

ABB 1LDE000082 Thermosiphon datasheet

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Transformers are a vital element of any power distribution system. In order to achieve enhanced operational safety, transformers are normally installed in protective enclosures. Using enclosures with a high protection class, the transformer is optimally protected against adverse environmental conditions, such as dirt, carbon or metal dust, or dampness and moisture, thus increasing the lifetime of the transformer. Thanks to a cooling system newly developed by ABB, there are interesting options in terms of installation.

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Compact and efficient cooling for dry-type transformers Thermosyphon-based cooling system

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Multi-faceted installation options

Dry-type transformers, erected in protective enclosures, can be installed both indoors and outdoors. It's increasingly common nowadays that the space available is a limiting factor when it comes to installing electrical systems, which is why more compactly dimensioned designs are gaining progressively in importance. The less free space surrounding a transformer, however, the more vital it is to ensure fit-for-purpose cooling.

A choice of cooling variants

Transformers not only rank among the traditional categories of electrical equipment, they are also the devices with the highest efficiency. At the ratings nowadays customary with industrial transformers in the range from 10 to 15 MVA, for example, the efficiency is more than 99%, though this nonetheless corresponds to a power dissipation level of 100 to 150 kW, with a corresponding heat input.



It is vital to ensure that this heat is removed, since otherwise the transformer will be heated up excessively. To ensure optimally dimensioned design, it is accordingly essential to also take due account of the conditions surrounding the transformer.

For transformers that are directly erected in enclosures featuring a high protection class (IP44 and higher), there are several different options for the cooling function. Cooling systems in common use include air-to-air or air-to-water systems that are flanged directly against the enclosure, enabling heat to be transferred directly. In recent years, ABB has developed a thermosyphon-based air-to-air cooling system for transformers, opting here for a technology that has long since been in use for cooling semiconductors and which also derives from fieldproven technologies used in the automotive and aviation industries.



Cooling capacity	Dimensions of cooling section [B x L x H] [mm]
up to 30 kW	750 x 1395 x 2226
up to 50 kW	896 x 1600 x 2550
up to 60 kW	896 x 1800 x 2700
up to 80 kW	1892 x 1530 x 2800
up to 107 kW	1892 x 1530 x 2800

Multiple benefits for customers and the environment

In comparison to previous cooling systems, ABB's new thermosyphon-based air-to-air cooling system achieves remarkable advantages for the same cooling capacity:

- improved cooling and reduced power consumption of the coolers, thanks to adapted and optimized heat transfer geometry
- further energy savings thanks to speed control of the motors
- less material required, reducing the weight of the cooling system and thus reducing consumption of natural resources
- more compact dimensions
- operating noise emissions reduced by up to 10 dB(A)
- increased reliability can be achieved by using thermosyphon cooling systems connected in parallel (redundancy)
- closed circuit, which is protected against outside environmental conditions such as polluted air
- increased protection against external influences, because all components of the cooling system are located inside the protective enclosure

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Uniquely natural mode of operation

These advantages are achieved by using a thermosyphon for efficient heat transfer. A thermosyphon is a hermetically sealed system that functions in purely passive mode – without any pumps or control systems. The thermosyphon contains a cooling medium that is warmed up by the heat dissipated from the transformer, and thus evaporates. The rising vapor condenses in the upper section of the thermosyphon and gives off heat. Now in liquid form again, it flows back downwards, and the cycle begins once more.

The thermosyphon simultaneously serves to separate the air inside and outside the transformer's enclosure. Fans are used to guide the flow over the evaporator section of the thermosyphon. Heat is transferred between the air inside the enclosure and the thermosyphon's cooling medium, which serves to cool down the warmed-up air inside the transformer's enclosure, while at the same time the cool outside air is passed along the condenser section. The inside and outside air do not mingle, so that the transformer remains protected against any environmental conditions.

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