



# MOTOR & GENERATOR COOLERS

QLKE, QDKR



Coiltech<sup>®</sup> industrial heat transfer



A04



# KEEPING THE POWER GENERATION INDUSTRY COOL

Modine designs and manufactures cleanable coolers for electrical motors and generators. Available in both single tube (QLKE) and double tube (QDKR) versions, the Modine motor/generator coolers feature a removable header, making cleaning even easier for the most demanding conditions.

Thanks to its many years serving the very diverse needs and often corrosive environments of the power generation industry, Modine is able to support its clients in selecting the configuration and materials that best suit the specific operating conditions.

To further assist clients in the selection of the ideal motor/generator cooler, Modine offers its proprietary "COILS" selection software that helps in selecting the most appropriate heat exchanger configuration based on clients' specific criteria and installation conditions.



# MOTOR & GENERATOR COOLERS QLKE, QDKR

Modine designs and manufactures cleanable coolers for electrical motors and generator cooling, where untreated sea or lake water is used. The motor/generator coolers are used for the cooling of air via circulating water and can be installed for either horizontal or vertical airflow.

The cleanable coolers have removable headers and can be designed with single or double tube, made of different materials depending on the corresponding water conditions. Based on water analysis, Modine can recommend the best combination of materials for your cooler.

## SINGLE TUBE COOLER TYPE QLKE

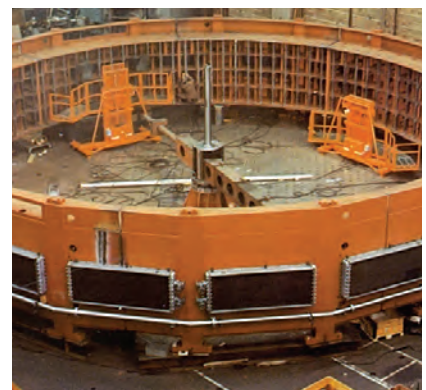
The single tube cooler is made of 1/2" (12,7 mm) tubes with a circuit sized for the conditions of the cooling water. The tubes are mounted in a bundle of aluminium or copper fins.

## DOUBLE TUBE COOLER TYPE QDKR

The double tube cooler is made of 1/2" (12,7 mm) primary tubes with a circuit specifically sized for the conditions of the cooling water. The pair of tubes are mounted in a bundle of aluminium or copper fins. The primary tube is inserted in a secondary copper tube with internal grooves. These grooves will drain any leakage water from the primary tubes. The water is drained out by a clearance between the primary and the secondary tube plate to any type of leakage device. Modine can supply leakage detectors (see accessories list) which can be mounted into the cooler.

## CLASSIFICATION

The double tube cooler is often used for applications in marine environments such as cooling of motors and generators aboard vessels and on offshore platforms. The QDKR double tube cooler design is approved by most classification societies and we can provide classification certificates on request, issued by DNV, BV, GL, ABS, CCS, LR, RINA etc.



Examples of areas where our motor/generator coolers can be seen.

Photo: ABB



### TUBE MATERIALS

The tubes are made of copper, copper-nickel (90/10), stainless steel or titanium. The secondary tube for double tube cooler is made of copper. The fins on the tubes give an increased heating surface to compensate for the low heat transfer coefficient on the air side. The tubes are mechanically expanded into the fins to give absolute contact between the two materials. The pitch between the fins is selected to get required cooling duty and air pressure drop conditions.

### FIN MATERIALS

The fins are as standard made of aluminium, but can also be made of copper that resists a saline environment very well.

### REMOVABLE HEADER

To assist with the mechanical cleaning of the cooler, the coil body is fixed between tube plates with a removable header (water box). The header is also equipped with drain and venting plugs. Headers can be made of Rilsan® coated steel, stainless steel or titanium.

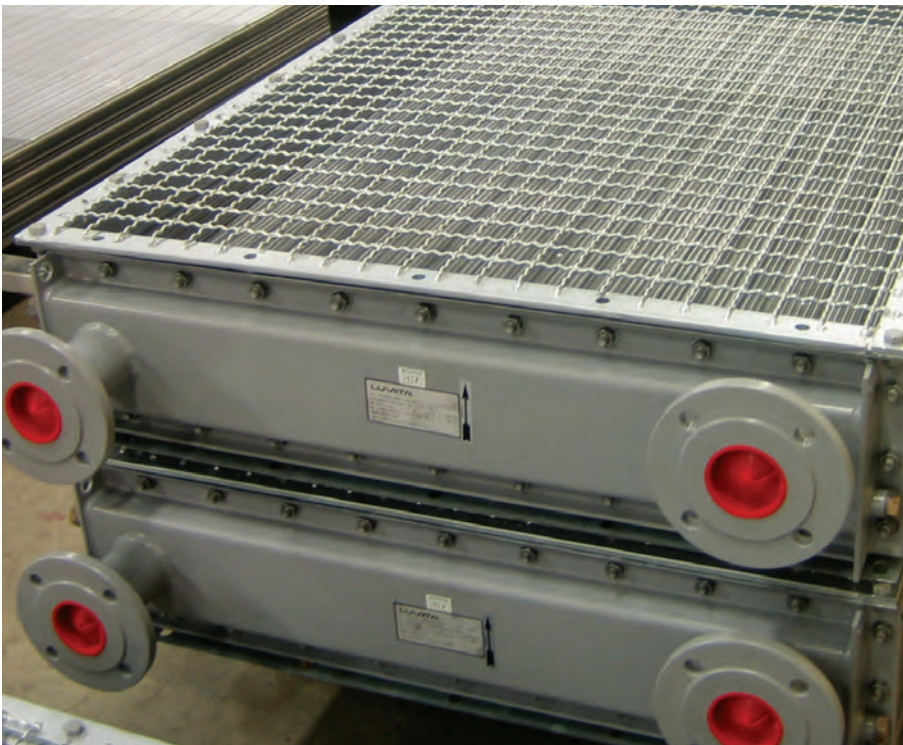
The cooler may be internally cleaned by simply removing the headers and using a brush inside the tubes. The brush can be ordered as an accessory (QLKZ-08).

### OIL & GAS

Modine motor generator cooler design can meet requirements on material selection, tightness control and strength evaluation often specified for oil and gas sector. For this market we also offer the necessary quality verification and administrative tasks. Please contact us for more information.



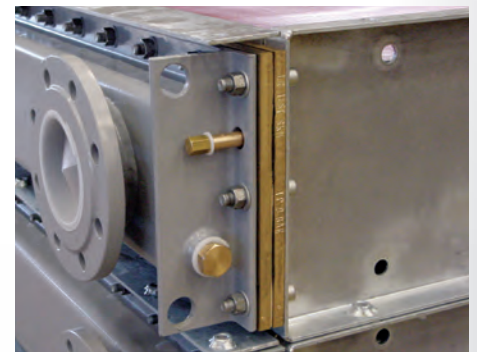
Modine's management system is certified acc. to ISO 9001:2008, ISO 14001:2004 & ISO 3834-2:2005.



Single tube cooler with fin surface protection guard, QLKZ-03.



Tube plate with smooth rolled tubes.



Double tube cooler with fitting for leakage detector, QLKZ-09.



# PACKING & SOFTWARE COILS

## TECHNICAL DATA QLKE & QDKR

	ii*=00	ii*=01	ii*=02
Max. working pressure (MPa)	0,6	0,8	1,0
Design temperature (°C)	99	99	99
Test pressure (MPa)	0,9	1,2	1,5
<b>For stainless steel &amp; titanium header</b>			
Max. working pressure (MPa)	0,5	0,8	1,0
Design temperature (°C)	99	99	99
Test pressure (MPa)	0,75	1,2	1,5

\* ii= Pressure class, according to product code key (see page 9).

## BUILT-IN FLEXIBILITY, VALUE-ADDED CUSTOMIZATION

With our extensive list of products, combined with a wide range of available options, we provide flexibility in building the exact solution for the exact industrial application. And if this flexibility isn't enough, our experienced design and engineering department will provide a specified quotation for a customized solution that does. After all, no two applications are often exactly the same.

## PACKING

The motor/generator coolers are delivered with different wood packing options depending on the specific transportation mode. The cooler is equipped with lifting lugs in order to place the cooler in right position.

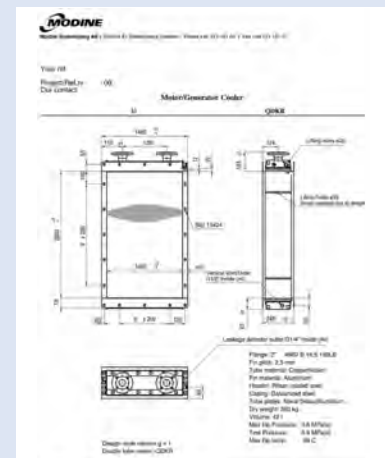


Different wood packing options.

## COILS SELECTION SOFTWARE

The Motor/Generator coolers QLKE and QDKR are available in a wide range of configurations. Modine's software COILS is used to select and size the correct cooler. It is a reliable and flexible software and generates a print-out of technical data and a dimensional drawing of the selected cooler. Some variables to be considered while sizing and selecting include:

- Cooling capacity
- Water flow rate & temperatures
- Air temperature
- Water quality condition
- Cooler size
- Mounting alternatives
- Environmental conditions



Dimensional drawing.

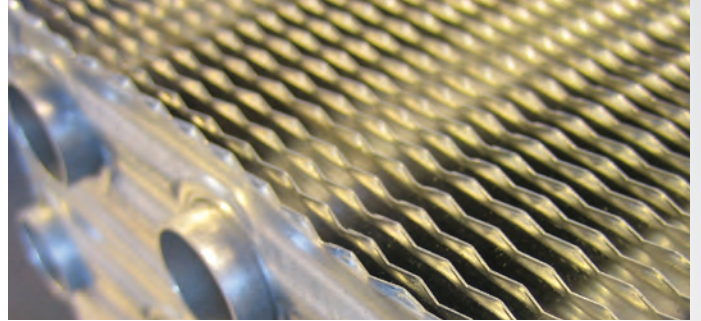


**Contact us** and we can supply the COILS software or help you in selecting the optimal cooler.

# MATERIALS & ACCESSORIES QLKE



Single tube cooler with copper fins resist saline environment very well.



Aluminium fins as standard on QLKE.



Set of counter-flanges, QLKZ-02-h.



Drain valve QLKZ-04-21.

## STANDARD MATERIAL – QLKE SINGLE TUBE

### Tubes

Copper, Copper-Nickel, Stainless Steel, Titanium

### Fins

Aluminium, Copper

### Tube Plate

Brass, Stainless Steel, Titanium

### Header

Galvanized Steel, Rilsan® Coated Steel, Stainless Steel, Titanium

### Frame work

Galvanized Steel, Stainless Steel, Aluminium, Titanium

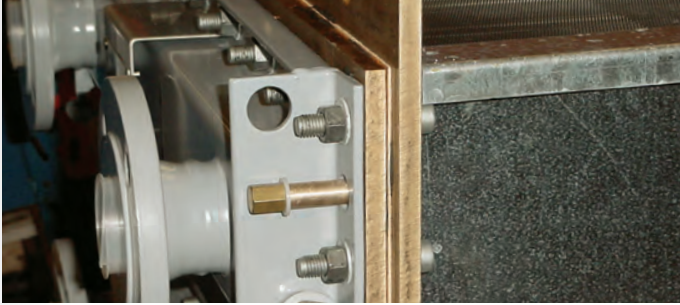
### Special design

We have a wide range of standard materials, but if your application need a cooler with special requirements, such as corrosion protection or special materials, a special design may be the best solution. Please contact us for more information.

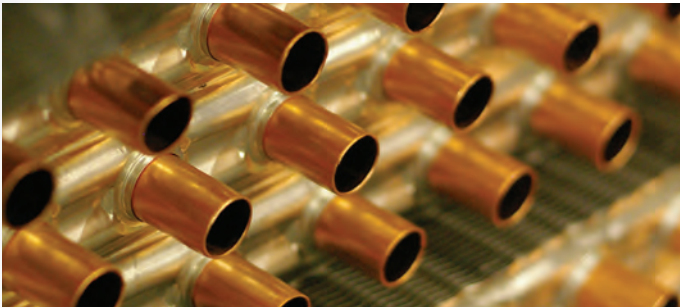
## ACCESSORIES – QLKE SINGLE TUBE

QLKZ-01-bbb-c-e	Gasket set, EDPM rubber
QLKZ-02-h-M	Set of counter-flanges
QLKZ-03-aaa-bbb	Fin surface protection guard, hot dip galvanized steel
QLKZ-04-21	Vent/Drain valve, 1/2" ball valve with 90° bend
QLKZ-04-22	Vent/Drain valve, 1/2" ball valve with straight outlet
QLKZ-04-23	Vent/Drain valve, 1/2" ball valve with straight outlet, special
QLKZ-06-MD-E	Set of sacrificial anodes
QLKZ-07-T-M	Stainless steel nameplate
QLKZ-08-aaa-n	Cleaning brush with rod
QLKZ-11-OPP-M	Safety valve

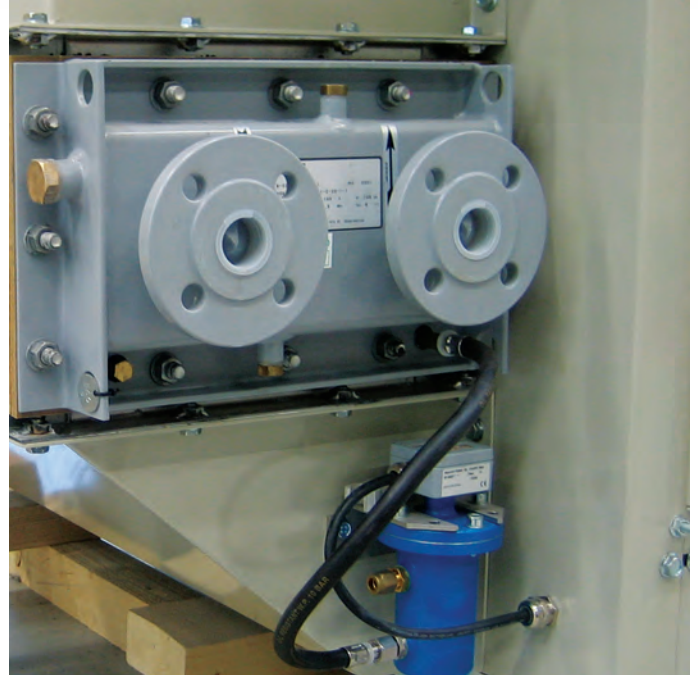
# MATERIALS & ACCESSORIES QDKR



QDKR double tube.



QDKR with copper tubes and aluminium fins.



QDKR with mounted leakage detector, type QDKZ-09-3.

## STANDARD MATERIAL – QDKR DOUBLE TUBE

### Primary Tube

Copper, Copper-Nickel, Stainless Steel, Titanium

### Secondary Tube

Copper

### Fins

Aluminium, Copper

### Primary Tube Plate

Brass, Stainless Steel, Titanium

### Secondary Tube Plate

Aluminium, Brass

### Header

Galvanized Steel, Rilsan® Coated Steel, Stainless Steel, Titanium

### Frame work

Galvanized Steel, Stainless Steel, Aluminium, Titanium

### Special design

We have a wide range of standard materials, but if your application need a cooler with special requirements, such as corrosion protection or special materials, a special design may be the best solution. Please contact us for more information.

## ACCESSORIES – QDKR DOUBLE TUBE

QLKZ-01-bbb-c-e	Gasket set, EDPM rubber
QLKZ-02-h-M	Set of counter-flanges
QLKZ-03-aaa-bbb	Fin surface protection guard, hot dip galvanized steel
QLKZ-04-21	Vent/Drain valve, 1/2" ball valve with 90° bend
QLKZ-04-22	Vent/Drain valve, 1/2" ball valve with straight outlet
QLKZ-04-23	Vent/Drain valve, 1/2" ball valve with straight outlet, special
QLKZ-06-MD-E	Set of sacrificial anodes
QLKZ-07-T-M	Stainless steel nameplate
QLKZ-08-aaa-n	Cleaning brush with rod
QLKZ-11-OPP-M	Safety valve
QDKZ-09-2-L	Optical leakage detector, type CLD
QDKZ-09-3-T-HL	Level switch leakage detector, type Kübler



# PRODUCT CODE KEY QLKE & QDKR

## CODE KEY - QLKE

### QLKE-aaa-bbb-c-d-e-ff-g-h-ii

**aaa = Length parallel to tubes (cm)** 040-300  
(every 10 mm valid)

**bbb = Width perpendicular to tubes (cm)** 030-140  
(every 33,33 mm valid)

**c = Number of tube rows** 2, 3, 4, 5, 6

**d = Fin pitch (mm)**

Al, Cu (standard thickness) Al, Cu (reinforced thickness)

0 = 1,8

5 = 1,8

1 = 2,0

6 = 2,0

2 = 2,5

7 = 2,5

3 = 3,0

8 = 3,0

**e = Number of water passes** 2 or 4

**\_f = Material combination (Primary Tubes - Fins)**

1f = Copper - Aluminium

2f = Copper Nickel 90/10 - Aluminium

3f = Titanium - Aluminium

4f = Stainless Steel - Aluminium

5f = Titanium - Copper

6f = Tinned Copper - Tinned Copper

7f = Copper - Tinned Copper

8f = Copper Nickel 90/10 - Tinned Copper

9f = Copper - Copper

0f = Copper Nickel 90/10 - Copper

**f\_ = Material in header**

f1 = Galvanized Steel, f2 = Stainless Steel

f3 = Rilsan® Coated Steel, f4 = Titanium

For ff = 1f, 2f, 6f, 7f, 8f, 9f, 0f the tube plates are made of Brass, for ff = 4f they are made of Stainless Steel.

3f and 5f have tube plates made of Titanium.

**g = Installation type** (see page 10)

1 = Duct installation, vertical mounting

2 = Hood installation, connection inwards, vertical mounting

3 = Hood installation, connection outwards, vertical mounting

6 = Hood installation, connection outwards, horizontal mounting

**h = Connection flange**

EN 1092-1 type 11 ANSI B 16.5 150 lbs

1 = DN 32

6 = 1 1/4"

A = DN 40

B = 1 1/2"

2 = DN 50

7 = 2"

3 = DN 65

8 = 2 1/2"

4 = DN 80

9 = 3"

5 = DN 100

0 = 4"

**ii = Pressure class**

00 = 0,6/0,9 MPa f\_=\_1 & \_3

0,5/0,75 MPa f\_=\_2 & \_4

01 = Pressure class 1: 0,8/1,2 MPa

02 = Pressure class 2: 1,0/1,5 MPa

**We have a wide range of standard products, but can also build special solutions. Contact us for more information.**

## CODE KEY - QDKR

### QDKR-aaa-bbb-c-d-e-ff-g-h-ii

**aaa = Length parallel to tubes (cm)** 040-300  
(every 10 mm valid)

**bbb = Width perpendicular to tubes (cm)** 030-140  
(every 50 mm valid)

**c = Number of tube rows** 2, 3, 4, 5, 6

**d = Fin pitch (mm)** 0=1,8; 1=2,0; 2=2,5; 3=3,0

**e = Number of water passes** 2 or 4

**\_f = Material combination**

**Primary tube/Secondary tube/Primary tubeplate/  
Secondary tubeplate/Fins**

1f = Copper/Copper/Brass/Aluminium/Aluminium

2f = CuNi (90/10)/Copper/Brass/Aluminium/Aluminium

3f = Titanium/Copper/Titanium/Aluminium/Aluminium

4f = Stainless Steel/Copper/Stainless Steel/Aluminium/Aluminium

5f = Titanium/Copper/Titanium/Brass/Copper

6f = Stainless Steel/Copper/Stainless Steel/Brass/Copper

7f = Titanium/Copper/Titanium/Brass/Tinned Copper

8f = Stainless Steel/Copper/Stainless Steel/Brass/Tinned Copper

9f = Copper/Copper/Brass/Brass/Copper

0f = CuNi (90/10)/Copper/Brass/Brass/Copper

**f\_ = Material in header**

f1 = Galvanized Steel, f2 = Stainless Steel

f3 = Rilsan® Coated Steel, f4 = Titanium

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9 = 3"

5 = DN 100

0 = 4"

**ii = Pressure class**

00 = 0,6/0,9 MPa f\_=\_1 & \_3

0,5/0,75 MPa f\_=\_2 & \_4

01 = Pressure class 1: 0,8/1,2 MPa

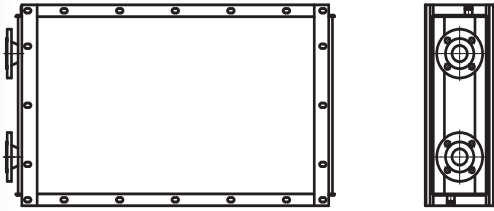
02 = Pressure class 2: 1,0/1,5 MPa

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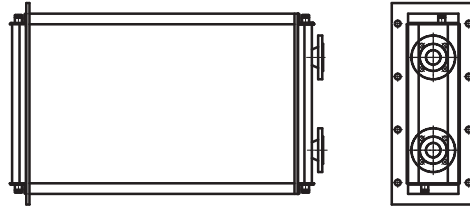
# INSTALLATION ARRANGEMENTS & HOOD INSTALLATIONS

## INSTALLATION TYPE (G) – QLKE & QDKR

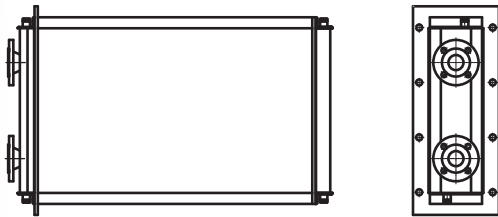
g=1 - Duct installation - Vertical mounting



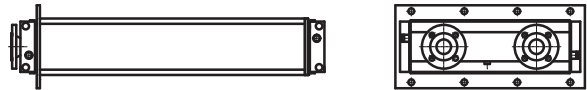
g=2 - Hood installation - Connection inwards - Vertical mounting



g=3 - Hood installation - Connection outwards - Vertical mounting



g=6 - Hood installation - Connection outwards - Horizontal mounting

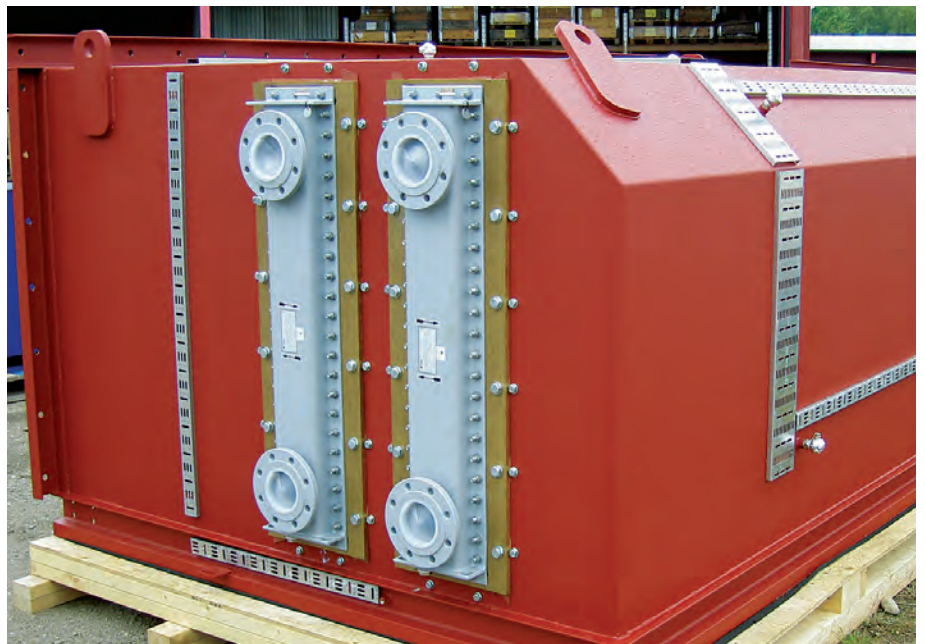


## HOOD INSTALLATIONS A COMPLETE UNIT

Modine supplies the complete hood unit, including the cooler, designed specifically to interface with motors or generators. The hood units are customized to fit the client's needs and can be delivered with or without fan units and with the steel painted according to the corresponding preferred paint system. Hoods made of stainless steel are also available.

The hood can be equipped with for example PT100 sensors, cable rails, inspection doors, drip tray with leakage detector and certified lifting lugs according to clients demands etc.

Large hoods can be designed as two separate pieces to optimize transportation. Please contact us for more information.



Hood installation with vertical mounting.

### RESIN TRANSFORMER COOLER

Modine's Resin transformer cooler is a complete customizable unit with a cleanable cooler, fans, damper and leakage detector. Designed for small-medium transformer applications, such as transformer plants on sport fields, ships or other industrial applications where a tension commutation is needed without the set-up of a fixed plant cooled by oil.

Resin transformer cooler is particularly suitable for those environments subject to blast dangers, where traditional oil cooling would consequently not be recommended. On cruise or merchant ships, for example, this solution is very effective in order to comply with the safety rules concerning dangerous fluids: the traditional plant is replaced by static equipment, where only the fan-motors are rotating. All mobile or semi-mobile applications can therefore be operated by this integrated system that features forced air circulation.

### FINNED PACK HEAT EXCHANGER

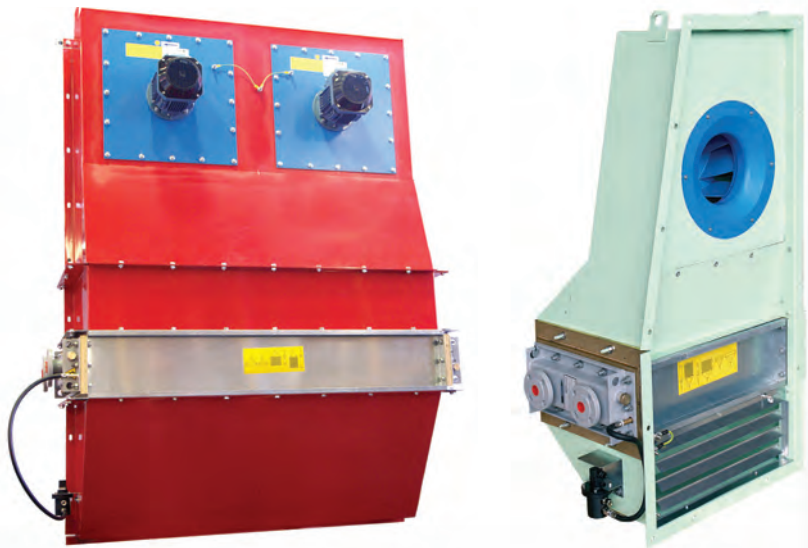
At the core of the Resin transformer cooler is a finned pack heat exchanger that allows the regulation of the air flow forced inside by the fan-motors. The product can also be equipped with dampers that intercept the air flow in case the fan-motors switch off.

### COMPLETE SOLUTION

Modine supplies the complete solution, including the cooler and corresponding finned pack heat exchanger with all the control devices.



Modine's Resin transformer cooler is suitable for example on cruise ships.



Resin transformer cooler, a complete cooling unit.



To learn more, visit  
[www.modine.com](http://www.modine.com)

Follow us @ModineHVAC  
 See us at [YouTube.com/ModineHVAC](https://www.youtube.com/ModineHVAC)

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#### About Modine

Modine specializes in thermal management systems and components, bringing highly engineered heating and cooling components, original equipment products, and systems to diversified global markets through its three complementary business units: Vehicular Thermal Solutions (VTS); Commercial & Industrial Solutions (CIS); and Building HVAC Systems (BHVC).

Modine is a global company headquartered in Racine, Wisconsin (USA), with operations in North America, South America, Europe, Asia and Africa.

#### Contacts:

**Sweden**  
 Industrigatan 2  
 SE-614 81 Söderköping, Sweden  
 Tel +46 121.191.00  
[inquiry-sodese@modine.com](mailto:inquiry-sodese@modine.com)

**Italy**  
 Via Giulio Locatelli, 22  
 33050 Pocenìa (UD), Italy  
 Tel +39 0432.772.001

**Belgium**  
 Poortakkerstraat 41  
 B - 9051 Sint-Denijs-Westrem - Belgium

**PRC**  
 No. 19 Xin Nan Zhong Road,  
 Mei Cun, Wuxi New District  
 Wuxi 214112 Jiangsu  
 Tel +86 510.8855.3982

**USA**  
 PO Box 1457, 1000 Heatcraft Dr.  
 Grenada, MS 38902  
 Tel +1 662.229.4116  
 Fax +1 662.229.2002

