

Overview

Nowadays, there is an increased demand for solutions to monitor residual current in the server rack, as continuous monitoring allows faults that occur to be detected quickly.

- **Cost-Effective**
 - By having Residual Current Metering at the rPDU, customers that regularly maintain their stationary electrical systems and equipment can forgo local inspection based on the DGUV V3 prescribed suite of recurring inspections.
 - With no need to take equipment offline for 3rd party inspection, our customers save not only on the expensive testing costs but can keep their equipment online.
- **Continuous-Monitoring**
 - Enable operators to proactively respond to fault-condition events, such as critical equipment shutdown, electric shock, and electrical fires.
 - Customizable alarms give operators immediate notifications of changes in residual current leakage due to the continuous monitoring provided by RCM Type B measurement.
- **Enhanced safety**
 - Gain the peace of mind that the equipment-investments and personnel on-site gain enhanced safety measures in place through the fault-current monitoring, and fast centralized alarming with the RCM Type B metering.

Protection of the Most Valuable Assets

Vertiv™ Geist™ range of intelligent and switched rack PDUs (rPDUs) are counted on for the reliability and range of monitoring options, including remote monitoring, management, and automated alerts. Continuous monitoring of the leakage current in a Data Center is paramount for the early detection of faults that can lead to damaged equipment and life-safety concerns. RCM Type B Monitoring helps Data Center Managers who want to protect their equipment investments and on-site personnel while meeting local compliance by monitoring the leakage current at the rack PDU level with fault current detection, protecting the equipment and increasing safety for data center operators.

Vertiv Geist rack PDU models support Residual Current Metering Type B (RCM-B). RCM-B continuously monitors the fault current of the power distribution within the IT rack. Customizable alarms provide immediate notifications of changes in residual current leakage allowing users to proactively respond to a fault condition avoiding potential catastrophic events such as critical equipment shutdown, electric shock, and electrical fires.

A residual current measurement signals from a limit value, but does not disconnect the system from the power supply. There are two different measurement methods that are used in practice. These are classified into two types according to DIN EN 62020:

- **Type A:** Measurement of alternating currents and pulsating direct currents.
- **Type B:** All-current sensitive measurement (measurement of direct and alternating currents, so all currents are detected).

Switch-mode power supplies, which are installed in servers, work on the principle that they rectify the AC voltage, then the DC voltage is hashed with a very high frequency. This technique can produce fault currents that have DC components or AC currents with a very high frequency. These residual currents can only be detected by devices that measure according to type B. It is therefore important to use devices that measure the residual current according to type B (universal current sensitive).

Alongside safety and availability, RCM measurement reduces testing costs. The DGUV V3 prescribes recurring tests for electrical systems and equipment. These are time-consuming and expensive. If stationary electrical systems and equipment are regularly maintained by electricians and tested by metrological measures (e.g. monitoring of the insulation resistance by RCM measurement), then they are continuously monitored. The required recurring inspection is ensured by the permanent RCM measurement. Costs are saved because insulation measurements are no longer required, loads/servers do not have to be switched off, and the number of personnel required is lower.





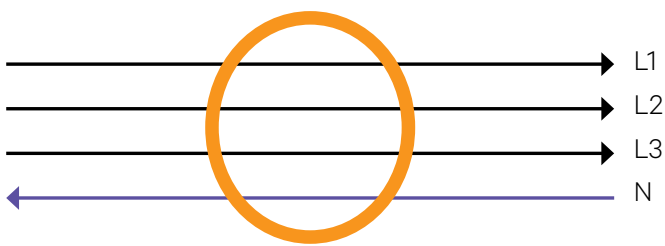
How to read RCM values

The residual current monitoring of the Vertiv™ Geist™ rPDU enables continuous monitoring of the insulation level in the IT rack, with possible changes that are detected immediately.

This saves time and increases the availability of your system. In practice, however, this current is not zero, since every installation has leakage currents caused, for example, by filter circuits or insulation.

So, the residual current is the measured difference of the values of the currents in included line cores. The need to not only know it, but detect it, analyze it and report it accordingly is key to the protection of equipment and the safety of personnel. The advantage of such a residual current measurement is the detection of all possible fault currents, which are derived and recorded as a sum.

With three-phase rPDUs, occurring residual currents are detected per phase. This supports a design standard of power supply for use in data centers. If a fault occurs it will be signaled with a red visual warning in the Web-based Graphical User Interface (GUI). The phase on which the fault occurred will be highlighted, and the text "Residual Current" will turn red, indicating the current (mA).



No Fault: Residual Current = 0

Fault: Residual Current > 0

State	Label	Energy (kWh)	Real Power (W)	Apparent Power (VA)	Power Factor (%)	Voltage (V _{lines})	Current (A _{lines})	Current Crest Factor	Balance (%)
	Total	0.033	264	264	100				
	Phase A	0.011	0	0	100	121.5	0.00	1.00	0
	Phase B	0.014	264	264	99	121.1	2.18	1.42	100
	Phase C	0.008	0	0	100	122.4	0.00	1.00	0
	Neutral Line						2.17		
	Residual Current						17		11
	Circuit 1						0.00		
	Circuit 2						2.18		
	Circuit 3						0.00		
	Circuit 4						0.00		
	Circuit 5						0.00		
	Circuit 6						0.00		
	Outlet 1	0.000	0	0	100	120.8	0.00	1.00	
	Outlet 2	0.000	0	0	100	119.6	0.00	1.00	
	Outlet 3	0.000	0	0	100	120.5	0.00	1.00	
	Outlet 4	0.000	0	0	100	120.7	0.00	1.00	

Benefits of the Residual Current measurement



Cost effectiveness

- Avoiding critical equipment shutdown with preventive intervention.
- Cost optimized maintenance according to preventive intervention and remote diagnostics.
- Reduction of operating costs by permanently monitoring.



Enhanced safety

- Compliant with the EN62020 standard for total residual current metering of both AC and DC current.
- Preventive electrical safety for users.
- Enhanced protection for equipment.
- Enclosed fire protection by fast centralized alarm for high fault currents.



Continuous monitoring

- RCM-B monitoring at the rPDU level provides permanent continuous residual current metering complying with DGUV regulation 3 and does not require system disconnection for testing.
- The rack PDUs monitor per phase on three-phase rPDUs supporting the data center standard EN50600.
- Leakage fault currents are detected before they can cause major damage.
- RCM-B Detects weak points in existing and new electrical system. Additional insulation measurement are no longer required.



Quick shipment

- rPDUs will be shipped within days of Vertiv receiving the order.

The list of stocked Vertiv™ Geist™ PDUs with RCM-B

Model	VP4G8002	VP4G9000	VP4G9002
rPDU Type	Monitored	Monitored	Monitored
rPDU Sub-Type	Unit Level	Unit Level	Unit Level
Horizontal/Vertical	V	V	V
Volts	230/400 V	230 V	230/400 V
Amps	16 A	32 A	32 A
Max KVA	11	7.3	22
Plug Type	3P+N+E (IP44)	1P+N+E (IP44)	3P+N+E (IP44)
Socket QTY/Type	(36) Combination C13/C19	(36) Combination C13/C19	(36) Combination C13/C19
Max Operating Temp.	60 °C	60 °C	60 °C
RCM-B	YES	YES	YES