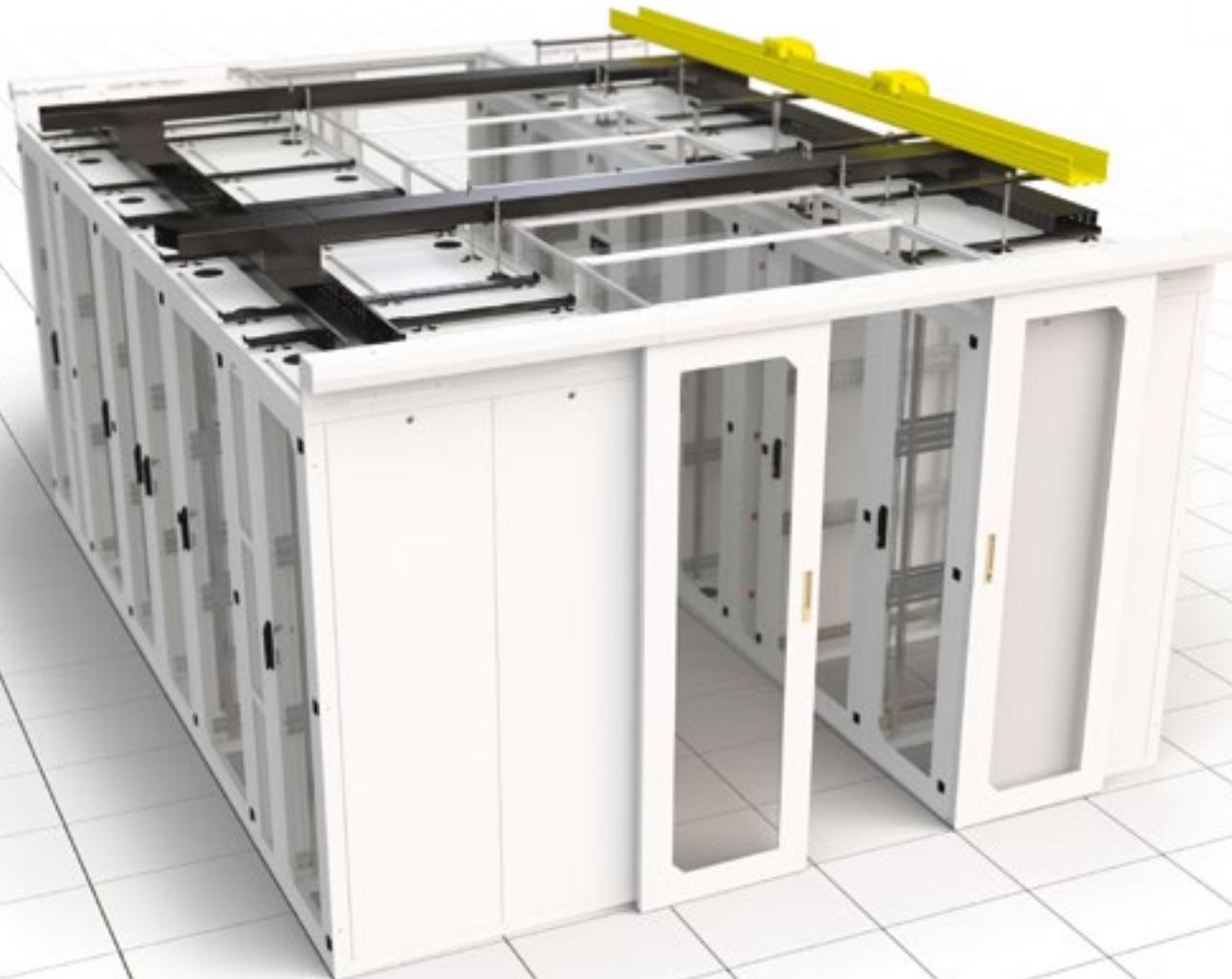


TOTAL SOLUTIONS FOR DATA CENTERS



...to complete your network

CONTENTS

ABOUT CONTEG	3	TESTCENTER FOR DATA CENTERS TC4DC	28
DATA CENTER SOLUTIONS		SUPPORT – SERVICES	30
Data Centers ...	4	Project Support	30
Data Center efficiency and operational safety	4	Consultation for DC Solutions	30
DATA CENTER ARRANGEMENTS		Conteg Product Commissioning	30
Modular Closed Loop	8	Conteg Assembling Assistance	30
Contained Cold Aisle	10	Computational Fluid Dynamics (CFD) modeling	31
Contained Hot Aisle	12	Conteg Live Meeting Webcast & Training Calendar	31
Hot / Cold Aisle	14	Conteg Certification Program	31
Plenum Feed with Room Return	15	CONTACTS	32
Room Feed with Plenum Return	16		
PRODUCTS	18		
Free-Standing Racks - PREMIUM Server RSF	18		
Side-To-Side Airflow Solution – STS	20		
Intelligent & Basic Power Distribution Units	21		
Rack Monitoring System (RAMOS)	22		
Aegis DCIM (Data Center Infrastructure Management)	23		
High Density Wire Management	24		
Optical Pathway System – OptiWay	25		
Top Duct	26		
Cable Protection in Openings	27		
Access Control System (ACS)	27		
KVM Solutions LCD Holders	27		

ABOUT CONTEG

Conteg is one of the leading producers of racks and data center solutions in EMEA. In our product portfolio, you can find telecommunication and data racks, complete solutions for data centers, outdoor and industrial cabinets. Our solutions include free-standing & wall-mounting racks, precision cooling, cable management, intelligent power distribution & environmental monitoring systems, as well as a wide range of accessories.



Conteg Headquarters:
Na Vítězné pláni 1719/4
140 00 Prague 4, Czech Republic



Conteg Production Facilities and Central Warehouse:
K Silu 2179
393 01 Pelhřimov, Czech Republic

Conteg is based in the Czech Republic and its products satisfy customer needs across Europe, Africa, and Asia – from the United Kingdom to Saudi Arabia to Bangladesh and from Finland to France to South Africa. A wide network of distribution partners covers more than 50 countries which means Conteg products are always close to you – ready to be shipped and installed. Many countries are also covered by local branch offices with permanent staff.

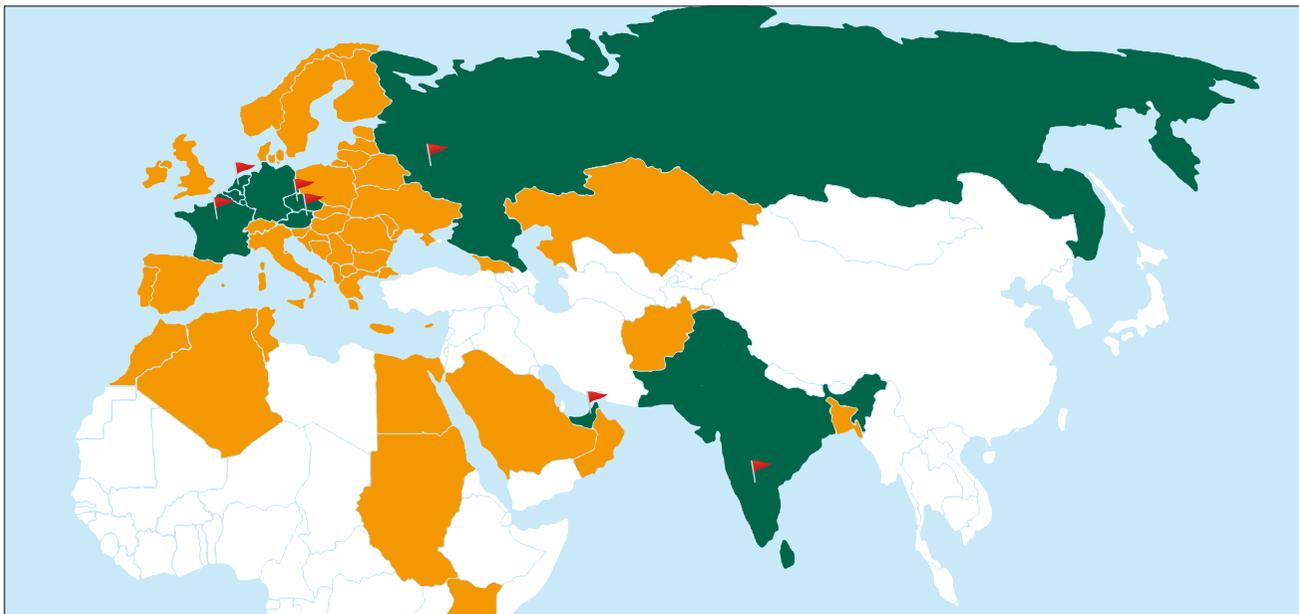
Local Branches and Showrooms:

- Austria, Vienna**
- Czech Republic, Prague**
- France, Paris**
- India, Bangalore**
- Russia, Moscow**
- The Netherlands, Breda**
- Finland, Helsinki**
- United Arab Emirates, Dubai**

Our innovative and modular products and solutions are in line with current industry trends. Their quality and functionality can be endorsed by our global customers. They are used throughout the IT industry when deploying servers, UPS and other components and to manage structured cabling systems both inside and outside the racks.

Our core values include:

- **Innovativeness**
- **Responsibility and flexibility**
- **Continuous technical support**
- **Quality service**
- **Trust**
- **Experienced and friendly staff**
- **Top-quality products at competitive prices**
- **Saving you time**



DATA CENTERS...

A data center can be defined as a facility used to house computer systems and associated components, such as storage systems and telecommunication equipment. They generally include redundant or backup power supplies, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices.

Every organization has a data center, although it might be referred to as a server room or even a free-standing rack. An independent data center is usually understood to be an object with a defined and rated physical infrastructure. A trained and certified designer's, for example a Certified Data Centre Design Professional's (CDCDP), goal is to create an environment that will house ICT equipment as well as active and passive elements that will last the data center's entire lifespan. The environment would respond to changes and modifications in ICT technologies during operation time and would adjust its own capacity to growing performance requirements, while staying energy efficient and green. Since the lifetime of modern data centers is about 15 to 20 years, the requirements and prerequisites mentioned above may only be met by adopting a modular design for data centers. A Modular data center may be described as a gradual, predefined and Computational Fluid Dynamics (CFD) verified process of filling space by technologies in performance units (modules). The benefits of the modular structure include lower investment costs (lower CAPEX), lower operating costs (lower OPEX) and significant savings throughout the life cycle of a data center (lower TCO). Choosing where to build a data center is an integral and very

important step, as this venue will require around-the-clock care given a data center's non-stop operation.

Selecting a suitable location is often the first step in ensuring the safety of a future data center. When designing any data center, many issues have to be considered. It is necessary to get information about the available power input and output and data connectivity for any potential location. It is also important to consider the suitability of a location in regard to various safety risks and possible limitations like floor load capacity, noise and exhaust emissions, layout, fire resistance and gradual construction requirements. The basic requirements of data centers are already specified in standards such as ANSI-TIA/EIA 942A and other standards related to data communications and systems. Data centers, whether small or large, mainly address the availability of stored data and computing resources for users. This sums up Tier 1 to 4, which define what services are available between 99.671% and 99.995 % of time. Tier 1 is defined by the possibility of failure up to 28.8 hours per year, while Tier 4 is defined by the possibility of failure up to 28 minutes per year. Although newly built data centers accommodate more modern energy-saving IT equipment, which decreases the power consumption of each unit, the overall IT power consumption is growing

globally. The logical consequence is that the heat-load density of each data center is also on the rise. With the growing need for more power and the availability of ICT equipment for data centers, ICT elements must be consolidated. This means replacing equipment with a low rate of utilization and high power consumption with more powerful equipment with lower power consumption and a higher rate of utilization. This is where the development of virtualization and cloud solutions comes in. While the weight and input power of newly used equipment is rising, the virtualization and utilization significantly reduce the amount of equipment installed in a data center, making the data center more efficient.

As already mentioned, building data centers is a very complex process, requiring knowledge of other disciplines, cooling systems, power systems, safety equipment access, monitoring and supervision. Some important issues regarding the design, installation and operation of a data center are discussed in the following sections. Conteg has extensive experience when it comes to laying out a data center's basic systems, which include cooling, monitoring and traffic control.



DATA CENTER EFFICIENCY AND OPERATIONAL SAFETY

An efficient data center is comprised of reliable cost-saving energy and operational systems. A data center operational safety includes a level of physical security for all IT and non-IT equipment. Redundant components and systems are used to mitigate operational risks and reduce data center downtime. To be able to improve data center efficiency, we must measure its losses, as well as its values and savings trends. At the same time, the price of such systems must be acceptable and compliant with the targeted ROI (return on investment) and applicable legal rules.

No universal data center efficiency benchmark exists. High Performance Computing (HPC) data centers use a number of math operations per second (MIPS), telco data centers use networking traffic, data warehouses use stored Terra-bytes. All of them use some recognized monitoring system (DC-FVER, PUE, DCiE), but still their performance per 1 consumed Watt will differ significantly. Nevertheless, a data center's electrical parameters can be measured and linked to financial costs. A common monitoring system used today is the PUE (Power Usage Effectiveness). PUE metering allows us to compare data centers with similar purposes and climates. PUE is calculated by dividing the Total Facility Energy by the IT Equipment Energy.

The PUE system is generally implemented in 3 stages.

- Minimum Practical Monitoring involves performing periodic spot measurements with portable equipment. Data is acquired from the installed equipment, like UPSs etc. This approach requires staff to perform a manual data collection. No infrastructure upgrades or the purchase of measurement equipment is needed.
- Best Practical Monitoring using semi-automatic data logging may not necessarily be supported by online software. Long-term monitoring equipment may need to be installed. Limited modifications to the infrastructure should be expected.
- In State-of-the-Art Monitoring, real time data is collected by an permanent automated recording system with the support of online software that is able to extensively monitor trends. It is likely that consultant support will be necessary during the

implementation process, as several modifications to the system's infrastructure will have to be made.

Concerning data center security, there are three potential risk groups: (a) Data and software safety - viruses, spam, unauthorized network access, data misuse; (b) Physical security - HW failures of IT equipment, human factor, force majeure, fire, theft; (c) Network Critical Physical Infrastructure (NCPI).

Conteg, as a supplier of physical infrastructure, specializes in maintaining and repairing the latest data center technologies (24x7x365) by eliminating SPoF (Single Point of Failure) and hotspots. In order to maintain your data center status, it is highly recommended that you install an advanced monitoring system (e.g. Conteg's DCIM called AEGIS).

The escalation processes and service level agreements (SLAs) must be well set. Monitoring of a large amount of input data requires specific training for data center personnel, which will lead to more energy achievements and cost savings. Last but not least, it is important to have the correct rack sizes, cooling systems and cable pathways. Conteg's experienced team of data center designers will be glad to help you optimize your projects.

TOTAL FACILITY POWER



Building load

Power

- Switchgear
- Generators, UPS, etc.

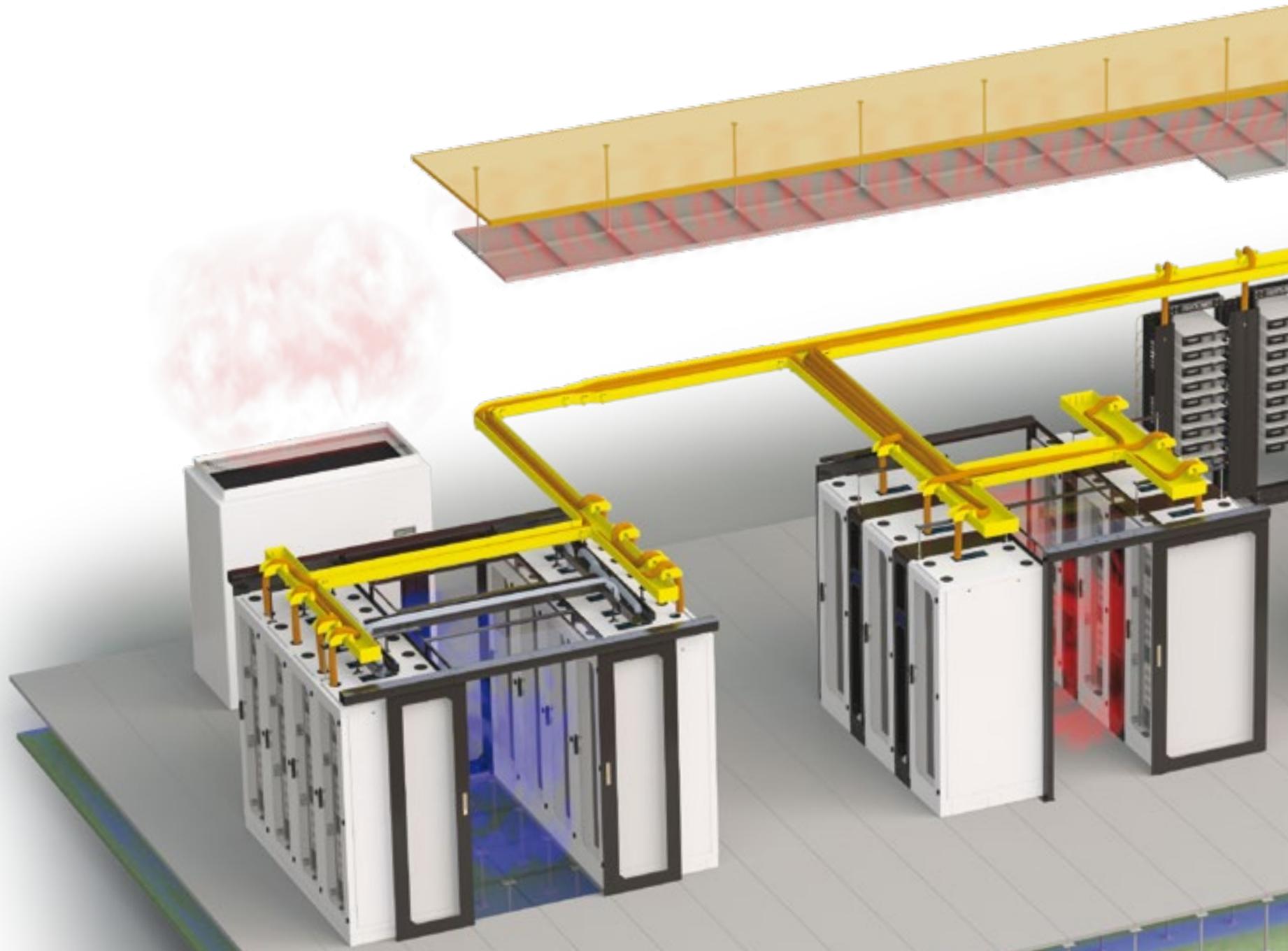
- Cooling
- Chillers
- Free cooling
- etc.

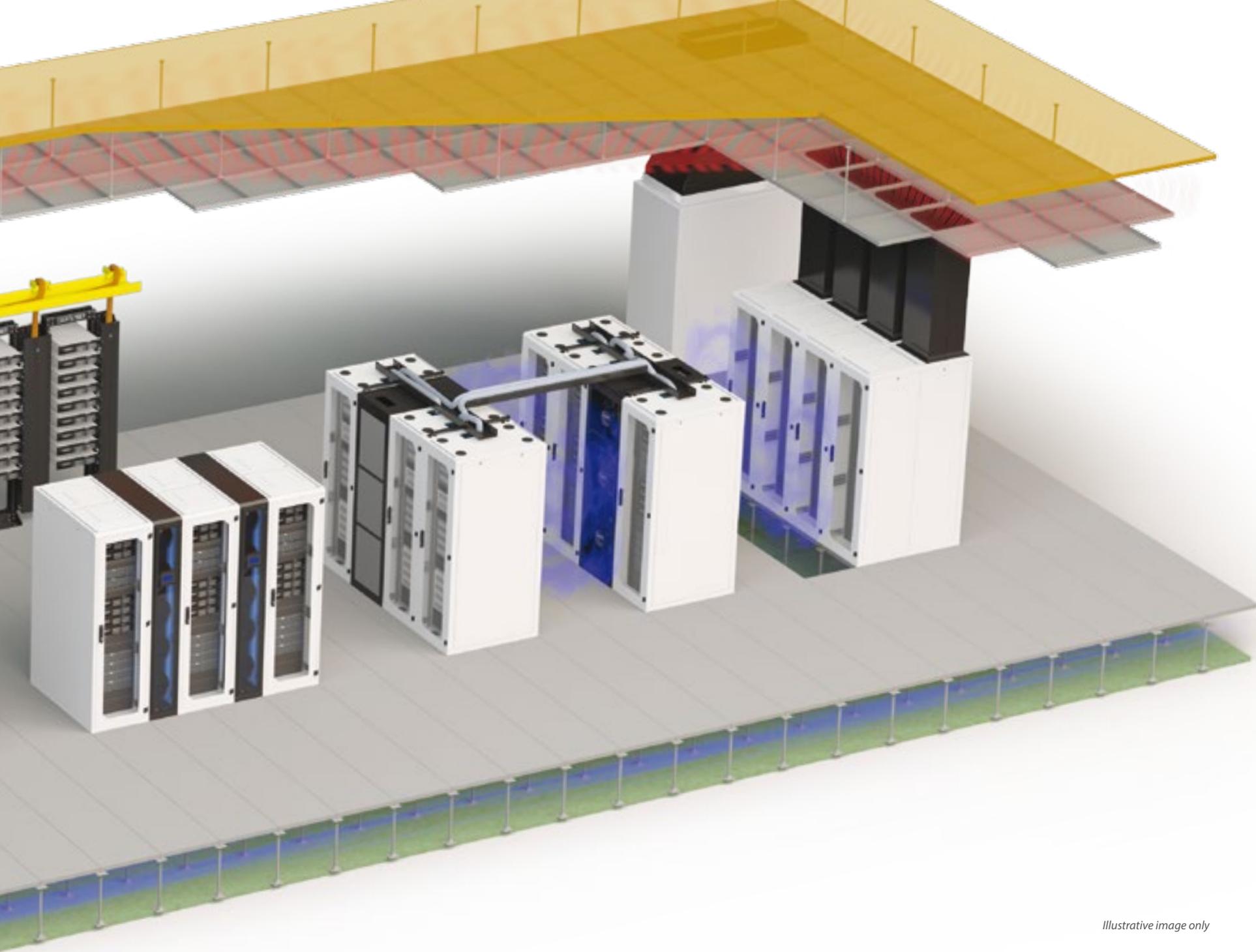


IT load

IT

- Services
- Storage
- Telco equipment
- etc.

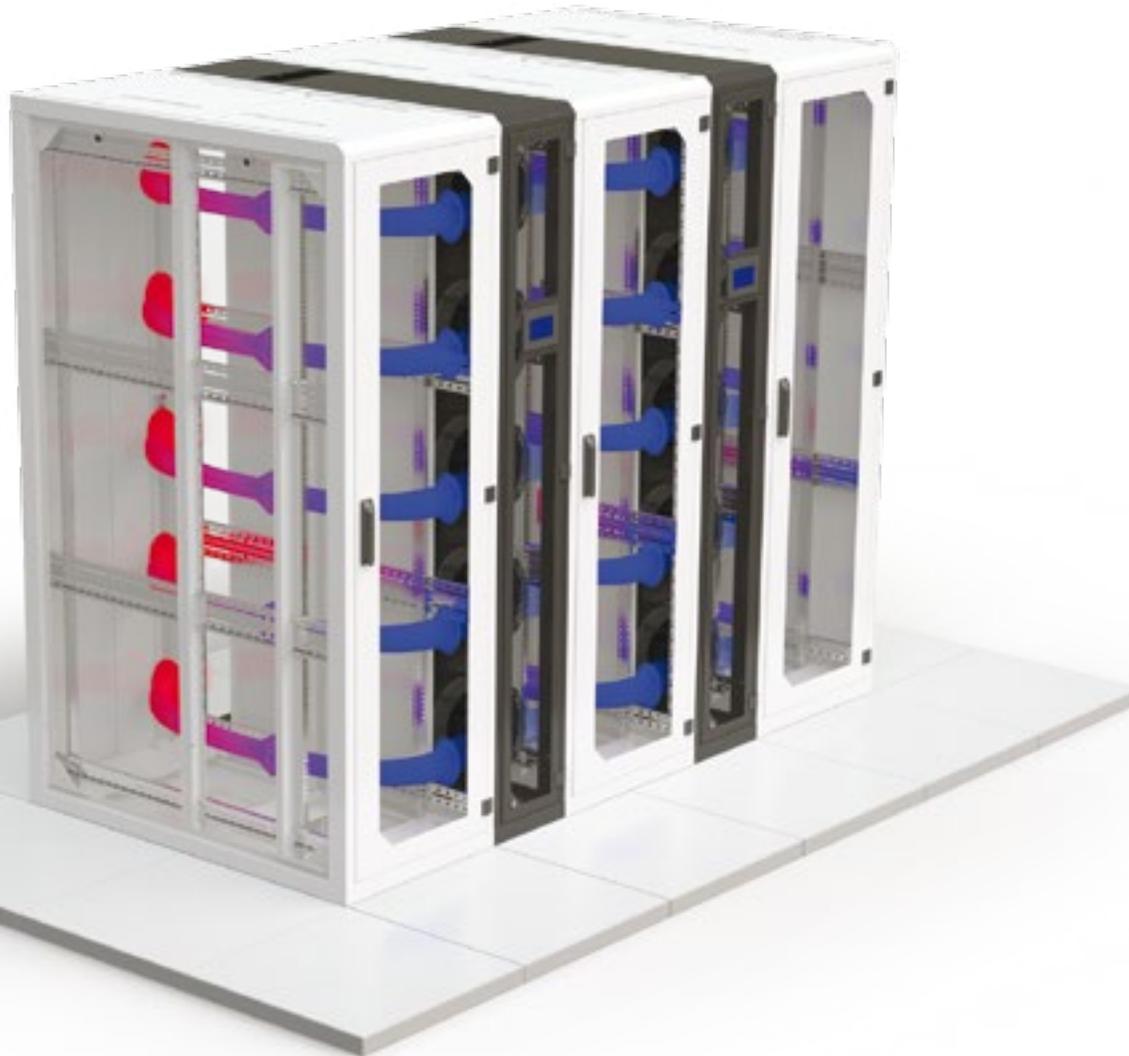




Illustrative image only

MODULAR CLOSED LOOP

Modular Closed Loop offers the ability to achieve up to 35 kW of cooling power per rack per assembly. This type of architecture can be especially useful when planning to install high-density racks into a facility since the racks do not release any heat into the data center environment. It is also an ideal solution when limited rack space is required, but cooling becomes an issue because of the high-density applications housed there.



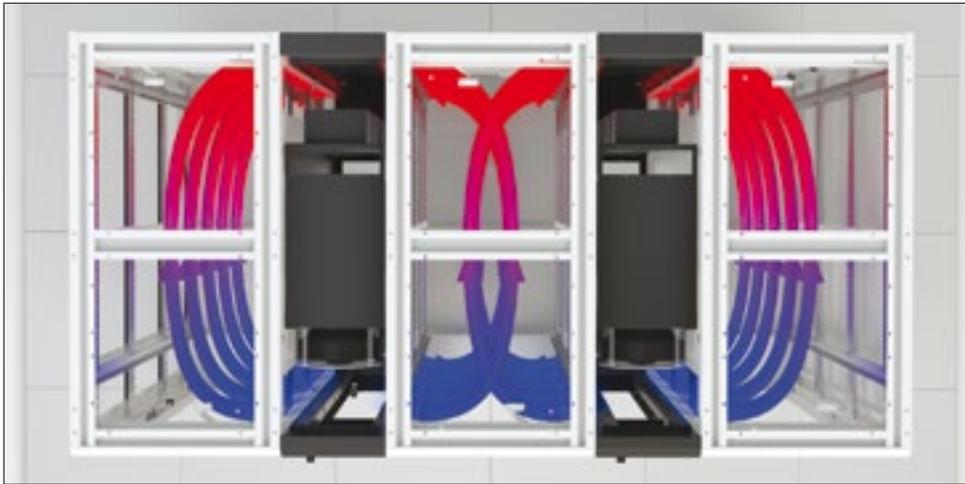
- Modular design - unlimited number of racks and cooling units can be combined into one module
- Cooling of Modular Closed Loop based on CoolTeg units
- CoolTeg unit versions, chilled water (CW) direct expansion (XC, DX)
- Racks from the PREMIUM Server portfolio.
- Modular Closed Loop is fully flexible - accommodates any combinations of cooling units and racks to meet the required levels of cooling capacity and redundancy
- High-density solution accommodates any high-capacity IT equipment (e.g. Blade servers)

Inside of the Modular Closed Loop, the cold air is generated by the CoolTeg unit(s) and delivered into the cold zone in the front part of rack(s), where it is close to the IT equipment cold air intake. The hot exhaust air from the IT equipment is then immediately removed from the hot zone in the rear part of the rack(s) by the CoolTeg unit(s), cooled and delivered back into the cold zone, forming a closed recycling air loop.

We also offer the most commonly used and tested combinations of cabinets, chillers, monitoring systems and other useful accessories in R2U (Ready to Use) sets. The advantage of this arrangement is speed of choice, an easy ordering process, fast delivery and simple installation.

The Modular Closed Loop solution is high-density oriented and energy efficient, especially when CoolTeg Plus units are connected to a chiller with free-cooling technology.

Modular Closed Loop design guidelines



The Modular Closed Loop can consist of a virtually unlimited number of PREMIUM Server racks and CoolTeg cooling units. All racks are delivered fully assembled with passive airflow management installed (separation frames). Cooling units are available to provide the module with a cooling capacity of up to 35 kW per rack. The module can be easily designed in a fully redundant mode.

Typical configuration

- PREMIUM Server racks 42U (optionally 45 or 48U) – 600 and 800 mm wide – 1200 mm deep
- Air separation frames included – 200 mm deep
- Front glass door
- Solid rear door
- Hermetic cable entries
- Blanking panels for all unused U positions
- Monitoring of inside cabinet environmental conditions via RAMOS
- IP54 protection recommended
- CoolTeg cooling unit CW30 - 42U (optionally 45 or 48U) – 300 mm wide – 1200 mm deep (optionally also in DX mode)
- Local extinguishing system LES-RACK
- Emergency opening door system
- Recommended depth of the servers 800 mm; other need to be consulted

CLOSED LOOP SAFETY SYSTEMS

Information is critically important to all of us and the security of our data needs to be ensured. One of the most dangerous threats to our data systems are heat and fire.

Emergency Opening System

In the case of no redundant cooling unit we recommend to use Emergency Opening System (EOS). The EOS automatically opens the front and rear doors of the Modular Closed Loop in case that cooling unit fails to prevent the overheating of ICT equipment inside the racks. The high temperature problem is detected by temperature sensors and the RAMOS Mini monitoring system (not a standard part of the EOS) which provides an alarm message to the EOS and also informs via email service desk about this critical issue. Meanwhile, as the doors are opened there is temporary cooling by ambient air to prevent possible damage to the equipment. However, the best protection is provided by having a fully redundant module configuration.

Local Extinguishing System

The Local Extinguishing System (LES-RACK) is a self-contained, fully automatic fire detection and protection system ideal for Modular Closed Loop use

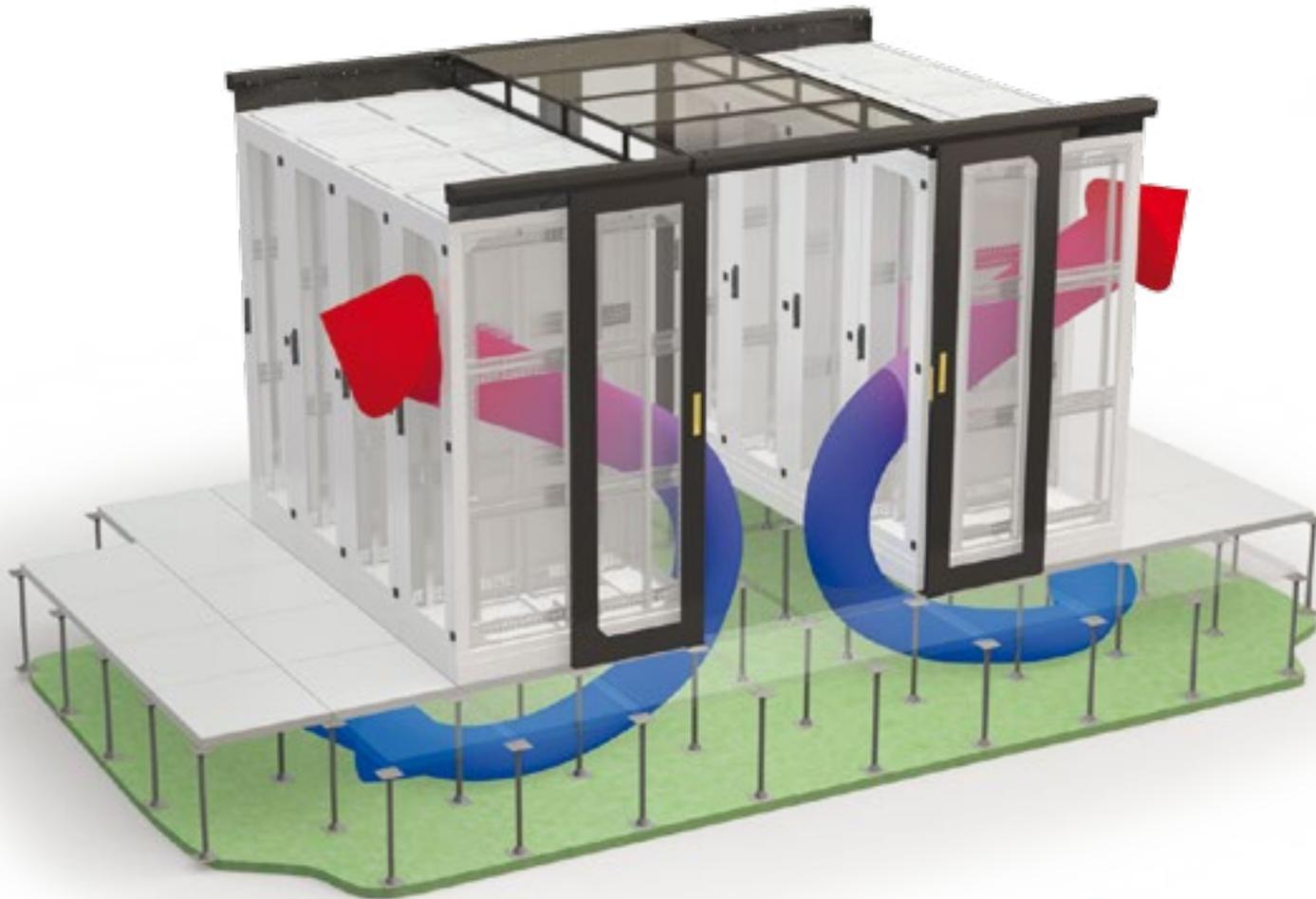


- Designed for installation directly into one rack with IP30 or higher
- An effective solution for servers, telecommunication and closed-control racks.
- An automatic system of fire detection, control, evaluation, communication and extinguishing
- Performs extinguishing on the principle of flooding the protected space with clean gas and maintaining required extinguishing concentration inside the space
- Optical detectors for fire detection



CONTAINED COLD AISLE

The Conteg Contained Cold Aisle (CCA) solution physically separates cold and hot zones by forming a cold plenum space in front of IT equipment. This prevents hot and cold air from mixing, thereby eliminating hot spots. Racks are aligned front to front and cold air is delivered using the raised floor or CoolTeg units.



- Modular design - an unlimited number of racks can be combined into one Contained Cold Aisle
- The cold air can be supplied into the contained aisle through perforated tiles from the raised floor
- Optionally cold air can be supplied via CoolTeg units
- The standard width of the CCA is 1.2 m (two perforated tiles) or 1.8 m (three perforated tiles)
- CCA can have two door or one door access
- CCA can be deployed with double swing doors or dual leaf sliding doors
- It supports racks with the same height that is 42U, 45U or 48U high
- The system is designed to work with the PREMIUM rack series
- Front and rear vented doors (86% perforation) are required
- Blank panels are recommended to fill any unused space within the rack
- Air separation frame at the front of the rack helps to block unwanted cold air bypass and hot air return around the mounting profiles
- Complex solution leading to an improvement in efficiency and ultimately an operational cost savings

Using the Contained Cold Aisle solution is highly recommended to maximize the cooling efficiency and minimize the energy consumption of the entire data center.

Roof

Roof sections are connected to the top of the racks to prevent the mixture of cold air and hot exhaust. Roof panels corresponding to the layout of installed cabinets and cooling units are 400, 600, 800, 900 and 1 100 mm long, and are made of 6 mm thick clear or multiwall polycarbonate to ensure the spread of light within the contained aisle. Our solution also supports the installation of extinguishing systems.

Door sections

CCA entry is via a sliding door. A standard sliding door consists of a Mechanical opening system (each door wing is independent), and can be equipped with either a Dual Synchro system (both door wings moving simultaneously) or Automatic system with basic or full control logic. Sliding doors are made of aluminum. A blank panel can be used instead of a door to close one entry of the contained aisle.

Typical Contained Cold Aisle configuration

- PREMIUM Server racks 42U high (optionally 45 or 48U) – 600 and 800 mm wide and 1 000 and 1 200 mm deep
- Air separation frame per rack
- Blank panels for all unused U positions
- Front and rear vented door with 86% perforation
- Double-brush grommets for cable entries
- Cold Air Containment – 1 200 mm wide (optionally 1000 or 1 800 mm)
- Roof panels corresponding with layout of installed cabinets and cooling units - 400, 600, 800, 900 and 1100 mm in length
- The Modular Contained Aisle system is ideal for rows of racks with different heights or gaps require containment

CCA with Inrow units

In the case of a missing raised floor as a plenum for cold air delivery, the cooling of IT equipment can be provided locally by CoolTeg units. CoolTeg units are installed in the same row as cabinets are and together with aisle roof and door sections form a Contained Cold Aisle. This solution is currently very popular as it can address very high heat loads and cooling units can achieve high energy efficiency.



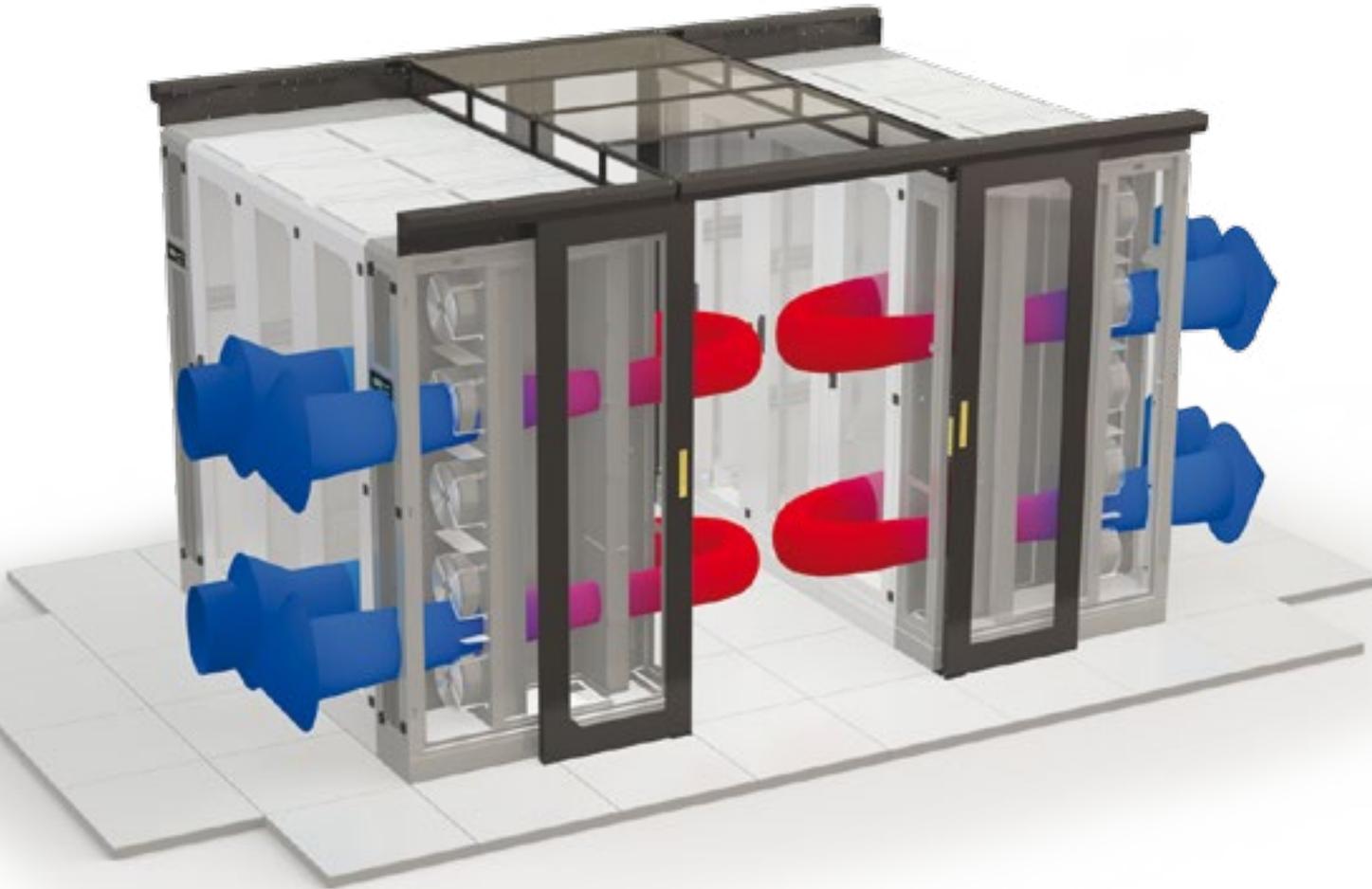
CCA with CoolTop Units

Do you prefer space-saving cooling units for your data center floor? Use our unique solution with cooling units placed on top of the IT racks. Our CoolTop units fit perfectly on all types and sizes of server racks, and can be used (along with other accessories) to create contained aisles, an ideal solution providing comfort for your IT equipment. The bonus will be very low power consumption and perfect project adaptability.



CONTAINED HOT AISLE

With the Conteg Contained Hot Aisle (CHA) solution, the containment system is used to physically separate hot exhaust from cold air by forming a hot plenum space at the rear of IT equipment and preventing hot and cold air from mixing, thereby eliminating hot spots. Racks and cooling units are aligned back to back and hot air is transformed to cold air via CoolTeg units.



- Modular design - an unlimited number of racks can be combined into a Contained Hot Aisle
- The hot air is aimed into the contained aisle, cooled by CoolTeg units and directed in front of racks where servers will use it
- The standard width of the CHA is 1 m wide (optionally 1.2 m)
- CHA can have two door or one door access
- CHA can be deployed with a single wing sliding door
- The system is designed to work with the PREMIUM rack series
- It supports racks with the same height that is 42U, 45U or 48U high
- Front and rear vented doors (86% perforation) are required
- Blank panels are recommended to fill any unused space within the rack
- Air separation frame at the front of the rack helps to block unwanted cold air bypass and hot air return around the mounting profiles
- Complex solution leading to an improvement in efficiency and ultimately an operational cost savings

Using the Contained Hot Aisle is highly recommended to maximize cooling efficiency and minimize energy consumption of the entire data center.

CoolTeg Plus – Product of the New Generation

In our CoolTeg air conditioning units, we use a combination of the newest component technologies and precision controls based on our experience and feedback from data centers around the world. Fan, heat exchanger and control parts technology is advancing, so we are always modifying our products to make sure our clients have the most up-to-date features.



Features

- User friendly
 - Energy efficient
 - Accurate data center monitoring
 - Total flexibility
 - Excellent rack compatibility
 - Ideal solution for all types of data center projects
- New generation of CoolTeg Plus cooling units is ready for modern data centers
 - Chilled water and DX versions 300 mm wide
 - 600 mm wide CW CoolTeg Plus unit ready for cooling of high-density zones
 - Energy-saving EC fans and high-efficiency copper-aluminum heat exchangers.
 - New control box and a new 4.3" size graphic touch screen display with 65000 colors - 21st century technology
 - One remote display can be used for all CoolTeg units in one data room – also bigger 10" displays for monitoring of the whole cooling part of a data center are available
 - Communication through TCP/IP protocol as standard. ModBUS or other protocols are also available, and remote management from any computer connected to the Internet is simply manageable.
 - Temperature and humidity is measured in both hot and cold zones
 - Open and closed architecture
 - Design compatibility with PREMIUM rack series



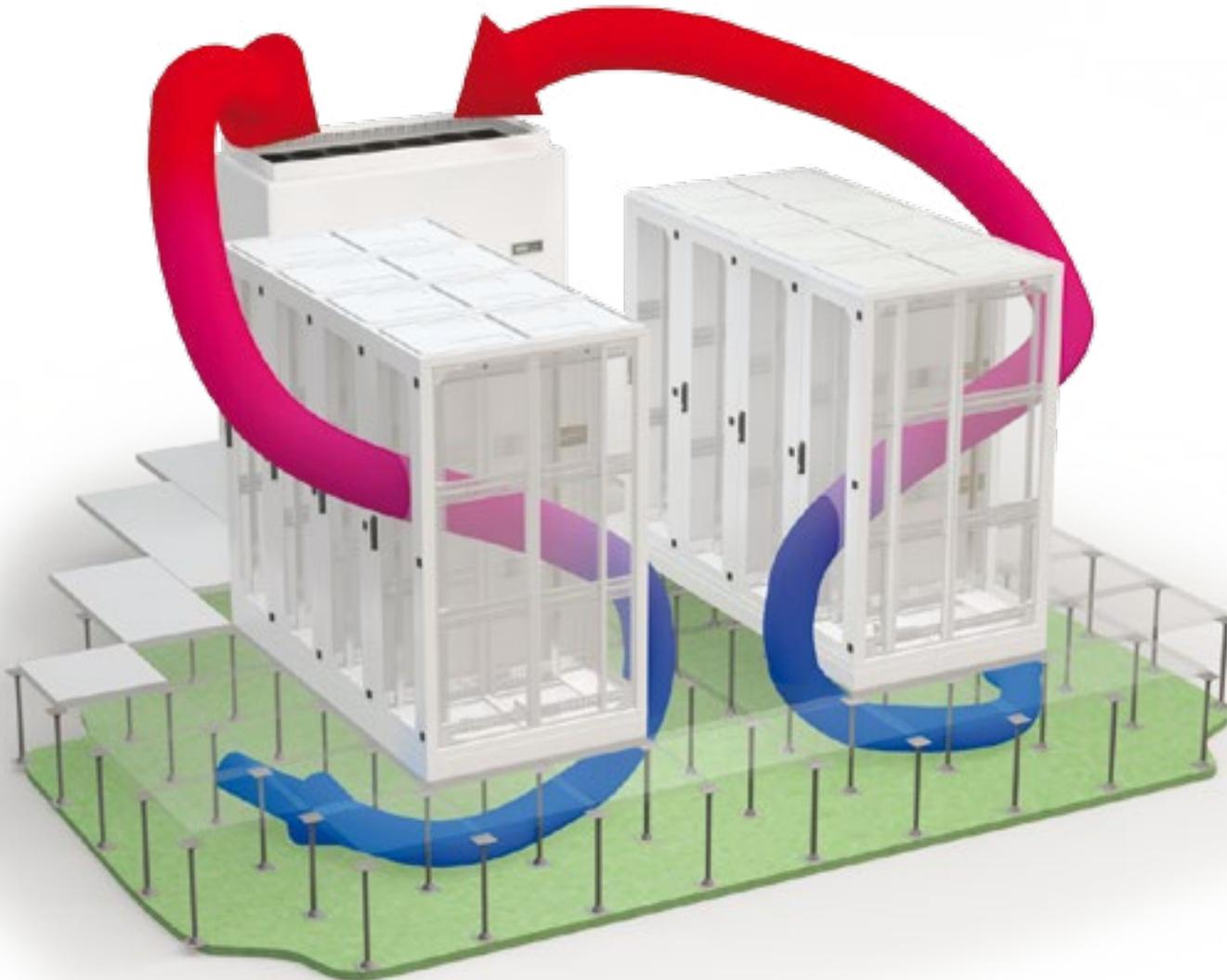
Contained Hot Aisle configuration

- PREMIUM Server racks 42U high (optionally 45 or 48U) – 600 and 800 mm wide – 1000 mm deep
- Air separation frame per each rack
- Blank panels for all unused U positions
- Front and rear vented doors 86% perforation
- Double brush grommets for cable entries
- Contained Hot Aisle – 1000 mm wide
- Single leaf sliding door
- Roof panels corresponding with layout of installed cabinets and cooling units
- Monitoring of containment environment



HOT / COLD AISLE

The Open Hot/Cold Aisle arrangement is considered to be the “norm” for data center designs. Racks are aligned front to front and cold air is delivered using the raised floor as a cold air handling space (plenum) or CoolTeg units.



- The ANSI/TIA/EIA 942 A standard recommends a cold aisle width of 1.2 meters (two perforated floor tiles)
- The system is designed to work with the PREMIUM rack series
- Front and rear vented doors (86% perforation) are recommended
- Blank panels are recommended to fill any unused space within the rack
- Air separation frame at the front of the rack helps to block unwanted cold air bypass and hot air return around the mounting profiles
- Complex solution leading to an improvement in efficiency and ultimately an operational cost savings

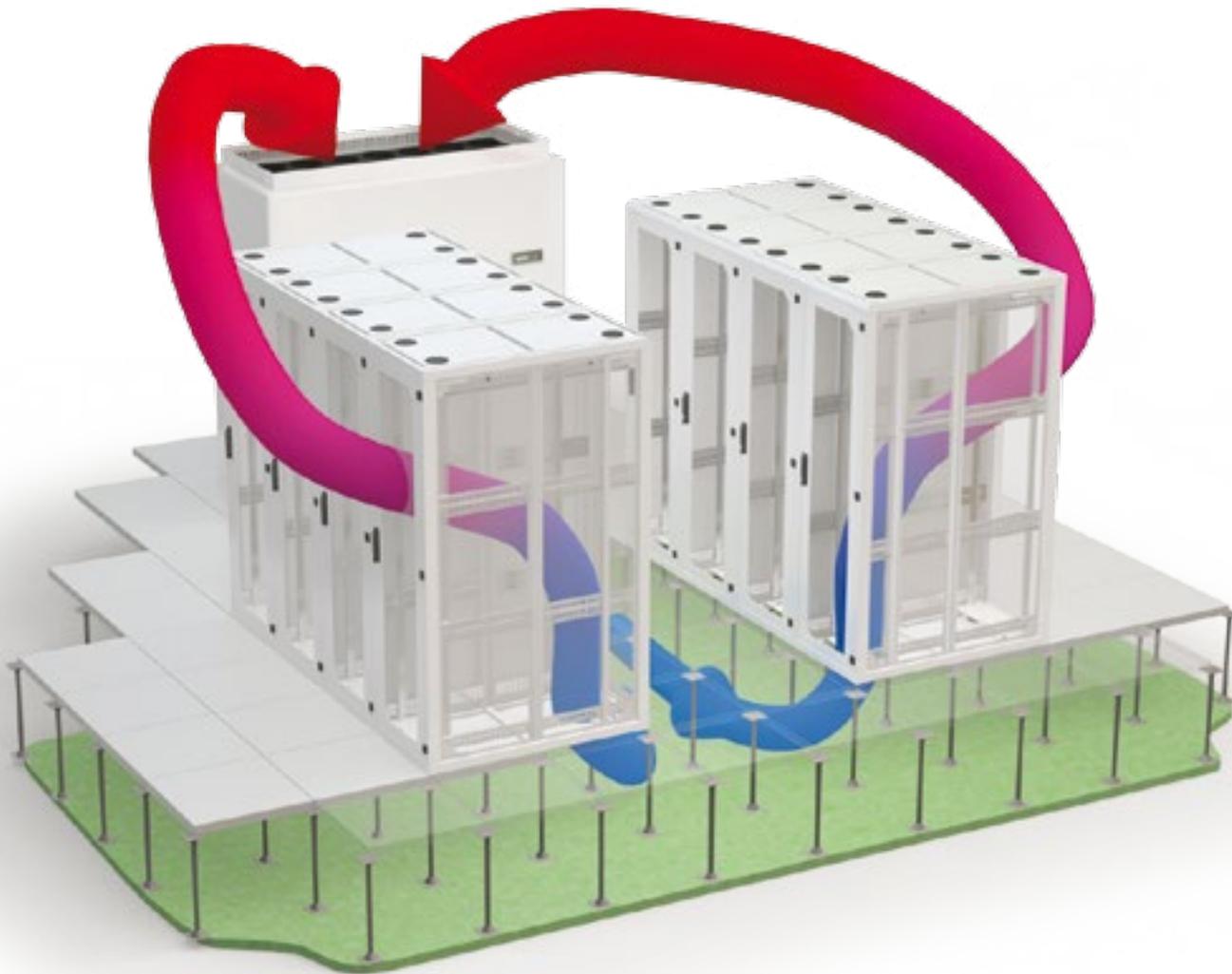
As the raised floor is being used to deliver the cold air, it is essential that all openings within the floor, such as the cable entries, are well sealed using double brush grommets. This helps to maintain static pressure within the floor and minimizes the amount of air that can escape in unintended or undesired locations. In cases where racks cannot be used we can offer an alternative solution with 19" open frames RSG4. Load rating is up to 1500 kg, which is suitable for heavy servers.

For configuration see page 17.

Hot/Cold Aisle design can be modified in various ways to meet today's higher energy efficiency requirements. It can be easily improved (e.g. by separating the cold and the hot air zones), making it a Contained Cold Aisle solution. See previous chapters to learn more.

PLENUM FEED WITH ROOM RETURN

The Conteg Plenum Feed with Room Return solution optimizes the use of cold air by directing this air from the raised floor straight to the equipment within the rack. Dedicated hot and cold aisle layout is no longer required as the racks contain elements that separate hot and cold zones.



- The system is designed to work with the PREMIUM rack series
- Front glass and rear vented doors (86% perforation) are recommended
- Blank panels are recommended to fill any unused space within the rack
- Air separation frame at the front of the rack creates cold zone in front of IT equipment and blocks unwanted cold air bypass and hot air return around the mounting profiles
- Deflector located in the bottom of the rack directs the cold air to the front of IT equipment
- Variable flow regulating louvre can be installed to control airflow throughput or shut the air supply off if no equipment is housed in the rack
- Complex solution leading to an improvement in efficiency and ultimately an operational cost savings

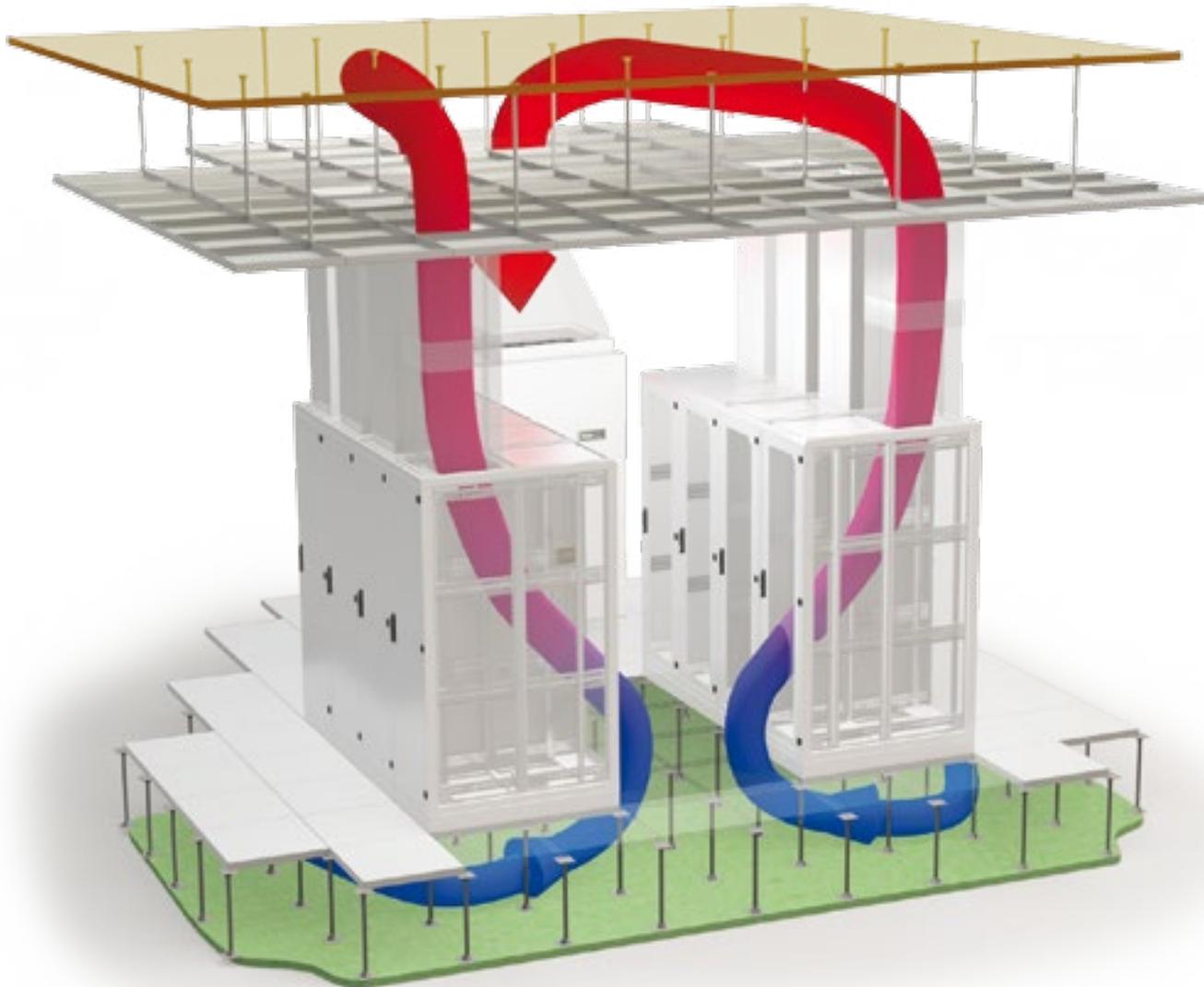
Cold air is kept below the raised floor and within the rack by a solid front door which can be either glass or metal depending on preference. Air separation frame is used to create a cold zone in front of the installed equipment. All unused positions should be covered by blank panels to prevent cold air leakage. Hot exhaust air is rejected from the rack into the room through a vented rear door ensuring that cold supply and hot exhaust air streams remain separated, resulting in more efficient use of the cold air and the elimination of hotspots.

For configuration see page 17.

One significant advantage of the Plenum Feed Room Return system is the flexibility of floor planning.

ROOM FEED WITH PLENUM RETURN

Contained Cold Aisle and Plenum Feed/Room Return technologies release the warm exhaust air into the room. Generally, this should not pose a problem as long as the layout of the data center takes this into account. However, in certain very high-density applications it may be desirable to completely separate the hot exhaust from the cool supply air.



- The system is designed to work with the PREMIUM Server rack
- Hot Plenum Return Kit (HPR) addresses this requirement by using a vertical “chimney” at the top rear of the rack directly connected to a hot plenum below the ceiling
- Turning vane located at the bottom rear of the rack helps to optimize the flow of hot exhaust into the chimney
- Front vented (86% perforation) and rear solid door are recommended
- Blank panels are recommended to fill any unused space within the rack
- Air separation frame at the front of the rack creates cold zone in front of IT equipment and to block unwanted cold air bypass and hot air return around the mounting profiles
- Complex solution leading to an improvement in efficiency and ultimately an operational cost savings

The hot plenum is formed by installing a suspended ceiling within the facility room and rather than using the stratification principle to warm exhaust (typical in a traditional hot/cold aisle arrangement), the hot exhaust air is removed into a separate air handling space. The Computer Room Air Handlers (CRAH) are also connected to the plenum so that an air loop is formed. This layout can tolerate very high heat densities with excellent cooling system efficiency; a study by Intel which originally pioneered this concept, shows that this design can handle as much as 30 kW per rack.

For configuration see page 17.

Cooling capacity of this configuration can reach higher values depending on many variables such as capacity and features of precision computer room cooling unit, ratio of supply air space to return plenum space and amount of air obstructions in the supply and return air spaces.

COOLTOP

CoolTop equipment represents a family of precision cooling units specifically designed for an installation on the top of IT racks in server rooms and large data centers. CoolTop is an ideal cooling system for Conteg-contained IT rack aisles. If you complete it with Conteg's monitoring system RAMOS you can have a highly effective and economic cooling solution.

Effective use of floor space

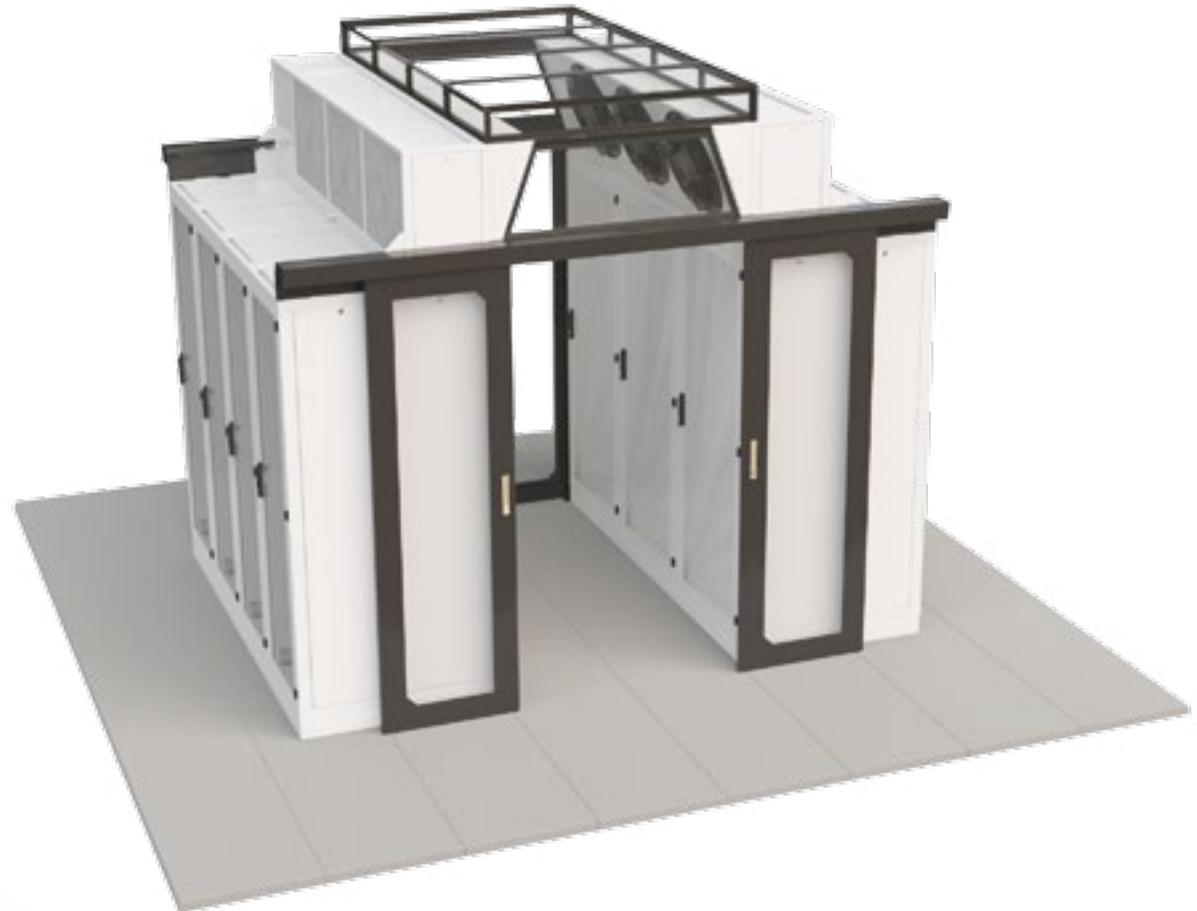
- Cooling systems with Cooltop units do not occupy any floor area
- A raised floor is not used for air distribution

Very low power consumption

- A set of highly-efficient fans with EC technology motors
- Perfect air flow control
- Optimized heat exchanger and interior aerodynamics
- Recommended pressure control

Perfect project adaptability

- Easy grouping of CoolTop units to meet the requested capacities
- Ideal for contained cold aisles, suitable even for contained hot aisles



SUITABLE FOR

- All kinds of data centers
- Applications with high value of floor space
- Clients focused on Energy saving

PRODUCTS

Conteg products are based on the needs of customers from around the world as well as and the latest developments in the field. We offer a complete range of products from telecommunications and data distribution to data centers, server rooms and small applications.



Free-Standing Racks

Free-standing racks are designed for secure and easy accommodation of equipment, including cabling. In our product portfolio, you can find 2 main rack series - PREMIUM and iSEVEN - that will satisfy even the most demanding user who needs to house ICT and telecommunications technology. We offer universal types with welded or unassembled construction, as well as special racks for specific uses (e.g. server racks). Our goal is to meet the unique requirements of each individual customer; therefore we are constantly developing and adding new products and services to our portfolio.

PREMIUM Server RSF

The PREMIUM Server RSF rack is designed as a pure server cabinet for data centers, equipment rooms and network or telecommunication closets. RSF's heavy-duty, all-welded design and 1500 kg load rating mean that it's possible to accommodate the heavy equipment within a standard rack footprint. The RSF comes with a full range of doors, panels and locks. Available in various heights and depths, RSF is designed to work with Conteg's airflow optimization solutions and flexible cable management systems, which means that RSF can be tailored to suit your needs. RSF can be used with many complementary systems (e.g. Intelligent Power PDUs), making your servers safe and secure.

Air Separation Frame

The Air separation frame is used for minimizing bypass airflow trough racks between hot and cold zones. Using an Air separation frame in a Room Feed with Plenum Return deployment forms a "cold zone" inside the rack between the front door and the equipment mounted on the 19" profiles. Cold zone depth is recommended as 150 mm. New standard type of the separation frame features 6 installation openings with covers so it can be factory pre-installed and it is also possible to use connecting kit and simply connect racks into a row.



Air separation frame - illustrative image

19" Blank and fast blank panels

Used to cover empty positions in rack to minimize bypass airflow, increase energy efficiency of cooling system, and enhance aesthetic appearance.



DP-ZA-1F

Adaptive extrusions



PREMIUM Server RSF rack has always two pairs (front and rear) of vertical 19" equipment mounting extrusions fully compatible with servers. They can be adjusted from front to rear within the cabinet. They have marked "U" positions on front and rear side. Lines are marked on all extrusions and U numbers on the left extrusion only. A unique feature is that rear pair of 19" extrusions is horizontally divided in to 3 sections. Each section is separately adjusted, based on the depth of installed IT equipment.

Additional space U

In 800 mm wide rack only, each 19" extrusion provides three additional U positions. It is 12U extra positions per rack in total. They can be used for the installation of passive and active equipment such as patch panels, power distribution units, switches, fiber optical splice boxes, even 1U pizza servers.



Various rack dimensions

We have embodied all the traditional requests of users into the PREMIUM rack series design and made it the TOP rack series in the Conteg rack portfolio. With PREMIUM racks, the dimension variability starts from 27U and 42U up to 48 U high, 600 or 800 mm wide and 800, 1000 and 1200 mm deep enclosure. The frame remains the same. All other parts – 19" extrusions, top and bottom plates, front and rear doors or panels, locks, side panels, feet or plinth – can be defined by you. A wide portfolio of all the mentioned parts is ready to be applied, so an individual rack, meeting the most demanding requirements of data center and server room IT administrators, can be defined. Although the main design features remain the same, three configurations according to specific user needs have been pre-designed – PREMIUM Server or Cabling rack.

Next Generation of extrusions for PREMIUM Server RSF

Conteg presents a new non-limiting flexible solution of 19" extrusions for its PREMIUM rack series, which will make installation much easier. Combining experience with creativity, we developed a unique solution which can be used with many accessories and supplements. The new solution is based around strong 19" extrusions that are capable of supporting a load rating of up to 1 500 kg.

This solution's specially developed shape allows for the easy assembly of all additional cable management support products and airflow management components. Most importantly, an intelligent PDU can also be installed using this solution.



Highly vented door

PREMIUM Server RSF has as a standard front and rear door vented with one of the highest perforations on the market (86% perforation). This rate of perforation allows easy air handling throughout server rack while maintaining a high level of physical security. Vertically divided vented door for 600 and 800 mm wide racks can also be deployed.

Side-To-Side airflow solution – STS

Separation of cold and hot air zones is the main tool used to improve efficiency in data centers. The goal is perfect separation in each rack. But very difficult task is separation in racks with different IT components - namely various airflow directions make a big problem there. Conteg has a solution for all these possibilities. We can manage the situation with side-to-side air direction components in our racks.



Increase of the computing capacity has direct impact on the volume of transferred data. Currently there are several high-end network equipment producers on the market who supply products that bring a new challenge to the airflow management area. Typical suppliers of such equipment include Cisco Systems Inc. and Juniper Networks Inc. These newly designed high performance products are not in compliance with the current industry standard's "front to back" airflow configuration where vertical or front to back airflow is being supported. In these new applications, a more efficient "side to side" airflow management configuration is desirable. Designing for efficiency is nothing new at Conteg. The company has always led the industry with designs and solutions to meet the ever changing challenges.

Basic product guidelines

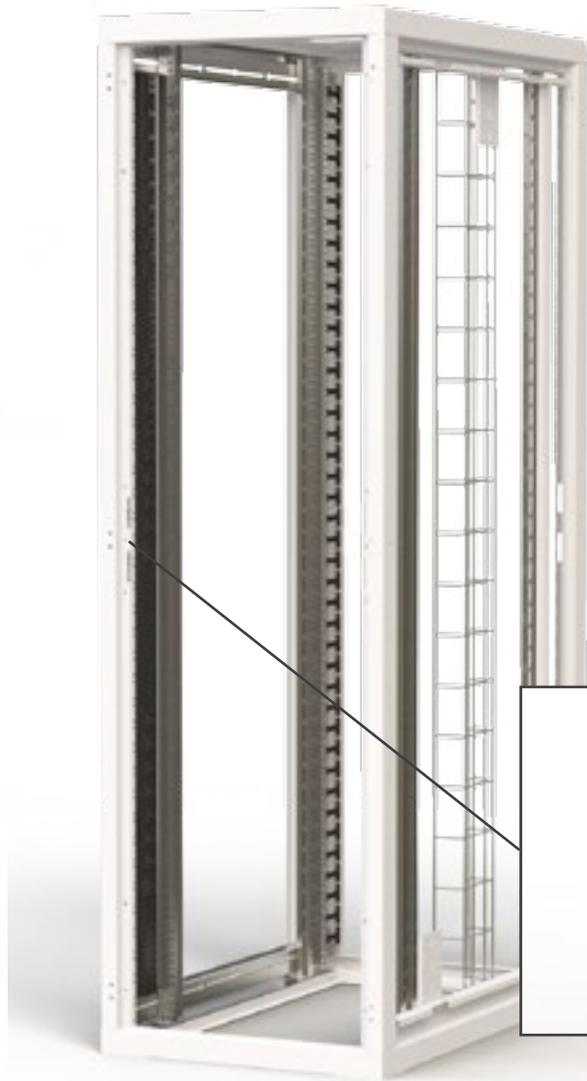
- **Enables installation of the network components for specific data center layouts:**
 - › Hot/Cold Aisle
 - › Contained Aisle
 - › Chimney solution
 - › Modular Closed Loop
- **Adaptors for various types of the network chassis - CISCO, JUNIPER, AVAYA, HUAWEI etc.**
- **Adaptors need to be ordered separately**
- **Enables combination of several types of the network chassis in one rack**
- **Parts of the network chassis allow cable management only on right side.** It is possible to use HDWM-HM-3F to guide these bundles of cables to opposite sides above and below the chassis into another installed cable manager - HDWM-VMR-42-12/10F.



Side extension kit for 1200 mm deep rack

INTELLIGENT & BASIC POWER DISTRIBUTION UNITS

The Conteg Intelligent & Basic Power product range comprises three different technologies that address the needs of the high-density computing user. The range comprises power strips which feature either no intelligence (Basic), the ability to remotely monitor current draw per strip using Ethernet and IP (Monitored range) or the ability to fully manage power strips and groups of power strips across the network (Managed range).



Conteg Intelligent & Basic Power offers a combination of outlets, including national outlet styles combined with industrial outlets, high amperage inputs and both 1-phase and 3-phase powered models. Standard 1-phase input plug styles are the EN60309 16A and 32A type or the IEC-C20 or Schuko/UTE which are also rated for 16A operation, standard 3-phase input plug is the EN60309 3x16A or 3x32A.

Designed for high-density, mission-critical server applications, the Conteg Basic, Monitored and Managed Power strips provide reliable power to the cabinet for both standard and blade server environments.

Intelligent power monitored

Strips feature a local easy-to-read ammeter on the outlet strip along with the ability to monitor the current draw of outlets remotely over an Ethernet connection. The user can aggregate the information from thousands of Intelligent Power Strips in one location.



Typical position of vertical (OU) PDU in the rear side of the rack

Intelligent power managed

Strips represent the leading edge in functionality available in a power strip. Employing a server-grade microprocessor, this product has unprecedented management and monitoring capabilities available through its built-in web server and firewall.

- Switch individual outlets on or off to enable remote reboot of servers
- Virtual grouping of outlets for single-click reboot of multi-corded servers
- Single-click control of entire racks or non-critical loads
- Current Monitoring per outlet (POM)
- User definable sequencing of outlets for reboot

Enhanced version of the managed strip offers also Voltage and frequency metering. Hence the PDU is able to report power factor, active and apparent power and main energy consumed in kWh. It can also calculate carbon emission data (CO₂ footprint) and estimate the cost of the energy consumption.



Managed PDU

RACK MONITORING SYSTEM

Conteg is introducing new environmental monitoring for single racks, server rooms and a wide range of data centers. For every IT Rack, especially in a data center, monitoring environmental conditions and detecting potential accidents is essential. Temperature, humidity, flood leakage and fire detection monitoring allows operators to act promptly and prevent wider damage.

RAMOS Ultra - FRONT VIEW



Max. cable length 300 m

RAMOS Ultra EX-016 FRONT PANEL



RAMOS Ultra EX-016 REAR PANEL



RAMOS Ultra EX-18 FRONT PANEL



RAMOS Ultra EX-18 REAR PANEL



TOP VIEW



RAMOS Ultra EX-D8-8 SIDE VIEW



To address developments in the area of data communications and technologies and the ever-increasing need for greater monitoring, Conteg brings to the market new solutions that better meet the higher demands of customers. The ability to recognize a trend now plays a very important role in surveillance data distributors and leads to effective management. New solutions are now able to accommodate large groups of customers with their new features and capabilities.

RAMOS Monitoring System is offered in 3 versions:

- **RAMOS Mini** – suitable for single cabinets or racks
- **RAMOS Optima** – suitable for smaller groups of cabinets or racks
- **RAMOS Ultra** – suitable for server rooms and data centers

RAMOS Ultra

RAMOS Ultra is an excellent solution for server rooms and data centers with many advanced features. Suitable for installations requiring up to 8 or up to 500 sensors, by using expanders. It is possible to “drag and drop” sensor icons onto uploaded pictures. RAMOS Ultra is also suitable for designs that require GSM gateways without additional software applications. RAMOS Ultra uses the Linux Operating System for easy configuration and monitoring. **RAMOS Ultra** Interface is multilingual and has configurable User and Group management. RAMOS Ultra can store all events in SYSLOG history, support SNMP functions, including SNMP v3 encryption, Modbus Master/Slave, Modbus RTU and Modbus over TCP/IP. RAMOS Ultra has up to 80 virtual sensors for reading information from other SNMP or Modbus devices connected to the same network.

AEGIS DCIM (Data Center Infrastructure Management)

Conteg's Aegis - Data Center Infrastructure Management (DCIM) is a complete monitoring application for managing data center infrastructure. PUE, kW, kWh, alarms, °C, RH% - these are the most important areas requiring your attention if you are responsible for a server room, data center or IT rack. Aegis provides you with maximum information and control.

Conteg's Aegis (DCIM) system collects data, analyzes reports and manages infrastructure equipment in real time using standardized data communication protocols. Improving efficiency reduces the operational expenses (OPEX) of a data center, and will reduce the data center's carbon footprint. It also helps to make the facility compliant with current and future developing governmental regulations.

Conteg's Aegis – DCIM can measure many other metrics, for example EUE, EER etc. which can be displayed on a main dashboard. Access to the system is through a standard web-browser interface. Compatible with 64 bits systems and can run on a virtual server.

Conteg's Aegis DCIM is designed to operate with all types of devices, equipment and third-party software applications. Aegis DCIM supports communication with data bases, including SAP BAPI (Business Application Programming Interface), MS SQL server 2008, My SQL, Oracle, MS Access, ODBC, OLEDB and the data mining Grid Control tool enables OPC, SNMP and real-time data mining.

AEGIS DCIM can be customized based on the individual needs of each client and supports multiple languages.



Technical Information

- Useful computer room information. Metrics like PUE, EUE, EER, etc. are shown on Aegis DCIM dashboard
- Alarm for defects/equipment malfunctions, temperature problems, exceeding humidity or temperature levels.
- Monitoring and reporting of IT equipment's energy consumption at facility, row, rack or outlet level
- Monitoring of electrical breaker loads, based on actual and daily peak load values
- Capacity reports
- Local and remote accessibility via a standard web portal
- Data security on various levels

CONTEG PRO SERVER MANAGEMENT SW

Is monitoring application for Conteg Products. This user friendly application is design to show events, graphs, statistics and sensors on map on multiple screens to give operator maximal and comfort information. Application is required for Ramos Ultra ACS system. SW support IP cameras with high effective recording policy, like a recording initiated by sensors or events to minimize HDD space.

With wide range of notification actions is possible to be inform about any event or proceed any control action.

PRO Server



HIGH DENSITY WIRE MANAGEMENT

Cable management can have a serious impact on the reliability of your data transmissions. Poorly managed cables can adversely affect network throughput, while poorly arranged patch cords can make cabling migration, addons and changes difficult to achieve. High Density Wire Managers will help to improve network performance and reliability by reducing the risk of attenuation due to fiber micro bends. The horizontal and vertical pathways come in two sizes - standard and long. They can hold a large number of patch cables without exceeding the TIA/EIA/ISO recommended fill factor. With the longer size option you can manage up to 48 patch cords (Cat.7 or higher) in a 1U position. Thanks to their modern design, backbone and patch, cables are well organized in accordance with industry standards and recommendations from major cable manufacturers. They will easily meet all your cabling needs.



INSTALLATION
vertical high density wire managers can be installed in any type of standard vertical 19" extrusions

HDWM-HM-1FR
front/rear horizontal 1U high density wire manager, applicable in both rack and frame deployments

front/rear horizontal 2 or 3U high density wire manager with brush also available

HDWM-HM-2F
front horizontal 2U high density wire manager, applicable in both rack and frame deployments

HDWM-VMR-ACT
horizontal adjustable cable troughs to lead the cables between front and rear vertical rack high density wire managers

HDWM-HM-3F
front horizontal 3U high density wire manager, applicable in both rack and frame deployments

HDWM-VMR-42-12/10F
front vertical high density wire managers, applicable in rack deployment

HDWM-FDF-S3-20B
front duct system, compatible with HDWM-VMF-xx-yy/20F installed on the both sides

HDWM-VMF-47-15/20F
front vertical high density wire manager, applicable in frame deployments

HDWM-VMF-47-15/20F
front vertical high density wire manager, applicable in frame deployments

HDWM-VMF-ACT
horizontal adjustable cable troughs to lead the cables between front and rear vertical open frame high density wire managers

HDWM-VMF-47-25/20F (2 x)
front wire managers shown joined to give front & rear cable management, applicable in frame deployments

HDWM-VMF-47-25/30F
front vertical high density wire manager, applicable in frame deployments

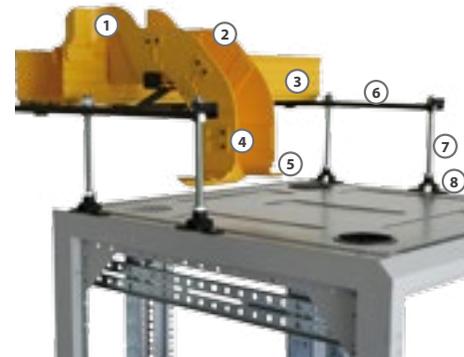
Open frames are used where it is not possible or not desirable to use racks or when unrestricted access to the installed equipment is necessary.

OPTICAL PATHWAY SYSTEM - OptiWay

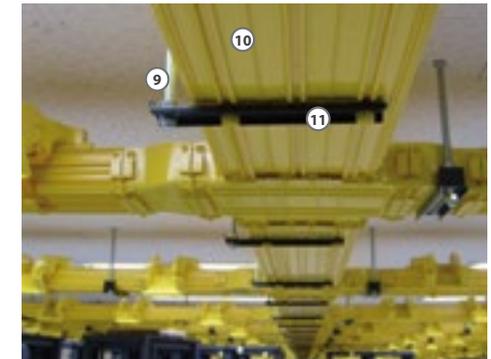
OptiWay is designed to provide a safe, easy to use, and cost effective management system for your fragile optical cables. OptiWay allows you to route fiber optic cables among equipment and provides the physical protection and bend radius management that is crucial to optical cable performance.



Constructed of halogen free PC/ABS material OptiWay can be used to protect your cabling from the moment it's installed. The OptiWay system is fully modular giving you unrivalled flexibility in your chosen layout, whether a new built or refurbishment project.



1. Example of OptiWay installation on the top of the rack



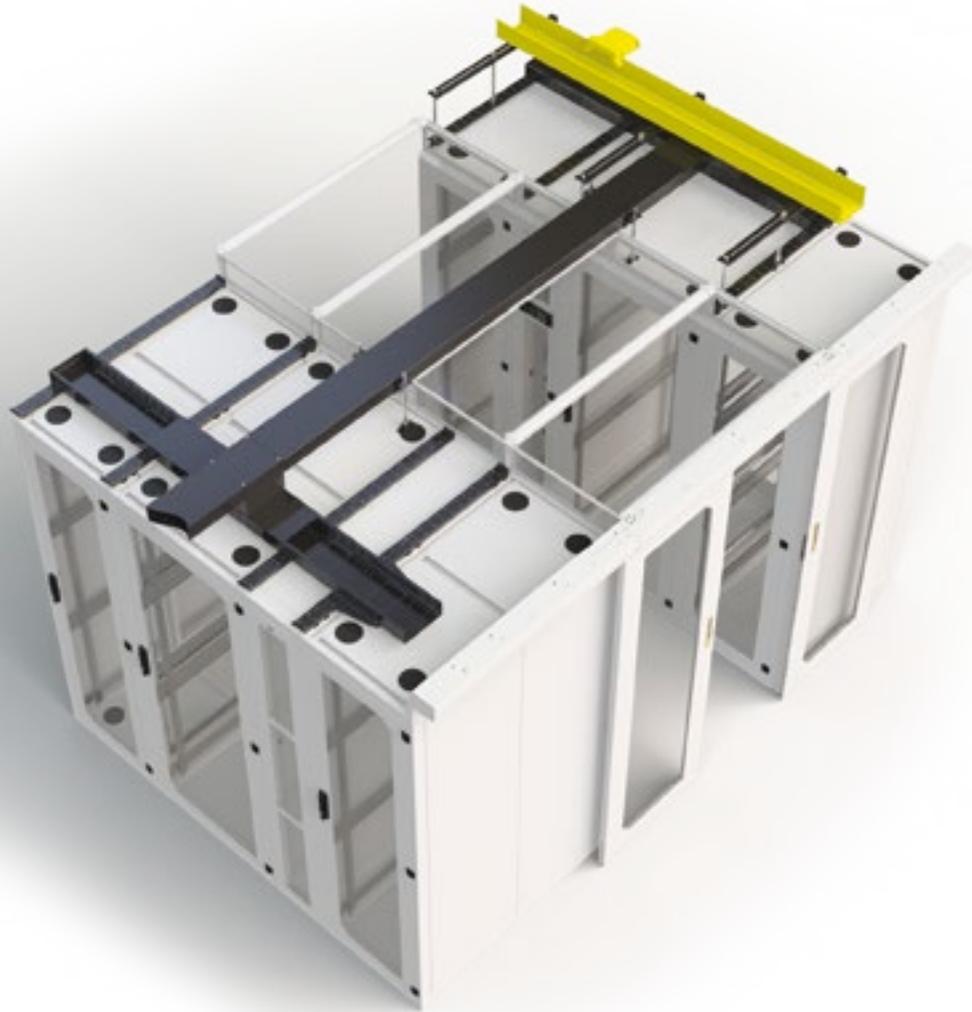
2. Example of OptiWay installation from the ceiling

Description of pictures 1 and 2 on the right		
No	Code	Description
1	OPW-10DR	Spillover
2	OPW-10IA45-YL	Vertical inside elbow
3	OPW-16MD2M	Main duct
4	OPW-10JO	Joiner
5	OPW-10TP	Trumpet
6	OPW-RRB-100	Threaded rod attachment bracket (rack mounting)
7	OPW-TR-16/20	Threaded rod
8	OPW-TR-BR	Threaded rod mounting bracket
9	OPW-TR-16/100	Threaded rod
10	OPW-30MD2M	Main duct
11	OPW-TRB-30	Threaded rod attachment bracket (ceiling mounting)

OptiWay INSTALLATION – there are two ways of installing the OptiWay system. In the first case the threaded rods are fixed to the ceiling construction and OptiWay ducts are supported by brackets mounted on the threaded rods. In the second case, threaded rods are fixed to the top of rack. OptiWay ducts are again supported by brackets mounted on the threaded rods. As each type of installation has its own specific features, the final design is individually customized by Conteg product engineers to guarantee the best available OptiWay system performance.

TOP DUCT

Top ducts are designed to provide a safe, easy-to-use, and cost-effective management system for copper cables above the racks. Top ducts are simple to install and at the same time allow for easy installation, manipulation, and re-patching of copper cables between server, network and UPS racks. The system is designed to provide a simple connection between the rack rows without ceiling or other exterior support. This solution reduces the installation time and the rack layout can be easily changed. The connection between rack rows can be multi-layered and can be combined with the Conteg OptiWay pathway system to provide independent routes for fiber cables. The solution complies with market requirements, recommendations, and best practices.



The top duct solution provides a backbone cable management system above a rack. The basic length segments correspond with the rack's width and can be easily removed and later installed back in without affecting neighboring racks. All cable ducts can be covered by tool-less covers. The main duct has perforations and can be used with all cover types and their combinations. The duct profile is 200×70 mm. It is recommended that the length of the end member be 350 mm in places where it is not possible to use a full length cable duct.

Main components

- Top duct
- Cross connection
- Radius protectors and accessories
- Supporting brackets for use with Conteg OptiWay pathway system
- Supporting brackets for use without Conteg OptiWay pathway system
- Accessories for cable management



CPW-20TD80



CPW-20TDC80

CABLE PROTECTION IN OPENINGS

Various cable entries with single or double brush or entries with IP54 protection help secure cables on rack entry. They can limit dust, water penetration and separate hot and cold zones within the rack.

In all cases they are installed into the cable inlet openings.

- DP-KP-KAR-A: Installed in raised floor cutouts (410×215 mm)
- DP-KP-KAR4 and 4-D: Installed in free-standing racks' cable entry openings (300×100 mm or 300×50 mm)
- DP-KP-RB4: Installed in PREMIUM free-standing racks rounded cable entry openings (4")
- DP-KP-HCE2: Installed in Modular Closed Loop and free-standing racks with IP54 protection (300×100 mm)



DP-KP-RB4



DP-KP-KAR-A



DP-KP-KAR4



DP-KP-KAR4-D

ACCESS CONTROL SYSTEM (ACS)

Most of the technical and server rooms face a similar challenge. Many of the technical staff require unlimited physical access to the trusted servers and other equipment; each group of staff however has different needs so individual access rights must be defined. Setting such rights and their management can be difficult and time consuming.



- The top of the ACS portfolio is the Ramos Ultra ACS system, which use RMS-ACS-U-RDU as ACS expander
- The RMS-ACS-U-RDU is design for centralizes system, which allow to remotely control, setup access points, group and users
- With RMS-ACS-U-RDU system you will only need a key card or PIN (or both) to open the rack or any door, instead of a key
- The system have variable optional locks and readers/ keypads to fulfill all requirements, also can be used combine latch with built in dual reader without door modification
- The ACS support EM & HID Prox card (125kHz) and can provide access logs via CONTEG Pro Server application
- On the RMS-ACS-U-RDU unit can be also connected intelligent sensors

KVM SOLUTIONS LCD HOLDERS

Conteg KVM consoles are designed for deployment in server rooms or data centers. The consoles allow direct or remote access to individual servers or their multi-levels. Using the Conteg console, you will be able to configure and administer servers from all the main manufacturers (IBM, HP, DELL, SUN and others). The Conteg KVM console has an integrated 1U compact design.



- LCD holders include high-quality SAMSUNG monitors with a 15", 17" and 19" diagonal
- The design of the holder allows the screen to be folded when not in use so that the total height of the console including the LCD monitor does not exceed 1U
- The holder includes extrusions designed for easy assembly and for drawing out the KVM/LCD console
- A significant advantage of Conteg's KVM/LCD holders is a full keyboard (including numerical symbols) with 104 keys and optional language settings, including a touchpad

TESTCENTER FOR DATA CENTERS TC4DC

Conteg's TestCenter for Data Centers in Pelhřimov, Czech Republic was built especially for testing new and existing products and their impact in different configurations on the overall power consumption, efficiency, reliability and effectiveness of data centers. Computer simulations and real measurements in the laboratory allow specialists in the company to verify the principles of the various processes in the server rooms and to implement innovative solutions.



TC4DC is also a gathering place for experts and training specialists in the design, build-out, and maintenance of data centers. We would also like to let our clients use the premises and equipment in the experimental data center to test any components, and see how the components might react to varying critical conditions, which are difficult and far too risky to simulate in the real operation. Finally, our clients can also use premium wired and wireless measuring instruments for testing and auditing existing data centers to obtain information about how to optimize and use the advancements in the industry.

Basic information

- Conteg TC4DC testing lab covers a total area of 156 m² and consists of two rooms - an experimental data center and rooms for technical support.
- Experimental data center is designed as a real data center with a raised floor and suspended ceiling, the area of the laboratory is 75 m² and is separated from a technical workshop and observation area by a glass wall. The experimental data center can be arranged to simulate real life situations. It is possible to install separate racks, their rows, contained aisles and also closed loops.
- Room for technical equipment – place for hardware and software to operate the center, conference room and presentation equipment.
- Cooling system - several variable cooling options for testing different variants of traditional and experimental arrangements of ICT cabinets with thermal loading are available.
- Sources of heat – the laboratory is equipped with 20 heat sources, which can be installed in 19" racks.



Measuring instruments

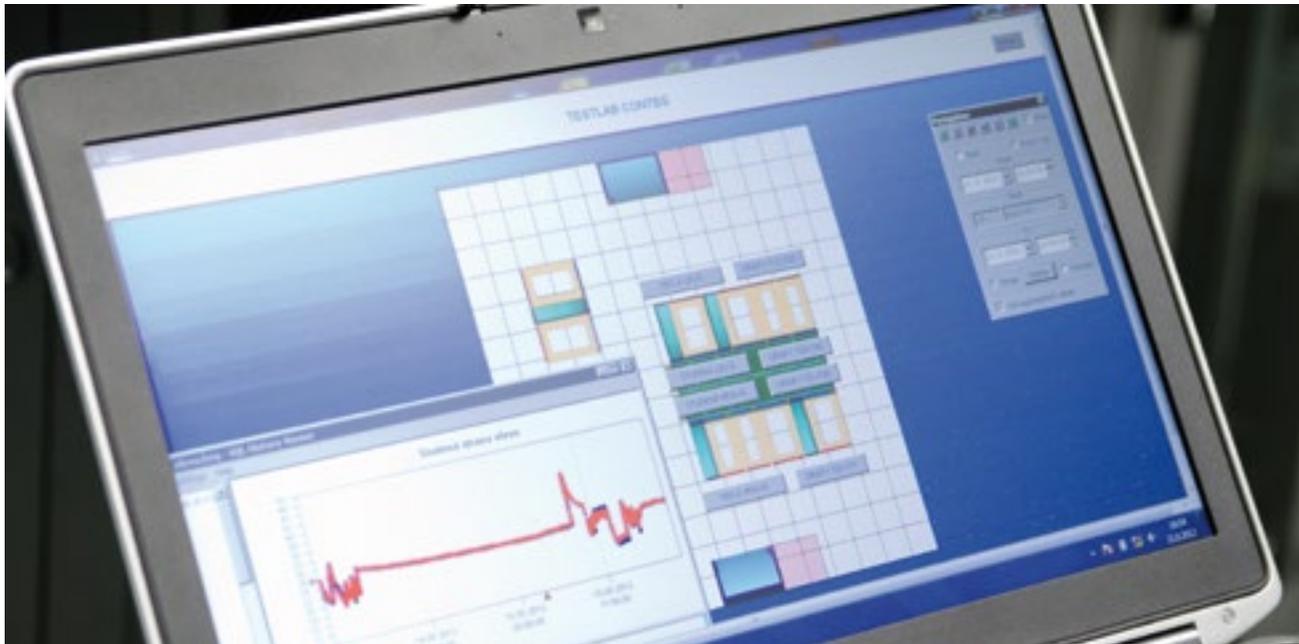
- A system of sensors for long-term monitoring of quantities in the laboratory transmits information to a central measuring unit. The data is then processed and archived by specially designed laboratory software that allows for the evaluation, visualization, and presentation of data from individual experiments.
- There is a system for measuring values of central cooling units and wireless temperature and humidity sensors. These can be used both in the laboratory and in a real data center to verify laboratory measurements in practice.
- Separate calibrated measuring instruments for accurate verification of all local variables (sound meter, thermal imagers, anemometers, thermometers, hygrometers, CO₂ sensor, pressure gauges, wattmeter, ammeter, oscilloscope, tachometer, etc.).

Some examples of what can be measured

- Humidity
- Temperature (water, air, and surface of all equipment and racks)
- Airflow and water flow
- Speed of airflow and water flow
- Pressure differences in individual parts of experimental arrangements
- CO₂ concentration
- Electrical parameters (voltage, current, power consumption)
- Noise parameters
- Fan speed



SUPPORT - SERVICES



Project Support

When preparing a complex network project, consultants, designers or your company's IT department can benefit from the advice or support of our product managers. Our product managers have in-depth knowledge about the parameters and characteristics of all Conteg product portfolio items as well as years of experience successfully delivering completed projects. It does not matter how challenging or simple your project is, Conteg has an engineered solution to fully meet your requirements. Do not hesitate to contact our team.

Consultation on DC Solutions

Our specialists in cabling, power distribution, cooling, environmental monitoring, etc. are ready to help you with consultations and calculations when designing your data center. The data center works as a complex organism, in

which all parts must operate properly to function reliably and efficiently. Conteg has experts in total solutions for data centers (CDCDP), specialists in issues of power distribution, cooling, fire management, cabling, etc. A well prepared project is essential for swift and correct implementation, and for a completion that satisfies the customer's requirements. Our team can design a layout of your data rooms, the location of individual components (UPS, cabling, IT cabinets, fire extinguishing, engine room), as well as detailed rack distribution on floor tiles. We can offer energy studies, and also the entire cooling system projects, using Conteg products and other brands. The goal is always to maximize the benefits, while minimizing capital and operating costs. You can also consult with us about minor details and questions that arise during the planning, implementation or operation of your data center or server room.

Conteg Product Commissioning

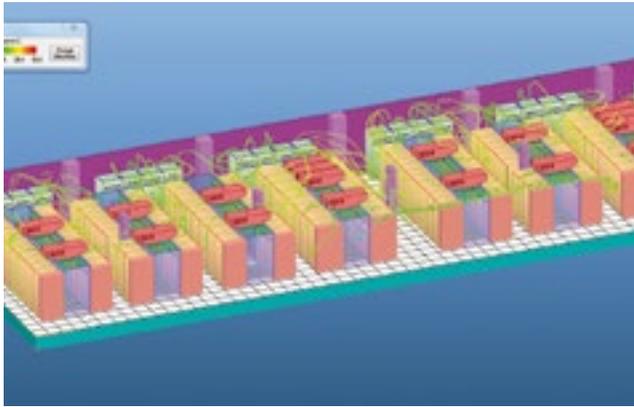
As part of our continuous support, Conteg provides a wide range of services to ensure the best quality support to all customers. The Start-up service was designed to provide professional Start-up and commissioning services to all types of our cooling equipment while focusing on optimal energy performance and equipment longevity. Only Conteg's technical support personnel or Conteg certified service technicians are allowed to perform the Start-up.



Conteg Assembling Assistance

As an important part of our expanding service to our customers, we are offering a service called Conteg Assembling Assistance (CAA). This service ensures that a Conteg specialist is present on-site to supervise installation and to provide best practice training for your technical staff. We believe that CAA service will help our partners to provide installations of Conteg products at the highest level. Tasks like Contained Aisle (Modular/Fixed) installation, OptiWay attachment, High Density Wire Management placement and RAMOS implementation together with, for example site survey, are ideal for CAA. For more info contact your sales representative.

Computational Fluid Dynamics (CFD) modeling



Computational Fluid Dynamics (CFD) modeling is a service designed to provide detailed data to assess and track the temperature and airflow within your existing or proposed data center. A team of Conteg professionals will assist you with the space planning and data center layout and then model your project on CFD software. The CFD model will simulate the airflows, air pressures, and temperature maps of your data center. Using 3D imaging, the CFD application can run nominal and failure scenarios for the data center or server room project, which displays how the design will perform under these varied conditions. Identifying potential hotspots, optimizing airflows, and picking the right sized cooling system are a few of the ways of how the CFD simulation can assist you. The service includes detailed reports with graphics of the room conditions under each scenario, details of the airflow maps, pressure and temperature for the racks, floor tiles, and various elevations within the space.

Conteg Live Meeting Webcast & Training Calendar

As an important part of our training initiative, Conteg provides Live Meeting Webcasts using the MS Office Live meeting service. These webcasts focus on product portfolio training, positioning new products on the market, introducing Conteg Total Solutions and many other topics. With this service, participants will receive up-to-date information on the latest trends in data center solutions from dedicated Conteg professionals



and product managers. There is a weekly schedule and live meetings are provided in English. Other language versions are available upon request. For a live meeting calendar and other training schedules check our website or contact your local sales representatives.

Conteg Certification Program

The Conteg certification program provides quality training for our business partners and integrators worldwide. We offer a wide range of certificates that are technically oriented. Certification training is carried out by our technical staff, in collaboration with local sales representatives. It is a personal training and we use our wide network of show rooms around the world, as well as our training center at the factory in Pelhřimov, Czech Republic. Passing the certification training will help our partners fully understand all details of our products, solutions, and our sales strategy with the goal to improve our services for our customers. For a detailed training calendar and certification schedule, check our website or contact your local sales representatives.

Conteg CERTIFICATES

- CDCS** - Conteg Data Center Solutions - For data center designers, project managers, professionals responsible for data center implementation
- CDCSI** - Conteg Data Center Solutions Integrator - For companies whose employees successfully passed CDCS
- TRS** - Total Rack Solutions - For sales representatives, pre-sales, inside-sales, installers
- CCIP** - Conteg Certified Installation Partner – For installation companies and installers
- CTSS** - CoolTeg Start-up Service - For cooling professionals
- CCSP** - Conteg Certified Service Partner - For cooling professionals and companies

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