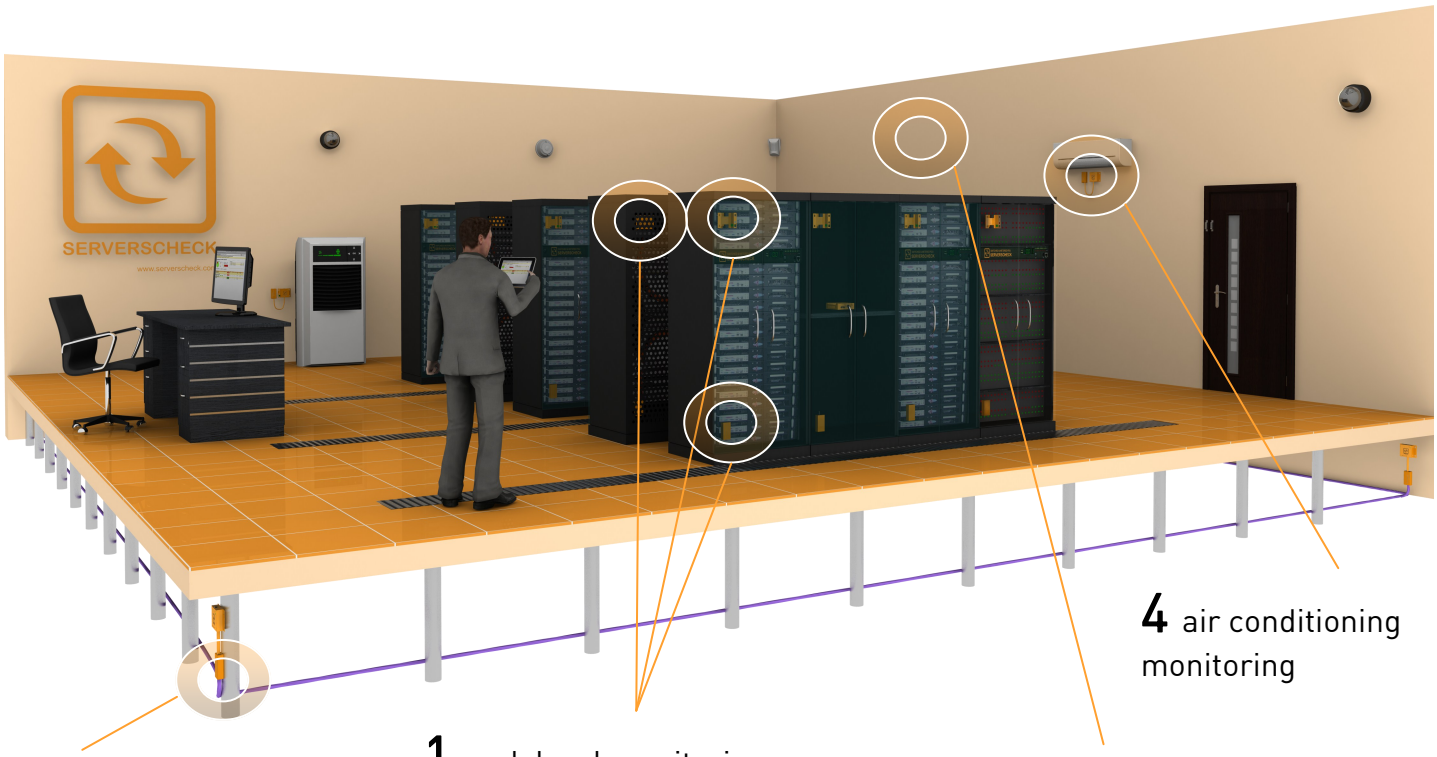
Environmental Monitoring

suggestions for monitoring server rooms & data centers



1 Rack Level Monitoring

The value of the equipment inside a rack easily exceeds $10,000 not counting the business value of the equipment inside the rack. Keeping the equipment running is not an option it is a must. Environmental monitoring can help and at a less than 5% of the total value of the equipment.

A mistake often made is to only rely on monitoring the conditions at a room level and not at a rack level. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends no less than 6 temperature sensors per rack in order to safeguard the equipment (top, middle, bottom at front & back of rack). When a heat issue arises, air conditioning units will initially try to compensate the problem. This means that with room level temperature monitoring, the issue will only be detected when the running air conditioning units are no longer capable of compensating the heat problem. It may be too late then.

We recommend monitoring temperature per rack at a minimum of 3 points: at the bottom front of the rack to verify the temperature of the cold air arriving to the rack (combined with airflow monitoring); at the top front of the rack to verify if all cold air gets to the top of the rack; and finally one at the top back of the rack which is typically the hottest point of the rack. Intake temperature should be between 18°-27°C / 64°-80°F. Outtake temperature should typically be not more than 20°C / 35°F of the intake temperature.

What is the impact of temperature on your systems? High end systems have auto shutdown capabilities to safeguard themselves against failures when temperature is too high. However before this happens systems will experience computation errors at a CPU level resulting in application errors. Then system cooling (fan) will be stressed reducing equipment life time expectance (and as such their availability and your business continuity).

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2 Ambient room monitoring

Ambient room monitoring is the environmental monitoring of the room for its humidity and temperature levels. Temperature and humidity sensors are typically deployed in:

- potential "hot zones" inside the server room or data center
- near air conditioning units to detect failure of such systems. When multiple air conditioning systems are available in a room, then a failure of one system will initially be compensated by the others before it may lead to a total failure of the cooling system due to overload. As a result temperature / airflow sensors are recommended near each unit to get early failure detection.

Humidity in server rooms should be between 40% and 60% rH. Too dry will result in the build up of static electricity on the systems. Too humid and corrosion will start slowly damaging your equipment resulting in permanent equipment failures.

When using cold corridors inside the data center, then ambient temperature outside the corridor may be at higher levels. Temperatures of 37°C / 99°F are not uncommon in such setups. This allows to significantly reduce the energy cost. However this also means that temperature monitoring is of utmost importance as a failing air conditioning unit will have a way faster impact on the systems lifetime and availability (fans stress, CPU overheating, ...) and running a room at higher temperatures may also affect non rack mounted equipment.

When using hot corridors it is important to monitor temperature across the room to ensure that sufficient cold air gets to each rack. In this case however one can also rely on rack based temperature sensors in addition of temperature and humidity sensors close to each air conditioning unit.

3 Water & Flooding Monitoring

Water leakage is a less known threat for server rooms & data centers. The fact that most data centers and server rooms have raised floors makes the risk even bigger as water seeks the lowest point.

Two type of sensors for water leakage can be commonly found: spot and water snake cable based. Spot sensors will trigger an alert when water touches the unit. Water rope or water snake cable sensors use a conductive cable whereby contact at any point on the cable will trigger an alert. The latter type is recommended over the first one due to its higher range and higher accuracy.

If using a raised floor, then one should consider putting the sensor under the raised floor as water seeks the lowest point.

The four main sources of water in a server room are:

- leaking air conditioning systems: a water sensor should be placed under each AC unit
- water leaks in floors or roof above the data center & server room: water sensors should be put around the perimeter of the room at around 50cm/3ft from the outer walls
- leaks of water pipes running through server rooms: a water sensor should be placed under the raised floors
- traditional flooding: same as second point for water leaks from roof or above floors applies

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Sensor Deployment Overview

Application	Location	Setting	SKU	Sensor Package
Rack Level Monitoring				
Intake temperature monitoring	Front - Bottom of rack for room or floor cooling, top of rack for top cooling	18-27°C / 64-80°F	365710	PoE & SNMP Temperature Sensor
Outtake temperature monitoring	Back - Top of rack (hot air climbs)	less than 20°C / 35°F difference from inlet temperature (typically <40°C / 105°F)	365710	PoE & SNMP Temperature Sensor
Ambient monitoring				
Ambient humidity and temperature monitoring	small server rooms: center of the room data centers: potential hot zones - furthest away from airco units	humidity: 40-60% rH	365709	PoE SNMP Temperature & Humidity Sensor
Airconditioning Monitoring				
Early detection of failing air condi-	next to airco units	depends on room setup	365709	PoE & SNMP Temperature &
Water Leaks / Flooding				
Detecting water leaks coming from outside of room	Around outside walls of server room / data center and under raised floor best is to keep a 30-50cm / 10-20" from outer wall		365707	PoE & SNMP Flooding Sensor with 6m/20ft water sensitive cable
Detecting water leaks from air conditioning units	Under each air conditioning unit		365707	PoE & SNMP Flooding Sensor with 6m/20ft water sensitive cable

Suggestions in above table and document were designed to provide the reader with an idea of how a server room or data center could be environmentally monitored. It is not an exhaustive list of suggestions and actual requirements will probably be different based on the specific layout of the server room and its infrastructure.

Additional Information

We kindly invite you to visit our website at **http://www.serverscheck.com/sensors** where you can find detailed information about our sensors, the way they are configured, user manuals, live demo, 360° virtual tours and much more.

We also welcome you to contact our sales team at **sales@serverscheck.com** with any question you may have. It will be our pleasure to assist you.

The sensors can be ordered from our website at **https://store.serverscheck.com** or through one of our preferred partners (**http://www.serverscheck.com/partners**)