Functional Description and Specifications

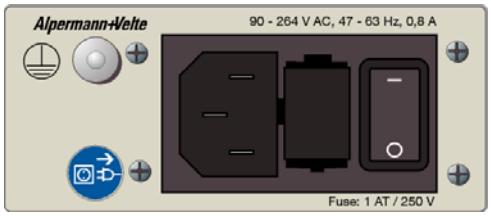
Version: 1.1

May 16, 2013

PM-PQ-PS-PT

60 W Power Supplies of the RUB1 and RUB3 System

Supplement to the “Installation & Systems Manual RUBIDIUM SERIES”



Alpermann+Velte

CONTENTS

A1 REVISION HISTORY

A2 COPYRIGHT

A3 GENERAL REMARKS

1 OVERVIEW OF THE POWER SUPPLY MODULES 6

1.1 GENERAL CHARACTERISTICS 6

1.2 THE INDIVIDUAL MODULES 7

1.3 REAR PANEL AND CONNECTIONS 8

1.4 INSERTION OR REMOVAL OF A POWER SUPPLY MODULE 9
1.4.1 Note on Handling OLED Displays (Modules PQ and PM with Option ‘Q’) 9
1.4.2 Inserting a Power Supply Module 10
1.4.3 Removing a Power Supply Module 12

2 60 W POWER SUPPLY 13

2.1 SPECIFICATIONS 13

2.2 FUSE REPLACEMENT PROCEDURE 14

2.3 POWER SUPPLIES IN A PARALLEL CONFIGURATION 14

2.4 EXAMPLES FOR PARALLEL OPERATION 15

3 SPECIAL FEATURES AND OPTIONS 16

3.1 LTC INPUT AT PQ MODULES 16

3.2 THE OLED DISPLAY AT PQ AND PM WITH OPTION ‘Q’ 17
3.2.1 General 17
3.2.2 Connections and Specifications 17
3.2.3 Operation 18

4 STATUS MONITOR 21

A1 Revision History

No.	Date	Subject
0.n		Preliminary documents, changes without notice.
1.0	February 28, 2013	This new document summarized the descriptions of PM, PQ, PS, and PT modules. Regarding the Ethernet functionality of the PM module please refer to document "*Functional Description and Specifications RUB Ethernet*".
1.1	May 16, 2013	PM with option 'Q' offers to set-up the OLED display via browser.

A2 Copyright

Copyright © Alpermann+Velte Electronic Engineering GmbH 2002. All rights reserved. No part of this publication may be reproduced, translated into another language, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written consent of Alpermann+Velte Electronic Engineering GmbH.

Printed in Germany.

Technical changes are reserved.

All brand and product names mentioned herein are used for identification purposes only, and are trademarks or registered trademarks of their respective holders.

Information in this publication replaces all previously published information. Alpermann+Velte Electronic Engineering GmbH assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained herein.

For further information please contact your local dealer or:

Alpermann+Velte

Electronic Engineering GmbH
Otto-Hahn-Str. 42
D-42369 Wuppertal
Phone: ++49 - (0)202 – 244 111 0
Fax: ++49 - (0)202 – 244 111 5
E-Mail: info@alpermann-velte.com
Internet: http://www.alpermann-velte.com

A3 General Remarks

This manual is a supplement to the *'Installation & Systems Manual RUBIDIUM SERIE'"*. Please read the below listed chapters of this document as these chapters are necessary for the safe and proper use of the RUBIDIUM power supply modules:

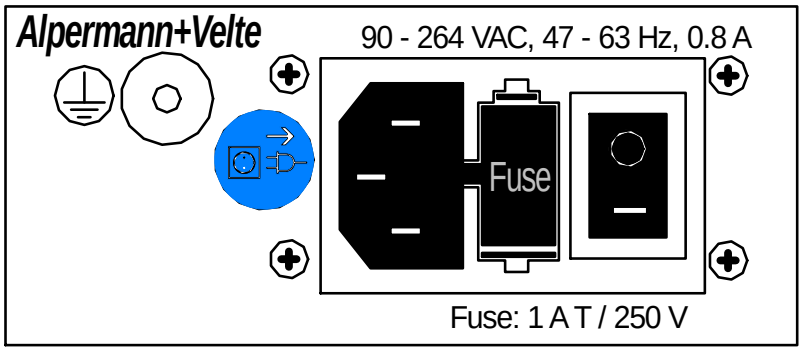
- A3 Warranty
- A4 Unpacking/Shipping/Repackaging Information
- A5 Safety Instructions
- A6 Certifications & Compliances
- Plug-In a Module
- Remove a Module

1 Overview of the Power Supply Modules

1.1 General Characteristics

All modules have the following common characteristics:

- Each power supply module can be installed at any slot (location) of the frame just as any other module would. Power is distributed in parallel to all slots and to the 24 V pin at the DSUB female connector **RLC** at the rear of the frame.
- Maximum continuous output power over the whole specified temperature range is **45 W**.
- There is no initial set-up or configuration of these modules provided; they cannot be addressed from any RUBIDIUM configuration tool.
- Mains inlet:
  - Universal IEC locking inlet.
  - 2-pole ON/OFF switch and 2-pole fuse-holder.
  - Extra safe fuse-drawer: to remove the drawer it is necessary to pull out the power supply cord first. Manual opening is virtually impossible; the aid of a tool (e.g. a small screwdriver) is required.
- Additional ground terminal located on the rear panel.
- RUB1 version modules: red LED at the front indicates that power is on.
- Continuous short circuit protection.
- Temperature and voltage sensing. Measured values can be viewed by using a status monitor of a configurable RUBIDIUM module which must be located in the same frame.
- Isolation diode is provided, so parallel operation with a second module of the same type is possible.
- 'Hot Swapping', i.e. it is possible to insert or remove the power supply module in parallel operation without interrupting the operation of other modules in this frame.
- Failure relay: connected to the FAIL_A and FAIL_B pins of the **RLC** connector at the rear of the frame. Relay closes in case that voltage drops below the specified threshold or temperature rises above the specified value.



1.2 The Individual Modules

PS and **PQ** modules are provided for the RUB1 system (19“, 1 RU).

PT modules are provided for the RUB3 system (19“, 3 RU).

PM modules are available in RUB1 version or RUB3 version; option **Q** is available in RUB1 version only. For a description of the Ethernet functionality of the PM module please refer to document ‘*Functional Description and Specifications RUB Ethernet*’.

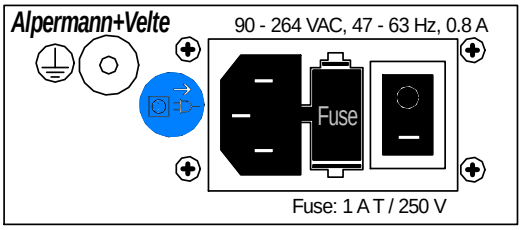
Module	**System**	**Special Features or Options**	
PS	RUB1	none	
PT	RUB3	none	
PQ	RUB1	LTC Reader:	LTC input via RJ45 at the rear panel.
		OLED Display:	Display of time and user data or date decoded from the LTC input or from telegrams of the internal TC_link interface of the RUBIDIUM systems.
PM	RUB1	Ethernet:	Network connection offers access to all RUBIDIUM modules for set-up and status monitor.
		Option **S**:	SNMP option.
		Option **N**:	NTP Server option.
		Option **M**:	MTDoE option.
		Option **Q**:	OLED display: Display of time and user data or date decoded from telegrams of the internal TC_link interface of the RUBIDIUM systems.
PM	RUB3	Ethernet:	Network connection offers access to all RUBIDIUM modules for set-up and status monitor.
		Option **S**:	SNMP option.
		Option **N**:	NTP Server option.
		Option **M**:	MTDoE option.

General technical data:

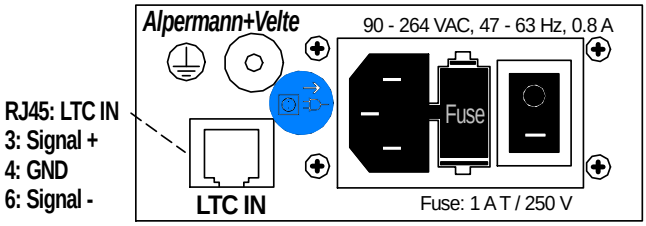
	PM	**PQ**	**PS**	**PT**
Weight	≈ 0.5 kg	≈ 0.5 kg	≈ 0.5 kg	≈ 0.5 kg
Circuit board W x D	100 x 160 mm	100 x 160 mm	100 x 160 mm	100 x 160 mm
Rear panel RUB1 RUB3	103 x 44 mm 8 HP, 3 RU	103 x 44 mm	103 x 44 mm	8 HP, 3 RU
Total power dissipation	9.4 W	9.4 W	8.7 W	8.7 W
Power dissipation of electronic part	1.9 W	1.9 W	1.2 W	1.2 W

1.3 Rear Panel and Connections

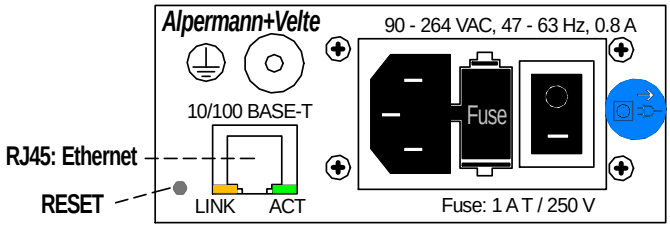
RUB1 PS



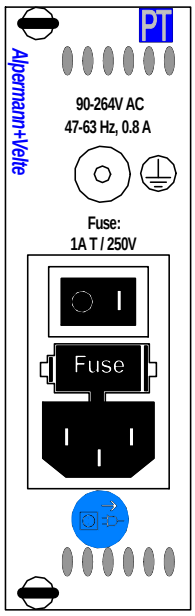
RUB1 PQ



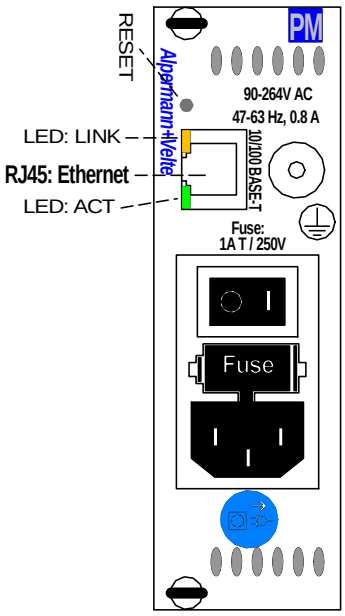
RUB1 PM



RUB3 PT



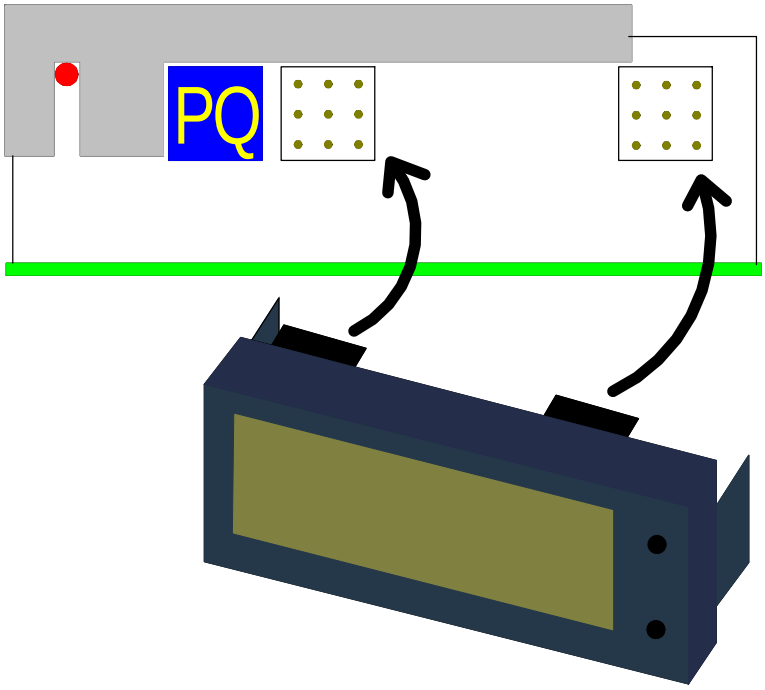
RUB3 PM



1.4 Insertion or Removal of a Power Supply Module

1.4.1 Note on Handling OLED Displays (Modules PQ and PM with Option 'Q')

The OLED display is connected on the front side of the module. The connectors are comprised of two sets of 3 x 3 pins, whereas some pins are protruding.



- **Before a module with an OLED display is inserted into a H1 chassis, the display must first be removed (unplugged) from the module.**

- **Before a module with an OLED display is removed from a H1 chassis, the power switch of the module must first be switched off, then the display must be removed! Never remove the display from a powered unit!**

1.4.2 Inserting a Power Supply Module

- Make sure that the power cable is not connected and that the power switch is in the off "**O**" position.
- For modules with OLED display: Pull the display straight out of the connections.

System RUB1 (1 RU)

- Remove the solid rear panel cover plate for the slot where the module should be installed: On the right hand side of the slot there is a small protruding tab that needs to be slightly pressed to the right, so that the rear panel cover plate can be easily removed. Retain the cover plate for possible future use.
- Remove the front panel cover plate for the slot where the module should be installed in (it pops off with the use of a small flat screwdriver). This will open the cut-outs for 4 keys and for the module identification button. Retain the cover plate for possible future use.

System RUB3 (3 RU)

- Remove the solid rear panel cover plate for the slot where the module should be installed: Unscrew both the collar screws, so that the rear panel cover plate can be easily removed. Retain the cover plate for possible future use.

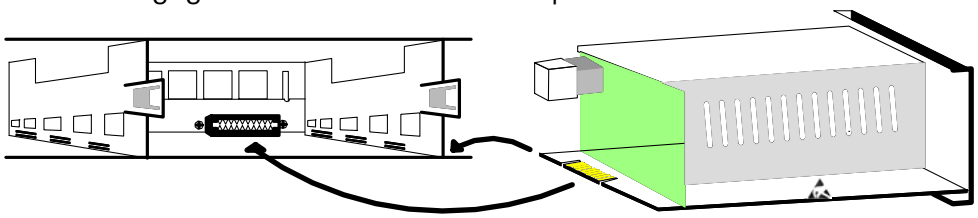
- Remove the module from its anti-static packing material.

Observe precautions for handling electrostatic-sensitive devices.

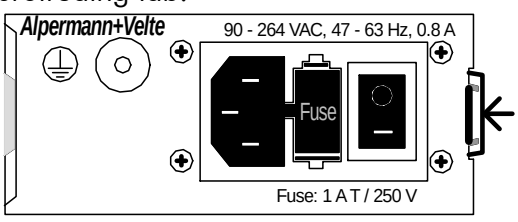
Hold the module by the edges or the rear plate; please do not touch the electronic components, strip conductors or pins. Retain the packing material for possible future use.

System RUB1 (1 RU)

- The connector pads of the circuit board fit into the socket receptacles inside the slot. Insert the module into the appropriate slot, being careful to fit the lower circuit board into the slotted card guides located on both sides of the slot. With sufficient pressure push the module until it engages into the front socket receptacle.

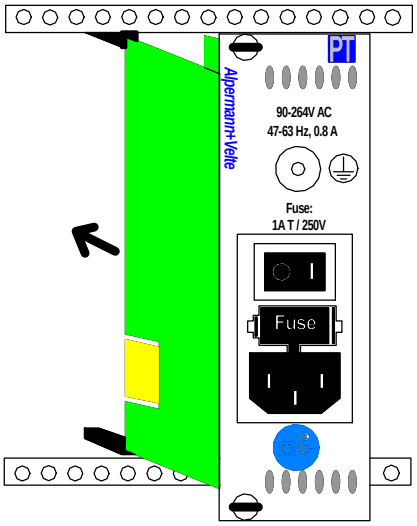


- In order to fasten the module: Take care that the rear panel of the module has fully clicked into the frames protruding tab.



System RUB3 (3 RU)

- The connector pads of the circuit board of the module fit into the socket receptacles inside the slot. Insert the board into the appropriate slotted card guides. With sufficient pressure push the module until it engages into the front socket receptacle.



- In order to fasten the module: Fasten both the collar screws of the rear plate.

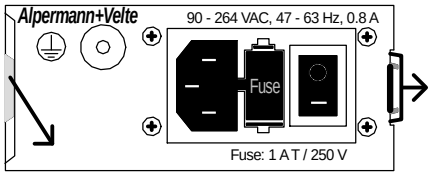
- For modules with OLED display: Once the module is completely pushed/locked into the chassis, the display must then be attached. Hold the display with two fingers right/left in such a way that the two keys next to the display module are on the right side. Press the sides together and direct the lateral latches into the outside four square openings of the front plate on the chassis. The pins will then line up automatically into the socket. With using only light pressure, the display can now be pushed completely flush with the front plate.
- Now the unit may be plugged in using a mains power cable and the power switche can be turned on.

1.4.3 Removing a Power Supply Module

- Make sure that the power cable is not connected and that the power switch is in the off "**O"** position.
- For modules with OLED display: Using two fingers from one hand squeeze either the left and right or top and bottom of the OLED display and pull it straight out.

System RUB1 (1 RU)

- Unlock the module: On the right hand side of the slot there is a small protruding tab that needs to be slightly pressed to the right. Now pull the module out of the slot.



System RUB3 (3 RU)

- Unlock the module: Unscrew both the collar screws. Now pull the module out of the slot.

- For modules with OLED display: Once the module is completely removed from the chassis, the display can then be reconnected to the module for safe storage or transportation.
- Keep the anti-static packing material (original packaging material or adequate packaging) ready.

Observe precautions for handling electrostatic-sensitive devices.

Hold the module by the edges or the rear plate; do not touch the electronic components, strip conductors or pins. Slide the module into the anti-static packing material.

System RUB1 (1 HE)

- Install the original front and rear panel cover plates if the slot is to remain empty. The frame is cooled by forced air drawn in from on side and expelled through the fan on the other side. In order to maintain this air flow no additional opening at the frame is allowed.

System RUB3 (3 HE)

- Install the original rear panel cover plate if the slot is to remain empty. The frame is cooled by forced air drawn in from on side and expelled through the fan on the other side. In order to maintain this air flow no additional opening at the frame is allowed.

2 60 W Power Supply

2.1 Specifications

Input:

Inlet socket	According to IEC/EN 60320-1/C14, protection class 1
Line voltage range	90 - 264 VAC, auto-ranging
Power line frequency	47 - 63 Hz
Input current	800 mA maximum at 90 VAC
Inrush current	50 A max. @ 264 VAC
Efficiency	86 % typical at 75 % load, 25 °C, nominal line, after five minutes warm-up
Line regulation	± 0.5 %

Output:

Output voltage	23.7 VDC ± 5 %	
Output current	0.05 A minimum, 2.5 A maximum	
Maximum continuous output power over the whole specified temperature range		45 W
Turn-on delay	4 seconds maximum	
Ripple & Noise	1 %	
Load regulation	± 1 %	
Temperature coefficient	± 0.05 % / °C	
Hold-up time at 100 % load	8 ms typical	

Failure relay:

FAIL signal threshold voltage	If the output voltage (nominal 23.7 V) of the power supply falls below 20 V approximately.
FAIL signal temperature value	T_{amb} > 70 °C.
Max. switching power	10 W
Max. switching voltage	175 V
Max. switching current	0.5 A
Max. transportable current	1.0 A

Others:

Environmental character-istics, operating	Ambient temperature if plugged to a RUB1 or RUB3 frame: +5 °C to +40 °C Relative humidity: 20 % - 80 %, non-condensing
Environmental character-istics, non-operating	Temperature: -30 °C to +70 °C Relative humidity: 5 % - 95 %, non-condensing
Altitude	Operating at 3000 m / 10.000 ft maximum

Please also refer to document '*Rubidium Series 1 and 3: Power and Heat Considerations*', available at: http://www.alpermann-velte.com/faq_e/faq_e.html.

2.2 Fuse Replacement Procedure

The power plug module has a 2-pole fuse-holder incorporated, which is located between the inlet and the ON/OFF switch.

To access the fuses please proceed as follows:

1. Turn power switch to off (position **O**).
2. Disconnect the mains plug.
3. With the aid of a tool (e.g. a small screwdriver) the fuse-drawer can be removed.

Type of fuse	250V, 1A T, 5 x 20 mm

Warning: to avoid fire hazard, the fuse must always be replaced with the same type of fuse and specified rating.

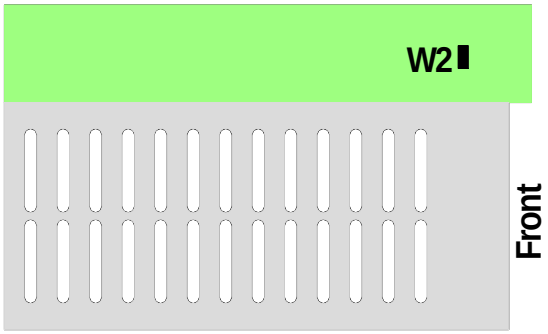
2.3 Power Supplies in a Parallel Configuration

Parallel operation may be used for fail-safe reason but not to increase the total power output.

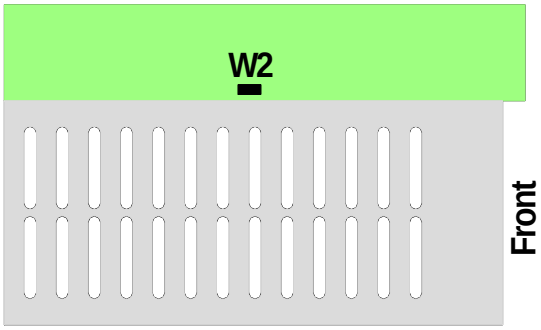
- The total DC output power should not exceed the power rating of the **individual** module.
- Each power supply module is fitted with a decoupling diode.
- In case that there are two power supply modules located in the same frame, the jumper **W2** has to be removed at one module (see diagram below). This enables the status monitor (of a configurable RUBIDIUM module which must be located in the same frame) to show and supervise the measured values of temperature and voltage of both modules.

  For modules with OLED display: The OLED display indicates **#2** at the upper right corner that the jumper has been removed.

Position of jumper at PS/PT/PQ:

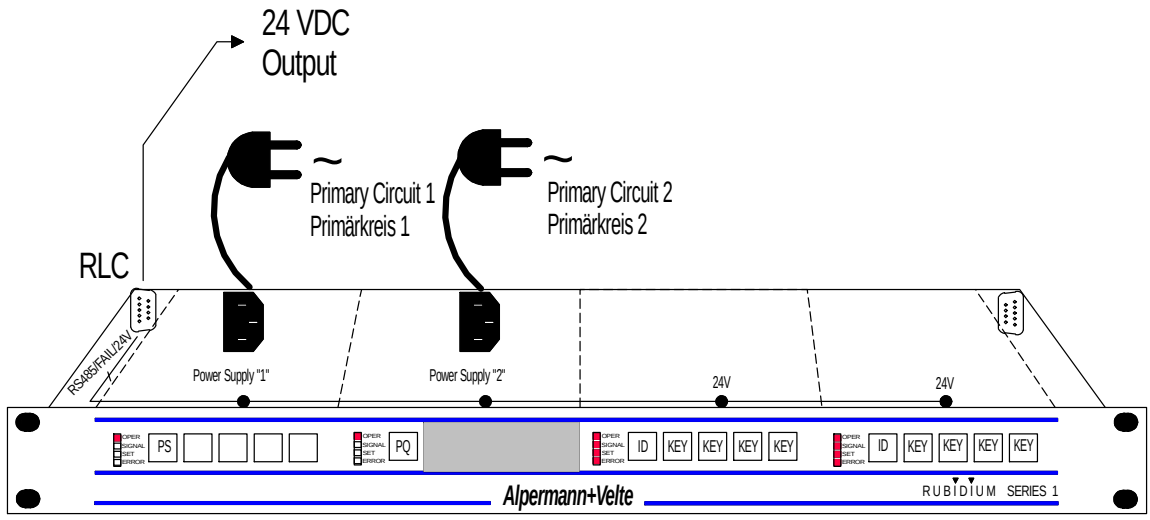


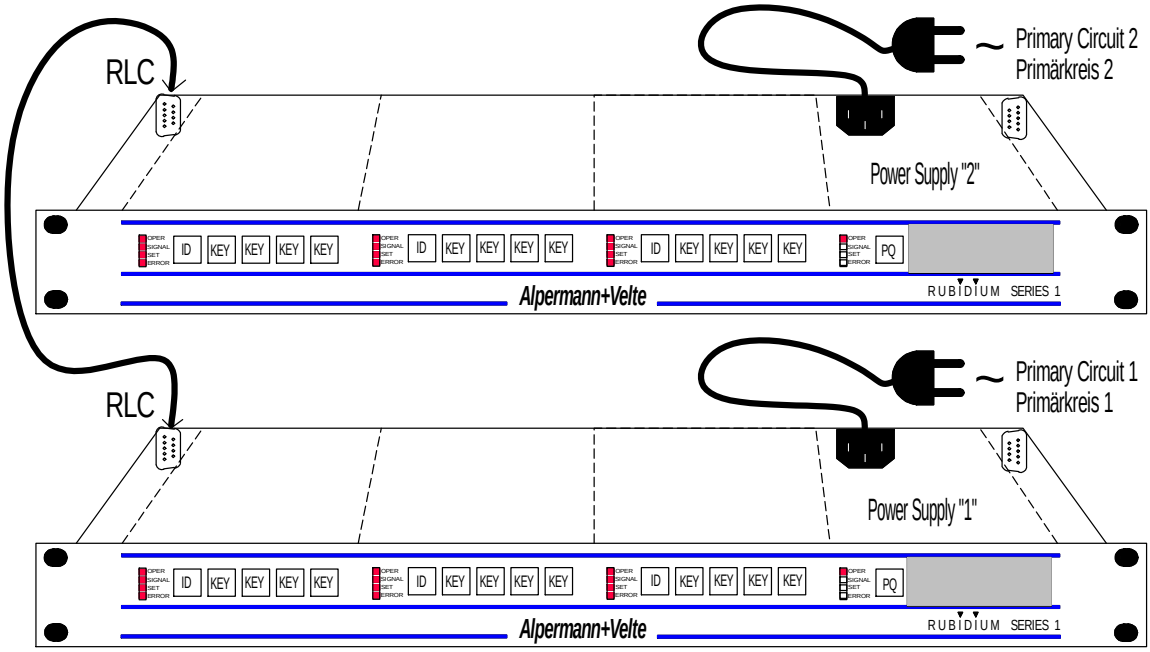
Position of jumper at PM:



2.4 Examples for Parallel Operation

These are examples for fail-safe operation using two power supply modules in parallel.





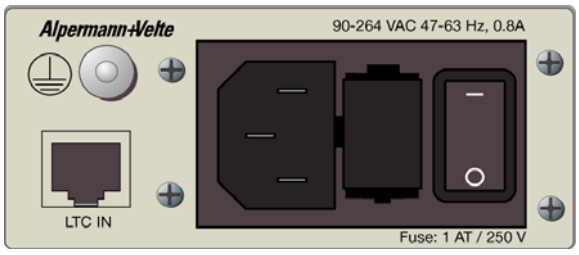
- The fail-safe operation can be achieved with respect to the primary power supply circuit as well, if each power supply module receives the mains input from a different primary circuit

3 Special Features and Options

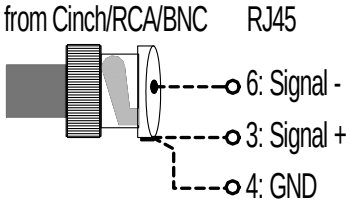
3.1 LTC Input at PQ Modules

PQ modules offer an LTC reader. Time and user data of the read LTC can be displayed on the OLED display.

The LTC input is located on the rear side of the module (RJ45 jack):



Technical data:

Connection and pin assignment	LTC IN (RJ45 jack) 3: Signal + 6: Signal – 4: GND All other pins: not connected Balanced signal input. If used with unbalanced signals, connect this way: 
Format	According to ANSI/SMPTE 12M-1-2008
Input impedance	18 kΩ
Signal level	100 mV_{p-p} to 5 V_{p-p}, automatic adaptation
Frequency	20 to 37 frames/s

3.2 The OLED Display at PQ and PM with Option 'Q'

3.2.1 General

Data received from the internal RUBIDIUM TC_link interface or read from the LTC input (PQ modules only) can be displayed on the OLED display (Organic Light Emitting Diode).

Data from the TC_link interface are available as soon as any configurable module transmits a telegram. Telegrams can be programmed at the **Link** function utilizing any RUBIDIUM configuration tool.

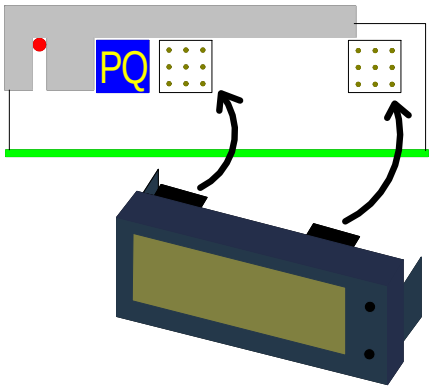
The OLED display indicates its software version just after power has turned on.

Example:

There are two front side buttons at the OLED which enables an easy set-up of display modes:

- Display brightness setting
- Selection of Time Code source
- Selection of Time Code format
- Selection of display format

3.2.2 Connections and Specifications



The OLED display is connected on the front side of the module.

The connectors are comprised of two sets of 3 x 3 pins, whereas some pins are protruding

OLED display module:

Dimensions	58 (W) x 35 (H) x 11 (D) mm
Display Format	128 columns x 64 rows
Pixel Size	0.255 x 0.255 mm
Display Diagonal	1.6"
Active Area	36.46 (B) x 18.22 (H)
Colour	Monochrome yellow
Grey Scale	4 bits
Brightness	Adjustable, 8 steps

3.2.3 Operation

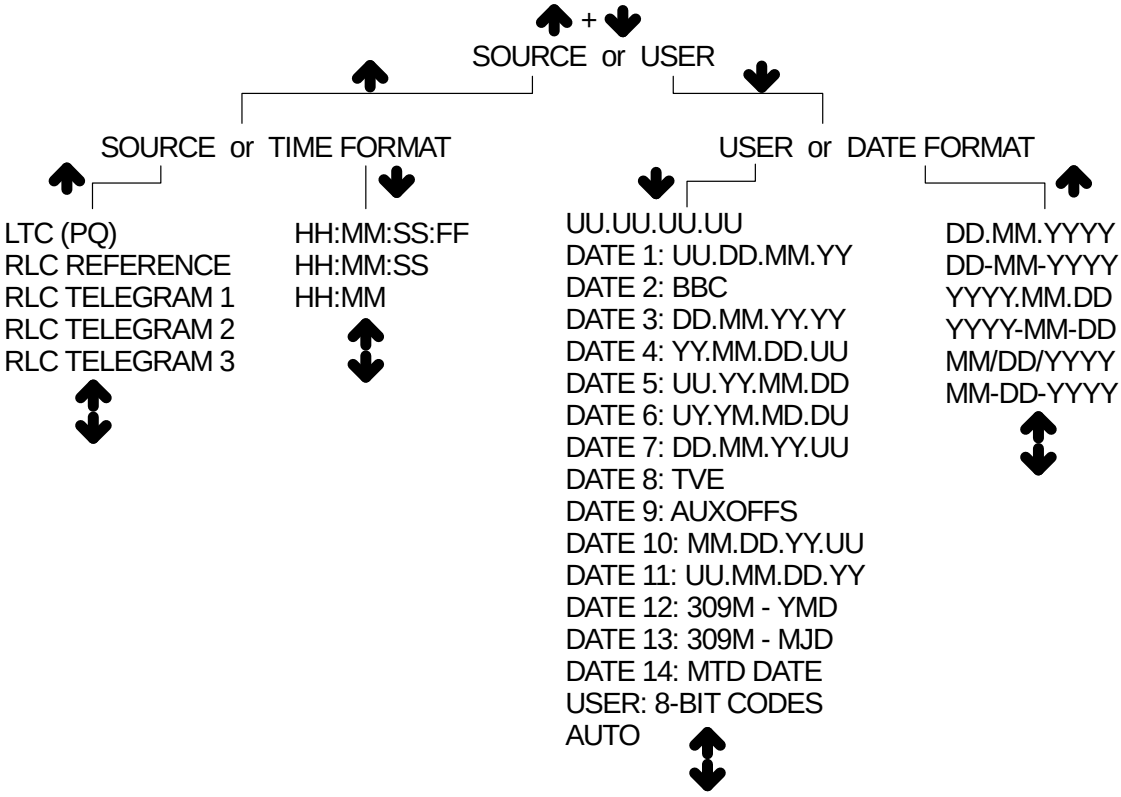
Setting the brightness:

During normal operating mode (menu inactive) the upper button lets the brightness increase and the lower key decrease. The brightness is adjustable in eight stages.

Set-up via buttons:

Press both buttons simultaneously. The upper line then shows two options, and a text flashes next to the two buttons.

As long as a text flashes next to the buttons, you can enter a submenu pressing a button. There are no further submenus if only one text will flash. Now select your function with button ↑ or ↓ according to the diagram below.

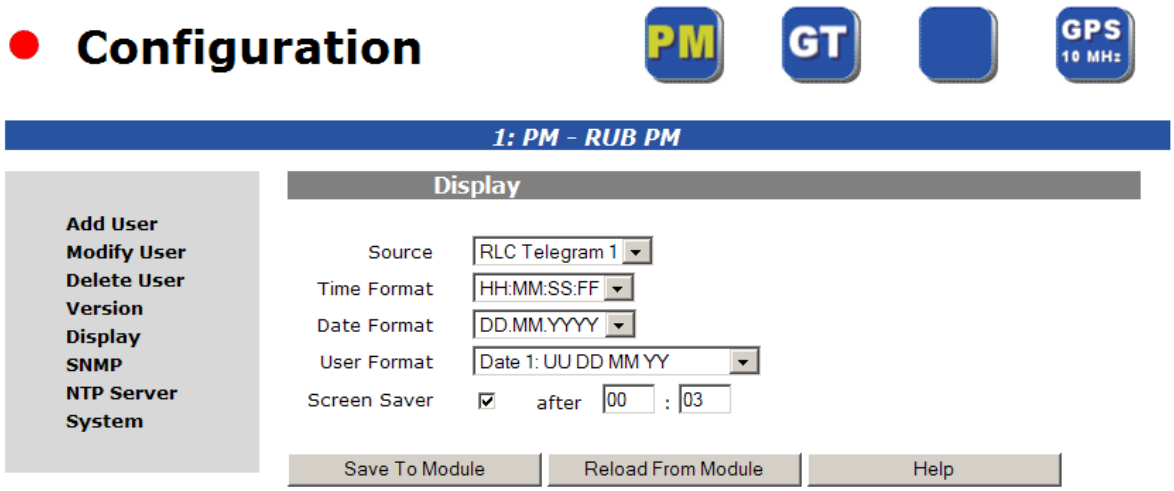


If no button has been pressed for about 7 seconds, the menu will switch off automatically. The last completed setting will be saved and remained even if power is turned off.

Set-up the OLED operation mode of PM via browser:

For a description of the Ethernet functionality of the PM module and how to access the status and set-up pages please refer to document *'Functional Description and Specifications RUB Ethernet'*.

PM with option **Q** offers a **Display** set-up:



Use the drop-down menus to program display's operating mode.

SOURCE: Select the source of data to be displayed.

Selection	Description
LTC (PQ only)	External LTC, connected at RJ45 LTC IN.
RLC REFERENCE	Data from the internal TC_link interface: Time and date from a real-time reference. Any RUB module must send a "reference" telegram.
RLC TELEGRAM 1 RLC TELEGRAM 2 RLC TELEGRAM 3	Data from the internal TC_link connection: Time code can be read from channel 1, 2 or 3. Any RUB module must send a time code telegram ("Telegram 1" or "Telegram 2" or "Telegram 3").

TIME FORMAT: Select the format of the time display.

Selection
HH:MM:SS:FF
HH:MM:SS
HH:MM

USER FORMAT: Select the format of the user data (binary groups) of the time code. This selection must correspond to the received format, otherwise it is not possible to correctly decode and display data (especially a date).

Selection	Description
AUTO	Automatic: based on the "Binary Groups Flags" in the time code the DATE 12..., DATE 13… and USER 8-BIT CODE formats can be identified automatically. With any other combination of the "Binary Groups Flags" the unspecified format will be displayed (no decoding).
USER: UU.UU.UU.UU	Unspecified use of the user data, no decoding
USER 8-BIT CODES	User data with 4 ASCII characters
DATE 1: UU.DD.MM.YY	Use of the user data as date + two arbitrary characters
DATE 2: BBC	Use of the user data as date in “BBC“ Format
DATE 3: DD.MM.YYYY	Use of the user data as date
DATE 4: YY.MM.DD.UU	Use of the user data as date + two arbitrary characters
DATE 5: UU.YY.MM.DD	Use of the user data as date + two arbitrary characters
DATE 6: UY.YM.MD.DU	Use of the user data as date + two arbitrary characters
DATE 7: DD.MM.YY.UU	Use of the user data as date + two arbitrary characters
DATE 8: TVE	Use of the user data as date in “TVE“ Format
DATE 9: AUXOFFS	Use of the user data as date
DATE 10: MM.DD.YY.UU	Use of the user data as date + two arbitrary characters
DATE 11: UU.MM.DD.YY	Use of the user data as date + two arbitrary characters
DATE 12: 309M - YMD	Use of the user data as date according to SMPTE 309M
DATE 13: 309M - MJD	Use of the user data as date according to SMPTE 309M
DATE 14: MTD DATE	LTC(MTD): data of the MTD Timer System

DATE FORMAT: Select the display format of the date which will be decoded out of the user data.

Selection	Description
DD.MM.YYYY	Day.Month.Year, with a decimal point as a separator
DD-MM-YYYY	Day-Month-Year, with a “-“ as a separator
YYYY.MM.DD	Year.Month.Day with a decimal point as a separator
YYYY-MM-DD	Year-Month-Day with a “-“ as a separator
MM/DD/YYYY	Month/Day/Year with a “/“ as a separator
MM-DD-YYYY	Month-Day-Year with a “-“ as a separator

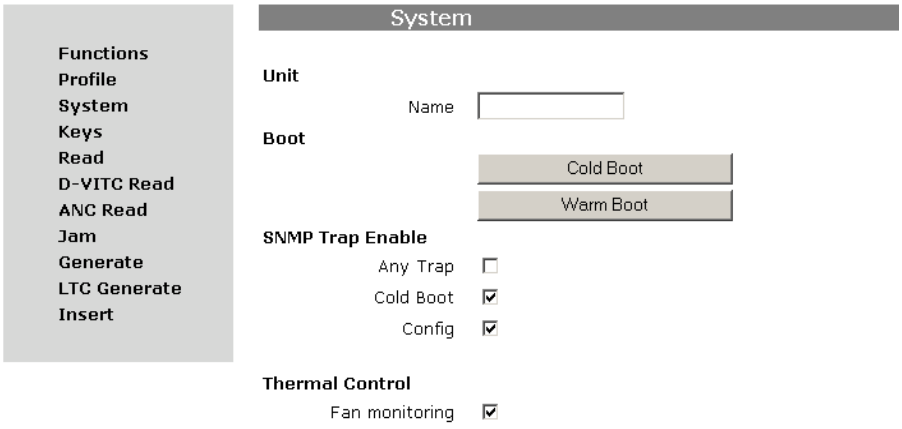
Screen Saver:

A screen saver has been implemented to increase the lifespan of the OLED display. PM with option Q offers a set-up of this feature via browser; without this set-up the screen saver program starts if during one hour no key has been pressed. In this mode a 6-digits time display moves over the screen. During screen saver mode the next key press will set the display to normal mode, the original function initiated by this key will be omitted.

4 Status Monitor

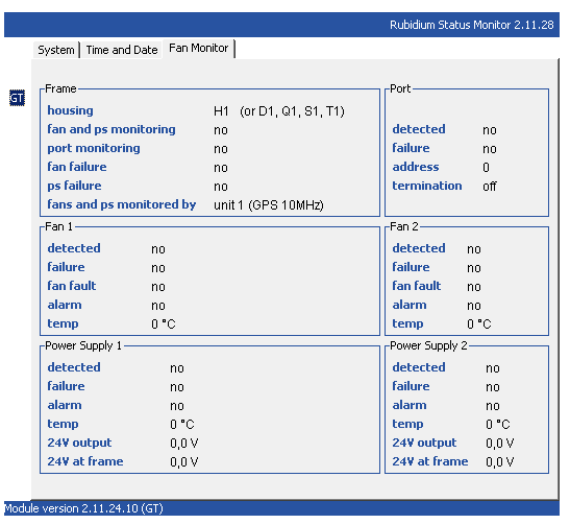
Basically, any configurable module is able to monitor the status of fans and power supplies which are located in the same frame. A RUB1 chassis holds one fan and up to two power supplies. A RUB3 chassis holds two fans and up to two power supplies.

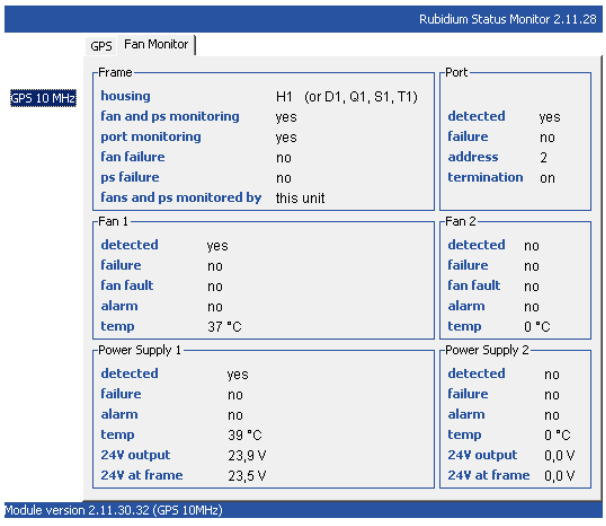
This monitoring feature has to be switched on: Click on the '**Fan monitoring**' check box of the 'System" function utilizing one of the Rubidium configuration tools:



If more than one module has "Fan Monitoring" enabled, there will be only one module which indeed is responsible for monitoring.

Example of a "**Fan Monitor**" status display: GT (left side) is not responsible for monitoring but refers to module GPS 10 MHz (right side).





Failure of a fan: "**fan failure** = yes" will be indicated if a blocking or a stop has been detected.

An **alarm** (fan or power supply) will be generated if the temperature rises above **65 °C**.