User's Guide

SR301 *Estérel* – Ultra-Low Noise Current Source

SISYPH
Signals & Systems for Physics

www.sisyph.com

1 General information

1.1 Important notice

1.2 Scope

This manual provides the user with a description of the operation for the SR301 *Estérel* Ultra-Low Noise Current Source.

1.3 Related documents

The SR301 is composed of several modules of the SMC-Series, which are :

- SMZ00 Power interface,
- SMC11 Ultra-low noise current source,
- SMC51 Cables interface,
- SMC111 Current Source BNC interface.

Refer to the related web pages for complete information.

1.4 Certification

Signals and Systems for Physics certifies that this product met its published specifications at the time of shipment.

1.5 Warranty

This *Signals and Systems for Physics* product is warranted against defects in materials and workmanship for a period of one (1) year from the date of shipment.

1.6 Absolute maximum ratings

The SR301 *Estérel* is designed to be operated in laboratory environment.

Parameter	**Rating**
Environmental Temperature	$> 15°$ C and $< 30°$ C
Environmental Humidity	$< 60\,\%$

Contents

2 Overview

The SR301 *Estérel* Current Controller is a combination of five SMC-Series modules which are assembled to provide a ready-to-use laser diode (LD) driver based on the SMC11 ultra-low noise current source. *The SR301 current controller operates with grounded anode LDs.*

2.1 Current source

The DC operating current of the laser diode is primary set using the front panel potentiometer. It can be also controlled through the voltage applied to the modulation input BNC connector. The current source features two range settings (210 mA or 470 mA) which are specified when ordering. This LD excitation current is delivered by an ultra-low noise current source, the SMC11 *Puy Mary* module.

A fast current modulation of the current is available *via* a BNC connector. This input features a sensitivity of 1 mA/V and it operates from DC to 30 MHz. Modulation at RF-frequencies (from 10 MHz to 1000 MHz) is also available using the dedicated SMA connector on the front panel.

Safe operation of the LD is assured through a series of features, including a current limiter, a status monitoring, a slow turn-on circuit. The current limiter uses the DC current monitoring signal and a current limit value to control the conduction of a bypass transistor. The current limit value is set using the front panel trimmer. When the current limiter is engaged, the bypass element sinks the exceeding current of the source. This operation is both signalled by a front-panel led and an active-low digital output. The status monitoring circuit is able to shut down the current source when a fault from the power supply interface or a broken interlock loop is detected. Once the shut down procedure is triggered, the current limiter is forced and a shorting relay is closed to protect the laser diode. Note that a compliance over-voltage can also trigger a laser shut down. In addition, a fast recovery diode is connected to the output to prevent reverse voltage operation.

2.2 Laser Diode

The laser is connected to the current source output *via* a coaxial SMA connector located on the front panel. A multipoint connector (DSUB9) provides a second way to connect the LD to the current controller. When this second option is used, the RF modulation port should not be used since the coaxial transmission line is broken at the DSUB9 connector. A dual position switch controls the laser turn-on procedure: once a 5-s delay is elapsed, the shorting relay opens and the slow turn-on circuit is engaged, which provides that the laser diode current settles after a ramp transient. A front panel led and a digital output signal that the laser is running. The current source output is also connected to the analog interface for custom applications purpose.

2.3 Grounding

The SR301 *Estérel* is designed to operate *grounded anode LDs*. Since most of telecom laser have their anode terminal connected to the chassis ground through the LD package, the SR301 is recommended to drive such lasers. Floating terminals lasers can be also driven by the SR301. In this case, we recommended to leave the anode terminal floating from the chassis ground.

It is recommended to operate the laser diode floating without connection to ground. Note that many laser packages ground one terminal of the laser to the package case, *e.g.* telecom laser diodes in 14-pin butterfly cases. It is still recommended to use configurations where the package case does not connect to ground. In situations where the laser case must be connected to the ground, be careful to understand all potential

ground paths in your system to avoid inadvertant ground loops or short circuits. *In such situations, only the laser anode can be grounded.*

2.4 Interlock

The laser operation is enabled only if a low resistance is detected between the terminals of the dedicated connector. This BNC coaxial connector is located on the front panel. *Neither of these pins may be allowed to contact ground or any other signal.*

3 Features and controls

The remaining sections in this chapter explain each part of the front and rear panel of the SR301. Circled numbers refer to Figure 1.

3.1 Power

3.1.1 Power entry

The SR301 is powered from external DC power supplies. To operate, the SR301 requires 3 DC input voltages, which are +5 V and ±15 V.
(1) The rear panel of the case provides the user to power the SR301 unit using a 7-pin connector . This connector is used with the Sisyph low-noise power supplies like the SR103 *Estélas*. The required cable (SCB101) can be ordered separately.
(2) The user is also free to use its own power supplies. For this purpose, 4 pairs of 2-mm banana jacks are provided on the rear panel. *Always use low-noise power supplies to preserve the current noise specifications.* The +24 V input pair can be left floating here.

3.1.2 Power status leds

(18) Four leds display the current status of the DC power supplies. Once the power supplies have been switched on, the green leds related to the +5 V and the ±15 V should be on. The red led is on when a power supply is missing or an undervoltage operation is detected, in this case the related led is off. The +24 V led remains off since this power supply is not used by theSR301.

3.2 I/O control

3.2.1 Current monitor BNC

(3) This connector provides the measurement of the DC operating current. This output can drive light loads or it can be left open if not used. It is used to measure the LD's current by connecting a digital voltmeter on this output.

3.2.2 Limit monitor BNC

(4) This connector provides the measurement of the current limit value. This output can drive light loads like a digital voltmeter or it can be left open if not used. It is used when the current limit value is adjusted.

3.2.3 Setpoint input BNC

(5) This connector provides the user with remote control of the operating current using a DC voltage. In order to enable this input and disable the front-panel trimmer, the related switch must be set into **Remote** position. The allowed input range is 0 V to +5 V, which corresponds to the full range output current.

3.2.4 Interlock BNC

(6) A low-resistance switch must be connected between the two connector's terminals for the laser to operate. The inner terminal is able to source +5 V through a 1-kΩ current limiting resistor. When the outer terminal

is driven low or left open, the laser is shut down immediately. *This terminal is not allowed to contact ground or any other signal.* Connect these terminals to the interlock switch. If the Interlock function is not required, just install either a 50-Ω terminator or a short on the BNC.

3.2.5 Power monitor BNC

(7) This connector provides the measurement of the power detected by the photodiode of the laser head. This photodiode is connected to an internal transimpedance amplifier *via* the **Laser Current** connector. The photodiode can be reverse biased between 0 V and +10 V while the transimpedance gain can be switched between 1 kV/A and 10 kV/A. Because these settings are located on the board of the SMC111 module, the SR301 case must be open to access the gain's jumpers and the reverse bias voltage trimmer. The **Power Monitor** output ranges from 0 V to +10 V under light loads.

3.3 Settings and modulation

3.3.1 Laser status leds

(8) Three leds display the current status of the laser output. The green is on when the laser is running: the laser diode is then connected to the output of the current source and the programmed biasing current is allowed to flow. This led is on only 5 s after the laser turn-on action because of the required safety delay. The yellow led indicates that the laser is off and its terminals are shorted by the internal relay's contacts. The last led is on when the current limiter is engaged indicating that the output current is reduced to the current limit value. This red led is also lit during a short amount of time during the turn-on and shut-down procedures.

3.3.2 Current setpoint potentiometer

(9) This 20-turn potentiometer sets the laser diode's current from 0 mA (full counterclockwise) to its maximal value (full clockwise). Its action allowed when the **Setpoint Source switch** is set to **Panel**.

3.3.3 Current limit trimmer

(10) This 10-turn trimmer sets the laser diode current limit from 0 mA (full counterclockwise) to its maximal value (full clockwise). *Note that the current noise density increases if the current limit and the setpoint values are too close.* To prevent this degradation, the current limit value should be set at least 10 % higher.

3.3.4 RF modulation input

(11) An SMA coaxial connector is provided to modulate the laser current at RF frequencies. This input can be used, for example, to create FM sidebands. Connect the 50-Ω output of a function generator to this input using an SMA coaxial cable. Can be left open if not used. Refer to the datasheet of the laser diode for maximum admissible ratings. *Note that excess level on this input could damage the laser diode.*

3.3.5 Servo modulation input

(12) This input is intended to laser frequency control, providing a DC-coupled current modulation over a large bandwidth, ranging from DC to 30 MHz. The applied voltage to this BNC connector is converted into a laser diode current using a transconductance stage, which provides a modulation coefficient of 1 mA/V.

Because this stage features an automatic bias circuit, the laser diode setpoint is not altered whether this input is connected, grounded or left open.

3.3.6 Laser enable switch

(13) To allow the current to flow through the LD, set this switch to the right position (**ON**). If no faults are detected, the current is delivered to the laser after a safety delay of 5 s. Whenever the switch is brought in the left position (**OFF**) or a fault occurs, the laser is immediately shut down. Because the current source features a slow turn-on circuitry, it is not necessary to bring the current back to zero prior enabling the output.

3.3.7 Setpoint selector switch

(14) This switch must be set in the right position (**Remote**) to enable the remote control of the operating current *via* the **Setpoint input**. In this case, the front-panel potentiometer is disabled and the current is set using the DC voltage applied to the dedicated BNC connector. When the switch is set in the left position (**Panel**), the current is controlled using the 20-turn potentiometer.

3.4 Laser connections

3.4.1 Laser output

(15) The output current source is delivered to the laser diode through this coaxial SMA connector *via* a coaxial cable (not included). *Only floating terminals LDs or anode grounded LDs can be driven using the SR301 Current Controller.* The laser diode connections are:

Cable	Laser Diode
Center conductor	Laser cathode
Outer (shield) conductor	Laser anode

3.4.2 Temperature

(16) This connector is provided to control the temperature of the LD. For this purpose, the pins of this DSUB15 connector are directly connected to the internal bus through the stacking connectors. The first use of this connector is to control the temperature of the optional SMC41 *Valescure* Laser Mount module. In this case, an external temperature controller can be connected to this connector to control the LD's temperature. A DSUB15 male connector is then required. A second use for this connector is to control the temperature of an external LD using the optional SMC20 *Cézallier* Temperature Controller. In this case the DSUB15 has to be a female connector. Whatever its gender, this connector is compatible with the ILX^{TM}pins' assignments.

Pin	Description
1,2	TEC + terminal
3,4	TEC − terminal
5,6	Chassis
7	Sensor 2-wire + (NTC terminal)
8	Sensor 2-wire − (NTC terminal)
9,10,11,12,13,14,15	no connection
Shell	Chassis

3.4.3 Current

(17) This connector provides the user to connect the current source to an external LD. The pins' assignments of this DSUB9 female connector are compatible with the ILX^{TM}standard. A cable (not included) is used to connect the source to the external laser mount. This cable is not required when the optional SMC41 *Valescure* Laser Mount module is used. Indeed, in this case, the LD's pins and the current source ones are connected together *via* the internal bus. *Only floating terminals LDs or anode grounded LDs can be driven using the SR301 Current Controller.*

Pin	Description
1	Interlock (source)
2	Interlock (sense)
3	Chassis
4,5	Laser cathode
6	Photodiode cathode
7	Photodiode anode
8,9	Laser anode
Shell	Chassis

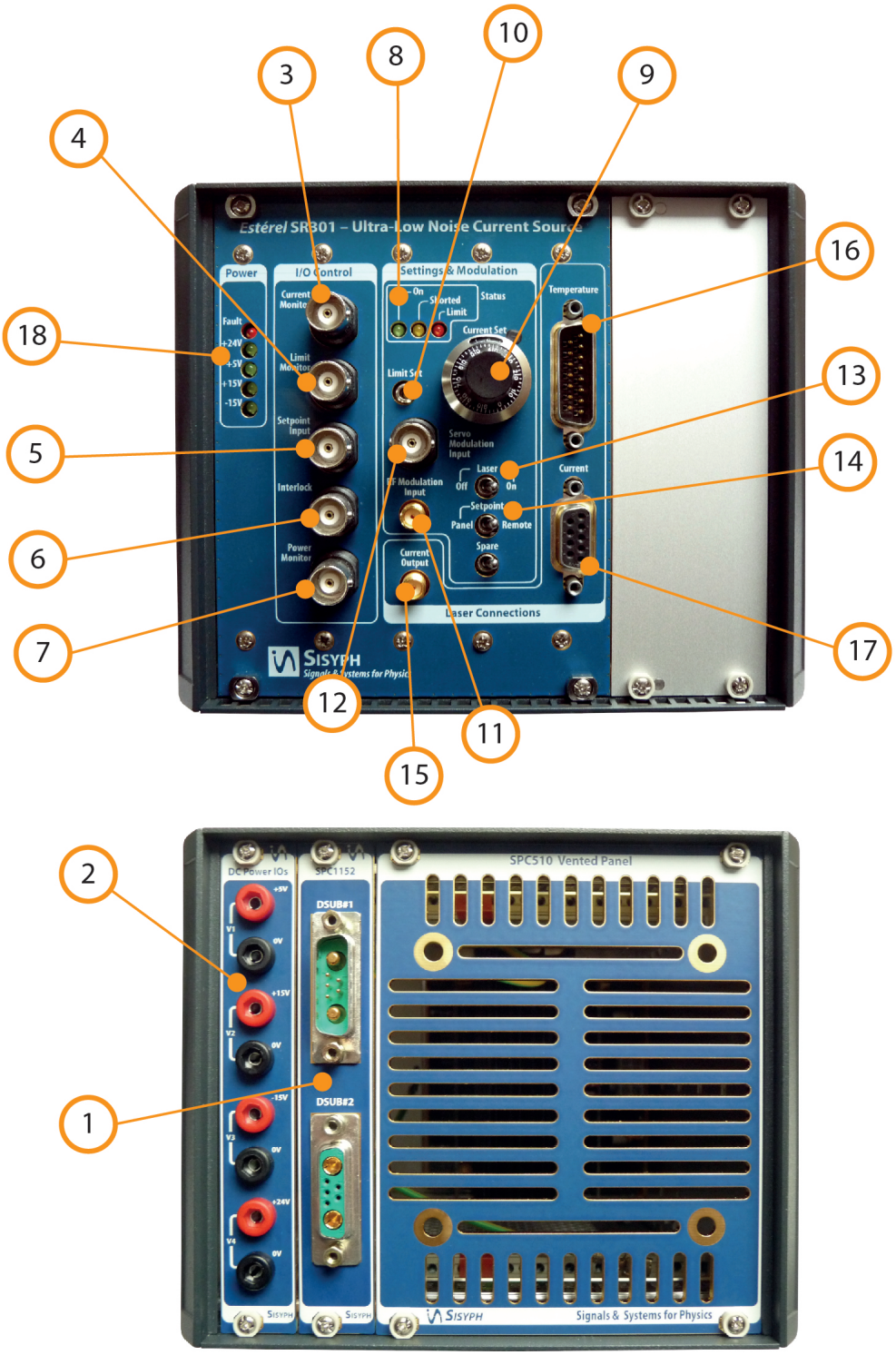

Figure 1: The SR301's front and rear panels. The SR301 unit is mounted in a small 3U/28HP shielded case, but wider cases are also available to accommodate several units.

4 Getting started

This chapter gives you the necessary information to get started quickly with the SR301 Current Controller.

4.1 Power and ground

Before connecting the laser diode, make sure the **Laser Enable switch** is at **OFF** position. Connect the required power supplies at the rear panel using either the banana jacks or the DSUB connector.

4.2 Laser diode connections

Be certain that the connection from the SR301 to your laser diode preserves the wiring polarity. Either the DSUB9 male connector or the SMA connector can be used.

The interlock function requires a low-resistance electrical connection between the terminals for the laser to operate. Neither of these pins may be allowed to contact ground or any other signal.

4.3 Checking wiring

Before installing your laser diode into the laser diode mount, it is important to verify that all wiring is correct. This is especially important with laser mounts that have user-configurable connection schemes.

4.4 Turning on power

With the laser diode connected to the SR301, switch the DC-power supplies on. The **Power Status leds** should be on.

Do not switch the laser output on yet since neither the bias current nor the limit value have been adjusted to your particular laser.

4.5 Current setpoint source selection

Set the **Current Setpoint selector switch** to the **Panel** position to use the front panel trimmer. This switch is at the **Remote** position to allow the current source to be adjusted using the DC voltage applied to the **Setpoint Input** BNC.

4.6 Power Monitor

A photodiode must be connected to the SR301 in order to use this output. The first way to make this connection is to use the dedicated pins of the **Laser Current** (DSUB9) connector. It is also possible to connect the photodiode using the **Analog I/O Interface** connector. Before using this output, both the photodiode bias voltage and the transimpedance gain have to be set.

4.7 Interlock

A low-resistance switch is connected to the **Interlock** BNC.

4.8 Current limit setting

To change the limit setting, first connect a digital voltmeter to the **Limit Monitor** BNC. The limit is then adjusted to the desired value using the **Current Limit** trimmer. *In order to preserve the low-noise specifications, the current limit value should be set at least* 10 % *above the operating current.*

4.9 Current setpoint setting

Before adjusting the output current, a digital voltmeter must be connected to the **Current Monitor** BNC. Then, the bias current can be adjusted using the front panel trimmer or the DC voltage according to the **Setpoint Source selector** position.

4.10 Operating the laser

Once the setpoint and limit values have been adjusted, the laser can be turned-on using the **Laser Enable switch**. The **Laser Status Leds** switch from yellow to green after 5 seconds, indicating that the output current is flowing through the laser.

Because the setpoint value can be adjusted when the laser is on, it is a good practice to have a voltmeter connected to the **Current Monitor** output. If the setpoint is increased above the limit value the red **Laser Status Led** is switched on.

4.11 Modulation

The DC current modulation is controlled by the voltage applied to the **Servo Modulation** input BNC. This input can be used in servo applications where a high-speed control of the laser current is required.

4.12 Factory default settings

Some features are controlled by switches located on the printed circuit boards that compose the SR301. Since some of these switches require the SR301 to be de-assembled, caution is required to access these settings (see related section).

5 Accessories

5.1 Additional modules

All modules of the SMC-series can be mounted on the same stack to be interconnected. The SR301 consists in a low-noise current contoller but a temperature controller can be also mounted on the same stack. Likewise, a laser mount can be mounted to provide a compact laser solution without any cables since the connections are made, in this case, through the internal stacking connectors. Contact us for more information.

6 Specifications

The specifications of the SR301 Current Controller are detailled in this section.

6.1 Current source

Current Source Output	
Terminals	(i) front-panel SMA connector or (ii) DSUB9 connector or (iii) 50-pin stack-through connector
Setpoint	front-panel 20-turn trimmer
Range	0 mA to 210 mA or 0 mA to 470 mA
Noise Density[1,4]	100 pA/$\sqrt{\text{Hz}}$ @ 1 kHz
Noise Density[1,4]	15 pA/$\sqrt{\text{Hz}}$ @ 10 kHz
Noise Density[1,4]	15 pA/$\sqrt{\text{Hz}}$ @ 100 kHz
Noise Density[1,4]	20 pA/$\sqrt{\text{Hz}}$ @ 1 MHz
RMS Noise[1,5]	25 nA
Compliance Voltage[3]	5 V
Current Limiter	
Setpoint	front-panel 20-turn trimmer
Range	0 mA to 230 mA or 0 mA to 500 mA

[1] The test is performed at $I_{\max} = 210\,\text{mA}$ or $I_{\max} = 470\,\text{mA}$.
[3] A level above this threshold is detected as an open circuit and is interpreted as a fault condition.
[4] See also the *Typical Performance Curves*.
[5] The integrated bandwidth ranges from 100 Hz to 1 MHz.

6.2 Analog I/Os interface specifications

Servo Input	
Terminal[1]	(i) front-panel BNC connector or (ii) 50-pin stack-through connector
Impedance[2]	1 kΩ
Sensitivity[3]	+1 mA/V
Range	±10 V
Bandwidth [4,5]	DC to 30 MHz
RF Modulation Input	
Terminal	front-panel SMA connector
Impedance	50 Ω
Operating frequency	10 MHz to 100 MHz
Max. Level[6]	0 dBm
Setpoint External Input	
Terminal	(i) front-panel BNC connector or (ii) 50-pin stack-through connector
Impedance	10 kΩ
Sensitivity	−40 mA/V[7] or −90 mA/V[8]
Range	0 V to +5 V
Settling time	10 ms
Current Monitor Output	
Terminal	(i) front panel BNC or (ii) 50-pin stack-through connector
Impedance	1 kΩ
Sensitivity	+10 V/A
Range	0 V to −2.1 V[7] or 0 V to −4.7 V[8]
Accuracy	±5%
Current Limit Monitor	
Terminal	50-pin stack-through connector
Impedance	1 kΩ
Sensitivity	+10 V A
Range	0 V to −3 V[7]or 0 V to −5 V[8]
Accuracy	±5%
Shorting Relay Contacts	
Terminal	50-pin stack-through connector
DC Rated current	250 mA
Max. DC switching voltage	24 V

[1] The signal source is selected between the BNC or the AIO connector pins using the switch SW701 located on the PCB.
[2] The given impedance value refers to the BNC input. When the signal is sourced from the AIO bus, the input impedance is 10 kΩ.
[3] Lower sensitivities are allowed, please contact us.
[4] The cut-off frequency is measured at −3 dB.
[5] See also the *Typical Performance Curves*.
[6] The laser diode must be biased before applying the RF signal. Excessive voltage applied to this input could damage the laser diode. Always refer to the laser diode specifications to guarantee safe operation.
[7] The specification applies for the 210-mA version.
[8] The specification applies for the 470-mA version.

6.3 Digital I/Os interface specifications

Active-Low Inputs[1]	
Terminal	50-pin stack-through connector
Impedance	100 kΩ pull-up resistor
Level	+5 V CMOS logic compatible
Active-Low Outputs[2]	
Terminal	50-pin stack-through connector
Limitation resistor	1 kΩ
Level	+5 V CMOS logic compatible
Apply to	
Interlock	
Terminal	50-pin stack-through connector
Level	+5 V CMOS logic compatible
Interlock Source Output	+5 V/1 mA max. (1 kΩ current limiting resistor)
Interlock Sense Input	100 kΩ pull-down resistor

[1] Specifications apply for following inputs: `/Setpoint_Enable`, `/Laser_Enable`, `/Power_Fault` and `/Temperature_Fault`.
[2] Specifications apply for following outputs: `/Laser_ON` and `/Limit`.

6.4 Current noise spectral density

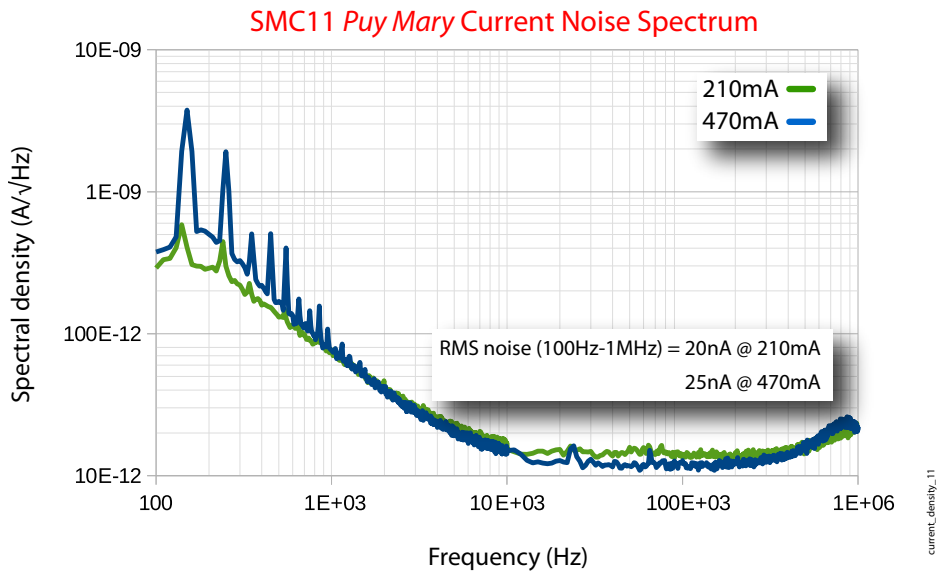

Figure 2: Current Noise Density vs. Frequency.

6.5 Current modulation bandwidth

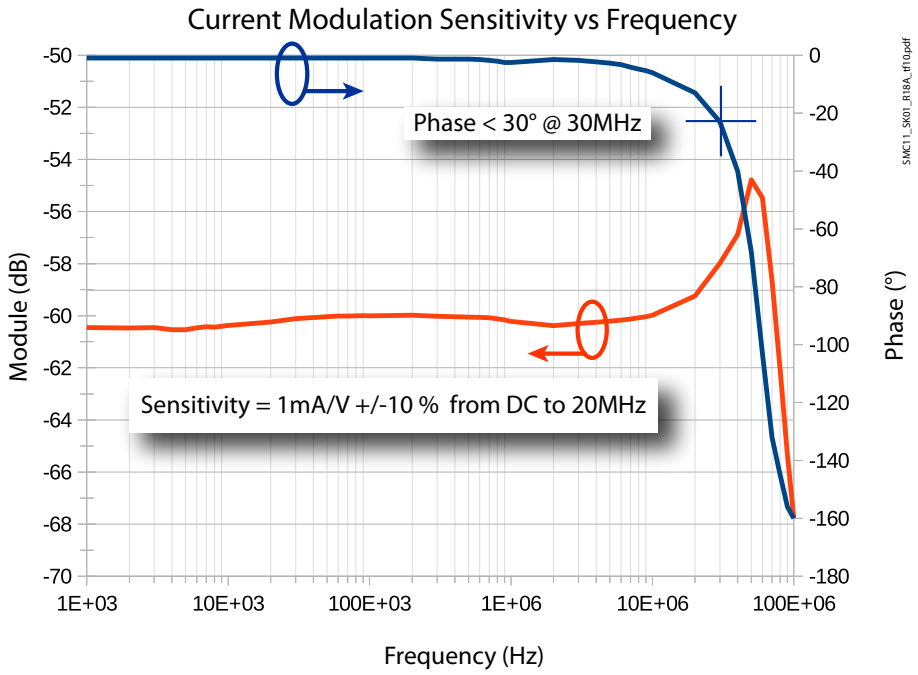

Figure 3: Current modulation using the Servo Input - Frequency response

6.6 General specifications

The SR301 is designed to be operated in laboratory environment.

Operating	
Temperature	+15 °C to +30 °C
Power Requirements	
−15 V	250 mA (210-mA range) or 600 mA (470-mA range)
+15 V	100 mA
+5 V	50 mA
+24 V	Not used
Physical Properties	
Dimensions[1]	170 × 140 × 280 mm
Weight[1]	2200 g
Warranty	
One (1) year parts and labor on defects	

[1] The SR301 unit is mounted in a shielded 3U/28HP case.

7 Analog and digital I/Os interface connectors

The SR301 is composed of several modules of the SMC-Series. These modules are interconnected through 2 stacking connectors. In this section, each pin allocated to the analog and the digital interface is described. Contact us for more information about the pin assignments of the interfaces connectors.

7.1 Analog I/O interface connector

7.1.1 Servo modulation input

The **Servo Modulation Input** allows fast control of the laser current, for example in laser frequency control applications. This input acts like its front panel counterpart: the applied voltage is converted into a laser diode current using a transconductance stage, which provides a modulation coefficient of 1 mA/V. Since the **Current Setpoint input** is received by a differential amplifier, the modulation voltage is applied between two the terminals labelled **Servo Pos** and **Servo Neg**. Because this stage features an automatic bias circuit, the laser diode setpoint is not altered whether the **Servo Modulation input** is connected, grounded or left open. To enable the input from the front panel, the **Servo Source Selector switch** located on the printed circuit board must be set.

7.1.2 Reference ground output

The **Reference Ground** output provides a clean ground connection (0 V)) for analog differential measurements. *Do not tie this pin to the ground of the measuring circuitry.* Left open if not used.

7.1.3 Shorting relay common

The **Shorting Relay Common** is connected to the common of the second switch of the shorting relay. This switch is aimed at user applications requiring to know whether the laser is running or not.

7.1.4 Shorting relay NC

When the laser is off, the **Shorting Relay NC** and **Shorting Relay Common** terminals are shorted.

7.1.5 Shorting relay NO

When the laser is running, the **Shorting Relay NO** and **Shorting Relay Common** terminals are shorted.

7.1.6 Photodiode anode

This pin connects the anode of the laser head's photodiode to the internal transimpedance amplifier *via* the DSUB9 **Laser connector**.

7.1.7 Photodiode cathode

This pin connects the cathode of the laser head's photodiode to the internal transimpedance amplifier *via* the DSUB9 **Laser connector**.

7.1.8 Analog power supply

The analog circuitry of the module operates from +15 V and −15 V power supplies. The digital ground **DGND** terminal is internally tied to the analog ground **AGND**.

7.1.9 Pin assignments

Signal label	Pin assignment	Direction
Photodiode Anode	AIO.10	passive
Photodiode Cathode	AIO.12	passive
Servo Modulation Pos.	AIO.37	input
Servo Modulation Neg.	AIO.39	input
Current Setpoint Pos.	AIO.42	input
Current Setpoint Neg.	AIO.44	input
Current Limit Monitor	AIO.35	output
Current Monitor	AIO.40	output
Reference Ground	AIO.46	output
Laser Diode Anode	AIO.7	output
Laser Diode Cathode	AIO.9	output
Shorting Relay Common	AIO.3	input/output
Shorting Relay NC	AIO.1	input/output
Shorting Relay NO	AIO.5	input/output
AGND	AIO.6	power input
−15 V	AIO.45	power input
+15 V	AIO.47	power input
AGND	AIO.49	power input
Chassis	AIO.2	chassis ground input (Earth)

7.2 Digital I/O interface connector

7.2.1 /Power fault input

This active-low input is used to shut the laser down when a power supply fault is detected. The /**Power Fault input** is driven by the SMZ00 Power Interface module, which is able to provide such a signal. Until the /**Power Fault input** goes high, the laser remains shorted whatever the level of the /**Laser Enable input**.

7.2.2 /Temperature fault input

A low digital level on the /**Temperature Fault input** shut the laser down immediately. This input can be driven by the SMC20 Temperature Controller module to indicate that a severe fault is detected in the thermal control path. Until the /**Temperature Fault input** goes high, the laser remains shorted whatever the level of the /**Laser Enable** input. To enable the temperature monitoring, the **Temperature Fault Sensing switch** located on the printed circuit board must be set.

7.2.3 /Laser on output

The digital/**Laser On output** is driven low when the laser is running.

7.2.4 /Limit output

The digital/**Limit output** is driven low to indicate that the current limiter is engaged.

7.2.5 /Source output

The digital/**Source output** is driven low to indicate that the current controller is a current source where the laser cathode terminal is grounded. This output can be used, for example, by the laser mount to prevent wrong polarity connections between the current controller and the laser diode.

7.2.6 Digital power supply

The digital circuitry of the module operates from a +5 V power supply. The digital ground **DGND** terminal is internally tied to the analog ground **AGND**.

7.2.7 Pin assignments

.

Signal label	Pin assignment	Direction
/Laser Enable	DIO.37	input
/Setpoint	DIO.35	input
Interlock Sense	DIO.40	input
/Temperature Fault	DIO.26	input (from C20 Temperature Controller)
/Power Fault	DIO.45	input (from Z00 Power Interface)
/Laser ON	DIO.36	output
/Limit	DIO.38	output
Interlock Source	DIO.42	output
+5 V	DIO.47	power input
+5 V	DIO.48	power input
DGND	DIO.49	power input
DGND	DIO.50	power input
Chassis	DIO.1	chassis ground input (Earth)

8 On-board settings and connectors

Some features are controlled using switches or jumpers located on the printed circuit boards that compose the SR301 Current Controller. They are accessed by removing the SR301 unit from its case.

8.1 Photodiode settings

The photodiode settings are controlled *via* 4 jumpers (J201 and J203) and one trimmer (RV201). They are located on the edge of the SMC111 board. These settings are accessed by removing the SR301 from its unit.

8.1.1 Photodiode biasing jumpers

Use the J203 jumpers to set the reverse biasing voltage of the photodiode.

Jumper J203 Position	**Photodiode bias voltage**
between pins 1 and 2	Adjustable from 0 V to +10 V
between pins 3 and 4	0 V [**Default value**]

8.1.2 Photodiode biasing trimmer

The variable resistor RV203 is used to adjust the reverse biasing voltage from 0 V to +10 V.

8.1.3 Transimpedance gain jumpers

The SMC111 module includes a transimpedance amplifier. Its gain is controlled using 2 jumpers (J201) located on its printed circuit board.

Jumper J201 Position	**Transimpedance gain**
between pins 1 and 2	10 kV/A
between pins 3 and 4	1 kV/A [**Default value**]

8.2 Current source settings

Some features of the SMC11 Current Source module are controlled using switches located on its printed circuit board. They are accessed by removing the SR301 from its case. The front panel has to be also removed.

8.2.1 Temperature fault sensing switch

To disable the /**Temperature Fault input**, set the **Temperature Fault Sensing switch** off. This operation is not recommended because, in this case, the laser is not protected from a thermal control failure. Set the switch on for normal operation.

SW601.1	**Temperature fault sensing status**
on	Enabled, normal operation [**Default value**]
off	Disabled, not recommended operating mode

8.2.2 Interlock status switch

To disable the interlock function, set the **Interlock Status switch** on. Because this operation is not recommended for safety reasons, the switch should be set in the off-position for normal operation.

SW601.2	Interlock status
on	Disabled, not recommended operating mode
off	Enabled, normal operation [**Default value**]

8.2.3 Servo source selector switch

To select which signal from the front-panel or the analog interface is used for the current modulation, the **Servo Source Selector Switch** must be set in proper position:

SW701.1	SW701.2	Servo modulation input from
on	off	Analog Interface terminals
off	on	Front panel BNC [**Default value**]

8.2.4 Digital voltmeter connector

The four-pin **Digital Voltmeter** connector is intended to measure the DC operating current using a small digital voltmeter module (DVM). To connect the voltmeter, use the following pin assignments :

J202 pin	Signal	DVM pin
1	Current Monitor	Positive Input (High),
2	+5 V	Positive Power Supply, 100 mA max
3	Analog Ground	Negative Input (Low)
4	Digital Ground	Negative Power Supply (0 V)

Document identifier

This document is identified as **SR301-SN01-P21A**.