Sacher Lasertechnik Group

TEC070 TEC072 DBR Butterfly Laser Mount

User Manual

Warranty

This Sacher Lasertechnik[Group] product is warranted against defects in materials and workmanship for a period of two years from date of shipment.
Duration and conditions of warranty for this product may be superceded when the product is integrated into (becomes a part of) other Sacher Sacher Lasertechnik[Group] products. During the warranty period, Sacher Lasertechnik[Group] will, at its option, either repair or replace products which prove to be defective.
The warranty period begins on the date of delivery or on the date of installation if installed by Sacher Lasertechnik[Group].

This warranty is in lieu of all other guarantees expressed or implied and does not cover incidental or consequential loss.

Service

Information and advice about the performance or operation of Sacher Lasertechnik[Group] products is available from our web site and our applications engineers.
For quickest response ask for 'Technical Support' and have your model and serial number available. Support is available by:

Sacher Lasertechnik[Group]
Rudolf-Breitscheid-Str. 1–5
35037 Marburg, Germany
Tel: +49 6421 305 – 0, Fax: +49 6421 305 - 299
Contact@sacher-laser.com
or
5765 Equador Way
Buena Park, CA 90620
USA
Tel.: +1 800 352 3639, Fax: +1 714 670 7662

Content

General Information

General Description

The laser head contains all necessary parts for a safely operation of a DBR diode laser within a 14pin butterfly package. The following description gives an overview as well as detailed information about the following topics:

- the opto-mechanical construction
- 14-pin butterfly connection
- the electrical connectors
- features of the protection circuitry
- the bias-T circuit.
- safety switch
- indicator lamp

Opto-Mechanical Construction

The laser head is a professional mount for butterfly style laser modules and offers several advantages over home built solutions. It offers unlimited access to all the relevant operating conditions. Especially the use of the DBR and phase segments has been prepared.
The laser module will be screwed into the mount with 4 metric screws of type M2x6. When screwed into place the laser module is in thermally well conducting contact to a heat sink formed by the chassis of the mount.
On the laser head are two Sub-D connectors for the temperature control and current control cable provided. Furthermore there are three SMA high frequency connector for modulating the different segments of the DBR. The jack connector has been implemented for cases where the operator wants or has to provide increased laser security using a remote interlock. When unused the jack connector may be short circuited with a M2,5x12 screw as delivered. The connector may also be used to connect a remote interlock switch that opens the interlock circuit in case of an unwanted condition (like door opened etc.).

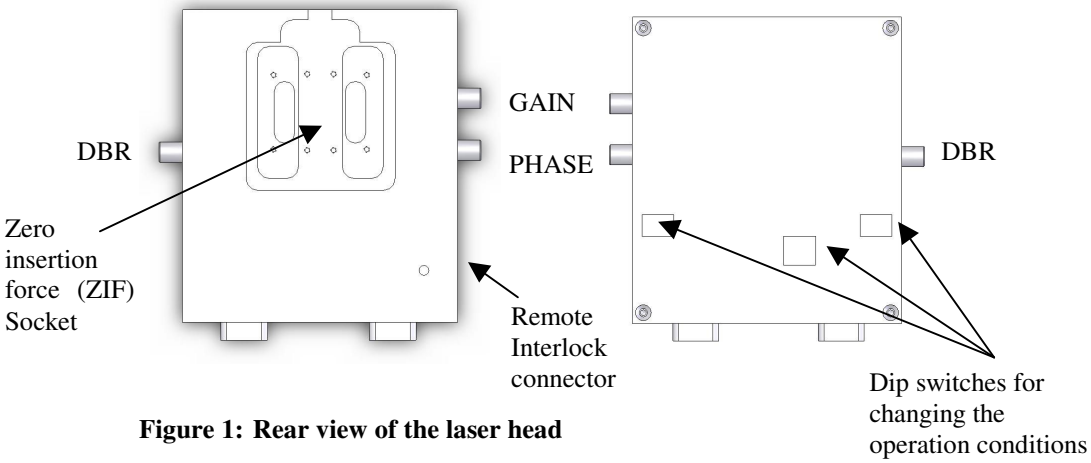


Figure 1: Rear view of the laser head

Proper mounting of the laser head is essential for stable wavelength operation. The wavelength is strongly dependent on the temperature of the DBR laser, which is actively stabilized using the thermoelectric cooler.
The cooler utilizes the laser head housing as heat reservoir. For this reason, the butterfly mount needs to provide a good thermal path away from the laser. The laser mount features ZIF sockets that provide also best thermal contact.
After mounting the laser head, take precautions to prevent back reflections into the laser aperture.

Prevent back reflections into the laser head. Optical feedback may damage the laser diode.

Isolation can be achieved by angling the used optics or with the use of an optical isolator. The degree of isolation required depends on how you are using the laser. Please contact Sacher Lasertechnik for technical support with your application.

Mounting 14-Pin Butterfly Devices

This device should not be operated unless properly attached to a heat sink. Failure to adequately cool the device will cause immediate and permanent damage. The heat sink should be made of copper, aluminium or another material with similar, or better, thermal conductivity. The heat sink surface finish should be 0.8µm (32 µ-in) or better. The surface flatness under the package should be better than 12µm (0.0005"). The heat sink must be capable of removing heat from the package in order that the case temperature of the package does not exceed its specified maximum operating temperature. The case temperature limits for all butterfly packages are specified as the maximum temperature on the base of the package. Use of a thermal interface material between the package and heat sink is strongly recommended. A good quality thermal grease or thermal interface pad can be used. Typically, is desirable to achieve less than 0.2 K/W between the package and the heat sink; this can be achieved if the thermal interface material is rated at 2.5 x 10^{-5} Km^2/W (0.038 Kin^2/W) or better. We recommends Panasonic “PGS” (Pyrolytic Graphite Sheet) thermal interface material. The package can be mounted with M2.5x 0.45 screws. First, the screws must be tightened to a torque of 0.015 Nm (2.0 inoz) in the order, 1-3-2-4, see Figure 2: Screw numbers on mounted package. Next, the screws should be tightened to 10 in-oz (0.070N-m) in the same order, 1-3-2-4.

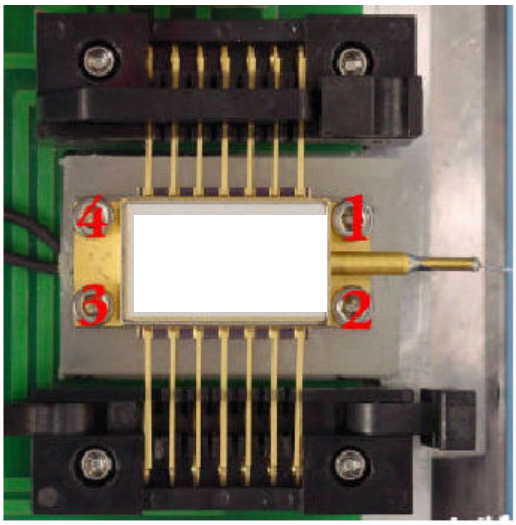


Figure 2: Screw numbers on mounted package

The package can be permanently distorted and the internal components destroyed if the screws are tightened unevenly or are over tightened. The screw threads should be locked to prevent loosening over the time.
Making the Safety Interlock Connections:

Safety an Proper Handling

The user of the laser mount is primary responsible for being compliant with the laser safety requirements.
We recommend to pay attention on the following topics.

Laser Safety

Classification requirements and user guideline described in DIN EN 60 825-1:2001 should be fulfilled.

Laser products for introduction into commerce in or imported into the United States must

- Comply with 21 CFR §1040.10 and §1040.11(medical laser products) as applicable,
- be certified and identified in accordance with 21 CFR §1010.2 and, §1010.3
- Be reported in accordance with 21 CFR §1002.10

The connector between controller and laser module is not suited for connection or disconnection while operation.

Proper Handling

The storage temperature of the laser head is -20 °C (-4 °F) to 75 °C (167 °F). Protect the laser system from condensing if transferred from a cold environment into a warmer working environment. Never operate the laser head or a grating in an environment that is above -10 °C (14 °F) or below 65 °C (149 °F). Never place the laser head on a heat source such as a power supply. This may result in distortion of the wavefront leading to an unstable multimode operation. Always wear a grounding wrist strap when operating ta laser. Diode lasers are extremely susceptible to damage from static discharge. The optical components of the system should never need to be cleaned under normal operating conditions with the cover closed. Do not attempt to clean the optics yourself. Doing so will void the warranty. If the optics become accidentally soiled send the unit back to the manufacturer for cleaning.

Fiber Handling Precautions

This device could be equipped with a fiber optic pigtail, and should only be handed by qualified operators with specific training on handling fibered devices. The minimum bend radius for the fiber on this device must be respected. Bending the fiber to a smaller radius than the minimum may result in immediate breakage of the fiber or it may induce damage, which is not immediately apparent but will lead to premature device failure. Always wear eye protection when handling optical fiber.

Handling Precautions for ESD

Follow all of the following precautions when handling a pigtailed product, as this device may be damaged by static electrical discharge. Remove any lead shorting clips only when ready to use. Replace the clips for device storage or transport. Always store and transport in closed conductive containers. Remove from containers only after grounding at a Static Control Work Station. Personnel who handle this device should wear a static dissipative outer garment and should be grounded at all times. Floors should have a grounded static dissipative covering or treatment. Tables should have a grounded static dissipative covering. Avoid insulating materials of any kind. Always use a grounded soldering iron to install. Test only at static controlled workstations. Failure to follow all of these precautions may result in immediate failure of the device or shortened life.

Label Identification

You find the following labels on the laser mount.

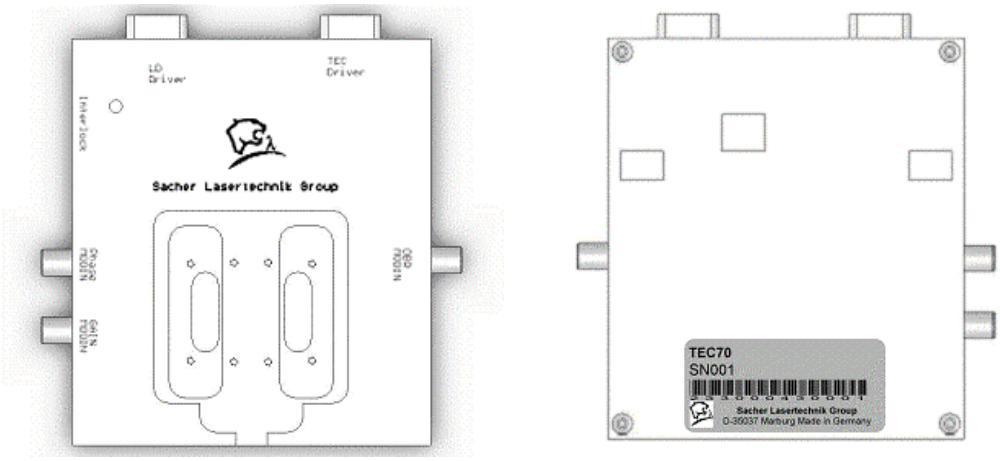


Figure 3: Top and bottom labels

This label shows the logo of Sacher LasertechnikGroup, located on top of the housing.

Identification label with Sacher part number and serial number

DBR Laserdiode Driver Setup

The following schematic shows a typical setup for diode laser applications.

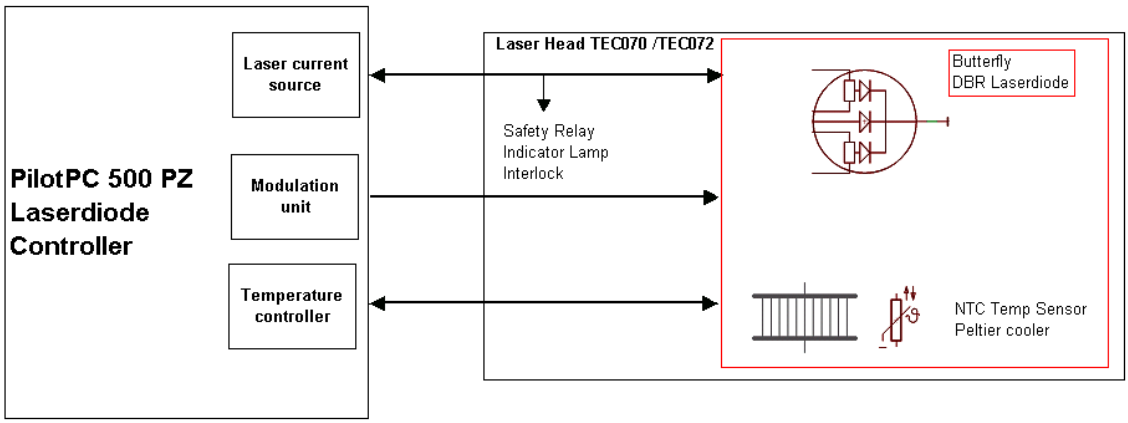


Figure 4: Typical DBR laser setup

The laser diode controller consist of

- a low noise current source witch is used to drive the BBR Gain (TEC070) or the DBR segment(TEC072) of the DBR diode
- a control unit witch supervised the interlock, the safety relay and the indicator lamp
- a temperature controller witch is able to read out the DBR temp sensor and control the peltier cooler
- a modulation unit witch is used to drive the internal heating resistors of the DBR diode

Remote Interlock Connector /Indicator Lamp

The TEC70, TEC72 are equipped with a remote interlock connector located on the side panel and an indicator lamp on top.

In order to enable the laser driver, a short circuit must be applied across the terminals of the Remote interlock connector. In practice this connection is made available to allow the user to connect a remote actuated switch to the connector (i.e. an open door indicator). The switch (which must be normally open) has to be closed in order for the unit to be enabled. Once the switch is in an open state the laser diode must automatically shutdown.

This safety functionality is available together with the Sacher Laser diode controller.
See chapter before.

All units are configured with a shorting device installed in the interlock connector. If you are not going to use this feature then you can leave the shorting device installed and the unit will operate normally as described in the procedures in this manual. If you wish to make use of the interlock feature you will need to acquire the appropriate connector mate and wire it your remote interlock switch. Next, remove the shorting device by unscrewing it from the input and install the connector into the Interlock input.

The interlock input only accepts a 2.5mm mono phono jack.

Butterfly Pin Layout TEC070 and TEC072

The following table describe the butterfly laser socket connection. This connection table must match with the laser diode datasheet.

Pin-No	Description	Pin-No	Description
1	Peltier (+)	14	Peltier (-)
2	Thermistor	13	Case Ground
3	PD Anode	12	N/C
4	PD Cathode	11	LD Cathode (-)
5	Thermistor	10	LD Anode (+)
6	DBR Anode	9	Phase Anode
7	DBR Anode	8	Phase Anode

Table 1: Connection table of the butterfly

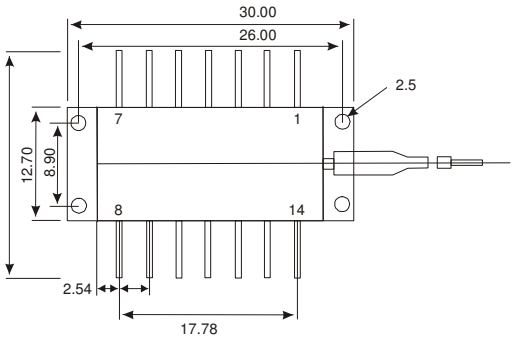


Figure 5: Pin connection of the butterfly

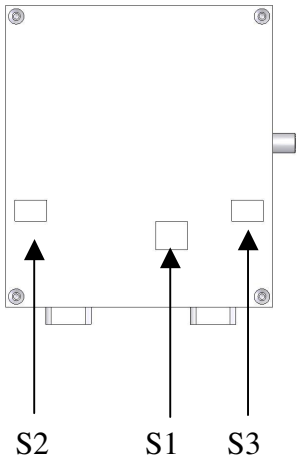
Product Options

The following product options are available.

Name	Description	Sacher Part Number
Laser Mount TEC070	Laser Mount for butterfly housing DBR Laser Diodes GAIN segment driven	23-4000-43-0008
Laser Mount TEC072	Laser Mount for butterfly housing DBR Laser Diodes DBR segment driven	23-4000-43-0013

Dip Swiches

The TEC71 is equipped with 3 DIP switches to support different polarity and case ground settings .In case of a DBR laser different modulation settings are possible.

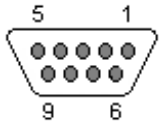


S1.1	Connect electronic ground to laser cathode
S1.2	Connect test pad laser to cathode
S1.3	Connect Butterfly case to laser cathode
S2.1	Connect Gain segment to Phase Segment
S2.2	Connect DBR segment to Phase Segment
S3.1	Connect Gain segment to DBR
S3.2	Not used

Connectors

Laser Input

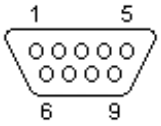
Standard Sub-D9 FEMALE connection rated for 5A.
This connection is required.



Pin Nr.	Signal Name	Description
1	Interlock	
2	PD-	Photodiode Signal Minus
3	LD GND	Laser Diode Ground
4	PD+	Photodiode Signal Plus
5	Interlock	
6	REL+	Safety Relay Plus
7	LD-	
8	LD+	Laser Diode Plus
9	GND	

TEC Input

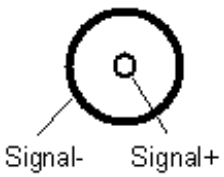
Standard Sub-D9 MALE connection rated for 5A. This connection is usually required, but optional if temperature control is not needed.



Pin Nr.	Signal Name	Description
1	MGND	
4		
5		
6	NTC	Temperature Sensor
7	TEC-GND	
8	TEC-OUT	Peltier Output
9	NTC	Temperature Sensor

MOD INPUTS

The input is used for modulating the laser a non differential input.



Pin Nr.	Signal Name	Description
1	MOD P	Modulation Plus
2	MOD M	Modulation Minus

Specifications

Laser Spec

Laser

Max Laser Current :	2A (Limit of LD)
Laser Polarity TEC070:	negative
Laser Polarity TEC071:	negative
Laser Polarity TEC072:	positive

RF Modulation Inputs

Input Impedance :	47Ohm
Coupling Capacitor :	10uF
Max Input Voltage:	25V
Coupling Connector :	SMA
Freq-Range :	100kHz..100MHz

Safety Relais

Relay coil :	12V/320R

TEC Spec

TEC

Max Current:	5.0A
Cooling Capacity:	Laser Specific
Temperature Range:	LD dependent
Temp Sensors:	Laser Specific

Mechanical Drawings

Laser Mount TEC070 TEC072

Laser head:

Size (H x W x L):	25.5 x 94 x 106.7 mm
	1.0 x 3.7 x 4.2 inch
Weight:	330g

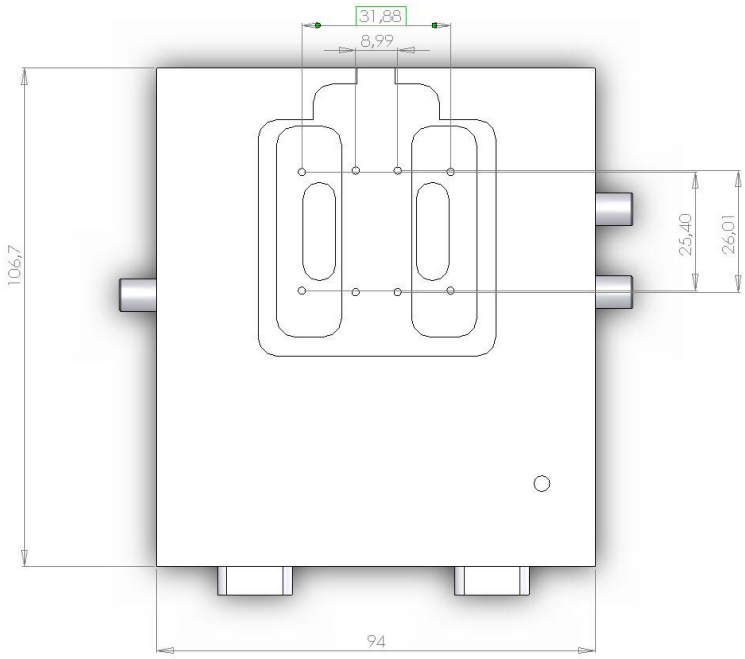


Figure 6: Top view of the TEC070 TEC072 laser head.

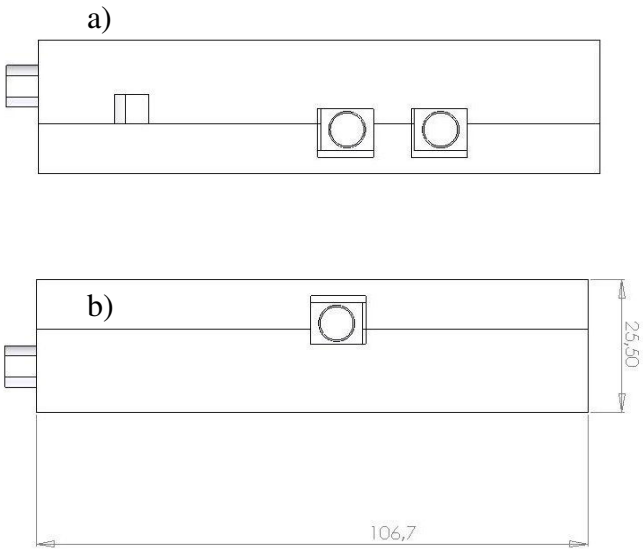


Figure 7: Side view of the TEC070 TEC072 laser head. a: right side; b: left side

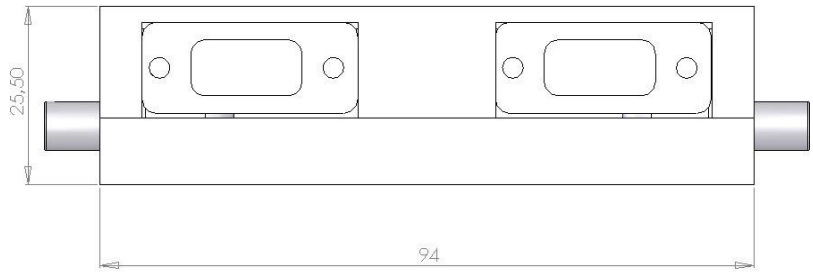


Figure 8: Rear view of the CHEETAH laser head.

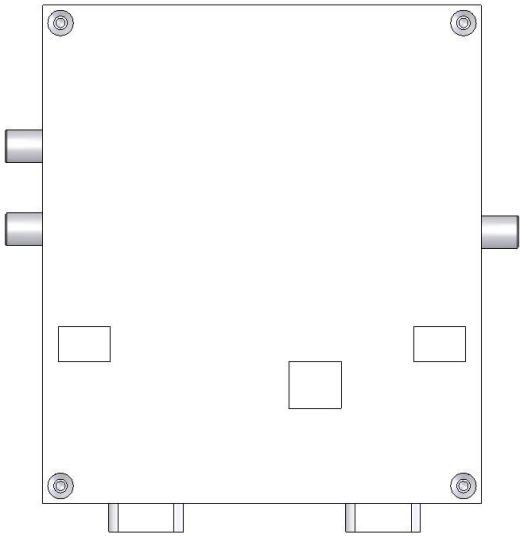
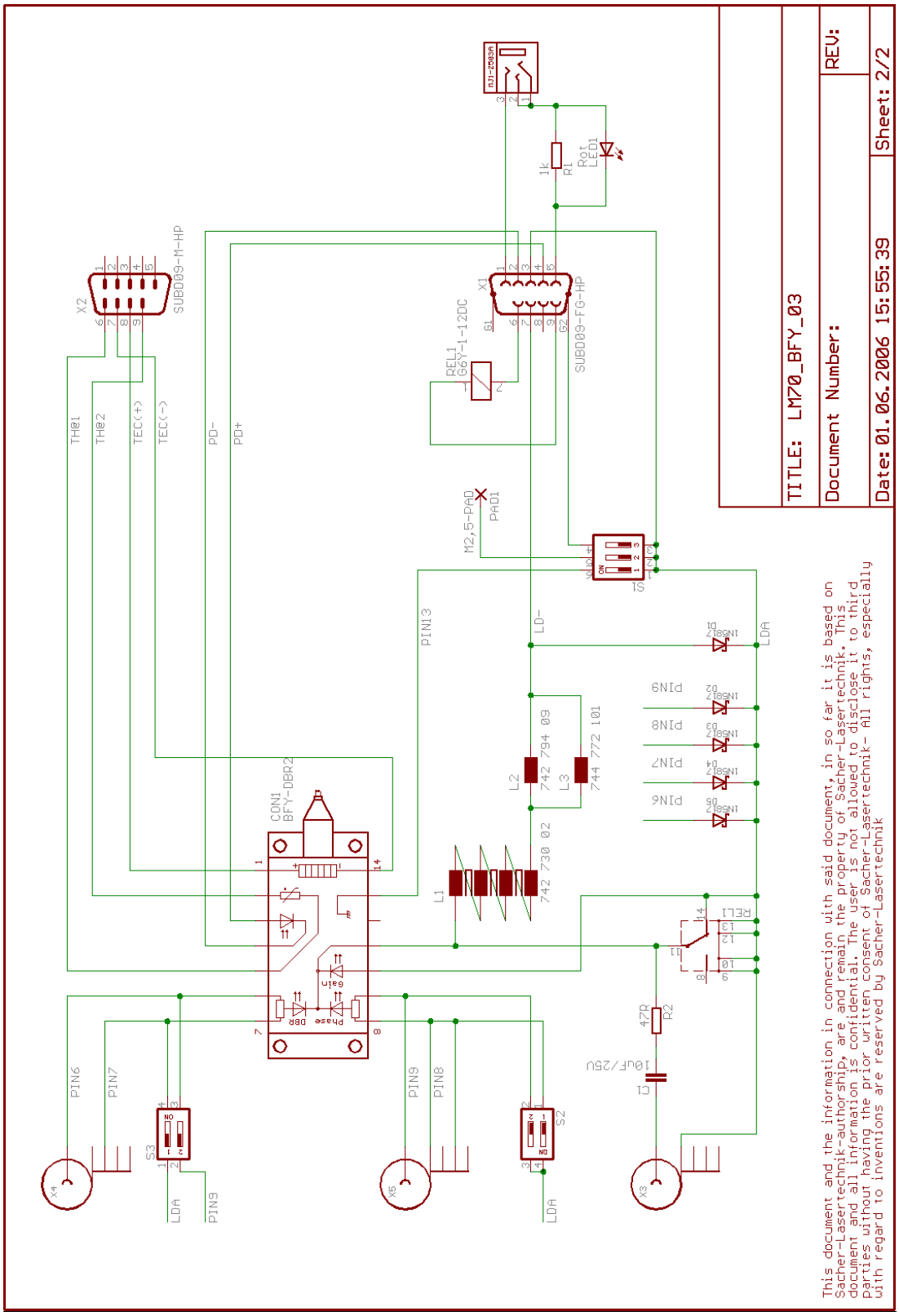
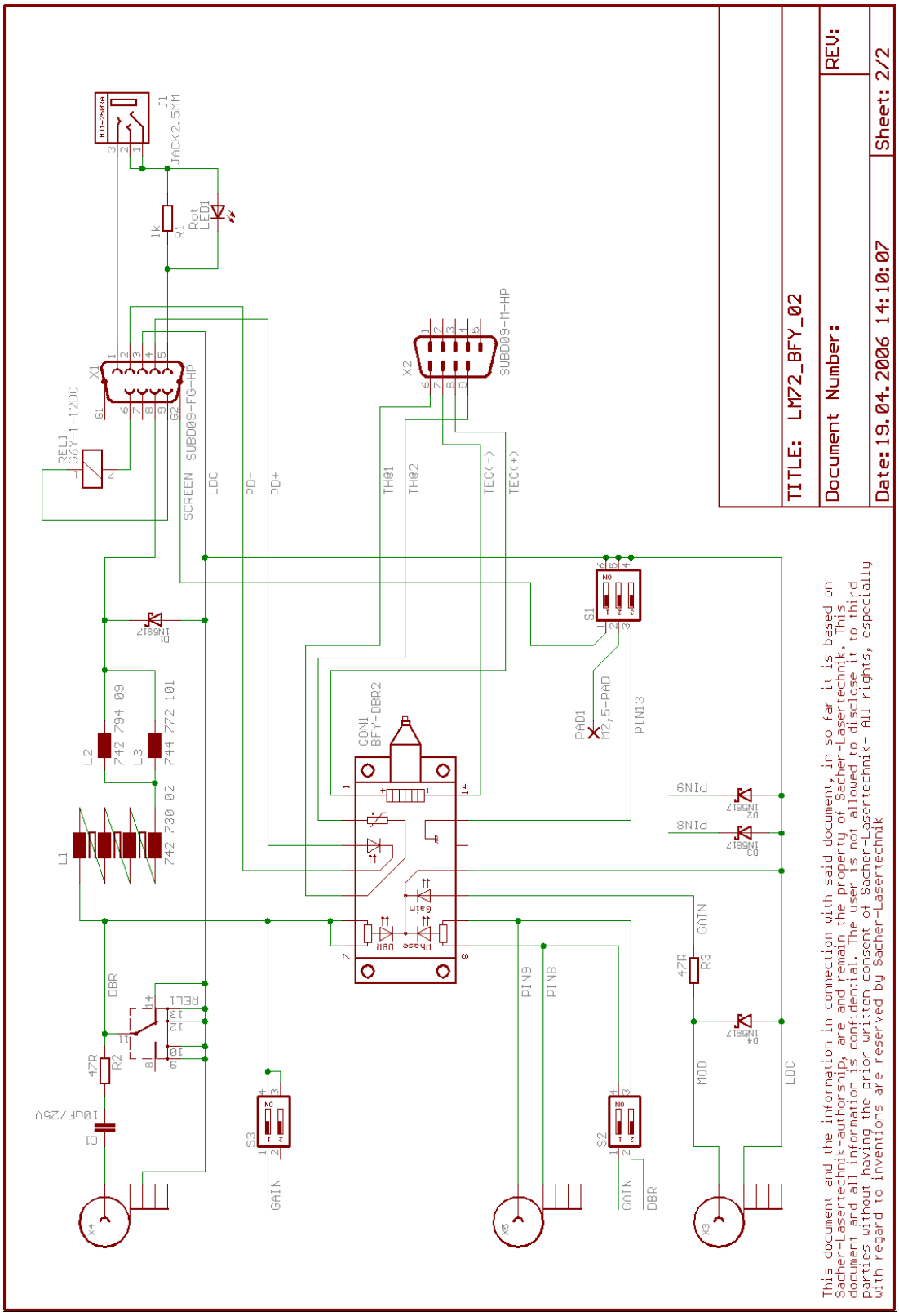


Figure 9: Bottom view of the TEC070 TEC072 laser head.

Laser Mount Schematic TEC070



Laser Mount Schematic TEC072

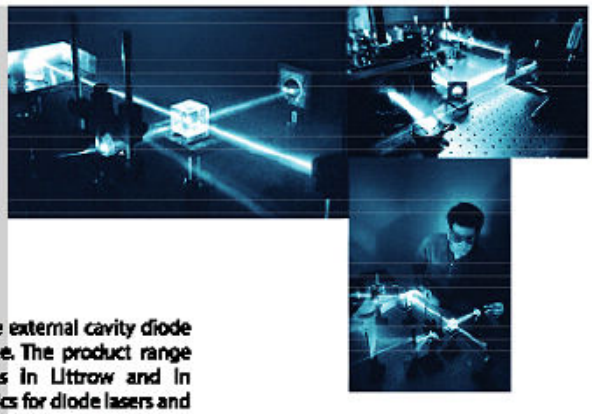


Technical Support

Information and advice about the performance or operation of your laser is available from our application engineers. For quickest response ask for “Technical Support” and have your model and serial number available. Support is available by:

Sacher – Lasertechnik[Group]
Rudolf-Breitscheid-Str. 1–5
35037 Marburg, Germany
Tel: +49 6421 305 – 290, Fax: +49 6421 305 - 299
Contact@sacher-laser.com
or
5765 Equador Way
Buena Park, CA 90620
USA
Tel.: +1 800 352 3639, Fax: +1 714 670 7662

http://www.sacher-laser.com



Company Profile

Sacher Lasertechnik is leading manufacturer of tunable external cavity diode lasers (ECDLs) with more than 10 years of experience. The product range includes anti-reflection coated diode lasers, ECDLs in Littrow and in Littman/Metcalf configuration as well as driver electronics for diode lasers and sophisticated measuring electronics.

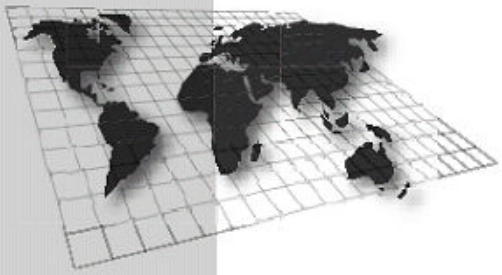
Sacher Lasertechnik was founded as a spin-off company of Marburg University in 1992. We started up with the manufacturing of anti-reflection coatings for diode lasers according to patent 6,297,066. Based on this key knowledge, we developed stable, narrow linewidth, wavelength tunable laser sources for spectroscopy, patent 5,867,512. We gratefully acknowledge the support of the German ministry of research within contracts 13N6693 and 13N7156.

Our product range currently covers

- Diode Lasers, Fabry Perot, DFB, Antireflection coated
- Tunable diode lasers in Littrow configuration
- Tunable diode lasers in Littman / Metcalf configuration
- High power (P>300mW) Raman lasers in Littrow configuration
- Low noise diode laser controllers
- Measurment electronics

Please contact us with your measurement requirements. We would be proud to support you with our competence.

Dr. Joachim R. Sacher



Sacher Lasertechnik, LLC
5765 Equador Way
Buena Park, CA 90620
U.S.A

www.sacher.us

Sacher Lasertechnik GmbH
Hannah-Arend-Str. 3-7
35037 Marburg
Germany

www.sacher.de