

Defence & Aerospace

Rugged products & integrated systems solutions



**SINGLE
SOURCE**

- Rugged enhanced mechanics
- High-speed backplane
- Performance in harsh environments
- Rapidly deployable solutions
- Compliance with defense requirements



Strong brands, long term program support

Your partner for next generation

Pentair Technical Products.

Pentair Technical Products, a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. With the highest level of quality, performance and aesthetics available in the market today, its industry-leading brands provide a broad variety of standard, modified and engineered solutions to the commercial, communications, energy, electronics, industrial, infrastructure, medical, and security and defense markets.



VPX backplane



Rugged retainers



Pentair
Technical Products

www.pentairtechnicalproducts.com



Electrical enclosure, stainless steel

Schroff[®]

www.schroff.biz

Schroff[®] has been a world leading brand in the electronics packaging industry for over four decades. Schroff[®] supplies subracks and accessories, instrument cases, 19" cabinets, backplanes, integrated systems and enclosure hardware, complete packaging systems for MicroTCA, AdvancedTCA, CompactPCI, PXI, VME, VME64x, VPX, VSX and customer-specific enclosure systems.

Birtcher[®]

www.birtcherproducts.com

Birtcher[®] designs and manufactures rugged COTS (Commercial-off-the-shelf) printed circuit board card guides, Wedge-Lok[®] retainers, conduction cooled frames for use in severe applications, and extractors for extreme airborne, shipborne, and critical land based applications.

CALMARK[®]

www.calmark.com

Calmark[®] is the industry leader in the manufacture of ruggedized components that hold boards in place and transfer heat in demanding defense and aerospace applications. Calmark products include card guides, Card-Lok retainers, PCB retainers, and metal inserters / extractors.

Hoffman[®]

www.hoffmanonline.com

Hoffman[®] offers a broad range of enclosure designs and sizes for demanding environments. The range goes beyond electrical enclosures and includes thermal and condensation management products and a wide array of accessories.

Preface

High-tech solutions from a single source

on Mil-Aero applications

Performance & dependability for mission-critical systems



3U VPX clamshell



VARISTAR MIL 901D cabinet



Titan: Rugged enhanced chassis with forced air cooling

Trusted protection for critical systems applications.

For more than 40 years we have claimed a leading position worldwide for the reliable and secure protection of electronic systems. Our decades of experience and leading-edge technology enable us to offer precisely what will help take you a step further: electronics and electrical enclosures, systems, subracks, ruggedized card guides, mechanical assemblies, and thermal management products for failsafe critical systems applications. These can be implemented globally and are developed to meet your particular requirements. Furthermore, they will withstand the strict performance criteria required for military and aerospace applications.

Broad-based high-tech solutions.

Our comprehensive range of certified standard products demonstrates our capabilities and ensures performance every day, on land, on sea, and in the air. Thanks to our modular rugged platform concept, Pentair Technical Products delivers COTS benefits and can be easily adapted to meet your individual requirements. Our products guarantee success by their high level of technical dependability and extended performance.

Partnership and long term program support.

When you partner with Pentair Technical Products, you join forces with a company that has the technical, production, and financial resources to design, manufacture, assemble, and test your critical-use systems. We rely on our in-house engineering and manufacturing know-how, rapid development and production turn-around, fast delivery, and long term project management to build complete customer confidence.

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Enabling high-speed data transfer

Know-how and competence

Components and system solutions . . .

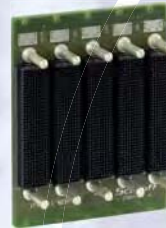


AIR

Increased performance. Uncompromising availability. "Network-centric warfare" is the challenge for the 21st century. More than ever before, success depends on the capability to rapidly gather and distribute specific information. High-speed data transfer, system availability and mission-critical reliability are crucial in the defense world today. Communications equipment must be capable of rapid deployment and ensure interoperability with the existing platform even in the most extreme environments. Cutting-edge rugged COTS-based technology from Pentair Technical Products ensures the best return for your investment.



Card-Loks for secure clamping forces



High-speed rugged backplanes for modern military use



3U VPX clamshell for Two-Level Maintenance



LAND



High-performance rugged systems

Hoffman[®]

Birtcher[®]

Ruggedized for tough en

Our technical know-how - crucial for today's military missions.

Ensuring interoperability with existing platforms

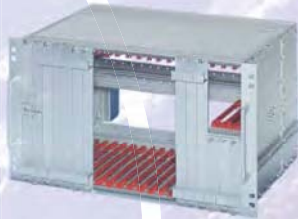
for Netcentric Warfare

... for land-based, naval and aerospace applications



ATR chassis

SPACE



Rugged 19" subracks

Dependable solutions for every operating environment.

Communications play a pivotal role in military operations. Whether it be on ships, tanks, ground control stations, combat aircraft, or on unmanned air vehicles, our modular product platforms, specific applications expertise and cutting-edge technology allow us to offer individual solutions for every operating environment.

Secure protection of your electronics, including Mil-certification:

- Superb mechanics
- High shock and vibration resistance
- Perfect shielding
- Optimized cooling
- Dependable power supplies
- Outstanding system management

Schroff®
CALMARK®

**solutions
in every environment**



Shock-mounted
MIL 901D cabinets

SEA



Cost-effective, quick and timely

COTS-based system solution

Cutting-edge technology . . .



Uncompromising performance.

The demands of today's digital battlefield require the highest standards of performance. Rapidly gathering, distributing and utilizing information, military aerospace communications systems have to perform even in worst-case scenarios. Whether the mission-critical system is C4ISR, ISTAR, FADEC or ELMS, the basic requirements are dependability and high performance at a reasonable cost and in a small form factor.

Communications technology expertise.

Pentair Technical Products has a long established record in delivering electronics packaging solutions for communications and high-speed data transfer. Modern connectivity requires serial backplanes, greater signal density, and a larger power budget. Equipped with the latest technology, our systems solutions provide access to real-time information, allowing for highest data throughput for maximum processing power.

Committed to rugged COTS products.

Pentair Technical Products brings an uncompromising commitment to performance for rugged applications. With Card-Lok retainers, conduction-cooled assemblies, 19" subracks, basic military systems, and 901D cabinets our rugged COTS range delivers the optimum combination of performance, reliability, cost and rapid time to market. Of course, this applies to all our rugged packaging solutions for military electronic systems and subsystems, irrespective of whether they are based on our huge 19" product portfolio or on the new modular Titan concept.

Pentair Technical Products military solutions.

While meeting your strict design specifications, you can be assured that the backplane, chassis, cooling, power supply and system management, including all interfaces, will be selected and integrated for optimal performance. This provides our customers with a clear advantage, since a solution can be developed and provided quickly, all under one roof.

- Reinforced mechanics
- High-speed backplane
- Performance across a wide temperature range
- Dependable power supplies
- Chassis or shelf management



Titan: modular rugged enhanced technology

Our cutting-edge engineering – reliable in worst-case scenarios.

Rapidly deployable

s from a single source

. . . for high-speed military networking

Rapid deployment platform systems.

Whether stationary or mobile, conduction or forced-air cooled, we can draw from our extensive platform capabilities to offer a COTS-based solution tailored to your specific requirements in a timely manner. No matter what your general specification may encompass - high shock and vibration requirements, EMC shielding, special MIL specification finishes, conformal coatings and even perhaps mountable with telescopic slides, we have a ready-made solution. Our continuing commitment to various architectures - VMEbus, VXS, CompactPCI, AdvancedTCA, MicroTCA and now also OpenVPX - ensures the best possible future-proof solution.

SWaP: high performance in a small form factor.

For many applications such as UAVs and indeed for general platform upgrades, space, weight, and power (SWaP) are at a premium. Our investment in a 3U VPX conduction cooled portfolio demonstrates our commitment to providing optimum performance with minimal real estate.

Double benefit: bandwidth and legacy needs.

Our current investment in OpenVPX technologies provides for future requirements and is a valuable option for legacy platform upgrades.

Withstanding harsh environments.

From individual components to the integrated system, our military networking hardware provides a physical construction capable of withstanding extreme conditions such as low atmospheric pressure, exposure to extreme temperature ranges, high EMC shielding and radiation requirements, and negative impacts from sand and dust, rain, humidity, fungus, salt spray, and salt fog.

Resisting shock and vibration.

With these harsh environments in mind, our cabinets, cases and sub racks are designed to protect the maximum mechanical performance of the electronics and to provide shock and vibration resistance.



VARISTAR MIL 901D cabinet

ADVANTAGES AT A GLANCE:

- **Complete:** Mechanical, electrical, electronic, and thermal competence from a single source
- **Rapid:** Reduced development time by leveraging high volume board and system designs
- **Robust:** Proven track record with Schroff®, Calmark®, Birtcher® and Hoffman® for over 25 years
- **Secure:** Shock and vibration resistant to MIL-STD-901D
- **Protected:** Conformal coating as a standard feature

Various design options available

Card retainers and conducti

Rugged printed circuit board retainers . . .



Design flexibility.

Different lengths, individual wedge dimensions, the relocation or addition of mounting holes, or even different hardware, materials and finishing - our product range provides an extremely broad variety of configurations allowing us to meet your application needs.



Calmark® 223 series: torque limiting Card-Lok - no special tool required

VITA 48.2 retainer configurations:

Primary-side placement

Retainers (Card-Loks, Wedge-Loks®) oriented on the primary side of the PCB. The main thermal interface to the cold-plate slot is through the secondary-side cover flanges.

Secondary-side placement

Retainers oriented on the secondary side of the PCB. The main thermal interface to the cold-plate slot is through the primary side cover flanges. While providing a better thermal path from the PCB components to the cold plate, this implementation reduces the available PCB area.



Birtcher® 24BX: Lever-actuated, chassis mount, non cold-wall

Series	Footprint (mm)	Expansion range (mm)	Force (N)	Description
New 223 Series	5.72	6.86 to 8.26	2700	New torque-limiting Card-Lok
Birtcher 24BX	7.62	na	na	Medium performance for sheet metal, non cold-wall applications
Calmark 260	6.35	6.86 to 8.26	1700	High clamping and thermal performance
Calmark 267	6.35	5.00 to 5.99	1560	High performance with low profile
Calmark 280	9.27	9.65 to 11.68	3000	Ultra high performance for bigger form factors
Birtcher 42-5	5.72	5.72 to 7.37	1869	High performance, low profile with retaining springs
Birtcher 48SL-5	6.35	6.35 to 8.26	1446	High performance with built in wedge retaining feature

ADVANTAGES AT A GLANCE:

- **Secure:** Maximum clamping force for high shock and vibration resistance
- **Efficient:** Maximum thermal heat transfer for cold-wall applications
- **Appropriate:** Sophisticated design for easy insertion and lighter weight
- **Variable:** Special lengths, finishes, screw head styles or other design options available



Modified VME and CompactPCI conduction cooled assemblies available

Our many options – capable of meeting any design needs.

Rugged but lightweight design

on-cooled assemblies

... complete solutions at module level



Designed for Two-Level Maintenance.

In modern theatres of operation, “Two-Level Maintenance” is an essential requirement for success. Our Type 1 plug-in unit is designed to the highest level of mechanical ruggedness and in compliance with ANSI/VITA 47 ESD requirements. Available with either primary or secondary side cooling, connector protection is also available as an option.

Complete solutions at module level.

Pentair Technical Products provides standard off-the-shelf conduction cooled assemblies for the VME, CompactPCI, VPX, and AdvancedMC (MicroTCA.3) platforms. Recently we added our VPX clamshell range to this program. Optimized with our in-house thermal management capabilities, Pentair Technical Products offers a complete conduction cooled solution at module level.

Clamshells.

Our clamshells are supplied complete with high-performance Wedge-Loks® and extractor handles. They are available in standard configurations or machined to the contours of your board topography.

Conduction cooled frames are available in 3U or 6U, VME/VME64x (IEEE 1101.2) or cPCI (VITA 30.1) based designs, and we accommodate ccPMC (as per VITA 20) or XMCs.

Cutting-edge development.

Our most recent developments include the Birtcher® 3U VPX clamshell, available with either primary or secondary-side cooling and also with optional connector protection, offering compatibility with VITA 48.2.

VITA 48.2 plug-in units (clamshell with Card-Loks/Wedge-Loks®):

Type 1 plug-in units

This type is Two-Level Maintenance compatible. The covers they require provide increased mechanical protection and handling robustness and, equipped with optional connector protection, they assure increased robustness during Two-Level Maintenance. Type 1 plug-in units also provide compliance with the ESD compatibility requirements defined in VITA 47.

Type 2 plug-in units

These may have one or more protective covers absent and may therefore not be Two-Level Maintenance compliant.

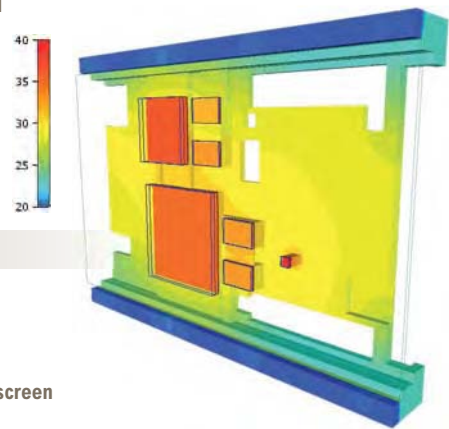
NEW!!

Birtcher® 3U 1” pitch VPX clamshell with primary-side cooling (left) and connector protection conforming to VITA 48.2 REDI. Also available with secondary-side cooling (right).



Secondary clamshell

Primary clamshell



Modular level thermal analysis

ADVANTAGES AT A GLANCE:

- **Strong:** Aluminum for high thermal conductivity and lightweight support
- **Robust:** Machined from a single piece for high heat transfer and structural support
- **Large selection:** Available in black anodize, chemical film, electroless nickel plating and custom silkscreen
- **Reliable:** Locking helicoils secure board fasteners in extreme vibration environments, and extractors provide ample force to disengage board connectors easily

Protected for harsh environments

Backplanes

The heart of high-speed serial data communication



The right partner for customer-specific modifications.

In addition to our standard backplane product portfolio of VMEbus, VME64x, VXS, and VPX backplanes, we offer custom designs ranging from minor modifications and open standard based customer specific solutions up to completely proprietary backplanes. Backplane design, production, full production process testing, simulation and measurement, together with the design and production of mechanical components and system assembly make Schroff® the ideal partner for the customer-specific system solution.

Stepping safely into the high-speed future.

The defense market embraces new technology. Now, with the VPX specification VITA 46.0 and the draft of the Open VPX specification (VITA 65), the defense market has moved from parallel (VME) to high-speed serial data communication. With more than a decade of experience in high speed AdvancedTCA, MicroTCA, CompactPCI Serial, VPX and VXS backplane design, Schroff® is the right partner to assist you in advancing from parallel bus to serial data transfer.

Protected for harsh environments.

When your equipment is installed in harsh environments, the electronics must be protected against fungus, salt spray, and other aggressive substances. We have the in-house capability to provide each backplane with a conformal coating to MIL-STD-810E, DIN 50155 and UL94V-0 specifications.



In-house conformal coating process



VPX full-mesh



VXS single star



Signal integrity measurement

ADVANTAGES AT A GLANCE:

- High capacity: Superior signal integrity to provide up to 40 gigabit data transfer per lane
- Leading-edge technology: High-speed simulation and measurement capabilities
- Complete capability: In-house conformal coating
- Superior quality: 100% backplane testing to guarantee superior quality

Our sophisticated products – performing wherever required.

Engineered for extreme conditions

Ruggedized subracks

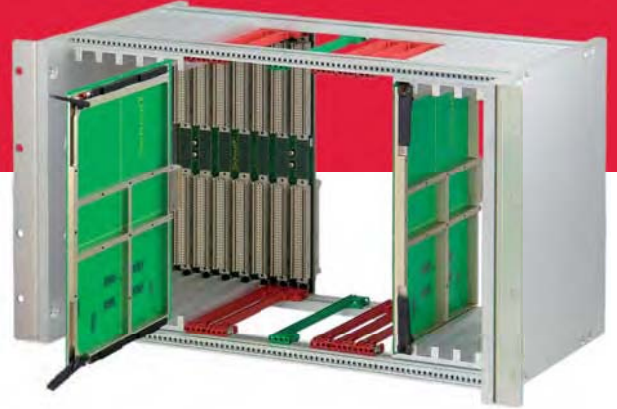
Protection for harsh environments

Withstanding extremes of shock and vibration.

From a modular toolbox, our subracks are available in three levels of ruggedization. Readily available product platforms are configurable to fulfill your individual needs. From standard industrial to robust transportation, light military use and rugged-level products (1g up to 25g), we have the right solution.

Special rugged product:

- Reinforced side panels, 19" brackets and top/bottom covers with additional mounting positions to horizontal rails
- Aluminum horizontal rails with 3 fastening points for harsh environments
- Aluminum guide rails (one piece) or Birtcher®/Calmark® retainers optional



Customer-specific subrack

Special features:

- Standard passivated surface treatment
- Individual surface treatments such as yellow chromate or to customer's specification
- MIL-C-5541 Class 1A, Gold
- EMC shielded standard solution available
- Aluminum guide rails can be screwed to horizontal rails
- Available with Birtcher®/Calmark® retainers



Conduction cooled assembly



Rugged metallic card guides



Optional rugged card guides with enhanced clamping function

Ruggedization & cooling efficiency

ADVANTAGES AT A GLANCE:

- From a single source: All competencies under one roof
- Modular toolbox: Multiple ruggedization levels
- Adaptable: Several retainer options allowing upgrade to increasingly higher performance levels according to shock and vibration requirements
- Modification: Service for small to large quantities

Ensuring rapid time-to-market deployment

The next level: Titan

... excel in extreme environments



3U rugged enhanced conduction cooled chassis with forced air option

Rugged enhanced systems.

Working from REDI (rugged enhanced design implementation) VITA 48.2 as a basis, we have developed a modular conduction cooled chassis. This enclosure utilizes high-grade machined aluminum alloys and protective chemical finishes combined with the latest technology in design and machining to achieve a tightly toleranced system.

Quickly deployable. Highly secure.

Controlled assembly processes provide a complete, highly rugged, cost effective, and environmentally sealed enclosure. To ensure rapid time-to-market deployment and quick development, these systems can easily be configured with a custom front I/O panel to support your unique system configuration. Schroff® can also engineer a modified backplane interconnect and customize power requirements as needed.

Rugged construction.

- Various Mil-aero grade materials available (EN AW6062, 6082, 7075, etc.)
- Full IP/EMC gasketing options available
- Variety of finishes available such as anodize, allodyne 1200, electroless nickel, Sur-Tec or powder coating for external surfaces

Modular design. Fully customizable.

- Allows Type 1 or Type 2 plug-in units
- Accepts plug-in units with optional connector protection
- Available with 0.8", 0.85", and 1" pitch
- Allows a variety of external heat dissipation options such as heat sinks, forced air and liquid cooling

New Titan series.

Titan is designed in accordance with the VITA 48.2 mechanical specification for microcomputers using REDI conduction cooling applied to VITA 46. This allows a variety of open-standard bus architectures that Schroff® already provides including VPX, VME, CompactPCI, CompactPCI Serial, CompactPCI Plus IO, and VME64 extensions that conform to the IEEE standard for mechanical core specifications for conduction-cooled Euroboards.



7 slot 3U VPX Titan chassis, available with Birtcher® 3U VPX clamshell, vertical and horizontal mounting options; various modular design options available



cooling efficiency

ADVANTAGES AT A GLANCE:

- **Complete:** With Schroff® VPX backplane, fully modular design for maximum flexibility
- **Robust:** Machined aluminum construction with IP/EMC gasketing options for severe environments
- **Powerful:** Optimized heat transfer and dissipation, extreme shock and vibration protection



Guaranteeing dependable system functioning

Rugged 19" systems

Mechanics and electronics from a single source . . .

Rugged 19" systems.

Based on our standard rugged subrack and system program, we offer a wide range of solutions. With our broad experience we can easily adapt to your specific requirements for wide temperature ranges, high shock and vibration levels, and extremely harsh environmental conditions.



Electronic components including backplane, adapter panels, control modules and power supplies are typically conformal coated

Typical customer requirements:

- Reinforced side panels, horizontal rails and covers; screws and other fasteners in stainless steel; prepared for telescopic slides
- High-speed VXS or VPX backplane
- Controlled air cooling concept from front to rear
- Dependable 19" power supplies with 1000 W total output power
- Chassis monitoring module for monitoring voltages, temperatures and digital inputs
- Communication and remote monitoring via RS 232 or Ethernet interface (10BaseT)
- Redundant system architecture
- EMC shielded subrack
- Electronic components such as backplane, adapter panels, control modules, and power supplies are conformal coated

Typical specifications:

MIL-HDBK-217F	Reliability Prediction of Electronic Equipment
MIL-STD-1472F	Human Engineering Design Criteria for Military Systems, Equipment and Facilities
MIL-C-38999 Series	Connectors
MIL-STD-810D	Environmental Test Method and Engineering Guidelines
MIL-STD-461D	EMC Compatibility
MIL-STD-2036	General Requirements for Electronics Equipment Specification

Standard product test platform:

- Flexible platform for board and application evaluation at laboratory stage
- Cards accessible from all sides
- Modular power solution
- Card cage for forced air and conduction-cooled cards



ADVANTAGES AT A GLANCE:

- **Flexible:** Meeting specific design requirements thanks to modular product platforms that form the basis for individual solutions
- **Fast:** All design, manufacturing and testing resources under one roof to ensure rapid time-to-market
- **Secure:** Backplanes and electronic components' simulation, development, production and testing – complete in-house capabilities
- **Reliable:** Efficient cooling optimized by air measurements and heat simulations in a climate controlled laboratory

Our complete solutions – offering best performance & quality.

COTS-based rapid-deployment solutions

Mil-certified cabinets

- VARISTAR – versatile cabinet platform for extreme conditions
- eurorack – lightweight, dismantlable and with flexible dimensions



Uncompromisingly secure and economical.

Cost control is a requirement for most projects. COTS solutions are a useful tool to achieve this for military applications. Schroff® is committed to providing a COTS solution and to providing uncompromising security.

VARISTAR in steel and eurorack in aluminum are designed to provide 100% reliability for robustness under shock and vibration, shielding against high frequency interference, and ensuring long-term durability. Attention to detail and total reliability down to the smallest detail make the fulfillment of complex security tasks possible - and also economically viable.

Long-term service.

VARISTAR and eurorack remain unfazed even in dusty and high humidity conditions. Zinc plating and additional powder coating provide double protection against corrosion.

Best-in-class HF shielding. IP protection included.

The VARISTAR shielding principle protects sensitive data from interference radiation. Best of all, even in the most diverse cabinet configuration, VARISTAR performs with the highest shielding effectiveness. Tested to IEC 61587-3, the HF gasket simultaneously forms a barrier against dust and water to IP 55.

VARISTAR EMC test results (to IEC 61587-3)*:

VARISTAR with

- solid steel door: 60 dB at 1 GHz
- perforated door: 40 dB at 1 GHz
- fan top cover: 55 dB at 1 GHz
- cable entry in base plate: 45 dB at 1 GHz
- solid steel door: 40 dB at 3 GHz
- perforated door: 30 dB at 3 GHz

* Standard dimensions of tested object 2000 x 600 x 600 mm

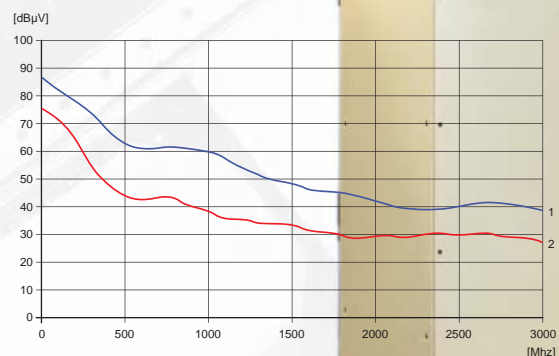
Shock and vibration resistance.

In general, cabinets installed on ships are equipped with shock absorbers. Four absorbers are fitted under the cabinet, and two are used for wall mounting on the top. The design requires a calculation that takes the cabinet dimensions and payload into consideration. Shock absorber selection and dimensioning is performed by our specialist partner Socitec. Documentation of standard versions with detailed descriptions and test reports are available at:

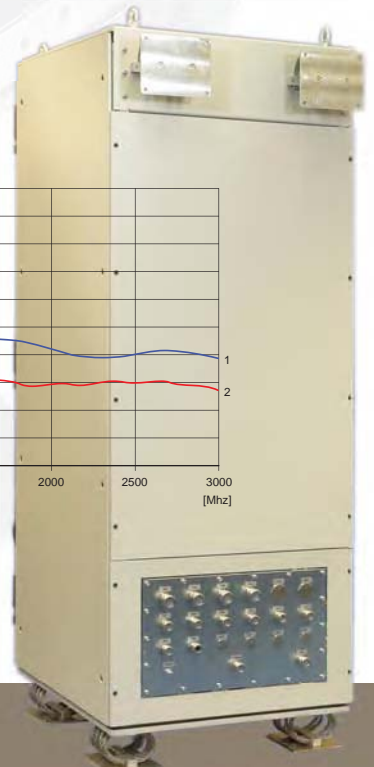
www.schroff.co.uk/testreports



The Heavy-Duty version offers a maximum static load-carrying capacity of 800 kg and withstands dynamic loads up to DL6.



1 Cabinet with solid steel door
2 Cabinet with perforated door



Our cabinet solutions – successful aboard military programs.

Meeting the strictest design requirements

Compliant with MIL-STD-901D



F.E. model - mesh and stress analysis



Cabinet tested to MIL-STD-901D

Mil-certified cabinets.

Externally isolated at both base and rear, our VARISTAR and eurorack cabinet platforms have been successful aboard key naval programs. Defense agencies rely on our flexibility and ability to modify our COTS platform to the most demanding environments on the high seas. With our partner Socitec we offer 19" ruggedized cabinets, validated to MIL-S-901D.

The cabinet is derived from our standard COTS platform solutions and combines today's requirements for integration:

- High performance elastomer or cable elastic mountings for COTS equipment
- 19" standard
- Large selection of dimensions (height and depth)
- Great variety of accessories available
- Reduced engineering and fabrication costs
- EMC or HF adaptable
- ROHS compliant



Versions of shock absorbers

Designed to MIL-STD-901D for shock and MIL-STD-167F for vibration. For specific customer requirements Schroff® is developing and testing rugged cabinet solutions to further MIL standards such as MIL-STD-810F for environmental conditions.

ADVANTAGES AT A GLANCE:

- **Certified:** Packaged and MIL-STD-901D tested in cooperation with our partner Socitec
- **Flexible:** Highly flexible construction for tight spaces
- **Reliable:** Shielded against high-frequency interference: 60 dB at 1 GHz, 40 dB at 3 GHz
- **Protected:** Against dust and water (IP 55)
- **Durable:** Dual protection against corrosion with zinc-plated and powder-coated frame

Continuous quality assurance

Testing & Simulation

Wide range of in-house process capabilities . . .

Development and design to MIL standards.

Our team of experienced development, design and application engineers, modern design tools, and high quality project management are the guarantee of our high quality standard. To ensure this remains the case in the future, our engineers are constantly researching many areas including signal integrity, EMC, cooling, shock and vibration resistance, and surface treatment.



FOR THE OPTIMAL DESIGN WITH MAXIMUM PERFORMANCE:

- Latest CAD software, simulation tools, and measuring equipment
- Experienced developers
- Up-to-date layout tools, e.g. Mentor Graphics Board Station and PADS
- 3D files of the layout tools are used in the mechanical design

Modeling, simulation, and measurement: 100% quality.

One thing remains top priority at every stage of development: the continuous assurance of 100% quality. Our engineers therefore always use the most up-to-date modeling and simulation tools, measuring instruments and in-house-designed, high-performance test adapters. In this way we can optimize the development process and ensure, from as early as the layout stage, that we are offering our customer the best and highest-performance products. For more advanced tests we work in cooperation with certified testing and examining institutes.

FOR A RAPID DEVELOPMENT PROCESS AND HIGH RELIABILITY:

- For interference emission and interference immunity: EMC/CE test location
- Circuit simulator: P-Spice
- For signal integrity measurements: backplane board simulation using Ansoft Designer
- Speed simulation
- For thermal simulations: Flotherm
- For thermal tests: wind tunnel and climate cabinet
- Shock and vibration test
- IP test



Our resources and capabilities – unmatched in the industry.

Efficient production in small and large quantities

Manufacture

... a good understanding of MIL customer priorities

Modern manufacturing facilities.

Innovative production methods, modern machinery and a high degree of automation guarantee that our product offering assures the consistent high quality and performance characteristics demanded in military and aerospace applications. Optimized for small and medium-sized batches, our customers benefit from further advantages such as time and cost savings.



MANUFACTURE OF MECHANICAL COMPONENTS:

The best processes, assuring flexibility and high quality:

- Cutting
- Power-press punching
- CNC punching
- Routing
- Bending
- Laser processing
- Joining techniques
- Steel and aluminum welding
- Galvanic surfaces for steel and aluminum parts
- Screen or digital printing

Machines developed in-house for still higher production efficiency:

- Fully-automated production lines for horizontal rails
- Production facility for threaded inserts
- Highly flexible punching facility for custom front panel manufacture



MANUFACTURE OF ELECTRONIC COMPONENTS:

Economic solutions with the highest precision:

- Solder paste printing
- Automatic SMD placement
- Vapor-phase soldering
- Wave soldering
- Automated press-in operations
- Conformal coating



Striving for 100% reliability

Quality Assurance

Assurance in quality

More than a policy: A core value.

Pentair Technical Products is committed to the highest possible standards in military and aerospace. With our high-quality product offering, quality control is a core value. This means that our quality management continuously examines and improves procedures and processes, at every stage of design and manufacturing.



QUALITY CONTROL:

FMEA

- Looks for potential weaknesses in product or production processes during the design and development phases

Automatic optical inspection

Testing of electronic sub-assemblies for manufacturing defects such as:

- Poorly soldered joints
- Wrongly-placed or missing components

In-circuit test

- Detects faults in the conductive path such as short circuits or discontinuities
- Isolates soldering errors and component faults
- Circuit block tests

Function and safety testing

- System functions
- Earthing test
- Insulation test (high-voltage test)

Fatigue/burn-in test

- Fatigue testing of power supply units under operating conditions
- Early-failure detection



Our global corporate policies – essential for prime contractors.

Guaranteeing repeatable and calibrated results

Compliance & Documentation

Compliance for large government programs

Our benchmark: complete customer confidence.

Our comprehensive quality promise guarantees prime contractors and their customers compliance with military requirements. As a result of our decades of experience and cutting-edge technology, customers can rest assured that the products they receive fully meet their expectations. What is more, our customers benefit from the highest quality and reliability – simply from a single source.



We guarantee product performance.

Our extensive in-house product testing is unmatched in the industry with UL approved test labs, EMC, CSA/TUV, water and salt spray, UV, and static load testing facilities. During the design phase, we perform extensive DVT (design verification testing) protocols to validate product performance.

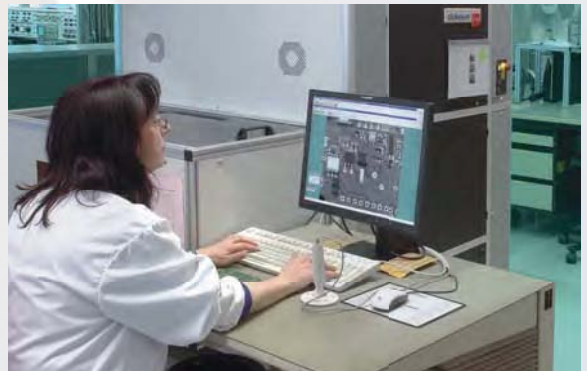
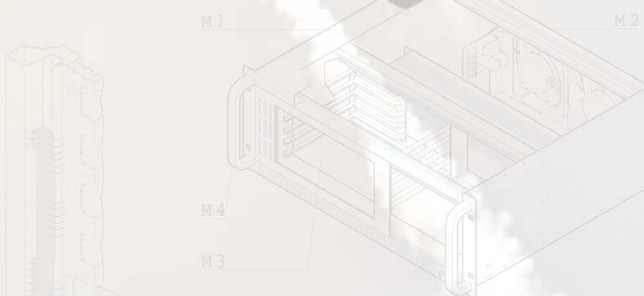
Through a highly integrated electronic database, we provide complete serial number traceability on all systems, FRUs, key components, and software updates.

When you take delivery of your components, you have our guarantee that they meet or exceed all applicable industry performance standards for repeatable and calibrated results.

Compliance and documentation.

We can provide procured part certification and traceability for U.S. Government programs. As a result of our broad experience in the market, we know and understand Defense Federal Acquisition Regulation Supplement (DFARS) compliance requirements.

Pentair Technical Products has completed the implementation of policies and procedures at its San Diego and Rhode Island facilities to meet the requirements of the Directorate of Defense Trade Controls (DDTC) compliance program for registered manufacturers and exporters of defense articles and services as defined in the United States Munitions List (USML).



About Pentair Technical Products

Pentair Technical Products, a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. Its industry-leading brands – Hoffman®, Schroff®, McLean® Cooling Technology, Calmark®, Birtcher®, Aspen Motion Technologies™ and Taunus™ – provide a broad variety of standard, modified and engineered solutions to the commercial, communications, energy, general electronics, industrial, infrastructure, medical, and security and defense markets.



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