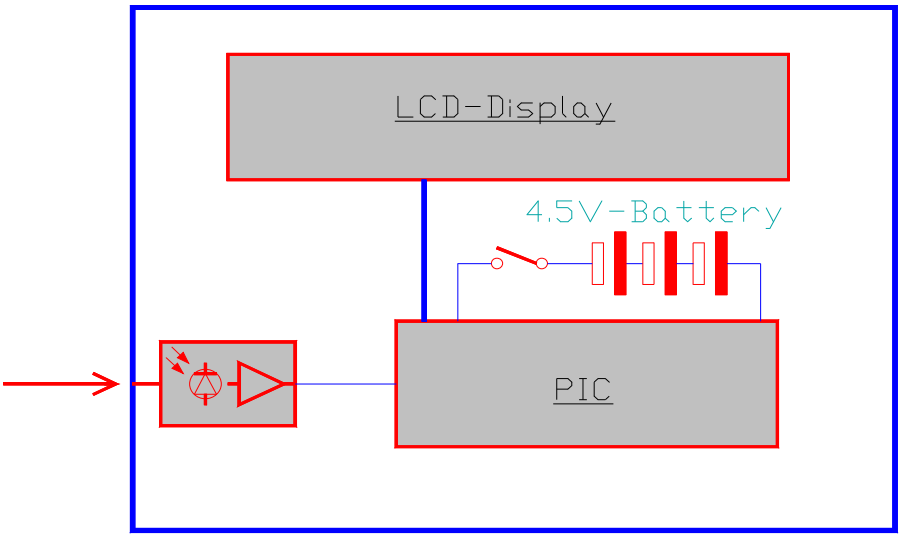
Light power measuring device

INFO-Mess

Light Power Measurements

The light power measuring device INFO-MESS allows users to obtain precise on-site information about the existing light intensity.
The device is designed for the Toslink products from Toshiba.

In order to set the required light intensity as precisely as possible as a function of the length, bending radii, adaptors, etc., typical attenuation values have been measured and are included in the documentation.



Technical Data

Field of application

The light power of the following Toslink™ transmitters can be measured:

- TOTX111
- TOTX195/TOTX195A
- TOTX197
- TODX295
- TODX297

Wavelength

λ=670nm

Measurement range

-10 ... -28dBm
Transmitting power: 100µW ... 1.5µW

Display

0.1dBm

Battery

- Power supply 3x 1.5V battery AM3
- Battery check:
  Display of the battery voltage when switching on and when voltage is too low.

Order No. INFO-MESS 609725800

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Light power measuring device

Attenuation Values

Fiber types

APF: All Plastic Fiber
PCF: Plastic Cladding Silica Fiber
Silica: Silica Fiber

The INFO-MESS measurement unit is designed for APF fibers.

Typical attenuation values

Fiber	min	typ	max	unit
Silica:	-	3		dBm / km
PCF:	-	6	7	dBm / km
APF:	-	220	240	dBm / km

Light attenuation: (dBm = 10 x Log (P1/P2))

1 dB attenuation corresponds to approx. 4.5m APF fiber lenght!

Fiber end
APF fiber end with one APF connector
polished ends: -1dBm → 4.5m
lapped ends: -0.5dBm → 2.3m

Adaptor
Two APF connectors connected through APF adaptor
polished ends: -3dBm → 13.5m
lapped ends: -1dBm → 4.5m

Radii
Minimum radius of the APF fiber: 25mm
180° bend, 25mm radius: -1dBm → 4.5m
180° bend, 10mm radius: approx. -3dBm →13.5m

Fiber-optic cable assemblies

Fiber-optic line section with two connectors

Fiber lenght	grinded	polished
m	dBm	dBm
0.2	-2	-1
1	-2.22	-1.22
5	-3.1	-2.1
10	-4.2	-3.2

Products

APF connector: TOCP155K
APF fiber: TOCP155
APF adaptor: TOCA150

Measuring correctly with INFO-MESS

Procedure for measuring the light intensity

1. Switch on INFO-MESS; battery voltage must not drop below 2.8V.

2. Switch on power supply of the board with Toslink transmitter. The light must be constant, it must not be modulated!
   Constant light:
   All INFO modules: For constant light, the fiber must be disconnected at the receiver.
   Master boards: The master boards emit only constant light while `Trans.exe` or `Trans32.exe` is executed.

3a. Connect INFO-MESS **at the end of the light transmission section**. Read and evaluate value:

The Toslink receiver requires:	
Normal environment:	-16...-25dBm
With heavy interference:	-16...-19dBm
(e.g. servo controller, frequency converter)	

The values are only valid with a constant light source!

3b. Connect INFO-MESS **at the beginning of the light transmission section**. (As closely as possible to the emitter). Read and evaluate value:

Required emitting power @25degrees for:		
Fiber-optic line:	30 ... 50m	-8..-10dBm
Fiber-optic line:	10m	-12..-14dBm
Fiber-optic line:	<10m	-16..-18dBm

The attenuation caused by adaptors or tight radii must be added to the emitting power; or it will reduce the maximum fiber-optic line length (1dB attenuation corresponds to approx. 4.5m fiber-optic line).

Notes

Electromagnetic interference will penetrate the receiver mainly if there is "too little light". To have sufficient safety reserves, never go below the -25dBm receiving power.

Above -15dBm receiving power, pulse distortion will rise at such an extreme rate that more light than -15dBm is bad for high transmission rates (up to 11Mbit/s).

Temperature-dependence

APF fiber:		not measurable
Transmitter TOTX111:	-20 ... +70°	+1.5 ... -1.5dBm
Transmitter TOTX195:	-20 ... +70°	+0.5 ... -0.8dBm
(Variation of output power)		
Receiver TORX111:	-20 ... +70°	+1.2 ... -0.75dBm
Receiver TORX194:	-20 ... +70°	+1.2 ... -1.5dBm
(Variation of maximum receiving power)		

Checklist in case of fiber-optics problems

Error counter

In the event of inexplicable failures in any plant (e.g. axis path errors without any obvious reason), ALWAYS first check the Link Error Counter.
It should not count when installed in a machine to be shipped, even during full operation over a prolonged period of time.
Always first eliminate all fiber-optic problems before searching for other faults. Consequential faults can only be ruled out if the INFO-Link connection is working properly.

Transmission power

Always start checking the longest connections. Wherever possible, measure the light power by means of our fiber-optic measurement device.

- Does the receiver really receive –16 ... -21dBm? Even if the cover is closed, including the last bending radius just ahead of the receiver?
- Are the jumpers of the transmitter properly inserted?
  In case of doubt, more light: 10m jumper from 5m,
  30m jumper from 15m.
- If the receiving power deviates from the specified value, the light intensity must be corrected:
  Below -25dBm: Set jumper > 10m or > 30m of transmitter TOTX195 or use shorter fiber-optic cable.
  Above -16dBm: Reset jumper > 10m or > 30m of transmitter TOTX195 or use longer fiber-optic cable.
- Has the fiber-optic line been ruptured? Has the line been crushed somewhere, has someone stepped on it or passed over it with a chair?

The values indicated by the light power measurement unit are only valid with a constant light source! The fiber-optic line (transmitting line!) must be isolated at the master. → The yellow LED on the modules must not be lit. The master only transmits constant light during "transen"!

Bending radii

In case of very short connections, make sure the bending radius is larger than 25mm. In case of doubt, apply a somewhat longer fiber-optic cable (approx. 20cm)!
Always measure the light power with the bending radius as it occurs in the ready-for-operation state. Here, too, look for fiber-optic line ruptures underneath the outer jacket.

Cable assembly

Check all fiber-optic connectors. Are their ends properly polished or lapped? (See surface treatment) Has too much been polished off at the connector? The small 45-degree bevel on the fiber-optic connector must still be clearly visible.
Always polish fiber-optic connectors using a special template!

Checklist in case of fiber-optics problems

If the Link Error Counter continues to count, pinpoint the fault by always only connecting half of the boards on the INFO-Master until only one is left, which you must replace.

EMC-related faults

If faults only occur during activation of certain relays, contactors, motors, etc., determine by means of our EMC detector whether transmission lines with heavy interference by these users run very closely past a fiber-optic receiver.

- Always provide spark-generating contacts with appropriate interference suppression elements!
- Set the line and the fiber-optic receiver apart (min 15cm) or interpose well-grounded steel plates.
- Increase the light power on the fiber-optic section to the maximum of -15dBm receiving power.
- Check all partial sections for sufficient reserves by bending each fiber-optic line 180° around a finger. With approx. 20mm radius, each connection should still perform properly.

Test tools

Light power measurement unit	Art. No. 609725800
EMC detector	Art. No. 609520700
Fiber-optic polishing template	Art. No. 609418000

Online service

This document is available online: http://www.indel.ch