

MPBC Fiber Laser

2RU-VYFA-SF Series

User's Manual

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INTRODUCTION

1.1. Safety Information

1.1.1. Class 3B / Class 4 Source of Optical Radiation

Fiber lasers in VYFA-Series are either Class 3B or Class 4 light sources of optical radiation. The lasers emit at a single wavelength within the range of 400 to 800 nm. The maximum CW output power is less than 500mW for Class 3B. Models with the output power of 500 mW or more are classified as Class 4.

Safety information and operating instructions are detailed in this manual. Failure to follow instructions may impair the protection provided by the equipment design and result in hazardous radiation exposure.

This product was primarily designed for use in research applications and should be operated in a laboratory environment.

1.1.2. Safety Specifications

- 1) Wavelength: 400 to 800 nm,
- 2) Beam size at aperture: 1 mm
- 3) Beam divergence (full angle): 0.5 mrad
- 4) Maximum CW output power of Class 3B lasers: <500 mW
- 5) CW output power of Class 4 lasers: ≥ 500 mW

1.1.3. Optical Interface

The output beam is emitted from the laser head connected to the 2RU optical amplifier unit with a flexible stainless-steel armored conduit. This armored cable is permanently attached to the laser head and 2RU units and users should not attempt to disconnect, apply undue stress to the cable nor bend the cable to a diameter < 10 cm. The laser head emits a collimated beam through an optical window on the front side and is equipped with a mechanical beam shutter.

1.1.4. Eye Protection

It is mandatory that users wear protective eye goggles with better than OD5 attenuation at the emission wavelength of the laser. These goggles should allow a partial transmission of white light spectrum such that the LASER STATUS LED on the front panel is clearly visible.

*****IMPORTANT*****

***WARNING: Both direct and scattered radiation are deceptively dangerous.
Appropriate laser safety goggles are an absolute necessity.***

1.1.5. Skin Exposure

Avoid skin exposure to both direct and scattered laser radiations. Serious skin damage can result even from exposure to diffusely scattered laser radiation.

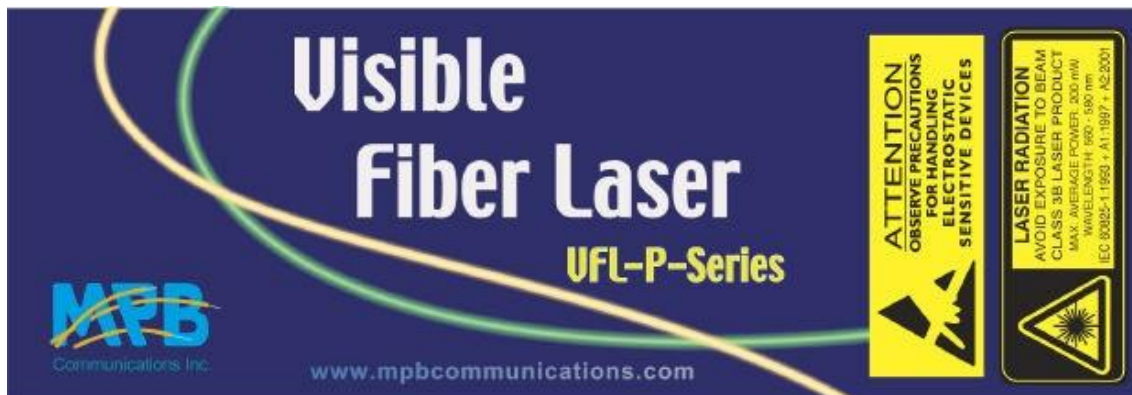
1.2. Labels

1.2.1. Identification Label

The identification label, showing the manufacturer's name and address, laser model number, serial number and manufacturing date, is attached to the back panel of the laser.

	Model	Serial Number	Date of Mfg.
MPB Communications inc. 147 Hymus Blvd. Pointe-Claire, Qc Canada, H9R 1E9	2RU-VYFA-P-1000-532-SF	2RU-xxxx-xxx	January 1, 2018

A VYFA-SF-series identification label as shown below is affixed to the front panel of the laser.



1.2.2. Warning Label



The warning label is affixed to SHG laser head module. A Class 3B or Class 4 label is used depending on the maximum laser output power.

1.3. Radiation Emission Indicators

There are 2 LED indicators on the front panel:

- **Green/Orange LED:** First, when the laser is powered up and goes through a warm-up process, it emits orange light. The LED turns OFF when the unit is ready for operation. Blinking orange indicates the detection of a fault.
- **White LED:** When the “laser enable” command has been submitted, the white LED starts blinking indicating the laser is about to start emitting the light. There is a 3 seconds delay between the time the “laser enable” command has been issued and the time a laser emission appears at the laser output, at that moment the LED starts emitting continuous light.

1.4. Key switch

The role of the key switch is to prevent unauthorised use of the laser. The laser cannot be started unless the key is in ON position.

In case of emergency, the key switch can be used to shut the laser down quickly.

In case the interlock loop gets opened, the laser will be shut down immediately. To restart the laser after the interlock loop gets restored, the key switch must be turned counter clockwise and turned back to ON (Horizontal) position before the laser emission can be software enabled.

If the laser was powered up when the key switch was in ON position, the laser cannot be enabled. In that case the key switch must be reset - first turned Off and then turned back to On position.

1.5. Remote Interlock Connector

The Remote Interlock is a safety feature which results in the laser being shut down immediately when a safety interlock loop is opened. To restart the laser after the interlock loop is restored, the key switch must be turned counter clockwise and turned back to the ON position before the laser emission can be software enabled. The interlock is rated at 5 V, 2.5 mA. The short-circuit resistance should be less than 200 Ohm to guaranty a valid state.

1.6. Time Delay

For safety considerations, a time delay of 3 seconds has been imposed between the time when a “laser enable” command is submitted and the time when the laser starts emission. The white LED starts blinking indicating the laser is about to start emitting the light. After the mandatory 3 seconds the laser starts emission and the LED starts emitting continuous light.

1.7. Manual Reset

When the laser was shut down by either activation of the interlock or by line power failure, the key switch will have to be turned counterclockwise and then turned ON again in order to enable laser emission.

1.8. Input Line Voltage

This unit requires alternating current input between 100 and 240VAC, 50/60Hz, with current capability of 2.0A at 100VAC and 1.0A at 240 VAC.

1.9. ON/OFF switch

The power entry module is equipped with a rocker switch marked with symbols “O” and “I”. To turn the unit ON, depress the switch in the “I” position. Depress “O” to turn OFF.

1.10. Input Protection Fuse

The main fuse is located in the fuse drawer of the power entry module on the front panel. To replace, remove the fuse drawer and use a Fast Blow 2.5A, 250V fuse.

1.11. Earth Connection

The power cord supplied with this equipment provides the protective earth connection for this product. Use only IEC-60320 compliant cords for replacement. No other earth connection is provided on the unit.

UNPACKING AND INSTALLATION

2.1 Initial Inspection

MPBC VYFA-SF-series lasers have been carefully packaged at the factory to minimize the possibility of damage during shipping. However, if there is visible damage to the unit upon receipt, inform the shipping company and MPBC immediately.

Although not recommended, there should be no adverse effects if the unit is transported upside down or sideways, but there may be damages if the unit is exposed to temperatures out of – 40 °C to 60 °C range.

**If the equipment is used in a manner not specified in this manual,
the protection provided by the equipment may be impaired.**

Along with the laser unit, please check that the following accessories are included in the shipment:

- RS232 cable (MPB P/N W-01517-1)
- Test Report Datasheet
- CD with user's manual and control software CT
- AC power cord
 - Continental Europe CEE 7/7 to IEC 60320-C13 (MPB P/N 3190)
 - Or North America/Japan NEMA 5-15P to IEC 60320-C13 (MPB P/N 2056LF)
 - Or UK/Ireland BS 1363 to IEC 60320-C13 (MPB P/N 4851LF)
- L-brackets (MPB P/N F-03982-2)
- USB Cable (MPB P/N 4724LF)

2.2 Electrical Requirements

The 2RU-VYFA-SF-series lasers are equipped with a universal power supply and can be operated from a two-phase 100V or 240V AC voltage. AC power inlet located on the right side of the front panel has a built-in fuse and ON/Off switch. Please refer to the technical specifications for details.

2.3 Mounting of Unit for Operation

This unit can be mounted into a 19" rack using two L-brackets supplied or be placed on any reasonably firm table or bench.

Be sure not to obstruct the back, left and right sides of the laser enclosure used for ventilation.

Do not position equipment so that it is difficult to turn OFF the AC source in case of emergency.

2.4 Operating Conditions

The VYFA-SF-series lasers should be operated within a temperature range from 15°C to 35°C, RH 93%, indoor, altitude 2000m, pollution degree 2.

DESCRIPTION / OPERATION

VYFA-SF is a source of a narrowband visible light within the wavelength range of 400 to 800 nm. The source comprises of a three-stage polarization maintaining Yb-doped fiber amplifier and second harmonic generator (SHG) module. It amplifies an external single-frequency near-infrared signal. The frequency of the amplified signal is then subsequently converted into visible band in SHG module. The output power of the laser can be adjusted by changing the operational current of the booster amplification stage. The change of the output power does not change the emission wavelength.

The amplified infrared light is guided by an optical fiber protected with a stainless-steel conduit to the SHG module which emits a collimated visible beam through an AR coated window. This fiber conduit is permanently attached and cannot be disassembled.

An external seed source has to be equipped with a PM fiber (Panda-980) terminated with FC/APC connector. The amplifier has a PM fiber input which has to be connected to the seed fiber output using a bulkhead adapter provided.

*****IMPORTANT*****

***WARNING: Both direct and scattered radiation are deceptively dangerous.
Appropriate laser safety goggles are an absolute necessity.***

3.1 Front Panel Connectors and Indicators

- ◆ AC power inlet, fuse and power switch are located on the right side of the front panel.
- ◆ RS 232 port (for connector pin out, refer to Table 1 in Section 4.1).
- ◆ USB port.
- ◆ Interlock (pin 1 and 3 have be wired to an interlock safety loop). To operate the laser the safety loop must be closed.
- ◆ 10-pin SHG connector for temperature control and power monitoring of the SHG unit.
- ◆ Green/Orange SHG LED is located above the 10-pin connector. Orange indicates warm-up is in progress. Off state indicates the laser is ready to operate. Blinking orange indicates a fault condition that prevents the laser to be started.
- ◆ White LED, located above the optical fiber cable, is illuminated when the laser is enabled.
- ◆ Key switch.

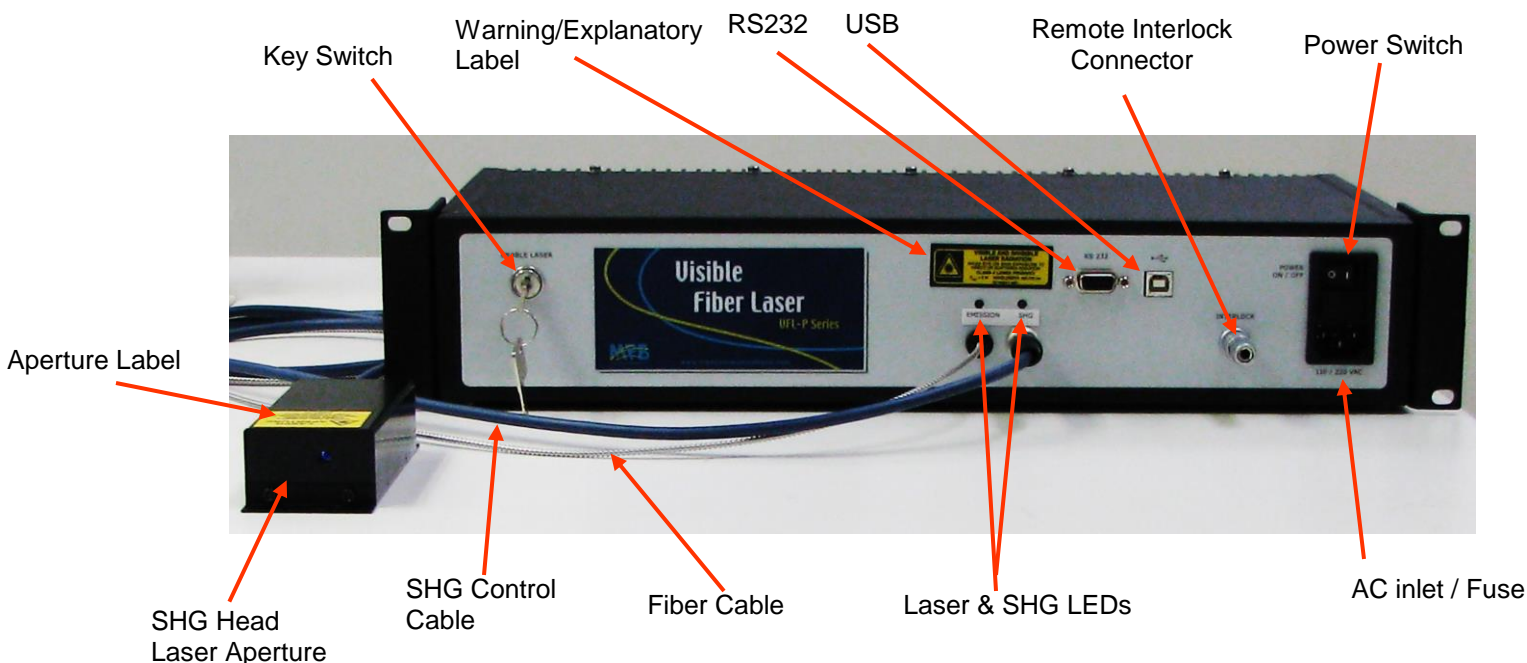


Fig. 1. Front panel connectors and indicators

3.2 Available Models

All models in the VYFA-SF-series emit a narrowband light within wavelength range of 400 - 800 nm. Available output power ranges from 100 mWs up to several Watts. Laser modules with other wavelengths/powers are also available upon a customer request. Please visit our web site to have a list of standard models.

VYFA-SF-series in 2RU rack mountable enclosure may be ordered as 2RU-VYFA-XXXX-YYY-SF, where XXXX is the output power in mW and YYY is the emitted wavelength in nm. For example, 2RU-VYFA-P-1000-532-SF - a linearly polarized single-frequency fibre amplifier with 532-nm SHG module and the output power of 1000 mW in 2RU enclosure.

3.3 Power-up the Unit

- ◆ Connect the unit with RS 232 cable (or optional USB) to a serial (USB) port of a computer.
- ◆ Wire the interlock LEMO connector to an interlock safety loop. VYFA-SF-series lasers comes with a receptacle LEMO connector with a short wire already in place.
- ◆ Connect AC power cord to the laser unit.
- ◆ Remove the dust protection endcap from the input FC/APC connector. Inspect carefully the fiber tip/endface with a fiberscope to make sure the fiber tip/endface is free of dust or dirt. If the fiber endface is dirty, it can be cleaned with lint-free wipes and 99% isopropyl alcohol.
- ◆ Inspect the external seed FC/APC fiber output connector and verify its output power. The acceptable seed power range is typically 5-50mW. Please refer to the test report of a particular unit for exact seed power range.
- ◆ Connect the seed fiber output to the input of VYFA module using a bulk head connector.

*****IMPORTANT*****

NEVER look directly into the beam output aperture even when the laser is in a standby mode.

- ◆ Insert the key switch and leave it in OFF (vertical) position.
- ◆ Turn AC power switch ON. The LED labeled SHG is orange at power up, indicating the Warm-up is in process for 30 seconds. Once the LED has turned OFF, the laser is ready for operation. **If the key switch was in ON position when the laser was powered, it must be then reset (turned OFF and then turned back ON), otherwise the laser cannot be enabled.**

3.4 Activate and Control the Unit Using Craft Terminal (VYFA CT)

The VYFA-SF laser module can communicate with a computer via either the RS-232 or the USB port. If the USB cable is installed, the unit will communicate through the USB port. For the RS-232 communication to be effective, the USB cable must be unplugged.

The VYFA CT is a simple software program for controlling the VYFA-SF module:

- ◆ Turn the laser ON/OFF
- ◆ Set booster (LD3) current to change laser output power
- ◆ Monitor booster LD3 current and LD3 case temperature
- ◆ Monitor seed optical power
- ◆ Monitor preamp LD1 current
- ◆ Monitor mid-stage amp LD2 current
- ◆ Monitor the SHG output power.
- ◆ Display status of the laser
- ◆ Display alarms and faults

To work with the VYFA CT use the following procedure:

1. Install VYFA CT and mpbcusbcdc64.inf files on your computer. For more details, see Section 0.
2. Install the communication cable (Serial or USB) between the laser and the computer.
3. Run VYFA CT software (shown in Fig. 2).
4. Activate 2RU power switch.
5. Select a COM port number by clicking on the Serial Port selector on top left corner. Once a proper COM port is selected, all CT widows become active.
6. Turn the laser enable key switch, located on the left side of the front panel, clockwise to the ON position.
7. The VYFA-SF-series works in **Current Stabilization Mode ACC** (LD3 mode set to 0) or in **Automatic Power Control mode APC** (LD3 mode set to 1).

3.5 Operation in ACC mode (LD3 mode set to 0).

1. The initial activation has to be conducted in ACC mode. That allows to verify that SHG module is tuned to the optimal temperature and therefore provides the best possible power conversion efficiency of the IR seed emission to the visible power. In that case the amplifier operates at lowest possible LD 3 current.
2. The operational currents of LD1 and LD2 are factory pre-set and cannot be changed.
3. The unit usually comes with the SHG temperature pre-tuned to a customer's seed frequency, but some minor (within +/-0.2 degree C) adjustments of the SHG temperature might be necessary. If at some point the seed frequency will be changed, the SHG temperature has to be re-tuned matching a new value of the seed frequency.
4. To SHG temperature can be adjusted using TEC4 on the Laser Diode Monitors page of CT (Fig.3).

5. Verify the signal external power in the **Input Power** monitor window on the Unit Operation page of CT. It has to be within the power range of the test report. If the seed power is turned to be lower than minimum acceptable level, the software will not allow to activate the amplifier.
6. To turn the unit ON check **Laser Enable** window. The **Laser State** window indicates the current status of the laser. Once the laser enabled, it starts emitting light after ~ 3 seconds delay. During that time the Laser emission status LED, located on the front panel, will be blinking.
7. The booster LD3 pump current can be adjusted with the arrows located on Unit operation page of the CT.
8. Please refer to the Laser test report to verify the SHG output power in respect to the LD3 booster current.
9. If necessary adjust the SHG temperature using **TEC4** temperature set point located on Laser Diode Monitors page of CT. A new optimal SHG temperature can be saved in EPROM by checking “**Save setting**” on Unit configuration page of CT (Fig.4).
10. To turn the unit Off – click OFF button.

VYFA CT 0.1.0.0 - Unit Operation

Main Menu Trace File

Settings

Serial Port: **COM4** Trace file:

Trace interval: **60** s

Unit Control

Mode: **AUTO**

LD Current

LD1 Setpoint: **400** mA

LD2 Setpoint: **4500** mA

LD3 Setpoint: **2210** mA

LD3 Mode: **0**
(ACC: 0, APC: 1)

Output Power

Power Setpoint: **300** mW

Laser Enable: ☒ **ON** Firmware reset: ☐ **OFF**

Clear faults: ☐ **OFF**

Measurements

Trace size: **2019-03-22** bytes **12:00:21**

Input Power **12.478** mW

LD Current

LD1: **399.289** mA **StateOK** **ON**

LD2: **4485.840** mA **ON**

LD3: **2219.800** mA

Output Power **1006.200** mW

Reported Faults

SHG temp. **OFF** TEC temp. **OFF** LD Current **OFF** Other **OFF** CASE temp. **OFF**

Reported Alarms

SHG temp. **OFF** TEC temp. **OFF** Pump Bias **OFF** LOS Output **OFF** CASE temp. **OFF** LOS Input **OFF**

System States

MCU state **NORMAL** Laser state **BOOSTER_ON** LDD1 state **NORMAL** LDD2 state **NORMAL** LDD3 state **NORMAL** Interlock In **OFF** KeyOFF In **OFF**

System Outputs

FAULT **OFF** Laser ON **ON** Warm-Up **OFF**

Fig. 2. VYFA CT – Unit operation page

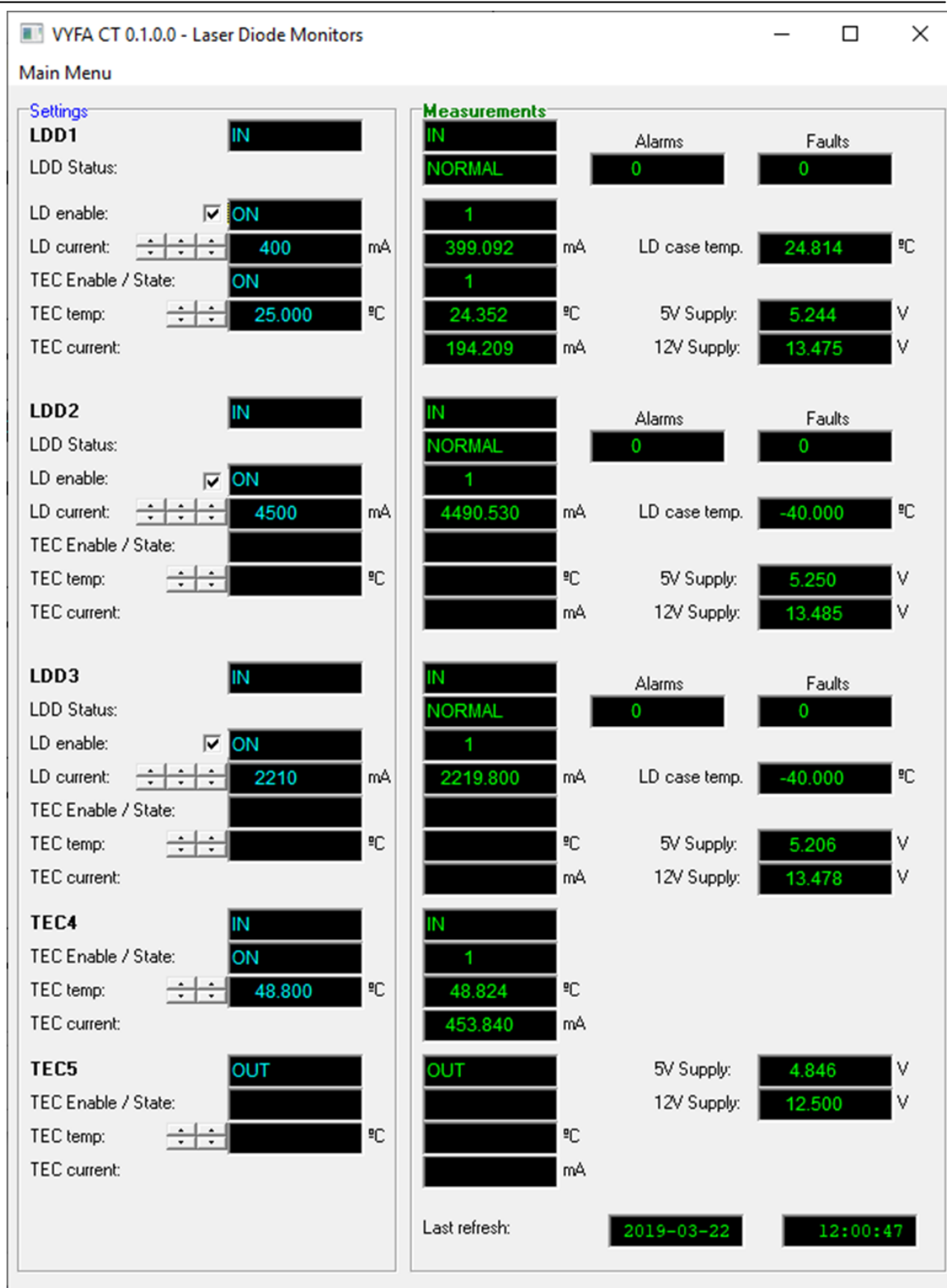


Fig. 3. VYFA CT – Laser diodes monitors page

VYFA CT 0.1.0.0 - Unit Configuration

Main Menu

Settings

Designation

Amplifier model: 2RU-VYFL-P-1000-S43.5-SF-FRCPC

Serial number: 2RU-1905-6133

Firmware revision: VYFA_MOPA_SHGTT_VER_2.7.1.8_(0:0/MAR_6_2019/14:32:17)UARTUSBLD2-SAFEKEY

Ranges

Case temperature: Minimum 5.000 °C Maximum 50.000 °C

Alarm Thresholds

Case temp.: Minimum 10.000 °C Maximum 40.000 °C LDD # 1

LOS Input: 7.000 mW 8.000 mW

LOS Output: 90.000 % 110.000 %

Time Of Operation

Laser Head: 71 Hrs 3400 Sec

Laser Controller: 103 Hrs 1246 Sec

Eeprom Configuration

Save settings: ☐ OFF

Restore Default settings: ☐ OFF

Measurements

Last refresh: 2019-03-22 12:02:14

Fig. 4. VYFA CT – Unit configuration page

3.6 Operation in APC mode (LD3 mode set to 1)

1. In APC mode the output power is maintained using a feedback loop connecting SHG output power monitor and LD3 booster driver.
2. The APC laser mode can be selected by setting **LD3 mode** to **1** in LD3 Mode window of the Unit Operation page.
3. A desirable power can be set in **Output Power set point** window.
4. We recommend to start the laser initially at a modest power of 300mW and then increase it gradually to a desired power.
5. The amplifier can be switched between ACC and APC mode only when the laser emission is disabled.

COMMUNICATION WITH PC

The VFL module can communicate with a computer either via RS-232 or USB port.

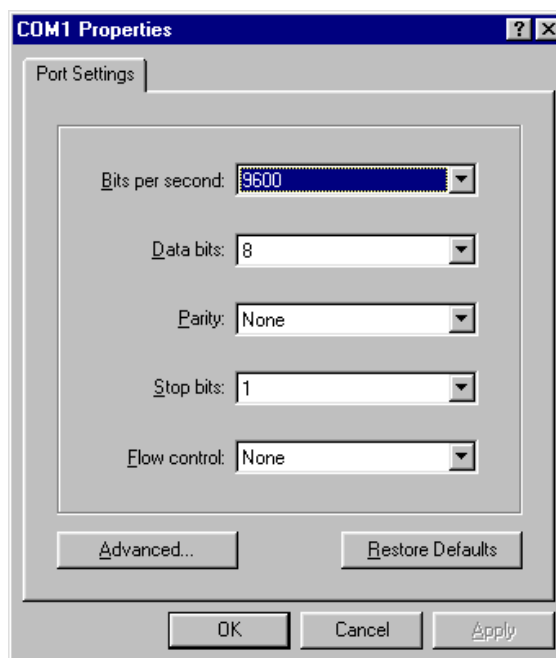
4.1 RS-232 COM Port Settings

The RS-232 has the following pin out:

Signal	I/O	Pin #	Description
TX	O	2	Serial communication Laser RS232 Transmit Line.
RX	I	3	Serial communication Laser RS232 Receive Line.
COM	-	5	Common return for RX and TX
NC	-	1,4,6,7,8,9	No Connect

Table 1 RS232 pin-out

To communicate with the unit through RS-232 port, a standard serial extension cable (supplied with the unit) should be used to connect the unit to a COM port of a computer. Use the Windows Hyper Terminal program to establish a communication. Settings for COMx port are as follows:



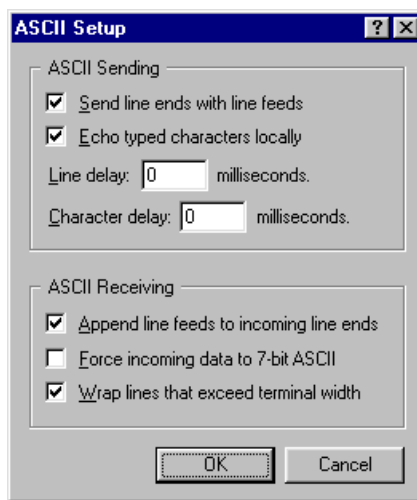


Fig. 5 RS-232 Communication Settings

4.2 USB Port Settings

To communicate with the unit through USB port, a standard USB cable should be used to connect the computer USB port (USB Type A connector) to the unit (USB Type B connector). If the USB cable is installed, the unit will communicate through the USB port and the RS-232 port will be automatically disabled.

The unit supports the standard USB Communication Device Class (CDC), used to simulate RS-232 port using the USB hardware. Once the USB device is properly configured, a virtual COM port will be available through the USB device. So the PC application will be the same one as for the RS-232 option. The USB CDC driver is included in Windows 2000, XP and Vista.

Once the unit is powered-on and the USB cable is connected properly, a new device detection wizard will appear in Windows, the first time the USB device is detected.

Windows 10 is able to detect the driver automatically with no need for manual installation of the USB info file. For more details, refer to the document: ***MPBC Fiber Laser USB detection in Win10***.

For previous Windows releases, the file ***mpbcusbcdc64bit.inf*** is required.



Fig. 6

Point the wizard to the folder where the info file ***mpbcusbcdc64bit.inf*** is located.

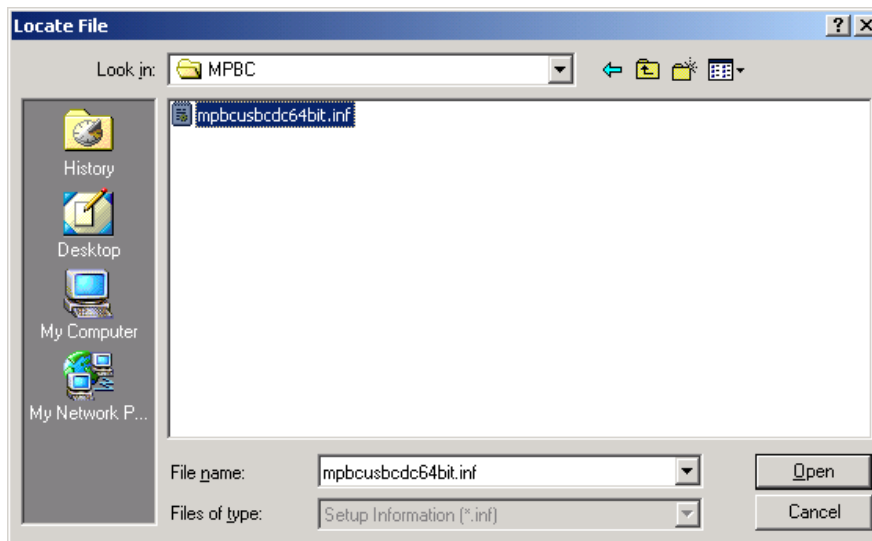


Fig. 7

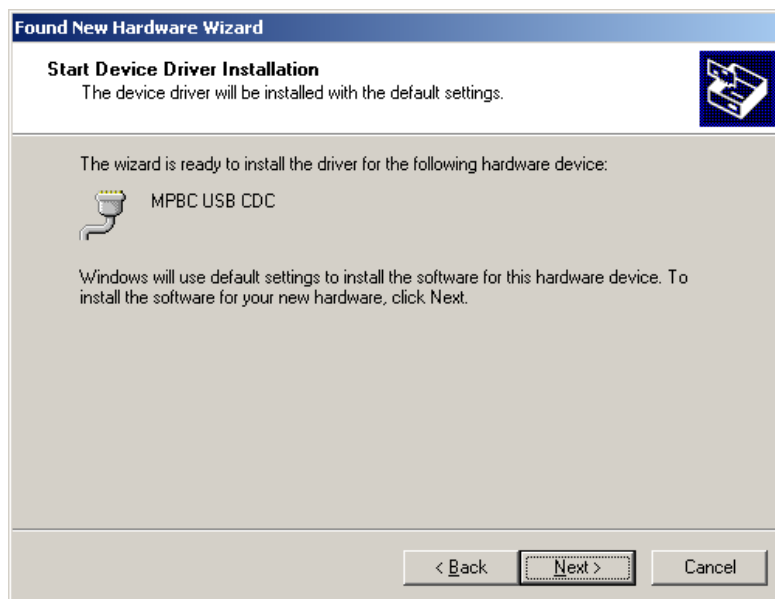


Fig. 8

Then check in the Device Manager utility, that the unit is enumerated as a **MPB USB CDC COM** Port.

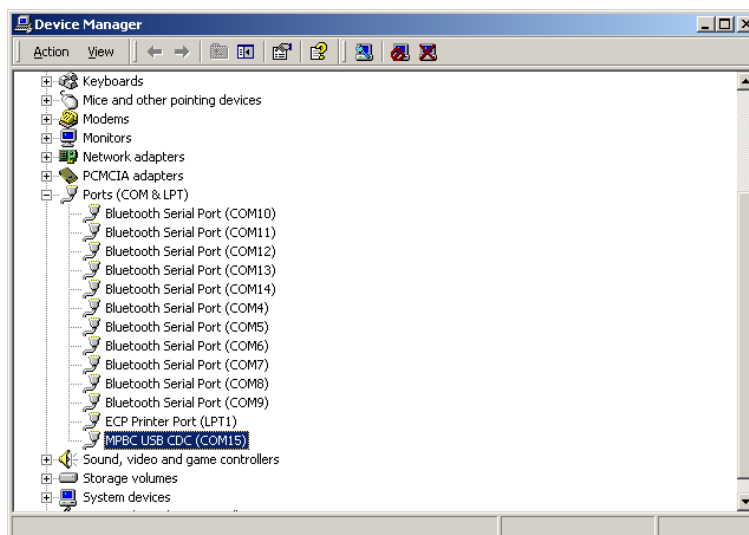


Fig. 9

Then you can select this COM port in the CT application to communicate with the unit.

4.3 List of Commands

All commands shall be completed with <CR> symbol. Some commands require decimal (integer or floating point) parameter. If a command is received and executed successfully, then a requested value will be returned (if any) and a new command line is promoted to enter with "D >". If the unit is not able to interpret the command properly, or parameter sent is out of range, or other conditions were not met and command can't be executed, an error message is returned. Then the command prompt will be changed to "F >".

MNEMONIC	NAME	ACTION	CONDITIONS	NOTES
Enable / Disable Commands				
setLDenable 1	Enable the laser	1 - turn the laser On	TEC temperature is within range.	None
setLDenable 0	Disable the laser	0 - turn the laser Off	None	The Laser is turned off. The white LASER LED is OFF.
getLDenable	Get laser software enable flag value	Return laser software enable flag value [0:Disable, 1:Enable]	None	None
Measurements and Control				
getLDcur 3	Get LD current	Return booster laser diode current setpoint in mA	None	None
setLDcur 3	Set LD current	Set booster laser diode current setpoint in mA	In ACC mode only	None
LDcurrent 3	LD current	Return monitored booster LD current in mA	None	None
LDcurrent 2	LD current	Return monitored preamp LD current in mA	None	None
LDcurrent 1	LD current	Return monitored seed LD current in mA	None	None
LDtemp 1	LD temperature	Return monitored LD case temperature in °C	None	None
Power 1	Power	Return monitored seed output power in mW	None	None
SaveALL	Save All Settings	Save All actual settings in the non-volatile memory to be reloaded automatically after laser power-up	None	None
GETALR	Get alarms	1: SHG Temperature, flag [0, 1] 2: TEC Temperature, flag [0, 1] 3: Pump Bias, flag [0,1] 4: Loss of Output, flag [0, 1] 5: Case Temperature, flag[0,1]	None	None
GETFLT	Get faults	1: SHG temperature, flag [0, 1] 2: Tec temperature, flag [0, 1] 3: Laser diode current, flag [0, 1] 4: Watchdog timeout, flag [0, 1] 5: Case temperature, flag [0, 1]	None	None
GETMODEL	Get laser model number	1: Model, string	None	None
GETSN	Get laser serial number	1: Serial #, string	None	None
GETTIMEOP	Get Time of Operation of laser head	1: # of Hours, integer [0..11930046] 2: # of seconds, integer [0..3599] 3: # of msec, integer [0.999]	None	None

Table 2 List of Commands

MAINTENANCE

5.1 Protecting the output optical fiber tip/endface

The laser output is provided through a stainless steel armored fiber optic cable which is terminated by a standard FC/APC connector protected with a dustcap. The dustcap serves for protecting the fiber tip from dust and damages.

NEVER leave the endface of the fiber unprotected while the laser is not in use, any dust particles must be carefully removed from the endface of the FC/APC connector prior to operating the laser.

*****IMPORTANT*****

ALWAYS turn the laser OFF before attempting to view the tip/endface of the fiber.

5.2 Calibration / Repairs

No calibration and/or repairs should be done on the VYFA-SF-series. If the performance of the laser is not optimal, contact MPB Communications' customer service. The covers of this unit have been sealed prior to shipment. Users are not permitted access inside the laser enclosure.

5.3 Cleaning

The external surfaces (housing and front panel) can be cleaned when needed.

To clean the instrument:

1. Make sure the instrument is turned off and the power cord is disconnected.
2. Clean the housing and the front panel with a soft dry cloth.

Caution

Do not clean the instrument with a water jet, spray can, or spray bottle. Liquid could seep in and damage the instrument, or the connector contacts could stay wet and produce a short circuit when plugging cables.

WARRANTY

6.1 General Information

MPB Communications Inc. (MPBC) warrants this equipment against defects in material and workmanship for a period of one year from the date of original shipment. MPBC also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, MPBC will, at its discretion, repair, replace, or issue credit for any defective product. This warranty also covers recalibration for one year if the equipment is repaired or if the original calibration is erroneous.

IMPORTANT

The warranty can become null and void if:

- *the equipment has been tampered with, repaired, or worked upon by unauthorized individuals or non-MPBC personnel,*
- *the warranty stickers have been removed,*
- *the equipment serial number has been altered, erased or removed,*
- *the equipment has been misused, neglected, or damaged by accident.*

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MPBC BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

6.2 Liability

MPBC shall not be liable for damages resulting from the use of the purchased product, nor shall be responsible for any failure in the performance of other items to which the purchased product is connected or the operation of any system of which the purchased product may be a part.

6.3 Exclusions

MPBC reserves the right to make changes in the design or construction of any of its products at any time without incurring any obligation to make changes whatsoever on



units purchased. Accessories, including but not limited to power cords and interlock connectors used with MPBC's products are not covered by this warranty.

6.4 Certification

MPBC certifies that this equipment met its published specifications at the time of shipment from the factory.

6.5 Service and Repairs

To obtain service or repair for any equipment, follow the procedure below.

1. Call MPBC Sales and Marketing Group. Support personnel will determine if the equipment requires service, repair, or calibration.
2. If the equipment must be returned to MPBC, support personnel will issue a Return Merchandise Authorization (RMA), an address for return and shipping instructions.
3. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.

IMPORTANT

4. Return the equipment, prepaid, to the address given by the support personnel. Be sure to write the RMA on the shipping slip. MPBC will refuse and return any package, which does not bear an RMA.

Note: A test setup fee will apply to any returned unit, which after test, is found to meet the applicable specifications.

5. After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, the customer will be invoiced for the cost appearing on this report. The customer will pay return-shipping costs for equipment under warranty. However, shipping insurance is at the customer's expense.

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