

AdvancedTCA Shelf, 2-slot

User's Manual



Product Number:

11596-088

11596-090

11596-106

11596-107

Rev.	Date updated	Change
D1.2	22.12.2008	Draft Release
D2.0	February 05, 2009	Draft Release
R1.0	September 06, 2010	Initial Release

Impressum:

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The details in this manual have been carefully compiled and checked - supported by certified Quality Management System to EN ISO 9001/2000

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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! <i>This is the electrical hazard symbol. It indicates that there are dangerous voltages inside the Shelf.</i>
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	Caution! <i>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.</i>
---	---

	Danger of electrostatic discharge! <i>The Shelf contains static sensitive devices. To prevent static damage you must wear an ESD wrist strap.</i>
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1.2 General Safety Precautions

	Warning! <i>Voltages over 60 VDC can be present in this equipment. As defined in the PICMG 3.0 Specification, this equipment is intended to be accessed, to be installed and maintained by qualified and trained service personnel only.</i>
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- 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.
- For additional information about this equipment, see the PICMG 3.0 Specification (www.picmg.com).

1.3 References and Architecture Specifications

- User Manual Shelf Manager ACB-V, order-no.: 63972-243
- User Manual Shelf Alarm Panel, order-no.: 63972-230
- User Manual AC power supply, order-no.: 63972-246
- Pigeon Point Systems IPM Sentry Shelf-External Interface Reference (www.pigeonpoint.com)
- PICMG® 3.0 Revision 3.0 AdvancedTCA® Base Specification (www.picmg.com)

1.4 Product Definition

The Schroff 11596-088/ -090/ -106/ -107 are 2 U / 2 Slot AdvancedTCA Shelves for Enterprise or Development applications. Different versions are available:

- **11596-088:** Base Interface in a **Node/Node** configuration, autonomous fan controller, no Shelf Manager slots, no Rear I/O
- **11596-106:** Base Interface in a **Node/Node** configuration, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), fans controlled by the Shelf Manager or through autonomous fan controller
- **11596-107:** Base Interface in a **Node/Node** configuration, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), fans controlled by the Shelf Manager or through autonomous fan controller
- **11596-090:** Base Interface in a **Hub/Hub** configuration supporting ShMC cross connects, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), fans controlled by the Shelf Manager or through autonomous fan controller

1.5 Terms and Acronyms

Table 1: Terms and Acronyms

Term	Definition
ATCA	Advanced Telecom Computing Architecture
Backplane	Passive circuit board providing the connectors for the front boards. Power distribution, management and auxiliary signal connections are supported
Chassis	Enclosure containing subrack, Backplane, boards, cooling devices, PEMs, same as Shelf
ECN	Engineering Change Notice
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FRU	Field Replaceable Unit
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Controller
IPMI	Intelligent Platform Management Interface
PCB	Printed Circuit Board
PEM	Power Entry Module
RTC	Real Time Clock
RTM	Rear Transition Module
Shelf	See Chassis
U	Unit of vertical pitch. 1 U = 1.75 inches = 44.45 mm
VRTN	Voltage Return

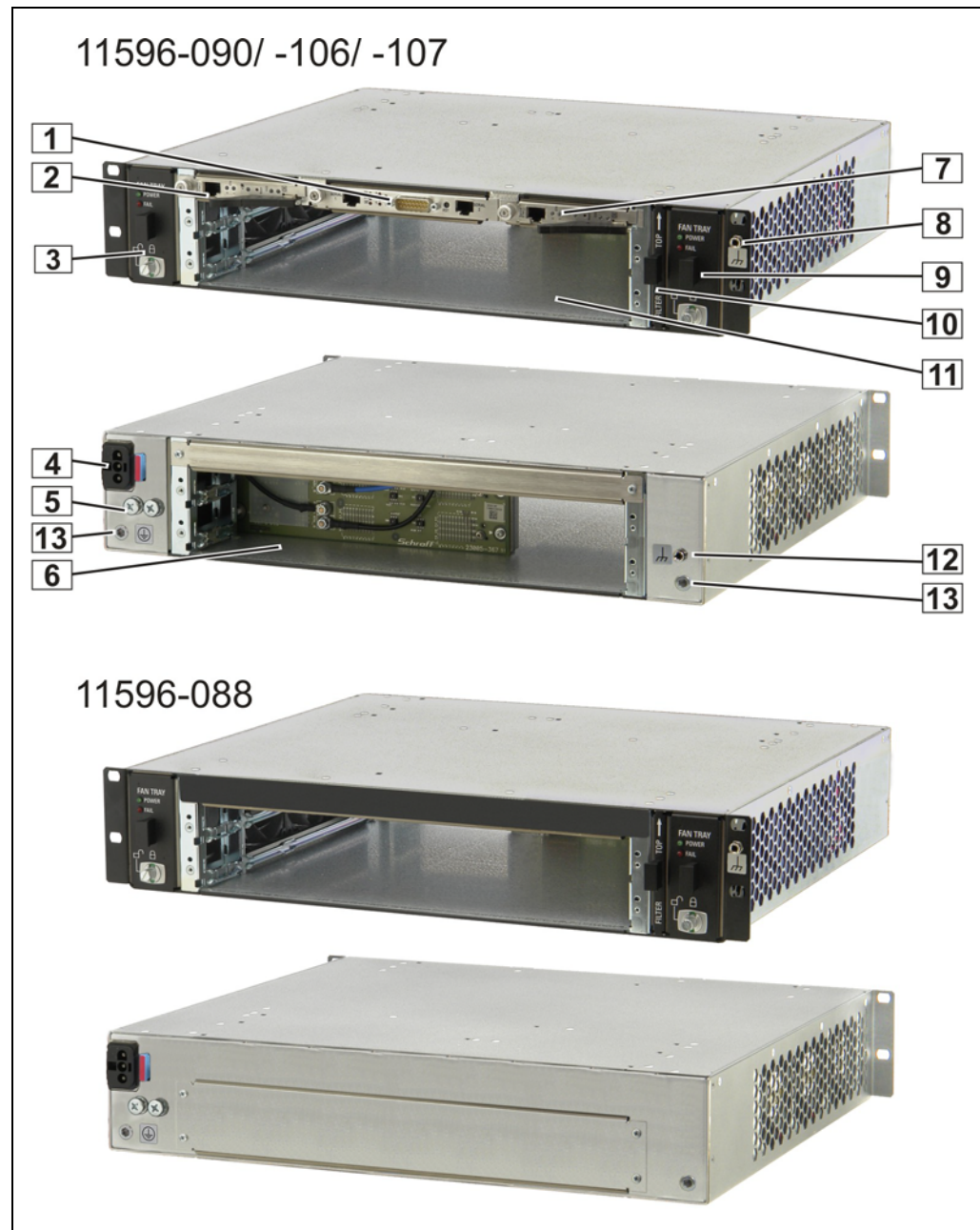
1.6 Hardware Platform

The Schroff 2 U / 2 Slot AdvancedTCA Shelf implements the following features:

- 2 slot ATCA Backplane with 15 x interconnected Fabric Interface, Base Interface in HUB/HUB **or** NODE/NODE configuration, bused IPMB interface, supporting two 8 U ATCA hub boards or node boards (depending on chassis/backplane type)
- Mounting brackets to assemble the chassis in 19" cabinets
- ESD Wrist Strap Terminals at the front and the back
- 2 dedicated slots for Schroff Shelf Managers ACB-V (only Shelves 11596-090/ -106/ -107)
- 1 slot for a Schroff Shelf Alarm Panel (only Shelves 11596-090/ -106/ -107): Provides Telco Alarm Connector, Alarm Status LEDs and serial interfaces for the Shelf Managers
- 2 front pluggable Fan Trays in push-pull arrangement providing optimized cooling with fault tolerant capability
- Front pluggable air inlet filter
- One -48/-60 VDC Power Entry

1.7 Shelf Front and Rear View

Figure 1: Shelf Front and Rear View



12708864

- | | | | |
|---|------------------------------|----|----------------------------|
| 1 | Shelf Alarm Panel (optional) | 7 | Shelf Manager 1 (optional) |
| 2 | Shelf Manager 2 (optional) | 8 | Right Fan Tray |
| 3 | Left Fan Tray | 9 | Air Filter |
| 4 | Power Input Feed A | 10 | ESD Wrist Strap Terminal |
| 5 | Ground Terminal | 11 | Front Card Cage |
| 6 | Rear Card Cage | 12 | ESD Wrist Strap Terminal |
| | | 13 | Rear Fixing Points (M5) |

2 ATCA Backplane

The 2-slot ATCA monolithic Backplane provides 2 ATCA slots in a:

- **Hub/Hub** configuration (Backplane 23005-374) or
- **Node/Node** configuration (Backplane 23005-384)

2.1 Logical to Physical Slot Mapping

The physical and logical slots are sequentially numbered from the lower to the upper slot.

Table 2: 2-Slot ATCA Backplane physical to logical slot mapping

Physical Slot #	Logical Slot #	HW-Address (Hex)	IPMB-Address (Hex)	Update Channel
2	2	42	84	
1	1	41	82	

2.2 Interfaces

2.2.1 Fabric Interface

All 15 Fabric Channels of slot 1 are routed to the respective Fabric Channels of slot 2.

2.2.2 Synchronization Clock Interface

6 pairs of synchronization clocks are bused between both ATCA slots and terminated at both ends.

2.2.3 Update Channel Interface

The Update Channels are wired between both ATCA slots. The Update Channel can be used to pass data or routing information between two redundant ATCA Boards.

2.2.4 Intelligent Platform Management Interface

The Shelf uses an Intelligent Platform Management Bus (IPMB) for management communications among all ATCA Boards. The reliability of the IPMB 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 between the ATCA slots.

2.2.5 Base Interface

Node/Node configuration

11596-088/ -106/ -107 with Backplane 23005-384:

All 16 Base Channels of slot 1 are routed to the respective Base Channels of slot 2.

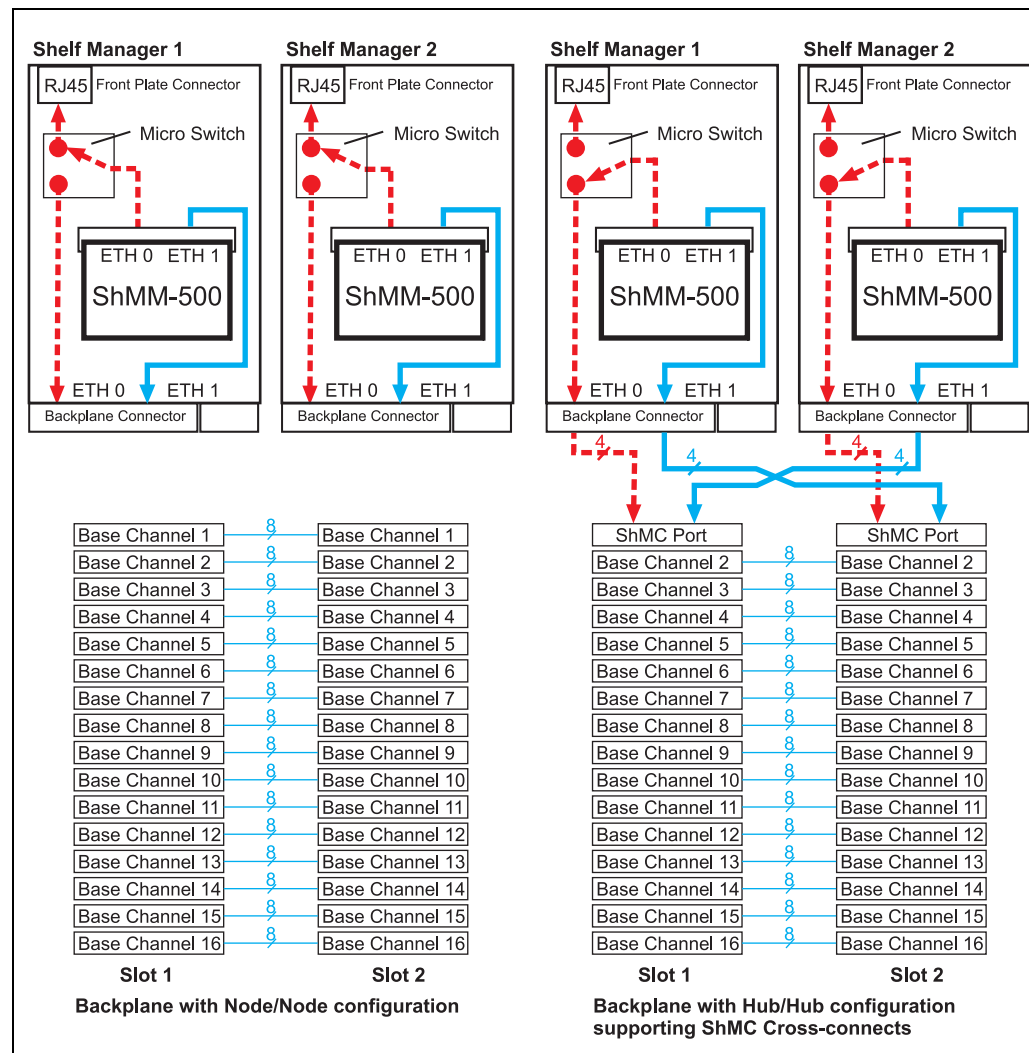
Hub/Hub configuration

11596-090 with Backplane 23005-374:

All Base Channels 2 - 16 of slot 1 are routed to the respective Base Channels of slot 2.

Base Channel 1 (ShMC) of slot 1 and 2 is cross connected to both dedicated Shelf Manager slots.

Figure 2: Base Channel routing



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2.3 Shelf FRU SEEPROM

2 Shelf FRU SEEPROMs are located on the Backplane. The hardware address for these SEEPROMs is 0xA4.

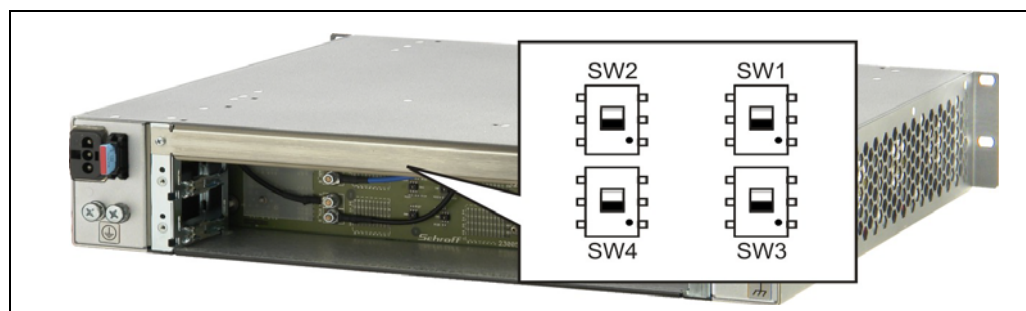


Access to the Shelf SEEPROMs with the FRU Data only with the Schroff ACB-V Shelf Manager

2.4 DIP-Switches on Backplane

There are 4 DIP-Switches located at the backplane backside. These switches are for future extensions and can not be used at the moment. Modification of the default settings will cause malfunction.

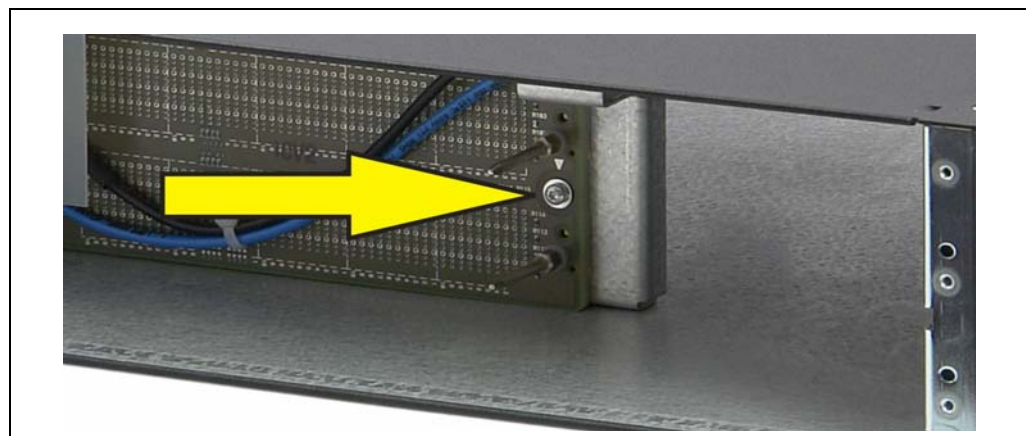
Figure 3: Dip-Switches default position



12710857

2.5 Logic Ground

Figure 4: Logic Ground



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The ATCA backplane provides a mechanism to connect Logic Ground and Shelf Ground. The backplane fixing screw (arrow) is isolated by a plastic washer. To connect Logic Ground and Shelf Ground remove the screw, remove the plastic washer and re-install the screw.



The default factory assembly isolates Logic Ground from Shelf Ground.

3 Air Filter

Figure 5: Air Filter



12708824

- | | | | |
|---|------------|---|----------------|
| 1 | Air Filter | 2 | Filter Element |
|---|------------|---|----------------|

3.1 Introduction

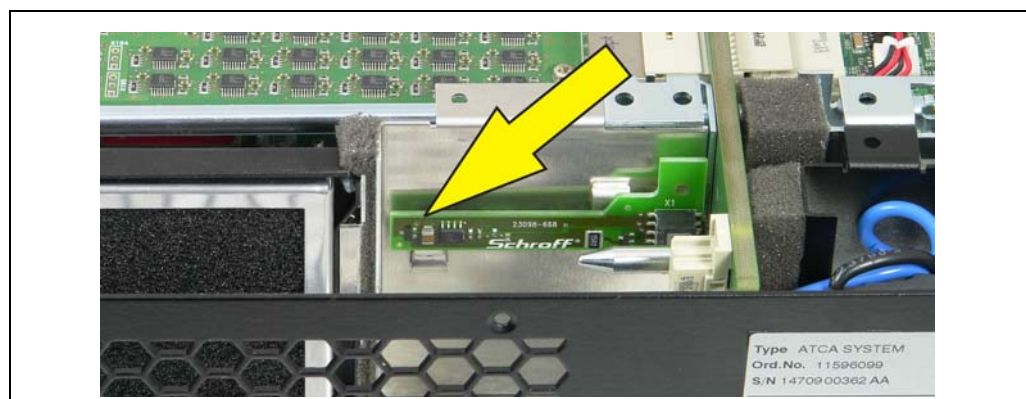
The ATCA Shelf provides a front replaceable air filter. The filter element is an open cell polyurethane foam special coating to provide improved fire retardation and fungi resistance.

The filter meets the requirements of the Telcordia Technologies Generic Requirements GR-78-CORE specification.

3.2 Air Filter Presence Switch

The air filter presence is detected by a hall-effect sensor switch located on a plug-in module close to the air filter frame. The presence signal is routed to both Shelf Manager slots.

Figure 6: Air Filter



12710851

4 Shelf Ground Connection



Hazardous voltage!

Before powering-up the Shelf, make sure that the Shelf Ground terminals are connected to Protective Earth (PE) of the building.

The ATCA Shelf provides a Shelf ground terminal at the left rear side. The Shelf ground terminal provides two threads (M6) with a 15.88 mm spacing between thread centers to connect a double-lug Shelf ground terminal cable.

Figure 7: Shelf Ground Terminal



12710856



Please note, that in a typical telecom environment, the VRTN path of the -48 V supply is grounded to Protective Earth (PE) of the building.

4.1 Specification for the Shelf Ground connection cable

Required wire size: AWG10

Required terminals: Use only double lug terminals.

5 Shelf Alarm Panel (optional)

Some I/O functions of the Schroff ACB-V Shelf Manager have been moved to a separate board called Shelf Alarm Panel (SAP). The Shelf Alarm Panel is a FRU and provides:

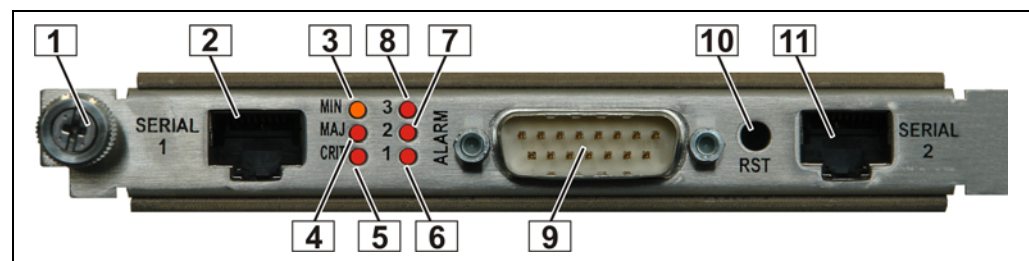
- 3 Telco Alarm LEDs (MINOR, MAJOR, CRITICAL)
- 3 User definable LEDs
- The Telco Alarm connector (DB15-male)
- The Alarm Silence Push Button
- Serial console interfaces for Schroff Shelf Managers (RJ45 connectors)
- Temperature sensor (LM75)
- SEEPROM for FRU information

The SAP is connected to the Schroff ACB-V Shelf Manager by a I²C connection, the signals from the serial connectors are routed directly to serial console interface on the Shelf Manager.

For detailed information see the SAP User Manual. order-no: 63972-230

5.1 SAP Front Panel

Figure 8: Front Panel SAP



12708813

- | | | | |
|---|--------------------------------------|----|--------------------------------------|
| 1 | Fixing screw | 7 | LED USER 2 |
| 2 | Serial Interface for Shelf Manager 1 | 8 | LED USER 3 |
| 3 | LED Minor Alarm (red) | 9 | Telco Alarm Connector |
| 4 | LED Major Alarm (red) | 10 | Alarm Silence button |
| 5 | LED Critical Alarm (amber) | 11 | Serial Interface for Shelf Manager 2 |
| 6 | LED USER 1 | | |

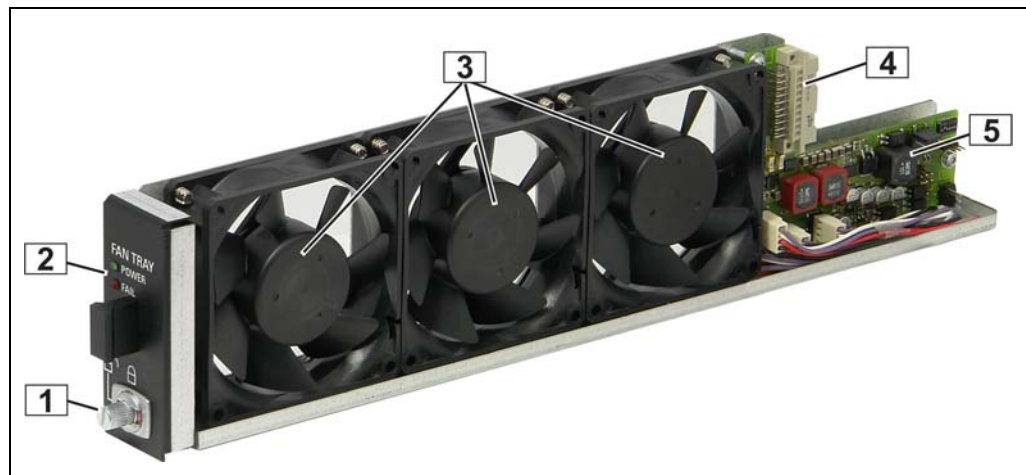
6 Fan Trays

The 2 Slot ATCA Shelf contains two interchangeable Fan Trays arranged in a side to side configuration for maximum air flow. The Fan Trays are plugged-in at the left and right front of the Shelf.

The Fan Tray is locked into the Shelf by a mini compression latch with indicator.

Each Fan Tray contains three 80 mm fans (125 m³/h (74 CFM) each). The fans are controlled as a group by a Fan Control Module (FCM).

Figure 9: Fan Tray



12708865

- | | |
|---|-----------------------|
| 1 Mini compression latch with indicator | 4 Backplane connector |
| 2 Status LEDs | 5 Fan Control Module |
| 3 Fans | |

6.1 Fan Control Module

The Fan Control Module (FCM) is located on the Fan Tray and has 2 operation modes:

1. Shelf Manager Mode

The tachometer signals from the Fan Trays are routed through the Backplane to the Shelf Manager slots. The active Shelf Manager monitor these signals and controls the speed via a PCM signal. Via an I2C-bus the Shelf Manager can access an LM75 temperature sensor and FRU-Data EEPROM on the Fan Control Module and can control the red (Fail) LED.

Note: As soon as a Shelf Manager is plugged-in and becomes active, the FCM switches automatically into the Shelf Manager mode. The Fan Trays can only be controlled by Schroff ACB IV/V Shelf Managers by proprietary signals. The control via the I2C-bus is not possible.

2. Autonomous Mode

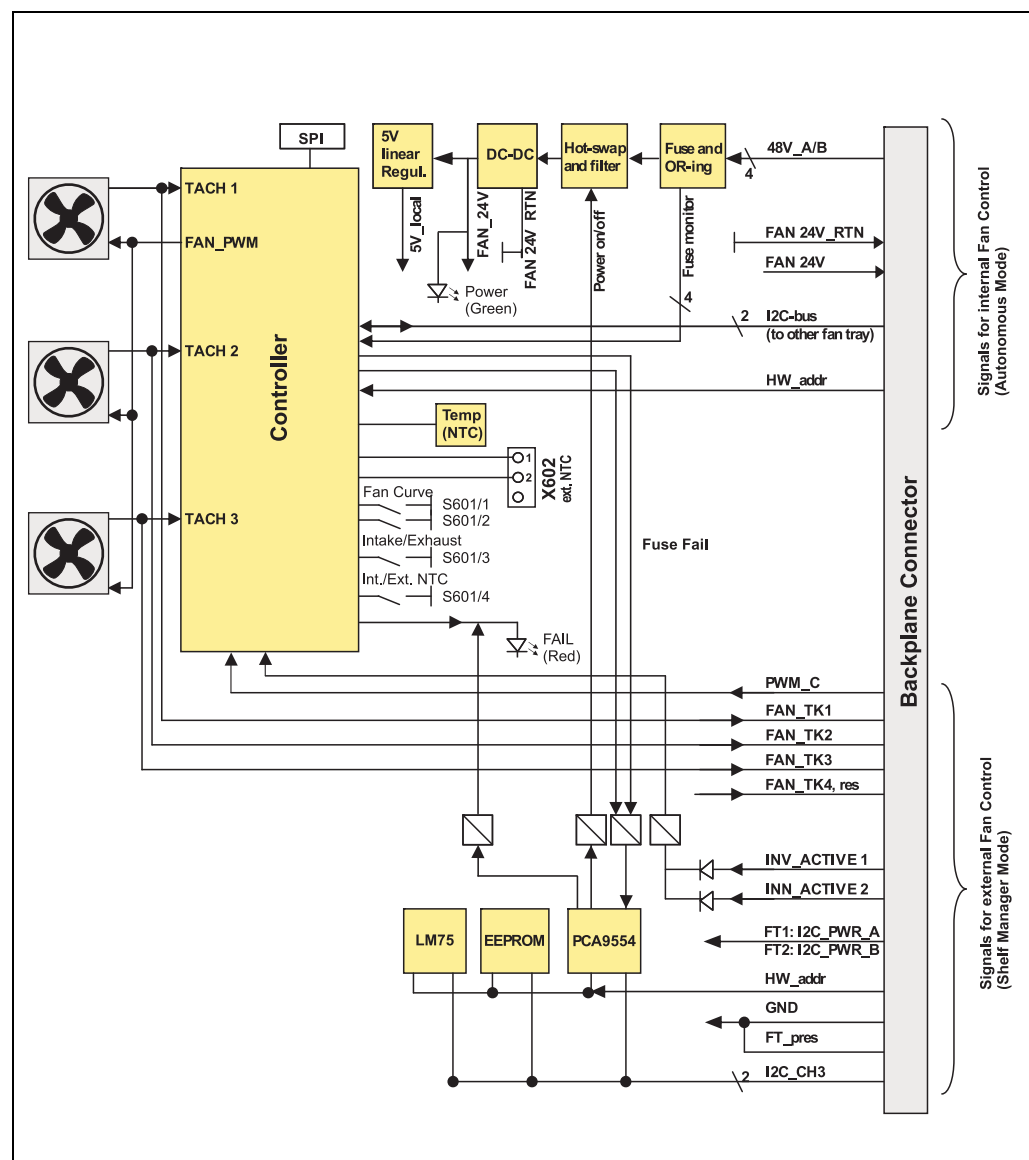
When no Shelf Manager is present, the Fans are controlled by the FCMs in a Master-Slave configuration, whereas the right Fan Tray is the master. The fan speed depends on the temperature of an NTC sensor located on the Fan

Control Module. With a Micro DIP switch you can select either the intake air temperature from the right Fan Tray or the exhaust temperature from the left Fan Tray as reference for the fan speed.
The Fan Control Module also provides a connector (X602) for an external NTC sensor.
By default the temperature of the NTC sensor on the right Fan Tray (Intake) is used to determine the fan speed.

4 different fan curves are user-selectable by a micro DIP-switch on the Fan Control Module.

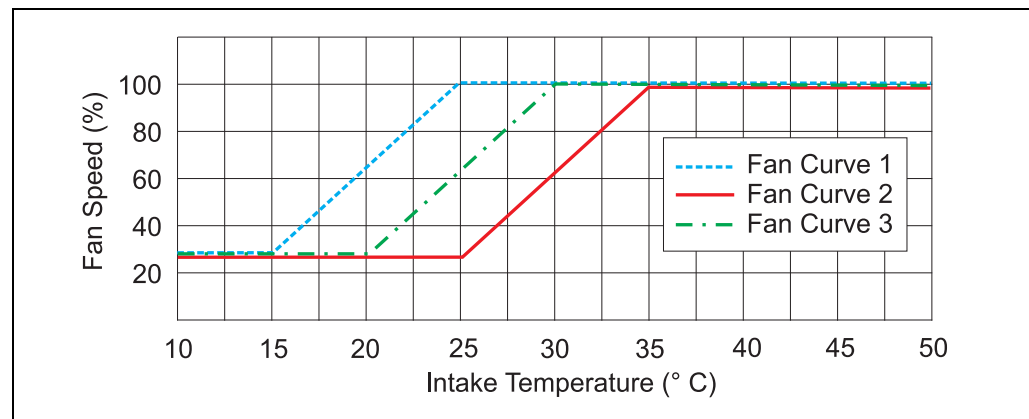
The speed of all fans is varied by a common PWM signal generated on the Fan Control Module.

Figure 10: Fan Control Module Block Diagram



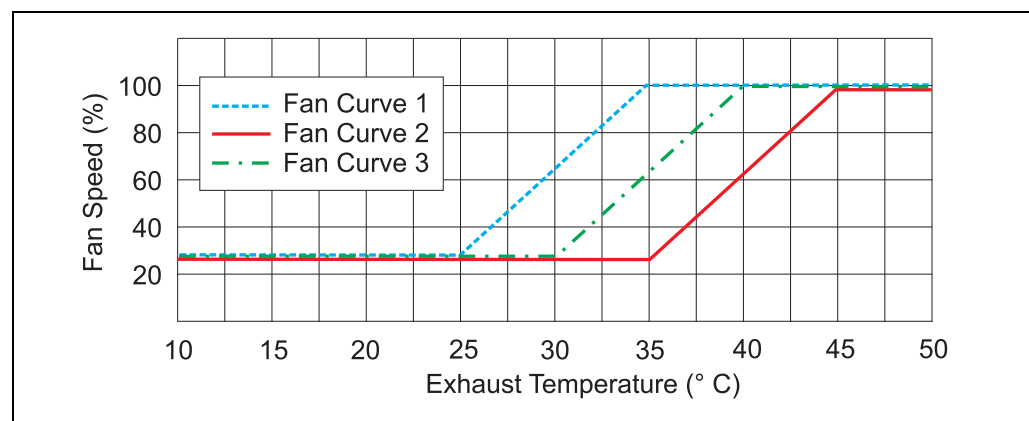
12709800

Figure 11: Fan curves, temperature measured at intake NTC



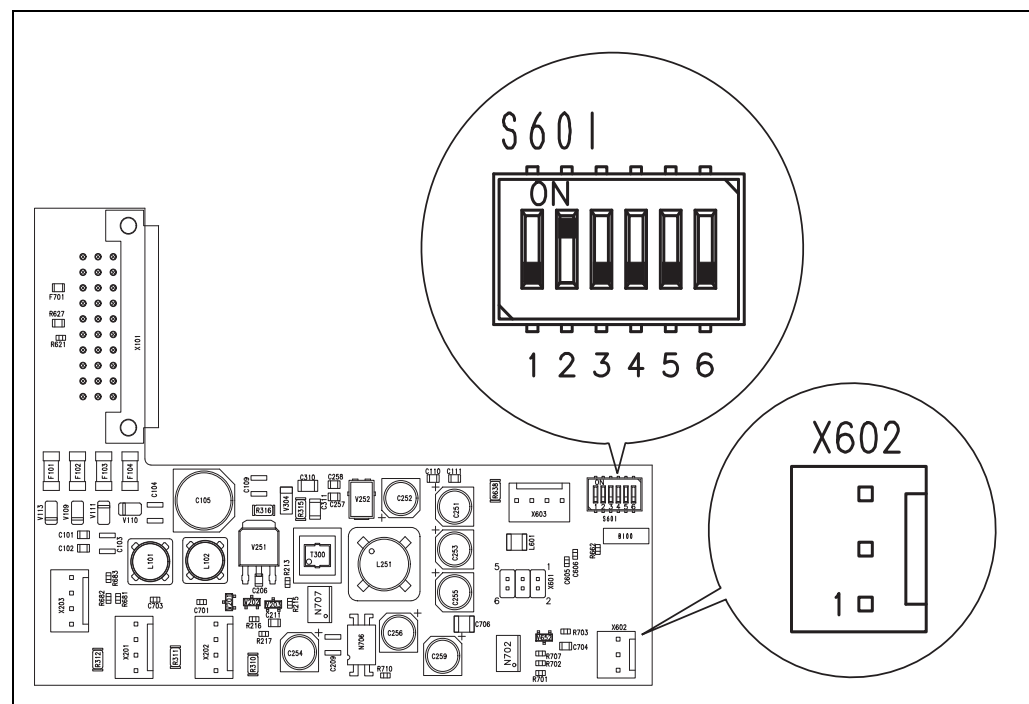
12709801

Figure 12: Fan curves, temperature measured at exhaust NTC



12709802

Figure 13: Micro DIP switch and connector X602 on PCB



12709803

Table 3: Micro DIP switch settings

Switch	Default Setting	Preset	On	Off
1	Off	Fan Curve Bit 0	1	0
2	On	Fan Curve Bit 1	1	0
3	Off	Intake/Exhaust	Temperature is measured on Exhaust Fan tray	Temperature is measured on Intake Fan tray
4	Off	external NTC	external NTC used	internal NTC used
5	Off	-	-	-
6	Off	-	-	-

Table 4: Fan Curves

Fan Curve	Switch 1	Switch 2	
0	0	0	The fan speed is always maximum, regardless of NTC setting or temperature reading.
1	1	0	Min. fan level at 15 °C, max. fan level at 25 °C intake temperature Min. fan level at 25 °C, max. fan level at 35 °C exhaust temperature, temperature range depending on setting of switch 3
2	0	1	Min. fan level at 25 °C, max. fan level at 35 °C intake temperature Min. fan level at 35 °C, max. fan level at 45 °C exhaust temperature, temperature range depending on setting of switch 3
3	1	1	Min. fan level at 20 °C, max. fan level at 30 °C intake temperature Min. fan level at 30 °C, max. fan level at 40 °C exhaust temperature, temperature range depending on setting of switch 3

7 Power Entry

	Hazardous voltage! <i>Before working ensure that the power is removed from the power connection cables.</i>
	Warning! <i>Although there are fuses in the power entry circuit of the Shelf, the power lines have to be protected on rack level with 15 A breakers.</i>



The Shelf can be powered using a regular telecommunication power supply of -48 VDC / -60 VDC with a voltage return. The specified voltage range is from -40.5 VDC to -72 VDC.

7.1 Introduction

The Power Input is located at the left rear side of the Shelf. The Power Input provides a Power Input Module with EMC filter and a connector for a MOLEX HCS-125 plug. The power feed consists of a -48 VDC cable and its corresponding return cable and is protected by a 15 A fuse.

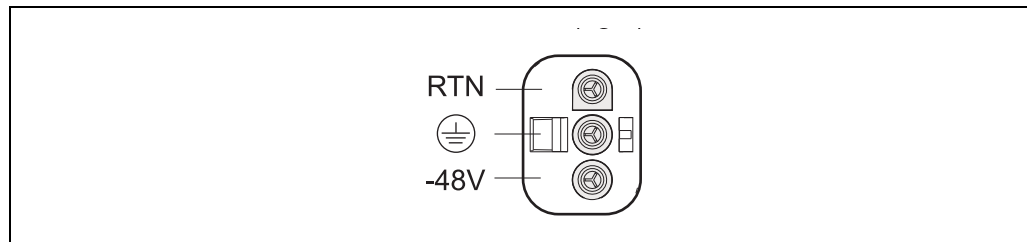
Figure 14: Power Input



- 1 Ground Terminal
- 2 Power Input Module

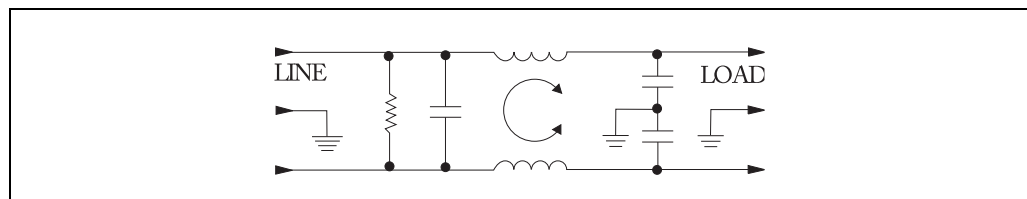
- 3 Fuse 80 V / 15 A

Figure 15: Power Input Pinout



12708806

Figure 16: Power Input Module Block Diagram



12708805

7.2 Specification for the power connection cables

Required Connector:

MOLEX HCS-125

Required wire size:

Diameter 4 mm² resp. AWG11

max. length 2.5 to 3.0 m

suitable for 15 A at 50 °C ambient temperature.

7.3 AC Power Supply (Accessory)

An AC power supply is available as an accessory.

The Schroff 21596-370 is an AC power supply with wide range AC input and 48 VDC output. The power supply can be mounted backside of the Shelves. At the 11596-088 you must remove the rear panel, at the 11596-090/ -106/ -107 Shelves the PSU occupies the upper RTM slot. The lower RTM slot can still be used.

The power input is provided by an AC mains/line module with IEC 320-C14 connector and integrated mains/line filter. The power output is via a cable with MOLEX HCS-125 connector.

Figure 17: Ac Power Supply



12709804

SPECIFICATIONS	
Input Voltage Range	90-264 V _{AC} , 47 Hz - 63 Hz
Input Current (maximum)	7.0 A @ 90 V _{AC} , 5.8 A @ 180 V _{AC}
Inrush Current	20 A max. peak (per ETS 300 132-1)
Input Fuse	1 fuse 10 A in line
Power Factor and Harmonics	0.99 typical complies with EN61000-3-2 Class A
Efficiency	90% typical
Output Power	Constant Power: 850 W (230 V _{AC} input), 500 W (110 V _{AC} input)
Output Current	15.7 A @ 54 V (230 V _{AC} input); 9.3 A @54 V (110 V _{AC} input)
Output Voltage Range	-42 V _{DC} to -58 V _{DC}
Voltage Regulation	± 0.5% load effect; ± 0.1% line effect
Output Ripple and Noise	20 kHz bandwidth per ETS300132-2, CCITT 0.41, Wide band noise: max. 2 mVrms psophometric; 10 mVrms non-weighted
Transient Response	Overshoot 1 V max. Recovery time: 4 ms max. @ 50% load step and di/dt<0,5 A/μs
Start-up Time	1.5 s typical (max. 2.5 s)
Hold-up Time	10 ms at full load
Current Limit Protection	20.3 A
Short Circuit Current	25 A max.
Over Voltage Protection	-59.5 V _{DC} Latching
Over Temperature Protection	Non latching; protection active when internal temperature is too high
Operating Temperature	-20 °C to +70 °C / (-4 °F to +158 °F). Power derating above 55 °C/131 °F 2% per °C ; starts operation at -40 °C / (-40 °F)
EMI	Class B (FCC and CISPR compliant) - EN55022 level B, CE marked, Telecordia GR-63-CORE
LED Indicators	DC OK: green; AC OK: green; TEMP OK: green;
Cooling	Fan cooled right to left; variable speed
Weight	approx. 1.9 kg

8 Shelf Managers

This Chapter describes the Shelf Manager hardware. For explicit software documentation see:

- Pigeon Point Shelf Manager User Guide
- Pigeon Point Shelf Manager External Interface Reference
- Schroff Shelf Manager User's Manual, Order-no. 63972-243

The documentation is available for registered users at www.schroff.biz



*Shelf Manager with bused IPMB: 21596-291 (Product Number)
21596-300 (Catalog Number with packaging)*

The Shelf Managers are not included with the Shelf

8.1 Introduction

The Schroff Shelf Manager ACB-V is a 78 mm x 280 mm board that fits into a dedicated Shelf Manager slot in a Schroff ATCA Shelf.

The Shelf Manager has two main responsibilities:

- 1 Manage/track the FRU population and common infrastructure of a Shelf, especially the power, cooling and interconnect resources and their usage.
- 2 Enable the overall System Manager to join in that management/tracking through the System Manager Interface, which is typically implemented over Ethernet.

The Shelf management based on the Pigeon Point Shelf management solution for AdvancedTCA products.

The Shelf management software executes on the Pigeon Point **Shelf Management Mezzanine 500 (ShMM-500)**, a compact SO-DIMM form-factor module, installed on the ACB-V carrier board.

The ACB-V carrier board includes several on-board devices that enable different aspects of Shelf management based on the ShMM-500. These facilities include I²C-based hardware monitoring/control and GPIO expander devices.

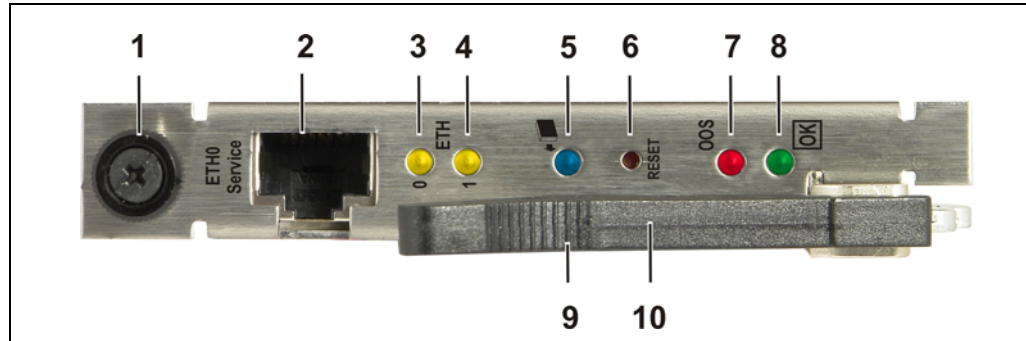
The ACB-V provides the Fan Controller for up to 9 Fans and individual Ethernet connections to both Base Hubs (ShMC cross connect).

The Shelf Manager also provides an IPMB interface for the non-intelligent FRUs in a Schroff Shelf. The Shelf Manager communicate with the non-intelligent FRUs over I²C busses and expose the sensors for these FRUs at IPMB address 0x20.

To maximize availability, the Schroff ATCA Shelves are designed to work with two redundant Schroff ShMM-ACB-V Shelf Managers.

8.2 Front Panel Components

Figure 18: Shelf Manager Front Panel Components



12708844

1 Fixing screw	6 RESET push button
2 ETH 0 Ethernet Service Connector (RJ45)	7 Shelf Manager Status LED (red) - Red = Out of Service (OOS)
3 ETH 0 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	8 Shelf Manager Status LED (green) - Solid Green = in Service, active Shelf Manager - Blinking = in Service, Backup Shelf Manager
4 ETH 1 Link/Activity LED (yellow) - On = Link - Off = No Link - Blinking = Activity	9 Hot Swap Switch - Activated by extraction handle
5 Hot Swap LED (blue) - Solid Blue = ready to remove - Blinking = Hot Swap is requested - Off = No Hot Swap possible	10 Extraction handle

8.3 Master-Only I²C Bus

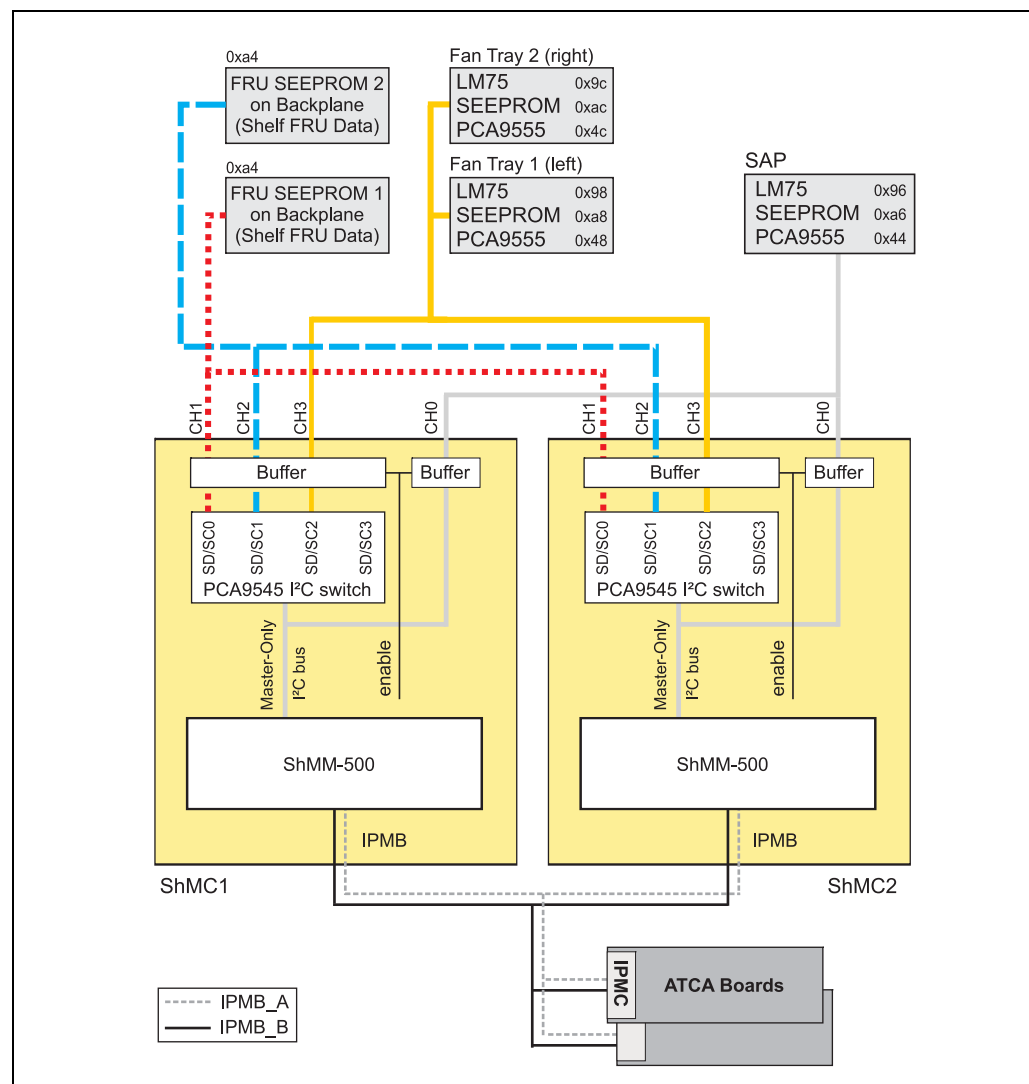
The master-only I²C bus is used internally on the ShMM-500 for the RTC and SEEPROM devices. The Shelf Manager also has a number of onboard I²C devices connected to the master-only I²C bus. These devices read the slot's hardware address, communicate with the System Management controllers ADM1024/1026 and monitor the presence signals from the Fan Trays.

The master-only I²C bus is fed to a 4-channel switch and then routed to:

- the Shelf FRU SEEPROMs (Channel 1 and 2)
- the Fan Trays (Channel 3)

The master only I²C-bus is also buffered by a LTC4300 device and then routed to the SAP. The 'Active' signal of the ShMM-500 is used to enable the LTC4300 buffers, so that only the active Shelf Manager has access to the Shelf I²C-bus devices.

Figure 19: Master-Only I²C-bus



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8.4 I²C Addresses

Table 5: I²C-bus addresses of the Shelf

I ² C addr.	Shelf Manager		FRU			
	ShMM-500	ACB-IV	CH 0 (SAP)	CH 1	CH 2	CH 3 (FT/ Tmp)
0x44 / 22			PCA9555 Telco Alarms			
0x46 / 23		PCA9554 HW-Addr				
0x48 / 24						PCA9554 Fan Tray 1 (left)
0x4c / 26						PCA9554 Fan Tray 2 (right)
0x58 / 2C		ADM1024				
0x5c / 2E		ADM1026				
0x94 / 4c						LM75 exhaust temp. left
0x96 / 4b			LM75 SAP temperature			
0x9c / 4e						LM75 intake temp. (right)
0xa0 / 50	SEEPROM					
0xa4 / 52				SEEPROM	SEEPROM	
0xa6 / 53			SEEPROM SAP			
0xa8 / 54						SEEPROM Fan Tray 1 (left)
0xac / 56						SEEPROM Fan Tray 2 (right)
0xe0 / 70		PCA9545 I ² C- bus switch				
0xd0 / 68	RTC DS1337					

8.5 Ethernet Channels

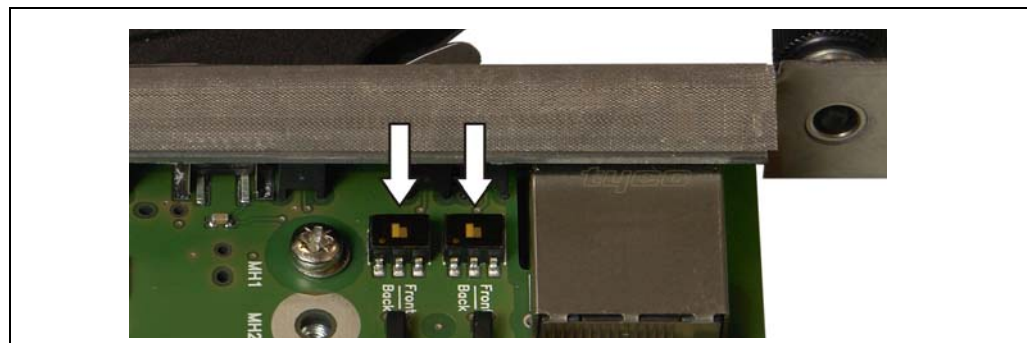
The Shelf Manager provides two 10/100 Ethernet interfaces. The first Ethernet channel (ETH0) is routed either to the RJ45 connector on the front panel or to the Backplane connector J2 (default setting). The routing depends on the settings of the rocker switches S101 and S102. The ATCA Backplane routes ETH0 from the connector J2 to the ShMC port on the corresponding Base Interface Hub board. The second Ethernet channel (ETH1) is routed to the other Base Interface Hub board (ShMC Cross Connect). Both Ethernet ports support 10 Mb (10BASE-T) and 100 Mb (100BASE-TX) connections.

The front panel ETH0 Ethernet connector is intended for service use only or for debugging purposes in laboratory environment. The computer which is connected to this interface must be located nearby the shelf manager with an Ethernet cable that is not longer than 10 m. The front panel Ethernet connector **MUST NOT** be connected to a Telecommunication Network Circuit that leaves the building.

The ETH0 interface of the shelf manager can manually be switched between the front panel RJ45 connector ("Front"-position of the rocker-switch) and the backplane connector going to the hub board base interface ("Back"-position of the rocker-switch).

The ATCA specification requires a base channel interface between the shelf manager and the Hub board. The ETH0 rocker-switch **MUST** be in "Back"-position in normal operation of the shelf manager in an ATCA-shelf.

Figure 20: Switches S101 and S102 shown in default position



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Shelves with a backplane in a Node/Node configuration do not support ShMC cross connects. Access to the Shelf Manager's Ethernet interface is possible only through the RJ45 front panel connector. ("Front" position of the rocker switch).

9 Thermals

9.1 System Airflow Path

The Schroff 2 U 2 slot ATCA Shelf provides airflow using two Fan Trays at each side of the Blade subrack. Each Fan Tray has 3 fans (125 m³/h (74 CFM) each) moving air from the right side to the left side of the Shelf in a push-pull arrangement. This arrangement provides excellent airflow as well as fault tolerance in the unlikely event of a fan failure.

10 Technical Data

Table 6: Technical Data

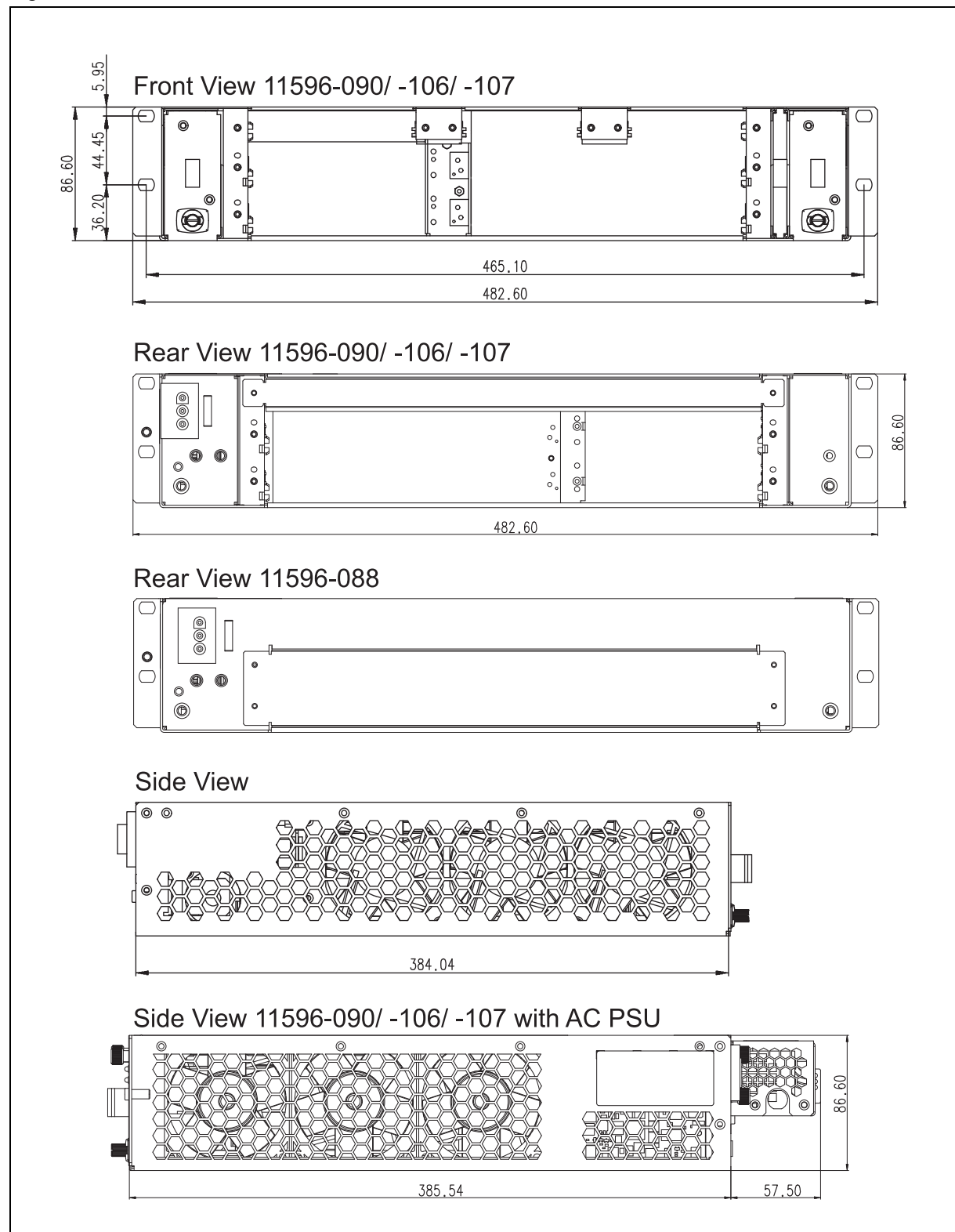
Physical Dimensions	
Height	2 U
Width	482.6 mm (19")
Depth (w/o handles)	385.54 mm
Weight	
Shipping weight completely assembled with packaging	10 Kg
Shelf weight completely assembled	8,8 Kg
Power	
Input voltage	-40 VDC -72 VDC
Input Power	14 A
Overcurrent Protection	15 A Fuse on Power Input
Cooling Capacity	
Front Boards	min. 200 W / Board
RTM	min. 15 W / Board
Environmental	
Ambient temperature	+5°C...+40°C (long term) -5°C...+55°C (short term)
Humidity	+5%...+85%, no condensation
EMI	
Conducted Emissions	EN 55022 Class A
Radiated Emissions	EN 55022 Class A
Safety	
Protected Earth Test	EN 60950-1, test current 25 A, resistance <100mOhm
Hipot Test	EN 60950-1, 1000 V

10.1 Accessories

Order No.	Description
21596-300	Schroff Shelf Manager ACB-V
21596-077	Shelf Alarm Panel (SAP)
21596-370	AC Power Supply
21596-514	Fan Tray (Spare Part)
21596-515	Air Filter Element

10.2 Shelf Mechanical Dimensions

Figure 21: Shelf Mechanical Dimensions



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