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FRIEDHELM LOH GROUP

Open Compute Project (OCP)

Big data is a subject which is shaking up many areas of industry, commerce and trade. It is not only that data volumes are increasing exponentially, it is also that efficient and fast data processing will be more and more decisive for successful business in the future.

The OCP community came together to find solutions to this challenge. The prime objective of the Open Compute Project (OCP) is to reduce the investment and operating costs, energy consumption and environmental impact of data centers by way of innovative, fully standardized IT architectures. To this end, the OCP provides an open platform for the sharing of ideas and know-how, and is a vehicle for the definition of ground-breaking standards for the data center of the future.

OCP Solutions – Architectures for the future

As a leading manufacturer of IT infrastructures, Rittal is proud to be a platinum member of the OCP community. Expertise in the standardization of data center architectures, in particular, has established Rittal's reputation as a strong partner when it comes to demanding OCP-related tasks. Rittal has extended its standard portfolio with a complete line of Open Compute Project standards-conforming products and continues to provide customized, application specific racks. Beyond the rack itself, Rittal offers a comprehensive range of accessories, a special power supply unit, and a new innovative cooling system.



OCP Cooling

In a strategic partnership, Rittal and ZutaCore, a waterless, two-phase, liquid cooling company, have developed the first Rittal HPC Cooled-by-ZutaCore solutions, now available at scale. By using an innovative direct-on-chip evaporative cooling technology, Rittal OCP racks are prepared to cool any existing or future processor that might be required, no matter what the power level, as computing continues to evolve.



OCP Power

In a joint collaboration with Bel Power Solution & Protection, Rittal provides power supplies for OCP racks. These innovative and efficient power distributors are a key element of any OCP architecture. Substantial power savings can be achieved by transforming the power centrally and distributing it via the busbars that typify an OCP system.

Proven rack design for Open Compute

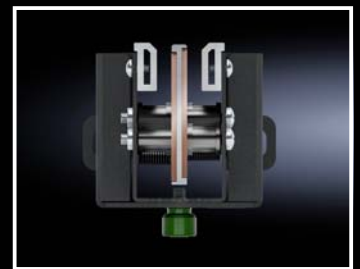
- Meets Open Rack standard 1.2 and 2.0
- UL/CE listed
- 12 V DC/48 V DC
- 13.2 kW – 40 kW
- 21" to 19" bridging adaptors
- Shelves configurable in 1 OU increments
- Modular configuration of busbars



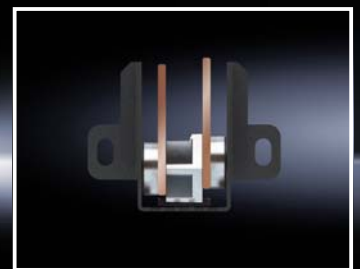
Modular busbar system
12 V DC to 48 V DC



48 V DC/36 kW



48 V DC/15 kW



12 V DC/6.6 – 13.2 kW

More flexibility in system expansion

The rack can be equipped with side panels and a range of doors to suit a standalone or bayed configuration and the adaptability to divide the rack into split zones, providing up to 19.8 kW in one or 6.6 kW in another, along with a central divider shelf enables colocation deployments.



Door

- Range of lock options available, from standard keyed swing handle to electronic combination or swipe card access



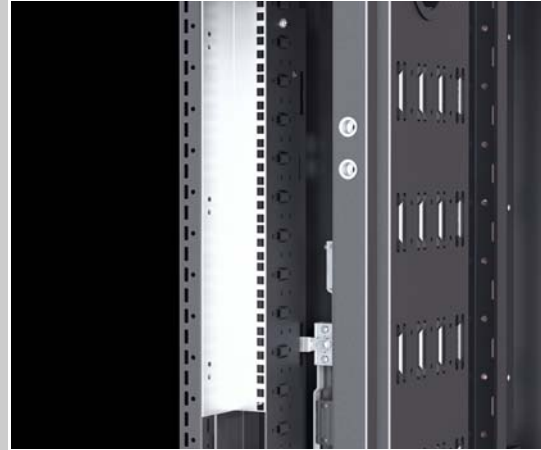
Side panel

- Sheet steel one piece for end of row instalment



Variable interior

- IT slide rails are available in 1 OU and 3 OU heights as well as the standard 2 OU and with new EIA adaptors the interior can be configured to suit customers' requirements.



Adaptor

- Standard 1 U 19" tool-free adaptor for installation of 19" hardware
- Special 19" front/rear EIA angle in various heights to accommodate multiple 19" equipment



IT slide rails

- The slide rails help to adapt your cabinet to the various server heights
- Available in 1 up to 3 OU



Rittal HPC Cooled-by-ZutaCore

Customers can use OCP racks from Rittal combined with the innovative direct-on-chip evaporative cooling solution from ZutaCore to meet and surpass the challenges posed by server-level hot spots and high-performance-computing requirements, consistently, in any climate. This solution goes beyond the limits of air and eliminates the use of water, mitigating the risk of IT failure. Furthermore, two-phase liquid cooling is prepared for any evolution in high-powered chips: there is no limit to what it can cool as processor packages progress toward 1000 W and even beyond.





Benefits

- Minimal additional space (RHx door or in-rack HRU).
- No chilled water cooling system required to remove the high heat load.
- Easily deployed without modifying existing infrastructure and easy maintenance.
- Installation of high-powered computing nodes in an existing data center facility served by a traditional room cooling technology.
- The direct-on-chip system uses a non-conductive refrigerant, eliminating water inside the rack.

OCP In-Rack Solution

The Rittal HPC Cooled-by-ZutaCore air-cooled In-Rack Edge solution fits into any rack in almost any environment. It uniquely supports up to 20 kW computing power with an in-rack air cooled condenser and 70 kW computing power with an in-rack water cooled condenser. It needs no plumbing or special environment outside of the rack – making it an ideal solution for existing data centers needing to accommodate higher power density in servers and racks as well as edge applications.

The operation sequence of the system consists of the following steps:

- The dielectric liquid refrigerant flows into the specially designed heat exchangers (Enhanced Nucleation Evaporator – ENE) the various CPUs / GPUs inside the different servers.
- The refrigerant evaporates by absorbing the heat of the CPU / GPU.
- The gas returns via the piping system and is guided to the condenser (Heat Rejection Unit – HRU).
- Within the air/refrigerant heat exchanger, the gas condenses back to a liquid.
- A pump ensures that the liquid refrigerant flows again into the cooling system.

OCP Rear-Door-Air Solution

In the Rittal HPC Cooled-by-ZutaCore rear-door-air solution, the standard OCP rack is enhanced by a rear door heat exchanger (RHx). Compact and easy to deploy, it can be integrated into data centers without modifying existing infrastructure, enabling users to deploy the latest, most powerful processors in a standard data center environment. It cost-effectively cools high-powered processors challenging to traditional air-conditioning systems.

The operation sequence of the system consists of the following steps:

- The RHx consist of fans and the refrigerant/air heat exchanger itself. The fans ensure that the required air volume is moved through the rack – from front to back – transporting the heat out the cabinet.
- In parallel, the air stream through the rack cools down the rest of the active IT components not served by the DCEC cooling system.
- The refrigerant gas coming from the ENEs flows through the heat exchanger.
- The lower temperature of the air condenses the gas back to the fluid state.

Standard R-OCP V2 rack



OCP rack, 41 OpenU (OU), for use in energy-efficient IT architectures based on the principles of the Open Compute Project. Depending on the variant, with split 12 V DC busbar fitted at the rear, or without busbar for individual configuration. Depending on accessories and the use of power packs, one (single) or two (dual) power zones may be used in the rack.

Benefits:

- Complies with Open Rack standard 1.2 and 2.0
- Stable, firmly linked frame structure on castors
- Height units in the Open Compute Design with a variable OpenU pitch pattern (OU) of between 1 OU (48 mm) and 3 OU
- Preconfigured slide rails for direct installation of servers, height-adjustable on the OpenU (OU) pitch pattern
- Prepared to accommodate special OCP hardware with a system width of 21" at the front
- Highly efficient power distribution by connecting the hardware directly to the 12 V DC busbar integrated into the rack
- 21"/19" adaptor for the additional integration of 482.6 mm (19") components optionally available
- Matching OCP power packs (power shelves) and batteries (back-up units) for central power supply and protection optionally available in the rack

- Extendible up to a maximum of 3 busbars
- UL/CE-listed

Supply includes:

- Firmly linked frame structure, with fitted castors, without doors, without side panels
 - 2 pairs of slide rails, fitted
- Please observe the product-specific scope of supply.

Standards:

- Open Rack Standard V2

Units OU	Packs of	41	41	Page
Width mm		600	600	
Height mm		2246	2246	
Depth mm		1068	1068	
Design		OCP V2 rack, deep, without busbar, for individual configuration	OCP V2 rack, deep, incl. preconfigured 12 V DC busbar with 2 power zones	
Load capacity		15,000 N (dynamic)	15,000 N (dynamic)	
Power consumption min./max. kW		-	6.6 / 13.2	
Model No.	1 pc(s).	7100.200	7100.221	
Product-specific scope of supply				
1 x 12 V DC busbar		-	■	
Also required				
12 V DC OCP busbar	1 pc(s).	7100.312	-	
Accessories				
12 V DC OCP busbar	1 pc(s).	-	7100.312	
OCP adaptor	2 pc(s).	7100.401	7100.401	
OCP V2 side panel	2 pc(s).	7100.501	7100.501	
OCP PDU		see page	see page	10

12 V DC OCP busbar

Design	Output range	Packs of	Model No.
12 V DC	6.6 - 13.2 kW	1 pc(s).	7100.312

12 V DC OCP busbar for power distribution in a standard R-OCP V2 rack. The busbar is fitted at the rear and is used to supply power to the hardware in the rack. The hardware and busbar make contact via a clip connection at the rear of the hardware.

Benefits:

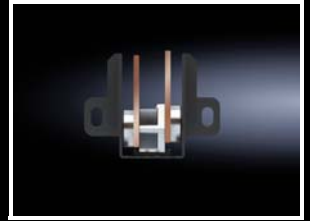
- Multiple 12 V DC busbars may be combined
- Simple configuration of two to one power zone
- Greater energy efficiency with silver-plated contact area

Material:

- Copper, zinc-plated, silver-plated

Supply includes:

- Assembly parts



OCP V2 side panel

Height mm	Depth mm	Packs of	Model No.
2246	1068	2 pc(s).	7100.501

OCP V2 side panel, 1-piece, for finishing off a rack suite with standard R-OCP V2 racks.

Material:

- Sheet steel

Supply includes:

- Assembly parts



OCP adaptor

21"/19"

Adaptor for installing 19" components in the 21" OCP rack system. The adaptor simply snaps onto the 21" profile.

OU	Packs of	Model No.
1	2 pc(s).	7100.401



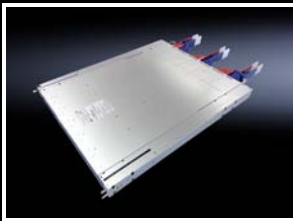
Accessories



OCP PDU

The OCP PDU installed on the rack distributes power for the data center to the power shelves fit-ted in the rack.

Input voltage	Infeeds	Phases per infeed	Output voltage	Number of outputs	Rated voltage A	Type of electrical connection	Overvoltage protection	To fit Model No.	Packs of	Model No.
240 / 415 V AC	1	3~	240 / 415 V AC	2	32	IEC 60 309	■	7100.200/ 7100.221	1 pc(s).	7100.911
277 / 480 V AC	2	3~	277 / 480 V AC	2	20	L22-20P	■	7100.200/ 7100.221	1 pc(s).	7100.912
277 / 480 V AC	1	3~	277 / 480 V AC	2	30	L22-30P	■	7100.200/ 7100.221	1 pc(s).	7100.913
48 V DC	2	–	48 V DC	2	250	–	–	7100.200/ 7100.221	1 pc(s).	7100.914
200 / 415 V AC	1	3~	54.5 V DC	3	–	–	–	7100.200	1 pc(s).	7100.915



OCP Power Shelf

The power shelf connects the power supply to the busbar of the OCP rack, and at the same time functions as a rack-mounted frame for the power supply units and the battery back-up units. Depending on the variant, a built-in controller for monitoring the power supply is already fitted.



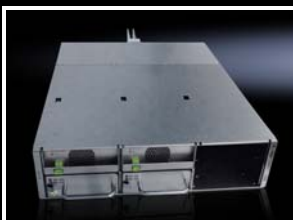
Also required:

- OCP PDU, see page 10
- OCP Power Supply Unit, see page 11



Accessories:

- OCP Battery Back-up Unit, see page 11
- OCP Power Supply Unit, see page 11



Design	Number of slots	Redundancy	Output voltage	Active power kW	Number of outputs	Height OU	Product-specific scope of supply	To fit Model No.	Packs of	Model No.
Shelf type: AC-DC	3 x PSU / 3 x UPS	2+1	12 V DC	6.6	1	3	–	7100.221	1 pc(s).	7100.921
Shelf type: AC/DC-DC	6 x PSU	3+3 / 5+1	12 V DC	18	3	1	Built-in controller	7100.200	1 pc(s).	7100.922
Shelf type: AC/DC-DC	6 x PSU	3+3 / 5+1	12 V DC	18	1	1	Built-in controller	7100.221	1 pc(s).	7100.923
Shelf type: AC/DC-DC	6 x PSU	3+3 / 5+1	48 V DC	24	1	1	Built-in controller	7100.200	1 pc(s).	7100.924
Shelf type: DC-DC	6 x PSU	3+3 / 5+1	12 V DC	15	1	1	Built-in controller	7100.221	1 pc(s).	7100.925
Blanking cover	–	–	–	–	–	1	–	7100.921	1 pc(s).	7100.961
Blanking cover	–	–	–	–	–	1	–	7100.921	1 pc(s).	7100.962

OCP Power Supply Unit

The power supply unit (PSU) is a power pack which centrally transforms the current or voltage in an OCP rack. The PSUs operate in parallel mode. A power shelf is needed for installation of the power supply units. Depending on the power shelf, up to 6 PSUs may be installed.

Benefits:

- May be connected with the system operational
- Parallel operation with active load distribution

Design	Input voltage	Output voltage	Active power kW	Power pack	To fit Model No.	Packs of	Model No.
Power Module PM	200 - 277 V AC	12.6 V DC	3.3	AC - DC	7100.921	1 pc(s).	7100.931
Power Module PM	90 - 300 V AC / 240 - 400 V DC	12.3 V DC	3	AC/DC - DC	7100.922/ 7100.923	1 pc(s).	7100.932
Power Module PM	90 - 300 V AC / 192 - 400 V DC	12.3 V DC	3.6	AC/DC - DC	7100.922/ 7100.923	1 pc(s).	7100.933
Power Module PM	200 - 277 V AC / 192 - 400 V DC	48 V DC	4	AC/DC - DC	7100.924	1 pc(s).	7100.934
Power Module PM	40 - 72 V DC	12,5 V DC	3	DC - DC	7100.925	1 pc(s).	7100.935
Blanking cover	-	-	-	-	7100.922/ 7100.923	1 pc(s).	7100.963

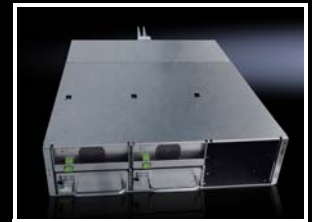
OCP Battery Back-up Unit

The battery back-up unit is an internal UPS in OCP architecture housed inside the rack, to ensure a controlled shutdown of the hardware and data backup in the event of a power failure.

Benefits:

- May be connected with the system operational
- Parallel operation with active load distribution

Design	Input voltage	Active power kW	To fit Model No.	Packs of	Model No.
Lithium ion battery back-up unit	52.5 V DC	3.6	7100.921	1 pc(s).	7100.951



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