MANUAL

FO CONVERTER

Signal Distribution over long Distances

5th February 2016

Meinberg Radio Clocks GmbH & Co. KG

Table of Contents

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 - 30

Internet: http://www.meinberg.de
Mail: info@meinberg.de

Date: 2015-08-06

2 Safety Instructions for Building-in Equipment

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

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

- The building-in equipment is a class 1 - equipment and must be connected to an earthed outlet (TN Power System).
- The building-in equipment has been evaluated for use in office environment (pollution degree 2) and may be only used in this environment. For use in rooms with a higher pollution degree more stringent requirements are applicable.
- The building-in equipment may not be opened.
- Protection against fire must be assured in the end application.
- The ventilation opening may not be covered.
- The equipment/building-in equipment was evaluated for use in a maximum ambient temperature of 40°C.
- For safe operation the building-in equipment must be protected by max 16 A fuse in the power installation system.
- Disconnection of the equipment from mains is done by pulling the mains plug.

3 Fiber Optic Converter Overview

The following fiber optic converters have been designed for the distribution of electrical signals over optical fibers. The multi mode converters are linked via an optical GI50/125μm or GI62.5/125μm multimode fiber using a wave lenght of 850nm. The single mode converters are linked via an optical E9/125μm monomode fiber using a wave lenght of 1310nm.

The elecrical inputs and outputs are provided via female BNC connectors or 9pin. SubD connectors. If necessary, the output signals of the digital modules can be inverted against the respective input signal by a jumper inside the aluminium profile housing (71mm x 84mm x 24mm / width x depth x height). The required supply voltage (18 - 72 V DC) is provided by a power adapter (V_{in} : 100 - 240 V AC; V_{out} : 24 V DC) which is optionally included in the scope of supply. Alternatively, the modules are available without plug-in power supply (/DC), in this case the needed supply voltage of 18 - 72 V DC must be provided externally.

Furthermore, the modules are available with a fixing clamp for 35mm DIN mounting rails (/HS).

3.1 CON/TTL/FO

The fiber optic module CON/TTL/FO converts an input signal (TTL, RS-422 or FO) into one or more FO (fiber optical) output signals.

Standard variants (PPS, PPM, IRIG-B DCLS, TxD)
CON/TTL/FO: TTL In (BNC) to 1 x FO Out
CON/422/FO: RS-422 In (DB9 female) to 1 x FO Out

Variants up to 10MHz
CON/TTL/FO/10M: TTL In (BNC) to 1 x FO Out
CON/FO/FO/10M: FO In to 1 x FO Out

Option: up to 4 x FO Out CON/.../FO-x /Output

3.1.1 Technical Specifications CON/TTL/FO

Power requirements:	18 V - 72 V DC, 200 mA max.
Input:	TTL input signal via female BNC connector or RS422 input signal via male DSub9 connector (Pin7: -IN, Pin8: +IN) or FO input signal via ST connector, optical input level: 3μW min.
Optical Outputs:	up to four multimode FO outputs via ST connectors (for GI 50/125μm or GI 62,5/125μm gradient fiber)
Launchable output power:	typ. 15μW per output (into GI 62,5/125μm gradient fiber)
Wave length:	850nm
Signal delay:	Delay of the electrical slope, detected with CON/TTL/FO and CON/FO/TTL: rising edge: 1,65μs falling edge: 15,3μs data rate: 10kHz max. CON/TTL/FO/10M and CON/FO/TTL: rising edge: 108ns falling edge: 132ns data rate: 1MHz max. CON/TTL/FO/10M and CON/FO/TTL/10M: rising edge: 85ns falling edge: 100ns data rate: 10MHz max.
Housing:	Aluminium profile case, 84mm x 71mm x 24mm

CLASS 1 LED PRODUCT

3.2 CON/FO/TTL

The fiber optic module CON/FO/TTL converts a FO (fiber optical) input signal into one or more electrical output signals (TTL or RS-422).

Standard variants (PPS, PPM, IRIG-B DCLS, TxD)
CON/FO/TTL: FO In to 2 x TTL Out (BNC)
CON/FO/422: FO In to 1 x RS-422 Out (DB9 female)
CON/FO/TTL/422: FO In to 1 x RS-422 and 1 x TTL Out

Variants up to 10MHz
CON/FO/TTL/10M: FO In to 1 x TTL Out (BNC)
CON/FO/TTL-2/10M: FO In to 2 x TTL Out (BNC)

3.2.1 Technical Specifications CON/FO/TTL

Power Requirements:	18 V - 72 V DC, 200 mA max.
optical Input:	1 x multimode FO input via ST connector (for GI 50/125μm or GI 62,5/125μm gradient fiber)
optical input level:	min. 3μW
Wave length:	850nm
electrical Outputs:	TTL output signal via female BNC connector RS422 output signal via female 9pin-DSub connector (Pin7: +OUT, Pin8: -OUT)
Signal delay:	Delay of the electrical slope, detected with CON/TTL/FO and CON/FO/TTL: rising edge: 1,65μs falling edge: 15,3μs data rate: 10kHz max. CON/TTL/FO/10M and CON/FO/TTL: rising edge: 108ns falling edge: 132ns data rate: 1MHz max. CON/TTL/FO/10M and CON/FO/TTL/10M: rising edge: 85ns falling edge: 100ns data rate: 10MHz max.
Housing:	Aluminium profile case, 84mm x 71mm x 24mm

3.3 CON/232/FO

The fiber optic module CON/232/FO converts a RS232 signal (TxD and RxD) into optical signals.

Standard variants (for RxD and TxD)
CON/232/FO: RS232 (DB9 male) to 1 x FO In and 1 x FO Out

Variants (TxD only), also as diplexer
CON/232/FO-1: TxD In (DB9 male) to 1 x FO Out

Optional up to 4 x FO Out: CON/.../FO-x /Output

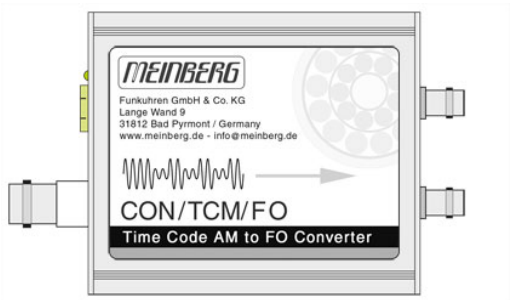
3.3.1 Technical Specifications CON/232/FO

Power requirements:	18 V - 72 V DC, 200 mA max.
Electrical signals:	RS232 input/output (TxD, RxD) via male DSub9 connector (Pin 2: TxD in, Pin 3: RxD out, Pin 5: GND) or RS232 input (TxD only) via male DSub9 connector (Pin 2: TxD in, Pin 5: GND)
Optical Signals:	1 multimode FO output (TxD) and 1FO input (RxD) or up to four multimode FO outputs via ST connectors (for GI 50/125μm or GI 62,5/125μm gradient fiber)
Launchable output power:	typ. 15μW per output (into GI 62,5/125μm gradient fiber)
Optical input level:	min. 3μW
Wave length:	850nm
Signal delay:	delay of a RS232 signal: 1μs data rate: 120kbps (detected with two CON/232/FO)
Housing:	Aluminium profile case, 84mm x 71mm x 24mm

CLASS 1 LED PRODUCT

3.4 CON/TCM/FO und CON/FO/TCM

These fiber optic modules carry an amplitude modulated Time Code AM signal over an optical fiber. Signal delay: 60μs



Variant to convert a Time Code AM signal to FO
CON/TCM/FO: Time Code In (BNC) to 2 x FO Out

Variant to back-convert the FO signal to Time Code AM
CON/FO/TCM: FO In to 2 x Time Code Out (BNC)

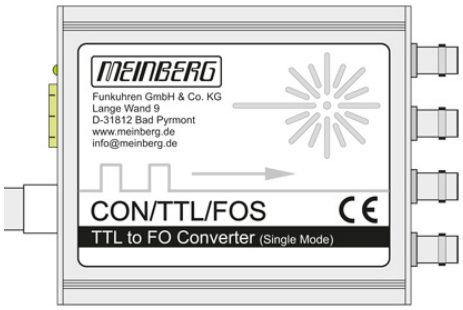
3.4.1 Technical Specifications CON/TCM/FO

Power Requirements:	18 V - 72 V DC, 150 mA max.
Input:	amplitude modulated IRIG-B, IEEE1344 or AFNOR signal, input insulated by transformer, impedance: 50 Ohm, via female BNC connector
Input level:	600mVpp to 8Vpp (Mark)
optical Outputs:	2 multimode FO outputs via ST connectors (for GI 50/125μm or GI 62,5/125μm gradient fiber)
Launchable output power:	typ. 15μW per output (into GI 62,5/125μm gradient fiber)
Wave length:	850nm
Signal delay:	Delay of a Time Code signal: 60μs transfer rate (sine wave carrier): 1kHz (detected with CON/TCM/FO and CON/FO/TCM)
Housing:	Aluminium profile case, 84mm x 71mm x 24mm

CLASS 1 LED PRODUCT

3.5 CON/TTL/FOS

The fiber optic module CON/TTL/FOS converts an input signal (TTL, RS-422 or FO) into one or more FO (fiber optical) output signals for single mode.



Standard variants (PPS, PPM, IRIG-B DCLS, 10MHz)
CON/TTL/FOS: TTL In (BNC) to 1 x FO Out
CON/422/FOS: RS-422 In (DB9 male) to 1 x FO Ou
CON/FOS/FOS: FO In to 1 x FO Out

Option: up to 4 x FO Out

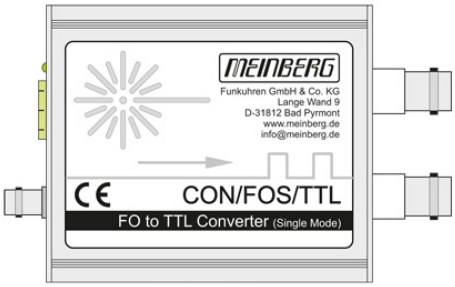
3.5.1 Technical Specification CON/TTL/FOS

Power Requirements:	18 V - 72 V DC, 200 mA max.	
Input:	**TTL**	signal via BNC female connector input impedance 10 kOhm
	or	
	RS422	signal via DSub9 male connector pin 5: GND, pin 7: +IN, pin 8: -IN
	or	
	FOS	singlemode FO signal via ST connector minimum input level: -38dBm, wave length: 1310nm
	or	
	FO	FO multimode FO signal via ST connector minimum input level: 3μW, wave length: 850nm
Optical Outputs:	up to four singlemode FOS outputs via ST connectors for E9/125μm monomode fiber, wave length: 1310nm	
Launchable output power:	typ. -22dBm per output	
Maximum Data Rate	TTL:	10MHz
	RS422:	1MHz
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)	
Housing:	Aluminium profile case, 84mm x 71mm x 24mm	

CLASS 1 LED PRODUCT

3.6 CON/FOS/TTL

The fiber optic module CON/FOS/TTL converts a single mode FO input signal into one or more electrical output signals (TTL or RS-422).



CON/FOS/TTL-2

Standard Varianten (PPS, PPM, IRIG-B DCLS, 10MHz)
CON/FOS/TTL: FO In to 2 x TTL Out (BNC)
CON/FOS/422: FO In to 1 x RS-422 Out (DB9 female)
CON/FOS/TTL/422: FO In to 1 x RS-422 and 1 x TTL

Optional for all Variants:
CON/.../DC: 18 V - 72 V DC (no plug-in power supply included!)
CON/.../HS: fixing clamp for 35mm DIN mounting rails

3.6.1 Technical Specification CON/FOS/TTL

Power Requirements:	18 V - 72 V DC, 200 mA max.	
Input:	one singlemode FO input via ST connector for E9/125μm monomode fiber minimum input level: -38dBm, 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
Maximum Data Rate:	TTL:	10MHz
	RS422:	1MHz
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)	
Housinge:	Aluminium profile case, 84mm x 71mm x 24mm	