

SYS DC 110 Series

Laser Driver and Frequency Stabilization Modules



DC 110 diode laser supply racks

The diode laser supply rack DC 110 serves as a general basis for all plug-in modules of the SYS DC 110 series. It provides the necessary supply and HV voltages via an integrated backplane. The backplane also enables the communication between the different modules, provides data lines for the monitor display, and – via the DCB 110 analog interface – allows for remote control of the modules by external devices.

The rack is available as 12", 19" and double-stage 19" version, housing 3, 5 and 10 units in addition to the DC 110 monitor, respectively. In its basic configuration, the rack is equipped with a DC 110 Monitor Unit, Current Control module DCC 110, Temperature Control module DTC 110 and Scan Control SC 110. Other modules can be flexibly added, depending on the number of lasers to be controlled, or for frequency stabilization tasks.

DC 110 monitor unit with LCD display

The monitor unit of the Diode Laser Controller DC 110 displays the most relevant laser parameters at a glance. Actual and pre-set values of current and temperature of up to three laser systems are indicated on a four-line LCD unit. Other important values, e.g. adjusted maximum current or operating temperature range, can also be shown.

The monitor unit features a power-up switch for the control rack, and an extra button to enable or disable laser operation. Internal safety circuits are included to prevent damage of the laser diode in case of power failure. An RS 232 interface is provided for reading out parameter values.

Specifications and safety features DC 110 supply rack

Linearly regulated, low noise power supply, thermally protected

Automatic mains voltage detection (100 - 120 or 220 - 240 VAC, 50 - 60 Hz)

Very low noise transformers

All supply voltages short circuit protected

Interlock socket for external interlock circuit

Specifications DC 110 monitor

Four-line LCD dot matrix display

Push buttons and rotary encoder for display selection of the operating parameters of up to 3 diode lasers

Power supply ON/OFF safety key switch

RS 232 interface for laser parameter monitoring

Monitor "sleep" function

DCC 110, DTC 110, SC 110, DCB 110

Standard Electronics

Standard electronics for TOPTICA's scientific diode lasers

Based on the rack and monitor, TOPTICA offers the perfect driving system for all scientific diode lasers. Besides the monitor unit, standard systems include the needed number of current, temperature and scan control modules (DCC 110, DTC 110, and SC 110).

The **DCC 110** modules are ultra low noise analog current control modules, that deliver currents up to 100 mA, 500 mA or 3000 mA. BNC input and output connectors are provided for external modulation of the laser current, and for monitoring the internal photodiode signal of a laser diode.

The **DTC 110** is a low-noise temperature control module, that regulates the laser diode temperature with a precision of approx. 1mK. It can be used to sweep the emission wavelength of DFB diodes. Its bipolar control allows fast and stable regulation. Special versions are available for DFB diodes and for regulating the temperature of nonlinear crystals.

The **SC 110** is optimized for driving external cavity diode lasers, DFBs or scanning Fabry-Perot interferometers (FPI 100). It can be configured in HV (150 V) or LV (24 V) output. The feed forward feature controls the diode current during a Piezo scan to maximize the mode hop free tuning range of external cavity lasers.

The **DCB 110** is an analog interface board, that provides access to the backplane of the rack. It enables the user to monitor and control important parameters of the modules in the rack.

Standard systems can easily be extended with TOPTICA's sophisticated locking electronics (see pages 34 - 39).



Specifications DCC 110

Output current range:
0 ... ± 100 mA (DCC 110/100 mA)
0 ... ± 500 mA (DCC 110/500 mA)
0... ± 3 A (DCC 110/3A)

Laser stabilization to constant operating current or constant light power

Fine tuning of output current or laser power via precision trimmers

External modulation of output current up to 7 kHz (-3 dB)

Numerous protection circuits for the laser diode, including excess voltage clip

RMS wideband noise and ripple, 5 Hz .. 1 MHz:
200 nA (DCC 110/100 mA),
1 µA (DCC 110/500 mA),
10 µA (DCC 100/3 A)

Specifications DTC 110

Output current: 0 .. 5 A,
maximum output power: 30 W

Temperature selection range:
0 °C to 50 °C or
-50 °C to +150 °C
for non-linear crystals

Limits of operating temperature adjustable via precision trimmers

Typical long-term stability with TOPTICA laser heads:
1 .. 2 mK (RMS)

Remote control of set temperature possible via backplane and DCB 110 interface

Relevant parameters available at DC 110 monitor

Specifications SC 110

Frequency 0.01 Hz to 10 kHz,
coarse frequency range switch
and continuous fine tuning

High voltage mode: maximum amplitude 150 V up to 10 kHz,
adjustable offset -5 .. +150 V

Low voltage mode: maximum amplitude 24 V up to 10 kHz,
adjustable offset -12 .. +12 V

Sawtooth signals with symmetric or asymmetric ramp, variable degree of symmetry (e.g. for generation of steep slopes)

TTL trigger synchronization output, adjustable trigger time delay

Adjustable feed forward for simultaneous control of laser current and grating angle

Specifications DCB 110

Sub-D25 connector to access all relevant backplane parameters

BNC-Connector for additional access to selected backplane lines (e.g. remote scan control or remote temperature control)

Sensitivity of electrical parameters 10 mAV (DCC 110, 100 mA and 500 mA),
100 mAV (DCC 110 / 3 A), 10 °C/V (DTC 110)

Depending on the signal, a line is buffered or used as read/write line

DCB 110 AUX: additional supply port for auxiliary DC supply voltages (- 12 V, - 5 V, GND, +5 V, +12 V)