

Cooling of rooms with high thermal loading by means of indirect free cooling, "adiabatic" evaporative cooling, and an output-regulated compressor refrigeration system



Automatically selects the most economical operating mode!

Adcoolair 75

TOTAL COOLING CAPACITY: 11.1 kW – 226.6 kW



Adcoolair 75 13 01 - simplified illustration

At a glance:

- ▶ **Efficient cooling through the use of natural resources**
- ▶ **Compact dimensions, optimised for installation in plant rooms without an additional cooling tower**
- ▶ **Reliable cooling, even when outside temperatures are very high**
- ▶ **No contamination of the process airflow with dust or corrosive pollutants**
- ▶ **Moisture content of the process air remains unaffected**
- ▶ **Low airflow rate required for heat dissipation**
- ▶ **Excellent PUE values of up to 1.1**
- ▶ **Integrated control and regulation system, compatible with all conventional building management systems**

Thanks to the combination of indirect free cooling, "adiabatic" evaporative cooling and the integrated output-regulated compressor refrigeration system, each of which supports the effectiveness of the others, the Adcoolair 75 unit series allows heat dissipation in recirculation mode from data processing centres and other rooms with high thermal loads, with minimal space requirements, low air pressure drops within the unit and very little energy

consumption. The use of energy-efficient EC fan units, in combination with a demand-based flow rate control system, additionally contributes to the reduction of operating costs. The Adcoolair 75 unit series is optimally adapted to high return air temperatures. The combination of first-class components with precise control and regulation systems guarantees economical operation at all times.

Further performance parameters and options:

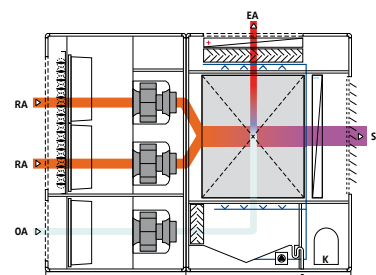
- Highest electrical efficiency, as all components are designed for minimal pressure losses
 - Energy-saving EC fans
 - Corrosion-free cross counterflow plate heat exchanger made from polypropylene
 - Oil sump heater that can be switched off
 - Use of electronic expansion valves
 - Filtering the air in any operating mode
 - Individually controllable performance parameters
 - Complete unit, ready to connect, contains all structural elements for recirc air cooling, including all control and regulation fittings
 - Intensive quality inspection with factory test run
- Options
- Integrated exhaust air/outside air bypass to avoid formation of condensate at low outside temperatures
 - Hot water extraction, to use waste heat for heating purposes
 - Pumped chilled water cooling coil instead of integrated compressor refrigeration system
 - Outdoor installation
 - Remote maintenance
 - And many more

Functional description

Indirect free cooling at low outside air temperatures

The warm process air from the room with high thermal loads is drawn in via the return air fan and through an asymmetrical cross-counterflow recuperator. In order to extract the heat from the process air. The outside air is passed through the recuperator in a second air flow path, physically separate from the process air. The process air is cooled down in the recuperator

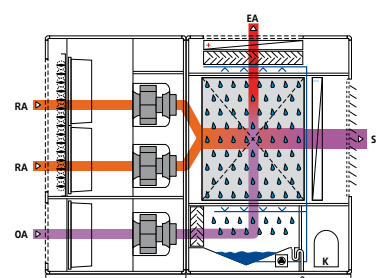
through the cooling potential of the outside air. The outside air is variably adjusted, depending on the outside air temperature: with lower outside air temperature, the volume flow rate is reduced. The use of "adiabatic" evaporative cooling and the compressor refrigeration system is not required at that stage.



Adiabatic mode at moderate outside air temperatures

The process air is cooled down using indirect "adiabatic" evaporative cooling. The use of the compressor refrigeration system is not yet required. Even at low outside temperatures, heat exchange can take place using "adiabatic" humidification.

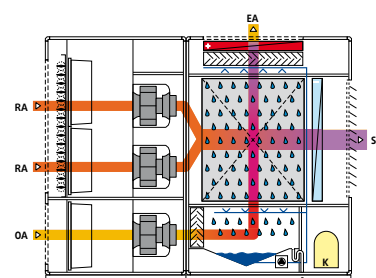
As a result of this, the OA/EA volume flow rate dissipating the heat can be kept low, and this reduces the power consumption of the fan/motor unit.



Operation at high outside temperatures

In summertime conditions at very high outside air temperatures and in addition to the "adiabatic" evaporative cooling, the compressor refrigeration system with output-controlled scroll compressors is activated. In the first stage, the outside air is humidified and then cooled through the evaporation of the water. The cooled outside air indirectly extracts heat from the warm process air in the recuperator. Thus, the process air is significantly cooled, but not humidified. In the second stage, the downstream evaporator is used to cool the process

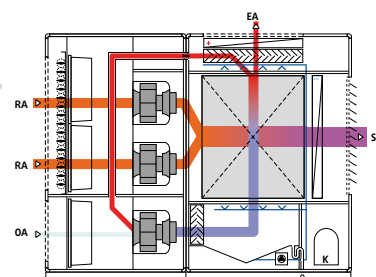
air to the desired supply air temperature. The heat extracted from the process air is transferred to the exhaust air. As the "adiabatic" evaporative cooling delivers approximately 50% of the required refrigeration capacity, the continuously adjustable compressor refrigeration system is correspondingly dimensioned for approximately 50% of the total cooling capacity. This allows the lowest possible pressure losses to be maintained at the evaporator and condenser.



Optional: EA/OA bypass

In order to prevent dehumidification of the process air, the outside air can be preheated by means of an integrated

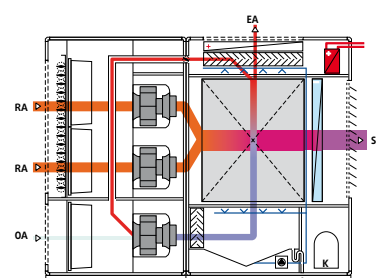
EA/OA bypass. This prevents condensation of the return air humidity in the recuperator.



Optional: Warm water condenser

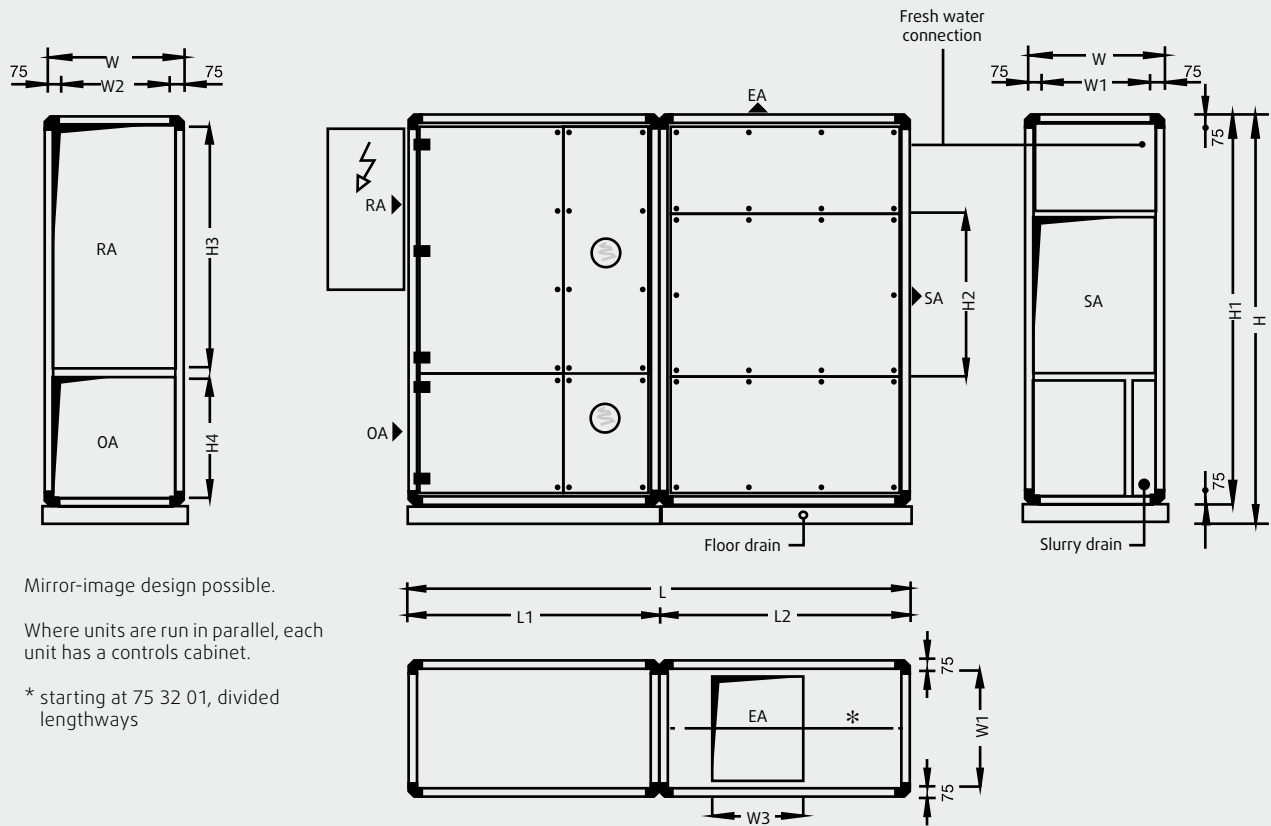
Via a warm water condenser, the heat extracted from the process air at the evaporator can be used for heating or hot process water. The integrated compressor refrigeration system operates as

a heat pump in this mode. The control system ensures that the heat pump is primarily used when heat is required.



Adcoolair Type 75

System dimensions and weights



Unit type	L	W ¹	H ²	L1	L2	W1	W2	W3	H1	H2	H3	H4	Weight
75 02 01	2,900	730	2,130	1,370	1,530	580	580	580	2,010	740	1,220	580	1,020
75 04 01	2,900	1,050	2,130	1,370	1,530	900	900	580	2,010	740	1,220	580	1,240
75 06 01	2,900	1,370	2,130	1,370	1,530	1,220	1,220	580	2,010	740	1,220	580	1,430
75 08 01	3,380	1,050	2,770	1,690	1,690	900	900	940	2,650	1,220	1,540	900	1,490
75 13 01	3,380	1,370	2,770	1,690	1,690	1,220	1,220	940	2,650	1,220	1,540	900	1,800
75 22 01	3,380	2,650	2,770	1,690	1,690	2,500	2,500	940	2,650	1,220	1,540	900	2,660
75 32 01	4,020	3,060	3,250	1,850	2,170	2 x 1,380	2,910	1,300	3,130	1,540	2,020	900	4,180
75 42 01	4,020	4,020	3,250	1,850	2,170	2 x 1,860	3,870	1,300	3,130	1,540	2,020	900	5,360
75 52 01	4,020	4,660	3,250	1,850	2,170	2 x 2,180	4,510	1,300	3,130	1,540	2,020	900	6,170

Largest transport unit

Unit Type	L	W	H ²	Weight
75 02 01	1,530	730	2,130	600
75 04 01	1,530	1,050	2,130	720
75 06 01	1,530	1,370	2,130	840
75 08 01	1,690	1,050	2,770	850
75 13 01	1,690	1,370	2,770	1,050
75 22 01	1,690	2,650	2,770	1,500
75 32 01	2,170	3,060	3,250	2,500
75 42 01	2,170	4,020	3,250	3,150
75 52 01	2,170	4,660	3,250	3,630

Controls cabinet

Unit Type	H x W x D	Position at unit
75 02 01	1,120 x 640 x 210	SA/RA side
75 04 01	1,120 x 640 x 210	SA/RA side
75 06 01	1,280 x 640 x 210	SA/RA side
75 08 01	1,280 x 640 x 210	SA/RA side
75 13 01	1,280 x 640 x 210	SA/RA side
75 22 01	1,280 x 640 x 210	SA/RA side
75 32 01	1,280 x 640 x 210	SA/RA side
75 42 01	1,600 x 640 x 210	SA/RA side
75 52 01	1,600 x 640 x 210	SA/RA side

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.

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

Technical specifications and services

Unit Type		75 02 01	75 04 01	75 06 01	75 08 01	75 13 01	75 22 01	75 32 01	75 42 01	75 52 01
Total cooling capacity ¹	kW	11.1	20.9	29.3	36.7	50.7	100.7	146.0	189.9	226.6
Air volume flow process air	m ³ /h	2,200	4,500	6,300	7,900	11,000	22,000	32,000	42,000	50,000
Air volume flow OA-EA	m ³ /h	1,300	2,700	3,800	4,700	6,600	13,200	19,200	25,200	30,000
Energy Efficiency Ratio ²	EER	5.4	7.9	7.6	8.3	8.7	9.3	9.3	9.5	9.9
Total electrical power rating ³	kW	3.0	4.7	6.7	8.1	10.9	19.8	29.2	37.7	46.1
Current consumption ³	A	10.0	14.7	21.3	28.9	33.3	62.0	61.7	86.7	92.2
Operating voltage		3 / N / PE 400 V 50 Hz								
Ext. pressure loss										
Return air and supply air duct	Pa	250	250	250	250	250	250	250	250	250
Outside air and exhaust air duct	Pa	250	250	250	250	250	250	250	250	250
Sound power level ⁴										
Supply air vent	dB(A)	65	65	70	69	69	72	74	75	77
RA connection	dB(A)	64	67	72	71	71	74	76	77	79
Outside air vent	dB(A)	73	70	71	78	70	73	74	74	76
EA connection	dB(A)	76	68	71	77	71	74	72	74	74
Acoustic pressure in 1 m distance from device ⁴	dB(A)	61	54	58	62	58	60	60	62	63
Fan units										
Rated motor input for process air ⁵	kW	0.54	1.20	1.75	2.10	2.84	4.76	7.68	10.28	13.08
Rated motor input for outside air ⁵	kW	0.45	0.83	1.25	1.54	2.02	4.00	5.50	7.11	8.54
SFP category supply air/outside air		2 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3
Evaporative cooling ⁶										
Cooling capacity of "adiabatic" evaporative cooling system	kW	4.6	9.5	13.4	16.7	23.2	45.8	66.2	86.8	103.5
Rated pump input for evaporative cooling	kW	0.64	0.64	0.64	0.64	0.79	0.79	1.58	1.58	1.58
Compressor refrigeration system										
Filling volume for refrigerant type R407C	kg	5.0	7.0	9.0	11.0	17.0	34.0	46.0	70.0	78.0
Rated compressor input	kW	1.4	2.0	3.1	3.8	5.2	10.2	14.4	18.7	21.7
Mechanical cooling capacity	kW	6.5	11.4	15.9	20.0	27.5	54.9	79.8	103.1	123.1
Number of cooling circuits		1	1	1	1	1	1	2	2	2
Number of compressors		1	1	1	1	1	2	2	2	4
Compressor power modulation		single stage	output-controlled scroll compressor 10 - 100%							
Connections										
Clean water connection ⁷	DN	15	15	15	15	15	15	15	15	15
Slurry drain	DN	50	50	50	50	50	50	50	50	50
Floor drain	DN	40	40	40	40	40	40	40	40	40

Specifications of technical data relate to the return air conditions 34°C / 20% r.h., outside air conditions 35°C / 40% r.h., unless otherwise specified

- 1 Evaporative cooling + compressor refrigeration system; SA = 20°C
- 2 Taking into account power consumption for adiabatic pump(s)
- 3 dependent on configuration of measurement and control system/unit
- 4 At 250 Hz mid-band frequency and standard unit housing
- 5 with average filter contamination
- 6 water quality of make-up water corresponds to VDI 3803 table B3 with a bacteria count < 100 CFU/ml, water hardness range "soft".
- 7 2 bar system pressure required at 25 l/min flow rate

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