



The Synchronization Experts.



MANUAL

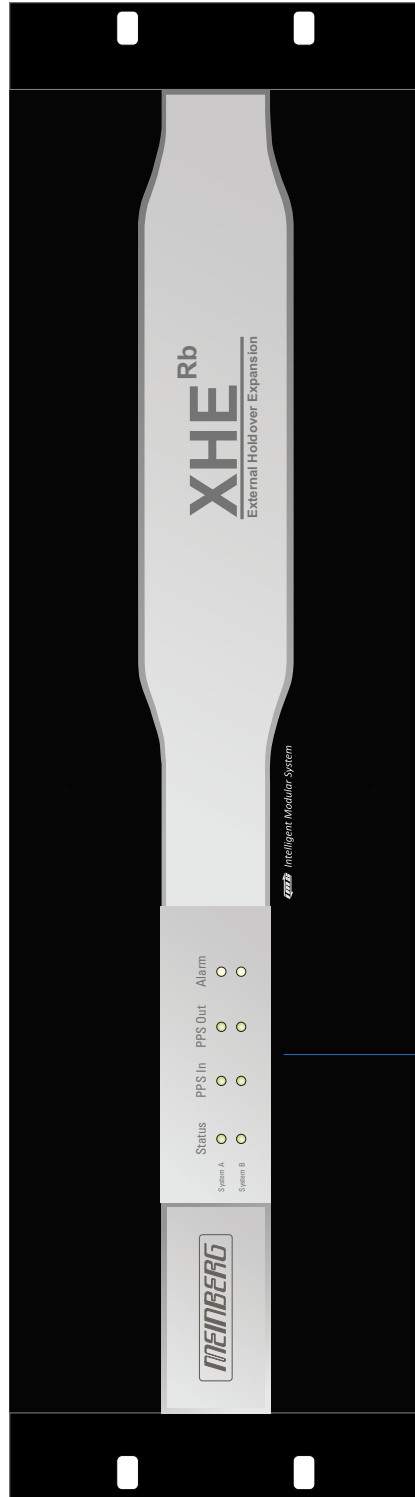
XHE-Rubidium

Holdover Extension

November 18, 2021

Meinberg Funkuhren GmbH & Co. KG

Front view (Frontansicht) XHE-Rubidium



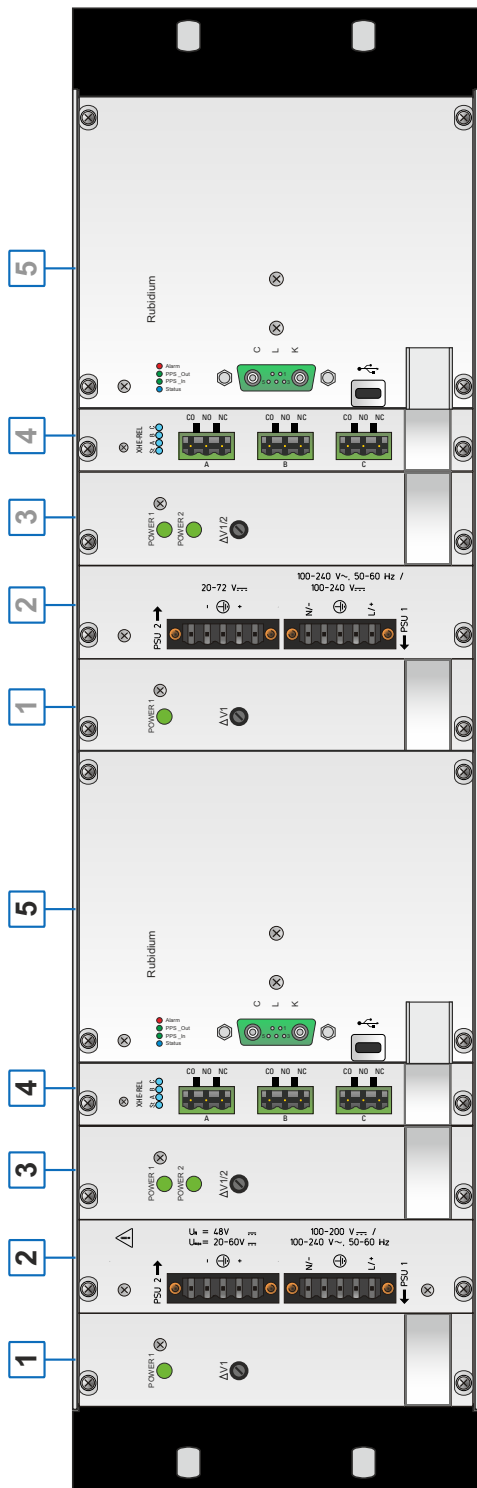
DEUTSCH

1. LED Statusanzeige:
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



ENGLISH

1. PSU 1: XHE-PWR-AC/DC :: AC/DC Power Supply, 100-240 V AC (50-60 Hz) / 100-200 V DC
2. XHE-CON AC/DC | DC :: Connector Module for AC/DC Power
3. PSU 2: XHE-PWR-DC :: DC Power Supply, 20-60 V DC
4. XHE-REL :: XHE Relais Module
5. XHE-SPI RUBIDIUM :: XHE Rubidium Module

DEUTSCH

1. PSU 1: XHE-PWR-AC/DC :: AC/DC Netzteil, 100-240 V AC (50-60 Hz) / 100-200 V DC
2. XHE-CON AC/DC | DC :: Anschlussmodul für AC/DC Netzteile
3. PSU 2: XHE-PWR-DC :: DC Netzteil 20-60 V DC
4. XHE-REL :: XHE Relaismodul
5. XHE-SPI RUBIDIUM :: XHE Rubidium-Modul

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1 Imprint

Meinberg Funkuhren GmbH & Co. KG
Lange Wand 9, 31812 Bad Pyrmont, Germany

Phone: + 49 (0) 52 81 / 93 09 - 0

Fax: + 49 (0) 52 81 / 93 09 - 230

Website: <https://www.meinbergglobal.com>

Email: info@meinberg.de

Date: November 18, 2021

2 Important Safety Information

2.1 Important Safety Instructions and Protective Measures

The following safety instructions must be observed whenever the device is being installed or operated. Failure to observe safety instructions and other special warnings and operating instructions in the product manuals constitutes improper usage and may violate safety standards and the manufacturer's requirements.



Depending on the configuration of your device or installed options, some information may not specifically apply to your device.



The device satisfies the requirements of the following EU regulations: EMC Directive, Low Voltage Directive, RoHS Directive and—where applicable—the Radio Equipment Directive.

If a procedure is marked with the following signal words, you may only proceed with it if you have understood and fulfilled all requirements. Hazard notices and other relevant information are classified and indicated as such in this manual according to the following system:



DANGER!

This signal word indicates a hazard with a high risk level . Such a notice refers to a procedure or other action that will very likely result in serious injury or even death if not observed or if improperly performed.



WARNING!

This signal indicates a hazard with a medium risk level . Such a notice refers to a procedure or other action that may result in serious injury or even death if not observed or if improperly performed.



CAUTION!

This signal word indicates a hazard with a low risk level . Such a notice refers to a procedure or other action that may result in minor injury if not observed or if improperly performed.















ATTENTION!

This signal word refers to a procedure or other action that may result in product damage or the loss of important data if not observed or if improperly performed.

2.2 Used Symbols

The following symbols and pictograms are used in this manual. Pictograms are used in particular to indicate potential hazards in all hazard categories.

Symbol	Beschreibung / Description
	IEC 60417-5031 Gleichstrom / <i>Direct current</i>
	IEC 60417-5032 Wechselstrom / <i>Alternating current</i>
	IEC 60417-5017 Erdungsanschluss / <i>Earth (ground) terminal</i>
	IEC 60417-5019 Schutzleiteranschluss / <i>Protective earth (ground) terminal</i>
	ISO 7000-0434A Vorsicht / <i>Caution</i>
	IEC 60417-6042 Vorsicht, Risiko eines elektrischen Schlages / <i>Caution, risk of electric shock</i>
	IEC 60417-5041 Vorsicht, heiße Oberfläche / <i>Caution, hot surface</i>
	IEC 60417-6056 Vorsicht, Gefährlich sich bewegende Teile / <i>Caution, moving parts</i>
	IEC 60417-6172 Trennen Sie alle Netzstecker / <i>Disconnect all power connectors</i>
	IEC 60417-5134 Elektrostatisch gefährdete Bauteile / <i>Electrostatic Discharge Sensitive Devices</i>
	IEC 60417-6222 Information generell / <i>General information</i>
	2012/19/EU 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. To ensure that the product is disposed of in a WEEE-compliant fashion, it must be returned to the manufacturer.</i>

The product manuals are provided on a USB flash drive delivered with the system. The manuals can also be downloaded from the Meinberg website at <https://www.meinbergglobal.com>, where you can enter your system name into the search box at the top of the page to find the relevant manual. Alternatively, contact Meinberg Support for further assistance.



This manual contains important safety instructions for the installation and operation of the device. Please read this manual thoroughly before using the device.

This device may only be used for the purpose described in this manual. In particular, the specified operating limits of the device must be heeded. The person setting up the device is responsible for safety matters in relation to any larger system in which the device is installed!

Failure to observe these instructions may have an adverse impact on device safety!

Please keep this manual in a safe place.

This manual is only intended to be used by qualified electricians, or by persons who have been appropriately instructed by a qualified electrician and who are familiar with applicable national standards and with safety rules & regulations. This device may only be installed, set up, and operated by qualified personnel.

2.3 Safety during Installation



WARNING!

Pre-Operation Procedures and Preparation for Use

This mountable device has been designed and examined in accordance with the requirements of the standard IEC 62368-1 "Audio/Video, Information and Communication Technology Equipment - Part 1: Safety Requirements".

When the mountable device is to be used as part of a larger unit (e.g., electrical enclosure), there will be additional requirements in the IEC 62368-1 standard that must be observed and complied with. General requirements regarding the safety of electrical equipment (such as IEC, VDE, DIN, ANSI) and applicable national standards must be observed in particular.

The device has been developed for use in the industrial sector or in home environments and may only be used in such environments. In environments at risk of high environmental conductivity ("high pollution degree" according to IEC 60664-1), additional measures such as installation of the device in an air-conditioned electrical cabinet may be necessary.

Transport, Unpacking, Installation

If the unit has been brought into the usage area from a cold environment, condensation may develop; in this case, wait until the unit has adjusted to the temperature and is completely dry before setting it up.

When unpacking & setting up, and before operating the equipment, be sure to read the information on installing the hardware and the specifications of the device. These include, for example, dimensions, electrical characteristics, or necessary environmental conditions.

Fire safety standards must be upheld with the device in its installed state.

The device must not be damaged in any way when mounting it. In particular, holes must not be drilled into the housing.

For safety reasons, the device with the highest mass should be installed at the lowest position in the rack. Further devices should be installed from the bottom, working your way up.

The device must be protected against mechanical & physical stresses such as vibration or shock.



Connecting Data Cables

Do not connect or disconnect data cables during a thunderstorm, as doing so presents a risk in the event of a lightning strike.

The device cables must be connected or disconnected in the order specified in the user documentation for the device. Cables should always be held by the connector body when connecting or disconnecting them. Never pull a connector out by pulling on the cable. Doing so may cause the plug to be detached from the cable or cause damage to the plug itself.

Cables must be installed so that they do not represent a health & safety hazard (e.g., tripping) and are not at risk of damage (e.g., kinks).

Connecting the Power Supply

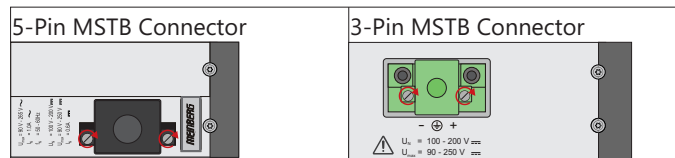
This equipment is operated at a hazardous voltage. Failure to observe the safety instructions in this manual may result in serious injury, death or property damage.

Before the device is connected to the power supply, a grounding conductor must be connected to the earth terminal of the device.

The power supply should be connected with a short, low-inductance cable.

Before operation, check that all cables and lines work properly and are undamaged. Ensure in particular that the cables do not have kinks, that they are not wound too tightly around corners, and that no objects are placed on the cables.

Ensure that all connections are secure—make sure that the lock screws of the power supply plug are tightened when using a 3-pin MSTB or 5-pin MSTB connector (see diagram, LANTIME M300 power supply).



Faulty shielding or cabling and improperly connected plugs are a health & safety risk (risk of injury or death due to electrical shock) and may damage or even destroy your Meinberg device or other equipment.

Ensure that all necessary safety precautions have been taken. Connect all cables to the device only while the device is de-energized before turning on the power. Observe the safety instructions on the device itself (see safety symbols).

The metal chassis of the device is grounded. When installing the device in an electrical enclosure, it must be ensured that adequate clearance is provided, creepage distances to adjacent conductors are maintained, and that there is no risk of short circuits.

In the event of a malfunction or if servicing is required (e.g., damage to the chassis or power cable, ingress of fluids or foreign objects), the power supply may be cut off.

Please address any questions regarding your building's electrical, cable or antenna installations to the person or department responsible for that installation within your building.

AC Power Supply	DC Power Supply
<ul style="list-style-type: none"> • The device is a Protection Class 1 device and may only be connected to a grounded outlet (TN system). • For safe operation, the installation must be protected by a fuse of a rating not exceeding 16 A and equipped with a residual-current circuit breaker in accordance with applicable national standards. • The disconnection of the appliance from the mains power supply must always be performed from the mains socket and not from the appliance itself. • Mains-powered appliances are equipped with a safety-tested mains cable designed for use in the country of operation and may only be connected to a grounded shockproof socket, otherwise electric shock may occur. • Make sure that the mains socket on the appliance or the mains socket of the house installation is readily accessible for the user so that the mains cable can be pulled out of the socket in an emergency. 	<ul style="list-style-type: none"> • In accordance with IEC 62368-1, it must be possible to disconnect the appliance from the supply voltage from a point other than the appliance itself (e.g., from the primary circuit breaker). • The power supply plug may only be fitted or dismantled while the appliance is isolated from the power supply (e.g., disconnected at the primary circuit breaker). • Supply cables must be adequately secured and have an adequate wire gauge size. <p style="margin-left: 40px;"><i>Connection Cable Wire Gauge:</i></p> <p style="margin-left: 80px;"><i>1 mm² – 2.5 mm²</i></p> <p style="margin-left: 80px;"><i>17 AWG – 13 AWG</i></p> <ul style="list-style-type: none"> • The power supply of the device must have a suitable disconnection mechanism such as a switch. This disconnection mechanism must be readily accessible in the vicinity of the appliance and marked accordingly as a cut-off mechanism for the appliance.

2.4 Connection of Protective Earth Conductor/Grounding



ATTENTION!



In order to ensure that the device can be operated safely and to meet the requirements of IEC 62368-1, the device must be correctly connected to the protective earth conductor via the protective earth connection terminal.



If an external earth terminal is provided on the housing, it must be connected to your bonding busbar (grounding busbar). The parts required to attach the device to a grounding busbar are not included with the shipped product.

Note:

Please use a grounding cable with a core cross-section of $\geq 1.5 \text{ mm}^2$
Always ensure that the connection is properly crimped!

2.5 Safety during Operation



WARNING!

Avoiding Short-Circuits

Protect the device against all ingress of solid objects or liquids. Ingress presents a risk of electric shock or short-circuiting!

Ventilation Slots

Ensure that the ventilation slots are clean and uncovered at all times. Blocked ventilation slots may cause heat to be trapped in the system, resulting in overheating. This may cause your device to malfunction or fail.

Appropriate Usage

The device is only deemed to be appropriately used and EMC limits (electromagnetic compatibility) are only deemed to be observed if the chassis cover is properly fitted (thus ensuring that the device is properly cooled, fire-safe, and shielded against electrical, magnetic and electromagnetic fields).



Switching the Device Off in the Event of a Malfunction or when Repairs are Required

It is not sufficient to simply switch off the device itself in order to disconnect the power supply. If the device is malfunctioning, or if repairs become necessary, the device must be isolated from all power supplies immediately.

To do so, follow the procedure below:

- Switch off the device from the unit itself.
- Pull out all power supply plugs.
- Inform the person or department responsible for your electrical installation.
- If your device is connected to an Uninterruptible Power Supply (UPS), it will remain operational even after pulling the UPS power cable from the mains socket. In this case, you will need to shut down your UPS in accordance with the user documentation of your UPS system.

2.6 Safety during Maintenance



WARNING!

When you are expanding the device, use only device parts that are approved for the system. Non-observance may result in injury to the EMC or safety standards and cause malfunction of the device.

If device parts, which are released for the system, are extended or removed there may be a risk of injury in the area of the hands, due to the pull-out forces (approx. 60 N).

The service informs you which device parts may be installed.

The device must not be opened, repairs to the device may only be carried out by the manufacturer or by authorized personnel. Improper repairs can result in considerable danger to the user (electric shock, fire hazard).

Unauthorized opening of the device or of individual parts of the device can also lead to considerable risks for the user and result in a loss of warranty as well as an exclusion of liability.



- Danger due to moving parts - keep away from moving parts.



- Device parts can become very hot during operation. Do not touch these surfaces! If necessary, switch off the unit before installing or removing any equipment, and allow it to cool down.

2.7 Cleaning and Care



ATTENTION!

Never clean the device using liquids! Water ingress is a significant safety risk for the user (e.g., electric shock).

Liquids can cause irreparable damage to the electronics of the device! The ingress of liquids into the device chassis may cause short circuits in the electronic circuitry.

Only clean with a soft, dry cloth. Never use solvents or cleaners.

2.8 Prevention of ESD Damage



ATTENTION!

An ESDS device (electrostatic discharge-sensitive device) is any device at risk of damage or malfunction due to electrostatic discharges (ESD) and thus requires special measures to prevent such damage or malfunction. Systems and modules with ESDS devices usually bear the following symbol:



Symbol Indicating Devices with ESDS Components

The following measures will help to protect ESDS components from damage and malfunction.

When preparing to dismantle or install devices:

Ground your body (for example, by touching a grounded object) before touching sensitive devices.

Ensure that you wear a grounding strap on your wrist when handling such devices. These straps must in turn be attached to an uncoated, non-conductive metal part of the system.

Use only tools and devices that are free of static electricity.

When transporting devices:

Devices must only be touched or held by the edges. Never touch any pins or conductors on the device.

When dismantling or installing devices:

Avoid coming into contact with persons who are not grounded. Such contact may compromise your connection with the earth conductor and thus also compromise the device's protection from any static charges you may be carrying.

When storing devices:

Always store devices in ESD-proof ("antistatic") bags. These bags must not be damaged in any way. ESD-proof bags that are crumpled or have holes cannot provide effective protection against electrostatic discharges.

ESD-proof bags must have a sufficient electrical resistance and must not be made of conductive metals if the device has a lithium battery fitted on it.

2.9 Return of Electrical and Electronic Equipment



ATTENTION!

WEEE Directive on Waste Electrical and Electronic Equipment 2012/19/EU
(WEEE Waste Electrical and Electronic Equipment)

Waste Separation

Product Category: According to the device types listed in Annex I of the WEEE Directive, this product is classified as "IT and Telecommunications Equipment".



This product satisfies the labeling requirements of the WEEE Directive. The product symbol on the left indicates that this electronic product must not be disposed of in domestic waste.

Return and Collection Systems

When disposing of your old equipment, please use the national return or collection systems available to you. Alternatively, you may contact Meinberg, who will provide further assistance.

The return of electronic waste may not be accepted if the device is soiled or contaminated in such a way that it potentially presents a risk to human health or safety.

Return of Used Batteries

The EU Battery Directive prohibits the disposal of batteries marked with the WEEE trashcan symbol above in household waste.

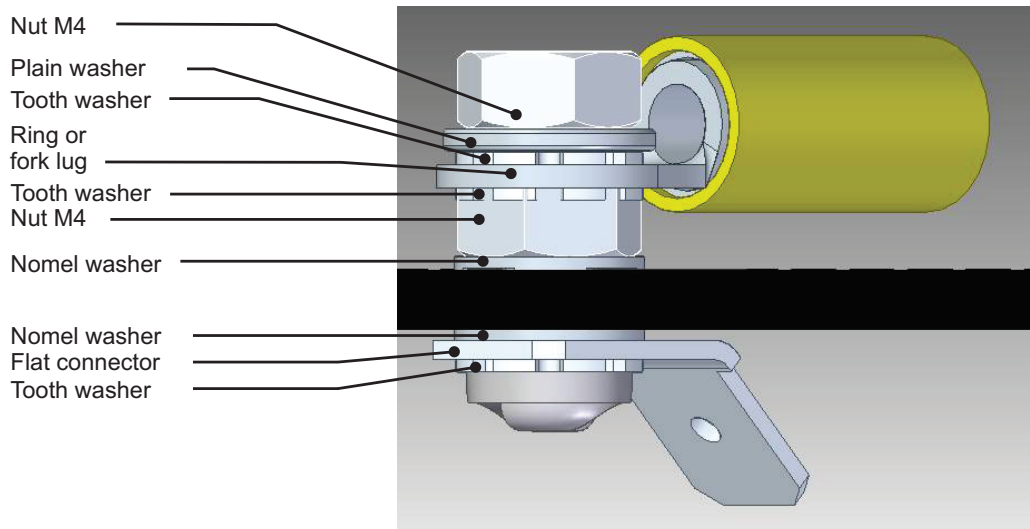
2.10 Grounding connection XHE



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.



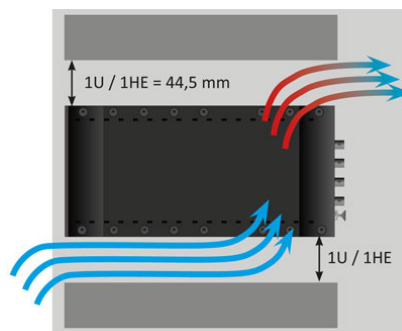
Note:

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

2.11 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 Introduction

IMS XHE Rubidium - external holdover extension

The system consists of a 19 inch / 3U subrack and can be equipped with up to two Rubidium modules. These are powered by two power supply units each. Several combinations of AC and DC power supplies are available (see Appendix Technical Specifications).

Compatibility

The XHE can be used as a highly accurate external synchronization source for all LANTIME systems of the IMS family in the holdover case. For this purpose the XHE cable (included in the scope of delivery) is connected between XHE and e.g. the receiver module of an M3000.

4 External Holdover Expansion XHE - Rubidium

The system consists of a 19 inch / 3U chassis with up to two Rubidium modules, which are powered by two power supplies. Several combinations of AC and DC power supplies are available (see Appendix Technical Specifications).

Mode of Operation:

The generated PPS second pulse is used as an additional MRS (Multi Reference Source) time source to synchronize all timing tasks in Meinberg IMS systems.

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 Before you start

5.1 Contents of Delivery

Included in delivery of a Meinberg XHE-Rubidium:

Main System

1. XHE-Rubidium

Connection Cables

2. 2 (4) x two-part power cable
3. 1 (2) x XHE-RB connection cable for IMS systems (0.5 m)

Accessories

4. USB stick with software and documentation

Unpack the system carefully and check the contents of the delivery against the enclosed packing list to ensure that no parts are missing. If any of the listed items are missing, please contact our sales department: sales@meinberg.de

Check that the product has not been damaged in transit. If the product is damaged or fails to operate upon installation, contact Meinberg immediately. Only the recipient (the person or company receiving the system) may file claims or complaints against the forwarder for damage caused in transit.

Meinberg recommends that you keep the original packaging materials in case the product needs to be shipped again at a later date.

5.2 Disposal of Packaging Materials





The packaging materials we use are fully recyclable:

Material	Use for	Disposal
Polystyrol	packaging frame/filling material (polystyrene peanuts, bubble wrap)	Recycling Depot
PE-LD Polyethylene low density	accessories packaging	Recycling Depot
Cardboard	shipping packaging, accessories packaging	Paper recycling

5.3 System Installation

5.3.1 Required Tools

The following tools are required for the installation of your XHE.

No.	Symbol	Tool	Work step
1		Screwdriver (Torx TR8 x 60)	dis/assembly of the build-in modules
2		7 mm spanner or pin type socket wrench	dis/assembly of the earth connection

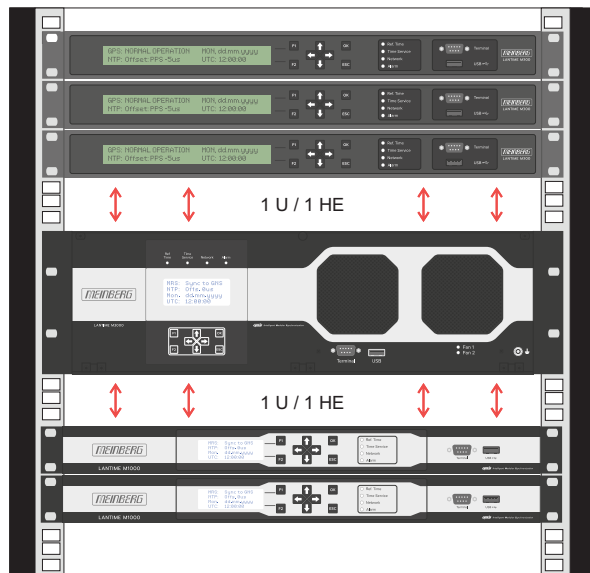
5.3.2 Assembly XHE

Due to its dimensions, the XHE is constructed for mounting in a 19inch-rack. The XHE is inserted into the rack and then screwed to the rack with four screws (not included) via the mounting brackets.

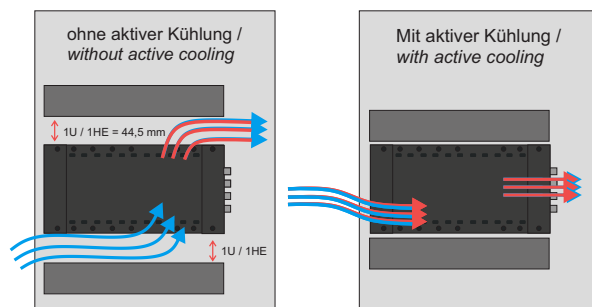
ATTENTION:



To avoid overheating damage during operation, it is necessary to provide a ventilation space (distance) of 1U above and below the IMS System.



The figure shows the expected air flow during operation without active cooling – with space above and below (left side). The graphic on the right shows the air flow when operating an IMS-M3000 with ACM module and without any space up and down between the systems in the server rack.



5.3.3 Connecting the System

At first connect the XHE cable (included in delivery) to the SPI connector of the Rubidium as well as to the SPI connector of the receiver module (e.g. GPS receiver with SPI interface in the IMS-M3000). Then connect the power supply of the XHE by plugging the 5 pin DFK connector to the power supply.

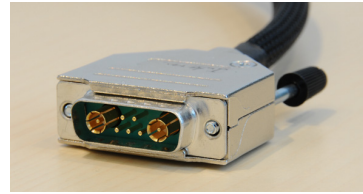
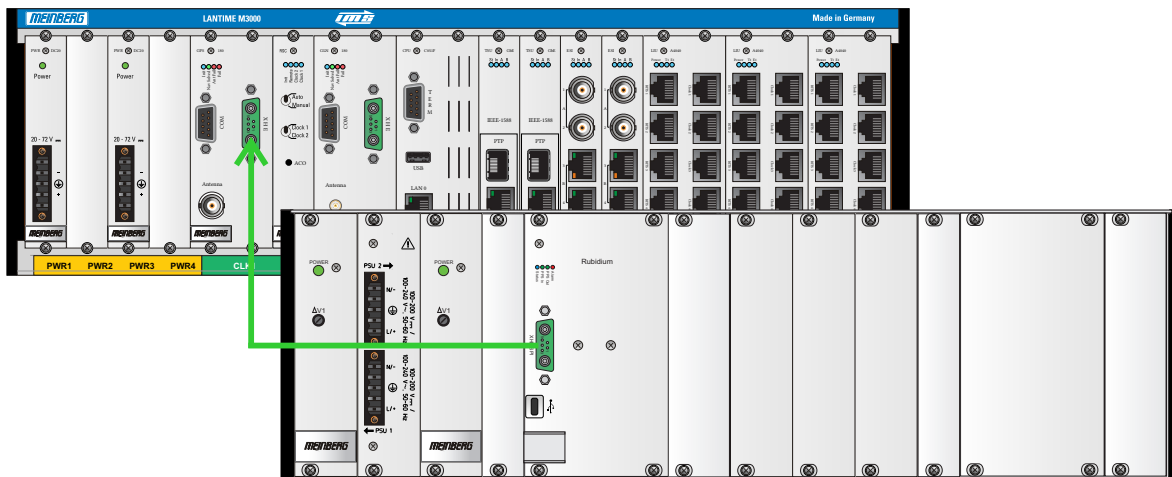


Figure: XHE cable with SPI connector

Application example:

The following schematic illustration shows the connection of an XHE-Rubidium via XHE-cable to an IMS-M3000 to serve as a holdover system.

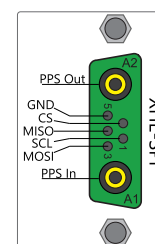


Pin Assignment of the optional XHE-SPI Connectors:

A1: PPS In
A2: PPS Out

Pin 1: SCL_Out (SPI Clock)
Pin 2: CS (Chip Select)
Pin 3: MOSI (Master Out, Slave In)
Pin 4: MISO (Master In, Slave Out)
Pin 5: GND

(receiver side)



6 Initial Start of the System

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	●	●	●	○

7 Technical Specifications XHE

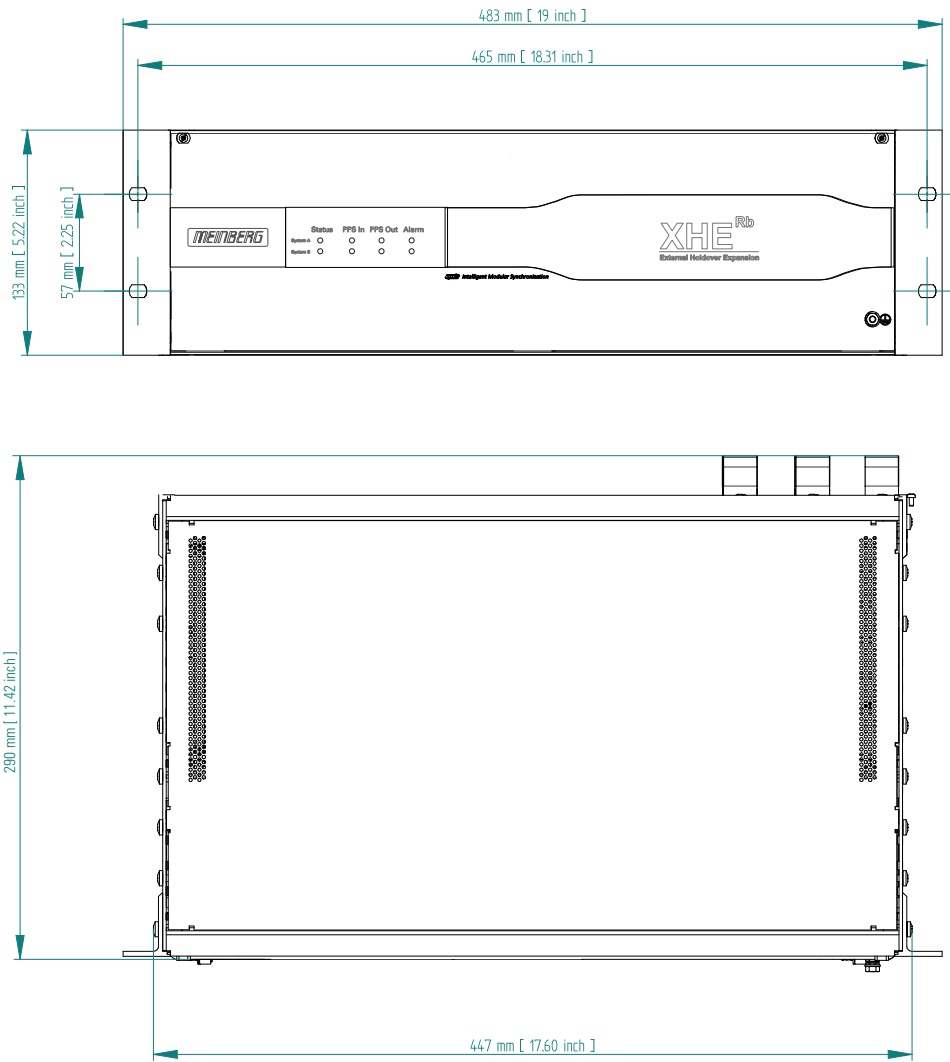
Technical Data PRS10 Rubidium Module

Aging:	day	$< 1.5 * 10^{-11}$
	month	$< 5 * 10^{-11}$
	year	$< 5 * 10^{-10}$
	10 years	$< 1 * 10^{-9}$
Short Term Stability:	$< 2 * 10^{-11}$	$\tau = 1 \text{ sec}$
	$< 1 * 10^{-11}$	$\tau = 10 \text{ sec}$
	$< 2 * 10^{-12}$	$\tau = 100 \text{ sec}$
Holdover:	72 hours Stratum 1 Level	
Retrace:	$\pm 5 * 10^{-11}$ (72 hrs. off then 72 hrs. on)	
Warm-up Time:	< 15 minutes (time to lock)	
	< 20 minutes (time to $1 * 10^{-9}$)	
Accuracy:	GPS/GLONASS-synchronized, averaged 24h: $\pm 1. 10^{-12}$ (± 0.01 mHz)	
	without GNSS-synchronization at 20 °C: see Aging	
Temperature Drift:	$\pm 1 * 10^{-10}$ (-20°C...65°C)	
Card Type:	Eurocard, 100 mm x 160 mm, 1.5 mm Epoxy	
Card Panel:	3U / 20HP (128 mm high x 101.6 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:	2 x 100-240 V AC (50-60 Hz) / 100-200 V DC or 2 x 20-60 V DC (also available as AC/DC variant)
Physical Dimensions:	482 mm x 273 mm x 133 mm (Width x Depth x Height)
Ambient Temperature:	0 ... 40 °C
Humidity:	85% max. (non condensing)

7.1 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	6 HP
Connectors PWR1 - PWR2	6 HP
PSU PWR2	6 HP
XHE-REL:	4 HP
Rubidium Clock 1	20 HP

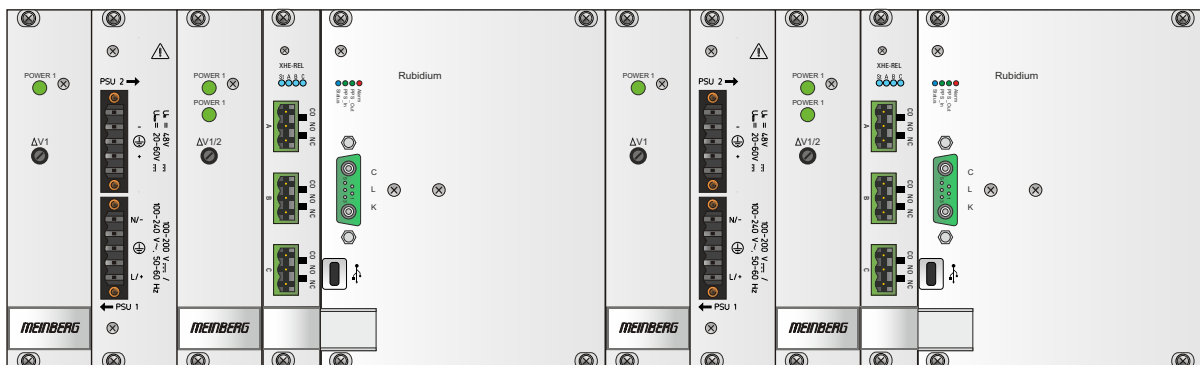
RUB-CLOCK 2

Power supply PWR1	6 HP
Connectors PWR1 - PWR2	6 HP
PSU PWR2	6 HP
XHE-REL:	4 HP
Rubidium Clock 1	20 HP

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

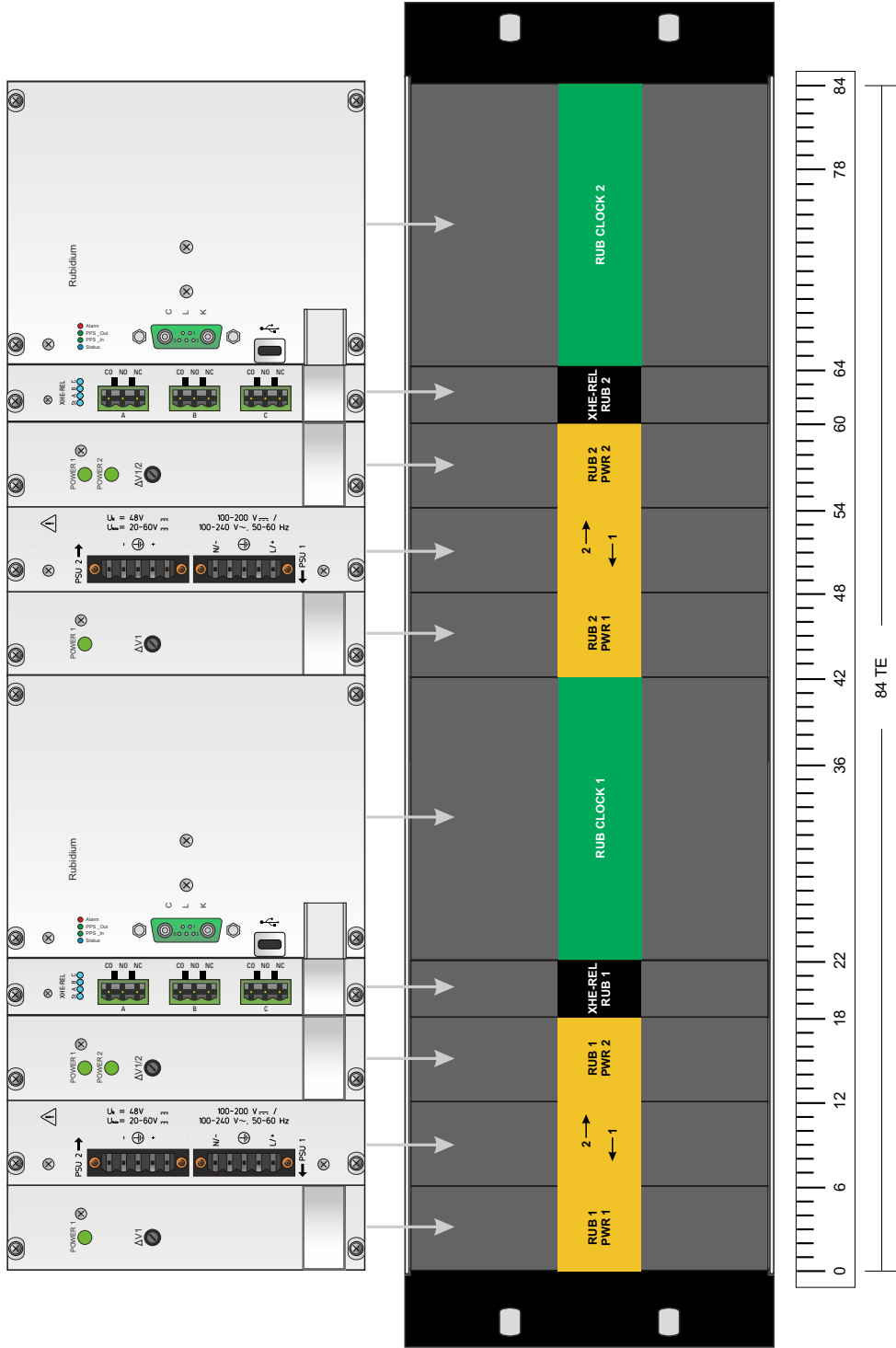
Please Note:

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 | DC Power Supplies = RUB-Clock 2 - AC/DC | DC Power Supplies

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.



7.2 AC/DC Power Connector

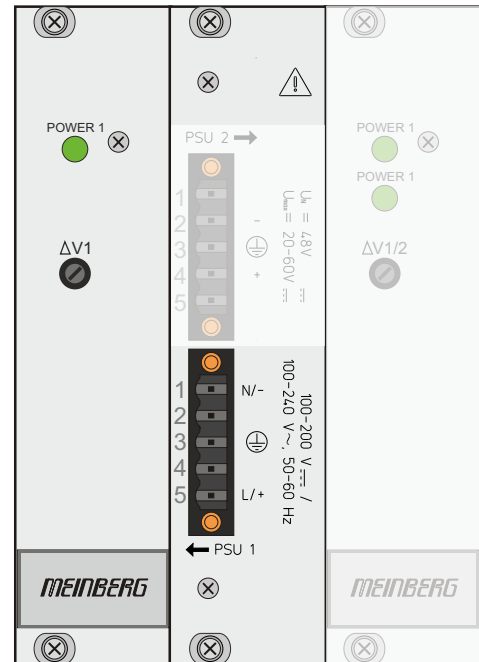
Connector Type:	5-pol. DFK
Status-LED:	green - Power On
$\Delta V1$:	Potentiometer for adjusting the output voltage (24 V) *
Pin Assignment:	1: N/- 2: not connected 3: PE (Protective Earth) 4: not connected 5: L/+

Input Parameter

Nominal Voltage Range:	U_N	=	100-240 V \sim 100-240 V \equiv
Maximum Voltage Range:	U_{max}	=	90-264 V \sim 100-250 V \equiv
Nominal Current:	I_N	=	0.40 A \sim
Nominal Frequency Range:	f_N	=	50-60 Hz
Maximum Frequency Range:	f_{max}	=	47-63 Hz
Inrush Current:	I_P	=	20 A @ 230 V AC

Output Parameter

Maximum Power:	P_{max}	=	50 W
Maximum Heat:	P_{therm}	=	180.00 kJh (136.49 BTU/h)



* Attention: The output voltage $\Delta V1$ of the power supply unit is set at the factory and must not be changed afterwards. If the power supply unit malfunctions, please contact the Meinberg Technical Support.



WARNING!

This equipment is operated at a hazardous voltage.



Danger of death from electric shock!

- This device must be connected by qualified personnel (electricians) only.
- Never handle exposed terminals or plugs while the power is on.
- All connectors must provide protection against contact with live parts in the form of a suitable plug body!
- Note: Always ensure that wiring is safe!
- Important: The device must be grounded by means of a connection with a correctly installed protective earth conductor (PE).

7.3 DC Power Connector

Connector Type:	5-pol. DFK
Status-LEDs:	green - Power 1/2 On
$\Delta V1/V2$:	Potentiometer for adjusting the output voltages V1/V2 (2x 12 V = 24 V) *
Pin Assignment:	1: not connected 2: - 3: PE (Protective Earth) 4: + 5: not connected

Input Parameter

Nominal Voltage Range: $U_N = 48 \text{ V} \overline{\text{---}}$

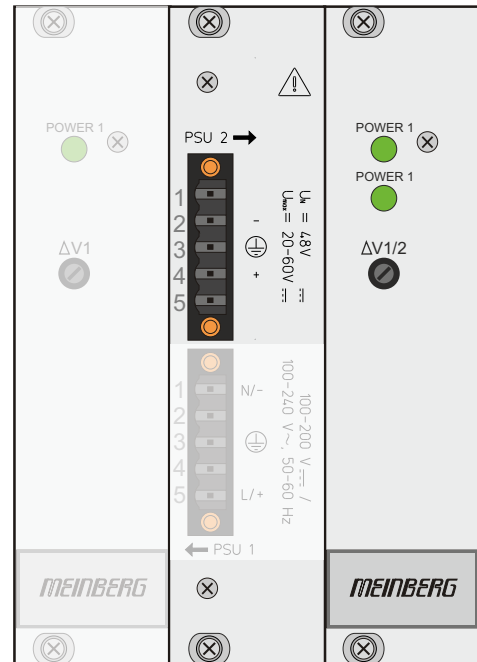
Maximum Voltage Range: $U_{\text{max}} = 20\text{-}60 \text{ V} \overline{\text{---}}$

Nominal Current: $I_N = 2.25 \text{ A}$

Output Parameter

Maximum Power: $P_{\text{max}} = 98 \text{ W}$

Maximum Heat: $P_{\text{therm}} = 388.80 \text{ kJ/h (368.52 BTU/h)}$



* **Attention:** The output voltages $\Delta V1/V2$ of the power supply unit are set at the factory and must not be changed afterwards. If the power supply unit malfunctions, please contact the Meinberg Technical Support.

7.4 XHE-REL Error Relay

Error Output:

Relay A:	PWR 1
Relay B:	PWR 2
Relay C:	Rubidium

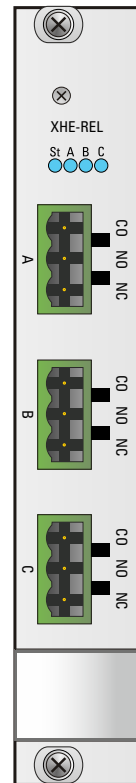
If the Rubidium module is synchronous to the source, the relay is switched to NO (Normally Open) mode. In the event of an error, the relay switches to NC (Normally Closed).

Technical Specifications Error Relay:

Switching Voltage:	220 V DC _{max} / 250 V AC _{max}	
Switching Load:	60 W _{max} / 62.5 VA _{max}	
UL/CSA:	0.3 A	125 V AC
	0.3 A	110 V DC
	1 A	30 V DC
Response Time:	ca.3 ms	

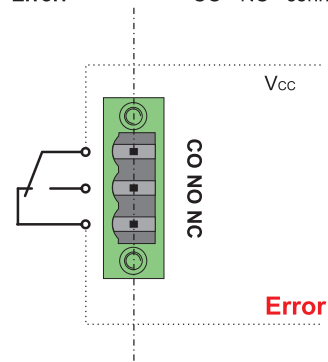
Status-LEDs

St:	blue - during initialization green - normal operation
A:	green - PWR 1 OK red - PWR 1 not connected
B:	green - PWR 2 OK red - PWR 2 not connected
C:	green - Rubidium in normal operation rot - Error (event notification)



Normal Operation: CO - NO connected

Error: CO - NC connected



7.5 XHE Connectors

Status-LEDs:

Status: blue - during the initialisation phase
 yellow- the Rubidium has warmed up
 green - the Rubidium is synchronized with the external PPS

PPS_In: green - PPS input from Rubidium is locked to connected Clock

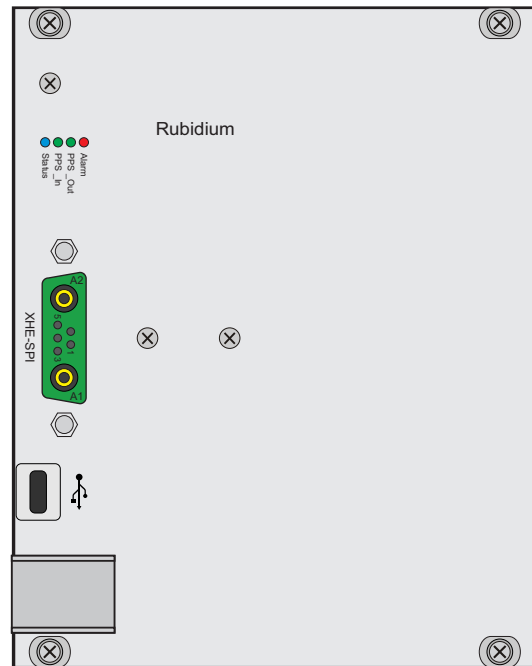
PPS_Out: green - PPS output from Rubidium to connected clock is OK

Alarm: red - internal error (e.g. power supply)

CLK-XHE-Connection (to the connected receiver):
Connection Type: 7W2 D-SUB Combi female

Pin Assignment: A1: PPS In
 A2: PPS Out

Pin 1: SCL_Out (SPI Clock)
 Pin 2: CS (Chip Select)
 Pin 3: MOSI (Master Out, Slave In)
 Pin 4: MISO (Master In, Slave Out)
 Pin 5: GND



Attention: Always use the supplied cable to connect the Rubidium module to the receiver.

USB: USB Micro-B
 (only for factory installation of firmware or for use by authorized personnel)



Warning: This USB plug is covered with a small plate at delivery state. No devices (e.g. USB stick) may be connected to this connector. Failure to follow this instruction will result in system errors.

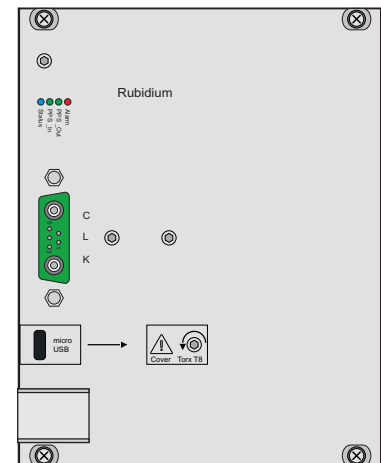
8 Loading the system software PRS10 - Rubidium module

The following things are required to load or update the system software:

Screwdriver:	Torx (T8)
USB cable:	With Micro-USB connector for the Rubidium module
Computer:	With pre-installed programming software "MBGFlash"

Download MBGFlash für Windows:

<https://www.meinbergglobal.com/download/utills/windows/mbgflash-1.14.exe>



ATTENTION: The system must first be disconnected from the power supply.

The following steps must be carried out in this order:

1. remove the cover plate above the USB port
2. connect the module to the PC via USB cable
3. start the "MBGFlash" program on your PC
4. select the supplied program file to be load
5. select the processor type "SAM3S" in the "Processor" field
6. switch on the power supply and select the additionally detected interface in MBGFlash.
7. press the "Flash" button to flash the program memory
8. after flashing the module, remove the USB cable and trigger a reset by interrupting the voltage.

Test run:

Check the function of the LEDs as follows:

Initialization phase:

This phase continues until the USB initialization is completed.

LED Status: blue
LED PPS In: off
LED PPS Out: off
LED Alarm: off

Boot phase:

LED Status: blue
LED PPS In: 1s red, 1s yellow, 1s green, 1s off
LED PPS Out: 1s red, 1s yellow, 1s green, 1s off
LED Alarm: 1s red, 1s yellow, 1s green, 1s off

Normal Mode:

LED Status: green
LED PPS In: green when PPS In is applied
LED PPS Out: green, when PPS from rubidium is applied
LED Alarm: green, when PPS output is enabled

9 RoHS and WEEE

Compliance with EU Directive 2011/65/EU (RoHS)

We hereby declare that this product is compliant with the European Union Directive 2011/65/EU and its delegated directive 2015/863/EU "Restrictions of Hazardous Substances in Electrical and Electronic Equipment". We ensure that electrical and electronic products sold in the EU do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBBs), polybrominated diphenyl ethers (PBDEs), bis(2-ethylhexyl)phthalat (DEHP), benzyl butyl phthalate (BBP), dibutyl phthalate (DBP), or diisobutyl phthalate (DIBP) above the legal limits.



WEEE status of the product

This product is handled as a B2B (Business to Business) category product. To ensure that the product is disposed of in a WEEE-compliant fashion, it must be returned to the manufacturer. Any transportation expenses for returning this product (at end-of-life) must be covered by the end user, while Meinberg will bear the costs for the waste disposal itself.



10 Declaration of Conformity

Konformitätserklärung

Doc ID: XHE-Rubidium Expansion Unit-November 18, 2021

Hersteller Meinberg Funkuhren GmbH & Co. KG
Manufacturer Lange Wand 9, D-31812 Bad Pyrmont

erklärt in alleiniger Verantwortung, dass das Produkt,
declares under its sole responsibility, that the product

Produktbezeichnung XHE-Rubidium Expansion Unit
Product Designation

auf das sich diese Erklärung bezieht, mit den folgenden Normen und Richtlinien übereinstimmt:
to which this declaration relates is in conformity with the following standards and provisions of the directives:

EMV – Richtlinie <i>EMC Directive</i>	DIN EN 61000-6-2:2019 DIN EN 61000-6-3:2007 + A1:2011 DIN EN 55032:2015
2014/30/EU	DIN EN 55024:2010 + A1:2015 DIN EN 61000-3-2:2019 DIN EN 61000-3-3:2013 + A1:2019

Niederspannungsrichtlinie <i>Low-voltage Directive</i>	DIN EN 62368-1:2014 + A11:2017
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2014/35/EU

RoHS – Richtlinie <i>RoHS Directive</i>	DIN EN IEC 63000:2018
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2011/65/EU + 2015/863/EU

Bad Pyrmont, November 18, 2021


Stephan Meinberg
Production Manager



XHE-Rubidium_181121