

FULLALUXSTREAM

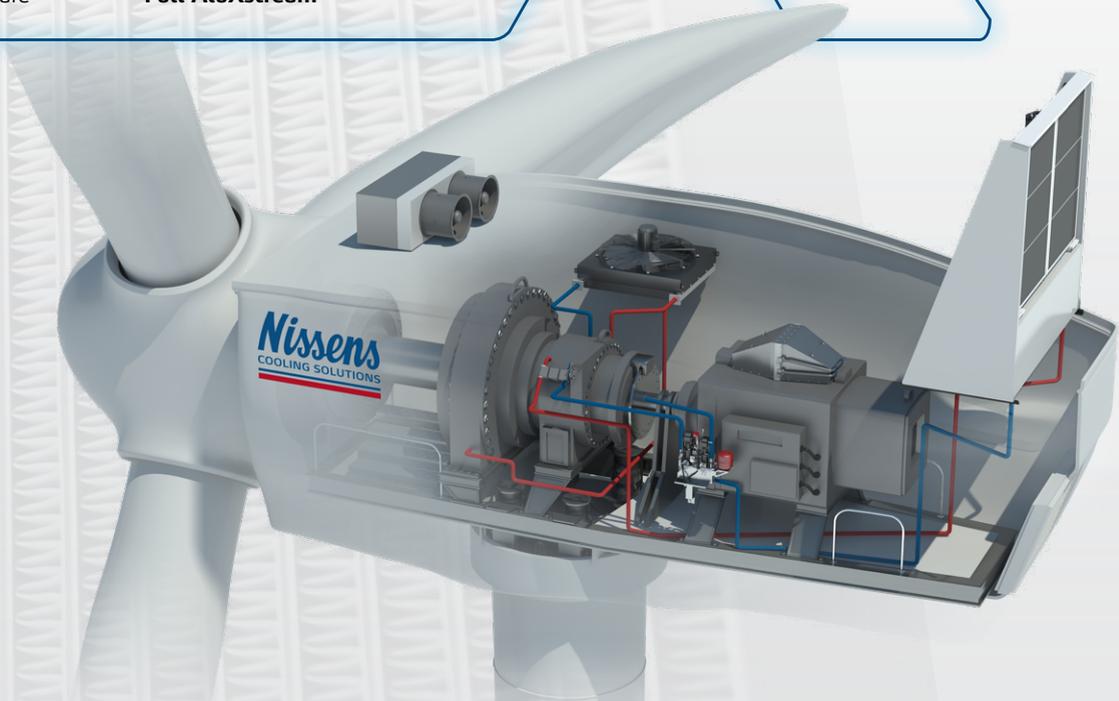
*Nissens*  
COOLING SOLUTIONS

# Nissens Cooling Solutions' Full AluXstream

The X-series from Nissens Cooling Solutions is a range of unique products, which are each designed and manufactured on the basis of proven technologies and Nissens Cooling Solutions' excellence in handling aluminum processes. Our products are developed with customized features individually matching every customer's need. Common to them all: They are renowned for their high quality and proven performance. The X-series from Nissens Cooling Solutions aims at taking the market to the next level.

The X-series portfolio includes:

- AluXchanger
- AluXsafe
- Full AluXsafe
- AluXair
- AluXstream
- **Full AluXstream**



# Experience Know-how Innovation

## Experience

With decades of **experience** from the global wind turbine industry, Nissens Cooling Solutions serves as a development partner to a number of the leading wind turbine manufacturers around the world.

## Know-how

More advanced turbines have taken Nissens Cooling Solutions on a journey from a mere cooling component supplier to a solutions provider of advanced cooling systems and modules. We have built our in-depth **know-how** of wind turbine applications through design and manufacturing involvement in constant series of next generation turbines for both on- and offshore wind applications.

## Innovation

As cooling pioneers in the wind turbine industry, we have now gained a position as a technology leader within cooling for modern wind turbines. The size, the technology and the complexity of today's wind turbines have put new demands up for the complete cooling solution to be installed. In close co-operation with our customers, we serve as a development partner, who provides a strong combination of design, test, manufacturing, distribution and services. **Innovation** and product novelties resides in Nissens Cooling Solutions' DNA.

## Full AluXstream: One-shot Brazed Aluminum Cooler

– specially designed for the needs  
of the wind turbine industry.

Nissens Cooling Solutions has developed the Full AluXstream cooler, which is a one-shot brazed cooler developed, optimized and customized for high-pressure water systems with a 6 bar working pressure.

### Full AluXstream Features:

- One-shot brazing
- Simple design with fewer parts
- Optimal cleanliness
- Light-weight construction
- Flexible module integration for scalable needs
- Strong performance features

### + One-shot Brazing Solution

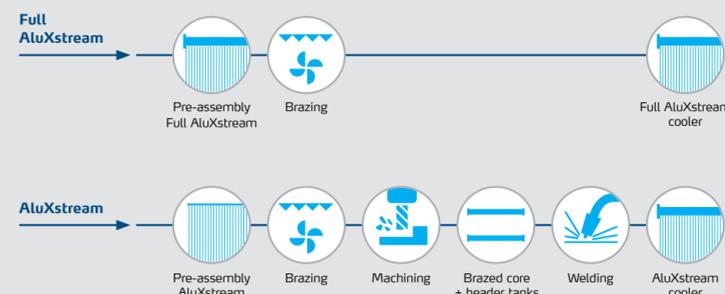
The Full AluXstream cooler is an innovative and technological cooling breakthrough developed to out-perform traditional plate and bar coolers as a both technically advanced and cost-competitive cooling solution.

The unique Full AluXstream cooling solution is available as a one-shot brazed cooler in single cores with a height up to 2,800 mm and a width of 700 mm.

No traditional plate and bar coolers can be subject to one-shot brazing, but thanks to the special design of the Full AluXstream cooler, one-shot brazing is feasible, and the unique opportunity of eliminating the production processes traditionally integrated between our brazing and welding processes.

### Production Process

#### Full AluXstream vs. AluXstream



### + Optimal Cleanliness

Thanks to the one-shot brazing approach, the need for post-machining or welding of the Full AluXstream is eliminated.

With the elimination of the welding process, the mandatory post-welding cleaning process for traditional plate and bar coolers is removed in the case of the Full AluXstream cooler.

### + Light-weight Construction

The design and material of the Full AluXstream position the product as a light-weight cooling solution compared to both traditional plate and bar coolers and Nissens Cooling Solutions' own AluXstream cooler.

Lower weight supports better performance and contributes to the cost competitiveness of Full AluXstream.

### + Flexible Module Integration for Scalable Needs

The individual Full AluXstream coolers may be subject to flexible module integration allowing for up to four coolers to be assembled as one plug-and-play solution without the use of hose and pipe components.

The modularization possibility is created thanks to the one-shot brazing technology as well as to the important parallelism of the connectors. The modularization of Full AluXstream is a perfect response to the demand for scalability and large-size cooling systems in the wind turbine industry.



### + Simple Design with Fewer Parts

Nissens Cooling Solutions' AluXstream solutions are based on an innovative hybrid construction with fewer parts. The tube plates of the products are integrated with the bars as well as with a special turbulator pattern. This simplified design offers customized cooling solutions with fewer parts.

The design of the Full AluXstream cooler is in full compliance with the Pressure Equipment Directive PED 97/23/EC article 3.3.

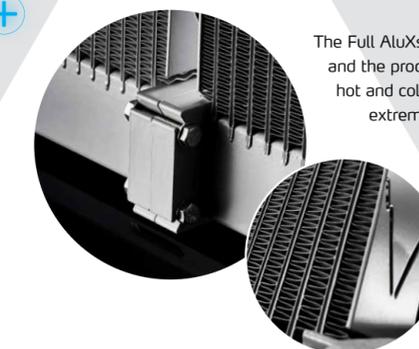
### + Strong Full AluXstream Performance Features

#### The Full AluXstream specifications:

<b>Height:</b>	650 – 2,800 mm
<b>Width:</b>	200 – 700 mm
<b>Depth:</b>	63 – 94 mm
<b>Max. working pressure:</b>	6 bar
<b>Burst pressure:</b>	>20 bar

Additionally, the thermal expansion performance of the Full AluXstream (  $\Delta 80^{\circ}\text{C}$  ) is better than the thermal expansion for traditional cooling products thanks to a homogeneous material thickness.

The Full AluXstream offers a high product lifetime, and the product is very suitable for operation in hot and cold climate environments with high or extreme temperature fluctuations.



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