

2009
reduction



MIRACEL® Server RACK from Knurr Equipped with Silentium Active Noise Control Technology

Expanding its AcoustiRACK ACTIVE™ product line, Silentium has implemented its advanced Active Noise Control technology on Knurr's Miracel® Server Rack. Currently the modified Miracel® system can provide better heat dissipation capabilities at a lower noise level.

The new Knurr Miracel® server rack is available in 33U and 15U useable size, with a front glass or still door. This product is the most advanced solution for the growing IT noise problems faced by today's workforce.

Silentium's proprietary noise-cancelling technology is highly effective in reducing low-frequency noises. When combined with unique high quality acoustic materials, this product achieves unprecedented spatial noise reduction over the entire frequency bandwidth of the audible spectrum.

- Aluminum construction
- Static load of 500Kg
- 180° door opening angle
- 30dB(A) noise reduction

This new product benefits both Knurr Miracel® advanced high quality and reliable technology as well as Silentium unique Active Noise Control methods.

ARA™

**SILENTIUM'S "GREEN IT"
CONTRIBUTION**

We are continually improving our products. Specifications are subject to change without prior notice.

AcoustiRACK™ - A Server Room in A Cabinet



2 Bergman St. Tamar Science Park

Rehovot 76703 Israel

ACOUSTIRACK™- A RANGE OF SOUNDPROOFED RACK MOUNT CABINETS WITH ACTIVE NOISE REDUCTION & ACTIVE HEAT DISSIPATION



AcoustiRACK™ is a range of Soundproofed Rack mount Cabinets available in forms and comes in various sizes; Mirace[®] ARA (MARA) 33U, 15U (1000mm, 1200mm deep)

Silentium introduces a breakthrough in noise reduction performance with ARA™ of up to 30dBA equipment noise attenuation. The ARA™ has been designed to trap and absorb unwanted noise generated inside the rack, while actively allowing free air movement and heat exchange with the outside of the unit, resulting in up to 8KW cooling/heat dissipation.

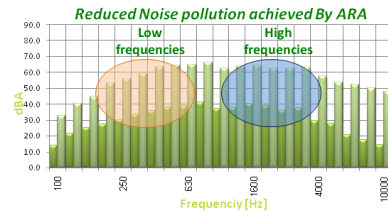
Silentium's proprietary noise-cancelling technology is highly effective in reducing low-frequency noises. Once combined with unique high quality acoustic materials, this product achieves unprecedented spatial noise reduction over the entire frequency bandwidth of the audible spectrum of up to 20dBA.

These high performances are achieved by using the patent pending modular Active Silenced Fan Tray™ (ASFT™) units, which can be easily applied to any miracle 19" racks.



Why Choose an AcoustiRACK™ CABINET?

- A "SERVER ROOM IN A CABINET"
 - **Save on Server Room Costs** - save the costs of planning, designing and building a server room. (Smallest floor print 42U sound proof rack)
 - **Use Office Space More Effectively** - no need for a dedicated computer room, use 'dead' office space
 - Fully mobile on heavy duty locking castor wheels
 - Sized by design to pass through a standard office door
 - High-quality office style
 - **Easy secure access** - 19" racks can be both secure and Handy! Lockable side panels, front glass door & rear door.
- QUIET WORK ENVIRONMENT
 - **Up to 30dBA equipment noise attenuation** - Independently tested by leading rack companies in accordance with ISO7779
 - **Intrinsic minimal noise level of 40dBA.**
 - Contributing to improved concentration and productivity.
 - **Active noise reduction technology**- Attenuation of low frequencies
- ACTIVE HEAT DISSIPATION
 - **High capacity thermal solution up to 8KW**
 - Thermostatic cooling.
 - **Efficient airflow path** - Save electrical power and prevent Hot Spot.
- ADVANCED MECHANICAL DESIGN
 - **Heavy Duty Aluminum Construction**
 - **180° door opening angle**
 - **Protects equipment from dust**- Effective Dust Filtered Air Inlet for reducing dust inside the cabinet
 - **Modular Solution** - Active Silencer Fan Tray (ASFT™),
 - **Suitable For Different Applications**- Server Room, Office Environment & Labs
 - **Flexible hardware choice**- Compatible with all leading server brands including blade server.
 - **Varied dimensions** - useable size of 33U and 15U of 1000mm and 1200mm depth.
 - **Full range of accessories available**
 - **Knurr Mirace[®] advanced high quality and reliable technology.**



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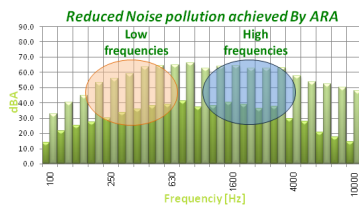
- **WHAT DOES ACTIVE NOISE CONTROL MEANS?**
- **WHAT IS AN ACOUSTICAL NOISE DECLARATION?**

What does Active Noise Control (ANC) mean?

The basic idea behind Active Noise Control (ANC) has been known for more than 70 years. Producing an opposing signal (anti-noise) with the same amplitude as the noise you want to reduce (unwanted noise), but with the opposite phase, yielding a significant reduction in the noise level. According to the superposition of waves, two waves with equal amplitude but opposite phase have a subtractive effect, resulting in a reduction of the overall amplitude.

The heart of Silentium's ANC technology is the S-Cube™ electronic controller, calculating and producing the anti-noise. The S-Cube™ Kit (SCDK™) includes an S-Cube™ controller, a microphone and a speaker. The microphone receives the noise to be cancelled (unwanted noise) and forwards it to the controller. The controller receiving the unwanted noise from the microphone calculates the anti-noise and transmits it to the speaker. The speaker is a device that physically produces the anti-noise.

ANC is mostly effective for reducing low frequencies that cannot be efficiently reduced by passive means, as can be seen in the following figure.



Within the area of cabinet application, the term "Active" is used in various contexts. For example, one can find this term in the sense of active heat dissipation, e.g. use active auxiliary fans to dissipate the heat. In the AcousticRack™ Active, the term "Active" describes not only active heat dissipation but active noise reduction as well.

What is an Acoustical Noise Declaration?

The information in the noise declaration must be presented in a uniform manner in order to indicate the benefits to the consumers or prospective buyers that wish to compare between the various products available in the market. The measurement standard (ISO 7779) is included in the noise declaration standard for IT equipment, and therefore does not have to be mentioned. Thus, at this point, the most precise way to show that IT noise figures have been obtained and declared according to their international standards is to state:

Product:	(The name of the product)		
Declared noise emissions in accordance with ISO 9296:			
	Operating	Idle	Sleep
LWAd	x.x B or dBA	x.x B or dBA	x.x B or dBA

Note: ISO 7779 is the IT noise measurement standard, while ISO 9296 is the IT noise declaration standard, i.e. the interface where IT manufacturers and buyers can meet. ISO 9296 states to report

mathematically-statistical adjusted figures, based on ISO 7779 raw data.

Let us be clear, any enclosure using auxiliary fans - generates noise!

The server's **sleep mode** is an energy-saving mode of operation in which all unnecessary components are shut down. The parallel mode in sound proof cabinets is when the auxiliary fans are shutdown and the cabinet will not generate any noise; then we can measure the equipment's noise attenuation within the rack. **So, reducing up to 30dBA of equipment noise means** that any noise in the range of 30dBA above the background noise will be screened by the background noise upon installation inside the cabinet in a sleep mode.

Minimum Intrinsic noise is equal to the server's **idle mode**. In servers, the idle mode is the state in which the operating system and other software programs have completed loading, the system is not asleep, and the activity is limited to those basic applications that the system starts by default. Idle state is considered a subset of the Active Mode. **The ARA™ idle mode** is the state whereas the fans work on minimum speed without the equipment inside. The ARA™ minimal noise level of 40dBA is achieved in the idle mode, once the fans are running to enable up to 4KW heat dissipation.

The last mode is the operating mode or active mode, in which the server, while connected to a power source, is producing useful work. The equal ARA™ mode generates up to 4KW with approximately 70dBA noise of the equipment installed within the cabinet. In these conditions, the average noise level emitted from the ARA™ is about 40-47 dBA, depending on the equipment spectrum. This minimum noise level achieved due to the use of Silentium's hybrid noise technology that can reduce the auxiliary fans noise by about 20dBA on any fan speed. The advantage of the ANC is what makes the ARA the quietest cabinet in the market, while providing heat dissipation of up to 8KW.

The following table expresses the relations between dBA of the ARA™ and the familiar noise source.

dBA	Noise Comparisons	
0	Hearing threshold	S
10	Heart beat	a
20	Quiet day in the country	f
30	Whisper	e
40	Quiet office, Blade server within ARA+ARA intrinsic noise	r
50	Conversation, Blade servers Max mode within ARA+ARA intrinsic noise	a
60	Busy Office, 1*Blade Idle mode, 1*Standard Server	n
70	1*Blade Operating mode,	g
80	1*Blade Max. mode	e
90	Yelling	D
100	Busy Workshop	a
110	Pneumatic drill	n
120	Rock & Roll Band	g
130	Pain threshold	e
140	Jets Takeoff	r

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MIRACEL® ACOUSTIRACK™ ACTIVE

AcustiRACK™ Active Based on Knurr MIRACEL® (MARA™)

Expanding its AcustiRACK™ Active product line, Silentium has implemented its advanced Active Noise Control (ANC) technology on Knurr's Miracel® Server Rack. The modified Miracel® system can provide better heat dissipation capabilities at a lower noise level.

The MARA™ reduces equipment noise by 30dB (A) while allowing airflow for up to 8KW thermal dissipation. This product is the most advanced solution for the growing IT noise problems faced by today's workforce.

The new MARA™ is available in 33U and 15U useable size (1000mm deep, 1200mm deep), with a front glass or steel door.

Silentium's proprietary noise-cancelling technology is highly effective in reducing low-frequency noises. Once combined with unique high quality acoustic materials, this product achieves unprecedented spatial noise reduction over the entire frequency bandwidth of the audible spectrum.

This new product benefits both Knurr Miracel® advanced high quality and reliable technology as well as Silentium's unique Active Noise Control methods.



Active Silencer Fan Tray (ASFT™) - why twice?



The Active Silencer Fan Tray™ (ASFT™) is a fan drawer, designed for assisting ventilation by forcing air into and out of an enclosure, while preventing noise from escaping.

The unit is lined with acoustic material and equipped with Silentium's proprietary noise-cancelling technology which is highly effective in reducing low-frequency noise. When combined with unique high quality acoustic materials this product achieves unprecedented spatial noise reduction over the entire frequency bandwidth of the audible spectrum.

This product is the most advanced solution for the growing IT noise problems faced by today's workforce. The ASFT™ reduces the auxiliary fans noise by 20dBA and the left installed equipment noise to the surrounding noise level.

ASFT™830 TECHNICAL DETAILS

- Up to 20dB(A) broadband noise reduction
- Two Dustproof fans (each 24VDC).
- 360 CFM for each fan in free air, cumulative airflow is approx. 650CFM
- Soundproofing materials lining within significantly reduce the fan motor & installed equipment hi frequency noise to approx. 30dBA
- Anti-vibration soft fan gasket
- Thermocouple fan speed control - the ASFT™ provides the customer with flexible airflow control
- Dimensions: 4U, 830(L)x445x(W)mm
- Gross Weight: 24Kg
- PSU: 24v, 220W
- Input Socket: DC Connector
- CE, FCC compliance



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MIRACEL® SERVER RACK FROM KNURR EQUIPPED WITH SILENTIUM ACTIVE NOISE CONTROL TECHNOLOGY

Miracel® AcustiRack™ Active Specification

		MARA™ 15U	MARA™ 33U
Equipment Noise Attenuation	Sleep mode	Up to 30dBA	Up to 30dBA
Intrinsic minimum noise level	Idle mode	40dBA	40dBA
Operation noise level	Operating mode	46dBA	46dBA
Heat Dissipation¹		Up to 8KW	Up to 8KW
External[mm]	cabinet w/o legs	1253 _H *600 _W *1000/1200 _L	2026 _H *600 _W *1000/1200 _L
	cabinet w/ legs		
	cabinet w/ castors	1370 _H *600 _W *1000 _L /1200 _L	2175 _H *600 _W *1000 _L
Internal[mm]	Front to back door	980/1080	980
	Front to back mounting profile ¹	610 up to 720/820	610 up to 720/820
Min. Distance	Front door to front panels	140	140
Min. Distance	Rear mounting profile to back door	125/425	125/425
Max load²	Legs	N/A	N/A
	Castors	600kg (Static)	600kg (Static)
Miracel Pluse	heavy duty legs	1000Kg (Static)	1000Kg (Static)
Minimum required clearance		10cm from Floor	10cm from Floor

1. See thermal guidelines in the UG
2. See weight & Load guidelines

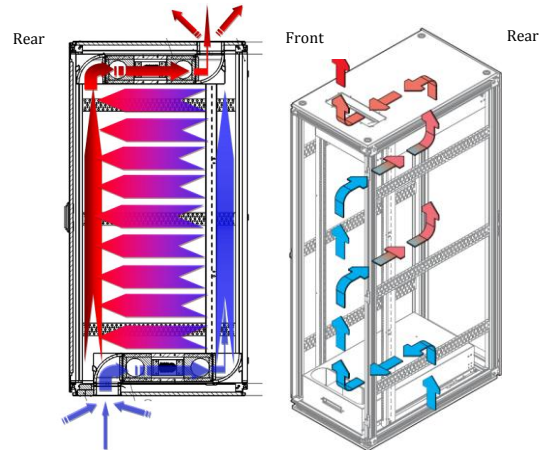
MANUFACTURE STATEMENT STANDARDS

- CE, IEC 60 297 1, IEC 60 297 2, IEC 60 297 3 Racks & Panels
- IEC 529 compliance
- IEC 60 297-2 19" Racks
- RoHS Compliance
- Flammability: Acoustic foam FMVSS 302; UL94: V0, HF1 compliance
- ISO 9001 Accreditation

MARA™ Air flow Characteristics

The MARA™ airflow design considerations were made to enable maximum noise hybrid reduction by using hybrid means. Simultaneously, the chance of inflicting damage to enclosed equipment is reduced by preventing hotspot and dissipating maximum heat under the constraint of keeping minimum total cost of the rack ownership.

Cool air is suctioned in through a fan tray at the bottom of the MARA™. The air is directed to the front of the unit, whereas a cool wall of air is formed and then flows through the equipment to the rear of the cabinet. The newly warm air is emitted out of the front of the cabinet through a second fan tray positioned at the top. This keeps a continuous flow of fresh air through the MARA™ cabinet. The advantages of this design allow the user to place the rack to the wall and save valuable space and high flexibility.



MARA™ Air flow Characteristic



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MIRACEL® SERVER RACK FROM KNURR EQUIPPED WITH SILENTIUM ACTIVE NOISE CONTROL TECHNOLOGY

Miracle® AcustiRack™ Active Benefits/Features

Feature	Higher Availability	Flexibility	Lowest Total Cost of Ownership
Extruded aluminum frame VS folded metal.	N/A	Patented aluminum extrusion creates channels, allowing for easy mounting anywhere in the cabinet.	Simplified installation of components reduces overall installation time, reducing costs.
Designed as a system VS a simple rack, with complete accessory line.	Since components are not cobbled/mounted together, the system is more reliable and more secure than if fastened together by the user.	Can customize solutions with standard Components.	No specialized construction needed, keeping prices down.
Glass Door	Computer System warning indicator available	Located in close vicinity to a network technician	N/A
Up to 30dBA Noise reduction & Intrinsic minimum noise level of 40dBA	Can be Located in close vicinity to a network technician.	No need for a dedicated computer room, use 'dead' office space	Save on Server Room Costs - save the costs of planning, designing and building a server room – saves cost
Up to 8KW	Allows more cool air circulation by having more free airflow, cooler air helps servers run more efficiently than hot servers	N/A	Reduced chance of inflicting damage to enclosed equipment
Bottom to Top Airflow entrance		Suited for air entrance from the floor. Can be located near a wall or a corner	Create smaller floor print , use office space more effectively – save cost In server room – no need to cool the overall environment, just tunnel the air from the floor- save energy, save cost
Optional cable management system	Reduces obstructions to airflow, thereby reducing the adverse impact of heat on IT equipment.	System provides management based on the user's own needs and requirements.	By having a full standard solution, there are less expenses than having to create a special solution.
42U in 2 meter height	N/A	Fits through standard sized doorways.	Easily movable to other spaces, reducing costs as new spaces are created.
180° hinge on door;	N/A	Easy cabinet access.	It is not uncommon to remove doors during initial installation of components. Not having to remove doors saves time.
Easy release Sidewalls	N/A	One person can change sidewalls without requiring special tools.	No special tools needed, saving time.
Door stiffener/rigidity	N/A	Provides additional mounting points.	Allows low-cost cooling to be mounted at rear of cabinet.
Zero U PDU	PDU can be securely mounted in a Convenient location, promoting safety and security for equipment in a cabinet.	PDU can be mounted anywhere in the cabinet to bring outlets closer to the required location.	Maximizes the amount of equipment that can be mounted in cabinet, ultimately reducing cabinet count.

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SILENTIUM UPGRADE KIT FOR KNUERR MIRACEL® 23U, 41U 600*1000MM SERVER RACK

Silentium Upgrade Kit for Knuerr MIRACEL® 23U, 41U 600*1000mm&1200mm Server RACK

Silentium provides its unique acoustic solutions for Knuerr's Miracel® server racks. Through implementing its Active Noise Control (ANC) technology on the Miracel® Knuerr server rack, Silentium provides more extensive and improved solutions for Miracel® users. Combining Knuerr, a worldwide leading manufacturer of racks, with Silentium's ANC technology, results in a superior rack server enclosure.

Silentium's Upgrade Kit for Knuerr MIRACEL® Server RACK consists of four parts:

- ASFT™x2
- Miracel® Metal Kit
- Acoustic Foam Kit
- Optional dust filter

Assumed imperforated doors are being used, the Upgrade Kit enables existing Miracel® users to upgrade their rack to the leading soundproof rack that is available in the market today, while enjoying all its benefits.

A high level of noise associated with server racks has been one of the biggest barriers in HPC adoption within office / lab environments. Nowadays, using Silentium's Upgrade Kit, all leading server brands around the world can provide a complete suit and enable small and midsize companies' costumers to use their High-Performance Computing (HPC) in their office / lab close/nearby environments.

Active Silencer Fan Tray™ (ASFT™)

The Active Silencer Fan Tray™ (ASFT™) is a fan drawer, designed for assisting ventilation by forcing air into and out of an enclosure, while preventing noise from escaping.

The unit is lined with acoustic material and equipped with Silentium's proprietary noise-cancelling technology, which is highly effective in reducing low-frequency noise. Once combined with unique high quality acoustic materials, this product achieves unprecedented spatial noise reduction over the entire frequency bandwidth of the audible spectrum.

This product is the most advanced solution for the growing IT noise problems faced by today's workforce. The ASFT™ reduces the auxiliary fan noise by 20dBA and the remaining installed equipment noise to the surrounding noise level.



ASFT™830 TECHNICAL DETAILS

- Up to 20dB(A) broadband noise reduction
- Two dustproof fans (each 24VDC).
- 360 CFM per fan in free air, cumulative airflow is approx. 650CFM
- Soundproofing materials lining within the rack, significantly reduce the fan motor & installed equipment hi frequency noise to approx. 30dBA
- Anti-vibration soft fan gasket
- Thermocouple fan speed control - the ASFT™ provides the customer with flexible airflow control
- Dimensions: 4U, 830(L)x445x(W)mm
- Gross Weight: 24Kg
- PSU: 24v, 220W
- Input Socket: DC Connector
- CE, FCC compliance

Miracel® Metal Kit

The metal Kit includes one roof, one floor, two short duct adapters for the ASFT™ and one cable box.

The difference of the roof and floor from the original Miracel® is the air opening and the cable box opening.

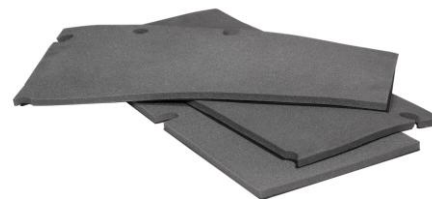
The extra parts are the short duct and the cable box.



Miracel® Acoustic Foam Kit

The main difference between a normal rack to a sound proof rack is the acoustic material, especially in Knuerr rack, since it is already sealed whereas a glass door in the front and imperforated metal door in the back are being used.

The acoustic foam kit includes foam parts for the side panels, a back door roof and floor and already cut to be easily fitted by the user.



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HP QUIET COMPUTE CLUSTER (QCC)

BASED ON KNUERR MIRACEL® 23U SILENTIUM READY SERVER RACK

Quiet Compute Cluster based on Silentium Upgrade Kit for Knuerr MIRACEL® 23U Server Rack

SILENTIUM joined HP BladeSystem Solution Builder Program, designed to benefit customers by reducing costs and accelerating the planning, deployment and delivery of blade solutions, simplifying their infrastructure. This new "Green IT" innovative offering will promote noise-free workgroups and departmental clustering, to accelerate business and research outcomes.

A high level of noise associated with server racks has been one of the biggest barriers in HPC adoption in office / lab environments. Small and midsize companies, workgroups, and departmental environments can now leverage the power of high-performance computing (HPC) to process compute-intensive workloads by deploying QCC in close proximity to people, rather than in designated IT rooms.

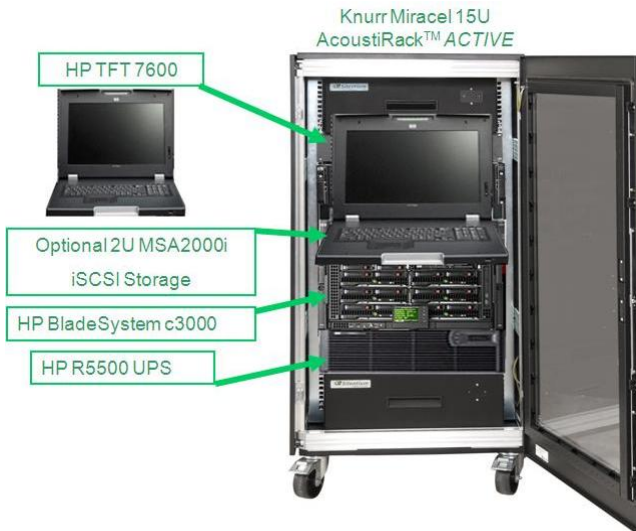
This new product benefits HP remote solution and Knuerr Miracel® advanced high quality and reliable technology as well as Silentium's unique Active Noise Control methods.

This product is the most advanced solution for the growing IT noise problems faced by today's workforce.



Quiet Compute Cluster includes:

- C3000 enclosure with blades
- Configure with C3000 (QuickSpecs)
- HP R5500 UPS (5000VA/4500W) Part number: AF426A (NA)
- Optional: Local KVM capability Part numbers: HP C3000 KVM module – 437575-B21
- HP TFT 7600 Rackmount Keyboard/Monitor (see c3000 QuickSpecs for country-specific part numbers)
- 15U Miracel® AcustiRack™ Active with front & back locking doors, utilizing Silentium's noise reduction kit.
- Part numbers: Knuerr Miracel® 23U rack: SI-ARA1140x600x1000-G
- Noise reduction kit:: SI-ASFT 830-C



For more details contact your local HP reseller.

