

HBR

HBR Hybrid Cooler

HBR
Series



cooling
TORRAVAL
product, technology & services
MITA Group

■ HBR Hybrid Cooler

HBR series is the result of the long experience of MITA technicians. It combines the well-known TORRAVAL's distinguishing feature of corrosion-free products with an easy and innovative working principle, designed to reduce water and energy consumption to a minimum.

The distinctive characteristic of the HBR hybrid cooler is that it has two separate air circuits at its disposal. The system is realized thanks to the use of reversible axial ventilators and gravity overpressure opening/closing dampers.

The peculiar design of the cooler has been developed so that the two heat exchangers (smooth tube coil for wet function and finned coil for dry function) remain out of the air flow when they are in stand-by.

This way it is possible to consume only the strictly necessary electric power for the function of the operating coil. Besides both coils can be preserved (when in stand-by) from fouling due to any possible dirt contained in the air which is not - moreover - thermally altered by the presence of the other heat exchanger.

The HBR series has a strong HDGS load-bearing structure, FRP sandwich panels for the casing, water collecting basin and tops in FRP.

The heat exchange coil for the wet function is made of high quality smooth surface steel tubes manufactured in compliance with PED Directive 97/23/EC and hot-dip galvanized after fabrication. The heat exchange finned coil for the dry function is made of copper tubes and aluminium fins. They are located in the upper part of the unit, in vertical position, outside the cooler's body, therefore not crossed by the wet air flow when in stand-by. The units are equipped with aluminium overpressure dampers, opening and closing depending on the airflow direction.

The standard layout of the unit includes water collection basin with sloped bottom for easy drainage and fan stacks, both made of FRP.

The range includes several basic models that can satisfy cooling plant's demands until max. 1.000 kW approximately.

■ Distinguishing features

- **Unique design on the market** (European Patent pending)
Peculiar geometry and parallel position of the two heat exchangers; one or more reversible ventilators; gravity aluminium overpressure dampers.
- **Extremely reduced consumptions**
HBR is designed in order to consume the bare minimum. Within the space of a year it exploits the most appropriate cooling method depending on the different climatic conditions.
- **Maximum efficiency of wet function** (summer)
The fluid flows inside the smooth tubes heat exchanger and it is cooled by evaporation. The finned tubes' coils are in stand-by and they are located outside the saturated air flow, sucked by the ventilators.
- **Maximum efficiency of dry function** (winter)
The fluid flows inside the finned tubes heat exchangers and it is cooled by air. The smooth tube's coil is in stand-by and it is outside the warm air flow pushed by the ventilators. Only the necessary energy for the air circulation through the finned coils is consumed.

In both cases the air flow is not influenced by the stand-by heat exchanger presence and the pressure drop is reduced.

- **Cost-effective control**
The system is electronically controlled by a PLC. It can be supplied pre-wired on the unit's side (in the factory), or it can be provided by the customer.
- **Long working life**
Naturally corrosion-free materials and resistant over time.
- **Accessibility**
Several solutions to simplify the access to the internal components; easy and total access to the coils.
- **Focus on sound emissions**
Several technical solutions to reduce the noise levels measured and calculated in accordance with ISO 3744 and EN 13487 standards.



■ Description of the HBR cooler

The fluid to be cooled (water or, in case of low ambient temperature, a mixture of water and glycol) flows inside two separate heat exchangers coils made of:

- **Smooth tubes coils**, exchangers which are normally used in evaporative systems. They grant high performances during summer, but lower performances if air cooled in winter. This heat exchanger coil is located inside the cooling tower casing. It is continuously wetted by the water contained in the unit's basin. The water is pumped to a water distribution system with spray nozzles
- **Finned tubes coils**, exchangers which are normally used in dry cooling. They grant high performances at low ambient temperatures, but lower performances during the warmest months.
 In HBR series the finned tubes heat exchangers are totally independent coils, solely air cooled.

Depending on the specific demands, the customer can have a preference for the wet cooling mode that allows a reduction of

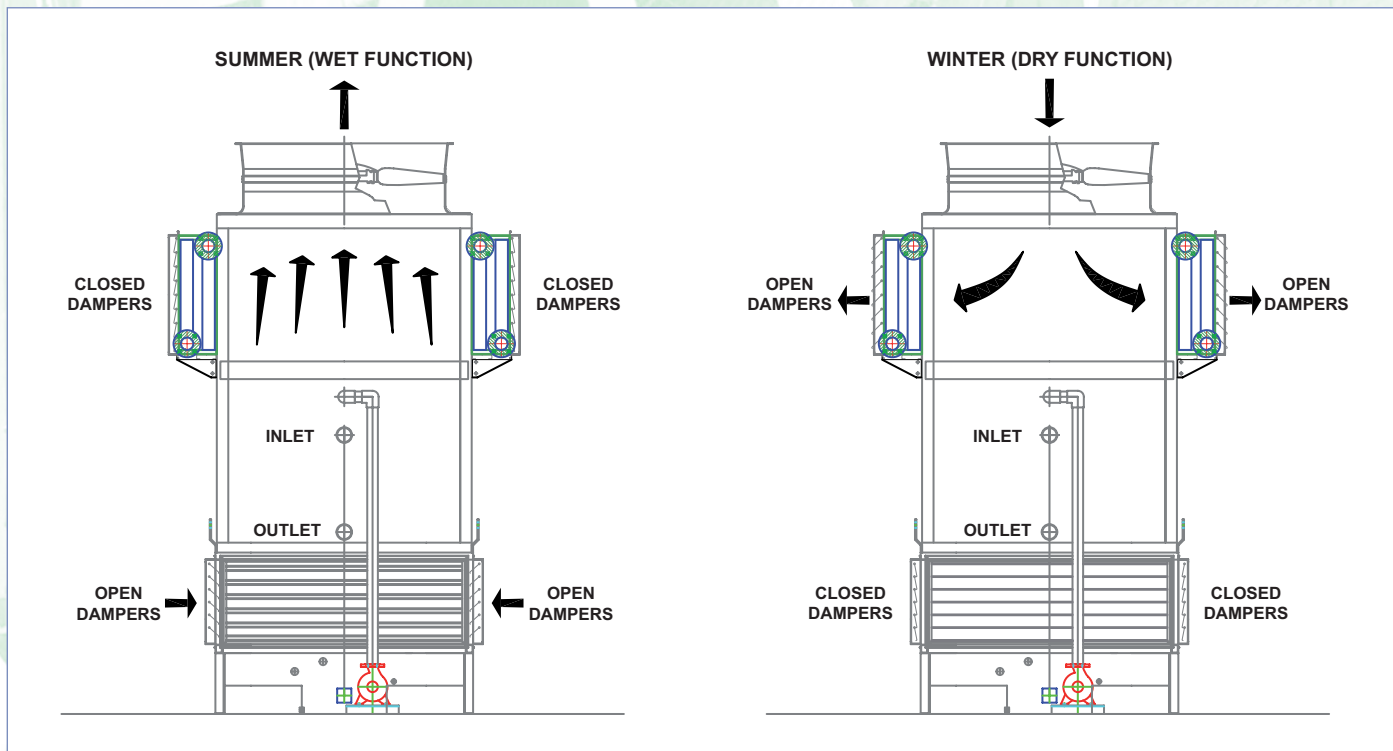
the electric power consumption, but it involves the use of water. The dry cooling mode, on the other hand, does not involve the use of water, but only energy consumption.

The HBR hybrid closed circuit coolers take advantage of the performance characteristics of both systems. Depending on the climatic conditions of the moment, thanks to the control by PLC, the fluid to be cooled is sent to that heat exchanger, which grants the best performance.

The "switch" temperature from the wet to the dry function mode (and vice versa) is adjustable by the customer as he requires (in the operation interval of the coolers in the two function modes).

The operation of one system instead of the other is established by the air flow direction determined by the rotation direction of one or more reversible axial ventilator(s) granting the same performances in both directions of rotation. The cooler is equipped as well with servo-controlled interception valves for the fluid to be cooled.

Principle of operation



Wet function mode (summer)

- The fluid to be cooled flows inside the smooth tubes coils
- The spraying pump is ON
- Reversible axial ventilators in suction mode
- Lower dampers open (because of overpressure outside/ inside)
- Upper dampers closed (because of underpressure inside/ outside)
- Finned tubes coils in stand-by

Dry function mode (winter)

- The fluid to be cooled flows inside the finned tubes coils
- The spraying pump is OFF
- Reversible axial ventilators in blower mode
- Lower dampers closed (because of overpressure inside/ outside)
- Upper dampers open (because of underpressure outside/ inside)
- Smooth tubes coils in stand-by

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