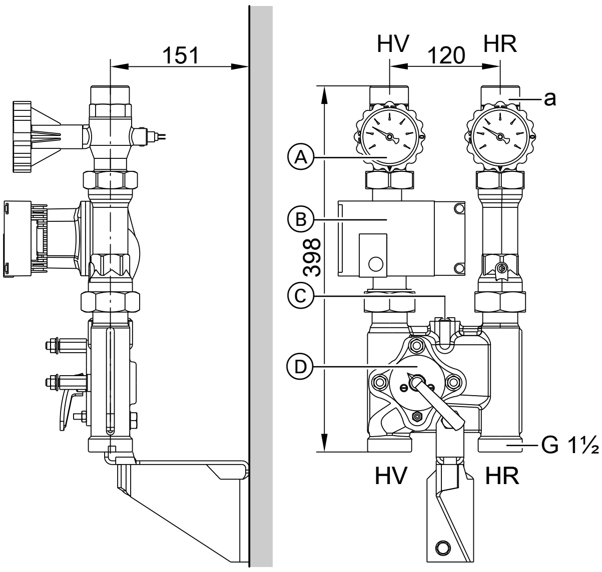
Note
The Divicon heating circuit distributor is not suitable for heating circuits that are also used for cooling operation.

Design and function

- Available with R ¾, R 1 and R 1¼ connections
- With heating circuit pump, check valve, ball valves with integral thermometers and 3-way mixer or without mixer
- Quick and simple installation due to pre-assembled unit and compact design
- All-round thermal insulation shells for low radiation losses
- High efficiency circulation pumps and optimised mixer curve ensure low electricity costs and precise control characteristics
- The bypass valve for hydronic balancing of the heating system is available as an accessory and is provided as a threaded component for inserting into the prepared hole in the cast body.
- Individually wall mounted or with a double manifold
- Also available as a set; see Viessmann pricelist for more details.

For part numbers in conjunction with the different circulation pumps, see the Viessmann pricelist.
The dimensions of the heating circuit distributor are the same, with or without mixer.

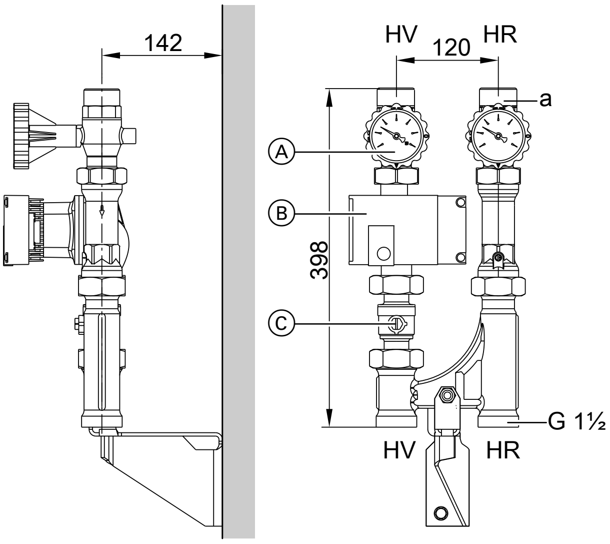
Divicon with mixer



Wall mounting, shown without thermal insulation and without mixer drive extension kit

HR Heating return
HV Heating flow
Ⓐ Ball valves with thermometer (as programming unit)
Ⓑ Circulation pump
Ⓒ Bypass valve (accessories)
Ⓓ Mixer-3

Divicon without mixer



Wall mounted, diagram without thermal insulation

HR Heating return
HV Heating flow
Ⓐ Ball valves with thermometer (as programming unit)
Ⓑ Circulation pump
Ⓒ Ball valve

Heating circuit connection	R	¾	1	1¼
Max. flow rate	m^3/h	1.0	1.5	2.5
a (female)	Rp	¾	1	1¼
a (male)	G	1¼	1¼	2

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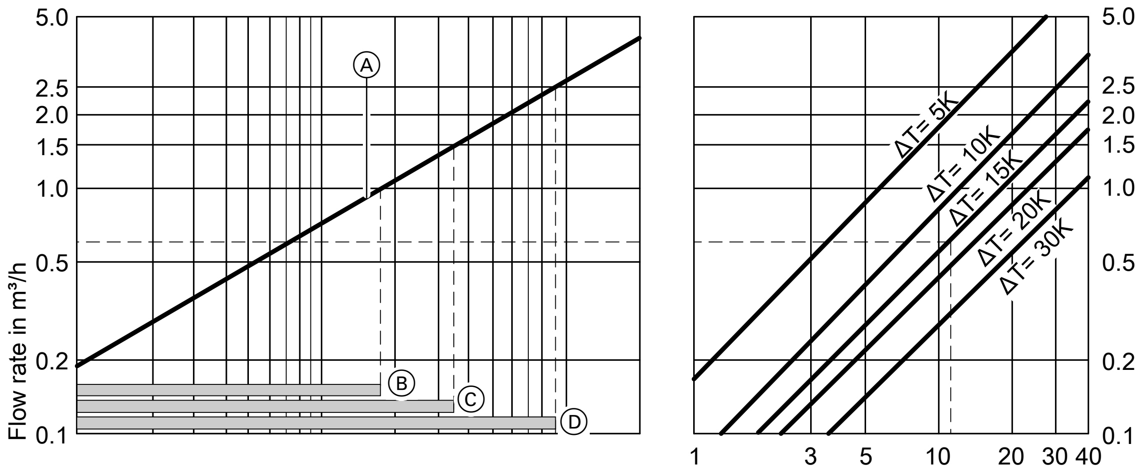
Determining the required nominal diameter



Mixer control characteristics

Heating circuit output in kW

Ⓐ Divicon with mixer-3
The operating ranges marked Ⓑ to Ⓓ provide optimum control characteristics with the Divicon mixer:

Ⓑ Divicon with mixer-3 (R ¾)
Operating range: 0 to 1.0 m^3/h

Ⓒ Divicon with mixer-3 (R 1)
Operating range: 0 to 1.5 m^3/h

Ⓓ Divicon with mixer-3 (R 1¼)
Operating range: 0 to 2.5 m^3/h

Example:
- Heating circuit for radiators with a heating output of $\dot{Q}$ = 11.6 kW
- Heating system temperature 75/60 °C (ΔT = 15 K)

$$\dot{Q} = \dot{m} \cdot c \cdot \Delta T \qquad c = 1.163 \frac{Wh}{kg \cdot K} \qquad \dot{m} \mathrel{\hat{=}} \dot{V} \ (1\ kg \approx 1\ dm^3)$$

$$\dot{V} = \frac{\dot{Q}}{c \cdot \Delta T} = \frac{11600\ W \cdot kg \cdot K}{1.163\ Wh \cdot (75\text{-}60)\ K} = 665 \frac{kg}{h} \mathrel{\hat{=}} 0.665 \frac{m^3}{h}$$

c Specific thermal capacity
$\dot{m}$ Mass flow rate
$\dot{Q}$ Heating output
$\dot{V}$ Flow rate

Select the smallest possible mixer within the application limit with the value $\dot{V}$.
Example result: Divicon with mixer-3 (R ¾)

Circulation pump curves and pressure drop on the heating water side

The residual pump head results from the differential between the selected pump curve and the pressure drop curve of the respective heating circuit distributor or further components (pipe assembly, distributor, etc.).
The following pump graphs show the pressure drop curves of the different Divicon heating circuit distributors.
Maximum flow rate for Divicon:
- With R ¾ = 1.0 m^3/h
- With R 1 = 1.5 m^3/h
- With R 1¼ = 2.5 m^3/h

Example:
Flow rate $\dot{V}$ = 0.665 m^3/h

Selected:
- Divicon with mixer R ¾
- Wilo Yonos PARA 25/6 circulation pump, variable differential pressure operating mode and set to maximum delivery head
- Pump rate 0.7 m^3/h

Head of the relevant pump curve:	48 kPa
Divicon pressure drop:	3.5 kPa
Residual head:	48 kPa – 3.5 kPa = 44.5 kPa.

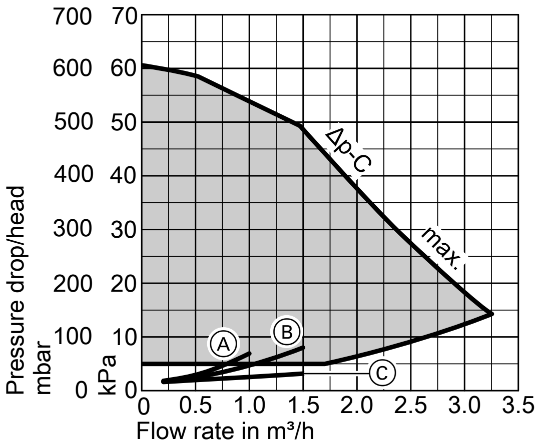
Note
For further components (pipe assembly, distributor, etc.) determine the pressure drop and deduct it from the residual head.

Differential pressure-dependent heating circuit pumps
According to the [German] Energy Saving Ordinance (EnEV), circulation pumps in central heating systems must be sized in accordance with current technical rules.
Ecodesign Directive 2009/125/EC requires high efficiency circulation pumps to be used throughout Europe from 1 January 2013, if the pumps are not installed in the heat generator.

Design information
The use of differential pressure-dependent heating circuit pumps requires heating circuits with variable flow rates, e.g. single-line and twin-line heating systems with thermostatic valves and underfloor heating systems with thermostatic valves or zone valves.

Wilo Yonos PARA 25/6
- Particularly power saving, high efficiency circulation pump
- Energy efficiency index EEI ≤ 0.20

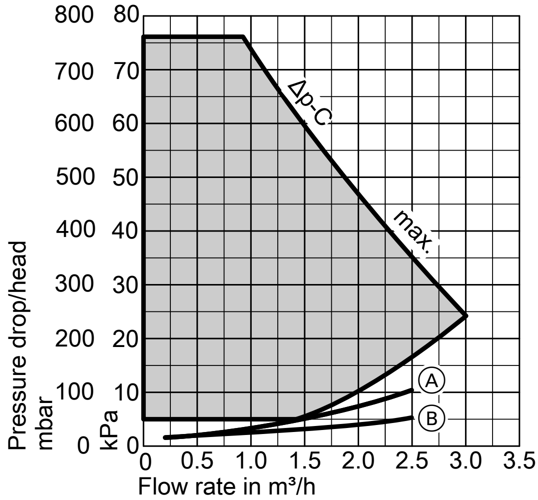
Operating mode: Constant differential pressure



Ⓐ Divicon R ¾ with mixer
Ⓑ Divicon R 1 with mixer
Ⓒ Divicon R ¾ and R 1 without mixer

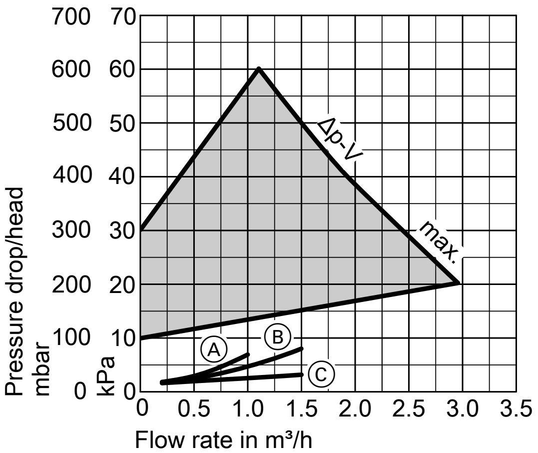
Wilo Yonos PARA Opt. 25/7.5
- Energy efficiency index EEI ≤ 0.21

Operating mode: Constant differential pressure



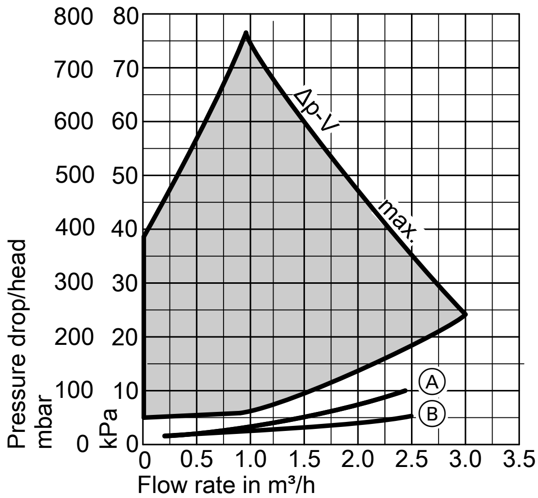
Ⓐ Divicon R 1¼ with mixer
Ⓑ Divicon R 1¼ without mixer

Operating mode: Variable differential pressure



Ⓐ Divicon R ¾ with mixer
Ⓑ Divicon R 1 with mixer
Ⓒ Divicon R ¾ and R 1 without mixer

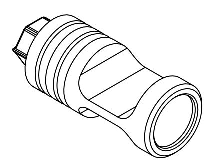
Operating mode: Variable differential pressure



Ⓐ Divicon R 1¼ with mixer
Ⓑ Divicon R 1¼ without mixer

Bypass valve

Part no. 7464889
- For hydronic balancing of the heating circuit with mixer
- To be inserted into the Divicon.



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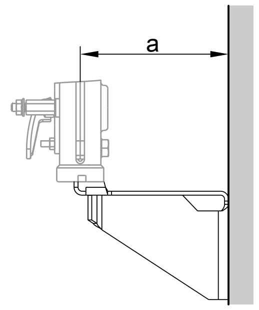
Wall mounting bracket for individual Divicon

Part no. 7465894
With screws and rawl plugs



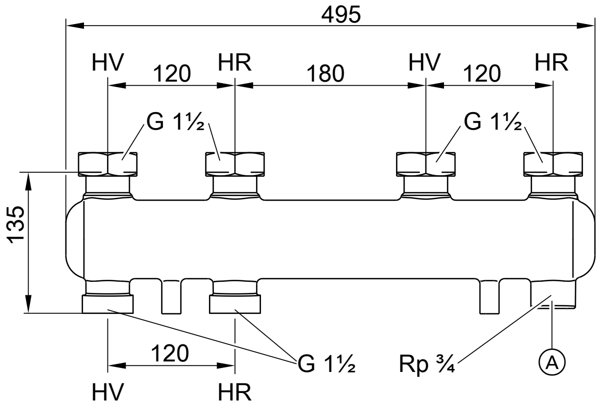
Divicon		With mixer	Without mixer
a	mm	151	142

Manifold

- With thermal insulation
- Wall mounted with wall mounting bracket to be ordered separately
- The connection between boiler and manifold must be made on site.

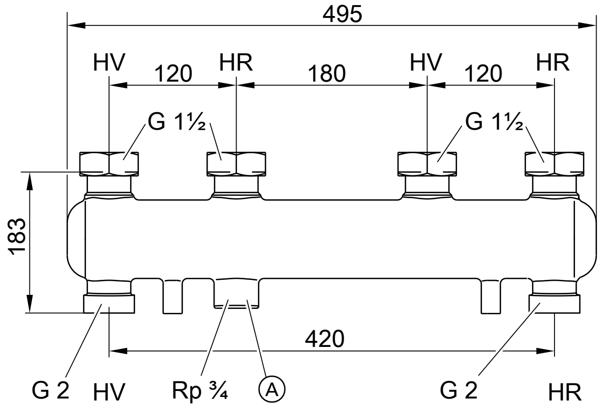
For 2 Divicons

Part no. 7460638
For Divicon R ¾ and R 1



Ⓐ Connection option for expansion vessel
HV Heating water flow
HR Heating water return

Part no. 7466337
For Divicon R 1¼



Ⓐ Connection option for expansion vessel
HV Heating water flow
HR Heating water return

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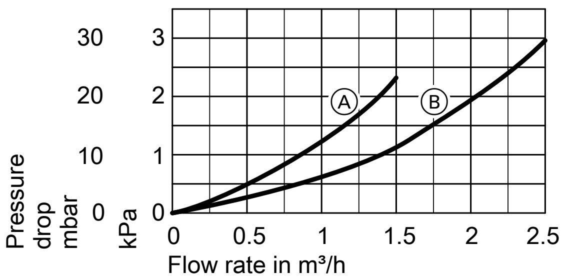
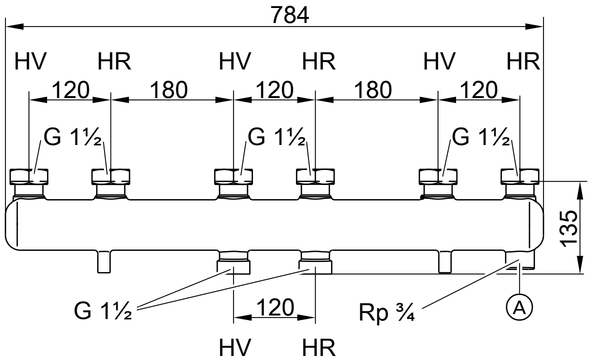
Pressure drop



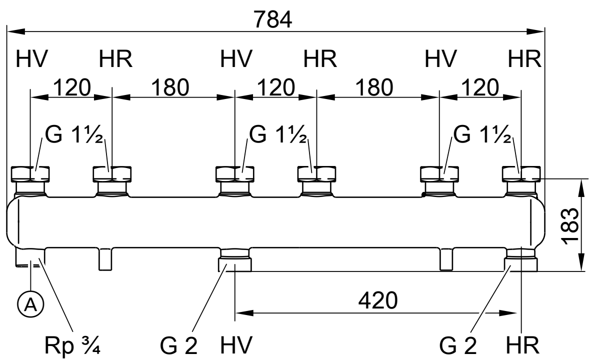
Ⓐ Manifold for Divicon R ¾ and R 1
Ⓑ Manifold for Divicon R 1¼

For 3 Divicons

Part no. 7460643	**Part no. 7466340**
For Divicon R ¾ and R 1	For Divicon R 1¼

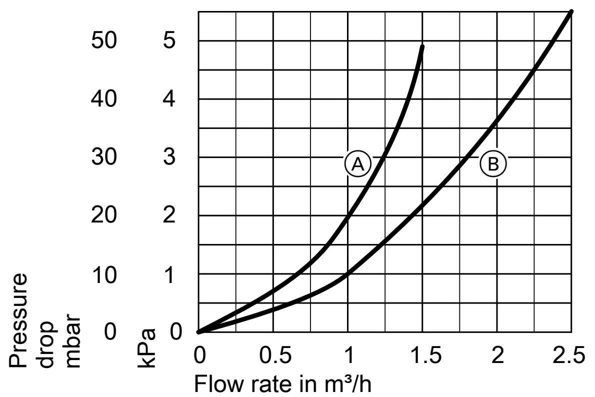


Ⓐ Connection option for expansion vessel
HV Heating water flow
HR Heating water return



Ⓐ Connection option for expansion vessel
HV Heating water flow
HR Heating water return

Pressure drop

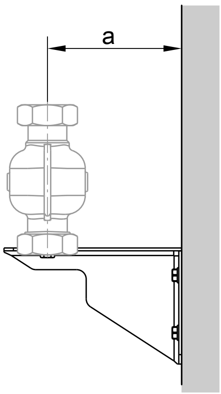


Ⓐ Manifold for Divicon R ¾ and R 1
Ⓑ Manifold for Divicon R 1¼

Wall mounting bracket for manifold

Part no. 7465439
With screws and rawl plugs

Divicon		R ¾ and R 1	R 1¼
a	mm	142	167



8.7 Accessories for DHW heating with Vitocell 100-W, type CVWA

Vitocell 100-W, type CVWA

For Vitocal 200-G/300-G, type BWC

Part no.	Cylinder capacity (AT: Actual water capacity)
Z017719	300 l
Z019215	390 l
Z019216	500 l

For DHW heating in conjunction with heat pumps up to 17 kW and solar collectors; also suitable for boilers and district heating systems

Suitable for the following systems:
- DHW temperature up to **95 °C**
- Heating water flow temperature up to **110 °C**
- Solar flow temperature up to **140 °C**
- Operating pressure on the **heating water side** up to **10 bar (1.0 MPa)**
- Operating pressure on the **solar side** up to **10 bar (1.0 MPa)**
- Operating pressure on the **DHW side** up to **10 bar (1.0 MPa)**

Vitocell 100-V, colour: Vitosilver
Vitocell 100-W, colour: White

Specification

Type			CVWA		
Cylinder capacity (AT: Actual water capacity)		**l**	**300**	**390**	**500**
Heating water capacity		l	22	27	40
Gross volume		l	322	417	540
DIN registration no.			9W173-13MC/E		
Continuous output for DHW heating from **10 to 45 °C** and a **heating water** flow temperature of … at the heating water flow rate stated below	90 °C	kW	85	98	118
		l/h	2093	2422	2896
	80 °C	kW	71	82	99
		l/h	1749	2027	2428
	70 °C	kW	57	66	79
		l/h	1399	1623	1950
	60 °C	kW	42	49	59
		l/h	1033	1202	1451
	50 °C	kW	25	29	36
		l/h	617	723	881
Continuous output for DHW heating from **10 to 60°C** and a **heating water** flow temperature of … at the heating water flow rate stated below	90 °C	kW	73	85	102
		l/h	1255	1458	1754
	80 °C	kW	58	67	81
		l/h	995	1159	1399
	70 °C	kW	41	48	59
		l/h	710	830	1008
Heating water flow rate for the stated continuous outputs		m^3/h	3.0	3.0	3.0
Draw-off rate		l/min	15	15	15

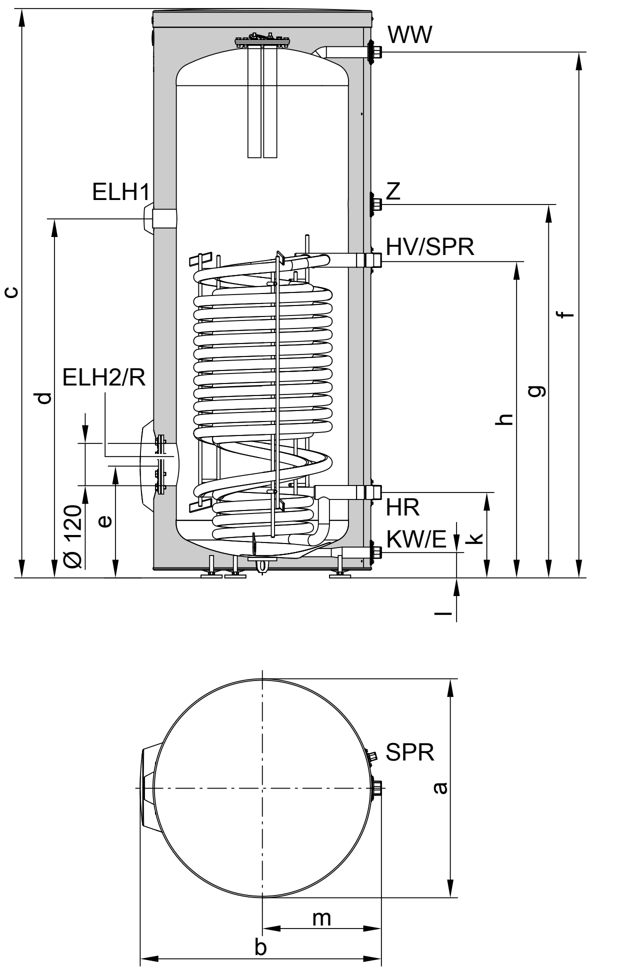
Type			CVWA		
Cylinder capacity **(AT: Actual water capacity)**		**l**	**300**	**390**	**500**
Drawable water volume without reheating					
– Cylinder content heated to 45 °C Water at t = 45 °C (constant)		l	210	285	350
– Cylinder content heated to 55 °C Water at t = 55 °C (constant)		l	210	285	350
Heat-up time if connected to a heat pump with 16 kW rated heating output and a heating water flow temperature of 55 **or** 65 °C					
– For DHW heating from 10 to 45 °C		min	50	60	66
– For DHW heating from 10 to 55 °C		min	60	76	85
Max. connectable heat pump output at 65 °C heating water flow and 55 °C DHW temperature and the specified heating water flow rate		kW	12	15	17
Max. aperture area that can be connected to the solar heat exchanger set (accessories)					
– Vitosol-T		m^2	—	6	6
– Vitosol-F		m^2	—	11.5	11.5
Performance factor N_L in conjunction with a heat pump					
Cylinder storage temperature	45 °C		1.7	2.5	3.5
	50 °C		1.9	2.8	3.9
Standby heat loss		kWh/24 h	1.65	1.80	1.90
Dimensions					
Length (∅)					
– With thermal insulation	a	mm	667	859	859
– Excl. thermal insulation		mm	—	650	650
Total width					
– With thermal insulation	b	mm	744	923	923
– Excl. thermal insulation		mm	—	881	881
Height					
– With thermal insulation	c	mm	1734	1624	1948
– Excl. thermal insulation		mm	—	1522	1844
Height when tilted					
– Incl. thermal insulation		mm	1825	—	—
– Excl. thermal insulation		mm	—	1550	1860
Entire **weight** incl. thermal insulation		kg	180	190	200
Heating surface		m^2	3.0	4.0	5.5
Connections					
Heating water flow and return (male thread)		R	1¼	1¼	1¼
Cold water, DHW (male thread)		R	1	1	1
Solar heat exchanger set (male thread)		R	—	¾	¾
DHW circulation (male thread)		R	¾	¾	¾
Immersion heater (female thread)		Rp	1½	1½	1½
Energy efficiency class			B	B	B

Information regarding continuous output
When designing systems with the specified or calculated continuous output, select a matching circulation pump. The stated continuous output is achieved only if the rated boiler heating output is ≥ continuous output.

Take the following into account when sizing entry points:
The actual dimensions of the DHW cylinder may vary slightly due to manufacturing tolerances.

Installation accessories (cont.)

300 litre capacity



Dimensions

Cylinder capacity		**l**	**300**
Length (∅)	a	mm	667
Width	b	mm	744
Height	c	mm	1734
	d	mm	1063
	e	mm	314
	f	mm	1601
	g	mm	1137
	h	mm	967
	k	mm	261
	l	mm	77
	m	mm	360

E Drain outlet
ELH1 Connector for immersion heater
ELH2 Flanged aperture for immersion heater
HR Heating water return
HV Heating water flow
KW Cold water
R Inspection and cleaning aperture with flange cover
SPR Sensor well for cylinder temperature sensor or temperature controller (internal diameter 16 mm)
WW DHW
Z DHW circulation

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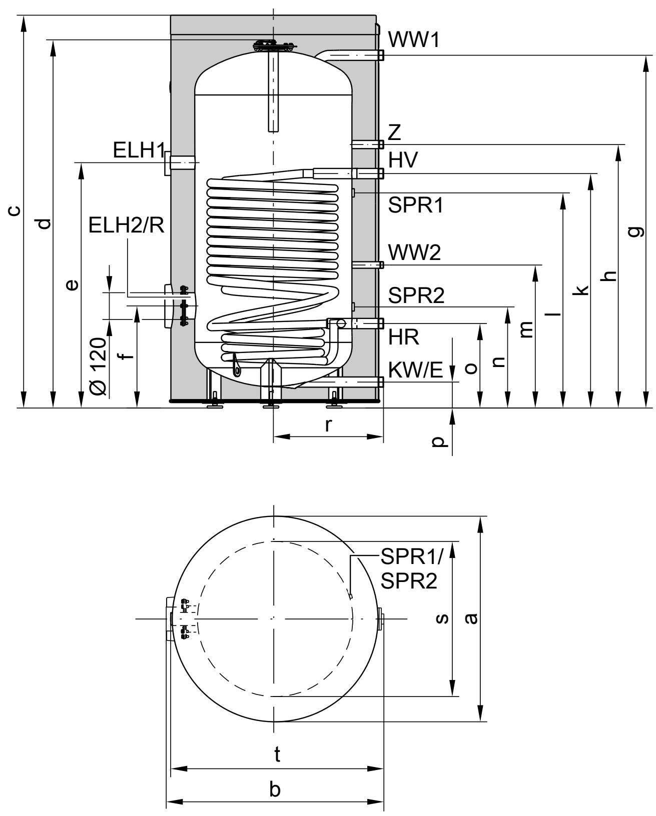
390 and 500 l capacity



Dimensions

Cylinder capacity		l	390	500
Length (∅)	a	mm	859	859
Width	b	mm	923	923
Height	c	mm	1624	1948
	d	mm	1522	1844
	e	mm	1000	1307
	f	mm	403	442
	g	mm	1439	1765
	h	mm	1070	1370
	k	mm	950	1250
	l	mm	816	1116
	m	mm	572	572
	n	mm	366	396
	o	mm	330	330
	p	mm	88	88
	r	mm	455	455
	s	mm	650	650
	t	mm	881	881

Performance factor N_L

To DIN 4708

Cylinder storage temperature T_{cyl} = cold water inlet temperature + 50 K $^{+5\,K/-0\,K}$

E Drain outlet
ELH1 Connector for immersion heater
ELH2 Flanged aperture for immersion heater
HR Heating water return
HV Heating water flow
KW Cold water
R Inspection and cleaning aperture with flange cover
SPR1 Clamping device for securing immersion temperature sensors to the cylinder jacket. Fixing point for 3 immersion temperature sensors per clamping device
SPR2 Clamping device for securing immersion temperature sensors to the cylinder jacket. Fixing point for 3 immersion temperature sensors per clamping device
WW1 DHW
WW2 DHW from solar heat exchanger set
Z DHW circulation

Cylinder capacity	l	300	390	500
Performance factor N_L				
at heating water flow temperature				
90 °C		9.5	12.6	16.5
80 °C		8.5	11.3	14.9
70 °C		7.5	10.0	13.3

Installation accessories (cont.)

Information on performance factor N_L

The performance factor N_L depends on the cylinder storage temperature T_{cyl}.

Standard values
- T_{cyl} = 60 °C → 1.0 × N_L
- T_{cyl} = 55 °C → 0.75 × N_L
- T_{cyl} = 50 °C → 0.55 × N_L
- T_{cyl} = 45 °C → 0.3 × N_L

Peak output (over 10 minutes)

Relative to performance factor N_L

DHW heating from 10 to 45 °C

Cylinder capacity	**l**	**300**	**390**	**500**
Peak output				
at heating water flow temperature				
90 °C	l/10 min	415	540	690
80 °C	l/10 min	400	521	667
70 °C	l/10 min	357	455	596

Max. draw-off rate (over 10 minutes)

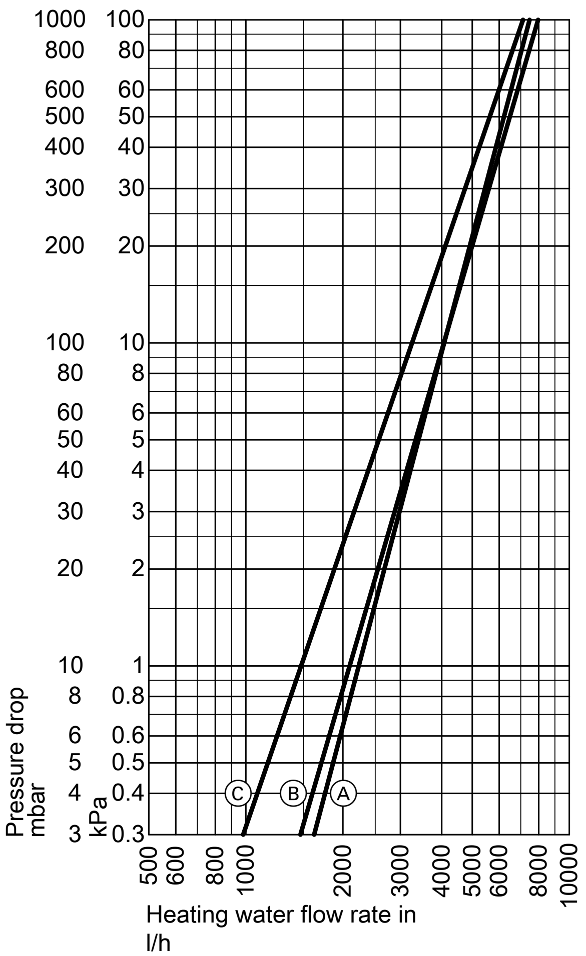
Relative to performance factor N_L

With reheating

DHW heating from 10 to 45 °C

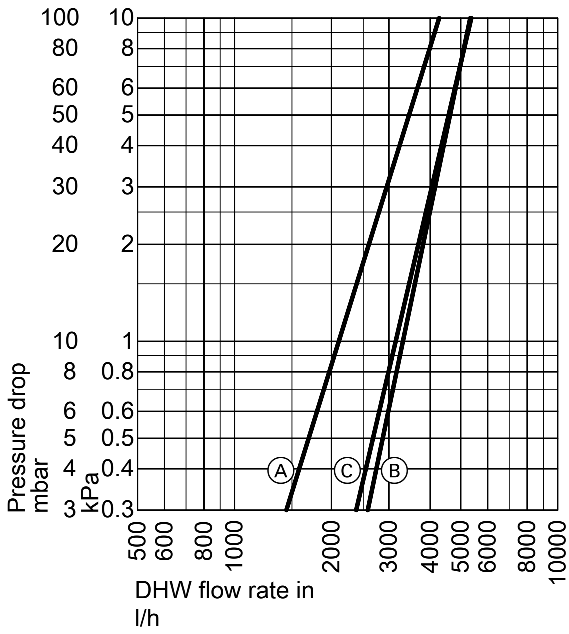
Cylinder capacity	**l**	**300**	**390**	**500**
Max. draw-off rate				
at heating water flow temperature				
90 °C	l/min	41	54	69
80 °C	l/min	40	52	66
70 °C	l/min	35	46	59

Pressure drop on the heating water side



Ⓐ Cylinder capacity 300 l
Ⓑ Cylinder capacity 390 l
Ⓒ Cylinder capacity 500 l

Pressure drop on the DHW side



Ⓐ Cylinder capacity 300 l
Ⓑ Cylinder capacity 390 l
Ⓒ Cylinder capacity 500 l

System check with DHW cylinder

The system check in conjunction with the Vitocell 100-W, type CVWA has been carried out with the following heat pumps:

		Vitocal 200-G		**Vitocal 300-G**
		Type BWC 201.B08	**Type BWC 201.B13**	**Type BWC 301.C12**
Vitocell 100-W, type		CVWA	CVWA	CVWA
Cylinder capacity (AT: Actual water capacity)	l	300	300	300
Max. drawable water volume – DHW temperature 40 °C – Cylinder storage temperature 53 °C – Draw-off rate 10 l/min	l	401	401	401
Max. DHW temperature				
– Only with heat pump at primary inlet temperature between 0 °C and 10 °C	°C	55	55	60
– With instantaneous heating water heater	°C	63	63	65
Energy efficiency, DHW heating η_{wh}	%	114	106	114
Coefficient of performance ε (COP_{DHW})		2.78	2.66	2.80
Draw-off profile		XL	XL	XL

Immersion heater EHE

Part no. Z012684

For installation in the connector in the **upper** section of the Vitocell 100-V/100-W, type CVWA with cylinder capacity **300 l**/**390 l**/**500 l**

- Use the immersion heater only with soft to medium hard water up to 14 °dH (hardness level 2, up to 2.5 mol/m^3).
- The heating output can be selected: 2, 4 or 6 kW

Components:

- High limit safety cut-out
- Temperature controller

Note

- *A contactor relay, part no. 7814681, is required for switching the immersion heater via the heat pump.*
- *The immersion heater is not intended for operation with 230 V~. If no 400 V connection is available, use commercially available immersion heaters.*

Specification

Output	**kW**	**2**	**4**	**6**
Rated voltage		3/N/PE 400 V/50 Hz		
IP rating		IP 44		
Rated current	A	8.7	8.7	8.7
Heat-up time from 10 to 60 °C				
– Immersion heater in the bottom section	h	8.5	4.3	2.8
– Immersion heater in the top section	h	4.0	2.0	1.3
Content that can be heated by the immersion heater				
– Immersion heater in the bottom section	l	294		
– Immersion heater in the top section	l	136		

Immersion heater EHE

- **Part no. Z019217**:
  For installation in the flanged aperture in the **lower** section of the Vitocell 100-V/100-W, type CVWA with a cylinder capacity of **300 l**
- **Part no. Z019218**:
  For installation in the connector in the **lower** section of the Vitocell 100-V/100-W, type CVWA with a cylinder capacity of **390 l** and **500 l**
- Use the immersion heater only with soft to medium hard water with a calcium hardness up to 14 °dH (hardness level 2, up to 2.5 mol/m^3).
- The heating output can be selected: 2, 4 or 6 kW

Components:

- High limit safety cut-out
- Temperature controller

Note

- *A contactor relay, part no. 7814681, is required for switching the immersion heater via the heat pump.*
- *The immersion heaters are not designed for 230 V~ operation. If no 400 V connection is available, use commercially available immersion heaters.*

Specification

Output	**kW**	**2**	**4**	**6**
Rated voltage		3/N/PE 400 V/50 Hz		
IP rating		IP 44		
Rated current	A	8.7	8.7	8.7
Heat-up time from 10 to 60 °C				
– Immersion heater in the bottom section	h	8.5	4.3	2.8
– Immersion heater in the top section	h	4.0	2.0	1.3
Content that can be heated by the immersion heater				
– Immersion heater in the bottom section	l	294		
– Immersion heater in the top section	l	136		

Solar heat exchanger set

Part no. 7186663

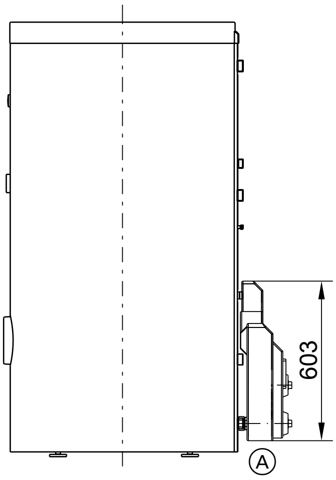
For the connection of solar collectors to the Vitocell 100-V/100-W, type CVWA (390 and 500 l capacity)
Suitable for systems to DIN 4753. Total water hardness of up to 20 °dH (3.6 mol/m^3)

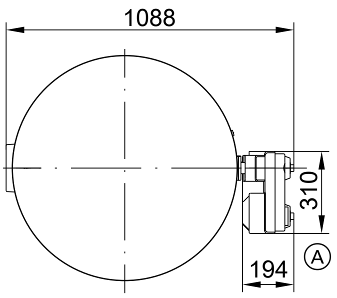
Max. collector surface area that can be connected:

- 11.5 m^2 flat-plate collectors
- 6 m^2 tube collectors

Specification

Permissible temperatures	
Solar side	140 °C
Heating water side	110 °C
DHW side	
– For boiler operation	95 °C
– For solar operation	60 °C
Permissible operating pressure Solar side, heating and DHW side	10 bar (1.0 MPa)
Test pressure Solar side, heating and DHW side	13 bar (1.3 MPa)
Minimum wall clearance For installation of the solar heat exchanger set	350 mm
Circulation pump	
Power supply	230 V/50 Hz
IP rating	IP 42





Ⓐ Solar heat exchanger set

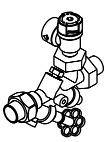
Impressed current anode

Part no. Z004247
- Maintenance-free
- For installation in the Vitocell 100-V/100-W, type CVWA in place of the supplied protective magnesium anode

Safety assembly to DIN 1988

Part no. 7180662, 10 bar (1 MPa)
AT: Part no. 7179666, 6 bar (0.6 MPa)

- DN 20/R 1
- Max. heat input: 150 kW



Components:
- Shut-off valve
- Non-return valve and test connector
- Pressure gauge connector
- Diaphragm safety valve

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8.8 Accessories for DHW heating with cylinder loading system

Vitocell 100-L, type CVL/CVLA

For Vitocal 200-G/300-G/350-G

Part no.	Cylinder type	Cylinder capacity (AT: Actual water capacity)
Z002074	CVL	500 l
Z015313	CVLA	750 l
Z015314	CVLA	950 l

Cylinder for DHW heating in a cylinder loading system

Suitable for systems with the following parameters:
- Max. DHW temperature in the cylinder **95 °C**
- Operating pressure on the **DHW side** up to **10 bar (1.0 MPa)**

Vitocell 100-L, colour: Vitosilver

Specification

Type			CVL	CVLA	CVLA
Cylinder capacity (AT: Actual water capacity)		l	**500**	**750**	**950**
DIN registration number			0256/08-13	Applied for	
Standby heat loss		kWh/24 h	1.95	2.28	2.48
Dimensions					
Length (∅)					
– Incl. thermal insulation	a	mm	859	1062	1062
– Excl. thermal insulation		mm	650	790	790
Width					
– Incl. thermal insulation	b	mm	923	1110	1110
– Excl. thermal insulation		mm	837	1005	1005
Height					
– Incl. thermal insulation	c	mm	1948	1897	2197
– Excl. thermal insulation		mm	1844	1817	2123
Height when tilted					
– Excl. thermal insulation		mm	1860	1980	2286
Weight, cylinder					
– Excl. thermal insulation		kg	136	235	284
– Incl. thermal insulation		kg	156	260	314
Connections (male thread)					
DHW inlet from the heat exchanger		R	2	2	2
Cold water, DHW		R	2	2	2
DHW circulation, drain outlet		R	1¼	1¼	1¼
Energy efficiency class			B	—	—

Take the following into account when sizing entry points:
The actual dimensions of the DHW cylinder may vary slightly due to manufacturing tolerances.

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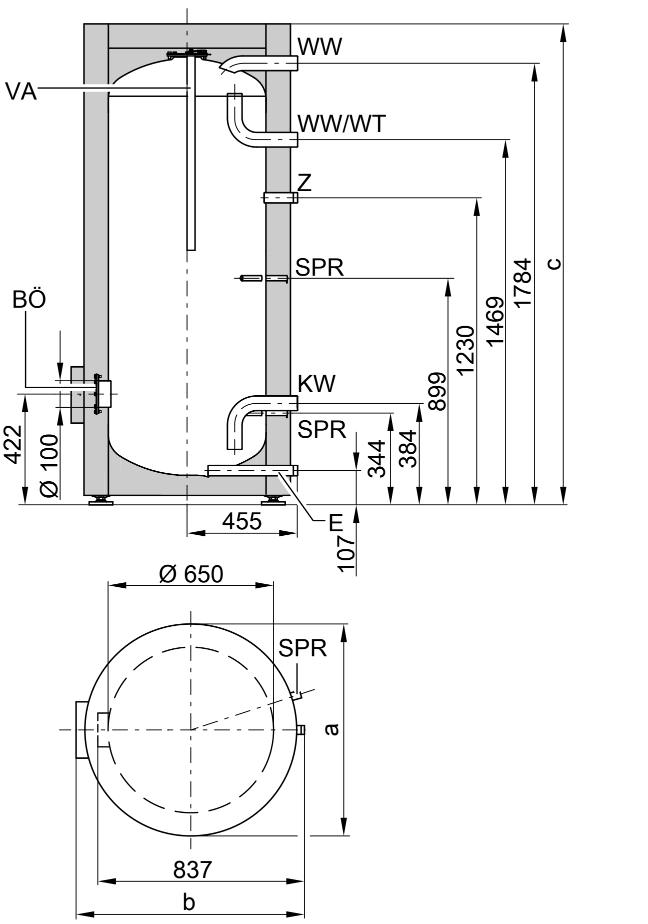
500 l capacity

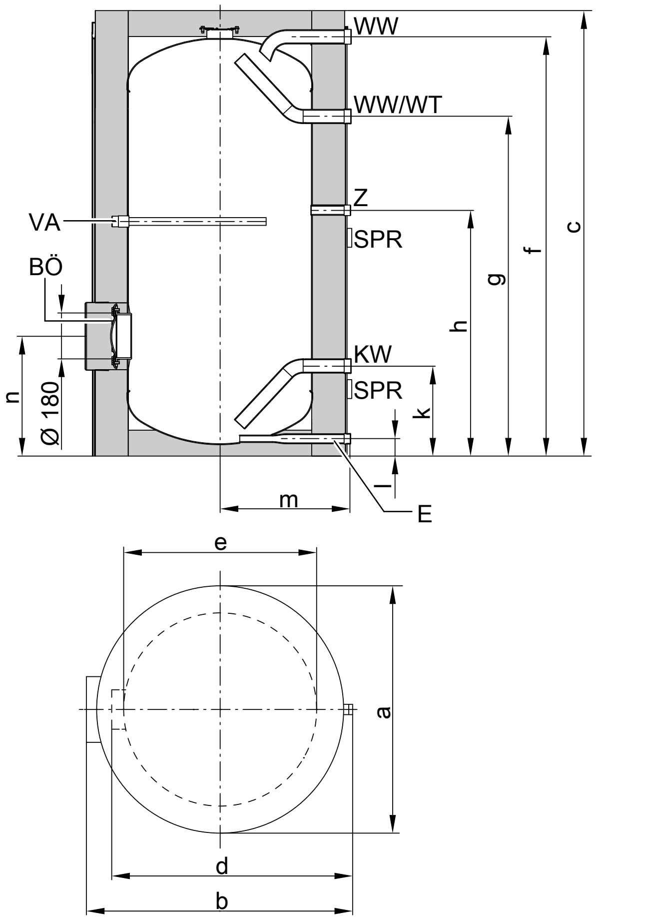


BÖ Inspection and cleaning aperture
E Drain
KW Cold water
SPR Sensor well for cylinder temperature sensor and temperature controller (internal diameter 16 mm)
VA Protective magnesium anode
WW DHW
WW/WT Hot water inlet from the heat exchanger
Z DHW circulation

Dimensions

Cylinder capacity		**l**	**500**
Length (∅)	a	mm	859
Width	b	mm	923
Height	c	mm	1948

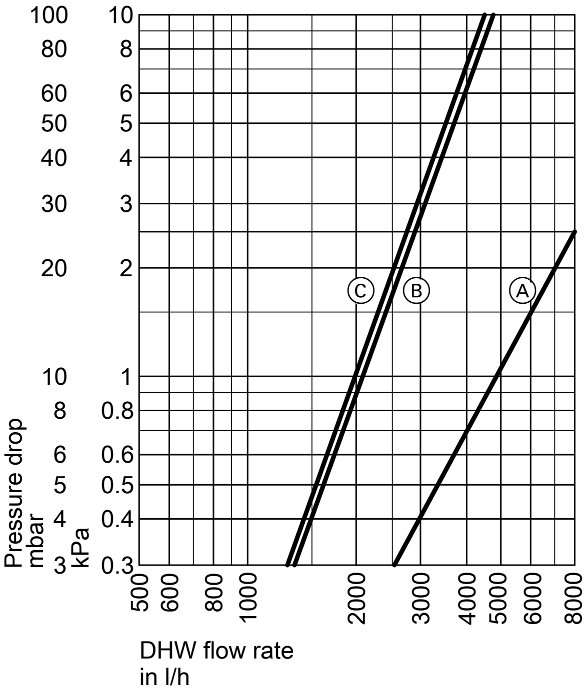
750 and 950 l capacity



Dimensions				
Cylinder capacity		**l**	**750**	**950**
Length (∅)	a	mm	1062	1062
Width	b	mm	1110	1110
Height	c	mm	1897	1897
	d	mm	1005	1005
∅ excl. thermal insulation	e	mm	790	790
	f	mm	1785	2090
	g	mm	1447	1752
	h	mm	1049	1285
	k	mm	338	379
	l	mm	79	79
	m	mm	555	555
	n	mm	514	506

BÖ Inspection and cleaning aperture
E Drain
KW Cold water
SPR Clamping system for fixing immersion temperature sensors to the cylinder jacket. Fixing points for 3 immersion temperature sensors
VA Protective magnesium anode
WW DHW
WW/WT Hot water inlet from the heat exchanger
Z DHW circulation

Pressure drop on the DHW side



Ⓐ 500 l cylinder capacity
Ⓑ 750 l cylinder capacity
Ⓒ 950 l cylinder capacity

Heating lance

Part no. ZK00037
- For DHW heating with a heat pump via an external heat exchanger (cylinder loading system)
- For installation in the flanged aperture of the Vitocell 100-L, type CVL with a cylinder volume of **500 l**

Heating lance made from plastic suitable for potable water applications
- Tube with end cap and several openings
- Flange
- Gasket
- Flange hood

Note
The heating lance may be used in conjunction with an immersion heater EHE.

Impressed current anode

Part no. 7265008
- Maintenance free
- Install in place of the magnesium anode supplied

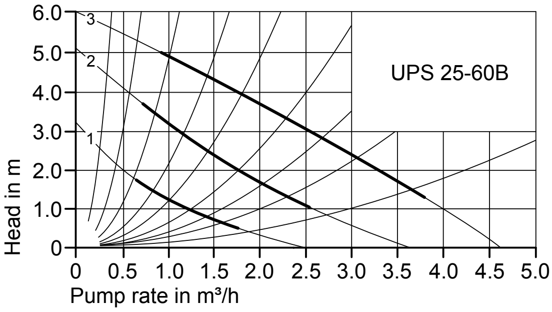
Cylinder loading pump

For DHW heating via an on-site plate heat exchanger:
- Grundfos UPS 25-60 B
  Part no. 7820403
- Grundfos UPS 32-80 B
  Part no. 7820404

Installation accessories (cont.)

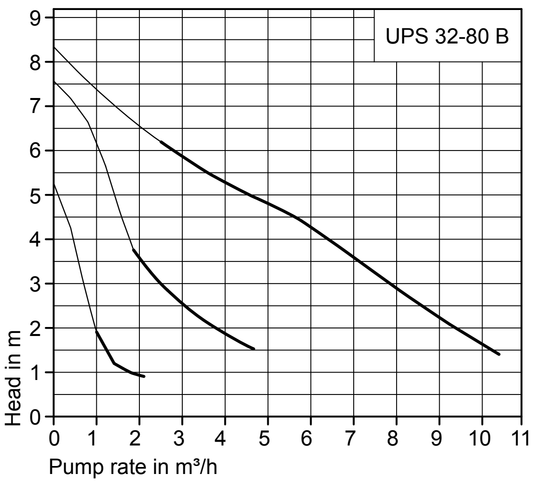
Curves

Type UPS 25-60 B, 230 V~



Power consumption: 45 to 90 W

Type UPS 32-80 B, 230 V~



Power consumption: 135 to 225 W

2-way motorised ball valve (DN 32)

Part no. 7180573

To heat DHW with a primary store system; may be used as a shut-off valve.

- With electric drive (230 V~)
- Connection R 1¼

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8.9 Accessories for DHW heating with freshwater module/heating water storage

Vitocell 120-E, type SVW, 600 l

For Vitocal 200-G/300-G, type BWC

Cylinder capacity 600 l

Part no.	With Vitotrans 353
Z015393	Type PZSA Draw-off rate 25 l/min
Z015394	Type PZMA Draw-off rate 48 l/min

For storing heating water in conjunction with heat pumps up to 17.2 kW rated heating output; DHW heating with Vitotrans 353; option to integrate an immersion heater and a conventional heat generator

Suitable for the following systems:
- DHW temperature up to **95 °C**
- Heating water flow temperature up to **95 °C**
- Operating pressure on the **heating water side** up to **3 bar (0.3 MPa)**
- Operating pressure on the **DHW side** up to **10 bar (1.0 MPa)**

Vitocell 120-E, colour: Vitosilver

Specification

Type			**SVW**	
Cylinder capacity		**l**	**600**	
AT: Actual water content				
– DHW zone (top) for Vitotrans 353		l	350	
– Heating circuit zone (bottom)		l	250	
Vitotrans 353		Type	PZSA	PZMA/PZMA-S
Continuous output (in conjunction with Vitocal 16 kW rated heating output) For DHW heating from **10 to 45 °C** and heating water flow temperature	55 °C	kW	15	15
		l/h	372	372
Draw-off rate		l/min	20	20
Drawable water volume without reheating				
– DHW zone heated to 55 °C; water at T = 45 °C (constant)		l	315	315
– DHW zone heated to 60 °C; water at T = 45 °C (constant)		l	345	345
DHW zone heat-up time (in conjunction with Vitocal) For heating from 15 to 50 °C and a rated heating output of	9 kW	min	84	84
	13 kW	min	58	58
	16 kW	min	57	57
DHW zone heat-up time (in conjunction with Vitocal) For heating from 15 to 55 °C and a rated heating output of	9 kW	min	90	90
	13 kW	min	62	62
	16 kW	min	50	50
Max. connectable rated heating output of a heat pump		kW	17.2	17.2
Continuous output (in conjunction with conventional heat generators) For DHW heating from **10 to 45 °C** and a **heating water** flow temperature of … at the heating water flow rate stated below	90 °C	kW	81	146
		l/h	1980	3600
	80 °C	kW	81	146
		l/h	1980	3600
	70 °C	kW	81	146
		l/h	1980	3600
	60 °C	kW	61	117
		l/h	1500	2880
	55 °C	kW	52	100
		l/h	1260	2460
Continuous output (in conjunction with conventional heat generators) For DHW heating from **10 to 60°C** and a **heating water** flow temperature of … at the heating water flow rate stated below	90 °C	kW	108	195
		l/h	1860	3360
	80 °C	kW	88	164
		l/h	1500	2820
	70 °C	kW	65	127
		l/h	1140	2220
Heating water flow rate for the stated continuous outputs		m^3/h	3.0	3.0
Standby heat loss		kWh/24 h	2.1	2.1

Type		**SVW**	
Cylinder capacity **AT: Actual water content**	**l**	**600**	
Dimensions			
Complete with Vitotrans 353 and thermal insulation			
– Length (∅)	mm	1064	1064
– Total width	mm	1466	1466
– Height	mm	1645	1645
Heating water buffer cylinder (cylinder body)			
– Length (∅)	mm	790	790
– Width	mm	1062	1062
– Height	mm	1520	1520
Height when tilted without adjustable feet	mm	1630	1630
Weight			
– Complete with Vitotrans 353 and thermal insulation	kg	143	150
– Heating water buffer cylinder without thermal insulation	kg	96	96
– Heating water buffer cylinder with thermal insulation	kg	119	119
Heating water buffer cylinder connections			
– Heating water flow and return (male thread)	R	1¼	
– Heating water flow heating lance (male thread)	G	1½	
– Immersion heater (female thread)	Rp	1½	
Energy efficiency class		B	

For a more detailed specification of and accessories for Vitotrans 353, see "Vitotrans 353" datasheet.

Information regarding continuous output

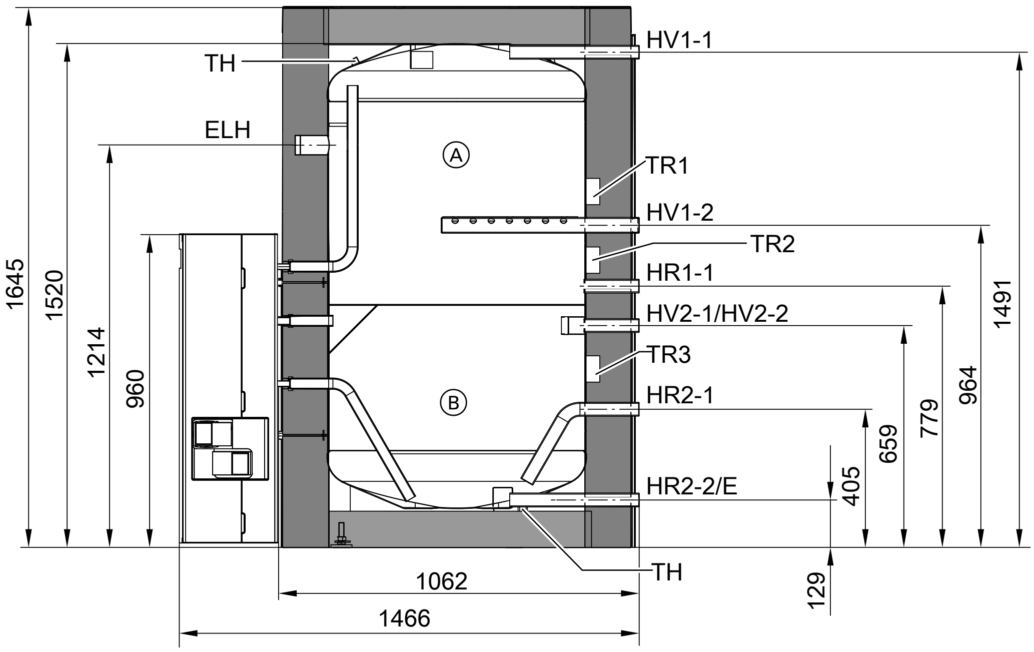
When designing systems with the specified or calculated continuous output, select a matching circulation pump. The stated continuous output is only achieved if the rated heating output of the heat generator is ≥ the continuous output.

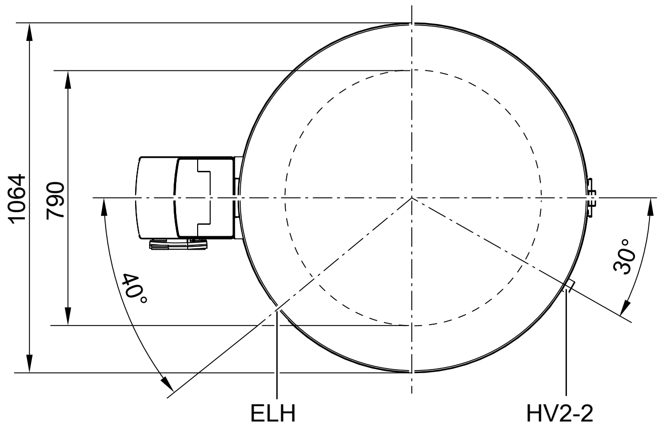
DHW temperature in conjunction with heating water buffer cylinder and freshwater module

Where planning measures must ensure a DHW temperature of at least 60 °C at the outlet of the freshwater module, a heat pump operating in mono mode can ***only*** *provide basic heating of the heating water buffer cylinder. Complete heating up to the set buffer temperature must be provided by means of an additional heat generator, e.g. an electric instantaneous heating water heater or peak load boiler.*

Take the following into account when sizing entry points:

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





Ⓐ	DHW zone
Ⓑ	Heating circuit zone
E	Drain
ELH	Immersion heater
HR1-1	Heating water return, DHW zone (heat pump/external heat generator)
HR2-1	Heating water return, heating circuit zone (heat pump)
HR2-2	Heating water return (heating circuit)
HV1-1	Heating water flow, DHW zone (external heat generator)
HV1-2	Heating water flow, DHW zone (heat pump to heating lance)
HV2-1	Heating water flow, heating circuit zone (heat pump)
HV2-2	Heating water flow (heating circuit)
TH	Retainer for thermometer sensor or additional sensor (clamping bracket)
TR	Clamping system for fixing immersion temperature sensors to the cylinder jacket. Fixing points for 3 immersion temperature sensors per clamping system

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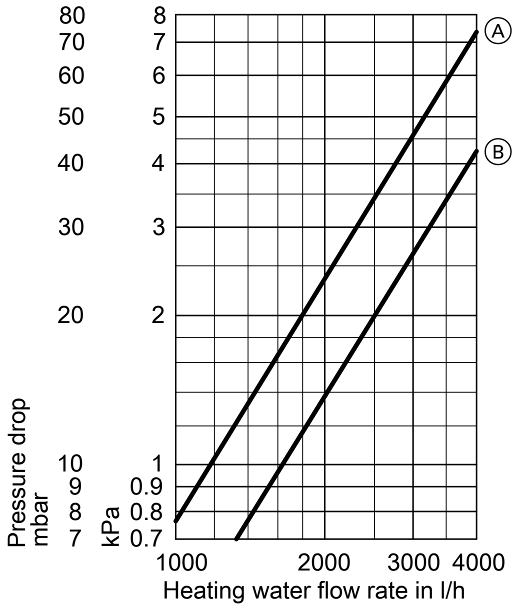
Pressure drop



Ⓐ DHW zone
Ⓑ Heating circuit zone

Vitocell 120-E, type SVW, 950 l

For Vitocal 200-G/300-G/350-G

Cylinder capacity 950 l

Part no.	With Vitotrans 353
Z017686	Type PBSA Draw-off rate 25 l/min
Z017687	Type PBMA Draw-off rate 48 l/min
Z017688	Type PBLA Draw-off rate 68 l/min

- **For storing heating water** in conjunction with the following heat pumps:
  - Vitocal 200-G, type BWC 201.B06 to B17
  - Vitocal 300-G, type BW/BWS 301.A21 to A29
  - Vitocal 300-G, type BWC 301.C06 to C16
  - Vitocal 350-G, type BW/BWS 351.B20 to B33
  - Vitocal 300-A, type AWO 302.B25
- DHW heating with Vitotrans 353, possibility of integrating an immersion heater and a conventional heat generator

Suitable for the following systems:
- DHW temperature up to **95 °C**
- Heating water flow temperature up to **95 °C**
- Operating pressure **on the heating water side** up to **3 bar (0.3 MPa)**
- Operating pressure **on the DHW side** up to **10 bar (1.0 MPa)**

Vitocell 120-E, colour: Vitosilver

Specification

Type		SVW		
Cylinder capacity	**l**		**950**	
AT: Actual water content				
– DHW zone (top) for Vitotrans 353	**l**		**700**	
– Heating circuit zone (bottom)	**l**		**250**	
Vitotrans 353	**Type**	**PBSA**	**PBMA/PBMA-S**	**PBLA/PBLA-S**
Continuous output for DHW heating from 10 to 45 °C, heating water flow temperature 55 °C				
In conjunction with **Vitocal 200-G**, type				
– BWC 201.B06, rated heating output 5.8 kW, B0/W35	kW	5.2	5.2	5.2
	l/h	128	128	128
– BWC 201.B08, rated heating output 7.5 kW, B0/W35	kW	7.0	7.0	7.0
	l/h	172	172	172
– BWC 201.B10, rated heating output 10.4 kW, B0/W35	kW	9.5	9.5	9.5
	l/h	233	233	233

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Type		SVW		
Cylinder capacity	l		**950**	
AT: Actual water content				
– DHW zone (top) for Vitotrans 353	l		**700**	
– Heating circuit zone (bottom)	l		**250**	
Vitotrans 353	**Type**	**PBSA**	**PBMA/PBMA-S**	**PBLA/PBLA-S**
– BWC 201.B13, rated heating output 13.0 kW, B0/W35	kW	11.8	11.8	11.8
	l/h	290	290	290
– BWC 201.B17, rated heating output 17.4 kW, B0/W35	kW	16.0	16.0	16.0
	l/h	393	393	393
In conjunction with **Vitocal 300-G**, type				
– BWC 301.C06, rated heating output 8.6 kW, B0/W35	kW	7.9	7.9	7.9
	l/h	195	195	195
– BWC 301.C12, rated heating output 11.4 kW, B0/W35	kW	10.4	10.4	10.4
	l/h	255	255	255
– BWC 301.C16, rated heating output 15.9 kW, B0/W35	kW	14.6	14.6	14.6
	l/h	362	362	362
– BW/BWS 301.A21, rated heating output 21.2 kW, B0/W35	kW	19.2	19.2	19.2
	l/h	472	472	472
– BW/BWS 301.A29, rated heating output 28.8 kW, B0/W35	kW	26.0	26.0	26.0
	l/h	630	630	630
In conjunction with **Vitocal 350-G**, type				
– BW/BWS 351.B20, rated heating output 20.5 kW, B0/W35	kW	20.5	20.5	20.5
	l/h	504	504	504
– BW/BWS 351.B27, rated heating output 28.7 kW, B0/W35	kW	29.8	29.8	29.8
	l/h	733	733	733
– BW/BWS 351.B33, rated heating output 32.7 kW, B0/W35	kW	34.1	34.1	34.1
	l/h	839	839	839
In conjunction with **Vitocal 300-A**, type				
– AWO 302.B25, rated heating output 24.5 kW, A7/W35	kW	22.5	22.5	22.5
	l/h	553	553	553
Draw-off rate	l/min	20	30	30
Drawable water volume without reheating				
– DHW zone heated to 55 °C; water at T = 45 °C (constant)	l	600	520	520
– DHW zone heated to 60 °C; water at T = 45 °C (constant)	l	730	640	640
Heat-up time of DHW zone when heating from 15 to 50 °C				
In conjunction with **Vitocal 200-G**, type				
– BWC 201.B06, rated heating output 5.8 kW, B0/W35	min	313	313	313
– BWC 201.B08, rated heating output 7.5 kW, B0/W35	min	235	235	235
– BWC 201.B10, rated heating output 10.4 kW, B0/W35	min	171	171	171
– BWC 201.B13, rated heating output 13.0 kW, B0/W35	min	146	146	146
– BWC 201.B17, rated heating output 17.4 kW, B0/W35	min	104	104	104
In conjunction with **Vitocal 300-G**, type				
– BWC 301.C06, rated heating output 8.6 kW, B0/W35	min	205	205	205
– BWC 301.C12, rated heating output 11.4 kW, B0/W35	min	159	159	159
– BWC 301.C16, rated heating output 15.9 kW, B0/W35	min	111	111	111
– BW/BWS 301.A21, rated heating output 21.2 kW, B0/W35	min	84	84	84
– BW/BWS 301.A29, rated heating output 28.8 kW, B0/W35	min	62	62	62
In conjunction with **Vitocal 350-G**, type				
– BW/BWS 351.B20, rated heating output 20.5 kW, B0/W35	min	87	87	87
– BW/BWS 351.B27, rated heating output 28.7 kW, B0/W35	min	62	62	62
– BW/BWS 351.B33, rated heating output 32.7 kW, B0/W35	min	55	55	55
In conjunction with **Vitocal 300-A**, type				
– AWO 302.B25, rated heating output 24.5 kW, A7/W35	min	75	75	75
Heat-up time of DHW zone when heating from 15 to 55 °C				
In conjunction with **Vitocal 200-G**, type				
– BWC 201.B06, rated heating output 5.8 kW, B0/W35	min	352	352	352
– BWC 201.B08, rated heating output 7.5 kW, B0/W35	min	266	266	266
– BWC 201.B10, rated heating output 10.4 kW, B0/W35	min	193	193	193
– BWC 201.B13, rated heating output 13.0 kW, B0/W35	min	163	163	163
– BWC 201.B17, rated heating output 17.4 kW, B0/W35	min	117	117	117
In conjunction with **Vitocal 300-G**, type				
– BWC 301.C06, rated heating output 8.6 kW, B0/W35	min	232	232	232
– BWC 301.C12, rated heating output 11.4 kW, B0/W35	min	178	178	178
– BWC 301.C16, rated heating output 15.9 kW, B0/W35	min	126	126	126
– BW/BWS 301.A21, rated heating output 21.2 kW, B0/W35	min	96	96	96
– BW/BWS 301.A29, rated heating output 28.8 kW, B0/W35	min	71	71	71

Installation accessories (cont.)

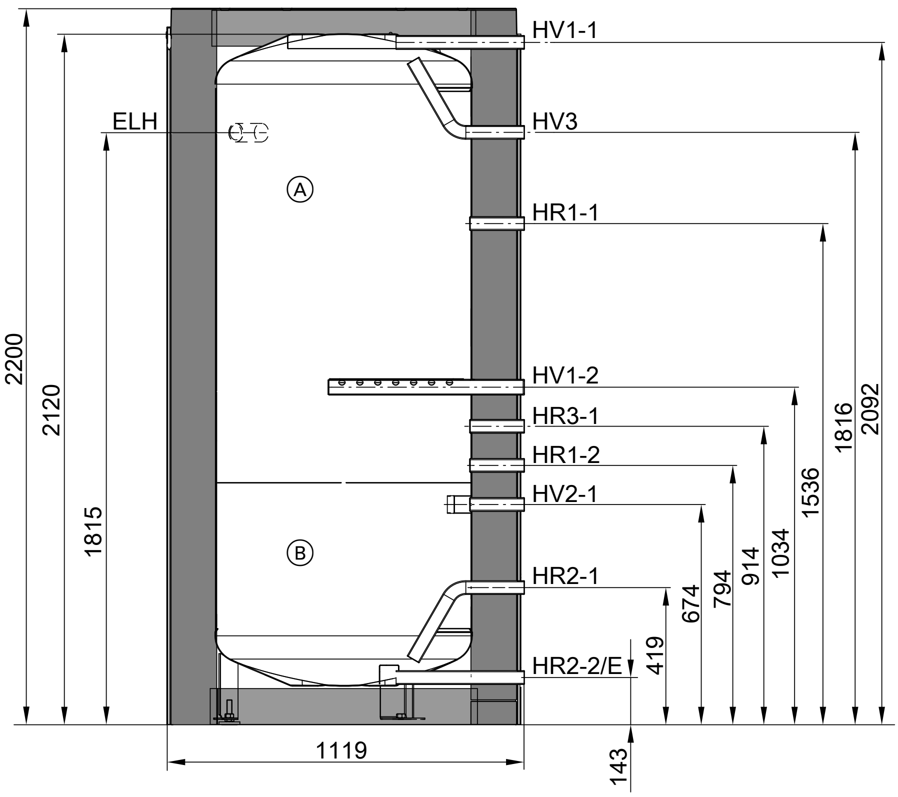
Type			SVW		
Cylinder capacity		l	**950**		
AT: Actual water content					
– DHW zone (top) for Vitotrans 353		l	**700**		
– Heating circuit zone (bottom)		l	**250**		
Vitotrans 353		**Type**	**PBSA**	**PBMA/PBMA-S**	**PBLA/PBLA-S**
In conjunction with **Vitocal 350-G**, type					
– BW/BWS 351.B20, rated heating output 20.5 kW, B0/W35		min	98	98	98
– BW/BWS 351.B27, rated heating output 28.7 kW, B0/W35		min	70	70	70
– BW/BWS 351.B33, rated heating output 32.7 kW, B0/W35		min	61	61	61
In conjunction with **Vitocal 300-A**, type					
– AWO 302.B25, rated heating output 24.5 kW, A7/W35		min	84	84	84
Heat-up time of DHW zone when heating from 15 to 60 °C					
In conjunction with **Vitocal 200-G**, type					
– BWC 201.B06, rated heating output 5.8 kW, B0/W35		min	392	392	392
– BWC 201.B08, rated heating output 7.5 kW, B0/W35		min	294	294	294
– BWC 201.B10, rated heating output 10.4 kW, B0/W35		min	215	215	215
– BWC 201.B13, rated heating output 13.0 kW, B0/W35		min	181	181	181
– BWC 201.B17, rated heating output 17.4 kW, B0/W35		min	130	130	130
In conjunction with **Vitocal 300-G**, type					
– BWC 301.C06, rated heating output 8.6 kW, B0/W35		min	259	259	259
– BWC 301.C12, rated heating output 11.4 kW, B0/W35		min	198	198	198
– BWC 301.C16, rated heating output 15.9 kW, B0/W35		min	142	142	142
– BW/BWS 301.A21, rated heating output 21.2 kW, B0/W35		min	108	108	108
– BW/BWS 301.A29, rated heating output 28.8 kW, B0/W35		min	79	79	79
In conjunction with **Vitocal 350-G**, type					
– BW/BWS 351.B20, rated heating output 20.5 kW, B0/W35		min	109	109	109
– BW/BWS 351.B27, rated heating output 28.7 kW, B0/W35		min	78	78	78
– BW/BWS 351.B33, rated heating output 32.7 kW, B0/W35		min	68	68	68
In conjunction with **Vitocal 300-A**, type					
– AWO 302.B25, rated heating output 24.5 kW, A7/W35		min	91	91	91
Max. connectible rated heating output of a heat pump		kW	32.7	32.7	32.7
Continuous output (in conjunction with conventional heat generators) For DHW heating from **10 to 45 °C** and a **heating water** flow temperature of … at the heating water flow rate stated below	90 °C	kW	81	146	203
		l/h	1980	3600	4980
	80 °C	kW	81	146	203
		l/h	1980	3600	4980
	70 °C	kW	81	146	203
		l/h	1980	3600	4980
	60 °C	kW	61	117	166
		l/h	1500	2880	4080
	55 °C	kW	52	100	143
		l/h	1260	2460	3540
Continuous output (in conjunction with conventional heat generators) For DHW heating from **10 to 60 °C** and a **heating water** flow temperature of … at the heating water flow rate stated below	90 °C	kW	108	195	277
		l/h	1860	3360	4800
	80 °C	kW	88	164	233
		l/h	1500	2820	4020
	70 °C	kW	65	127	181
		l/h	1140	2220	3210
Heating water flow rate for the stated continuous outputs		m^3/h	3.0	3.0	3.5
Standby heat loss		kWh/24 h	2.48		
Dimensions of heating water buffer cylinder					
Complete with thermal insulation					
– Length (∅)		mm	1064		
– Total width		mm	1119		
– Height		mm	2200		
Cylinder body, heating water buffer cylinder					
– Length (∅)		mm	790		
– Width		mm	1062		
– Height		mm	2120		
Height when tilted without adjustable feet		mm	2140		
Weight					
– Heating water buffer cylinder with thermal insulation		kg	194		
– Heating water buffer cylinder without thermal insulation		kg	164		
Heating water buffer cylinder connections					
– Heating water flow and return (male thread)		R	1¼		
– Heating water flow heating lance (male thread)		G	1½		
– Immersion heater (female thread)		Rp	1½		
Energy efficiency class			B		

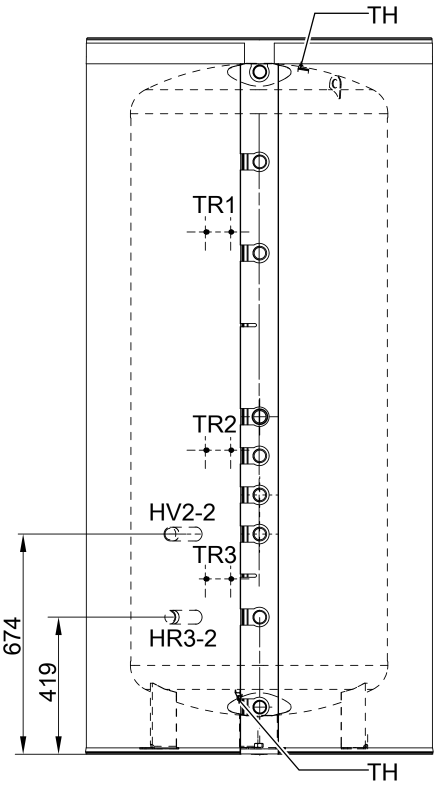
For a more detailed specification and accessories for the Vitotrans 353: See "Vitotrans 353" datasheet.

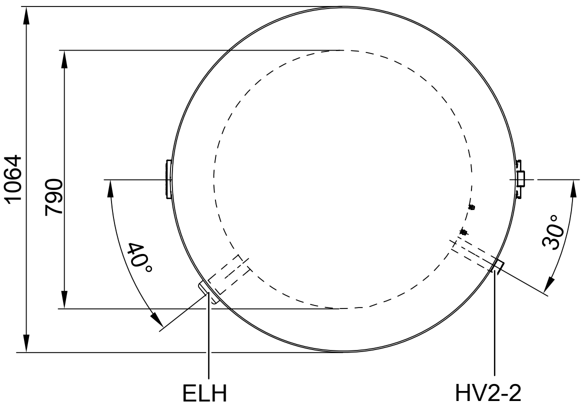
Notes on continuous output
When designing systems with the specified or calculated continuous output, allow for an appropriate circulation pump. The stated continuous output is only achieved if the rated heating output of the heat generator is greater than or equal to the continuous output.

DHW temperature in conjunction with heating water buffer cylinder and freshwater module
Where planning measures must ensure a DHW temperature of at least 60 °C at the outlet of the freshwater module, a heat pump operating in mono mode can ***only*** *provide basic heating of the heating water buffer cylinder. Complete heating up to the set buffer temperature must be provided by means of an additional heat generator, e.g. an electric instantaneous heating water heater or peak load boiler.*

Take the following into account when sizing entry points:
The actual dimensions of the DHW cylinder may vary slightly due to manufacturing tolerances.







Ⓐ	DHW zone
Ⓑ	Heating circuit zone
E	Drain
ELH	Immersion heater
HR1-1	Heating water return, DHW zone (external heat generator)
HR1-2	Heating water return 1 (Vitotrans 353 DHW heating)
HR2-1	Heating water return, heating circuit zone (heat pump)
HR2-2	Heating water return (heating circuit)
HR3-1	Heating water return, DHW zone (heat pump)
HR3-2	Heating water return 2 (Vitotrans 353 DHW heating)
HV1-1	Heating water flow, DHW zone (external heat generator)
HV1-2	Heating water flow, DHW zone (heat pump to heating lance)
HV2-1	Heating water flow, heating circuit zone (heat pump)
HV2-2	Heating water flow (heating circuit)
HV3	Heating water flow (Vitotrans 353 DHW heating)

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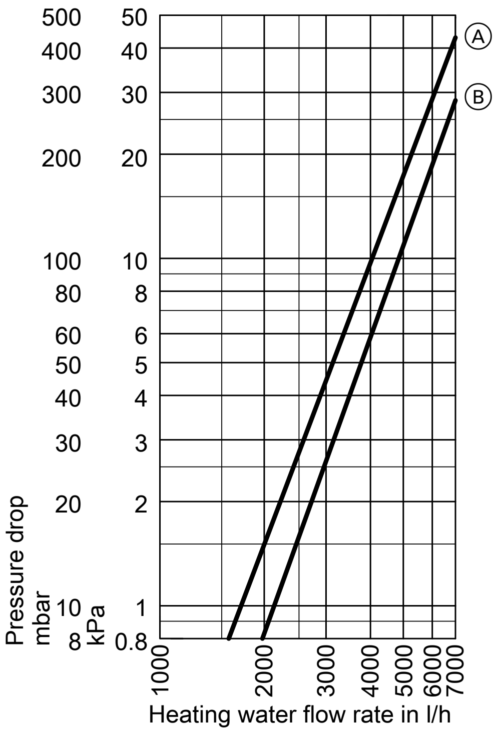
TH Retainer for thermometer sensor or additional sensor (clamping bracket)
TR Clamping device for securing immersion temperature sensors to the cylinder jacket: Fixing points for 3 immersion temperature sensors per clamping device

Pressure drop



Ⓐ DHW zone
Ⓑ Heating circuit zone

Immersion heater EHE

Part no. Z014468
- Optional heating output: 2, 4 or 6 kW
- For installation in the Vitocell 120-E, type SVW
- Only use with soft to medium hard water up to 14 °dH (hardness level 2 to 2.5 mol/m^3)

Components:
- High limit safety cut-out
- Temperature controller

Note
A contactor relay, part no. 7814681, is required for switching the immersion heater via the heat pump.

Specification

Output	kW	2	4	6
Rated voltage		1/N/PE 230 V/50 Hz		3/PE 400 V/50 Hz
Rated current	A	8.7	17.4	8.7
IP rating		IP 45	IP 45	IP 45
Heat-up time from 10 °C to 60 °C	h	3.5	1.7	1.2
Content that can be heated by the immersion heater	l	120		

Part no. Z014469
- Optional heating output: 4, 8 or 12 kW
- For installation in the Vitocell 120-E, type SVW
- Only use with soft to medium hard water up to 14 °dH (hardness level 2 to 2.5 mol/m^3)

Components:
- High limit safety cut-out
- Temperature controller

Note
A contactor relay, part no. 7814681, is required for switching the immersion heater via the heat pump.

Specification

Output	kW	4	8	12
Rated voltage		2/PE 400 V/50 Hz		3/PE 400 V/50 Hz
Rated current	A	10.0	20.0	17.3
IP rating		IP 45	IP 45	IP 45
Heat-up time from 10 °C to 60 °C	h	1.7	0.9	0.6
Content that can be heated by the immersion heater	l	120		

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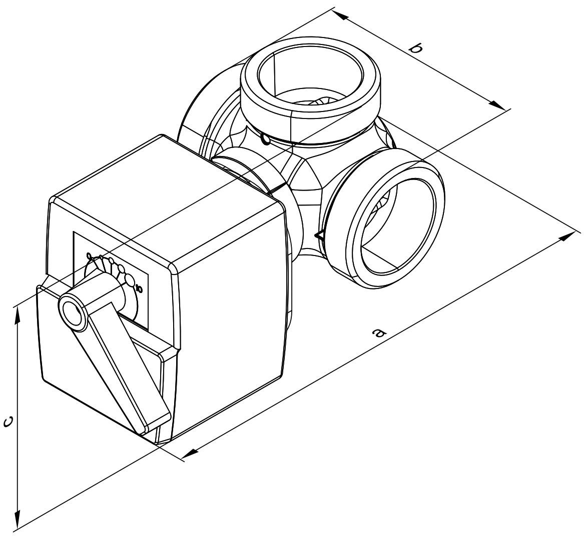
3-way diverter valve

Connection (male thread)	Dimension in mm			Part no.
	a	b	c	
G 1	145	82	103	**ZK01343**
G 1½	161	139	109	**ZK01344**
G 2	174	106	115	**ZK01353**

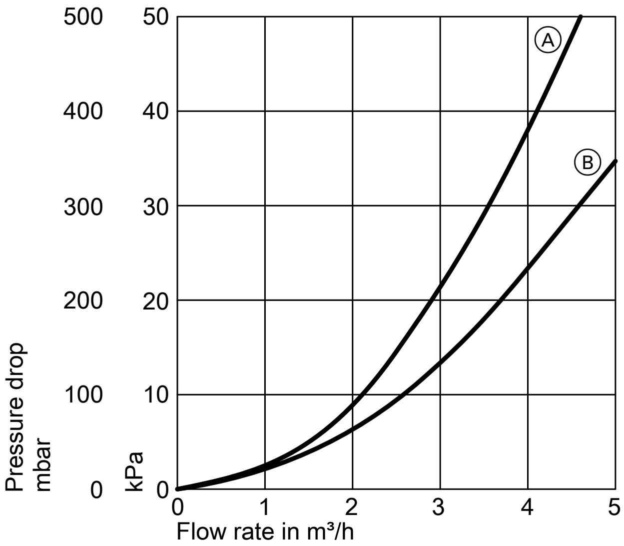
- With electric drive
- For the hydraulic connection of a heating water buffer cylinder to the freshwater module

Note
Available system examples:
*See **www.viessmann-schemes.com**.*



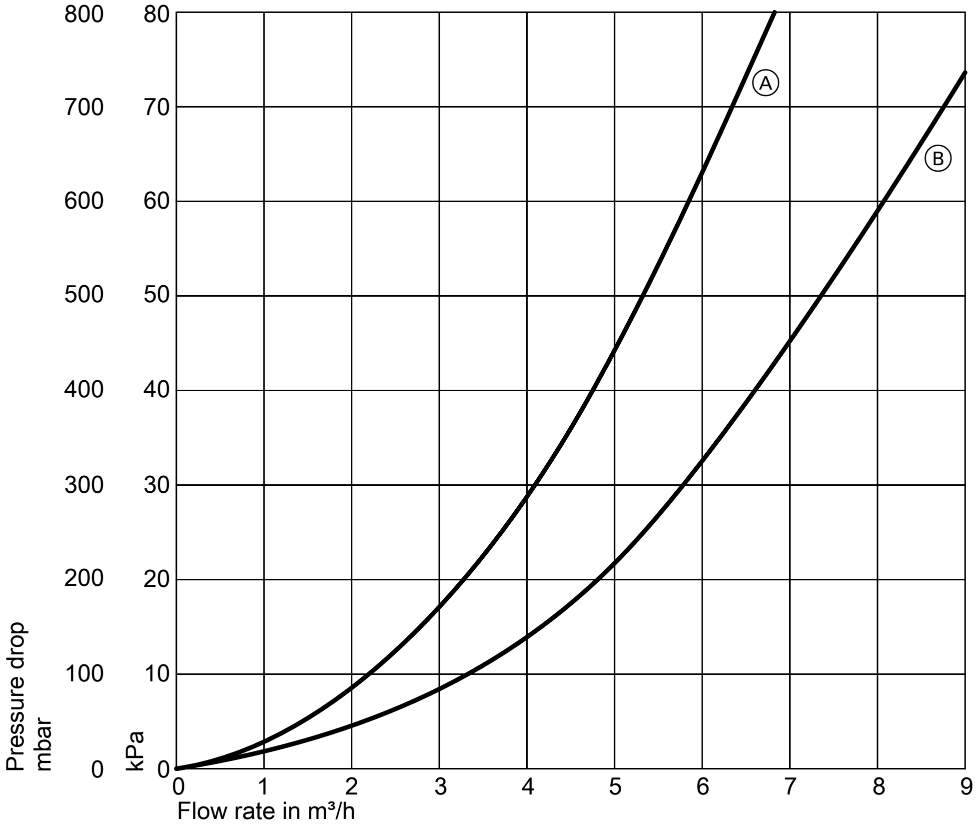
Pressure drop graphs

3-way diverter valve with G 1 connection



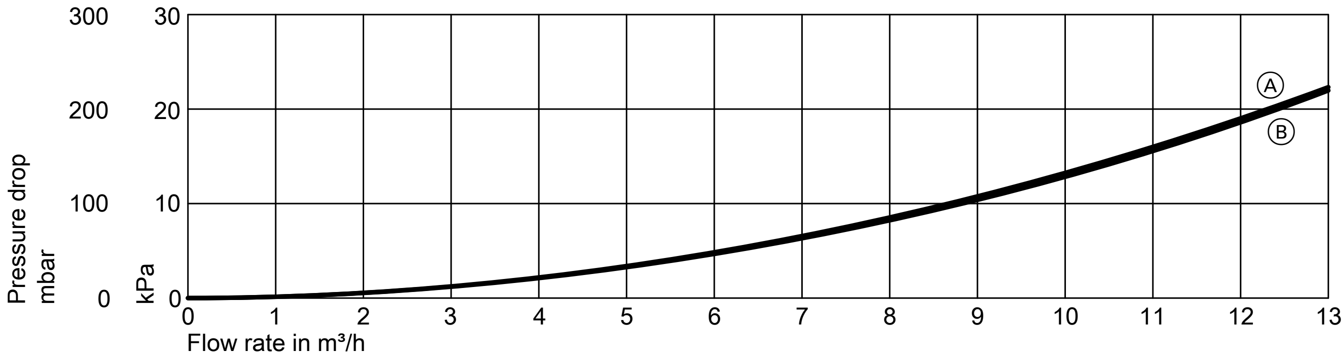
Ⓐ Diverted flow
Ⓑ Straight flow

3-way diverter valve with G 1½ connection



Ⓐ Diverted flow
Ⓑ Straight flow

3-way diverter valve with G 2 connection



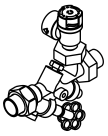
Ⓐ Diverted flow
Ⓑ Straight flow

8.10 Accessories for DHW heating with integral DHW cylinder

Safety assembly to DIN 1988

Part no. 7180662, 10 bar (1 MPa)
AT: Part no. 7179666, 6 bar (0.6 MPa)

- DN 20/R 1
- Max. heat input: 150 kW



Components:
- Shut-off valve
- Non-return valve and test connector
- Pressure gauge connector
- Diaphragm safety valve

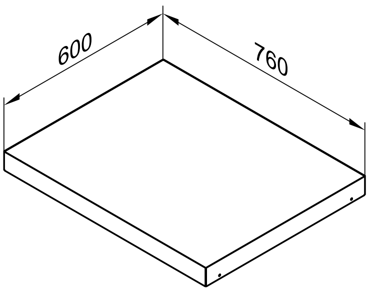
Impressed current anode

Part no. 7182008
- Maintenance free
- Install in place of the magnesium anode supplied

8.11 Installation accessories

Platform for unfinished floors

Part no. 7417925

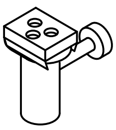


- With adjustable feet, for screed heights between 10 and 18 cm.
- For installation of the appliance on unfinished floors; suitable for siting tight against the wall.
- Incl. thermal insulation.

Note
In the case of installation flush with the wall, insert edge insulation strips for sound insulation between the platform for unfinished floors and the wall.

Tundish set

Part no. 7176014

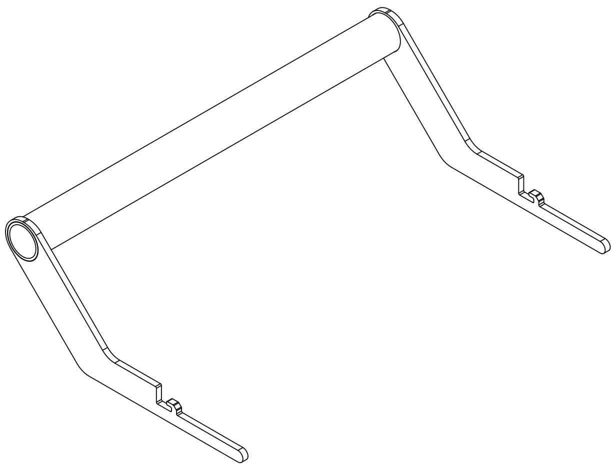


Tundish with trap and bezel: DN 40

Transport aid for heat pump module

Part no. ZK04568
For straightforward removal and carrying of the heat pump module by 2 persons

Components:
- 2 handles for inserting into the heat pump module



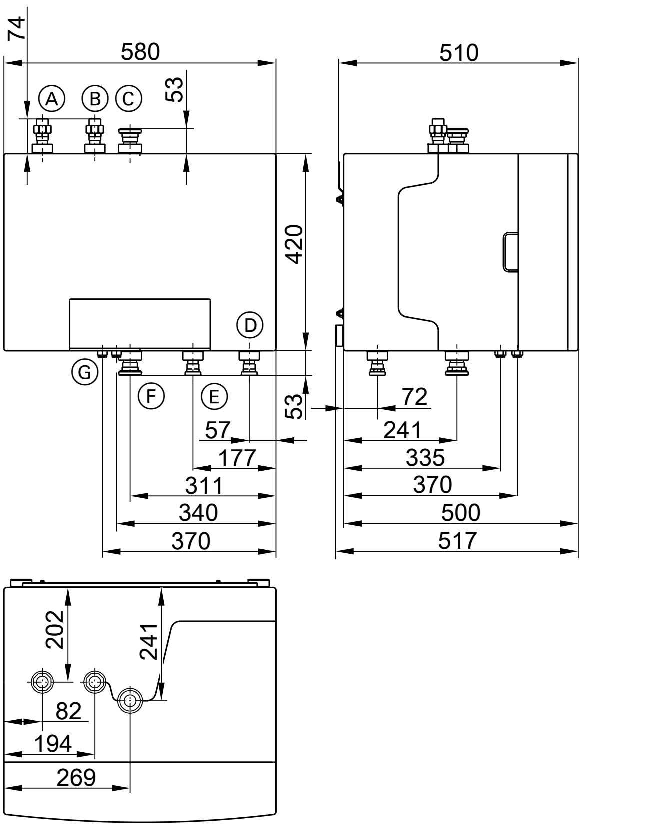
8.12 Cooling

NC-Box

Part no.: ZK01836

Pre-assembled unit with mixer, for implementing the natural cooling function. The cooling function can optionally be used on a heating/cooling circuit or on a separate cooling circuit.
For connection, for example, to underfloor heating systems, fan convectors or chilled ceilings.
Max. cooling capacity 5 kW (subject to the heat pump and cooling source used).
Direct control by the heat pump control unit ("NC signal")

Components:
- Plate heat exchanger
- Frost protection valve
- Frost stat
- Natural cooling contact humidistat
- Primary HE circulation pump for the cooling circuit
- Secondary HE circulation pump for the cooling circuit
- 3-way diverter valve (heating/cooling)
- 3-way mixer with motor
- Thermally and sound insulated, vapour diffusion-proof EPP casing



Ⓐ Return, heating/cooling circuit or separate cooling circuit
Ⓑ Flow, heating/cooling circuit or separate cooling circuit
Ⓒ Flow, primary circuit (brine inlet, NC-Box)
Ⓓ Return, secondary circuit to the heat pump
Ⓔ Flow, secondary circuit to the NC-Box
Ⓕ Flow, primary circuit (brine outlet, NC-Box)
Ⓖ Cable entry

Information regarding the cooling capacity
The expected cooling capacity largely depends on the sizing and type of heat source.
The cooling capacity is at its highest at the end of the heating season. The cooling capacity diminishes as the ground warms up.

Specification

Expected cooling capacity subject to the heat pump output	
– 16 kW	approx. 5.00 kW
– 8 kW	approx. 2.50 kW
– 4 kW	approx. 1.25 kW
Permissible ambient temperature	
– Operation	+2 to +30 °C
– Handling and storage	–30 to +60 °C
Dimensions	
– Total length	520 mm
– Total width	580 mm
– Total height	420 mm
Weight	28 kg
Connections	
– Flow, primary circuit (brine inlet and outlet, NC-Box)	G 1½
– Flow and return, heating/cooling circuit, separate cooling circuit	G 1
– Flow and return, secondary circuit to the heat pump	G 1
Energy efficiency index EEI	
– Primary high efficiency circulation pump for the cooling circuit	≤ 0.20
– Secondary high efficiency circulation pump for the cooling circuit	≤ 0.20

Note
- *The NC-Box can be used only up to the rated heating output of 17.2 kW.*
- *Two-stage heat pumps:*
  In conjunction with a two-stage heat pump, the NC-Box ***cannot*** *be installed immediately above the heat pumps. The hydraulic lines between the heat pumps are fitted above the heat pumps.*

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Contact humidistat 24 V

Part no. 7181418
- Dew point contact switch
- To prevent the formation of condensate when cooling via a heating circuit

Natural cooling extension kit

Part no. 7179172
- PCB for processing signals and controlling the natural cooling function
- Connection plug
- Installation accessories

Frost stat

Part no. 7179164
Safety switch to protect the cooling heat exchanger from frost.

2-way motorised ball valve (DN 32)

Part no. 7180573

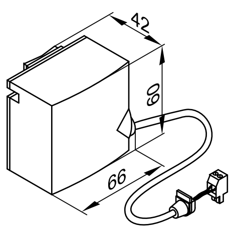
To heat DHW with a primary store system; may be used as a shut-off valve.
- With electric drive (230 V~)
- Connection R 1¼

3-way diverter valve (R 1¼)

Part no. 7165482
- With electric drive (230 V~)
- Connection R 1¼

Contact temperature sensor

Part no. 7426463
For capturing the flow temperature of the separate cooling circuit or the heating circuit without mixer, if it is designed as a cooling circuit.



Secured with a tie.

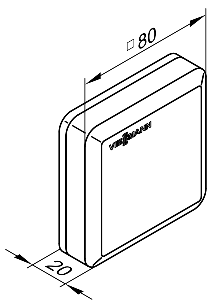
Specification

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

Room temperature sensor for separate cooling circuit

Part no. 7438537
Install in the room to be cooled on an internal wall, opposite radiators/heat sinks. Never install inside shelving units, in recesses, or immediately adjacent to a door or heat source (e.g. direct sunlight, fireplace, TV set etc.).
Connect the room temperature sensor to the control unit.

Connection:
- 2-core lead with a cross-section of 1.5 mm^2 (copper)
- Lead length from the remote control up to 30 m
- Never route this lead immediately next to 230/400 V cables.



Specification

Protection class	III
IP rating	IP 30 to EN 60529; ensure through design/installation.
Sensor type	Viessmann NTC 10 kΩ at 25 °C
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	−20 to +65 °C

8.13 Solar

Solar collectors

See Viessmann pricelist.

Max. connectable collector area
- 4.6 m² Vitosol 200-F/300-F
- 3 m² Vitosol 200-T/300-T

Solar heat exchanger set (Divicon)

Part no. ZK04099

For connecting solar thermal systems to heat pump compact appliances
- Connections matched to Solar-Divicon for direct mounting below the Solar-Divicon
- Suitable for systems to DIN 4753. Up to a total water hardness of 20 °dH (3.6 mol/m³)
- Max. collector surface area that can be connected:
  – 5 m² flat-plate collectors
  – 3 m² tube collectors

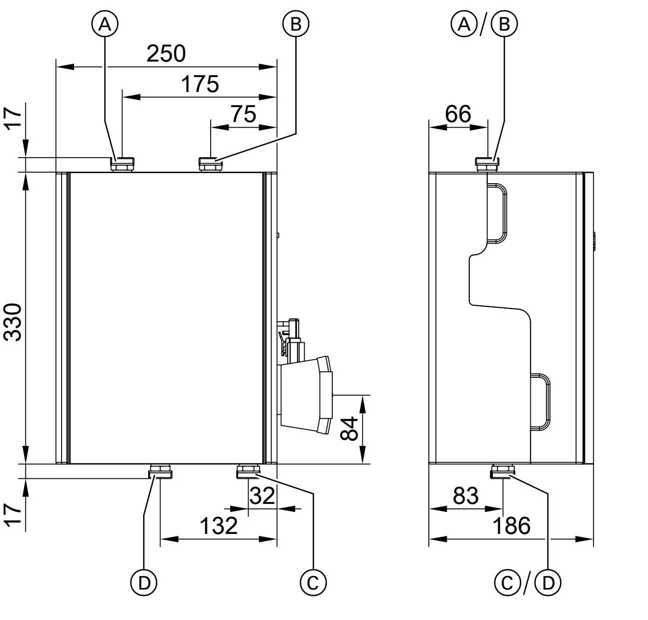
Components:
- Circulation pump
- Plate heat exchanger
- Connection pipes G ¾ (male thread)
- Sensor well for the cylinder temperature sensor (connection to electronics module SDIO/SM1A for solar control)
- Thermal insulation
- Connection elbow with sensor well

Note
The hydraulic connections for the solar circuit can optionally be routed either upwards or downwards from the appliance.

Specification

Permissible temperatures	
Solar side	140 °C
Heating water side	110 °C
DHW side	
– For boiler operation	95 °C
– For solar operation	60 °C
Permissible operating pressure	10 bar (1.0 MPa)
Solar side, heating and DHW side	
Test pressure	13 bar (1.3 MPa)
Solar side, heating and DHW side	
Circulation pump	
Power supply	230 V/50 Hz
IP rating	IP 42

Hydraulic connections upwards and downwards



Ⓐ Solar circuit return
Ⓑ Solar circuit flow
Ⓒ DHW cylinder return
Ⓓ DHW cylinder flow

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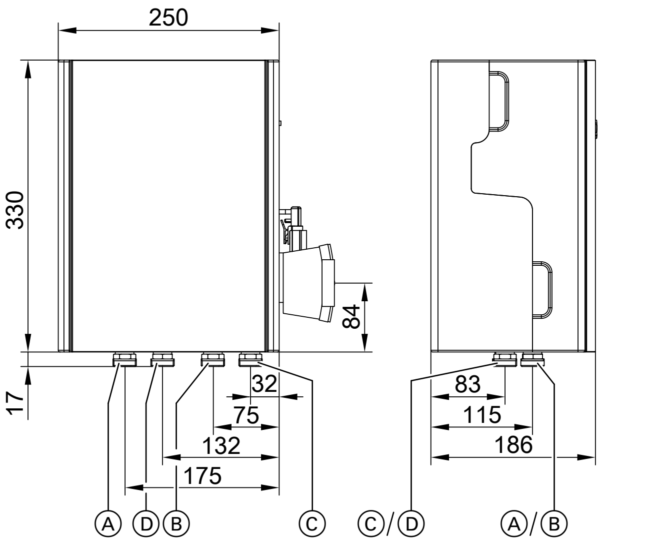
Hydraulic connections downwards



Ⓐ Solar circuit return
Ⓑ Solar circuit flow
Ⓒ DHW cylinder return
Ⓓ DHW cylinder flow

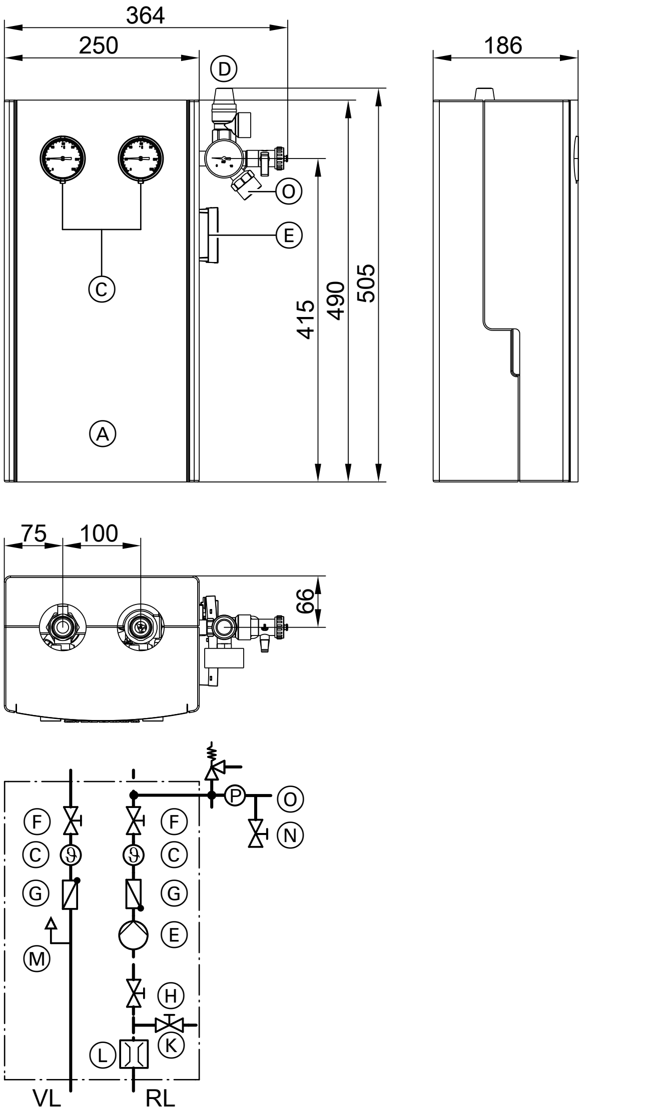
Solar Divicon, type PS10

Part no. Z017690

Pump station for the collector circuit

- With variable speed high efficiency circulation pump for alternating current
  Delivery head: 6.0 m at a pump rate of 1000 l/h
- Integrated SDIO/SM1A electronics module for solar control
- For apertures of up to 40 m^2 in area for Vitosol 200-F, 300-F, 200-T and 300-T
  The aperture area details refer to "low flow systems" and are subject to the system pressure drop: See technical guide for solar collectors.

Design



Ⓐ Solar-Divicon
Ⓒ Thermometer
Ⓓ Safety assembly (safety valve 6 bar, pressure gauge 10 bar)
Ⓔ High efficiency circulation pump
Ⓕ Shut-off valves
Ⓖ Non-return valves
Ⓗ Shut-off valve
Ⓚ Drain valve
Ⓛ Flow indicator
Ⓜ Air separator
Ⓝ Fill valve
Ⓞ Expansion vessel connection
RL Return
VL Flow

Safety valve in conjunction with Vitosol-FM switching flat-plate collector

Up to a system height of 20 m, the Solar-Divicon may be used with the 6 bar safety valve.
At system heights over 20 m, the safety valve may be replaced with an 8 bar safety valve (see "Vitosol" accessories).

Compact heat pumps

The permissible operating pressure in solar circuits linked to compact heat pump appliances is 6 bar.
Vitosol-FM collectors can only be used in conjunction with compact heat pump appliances where the system height is 20 m maximum.

Specification

Type	**PS10**
High efficiency circulation pump – Energy efficiency index EEI	Wilo Para 15/7.0 ≤ 0.20
Rated voltage	230 V~
Power consumption	
– Min. – Max.	3 W 45 W
Flow indicator	1 to 13 l/min
Safety valve (solar) – At the factory – When replacing	 6 bar 0.6 MPa 10 bar 1 MPa
Max. operating temperature	120 °C
Max. operating pressure	10 bar 1 MPa
Connections (locking ring fitting/double O-ring)	
– Solar circuit – Expansion vessel	22 mm 22 mm

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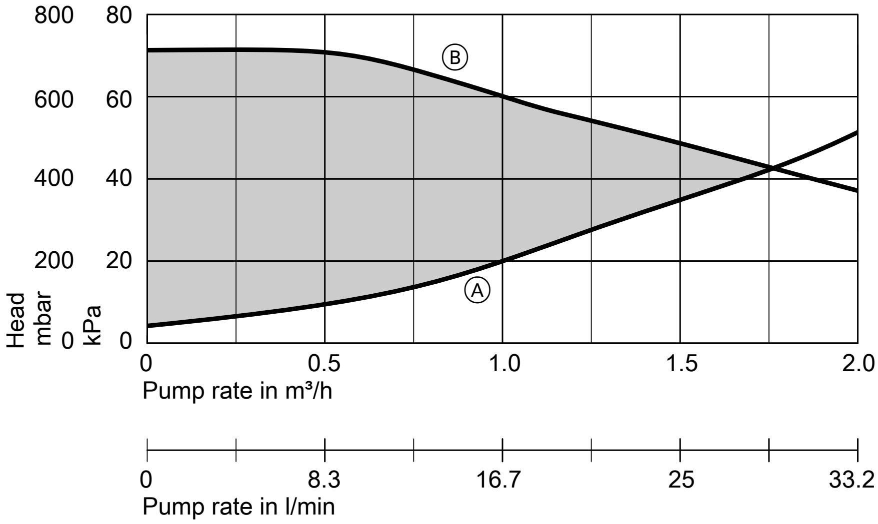
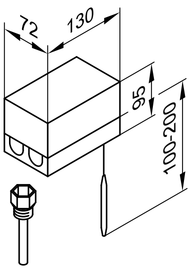
Curve



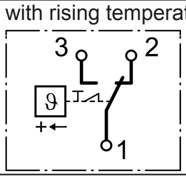
Ⓐ Pressure drop curve
Ⓑ Max. delivery head

High limit safety cut-out for solar thermal system

Part no. 7506168
- With a thermostatic system
- With stainless steel sensor well R ½ x 200 mm
- With setting scale and reset button in casing



Specification

Connection	3-core lead with a cross-section of 1.5 mm²
IP rating	IP 41 to EN 60529
Switching point	120 (110, 100, 95) °C
Max. switching differential	11 K
Breaking capacity	6 (1.5) A, 250 V~
Switching function	with rising temperature from 2 to 3 
DIN reg. no.	DIN STB 98108 or DIN STB 116907

Collector temperature sensor

Part no. 7831913

Immersion temperature sensor for installation in the solar collector
- For systems with 2 collector arrays
- For heat statement (recording flow temperature)

On-site extension of the connecting lead:
- 2-core lead, length up to 60 m with a cross-section of 1.5 mm² (copper)
- Never route this lead immediately next to 230/400 V cables.

Specification

Lead length	2.5 m
IP rating	IP 32 to EN 60529; ensure through design/installation
Sensor type	Viessmann NTC 20 kΩ at 25 °C
Permissible ambient temperature	
– Operation	−20 to +200 °C
– Storage and transport	−20 to +70 °C

Heat transfer medium "Tyfocor LS"

Part no. 7159727
- Ready-mixed to –28 °C
- 25 l in a disposable container

Tyfocor LS can be mixed with Tyfocor G-LS.

9.1 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 company]. Check the connection conditions specified by your local power supply utility for the stated equipment details. It is crucial to establish whether a 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 periods.
Address any questions relating to these issues to your customer's local power supply utility.

Application procedure

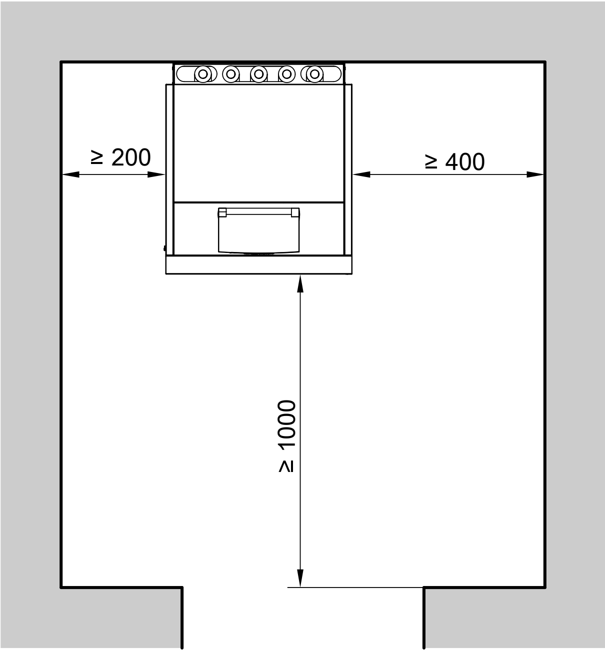
The following details are required to assess the effect of the heat pump operation on the grid of your local power supply utility:
- User address
- Location where the heat pump is to be used
- Type of demand in accordance with general tariffs (domestic, agricultural, commercial, professional and other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

9.2 Installation requirements

- The installation room must be dry and safe from the risk of frost.
- Never install the appliance in living spaces or directly next to, below or above quiet rooms/bedrooms.
- Observe the minimum clearances and minimum room volume: See the following chapter.
- Sound insulation measures:
  - Reduction of reverberative surfaces, particularly on walls and ceilings. Rough structural renders absorb more sound than tiles.
  - If quietness is a particularly important consideration, apply sound-absorbing material to the walls and ceilings (commercially available).
  - We recommend you never install this device on wooden floors in the roof space, to prevent the transmission of structure-borne noise.
  - The doors of the installation room should correspond to at least emission class E1. This is usually achieved by fitting tubular chipboard doors.
- Hydraulic connections:
  - Always make hydraulic heat pump connections flexible and stress-free.
  - Apply anti-vibration fixings to pipework and installations.
  - To prevent condensation, thermally insulate lines and components in the primary circuit with vapour diffusion-proof materials.
  - Provide corresponding installation areas for accessories and expansion vessels on the brine side.

Siting the Vitocal 200-G/300-G, type BWC

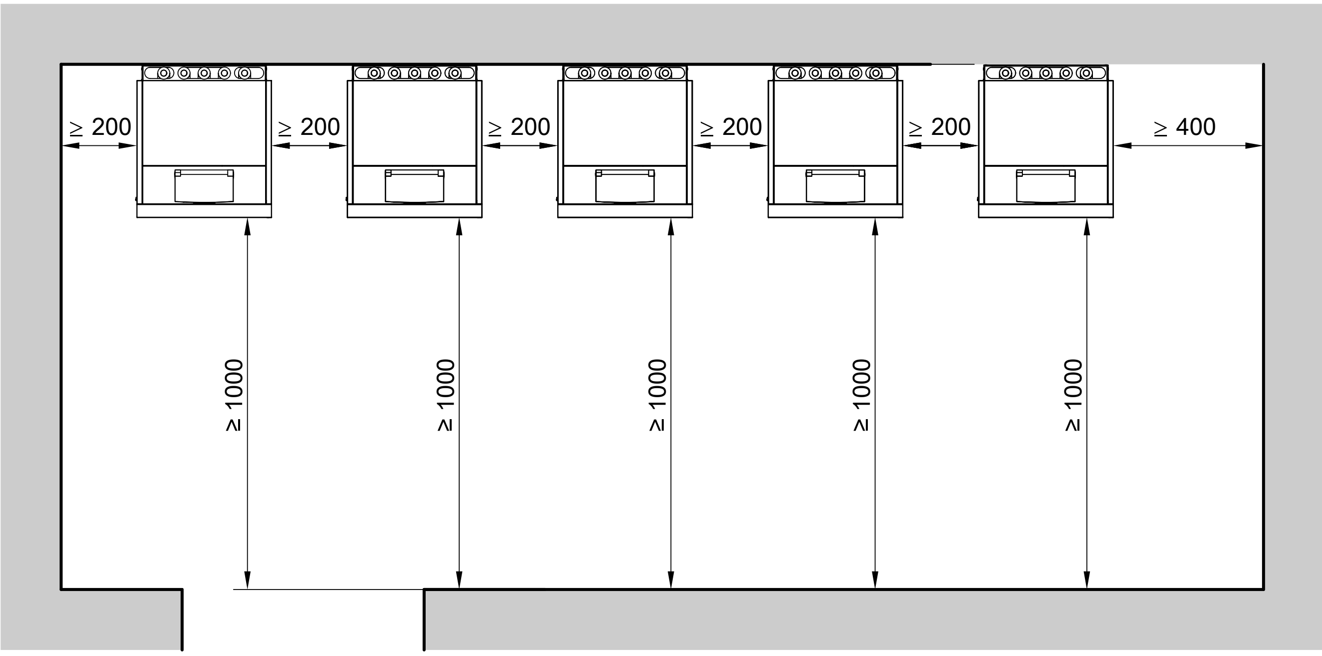
Minimum clearances for 1 heat pump



Observe clearances for installation and maintenance.

Note
- *The NC-Box (accessories) can be installed **with a clearance** above or next to the heat pump: See page 198.*
- *If installing above the heat pump, take into account the height of the heat pump when the top panel is open: See pages 12 and 40.*

Minimum clearances for heat pump cascades (max. 5 heat pumps)



Observe clearances for installation and maintenance.

Siting the Vitocal 300-G/350-G, type BW/BWS

Minimum clearances

Note
Additional strain relief clamps are required for the power cables if the clearance behind the heat pump is more than 80 mm.

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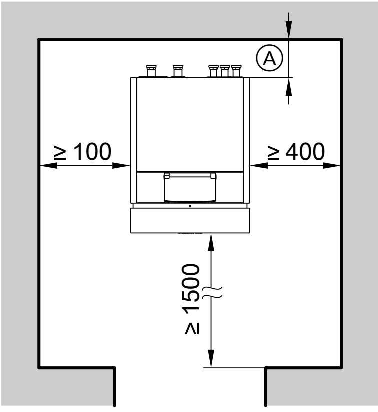
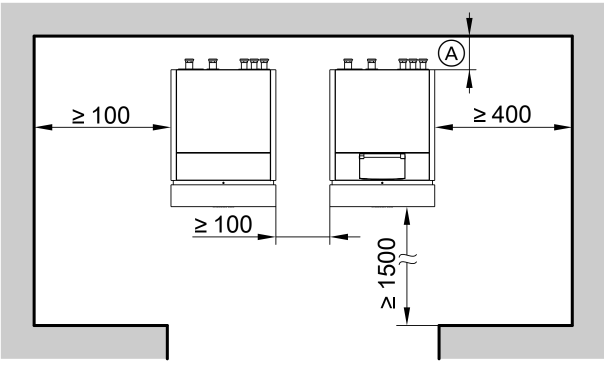


Type BW



Type BWS+BW

Ⓐ Subject to on-site installation and site conditions

Observe clearances for installation and maintenance.

Notes

- *Type BWS (heat pump stage 2) is always positioned to the left of type BW (heat pump stage 1).*
- *Make the hydraulic connections between the two heat pumps above both heat pumps (connection set on site).*
- *The NC-Box (accessories) can be installed* ***with a clearance*** *above or next to the heat pumps:* *See page 198.*

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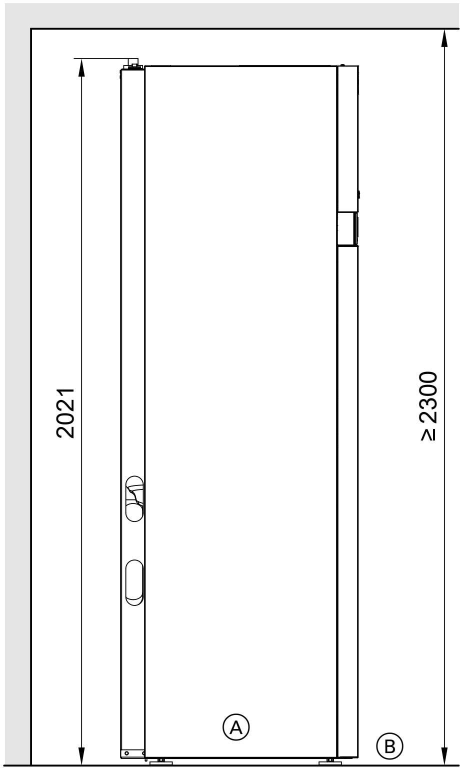
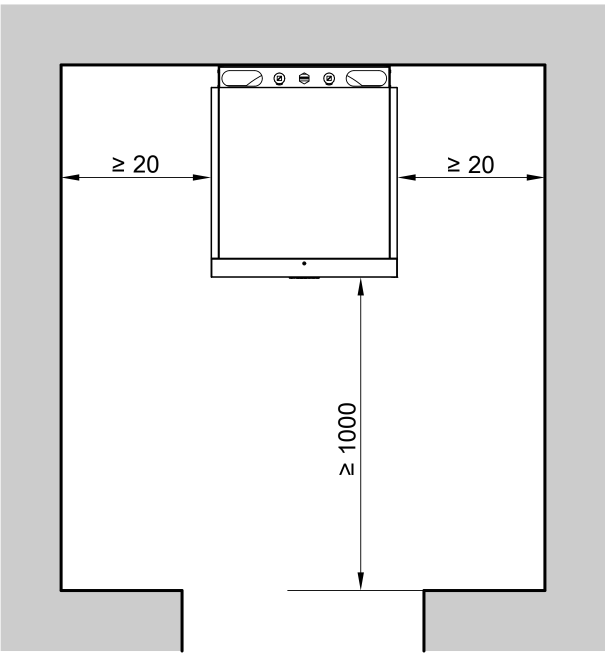
Siting the Vitocal 222-G/333-G

Minimum room height



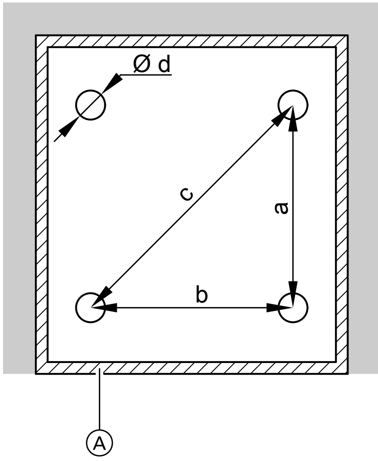
Ⓐ Compact heat pump
Ⓑ Finished floor level or top edge of platform for unfinished floors

Minimum clearances



Siting in conjunction with Vitovent 300-F
See "Vitovent" technical guide.

Pressure points



Ⓐ Partition joint with edge insulation strip as part of the floor construction
a 484 mm
b 480 mm
c 657 mm
d 64 mm

Each pressure point (each with an area of 3217 mm^2) is subject to a load of up to 132 kg.

Total weight with filled DHW cylinder, Vitocal 222-G

Type		Weight in kg
BWT	221.B06	497
BWT-M	221.B08	502
	221.B10	508

Total weight with filled DHW cylinder, Vitocal 333-G

Type		Weight in kg
BWT	331.C06	485
	331.C12	495

9

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Minimum room volume

According to EN 378, the minimum volume of the installation room depends on the refrigerant charge and composition.

$$V_{min} = \frac{m_{max}}{G}$$

V_{min} Minimum room volume in m^3
m_{max} Maximum refrigerant charge in kg
G Practical limit to EN 378, subject to the composition of the refrigerant

Refrigerant	Practical limit in kg/m^3
R410A	0.44
R407C	0.31

Note
If several heat pumps are to be installed in one room, the minimum room volume must be calculated according to the appliance with the greatest refrigerant charge.

Taking into account the refrigerant used and the refrigerant charge, the following minimum room volumes result:

400 V appliances

Vitocal	Minimum room volume in m^3
200-G, type	
BWC 201.B06	3.2
BWC 201.B08	4.5
BWC 201.B10	5.5
BWC 201.B13	5.1
BWC 201.B17	6.3
300-G, type	
BWC 301.C06	5.3
BWC 301.C12	6.5
BWC 301.C16	7.4
BW, BWS 301.A21	10.7
BW, BWS 301.A29	14.1
BW, BWS 301.A45	17.5

Vitocal	Minimum room volume in m^3
350-G, type	
BW, BWS 351.B20	12.5
BW, BWS 351.B27	16.6
BW, BWS 351.B33	20.5
BW, BWS 351.B42	21.0
222-G, type	
BWT 221.B06	3.2
BWT 221.B08	4.5
BWT 221.B10	5.5
333-G, type	
BWT 331.C06	5.3
BWT 331.C12	6.5

230 V appliances

Vitocal	Minimum room volume in m^3
200-G, type	
BWC-M 201.B06	3.2
BWC-M 201.B08	4.5
BWC-M 201.B10	5.5
BWC-M 201.B13	5.1
BWC-M 201.B17	6.3
222-G, type	
BWT-M 221.B06	3.2
BWT-M 221.B08	4.5
BWT-M 221.B10	5.5

9.3 Electrical connections for central heating and DHW heating

- Observe the technical connection requirements specified by your local power supply utility.
- Your local power supply utility will provide you with 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~. In some countries, 230 V models are also available.
The control circuit requires a power supply of 230 V~.
The control circuit fuse (6.3 A) is located in the heat pump control unit.

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 off the power supply to the Vitotronic control unit.

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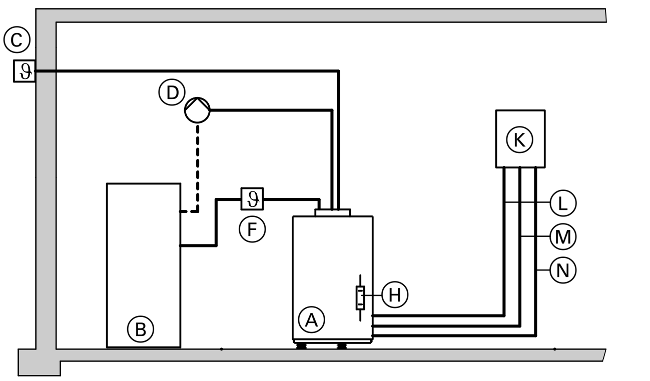
Electrical connections - Vitocal 200-G, type BWC



- Ⓐ Heat pump with integral primary and secondary pump, with 3-way diverter valve "central heating/DHW"
- Ⓑ DHW cylinder
- Ⓒ Outside temperature sensor, sensor lead: 2 x 0.75 mm²
- Ⓓ DHW circulation pump, power cable: 3 x 1.5 mm²
- Ⓕ Cylinder temperature sensor, sensor lead: 2 x 0.75 mm²
- Ⓗ Instantaneous heating water heater
- Ⓚ Electricity meter/domestic mains supply
- Ⓛ Power cable for compressor: See following table.
- Ⓜ Power cable for heat pump control unit: See following table.
- Ⓝ Power cable for instantaneous heating water heater: See following table.

Recommended power cables for 400 V appliances

Power supply		Cable	Max. cable length	Fuse rating
Heat pump control unit 230 V~	– Without power-OFF – With power-OFF	3 x 1.5 mm² 5 x 1.5 mm²		B16 A B16 A
Compressor 400 V~		5 x 2.5 mm²	25 m	B16 A
Instantaneous heating water heater 400 V~		5 x 2.5 mm²	25 m	B16 A

Recommended power cables for 230 V appliances

Power supply		Cable	Max. cable length	Fuse rating
Heat pump control unit 230 V~	– Without power-OFF – With power-OFF	3 x 1.5 mm² 5 x 1.5 mm²		B16 A B16 A
Compressor 230 V~ – Type BWC-M 201.B06/B08 – Type BWC-M 201.B10		 3 x 2.5 mm² 3 x 2.5 mm²	 25 m 25 m	 B20 A B25 A
Instantaneous heating water heater 230 V~		7 x 2.5 mm²	25 m	B16 A

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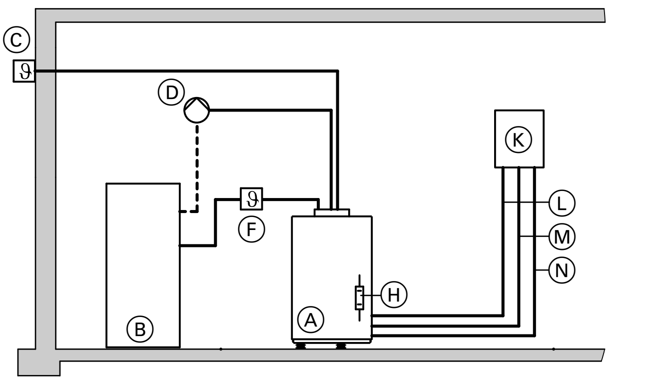
Electrical connections - Vitocal 300-G, type BWC



Ⓐ Heat pump with integral primary and secondary pump, with 3-way diverter valve "central heating/DHW"
Ⓑ DHW cylinder
Ⓒ Outside temperature sensor, sensor lead: 2 x 0.75 mm^2
Ⓓ DHW circulation pump, power cable: 3 x 1.5 mm^2
Ⓕ Cylinder temperature sensor, sensor lead: 2 x 0.75 mm^2
Ⓗ Instantaneous heating water heater
Ⓚ Electricity meter/domestic mains supply
Ⓛ Power cable for compressor: See following table.
Ⓜ Power cable for heat pump control unit: See following table.
Ⓝ Power cable for instantaneous heating water heater: See following table.

Recommended power cables for 400 V appliances

Power supply		Cable	Max. cable length	Fuse rating
Heat pump control unit 230 V~	– Without power-OFF – With power-OFF	3 x 1.5 mm^2 5 x 1.5 mm^2		B16 A B16 A
Compressor 400 V~		5 x 2.5 mm^2	25 m	B16 A
Instantaneous heating water heater 400 V~		5 x 2.5 mm^2	25 m	B16 A

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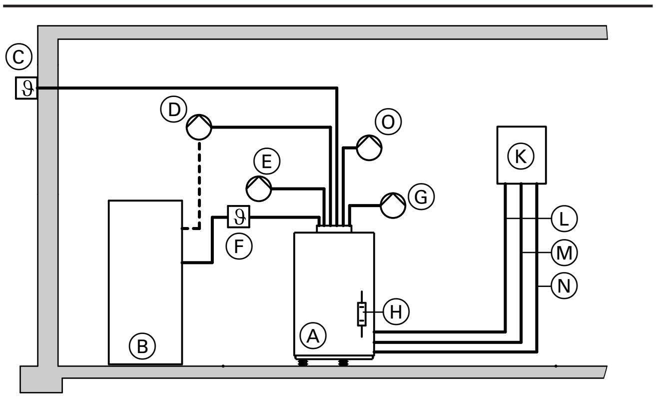
Electrical connections - Vitocal 300-G/350-G, type BW



Ⓐ Heat pump
Ⓑ DHW cylinder
Ⓒ Outside temperature sensor, sensor lead: 2 x 0.75 mm^2
Ⓓ DHW circulation pump, power cable: 3 x 1.5 mm^2
Ⓔ Primary pump (brine): Power cable 3 x 1.5 mm^2 or 5 x 1.5 mm^2 for circulation pump with thermal relay
If a 400 V circulation pump is used, connect it via a contactor relay.
Ⓕ Cylinder temperature sensor, sensor lead: 2 x 0.75 mm^2
Ⓖ Secondary pump, power cable: 3 x 1.5 mm^2
Further circulation pumps are required for heating water buffer cylinders, heating circuits with mixer and external heat generators.
Ⓗ Instantaneous heating water heater (accessories)
Ⓚ Electricity meter/mains
Ⓛ Compressor power cable, 400 V~: 5 x 2.5 mm^2, dependent on heat pump type (max. 30 m)
Ⓜ Power cable for 230 V~ heat pump control unit: 5 x 1.5 mm^2 with power-OFF signal
Ⓝ Power cable, 400 V~ for instantaneous heating water heater (accessories): 5 x 2.5 mm^2, control via heat pump control unit
Ⓞ Circulation pump for cylinder heating (heating water side): Power cable 3 x 1.5 mm^2

For a **water/water configuration**, take the following additional components into account:
- Well pump:
  If a 400 V well pump is used, a contactor relay is required.
- Flow switch
- Frost stat
- Separating heat exchanger

Note
When installing additional heating water buffer cylinders, heating circuits with mixer, external heat generator (gas/oil/wood) etc., allow for the additionally required supply cables, control cables and sensor leads.
Check the power cable cross-sections. Enlarge the cable cross-sections if necessary.

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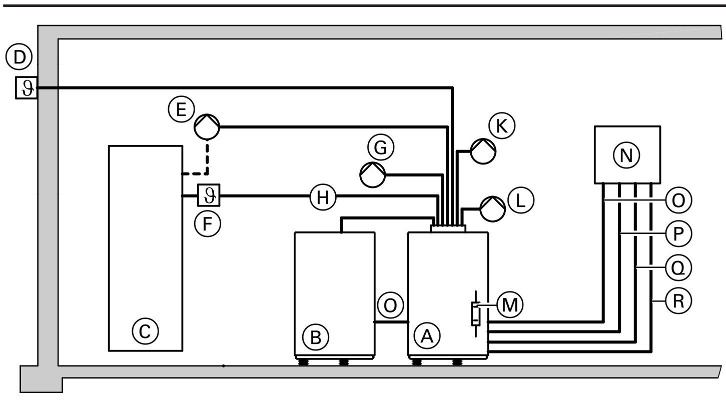
Electrical connections - Vitocal 300-G/350-G, type BW+BWS (2-stage heat pump)



Ⓐ Heat pump, type BW
Ⓑ Heat pump, type BWS
Ⓒ DHW cylinder
Ⓓ Outside temperature sensor, sensor lead: 2 x 0.75 mm^2
Ⓔ DHW circulation pump, power cable: 3 x 1.5 mm^2
Ⓕ Cylinder temperature sensor, sensor lead: 2 x 0.75 mm^2
Ⓖ Primary pump (brine): Power cable 3 x 1.5 mm^2 or 5 x 1.5 mm^2 for circulation pump with thermal relay
If a 400 V circulation pump is used, connect it via a contactor relay.
With the 2-stage heat pump, either a common primary pump can be used for both stages, or a separate primary pump can be used for each stage.

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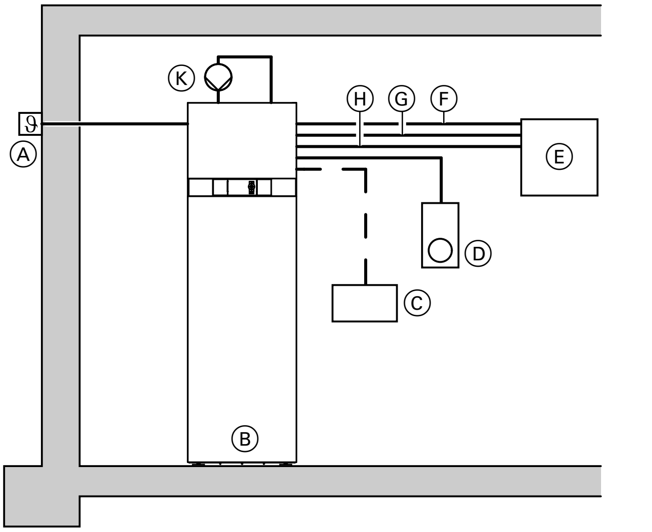
Ⓗ Electrical connecting cables between heat pump stage 1 and 2 (standard delivery)
Ⓚ Circulation pump for cylinder heating (heating water side), power cable (3 x 1.5 mm^2)
With the 2-stage heat pump, 2 circulation pumps for cylinder heating can be used (one circulation pump for each stage).
Ⓛ Secondary pump, power cable: 3 x 1.5 mm^2
2 secondary pumps are required for the 2-stage heat pump (one for each stage).
Further circulation pumps are required for heating water buffer cylinders, heating circuits with mixer and external heat generators.
Ⓜ Instantaneous heating water heater (accessory, installation only in type BW)
Ⓝ Electricity meter/mains
Ⓞ Power cable for compressor, type BWS, 400 V~: 5 x 2.5 mm^2, cable length dependent on heat pump type, max. 30 m
Ⓟ Power cable for compressor, type BW, 400 V~: 5 x 2.5 mm^2, cable length dependent on heat pump type, max. 30 m
Ⓠ Power cable for heat pump control unit, 230 V~: 5 x 1.5 mm^2 with power-OFF signal
Ⓡ Power cable, 400 V~ for instantaneous heating water heater (accessories): 5 x 2.5 mm^2, control via heat pump control unit

For a **water/water configuration**, take the following additional components into account:
- Well pump:
  If a 400 V well pump is used, a contactor relay is required.
- Flow switch
- Frost stat
- Separating heat exchanger

Electrical connections Vitocal 222-G



Ⓐ Outside temperature sensor, sensor lead (2 x 0.75 mm^2)
Ⓑ Compact heat pump
Ⓒ Natural cooling switching contact, for switching the underfloor heating system with central hook-up, power cable (5 x 1.5 mm^2)
Ⓓ Vitotrol 200 remote control, power cable (2 x 0.75 mm^2)
Ⓔ Electricity meter/domestic mains supply
Ⓕ Power cable for compressor: See following table.
Ⓖ Power cable for instantaneous heating water heater: See following table.
Ⓗ Power cable for heat pump control unit: See following table.
Ⓚ DHW circulation pump, power cable (3 x 1.5 mm^2)

Recommended power cables for 400 V appliances

Power supply		Cable	Max. cable length	Fuse protection
230 V~ heat pump control unit	– Without power-OFF	3 x 1.5 mm^2		B16A
	– With power-OFF	5 x 1.5 mm^2		B16A
400 V~ instantaneous heating water heater		5 x 2.5 mm^2	25 m	B16A

400 V~ compressor

Type		Cable	Max. cable length	Fuse protection
BWT	221.B06	5 x 2.5 mm^2	20 m	C16A
	221.B08	5 x 2.5 mm^2	20 m	B16A
	221.B10	5 x 2.5 mm^2	20 m	B16A

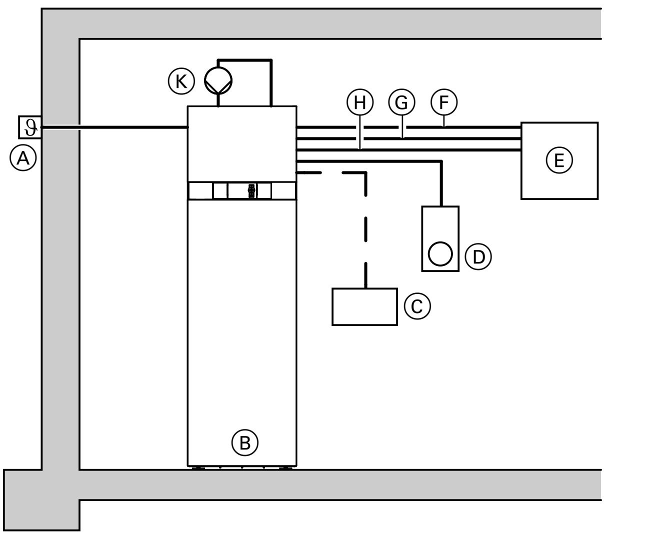
Recommended power cables for 230 V appliances

Power supply		Cable	Max. cable length	Fuse rating
Heat pump control unit 230 V~	– Without power-OFF	3 x 1.5 mm^2		B16A
	– With power-OFF	5 x 1.5 mm^2		B16A
Instantaneous heating water heater 230 V~		7 x 2.5 mm^2	25 m	B16A

Compressor 230 V~

Type		Cable	Max. cable length	Fuse rating
BWT-M	221.B06	3 x 2.5 mm^2	25 m	B16A
	221.B08	3 x 2.5 mm^2	25 m	B20A
	221.B10	3 x 2.5 mm^2	25 m	B25A

Electrical connections Vitocal 333-G



Ⓐ Outside temperature sensor, sensor lead (2 x 0.75 mm^2)
Ⓑ Compact heat pump
Ⓒ Natural cooling switching contact, for switching the underfloor heating system with central hook-up, power cable (5 x 1.5 mm^2)
Ⓓ Vitotrol 200 remote control, power cable (2 x 0.75 mm^2)
Ⓔ Electricity meter/domestic mains supply
Ⓕ Power cable for compressor: See following table.
Ⓖ Power cable for instantaneous heating water heater: See following table.
Ⓗ Power cable for heat pump control unit: See following table.
Ⓚ DHW circulation pump, power cable (3 x 1.5 mm^2)

Recommended power cables

Power supply		Cable	Max. cable length	Fuse rating
Heat pump control unit 230 V~	– Without power-OFF	3 x 1.5 mm^2		B16A
	– With power-OFF	5 x 1.5 mm^2		B16A
Instantaneous heating water heater 400 V~		5 x 2.5 mm^2	25 m	B16A

Compressor 400 V~

Type		Cable	Max. cable length	Fuse rating
BWT	331.C06	5 x 2.5 mm^2	25 m	B16A
	331.C12	5 x 2.5 mm^2	25 m	B16A

9.4 Information on hydraulic connection

System examples

Available system examples: See **www.viessmann-schemes.com**.

Additional external circulation pumps

The following external circulation pumps can be **additionally** connected on site to the Vitotronic 200 heat pump control unit, type WO1C:
- Well pump for operation as a water/water heat pump (conversion kit for water/water heat pump required, accessories)
- Additional primary/secondary pump, if the residual heads of the installed primary/secondary pumps are not sufficient

The following points must be taken into account when using additional circulation pumps:
- The residual heads of the integral circulation pumps and the additional pumps are added together.
- The additional circulation pumps are connected in series to the integral circulation pumps.
- The additional circulation pumps cannot be controlled via a PWM signal from the heat pump control unit.
- The settings must be performed on the control units belonging to the additional circulation pumps.
- The circulation pumps installed in the heat pump must be operated at a constant 100 % speed: The parameters for this need to be set on the heat pump control unit.

Two-stage heat pumps

2-stage heat pumps can be implemented with the following heat pumps:
- Vitocal 300-G, type BW+BWS
- Vitocal 350-G, type BW+BWS
- If stage 1 (type BW) and stage 2 (type BWS) heat pumps are installed with the same rated heating outputs, **1** primary pump can be used due to the same flow rates.
- If stage 1 (type BW) and stage 2 (type BWS) heat pumps are installed with different rated heating outputs, **2** primary pumps need to be used due to the different flow rates.
  The on-site primary pump for the stage 2 heat pump cannot be connected to the heat pump control unit via a PWM signal. The settings must be performed on the primary pump control unit.

Heat pump cascade

Heat pump cascades can be implemented with the following heat pumps:
- Vitocal 200-G
- Vitocal 300-G, type BW/BWS

  Note
  *A heat pump cascade is **not** possible with the Vitocal 300-G, type BWC 301.C.*

- Vitocal 350-G, type BW/BWS

A heat pump cascade consists of a lead heat pump and up to 4 lag heat pumps. Each lag heat pump has a heat pump control unit. Both the lead heat pump and the lag heat pumps can have 2 stages; the Vitocal 200-G only 1 stage.
The lead heat pump regulates operation of the heat pumps within the cascade.
- The following communication modules (accessories) must be fitted in the heat pump control units:
  - Lead heat pump: LON communication module for cascade control
  - Lag heat pumps: LON communication module
- Depending on the system equipment level, all heat pumps in a cascade can be separately enabled via LON for different functions.
  This is done with the parameter **"Use of heat pump in cascade 700C"**:
  - Central heating/room cooling
  - DHW heating
  - Swimming pool heating

  Several functions can be active simultaneously.

The DHW cylinder return may only be connected to the heat pump stage 1.

9.5 Sizing the heat pump

First establish the standard heat load Φ_{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, take into account the likely primary inlet temperatures at the installation site and the heat pump application limits:
For minimum primary inlet temperature and minimum secondary circuit 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 primary inlet 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 primary inlet 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.
- If frost protection mode is permanently enabled (e.g. in a holiday home), the secondary circuit temperature can drop below the 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.
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.

Note
Depending on the heat pump type, the instantaneous heating water heater is either factory-fitted in the heat pump or available as an accessory:
See chapter "Installation accessories".

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 EnEV)	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 the power-OFF for 3 × 2 hours
Example:
For a new building with good thermal insulation (50 W/m^2) and a heated area of 170 m^2
- Estimated heat load: 8.4 kW
- Maximum power-OFF time 3 × 2 hours at a minimum outside temperature to EN 12831

For a 24 h period, this results in a daily heat volume of:
- 8.4 kW · 24 h = 202 kWh

To cover the maximum daily heat amount, only 18 h are available per day for heat pump operation on account of the power-OFF periods. The building inertia means that 2 hours are not taken into consideration.
- 202 kWh / (18 + 2) h = 10.1 kW

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

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*9 in kW/person
Low demand	15 to 30	600 to 1200	0.08 to 0.15
Standard demand*10	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*9 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*10 (average demand)	50	Approx. 2000	Approx. 0.250

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.

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

9

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

The heat pump system is supported by an additional electric heat source, an instantaneous heating water heater. The control unit switches the instantaneous heating water heater on, subject to the outside temperature (dual mode temperature) and heat load. The instantaneous heating water heater can be enabled separately for central heating and DHW heating.

Note
*That part of the electric power drawn by the instantaneous heating water heater will generally **not** be charged at special tariffs.*

Sizing of typical system configurations:
- 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.
- Blocking periods 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. To compensate for this, increase the size of the heat source for brine/water heat pumps.
As standard value for a geothermal probe system, the annual extraction rate must not exceed 100 kWh/m p.a.

Instantaneous heating water heater
Depending on the type of heat pump, the instantaneous heating water heater is either factory-fitted or installed as an accessory in the secondary circuit flow or the heat pump as applicable. The instantaneous heating water heater is connected and protected via a separate power supply connection.
The heat pump control unit regulates this function. The instantaneous heating water heater is enabled via parameters for heating operation and/or DHW heating. When enabled, the heat pump control unit activates stages 1, 2 or 3 of the instantaneous heating water heater, subject to the heat demand. As soon as the maximum flow temperature in the secondary circuit is reached, the heat pump control unit switches the instantaneous heating water heater off.
Parameter "Stage at power-OFF" restricts the output stage of the instantaneous heating water heater for the duration of the power-OFF period.
To limit the total power consumption, the heat pump control unit stops the instantaneous heating water heater for a few seconds directly before the compressor starts. Each stage is subsequently started individually one after the other at intervals of 10 s.
If the instantaneous heating water heater is on and the differential between flow and return temperatures in the secondary circuit does not rise by at least 1 K within 24 h, the heat pump control unit displays a fault message.

Dual mode operation

External heat generator
The heat pump control unit enables dual mode operation of the heat pump with an external heat source, e.g. oil boiler.
The external heat source is hydraulically connected in such a way that the heat pump can also be used as a return temperature raising facility for the boiler. System separation is provided with either a low loss header or a heating water buffer cylinder.
For optimum heat pump operation, the external heat source must be integrated via a mixer into the heating water flow. Direct activation of this mixer by the heat pump control unit results in a quick response.
If the outside temperature (long-term average) is below the dual mode temperature, the heat pump control unit starts the external heat source. In the case of direct heat demand from the consumers (e.g. for frost protection or if the heat pump is faulty), the external heat source is also started above the dual mode temperature.

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

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

9.6 Heat sources for brine/water heat pumps

Frost protection

The antifreeze shifts the ice crystallisation point of a liquid to lower temperatures. The ice crystallisation point is the temperature at which the first ice crystals start to form in the liquid, before expansion causes any damage.
To safeguard trouble-free heat pump operation, use antifreeze in the primary circuit. The antifreeze must protect against frost down to at least –15 °C and contain suitable anti-corrosion inhibitors. Ready-mixed solutions ensure an even distribution of concentrate throughout the primary circuit.

Recommendation:
For the primary circuit, use Viessmann "Tyfocor" heat transfer medium which is based on ethylene glycol (ready-mixed down to -16 °C, light green).

Where the following conditions are met, bioethanol-based antifreeze can be used with Viessmann brine/water heat pumps:
- Ready-mixed solution concentration: ≤ 30 % by vol.
- Recommendation: With corrosion inhibitors to improve residual alkalinity
- Please observe manufacturer usage instructions and safety datasheets.

Note
When selecting the antifreeze, always observe the stipulations of the authorising body.

Operation of probe with water

The authorising body may prohibit operation with antifreeze:
- For example if there is a risk to the groundwater from escaping brine
- For example if there is a risk to groundwater horizons due to freeze/thaw cycles inside the borehole

In such cases, the probe can be operated with water. When doing so, the drilling company must size the probe so that frost-free operation is guaranteed at all times.
- The temperature in the primary circuit flow (heat pump brine inlet) can be cooled down to 5 K by the heat pump (depending on design). When sizing, therefore, ensure that the temperature in the primary circuit return (heat pump brine outlet) can remain above 0 °C with sufficient certainty.
- Despite operating the probe frost-free, temperatures < 0 °C on the refrigerant circuit side of the evaporator cannot be ruled out. To prevent damage to the evaporator caused by ice formation, a direct flow of water through the heat pump is not permitted. To operate the probe with water, an additional separating heat exchanger with intermediate circuit must be factored in (similar to the well circuit on water/water heat pumps).

Heat source protection function for heat pumps with inverter-controlled heating output

To ensure that the heat source is not overloaded, e.g. in existing systems, a heat source protection function is integrated in the Vitocal 300/333-G brine/water heat pumps with inverter and output-dependent control. To this end, the temperature in the primary circuit is continuously monitored.
As soon as the value drops below the factory-set 1st limit for the primary circuit flow temperature (heat pump brine inlet), the heat pump reduces the heating output. If, despite the reduction in heating output, the primary circuit flow temperature proceeds to fall below the 2nd limit, the heat pump switches off.
Once the primary source has regenerated, the heat pump switches back on automatically. It is possible to operate the instantaneous water heater in parallel or on its own while the heat source protection function is active.

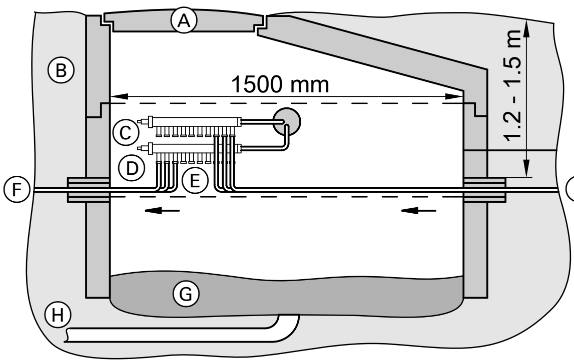
Geothermal collector

The thermal properties of the upper layer of the earth, such as the volumetric thermal capacity and thermal conductivity, are largely dependent on the consistency and properties of the ground.
The wetter the soil, the higher the proportion of mineral constituents (quartz or feldspar) of the soil and the smaller the proportion of pores, the better the storage characteristics and thermal conductivity.
The specific extraction rate q_E for the ground lies between approx. 10 and 35 W/m².

Dry sandy soil	q_E = 10–15 W/m²
Damp sandy soil	q_E = 15–20 W/m²
Dry loamy soil	q_E = 20–25 W/m²
Damp loamy soil	q_E = 25–30 W/m²
Ground with groundwater	q_E = 30–35 W/m²

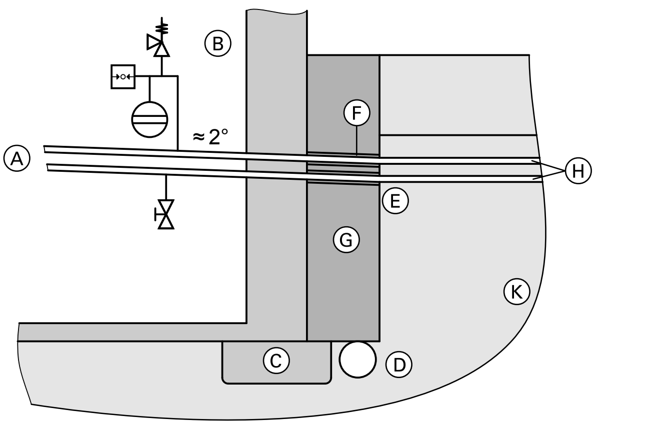
These details enable the required ground area to be calculated subject to the heat load of the building and the refrigerating capacity $\dot{Q}_K$ of the heat pump.
$\dot{Q}_K = \dot{Q}_{WP} - P_{WP}$
$\dot{Q}_K$ is the difference between the heat pump heating output ($\dot{Q}_{HP}$) and its power consumption (P_{HP}).

Manifolds and headers
The manifold and the header should be installed so that they are accessible for future inspections, e.g in their own distribution ducts outside the house or in the basement window duct.
Every pipe circuit should be able to be isolated individually on the flow and return side to enable the collector to be filled and vented.



Example of a common duct

Ⓐ Access point ∅ 600 mm
Ⓑ Concrete rings
Ⓒ Primary flow
Ⓓ Primary return
Ⓔ Brine distributor
Ⓕ Collector pipes
Ⓖ Crushed stone
Ⓗ Drainage



Example of a wall outlet

- Ⓐ To the heat pump
- Ⓑ Building
- Ⓒ Foundations
- Ⓓ Drainage
- Ⓔ Seal
- Ⓕ Pipe liner
- Ⓖ Crushed stone
- Ⓗ PE 32 × 3.0 (2.9)
- Ⓚ Ground

All pipes, profiles etc. must be made from corrosion-resistant materials. Flow and return lines transport cold brine (brine temperature < cellar temperature). For that reason, all pipes inside the house and the wall outlets (even inside the wall structure) must be thermally insulated and vapour diffusion-proof to prevent the formation of condensation and subsequent damage from moisture. Alternatively, a drain can be installed to remove condensate. Practical experience has shown that a prepared brine mixture is satisfactory for filling the system.

Pipework should be routed on the outside of the building with a slight slope to prevent ingress of water during heavy rain. A good drainage system will ensure that the rainwater drains away.
The use of approved wall outlets (e.g. Doyma) is required if the site makes specific demands regarding pressing water.

Rough sizing
Basis for sizing is the refrigerating capacity $\dot{Q}_K$ of the heat pump at **operating point B0/W35**.
Required area $F_E = \dot{Q}_K/\dot{q}_E$ (average extraction rate subject to ground conditions).

Required number of pipe circuits @ 100 m length subject to F_E and the pipe dimension:
- With PE 20 × 2.0:
  Pipe circuits @ 100 m length = $F_E \cdot 3/100$
- With PE 25 × 2.3:
  Pipe circuits @ 100 m length = $F_E \cdot 2/100$
- With PE 32 × 3.0 (2.9):
  Pipe circuits @ 100 m length = $F_E \cdot 1.5/100$

The detailed design depends on the ground structure and can only be determined following a local inspection.

Required brine manifolds and pipe circuits for $\dot{q}_E$ = 25 W/m^2

Assumed distances between pipes for a length of 100 m:
PE 25 x 2.3 approx. 0.50 m (2 m pipe/m^2)
PE 32 x 2.9 approx. 0.70 m (1.5 m pipe/m^2)

Approximate sizing for 100 m length, 400 V appliances

Vitocal	$\dot{Q}_K$ in kW	F_E in m^2 (rounded)	PE 25 x 2.3 Number of pipe circuits	PE 25 x 2.3 Part no. of brine manifold	PE 32 x 2.9 Number of pipe circuits	PE 32 x 2.9 Part no. of brine manifold
200-G, type						
BWC 201.B06	4.4	180	4	1 x ZK01287	3	1 x ZK01289
BWC 201.B08	6.1	244	5	1 x ZK01286 1 x ZK01285	4	1 x ZK01290
BWC 201.B10	8.3	332	7	1 x ZK01286 1 x ZK01287	5	1 x ZK01289 1 x ZK01288
BWC 201.B13	10.5	424	8	2 x ZK01287	6	2 x ZK01289
BWC 201.B17	13.8	556	12	3 x ZK01287	9	3 x ZK01289

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Vitocal	$\dot{Q}_K$ in kW	F_E in m² (rounded)	PE 25 x 2.3		PE 32 x 2.9	
			Number of pipe circuits	Part no. of brine manifold	Number of pipe circuits	Part no. of brine manifold
300-G, type						
BWC 301.C06	6.6*11	264	5	1 x ZK01286 1 x ZK01285	4	1 x ZK01290
BWC 301.C12	8.55*11	342	7	1 x ZK01286 1 x ZK01287	6	2 x ZK01289
BWC 301.C16	12.4*11	496	10	1 x ZK01285 2 x ZK01287	8	2 x ZK01290
BW 301.A21	17.0	700	14	2 x ZK01287 2 x ZK01286	11	4 x ZK01289
BW 301.A29	23.3	940	19	4 x ZK01287 1 x ZK01286	14	3 x ZK01290 2 x ZK01288
BW 301.A45	34.2	1370	27	On site	21	On site
300-G, 2-stage, type						
BW+BWS 301.A21	34.0	1360	27	On site	20	5 x ZK01290
BW+BWS 301.A29	46.6	1870	37	On site	28	On site
BW+BWS 301.A45	68.4	2740	55	On site	41	On site
350-G						
BW 351.B20	16.4	656	14	3 x ZK01287 1 x ZK01285	10	2 x ZK01290 1 x ZK01288
BW 351.B27	23.0	920	19	4 x ZK01287 1 x ZK01286	14	3 x ZK01290 1 x ZK01288
BW 351.B33	26.3	1052	21	On site	16	4 x ZK01290
BW 351.B42	33.6	1344	27	On site	21	On site
350-G, 2-stage, type						
BW+BWS 351.B20	32.8	1312	27	On site	20	5 x ZK01290
BW+BWS 351.B27	46.0	1840	37	On site	28	On site
BW+BWS 351.B33	52.6	2104	42	On site	32	On site
BW+BWS 351.B42	67.2	2688	54	On site	41	On site
222-G, type						
BWT 221.B06	4.4	180	4	1 x ZK01287	3	1 x ZK01289
BWT 221.B08	6.1	244	5	1 x ZK01286 1 x ZK01285	4	1 x ZK01290
BWT 221.B10	8.3	332	7	1 x ZK01286 1 x ZK01287	5	1 x ZK01289 1 x ZK01288
333-G, type						
BWT 331.C06	6.6*11	264	5	1 x ZK01286 1 x ZK01285	4	1 x ZK01290
BWT 331.C12	8.55*11	342	7	1 x ZK01286 1 x ZK01287	6	2 x ZK01289

Approximate sizing for 100 m length, 230 V appliances

Vitocal	$\dot{Q}_K$ in kW	F_E (rounded) in m²	PE 25 x 2.3		PE 32 x 2.9	
			Number of pipe circuits	Part no. of brine manifold	Number of pipe circuits	Part no. of brine manifold
200-G, type						
BWC-M 201.B06	4.3	172	4	1 x ZK01287	3	1 x ZK01289
BWC-M 201.B08	5.9	236	5	1 x ZK01286 1 x ZK01285	4	1 x ZK01290
BWC-M 201.B10	8.2	328	7	1 x ZK01286 1 x ZK01287	5	1 x ZK01289 1 x ZK01288
222-G, type						
BWT-M 221.B06	4.3	172	4	1 x ZK01287	3	1 x ZK01289
BWT-M 221.B08	5.9	236	5	1 x ZK01286 1 x ZK01285	4	1 x ZK01290
BWT-M 221.B10	8.2	328	7	1 x ZK01286 1 x ZK01287	5	1 x ZK01289 1 x ZK01288

Note

Up to 10 brine circuits can be connected in series to a single flow or return; up to 20 brine circuits can be connected in a parallel circuit. The brine manifolds and geothermal collector circuits must be designed and sized by a qualified contractor.

**11 For heat pumps with output-dependent control, the maximum cooling capacity at B0/W35 is assumed as the design basis. The assumed cooling capacity can also be lower, depending on the heat load of the building in the individual system design.*

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Sample calculations for sizing the geothermal collector

Specification:

Building heat load (net heat load)	8.5 kW
DHW heating supplement for a 4-person household	1.0 kW (See chapter "DHW heating supplement": 0.25 kW/person × 4 persons = 1.0 kW. This equates to < 20 % of the building heat load.)
Power-OFF times	3 × 2 h/d (only 4 h are taken into account: See chapter "Mono mode operation". This equates to 10.2 kW.)
Total heat load of building Φ_{HL} (corresponds to the heat pump heating output actually required)	10.2 kW (= 10200 W)
System temperature	35/30 °C
Operating point of heat pump for sizing purposes	B0/W35

Sample calculation for sizing the geothermal collector for heat pumps with fixed heating output

Selection of the heat pump

The Vitocal 200-G heat pump, type BWC 201.B10 achieves a heating output of 10.36 kW at operating point B0/W35 (see chapter "Specification"). The specified required heat load of 10.2 kW (incl. supplements for power-OFF periods, with DHW heating) is covered by the Vitocal 200-G, type BWC 201.B10 in mono mode. The heat pump is slightly oversized.
The cooling capacity $\dot{Q}_K$ at this operating point equates to 8.32 kW (see chapter "Specification").

Sizing the geothermal collector

- Average extraction rate:
  $\dot{q}_E = 25\ W/m^2$
- Cooling capacity:
  $\dot{Q}_K = 8.32\ kW = 8320\ W$
- Required area:
  $F_E = \dot{Q}_K/\dot{q}_E = 8320\ W/25\ W/m^2 = 333\ m^2$
- The number X of required pipe circuits, each 100 m in length:
  $X = F_E \cdot 2/100 = 333\ m^2 \cdot 2\ m/m^2/100\ m = 6.66 \approx 7$
- **Selected** pipe dimension:
  PE pipe 25 × 2.3 with 0.327 l/m

Required amount of heat transfer medium (V_R)

- Take the content of the geothermal collector into consideration, including all supply lines, plus the volume of fittings and the heat pump.
  Provide distributors corresponding to the number of pipe circuits.
- **Selected** supply line: 10 m (2 · 5 m) PE pipe 32 x 3.0 (2.9) with 0.531 l/m
  V_R = no. of pipe circuits · 100 m · pipeline volume
  + supply line length · pipeline volume
  = 7 · 100 m · 0.327 l/m + 10 m · 0.531 l/m
  = 228.9 l + 5.31 l = 234.2 l

Selected: 260 l incl. heat transfer medium in the fittings and the heat pump

Pressure drop of geothermal collector (Δp)

- Heat transfer medium: Tyfocor
- Heat pump minimum flow rate with Vitocal 200-G, type BWC 201.B10: 1470 l/h (see chapter "Specification")
- Flow rate per pipe circuit = (1470 l/h)/(7 circuits of 100 m each) = 210 l/h per pipe circuit
- Δp = R value × pipe length

R value (pressure drop value) for PE 25 × 2.3 and 32 × 3.0 (2.9) (see tables "Pressure drop" for the pipelines):
- At 210 l/h ≈ 58 Pa/m
- At 1470 l/h ≈ 450 Pa/m

$\Delta p_{pipe\ circuit}$ = 58 Pa/m · 100 m = 5800 Pa
$\Delta p_{supply\ line}$ = 450 Pa/m · 10 m = 4500 Pa
$\Delta p_{permissible}$ = 65000 Pa = 650 mbar (residual head at minimum flow rate)
Δp = $\Delta p_{pipe\ circuit} + \Delta p_{supply\ line}$ = 5800 Pa + 4500 Pa = 10300 Pa = 103 mbar

Result:
$\Delta p = \Delta p_{pipe\ circuit} + \Delta p_{supply\ line}$ does not exceed the value for $\Delta p_{permissible}$, so the intended geothermal collector can be operated with the Vitocal 200-G, type BWC 201.B10 heat pump with a rated heating output of 10.36 kW.

Sample calculation for sizing the geothermal collector for heat pumps with inverter-controlled heating output

Selection of the heat pump

The Vitocal 300-G heat pump, type BWC 301.C12 modulates between a heating output of 2.4 kW and 11.4 kW at operating point B0/W35 (see chapter "Specification"). The specified heat load of 10.2 kW (incl. supplements for power-OFF periods, incl. DHW heating) is covered according to demand by the Vitocal 300-G, type BWC 301.C12 in mono mode.

The required cooling capacity $\dot{Q}_K$ is calculated as follows:
$\dot{Q}_K = \Phi_{HL} - (\Phi_{HL}/\varepsilon_{nominal})$
$= 10200\ W - (10200\ W/4.80) = 8075\ W$

$\dot{Q}_K$: Cooling capacity
Φ_{HL}: Total heat load of building ≙ the heat pump heating output actually required
$\varepsilon_{nominal}$: Nominal coefficient of performance
For mono mode operation, a simplified solution using the coefficient of performance at rated heating output ε (COP) is applied, as the COP cannot be determined for every heating output of the modulation range.
The simplified calculation using the coefficient of performance at rated heating output ε (COP) produces a slightly higher cooling capacity and consequently results in a slightly larger heat source than required. The slightly larger heat source results in more efficient heat pump operation.

Sizing the geothermal collector

- Average extraction rate:
  $\dot{q}_E = 25\ W/m^2$
- Cooling capacity:
  $\dot{Q}_K = 8.075\ kW = 8075\ W$
- Required area:
  $F_E = \dot{Q}_K/\dot{q}_E = 8075\ W/25\ W/m^2 = 323\ m^2$
- The number X of required pipe circuits, each 100 m in length:
  $X = F_E \cdot 2/100 = 323\ m^2 \cdot 2\ m/m^2/100\ m = 6.46 \approx 7$
- **Selected** pipe dimension:
  PE pipe 25 × 2.3 with 0.327 l/m

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Required amount of heat transfer medium (V_R)

- Take the content of the geothermal collector into consideration, including all supply lines, plus the volume of fittings and the heat pump.
  Provide distributors corresponding to the number of pipe circuits.
- **Selected** supply line: 10 m (2 · 5 m) PE pipe 25 × 2.3 with 0.327 l/m
  V_R = no. of pipe circuits · 100 m · pipeline volume
  + supply line length · pipeline volume
  = 7 · 100 m · 0.327 l/m + 10 m · 0.327 l/m
  = 228.9 l + 3.27 l = 232.2 l

Selected: 260 l incl. heat transfer medium in the fittings and the heat pump

Pressure drop of geothermal collector

- Heat transfer medium: Tyfocor
- Heat pump minimum flow rate with Vitocal 300-G, type BWC 301.C12: 1000 l/h (see chapter "Specification")
- Flow rate per pipe circuit = (1000 l/h)/(7 circuits of 100 m each) = 143 l/h per pipe circuit
- Δp = R value × pipe length

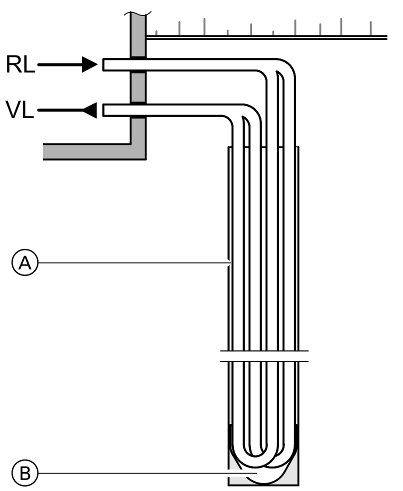
R value (pressure drop value) for PE 25 × 2.3 (see "Pressure drop" tables for the pipelines):

- At 143 l/h ≈ 39 Pa/m
- At 1000 l/h ≈ 749.4 Pa/m

$\Delta p_{pipe\ circuit}$ = 39 Pa/m · 100 m = 3900 Pa
$\Delta p_{supply\ line}$ = 749.4 Pa/m · 10 m = 7494 Pa
$\Delta p_{permissible}$ = 80000 Pa = 800 mbar (residual head at minimum flow rate)
Δp = $\Delta p_{pipe\ circuit} + \Delta p_{supply\ line}$ = 3900 Pa + 7494 Pa
= 11394 Pa ≈ 114 mbar

Result:
$\Delta p = \Delta p_{pipe\ circuit} + \Delta p_{supply\ line}$ does not exceed the value for $\Delta p_{permissible}$, so the intended geothermal collector can be operated with the Vitocal 300-G heat pump, type BWC 301.C12 with a heating output of 10.2 kW.

Geothermal probe



RL Primary circuit return
VL Primary circuit flow
Ⓐ Bentonite-cement suspension
Ⓑ Protective cap

On smaller plots and when retrofitting existing buildings, geothermal probes are an alternative to geothermal collectors. Below we consider the double U-shaped pipe probe.
One version would be 2 double U-pipe loops made from plastic in one borehole. All cavities between the pipes and the ground are filled with a highly conductive material, e.g. bentonite.

Note
Prior to applying any thermal load to the geothermal probe, we recommend allowing the backfill material to set for 1 to 2 months. This improves the long-term stability of the geothermal probe and reduces the risk of frost damage (formation of cracks).

We recommend the following spacing between 2 geothermal probes:

- Min. 5 m to 50 m depth
- Min. 6 m to 100 m depth

The geothermal probes are installed either by drilling or by ramming, subject to their design. For these kinds of systems, local water authorities may have to be notified of the plan in advance and a permit obtained.

Possible specific extraction rates q_E for double U-shaped pipe probes (to VDI 4640 Part 2)

Subsoil	Specific extraction rate q_E in W/m
Standard values	
Poor subsoil (dry sediment) ($\lambda < 1.5$ W/(m·K))	20
Normal solid rock subsoil and water-saturated sediment ($1.5 \leq \lambda \leq 3.0$ W/(m·K))	50
Solid rock with high thermal conductivity ($\lambda > 3.0$ W/(m·K))	70
Individual rocks	
Gravel, sand (dry)	< 20
Gravel, sand (aquiferous)	55 to 65
Clay, loam (damp)	30 to 40
Limestone (solid)	45 to 60
Sandstone	55 to 65
Acidic magmatite (e.g. granite)	55 to 70
Basic magmatite (e.g. basalt)	35 to 55
Gneiss	60 to 70

Rough sizing
The basis for sizing is the cooling capacity $\dot{Q}_K$ of the heat pump at **operating point B0/W35**.
Required probe length $l = \dot{Q}_K/\dot{q}_E$ ($\dot{q}_E$ = average extraction rate subject to ground conditions)
The precise sizing depends on the ground structure and the water-carrying ground strata, and can only be determined following a local inspection by the drilling contractor.

Note
Reducing the number of drilled holes in favour of probe depth increases the pressure drop to be overcome and the required pump rate.

9

Information regarding dual mode parallel and mono energetic operation
In case of dual mode parallel and mono energetic operation, consider the higher heat source load: See chapter "Sizing".
As a standard value for a geothermal probe system, the annual extraction rate must not exceed 100 kWh/m per year.

Required geothermal probes and brine manifolds for $\dot{q}_E$ = 50 W/m

Approximate sizing of geothermal probe as per VDI 4640 for 2000 hours run, 400 V appliances

Vitocal	**$\dot{Q}_K$ in kW**	**PE 32 x 2.9**		**Part no. of brine manifold**
		Total pipe length in m	**Length of geothermal probe in m**	
200-G, type				
BWC 201.B06	4.4	90	1 x 90	1 x ZK01288
BWC 201.B08	6.1	122	1 x 122 or 2 x 66	1 x ZK01290
BWC 201.B10	8.3	166	2 x 83	1 x ZK01290
BWC 201.B13	10.5	212	2 x 106 or 3 x 71	2 x ZK01289
BWC 201.B17	13.8	278	3 x 93	2 x ZK01289
300-G, type				
BWC 301.C06	6.6*11	132	2 x 66	1 x ZK01290
BWC 301.C12	8.55*11	171	2 x 86	1 x ZK01290
BWC 301.C16	12.4*11	248	3 x 83	2 x ZK01289
BW 301.A21	17.0	340	3 x 114 or 4 x 85	4 x ZK01290
BW 301.A29	23.3	466	5 x 94	2 x ZK01290 1 x ZK01288
BW 301.A45	34.2	684	7 x 98	3 x ZK01290 1 x ZK01288
300-G, 2-stage, type				
BW+BWS 301.A21	34.0	680	7 x 98	3 x ZK01290 2 x ZK01288
BW+BWS 301.A29	46.6	932	10 x 94	5 x ZK01290
BW+BWS 301.A45	68.4	1368	14 x 98	On site
350-G, type				
BW 351.B20	16.4	328	3 x 110 or 4 x 82	2 x ZK01290
BW 351.B27	23.0	460	5 x 92	2 x ZK01290 1 x ZK01288
BW 351.B33	26.3	526	6 x 88	3 x ZK01290
BW 351.B42	33.6	672	7 x 97	3 x ZK01290 1 x ZK01288
350-G, 2-stage, type				
BW+BWS 351.B20	32.8	656	7 x 94	3 x ZK01290 1 x ZK01288
BW+BWS 351.B27	46.0	920	10 x 92	5 x ZK01290
BW+BWS 351.B33	52.6	1052	11 x 96	On site
BW+BWS 351.B42	67.2	1344	14 x 97	On site
222-G, type				
BWT 221.B06	4.5	90	1 x 90	1 x ZK01288
BWT 221.B08	6.1	122	1 x 122 or 2 x 61	1 x ZK01290
BWT 221.B10	8.3	166	2 x 83	1 x ZK01290
333-G, type				
BWT 331.C06	6.6*11	132	2 x 66	1 x ZK01290
BWT 331.C12	8.55*11	171	2 x 86	1 x ZK01290

Approximate sizing of geothermal probe as per VDI 4640 for 2000 hours run, 230 V appliances

Vitocal	**$\dot{Q}_K$ in kW**	**PE 32 x 2.9**		**Part no. of brine manifold**
		Total pipe length in m	**Length of geothermal probe in m**	
200-G, type				
BWC-M 201.B06	4.3	86	1 x 86	1 x ZK01288
BWC-M 201.B08	5.9	118	1 x 118 or 3 x 71	1 x ZK01290
BWC-M 201.B10	8.2	164	2 x 93	1 x ZK01290

*11 *For heat pumps with output-dependent control, the maximum cooling capacity at B0/W35 is assumed as the design basis. The assumed cooling capacity can also be lower, depending on the heat load of the building in the individual system design.*

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Vitocal	$\dot{Q}_K$ in kW	PE 32 x 2.9 Total pipe length in m	Length of geothermal probe in m	Part no. of brine manifold
222-G, type				
BWT-M 221.B06	4.4	90	1 x 90	1 x ZK01288
BWT-M 221.B08	6.1	122	1 x 122 or 2 x 61	1 x ZK01290
BWT-M 221.B10	8.3	166	2 x 83	1 x ZK01290

Brine manifold for 2-stage heat pump (BW+BWS)
The brine manifold for geothermal probes must be designed and sized by a qualified contractor.

Sample calculations for sizing the geothermal probe

Specification:

Building heat load (net heat load)	8.5 kW
DHW heating supplement for a 4-person household	1.0 kW (See chapter "DHW heating supplement": 0.25 kW/person × 4 persons = 1.0 kW. This equates to < 20 % of the building heat load.)
Power-OFF times	3 × 2 h/d (only 4 h are taken into account: See chapter "Mono mode operation". This equates to 10.2 kW.)
Total heat load of building Φ_{HL} (corresponds to the heat pump heating output actually required)	10.2 kW (= 10200 W)
System temperature	35/30 °C
Operating point of heat pump for sizing purposes	B0/W35

Sample calculation for sizing the geothermal probe for heat pumps with fixed heating output

Selection of the heat pump
The Vitocal 200-G heat pump, type BWC 201.B10 achieves a heating output of 10.36 kW at operating point B0/W35 (see chapter "Specification"). The specified required heat load of 10.2 kW (incl. supplements for power-OFF periods, with DHW heating) is covered by the Vitocal 200-G, type BWC 201.B10 in mono mode. The heat pump is slightly oversized.
The cooling capacity $\dot{Q}_K$ at this operating point equates to 8.32 kW (see chapter "Specification").

Sizing the geothermal probe as double U-pipe
- Average extraction rate:
  $\dot{q}_E$ = 50 W/m
- Cooling capacity:
  $\dot{Q}_K$ = 8.32 kW = 8320 W
- Required probe length:
  Probe length L = $\dot{Q}_K/\dot{q}_E$ = 8320 W/50 W/m = 166.4 m ≈ 167 m
  = 2 × 84 m
  Geothermal probe as double U-pipe: L = 4 × 84 m
- **Selected** pipe dimension:
  PE pipe 32 × 3.0 (2.9) with 0.531 l/m

Required amount of heat transfer medium (V_R)
- Take the content of the geothermal probe into consideration, including all supply lines, plus the volume of fittings and the heat pump.
  If there is more than 1 geothermal probe, distributors must be provided.
- **Selected** supply line: 10 m (2 · 5 m) PE pipe 32 × 3.0 (2.9) with 0.531 l/m

V_R = 4 · probe length L · number of probes · pipeline volume + supply line length · pipeline volume
= 4 · 84 m · 2 · 0.531 l/m + 10 m · 0.531 l/m
= 363 l

Selected: 400 l incl. heat transfer medium in the fittings and the heat pump

Pressure drop of the geothermal probe
- Heat transfer medium: Tyfocor
- Heat pump minimum flow rate with Vitocal 200-G, type BWC 201.B10: 1470 l/h (see chapter "Specification")
- Flow rate per U-pipe: 1470 l/h : 4 = 368 l/h
- Δp = R value × pipe length

R value (pressure drop value) for PE 32 × 3.0 (2.9) (see tables "Pressure drop" for the pipelines):
- At 368 l/h ≈ 38.5 Pa/m
- At 1470 l/h ≈ 450 Pa/m

$\Delta p_{\text{double U-pipe probe}}$ = 38.5 Pa/m × 4 × 84 m = 12936 Pa
$\Delta p_{\text{supply line}}$ = 450 Pa/m · 10 m = 4500 Pa
$\Delta p_{\text{permissible}}$ = 65000 Pa = 650 mbar (residual head at minimum flow rate)
Δp = $\Delta p_{\text{double U-pipe probe}} + \Delta p_{\text{supply line}}$
= 12936 Pa + 4500 Pa = 17436 Pa ≈ 174 mbar

Result:
$\Delta p = \Delta p_{\text{double U-pipe probe}} + \Delta p_{\text{supply line}}$ does not exceed the value for $\Delta p_{\text{permissible}}$, so the intended geothermal probe can be operated with the Vitocal 200-G, type BWC 201.B10 heat pump with a rated heating output of 10.36 kW.

Sample calculation for sizing the geothermal probe for heat pumps with inverter-controlled heating output

Selection of the heat pump
The Vitocal 300-G heat pump, type BWC 301.C12 modulates between a heating output of 2.4 kW and 11.4 kW at operating point B0/W35 (see chapter "Specification"). The specified heat load of 10.2 kW (incl. supplements for power-OFF periods, with DHW heating) is covered according to demand by the Vitocal 300-G, type BWC 301.C12 in mono mode.

The required cooling capacity $\dot{Q}_K$ is calculated as follows:

$\dot{Q}_K = \Phi_{HL} - (\Phi_{HL}/\varepsilon_{nominal})$
= 10200 W – (10200 W/4.80) = 8075 W

$\dot{Q}_K$: Cooling capacity

Φ_{HL}: Total heat load of building ≙ the heat pump heating output actually required

$\varepsilon_{nominal}$: Nominal coefficient of performance
For mono mode operation, a simplified solution using the coefficient of performance at rated heating output ε (COP) is applied, as the COP cannot be determined for every heating output of the modulation range.
The simplified calculation using the coefficient of performance at rated heating output ε (COP) produces a slightly higher cooling capacity and consequently results in a slightly larger heat source than required. The slightly larger heat source results in more efficient heat pump operation.

Sizing the geothermal probe as double U-pipe

- Average extraction rate:
  $\dot{q}_E$ = 50 W/m
- Cooling capacity:
  $\dot{Q}_K$ = 8.075 kW = 8075 W
- Required probe length:
  Probe length L = $\dot{Q}_K/\dot{q}_E$ = 8075 W/50 W/m = 161.5 m ≈ 162 m
  = 2 × 81 m
  Geothermal probe as double U-pipe: L = 4 × 81 m
- **Selected** pipe dimension:
  PE pipe 32 × 3.0 (2.9) with 0.531 l/m

Required amount of heat transfer medium (V_R)

- Take the content of the geothermal probe into consideration, including all supply lines, plus the volume of fittings and the heat pump.
  If there is more than 1 probe, distributors must be provided.
- **Selected** supply line: 10 m (2 · 5 m) PE pipe 32 × 3.0 (2.9) with 0.531 l/m
  V_R = 4 · probe length L · number of probes · pipeline volume + supply line length · pipeline volume
  = 4 · 81 m · 2 · 0.531 l/m + 10 m · 0.531 l/m
  = 350 l

Selected: 400 l incl. heat transfer medium in the fittings and the heat pump

Pressure drop of the geothermal probe

- Heat transfer medium: Tyfocor
- Heat pump minimum flow rate with Vitocal 300-G, type BWC 301.C12: 1000 l/h (see chapter "Specification")
- Flow rate per U-pipe: 1000 l/h : 4 = 250 l/h
- Δp = R value × pipe length

R value (pressure drop value) for PE 32 × 3.0 (2.9) (see tables "Pressure drop" for the pipelines):

- At 250 l/h ≈ 30 Pa/m
- At 1000 l/h = 228.7 Pa/m

$\Delta p_{double\ U\text{-}pipe\ probe}$ = 30 Pa/m × 4 × 81 m = 9720 Pa
$\Delta p_{supply\ line}$ = 228.7 Pa/m · 10 m = 2287 Pa
$\Delta p_{permissible}$ = 80000 Pa = 800 mbar (residual head at minimum flow rate)
Δp = $\Delta p_{double\ U\text{-}pipe\ probe} + \Delta p_{supply\ line}$
= 9720 Pa + 2287 Pa = 12007 Pa ≈ 120 mbar

Result:
$\Delta p = \Delta p_{pipe\ circuit} + \Delta p_{supply\ line}$ does not exceed the value for $\Delta p_{permissible}$, so the intended geothermal collector can be operated with the Vitocal 300-G heat pump, type BWC 301.C12 with a heating output of 10.2 kW.

Expansion vessel for primary circuit

An expansion vessel with a capacity of 25 l is sufficient up to a supply line length of 20 m and up to a size of PE 40.
Detailed calculations are required for greater lengths.

V_A = total system volume (brine) in litres
V_N = rated volume of the expansion vessel in litres
V_Z = increase in volume during system heating, in litres
= $V_A \cdot \beta \cdot \Delta t$
β = expansion factor (β for Tyfocor 35 % = 0.0004)
Δt = temperature differential primary circuit (–5 to +20 °C) = 25 K
V_V = safety hydraulic seal (heat transfer medium Tyfocor) in litres
= V_A · (hydraulic seal: 0.005), at least 3 l (to DIN 4807)
p_e = permiss. terminal pressure in bar
= $p_{si} - 0.1 \cdot p_{si}$
= $0.9 \cdot p_{si}$
p_{si} = safety valve discharge pressure = 3 bar
$V_N = (V_Z + V_V) \cdot (p_e + 1) / (p_e - p_{st})$
p_{st} = nitrogen pre-charge pressure = 1.5 bar

Expansion vessel capacity for geothermal collector

V_A = geothermal collector capacity incl. supply line + heat pump capacity = 130 l
$V_Z = V_A \cdot \beta \cdot \Delta t$ = 130 l · 0.0004 1/K · 25 K = 1.3 l
$V_V = V_A \cdot 0.005$ = 130 l · 0.005 = 0.65 l

Selected: 3 l

$$V_N = \frac{1.3\ \text{litres} + 3.0\ \text{litres}}{2.7\ \text{bar} - 1.5\ \text{bar}} \cdot (2.7\ \text{bar} + 1) = 13.25\ \text{litres}$$

Expansion vessel capacity for geothermal probes

V_A = geothermal collector capacity incl. supply line + heat pump capacity = 220 l
$V_Z = V_A \cdot \beta \cdot \Delta t$ = 220 l · 0.0004 1/K · 25 K = 2.2 l
$V_V = V_A \cdot 0.005$ = 220 l · 0.005 = 1.1 l

Selected: 3 l

$$V_N = \frac{2.2\ \text{litres} + 3.0\ \text{litres}}{2.7\ \text{bar} - 1.5\ \text{bar}} \cdot (2.5\ \text{bar} + 1) = 15.17\ \text{litres}$$

Note
The brine expansion vessels are delivered with a pre-charge pressure of 4.5 bar (0.45 Pa). The pre-charge pressure must be adjusted to the required pressure in the primary circuit of 1.5 bar (0.15 Pa).

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Pipework, primary circuit

Pressure drop in PE pipes, PN 10 with Tyfocor

R value (resistance value):
- R value = pressure drop/m line
- The specified R values refer to Tyfocor heat transfer medium:
  - Kinematic viscosity = 4.0 mm^2/s
  - Density = 1050 kg/m^3

Grey	Laminar flow
White	Turbulent flow

Flow rate in l/h	R values in Pa/m for PE pipe		
	20 × 2.0 mm	25 × 2.3 mm	32 × 2.9 mm
100	77.4	27.5	–
120	92.9	32.9	–
140	108.4	38.4	–
160	123.9	43.9	–
180	139.4	49.4	–
200	154.9	54.9	–
220	170.3	60.4	–
240	185.8	65.9	–
260	201.3	71.4	–
280	216.8	76.9	–
300	232.3	82.3	31.2
320	247.8	87.8	33.3
340	263.3	93.3	35.4
360	278.7	98.8	37.5
380	294.2	104.3	39.5
400	309.7	109.8	41.6
420	325.2	115.3	43.7
440	554.6	120.8	45.8
460	599.5	126.3	47.9
480	645.8	131.7	49.9
500	693.7	137.2	52.0
520	742.9	142.7	54.1
540	793.7	246.3	56.2
560	845.8	262.4	58.3
580	899.4	279.1	60.3
600	–	296.1	62.4
620	–	313.6	64.5
640	–	331.5	66.6
660	–	349.9	68.7
680	–	368.6	70.7
700	–	387.8	122.5
720	–	407.4	128.7
740	–	427.4	135.0
760	–	468.7	141.5
780	–	489.9	148.1
800	–	511.5	154.8
820	–	533.5	161.6
840	–	566.0	168.6
860	–	578.8	175.7
880	–	602.0	182.9
900	–	625.6	190.2
920	–	649.6	197.7
940	–	674.0	205.3
960	–	698.8	213.0
980	–	723.9	220.8
1000	–	749.4	228.7
1020	–	775.3	236.8
1040	–	801.6	245.0
1060	–	828.3	253.3
1080	–	855.3	261.7
1100	–	–	270.2
1120	–	–	278.9
1140	–	–	287.7
1160	–	–	296.6
1180	–	–	305.6
1200	–	–	314.7
1240	–	–	333.3
1280	–	–	352.3
1320	–	–	371.8
1360	–	–	391.7
1400	–	–	412.1
1440	–	–	433.0
1480	–	–	454.2
1520	–	–	475.9
1560	–	–	498.1
1600	–	–	520.6
1640	–	–	543.6
1680	–	–	567.0
1720	–	–	590.9
1760	–	–	615.1
1800	–	–	639.8
1840	–	–	664.9
1880	–	–	690.4
1920	–	–	716.3
1960	–	–	742.6
2000	–	–	769.3
2040	–	–	796.4
2080	–	–	824.0
2120	–	–	851.9
2160	–	–	880.2
2200	–	–	909.0
2240	–	–	938.1
2280	–	–	967.6
2320	–	–	997.5
2360	–	–	1027.8
2400	–	–	1058.5
2440	–	–	1089.5
2480	–	–	1121.0
2520	–	–	1152.8
2560	–	–	1185.0
2600	–	–	1217.6
2640	–	–	1250.6
2680	–	–	1283.9
2720	–	–	1317.6
2760	–	–	1351.7
2800	–	–	1386.2
2840	–	–	1421.1
2880	–	–	1456.3
2920	–	–	1491.8
2960	–	–	1527.8
3000	–	–	1564.1

Flow rate in l/h	R-values in Pa/m for PE pipe		
	40 × 3.7 mm	50 × 4.6 mm	63 × 5.8 mm
1500	165.8	56.9	17.8
1600	209.6	61.7	25.3
2000	274.0	96.0	30.1
2100	305.5	102.8	34.0
2300	383.6	117.8	42.7
2400	389.1	128.8	45.2
2500	404.2	141.8	48.0
2700	479.5	163.7	56.2
3000	575.4	189.1	63.0
3200	675.6	216.5	69.9
3600	808.3	202.8	84.9
3900	952.2	315.1	102.8
4200	1082.3	356.2	121.9
5200	1589.2	530.2	161.7
5400	1712.5	569.9	187.7
5500	1787.9	596.0	191.8
6200	2274.2	739.8	227.4
6300	2340.0	771.3	239.8
7200	–	1000.1	316.5

Flow rate in l/h	R-values in Pa/m for PE pipe		
	40 × 3.7 mm	50 × 4.6 mm	63 × 5.8 mm
7800	–	1257.7	367.2
9200	–	1568.7	493.2
9300	–	1596.1	509.6
12600	–	2794.8	956.3
15600	–	–	1315.2
18600	–	–	1808.4

Volumes in PE pipes, PN 10

External Ø of pipe × wall thickness in mm	DN	Volume per m pipe in l
20 × 2.0	15	0.201
25 × 2.3	20	0.327
32 × 3.0 (2.9)	25	0.531
40 × 2.3	32	0.984
40 × 3.7	32	0.835
50 × 2.9	40	1.595
50 × 4.6	40	1.308
63 × 5.8	50	2.070
63 × 3.6	50	2.445

Percentage supplements to pump output for operation with Tyfocor

Note
Circulation pump curves: See chapter "Primary pump".

- Design flow rate:
  $\dot{Q}_A = \dot{Q}_{water} + f_Q$ (in %)
- Design delivery head:
  $H_A = H_{water} + f_H$ (in %)

The pump must be selected using the increased pump rate details $\dot{Q}_A$ and H_A.

Note
The loading only includes the correction for the circulation pumps. Corrections for the system curve and system data must be determined with the help of technical literature and information provided by the valve manufacturer.
Viessmann heat transfer medium "Tyfocor" (ready mixed medium for temperatures down to –16 °C) has an ethylene glycol volume fraction of 30 %.

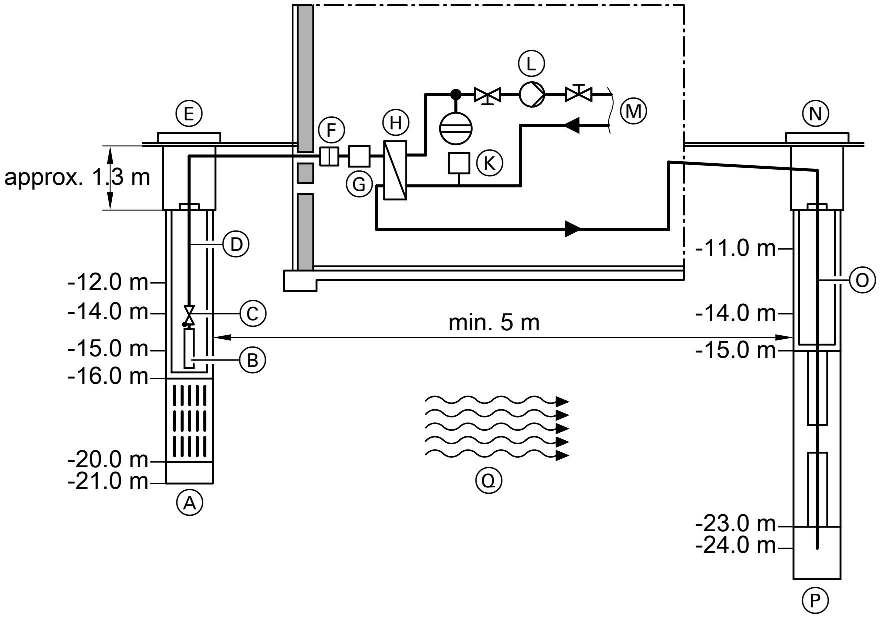
Volume ratio ethylene glycol	%	25	30	35	40	45	50
At operating temperature 0 °C							
– f_Q	%	7	8	10	12	14	17
– f_H	%	5	6	7	8	9	10
At operating temperature +2.5 °C							
– f_Q	%	7	8	9	11	13	16
– f_H	%	5	6	6	7	8	10
At operating temperature +7.5 °C							
– f_Q	%	6	7	8	9	11	13
– f_H	%	5	6	6	6	7	9

9.7 Heat source for water/water heat pumps

A conversion kit is required for operation as a water/water heat pump: See Viessmann pricelist.

Groundwater

Water/water heat pumps utilise the energy content of groundwater or cooling water.



Ⓐ Delivery well
Ⓑ Well pump
Ⓒ Non-return valve
Ⓓ Supply pipe
Ⓔ Well shaft
Ⓕ Dirt trap (on site)
Ⓖ Flow switch, well circuit
Ⓗ Separating heat exchanger, intermediate circuit
Ⓚ Primary circuit frost stat
Ⓛ Primary pump (integrated subject to type)
Ⓜ To the heat pump
Ⓝ Well shaft
Ⓞ Pressure pipe
Ⓟ Return well
Ⓠ Groundwater flow direction

Water/water heat pumps achieve high performance factors. Groundwater offers an almost constant temperature all year round of 7 to 12 °C. Therefore the temperature level needs to be raised only a little higher (compared to other heat sources) in order for it to be able to be utilised for heating purposes.
Depending on the design, the heat pump cools the groundwater by up to 5 K, although its consistency remains otherwise unchanged.

- Due to the cost of pumping systems, we recommend that for detached houses and two-family houses the groundwater is pumped from a maximum depth of approx. 15 m: See previous diagram. For commercial or large scale systems, pumping from greater depths could still be viable.
- Maintain a distance of at least 5 m between the point of extraction (delivery well) and the point of re-entry (return well). Delivery and return wells must be located in the line of flow of the groundwater to prevent a "flow short circuit". Construct the return well so that the water exits below the groundwater level.
- Due to fluctuating water quality, we generally recommend system separation between wells and heat pump: See "Heat pump principles" technical guide.
- The groundwater flow and return lines to/from the heat pump must be protected against frost and must fall towards the well.
- Recommendation: Use a dirt trap to protect the separating heat exchanger for the intermediate circuit.
- Two-stage heat pumps:
  If the stage 1 and 2 heat pumps (type BW and BWS) are installed with different rated heating outputs, two primary pumps must be used due to the differing flow rates.

Note
The on-site primary pump for the 2nd stage cannot be connected to the heat pump control unit via a PWM signal. The settings must be performed on the primary pump's control unit.

Calculating the required groundwater volume

The required groundwater flow rate depends on the heat pump output and the rate of groundwater cooling.
For minimum flow rates, see the heat pump specification, e.g. minimum flow rate for Vitocal 200-G, type BWC 201.B13 = 3.3 m^3/h.

When sizing the primary pumps, please note that higher flow rates result in an increased internal pressure drop.

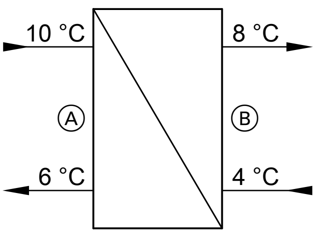
Permits for a groundwater/water heat pump system

This project requires permission from the "local water authority" [check local regulations].
Where buildings must be connected to the public water system, the utilisation of the groundwater as a heat source for heat pumps must be authorised by your local authority [check local regulations].

Permits can be subject to certain stipulations.

9

Sizing the heat exchanger, primary intermediate circuit



Ⓐ Water
Ⓑ Brine (antifreeze mixture)

Note
Fill the primary intermediate circuit with antifreeze mixture (brine, min. –5 °C).

The operational reliability of a water/water heat pump improves when it is used with a heat exchanger in the primary intermediate circuit. Subject to the correct sizing of the primary pump and the optimum layout of the primary intermediate circuit, the coefficient of performance of a water/water heat pump will be reduced by a maximum of 0.4.
We recommend the use of the threaded stainless steel plate heat exchanger from the Viessmann Vitoset pricelist (manufacturer: Tranter AG); see the following selection table.

Selection table for plate heat exchangers (separating heat exchangers) for water/water heat pumps

400 V appliances

Vitocal	**Cooling capacity in kW**	**Flow rate in m³/h**		**Pressure drop in kPa**		**Plate heat exchanger (threaded) Part no.**
		Primary circuit Ⓐ (to the well)	**Primary intermediate circuit Ⓑ (to the heat pump)**	**Primary circuit Ⓐ (to the well)**	**Primary intermediate circuit Ⓑ (to the heat pump)**	
200-G, type						
BWC 201.B06	5.8	1.2	1.4	15.0	14.2	7539 287
BWC 201.B08	8.5	1.8	2.1	19.0	19.0	7539 288
BWC 201.B10	11.6	2.5	2.9	17.0	18.4	7539 291
BWC 201.B13	14.5	3.1	3.3	17.5	19.6	7539 289
BWC 201.B17	19.2	4.1	4.5	19.3	22.2	7539 292
300-G, type						
BWC 301.C06[*11]	9.1	2.0	1.2	22.2	21.6	7539 288
BWC 301.C12[*11]	11.6	2.5	1.5	17.0	18.4	7539 291
BWC 301.C16[*11]	17.4	3.82	4.09	15.0	20.0	7539 290
BW 301.A21	23.7	5.1	5.2	28.8	32.9	7539 292
BW 301.A29	31.4	6.7	7.2	36.0	42.1	7540 293
BW 301.A45	48.9	10.5	10.6	38.1	45.7	7541 296
300-G, 2-stage, type						
BW+BWS 301.A21	47.4	10.2	10.4	35.9	43.1	7542 296
BW+BWS 301.A29	62.8	13.5	14.4	19.0	22.9	7543 298
BW+BWS 301.A45	97.8	21.0	21.2	32.5	20.4	7544 299
350-G, type						
BW 351.B20	21.1	4.5	4.8	23.1	26.4	7539 292
BW 351.B27	29.3	6.3	6.5	31.8	37.0	7540 293
BW 351.B33	35.7	7.7	7.7	22.9	27.3	7539 295
BW 351.B42	43.8	9.4	10.5	30.9	37.1	7540 296
350-G, 2-stage, type						
BW+BWS 351.B20	42.2	9.1	9.6	28.8	34.6	7541 296
BW+BWS 351.B27	58.6	12.6	13.0	16.6	20.4	7543 298
BW+BWS 351.B33	71.4	15.3	15.4	24.1	28.6	7543 298
BW+BWS 351.B42	87.6	18.8	21.0	26.4	31.6	7544 299

230 V appliances

Vitocal	**Cooling capacity in kW**	**Flow rate in m³/h**		**Pressure drop in kPa**		**Plate heat exchanger (threaded) Part no.**
		Primary circuit Ⓐ (to the well)	**Primary intermediate circuit Ⓑ (to the heat pump)**	**Primary circuit Ⓐ (to the well)**	**Primary intermediate circuit Ⓑ (to the heat pump)**	
200-G, type						
BWC-M 201.B06	6.5	1.2	1.4	15.0	14.2	7539 287
BWC-M 201.B08	8.6	1.8	2.1	19.0	19.0	7539 288
BWC-M 201.B10	11.7	2.5	2.9	17.0	18.4	7539 291

**11 For heat pumps with output-dependent control, the maximum cooling capacity at B0/W35 is assumed as the design basis. The assumed cooling capacity can also be lower, depending on the heat load of the building in the individual system design.*

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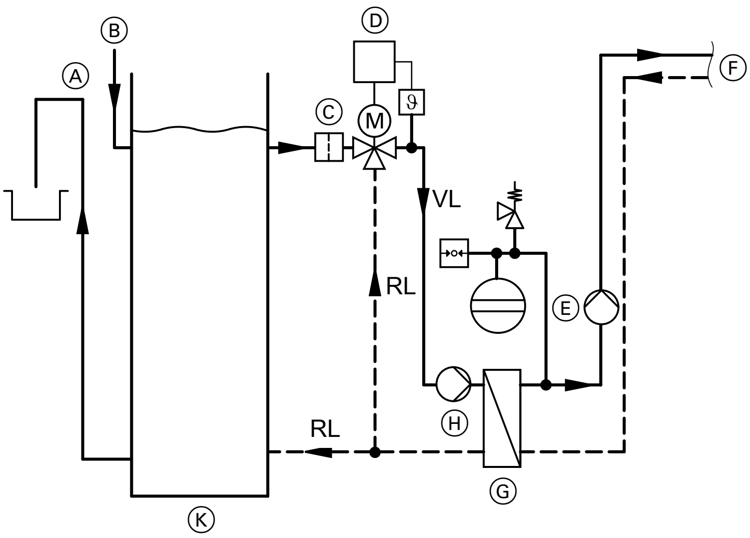
Vitocal 200-G/300-G, type BWC
Flow rate and pressure drop in the primary intermediate circuit are ensured by the integral circulation pumps as long as the following condition is met:
The maximum external pressure drop in the heat pump (see "Specification") must be lower than the total pressure drop in the primary intermediate circuit heat exchanger and pipework.

Coolant

If coolant from an industrial waste heat process is used as a heat source for a water/water heat pump, please observe the following:
- The water quality must comply with the limits applicable for copper-soldered or brazed stainless steel plate heat exchangers: See table in chapter "Principles".
- If the water quality falls outside these limits, use a stainless steel heat exchanger in the primary intermediate circuit: See table on page 180. Sizing is carried out by the manufacturer of the heat exchanger.
- The available amount of water must satisfy the minimum flow rates of the primary side of the heat pump: See "Specification" for the relevant heat pump.
- The max. flow temperature (water inlet) for water/water heat pumps is 25 °C. With higher water temperatures, low-end controllers on the primary side of the heat pump must limit the max. flow temperature (water inlet) to 25 °C, e.g. by adding cool return water. Low end controller: Landis & Staefa GmbH, Siemens Building Technologies, for example

  Note
  The utilisation of coolant is also possible in conjunction with a brine/water heat pump. The max. flow temperature must then be limited as for the water/water heat pump to 25 °C.



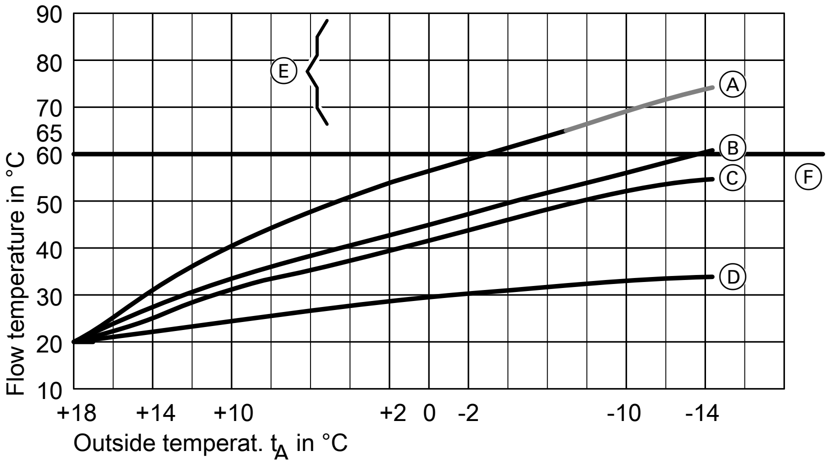
Ⓐ Overflow
Ⓑ Inlet
Ⓒ Dirt trap (on site)
Ⓓ Low end controller and valve (on site)
Ⓔ Primary pump
Ⓕ To the heat pump
Ⓖ Primary circuit heat exchanger: See page 180.
Ⓗ Circulation pump (well pump)
Ⓚ Water container, min. 3000 l capacity (on site)

9.8 Heating circuit and heat distribution

Different heating water flow temperatures are required depending on the heating system design.
Heat pumps reach a maximum flow temperature of 65 °C.

To enable the mono mode operation of the heat pump, install a low temperature heating system with a heating water flow temperature of ≤ 60 °C.

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



Ⓐ Max. heating water flow temperature = 75 °C
Ⓑ Max. heating water flow temperature = 60 °C
Ⓒ Max. 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 operation of the heat pump
Ⓕ Max. heat pump flow temperature, e.g. = 60 °C

9.9 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 strictly observed: See tables on page 184.

In heat pumps with output control the heat transfer adjusts to the building's heat load, which enables reduced cyclical operation in the partial load range.
Even with these heat pumps, however, the minimum system volume must be available when the heat demand in the building is very low, e.g. towards the end of spring.

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.
- The secondary pump can be sized smaller, due to the lower pressure drop to the heating water buffer cylinder.
- 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).

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 the heating water buffer cylinder for runtime optimisation

Note
With 2-stage heat pumps and heat pump cascades, the volume of the heating water buffer cylinder can be sized to match the output of the heat pump with the highest rated heating output, to achieve runtime optimisation.

V_{HP} = Q_{WP} · (20 to 25 l)
Q_{WP} = Absolute rated heating output of the heat pump
V_{HP} = Heating water buffer cylinder capacity in l

Example:
Vitocal 200-G, type BWC 201.B10 with Q_{WP} = 10.36 kW
V_{HP} = 10.36 · 20 l
= 207 l cylinder capacity

Selection: Vitocell 100-E with 200 l cylinder capacity

Sizing the heating water buffer cylinder for bridging power-OFF periods

These versions are offered for heat distribution systems without additional cylinder mass (e.g. radiators, hot water air heaters). Storing 100 % of heating energy for the duration of the power-OFF periods is feasible, but not recommended, otherwise the cylinder volume required would be too great.

Example:
Φ_{HL} = 10 kW = 10,000 W
t_{Sz} = 2 h (max. 3 x per day)
$\Delta\vartheta$ = 10 K
c_P = 1.163 Wh/(kgK) for water
c_P spec. thermal capacity in kWh/(kg·K)
Φ_{HL} Heat load of the building in kW
t_{Sz} Blocking time in h
V_{HP} Heating water buffer cylinder volume in l
$\Delta\vartheta$ System cool-down in K

100 % sizing
(subject to the existing heating surfaces)

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

$$V_{HP} = \frac{10000\ W \cdot 2\ h}{1.163\ \frac{Wh}{kg \cdot k} \cdot 10\ k} = 1720\ kg$$

1720 kg water represent a cylinder capacity of 1720 l.
Selection: 2 Vitocell 100-E, each with 1000 litre cylinder capacity

Rough sizing
(subject to the utilisation of the delayed building heat loss)
V_{HP} = Φ_{HL} · (60 to 80 l)
V_{HP} = 10 · 60 l
V_{HP} = 600 l cylinder capacity
Selection: 1 Vitocell 100-E with 750 l cylinder capacity

Systems with heating water buffer cylinder connected in series

In systems with a heating water buffer cylinder connected in series the required minimum system volume can be ensured. This type of heating water buffer cylinder is integrated into the secondary circuit return.

Benefits
- 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.

Implementation instructions
- An overflow valve **must** be integrated in the heating circuit to ensure that the additional system volume is always available even in sealed unvented heating circuits.
  The flow rate of the overflow valve must be selected to ensure the minimum flow rate of the heat pump.
- Set up the safety equipment for the system according to EN 12828.
- 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).

Systems without heating water buffer cylinder

In systems without a heating water buffer cylinder, trouble-free operation of the heat pump is only ensured if the following conditions are met:
- The minimum flow rate and the minimum system volume of the heat pump are ensured at all times.
- To avoid any loss of comfort caused by blocking periods, set up the heat pump power supply without power-OFF.

Implementation instructions

Take the following measures to ensure that the minimum flow rate of the heat pump is always available even in sealed unvented heating circuits:
- Fit an overflow valve in the heating circuit.
  The flow rate of the overflow valve must be selected to ensure the minimum flow rate of the heat pump.
- The volume of the overflow circuit must be at least as large as the minimum system volume.
- Keep parts of the heat distribution system open:
  Observe the relevant national regulations and/or Energy Savings Ordinance. The consent of the system user is required.
- 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).

9.10 Planning aids for the secondary circuit

Minimum flow rate and minimum system volume

The required minimum flow rate and the minimum system volume must always be guaranteed. The following tables give an overview of which components can be used to achieve this:
- Secondary circuit pipework
- Low loss header connected in parallel to the heat pump
- Heating water buffer cylinder connected in parallel to the heat pump
- Heating water buffer cylinder connected in series to the secondary circuit return

400 V appliances

Heat pump	Type	$\dot{V}_{min}$ in l/h	∅$_{pipes}$	V_{min} in l*12	Without buffer cylinder	Buffer cylinder (recommended minimum)		
							◎	+ ◎
Vitocal 200-G	BWC 201.B06	600	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC 201.B08	710	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC 201.B10	920	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC 201.B13	1115	DN 32	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 200 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC 201.B17	1500	DN 32	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 200 l	Vitocell 100-W 400 l	Vitocell 100-W 400 l
Vitocal 300-G	BWC 301.C06	600	DN 25	15	X	Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC 301.C12	720	DN 25	19	X	Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC 301.C16	1100	DN 32	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 200 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BW/BWS 301.A21	1900	DN 40	Do not calculate the minimum system volume via the pipework.				
	BW/BWS 301.A29	2550	DN 40	Do not calculate the minimum system volume via the pipework.				
	BW/BWS 301.A45	3700	DN 40	Do not calculate the minimum system volume via the pipework.				
Vitocal 350-G	BW/BWS 351.B20	1500	DN 40	Do not calculate the minimum system volume via the pipework.		Individual sizing required		
	BW/BWS 351.B27	2050	DN 40	Do not calculate the minimum system volume via the pipework.				
	BW/BWS 351.B33	2400	DN 40	Do not calculate the minimum system volume via the pipework.				
	BW/BWS 351.B42	3000	DN 40	Do not calculate the minimum system volume via the pipework.				
Vitocal 222-G	BWT 221.B06	600	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWT 221.B08	710	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWT 221.B10	920	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l

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

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Heat pump	Type	$\dot{V}_{min}$ in l/h	$\varnothing_{pipes}$	V_{min} in l*12	Without buffer cylinder	Buffer cylinder (recommended minimum)		
								+
Vitocal 333-G	BWT 331.C06	600	DN 25	15	X	Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWT 331.C12	720	DN 25	19	X	Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l

Heating water buffer cylinder in the heat pump return (connected in series)

230 V appliances

Heat pump	Type	$\dot{V}_{min}$ in l/h	$\varnothing_{pipes}$	V_{min} in l*13	Without buffer cylinder	Buffer cylinder (recommended minimum)		
								+
Vitocal 200-G	BWC-M 201.B06	600	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC-M 201.B08	710	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWC-M 201.B10	920	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
Vitocal 222-G	BWT-M 221.B06	600	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWT-M 221.B08	710	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l
	BWT-M 221.B10	920	DN 25	Do not calculate the minimum system volume via the pipework.		Vitocell 100-W 46 l	Vitocell 100-W 200 l	Vitocell 100-W 200 l

Heating water buffer cylinder in the heat pump return (connected in series)

Icons:
X Possible
$\dot{V}_{min}$ Minimum flow rate, secondary circuit
$\varnothing_{pipes}$ Minimum diameter of pipes in secondary circuit
V_{min} Minimum volume of the heating system
Underfloor heating circuit
Radiator heating circuit

Pipework volume

Pipe	Nominal diameter	Dimension x wall thickness in mm	Volume in l/m
Copper pipe	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	1	33.7 x 3.25	0.58
	1 ¼	42.4 x 3.25	1.01
	1 ½	48.3 x 3.25	1.37
	2	60.3 x 3.65	2.21
Composite pipes	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
Hydraulic connection lines	DN 32	40 x 3.7	0.84
	DN 40	50 x 4.6	1.31

Note
If the heat pump is also used for cooling, the heating water flow and heating water return must be thermally insulated with vapour diffusion-proof material.

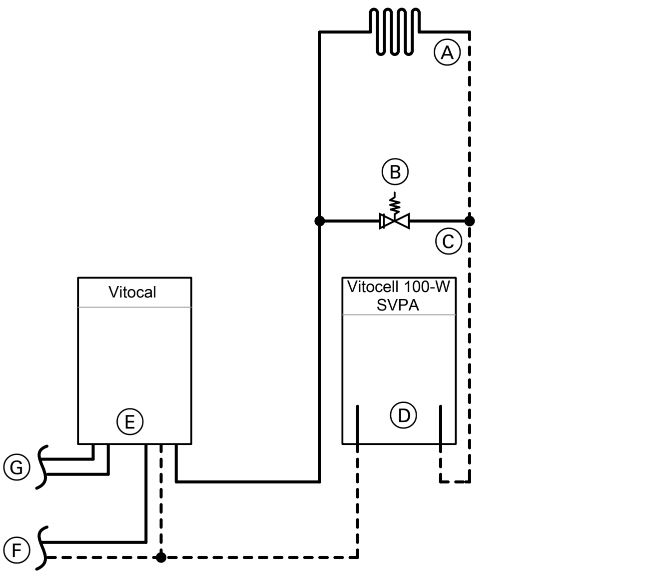
*12 *Cannot be fitted with shut-off devices*
*13 *Cannot be fitted with shut-off devices*

Overflow valve

Note
The overflow valve is only required if there is no buffer cylinder connected in parallel.

In the case of heating circuits connected directly to the heat pump, it is possible to guarantee the minimum system volume and minimum heat pump flow rate by using an overflow valve. The overflow valve is installed in a bypass line between the flow and return in the secondary circuit.
When the heating circuit thermostats are partially closed, the system pressure in the secondary circuit rises. The flow rate drops.
If the system pressure exceeds the differential pressure set at the overflow valve, the overflow valve opens and some of the heating water additionally flows through the bypass. The minimum flow rate required for fault-free heat pump operation is thereby guaranteed.

Systems with a heating water buffer cylinder connected in series
The bypass, together with the overflow valve, can be installed immediately downstream of the heating water buffer cylinder.



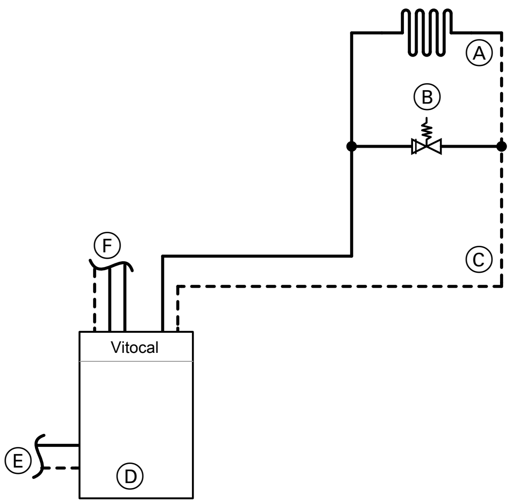
Ⓐ System with 1 heating circuit
Ⓑ Overflow valve
Ⓒ Overflow circuit
Ⓓ Vitocell 100-W heating water buffer cylinder, type SVPA
Ⓔ Heat pump
Ⓕ Interface to DHW cylinder
Ⓖ Primary circuit interface

Systems without a heating water buffer cylinder connected in series

Note
This system configuration is not permissible for every heat pump.

Install the bypass with overflow valve between the secondary circuit flow and return, at the furthest point from the heat pump. When doing so, bear in mind that the volume in the overflow circuit is larger than the minimum system volume: See chapter "Minimum flow rate and minimum system volume".

Note
The diameters of the lines in the heating circuit flow and in the overflow circuit must not be smaller than the connection diameter of the overflow valve.



Ⓐ System with 1 heating circuit
Ⓑ Overflow valve
Ⓒ Overflow circuit
Ⓓ Heat pump
Ⓔ Primary circuit interface
Ⓕ Interface to DHW cylinder

9.11 Water quality and heat transfer medium

DHW

The appliances can be used with potable water up to 20 °dH (3.58 mol/m^3). In case of higher hardness levels, a softening system for potable water is required on site to protect the integral plate heat exchanger.

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.

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- Flush the heating system thoroughly before filling.
- Only fill with water of potable quality.
- If the fill and top-up water has a water hardness greater than 16.8 °dH (3.0 mol/m³), it must be softened, e.g. using the small softening system for heating water: See the 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, e.g. on the heat exchanger in the DHW cylinder.

We therefore recommend installing a dirt separator with magnet in both existing and new heating systems: See Vitoset pricelist.

Solar circuit heat transfer medium

- Fill the solar circuit only with Tyfocor LS heat transfer medium (frost protection down to −28 °C). Never dilute heat transfer medium with water.
- Provide an expansion vessel for the solar circuit. Size the expansion vessel according to the data on page 203.
- Never use zinc-plated/galvanised pipes or components for the solar circuit.

Heat transfer medium, primary circuit (brine circuit)

- To ensure fault-free heat pump operation, the primary circuit should be filled only with the approved heat transfer media: 168.
- Provide an expansion vessel for the primary circuit. Size the expansion vessel according to the data on page 176.
- Never use zinc-plated/galvanised pipes for the primary circuit.

9.12 DHW heating

Function description regarding DHW heating

Compared to central heating, DHW heating makes fundamentally different demands, as almost identical amounts of heat must be provided all the year round at the same temperature level.

In the delivered condition, DHW heating by the heat pump takes priority over the heating circuits.

The heat pump control unit switches the DHW circulation pump OFF during cylinder heating to prevent cylinder heating from being impaired or extended.

The max. cylinder storage temperature is limited subject to the heat pump used and the individual system configuration. Storage temperatures above this limit are only possible with the assistance of a booster heater.

Booster heaters suitable for DHW reheating:
- External heat generator
- Instantaneous heating water heater (accessory)
- Immersion heater EHE (accessory)

Note
Only use the EHE immersion heater with soft to medium hard water up to 14 °dH (average hardness level, up to 2.5 mol/m³).

The integral load manager in the heat pump control unit decides which heat sources to use for DHW heating. Generally the external heat generator has priority over the electric heaters.

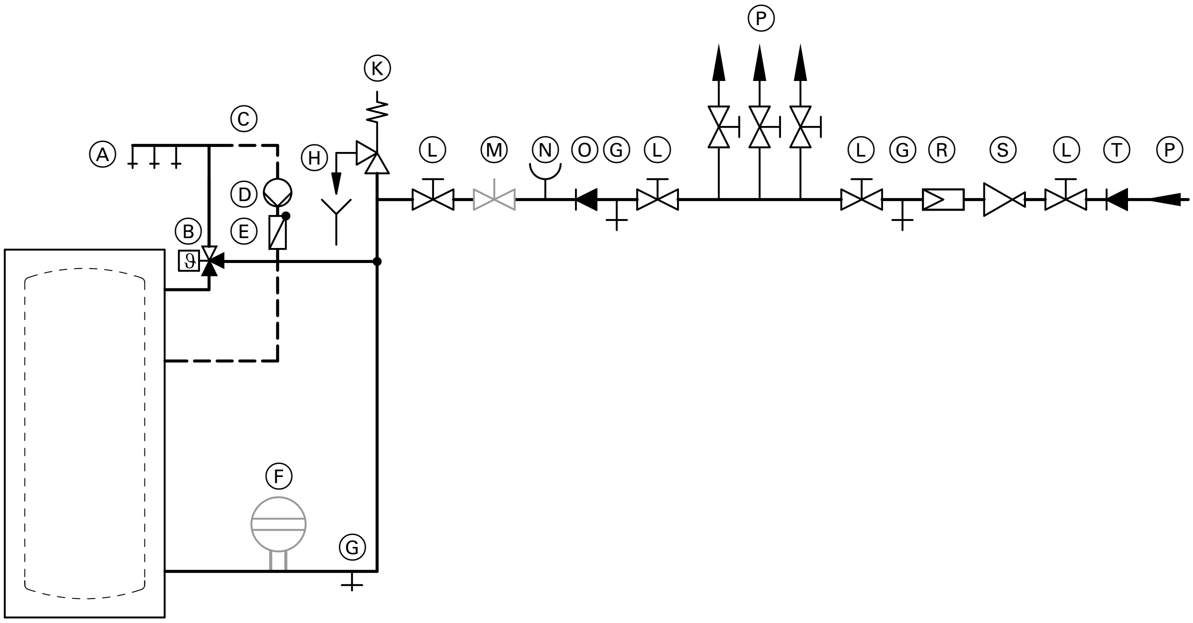
If one of the following criteria is met, the booster heaters begin cylinder heating:
- Cylinder temperature below 3 °C (frost protection).
- Heat pump supplies no heating output and actual temperature has fallen below set value at the top cylinder temperature sensor.

Note
The immersion heater in the DHW cylinder and the external heat generator stop as soon as the set value at the top temperature sensor is reached, minus a hysteresis of 1 K.

DHW heating should preferably take place during the night after 22:00 h. This has the following advantages:
- The heat pump heating output is available for central heating during the daytime.
- Better utilisation of economy (night) tariffs (if offered by the power supply utility).
- DHW cylinder heating and simultaneous drawing can be avoided. When using an external heat exchanger, the system may not always achieve the required draw-off temperatures because of the system design.

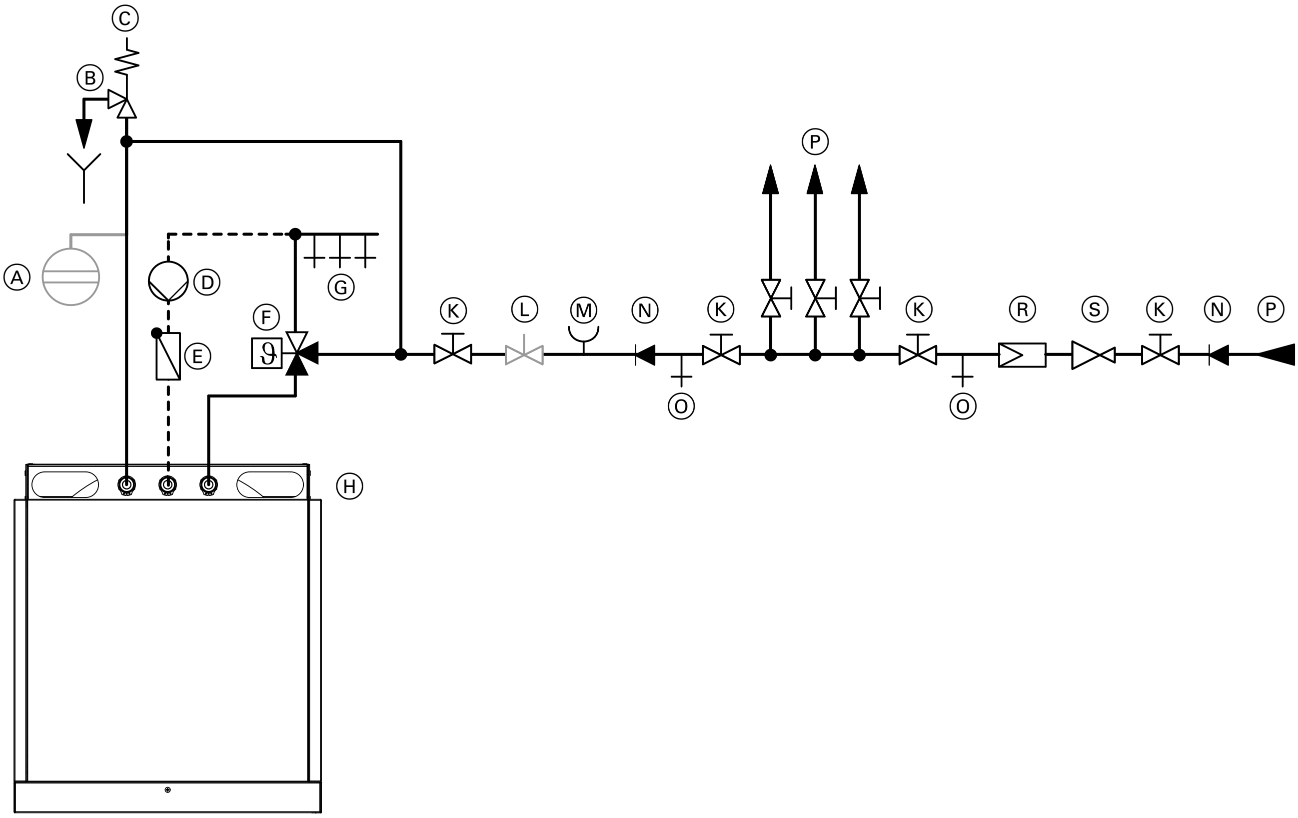
Connection on the DHW side

For connecting the DHW side, observe EN 806, DIN 1988 and DIN 4753 (CH: SVGW regulations). Observe other country-specific standards as applicable.



Example with Vitocell 100-W, type CVWA

- Ⓐ DHW
- Ⓑ Automatic thermostatic mixing valve
- Ⓒ DHW circulation pipe
- Ⓓ DHW circulation pump
- Ⓔ Spring-loaded check valve
- Ⓕ Expansion vessel, suitable for drinking water
- Ⓖ Drain outlet
- Ⓗ Visible discharge pipe outlet point (tundish)
- Ⓚ Safety valve
- Ⓛ Shut-off valve
- Ⓜ Flow regulating valve (installation recommended)
- Ⓝ Pressure gauge connection
- Ⓞ Non-return valve
- Ⓟ Cold water
- Ⓡ Drinking water filter
- Ⓢ Pressure reducer DIN 1988-200:2012-05
- Ⓣ Non-return valve/pipe separator



Example showing the Vitocal 333-G

Ⓐ Expansion vessel, suitable for drinking water
Ⓑ Visible discharge pipe outlet point (tundish)
Ⓒ Safety valve
Ⓓ DHW circulation pump
Ⓔ Spring-loaded check valve
Ⓕ Automatic thermostatic mixing valve
Ⓖ DHW
Ⓗ Heat pump terminal area (plan view)
Ⓚ Shut-off valve
Ⓛ Flow regulating valve
Ⓜ Pressure gauge connection
Ⓝ Non-return valve/pipe separator
Ⓞ Drain valve
Ⓟ Cold water
Ⓡ Drinking water filter
Ⓢ Pressure reducer DIN 1988-200:2012-05

Safety valve

Protect the DHW cylinder with a safety valve against unduly high pressure.

Recommendation: Install the safety valve higher than the top edge of the cylinder. This protects the valve against contamination, scaling and high temperatures. The DHW cylinder will also not need to be drained when working on the safety valve.

Automatic thermostatic mixing valve

With appliances that heat DHW to temperatures above 60 °C, an automatic thermostatic mixing valve must be installed in the DHW line as protection against scalding.

This also particularly applies when connecting solar thermal systems.

9.13 DHW cylinder selection

For systems with Viessmann heat pumps, we recommend using only the approved Viessmann DHW cylinders listed in this technical guide.
For the best possible system operation and efficiency, the following design information and calculation principles must be taken into account when sizing the DHW cylinder.

Note
- *If a Viessmann DHW cylinder is **not** being used, it is the personal responsibility of the specialist design engineer to guarantee that the following design information and calculation principles are applied when sizing the DHW cylinder.*
- *Any local requirements regarding DHW heating should be taken into account in the design process.*

Heat exchanger surface area
To enable the heat pump to transfer heat to the water, the DHW cylinder must have a sufficiently large heat exchanger surface area. If the surface area is too small, the return temperature will exceed the permitted value during cylinder heating and the heat pump will switch off. Cylinder heating will consequently stop before the set cylinder temperature programmed at the heat pump control unit is reached. This will subsequently cause the heat pump to switch on and off frequently to heat the cylinder.
In the case of Viessmann DHW cylinders, the heat exchanger surface area required for heat pump operation has already been taken into account at the development stage. As a result, approved combinations of heat pump and DHW cylinder have been devised.

For third party cylinders, an approximate calculation of the required heat exchanger surface area may be obtained as follows:
A_{min} = P × 0.3 m^2/kW

A_{min} Min. heat exchanger surface area in m^2
P Rated heating output of the heat pump in kW for operating point with the highest primary inlet temperature
This calculation prevents the heat pump from switching off prematurely even when the primary inlet temperature is high, e.g. in summer.

Note
- *In the case of heat pumps with inverter and output-dependent control, the rated heating output can be used for the calculation, since the cylinder is heated under partial load.*
- *The heat exchanger surface area of third party cylinders can be found in the relevant documents provided by the manufacturer.*

Max. cylinder temperature

The max. achievable cylinder temperature is influenced by the following factors:
- Secondary circuit flow temperature
- Temperature spread between secondary circuit flow and return

Recommendation:
- 4 person household:
  DHW cylinder with 300 l capacity
- 5 to 8 person household:
  DHW cylinder with 500 l capacity with additional immersion heater or an instantaneous heating water heater in the secondary circuit flow

Flow temperature in the secondary circuit
The max. achievable flow temperature in the secondary circuit is dependent on the primary inlet temperature: See chapter "Application limits".
If the heat pump cannot achieve the required cylinder temperature in mono mode operation, it must be operated in mono energetic mode (with instantaneous heating water heater) or dual mode (with external heat generator).

Temperature spread between secondary circuit flow and return
For fault-free heat pump operation, there needs to be a sufficient temperature spread between the secondary circuit flow and return. Particularly with heat pumps with a fixed heating output, a high temperature spread enables the cylinder to be efficiently heated up to the set cylinder temperature.

Standard values for the temperature spread for adjustment of the flow rate at the start of cylinder heating:
- Heat pumps with fixed heating output: 5 to 8 K
- Heat pumps with inverter and output-dependent control: 4 to 5 K

Minimum flow rate
When the flow rate is being adjusted, it must not fall below the required minimum flow rate ($\dot{V}_{min}$) of the heat pump, even at the start of cylinder heating: See chapter "Design guide for the secondary circuit" and/or "Specification".

Lines to the DHW cylinder

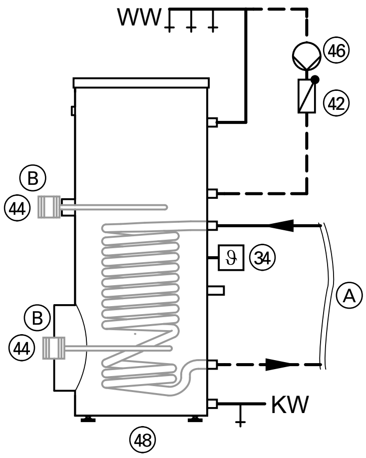
For highly efficient DHW heating, we recommend taking the following into account:
- Comply with the minimum diameters for the lines connecting the DHW cylinder to the heat pump: See chapter "Design guide for the secondary circuit"
- Keep the lines between heat pump and DHW cylinder as short as possible and keep changes of direction to a minimum.

Vitocal	**Up to 4 occupants Vitocell 100-W, CVWA**				**Up to 8 occupants Vitocell 300-B**
				Vitocell 300-B	
	300 l	**390 l**	**500 l**	**300 l**	**500 l**
200-G, type					
BWC 201.B06 to B10	X	X	X	X	X
BWC 201.B13	X	X	X	–	–
BWC 201.B17	–	X	X	–	–
300-G, type					
BWC 301.C	X	X	X	X	X

Further specifications for DHW cylinders
See chapter "Installation accessories" and separate technical guides.

Hydraulic connection, DHW cylinder

DHW cylinder with internal indirect coils



Vitocell 100-W, type CVWA

Ⓐ Heat pump connection
Ⓑ Alternative
KW Cold water
WW DHW

Equipment required

Pos.	Designation	Number	Part no.
34	Cylinder temperature sensor, top	1	7438702
42	Spring-loaded check valve	1	On site
44	Immersion heater EHE		
	For top installation (can be regulated only by an internal temperature controller)	1	Z012684
	or		
	For lower installation	1	Z012677
46	DHW circulation pump		See Vitoset pricelist.
48	Vitocell 100-W, type CVWA, 300 l/390 l/500 l	1	See Viessmann pricelist.

9.14 Selecting cylinders for DHW heating and heating water storage

The advantage of a heating water buffer cylinder in combination with a freshwater module lies in the provision of demand-based, continuous DHW heating. Thermal storage occurs exclusively via the heating water, there is no need for storing large amounts of DHW.

DHW temperature in conjunction with heating water buffer cylinder and freshwater module
If a DHW outlet temperature of more than 60 °C is required, an additional heat source must be provided. Either an immersion heater (accessories) can be installed in the heating water buffer cylinder or an additional heat generator can be integrated into the system. This additional heat generator should be sized to meet on-site requirements.

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Vitocal	**Up to 5 occupants**	**Up to 16 occupants**
	Vitocell 120-E, type SVW, 600 l	**Vitocell 120-E, type SVW, 950 l**
200-G, type		
BWC 201.B06	X	X
BWC 201.B08	X	X
BWC 201.B10	X	X
BWC 201.B13	X	X
BWC 201.B17	X	X
300-G, type		
BWC 301.C06	X	X
BWC 301.C12	X	X
BWC 301.C16	X	X
300-G, 1-stage and 2-stage, type		
BW/BWS 301.A21		X
BW/BWS 301.A29		X
350-G, 1-stage and 2-stage, type		
BW/BWS 351.B20		X
BW/BWS 351.B27		X
BW/BWS 351.B33		X

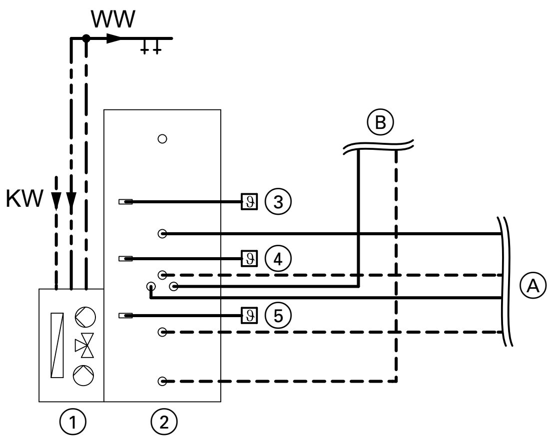
230 V appliances

Vitocal	**Up to 5 occupants**	**Up to 16 occupants**
	Vitocell 120-E, type SVW, 600 l	**Vitocell 120-E, type SVW, 950 l**
200-G, type		
BWC-M 201.B06	X	X
BWC-M 201.B08	X	X
BWC-M 201.B10	X	X

Further specifications for cylinders
See chapter "Installation accessories" and separate technical guides.

Hydraulic connection of cylinders for DHW heating and heating water storage

Recommended for heat pumps up to 45 kW



Hydraulic scheme with Vitocell 120-E, type SVW

Ⓐ Heat pump connection
Ⓑ Secondary circuit connection
KW Cold water
WW DHW

Equipment required

Pos.	**Description**	**Number**
①	Vitotrans 353 freshwater module for cylinder mounting, type PZSA/PZMA (part of standard delivery for the Vitocell 120-E, 600 l)	1
	or	
	Vitotrans 353 freshwater module for wall mounting, type PBSA/PBMA/PBLA (part of standard delivery for the Vitocell 120-E, 950 l)	1
②	Vitocell 120-E, type SVW (600 l/950 l)	1
③	Cylinder temperature sensor	1
④	Temperature sensor for return stratification	1
⑤	Buffer temperature sensor	1

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9.15 Loading cylinder selection

Loading cylinder	Capacity l	Max. heat pump heating output (single stage operation, flow temperature 60 °C) kW	Optional booster heater Immersion heater EHE (6 kW)	On-site instantaneous DHW heater (for preheated DHW)	Applications
Vitocell 100-W/100-V					
Type CVAA	300	16	X	X	Up to 4 occupants
Vitocell 100-L					
Type CVL	500	32	X	X	Up to 8 occupants
Type CVLA	750	32	X	X	Up to 16 occupants
	950	32	X	X	Up to 16 occupants

Selection of Vitocell 100-L, type CVL/CVLA

400 V appliances

Vitocal	Vitocell 100-L, type CVL 500 l	Vitocell 100-L, type CVLA 750 l	 950 l
200-G, type			
BWC 201.B06	X	–	–
BWC 201.B08	X	–	–
BWC 201.B10	X	–	–
BWC 201.B13	X	–	–
BWC 201.B17	X	–	–
300-G			
BWC 301.C06	X	–	–
BWC 301.C12	X	–	–
BWC 301.C16	X	–	–
BW 301.A21	X	X	X
BW 301.A29	X	X	X
BW 301.A45	X	X	X
300-G 2-stage, type			
BW+BWS 301.A21	X	X	X
BW+BWS 301.A29	DHW heating with heat pump stage 1		
BW+BWS 301.A45	DHW heating with heat pump stage 1		
350-G, type			
BW 351.B20	X	X	X
BW 351.B27	X	X	X
BW 351.B33	X	X	X
BW 351.B42	X	X	X
350-G 2-stage, type			
BW+BWS 351.B20	X	X	X
BW+BWS 351.B27	DHW heating with heat pump stage 1		
BW+BWS 351.B33	DHW heating with heat pump stage 1		
BW+BWS 351.B42	DHW heating with heat pump stage 1		

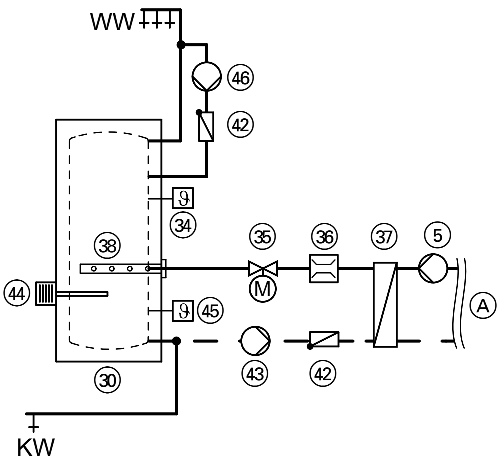
230 V appliances

Vitocal	Vitocell 100-L, type CVL 500 l	Vitocell 100-L, type CVLA 750 l	 950 l
200-G, type			
BWC-M 201.B06	X	–	–
BWC-M 201.B08	X	–	–
BWC-M 201.B10	X	–	–

Further specifications for DHW cylinders
See chapter "Installation accessories" and separate technical guides.

Hydraulic connection, cylinder loading system

DHW cylinder with external heat exchanger (cylinder loading system)
For connecting a heat pump with an **external** circulation pump for cylinder heating



Ⓐ Heat pump connection
KW Cold water
WW DHW

Equipment required

Pos.	Designation	Number	Part no.
⑤	Circulation pump for cylinder heating	1	7820403 or 7820404
㉚	Vitocell 100-L, type CVL (500 l capacity)	1	See Viessmann pricelist
㉞	Cylinder temperature sensor, top	1	7438702
㉟	2-way motorised ball valve (N/C)	1	7180573
㊱	Flow limiter (TacoSetter)	1	On site
㊲	Vitotrans 100 plate heat exchanger	1	See page 196.
㊳	Heating lance	1	ZK00037
㊷	Spring-loaded check valve	2	On site
㊸	Cylinder loading pump	1	7820403 or 7820404
㊹	Immersion heater EHE Create electrical circuit on site. Only use as an alternative to the instantaneous heating water heater or external heat generator for DHW reheating.	1	See Viessmann pricelist.
㊺	Cylinder temperature sensor, bottom (optional)	1	7438702
㊻	DHW circulation pump	1	See Vitoset pricelist.

DHW cylinder with external heat exchanger (cylinder loading system) and heating lance

For connecting a heat pump with an **integral** 3-way diverter valve "central heating/DHW heating":
During cylinder loading (no draw-off) in the cylinder loading system, cold water is drawn from the bottom of the DHW cylinder by the cylinder loading pump. This cold water is heated in the heat exchanger and resupplied to the DHW cylinder via the heating lance mounted in the flange.
The generously sized outlet apertures in the heating lance result in low flow velocities, which in turn provide a clean temperature stratification inside the DHW cylinder.
DHW booster heating is possible if an additional immersion heater is installed (on site).

Note
The flow rate in the DHW cylinder may be no more than 7 m³/h.

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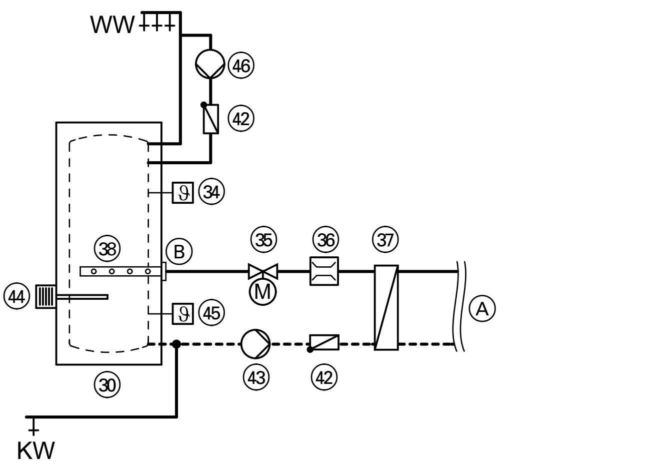
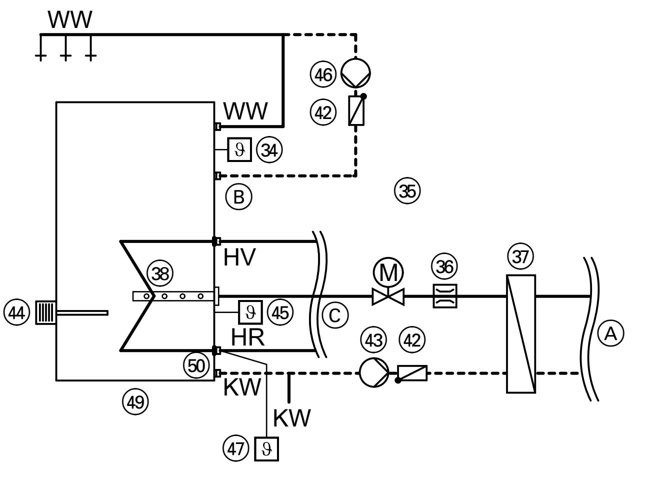


KW Cold water
WW DHW
Ⓐ Heat pump interface
Ⓑ DHW inlet from the heat exchanger

Equipment required

Pos.	Designation	Number	Part no.
㉚	Vitocell 100-L, type CVL (500 l capacity) or CVLA (750 or 950 l capacity) or Vitocell 100-V, type CVAA (300 l capacity) or type CVA (500 l capacity)	1	See Viessmann pricelist
㉞	Cylinder temperature sensor, top	1	7438702
㉟	2-way motorised ball valve (N/C)	1	7180573
㊱	Flow limiter (TacoSetter)	1	On site
㊲	Vitotrans 100 plate heat exchanger	1	See page 196.
㊳	Heating lance	1	See Viessmann pricelist.
㊷	Spring-loaded check valve	1	On site
㊸	Cylinder loading pump	1	7820403 or 7820404
㊹	Immersion heater EHE Create electrical circuit on site. Only use as an alternative to the instantaneous heating water heater or external heat generator for DHW reheating.	1	See Viessmann pricelist.
㊺	Cylinder temperature sensor, bottom (optional)	1	7438702
㊻	DHW circulation pump	1	See Vitoset pricelist.

DHW cylinder with external heat exchanger (cylinder loading system) and solar backup



Ⓐ Heat pump connection
Ⓑ DHW circulation connection
Ⓒ Solar circuit connection
HR Solar circuit flow
HV Solar circuit return
KW Cold water
WW DHW

9

Equipment required

Pos.	Designation	Number	Part no.
(34)	Cylinder temperature sensor, top	1	7438702
(35)	2-way motorised ball valve (N/C)	1	7180573
(36)	Flow limiter (TacoSetter)	1	On site
(37)	Vitotrans 100 plate heat exchanger	1	See page 196.
(38)	Heating lance	1	ZK00038
(42)	Spring-loaded check valve	2	On site
(43)	Cylinder loading pump	1	7820403 or 7820404
(44)	Immersion heater EHE Create electrical circuit on site. Only use as an alternative to the instantaneous heating water heater or external heat generator for DHW reheating.	1	See Viessmann pricelist.
(45)	Cylinder temperature sensor	1	7438702
(46)	DHW circulation pump	1	See Vitoset pricelist.
(47)	Cylinder temperature sensor (standard delivery with solar control module, type SM1 or Solar-Divicon, type PS 10)	1	7429073
(49)	Vitocell 100-V, type CVAA (300 l capacity) or type CVA (500 l capacity)	1	See Viessmann pricelist.
(50)	Threaded elbow as retainer for the cylinder temperature sensor (pos. (45))	1	7175214

Vitotrans 100 plate heat exchanger

Note
For pressure drop of heat exchangers: See the technical guides on solar thermal systems and heating water buffering.

Flow rate and pressure drop at B15/W35, 400 V appliances

Vitocal	Heating output in kW	Flow rate in m³/h		Pressure drop in kPa		Vitotrans 100 Part no.
		DHW cylinder Ⓐ (domestic hot water)	Heat pump Ⓑ (heating water)	DHW cylinder Ⓐ (domestic hot water)	Heat pump Ⓑ (heating water)	
200-G/300-G: Spread 10 K						
200-G, type						
BWC 201.B06	8.6	0.8	0.8	3.2	3.9	3003492
BWC 201.B08	11.1	1.0	1.0	5.3	6.4	3003492
BWC 201.B10	15.2	1.4	1.4	3.6	4.0	3003493
BWC 201.B13	19.2	1.7	1.7	5.6	6.2	3003493
BWC 201.B17	24.9	2.2	2.2	4.6	4.9	3003494
300-G, type						
BWC 301.C06	12.5*14	1.1	1.1	8.0	6.6	3003492
BWC 301.C12	16.2*14	1.4	1.4	13.2	10.8	3003492
BWC 301.C16	22.2*14	1.94	1.94	7.3	8.2	3003495
300-G: 5 K spread						
300-G, type						
BW 301.A21	31.0	5.4	5.4	26.0	27.9	3003494
BW 301.A29	41.2	7.2	7.2	25.4	26.6	3003495
BW 301.A45	63.6	11.1	11.1	—	—	On request

Diagram for 200-G/300-G: Spread 10 K:

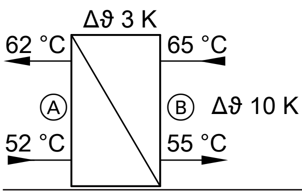
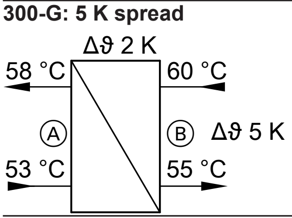


Diagram for 300-G: 5 K spread:



**14 For heat pumps with output-dependent control, the maximum heating output at B15/W35 is assumed as the design basis.*

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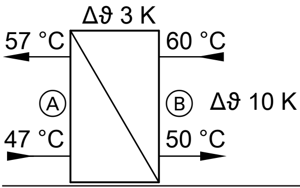
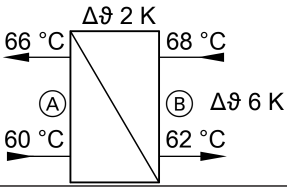
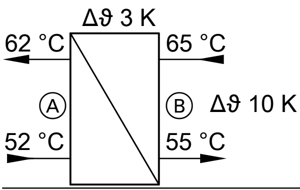
Vitocal	Heating output in kW	Flow rate in m³/h DHW cylinder Ⓐ (domestic hot water)	Flow rate in m³/h Heat pump Ⓑ (heating water)	Pressure drop in kPa DHW cylinder Ⓐ (domestic hot water)	Pressure drop in kPa Heat pump Ⓑ (heating water)	Vitotrans 100 Part no.
300-G: 10 K spread						
						
300-G, type						
BW 301.A21	31.0	2.7	2.7	13.9	15.5	3003493
BW 301.A29	41.2	3.6	3.6	12.0	12.8	3003494
BW 301.A45	63.6	5.6	5.6	15.5	16.2	3003495
350-G: Spread 6 K: Sizing for a DHW temperature of 60 °C in the loading cylinder: See "Application limits".						
						
350-G, type						
BW 351.B20	—	—	—	—	—	—
BW 351.B27	35.0	5.1	5.1	13.0	13.6	3003495
BW 351.B33	43.0	6.3	6.3	19.3	20.2	3003495
BW 351.B42	54.0	7.9	7.9	—	—	On request

Flow rate and pressure drop at B15/W35, 230 V appliances

Vitocal	Heating output in kW	Flow rate in m³/h DHW cylinder Ⓐ (domestic hot water)	Flow rate in m³/h Heat pump Ⓑ (heating water)	Pressure drop in kPa DHW cylinder Ⓐ (domestic hot water)	Pressure drop in kPa Heat pump Ⓑ (heating water)	Vitotrans 100 Part no.
200-G: 10 K spread						
						
200-G, type						
BWC-M 201.B06	8.6	0.8	0.8	3.2	3.9	3003492
BWC-M 201.B08	11.1	1.0	1.0	5.3	6.4	3003492
BWC-M 201.B10	15.2	1.4	1.4	3.6	4.0	3003493

Note

The max. achievable heat pump flow temperature is subject to the flow temperatures in the primary circuit (brine inlet): See application limits for the respective heat pump.

In the case of brine inlet temperatures outside these application limits (very low or very high temperatures), the heat pump may not be able to provide the max. flow temperature.

Cylinder loading pump curves

See page 137.

9.16 Cooling mode

Cooling mode is possible either via one of the available heating circuits, or via a separate cooling circuit (e.g. chilled ceilings or fan convectors).

For cooling mode in the following cases, a room temperature sensor must be installed and enabled:
- Weather-compensated cooling mode with room influence
- Room temperature-dependent cooling mode
- Cooling with active cooling function
- Cooling via a separate cooling circuit

Weather-compensated cooling mode
In weather-compensated cooling mode, the set flow temperature is calculated from the relevant set room temperature and the current outside temperature (long term average) according to the cooling curve. Level and slope of the cooling curve are adjustable.

Room temperature-dependent cooling mode
The set flow temperature is calculated from the differential between the set room temperature and the actual room temperature.

Types and configuration

Depending on the system version, the following cooling functions are possible:
- "Natural cooling"
  – The compressor is switched off. Exchange of heat takes place directly through the primary circuit.
- "Active cooling"
  – The heat pump is used as a refrigeration unit, meaning a higher cooling capacity is possible than with natural cooling.
  – This function is only possible outside a power-OFF period, and must be enabled separately by the system user.

Even if active cooling is selected and enabled, the control unit will initially start the natural cooling function. If the set room temperature cannot be achieved with this function for a prolonged period, the compressor starts.
A mixer can only be used with natural cooling, and particularly in cooling mode on underfloor heating circuits, it keeps the flow temperature above the dew point. No mixer is used with active cooling, to ensure the transfer of the high cooling capacity at all times.

Natural cooling function

Function description

With natural cooling, the heat pump control unit regulates the following functions:
- Switching all necessary circulation pumps, diverter valves & mixers
- Recording all essential temperatures
- Dew point monitoring

The control unit enables the natural cooling function if the outside temperature exceeds the cooling limit (adjustable). Control in weather-compensated mode when cooling via a heating circuit (underfloor heating circuit). When a separate cooling circuit is used, e.g. a fan convector, then control is room temperature-dependent. DHW heating by the heat pump is possible during cooling mode.

Note
- *For cooling operation via a separate cooling circuit, a room temperature sensor must be installed and enabled.*
- *For cooling operation via a separate cooling circuit or heating circuit without mixer, use a contact temperature sensor to capture the flow temperature.*

NC-Box
- The installation room must be dry and free from the risk of frost.
- Vitocal 200-G, type BWC 201.B and Vitocal 300, type BWC 301.C: Mount NC-Box in the installation room, above or close to the heat pump. Make the hydraulic connections for the NC-Box and heat pump on site.
- Compact heat pumps: Install the NC-Box close to the compact heat pump. Make the hydraulic connections for the NC-Box and compact heat pump on site.
- Insulate all brine and cold water lines with vapour diffusion-proof thermal insulation in accordance with engineering standards to prevent condensation.
- Power supply (1/N/PE 230 V/50 Hz) is required.
  Recommendation: Utilise the heat pump power supply from an on site power distribution board.
- If the NC-Box is operated via a separate cooling circuit (used exclusively for cooling), protect this circuit by means of an additional expansion vessel and safety valve.
- Use only Teflon and EPDM seals for the connections on the NC-Box.

Natural cooling with the NC-Box
Subject to the probe/collector system and the temperatures under ground, the NC-Box can transfer a cooling capacity of up to 5 kW.

For cooling, it is possible to connect either a heating/cooling circuit, e.g. underfloor heating circuit, or a separate cooling circuit, e.g. a fan convector.

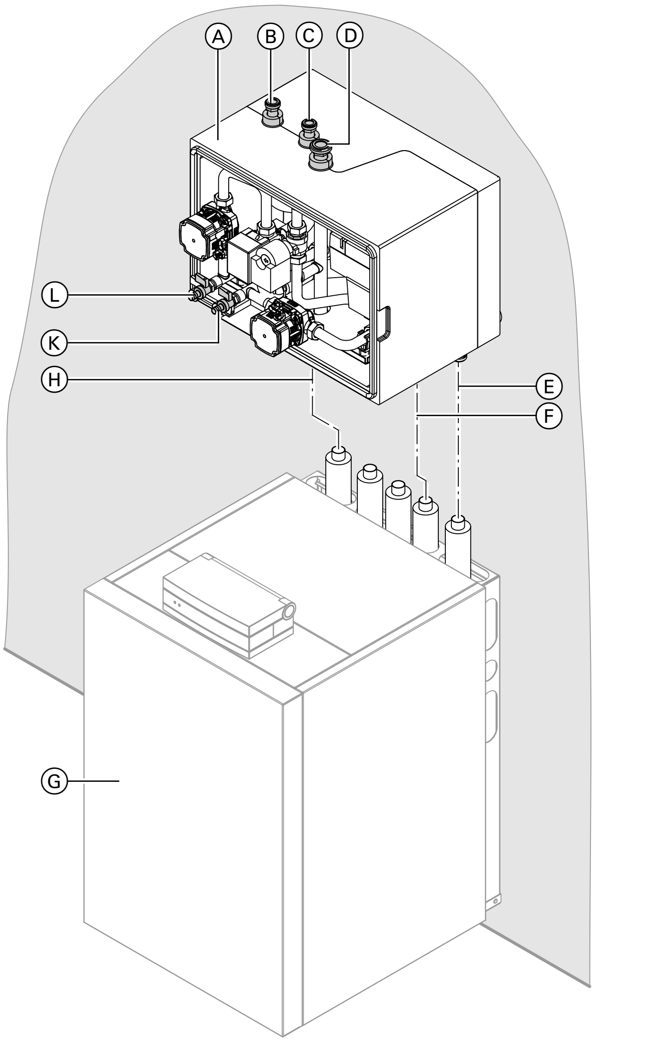
The NC-Box is supplied with all necessary components:
- Circulation pumps
- Diverter valves
- Mixers
- Sensors
- KM-BUS interface for heat pump control unit

The heat that is extracted from the heating/cooling circuit is transferred to the ground by the heat exchanger in the NC-Box. This heat exchanger is connected in series and enables system separation between the primary circuit and the heating circuit.

Note
Thermally insulate all lines on site with vapour diffusion-proof material.

Arrangement of the NC-Box adjacent to the heat pump
- In compact heat pump appliances Vitocal 222-G, 333-G
- For Vitocal 200-G, type BWC 201.B and Vitocal 300, type BWC 301.C, if there is insufficient installation space above the heat pumps.
- Hydraulic connection on site

Arrangement of the NC-Box above the heat pump
- For Vitocal 200-G, type BWC 201.B and Vitocal 300, type BWC 301.C
- Hydraulic connection on site



Ⓐ NC-Box
Ⓑ Return, heating/cooling circuit or separate cooling circuit
Ⓒ Flow, heating/cooling circuit or separate cooling circuit
Ⓓ Flow, primary circuit (NC-Box brine inlet)
Ⓔ Return, secondary circuit to heat pump
Ⓕ Flow, secondary circuit to the NC-Box
Ⓖ Heat pump
Ⓗ Flow, primary circuit (heat pump brine inlet)
Ⓚ Primary circuit BDF valve (brine)
Ⓛ BDF valve, secondary circuit (heating water)

Cooling with an underfloor heating system
The underfloor heating system can be used for heating and for cooling buildings and rooms.
Underfloor heating systems are hydraulically connected to the brine circuit via a cooling heat exchanger. A mixer is required to match the cooling load of the room to the outside temperature. Similar to a heating curve, the cooling capacity can be matched exactly to the cooling load via a cooling curve and the cooling circuit mixer that is regulated by the heat pump control unit.
Surface temperature limits must be maintained to observe comfort criteria and to prevent condensation. The surface temperature of the underfloor heating system in cooling operation must not fall below 20 °C.
Install a natural cooling contact humidistat (for capturing the dew point) in the underfloor heating system flow to prevent condensation forming on the floor surface. This safely prevents the formation of condensate, even if weather conditions change quite rapidly (e.g.during a thunderstorm).
The underfloor heating system should be sized in accordance with a flow/return temperature pair of approx. 14/18 °C.
The following table can assist in estimating the possible cooling capacity of an underfloor heating system.

In principle, the following applies:
The minimum flow temperature for cooling with an underfloor heating system and the minimum surface temperature are subject to the prevailing ambient conditions inside the room (air temperature and relative humidity). These must therefore also be taken into consideration during the design phase.

9

Estimating cooling capacity of an underfloor heating system subject to floor covering and the spacing between pipe runs (assumed flow temperature of approx. 16 °C, return temperature approx. 20 °C)

Floor covering		**Tiles**			**Carpet**		
Spacing	**mm**	**75**	**150**	**300**	**75**	**150**	**300**
Cooling capacity with pipe diameter							
–10 mm	W/m^2	40	31	20	27	23	17
–17 mm	W/m^2	41	33	22	28	24	18
–25 mm	W/m^2	43	36	25	29	26	20

Details accurate for:

Room temperature	26 °C
Rel. humidity	50 %
Dew point temperature	15 °C

Active cooling function

Requirements
On-site hydraulic components are required to implement the active cooling function; some of these are available as accessories. These components include, among others, circulation pumps, 3-way diverter valves and mixers.
The control functions for active cooling are available in the heat pump control unit.

Note
System schemes with active cooling function:
*See **www.viessmann-schemes.com**.*

Function description
Brine/water and water/water heat pumps can, during spring, summer or autumn, utilise the temperature level of what is used as a heat source in winter as a heat sink, i.e. to cool the building with natural cooling.
Active cooling for the building can be achieved by operating the compressor and reversing the functions of the primary and secondary sides. Here, the available cooling capacity is significantly higher compared to natural cooling.

- The heat generated is dissipated via the primary source or a consumer.
- The system always responds initially to the cooling demand with the natural cooling function.
- If the cooling capacity is no longer sufficient, the active cooling function is activated.
- The heat pump starts to operate and the cold side (primary circuit) and hot side (secondary circuit) are changed over via the on-site hydraulic components.
- The heat generated is made available to the connected consumers, e.g. DHW cylinder. Excess heat is dissipated into the ground or well system.
  To prevent the geothermal collectors or probes being overloaded (risk of drying out), the primary temperature and its spread are permanently monitored by the heat pump control unit. If overloading occurs, the system automatically changes over to natural cooling.
- All circulation pumps, valves and mixers required for active cooling are regulated by the heat pump control unit.
- A contact humidistat must be fitted to a free pipe piece at the cooling circuit flow.

Note
For cooling operation via a separate cooling circuit, a room temperature sensor must be installed and active.

Sizing
Example:
For Vitocal 200-G, type BWC 201.B06, the maximum system cooling capacity is 4.44 kW.

Conditions:
- The installed primary source has been sized for the output.
- The installed primary source can transfer the generated heat.

Note
For operation of the system with active cooling, inform the engineer or drilling contractor about the sizing. The primary source must be sized accordingly larger.

Electrical connection

The following components can be connected directly to the heat pump control unit:
- AC signal for controlling circulation pumps and 3-way diverter valves
- Contact humidistat (accessories)
- Additional frost stat (accessories)

Contact humidistat
If surface cooling systems (e.g. underfloor cooling, chilled ceiling) are used, provide a contact humidistat (accessories).

- The contact humidistat is installed at the cooling circuit flow, if necessary in a reference room.
- If very different room conditions are expected with regard to the air humidity, several contact humidistats may have to be used.
- Where several contact humidistats are used, connect all contact humidistats in series.

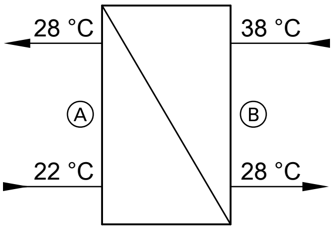
9.17 Swimming pool heating

Hydraulic connection, swimming pool

Swimming pool heating is effected hydraulically via the changeover of a second 3-way diverter valve (accessories).
If the temperature falls below the value set at the swimming pool temperature controller (accessories), a demand signal is sent to the heat pump control unit via the external EA1 extension (accessories).
In the delivered condition, central heating and DHW heating have priority over swimming pool heating.

For more detailed information regarding systems with swimming pool heating, see **www.viessmann-schemes.com**.

Sizing the plate heat exchanger



External swimming pool for average water temperatures up to 25 °C.

Ⓐ Swimming pool (swimming pool water)
Ⓑ Heat pump (heating water)

Use only stainless steel plate heat exchangers (threaded) that are suitable for potable water for swimming pool heating.
Size the plate heat exchanger subject to the maximum output and the temperature specified for the plate heat exchanger.

Note
The flow rates calculated during sizing must be maintained during the installation.

Selecting a plate heat exchanger for a swimming pool

400 V appliances

Vitocal	Heating output in kW (B15/W35)	Swimming pool flow rate in m³/h	Heat pump flow rate in m³/h
200-G, type			
BWC 201.B06	8.6	1.2	0.7
BWC 201.B08	11.1	1.6	1.0
BWC 201.B10	15.2	2.2	1.3
BWC 201.B13	19.2	2.8	1.7
BWC 201.B17	24.9	3.6	2.1
300-G, type			
BWC 301.C06	12.5	1.8	1.1
BWC 301.C12	16.2	2.3	1.4
BWC 301.C16	22.2	3.2	1.9
BW 301.A21	31.0	4.4	2.7
BW 301.A29	41.2	5.9	3.5
BW 301.A45	63.6	9.1	5.5
300-G 2-stage, type			
BW+BWS 301.A21	62.0	8.9	5.3
BW+BWS 301.A29	82.4	11.8	7.1
BW+BWS 301.A45	127.2	18.2	10.9
350-G, type			
BW 351.B20	26.0	3.7	2.2
BW 351.B27	35.0	5.0	3.0
BW 351.B33	43.0	6.2	3.7
BW 351.B42	54.0	7.7	4.6
350-G 2-stage, type			
BW+BWS 351.B20	52.0	7.5	4.5
BW+BWS 351.B27	70.0	10.0	6.0
BW+BWS 351.B33	86.0	12.3	7.4
BW+BWS 351.B42	108.0	15.5	9.3
222-G, type			
BWT 221.B06	8.6	1.2	0.7
BWT 221.B08	11.1	1.6	1.0
BWT 221.B10	15.2	2.2	1.3
333-G, type			
BWT 331.C06	12.5	1.8	1.1
BWT 331.C12	16.2	2.3	1.4

230 V appliances

Vitocal	**Heating output in kW (B15/W35)**	**Swimming pool flow rate in m³/h**	**Heat pump flow rate in m³/h**
200-G, type			
BWC-M 201.B06	8.6	1.2	0.7
BWC-M 201.B08	11.1	1.6	1.0
BWC-M 201.B10	15.2	2.2	1.3
222-G, type			
BWT-M 221.B06	8.6	1.2	0.7
BWT-M 221.B08	11.1	1.6	1.0
BWT-M 221.B10	15.2	2.2	1.3

9.18 Integrating a solar thermal system

In conjunction with a solar control unit, a solar thermal system can be controlled for DHW heating, central heating backup and swimming pool heating. The heat-up priority can be selected individually at the heat pump control unit.
The heat pump control unit enables certain values to be checked. When there is a high level of insolation, all heat consumers can be heated to a higher set value, thereby raising the solar coverage. All solar temperatures and set values can be scanned and adjusted via the control unit.
To prevent thermal shocks inside the solar circuit, the operation of the solar thermal system will be interrupted at collector temperatures > 120 °C (collector protection).

Solar DHW heating
The solar circuit pump starts and the DHW cylinder is heated up if the temperature differential between the collector temperature sensor and the cylinder temperature sensor (in the solar circuit return) is greater than the start temperature differential set at the solar control unit.
The heat pump will be prevented from heating the cylinder if the temperature at the cylinder temperature sensor (in the DHW cylinder, top) exceeds the set value selected at the heat pump control unit. The solar thermal system heats the cylinder to the set value selected at the solar control unit.

Note
- *Hydraulic connection: See **www.viessmann-schemes.com**.*
- *Aperture area that can be connected: See the "Vitosol" technical guide.*

Solar central heating backup
The solar circuit pump and the circulation pump for cylinder heating start if the temperature differential between the collector temperature sensor and the cylinder temperature sensor (solar) is greater than the start temperature differential selected at the heat pump control unit. The heating water buffer cylinder is heated.
Heating stops when the temperature differential between the collector temperature sensor and the cylinder temperature sensor (solar) is less than half the hysteresis (standard: 6 K) or if the actual temperature captured by the lower cylinder temperature sensor corresponds to the selected set temperature.
See also the "Vitosol" technical guide.

Solar swimming pool heating
See "Vitosol" technical guide.

Solar control unit
- Vitocal 200-G, 300-G and 350-G:
  Solar control module, type SM1 (accessories: See page 218).

  Note
  The Solar-Divicon (part no. Z017690) also includes a solar control module: SDIO/SM1A electronics module

- Vitocal 222-G and 333-G:
  – With solar heat exchanger set (accessories) and for solar circuit pump with control via PWM signal:
    Solar control module, type SM1 (accessories: See page 218).
  – With Solar-Divicon, type PS10 (part No. Z017690)
    SDIO/SM1A integrated electronics module

See Viessmann pricelist, register 13.

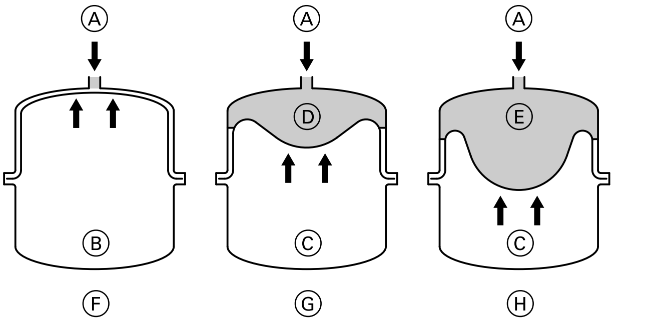
Connecting solar collectors to the Vitocal 222-G/333-G

Up to 5 m² flat-plate collectors (Vitosol 200-F/300-F) or 3 m² tube collectors (Vitosol 200-T/300-T) can be connected to the compact heat pumps. Connection to the appliance is made using the solar heat exchanger set (Divicon, accessories). The necessary control functions are integrated.
Install pipework from the collector area to the compact heat pump on site. Connect a suitably sized expansion vessel to the pipework to be installed. Provide thermal insulation for the pipework using a material capable of withstanding temperatures up to 185 ºC. This requirement also applies to the use of fixing clamps.
To achieve the required pump rate it is necessary to calculate the pressure drop of the pipework together with the collector area. With regard to implementation, installation, calculation and application limits of the solar thermal system, the latest version of the technical guide, service instructions and installation instructions for the solar thermal system apply.

Sizing the solar expansion vessel

Solar expansion vessel

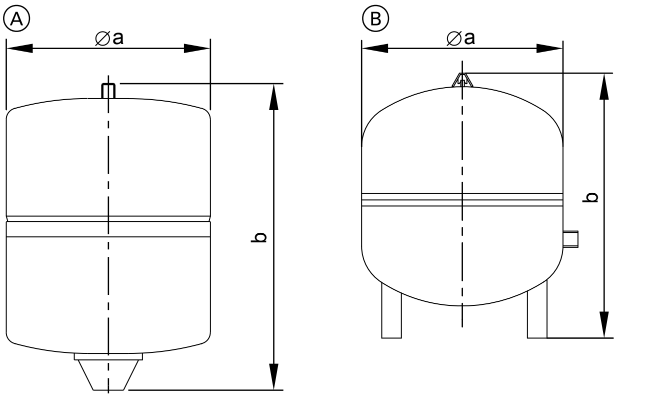
Design and function
With shut-off valve and fixings



Ⓐ Heat transfer medium
Ⓑ Nitrogen charge
Ⓒ Nitrogen buffer
Ⓓ Minimum safety seal 3 l
Ⓔ Safety seal
Ⓕ Delivered condition (pre-charge pressure 4.5 bar, 0.45 MPa)
Ⓖ Solar thermal system filled, without heat effect
Ⓗ At maximum pressure and the highest heat transfer medium temperature

A solar expansion vessel is a sealed vessel where the gas space (nitrogen charge) is separated from the space containing liquid (heat transfer medium) by a diaphragm and the pre-charge pressure is subject to the system height.

Specification



Expansion vessel	Part no.	Capacity l	Pre-charge pressure bar (MPa)	Ø a mm	b mm	Connection	Weight kg
Ⓐ	**7248241**	18	4.5 (0.45)	280	370	R ¾	7.5
	7248242	25	4.5 (0.45)	280	490	R ¾	9.1
	7248243	40	4.5 (0.45)	354	520	R ¾	9.9
Ⓑ	**7248244**	50	4.5 (0.45)	409	505	R 1	12.3
	7248245	80	4.5 (0.45)	480	566	R 1	18.4

Note
Included in standard delivery with solar packs

For details on calculating the required volume: See the "Vitosol" technical guide.

9.19 Tightness 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.

400 V appliances

Vitocal	Leak test
200-G, type BWC 201.B	No
300-G, type BWC 301.C	No
300-G, 1-stage and 2-stage, type BW/BWS 301.A21	No
BW/BWS 301.A29 to A45	Every 12 months
350-G, 1-stage and 2-stage, type BW/BWS 351.B	Every 12 months
222-G, type BWT 221.B	No
333-G, type BWT 331.C	No

230 V appliances

Vitocal	Leak test
200-G, type BWC-M 201.B	No
222-G, type BWT-M 221.B	No

9.20 Intended use

The appliance is only intended to be installed and operated in sealed unvented heating systems that comply with EN 12828, with due attention paid to the associated installation, service and operating instructions.

Depending on the version, the appliance can only be used for the following purposes:
- Central heating
- Central cooling
- DHW heating

The range of functions can be extended with additional components and accessories.

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

Commercial or industrial usage for a purpose other than central heating/cooling or DHW heating shall be deemed inappropriate.

Incorrect usage or operation of the appliance (e.g. the appliance being opened by the system user) is prohibited and will result in an exclusion of liability. Incorrect usage also occurs if the components in the heating system are modified from their intended function.

Note
The appliance is intended exclusively for domestic or semi-domestic use, i.e. even users who have not had any instruction are able to operate the appliance safely.

Heat pump control unit

10.1 Vitotronic 200, type WO1C

Design and functions

Modular design
The control unit comprises the standard modules, PCBs and the programming unit.

Standard modules:
- ON/OFF switch
- Optolink interface
- Operating and fault display
- Fuses

PCBs for connecting external components:
- Connections for 230 V~ components, such as pumps, mixers etc.
- Connections for signal and safety components
- Connections for temperature sensors and KM BUS

Programming unit
- Straight forward operation:
  - Plain text display with graphic ability
  - Large font and black/white depiction for good contrast
  - Context-sensitive help texts
- With time switch
- Operating keys:
  - Navigation
  - Confirmation
  - Help
  - Extended menu
- Settings:
  - Standard and reduced room temperature
  - Standard and second DHW temperature
  - Operating program
  - Time programs, e.g. for central heating, DHW heating, DHW circulation and heating water buffer cylinder
  - Economy mode
  - Party mode
  - Holiday program
  - Heating and cooling curves
  - Parameter
- Display:
  - Flow temperatures
  - DHW temperature
  - Information
  - Operating data
  - Diagnostic details
  - Information, warning and fault messages

- Available languages:
  - German
  - Bulgarian
  - Czech
  - Danish
  - English
  - Spanish
  - Estonian
  - French
  - Croatian
  - Italian
  - Latvian
  - Lithuanian
  - Hungarian
  - Dutch
  - Polish
  - Russian
  - Romanian
  - Slovenian
  - Finnish
  - Swedish
  - Turkish

Functions

- Electronic maximum and minimum temperature limit
- Demand-dependent shutdown of the heat pump and the pumps for the primary and secondary circuits
- Adjustment of a variable heating and cooling limit
- Pump anti-seizing protection
- Monitoring frost protection of system components
- Integral diagnostic system
- Cylinder temperature controller with priority control
- Auxiliary function for DHW heating (short-term heating to a higher temperature)
- Control of a heating water buffer cylinder
- Screed drying program
- External hook-ups: Mixer OPEN, mixer CLOSE, changeover of operating mode (with external EA1 extension, accessories)
- External demand (adjustable set flow temperature) and heat pump blocking, specifying the set flow temperature via an external 0 to 10 V signal (with external EA1 extension, accessories)
- Function check of controlled components, e.g. circulation pumps
- Optimised utilisation of power generated by the photovoltaic system (on-site power consumption)
- Control and operation of compatible Viessmann ventilation units

Functions subject to heat pump type

	Vitocal 200-G	300-G	350-G	222-G	333-G
Weather-compensated control of the flow temperatures for heating or cooling mode					
– System flow temperature or flow temperature of heating circuit without mixer A1/HC1	X	X	X	X	X
– Flow temperature of heating circuit with mixer M2/HC2: Direct control of the mixer motor by the control unit	X	X	X	X	X
– Flow temperature of heating circuit with mixer M3/HC3: Control of the mixer motor via the KM-BUS	X	X	X	X	X
– Flow temperature for cooling via a heating/cooling circuit or separate cooling circuit	X	X	X	X	X
Cooling function					
– Natural cooling function (NC)	X	X	X	X	X
– Active cooling function (AC)	X	X	X	—	—
Solar DHW heating/central heating backup For solar circuit pump with control via PWM signal					
– Control with solar control module, type SM1 (accessories)	X	X	X	—	—
– Control unit with SDIO/SM1A electronics module (integrated in Solar-Divicon, type PS10)	—	—	—	X	X
Control of external heat generator (e.g. oil/gas boiler)	X	X	X	—	—
Control of instantaneous heating water heater	X	X	X	X	X
Control of Viessmann ventilation unit	X	Types BWC	—	X	X
Optimised utilisation of power generated on site	X	X	X	X	X
Control of swimming pool heating	X	X	X	X	X
Control of heat pump cascade – For up to 5 Vitocal appliances via LON, LON communication module required (accessories)	X	—	X	—	—
Connection to higher ranking KNX/EIB system Via Vitogate 200, type KNX (LON communication module required, accessories)	X	X	X	X	X

Data communication overview

Device	**Vitoconnect type OPTO2**		**Vitocom 100 type LAN1**		**Vitocom 300 type LAN3**	
Operation	**ViCare app**	**Vitoguide**	**Vitotrol app**	**Vitodata 100**	**Vitodata 100**	**Vitodata 300**
Communication	WiFi		Ethernet, IP networks		Ethernet, IP networks	
	Push notification	Email	Vitotrol app	Email, SMS, fax	Email, SMS, fax	
Max. number of heating systems	1	1	1	1	1	5
Max. number of heating circuits	3	3	3	32	32	32
Remote monitoring	X	X	X	X	X	X
Telecontrol	X	X	X	X	X	X
Remote setting (setting the heat pump control parameters)	–	–	–	–	–	X
Linking in the heat pump control unit	Optolink	Optolink	LON	LON	LON	LON
Accessories required for the heat pump control unit	–	–	Communication module (Vitocom standard delivery or accessories)			

Information on Vitoconnect
Heating system: Only 1 heat generator

Information on Vitodata 100
The full extent of the heat pump energy statement cannot be retrieved.

The requirements of EN 12831 for calculating the heat load are met. To reduce the heat-up output, the "Reduced" operating status is switched to the "Standard" operating status if outside temperatures are low.

According to the [German] Energy Saving Ordinance, the temperature in each room must be individually controlled, e.g. by means of thermostatic valves.

Time switch

Digital time switch (integrated into the programming unit)
- Individual day and seven-day program
- Automatic summer/wintertime changeover
- Automatic function for DHW heating and DHW circulation pump
- Standard switching times are preset at the factory, e.g. for central heating, DHW heating, charging a heating water buffer cylinder and switching the DHW circulation pump.
- Time program is individually adjustable; up to 8 time phases per day
  Shortest switching interval: 10 min
  Power reserve: 14 days

Setting the operating programs

Frost protection monitoring for the system components is enabled in all operating programs (see frost protection function).
You can select the following operating programs via the menu:
- For heating/cooling circuits:
  "Heating and DHW" or "heating, cooling and DHW"
- For a separate cooling circuit:
  "Cooling"
- "Only DHW"; separate settings for each heating circuit

  Note
  If the heat pump only needs to be on for DHW heating (e.g. in the summer), the operating program "Only DHW" must be selected for ***all*** *heating circuits.*

- "Standby mode"
  Frost protection only

The operating programs can also be switched over externally, e.g. by Vitocom 100.

Frost protection function

- If the outside temperature falls below +1 °C, the frost protection function is switched on.
  With active frost protection, the heating circuit pump will be switched on and the flow temperature in the secondary circuit will be maintained at a lower temperature of approx. 20 °C.
  The DHW cylinder will be heated to approx. 20 °C.
- If the outside temperature exceeds +3 °C, the frost protection function is switched off.

Heating and cooling curve settings (slope and level)

The Vitotronic 200 regulates the flow temperatures for the heating/cooling circuits in weather-compensated mode:
- System flow temperature or flow temperature of heating circuit without mixer A1/HC1
- Flow temperature of heating circuit with mixer M2/HC2:
  Depending on the heat pump, the mixer motor is controlled either directly by the control unit or via the KM-BUS.
- Flow temperature of heating circuit with mixer M3/HC3:
  Not available on all heat pumps; mixer motor control via the KM-BUS
- Flow temperature for cooling via heating circuit; the separate cooling circuit is regulated depending on the room temperature.

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 or cooled.
Adjusting the heating or cooling curves matches the flow temperature to these conditions.

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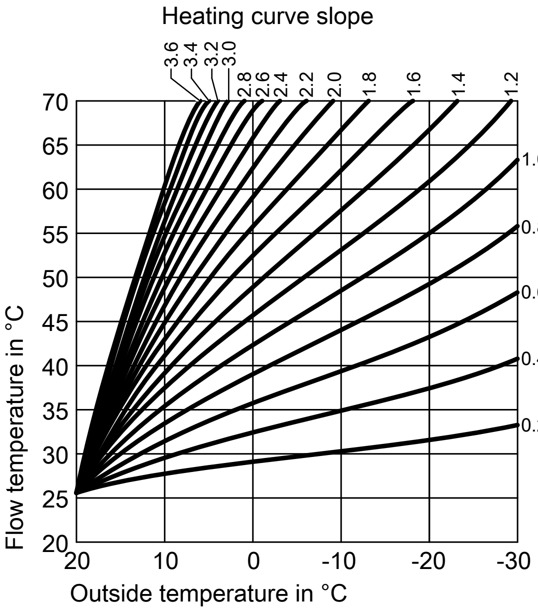
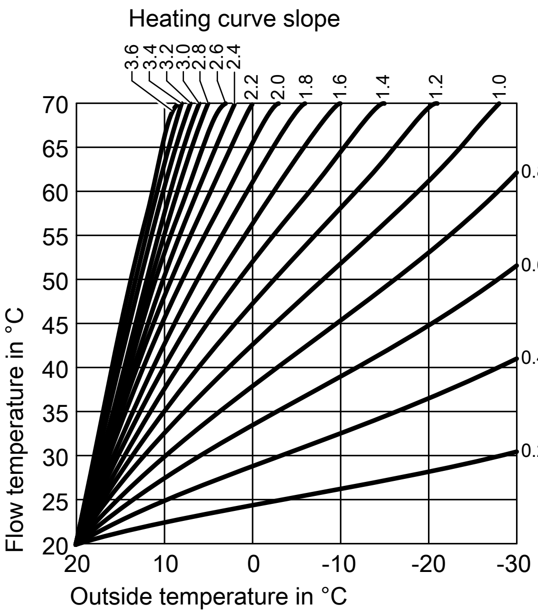
- Heating curves:
  The flow temperature of the secondary circuit is restricted at the upper end of the scale by the temperature limiter and the maximum temperature set at the heat pump control unit.

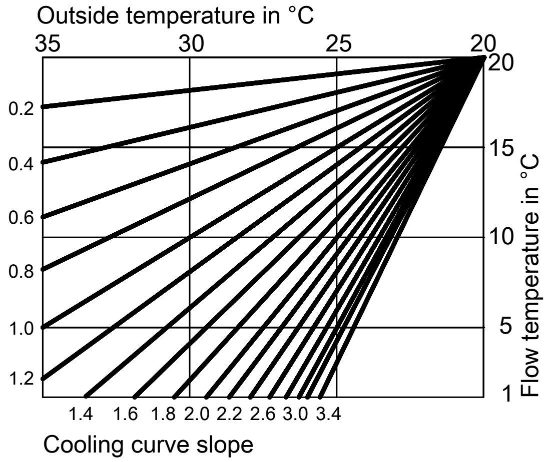


Heating curves for one heating circuit without mixer



Heating curves for one heating circuit with mixer

- Cooling curves:
  The flow temperature of the secondary circuit is restricted at the lower end of the scale by the minimum temperature set at the heat pump control unit.



Heating systems with heating water buffer cylinder

When using hydraulic separation, a temperature sensor must be integrated in the heating water buffer cylinder. This temperature sensor is connected to the heat pump control unit.

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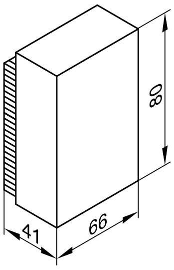
Outside temperature sensor

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-core lead, length up to 35 m with a cross-section of 1.5 mm^2 (copper)
- Never route this lead immediately next to 230 V/400 V cables.



Specification

IP rating	IP 43 to EN 60529; ensure through design/installation.
Sensor type	Viessmann NTC 10 kΩ at 25 °C
Permissible ambient temperature during operation, storage and transport	−40 to +70 °C

10.2 Specification Vitotronic 200, type WO1C

General

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	6 A
Protection class	I
Permissible ambient temperature	
– Operation	0 to +40 °C Installation in living spaces or boiler rooms (standard ambient conditions)
– Storage and transport	–20 to +65 °C
DHW temperature setting range	10 to +70 °C
Heating and cooling curves setting range	
– Slope	0 to 3.5
– Level	–15 to +40 K

Power supply for DHW circulation pump
DHW circulation pumps with their own internal control units must be connected via a separate power supply. It is ***not*** *permissible to use the power supply from the Vitotronic control unit or Vitotronic accessories.*

Supply values of 230 V~ components

Component	Connected load in W	Max. switching current in A
Primary pump and control of well pump	200	4(2)
Secondary pump	130	4(2)
3-way diverter valve "central heating/DHW heating"	130	4(2)
Heating circuit pump A1/HC1 and M2/HC2	100	4 (2)
Circulation pump for cylinder heating (heating water side)	130	4 (2)
Control of instantaneous heating water heater, stage 1 and 2	10	4(2)
Cylinder loading pump (DHW side) and 2-way shut-off valve	130	4 (2)
Circulation pump for DHW reheating Or Control of immersion heater EHE	100	4 (2)
Control of external heat generator	Floating contact	4 (2)
Control of cooling	10	4 (2)
DHW circulation pump	50	4 (2)
Control of mixer motor for heating circuit with mixer M2/HC2 or external heat generator, signal mixer CLOSE	10	0.2(0.1)
Control of mixer motor for heating circuit with mixer M2/HC2 or external heat generator, signal mixer OPEN	10	0.2(0.1)
Central fault message	Floating contact	4 (2)
Total	Max. 1000	Max. 5(3) A

Values in brackets at cos φ = 0.6

Note
Heating circuit pump M3/HC3 and mixer motor for heating circuit M3/HC3 are connected to the mixer extension kit (accessories).

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11.1 Overview

Accessories	Part no.	Vitocal 200-G	300-G	350-G	222-G	333-G
Photovoltaics: See page 209 onwards.						
1-phase electricity meter 3-phase electricity meter	7506156 7506157	BWC-M 201.B BWC 201.B	X	X	BWT-M 221.B BWT 221.B	X
Remote control units: See page 211 onwards.						
Vitotrol 200-A	Z008341	X	X	X	X	X
Wireless remote control units: See page 211 onwards.						
Vitotrol 200-RF	Z011219	X	X	X	X	X
Wireless base station	Z011413	X	X	X	X	X
Wireless repeater	7456538	X	X	X	X	X
Sensors: See page 213 onwards.						
Contact temperature sensor (NTC 10 kΩ)	7426463	X	X	X		
Immersion temperature sensor (NTC 10 kΩ)	7438702	X	X	X	X	X
Collector temperature sensor (NTC 20 kΩ)	7831913				X	X
Miscellaneous: See page 214 onwards.						
Contactor relay	7814681	X	X	X	X	X
Phase monitor	7463720	X				
KM-BUS distributor	7415028	X	X	X	X	X
Swimming pool temperature controller: See page 215 onwards.						
Temperature controller for regulating swimming pool temperature	7009432	X	X	X	X	X
Extension for heating circuit control unit for heating circuit with mixer M2/HC2 (direct switching via the Vitotronic): See page 215 onwards.						
Mixer extension kit	7441998	X	X	X	X	X
Extension for heating circuit control unit for heating circuit with mixer M3/HC3 (control via the Vitotronic KM-BUS): See page 216 onwards.						
Mixer extension kit (mixer mounting)	ZK02940	X	X	X	X	X
Mixer extension kit (wall mounting)	ZK02941	X	X	X	X	X
High limit safety cut-out	7197797	X	X	X		
Immersion thermostat	7151728	X	X	X	X	X
Contact thermostat	7151729	X	X	X	X	X
Solar DHW heating and central heating backup: See page 218 onwards.						
Solar control module type SM1	Z014470	X	X	X		
Function extensions: See page 219 onwards.						
AM1 extension	7452092	X	X	X	X	X
EA1 extension	7452091	X	X	X	X	X
Communication technology: See page 220 onwards.						
Vitoconnect 100, type OPTO2	ZK04789	X	X	X	X	X
Vitocom 100, type LAN1 with communication module	Z011224	X	X	X	X	X
Vitocom 300, type LAN3 with LON communication module	Z011399	X	X	X	X	X
LON communication module	7172173	X	X	X	X	X
LON communication module for cascade control	7172174	X		X		
LON cable for control unit data exchange	7134495	X	X	X	X	X
LON coupling, RJ45	7143496	X	X	X	X	X
LON plug-in connector, RJ45	7199251	X	X	X	X	X
LON socket, RJ45	7171784	X	X	X	X	X
Terminator	7143497	X	X	X	X	X

Note
- *The following description of control unit accessories lists all functions and connections of each control unit accessory. The available functions depend on the respective heat generator: See page 205.*
- *For more information on communication technology: See the "Data communication" technical guide.*

11.2 Photovoltaics

Energy meter 1-phase

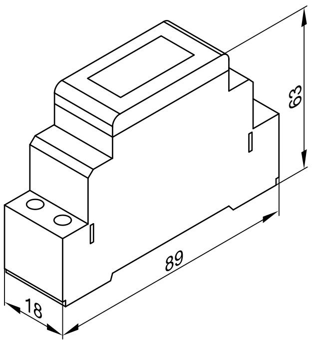
Part no. 7506156

With standard Modbus interface.

The Vitotronic control unit receives information via the Modbus detailing whether and how much (residual) energy is available to the heat pump from the photovoltaic system.

For optimised utilisation of the self-generated power from photovoltaic systems (own energy consumption), the following components and functions may be enabled by the Vitotronic control unit:
- Heat pump compressor.
- Heating of the DHW cylinder to the set DHW temperature or the second set DHW temperature.
- Heating the heating water buffer cylinder.
- Central heating
- Central cooling

Connection:
- Installation on 35 mm top-hat rail (as per EN 60715 TH35)
- Power cable cross-section: max. 6 mm^2
- Control circuit cross-section: max. 2.5 mm^2



Specification

Single phase electricity meter	
Rated voltage	230 V~$^{-20\text{ to }+15\ \%}$
Rated frequency	50 Hz$^{-20\text{ to }+15\ \%}$
Current	
– Reference current	5 A
– Max. test current	32 A
– Starting current	20 mA
– Min. current	0.25 A
Power consumption	0.4 W actual power
Display	
– Actual power, voltage, current	LCD, 7-digit
– Count range	0 to 999999.9
– Pulses	2000 per kWh
– Accuracy categories	B as per EN 50470-3 1 as per IEC 62053-21
Permissible ambient temperature	
– Operation	−10 to +55 °C
– Storage and transport	−30 to +85 °C

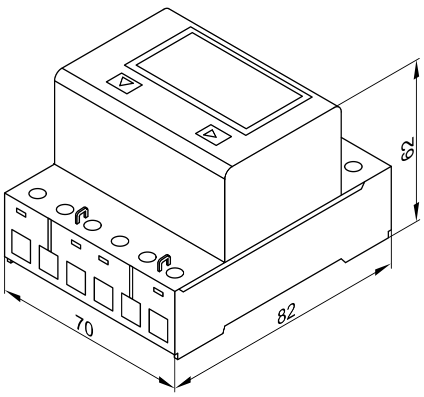
Electricity meter, 3-phase

Part no. 7506157

With standard Modbus interface.
The Vitotronic control unit receives information via the Modbus detailing whether and how much (residual) energy is available to the heat pump from the photovoltaic system.

For optimised utilisation of the self-generated power from photovoltaic systems (own energy consumption), the following components and functions may be enabled by the Vitotronic control unit:
- Heat pump compressor.
- Heating of the DHW cylinder to the set DHW temperature or the second set DHW temperature.
- Heating the heating water buffer cylinder.
- Central heating
- Central cooling

Connection:
- Installation on top-hat rail 35 mm (to EN 60715 TH35)
- Main circuit cable cross-section: 1.5 to 16 mm^2
- Control circuit cable cross-section: Max. 2.5 mm^2



Specification

Rated voltage	3 x 230 V~/400 V~$^{-20\text{ to }+15\ \%}$
Rated frequency	50 Hz$^{-20\text{ to }+15\ \%}$
Electricity	
– Reference current	10 A
– Max. measurable current	65 A
– Starting current	40 mA
– Min. current	0.5 A
Power consumption	0.4 W actual power per phase
Display	
– Per phase: Actual power, voltage, current	LCD, 7-digit, for 1 or 2 tariffs
– Count range	0 to 999999.9
– Pulses	100 per kWh
– Accuracy categories	B as per EN 50470-3 1 as per IEC 62053-21
Permissible ambient temperature	
– Operation	−10 to +55 °C
– Storage and transport	−30 to +85 °C

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11.3 Remote control units

Information on Vitotrol 200-A

A Vitotrol 200-A can be used for each heating or cooling circuit.
The Vitotrol 200-A can operate 1 heating/cooling circuit.
Up to 3 remote control units can be connected to the control unit.

Note
Hardwired remote control units cannot be combined with the wireless base station.

Vitotrol 200-A

Part no. Z008341
KM-BUS subscriber
- Displays:
  – Room temperature
  – Outside temperature
  – Operating condition
- Party and economy mode can be enabled via keys
- Integral room temperature sensor for room temperature hook-up (only for one heating circuit with mixer)
- Settings:
  – Set room temperature for standard mode (normal room temperature)

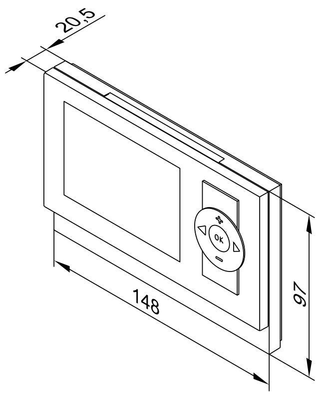
  Note
  The set room temperature for reduced mode (reduced room temperature) is set at the control unit.

  – Operating program

Installation location:
- Weather-compensated mode:
  Installation anywhere in the building
- Room temperature hook-up:
  The integral room temperature sensor captures the actual room temperature and effects any necessary correction of the flow temperature.

  The captured room temperature depends on the installation site:
  – Main living room on an internal wall opposite radiators
  – Not on shelves or in recesses
  – Never in the immediate vicinity of doors or close to heat sources (e.g. direct insolation, fireplace, TV set, etc.).

Connection:
- 2-core lead, length max. 50 m (even if connecting several remote control units)
- Never route this lead immediately next to 230/400 V cables
- LV plug as standard delivery



Specification

Power supply	Via KM-BUS
Power consumption	0.2 W
Protection class	III
IP rating	IP 30 to EN 60529; ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	−20 to +65 °C
Setting range of the set room temperature for standard mode	3 to 37 °C

Notes
- *If the Vitotrol 200-A is to be used for room temperature hook-up, site the device in a main living room (lead room).*
- *Connect maximum 3 Vitotrol 200-A units to the control unit.*

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11.4 Wireless remote control units

Information on Vitotrol 200-RF

Wireless remote control unit with integral wireless transmitter for operation with the wireless base station.
A Vitotrol 200-RF can be used for each heating or cooling circuit.
The Vitotrol 200-RF can operate one heating/cooling circuit.
Up to 3 wireless remote control units can be connected to the control unit.

Note
The wireless remote control unit ***cannot*** *be combined with a hardwired remote control.*

Vitotrol 200-RF

Part no. Z011219
Wireless subscriber

- Displays:
  – Room temperature
  – Outside temperature
  – Operating condition
  – Wireless signal reception quality
- Settings:

– Set room temperature for standard mode (normal room temperature)

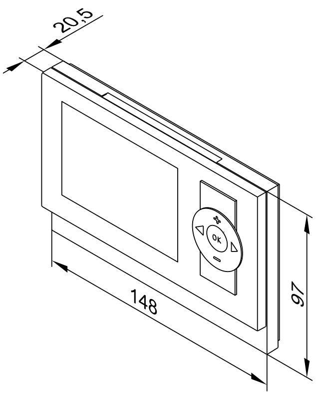
Note
The set room temperature for reduced mode (reduced room temperature) is set at the control unit.

– Operating program
- Party and economy mode can be enabled via keys
- Integral room temperature sensor for room temperature hook-up (only for one heating circuit with mixer)

Installation location:
- Weather-compensated mode:
  Installation anywhere in the building
- Room temperature hook-up:
  The integral room temperature sensor captures the room temperature and effects any necessary correction of the flow temperature.

  The captured room temperature depends on the installation site:
  – Main living room on an internal wall opposite radiators
  – Not on shelves or in recesses
  – Never in the immediate vicinity of doors or close to heat sources (e.g. direct insolation, fireplace, TV set, etc.)

Note
Observe the "Wireless accessories" technical guide.



Specification

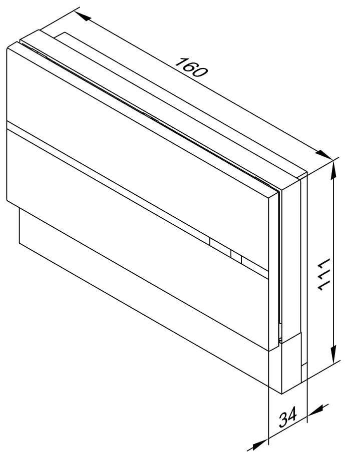
Power supply	2 AA batteries 3 V
Radio frequency	868 MHz
Wireless range	See "Wireless accessories" technical guide
Protection class	III
IP rating	IP 30 to EN 60529; ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	–20 to +65 °C
Setting range of the set room temperature for standard mode	3 to 37 °C

Wireless base station

Part no. Z011413

KM-BUS subscribers
- For communication between the Vitotronic control unit and Vitotrol 200-RF wireless remote control
- For up to 3 wireless remote control units. Not in conjunction with a hardwired remote control unit

Connection:
- 2-core lead: Length up to 50 m (even when connecting several KM-BUS subscribers)
- Never route this lead immediately next to 230 V/400 V cables.



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Specification

Power supply via KM-BUS	
Power consumption	1 W
Radio frequency	868 MHz
Protection class	III
IP rating	IP 20 to EN 60529, ensure through design/installation.
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	–20 to +65 °C

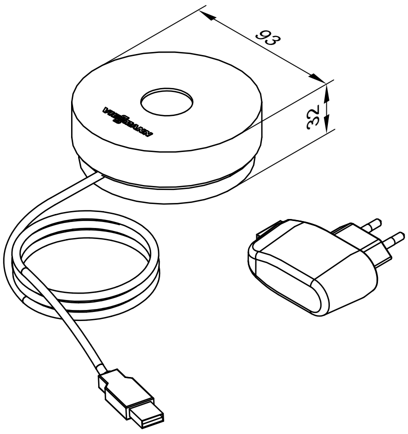
Wireless repeater

Part no. 7456538

Mains operated wireless repeater to increase the wireless range and for use in areas where wireless communication is difficult. Observe the "Wireless accessories" technical guide.

Do not use more than one wireless repeater per Vitotronic control unit.

- For preventing strongly diagonal angles of penetration of the radio signals through steel reinforced concrete ceilings/floors and/or multiple walls
- For circumventing large metallic objects situated between the wireless components.



Specification

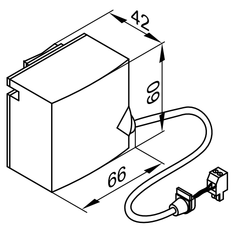
Power supply	230 V~/5 V⎓ via plug-in power supply unit
Power consumption	0.25 W
Radio frequency	868 MHz
Lead length	1.1 m with plug
Safety category	II
IP rating	IP 20 to EN 60529; ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +55 °C
– Storage and transport	−20 to +75 °C

11.5 Sensors

Contact temperature sensor

Part no. 7426463

To capture the temperature on a pipe



Secured with a tie.

Specification

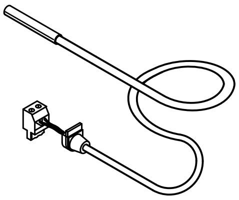
Lead length	5.8 m, fully wired
IP rating	IP 32D to EN 60529; ensure through design/installation
Sensor type	Viessmann NTC 10 kΩ at 25 °C
Permissible ambient temperature	
– Operation	0 to +120 °C
– Storage and transport	–20 to +70 °C

Immersion temperature sensor

Part no. 7438702

To capture a temperature in a sensor well

5822541



Specification

Lead 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

Collector temperature sensor

Part no. 7831913

Immersion temperature sensor for installation in the solar collector
- For systems with 2 collector arrays
- For heat statement (recording flow temperature)

On-site extension of the connecting lead:
- 2-core lead, length up to 60 m with a cross-section of 1.5 mm^2 (copper)
- Never route this lead immediately next to 230/400 V cables.

Specification

Lead length	2.5 m
IP rating	IP 32 to EN 60529; ensure through design/installation
Sensor type	Viessmann NTC 20 kΩ at 25 °C
Permissible ambient temperature	
– Operation	−20 to +200 °C
– Storage and transport	−20 to +70 °C

11.6 Miscellaneous

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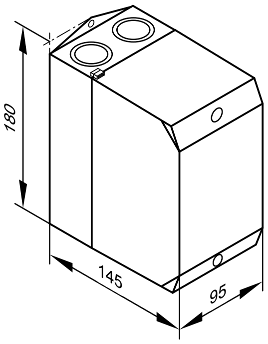
Contactor relay

Part no. 7814681
- Contactor in small enclosure
- With 4 N/C and 4 N/O contacts
- With terminal strips for earth conductors

Specification

Coil voltage	230 V/50 Hz
Rated current (I_{th})	AC1 16 A AC3 9 A

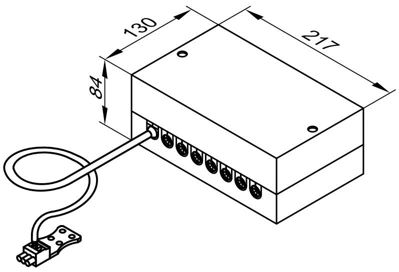


Phase monitor

Part no. 7463720
For monitoring the compressor power supply.

KM BUS distributor

Part no. 7415028
For connecting 2 to 9 devices to the KM BUS



5822541

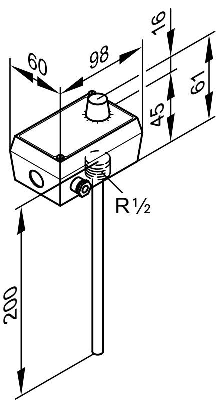
Specification

Cable length	3.0 m, fully wired
IP rating	IP 32 to EN 60529; ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	−20 to +65 °C

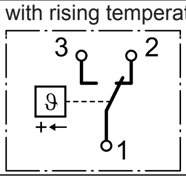
11.7 Swimming pool temperature control

Temperature controller for regulating the swimming pool temperature

Part no. 7009432



Specification

Connection	3-core lead with a cross-section of 1.5 mm²
Setting range	0 to 35 °C
Switching differential	0.3 K
Breaking capacity	10(2) A, 250 V~
Switching function	with rising temperature from 2 to 3 
Stainless steel sensor well	R ½ x 200 mm

11.8 Heating circuit control unit extension

Direct control via the Vitotronic:

- Vitocal 200-G/300-G/350-G: For heating circuit with mixer M2/HC2 and for connecting an external heat generator
- Vitocal 222-G/333-G: For heating circuit with mixer M2/HC2

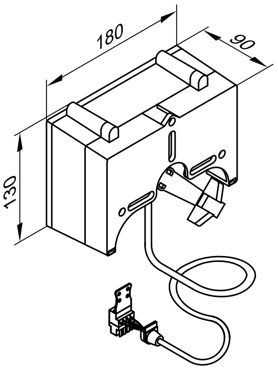
Mixer extension kit

Part no. 7441998

Components:

- Mixer motor with connecting cable (4.0 m long) for Viessmann mixer DN 20 to DN 50 and R ½ to R 1¼ (not for flanged mixers) and plug
- Flow temperature sensor as contact temperature sensor with connecting cable (5.8 m long) and plug
- Plug for heating circuit pump

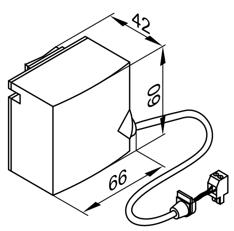
Mixer motor



Mixer motor specification

Rated voltage	230 V~
Rated frequency	50 Hz
Power consumption	4 W
Safety category	II
IP rating	IP 42 to EN 60529; ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	−20 to +65 °C
Torque	3 Nm
Runtime for 90° ∢	120 s

Flow temperature sensor (contact temperature sensor)



Secured with a tie.

5822541

Specification, flow temperature sensor

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

11.9 Heating circuit control unit extension

Control via the Vitotronic KM-BUS:
- For heating circuit with mixer M3/HC3

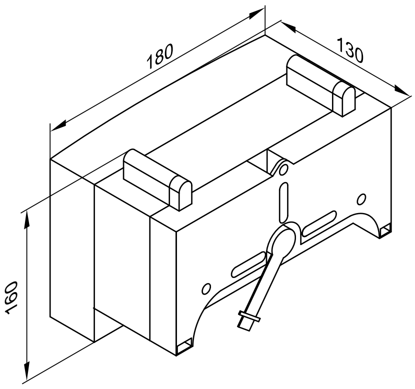
Mixer extension kit with integral mixer motor

Part no. ZK02940
KM-BUS subscribers

Components:
- Mixer PCB with mixer motor for Viessmann mixer DN 20 to DN 50 and R ½ to R 1¼
- Flow temperature sensor (contact temperature sensor)
- Plug for connecting the heating circuit pump
- Power cable (3.0 m long) with plug
- Bus connecting cable (3.0 m long) with plug

The mixer motor is mounted directly onto the Viessmann mixer DN 20 to DN 50 and R ½ to R 1¼.

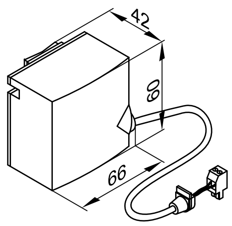
Mixer PCB with mixer motor



Specification, mixer PCB with mixer motor

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	2 A
Power consumption	5.5 W
IP rating	IP 32D to EN 60529; ensure through design/installation
Protection class	I
Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	–20 to +65 °C
Rated breaking capacity of the relay output for heating circuit pump 20	2(1) A, 230 V~
Torque	3 Nm
Runtime for 90° ∢	120 s

Flow temperature sensor (contact temperature sensor)



Secured with a tie.

Specification, flow temperature sensor

Cable length	2.0 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

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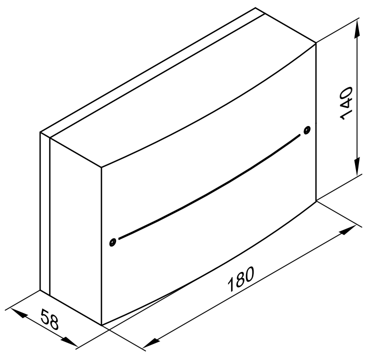
Mixer extension kit for separate mixer motor

Part no. ZK02941
KM-BUS subscribers
For connecting a separate mixer motor
Components:
- Mixer PCB for connecting a separate mixer motor
- Flow temperature sensor (contact temperature sensor)
- Plug for connecting the heating circuit pump and the mixer motor
- Power cable (3.0 m long) with plug
- Bus connecting cable (3.0 m long) with plug

Mixer PCB

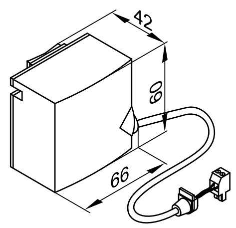


Specification mixer PCB

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	2 A
Power consumption	1.5 W
IP rating	IP 20D to EN 60529, ensure through design/installation
Protection class	I

Permissible ambient temperature	
– Operation	0 to +40 °C
– Storage and transport	–20 to +65 °C
Rated relay output breaking capacity	
– Heating circuit pump [20]	2(1) A, 230 V~
– Mixer motor	0.1 A, 230 V~
Required runtime of the mixer motor for 90° ∢	Approx. 120 s

Flow temperature sensor (contact temperature sensor)



Secured with a tie.

Specification, flow temperature sensor

Cable 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

11

High limit safety cut-out

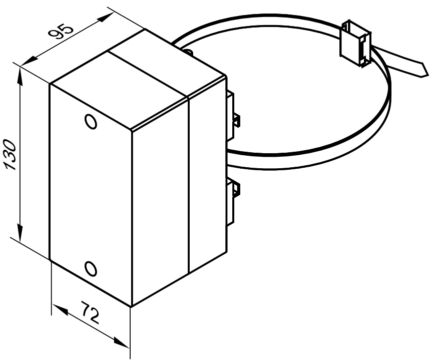
Part no. 7197797

Note
Only use with heat pumps that reach a flow temperature of up to 65 °C.

If an external heat generator is connected in the secondary circuit, the high limit safety cut-out protects the heat pump refrigerant circuit from unacceptably high temperatures.

Examples of heat generators:
- Solar thermal systems
- Solid fuel boilers
- Non-modulating boilers

The high limit safety cut-out is connected to the control unit of the external heat generator. If the heat generator exceeds the temperature, it is switched off via the high limit safety cut-out.



Specification, high limit safety cut-out

Connection	4.2 m, fully wired
Switching point	65 °C (cannot be changed)
Switching tolerance	+0/–6.5 K
IP rating	IP 41 to EN 60529; ensure through design/installation.
Ambient temperature	Max. 50 °C
Sensor temperature	Max. 90 °C
Sensor diameter	6.5 mm

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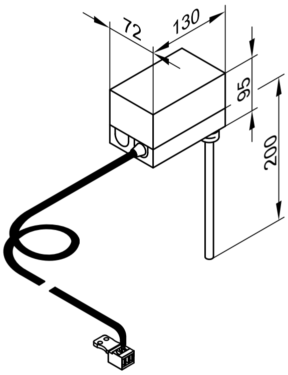
Immersion thermostat

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



Specification

Cable 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

Contact thermostat

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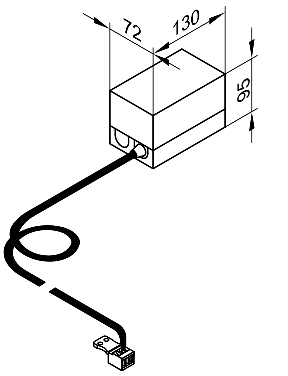
Part no. 7151729
May be used as a maximum temperature limiter for underfloor heating systems (only in conjunction with metal pipes).
The temperature limiter is integrated into the heating flow. If the flow temperature is too high, the temperature limiter switches off the heating circuit pump.



Specification

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

11.10 Solar DHW heating and central heating backup

Solar control module, type SM1

Part no. Z014470
- Function extension inside wall mounting enclosure
- Electronic temperature differential control for dual mode DHW heating and central heating backup using solar collectors

Specification

Functions
- Output statement and diagnostic system
- Operation and display via the Vitotronic control unit.
- Switching the solar circuit pump
- Heating of 2 consumers via a collector array
- 2nd temperature differential control
- Thermostat function for reheating or utilising excess heat
- Speed control for solar circuit pump via PWM input (make: Grundfos and Wilo)
- Suppression of DHW cylinder reheating by the heat generator subject to solar yield
- Heat-up of the solar preheating stage (with 400 l DHW cylinders or larger)
- Collector safety shutdown
- Electronic temperature limitation in the DHW cylinder
- Switching of an additional pump or valve via relay

To implement the following functions, also order immersion temperature sensor, part no. 7438702:
- For DHW circulation diversion in systems with 2 DHW cylinders
- For return changeover between the heat generator and the heating water buffer cylinder

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- For return changeover between the heat generator and the primary heat store
- For heating additional consumers

Structure

The solar control module contains:
- PCB
- Terminals:
  - 4 sensors
  - Solar circuit pump
  - KM BUS
  - Power supply (on-site ON/OFF switch)
- PWM output for switching the solar circuit pump
- 1 relay for switching one pump or one valve

Collector temperature sensor
For connection inside the appliance

On-site extension of the connecting lead:
- 2-core lead, length up to 60 m with a cross-section of 1.5 mm^2 (copper)
- Never route this lead immediately next to 230/400 V cables.

Collector temperature sensor specification

Lead length	2.5 m
IP rating	IP 32 to EN 60529; ensure through design/installation.
Sensor type	Viessmann NTC 20 kΩ at 25 °C
Permissible ambient temperature	
– Operation	−20 to +200 °C
– Storage and transport	−20 to +70 °C

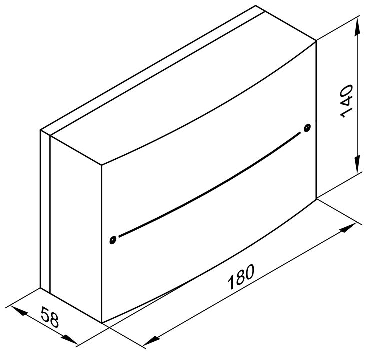
Cylinder temperature sensor
For connection inside the appliance

On-site extension of the connecting lead:
- 2-core lead, length up to 60 m with a cross-section of 1.5 mm^2 (copper)
- Never route this cable immediately next to 230/400 V cables.

Cylinder temperature sensor specification

Lead length	3.75 m
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

For systems with Viessmann DHW cylinders, the cylinder temperature sensor is installed in the threaded elbow in the heating water return (standard delivery or accessory for the relevant DHW cylinder).



Solar control module specification

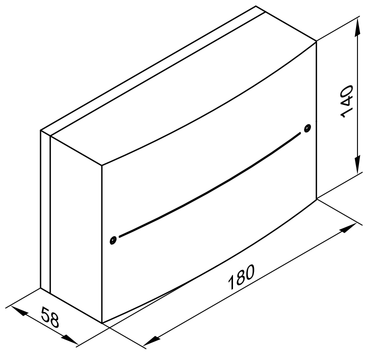
Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	2 A
Power consumption	1.5 W
Protection class	I
IP rating	IP 20 to EN 60529; ensure through design/installation.
Function type	Type 1B to EN 60730-1
Permissible ambient temperature	
– Operation	0 to +40 °C, use in the living space or boiler room (standard ambient conditions)
– Storage and transport	−20 to +65 °C
Rated relay output breaking capacity	
– Semi-conductor relay 1	1 (1) A, 230 V~
– Relay 2	1 (1) A, 230 V~
– Total	Max. 2 A

11.11 Function extensions

AM1 extension

Part no. 7452092
Function extension inside enclosure, for wall mounting

Using the extension allows the following functions to be achieved:
- Cooling via coolant buffer cylinder
- or
  Central fault message
- Heat transfer to the coolant buffer cylinder



Specification

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	4 A
Power consumption	4 W
Rated relay output breaking capacity	2(1) A, 250 V~ each, total max. 4 A~
Safety category	I
IP rating	IP 20 D to EN 60529, ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +40 °C Installation in living spaces or boiler rooms (standard ambient conditions)
– Storage and transport	–20 to +65 °C

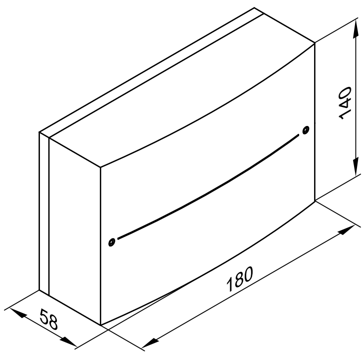
EA1 extension

Part no. 7452091
Function extension inside a casing, for wall mounting.
Using the inputs and outputs allows up to 5 functions to be implemented.

1 analogue input (0 to 10 V):
- Default set flow temperature, secondary circuit.

3 digital inputs:
- External changeover of the operating state.
- External demand and blocking.
- External demand for a minimum heating water temperature.

1 switching output:
- Swimming pool heating control.



Specification

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	2 A
Power consumption	4 W
Rated breaking capacity of the relay output	2(1) A, 250 V~
Safety category	I
IP rating	IP 20 D to EN 60529, ensure through design/installation
Permissible ambient temperature	
– Operation	0 to +40 °C Installation in living spaces or boiler rooms (standard ambient conditions)
– Storage and transport	–20 to +65 °C

11.12 Communication technology

Note
For more information on communication technology: See the "Data communication" technical guide

Vitoconnect, type OPTO2

Part no. ZK04789

- Internet interface for remote control of a heating system with 1 heat generator via WiFi with DSL router
- Compact device for wall mounting
- For system operation with **ViCare app** and/or **Vitoguide**

Functions when operating with the ViCare app
- Calling up the temperatures of connected heating circuits
- Intuitive adjustment of preferred temperatures and time programs for central heating and DHW heating
- Heating system fault reporting by push notification

The ViCare app supports mobile devices with the following operating systems:
- Apple iOS
- Google Android

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Note
- *Compatible versions: Visit the App Store or Google Play.*
- *Further information: Visit **www.vicare.info***

Functions when operating with Vitoguide
- Monitoring of heating system following service clearance by the system user
- Access to operating programs, set values and time programs
- Retrieving system information for all connected heating systems
- Display and forwarding of fault messages in plain text

Vitoguide supports the following end devices:
- Mobile devices with a screen size of 8 inches or larger

Note
*Further information: Visit **www.vitoguide.info***

On-site requirements
- Compatible heating systems with Vitoconnect, type OPTO2

  Note
  *Supported control units: Visit **www.viessmann.de/vitoconnect***

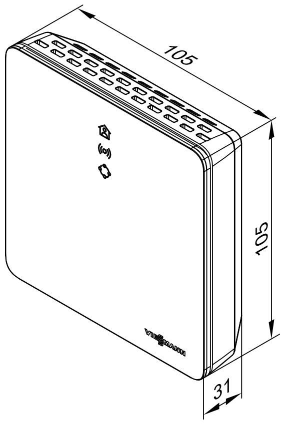
- Before commissioning, check the system requirements for communication via local IP networks/WiFi.
- Port 443 (HTTPS) and port 123 (NTP) must be open.
- The MAC address is printed on the device label.
- Internet connection with flat rate data (**without time or volume restrictions**)

Installation location
- Installation type: Wall mounting
- Installation only in enclosed buildings
- The installation location must be dry and free of frost.
- Distance to heat generator min. 0.3 m and max. 2.5 m
- Standard socket 230 V/50 Hz
  or
  US/CA: Socket 120 V/60 Hz
  max. 1.5 m to installation location
- Internet access with adequate WiFi signal

  Note
  The WiFi signal strength can be increased with commercially available WiFi repeaters.

Standard delivery
- Web interface for wall mounting
- Power cable with plug-in power supply unit (1.5 m long)
- Connecting cable with Optolink/USB (WiFi module/boiler control unit, 3 m long)

Specification



Vitoconnect specification

Rated voltage	12 V⎓
WiFi frequency	2.4 GHz
WiFi encryption	Unencrypted or WPA2
Frequency band	2400.0 to 2483.5 MHz
Max. transmitting power	0.1 W (e.i.r.p.)
Internet protocol	IPv4
IP assignment	DHCP
Rated current	0.5 A
Power consumption	5.5 W
Protection class	III
IP rating	IP 20D to EN 60529
Permissible ambient temperature	
– Operation	5 to +40 °C Installation in living spaces or boiler rooms (standard ambient conditions)
– Storage and transport	–20 to +60 °C

Plug-in power supply unit specification

Rated voltage	100 to 240 V~
Rated frequency	50/60 Hz
Output voltage	12 V⎓
Output current	1 A
Protection class	II
Permissible ambient temperature	
– Operation	5 to +40 °C Installation in living spaces or boiler rooms (standard ambient conditions)
– Storage and transport	–20 to +60 °C

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Keyword index

Keyword index

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Keyword index

Subject to technical modifications.

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