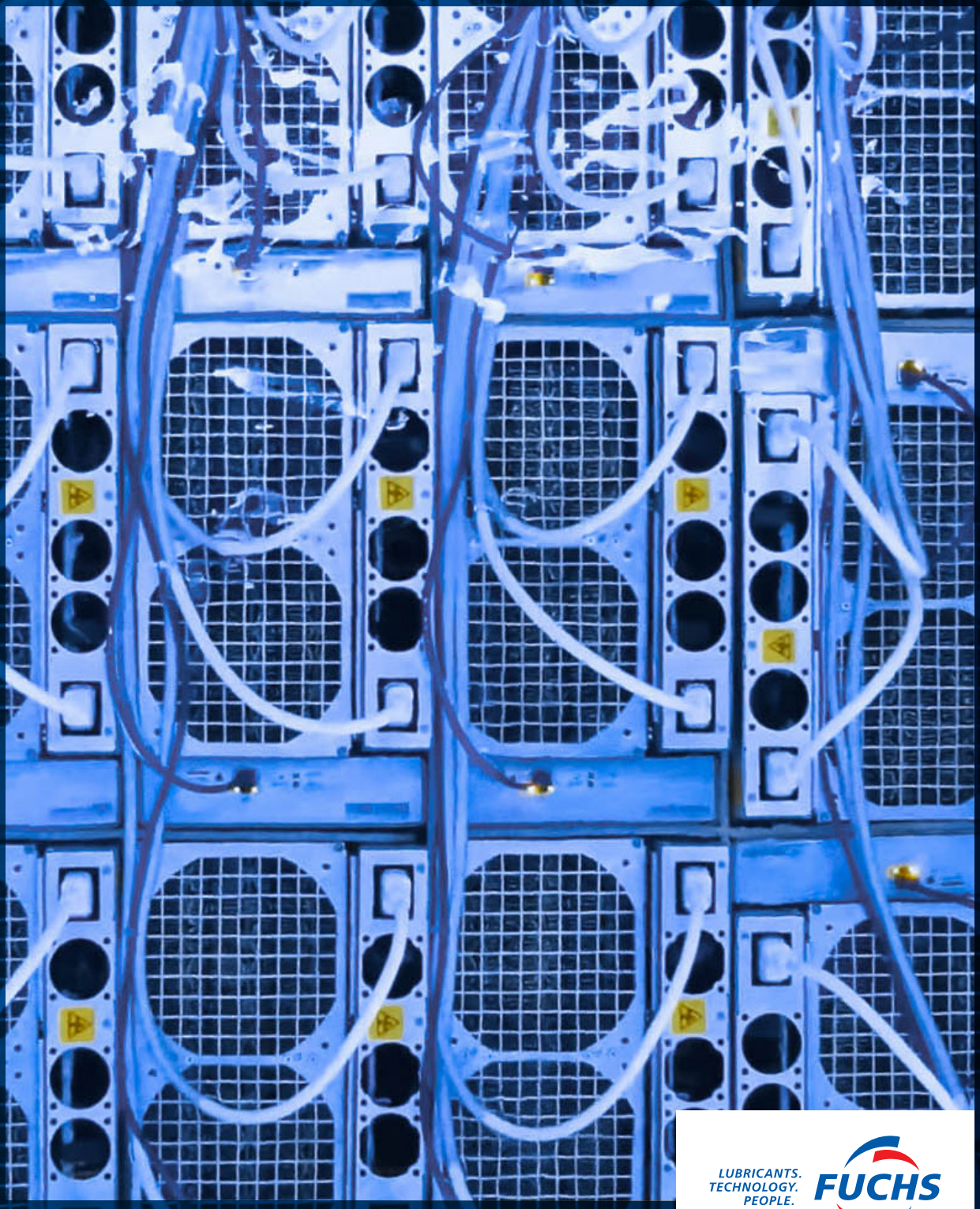
Single Phase Immersion Cooling Fluids

Designed with the Data Center Industry in Mind



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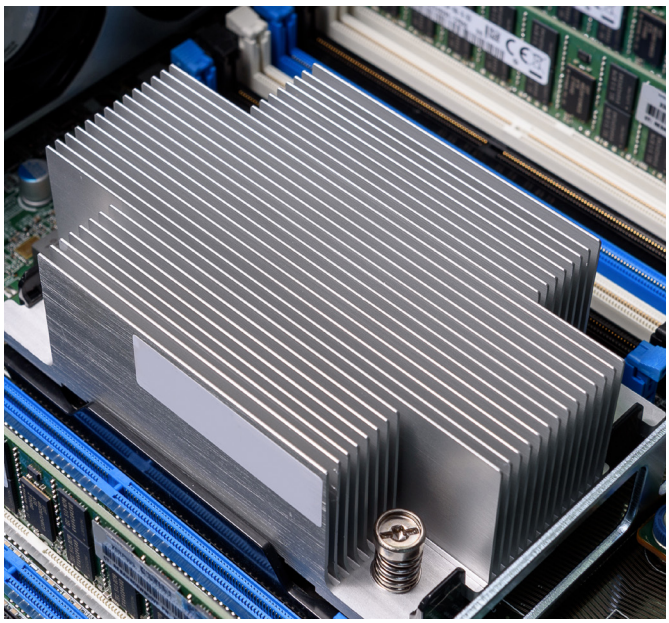
TECHNOLOGY.
PEOPLE.

FUCHS

INCREASING COMPUTATIONAL POWER IN DATA CENTERS

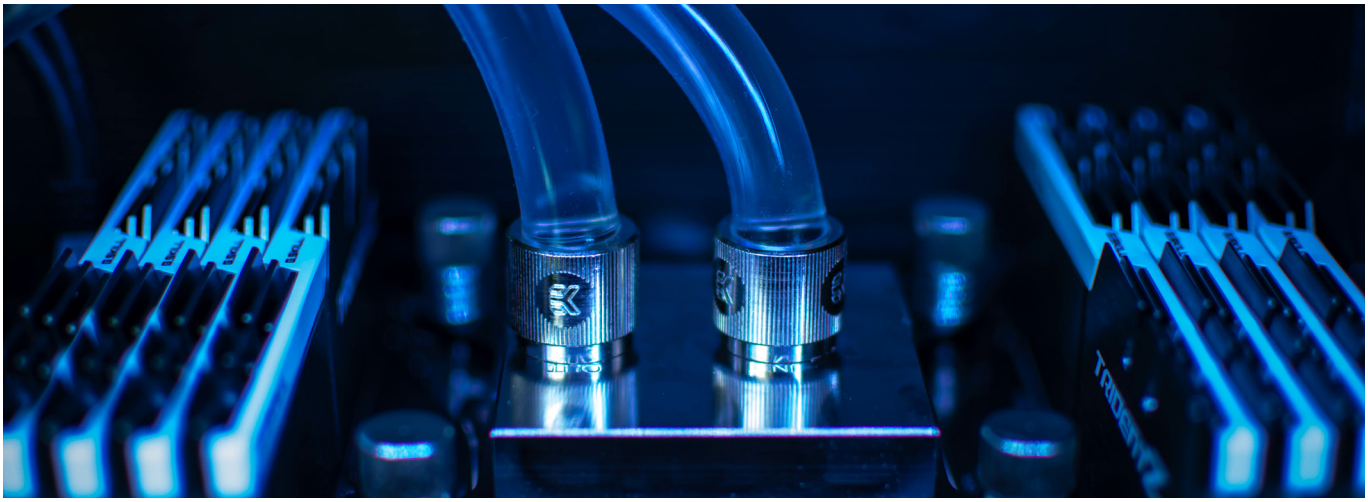
Technologies like 5G, Internet of Things, Blockchain, and Artificial Intelligence are driving the development of more powerful data centers. Engineers are often tasked with the challenge of expanding a data center's computing capacity while minimizing their real-estate footprint and environmental impact. Many are choosing to do this with powerful high-density rack designs that pose challenges such as increased temperatures and energy usage. Traditional air cooling cannot address these concerns as it requires more space, energy, and water usage. Single phase immersion cooling fluids work into your pre-existing design and are an energy-efficient, cost-effective alternative to traditional air cooling.



What is Single Phase Immersion Cooling?

During single phase immersion cooling, racks are filled with a dielectric fluid that is then circulated between racks via a coolant distribution unit. It can also be applied direct-to-chip on a printed circuit board or via tank immersion. Dielectric coolants are an insulative fluid that transfer heat without conducting electricity, making it a safe and effective solution.

Why Should You Use Single Phase Immersion Cooling Fluids?



Why are more and more data centers turning towards immersion cooling? Cooling fluids can improve your data center's performance while minimizing its environmental impact. Single phase cooling enables greater computing performance by:

Increasing Power Rack Density

On average, single phase cooling reduces a data center's IT footprint by 70% when compared to traditional air cooling. Reducing the number of aircooling units required in a plant frees up available real estate for additional rack units. Additionally, because immersion cooling significantly reduces the heat generated by the server, servers can be placed closer together, thus enabling high-density rack designs.

Reducing Energy Usage

Data centers account for 1% of global electricity usage. Single phase cooling uses 50% less energy when compared to traditional air cooling.

Reducing Water Usage

A 15-megawatt data center can use 360,000 gallons of water per day. Single phase cooling uses less water than air cooling which reduces the risk of short circuits and outages.

Reducing CO_2 Emissions

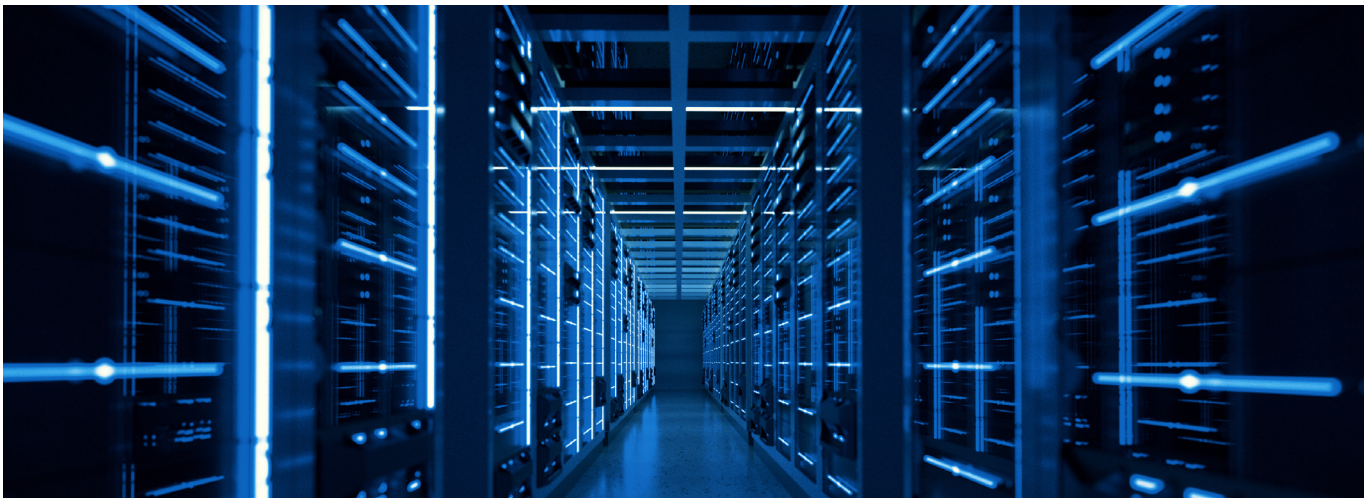
Single phase cooling is a more efficient cooling method that reduces your CO_2 emissions by up to 30%. Our cooling fluids have zero Global Warming and Ozone Depletion Potential.

Cutting Operational Costs

Our cooling fluids are competitively priced compared to other dielectric fluids. Switching to single phase immersion cooling can lower your PUE from 1.67 to 1.03, meaning nearly all of your electric power draw is going to cooling the IT equipment. For a 15-megawatt data center that is equivalent to over $10,000 per day. In addition, depending on their needs, facilities might consider FUCHS cooling fluid subscription plan that would make single-phase immersion cooling more cost effective.

Case Study

Odorless Fluid with Improved Cooling Performance



Overview

Location: Poland
Application: Cryptocurrency Mining Systems
Coolant: RENOLINN FECC 5 and FECC 5 SYNTH

Challenge

A single-phase immersion cooling system leader serving the cryptocurrency mining system segment was looking to replace their current single phase immersion fluid with a product from FUCHS. The fluid would be used to cool a variety of components such as servers, panels, boards, and more. The fluid needed to be odorless, have an extremely high flash point, exhibit great thermal conductivity and low viscosity in order to effectively and safely transfer the processing heat within their systems.

Solution

After reviewing the customers heat capacity requirements, FUCHS then recommended switching to RENOLIN FECC 5, an odorless mineral-based fluid containing excellent dielectric properties.

Results

The implementation of RENOLINN FECC 5 sufficiently cooled components and reduced the total cost to the customer. The operational benefits included:

- SAFETY: High flash point ensures product safety
- EFFICIENCY: Efficiently transfers heat to cool system components
- USABILITY: Has a very low odor and low viscosity for efficient circulation

Savings

Working with FUCHS, the customer was able to provide both the system and fluid to their end customer without issue. Since then the customer has started using FECC 5 SYNTH which offers improved cooling capabilities without compromising the odorless and high flashpoint requirements. Improved cooling is often needed in other data center segments.

FUCHS RENOLIN FECC

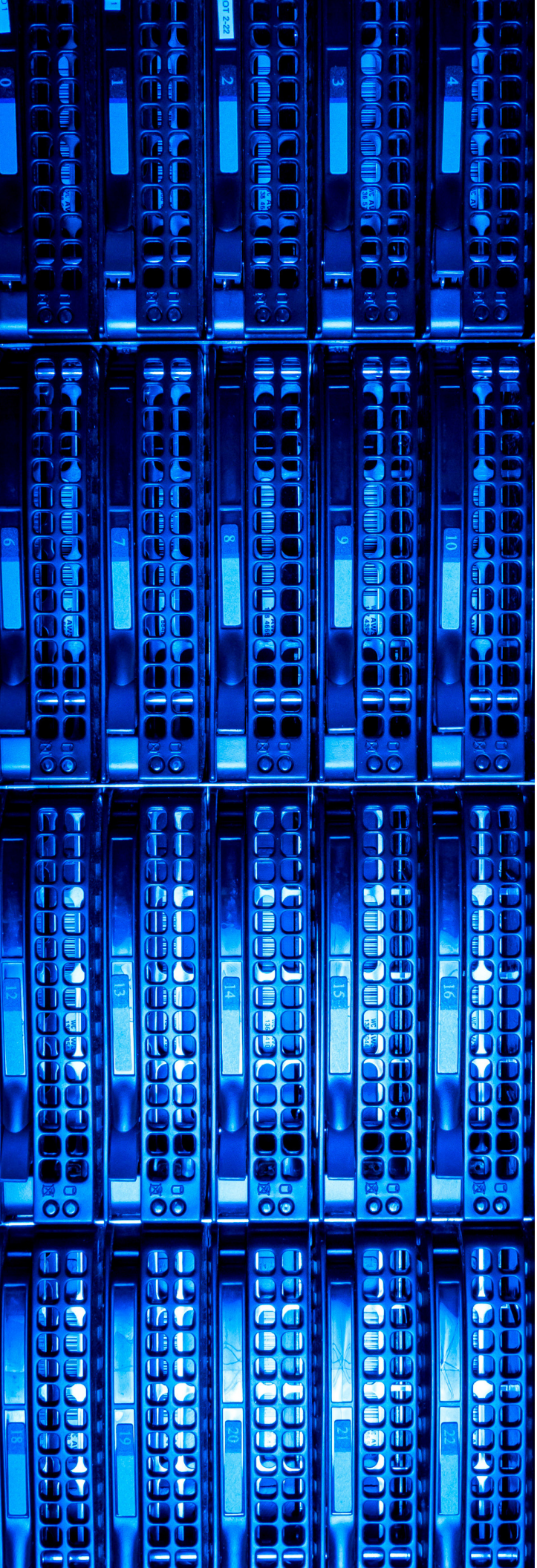
Designed with the Data Center Industry in mind

Specification	Conditions	RENOLIN FECC 7	RENOLIN FECC 5	RENOLIN FECC 5 SYNTH
Density	15 °C	833 kg/m³	826 kg/m³	797 kg/m³
Thermal Conductivity	100 °C	0.119 W/(m*K)	0.114 W/(m*K)	0.123 W/(m*K)
	40 °C	0.129 W/(m*K)	0.125 W/(m*K)	0.136 W/(m*K)
	0 °C	0.135 W/(m*K)	0.129 W/(m*K)	0.143 W/(m*K)
Specific Heat Capacity	100 °C	2.33 J/(kg*K)	2.30 J/(kg*K)	2.43 J/(kg*K)
	40 °C	2.10 J/(kg*K)	2.10 J/(kg*K)	2.22 J/(kg*K)
	0 °C	1.96 J/(kg*K)	1.96 J/(kg*K)	2.10 J/(kg*K)
Kinematic Viscosity	100 °C	2.20 mm²/s	1.70 mm²/s	1.80 mm²/s
	40 °C	7.60 mm²/s	4.96 mm²/s	5.10 mm²/s
AC Breakdown Voltage	2.5 mm gap	> 60 kV	> 60 kV	> 60 kV
Water Content	–	< 30 ppm	< 20 ppm	< 20 ppm

RENOLIN Fluids for Electronic Component Cooling

Our RENOLIN Fluids for Electronic Component Cooling (FECC) systems are available as mineral oils and synthetic fluids and are safe and reliable. Advantages include:

- Excellent dielectric properties
- Great heat conductivity
- Protects against corrosion
- Common IT materials compatiblity
- High flash point
- Oxygen stable
- Low water content
- High breakdown voltage



RIVOLTA S.L.X. 1000

Electronic Cleaner for Voltage Applications

Description

Immersed server components sometimes need to be exchanged or cleaned. For applications like these, a specialty electronics cleaner like RIVOLTA S.L.X. 1000 is recommended.

RIVOLTA S.L.X. 1000 is a highly-efficient cleaner with no flash point and high dielectric strength, meaning that it can safely be applied under voltage.

Advantages

- Intensive cleaning power
- NSF-K2 registered
- High dielectric strength
- Evaporates quickly
- High material compatibility
- Odorless
- No flashpoint

How To Use

In most of the cases best results can be reached while S.L.X. 1000 is sprayed with fine stream through spray cans or an electrical spray gun and fitted needle-shaped jet. S.L.X. 1000 can also be applied by painting on with a brush, dipping the electronics into a bath (or an ultrasonic bath).

RIVOLTA S.L.X. 1000 is available in 300 ml spray can or 4 kg or 15 kg can.

WHY FUCHS?

Your data centers are all over the world, and so are we. FUCHS operates 35 production facilities around the world and operates a global distribution network. With our extensive product and service portfolio we offer:

Services

- Fluid Analysis and Evaluation
- Fluid Monitoring During Operation
- Local Support
- Lubrication Training

Products

- Coatings
- Greases
- Industrial Oils

Customized Products & Validation Testing

Our products can be customized and then tested to your requirements.

Private Labeling

We can privately label our products to your needs.

FUCHS Lubricants

Innovative lubricants need experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then the best lubricant system can be selected. Experienced FUCHS engineers will be glad to advise on products for the application in question and also on our full range of lubricants.

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930093929 10/2021