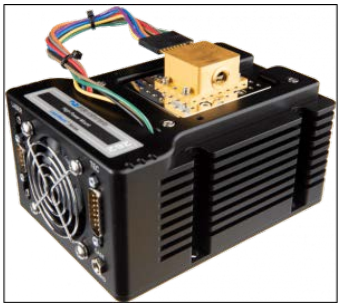
Boston Electronics

ALPES LASERS

arroyo instruments

CW Controller Kits for HHL Packaged Lasers



- Controller kits for HHL packaged lasers
- Arroyo 6310-QCL Combosource - laser driver and temperature controller
- Optional Arroyo 262 LaserMount - passive or active heat sink
- All required cables for set up and operation

91 Boylston Street, Brookline, MA 02445 tel: (617)566-3821
www.boselec.com shop.boselec.com qcl@boselec.com

arroyo instruments

6300 SERIES COMBOSOURCE

DUAL RANGE LASER DRIVER + TEMPERATURE CONTROLLER

The 6300 Series ComboSource is a high-accuracy laser driver combined with a 60W temperature controller. With unique operational modes and safety features not found in other devices, this instrument is ideal for low and medium-power laser and LED applications.

DUAL RANGE LASER DRIVER

Operates at half-scale for improved resolution and lower noise.

OVERLAPPING LASER PROTECTION

Including safety interlock, ESD protection, hardware limits for current & voltage, soft power-on, and intermittent contact safeguards

MULTIPLE OPERATING MODES

Choose from: ● **Constant Current** ● **Constant Power** ● **Constant Voltage**

REMOTE VOLTAGE SENSING

Supports an extra pair of sensing wires to measure the operating voltage of your laser diode or LED.

AUTO-TUNE AND MANUAL PID SELECTION

One button auto-tunes your control loop, or choose from 8 factory gain settings, or select your own.

POWERFUL TEMPERATURE CONTROLLER

Supplies up to 60 Watts of TEC control and up to ± 0.004 °C. Works with a thermistor, LM-335, AD-590, or an RTD.

HIGH CONTRAST VFD MULTI-VIEW DISPLAY

View All 4 At Once: ● **Laser Current & Voltage** ● **Photodiode Current** ● **Actual & Temp Set Point** ● **TEC Voltage & Current**

AT-A-GLANCE

Current/Voltage Ranges

- 100 mA / 10 Volt
- 500 mA / 10 Volt
- 1 Amp / 10 Volt
- 4 Amp / 4 Volt

High Accuracy

- Up to 0.025% of reading + 0.025% of scale

Low Noise

- As low as <1 µA

Superb Temperature Stability

- ± 0.004 °C (over 1 hour)
- ± 0.01 °C (over 24 hours)

Remote Operation via PC

- Use your existing control code. Our command set is compatible with other manufacturers.
- USB / RS-232 Connections

GROUND LOOPS: ELIMINATED.

YOUR LASER IS PROTECTED.

A ground loop can destroy your laser in an instant. Every input and control circuit on the ComboSource is electrically isolated. Offset voltages, ground connections, and AC noise will never act on your system.

No other laser driver on the market has this capability.

6300
LASER SPECIFICATIONS

			6301		6305		6310		6340	
Laser	Setpoint	**Laser Current**								
		Range (mA)	0-50	0-100	250	500	500	1000	2000	4000
		Max Resolution (mA)	0.002	0.005	0.01	0.02	0.02	0.05	0.1	0.2
		Accuracy (± [% set+mA])	0.025% + 0.02	0.025% + 0.03	0.025% + 0.08	0.025% + 0.12	0.025% + 0.12	0.025% + 0.3	0.025% + 0.5	0.05% + 0.8
		Stability (ppm, time)	< 10, 1 hour							
		Temperature Coeff (ppm/°C)	50							
		Noise/Ripple (µA rms)	< 1		< 1.2	< 1.5	< 1.5	< 2.5	< 35	< 40
		Transients (µA)								
		Compliance Voltage (V)	10		10		10		4	
		Photodiode Current								
		Range (µA)	2 – 5,000							
		Resolution (µA)	0.1							
		Accuracy (± [% set+µA])	0.05% + 1							
		Stability (ppm, time)	< 200, 24 hours							
		Temperature Coeff (ppm/°C)	< 200							
		PD Bias (V)	0 to -5V, programmable							
		Laser Voltage								
		Range (V)	0 – 10		0 – 10		0 – 10		0 – 5	
		Resolution (V)	0.001							
		Accuracy (± [% set+V])	0.05% + 0.005							
		Stability (ppm, time)	< 50, 1 hour							
		Temperature Coeff (ppm/°C)	< 100							
		External Modulation								
		Input Range	0 – 10V, 10kΩ							
		Modulation Bandwidth (kHz)	325		325		200		150	
	Measurement	**Laser Current**								
		Resolution (mA)	0.002	0.005	0.01	0.02	0.02	0.05	0.1	0.2
		Accuracy (± [% set+mA])	0.025%+ 0.02	0.025%+ 0.03	0.025%+ 0.08	0.025%+ 0.12	0.025%+ 0.12	0.025%+ 0.3	0.025%+ 0.5	0.05%+ 0.8
		Laser Voltage								
		Resolution (V)	0.001							
		Accuracy (± [% read+V])	0.05% + 0.005							
		Photodiode Current								
		Resolution (µA)	0.1							
		Accuracy (± [% read+µA])	0.05% + 0.5							
	Limits	**Laser Current**								
		Resolution (mA)	1							
		Accuracy (± mA)	2		5		10		40	
		Laser Voltage								
		Resolution (V)	0.1							
		Accuracy (± % FS)	2.5%							

www.arroyoinstruments.com
arroyo instruments 800-644-0416
1201 Prospect Street, San Luis Obispo, CA sales@arroyoinstruments.com

6300
TEC
SPECIFICATIONS

			6301	6305	6310	6340
TEC	Setpoint	**Temperature**				
		Range (°C)[1]	-99 to 250			
		Resolution (°C)	0.01			
		Therm Accuracy (± °C)[2]	0.05[3]			
		AD560 Accuracy (± °C)[2]	0.05			
		LM335 Accuracy (± °C)[2]	0.05			
		100Ω RTD Accuracy (± °C)[2]	0.33			
		1kΩ RTD Accuracy (± °C)[2]	0.40			
		Stability (1hr) (± °C)[4]	0.004			
		Stability (24hr) (± °C)[4]	0.01			
		Current				
		Range (A)	5			
		Compliance Voltage (V)	12			
		Max Power (W)	60			
		Resolution (A)	0.01			
		Accuracy (± [% set+mA])	0 + 30			
		Noise/Ripple (mA, rms)	< 5			
	Measurement	**Current**				
		Resolution (mA)	10			
		Accuracy (± [% read+mA])	0 + 30			
		Voltage				
		Resolution (mV)	10			
		Accuracy (± [% read Volts])	0 + 0.05			
		10µA Thermistor				
		Range (kΩ)	0.2 – 450			
		Resolution (kΩ)	0.01			
		Accuracy (± [% read+kΩ])	0.05 + 50			
		100µA Thermistor				
		Range (kΩ)	0.02 – 45			
		Resolution (kΩ)	0.001			
		Accuracy (± [% read+kΩ])	0.05 + 5			
		LM335				
		Bias (mA)	1			
		Range (mV)	1730 – 4730			
		Resolution (mV)	0.1			
		Accuracy (± [% read+mV])	0.3 + 1			
		AD590				
		Bias (V)	4.5			
		Range (µA)	173 – 473			
		Resolution (µA)	0.01			
		Accuracy (± [% read+ µA])	0.03 + 0.1			
		100Ω RTD				
		Range (Ω)	20 – 192			
		Resolution (Ω)	0.01			
		Accuracy (± [% read+Ω])	0.03 + 0.1			
		1kΩ RTD				
		Range (Ω)	100 – 4500			
		Resolution (Ω)	0.1			
		Accuracy (± [% read+Ω])	0.05 + 1			
	Limits	**Laser Current**				
		Resolution (mA)	10			
		Accuracy (mA)	40			
General		Display Type	4x20 VFD			
		Laser Connector	DB-9, female			
		TEC Connector	DB-15, female			
		Fan Supply	4 – 12V, 350mA max			
		Computer Interface	USB 2.0 Full Speed (Type B), RS-232 (DB-9, male)			
		Power	100V / 120V / 230V, 50/60 Hz			
		Size (H x W x D) [inches (mm)]	3.47 (89) x 8.5 (215) x 12 (305)			
		Weight [lbs (kg)]	7.8 (3.5)			
		Operating Temperature	+10°C to +40°C			
		Storage Temperature	-20°C to +60°C			

1. Software limits. Actual range dependent on sensor type and system dynamics.
2. Accuracy figures are the additional error the 5300 adds to the measurement, and does not include the sensor uncertainties.
3. 25°C, 100µA thermistor.
4. Stability measurements done at 25°C using a 10kΩ thermistor on the 100µA setting. The number is ½ the peak-to-peak deviation from the average over the measurement period.

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1201 Prospect Street, San Luis Obispo, CA
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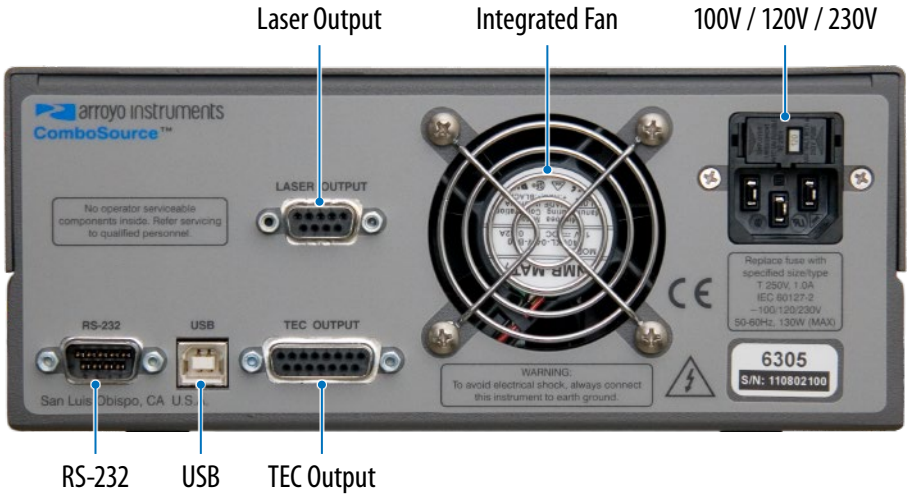
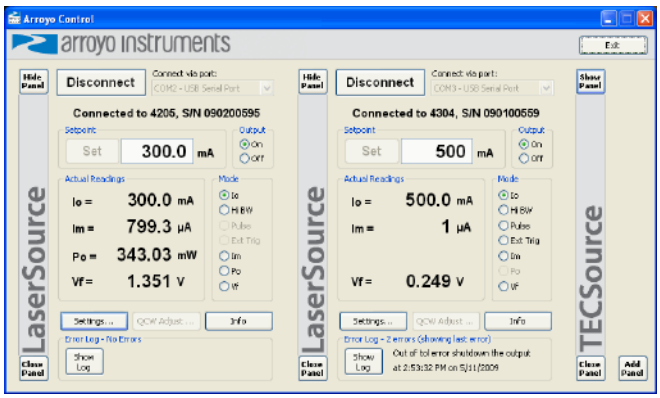
sales@arroyoinstruments.com

REAR VIEW



ARROYO CONTROL



Control any Arroyo laser driver or temperature controller directly from your PC. Simply connect to your Arroyo device via USB or RS-232 and gain direct access to settings, device limits, and adjustments from an easy-to-use Windows interface. You can even connect to multiple instruments at the same time.

Download ArroyoControl for free from www.arroyoinstruments.com.

LabView drivers available.

ACCESSORIES

1401-RM-1

6300 SERIES 2U RACK MOUNT KIT, 1 UNIT

This rack mount kit will mount any 6300 ComboSource, 5300 Series TECSource, or 4300 Series LaserSource in 2U of rack space. The unit can be positioned to the left or right side of the rack space, depending on how you mount the hardware.

1401-RM-2

6300 SERIES 2U RACK MOUNT KIT, 2 UNITS

This rack mount kit will mount any 6300 ComboSource, 5300 Series TECSource, or 4300 Series LaserSource side-by-side in 2U of rack space.

arroyo instruments

260 SERIES HIGH-POWER LASERMOUNTS

The 260 series LaserMounts are designed to provide high performance and long term operation. Wire harnesses for various types of lasers are available. Each 260 Series mount can be bolted to an optical table or work surface using holes matching the 1" centers of most optical tables.

CUSTOMIZABLE COPPER COLD PLATE

100% copper cold-plate with mounting holes for common lasers and LEDs, and hard nickel plating for maximum performance and scratch resistance. **Custom mounting configurations available.**

PASSIVE COOLING (MODEL 262)

Take advantage of the 0.25ºC-per-Watt cooling efficiency of the Model 262 to maintain low package temperatures.

ACTIVE HEATING AND COOLING (MODEL 264)

The 264 LaserMount includes a built-in Peltier device and temperature sensor for bi-polar temperature control.

STANDARDIZED CABLE CONNECTORS

Connect to Arroyo Instruments laser drivers and temperature controllers with standard cables.

NITROGEN PURGE (OPTIONAL)

The optional 260-C cover with available ⅛" barbed nozzle adapts to a nitrogen supply to eliminate condensation around the laser device.

AT-A-GLANCE

Mounting Plates

- All Copper Design
- Breadboard or Multi-Device
- Customizable Mounting Holes

Cooling Mode

- Passive Cooling (Model 262)
- Active Heating & Cooling (Model 264)

Thermal Capacity

- 0.25ºC/W (Model 262)
- 30 Watts (Model 264)

Also Includes

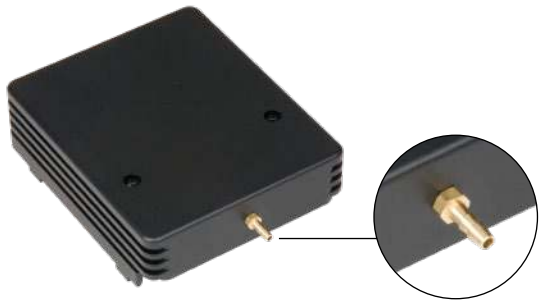
- Integrated Fan
- Optional Laser Harness

OPTIONAL HIGH TEMPERATURE

The 260 Series mounts are available in an optional high temperature configuration, allowing for operation up to 150°C, but retaining the temperature range and thermal capacity of the standard mount. Because thermistors do not perform well at high temperatures, the sensor is replaced with a high accuracy Pt100 RTD sensor.

Contact the factory for a quote.

ACCESSORIES



260-C

COVER FOR 260 SERIES MOUNTS

For applications that need a very stable response or protection of the device, the 260-C is a custom designed cover that fits snugly on top of the fixture, and includes a ⅛" barbed nitrogen purge nipple.

RECOMMENDED CONTROLLERS AND CABLES

The right temperature controller for your application depends on the mount and temperature range your application requires:

MODEL 262

5240 or 5305 (depending on laser module requirement) and 1260B cable

MODEL 264

5305 and 1260B cable.

MODEL 264, 150°C

5300-04-15 and 1260B cable, or
5300-08-24 and 1262B cable

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arroyo instruments 800-644-0416
1201 Prospect Street, San Luis Obispo, CA 93401 sales@arroyoinstruments.com

arroyo instruments

APPLICATION NOTE AN-020

Building a Complete System for QCL HHL Lasers

April 2, 2021, Rev A

Operation of QCL lasers is very dependent both a stable, low-noise current source for the laser plus the ability to control the temperature of the laser chip across a wide range, as temperature, combined with current, determines the operating frequency of the QCL laser. Thermal control can often be one of the more challenging aspects of the system due to the wide temperature range required of the QCL laser.

This document will provide suggestions for both control of the laser as well as thermal solutions to manage the wide temperature requirements.

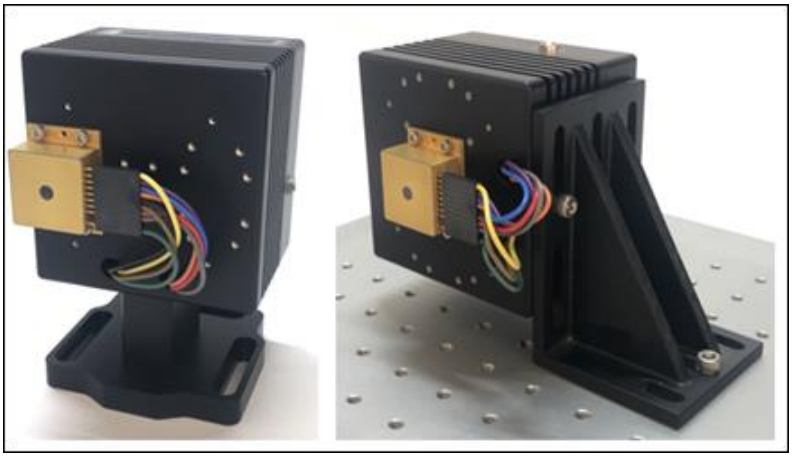
Controlling the QCL Laser and TEC

HHL laser modules have a need for both driving the QCL laser itself plus control of the internal thermoelectric cooler (TEC) module for temperature stabilization. With a 1 Amp / 18 Volt output for the laser, the 6310-QCL will provide the current and voltage requirements for most QCL lasers. The integrated 60W temperature controller has enough power to most QCL TEC modules. The 6310-QCL is also a very low-noise controller, with less than 2.5uA RMS of current noise on the laser and better than 0.002°C temperature stability. High current and voltage options are available, contact the factory for more details.

As for temperature control, Arroyo Instruments offers three different configurations that go from most cost effective to highest performance. Choosing the right solution will ensure the QCL laser can reach the full requirements of your application.

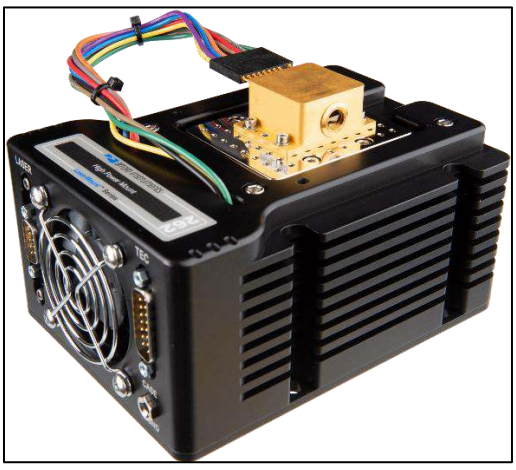
Lowest-Cost Solution

The **244 LaserMount** is our solution for typical HHL applications. It has the laser and TEC connectors integrated, comes with a pedestal-type mounting which can be removed for alternative mounting methods (such as the 30-60-90 bracket [not included with the mount] shown in the right photo). The device can be rotated 90° so the pedestal mount can be used, but the bracket allows for more flexible adjustment of beam height relative to the table. The device can be both center and edge mounted onto the face of the 244. As it is a passive system, there is no need for a second TEC controller.



Highest Passive Performance

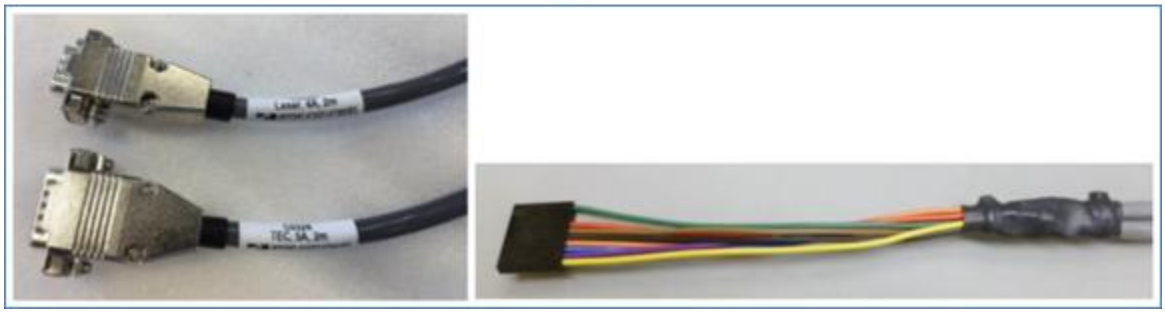
The 262-06-06-DB9 LaserMount is based on our **262 LaserMount**. It adds a copper heat spreader and HHL wiring harness for plug-and-play operation. This should generally support laser temperature operation down to 0°C or lower for most QCL devices, although a review of the total heat load of the QCL should be considered. Like the solution above, it is a passive system so there is no need for a second TEC controller.



Lowest Operating Temperature

The **285 TECMount** is a higher performance air-cooled mount that will support up to 50W at a 25°C plate temperature and should be enough to allow -30°C laser temperature operation. It does require its own temperature controller, typically a **5310 TECSource** (although the lower cost **5305** might work in a lower power application).

Another mount option would be the **274 TECMount**. This is a water-cooled mount, and for customers that already have house water, would be an interesting option. Because of the heat-shedding performance of water, a smaller temperature controller can be used for external temperature control. Unlike the **244** and **262** mounts, the **285** and **274** mounts do not have an integrated HHL wire harness, and instead requires a separate cable harness (see cable photo below).



In Summary

Below is a chart that quickly summarizes the various options for the thermal platform. When combined with a 6310-QCL ComboSource controller, it creates a complete plug-and-play system.

Solution	Est. Lowest Laser Temp	Mount	Benchtop Case TEC Controller	Case Control	HHL Cable(s)	Case TEC Cable
Lowest Cost	10°C	244	None	Passive	1220B and 1260B	n/a
Best Passive Performance	0°C	262	None	Passive	1220B and 1260B	n/a
Lowest Temperature, Air	-30°C	285	5305 or 5310	TEC / Air	C0326	1260B or 1262B
Lowest Temperature, Water	-30°C	274	5240 or 5305	TEC / Water	C0326	1260B

Please contact the factory for any questions you might have on the various solutions available, or to explore other options that might fit your requirements better.