

 HiRef



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 HiRef

# Perimeter-mounted units



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>TRF CW</b>	CHILLED WATER	<b>33-257</b> (kW)	<b>8</b>
DATA CENTER INDUSTRIAL			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>CHILLED WATER PERIMETER MOUNTED AIR CONDITIONING UNITS FOR DATA CENTER WITH UNDERFLOOR FANS - SLIM EDITION</b>			
<b>TRF CS</b>	CHILLED WATER	<b>58-242</b> (kW)	<b>10</b>
DATA CENTER			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH UNDERFLOOR FANS</b>			
<b>TRF CF</b>	CHILLED WATER	<b>78-329</b> (kW)	<b>12</b>
DATA CENTER			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS</b>			
<b>NRG A</b>	AIR-AIR	<b>9-147</b> (kW)	<b>14</b>
DATA CENTER INDUSTRIAL			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS</b>			
<b>NRG W/Z</b>	AIR-WATER	Mod. W <b>9-112</b> (kW) Mod. Z <b>10-124</b> (kW)	<b>16</b>
DATA CENTER INDUSTRIAL			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS WITH INDIRECT FREE-COOLING</b>			
<b>NRG F</b>	AIR-WATER	<b>11-99</b> (kW)	<b>18</b>
DATA CENTER INDUSTRIAL			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>DUAL COOLING PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS</b>			
<b>NRG D/K/Q</b>	Mod. D AIR-AIR Mod. Q/K AIR-WATER	Mod. D <b>12-99</b> (kW) Mod. K <b>11-101</b> (kW) Mod. Q <b>13-110</b> (kW)	<b>20</b>
DATA CENTER INDUSTRIAL			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>TRF DX A</b>	AIR-AIR	<b>24-160</b> (kW)	<b>24</b>
DATA CENTER INDUSTRIAL			



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>TRF DX W/Z</b>	AIR-WATER	Mod. W <b>24-165</b> (kW) Mod. Z <b>28-185</b> (kW)	<b>26</b>
DATA CENTER INDUSTRIAL			

Technical data are subject to change without notice. Do not use these data in the design stage.

# Perimeter-mounted units



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH INDIRECT FREE-COOLING</b>			
<b>TRF DX F</b>	DATA CENTER	AIR-WATER	23-150 (kW)
	INDUSTRIAL		
			<b>28</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>DUAL COOLING PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>TRF DX D/K/Q</b>	DATA CENTER	Mod. D AIR-AIR	Mod. D 23-149 (kW)
	INDUSTRIAL	Mod. Q/K AIR-WATER	Mod. K 23-152 (kW)
			Mod. Q 27-170 (kW)
			<b>30</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>JREF CW Radial</b>	DATA CENTER	CHILLED WATER	15-33 (kW)
	INDUSTRIAL		
			<b>34</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>JREF DX A Radial</b>	DATA CENTER	AIR-AIR	7-25 (kW)
	INDUSTRIAL		
			<b>36</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>JREF DX W/Z Radial</b>	DATA CENTER	AIR-WATER	Mod. W 7-24 (kW)
	INDUSTRIAL		Mod. Z 7-27 (kW)
			<b>38</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>JREF CW Centrifugal</b>	DATA CENTER	CHILLED WATER	7-24 (kW)
	INDUSTRIAL		
			<b>40</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>JREF DX A Centrifugal</b>	DATA CENTER	AIR-AIR	7-24 (kW)
	INDUSTRIAL		
			<b>42</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS</b>			
<b>JREF DX W/Z Centrifugal</b>	DATA CENTER	AIR-WATER	Mod. W 7-24 (kW)
	INDUSTRIAL		Mod. Z 7-28 (kW)
			<b>44</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	PAGE
<b>FANWALL AIR CONDITIONERS CHILLED WATER OR DIRECT EXPANSION VERSIONS FOR HIGH DENSITY HYPERSCALE DATA CENTER</b>			
<b>FANWALL</b>	DATA CENTER	CHILLED WATER	45-461 (kW)
			<b>46</b>

Technical data are subject to change without notice. Do not use these data in the design stage.

# Perimeter-mounted units



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	
<b>CHILLED WATER UNITS FOR MEDIUM/SMALL SERVER ROOMS</b>			
<b>HTI CW</b>	DATA CENTER	CHILLED WATER	8-45 (kW)
	INDUSTRIAL		
			PAGE <b>48</b>

# Evaporative air conditioner air-to-air



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	
<b>AIR/AIR SYSTEMS FOR DATA CENTERS WITH ADIABATIC SYSTEM</b>			
<b>DataBatic</b>	DATA CENTER	CHILLED WATER AIR-AIR	10-330 (kW)
			PAGE <b>52</b>

# High Density Cooling



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	
<b>DIRECT EXPANSION AIR CONDITIONERS FOR HIGH DENSITY RACKS WITH MODULATING COMPRESSORS</b>			
<b>NRCD/NRCV</b>	DATA CENTER	AIR-AIR	Mod. NRCD 12-50 (kW)
			Mod. NRCV 13-37 (kW)
			PAGE <b>56</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	
<b>CHILLED WATER AIR CONDITIONING UNITS FOR HIGH POWER DENSITY RACKS</b>			
<b>HRCC</b>	DATA CENTER	CHILLED WATER	20-57 (kW)
			PAGE <b>58</b>



APPLICATION	SYSTEM TYPE	COOLING CAPACITY	
<b>MINI RACK COOLER FOR HIGH DENSITY SYSTEM</b>			
<b>MRAC CW/DX</b>	DATA CENTER	CHILLED WATER AIR-AIR	Mod. MRACK CW 3-5 (kW)
			Mod. MRACK DX 7-8 (kW)
			PAGE <b>60</b>





# **PERIMETER- MOUNTED UNITS**

# Platform TRF Evolution

## Inspired by the best of TREF Revolutionary design

**Efficiency, flexibility, reduced footprint, optimization of internal layout**

**TRF Evolution** is the new family of HiRef **perimeter-mounted cabinets** designed for data centre air conditioning. It brings together in a single and revolutionary family the many product ranges already on offer, from chilled-water to direct expansion units. Units of the TRF Evolution platform have everything needed to provide the **most efficient** Data Center cooling solution, ensuring **reliability, precise control** of thermo-hygrometric conditions and the **flexibility to adapt** to different working conditions. The depth has been increased to 890 mm and 960 mm, with a finned-coil exchanger

30% larger in the NRG and TRF DX versions and 16% larger in the TRF CW, compared to the units of previous generations. There is a rise in specific capacity (kW/Sq.m) and efficiency, thanks to a next-generation fan that **increases performance by 15%**. Each HiRef unit is also customizable in the co-design phase with the client or the designer, depending on the specific application, **making solutions modular and more efficient on a case-by-case basis**.



### CHILLED WATER

Chilled water units are available in several configurations and versions:

- **broad range of cooling capacity:** from 40 kW for TRF CW units to 350 kW for TRF CF units;
- **air flow:** several air flow configurations for the TRF CW models and fan module configurations for the TRF CS and TRF CF units are possible;

- **hydraulic circuit:** the configurations A, B and C have been developed to be able to choose the best option for the Data Center's actual operating conditions:

#### Geometry "A"

Designed to work with high water flow rates and  $\Delta T = 5^{\circ}\text{C}$ . Ideal for existing solutions

#### Geometry "B"

Designed to work with moderate water flow rates and  $\Delta T = 8^{\circ}\text{C}$ . Ideal for next-generation Data Centers

#### Geometry "C"

Designed to work with low water flow rates and  $\Delta T = 12^{\circ}\text{C}$ . Ideal for the very latest Data Centers

### Adjustment

All TRF units are fitted with **water flow control valves**. In addition to the 2- or 3-way modulating valves, pressure-independent regulating valves can be fitted on request. These offer a host of benefits, including reduced commissioning costs, greater accuracy and stability in regulating cooling capacity.

Flexibility

Efficiency

Optimization  
of internal layout

Reduced  
footprint



## NRG

PERIMETER MOUNTED UNITS  
FOR DATA CENTRES  
WITH MODULATING COMPRESSORS



## TRF DX

PERIMETER MOUNTED UNITS  
FOR DATA CENTRES  
WITH ON-OFF COMPRESSORS



## TRF CW

CHILLED WATER  
PERIMETER-MOUNTED UNITS  
FOR DATA CENTERS



## TRF CS

CHILLED WATER  
PERIMETER-MOUNTED  
CONDITIONERS FOR  
DATA CENTERS WITH  
FANS - SLIM EDITION



## TRF CF

CHILLED WATER  
PERIMETER-MOUNTED  
CONDITIONERS FOR  
DATA CENTERS WITH  
UNDERFLOOR FANS

### Direct expansion

The TRF Evolution product family also includes the TRF DX and NRG **direct expansion** ranges: the former mounts on-off compressors on the whole range, the latter **inverter-driven modulating compressors**. The use of inverter technology allows the units in the NRG range to take their place among the **most energy-efficient and high-precision air-conditioning solutions**.

Depending on system requirements, it is possible to choose between an air- or water-cooled condensing unit during the offer phase. With **Dual Cooling** complete **redundancy** is possible thanks to the additional chilled water coil. Finally, with the **indirect water Free-Cooling** version, **energy consumption** can be minimized, taking advantage of low room temperatures to chill water without using the compressor.

Platform **TRF Evolution**

# TRF CW

DATA CENTER

INDUSTRIAL

## CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS

33.4–257.1 kW

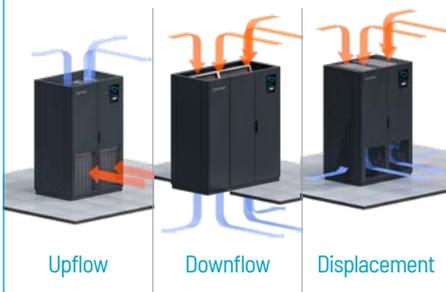


MULTI-PROTOCOL COMMUNICATION INTERFACE	EC RADIAL FANS	MODBUS CONTROLLED FANS	PRESSURE INDEPENDENT VALVE (PICV)
FAST RESTART	ON-BOARD HUMIDIFIER	VARIABLE GEOMETRY COIL (FLEXY)	DOUBLE CIRCUIT

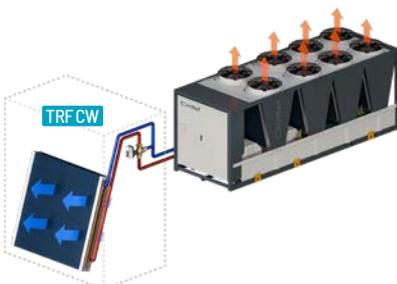


The new chilled water air conditioners of the TRF CW series are particularly suitable for IT facilities where **temperature and air flow need to be continuously monitored**. The components of the TRF CW unit offer the most efficient solution for **Data Center cooling**, ensuring **reliability, precise control of thermo-hygrometric conditions** and the **flexibility** to adapt to different working conditions.

### AIRFLOW CONFIGURATIONS



### CHILLED WATER



### Easier scheduled maintenance

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards**.



### Ventilation adjustment

Depending on the air distribution logic in the server room, it is possible to adjust the machine on-board ventilation system to ensure a **constant air flow rate** (air flow control) or a **constant available overpressure** ( $\Delta P$  control). The latter is particularly useful if a floating floor is used.

### Double circuit

Chilled water units are also available with a double circuit. In this version, the supply is via **two different hydraulic circuits** that can offer the **utmost operational continuity if one of the two circuits malfunctions**. Each circuit is equipped with a regulating valve.

- Temperature control through heating and post-heating systems using electric heating elements, additional hot water coil or both
- Humidity control through dehumidification and humidification (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Hydraulic connections from the bottom of the unit
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Double panelling only on the front doors or on the whole machine (optional)
- Instant reading of water flow rate, water inlet and outlet temperatures, or supplied cooling capacity (optional)



**Finned pack coil with hydrophilic coating**

All models in the TRF CW range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



**Accurate regulation with multiple types of valves**

All units in the TRF CW range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system or with servo motor with spring return. Pressure-independent valves can also be fitted on request. All these types of valves **ensure the utmost adjustment accuracy while maintaining the system's hydronic balance.**



**New design: efficiency, flexibility and optimization of internal layout**

Internal spaces have been completely redesigned for **a better distribution of components.** The new internal layout features a larger pack heat exchanger and a state-of-the-art fan for **maximum air flow and efficiency.** Following a **painstaking dynamic fluid study,** the filtering surface has also been expanded, now it is distributed over the entire coil **to further reduce air pressure drops.**



**Ventilation EC 2.0**

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant ΔP and ΔT. Their accurate adjustment allows **an efficient use of power for ventilation and a consequent reduction of the system's PUE.** The speed, with extended range, is adjusted via the Modbus protocol. Finally, the "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions.**



**Guaranteed flexibility**

With three different types of heat exchangers, each optimised to a specific water ΔT value (difference in water temperature between inlet/outlet), we ensure **high flexibility in adapting to the system or liquid chillers already in operation,** without compromising cooling performance:

- **Geometry A** for ΔT = 5°C
- **Geometry B** or ΔT = 8°C
- **Geometry C** for ΔT = 12°C

TRF CW		040	060	070	080	090	100	110	130	170	240
<b>Version A</b>		<b>Air temperature 24°C - Relative humidity 50% / Water temperature In 7°C Out 12°C</b>									
Cooling capacity	kW	38.1	58	64.4	80.8	85.3	105.5	103.1	137.2	177.2	257.1
SHR		0.86	0.79	0.82	0.78	0.81	0.77	0.83	0.77	0.77	0.74
EER		31.07	39.97	33.28	37.31	34.93	40.41	33.65	40.43	36.02	34.82
<b>Version A</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>									
Cooling capacity	kW	43.3	59.6	67.9	80.8	89.9	104	112.3	133.7	172.7	236.3
SHR		1	0.99	1	0.99	1	0.97	1	0.99	0.99	0.94
EER		35.36	41.06	35.05	37.33	36.82	39.84	36.66	39.41	35.11	32.01
<b>Version B</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 18°C</b>									
Cooling capacity	kW	38.9	55.2	63.3	74.8	82.4	98.4	104.8	126.3	163.1	229.5
SHR		1	1	1	1	1	1	1	1	1	0.96
EER		31.69	38	32.69	34.54	33.73	37.69	34.19	37.2	33.15	31.08
<b>Version C</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 22°C</b>									
Cooling capacity	kW	33.4	49.8	54.4	67.5	73.2	87.6	90.1	111.8	144.4	210.2
SHR		1	1	1	1	1	1	1	1	1	1
EER		27.23	34.32	28.1	31.2	30	33.55	29.39	32.94	29.35	28.47
<b>Version A</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>									
Cooling capacity	kW	43.7	58.6	68.2	80.2	89.3	102.3	112.9	133.9	172.9	237.5
SHR		1	1	1	1	1	1	1	1	1	1
EER		35.65	40.36	35.22	37.03	36.57	39.16	36.84	39.46	35.16	32.17
<b>Version B</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 23°C</b>									
Cooling capacity	kW	39.1	55	63.4	75.3	82.4	98.1	104.9	125.9	162.6	228.4
SHR		1	1	1	1	1	1	1	1	1	1
EER		31.89	37.91	32.74	34.8	33.74	37.56	34.24	37.1	33.06	30.94
<b>Version C</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 27°C</b>									
Cooling capacity	kW	33.9	50.1	56.5	67.9	73.9	87.9	91	112.3	145.1	210.6
SHR		1	1	1	1	1	1	1	1	1	1
EER		27.67	34.49	29.17	31.35	30.24	33.68	29.7	33.1	29.49	28.52
<b>Rated air flow</b>	m <sup>3</sup> /h	10700	10700	14500	14500	18000	18000	24000	24000	18000	31000
<b>Total fan absorbed power</b>	kW	1.2	1.5	1.9	2.2	2.4	2.6	3.1	3.4	4.9	7.4
<b>Lp @ Nominal rpm ; dist.= 2 m Q=2</b>	dB(A)	61		67		72		66	67	72	71
<b>Dimensions Mod. "D" (Downflow)</b> [LxHxD]	mm	1010x2000x890		1270x2000x890		1760x2000x890		2020x2000x890		2510x2000x890	3160x2000x960
<b>Power supply</b>	V/ph/Hz	400/3+N/50									

Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Units also available in the models Upflow and Displacement, with the exception of size 240. | Height of model Displacement 2250 mm.

Platform **TRF Evolution**

**DATA CENTER**

# TRF CS

## CHILLED WATER PERIMETER MOUNTED AIR CONDITIONING UNITS FOR DATA CENTER WITH UNDERFLOOR FANS - SLIM EDITION

58.2-242.4 kW

 MULTI-PROTOCOL COMMUNICATION INTERFACE	 EC RADIAL FANS
 MODBUS CONTROLLED FANS	 PRESSURE INDEPENDENT VALVE (PIV)
 FAST RESTART	 ON-BOARD HUMIDIFIER
 VARIABLE GEOMETRY COIL (FLEYX)	 DOUBLE CIRCUIT



TRF CS is the range of chilled-water air conditioners for high power density computer rooms. The fans of the TRF CS units are positioned in separate housing (so-called FREE FAN solution), to increase the overall cooling capacity of the unit, but not to the detriment of the depth, which remains 890 mm. Great care has gone into every detail, in order to minimize air flow pressure drops and energy consumption of the fans, the only electrical load present in the machine.

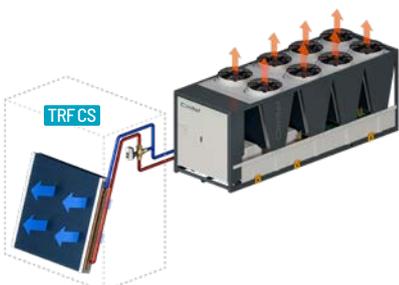


### FREE FAN solution

The FREE FAN solution with the fans mounted in separate housing **free up space inside the unit and thus increases the surface area of the coil**. This results in both an **increase in air flow and cooling capacity and a reduction in air pressure drops**. The FREE FAN solution increases the refrigerating power of the entire range.

- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Hydraulic connections from the bottom of the unit
- Broad choice of accessories, including plenums for ducting, plenums for direct Free-Cooling
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Double panelling only on the front doors or on the whole machine (optional)
- Instant reading of water flow rate, water inlet and outlet temperatures, or supplied cooling capacity (optional)

### CHILLED WATER



### AIRFLOW CONFIGURATIONS





**Ventilation EC 2.0**

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant  $\Delta P$  and  $\Delta T$ . Their accurate adjustment allows **an efficient use of power for ventilation and a consequent reduction of the system's PUE**. Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions**.



**Accurate regulation with multiple types of valves**

All units in the TRF CS range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system or with servo motor with spring return. Pressure-independent valves can also be fitted on request. All these types of valves **ensure the utmost adjustment accuracy while maintaining the system's hydronic balance**.



**Ventilation adjustment**

Depending on the air distribution logic in the server room, it is possible to adjust the machine on-board ventilation system to ensure a **constant air flow rate** (airflow control) or a **constant available overpressure** ( $\Delta P$  control). The latter is particularly useful if a floating floor is used.



**Finned pack coil with hydrophilic coating**

All models in the TRF CS range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit**.

**Double circuit**

Chilled water units are also available with a double circuit. In this version the supply is **via two different hydraulic circuits** that can offer the **utmost operational continuity if one of the two circuits malfunctions**. Each circuit is equipped with a regulating valve



**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards**.

TRF CS		045	055	065	075	150	180	200	210	
<b>Version A</b>		<b>Air temperature 24°C - Relative humidity 50% / Water temperature In 7°C Out 12°C</b>								
Cooling capacity	kW	68.9	81.8	104.7	131.2	165.3	200.5	-	-	
SHR		0.82	0.8	0.82	0.78	0.8	0.78	-	-	
EER		26.92	29.21	31.38	35.17	35.68	38.28	-	-	
<b>Version A</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>								
Cooling capacity	kW	72.6	84.8	110.2	131.2	172.3	200.6	-	-	
SHR		1	1	1	0.99	1	0.99	-	-	
EER		28.35	30.26	33.05	35.19	37.19	38.29	-	-	
<b>Version B</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 18°C</b>								
Cooling capacity	kW	66	79.9	102.8	121.4	157.2	189.4	205.2	242.4	
SHR		1	1	1	1	1	1	1	1	
EER		25.81	28.53	30.82	32.56	33.93	36.15	29.64	31.42	
<b>Version C</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 22°C</b>								
Cooling capacity	kW	58.2	70.6	88.4	109.7	135.1	167.7	176.4	218.9	
SHR		1	1	1	1	1	1	1	1	
EER		22.73	25.2	26.5	29.41	29.17	32	25.48	28.38	
<b>Version A</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>								
Cooling capacity	kW	72.9	84.9	110.8	130.2	173	199	-	-	
SHR		1	1	1	1	1	1	-	-	
EER		28.49	30.3	33.21	34.91	37.35	37.98	-	-	
<b>Version B</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 23°C</b>								
Cooling capacity	kW	67.8	79.7	103	121.2	157.4	188.9	205.5	241.8	
SHR		1	1	1	1	1	1	1	1	
EER		26.48	28.47	30.87	32.49	33.98	36.05	29.69	31.35	
<b>Version C</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 27°C</b>								
Cooling capacity	kW	58.8	71	89.3	110.2	136.5	168.5	178.2	220	
SHR		1	1	1	1	1	1	1	1	
EER		22.97	25.33	26.77	29.55	29.47	32.16	25.75	28.52	
<b>Rated air flow</b>	m <sup>3</sup> /h	15500	15500	23550	23550	36000	36000	47000	47000	
<b>Total fan absorbed power</b>	kW	2.6	2.8	3.3	3.7	4.6	5.2	6.9	7.7	
<b>Lp @ Nominal rpm ; dist.= 2 m Q=2</b>	dB(A)	69		66	67	68		69	70	
<b>Dimensions [LxHxD]</b>	mm	1270x2000x890		1760x2000x890		2510x2000x890		3160x2000x890		
<b>Power supply</b>	V/ph/Hz	400/3+N/50								

Also available with 60 Hz power supply. | Minimum height with fanmodule 2550 mm.



**Extended filter section**

Air filters, located on the entire surface of the coil, **maximize the filtering section and minimize the unit's air pressure drops**.



Platform **TRF Evolution**

# TRF CF

**DATA CENTER**

## CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH UNDERFLOOR FANS

77.6–329.2 kW



MULTI-PROTOCOL COMMUNICATION INTERFACE	EC RADIAL FANS
MODBUS CONTROLLED FANS	PRESSURE INDEPENDENT VALVE (PIV)
FAST RESTART	ON-BOARD HUMIDIFIER
VARIABLE GEOMETRY COIL (FLEXY)	DOUBLE CIRCUIT

TRF CF is the range of chilled-water air conditioners for computer rooms **with very high power density**. As for the TRF CS range, the fans are mounted in separate housing, but in addition units are **equipped with two chilled water batteries**. With these solutions the **cooling capacity is maximized**, at the same depth of 960 mm. In-depth fluid dynamic analysis has resulted in the meticulous design of every last constructive detail **to minimise air pressure drops and fan power consumption**, the only power load in the machine.

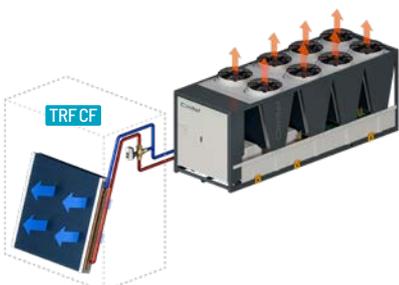


### FREE FAN solution

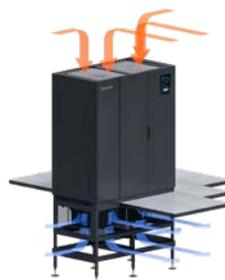
The FREE FAN solution with the fans mounted in separate housing frees up space inside the unit and thus **increases the surface area of the coil**. This results in both an **increase in air flow and cooling capacity and a reduction in air pressure drops**. The **FREE FAN solution increases the refrigerating power of the entire range**.

- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Hydraulic connections from the bottom of the unit
- Broad choice of accessories, including plenums for ducting, plenums for direct Free-Cooling
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Double panelling only on the front doors or on the whole machine (optional)
- Instant reading of water flow rate, water inlet and outlet temperatures, or supplied cooling capacity (optional)

### CHILLED WATER



### AIRFLOW CONFIGURATIONS





### Ventilation EC 2.0

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant  $\Delta P$  and  $\Delta T$ . Their accurate adjustment allows an **efficient use of power for ventilation and a consequent reduction of the system's PUE**. Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions**.



### Accurate regulation with multiple types of valves

All units in the TRF CS range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system or with servo motor with spring return. Pressure-independent valves can also be fitted on request. All these types of valves **ensure the utmost adjustment accuracy while maintaining the system's hydronic balance**.



### Ventilation adjustment

The most suitable on-board ventilation system can be chosen based on the air distribution logic in the server room, guaranteeing a **constant flow of air** (airflow control) **or a constant available overlap** ( $\Delta p$  control); the latter is particularly useful when using a floating floor.



### Finned pack coil with hydrophilic coating

All models in the TRF CF range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit**.

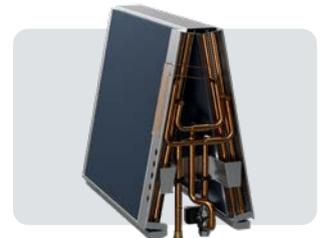
### Double circuit

Chilled water units are also available with a double circuit. In this version the supply is **via two different hydraulic circuits** that can offer the **utmost operational continuity if one of the two circuits malfunctions**. Each circuit is equipped with a regulating valve



### Easier scheduled maintenance

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards**.



### Double coil

The double coil solution is designed to optimize the internal spaces of the unit, **significantly increasing the heat exchange surface and potential refrigerating power**.

TRF CF		045	055	065	075	150	180	200	210
<b>Version A</b>		<b>Air temperature 24°C - Relative humidity 50% / Water temperature In 7°C Out 12°C</b>							
Cooling capacity	kW	92.8	111.2	154.5	191.2	234.5	-	-	-
SHR		0.77	0.73	0.78	0.74	0.78	-	-	-
EER		33.56	38.75	26.02	30.55	24.78	-	-	-
<b>Version A</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>							
Cooling capacity	kW	91.1	102.4	154	176.7	233.7	-	-	-
SHR		1	0.93	1	0.94	1	-	-	-
EER		32.94	35.68	25.93	28.23	24.7	-	-	-
<b>Version B</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 18°C</b>							
Cooling capacity	kW	85.9	97.9	141.8	164.6	219.8	254.3	283.7	329.2
SHR		1	0.95	1	0.98	1	0.97	1	0.98
EER		31.06	34.14	23.88	26.31	23.23	25.54	22.07	24.28
<b>Version C</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 22°C</b>							
Cooling capacity	kW	77.6	90.6	127.2	153.2	193	232.5	254.4	300.4
SHR		1	1	1	1	1	1	1	1
EER		28.06	31.59	21.41	24.49	20.4	23.35	19.79	22.16
<b>Version A</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>							
Cooling capacity	kW	91.2	100.5	154.4	173.6	234.2	-	-	-
SHR		1	1	1	1	1	-	-	-
EER		32.99	35.03	25.99	27.75	24.75	-	-	-
<b>Version B</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 23°C</b>							
Cooling capacity	kW	85.7	96.6	141.7	163.9	219.5	253.2	283.4	327.9
SHR		1	1	1	1	1	1	1	1
EER		30.99	33.68	23.85	26.2	23.2	25.43	22.05	24.18
<b>Version C</b>		<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 27°C</b>							
Cooling capacity	kW	78	89.9	128	153.6	194.2	233	256	301.2
SHR		1	1	1	1	1	1	1	1
EER		28.19	31.35	21.55	24.54	20.53	23.41	19.92	22.22
<b>Rated air flow</b>	m <sup>3</sup> /h	16500	16500	29000	29000	44000	44000	58000	58000
<b>Total fan absorbed power</b>	kW	2.8	2.9	5.9	6.3	9.5	10	12.9	13.6
<b>Lp @ Nominal rpm ; dist.= 2 m Q=2</b>	dB(A)	70		71		73		74	75
<b>Dimensions [LxHxD]</b>	mm	1270x2000x960		1760x2000x960		2510x2000x960		3160x2000x960	
<b>Power supply</b>	V/ph/Hz	400/3+N/50							

Also available with 60 Hz power supply. | Minimum height with fanmodule 2550 mm.



Platform **TRF Evolution**

DATA CENTER

INDUSTRIAL

# NRG A

## AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS

9.3–147.2 kW



MULTI-PROTOCOL COMMUNICATION INTERFACE	SCROLL COMPRESSORS
EC RADIAL FANS	MODBUS CONTROLLED FANS
FAST RESTART	ON-BOARD HUMIDIFIER
MODULATING HOT GAS POST-HEATING	INVERTER DRIVEN COMPRESSORS

NRG series perimeter-mounted air conditioning units are designed for **high thermal density** IT facilities requiring **accurate hygrothermal parameter control and continuous operation**. The use of inverter-driven compressors, capable of tracking the thermal load with extreme precision, of EC fans (standard), and of electronically controlled lamination valves (standard) also **make it possible to achieve high performance with reduced energy consumption, improving the Data Centre's PUE**. The strength of the new NRG range is **the high cooling density (kW/m<sup>2</sup>)**, obtained thanks to the precise internal design, a frame of just 890 mm in depth, and the careful choice of components.

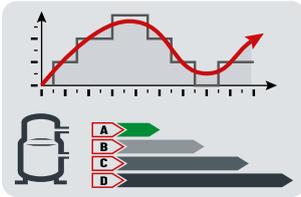
### Versatile and flexible range

The following refrigerating configuration options are available:

- NRG A** Air cooled with remote condenser.
- NRG W** Dry Cooler or water cooled.
- NRG Z** Mains water cooled (15°C).
- NRG F** Water cooled and indirect water Free-Cooling.
- NRG D** Air cooled with remote condenser and Dual Cooling.
- NRG K** Dry-Cooler or water cooled and Dual Cooling.
- NRG Q** Mains water cooled (15°C) and Dual Cooling.

The NRG A units are air-condensed perimeter-mounted units of the NRG range; they are widely used for the cooling of Data Centers. The air-condensed solution offers a **simple system design**, thanks to the absence of auxiliary circuits and pumps; **the cooling circuit is managed by the cabinet**, and both the indoor unit and the remote condenser are **easy to install**.

- Refrigerant R410A
- EC Fans
- Scroll inverter compressors
- Electronic expansion valves (optional)
- Advanced programmable microprocessor control with LCD display
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Long distance kits for optimal operation in the event of large distances between indoor and outdoor units (on request)



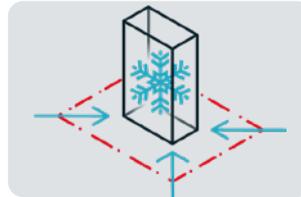
**Power modulation**

The NRG A units adapt quickly to Data Center cooling requests. Thanks to the inverter-controlled compressor, performance can be modulated to **up to 25%** of the rated value, **thus reducing consumption**. This ensures **continuous operation of the unit** even at low loads, without switching cycles on and off.



**Aiming at maximised system efficiency**

Design choices include, in addition to the use of electronically controlled expansion valves, the management of variable-speed Scroll compressors and EC (electronically commutated) fans via Modbus. Thanks to these features it is possible **to acquire, manage and adjust operating parameters and therefore thermo-hygrometric values in the server room very accurately, with high levels of energy efficiency.**



**Maximised power density**

The internal design and the special arrangement of the components of the TRF Evolution platform, used in the NRG units, have been designed to maximise the exchange surface of the evaporating coil. These characteristics, combined with the use of latest-generation electronic switching EC fans with high air flow rate, have allowed **the power density to be increased**. The space available in the server room is made the most of and this makes the NRG A units suitable for applications with **high thermal load density, typical of latest generation Data Centres.**

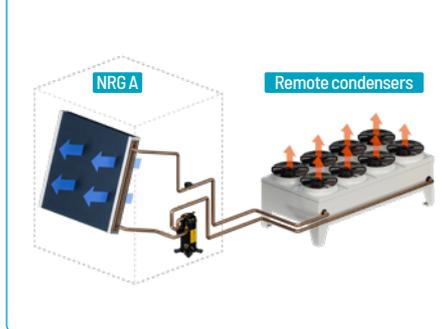


**Remote condensers**

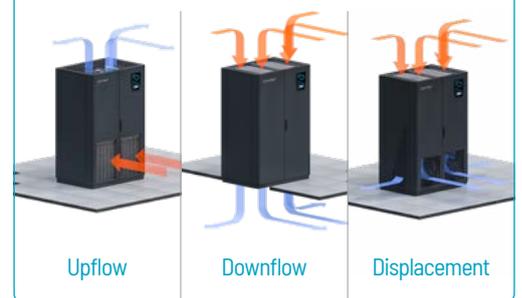
All units can be combined with HiRef remote condensers, **choosing from different combinations to meet all system needs. Oversize remote condensers** are ideal for warmer environments, where it is necessary to keep the condensing temperature under control, while **the compact condensers** on the other hand are small in terms of both size and consumption. The condensers, used with dual-circuit units, are available with a single cooling circuit **for maximum reliability and redundancy** of the system or with a double cooling circuit, **to reduce installation spaces and costs.**



**AIR CONDENSED**



**AIRFLOW CONFIGURATIONS**



NRG A	0091	0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962	1003	1103	
<b>Air temperature 24°C - Relative humidity 50% / Outdoor Air Temperature 35°C</b>																	
Cooling capacity	9.3	12.3	19.8	23.8	31.3	38.1	44	47.7	56.8	58.2	73.8	77.3	81.4	93.3	109.2	127	
SHR	0.89	0.94	1	1	1	0.99	0.93	0.99	0.91	0.99	0.93	0.99	1	0.94	0.87	0.81	
EER	3.74	3.71	4	3.99	4.19	3.9	3.46	3.89	3.78	3.85	3.72	3.83	4.21	4.1	4.06	3.61	
Total absorbed power	2.7	3.7	6.2	7.2	9.3	11.6	14.5	14.5	17.2	18	23.8	25.1	25.2	28.6	32.8	41.1	
<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>																	
Cooling capacity	10	13.9	22.5	27	35.5	43.2	48.7	53.7	62.9	65.6	81.9	87.3	92	104.1	119	135.7	
SHR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.97	
EER	3.94	4.09	4.44	4.42	4.67	4.32	3.67	4.2	4.11	4.23	3.98	4.16	4.65	4.45	4.37	3.79	
Total absorbed power	2.7	3.8	6.3	7.4	9.4	11.8	15.1	15	17.5	18.4	24.5	25.9	25.6	29.3	33.1	41.7	
<b>Air temperature 35°C - Relative humidity 30% / Outdoor Air temperature 35°C</b>																	
Cooling capacity	10.8	15.2	25	29.9	39.2	47.5	53.4	59	68.9	72.3	90	96.1	101.2	114.3	130.1	147.2	
SHR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
EER	4.18	4.35	4.86	4.81	5.08	4.66	3.9	4.48	4.43	4.59	4.25	4.45	5.02	4.81	4.69	4.04	
Total absorbed power	2.8	3.9	6.4	7.4	9.5	12	15.5	15.4	17.8	18.6	25.1	26.5	26	29.6	33.6	42.3	
Rated air flow	2150	3700	8800	8800	11720	11720	11720	14300	14300	17500	19900	23700	25300	25300	25300	25300	
Number of circuits	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	
Number of inverter compressors	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of on/off compressors	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	
Lp @ Nominal rpm ; dist.= 2 m Q=2	50	54	70		71		74		75		77		76			77	
Dimensions [LxHxD]	600 x1875 x600	900 x1875 x600	1010x2000x890			1270x2000x890			1760 x2000 x890			2020 x2000 x890			2510x2000x890		
Power supply	V/ph/Hz								400/3+N/50								

Performance data relating to Downflow versions combined with standard HiRef remote condenser. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm for sizes 0091-0131.

Platform **TRF Evolution**

# NRG W/Z

DATA CENTER

INDUSTRIAL

## WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS

NRG W > 8.8-112.1 kW

NRG Z > 9.7-124 kW



MULTI-PROTOCOL COMMUNICATION INTERFACE	SCROLL COMPRESSORS	EC RADIAL FANS
MODBUS CONTROLLED FANS	FAST RESTART	ON-BOARD HUMIDIFIER
MODULATING HOT GAS POST-HEATING	INVERTER DRIVEN COMPRESSORS	PLATE HEAT EXCHANGER

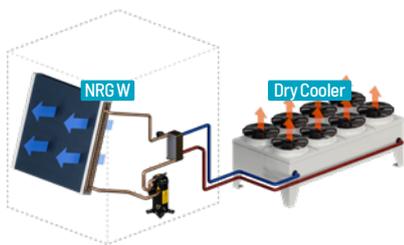
The NRG W units are water-condensed perimeter cabinets. The W series uses Dry Cooler water, the Z series on the other hand uses low temperature mains water or groundwater (15°C). The NRG units of these series are monobloc units inside which the **entire cooling circuit is concentrated**, cooling is via a **brazed plate exchanger made from stainless steel AISI 304**.

The NRG Z units are water-condensed perimeter cabinets. The W series uses Dry Cooler water, the Z series on the other hand uses low temperature mains water or groundwater (15°C). The NRG units of these series are monobloc units inside which the **entire cooling circuit is concentrated**, cooling is via a **brazed plate exchanger made from stainless steel AISI 304**.

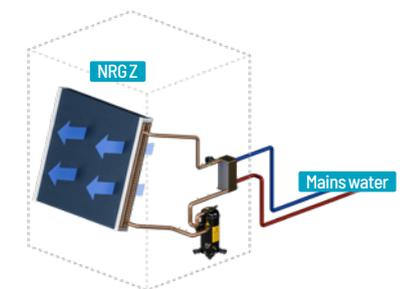


- Refrigerant R410A
- EC Fans
- Scroll inverter compressors
- Electronic expansion valves (optional)
- Advanced programmable microprocessor control with LCD display
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)

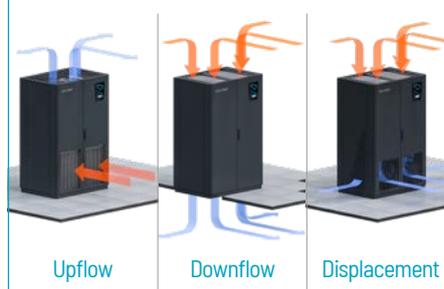
### WATER CONDENSED

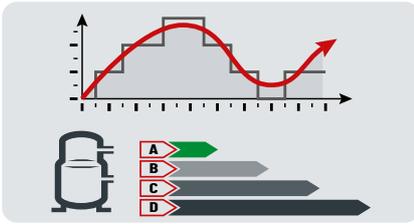


### MAINS WATER CONDENSED



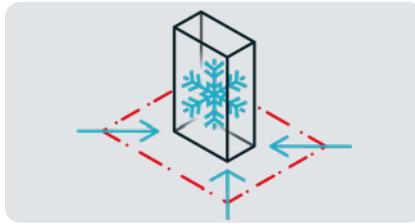
### AIRFLOW CONFIGURATIONS





**Power modulation**

The NRG W/Z units adapt quickly to Data Center cooling requests. Thanks to the inverter-controlled compressor, performance can be modulated to **up to 25%** of the rated value, thus **reducing consumption**. This ensures **continuous operation of the unit even at low loads**, without switching cycles on and off.



**Maximised power density**

The internal design and the special arrangement of the components of the TRF Evolution platform, used in the NRG units, have been designed **to maximise the exchange surface of the evaporating coil**. These characteristics, combined with the use of latest-generation electronic switching EC fans with high air flow rate, have allowed the **power density to be increased**. The space available in the server room is made the most of and this makes the NRG W units suitable for applications with **high thermal load density, typical of latest generation Data Centres**.



**Aiming at maximised system efficiency**

Design choices include, in addition to the use of electronically controlled expansion valves, the management of variable-speed Scroll compressors and EC (electronically commutated) fans via Modbus. Thanks to these features it is possible **to acquire, manage and adjust operating parameters and therefore thermo-hygrometric values in the server room very accurately, with high levels of energy efficiency**.



NRG W		0091	0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962
<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C</b>															
Cooling capacity	kW	8.8	11.9	20.4	24.5	32.1	37.1	44.1	46.3	54.3	56.3	71.3	74.8	82.8	90.1
SHR		0.85	0.95	1	1	1	0.98	0.91	0.98	0.91	0.98	0.93	0.99	0.99	0.93
EER		3.15	3.37	4.43	4.38	4.58	3.97	3.77	3.94	3.64	3.82	3.66	3.83	4.47	4.06
Total absorbed power	kW	3	3.9	5.8	6.8	8.8	11.1	13.5	14	17.1	17.6	23.4	24.5	24.4	28.1
<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 45°C</b>															
Cooling capacity	kW	9.5	13.5	23.6	28.2	36.9	42.4	49.3	52.9	60.5	64.1	79.8	85.6	95	101.5
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		3.34	3.77	5.26	5.14	5.35	4.56	4.2	4.47	4.05	4.35	4.05	4.32	5.18	4.58
Total absorbed power	kW	3	4	5.7	6.7	8.7	11.1	13.5	14.1	17.2	17.6	23.6	24.7	24.2	28.1
<b>Air temperature 35°C - Relative humidity 30% / Water 40°C - 45°C</b>															
Cooling capacity	kW	10.3	14.8	26.4	31.3	41.3	47.1	54.6	58.8	67	71.2	88.1	94.8	105.4	112.1
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		3.57	4.11	6.07	5.84	6.16	5.12	4.63	4.95	4.5	4.86	4.43	4.74	5.82	5.07
Total absorbed power	kW	3.1	4	5.6	6.6	8.5	11	13.6	14.1	17.1	17.5	23.8	25	24	28
Rated air flow	m <sup>3</sup> /h	2150	3700	8800	8800	11720	11720	11720	14300	14300	17500	19900	23700	25300	25300
Number of circuits		1	1	1	1	1	1	1	1	1	1	1	1	2	2
Number of inverter compressors		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of on/off compressors		-	-	-	-	-	-	-	-	-	-	-	-	1	1
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	50	54	70	71	74	75	77	76						
Dimensions [LxHxD]	mm	600 x1875 x600	900 x1875 x600	1010x2000x890		1270x2000x890		1760x2000x890		2020x2000x890		2510x2000x890			
Power supply	V/ph/Hz	400/3+N/50													
NRG Z		0091	0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962
<b>Air temperature 24°C - Relative humidity 50% / Water 15°C - 30°C</b>															
Cooling capacity	kW	9.7	13.6	22.8	27.1	35.7	41.7	49.9	52.6	61.2	62.9	79.7	84.3	93.4	102.7
SHR		0.85	0.89	1	1	1	0.93	0.85	0.93	0.86	0.93	0.87	0.94	0.94	0.87
EER		4.51	5.46	7.2	6.9	7.3	6.12	5.72	6.04	5.43	5.71	5.36	5.64	7.13	6.39
Total absorbed power	kW	2.3	2.9	4.4	5.2	6.7	8.6	10.5	10.9	13.5	13.9	18.8	19.9	19	21.9
<b>Air temperature 30°C - Relative humidity 35% / Water 15°C - 30°C</b>															
Cooling capacity	kW	10.3	14.9	26	31	40.8	46.6	54.2	58.9	66.9	70.7	88	94.9	105.1	112.4
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		4.8	6.04	8.89	8.38	8.92	7.03	6.24	6.84	5.99	6.52	5.87	6.29	8.34	7.1
Total absorbed power	kW	2.3	2.8	4.2	4.9	6.4	8.4	10.5	10.8	13.4	13.7	18.9	20	18.5	21.7
<b>Air temperature 35°C - Relative humidity 30% / Water 15°C - 30°C</b>															
Cooling capacity	kW	11.1	16.5	28.7	34.1	44.9	51.6	59.9	65	73.5	78.2	96.6	104.2	115.6	124
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		5.14	6.74	10.68	9.85	10.53	8.06	6.98	7.7	6.69	7.39	6.4	6.88	9.64	8.03
Total absorbed power	kW	2.3	2.8	3.9	4.7	6.1	8.2	10.4	10.7	13.2	13.5	19	20.1	17.9	21.3
Rated air flow	m <sup>3</sup> /h	2150	3700	8800	8800	11720	11720	11720	14300	14300	17500	19900	23700	25300	25300
Number of circuits		1	1	1	1	1	1	1	1	1	1	1	1	2	2
Number of inverter compressors		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of on/off compressors		-	-	-	-	-	-	-	-	-	-	-	-	1	1
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	50	54	70	71	74	75	77	76						
Dimensions [LxHxD]	mm	600 x1875 x600	900 x1875 x600	1010x2000x890		1270x2000x890		1760x2000x890		2020x2000x890		2510x2000x890			
Power supply	V/ph/Hz	400/3+N/50													

Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm for sizes 0091-0131.

Platform **TRF Evolution**

# NRG F

**PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS WITH INDIRECT FREE-COOLING**

11.4-99.2 kW



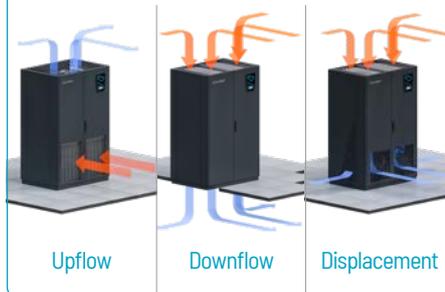
MULTI-PROTOCOL COMMUNICATION INTERFACE	SCROLL COMPRESSORS
EC RADIAL FANS	MODBUS CONTROLLED FANS
FAST RESTART	ON-BOARD HUMIDIFIER
INVERTER DRIVEN COMPRESSORS	PLATE HEAT EXCHANGER

NRG F units are water-condensed perimeter-mounted cabinets that are able to exploit the **effect of indirect water-based Free-Cooling**. The F Series uses Dry Cooler water as both a cooling source for free-cooling and a heat exchange fluid for condensing the cooling circuit. NRG F units are "monobloc" units inside which the **entire cooling circuit** is concentrated. Cooling is via a **braced plate exchanger made of stainless steel AISI 304**.

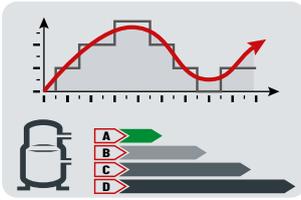
**INDIRECT WATER-SIDE FREECOOLING**



**AIRFLOW CONFIGURATIONS**

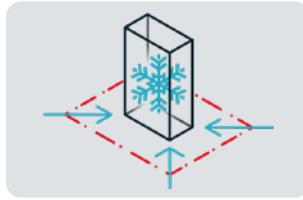


- Refrigerant R410A
- EC Fans
- Scroll inverter compressors
- Electronic expansion valves (optional)
- Advanced programmable microprocessor control with LCD display
- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)



**Power modulation**

NRG F units adapt quickly to Data Center cooling requests. Thanks to the inverter-controlled compressor, performance can be modulated to **up to 25% of the rated value**, thus reducing consumption. This ensures **continuous operation of the unit even at low loads**, without switching cycles on and off.



**Maximised power density**

The internal design and the special arrangement of the components of the TRF Evolution platform, used in the NRG units, have been designed to **maximise the exchange surface of the evaporating coil**. These characteristics, combined with the use of latest-generation electronic switching EC fans with high air flow rate, have allowed the **power density to be increased**. The space available in the server room is made the most of and this makes the NRG F units suitable for applications with **high thermal load density**, typical of latest generation Data Centers.



**Aiming at maximised system efficiency**

Design choices include, in addition to the use of electronically controlled expansion valves, the management of variable-speed Scroll compressors and EC (electronically commutated) fans via Modbus. Thanks to these features it is possible to **acquire, manage and adjust operating parameters and therefore thermo-hygrometric values in the server room very accurately, with high levels of energy efficiency**.

**Maximum energy saving**

In periods when the air outside is cooler than the warm air inside the Data Center, the cold water produced by the dry cooler directly feeds the heat exchange coil, which is able to provide a part or all of the required cooling capacity. Before returning to the dry cooler, the water is reused inside the plate exchanger, serving the compressor. The entire process is regulated by a 3-way valve **directly controlled by HiRef software, which maximizes the Free-Cooling effect and checks the cooling circuit**. In this way the work of the compressor is significantly reduced, and shuts down when a state of Free-Cooling is fully reached, **with a significant reduction in the system's PUE**.



NRG F		0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962	
		<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C / Free-Cooling water 7°C / Glycol 30%</b>													
Cooling capacity	kW	11.4	19.3	22.9	29.3	33.7	39.9	43.7	51	51.8	64.2	69.7	76.2	82.7	
SHR		0.92	1	0.99	1	0.92	0.85	0.95	0.88	0.94	0.84	0.95	0.93	0.87	
EER		3.18	4.14	4.05	4.12	3.57	3.41	3.7	3.4	3.5	3.31	3.56	4.08	3.71	
Free-Cooling capacity	kW	8.8	22.5	24.6	33.3	37.8	40.8	48	52	56.4	65.8	80.4	80.4	86.8	
SHR Free-Cooling		0.93	1	0.9	0.9	0.84	0.81	0.87	0.83	0.87	0.8	0.85	0.85	0.81	
Total absorbed power	kW	4	5.8	6.8	8.7	11	13.3	14.1	17.3	17.5	22.1	24.2	23.3	27	
		<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 47°C / Free-Cooling water 12°C / Glycol 30%</b>													
Cooling capacity	kW	12.5	21.9	25.7	32.9	37.3	43.1	48.7	55.5	57.8	68.9	77.7	84.2	89.5	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		3.36	4.6	4.44	4.51	3.85	3.56	3.97	3.59	3.79	3.43	3.82	4.36	3.87	
Free-Cooling capacity	kW	8.5	22.6	24	31.5	34.4	35.3	45.5	48	53.4	57.9	73.2	75.2	77.3	
SHR Free-Cooling		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	4.2	5.9	6.9	8.9	11.3	13.7	14.5	17.7	18	22.8	25	24	27.8	
		<b>Air temperature 35°C - Relative humidity 30% / Water 40°C - 47°C / Free-Cooling water 17°C / Glycol 30%</b>													
Cooling capacity	kW	13.9	24.3	28.6	36.6	41.6	47.6	54	61.2	63.6	75.9	85.4	93.2	99.2	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		3.69	5.21	5.01	5.08	4.3	3.9	4.38	3.95	4.17	3.73	4.15	4.86	4.28	
Free-Cooling capacity	kW	9	23.5	24.9	33.6	35.5	36.6	48.2	49.7	56.6	58.4	77.5	77.5	80	
SHR Free-Cooling		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	4.2	5.8	6.8	8.8	11.3	13.8	14.6	17.7	18	23	25.2	23.8	27.8	
Rated air flow	m <sup>3</sup> /h	3700	8000	8000	10800	10800	10800	14300	14300	16800	16800	23000	23000	23000	
Number of circuits		1	1	1	1	1	1	1	1	1	1	1	2	2	
Number of inverter compressors		1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of on/off compressors		-	-	-	-	-	-	-	-	-	-	-	1	1	
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	54	70			74		75	77		75	76	75		
Dimensions [LxHxD]	mm	900 x1875 x600	1010x2000x890			1270x2000x890		1760x2000x890		2020x2000x890		2510x2000x890			
Power supply	V/ph/Hz							400/3+N/50							

Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm for size 0131.

Platform **TRF Evolution**

# NRG D/K/Q

DATA CENTER

INDUSTRIAL

## DUAL COOLING PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH MODULATING COMPRESSORS

NRG D > 11.7-98.9 kW

NRG K > 11.4-100.8 kW

NRG Q > 12.9-110.3 kW

 MULTI-PROTOCOL COMMUNICATION INTERFACE	 SCROLL COMPRESSORS	 EC RADIAL FANS
 MODBUS CONTROLLED FANS	 FAST RESTART	 ON-BOARD HUMIDIFIER
 INVERTER DRIVEN COMPRESSORS	 PLATE HEAT EXCHANGER	



\* Mod. Q e K only

NRG D/K/Q units are Dual Cooling units. They combine the traditional evaporative coil of the cooling circuit with **the cooling effect of chilled water**, coming from an outdoor unit such as a chiller. The use of a dual source guarantees the **continuity of supply to the system** and **the best operational solution in all cases**.

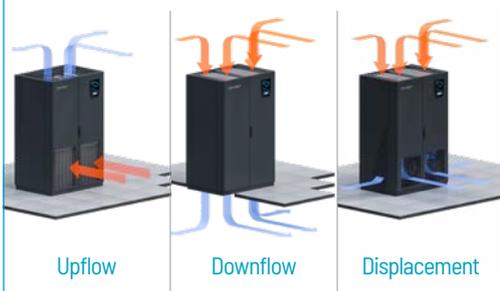


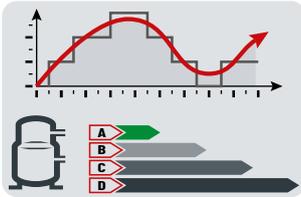
### Remote condensers

All NRG D units can be combined with HiRef remote condensers, choosing from **different combinations to meet all system needs**. **Oversize remote condensers** are ideal for warmer environments, where it is necessary to keep the condensing temperature under control, while the **compact condensers** on the other hand are small in terms of both size and consumption. The condensers, used with dual-circuit units, are available with a single cooling circuit **for maximum reliability and redundancy of the system** or with a double cooling circuit, **to reduce installation spaces and costs**.

- Refrigerant R410A
- EC Fans
- Scroll inverter compressors
- Electronic expansion valves (optional)
- Advanced programmable microprocessor control with LCD display
- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Long distance kits for optimal operation in the case of large distances between indoor and outdoor units (on request)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)

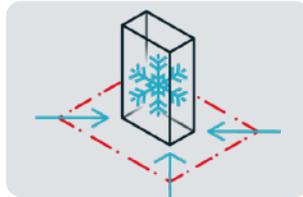
### AIRFLOW CONFIGURATIONS





**Power modulation**

The NRG D/K/Q units adapt quickly to Data Center cooling requests. Thanks to the inverter-controlled compressor, performance can be modulated to **upto 25%** of the rated value, **thus reducing consumption**. This ensures **continuous operation of the unit even at low loads**, without switching cycles on and off.



**Maximised power density**

The internal design and the special arrangement of the components of the TRF Evolution platform, used in the NRG units, have been designed **to maximise the exchange surface of the evaporating coil**. These characteristics, combined with the use of latest-generation electronic switching EC fans with high air flow rate, have allowed the **power density to be increased**. The space available in the server room is made the most of and this makes the NRG D/K/Q units suitable for applications with **high thermal load density**, typical of latest generation Data Centres.

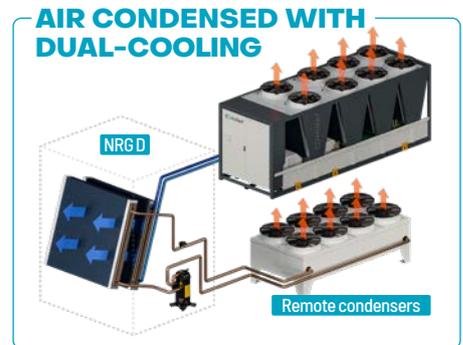


**Aiming at maximised system efficiency**

Design choices include, in addition to the use of electronically controlled expansion valves, the management of variable-speed Scroll compressors and EC (electronically commutated) fans via Modbus. Thanks to these features it is possible **to acquire, manage and adjust operating parameters and therefore thermo-hygrometric values in the server room very accurately, with high levels of energy efficiency**.

**Maximum flexibility**

The Dual Cooling units combine **the reliability of a dual source with the ease of operation of HiRef cabinets**. The on-board control allows you to select the source according to different logics, at your discretion.

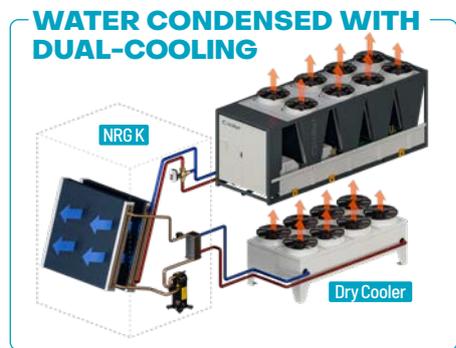


NRG D		0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962	
<b>Air temperature 24°C - Relative humidity 50% / Outdoor Air Temperature 35°C / Water temperature In 7°C Out 12°C</b>															
Cooling capacity	kW	11.7	18.8	22.4	28.8	33.4	38.5	43	51.3	51.6	64	69	73.6	82.8	
SHR		0.9	1	1	1	0.93	0.87	0.96	0.88	0.94	0.84	0.95	0.94	0.87	
EER		3.57	3.81	3.77	3.91	3.47	3.1	3.55	3.44	3.46	3.3	3.48	3.72	3.72	
Chilled water cooling capacity	kW	8.2	29.1	29.1	40.8	40.8	40.8	56	56	65.8	65.8	90	90	90	
SHR Chilled water		1	0.82	0.82	0.81	0.81	0.81	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Total absorbed power	kW	3.7	6.1	7.1	8.9	11.2	14	14.4	17.2	17.6	22.1	24.5	24.5	26.9	
<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C / Water temperature In 10°C Out 15°C</b>															
Cooling capacity	kW	13	21.4	25.3	32.5	37.2	42	48.4	56.2	57.7	69.7	77.5	82.3	90.1	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		3.89	4.26	4.19	4.33	3.77	3.31	3.87	3.72	3.79	3.51	3.8	4.05	3.96	
Chilled water cooling capacity	kW	10.5	31.4	31.4	42.3	42.3	42.3	57.5	57.5	67.5	67.5	92.5	92.5	92.5	
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	3.8	6.1	7.2	9.1	11.4	14.3	14.8	17.4	17.9	22.5	25.1	25	27.4	
<b>Air temperature 35°C - Relative humidity 30% / Outdoor air temperature 35°C / Water temperature In 15°C Out 20°C</b>															
Cooling capacity	kW	14.4	23.5	27.9	36	41	46.1	52.9	61.4	63.3	75.7	85	90.4	98.9	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		4.2	4.63	4.56	4.73	4.1	3.51	4.1	3.99	4.09	3.71	4.04	4.33	4.25	
Chilled water cooling capacity	kW	10.7	31.6	31.6	42.7	42.7	42.7	57.9	57.9	68	68	93.1	93.1	93.1	
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	3.9	6.2	7.3	9.2	11.6	14.7	15.2	17.7	18.2	23.1	25.7	25.5	27.9	
Rated air flow	m <sup>3</sup> /h	3700	8000	8000	10800	10800	10800	14300	14300	16800	16800	23000	23000	23000	
Number of circuits		1	1	1	1	1	1	1	1	1	1	1	2	2	
Number of inverter compressors		1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of on/off compressors		-	-	-	-	-	-	-	-	-	-	-	1	1	
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	54		70			74		75		77		75		
Dimensions [LxHxD]	mm	900 x1875 x600	1010x2000x890			1270x2000x890			1760x2000x890			2020x2000x890		2510x2000x890	
Power supply	V/ph/Hz							400/3+N/50							

Performance data relating to Downflow versions combined with standard HiRef remote condenser. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm for size 0131.

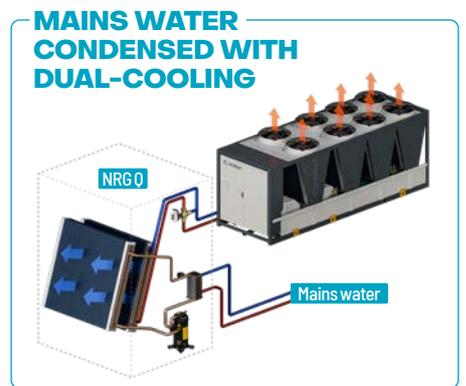
Platform **TRF Evolution**

# NRG D/K/Q



NRG K		0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962	
		<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C / Water temperature In 7°C Out 12°C</b>													
Cooling capacity	kW	11.4	19.3	23	29.4	33.8	40.1	43.6	51.2	52	64.5	69.7	76	83.1	
SHR		0.91	1	0.99	1	0.92	0.85	0.95	0.88	0.94	0.84	0.95	0.93	0.87	
EER		3.23	4.16	4.1	4.16	3.61	3.46	3.72	3.44	3.54	3.35	3.59	4.1	3.75	
Chilled water cooling capacity	kW	8.2	29.1	29.1	40.8	40.8	40.8	56	56	65.8	65.8	90	90	90	
SHR Chilled water		1	0.82	0.82	0.81	0.81	0.81	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Total absorbed power	kW	4	5.8	6.7	8.6	10.9	13.2	14	17.2	17.4	22	24.1	23.2	26.8	
		<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 45°C / Water temperature In 10°C Out 15°C</b>													
Cooling capacity	kW	12.7	22.2	26.1	33.4	38.1	43.7	49.4	56.3	58.6	69.9	78.8	86	91	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		3.57	4.89	4.71	4.77	4.08	3.75	4.18	3.77	3.98	3.59	4.01	4.65	4.1	
Chilled water cooling capacity	kW	10.5	31.4	31.4	42.3	42.3	42.3	57.5	57.5	67.5	67.5	92.5	92.5	92.5	
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	4	5.7	6.7	8.6	10.9	13.3	14.1	17.2	17.4	22.2	24.3	23.2	26.9	
		<b>Air temperature 35°C - Relative humidity 30% / Water 40°C - 45°C / Water temperature In 15°C Out 20°C</b>													
Cooling capacity	kW	14.1	24.7	29.1	37.2	42.1	48.2	55.1	62.4	64.5	77	87	94.4	100.8	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		3.93	5.56	5.32	5.41	4.54	4.11	4.65	4.18	4.38	3.92	4.38	5.14	4.54	
Chilled water cooling capacity	kW	10.7	31.6	31.6	42.7	42.7	42.7	57.9	57.9	68	68	93.1	93.1	93.1	
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	4	5.6	6.6	8.5	10.9	13.3	14.1	17.2	17.4	22.3	24.5	23	26.9	
Rated air flow	m <sup>3</sup> /h	3700	8000	8000	10800	10800	10800	14300	14300	16800	16800	23000	23000	23000	
Number of circuits		1	1	1	1	1	1	1	1	1	1	1	2	2	
Number of inverter compressors		1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of on/off compressors		-	-	-	-	-	-	-	-	-	-	-	1	1	
Lp @ Nominal rpm ; dist.= 2 m 0=2	dB(A)	54	70			74		75	77		75	76	75		
Dimensions [LxHxD]	mm	900 x1875 x600	1010x2000x890			1270x2000x890		1760x2000x890		2020x2000x890		2510x2000x890			
Power supply	V/ph/Hz	400/3+N/50													

Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm for size 0131.



NRG Q		0131	0201	0251	0301	0381	0441	0501	0551	0641	0701	0801	0852	0962	
		<b>Air temperature 24°C - Relative humidity 50% / Water 15°C - 30°C / Water temperature In 7°C Out 12°C</b>													
Cooling capacity	kW	12.9	21.4	25.6	32.4	37.9	45.3	49.6	57.6	57.8	71.5	77.8	86.2	94.3	
SHR		0.86	1	0.94	0.97	0.87	0.81	0.89	0.83	0.89	0.8	0.89	0.87	0.82	
EER		5.15	6.59	6.36	6.41	5.49	5.19	5.69	5.09	5.21	4.84	5.24	6.46	5.82	
Chilled water cooling capacity	kW	8.2	29.1	29.1	40.8	40.8	40.8	56	56	65.8	65.8	90	90	90	
SHR Chilled water		1	0.82	0.82	0.81	0.81	0.81	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Total absorbed power	kW	2.9	4.4	5.1	6.6	8.5	10.3	11	13.6	13.8	17.5	19.5	18	20.9	
		<b>Air temperature 30°C - Relative humidity 35% / Water 15°C - 30°C / Water temperature In 10°C Out 15°C</b>													
Cooling capacity	kW	13.9	24.5	28.7	36.7	41.7	48.2	54.9	61.8	64.3	76.6	86.5	94.1	101.1	
SHR		1	1	1	1	1	0.97	1	0.99	1	0.96	1	1	0.98	
EER		5.62	8.04	7.48	7.58	6.12	5.52	6.33	5.49	5.84	5.17	5.78	7.19	6.29	
Chilled water cooling capacity	kW	10.5	31.4	31.4	42.3	42.3	42.3	57.5	57.5	67.5	67.5	92.5	92.5	92.5	
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	2.9	4.2	5	6.4	8.4	10.3	10.9	13.5	13.7	17.5	19.6	17.7	20.7	
		<b>Air temperature 35°C - Relative humidity 30% / Water 15°C - 30°C / Water temperature In 15°C Out 20°C</b>													
Cooling capacity	kW	15.4	26.9	31.7	40.5	45.7	52.7	60.2	67.7	70.7	83.4	94.9	103.8	110.3	
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	
EER		6.27	9.47	8.7	8.81	6.85	6.06	7.02	6.08	6.52	5.58	6.29	8.21	6.95	
Chilled water cooling capacity	kW	10.7	31.6	31.6	42.7	42.7	42.7	57.9	57.9	68	68	93.1	93.1	93.1	
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total absorbed power	kW	2.9	4	4.8	6.2	8.3	10.3	10.9	13.4	13.5	17.7	19.7	17.3	20.5	
Rated air flow	m <sup>3</sup> /h	3700	8000	8000	10800	10800	10800	14300	14300	16800	16800	23000	23000	23000	
Number of circuits		1	1	1	1	1	1	1	1	1	1	1	2	2	
Number of inverter compressors		1	1	1	1	1	1	1	1	1	1	1	1	1	
Number of on/off compressors		-	-	-	-	-	-	-	-	-	-	-	1	1	
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	54	70			74		75	77		75	76	75		
Dimensions [LxHxD]	mm	900 x1875 x600	1010x2000x890			1270x2000x890		1760x2000x890		2020x2000x890		2510x2000x890			
Power supply	V/ph/Hz								400/3+N/50						

Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm for size 0131.

Platform **TRF Evolution**

# TRF DX A

DATA CENTER

INDUSTRIAL

## AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS

23.9–160.1 kW



MULTI-PROTOCOL COMMUNICATION INTERFACE	SCROLL COMPRESSORS
EC RADIAL FANS	MODBUS CONTROLLED FANS
FAST RESTART	ON-BOARD HUMIDIFIER
MODULATING HOT GAS POST-HEATING	LOW GWP REFRIGERANT

The TRF DX series perimeter mounted units are direct expansion units with Scroll on-off compressors designed to be installed in medium/large-sized premises such as server rooms and labs or for applications where **accurate control of thermo-hygrometric parameters and round-the-clock operation are required**. The top priority for internal design and for the choice of components is **energy efficiency to optimise the system overall electricity** consumption with a positive impact on the Data Center Power Usage Effectiveness (PUE).

### Versatile and flexible range

Thanks to different refrigerating configurations available, the **TRF DX** range is suitable for a number of applications in the field of Data Center air conditioning.

**TRF A**

Air condensed with remote condenser

**TRF W**

Dry Cooler or Evaporative tower water condensed

**TRF Z**

Mains water condensed (15°C)

**TRF F**

Water condensed and indirect water Free-Cooling

**TRF D**

Air condensed with remote condenser and Dual Cooling

**TRF K**

Evaporative tower water condensation or Dry Cooler and Dual Cooling

**TRF Q**

Mains water condensed (15°C) and Dual Cooling

TRF DX A units are air-condensed perimeter-mounted units in the TRF range; they are widely used for the cooling of Data Centers. The air-condensed solution offers a **simple system design**, thanks to the absence of auxiliary circuits and pumps; **the cooling circuit is managed by the cabinet**, and both the indoor unit and the remote condenser are **easy to install**.

- Refrigerant R410A: Also available with R513A and R134a
- EC Fans
- Scroll on/off compressors
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Electronic expansion valves (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Long distance kits for optimal operation in the event of large distances between indoor and outdoor units (on request)



**Safety in the server room**

All models in the TRF DX A range feature heat exchange coils with hydrophilic coating as standard. This special coating - together with an adequate selection of air through-flow speeds - aids condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.



**Efficiency**

The performance, reliability and efficiency of HiRef units are guaranteed by using the best quality components and by cleverly designed internal and external layouts.



**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This makes routine maintenance easier in full compliance with safety standards.



**Remote condensers**

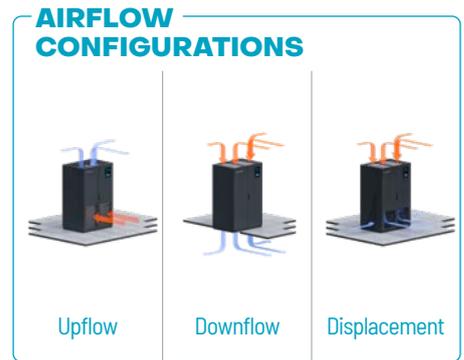
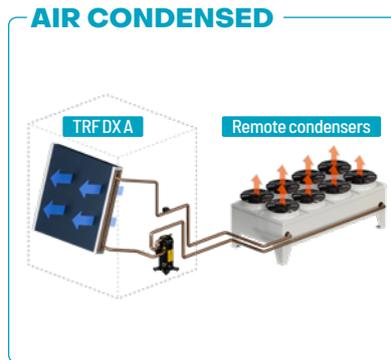
All units can be combined with HiRef remote condensers, choosing from different combinations to meet all system needs. Oversize remote condensers are ideal for warmer environments, where it is necessary to keep the condensing temperature under control, while the compact condensers on the other hand are small in terms of both size and consumption. The condensers, used with dual-circuit units, are available with a single cooling circuit for maximum unit redundancy and ensures continuity of service, more precise refrigerating power and less absorption for partial Data Center loads.

**Green**

HiRef is constantly committed to the search for refrigerants with ever-lower environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for close control application. TRF DX A units are available with R134a and R513A refrigerants.

**Dual circuit**

Double-circuit versions are already available at low power levels. This solution offers maximum unit redundancy and ensures continuity of service, more precise refrigerating power and less absorption for partial Data Center loads.



TRF DX A	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304			
<b>Air temperature 24°C - Relative humidity 50% / Outdoor Air Temperature 35°C</b>																									
Cooling capacity	kW																								
SHR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
EER	4	3.99	3.89	4.34	4.41	4.08	4.09	4.44	4.22	4.63	4.13	4.09	4.05	4.06	4.22	4.05	3.99	4.23	3.96	3.95	4.07	3.87			
Total absorbed power	kW																								
	7.2	7.9	8.8	9.5	10	11.5	12.6	13.6	15.1	11	13.2	14.5	15.9	17.7	19.2	21.1	23.5	25.2	28.5	30.7	35.9	40.5			
<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>																									
Cooling capacity	kW																								
SHR	1	0.99	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
EER	4.39	4.37	4.25	4.83	4.94	4.45	4.4	4.89	4.62	5.11	4.5	4.51	4.44	4.39	4.64	4.51	4.31	4.64	4.3	4.26	4.46	4.11			
Total absorbed power	kW																								
	7.4	8	9	9.7	10.1	11.8	12.9	13.9	15.4	11.3	13.6	15	16.3	18.1	19.5	21.3	23.9	25.7	29.1	31.2	36.3	41.3			
<b>Air temperature 35°C - Relative humidity 30% / Outdoor air temperature 35°C</b>																									
Cooling capacity	kW																								
SHR	1	1	1	1	1	1	1	1	1	0.85	1	1	1	1	1	1	1	1	1	1	1	1			
EER	4.71	4.7	4.61	5.19	5.31	4.74	4.73	5.24	4.93	5.36	4.77	4.79	4.82	4.75	5.03	4.83	4.57	5.06	4.58	4.61	4.79	4.47			
Total absorbed power	kW																								
	7.6	8.2	9.1	9.8	10.3	12.1	13.1	14.1	15.8	11.5	14	15.4	16.4	18.3	19.8	21.7	24.5	25.9	29.6	31.6	36.9	41.7			
Rated air flow	m³/h																								
	8800	8800	8800	11800	11800	15500	11800	15500	11800	15500	15500	15500	15500	15500	19900	19900	19900	25300	25300	25300	32100	32100			
Number of circuits																									
	1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2			
Number of compressors																									
	1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	4	4			
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)																								
	61	62	63	66			71	67	71	67	71			66			69			66					
Dimensions [LxHxD]	mm																								
	1010x2000x890			x2000		x2000		x2000		x2000		x2000		1760x2000x890			2020x2000x890			2510x2000x890			x2000		3160
				x890		x890		x890		x890		x890													x960
Power supply	V/ph/Hz																								
	400/3+N/50																								

Performance data relating to Downflow versions with R410A refrigerant combined with standard HiRef remote condenser. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.

Platform **TRF Evolution**

# TRF DX W/Z

DATA CENTER

INDUSTRIAL

## WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS

TRF DX W > 24.4-165.1 kW

TRF DX Z > 28-184.7 kW



 LOW GWP REFRIGERANT	 MULTI-PROTOCOL COMMUNICATION INTERFACE	 SCROLL COMPRESSORS
 EC RADIAL FANS	 MODBUS CONTROLLED FANS	 FAST RESTART
 ON-BOARD HUMIDIFIER	 MODULATING HOT GAS POST-HEATING	 PLATE HEAT EXCHANGER

TRF DX W units are water-condensed perimeter-mounted cabinets that use Dry Cooler water. The TRF units of this series are "monobloc" units inside which **the entire cooling circuit is concentrated**. Cooling is via a **brazed-plate exchanger made of stainless steel AISI 304**.

TRF DX Z units are water-condensed perimeter-mounted cabinets that use low temperature mains water or groundwater (15°C). The TRF units of this series are "monobloc" units inside which **the entire cooling circuit is concentrated**. Cooling is via a **brazed-plate exchanger made of stainless steel AISI 304**.

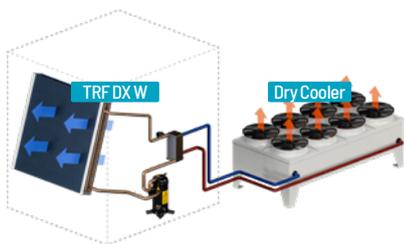


### Easier scheduled maintenance

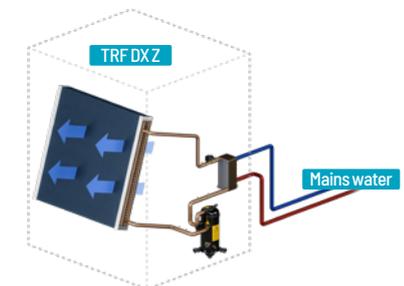
The unit has been painstakingly designed to ensure frontal access to components even with the units running. This makes **routine maintenance easier in full compliance with safety standards**.

- Refrigerant R410A: Also available with R513A and R134a
- EC Fans
- Scroll on/off compressors
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Electronic expansion valves (optional)

### WATER CONDENSED



### MAINS WATER CONDENSED





**Green**

HiRef is constantly committed to the search for refrigerants with ever-lower environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for close control application. TRF DX W/Z units are available with R134a and R513A refrigerants.



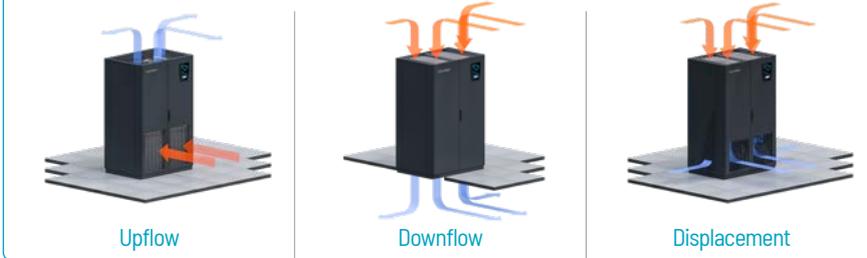
**Efficiency**

The performance, reliability and efficiency of HiRef units are guaranteed by using the best quality components and by cleverly designed internal and external layouts.

**Safety in the server room**

All models in the TRF DX W/Z range feature heat exchange coils with hydrophilic coating as standard. This special coating - together with an adequate selection of air through-flow speeds - aids condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.

**AIRFLOW CONFIGURATIONS**



**Dual circuit**

Double-circuit versions are already available at low power levels. This solution offers maximum unit redundancy and ensures continuity of service, more precise refrigerating power and less absorption for partial Data Center loads.

TRF DX W	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304
<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C</b>																						
Cooling capacity	kW																					
SHR																						
EER																						
Total absorbed power	kW																					
<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 45°C</b>																						
Cooling capacity	kW																					
SHR																						
EER																						
Total absorbed power	kW																					
<b>Air temperature 35°C - Relative humidity 30% / Water 40°C - 45°C</b>																						
Cooling capacity	kW																					
SHR																						
EER																						
Total absorbed power	kW																					
Rated air flow	m <sup>3</sup> /h																					
Number of circuits																						
Number of compressors																						
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)																					
Dimensions [LxHxD]	mm																					
Power supply	V/ph/Hz																					

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.

TRF DX Z	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304
<b>Air temperature 24°C - Relative humidity 50% / Water 15°C - 30°C</b>																						
Cooling capacity	kW																					
SHR																						
EER																						
Total absorbed power	kW																					
<b>Air temperature 30°C - Relative humidity 35% / Water 15°C - 30°C</b>																						
Cooling capacity	kW																					
SHR																						
EER																						
Total absorbed power	kW																					
<b>Air temperature 35°C - Relative humidity 30% / Water 15°C - 30°C</b>																						
Cooling capacity	kW																					
SHR																						
EER																						
Total absorbed power	kW																					
Rated air flow	m <sup>3</sup> /h																					
Number of circuits																						
Number of compressors																						
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)																					
Dimensions [LxHxD]	mm																					
Power supply	V/ph/Hz																					

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.

Platform **TRF Evolution**

# TRF DX F

DATA CENTER

INDUSTRIAL

**PERIMETER MOUNTED UNITS FOR DATA CENTERS WITH INDIRECT FREE-COOLING**

22.9–149.9 kW



 LOW GWP REFRIGERANT	 MULTI-PROTOCOL COMMUNICATION INTERFACE
 SCROLL COMPRESSORS	 EC RADIAL FANS
 MODBUS CONTROLLED FANS	 FAST RESTART
 ON-BOARD HUMIDIFIER	 PLATE HEAT EXCHANGER

TRF DX F units are water-condensed perimeter-mounted cabinets that are able to exploit **the effect of indirect water-based Free-Cooling**. The F Series uses Dry Cooler water as both a cooling source for Free-Cooling and a heat exchange fluid for condensing the cooling circuit. TRF DX F units are monobloc units inside which the **entire cooling circuit is concentrated**. Condensation takes place through a brazed-plate heat exchanger made of AISI 304 stainless steel.

### Maximum energy saving

In periods when the air outside is cooler than the warm air inside the Data Center, the cold water produced by the dry cooler directly feeds the heat exchange coil, which is able to provide a part or all of the required cooling capacity. Before returning to the dry cooler, the water is reused inside the plate exchanger, serving the compressor. The entire process is regulated by a 3-way valve **directly controlled by HiRef software, which maximizes the Free-Cooling effect and checks the cooling circuit**. In this way the work of the compressor is significantly reduced, and shuts down when a state of Free-Cooling is fully reached, **with a significant reduction in the system's PUE**.



### Safety in the server room

All models in the TRF DX F range feature heat exchange coils with hydrophilic coating as standard. This special coating - together with an adequate selection of air through-flow speeds - **aids condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit**.

### INDIRECT WATER-SIDE FREECOOLING



- Refrigerant R410A: Also available with R513A and R134a
- EC Fans
- Scroll on/off compressors
- Advanced control comes as standard
- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Electronic expansion valves (optional)



**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components even with the units running. This makes **routine maintenance easier in full compliance with safety standards.**



**Efficiency**

The performance, reliability and efficiency of HiRef units are guaranteed **by using the best quality components and by cleverly designed internal and external layouts.**

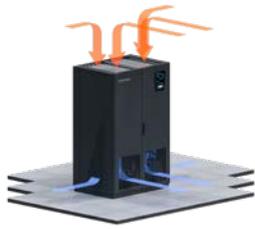
**Green**

HiRef is constantly committed to the search for refrigerants with ever-lower environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for the close control application. TRF DX F units are available with R134a and R513A refrigerants.

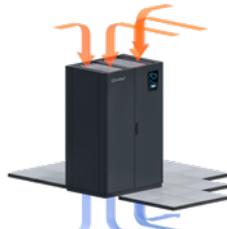
**Dual circuit**

Double-circuit versions are already available at low power levels. This solution offers **maximum unit redundancy and ensures continuity of service, more precise refrigerating power and less absorption for partial Data Center loads.**

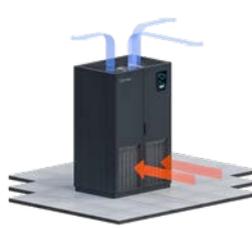
**AIRFLOW CONFIGURATIONS**



Upflow



Downflow



Displacement



TRF DX F	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304	
<b>Inside air 24°C - 50% / Water 40°C - 45°C / Free-cooling water 7°C / Glycol 30%</b>																							
Cooling capacity	kW	22.9	25.7	28.9	32	34.9	39.1	42.9	46.2	50.8	37.1	41.8	45.8	52.5	57.6	62.3	68.7	75.9	80.1	89.6	96.7	115.4	128.4
SHR		1	0.95	0.89	0.97	1	0.89	0.87	1	0.96	1	1	1	0.94	0.88	0.94	0.91	0.85	0.98	0.88	0.87	0.89	0.85
EER		4.01	4.16	3.95	4.42	4.28	4.24	4.08	4.39	4.29	4.58	4.33	4	4.28	3.96	4.35	4.25	4.12	4.33	4.25	4.07	3.88	3.81
Free-Cooling capacity	kW	24.6	26.9	28	33.3	34.8	37.8	40.8	52.1	52.1	44.9	46.2	52.1	54.2	58.5	62.5	67.6	70.2	85.7	89.1	92.5	124.5	133.3
SHR Free-Cooling		0.9	0.86	0.84	0.9	0.88	0.84	0.81	0.86	0.86	1	0.91	0.86	0.84	0.81	0.86	0.82	0.81	0.84	0.82	0.81	0.79	0.77
Total absorbed power	kW	6.8	7.3	8.4	8.8	9.7	10.7	12	13.2	14.5	10.8	12.2	14.1	15	17.2	17.6	19.4	21.7	23.8	26.4	29.1	35.2	39.2
<b>Inside air 30°C - 35% / Water 40°C - 47°C / Free-cooling water 12°C / Glycol 30%</b>																							
Cooling capacity	kW	26	28.4	31.4	36	38.7	42.7	46.1	51.5	55.9	42.5	47.9	51.8	57.7	62.1	69.1	74.5	81.2	88.3	97.7	103.3	125.2	136.3
SHR		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		4.38	4.45	4.14	4.83	4.61	4.47	4.23	4.75	4.57	5.06	4.76	4.35	4.55	4.12	4.68	4.47	4.24	4.62	4.48	4.19	4.07	3.93
Free-Cooling capacity	kW	24	24.7	25.5	32.4	33.4	34.4	35.3	47.9	49.3	43.8	45.1	49.3	49.3	50.7	57.5	60.8	62.5	77.9	80.1	82.3	109.6	109.6
SHR Free-Cooling		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total absorbed power	kW	7.1	7.5	8.7	9	9.9	11.1	12.4	13.5	14.9	11.1	12.6	14.6	15.4	17.7	18	19.9	22.4	24.4	27.1	29.9	36.3	40.2
<b>Inside air 35°C - 30% / Water 40°C - 47°C / Free-cooling water 17°C / Glycol 30%</b>																							
Cooling capacity	kW	28.8	31.4	34.5	39.9	42.9	47	50.7	57.2	61.8	47	53.1	57.6	63.9	68.9	76.7	82.6	90.1	98.4	108.1	114.3	137.8	149.9
SHR		1	1	1	0.98	1	0.99	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		4.85	4.98	4.59	5.41	5.17	4.94	4.67	5.34	5.07	5.61	5.29	4.83	5.1	4.61	5.23	5.01	4.71	5.18	4.97	4.65	4.49	4.34
Free-Cooling capacity	kW	25.6	26.3	26.4	34.5	34.5	35.7	36.6	50.9	50.9	46.9	47.9	50.9	50.9	53.9	61.1	62.7	63	80.4	82.6	85.2	112.7	113.3
SHR Free-Cooling		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total absorbed power	kW	7.1	7.4	8.7	8.9	9.8	11	12.4	13.4	14.9	11.1	12.6	14.6	15.2	17.6	17.9	19.8	22.4	24.3	27	29.9	36.2	40
Rated air flow	m³/h	8000	8000	8000	10800	10800	15500	10800	15000	10800	15500	15500	15500	15500	15500	18600	18600	18600	24500	24500	24500	31800	31800
Number of circuits		1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2
Number of compressors		1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	4	4
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	61	62		65	71	65	71	65				71			65			69			66	
Dimensions [LxHxD]	mm	1010x2000x890			1270x2000x890	1760x2000x890	1270x2000x890	1760x2000x890	1270x2000x890		1760x2000x890				2020x2000x890				2510x2000x890				3160x2000x960
Power supply	V/ph/Hz												400/3+N/50										

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.

Platform **TRF Evolution**

# TRF DX D/K/Q

DATA CENTER

INDUSTRIAL

## DUAL COOLING PERIMETER MOUNTED UNITS FOR DATA CENTERS

TREF DX D > 22.6-148.6 kW

TREF DX K > 23-152 kW

TREF DX Q > 26.7-170.2 kW



MULTI-PROTOCOL COMMUNICATION INTERFACE	SCROLL COMPRESSORS	EC RADIAL FANS
MODBUS CONTROLLED FANS	FAST RESTART	LOW GWP REFRIGERANT
ON-BOARD HUMIDIFIER	PLATE HEAT EXCHANGER	

*\* Mod. Q e K only*

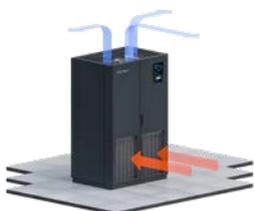
TRF DX D/K/Q units are Dual Cooling units. They combine the traditional evaporative coil of the cooling circuit with **the cooling effect of chilled water** coming from an outdoor unit such as a chiller. The use of a dual source guarantees the **continuity of supply to the system and the best operational solution in all cases, in order to minimize operating costs.**



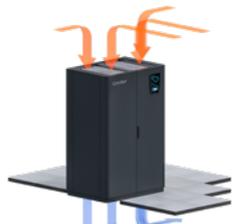
### Remote condensers

All TREF DX D units can be combined with HiRef remote condensers, choosing **from different combinations to meet all system needs.** **Oversize remote condensers** are ideal for warmer environments, where it is necessary to keep the condensing temperature under control, while **the compact condensers** on the other hand are small in terms of both size and consumption. The condensers, used with dual-circuit units, are available with a single cooling circuit for **maximum reliability and redundancy of the system** or with a double cooling circuit, to **reduce installation spaces and costs.**

### AIRFLOW CONFIGURATIONS



Upflow



Downflow



Displacement

- Refrigerant R410A: Also available with R513A and R134a
- EC Fans
- Scroll on/off compressors
- Advanced control comes as standard
- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Electronic expansion valves (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Long distance kits for optimal operation in the case of large distances between indoor and outdoor units (on request, available exclusively for Version D)



**Safety in the server room**

All models in the TRF DX D/K/Q range feature heat exchange coils with hydrophilic coating as standard. This special coating - together with an adequate selection of air through-flow speeds - **aids condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



**Efficiency**

The performance, reliability and efficiency of HiRef units are guaranteed **by using the best quality components and by cleverly designed internal and external layouts.**



**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards.**

**Maximum flexibility**

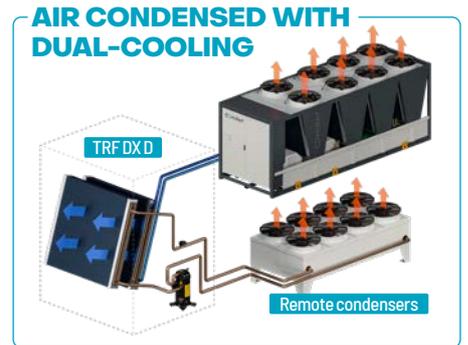
The Dual Cooling units combine **the reliability of a dual source with the ease of operation of HiRef cabinets.** The on-board control allows you to select the source according to different logics, at your discretion.

**Green**

HiRef is constantly committed to the search for **refrigerants with an ever-lower environmental impact.** The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for close control application. TRF DX D/K/Q units are available with R134a and R513A refrigerants.

**Dual circuit**

Double-circuit versions are already available at low power levels. This solution offers **maximum unit redundancy and ensures continuity of service, more precise refrigerating power and less absorption for partial Data Center loads.**



TRF DX D	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304
<b>Air temperature 24°C - Relative humidity 50% / Outdoor Air Temperature 35°C / Water temperature In 7°C Out 12°C</b>																						
Cooling capacity	kW																					
SHR	22.6	25	28.6	31.4	34.8	38.3	42.7	45.4	49.7	36.7	40.6	45.3	50.4	57	61.1	67.2	74.6	78.6	87.4	95.5	115.6	126.5
EER	1	0.97	0.91	1	1	0.9	0.89	1	0.95	1	1	1	0.92	0.9	0.97	0.91	0.86	0.96	0.92	0.87	0.89	0.83
Chilled water cooling capacity	kW																					
SHR Chilled water	3.84	3.83	3.8	4.14	4.24	4.01	4	4.19	4.05	4.44	3.91	3.86	3.83	3.81	4.06	3.98	3.9	4.14	3.93	3.93	3.89	3.68
Total absorbed power	29.1	29.1	29.1	40.8	40.8	40.8	40.8	58.5	58.5	58.5	58.7	58.5	58.5	70.2	70.2	70.2	92.5	92.5	92.5	128.9	128.9	
	0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.8	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.78	0.78
	7	7.7	8.6	9.1	9.7	11.1	12.2	13.5	15	11	12.9	14.4	15.8	17.6	18.3	20.1	22.4	24.3	27.5	29.6	35.2	39.9
<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C / Water temperature In 10°C Out 15°C</b>																						
Cooling capacity	kW																					
SHR	25.8	27.9	31.1	35.5	38.8	42.2	46.3	50.8	55	42.2	46.4	51.4	56.2	62	68	73.6	81.1	87.8	96	103.4	125.8	136
EER	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Chilled water cooling capacity	kW																					
SHR Chilled water	4.24	4.18	4.06	4.58	4.67	4.29	4.27	4.57	4.34	4.94	4.26	4.23	4.17	4.07	4.45	4.29	4.15	4.51	4.23	4.16	4.16	3.91
Total absorbed power	31.4	31.4	31.4	42.3	42.3	42.3	42.3	60.8	60.8	60.8	60.3	60.8	60.8	60.8	72.9	72.9	72.9	96.1	96.1	96.1	127.8	127.8
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	7.2	7.8	8.8	9.3	9.8	11.3	12.4	13.8	15.4	11.2	13.4	14.8	16.1	17.9	18.5	20.4	22.8	24.8	28	30.1	35.8	40.3
<b>Air temperature 35°C - Relative humidity 30% / Outdoor air temperature 35°C / Water temperature In 15°C Out 20°C</b>																						
Cooling capacity	kW																					
SHR	28.3	30.3	34.1	39	42.6	46.2	50.5	55.9	60.4	46.2	50.7	56.4	61.4	67.4	74.7	81	88.7	96.5	104.8	112.9	137.5	148.6
EER	1	1	1	1	1	1	1	1	1	1	0.99	1	1	1	1	1	1	1	1	1	1	1
Chilled water cooling capacity	kW																					
SHR Chilled water	4.56	4.42	4.39	4.94	5.09	4.59	4.58	4.93	4.7	5.27	4.56	4.49	4.47	4.33	4.76	4.67	4.44	4.88	4.48	4.46	4.47	4.21
Total absorbed power	31.6	31.6	31.6	42.7	42.7	42.7	42.7	61.2	61.2	61.2	60.7	61.2	61.2	61.2	73.5	73.5	73.5	96.8	96.8	96.8	128.7	128.7
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	7.3	8	8.9	9.4	9.9	11.6	12.5	14	15.6	11.4	13.7	15.3	16.4	18.3	19	20.6	23.2	25.1	28.7	30.6	36.2	40.8
Rated air flow	8000	8000	8000	10800	10800	15500	10800	15000	10800	15500	15500	15500	15500	15500	18600	18600	18600	24500	24500	24500	31800	31800
Number of circuits	1	1	1	1	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2
Number of compressors	1	1	1	1	1	2	1	2	1	2	1	2	2	2	2	2	2	2	2	2	4	4
Lp @ Nominal rpm ; dist.= 2 m Q=2	61	62		65		71	65	71	65		71				65			69				66
Dimensions [LxHxD]	1010x2000x890		x2000		x2000		x2000		x2000		x2000		1760x2000x890		2020x2000x890		2510x2000x890		x2000		x960	
Power supply	V/ph/Hz										400/3+N/50											

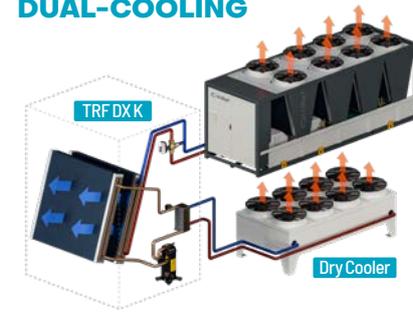
Performance data relating to Downflow versions with R410A refrigerant combined with standard HiRef remote condenser. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.

Platform **TRF Evolution**

# TRF DX D/K/Q

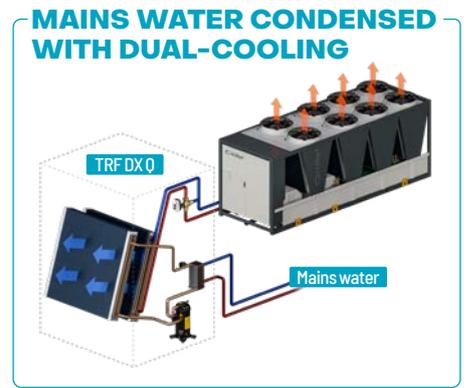


**WATER CONDENSED WITH DUAL-COOLING**



TRF DX K	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304	
<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C / Water temperature In 7°C Out 12°C</b>																							
Cooling capacity	kW	23	25.8	29.1	32.2	34.9	39.2	43.1	46.4	50.7	37.2	42	45.8	52.3	57.9	62.6	68.4	76.2	79.9	90.1	97.2	116.1	128.1
SHR		1	0.93	0.9	0.97	0.96	0.9	0.87	1	0.92	1	1	0.98	0.9	0.88	0.94	0.88	0.86	0.95	0.89	0.88	0.9	0.82
EER		4.05	4.2	4	4.48	4.3	4.29	4.14	4.45	4.31	4.63	4.38	4.04	4.29	4.01	4.4	4.26	4.16	4.36	4.3	4.12	3.93	3.83
Chilled water cooling capacity	kW	29.1	29.1	29.1	40.8	40.8	40.8	40.8	58.5	58.5	58.5	58.7	58.5	58.5	58.5	70.2	70.2	70.2	92.5	92.5	92.5	128.9	128.9
SHR Chilled water		0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.8	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.78	0.78
Total absorbed power	kW	6.8	7.3	8.4	8.7	9.6	10.7	11.9	13.1	14.5	10.7	12.2	14	14.9	17.1	17.5	19.3	21.6	23.6	26.2	28.9	35	38.9
<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 45°C / Water temperature In 10°C Out 15°C</b>																							
Cooling capacity	kW	26.5	29.1	31.9	36.6	39.3	43.3	47.1	52.6	57.1	43.2	48.7	52.8	58.6	63.1	70.2	76.1	82.9	90.1	99.2	105.5	127.2	138.2
SHR		1	1	1	0.98	1	0.99	1	1	1	1	1	1	1	1	1	1	1	1	0.99	1	1	0.99
EER		4.67	4.78	4.4	5.13	4.89	4.73	4.52	5.09	4.87	5.37	5.07	4.64	4.85	4.38	4.96	4.78	4.52	4.92	4.74	4.47	4.31	4.15
Chilled water cooling capacity	kW	31.4	31.4	31.4	42.3	42.3	42.3	42.3	60.8	60.8	60.8	60.3	60.8	60.8	60.8	72.9	72.9	72.9	96.1	96.1	96.1	127.8	127.8
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total absorbed power	kW	6.8	7.2	8.4	8.6	9.6	10.7	12	13	14.4	10.7	12.2	14.1	14.8	17.1	17.4	19.2	21.6	23.6	26.2	28.9	35	38.8
<b>Air temperature 35°C - Relative humidity 30% / Water 40°C - 45°C / Water temperature In 15°C Out 20°C</b>																							
Cooling capacity	kW	29.4	32.1	35.4	40.8	43.4	47.6	51.5	58.1	63.1	47.9	54	58.8	64.9	70	77.8	83.8	91.3	99.7	109.8	116.1	141.1	152
SHR		1	1	1	1	1	0.98	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
EER		5.19	5.35	4.92	5.8	5.48	5.24	4.96	5.67	5.42	5.97	5.62	5.17	5.44	4.9	5.56	5.32	4.99	5.5	5.29	4.94	4.82	4.6
Chilled water cooling capacity	kW	31.6	31.6	31.6	42.7	42.7	42.7	42.7	61.2	61.2	61.2	60.7	61.2	61.2	61.2	73.5	73.5	73.5	96.8	96.8	96.8	128.7	128.7
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total absorbed power	kW	6.8	7.1	8.3	8.6	9.4	10.6	11.9	12.9	14.3	10.7	12.2	14.1	14.6	17	17.3	19	21.6	23.4	26.1	28.8	34.8	38.6
Rated air flow	m <sup>3</sup> /h	8000	8000	8000	10800	10800	15500	10800	15000	10800	15500	15500	15500	15500	15500	18600	18600	18600	24500	24500	24500	31800	31800
Number of circuits		1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2
Number of compressors		1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	4	4
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	61	62		65		71	65	71	65				71				65		69			66
Dimensions [LxHxD]	mm	1010x2000x890			x2000	x2000	x2000	x2000	x2000	x2000	1760x2000x890				2020x2000x890			2510x2000x890			x2000	x960	
Power supply	V/ph/Hz											400/3+N/50											

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.



TRF DX Q	0241	0261	0291	0331	0361	0391	0441	0481	0521	0382	0432	0492	0532	0602	0632	0682	0762	0802	0872	0962	1204	1304	
<b>Air temperature 24°C - Relative humidity 50% / Water 15°C - 30°C / Water temperature In 7°C Out 12°C</b>																							
Cooling capacity	kW	26.7	29.6	33.2	36.8	39.7	44.2	49.1	53.3	58.3	42.9	48.8	53.5	59.8	65.9	71.1	77.4	86	90.9	103.5	110.4	134.6	147.7
SHR		0.93	0.88	0.83	0.93	0.91	0.82	0.81	0.93	0.88	1	0.96	0.92	0.85	0.82	0.9	0.84	0.82	0.88	0.84	0.81	0.85	0.78
EER		6.46	7.08	6.54	7.5	7.15	6.97	6.76	7.49	7.07	7.38	6.99	6.47	7.14	6.45	7.13	6.89	6.56	7.2	7.14	6.61	6.66	6.47
Chilled water cooling capacity	kW	29.1	29.1	29.1	40.8	40.8	40.8	40.8	58.5	58.5	58.5	58.7	58.5	58.5	58.5	70.2	70.2	70.2	92.5	92.5	92.5	128.9	128.9
SHR Chilled water		0.82	0.82	0.82	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.8	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.78	0.78
Total absorbed power	kW	5.3	5.3	6.2	6.4	7.1	7.9	8.8	9.8	10.9	8.5	9.5	11	11.1	12.9	13.2	14.5	16.4	17.9	19.8	22	25.7	28.3
<b>Air temperature 30°C - Relative humidity 35% / Water 15°C - 30°C / Water temperature In 10°C Out 15°C</b>																							
Cooling capacity	kW	29.7	32.3	35.6	41.2	43.7	48	52.5	59	63.8	49.3	55.2	59.7	65.4	70.5	78.3	83.3	91.3	100.2	110.6	118.1	144	156.8
SHR		1	1	1	1	1	1	0.99	1	1	1	1	1	0.99	1	1	0.96	1	0.98	0.98	1	0.93	0.93
EER		7.2	8.01	7.13	8.75	8.11	7.74	7.31	8.56	7.9	8.49	7.88	7.21	8.07	7.02	8.08	7.55	7.05	8.23	7.75	7.15	7.27	6.97
Chilled water cooling capacity	kW	31.4	31.4	31.4	42.3	42.3	42.3	42.3	60.8	60.8	60.8	60.3	60.8	60.8	60.8	72.9	72.9	72.9	96.1	96.1	96.1	127.8	127.8
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total absorbed power	kW	5.3	5.2	6.1	6.2	6.9	7.7	8.7	9.6	10.8	8.5	9.6	11	10.8	12.7	12.9	14.3	16.2	17.5	19.6	21.8	25.3	28
<b>Air temperature 35°C - Relative humidity 30% / Water 15°C - 30°C / Water temperature In 15°C Out 20°C</b>																							
Cooling capacity	kW	32.9	35.5	39.1	45.2	48	52.4	56.9	65.1	70	54.4	61.1	66	71.9	77	85.5	91.7	99.8	110	122.4	128	157.1	170.2
SHR		1	1	1	1	1	0.99	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.98
EER		7.96	9.26	8.08	10.1	9.28	8.74	8.07	9.86	8.88	9.4	8.72	7.97	9.32	7.9	9.2	8.59	7.89	9.47	8.85	7.87	8.19	7.78
Chilled water cooling capacity	kW	31.6	31.6	31.6	42.7	42.7	42.7	42.7	61.2	61.2	61.2	60.7	61.2	61.2	61.2	73.5	73.5	73.5	96.8	96.8	96.8	128.7	128.7
SHR Chilled water		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total absorbed power	kW	5.3	5	6	6	6.7	7.5	8.6	9.3	10.6	8.5	9.6	11	10.4	12.4	12.6	13.9	15.9	16.9	19.1	21.6	24.7	27.4
Rated air flow	m <sup>3</sup> /h	8000	8000	8000	10800	10800	15500	10800	15000	10800	15500	15500	15500	15500	15500	18600	18600	18600	24500	24500	24500	31800	31800
Number of circuits		1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	2	2
Number of compressors		1	1	1	1	1	2	1	2	1	1	2	1	2	2	2	2	2	2	2	2	4	4
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	61	62		65	71	65	71	65				71			65			69			66	
Dimensions [LxHxD]	mm	1010x2000x890			x2000x890		1270x890	1760x890	1270x890	1760x890	1270x890	1760x2000x890			2020x2000x890			2510x2000x890			x2000x960		
Power supply	V/ph/Hz											400/3+N/50											

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Height of model Displacement 2250 mm.

DATA CENTER

INDUSTRIAL

# JREF CW

## Radial

CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS

14.6–32.9 kW



 MULTI-PROTOCOL COMMUNICATION INTERFACE	 EC RADIAL FANS	 MODBUS CONTROLLED FANS
 FAST RESTART	 ON-BOARD HUMIDIFIER	 DOUBLE CIRCUIT

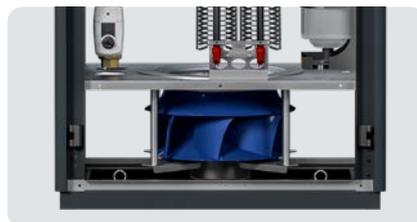
The JREF CW Radial series perimeter mounted units are chilled water units with EC radial fans for small-sized premises such as server rooms and labs or for applications where **accurate control of thermo-hygro-metric parameters and round-the-clock operation are required**. In-depth CFD (computational fluid dynamics) analysis has allowed for the meticulous design of every last constructive detail to **minimise air pressure drops and, therefore, fan power consumption**. Air through-flow sections have been expanded to make **installation and maintenance operations faster and easier**.

- Temperature control through heating and post-heating systems using electric heating elements, additional hot water coil, or both (optional)
- Humidity control through dehumidification and humidification (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Instant reading of water flow rate, water inlet and outlet temperatures, or supplied cooling capacity (optional)



### Extended filter section

Air filters, located on the entire surface of the coil, **maximize the filtering section and minimize the unit's air pressure drops**.



### Ventilation adjustment

Depending on the air distribution logic in the server room, it is possible to adjust the machine on-board ventilation system to ensure **a constant air flow rate** (airflow control) or **a constant available overpressure ( $\Delta P$  control)**. The latter is particularly useful if a floating floor is used.

### AIRFLOW CONFIGURATIONS



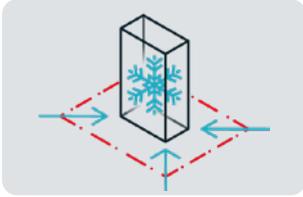
Upflow



Downflow



Displacement

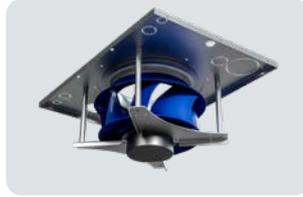


**High power density**

The reduced footprint and high efficiency **offer higher cooling capacity**. In this way **the space dedicated to the units in the Data Center is minimized, making the most of available spaces**.

**Double circuit**

Chilled water units are also available with a double circuit. In this version the supply is **via two different hydraulic circuits** that can offer the **utmost operational continuity if one of the two circuits malfunctions**. Each circuit is equipped with a regulating valve



**Ventilation EC**

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant  $\Delta P$  and  $\Delta T$ . Their accurate adjustment allows an efficient use of power for ventilation and **a consequent reduction of the system's PUE**. Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions**.



**Finned pack coil with hydrophilic coating**

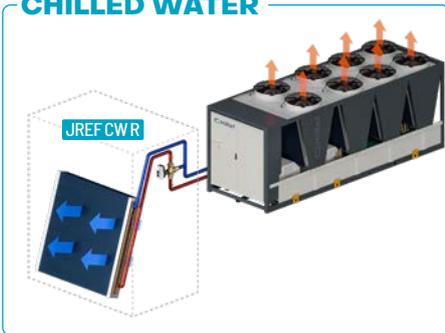
All models in the JREF CW Radial range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit**.



**Accurate regulation with multiple types of valves**

All units in the JREF CW Radial range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system or with servo motor with spring return. Pressure-independent valves can also be fitted on request. All these types of valves ensure **the utmost adjustment accuracy while maintaining the system's hydronic balance**.

**CHILLED WATER**



**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards**.



JREF CW R		0150	0170	0210	0250	0270	0320
<b>Air temperature 24°C - Relative humidity 50% / Water temperature In 7°C Out 12°C</b>							
Cooling capacity	kW	14.6	17	21.2	24.8	27.2	31.7
SHR		0.9	0.88	0.8	0.84	0.86	0.8
EER		19.55	21.34	23.96	20.79	23.17	27.54
<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>							
Cooling capacity	kW	17.7	20.2	21.9	27.4	31.4	32.9
SHR		1	1	1	1	1	0.99
EER		23.62	25.33	24.83	22.98	26.72	28.56
<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>							
Cooling capacity	kW	17.8	20.3	22	27.6	31.5	32.9
SHR		1	1	1	1	1	1
EER		23.84	25.46	24.86	23.14	26.83	28.59
Rated air flow	m <sup>3</sup> /h	4130	4130	4130	6130	6060	5930
Total fan absorbed power	kW	0.8	0.8	0.9	1.2	1.2	1.1
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	59	60	61		62	
Dimensions [LxHxD]	mm	600x2000x600			900x2000x600		
Power supply	V/ph/Hz				400/3+N/50		

Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Height of model Displacement 2100 mm.

DATA CENTER

INDUSTRIAL

# JREF DX A

## Radial

**AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS**

6.5-24.9 kW



LOW GWP REFRIGERANT	MULTI-PROTOCOL COMMUNICATION INTERFACE	SCROLL COMPRESSORS
EC RADIAL FANS	MODBUS CONTROLLED FANS	FAST RESTART
ON-BOARD HUMIDIFIER	MODULATING HOT GAS POST-HEATING	

The JREF DX Radials series perimeter mounted units are direct expansion units with EC radial fans designed to be installed in small-sized premises such as server rooms and labs or for applications where **accurate control of thermo-hygrometric parameters and round-the-clock operation are required**. The top priority for internal design and for the choice of components is **energy efficiency** - to **optimise the system overall electricity consumption** with a positive impact on the Data Center Power Usage Effectiveness (PUE).

### Versatile and flexible range

It is available with different cooling configurations:

**JREF A** Air condensed units with remote condenser

**JREF Z** Mains water condensed units (15°C) with on board plate condenser

**JREF W** Dry Cooler water condensed units (15°C) with on board plate condenser

The JREF DX A Radial units are air-condensed perimeter-mounted units in the JREF range; they are widely used for the cooling of Data Centers. The air-condensed solution offers **a simple system design**, thanks to the absence of auxiliary circuits and pumps; the cooling circuit is managed by the cabinet, and both the indoor unit and the remote condenser are **easy to install**.

### AIRFLOW CONFIGURATIONS



Upflow



Downflow



Displacement

- Refrigerant R410A: Also available with R513A and R134a
- EC Fans
- Scroll on/off compressors
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Electronic expansion valves (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Long distance kits for optimal operation in the event of large distances between indoor and outdoor units (on request)



**Safety in the server room**

All models in the JREF DX A Radial range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**

**Green**

HiRef is constantly committed to the search for refrigerants that have an increasingly reduced environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for the "close control" application. JREF DX A Radial units are available with R134a and R513A refrigerants.



**Ventilation EC**

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant  $\Delta P$  and  $\Delta T$ . Their accurate adjustment allows an efficient use of power for ventilation and **a consequent reduction of the system's PUE.** Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions.**



**Efficiency**

The performance, reliability and efficiency of HiRef units are guaranteed **by using the best quality components and by cleverly designed internal and external layouts.**



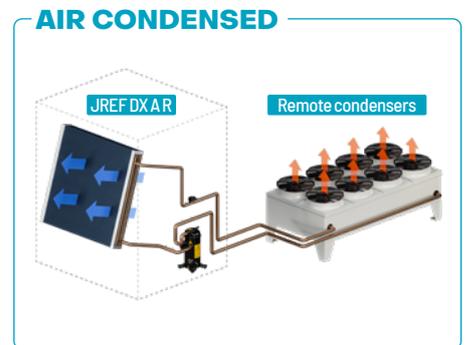
**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards.**



**Remote condensers**

All units can be combined with HiRef remote condensers, choosing from **different combinations to meet all system needs. Oversize remote condensers** are ideal for warmer environments, where it is necessary to keep the condensing temperature under control, while **the compact condensers** on the other hand are small in terms of both size and consumption. The condensers, used with dual-circuit units, are available with a single cooling circuit for **maximum reliability and redundancy of the system** or with a double cooling circuit, **to reduce installation spaces and costs.**



JREF DX A R		0060	0080	0100	0110	0130	0160	0190	0205	0212
<b>Air temperature 24°C - Relative humidity 50% / Outdoor Air Temperature 35°C</b>										
Cooling capacity	kW	6.5	8.6	10.8	11.9	13.8	16.7	19.7	22.6	22.8
SHR		0.99	0.94	0.98	0.97	0.89	1	0.95	0.89	0.88
EER		3.49	4.76	3.92	3.89	3.38	3.83	3.82	4.12	3.79
Total absorbed power	kW	2	2	3	3.3	4.5	5.2	6	6.3	6.8
<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>										
Cooling capacity	kW	7.1	9.4	12.1	13.4	15.2	18.9	22.1	24.7	24.9
SHR		1	1	1	1	1	1	1	1	1
EER		3.71	5.14	4.33	4.32	3.63	4.17	4.16	4.43	4.09
Total absorbed power	kW	2	2	3.1	3.4	4.6	5.4	6.1	6.4	6.9
Rated air flow	m <sup>3</sup> /h	1785	2150	3530	3530	3700	5100	5100	5100	5100
Number of circuits		1	1	1	1	1	1	1	1	2
Number of compressors		1	1	1	1	1	1	1	1	2
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	49	50		53		54		56	
Dimensions [LxHxD]	mm	600x1875x600				900x1875x600				
Power supply	V/ph/Hz					400/3+N/50				

Performance data relating to Downflow versions with R410A refrigerant combined with standard HiRef remote condenser. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

DATA CENTER

INDUSTRIAL

# JREF DX W/Z

## Radial

**WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS**

JREF DX W > 6.6–24.2 kW

JREF DX Z > 7.3–26.5 kW



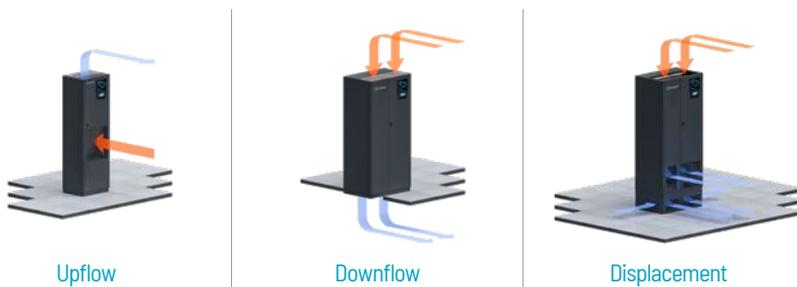
 LOW GWP REFRIGERANT	 MULTI-PROTOCOL COMMUNICATION INTERFACE	 SCROLL COMPRESSORS
 EC RADIAL FANS	 MODBUS CONTROLLED FANS	 FAST RESTART
 ON-BOARD HUMIDIFIER	 MODULATING HOT GAS POST-HEATING	 PLATE HEAT EXCHANGER

JREF W Radial units are water-condensed perimeter-mounted cabinets and they use Dry Cooler water. The JREF units of this series are “monobloc” units inside which **the entire cooling circuit is concentrated**. Cooling is via a **brazed plate exchanger made of stainless steel AISI 304**.

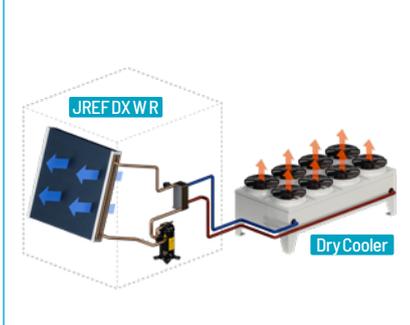
JREF Z Radial units are water-condensed perimeter-mounted cabinets they use low temperature mains water or groundwater (15°C). The JREF units of this series are “monobloc” units inside which **the entire cooling circuit is concentrated**. Cooling is via a **brazed plate exchanger made of stainless steel AISI 304**.

- Refrigerant R410A: Also available with R513A and R134a
- EC Fans
- Scroll on/off compressors
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Electronic expansion valves (optional)

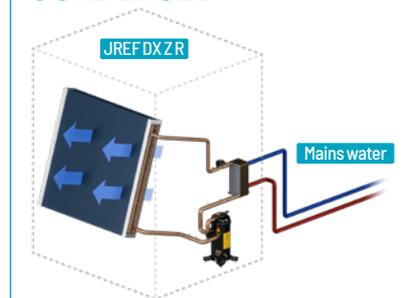
### AIRFLOW CONFIGURATIONS



### WATER CONDENSED



### MAINS WATER CONDENSED





### Safety in the server room

All models in the JREF W/Z Radial range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



### Ventilation EC

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant  $\Delta P$  and  $\Delta T$ . Their accurate adjustment allows an efficient use of power for ventilation and **a consequent reduction of the system's PUE.** Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions.**



### Efficiency

The performance, reliability and efficiency of HiRef units are guaranteed **by using the best quality components and by cleverly designed internal and external layouts.**



### Easier scheduled maintenance

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards.**

### Green

HiRef is constantly committed to the search for refrigerants that have an increasingly reduced environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for the "close control" application. All JREF W/Z Radial units are available with R134a and R513A refrigerants.



JREF DX W R	0060	0080	0100	0110	0130	0160	0190	0205	0212	
<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C</b>										
Cooling capacity	6.6	8	10.5	11.5	13.6	16.3	18.9	20.8	22	
SHR	0.98	0.98	1	0.98	0.91	1	0.97	0.93	0.9	
EER	3.82	3.78	3.54	3.54	3.18	3.66	3.45	3.17	3.35	
Total absorbed power	1.9	2.3	3.2	3.5	4.7	5.3	6.3	7.4	7.4	
<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 45°C</b>										
Cooling capacity	7.3	8.8	11.8	13.2	15.1	18.7	21.5	23.1	24.2	
SHR	1	1	1	1	1	1	1	1	1	
EER	4.12	4.17	4	4.04	3.49	4.17	3.88	3.48	3.69	
Total absorbed power	1.9	2.3	3.2	3.5	4.7	5.3	6.4	7.5	7.4	
Rated air flow	1785	2150	3530	3530	3700	5100	5100	5100	5100	
Number of circuits	1	1	1	1	1	1	1	1	2	
Number of compressors	1	1	1	1	1	1	1	1	2	
Lp @ Nominal rpm ; dist.= 2 m Q=2	49	50	53		54	55		56		
Dimensions [LxHxD]	600x1875x600				900x1875x600					
Power supply					400/3+N/50					

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

JREF DX Z R	0060	0080	0100	0110	0130	0160	0190	0205	0212	
<b>Air temperature 24°C - Relative humidity 50% / Water 15°C - 30°C</b>										
Cooling capacity	7.3	9.1	11.7	12.8	15.7	19.1	22.2	24.1	24.5	
SHR	0.89	0.89	0.94	0.92	0.86	0.93	0.9	0.86	0.85	
EER	5.99	6.07	5.21	5.01	5.03	5.8	5.53	4.99	4.74	
Total absorbed power	1.3	1.7	2.5	2.8	3.5	4.1	4.8	5.7	6	
<b>Air temperature 30°C - Relative humidity 35% / Water 15°C - 30°C</b>										
Cooling capacity	7.8	9.9	12.9	14.3	16.8	21.2	24.3	25.9	26.5	
SHR	1	1	1	1	1	1	1	1	1	
EER	6.39	6.55	5.73	5.57	5.37	6.39	5.97	5.34	5.14	
Total absorbed power	1.3	1.7	2.5	2.9	3.5	4.2	4.9	5.7	6	
Rated air flow	1785	2150	3530	3530	3700	5100	5100	5100	5100	
Number of circuits	1	1	1	1	1	1	1	1	2	
Number of compressors	1	1	1	1	1	1	1	1	2	
Lp @ Nominal rpm ; dist.= 2 m Q=2	49	50	53		54	55		56		
Dimensions [LxHxD]	600x1875x600				900x1875x600					
Power supply					400/3+N/50					

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

DATA CENTER

INDUSTRIAL

# JREF CW

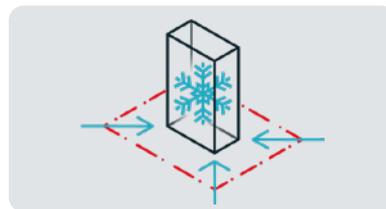
## Centrifugal

CHILLED WATER PERIMETER MOUNTED UNITS FOR DATA CENTERS

6.9-23.8 kW



The JREF CW Centrifugal series perimeter mounted units are chilled water units with AC centrifugal fans for small-sized premises such as server rooms and labs or for applications where **accurate control of thermo-hygrometric parameters and round-the-clock operation are required**. The internal design and the choice of components are primarily aimed at **ensuring a compact design to make unit installation as easy as possible**.



### High power density

The reduced footprint and high efficiency offer **higher cooling capacity**. In this way **the space dedicated to the units in the Data Center is minimized, making the most of available spaces**.

### Double circuit

Chilled water units are also available with a double circuit. In this version the supply is **via two different hydraulic circuits** that can offer the **utmost operational continuity if one of the two circuits malfunctions**. Each circuit is equipped with a regulating valve

- Temperature control through heating and post-heating systems using electric heating elements, additional hot water coil, or both (optional)
- Humidity control through dehumidification and humidification (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Instant reading of water flow rate, water inlet and outlet temperatures, or supplied cooling capacity (optional)





**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This makes **routine maintenance easier in full compliance with safety standards.**



**Finned pack coil with hydrophilic coating**

All models in the JREF CW Centrifugal range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



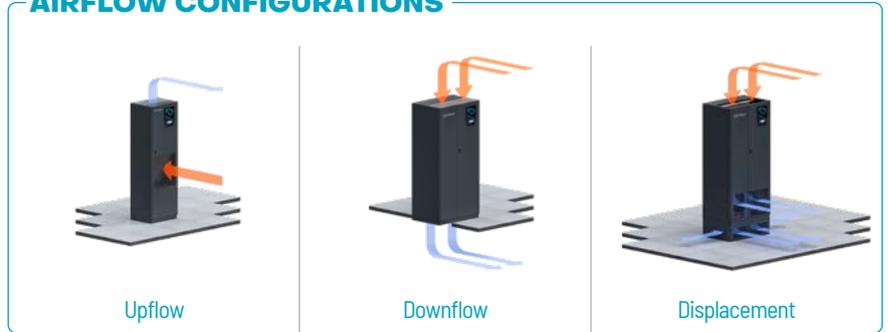
**Accurate regulation with multiple types of valves**

All units in the JREF CW Centrifugal range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system or with servo motor with spring return. Pressure-independent valves can also be fitted on request. All these types of valves ensure **the utmost adjustment accuracy while maintaining the system's hydronic balance.**

**CHILLED WATER**



**AIRFLOW CONFIGURATIONS**



JREF CW C		0080	0110	0140	0160	0200	0230
<b>Air temperature 24°C - Relative humidity 50% / Water temperature In 7°C Out 12°C</b>							
Cooling capacity	kW	6.9	10	12.8	14.5	18.7	20.8
SHR		0.87	0.85	0.88	0.87	0.88	0.85
EER		31.27	35.76	22.84	25.83	27.86	31.06
<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>							
Cooling capacity	kW	8.8	10.7	15.3	17	21.8	23.7
SHR		0.94	1	1	1	1	1
EER		40	38.09	27.34	30.44	32.53	35.35
<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>							
Cooling capacity	kW	8.9	10.7	15.4	17.1	22	23.8
SHR		0.94	1	1	1	1	1
EER		40.25	38.24	27.53	30.56	32.77	35.49
Rated air flow	m <sup>3</sup> /h	1785	2150	3530	3470	5115	4990
Total fan absorbed power	kW	0.2	0.3	0.6	0.6	0.7	0.7
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	48	50	51		52	
Dimensions [LxHxD]	mm	600x1875x449		900x1875x449		1200x1875x449	
Power supply	V/ph/Hz			400/3+N/50			



Performance data relating to Downflow versions. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

DATA CENTER

INDUSTRIAL

# JREF DX A

## Centrifugal

AIR CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS

6.5-24.4 kW



 MULTI-PROTOCOL COMMUNICATION INTERFACE	 SCROLL COMPRESSORS
 FAST RESTART	 ON-BOARD HUMIDIFIER
 CENTRIFUGAL FANS	 MODULATING HOT GAS POST-HEATING
 LOW GWP REFRIGERANT	

The JREF DX Centrifugal units are direct expansion units with centrifugal AC fans designed to be installed in small-sized premises such as server rooms and labs or for applications where **accurate control of thermo-hygrometric parameters and round-the-clock operation are required**. The internal design and the choice of components are primarily aimed at **ensuring a compact design to make unit installation as flexible as possible**.

JREF DX A Centrifugal units are air-condensed perimeter-mounted units in the JREF range; they are widely used for the cooling of Data Centers. The air-condensed solution offers **simple system design**, thanks to the absence of auxiliary circuits and pumps; the cooling circuit is managed by the cabinet, and both the indoor unit and the remote condenser are **easy to install**.

### Versatile and flexible range

The JREF DX range is available with different refrigeration configurations:

**JREF A**

Air condensing with remote condenser

**JREF W**

Dry Cooler or Evaporative tower water condensing

**JREF Z**

Mains water condensing (15°C)

- Refrigerant R410A: Also available with R513A and R134a
- Scroll on/off compressors
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Electronic expansion valves (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Long distance kits for optimal operation in the event of large distances between indoor and outdoor units (on request)



### Easier scheduled maintenance

The unit has been painstakingly designed to ensure frontal access to components even with the units running. This makes **routine maintenance easier in full compliance with safety standards**.



### Efficiency

The performance, reliability and efficiency of HiRef units are guaranteed **by using the best quality components and by cleverly designed internal and external layouts**.



**Safety in the server room**

All models in the JREF DX A Centrifugal range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**

**Green**

HiRef is constantly committed to the search for refrigerants that have an increasingly reduced environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for the "close control" application. All JREF DX A Centrifugal units are available with R134a and R513A refrigerants.

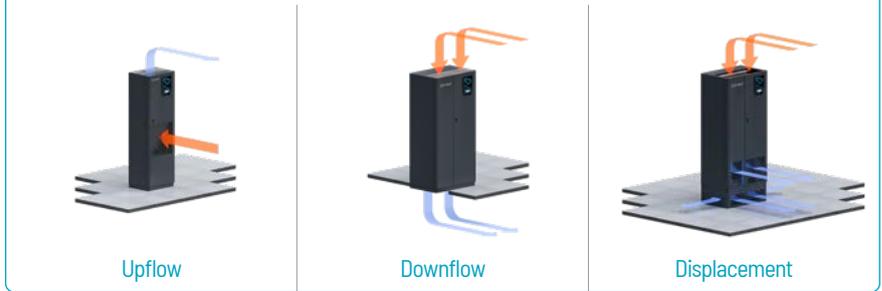


**Remote condensers**

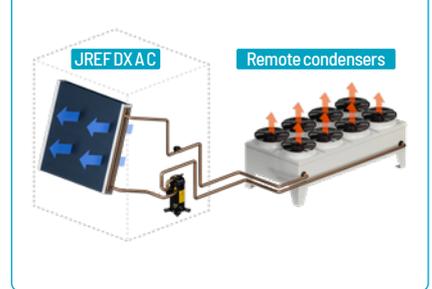
All units can be combined with HiRef remote condensers, choosing from **different combinations to meet all system needs. Oversize remote condensers** are ideal for warmer environments, where it is necessary to keep the condensing temperature under control, while **the compact condensers** on the other hand are small in terms of both size and consumption. The condensers, used with dual-circuit units, are available with a single cooling circuit for **maximum reliability and redundancy of the system** or with a double cooling circuit, **to reduce installation spaces and costs.**



**AIRFLOW CONFIGURATIONS**



**AIR CONDENSED**



JREF DX A C	0060	0080	0100	0110	0130	0160	0190	0205		
<b>Air temperature 24°C - Relative humidity 50% / Outdoor Air Temperature 35°C</b>										
Cooling capacity	kW	6.5	8.6	11.2	12.3	14.6	16.2	19.7	22.6	
SHR		0.99	0.94	0.99	0.95	0.9	0.98	0.94	0.87	
EER		3.52	4.79	4.06	4.01	3.53	3.71	3.82	4.12	
Total absorbed power	kW	2.1	2.1	3.3	3.6	4.7	5	5.8	6.2	
<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>										
Cooling capacity	kW	7.1	9.4	12.4	13.7	16	18.3	21.9	24.4	
SHR		1	1	1	1	1	1	1	1	
EER		3.7	5.19	4.43	4.39	3.79	4.08	4.12	4.39	
Total absorbed power	kW	2.2	2.1	3.4	3.7	4.8	5.2	6	6.2	
Rated air flow	m³/h	1785	2150	3690	3530	3470	5115	4990	4990	
Number of circuits		1	1	1	1	1	1	1	1	
Number of compressors		1	1	1	1	1	1	1	1	
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	46		48		49		51	53	
Dimensions [LxHxD]	mm	600x1875x449			900x1875x449			1200x1875x449		
Power supply	V/ph/Hz								400/3+N/50	

Performance data relating to Downflow versions with R410A refrigerant combined with standard HiRef remote condenser. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

DATA CENTER

INDUSTRIAL

# JREF DX W/Z

## Centrifugal



### WATER CONDENSED PERIMETER MOUNTED UNITS FOR DATA CENTERS

JREF DX W > 6.7-23.7 kW

JREF DX Z > 7.4-27.7 kW

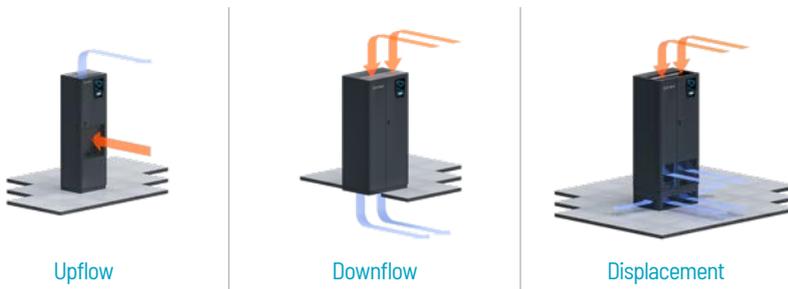
 MULTI-PROTOCOL COMMUNICATION INTERFACE	 SCROLL COMPRESSORS	 FAST RESTART
 ON-BOARD HUMIDIFIER	 PLATE HEAT EXCHANGER	 CENTRIFUGAL FANS
 MODULATING HOT GAS POST-HEATING	 LOW GWP REFRIGERANT	

JREF W Centrifugal units are water-condensed perimeter-mounted cabinets, and they use Dry Cooler water. The JREF units of this series are “monobloc” units inside which **the entire cooling circuit is concentrated**. Cooling is via a **brazed-plate exchanger made of stainless steel AISI 304**. All W units can be paired with **HiRef Dry Coolers**.

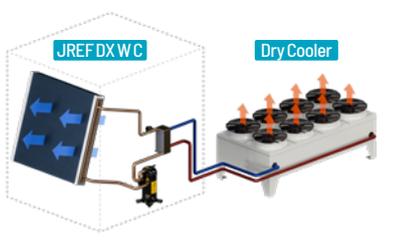
JREF Z Centrifugal units are water-condensed perimeter-mounted cabinets, and they use low temperature mains water or groundwater (15°C). The JREF units of this series are “monobloc” units inside which **the entire cooling circuit is concentrated**. Cooling is via a **brazed plate exchanger made of stainless steel AISI 304**.

- Refrigerant R410A: Also available with R513A and R134a
- Scroll on/off compressors
- Temperature control through heating and post-heating systems with electric heating elements, hot water and hot gas (optional)
- Humidity control through dehumidification and humidification (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)
- Broad choice of accessories, including base modules and plenums for ducting
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Electronic expansion valves (optional)

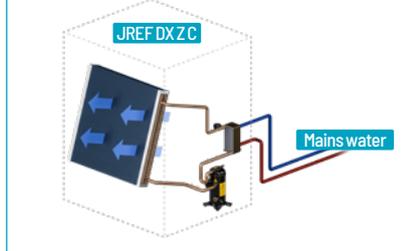
#### AIRFLOW CONFIGURATIONS



#### WATER CONDENSED



#### MAINS WATER CONDENSED





**Efficiency**

The performance, reliability and efficiency of HiRef units are guaranteed **by using the best quality components and by cleverly designed internal and external layouts.**



**Safety in the server room**

All models in the JREF W/Z Centrifugal range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components even with the units running. This makes **routine maintenance easier in full compliance with safety standards.**

**Green**

HiRef is constantly committed to the search for refrigerants that have an increasingly reduced environmental impact. The use of ASHRAE Class A1 refrigerants, non-toxic and non-flammable, is essential for the "close control" application. All JREF W/Z Centrifugal units are available with R134a and R513A refrigerants.



JREF DX W C		0060	0080	0100	0110	0130	0160	0190	0205	
<b>Air temperature 24°C - Relative humidity 50% / Water 40°C - 45°C</b>										
Cooling capacity	kW	6.7	8.1	11	12.1	14.9	16.3	19.8	21.8	
SHR		0.97	0.97	0.99	0.97	0.9	0.98	0.94	0.89	
EER		3.91	3.92	3.82	3.81	3.66	3.91	3.9	3.63	
Total absorbed power	kW	1.9	2.4	3.4	3.7	4.6	4.8	5.7	6.7	
<b>Air temperature 30°C - Relative humidity 35% / Water 40°C - 45°C</b>										
Cooling capacity	kW	7.4	9	12.3	13.6	16.3	18.4	22	23.7	
SHR		1	1	1	1	1	1	1	1	
EER		4.25	4.38	4.32	4.33	4	4.42	4.33	3.95	
Total absorbed power	kW	2	2.3	3.4	3.7	4.6	4.8	5.7	6.7	
Rated air flow	m <sup>3</sup> /h	1785	2150	3690	3530	3470	5115	4990	4990	
Number of circuits		1	1	1	1	1	1	1	1	
Number of compressors		1	1	1	1	1	1	1	1	
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	46		48	49	51	52		53	
Dimensions [LxHxD]	mm	600x1875x449			900x1875x449			1200x1875x449		
Power supply	V/ph/Hz	400/3+N/50								

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

JREF DX Z C		0060	0080	0100	0110	0130	0160	0190	0205	
<b>Air temperature 24°C - Relative humidity 50% / Water 15°C - 30°C</b>										
Cooling capacity	kW	7.4	9.3	12.4	14	17.1	19.5	23.7	25.8	
SHR		0.89	0.88	0.92	0.89	0.84	0.88	0.86	0.82	
EER		6.29	6.5	6.02	5.84	5.78	6.35	6.39	5.9	
Total absorbed power	kW	1.4	1.7	2.6	3	3.5	3.7	4.4	5	
<b>Air temperature 30°C - Relative humidity 35% / Water 15°C - 30°C</b>										
Cooling capacity	kW	8	10.1	13.5	15.5	18.3	21.4	25.5	27.7	
SHR		1	1	1	1	1	1	1	0.99	
EER		6.81	7.07	6.59	6.51	6.2	6.94	6.88	6.32	
Total absorbed power	kW	1.4	1.7	2.6	2.9	3.5	3.7	4.4	5	
Rated air flow	m <sup>3</sup> /h	1785	2150	3690	3530	3470	5115	4990	4990	
Number of circuits		1	1	1	1	1	1	1	1	
Number of compressors		1	1	1	1	1	1	1	1	
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	46		48	49	51	52		53	
Dimensions [LxHxD]	mm	600x1875x449			900x1875x449			1200x1875x449		
Power supply	V/ph/Hz	400/3+N/50								

Performance data relating to Downflow versions with R410A refrigerant. | Also available with 60 Hz power supply. | Model height Displacement 2125 mm.

DATA CENTER

# FanWall

## FANWALL AIR CONDITIONERS CHILLED WATER OR DIRECT EXPANSION VERSIONS FOR HIGH DENSITY HYPERSCALE DATA CENTER

44.9–460.6 kW



 MULTI-PROTOCOL COMMUNICATION INTERFACE	 EC RADIAL FANS	 MODBUS CONTROLLED FANS	 PRESSURE INDEPENDENT VALVE (PICV)
 FAST RESTART	 VARIABLE GEOMETRY COIL (FLEXY)	 DOUBLE CIRCUIT	

Our chilled water FanWall HBCV series air conditioners are designed for technological environments where a **compact footprint is a requirement - without any impact on these units' cooling output capacity**. An in-depth CFD (computational fluid dynamics) analysis has allowed every last constructive detail to be designed so as **to minimise internal airflow pressure drops and, therefore, fan power consumption**. At the same time, the large surface of the finned pack exchanger **minimises the approach temperatures between inlet air and outlet water, maximising system efficiency**.



### Ventilation EC 2.0

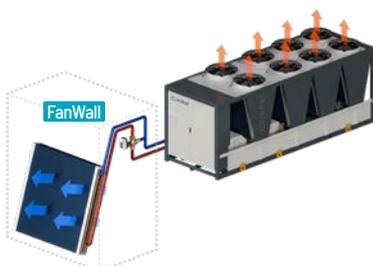
The use of standard-equipment EC plug fans across the whole range - designed to adjust the air flow according to the thermal load - results in efficient use of the electricity for ventilation purposes, **with a positive impact on the system PUE**. Extended range speed adjustment is carried out via MODBUS protocol. The emergency speed function allows for fan operation consistency **even in the event of microprocessor malfunctions**.

### Maximum possible redundancy

To ensure system operation continuity, the FanWall HBCV range makes it possible to have a **fully redundant refrigeration circuit**: a double coil and double water adjustment valve allow the server room to be cooled **even when either circuit fails**.

- Stainless steel condensate drain pan
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Constant-flow ventilation modulation (Airflow Control), optional
- Double power supply with automatic switch (on request)
- Instantaneous reading of the supplied cooling capacity (optional)

### CHILLED WATER



### Finned pack coil with hydrophilic coating

All models in the FanWall HBCV range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection and outflow during the dehumidification process, preventing any dripping on the inside and outside of the unit.**

### Accurate regulation with multiple types of valves

The adjustment valve with 0-10V servomotor (standard on the whole range) can be obtained in a 2-way (requires variable flow system) or 3-way version. The other versions available with configurator are those with spring return servomotor or independent pressure valves. The flow control performance of this type of valve guarantees **adjustment accuracy, while at the same time maintaining the hydronic balance in the system.**

### Ventilation adjustment

Depending on the air distribution logic in the server room, it is possible to adjust the machine on-board ventilation system to ensure **a constant air flow rate** (airflow control) **or a constant available overpressure** ( $\Delta P$  control). The latter is particularly useful if a floating floor is used.

### Easier scheduled maintenance

The unit has been designed with the utmost care to grant front (air inlet side) access to internal components even with the units running. This makes **routine maintenance easier in full compliance with safety standards.**

### Blown finned coil

According to a specific design choice, this finned coil is installed downstream of the fans. This ensures a more even distribution of the delivery air to the racks, **minimising turbulence in the air flow.**



FanWall		051	102	121	171	242	342
<b>Geometry B</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 18°C</b>					
Cooling capacity	kW	48.5	97	118.2	173.4	236.4	346.8
SHR		1	1	1	1	1	1
EER		69.3	69.29	62.21	59.79	62.21	59.79
<b>Geometry C</b>		<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 22°C</b>					
Cooling capacity	kW	44.9	89.8	110.2	164.4	220.4	328.8
SHR		1	1	1	1	1	1
EER		64.1	64.1	58	56.7	58	56.7
<b>Geometry B</b>		<b>Air temperature 35°C - Relative humidity 25% / Water temperature In 10°C Out 18°C</b>					
Cooling capacity	kW	63.7	127.4	157.1	230.3	314.2	460.6
SHR		1	1	1	1	1	1
EER		91	91	82.68	79.41	82.68	79.41
<b>Geometry C</b>		<b>Air temperature 35°C - Relative humidity 25% / Water temperature In 10°C Out 22°C</b>					
Cooling capacity	kW	60.6	121.2	148.9	219.8	297.8	439.6
SHR		1	1	1	1	1	1
EER		86.6	86.6	78.4	75.8	78.4	75.8
Rated air flow	m <sup>3</sup> /h	8700	17400	21200	31100	42400	62200
Total fan absorbed power	kW	0.7	1.4	1.9	2.9	3.8	5.8
Dimensions [LxHxD]	mm	1500 x1475 x1300	1500 x2950 x1300	2950 x1475 x1300	4000 x1475 x1300	2950 x2950 x1300	4000 x2950 x1300
Power supply	V/ph/Hz	400/3+N/50					
Module number		1	2	1	1	2	2

Data declared for chilled water version. | Also available with 60 Hz power supply. | The dimensions shown refer to standard models but can be customised according to application requirements.



# HTI CW

## CHILLED WATER UNITS FOR MEDIUM/SMALL SERVER ROOMS

7.9-45.4 kW



HTI CW units are split-type air conditioners intended for small and medium-sized Data Centers. Designed for **ceiling or wall mounting**, they are suitable for air conditioning of control centres with limited internal space or space entirely taken up by technological equipment. Thanks to the **rational layout of components and wide range of available accessories**, these units are **easy to install and suitable for different shelter configurations**.

- Temperature control through heating and post-heating systems with electric heating elements (optional)
- Humidity control through dehumidification and humidification with external humidifier (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Version available with dual power supply for emergencies: 230/400V network and 24/48VDC backup supply
- Epoxy powder painted structural metalwork supplied as standard
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Instant water inlet/outlet temperature reading function (on request)



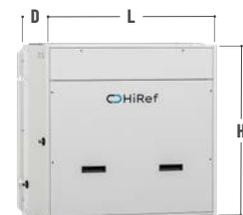
### Finned pack exchanger with hydrophilic coating.

All models in the HTI CW range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



### Ventilation EC

EC PLUG fans, standard on the entire range, make it possible to vary the air flow according to the thermal load. Their accurate adjustment allows an efficient use of power for ventilation and **a consequent reduction of the system's PUE**. Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions**.





**Maximised Redundancy**

In case of mains power + uninterruptible power supply in direct current (DUAL), the (optional) Free-Cooling mode ensures correct internal thermal conditions, **even in the event of blackouts**. This ensures the **continuity of service of the system**.

**Simple and fast installation**

The units can be installed, as needed, on the ceiling or on the wall. Thanks to the use of EC PLUG fans, air conditioners in the HTI CW series guarantee: **optimal air distribution, efficiency, energy savings, reliability and compactness**, whatever the configuration chosen.

**Easier scheduled maintenance**

The unit has been painstakingly designed to ensure frontal access to components. This aspect, combined with the complete extractability of filters and Free-Cooling damper (if present), **greatly facilitates routine maintenance operations**.

**Accurate regulation with multiple types of valves**

All units in the HTI CW range have as standard regulating valves fitted with 0-10V servo motor, selectable in 2-way execution, with variable or 3-way flow system. It is also possible to mount a servo motor with spring return and pressure-independent valves on request. All these types of valves ensure **the utmost adjustment accuracy while maintaining the system's hydronic balance**.



**Maximised energy saving with direct Free-Cooling**

The units can, on request, be equipped with a direct Free-Cooling module. This system, which can also be installed inside an already operational unit, reduces the work of the chiller units in generating chilled water (partial Free-Cooling), and in a state of complete Free-Cooling can be switched off. **This naturally has an important effect on the system's PUE.**

**INSTALLATION**

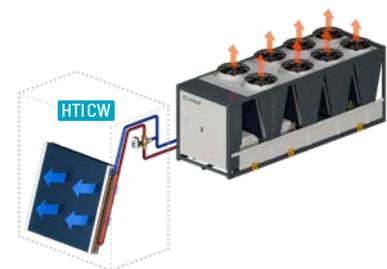


Wall mount



Ceiling mount

**CHILLED WATER**



HTI CW		0073	0105	0120	0145	0310	0380
<b>AIR TEMPERATURE 27°C - RELATIVE HUMIDITY 40% / WATER TEMPERATURE IN 7°C OUT 12°C</b>							
Cooling capacity	kW	8.9	10.1	13.1	14.6	38.4	45.4
SHR		0.82	0.78	0.83	0.79	0.92	0.85
EER		52.88	51.03	52.11	49.35	33.25	36.78
<b>AIR TEMPERATURE 30°C - RELATIVE HUMIDITY 35% / WATER TEMPERATURE IN 10°C OUT 15°C</b>							
Cooling capacity	kW	7.9	8.5	11.5	12.5	36.3	41.7
SHR		0.94	0.9	0.96	0.91	1	0.95
EER		47.07	43.27	45.54	42.39	31.37	33.78
<b>AIR TEMPERATURE 35°C - RELATIVE HUMIDITY 30% / WATER TEMPERATURE IN 15°C OUT 20°C</b>							
Cooling capacity	kW	7.9	8.4	11.3	12.4	35.6	41.8
SHR		0.98	0.96	1	0.96	1	0.99
EER		46.69	42.89	44.76	42.02	30.84	33.82
Rated air flow	m³/h	1300	1300	1950	1950	7000	7000
Total fan absorbed power	kW	0.2	0.2	0.3	0.3	1.2	1.2
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	53	55	54	56	66	
Dimensions [LxHxD]	mm	1050x358x936		1150x408x1026		1500x685x1096	
Power supply	V/ph/Hz	230/1/50			400/3+N/50		

Also available with 60 Hz power supply. | Units can only be installed on the ceiling for sizes 0310-0381.





**EVAPORATIVE  
AIR CONDITIONER  
AIR-TO-AIR**

DATA CENTER

# DataBatic

## AIR/AIR SYSTEMS FOR DATA CENTERS WITH ADIABATIC SYSTEM

10-330 kW



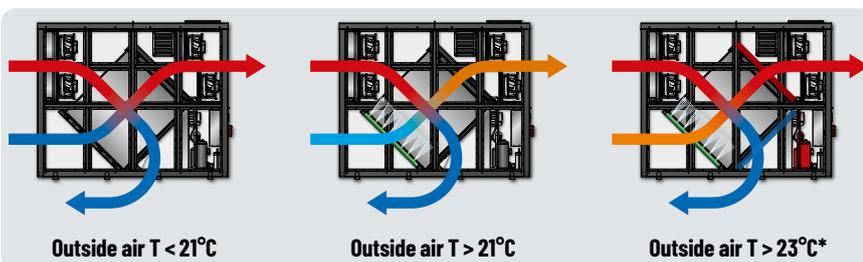
ADIABATIC COOLING	MULTI-PROTOCOL COMMUNICATION INTERFACE	REFRIGERANT R744 (CO <sub>2</sub> )	SCROLL COMPRESSORS
SCREW COMPRESSORS	EC RADIAL FANS	MODBUS CONTROLLED FANS	INVERTER DRIVEN COMPRESSORS
FAST RESTART	ON-BOARD HUMIDIFIER	CORROSION RESISTANT MATERIAL	CROSS-FLOW HEAT RECOVERY UNIT
LOW GWP REFRIGERANT			

The combination of the evaporative cooling system with the air/air cross-flow exchanger of the HDB-DataBatic range **extends indirect Free-Cooling for more hours during the year and more climate zones**. The reduction, and in some cases cessation, of mechanical operation has two benefits: **it reduces operating costs for greater annual energy efficiency** (reduced PUE) and **reduces deployment costs, thanks to the lower installed power**. HDB units can accommodate the “cooling circuit” option, and are **entirely factory assembled** in a **monobloc solution** to **facilitate installation operations**.

- Possibility of managing multiple units in parallel in the same system
- High efficiency through-flow heat exchanger with epoxy surface treatment for protection against corrosion (Eurovent certification)
- Management of overpressure in the air distribution plenum ( $\Delta P$  Control)
- Side and front access to all components, even when units are operational, to make maintenance easier and avoid system downtime situations
- Panelling developed and assembled in accordance with standard UNI 1886
- Air renewal kit with modulating dampers (Fresh air kit)
- Ultrasonic humidifier
- Kit for applications at low outdoor air temperatures (up to  $-40^{\circ}\text{C}$ )

### Direct expansion or chilled water integration

If external climatic conditions cannot satisfy internal load requirements using only indirect Free-Cooling + Evaporative Cooling, the mechanical cooling system comes into play. There is thus the option of a cooling circuit with **BLDC modulating compressors specific for R410A**, **electronically controlled expansion valve** and **hydrophilically treated fin evaporator**. Alternatively, a chilled water coil can be installed, to be connected to an external chiller.



\* Wet bulb condition for a 1 MW Data Center (Redundancy N + 1) in Amsterdam at  $36^{\circ}\text{C}$  -25%; Delivery air T  $24^{\circ}\text{C}$ ; Max T of air delivery  $26^{\circ}\text{C}$



**Plug type fans with EC motor**

EC type ventilation on both air flows provides:

- higher efficiency at partial loads;
  - reduced noise emissions;
  - precise tracking of thermal load variations.
- Fan consumption, in the "hot swappable" configuration, can be displayed in real time on the machine's display

**Evaporative cooling on the air flow from the outside**

HDB - DataBatic units are equipped with **Evaporative Cooling technology**, based on the use of nozzles that spray water onto the air flow coming from outside. Evaporating water cools the air due to an adiabatic effect, the air then passes the cross-flow exchanger at a temperature close to the wet bulb temperature, **extending the period of time in which it is possible to exploit the Free-Cooling effect**. Finally, the system is of the **multistep type** in respect of the air flow, in order to **optimize saturation efficiency**.

**Indirect Air-Side Free-Cooling**

Indirect Air-Side Free-cooling Indirect Free-Cooling, as opposed to direct:

- does not create contamination between the indoor air of the Data Center and outdoor air;
- blocks the entry of dust and pollutants into the Data Center without the need for additional filtering;
- there is no latent load increase.

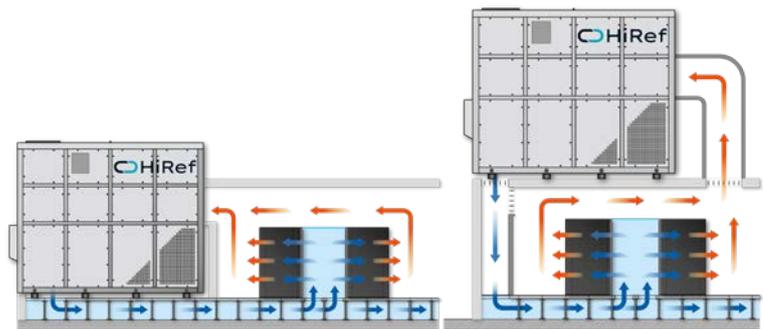
The result is a **clear reduction in energy consumption for system management**.

**Water saving function and legionella-free system**

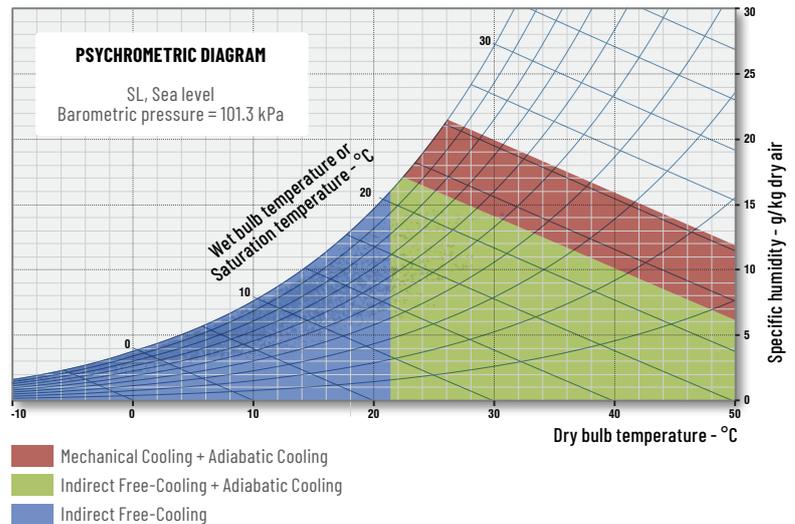
Pump adjustment logic, of the electronic and modulating type, makes it possible to **optimize air saturation** and at the same time Water Usage Effectiveness (WUE) and energy consumption. The particular configuration of the hydraulic circuit and the algorithms used for its management guarantee **the necessary replenishment of water in the system** to avoid high salt concentrations and **prevent water from stagnating in the collection tank**, with the risk of the spread of legionellosis.

$$WUE = \frac{\text{Annual Water Usage}}{\text{IT Equipment Energy}} [l / kWh]$$

**DESIGNED FOR INSTALLATION ON ROOF OR ON THE WALL OF THE DATA CENTER.**



Example of use for a 1 MW Data Center (Redundancy N+1) in Amsterdam at 36°C -25%; Air temp. 24°C; Max air temp. in 26°C



DataBatic	0060	0100	0200	0300	
<b>Air temperature 36°C - Relative humidity 25% / Supply air temperature 24°C/ SHR = 1 / Outdoor air temperature 35°C - Relative humidity 30%</b>					
<b>Rated air flow</b>	m <sup>3</sup> /h	15000	27000	53000	82500
<b>Minimum cooling capacity</b>	kW	10	60	100	200
<b>Maximum cooling capacity</b>	kW	60	100	200	330
<b>Dimensions [LxHxD]</b>	mm	2750x2650x1180	4200x2650x2250	4700x3600x2250	4700x3600x3100
<b>Power supply</b>	V/ph/Hz	400/3+N/50			

Data declared with chilled water or direct expansion circuit working in top up cooling mode. | Also available with 60 Hz power supply. | The dimensions shown refer to standard models without accessories and with Free-Cooling and top up cooling execution.





 HiRef

# HIGH DENSITY COOLING

DATA CENTER

# NRCD/NRCV

## DIRECT EXPANSION AIR CONDITIONERS FOR HIGH DENSITY RACKS WITH MODULATING COMPRESSORS

NRCD > 12.4-50.1 kW

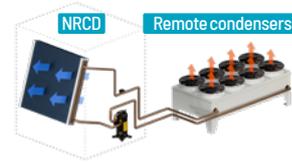
NRCV > 13.3-37.4 kW



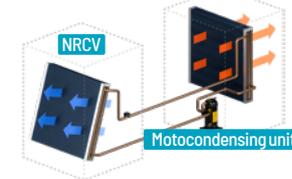
MULTI-PROTOCOL COMMUNICATION INTERFACE	EC RADIAL FANS	MODBUS CONTROLLED FANS	SCROLL COMPRESSORS
INVERTER DRIVEN COMPRESSORS	HOT-SWAPPABLE FANS	ON-BOARD HUMIDIFIER	

The rack coolers in the NRCD/NRCV range are an ideal solution for the cooling of small-to-medium size Data Center racks where **precision control of hygrothermal parameters is required 24/7**. They are particularly suitable for **small installations** where a chiller cannot be installed or where water in the Data Center is not allowed. Internal design and component selection focus on the achievement of **very high energy efficiency levels to minimise running costs of the entire system**. NRCD/NRCV units have an external remote condenser, which guarantees efficiency and reliability. In-rack or in-row configuration Depending on how rack cooling is done - by creating hot and cold aisles in the Data Center via compartmentalisation and localised cooling - the NRCD/NRCV range comes in two different configurations.

### AIR CONDENSED



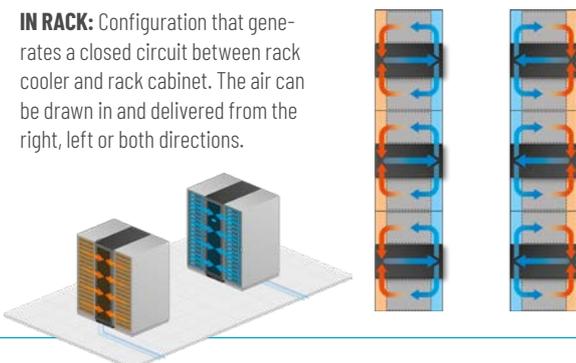
### AIR CONDENSED WITH MOTOCONDENSING



- Refrigerant R410A
- EC Fans
- Twin rotary and Scroll inverter compressors
- Electronic expansion valves (optional)
- Advanced programmable microprocessor control with LCD display
- Humidity control through dehumidification and humidification (optional)
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Low temperature kits for optimal operation in the case of installation in particularly cold environments (on request)

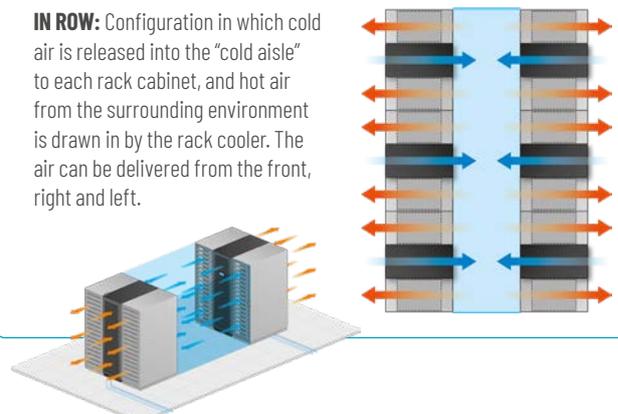
### IN RACK

**IN RACK:** Configuration that generates a closed circuit between rack cooler and rack cabinet. The air can be drawn in and delivered from the right, left or both directions.



### IN ROW

**IN ROW:** Configuration in which cold air is released into the "cold aisle" to each rack cabinet, and hot air from the surrounding environment is drawn in by the rack cooler. The air can be delivered from the front, right and left.





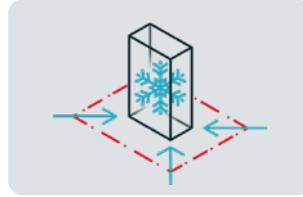
**Hot swappable fans**

In order to minimize machine shut-down, **a failed fan can be replaced without turning off the unit**, thanks to the use of the protective basket and connectors for the power and control section. Fan replacement thus becomes a routine maintenance operation.



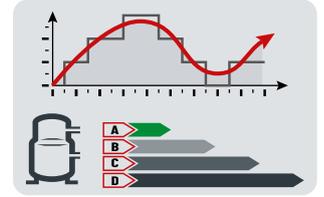
**Safety in the server room**

All models in the NRCD/NRCV range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit.**



**High power density**

The internal design and the special component layout allows for an evaporating coil **with an extensive heat exchange surface area.** The unit footprint is still small, **ensuring optimal use of space in the server room.**



**Power modulation**

The units adapt quickly to the Data Center's cooling requests. Thanks to the inverter-controlled compressor, performance can be modulated to **up to 25% of the rated value, thus reducing consumption.** This ensures **continuous operation of the unit even at low loads**, without switching cycles on and off.



**Ventilation EC**

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant ΔP and ΔT. Their accurate adjustment allows an efficient use of power for ventilation and a consequent **reduction of the system's PUE.** Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions.**

NRCD		0100	0200	0260	0300	0400	0450
		<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>					
Cooling capacity	kW	12.4	21.8	26.1	29.4	41.3	46.2
SHR		1	0.91	1	0.82	1	0.99
EER		3.9	2.89	3.46	2.55	3.59	3.18
Total absorbed power	kW	3.4	8.2	8.1	12.4	13.1	16.1
		<b>Air temperature 35°C - Relative humidity 30% / Outdoor Air temperature 35°C</b>					
Cooling capacity	kW	13.1	23.6	28.6	31.6	45.5	50.1
SHR		1	0.95	1	0.85	1	1
EER		4.04	3.07	3.75	2.67	3.85	3.33
Total absorbed power	kW	3.5	8.4	8.2	12.7	13.4	16.6
Rated air flow	m <sup>3</sup> /h	2700	4000	5000	4250	9000	9000
Number of circuits		1	1	1	1	1	1
Number of compressors		1	1	1	1	1	1
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	64	66	60	67	73	
Dimensions [LxHxD]	mm	300x2000x1200		600x2000x1200	300x2000x1200	600x2000x1200	
Power supply	V/ph/Hz	230/1/50		400/3+N/50			
NRCV		0140	0240	0330			
		<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>					
Cooling capacity	kW	13.3	24.6	34.6			
SHR		1	1	0.88			
EER		4.06	3.17	3.1			
Total absorbed power	kW	4.1	9.1	13.1			
		<b>Air temperature 35°C - Relative humidity 30% / Outdoor Air temperature 35°C</b>					
Cooling capacity	kW	14.5	26.9	37.4			
SHR		1	1	0.91			
EER		4.36	3.36	3.3			
Total absorbed power	kW	4.1	9.3	13.3			
Rated air flow rate indoor unit	m <sup>3</sup> /h	3100	5300	5300			
Rated air flow rate outdoor unit	m <sup>3</sup> /h	6400	9300	16300			
Number of circuits		1	1	1			
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	62		63			
Lp @ Nominal rpm ; dist.= 10 m Q=2	dB(A)	46	46	46			
Dimensions indoor unit [LxHxD]	mm	300x2000x1200			300x2000x1200		
Dimensions outdoor unit [LxHxD]	mm	1250x460x882	1565x605x1275	1965x950x1322			
Power supply indoor unit	V/ph/Hz	230/1/50					
Power supply outdoor unit	V/ph/Hz	230/1/50	400/3+N/50	400/3+N/50			



**Sliding control panel**

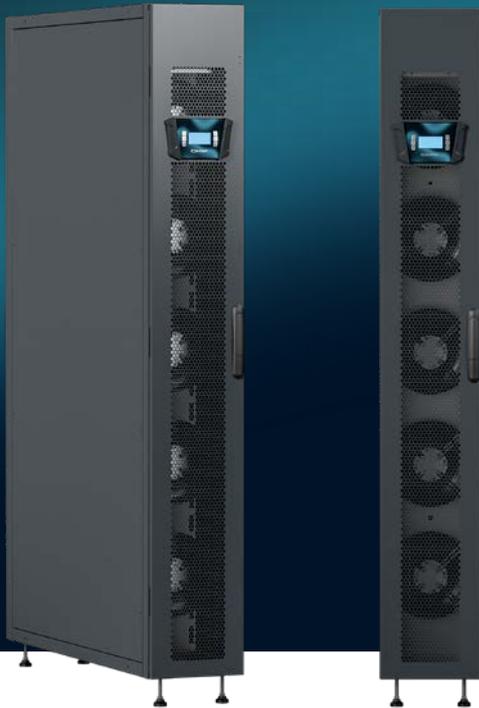
For 300 mm wide structures, the electrical panel is designed to take up **as little space as possible without interfering with air distribution over the whole working height of the unit.** A "sliding drawer" structure has been used, making access possible during commissioning and extraordinary maintenance operations. This configuration also prevents tangling of the wiring.

Total absorbed power relating to indoor unit and motocondensing unit. | Also available with 60 Hz power supply.

# HRCC

## CHILLED WATER AIR CONDITIONING UNITS FOR HIGH POWER DENSITY RACKS

20.1-57.2 kW



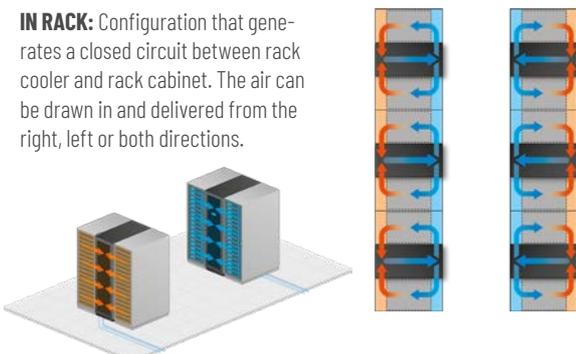
HRCC units are chilled water cooler racks. They offer an ideal solution for the cooling of Data Center racks where **precision control of hygrothermal parameters is required 24/7**. They are particularly suitable for integration into chilled water systems with Free-Cooling chillers, given the possibility of making these air conditioners work even with **higher water temperatures than the usual 7/12°C or 10/15°C values**. The internal design and the choice of components are aimed at obtaining **high levels of energy efficiency and guaranteeing service continuity**, the second being a key requirement in this type of application with **high/very high power density**.

- Advanced programmable microprocessor control with LCD display
- Humidity control through dehumidification and humidification (optional)
- Fan speed modulation based on thermal load (constant  $\Delta T$ )
- Air filter class G3 as standard. Air Filters G4, M5, F7 (optional)
- Double power supply with automatic switch (optional)
- Constant-flow (airflow control) or constant available overpressure ( $\Delta P$  control) ventilation modulation (optional)
- Instant reading of water flow rate, water inlet and outlet temperatures, or supplied cooling capacity (optional)

Depending on how rack cooling is done - by creating hot and cold aisles in the Data Center or via compartmentalisation and localised cooling - the HRCC range comes in two different configurations: On request Configuration that generates a closed circuit between rack cooler and rack cabinet. The air can be drawn in and delivered from the right, left or both directions.

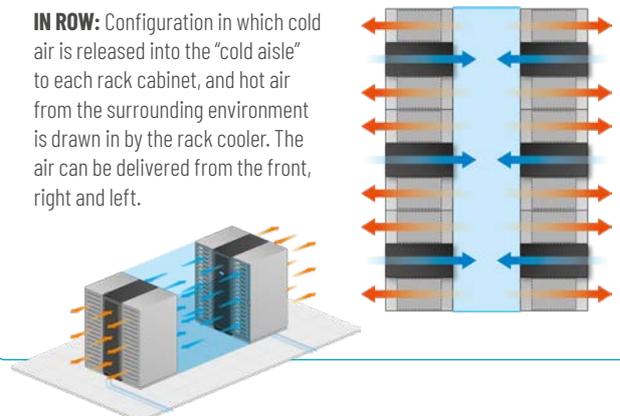
### IN RACK

**IN RACK:** Configuration that generates a closed circuit between rack cooler and rack cabinet. The air can be drawn in and delivered from the right, left or both directions.



### IN ROW

**IN ROW:** Configuration in which cold air is released into the "cold aisle" to each rack cabinet, and hot air from the surrounding environment is drawn in by the rack cooler. The air can be delivered from the front, right and left.





### Ventilation EC

EC PLUG fans, standard throughout the range, are adjustable using different logics: flow rate, overpressure, constant  $\Delta P$  and  $\Delta T$ . Their accurate adjustment allows an efficient use of power for ventilation and a consequent **reduction of the system's PUE**. Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function allows for fan operation **even in the event of microprocessor malfunctions**.



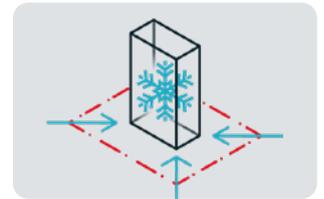
### Hot swappable fans

In order to minimize machine shutdown, **a failed fan can be replaced without turning off the unit**, thanks to the use of the protective basket and connectors for the power and control section. Fan replacement thus becomes a routine maintenance operation.



### Safety in the server room

All models in the range feature heat exchange coils with hydrophilic coating. This special coating - together with adequate adjustment of air through-flow speeds - **helps condensate collection during the dehumidification process, preventing any dripping on the inside and outside of the unit**.



### High power density

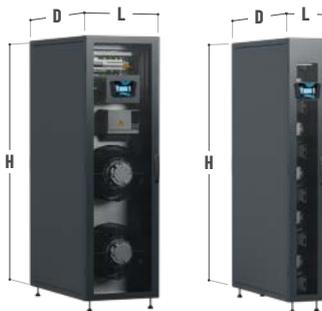
The internal design and the special component layout allows for an evaporating coil **with an extensive heat exchange surface area**. The unit footprint is still small, **ensuring optimal use of space in the server room**.



### Sliding control panel

For 300 mm wide structures, the electrical panel is designed to take up **as little space as possible without interfering with air distribution over the whole working height of the unit**. A "sliding drawer" structure has been used, making access possible during commissioning and extraordinary maintenance operations. This configuration also prevents tangling of the wiring.

### CHILLED WATER



HRCC		0200	0250	0450	0510
<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>					
Cooling capacity	kW	20.1	27.7	46.2	57
SHR		1	1	1	1
EER		43.54	38.35	31.1	37.27
<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>					
Cooling capacity	kW	20.2	27.8	46.4	57.2
SHR		1	1	1	1
EER		43.69	38.44	31.21	37.37
Rated air flow	m <sup>3</sup> /h	4000	5300	9000	11000
Total fan absorbed power	kW	0.5	0.7		1.5
Lp @ Nominal rpm ; dist.= 2 m Q=2	dB(A)	62	65	70	67
Dimensions [LxHxD]	mm	300x2000x1200		600x2000x1200	
Power supply	V/ph/Hz	230/1/50		400/3+N/50	

Also available with 60 Hz power supply.

# MRAC CW/DX

MINI RACK COOLER  
FOR HIGH DENSITY SYSTEM

MRAC CW > 3.4-4.5 kW

MRAC DX > 7.3-7.8 kW



MULTI-PROTOCOL  
COMMUNICATION  
INTERFACE



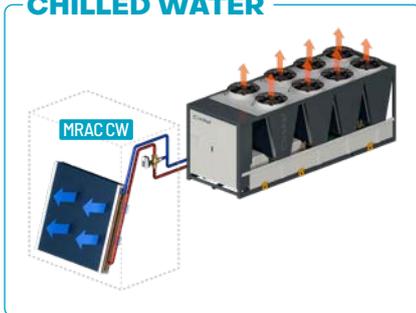
EC RADIAL FANS



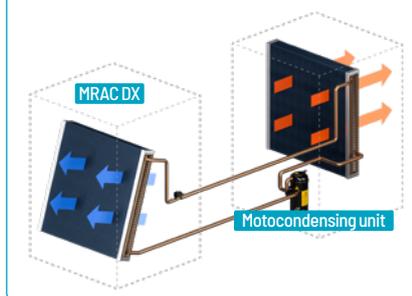
INVERTER DRIVEN  
COMPRESSORS

The units in the MRAC family offer an ideal solution for cooling 19" racks, which require **precise internal temperature control and 24/7 operation**. In split execution, with R410A refrigerant external condensing unit, the range extends from 3.6 to 7.9 kW. The CW version, with chilled water, reaches 4.5 kW. The MRAC unit is controlled by a **dedicated software**, developed within HiRef, allowing a LAN connection for **up to 8 units** and interfacing with an automatic door-opening system in the event of an **alarm**.

## CHILLED WATER

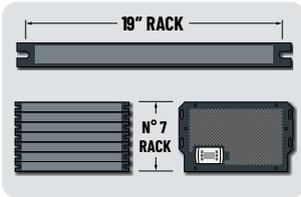


## AIR CONDENSED WITH MOTOCONDENSING UNIT



- Coil with highly efficient hydrophilic fin and aluminum frame
- A version is available for low outdoor air temperatures
- Compressor with brushless inverter technology available for 7 kW version
- Condensate drain pan made from stainless steel AISI 430
- Electrical and rapid control connections
- Completely insulated panelling
- Air filter type G3
- Refrigerant R410A (only DX version)





**Compactness**

MRAC has been designed to **be hidden inside the rack cabinet** and take up as little space as possible. Installable in any rack cabinet with 19" racks, it occupies the height of just 7 racks, **taking up very little space in the Data Center.**



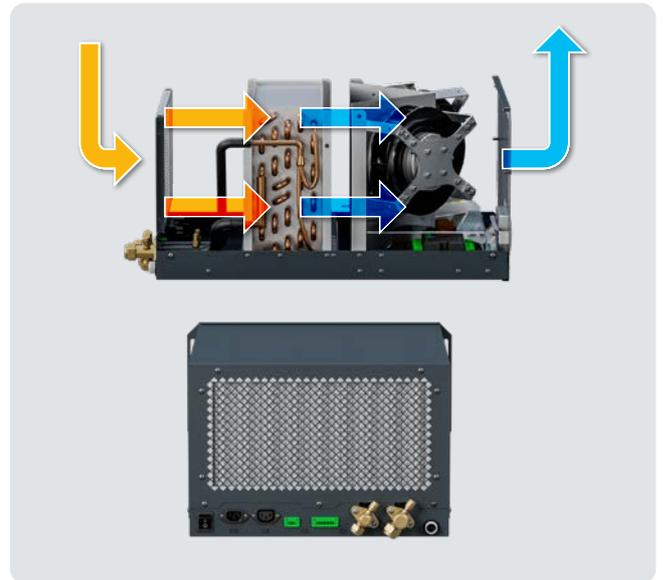
**Maximum MRAC redundancy with the version having two external motocondensing units**

The MRAC unit with dual external motocondensing unit is available on request. This solution provides **redundancy and ensures continuity of service even in the event of failure of one of the two units.**



**Ventilation EC**

EC PLUG fans, standard on the entire range, make it possible to vary the air flow according to the thermal load. Their accurate adjustment allows an efficient use of power for ventilation and a consequent **reduction of the system's PUE.** Extended range speed adjustment is carried out via Modbus protocol. The "emergency speed" function enables the fan to move **even if the microprocessor is switched off.**

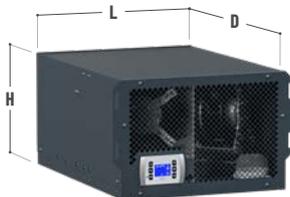


MRAC CW	0035	0070
	<b>Air temperature 30°C - Relative humidity 35% / Water temperature In 10°C Out 15°C</b>	
Cooling capacity kW	3.4	4.5
SHR	1	1
EER	17	22.5
	<b>Air temperature 35°C - Relative humidity 30% / Water temperature In 15°C Out 20°C</b>	
Cooling capacity kW	3.5	4.5
SHR	1	1
EER	17.5	22.5
Rated air flow m³/h	915	915
Total fan absorbed power kW	0.2	0.2
Lp @ Nominal rpm ; dist.= 2 m Q=2 dB(A)	61	
Dimensions [LxHxD] mm	485x300x600	
Power supply V/ph/Hz	230/1/50	

Also available with 60 Hz power supply.

MRAC DX	070 (INVERTER)	
	<b>Air temperature 30°C - Relative humidity 35% / Outdoor air Temperature 35°C</b>	
Cooling capacity kW	7.3	
SHR	0.91	
EER	3.92	
Total absorbed power kW	2.6	
	<b>Air temperature 35°C - Relative humidity 30% / Outdoor Air temperature 35°C</b>	
Cooling capacity kW	7.8	
SHR	0.94	
EER	4.14	
Total absorbed power kW	2.6	
Rated air flow rate indoor unit m³/h	1330	
Rated air flow rate outdoor unit m³/h	5100	
Lp @ Nominal rpm ; dist.= 2 m Q=2 indoor unit dB(A)	66	
Lp @ Nominal rpm ; dist.= 10 m Q=2 outdoor unit dB(A)	46	
Dimensions indoor unit [LxHxD] mm	485x300x600	
Dimensions outdoor unit [LxHxD] mm	1305x648x495	
Power supply indoor unit V/ph/Hz	230/1/50	
Power supply outdoor unit V/ph/Hz	230/1/50	

Performance data for size 035B relating to operation with only one motocondensing unit. | Total absorbed power relating to indoor unit and motocondensing unit. | Also available with 60 Hz power supply.



# REMOTE CONDENSERS

The HiRef remote condensers are outdoor units that can be combined with air-condensed indoor units such as cabinets in the A-D series and NRCD rackcoolers. HiRef offers a **wide range of condensers**, suitable for working with refrigerants R410A, R134a, R454B, R407C. The condensers, used with dual-circuit units, are available with a single cooling circuit for **maximum reliability and redundancy of the system** or with a double cooling

circuit, **to reduce installation spaces and costs**. The models have an aluminum alloy and galvanized sheet frame, ideal for ensuring **high corrosion resistance, protection of copper pipes and solidity**. The galvanized sheet external panels have an **anti-corrosion and anti-UV radiation polyester coating**.

- Power supply 230V single phase or 400V three phase
- Power supply from HiRef indoor unit (standard) or stand alone (on request)

## Finned coil

The finned-coil heat exchangers are made with copper tubes and, depending on the model, wavy or corrugated aluminium fins. The standard spacing between the fins is 1.8 - 2 - 2.1 mm, depending on the model, **offering high heat exchange efficiency without affecting the ease of routine cleaning**.

## Silent operation

The remote condensers are also available in **low noise emission versions**, ideal in areas where **a high level of acoustic comfort must be maintained**.



## Customization

The units can be customized on request to meet the customer's design needs. Among the various options:

- **special treatment for the finned-coil exchanger**, including epoxy treatment, offering good resistance to corrosive environments, or copper fins for installation in marine environments;
- **increased fin spacing** to reduce soiling and facilitate cleaning in sandy environments;
- **special ductable condensers** for installation in closed places.

## Versatility

As an alternative to vertical installation with horizontal air flow, as standard, **horizontal installation with upward air flow is possible**, with the use of a leg kit that can be ordered separately.

## Efficiency

Depending on the model, the units mount axial fans with diameters of 350 - 450 - 500 - 630 mm. The fans, with 4 or 6 poles, can be adjusted using a speed regulator from the indoor unit or mounted on the machine. The units are also available with high efficiency EC fans **for low operating consumption and reliable control of the condensing temperature thanks to electronic speed regulation**.

# DRY COOLER

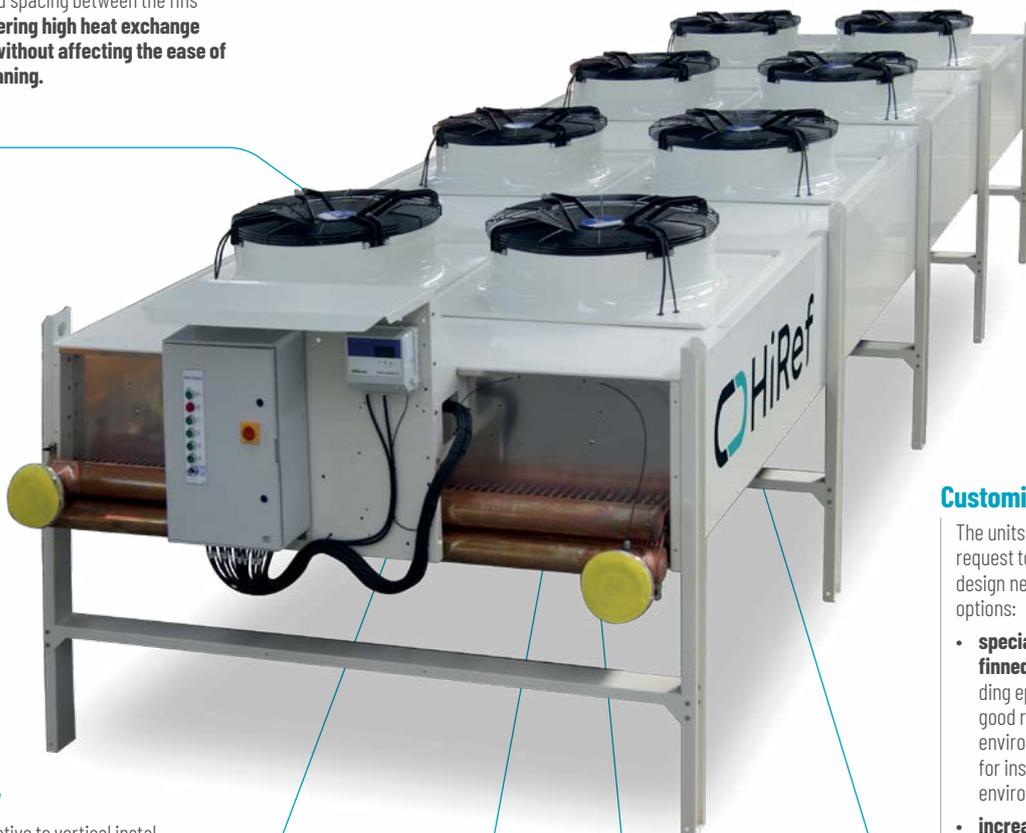
HiRef Dry Coolers are outdoor units that can be combined with water-condensed indoor units such as cabinets in the W - F - K series. HiRef offers a **wide range** of Dry Coolers suitable for working with a **water-glycol mixture up to 60%**. They are made with frame in aluminium alloy and galvanized

sheet steel that ensures **corrosion resistance, copper pipe protection and solidity**. The external panels are made of galvanized sheet metal finished with **corrosion- and UV-resistant polyester paint**.

- Power supply 230V single phase or 400V three phase
- Power supply from HiRef indoor unit (standard) or stand alone (on request)

## Finned coil

The finned-coil heat exchangers are made with copper tubes and, depending on the model, wavy or corrugated aluminium fins. The standard spacing between the fins is 2 mm, **offering high heat exchange efficiency without affecting the ease of routine cleaning**.



## Versatility

As an alternative to vertical installation with horizontal air flow, as standard, **horizontal installation with upward air flow is possible**, with the use of a leg kit that can be ordered separately.

## Silent operation

The Dry Coolers are also available in **low noise emission versions**, ideal in areas where a **high level of acoustic comfort must be maintained**.

## Customization

The units can be customized on request to meet the customer's design needs. Among the various options:

- **special treatment for the finned-coil exchanger**, including epoxy treatment, offering good resistance to corrosive environments, or copper fins for installation in marine environments;
- **increased fin spacing** to reduce soiling and facilitate cleaning in sandy environments.

## Efficiency

Depending on the model, the units mount axial fans with diameters of 350 - 500 - 630 - 800 mm. The fans, with 6 or 8 poles, can be adjusted using a speed regulator from the indoor unit or mounted on the machine. The units are also available with high efficiency EC fans for **low operating consumption and reliable control of the condensing temperature thanks to electronic speed regulation**.

 HiRef

The background features a complex, abstract pattern of glowing, fiber-optic-like lines that radiate from a central dark circular void. The lines are composed of numerous fine, parallel strands, some of which are highlighted with small, bright white dots, creating a sense of depth and movement. The overall color palette is a range of blues, from deep navy to light, ethereal cyan.

# INNOVATORS

above the standards



CATALOGUE  
CCAC – IEC – HDC

 **HiRef**

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