



The Synchronization Experts.



## MANUAL

### Signal Distribution Unit SDU/TCM

Meinberg Funkuhren GmbH & Co. KG



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# 1 Imprint & Legal Information

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## 3 Presentation Conventions in this Manual

### 3.1 Conventions for the Presentation of Critical Safety Warnings

Warnings are indicated with the following warning boxes, using the following signal words, colors, and symbols:



#### 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.



#### Warning!

This signal word 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.



#### 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.

## 3.2 Secondary Symbols Used in Safety Warnings

Some warning boxes may feature a secondary symbol that emphasizes the defining nature of a hazard or risk.



The presence of an “electrical hazard” symbol is indicative of a risk of electric shock or lightning strike.



The presence of a “fall hazard” symbol is indicative of a risk of falling when performing work at height.



This “laser hazard” symbol is indicative of a risk relating to laser radiation.

## 3.3 Conventions for the Presentation of Other Important Information

Beyond the above safety-related warning boxes, the following warning and information boxes are also used to indicate risks of product damage, data loss, and information security breaches, and also to provide general information for the sake of clarity, convenience, and optimum operation:



### Important!

Warnings of risks of product damage, data loss, and also information security risks are indicated with this type of warning box.



### Information:

Additional information that may be relevant for improving efficiency or avoiding confusion or misunderstandings is provided in this form.



### 3.4 Generally Applicable Symbols

The following symbols and pictograms are also used in a broader context in this manual and on the product.



The presence of the “ESD” symbol is indicative of a risk of product damage caused by electrostatic discharge.



Direct Current (DC) (*symbol definition IEC 60417-5031*)



Alternating Current (AC) (*symbol definition IEC 60417-5032*)



Grounding Terminal (*symbol definition IEC 60417-5017*)



Protective Earth Connection (*symbol definition IEC 60417-5019*)



Disconnect All Power Connectors (*symbol definition IEC 60417-6172*)

## 4 Important Safety Information



The safety information provided in this chapter as well as specific safety warnings provided at relevant points in this manual must be observed during every installation, set-up, and operation procedure of the device, as well as its removal from service.

Any safety warnings affixed to the device itself must also be observed.

Any failure to observe this safety information, these safety warnings, and other safety-critical operating instructions in the product documentation, or any other improper usage of the device may result in unpredictable behavior from the product, and may result in injury or death.

Depending on your specific device configuration and installed options, some safety information may not be applicable to your device.

Meinberg accepts no responsibility for injury or death arising from a failure to observe the safety information, warnings, and safety-critical instructions provided in the product documentation.

It is the responsibility of the operator to ensure that the product is safely and properly used.

Should you require additional assistance or advice on safety-related matters for your product, Meinberg's Technical Support team will be happy to assist you at any time. Simply send a mail to [techsupport@meinberg.de](mailto:techsupport@meinberg.de).

### 4.1 Appropriate Usage



**The device must only be used appropriately in accordance with the specifications of the product documentation!** Appropriate usage is defined exclusively by this manual as well as any other relevant documentation provided directly by Meinberg.

**Appropriate usage includes in particular compliance with specified limits!** The device's operating parameters must never exceed or fall below these limits!

## 4.2 Product Documentation

The information in this manual is intended for readers with an appropriate degree of safety awareness.

The following are deemed to possess such an appropriate degree of safety awareness:

- **skilled personnel** with a familiarity with relevant national safety standards and regulations,
- **instructed personnel** having received suitable instruction from skilled personnel on relevant national safety standards and regulations.



Read the product manual carefully and completely before you set the product up for use.

If any of the safety information in the product documentation is unclear for you, do **not** continue with the set-up or operation of the device!

Safety standards and regulations change on a regular basis and Meinberg updates the corresponding safety information and warnings to reflect these changes. It is therefore recommended to regularly visit the Meinberg website at <https://www.meinbergglobal.com> or the Meinberg Customer Portal at <https://meinberg.support> to download up-to-date manuals.

Please keep all product documentation, including this manual, in a safe place in a digital or printed format to ensure that it is always easily accessible.

Meinberg's Technical Support team is also always available at [techsupport@meinberg.de](mailto:techsupport@meinberg.de) if you require additional assistance or advice on safety aspects of your Meinberg product.

## 4.3 Safety during Installation

This rack-mounted device has been designed and tested in accordance with the requirements of the standard IEC 62368-1 (*Audio/Video, Information and Communication Technology Equipment—Part 1: Safety Requirements*). Where the rack-mounted device is to be installed in a larger unit (such as an electrical enclosure), additional requirements in the IEC 62368-1 standard may apply 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 industrial or commercial 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 enclosure may be necessary.

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



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

Fire safety standards must be upheld with the device in its installed state—never block or obstruct ventilation openings and/or the intakes or openings of active cooling solutions.

The device with the highest mass should be installed at the lowest position in the rack in order to position the center of gravity of the rack as a whole as low as possible and minimize the risk of the rack tipping over. 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.

**Never** drill holes into the device to mount it! If you are experiencing difficulties with rack installation, contact Meinberg's Technical Support team for assistance!

Inspect the device housing before installation. The device housing must be free of any damage when it is installed.

## 4.4 Grounding the Device



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 terminal.

If an external grounding terminal is provided on the chassis, it must be connected to the grounding busbar for safety reasons before connecting the power supply. This ensures that any possible leakage current on the chassis is safely discharged to earth.



The screw, washer, and toothed lock washer necessary for mounting the grounding cable are provided on the grounding terminal of the chassis. A grounding cable is not included with the device.



Please ensure that your grounding cable has a thickness of  $1.5 \text{ mm}^2$  or greater, that you use a suitable grounding terminal or lug, and that the cable is properly crimped!

## 4.5 Electrical Safety

**This Meinberg product is operated at a hazardous voltage.**

This system may only be set up and connected by skilled personnel, or by instructed personnel who have received appropriate technical & safety training from skilled personnel.

Custom cables may only be assembled by a qualified electrician.

**Never** work on cables carrying a live current!

**Never** use cables or connectors that are visibly damaged or known to be defective! Faulty, defective, or improperly connected shielding, connectors, or cables present a risk of injury or death due to electric shock and may also constitute a fire hazard!

Before operating the device, check that all cables are in good order. Ensure in particular that the cables are undamaged (for example, kinks), that they are not wound too tightly around corners, and that no objects are placed on the cables.

Cables must be laid in such a way that they do not present a tripping hazard.

The power supply should be connected using a short, low-inductance cable. Avoid the use of power strips or extension cables if possible. If the use of such a device is unavoidable, ensure that it is expressly rated for the rated currents of all connected devices.

**Never** connect or disconnect power, data, or signal cables during a thunderstorm! Doing so presents a risk of injury or death, as cables and connectors may conduct very high voltages in the event of a lightning strike!

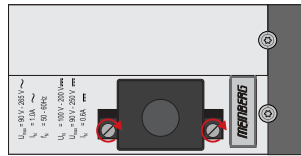
Device cables must be connected or disconnected in the order specified in the user documentation for the device. Connect all cables only while the device is de-energized before you connect the power supply.

**Always** pull cable connectors out at **both** ends before performing work on connectors! Improperly connecting or disconnecting this Meinberg system may result in electric shock, possibly resulting in injury or death!

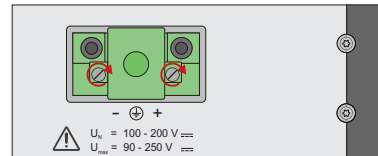
When pulling out a connector, **never** pull on the cable itself! Pulling on the cable may cause the plug to become detached from the connector or cause damage to the connector itself. This presents a risk of direct contact with energized components.



### 5-Pin MSTB Connector



### 3-Pin MSTB Connector



*Illustration: Lock screws on an MSTB plug connector; in this case on a LANTIME M320*

Ensure that all plug connections are secure. In particular, when using plug connectors with lock screws, ensure that the lock screws are securely tightened. This is especially important for power supply connectors where 3-pin or 5-pin MSTB connectors with lock screws are used (see illustration).

Before the device is connected to the power supply, the device housing must be grounded by connecting a grounding cable to the grounding terminal of the device.

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

Protect the device from the ingress of objects or liquids!

If the device malfunctions or requires servicing (for example, due to damage to the housing, power supply cable, or the ingress of liquids or objects), the power supply may be cut off. In this case, the device must be isolated immediately and physically from all power supplies! The following procedure must be followed in order to correctly and reliably isolate the device:

- Pull the power supply plug from the power source.
- Loosen the locking screws of the MSTB power supply plug on the device and pull it out of the device.
- Contact the person responsible for your electrical infrastructure.
- If your device is connected to one or more uninterruptible power supplies (UPS), the direct power supply connection between the device and the UPS solution must be first be disconnected.



### 4.5.1 Special Information for Devices with AC Power Supply



This 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 rated for currents not exceeding 20 A and equipped with a residual-current circuit breaker in accordance with applicable national standards.

The appliance must only ever be disconnected from the mains power supply via the mains socket and not from the appliance itself.

Make sure that the power connector on the appliance or the mains socket is readily accessible for the user so that the mains cable can be pulled out of the socket in an emergency.

Non-compliant cabling or improperly grounded sockets are an electrical hazard!

Only connect the appliance to a grounded shockproof outlet using a safety-tested mains cable designed for use in the country of operation.

### 4.5.2 Special Information for Devices with DC Power Supply



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 via the primary circuit breaker).

Power supply cables must have adequate fuse protection and have an adequate wire gauge size (1 mm<sup>2</sup> – 2.5 mm<sup>2</sup> / 17 AWG – 13 AWG)

The power supply of the device must have a suitable on-demand disconnection mechanism (i.e., a switch). This disconnection mechanism must be readily accessible in the vicinity of the appliance and marked accordingly as a disconnection mechanism for the appliance.



## 4.6 Safety when Maintaining and Cleaning the Device

Only use a soft, dry cloth to clean the device.

**Never** use liquids such as detergents or solvents to clean the device! The ingress of liquids into the device housing may cause short circuits in the electronic circuitry, which in turn can cause a fire or electric shock!



Neither the device nor its individual components may be opened. The device or its components may only be repaired by the manufacturer or by authorized personnel. Improperly performed repairs can put the user at significant risk!



In particular, **never** open a power supply unit or module, as hazardous voltages may be present within the power supply device even after it is isolated from the upstream voltage. If a power supply unit or module is no longer functional (for example due to a defect), it can be returned to Meinberg for repair.

Some components of the device may become very hot during operation. Do not touch these surfaces!

If maintenance work is to be performed on the device and the device housing is still hot, switch off the device beforehand and allow it to cool.

## 5 Important Product Information

### 5.1 CE Marking

This product bears the CE mark as is required to introduce the product into the EU Single Market.



The use of this mark is a declaration that the product is compliant with all requirements of the EU directives effective and applicable as at the time of manufacture of the product.

These directives are listed in the EU Declaration of Conformity, appended to this manual as → [Chapter 11](#).

### 5.2 UKCA Marking

This product bears the British UKCA mark as is required to introduce the product into the United Kingdom (excluding Northern Ireland, where the CE marking remains valid).



The use of this mark is a declaration that the product is in conformity with all requirements of the UK statutory instruments applicable and effective as at the time of manufacture of the product.

These statutory instruments are listed in the UK Declaration of Conformity, appended to this manual as → [Chapter 12](#).

### 5.3 Ensuring the Optimum Operation of Your Device

- Ensure that ventilation slots are not obscured or blocked by dust, or else heat may build up inside the device. While the system is designed to shut down safely and automatically in the event of temperature limits being exceeded, the risk of malfunctions and product damage following overheating cannot be entirely eliminated.
- The device is only deemed to be appropriately used and EMC limits (electromagnetic compatibility) are only deemed to be complied with while the device housing is fully assembled in order to ensure that requirements pertaining to cooling, fire safety, electrical shielding and (electro)magnetic shielding are upheld.

## 5.4 Prevention of ESD Damage



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

Precautionary measures should be taken to protect ESDS components from damage and malfunction.

- Before removing or installing a module, ground your body first (for example, by touching a grounded object) before touching ESDS components.
- Ensure that you wear a grounding strap on your wrist when handling such ESDS components. This strap must in turn be attached to an uncoated, non-conductive metal part of the system.
- Use only tools and equipment that are free of static electricity.
- Ensure that your clothing is suitable for the handling of ESDS components. In particular, do not wear garments that are susceptible to electrostatic discharges (wool, polyester). Ensure that your shoes enable a low-resistance path for electrostatic charges to dissipate to the ground.
- Only touch or hold ESDS components by the edges. Never touch any pins or conductors on the ESDS components.
- When removing or installing ESDS components, avoid coming into contact with persons who are not grounded. Such contact may compromise your connection with the grounding conductor and thus also compromise the ESDS component's protection from any static charges you may be carrying.
- Always store ESDS components in ESD-proof 'antistatic' bags. These bags must not be damaged in any way. Antistatic bags that are crumpled or have holes cannot provide effective protection against electrostatic discharges. Antistatic bags must have a sufficient electrical resistance and must not be made of conductive metals if the ESDS component has a lithium battery fitted on it.

## 5.5 Disposal

### Disposal of Packaging Materials



The packaging materials that we use are fully recyclable:

| Material                         | Use for                                   | Disposal        |
|----------------------------------|-------------------------------------------|-----------------|
| Polystyrene                      | Packaging frame/filling material          | Recycling Depot |
| PE-LD (Low-density polyethylene) | Accessories packaging, bubble wrap        | Recycling Depot |
| Cardboard                        | Shipping packaging, accessories packaging | Paper Recycling |

For information on the proper disposal of packaging materials in your specific country, please inquire with your local waste disposal company or authority.

### Disposal of the Device



This product falls under the labeling obligations of the Waste Electrical and Electronic Equipment Directive 2012/19/EU ("*WEEE Directive*") and thus bears this WEEE symbol. The presence of this symbol indicates that this electronic product may only be disposed of in accordance with the following provisions.



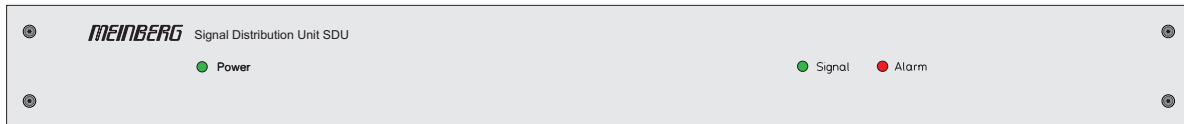
#### Important!

**Do not** dispose of the product or batteries via the household waste. Inquire with your local waste disposal company or authority on how to best dispose of the product or battery if necessary.

This product is considered to be a "B2B" product for the purposes of the WEEE Directive and is also classified as "IT and Telecommunications Equipment" in accordance with Annex I of the Directive.

It can be returned to Meinberg for disposal. 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. If you wish for Meinberg to handle disposal for you, please get in touch with us. Otherwise, please use the return and collection systems provided within your country to ensure that your device is disposed of in a compliant fashion to protect the environment and conserve valuable resources.

## 6 The Modular System SDU



The Signal Distribution Unit "SDU" is installed in a 1U 19-inch housing and is used to distribute a variety of signals. The connectors of the input/output signals of the SDU are provided by connectors on the rear of the housing.

The system consists of one or two distribution modules which can distribute TTL-level signals (1PPS, IRIG DCLS or 10 MHz), sine wave signals (10 MHz), optical fiber optic signals and/or modulated IRIG (IRIG am) depending on the application area.

Some device options using the example of a TTL signal distributor:

| Designation   | Signal     | Number of inputs | Number of outputs |
|---------------|------------|------------------|-------------------|
| SDU/TTL       | TTL        | 1x               | 12                |
| SDU/TTL-12-12 | TTL        | 2x               | 12                |
| SDU/TTL-24    | TTL        | 1x               | 24                |
| SDU/SIN-12    | Sinus-Wave | 1x               | 12                |

It is also possible to use different types of power supply units with the SDU.

### Power Supply

(AD10) 1x AC/DC Power Supply  
 $U_{\max} = 90-265 \text{ V} \sim$   
 $90-250 \text{ V} \equiv$

(DC20) 1x DC Power Supply  
 $U_{\max} = 20-60 \text{ V} \equiv$

### Redundant Power Supply Configurations:

(AD10-AD10) 2x AC/DC Power Supplies

(DC20-DC20) 2x DC Power Supplies

(AD10-DC20) 1x AC/DC Power Supply + 1x DC Power Supply

## 7 Technical Specifications: SDU-Chassis

Chassis Type: 19" Multipac Chassis, 1U

Chassis Material: Sheet Steel

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### Power Consumption

Max. Power per PSU: 50 W

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### Temperature Range

Ambient Temperature: 0 °C to 50 °C

Storage Temperature: -20 °C to 70 °C (-4 °F to 158 °F)

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### Supported Relative Humidity

Operation: Max. 95 % (non-condensing) at 40 °C (104 °F)

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### Operating Altitude

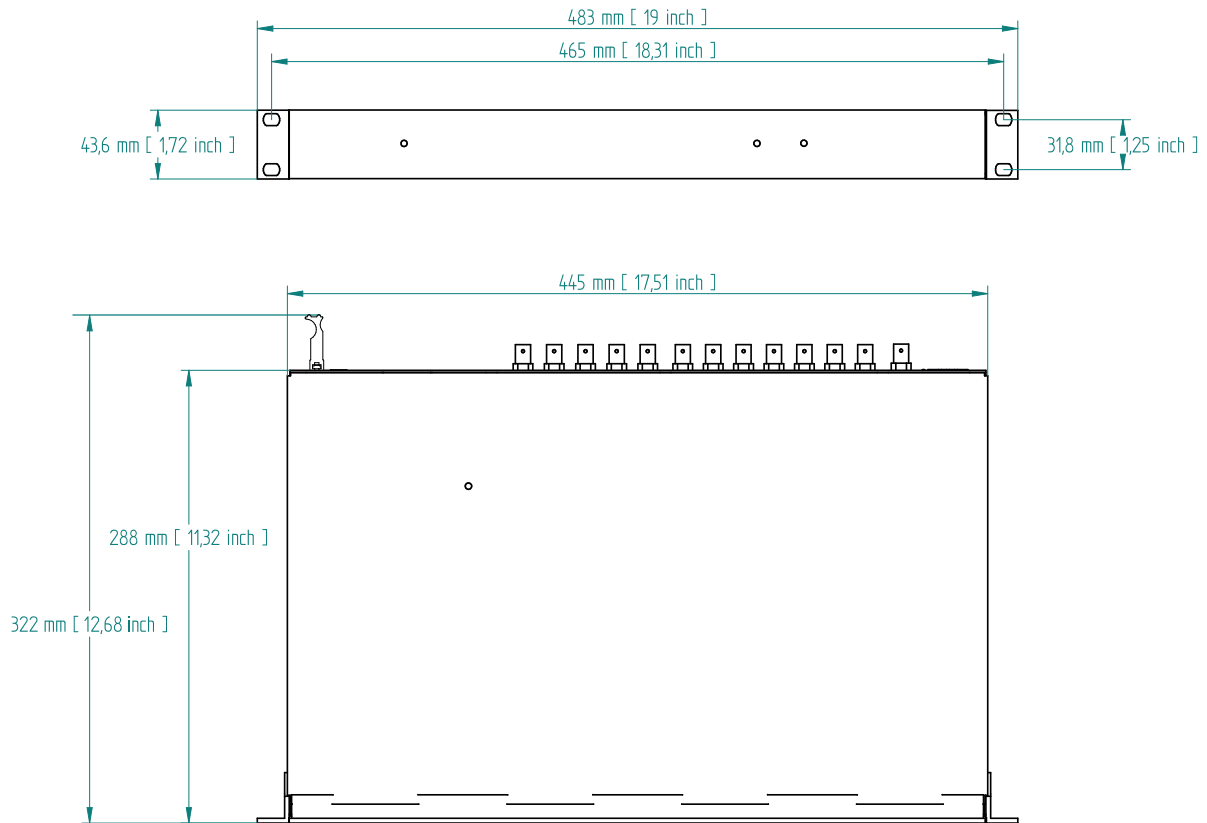
Operation: Max. 4,000 m above sea level (13,123 ft)

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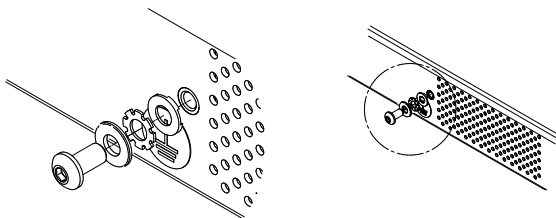
Acoustic Emissions: 0 dB (A)

IP Rating: IP30

## Chassis Dimensions



## External Ground Conductor Terminal on Chassis



### Information:

This terminal must be wired to a bonding busbar (grounding busbar). The terminal is located on the side of the chassis with the power supply unit. The parts required to establish this connection—not including the grounding conductor cable itself—are included with the product as shipped.

## 8 Time Code Distribution SDU/IRIG

The Board SDU/IRIG was designed for the distribution of IRIG-A/B Timecode signals. It is equipped with an adjustable input amplifier as well as twentyfour output buffers. The signal outputs are available via BNC connectors. By means of signal LEDs (Frontpanel), the status of the board is identifiable. Due to the input amplifiers adjustable gain, the boards are cascable.

The SDU/IRIG contains an error detection for losing signal output, this ERROR state is signed by the Alarm LED on the front panel, and by the ERROR output connector on the back panel.

- During "OK" State the connection of the Relay is between: CO - NO
- During "ERROR" State the connection of the Relay is between: CO - NC

The SDU/IRIG is available with two different modules

- **Modul TCM:** Time Code modulated unbalanced
- **Modul TCB:** Time Code modulated balanced

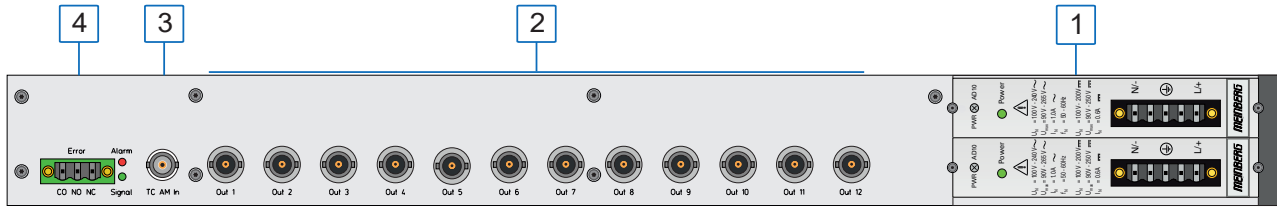
### Specification:

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|                      |                                                                                                                                                                                                                                                                                       |                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Inputs:              | IRIG-A/B Signal or similar timecode with sinusoidal carrier                                                                                                                                                                                                                           |                                     |
| Input Voltage Range: | 1.0 V <sub>pp</sub> ...6 V <sub>pp</sub>                                                                                                                                                                                                                                              |                                     |
| Input Impedance:     | 50 Ohm / 600 Ohm, DC-Insulated                                                                                                                                                                                                                                                        |                                     |
| Outputs:             | balanced or unbalanced<br>max. 24 x IRIG-A/B Signal (or similar Timecode)<br><br><b>unbalanced</b> 3 V <sub>pp</sub> (MARK), 1 V <sub>pp</sub> (SPACE) at 50 Ohm for IRIG common GND for all outputs<br><br><b>balanced</b> 2 V <sub>pp</sub> at 600 Ohm, with isolated BNC connector |                                     |
| Gain:                | adjustable automatic gain control                                                                                                                                                                                                                                                     |                                     |
| Connectors:          | <b>Input signal:</b>                                                                                                                                                                                                                                                                  | 1 x BNC Female, isolated            |
|                      | <b>Output signal:</b>                                                                                                                                                                                                                                                                 | max. 12 (24) x BNC Female, isolated |



## 9 Connectors SDU/TCM



### ENGLISH

1. Power supply
2. Time Code AM outputs, BNC female
3. Time Code AM input, BNC female, isolated
4. Error relay output, 3pin DFK connector

### DEUTSCH

1. Spannungsversorgung
2. Timecode AM Ausgänge, BNC Buchse
3. Time Code AM Eingänge, BNC Buchse, isoliert
4. Error-Relaisausgang, 3-pol. DFK Anschluss



### Information:

The figure shows an SDU/TCM/AD10-AD10

The numbering above relates to the corresponding subsection in this chapter.

### The following system configurations are available:

#### Input/output signal options:

- |                   |                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SDU/TCM/...       | 1x TCM In – a single input signal with error relay and an internal SDU/IRIG distribution card with 12 TCM outputs via BNC female connectors                          |
| SDU/TCM-24/...    | 1x TCM In – a single input signal with error relay and two internal SDU/IRIG distribution cards with 12 + 12 (24) TCM outputs via BNC female connectors              |
| SDU/TCM-12-12/... | 2x TCM In – two independent input signals with error relay each and two internal SDU/IRIG distribution cards with 12 + 12 (24) TCM outputs via BNC female connectors |

#### Power supply

- |              |                                                                                                |
|--------------|------------------------------------------------------------------------------------------------|
| SDU/.../AD10 | 1x AC/DC power supply<br>$U_{\max} = 90-265 \text{ V } \sim$<br>$90-250 \text{ V } \text{---}$ |
| SDU/.../DC20 | 1x DC power supply<br>$U_{\max} = 20-60 \text{ V } \text{---}$                                 |

#### Redundant power supply configurations:

- |                   |                                            |
|-------------------|--------------------------------------------|
| SDU/.../AD10-AD10 | 2x AC/DC power supply                      |
| SDU/.../DC20-DC20 | 2x DC power supply                         |
| SDU/.../AD10-DC20 | 1x AC/DC power supply + 1x DC power supply |

## 9.1 AC/DC Power Connector

### Danger!

This equipment is operated at a hazardous voltage.

Danger of death from electric shock!



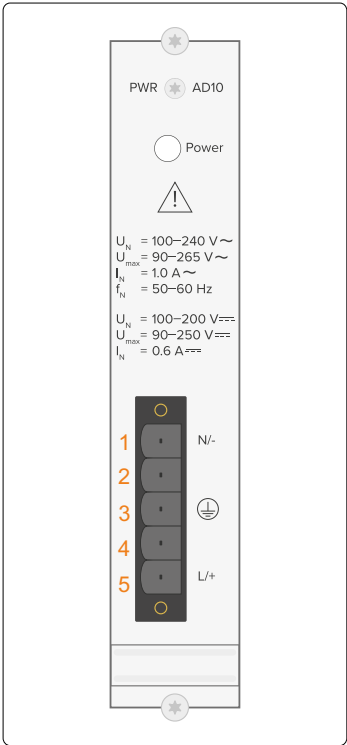
- This device must be connected by skilled personnel or instructed personnel only.
- **Never** handle exposed terminals or plugs while the power is on.
- All connectors must provide protection against contact with live parts in the form of a suitable plug body!
- Always ensure that wiring is safe!
-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

### AC/DC Power Supply Module Technical Specifications

|                                |                                                                                      |
|--------------------------------|--------------------------------------------------------------------------------------|
| Connector Type:<br>(on device) | MSTB 5-Pin, Male<br>with lock screws                                                 |
| Pin Assignment:                | 1: N/-<br>2: Not Connected<br>3: PE (Protective Earth)<br>4: Not Connected<br>5: L/+ |

#### Input Specifications

|                          |                  |   |                                                                                                   |
|--------------------------|------------------|---|---------------------------------------------------------------------------------------------------|
| Nominal Voltage Range:   | $U_N$            | = | $100\text{ V} \sim - 240\text{ V} \sim$<br>$100\text{ V} \text{ --- } - 200\text{ V} \text{ ---}$ |
| Rated Voltage Range:     | $U_{\text{max}}$ | = | $90\text{ V} \sim - 265\text{ V} \sim$<br>$90\text{ V} \text{ --- } - 250\text{ V} \text{ ---}$   |
| Nominal Current:         | $I_N$            | = | $1.0\text{ A} \sim$<br>$0.6\text{ A} \text{ ---}$                                                 |
| Nominal Frequency Range: | $f_N$            | = | $50\text{ Hz} - 60\text{ Hz}$                                                                     |
| Rated Frequency Range:   | $f_{\text{max}}$ | = | $47\text{ Hz} - 63\text{ Hz}$                                                                     |



#### Output Specifications

|                   |                    |   |                            |
|-------------------|--------------------|---|----------------------------|
| Max. Power:       | $P_{\text{max}}$   | = | 50 W                       |
| Max. Heat Output: | $E_{\text{therm}}$ | = | 180.00 kJ/h (170.61 BTU/h) |

## DC Power Supply Module Technical Specifications

**Connector Type:** MSTB 5-Pin, Male  
(on device) with lock screws

**Pin Assignment:**

- 1: Not Connected
- 2:  $V_{IN-}$
- 3: PE (Protective Earth)
- 4:  $V_{IN+}$
- 5: Not Connected

### Input Specifications

**Nominal Voltage Range:**  $U_N = 24\text{ V} \text{ --- } 48\text{ V} \text{ ---}$

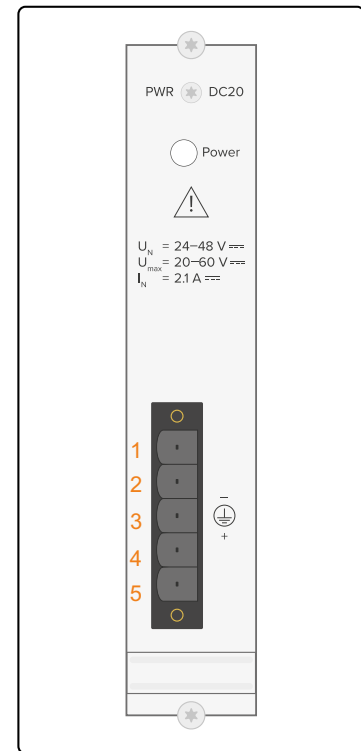
**Rated Voltage Range:**  $U_{max} = 20\text{ V} \text{ --- } 60\text{ V} \text{ ---}$

**Nominal Current:**  $I_N = 2.10\text{ A} \text{ ---}$

### Output Specifications

**Max. Power:**  $P_{max} = 50\text{ W}$

**Max. Heat Output:**  $E_{therm} = 180.00\text{ kJ/h (170.61 BTU/h)}$



## Replacing a Hot-Pluggable Power Supply Module

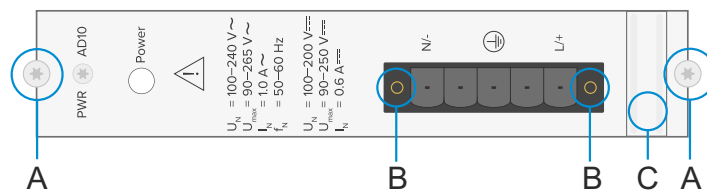


### Information:

It is possible to remove or install a power supply module (e.g., due to a fault) while maintaining operation if the system is operated with redundant power supplies.

### Tools Required

- Slotted Screwdriver: 0.4 mm Tip Thickness, 2.5 mm Tip Width
- Torx Screwdriver: TR8x60



1. Cut off the power supply to the module by pulling the mains plug of the power supply cable out of the mains socket.
2. Remove the 5-pin MSTB plug from the power supply module after loosening the two screws (B) using the slotted screwdriver.



### Important!

#### Screw Torque Value (A)

When tightening the Torx screws (A) to fix the newly installed power supply module in place, please do not exceed the specified torque of 0.6 Nm.

3. Use the Torx screwdriver (TR8) to remove the two Torx screws (A) of the power supply unit to be replaced.
4. The detached power supply module can now be pulled out by the handle (C).
5. Insert the new power supply into the free slot and secure it using the two Torx fastening screws (A) that were used to secure the old power supply unit.
6. Connect the 5-pin MSTB connector of the power cable to the power supply and retighten the two slotted-head screws (B).

7. The power cable can now be reconnected to the power supply.
8. The status LED of the new power supply should now light up and an "OK" status should be displayed in the Web Interface.

### **Checking the Status of the Power Supply Unit**

The status of each power supply module can be checked using the associated LED on the front panel of the device or using the LED on the power supply module itself.

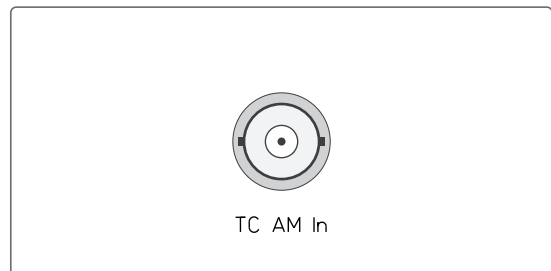
## 9.2 Time Code AM Output

|                    |                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------|
| Carrier frequency: | 1 kHz (IRIG-B)                                                                                    |
| Signal outputs:    | Unbalanced sine wave-signal:<br>3 V <sub>pp</sub> (MARK)<br>1 V <sub>pp</sub> (SPACE) into 50 Ohm |
| Connector:         | BNC, female                                                                                       |
| Cable:             | shielded coax line                                                                                |



## 9.3 Time Code AM Input

|                    |                                      |
|--------------------|--------------------------------------|
| Isolation voltage: | 3000 V DC                            |
| impedance (input): | std. 600 Ohm,<br>(50 Ohm / 5 kOhm)   |
| Signal range:      | ca.600 mV – 8 V<br>(Mark, peak-peak) |
| Connector:         | BNC Female, isolated                 |
| Cable:             | shielded coax line                   |



### Danger!

This equipment is operated at a hazardous voltage.

**Danger to life due to electrical shock!**



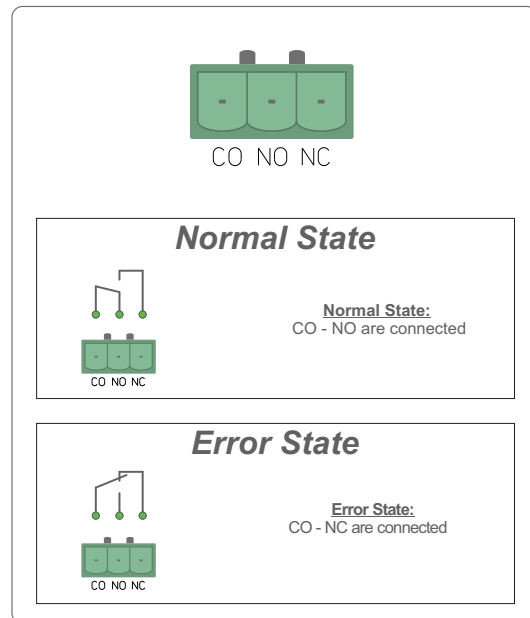
- Never work with open terminals and plugs while the power is on!
- When working on the connectors, always remove both sides of the cable from the respective devices!
- The device is equipped with potential-free and isolated connections.
- In the event of a fault in a connected device, dangerous voltages can occur at the signal lines.

## 9.4 Error Relay

There is a relay output that is labeled "Error" on the unit. This is a potential free contact, which is directly controlled. Normally, when an input signal is applied, the relay and the relay contact "NO" is active. If the input is faulty or switched off the device, the relay contact "NC" is active.

### Technical Specification

|                           |          |          |
|---------------------------|----------|----------|
| Switching Voltage max.:   | 125 V DC |          |
|                           | 150 V AC |          |
| Switching Current max.:   | 1 A      |          |
| Switching Load max.:      | DC       | 30 W     |
|                           | AC       | 60 VA    |
| Switching Current UL/CSA: | 0.46 A   | 150 V AC |
|                           | 0.46 A   | 65 V DC  |
|                           | 1 A      | 30 V DC  |
|                           |          |          |
| Response Time:            | ca.2 ms  |          |



## Danger!

This equipment is operated at a hazardous voltage.

### Danger of death from electric shock!



- Never work with open terminals and plugs while the power is on!
- When handling the connectors of the error relay cable, always disconnect both ends of the cable from their respective devices!
- Hazardous voltages may be passing through the terminal of the fault signal relay! Never handle the fault signal relay terminal while the signal voltage is present!

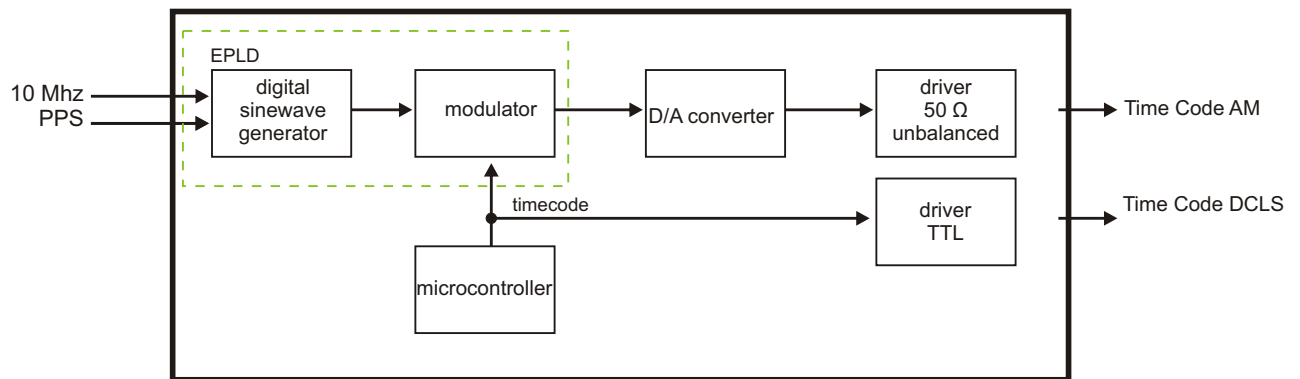
## 9.5 Time Code

### 9.5.1 Abstract of Time Code

The transmission of coded timing signals began to take on widespread importance in the early 1950's. Especially the US missile and space programs were the forces behind the development of these time codes, which were used for the correlation of data. The definition of time code formats was completely arbitrary and left to the individual ideas of each design engineer. Hundreds of different time codes were formed, some of which were standardized by the "Inter Range Instrumentation Group" (IRIG) in the early 60's.

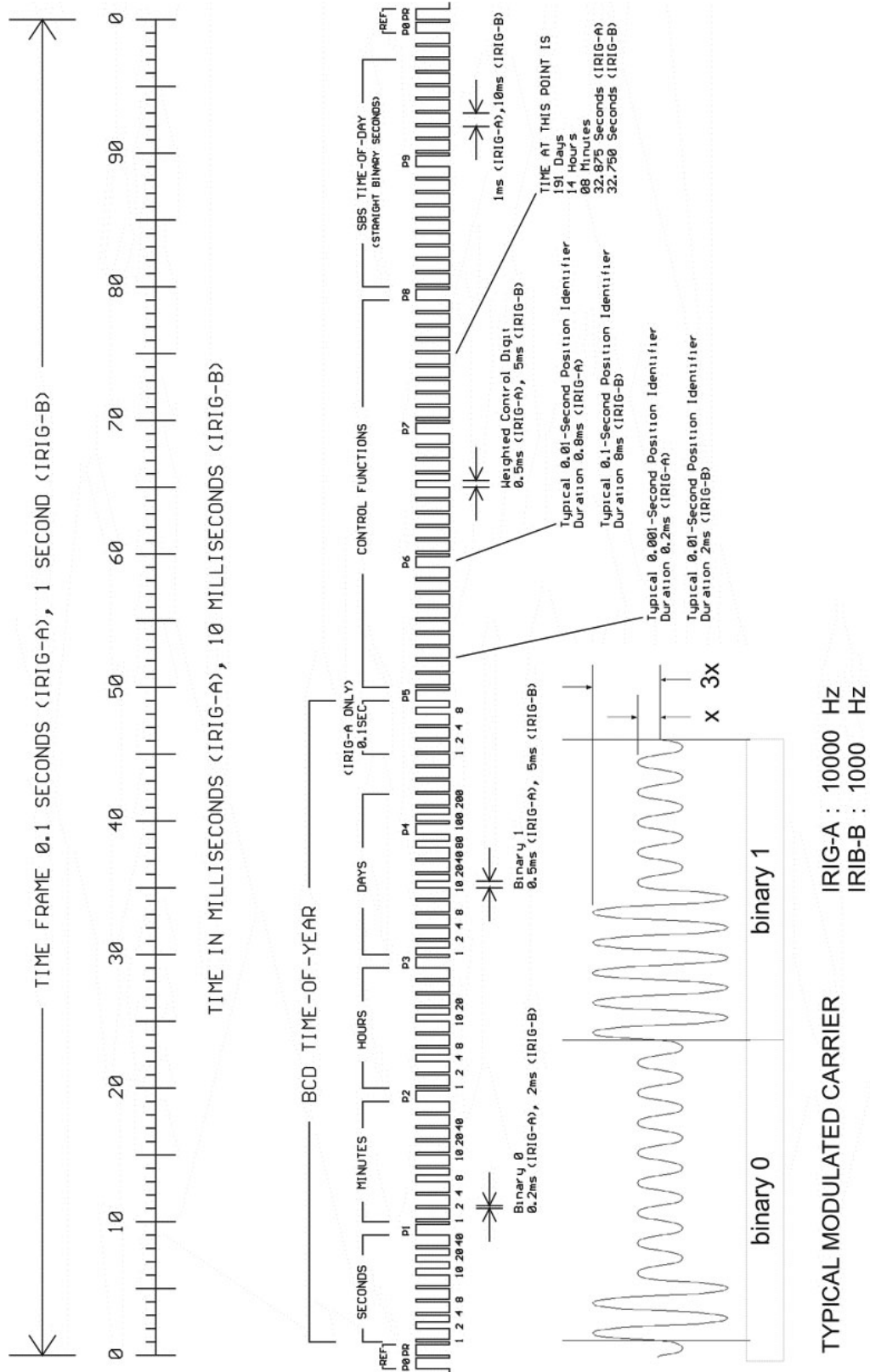
Except these "IRIG Time Codes", other formats like NASA36, XR3 or 2137 are still in use. The SDU/TCM however generates the IRIG-B, AFNOR NFS 87-500 code as well as IEEE1344 code which is an IRIG coded extended by information for time zone, leap second and date.

### 9.5.2 Block Diagram Time Code

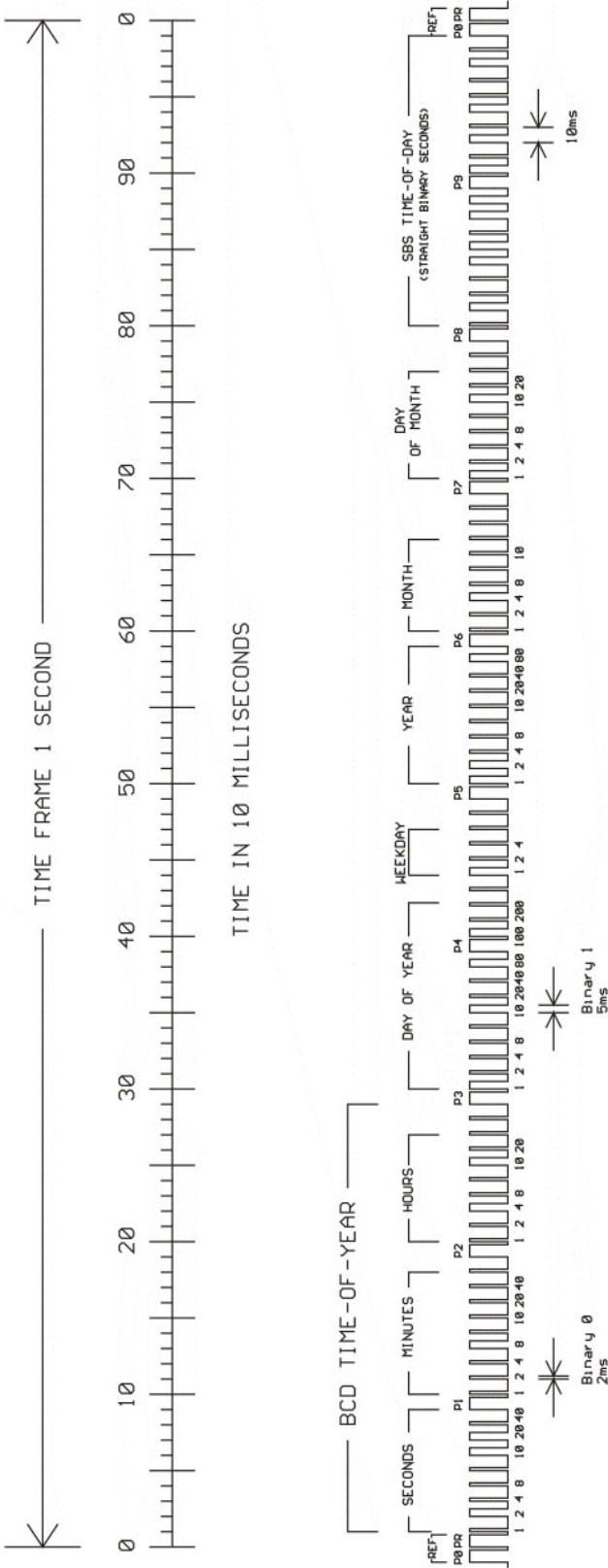




### 9.5.3 Timecode Format According to IRIG Standard



9.5.4 Timecode Format According to AFNOR Standard



### 9.5.5 Structure of CF Segment in IEEE 1344 Code

| Bit No. | Designation                   | Description                                                                                                       |
|---------|-------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 49      | Position Identifier P5        |                                                                                                                   |
| 50      | Year BCD encoded 1            | Low nibble of BCD-encoded year                                                                                    |
| 51      | Year BCD encoded 2            |                                                                                                                   |
| 52      | Year BCD encoded 4            |                                                                                                                   |
| 53      | Year BCD encoded 8            |                                                                                                                   |
| 54      | empty, always zero            |                                                                                                                   |
| 55      | Year BCD encoded 10           | High nibble of BCD-encoded year                                                                                   |
| 56      | Year BCD encoded 20           |                                                                                                                   |
| 57      | Year BCD encoded 40           |                                                                                                                   |
| 58      | Year BCD encoded 80           |                                                                                                                   |
| 59      | Position Identifier P6        |                                                                                                                   |
| 60      | LSP - Leap Second Pending     | Set until 59s before LS insertion                                                                                 |
| 61      | LS - Leap Second              | 0 = Add leap second, 1 = Remove leap second <sup>1)</sup>                                                         |
| 62      | DSP - Daylight Saving Pending | Set until 59s before Daylight Saving Time changeover                                                              |
| 63      | DST - Daylight Saving Time    | Set during Daylight Saving Time                                                                                   |
| 64      | Timezone Offset Sign          | Sign of TZ offset 0 = "+", 1 = "-"                                                                                |
| 65      | TZ Offset binary encoded 1    | Offset between IRIG time and UTC time.<br>Encoded IRIG time plus TZ offset equals UTC at all times!               |
| 66      | TZ Offset binary encoded 2    |                                                                                                                   |
| 67      | TZ Offset binary encoded 4    |                                                                                                                   |
| 68      | TZ Offset binary encoded 8    |                                                                                                                   |
| 69      | Position Identifier P7        |                                                                                                                   |
| 70      | TZ Offset 0.5 hour            | Set if additional half-hour offset                                                                                |
| 71      | TFOM Time figure of merit     | TFOM represents approximate clock error <sup>2)</sup><br>0x00 = Clock synchronized, 0x0F = Clock in free-run mode |
| 72      | TFOM Time figure of merit     |                                                                                                                   |
| 73      | TFOM Time figure of merit     |                                                                                                                   |
| 74      | TFOM Time figure of merit     |                                                                                                                   |
| 75      | PARITY                        | Parity of all preceding bits                                                                                      |

1.) Current firmware only supports insertion of leap seconds!

2.) TFOM is set to 0 if clock has been able to synchronize since power up. The firmware does not support other codes.

For more information, please refer to the time code specifications.

### 9.5.6 Generated Time Codes

Besides the amplitude modulated sine wave signal, the board also provides unmodulated DC-Level Shift TTL output in parallel. Thus six time codes are available.

- a) B002: 100 pps, DCLS signal, no carrier  
BCD time-of-year
- b) B122: 100 pps, AM sine wave signal, 1 kHz carrier frequency  
BCD time-of-year
- c) B003: 100 pps, DCLS signal, no carrier  
BCD time-of-year, SBS time-of-day
- d) B123: 100 pps, AM sine wave signal, 1 kHz carrier frequency  
BCD time-of-year, SBS time-of-day
- e) B006: 100 pps, DCLS Signal, no carrier  
BCD time-of-year, Year
- f) B126: 100 pps, AM sine wave signal, 1 kHz carrier frequency  
BCD time-of-year, Year
- g) B007: 100 pps, DCLS Signal, no carrier  
BCD time-of-year, Year, SBS time-of-day
- h) B127: 100 pps, AM sine wave signal, 1 kHz carrier frequency  
BCD time-of-year, Year, SBS time-of-day
- i) AFNOR: Code according to NFS-87500, 100 pps, wave signal,  
1kHz carrier frequency, BCD time-of-year, complete date,  
SBS time-of-day, Signal level according to NFS-87500
- j) IEEE1344: Code according to IEEE1344-1995, 100 pps, AM sine wave signal,  
1kHz carrier frequency, BCD time-of-year, SBS time-of-day,  
IEEE1344 extensions for date, timezone, daylight saving and  
leap second in control functions (CF) segment.  
(also see table 'Assignment of CF segment in IEEE1344 mode')
- k) C37.118 Like IEEE1344 - with turned sign bit for UTC-Offset

### 9.5.7 Selection of Generated Time Code

The time code to be generated can be selected by Menu Setup IRIG-settings or by the used Monitorprogram (except Lantime models). DC-Level Shift Codes (PWM-signal) B00x and modulated sine wave carrier B12x are always generated simultaneously. Both signals are provided at the VG64-Connector, i.e. if code B132 is selected also code B002 is available. This applies for the codes AFNOR NFS 87-500 and IEEE1344 as well.

The TFOM field in IEEE1344 code is set dependent on the 'already synced' character ('#') which is sent in the serial time telegram. This character is set, whenever the preconnected clock was not able to synchronize after power up reset. The 'time figure of merit' (TFOM) field is set as follows.

|                                         |             |
|-----------------------------------------|-------------|
| Clock synchronized once after power up: | TFOM = 0000 |
| Clock not synchronized after power up:  | TFOM = 1111 |

For testing purposes the output of TFOM in IEEE1344 mode can be disabled. The segment is set to all zeros then.

## 9.5.8 Outputs

The module SDU/TCM provides modulated (AM) and unmodulated (DCLS) outputs. The format of the timecodes is illustrated in the diagrams "IRIG-" and "AFNOR standard-format".

### 9.5.8.1 AM - Sine Wave Output

The carrier frequency depends on the code and has a value of 1 kHz (IRIG-B). The signal amplitude is 3 V<sub>pp</sub> (MARK) and 1 V<sub>pp</sub> (SPACE) into 50 Ohm. The encoding is made by the number of MARK-amplitudes during ten carrier waves. The following agreements are valid:

- a) binary "0": 2 MARK-amplitudes, 8 SPACE-amplitudes
- b) binary "1": 5 MARK-amplitudes, 5 SPACE-amplitudes
- c) position-identifier: 8 MARK-amplitudes, 2 SPACE-amplitudes

### 9.5.8.2 PWM DC Output

The pulse width DCLS signals shown in the diagrams "IRIG" and "AFNOR standard format" are coexistent to the modulated output and is available at the VG connector pin 13a with TTL level.

## 9.5.9 Technical Data

**Outputs:** Unbalanced AM-sine wave-signal:  
3 V<sub>pp</sub> (MARK) / 1 V<sub>pp</sub> (SPACE) into 50 Ohm

DCLS signal: TTL

## 10 RoHS Conformity

### Conformity 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" and that no impermissible substances are present in our products pursuant to these Directives.

We warrant that our 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.



# 11 Declaration of Conformity for Operation in the European Union

## EU-Konformitätserklärung

Doc ID: SDU/TCM-May 19, 2025

**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**                      SDU/TCM  
*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     | EN 61000-6-2:2019                            |
| <i>EMC Directive</i> | EN IEC 61000-6-3:2021                        |
|                      | EN 55035:2017/A11:2020                       |
|                      | EN 55032:2015 + AC:2016 + A11:2020 + A1:2020 |

2014/30/EU

---

|                              |                                |
|------------------------------|--------------------------------|
| Niederspannungsrichtlinie    | EN IEC 62368-1:2020 + A11:2020 |
| <i>Low-voltage Directive</i> |                                |

2014/35/EU

---

|                       |                   |
|-----------------------|-------------------|
| RoHS – Richtlinie     | EN IEC 63000:2018 |
| <i>RoHS Directive</i> |                   |

2011/65/EU + 2015/863/EU

---



## EU-Declaration of Conformity

Doc ID: SDU/TCM-May 19, 2025

Diese EU-Konformitätserklärung umfasst alle nachfolgend aufgeführten Gerätekonfigurationen:  
*This UKCA Declaration of Conformity further covers all the device configurations listed below:*

|                                 |                         |
|---------------------------------|-------------------------|
| <b>Signal Distribution Unit</b> | SDU/TCM/AD10            |
|                                 | SDU/TCM/AD10-AD10       |
|                                 | SDU/TCM/AD10-DC20       |
|                                 | SDU/TCM/DC20            |
|                                 | SDU/TCM/DC20-DC20       |
|                                 | SDU/TCM-24/AD10         |
|                                 | SDU/TCM-24/AD10-AD10    |
|                                 | SDU/TCM-24/AD10-DC20    |
|                                 | SDU/TCM-24/DC20         |
|                                 | SDU/TCM-24/DC20-DC20    |
|                                 | SDU/TCM-12-12/AD10      |
|                                 | SDU/TCM-12-12/AD10-AD10 |
|                                 | SDU/TCM-12-12/AD10-DC20 |
|                                 | SDU/TCM-12-12/DC20      |
|                                 | SDU/TCM-12-12/DC20-DC20 |

Bad Pyrmont, den May 19, 2025

Aron Meinberg  
Quality Management

  
Meinberg Funkuhren GmbH & Co. KG  
Lange Wand 9  
31842 Bad Pyrmont

# 12 Declaration of Conformity for Operation in the United Kingdom

## UKCA Declaration of Conformity

Doc ID: SDU/TCM-May 19, 2025

**Manufacturer**

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

*declares that the product*

**Product Designation**

SDU/TCM

*to which this declaration relates, is in conformity with the following standards and provisions of the following regulations under British law:*

---

Electromagnetic Compatibility  
Regulations 2016 (as amended)  
*SI 2016/1091*

EN IEC 61000-6-2:2019  
EN IEC 61000-6-3:2021  
EN 55035:2017/A11:2020  
EN 55032:2015 + AC:2016 + A11:2020 + A1:2020

---

Electrical Equipment (Safety)  
Regulations 2016 (as amended)  
*SI 2016/1101*

EN IEC 62368-1:2020/A11:2020

---

The Restriction of the Use of Certain  
Hazardous Substances in Electrical and  
Electronic Equipment Regulations 2012  
(as amended)  
*SI 2012/3032*

EN IEC 63000:2018

---

## UKCA Declaration of Conformity

Doc ID: SDU/TCM-May 19, 2025

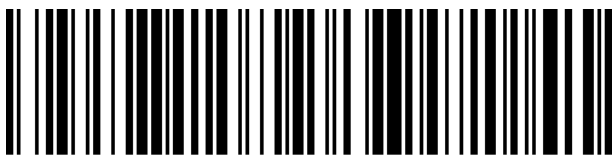
*This UKCA Declaration of Conformity further covers all the device configurations listed below:*

|                                 |                         |
|---------------------------------|-------------------------|
| <b>Signal Distribution Unit</b> | SDU/TCM/AD10            |
|                                 | SDU/TCM/AD10-AD10       |
|                                 | SDU/TCM/AD10-DC20       |
|                                 | SDU/TCM/DC20            |
|                                 | SDU/TCM/DC20-DC20       |
|                                 | SDU/TCM-24/AD10         |
|                                 | SDU/TCM-24/AD10-AD10    |
|                                 | SDU/TCM-24/AD10-DC20    |
|                                 | SDU/TCM-24/DC20         |
|                                 | SDU/TCM-24/DC20-DC20    |
|                                 | SDU/TCM-12-12/AD10      |
|                                 | SDU/TCM-12-12/AD10-AD10 |
|                                 | SDU/TCM-12-12/AD10-DC20 |
|                                 | SDU/TCM-12-12/DC20      |
|                                 | SDU/TCM-12-12/DC20-DC20 |

Bad Pyrmont, Germany, dated May 19, 2025

Aron Meinberg  
Quality Management

  
Meinberg Funkuhren GmbH & Co. KG  
Lange Wand 9  
31842 Bad Pyrmont



SDU/TCM\_190525