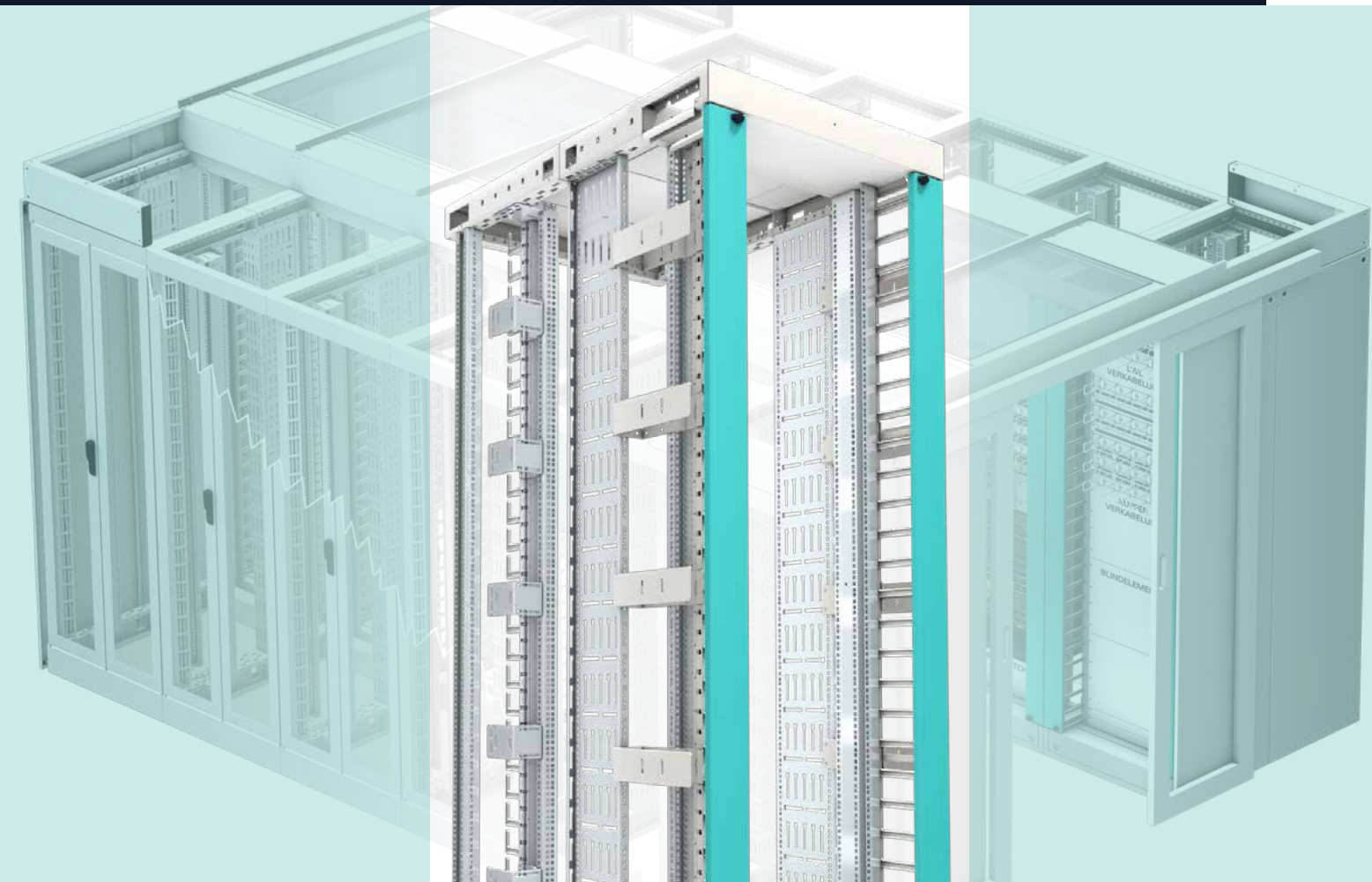


dtm group – The IT Manufaktur
Racks, Server Racks
Cold & Hot Aisle Containment



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The system at a glance

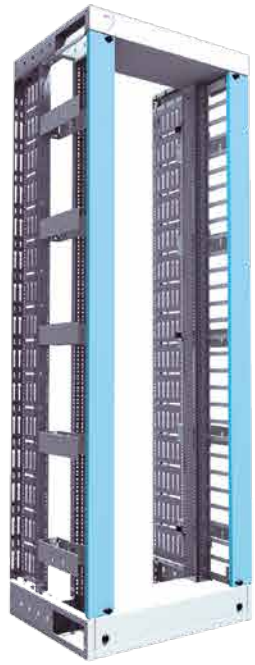
With the STV40/45n system, the dtm company has laid the cornerstone for a new flexible data center and floor distributor concept. The open rack has been launched in the third generation after more than 20 years of experience in the 19-inch domain. A particular characteristic of the system is its backward compatibility with all predecessor models and the high flexibility in everyday use. This makes it possible to implement changes right away with the data center in operation. An outstanding feature is the cable management, which has been refined since the first generation, however, has maintained its fundamental properties. The 360° patch cable management allows vertical and horizontal routing of patch cables. The integrated cable troughs at the top and bottom can be used for patching across a full row of racks. The link cables are routed in layers of 24 cables on the cable mounting panels in such a way that up to 1000 link cables can be run in a cabinet with a depth of only 600 mm without the 19" area being affected by any cables. These characteristics are unmatched to date and offer great advantages regarding space and energy efficiency.

The system is supplemented with the server rack, which was developed for the needs of high-performance 19" servers and switches. Configured either as a closed rack with laterally mounted side coolers or installed in a containment, the server rack asserts its advantages in any kind of application with its high payload of up to 1.5 tons and the flexibility of its adjustable 19" posts. The high flexibility of the 19" posts makes it possible to tailor the cold air and hot air areas precisely to the hardware so that hot spots and any overheating of the hardware are avoided. The server rack can be extended to a depth of 1425 mm with standard elements; special dimensions are also possible on customer's request.

Modular design

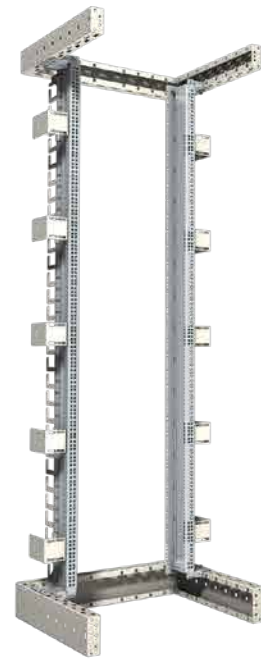
The rack systems are perfected by our containment system which has been in the market since 2010, demonstrating its high potential for savings. With its modular concept, the system adjusts to most rack systems without adaptation efforts and fits with any room layout from small server rooms to large data centers and for hot aisle or cold aisle containment configurations. Our sophisticated air conditioning concepts enable us to upgrade any server room or data center to the latest state of technology and energy efficiency without interrupting operations so that the energy cost savings amortize the investment within a year. The strength of our company is that we have planned, built and modernized server rooms and data centers for more than 50 years. This outstanding experience flows into our development activities so that you benefit from it in your daily operations.

Racks and their configuration options



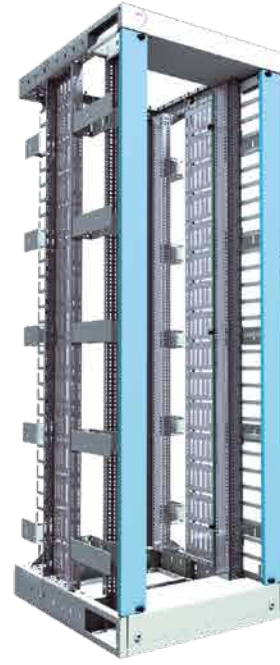
Basic rack

+



Depth extension 270-830mm

=



STV40/45n
up to 1425mm



Side panels, top & bottom plates

=



Rack 40/45U

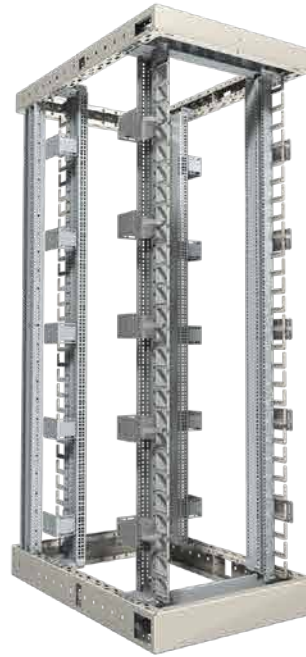
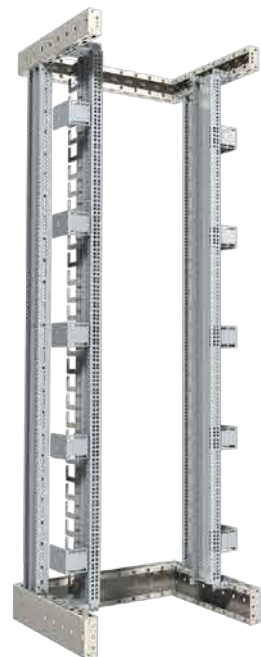
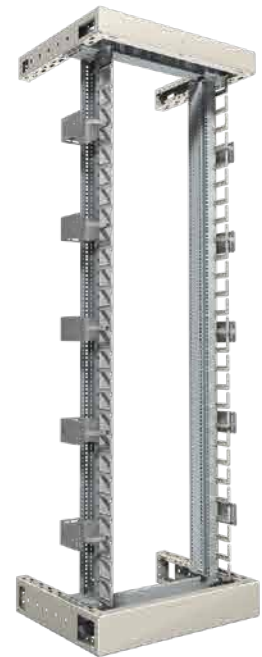
Depth extension

+

Depth extension 270-830mm

=

Server rack 40/45U
up to 1425mm



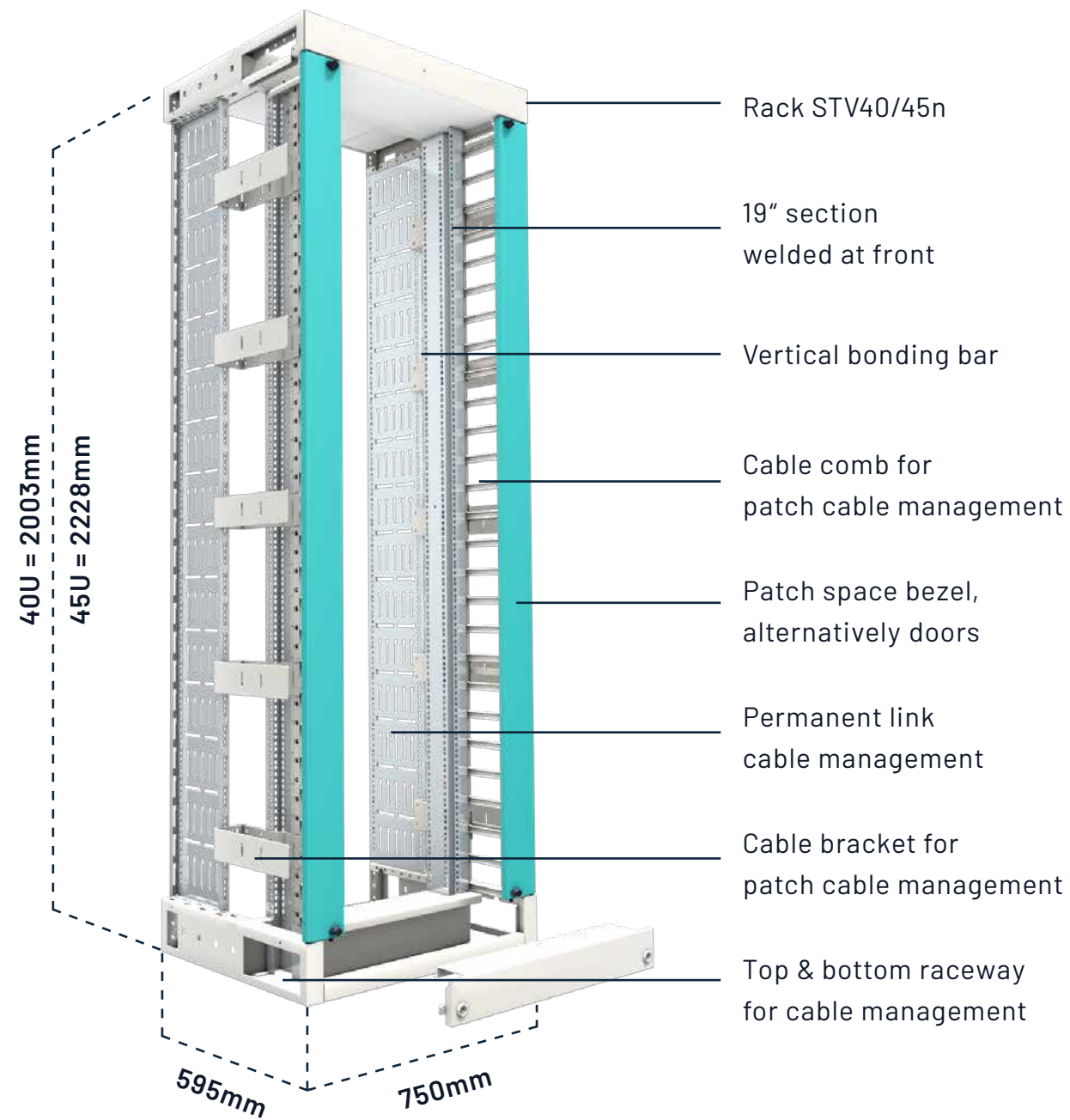
Side panels, top & bottom plates

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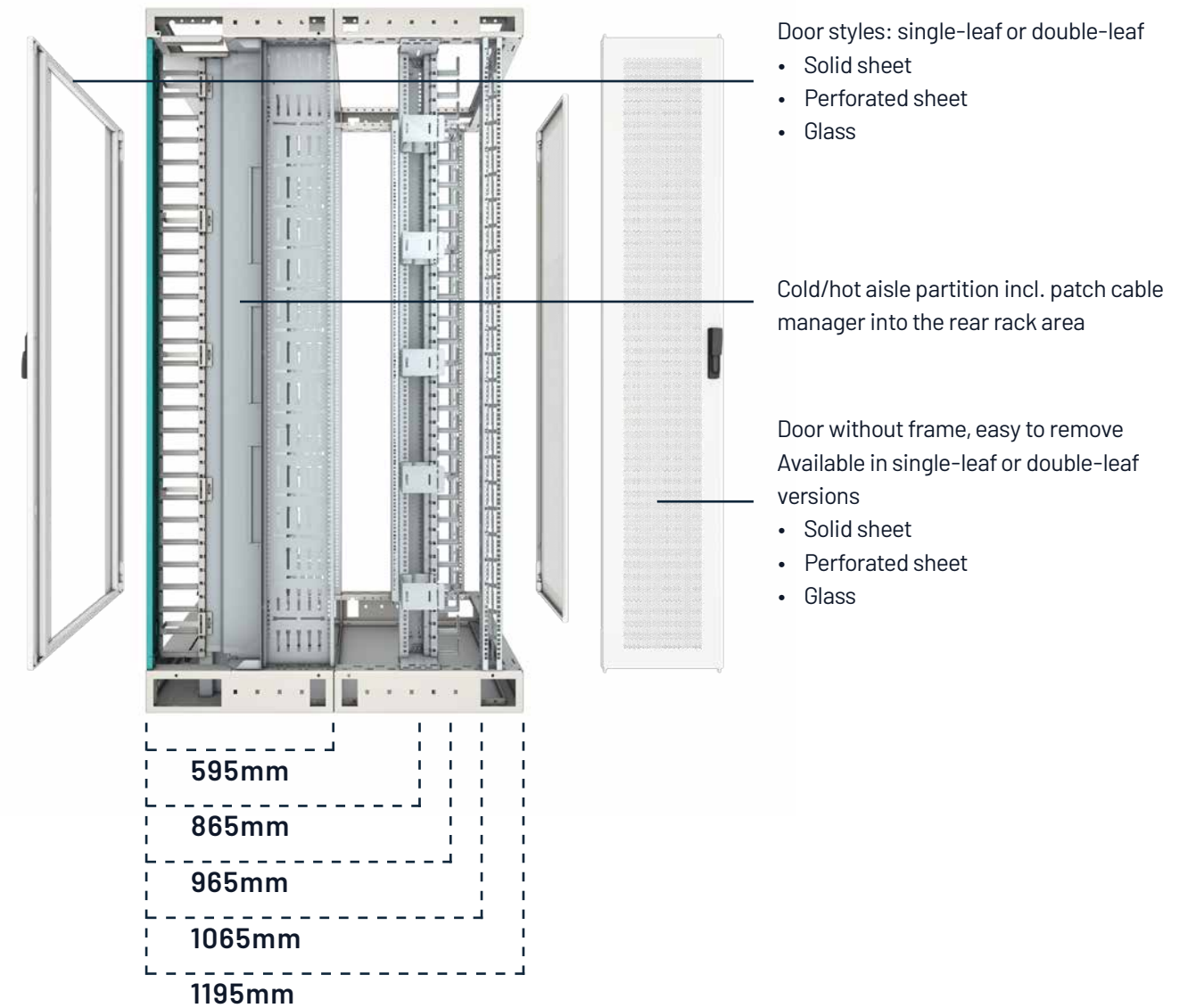
Server rack 40/45U

Front view



Side view

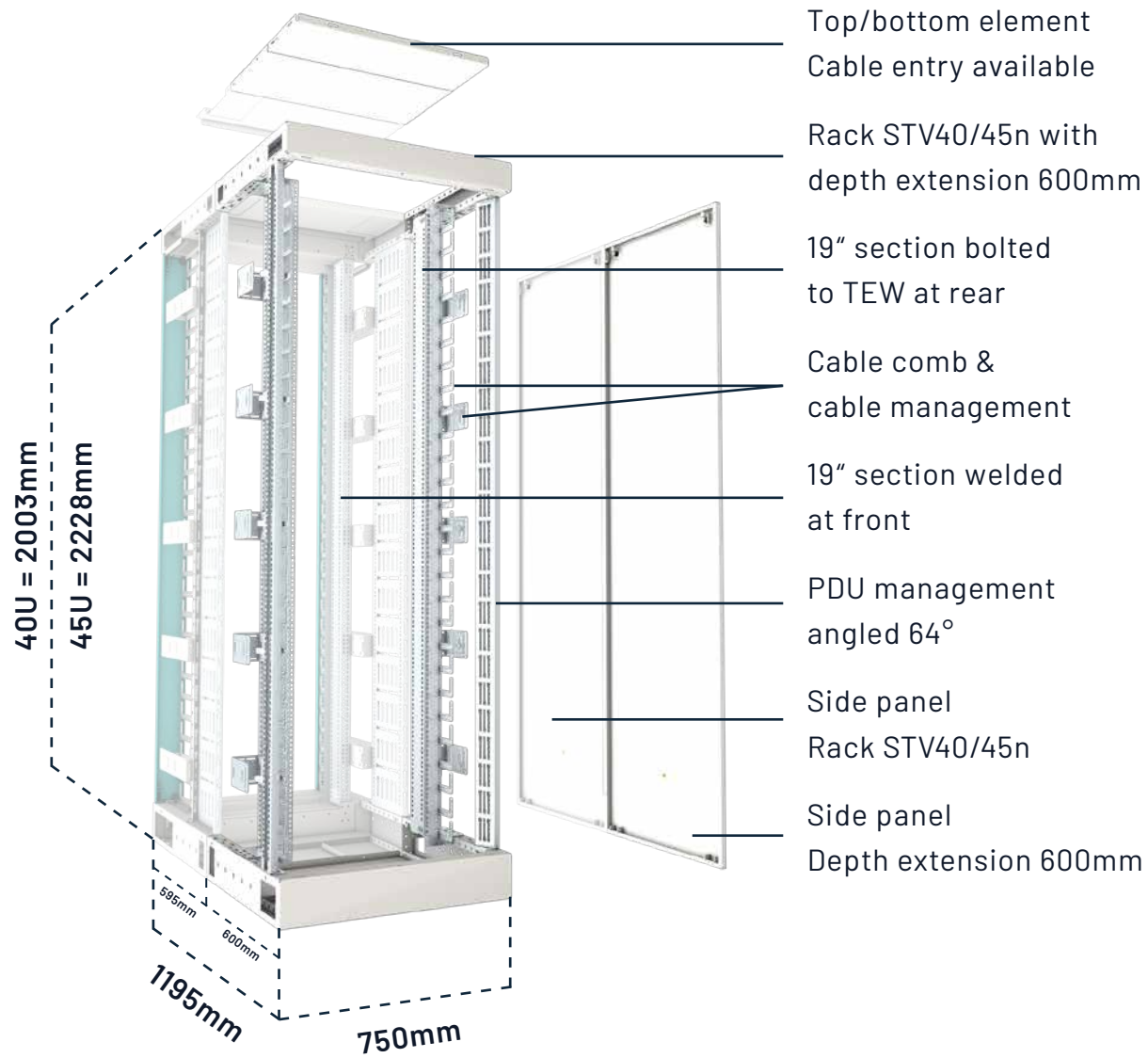
WITH DEPTH EXTENSION (TEW)



Combination options

| Article name | Overall dim. |
|-----------------|--------------|
| dtm STV+TEW 270 | 865 mm |
| dtm STV+TEW 370 | 965 mm |
| dtm STV+TEW 470 | 1065 mm |
| dtm STV+TEW 600 | 1195 mm |
| dtm STV+TEW 830 | 1425 mm |

Rear view



Rack System STV40/45n

Space-saving and flexible design

The space-saving and flexible design of the rack system STV40/45n makes it suitable for installation of active components or a passive infrastructure. The small width of only 750mm provides better utilization of space, for example, in data centers. Nevertheless the small width does not involve any restrictions in lateral cable management. Numerous extension options up to a depth of 1425mm and the possibility of migrating to a closed data cabinet make the STV40/45n rack suitable for all-round use offering maximum flexibility. Its versatility and high quality ensure long-term use since the system can adjust to changing requirements and therefore offers optimum protection for your investment.

Extensions and energy efficiency

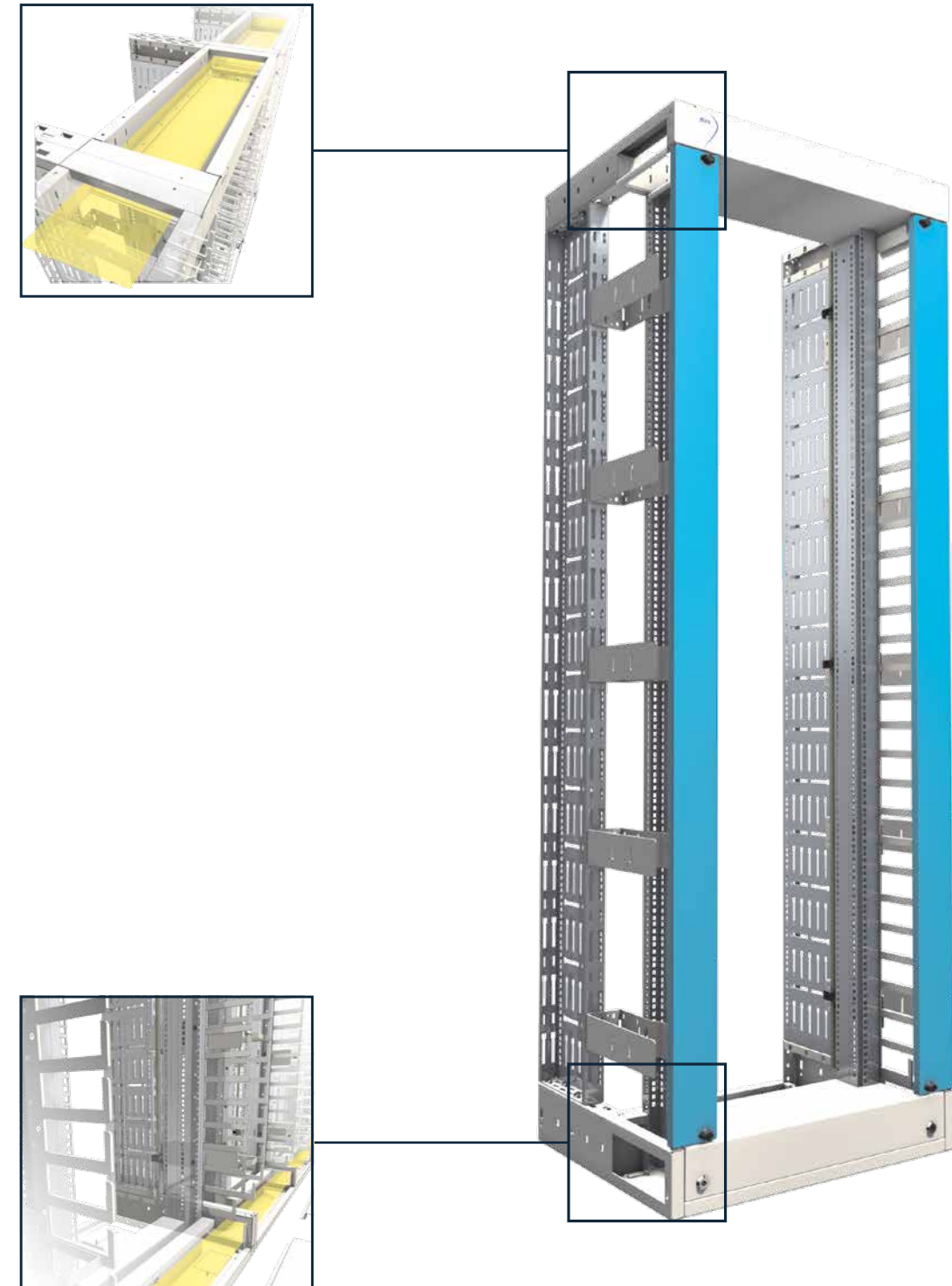
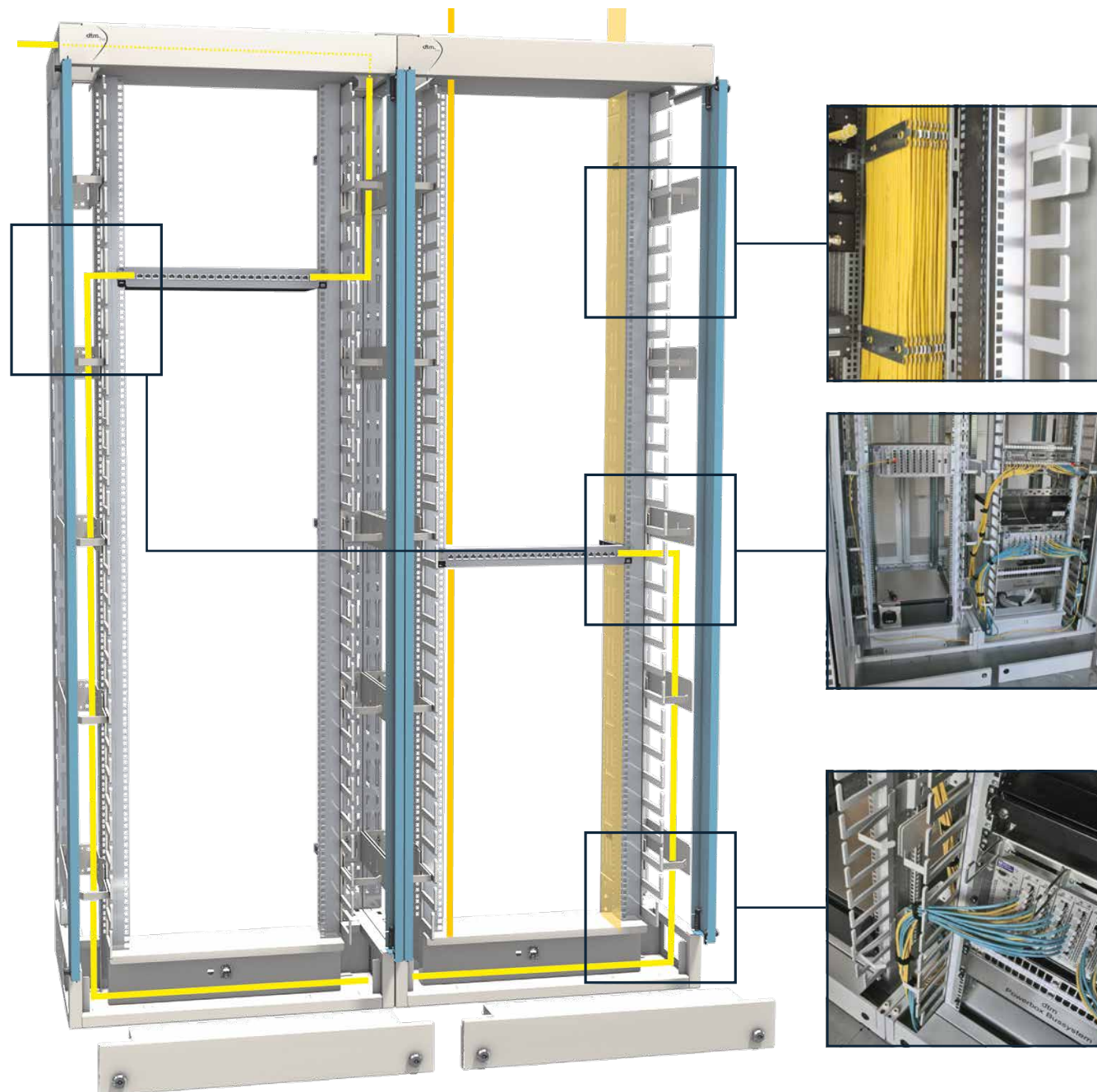
The STV40/45n rack system is under continuous further development. The development of a consistent cold/hot aisle containment system for data centers has been completed. In this respect, the cable management factors match perfectly with the cold/hot aisle concept since, for example, patch cables are routed via the integrated cable troughs in the cold aisle. Alternative systems often make it necessary to route these in external cable troughs, which may cause mixing of cold and hot air with a resulting increased energy consumption. The limited space conditions in data centers are addressed by the new development combining the active and passive cabinet in one rack. With this concept, the hardware is installed in the 19 inch section and the lateral patch cable pathway is used for the installation of passive panels.

The modular design of the STV40/45n rack system can accommodate all requirements and changes and will be your long-term reliable companion to support your network environment owing to our consistent further development.

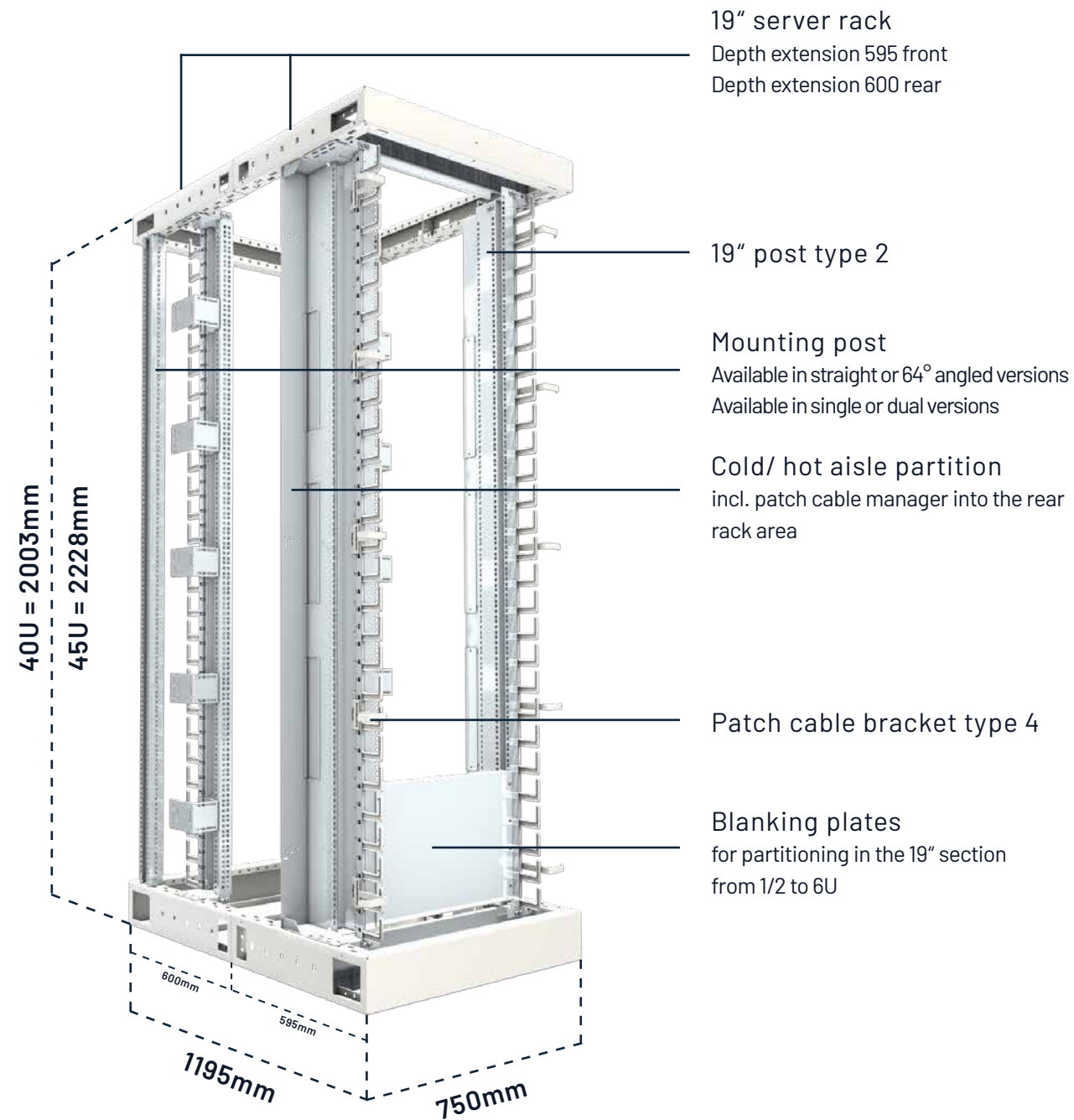
The rack system is suitable for all requirements ranging from an open rack to a closed cabinet configuration.

Cable management

The patented cable management system is unique in its design. It allows well arranged cable routing without additional cable troughs between racks. This practical system saves you hidden costs, facilitating conversion activities and everyday patching operations. A particularly wide cable mounting panel in the rack accommodates up to 24 data cables in parallel per layer. In this way, you can utilize a rack unit completely. This provides clearly arranged and proper systematic cabling and results in a higher energy efficiency since the air heated by servers and switches can be output optimally towards the rear.

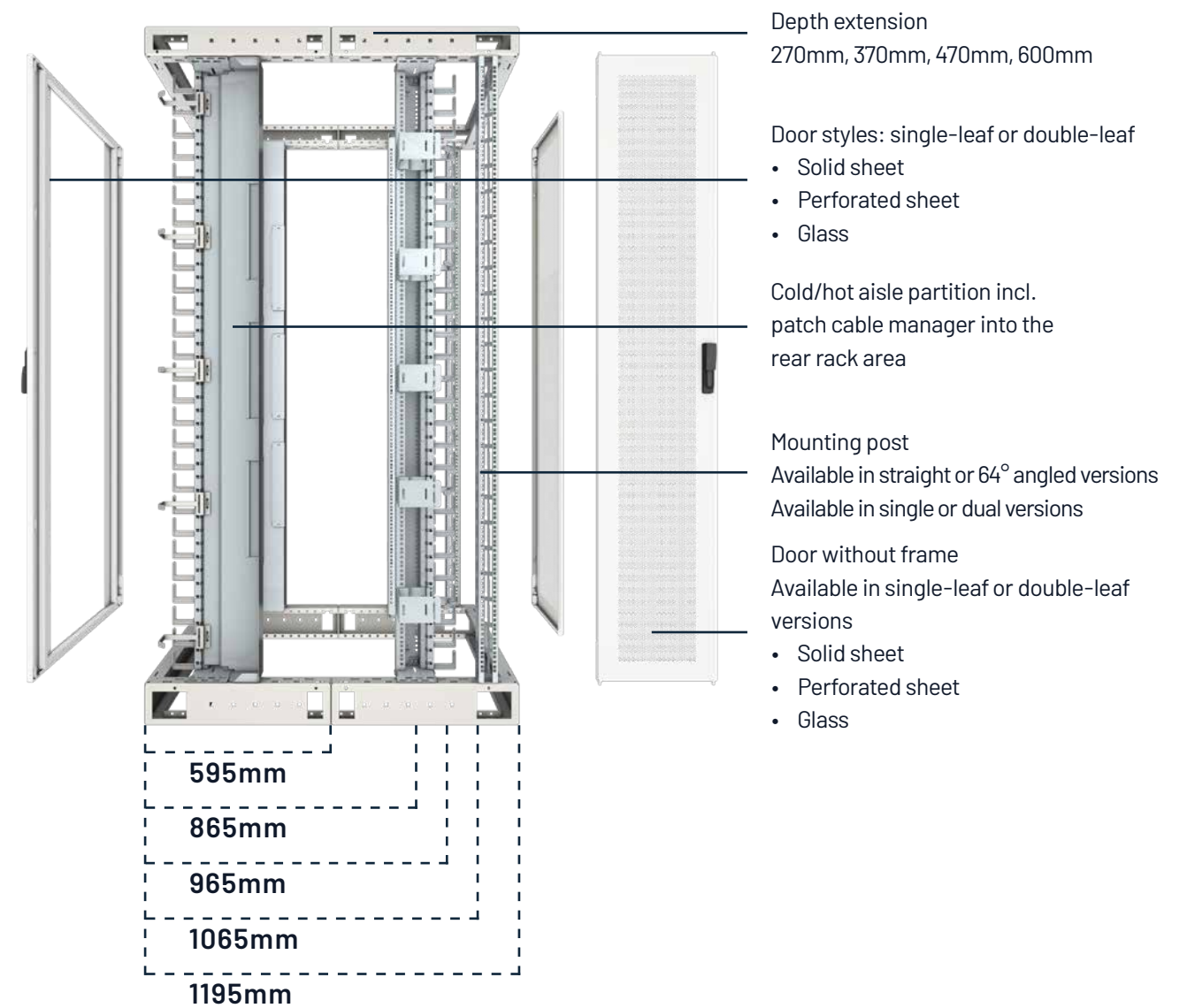


Front view



Side view

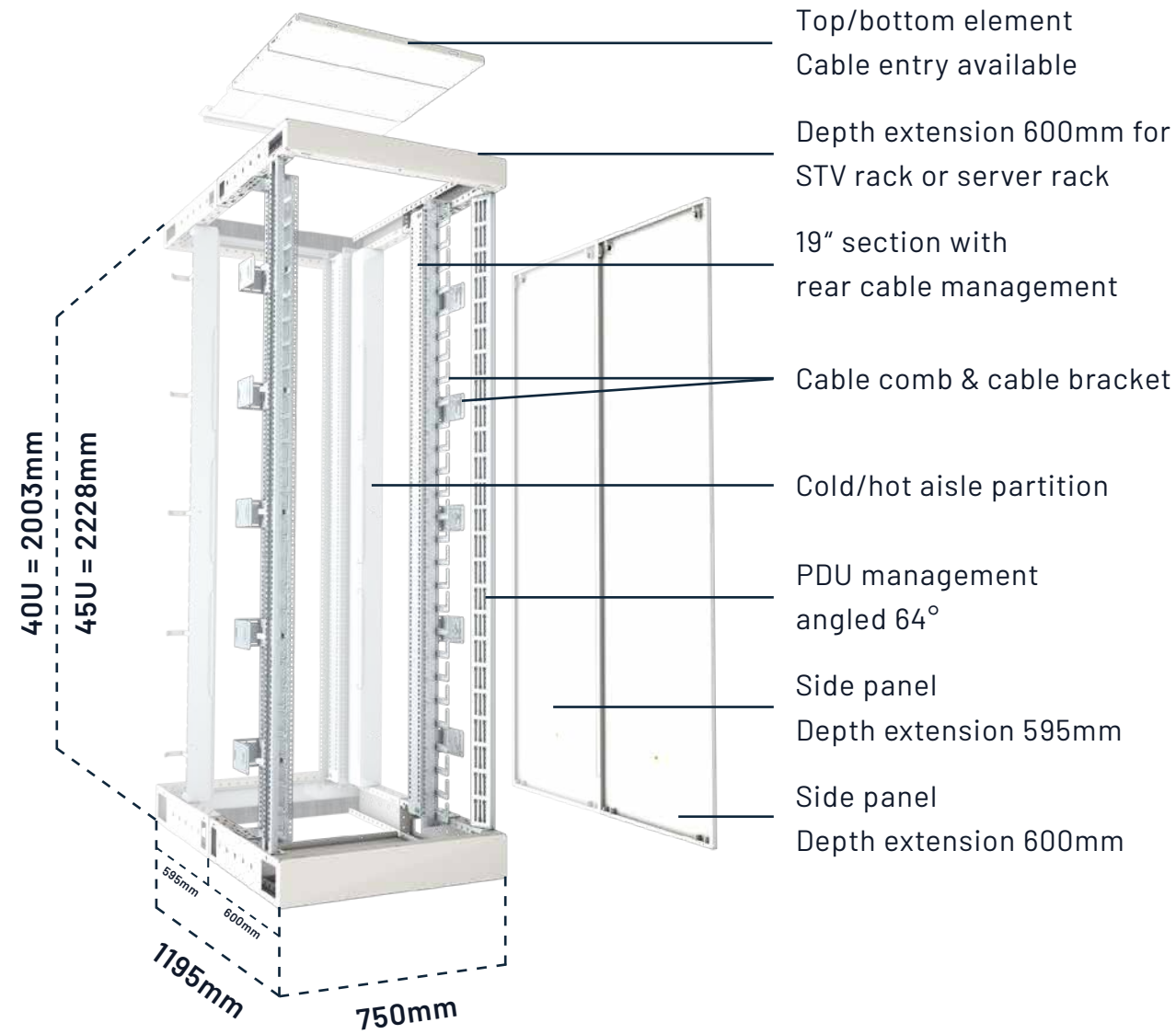
WITH DEPTH EXTENSION (TEW)



Combination options

| Article name | Overall dim. |
|-------------------------|--------------|
| dtm server rack+TEW 270 | 865 mm |
| dtm server rack+TEW 370 | 965 mm |
| dtm server rack+TEW 470 | 1065 mm |
| dtm server rack+TEW 600 | 1195 mm |
| dtm server rack+TEW 830 | 1425 mm |

Rear view



- Top/bottom element
- Cable entry available
- Depth extension 600mm for STV rack or server rack
- 19" section with rear cable management
- Cable comb & cable bracket
- Cold/hot aisle partition
- PDU management angled 64°
- Side panel
- Depth extension 595mm
- Side panel
- Depth extension 600mm

Server rack system

Part of the system and still unique

The dtm server rack is made from two depth extensions mounted to each other. In contrast with the STV40/45n rack, none of its 19" mounting sections is welded. However, this is not detrimental to the load carrying capacity or stability but provides more flexibility regarding the hardware mounting options. Specifically if side coolers are used, the cold and hot air areas can be calculated and dimensioned precisely so that the cold air stream is directed to the front of the hardware, at the same time avoiding hot spots in the rear part of the rack which might cause a hardware failure.

Optimum place for hardware of all kinds

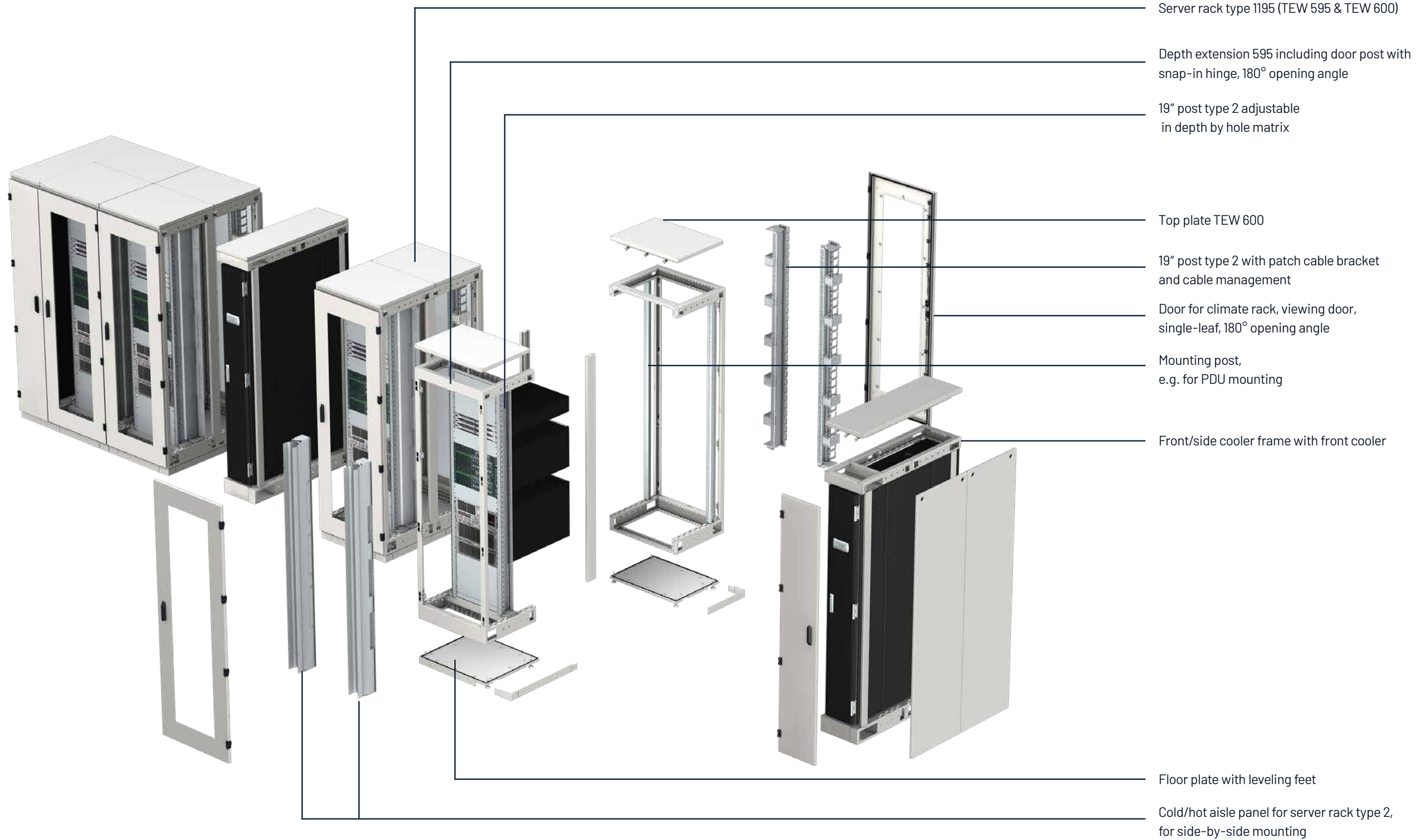
The server rack can demonstrate its advantages in many ways, whether used as a closed rack/cabinet or in a series arrangement within a containment system. It offers a high variability for the installation of hardware. For example, ducts in the server rack can supply air also laterally from the cold aisle to switches and servers. This lateral duct may be opened to cool components at specific rack units. The duct system can also be retrofitted or modified later.

The variable installation options in the 19" sections make it possible to install hardware of varying depths optimally in the system. For example, you can install short switches and long servers.

A closed hardware cabinet with cooling or arranged in a row within a containment system, the server rack provides the optimum accommodation for your hardware.

Sample applications of server rack 40/45U

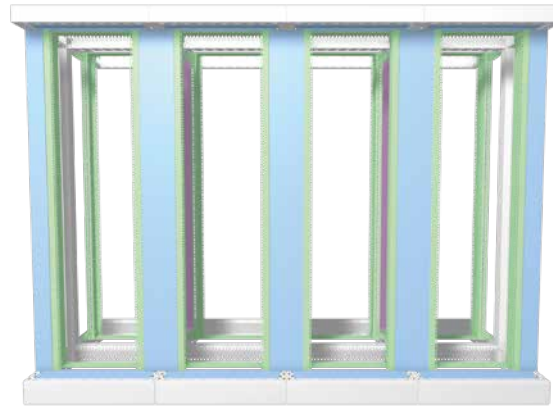
Server rack type 1195



Sample applications of server rack 40/45U

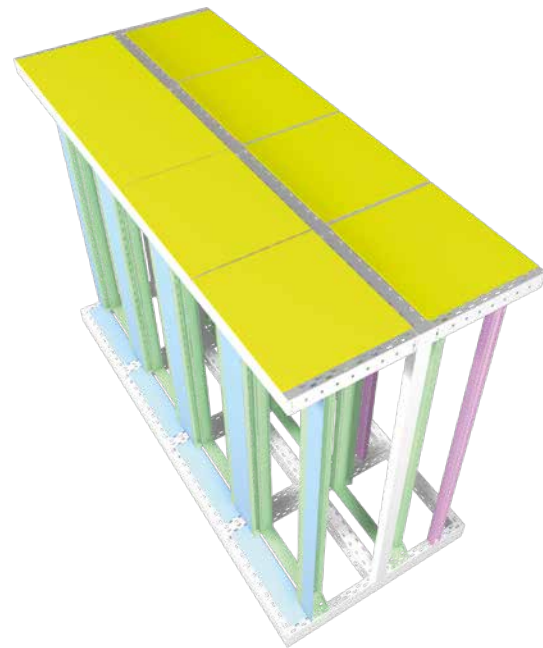
Server rack front view

The server racks arranged side by side are provided with cold/hot aisle front bezels as partitions towards the rear. These differ depending on whether two racks are joined or a side panel closes the last rack in the row. If lateral cooling is intended for a server or switch, the cold/hot aisle front bezel is supplied as a perforated version enabling cool air to flow from the cold aisle into a duct leading laterally to the server or switch.



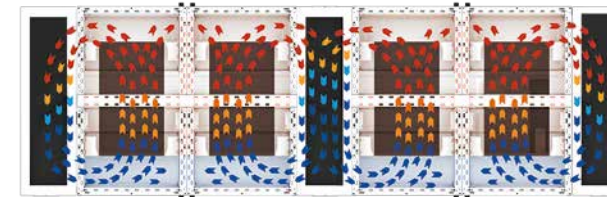
Server rack as a self-contained system

The versatile add-on components of the server rack make it suitable for use with climate control equipment such as side coolers. In this application, the climate door is installed, the 19" section is equipped with hardware and blanking plates and the sides are closed by the cold/hot aisle front bezels. This creates a self-contained system for cooling high-power computing applications with high flexibility and efficiency.



Server rack in a row

The 19" section at the front is closed, however, it may be opened towards the rear for patch cable management using brush rails to allow patching to the rear. Two 19" sections are provided on the rear to accommodate hardware devices of different lengths. The top and bottom of the server rack are closed by identical top and bottom elements.

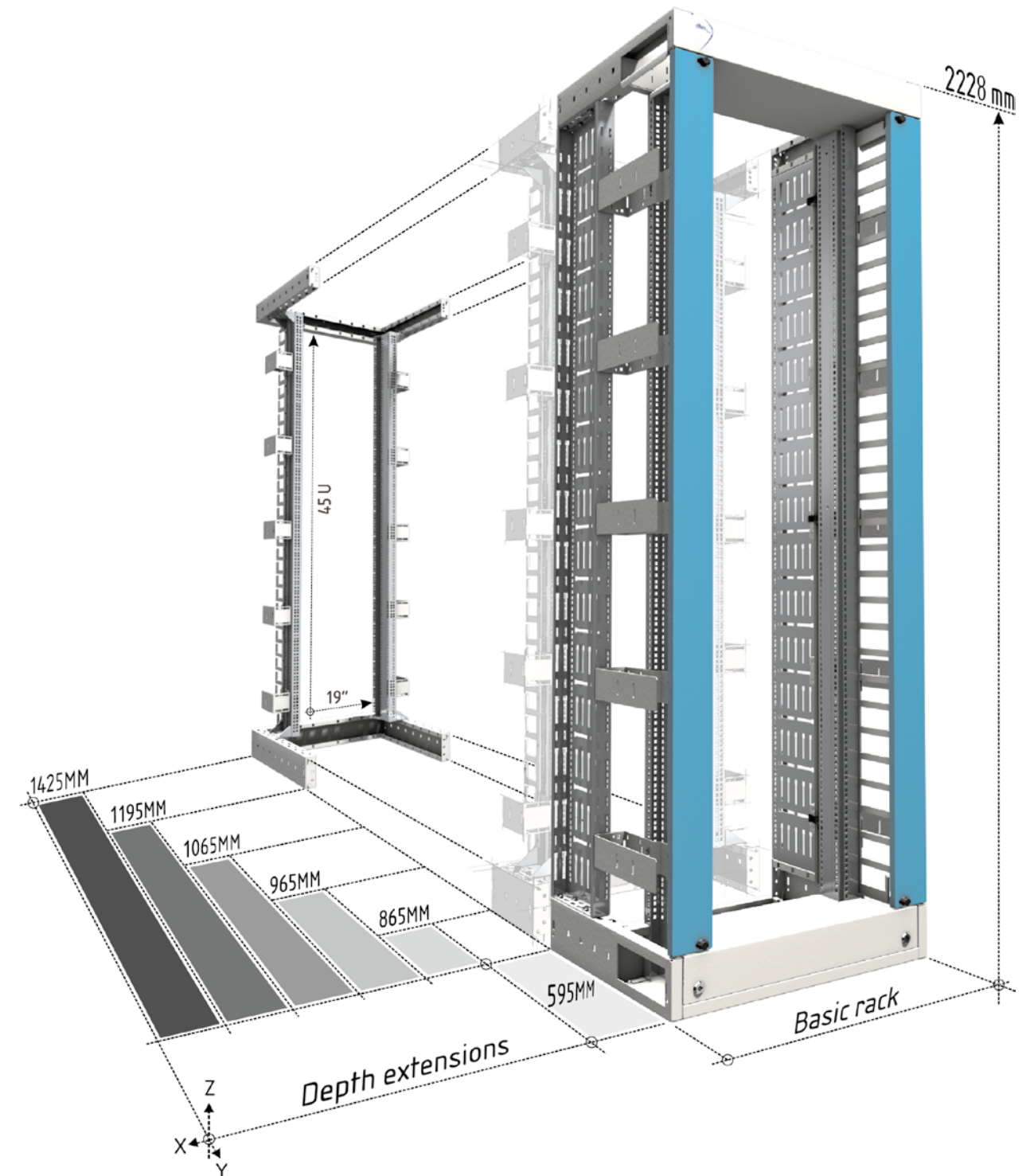
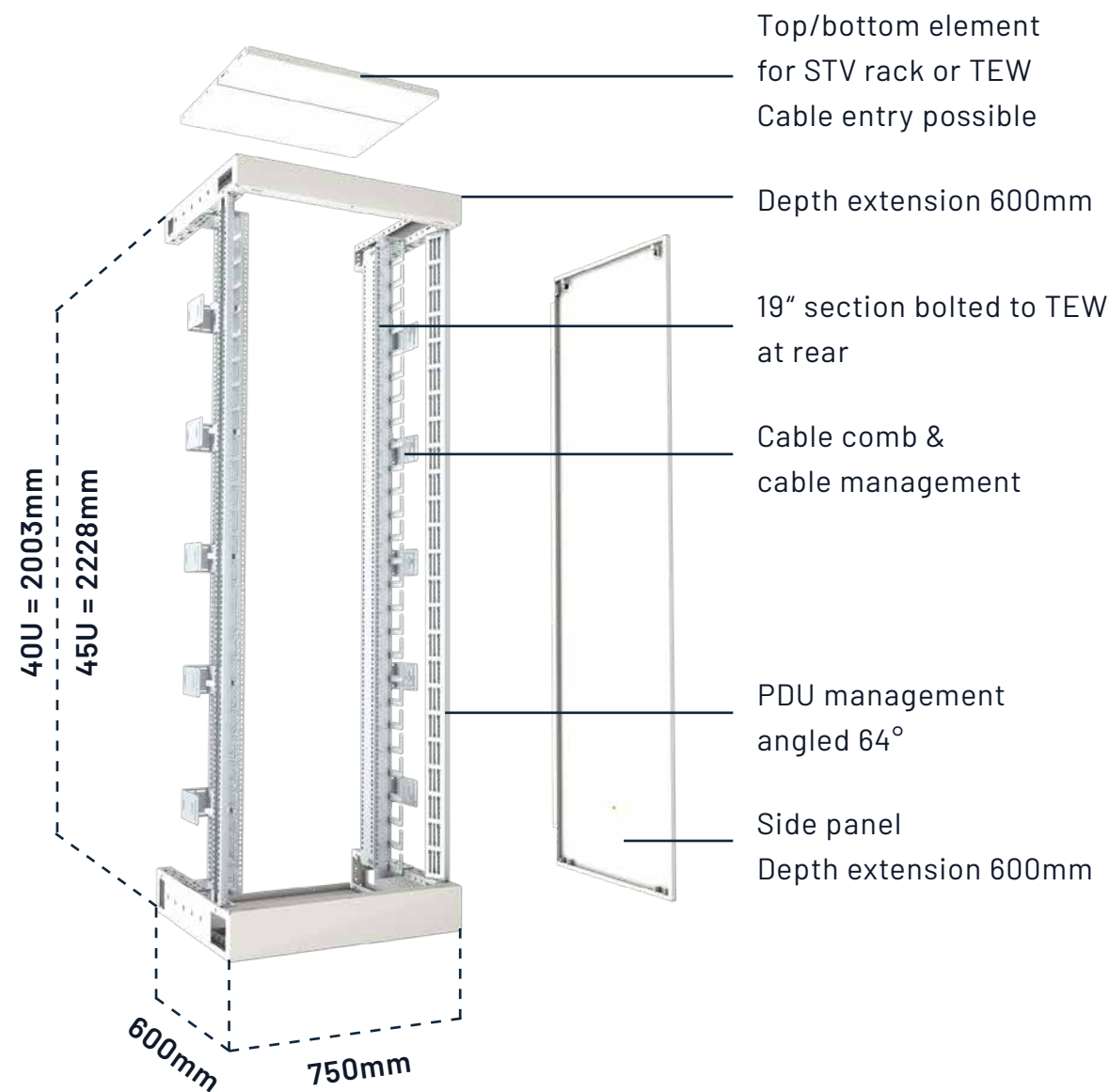


Schematic top view of the self-contained system

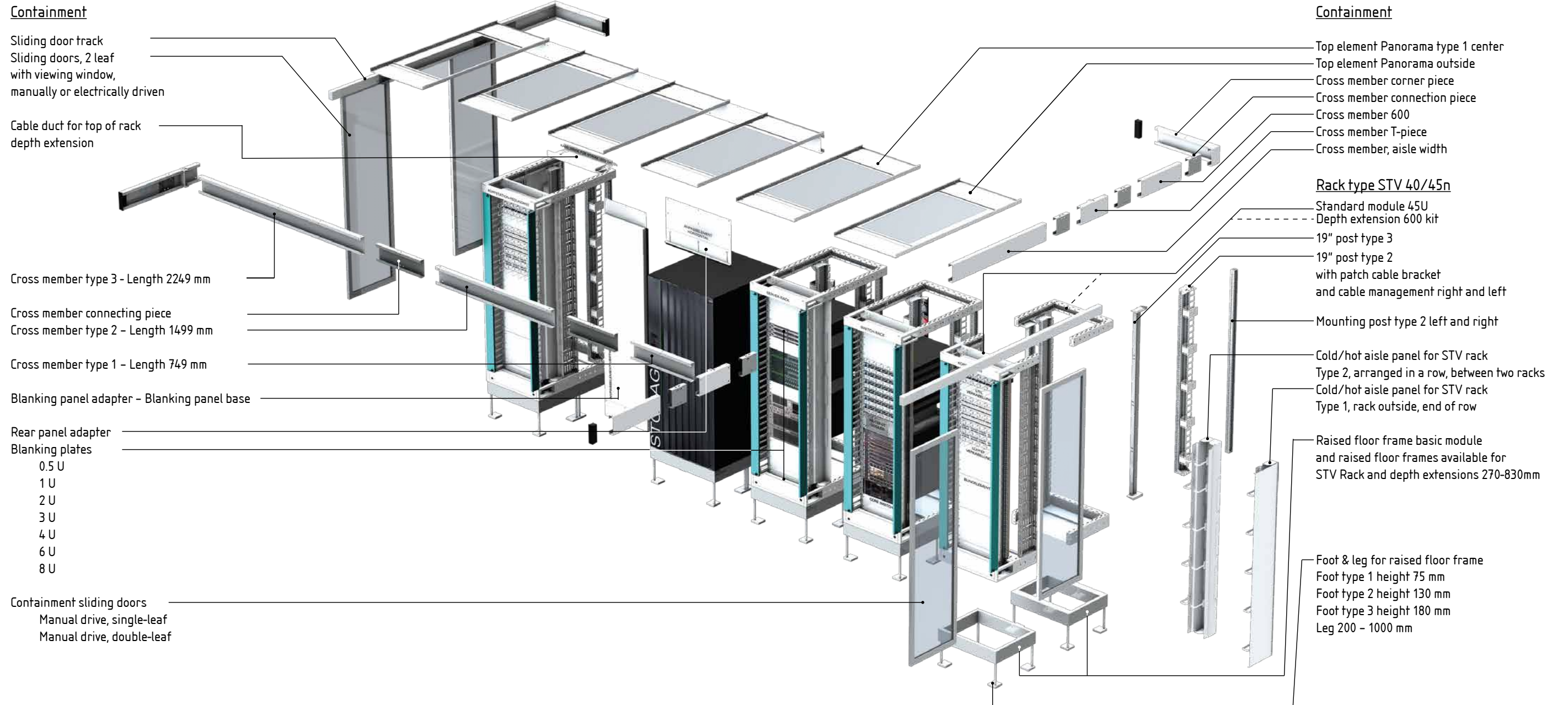
The schematic top view shows how the side coolers take the hot air from the rear area and redirect it after cooling to the front area. The system configuration allows dimensioning of the cold and hot air sections depending on the application. In extreme cases, up to 30 kW of cooling power per rack can be implemented.

Depth extension (TEW) for 45U as an example

The modular depth extension elements are available in the dimensions 270, 370, 470, 600 and 830 mm. They can be supplied as a kit or as single parts so that you can change, for example, only the two upper and lower U-profiles if hardware with a different length is to be installed. This offers a substantial potential for savings in operations since networks are undergoing constant change nowadays.

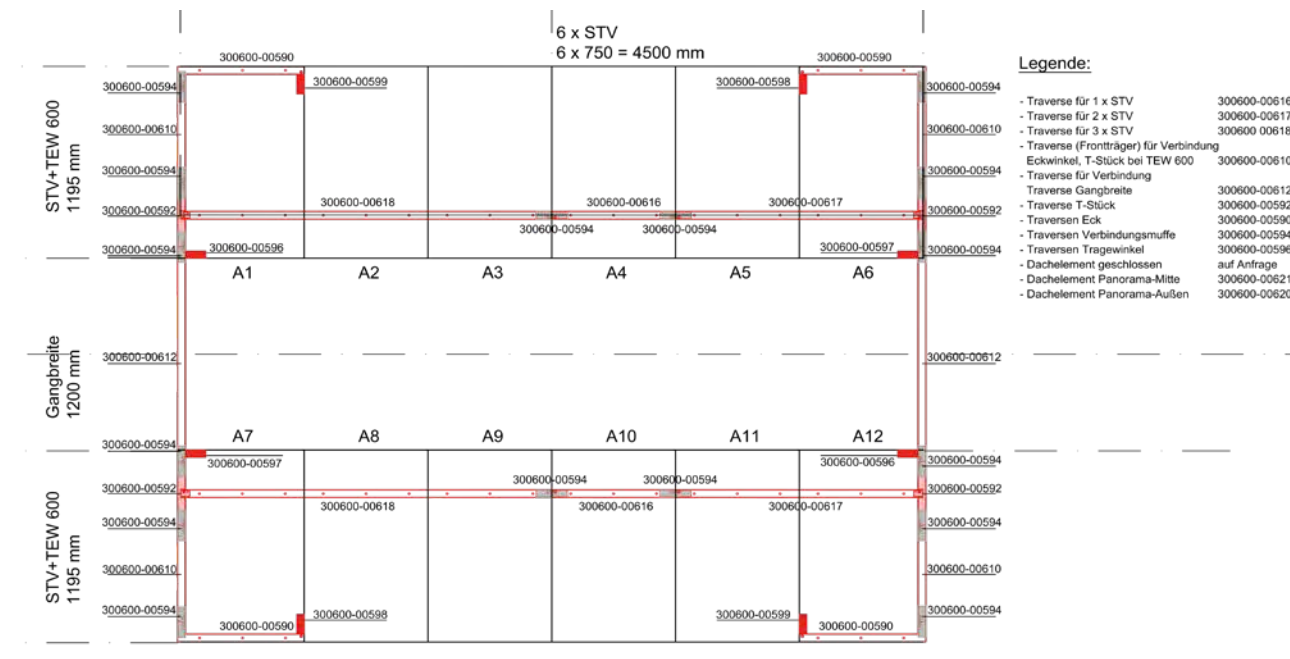
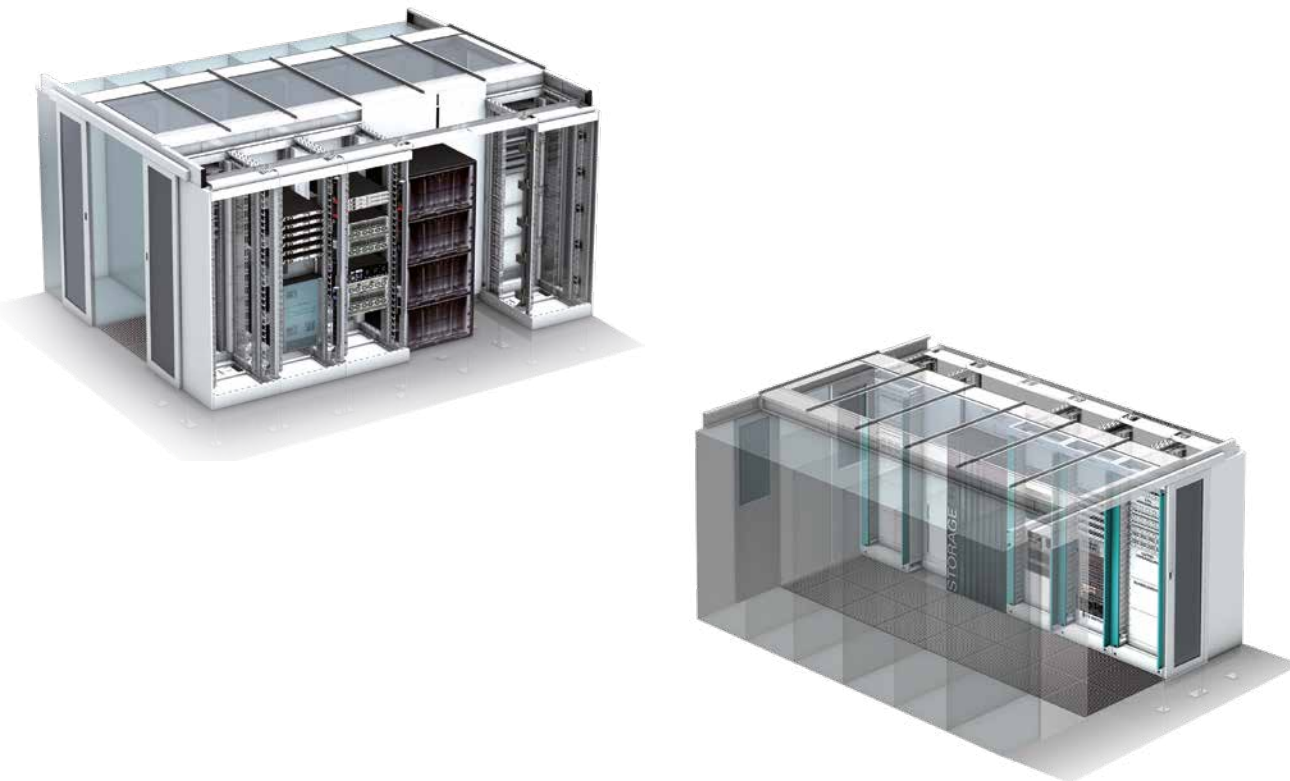


System overview



Containment system

The dtm containment system has been in the market since 2010 demonstrating its high potential for savings in data centers of all sizes. With its modular concept, the system adjusts to most rack systems without adaptation efforts and fits with any room layout from small server rooms to large data centers and for hot aisle or cold aisle containment configurations. Our sophisticated air conditioning concepts enable us to upgrade any server room or data center to the latest state of technology and energy efficiency without interrupting operations so that the energy cost savings amortize the investment already within a year.



Multi-stage monitoring can be integrated completely with hardware and software

- Access control, e.g. by fingerprints, keyless systems
- Camera surveillance
- Early fire detection
- Fire extinguishing systems, e.g. Novec inert gas
- Climate control by front or side coolers, raised floors
- Sensing systems for temperature, humidity, airflow, cooling power, leakage, amperage, power usage effectiveness, dew point, PDU management, etc.

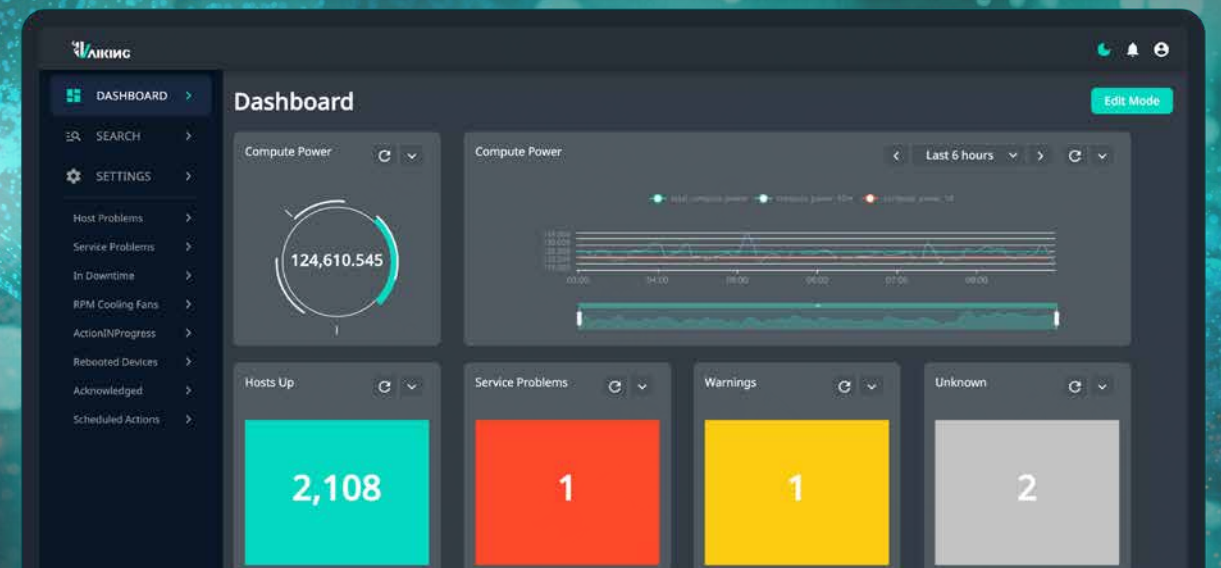


Sensor values can be monitored and analyzed remotely using special data center management tools such as Vaiking. Vaiking is a web-based platform-independent DCM tool for server rooms that can run on any terminal device with web capability without needing to install any software. We developed this DCM tool ourselves to offer an AI-based management tool for data centers.



Vaiking is the new Intelligence for all data centers and server rooms.

Vaiking is an excellent solution for all large-scale data centers, co-locations and hyperscalers who need to monitor extremely many data points instantly and efficiently. Another strength of the system are distributed infrastructures, such as edge data centers, which can be controlled and monitored automatically and thereby facilitate remote handling tremendously.

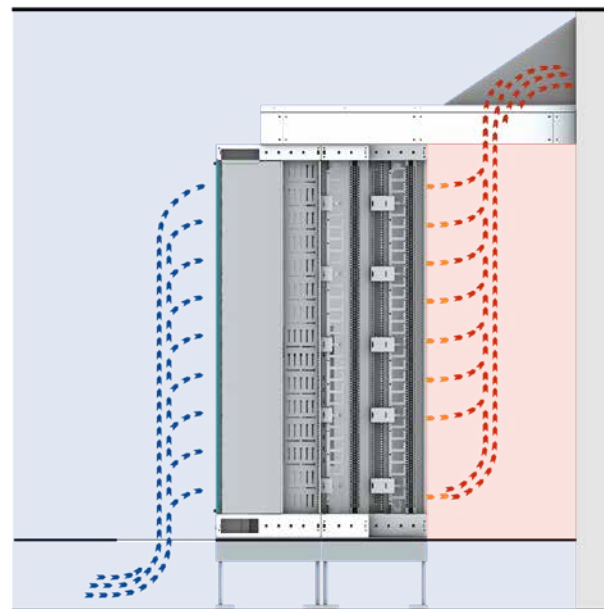
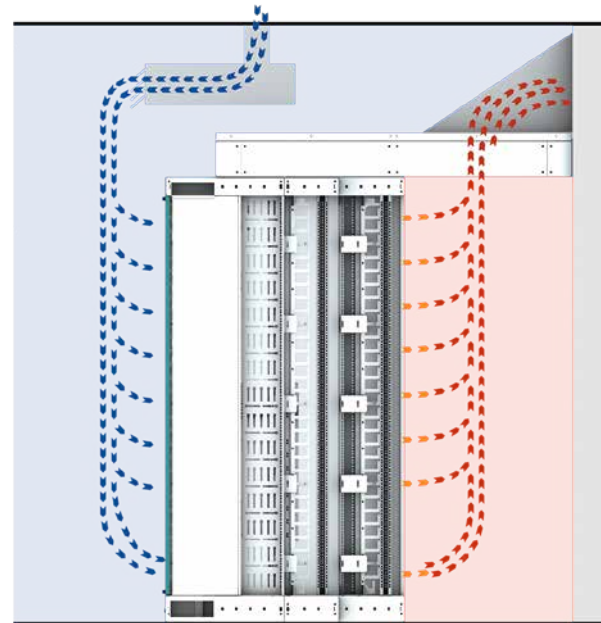


Hot aisle containment

Cooling by climate control equipment or raised floor

Hot aisle containment towards wall with room air conditioner

It is recommended to separate cold and hot air consistently to reduce energy costs in existing installations. For example, if a room air conditioner is installed, the space behind the racks can be isolated by containment towards the wall, where the hot air is removed. This prevents cool air from being heated by rising hot air, which results in increased energy efficiency and savings.

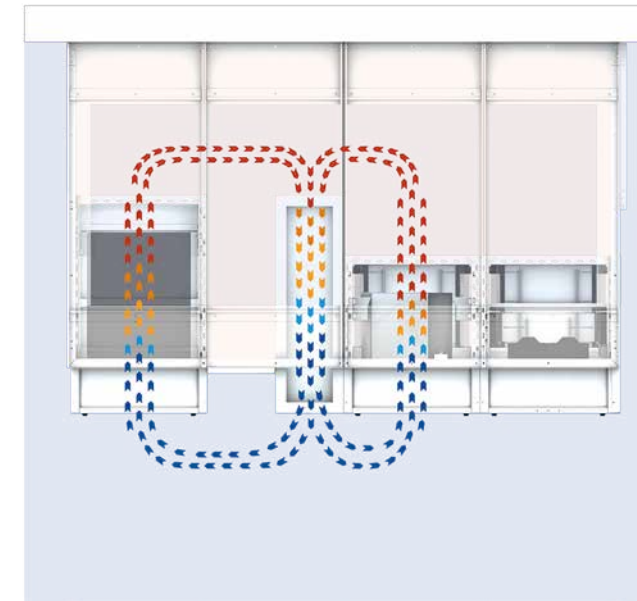


Hot aisle containment towards wall with raised floor cooling

If a row of racks is cooled via the raised floor, a stand-alone row is suitable for installing a hot aisle containment system with central hot air removal. This prevents mixing of air and increases the energy efficiency of the whole system.

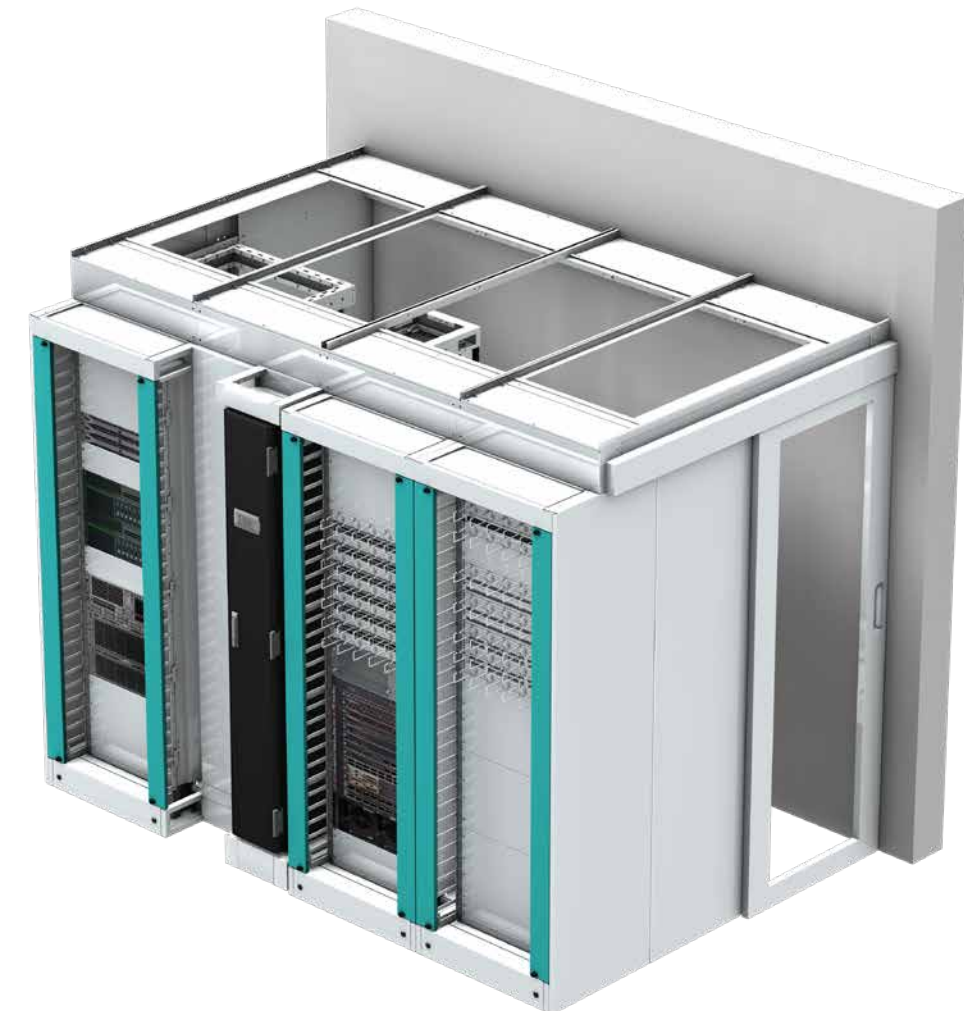
The figure on the right shows the principle of hot aisle containment with front and side coolers. They offer the advantage that hot air removal to the outside does not need to be installed since the hot air is taken in and cooled down in the front and/or side cooler.

Cooling by front cooler



Hot aisle containment towards wall with front coolers

If front coolers are used for cooling, the cooling devices are integrated into the rack row (in-row cooling). The cooling device draws hot air from the isolated hot aisle by fans, cools it down through a register and supplies the cool air to the cold aisle in front of the racks. The cooler is installed in a front/side cooler housing designed by dtm in a vendor independent way which ensures a uniform design in your data center. The raised plinth section achieved by the housing is suitable for connection of inflow and outflow. In addition, horizontal cable management is ensured between the individual racks.

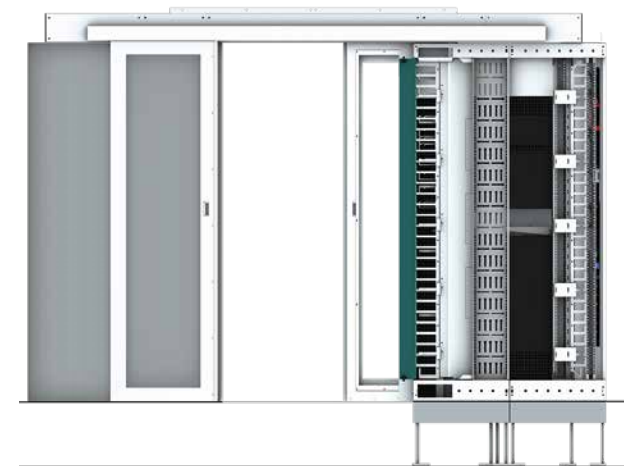
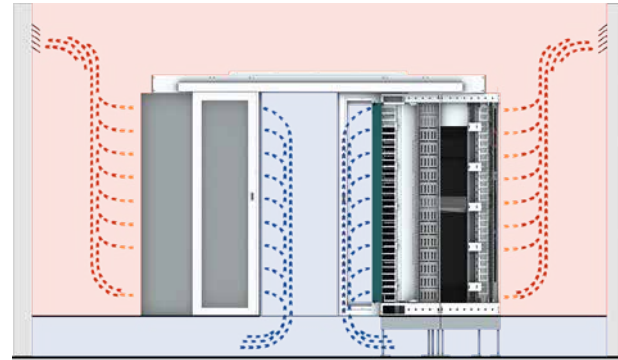


Cold aisle containment

Cooling by raised floor

Cold aisle containment in a row with raised floor cooling

If there are two opposed rows of racks supplied with cold air from the raised floor, it is recommended to provide isolation against the rising hot air on the rack rear sides in the 19" section. In addition to separating cold and hot air, the containment made by dtm contributes substantially to a homogeneous airflow to all rack units. This has been engineered on the basis of many different airflow simulations and feedback obtained from practical applications. The increased efficiency makes it possible to run the climate control devices at higher temperatures and this offers a tremendous potential for savings.

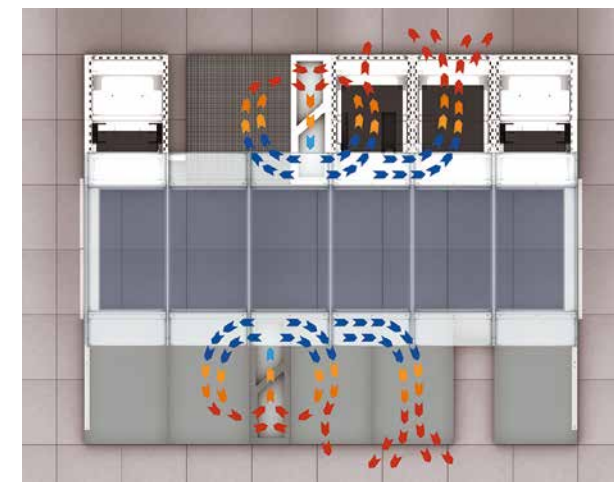
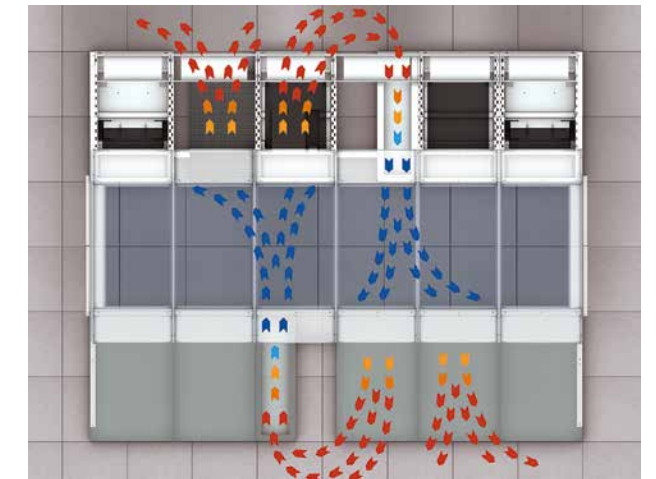


The containment system can be used with the STV40/45 rack, the server rack or third-party equipment. The modular cross member system can be applied to any type of space layout. The system is therefore very attractive because of its energy saving potential and the low investment. For energy renovation or restructuring activities in existing installations, dtm can design customized components suitable for the local conditions for its customers.

Cooling by front or side cooler

Cold aisle containment in a row with front cooler

Besides the frequently used raised floor cooling approach, cold can be generated directly on the heat-producing equipment using systems such as the front or side cooler. They do not necessarily require a raised floor and can generate cold on the heat-producing equipment in a more flexible and efficient way than with central air conditioners. With this principle, the space between the rack rows is supplied with cold air from the front or side coolers. Hot air emitted into the room is taken in by the front or side coolers and cooled down.



Distributed cold generation according to the specific needs offers additional potential for savings. The energy costs for server room or data center air conditioning can be further reduced by geothermal equipment, free coolers or alternative concepts, depending on the operating concept of the front or side coolers.

Front / side coolers

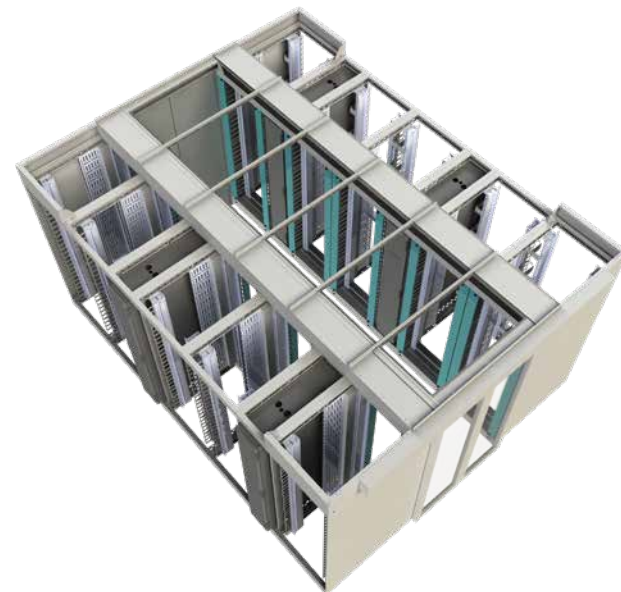
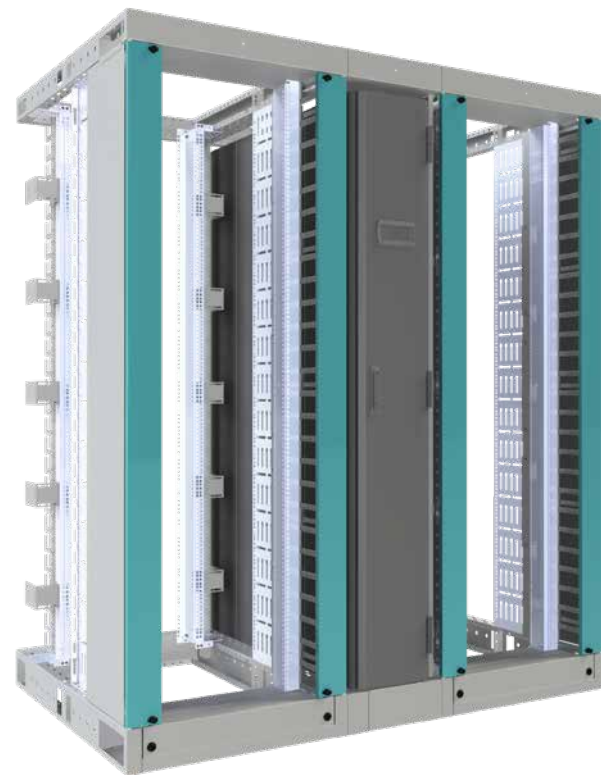
Housings for coolers



Front / side cooler housing

If coolers are installed between the dtm racks (in-row cooling), the front/side cooler housing is used for 45U configurations. The housing incorporates cold/hot aisle separation. Coolers installed in the housing ensure optimum cooling of the hardware and achieve a uniform design. Moreover, the raised plinth section makes it easier to connect the inflow and outflow through the floor. When using 40U racks, the coolers are placed directly on the floor.

The front / side cooler housing also ensures horizontal cable management between the racks in the row.



IN-ROW SAMPLE APPLICATION

Front cooler supplied by BM Green Cooling

Front cooler CW 2000/1200/300 EC

Water-cooled rack unit for installation on server racks
BMGC front cooler for open 19" racks

- Integrated monitoring
- Fail-safe due to emergency function in case of control failure
- Automatically controlled EC fans
- Fans with hot-plug capability
- Media connections with 1¼" outside thread



Device function

Cooled inlet air is blown into the area in front of the racks through the perforated front door. The IT equipment draws this air in. The process heat absorbed by the circulating air is drawn in by the front cooler at the rear of the rack. The circulating air is cooled by the large-volume cold water heat exchanger and fed back in as inlet air by five fans across the complete height of the rack.

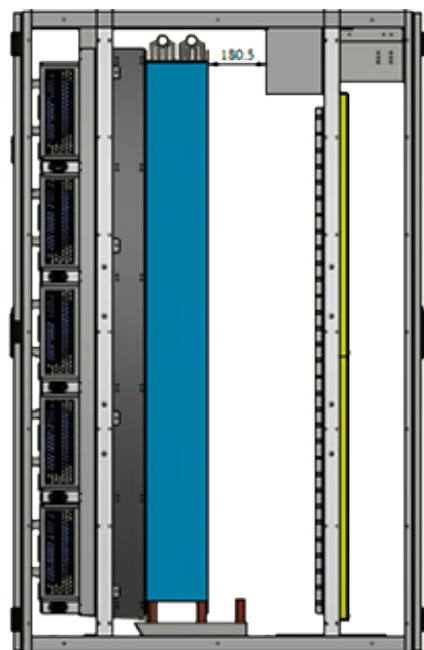
The cooling media supply and the electrical connection lines can be connected either at the top or bottom. The cooling medium is supplied through burst-proof, ageing-resistant high-pressure flex hoses (sep. items).

A large-volume Cu/Al finned heat exchanger and a 3-way control valve incorporated in the cooling water return line combined with an intelligent control algorithm for inlet and outlet air temperatures ensure energy-efficient operation.

A stainless steel condensate pan arranged under the heat exchanger and water-conveying components collects any condensate formed when operating the equipment below the dew point. An integrated water sensor can detect any leakage. This fixed sensor may optionally be replaced by a leak detection cable.

The housing style, the flexible connection method and dry-mode operation combined make it possible to separate or relocate the racks with only a minimum of effort at any time.

Front cooler supplied by BM Green Cooling



Measuring & control technology

Operation via display on the operator side of the unit; all parameters and messages are displayed in plain text.

Operation, parameter setting and setup are arranged at several password-protected levels (user, service and factory levels); reset function included.

Network protocols

- Modbus
- BACnet
- SNMP
- TCP/IP
- LonWorks (Local Operating Network)

Cooling unit features

- Autonomous power-on after power failure
- Adjustment to the cooling power required
- Continuously variable water volume control 0 - 100 %
- Continuously variable fan control 30 - 100 %
- Any condensate formed is drained through a waste water port
- Integrated condensate pan

Maintenance

Fans can be exchanged during operation of the equipment. Venting the cooler is possible without dismounting (no conduits or cable runs should be placed directly above the unit, otherwise this will not be possible any more).

Front cooler accessories

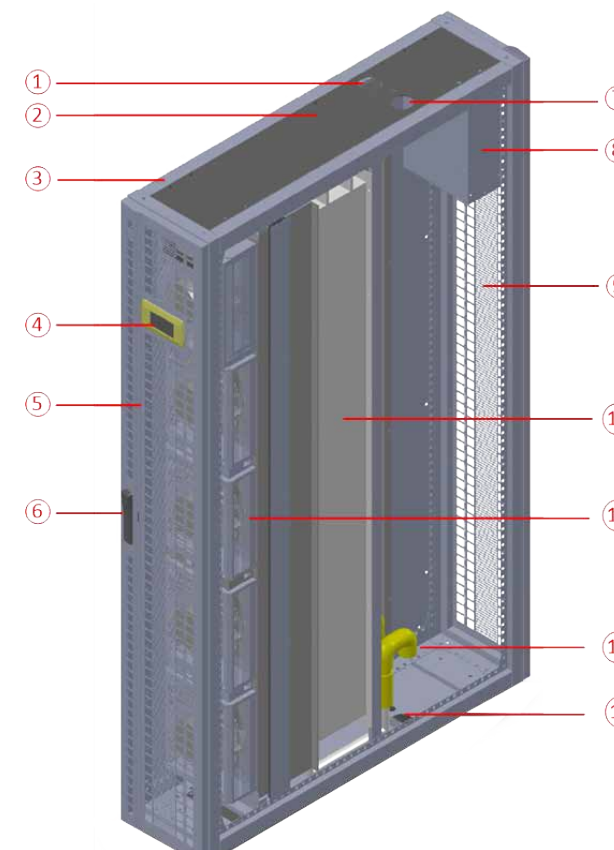
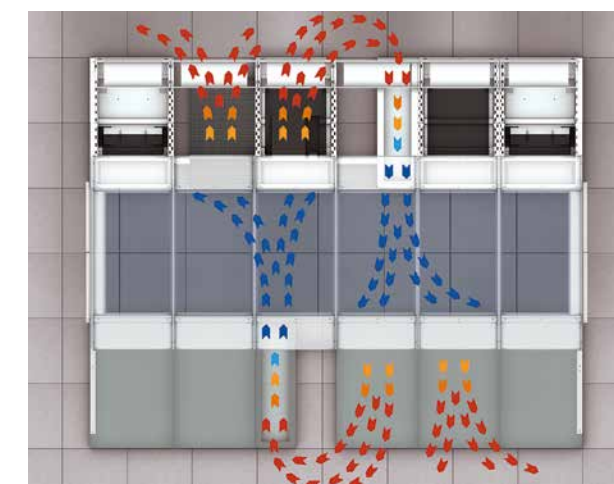
- Factory terminated high-pressure flex hoses with threaded connectors
- Leak detection cable
- Volume flow meter

Power supply

- The front cooler can be connected to a single-phase supply using the plug included.

Cooling principle

The cold inlet air is blown out across the full height of the front cooler and uniformly blown in before the rack systems. The heated outlet air is taken in by these fans from the rear area of the rack system, with the same volume as the air blown in at the front. Inlet and outlet air must be consistently separated to prevent any mixing of inlet and outlet air. It is basically possible to use in-rack cooling, as described above. In this case, only the racks but not the room will be cooled. In addition, the same unit may also be used as an in-row cooler to cool the cold aisle. Mixed configurations are also possible. For example, the cooler can be installed in such a way that the heated air is drawn in within the rack in the rear section but the cold air is blown into the room freely by the front cooler into the area in front of the 19" section.



1. Pipe bushing (feed line)
2. Top cover (3 parts)
3. Main frame
4. Digital control panel
5. Front door
6. Door handle
7. Pipe bushing (return line)
8. Control cabinet
9. Rear door
10. Heat exchanger
11. Radial fan
12. 1 1/4" outside thread (media port)
13. Condensate pan

Product Catalog

For more information about these and other products, please go to:



dtm-group.de/de/shop



dtm-group.de/en/info-center/downloads

Address

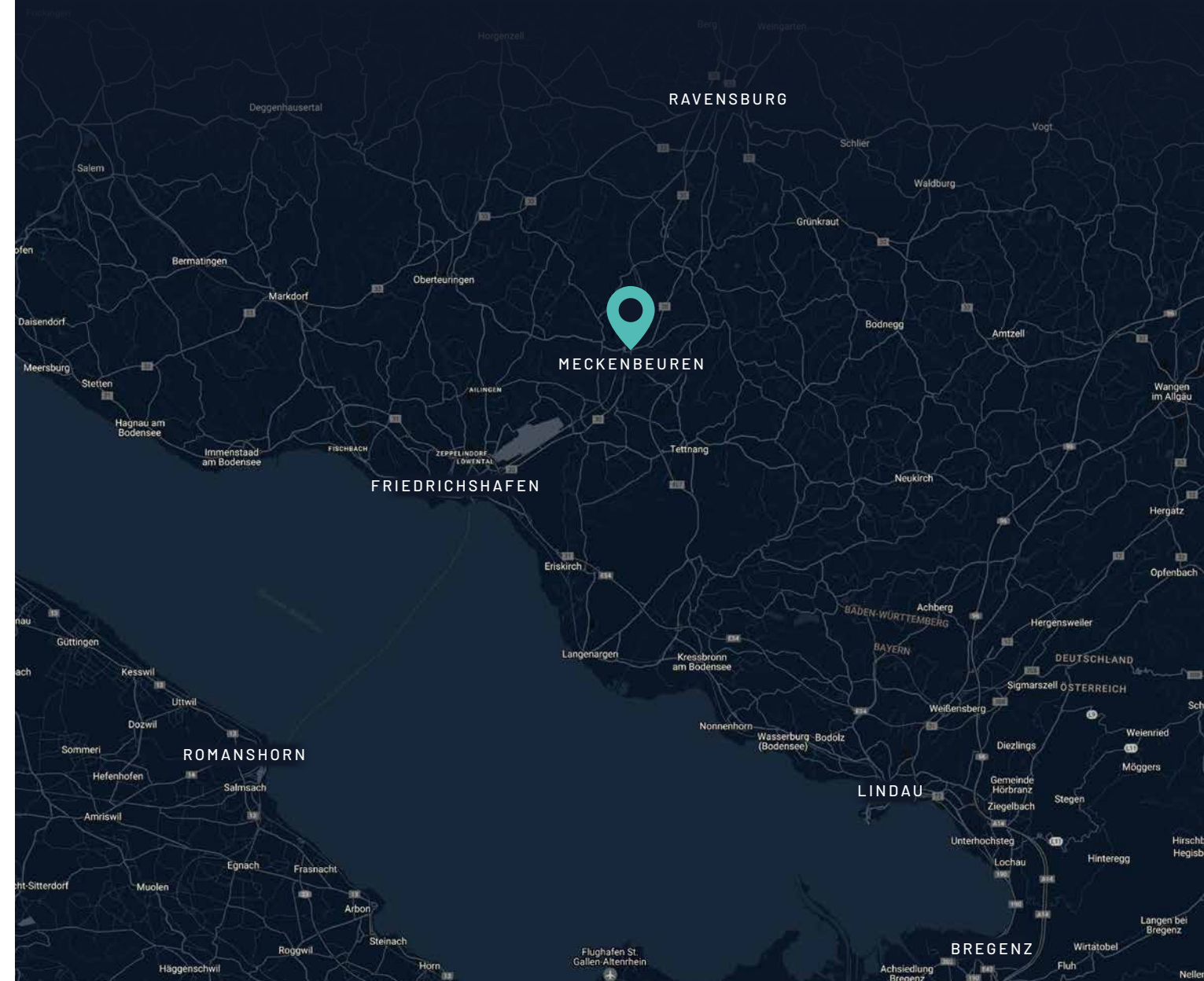
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Scope of Services – Consulting, Planning & Installation

- Server rooms, data centers, containment
- Individual data center visualizations in 3D
- Preparation of contract specifications
- LAN/WAN network installation for office/industry
- WLAN coverage
- Hardware procurement (HP, Dell, Cisco Partner)
- IP telephony
- Camera surveillance
- Relocation management for technical equipment
- DGUV V3 measurements
- Structural & technical baseline studies
- Cabling for media technology & conference room equipment (HDBaseT, HDMI, DVI)
- Technical building documentation in AutoCAD & FNT Command
- Fire fighting, escape and rescue route plans
- Data center check
- Vaiking DCM software
- Engineering of 19" racks, cabinets and panels
- Individual 19" solutions
- Network analysis, troubleshooting
- Training
- 24-hour service

