DC-BOOK
by ESTAP

Estap®

CONTENTS

DATA CENTER
What is Data Center?

A data center is a facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communications connections, environmental controls (e.g., air conditioning, fire suppression) and security devices. Large data centers are industrial scale operations using as much electricity as a small town and sometimes are a significant source of air pollution in the form of diesel exhaust.

About Data Centers

Due to the large market potential many solutions arise for each aspect of Data center design: Cooling, Power, Management and Infrastructure, resulting in a large range of solutions. This creates another issue: When to select what kind of products in what type of situation suitable for what type of Data center, commercial, corporate, small or large?

Following fundamental principles, especially during the design, will create a solution that pays-off during the whole lifetime of a Data center. In terms of energy efficiency and the way it complies to its function and/or business goals. An optimal performing Data center will create a stronger position in the market or within the company.

Why Do We Need Data Centers?

Because of below listed reasons, Data Centers are always better and useful.

• High internet connection speed.
• Improved electricty network and back-up power system.
• Security.
• Professional cooling.
• Environmental monitoring and controling.

BUSINESS MODELS IN DATA CENTER

There are different types of business models in Datacenter business. One is providing everything A to Z; the other is only providing operational services.

TYPE OF BUSINESS	DESCRIPTION
Operator	Operates the entire data center from the physical building through to the consumption of the IT services delivered.
Colo Room provider	Operates the data center for the primary purpose of selling space, power and cooling capacity to customers who will install and manage racks and IT hardware.
Colo provider	Operates the data center for the primary purpose of selling space, power and cooling capacity to customers who will install and manage IT hardware.
Colo customer	Owns and manages IT equipment located in a data center in which they purchase managed space, power and cooling capacity.
Managed service provider (MSP)	Owns and manages the data center space, power, cooling, IT equipment and some level of software for the purpose of delivering IT services to customers. This would include traditional IT outsourcing.
Managed service provider in Colo	A managed service provider which purchases space, power or cooling in this data center.

TIER LEVELS

As being a Global Authority, Uptime Institude, in 2005, has launched some standards. The reason is to improve Data Center knowledge and raise the quality of Data Center to gain efficiency.

Tier I: Non-Redundant
Dedicated Data Center Infrastructure Beyond Office Setting

Tier I solutions meet the data center owner's or operator's desire for dedicated site infrastructure to support information technology (IT) systems. Tier I infrastructure provides an improved environment compared to an office setting and includes a dedicated space for IT systems; an uninterruptible power supply (UPS) to filter power spikes, sags, and momentary outages; dedicated cooling equipment that won't get shut down at the end of normal office hours; and an engine generator to protect IT functions from extended power outages. Examples of industries that will benefit from a Tier I facility are real estate agencies, the hospitality industry and business services such as lawyers, accountants, etc.

Tier II: Basic Redundant
Power and Cooling Systems Have Redundant Capacity Components

Tier II facility infrastructure solutions include redundant critical power and cooling components to provide an increased margin of safety against IT process disruptions that would result from site infrastructure equipment failures. The redundant components are typically power and cooling equipment such as extra UPS modules, chillers or pumps, and engine generators. This type of equipment can experience failures due to manufacturing defects, installation or operation errors or over time, worn-out equipment.
Examples of industries that select Tier II infrastructure include institutional and educational organizations because there is no meaningful tangible impact of disruption due to data center failure.

TIER LEVELS (continued)

Tier III: Concurrently Maintainable
No Shutdowns for Equipment Replacement and Maintenance
Tier III site infrastructure adds the capability of Concurrent Maintenance to Tier II solutions.
As a result, a redundant delivery path for power and cooling is added to the redundant critical
components of Tier II. So that each and every component needed to support the IT processing
environment can be shut down and maintained without impact on the IT operation.
Organizations selecting Tier III infrastructure typically have high-availability requirements for
ongoing business or have identified a significant cost of disruption due to a planned data center
shutdown. Such organizations often support internal and external clients 24 x Forever, such as
product service centers and help desks.

Tier IV: Fault Tolerant
Withstand a Single, Unplanned Event, e.g., Fire, Explosion, Leak
Tier IV site infrastructure builds on Tier III, adding the concept of Fault Tolerance to the site
infrastructure topology. Fault Tolerance means that if/when individual equipment failures or
distribution path interruptions occur the effects of the events are stopped short of the IT
operations.
Organizations that have high-availability requirements for ongoing business (or mission
imperatives), or that experience a profound impact of disruption due to any data center
shutdown, select Tier IV site infrastructure. Tier IV is justified most often for organizations with
an international market presence delivering 24 x Forever services in a highly competitive or
regulated client-facing market space, such as electronic market transactions or financial settlement
processes.

STAKEHOLDERS AND THEIR CONCERNS

*TCO: Total Cost of Ownership.
*CAPEX: Capital Expenditure.
*OPEX: Operational Expenditure.
*ROI: Return On Investment.
*CEO: Chief Executive Officer.
*CFO: Chief Financial Officer.
*ICT: Information and Communication Technologies.

KEY ELEMENTS OF DATA CENTER

1. Power and Electrical Infrastructure
2. Cooling
3. Security, Fire Detection-Suppression and Access Control
4. Network/Cabling
5. Knowledge
6. Housing, Cabinets and Corridor Solutions.

POWER IN DATA CENTER

Sometimes, 2 seconds energy interruption in Data Centers will cause many problems all over the world. Or cause of surge equipments will broken down. So to have a good quality energy and continuity on power, electricty has to be design and build according to standarts. Also power using volume and power saving is a world wide issue to home better future.

POWER USAGE EFFECTIVENESS (PUE)

The Power Usage Effectiveness (PUE) of a data center is a metric that is used by engineers and project managers of data center to define the energy efficiency of a data center (over time) and to specify in what areas and through the use of which technologies certain improvements to the energy efficiency could be made.

Although a mature level of PUE information gathering is preferable in the end (Master PUE), one could easily start off with Basic PUE principles and gradually move towards an Advanced PUE and then a Master PUE level. Basic PUE monitoring principles can be implemented using simple tools that are low on initial investments, for example with an instrument like a Current Clamp Meter, which is just a general electrician tool.

A PUE is an index number. Generally speaking a traditional server room design will generate a PUE of about 2.0, sometimes even higher. The closer to 1.0 it gets, the more energy efficient a server room set-up will be. However, a result of 1.0 is hardly possible as it would imply an absence of overheads such as lighting and so on. An overall PUE figure can be subdivided into several location specific sub figures, so adequate and prioritized measurements can be taken in locations that need attention.

The definition of a PUE is as follows: $PUE = \dfrac{\text{Total Facility Power}}{\text{IT Equipment Power}}$

PUE Basic Calculation

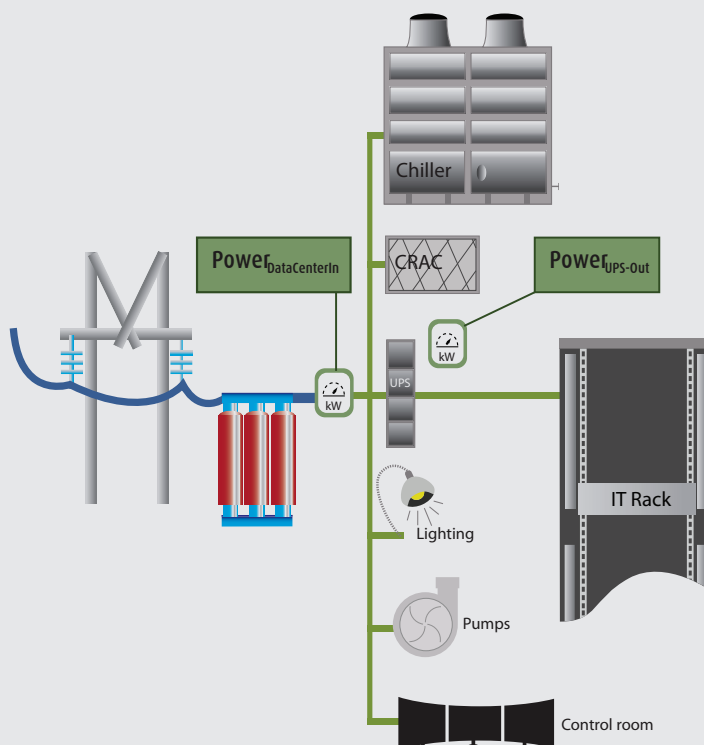$$PUE = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

For example:

	INCOME	UPS INCOME	UPS OUTCOME
1 SEPTEMBER 2012	18.604,8 MWh	6.480.321 kWh	5.184.257 kWh
1 OCTOBER 2012	19.705,3 MWh	7.200.321 kWh	5.760.260 kWh

$$PUE = \frac{Power_{DataCentre-in}}{Power_{UPS-out}}$$

With this calculation, we will have the basic values of the system. Shows only UPS output and Data center input.

$$PUE = \frac{EnergyDC\text{-}in}{EnergyUPS\text{-}out} = \frac{19.705,3 - 18.604,8 \ (MWh)}{5.760,257 - 5.184,260 \ (kWh)} = \frac{1100,5 \ MWh}{575.997 \ kWh} = \frac{1.100.500 \ kWh}{575.997 \ kWh} = \mathbf{1,91}$$

Professional PUE Calculation

For example:

	INCOME	UPS INCOME	UPS OUTCOME
1 SEPTEMBER 2012	18.604,8 MWh	6.480.321 kWh	5.184.257 kWh
1 OCTOBER 2012	19.705,3 MWh	7.200.321 kWh	5.760.260 kWh

$$PUE = \frac{E_{DATACENTRE-IN}}{E_{RACK-PDU1} + ... + E_{RACK-PDU1}}$$

In this calculation you need to measure all Power Distribution Unit (PDU), output of a cabinet (IT Equipment Power) and data center input power (Total Facility Power).

$$PUE = \frac{EnergyDC\text{-}in}{EnergyUPS\text{-}out} = \frac{19.705,3 - 18.604,8 \ (MWh)}{5.760,257 - 5.184,260 \ (kWh)} = \frac{1100,5 \ MWh}{575.997 \ kWh} = \frac{1.100.500 \ kWh}{575.997 \ kWh} = 1,91$$
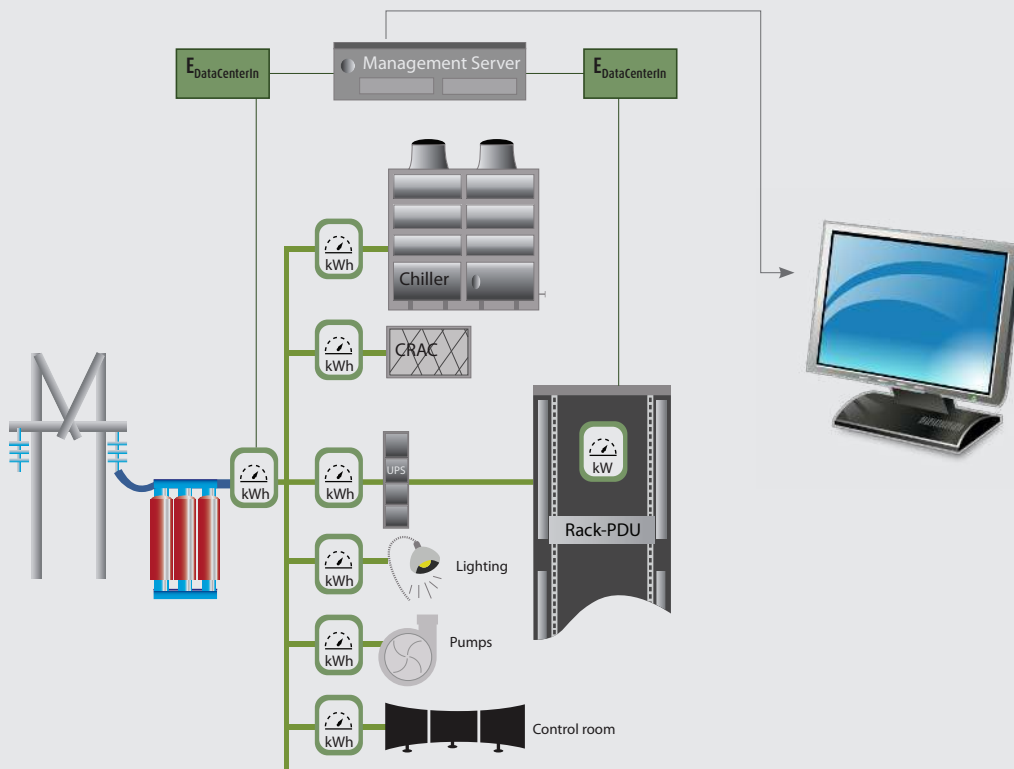
Tips to Lower PUE

Monitoring first of all is a prerequisite to start lowering your PUE figure, otherwise you will never know where to start your quick win efforts and what results it will bring. After having a PUE monitoring system installed one can start picking the low hanging PUE fruits. Not every low hanging fruit will be applicable for every data center in the market, but generally speaking the following actions could be taken to have some quick wins.

• Installing Cold Corridors
Complete separation of hot and cold airflows, achieved by enclosing the roof section between opposing data center cabinets on the cold aisle with glass panels. Both ends of the cold aisle are sealed off using sliding doors to contain the air. Installing Cold Corridors together with other measures will lead to significant efficiency improvements.

• Installing Free Cooling
The use of Free Cooling is not applicable for every data center environment. Especially within existing and full operational data center environments installing Free Cooling would be a tough job to realize. For new data center development however one should definitely have a look at this option. When Free Cooling is actually being installed it is very important to have the system tuned correctly. It happens quite often that Free Cooling is being installed but not tuned the way it should, with the result that the investment in Free Cooling doesn't pay off.

Tips to Lower PUE (continued)

• Reduce air leakage

Cabinets within a Cold Corridor system can be easily equipped with blanking panels, so cooling air is not wasted at spots where no equipment is being installed yet. The use of blanking panels makes sure the only route for air flows is through the equipment. Another way to reduce leaks is by using air sealed racks.

• Adjusting fan speed of cooling systems

Especially when one is using Cold Corridors, the fan speed of cooling equipment can be set at lower levels than one is probably used to. That's because cool air is more equally and efficiently being divided within a Cold Corridor system.

• Allowing higher temperature set points will also lower your PUE figure

Separation of hot and cold air avoids hotspots and therefore temperature set points can be higher without compromising the server inlet temperature. Setting CRAC units at supply air temperature instead of return air temperature before the introduction of hot and cold aisles data center CRAC units were set at room temperature i.e. 22°C. This is return (hot) air temperature. In a Cold Corridor DC the supply air temperature to the servers should be controlled, not the return air temperature. Get in contact with the CRAC unit manufacturer or installer to check whether this is possible.

COOLING SOLUTIONS
About Cooling

Data Center technology has arrived to a point of no return in the recent times. The servers used in them have evolved and have reduced in physical size but have increased in performance levels.
The trouble with this fact is that it has considerably increased their power consumption and heat densities. Thus, the heat generated by the servers in Data Centers is currently ten times greater than the heat generated by them around 10 years back; as a result, the traditional computer room air conditioning (CRAC) systems have become overloaded. Hence, new strategies and innovative cooling solutions must be implemented to match the high-density equipment. The rack level power density increase has resulted in the rise of thermal management challenges over the past few years. Reliable Data Center operations are disrupted by hot spots created by such high-density equipment.
Some of the main Data Center challenges faced in the current scenario are adaptability, scalability, availability, life cycle costs, and maintenance. Flexibility and scalability are the two most important aspects any cooling solution must possess; this, combined with redundant cooling features, will deliver optimum performance.
The two main Data Center cooling challenges are airflow challenge and space challenge. These challenges can be overcome with the use of innovative cooling solutions.

ASHRAE, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc, whom is defining standarts, adviced the recommended environment conditions as like in below chart in 2008.

ENVIRONMENT	CONDITION
Low End Temperature	18°C (64.4 °F)
High End Temperature	27°C (80.6 °F)
Low End Moisture	5.5°C DP (41.9 °F)
High End Moisture	60% RH & 15°C DP (59°F DP)

2012 ASHRAE Environmental Guidelines for Datacom Equipment

Cooling Design Models

Hot Aisle Containment
Racks will be positioned in rows back to back. The hot aisle in between racks will be covered on the top and at the end of the rows and ducted back to the CRAC unit. A full separation between supply and return air is achieved. Cold supply air will be delivered into the room and the room itself will be at a low temperature level.
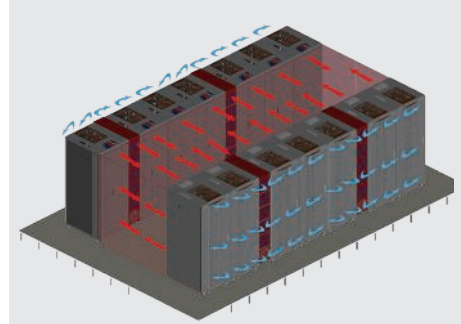
Cold Aisle Containment
Racks will be positioned in rows front to front. The cold aisle in between racks will be covered on the top and at the end of the rows. A full separation between supply and return air is achieved. Cold air will be supplied through the raised floor into the contained cold aisle; hot return air leaves the racks into room and back to the CRAC unit. The room itself will be at a high temperature level.
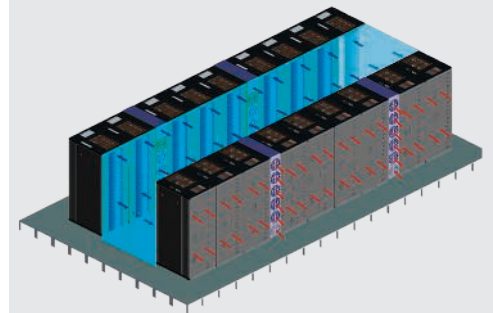
Direct In-Rack Supply, Room Return Concept
Cold supply air from the CRAC enters the rack through the raised floor directly in the bottom front area. Hot return air leaves the rack directly into the room. A full separation between supply and return air is achieved. The room itself will be at a high temperature level.
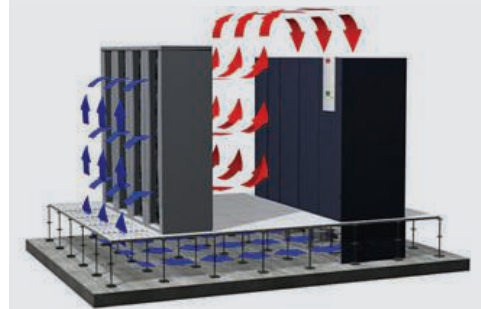
Room Supply, Direct Rack-Out Return Concept
Cold supply air from the CRAC enters the rack through the room. Hot return air leaves the rack through a duct and suspended ceiling directly back to the CRAC unit. A full separation between supply and return air is achieved. The room itself will be at a low temperature level.

Close coupling of CRAC units and Racks on Supply and Return Side
Cold supply air from the CRAC enters the rack through the raised floor directly in the bottom front area. Hot return air leaves the rack through a duct and suspended ceiling directly back to the CRAC unit.
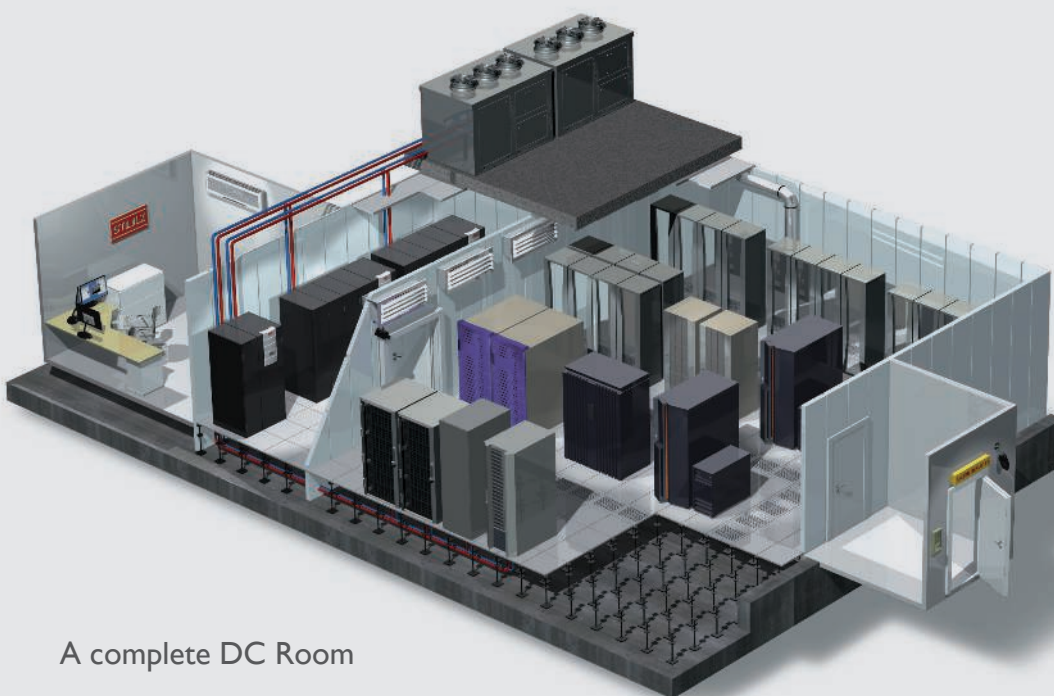
Cooling Design

Hot Aisle and Cold Aisle solutions have same cooling power and power efficiency. Just are different installation and different ideas of different Data Center drivers on the way of same goal.
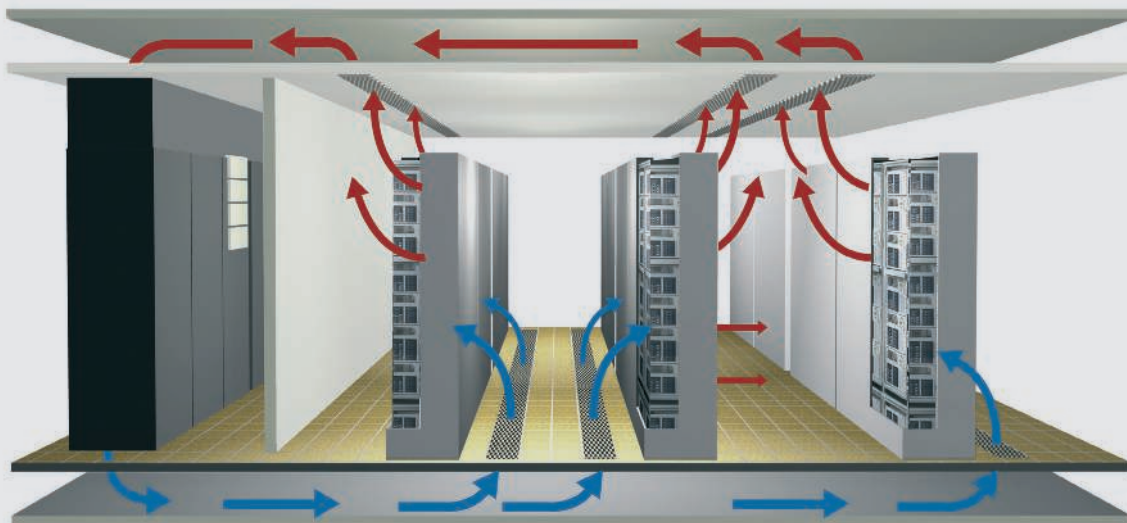
Crac on Supply and Return

A complete DC Room

Cooling Units

What is CRAC Unit?

Computer Room Air Conditioning (CRAC) unit is a device that monitors and manages the temperature, air distribution and humidity in a network room or data center.

Mini Crack Unit

MiniSpace DX
Cooling capacity5 kW
to 23 kW Cooling systems
A/GDirection of
airdownflow / upflow

MiniSpace CW
Cooling capacity 11 kW
to 28 kW Cooling systems
CWDirection of
airdownflow / upflow

Cool your medium or small sized DCRooms.

The advantages at a glance
- Maximum cooling performance with minimum floor space
- Air-cooled, water/glycol-cooled and chilled water versions available
- Units as downflow and upflow versions
- Simple installation and maintenance through doors on the front air filtering with filter class EU 4
- Steplessly adjustable EC fan
- C7000 IO controller for controlling and monitoring the air-conditioning system
- Automatic switchover to redundant standby units in the event of problems
- Modbus preinstalled
- Continual recording of measured values

Options
- C7000 Advanced user interface with LCD graphic display, RS485 interface and other preinstalled data protocols for linking to building services management systems
- Communication via SNMP/HTTP IP protocols
- Humidifier/heating
- R134a high-temperature refrigerant

Cooling Units

Crack Unit

Dimensions
WxHxD in mm

Size 1: 950 x 1980 x 890
Size 2: 1400 x 1980 x 890
Size 3: 1750 x 1980 x 890
Size 4: 2200 x 1980 x 890
Size 5: 2550 x 1980 x 890
Size 6: 3110 x 1980 x 890
Size 7: 3350 x 1980 x 890

CyberAir 3 DX and Dual-Fluid Units, single-circuit
Cooling capacity 18 kW to 54 kW Cooling systems A/AS/G/ACW/GCW Direction of airdownflow / upflowSizes1-3; AS only 2

CyberAir 3 DX and Dual-Fluid Units, dual-circuit
Cooling capacity 40 kW to 105 kW Cooling systems A/AS/G/ACW/GCW Direction of airdownflow / upflow Sizes 3-5; AS only 3,4

CyberAir 3 GE Units, single-circuit
Cooling capacity 18 kW to 55 kW Cooling systems GE/GES Direction of airdownflow / upflow Sizes1-5; GES only

CyberAir 3 GE Units, dual-circuit
Cooling capacity 41 kW to 104 kW Cooling systems GE/GES Direction of airdownflow / upflow Sizes1-5; GES only 4,5

*Size 7 is only available as a downflow version

CyberAir 3 CW
Cooling capacity 30 kW - 214 kW Cooling systems CW Direction of airdownflow / upflow Sizes1-5; 7*

CyberAir 3 CW2
Cooling capacity 27 kW to 137 kW Cooling systems CW2 Direction of airdownflow / upflow Sizes1-5; 7*

CyberAir 3 CWE/CWU
Cooling capacity 39 kW to 237 kW Cooling systems CWE/CWU Direction of airdownflow Sizes1-5; 7; 8

Cooling Units

Outside Unit

Direct Expansion DX units (open and closed loop) are a suitable solution for data centers of any size. The heat load absorbed by the refrigerant gas is released to the external environment through modular motor-condensing units, with cooling capacity from 4 kW to 20 kW.
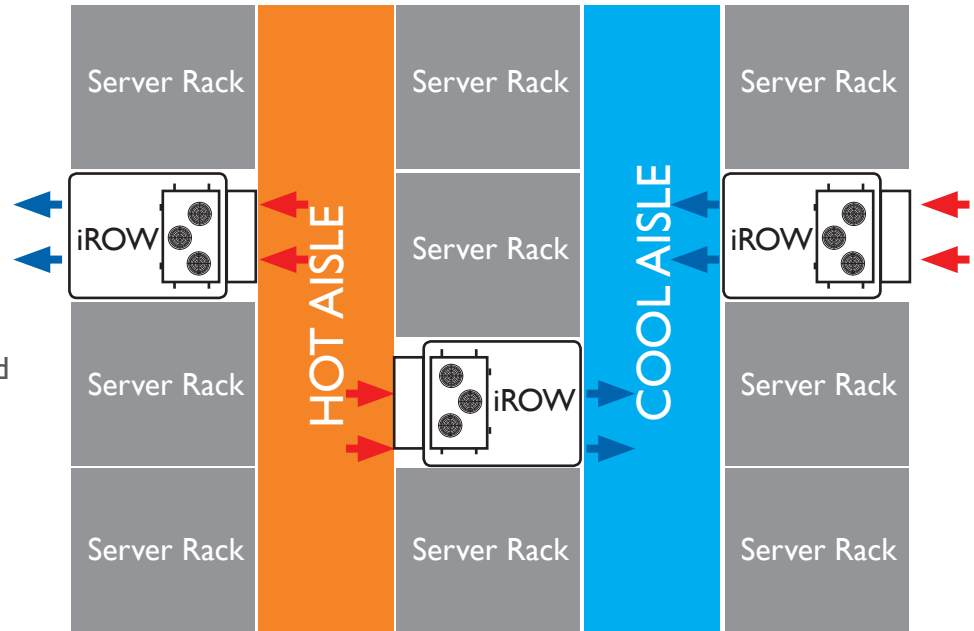
Equipped with:
- Fan Hot Swap: on "multiswitch bar"
- Temperature probes on return air
- Fixed or variable fans speed according to set point
- Humidity Sensor for dehumidification mode.
- External motor-condensing unit with inverter compressor.

Cooling Units

Open Loop, for hot/cold aisle solutions.

Hot air heated by server sucked from hot aisle and delivered to cold aisle as cold air.

Server Rack	HOT AISLE	Server Rack	COOL AISLE	Server Rack
iROW		Server Rack		iROW
Server Rack		iROW		Server Rack
Server Rack		Server Rack		Server Rack

Model	Power Supply (V/ph/Hz)	Cooling Circuit	Cooling Capacity (kW)	Air Volume (m³/h)
RAW A1	230/1/50	Chilled Water	12,5	2500
RAW A7	230/1/50	Chilled Water	16,2	3600
RAW AB1	230/1/50	Chilled Water	19,5	3600

Airflow in Cooling

Today's Data center industry is moving more and more towards energy efficient cooling solutions. Free cooling or Fresh Air cooling is one of the techniques which has become increasingly common. This is a great development towards a more sustainable and profitable IT-industry, but there is still much to be gained, especially in the area of proper airflow design. Daily practice shows that despite some useful measures, such as the Cold Corridor, blanking panels etc. There are still a lot of inefficiencies in the air transport system. Due to bypass and recirculation a poor utilization of installed cooling capacity of the air leads to unstable and unpredictable airflow behaviour.
By simple and low-cost improvements major energy consumption and reliability benefits can be achieved. Although cooling systems become more efficient that doesn't mean cooled air is used optimally. It's like driving a hybrid car over a sandy road. It doesn't make sense if you don't look at all the aspects impacting the efficiency of your cooling design. The goal is to better utilize our installed cooling capacity and make sure that all the air leaving the cooling units reach the IT-equipment without any blending along the way. The benefits are a reduced energy consumption, increased cooling capacity and a more manageable environment.

Airflow Improvements

Improper airflow design will basically cause the supply (cold) air to warm up and the return air to cool down therefore compromising the efficiency of the cooling system. As a result it makes it hard to predict how much air and at what temperature will make it to the IT-equipment. Although the Cold Corridor has already contributed significantly to minimize these effects there is still room for improvement. The most common causes of non optimal usage of airflow inside a traditional CRAC cooling setup are described below.

Static Pressure Difference (SPD): At floor level near the cooling units hot return air can bypass the cooling unit due to differences in air velocities and the resulting static pressure differences, also called negative pressure. The location is typically near the cooling unit due to the high airspeed differences there.

Bypass Cold Corridor (BPCC): Referring to conditioned air from the raised floor that is directly bypassing the Cold Corridor. Usually this is caused by floor cutouts or poorly sealed cable throughputs on the rear side of cabinets.

Bypass Rack (BPR): Conditioned air inside the Cold Corridor that is bypassing the IT equipment and is directly deposited into the hot corridor. Traditionally this occurs due to poorly sealed side-panels, blanking panels and large gaps between racks, doors and roof panels.

Recirculation (R): At rack level return air can be forced into the Cold Corridor by poorly designed air ducts around network equipment, fluctuating static pressure build up inside the Cold Corridor and large differences between server's airflow.

The net result of 3 and 4 determine whether the air inside the Cold Corridor heats up or the air deposited in the hot aisle cools down.

Placed only at positions, where cold air is really required.

• Do not place perforated tiles near CRAC units; keep at least 2m distance "negative airflow".

Close any entry holes

Existing Improvements

Many of the improvements are not complex in nature and might seem obvious. However, common day practice shows that often they are poorly executed. The reasons for that can be numerous. Nevertheless, keep the following guidelines in mind.

1. Static Pressure Difference or Negative Pressure can be dealt with by properly sealing the area around the CRAC units or any other cooling devices. Be critical in the selection of floor tiles as well. The biggest gain can come from reducing the average airspeed by increasing the raised floor height as much as possible.

2. Make sure that at the bottom of all cabinets the cable throughputs are sealed completely. Standard cable brushes do not provide sufficient sealing. Improved products exist.

3. Use special sealed side panels and blank panels and be critical to all remaining construction related openings.

4. Use specially designed network equipment air guidance ducts. Standard solutions do almost never fully force the air in the right direction. Due to the variety of network equipment many special products have been developed already.

5. At server level check the specifications of the servers to be applied. Make sure that your servers contain fans with almost identical fan characteristics. If you do have several type of servers, which is very likely, make sure they are grouped logically. When this is beyond your scope of influence make sure that guidelines are in place.

6. Apply only Cold Corridors where special attention has been paid to air leakage. Properly sealed roof panels, sliding doors and a door closing system that automatically shuts down are some of the measures which decrease air leakage. Make sure that pressures inside the Cold Corridor do not exceed 5-7 Pa. If you require higher levels of pressure there is something wrong in the way your corridors are setup.

7. Make sure that all openings in the building's wall, that are not meant for natural ventilation, are sealed properly, especially around cable throughputs.

OPERATIONAL EXCELLENCE IN DATA CENTER

Operational Excellence is a definition that enables one to focus on achieving ones business goals in an integrated approach. Not just only focus on one aspect, like the PUE, but take into account the complete operation required to successfully do business or fulfill a function. Whether the Data center is small or large, commercial or corporate, Operational Excellence helps to professionalize because it challenges to analyze the Data center activities in a process like way.

Operational Excellence from the point of view of Data centers

Operators means:

1. Optimize the quality of Data center products and services towards (internal) IT-customers, know their demands.

2. Optimize processes and effectively use resources to decrease the total cost or impact of an operation.

3. Create a flexible business process which can adapt to varying market demands.

Below Table shows us the requirements of both Operator and Supplier.

The Expectations From a Data Center

DATA CENTER OPERATOR PERSPECTIVE	DATA CENTER SUPPLY INDUSTRY PERSPECTIVE
Delivery of a quality IT-product at a reasonable price	Provide energy efficient solutions that are also reliable
A business strategy that fits (changing) market opportunities	Incorporate the right level of modularity and flexibility into the solutions provided.
A continuous process of innovation to stay competitive and maintain quality.	Provide intelligent solutions which give the DC manager sufficient control over his processes
Improve process and risk controls	Create a transparent design to keep good overall control
Keep up to date with legislation and standards.	Solutions should resemble the latest insights
Streamline processes to reduce costs.	Provide integrated solutions which are dedicated and optimised
Keep focusing on core activities, specialise	Ability to customise solutions

Indicators for Operational Excellence

1. People: IT users:

Increasing demand for data: Developments like Youtube and the social media, Twitter, Facebook, etc. have resulted in people using more data and becoming more reliant on availability of data anywhere at any time.

New markets: Beside the growing applications, there is a potential large 'new' consumer market waiting to profit from all the benefits the digital era has to offer. China and India form a market of more then 2 billion potential users.

2. Technological Developments:

Miniaturisation of electronics: Moore's Law still holds and the further decreasing size and costs of electronics create new product opportunities. This can only lead to more data being used. Think of all the mobile applications for example.

Cloud computing and virtualisation: These trends result in the decoupling between hardware and software. It's no longer about ownership but about availability.

3. Market / Competition:

Insourcing versus Outsourcing: Many companies re-evaluate what services, for example e-mail, should be outsourced and what products should be kept within the company. It's all about what belongs to the core competence of ones business and what IT-competences available in-house versus what common IT-goods can be better handled by specialised commercial Data centers.

Energy costs: The continuously rising energy prices together with the increasing energy consumption makes the costs related to energy form a big portion of the total Operational Expenses (OPEX) which is passed on to the costs of IT-services.

Solutions and Operational Excellence

The Data center supply industry should provide solutions which are:

Manageable: The many changes taking place during the lifetime of a DC should not have an impact on the quality and availability of a product. Solutions should be simple yet effective.

Modular: To minimize the financial impact the investments (CAPEX) and operational expenses (OPEX) should be matched with the specific Data center budgets.

Flexible: The right level of modularity increases the flexibility. This is required to be responsive towards market developments. A tool will given later on in this book.

Energy Efficient: Both for the sake of lowering the Operational Expenses (OPEX) as well as reducing the carbon footprint from an environmental responsibility point of view.

Importance of Cooling and Integration for Operational Excellence

Cooling because:

• It plays a big part of the total energy consumption of a DC. There by contributing heavily to the total operation costs.

• Cooling is a fundamental ingredient in a reliable and successful operation of IT-equipment.

• Cooling equipment technology is not yet fully optimised for DC operation. There is still much to be gained in improving cooling components and architectures.

Integration because:

• It can increase the effectiveness and efficiency of the IT-
  infrastructure components considerably when the individual
  components work together as one entity.

• A good integration facilitates future growth and expansion by telling
  exactly the current state of a DC at any given time. It therefore
  allows to be well managed.

• A good integration platform/system goes even further by showing
  how the Data center operation can be improved and thereby
  relieves some of the tasks from the Data center manager.

PERSPECTIVES OF DATA CENTERS

There are 5 main perspectives that play a role in designing of Data Center.

Business/Financial perspective: The Data center is regarded as a financial
asset or seen as a business unit serving the organization from which it is
part of. In commercial Data centers, the costs and profits can be more easily
subscribed to the Data center operation. In a corporate environment, the
costs and profits cannot only be expressed in financial parameters only. Due
to its supporting function IT is an enabler of business. Nevertheless budget
regimes and business goals can be determined for the Data center. Typical
stakeholders in this perspective are CEO, CFO.

The commercial/IT perspective: Whether the IT-services provided are meant
for inter-company or external end-users, in any case there should exist a
balance between demand and supply of IT-services. From this perspective
the Data center its main function is to translate desires/demands into
functionality/services. The commercial perspective raises the question:
What should this Data center do for my (internal) customer?

The technical perspective: Computers can only operate if there is enough power, cooling, network and presence of infrastructure components available. Almost all electrical energy is converted into heat. The technical infrastructure is basically there to keep the computers running safely under the right conditions. Nothing more and nothing less. The IT-infrastructure has a facilitating nevertheless important role. Beside electrical energy, air and, in some situations, water is required to be able to remove the heat to the outdoor environment.

The sustainable perspective: As part of the Corporate Social Responsibility (CSR) it is the duty of each company to operate in a way that minimizes its environmental impact. Using materials, consuming energy and wasting heat to the environment produces CO2 as by product.

The people's perspective: Another aspect of the CSR is the social context in which or by which a Data center operates. In all fore mentioned perspectives people are involved. Beside work related drivers people always have personal drivers as well. For any business to be successful it is necessary to know the personal drivers of it's (internal) people.

ENVIRONMENT / SUSTAINABILITY:

Legislation and awareness: Governments and organisations become more aware of their responsibility towards the environment and want to act in a proper way. In the UK the CRC (Carbon Reduction Commitment) sets up a whole system of legislation in order to stimulate companies to reduce their energy consumption. Also the Dutch government has adopted a sustainable purchase policy.

SECURITY
Fire Suppression Agents

There are three main agents used in Fire Suppression Systems for Data Centers Inert Gas, FM200 and Novec 1230. Each has it's own advantages and disadvantages and it is best to know them all so that you can decide what is best for your Data Centre.

Inert Gas

Inert Gas Suppression Systems have the best credentials in relation to the environment. They consist of up to naturally occurring gases namely Nitrogen, Argon and CO_2 and can be used in a number of different mixture. Inert Gas is very flexible in that it can protect multiple rooms and also be stored at a relatively long distance from the Data Centre.

Inert Gas Fire Suppression Agents unfortunately take up quite a large amount of space in comparison to other agents. This is because they are store as gases at high pressure and therefore are not very efficient in terms of storage space.
The high pressure they are stored at also means that you must fit Over Pressure Vents to ensure during a discharge the building is not damaged.

FM200

FM200 was the main replacement for Halon when it was banned for use as a Fire suppression Agent. This agent is commonly called a Clean Chemical Agent and is a cost effective Fire Suppression Agent and because it is stored as a liquid (but discharged as a gas) it has small footprint in comparison to Inert Gas Fire Suppression Systems. FM200 is not as environmentally friendly as Inert Gas and Novec 1230 as it has a Atmospheric Lifespan of up to 36 years this of course can be offset from the fact that you would only be discharging FM200 during a fire and therefore the environmental impact of a fire would be much greater than the FM200.

Novec 1230

Novex 1230 is the newest of the normally used Fire Suppression Agents used in Data Centres and is similar to FM200 in that it is much more efficient storage than Inert Gas Agents as it is stored as a liquid and discharged as a gas.
Novec 1230 is much more environmentally friendly than FM200 in that its Atmospheric Lifespan is just 3-5 days.

It requires slightly more agent by weight than FM200 and is also quite a bit more expensive but good things don't always come cheap.

* Estap is prefering and supplying Novec Systems.
For more information and pricing, please contact sales department.

Physical Security Systems

Security starts from entrance of facility. Only the permitted personel can pass through the doors. To pass, there are several types of security controls as we all know. Different types of proximity card pass, retina pass, finger print,cameras, etc.

Cabinet Door Locking Systems / Mechanical Locks

There are a lot of mechanical lock mechanisms to apply onto cabinet doors. Some of them are like below.

K1185-U1
Cool design
aesthetic view
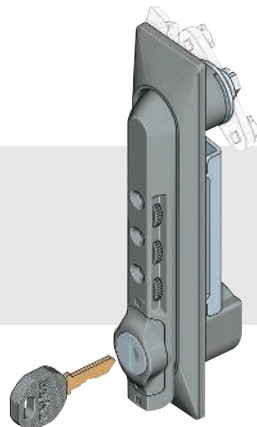
K1155
3 digit locking
system

K1325-U2
4 different easy changeable
barrel options:
Cylindirical, semi cylindirical,
electronic and insert.

K1150-U56
Electro-mechanic
locking system

K1125
Semi-cylindrical
barrel

K1225
Cylindrical barrel

Cabinet Door Locking Systems / Electronical Locks

Agent E is a battery-operated electro-mechanical handle module which can be installed instead of a usual handle or quarter turn. It takes over the functionality of the lock. Three different versions of Agent E are available (Basic, Professional, Superior). Release and programming is effected via micro transmitter (TAG) with an encoded light beam, directed to a receiver cell inside the handle module.

K3000-U 93 (Agent E)

Stand Alone: Can be applied both front and rear or only front. No need external power supply unit. Two options, keypad with handle and keypad.
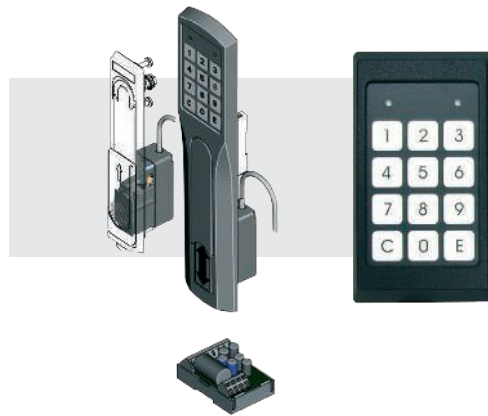
Proximity Locks: To monitor and control cabinet doors 7/24 and take logs who and when opened the doors. Also you can assign different authorisations to proximity cards. You can recieve alarms by SMS with the GSM unit.

Cabinet Door Locking Systems / Electronical Locks

Box - encapsulated version

The "Box Module" is a closed metal housing with dimensions 235 x 135 x 33 mm in RAL-7035.
The housing can be equipped with one single ELM electronic module.
The "Box Module" provides the same plug connector system as the 19" Rack Mount Unit.

GSM Module

By means of DTMF-capable telephone (mobile or fixed network) a telephone connection is established to the GSM modem and therewith access is given to the complete ELM System.
All locking systems connected can be operated. Furthermore, text messages (SMS) of certain alarms may be sent to correspondingly listed addresses.
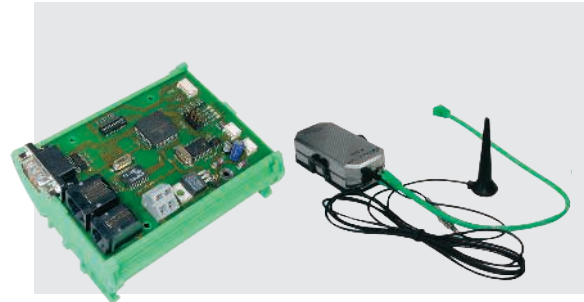
KIT - for top hat rail mounting

The modules in the KIT version are appropriate especially for connection and control systems.
The modules are connected to each other via special CAN bus cables; handles and sensors are connected via push terminals. The modules are installed in a carrier for top hat rail mounting.
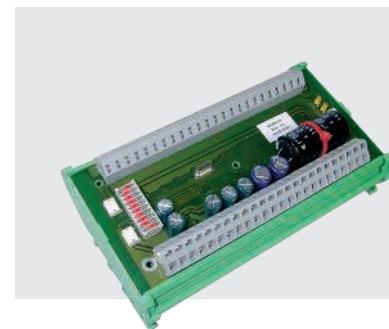
19" rack mount unit 1 HE

The 19" rack mount unit of the ELM system may be equipped with up to 6 modules of the ELM System.
Composition and wiring are carried out according to the customer's needs.
To equip the racks with modules the full scope of the ELM System can be used.

CABINETS

As we have seen in previous pages, cooling and power management is very important in Data Center projects. But you need to build a good house for your active and passive equipments.

Cabinet is one of the important structure of housing. To fix your equipments and to manage the cabling well organized, Estap provides a wide variety of cabinets and accessories.

Features Of Cabinets

- IP20 protection level for cooling performance.

- %80 perforated front/rear doors for best air circulation.

- Easy move 19" rails while loaded.

- Curved door for free space for front cabling.

- Heavy duty structure, 1500kg load carrying capacity.

- Wide Range of cabinet sizes and accessories. Dimensions:
  42/47U 600 or 800x1000/1100/1200 mm

- Ready for cold / hot corridor containment.

- Ample variety of accessories.

- Maximum inner space for servers.

- Professional cable management on top, bottom and inner of cabinet.

- Compatibility with all vendors' servers.

- High technical performance; grounding continuity.

- Aesthetic and professional view.

- Overhead cable trays separate electrical and data cables.

- 2 and 4 section Co-Location cabinets.

- By using cable rings, airflow is improved, installation time and cost is reduced.
  It creates space savings and flexibility inside the cabinet.

- Passed Belcore Zone 4 earthquake test with 1000kg. load.

- With special design of side frames, you can move the 19" mounting rails while equipments loaded.

- Simply the raceway for cables are created by fixing cable rings on all profiles in front and rear part of the cabinets.
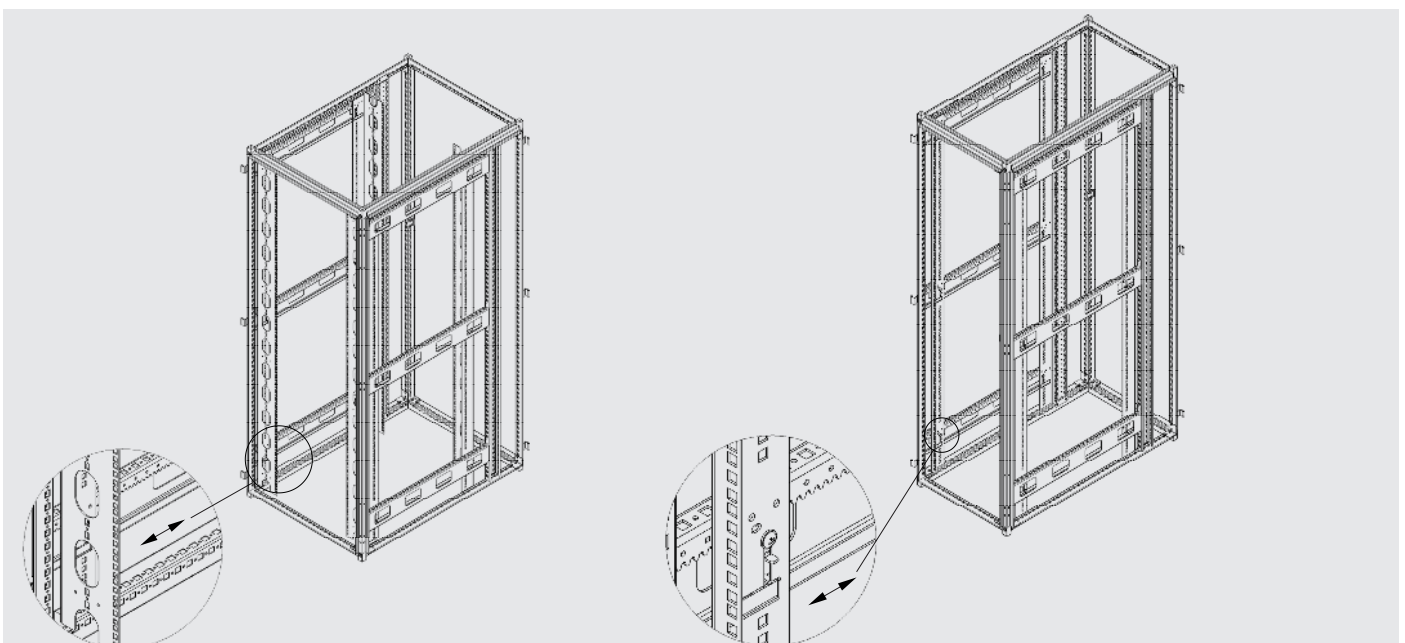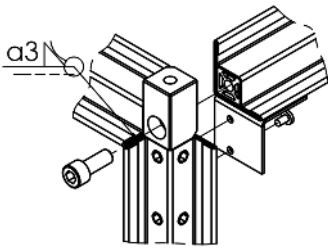
Technical Specifications

MAIN STRUCTURE
Closed Form Frame Structure:

Produced from DKP sheetmetal with a special technique to have a strong frame.

• Produced from DKP sheet metal.
• The curved door has %80 perforations to have a good air flow.
• Provides enough space for patch cords between door and equipment.
• Can open 130°.

Locking Mechanism:
3 point lock, handle with semi cylindirical barrel of EMKA.

Hinge System:
3 pcs Zinc alloy Steel to fix the door.
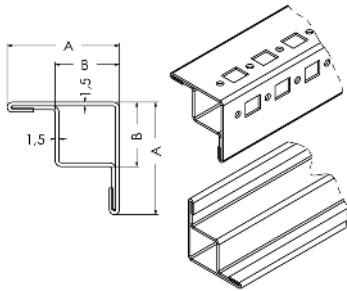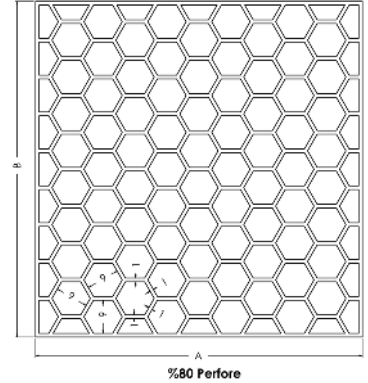
%80 Perfore

SIDE PANEL
Structure:
• Produced from DKP sheet metal.
• Thickness is 1,5mm.
• Fixed to cabinet from 8 point by screw.
• 2 pcs in one side.

REAR DOOR
Structure:
• Produced from DKP sheet metal.
• The flat door has %80 perforations to have a good air flow.
• Can open 130°

Locking Mechanism:
3 point lock, handle with semi cylindirical barrel of EMKA.

Hinge System:
3 pcs Zinc alloy Steel to fix the door.

ROOF
Structure:
• Produced from DKP sheet metal.
• Suitable to fan fixing.
• Cable Entry Alternatives
• High cable entry possibility.
• Brush type cable entries.
• Sliding cover cable entries.
• Cable Manager Bag option.

CERTIFICATES

ENVIRONMENT:
EN61587-1/4.2, IEC60068-2-1, IEC60068-2-2, IEC60068-2-30, IEC60917 ve IEC60297
Industrial Enviroment:
EN61587-1/4.3, IEC60068-2-42, IEC60068-2-43 and IEC60068-2-49, IEC60068-2-1,
IEC60917 ve IEC60297
Static Mechanical Loding Test:
EN61587-1 / 5.2.1, IEC60917 and IEC60297
Static Mechanical Structure:
EN61587-1 / 5.2.2, IEC60917 ve IEC60297
Dynamic Load, Vibration and Mechanic:
EN61587-1 / 5.3.1, EN61587-1 / 5.3.3, IEC60917, IEC60297, IEC62208
Earthing:
EN61587-1 / 6.2, IEC60917 ve IEC60297
Fire Resistance:
EN61587-1 / 6.3, IEC60917 and IEC60297
Corossion:
ISO9227 and ASTM B 117-85, IEC60917 and IEC60297
IP Protection Level:
IP20 regarding to EN61587-1 / 6.4, IEC60529, IEC60917 and IEC60297
Carrying:
ETS300019-1-2 Class2.3
Loading:
ETS300019-1-1 Class1.2
Security:
EN60950_LVD
Loading Capacity:
1500 kg static load. Passed earthquake test with 1000kg.
(BELLCORE GR-63-CORE ZONE 4, NEBS requirements).

PURCHASED PRODUCT CERTIFICATES:
Sheet Metal:
ISO 9001, DIN EN 10130 – 99 Ereğli DC- 01 6112, RoHS
Electrostatic Dry Paint:
ISO 9001, ISO 2178, ISO 2813, ISO 6272, ISO 8130-5, ISO 8130-3, RoHS, Reach, ISO
8130-1, ISO 8130, ISO 1519, ISO 1520, ISO 2815, ISO 2409
Fan:
ISO 9001, CE (89/336/EEC EMC, 73/23/EEC LVD), RoHS
Glass:
ISO 9001, EN 12150 – 1 : 2000 (tempered/security glass)
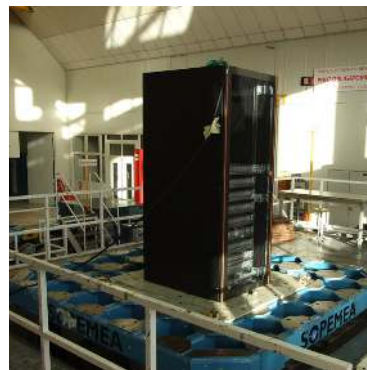**Fixing units (screw, washer, nut, etc):**
DIN 7985, DIN 965, DIN 7981, DIN 934, DIN 985, DIN 933, RoHS
Castors: ISO 9001, TS EN 12530, TS EN 12532, RoHS
Locking Systems: DIN 1743, DIN 53571, RoHS

Seismic Test Report

Bellcore Seismic Test shows us, the cabinet is how durable against vibration and movement.

BELLCORE GR-63-CORE zone 4 (NEBS requirements) TEST HAS BEEN PASSED WITH 1000kg!

3.6.1 RESONANCE FREQUENCY SEARCH

Date	Axis	Program	Duration	Graph No	Comments
21/01/10	Z	A	6 min.	1 to 14	Nothing to report
21/01/10	X	A	6 min.	15 to 28	Nothing to report
21/01/10	Y	A	6 min.	29 to 42	Nothing to report

3.6.2 EARTHQUAKE RESISTANCE TEST

Date	Axis	Program	Duration	Graph No	Comments
22/01/10	Z	B	30 s	A 43 to 68	Nothing to report. No damage was observed on each tested part.
22/01/10	X	B	30 s	B 69 to 94	Nothing to report. No damage was observed on each tested part.
22/01/10	Y	B	30 s	C 95 to 120	Remark: during test, opening of the front mesh door and the rear mesh door. See video. Deformation of the front mesh door of the cabinet. Deformation of the rear mesh door closing linage. It is noted deformations inside the cabinet on recoveries of the 4 pillars. ESTAP informed SOPEMEA that door are not a relevant tested part (only for integration of cabinet for test process) Cracks on 2nd and 3rd rack. Deformation of vertical pillar on the 1st and 2nd rack. It's not broken, no cracks are detected. No deformation on the outer structure of the cabinet (out of mesh doors).

Load Carrying Capacity Test

1500kg Static Load to fix your equipments without any hesitation.

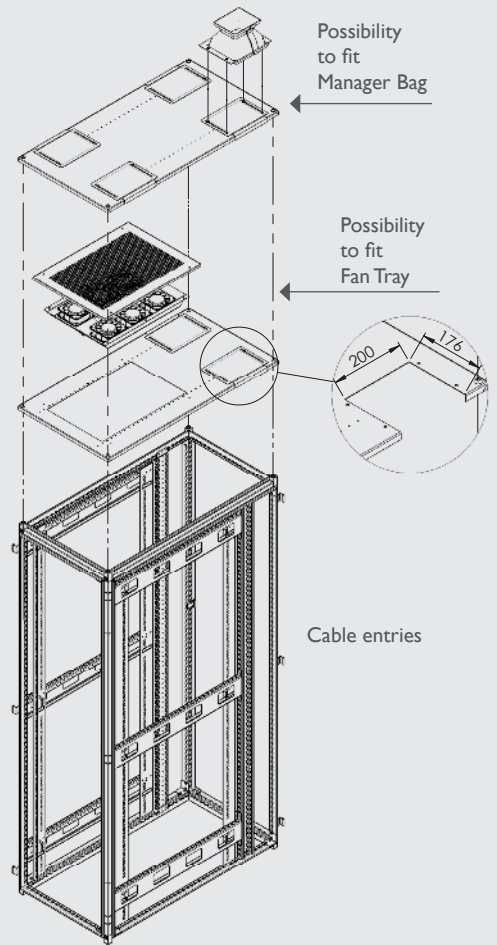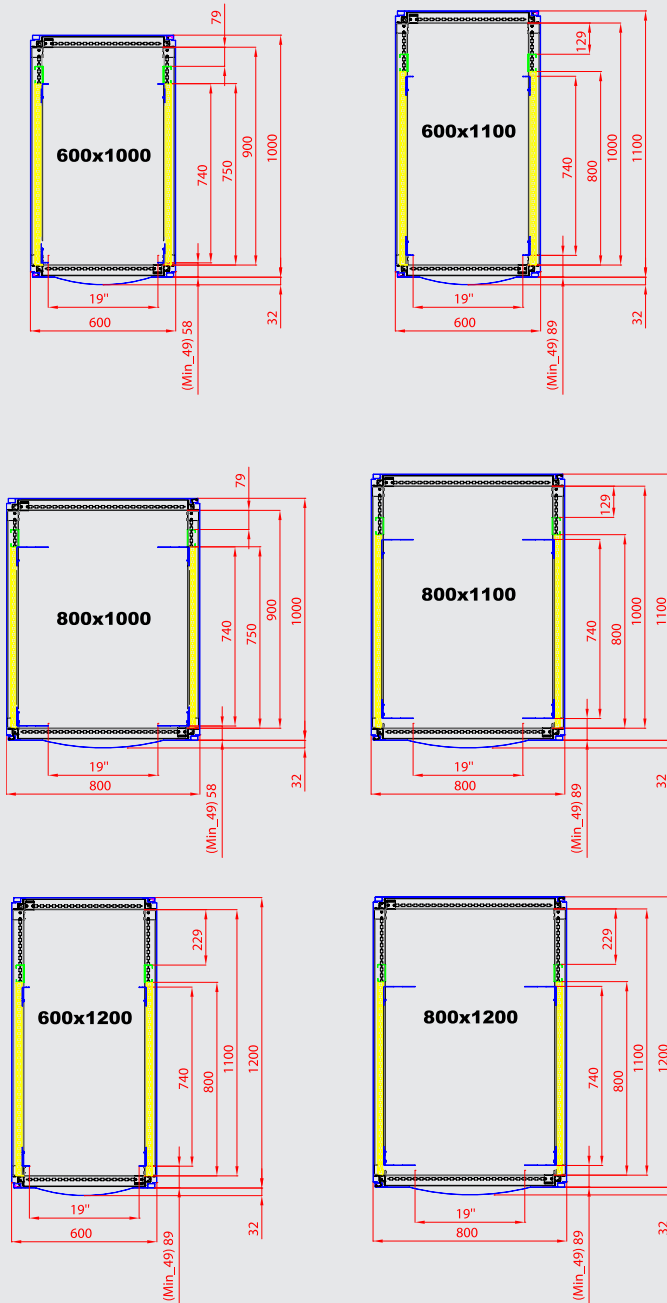## Diagonal Dimensions of ESTAP DCMAX Data Center Cabinet at Each Static Load

Dimensions (mm)

Static Load (kg)
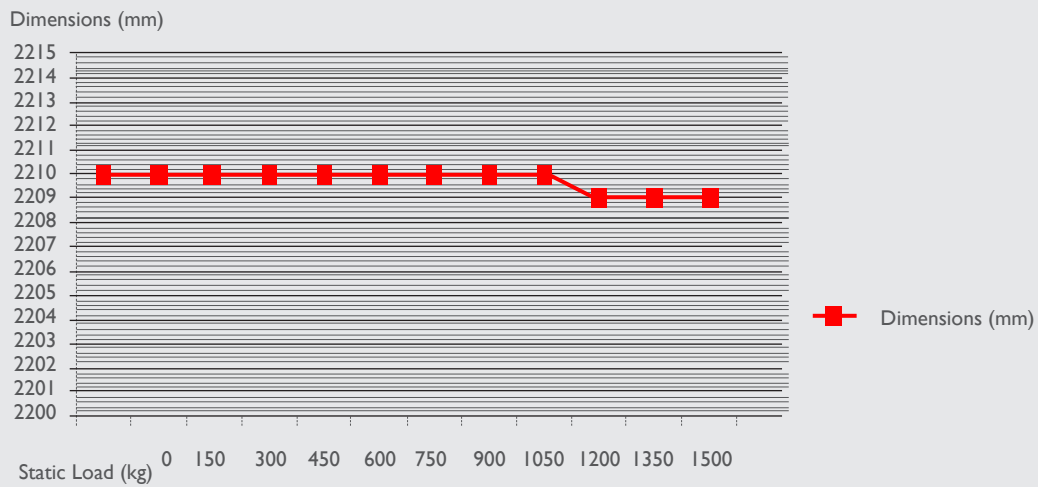
■ Dimensions (mm)

Thanks to the special structure and design, Estap DcMax cabinets can carry 1500kg static load.

600x1000

79
900
1000
740
750
19"
600
32
(Min_49) 58

600x1100

129
1000
1100
740
800
19"
600
32
(Min_49) 89

800x1000

79
900
1000
740
750
19"
800
32
(Min_49) 58

800x1100

129
1000
1100
740
800
19"
800
32
(Min_49) 89

600x1200

229
1100
1200
740
800
19"
600
32
(Min_49) 89

800x1200

229
1100
1200
740
800
19"
800
32
(Min_49) 89

Possibility to fit Manager Bag

Possibility to fit Fan Tray

200
176

Cable entries

Cabinet Dimensions and Part No - W600

Single Opening, Curved, %80 Perforated Front Door;
Double Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U61055PWPD	19" 42U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2000x1000
SRVES42U61155PWPD	19" 42U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2000x1100
SRVES42U61255PWPD	19" 42U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2000x1200
SRVES47U61055PWPD	19" 47U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2200x1000
SRVES47U61155PWPD	19" 47U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	600x2200x1100
SRVES47U61255PWPD	19" 47U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2200x1200

Cabinet Dimensions and Part No - W600

Single Opening, Curved, %80 perforated Front Door;
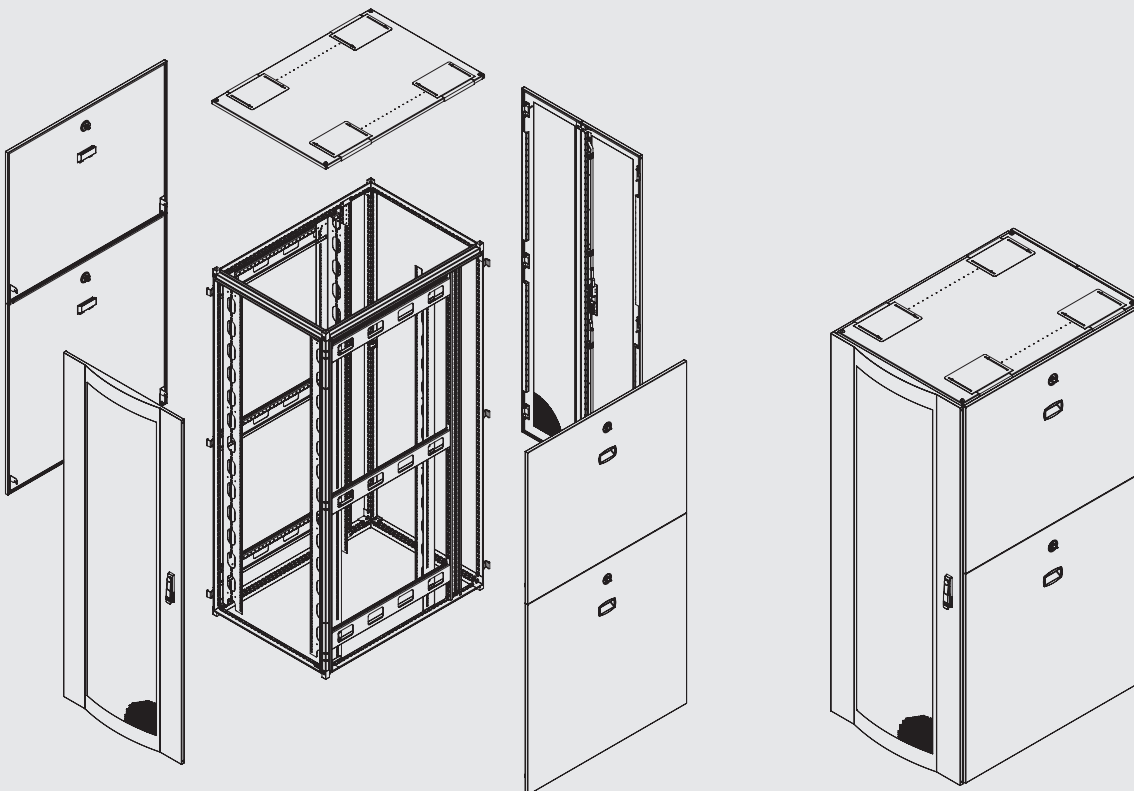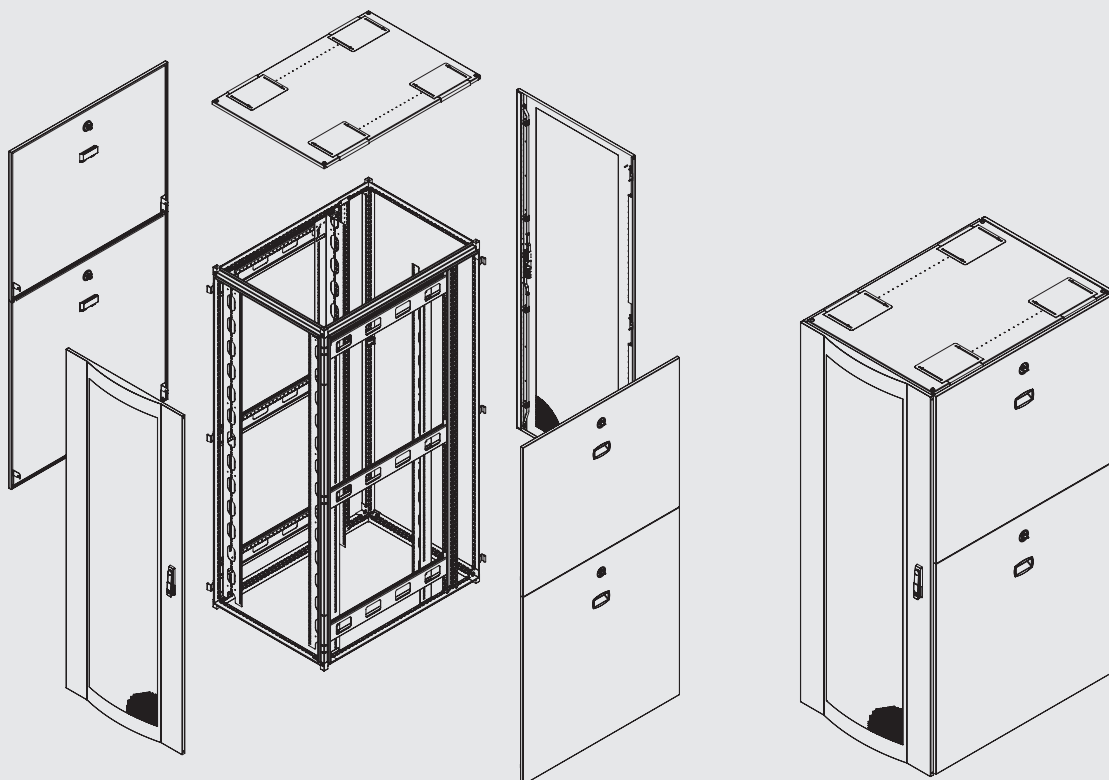Double Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U61055PWP	19" 42U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2000x1000
SRVES42U61155PWP	19" 42U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2000x1100
SRVES42U61255PWP	19" 42U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2000x1200
SRVES47U61055PWP	19" 47U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2200x1000
SRVES47U61155PWP	19" 47U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2200x1100
SRVES47U61255PWP	19" 47U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2200x1200

Cabinet Dimensions and Part No - W800

Single Opening, Curved, %80 perforated Front Door;
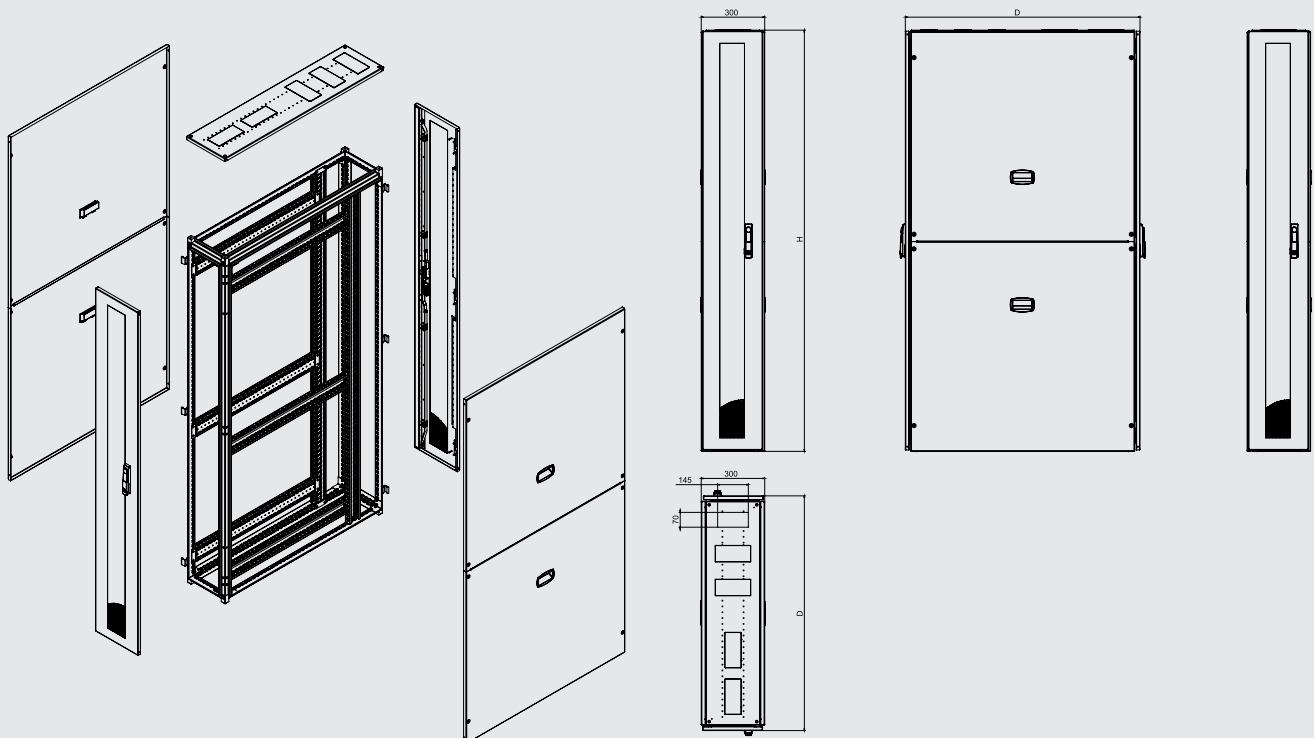Double Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U81055PWPD	19" 42U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2000x1000
SRVES42U81155PWPD	19" 42U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2000x1100
SRVES42U81255PWPD	19" 42U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2000x1200
SRVES47U81055PWPD	19" 47U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Fron and Double Opening Rear Doors.	800x2200x1000
SRVES47U81155PWPD	19" 47U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2200x1100
SRVES47U81255PWPD	19" 47U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Fron and Double Opening Rear Doors.	800x2200x1200

Cabinet Dimensions and Part No - W800

Single Opening, Curved, %80 Perforated Front Door;
Double Opening, %80 Perforated Rear Door.

| PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U81055PWP	19" 42U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2000x1000
SRVES42U81155PWP	19" 42U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2000x1100
SRVES42U81255PWP	19" 42U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2000x1200
SRVES47U81055PWP	19" 47U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2200x1000
SRVES47U81155PWP	19" 47U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2200x1100
SRVES47U81255PWP	19" 47U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2200x1200

Cabinet Dimensions and Part No - W300

W=300 mm cabinets are designed for Estap side cooling units.

| PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U31055PWP	19" 42U, 300x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2000x1000
SRVES42U31155PWP	19" 42U, 300x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2000x1100
SRVES42U31255PWP	19" 42U, 300x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2000x1200
SRVES47U31055PWP	19" 47U, 300x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2200x1000
SRVES47U31155PWP	19" 47U, 300x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2200x1100
SRVES47U31255PWP	19" 47U, 300x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2200x1200

High Density Cabling Cabinet
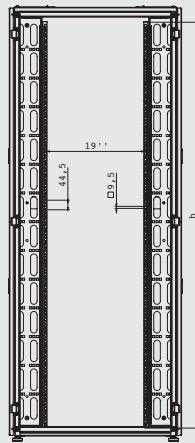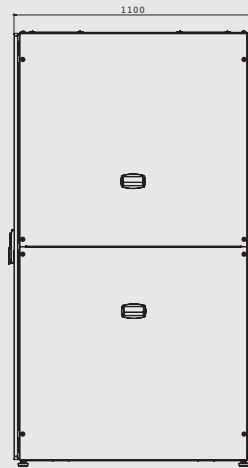
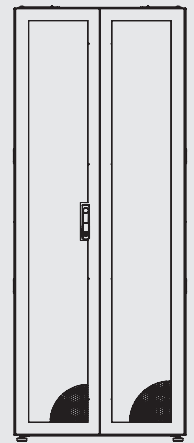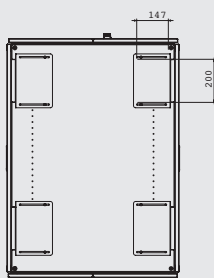Professional cabinet solution for professional cabling.
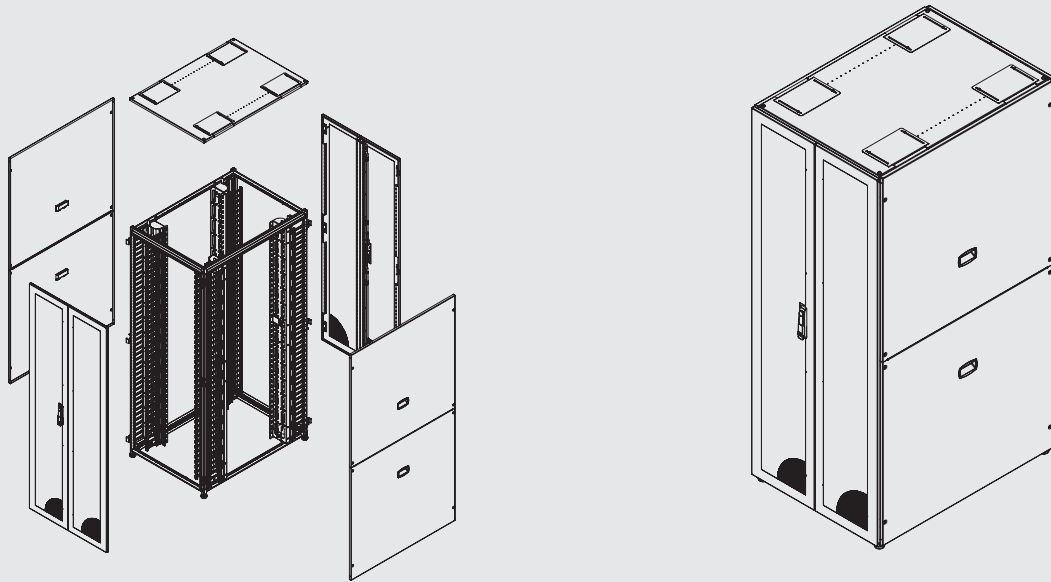
Exploded View

Iso View
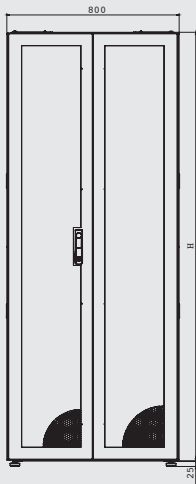
Front View

Inside View

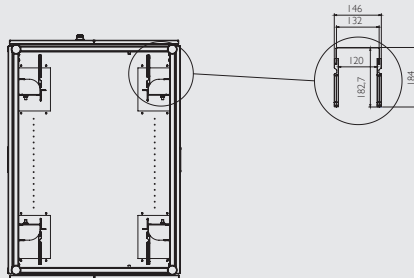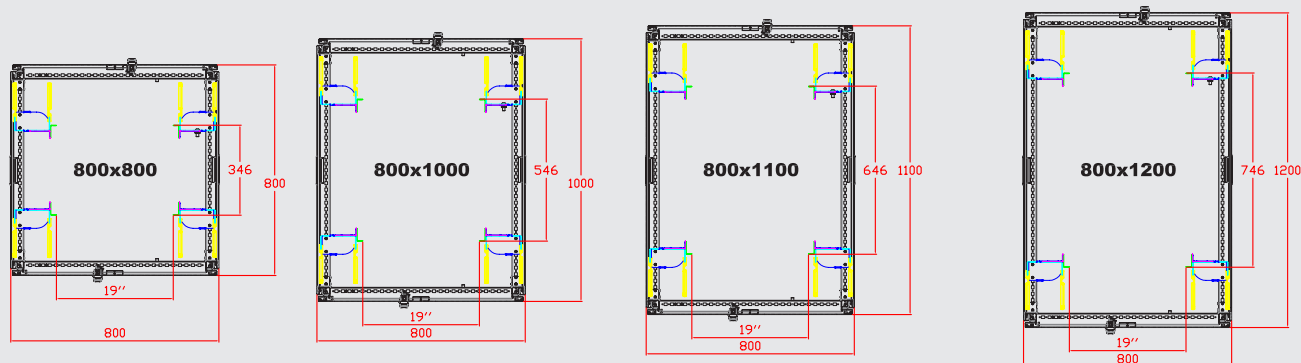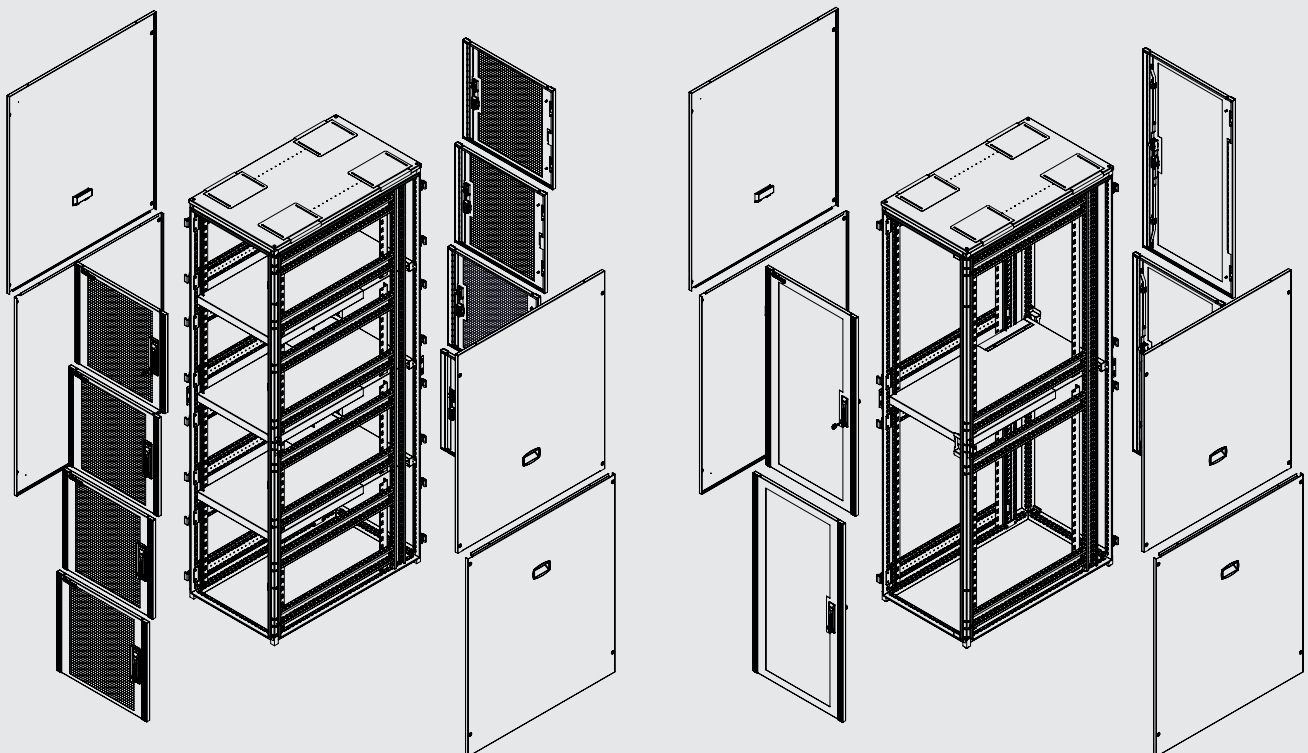Side View

Back View

Top View

Bottom View

PART NO	DESCRIPTION	W x H x D (mm)
SRV ES42U8855 OFRM	19" 42U 800x800 mm DCMAX Cabling Open Frame Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front. Cabinet is without side panels, front and rear door.	800x2000x800
SRV ES42U8855 SCC IP20	19" 42U 800x800 mm DCMAX Cabling Open Frame Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front. Cabinet is without side panels, front and rear door.	800x2000x800
SRV ES42U81055 SCC IP20	19" 42U 800x1000 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2000x1000
SRV ES42U81155 SCC IP20	19" 42U 800x1100 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2000x1100
SRV ES42U81255 SCC IP20	19" 42U 800x1200 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2000x1200
SRV ES47U8855 OFR	19" 47U 800x800 mm DCMAX Cabling Open Frame Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front. Cabinet is without side panels, %80 perforated front and rear door.	800x2200x800
SRV ES47U8855 SCC IP20	19" 47U 800x800 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x800
SRV ES47U81055 SCC IP20	19" 47U 800x1000 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x1000
SRV ES47U81155 SCC IP20	19" 47U 800x1100 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x1100
SRV ES47U81255 SCC IP20	19" 47U 800x1200 mm DCMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x1200

Co-Location Cabinets

Sometimes your equipments not fill much more than 10U or 20U.
In this case you need Co-Location cabinets.

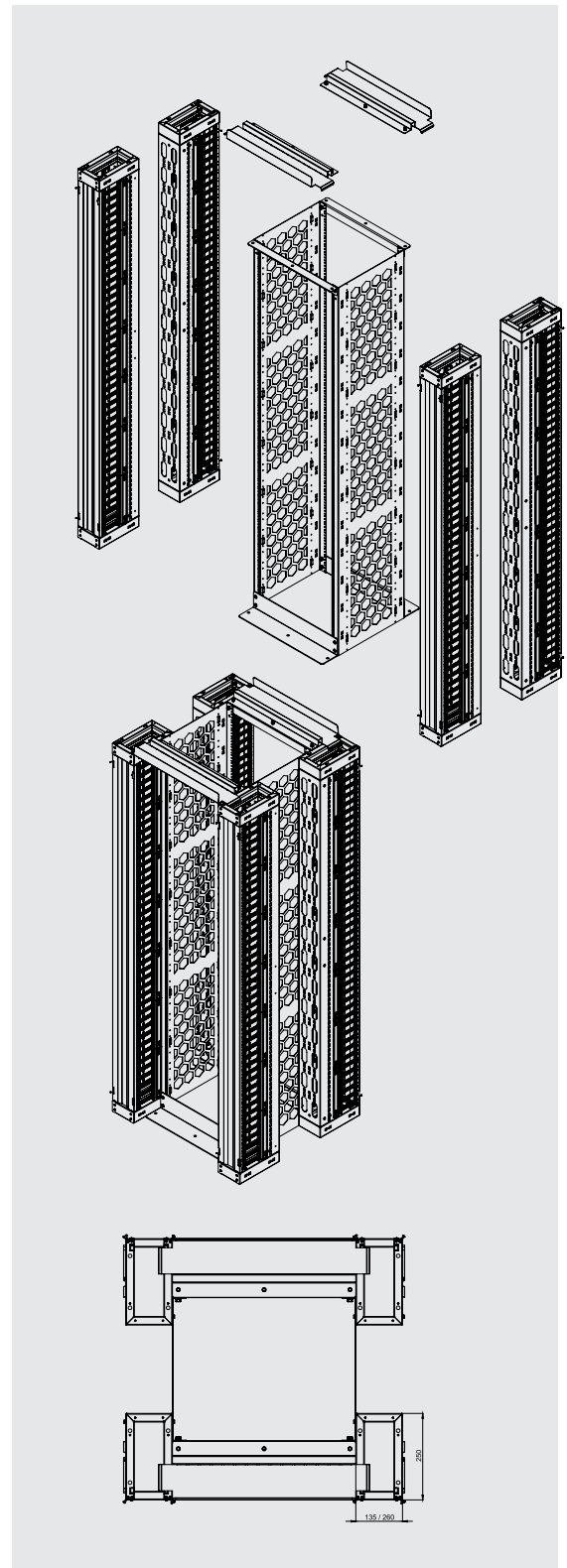| PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES47U61055PWPC2	47U 600X1000 mm, DCMAX IP20 %80 Perforated single opening front and rear doors, mechanical lock, black, co-location, 2 compartment	600x2200x1000
SRVES47U61055PWPC4	47U 600X1000 mm, DCMAX IP20 %80 Perforated single opening front and rear doors, mechanical lock, black, co-location, 4 compartment	600x2200x1000
SRVES47U61155PWPC2	47U 600X1100 mm, DCMAX IP20 %80 Perforated single opening front and rear doors, mechanical lock, black, co-location, 2 compartment	600x2200x1100
SRVES47U61155PWPC4	47U 600X1100 mm, DCMAX IP20 %80 Perforated single opening front and rear doors, mechanical lock, black, co-location, 4 compartment	600x2200x1100
SRVES47U61255PWPC2	47U 600X1200 mm, DCMAX IP20 %80 Perforated single opening front and rear doors, mechanical lock, black, co-location, 2 compartment	600x2200x1200
SRVES47U61255PWPC4	47U 600X1200 mm, DCMAX IP20 %80 Perforated single opening front and rear doors, mechanical lock, black, co-location, 4 compartment	600x2200x1200

For more options please ask to sales department

System Rack – Open Frame

Sometimes you need simple solutions for patching cabinets. System
Rack has high capability of cabling and easy access from all sides.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
LR26U 80	26U 19" Systemrack, D=80	530x1290x80
LR36U 80	36U 19" Systemrack, D=80	530x1734x80
LR42U 80	42U 19" Systemrack, D=80	530x2001x80
LR48U 80	48U 19" Systemrack, D=80	530x2134x80
LR42U 160	42U 19" Systemrack, D=160	530x2001x160
LR48U 160	48U 19" Systemrack, D=160	530x2134x160
LR42U 420	42U 19" Systemrack, D=420	530x2001x420
LR48U 420	48U 19" Systemrack, D=420	530x2134x420

VERTICAL CABLE MANAGER OPTIONS

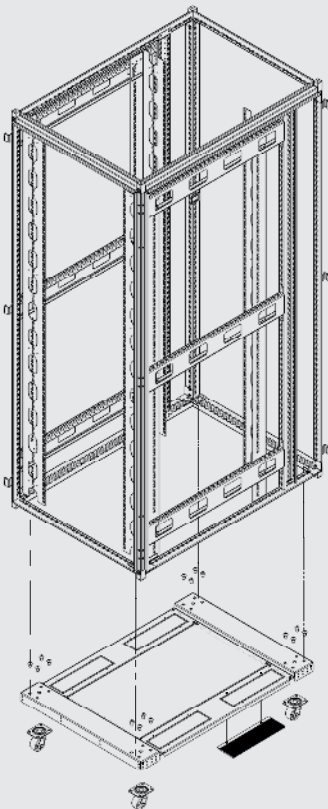| PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
M44 ORG2613 RLYG	26U Vertical cable management panel 1ea. w=135mm, Finger Type	135x1292x250 (1176)
M44 ORG3613 RLYG	36U Vertical cable management panel 1ea. w=135mm. Finger Type	135x1736x250 (1620)
M44 ORG4213 RLYG	42U Vertical cable management panel 1ea. w=135mm, Finger Type	135x2003x250 (1887)
M44 ORG4813 RLYG	48U Vertical cable management panel 1ea. w=135mm, Finger Type	135x2270x250 (2154)
M44 ORG2626 RLYG	26U Vertical cable management panel 1ea. w=260mm, Finger Type	260x1292x250 (1176)
M44 ORG3626 RLYG	36U Vertical cable management panel 1ea. w=260mm, Finger Type	260x1736x250 (1620)
M44 ORG4226 RLYG	42U Vertical cable management panel 1ea. w=260mm, Finger Type	260x2003x250 (1887)
M44 ORG4826 RLYG	48U Vertical cable management panel 1ea. w=260mm, Finger Type	260x2270x250 (2154)

ACCESSORIES
Accessories / Bottom Cover

To close the bottom of the cabinet for dust protection.

PART NO	DESCRIPTION	W x D (mm)
EST30110BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=300 mm depth=1100 mm	300x1100
EST30120BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=300 mm depth=1200 mm	300x1200
EST60100BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=600 mm depth=1000 mm	600x1000
EST60110BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=600 mm depth=1100 mm	600x1100
EST60120BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=600 mm depth=1200 mm	600x1200
EST80100BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=800 mm depth=1000 mm	800x1000
EST80110BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=800 mm depth=1100 mm	800x1100
EST80120BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=800 mm depth=1200 mm	800x1200

# Accessories / Plinth

To raise the cabinet where you need.

PART NO	DESCRIPTION	W x D (mm)
EST 30100 PLNTH	Plinth for DCMAX width=300 mm depth=1000 mm	300x1000
EST 30110 PLNTH	Plinth for DCMAX width=300 mm depth=1100 mm	300x1100
EST 30120 PLNTH	Plinth for DCMAX width=300 mm depth=1200 mm	300x1200
EST 60100 PLNTH	Plinth for DCMAX width=600 mm depth=1000 mm	600x1000
EST 60110 PLNTH	Plinth for DCMAX width=600 mm depth=1100 mm	600x1100
EST 60120 PLNTH	Plinth for DCMAX width=600 mm depth=1200 mm	600x1200
EST 80100 PLNTH	Plinth for DCMAX width=800 mm depth=1000 mm	800x1000
EST 80110 PLNTH	Plinth for DCMAX width=800 mm depth=1100 mm	800x1100
EST 80120 PLNTH	Plinth for bw width=800 mm depth=1200 mm	800x1200
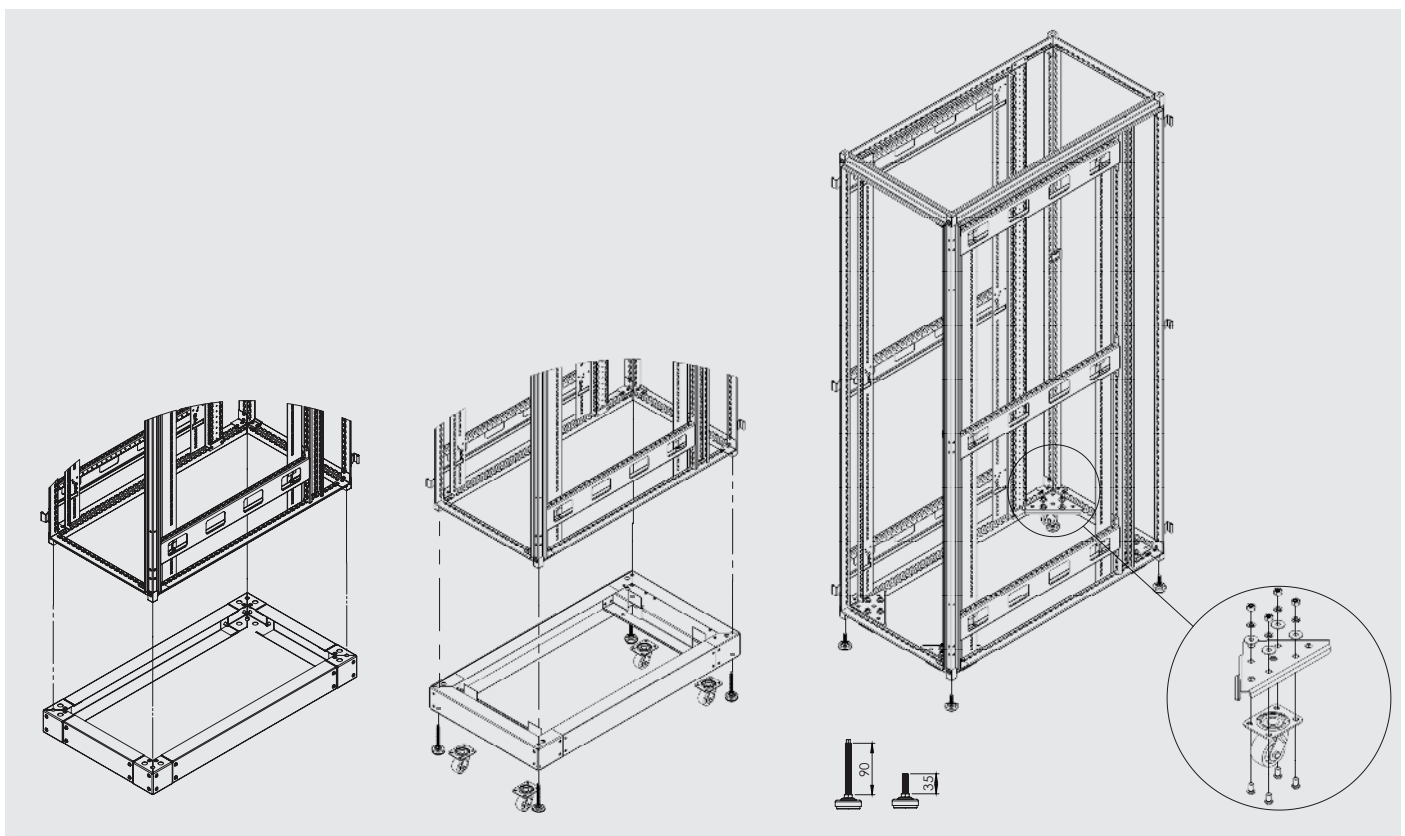
Accessories / Floor Fixing Kit and Castor Set

To fix the cabinet to floor for more stability

PART NO	DESCRIPTION
M44FFK	Floor fixing kit (1set=4pcs.) from inner corner of cabinet
M44FFK TKR	Castor Group (1set=4pcs.)
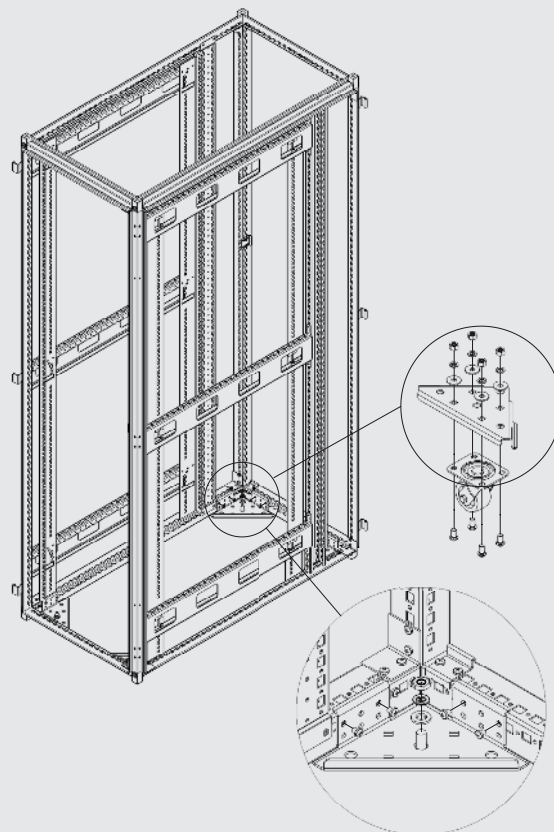
Accessories / Cable Management Rings

To guide your cables where you need.

| PART NO	DESCRIPTION	W x H (mm)
K44 RING 06	Ring for cable management 45x100 mm (1 set = 5 ea.)	45x100
K44 RING 05	Ring for cable management 60x100 mm (1 set = 5 ea.)	60x100
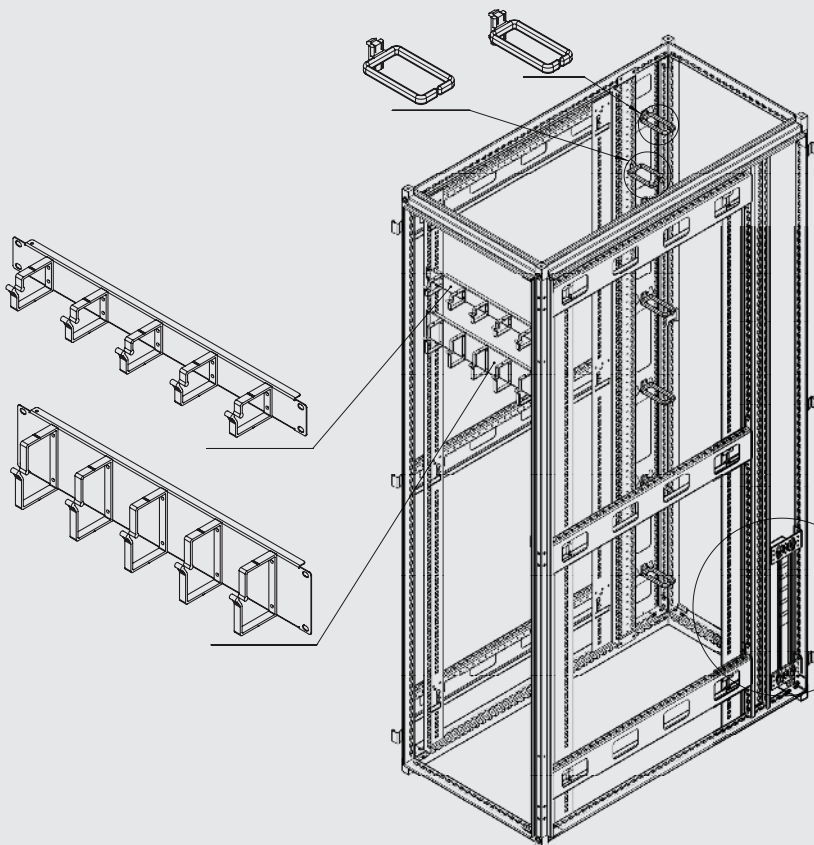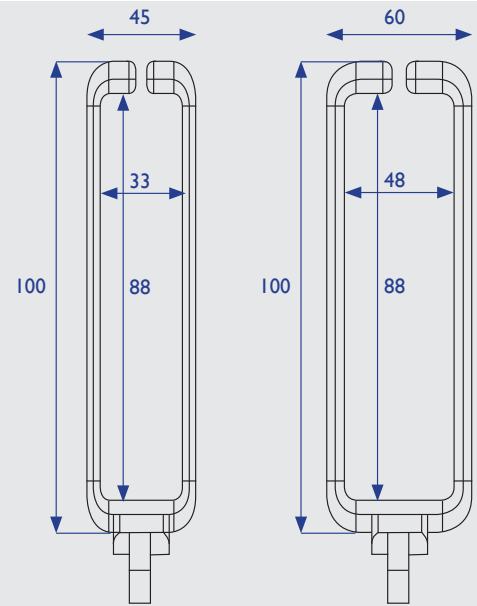
Cable Rings can be used in all cable trays, vertical and horizantal C rails, framework of cabinet itself.
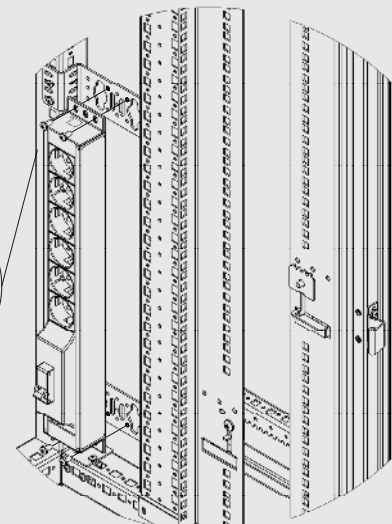
Accessories / Vertical Cable Manager

To guide and manage the cabling cables vertically.

PART NO	DESCRIPTION	W x H x D (mm)
M78 ORG42	42U Vertical Cable Manager, Finger type with metal cover.	92x1885x179
M78 ORG47	47U Vertical Cable Manager, Finger type with metal cover.	92x2110x179
BZ TRB 1722020 IP20	Cable Manager Bag	175x200x200

Cable Manager Bag
Fix and tighthened the bag to prevent air leakage from cable entry

Vertical Cable Manager,
Finger Type

92
67
179
168
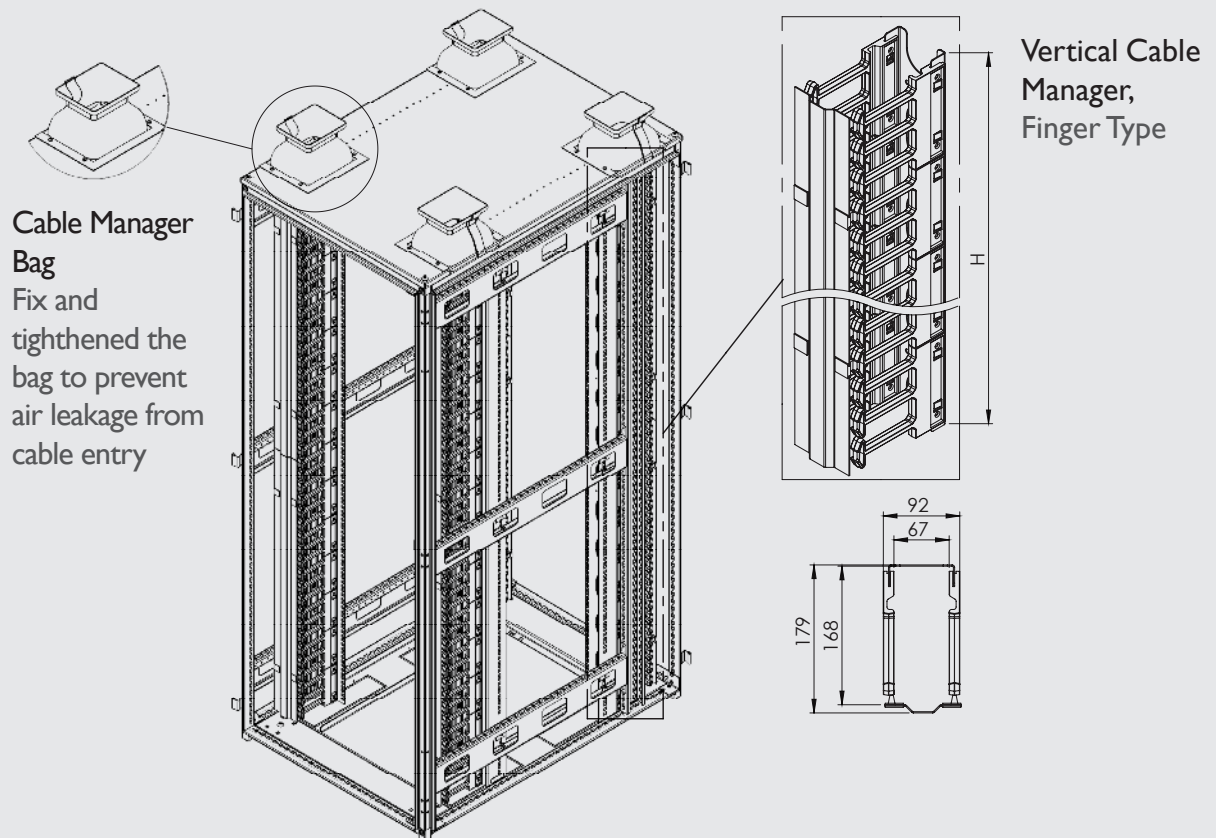
Accessories / Blank Panels

Airflow management is an important factor for a successful Data Center operation and contributes much to the availability.
To have a perfect airflow inside the cabinet, vertical and horizontal blank panels should be used.

Without blank panel
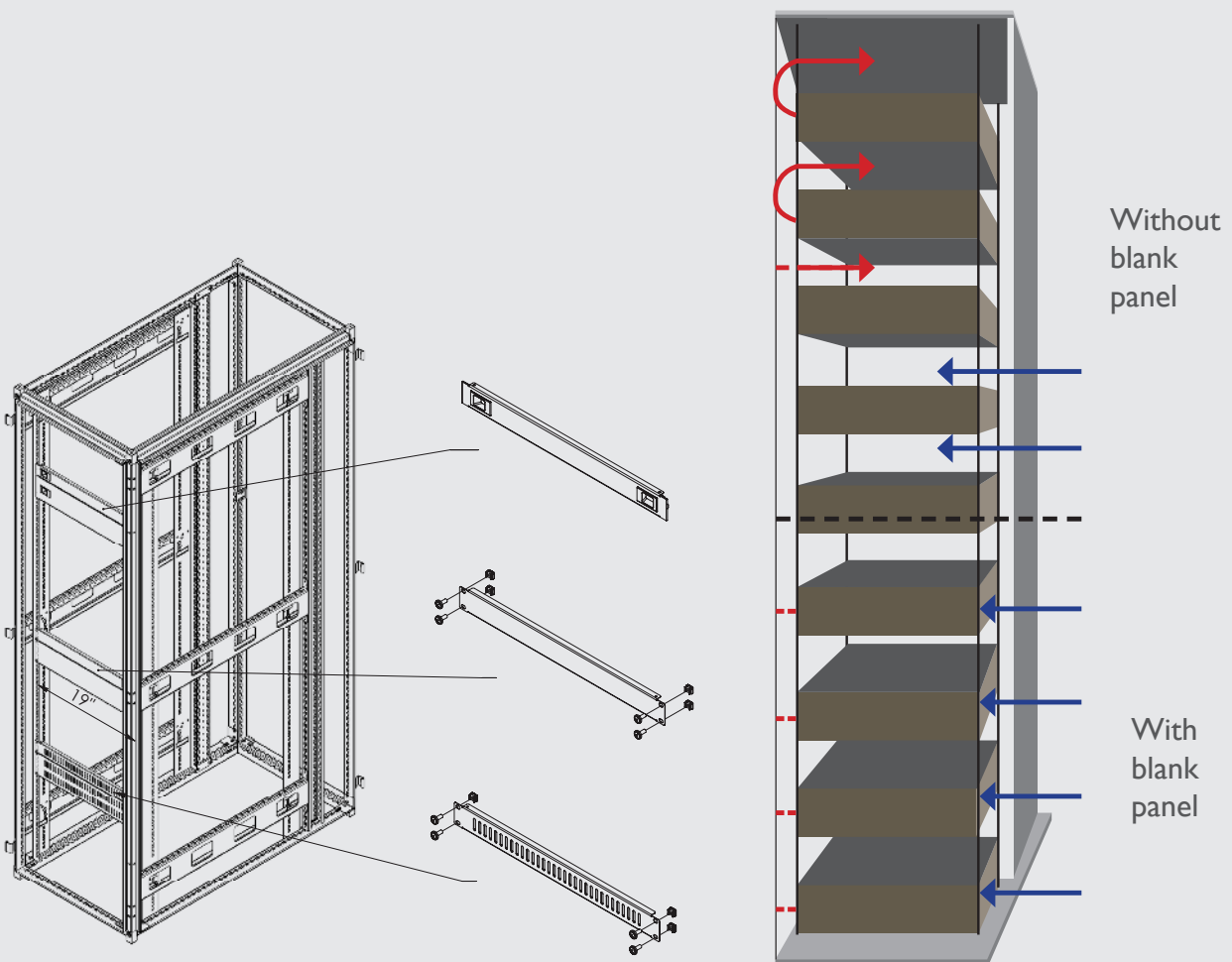
With blank panel

Air flow with or without blank panels inside cabinet

Accessories / Blank Panels

Close unused units in the rack with blanking panels to avoid airflow short circuit inside the rack.
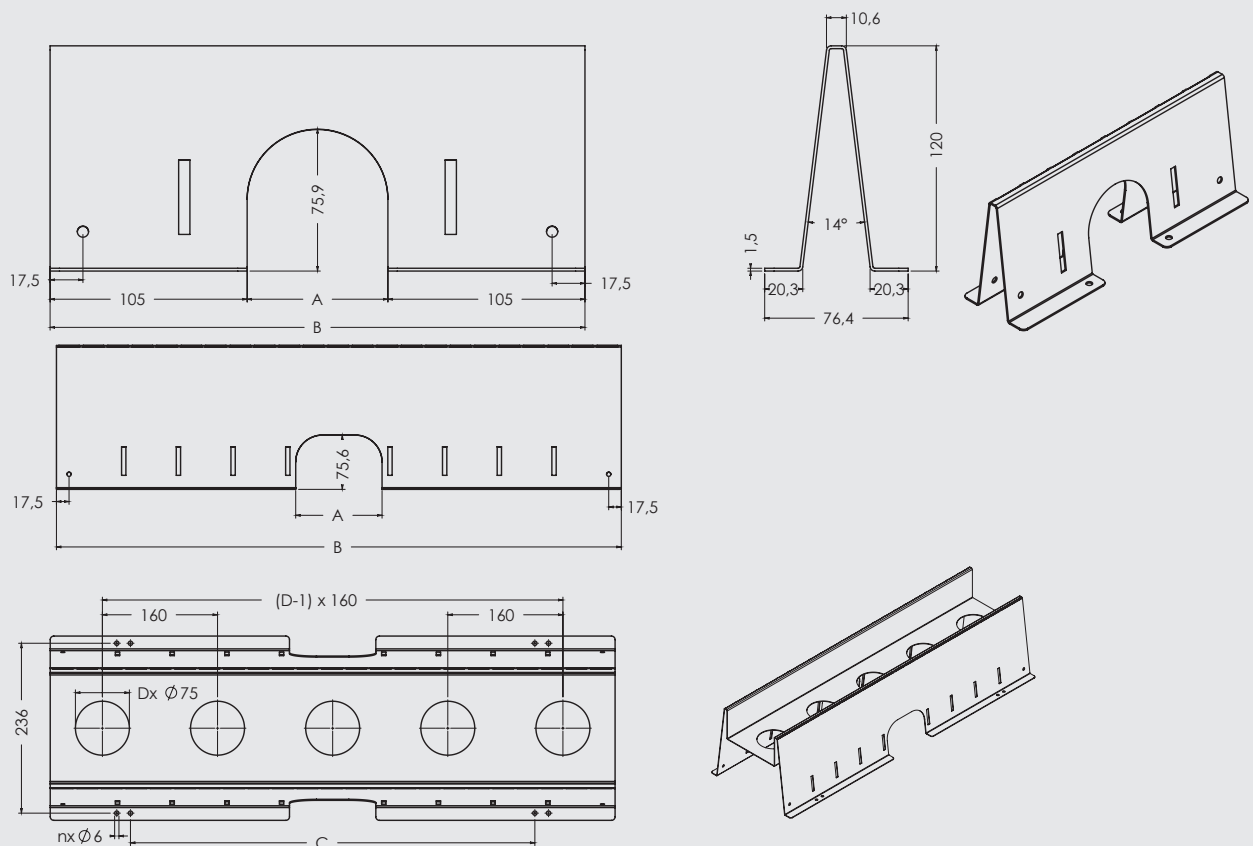
PART NO	DESCRIPTION	W x H x D (mm)
E44BPN01	1U 19" Blank panel	483x12x44
E44BPN02	2U 19" Blank panel	483x12x88
E44BPN03	3U 19" Blank panel	483x12x133
E44BPN04	4U 19" Blank panel	483x12x177
E44BPN05	5U 19" Blank panel	483x12x222
E44BPN06	6U 19" Blank panel	483x12x266
E44BPN01	1U 19" Blank panel vented	483x12x44
E44BPN02	2U 19" Blank panel vented	483x12x88
E44BPN01_03	1U 19" Toolless Blank panel	483x12x44
E44BPN01_TMP	1U 19" Toolless Blank Panel, With Temperature Strip	483x12x44
E44BPN4288	42U Vertical blank panel for w=800 mm cabinets (1set=2pcs. Left + right)	100x1900x63
E44BPN4788	47U Vertical blank panel for w=800 mm cabinets, (1set=2pcs. Left+right)	100x2125x63
E44BPN4266	42U Vertical blank panel for w=600 mm cabinets, brush (1set=2pcs. Left+right)	80x1934x3
E44BPN4766	47U Vertical blank panel for w=600 mm cabinets, brush (1set=2pcs. Left+right)	80x2150x3
E44BPN4288_AFM	42U Vertical blank panel with cable entries for w=800 mm cabinets (1set=2pcs. Left + right)	100x1900x63
E44BPN4788_AFM	47U Vertical blank panel with cable entries for w=800 mm Cabinets (1set=2pcs. Left + right)	100x2125x63
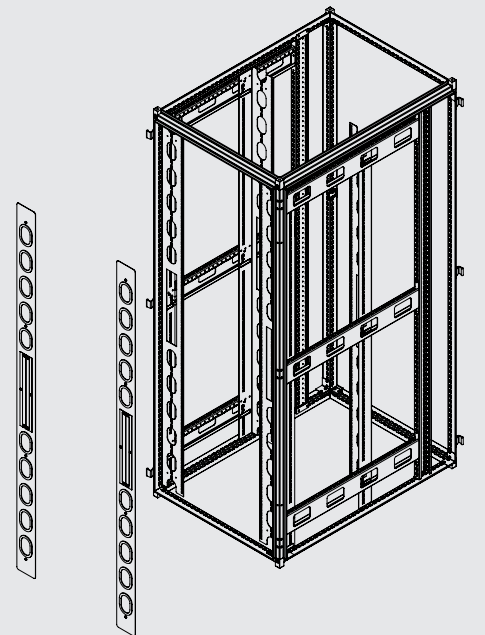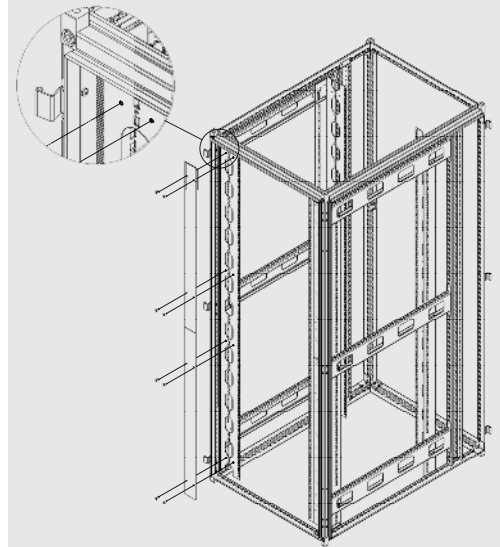
Accessories / Cable Management On Cabinet Top

Estap DcMax Server Cabinets offer professional and highly secured management of high density data and power cables. Separate cable inlet for data and energy cables, and separate overhead cable trays and dividers minimize the electromagnetic and physical interference.

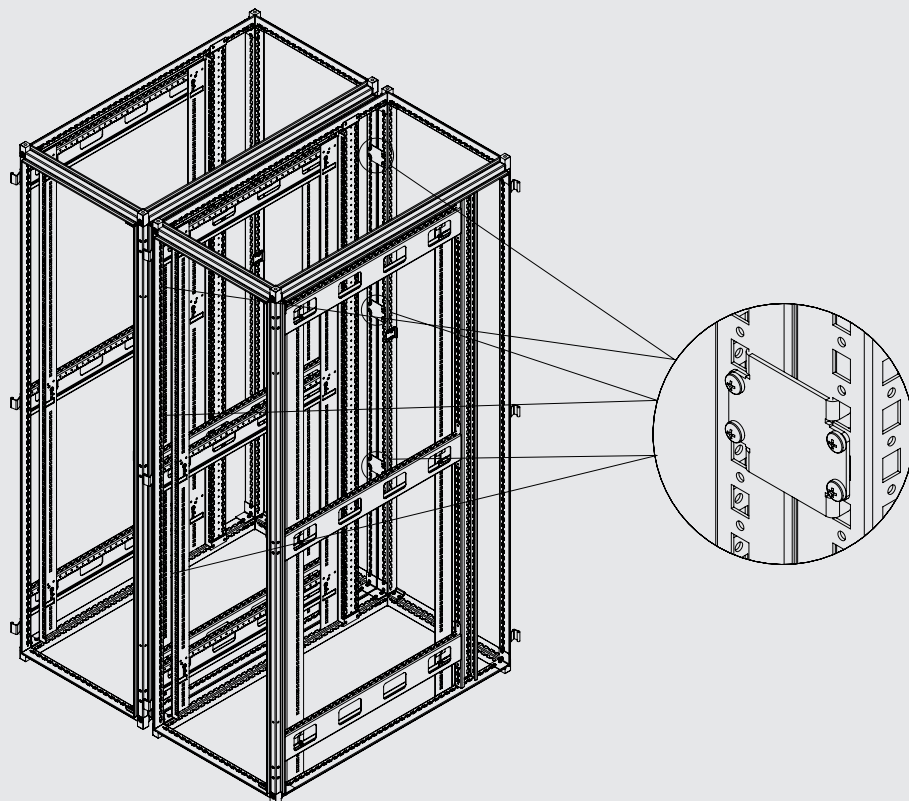| PART NO	DESCRIPTION	W x H (mm)
M44CS1230	Cable separator on Cabinet Roof h=120 mm w=300 mm (each)	300x120
M44CS1260	Cable separator on Cabinet Roof h=120 mm w=600 mm (each)	600x120
M44CS1280	Cable separator on Cabinet Roof h=120 mm w=800 mm (each)	800x120
M44CT2030	Cable Tray on Cabinet Roof h=200 mm w=300 mm (each) (useful dimension for cabling: w=600 mm d=150 mm h=80 mm)	300x200
M44CT2060	Cable Tray on Cabinet Roof h=200 mm w=600 mm(each) (useful dimension for cabling: w=600 mm d=150 mm h=80 mm)	600x200
M44CT2080	Cable Tray on Cabinet Roof h=200 mm w=800 mm (each) (useful dimension for cabling: w=800 mm d=150 mm h=80 mm)	800x200

Accessories / Baying Kit

Can bay while the side panels are onto the cabinet.
Can bay while there is no side panels.

PART NO	DESCRIPTION
M44BLG05	Baying kit from inside of Datacenter cabinets (used when side panels are not mounted) 1set=6pcs.
M44BLG04	Baying kit from outside of Datacenter cabinets (used when side panels are on cabinet) 1set=4pcs. (2ea for bottom, 2ea. for top)

Accessories / Cable Trays

With Estap Cable Tray, you can manage your cables on side of the cabinet.
Also you can fix cable manager rings on it.

| PART NO	DESCRIPTION	W x H (mm)
E44 KNL42 CHLD	42U Multipurpose C profile as cable holders, rings and management	10x103x1814
E44 KNL47 CHLD	42U Multipurpose C profile as cable holders, rings and management	10x103x2036
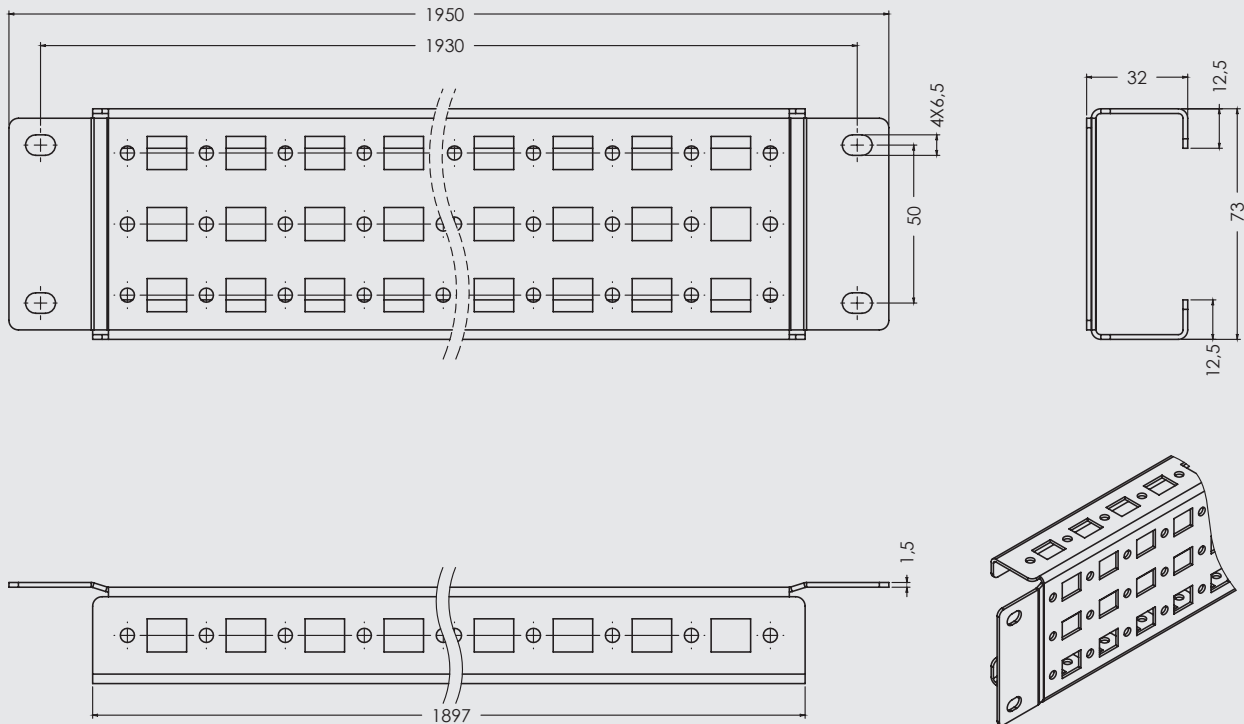
Accessories / Front Label Plate

Also, front Labeling Plate is necessary for a good view and to fit aisle roofs well.

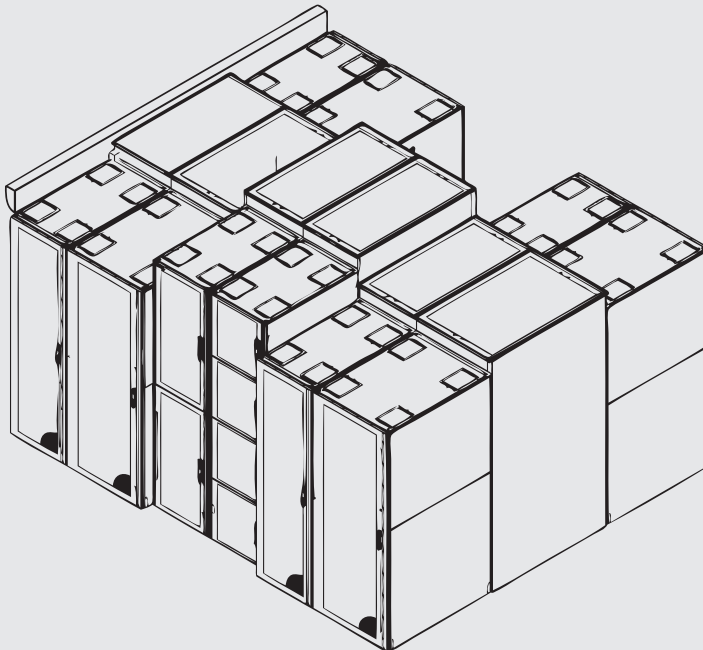| PART NO	DESCRIPTION	W x H (mm)
M44FLP1230	Front Label Plate h=120 mm w=300 mm	300x120
M44FLP1260	Front Label Plate h=120 mm w=600 mm	600x120
M44FLP1280	Front Label Plate h=120 mm w=800 mm	800x120
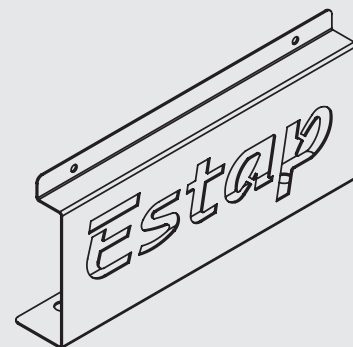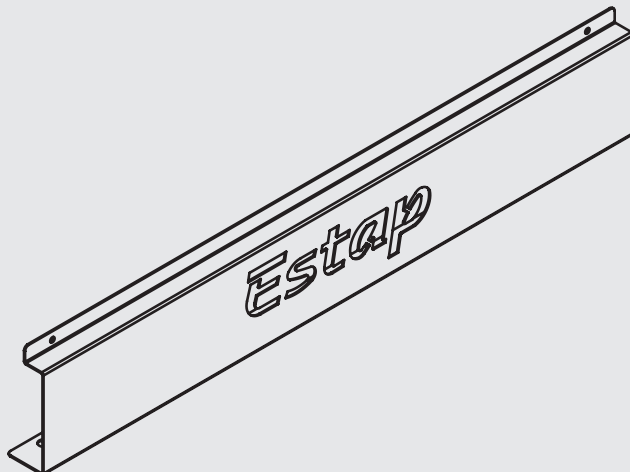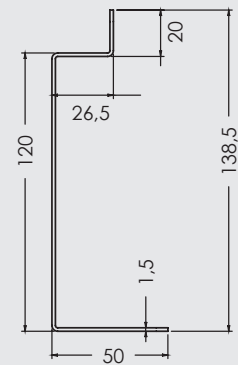
CORRIDOR SOLUTIONS

In data center rooms, to have efficient cooling and to have a well organized system, corridor solutions are the right instrument. A closed corridor can provide roughly %40 cooling efficiency.
Estap can provide different closing alternatives, although the racks have different hights or widths. Also suitable for future expansions.
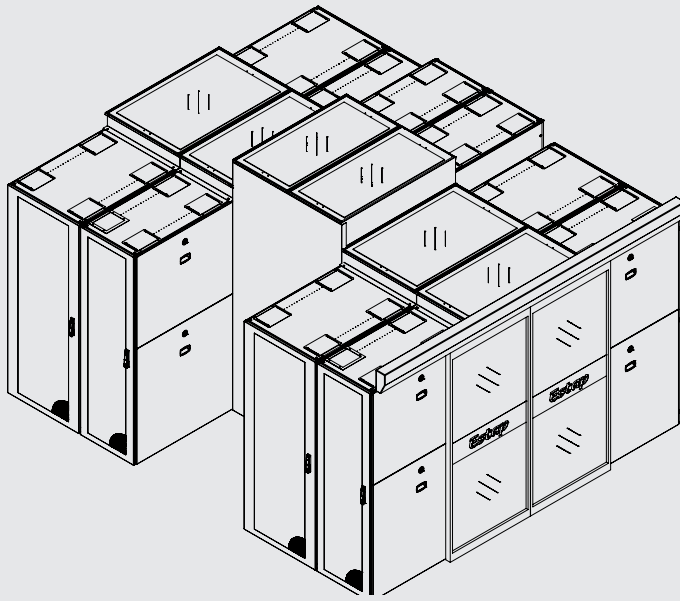
Please contact to Sales Department for more alternative solutions.

CORRIDOR SOLUTIONS

Aisle Roof

To close the top of hot/cold aisle. Easy to fix.
Polycarbonate closing with reinforced metal frame.

PART NO	DESCRIPTION	W x D (mm)
M44CCR60120	Cold Coridor Roof w=600 d=1200 mm polycarbonate transparent top cover with metal frame.	600x1200
M44CCR80120	Cold Coridor Roof w=800 d=1200 mm polycarbonate transparent top cover with metal frame.	800x1200
M44CCR90120	Cold Coridor Roof w=900 d=1200 mm polycarbonate transparent top cover with metal frame.	900x1200
M44CCR110120	Cold Coridor Roof w=1100 d=1200 mm polycarbonate transparent top cover with metal frame.	1100x1200
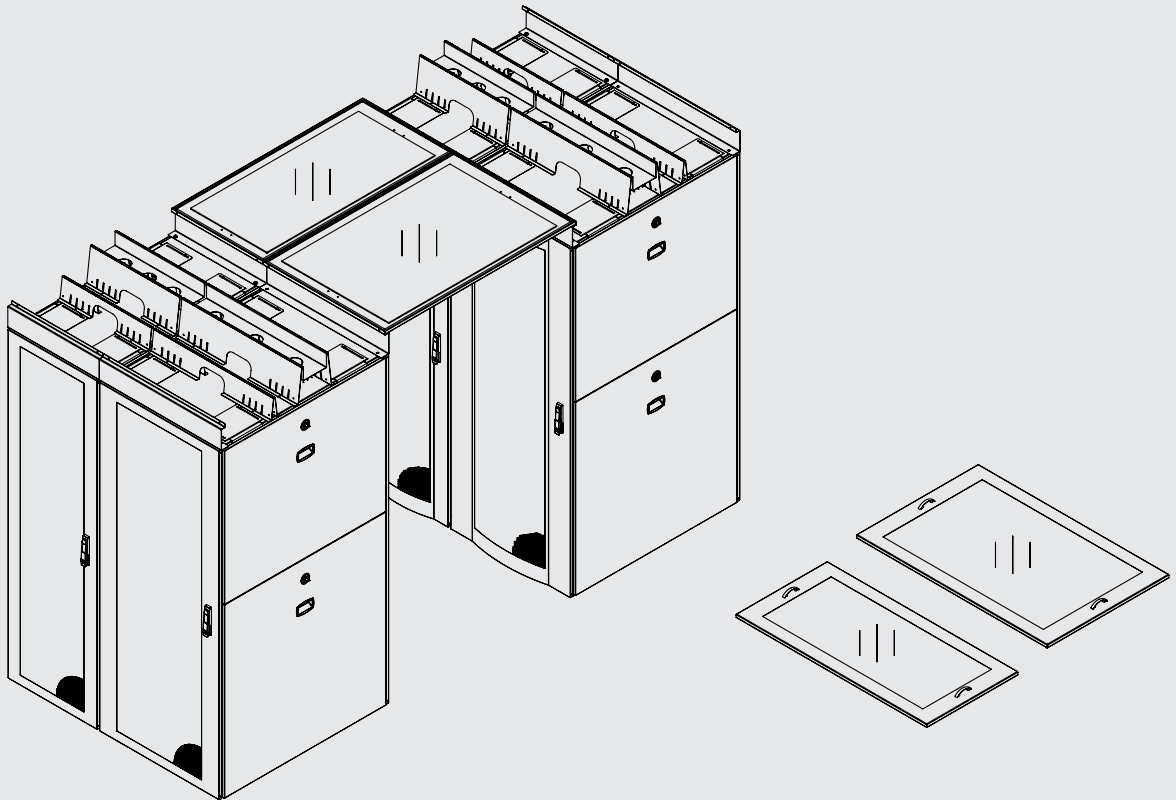
Corridor Doors:

2 types of door options are available as automatic opening and manuel opening.
System is CE, TUV and ISO certificated.

Automatic Opening

Wing Frame Metarial:
Aluminium.
Glass:
4+4 mm transparent laminated glass with Estap Logo.
Carrier System:
5 x 60 x 120 mm – 4x brackets; 40 x 60 x 2mm Alm. Profile posts.
Carrier wide:
3200mm – 3600 mm*
Security Sensor:
Active 8 curtain photocell sensor.
Mechanism Wide:
2500 mm
Corridor Wide:
1200 x 2240 mm
Wings:
2 x moving wings, automatic.
Locking:
Electro-mechanic locking systems.
Locking Options:
Keypad or Proximity Card.**
Colour:
RAL 9005 and RAL 7035
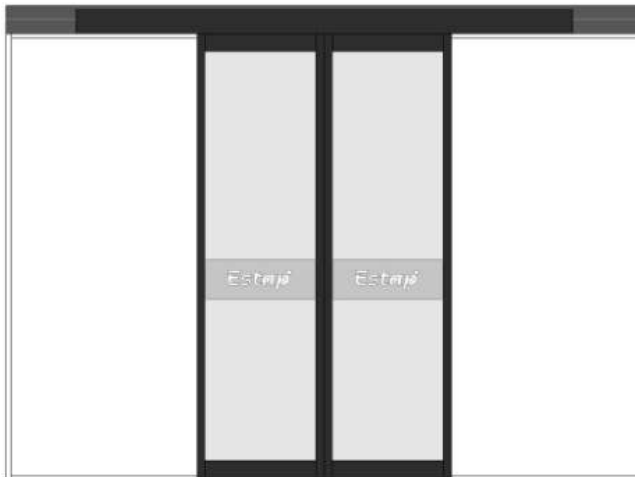
*Depends to the cabinets depth.
** Proximity system can be adapt to Estap EMS system.

Manuel Opening

Wing Frame Metarial:
Aluminium.
Glass:
4+4 mm transparent laminated glass with Estap Logo.
Carrier System:
5 x 60 x 120 mm – 4x brackets; 40 x 60 x 2mm Alm. Profile posts.
Carrier wide:
3200mm – 3600 mm*
Mechanism Wide:
2500 mm
Corridor Wide:
1200 mm
Wings:
2 x synchronized wings.
Locking:
Lock to the bottom.
Colour:
RAL 9005 and RAL 7035
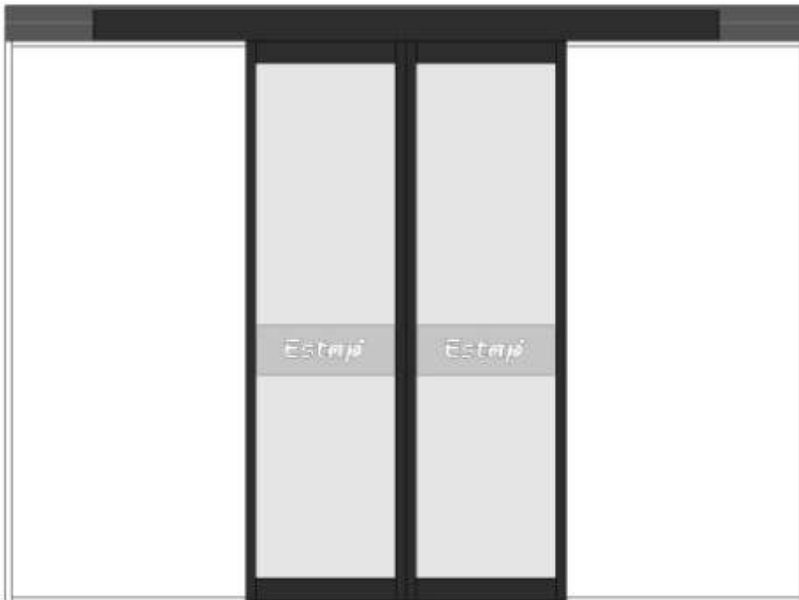
*Depends to the cabinets depth.

ENVIRONMENTAL MONITORING SYSTEMS
Main Unit EST-EM3000

Which initializes external sensors, requests data from sensors, evaluates and archives the data, generates alarm when necessary and intervenes the output process, is the core of the EST-EM3000 architecture.
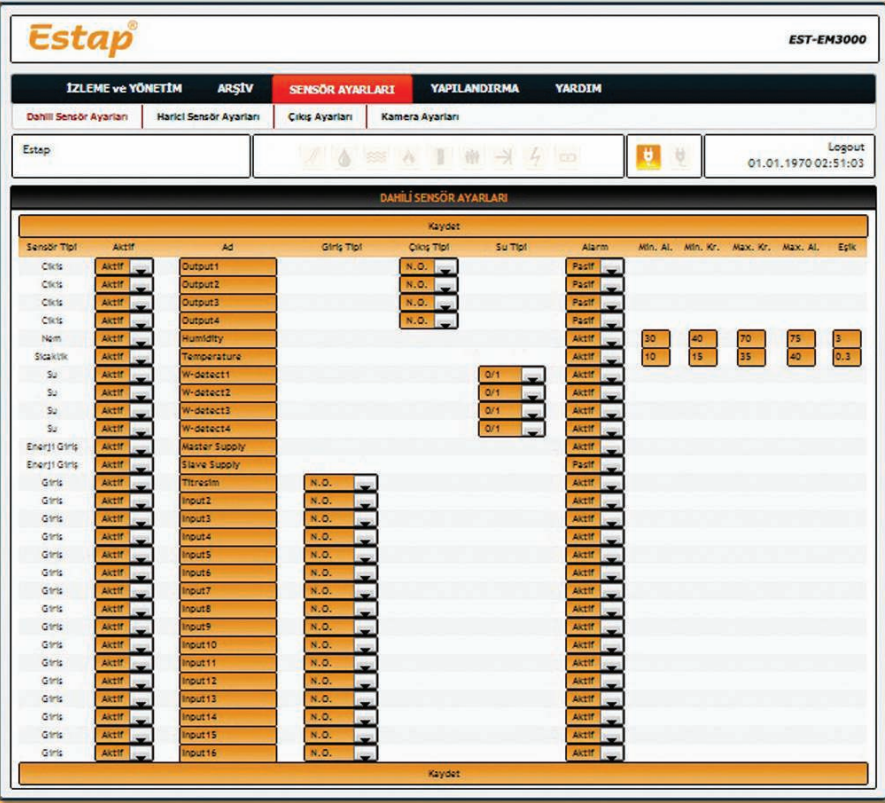
EST-EM3000 is an IT unit where required applications run on Linux operating system.

The Internal components other than the main unit are, 1 Temperature-Humidity Sensor, 4 Analog Inputs or Water Sensor ports, 4 Relay Outputs, 16 Dry Contacts, 2 RS232 COM Ports, 2 USB Ports, 1 LAN port, 1 LCD Screen, 1 Buzzer and 16 ExaBus Ports.

Software Features

- User Friendly Web-Interface
- Alarming over e-mail, SMS, Voice Calling Module and LCD
- Display
- IP address monitoring on the LCD Display
- Critical and Alarming Level Setup
- Minimum and Maximum Alarming Value Assignment
- SNMP Support
- Easy Setup and Configuration
- IP Camera Support

To monitor and control the system which has main unit more than 1, centralised monitoring program is needed.

Hardware Features

- 19" Rack Installation
- 1 x internal Temperature&Humidty Port
- 1 x built-in Temperature&Humidty Sensor with extension cable
- 16 x Sensor Ports
- 16 x Dry Contact Ports – all isolated
- 1 Ethernet Port
- 4 x Analog/Water Sensor Ports
- 4 x 10A Relay Outputs
- 2 x RS-232 Ports
- 2 x USB Ports
- 1 x integrated Buzzer
- 2 x 12V DC Output (1x12V DC for Redundancy)

ENVIRONMENTAL MONITORING SYSTEMS
Main Unit EST-EM2000

EST-EM2000 is especially designed for Smart Cabinet solutions to basically monitor the environment.
System is same with EST-EM3000, just EST-EM2000 has few connection ports.

SOFTWARE FEATURES
- User Friendly Web-Interface
- Alarming over e-mail, SMS, Voice Calling Module and LCD
- Display
- IP address monitoring on the LCD Display
- Critical and Alarming Level Setup
- Minimum and Maximum Alarming Value Assignment
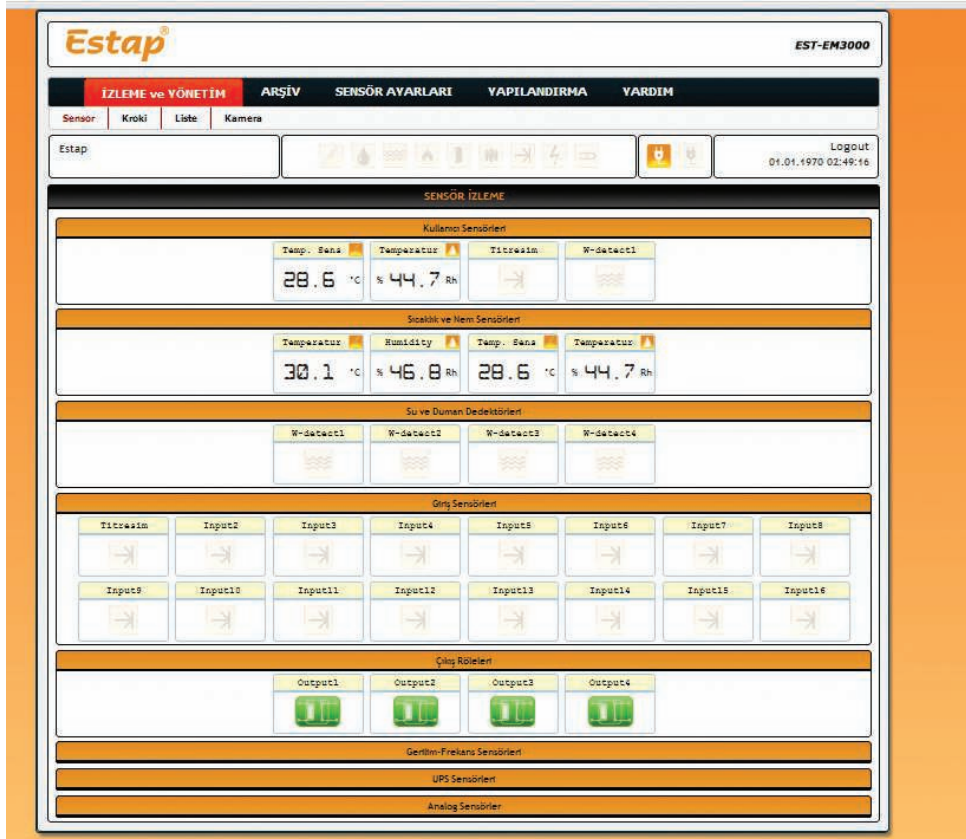- SNMP Support
- Easy Setup and Configuration

HARDWARE FEATURES
- 1 x internal Temperature&Humidty Port
- 3 x Sensor Ports
- 4 x Dry Contact Ports – all isolated
- 1 Ethernet Port
- 1 x Analog/Water Sensor Ports
- 2 x 10A Relay Outputs

Sensors

- EST-EM3010 Temperature Humidity Sensor
- EST-EM3020 Temperature Sensor
- EST-EM3030 Water Sensor
- EST-EM3031 Water Detect Cable – 1 m
- EST-EM3035 Water Detect Cable – 5 m
- EST-EM3040 One – Three Phase V/F Sensor
- EST-EM3050 Airflow Sensor
- EST-EM3060 Air Quality Sensor
- EST-EM3070 Vibration Sensor
- EST-EM3080 Light Detector
- EST-EM3090 Rack Mount Battery Pack – 24 hours Back Up
- EST-EM3100 Smoke Detector
- EST-EM3110 Door Detector
- EST-EM3120 Movement Sensor
- EST-EM3130 Proximity Reader
- EST-EM3131 Proximity Card

- EST-EM3141 Cabinet Door Lock
- EST-EM3142 Room Entrance Lock
- EST-EM3151 Signal Tower with Buzzer
- EST-EM3152 Buzzer
- EST-EM3160 GSM Module
- EST-EM3170 3G Router Module
- EST-EM3180 Voice Calling Module
- EST-EM3190 Integration Module&Software

EST-EM3001 COMBO Sensor
- 1 x Temperature Humidity Sensor
- 4 x Dry Contact Ports – All Isolated
- 2 x Relay Output
- 1 x Proximity Reader Port
- 1 x Water Detect Cable Port

CENTRALISED MANAGEMENT SOFTWARE
- EST-CMP5 Centralised Management Pack, 1-5 Nodes
- EST-CMP15 Centralised Management Pack, 1-15 Nodes
- EST-CMPU Centralised Management Pack, Unlimited Node Licence

INTELLIGENT POWER DISTRIBUTION UNITS

20xIEC 320 (16xC13 + 4xC19) Socket **MANAGED IP PDU** with Ampermeter Display, ZeroU, aluminium profile frame, 2x16A MCB, 8000 Watt, 250V AC, 3x6.0mm^2, 3m cord with IEC60309 plug (32A 2P+E), CE mark, daisy-chain function upto 10 units, Remote Monitoring ports for temperature-humidity-door access-water leakage-smoke.

20xIEC 320 (16xC13 + 4xC19) Socket **MONITORED IP PDU** with Ampermeter Display, ZeroU, aluminium profile frame, 2x16A MCB, 8000 Watt, 250V AC, 3x6.0mm^2, 3m cord with IEC60309 plug (32A 2P+E), CE mark, daisy-chain function upto 10 units, Remote Monitoring ports for temperature-humidity-door access-water leakage-smoke.

Outlet monitored and switched PDU, 20xIEC320 C13 socket, 4xIEC320 C19 socket,3x6.0mm^{2}x3.0m cable, Single phase 32A IEC60309 plug, 250v, 32A, with power consumption monitoring.

Outlet monitored and switched PDU, 20xIEC320 C13 socket, 4xIEC320 C19 socket, 5x6.0mm^{2}x3.0m cable,three phase 3x32A IEC60309 plug, input 380v, output 230v, 3x32A, with power consumption monitoring.
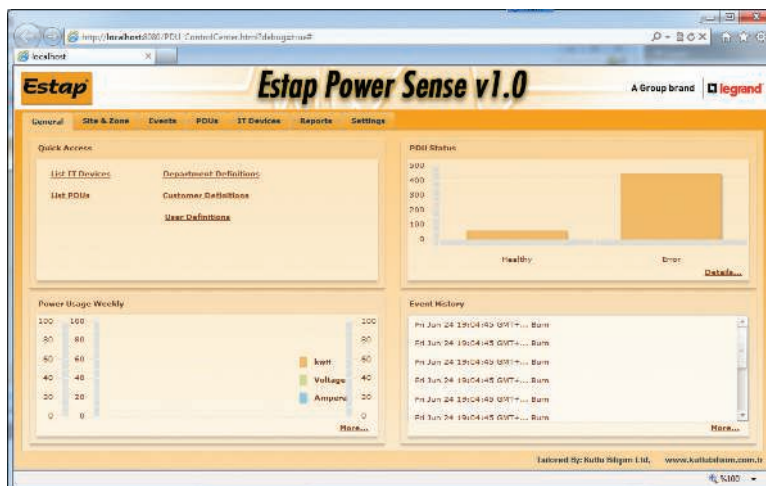
With central management programme Power Sense, you can manage your smart PDUs over one interface.

CONSOLES WITH KVM SWITCH

- Support an optional remote console (Cat5 based or Over-IP)
- CAT5 console up to 1000 feet away from KVM switch with superior auto-adjust RGB gain/delay control capability
- Support multiplatform - PS/2 and USB computers (SUN and MAC)
- Support DOS. Windows, Netware, Unix, MacOS
- Hot Pluggable-Add or remote connected PCs without having to power down the KVM switch or PCs.
- Superior video quality-up to 1280x1024, DDC2B
- No software required-easy PC selection via Push Buttons, Hot Keys or OSD (on screen display)
- Support Daisy Chainning up to 7 additional units
- Auto Scan Mode for monitoring PCs
- Firmware upgradeable for stying compatible with new coming computers
- Metal case, rack mountable
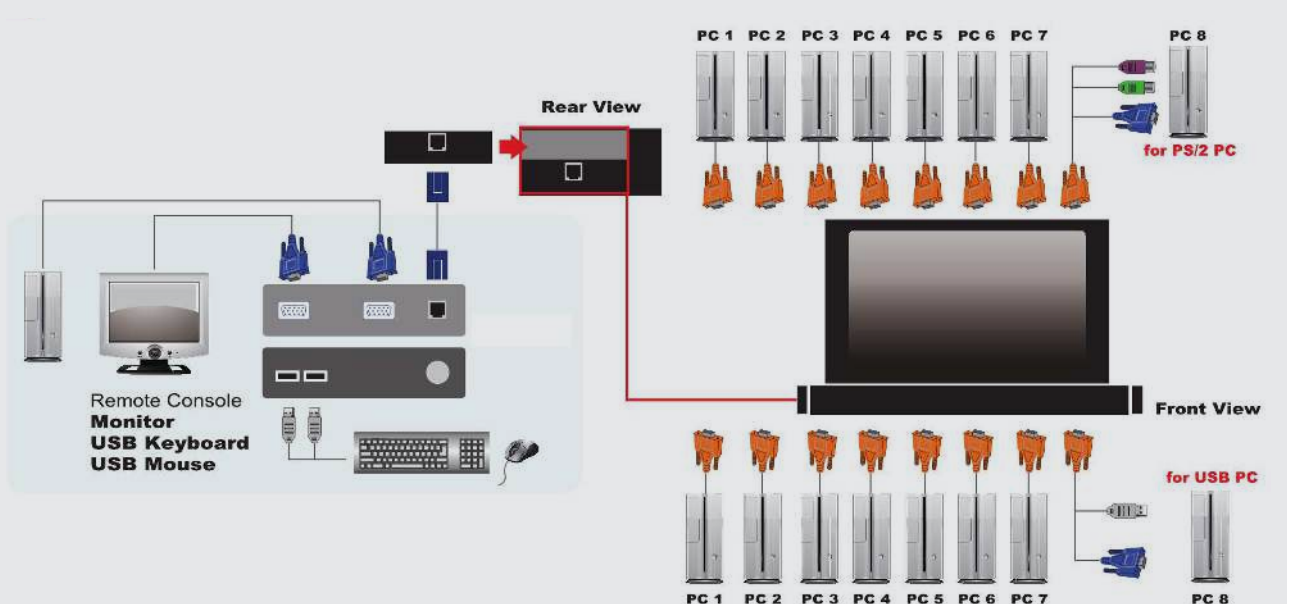
Installation of Console with KWM Switch

OTHER ACCESSORIES FOR DATACENTER ROOMS
Raised Floor Grill – Tirad Hi-Plume

- Hi-Plume Stratification fin increases cooling capacity and lowers server temperatures by 5 to 15°F.
- 4% Energy cost saving for each degree Fahrenheit lowered.
- Delivers air to full height of the rack.
- 600 mm x 600 mm heavy duty steel tile.
- TopSat leveler allows level to be adjusted both vertically and horizontally to allow a flush mount to the existing raised floor.
- Load rating of 680Kg (1,500lbs).
- Dual Lift-n-Lock integrated handles eliminate the need for suction cup lifters.
- Optional dampers and baffles can be fitted.
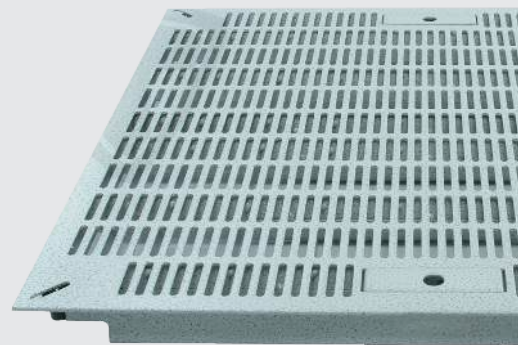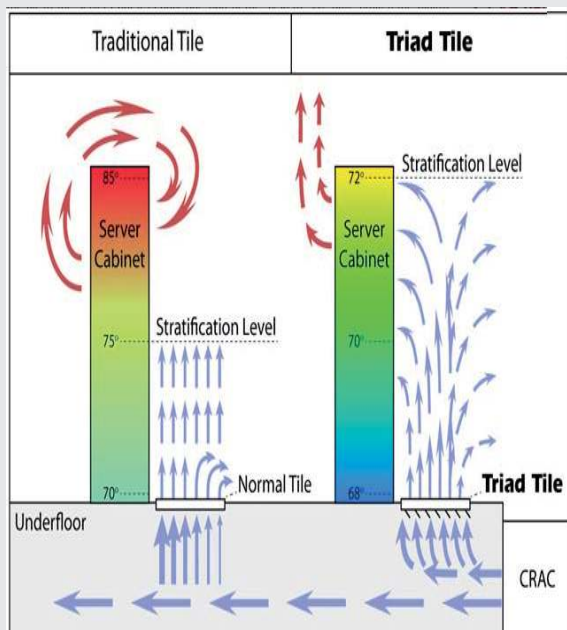
Raised Floor Grommets (KoldLok)

By sealing cable openings, you increase the static pressure under the raised floor and reduce bypass airflow (any conditioned air which doesn't pass through the IT equipment is considered to be bypass airflow).

Effectiveness:
- 100% bypass airflow sealing in areas undisturbed by cable penetrations at static pressures up to 0.10 inches of water column.
- 100% bypass airflow sealing with four 13 mm (½") cables penetrating the grommet at the static pressure required to cool up to 3kW per cabinet.
- 96% bypass airflow sealing with four 13 mm (½") cables penetrating the grommet at a static pressure of 0.10 inches of water column.

Benefits:
- Increases existing cooling unit capacity.
- Reduces the need to purchase additional cooling units.
- Improves equipment reliability and extends equipment life.
- Increases static pressure under the raised floor, and improves cool air delivery through floor grates and perforated tiles.
- Facilitates Cold Aisle / Hot Aisle best practices.

ESTAP PRODUCTS
PART NUMBERS

ESTAP PRODUCTS PART NUMBERS
Cabinet Dimensions and Part No - W600
Single Opening, Curved, %80 Perforated Front Door; Double Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U61055PWPD	19" 42U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2000x1000
SRVES42U61155PWPD	19" 42U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2000x1100
SRVES42U61255PWPD	19" 42U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2000x1200
SRVES47U61055PWPD	19" 47U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2200x1000
SRVES47U61155PWPD	19" 47U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	600x2200x1100
SRVES47U61255PWPD	19" 47U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors	600x2200x1200

Cabinet Dimensions and Part No - W600
Single Opening, Curved, %80 Perforated Front Door; Single Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U61055PWP	19" 42U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2000x1000
SRVES42U61155PWP	19" 42U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2000x1100
SRVES42U61255PWP	19" 42U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors	600x2000x1200
SRVES47U61055PWP	19" 47U, 600x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2200x1000
SRVES47U61155PWP	19" 47U, 600x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2200x1100
SRVES47U61255PWP	19" 47U, 600x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	600x2200x1200

ESTAP PRODUCTS PART NUMBERS

Cabinet Dimensions and Part No - W800

Single Opening, Curved, %80 Perforated Front Door; Double Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U81055PWPD	19" 42U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2000x1000
SRVES42U81155PWPD	19" 42U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2000x1100
SRVES42U81255PWPD	19" 42U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2000x1200
SRVES47U81055PWPD	19" 47U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Fron and Double Opening Rear Doors.	800x2200x1000
SRVES47U81155PWPD	19" 47U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Double Opening Rear Doors.	800x2200x1100
SRVES47U81255PWPD	19" 47U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Fron and Double Opening Rear Doors.	800x2200x1200

Cabinet Dimensions and Part No - W800

Single Opening, Curved, %80 Perforated Front Door; Single Opening, %80 Perforated Rear Door.

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U81055PWP	19" 42U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2000x1000
SRVES42U81155PWP	19" 42U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2000x1100
SRVES42U81255PWP	19" 42U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2000x1200
SRVES47U81055PWP	19" 47U, 800x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2200x1000
SRVES47U81155PWP	19" 47U, 800x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2200x1100
SRVES47U81255PWP	19" 47U, 800x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors.	800x2200x1200

ESTAP PRODUCTS PART NUMBERS
Cabinet Dimensions and Part No - W300

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES42U31055PWP	19" 42U, 300x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2000x1000
SRVES42U31155PWP	19" 42U, 300x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2000x1100
SRVES42U31255PWP	19" 42U, 300x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2000x1200
SRVES47U31055PWP	19" 47U, 300x1000 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2200x1000
SRVES47U31155PWP	19" 47U, 300x1100 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2200x1100
SRVES47U31255PWP	19" 47U, 300x1200 mm DcMAX, %80 Perforated, Single Opening Front and Rear Doors; Housing For Side Cooler	300x2200x1200

Co-Location Cabinets

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
SRVES47U61055PWPC2	47U 600X1000 mm, DcMAX IP20 %80 Perforated Single Opening Front and Rear Doors, Mechanical Lock, Black, Co-location, 2 compartment	600x2200x1000
SRVES47U61055PWPC4	47U 600X1000 mm, DcMAX IP20 %80 Perforated Single Opening Front and Rear Doors, Mechanical Lock, Black, Co-location, 4 compartment	600x2200x1000
SRVES47U61155PWPC2	47U 600X1100 mm, DcMAX IP20 %80 Perforated Single Opening Front and Rear Doors, Mechanical Lock, Black, Co-location,, 2 compartment	600x2200x1100
SRVES47U61155PWPC4	47U 600X1100 mm, DcMAX IP20 %80 Perforated Single Opening Front and Rear Doors, Mechanical Lock, Black, Co-location, 4 compartment	600x2200x1100
SRVES47U61255PWPC2	47U 600X1200 mm, DcMAX IP20 %80 Perforated Single Opening Front and Rear Doors, Mechanical Lock, Black, Co-location, 2 compartment	600x2200x1200
SRVES47U61255PWPC4	47U 600X1200 mm, DcMAX IP20 %80 Perforated Single Opening Front and Rear Doors, Mechanical Lock, Black, Co-location, 4 compartment	600x2200x1200

ESTAP PRODUCTS PART NUMBERS
High Density Cabling Cabinet

PART NO	DESCRIPTION	W x H x D (mm)
SRVES42U8855OFRM	19" 42U 800x800 mm DcMAX Cabling Open Frame Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front. Cabinet is without side panels, front and rear door.	800x2000x800
SRVES42U8855SCCIP20	19" 42U 800x800 mm DcMAX Cabling Open Frame Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front. Cabinet is without side panels, front and rear door.	800x2000x800
SRVES42U81055SCCIP20	19" 42U 800x1000 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2000x1100
SRVES42U81155SCCIP20	19" 42U 800x1100 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2000x1100
SRVES42U81255SCCIP20	19" 42U 800x1200 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2000x1200
SRVES47U8855OFRM	19" 47U 800x800 mm DcMAX Cabling Open Frame Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front. Cabinet is without side panels, %80 perforated front and rear door.	800x2200x800
SRVES47U8855SCCIP20	19" 47U 800x800 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x800
SRVES47U81155SCCIP20	19" 47U 800x1100 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x1100
SRVES47U81155SCCIP20	19" 47U 800x1100 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x1100
SRVES47U81255SCCIP20	19" 47U 800x1200 mm DcMAX IP20 Cabling Closed Cabinet, including 4ea. 19" mounting profile. 4ea. Vertical cable management panel at left and right, rear and front, complete with side panels, %80 perforated front door and rear door.	800x2200x1200

ESTAP PRODUCTS PART NUMBERS
System Rack – Open Frame

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
LR26U 80	26U 19" Systemrack, D=80	530x1290x80
LR36U 80	36U 19" Systemrack, D=80	530x1734x80
LR42U 80	42U 19" Systemrack, D=80	530x2001x80
LR48U 80	48U 19" Systemrack, D=80	530x2134x80
LR42U 160	42U 19" Systemrack, D=160	530x2001x160
LR48U 160	48U 19" Systemrack, D=160	530x2134x160
LR42U 420	42U 19" Systemrack, D=420	530x2001x420
LR48U 420	48U 19" Systemrack, D=420	530x2134x420

VERTICAL CABLE MANAGER OPTIONS

PART NO	DESCRIPTION	DIMENSIONS W x H x D (mm)
M44 ORG2613 RLYG	26U Vertical cable management panel 1ea. w=135mm, Finger Type	135x1292x250 (1176)
M44 ORG3613 RLYG	36U Vertical cable management panel 1ea. w=135mm. Finger Type	135x1736x250 (1620)
M44 ORG4213 RLYG	42U Vertical cable management panel 1ea. w=135mm, Finger Type	135x2003x250 (1887)
M44 ORG4813 RLYG	48U Vertical cable management panel 1ea. w=135mm, Finger Type	135x2270x250 (2154)
M44 ORG2626 RLYG	26U Vertical cable management panel 1ea. w=260mm, Finger Type	260x1292x250 (1176)
M44 ORG3626 RLYG	36U Vertical cable management panel 1ea. w=260mm, Finger Type	260x1736x250 (1620)
M44 ORG4226 RLYG	42U Vertical cable management panel 1ea. w=260mm, Finger Type	260x2003x250 (1887)
M44 ORG4826 RLYG	48U Vertical cable management panel 1ea. w=260mm, Finger Type	260x2270x250 (2154)

ESTAP PRODUCTS PART NUMBERS
Accessories / Bottom Cover

PART NO	DESCRIPTION	W x D (mm)
EST30110BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=300 mm depth=1100 mm	300x1100
EST30120BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=300 mm depth=1200 mm	300x1200
EST60100BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=600 mm depth=1000 mm	600x1000
EST60110BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=600 mm depth=1100 mm	600x1100
EST60120BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=600 mm depth=1200 mm	600x1200
EST80100BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=800 mm depth=1000 mm	800x1000
EST80110BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=800 mm depth=1100 mm	800x1100
EST80120BTCVR	Bottom Cover - c/w Multiple Cable Entry Plates width=800 mm depth=1200 mm	800x1200

ESTAP PRODUCTS PART NUMBERS
Consoles and KWM Switch

PART NO	DESCRIPTION
IC-1701	ESTAP 19" console with 17" TFT
IC-1708	ESTAP 19" console with 17" TFT and 8-port KVM switch
IC-1716	ESTAP 19" console with 17" TFT and 16-port KVM switch

Corridor Doors

PART NO	DESCRIPTION
M44CCD120200 EBM2	Cold Corridor Door System, Double Wings, W=1200 H=2000mm. Secure Glass, Manual Opening
M44CCD120200 EBA2	Cold Corridor Door System, Double Wings, W=1200 H=2000mm. Secure Glass, Automatic Opening with motor motion, proximity card or keypad controlled from outside, open bottom inside, electronic locking system.

Smart PDU

PART NO	DESCRIPTION
M44 20AL IEC MONITOR	20xIEC 320 (16xC13 + 4xC19) Socket MONITORED IP PDU with Ampermeter Display, ZeroU, aluminium profile frame, 2x16A MCB, 8000 Watt, 250V AC, 3x6.0mm^{2}x3m cord with IEC60309 plug (32A 2P+E), CE mark, daisy-chain function upto 10 units, sensor ports
M44 20AL IEC MANAGED	20xIEC 320 (16xC13 + 4xC19) Socket, Socket Based MANAGED IP PDU with Ampermeter Display, ZeroU, aluminium profile frame, 2x16A MCB, 8000 Watt, 250V AC, 3x6.0mm^{2}x3m cord with IEC60309 plug (32A 2P+E), CE mark, daisy-chain function upto 10 units, sensor ports
M44 20AL IEC NP41S 1P	NPM4100 D Series, Outlet monitored and switched PDU, 20xIEC320 C13 socket, 4xIEC320 C19 socket, 3x6.0mm^{2}x3m cable, Single phase 32A IEC60309 plug, 250v, 32A (without power consumption monitoring) sensor ports
M44 20AL IEC NP51S 3P	NPM5100 D Series, Outlet monitored and switched PDU, 20xIEC320 C13 socket, 4xIEC320 C19 socket, 5x6.0mm^{2}x3m cable, three phase 3x32A IEC60309 plug, input 380v, output 230v, 3x32A, (without power consumption monitoring) sensor ports
M44 20AL IEC NP70S 1P WPC	NPM7000 D Series, Outlet monitored and switched PDU, 20xIEC320 C13 socket, 4xIEC320 C19 socket, 3x6.0mm^{2}x3.0m cable, Single phase 32A IEC60309 plug, 250v, 32A, with power consumption monitoring sensor ports
M44 20AL IEC NP80S 3P WPC	NPM8000 D Series, Outlet monitored and switched PDU, 20xIEC320 C13 socket, 4xIEC320 C19 socket, 5x6.0mm^{2}x3.0m cable, three phase 3x32A IEC60309 plug, input 380v, output 230v, 3x32A, with power consumption monitoring, sensor ports

ESTAP PRODUCTS PART NUMBERS
Environmental Monitoring System and DCIM Tools

PART NO	DESCRIPTION
EST-EM3000	Estap Environmental Monitoring System complete with Temp&Humidity Sensor
EST-EM3001 COMBO	COMBO Sensor (Temp&Humidity Sensor - 4xDry Contact - 2x Relais-1xProximity Card Reader - 1xWater Detect Ports)
EST-EM3010	Temperature&Humidity Sensor
EST-EM3020	Temperature Sensor
EST-EM3030	Water Sensor
EST-EM3031	Water Detect Cable - 1 metre
EST-EM3035	Water Detect Cable - 5 metre
EST-EM3040	One - Three Phase V/F Sensor
EST-EM3050	wAirflow
EST-EM3060	Air Quality
EST-EM3070	Vibration Sensor
EST-EM3080	Light Detector
EST-EM3090	Rack Mount Battery Pack
EST-EM3100	Smoke Detector
EST-EM3110	Door Detector
EST-EM3120	Movement Sensor
EST-EM3130	Proximity Reader
EST-EM3131	Proximity Card
EST-EM3141	Cabinet Door Lock
EST-EM3142	Room Entrance Lock
EST-EM3151	Signal Tower with Buzzer
EST-EM3152	Buzzer
EST-EM3160	GSM Module
EST-EM3170	3G Router Module
EST-EM3180	Voice Calling Module
EST-EM3190	Integration Module & Software
EST-CMP5	Centralised Management Pack 1-5 Node Licence
EST-CMP15	Centralised Management Pack 1-15 Node Licence
EST-CMPU	Centralised Management Pack Unlimited Node Licence

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UPTIME INSTITUTE:
Uptime Institute, an independent division of the 451 Group, provides education, publications, consulting, certifications, conferences and seminars, independent research, and thought leadership for the enterprise data center industry and for data center professionals.

http://uptimeinstitute.com/images/stories/press_kits/UIPS_TiersSummary_1000511.pdf

ASHRAE:
American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc

2012 ASHRAE Environmental Guidelines for Datacom Equipment

MINKELS:
A group brand Legrand; Specialized Data Center Solutions.

MINKELS WHITEPAGES:
Tips & Tricks for a professional use of PUE as a management tool

MINKELS WHITE PAGES:
New Dimensions in Data Centre design

STULZ:
Air-Conditioning systems manufacturer.

EMKA:
Modular Closing systems manufacturer.

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AUGUST 2013

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