Oil coolers
for power
transformers

Axicooler

Solyvent

The power of air

Fläkt Solyvent-Ventec has been in the ventilation business since 1919.
The company specializes in the design, manufacture and sale of industrial fans and oil coolers for power transformers.

Ongoing innovation in its products and production facilities, and new fan and oil cooler technologies have made Fläkt Solyvent-Ventec the Centre of Excellence in the group worldwide for industrial centrifugal fans.

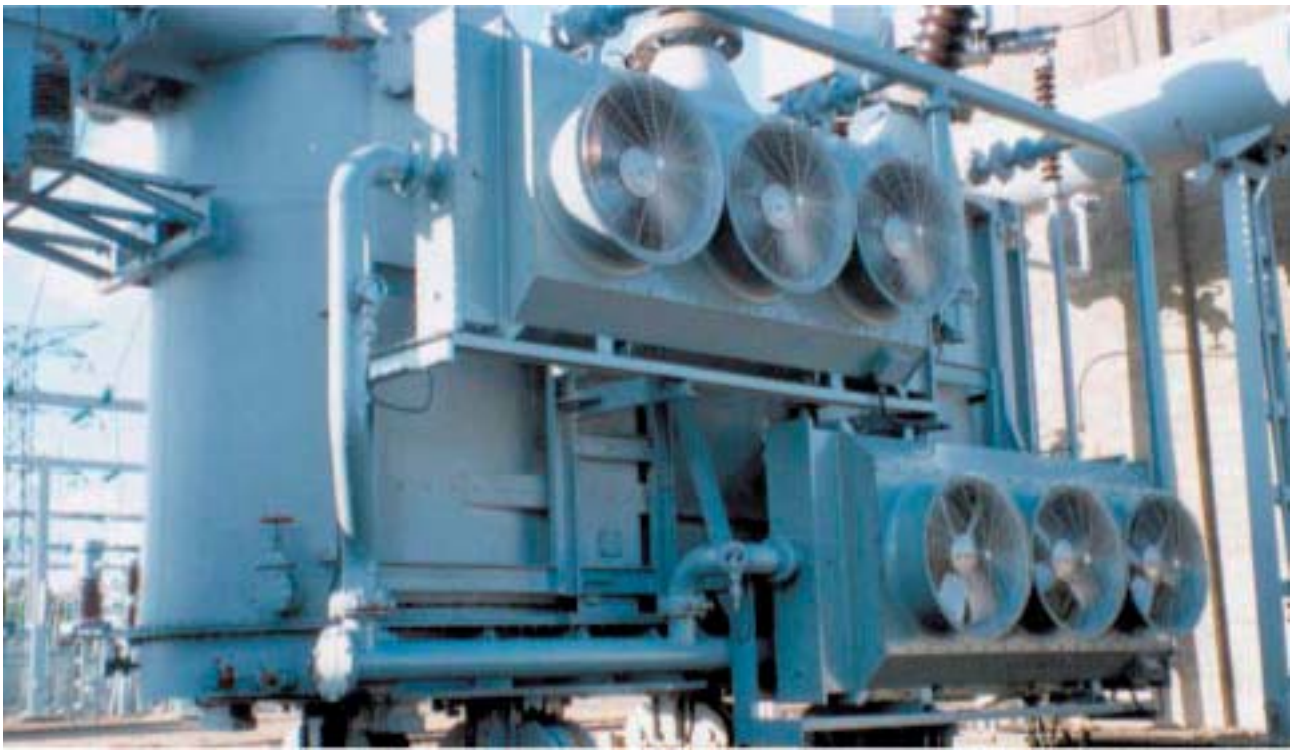
A global sales network ensures that Fläkt Solyvent-Ventec customers will enjoy a close collaboration.

ISO 9001 certification of its Environmental and Quality Management systems provides evidence of its commitment to a global quality policy.

Design

The oil coolers are designed and manufactured in our Research & Production Centre based in Meyzieu (near Lyon). The facility houses the most modern and advanced production processes:
• Laser cutting
• Welding robots
• Automated paint lines...

The oil coolers are exclusively adapted to cooling the oil used in power transformers. They are designed to run under the most stringent operating conditions:
• Temperature
• Corrosive atmospheres
• Dust, sand, rain and snow.



Description

1 - Tube stacks

Our finned tubes, without inner tubulators, are made of either aluminium or copper, depending on the corrosion risk.
• Pressure rating:
+ 350,000 Pa absolute
• Depression rating:
+ 100 Pa absolute

The tubes are roller expanded on a thick steel tube plate (15 or 20 mm).

Internal cleanliness

After expansion the inside of each tube is visually inspected. After the tightness test (described below), the oil cooler is rinsed with filtered transformer oil at 65°C, circulating at high speed for 20 minutes. The input and output pipes of the oil cooler are then hermetically sealed.

Tightness test

Each oil cooler undergoes a tightness test with hot transformer oil (65°C) circulating for 3 hours at a pressure of 300,000 Pa absolute.

2 - Manifolds

Made of steel, they can be bolted or welded to the tube plate with a bolted cover. Sealing is provided with a nitrile seal.

3 - Hook-up

The inlet/outlet pipes are fastened with flanges.

4 - Air supply plenum

The air supply plenum consists of two thick sheet side-members that connect the tube plates, and a fan support sheet. Spring washers on the plate/side-member attachments allow the stacks to expand.

5 - Axial fan

This fan, which is part of our Axipal BZI line, ensures the lowest sound levels and high efficiency. The casing, which forms a bell mouth for suction and a diffuser for blowing, minimizes pressure drops. The blower wire guard is compliant with international safety standards.

Motors

Compliant with international standards:
• foot mounted, aluminium frame,
• IP 55, class F, drain hole at low point.
They are electrically isolated from the fan casing.

6 - Filter wire guard

7 - Electrical connection box

Metal box compliant with international standards (IP 55 sealing). It receives the cables from the fan motors (and in some cases from the pump). It is equipped with terminal strips and stuffing glands for connection of the power cables.

Coatings

Surfaces in contact with oil

After SA 2.5 sandblasting:
• 1 coat of paint resistant to transformer oil
• Thickness: 20 microns.

Outer surfaces (standard version)

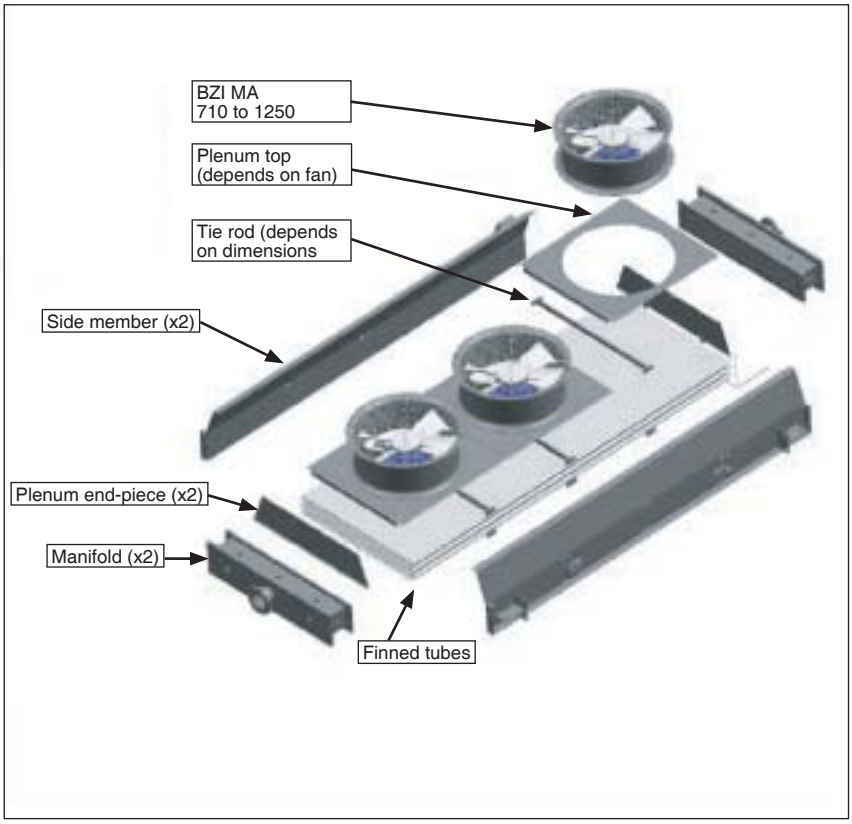
After SA 2.5 sandblasting:
• One coat of rust-proofing primer
• One finishing coat
• Total thickness: 125 microns (other coatings may be defined according to the environment or specific requests).

Nuts and bolts

Steel with 200h salt spray coating, zinc based.

Fan wire guard

Stainless steel.



Accessories

Motor pump

- exclusively adapted to the circulation of transformer oil
- motor integrated in pump, ensuring very high reliability
- operating safety

Filter wire guard

- protection against plant fragments
- easily removable for cleaning operations

Oil circulation indicator

- contact normally closed or open
- alarm if oil flow stops or is too weak
- no maintenance required

Electrical cabinet

- designed and built as per specifications

Selection charts

Selection chart for 1 oil passage

ΔT = 40k
θ ambient = +30°C

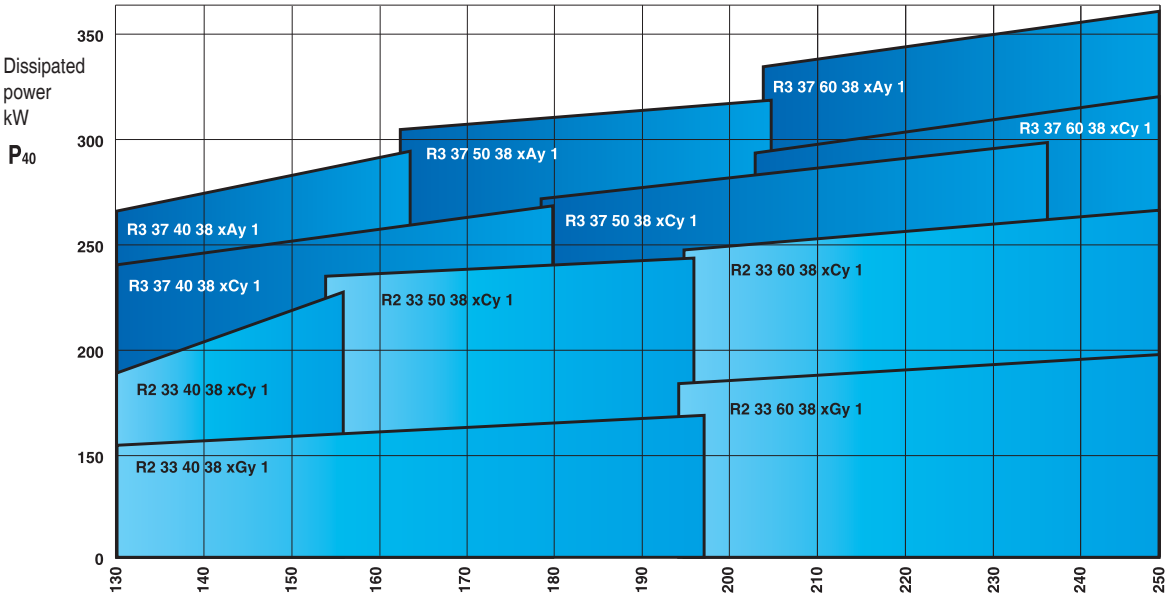


Figure 1

Selection chart for 3 oil passage

ΔT = 40k
θ ambient = +30°C

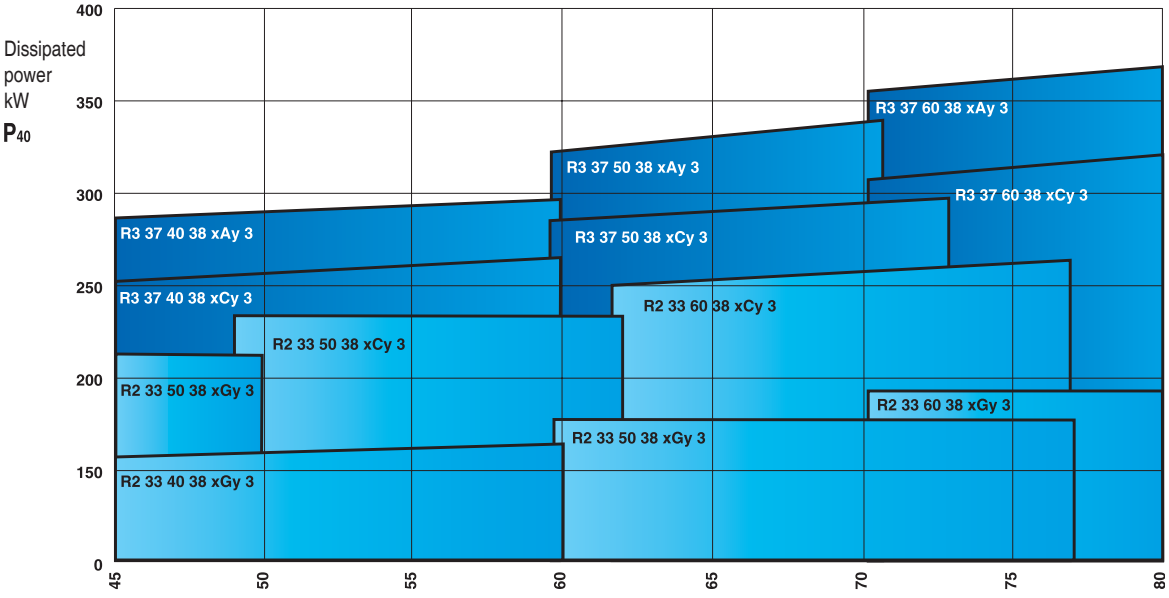


Figure 2

Oil cooler

On the selection charts, dissipated power P_{40} (kW) is given as a function of the oil flow Q (m^3/h) (figures 1 and 2).

Dissipated power

The dissipated power is given for an ambient air temperature of 30°C and an atmospheric pressure of 760 mm HG.

The mean oil temperature rise (ΔT) used in the calculation is 40K.

If the mean oil temperature rise is different (ΔT = δ), the new dissipated power Pδ of the oil cooler is as follows:
$P\delta = P_{40} + k\ (\delta - 40)$.
k is a coefficient that is specific to each coolant. Its value is given in the table in **figure 4**.

The selection charts allow you to select the oil cooler to perfectly suit your needs.

Motor-driven fans

The oil coolers proposed are equipped with 2 or 3 motor-driven fans whose rotational speed is 720 rpm with a 50 Hz/8-pole motor or a 60 Hz/10-pole motor. The characteristics of each motor-driven fan are presented in the table in **figure 4**.

Oil inlet/outlet

The oil coolers proposed are designed for 1 or 3 oil passages inside the tube stacks. The oil inlet and outlet can then be positioned, on request, on the respective manifolds.
Note: for oil coolers with 3 oil passages, they must be positioned symmetrically relative to axis 1 (see figure 3).

Oil cooler fastening

The oil cooler can be operated horizontally or vertically. The supporting devices are defined according to demand.

Pump

To be selected on demand.

Mechanical characteristics

For each oil cooler, the oil capacity, weight (without oil) and main dimensions are shown in the table in **figure 4**.

Acoustics

The sound power level Lwt is mentioned for each oil cooler in the table in Figure 4. It is either 81 dB(A) or 84 dB(A), depending on the number of fans (2 or 3) in the oil cooler.

Acoustic pressure level as per IEC 551

Acoustic pressure level at 2 meters, as per IEC 551, is defined as follows:
$Lp2m\ (dB(A)) = Lwt - 10 \log S$
S = effective area calculated as per IEC 551.

Mobile power stations

On request, a specific design is proposed to withstand the shocks and vibrations due to installation on board of a wagon on a road trailer.

Technical data and dimensions

Oil coolers with 1 and 3 oil passages

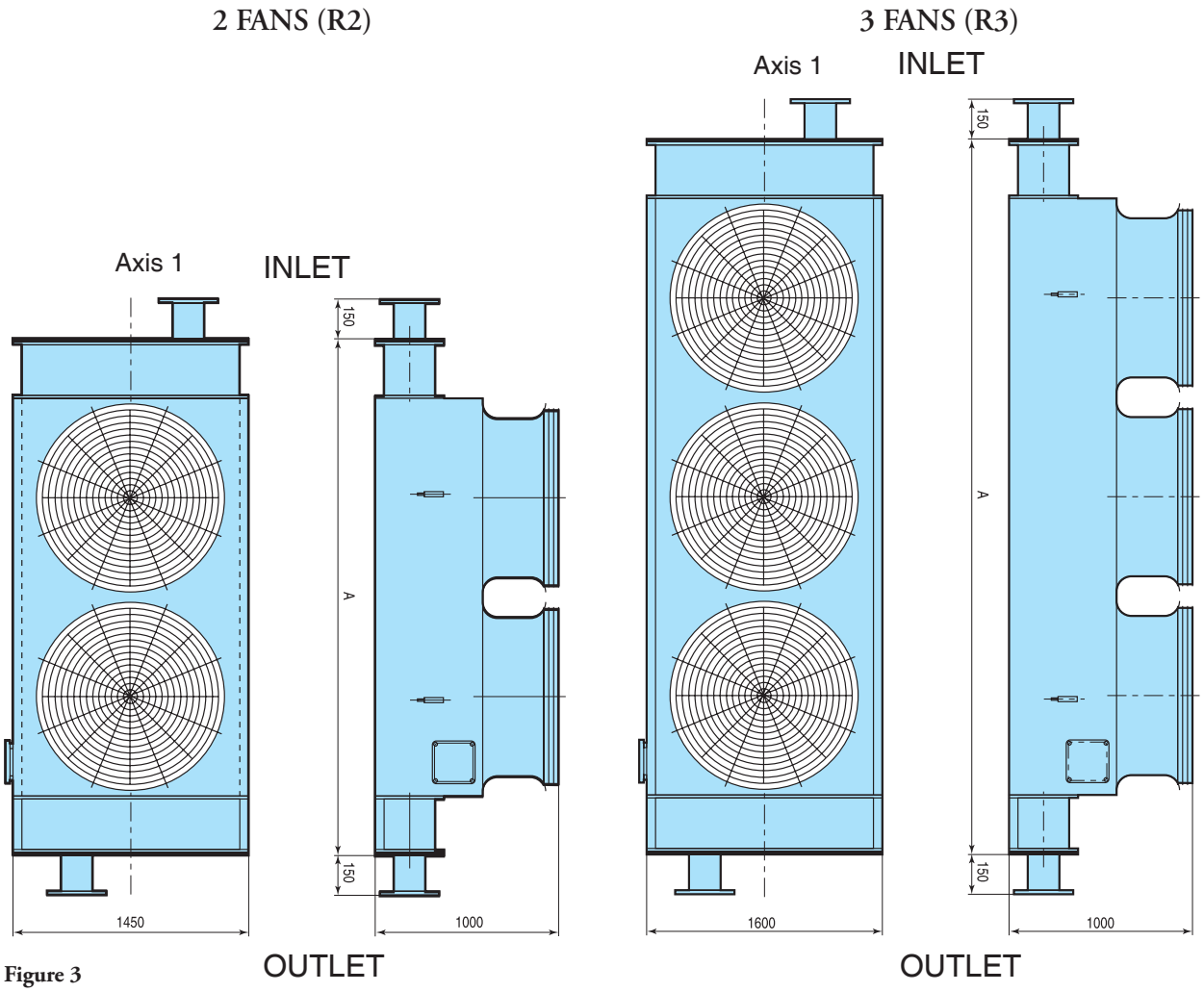


Figure 3

TYPE of oil-cooler	A (mm)	Motor-driven fan (50Hz / 60 Hz – 415V)					Coefficient K		Acoustic power Lwt dB(A)
		Weight (kg)	Oil capacity (l)	Per motor-driven fan					
				Line power (kW)	Line current (A)	Starting current (A)	1 passage	3 passages	
R2-33-40-38xGy	2300	800	160	1.1	3	10	4.6	4.5	81
R2-33-50-38xGy	2300	850	170	1.1	3	10	-	5.2	81
R2-33-60-38xGy	2300	900	180	1.1	3	10	5.5	5.5	81
R2-33-40-38xCy	3300	1000	260	1.1	3	10	6.0	6.0	81
R2-33-50-38xCy	3300	1100	270	1.1	3	10	6.7	6.7	81
R2-33-60-38xCy	3300	1200	280	1.1	3	10	7.1	7.2	81
R3-37-40-38xCy	3300	1100	270	1.1	3	10	7.6	7.4	84
R3-37-50-38xCy	3300	1200	280	1.1	3	10	8.7	8.5	84
R3-37-60-38xCy	3300	1300	290	1.1	3	10	8.9	9.0	84
R3-37-40-38xAy	3800	1500	340	1.1	3	10	8.6	8.1	84
R3-37-50-38xAy	3800	1600	350	1.1	3	10	9.2	9.6	84
R3-37-60-38xAy	3800	1700	360	1.1	3	10	10.0	10.2	84

***x* = *C:* copper tubes / *A:* aluminium tubes – *y* = *H:* horizontal position / *V:* vertical position**

Figure 4

Some leading projects

NUCLEAR

SOUNDPROOFING

100 MVA

Germany	ABB Transformatoren Schorch
Argentina	Faraday
Austria	VA Tech Elin
Belgium	Pauwels
Ivory Coast	CIE
Croatia	Končar
Spain	ABB Trafosur
France	EDF - Transport/Distribution/Production EDF - UTO EDF - Hydraulique France Transfo Alstom T&D Jeumont Schneider
Hungary	Ganz Ansaldo
India	Bharat Heavy Electricals
Israel	Elco
Italy	ABB Distribuzione ABB Trafo
Morocco	Alcatel Lyonnaise des Eaux Casablanca
Norway	ABB National Transformer
Poland	ABB Elta
Portugal	Efacec
United Kingdom	ABB Power T&D VA Tech Peebles Electric
Sweden	ABB Transformers
Switzerland	ABB Secheron
Turkey	AEG - ETI ABB Elektrik Sanayi
USA	Waukesha Electric Systems
Yugoslavia	Minel

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