ti-Series™ Water Cooled Laser, FH Marking Head, kit & WMPv6

SYNRAD

Important Note: Read all Danger, Warning, Caution terms, symbols, and instructions located in the (Laser Safety Hazard information) sections in the ti-Series Laser Operation Manuals located on our website http://synrad.com/synrad/docroot/resources/libraries/manuals.

Laser and Marking Head Unpacking:

1. Under your ti Series laser at the bottom of the box you will find the **mounting hardware/components kit.** The ***Marking Head*** **hardware/components kit** is located in the top shipping ***components box.*** Don't forget to save all shipping containment including plug covers and set them aside.

1.1 Lifting the **ti-Series** laser correctly by holding in the middle, do not carry laser by the mounting feet, this can disturb alignment.

1.2 **Ti-Series laser** mounting/component kit for the laser and the **FH FlyerMarking Head** (Inset).

Important Note: ***Keep All Foam and Packaging,*** you will need to re-use it when moving your laser to prevent damage that could void your warranty. Refer to this guide and the Technical Reference chapters in the laser's Operation Manual when re-packaging for shipping and/or relocation. Remove all accessory items not originally attached to the laser prior to re-packaging for shipping.

2. Upon arrival, inspect all shipping containers for signs of damage. If you discover shipping damage, document the damage (photographically if possible), then immediately notify the shipping carrier (responsible party for any transportation damage) and SYNRAD®. See the inventory section with in the Introduction chapter of the Operation Manual for packaging list(s).

Note: ***If shipped completely assembled,*** jump to the cooling section of this guide.

ti-Series™ Water Cooled Laser, FH Marking Head, kit & WMPv6

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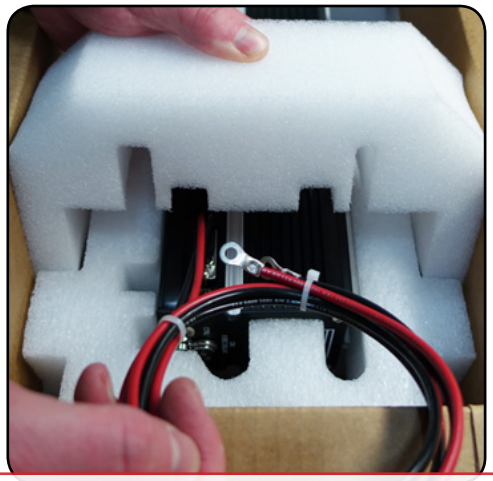
Lift both the both the marking head and the foam packaging out of the box.

Top Foam notch

Bottom Foam notch

2.1 Place the unit with foam packaging on a firm surface, remove foam end cap, notice foam notch locations for ports and interfaces.



The wire harness can be damaged in shipping if not re-packaged as shipped!

Don't forget to remove the **three (3) cap screws** on the lens aperture cover if a focusing lens is ordered.

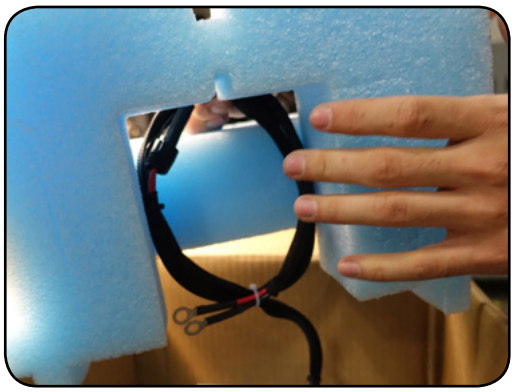
Important Note: **Caution! When packing the marking head for relocation or shipment, nothing can be on the sides of the unit at any time as damage will occur.** All box components must be stowed as they were when they arrived.

Please refer to the examples above and the laser's Operation Manual drawings located at the end of the Technical Reference Chapter.

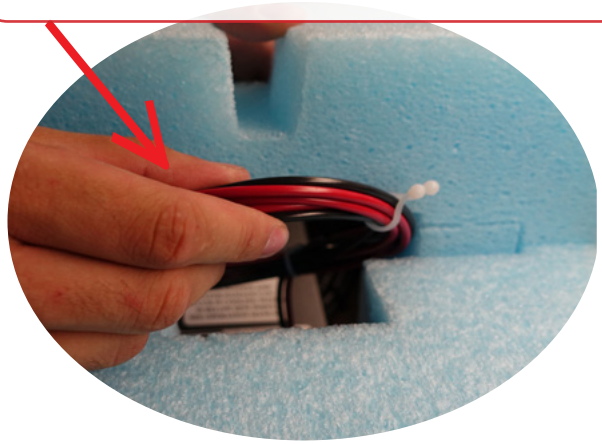
Laser Unpacking:

3. **Unseat** the wiring by **sliding** the harness out of the notch, then down and out of the foam as shown above.

3.1. Locate the wire harness in side one of the foam end caps.



3.2. Push the wire harness through the notch in the foam.



3.3. Drape the wire harness across the top of the laser housing when carrying.

3.4. Don't forget the hardware at the bottom of your box!

4. **Locate the laser hardware kit** at the bottom of this box **under** the laser.

Important Note:

Caution! Unpacking the wire harness incorrectly can damage the laser.

Keep All Foam and Packaging, you will need to re-use it when moving your laser. Refer to this guide and the Getting Started/Technical Reference chapters in the laser's Operation Manual when re-packaging for shipping and/or relocation.

Caution! When packing the laser for relocation or shipment, nothing can be on the sides of the laser at any time as damage will occur. The skin on the sides of the laser is fragile! All box components must be stowed under the laser.

The wire harness will be damaged in shipping if not re-packaged as shown above.

Mounting your Laser:

Note: Mounting feet and/or rails are **optional,** for complete details, refer to the Ti Series Operator's Manual. **Remove the laser aperture self-adhesive film before mounting to the rail.**

Don't tighten the path enclosure screws until the laser is mounted securely to the rail.

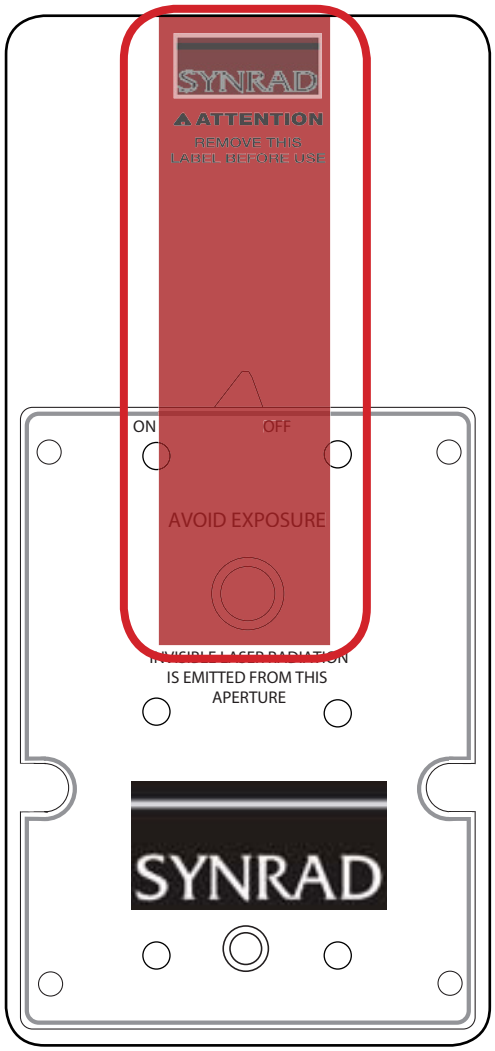
SYNRAD does not recommend mounting lasers in a vertical, (head and/or tail down) position. Please contact the factory for limitations as a vertical orientation increases the risk of damage to the lasers optics.

The laser's mounting feet are precisely aligned and shimmed at the factory to ensure alignment between the marking head and the Mounting Rail. **Do not loosen or remove the mounting feet from the laser.** See the FH Flyer Marking Head Operator's Manual for further details.

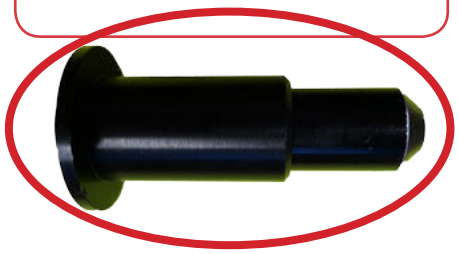
5. **Before** mounting the laser to the rail, ensure the **aperture seal is removed**.

6. Locate the ***Mounting Hardware Kit*** (Mounting Hardware Kit) path enclosure tube, marking head & laser hardware.

5.1 Remove the aperture seal.



6.1 Path enclosure tube.



6.2 6-32 x 1" Laser Mounting socket head capscrews.

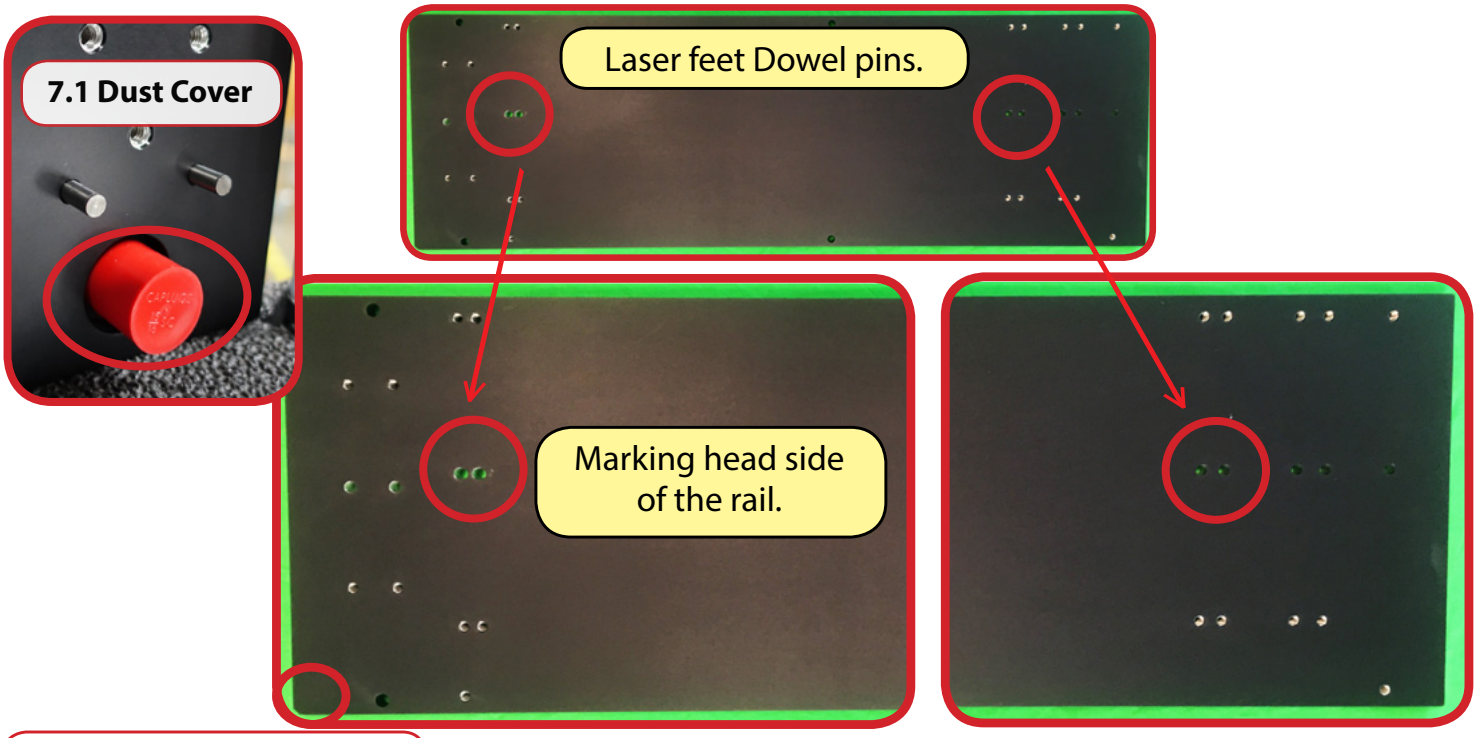
6.3 1/4-20 x 3/4" Marking Head Mounting socket head capscrews.

6.4 8-32 x 1/4" Marking Head Mounting button head socket screws.

6.5 Laser & Marking Head Mounting Kit(s).

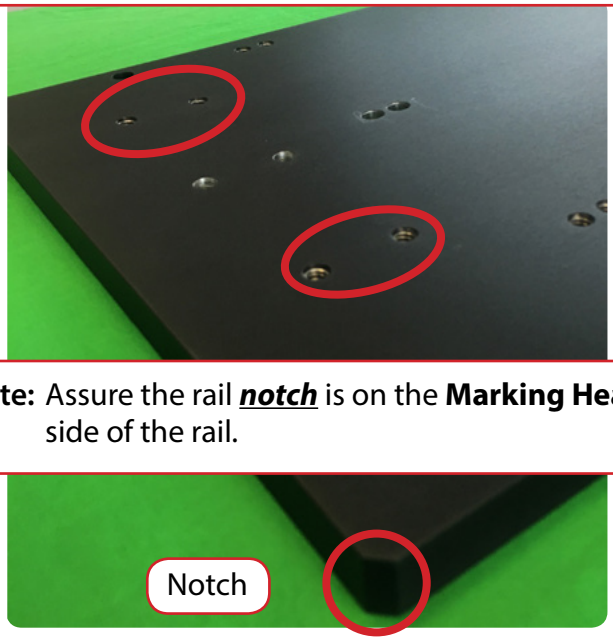
7. Remove the **dust cover** & set aside, from the rear end of the **marking head**, unwrap the **mounting rail**, set it on a firm surface. Orient the rail so that the ***l-bracket can be placed on the notch end of the rail.***

8. Mount the **l-bracket** to the **rail** using the (4) 1/4-20 x 3/4" socket head capscrews as shown in the following figures.



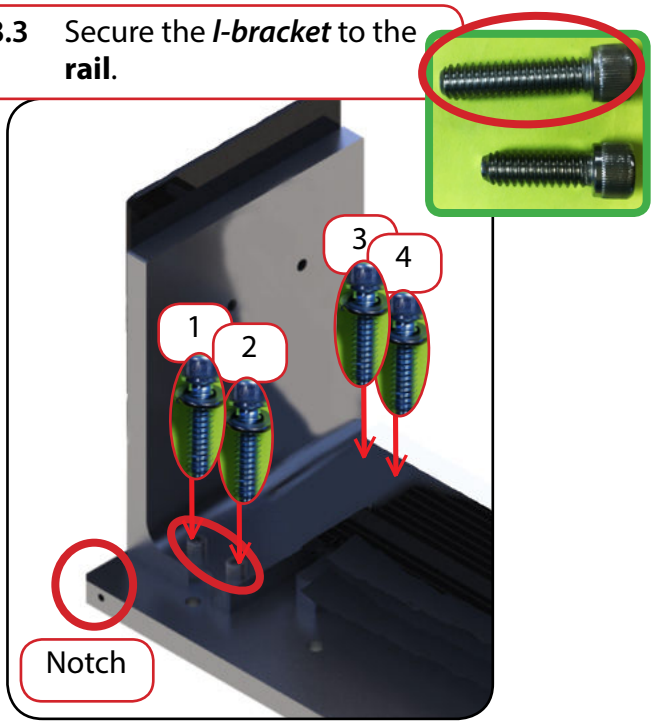
8.1 Notch end of the rail.

8.2 ***l-bracket*** mounting holes and ***notch*** locations on the rail.



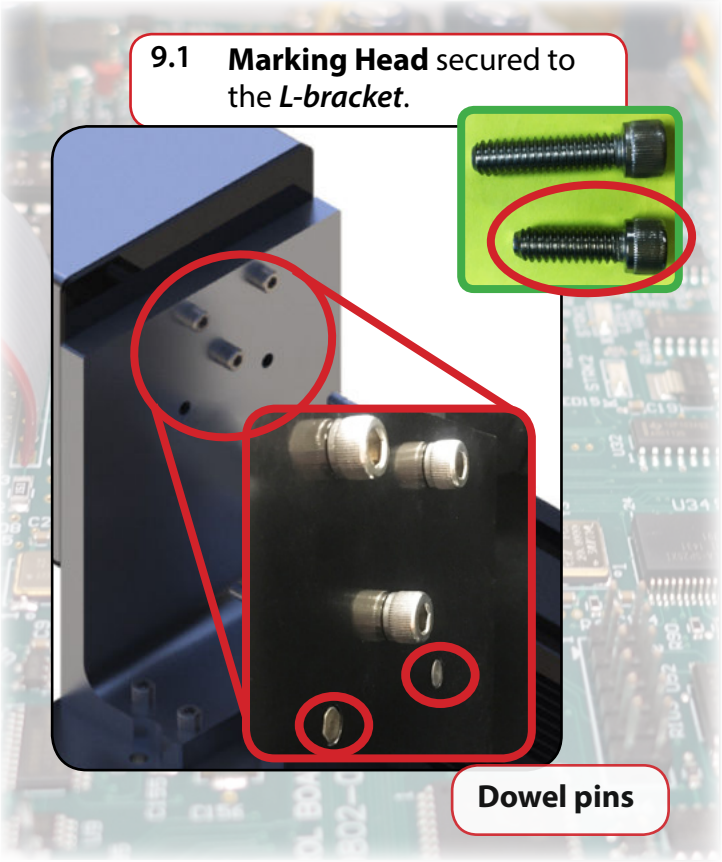
Note: Assure the rail ***notch*** is on the **Marking Head** side of the rail.

8.3 Secure the ***l-bracket*** to the **rail**.



Mounting your Marking Head onto a Rail (Continued):

9. Remove the **dust cover** & set aside, from the rear end of the **marking head**, unwrap the **mounting rail**, set it on a firm surface. Orient the rail so that the ***L-bracket can be placed on the notch end of the rail.***



Important Check Point:

The **anodized blanking plate & dust cover** are removed from the Marking Head.

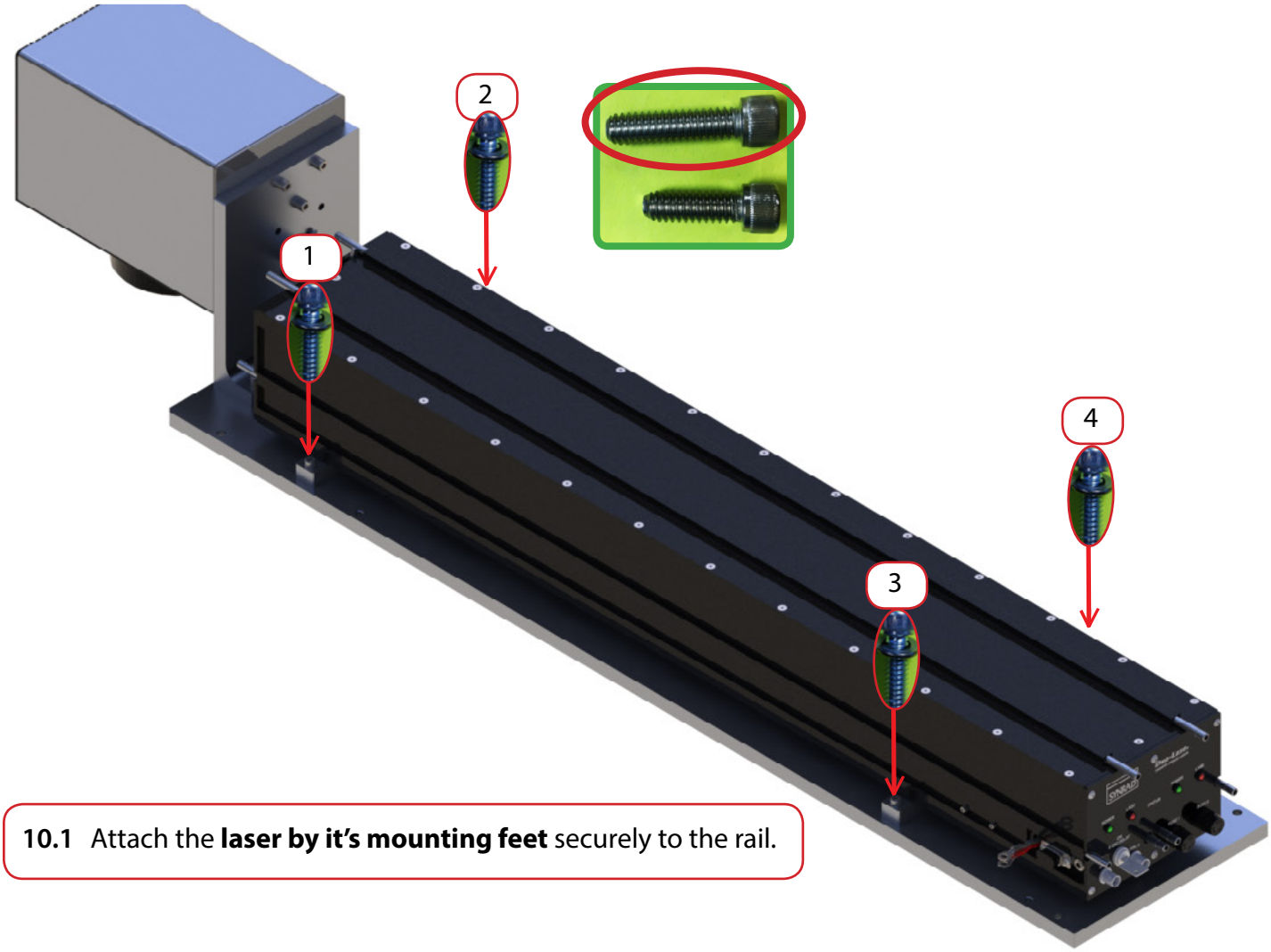
The **Marking Head** is mounted adjacent to the **notch on the rail**.

Refer to the appropriate chapter for more mounting details and the technical drawings in the Ti Series Operation Manual.

Mounting your Laser onto a Rail:

Important Note: Do not use any type of jackscrew arrangement as this will twist the baseplate and may distort the tube.

10. Ease the **laser** forward so the dowel pins on both mounting feet drop into their respective holes on the rail. Install/tighten the four (4) 6/32 x 1" socket head capscrews. See the figure below.



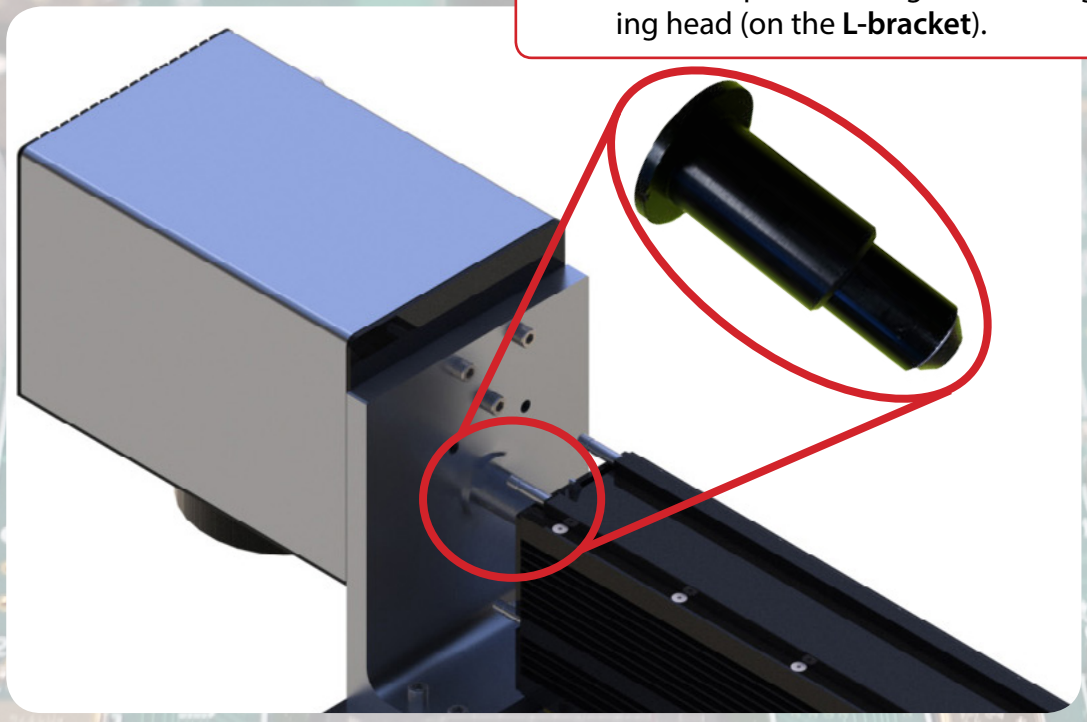
10.1 Attach the **laser by it's mounting feet** securely to the rail.

Important Note: **Calibration void if shim bolts are adjusted**, if your laser has mounting feet as shown above, careful not to carry or handle the laser by the feet to minimize misalignment risk.

Mounting your Laser onto a Rail (Continued):

9. After both the **laser** and the **marking head** are mounted to the rail, place the spring-loaded **path enclosure tube** as shown below.

9.1 Compress the **spring-loading path enclosure** tube and place the larger end facing the marking head (on the **L-bracket**).

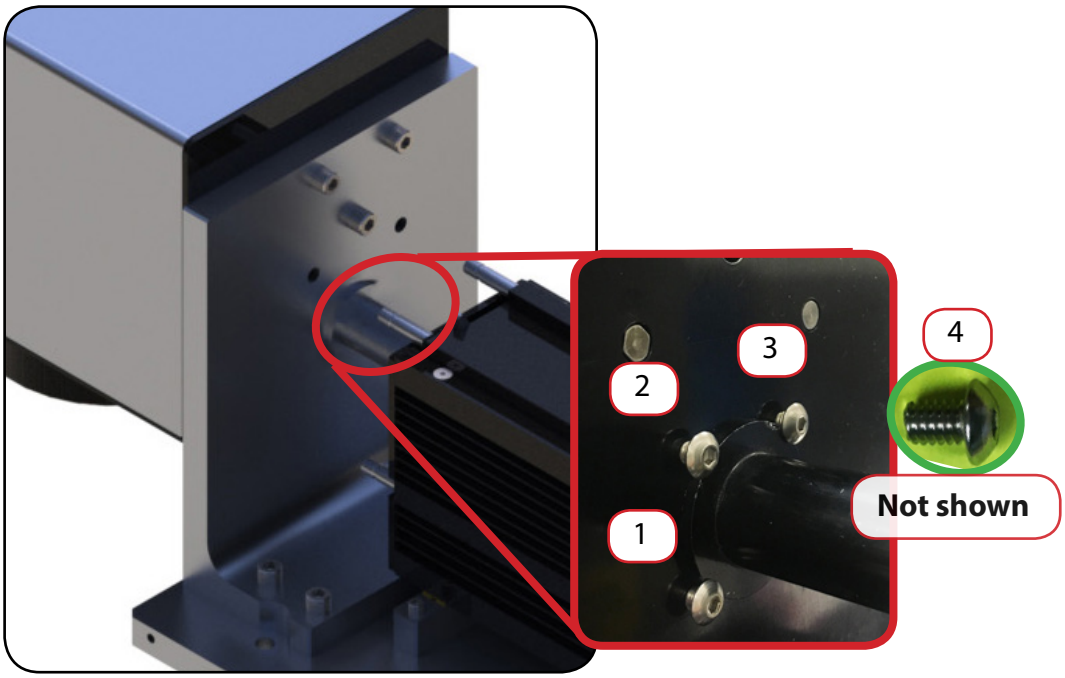


Important Note: Consult the factory for further mounting angle guidance outside >20% from the horizontal. When mounting the laser, use only one metric or SAE fastener per mounting tab on the baseplate. Do not use any type of jackscrew arrangement as this will twist the baseplate and may distort the tube.

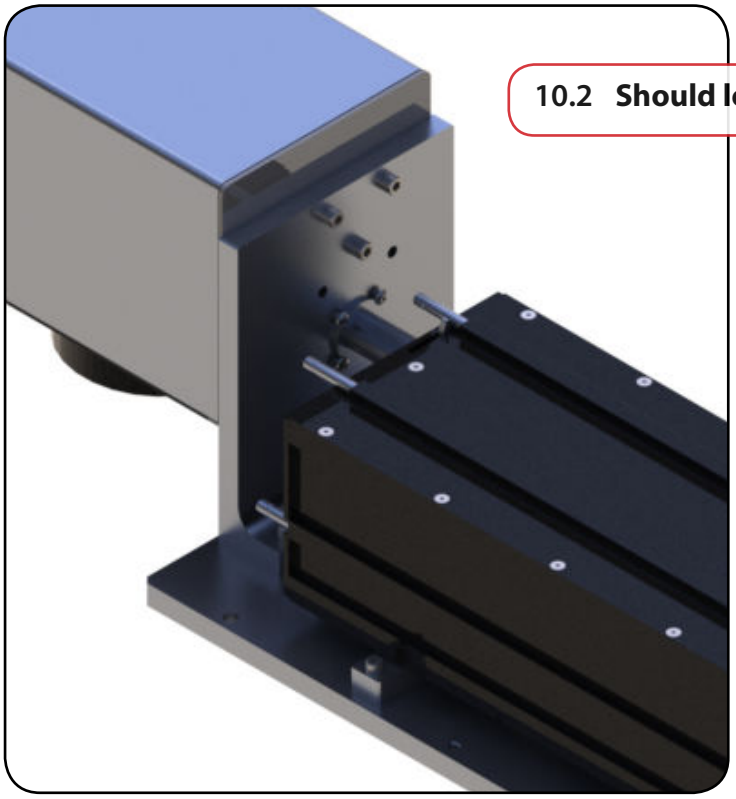
Note: The recommended mounting orientation for the ti Series is horizontal. Refer to the drawings within the Ti Series Operation Manual, see the Technical Reference chapter for further information.

Mounting your Laser onto a Rail (Continued):

10. Secure the **path enclosure tube** to the **L-bracket** with four (4) **8-32 x 1/4" button head socket** screws as shown below.



10.1 Assure the laser & marking head is securely mounted to the rail beforehand.



10.2 Should look like this.

Cooling:

Important Note: Use distilled water as the coolant. If glycol is necessary, add no more than 10% by volume. When filling your chiller, use at least 90% distilled or tap water by volume. If you must use glycol, do not add more than 10% by volume. See the technical reference chapter in the ti Series Operation Manual for the dew point table and cooling specifications.

Operating the laser with a coolant temperature ***below*** the dew point of the surrounding air may cause condensation to occur that will damage the laser! The setpoint temperature MUST be maintained above the dew point temperature.

When coolant temperature is lower than the dew point (the temperature at which moisture condenses out of the surrounding air), condensation forms inside the laser housing leading to failure of laser electronics as well as damage to optical surfaces.

The greatest risk of condensation damage occurs when water-cooled lasers are run in a high heat/high humidity environment and the chiller's coolant temperature is colder than the dew point temperature of the surrounding air or when the system is shut down, but coolant continues to flow through the laser for extended periods of time.

The chiller's temperature setpoint must always be set above the dew point temperature. In cases where this is not possible within the specified coolant temperature range of 18 °C to 22 °C (64 °F to 72 °F), then the following steps MUST be taken to reduce the risk of condensation damage.

A. Stop coolant flow when the laser is shut down.

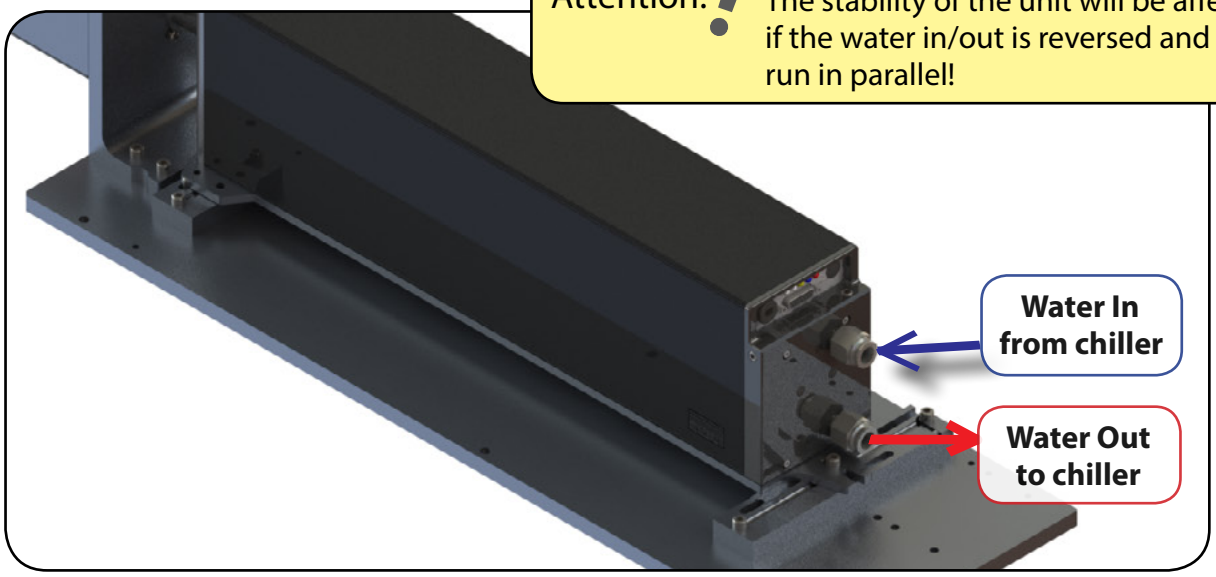
B. Increase coolant flow by an additional 3.8 LPM (1.0 GPM).

C. Air-condition the room or the enclosure containing the laser.

D. Install a dehumidifier to reduce the humidity of the enclosure containing the laser.

11. Locate the **Ship Kit (** 12 mm Cooling Tubing **)** Cooling quick-disconnect fittings and 1/2 inch polyethylene tubing. See the 48-1/48-2 Cooling connections (rear interface) in the figure below.

Attention: The stability of the unit will be affected if the water in/out is reversed and if not run in parallel!



Cooling (Continued):

Guidelines for cutting and installing tubing

- Cut tubing lengths generously to allow for trimming.
- Cut tubing squarely; diagonal cuts may not seal properly. Trim away any burrs if the cut is "ragged".
- Avoid excessive stress on fittings by creating a gentle radius when bends in the tubing are close to fittings. Bending tubing too sharply will compromise the sealing properties of the fitting.
- Never allow the tubing to kink, since kinking severely restricts coolant flow.
- Push tubing completely into the fitting, then pull the tubing to verify that it is locked into place.

If tubing needs to be disconnected from a fitting:

- First push and hold the tubing slightly into the fitting. Next push the white fitting ring evenly towards the fitting, and then pull the tubing free.
- After disconnecting tubing from a fitting, trim 12.7 mm (0.5 in) from its end before reconnecting. Trimming the end of the tubing before reconnecting provides an undisturbed sealing surface.

  If your integrated laser application uses metric cooling tubing, we recommend the installation of tubing adaptors to convert cooling kit fittings from 1/4" tubing to 6 mm metric tubing and 3/8" tubing to 8 mm metric tubing. These tubing adaptors are available from many tubing and fitting manufacturers.

Important Note: ***Choosing the correct coolant temperature is important to the proper operation and longevity of your laser otherwise internal condensation damage will occur!***

Reference the dew point chart for temperatures and range of air temperature and relative humidity values in the technical references chapter of the Operation Manual.

Remember that the laser's coolant temperature must be set above dew point temperatures.

Caution
possible equipment damage

Do not flow coolant through the laser for an extended period of time when the laser is shutdown. This causes condensation to form inside the laser which may result in catastrophic damage to internal optics and electronic circuits.

Inlet cooling water temperature must always be maintained above the dew point to prevent condensation and water damage to your laser.

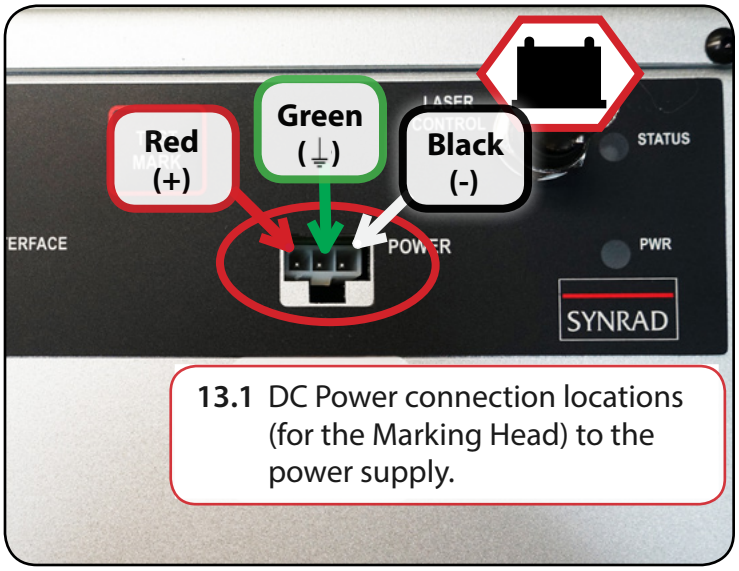
Power Connections:

Note: The negative (–) side of the DC input to the laser is internally connected so that the laser chassis serves as DC power ground.

You should isolate the laser's DC power supply so that the only grounded connection is at the laser. Alternatively, you can mount the laser chassis on an insulating pad or film in order to electrically isolate the DC return from the chassis ground.

12. Verify that input AC power to the DC power supply is physically locked out or disconnected.

13. Connect the Marking Head ***DC power VDC*** cable into the **Marking Head's power** supply.



13.1 DC Power connection locations (for the Marking Head) to the power supply.

Power Connections (Continued):

Important Note:

The ti-Series laser requires a DC power supply capable of providing 48 VDC at 18-35 A depending on model, refer to the specifications within the laser's operation manual.

For the ti-Series laser, SYNRAD® recommends the PS-48 DC power supply which provides a maximum of 50A at 48 VDC. AC input requirements for the PS-48 supply are 180-264 VAC, single phase (1Ø), 9.4 A max (@208 VAC), 47-63 Hz. Please refer to the corresponding power supply manual located on our website.

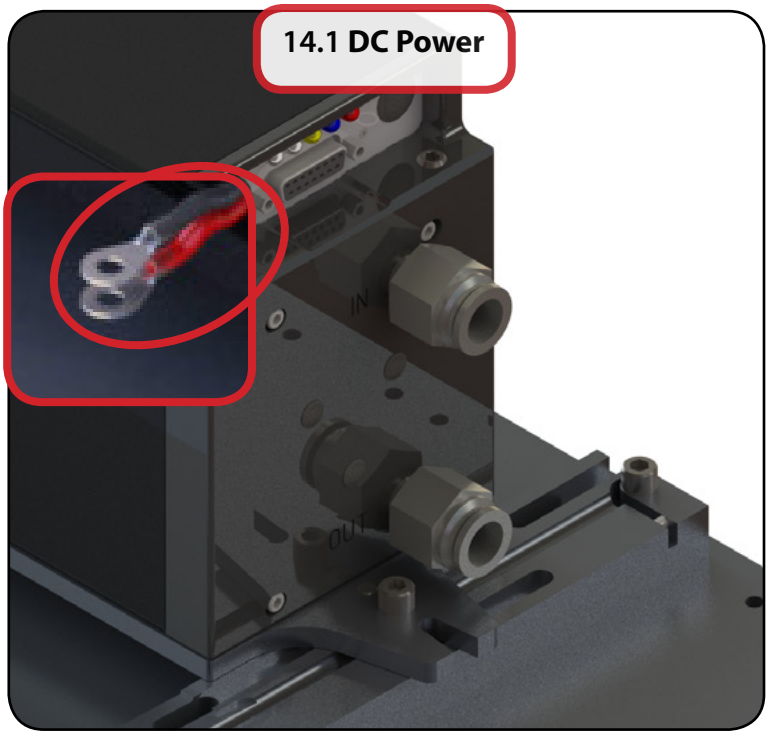
Do not reverse polarity when connecting the DC Power cable between the DC power supply and the ti-Series laser. Damage to the power supply may occur!

Because AC input connections and requirements vary from facility to facility, customers must provide the AC power cable or wiring.

Attach the red (+) wire(s) from the DC Power cable to the positive (+) 48 VDC output terminal and attach the black (-) wire(s) from the DC Power cable to the negative (-) 48 VDC output terminal.

14. Connect the negative (**black**) and the **positive** (**red**) DC power into the **laser's power** supply.

15. Connect one side of the 180–264V AC line to the input terminal labeled "AC/L".



16. Connect the other side of the AC line to the input terminal labeled "AC/N".

17. On the AC input section of the PS-48 power supply, connect the ground wire, typically green, to the input terminal labeled with the ground symbol.

Control Connections:

Important Note: All control connections to Firestar ti-Series lasers are made through the 15-pin User I/O connector on the laser's rear panel. The User I/O port receives power commands from SYNRAD's UC-2000 Universal Laser Controller, or FH marking head, and also serves as the connection point for auxiliary signals between the laser and any parts handling, automation, or monitoring equipment.

Warning
Serious personal injury

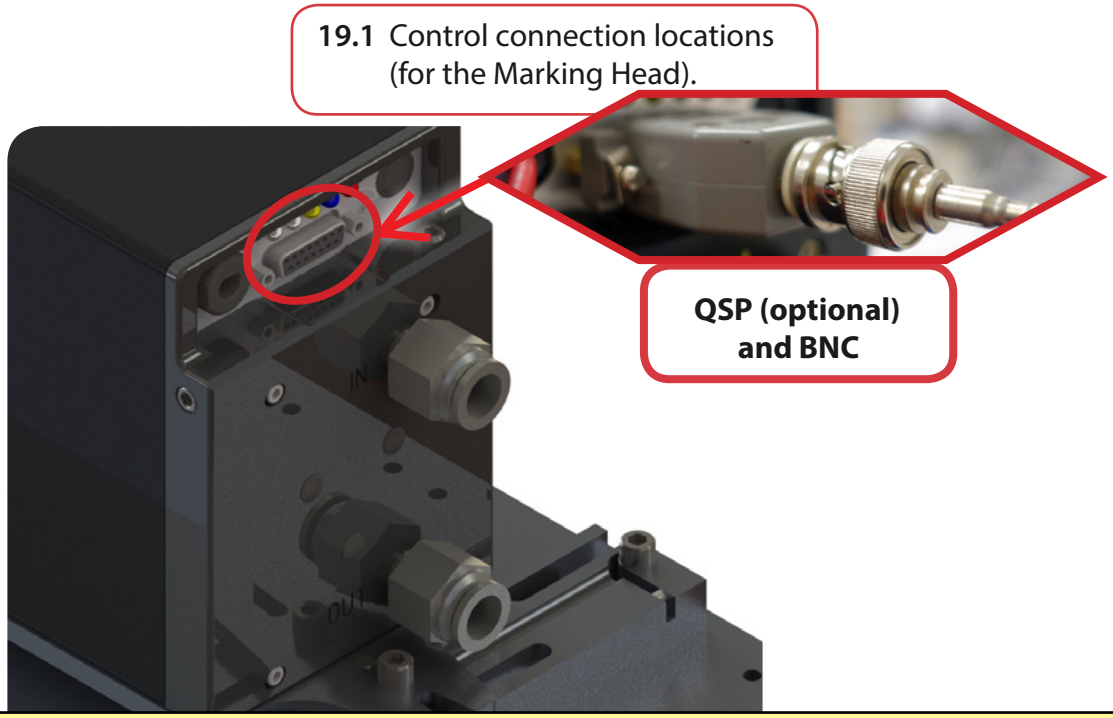
Always use shielded cable when connecting your PWM Command signal source to PWM Positive/PWM Negative inputs.

In electrically-noisy environments, **long lengths of unshielded wire act like an antenna and may generate enough voltage to trigger un-commanded lasing.**

18. Connect the ***laser's* control BNC** interface to the **Marking Head's laser control port**.

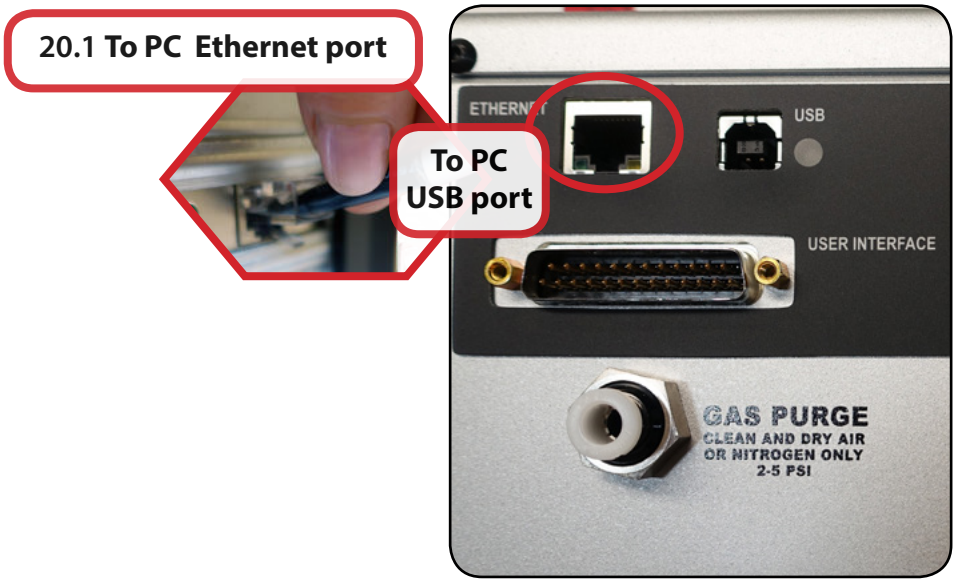
Control Connections (Continued):

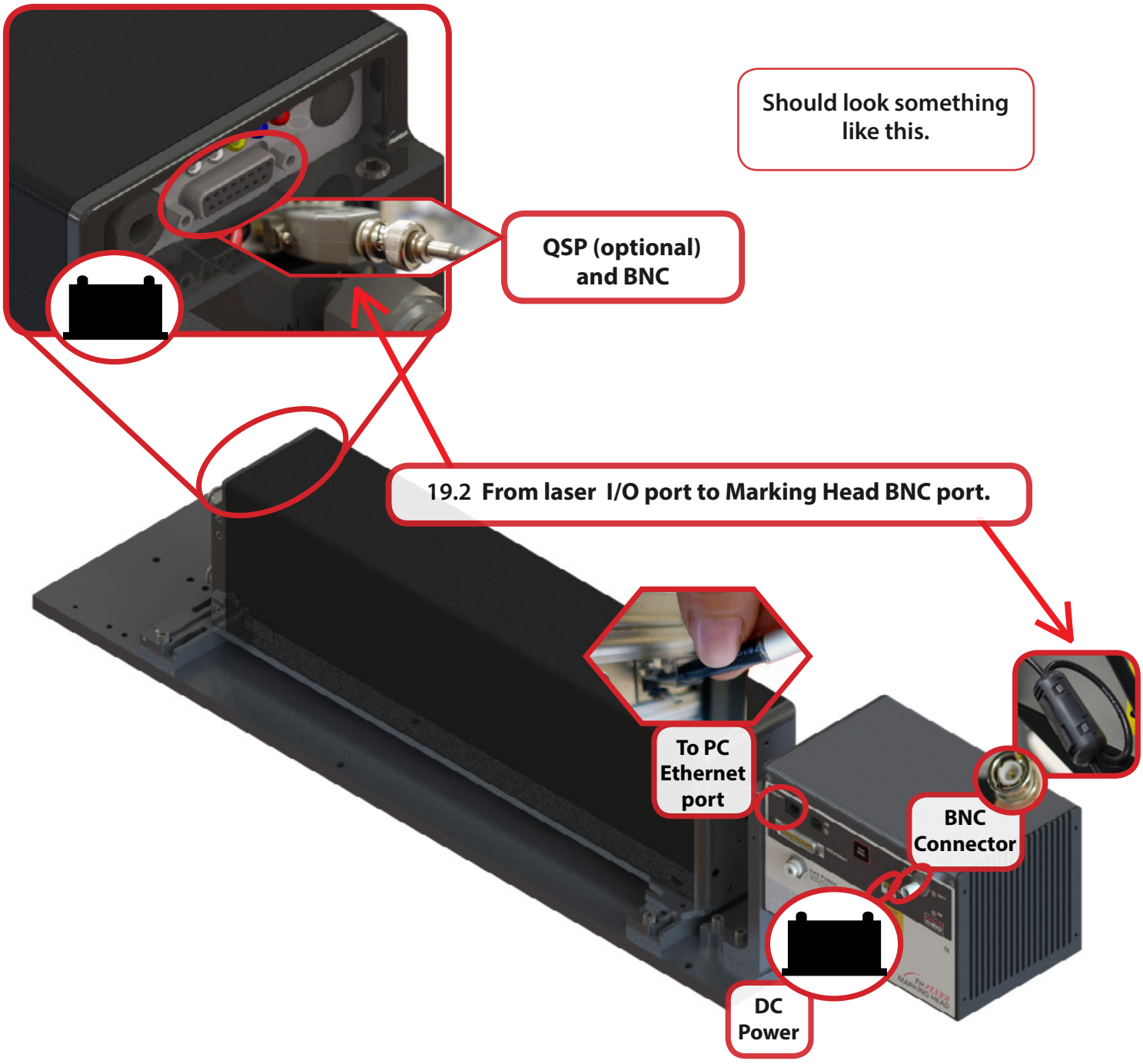
19. Connect the ***other end of the BNC cable to the control input, 15 pin User I/O, via the Quick Start Plug QSP (Optional)*** located on the rear end of the laser. (Refer to the figure on the following page.)



Caution: The ***Quick Start Plug*** bypasses the laser's safety interlock function, potentially exposing personnel to hazardous ***invisible*** laser radiation.

20. The Ethernet connector is ready to be plugged into the PC's Ethernet port and the USB cable is ready to be plugged from the FH Flyer Marking Head to the PC.




Should look something like this.
QSP (optional) and BNC
19.2 From laser I/O port to Marking Head BNC port.
To PC Ethernet port
BNC Connector
DC Power

Control Connections (Continued):

Laser Markers are pre-configured at the factory to a fixed address of 192.168.100.100. This allows you to make a peer-to-peer Ethernet connection. Your computer's Ethernet settings are determined by your facility's computer network. The FH Marking Head requires a connection to a computer with a static IP address if not connected to a local network (Peer to Peer). Reference the FH Flyer Operation Manual located on our website for more information.

Set your computer's static IP address

21. Disconnect the computer from your local network.

22. Turn off Dynamic Host Configuration Protocol (DHCP), if enabled, and create a static IP address for your computer.

Note: The exact steps may vary depending on your operating system.

a From the Start menu, go to Settings and choose Network Connections.

b Double-click on the appropriate Local Area Network (LAN).

c Locate the LAN's Internet Protocol (TCP/IP) properties.

d Select "Use the following IP address:" and enter the following information:

IP Address: 192.168.100.101
Subnet Mask: 255.255.255.0

e Click OK to submit the changes.

Laser Marking Software (WinMark®):

Important Note: Prior to installation of the WinMark pro laser marking software on your computer, review the requirements in the WinMark pro Operation Manual, remove power or unplug the USB cable from the FH Flyer marking head to prevent windows from arbitrarily assigning a USB driver that is not compatible with Flyer's USB port protocols.

(WinMark®) v6 Software Installation:

Note: **Find the WinMark pro v6 Software release notes** on our website. Refer to WinMark's website for supported operating systems and the WinMark Pro Operation Manual.

17. Before upgrading to a newer version of WinMark pro, backup all existing .mkh mark files and uninstall prior version(s) of WinMark pro software.

18. **Download the latest version 6 WinMark pro driver** from our website https://www.synrad.com/synrad/docroot/products/marking_heads_software/winmark-sw. Exit all programs prior to Installation.

19. To install WinMark pro v6, and associated device drivers on a Windows® 7 or Windows® Vista™ operating system, right-click the **setup.exe** file and choose '**Run as Administrator…**'.

Important Note: When upgrading from a v4 build to version v6, the WinMark Pro installer automatically performs a "clean install" because v6 is uses a different subset of registry keys. The "Perform Clean Installation" and "Keep Current Program Settings" options are grayed out to indicate this installation is a "clean installation".

Upgrading from one v6 build to another does allow the option of preserving existing WinMark settings in the computer's System Registry. Choose Yes to preserve current WinMark Pro v6 registry settings including custom date code formats, object defaults, shift codes, auto startup info, and saved serial numbers. Choose No to erase all previous WinMark v6 Registry entries and perform a clean installation.

Note: Due to Microsoft's implementation of registry virtualization, Windows Vista may require you to log on as an Administrator to perform certain functions like file importation or to save custom date code formats.

20. To install WinMark Pro v6, and associated device drivers, on a Windows® operating system, double-click the **setup.exe** file.

21. WinMark Pro v6 is a Microsoft .NET™ Framework-based application. If Microsoft .NET Framework Service Pack 1, or higher, is not installed on the computer, the installer will prompt you to click '**Accept**' to install the .NET Framework. You must have the .NET Framework runtime and associated files installed to run WinMark Pro.

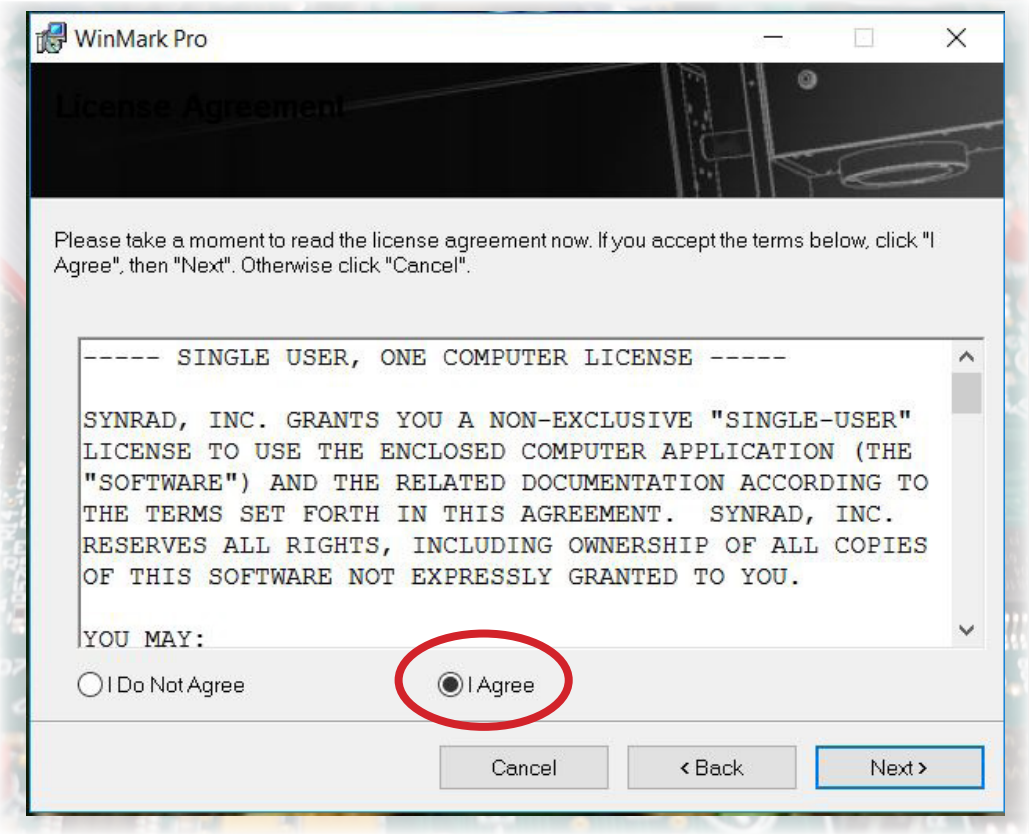
WinMarkpro v6 Installation (continued):

Note: If WinMark Pro is un-installed, the .NET package is not removed, because these files may be used by other applications installed after the original WinMark installation.

22. When the .NET Framework installation us complete, reboot if prompted to do so. Otherwise the WinMark installer will continue.

23. If Microsoft C++ Redistributable x86 file runtime components are not installed on the computer, the installer will prompt you to click '**Install**' to install C++ Redistributable files. You must have these files installed to run WinMark Pro.

24. Follow instructions in the installer dialog boxes to complete the WinMark Pro installation. You must click '**I Agree**' to accept the WinMark Pro license agreement and continue the installation.

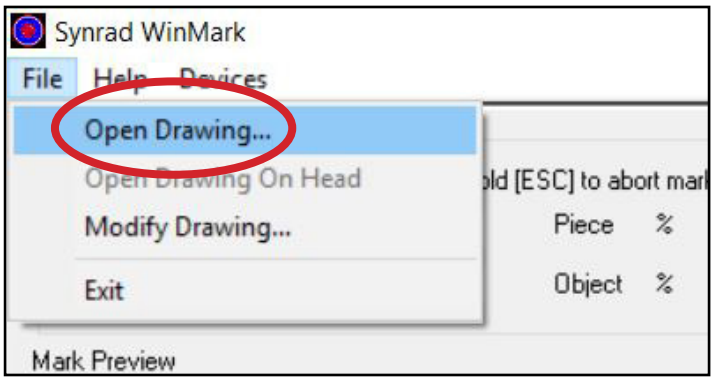


25. After installation is complete, remember to turn on any anti-virus software.

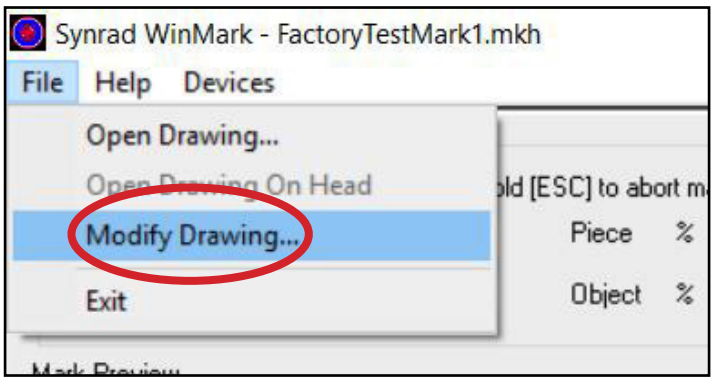
WinMark Launcher:

26. As part of the software installation, WinMark Launcher (Launcher.exe) is placed in the Program Files/ WinMark folder and a shortcut is placed on the desktop. Launcher allows non-administrative operators to load existing .mkh files for marking without opening WinMark's Drawing Editor by selecting the '**Open Drawing...**' from the file menu.

26.1 Opening an existing *.mkh file.

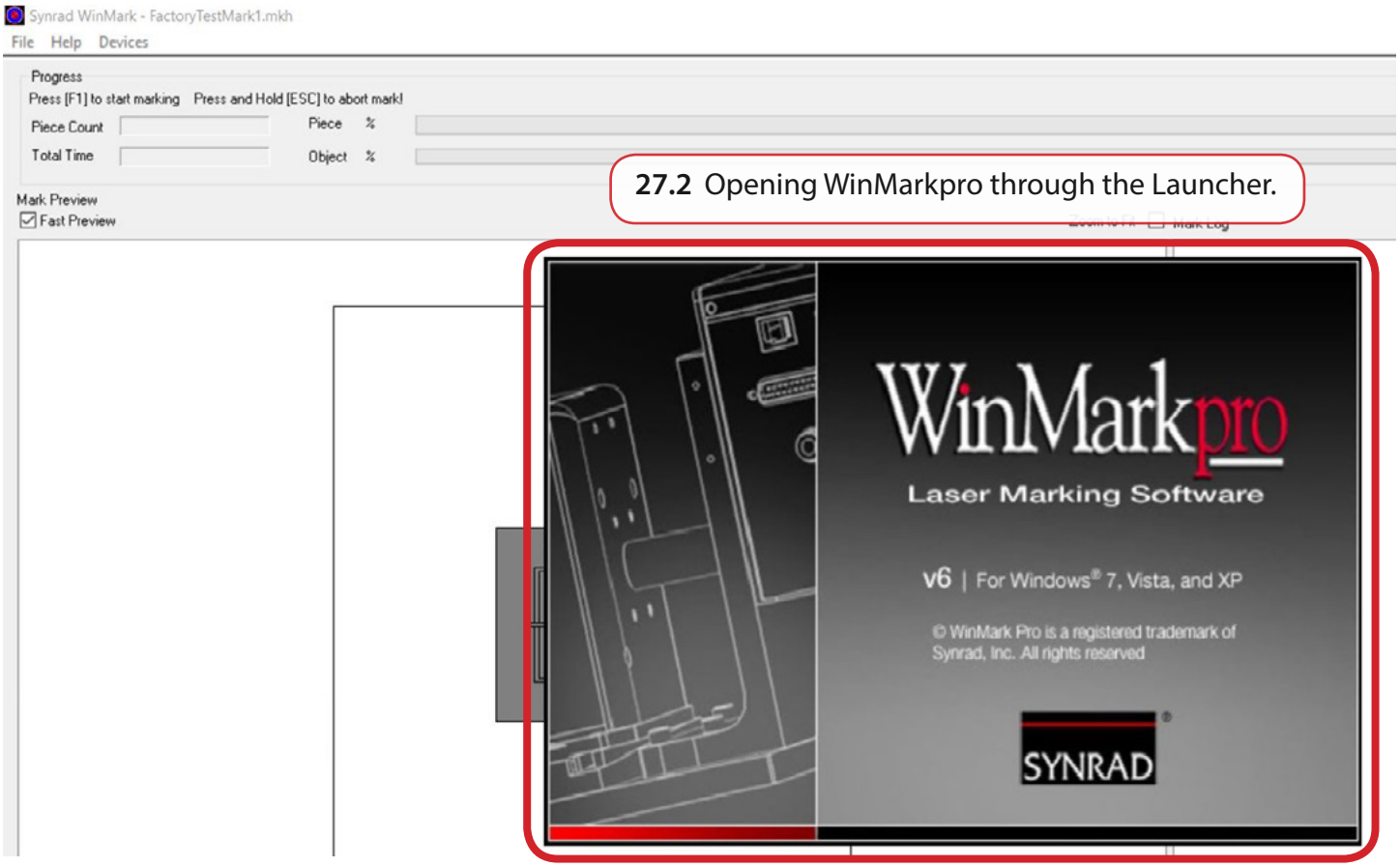


27.1 Modifying an existing *.mkh file.



27. To add an Admin password so operators cannot modify a drawing select '**Modify Drawing...**' which then opens the WInMarkpro application.

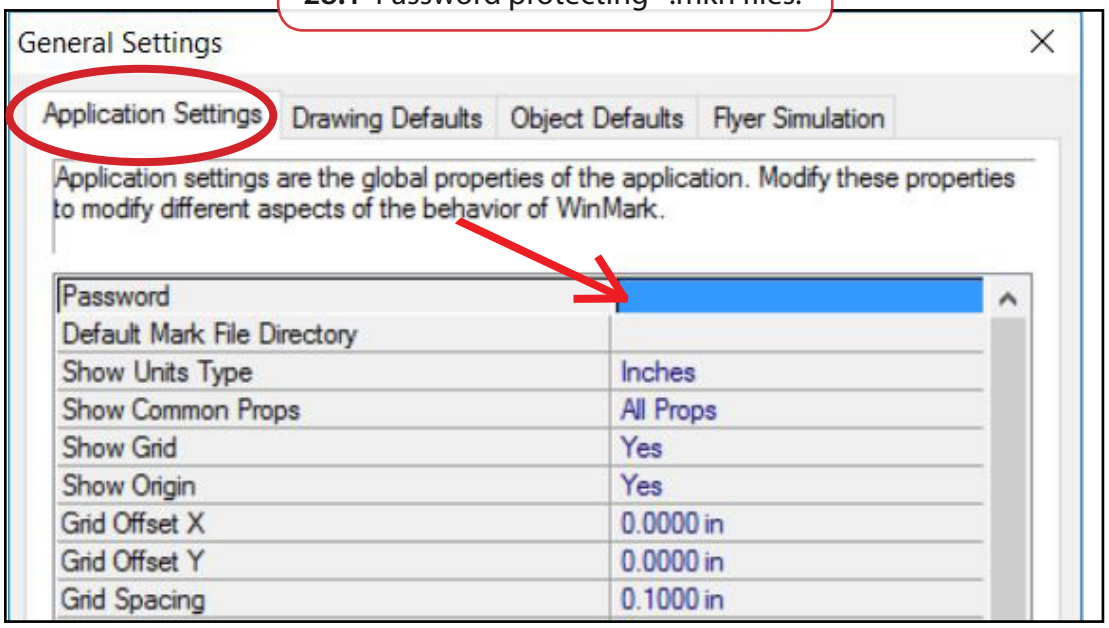
27.2 Opening WinMarkpro through the Launcher.



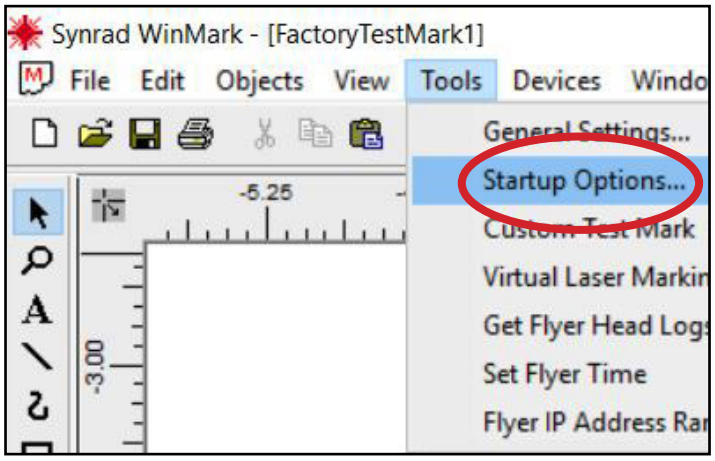
WinMark pro:

28. Once the WinMark Pro application opens, click the '**Tools**' menu and select '**General Settings...**'.

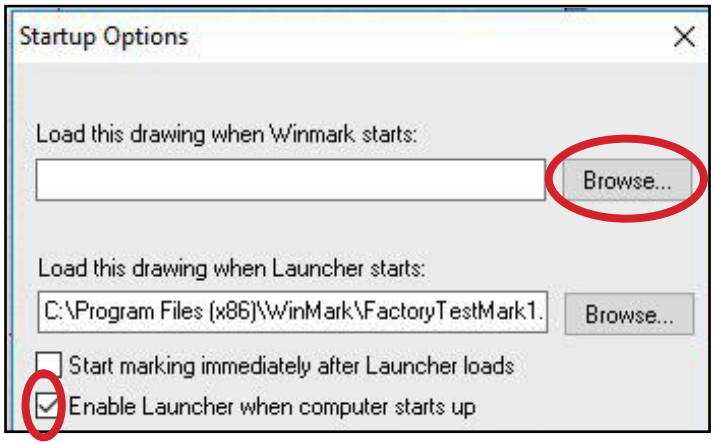
28.1 Password protecting *.mkh files.



29. Using WinMark Pro's '**Startup Options...**' within the Tools menu, Launcher can be configured to load a specific file and to start marking automatically when the computer is powered up.



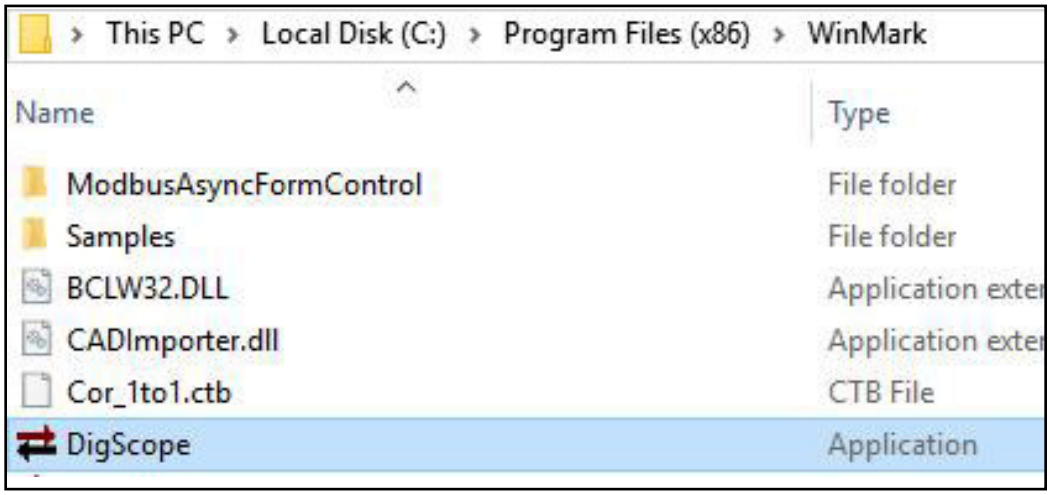
29.1 Modifying an existing *.mkh file.



29.2 **Browsing** to the desired startup-file, and **automatically launching** upon computer startup.

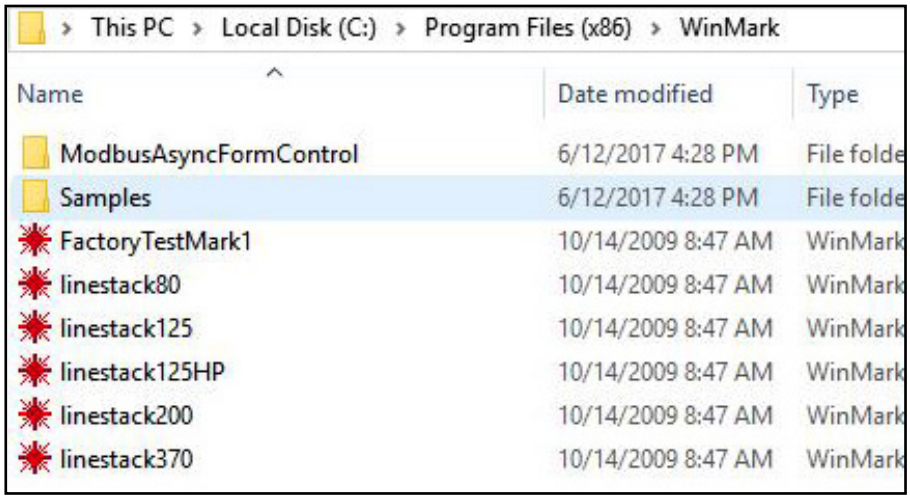
WinMark Digital Scope:

30. Digital Scope (**DigScope.exe**) is a stand-alone program included in the **WinMark** folder. Use Digital Scope to test individual inputs and outputs, turn the laser beam on or off, or adjust the laser's output power level. This "manual" control is especially useful when testing or troubleshooting I/O connections to/from the FH Flyer marking head.



30.1 Digital Scope Application on the WinMark Pro Software CD.

31. The Samples folder is also placed in the WinMark folder during installation. This folder contains a sample communications DLL; Microsoft® Visual Basic®, Microsoft® Visual C++®, and Microsoft® C#® (in a .NET™ framework) sample code that demonstrates the use of WinMark's ActiveMark™ control methods; a folder of importable bitmap and vector graphics files; and sample mark files illustrating all of WinMark Pro's available stroke fonts.



31.1 Samples folder on the WinMark Pro Software CD.

WinMark File Import Filters:

WinMark Pro automatically loads the File Import Filters during installation. These filters allow you to import a wide variety of graphic file formats. See the WinMark pro Operation Manual for details.

After the un-install is complete, some WinMark components, like .MKH mark files, will remain. To completely remove all WinMark-related files, go to C:\Program Files and delete the WinMark folder.

Uninstalling WinMark Pro:

If you decide to remove WinMark pro software from your computer, perform the following steps:

41. Click the '**Start**' button on the taskbar.

42. Select '**Programs**' and then locate the Synrad WinMark pro folder.

43. Click the '**Uninstall**' Synrad WinMark icon.

44. Follow the on-screen instructions.