

# Air-cooled Heat recovery chillers

EWTP110-540MBYN  
*Applied systems*



**R-407C**



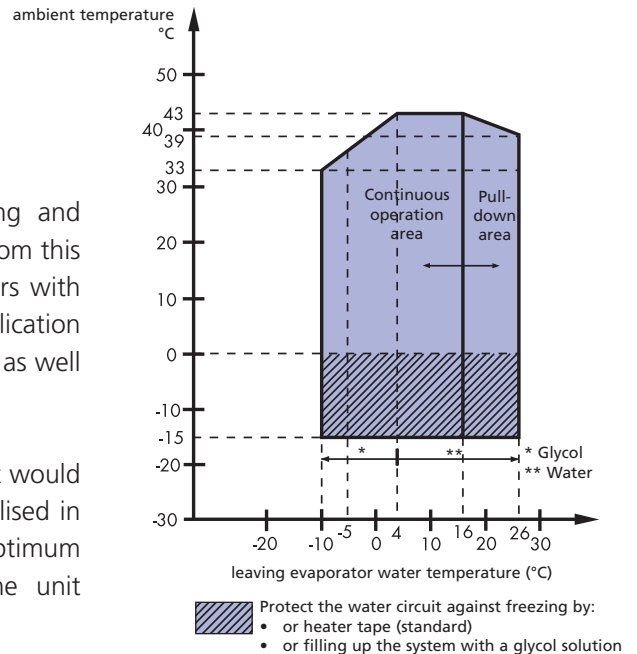
Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intention to become a leader in the provision of environmental friendly products. This challenge demands the eco design and development of a wide range of products and an energy management system; which involves energy conservation and reduction of waste.



## Flexible application

In many applications there often exists a simultaneous cooling and heating demand requirement alongside one another. To benefit from this Daikin offer the full range of R-407C EWTP110-540MBYN chillers with the option of heat recovery. This option further increases the application flexibility and extends possibilities in the hotel and leisure industry as well as the industrial and process sectors.

By energetically recovering useful heat from the cooling cycle that would otherwise be rejected to outside COP's of up to 5.62 can be realised in heat recovery mode. The heat recovery unit aims to achieve an optimum balance between cooling and heat recovery to maximize the unit efficiency and offer savings in hot water production.

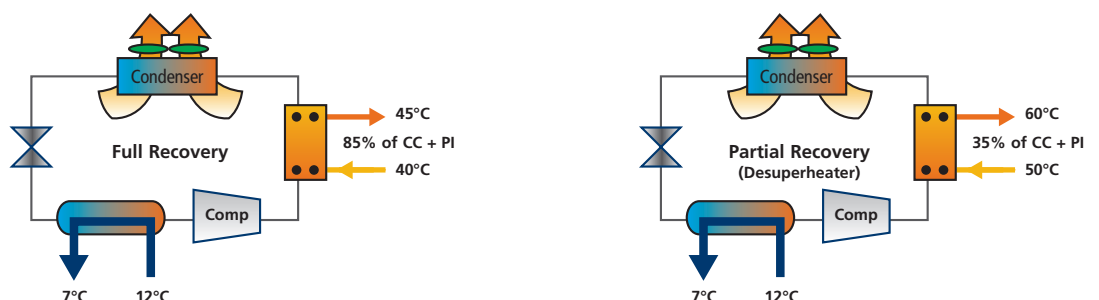


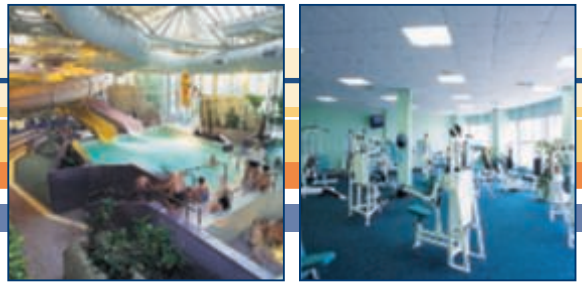
## Heat recovery concept

An additional stainless steel brazed plate heat exchanger is mounted in series between the compressor and air-cooled condenser. Depending on the temperature requirement for the hot water production this exchanger will act either as a desuperheater for partial heat recovery (30%) or as a condenser for full heat recovery (85%).

As a desuperheater the sensible heat from the hot discharge gas will be recovered, while the latent heat exchange will occur in the air-cooled condenser. The units efficiency is maintained as condensing pressure can be reduced due to air-cooled condenser becoming oversized. Hot water temperatures up to 70°C can be achieved.

For full heat recovery both sensible and latent heat exchange will occur in the recovery exchanger. Inverter fans will be used to control the recovery outlet water temperature, by throttling back the airflow and maintaining the required condensing temperature.





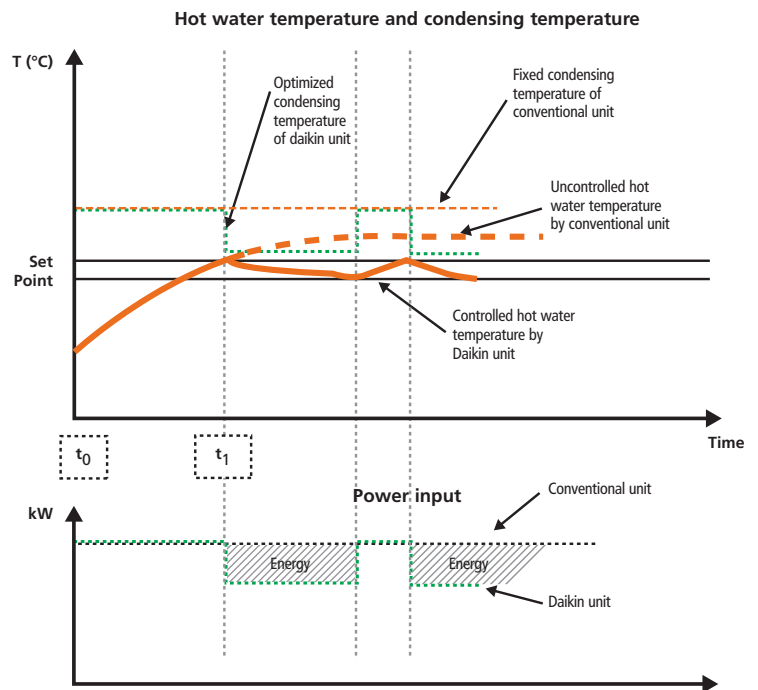
## Heat recovery control

A heat recovery unit must operate at high condensing temperature to have a high amount of heat recovered. Operation at high condensing temperature penalizes chiller efficiency due to the higher power input required.

A conventional unit has no temperature control on the hot water side and will operate at a fixed high condensing temperature. Even during periods of no or low heat request, the unit will remain operating at high condensing pressure. This will reduce the efficiency of the unit a lot.

The Daikin heat recovery unit can be equipped with a control on the hot water temperature. Thanks to its inverter driven fans, it will be able to change its target condensing temperature depending on whether there is heat requested or not. If there is no heat requested, the unit will operate in 'cooling mode' and the condenser fans will run at higher speed as to lower the condensing pressure.

If there is heat requested, the unit will operate in 'heat recovery' mode and the fans will run at lower speed as to achieve a higher condensing temperature. In this way, the condensing pressure is optimized for highest efficiency at all times.



Explanation:

From  $t_0$  to  $t_1$  there is a lot of heat requested. Both the Daikin unit and the conventional unit run at high condensing temperature. In point  $t_1$  the required hot water temperature is reached.

At this moment, the conventional unit will keep however operating at its fixed condensing temperature even if the heat demand is low. The hot water temperature will keep rising until the temperature difference with the condensing temperature is so low that no heat is anymore transferred to the water.

The Daikin unit however will, once the required hot water temperature is reached, reduce its condensing pressure. The power input of the unit is reduced and the water is not unnecessary heated. Compared to the conventional unit, this will result in major energy savings.

## Electronic control

Units fitted with heat recovery are compatible with the Daikin Integrated Chiller Network. DICN enables any 4 chillers of similar or different sizes, to operate simultaneously as if they were a single unit. By giving priority to the heat recovery unit, generation of hot water is reliable at part load conditions.

Thanks to the standard DICN, simultaneous operation of up to 4 chillers is allowed.

This function enables a Daikin 2MW chiller plant to be operated via a single controller.



EWTP-MBYN			110	140	160	200	280	340	400	460	540	
Nominal capacity	cooling	kW	107	138	158	191	274	335	379	449	520	
	cooling during HR	kW	97.7	126	144	171	251	311	337	401	465	
	heat recovery	kW	116	148	176	208	301	377	407	434	441	
Capacity steps		%	30 ~ 100% stepless						15 ~ 100% stepless			
Nominal input	cooling	kW	43.7	54.0	67.0	81.3	113	146	163	197	232	
	heat recovery mode	kW	39.4	47.8	62.4	73.2	103	132	142	177	214	
Heat recovered		%	85	85	85	85	85	85	85	75	65	
Water heat exchanger	evaporator	type	Braze plate heat exchanger, one per circuit									
	heat recovery	type	Braze plate heat exchanger, one per circuit									
Refrigerant circuit	type		R-407C									
	charge	kg	32	46	49	70	110	110	79+79	79+80	80+80	
	control		Thermostatic expansion valve									
	oil type		FVC68D									
	oil charge	l	5.5	5.5	7.5	7.5	10	10	2 x 7.5	7.5 + 10	2 x 10	
Compressor	type		Semi-hermetic single screw compressor									
	no. of circuits/compressors		1/1						2/2			
Air heat exchanger	type		Cross fin coil / Hi-X tubes and chromate waffle louvre fins									
	air flow rate	m <sup>3</sup> /min	960	960	960	1,920	1,920	1,920	2,880	2,880	2,880	
Dimensions	HxWxD	mm	2,250x2,346(2,700)x2,238			2,250x4,280(4,495)x2,238			2,250x5,901x2,238(2,653)			
Machine weight		kg	1,465	1,629	1,723	2,266	2,646	2,727	4,990	5,113	5,236	
Operation weight		kg	1,483	1,654	1,752	2,299	2,692	2,784	5,090	5,220	5,350	
Sound power level		dB(A)	89	94	94	95	96	98	99	99	99	
Casing	material		Polyester painted galvanised steel plate									
	colour		Ivory white / Munsell code 5Y7.5/1									
Piping connections	evaporator water inlet/outlet		Flexible coupling + counterpipe for welding 3"OD			Flexible coupling + counterpipe for welding 3"			Flexible coupling 5"			
	heat recovery condenser inlet/outlet		2" G									
	evaporator water drain		Field installation				1/4" G					
Safety and functional devices		Double PED approved high pressure switches / Low pressure protection / Pressure relief valve / Compressor motor thermal protector / Compressor motor overcurrent relay / Discharge temperature controller / Freeze up protection / Recycling and guard timer / Reverse phase protector										
Operation range	air side	°C	-15°C ~ 43°C									
	water side	°C	-10°C ~ 26°C									
Power supply		YN	3 ~ /400V/50Hz									

- Notes:
- Nominal cooling capacity at Eurovent conditions: evaporator 12°C/7°C; ambient 35°C
  - Nominal cooling power input at Eurovent conditions: evaporator 12°C/7°C; ambient 35°C
  - Minimum required water volume for standard thermostat settings and at nominal conditions
  - Nominal cooling capacity and heat recovery capacity during heat recovery mode according to EN14511
  - Values between brackets including installation space of delivered filter

Option Number	Option description	unit size									Availability	
		110	140	160	200	280	340	400	460	540		
<b>Completely combinable options</b>												
OP03	Dual pressure relief valve	o	o	o	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	Factory mounted
OP12	Suction stop valve	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	o (s)	Factory mounted
OP52	Main isolator switch	o	o	o	o	o	o	o	o	o	o	Factory mounted
OP57	A-meter / V-meter	o	o	o	o	o	o	o	o	o	o	Factory mounted
OPLN	Low noise operation	o	o	o	o	o	o	o	o	o	o	Factory mounted
OPCG	Condenser protection grilles	o	o	o	o	o	o	o	o	o	o	Factory mounted
<b>Available kits</b>												
EKCLWS	Leaving water control sensor for DICN	o	o	o	o	o	o	o	o	o	o	Kit
EKAC200A	BMS card	o	o	o	o	o	o	o	o	o	o	Kit
EKBMSMBA	BMS gateway modbus / j-bus protocol	o	o	o	o	o	o	o	o	o	o	Kit
EKBMSBNA	BMS gateway bacnet protocol	o	o	o	o	o	o	o	o	o	o	Kit
EKRUPC	Remote user interface	o	o	o	o	o	o	o	o	o	o	Kit

To install EKBMSMBA, EKBMSBNA → EKAC200A needs to be installed on the unit  
o available  
(s) option required for Swedish national law SNFS 992:16



Daikin Europe N.V. is approved by LRQA for its Quality Management System in accordance with the ISO9001 standard. ISO9001 pertains to quality assurance regarding design, development, manufacturing as well as to services related to the product.



ISO14001 assures an effective environmental management system in order to help protect human health and the environment from the potential impact of our activities, products and services and to assist in maintaining and improving the quality of the environment.



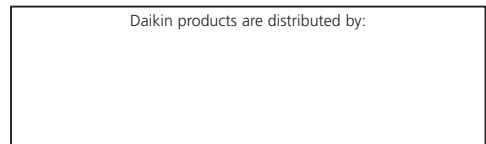
Daikin units comply with the European regulations that guarantee the safety of the product.



Daikin Europe NV participates in the Eurovent Certification Programme for Air Conditioners (AC), Liquid Chilling Packages (LCP) and Fan Coil Units (FC); the certified data of certified models are listed in the Eurovent Directory.

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