RAYLASE
focus on laser

Hardware Manual
IPG Interface Board

This manual has been compiled by RAYLASE for its customers and employees.

RAYLASE reserves the right to change the product described in this manual and the information contained therein without prior notice.

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1 BASIC INFORMATION

The RAYLASE IPG interface board is used to control a pulsed IPG laser in combination with RAYLASE control cards SP-ICE, RLC-PCI or RLC-USB.

Features

- Interface to Ytterbium pulsed IPG Fiber Lasers according to interface types B, B1, B2, D
- D-SUB 25 connector for 1:1 connection to pulsed IPG laser
- Detection, if 24V power is attached. Soft start to switch on the laser.
- Optically isolated control signals
- Detection of laser error conditions
- Reset of laser after detection of laser error either by push-button or software
- Support of integrated visible pointer
- Emergency Stop input for immediate shut off of laser output

1.1 Delivery Scope

- IPG interface board
- Connecting cable between IPG interface board and control card
- Laser adaptor
- Hardware manual

1.2 Warranty

The rights of the customer in respect of any defects in quality or deficiencies in title are governed by the general conditions of business of RAYLASE AG. These conditions are available for review on our website.

Before returning the product, please request an authorization number from RAYLASE. Pack the product in the original packaging or in packaging that provides equivalent protection for shipping.

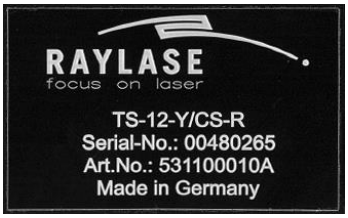
RAYLASE shall not be obliged to repair defects under the following circumstances:

- If persons not authorized by RAYLASE have attempted to repair the product.
- If persons not authorized by RAYLASE have modified the product.
- If the product has been used improperly.
- If the product has been connected to incompatible devices.
- If the product has been damaged because of inadmissible high laser power or focusing the laser on optical areas.
- If the product has been damaged because of unqualified cleaning of the optical areas.

Note: No implicit guarantee or warranty of suitability for specific purposes has been made. RAYLASE is not responsible for damages arising from use of the product. Individual assemblies or other assemblies manufactured by RAYLASE may be subject to separate warranty conditions. Refer to the corresponding manuals for further information.

1.3 Signs

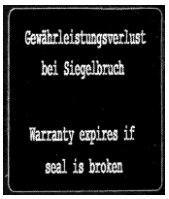
The following signs must be attached to the Interface Board. These signs may not be removed. Signs that have become illegible must be replaced.



Rating plate

The rating plate and the identification code printed on it allow the determination of the Interface Board type.

The **CE symbol** confirms the compliance of the Interface Board with European directives. It indicates that the Interface Board is approved for free trade within the EU.



The **seal label** warns against unauthorized opening of the Interface Board. If the seal is broken, all warranty claims against RAYLASE are void.

1.4 Conformity with directives

The Interface Board conforms to the requirements of the following directives:

- EU Directive 2004/108/EC (EMC)
- WEEE Directive 2012/19/EC
- RoHS II 2011/65/EU

For details of conformity with other directives, contact RAYLASE.

1.5 Laser Safety

Customers assume all responsibility for maintaining a laser-safe working environment. OEM customers must assume all responsibility for CDRH (Center for Devices and Radiological Health) certification.

WARNING:
Switch on the PC first, before switching on the laser system. In this way you can avoid an uncontrolled action of the laser when starting the control card.

1.6 Manufacturer

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Germany
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Fax: +49 (0) 81 53 - 88 98 - 10
http://www.raylase.de
E-mail: info@raylase.de

1.7 Customer Support

The RAYLASE support services are available for your problems either in respect to the product or the accompanying manual. Before calling for support, please make sure you refer to any appropriate sections in this manual that may answer your questions.

If you need further assistance call RAYLASE customer service department, Monday through Friday between 8 A.M. and 4 P.M. (Middle European Time).

The customer service personnel will be able to give you direct assistance and answers to your questions.

Germany (Wessling)
+49 (0) 81 53 - 88 98 - 0

... ask for the customer service department

1.8 Disposal

For the disposal of the Interface Board, note local policies, regulations and laws.

2 TECHNICAL DATA

2.1 Dimension and Weight

Dimensions: W 85mm, L 103mm, H 30mm

Weight: 400g

2.2 Environmental Conditions

Ambient temperature: +15°C to +35°C

Storage temperature: 0°C to +80°C

Humidity rel.: ≤80% non-condensing

2.3 SET-UP Procedure

Make sure that all requirements for laser safety, as described in the scan head manuals, are fulfilled. It is the user's responsibility to follow the regulations on laser safety.

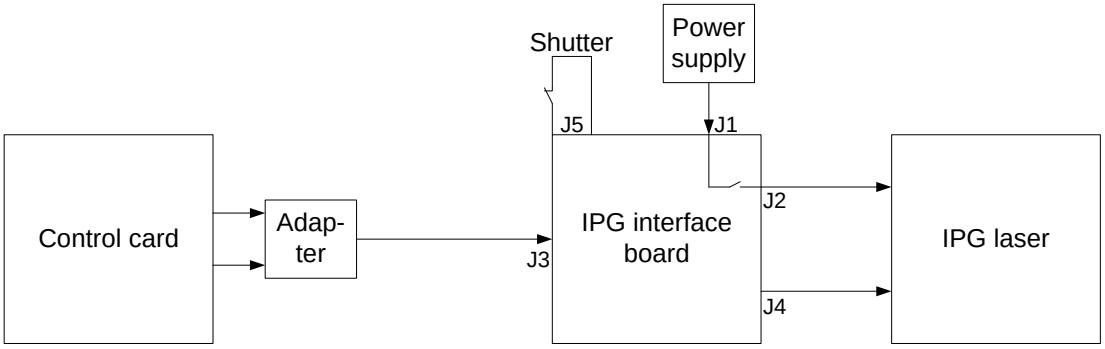


Fig. 1
Block diagram

Installation

- Connect power supply for laser to J1.
- Connect laser power supply output J2 to IPG laser.
- Connect IPG interface board output J4 to laser interface.
- Connect RAYLASE control card via adapter to IPG interface board input J3.
- Switch on laser power supply. After a short delay, the laser will be switched on.

Please note: J5 must be connected to switch on the laser.

2.4 Connections

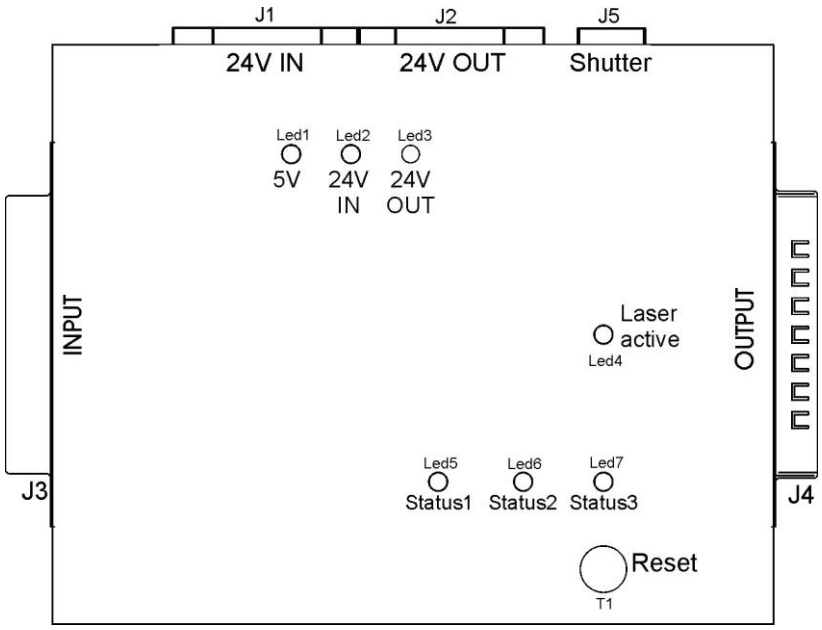
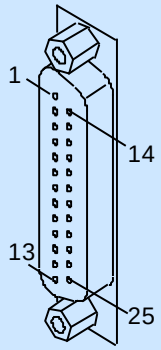


Fig. 2
IPG interface board, overview

ID	Assignment	Details
J1	Laser Power Input (24V)	---
J2	Laser Power Output	---
J3	IPG Interface Input	---
J4	IPG Interface Output	page 9
J5	Shutter / Emergency Stop	must be connected to switch-on the laser
T1	Laser Reset	resets the laser or the IPG interface in case of a fault

2.4.1 IPG Laser Interface

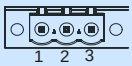
J4	PIN	Signal	PIN	Signal
 25 PIN D-SUB	1	D0	14	GND
	2	D1	15	nc
	3	D2	16	Alarm1
	4	D3	17	nc
	5	D4	18	MO / EE
	6	D5	19	Laser Modulation
	7	D6	20	PRR / Sync [interface type D]
	8	D7	21	Alarm2
	9	Latch	22	Pointer
	10	GND	23	Emergency stop
	11	Alarm3	24	nc
	12	Alarm4	25	nc
	13	nc	---	

EE = Emission Enable
LM = Laser modulation
MO = Master oscillator [interface type B]
nc = Not connected
PRR = Pulse Repetion Rate [interface type B]

Specifications

Output		
Output low	max. 0.55V	64mA
Output high	2.0 – 5.0V	32mA

2.4.2 Laser Power Input and Laser Power Output

J1, J2	PIN	Signal
 Laser power interconnection	1	24V
	2	Return
	3	Safety Ground

2.4.3 Cable Specifications

Connection	Cross-section	Length	Signals
24V power supply − J1	min. 3x2,5mm²	---	---
J2 − IPG laser	min. 3x2,5mm²	max. 2m	---
J4 − IPG laser	---	max. 2m	1:1

2.4.4 Status LEDs

LED				Meaning	
1	2	3	4		
green	-	-	-	5V Input	Voltage from control card is ready
-	green	-	-	24V Input	Voltage for laser is ready
-	-	red	-	24V Output	Soft start process of IPG laser is active.
-	-	green	-		IPG laser is powered up
-	-	-	red	Laser emission ON	Laser is active

LED			Meaning
5	6	7	
green	green	green	Normal state
yellow	green	green	Laser not ready (only interface type D)
yellow *	-	-	Shutter open (combinations with other fault possible)
-	-	red	Laser temperature out of range
-	red	-	Powersupply out of range (only interface type D)
red	-	-	Back Reflection error
red*	red*	red*	Internal system error

* flashing

3 PROGRAMMING

The following sections describe how to program an IPG laser for use with RAYLASE control card and RAYLASE IPG interface board.

3.1 Signals

Use the following signals to program the IPG interface board:

Signals of control card	Description
/LM	Setting Input Pulse Repetition Rate of IPG Laser
/MIP	Switching On/Off the Master Oscillator Input of IPG Laser
/FPS	Setting Power Setting Latch Input of IPG Laser
/PB 0-7	Setting 8 Bit Power Inputs of IPG Laser
/LM_Gate	Switching On/Off the Laser Modulation Input of IPG Laser
/Remote_Execute 1	Reset IPG Laser after Detection of Alarm Condition
/PA 6	Reading of combined Alarm1 to Alarm3 outputs of IPG Laser

3.2 Commands

To program the IPG interface board use the following commands:

- Set_Delays_7_8, Set_Delays_9_10
- Write_Port_List
- Long_Delay
- Read_Port
- Write_Port
- YAG1-Mode is required, Bit 4 = 0, Bit 5 = 1

See also the manual „Commands and Functions“ for details.

3.3 Programming sequence

Initialisation:

```
Init_Scan_Card ();                  // Initialise Scan Card
Load_Cor (lpstrFileName);           // Load Correction File
Set_Mode (0x0420);                  // Set YAG1-mode (Bit 5 = 1, Bit
                                    4 = 0)
```

Setting Master Oscillator input of IPG Laser with Control Commands:

```
Set_Start_List_1();                 // Filling Job Data into List 1
Set_Delays_7_8 (t1, t2);            // Set Laser Modulation Signal
Set_Delays_9_10 (t3, t4);           // t4 = 0
Write_Port_List (0x0A, value);      // Set Laser Power
...                                 // List Commands for Marking
Set_End_Of_List();
...                                 // Start Marking
Write_Port (0x0C, 0x0010);          // Switch-On Master Oscillator of
                                    IPG Laser
...                                 // Wait 10msec
Execute_List_1();                   // Execute Job
...
Write_Port (0x0C, 0x0000);          // Switch-Off Master Oscillator
                                    of IPG Laser
```

Setting Master Oscillator input of IPG Laser with List Commands:

```
Set_Start_List_1();                 // Filling Job Data into List 1
Write_Port_List (0x0C, 0x0010);     // Switch-On Master Oscillator of
                                    IPG Laser
Long_Delay 1000();                  // Wait 10msec
Set_Delays_7_8 (t1, t2);            // Set Laser Modulation Signal
Set_Delays_9_10 (t3, t4);           // t4 = 0
Write_Port_List (0x0A, value);      // Set Laser Power
...                                 // List Commands for Marking
Write_Port_List (0x0C, 0x0);        // Switch-Off Master Oscillator
                                    of IPG Laser
Set_End_Of_List();
...
Execute_List_1();                   // Execute Job
```

Checking Laser Alarms and Resetting of IPG Laser:

```
Read_Port (0x08);                   // Read Bit 6 of Port A for
                                    checking of Laser Alarm
                                    // If Bit 6 set to FALSE then an
                                    error occured
...
Write_Port (0x0C, 0x0020);          // Set Signal Remote_Execute_1 to
                                    TRUE
...                                 // Wait 1ms
Write_Port (0x0C, 0x0);             // Set Signal Remote_Execute_1 to
                                    FALSE
```

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