



TIMING SOLUTIONS

# Rubidium Series



RUB PM  
RUB PS  
RUB PT

## 60 W Power Supplies of the RUB1 and RUB3 System



Functional Description and Specifications  
Supplement to the "Installation & Systems Manual RUBIDIUM SERIES"  
Version: 1.3  
December 2, 2020





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## 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.
1.2	August 26, 2019	Removed PQ. Changed address of Plura Europe GmbH.
1.3	December 2, 2020	Re-formatted in new design.

## A2 Copyright

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## 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

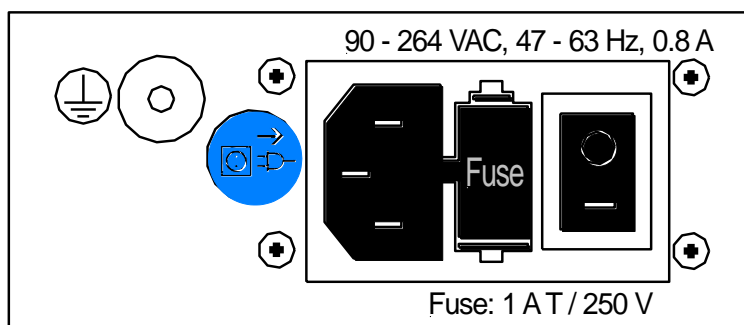


# 1 Overview of the Power Supply Modules

## 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** module is 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
PM	RUB1	<p><u>Ethernet:</u> Network connection offers access to all RUBIDIUM modules for set-up and status monitor.</p> <p><u>Option S:</u> SNMP option.</p> <p><u>Option N:</u> NTP Server option.</p> <p><u>Option M:</u> MTDoe option.</p> <p><u>Option R3:</u> Timer request protocol option, 3 clients.</p> <p><u>Option R10:</u> Timer request protocol option, 10 clients.</p>
PM	RUB3	<p><u>Ethernet:</u> Network connection offers access to all RUBIDIUM modules for set-up and status monitor.</p> <p><u>Option S:</u> SNMP option.</p> <p><u>Option N:</u> NTP Server option.</p> <p><u>Option M:</u> MTDoe option.</p> <p><u>Option R3:</u> Timer request protocol option, 3 clients.</p> <p><u>Option R10:</u> Timer request protocol option, 10 clients.</p>

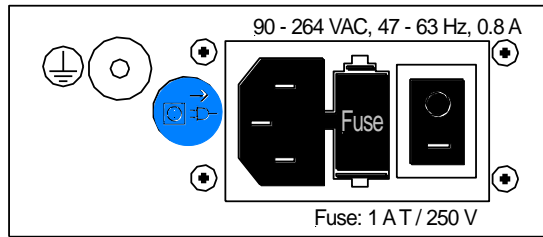
General technical data:

	PM	PS	PT
Weight	≈ 0.5 kg	≈ 0.5 kg	≈ 0.5 kg
Circuit board WxD	100x160 mm	100x160 mm	100x160 mm
Rear panel			
RUB1	103 x 44 mm	103 x 44 mm	
RUB3	8 HP, 3 RU		8 HP, 3 RU
Total power dissipation	9.4 W	8.7 W	8.7 W
Power dissipation of electronic part	1.9 W	1.2 W	1.2 W

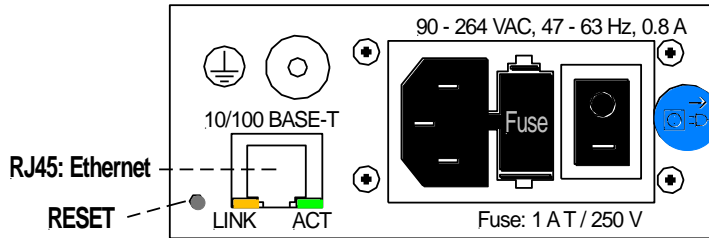


### 1.3 Rear Panel and Connections

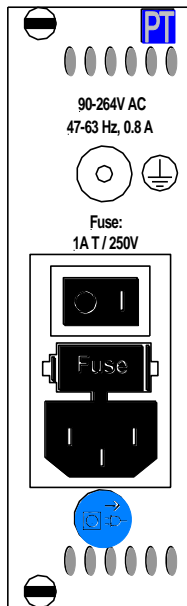
RUB1 PS



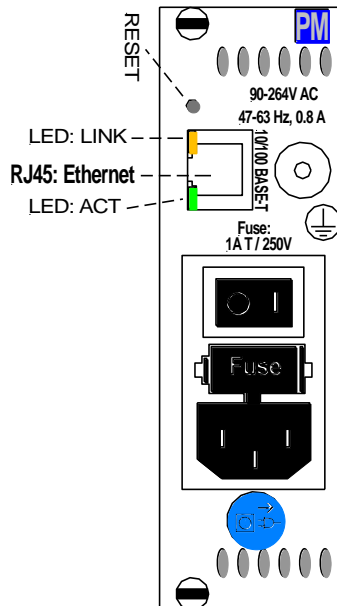
RUB1 PM



RUB3 PT



RUB3 PM





## 1.4 Insertion or Removal of a Power Supply Module

### 1.4.1 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.

#### 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.

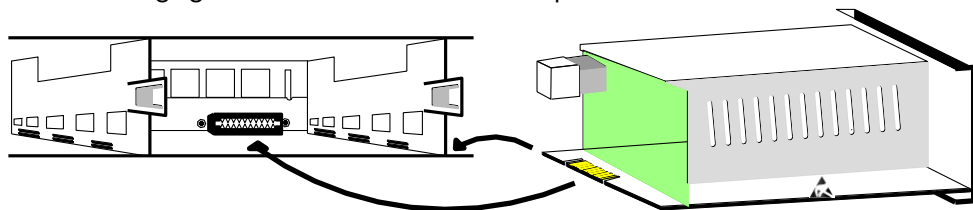


Observe precautions for handling electrostatic-sensitive devices.

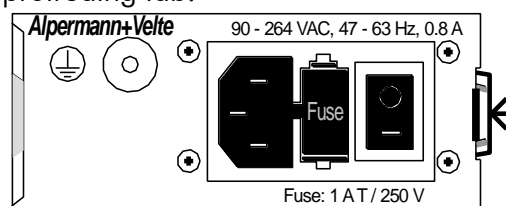
Hold the module by the edges or the rear plate; please do not touch the electronic components, strip conductors or pins. Retain the packing material for possible future use.

#### 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.

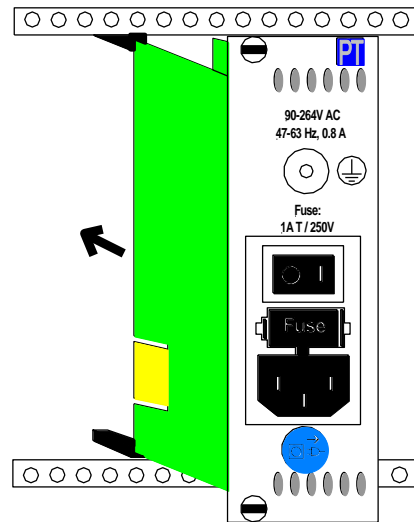


- In order to fasten the module: Take care that the rear panel of the module has fully clicked into the frames protruding tab.



### 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.
- Now the unit may be plugged in using a mains power cable and the power switch can be turned on.

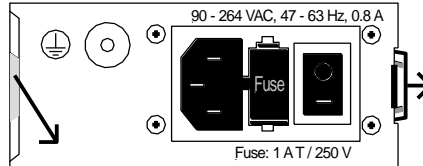


## 1.4.2 Removing a Power Supply Module

- Make sure that the power cable is not connected and that the power switch is in the off "O" position.

### 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.

- 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 V AC
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 20V approximately.
FAIL signal temperature value	T <sub>amb</sub> > 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 characteristics, operating	Ambient temperature if plugged to a RUB1 or RUB3 frame: +5 °C to +40 °C Relative humidity: 20 % - 80 %, non-condensing
Environmental characteristics, 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'.



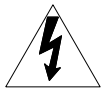
## 2.2 Fuse Replacement Procedure

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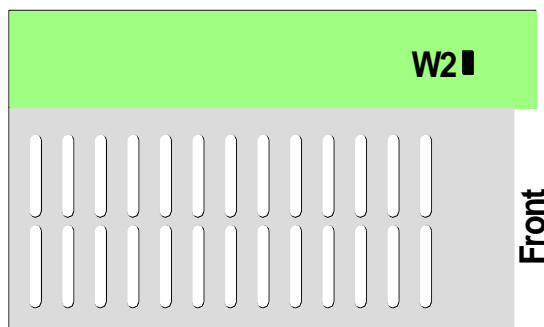
Warning: to avoid fire hazard, the fuse must always be replaced with the same type of fuse and specified rating.

## 2.3 Power Supplies in a Parallel Configuration

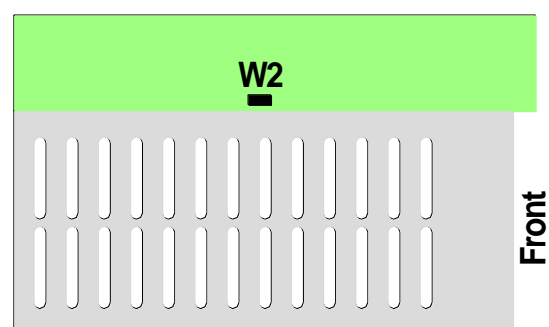
Parallel operation may be used for fail-safe reason but not to increase the total power output.

- 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.

Position of jumper at PS/PT:

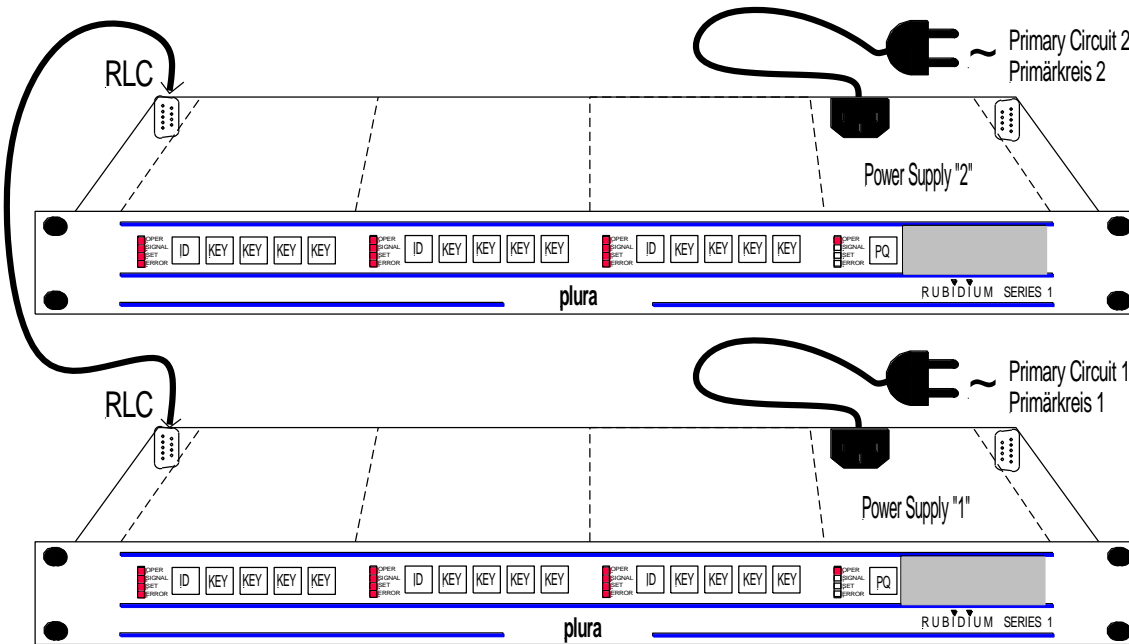
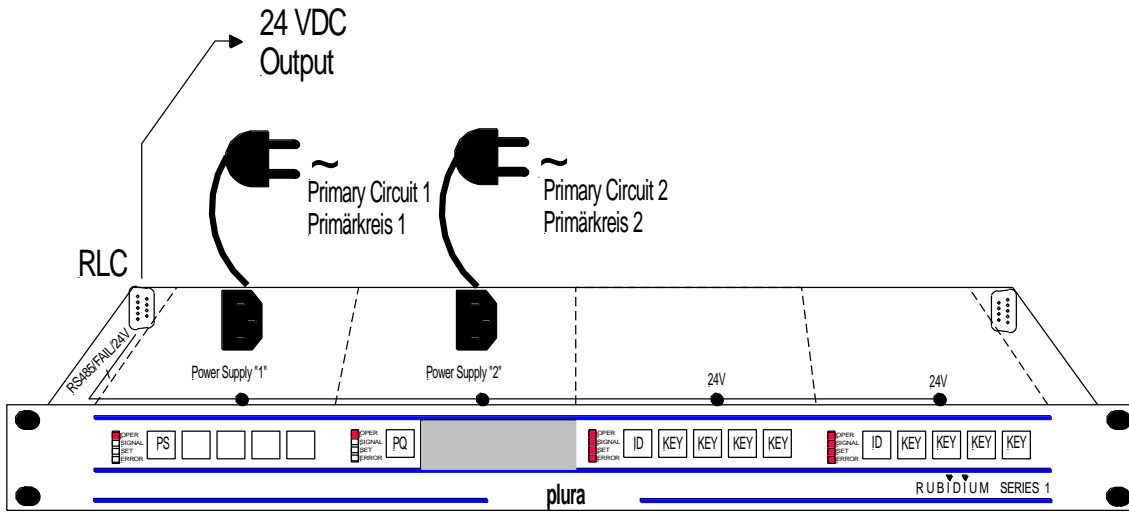


Position of jumper at PM:



## 2.4 Examples for Parallel Operation

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



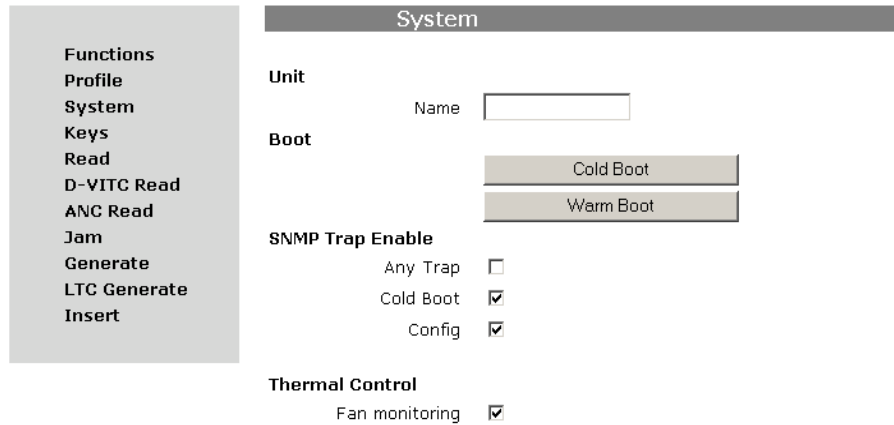
- The fail-safe operation can be achieved with respect to the primary power supply circuit as well, if each power supply module receives the mains input from a different primary circuit



### 3 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).

Rubidium Status Monitor 2.11.28			
System   Time and Date   Fan Monitor			
-Frame-		-Port-	
housing	H1 (or D1, Q1, S1, T1)	detected	no
fan and ps monitoring	no	failure	no
port monitoring	no	address	0
fan failure	no	termination	off
ps failure	no	fans and ps monitored by unit 1 (GPS 10MHz)	
-Fan 1-		-Fan 2-	
detected	no	detected	no
failure	no	failure	no
fan fault	no	fan fault	no
alarm	no	alarm	no
temp	0 °C	temp	0 °C
-Power Supply 1-		-Power Supply 2-	
detected	no	detected	no
failure	no	failure	no
alarm	no	alarm	no
temp	0 °C	temp	0 °C
24V output	0,0 V	24V output	0,0 V
24V at frame	0,0 V	24V at frame	0,0 V

Rubidium Status Monitor 2.11.28			
GPS Fan Monitor			
-Frame-		-Port-	
housing	H1 (or D1, Q1, S1, T1)	detected	yes
fan and ps monitoring	yes	failure	no
port monitoring	yes	address	2
fan failure	no	termination	on
ps failure	no	fans and ps monitored by this unit	
-Fan 1-		-Fan 2-	
detected	yes	detected	no
failure	no	failure	no
fan fault	no	fan fault	no
alarm	no	alarm	no
temp	37 °C	temp	0 °C
-Power Supply 1-		-Power Supply 2-	
detected	yes	detected	no
failure	no	failure	no
alarm	no	alarm	no
temp	39 °C	temp	0 °C
24V output	23,9 V	24V output	0,0 V
24V at frame	23,5 V	24V at frame	0,0 V

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**.



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