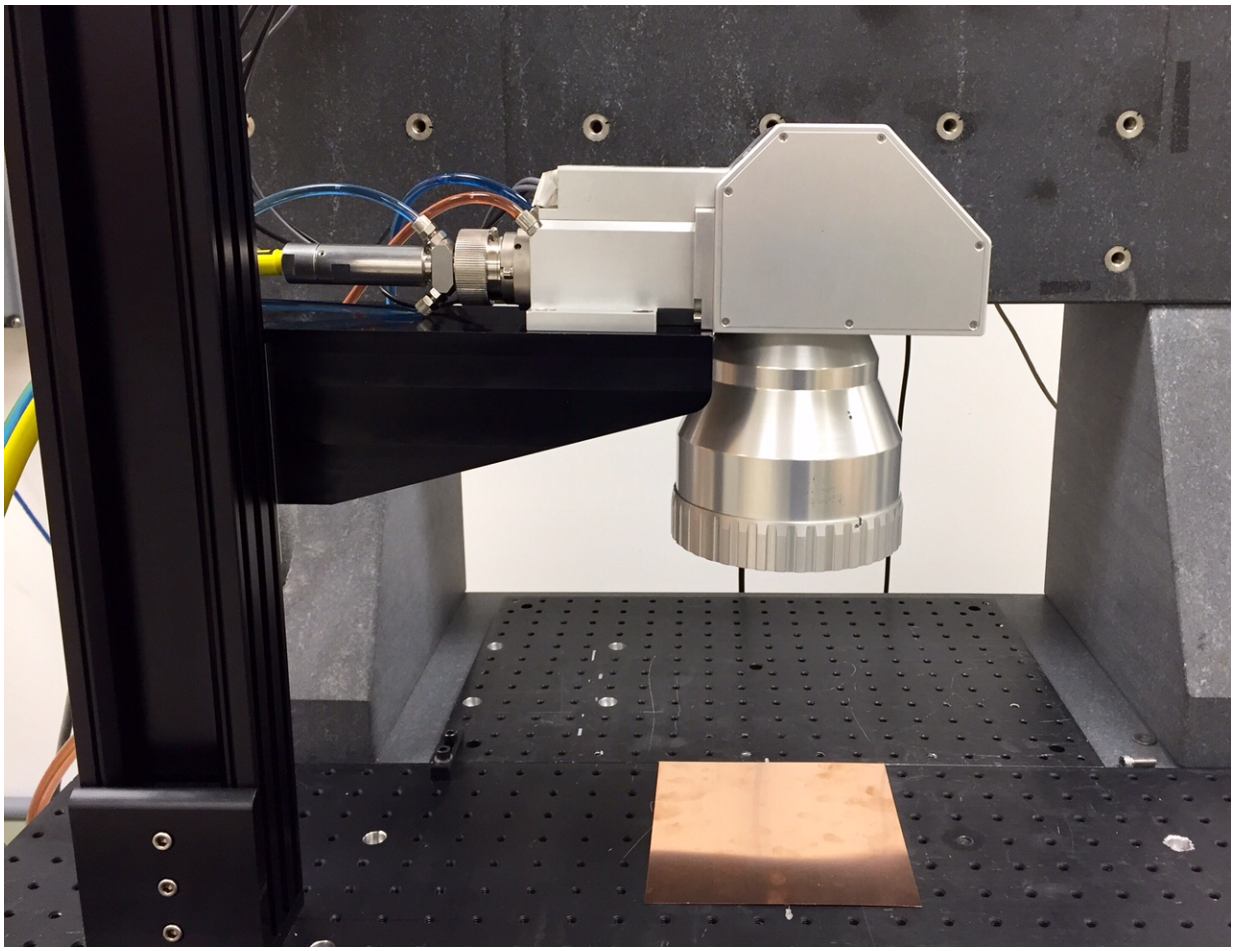
Mid Power Scanner

Quick Start Manual

Johanna Ylanen
Hamilton Pupo
Applications Engineers

Set Up Overview

- The delivery fiber is connected to the scanner via a standard QBH connector.



- IPGWeld-software is used to control the scanner and the laser.

Set Up Requirements

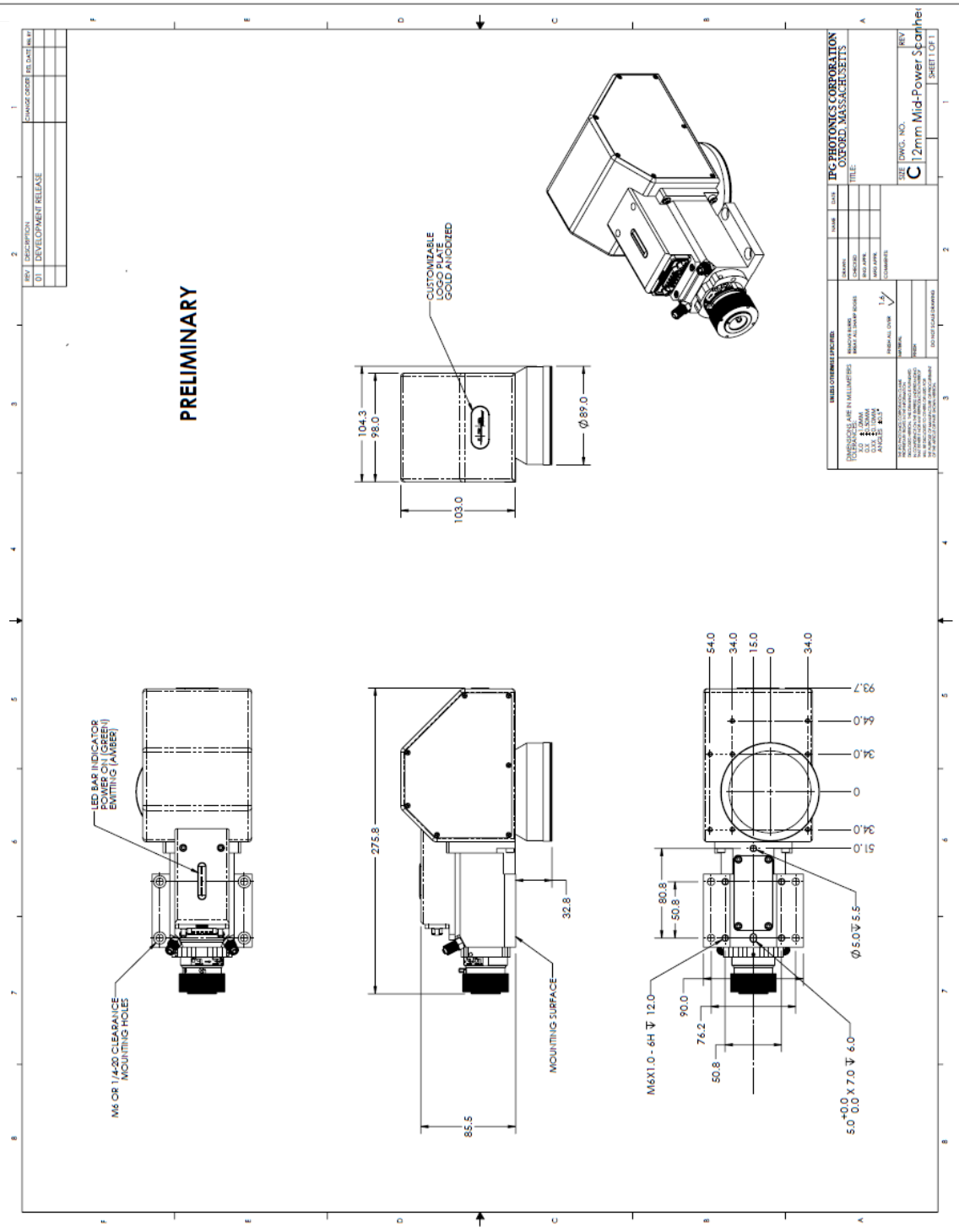
- Two power supplies for the scanner:
  - 24 V / 10 A for the galvos
  - 24 V / <1 A for housekeeping

  (See wiring diagrams below for further details)

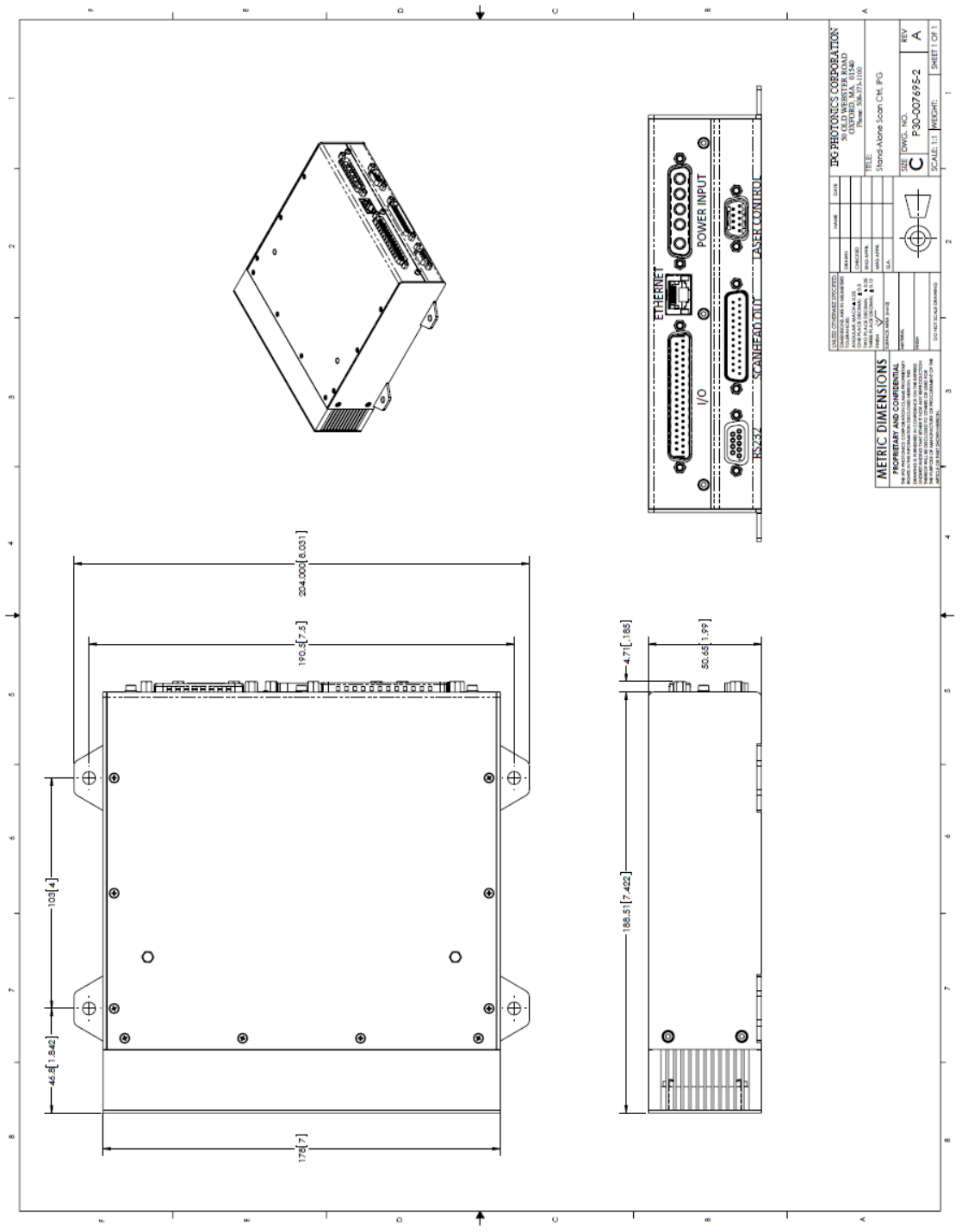
- Water cooling for the scanner head (If laser power > 1kW):
  - DI water, temperature 25-30 C
  - Flow rate minimum 0.75 l/min

- Air knife is recommended to protect the cover slide window from contamination (IPG part number: P30-007947)

Mechanical layout - Head

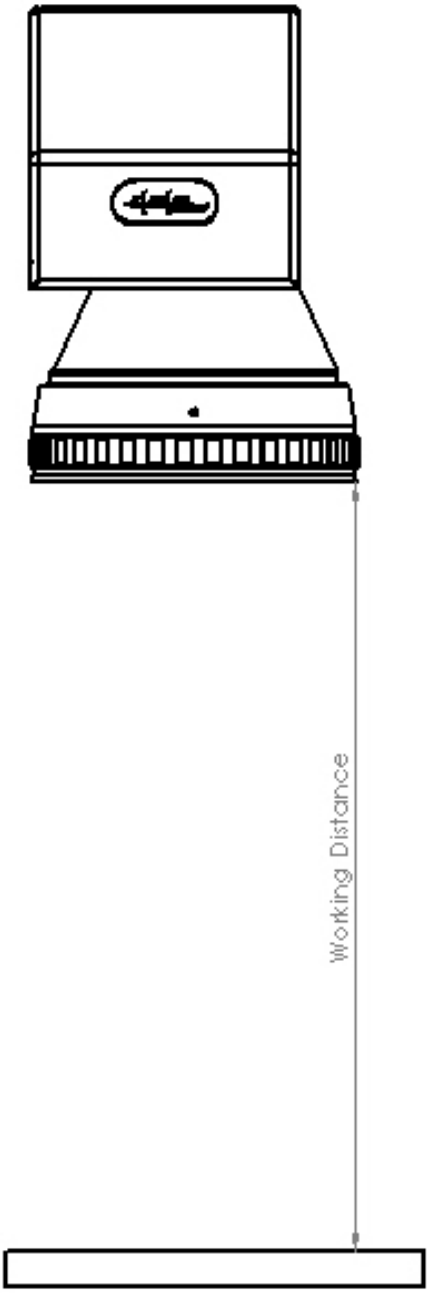


Mechanical Layout - Controller



Lens Options and Working Distances

Working distance is measured from the last mechanical surface on the head, the bottom of lens assembly, as indicated on the picture to the right



Mid Power Lens		
Lens FL	Marking Field	Working Distance
160 mm	80 x 80 mm	136 mm
254 mm	160 x 160 mm	244 mm

Low Power Lens		
Lens FL	Marking Field	Working Distance
110 mm	80 x 80 mm	TBD
160 mm	110 x 110 mm	TBD
254 mm	150 x 150 mm	TBD

Power supply

Power connector

The power connector is a DB 5W5, located on the scanner controller, and it is supplied with the laser

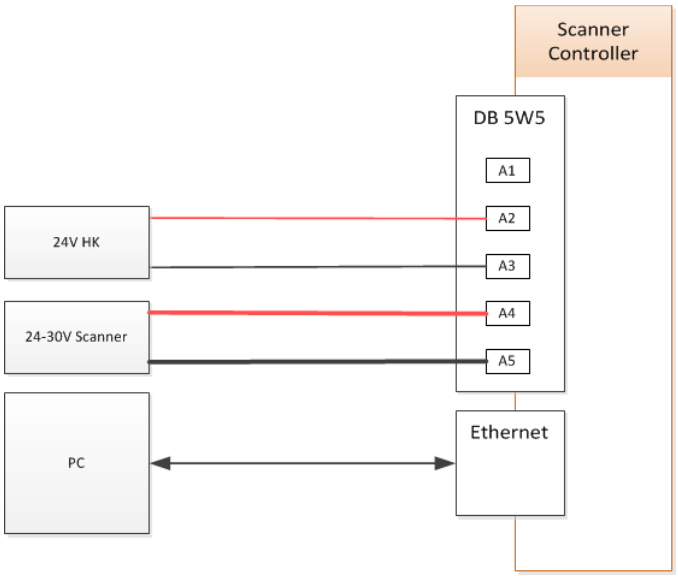
Power Requirements and Power Pinout

System	Voltage	Current
Laser HK	24V +/- 5%	< 1A
Scanner	24-30V +/- 5%	10A Peak - 2A Average

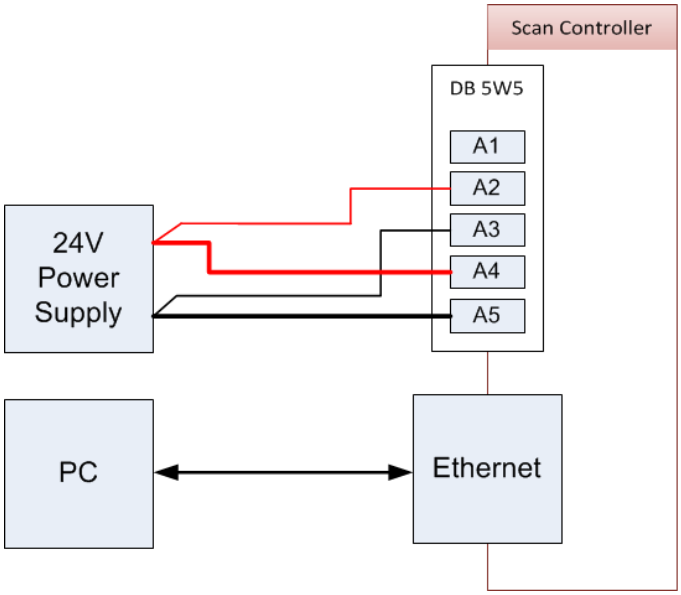
Pin	Function	Description
A1	Not Used	
A2	+V Laser HK	House Keeping Power 24V
A3	Return	Return For HK
A4	+V Scanner	Isolated Scanner Power (+V)-(-V) = 24V to 30V
A5	-V Scanner	

Power Supply Configurations

Configuration 1 – Separate Supply



Configuration 2 – Single Supply

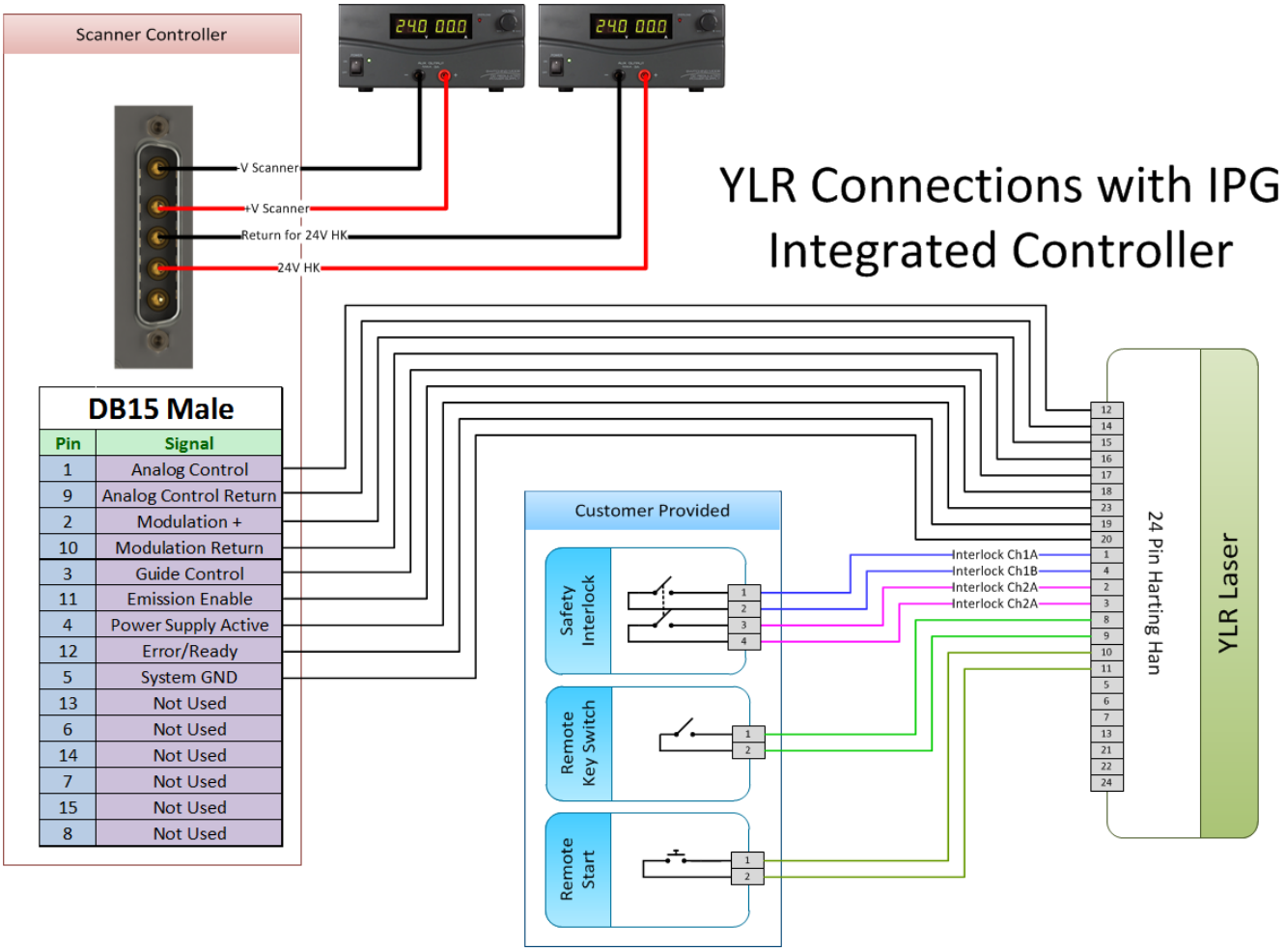


Notes:

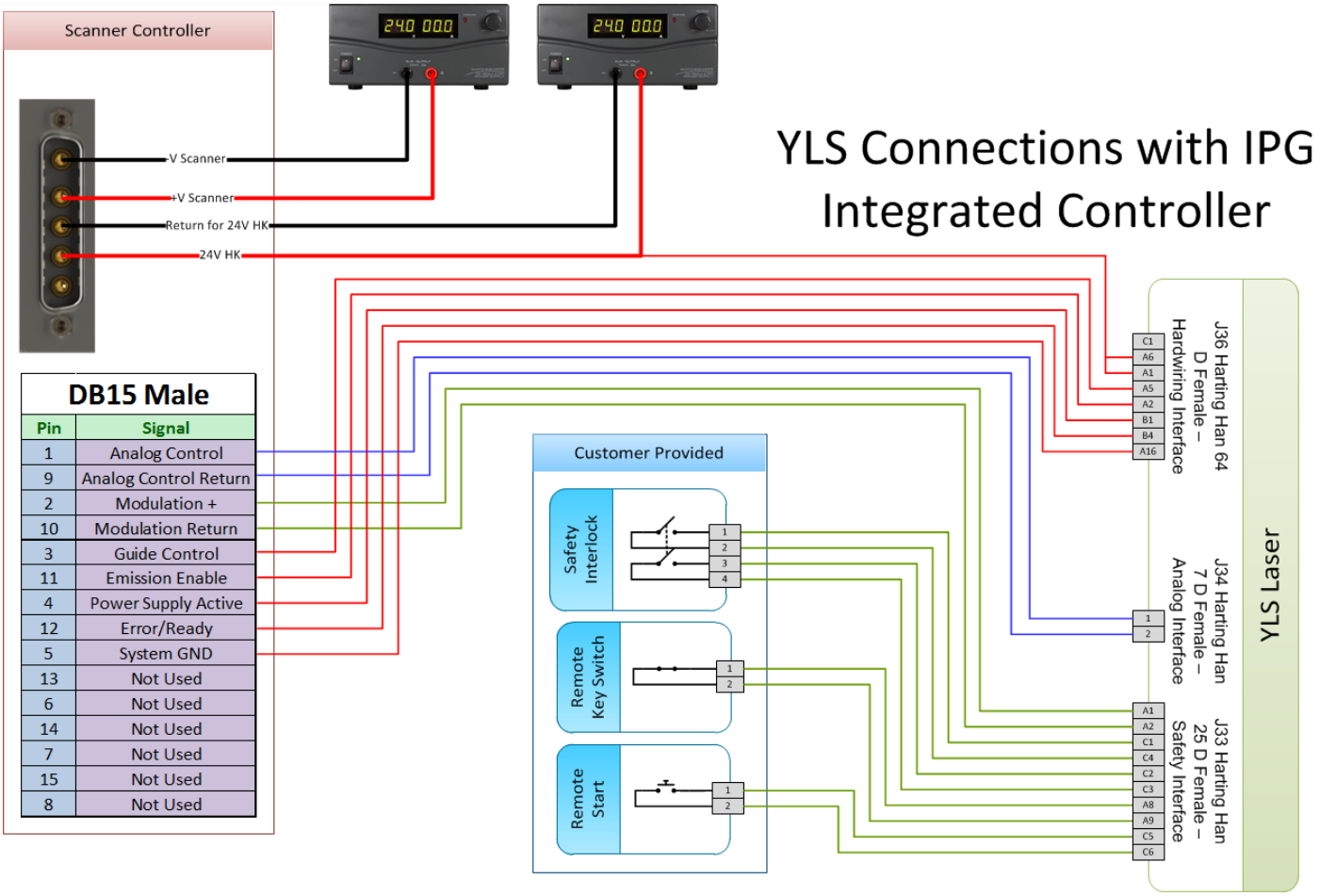
1. Power supply must have excellent transient response
2. Power supply return must not be connected to earth ground

Customer supplied wiring – YLR lasers

Customer is responsible for making additional cabling based on the schematics below. All connectors are supplied with laser, customer must supply only wires. The wiring is different depending on the laser source used.



Customer supplied wiring – YLS Lasers



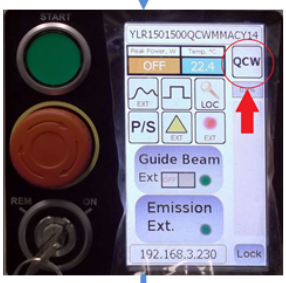
- Optionally, Remote Key Switch can be a NO contact, but laser will not power up in REM mode if this contact is open
- Pin C1 of connector J36 can also be used along with Remote Start. After Remote Start is pulsed ON for the first time (or if the E-Stop has been reset), the laser can be turned on and off by a HIGH or LOW signal on C1
- The above schematic does not display the beam switch selection pins, but a beam switch channel must be selected prior to starting the laser, otherwise a **Interlock Error** will occur. In order to clear the error, a functioning BS channel must be selected and the laser must be reset, either through LaserNet or using the reset pin
- If any signal output from the laser is required, 24V must be supplied to B15 on connector J36. Please check laser manual for details

Laser Source Setup

YLR

QCW Mode

Key Switch **ON**



Key Switch **REM**

Load correct LaserSpecification.xml

CW Mode

Key Switch **ON**

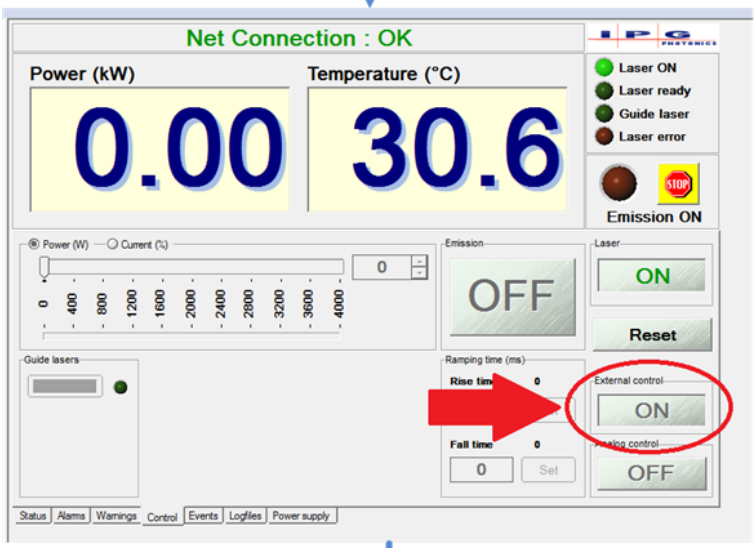
Key Switch **REM**

Load correct LaserSpecification.xml

Laser Source Setup

YLS

Key Switch to **ON**



Key Switch to **REM**

Load correct LaserSpecification.xml

Software Requirements

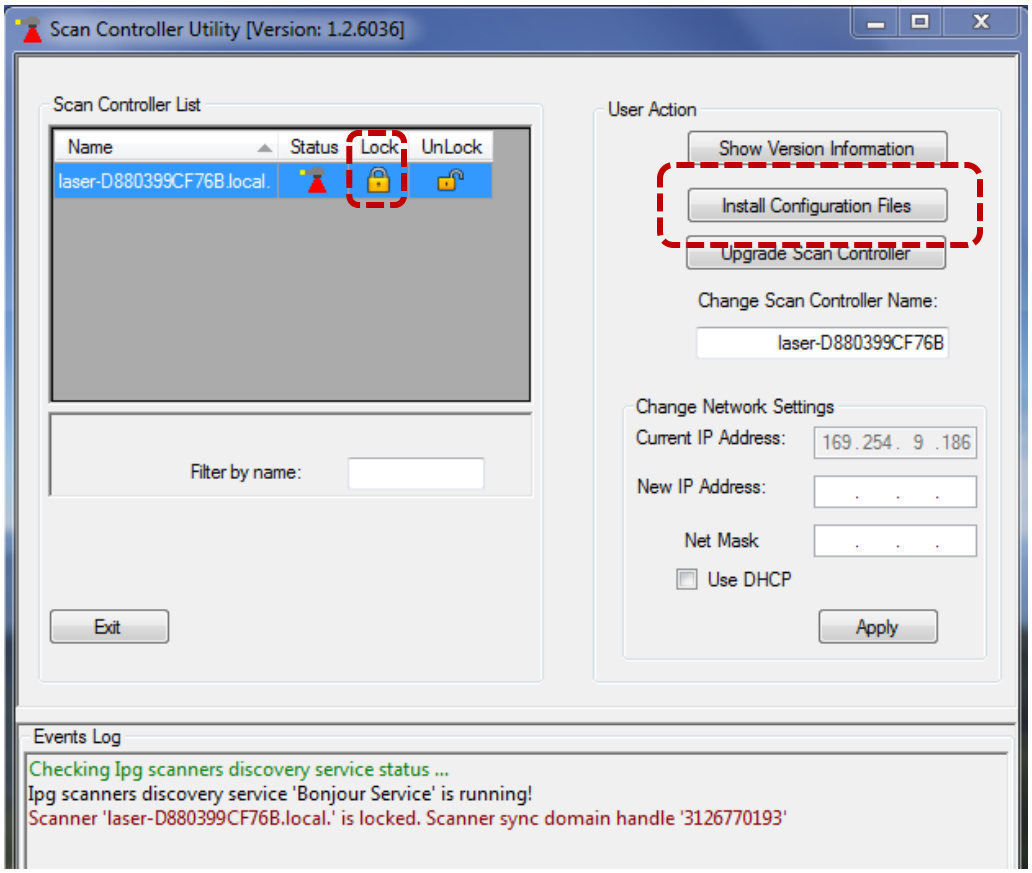
- The required programs can be downloaded on http://software.ipgphotonics.com/

- Go to “Welder”-subfolder and download and install the following programs:
  - ScanPack
  - IPGWeld
  - Scan Controller Upgrade Utility

Configuration Files

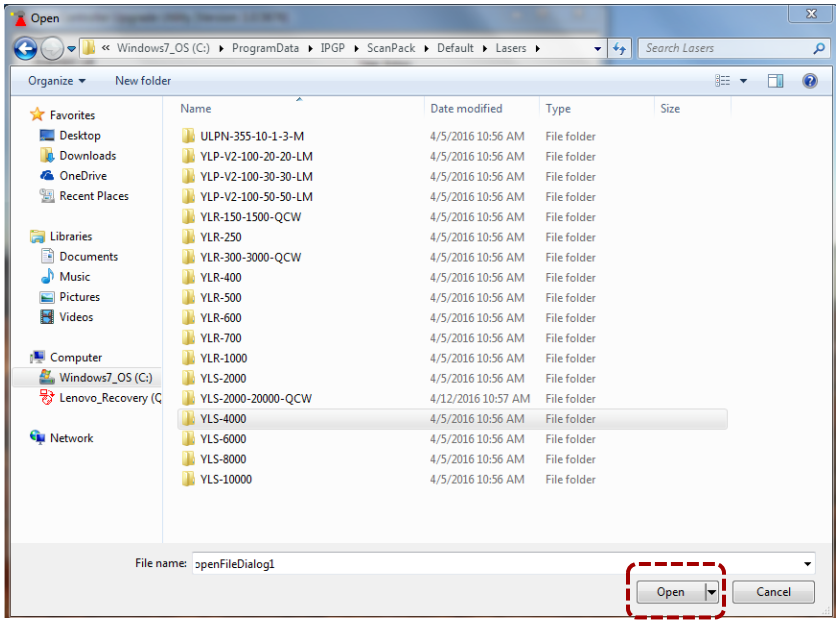
Before you start running the scanner via IPGWeld, open Scan Controller Upgrade Utility to select a correct configuration file for your laser:

1. Hit “Lock”-button for the scanner in the menu. Once locked, select “Upgrade Configuration Files”

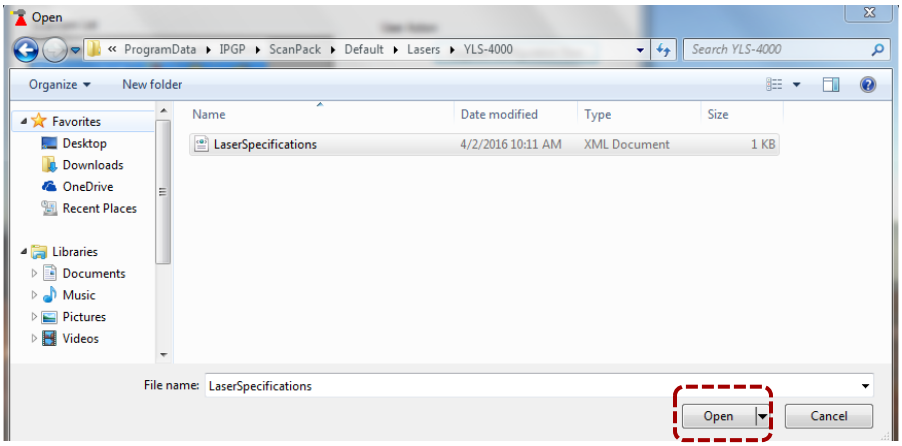


Configuration Files

2. In the Open-window, go to C:\ProgramData\IPGP\ScanPack\Default\Lasers\ and select the laser from the list appropriately:

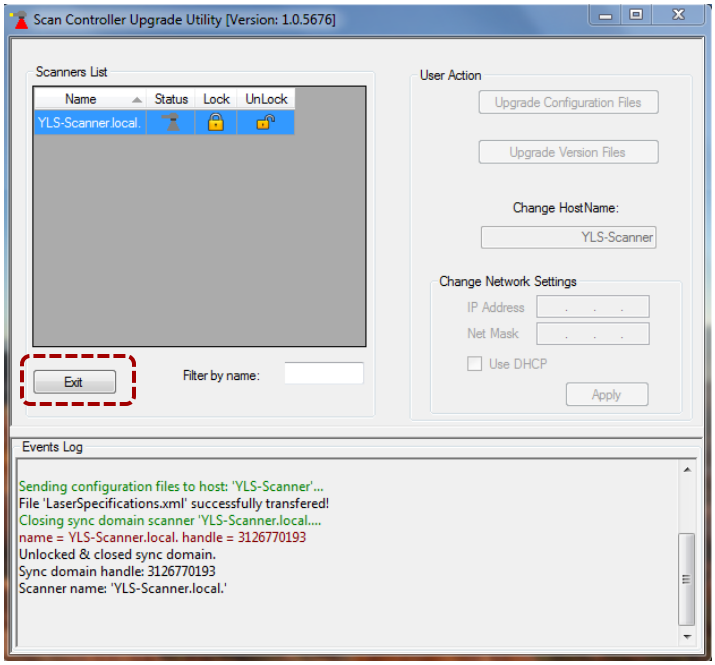


3. Under the Laser-folder, select “LaserSpecifications”-file and hit “Open”.



Configuration Files

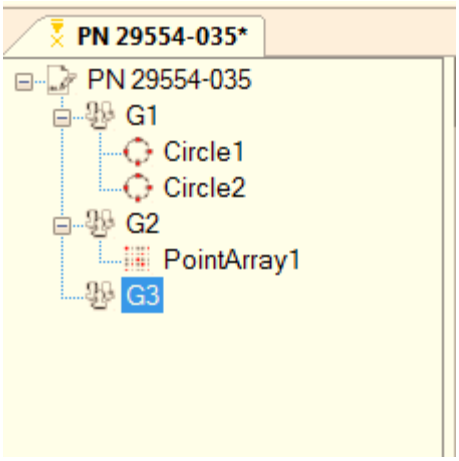
4. Once the configuration file has been transferred, hit the “Unlock”-button in the scanner menu and exit Scan Controller Upgrade Utility.



IPGWeld – Getting Started

- Open a new worksheet by Ctrl+N or by hitting  button

- The structure of the welding job is shown in the Job Explorer-tab. Each job is divided in groups (G) of objects. You can create new groups by Ctrl+G or hitting Create Group button in the toolbar 

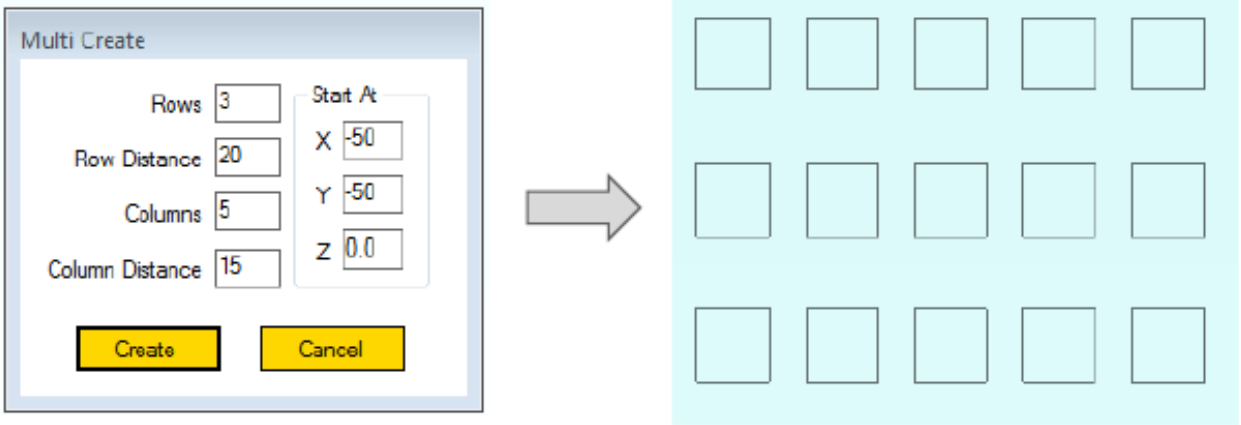


- Before drawing / importing a new object in the workspace, select a group in the Job Explorer (if none of the groups is selected, the drawing tools will be disabled).

Drawing Tools

- In the Tools-menu, as well as on the toolbar, you can find drawing tools for basic shapes, like lines, circles, points and spirals:

- To create arrays / draw duplicates of an object, hit Ctrl-button and select the feature from the toolbar. This opens Multi Create-window, where you can define the number of the objects to be drawn as well as the spacing between them. For example:

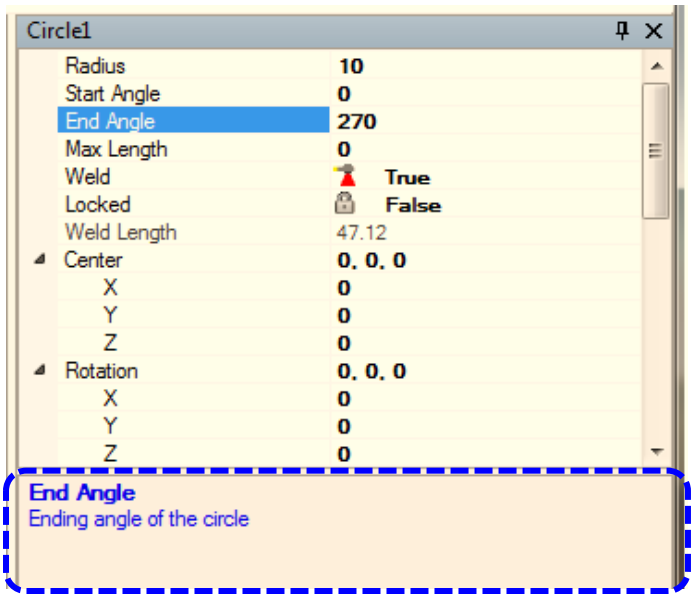


- Once the array has been created, the properties each object can still be modified separately (see pages 10-12).

Drawing Tools

- Vector files (.dxf, .dwg and .stl formats) can be imported using “DXF” and “STL” functions under the Tools-menu.

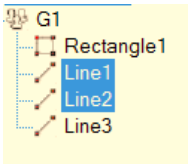
- Once the object has been drawn / imported, its properties (size, location, etc.) can be modified in the Parameter-window:

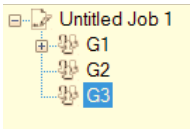


- When a certain parameter is highlighted in the menu, an explanation on this feature is given in the info box below.

Editing Tools

- Under Edit-menu, you can find Copy- (Ctrl+C) and Paste-functions (Ctrl+V). To copy-and-paste an object in the workspace:
  - Highlight the desired object(s) in the Job Explorer-tab
  - Hit Copy / Ctrl+C
  - Select a group in the Job Explorer-tab, where you want to paste the copied objects
  - Hit Paste / Ctrl+V

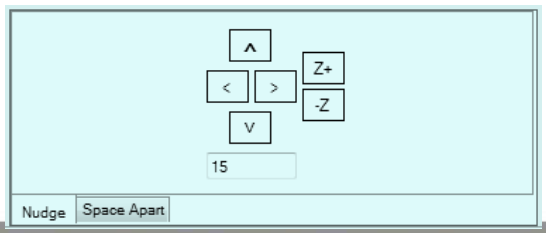




- To remove an object from the workspace, highlight the object in the Job Explorer-tab and hit Delete.

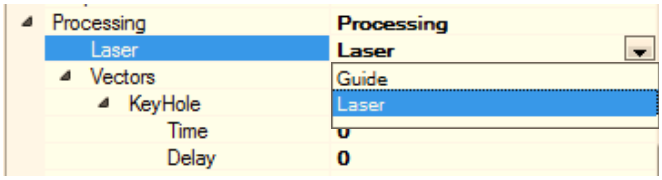
- To move objects in the workspace:
  - If moving a single object, you can select the object and modify its location coordinates in the Properties-window:

  - If moving multiple objects, highlight the desired features in the Job Explorer-tab. A Nudge-tool appears on the right side of the workspace. Using the arrows you can move the selected objects in x-, y- and z-direction:



Welding Parameters

- The welding parameters can be modified in the Properties-window:
  - In the drop menu under Processing-tab, you can define the beam to be used for each object in the workspace. If there are features you don't want to weld (e.g. alignment marks), select "**Guide**" in this drop menu. For features to be welded, select "**Laser**":

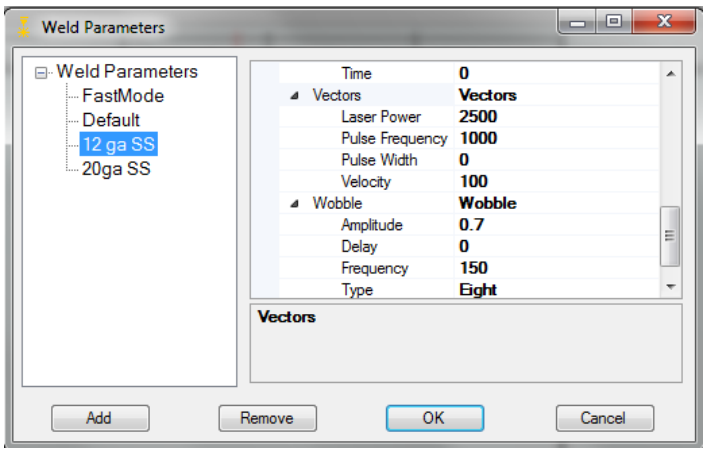


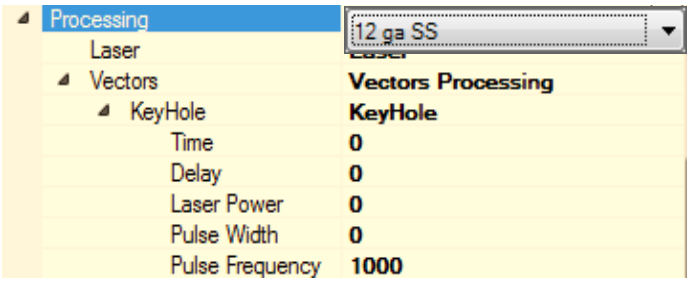
  - **KeyHole**-parameters (duration, laser power & pulsing settings) can be used to initiate the keyhole in the workpiece before the actual welding process starts. This option is beneficial when narrow, deep penetration welds are preferred.
  - **Vectors**-parameters define the process settings (welding speed, laser power & pulsing settings) for the actual weld.

Welding Parameters

- Fine tuning options for welding parameters:
  - **Wobble**: Four different wobble modes (Circle, Line, Figure 8, Figure ∞) with various amplitudes and frequencies can be used to improve the quality and consistency of the weld.
  - **Power ramping**: Select an object in the Job Explorer-tab and hit Energy Offset-button. Energy Offset-window opens up. Here you can create ramp up- / ramp down profiles for the laser power used in the welding process.

- Hint: You can create a welding parameter database for frequently used materials / parameters:
  - Go to View / Welding Parameters. In this window you can save welding parameter profiles.
  - Once you have saved a set of process parameters in this window, you can choose this welding profile in the Processing-drop menu – the fields for the welding parameters will then be autofilled.



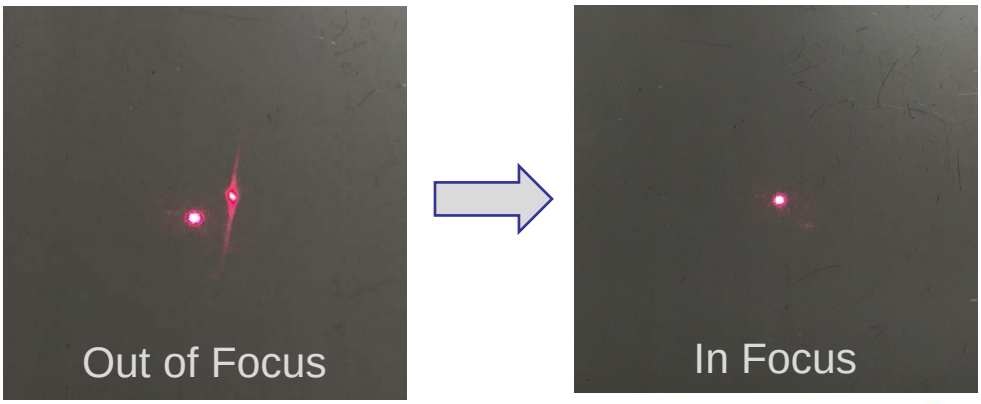


Focus Height Settings

- The Mid Power head can have a “Focus Assist Beam”. This is an optional item and it should be specified at the time of purchase

- The focal zero point can be defined by using the guide beam of the laser and the “focus guide beam” (assuming this option is installed):
  - Turn on both guide beams by hitting Toggle Focus Guide-button (or F7):

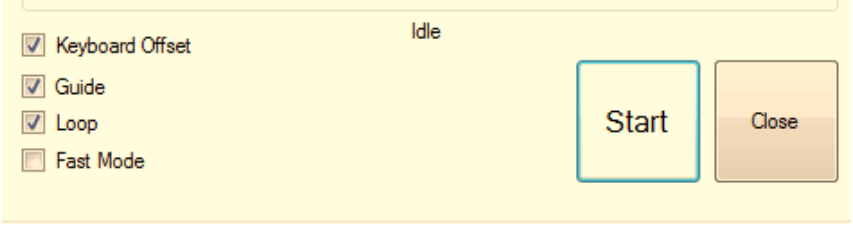
  - Looking at the workpiece, if the guide beams are overlapping, the focus height is correct. If the guide beams are separated, adjust the height of the workpiece (or scanner), until the guide beams overlap:



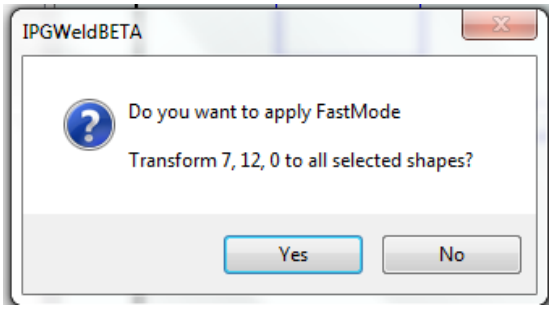
Previewing & Welding

- Hit the Start Welding-button (or F5) – Welding-window opens up:

  – If “Guide”-option is unchecked, the program will be run in the actual welding mode – firing the laser using the parameters defined on pages 11-12.



  – If “Guide”-option is checked, “Keyboard Offset”-option appears. If you start running the welding preview with this option enabled, you can adjust the position of your object using Ctrl- and arrow-buttons on the keyboard.
  – After this, when you close the Welding-window, the program will prompt for confirmation for the new position:



Appendix A – I/O DB37 Connector

Pin	Name	I/O	Active	Description
1	Active	Output	High	Mark in Progress
20	GND	3VTTL		
2	Ready	Output	High	Ready/Waiting for Start
21	GND	3VTTL		
3	Error	Output	High	Error Condition
22	GND	3VTTL		
4	Start	Input	Low	Start Signal - Pulled up to 3.3V
23	GND	3VTTL		
5	Stop_	Input	Low	Stop Signal - Pulled up to 3.3V
24	GND	3VTTL		
6	GPIO[0]	Input/Output		General Purpose I/O - Pulled up to 3.3V
25	GND	3VTTL		
7	GPIO[1]	Input/Output		General Purpose I/O - Pulled up to 3.3V
26	GND	3VTTL		
8	A_Axis_A+	Input/Output		Axis A Phase A or General I/O [1]
27	A_Axis_A-			
9	A_Axis_B+	Input/Output		Axis A Phase B or General I/O [1]
28	A_Axis_B-			
10	A_Axis_Z+	Input		Axis A Home or General I/O [2]
29	A_Axis_Z-			
11	B_Axis_A+	Input/Output		Axis B Phase A or General I/O [1]
30	B_Axis_A-			
12	B_Axis_B+	Input/Output		Axis B Phase B or General I/O [1]
31	B_Axis_B-			
13	B_Axis_Z+	Input		Axis B Home or General I/O [2]
32	B_Axis_Z-			
14	C_Axis_A+	Input/Output		Axis C Phase A or General I/O [1]
33	C_Axis_A-			
15	C_Axis_B+	Input/Output		Axis C Phase B or General I/O [1]
34	C_Axis_B-			
16	C_Axis_Z+	Input/Output		Axis C Home or General I/O [2,3]
35	C_Axis_Z-			
17	FiberInterlockA0	Out		Fiber Interlock is Safe with closed contact
36	FiberInterlockA1	Relay		
18	FiberInterlockB0	Out		Fiber Interlock is Safe with closed contact
37	FiberInterlockB1	Relay		
19	GND	Out		Logic Ground

Appendix A – I/O DB37 Connector

– Notes:
  - 1 – Signal uses RS-422 standard
  - 2 – Differential (RS-422) or Single Ended (on Z+ Pulled up to 3.3V)
  - 3 - ClkIn/ClkOut Differential for synchronization to laser

If 24V I/O is required, IPG also supplies an external interface board under part number P30-003943 .