



MANUAL

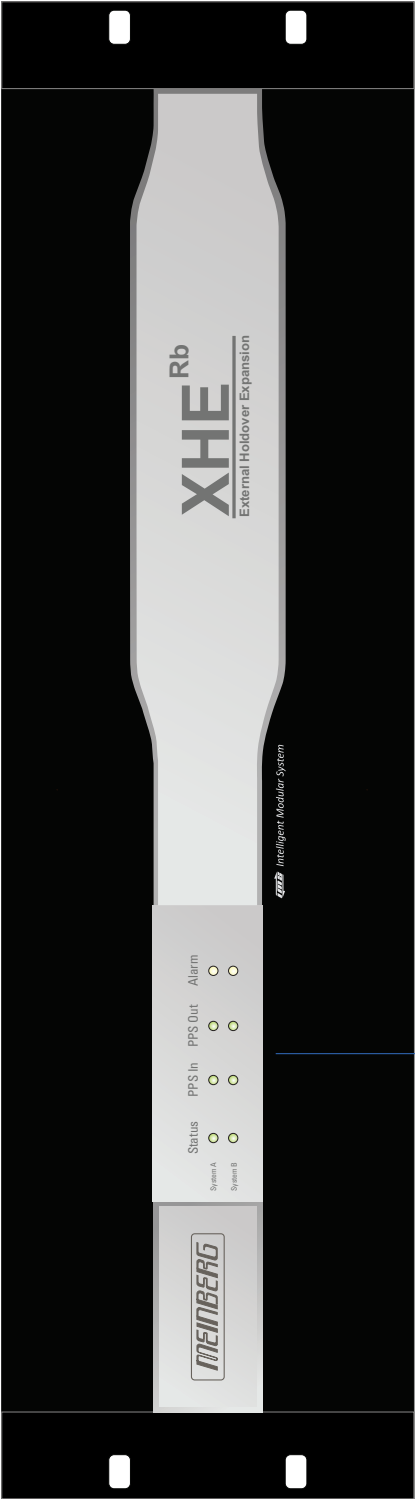
XHE-Rubidium

Holdover Extension

27th January 2016

Meinberg Radio Clocks GmbH & Co. KG

Front view (Frontansicht) XHE-Rubidium



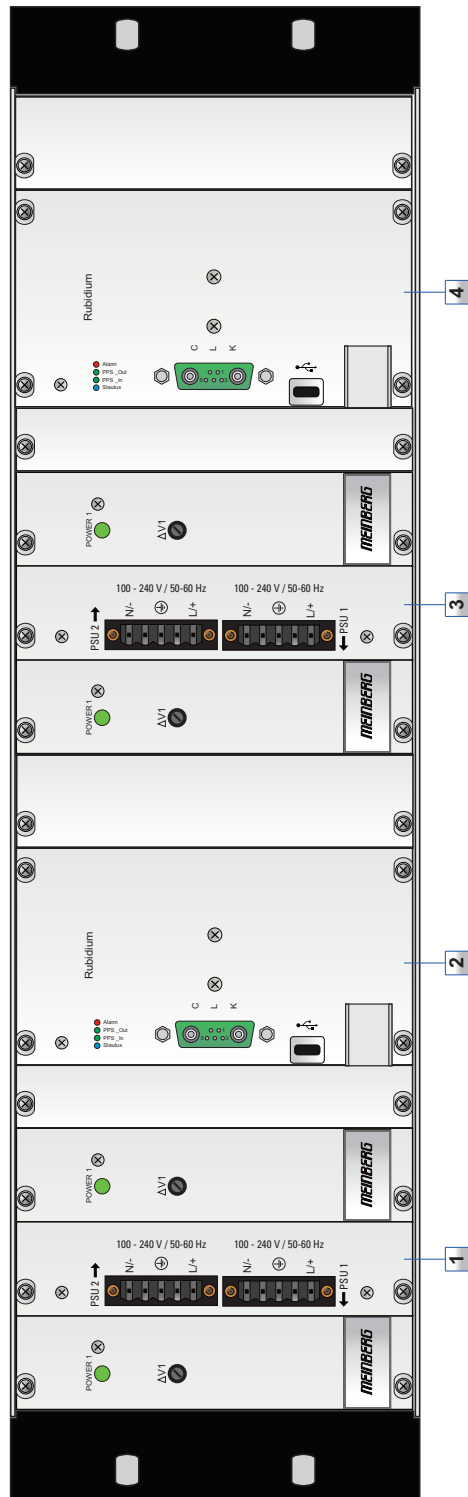
DEUTSCH

1. LED Statusanzeige:
- Status
 - PPS Eingangssignal
 - PPS Ausgang zum Empfänger
 - Fehler / Alarm

ENGLISCH

1. LED status Indicators:
- State (normal operation: green)
 - PPS input Signal from Receiver
 - PPS output signal to receiver
 - Error / Alarm

Rear view (Rückansicht) XHE-Rubidium



DEUTSCH

- 1. Netzanschluss PSU 1 und PSU 2 für PRS10 Modul Clock 1
100 - 240 V AC / 100 - 240 V AC
- 2. PRS10 Modul Clock 1
- 3. Netzanschluss PSU 1 und PSU 2 für PRS10 Modul Clock 2
100 - 240 V AC / 100 - 240 V AC
- 4. PRS10 Modul Clock 2

ENGLISH

- 1. Power connectors PSU 1 and PSU 2 for PRS10 module - Clock 1
100 - 240 V AC / 100 - 240 V AC
- 2. PRS10 module - Clock 1
- 3. Power connectors PSU 1 and PSU 2 for PRS10 module - Clock 1
100 - 240 V AC / 100 - 240 V AC
- 4. PRS10 Modul Clock 2

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1 Imprint

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






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2 Used Symbols

Nr.	Symbol	Beschreibung / Description
1		IEC 60417-5031 Gleichstrom / <i>Direct current</i>
2		IEC 60417-5032 Wechselstrom / <i>Alternating current</i>
3		IEC 60417-5017 Erdungsanschluss / <i>Earth (ground) Terminal</i>
4		IEC 60417-5019 Schutzleiterklemme / <i>Protective Conductor Terminal</i>
5		Vorsicht, Risiko eines elektrischen Schlages / <i>Caution, possibility of electric shock</i>
6		ISO 7000-0434 Vorsicht, Risiko einer Gefahr / <i>Caution, Danger</i>
7		2002/96/EC Dieses Produkt fällt unter die B2B Kategorie. Zur Entsorgung muss es an den Hersteller übergeben werden. <i>This product is handled as a B2B category product. In order to secure a WEEE compliant waste disposal it has to be returned to the manufacturer.</i>

CE marking

This device follows the provisions
of the directives 93/68/EEC



3 Safety instructions for building-in equipment

This building-in equipment has been designed and tested in accordance with the requirements of Standard IEC60950-1 "Safety of Information Technology Equipment, including Electrical Business Equipment".

During installation of the building-in equipment in an end application (i.e. rack) additional requirements in accordance with Standard IEC60950-1 have to be taken into account.

NOTE: First attach the case to protective earth - before you connect the XHE with the power line (see chapter Grounding connection XHE).



General Safety instructions

- The building-in equipment has been evaluated for use in office environment (pollution degree 2) and may be only used in this environment. For use in rooms with a higher pollution degree more stringent requirements are applicable.
- The equipment/building-in equipment was evaluated for use in a maximum ambient temperature of 40°C.
- The building-in equipment may not be opened.
- Protection against fire must be assured in the end application.
- The ventilation opening may not be covered.

For AC Supply 100-240VAC

- The building-in equipment is a class 1 - equipment and must be connected to an earthed outlet (TN Power System).
- For safe operation the building-in equipment must be protected by max 16 A fuse in the power installation system.
- Disconnection of the equipment from mains is done by pulling the mains plug at the outlet. Don't use the connector at the module for disconnection from mains.

For DC Supply 100-240VDC

- The device can be disconnected outside the unit in accordance with the regulations as in EN 60950 (e.g. through primary side line protection).
- Assembling and disassembling of the power connector is only allowed if the device is disconnected from power supply (e.g. through primary side line protection).
- All feed lines are sufficiently protected and dimensioned.

3.1 Additional Safety Hints



This manual contains important information for the installation and operation of this device as well as for your safety. Make sure to read carefully before installing and commissioning the device.

Certain operating conditions may require the observance of additional safety regulations not covered by this manual. Nonobservance of this manual will lead to a significant abatement of the security provided by this device. Security of the facility where this product is integrated lies in the responsibility of the installer.

The device must be used only for purpose named in this manual, any other use especially operation above the limits specified in this document is considered as improper use.

Keep all documents provided with the device for later reference.

This manual is exclusively for qualified electricians or by a qualified electrician trained personnel who are familiar with the applicable national standards and specifications, in particular for the construction of high voltage devices.

3.2 Supply Voltage



WARNING!

This device is powered by a dangerous voltage. Nonobservance of the safety instructions of this manual may lead to serious damage to persons and property and to danger to life! Installation, commissioning, maintenance and operation of this device are to be carried out by qualified personnel only.

The general safety instructions and standards (e.g. IEC, DIN, VDE, EN) for installation and work with high voltage equipment as well as the respective national standards and laws must be observed.

NONOBSERVANCE MAY LEAD TO SERIOUS DAMAGE TO PERSONS AND PROPERTY AND TO DANGER TO LIFE!

The device may not be opened. Repair services may only be carried out by the manufacturer.

Supply lines for this device must be equipped via an appropriate switch that must be mounted close to the device and must be marked as a mains switch for the device.

To ensure safe operation supply mains connected to this device must be equipped with a fuse and a fault-current circuit breaker according to the applicable national standards for safe operation.

The device must be connected to a protective earth with low grounding resistance according to the applicable national rules.

3.3 Cabling

**WARNING!**

DANGER TO LIFE BY ELECTRICAL SHOCK! NO LIVE WORKING!

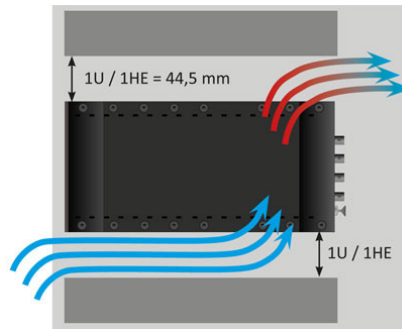
Wiring or any other work done the connectors particularly when connectors are opened may never be carried out when the installation is energized. All connectors must be covered to prevent from accidental contact to life parts.

ALWAYS ENSURE A PROPER INSTALLATION!

3.4 XHE Air Cooling in the Server Rack



Attention: To ensure sufficient cooling of the system, free space of at least 1U above and below the XHE must be maintained to the next installed chassis in the rack (see figure right).



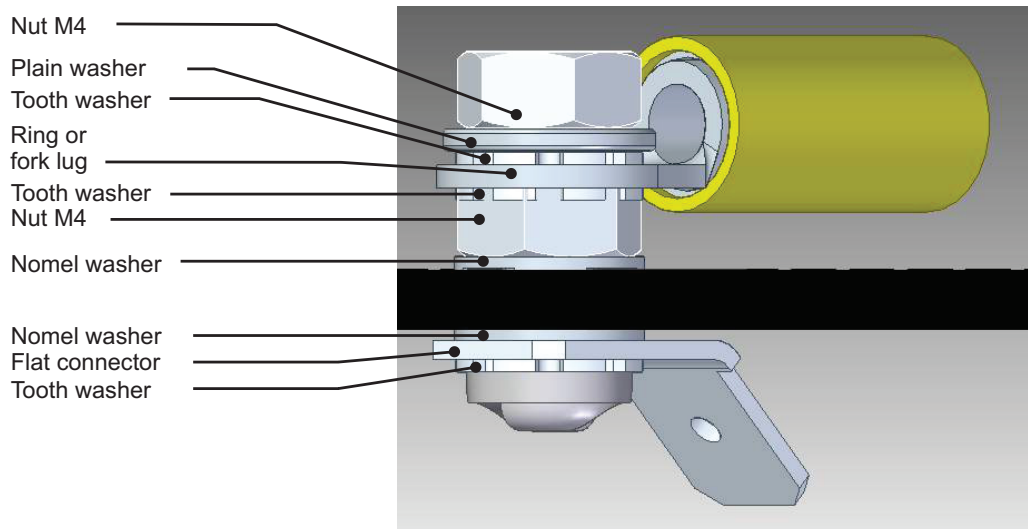
3.5 Grounding connection XHE



Note:

To ensure a safe operation and to fulfil the requirements in accordance with DIN EN 60950, the system must be correctly connected to an equipotential grounding bus. On the front panel of the system a grounding connector is provided.

The mounting components (without a cable) are included.



Note:

Use a grounding cable with $\geq 1,5\text{mm}^2$
Please ensure a correct crimp connection!

4 External Holdover Expansion XHE - Rubidium

The 19 inch / 3U rackmount chassis includes up to two rubidium modules, which are equipped with two power voltage units. For this, there are several combinations of AC and DC power are available.

Operation

The 10MHz frequency output is used for synchronization of all timing tasks within a Meinberg GPS-system.

Adjustment with PPS

The rubidium oscillator can be adjusted by means of an applied externally second impulse from a satellite receiver. Here, the rising edge of the 1PPS signal is used. A digital phase-locked loop (PLL) of second-order controls the output pulse per second (PPS) so that it corresponds to the steady state of the PPS source.

The PLL begins with the frequency control of the rubidium standards when 256 consecutive 1PPS signals were recognized as "good" (1PPS signals with a deviation of less than ± 2048 nsec compared with the first pulse). Pulses with a deviation greater than 1024 nsec compared with the last "good" second pulse are ignored.

The control by the PLL will be aborted and restarted when 256 consecutive "bad" 1PPS signals were detected. This is, for example, in the case of a jump of the second pulse to more than 1,024 nsec.

Pulse Output

If the rubidium oscillator is controlled by pulse per second, a 1PPS output signal is generated.

In this case, the digital phase loop (PLL) of second order controls the output frequency and the 1PPS output with a time constant of 65536 sec (2.25 hours). If the external PPS accurate and stable, the generated 1PPS signal is automatically adapted to the source.

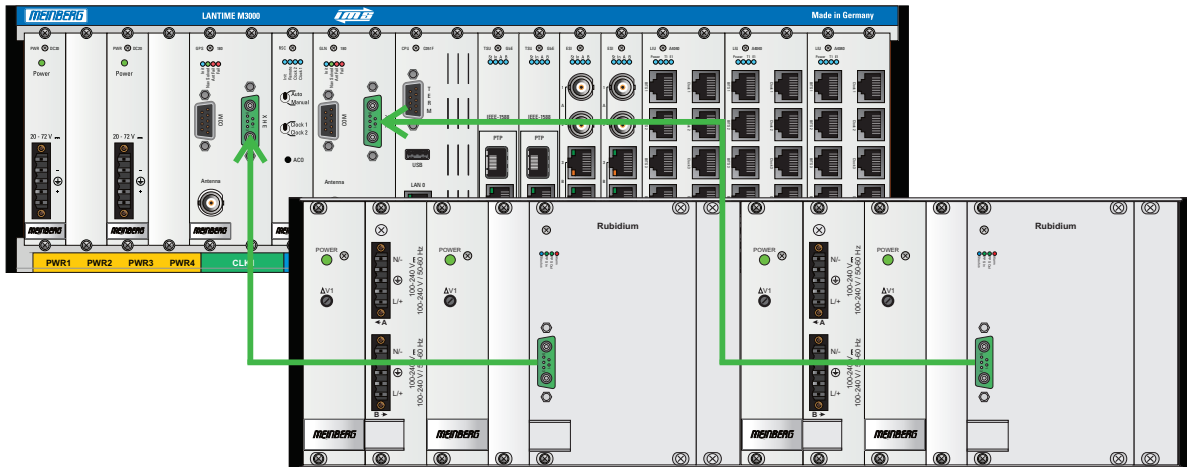
The second pulse output is controlled by a timer (400 nsec resolution) of the internal microcontroller. A special hardware generates two delays of 100 nsec and 0.5 nsec steps. The combination of these three signals allowed an initial adjustment of the generated second pulse with an accuracy and resolution of about 1 nsec.

Status Indication

Each rubidium module has four status LEDs which indicate the status of the oscillator and the input and output signals. The "Status" LED lights up blue during the initialisation phase of the rubidium, yellow if the module has warmed up and green if the rubidium is synchronized with the external PPS.

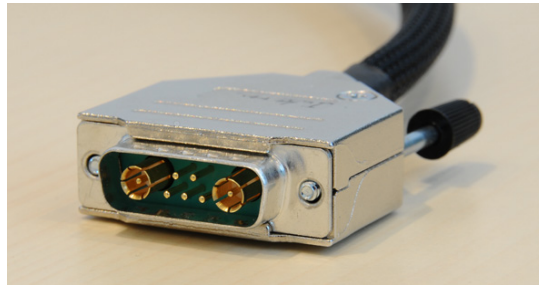
5 Initial Start of the System

Connection - Scheme: XHER^b with two Modules



Before commissioning, make sure that the connections between the rubidium module and the satellite receiver and the cable of the power supplies are installed correctly.

To connect the receiver with the rubidium module please use the supplied cable with the 7W2 D-SUB Combi plug.



After connecting the device to the supply voltage, the front panel LEDs of the associated systems should light up as shown here (after initialisation and warm up phase):

	Status	PPS In	PPS Out	Alarm
System A				
System B				

6 Technical Spezifications XHE

Technical Data PRS10 Rubidium Module

Aging:	day	$< 1.5 \cdot 10^{-11}$	
	month	$< 5 \cdot 10^{-11}$	
	year	$< 5 \cdot 10^{-10}$	
	10 years	$< 1 \cdot 10^{-9}$	
Short Term Stability:	$< 2 \cdot 10^{-11}$	$\tau = 1 \text{ sec}$	
	$< 1 \cdot 10^{-11}$	$\tau = 10 \text{ sec}$	
	$< 2 \cdot 10^{-12}$	$\tau = 100 \text{ sec}$	
Holdover:	72 hours Stratum 1 Level		
Retrace:	$\pm 5 \cdot 10^{-11}$ (72 hrs. off then 72 hrs. on)		
Warm-up Time:	< 15 minutes (time to lock)		
	< 20 minutes (time to $1 \cdot 10^{-9}$)		
Accuracy:	GPS/GLONASS-synchronized, averaged 24h:		
	$\pm 1 \cdot 10^{-12}$ ($\pm 0.01 \text{ mHz}$)		
	without GNSS-synchronization at 20°C : see AGING		
Temperature Drift:	$\pm 1 \cdot 10^{-10}$ ($-20^\circ\text{C} \dots 65^\circ\text{C}$)		
Card Type:	Eurocard, 100 mm x 160 mm, 1.5 mm Epoxy		
Card Panel:	3U / 14HP (128 mm high x 71.1 mm wide), Aluminium		
Rear Edge Connector:	according to DIN 41612/IEC 60603-2, type C 64, rows a+c (male)		

Power Supply and Chassis

Operational Voltage:	2x 100 - 240 V DC / V AC (50-60 Hz) or
	2x 20 - 72 V DC (also available as AC/DC variant)
Physical Dimensions:	482mm x 273 mm x 133 mm (Width x Depth x Height)
Ambient Temperature:	0 ... 40 °C
Humidity:	85% max. (non condensing)

6.1 Chassis Architecture XHE

The Rubidium XHE^{RB} expansion chassis is divided into 84 HP (Horizontal Pitch).
Each rubidium module occupies 36 HP:

RUB-CLOCK 1

Power supply PWR1	6HP
Connectors PWR1 - PWR2	6HP
PSU PWR2	6HP
Empty Space:	4HP
Rubidium Clock 1	14HP

Empty Space:	6HP
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RUB-CLOCK 2

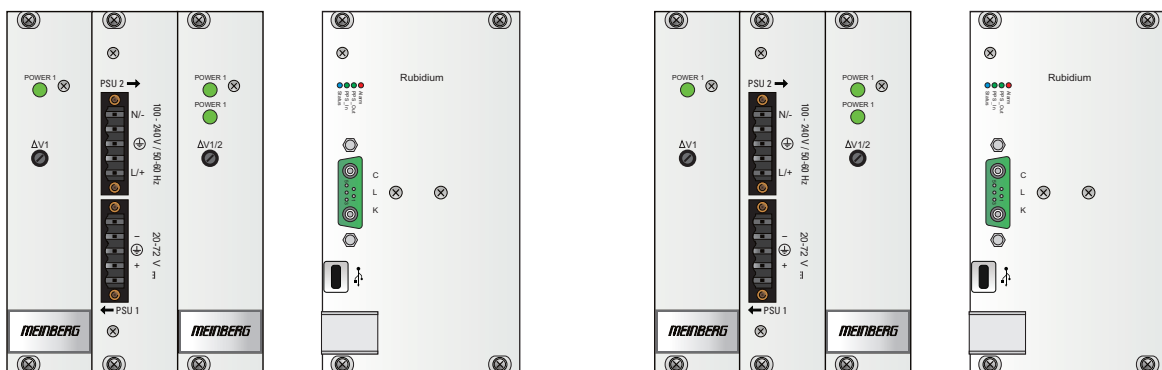
Power supply PWR1	6HP
Connectors PWR1 - PWR2	6HP
PSU PWR2	6HP
Empty Space:	4HP
Rubidium Clock 1	14HP

Empty Space:	6HP
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The XHE housing is always supplied with two back planes, this allows a second Rubidium module to be retrofitted on-site, at any time.

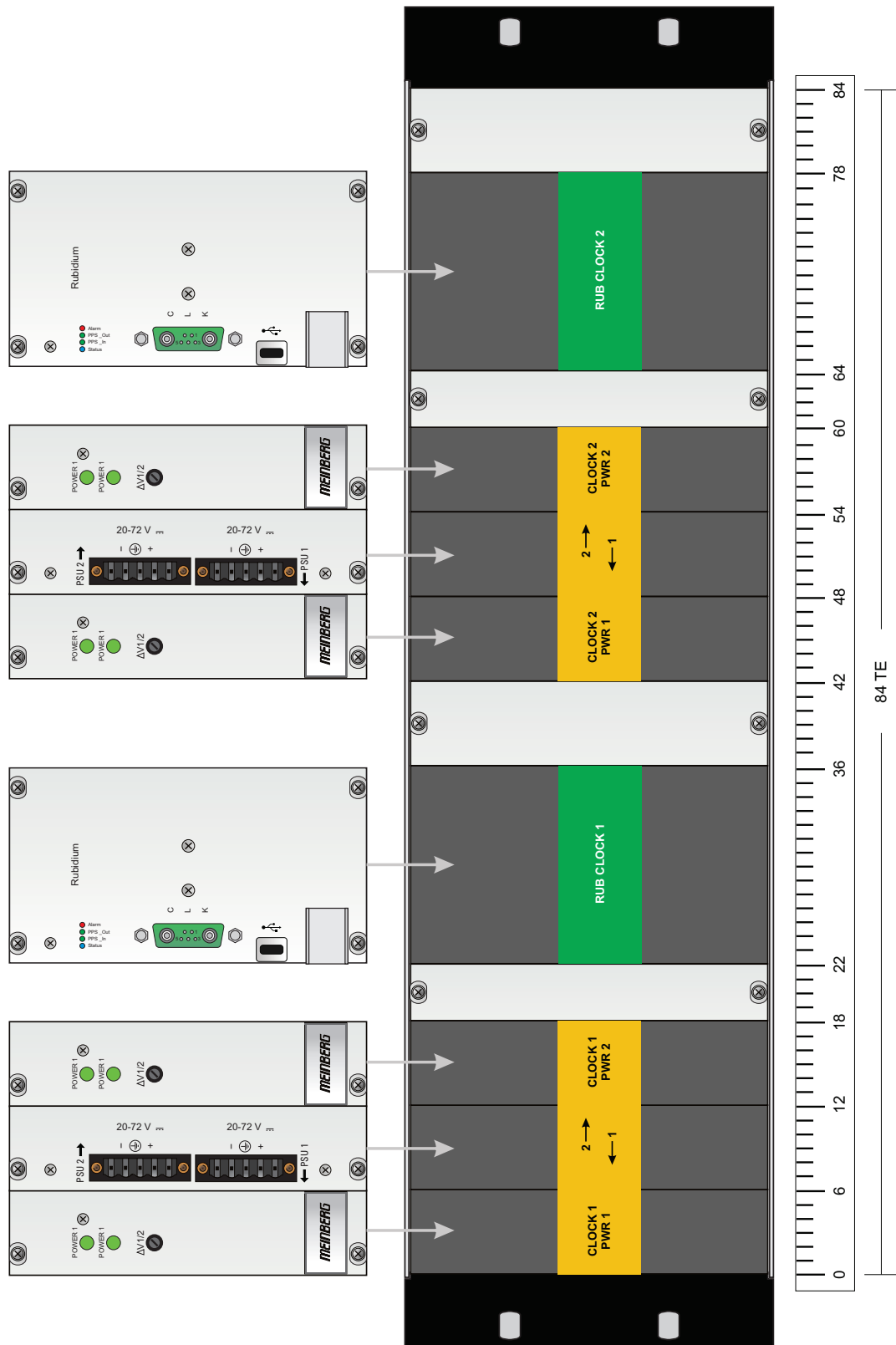
Please Note:

The power supply for a rubidium module will only be offered with a redundant power-supply configuration. In case of a second rubidium both modules are equipped with the same combination of power supply units. If the module for CLOCK 1 is configured with the AC / DC combination, the second module for CLOCK 2 will need the same power-supply configuration.



RUB-Clock 1 - AC / DC Power = RUB-Clock 2 - AC / DC Power

When removing a rubidium module (ensure that the system is disconnected from all power cords), first pull out the power supplies PWR1 and PWR2. After that you can remove the unit with the main power terminals.





XHE-Rubidium_151214