User Manual

MTCA.4 Cube

Product Number:

11890-098

11850-021

R1.0	January 2016	Initial release

The details in this manual have been carefully compiled and checked.

The company cannot accept any liability for errors or misprints. The company reserves the right to amendments of technical specifications due to further development and improvement of products.

1 Safety

The intended audience of this User's Manual is system integrators and hardware/software engineers.

1.1 Safety Symbols used in this document

⚠	**Hazardous voltage!** *This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.*

⚠	**Caution!** *This is the user caution symbol. It indicates a condition where damage of the equipment or injury of the service personnel could occur. To reduce the risk of damage or injury, follow all steps or procedures as instructed.*

⚠	**Danger of electrostatic discharge!** *The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.*

1.2 General Safety Precautions

⚠	**Warning!** *Voltages over 60 VDC can be present in this equipment. This equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.*

- Service personnel must know the necessary electrical safety, wiring and connection practices for installing this equipment.
- Install this equipment only in compliance with local and national electrical codes.

1.3 References and Architecture Specifications

- PICMG® MTCA.4 Specification
- PICMG® AMC® Base Specification
- PICMG® MicroTCA® Base Specification
  (*www.picmg.org*)

1.4 Product Definition

Schroff 11850-021: 5 U, 42 HP MicroTCA.4 Cube System with rear µRTM area.

Schroff 11890-089: 5 U, 42 HP MicroTCA.4 Cube System **without** rear µRTM area.

2 Hardware Platform

- Shielded galvanisized steel subrack with mounting brackets
- MicroTCA Backplane with radial IPMI-L from both MCH slots to all AMC slots and bused IPMB-0 among MCH, PM and CU.
- The Shelf provides:
  - 6 AMC double mid-size slots
  - 1 AMC double full-size slot
  - 1 MicroTCA Carrier Hub (MCH) slot (double full-size)
  - 1 Power Module (PM) slot (double full-size)
  - 7 RTM double mid-size slots (11850-021)
  - 1 RTM double full-size slot (11850-021)
- Active cooling through a hot-swappable Cooling Unit (CU), providing:
  - 6 speed controlled 12 VDC fans. (11850-021)
  - 4 speed controlled 12 VDC fans. (11890-098)
  - Cooling Unit Enhanced Module Management Controller (CU EMMC)
  - Display Module
- Front accessible air filter

2.1 Front an Rear View

Figure 1: 11850-021 Front View

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1	Backplane		3	Air filter
2	Cooling Unit			

Figure 2: 11850-021 Rear View

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4   Ground Terminal

Figure 3: 11890-089 Front View

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| 1 | Backplane | 3 | Air filter |
| 2 | Cooling Unit | | |

Figure 4: 11890-089 Rear View
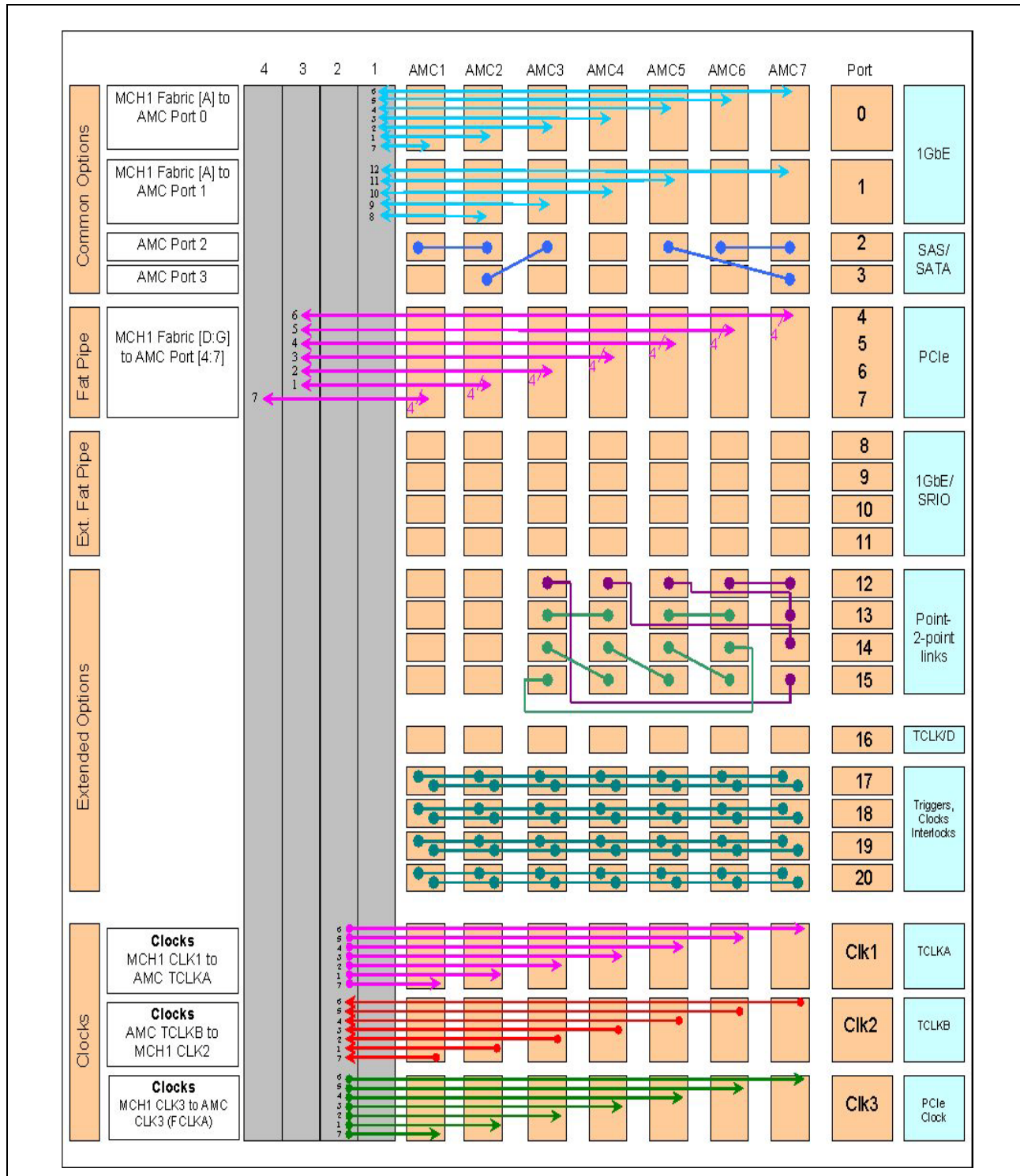

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4   Ground Terminal

3 Backplane

The 6+1+1 slot MicroTCA Backplane provides:

- 6 AMC double Mid-size slots (4 HP)
- 1 double Full-size MicroTCA Hub (MCH) slot (6 HP)
- 1 double Full-size Power Module (PM) slot (6 HP)

3.1 Backplane Topology

Figure 5: Backplane Topology

3.2 Fabric Interface

3.2.1 Common Options

MCH Fabric Port A is routed to all AMC slots Port 0 in a radial configuration.

MCH Fabric Port A is routed to AMC slots 2...7 Port 1 in a radial configuration.

AMC Ports 2 and 3 are direct slot to slot connections to support CPU/HDD configurations.

3.2.2 Fat Pipe

MCH1 Ports [D:G] are routed to all AMC slots Port [4:7] in a radial configuration.

3.2.3 Ports 12 to 15

Ports 12 to 15 are point to point connections as proposed in the MTCA.4 specification section 6.7.1.

3.2.4 Ports 17 to 20

Ports 17 to 20 are used as a bus for triggers, clocks and interlock signal distribution.

3.3 Synchronization Clock Interface

Synchronisation clock topology in accordance with AMC.0 R2.0, especially for the use of PCIe AMC modules in accordance with AMC0 R2.0 that expect the FabricCLK on FCLKA.

3.4 Intelligent Platform Management Bus (IPMB)

MicroTCA uses an Intelligent Platform Management Bus (IPMB) for management communications.

3.4.1 IPMB-L

The IPMB among AdvancedMCs and the MCHs is non-redundant and implemented in a radial topology. This IPMB called Local IPMB (IPMP-L)

3.4.2 IPMB-0

The IPMB among the MCH, the PM and the CU is called IPMB-0. The reliability of the IPMB-0 is improved by the addition of a second IPMB, with the two IPMBs referenced as IPMB-A and IPMB-B.

The IPMB-A and IPMB-B are routed in a bused configuration.

IPMB-A and IPMB-B are electrically and logically separate from the Local IPMB (IPMB-L)

3.5 IPMB Addresses

GA[2:0]	IPMB-L address	MicroTCA Carrier Local Address		Carrier Manager FRU Device ID
		Site Number	Site Type	
GGU	72h	1	AdvancedMC (07h)	5
GUG	74h	2	AdvancedMC (07h)	6
GUU	76h	3	AdvancedMC (07h)	7
UGG	78h	4	AdvancedMC (07h)	8
UGU	7Ah	5	AdvancedMC (07h)	9
UUG	7Ch	6	AdvancedMC (07h)	10
UUP	7Eh	7	AdvancedMC (07h)	11

GA[2:0]	IPMB-0 address	MicroTCA Carrier Local Address		Carrier Manager FRU Device ID
		Site Number	Site Type	
GGU	A8h	1	Cooling Unit (04h)	40
GGU	C2h	1	Power Module (0Bh)	50

3.6 JTAG

JTAG signals are not supported.

3.7 Carrier FRU SEEPROM

Two SEEPROMS are located at the backside of the Backplane. The SEEPROMS are connected to both MCHs through I²C-busses.

The I²C-addresses of the SEEPROMs is 0xa4.

3.8 Carrier Number

Each MicroTCA Carrier shall have a unique Carrier Number, ranging from 1 to 16 in its MicroTCA Shelf. To provide the Carrier Number, a mechanical and electronic (PCA9558) DIP switch and a PCF8574A I²C I/O expander is located on the Backplane.

Figure 6: Carrier Number Switches
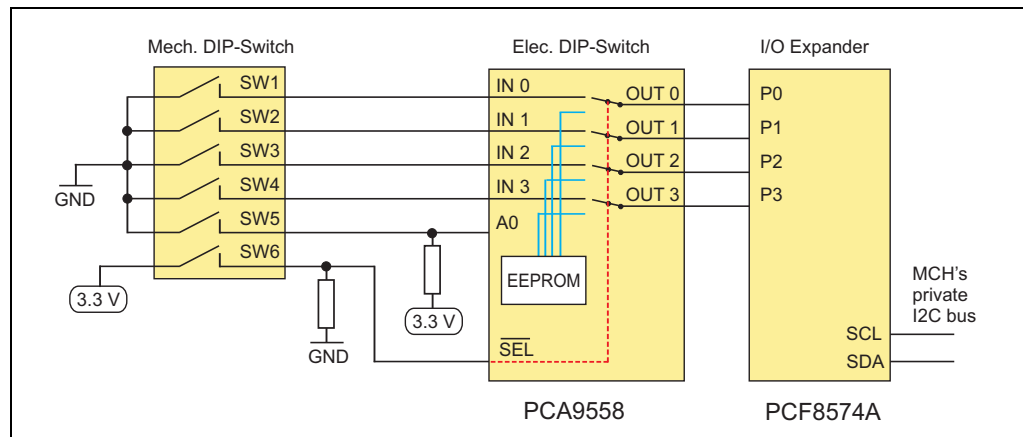
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The customer can use either the mechanical or the electronic DIP switch to set the carrier number.

3.8.1 Mechanical DIP Switch

The mechanical DIP switch is a 6-position switch.

- Switch 1 to 4 are used to set the carrier number (Switch 1 = Bit 0).
- Switch 5 is used to change the I2C-address of the electronic DIP switch.
  - Switch 5 ON: address = 9C
  - Switch 5 OFF: address = 9E
- With switch 6 you can select between mechanical or electronic DIP switch to set the carrier number.
  - Switch 6 ON: Mechanical DIP switch active
  - Switch 6 OFF: Electronic DIP switch active

Two DIP Switches (for redundancy) are located on the Backplane. They are user-accessible after removing the cooling units.

*When setting the carrier number with the **mechanical** DIP switch please note:*

Switch ON = logic 0
Switch OFF = logic 1

The mechanical DIP switch is connected to the input of the electronic DIP switch.
When the SEL signal is a logic 0, the electronic DIP switch will select the data from the internal EEPROM to drive the output pins, when the SEL signal is a logic 1, the electronic DIP switch will select the signal from the mechanical DIP switch to drive on the output pins.

3.8.2 Electronic DIP Switch (factory default)

The electronic DIP switch is connected to the lower four bits of the I/O lines of the PCF8574A I²C I/O expander. The I/O expander connects to the MCMC's private I²C bus. The MCMC reads the DIP switch setting from the I/O expander, **adds one**, and uses the result as its Carrier Number.

In the default factory setting the electronic DIP switch is active at the address 0x9E (SW5 and SW6 at the mechanical DIP switch = OFF)

Default carrier address = 1 (Data content EEPROM = 0000)

Table 1: I²C Addresses

PCA 9558 DIP switch	0x9e or 0x9c	0x9e or 0x9c = 8 bit address write (bit 0 = 0)
PCF8574A I/O expander	0x7c	0x3e = 7 bit address (8 bit address read = 0x7d)

To change the carrier number with the electronic DIP switch you have to send the following I2C command to the electronic DIP switch's EEPROM:
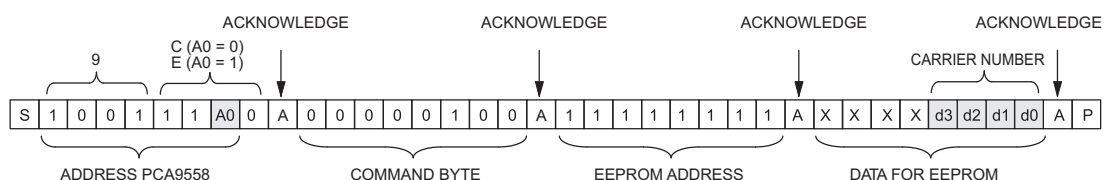
4 Air Filter

Figure 7: Air Filter
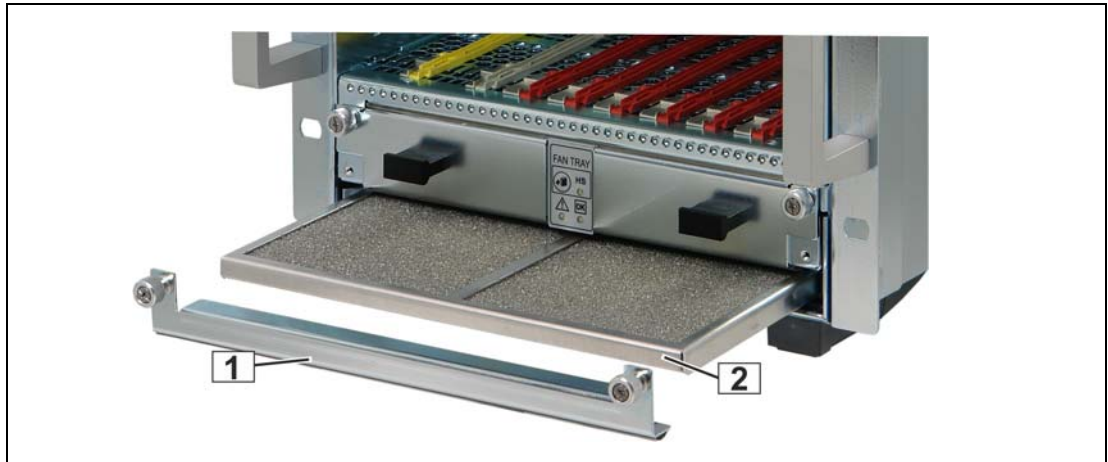
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1   Front plate   2   Filter Element

4.1 Introduction

The MicroTCA Shelf provides a front replaceable air filter.

The filter meets the following standards and classifications:

- UL 900 Class 2, UL94 HF-1
- Telcordia NEBS GR-78-CORE
- Telcordia NEBS GR-63-CORE

5 Cooling Unit

The MicroTCA cube provides a front-pluggable Cooling Unit. The Cooling Unit is locked into the cube by 2 captive knurled screws. A hot-swap push button is used to provide hot-swap functionality.

The Cooling Unit contains four (11890-098) or six (11850-021) 12 VDC fans (110 m³/h (64 cfm) each) and a Schroff Cooling Unit Enhanced Module Management Controller (CU EMMC). The CU EMMC has a Enhanced Module Management Controller (EMMC) onboard that communicate with the Carrier Manager over IPMB-0. The CU EMMC controls the fan speed, monitors the air filter sensor and provides hot-swap functionality.

Figure 8: Cooling Unit

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1   Captive knurled screws

Figure 9: Cooling Unit 11850-021 with fans for RTM

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5.1 Emergency Cooling

If a fan fails or the connection to the MCH is lost, the EMMC increases the fan speed to the maximum. To check the connection to the MCH, the EMMC sends every 5 seconds the IPMI command GET_DEVICE_ID to the MCH and waits for an acknowledge. After 5 consecutive attempts, the EMMC sets the Cooling Unit to Local Mode and increases the fan speed to the maximum.

5.2 Cooling Unit IPMB Address

Table 2: Cooling Unit IPMB Address

Cooling Unit	0xA8

5.3 Cooling Unit Connectors and Indicators

The display module at the cooling unit provides:

- A green LED – "In-Service"
- A red LED – "Out of Service"
- A blue LED – "Hot-Swap"
- A hot-swap switch

The hot-swap switch indicates to the MCH that the Cooling Unit is about to be removed. Once the operator pushes the hot-swap switch, the MCH is informed of the pending extraction. When the MCH feels it is "safe" to remove the Fan Tray, the blue Hot-Swap LED illuminates solid.

Table 3: LEDs on Fan Tray front panel

Color	Description	Status	Condition
Green	In-Service LED	Off	No Power to the Fan Tray
		Solid green	Normal Operation
Red	Alarm LED	Solid red	Attention Status (error condition)
Blue	Hot Swap LED	Off	In use
		Short blink	Preparing for extraction
		Solid blue	Ready to remove

5.4 Fan Controller Block Diagram

Figure 10: Fan Controller Block Diagram
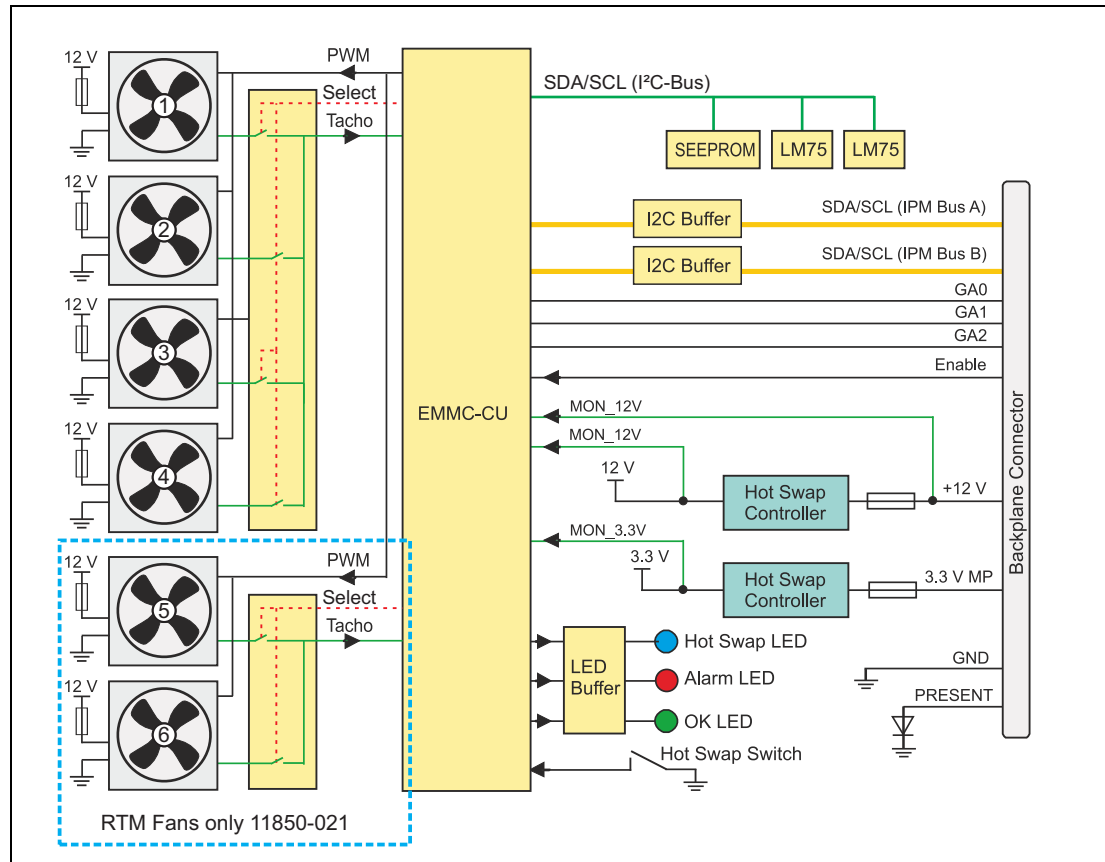
5.5 Cooling Capacity

The Schroff MTCA.4 Shelf provides airflow using a Cooling Unit below the card cage. The maximum power available to an AMC/µRTM combination is 80 W, the average power on the µRTM shall not exceed 30 W. The shelf cooling capacity for the AMC front boards is 80 W/board, the cooling capacity for the µRTM boards is 30 W/board ($\Delta t \approx 12$ K).

6 Technical Data

Table 4: Technical Data

Physical Dimensions	
Height (w/o feet)	222 mm (5 U)
Height (with feet)	237 mm
Width (w/o mounting brackets)	220 mm (42 HP)
Width (with mounting brackets)	260 mm
Depth (11950-098)	220 mm
Depth (with handles) (11890-098)	260 mm
Depth (11850-021)	373,3 mm
Depth (with handles) (11850-021)	413,3 mm
Weight	
Weight 11890-098	5 Kg
Weight 11850-021	7 Kg
Environmental	
Ambient temperature	+5°C...+50°C
Humidity	+5%...+85%, non-condensing

Schroff GmbH

Langenalber Str. 96 - 100
75334 Straubenhardt, Germany
Tel   +49.7082.794.0
Fax   +49.7082.794.200