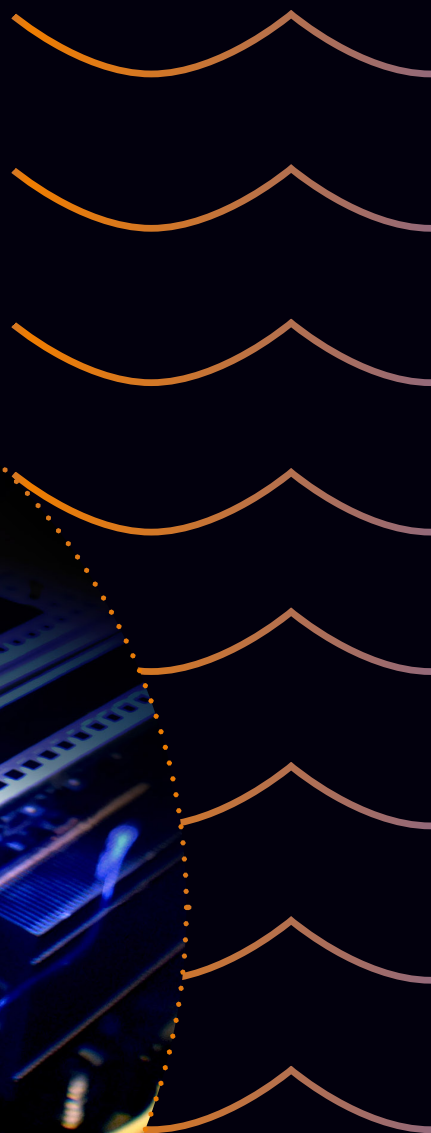
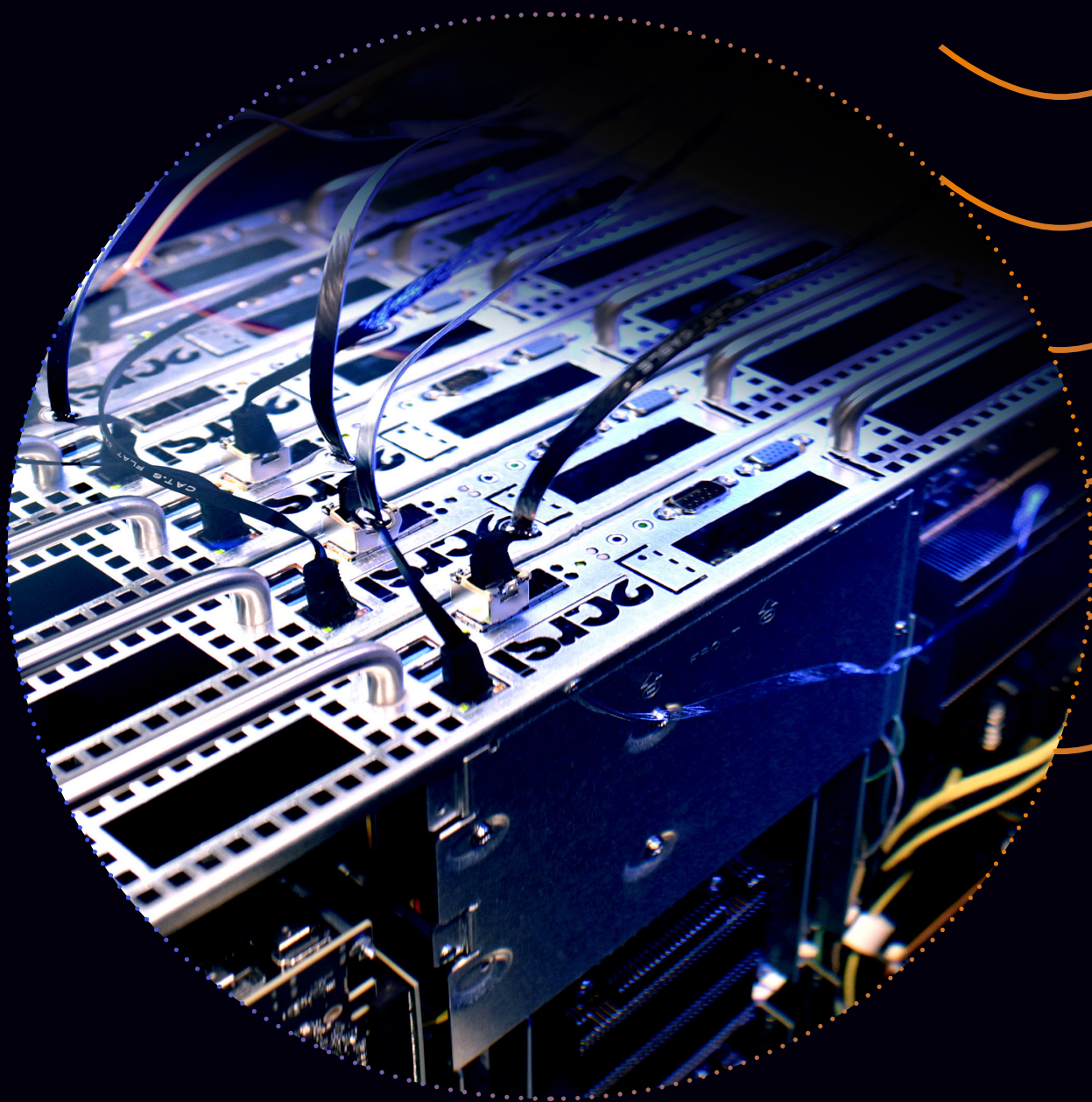




2crsi

 **submer**

IMMERSION COOLING
SOLUTIONS






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How does immersion cooling work?

Cooled by  **submer**

2CRSi partners with Submer

Submer Technologies is a European deep tech company, which develops and manufactures hyper-efficient and eco-friendly immersion cooling systems for new-age data centers.

2CRSi and Submer met for the first time in March 2018, at the Cloudfest show, and in September 2018 started a productive and enriching alliance.

Subsequently, the collaboration got reinforced by the creation of the OCtoPus 21" range servers which was complemented by the creation of compatible tanks built by Submer (which systems already offered trays suitable for 2CRSi 19" servers).

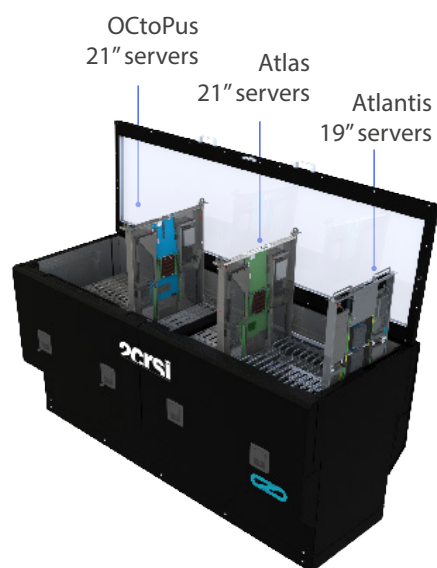


Design principles

The immersion cooling technology consists in completely immersing a server into a safe and dielectric liquid*.

Through this process, all the heat generated via the hardware is absorbed by the liquid. This dielectric fluid is able to capture 1500 times more heat than air, for the same volume.

The chosen liquid has a flash point which is above 150°C (302°F) and a high stability to prevent any risk of evaporation, overpressure or flammability. The physical-chemical properties of the SmartCoolant, allow higher heat transfer performance than air. The SmartCoolant liquid used by Submer in our Immersion Cooling solutions is a dielectric, synthetic, proprietary fluid, 100% non-hazardous for people or the environment and readily biodegradable according to OECD 301F norm.



SmartPodXL by Submer,
with 3 ranges of servers by 2CRSi
(OCtoPus, Atlas and Atlantis)

Why you should adopt immersion cooling

How do Data Centers manage fatal heat and power usage effectiveness issues today?

Data Centers are specific buildings containing a large quantity of servers, storage racks, network and telecommunications equipments, all producing important amount of heat. Constantly cooling this infrastructure to maintain a stable temperature requires a lot of energy.

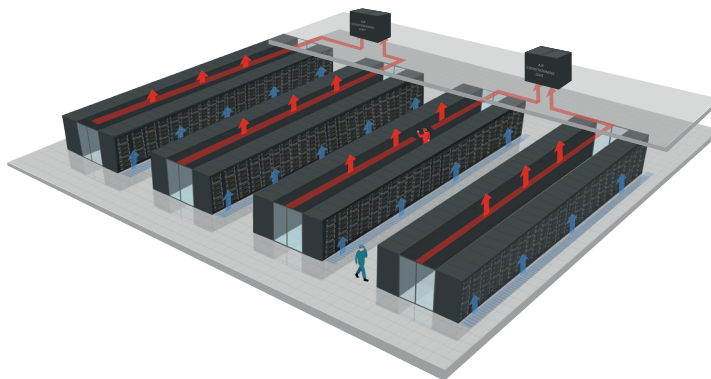
For as long as computing has taken place, there has been the challenge regarding how to efficiently and safely cool systems and Data Centers.

Today, Data Centers account for about 4% of the world's energy consumption and could represent up to 10% in the coming years.

Estimated worldwide Data Center power consumption for 2012 as about 382 billion kWh. Global Data Centers used roughly 416 TWh in 2016. USA Data Centers consumption was 90 billion kWh.

In Europe, according to the European Commission (EC), the energy consumption of Data Centers in 2013 represented 56 billion kWh. The EC estimates that this number reaches 104 billion kWh in 2020.

“Today, the chillers used to cool conventional Data Centers represent between 35% and 40% of the Data Center's electrical power consumption.”



TRADITIONAL DATA CENTER CONFIGURATION

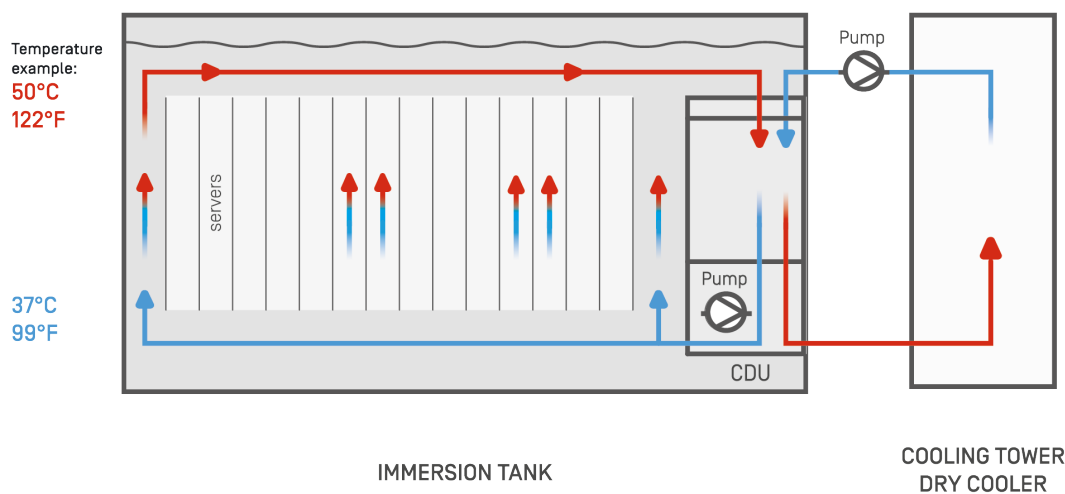
Hot and cold aisle configuration.
Arrows show flow of hot and cold air.
Cold air enters from raised floor.
Hot air is drawn into air conditioners.

Simple and efficient

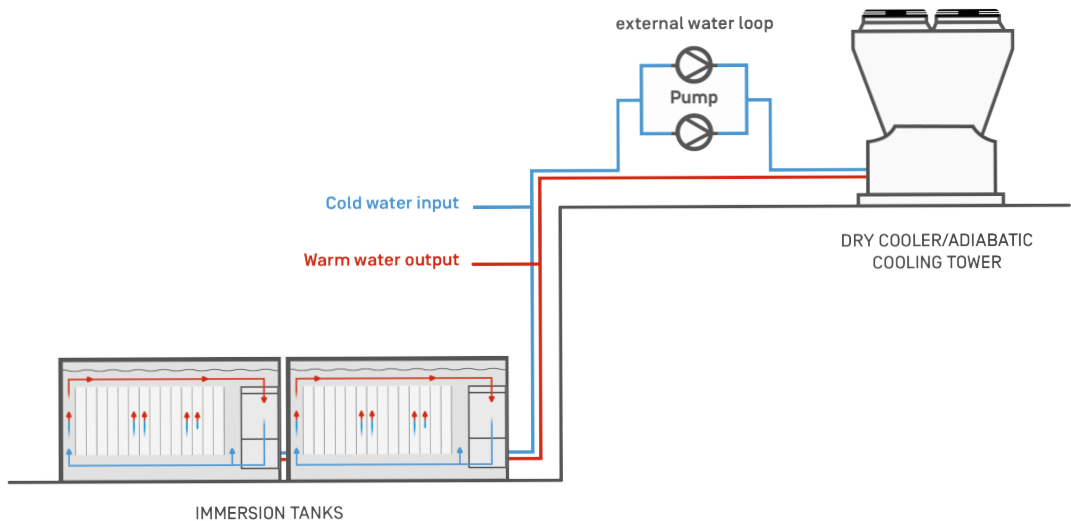
In our single-phase immersion tanks, the heat captured by the liquid from the servers circulates through a pump to a heat exchanger going to a secondary water system.

With immersion cooling, fans have to be removed or deactivated, reducing energy consumption. The heat captured by the network of water pipes can be either reused for heating or evacuated into the air by a dry cooler.

IMMERSION TANK DESIGN PRINCIPLE

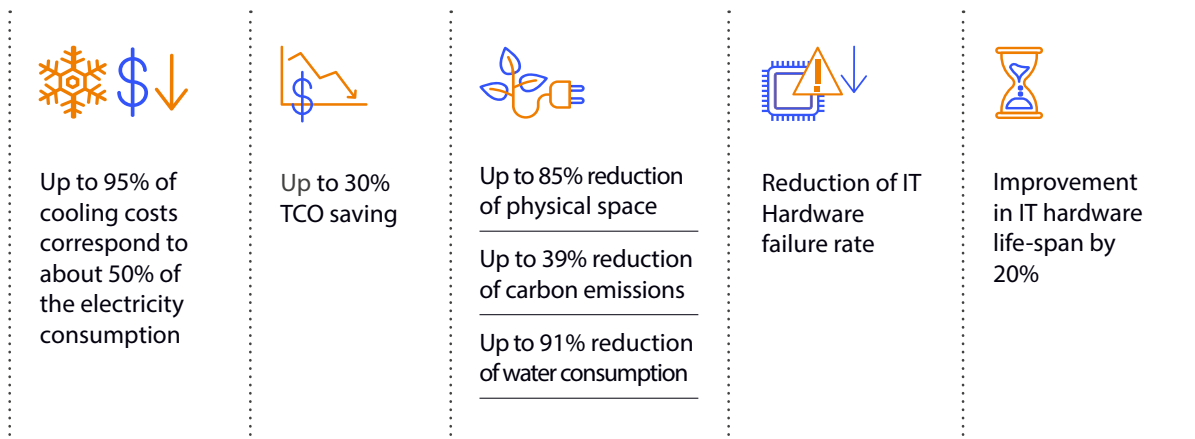


IMMERSION COOLING INFRASTRUCTURE EXAMPLE WITHOUT HEAT REUSE



Key Benefits of Data Center cooled by immersion

Unrivalled Total Cost of Ownership (TCO) compared to a traditional Data Center:



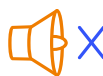
Meeting sustainable and ergonomic needs

The lifetime of immersed components is higher than with an traditional air-cooled solution.

A reduced failure rate allows to dramatically reduce replacement costs. Also, thanks to the temperature homogeneity ensured by the dielectric fluid, components are not stressed by sudden temperature changes.



Homogeneous cooling



Noiseless

In a conventional air-cooled Data Center, ambient noise can exceed 90 decibels, leading to poor difficult working conditions... As immersion cooling functions without fans, noise pollution is avoided, contributing to better working conditions.

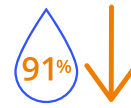
Carbon Neutrality

2CRSi's immersion cooling technology results in an annual reduction in carbon emissions by up to 39% * per year, providing similar capacity than a traditional DC. Water consumption can also be reduced by up to 91% * thanks to immersion.

*Comparison tables of carbon emissions and water consumption between two Data Centers (air cooled IT and immersion IT) can be found in the following pages.



Up to 39% reduction
of carbon emissions



Up to 91% reduction
of water consumption

Cool down your investment

Our IT cost effective response to your needs:

-30% CAPEX

Traditional Data Centers require very complex air cooling systems. With Immersion Cooling Technology, there is no need for the installation of refrigerated cabinets, false raised floors, corridors etc. As a result, CAPEX can be reduced by up to 30% *.

-40% OPEX

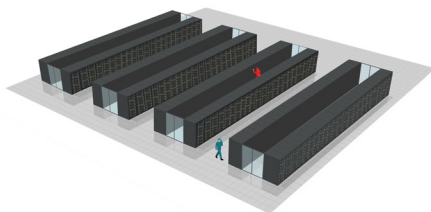
Data Center with Immersion Cooling Technology can reduce power consumption operating costs by up to 40% *.

OPTIMIZED FLOOR SPACE

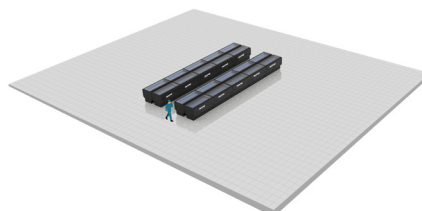
By eliminating essential equipment required for traditional air cooled Data Centers, immersion cooling makes it possible to optimize floor space usage. Our technology allows for greater density for the same number of servers per m² (see below).

(*) Estimation, based on use cases.

Floor space and electricity consumption comparison
between air-cooling and immersion



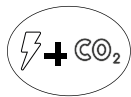
1000 M²:
200 Traditional racks
Rack power: 5 kW on a total
of 1 MW Data Center



90 M²:
20 SmartPodXL
Tank power: 50 kW on a total of 1 MW Data Center
Notice: Dedicated ACU is no longer required.

Deep Dive

Comparison of the carbon footprint of two Data Centers






In a increasingly digitalized world, carbon emissions are mainly driven by the extraction of raw materials and their transformation into electronic components, as well as by electrical production of electricity.

In FRANCE: 1 kWh of electricity = 0.104 kg of CO²
(less carbon emissions due to nuclear plants)
In USA: 1 kWh of electricity = 0.454 kg of CO²

CUE

Carbon usage effectiveness (CUE) is a metric that determines the amount of carbon gas emitted by a Data Center on a daily basis. This metric was developed by the non-profit consortium, The Green Grid. It is calculated by dividing the total carbon dioxide emissions equivalents (CO²) of the facility's energy consumption by the total IT energy consumption.

		Data Center A Air Cooling Efficient and traditional IT	Data Center B Immersion Cooling
	Capacity	12 000 servers	
	Average Power Consumption (per server)	350 W	280 W*
	Total IT Power Consumption	4.2 MW	3.36 MW
	Cooling Overhead	30%	2%
	Electrical Overhead	6%	1%
	Effective PUE (Power Usage Effectiveness)	1.36	1.03
	Total Facility Power	5.7 MW	3.5 MW
	Energy Consumption per year	50 Million kWh	30.3 Million kWh
	USA Carbon emissions per year	22.7 Million kgCO ²	13.8 Million kgCO ²
	FRANCE Carbon emissions per year	5.2 Million kgCO ²	3.2 Million kgCO ²
CUE	USA Effective CUE	0.62 kg CO ² /Kwh	0.47 kg CO ² /Kwh
	FRANCE Effective CUE	0.14 kg CO ² /Kwh	0.12 kg CO ² /Kwh

(*) Reduction due to fans removal






Reduction of the carbon emissions by up to 39% thanks to immersion

Comparison of the water consumption of two Data Centers

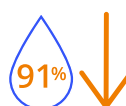
To reduce water consumption in Data Centers, a measurement system called WUE (Water Use Efficiency) allows measuring water and energy consumption in Data Centers. WUE is calculated by dividing Data Centers annual Energy source and Site water usages (in Liters) by Total IT Power Consumption.



Notice : WUE is a metric defined by the Green Grid.

		Data Center A Air Cooling Efficient and traditional IT	Data Center B Immersion Cooling
	Total IT Power Consumption	4.2 MW	3.36 MW
	Total Facility Power	5.7 MW	3.5 MW
	Daily site water usage*	507 300 L	43 750 L
	Energy source water per year	94.07 Million L	57 Million L
	Site Water Usage per year	185.16 Million L	15.97 Million L
	Site WUE	7.59 L/kWh	2.48 L/kWh

*Based on James Hamilton's estimate



Reduction of water consumption by up to 91% is enabled by immersion

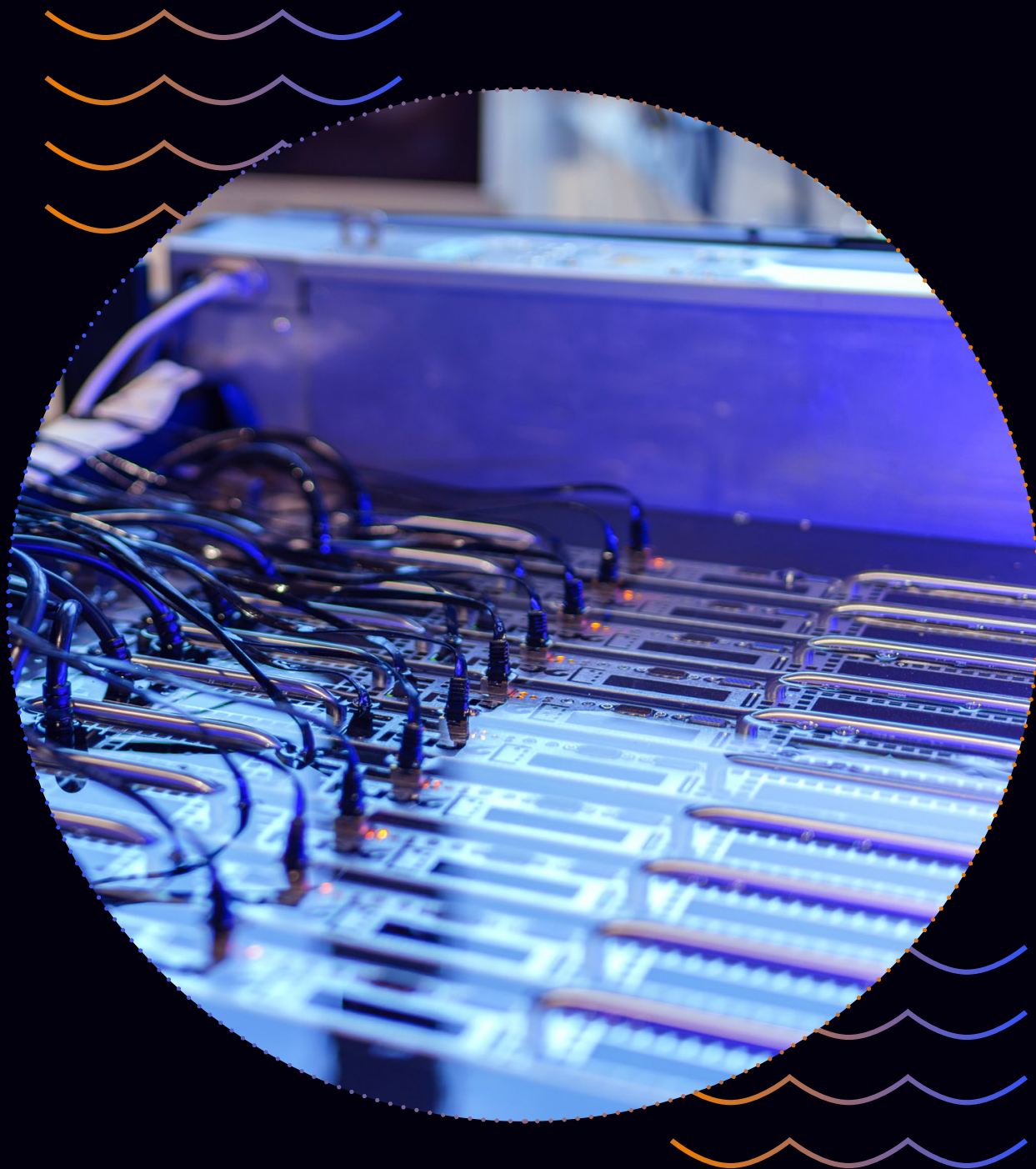
Immersion Ready Solutions

Immersion compatible servers by



SmartPods by





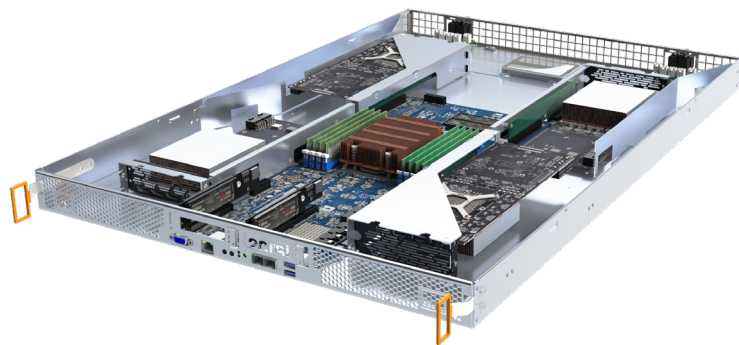
Immersed compatible servers



OCtoPus 1.4E

21-inch server
One CPU and four GPUs

- Based on OCP Principles
- High Flexibility
- No PSU
- Best Profitability
- Easy handling



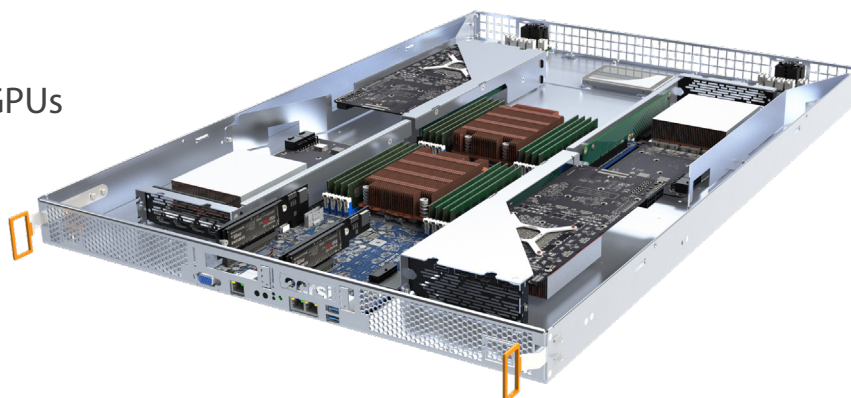
	Rev0	Rev1
Servers		
Form factor	21-inch (1 OpenU)	
Number of servers per SmartPodXL	36	
CPU		
CPU compatibility	AMD EPYC™ 7xx1	AMD EPYC™ 7xx2/7xx3
Number of core per SmartPod XL	up to 1 152 (with max. 32 cores)	up to 2 304 (with max. 64 cores)
DIMM		
Number of DIMM per server	8	
DIMM format	Max. 2666 MHz	Max. 3200 MHz
GPUs		
GPU max. dimensions	285 x 111.5 x 39.5mm	
Number of GPUs per SmartPod XL	up to 144	
Power consumption		
Total IT power consumption per server	1 280 W*	
Total dissipation capacity per SmartPodXL	50 kW	
PUE	1.018	

*with 36 servers (approx. 36x (1x 280W CPU + 4x 250W GPUs))

OCtoPus 1.4EE

21" server
Two CPUs and four GPUs

- Based on OCP Principles
- High Flexibility
- No PSU
- Best Profitability
- Easy handling



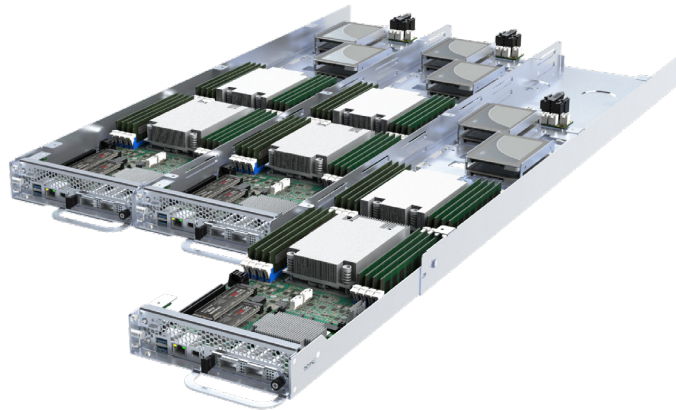
Servers	
Form factor	21" (1 OpenU)
Number of servers per SmartPodXL	36
CPU	
CPU compatibility	AMD EPYC™ 7xx2/7xx3
Number of core per SmartPod XL	up to 4 608 (with max. 2x 64 cores)
DIMM	
Number of DIMM per server	16
DIMM format	Max. 3200 MHz
GPUs	
GPU max. dimensions	285 x 111.5 x 39.5mm
Number of GPUs per SmartPod XL	up to 144
Power consumption	
Total IT power consumption per server	1 480 W*
Total dissipation capacity per SmartPodXL	50 kW
PUE	1.03

*with 36 servers (approx. 36x (2x 240W CPU + 4x 250W GPUs))

OCtoPus 3EE

21-inch server Six CPUs Chassis

- Based on OCP Principles
- High Flexibility
- No PSU
- Best Profitability
- Easy handling



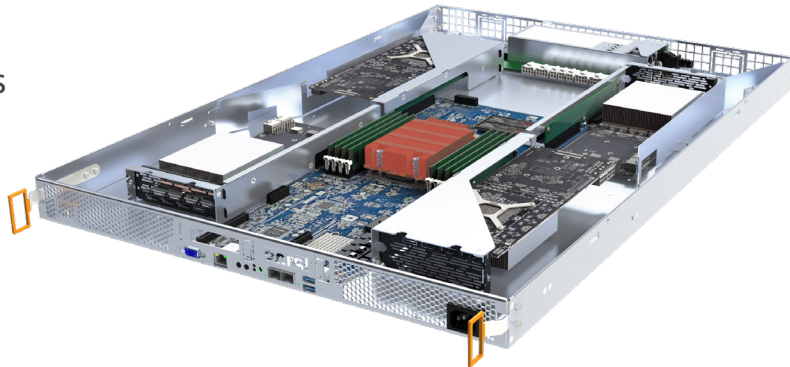
Servers	
Form factor	21-inch (1 OpenU)
Number of compute nodes per OpenU	6
Number of servers per SmartPodXL	36
Number of compute nodes per SmartPod XL	216
CPU	
CPU compatibility	AMD EPYC™ 7xx2/7xx3
Number of core per SmartPod XL	up to 13 824 (with max. 6x 64 cores)
DIMM	
Number of DIMM per server	48
DIMM format	Max. 3200 MHz
Power consumption	
Total IT power consumption per server	1 680 W*
Total dissipation capacity per SmartPodXL	50 kW
PUE	1.03

*with 36 servers (soit approx. 36x (1x 280W CPU + 4x 250W GPUs)

Atlas 1.4E

21-inch server
Two CPUs and four GPUs

- High speed processing
- High Flexibility
- Best Profitability
- Easy maintenance



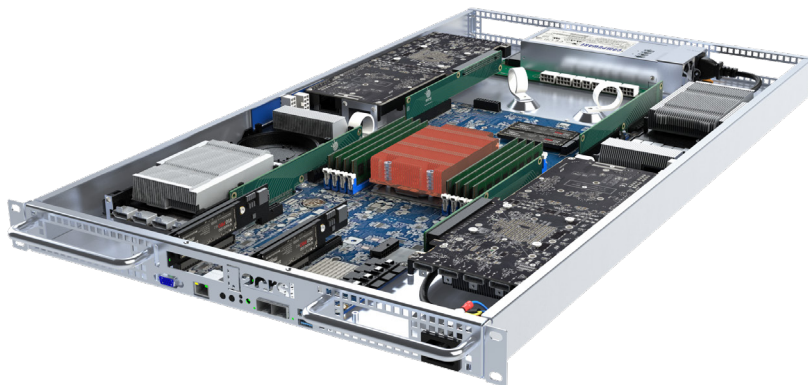
Servers	
Form factor	21-inch (1 OpenU)
Number of servers per SmartPodXL	42
CPU	
CPU compatibility	AMD EPYC™ 7xx3
Number of core per SmartPod XL	up to 1 344 (with max. 32 cores)
DIMM	
Number of DIMM per server	8
DIMM format	Max. 2666 MHz
GPUs	
GPU max. dimensions	285 x 111.5 x 39.5mm
Number of GPUs per SmartPod XL	up to 144
Power consumption	
Total IT power consumption per server	1 160 W*
Total dissipation capacity per SmartPodXL	50 kW
PUE	1.02

* with 42 servers (approx. 1x 280W CPU + 4x 220W GPUs)

Atlantis 1.4E

19-inch server
One CPU and four GPUs

- High speed processing
- High Flexibility
- Improved MTBF (Mean Time Between Failure)
- Easy maintenance



Servers	
Form factor	19-inch (1U)
Number of servers per SmartPodXL	44
CPU	
CPU compatibility	AMD EPYC™ 7xx2/7xx3
Number of core per SmartPod XL	up to 1 408 (with max. 32 cores)
DIMM	
Number of DIMM per server	8
DIMM format	Max. 2666 MHz
GPUs	
GPU max. dimensions	285 x 111.5 x 39.5mm
Number of GPUs per SmartPod XL	152
Power consumption	
Total IT power consumption per server	1 120 W*
Total dissipation capacity per SmartPodXL	50 kW
PUE	1.02

*with 44 servers (approx. 1x 280W CPU + 4x 210W GPUs)

SmartPods



SmartPodX

SmartPodX & SmartPodXL

Immersion cooling made practical

The SmartPodX & SmartPodXL have a cooling capacity of 50 kW. This dissipation is made possible thanks to the CDU (Cooling Distribution Unit) exchangers, which are directly integrated in each tank.

SmartPodXL+

unrivalled density

The XL+ has 2 CDUs for a total dissipation capacity of 100 kW for 39 OpenU or 41 U.

The CDUs ensure the temperature exchange between the hot liquid and the cold water getting into the tanks. The CDUs are equipped with a double pump, ensuring the appropriate redundancy and creating a movement within the liquid to ensure uniform cooling throughout the entire system.



SmartPodXL+



SmartCoolant

Submer's Smart Coolant is a tailor-made synthetic fluid that offers one of the highest performances on the market.



Highest Quality &
Economic

Fully Compatible with IT
components

Non-Corrosive

Non-Oxidative

Lifespan: 15 years



Protect your
IT investment

Barrier against dust & moisture

Thermal uniformity

Sealed environment

No moving parts



Safe for humans
& the environment

Non-toxic

Certified Biodegradable

SmartPod statement of line*

	SmartPodX	SmartPodXL	SmartPodXL+
IT Hardware capacity	21U / 19 OU	44U / 42 OU	41U / 39 OU
Dimensions	120(L) x 93(W) x 121(H) cm	228(L) x 90(W) x 119(H) cm	228(L) x 90(W) x 119(H) cm
Weight (Empty)	411 kg / 905 lbs	671 kg / 1,476 lbs	766,95 kg / 1,690 lbs
SmartCoolant capacity	576 l / 152,2 gal	1 186 l / 313 gal	1 186 l / 313 gal
Total weight (Full of SmartCoolant)	872 kg / 1,922 lbs	1 691 kg / 3,728 lbs	1 787 kg / 3,940 lbs
SmartCoolant Temperature setpoint	35°C-40°C		

The CDU (Cooling Distribution Unit)*

	SmartPodX	SmartPodXL	SmartPodXL+
Heat dissipation capacity	50 kW	50 kW	100kW or 50kW redundant
Max power consumption	750 W	750 W	1 500 W
Mechanical Power Usage Effectiveness	1,015		
Pump Redundancy	2N	2N	2N/Tier III CDU Redundancy
Power supply	380-400V 50Hz / 208-230V 60Hz		
Power supply connection	Industrial connector three phase 3P+E +N 32A IEC60309 / plug L2120 20A NEMA		
Water supply connection	G 1 1/4" BSPP female , NPT male		
Monitoring	+ 20 real-time metrics over public REST API / DCIM compatible		

Deployment Requirements*

	SmartPodX	SmartPodXL	SmartPodXL+
Water supply in let temperature	Recommended less or equal to 32°C / 89°F Inhibitors and/or softners: depending on lcing and Water quality conditions		
Water flow rate	5 to 10 m3/h / 22 to 44 US gpm		
Warm water outlet temperature	Expected 37°C / 99°F		
Floor load capacity	900 kg/m ² / 1980 lbs/ft ² (IT Hardware not considered)		
Fire Supression System	Standard air-cooled Data Center tire suppression system		
Temperature	-20°C to 55°C / -4°F to 131°F		

(*) All these informations are relative to the SmartPod 4.1 version.

About us

The objective behind the partnership between Submer & 2CRSi is to pool our respective strengths in order to create a first class added value for the end user. The immersion technology is brought by Submer and its unique expertise. 2CRSi completes the offer with its

enhanced know-how in high performance servers manufacturing, optimized through and through to be cooled by immersion. Together we are better and stronger to deliver value to our customers.



2CRSi is a French global Tech group, listed on Euronext Growth Paris and active in the IT & Computer Hardware industry. As a world class player in high performance and high efficiency server technology, the 2CRSi Group develops, manufactures, and distributes end-to-end energy-efficient computing solutions. Through our different companies and brands, we deliver a broad range of IT solutions and services for a variety of markets, including cloud computing, datacenters, enterprise IT, big data, HPC, artificial intelligence, 5G , IoT, rugged PCs or embedded and edge computing.

From 25 global locations and production sites in France (global HQ), Germany, Belgium, the Netherlands, the United Kingdom, the United States, the United Arab Emirates, Singapore, India, and Australia, our 350+ team members deliver in 50 countries, tailor-made solutions for companies from multiple sectors and industries including aerospace, defense, security, oil & gas, healthcare, scientific research, education,

telecommunications, automotive, banking, trading & finance, media & entertainment or web services.

As a proud player of the European Digital Sovereignty, 2CRSi was selected in 2021 by the European Commission to design and manufacture 100% european pilot systems based on RISC-V accelerators as a first step towards the realisation of a future operational european exascale systems.

The 2CRSi Group operates 6 complementary and global companies offering hardware solutions (2CRSi and Tranquil), datacenter housing & cloud services (Green Computing), IT consultancy & solution provider (Bios IT) and IT distribution networks / marketplace (Boston and Escape Technology).





Datacenters that make sense

We enable next generation cooling and automation for data & energy-intense environments by integrating our pristine, highly-efficient & sustainable technologies. Solving the challenges of today and powering the use cases of the future

We support organizations to make progress on environmental sustainability goals, reduce their company's carbon footprint and whilst making progress on broader business objectives of improving profitability and operational efficiency.

We'll strive every minute to add value to your business. Our main goal is to understand how we can support you, invest in your company journey and look for opportunities to make your infrastructure and IT investment a great success.

Your Submer experience will be around innovation, efficiency and being sustainable with great financial growth.

We believe a better world is possible by leveraging cleaner technologies that on top deliver unprecedented TCO metrics.





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