



Pressure | Temperature | Level

# Measurement technology for refrigeration



Smart in sensing



Alexander Wiegand,  
Chairman and CEO,  
WIKA

## About us

As a family-run business acting globally, with 11,200 highly qualified employees, the WIKA group of companies is a worldwide leader in pressure and temperature measurement. The company also sets the standard in the measurement of level, force and flow, and in calibration technology.

Founded in 1946, WIKA is today a strong and reliable partner for all the requirements of industrial measurement technology, thanks to a broad portfolio of high-precision instruments and comprehensive services.

With manufacturing locations around the globe, WIKA ensures flexibility and the highest delivery performance. Every year, over 50 million quality products, both standard and customer-specific solutions, are delivered in batches of 1 to over 10,000 units.

With numerous wholly owned subsidiaries and partners, WIKA competently and reliably supports its customers worldwide. Our experienced engineers and sales experts are your competent and dependable contacts locally.

# WIKA – your partner for refrigeration

The refrigeration cycle, as one of the components of any refrigeration application, is an important lever to optimise the efficiency of the entire system. This is why monitoring and controlling its various physical parameters is so essential.

Cooling occurs by evaporating a liquid refrigerant in an evaporator. The heat required for evaporation is thus extracted from the air to be cooled, which drops in temperature.

The evaporated refrigerant then leaves the evaporator at a low evaporation pressure and is drawn through a (refrigeration) compressor to a higher pressure (the condensation pressure). At this high condensation pressure, the heat extracted during the cooling process is dissipated through the condenser (water or air-cooled) until the gas condenses into a liquid at the same pressure as the condensation pressure.

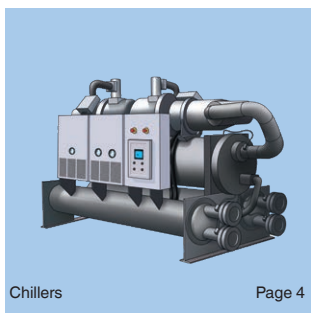
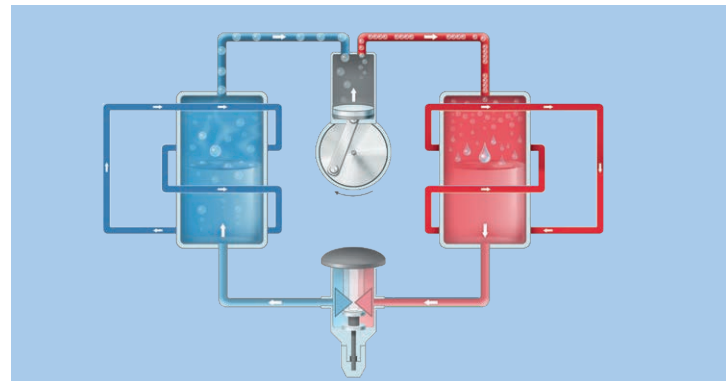
This liquid is injected back into the evaporator through an expansion valve. The liquid expands during injection to the lower evaporation pressure after which evaporation (i.e. cooling) begins again.

A cooling process is thus a cycle in which a liquid refrigerant alternately expands to a lower pressure, evaporates and then condenses.

Manufacturers of refrigeration systems understand how important it is to be able to rely completely on every single component.

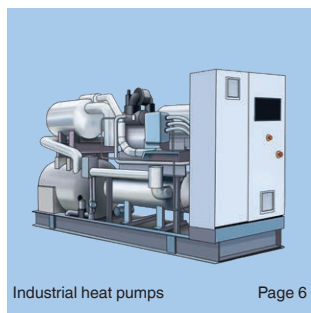
For this reason, WIKA focuses on the reliability and accuracy of the measuring instruments, as well as strong delivery performance. This brochure highlights the most important measuring instruments that WIKA offers for the different modules of a refrigeration system.

So that the system can run properly and efficiently, all the measuring instruments must work accurately and reliably.



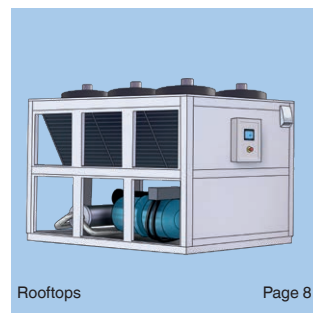
Chillers

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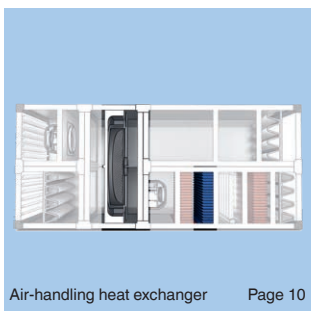
Industrial heat pumps

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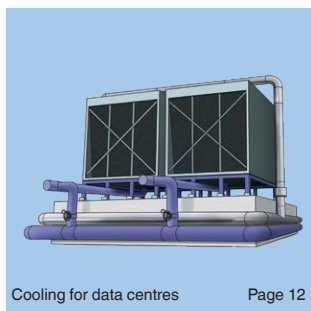
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# Chillers

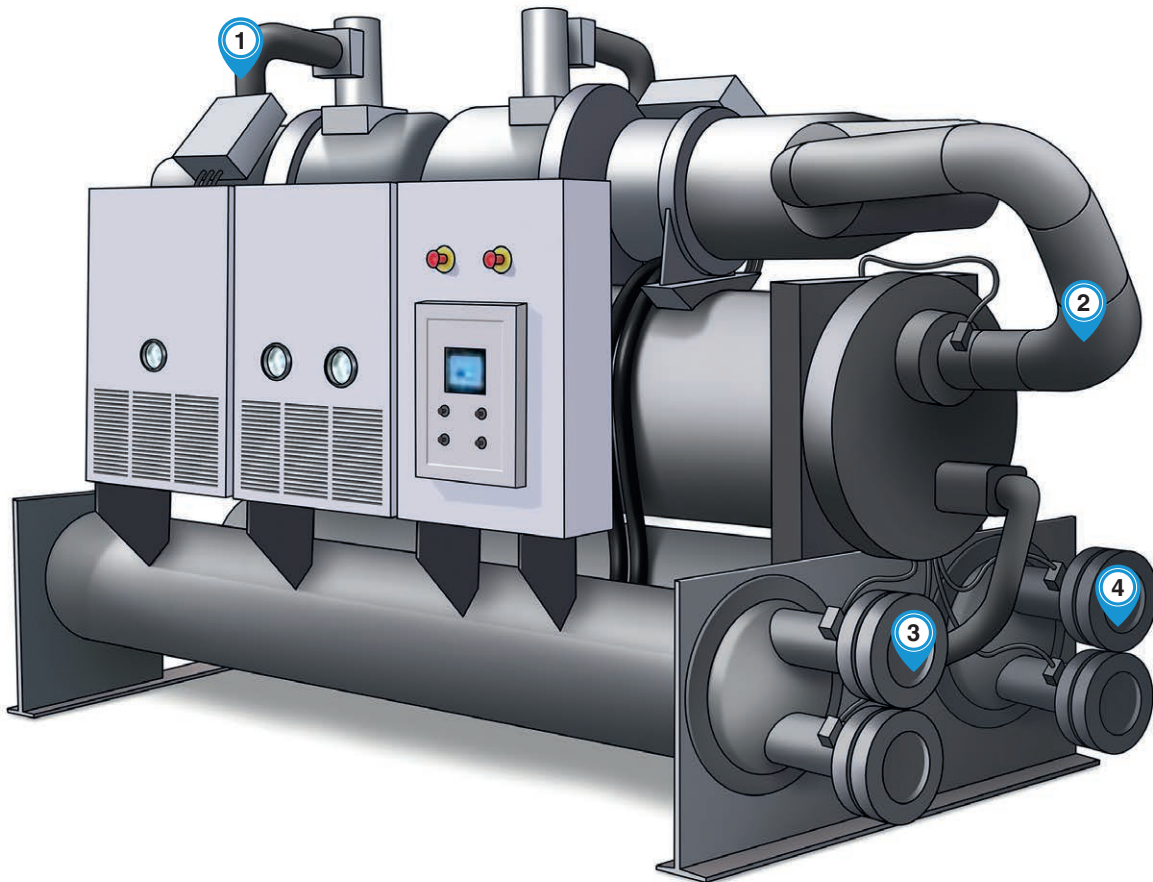
**Highest efficiency, smallest possible CO<sub>2</sub> footprint, low sound emissions and low costs – these are just some of the challenges which refrigeration unit manufacturers are faced with.**

To achieve this performance, the four basic components of a chiller (compressor, condenser, expansion valve and evaporator) must be matched to each other ideally, and the control system should be designed and fine-tuned for the specific application. Each regulation system is only as good as its individual components.

In the case of measuring instruments, this means that accurate measurement is needed in order to be able to operate the plant efficiently. In addition to their accuracy, instruments should feature additional properties, such as

resistance to weathering, condensation and media, to ensure that a chiller can withstand, for example, 365 days per year on a roof, exposed to the elements.

Not all measuring instruments have a direct influence on the control. The plant itself also requires maintenance at regular intervals in order to provide reliable service for many years. For this, reliable measuring instruments for monitoring the condition of various elements, such as the engine oil, are indispensable tools.



Legend – Measuring locations:

- ① Low-pressure line (suction gas)
- ② High-pressure line (gas)
- ③ High-pressure line (liquid)
- ④ Low-pressure line (liquid)

Temperature

- ①
- ②
- ③
- ④



**Resistance thermometer**

TF35  
TF37  
TF-2000  
TF44  
TF45

- ①
- ②
- ③
- ④



**Dial thermometer**

A52  
R52  
55

Pressure

- ①
- ②
- ③
- ④



**Bourdon tube pressure gauge**

112.28  
132.28  
213.53  
23x.50

- ①
- ②
- ③
- ④



**Pressure transmitter**

R-1

Accessories



**Switch**  
PCA  
PSM-690



**Syphon**  
910.15



**Valve**  
IV1x, IV2x

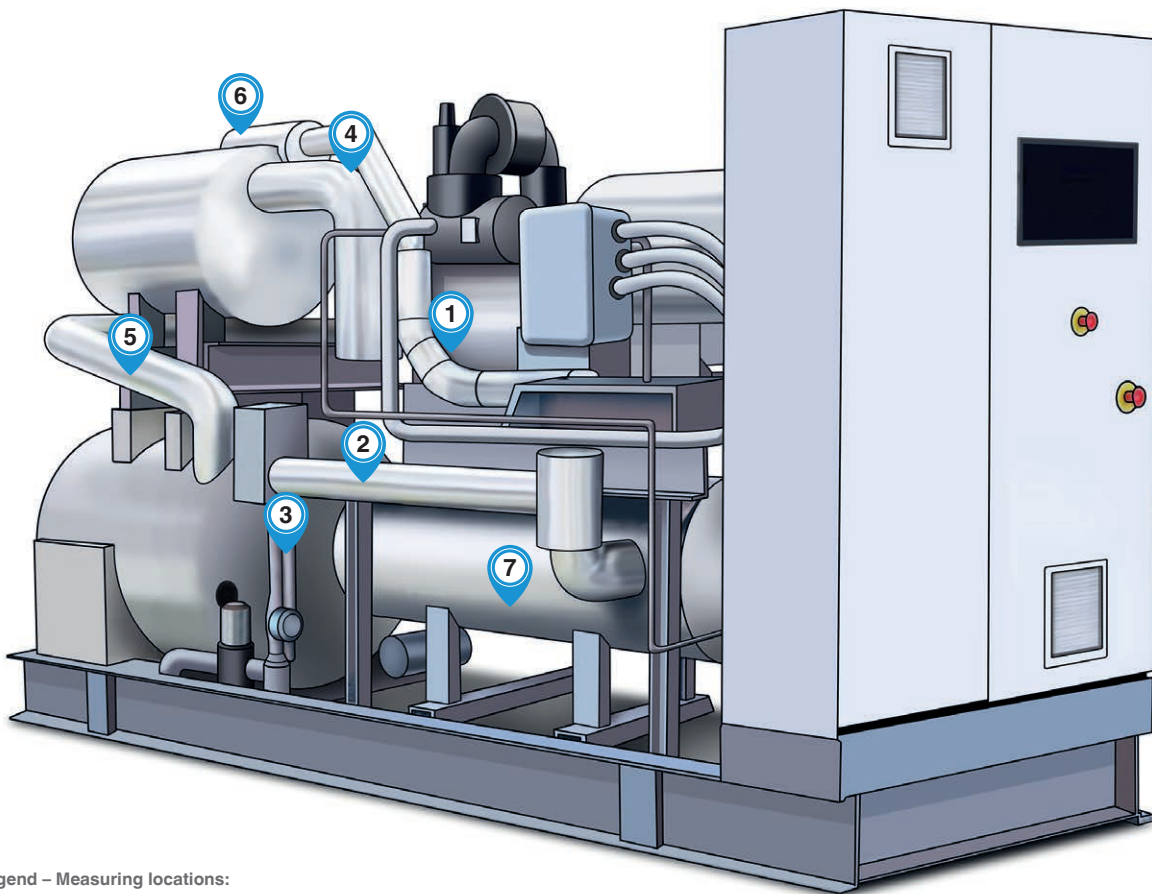
# Industrial heat pumps

For cooling applications in commercial and other non-domestic applications, such as schools, sports centres, shops and offices, larger heat pumps are used.

Via of the refrigeration circuit, unwanted heat is removed and thus the process or space is cooled. The heat absorbed by the refrigerant can be transferred to other areas. For example, in production areas where heat is indispensable as part of the production process, such as sterilisation or drying processes. The use of the waste heat, in connection with the use of (non-critical) refrigerants, makes this technology particularly environmentally friendly.

For the control of heat pumps, pressure and temperature measuring instruments are critical.

The measuring systems used ensure efficient operation of the heat pump. As a result, they must be particularly reliable.



Legend – Measuring locations:

- ① Low-pressure line (suction gas)
- ② High-pressure line (gas)
- ③ Heating circuit
- ④ High-pressure line (liquid)
- ⑤ Low-pressure line (liquid)
- ⑥ Evaporator
- ⑦ Compressor

Temperature

- ①
- ②
- ④
- ⑤



**Resistance thermometer**  
TF35  
TF37  
TF-2000  
TF44  
TF45

- ①
- ②
- ④
- ⑤



**Dial thermometer**  
A52  
R52  
55

Pressure

- ①
- ②
- ③
- ④
- ⑤



**Bourdon tube pressure gauge**  
111.10  
112.28  
132.28  
213.53  
23x.50

- ①
- ②
- ④
- ⑤



**Pressure transmitter**  
R-1

Level

- ⑥



**Optoelectronic level switch**  
OLS-C04

- ⑦



**Float switch**  
RLS-1000

Accessories



**Switch**  
PCA  
PSM-690



**Syphon**  
910.15



**Valve**  
IV1x, IV2x

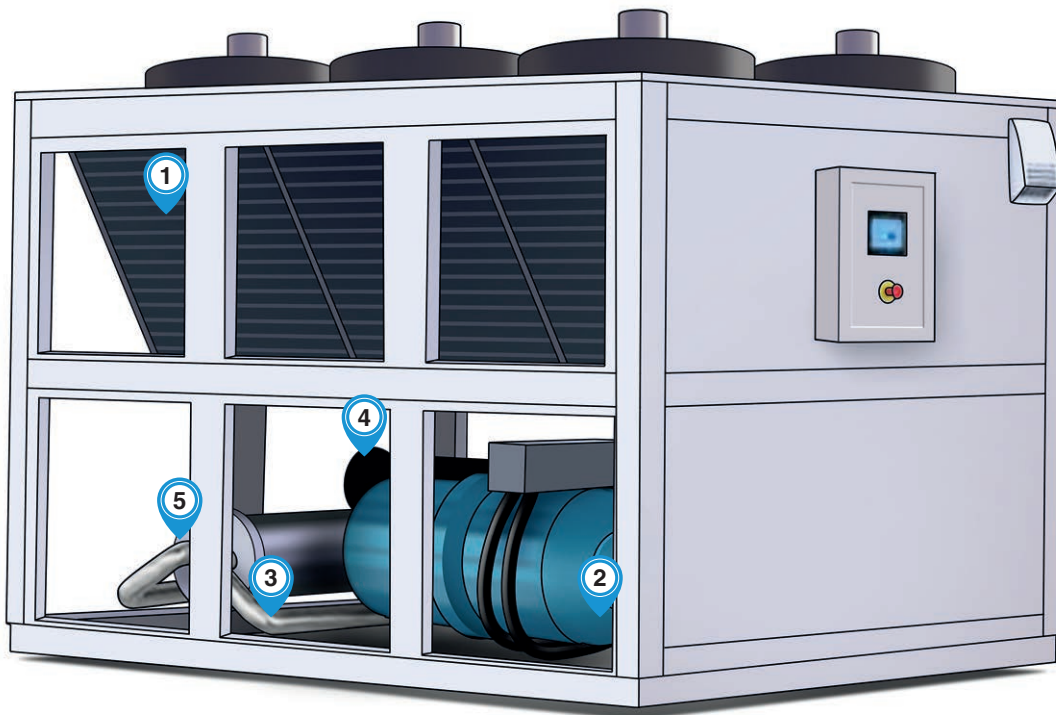
# Rooftops

**Rooftops provide a pleasant feel-good climate in commercial buildings or production and storage halls. The advantage of such a solution is that the system is installed on the roof and doesn't take up any usable space.**

This type of unit can be used either for heating only, cooling only or a combination of both, also in conjunction with a ventilation system.

As these units are installed on the roof of the building, it is important that the equipment and its measuring instruments are able to withstand the ambient conditions.

Air-cooled, roof-mounted systems are extremely energy-efficient. The cooling is based on cooling air through the evaporation of water. The energy required for evaporation is extracted from the air, and this therefore cools the air. Electricity is only required for the operation of the fans which circulate the air.



Legend – Measuring locations:

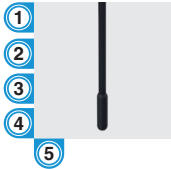
- ① Ambient air
- ② High-pressure line (gas)
- ③ High-pressure line (liquid)
- ④ Low-pressure line (liquid)
- ⑤ Low-pressure line (gas)



Temperature

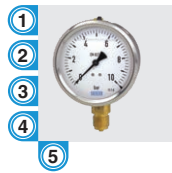


**Outdoor thermometer**  
TF41



**Resistance thermometer**  
TF-2000  
TF44  
TF45

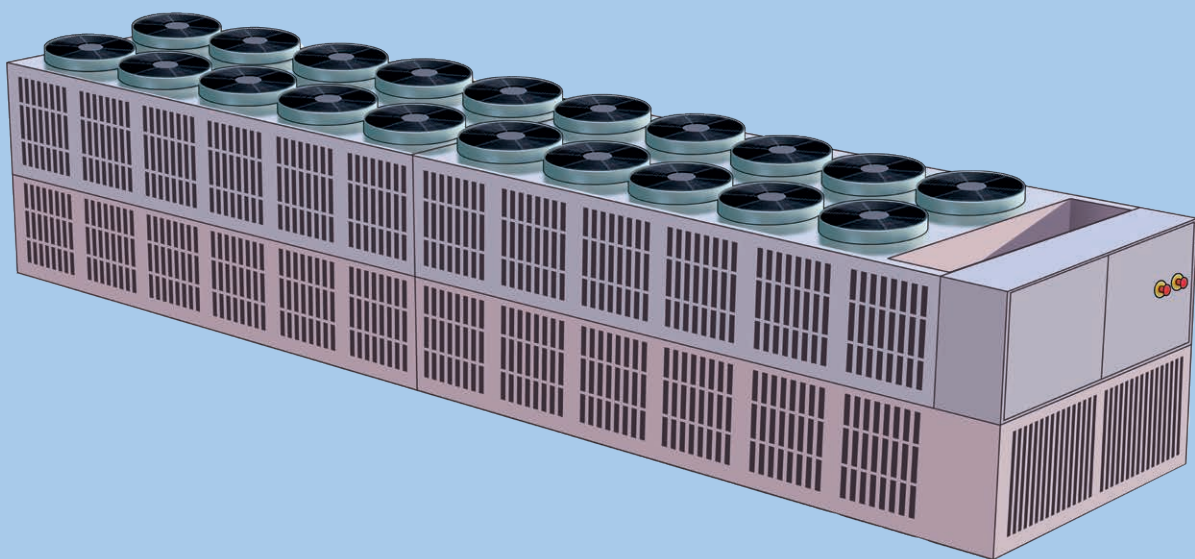
Pressure



**Bourdon tube pressure gauge**  
112.28  
132.28  
213.53  
232.50  
233.50



**Pressure transmitter**  
R-1

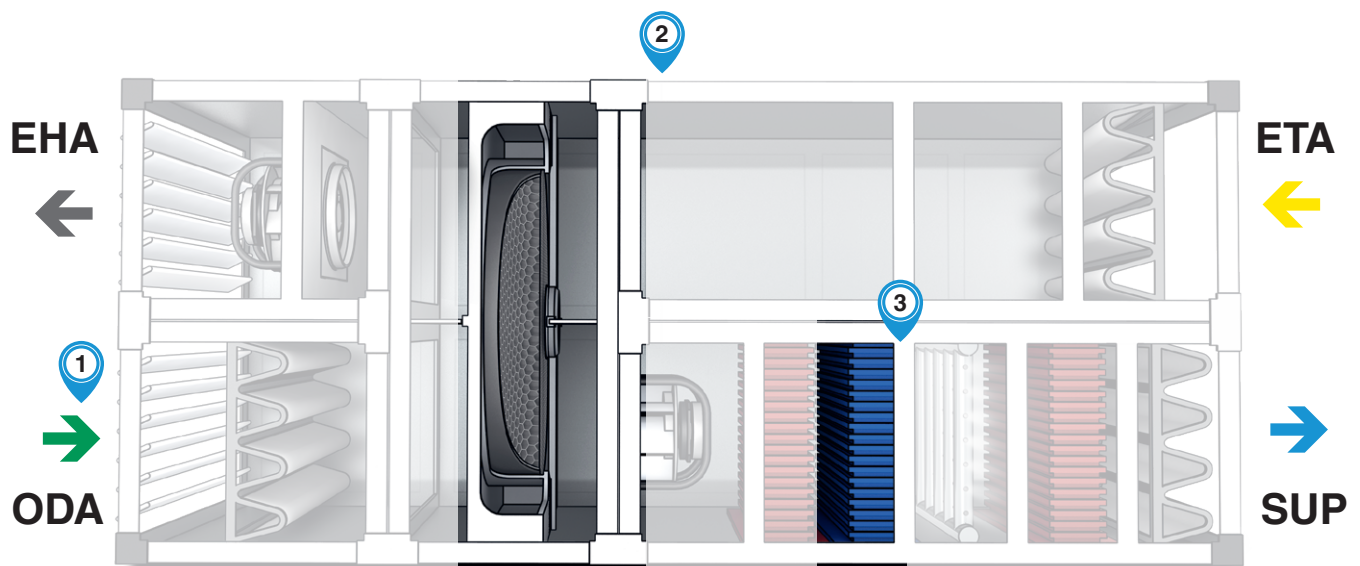


# Air-handling heat exchanger

Nowadays, most ventilation and air-conditioning systems are equipped with a heat exchanger, whereby their energy efficiency is significantly improved.

The inlet gas/liquid is usually separated from the outlet gas/liquid to prevent mixing, though some systems allow the media to be in contact with each other.

In the air-handling system the heat exchanger ensures that the heat from the used room air is recovered and returned to the fresh supply air.



Legend - Measuring locations:

- ① Outdoor air (ODA)
- ② Exhaust air (ETA / EHA)
- ③ Supply air (SUP)

## Temperature

①



**Outdoor thermometer**  
TF41

②

③



**Resistance thermometer**  
TF40  
TF-2000  
TF45

②

③



**Electronic ventilation duct temperature sensor**  
A2G-60

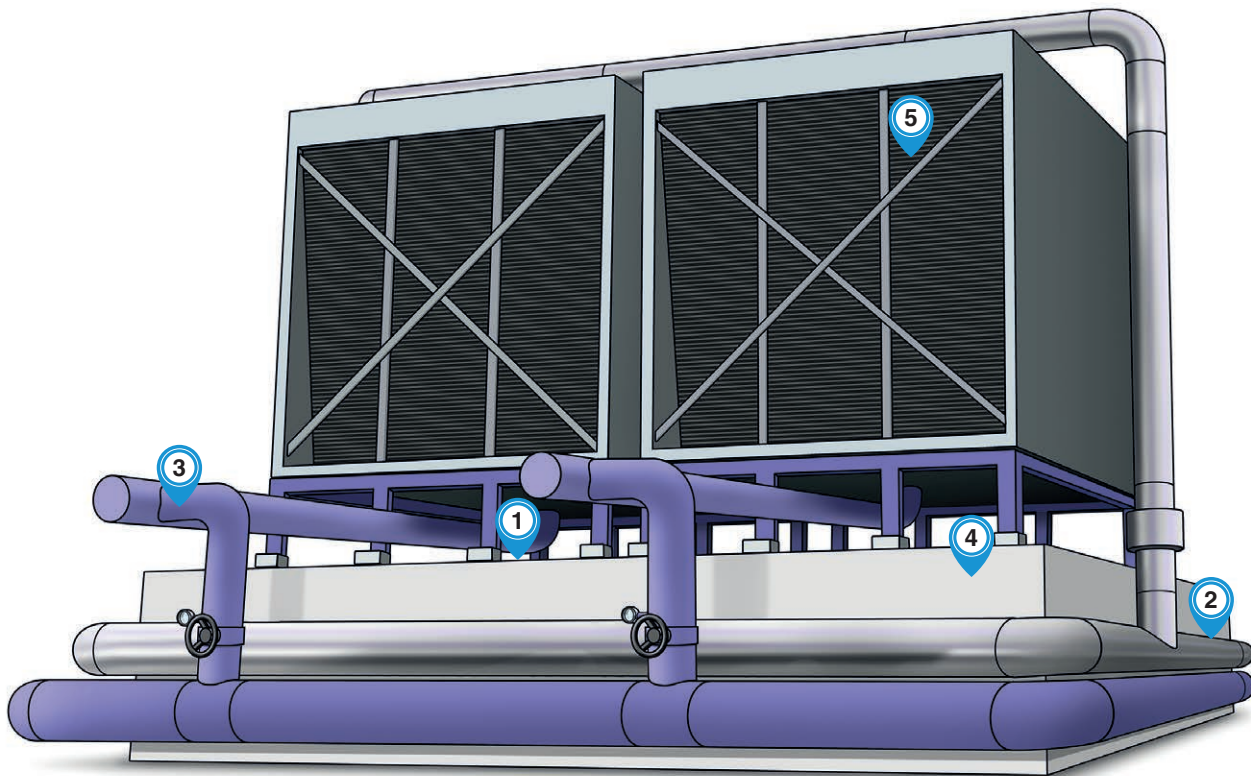
# Cooling for data centres

The digital world, both in business and for consumers, runs on data. This data is processed and stored around the world in servers located in data centres. This is where the cloud, e-mails and the internet lives.

All servers generate a lot of heat, meaning the cooling of data centres has to be both reliable and energy-efficient. For the cooling of the data centre's buildings there are separate cooling systems:

Pressure and temperature are monitored throughout all of these systems.

- Air-conditioning unit for server rooms (water/glycol/ refrigerant)
- Air conditioner for server rooms (refrigerant/glycol/ condensation water)
- Air-cooled and self-contained
- Air duct



Legend – Measuring locations:

- ① Condenser coil temperature
- ② High-pressure line (gas)
- ③ High-pressure line (liquid)
- ④ Evaporator temperature
- ⑤ Outdoor air temperature

Temperature

①  
④  
⑤



**Resistance thermometer**  
TF-2000  
TF44  
TF45

⑤



**Outdoor thermometer**  
TF41

Pressure

②  
③



**Bourdon tube pressure gauge**  
112.28  
132.28  
213.53

②  
③



**Pressure transmitter**  
R-1

# Vehicle refrigeration

**In all travel vehicles on roads and rails, healthy air circulation and climate comfort for the well-being of the occupants play an essential role.**

Buses and trains are therefore equipped with special cooling systems. With a perfectly thought-out and nested piping system, well-tempered fresh air is supplied to the interior and stale air is removed.

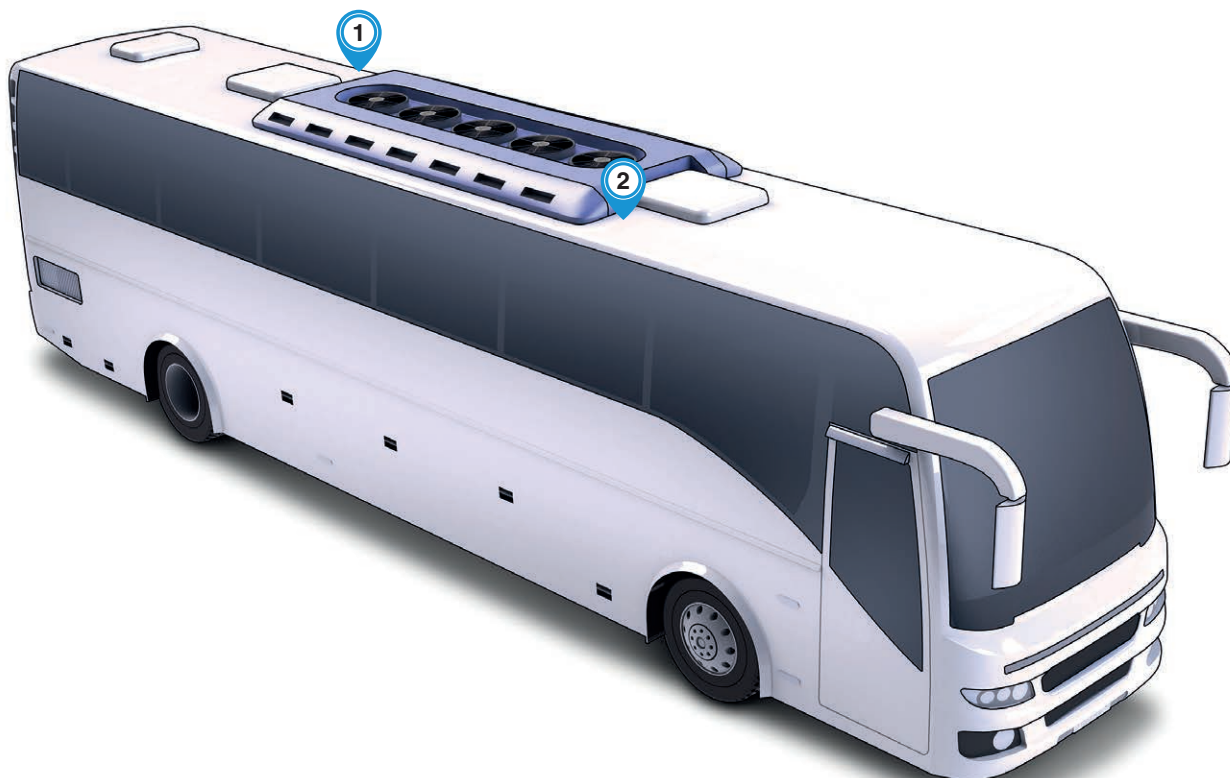
Their air conditioner has a condenser, among other things, an evaporator, a compressor, a fan [heat exchanger] and a nested piping system.

In order to keep the branched systems continuously stable, reliable and precise measuring instruments are indispensable.

**Also for the transport of food on trucks, trailers or containers, refrigeration systems are needed to maintain the cooling chain throughout the entire transport until arrival at the consignee's stable.**

Reefer containers for worldwide trade and storage of food and non-food products such as medicines or flowers are indispensable.

The cooling of containers and trucks is achieved by a cooling unit in the cargo hold. So that these can keep a constant temperature, their refrigeration circuit is constantly monitored. Pressure and temperature measuring instruments transmit the measured values to the control system, so that it can compensate the changed conditions.



Legend – Measuring locations:

- ① Pressure in compressor, condenser, evaporator
- ② Temperature in compressor, condenser, evaporator
- ③ Readout

## Temperature

②



**Resistance thermometer**  
TF-2000  
TF44  
TF45

③



**Digital indicator**  
DI10

## Pressure

①



**Bourdon tube pressure gauge**  
213.53

①



**Pressure transmitter**  
R-1

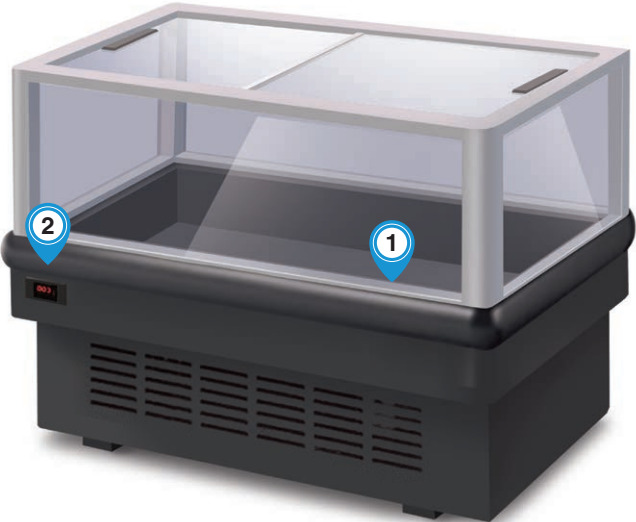


# Refrigeration and freezing solutions

In all supermarkets, convenience stores and petrol stations, refrigerated cabinets are available for storage and preservation of perishable foodstuffs. It is important that the cabinets work as efficiently as possible and do not consume too much energy, while keeping the goods at the correct temperature.

These units are equipped with a special cooling system, which requires pressure and temperature measurement to maintain the correct cooling temperature and the proper functioning of the cooling system.

On many cabinets, the temperature of the cooled goods is displayed.



Legend – Measuring locations:

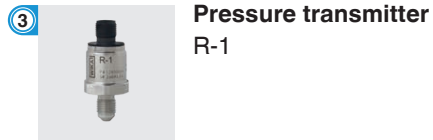
- ① Temperature
- ② Indication / readout
- ③ Pressure



## Temperature



## Pressure



# Ventilation and air-conditioning

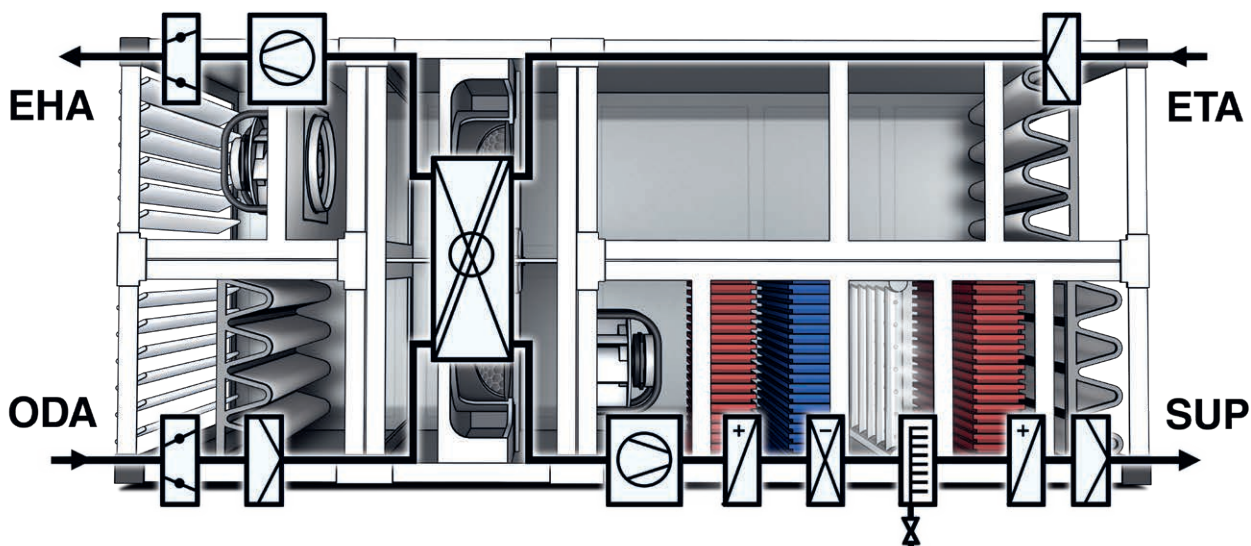
With the product line for ventilation and air-conditioning, WIKA offers a comprehensive range of measuring instruments for central air-handling units and ventilation systems.

Differential pressure measuring instruments, switches and transmitters are used for monitoring filters and ventilators. Air flow meters and air velocity transmitters measure the transported air quantity and its flow velocity in air ducts and air-handling systems.

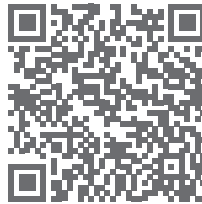
By using frost protection thermostats and temperature sensors, the air-handling system is protected from icing and frost damage.



The brochure “Sensor technology for ventilation and air-conditioning” gives you an overview of the product portfolio available for your application and, in particular, of the high technical specifications of the A2G product family.



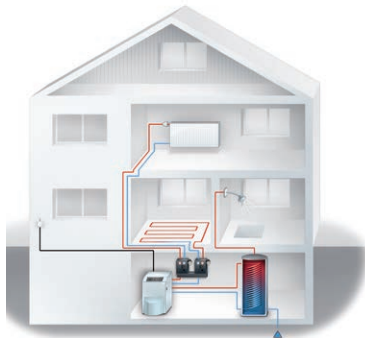
# Heating technology



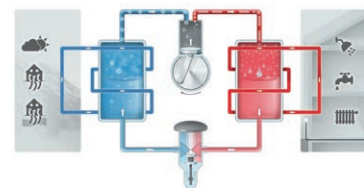
Whether in residential or office accommodation, in private households or public buildings; whether with wood, oil, gas or solar power: Modern heating technology enables you to obtain an efficient and sustained supply of heat and hot water. This conserves resources and the environment.

WIKAI offers manufacturers and distributors a comprehensive range of pressure, temperature and level measuring instruments tailored to suit a wide range of requirements. With this brochure, you will receive an overview of our products and services for heating technology.

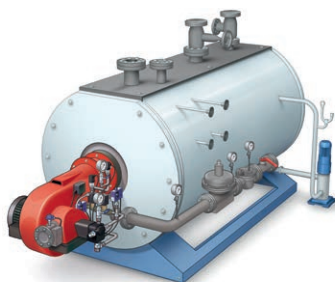
The brochure “Heating technology” shows you the strengths and application areas of our measuring instruments.



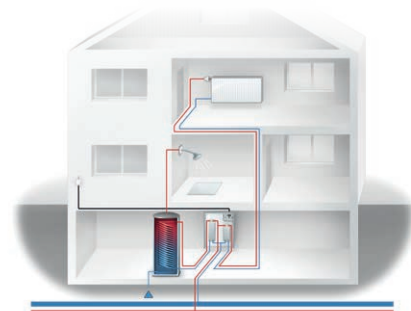
Heating systems



Heat pumps



Industrial boiler systems



Heat transfer and distribution stations

# WIKA worldwide

## Europe

### Austria

WIKA Messgerätevertrieb  
Ursula Wiegand GmbH & Co. KG  
Tel. +43 1 8691631  
info@wika.at / www.wika.at

### Benelux

WIKA Benelux  
Tel. +31 475 535500  
info@wika.nl / www.wika.nl

### Bulgaria

WIKA Bulgaria EOOD  
Tel. +359 2 82138-10  
info@wika.bg / www.wika.bg

### Croatia

WIKA Croatia d.o.o.  
Tel. +385 1 6531-034  
info@wika.hr / www.wika.hr

### Denmark

WIKA Danmark A/S  
Tel. +45 4581 9600  
info@wika.as / www.wika.as

### Finland

WIKA Finland Oy  
Tel. +358 9 682492-0  
info@wika.fi / www.wika.fi

### France

WIKA Instruments s.a.r.l.  
Tel. +33 1 71 68 10 00  
info@wika.fr / www.wika.fr

### Germany

WIKA Alexander Wiegand SE & Co. KG  
Tel. +49 9372 132-0  
info@wika.de / www.wika.de

### Ireland

WIKA Instruments Ireland Limited  
Tel. +35 386 1449 360  
info@wika.ie / www.wika.co.uk

### Italy

WIKA Italia S.r.l. & C. S.a.s.  
Tel. +39 02 93861-1  
info@wika.it / www.wika.it

### Poland

WIKA Polska spółka z ograniczoną  
odpowiedzialnością sp. k.  
Tel. +48 54 2301 10-0  
info@wikapolska.pl  
www.wikapolska.pl

### Romania

WIKA Instruments Romania S.R.L.  
Tel. +40 21 4048327  
info@wika.ro / www.wika.ro

### Russia

AO "WIKI MERA"  
Tel. +7 495-648018-0  
info@wika.ru / www.wika.ru

### Serbia

WIKA Merna Tehnika d.o.o.  
Tel. +381 11 2763722  
info@wika.rs / www.wika.rs

### Spain

Instrumentos WIKI S.A.U.  
Tel. +34 933 9386-30  
info@wika.es / www.wika.es

### Switzerland

WIKI Schweiz AG  
Tel. +41 41 91972-72  
info@wika.ch / www.wika.ch

### Türkiye

WIKI Instruments  
Endüstriyel Ölçüm Cihazları Tic. Ltd. Şti.  
Tel. +90 216 41590-66  
info@wika.com.tr  
www.wika.com.tr

### Ukraine

TOV WIKI Prylad  
Tel. +38 044 496 83 80  
info@wika.ua / www.wika.ua

### United Kingdom

WIKI Instruments Ltd  
Tel. +44 1737 644-008  
info@wika.co.uk / www.wika.co.uk

## North America

### Canada

WIKI Instruments Ltd.  
Tel. +1 780 4637035  
info@wika.ca / www.wika.ca

### USA

WIKI Instrument, LP  
Tel. +1 770 5138200  
info@wika.com / www.wika.us

### Gayesco-WIKA USA, LP

Tel. +1 713 4750022  
info@wikhouston.com  
www.wika.us

### Mensor Corporation

Tel. +1 512 3964200  
sales@mensor.com  
www.mensor.com

## Latin America

### Argentina

WIKI Argentina S.A.  
Tel. +54 11 5442 0000  
ventas@wika.com.ar  
www.wika.com.ar

### Brazil

WIKI do Brasil Ind. e Com. Ltda.  
Tel. +55 15 3459-9700  
vendas@wika.com.br  
www.wika.com.br

### Chile

WIKI Chile S.p.A.  
Tel. +56 9 4279 0308  
info@wika.cl / www.wika.cl

### Colombia

Instrumentos WIKI Colombia S.A.S.  
Tel. +57 601 7021347  
info@wika.co / www.wika.co

### Mexico

Instrumentos WIKI Mexico S.A. de C.V.  
Tel. +52 55 50205300  
ventas@wika.com / www.wika.mx

## Asia

### China

WIKI Instrumentation Suzhou Co., Ltd.  
Tel. +86 512 6878 8000  
info@wika.cn / www.wika.com.cn

### India

WIKI Instruments India Pvt. Ltd.  
Tel. +1800-123-101010  
info@wika.co.in / www.wika.co.in

### Japan

WIKI Japan K. K.  
Tel. +81 3 5439-6673  
info@wika.co.jp / www.wika.co.jp

### Kazakhstan

TOO WIKI Kazakhstan  
Tel. +7 727 225 9444  
info@wika.kz / www.wika.kz

### Korea

WIKI Korea Ltd.  
Tel. +82 2 869-0505  
info@wika.co.kr / www.wika.co.kr

### Malaysia

WIKI Instrumentation (M) Sdn. Bhd.  
Tel. +60 3 5590 6666  
info@wika.my / www.wika.my

### Philippines

WIKI Instruments Philippines Inc.  
Tel. +63 2 234-1270  
info@wika.ph / www.wika.ph

### Singapore

WIKI Instrumentation Pte. Ltd.  
Tel. +65 6844 5506  
info@wika.sg / www.wika.sg

### Taiwan

WIKI Instrumentation Taiwan Ltd.  
Tel. +886 3 420 6052  
info@wika.tw / www.wika.tw

### Thailand

WIKI Instrumentation Corporation  
(Thailand) Co., Ltd.  
Tel. +66 2 326 6876  
info@wika.co.th / www.wika.co.th

### Uzbekistan

WIKI Instrumentation FE LLC  
Tel. +998 71 205 84 30  
info@wika.uz / www.wika.uz

## Africa/Middle East

### Botswana

WIKI Instruments Botswana (Pty.) Ltd.  
Tel. +267 3110013  
info@wika.co.bw / wika.co.bw

### Egypt

WIKI Near East Ltd.  
Tel. +20 2 240 13130  
info@wika.com.eg / www.wika.com.eg

### Namibia

WIKI Instruments Namibia Pty Ltd.  
Tel. +26 4 61238811  
info@wika.com.na / www.wika.com.na

### Nigeria

WIKI WEST AFRICA LIMITED  
Tel. +234 17130019  
info@wika.com.ng / www.wika.ng

### Saudi Arabia

WIKI Saudi Arabia LLC  
Tel. +966 53 555 0874  
info@wika.sa / www.wika.sa

### South Africa

WIKI Instruments Pty. Ltd.  
Tel. +27 11 62100-00  
sales@wika.co.za / www.wika.co.za

### United Arab Emirates

WIKI Middle East FZE  
Tel. +971 4 883-9090  
info@wika.ae / www.wika.ae

## Australia

### Australia

WIKI Australia Pty. Ltd.  
Tel. +61 2 88455222  
sales@wika.com.au / www.wika.com.au

### New Zealand

WIKI Instruments Limited  
Tel. +64 9 8479020  
info@wika.co.nz / www.wika.co.nz

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**WIKI Alexander Wiegand SE & Co. KG**  
Alexander-Wiegand-Straße 30 | 63911 Klingenberg | Germany  
Tel. +49 9372 132-0 | info@wika.de | www.wika.de

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You can find further  
information here!



Smart in sensing

www.wika.com