

## AL20 Laser Series

\*Image of AL20-D-FC\*



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TRUMPF



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## Thank you for purchasing an Access Laser product

Access Laser specializes in RF Excited Longwave Infrared & Mediumwave Infrared lasers for custom applications in scientific experimentation, research and development, medical and high-performance material processing. Our system architecture emphasizes flexibility, and we take pride in ensuring that every product delivers optimal performance and satisfies your precise needs. We view our role as project collaborators, striving to offer transparent information about each product to make integration with your application successful.

Access Laser remains dedicated to your needs long after your initial purchase. Our technical support and service teams are available, regardless of the warranty period, and we welcome you to contact us whenever you have questions, concerns, or additional requirements at:

Email: [sales@accesslaser.com](mailto:sales@accesslaser.com)

Phone: [425-582-8674](tel:425-582-8674)



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## The AL20 Series

The AL20 was designed for integration into an industrial manufacturing environment, but bridges the gap by providing uncompromised performance with cost effective reliability. With these traits in mind the AL20 gives outstanding results utilizing any of the ALC technologies with fan cooled stability.

Available technology upgrades:

**Acousto-Optic Modulation:** Mounting an AOM external to the laser cavity can increase the pulse repetition frequency to 200kHz without optically saturating sensitive targets.

<https://accesslasers.wpengine.com/acousto-optic-modulator-aom/>

**Dual Drive:** Changing the DC power supply to the RF driver allows for a fluid switch from continuous wave output to Super Pulse, providing flexibility to your end use.

<http://accesslasers.wpengine.com/dual-drive-d/>

**Diffraction Grating:** For many applications producing a single wavelength of light is an absolute requirement. By implementing an intra-cavity grating, ALC provides access to more than 80 discrete lines in the Midwave and Longwave Infrared spectral regions.

<http://accesslasers.wpengine.com/diffraction-grating-g/>

**Stability:** By actively monitoring and compensating for temperature fluctuations, our stabilized lasers enable improved power and wavelength control.

<https://accesslasers.wpengine.com/stabilized-s/>

**Isotope Gas Mixtures:** The standard CO<sub>2</sub> laser provides spectral output between 9.2-10.8µm. For applications requiring other wavelengths, Access Laser can extend our lasers' spectral reach and power by varying gas mixtures.

<https://accesslasers.wpengine.com/isotope-gas-mixtures/>

**Line Tracker:** Utilizing our unique software-controlled optical feedback loop, Access Laser provides industry-leading power stability and wavelength selection.

<https://accesslasers.wpengine.com/line-tracker-t/>

**Polarization:** Augment your beam for polarization-dependent performance. We can add specialized coatings to internal optics that greatly improve the polarization extinction ratio.

<https://accesslasers.wpengine.com/enhanced-polarization-l/>

**Piezo Tuning:** Laser performance is highly correlated to maintaining precise control over resonator length. Command-driven frequency compensation is one way to enable high performance.

<https://accesslasers.wpengine.com/piezo-cavity-modulation-z/>

**Super Pulse:** By driving the laser gain three times harder for a shorter duration than standard pulse width modulation a discrete pulse train can be generated.

<http://accesslasers.wpengine.com/super-pulse-p/>



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## Warranty

All of Access Laser Company's lasers come with a one-year standard warranty. This certifies that your laser is free of any defects in material or workmanship.

Please see <https://accesslasers.wpengine.com/legal/> for detailed warranty information.

Upon final inspection of your order, please complete the information below and email to [service@accesslaser.com](mailto:service@accesslaser.com). If Access Laser Company is not notified within 14 days of delivery, we will assume that the shipment arrived in satisfactory condition.

Date Received: \_\_\_\_\_

Laser Model: \_\_\_\_\_

Laser Serial Number: \_\_\_\_\_

RF Driver Serial Number: \_\_\_\_\_

Received By: \_\_\_\_\_  
(Name and title)



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## Returns

If a failure should occur, please contact your Access Laser Company representative or contact Access Laser headquarters directly at 1-425-582-8674 or [service@accesslaser.com](mailto:service@accesslaser.com).

A company representative will determine whether your laser should be returned for repair or maintenance. If the laser needs to be returned, a Return Merchandise Authorization (RMA) will be issued. Any laser returned without an RMA will be at the client's sole expense.

An ALC representative will make a determination regarding shipping costs. Typically, for failures within the first 45 days, ALC pays all shipping costs to and from ALC; For failures after 45 days, but within the first year, the client shall be responsible for shipping costs to ALC. ALC will pay all shipping costs to return the item(s) to the client. Please be sure to verify shipping costs in advance with your ALC representative, as special considerations may apply.

When requesting an RMA, please have the following information ready:

- Date of purchase
- Laser model
- Serial number for the laser
- Serial number for the RF driver
- Brief description of the issue
- Date the issue was first discovered

Fill out the RMA as completely as possible and include a copy of the RMA with the shipment. Include the laser and ALL accessories when returning the laser. This allows ALC to test each component and determine the source of the issue.

SHIP TO:

Access Laser Company  
Attn: Service Department  
2211 W. Casino RD Suite A  
Everett, WA 98204

## Laser Shipment Contents

The following items are included with each standard laser shipment:

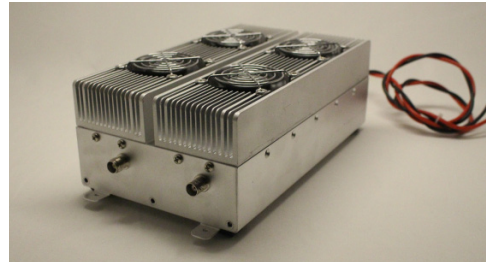
- AL20 Series Laser
- RF Driver
- BNC to TNC Coax Cables (2)
- D15 dongle
- Laser Test Documents
  - Final Test Document
  - Power Plot

If you have questions about the contents of your shipment, please contact us.



AL20 Series Laser

Figure. A1



RF Driver

Figure. A2



BNC to TNC Coax Cables (2)

Figure. A3



D15 Dongle

Figure. A4



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## FDA and International Regulations

Access Laser Company (ALC) lasers are designed, tested, and certified to comply with United States (US) and European Union (EU) regulations. For commerce within the US, laser safety requirements are governed by the Center for Devices and Radiological Health (CDRH) as set forth by United States Radiation Control for Health and Safety Act of 1968. For International commerce outside the US, laser safety is commonly governed by IEC Standards.

If you are an OEM that manufactures a laser product that is sold in the US or imported into the US, you are required to file a Product Report with the CDRH, prior to entering commerce in the US, that demonstrates compliance to 21 CFR 1040.10. If you are an OEM that operates and sells outside of the US, use IEC 60825-1 for laser safety compliance. It is the responsibility of the OEM or system integrator to assure complete compliance with any and all applicable regulations when an AL20 series laser is integrated into their system.

Since ALC is a US-based company with international sales, ALC has filed an OEM Product Report with the CDRH for all lasers in the AL20 series; the Product Report shows that our warning labels comply with IEC 60825-1. The AL20 laser complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

Both 21 CFR 1040 and IEC 60825-1 require OEM lasers to be incapable of lasing when removed from the OEM system. In such cases the laser must comply with all applicable requirements of 21 CFR 1040 or IEC 60825-1. When wired compliant to laser safety regulations the AL20 does not operate when removed from the OEM system.

## Safety Information

### Safety Symbols and Terms

Commonly used safety symbols and terms are used throughout this manual and on our products. Please familiarize yourself with the definitions and use of the terms and symbols.



Indicates a hazardous situation which will result in **DEATH** or **SERIOUS INJURY**.



Indicates a hazardous situation which could result in **DEATH** or **SERIOUS INJURY**.



Indicates a hazardous situation in which could result in **MINOR** or **MODERATE INJURY**.



Indicates an unsafe practice that can result in **PROPERTY DAMAGE**.



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## Safety Information (continued)

### Safety Label Definitions and Locations

1. Product Identification label – Indicates model, serial number and date of manufacture.
2. Yellow Compliance label – Calls out the edition of IEC 60825-1 used for compliance and the maximum power output and possible wavelengths.
3. Orange Danger label – Indicates laser class.
4. Safety Compliance label – Indicates whether the laser was manufactured in compliance with United States Code of Federal Regulations and/or International standards. (For OEM lasers, the laser component does not comply with all standards for complete laser products as specified by 21 CFR 1040.10 or IEC 60825-1: 2014-05.)
5. Aperture label – Indicates location of laser beam exit (aperture).



Figure. A5

Maximum Output 1000 Watts  
Emitted Wavelength(s) 9.1-11.8 $\mu$ m  
IEC 60825-1 2014-05

This device is a laser component which must be installed and operated in compliance with IEC 60825-1 and 21 CFR 1040.10



**DANGER**  
INVISIBLE LASER RADIATION  
AVOID EYE OR SKIN EXPOSURE TO  
DIRECT OR SCATTERED RADIATION  
CLASS 4 LASER PRODUCT



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## Operating Instructions

### Operating the laser

1. Direct the laser toward an appropriate beam dump.



Figure. 1

2. If using on an optical bench, secure the laser down with the mounting holes in the base plate.



Do not torque, twist or bend the laser body during the mounting process.

Applying uneven pressure to the laser body may distort the laser body, causing poor performance and possible damage.

3. Connect the Cooling System

#### A. Fan

Connect the 12V DC Power supply to the fan power connector.

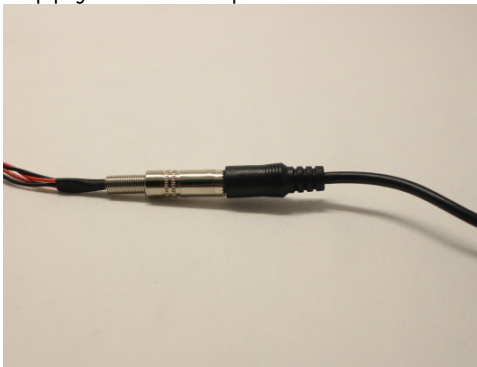


Figure. 2

#### B. Water

Connect the tubing to the PISCO fitting as described in the Water Cooling Connection Instructions on page 13.

4. Connect the RF Driver to the laser with the two coax cables, using the TNC and BNC connectors, as shown in the Connection Diagrams.

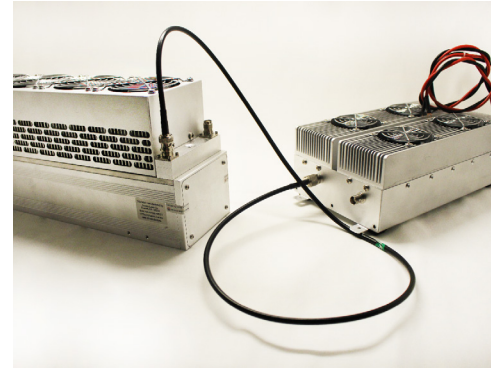


Figure. 3

5. Connect the RF Driver to the DC power supply.

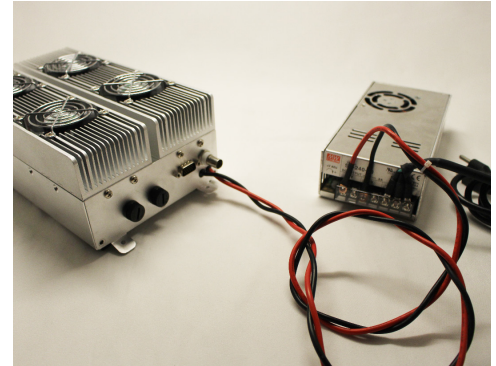


Figure. 4

6. Connect the D15 Dongle to the RF Driver.



Figure. 5

## Operating the laser (Continued)

7. Verify the beam path is pointed at an appropriate beam dump

**DANGER**

Eye Protection Required.

This laser can cause mild to severe burns if skin or eyes are exposed to the beam or scattered radiation. Protective eye wear should be worn at all times.



Figure. 6

8. Remove the protective tab from the aperture.



Figure. 7

12. Plug in the DC power supply to enable RF Driver.

**CAUTION**

-For Super Pulse operation running above 30% duty cycle or 400µs pulse length can damage the RF driver. The internal protection program will interrupt user signal beyond these parameters, making the output inconsistent .

- 5V input to TTL gate should not exceed 20mA or damage may occur

- When powering down the system, remove or disable the 5V input to the TTL gate before turning off the RF voltage to the laser.



Figure. 8

## Water Cooling Connection Diagram

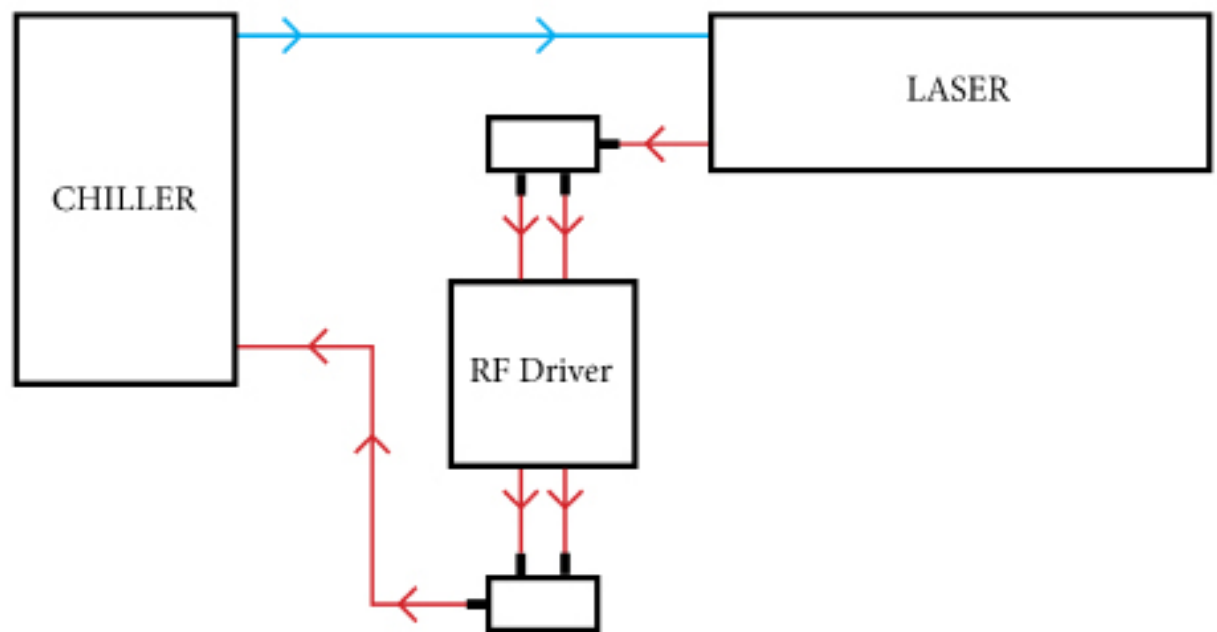


Figure. A6

## Water Cooling Connection Instructions

If your laser is water-cooled, your laser comes with a kit containing the parts required to connect your laser to your chiller (chiller not provided). If assistance is required, Access Laser Company would be happy to answer your questions.

For optimal performance with your water cooling system, keep the laser balanced, cool the laser equally, and keep the laser stable. The quick connect tubing fittings are made by PISCO ([www.pisco.com](http://www.pisco.com)). These fittings are easy to use.

### Assemble the PISCO fittings

1. Cut the end of the tubing clean and flat.
2. Ensure that the outer surface of the tubing is free of defects for the first ½" (13mm)
3. Ensure that the tubing is round (not distorted).
4. Verify that the tubing is the correct diameter for the fitting.
5. Insert the tubing into the fitting and push it in as far as possible. It should go in approximately 0.7" (18mm)
6. Pull gently on the tubing to verify that the small Stainless Steel teeth in the fitting are grabbing the tubing securely.
7. The fitting is ready to be used.

### To Remove

1. Push the tubing gently into the fitting.
2. Push the ring into the fitting. This will release the small Stainless Steel teeth from the tubing.
3. While holding the ring close to the fitting, gently pull the tubing out of the fitting.
4. The fitting can be removed and replaced on the tubing many times, until the end of the tubing becomes scratched. If the end of the tubing is scratched, it should be cut back to expose smooth surface.

### To Operate

1. Always turn on/off the water chiller and the laser power at the same time.
2. If the coolant is running while the laser power is off, condensation can occur. This will damage the laser electronics.



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## AL20 Laser Wiring Diagrams

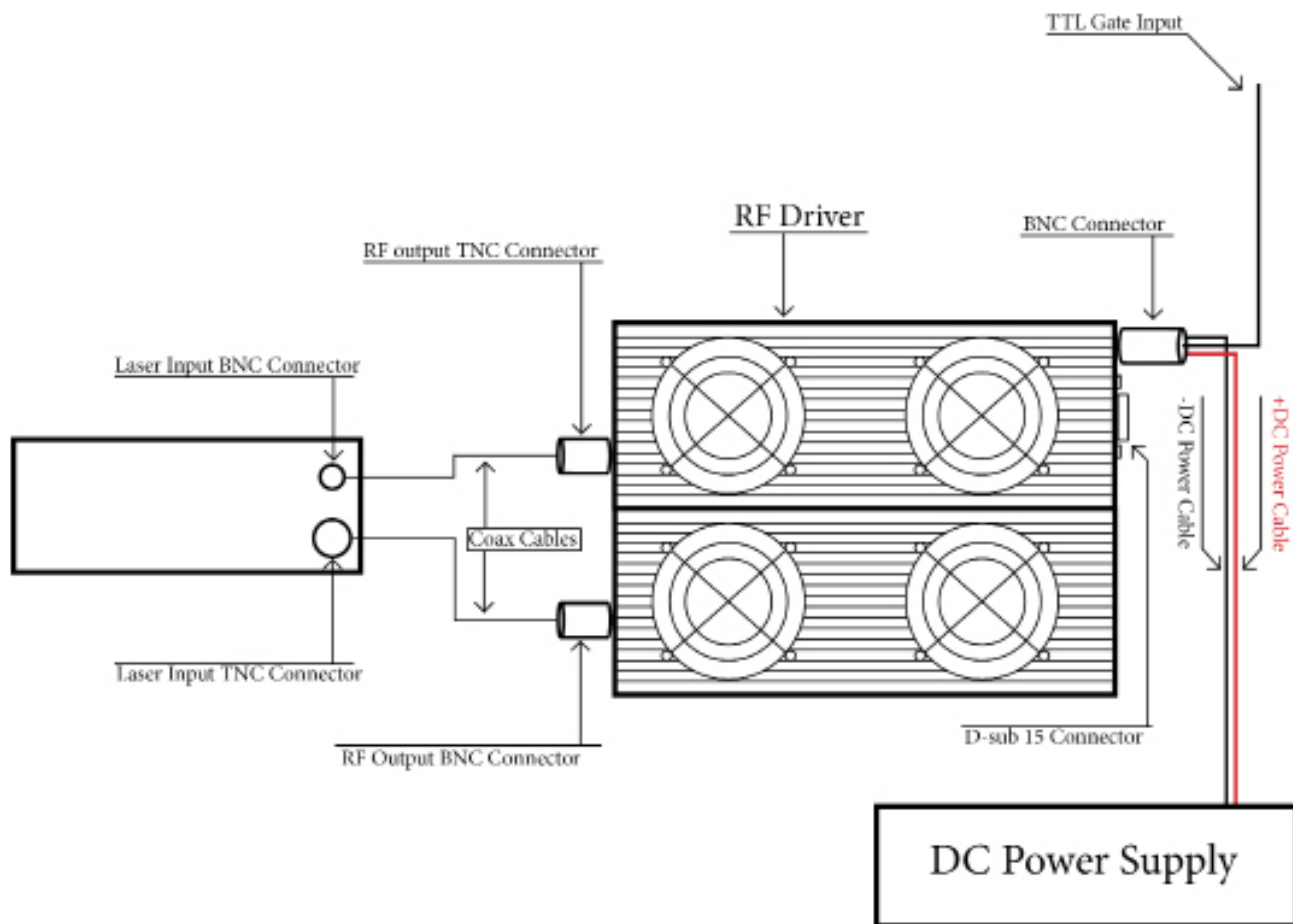


Figure. A7



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## AL20 Laser Connection Diagrams

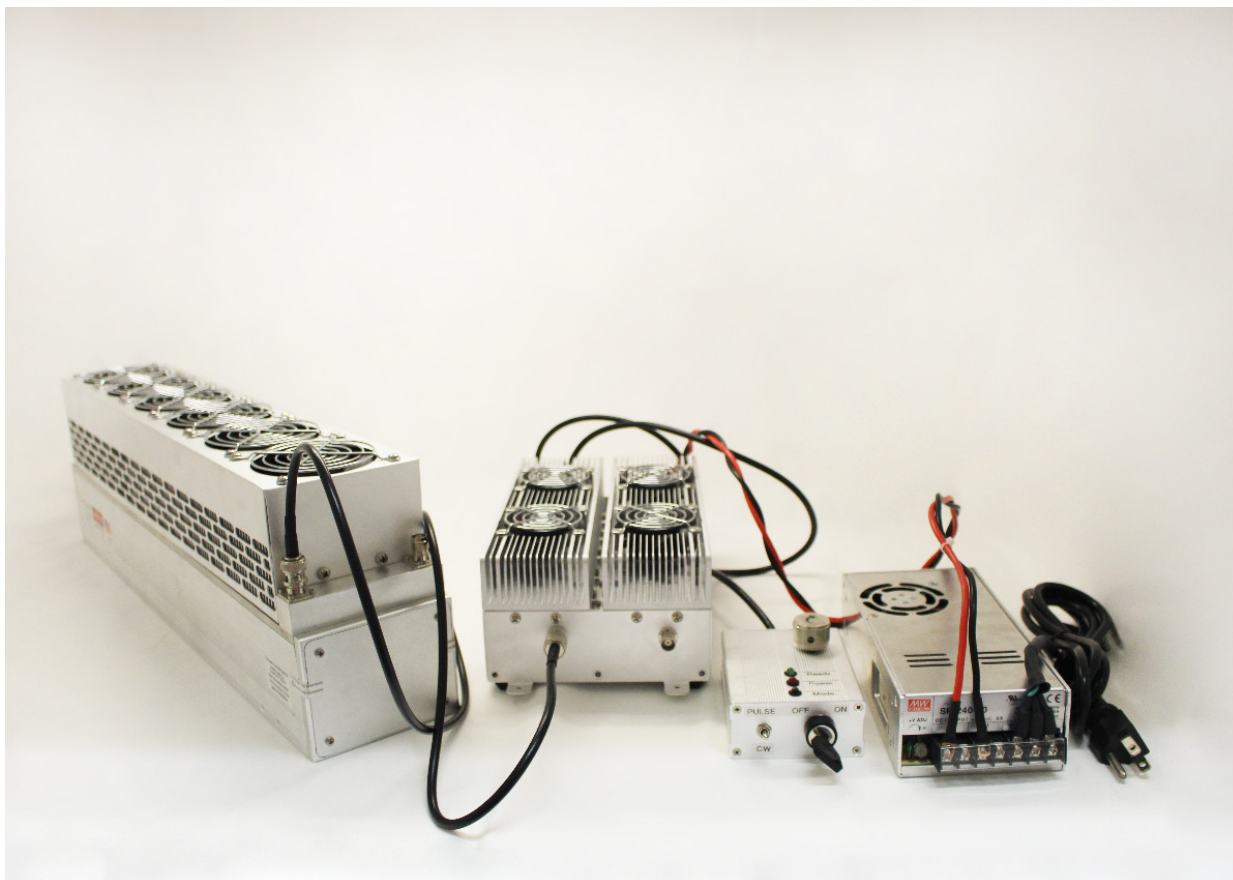


Figure. A8

From left to right : AL20 Laser, BNC to TNC cable, RF Driver, LC3 Controller, DC Power Supply.

## RF20 Driver Specifications

Model	RF30	RF30-P	RF30-D
Features	Standard	Super Pulse	Smart Driver that can be either Standard or Super Pulse
		External TTL Control Input up to 100kHz	
		Built-in Plasma Ignition Signal at 2.5kHz	
Frequency	40.68 MHz		
Supply Voltage	36V DC Regulated	48V DC Regulated	36V DC / 48V DC Regulated
Supply Current	16.5 Amps	10.5 Amps	16.5A / 10.5A
Output Power	2 X 150W at CW	2 X 250W Limited at 25% or 400us	2 x 150 W at 36VDC CW 2 X 250W at 48VDC Limited at 25% duty cycle or 400µs
Dimensions/ Weight	5.7 x 10.8 x 3.7 inches (144 x 274 x 93 mm) / 7 lbs (3.2 Kg)		

RF Output BNC Connector



RF Output TNC Connector



Figure. A9

D-sub 15 Connector  
The Dongle or  
LC3 Controller  
plug-in here



BNC Connector  
TTL Input Gate  
0V = Laser Off  
5V = Laser On



Figure. A10



## RF20 Driver Operation

The laser is controlled by applying 5V DC (20 mA) to the TTL Gate on the RF Driver (0V=off, 5V=on). The RF driver can be modulated at frequencies from 0 Hz to 100 kHz, but optimal gating frequency is 1-15 kHz.



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