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MODUSYS 2000 Kernel

OEM Information for the 2U cPCI Enclosure

P / N 217540 Revision A1
August 2002

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Using This Manual

This manual introduces the ModuSys 2000 Kernel and describes the Force Computers ModuSys Product Family 2U enclosure. It contains information on the product features, using storage devices, installing or removing option boards and module unit components.

This manual is for authorized personnel, including field service engineers responsible for building, configuring, and expanding systems created with ModuSys family of Modular Computing Components. You must be familiar with computer equipment and components before you use this manual. You must also be familiar with assembling and disassembling computer equipment.

Conventions

Convention	Description
n.nn	A period in numerals signals the decimal point indicator. For example, 1.75 equals one and three-fourths.
nn nnn	A space character separates digits in numerals with 5 or more digits. For example, 10 000 equals ten thousand.
Italic type	Indicates the following: Complete titles of associated documents and inline electronic addresses
bold type	In procedures, (n) refers to the number in the corresponding figure. In text, bold type highlights the first occurrence of a term referenced in the glossary.
Note	A note contains information of special importance to the reader.
Caution 	A caution contains information to prevent damage to the equipment.
Danger 	A danger contains information to prevent personal injury.
*	An asterisk (*) in a part number signifies any number in a particular position in a part number. For example, EBM3*-PA refers to the part numbers EBM31-PA, EBM32-PA, EBM33-PA, and so on.

How to Get Help

If you need help with the ModuSys Kernel Components, contact one of the following sources of support:

- Your supplier.
- A Force Computers field applications engineer.

Associated Documentation

The following documentation complements this manual.

- User information manuals accompanying each Single-Board Computer (SBC). Consult these manuals for more information on the SBC, firmware, and supported options.

For More Information

If you need help with the ModuSys systems, contact one of the following sources of support:

- Your supplier
- A Force Computers Field Applications Engineer
- Force ModuSys product family technical support, accessible via email at support-de@fci.com
- The Force Computers web site at **www.forcecomputers.com**

Abbreviations

ModuSys	Reference name for the ModuSys kernel plus SBC based system family.
AT	Industry standard PC connection.
HDU	Hard Disk Unit.
IDE	Integrated Device Electronics.
ISA	Industry Standard Architecture, an industry standard bus.
ISP	In-circuit programmable.
Kernel unit	In this manual the term kernel refers to a unit assembled from a backplane board and an enclosure (which includes the power supply and operator control panel [OCP]). A kernel does not contain either an SBC or specified storage devices.
Module unit	In this manual the term module unit refers to a module unit assembled from a backplane board, an enclosure, an SBC and specified storage devices.
OEM	Original Equipment Manufacturer.
OCP	Operator Control Panel.
cPCI	Compact Peripheral-Component Interface.
PICMG	PCI Industrial Computer Manufacturers Group.
RETMA	Radio, Electronic and Television Manufacturers Association.
SBC	Single Board Computer.

Revision History

SAP No.	Revision	Date	Description	Force (Matl) #
217540	A1	Aug 2002	ModuSys 2000 Kernel User Manual	EK-A1057-UG



Safety Notes

The text in this chapter is a translation of the “Sicherheitshinweise” chapter.

This section provides safety precautions to follow when installing, operating, and maintaining the ModuSys Kernel.

We intend to provide all necessary information to install and handle the ModuSys Kernel in this manual. However, as the product is complex and its usage manifold, we do not guarantee that the given information is complete. If you need additional information, ask your Force Computers representative.

The ModuSys Kernel has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by Force Computers or persons qualified in electronics or electrical engineering are authorized to install, maintain, and operate the ModuSys kernel. The information given in this manual is meant to complete the knowledge of a specialist and must not be taken as replacement for qualified personnel.

EMC

The system is designed to comply with the limits for a Class B digital device in this system, pursuant to part 15 of the FCC Rules respectively EN 55022 Class B. These limits are designed to provide reasonable protection against harmful interference when the system is operated in a commercial, business or industrial environment.

The system generates and uses radio frequency energy and, if not installed properly and used in accordance with this Preliminary System’s Guide, may cause harmful interference to radio communications. Operating the system in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. Use of shielded cables when connecting to the I/O interface ports is required to ensure compliance with EMC regulations and standards.



Cabling

Never change the system's cabling as delivered by Force Computers.

The cabling should follow existing cable paths using existing or similar cable fastenings. It must not break the airflow through the chassis.

The cabling should comply to the standards used for the existing cabling wherever applicable.

Check proper function of the system after cabling extensions.

If in doubt concerning cabling, ask your local Force Computers representative.

VCCI

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Interference (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

Environment

Always dispose of old boards or systems according to your country's legislation, if possible in an environmentally acceptable way.

Expansion

To avoid an overload of the system check the total power consumption of all components, i.e. the installed CPU boards and drives (see the technical specification of the respective components).

Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).



Opening

Only personnel trained by Force Computers or qualified persons in electronics or electrical engineering are authorized to open the system.

To avoid electric shock when opening the chassis it is not sufficient to switch off the main function switch because it does not remove the AC line voltage from the system. Therefore, before opening the chassis, an authorized person must check that the system is powered off and that the system's main power connector is disconnected.

Sicherheitshinweise

Dieser Abschnitt enthält Sicherheitshinweise, die beim Einbau, Betrieb und bei der Wartung des ModuSys Kernel zu beachten sind.

Wir sind darauf bedacht, alle notwendigen Informationen, die für den Einbau bzw. den Betrieb des ModuSys Kernel in diesem Handbuch bereit zu stellen. Da es sich jedoch um ein komplexes Produkt mit vielfältigen Einsatzmöglichkeiten handelt, können wir die Vollständigkeit der im Handbuch enthaltenen Informationen nicht garantieren. Falls Ihnen Informationen fehlen sollten, wenden Sie sich bitte an Ihren Ansprechpartner bei Force Computers.

Das ModuSys Kernel erfüllt die für die Industrie geforderten Sicherheitsvorschriften und darf ausschließlich für Anwendungen in der Telekommunikationsindustrie, im Zusammenhang mit Industriesteuerungen und in der Entwicklung verwendet werden.

Einbau, Wartung und Betrieb dürfen nur von durch Force Computers ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal durchgeführt werden. Die in diesem Handbuch enthaltenen Informationen dienen ausschließlich dazu, das Wissen von Fachpersonal zu ergänzen, können es jedoch nicht ersetzen.

EMV

Das System wurde entwickelt, um den für digitale Geräte der Klasse B gültigen Grenzwerten gemäß den FCC-Richtlinien Abschnitt 15 bzw. EN 55022 Klasse B zu entsprechen. Diese Grenzewerte sollen einen angemessenen Schutz vor Störstrahlung beim Betrieb des Systems in Geschäfts-, Gewerbe- sowie Industriebereichen gewährleisten.

Das System arbeitet im Hochfrequenzbereich und erzeugt Störstrahlung. Bei unsachgemäßem Einbau und anderem als in diesem Handbuch beschriebenen Betrieb können Störungen im Hochfrequenzbereich auftreten. Warnung! Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen. In diesem Fall kann von dem Betreiber verlangt werden, angemessene Maßnahmen durchzuführen.

Verkabelung/Kabelführung

Verändern Sie nie die von Force Computers ausgelieferte Verkabelung des Systems.

Stellen Sie sicher, dass die Verkabelung schon existierenden Kabelführungen folgt und bestehende oder ähnliche Befestigungen verwendet. Die Kabel dürfen den Luftstrom innerhalb des Systems nicht unterbrechen.

Die Verkabelung sollte wenn möglich den Standards der schon vorhandenen Verkabelung entsprechen.

Überprüfen Sie nach der Erweiterung der Verkabelung, ob das System ordnungsgemäß arbeitet.

Falls Sie Fragen bezüglich der Verkabelung haben, wenden Sie sich an Ihren Vertreter von Force Computers.

VCCI

Das ModuSys Kernel ist ein Gerät der Klasse B gemäß dem Standard des Voluntary Control Council for Interference von Information Technology Interference (VCCI). Wird das System in Wohngegenden betrieben, können Störungen im Hochfrequenzbereich auftreten. In einem solchen Fall ist der Benutzer verpflichtet, entsprechende Gegenmaßnahmen zu ergreifen.

Umweltschutz

Entsorgen Sie alte Boards und Systeme gemäß der in Ihrem Land gültigen Gesetzgebung, wenn möglich umweltfreundlich.

Ausbau/Erweiterung

Um eine Überlastung des Systems zu verhindern, überprüfen Sie die gesamte aufgenommene Leistung aller eingebauten Komponenten, also z.B. der installierten CPU Boards und Laufwerke (siehe die technischen Daten der entsprechenden Komponente).

Stellen Sie sicher, dass die Stromaufnahme jedes Verbrauchers innerhalb der zulässigen Grenzwerte liegt (siehe die technischen Daten des entsprechenden Verbrauchers).

Öffnen

Das System darf ausschließlich von durch Force Computers ausgebildetem oder im Bereich Elektronik oder Elektrotechnik qualifiziertem Personal geöffnet werden.

Um einen elektrischen Schlag beim Öffnen des Systems zu vermeiden, genügt es nicht, das System über den Ein/Ausschalter abzuschalten, da auch in abgeschaltetem Zustand noch eine Netzspannung anliegt. Bevor Sie das System öffnen, muss eine qualifizierte Person sichergestellt haben, dass das System ausgeschaltet und der Netzstecker gezogen ist.

1

Introduction

The Pre-Configured System

This section describes the Force ModuSys Product Family 2U system, which includes integral fan assembly using three axial fans for cooling, an **operator control panel (OCP)** and a **200W power supply unit (PSU**). An option of power supply redundancy is available by adding an additional 200W PSU.

The 2U cPCI enclosure is part of a ModuSys 2000 family of kernels designed for use with 4-Slot ModuSys backplanes.

Configuration Variants

The ModuSys product offering is part of the **Force Computers ModuSys Product Family**. The ModuSys 2000 uses an 4-Slot cPCI backplane suitable for use with the Force Computers 735R2 Intel x86-based SBCs. The Force ModuSys Product Family product offering provides high flexibility. A Force ModuSys Product Family enclosure can accommodate a variety of Force SBCs and supports multiple operating systems. The information in this manual applies to the enclosure portion of the ModuSys 2000 system.

Table 1 lists the part numbers you can order for the 2U cPCI enclosure.

Note: Please refer to the separate CPU User Manual for associated information.

Table 1: Sellable Part Numbers for ModuSys2000

Part Numbers (Old Matl)	Part Numbers (SAP)	Description
INT-MOD02-01	110814	ModuSys 2000 Kernel (Basic enclosure)
130-00095-01	217143	Power Supply 200W cPCI 3U 8HP
3X-IDE20-AA	108662	20GB Ultra ATA 5400RPM Disk Drive
3X-TRV10-AA	110517	IDE Travan Tape Drive (20GB Compressed)
N / A	110714	CPCI-735R2 / 512-800-L512-0 SBC
N / A	109895	ACC / RTB-735R2 Rear Transition Board
N / A	108939	PENT / CPCI 735-ACCKIT On-Board 2.5” EIDE HDD
N / A	109374	PENT / MEM 735 / 1G-ACCKIT 1G DRAM option
N / A	107088	PMC / VGA-4 Graphics Card
174-00247-01	217218	Filler Plate 6U 1-Slot (4TE)
174-00248-01	217219	Filler Plate 3U 2-Slot (8TE)

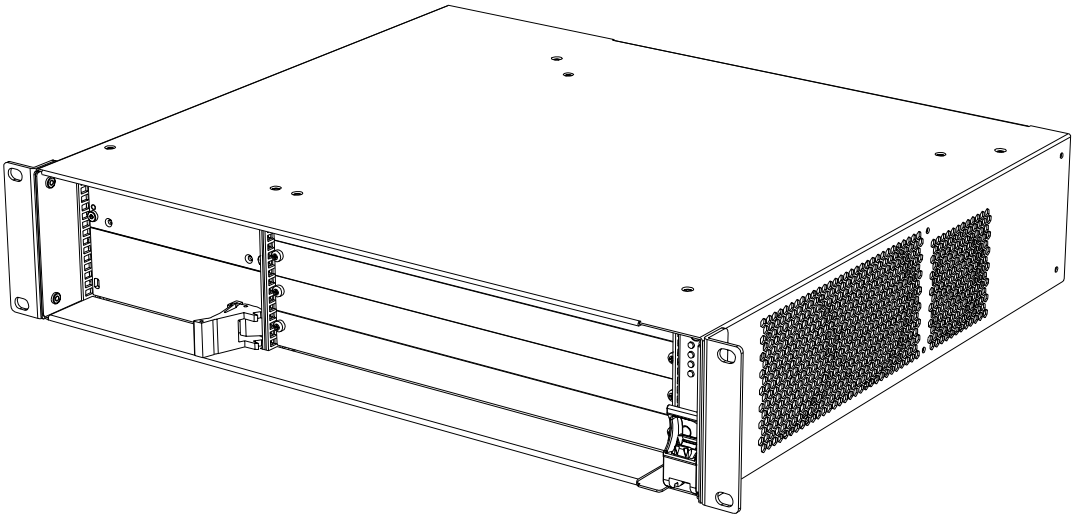


Figure 1: Illustration of the ModuSys 2000

Technical Specifications

This section provides information on the following

- Physical Specifications
- Power Input Specification
- Power Output Specifications
- Acoustic Noise Emission
- Acoustical Categories
- Airflow Specification
- Environmental Specifications

Physical Specifications

Refer to Table 2 for the physical specifications of the ModuSys2000 enclosure.

Table 2: Physical Specifications of the ModuSys2000 Enclosure

Specification	ModuSys Kernel
Weight, kg (lb)	10kg (22lbs)
Height, cm (in)	88.36mm (3.48”) [2U]
Width, cm (in)	437.8mm (17.24”)
Depth, cm (in)	380.0mm (14.96”)

Power Input Specification

Refer to Table 3 for the power input specifications of the ModuSys 2000 kernel.

Table 3: ModuSys 2000 Power Input Specifications

Voltage Range	Max. Current	Frequency Range
100 to 120 / 200 to 240 VAC	4.9 A	50 – 60 Hz

The input circuitry in the PSU in the ModuSys2000 kernel is auto-ranging between the voltage range specified in Table 3 and must not be operated outside these ranges.

Note: The input power at rated output must not exceed 275W per power supply installed.

Power Output Specifications

Table 4 lists the power output specifications of an individual ModuSys power supply. Redundancy is allowed when a second power supply option is incorporated. Up to 3 PSUs can be used in a ModuSys 2000 series system.

Table 4: ModuSys Power Output Specifications

Voltage	Voltage Range	Max. Current	Min. Current
+3.3 V	3.20 V to 3.40 V	33.0 A	0.2 A
+5.0 V	4.80 V to 5.25 V	33.0 A	0.5 A
+12 V	11.4 V to 12.60 V	5.5 A	0.2 A
-12 V	-13.20 V to -10.8 V	1.5 A	0.0 A

Note: The +5 V power plus the +3.3 V power must not exceed 200 W and the total power output must not exceed 200W per power supply installed.

Acoustic Noise Emission

The acoustic noise emission values of the enclosure are given in Table 5. The values presented in Table 5 are derived from measured emissions and statistically account for sample-to-sample noise emission variability. The declared values in Table 5 are as *per* ISO 9296 and ISO 7779. Current values for specific configurations are available from your Force Computers representative.

Table 5: Acoustic Noise Emission Values

	Sound Power Level (Lwadc) in decibels	Suitable Categories	Not Recommended
Product	**Operate**		
ModuSys2000	43.8	1, 2, 3, 4	5

Schallemissionswerte

Die Schallemissionswerte des Gehäuses sind in Table 6 dargelegt. Die in Table 6 beschriebenen Werte sind von gemessenen Emissionen abgeleitet und machen statistisch die Variabilität der Schallemissionsstichproben aus. Die in Table 6 gegebenen Werte entsprechen ISO 9296 und ISO 7779 / DIN EN 27779.

Table 6: Schallemissionswerte

	Schalleistungspegel LWAd, B(1 B = 10 dBA)	Geeignete Kategorien	Nicht empfohlen
Gerät	**Betrieb**		
ModuSys2000	43.8	1, 2, 3, 4	5

Acoustical Categories

Noise emission requirements provide guidance for the engineering and marketing of products that are acoustically compatible with customers' end-use environments. These environments and the corresponding product noise emission limits, are identified by one or more of the acoustical categories given over.

Acoustical Category Scope

Manufacturing space [1]

Includes manufacturing or assembly areas, garages, and spaces where speech or telephone communication is not required, but where there must be no risk of hearing damage.

Computer room [2]

Includes computer, peripheral, and office-equipment rooms, and mobile computer units (trailers).

Open-office/equipment- only space [3]

Includes normally unattended areas, such as copier or printout areas separated by either partial height partitions or by at least 4 m (13 ft) of distance from occupied desks or other worker stations, within any of the following spaces: open-plan offices with or without partial height partitions, office areas, laboratories, drafting rooms, and secretarial areas.

Open-office/occupied space [4]

Includes any open-office spaces other than open-office / equipment-only spaces within any of the following spaces: secretarial / clerical work areas, open-office areas in banks and other financial institutions, open-office computer-aided design (CAD) or other professional work areas, including co-located output devices. This category includes all open-office products except those specifically designed and marketed for equipment-only spaces.

Private office [5]

Includes offices with doors and full-height (floor-to-ceiling) partitions, conference rooms, quiet hospital spaces, library spaces, homes, and classrooms. Personal computers, personal printers, and general-purpose video display terminals are considered to be used in this category.

Table 7: Required Limits for Product Acoustical Noise Emission (Corrected Declared)

A-Weighted Sound Power Level Lwadc at 23°C +/- 2°C

Acoustic Category	Mode Type	Lwadc Limit (decibels)
Manufacturing Space	Operating	85
	Idle	85
Computer Room	Operating	80
	Idle	75
Open office / equipment only space	Operating	70
	Idle	64
Open office / occupied space	Operating	64
Non-desktop unit	Idle	58
Desktop unit	Idle	55
Private Office	Operating	60
Non-desktop units	Idle	53
Desktop units	Idle	50

Acoustic Category	Mode Type	Lwadc Limit (decibels)
Portable systems, remotely hosted products	Idle	46

Airflow Specification

The enclosure fans supplied with the ModuSys 2000 are rated at 2.5 cubic meters per minute (m3/min) [87.5 cfm] in free air or zero static pressure. The calculated airflow though the enclosure is in excess of 250 lfm, although the actual airflow volume through the enclosure is reduced depending on the selected SBC and options and their shape.

Danger



The system integrator must ensure that the airflow is suitable for the applications and must ensure that the air filters are cleaned on a regular basis.

Gefahr



Der Systemintegrator muß einen für die Anwendung ausreichenden Luftdurchsatz und die regelmässige Reingung der Luftfilter sicherstellen.

Environmental Specifications

Table 8 and Table 9 list the environmental specifications for the ModuSys kernel.

Table 8: Environmental Specifications for the ModuSys2000 Enclosure

Condition	Range or Value
Operating	
Temperature range	0°C (32°F) to 50°C (122°F)
Relative humidity	5% to 95% noncondensing
Operating altitude	6000 feet maximum[Note:]
Maximum wet bulb temperature	28°C (82°F)
Minimum dew point	2°C (36°F)
Vibration	5 Hz to 10 Hz: 0.020in (0.5mm) 10 Hz to 500 Hz to 10 Hz 0.1 G peak
Shock	10 G, 3 axis
MTBF Estimate (Telcordia Issue 6 Method 1, case 3).	See Table 9
Nonoperating	
Temperature range	-40°C (-40°F) to 65°C (149°F)
Storage (shipping) altitude	40 000 feet
Relative humidity	5% to 95%
Maximum wet bulb temperature	32°C (90°F)
Vibration	1.5 G, 3 axis

Note:

- **The maximum operating temperature must be derated by 1.8°C per 3280 feet (1000 m) above sea level**
- **Some options that you can add may have more restrictive environmental specifications. Refer to the user manuals accompanying the options for further information.**

Table 9: Reliability Estimates for ModuSys 2000 Kernels

Part Number	Description	MTBF[1] (hrs)
Reliability at 25°C		
Reliability at 40°C		
Reliability at 50°C		

[1] Air temperatures are inlet ambient to the ModuSys enclosure. These estimates are provided to assist in maintenance planning; they do not supersede or affect the published warranty. They exclude mechanical wearout, as of fans and disk. These estimates have been prepared in general accordance with Telcordia Issue 6 Method 1, case 3, including use of the RELEX 7.1 estimation tool.

Warranty and Ordering Information

This section provides warranty and ordering information on the Force Computers ModuSys products.

Returning Products to Force Computers Hardware Maintenance

All Force Computers ModuSys products carry a two-year Return-to-Force Computers warranty, as described in the following sections. For the first two years of the Warranty Period, FRUs will receive warranty service through Force Computer's standard RMA procedures. This warranty service may be performed by Force Computers, or by a Force Computers Authorized Service Provider.

Hardware Warranty

The Hardware Warranty is a limited warranty consisting of return to Force Computers Repair Service Center. Force will, at it's option, repair, replace or provide a credit for defective FRUs that are returned to Force under the warranty program. For repairs, Force Computers will repair the FRU with either new or refurbished parts at no charge. All parts that Force Computers replaces shall become Force Computers property upon the date Force Computers delivers the repaired FRU or part back to the purchaser.

Availability

Warranty is available worldwide to Customers. Proof of purchase or ownership of equipment, including serial numbers, may be required. Products which have been defaced by removing serial numbers, etch levels, or key components are not eligible for warranty. In such case, where a return is deemed non-warranty, the standard repair charges apply.

Response Time

Force Computers uses best efforts to repair eligible FRUs identified by customers as defective.

Eligible Parts

FRUs as defined by Force Computers are the only parts eligible for coverage. FRUs in need of repair due to improper treatment or use are not eligible for return. Improper treatment includes, but is not limited to; lifted or burnt etches or contamination due to non-Force Computers repair or modification.

Purchaser Responsibility

Please note the following customer responsibilities:

- The customer is responsible for installing the equipment.
- Fault diagnosis and equipment disassembly is the sole responsibility of the customer on return of FRUs.
- The customer shall properly package and prepay transportation cost of FRUs sent to Force Computers.
- The customer assumes all risk of loss or damage to FRUs in transit to Force Computers.

Pre-Call Checklist

Prior to calling Force Computers or an authorized reseller, please follow the pre-call checklist. This allows Force Computers to assist you more quickly and efficiently. The pre-call checklist is as follows:

- Consult your product user documentation included with your product to ensure that your system features are properly configured.
- Execute the customer diagnostics provided with your product, if applicable, and record the information. Consult the accompanying user documentation for more details on operation of this utility.
- Determine the product model number and serial number to enable the processing of warranty support.

Return-to-Force Computers Process

In order to return products under warranty, the customer must contact the Force Computers Customer Service Center. Upon confirmation of in-warranty material, the customer will be provided with a Return Material Authorization (RMA#) and an address to which to send the defective unit,

which would normally be as defined below. The Customer is responsible for sending the product to the address provided. The Customer pays for transportation for Return-to Force warranty to the factory. Force Computers pays transportation for return to the customer.

Field Replaceable Parts

For field replaceable parts associated with the ModuSys 2000 enclosure and module unit, please refer requests to your local Force sales office.

Setting Up the Module Unit

This section describes how to set up the module unit. It contains information on:

- Rear Panel Ports, Connectors, Controls and Indicators
- Option Support
- Choosing a Location for the Module Unit
- Turning On the Module Unit
- Turning Off the Module Unit

Front and Rear Panel Ports, Connectors and Controls

Table 10 lists the ports, connectors and controls on the front and rear panels of the ModuSys 2000 kernel and describes their functions. The item numbers in the first column of Table 10 refer to the various functions shown in Figure 2 and Figure 3.

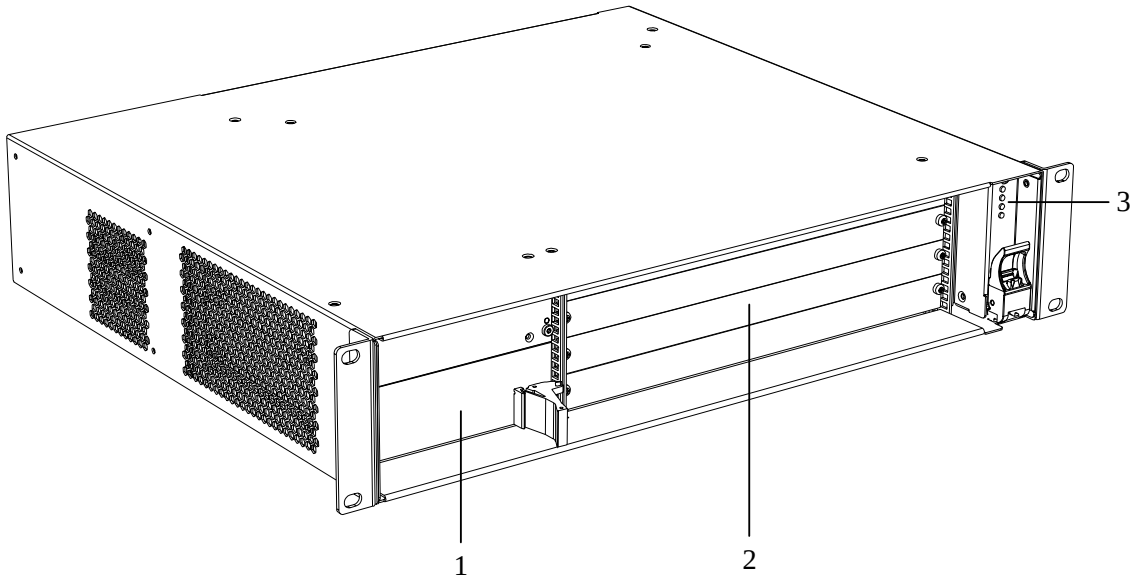


Figure 2: Location of the Front Panel Ports, Connectors, Controls and Indicators

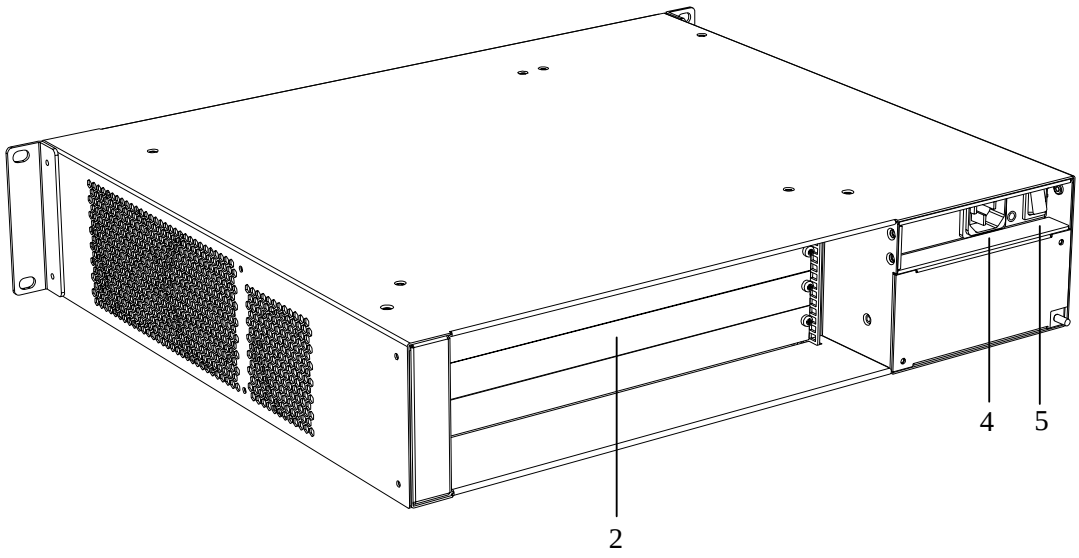


Figure 3: Location of the Rear Panel Ports, Connectors, Controls and Indicators

Danger



Use the Halt/Reset button only as allowed by the operating system.

Gefahr



Benutzen Sie den Halt/Reset Knopf nur so, wie es das Betriebssystem erlaubt.

Table 10: Rear Panel Ports, Connectors and Controls for ModuSys Kernel

Item	Control or Indicator	Function
1	Power Supply Drive Bays	Available for additional removable power supplies
2	Option slots	Depending on the options installed, these slots may contain various ports, connectors, controls or indicators. See your option documentation for more information.
3	Display Panel	Displays status of system and configuration setting switches for the system interface board.
4	Mains power input connector	Enables one to connect the module unit to a mains power socket. Requires cord with IEC320-C13 connector.
5	Mains power switch	Switches the PSU ON or OFF.

Operator Control Panel Indicators

Table 11 lists the operator control panel indicators on the front panel of the ModuSys 2000 kernel and details their functions. The item numbers in the first column of Table 11 refer to the various functions shown in Figure 4.

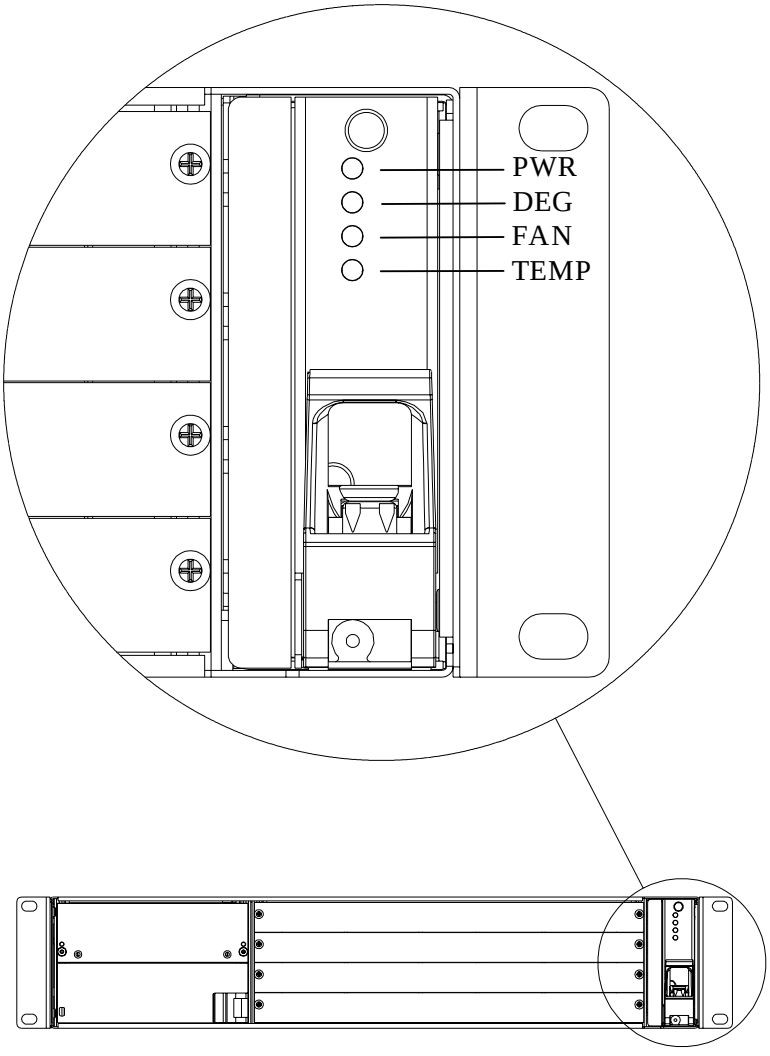


Figure 4: Location of the Operator Control Panel Indicators

Table 11: Operator Control Panel Indicators

Item		Control or Indicator	Function
1	PWR	Power ON / OFF status LED	Indicates the status of the output / input of the PSU.
2	DEG	Degrade indicator	Power supply over temperature warning signal.
3	FAN	Fan failure indicator	Indicates when a fan stops working.
4	TEMP	Over temperature indicator	Indicates that the temperature in the module unit has reached a critical level (approximately 60°C).

The item numbers in the first column of Table 11 refer to the various functions shown in Figure 4.

Option Support

For more information about the options supported by the SBC you choose, consult the SBC user documentation or contact your SBC supplier.

Choosing a Location for the Module Unit

Choose a location for the ModuSys 2000 enclosure that complies with the environmental specifications listed in Table 8. You must leave a minimum clearance of 3 inches at the front and rear of the module unit to allow air to circulate. Air vents on the top, front, side, and rear of the module unit must be left clear to allow adequate air circulation to prevent excessive heat, which can damage the internal components. Table 12 lists the various locations where you must not operate the module unit.

Caution



If the module unit is mounted on a rack, then the system integrator is responsible for the mechanical stability of the rack configuration in both of the following situations:

- **When the module unit is in the fully home position**
- **When the module unit is in the fully extended position**

The system integrator is also responsible for the thermal design in the enclosure.

Vorsicht



Wenn die Moduleinheit auf einem Gestell montiert ist, dann ist der Systemintegrator in den folgenden Fällen für die mechanische Stabilität der Gestellkonfiguration verantwortlich:

- **Wenn die Moduleinheit sich innerhalb des Gestells befindet**
- **Wenn die Moduleinheit sich außerhalb des Gestells befindet**

Der Systemintegrator ist außerdem dafür verantwortlich, daß im Gehäuse möglichst optimale thermische Bedingungen herrschen.

Table 12: Unsuitable Locations for the Module Unit

Location	Explanation
Dirty or dusty locations	Dirt and dust can damage the module unit components and clog the air vents.
Locations exposed to direct heat or sunlight	Direct heat and sunlight can cause the module unit to overheat and fail.
Unstable locations	See Table 2: Physical Specifications of the 2U cPCI Enclosure Kernels for the weight of the ModuSys2000 enclosure. If you are not placing the module unit on the floor, make sure that the location is steady and stable and can support the weight.

Turning On the Module Unit

Danger



Before connecting a power source, ensure that the voltage supply is within the ranges specified in Table 3. Failure to observe these precautions will result in damage to the module unit and may result in injury.

Gefahr



Stellen Sie vor dem Anschluß an eine Spannungsquelle sicher, daß sich die Versorgungsspannung innerhalb des in Table 3 genannten Rahmens bewegt. Nichtbeachtung dieser Vorsichtsmaßnahmen führt zu Beschädigung der Moduleinheit und kann Verletzungen verursachen.

Turn on the module unit as follows:

1. Consult the user manuals for all peripherals that are connected to the module unit to ensure that you follow the appropriate power sequencing procedure for each peripheral.
2. Set the power switch on the rear of the module unit to ON.
3. When the power is ON, the power-on indicator labeled PWR is illuminated.
5. See the user information manual for the specific SBC in each module unit for more information on the SBC power-up tests
6. Boot the operating system. See the operating system documentation for further information on the correct boot procedure to use

Turning Off the Module Unit

Turn off the module unit as follows:

1. Shut down the operating system, following the instructions in the operating system user information.
2. Set the power switches on all peripherals that are connected to the module unit to the OFF position.
3. Set the power switch on the rear of the module unit to OFF.

Force Computers ModuSys Product Family

The ModuSys kernel is part of the **Force Computers ModuSys Product Family**. Using X86-based single board computers (SBCs), the Force Computers ModuSys Product Family range allows systems designers to use a variety of low-cost, high-performance peripherals. The Force Computers ModuSys Product Family of enclosures can accommodate a variety of SBCs and supports multiple operating systems. For more information on Force Computers ModuSys Product Family, consult the following Web page:

`http://www.forcecomputers.com`

Systems designers can select options based on the *PCI Local Bus Specification Revision 2.0 or 2.1* in a variety of configurations.

2

Backplane

Backplane Block Diagram

Figure 5 shows a functional block diagram of the connections between the main functional components. It shows the main connections from Compact PCI backplane within the ModuSys2000 kernel.

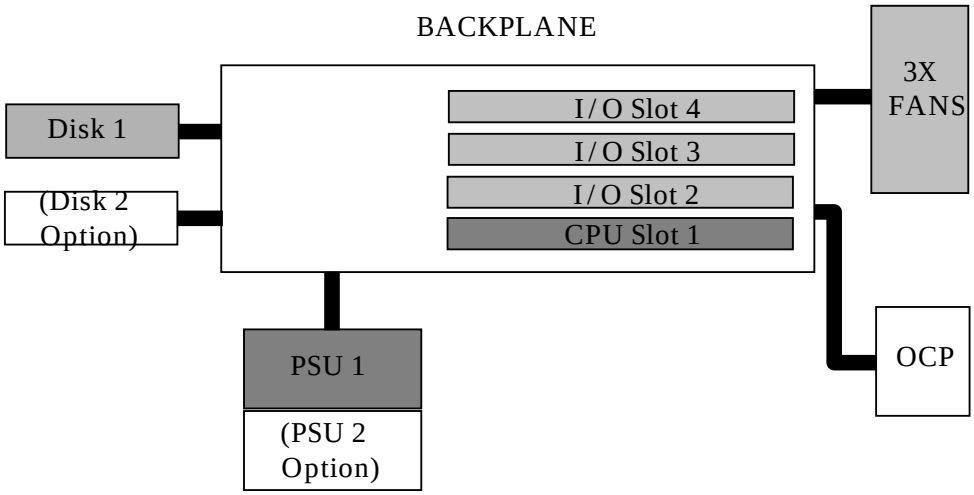


Figure 5: Functional Block Diagram of the ModuSys2000 Kernel

Connector Locations

Refer to Figure 6 and Figure 7, for the locations of the main functional components of the ModuSys 2000 backplanes. Information on individual components is contained in the following sections. Refer to the “Connector Summary” section in this chapter for information on specific connectors.

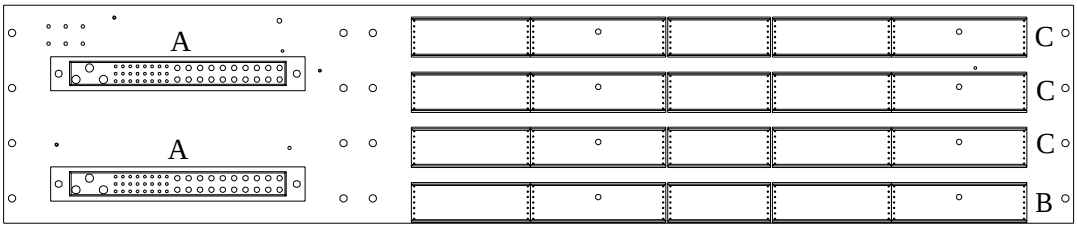


Figure 6: Connector Layout of the Front of the ModuSys 2735 Backplane

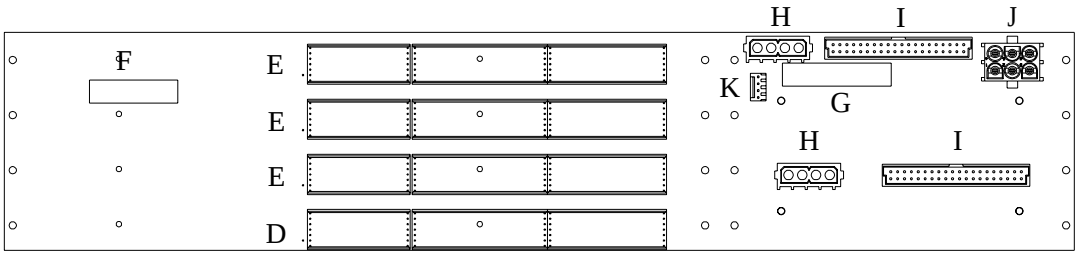


Figure 7: Connector Layout of the Rear Side of the ModuSys 2735 Backplane

Note: The components shown in Figure 6 and Figure 7 are shown as individual illustrations in later sections of this manual. Use Figure 6 and Figure 7 as a reference guide for the orientation of the various components.

Connector Summary

Refer to Table 13 for a brief description of the connectors on the ModuSys 2735 backplane and a pointer to the relevant section in this manual for each connector where you can find more information. For information on the cPCI connectors refer to *Compact PCI spec.*

Table 13: Summary of Connectors on the ModuSys 2735 Backplane

Connector	Description	Page
A	Positronic Power Connector	2-6
B	cPCI Connectors – SBC Slot	2-7
C	cPCI Connectors – Option Slots H110 Bus Compatible	2-7
D	RTB Connectors – SBC Slot	2-7
E	RTB Connectors – Option Slots H110 Bus Compatible	2-7
F	Operator Control Panel Connector	2-7
G	System Management Option Connector	2-11
H	Drive Power Connector	2-12
I	IDE Data Connector	2-13
J	Mains Power Connector	2-14
K	ICMB Connector	2-14

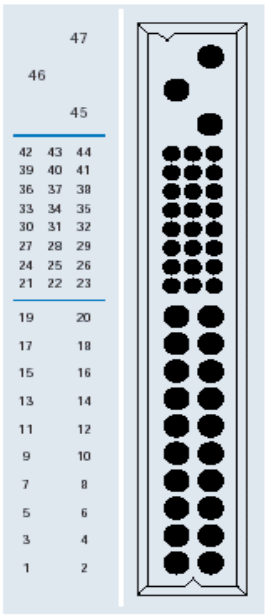
ModuSys 2735 Connectors

The following connectors are used on the ModuSys 2735 backplane:

- Positronic Power Connector (A)
- CPCI Connectors (B) (C) (D) (E)
- 20-Pin OCP Connector (F)
- 20-Pin Server Management Connector (G)
- Drive Power Connector (H)
- IDE Data Connector (I)
- Mains Power Connector (J)
- ICMB Connector (K)

Positronic Power Connector (A)

The Positronic connector is a standard power connector for Compact PCI power supplies for connection of +/–5 V, +/–12 V, +3.3 V, and PSU control signals to the backplane. Figure 8 lists the pin values for this connector.



Pin NO.	SIGNAL NAME	Pin NO.	SIGNAL NAME
1	V1 Output (5V)	24	V4 Return
2	V1 Output (5V)	25	Geographic Address Bit 0
3	V1 Output (5V)	26	Reserved
4	V1 Output (5V)	27	Enable
5	V1 and V2 Return	28	Geographic Address Bit 1
6	V1 and V2 Return	29	V1 Adjust
7	V1 and V2 Return	30	V1 Remote Sense
8	V1 and V2 Return	31	Data In
9	V1 and V2 Return	32	V2 Adjust
10	V1 and V2 Return	33	V2 Remote Sense
11	V1 and V2 Return	34	Sense Return
12	V1 and V2 Return	35	V1 Current Share
13	V2 Output (3.3V)	36	V3 Remote Sense (NC)
14	V2 Output (3.3V)	37	Data Out
15	V2 Output (3.3V)	38	Degrade Signal
16	V2 Output (3.3V)	39	Inhibit
17	V2 Output (3.3V)	40	Clock
18	V2 Output (3.3V)	41	V2 Current Share
19	V3 Return	42	Fail Signal
20	V3 Output (12V)	43	Chip Select
21	V4 Output (-12V)	44	V3 Current Share
22	Signal Return	45	Chassis Ground (safety ground)
23	Reserved	46	AC Input - Neutral; +DC Input
		47	AC Input - line; - DC Input

Figure 8: Connector Layout and Pin Values for the Positronic PSU Connectors

CPCI Connectors (B) (C) (D) (E)

The 735R2 SBC provides the CompactPCI connectors J1, J2, J3, J4 and J5. These correspond with signals on the cPCI connectors B on the backplane.

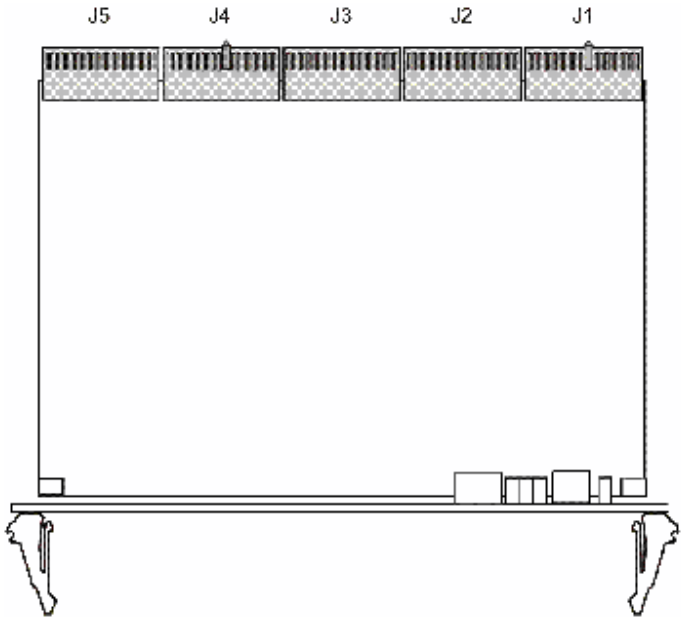


Figure 9: Location of SBC CompactPCI Connectors (Top View)

Connectors B; J1 and J2

The B; J1 and J2 connectors implement the CompactPCI 64-bit connector pinout as specified by the CompactPCI specification PICMG 2.0 R3.0. Therefore, these pinouts are not documented.

Connectors B; J3

The B; J3 provides interfaces to:

- Ethernet signals (ETHx, reserved_2.16) for PICMG 2.16 and RTB
- PMC1 I/O (PMC1IO_*)
- Rear transition board information block (RIB_*)

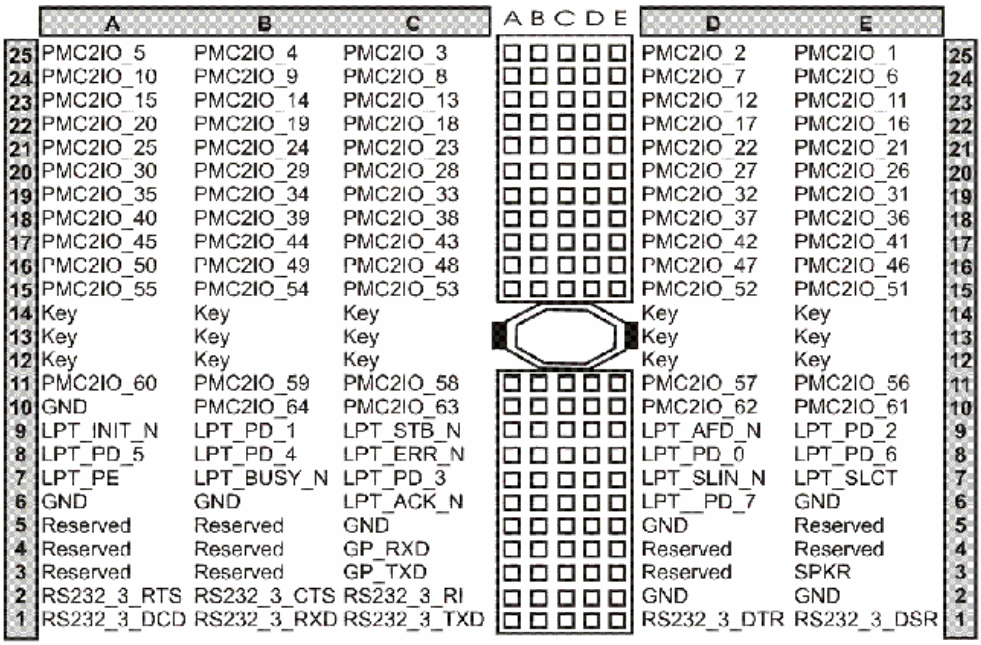
	A	B	C	A B C D E	D	E	
19	GND	GND	GND		GND	GND	19
18	FTH1_TX_P	FTH1_TX_N	GND		Reserved_2.16	Reserved_2.16	18
17	ETH1_RX_P	ETH1_RX_N	GND		Reserved_2.16	Reserved_2.16	17
16	ETH2_TX_P	ETH2_TX_N	GND		Reserved_2.16	Reserved_2.16	16
15	ETH2_RX_P	ETH2_RX_N	GND		Reserved_2.16	Reserved_2.16	15
14	GND	GND	GND		GND	GND	14
13	PMC1IO_5	PMC1IO_4	PMC1IO_3		PMC1IO_2	PMC1IO_1	13
12	PMC1IO_10	PMC1IO_9	PMC1IO_8		PMC1IO_7	PMC1IO_6	12
11	PMC1IO_15	PMC1IO_14	PMC1IO_13		PMC1IO_12	PMC1IO_11	11
10	PMC1IO_20	PMC1IO_19	PMC1IO_18		PMC1IO_17	PMC1IO_16	10
9	PMC1IO_25	PMC1IO_24	PMC1IO_23		PMC1IO_22	PMC1IO_21	9
8	PMC1IO_30	PMC1IO_29	PMC1IO_28		PMC1IO_27	PMC1IO_26	8
7	PMC1IO_35	PMC1IO_34	PMC1IO_33		PMC1IO_32	PMC1IO_31	7
6	PMC1IO_40	PMC1IO_39	PMC1IO_38		PMC1IO_37	PMC1IO_36	6
5	PMC1IO_45	PMC1IO_44	PMC1IO_43		PMC1IO_42	PMC1IO_41	5
4	PMC1IO_50	PMC1IO_49	PMC1IO_48		PMC1IO_47	PMC1IO_46	4
3	PMC1IO_55	PMC1IO_54	PMC1IO_53		PMC1IO_52	PMC1IO_51	3
2	PMC1IO_60	PMC1IO_59	PMC1IO_58		PMC1IO_57	PMC1IO_56	2
1	RTB_VP5	PMC1IO_64	PMC1IO_63		PMC1IO_62	PMC1IO_61	1

Figure 10: B; J3 Connector Pinout

Connectors B; J4

The connectors B; J3 provides interfaces to:

- Parallel (LPT_*)
- PMC 2 I / O (PMC2IO_*)
- COM3 (COM3_*)



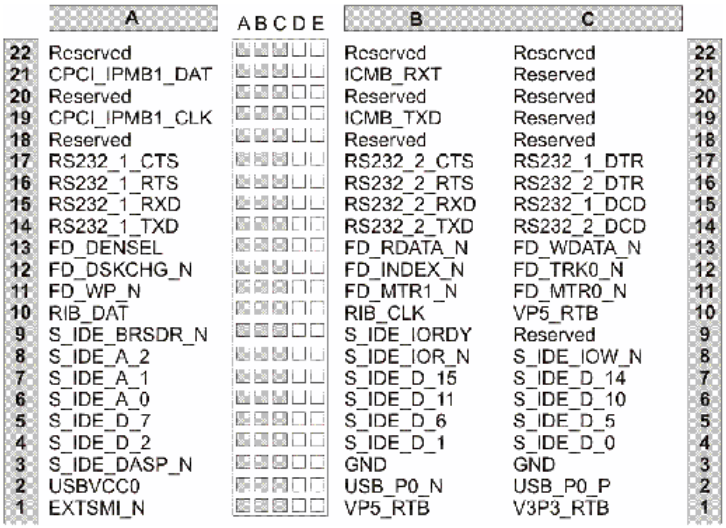
	A	B	C	D	E	
25	PMC2IO_5	PMC2IO_4	PMC2IO_3	PMC2IO_2	PMC2IO_1	25
24	PMC2IO_10	PMC2IO_9	PMC2IO_8	PMC2IO_7	PMC2IO_6	24
23	PMC2IO_15	PMC2IO_14	PMC2IO_13	PMC2IO_12	PMC2IO_11	23
22	PMC2IO_20	PMC2IO_19	PMC2IO_18	PMC2IO_17	PMC2IO_16	22
21	PMC2IO_25	PMC2IO_24	PMC2IO_23	PMC2IO_22	PMC2IO_21	21
20	PMC2IO_30	PMC2IO_29	PMC2IO_28	PMC2IO_27	PMC2IO_26	20
19	PMC2IO_35	PMC2IO_34	PMC2IO_33	PMC2IO_32	PMC2IO_31	19
18	PMC2IO_40	PMC2IO_39	PMC2IO_38	PMC2IO_37	PMC2IO_36	18
17	PMC2IO_45	PMC2IO_44	PMC2IO_43	PMC2IO_42	PMC2IO_41	17
16	PMC2IO_50	PMC2IO_49	PMC2IO_48	PMC2IO_47	PMC2IO_46	16
15	PMC2IO_55	PMC2IO_54	PMC2IO_53	PMC2IO_52	PMC2IO_51	15
14	Key	Key	Key	Key	Key	14
13	Key	Key	Key	Key	Key	13
12	Key	Key	Key	Key	Key	12
11	PMC2IO_60	PMC2IO_59	PMC2IO_58	PMC2IO_57	PMC2IO_56	11
10	GND	PMC2IO_64	PMC2IO_63	PMC2IO_62	PMC2IO_61	10
9	LPT_INIT_N	LPT_PD_1	LPT_STB_N	LPT_AFD_N	LPT_PD_2	9
8	LPT_PD_5	LPT_PD_4	LPT_ERR_N	LPT_PD_0	LPT_PD_6	8
7	LPT_PE	LPT_BUSY_N	LPT_PD_3	LPT_SLIN_N	LPT_SLCT	7
6	GND	GND	LPT_ACK_N	LPT__PD_7	GND	6
5	Reserved	Reserved	GND	GND	Reserved	5
4	Reserved	Reserved	GP_RXD	Reserved	Reserved	4
3	Reserved	Reserved	GP_TXD	Reserved	SPKR	3
2	RS232_3_RTS	RS232_3_CTS	RS232_3_RI	GND	GND	2
1	RS232_3_DCD	RS232_3_RXD	RS232_3_TXD	RS232_3_DTR	RS232_3_DSR	1

Figure 11: B; J4 Connector Pinout

Connectors B; J5

The B; J5 provides interfaces to:

- Secondary IDE (IDE_*)
- USB (USB_*), keyboard (KBD), PS2 mouse (MS), COM1 (COM1_*), COM2 (COM2_*), floppy (FD_*), IPMB, ICMB



	A	A B C D E	B	C	
22	Reserved		Reserved	Reserved	22
21	CPCI_IPMB1_DAT		ICMB_RXT	Reserved	21
20	Reserved		Reserved	Reserved	20
19	CPCI_IPMB1_CLK		ICMB_TXD	Reserved	19
18	Reserved		Reserved	Reserved	18
17	RS232_1_CTS		RS232_2_CTS	RS232_1_DTR	17
16	RS232_1_RTS		RS232_2_RTS	RS232_2_DTR	16
15	RS232_1_RXD		RS232_2_RXD	RS232_1_DCD	15
14	RS232_1_TXD		RS232_2_TXD	RS232_2_DCD	14
13	FD_DENSEL		FD_RDATA_N	FD_WDATA_N	13
12	FD_DSKCHG_N		FD_INDEX_N	FD_TRK0_N	12
11	FD_WP_N		FD_MTR1_N	FD_MTR0_N	11
10	RIB_DAT		RIB_CLK	VP5_RTB	10
9	S_IDE_BRSDR_N		S_IDE_IORDY	Reserved	9
8	S_IDE_A_2		S_IDE_IOR_N	S_IDE_IOW_N	8
7	S_IDE_A_1		S_IDE_D_15	S_IDE_D_14	7
6	S_IDE_A_0		S_IDE_D_11	S_IDE_D_10	6
5	S_IDE_D_7		S_IDE_D_6	S_IDE_D_5	5
4	S_IDE_D_2		S_IDE_D_1	S_IDE_D_0	4
3	S_IDE_DASP_N		GND	GND	3
2	USBVCC0		USB_P0_N	USB_P0_P	2
1	EXTSMI_N		VP5_RTB	V3P3_RTB	1

Figure 12: B; J5 Connector Pinout, Rows A-C

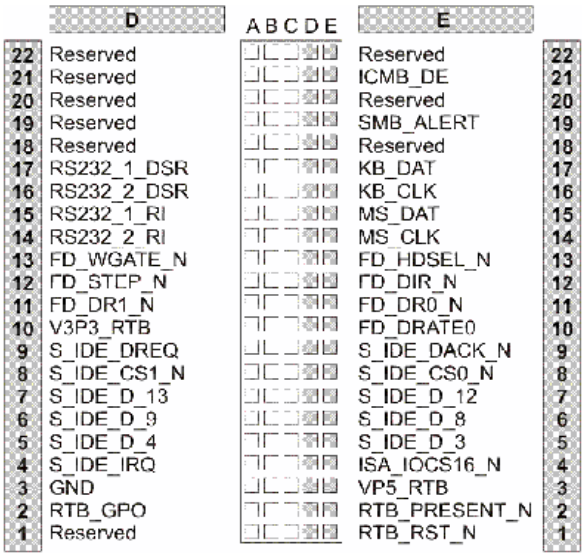


Figure 13: B; J5 Connector Pinout, Rows D-E

20-Pin OCP Connector (F)

The 20-pin OCP (Operator Control Panel) connector allows a single connection to be made to a purpose-designed operator control panel. This connection includes signals from the following:

- Fan Status
- Power Status
- Over Temp signals

Table 14 lists the pin values for the OCP connector and Figure 14 shows the location of the pins on the OCP connector.

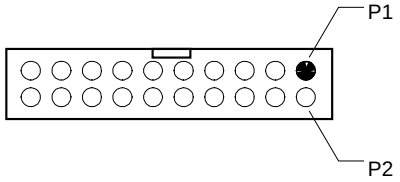


Figure 14: Location of Pins on the OCP Connector

Table 14: Pin Values for the 20-Pin OCP Connector

Pin	Value	Pin	Value
1	Backplane Fan 1 Fail	2	Backplane Fan 4 Fail
3	Backplane Fan 2 Fail	4	Backplane Fan 5 Fail
5	Backplane Fan 3 Fail	6	Backplane Fan 6 Fail
7	+3.3 V	8	+5 V
9	GND	10	+5V AUX (Not Available)
11	Backplane Over_Temp	12	User 1
13	Backplane SM_CLK	14	User 2
15	Backplane Data	16	PSU Degrade Signal
17	DC Enable	18	Soft ON
19	GND	20	GND

20-Pin Server Management Connector (G)

The 26-pin OCP connector allows a single connection to be made to a purpose-designed Server Management Board. This connection includes signals from the following:

- Fan Status
- Individual Power Status
- Over Temp signals

Table 14 lists the pin values for the OCP connector and Figure 14 shows the location of the pins on the OCP connector.

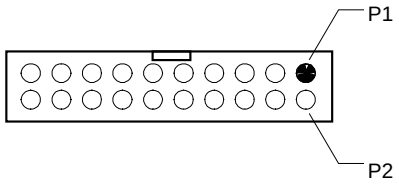


Figure 15: Location of Pins on the OCP Connector

Table 15: Pin Values for the 20-Pin OCP Connector

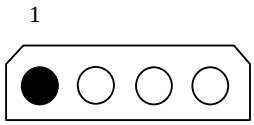
Pin	Value	Pin	Value
1	Backplane Fan 1 Fail	2	Backplane Fan 4 Fail
3	Backplane Fan 2 Fail	4	Backplane Fan 5 Fail
5	Backplane Fan 3 Fail	6	Backplane Fan 6 Fail
7	+3.3 V	8	+5 V
9	DC Enable	10	+5V AUX (Not Available)
11	Backplane Over_Temp	12	User 1
13	Backplane SM_CLK	14	User 2
15	Backplane Data	16	Soft ON
17	PSU 2 Degrade Signal	18	PSU 1 Degrade Signal
19	PSU 3 Degrade Signal	20	No Connection
21	PSU 3 Fail Signal	22	PSU 1 Fail Signal
23	No Connection	24	PSU 2 Fail Signal
25	GND	26	GND

Drive Power Connector (H)

This is a 4-pin connector for the connection of drive power from the backplane to a drive option. Cable connections can be made for front mounted drive options.

Table 16: Pin Values for the 4-Pin, Drive Power Connector

Pin	Value
1	+12 V
2	GND
3	GND
4	+5 V



IDE Data Connector (I)

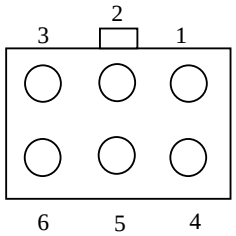
Refer to IDE bus specification for standard pin out of 40-pin connector.

Mains Power Connector (J)

This is a 6-pin connector for the connection of mains power from the input socket to the PSU(s) through the backplane.

Table 17: Pin Values for the 6-Pin, Backplane Mains Power Connector

Pin	Value
1	AC Live
2	AC Neutral
3	AC Earth
4	AC Live
5	AC Neutral
6	AC Earth

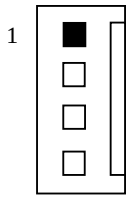


ICMB Connector (K)

This is a 5-pin connector for the connection of ICMB (Inter Chassis Management Bus) signals from the SBC via the backplane to the external environment.

Table 18: Pin Values for the 4-Pin, ICMB Connector

Pin	Value
1	GND
2	ICMB RDX
3	ICMB TDX
4	ICMB DE



3

Accessing Internal Components

Before You Begin

This section describes important information that you must know before accessing the internal module unit components. It describes:

- Preparing to Access Internal Components
- Equipment Requirements
- Antistatic Precautions

Preparing to Access Internal Components

Before you remove the module unit cover, follow these steps:

1. Shut down the operating system following the instructions in the operating system documentation.
2. Set the power switch to the OFF position on all peripherals connected to the module unit.
3. Set the power switch to the OFF position on the module unit.

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

Equipment Requirements

To properly complete the procedures in the remainder of this manual, you must have the following equipment:

- Philips screwdriver (number 1 tip size or similar)
- Wire cutters
- Small tie wraps
- Antistatic wrist strap

Antistatic Precautions

Force recommends that you use an antistatic wrist strap when handling internal components. In addition, follow these rules:

- Do not allow any circuit board or component to touch non-conductors.
- Ensure that your clothing does not make contact with any circuit board or component.
- Keep any loose circuit boards inside or on top of their special conductive plastic wrappers.
- Before you touch a loose circuit board or component, ensure that any static electricity is discharged.

Accessing the Module Unit

The design of the ModuSys 2000 system allows the majority of the major components and options to be accessible whilst the unit is installed in the rack frame. It is largely depending on the location and available access to areas of the rack mounted system whether it is necessary to remove the system from the rack frame.

This section provides information on dismounting the module unit from the rack frame, allowing greater access to the module unit. To access the module unit you must do the following action.

- Dismount a module unit from the rack frame

Dismounting a Module Unit from the Rack Frame

Danger



When accessing the module unit mounted on a rack, take precautions to ensure that the rack does not overbalance.

Gefahr



Beim Umgang mit einer auf einem Gestell montierten Moduleinheit ist darauf zu achten, daß das Gestell nicht kippt.

To dismount the module unit, carry out the following steps:

1. Remove all cables from the rear of the module unit.
2. Ensure that all other equipment installed in the rack is fully pushed back.
3. Unlock the locking features that hold the module unit to the rack frame.
4. If slides are fitted, slide the module unit forward on the chassis slides, until the slides lock.
5. Release the chassis slides by pressing the slide locks on each side of the module unit.
6. Using a lift, pull the module unit free of the rack rails.
7. Place the module unit on a level, stable surface.

Reassembling the Module Unit in the Rack

Reassemble the module unit in the rack as follows:

5. Reinstall the module unit in the rack, by reversing the steps in the section *Dismounting the Module Unit* in this chapter.
6. Reconnect any of the external cables that were disconnected from the module unit.
7. Set the power switches to the ON position on all peripherals connected to the module unit.
8. Set the power switch on the back of the power supply to the ON position.
9. If necessary, use firmware or operating system commands to test the operation of the module unit.

4

Installing and Removing Storage Devices

Drive Bays

This section provides information on the drive bays in the ModuSys 2000 kernel. Figure 16 and Figure 17 show the drive bay locations for storage devices in the enclosure. Table 19 list's the devices supported in the enclosure.

Table 19: Supported Drive Bay Configurations

Drive Bays	Supported Devices
Rear internal drive bay (1)	One 1.0" IDE drive
Front internal drive bay (2)	One additional 1.0" IDE drive option (replaces additional PSU option) **OR** One 1.0" front removal drive option eg: DAT drive (replaces additional PSU option)

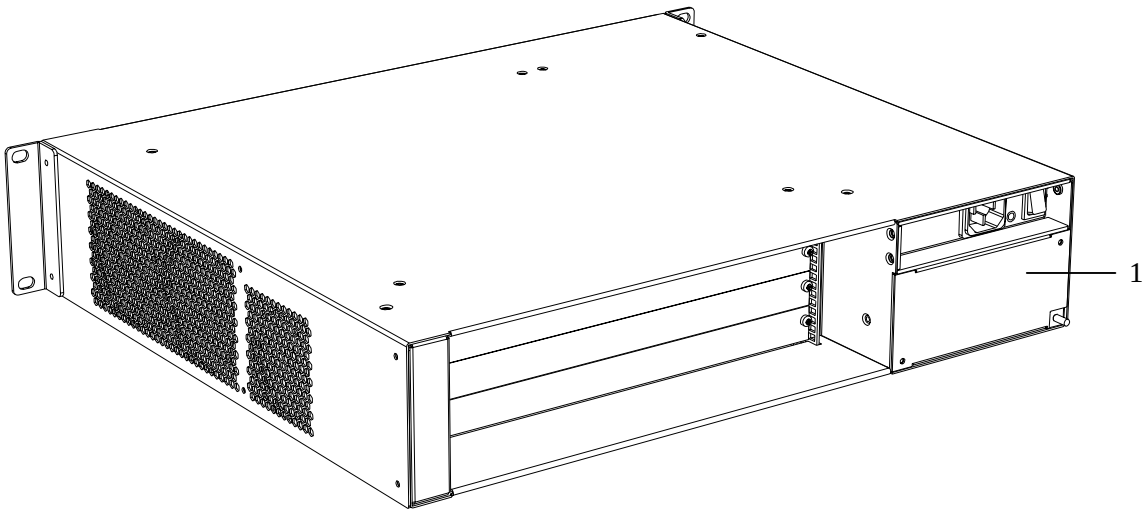


Figure 16: Main Enclosure Drive Bay

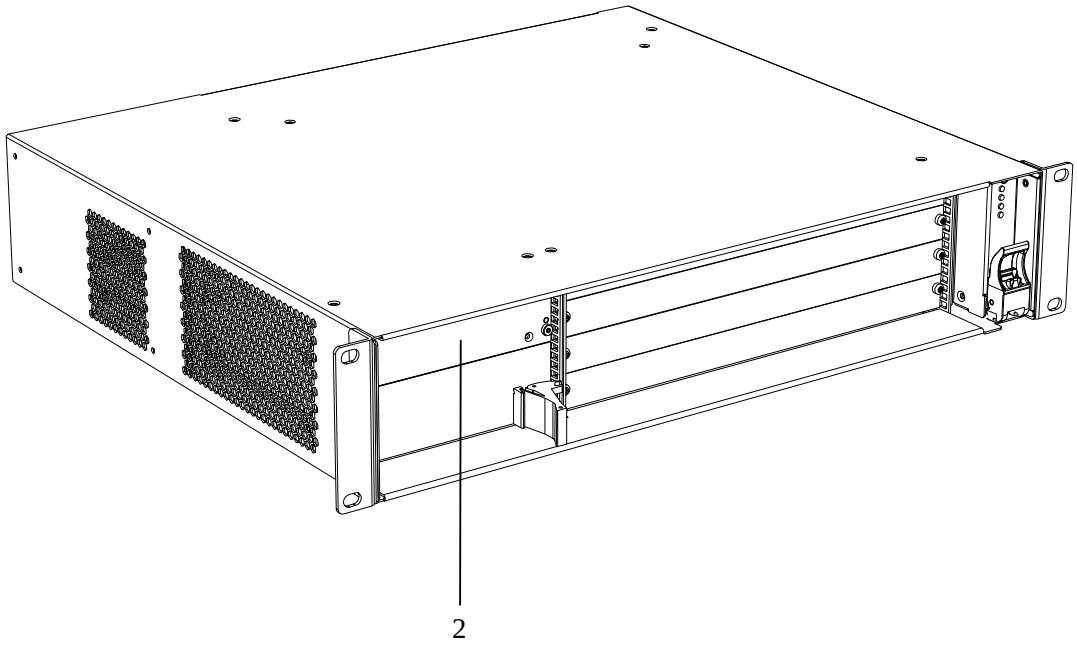


Figure 17: Optional Front Drive Bay Location

Removing an Internal Disk Drive

This section describes how to remove the internal disk drive.

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

You can remove disk drive storage device from the enclosure as follows (see Figure 18 and Figure 19):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required.
2. Ensure that the mains power cable has been removed from the rear of the module unit.
3. Unscrew the four screws (1) that secure the drive cover plate (2) to the enclosure.
4. Remove the drive cover plate from the enclosure.
5. Unscrew the captive locking screw (3) and disengage the disk extraction lever (4) to disengage the drive from the backplane connectors.
6. Slide the drive carrier assembly (5) from the enclosure.
7. Remove the drive (6) from the drive carrier (7) by removing the 4 retaining screws (8).
8. To reassemble the module unit, reverse the above instructions and follow the instructions in Chapter 3 to reassemble the module unit.

Caution



Take care when handling the storage device. The active components on the storage device are sensitive to electrostatic discharge (ESD), and can easily be damaged. Take anti-ESD precautions such as wearing isolation gloves or an antistatic wriststrap.

Vorsicht



Vorsicht im Umgang mit dem Speicherlaufwerkgerät. Die aktiven Bauteile auf dem Speicherlaufwerkgerät dürfen keiner elektrostatischen Entladung (ESD) ausgesetzt sein und können leicht beschädigt werden. Bitte treffen Sie Vorkehrungen gegen ESD, wie beispielsweise durch Tragen von Isolierhandschuhen oder antistatischem Armband.

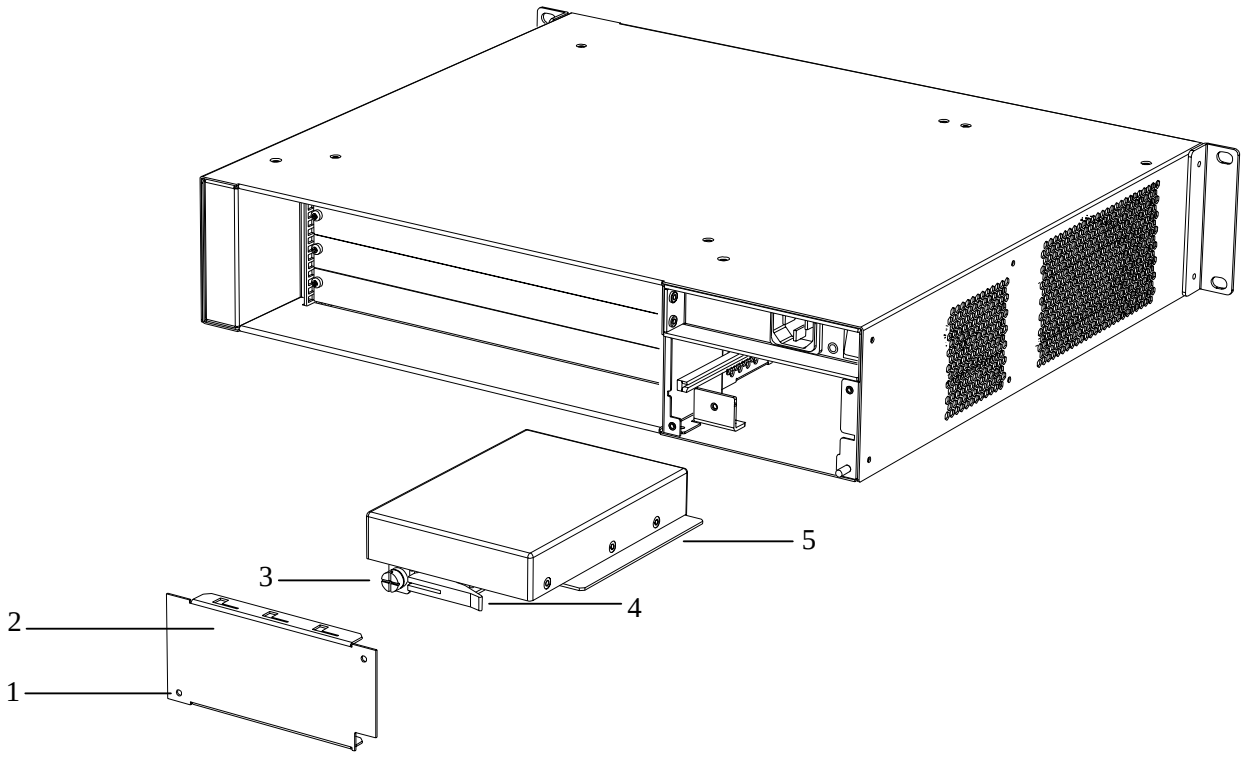


Figure 18: Removing a Disk Drive the Rear Access Drive Bay

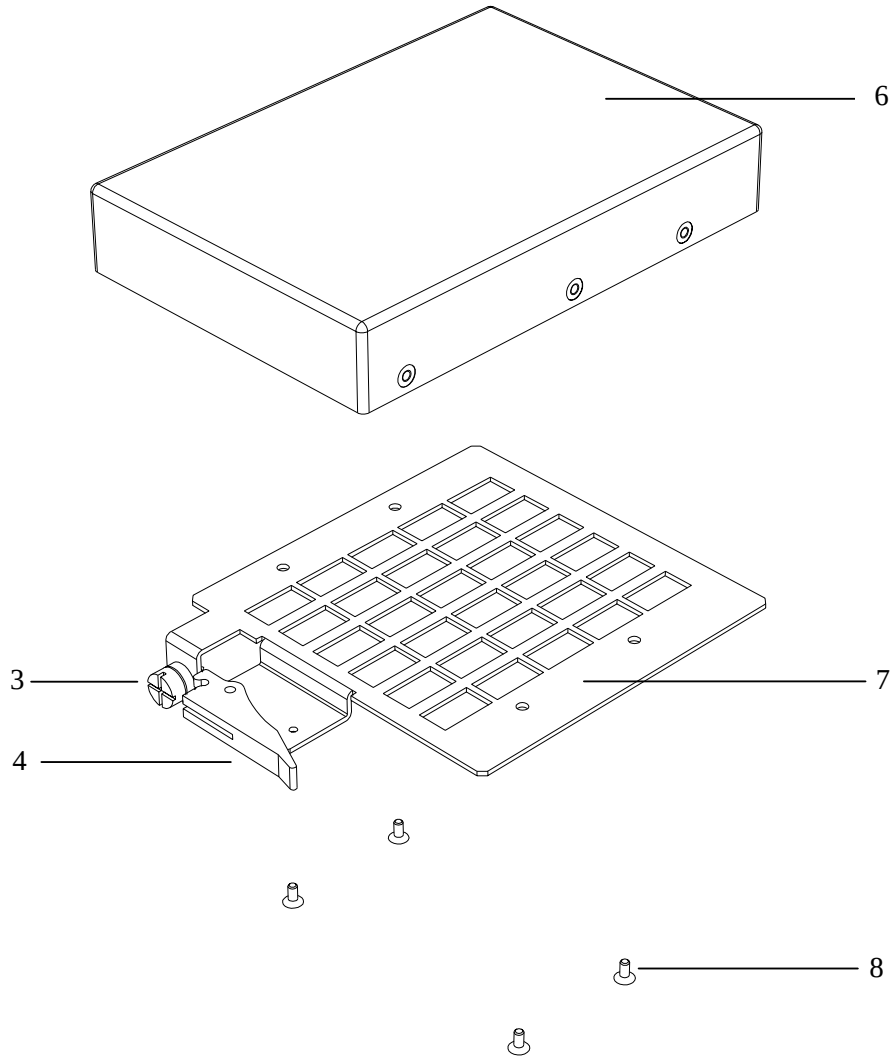


Figure 19: Rear Access Disk Drive Assembly

Installing an Internal Disk Drive

To install a storage device in the internal disk drive bay, reverse the steps in the section *Removing an Internal Disk Drive.*

Removing a Drive from the Front Access Drive Bay

This section describes how to remove a drive, including a floppy, from a front access drive bay.

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

You can remove a storage device from a front access drive bay as follows (see Figure 20):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required
2. Unscrew the two captive fasteners (1) and pull the drive assembly forwards to remove it from the enclosure drive bay.
3. With the drive assembly exposed remove the power and data cables from the rear of the drive unit (2).
4. With the drive assembly removed from the enclosure, remove the four screws (3) that secure the drive unit to the drive holder (4).
5. To reassemble the module unit, reverse the above instructions, taking care to ensure that the EMC gasket seals around the perimeter of the drive opening to maintain the EMC compliance of the enclosure.

Caution



Take care when handling the storage device. The active components on the storage device are sensitive to electrostatic discharge (ESD), and can easily be damaged. Take anti-ESD precautions such as wearing isolation gloves or an antistatic wriststrap.

Vorsicht

Vorsicht im Umgang mit dem Speicherlaufwerkgerät. Die aktiven Bauteile auf dem Speicherlaufwerkgerät dürfen keiner elektrostatischen Entladung (ESD) ausgesetzt sein und können leicht beschädigt werden. Bitte treffen Sie Vorkehrungen gegen ESD, wie beispielsweise durch Tragen von Isolierhandschuhen oder antistatischem Armband.

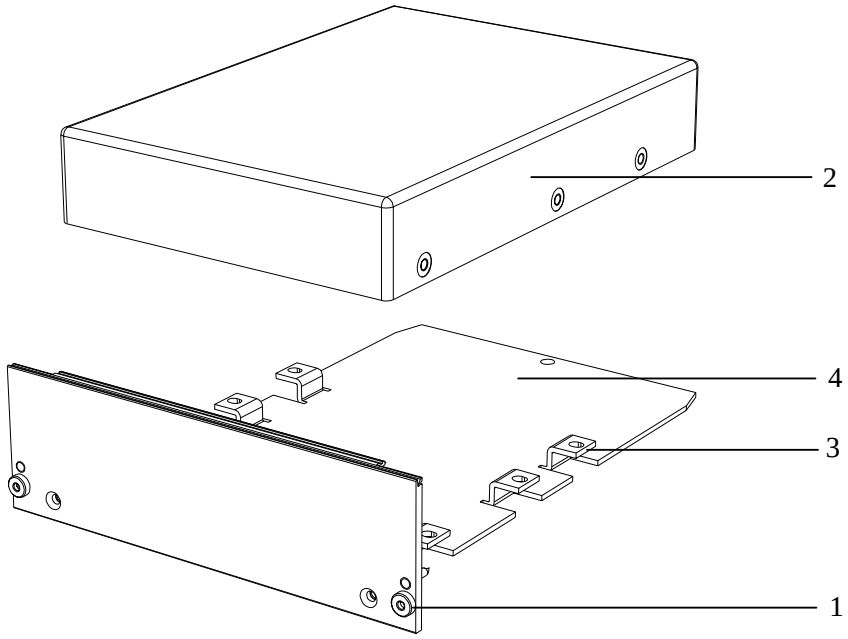


Figure 20: Front Access Drive Bay Assembly.

Installing a Drive into a Front Access Drive Bay

To install a storage device into a front access drive bay, reverse the steps in the section Removing a Drive from the Front Access Drive Bay. Ensure that, where the floppy or similar drive is fitted, the gasket seals around the perimeter of the drive carrier and enclosure opening maintain the EMC compliance of the enclosure.

Cable Routing to the Front Access Drive Bay

This section provides information on the routing of the power and IDE cables to an internal drive, when mounted in the front access drive bay. Figure 21 shows a diagram of the suggested routing of cables over the top of the backplane for front mounted storage devices in the ModuSys kernel. This cable route provides efficient routing between the backplane connectors and the device drive and minimizing the possibility of trapping or damaging the cable assemblies. Take care when routing cables and installing or removing components to avoid cable damage.

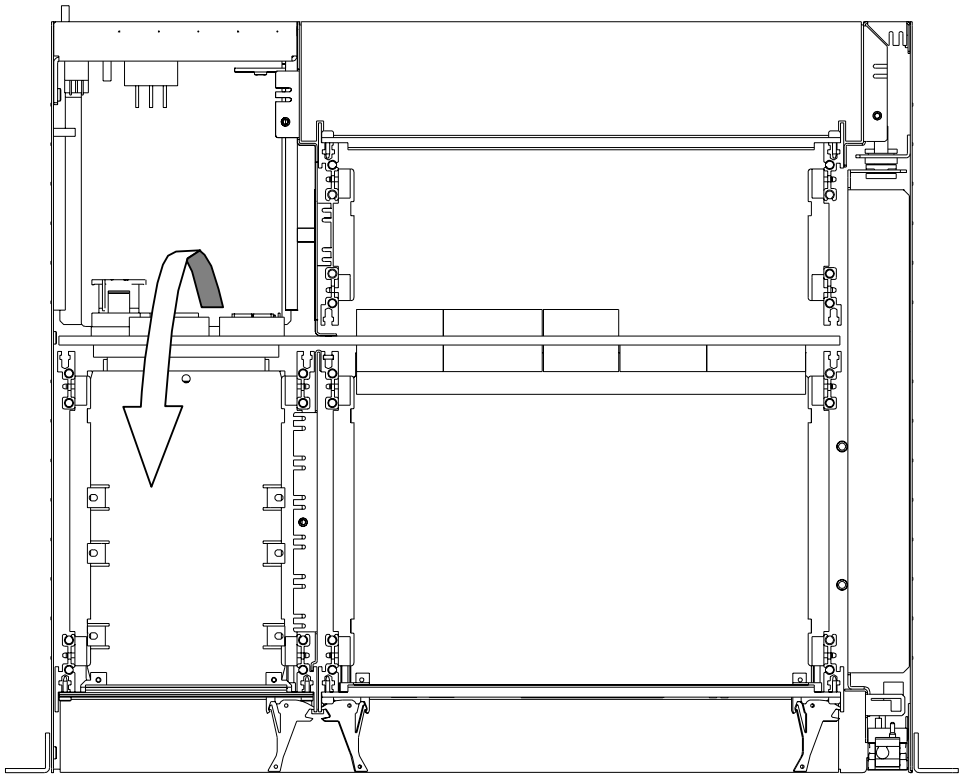


Figure 21: Cable Routing over Backplane to Front Access Drive Bay

5

Installing and Removing Option Boards

Option Board Configurations

This section provides information on option board configurations. The module unit has 8 external openings that can accommodate option boards. One of these openings is reserved for the SBC, the remainder can be used by a mixture of cPCI options (refer to Figure 22). Consult the manuals for the SBC for any additional requirements concerning power, adequate airflow provision, and any other matters. You can install various combinations of cPCI option boards onto the Force Computers ModuSys Product Family backplane (1). Installation of the SBC can only be made in the SBC connectors (B) located on the backplane (refer to Chapter 2).

Note:

- **The blanking panels of the enclosure have a series of gaskets that must connect with the gaskets of options cards. Take care when inserting the option cards so that they connect with these gaskets. If the option cards do not make proper contact with the gaskets, unacceptable electromagnetic interference may be caused. Care must also be taken when removing or installing the option cards.**

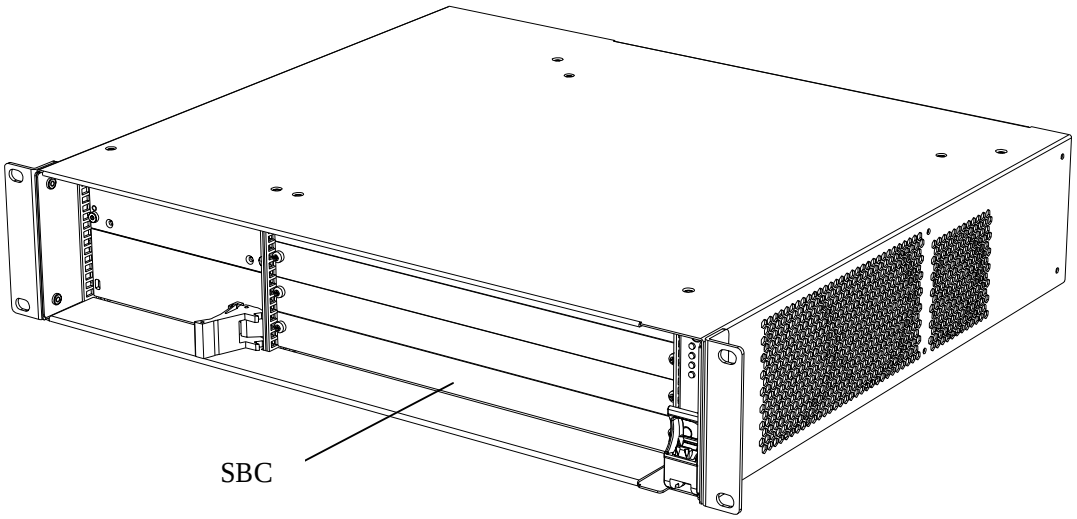


Figure 22: SBC Connector Location on the Backplane

Note: The illustrations in this chapter show a typical backplane for reference purposes.

Installing cPCI and PMC Option Boards

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

Install a cPCI option board as follows (see Figure 23 and Figure 24):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required
2. Select a vacant option board connector on the Force Computers ModuSys Product Family backplane. You must select a connector that is appropriate for the type of option board that you are installing.
6. Carefully slide the option board (1) into the appropriate connector on the Force Computers ModuSys Product Family backplane and press it firmly into place. Depending on the option, you may wish to install some cabling now.
7. Secure the option board to the chassis by engaging the two retaining locks (2).
8. Connect all required cables to the internal or external ports on the option board.
9. Follow the instructions in Chapter 3 to reassemble the module unit.

Caution



Take care when handling the storage device. The active components on the storage device are sensitive to electrostatic discharge (ESD), and can easily be damaged. Take anti-ESD precautions such as wearing isolation gloves or an antistatic wriststrap.

Vorsicht

Vorsicht im Umgang mit dem Speicherlaufwerkgerät. Die aktiven Bauteile auf dem Speicherlaufwerkgerät dürfen keiner elektrostatischen Entladung (ESD) ausgesetzt sein und können leicht beschädigt werden. Bitte treffen Sie Vorkehrungen gegen ESD, wie beispielsweise durch Tragen von Isolierhandschuhen oder antistatischem Armband.

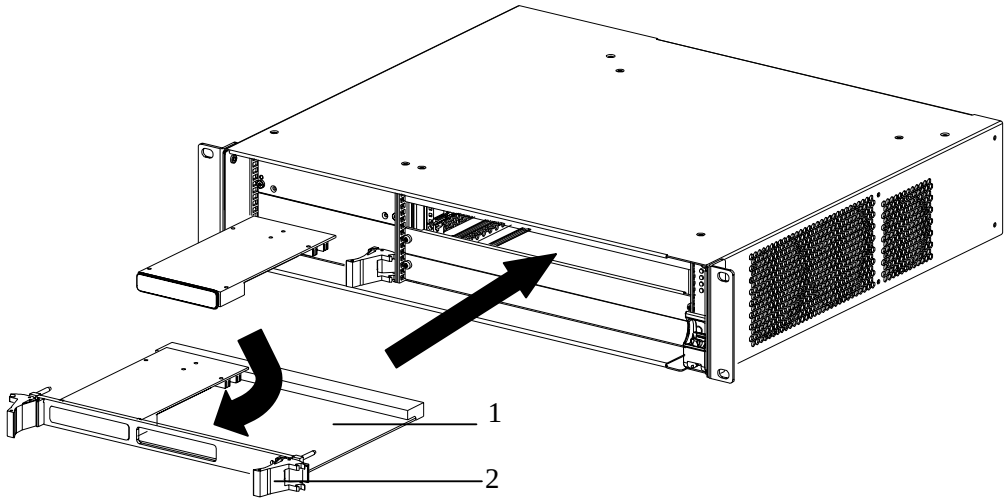


Figure 23: Installing an Option Board

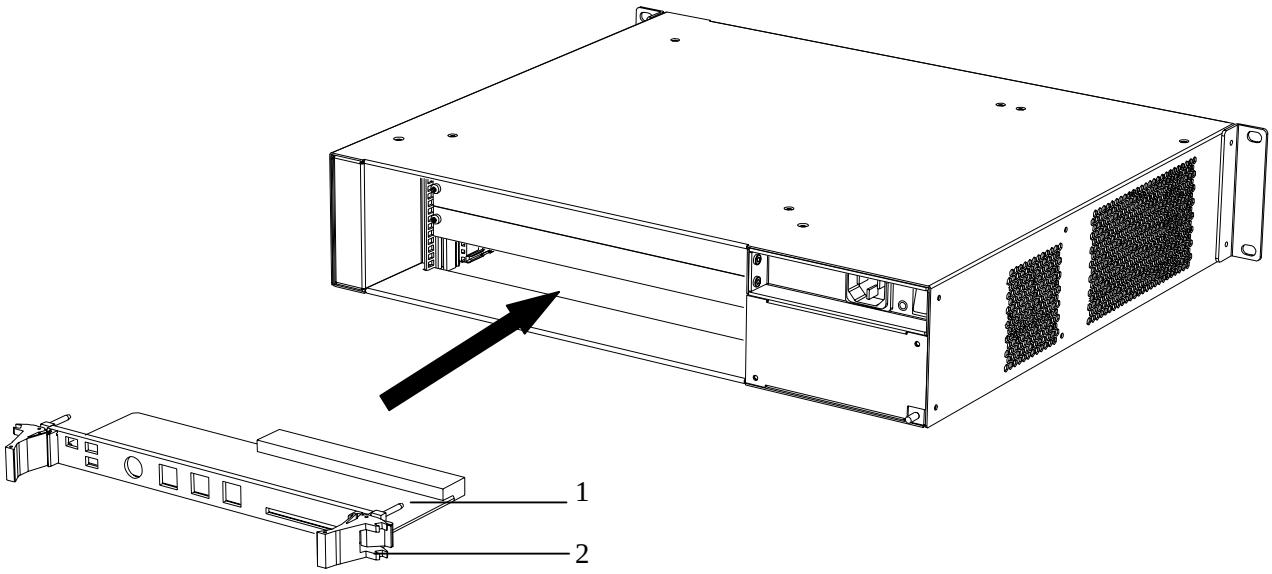


Figure 24: Installing an RTM Option Board

Removing cPCI and PMC Option Boards

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

Remove a cPCI option board as follows (see Figure 25 and Figure 26):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required
2. Note the location and orientation of all cables connected to the option board (1)
3. Disconnect any cables connected to the internal or external ports on the option board.
4. Disengage the two retaining locks (2) securing the option board to the chassis.
5. Carefully disconnect the option board from the connector on the backplane and remove the option board from the module unit.
6. If you intend leaving the option connector vacant, install a slot cover to maintain the EMC and thermal integrity of the enclosure.
7. Follow the instructions in Chapter 3 to reassemble the module unit.

Caution



Take care when handling the storage device. The active components on the storage device are sensitive to electrostatic discharge (ESD), and can easily be damaged. Take anti-ESD precautions such as wearing isolation gloves or an antistatic wriststrap.

Vorsicht

Vorsicht im Umgang mit dem Speicherlaufwerkgerät. Die aktiven Bauteile auf dem Speicherlaufwerkgerät dürfen keiner elektrostatischen Entladung (ESD) ausgesetzt sein und können leicht beschädigt werden. Bitte treffen Sie Vorkehrungen gegen ESD, wie beispielsweise durch Tragen von Isolierhandschuhen oder antistatischem Armband.

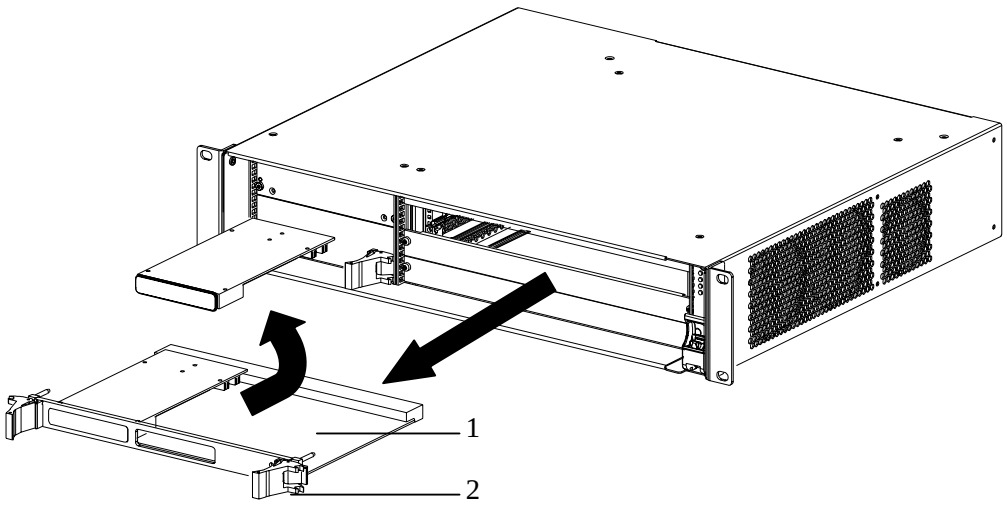


Figure 25: Removing an Option Board

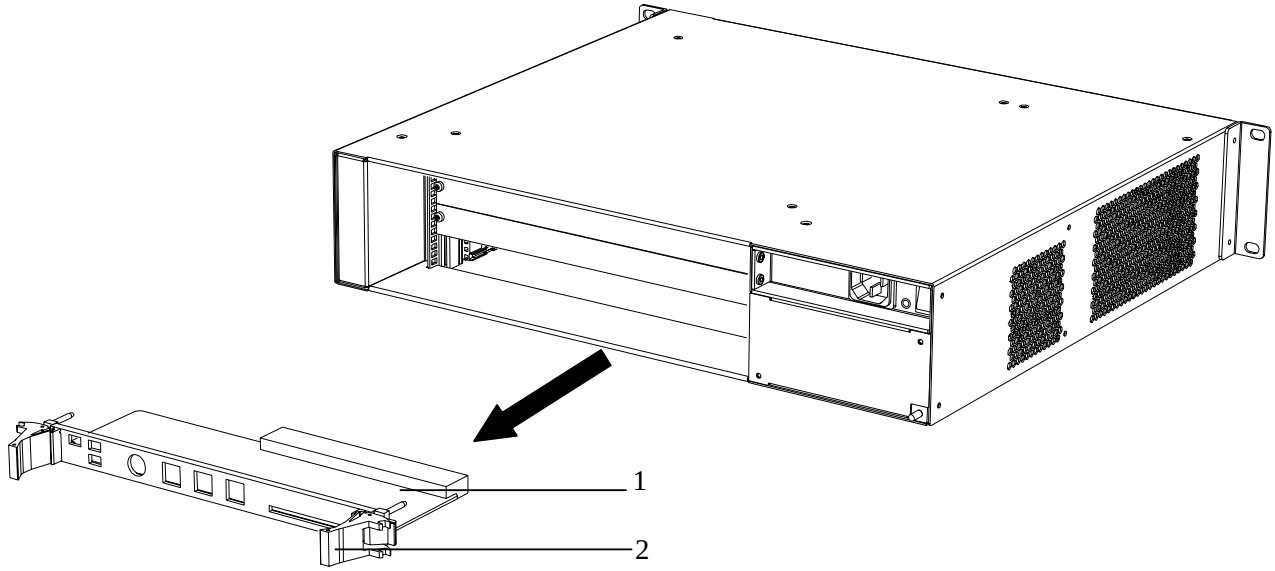


Figure 26: Removing an RTM Option Board

Installing an SBC

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

Install an SBC as follows (see Figure 27):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required.
2. Referring to Figure 22, locate the SBC connector on the backplane.
4. Remove the slot cover if fitted from the chassis and store it for future use.
5. Carefully install the SBC (1) in the correct connector on the backplane. Depending on the SBC, you may wish to connect some PMC options before installing the SBC.
6. Secure the SBC to the chassis by engaging the two retaining locks (2)
7. Connect the appropriate cables to the SBC. Refer to the user information manual supplied with each SBC for information about connecting cables to the SBC.
8. Follow the instructions in Chapter 3 to reassemble the module unit.

Caution



Take care when handling the SBC. The active components on the SBC are sensitive to electrostatic discharge (ESD), and can easily be damaged. Take anti-ESD precautions such as wearing isolation gloves or an antistatic wriststrap.

Vorsicht

Vorsicht im Umgang mit der SBC-Platte. Die aktiven Bauteile auf der SBC-Platte dürfen keiner elektrostatischen Entladung (ESD) ausgesetzt sein und können leicht beschädigt werden. Bitte treffen Sie Vorkehrungen gegen ESD, wie beispielsweise durch Tragen von Isolierhandschuhen oder antistatischem Armband.

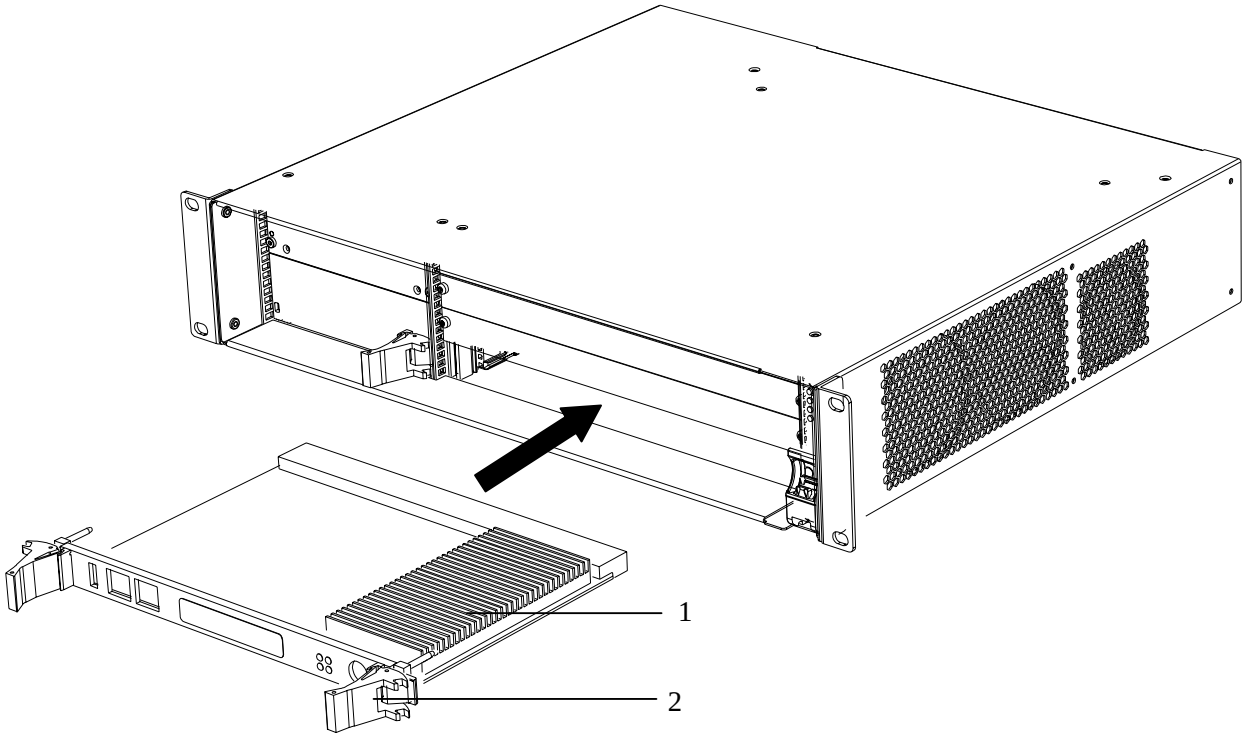


Figure 27: Installing an SBC

Removing an SBC

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

Remove an SBC as follows (see Figure 28):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required.
2. Note the location and orientation of all cables connected to the SBC (1).
3. Disconnect any cables attached to the SBC. You may wish to remove some cables after removing the SBC from the backplane.
4. Disengage the two retaining locks (2) that secure the SBC to the chassis.
5. Carefully remove the SBC from the SBC connector on the backplane.

Caution



Take care when handling the SBC. The active components on the SBC are sensitive to electrostatic discharge (ESD), and can easily be damaged. Take anti-ESD precautions such as wearing isolation gloves or an antistatic wriststrap.

Vorsicht



Vorsicht im Umgang mit der SBC-Platte. Die aktiven Bauteile auf der SBC-Platte dürfen keiner elektrostatischen Entladung (ESD) ausgesetzt sein und können leicht beschädigt werden. Bitte treffen Sie Vorkehrungen gegen ESD, wie beispielsweise durch Tragen von Isolierhandschuhen oder antistatischem Armband.

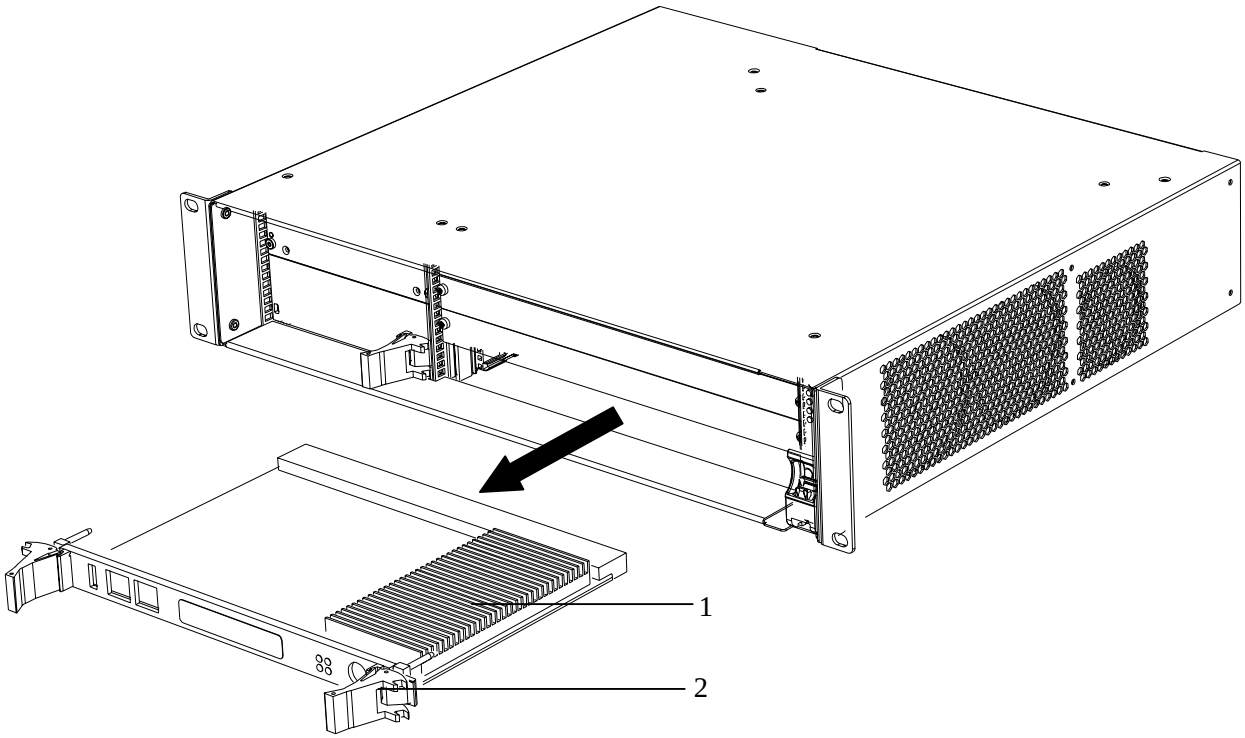


Figure 28: Removing an SBC

6

Replacing Module Unit Components

Removing the Fan Assembly

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte unterbrechen Sie die Spannungsquelle zur Moduleinheit, bevor Sie fortfahren.

This section contains information on removing the fan assembly. The fan assembly in the ModuSys 2000 system also contains the Operator Control Panel and the Air Filter. Please refer to this section for information on removing or replacing either of these components.

Remove the fan assembly follows (see Figure 29):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required
1. Disengage the retaining lock (1) that secures the fan assembly to the enclosure by pushing downwards.
2. Slide out the fan assembly (2) from the enclosure.
3. The OCP (3) and the Air Filter (4) are now accessible from the fan assembly

Note: The OCP and the Air Filter cannot be removed or replaced independently from the Fan Assembly. Failure in any of these components will require replacement of the complete assembly.

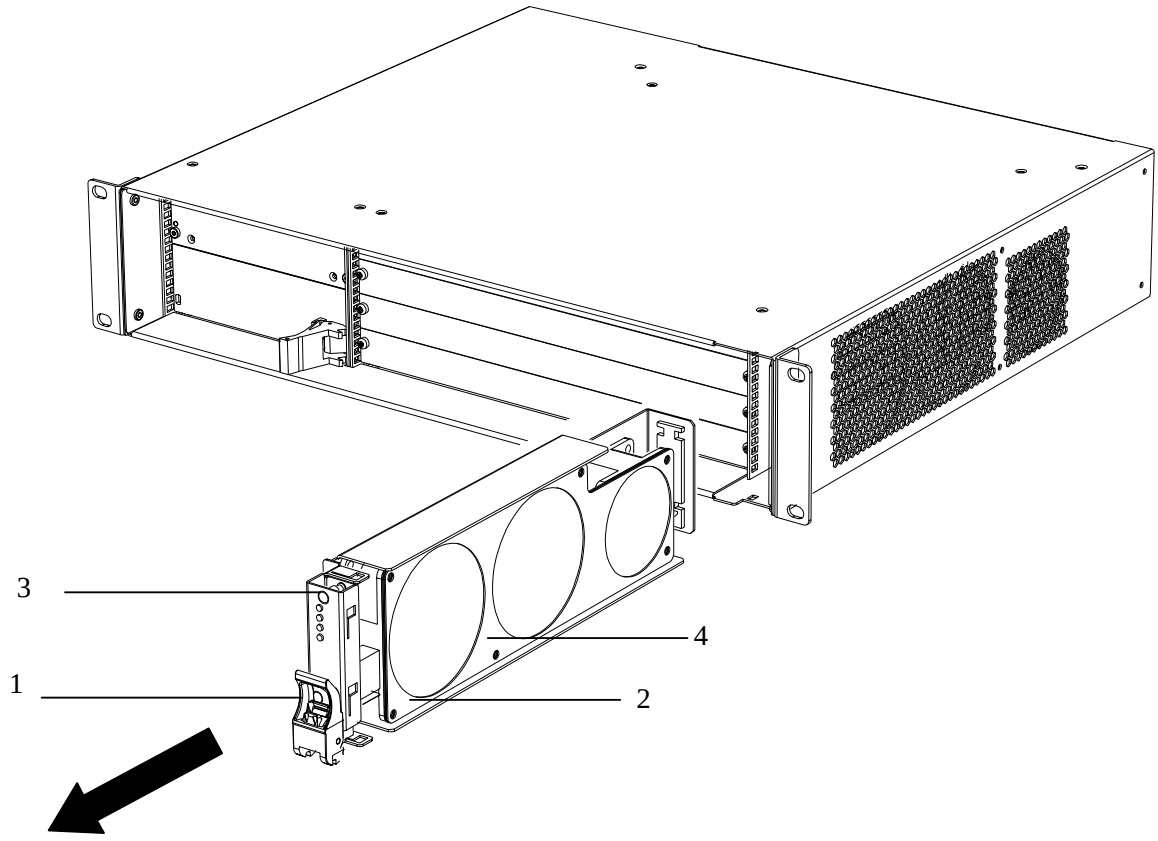


Figure 29: Removing the Fan Assembly

Note: Figure 29 illustrates the removal and replacement of a typical fan. If there is a fan safety guard, then replace the guard when you reassemble the fan.

Replacing the Fan Assembly

Danger



You must reconnect the fans when the backplane is replaced and you must verify their operation immediately after turning on the power. There is a risk of damage to the module unit if the fans are not correctly reconnected and functioning normally when the power is switched on.

Gefahr



Das Kühlgebläse muß nach dem Ersetzen der Rückplatte wieder angeschlossen werden. Der Betrieb des Kühlgebläses muß unmittelbar nach dem Einschalten des Stromes überprüft werden. Falls das Kühlgebläse nicht richtig wieder angeschlossen worden ist und nicht normal funktioniert, wenn der Strom eingeschaltet ist, besteht die Gefahr, daß die Moduleinheit beschädigt wird.

To replace the fans, reverse the steps in the section Removing the Fan Assembly Fans. Ensuring that the fans are oriented so that the airflow is drawn through the fans and blown over the SBC, option cards and power supplies. The direction of airflow is marked on the fan body.

Cleaning the Air Filter

This section describes how to clean the air filter.

Note: In all service operations, use care to avoid damaging cables and EMC Gasketing

Danger



The frequency with which you need to clean the air filter depends on local conditions.

Clean the air filter in the ModuSys2000 enclosure as follows (see Figure 30):

1. Refer to the previous section on Removing the fan assembly to access the assembly containing the air filter (1).
2. With the assembly removed, clean the air filter by vacuuming to remove dust particles.
3. Ensure that the air filter is clean and replace it by reversing the steps in the section on removing the fan assembly.

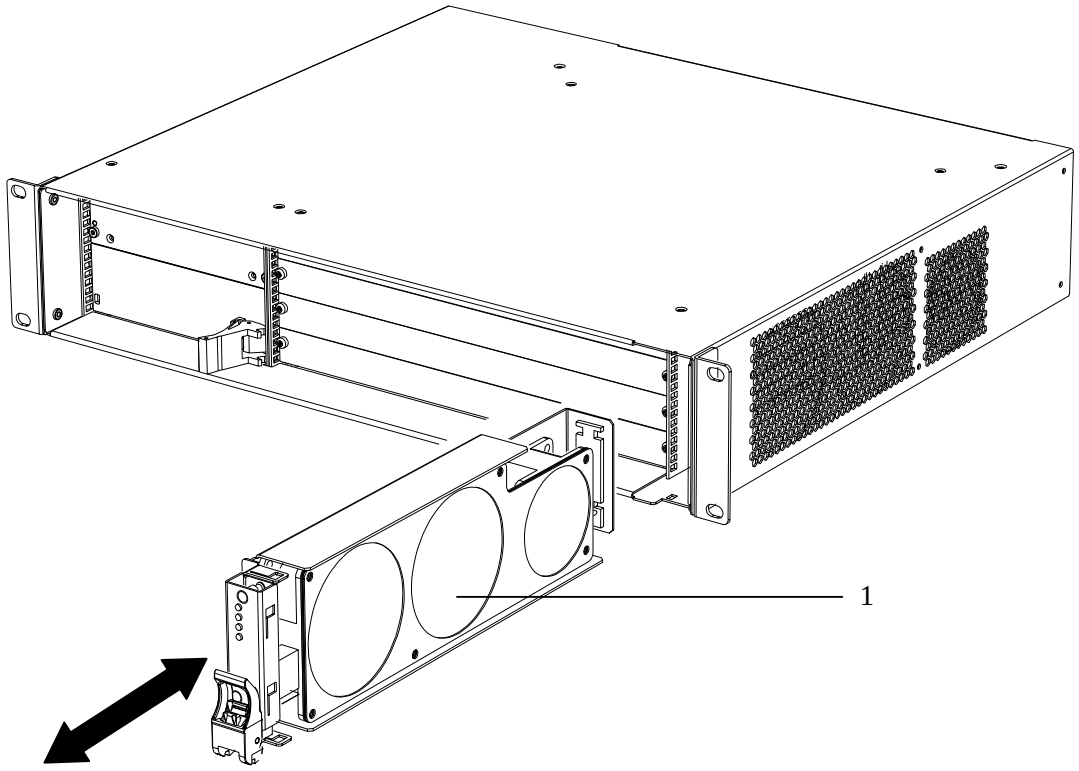


Figure 30: Cleaning the Air Filter

Removing the Power Supply Unit

This section describes how to remove a power supply unit from the enclosure.

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr



Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

Caution



Power Supply Service Personnel should note that the power supply contains double pole fusing.

Vorsicht



Wartungspersonal sollte beachten, daß die Spannungsquelle zweipolig gesichert ist.

Remove the power supply unit from ModuSys 2000 kernel as follows (See Figure 31):

1. Follow the instructions in Chapter 3 to dismount the module unit from a rack if additional access is required
2. Disconnect the mains power cord from the rear of the enclosure.
3. Disengage the retaining lock (1) by pushing sideways and slide out the PSU (2) from the enclosure.

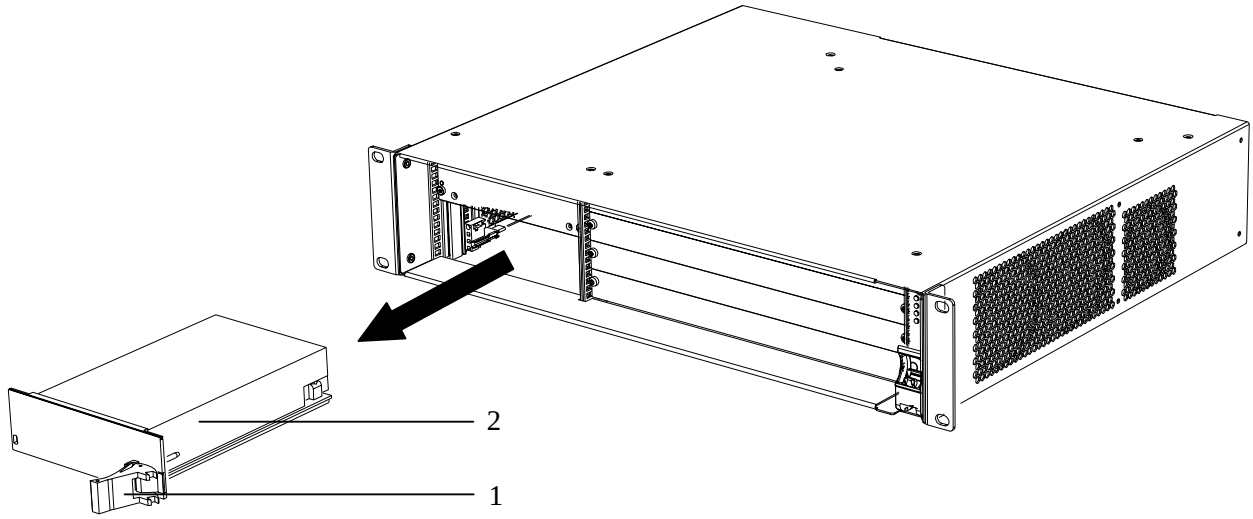


Figure 31: Removing the Power Supply Unit from the ModuSys Kernel

Replacing the Power Supply Unit

Danger



Make sure that the mains power supply is disconnected from the module unit before continuing.

Gefahr

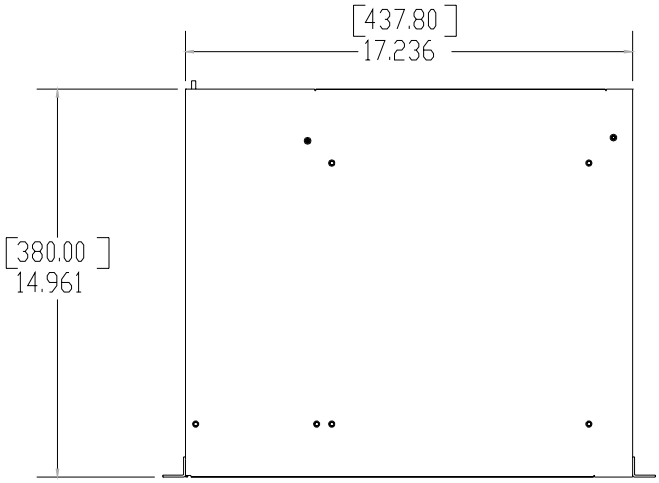


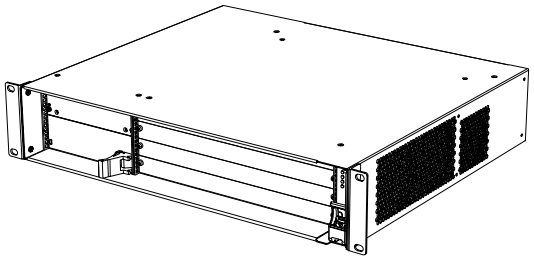
Bitte trennen Sie die Moduleinheit von der Spannungsversorgung, bevor Sie fortfahren.

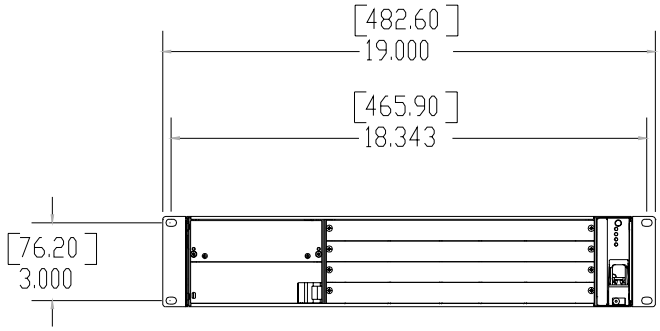
To replace the power supply unit reverse the steps in the section Removing the Power Supply Unit.

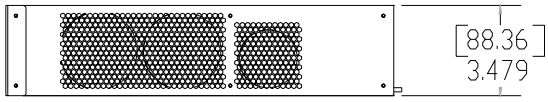
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Assembly Drawings


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