Compact chilled water unit for indoor installation with free cooling, adiabatic evaporative cooling and integrated compressor refrigeration system

Hybritemp 98 93 01 - simplified illustration

Automatically selects the most economical operating mode!

Hybritemp 97 and 98

TOTAL COOLING CAPACITY: 33 kW – 455 kW

At a glance:

- **Efficient cooling through the use of natural resources**
- **Very high performance with high EER and ESEER values at the same time**
- **Reliable cooling, even when outside temperatures are very high**
- **Compressor refrigeration system and free cooler optimally adapted to the respective application**
- **Compact design thanks to integrated recooling system, removing the need for cooling system components on the facade or on the roof**
- **Low air volumes required for heat dissipation**
- **Integrated control and regulation system, compatible with all conventional building management systems**

Cooling systems using chilled water can be found in a wide range of areas: For discharging excess heat from rooms with high thermal loads, for cooling industrial manufacturing processes or for comfort air conditioning of buildings. The units of the Hybritemp 97 and 98 series are optimally adapted to these requirements. The "all-in-one" unit offers efficient cooling in a very compact way. It is generally not necessary for cooling system components to be installed at or on the exterior of the building – and this drastically reduces the overall investment costs. Hybritemp has been developed in two design variants: The COP-optimised 97 series is characterised by its very high efficiency, while the development of the 98 series focussed on achieving maximum performance with minimum space requirements. The combination of first-class components with precise control and regulation systems guarantees economical operation at all times.

Further performance parameters and options:

- High corrosion prevention through the use of zinc sacrificial anodes, EPD-coated parts and components made from plastic
- Use of electronic expansion valves
- Energy-saving EC fans
- Filtering the air in any operating mode
- Individually controllable performance parameters
- Complete unit, ready to connect, contains all structural elements for chilled water generation, including all control and regulation fittings
- Intensive quality inspection with factory test run

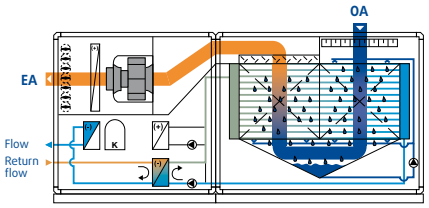
Options

- Conductivity-controlled elutriation control when using softened water
- Hot water extraction, to use waste heat for heating purposes
- Remote maintenance
- And many more

Functional description

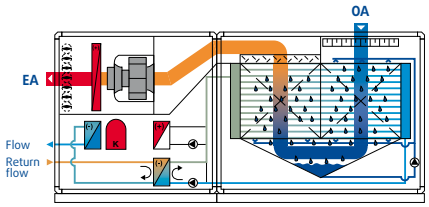
Free and evaporative cooling

At respective low outside air temperatures and humidity, the heat in the process water is dissipated to the outside air. In order to reduce the outside air temperature further and to increase the cooling capacity, evaporative cooling is activated. In an intermediate heat exchanger, the process water is cooled down to the required flow temperature. The cooling capacity is controlled continuously by varying the air volume flow rate.



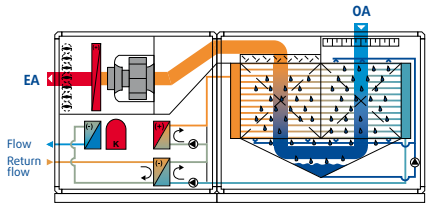
Part-load operation with free and evaporative cooling: Compressor refrigeration system condenses in the exhaust air

When outside air temperature and humidity are rising, the amount of heat that can be dissipated by evaporative cooling will reduce. If the process water in the intermediate heat exchanger can no longer be cooled down to the required flow temperature, after-cooling takes place in the evaporator of the integrated compressor refrigeration system. The heat of condensation from the multi-stage compressor refrigeration system in part-load operation is passed onto the exhaust air.



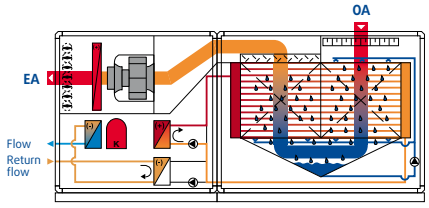
Free and evaporative cooling in operation under load: Compressor refrigeration system condenses in the exhaust air and secondary circuit

When an increasing part of the total cooling performance is carried out by the compressor refrigeration system, the condensation heat can no longer be passed solely onto the exhaust air. A proportion of the water is directed from the secondary circuit downstream of the intermediate heat exchanger to the water-cooled condenser of the compressor refrigeration system in order to discharge the residual heat of condensation. The controller regulates the condensation pressure in order to operate the chilled water with an optimum EER.



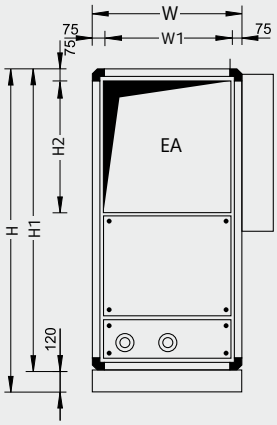
Operation under full load: Cooling by the compressor refrigeration system

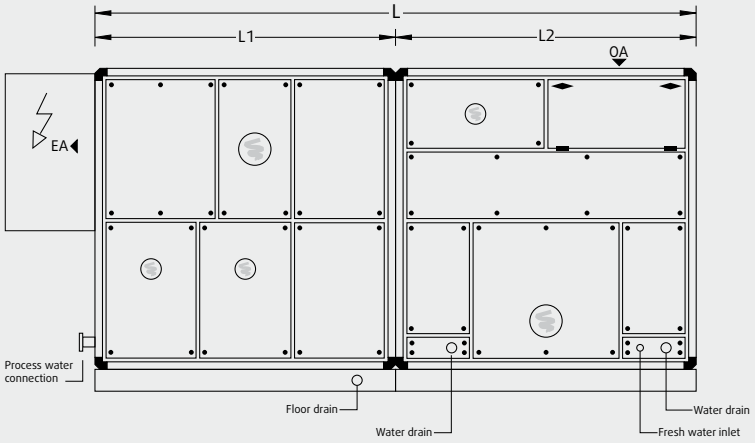
If the water temperature in the secondary circuit is higher than the process water temperature, the total cooling capacity required comes from the compressor refrigeration system. Due to the two-stage condensation heat output in the air condenser (desuperheater) to the exhaust air and in the water condenser to the secondary circuit, only a very low air volume is required. Thanks to the upstream evaporative cooling system, low condensation pressures are achieved, which in return lead to a high EER in the compressor refrigeration system.

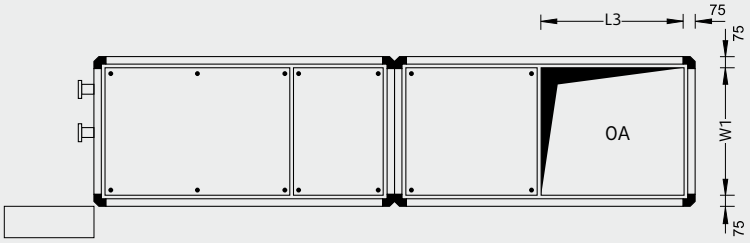


Hybritemp Type 97 and Type 98

System dimensions and weights







Caution! Where units are run in parallel, each unit has a controls cabinet.

Mirror-image design possible.

	Unit Type	L	W[1]	H[2]	L1	L2	L3	W1	H1	H2	Weight	Operating weight
Type 97 efficiency-optimised	97 04 01	3,700	890	1,650	2,010	1,690	900	740	1,530	580	1,300	1,470
	97 05 01	3,700	1,050	1,650	2,010	1,690	900	900	1,530	580	1,500	2,070
	97 06 01	4,340	730	2,310	2,010	2,330	1,220	580	2,190	900	1,800	2,490
	97 10 01	4,500	1,050	2,130	2,170	2,330	1,220	900	2,010	900	2,200	3,250
	97 13 01	4,660	1,370	2,130	2,330	2,330	1,220	1,220	2,010	900	3,000	4,390
	97 16 01	4,820	1,690	2,130	2,490	2,330	1,220	1,540	2,010	900	3,500	5,240
	97 19 01	4,820	2,010	2,130	2,490	2,330	1,220	1,860	2,010	900	4,000	6,110
Type 98 performance-optimised	98 04 01	3,700	890	1,970	2,010	1,690	900	740	1,850	580	1,600	2,070
	98 05 01	3,700	1,050	1,970	2,010	1,690	900	900	1,850	580	1,700	2,270
	98 06 01	4,980	730	2,450	2,650	2,330	1,220	580	2,330	900	2,100	2,800
	98 10 01	4,980	1,050	2,450	2,650	2,330	1,220	900	2,330	900	2,550	3,220
	98 13 01	4,660	1,370	2,450	2,330	2,330	1,220	1,220	2,330	900	3,400	4,830
	98 16 01	4,820	1,690	2,450	2,490	2,330	1,220	1,540	2,330	900	3,900	5,700
	98 19 01	4,820	2,010	2,450	2,490	2,330	1,220	1,860	2,330	900	5,000	7,170

Largest transport unit *

Unit Type	L	W	H[2]	Weight
97 04 01	2,010	890	1,650	770
97 05 01	2,010	1,050	1,650	930
97 06 01	2,330	730	2,310	730
97 10 01	2,330	1,050	2,130	910
97 13 01	2,330	1,370	2,130	1,830
97 16 01	2,490	1,690	2,130	2,140
97 19 01	2,490	2,010	2,130	2,490
98 04 01	2,010	890	1,970	1,030
98 05 01	2,010	1,050	1,970	1,100
98 06 01	2,650	730	2,450	1,300
98 10 01	2,650	1,050	2,450	1,590
98 13 01	2,330	1,370	2,450	2,160
98 16 01	2,490	1,690	2,450	2,500
98 19 01	2,490	2,010	2,450	3,420

Controls cabinet

Unit Type	H x W x D	Position/design
97 04 01	1,600 x 640 x 250	EA side
97 05 01	1,600 x 640 x 250	EA side
97 06 01	1,600 x 640 x 250	EA side
97 10 01	1,600 x 640 x 250	EA side
97 13 01	1,800 x 1,000 x 400	Floor standing cabinet
97 16 01	1,800 x 1,000 x 400	Floor standing cabinet
97 19 01	1,800 x 1,200 x 400	Floor standing cabinet
98 04 01	1,600 x 640 x 250	EA side
98 05 01	1,600 x 640 x 250	EA side
98 06 01	1,800 x 1,000 x 400	Floor standing cabinet
98 10 01	1,800 x 1,000 x 400	Floor standing cabinet
98 13 01	1,800 x 1,000 x 400	Floor standing cabinet
98 16 01	1,800 x 1,200 x 400	Floor standing cabinet
98 19 01	1,800 x 1,200 x 400	Floor standing cabinet

For service work, a clearance corresponding to dimension W is required on the operating side of the unit. If dimension W is smaller than one metre, please leave a clearance of one metre. For service work a clearance at the rear of at least 1.500 mm is required.

Please comply with the dimensions for body size, air duct connections and electrical switch cabinet.

All lengths are given in mm, weights in kg, weight incl. controls cabinet.

1 Door fitting assembly increase unit width by 25 mm each operating side
2 incl. 120 mm base frame
* Further partitioning for smaller apertures possible (at extra cost).

Hybritemp Type 97
efficiency-optimised

Technical specifications and services

Unit Type		97 04 01	97 05 01	97 06 01	97 10 01	97 13 01	97 16 01	97 19 01
Cooling capacity [1, 5]	kW	33 - 48	45 - 64	56 - 81	74 - 106	118 - 168	148 - 217	172 - 247
Refrigeration capacity [2]	ESEER	5.5	5.5	5.5	5.4	5.5	5.5	5.2
Nominal water volume flow rate for process water	m^3/h	5.0	7.0	8.0	11.0	17.0	21.0	25.0
Air volume flow OA-EA	m^3/h	4,400	5,300	6,300	9,500	13,000	16,000	19,000
Rated fan motor input for exhaust air [3]	kW	2.0	2.3	3.3	4.6	6.4	7.6	8.8
Rated pump input	kW	1.3	1.3	1.3	1.3	1.4	1.4	1.6
Filling volume for refrigerant type R407C	kg	10	12	17	22	18	20	23
Number of performance stages		2	2	3	3	4	4	4
Number of cooling circuits		1	1	2	2	2	2	2
Max. current consumption	A	37.6	43.4	61.9	70.8	104.1	150.1	165.0
Operating voltage		3 / N / PE 400 V 50 Hz						
Ext. pressure loss								
Outside air and exhaust air duct	Pa	300	300	300	300	300	300	300
Sound power level [4]								
Outside air vent	dB(A)	66	64	71	67	73	75	71
EA connection	dB(A)	76	74	77	76	79	80	79
Acoustic pressure at a distance of 1 m from the device[4]	dB(A)	58	56	59	58	61	62	61
6° C process water flow								
Total cooling capacity [5]	kW	33.3	45.1	55.7	73.6	117.5	148.3	171.7
Energy Efficiency Ratio	EER	5.0	4.8	4.7	4.9	4.8	4.7	4.5
Rated compressor input	kW	6.7	9.3	11.7	15.1	24.5	31.8	37.9
Alternative process water temperatures								
12° C process water flow								
Total cooling capacity [5]	kW	39.5	53.3	66.5	87.3	139.1	177.5	203.5
Energy Efficiency Ratio	EER	5.6	5.5	5.4	5.5	5.4	5.3	5.1
Rated compressor input	kW	7.0	9.6	12.3	15.8	25.6	33.3	39.8
18° C process water flow								
Total cooling capacity [5]	kW	47.8	64.4	81.4	106.0	168.4	217.2	246.6
Energy Efficiency Ratio	EER	6.5	6.4	6.2	6.3	6.2	6.1	5.8
Rated compressor input	kW	7.4	10.0	13.3	16.9	27.2	35.4	42.6
Connections								
Clean water connection [6, 7]	DN	15	15	20	20	20	20	20
Slurry drain	DN	50	50	80	80	80	80	80
Water drain	DN	25	25	25	32	32	40	40
Floor drains	DN	40	40	40	40	40	40	40
Process water flange	DN	50	50	50	65	80	80	80
Pressure loss process water	kPa	80	80	80	80	80	80	80

Technical data specified refer to nominal volume flow rate at 6° C flow temperature and outside air conditions 32° C 40% r.h., unless otherwise specified

Please seek approval of technical data and specifications prior to start of the planning process.

1 dependent on flow/return temperature and water flow rate
2 at flow = 6° C
3 with average filter contamination
4 at 250 Hz mid-band frequency
5 at OA = 32° C; 40% r.h.
6 2 bar system pressure required at 25 l/min flow rate
7 water quality of make-up water corresponds to VDI 3803 table B2 with a bacteria count < 100 CFU/ml, water hardness range "soft".

Hybritemp Type 98
performance-optimised

Technical specifications and services

Unit Type		98 04 01	98 0501	98 06 01	98 10 01	98 13 01	98 16 01	98 19 01
Cooling capacity [1, 5]	kW	65 - 93	79 - 112	102 - 145	133 - 189	196 - 278	244 - 350	319 - 455
Refrigeration capacity [2]	ESEER	4.7	4.7	4.7	5.0	4.9	5.1	4.9
Nominal water volume flow rate for process water	m^3/h	10.0	12.0	15.0	20.0	29.0	36.0	45.0
Air volume flow OA-EA	m^3/h	4,400	5,300	6,300	9,500	13,000	16,000	19,000
Rated fan motor input for exhaust air [3]	kW	2.0	2.3	3.5	4.8	6.6	7.8	9.2
Rated pump input	kW	1.3	1.3	1.3	1.3	2.2	1.4	1.6
Filling volume for refrigerant type R407C	kg	9	16	25	45	55	60	85
Number of performance stages		2	2	2	2	3	3	4
Number of cooling circuits		1						
Max. current consumption	A	58.6	79.6	97.8	121.0	183.7	213.6	279.0
Operating voltage		3 / N / PE 400 V 50 Hz						
Ext. pressure losses								
Outside air and exhaust air duct	Pa	300	300	300	300	300	300	300
Sound power level [4]								
Outside air vent	dB(A)	66	64	71	68	73	76	72
EA connection	dB(A)	76	74	78	77	80	81	79
Acoustic pressure at a distance of 1 m from the device[4]	dB(A)	58	56	60	59	62	63	61
6° C process water flow								
Total cooling capacity [5]	kW	65.0	78.8	102.4	132.9	195.8	244.4	318.5
Energy Efficiency Ratio	EER	3.5	3.6	3.4	3.8	3.6	3.8	3.6
Rated compressor input	kW	18.6	21.9	29.7	35.0	53.9	64.4	88.9
Alternative process water temperatures								
12° C process water flow								
Total cooling capacity [5]	kW	76.8	93.0	120.4	156.9	231.0	289.3	376.5
Energy Efficiency Ratio	EER	3.9	4.0	3.8	4.2	4.0	4.2	4.0
Rated compressor input	kW	19.5	23.1	31.6	37.1	57.1	68.3	94.3
18° C process water flow								
Total cooling capacity [5]	kW	92.7	111.9	144.7	189.3	278.4	350.4	455.4
Energy Efficiency Ratio	EER	4.5	4.5	4.3	4.8	4.5	4.8	4.5
Rated compressor input	kW	20.6	24.7	34.0	39.8	61.4	73.5	101.6
Connections								
Clean water connection [6, 7]	DN	15	15	15	15	15	20	20
Slurry drain	DN	50	50	80	80	80	80	80
Water drain	DN	25	25	25	32	32	40	40
Floor drains	DN	40	40	40	40	40	40	40
Process water flange	DN	50	50	50	65	80	80	100
Pressure loss process water	kPa	80	80	80	80	80	80	80

Technical data specified refer to nominal volume flow rate at 6° C flow temperature and outside air conditions 32° C 40% r.h., unless otherwise specified

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1 dependent on flow/return temperature and water flow rate
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4 at 250 Hz mid-band frequency
5 at OA = 32° C; 40% r.h.
6 2 bar system pressure required at 25 l/min flow rate
7 water quality of make-up water corresponds to VDI 3803 table B2 with a bacteria count < 100 CFU/ml, water hardness range "soft".