

1,5 μ m OEM PULSED FIBER LASER



MLT-PL-R-OEM-XX-YY-ZZ



REVISION HISTORY		
Rev. 00	24/12/2008	Creation
Rev. 02	11/03/2009	External trigger description Adjustable pulse duration version
Rev. 03	11/03/2009	Fixed pulse duration version
Rev. 04	08/04/2009	<ul style="list-style-type: none"> - Adjustable pulse duration version - New software version - Interface board for easy operation of the MLT
Rev.05	08/04/2009	<ul style="list-style-type: none"> - Fix pulse duration version - New software version - Interface board for easy operation of the MLT
Rev.06	04/06/09	New police
Rev.07	04/06/09	Internal trigger version
Rev.08	03/07/09	<ul style="list-style-type: none"> - Add hyperterminal settings - Level for the ADI signal - Internal or external trigger version - Adjustable or fixed pulse width version
Rev.09	15/09/09	Connector pinning
Rev.10	05/10/09	AM command deleted
Rev .11	22/10/09	ACC 2 command added
Rev .12	26/11/09	New pinning
Rev .13	22/06/10	Pin 30 :void
Rev. 14	12/07/10	Burst Mode



Pulsed OEM Fiber Laser User's Manual

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Last Revision:

Part Number:

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FRANCE



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PREFACE



Thank you for purchasing MANLIGHT's Pulsed OEM Fiber Laser (PL) system. This laser system produces ultra-bright, near-diffraction-limited, infrared laser light, delivered via a flexible output fiber. The PL contains reliable, high-brightness diode lasers that pump a double-clad, Er/Yb-doped optical fiber. The drive electronics power the diode lasers and control fiber laser operation. The PL has a RS-232 Interface that allows you to control it through your own electronics. The PL is only intended for integration into other equipment. The system does not comply with CDRH 21 CFR 1040.10 or EN 60825-1. The customer is responsible for CDRH and/or 60825-1 compliance of their system.

About This Manual

This document describes user's recommendations and the functionalities of the OEM Pulsed Fiber Laser for industrial or laboratory applications.

The laser includes an optical core, the pump laser diode, the electronic boards. It also integrates a RS232 interface for the control of the Laser.

The laser is OEM system manufacturer for the integration into other equipment. The user is responsible to integrate and operate the laser according to the national and international laser restrictions.


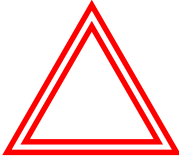
The Fiber laser emits a TEM₀₀ pulsed wave radiation in the 1,5μm range with a maximum of 10μJ output energy per pulse at nominal current.

This manual was written to help ensure your safety and to explain operation of the PL. Please read Sections 1 through 5 before you power up your new fiber laser.

If you have questions or comments about any part of this manual, please call MANLIGHT at 33-2-96-04-27-00.

Conventions Used in This Manual

This manual contains messages requiring particular kinds of attention, as follows:

Symbol	Description
	DANGER Conveys a personal safety hazard. Failure to observe such a warning may result in serious injury or loss of life. Ensure all conditions necessary for safe handling and operation are met before proceeding.
	CAUTION Conveys an equipment hazard. Failure to observe such a warning may result in serious damage to or destruction of the system. Ensure all conditions necessary for safe handling and operation are met before proceeding.
<i>NOTE Conveys useful information regarding your system's features.</i>	

The following acronyms are used in this manual:

OEM original equipment manufacturer

The following abbreviations and symbols are used in this manual:

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Date : 12/07/2009

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A	ampere (amp)
mA	milliampere
ms	millisecond
nm	nanometer
s	second
V	volt
VAC	volts AC
W	watt
ns	nanosecond

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1

SAFETY



1.1 General Safety Guidelines

Below is basic information about the PL that should be understood and heeded.



DANGER

AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION.

NEVER LOOK INTO THE BEAM PATH. KEEP ALL BODY PARTS AND REFLECTIVE MATERIALS OUT OF THE BEAM PATH.

The MLT-PL is a Class 4 infrared laser source that emits a diffraction limited beam of invisible radiation at powers up to 10W in the 1micron range. The beam has sufficient optical power to constitute a hazard, whether due to direct or scattered exposure. Some, but not all, potential human hazards include permanent loss of vision and/or subsurface skin damage. Additionally, the beam is collimated such that these hazards apply over large distances, as well as close up.



DANGER

The MLT-PL laser system should not be operated unless all appropriate safety precautions are taken. These include, but are not limited to:

1. wearing protective safety glasses by all people in the vicinity of the laser system,
2. installing warning lights, signs, safety screens and/or curtains,
3. implementing a safety interlock so the laser shuts down if someone unexpectedly enters an area containing the laser, and
4. containing the beam to eliminate or minimize the possibility of exposure to the beam.

Use of the MLT-PL other than as specified herein may result in hazardous radiation exposure.



DANGER

Use of optical instruments with the MLT-PL may increase eye hazard.



DANGER

Never operate the system if the cover of the module has been removed. Doing so may expose you and/or others in the vicinity to invisible laser radiation that can cause serious eye damage and possible vision loss.

Do not remove your system's cover, make adjustments to, or attempt to repair the MLT-PL system. Only MANLIGHT-authorized service personnel should perform repairs and adjustments.



1.2 Labels and Label Locations

Figure 1.1 provides information regarding warning and informational labels that are attached to the MLT-PL.

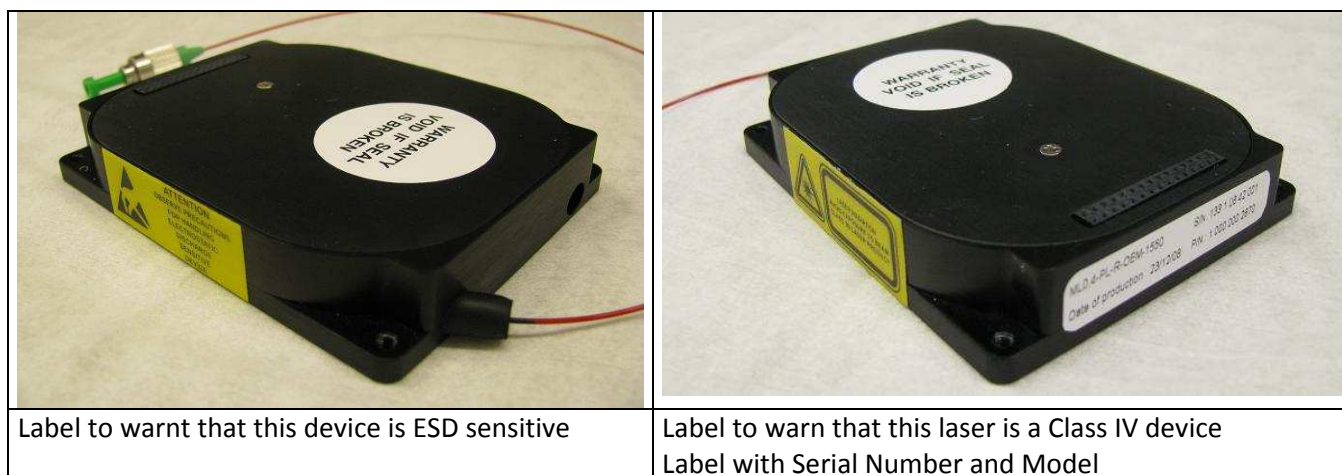


Figure 1-1 : Labels location on the device

1.3 Safety Interlock

The MLT-PL system has built-in safety relay and interlock features to help ensure laser radiation is emitted only when desired and only when predetermined conditions are met.

The remote interlock and remote stop features render the system inoperable when a predefined condition occurs, such as the opening of a door. The internal safety relay is analogous to a beam shutter. It interrupts drive current to the diode laser, and it is open each time the system is turned on. This means it will be impossible to apply current to the diode laser until you issue a command for the safety relay to close.

1.4 Compliance

1.4.1 Laser Safety Compliance

The MLT-PL laser system is only intended for integration into other equipment. The system does not comply with CDRH 21 CFR 1040.10 or EN 60825-1. The customer is responsible for CDRH and/or 60825-1 compliance of their system.

1.4.2 Additional Safety Information Resources

For more information on laser safety, the following sources are available:

Safe Use of Lasers (Z136.1), published by:
The American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
Tel: (212) 642-4900
Confidential document

Date : 12/07/2009

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Laser Safety Guide, published by:
The Laser Institute of America
13501 Ingenuity Drive, Suite 28
Orlando, FL 32826
Tel: (407) 380-1553.

A Guide for Control of Laser Hazards, published by:
The American Conference of Governmental and Industrial
Hygienists (ACGIH)
1330 Kemper Meadow Drive
Cincinnati, OH 45240
Tel: (513) 742-2020

CEN Central Secretariat
36, rue de Stassart
B-1050 Brussels
Fax : +32 2 550 08 19
Email : infodesk@cenorm.be

Union Technique de l'Electricité (UTE)
33, avenue du Général Leclerc – BP23
F-92262 Fontenay-Aux-Roses Cedex
Web : www.ute-fr.com

Deutsche Elektrotechnische Kommission im DIN und VDE (DKE)
Stresemannallee 15
D-60 596 Frankfurt am Main
Web : www.dke.de



2***ELECTRICAL CHARACTERISTICS***

2-1 Electrical characteristics

Characteristic	Test condition	Min	Typ	Max	Unit
Supply voltage		4,8	5	5,2	VDC
Supply current	T=25°C	-	3.6	4	A

Table 1: Electrical characteristics

2-2 Electrical connectors

The MLT-PL is provided with an interface to be connected on the laser as demontsrated on the Fig. 2-1 hereunder.

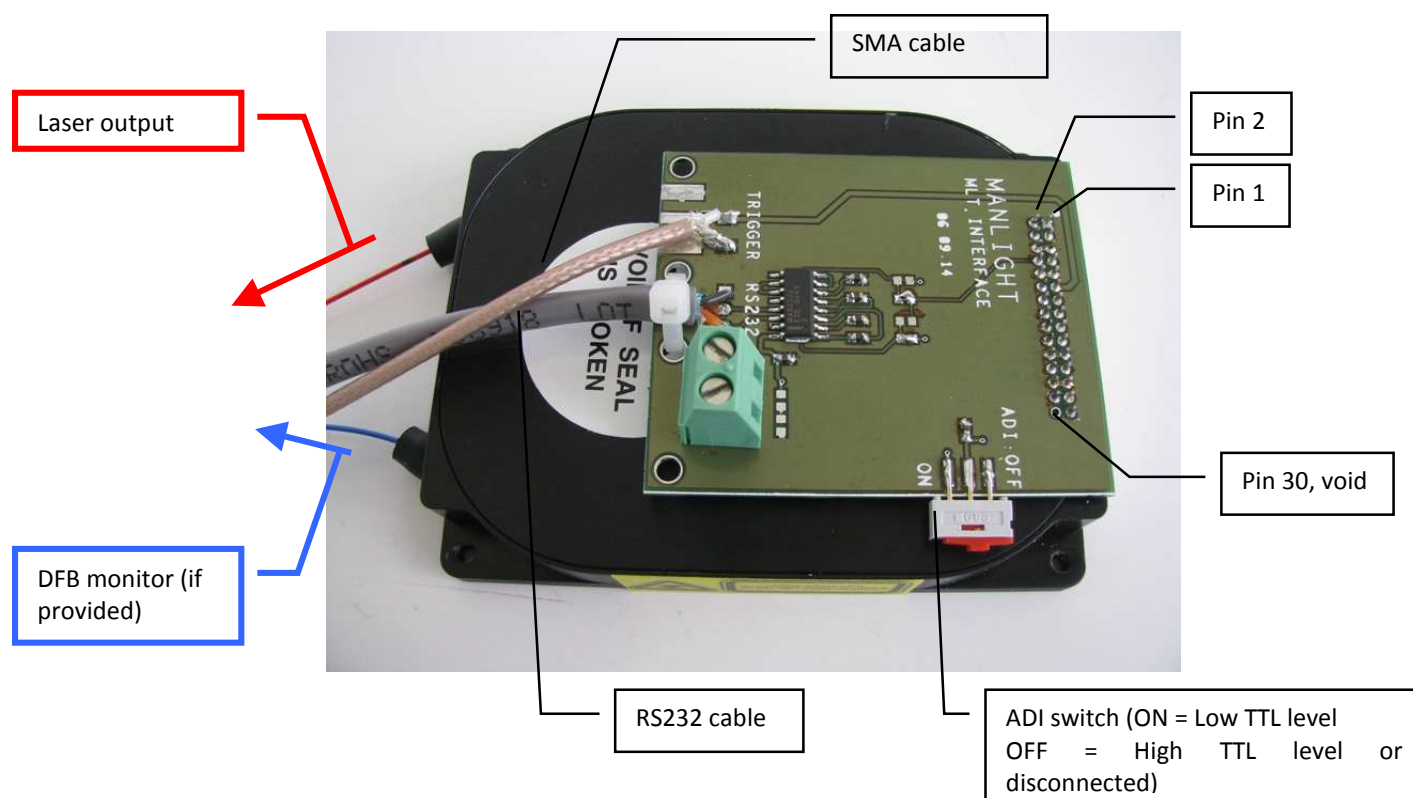


Figure 2-1 : Connect the device, with the provided wire, as demonstrated on the picture.

2-3 Electrical pining

The laser is equipped with a 30 pins connectors. Pining is as follow

Pining	Pin number	Pin number	Pining
+5V	2	1	+5V
+5V	4	3	+5V
GND	6	5	GND
TX RS232	8	7	RX RS232
GND	10	9	GND
Not connected	12	11	External trigger input (depending on version, otherwise, "Synchro Out" for "Internal trigger" versions)
Burst mode input , TTL level	14	13	ADI switch (ON = Low TTL level OFF = High TTL level or disconnected)
Not connected	16	15	Not connected
Not connected	18	17	Not connected
Status ON/OFF (Output)	20	19	Alarms (Trigger alarm or Laser Diode(s) current or Unit Case Temp)
GND	22	21	GND
Not connected	24	23	Not connected
GND	26	25	GND
+5V	28	27	+5V
void	30	29	+5V





3

CONTROL VIA RS232



3-1 RS232 mode

3-1-1 Hyper-terminal session

For use of the laser, you need to connect the RS232 sub D9 cable to a COM port of a Windows compatible computer. It is recommended to use the set of wires provided by Manlight with the laser. Then, follow these steps and use the following parameters while connecting to the fiber laser:

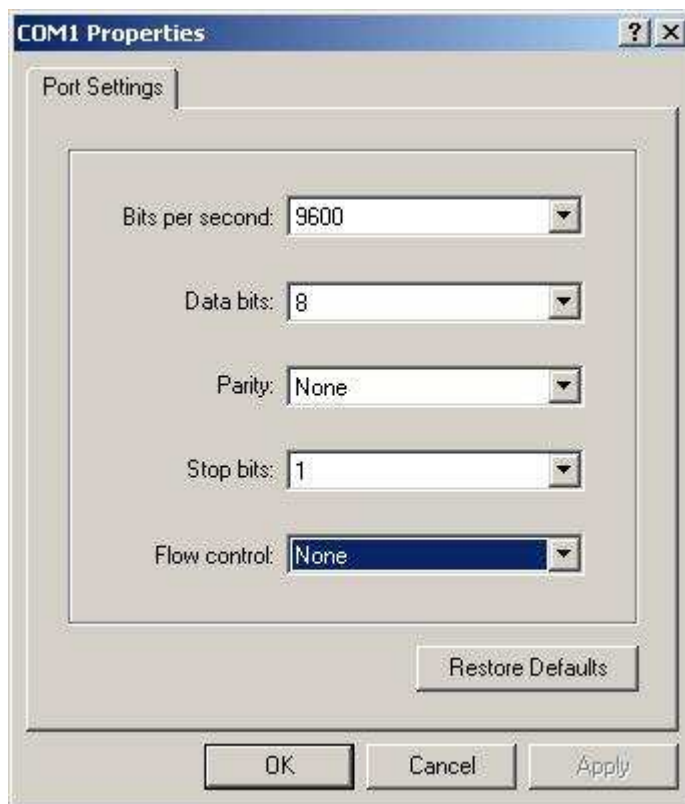
- Step 1 : Launch Hyperterminal software. Give a name to the session, for example "MLT"



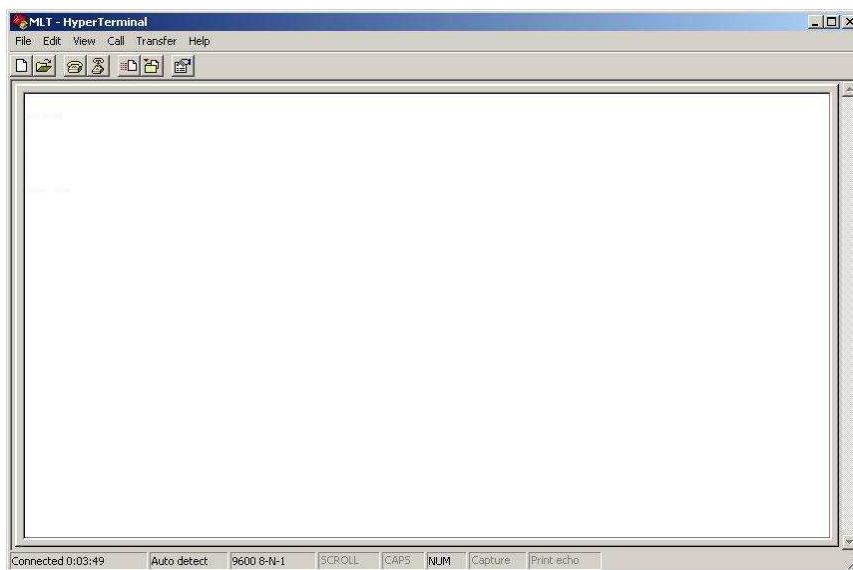
- Step 2 : The following window appears on the computer's screen. Select an available COM port on your computer. For example "COM 1".

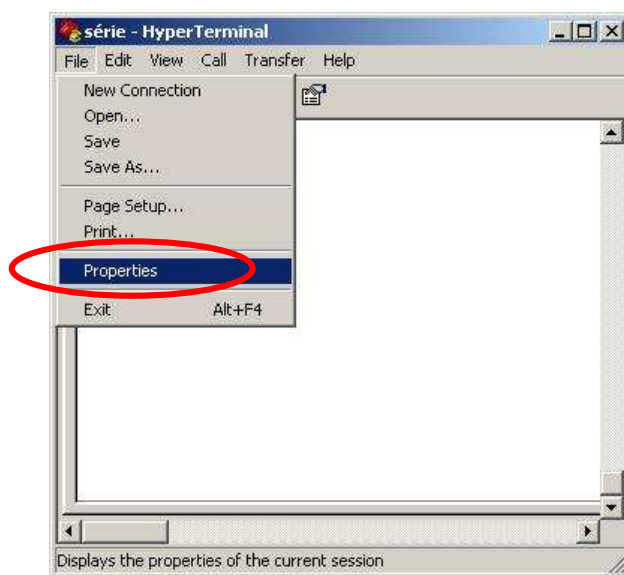


The following screen appears. Configure the port as follow. Then select “OK”

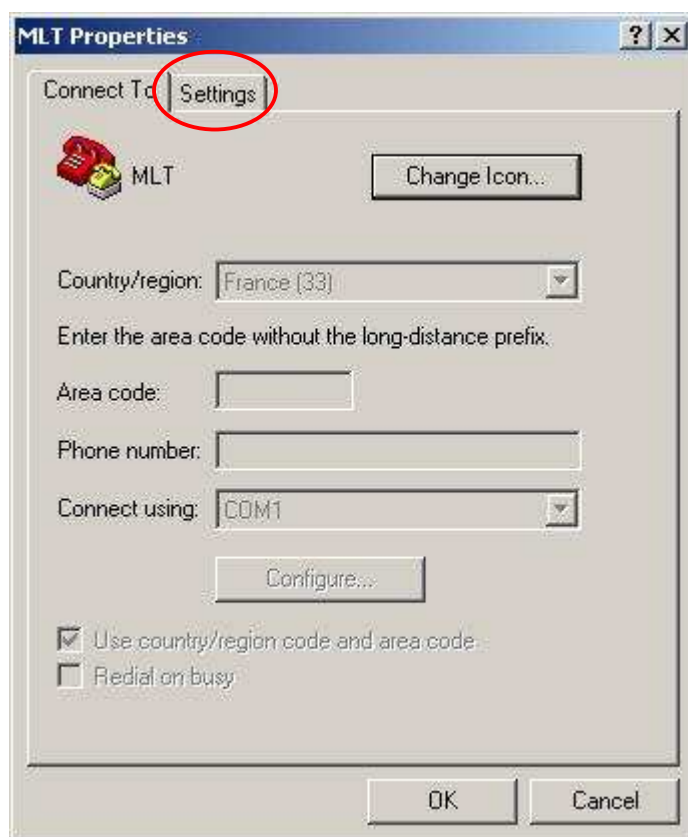


- Step 3 : In the default screen, select “Files” and then “Properties”

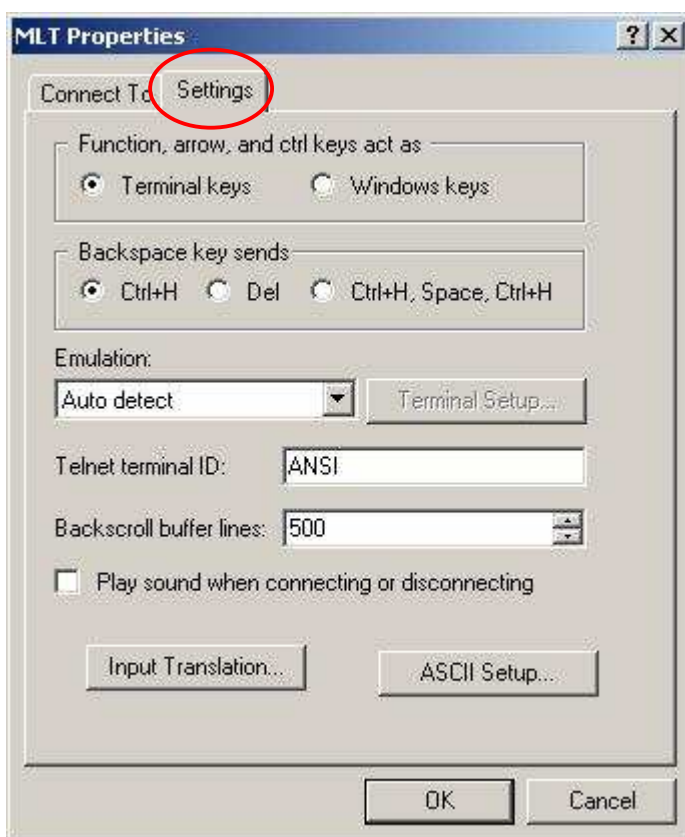




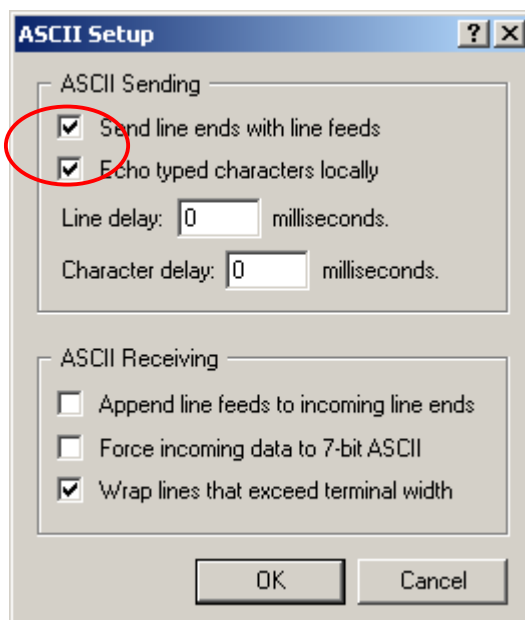
- Step 4 : The following screen appears. In properties window, select “Settings”



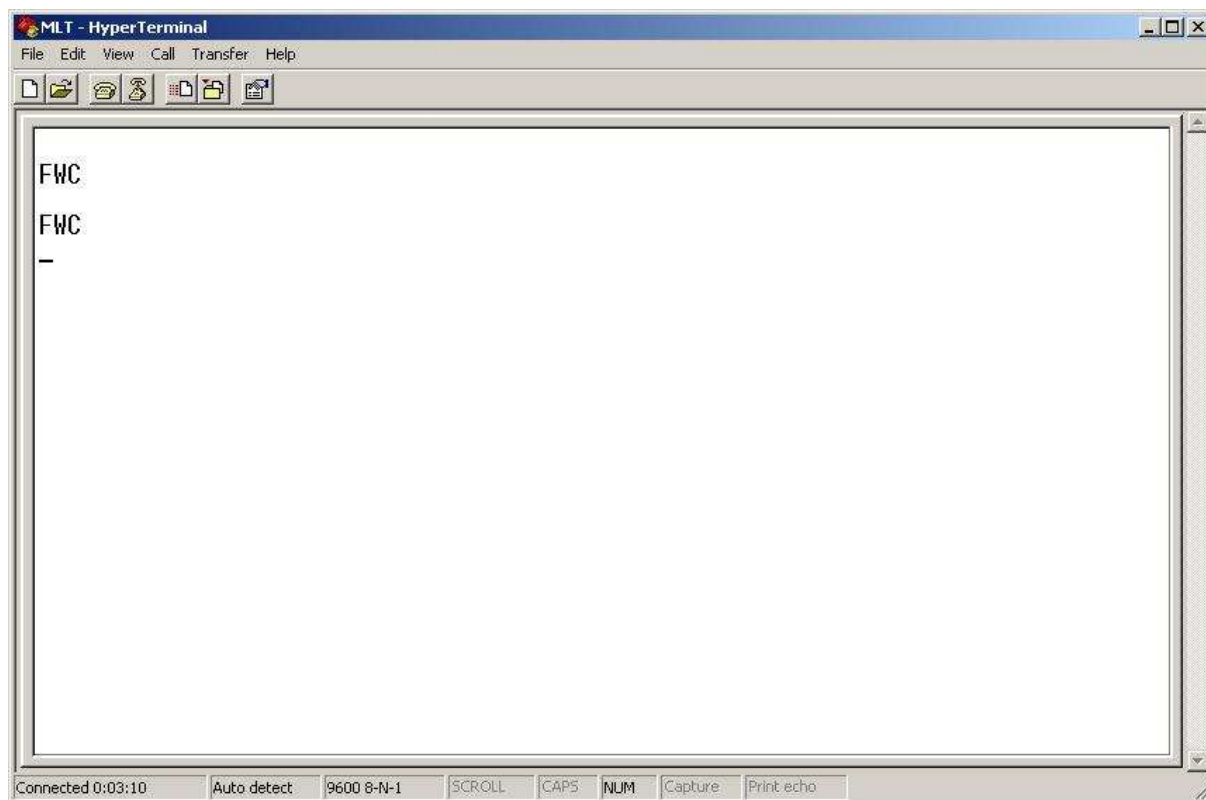
The following screen appears.



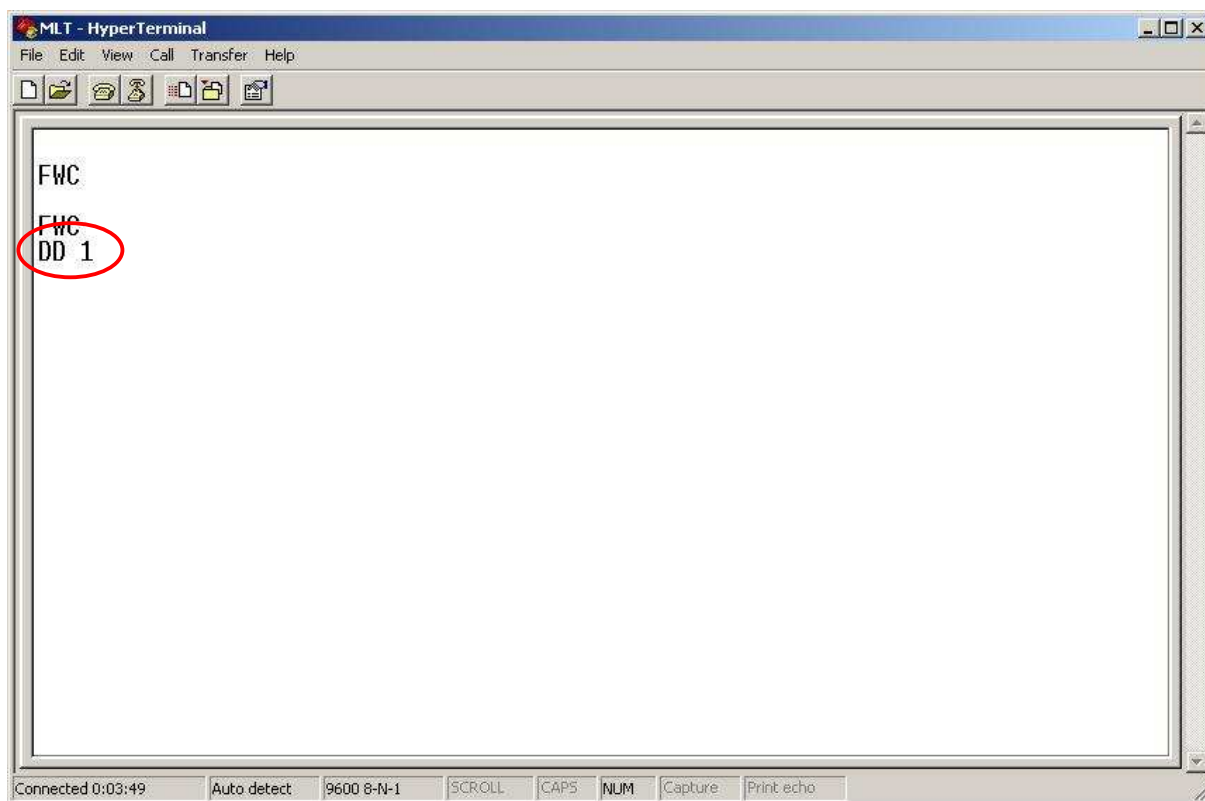
- Step 5 : Tick the 2 “ASCII setup” boxes and then select “OK”



- Step 6 : The main screen appears. If the device is powered up and if you press “enter” on the keyboard, the device echoes “FWC”



NOTE Once this 1st configuration is done at the install of the laser, save the session. Next time your powered up the device, you can save time by opening this “MLT” hyperterminal configuration. Once the device is powered up, the device will echo “DD 1” on the main hyperterminal session if the communication is established and “FWC” if you press “enter”.



Once the hyper-terminal session is launched with the above parameters, you can start to send commands to the laser.

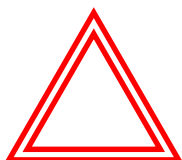


3-1-2 RS232 instructions

Active commands

Arg 0	Arg 1	Function
ACC	<space>2	Adjust current settings (allows to adjust pulse energy from ~0 to 0.1μJ) ACC<space>2<space>200<enter> : pump current is set to 200mA

Table 2 : RS232 active commands



CAUTION

Never change pulse duration while ACC<space>1 is different that 0. Missing to do so can lead to severe damage to the device.

Passive commands

Arg 0	Arg 1	Function
AM	<value>	To check for laser status AM<enter>
ACC	<space>2	To check for current settings ACC<space>2<enter>
FM		To read signal frequency FM<enter>
IT		Measurement of the internal temperature of the laser

Table3: RS232 passive commands



3-2 Operation of the device

**CAUTION**

The device **MUST** be operated with passive cooling via an adapted heatsink. Never operate the laser if it is not in good thermal contact with a heatsink. To proceed use normal thermal grease. Missing to do so can lead to severe damage to the device.

The operation of the device is quite simple, please proceed as follow :

3-2-1 Turning ON the device

- 1- For “external trigger” version of device only : Use function generator to provide clock to the laser (external trigger frequency to set pulse repetition frequency) to the laser

**DANGER**

There is high risk of failure if the external trigger (pulse repetition frequency generator) is disconnected while the laser is operating !

- 2- Connect the device to a dedicated power supply (see § 2-2 for reference)
- 3- For “external trigger” version of device only : Connect the function generator to the SMA connector of the interface board or the dedicated pin on the laser connector to apply to the pulse trigger
- 4- Open a hyperterminal software window (see § 3-1 for reference)
- 5- Check for output fiber connector cleanliness
- 6- Connect output fiber connector to dedicated FC adapter
- 7- Allow laser operation by connecting ADI (pin 13) to TTL low level or by switching ON the ADI switch of the “MLT interface board”.
- 8- Adjust pulse energy by ACC<space>2<space> command (see § 3-1-2 for reference), by Default ACC2 is at nominal current .

NOTE

For “Internal trigger” version of the device, the laser operated without any external clock. The laser will run by default at the last pulse repetition frequency set. Pulse repetition frequency can be changed by “FS” RS232 command at any time during operation of the laser.

3-2-2 Turning OFF the device

To turn the device OFF, proceed as follow :

- 1- Set pulse energy to 0 by ACC<space>2<space>0<enter>
- 2- Disable the laser by connecting to High TTL level the ADI pin or by disconnecting the pin.
- 3- Power down the device
- 4- For “external trigger” version of device only : Turn OFF the external trigger frequency



APPENDICES



Appendix 1: Optical Specifications

See “Technical specifications” sheet attached to this User’s Manual for further details



Appendix 2 :Warranty

MANLIGHT warrants the CW Fiber Laser to be free from defects in workmanship and materials, hereinafter called "Nonconformity," for a period of twelve (12) months from the date of shipment. This warranty does not apply to systems which MANLIGHT determines, upon inspection, have failed, become defective or unworkable due to abuse, mishandling, misuse, alteration (unless approved in writing by MANLIGHT), negligence, improper installation, use which is not in accordance with the information and precautions described in the PL Operator's Manual, or other causes beyond MANLIGHT's control.

Operating at above the maximum rated output power will void both the basic and extended warranty. This warranty does not apply to

- (i) any products or components not manufactured by MANLIGHT or
- (ii) any aspect of the products based on Buyer's specification, unless Seller has reviewed and approved such specification in writing.

EXCEPT FOR THE FOREGOING WARRANTY, MANLIGHT SPECIFICALLY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Buyer shall notify MANLIGHT of any Nonconformity during the warranty period, obtain a return authorization for the nonconforming products, and return the nonconforming products, freight prepaid, to MANLIGHT's designated facility along with a written statement describing the Nonconformity. MANLIGHT's sole and exclusive obligation under this warranty is to use reasonable commercial efforts, at MANLIGHT's option, to repair, replace or refund the purchase price for any products which are returned to MANLIGHT as set forth above and which are, after examination by MANLIGHT, determined in MANLIGHT's reasonable discretion to be nonconforming. Products which are repaired or replaced within the warranty period are warranted only for the remaining unexpired portion of the original warranty period applicable to the repaired or replaced products or components. However, the warranty period does not include the time period between when MANLIGHT receives the nonconforming products and when MANLIGHT returns the repaired or replacement products to Buyer.

Buyer agrees that the foregoing provisions constitute the sole and exclusive remedies available to Buyer for breach of warranty by MANLIGHT with respect to the products.

IN NO EVENT WILL MANLIGHT BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS OR BENEFITS, EVEN IF MANLIGHT HAS BEEN INFORMED OF THE POSSIBILITY THEREOF IN ADVANCE. IN NO CASE WILL MANLIGHT'S AGGREGATE LIABILITY TO BUYER BE GREATER THAN THE PURCHASE PRICE PAID BY BUYER TO MANLIGHT FOR THE PRODUCTS WHICH ARE THE SUBJECT OF BUYER'S CLAIM.

The products are not authorized by MANLIGHT for Buyer's use in any device or application where the failure, malfunction or inaccuracy of the product carries a risk of death or serious bodily injury, such as, but not limited to medical equipment, nuclear facilities, aircraft operations, air traffic control, life support or other applications representing a similar degree of hazard. Any such use is prohibited without prior written agreement of MANLIGHT under terms intended to allocate the risks of selling the product for such uses. Buyer will indemnify, defend and hold MANLIGHT harmless from all claims, losses, damages and expenses, including attorney's fees arising from any prohibited use or application of the products.



Appendix 3: Returned Material Authorization Notice

Should a problem occur, contact Manlight and Return Material Authorization (RMA) number will be issued for any faulty unit that needs to be returned. Note this number on the shipping container and all correspondence.

No return will be accepted without prior authorization (see attached form).



Return Material Agreement request form Formulaire de demande retour produit

Please fill in this form and fax it to Manlight : +33 (0)2 96 04 27 05.

Merci de compléter ce formulaire et de le faxer à Manlight : 02 96 04 2705

Company Société	
Contact Contact	
Address Adresse	
Phone n° Numéro téléphone	
Fax n° Numéro fax	
Customer order No. Numéro de commande client	

Part number Type produit	
Quantity of rejected piece(s) Quantité de pièces non conformes	
Serial number(s) Numéro(s) de série	
Delivery date Date de livraison	

a) *Problem description/ Description de la défaillance*

Name/ Nom	Title/ Fonction	Visa	Date

To be filled by Manlight quality department/ Partie réservée au service qualité de Manlight

RMA N°/ Numéro retour produit :	
Please return the unit(s) to Merci de retourner le produit à l'adresse suivante	

Please note the RMA number on the packages and on shipping documents.
Include a copy of this RMA form with the returned product.



Merci de préciser le numéro de retour produit sur le colis et sur les document d'expédition et de joindre une copie de ce document au produit retourné.

For assistance, or before any shipments, please contact Manlight:

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sales@manlight.com

