6U 6-slot AC/DC-powered ATCA Shelf

User‘s Manual

Product Numbers:

11990-202/-203/-204/-205

11990-222/-223/-224/-225

Doc-No: 63972-324_R1.5

March 2018

R1.5	March 2018	Rebranded

Impressum:

Schroff GmbH

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75334 Straubenhardt, Germany

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

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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!** *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 42 V_{AC} or 60 V_{DC} 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.*

- 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-VI, order-no.: 63972-331
- User Manual Shelf Alarm Panel, order-no.: 63972-230
- 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 11990-202/203/204/205 are 6 Slot AdvancedTCA 40G Shelves with enhanced per-slot power and cooling capability along with 40G backplane connectivity for fault tolerant/high availability applications. Different versions are available:

With replicated Full Mesh Backplane

- **11990-202:** Bussed IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **DC Power** Entry Module.
- **11990-204:** Bussed IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **AC Power** Entry Module.
- **11990-203:** Radial IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **DC Power** Entry Module.
- **11990-205:** Radial IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **AC Power** Entry Module.

With Dual Star Backplane supporting Dual/Dual Star Node Boards

- **11990-222:** Bussed IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **DC Power** Entry Module.
- **11990-224:** Bussed IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **AC Power** Entry Module.
- **11990-223:** Radial IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **DC Power** Entry Module.
- **11990-225:** Radial IPM interface, dedicated slots for two Schroff ACB-V Shelf Managers and one Shelf Alarm Panel (SAP), **AC Power** Entry Module.

Shelves with bussed IPM interface for on-blade shelf management are available on request.

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
CDM	Shelf FRU Data Module
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	Enclosure containing subrack, Backplane, boards, cooling devices, PEMs and Fan Trays
VRTN	Voltage Return

1.6 Hardware Platform

The Shelf is 6 U high and 19“ rack mountable. The chassis is designed for easy access of any Field Replaceable Units (FRU).

- Powder-coated 6 U / 19“ chassis with front card cage for ATCA boards and rear card cage for ATCA RTM boards
- 6 slot 40G ATCA Backplane with triple replicated Mesh Fabric Interface or Dual Star Backplane, Dual Star Base Interface radial or bussed IPM interface, supporting four 8 U node board slots and two 8 U hub slots
- Mounting brackets for 19“ racks and rear fixing points
- ESD Wrist Strap Terminals at the front and the rear
- Two dedicated Shelf Manager bays accepting Schroff Shelf Managers
- Push-Pull Fan Tray arrangement provides optimized cooling for ATCA blades with fault tolerant capability
- Two front pluggable, hot swappable Fan Trays
- Air inlet filter with presence monitoring
- Bay for front pluggable Shelf Alarm Panel (SAP):
  Provides Alarm Status LEDs, Telco Alarm interface and serial interfaces for the Shelf Managers
- Electrical power 450 W/slot
- Enhanced cooling capability with 450 W/slot
- Two rear pluggable AC- or DC-Power Entry Modules, the same interface in the subrack for AC PEM and DC PEM.
- 4 dedicated PSU bays accepting GE CP2000 2 kW or CP2725 2.7 kW front-pluggable AC Power Supplies with wide range input in a redundant 2+2 configuration

The torque of all FRU (Fan Tray, Air Filter, PEM, PEM cover) fixing screws is 0.7 Nm (6.2 in-lbs)

All pictures in this manual may differ from the latest series.

1.7 AC Shelf Front and Rear View

Figure 1: Shelf Front View

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1	PSU A1	6	PSU B1
2	PSU A2	7	PSU B2
3	Slot for Shelf Manager 1	8	ESD Wrist Strap Terminal
4	Slot for Shelf Alarm Panel (SAP)	9	Slot for Shelf Manager 2
5	Fan Tray 1	10	Fan Tray 2

Figure 2: Shelf Rear View

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1	PEM B	4	Rear fixing points
2	ESD Wrist Strap Terminal	5	PEM A
3	Ground Terminal		

1.8 DC Shelf Front and Rear View

Figure 3: Shelf Front View

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3	Slot for Shelf Manager 1	8	ESD Wrist Strap Terminal
4	Slot for Shelf Alarm Panel (SAP)	9	Slot for Shelf Manager 2
5	Fan Tray 1	10	Fan Tray 2

Figure 4: Shelf Rear View

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1	PEM B	4	Rear fixing points
2	ESD Wrist Strap Terminal	5	PEM A
3	Ground Terminal		

1.9 ESD Wrist Strap Terminals

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

One ESD Wrist Strap Terminal is located at the Shelf‘s upper front side, one ESD Wrist Strap Terminal is located at the left rear side of the Shelf.

2 ATCA Backplane

The 6-slot ATCA monolithic Backplane provides:

- Four ATCA Node slots
- Two ATCA Hub slots
- Two dedicated Shelf Manager slots
- Two PEM slots
- One Shelf Alarm Panel (SAP) slot
- Two Fan Tray slots

2.1 Logical to Physical Slot Mapping

The physical and logical slots are sequentially numbered from the lower to the upper side of the Shelf.

Table 2: 6-Slot ATCA Backplane physical to logical slot mapping

	Physical Slot	Logical Slot	HW-Address (Hex)	IPMB-Address (Hex)	Update Channel Routing
Node	6	6	46	8C	
Node	5	5	45	8A	
Node	4	4	44	88	
Node	3	3	43	86	
Hub Slot	2	2	42	84	
Hub Slot	1	1	41	82	

2.2 Base Interface

Logical slots 1 and 2 are the hub slots for the Dual Star Base Interface. Base Interface Channel 1 (ShMC) of logical slot 1 and 2 is cross connected to both dedicated Shelf Manager slots on the ATCA Backplane. See *Chapter 2.12, "Shelf Manager Cross Connect"* for details.

Table 3: Base Interface Interconnections

Connector	Base Ch.	Logical Slot					
		1	2	3	4	5	6
P23	1	ShMC	ShMC	1-3	1-4	1-5	1-6
P23	2	2-2	1-2	2-3	2-4	2-5	2-6
P23	3	3-1	3-2				
P23	4	4-1	4-2				
P23	5	5-1	5-2				
P23	6	6-1	6-2				

2.3 Replicated Mesh Fabric Interface

(System No. 11990-20x)

The Fabric Interface in the ATCA Backplane is routed as triple replicated Full Mesh with 3 Channels (24 differential pairs total), interconnecting each ATCA slot. See PICMG® 3.0 AdvancedTCA® Base Specification for details.

Table 4: 6 Slot Triple Replicated Mesh Fabric Interconnections

Connector	Fabric Channel	Logical Slot						
		1	2	3	4	5	6	
P20	15	6-11	6-12	6-13	6-14	6-15	5-15	Mesh 3
P20	14	5-11	5-12	5-13	5-14	4-14	4-15	
P20	13	4-11	4-12	4-13	3-13	3-14	3-15	
P21	12	3-11	3-12	2-12	2-13	2-14	2-15	
P21	11	2-11	1-11	1-12	1-13	1-14	1-15	
P21	10	6-6	6-7	6-8	6-9	6-10	5-10	Mesh 2
P21	9	5-6	5-7	5-8	5-9	4-9	4-10	
P21	8	4-6	4-7	4-8	3-8	3-9	3-10	
P22	7	3-6	3-7	2-7	2-8	2-9	2-10	
P22	6	2-6	1-6	1-7	1-8	1-9	1-10	
P22	5	6-1	6-2	6-3	6-4	6-5	5-5	Mesh 1
P22	4	5-1	5-2	5-3	5-4	4-4	4-5	
P22	3	4-1	4-2	4-3	3-3	3-4	3-5	
P23	2	3-1	3-2	2-2	2-3	2-4	2-5	Dual Star
P23	1	2-1	1-1	1-2	1-3	1-4	1-5	

A dual star is a subset of a replicated mesh. This chassis can be used in a dual star configuration without changes.

2.4 Dual Star Fabric Interface with Dual Dual Star Node Board Support (System No. 11990-22x)

The Fabric Interface of the ATCA Backplane is routed in a Dual Star configuration and supports Dual/Dual Star Node blades with Fabric Channels 1,2,3,4.

In a two-hub configuration with four Dual/Dual Star Node blades the backplane provides four Fabric connections to each node blade.

In a one-hub configuration with five Dual/Dual Star Node blades the backplane provides two Fabric connections to each node blade.

The Fabric channel 3 connection between slot 1 and slot 2 is to support the one-hub configuration with a Dual/Dual Star Node blade in slot 2.

Table 5: 6 Slot Dual Dual star Fabric Interconnections

Connector	Fabric Channel	Logical Slot						
		1	2	3	4	5	6	
P20	15	6-11	6-12	6-13	6-14	6-15	5-15	Mesh 3
P20	14	5-11	5-12	5-13	5-14	4-14	4-15	
P20	13	4-11	4-12	4-13	3-13	3-14	3-15	
P21	12	3-11	3-12	2-12	2-13	2-14	2-15	Dual Star 3
P21	11	2-11	1-11	1-12	1-13	1-14	1-15	
P21	10	4-6	4-7	6-8	6-9	6-10	5-10	Mesh 2
P21	9	3-6	3-7	5-8	5-9	4-9	4-10	
P21	8	2-6	1-6	4-8	3-8	3-9	3-10	
P22	7	3-3	3-4	6-5	6-6	6-7	5-7	Mesh 1
P22	6	4-1	4-2	5-5	5-6	4-6	4-7	
P22	5	6-1	6-2	4-5	3-5	3-6	3-7	
P22	4	5-1	5-2	2-7	2-8	2-9	2-10	Dual Star 2
P22	3	2-3	1-3	1-7	1-8	1-9	1-10	
P23	2	3-1	3-2	2-2	2-6	2-4	2-5	Dual Star 1
P23	1	2-1	1-1	1-2	1-6	1-4	1-5	

2.5 Synchronization Clocks

6 differential pairs of synchronization clocks are bused between all 6 ATCA slots and terminated at both ends with 80.6 Ohms between each differential pair.

2.6 Update Channel Interface

The Update Channels are wired between two redundant ATCA Backplane slots as 10 differential pairs with 100 Ohms impedance. (See *Table 2*)

The Update Channel is intended to pass information between two redundant ATCA Blades.

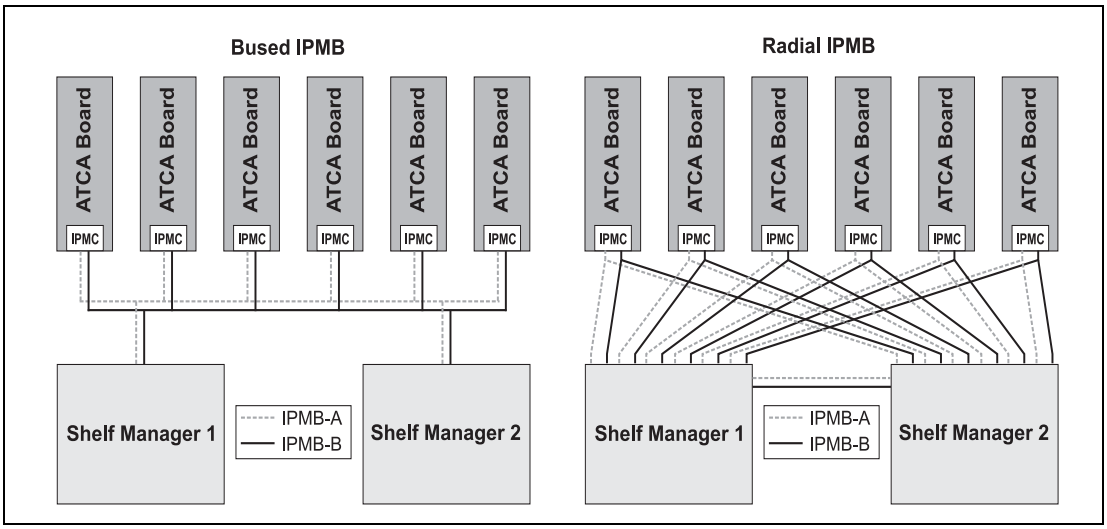
2.7 Intelligent Platform Management Bus (IPMB)

The Shelf uses an Intelligent Platform Management Bus (IPMB) for management communications among all ATCA Boards, the Fan Trays and the Shelf Managers. 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.

IPMB-A and IPMB-B are routed to the ATCA slots in:

- a bussed configuration
  (Product Number: 11990-202/204/222/224)
- a radial configuration
  (Product Number: 11990-203/205/223/225)

Figure 5: IPMB



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2.8 Shelf Manager Backplane Connectors

The front accessible Shelf Manager slots accept Schroff ACB-VI Shelf Managers. The Backplane Connectors are wired to:

- IPMB-A and IPMB-B (I^2C) to the Fan Trays and the ATCA blades
- Base Interface cross connections to the Hub Slots
- Presence connections to the SAP, Fan Trays and PEMs
- RS-232 connections to SAP
- Dedicated I2C to Shelf SEEPROMs

The Shelf Manager Backplane Connectors also have interconnected signals that allow the Shelf Managers to run in a redundant configuration.

2.9 Fan Tray Connectors

For pin assignment see *Chapter 6.3, "Fan Tray Connectors and Indicators"*.

2.10 SAP Connector

For pin assignment see *Chapter 5.11, "Shelf Alarm Panel Backplane Connector"*.

2.11 Shelf SEEPROM

The Shelf SEEPROM is a repository of the shelf specific information, capabilities of the system and other user configurable options.

The SEEPROM contains as example:

- a list of which slots are connected together
- how the update channels are routed
- how many slots are in the system
- what the maximum power is to each slot
- the serial number of the Shelf
- the backplane topology etc.

The Shelf Managers use this information to provide functions such as electronic keying, controlling the power state of the system, etc.
The Shelf Managers cache the information that is stored in the SEEPROMs so that the SEEPROM is only needed when the Shelf Managers are first inserted or when the Shelf is first turned on.
The redundant SEEPROMs ensure that if one is corrupt or non-functional, the second can provide the necessary information. The Shelf Manager selects what set of information is correct and then synchronizes the two SEEPROMs from the internally cached copy of the SEEPROM information.

2.11.1 Shelf SEEPROM Location

The SEEPROMs are located at the rear side of the backplane.

2.11.2 Shelf SEEPROMs I²C addresses

The SEEPROMs have the same address but are on different I²C-Channels!

CDM	I²C-Channel	I²C-bus address (7/8 bit)
SEEPROM1	Channel 1	0xa4/52
SEEPROM2	Channel 2	0xa4/52

2.12 Shelf Manager Cross Connect

The ATCA Backplane provides cross connect traces between the Base Hubs and the Shelf Managers.

Figure 6: Shelf Manager Cross Connect

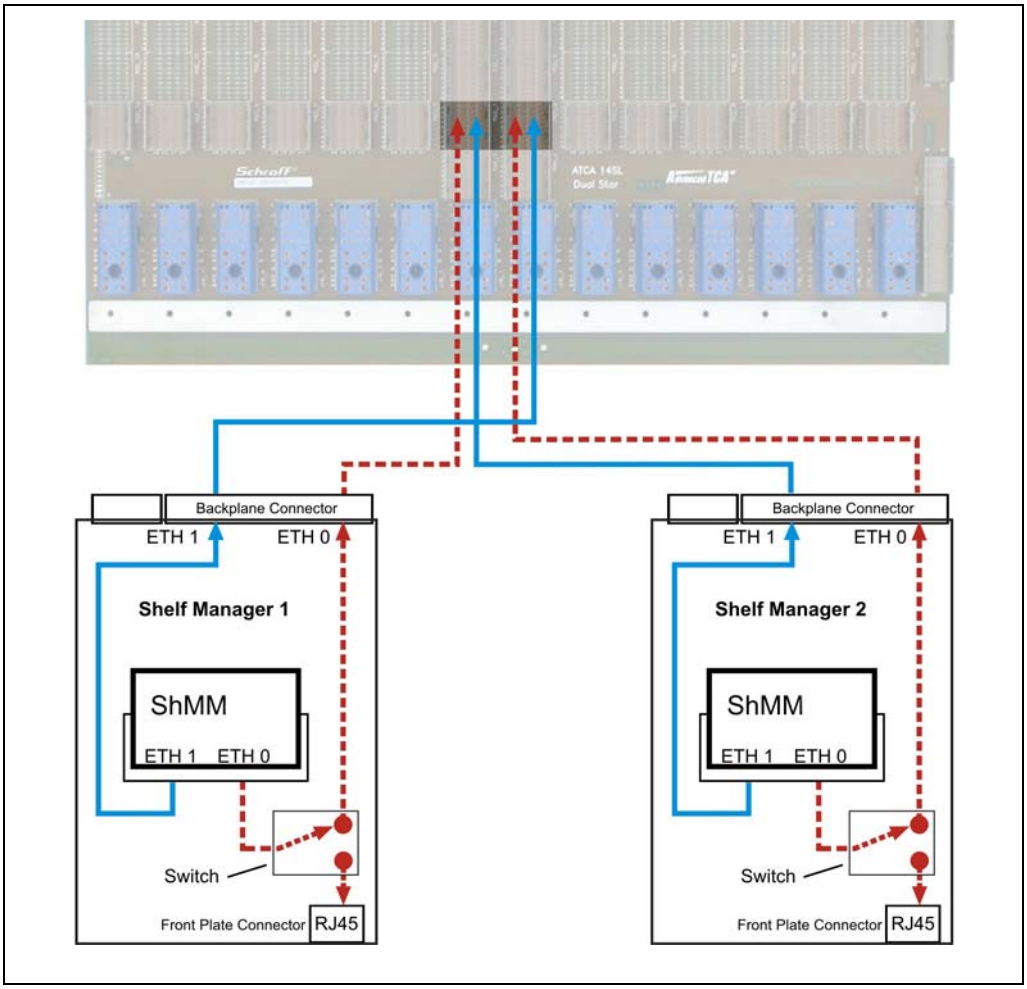
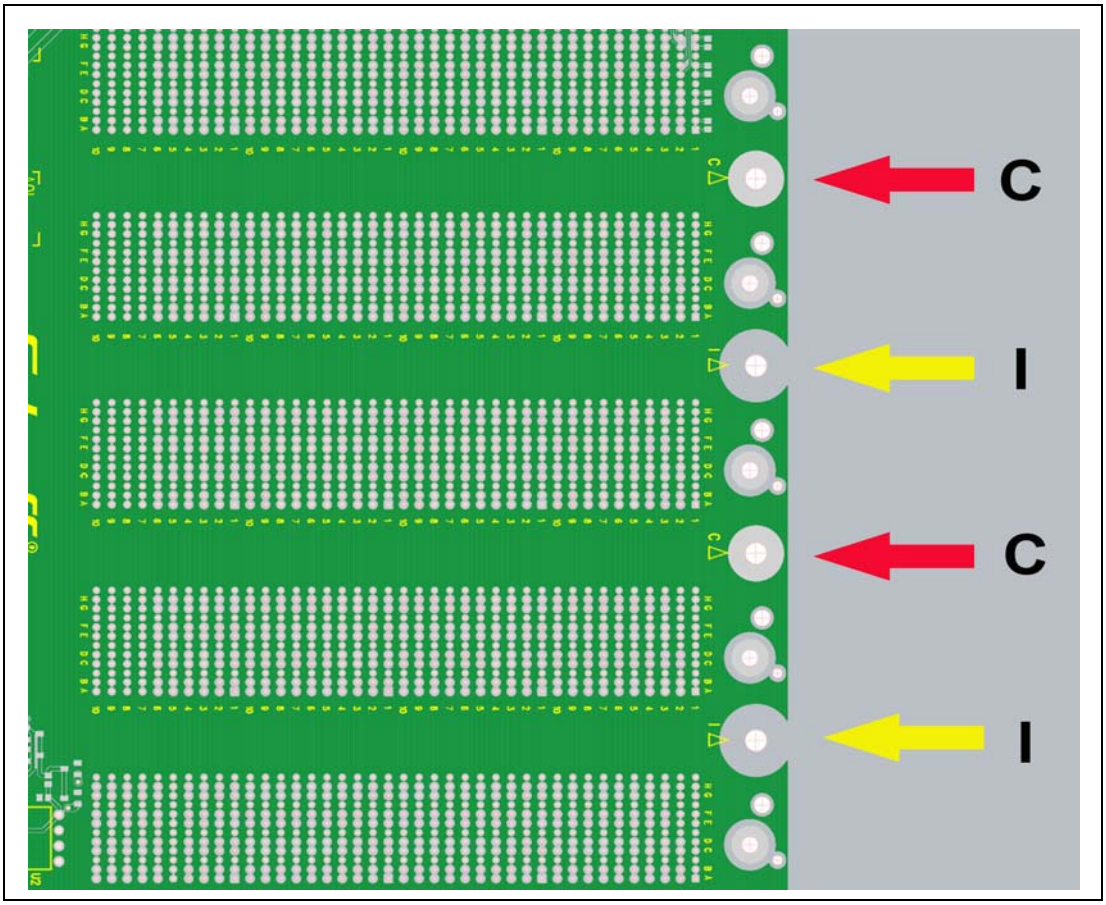


Table 6: Connector (P23) pin assignments for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

2.13 Logic Ground

Figure 7: Logic Ground



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The ATCA Backplane provides a mechanism to connect Logic Ground and Shelf Ground. Connect Logic Ground and Shelf Ground by swapping the mounting screws from positions (I) to (C).

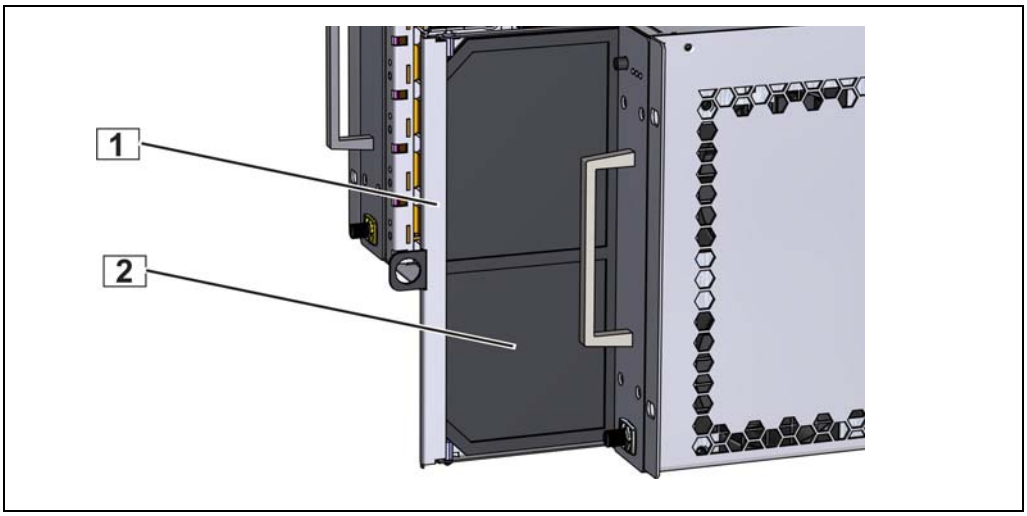
- Screws at position (I): Logic Ground and Shelf Ground isolated
- Screws at position (C): Logic Ground and Shelf Ground connected

By default, Logic Ground and Shelf Ground is isolated.

Torque for the screws: 0.7 Nm +10%

3 Air Filter

Figure 8: Air Filter



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1 Air Filter Tray *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

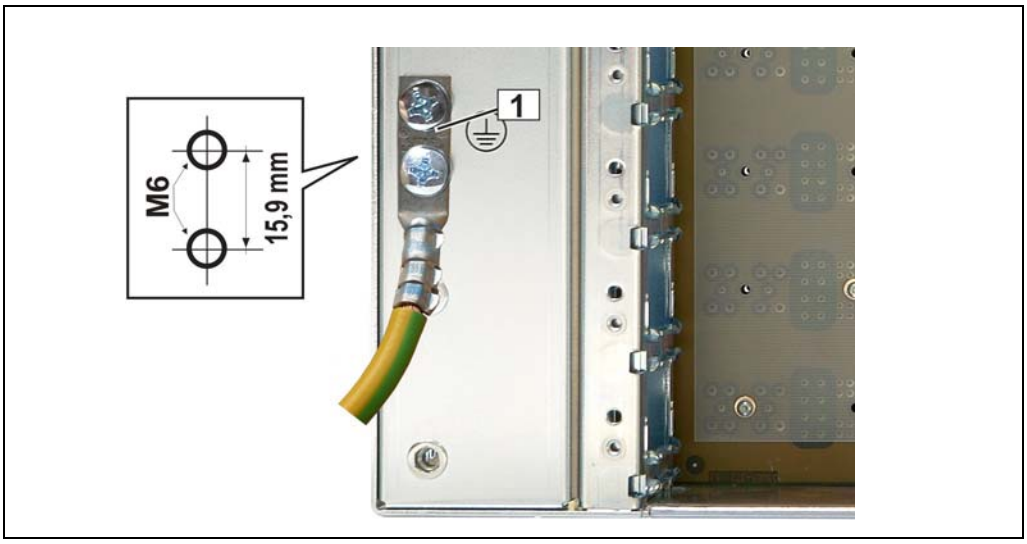
The air filter presence is detected by a sensor on the backplane. The signal is routed to the Shelf Managers.

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 (5/8“) spacing between thread centers to connect a two hole lug Shelf ground terminal cable.

Figure 9: Shelf Ground Terminal



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1 Ground Terminal

4.1 Specification for the Shelf Ground connection cable

Required wire size: #3 AWG or #2 AWG, maximum length 3 m.

Required terminals: Use only two hole lug terminals. (For example PANDUIT LCC2-14AHQ or LCD2-14AHQ with 45° angle)

5 Shelf Alarm Panel

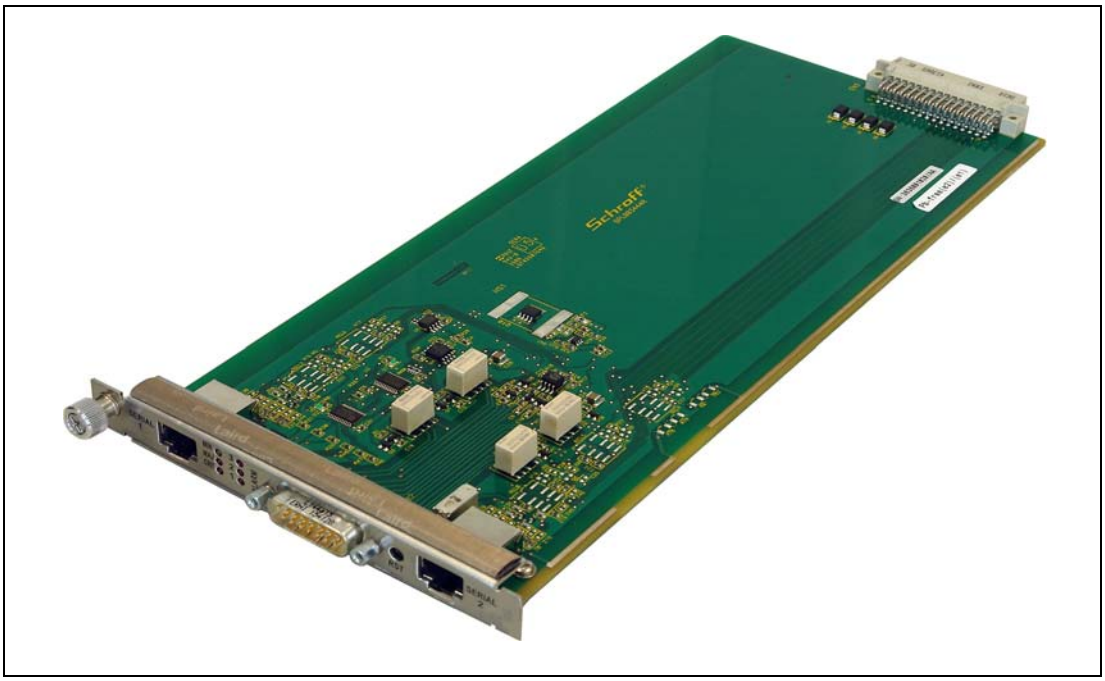
5.1 Introduction

Some I/O functions of the Schroff 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 Shelf Manager by an I²C connection, the signals from the serial connectors are routed directly to serial console interface on the Shelf Manager.

Figure 10: SAP



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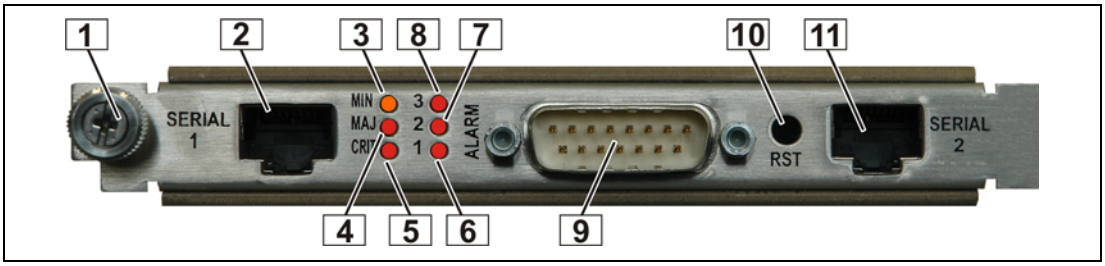
5.2 SAP Front Panel

Figure 11: Front Panel SAP



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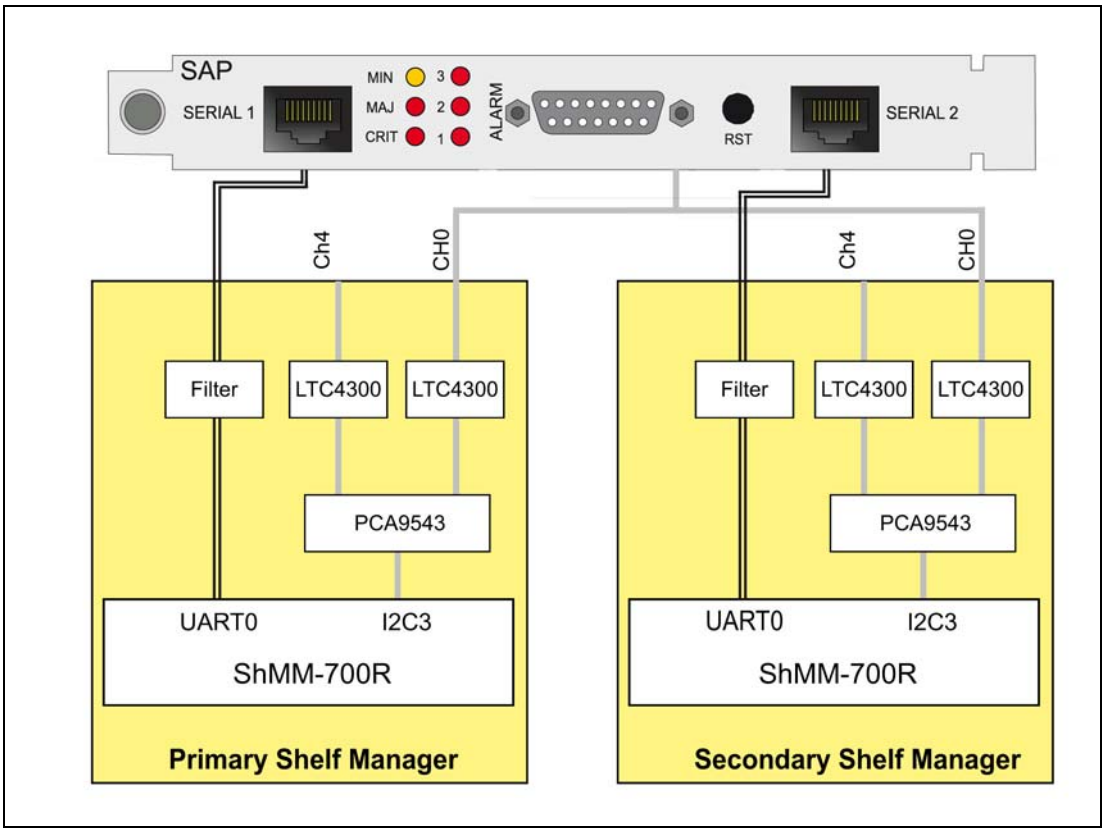
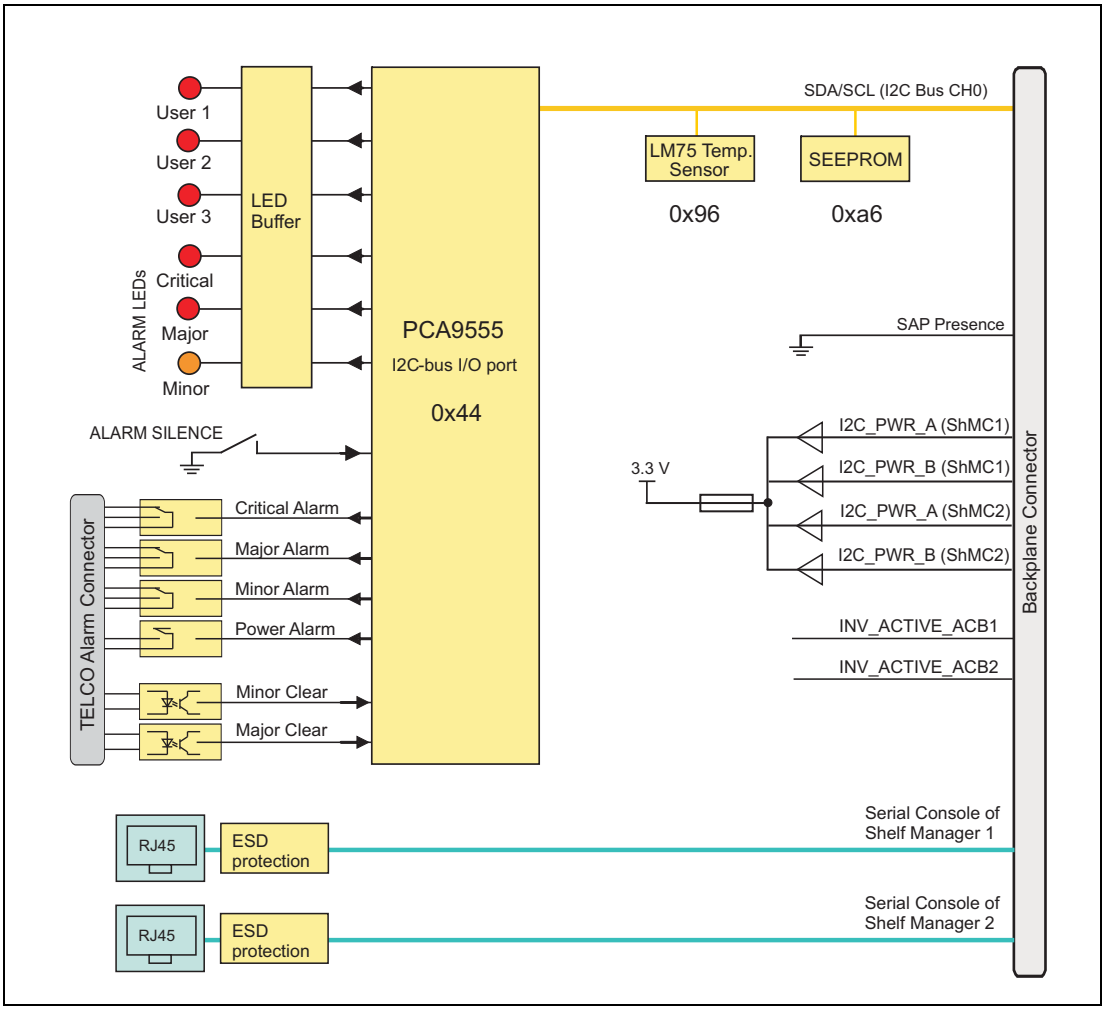
1	*Fixing screw*	*7*	*LED USER 2*
2	*Serial Interface for Shelf Manager 1*	*8*	*LED USER 3*
3	*LED Minor Alarm (amber)*	*9*	*Telco Alarm Connector*
4	*LED Major Alarm (red)*	*10*	*Alarm Silence button*
5	*LED Critical Alarm (red)*	*11*	*Serial Interface for Shelf Manager 2*
6	*LED USER 1*		

Figure 12: Connection between Shelf Manager and SAP



5.3 SAP Block Diagram

Figure 13: SAP Block Diagram



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5.4 SAP SEEPROM

The SAP SEEPROM is connected to the Master-Only I²C-bus and is a Microchip 24LC256 device.

5.5 SAP Temperature Sensor

The LM75 temperature sensor measuring the board temperature is located on the SAP PCB. The temperature sensor is connected to the Master-Only I²C-bus.

5.6 SAP PCA9555

The PCA9555 device:

- controls the status of the LEDs
- reads the status of the Telco Alarm Cutoff push button (CLEAR)
- controls the Telco Alarm relays

Table 7: SAP PCA9555 Device Function

PCA9555 I/O pins	Function	State
0.0	Power Alarm to telco relays output	1 = relays powered
0.1	Minor Alarm to telco relays output	1 = relays powered
0.2	Major Alarm to telco relays output	1 = relays powered
0.3	Critical Alarm to telco relays output	1 = relays powered
0.4	N/C	Pulled High
0.5	LED_MIN (Minor alarm LED) output	1 = On
0.6	LED_MAJ (Major alarm LED) output	1 = On
0.7	LED_CRIT (Critical alarm LED) output	1 = On
1.0	Alarm cutoff push button input	0 = push button pushed
1.1	Minor Clear input	0 = voltage applied to input pins
1.2	Major Clear input	0 = voltage applied to input pins
1.3	N/C	Pulled High
1.4	N/C	Pulled High
1.5	LED_USER3 output	1 = On
1.6	LED_USER2 output	1 = On
1.7	LED_USER1 output	1 = On

5.7 SAP I²C Addresses

Table 8: SAP I²C Addresses

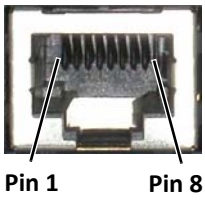
LM75	SEEPROM	PCA9555
0x96/0x4b	0xa6/0x53	0x44/0x22

5.8 User definable LEDs

The LEDs USER (1, 2, 3) are user definable and connected to the I²C-bus I/O port of the PCA 9555 on the SAP.

5.9 RS-232 Serial Console Interfaces on SAP

Figure 14: RS-232 Serial Console Interface on Shelf Alarm Display



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The SAP provides two RS-232 serial console connector (SERIAL 1 and 2) for Shelf Manager 1 and 2. The connectors are 8-pin RJ45 modular receptacles.

A full set of RS-232 signals, including modem control, is provided. The serial interface is implemented on the Schroff Shelf Manager.

The serial console default configuration is:

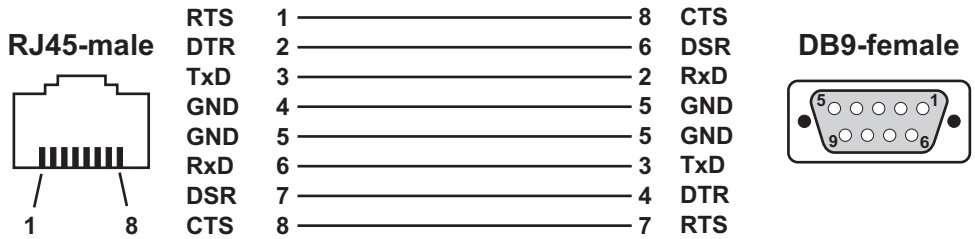
- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

Table 9: RS-232 Serial Console Interface Pin assignment

RJ45 Pin	RS-232 Signal	ShMM-500 Signal	Type	Description
1	RTS	RTS	Out	Request To Send
2	DTR	DTR	Out	Data Terminal Ready
3	TxD	TXD0	Out	Transmit Data
4	GND	GND	---	Logic Ground
5	GND	GND	---	Logic Ground
6	RxD	RXD0	In	Receive Data
7	DSR	DSR	In	Data Set Ready
8	CTS	CTS	In	Clear To Send

5.10 SAP Console Cable for the Shelf Manger Serial Interface

Figure 15: RJ45 to DB9 Serial Console Cable



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The connectors are shown with the cables pointing away.

Serial Console Cable sold separately,Schroff Catalog-No: 23204-187

5.11 Shelf Alarm Panel Backplane Connector

Figure 16: Shelf Alarm Panel Backplane Connector

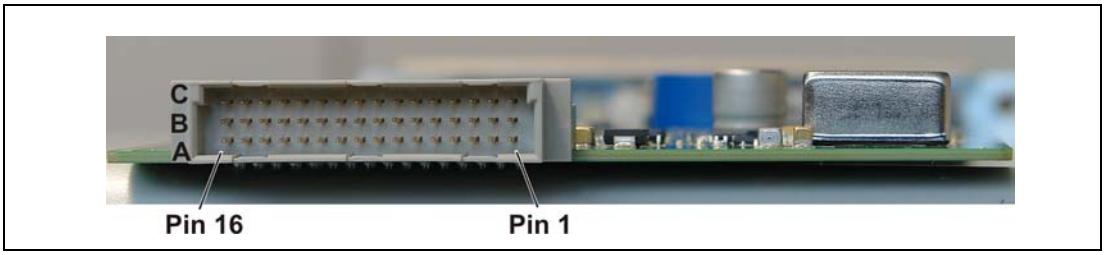

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Table 10: Shelf Alarm Panel Backplane Connector Pin Assignment

	SAP ATCA Backplane Connector					
Pin	**A**	**Description**	**B**	**Description**	**C**	**Description**
1	-48V_A	-48 V Feed A	-48V_B	-48 V Feed B		
2					VRTN_A	Voltage return Feed A
3					VRTN_B	Voltage return Feed B
4						
5			I2C_PWR_A (1)	3.6 V from Shelf Manager 1	I2C_PWR_B (1)	3.6 V from Shelf Manager 1
6	GND	Ground	GND	Ground	I2C_PWR_A (2)	3.6 V from Shelf Manager 2
7	SDA_CH0	Data I²C-bus Channel 0	GND	Ground	I2C_PWR_B (2)	3.6 V from Shelf Manager 2
8	SCL_CH0	Clock I²C-bus Channel 0	INT		GND	
9	INV_ACTIVE_ACB2	Active signal from Shelf Manager 2	RXD0_ACB1	Receive Data Shelf Manager 1	RXD0_ACB2	Receive Data Shelf Manager 2
10	DSR_ACB1	Data Set Ready Shelf Manager 1	DTR_ACB1	Data Terminal Ready Shelf Manager 1	DSR_ACB2	Data Set Ready Shelf Manager 2
11	CD_ACB2	Carrier Detect Shelf Manager 2	DTR_ACB2	Data Terminal Ready Shelf Manager 2	CD_ACB1	Carrier Detect Shelf Manager 1
12	CTS_ACB1	Clear To Send Shelf Manager 1	CTS_ACB2	Clear To Send Shelf Manager 2	RTS_ACB1	Request To Send Shelf Manager 1
13	TXD0_ACB2	Transmit Data Shelf Manager 2	TXD0_ACB1	Transmit Data Shelf Manager 1		
14			RTS_ACB2	Request To Send Shelf Manager 2		
15	SAP_PRES	SAP Presence signal to Shelf Manager				
16	INV_ACTIVE_ACB1	Active signal from Shelf Manager 1			SHELF_GND	Shelf Ground

5.12 SAP Telco Alarms

5.12.1 Telco Alarm Interface

The SAP provides a Telco Alarm interface on the DB15-male connector.
Three relay outputs are used for remote alarm distribution, reflecting the state of the three Alarm LEDs. The relays are capable of carrying 72 VDC or 1 A with a max. rating of 30 VA.

5.12.2 Telco Alarm LEDs

The Shelf Alarm Panel provides the Telco Alarm LEDs. These LEDs indicate presence of Critical, Major and Minor alarms as follows:

Table 11: Telco Alarm LEDs

State	Description
Off	No alarm active
On	Alarm active
Flashing	Alarm active, but silenced

5.12.3 Alarm Silence Push Button

The Alarm Silence push button on the Shelf Alarm Panel faceplate deactivates the alarm relays. During the time Alarm Silence is activated, the Alarm LEDs flash. By pressing the Alarm Silence push button a second time, the alarm relays are reactivated and the Alarm LEDs are solid.

*The **Alarm Silence** push button only activates the Alarm Silence state, but does not reset the alarms. If the silence interval (default 600 s) is exceeded without resolving the alarms, the alarms will be re-initiated.*

5.12.4 Alarm Reset

Hardware Reset:

Two relay inputs at the DB15 connector are used to reset the Minor and Major alarm state.

The reset inputs accept timed pulse inputs for clearing Minor and Major alarm states. Reset is accomplished by asserting a voltage differential from 3.3 VDC to 72 VDC for between 200 ms and 300 ms. The acceptance voltage range is from 0 to 48 VDC continuous (handles up to 60 VDC at a 50% duty cycle). The current drawn by a reset input does not exceed 12 mA.

There is no hardware reset (reset input) for the Critical Alarm state.

Software Reset:

The RMCP and CLI functions can be used to set and reset the Telco Alarms (incl. Critical Alarm). See the Pigeon Point Shelf Manager External Interface Reference for more information.

5.12.5 Telco Alarm Connector (DB15-male)

Figure 17: Telco Alarm Connector (DB15-male)

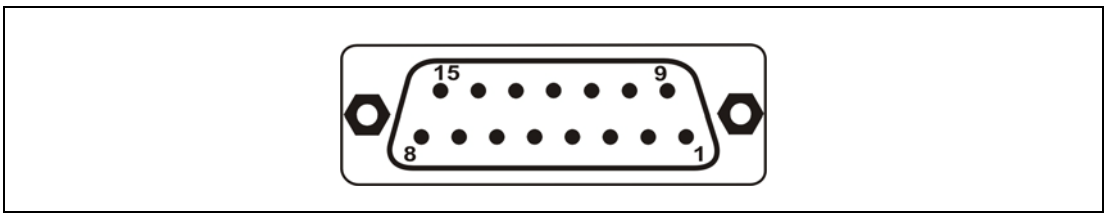

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Table 12: Telco Alarm Connector Pin Assignment

Pin	Name	Description
1	AMIR+	MinorReset+
2	AMIR-	MinorReset-
3	AMAR+	MajorReset+
4	AMAR-	MajorReset-
5	ACNO	CriticalAlarm - NO
6	ACNC	CriticalAlarm - NC
7	ACCOM	CriticalAlarm - COM
8	AMINO	MinorAlarm – NO
9	AMINC	MinorAlarm – NC
10	AMINCOM	MinorAlarm – COM
11	AMANO	MajorAlarm – NO
12	AMANC	MajorAlarm – NC
13	AMACOM	MajorAlarm – COM
14	APRCO	PwrAlarm – NO
15	APRCOM	PwrAlarm - COM
Shield	Shelf-GND	Shelf Ground

6 Fan Trays

6.1 Introduction

The Fan Trays are intelligent FRUs controlled by the ShMCs via IPMB.

The ATCA Shelf contains two interchangeable Fan Trays arranged in a pushpull configuration for maximum air flow. Two hot-swappable Fan Trays are arranged in a side to side configuration for maximum air flow.

Each Fan Tray contains six high speed / high air flow fans controlled as a group by the IPM Controller in the Fan Tray.

The Fan Tray is locked into the Shelf with two captive screws. A hot-swap push button is used to provide hot-swap functionality.

Each Fan Tray provides:

- A blue Hot Swap LED
- A red Fan Tray Alarm LED
- A green Fan Tray OK LED
- A Hot Swap push button

The Fan Tray is controlled via an on-board IPM controller. The Shelf Manager performs management of the Fan Tray through the two independent bussed IPMB connections.

With optional on-blade shelf management, the I^2C components of the PEMs and the SEEPROM of the CDMs are connected to the internal I^2C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

When the Fan Tray is first inserted into the system, the fans start at full speed and then decrease to 25% of full speed. The circuitry on-board the Fan Tray uses a PWM signal to control the speed of all the fans. Lower speeds reduce acoustic noise and power consumption and increase the lifetime of the fans.

The speed of each individual fan is monitored. If any of the fan speeds drops below the desired fan speed, a System Event Log (SEL) entry is logged by the Shelf Manager. The Shelf Manager then generates alerts and sets alarm conditions as necessary.

The system is designed to run indefinitely with any single fan failure. When one fan fails, all other fans are set to full speed.

6.2 Fan Tray Block Diagram

Figure 18: Fan Tray Block Diagram

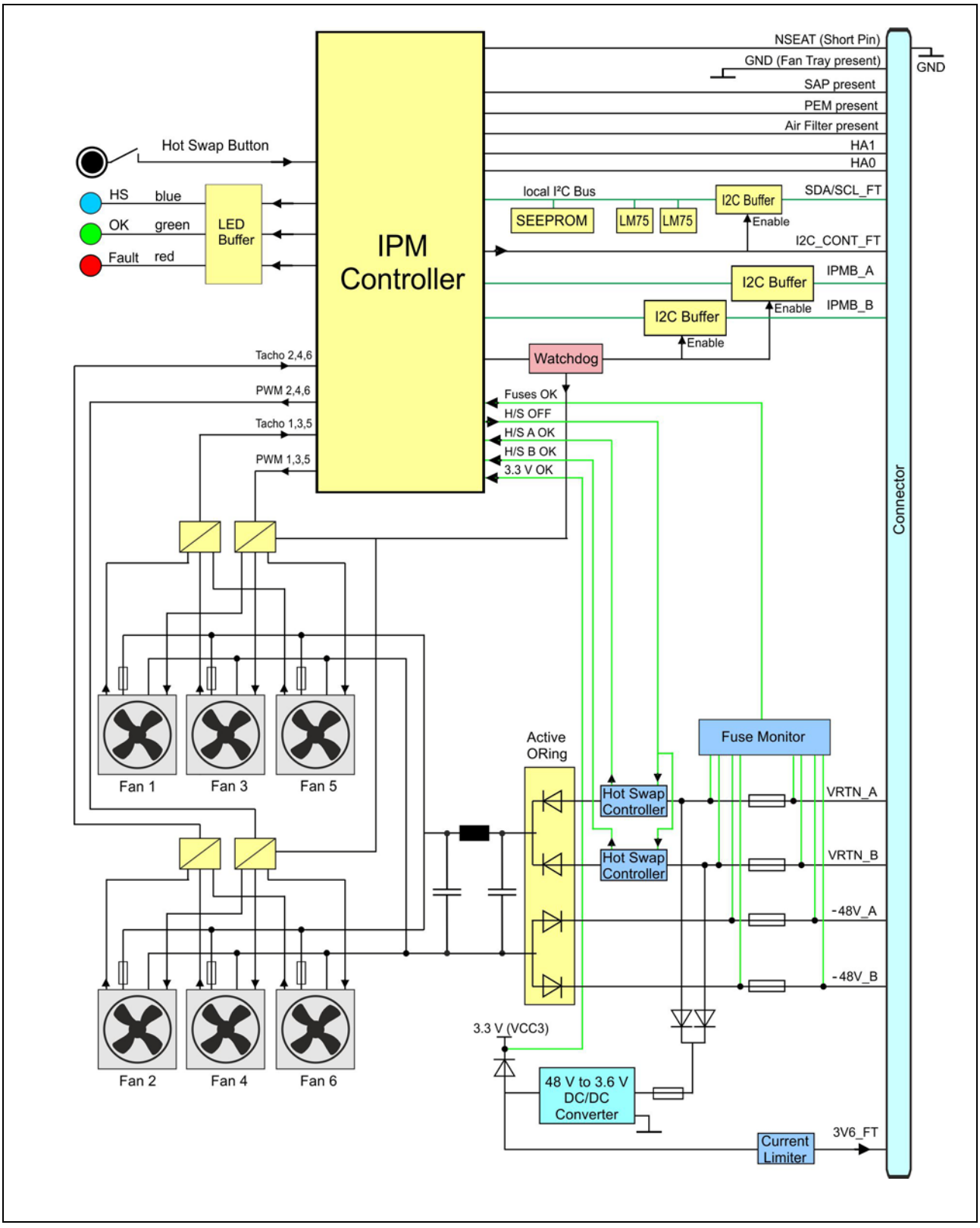

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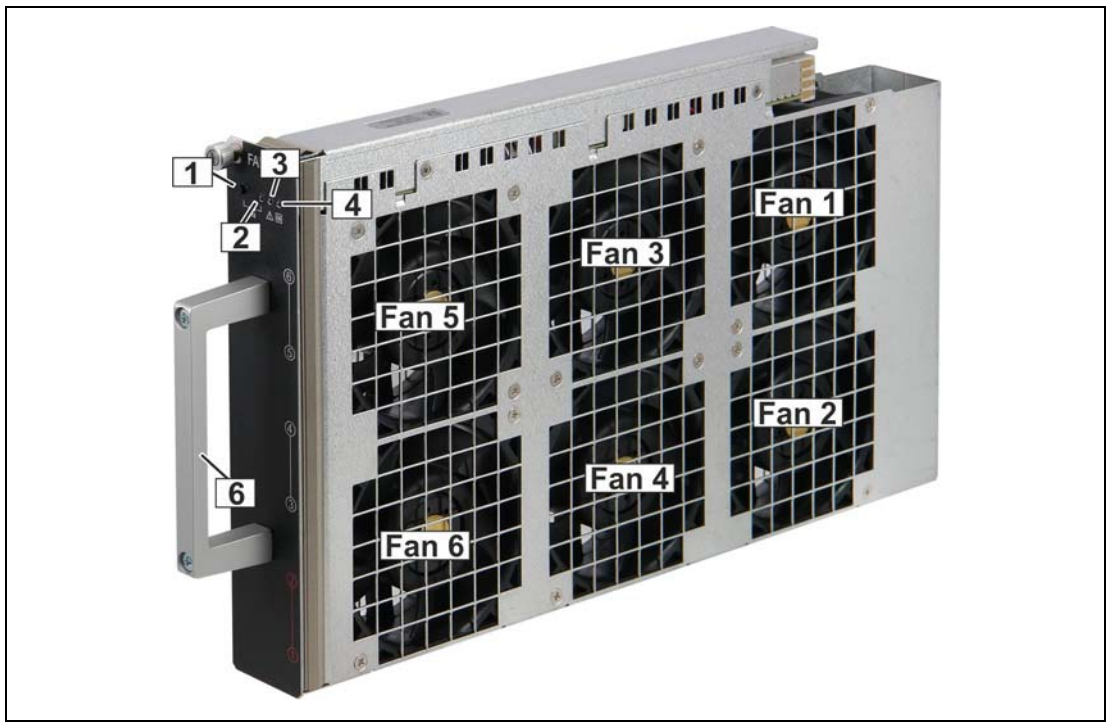
Figure 19: Fan Tray



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1	Hot Swap Push Button	4	Fan Tray OK LED (green)
2	Hot Swap LED (blue)	6	Handle
3	Fan Tray Fault LED (red)		

6.3 Fan Tray Connectors and Indicators

The front panel includes a green and red status LED and a blue hot-swap LED.

The Hot-Swap push button indicates to the Shelf Managers that the Fan Tray is about to be removed. Its use is optional, but it is provided so that service personnel can be trained to look for a blue LED to be illuminated on any active component before removing it from the system. Once the operator pushes the Hot-Swap button, the Shelf Manager is informed of the pending extraction. When the Shelf Manager feels it is “safe“ to remove the Fan Tray, the blue Hot-Swap LED illuminates solid.

Table 13: LEDs on Fan Tray front panel

Color	Description	Status	Condition
Green	OK LED	Off	No Power to the Fan Tray
		Solid green	Normal Operation
Red		Solid red	Attention Status (error condition)
Blue	Hot Swap LED	Off	No Power to the Fan Tray or not OK to extract Fan Tray
		Short blink	Preparing for extraction
		Solid blue	Ready to remove

6.4 Front Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification.

Front board pressure drop: 37 Pa at 0,85 m³/min

Figure 20: Front Board Air Distribution

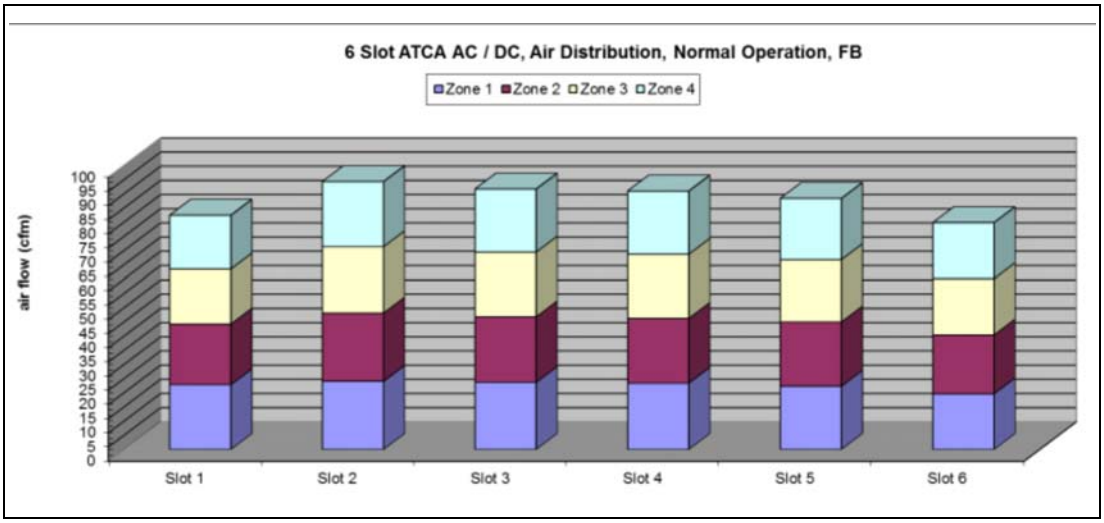

Figure 21: Front Board Air Distribution

	Zone 1 [cfm]	Zone 2 [cfm]	Zone 3 [cfm]	Zone 4 [cfm]	∑ **[cfm]**	∑ **[m³/h]**
Slot 1	22,9	21,4	19,3	18,9	**82,5**	**140,2**
Slot 2	24,1	24,1	23,2	23,0	**94,3**	**160,3**
Slot 3	23,7	23,1	22,7	22,2	**91,7**	**155,9**
Slot 4	23,4	22,8	22,4	22,3	**91,0**	**154,6**
Slot 5	22,3	22,6	21,8	21,5	**88,4**	**150,2**
Slot 6	19,6	20,8	19,7	19,7	**79,8**	**135,7**
∑	**136,0**	**134,7**	**129,2**	**127,7**	**527,6**	**897,0**

6.5 Rear Board Air Distribution

The airflow is measured with impedance boards acc. to the PICMG 3.0 R3.0 specification.

Rear board pressure drop: 24 Pa at 0,14 m³/min

Figure 22: Rear Board Air Distribution

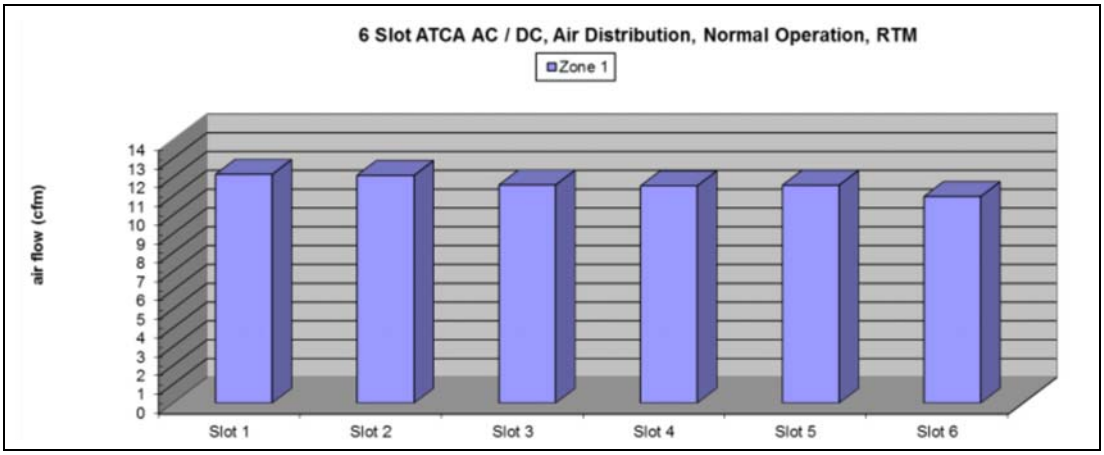

Figure 23: Rear Board Air Distribution

	Zone 1 [cfm]	∑ **[cfm]**	∑ **[m³/h]**
Slot 1	12,2	**12,2**	**12,2**
Slot 2	12,1	**12,1**	**12,1**
Slot 3	11,6	**11,6**	**11,6**
Slot 4	11,5	**11,5**	**11,5**
Slot 5	11,6	**11,6**	**11,6**
Slot 6	11,0	**11,0**	**11,0**
∑	**69,9**	**69,9**	**69,9**

7 Power

	**Hazardous voltage!** *Before working ensure that the power is removed from the power connection cables.*

The shelf supports AC- and DC-Power Entry Modules (PEMs). Both PEMs have the same interface to the shelf.

The AC-PEM can be powered with 100 V_{AC} to 120 V_{AC} or 200 V_{AC} to 240 V_{AC} line voltage.

***Note:** With 100 V_{AC} to 120 V_{AC} line voltage the available power and per slot power is limited. (See chapter 7.5)*

The Shelf supports redundant power inputs but the two inputs should be independently powered.

The AC power supplies are not included with the Shelf.

The Shelf accepts only GE Energy CP2000AC54TEZ and CP2725AC54TEZ power supplies.

The output voltage of the PSUs is 54 V_{DC}. Because the nominal supply voltage for ATCA systems acc. to the PICMG specification is 48 V_{DC}, all signal names in this manual with exception of this chapter are related to 48 V_{DC}.

The AC power supply CP2725AC54TEZ is available from Schroff with the catalogue number: 21990-286.

This power supply is already pre-configured with a FRU-file.

For instructions how to use the CP2000AC54TEZ contact your Schroff representant.

The DC-PEM can be powered using a regular telecommunication power supply of -48/-60 V_{DC} with a V_{DC} return. The specified voltage range is from -40 V_{DC} to-75 V_{DC}. The Shelf supports redundant power inputs but the two inputs should be independently powered.

7.1 AC PEM

Two pluggable redundant AC Power Entry Modules (PEM) are located at the rear top side of the Shelf. The power input is provided by 2 IEC 320-C20 connectors. Each AC PEM has interfaces for 2 AC PSUs and an interface to the backplane. Overcurrent protection is provided by 30 A fuses in the output branches.

Figure 24: AC PEM

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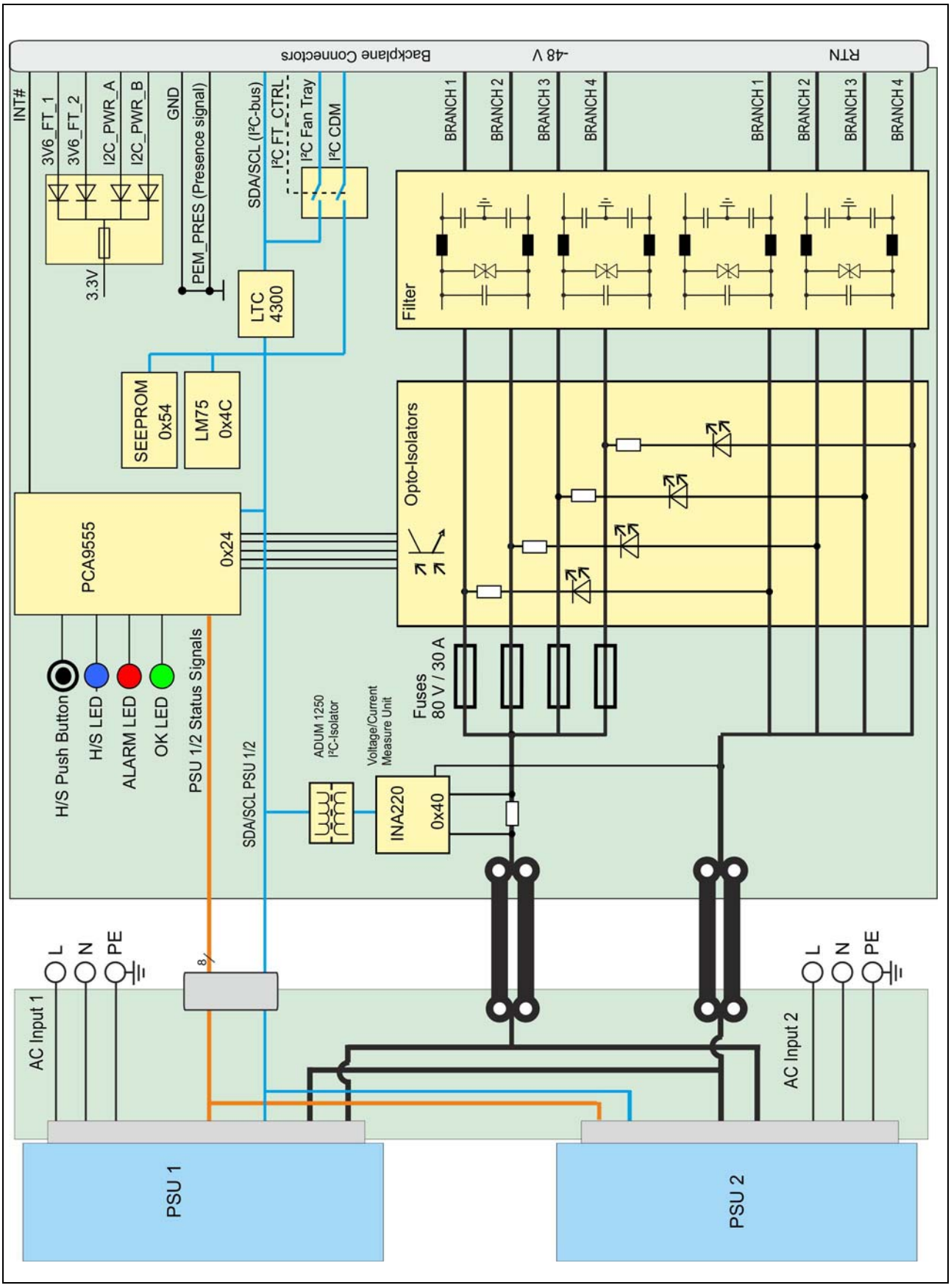
1	Hot Swap push button	4	Green Fan Tray OK LED
2	Blue Hot Swap LED	5	Mains Input 2 (IEC 320-C20 connector)
3	Red Fan Tray Alarm LED	6	Mains Input 1 (IEC 320-C20 connector)

7.2 AC PEM Block Diagram

Figure 25: AC PEM Block Diagram



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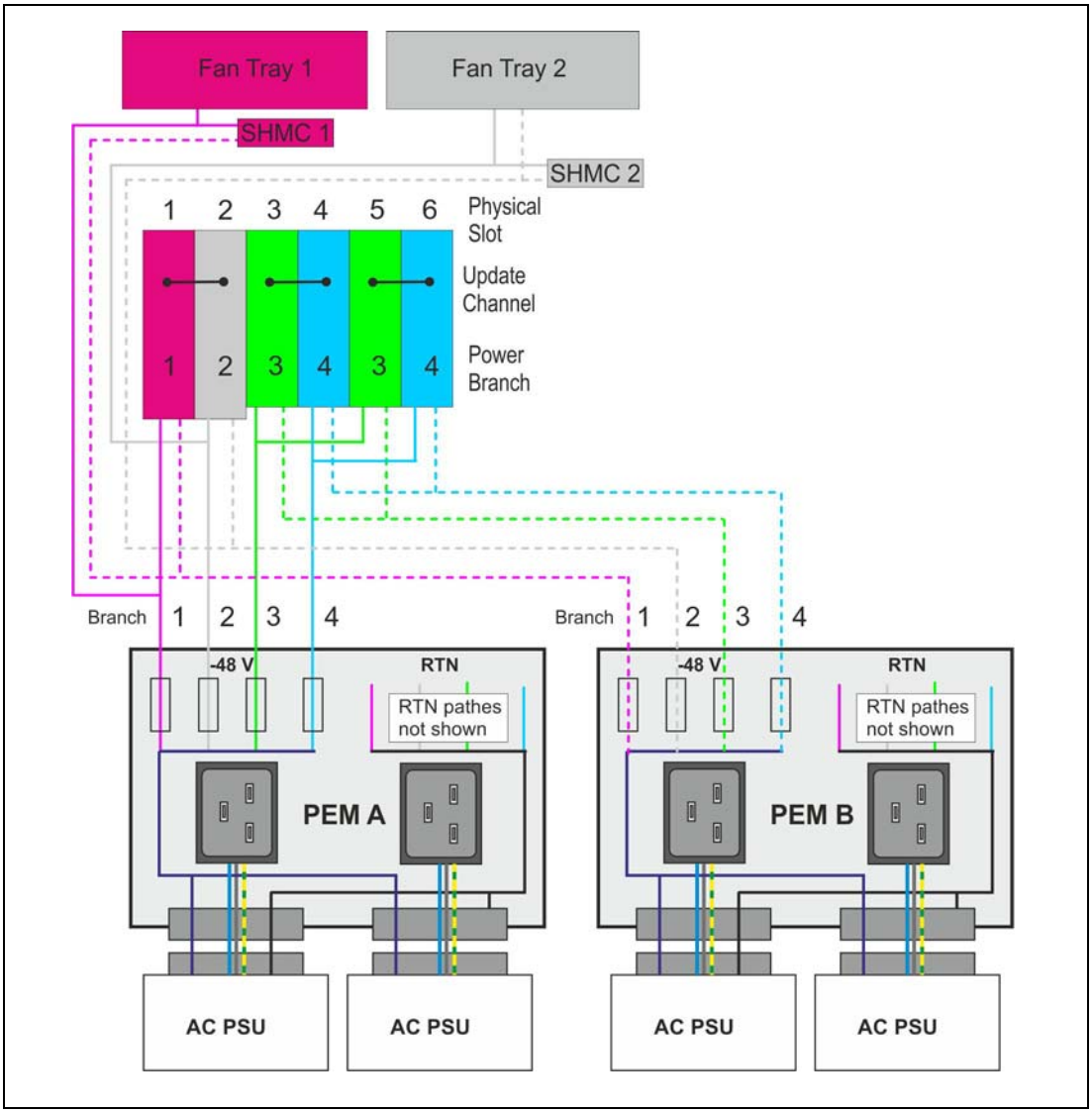
7.2.1 AC PEM Power Distribution

Power distribution within the Shelf originates from each AC PEM and powers all the blades, the Shelf Managers, the Fan Trays and the SAP. The PSUs are plugged into the AC PEM where the power is divided in 4 output branches towards the backplane.
For maximum fault tolerance, the two AC PEMs should be independently powered by a separate Feed A and Feed B.

If two AC PEMs are in service, each AC PEM is hot-swappable after removing the power cables from the AC PEM.

Figure 26: Power Distribution



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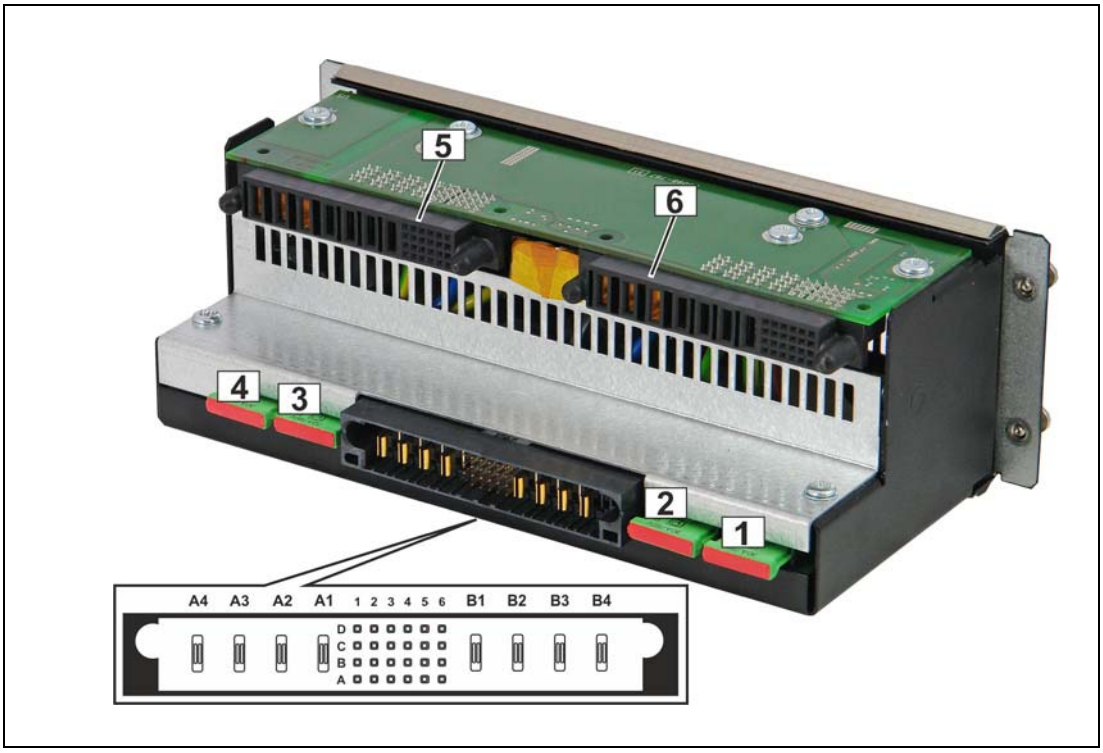
7.3 AC PEM Fuses

Figure 27: AC PEM Fuses



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1	Fuse Branch 1 (80 V / 30 A)	4	Fuse Branch 4 (80 V / 30 A)
2	Fuse Branch 2 (80 V / 30 A)	5	PSU Connector
3	Fuse Branch 3 (80 V / 30 A)	6	PSU Connector

7.4 AC Power Supply Units (PSUs)

The AC PSUs with front-to-back airflow are hot pluggable from the front side. The Shelf Manager can monitor the PSUs over a PMBus compliant I²C interface.

Table 14: Basic Specifications for the PSU CP2725AC54TEZ

200 V_{AC} to 240 V_{AC} Operation	
Input Voltage nominal	200 V_{AC} to 240 V_{AC}
Input Voltage Range max.	180 V_{AC} to 264 V_{AC}
Input Frequency Range	47 Hz - 66 Hz
Output Voltage	54 V_{DC}
Output Current	50.5 A
Output Power	2725 W with 54 V_{DC} Output Voltage
100 V_{AC} to 120 V_{AC} Operation	
Input Voltage nominal	100 V_{AC} to 120 V_{AC}
Input Voltage Range max.	90 V_{AC} to 140 V_{AC}
Input Frequency Range	47 Hz - 66 Hz
Output Voltage	54 V_{DC}
Output Current	22 A
Output Power	1200 W with 54 V_{DC} Output Voltage

See GE Energy CP2725 Data Sheet for detailed information.

7.5 Available Power

The system power and redundancy depends on the number of AC PSUs.

Figure 28: Available Power with CP2725AC54TEZ PSU

		Average slot power		Total power (6 slots)	
	Redundant	230 VAC	115 VAC	230 VAC	115 VAC
	Yes	>450 W	250 W	>2700 W	1500 W
	Yes	300 W	50 W	1800 W	300 W
	No	>450 W	250 W	>2700 W	1500 W
	No	>450 W	250 W	>2700 W	1500 W
	No	300 W	50 W	1800 W	300 W
	No	300 W	50 W	1800 W	300 W

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7.6 DC PEM

Two pluggable redundant DC Power Entry Modules (PEM) are located at the rear top side of the Shelf. Each PEM provides power terminals for a 90 A power feed. Each power feed consists of a –48 V_{DC} cable and its corresponding return cable.

The power filtering consists of filtered power terminals and a discrete line-filter for each power branch.The input voltage range for the Shelf is from -40 V_{DC} to -75 V_{DC}.

The PEM provides:

- PCA9555 I/O device for voltage monitoring and Hot Swap functionality
- LM75 temperature sensor
- 24LC256 FRU SEEPROM
- INA220B Current/Voltage measurement device

These devices are connected to the I²C-bus via an LTC4300 I²C buffer.

To detect a blown fuse, the presence of the voltages before and after the fuses is monitored by the PCA9555.
To indicate to the Shelf Manager the presence of the PEM, a presence signal is grounded by the PEM.

A Hot Swap Push Button and a Blue Hot Swap LED provide Hot Swap functionality.
A red (power failure) and a green (OK) LED provide status indication.

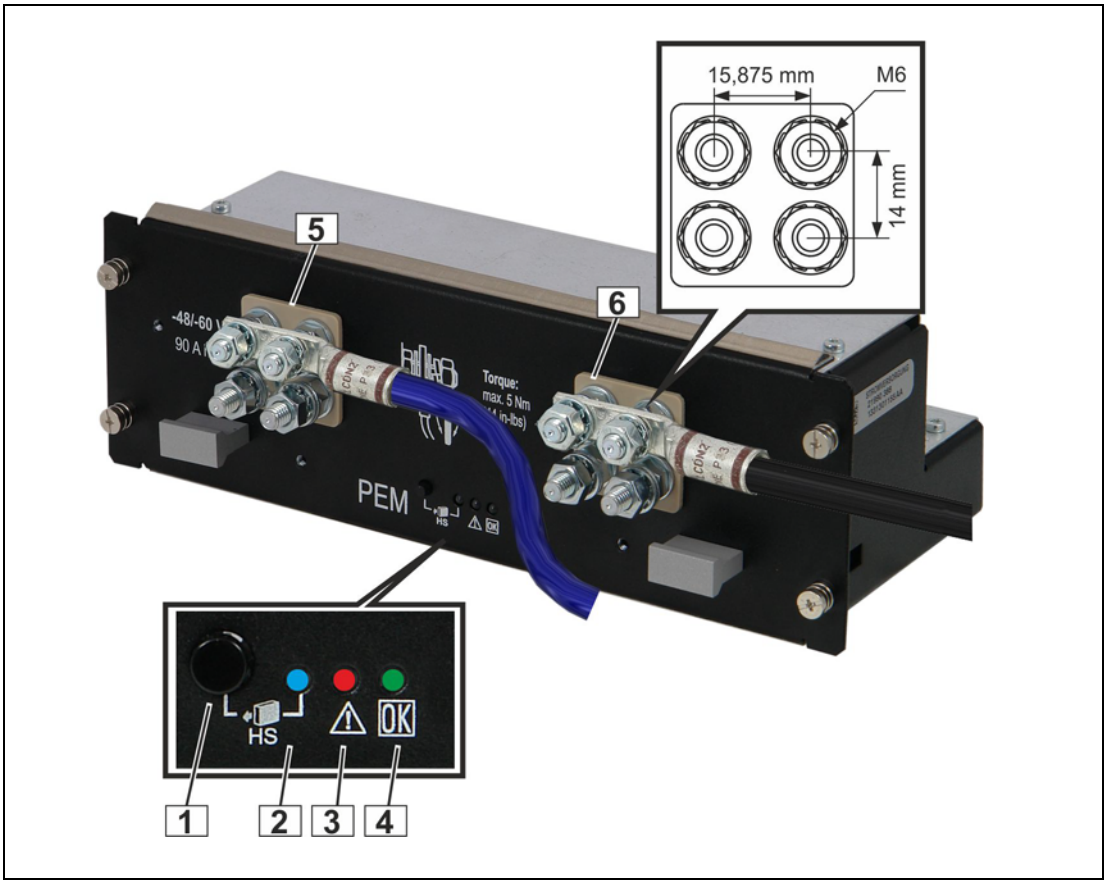
Each of the 4 redundant output branches supply power to a separate part of the ATCA Backplane.

The PEM (together with all shelf related FRUs) are protected against wrong polarity up to +57 V DC, but it does not block wrong polarity voltage being applied to shelf related FRUs and to Zone 1 power wiring of payload slots.

Suppressor diodes are included in the feed chain that provide protection against a K.20 pulse of 500 V being applied to its input (K.20 surge pulse, "Basic level", Table 7, pulse type 7.3, 500 V applied to -48 V and RTN branches at the same time against shelf ground) so that PEM itself and other shelf related FRUs can sustain this level of pulse.

7.7 DC PEM Front View

Figure 29: DC PEM Front View



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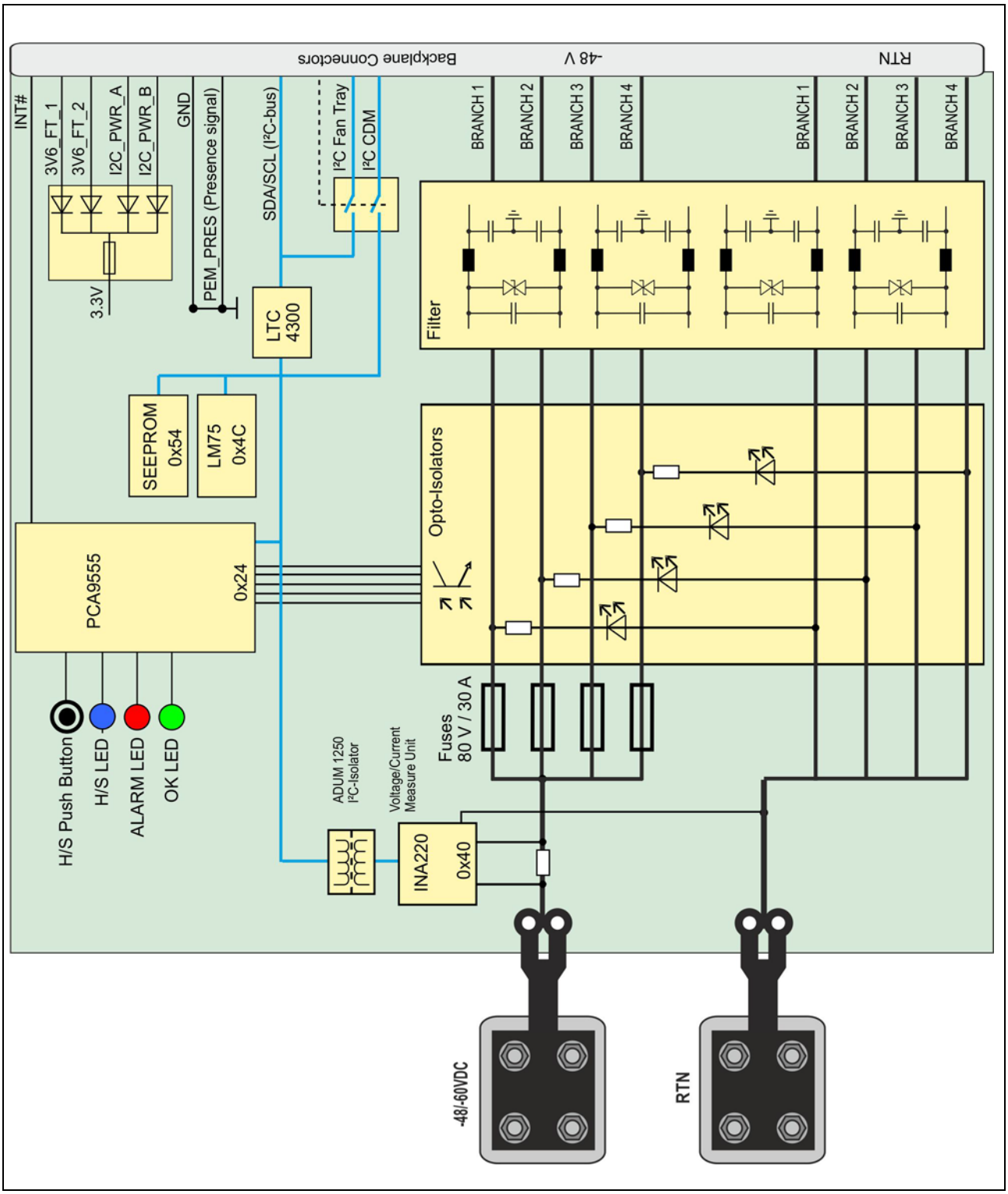
1	Hot-Swap Push Button	5	-48 V Input (-)
2	Hot-Swap LED (blue)	6	RTN Input (+)
3	Status LED „Failure“ (red)		
4	Status LED „OK“ (green)		

7.8 DC PEM Block Diagram

Figure 30: DC PEM Block Diagram

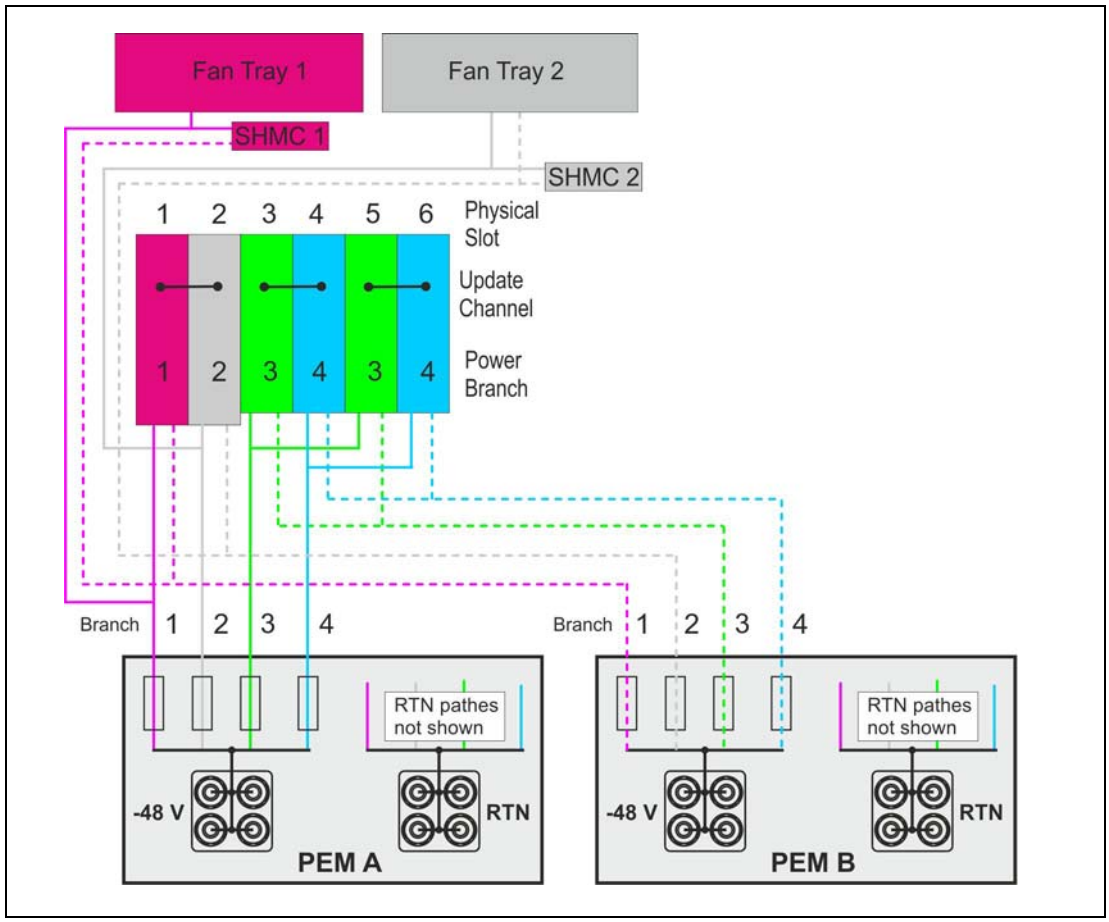


7.9 Power Branches

Power distribution within the Shelf originates from each DC PEM where the power is divided in 4 output branches towards the backplane. Each of the PEM's 4 power branches supplies power to a group of slots and a Fan Tray or Shelf Manager. This topology is used to keep the max. current per branch less than 30 A.

For maximum fault tolerance, the two DC PEMs should be independently powered by a separate Feed A and Feed B.

Figure 31: Power distribution of the 4 Power Branches within the Shelf



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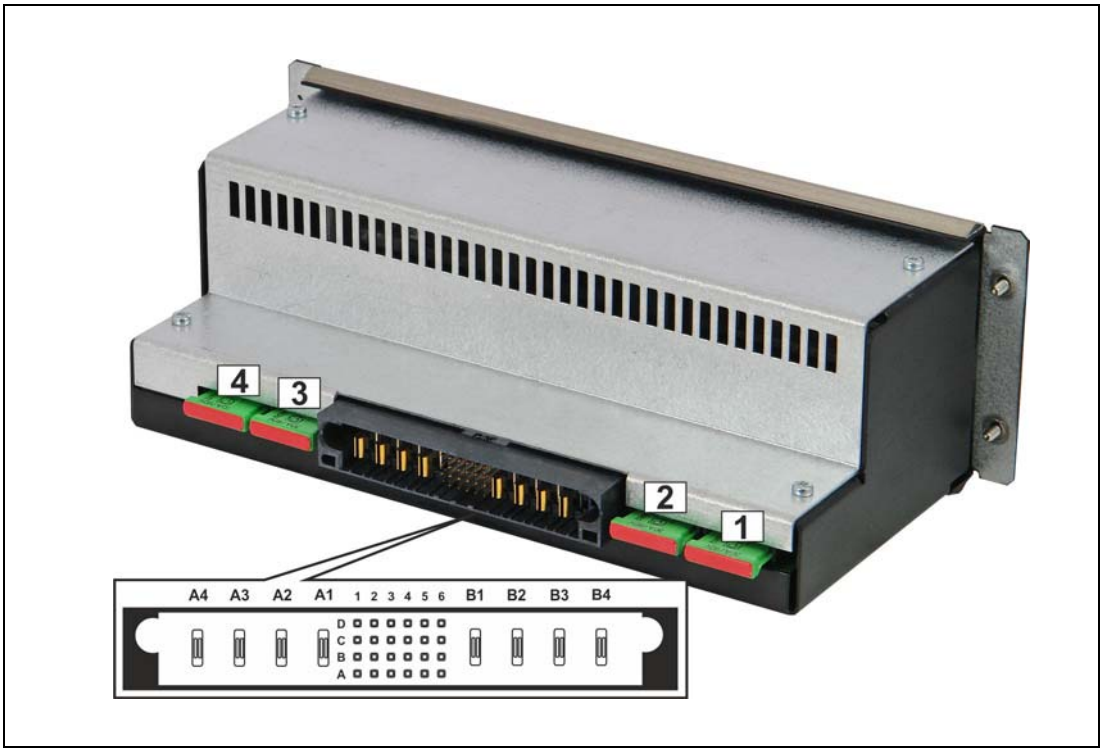
7.10 DC PEM Fuses

Figure 32: DC PEM Fuses



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1 Fuse Branch 1 (80 V / 30 A)
2 Fuse Branch 2 (80 V / 30 A)
3 Fuse Branch 3 (80 V / 30 A)
4 Fuse Branch 4 (80 V / 30 A)

7.10.1 DC PEM Indicators

The front panel includes a green and red status LED and a blue hot-swap LED.

Table 15: LEDs on DC PEM

Color	Description	Status	Condition
Green	OK LED	Off	No Power to the PEM
		Solid green	Normal Operation
Red		Solid red	Attention Status (error condition)
Blue	Hot Swap LED	Off	No Power to the PEM or not OK to extract PEM
		Short blink	Preparing for extraction
		Solid blue	Ready to remove

7.11 Specifications for the Power Cables

The PEM provides 4 M6 studs for the -48 V and 4 M6 studs for the RTN feed. The stud spacing is 5/8“ (15.875 mm).

	**Caution!** *The wiring methods and conductor sizes must be in compliance with local and national electrical codes and regulations.* *The following wiring scenarios are only recommendations. The suggested wire size is for single conductors in free air with a temperature rating of 90 °C, based on the resp. tables of the National Electrical Code (NEC) or the Canadian Electrical Code (CEC).*

1. Single cable wiring:
Connect one cable at the -48 V and one at the RTN feed with a two-hole terminal to either the upper or lower row of M6 studs.

Required cable size: #3 AWG, suitable for min. 90°C (194°F), maximum length = 3 m.

Recommended cable lug: Burndy YA2CL2NT14 or equivalent.

2. Split cable wiring:
Connect two cables at the -48 V and two at the RTN feed of each PEM with a two-hole terminal to the upper and lower row of M6 studs.

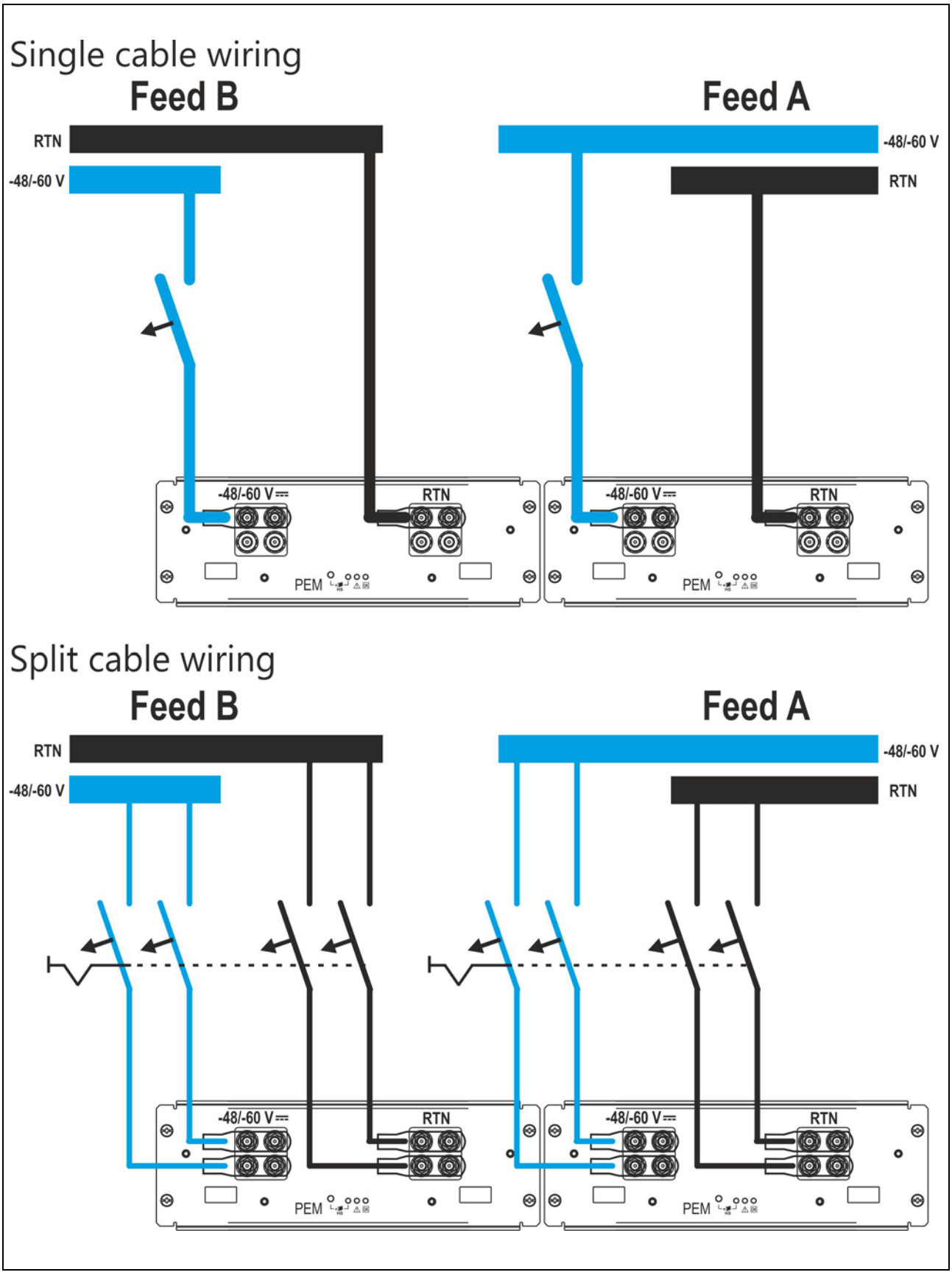
Required cable size: #8 AWG, suitable for min. 90°C (194°F), maximum length = 3 m.

Recommended cable lug: Burndy YA8CL2TC14 or equivalent.

For split cable wiring the two -48 V and the two RTN cables must be fused separately at the Power Distribution Unit.

7.12 DC PEM wiring

Figure 33: DC PEM wiring



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7.13 Slot Power Calculation

The shelf is designed for an average electrical power and cooling capacity of 450 W/slot. The actual per slot performance depends on the current rating of the backplane connector, the environment temperature and the total input current of the PEM. With unequal power distribution individual slots can be operated under certain circumstances with higher power than 450 W.

The power of the AC-PEM or DC-PEM is divided in 4 output branches towards the backplane. Each of the 4 power branches supplies power to a group of 2 slots or a slot and a Fan Tray and Shelf Manager. (See Fig. 26 and Fig. 31)

The Shelf Manager calculates the maximum branch power by the minimum expected operating voltage (default 40.5 V) and the maximum branch current (30 A) stored in the Shelf's FRU file. With this values the available branch power is calculated with 1215 W. Because the total input current of the DC-PEM is limited to 90 A, the default power capability per slot is set to 450 W in the Shelf's FRU file.

Table 16: Branch Power Distribution

Branch 1	Slot 1	450 W	900 W
	Fan Tray 1	440 W	
	ShMC 1	10 W	
Branch 2	Slot 2	450 W	900 W
	Fan Tray 2	440 W	
	ShMC 2	10 W	
Branch 3	Slot 3	450 W	900 W
	Slot 5	450 W	
Branch 4	Slot 4	450 W	900 W
	Slot 6	450 W	
Total power		3600 W	3600 W

If you want to use boards with more then 450 W, you can modify the slot's power capability with a CLI command, but the shelf's total power consumption shall not exceed 3600 W.

```
clia shelf PwrCapability [hw-addr] [FRU-ID] [Power]
```

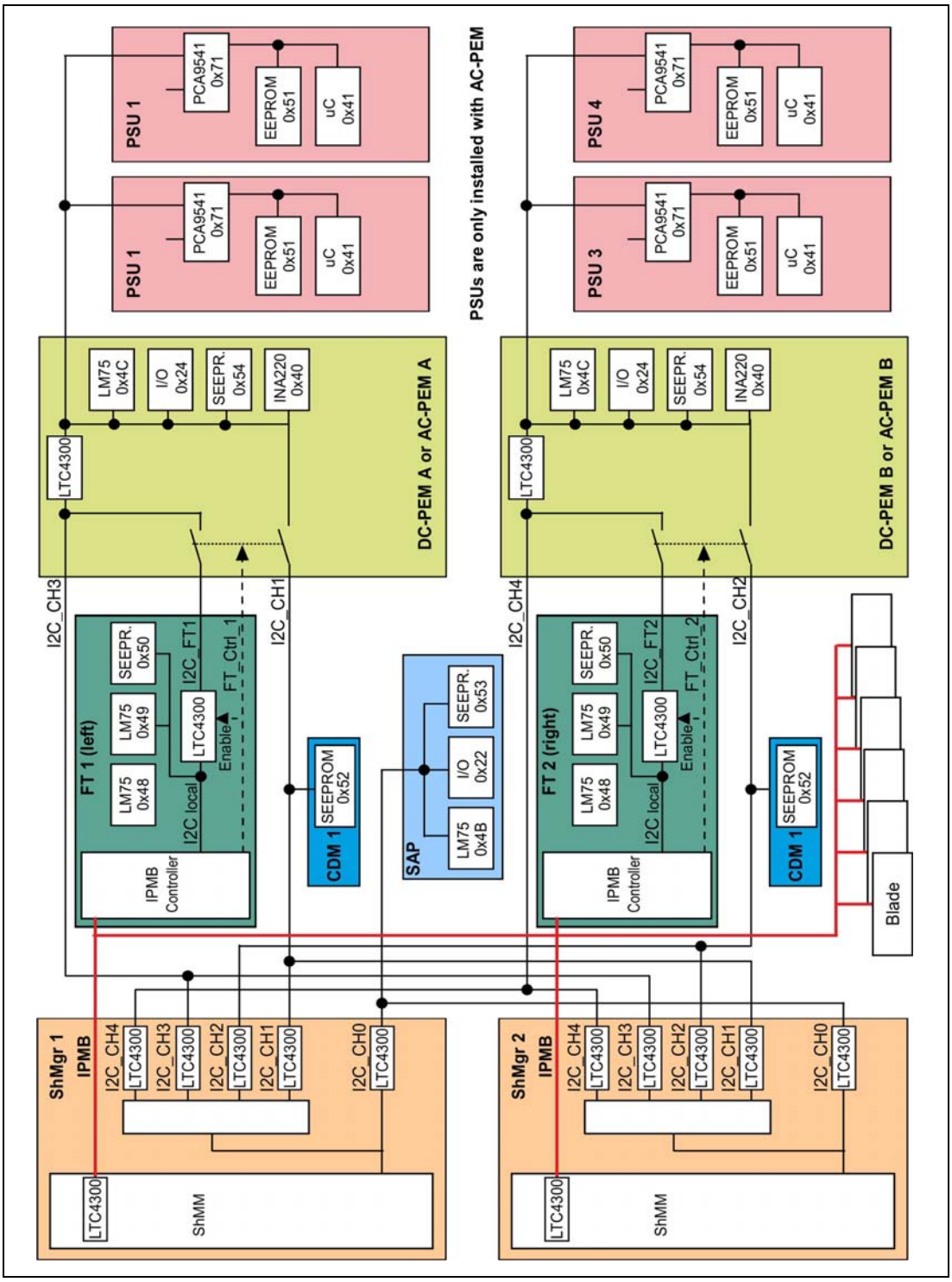
If the Shelf is operated with the AC-PSUs with 54 V output voltage, it is possible change the settings for the minimum expected operating voltage in the FRU file to gain a higher branch power.

If the joint power capability of all ATCA boards assigned to a branch is greater than the calculated branch power, the Shelf Manager will not power-on all boards. (The last plugged-in or the last in the power-up sequence.)

8 Shelf Management

The Schroff ATCA Shelves are designed to work with two redundant Schroff ShMM-ACB-VI Shelf Managers in dedicated Shelf Manager slots.

Figure 34: Shelf Management with Schroff Shelf Managers



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Upon request a version with on-blade shelf management is available. With on-blade shelf management, the I²C components of the PEMs and the SEEPROM are connected to the internal I²C bus on the Fan Trays. The on-blade Shelf Manager has access to these components via the IPM controller of the Fan Trays.

Figure 35: Shelf Management with On-Blade Shelf Managers

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9 Schroff Shelf Manager ACB-VI

These Chapters describe 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. 63972-331

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

Shelf Manager with bused IPMB: 21990-401 (Product Number)

21990-404 (Catalog Number with packaging)

The Schroff Shelf Manager ACB-VI 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:

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

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

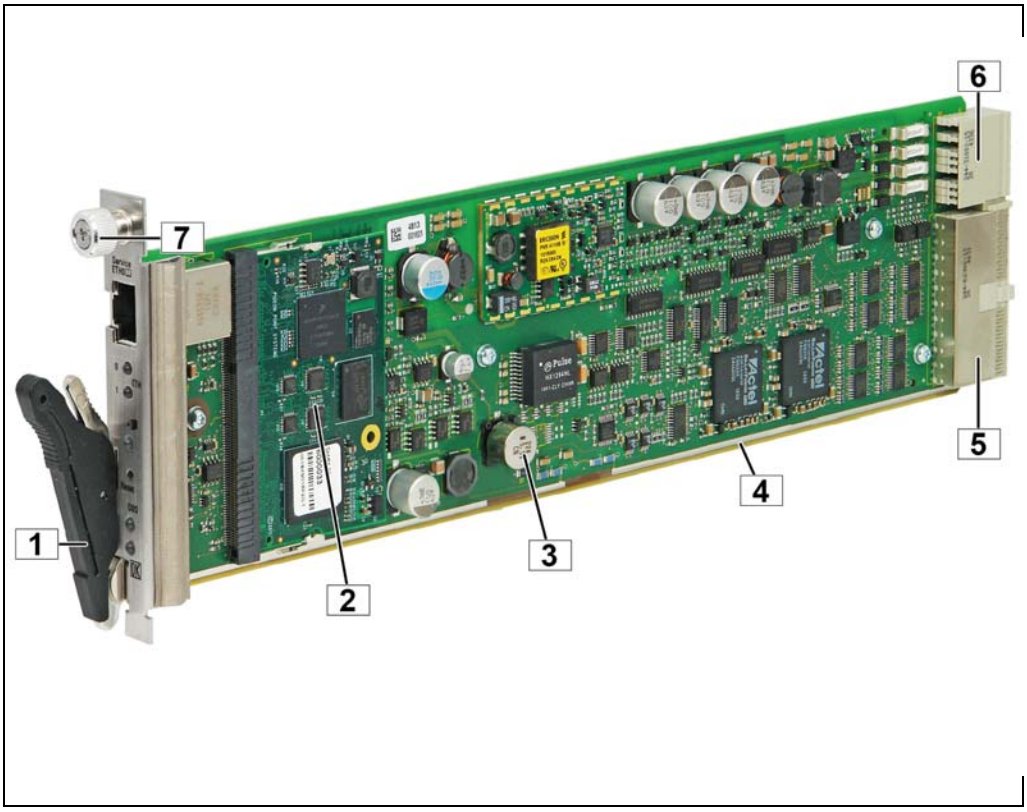
The Shelf management software runs on the Pigeon Point Shelf Management Mezzanine 700 (ShMM-700R), a compact 204-pin SO-DIMM form-factor module, installed on the ACB-VI carrier board.

The ACB-VI carrier board includes several on-board devices that enable different aspects of Shelf management based on the ShMM-700R. These facilities include I^2C-based hardware monitoring/control and GPIO expander devices.

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

The Shelf Manager communicates inside the Shelf with IPM controllers over the Intelligent Platform Management Bus (IPMB). The Shelf Manager also provides an IPMB interface for the non-intelligent FRUs in a Schroff Shelf. The Shelf Manager communicates with the non-intelligent FRUs over I^2C busses and expose the sensors for these FRUs at IPMB address 0x20.

Figure 36: Schroff Shelf Manager



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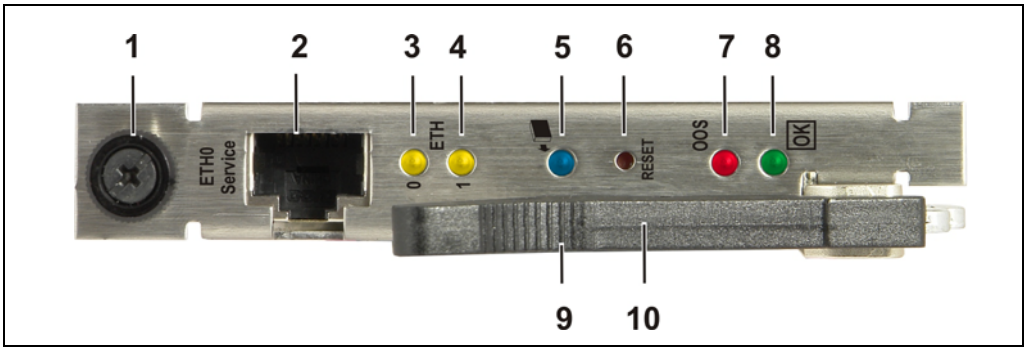
1	Extraction handle	5	Backplane Connector (X100)
2	ShMM-700R	6	Backplane Connector (X102)
3	RTC backup capacitor	7	Fixing screw
4	ACB-VI Carrier Board		

9.1 Front Panel Components

Figure 37: Shelf Manager Front Panel Components



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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

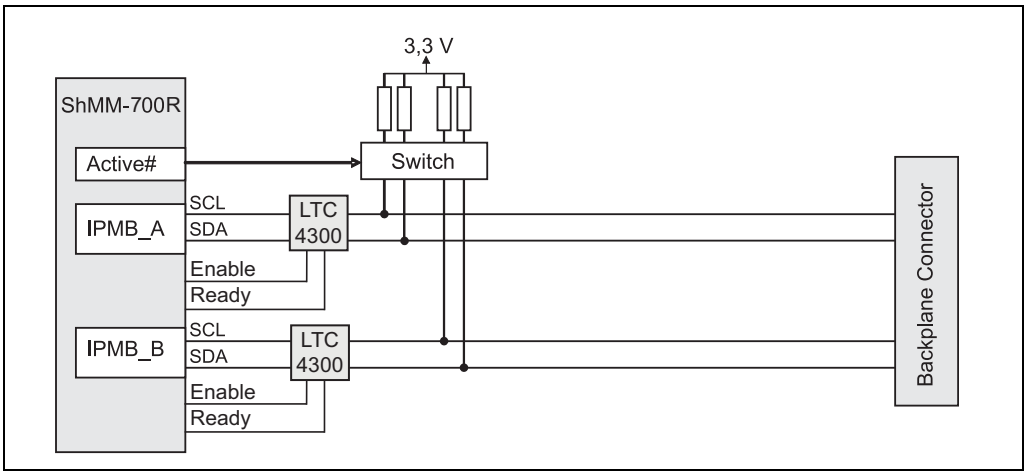
9.2 Bussed IPMB Interface

Only Shelf Managers with Product Number: 21990-401

The ShMM-700R provides two IPMBs. The IPMB-A and IPMB-B from the ShMM-700R are routed to the Backplane connector through I2c buffers. The ATCA Backplane buses the two IPMBs to the ATCA boards.

The Active# signal of the ShMM-700R is used to switch on/off the pull-up resistors of the IPMBs.

Figure 38: Block diagram bused IPMB

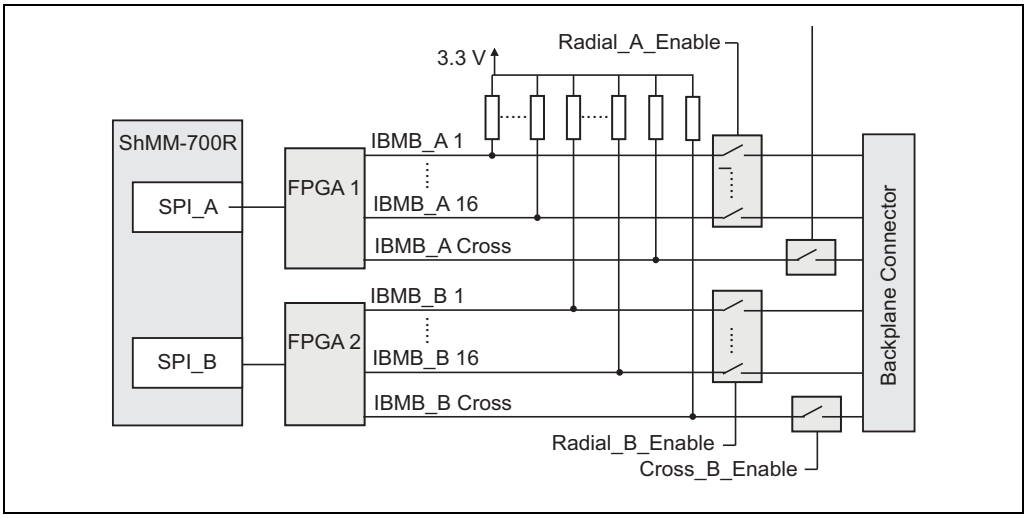


9.3 Radial IPMB Interface

Only Shelf Managers with Product Number: 21990-402

Radial IPMB is implemented by 2 FPGAs connected to the Serial Peripheral Interfaces (SPI) on the ShMM700R.

Figure 39: Block diagram radial IPMB



9.4 Ethernet Interfaces

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-switches) and the backplane connector going to the hub board base interface (“Back”-position of the rocker-switches).

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

Figure 40: ETH Switches shown in default position

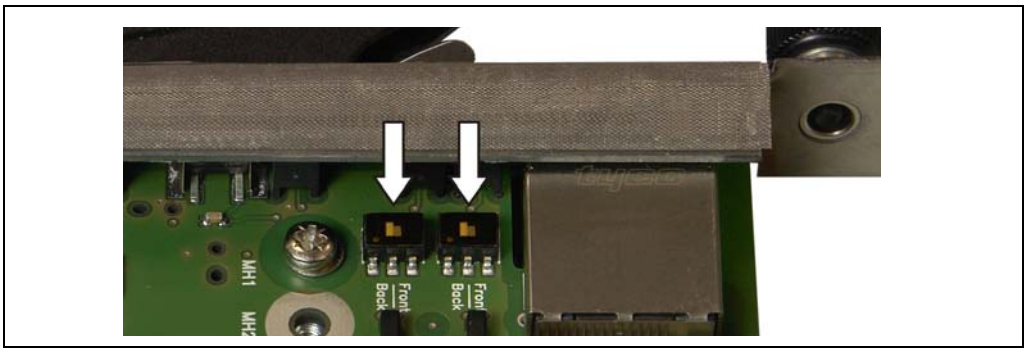


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Figure 41: Shelf Manager Cross Connect

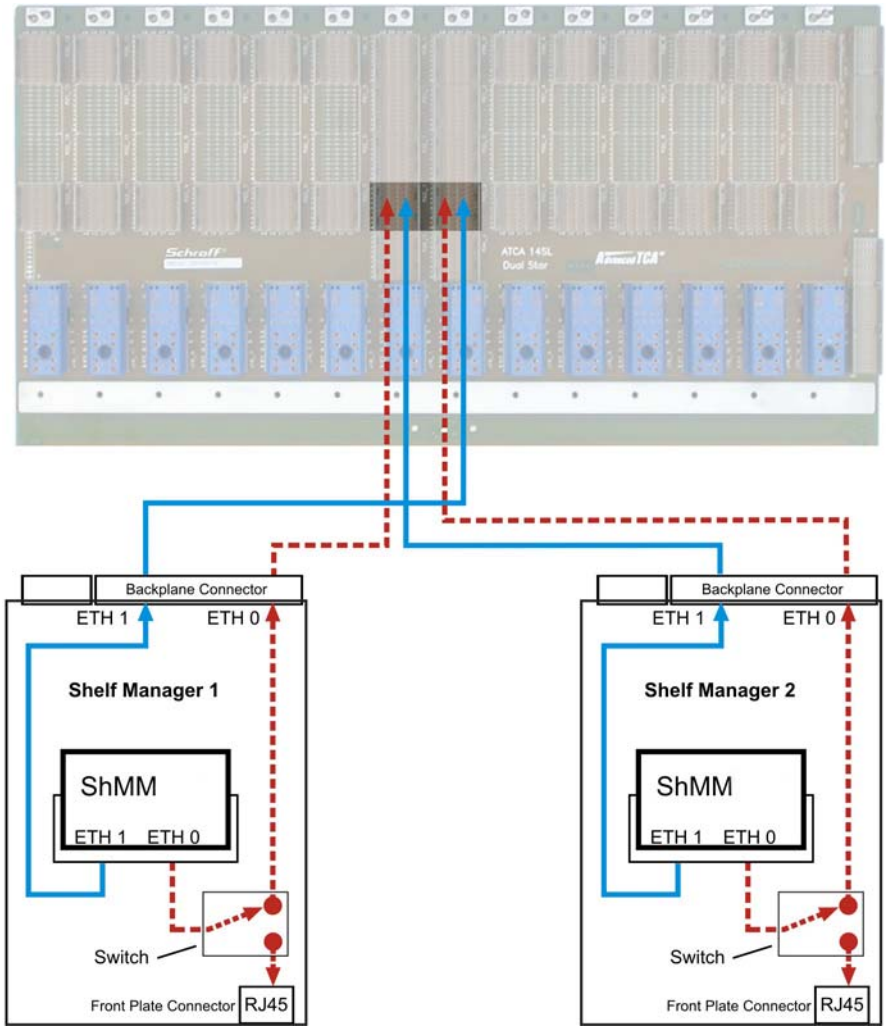

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Table 17: Connector (P23) pin assignment for Shelf Manager Cross Connect

Row	Designation	ab		cd		ef		gh	
5	Shelf Manager Port with Shelf Manager Cross Connects	Tx1+	Tx1-	Rx1+	Rx1-	Tx2+	Tx2-	Rx2+	Rx2-
		Shelf Manager Cross Connect 1				Shelf Manager Cross Connect 2			

9.5 Shelf Manager RS-232 Console Serial Interface

The Shelf Manager provides an RS-232 console interface that provides a full set of RS-232 signals, including modem control. These signals are routed through the Shelf Manager backplane connector to a RJ45 connector on the front panel of the lower Fan Tray.

The serial console default configuration is:

- *115200 baud*
- *no parity*
- *8 data bits*
- *1 stop bit*

9.6 Front Panel RESET push button

The Shelf Manager provides a RESET push button on the front panel. It is connected to the ShMM-700's MRST_IN# signal.

Pushing the RESET button will reset the Shelf Manager

9.7 Hot Swap Interface

The Shelf Manager provides a Hot Swap interface allowing the Shelf Manager to be replaced without powering down the Shelf. The interface is composed of three components:

- Hot Swap switch at injector/ejector handle
- Presence signal indicating that the Shelf Manager is fully seated in its backplane connector
- Hot Swap LED

9.7.1 Hot Swap LED

The Shelf Manager provides a a blue Hot Swap LED. The LED indicates when it is safe to "remove" the Shelf Manager from a powered Shelf.

Table 18: Hot Swap LED

LED State	Condition
Off	The Shelf Manager is not ready to be removed/disconnected from the Shelf
Solid Blue	The Shelf Manager is ready to be removed/disconnected from the Shelf
Long-blink	The Shelf Manager is activating itself
Short-blink	Deactivation has been requested

9.8 Hardware Address

The Shelf Manager reads the hardware address and parity bit from the backplane connector of the Dedicated Shelf Manager slot. Geographic address pins (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6 are hardware-coded on the Shelf Manager PCB.

	HW-Addr.	IPMB-Addr.	HA[0]	HA7
Shelf Manager 1	0x08	0x10	GND	GND
Shelf Manager 2	0x09	0x12	n.c.	n.c.

9.9 Redundancy Control

The Shelf Manager supports redundant operation with automatic switchover using redundant Shelf Managers. In a configuration where two Shelf Manager are present, one acts as the active Shelf Manager and the other as a standby. The Shelf Managers monitor each other and either can trigger a switchover if necessary.

9.9.1 Hardware Redundancy Interface

The two Shelf Manager communicate over the TCP/IP based Software Redundancy Interface (SRI) which is implemented via a pair of USB links between the ShMM-700Rs. The active instance posts incremental state updates to the backup via this interface. As a result, the backup can quickly step into the active role if necessary.

The Hardware Redundancy Interface (HRI) between the two Shelf Manager instances enables the exchange of hardware level ShMM-700R state information, including the following:

- Presence: each Shelf Manager instance knows whether the other instance is present in the shelf.
- Health: each instance knows whether the other instance considers itself „healthy“.
- Switchover: the backup instance can force a switchover if necessary.

The ACB-VI Hardware Redundancy Interface supports the upgrade from ACB-V to ACB-VI in an ATCA System without interruption. For details see the firmware release note.

9.10 Command Line Interface (CLI)

The Command Line Interface (CLI) connects to and communicates with the IPM-devices of the Shelf, the boards, and the Shelf Manager.
The CLI is an IPMI-based library of commands, service personnel or system administrators can access the CLI through Telnet, SSH, or the Shelf Managers serial port on the SAP.
With the CLI, users can access information about the current system status including sensor values, threshold settings etc.
Users can also access and modify Shelf- and Shelf Manager configurations, perform actions on a FRU a.e. set fan speeds etc.

The default user account is "root" and there is no password.
The default IP address of the primary Shelf Manager is 192.168.0.2

To access all sensor data you have to connect to the active Shelf Manager!

9.10.1 Basic CLI Commands

Service personnel can read system information, FRU information and sensor datas with the following basic commands. For a full list of all CLI commands refer to the Pigeon Point Shelf Manager External Interface Reference Manual.

- **Change IP address of the primary Shelf Manager:**

```
clia setlanconfig channel ip value
```

Value represents the IP address in dotted decimal notation.

```
clia setlanconfig 1 ip 192.168.0.2
```

- **Display the Shelf Managers firmware version:**

```
clia version
```

Info: To get a complete list of all information just type in "`version`".

- **List all IPM Controllers in a Shelf:**

```
clia ipmc
```

- **List all boards in the Shelf:**

```
clia board
```

- **List all sensors on a board:**

```
clia sensor IPMI-address
```

- **List only sensors which are outside of established thresholds:**

```
clia sensor -t
```

- **Get data (value) from a sensor on a board:**

```
clia sensordata IPMI-address sensor-number
```

- **Display the FRU information in a board:**

```
clia fruinfo IPMI-address FRU-id
```

- **Change the speed for a Fan Tray:**

```
clia setfanlevel IPMI-address Fru-id speed
```

Info: The value for the speed is from 0 to 15.

- **Display the contents of the System Event Log (SEL):**

```
clia sel
```

- **Clear the System Event Log (SEL):**

```
clia sel clear
```

9.11 Hardware Address

The Shelf Manager reads the hardware address and parity bit from the backplane connector of the Dedicated Shelf Manager slot. Geographic address pins (HA[0], HA7) at the Backplane connector determine bit 0 and bit 7, bit 1...6 are hardware-coded on the Shelf Manager PCB.

	HW-Addr.	IPMB-Addr.
Primary Shelf Manager (left)	0x08	0x10
Secondary Shelf Manager (right)	0x09	0x12

9.12 Sensor Table

IPMC	Nr.	LUN	Name	Type-Code		Event/Reading Type-Code		Description
10	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 0.
10	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link state.
10	2	0	Local Temp	Temperature	0x01	Threshold	0x01	This sensor measures the local temperature.
10	3	0	3V3_local	Voltage	0x02	Threshold	0x01	This sensor measures the local 3.3 V voltage in volts.
10	4	0	I2C_PWR_B	Voltage	0x02	Threshold	0x01	This sensor measures the 3.3 V power supply B voltage supplied to I2C devices in volts.
10	5	0	I2C_PWR_A	Voltage	0x02	Threshold	0x01	This sensor measures the 3.3 V power supply A voltage supplied to I2C devices in volts.
10	6	0	VBAT	Voltage	0x02	Threshold	0x01	This sensor measures the voltage of the hold-up capacitor on the local shelf manager in volts.
10	16	0	-48A Bus voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_A at the shelf manager backplane connector.
10	17	0	-48B Bus voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_B at the shelf manager backplane connector.
10	18	0	-48A ACB voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_A behind the shelf manager's main fuse.
10	19	0	-48B ACB voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_B behind the shelf manager's main fuse.
10	20	0	20V AUX	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of 20 V aux voltage on shelf manager.
10	21	0	-48A ACB Fuse	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the state of -48 V_A input fuse on the shelf manager.
10	22	0	-48B ACB Fuse	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the state of -48 V_B input fuse on the shelf manager.
10	128	0	CPLD State	OEM reserved	0xde	Discrete	0x6f	This sensor indicates the high-level redundancy state of the ShMM, along with the state of the low-level redundancy bits exposed by the CPLD, and redundancy-related exceptional conditions in the CPLD, if any.
10	129	0	Reboot Reason	OEM reserved	0xdd	Discrete	0x6f	This sensor indicates the reason for the last reboot.
							0x6f	
12	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 0.
12	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link state.
12	2	0	Local Temp	Temperature	0x01	Threshold	0x01	This sensor measures the local temperature.
12	3	0	3V3_local	Voltage	0x02	Threshold	0x01	This sensor measures the local 3.3 V voltage in volts.
12	4	0	I2C_PWR_B	Voltage	0x02	Threshold	0x01	This sensor measures the 3.3 V power supply B voltage supplied to I2C devices in volts.
12	5	0	I2C_PWR_A	Voltage	0x02	Threshold	0x01	This sensor measures the 3.3 V power supply A voltage supplied to I2C devices in volts.
12	6	0	VBAT	Voltage	0x02	Threshold	0x01	This sensor measures the voltage of the hold-up capacitor on the local shelf manager in volts.
12	16	0	-48A Bus voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_A at the shelf manager backplane connector.
12	17	0	-48B Bus voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_B at the shelf manager backplane connector.
12	18	0	-48A ACB voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_A behind the shelf manager's main fuse.
12	19	0	-48B ACB voltage	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the -48 V_B behind the shelf manager's main fuse.
12	20	0	20V AUX	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of 20 V aux voltage on shelf manager.
12	21	0	-48A ACB Fuse	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the state of -48 V_A input fuse on the shelf manager.
12	22	0	-48B ACB Fuse	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the state of -48 V_B input fuse on the shelf manager.
12	128	0	CPLD State	OEM reserved	0xde	Discrete	0x6f	This sensor indicates the high-level redundancy state of the ShMM, along with the state of the low-level redundancy bits exposed by the CPLD, and redundancy-related exceptional conditions in the CPLD, if any.
12	129	0	Reboot Reason	OEM reserved	0xdd	Discrete	0x6f	This sensor indicates the reason for the last reboot.

IPMC	Nr.	LUN	Name	Type-Code		Event/Reading Type-Code		Description
20	0	0	FRU 0 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 0.
20	0	3	HPI Sys Event	OEM reserved	0xdb	Discrete	0x6f	The purpose is to enhance the interaction between the shelf manager and Pigeon Point HPI implementa-tions: IntegralHPI and Pigeon Point OpenHPI. This sensor sends IPMI events in a special format to signal HPI implementa-tions that changes have occurred within the shelf man-ager.
20	1	0	IPMB LINK	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link state. (Only bussed IPM Bus)
20	2	0	FRU 1 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	Sensor returns the hot-swap states for FRU 1 (SEEPROM 1)
20	3	0	FRU 2 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	Sensor returns the hot-swap states for FRU 2 (SEEPROM 2)
20	4	0	FRU 3 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 3 (PEM A)
20	5	0	FRU 4 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 4 (PEM B)
20	6	0	FRU 5 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 5 (PSU A1)
20	7	0	FRU 6 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 6 (PSU A2)
20	8	0	FRU 7 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 7 (PSU B1)
20	9	0	FRU 8 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 8 (PSU B2)
20	10	0	FRU 9 HOT_SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states for FRU 9 (SAP)
20	11	0	IPMB LINK 1	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 1 state. (Only radial IPM Bus)
20	12	0	IPMB LINK 2	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 2 state. (Only radial IPM Bus)
20	13	0	IPMB LINK 3	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 3 state. (Only radial IPM Bus)
20	14	0	IPMB LINK 4	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 4 state. (Only radial IPM Bus)
20	15	0	IPMB LINK 5	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 5 state. (Only radial IPM Bus)
20	16	0	IPMB LINK 6	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 6 state. (Only radial IPM Bus)
20	17	0	IPMB LINK 7	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 7 state. (Only radial IPM Bus)
20	18	0	IPMB LINK 8	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 8 state. (Only radial IPM Bus)
20	19	0	IPMB LINK 9	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link 9 state. (Only radial IPM Bus)
20	50	0	PSU A1 Presence	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of PSU A1.
20	51	0	PSU A1 VOUT	Voltage	0x02	Threshold	0x01	This sensor measures the output voltage of PSU A1.
20	52	0	PSU A1 IOUT	Current	0x03	Threshold	0x01	This sensor measures the output current of PSU A1.
20	53	0	PSU A1 VIN	Voltage	0x02	Threshold	0x01	This sensor measures the input voltage of PSU A1.
20	54	0	PSU A1 PIN	Power Supply	0x08	Threshold	0x01	This sensor measures the input power of PSU A1.
20	56	0	PSU A1 OverTemp	Entity Presence	0x25	Discrete	0x6f	This sensor indicates an overtemperature of PSU A1, the overtemp LED at the PSU is active.
20	57	0	PSU A1 FanErr	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fan failure of PSU A1.
20	58	0	PSU A1 Fault	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fault of PSU A1.
20	60	0	PSU A2 Presence	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of PSU A2.
20	61	0	PSU A2 VOUT	Voltage	0x02	Threshold	0x01	This sensor measures the output voltage of PSU A2.
20	62	0	PSU A2 IOUT	Current	0x03	Threshold	0x01	This sensor measures the output current of PSU A2.
20	63	0	PSU A2 VIN	Voltage	0x02	Threshold	0x01	This sensor measures the input voltage of PSU A2.
20	64	0	PSU A2 PIN	Power Supply	0x08	Threshold	0x01	This sensor measures the input power of PSU A2.
20	66	0	PSU A2 OverTemp	Entity Presence	0x25	Discrete	0x6f	This sensor indicates an overtemperature of PSU A2, the overtemp LED at the PSU is active.
20	67	0	PSU A2 FanErr	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fan failure of PSU A2.
20	68	0	PSU A2 Fault	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fault of PSU A2.
20	70	0	PSU B1 Presence	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of PSU B1.
20	71	0	PSU B1 VOUT	Voltage	0x02	Threshold	0x01	This sensor measures the output voltage of PSU B1.
20	72	0	PSU B1 IOUT	Current	0x03	Threshold	0x01	This sensor measures the output current of PSU B1.
20	73	0	PSU B1 VIN	Voltage	0x02	Threshold	0x01	This sensor measures the input voltage of PSU B1.
20	74	0	PSU B1 PIN	Power Supply	0x08	Threshold	0x01	This sensor measures the input power of PSU B1.
20	76	0	PSU B1 OverTemp	Entity Presence	0x25	Discrete	0x6f	This sensor indicates an overtemperature of PSU B1, the overtemp LED at the PSU is active.
20	77	0	PSU B1 FanErr	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fan failure of PSU B1.
20	78	0	PSU B1 Fault	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fault of PSU B1.

IPMC	Nr.	LUN	Name	Type-Code		Event/Reading Type-Code		Description
20	80	0	PSU B2 Presence	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of PSU B2.
20	81	0	PSU B2 VOUT	Voltage	0x02	Threshold	0x01	This sensor measures the output voltage of PSU B2.
20	82	0	PSU B2 IOUT	Current	0x03	Threshold	0x01	This sensor measures the output current of PSU B2.
20	83	0	PSU B2 VIN	Voltage	0x02	Threshold	0x01	This sensor measures the input voltage of PSU B2.
20	84	0	PSU B2 PIN	Power Supply	0x08	Threshold	0x01	This sensor measures the input power of PSU B2.
20	86	0	PSU B2 OverTemp	Entity Presence	0x25	Discrete	0x6f	This sensor indicates an overtemperature of PSU B2, the overtemp LED at the PSU is active.
20	87	0	PSU B2 FanErr	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fan failure of PSU B2.
20	88	0	PSU B2 Fault	Entity Presence	0x25	Discrete	0x6f	This sensor indicates a fault of PSU B2.
20	119	0	TelcoAlarmInput	TELCO Alarm Input	0xf4	Discrete	0x6f	Telco alarm input sensor.
20	123	0	SAP Temp	Temperature	0x01	Threshold	0x01	This sensor measures the SAP temperature.
20	131	0	TELCO Alarms	OEM reserved	0xdf	Discrete	0x6f	This sensor indicates the presence of critical, major and minor alarm .
20	132	0	BMC Watchdog	Watchdog 2	0x23	Discrete	0x6f	BMC watchdog sensor.
20	133	0	SYSTEM EVENT	System Event	0x12	Discrete	0x6f	System event sensor.
20	135	0	FT Oper.Status	Management Subsyst. Health	0x28	Discrete	0x0b	This sensor monitors if all the fan trays are operational or if some fan trays is not operation.
20	136	0	Cooling State	Management Subsyst. Health	0x28	Discrete	0x07	This sensor monitors the cooling status.
20	137	0	Fans State	Management Subsyst. Health	0x28	Discrete	0x07	This sensor monitors the fan status.
20	138	0	SHM Redundancy	Management Subsyst. Health	0x28	Discrete	0x0b	This sensor monitors the shelf manager redundancy status.
20	140	0	PEM A Temp	Temperature	0x01	Threshold	0x01	This sensor measures the PEM A temperature.
20	141	0	PEM B Temp	Temperature	0x01	Threshold	0x01	This sensor measures the PEM B temperature.
20	150	0	Air Filter	Entity Presence	0x25	Discrete	0x6f	This sensor checks the presence of the air filter.
20	151	0	CDM 1 Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of CDM 1.
20	152	0	CDM 2 Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of CDM 2.
20	153	0	PEM A Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of PEM A
20	154	0	PEM B Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of PEM B.
20	155	0	Fan Tray 1 Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of fan tray 1. (left fan tray)
20	156	0	Fan Tray 2 Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of fan tray 2. (right fan tray)
20	157	0	SAP Pres	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the SAP.
20	160	0	PEM A Voltage	Voltage	0x02	Threshold	0x01	This sensor measures the output voltage of PEM A.
20	161	0	PEM A Current	Current	0x03	Threshold	0x01	This sensor measures the output current of PEM A. (Optional)
20	162	0	PEM A Power	Power Supply	0x08	Threshold	0x01	This sensor measures the input power of PEM A in the past hour. (Optional)
20	163	0	PEM A Branch 1	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 1 of PEM A.
20	164	0	PEM A Branch 2	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 2 of PEM A.
20	165	0	PEM A Branch 3	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 3 of PEM A.
20	166	0	PEM A Branch 4	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 4 of PEM A.
20	170	0	PEM B Voltage	Voltage	0x02	Threshold	0x01	This sensor measures the output voltage of PEM B.
20	171	0	PEM B Current	Current	0x03	Threshold	0x01	This sensor measures the output current of PEM B. (Optional)
20	172	0	PEM B Power	Power Supply	0x08	Threshold	0x6f	This sensor measures the input power of PEM B in the past hour. (Optional)
20	173	0	PEM B Branch 1	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 1 of PEM B.
20	174	0	PEM B Branch 2	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 2 of PEM B.
20	175	0	PEM B Branch 3	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 3 of PEM B.
20	176	0	PEM B Branch 4	Entity Presence	0x25	Discrete	0x6f	This sensor indicates the presence of the voltage after the fuse on branch 4 of PEM B.
20	180	0	Shelf Power	Power Supply	0x08	Threshold	0x01	This sensor measures the total input power of the shelf as a sum of both PEMs.

IPMC	Nr.	LUN	Name	Type-Code		Event/Reading Type-Code		Description
5a = Left Fan Tray								
5a	0	0	HOT SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states.
5a	1	0	Version Change	reserved	0x2b	Discrete	0x6f	This sensor indicates a hardware or software change.
5a	2	0	IPMB Physical	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link state.
5a	3	0	+3.3V	Voltage	0x02	Threshold	0x01	This sensor measures the local 3.3 V voltage in volts.
5a	4	0	+3.6V External	Voltage	0x02	Threshold	0x01	This sensor measures the external 3.6 V voltage in volts.
5a	5	0	FT Temp 2	Temperature	0x01	Threshold	0x01	This sensor measures temperature.
5a	6	0	FT Temp 1	Temperature	0x01	Threshold	0x01	This sensor measures temperature.
5a	7	0	Fan Tach. 1	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 1 (RPM).
5a	8	0	Fan Tach. 2	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 2 (RPM).
5a	9	0	Fan Tach. 3	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 3 (RPM).
5a	10	0	Fan Tach. 4	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 4 (RPM).
5a	11	0	Fan Tach. 5	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 5 (RPM).
5a	12	0	Fan Tach. 6	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 6 (RPM).
5a	13	0	Air Filter	OEM reserved	0xc0	Discrete	0x08	This sensor checks the presence of the air filter.
5a	14	0	-48V A	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_A at the left fan tray connector.
5a	15	0	-48V A Fused	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_A after fan tray's main fuse.
5a	16	0	-48V B	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_B at the left fan tray connector.
5a	17	0	-48V B Fused	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_B after fan tray's main fuse.
5c = Right Fan Tray								
5c	0	0	HOT SWAP	Hot Swap	0xf0	Discrete	0x6f	This sensor returns the hot-swap states.
5c	1	0	Version Change	reserved	0x2b	Discrete	0x6f	This sensor indicates a hardware or software change.
5c	2	0	IPMB Physical	IPMB Link	0xf1	Discrete	0x6f	This sensor returns the IPMB link state.
5c	3	0	+3.3V	Voltage	0x02	Threshold	0x01	This sensor measures the local 3.3 V voltage in volts.
5c	4	0	+3.6V External	Voltage	0x02	Threshold	0x01	This sensor measures the external 3.6 V voltage in volts.
5c	5	0	FT Temp 2	Temperature	0x01	Threshold	0x01	This sensor measures temperature.
5c	6	0	FT Temp 1	Temperature	0x01	Threshold	0x01	This sensor measures temperature.
5c	7	0	Fan Tach. 1	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 1 (RPM).
5c	8	0	Fan Tach. 2	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 2 (RPM).
5c	9	0	Fan Tach. 3	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 3 (RPM).
5c	10	0	Fan Tach. 4	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 4 (RPM).
5c	11	0	Fan Tach. 5	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 5 (RPM).
5c	12	0	Fan Tach. 6	Fan	0x04	Threshold	0x01	This sensor indicates the speed of the fan 6 (RPM).
5c	13	0	Air Filter	OEM reserved	0xc0	Discrete	0x08	This sensor checks the presence of the air filter.
5c	14	0	-48V A	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_A at the right fan tray connector.
5c	15	0	-48V A Fused	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_A after fan tray's main fuse.
5c	16	0	-48V B	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_B at the right fan tray connector.
5c	17	0	-48V B Fused	OEM reserved	0xc0	Discrete	0x08	This sensor indicates the presence of the –48 V_B after fan tray's main fuse.

10 Technical Data

Table 19: Technical Data

Physical Dimensions	
Height	6 U
Width	482.6 mm
Depth (with handles)	462 mm
Power AC	
Input voltage nom.	100 V_{AC} to 120 V_{AC} / 200 V_{AC} to 240 V_{AC}
Input voltage range	90 V_{AC} to 140 V_{AC} / 180 V_{AC} to 264 V_{AC}
Input Power	15 A per PSU
Overcurrent Protection	30 A fuses for each branch
Power DC	
Input voltage nom.	-48/-60 V_{DC}
Input voltage range	-40 V_{DC} to -75 V_{DC}
Input Power Protection	30 A
Cooling Capacity	
Front Boards	400 W / Board
RTM	50 W / Board
Environmental	
Ambient temperature (long term)	+5°C...+40°C (41°F to 104°F)
Ambient temperature (short term)	-5°C...+55°C (23°F to 131°F)
Humidity	+5%...+85%, no condensation
EMI	
Conducted Emissions	EN 55022 Class A
Radiated Emissions	EN 55022 Class A
Safety	
Protected Earth Test	EN50514, test current 25 A, resistance <100 mOhm
Hipot Test (AC system)	EN50116 Mains Input primary - PE: 2200 V_{DC} -48 V/RTN - PE: 700 V_{DC}
Hipot Test (DC system)	EN60950 -1000 V_{DC}

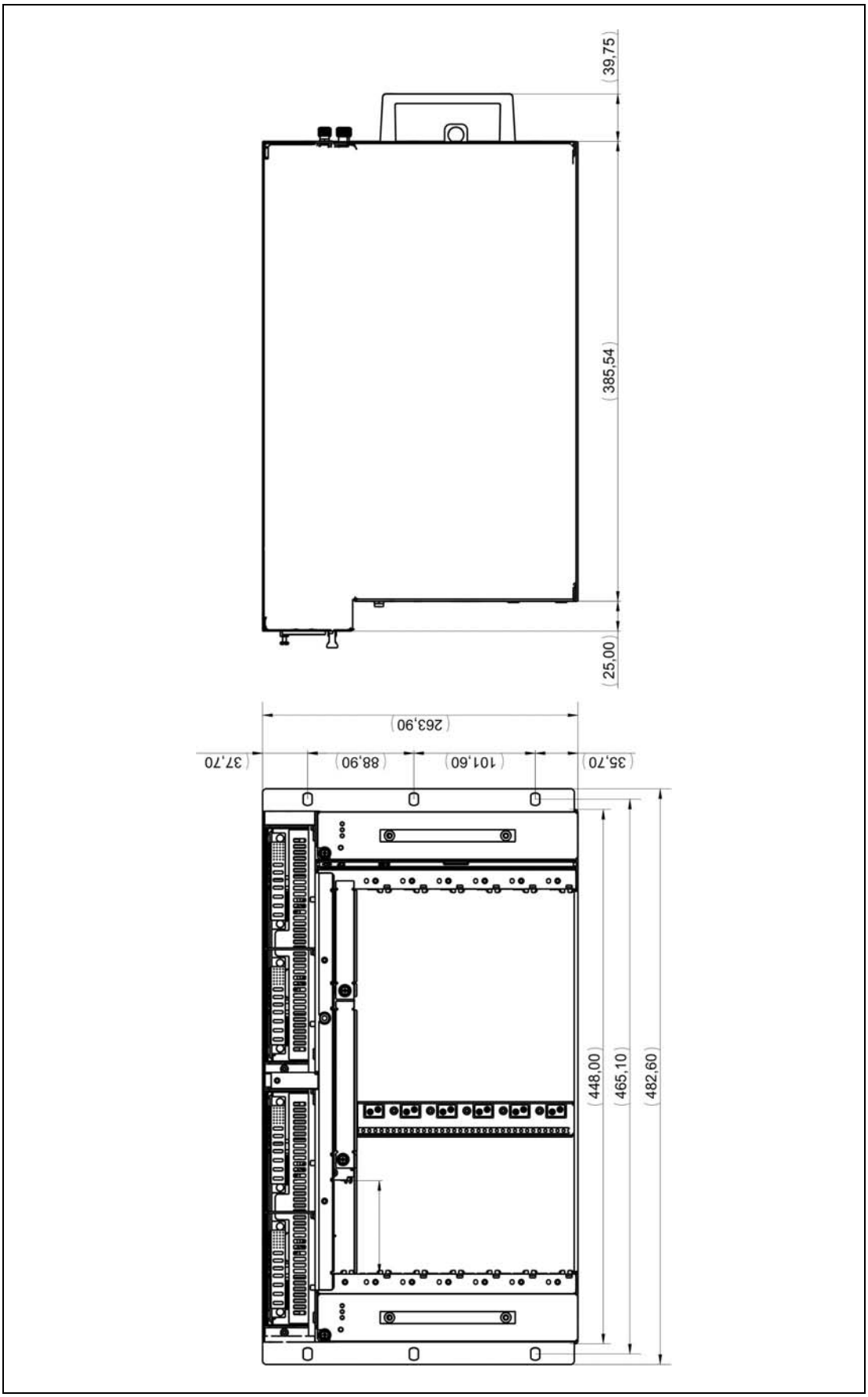
10.1 Part Numbers

Table 20: Part Numbers

Part Number	Description
11990-202	6-Slot ATCA Shelf, DC PEM, triple replicated Mesh Backplane, bussed IPMB
11990-203	6-Slot ATCA Shelf, DC PEM, triple replicated Mesh Backplane, radial IPMB
11990-204	6-Slot ATCA Shelf, AC PEM, triple replicated Mesh Backplane, bussed IPMB (Without PSUs)
11990-205	6-Slot ATCA Shelf, AC PEM, triple replicated Mesh Backplane, radial IPMB (Without PSUs)
11990-222	6-Slot ATCA Shelf, DC PEM, Dual Star Backplane, bussed IPMB
11990-223	6-Slot ATCA Shelf, DC PEM, Dual Star Backplane, radial IPMB
11990-224	6-Slot ATCA Shelf, AC PEM, Dual Star Backplane, bussed IPMB (Without PSUs)
11990-225	6-Slot ATCA Shelf, AC PEM, tDual Star Backplane, radial IPMB (Without PSUs)
21990-404	Shelf Manager ShMM-ACB-VI with bused IPMB
21990-405	Shelf Manager ShMM-ACB-VI with radial IPMB
21990-360	DC PEM (without PEM cover, for PEM cover see DC kit)
21990-361	AC PEM (without PSU)
21990-286	AC PSU CP2725
21990-362	Fan Tray
21990-363	Air Filter
21990-414	DC Kit (Front cover for the 4 PSU slots, left DC PEM cover, right DC PEM cover, fastening material. DC PEMs not included)

10.2 Dimensions

Figure 42: Dimensions



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