



STULZ

IT Cooling Solutions

CyberRow

Intelligent air flow control – for more efficiency
in rack cooling



Direct rack air conditioning goes in a new direction

An innovative idea ensures precise climate control and reliable ICT systems – CyberRow from STULZ

There are various ways of air conditioning a data center – and any of these may lead to your goal. To deliver the best results for your requirements, we offer a range of different, comprehensive air-conditioning solutions to meet diverse needs worldwide.

With CyberRow, we have developed an air-conditioning solution in which the air conduction goes in a new direction – that is, horizontal. The individual units are positioned right in the server room between the racks to dissipate the heat from the servers. CyberRow improves the air flow considerably, as the cold air is transported in two directions via an outlet on the side and evenly distributed in front of the racks. Closeness to the rack results in short air paths and largely eliminates mixing of cold and hot air, which contributes to CyberRow's high efficiency.

Cooling racks with STULZ CyberRow

CyberRow is an innovative precision air conditioner, tailor-made for targeted cooling of racks. In CyberRow, innovative air conduction has been enhanced with state-of-the-art technology boasting high performance, flexibility and efficiency. Fluctuating server rack loads, space restrictions, lack of a raised floor, existing server technology – these are exactly the tricky situations from everyday practice that CyberRow has been specially developed to deal with.

CyberRow is a standalone A/C unit and is installed and operated independently of the rack. It can be used with racks from any manufacturer. This complete separation of the rack and the A/C unit enhances reliability and provides greater flexibility in data center layout.

Horizontal air conduction:

The cold air reaches the rack via the shortest route.

STULZ C7000 controller:

Monitors and controls all components inside and outside the A/C unit that are needed to generate cold air.

Up to five EC fans:

Independently of each other, infinitely adjustable EC fans ensure maximum efficiency.

EC compressor:

Infinitely adjustable for precise cooling capacity, and no increase in start-up current due to inverter technology.

Flexibility and compatibility:

CyberRow is available in four different cooling systems (AS, CW, GS and GES system with Indirect Free Cooling) and in six sizes.

Modernising cooling systems in existing buildings:

Thanks to its compact size and universal suitability for racks from different manufacturers, CyberRow can also be used for trouble-free modernisation of cooling systems in existing buildings.



- Targeted cooling of high-density racks
- Smooth regulation of cooling capacity
- For data centers with and without raised floors
- Independent of rack manufacturer
- Three different widths for flexibility



CyberRow in widths of 300 mm, 400 mm and 600 mm

The right system for your requirements

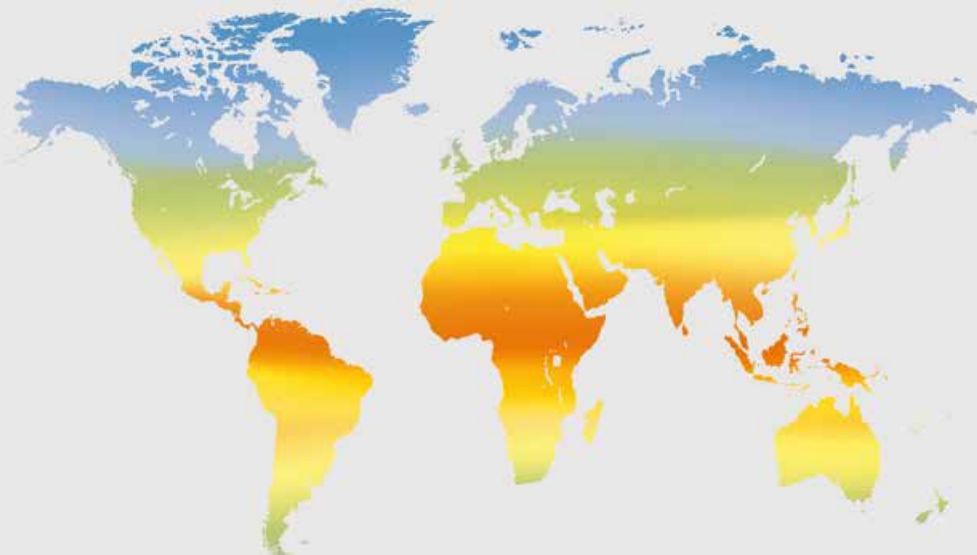
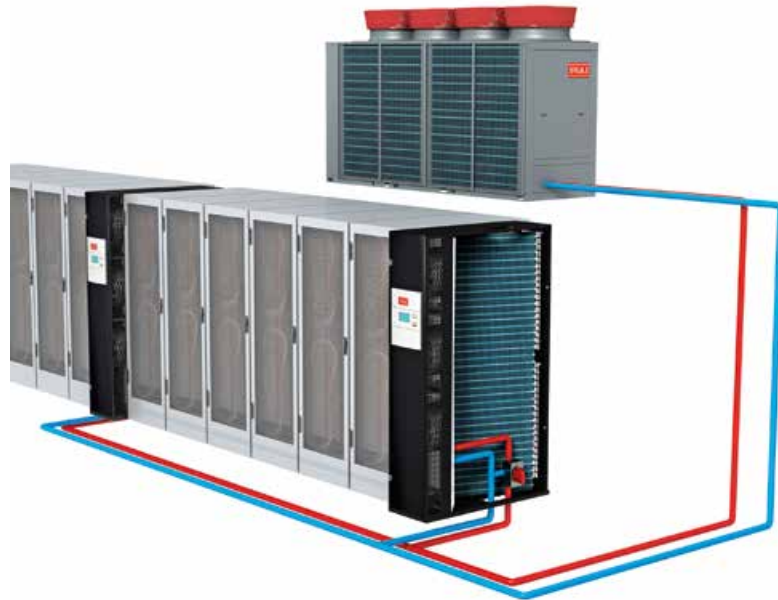


AS system with compressor cooling (DX mode)

The A/C unit's refrigerant circuit consists of an evaporator, an electronic expansion valve, an EC compressor and an external air-cooled condenser. Conveyed by fans, the ambient air flows through the evaporator, where heat is extracted from it and transferred to the refrigerant. The A/C unit and the external condenser are connected to one another by means of a closed refrigerant circuit.

CW system with chilled water cooling

The CW unit manages without a refrigerant circuit of its own, but requires separate chilled water generation. The ambient air conveyed by the fans flows through the direct cooling unit, which transfers the heat to the chilled water. The heat is extracted from the water by a chiller. The air conditioner and the chiller are connected to one another by means of a closed cooling water circuit.



In temperate climate zones north and south of the equatorial zone, the STULZ CyberRow with Indirect Dynamic Free Cooling can exploit its energy-saving advantages to the full, reducing electricity consumption for data center air conditioning by up to 60 %.



GS system with cooling water circuit

Like the AS system, but in the GS system, the heat from the DX circuit is transferred to a water-glycol mixture by a plate-type condenser integrated in the A/C unit. The mixture circulates in a closed circuit, and transfers the heat to the ambient air via an external dry cooler.

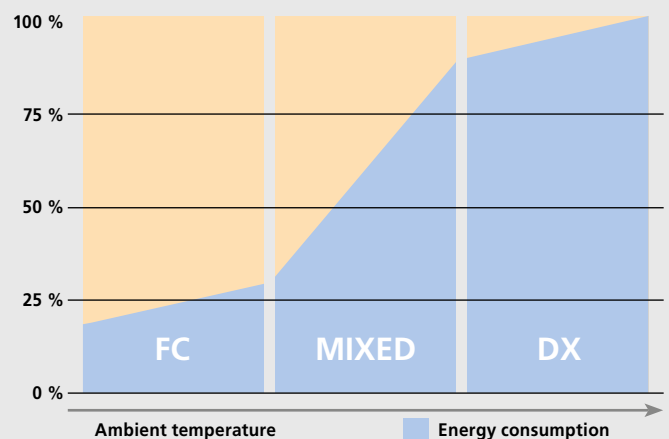


GES system with Indirect Free Cooling

The GES system is a hybrid system combining a GS system with Indirect Free Cooling. The GES system switches from compressor mode to energy-saving mode as soon as the ambient air temperature permits. The ambient air is then used for Indirect Free Cooling. In temperate climate zones north and south of the equatorial zone, the STULZ CyberRow can exploit its energy-saving advantages to the full, reducing electricity consumption for rack air conditioning by up to 60%. Using CyberRow GES cuts operating costs and is environmentally friendly.

STULZ Indirect Dynamic Free Cooling for CyberRow

- Electronically controlled GES cooling system, combining compressor cooling and Free Cooling in three stages:
 - FC – Free Cooling energy-saving mode
 - MIXED – Compressor and Free Cooling
 - DX – Compressor cooling
- Electronic load distribution for partial load mode
- Increased compressor efficiency in Mixed mode due to electronic expansion valve



CyberRow with variable cooling

High-performance IT systems work around the clock, and conditions in the data center change as the day goes by. CyberRow A/C units take this into account – and vary their

cooling capacity in accordance with the heat load to ensure that there is never too much or not enough cold air.



Rack air-conditioning scenario with CyberRow

With CyberRow, the air conditioners are placed directly between the racks. The speed-controlled EC fans blow out the cold air from the sides, ensuring uniform distribution over the entire length of the aisle. With the precise lateral air conduction, an enclosure is not essential. In addition, temperature sensors in the supply and return air ensure controlled, precision air conditioning in independent horizontal zones.

Cold-aisle containment

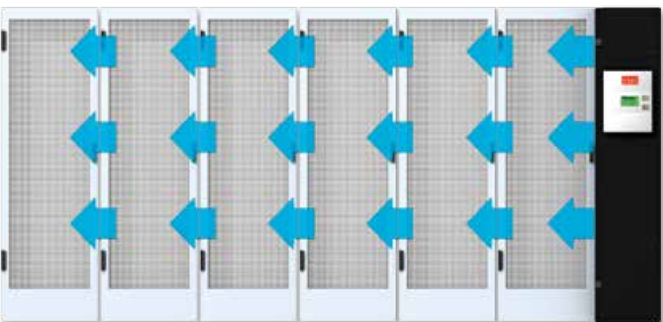
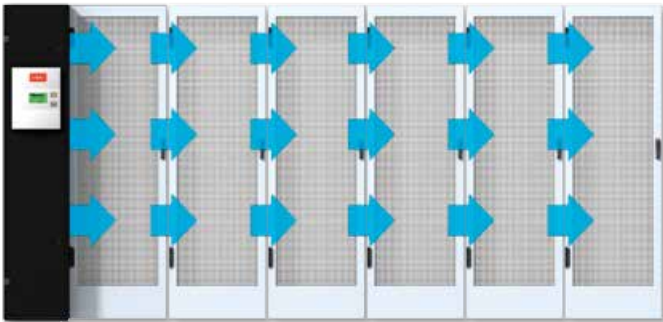
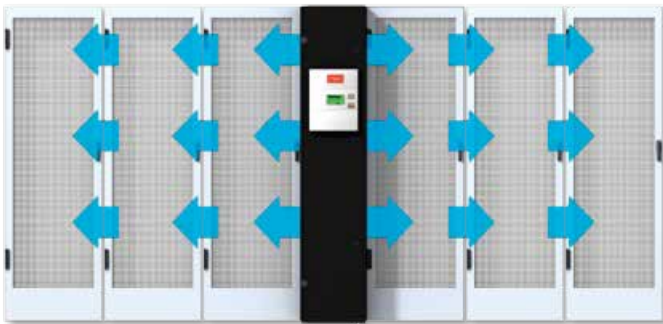
CyberRow units with frontal air outlets are used for cold-aisle containment. The units are positioned in a staggered arrangement to provide an optimum air supply to the server racks across from them.





Hot-aisle containment

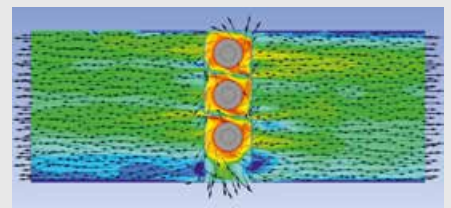
CyberRow units with lateral air conduction are used for hot-aisle containment.



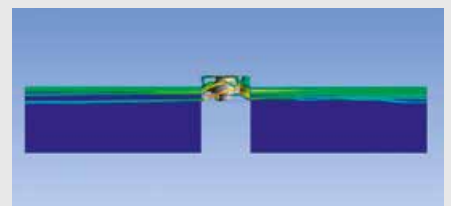
Depending on the required cooling capacity, a CyberRow can supply cold air to as many as six server cabinets.

CyberRow CFD analysis of air conduction

The air conduction of the CyberRow units was analysed with computational fluid dynamics (CFD) systems. In the first step, an exact visual simulation of the air flow was developed to identify all areas around the fans that have a negative effect on it. The analysis also showed that further structural adaptations such as special air baffles and partitions between the EC fans were needed in order to achieve almost perfectly uniform distribution of the cold air.



The red areas – around the EC fans – show that the fans emit the cold air at a very high speed (approx. 9-11 m/s) at the outlets. However, this is only the case as long as the air is in the housing. The partitions installed between the EC fans channel the air flow and the air baffles at the outlet ensure uniform distribution across the entire height of the racks.



This CFD visualisation shows how the air flow virtually sticks to the server racks and no turbulence arises. The cold air flows directly in front of the server racks.

CyberRow DX – Compressor cooling integrated right where you need it

The CyberRow DX is the embodiment of our decades of experience in the air conditioning of data centers. All its tried and tested components are perfectly tuned to each other, and can reliably deliver the necessary cooling capacity in the smallest space.



- 1 Switch cabinet (pivots for service and maintenance)
- 2 Air filter
- 3 Evaporator
- 4 EC fans
- 5 EC compressor
- 6 Humidifier (optional)
- 7 Pipe connections (top and bottom)
- 8 Optimised air flow baffle

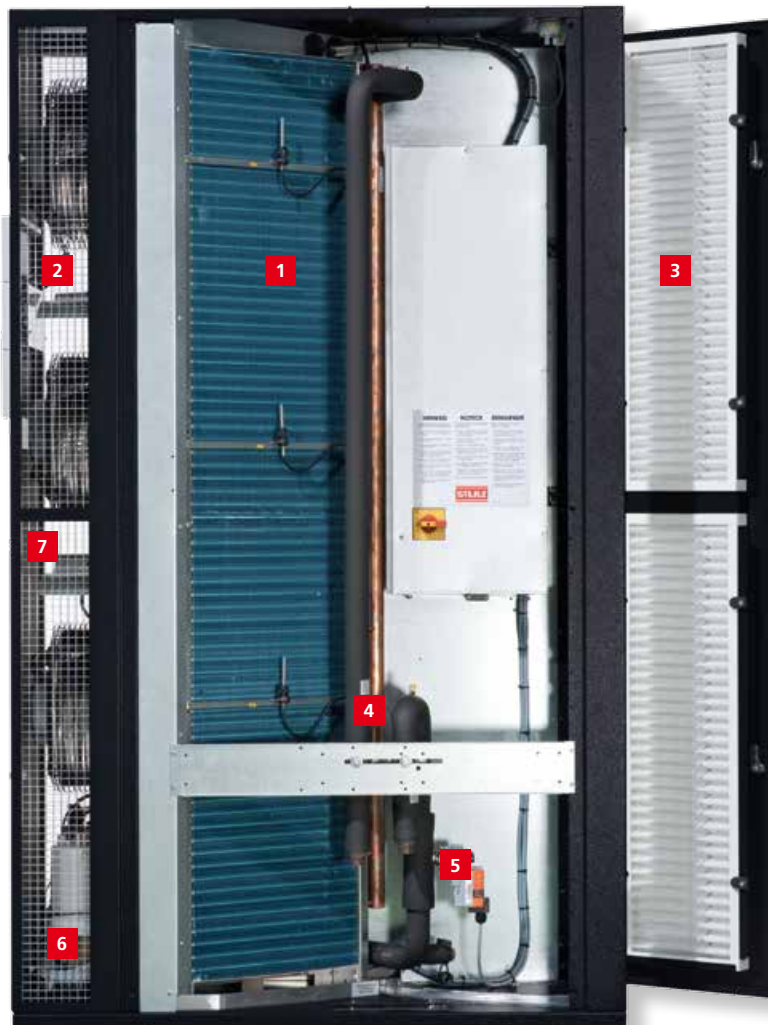
High-quality components for exceptional performance

All STULZ CyberRow units are equipped with optimum-quality components such as electronic expansion valves (EEV), compressors with EC technology and EC fans.



CyberRow CW – Liquid cooling integrated right where you need it

High performance values and top results in the smallest space: this requirement was also decisive in the development of our CW units. Here, too, you can rely on ultra-reliable, tried and tested STULZ technology.



- 1 CW heat exchanger with low air- and liquid-side pressure losses
- 2 EC fans
- 3 Air filter
- 4 Pipe connections (top and bottom)
- 5 2-way valve
- 6 Humidifier (optional)
- 7 Optimised air flow baffle

Ideal cold water supply for CyberRow: STULZ Indoor Data Chiller

STULZ CyberCool GE Indoor Data Chillers with Indirect Free Cooling provide optimum cold water supply to CyberRow units – safe, efficient and space-saving.

CyberCool GE selects the optimum operating mode depending on the ambient temperatures and cold water conditions. Energy-intensive compressor cooling is only used when the ambient temperature does not allow Free Cooling.



CyberRow – Efficiency at a glance

CyberRow is the innovative air-conditioning system in which the air conduction takes a whole new direction – horizontal! The individual units are positioned right in the server room between the racks, improving air conduction. This is what the CyberRow has to offer:



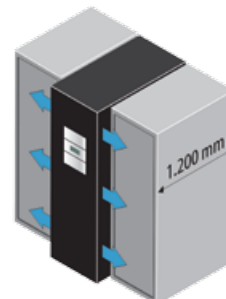
- Six different sizes for all applications:

CRS for 1,000 mm rack depth:

- Size 1: 1,950 x 300 x 1,200 (H x W x D)
- Size 2: 1,950 x 400 x 1,175 (H x W x D)
- Size 3: 1,950 x 600 x 1,175 (H x W x D)

CRL for 1,200 mm rack depth:

- Size 4: 1,950 x 300 x 1,375 (H x W x D)
- Size 5: 1,950 x 400 x 1,375 (H x W x D)
- Size 6: 1,950 x 600 x 1,375 (H x W x D)



Thanks to the new unit sizes (CRL), with a rack depth of 1,200 mm cold air can be blown out from the sides without impeding access from behind for maintenance, and without causing pressure losses.

- Up to 5 speed-controlled EC fans, which can be controlled independently of each other for optimum adaptation to different return air and supply air temperatures
- EC compressor (only for DX and GE units)
- Front and back maintenance access
- RS485 connectivity to standard BMS systems
- Zigzag G4 filter with metal frame
- Powder-coated housing with doors on front and rear sides
- Standard with pre-cut openings for water connections top and bottom
- No direct cable or refrigerant connections are required between the rack and the A/C unit, allowing greater flexibility for installation in the data center
- Pivoting E-box (for service and maintenance)

CyberRow Model	DX			GE		CW		
	CRS/CRL 211 AS	CRS/CRL 251 AS/GS	CRS/CRL 361 AS/GS	CRS/CRL 251 GES	CRS/CRL 361 GES	CRS/CRL 210 CW	CRS/CRL 320 CW	CRS/CRL 560 CW
Height	mm	1,950	1,950	1,950	1,950	1,950	1,950	1,950
Depth	mm	1,200/1,375	1,175/1,375	1,175/1,375	1,175/1,375	1,175/1,375	1,175/1,375	1,175/1,375
Width	mm	300	400	600	400	600	300	400
Cooling capacity ¹⁾	kW	22.2	25.3	37.5	25.3	37.5	22.7	33.3
Cooling capacity, Indirect Free Cooling ²⁾	kW	–	–	–	23.7	34.6	–	–
Air flow ¹⁾	m ³ /h	4,600	5,400	8,000	5,400	8,000	5,000	6,400

¹⁾ Return air conditions: 35 °C / 25 % RH; DX units: condensation temperature 45 °C; CW units: water inlet 10 °C / water outlet 15 °C, glycol fraction 0 %.
²⁾ Return air conditions: 35 °C / 25 % RH, water temperature 10 °C / 15 °C, 0 % glycol fraction.

Convenient monitoring and control of CyberRow

The CyberRow units are controlled and monitored by the C7000 controller. The controller brings all active system components into balance. These proven control systems form the heart of the control concept, enabling you to reliably keep control of

your STULZ CyberRow precision air-conditioning system. You can monitor the system and view operating data with separate control units, your PC or via a link to an existing BMS.

CyberRow control features

- **Six temperature sensors**
Three sensors each for supply air and return air ensure controlled precision cooling in 3 independent horizontal zones. The fan modulation depends on the temperature difference between return and supply air. The compressor speed and the chilled water valve opening are adjusted according to the supply air temperature.
- **Indirect Free Cooling (GE system only)**
As soon as ambient temperatures permit, the GE system switches from compressor mode to Indirect Free Cooling.
- **Fan redundancy**
If a fan fails, the other two fans will speed up.
- **Monitoring and reports for all faults**
- **BMS connectivity**
Standard RS-485 serial port for connection to BMS using Modbus and STULZ protocols.
- **Optional humidity sensor**
- **Optional heater**



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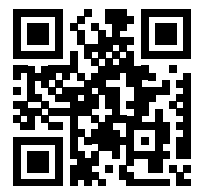
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IT Cooling Solutions

Close to you all over the world

With specialist, competent partners in our subsidiaries and exclusive sales and service partners around the world. Our six production sites are in Europe, North America and Asia.



Digital
Version

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