

Ceramic CO₂ Lasers

Most CO₂ lasers offered today are based on the original R&D approach developed at several different aerospace companies in the 1970s. This traditional approach involves extruding or machining aluminum bodies to contain the optical and electrical components inside the laser gas envelope - the laser tube. These designs are convenient for R&D work, but not ideal for building lasers that are reliable, and have long lifetimes. The ceramic CO₂ laser tube has a significant advantage.

The leading reliability issue with metal-tube lasers is that the metal is highly reactive with the gas mixture. Over time, as internal components wear, "scrub" each other's surfaces, fresh aluminum is exposed. Free oxygen in the laser's gas reacts with this raw metal (oxidation) changing the composition of the original gas mixture. In addition, many of these designs use O-ring seals that can allow air and moisture to enter the laser tube and further compromise the all-important gas mixture. These issues are eliminated with Ceramic CO₂ laser tubes.



Ceramic CO₂ laser tube technology solves these problems by moving all the reactive components to the outside of the laser tube leaving only pure clean Alumina (Al₂O₃) ceramic in contact with reactive gasses. Due to its chemical makeup, Alumina does not react with the gas. Alumina can also be fired at very high temperatures as part of the cleaning process. This further assures there are no organic contaminants from laser tube manufacturing, that remains inside the laser tube to react with the gas. The ceramic CO₂ laser tube is also the optical backbone that holds the resonator optics. The CTE (coefficient of thermal expansion) of alumina is 1/3 the CTE of aluminum. Since laser tube thermal variations have a direct impact on laser stability, Our Ceramic CO₂ laser tube has significantly better stability performance when compared with metal-based CO₂ lasers. Ceramic CO₂ laser tubes also enables gas mixtures of comparatively high pressure to be used. Ceramic CO₂ laser tubes allow for high pressure gas mixes and provide for faster rise and fall speed as well as much better power stability.

Infinity Series

RF excited 40 – 120 Watt Ceramic Core CO₂ lasers



The Infinity Series includes RF excited, 40, 60, 80, 100, and 120 Watt CO₂ lasers. For customer convenience, all models have identical form and fit with internal RF-drive electronics. If a different power laser is required, only the DC power supply will require changing.

40, 60, 80, 80, 100, and 120 Watt CO₂ lasers are offered in three different cooling configurations. The Air-Cooled configuration allows for the customer to supply the necessary cooling air for the laser. The Fan-Cooled configuration comes fitted with cooling fans. The water cooled version is supplied with an input and output port to connect a chilled water source.

All configurations of 40, 60, 80, 100, and 120 Watt lasers are built around our patented ceramic core technology that provides superior lifetime, reliability, and stability.

Model	Infinity 40	Infinity 60	Infinity 80	Infinity 100	Infinity 120
Rated Optical Power	40	60	80	100	120
Mode Quality (M ²)	1.2	1.2	1.2	1.2	1.2
Beam Ellipticity	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1	< 1.2:1
Beam Diameter (mm) 1/e ²	2.5	2.5	2.5	2.5	2.5
Beam Divergence (mR, full angle)	5.2	5.2	5.2	5.2	5.2
Wavelength (µm)	10.57-10.63	10.57-10.63	10.57-10.63	10.57-10.63	10.57-10.63
Rise Time (µS)	< 75	< 75	< 75	< 75	< 75
Power Stability from cold (%)	±6%	±6%	±6%	±6%	±6%
Polarization	Random	Random	Random	Random	Random
Cooling	Air or Water	Air or Water	Air or Water	Air or Water	Air or Water
Input power (Watts)	640	960	1200	1400	1400
Input Voltage / Current	32V / 20A	40V / 24A	45V / 24A	50V / 28A	50V / 28A
Weight (Kg / Lbs.)	14.7 / 32.4	14.7 / 32.4	14.7 / 32.4	14.7 / 32.4	14.7 / 32.4

Model Z30/Z40

The smallest RF driven 30 and 40 Watt laser

Our model Z30/Z40 is a 30/40 Watt CO₂ laser tube and is based on Our proven Ceramic Core Technology. One of the primary differences and technological advancements that is incorporated in this design is the resonator.

The Z30's/Z40's resonator is a Z-folded (2-fold) unstable resonator. This allows for a smaller package design when compared with other 30/40 Watt laser tubes and is the shortest (folded) resonator in the 30 – 50 watt CO₂ laser class, but has a remarkably long (unfolded) resonator length.

This provides superior power and beam diameter stability. Early test have shown the from-cold power stability in the ±2% range.



Model	Model 163	Model 164
Rated Optical Power	≤30	40
Mode Quality (M ²)	1.2	≤1.2
Beam Ellipticity	< 1.2:1	< 1.2:1
Beam Diameter (mm) 1/e ²	2.3	2.3
Beam Divergence (mR, full angle)	7	7
Wavelength (µm)	10.57-10.63	10.57-10.63
Rise Time (µS)	< 75	< 75
Power Stability from cold (%)	±5% from cold, guaranteed ±3% after 2 mins typical	±5% from cold, guaranteed ±3% after 2 mins typical
Polarization	Random	Random
Cooling	Air	Air
Flow Rate (air)	140CFM x 2	140CFM x 2
Input power (Watts)	480	600
Input Voltage / Current	48V / 10A	40V / 15A
Weight (Kg / Lbs.)	9.5 / 21	9.5 / 21

Model 1625
The lightest, most compact 250 Watt CO₂ laser source



Our model 1625 is a 250 Watt CO₂ laser tube and is based on our proven Ceramic Core Technology. Model 1625 is the smallest RF-driven, sealed CO₂ laser in the world.

RF Driven CO₂ lasers are typically designed to operate in a pulsed mode, at a specified Peak-Power. The pulses can vary in duration from near zero to continuous-wave (CW) - the laser is on continuously. Further, at the time of shipping, a laser could produce a significantly more peak-power than specified.

This additional, or reserve power is common in CO₂ lasers, and is intended to further the specified lifetime of a laser that is known to have power degradation over time; the laser will stay within specification longer.

Model	Infinity 1625
Rated Optical Power	250
Mode Quality (M ²)	1.2
Beam Ellipticity	< 1.2:1
Beam Diameter (mm) 1/e ²	2.5
Beam Divergence (mR, full angle)	5.2
Wavelength (μm)	10.57-10.63
Rise Time (μS)	< 75
Power Stability from cold (%)	±4%
Polarization	Vertical to mounting plane
Cooling	Water
Flow Rate (l/m, g/m)	>9.8, 2.6
Input power (Watts)	2800
Input Voltage / Current	50V / 56A
Weight (Kg / Lbs.)	23 / 50

ULR Series CW Air- and Water-Cooled RF-excited CO2 Laser

- ▶ Choices - Comprehensive selection of air- and water-cooled CO2 lasers with options to suit every need
 - OEM BASIC- Available in air-cooled and water-cooled configurations
 - OEM INTEGRATED - Available in air-cooled configuration with aluminum fan shroud - ideal for "bolt on" integration; no plumbing or chillers necessary
 - Class IV - Available in air-cooled or water-cooled configurations with key switch and shutter safety interlocks
- ▶ Easy Integration - New low profile mounting plate with quick release electrical connector can be mounted in any orientation
- ▶ Construction - All lasers are RF-excited with an internal tickle and built-in interlock and can be operated from CW to their maximum modulation frequency
- ▶ Innovations - New TTL temperature warning output guards against overheating; new fault indicator LED with pinout for remote diagnostics
- ▶ Options - A variety of options are available including visible pointing laser coaxial with the main beam, integrated turning mirror and reinforced thermal resistant front mounting plate
- ▶ Reliability - Superior engineering and innovative technology result in stable power output, reliable service and the lowest recharge cost in the industry
- ▶ Customer Service - The most responsive, customer-oriented technical support in the industry
- ▶ Warranty – 12 months on materials, workmanship and rated output power
- ▶ Patents – we have devoted many years of research and development into laser technology which has resulted in numerous innovations and a multitude of U.S. patents with additional patents pending



Model	ULR10-O-IA-x ULR10-O-BA-x	ULR25-O-IA-x	ULR30-O-IA-x	ULR40-O-IA-x
Rated power**	10W	25W	30W	40W
Wavelength	10.6um	10.6um	10.6um	10.6um
Power stability	±10%	±5%	±5%	±5%
M ²	1.4±0.2	1.2±0.2	1.2±0.2	1.2±0.2
Beam size(near field)	4±1mm	4±1mm	4±1mm	4±1mm
Beam divergence(full angle)	5±1mrad	5±1mrad	5±1mrad	5±1mrad
Polarization	Linear	Linear	Linear	Linear
Pointing stability	200µrad	200µrad	200µrad	200µrad
Optical pulse rise or fall time	120±40µS	120±40µS	120±40µS	120±40µS
Optical Delay Time	38±10us	38±10us	38±10us	38±10us
Optical modulation	100% up to 5kHz	100% up to 5kHz	100% up to 5kHz	100% up to 5kHz
Modulation signal type	TTL compatible	TTL compatible	TTL compatible	TTL compatible
Cooling	Air	Air built in)	Air (built in)	Air (built in)
Weight (Basic AC)	3.3kg			
Weight (Basic WC)				
Weight (Integrated AC)	3.9kg	9.0kg	9.0kg	10.4kg
Weight (integrated WC)				
Dimension (LxWxH, Basic AC)	343x71x98mm			
Dimension (LxWxH, Integrated AC)	414x89x114mm	540x133x140mm	540x133x140mm	629x133x140mm
Ambient temperature***	10-35°C	10-35°C	10-35°C	10-35°C
Relative humidity	<90%	<90%	<90%	<90%
DC input voltage	48VDC	48VDC	48VDC	48VDC
RMS current (CW)	5A	10A	10A	12A
Recommended DC power supply	DCPS-200-48	DCPS-600-48	DCPS-600-48	DCPS-600-48

* Polarisation is linear (Perpendicular to the laser base plate).

Model	ULR50-O-IA-x ULR50-O-IW-x	ULR60-O-IA-x ULR60-O-IW-x	ULR-75-O-IA-x ULR-O-IW-x	ULCR100-O-IA-x ULRC100-O-IW-x
Rated power**	50W	60W	75W	100W
Wavelength	10.6um	10.6um	10.6um	10.6um
Power stability	±5%	±5%	±5%	±5%
M ²	1.2±0.2	1.2±0.2	1.2±0.2	1.2±0.2
Beam size(near field)	4±1mm	4±1mm	4±1mm	4±1mm
Beam divergence(full angle)	5±1mrad	5±1mrad	5±1mrad	5±1mrad
Polarization	Linear	Linear	Lear	Random
Pointing stability	200μrad	200μrad	200μrad	200μrad
Optical pulse rise or fall time	120±40μS	120±40μS	120±40μS	120±40μS
Optical Delay Time	38±10us	38±10us	38±10us	38±10us
Optical modulation	100% up to 5kHz	100% up to 5kHz	100% up to 5kHz	100% up to 5kHz
Modulation signal type	TTL compatible	TTL compatible	TTL compatible	TTL compatible
Cooling	Air/water (built in)	Air/water (built in)	Air/water (built in)	Air/water (built in)
Weight (Integrated AC)	11.8kg	11.8kg	14kg	36.7kg
Weight (integrated WC)	11.8kg	11.8kg	14kg	36.7kg
Dimension (LxWxH, Integrated AC)	705x133x140mm	705x133x140mm	864x133x138mm	865x250x192mm
Dimension (LxWxH, Integrated WC)	705x133x140mm	705x133x140mm	864x133x138mm	865x250x192mm
Ambient temperature***	10-35°C	10-35°C	10-35°C	10-35°C
Relative humidity	<90%	<90%	<90%	<90%
DC input voltage	48VDC	48VDC	48VDC	48VDC
RMS current (CW)	18A	18A	20A	36A
Recommended DC power supply	DCPS-800-48	DCPS-800-48	DCPS-1000-48	DCPS-2000-48
Pack Dimension				1041x508x508mm
Pack weight (gross weight)				66kg

Model	ULCR120-O-IA-x ULRC120-O-IW-x	CO2-ULCR150		
Rated power**	120W	150W		
Wavelength	10.6um	10.6um		
Power stability	±5%	±5%		
M ²	1.2±0.2	1.2±0.2		
Beam size(near field)	4±1mm	4±1mm		
Beam divergence(full angle)	5±1mrad	5±1mrad		
Polarization	Random	Random		
Pointing stability	200μrad	200μrad		
Optical pulse rise or fall time	120±40μS	120±40μS		
Optical Delay Time	38±10us	38±10us		
Optical modulation	100% up to 5kHz	100% up to 5kHz		
Modulation signal type	TTL compatible	TTL compatible		
Cooling	Air/water (built in)	Air/water (built in)		
Weight (Integrated AC)	36.7kg	43kg		
Weight (integrated WC)	36.7kg	43kg		
Dimension (LxWxH, integrated AC)	865x250x192mm	1016x250x192mm		
Dimension (LxWxH, integrated WC)	865x250x192mm	1016x250x192mm		
Ambient temperature***	10-35°C	10-35°C		
Relative humidity	<90%	<90%		
DC input voltage	48VDC	48VDC		
RMS current (CW)	36A	40A		
Recommended DC power supply	DCPS-2000-48	DCPS-2000-48		

* The above specifications are subject to change without notice.

** Output power is guaranteed to exceed this level for a period of 15 months from the date of purchase, regardless of use.

*** At temperatures below 50°F[10°C] operation may be intermittent and there is a potential for damage to the power supply optics.

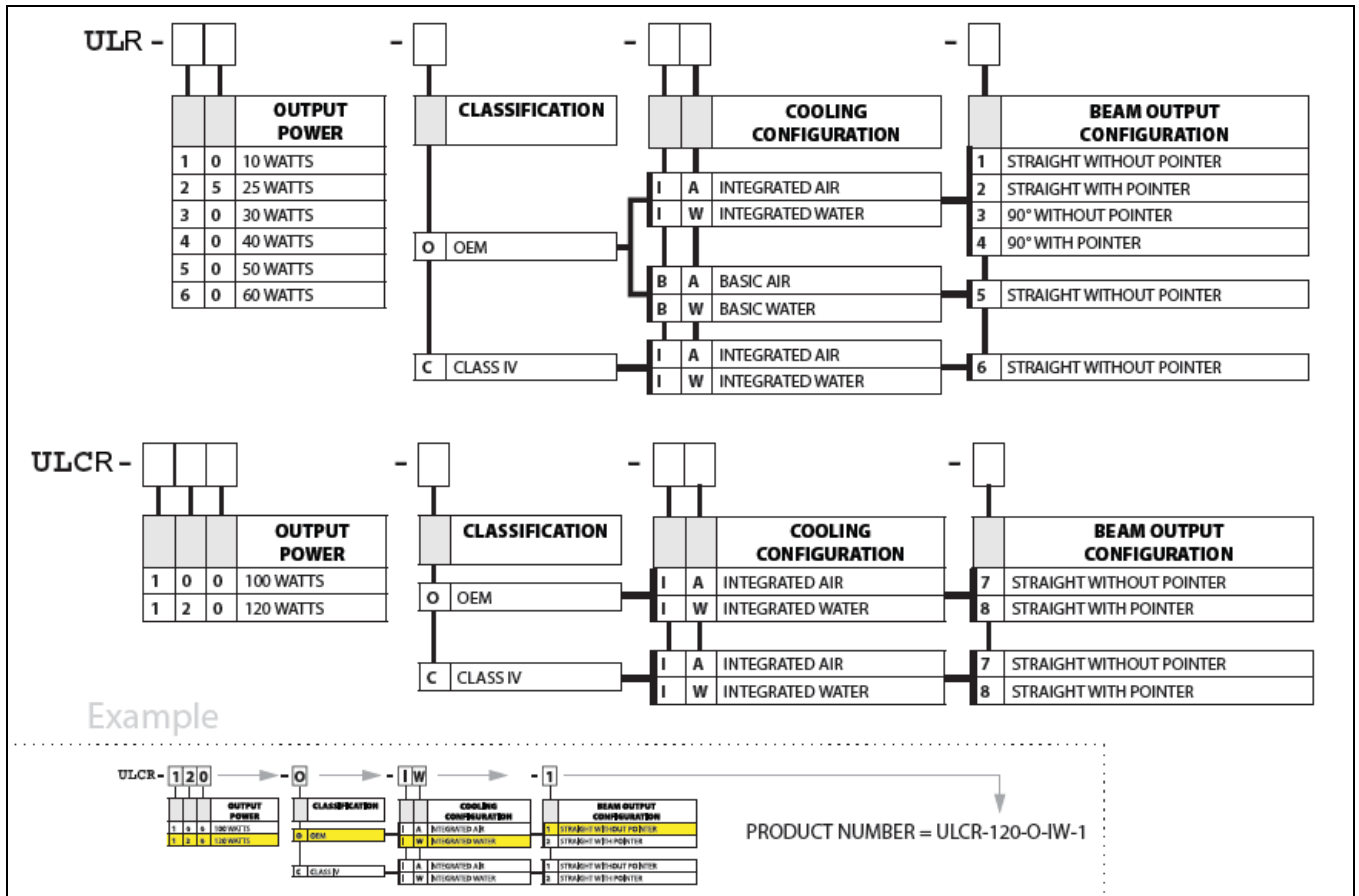
There are 3 types of configurations of each laser: OEM BASIC, OEM INTEGRATED and Class IV.

OEM BASIC: This configuration is a basic laser tube and RF power supply. There is no cover, no fans. This is for the OEM to integrate into their equipment and provide the proper cooling and protection. Air cooled or water cooled must be specified at time of ordering.

OEM INTEGRATED: This is the configuration that we have been offering for a number of years. The laser tube and RF power supply are covered with a shroud and have the fans included.

Class IV: This configuration has a cover, manual shutter, keyed lockout switch and fans or water connections, depending on type. Air cooled or water cooled must be specified at the time of ordering.

For used Universal lasers, we provide fully-refurbishing services at very low prices. The refurbishing includes replacing optics, RF power supply and refilling gas. All the jobs will be finished within 7 days.

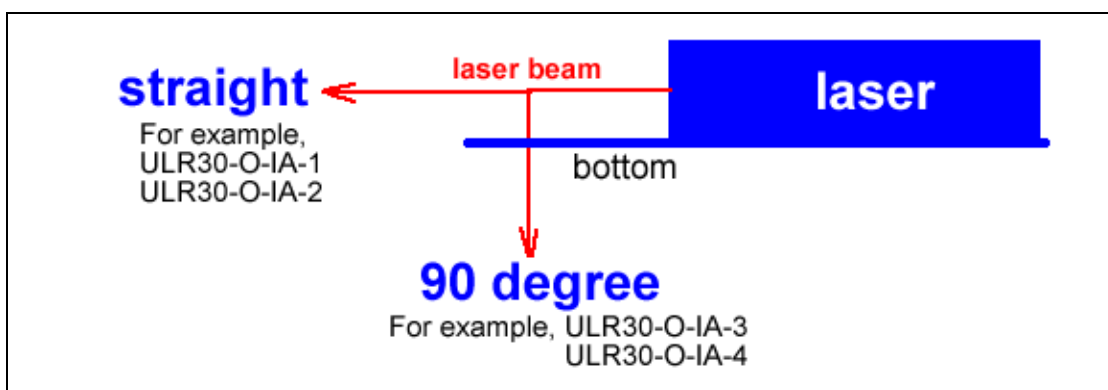


Main Difference between UL Series and ULR Series Lasers

The bottom and connector are swallow-tailed and 12PIN respectively but the bottom and connector are flat and 15PIN respectively. There is no difference on performance.

Beam Output Configuration:

With the 90 degree output the beam goes through the base plate. We cut a hole in the bottom and mount it to the face of the laser, turn it 90 degree down through the hole. We can not offer it in any other direction but through the bottom of the base plate. To offer this option on OEM lasers the beam output number is (#3) for 90 degree without pointer, (#4) for the 90 degree with pointer. This option is not offered on 10W Integrated air cooled due to the small base plate and no room to mount the out put.



Air- and Water-cooled RF-excited CO₂ Lasers

- 10, 30, 50, 100, 200 & 400w
- Compact, fully integrated design
- Low cost/high power source



CO2-SR-48 series



CO2-SR-V30



CO2-SR-F series

Model	CO2-SR-48-1	CO2-SR-V30	CO2-SR-48-5W
Output power (W)	10W	30W	50W
Mode quality	TEM ₀₀ 95%, M ² <1.1	TEM ₀₀ 95%, M ² <1.1	TEM ₀₀ 95%, M ² <1.1
Ellipticity	<1.2	<1.2	<1.2
Rise time (usec)	150	100	150
Beam diameter (mm)	3.5	2.0	3.5
Beam divergence (mrad)	4	7	4
Wavelength (um)	10.57-10.63	10.57-10.63	10.57-10.63
Power stability	±10%	±3%	±5%
Polarization	Linear (V)	Linear (H)	Random
Cooling	Air	Air	water
Head load (W)	300	550	800
Flow rate, air	250CFMx2	140CFMx2	
Flow rate, water (18-22°C)			1.5GPM
Input voltage/current (VDC/A)	30/7	30/18	30/28
Dimension (mm)	429x71x107	428x117x146	886x135x114
Weight, laser head (kg)	4.1	8.2	20
Pack (cm)	63x23x23		
Pack weight (kg)	5.92		

Model	CO2-SR-F100	CO2-SR-F201	CO2-SR-F400
Output power (W)	100W	200W	400W
Mode quality	TEM ₀₀ 95%, M ² <1.1	TEM ₀₀ 95%, M ² <1.1	TEM ₀₀ 95%, M ² <1.1
Ellipticity	<1.2	<1.1	<1.1
Rise time (usec)	100	100	100
Beam diameter (mm)	3.5	3.5	3.5
Beam divergence (mrad)	4	4	4
Wavelength (um)	10.2-10.7	10.2-10.7	10.2-10.7
Power stability	±6%	±5%	±5%
Polarization	Linear (H)	Linear (H)	Random
Cooling	water	water	water
Head load (W)	2000	4000	8000
Flow rate, air			
Flow rate, water (18-22°C)	2.0GPM	3.0GPM	6.0GPM
Input voltage/current (VDC/A)	96/20	96/40	96/80
Dimension (mm)	638x160x142	1232x216x152	1384x387x178
Weight, laser head (kg)	17.2	36.3	72.6

Air-Cooled RF-Excited OEM Industrial CO₂Laser

Features

- Ultra-compact
- Fast rise/ fall time
- Outstanding beam quality
- All-metal seals for long life
- Excellent power stability
- Wide operating power range
- Single, integrated package
- CW or modulated up to 25 kHz
- Cost-saving and simple, direct-air cooling
- Linear polarization
- Low-cost OEM configuration



Model	CO2-CH-Diamond-C-20A	CO2-CH-Diamond-C-30A
Wavelength (μm)	10.55to10.63	10.55 to 10.63
Optical Output Power ¹ (w)	20	30
Power Stability ² (%)	±8	±5
Mode Quality(M ²)	<1.2	<1.2
Beam Size(mm)	1.8±0.2	1.8 ±0.2
Divergence (mrad, fullangle)	7.5±0.5	7.5 ±0.5
Polarization	>100 to1 (fixed linear, parallel to width dimension)	>100 to 1 (fixed linear, parallel to width dimension)
Operating Frequency & Duty Cycle	0 to 25kHz, 0 to100% DC	0 to 25 kHz,0 to 100% DC
Weight	6.6kg (14.5lbs.)	6.6 kg (14.5 lbs.)
Dimensions (LxWxH)	357x92.5x154.5mm (14.1x3.64x6.08in.)	357 x 92.5 x 154.5 mm (14.1 x 3.64 x 6.08 in.)
Input Power	48 VDC±2% regulation, <±1% P-P noise / ripple, 12A max.avg., with18A peak for 1 msec. minimum, measured at input terminals	48VDC ±2% regulation, <±1% P-P noise/ripple, 12A max. vg., with 18A peak for 1 msec. minimum, measured at input terminals
Heat Dissipation (W)	<575	<575
Maximum Case Temperature	<60°C (140°F)	<60°C (140°F)
Operating Temperature	5 to 40°C (41 to 113°F)	5 to 40°C (41 to 113°F)
Operating Altitude	<2000m(6500ft.)	<2000 m (6500 ft.)
Operating Humidity	Non-condensing	Non-condensing
Shipping /Storage Environment	-10 to 60°C (14 to140°F), non-condensing	-10 to 60°C (14 to 140°F),non-condensing

- Power measured at 25°C and derated by 1%/C for higher laser head temperatures.
- Power stability based on $\pm (P_{max} - P_{min}) / (2 * P_{max})$ average power measurement at constant duty cycle after 10-minute warm up at operating condition.

DC-excited CO2 Laser Tubes

FEATURES:

- Coaxial glass-metal conduction cooling
- Hard sealed ZnSe mirrors
- High efficiency high voltage DC excited
- Sealed-off and refillable
- Stable free-space resonator
- Super-pulse capability
- Optional rear mirror monitoring output
- Optional collimated output coupler
- Operating lifetime >8000 hours
- Storage lifetime >10 years



Model	CTM300	CTSM500	CTS500	CTS1000	CTS1100	CTS1200	CTS1300
Output power (W)	>14	>28	>45	>70	>80	>100	>120
Output power after 8000 operating hours (W)	>8	>14	>22	>35	>40	>50	>60
Wavelength (um)	10.57-10.63	10.57-10.63	10.57-10.63	10.57-10.63	10.57-10.63	10.57-10.63	10.57-10.63
Transverse mode	TEM00-01*-10	TEM00	TEM00 - 01*	TEM00 - 01*	TEM00 - 01*	TEM00 - 01*	TEM00 - 01*
M ²	<2.2	<1.2	<1.9	<1.9	<1.9	<1.9	<1.9
Beam diameter (mm)	4 - 6.5	3.9 - 4.2	4.2 - 6.5	4.2 - 6.5	4.2 - 6.5	4.2 - 6.5	4.2 - 6.5
Beam divergence (mrad)	3.5	3	3	3	3	3	3
Polarization	random	random	random	random	random	random	random
Maximum operating current (mA)	18	24	30	30	30	30	35
Cooling	Air forced by fans	Water 1 l/min	Water 1 l/min	Water 1.5 l/min	Water 1.5 l/min	Water 2 l/min	Water 2 l/min
Start voltage (kV)	<15	<26	<26	<32	< 35	<38	<40
Power stability	+/-3%	+/-5%	+/-5%	+/-5%	+/- 5%	+/-5%	+/-5%
Weight (g)	650	1800	1800	2400	2700	3000	3300
Dimensions (mm)	52 x 520	65 x 860	65 x 860	65 x 1170	65 x 1260	65 x 1490	65 x1595
Power supply	SPS300P	SPS501C	SPS501C	SPS501D	SPS501D	SPS501E	SPS501F

All models are warranted for 12 months from date of shipment

More models and versions on demand

Power Supplies of CO2 Laser Tubes



Model	SPS300P	SPS501C	SPS501D	SPS501F
Input voltage (50/60Hz, VAC)	115 or 230	115 or 230	115 or 230	115 or 230
Output voltage (kV)	3 - 7	6 - 18	9 - 25	12 - 35
Output current (mA)	1 - 18	1 - 35	1 - 35	2 - 35
Firing voltage (kV)	20	35	40	45
Maximum output power (W)	120	350	500	700
Maximum pulse rate (kHz)	3	3	3	3
Duty cycle	0 to 100%	0 to 100%	0 to 100%	0 to 100%
Weight (g)	1100	3500	3500	4500
Dimensions (mm)	100x250x90	145x295x145	145x295x145	187x355x160
Suitable for	CTM300	CTS500	CTS1000-1100	CTS1100-1200-1300
Operating temperature (°C)	-20 to +50	-20 to +50	-20 to +50	-20 to +50

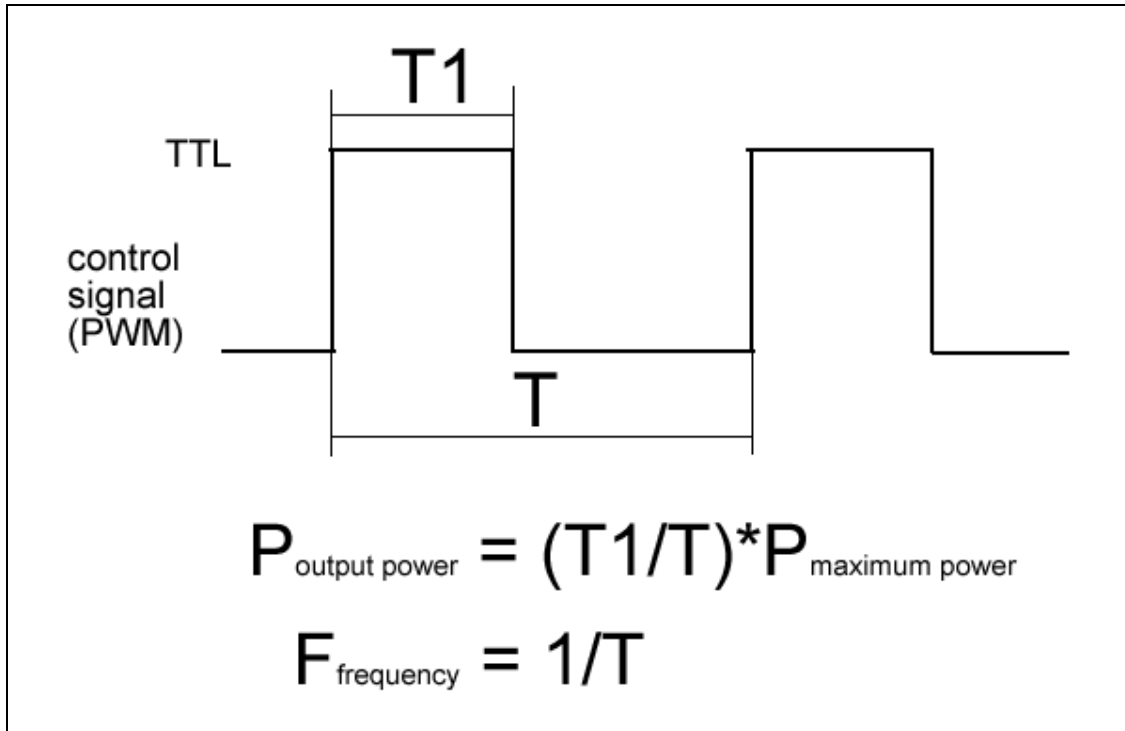
WARRANTY

All models are warranted to be free from defects in materials and workmanship for 12 months from date of shipment.

CO2 Laser Controller

1. Principle of adjusting laser power

A TTL compatible signal must be provided to the laser of the power and signal connector to drive the laser. Output power can be controlled from 0 to 100% (CW Mode) by pulse width modulation of the input signal. The output laser power is proportional to the duty of the PWM signal.



In our controllers, the frequency is fixed at 5kHz (0.2ms). Adjusting the output laser power means adjusting pulse width T1.

2. STCB series integrated laser controller

CO2 laser controller provides DC power supply of CO2 laser, control I/Os and laser power adjustment. It is integrated with a 19" control panel. Its main specifications are

- Model: STCB28-xxxx (xxxx: CO2 laser model such as ULR10, ULR50 etc)
- Provide DC power supply according to the lasers (ULR10, ULR30, ...) (optional)
- Laser power adjustable from 0 to 99% of the maximum laser power
- Two control methods available: manual and auto
- Under the manual method, a potentiometer on the panel is used to adjust the laser power and a button is used to switch on/off laser
- Under the auto method, external signal TTL is used to adjust laser power, laser pulse repetition rate and laser beam on/off
- Dimension (LxWxH): 500x302x100mm



3. STCBV series compact laser controller

This compact laser power controller is used to digitally modulate the RF amplifiers that excite the plasma within the resonating chamber of the laser. This is accomplished by using a clock frequency square wave of 5kHz and varying the duty cycle of that square wave from 0 to 99%.



The main specifications are:

- Power input: +5VDC
- Signal output: 0-99% duty cycle PWM 5kHz
- Gate input (default logic low): TTL logic (High +5VDC, Low 0VDC)
- Clock frequency: 5kHz +/-5% accuracy
- Enable input (default logic low): TTL logic (High +5VDC, Low 0VDC)
- Two control methods available: manual and auto
- Dimension (LxWxH): 6.26x4.125x1.5inch (159x105x38mm)
- Weight: 12.3 ounces (0.349kg)