



The Synchronization Experts.



## MANUAL

### CON/FOS/TTL

Fiber Optic to TTL Converter  
(Single Mode)

14th January 2020

Meinberg Funkhuren GmbH & Co. KG



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# Table of Contents

<b>1 Imprint</b>	<b>1</b>
<b>2 Important Safety Information</b>	<b>2</b>
2.1 Important Safety Instructions and Protective Measures . . . . .	2
2.2 Used Symbols . . . . .	3
2.3 Security during Installation . . . . .	5
2.4 Protective Conductor- / Ground-Terminal . . . . .	8
2.5 Safety during Operation . . . . .	9
2.6 Fiber Optic . . . . .	9
2.7 Safety during Maintenance . . . . .	10
2.8 Cleaning and Care . . . . .	11
2.9 Prevention of ESD Damage . . . . .	11
2.10 Return of Electrical and Electronic Equipment . . . . .	12
<b>3 Fiber Optic Converter CON/FOS/TTL</b>	<b>13</b>
3.1 Technical Specification CON/FOS/TTL . . . . .	14
3.2 LWL Converter Case . . . . .	14
<b>4 Declaration of Conformity</b>	<b>15</b>

# 1 Imprint

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## 2 Important Safety Information

### 2.1 Important Safety Instructions and Protective Measures

The following safety instructions must be respected in all operating and installation phases of the device. Non-observance of safety instructions, or rather special warnings and operating instructions in product manuals, violates safety standards, manufacturer instructions and proper usage of the device. Meinberg Funkuhren shall not be responsible for any damage arising due to non-observance of these regulations.



Depending on your device or the installed options some information is not valid for your device.



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

If a procedure is marked with the following signal words, you may only continue, if you have understood and fulfilled all requirements. In this documentation dangers and indications are classified and illustrated as follows:



#### **DANGER!**

The signal word indicates an imminently hazardous situation with a high risk level . This notice draws attention to an operating procedure or similar proceedings, of which a non-observance may result in serious personal injury or death .



#### **WARNING!**

The signal word indicates a hazard with a medium risk gradient . This notice draws attention to an operating procedure, a procedure or the like which, if not followed, can lead to serious injuries , possibly resulting in death .



#### **CAUTION!**

The signal word indicates a hazard with a low risk gradient . This notice draws attention to an operating procedure, a procedure or the like which, if not followed, can lead to minor injuries .















#### **ATTENTION!**

This notice draws attention to an operating procedure, a procedure or the like which, if not followed, can cause damage to the product or loss of important data .

## 2.2 Used Symbols

The following symbols and pictograms are used in this manual. To illustrate the source of danger, pictograms are used, which can occur in all hazard classes.

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 fan blades</i>
	IEC 60417-6172 Trennen Sie alle Netzstecker / <i>Disconnection, all power plugs</i>
	IEC 60417-5134 Elektrostatisch gefährdete Bauteile / <i>Electrostatic Sensitive Devices</i>
	IEC 60417-6222 Information generell / <i>Information general</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. In order to secure a WEEE compliant waste disposal it has to be returned to the manufacturer.</i>

The manuals for a product are included in the scope of delivery of the device on a USB stick. The manuals can also be obtained via the Internet. Enter [www.meinbergglobal.com](http://www.meinbergglobal.com) into your browser, then enter the corresponding device name in the search field at the top.



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

This device may only be used for the purpose described in this manual. In particular, the given limits of the device must be observed. The safety of the installation in which the unit is integrated is the responsibility of the installer!

Non-observance of these instructions can lead to a reduction in the safety of this device!

Please keep this manual in a safe place.

This manual is intended exclusively for electricians or persons trained by an electrician who are familiar with the applicable national standards and safety rules. Installation, commissioning and operation of this device may only be carried out by qualified personnel.

## 2.3 Security during Installation



### WARNING!

#### Preparing for Commissioning

This built-in unit, has been designed and examined according to the requirements of the standard IEC 60950-1 „Information Technology Equipment - Safety“.

When the built-in unit is used in a terminal (e.g., housing cabinet), additional requirements according to Standard IEC 60950-1 must be observed and complied with. In particular, the general requirements and the safety of electrical equipment (such as IEC, VDE, DIN, ANSI) as well as the applicable national standards are to be observed.

The device has been developed for use in the industrial sector as well as in residential areas and can only be used in such environments. For environments with higher levels of soiling, additional measures, e.g. Installation in an air-conditioned control cabinet required.

#### Transport, Unpacking, Installation

If the unit is brought into the operating room from a cold environment, condensation may occur, wait until the unit is temperature-controlled and absolutely dry before operating it.

When unpacking, setting up, and before operating the equipment, be sure to read the information on the hardware installation and the specifications of the equipment. These include, for example, dimensions, electrical characteristics, and necessary ambient and climatic conditions, etc.

The fire protection must be ensured in the installed state.

For mounting, the housing must not be damaged. No holes may be drilled in the housing.

For safety reasons, the device with the highest mass should be installed in the lowest position of the rack. Other devices must be placed from the bottom to the top.

The device must be protected against mechanical stress such as vibration or shock.





#### Connecting Data Cables

During a thunderstorm, data transmission lines must not be connected or disconnected (risk of lightning).

When wiring the devices, the cables must be connected or disconnected in the order of the arrangement described in the user documentation accompanying the device. Always attach all cables to the plug during connection and removal. Never pull the cable itself. Pulling the cable can cause the cables to disconnect from the plug.

Install the cables in way that they do not constitute a hazard (danger of tripping) and are not damaged, i.e. kinked.

#### Connecting Power Supply

This equipment is operated at a hazardous voltage. Non-observance of the safety instructions in this manual may result in serious personal injury or property damage.

Before connecting to the power supply, a grounding cable must be connected to the earth connection of the device.

Before operation, check that all cables and lines work properly and are undamaged. Pay particular attention to the facts that the cables do not have kinks or that they are not too short around corners, and no objects are placed on the cables. Also make sure that all connections are secure.

Faulty shielding or cabling will endanger your health (electrical shock) and may destroy other equipment.

Ensure that all necessary safety precautions have been taken. Make all connections to a unit before turning on the power. Observe the safety instructions on the device (see safety symbols).

The metal housing of the device is grounded. It must be ensured that enough air and creepage distances to neighboring voltage-carrying parts are provided during assembly in the control cabinet and no short circuits are caused.

In the case of malfunctions or servicing (e.g. in the event of a damaged housing or power cable or when fluids or foreign objects enter), the current flow can be interrupted. Questions about the house installation, need to be clarified with your house administration.

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

AC Power Supply	DC Power Supply
<ul style="list-style-type: none"> <li>• The device is a device of protection class 1 and may only be connected to a grounded outlet (TN system).</li> <li>• For safe operation, the device must be protected by an installation fuse of max. 16 A and equipped with a residual current circuit breaker in accordance with the applicable national standards.</li> <li>• The unit must always be disconnected from the mains and not from the appliance.</li> <li>• Devices with mains plugs are equipped with a safety-tested mains cable of the country of use and may only be connected to a grounded shockproof socket, otherwise electric shock may occur.</li> <li>• Make sure that the mains socket on the appliance or the mains socket of the house installation is freely accessible to the user so that the mains cable can be pulled out of the socket in case of emergency.</li> </ul>	<ul style="list-style-type: none"> <li>• Outside the assembly group the device must be disconnectable from the power supply in accordance with the provisions of IEC 60950-1 (e.g. by the primary line protection).</li> <li>• Installation and disassembly of the power supply plug is only permitted if the assembly group is switched off (e.g. by the primary line protection).</li> <li>• The supply lines must be adequately secured and dimensioned.</li> </ul> <p style="text-align: center;"><i>Connection Cross Section:</i>  <math>1\text{ mm}^2 - 2.5\text{ mm}^2</math>  17 AWG – 13 AWG</p> <ul style="list-style-type: none"> <li>• The device must be supplied with a suitable disconnecter (switch). The separation device must be easily accessible, placed near the device and marked as a separation device for the unit.</li> </ul>

## 2.4 Protective Conductor- / Ground-Terminal



ATTENTION!



In order to ensure safe operation 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 connection is provided on the housing, it must be connected to the equipotential bonding rail (grounding rail). The mounting parts (without cable) are not included in the scope of delivery.

**Note:**

Please use a grounding cable  $\geq 1.5 \text{ mm}^2$

Always pay attention to a correct crimp connection!

## 2.5 Safety during Operation



### WARNING!

#### Avoiding Short-Circuits

Make sure not to get any objects or liquids inside the unit. Electric shock or short circuit could result.

#### Ventilation Slots

Make sure that the ventilation slots are not covered or dusty, as there is a danger of overheating during operation. Disturbances during operation can result.

#### Normal Operation

The normal operation and the observance of the EMC limits (electromagnetic compatibility) are only ensured if the housing cover is properly installed and when the doors are closed (cooling, fire protection, shielding against electrical, magnetic and electromagnetic fields).



#### Switch off in fault / service case

By switching off, the devices are not disconnected from the power supply. In the event of a fault or service case, the devices must be immediately disconnected from all power supplies.

#### **Follow the steps below:**

- Switch off the device
- Disconnect all power plugs
- Inform the service
- Devices that are connected via one or more uninterruptible power supplies (UPS) remain operational even when the UPS power cord is disconnected. Therefore, you must put the UPS out of operation according to the documentation of the corresponding user documentation.

## 2.6 Fiber Optic



### ATTENTION!

Laser Class 1

#### **Risk of injury from laser!**

The optical interface corresponds to laser class 1 according to IEC 60825-1 and contains a light-emitting diode (LED). A direct view into this beam should be avoided.

Unused connectors of optical interfaces should always be provided with the protective cap.

## 2.7 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.

## 2.8 Cleaning and Care



### ATTENTION!

Do not wet clean the appliance! Penetrating water can cause considerable dangers to the user (e.g., electric shock).

Liquid can destroy the electronics of the device! Liquid penetrates into the housing of the device and can cause a short circuit of the electronics.

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

## 2.9 Prevention of ESD Damage



### ATTENTION!

The designation ESD (Electrostatic Sensitive Devices) refers to measures which are used to protect electrostatically endangered components from electrostatic discharge and thus to prevent destruction. Systems and assemblies with electrostatically endangered components usually have the following characteristics:



### Indicator for assemblies with electrostatic endangered components

The following measures protect electrostatically endangered components from destruction:

#### Prepare removal and installation of assemblies

Unload yourself (for example, by touching a grounded object) before touching assemblies.

Ensure that you wear a grounding strap on the wrist when working with such assemblies, which you attach to an unpainted, non-conductive metal part of the system.

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

#### Transporting Assemblies

Assemblies may only be touched at the edge. Do not touch any pins or conductors on assemblies.

#### Installing and Removing Assemblies

Do not touch persons who are not grounded while removing or installing components. This could result in a loss of grounding protection from your electrostatic discharge.

#### Storing Assemblies

Always keep assemblies in ESD protective covers. These protective covers must be undamaged. ESD protective covers, which are extremely wrinkled or even have holes, no longer protect against electrostatic discharge.

ESD protective covers must not be low-resistance and metallically conductive if a lithium battery is installed on the assembly.

## 2.10 Return of Electrical and Electronic Equipment



### ATTENTION!

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

#### Separate Collection

Product Category: According to the device types listed in the WEEE Directive, Appendix 1, this product is classified as an IT and communication device.



This product meets 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

For returning your old equipment, please use the country-specific return and collection systems available to you or contact Meinberg.

The withdrawal may be refused in the case of waste equipment which presents a risk to human health or safety due to contamination during use.

#### Return of used Batteries

Batteries marked with one of the following symbols may not be disposed of together with the household waste according to the EU Directive.

## 3 Fiber Optic Converter CON/FOS/TTL

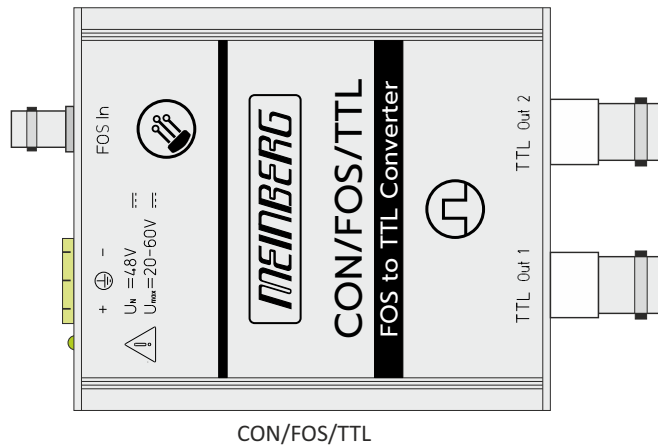
The fiber optic converter module CON/FOS/TTL for singlemode fibers converts an optical input signal into one or more electrical output signals (TTL or RS422).

**The following options are possible:**

- 1.) CON/FOS/TTL: two TTL outputs via BNC female connectors
- 2.) CON/FOS/422: one RS422 output via DSub9 female connector

The modules are suited for signals like PPS, PPM, IRIG-B DCLS or 10MHz, for example. The required supply voltage (20 - 60 V DC) is provided by a power adapter ( $V_{in}$  : 100 - 240 V AC;  $V_{out}$  : 24 V DC) which is included in the scope of supply. All models are equipped with a fixing clamp for 35mm DIN mounting rails. If necessary, the output signal can be inverted by setting a solder bridge inside the housing.

The maximum distance between transmitter and receiver comes up to 10 kilometers.





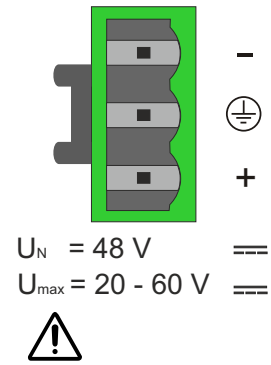
### 3.1 Technical Specification CON/FOS/TTL

#### Input Parameter

Nominal voltage range:	$U_N = 48 \text{ V} \text{ ---}$
Maximum voltage range:	$U_{\max} = 20 - 60 \text{ V} \text{ ---}$
Nominal current:	$I_N = 0.22 \text{ A}$

#### Output Parameter

Maximum power:	$P_{\max} = 10 \text{ W}$
Maximum heat:	$E_{\text{therm}} = 36.01 \text{ kJ/h (34.13 BTU/h)}$



Input Signal: one singlemode FO input via ST connector, edge-triggered for E9/125 $\mu\text{m}$  monomode fiber (PC or UPC)  
 minimum input level: 1 $\mu\text{W}$  (-30dBm), wave length: 1310nm

Electrical Outputs: 2 x TTL signal via BNC female connectors  
 2,5 V into 50 Ohm  
 or  
 1 x RS422 signal via DSub9 female connector  
 pin 5: GND, pin 7: +IN, pin 8: -IN

Signal Delay: Delay of the electrical slope, detected with CON/TTL/FOS and CON/FOS/TTL:  
 rising edge: 75ns  
 falling edge: 70ns  
 (plus the delay caused by the optical fiber: approx. 4,9ns/m)

Data Rate: max. 10 MHz

Signal Jitter: <1 ns

### 3.2 LWL Converter Case

Chassis: Aluminium profile case  
 84mm x 71mm x 24mm  
 (Width x Depth x Height)

Protection Rating: IP30

Temperature: 0 ... 50°C  
 Storage Temperature: -25 ... 70°C

Humidity: max. 85%



