

Thermal process technology Environmental simulation Project planning



00000

We project it.

l mbar

Temperature control systems

 \mathbf{O}



Temperature control systems

Contents

We are WKM	.03
Typical applications of the	
temperature control systems	05
Our services	05
Medium water / glycol	06
Medium oil	.08
What do you need?	10

We are WKM

WKM has been active as an independent sales company since 1996. We work as Factory representation and sales partner together with renowned manufacturers. Lachendorf in Lower Saxony became our new headquarters in 2014.

You can reach us for a personal conversation - without an automativ telephone waiting loop! Technical consultation on site is a matter of course for us. We would be pleased to arrange an appointment for a visit to your company or on a virtual meeting. For us, advice does not end with the order. After delivery of the system, you will receive a commissioning and equipment training on request.





lectromobility on the test bench	.11
Cold water / Chiller	. 12
Calculation example of the energy efficiency	
f the free cooler	.13
nvironmental Simulation	. 14
hermal Process Technology	. 14
References	.14

You are invited to visit our technical centre to get a detailed impression of our work and the quality characteristics of the product range. Here we can also carry out individual training and further education programmes for you.



Typical applications of the temperature control systems Tempering Shock test water Tempering Pressure control oil Full Service Our internal service team can be reached by phone workdays from 7:00 a.m. to 5:30 p.m. WKM is also your contact person after purchase and commissioning and ensures a proper function of your equipment and system. Our regularly trained service employees are always at your side. We also help without a maintenance contract. Our services • Repairs • Leakage test acc. to F-Gas regulation • Maintenance • DGUV - V3 measurements (previous BGV-A3) • Calibration • Leased devices





Temperature control systems

Medium water / glycol



Options:

- automatic filling, emptying and ventilating
- central refrigeration
- energy savings systems
- external setpoint pre-set
- fill speeds, adjustable
- isolating transformer for system separation
- leakage monitoring
- multi-circuit systems
- remote maintenance modules
- sensor inputs (pressure + temperature)
- split construction method

CO

- 0

Especially in the field of electromobility and fuel cell research, different components (e.g. power electronics, batteries, electric motors) must be subjected to reproducible functional and endurance testing. Accelerated temperature change times are reached with the tempering of the internal water / glycol or oil circuit. Furthermore, the thermal energy emitted by the test specimen is dissipated via the medium. Thus the test specimen is protected from overheating and earlier test results can be achieved through faster test cycles.

Not much space? We design your tempering device according to your requirements. Profit from our experience.

The following product properties are highly recommended for reproducible validation of energy storage systems and power electronics and thus are included in our standard design:

- powerful consumer pumps to -40 °C
- volume flow control over the entire temperature range
- needs-based heating and cooling capacity
- media resistance
- energy savings functions
- the fastest possible change speeds from regulated temperature ramps up to abrupt temperature change
- communication interfaces Modbus TCP, Ethernet, ProfiNet, ProfiBus etc.
- specially developed systems for achieving very low temperatures, e.g. -40 °C with water / glycol mixture

2-circuit tempering device







2-circuit tempering device

Temperature, volume flow and pressure control per circuit I Variable positioning of the connections

Set up in control

cabinet housing



Temperature control systems

Medium oil



Options:

- automatic filling, emptying and ventilating
- central refrigeration •
- energy savings option for • additional cooling capacity
- external setpoint pre-sets •
- fill speeds, adjustable • isolating transformer ٠
- for system separation
- leakage monitoring •
- multi-circuit systems ٠ recirculation pump ٠
- ٠
- remote maintenance modules sensor inputs (pressure + temperature) •
- split construction method

The tempering of the internal cooling and lubrication systems of the test specimen is important for the function and endurance test of electric motors, gearboxes and other components.

Here the function of your development is tested for various temperatures. Through fast temperature change of your test specimen, test times can be significantly reduced. Overheating of the total system and a subsequent damage to your test specimen is thus reduced. Also simulations under changed flow rate and pressure conditions can be tested and documented. You can use our conditioning systems process-reliable and powerfully.

Not much space? We can gladly adapt the dimensions uniquely to your installation conditions. Using our experience you achieve your goal.

The following product properties are elemental for the reproducible validation of gearboxes and electric motors:

- needs-based heating and cooling capacity
- energy savings functions •
- ventilation via special tank design to prevent foaming •
- communication interfaces Modbus TCP, Ethernet, ProfiNet, ProfiBus etc.
- powerful consumer pumps to -40 °C •
- media resistance •
- the fastest possible change speeds from regulated • temperature ramps up to abrupt temperature change
- volume flow control over the entire temperature range
- specially developed tempering design for achieving • very low temperatures, e.g. -40 °C with gear oils
- adaptation to on-site connections •







2-circuit oil tempering device

Integrated collection pan I Large control panel I Movable design

Worth knowing

What do you need?

Give us your requirement profiles for the conditioning of liquid media. Flexible module production enables a customer-optimised technical solution.

Not much space? We design your conditioning device according to your requirements.

With simultaneous tempering of several test specimen setups, frequently a separate tempering device is procured per test specimen. This increases the required space and budget demand. A conditioning system with several consumer circuits has significant advantages for you:

- reduction of the installation dimensions and procurement costs compared to several 1-circuit systems
- connections can be positioned to your installation conditions (side or rear wall as well as top of equipment)
- split construction method for a reduced noise level in the • work and testing area

Custom solutions for your tasks

Depending on the tasks, we match the tempering system exactly to your requirements:

- volume flow rate and pressure control for 1-circuit or multicircuit systems over the entire temperature range
- wide temperature ranges, system technology adjusted to test media
- leakage monitoring
- automatic filling and refilling equipment •
- emptying equipment for clean change of test specimen ٠ • energy savings system so that the conservation of resource
- already begins during the development

Simple integration in your higher-order test bench control

- communication interfaces to connect to your higher-order test bench control Modbus TCP, Ethernet, Profinet, Profibus, etc.
- control and monitoring via large touchscreen directly at the tempering system
- reduction of downtimes through direct notification from • error/malfunction messages
- flexible programmable parameters •



Only if battery, battery management system, electric motor, power electronics and gearbox are perfectly synchronised with each other is it possible to develop a reliable assembly or a complete vehicle.

In testing technology, among other things it is important to characterise the components independently of each other, or also as a complete technical module and to test for their functional efficiency.



Cooling water generation

Cold water set / chiller



When using water cooled systems and machines, a cooling water system absorbs the existing lost heat in order to take it away from the installation location. Frequently cold water units/chillers are used for central reverse cooling of the cooling water to the outlet temperature. Optionally this system can also be offered as an efficient free cooling system.

Made in Germany. Reliable and affordable.

When we have explained our talking points, such as

- frequency controlled consumer pumps
- minimised noise level at the installation location
- power consumption ٠
- power-controlled fans •
- setup conditions.

We will be glad to show you a target-oriented solution. Compressor cooling device for outdoors installation





Calculation example for energy efficiency of the free cooler

Armortisation calculation 400 kW chiller with free-air cooling

er consumption of compressor with free cooler (average value) per 100 kW cooling capac Power consumption of compressor with air-conditioned condenser (average value) per 100 kW Power consumption compressor with free-cooler (average value) per 100 kW cooling capacity nption of compressors with air-conditioned condenser (average value) per 100 kW co ion compressor with free-cooling condenser (average value) per 100 kW refrigera Power consumption of compressors with air-conditioned condenser (average value) per 100 kW co imption of compressor with free-cooler (average value) per 100 kW refrigerating Power consumption of compressor with air-conditioned condenser (average value) per 100 kW Power consumption of compressor with free cooler (average value) per 100 kW cooling capacit Power consumption of compressor with air-conditioned condenser (average value) per 100 kW

* Condensing temperature regulated to 35 °C

** Partial discharge via free cooler

Annual power consumption 24/7, 365d/a with air-cooled condenser: Annual power consumption 24/7, 365d/a with free cooler:

Energy savings per 100 kW cooling capacity / year with free cooler assumed energy costs per kwh:

Annual savings in euros with free cooler per 100 kW cooling capacity

Cooling capacity at 20 °C flow temperature and 32 °C ambient temperature in kW Average utilisation factor:

Annual savings in euros with free-cooler total system

Note:

This calculation was made to the best of our knowledge with partly assumed and/or averaged values and can only be considered as a guideline.

	KW/h	Ambient temperature	Annual hours	kwh/a
y	27,70	>27 °C (value 26 °C)	66,00	1.828,20
cooling capacity	20,20	>27 °C (value 26 °C)	66,00	1.333,20
	23,90	>22 °C (value 21 °C)	325,00	7.767,50
oling capacity	17,50	>22 °C (value 21 °C)	325,00	5.687,50
ng capacity*	17.60	>17 °C (value 16 °C)	918.00	16.156.80
oling capacity*	15.60	>17 °C (value 16 °C)	918.00	14.320.80
capacity**	12.00	>12 °C (value 11 °C)	1.815.00	21.780.00
cooling capacity*	15.60	>12 °C (value 11 °C)	1.815.00	28.314.00
v	2 90	< 12 °C (value 11 °C)	5 644 00	16.367.60
cooling capacity*	15.60	<12 °C (value 11 °C)	5.644.00	88.046.40
			/	

137.701,90 63.900,10

	73.801,80
0,24€	
17.712,43€	
400	
65%	
46.052.32€	

You can also benefit from our expertise



Plant growth

Tempering Medium

Tempering

Water / Glycol

Medium

Oil

80

Environmental simulation





Height

simulation



Thermal process technology

Corrosion



We will be pleased to advise you in the fields of thermal process technology and environmental simulation, in order to project an individual solution for your application. Contact us under the phone number +49 (0) 5145-28666-10.









WKM Wärmeprozess- und Klimaprüftechnik Michel GmbH & Co. KG Im Bulloh 30 - 32 29331 Lachendorf

Phone.: +49 (0) 5145 - 28 666 - 10 Fax: +49 (0) 5145 - 28 666 - 77 E-mail: info@wkm-michel.de Homepage: www.wkm-michel.de

certified acc. to DIN EN ISO 9001:2015

Tisax result available

