

IZI CODE

Laser marking system

F220

HARDWARE MANUAL



TAECHU ENGINEERING CO., LTD.

Revision.1.1

Document Information

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※ Warning



This product is a Class 4 laser product. The precaution concerning this class must be strictly observed.

The safety precautions mentioned and proposed in this manual must be strictly observed. Extra care during use is mandatory to minimize the possibility of equipment damage or personal injuries. Users must not abruptly disengage or apply strong force to the equipment as well as emitting the laser beam to humans. Severe damage can be caused when the laser beam touches the eyes of human. Therefore, users must use protection goggles to prevent eye injury. In addition, we recommend wearing safety glasses and other safety equipment since every direct/indirect exposure of laser beams are very dangerous.

The safety mechanisms and hazard prevention mechanisms supplied by IZI-CODE does not fully satisfy the local factory inspection organizations of clients, safety rules, and national regulations of the competent country, and it does not guarantee that it is in compliance with legal or other requirements. Therefore, the system installer shall be responsible for verifying any necessary regulations prior to installing the safety mechanisms to prevent potential hazards that may be caused by the laser marking equipment.

1. Laser Safety Information

1.1 Laser Type

Laser is categorized into many types depending on the stimulating mechanism. Laser beam radiation is very hazardous if exposed to human bodies. Consequently, many countries have established related requirements and compliance requirements, and the lasers are classified according to its level of risk.

ANSI Z136.1-2014

| | |
|----------|--|
| Class 1 | Lowest risk level, non-hazardous |
| Class 1M | Hazardous if using focused optical system |
| Class 2 | Blinking the eyes can prevent hazards (0.25 seconds) |
| Class 2M | Potential hazard even under 0.25 seconds of using focused optical system |
| Class 3R | Hazardous if laser beam enters the eyes |
| Class 3B | Hazardous if looking into visible or invisible laser beam source that may damage the eyes due to direct or indirect reflections. Reflected light at maximum output is also hazardous |
| Class 4 | Projecting direct or indirect laser beam is very dangerous Risk of causing damage to eyes, skin, or risk of fire Strict control measures are required |

1.2 Related Regulations

IZI-CODE laser system complies with the basic safety requirements of ANSI Z.136.1-2014(American National Standards Institute) and IEC60825-1 regulations (requirements), which are commonly applied internationally. Amendments to these regulations have recently been renewed. The amendments prescribe that only trained personnel shall have restricted access to the laser equipment, and signs indicating potential risks must be attached.

1.3 Management Method

Furthermore, laser products belonging to this class require extreme care when handling, and operation manuals, risk prevention mechanisms, etc. must be established to lower the class (risk level) for safer operation. We propose a management method that finely divides technical management areas and administrative management areas. Please strictly observe the management methods for implementation in your industrial site.

Technical Management Methods

- Technical management is an installation that are integrated in the laser system to contemplate the possible exposures.

Interlock System

- Interlocks are a common safety feature and are designed so that work can only be performed when the laser equipment is ready for operation. While the system operates and this signal activates, the error alarm LED lit and the laser stops working. Types of interlock includes UI interlock signals, laser source abnormality alarm signals, etc.

Access Key

- According to safety regulations, the equipment is designed to convey power to the laser source only after turning on the power and the access key.

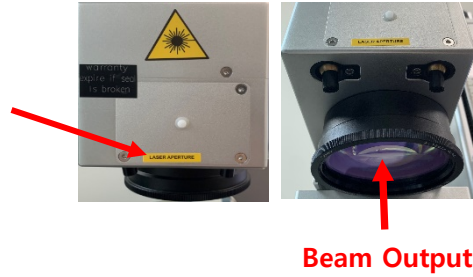
Administrative Management

- Administrative management refers to a guidebook that provides information for technical management, explaining regulation and operation.

Audible and Visible Emission Indicator



- Warning signs concerning exposure to radiation. Laser beams irradiate invisible infrared lasers, which may cause serious eye damage or burns. Therefore, safety stickers must be attached to the equipment to increase risk awareness for users.



- This label should be located at the entrance of laser and there is a label in front of the laser head. In hence, all users have to treat the equipment more carefully.

※ Warnings



When the laser system is operating, be aware not to expose your eyes or skin directly to the Laser beam emitting from the marking head lens.

(See picture above)

Use and Education for Personal Protection Equipment

- Eye Protection : Equip protection goggles depending on the laser type, wavelength and output level. (OD 7+, D LB6 + IRM LB7^b @ 950-1,080nm)
- Skin Protection : Do not expose your skins to the laser and clothes, gloves must be fire resistant.

Restrictions and SOP (Standard Operating Procedure) from the manufacturer company, Laser Safety Officer (LSO) or Laser Safety Committee

※ Laser Control Restriction



- Equipment must be used by a professional employee from the manufacturer or a laser safety manager.
- Access to the place where the laser is installed must be regulated for ensuring safety.

※ Standard Operating Procedure

- Operation manual and emergency measurements should be placed next to the equipment to use at any time.

Appropriate Environment for Installation

- Clean and Cool Area : The installation site must be isolated from dust, oil, or other contaminants. Such elements may lead to difficulties for maintenance and repair, or shorten the lifespan of the laser equipment. The fan opening of the controller and the head part must be kept clean at all times. Also, it is recommended to install a vacuum system or air conditioning system.
- A controlled room with warning labels : Preparations for potential hazards must be provided at all times, and safety must be the first and foremost priority. (Safety cover, authorized personnel only)

Fire and Electrical Safety



※ **All reflective objects must be removed from the laser installation area.**

- Fire safety: If the laser beam comes into contact with combustible substances, it may cause fire. In order to prevent such incidents, a fire extinguisher must be available near the laser equipment at all times. Also, in order to prevent laser beam reflections, adequate provisions must be made to all surface that surrounds the laser equipment, including the walls. The window curtains must be treated for flame resistance.
 - Electrical safety: Considering the fact that the laser equipment has high-voltage electrical circuits, an adequate electrical safety measures must be practiced at all times. Proper power must be supplied to the laser equipment and the use of extension cables for supplying power to the laser equipment is prohibited.
 - Electric shock accident: The laser equipment must be grounded and the bottom of the equipment must be free of moisture. Also, operators must have caution to prevent spillage of liquid over the laser equipment which could lead to unexpected electric shock accidents.
 - Inspection: Installation of electrical safety mechanism to prevent accidental laser irradiation is mandatory. Functional safety inspections on all cords, switches, circuit breakers, etc. must be performed on a regular basis.
-

1.4 Safety Warning and Sticker Information

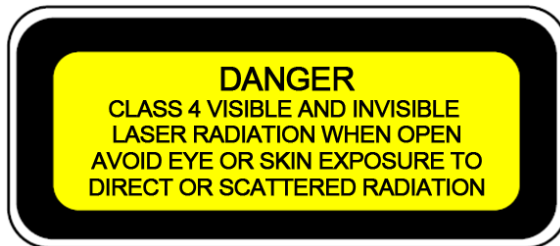
Label info

Safety Warning and Labels

- Laser Beam Warning Label 1
(Stick to top of marking head)



- Laser Beam Warning Label 2
(Stick to side part of controller and top of marking head)



- Laser Beam Warning Label 3
(Stick to the front-top part of marking head)



- Caution and Warning Label

- Laser Danger Label
(Stick to the top of marking head)



Label info

- Laser Aperture Label
(Stick to the front-bottom part of marking head)

Safety Warning and Labels

- Product Label
(Stick to the rear-bottom part of controller)



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

- Lens Label

2. Laser Introduction and Structure

2.1 Laser Introduction



IZI-CODE laser series are designed to mark (dynamic or static) serial numbers, desired characters, or images on the surface of paper or plastic manufactured products. Basic laser wavelength is 1,064nm and it is within the infrared range of the light spectrum meaning that it is not visible to our eyes.

The wavelengths generated from this laser system requires extra caution because it could potentially cause serious damage to the eyes. Also, damage to the skin or other body parts may vary depending on the laser's power level and exposure duration.

2.2 Before Starting



※ All users are required to wear a certified laser protection goggles at all times when operating a laser equipment that doesn't have a safety cover.

If you operate the equipment without understanding the function of each component, it may cause serious damage to the equipment. Therefore, it should be operated under the authorization of an expert or trained personnel after acquiring sufficient knowledge. This equipment must never be operated with interlocks or any other components disengaged. By turning OFF the Locker Switch (Main Power Switch), the product's power completely cuts off.

Box Contents

- The box includes a controller assembly and a head assembly on the top, securely packaged with PE foam. Various accessories (cables, manuals, etc.) are included in the bottom space.

Basic Parts & Accessories Provided

A list of parts and accessories given when purchasing the equipment

- Controller



- Marking Head



- Scanner Cable



- Key Interlock



- UI cable(Optional)



- Laser Power Key



- Power Cable



This is an AC Power Cable with two ferrite cores applied.

Model Name: ZCAT2035-0930

Manufacturer: TDK

- 112mm x 112mm Lens



- USB

Hardware Manual

Quick Start Manual

Software Manual

Software Backup File

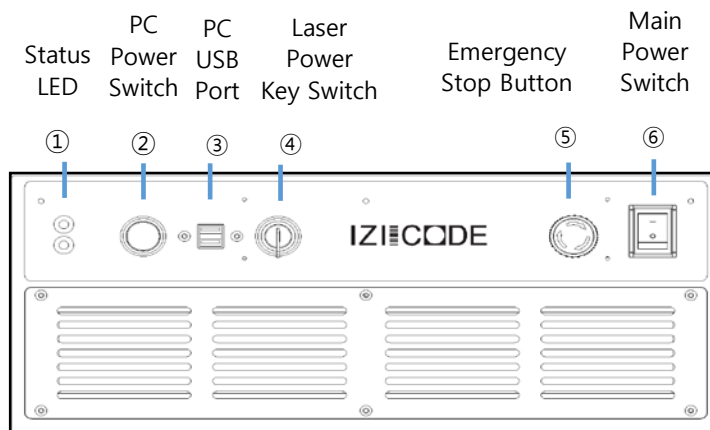
- QC Card, QC Report
- Fuse 2EA (Spare)
- Wrench Bolts 4EA (M6 *10)
- Square Spring Nuts 4EA

2.3 Structure

Hardware Components

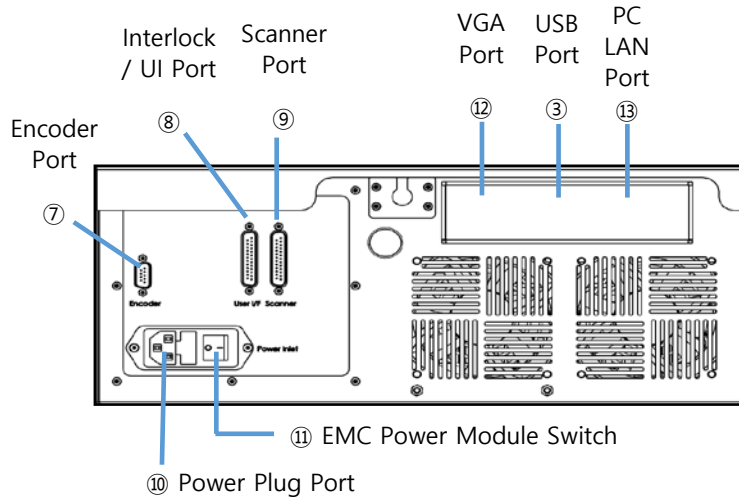
- IZI-CODE Laser F series is comprised with controller and marking head. The controller's interior consists of a power supply, laser source, and a signal processing system (Control board, interface boards, etc.).
- The marking head's interior are composed of laser head which emits the laser beam, scanner, F-Theta lens and other parts. The marking head and controller must be installed within 2m distance. Also, this product is capable of syncing with barcode readers and automated equipment processing system to be used as a Built-in equipment.
- The Controller fits into a 19" Rack (4U), and the marking head can be mounted by using the sliding spring nut on the bottom of the head (Intervals between nuts are 80mm) and M6 Bolts.

Front View (Controller)



- | | |
|---|--------------------------------------|
| ① | Ready (BLUE), Error (RED) status LED |
| ② | PC power switch |
| ③ | USB port (2 front, 4 rear) |
| ④ | Laser source power ON/OFF key switch |
| ⑤ | Emergency stop button |
| ⑥ | Main power ON/OFF switch |

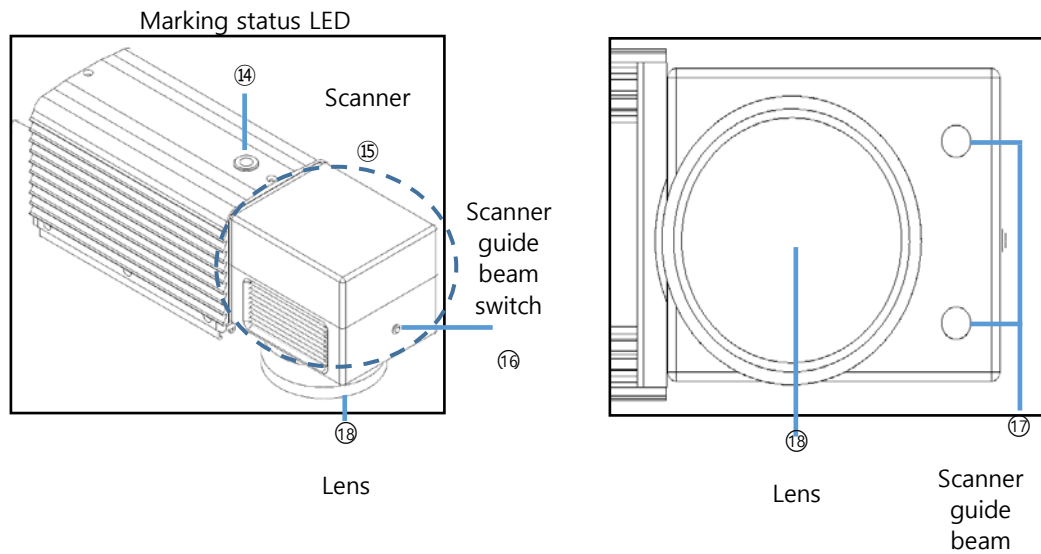
Rear View (Controller)



※ DC PORT, HDMI, DVI and Aux ports cannot be used.

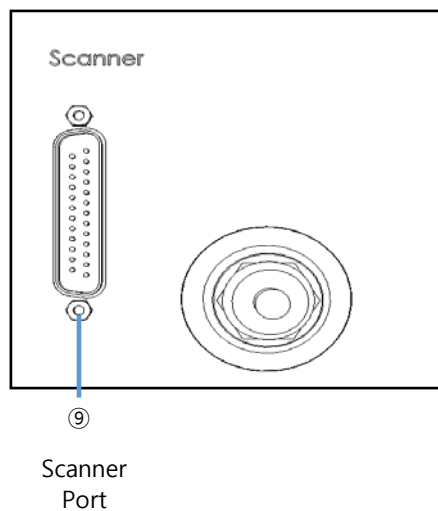
- ⑦ 24V Open collector type encoder port
- ⑧ Interlock key or UI cable port
- ⑨ Controller and scanner cable port
- ⑩ Power plug port for main power supply
- ⑪ EMC Power module switch
- ⑫ VGA Monitor port
- ⑬ PC LAN port (2 rear)

Front view (Marking head)



- ⑭ BLUE LED ON: Marking(in process) / BLUE LED OFF : Marking(ready to mark)
- ⑮ The scanner will target the object and emit a laser beam that were generated from the laser source.
- ⑯ Scanner guide beam ON / OFF switch
- ⑰ The interval between these two scanner guide beams are 65mm and its used for adjusting the height between the marking head and the targeting object(refer to page 34, focal length)
- ⑱ F-Theta lens (refer to page 34)

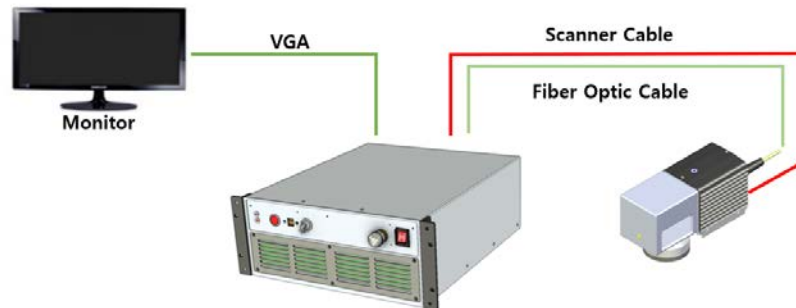
Rear View (Marking Head)



- ⑨ Controller and scanner cable port

Hardware Connection

- Each part of the laser marking system must be interconnected using shielded cables. When control signals are sent from the laser control board to the interface board attached to the controller, the interface board converts the received signals into an independent signal system to send to each control part.
- The independent signals converted from the control board are connected to the Fiber optic cable and scanner cable, allowing the laser source and scanner control unit to synchronize and mark the target.
- The connection terminals are illustrated in the image below. These connectors have been designed according to a pre-planned Pin map, thus, it must be connected correctly.



Schematic for the hardware contacting

- One of the power lead-in wires which is grounded must be separated from the power line and must be connected to the laser system at all times. The reason for using a ground connection between the laser system and the electrical power is for personal safety and system protection.
- In regards to operation safety, the ground connection can be regarded as low impedance (solely for safety purposes), which helps to protect the user and the equipment from the occurrence of dangerously high voltage while using the system. Impedance connection at high-frequency level cannot be presumed, and protection at high frequency cannot be guaranteed.



※ Warning

The electrical system must be grounded at all times, and the ground connection must be inspected for safe operation. The ground connection must not be removed for any reason.

System Structure

| | |
|--------------------------------------|--|
| Laser Beam Generator | A laser source which emits and controls the laser beam by receiving a signal from the electronic control part. |
| Scanner | The laser beam comes out from the source to reach the target surface by refracting through the reflective mirrors (X and Y mirrors) and F-Theta lens. |
| Electronics Control | It is the main part for controlling the marking system. It is largely divided into power control, scanner control, source output control, and external interface. |
| Cooling Unit (Forced Air Cooling) | Since lasers irradiate a lot of heat, it is necessary to maintain adequate system temperature at all times through a cooling system. IZI-CODE laser system contains a cooling fan installed inside the controller. |



※ Warning

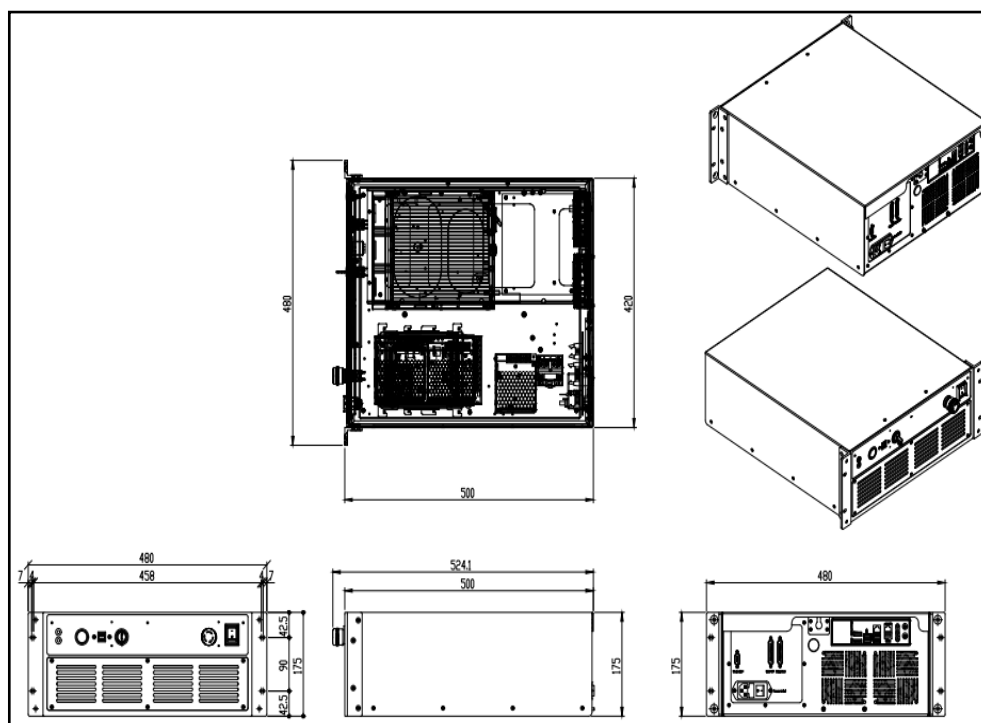
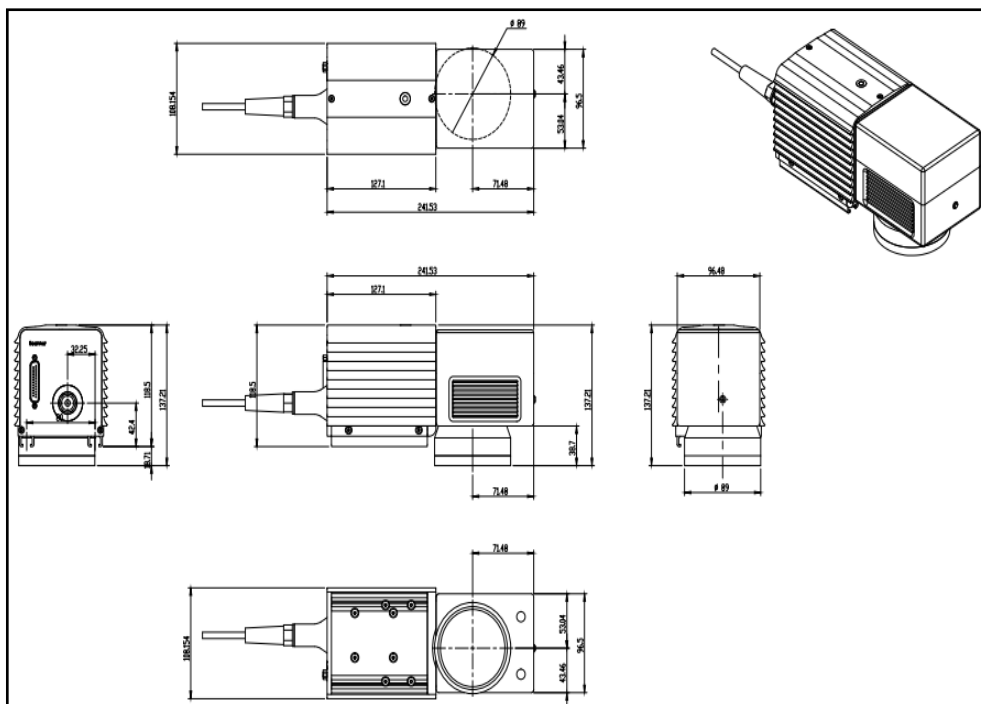
A specific amount of free space must be assured for the fan openings. Please be aware that obstructing the air circulation path could incur high temperature which could lead to laser malfunction.

2.4 Technical Information

Specifications

| | |
|-------------------------------------|--|
| · Model name | F220 |
| · Laser output | 20W (Wavelength: 1064 nm) |
| · Source guide beam output | Up to 15mW (Wavelength: 660nm) |
| · Scanner guide beam output | Up to 1mW peak (Wavelength: 655nm) |
| · Lens | 112mm X 112mm (Basic) 70mm X 70mm (Option), 174mm X 174mm (Option) |
| · Main power supply | 100~240VAC, 50/60Hz, 650 W |
| · Environmental condition | Temperature: 0°C(32°F) ~ 40°C(104°F), optimal workplace temperature Humidity: Not condensed from 10% to 80% without vibration |
| · Operation method | Pulse wave |
| · Pulse | 1~600 kHz / 25~600kHz (Full Power), 200ns |
| · Marking head | Laser Source Scanner F-Theta Lens |
| · Subsidiaries | Cables and other accessories |
| · Cooling method | Forced air cooling |
| · Weight | Total: 25.5kg Controller: 20kg Marking Head: 5.5kg |
| · Control | Full graphic interface software using PC Encoder, sensor, user interface (UI) |
| *Safety Specification | |
| · Used place | Indoor |
| · Pollution degree | 2 |
| · OVERVOLTAGE CATEGORY | 2 |
| · MAINS supply voltage fluctuations | ±10 % |
| · Altitude | Up to 2000m |

Hardware Schematics



3. Laser Operation

3.1 Order of Operation



※ Warning

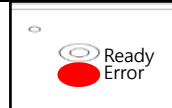
Using the equipment arbitrarily without following the guideline could cause injury from the emitted laser beam.

Preparation

- Check all connections and power cords.
- Connect the interlock key or UI cable to the User I/F port.
- Connect the scanner cable from controller scanner port to marking head scanner port.

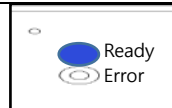
Power

- Turn ON the main power switch.
- Soon the error LED (red) will light up along with powering the system.
- The illuminating components (LED, normal lamp, warning lamp, etc.) connected to the UI cable will light.
- There is some noise when the audible components (buzzer, etc.) are connected.



Laser Preparation

- Turn the key switch (Laser Power) to ON position to activate the laser source.
- The error LED will turn off and ready LED (blue) will light up.
- The illuminating components (LED, normal lamp, warning lamp, etc.) connected to the UI cable will maintain its light.
- There is consistent noise when the audible components (buzzer, etc.) are connected.



PC Setup

- Press the PC ON switch to boot the PC.
- Later on, the PC ON switch (white) will light up.

Software Setup

- Run the EzCad software from your PC.
 - Check laser and software status.
 - Check marking data and parameter settings.
- ※ When creating new marking data, test the marking first before applying the parameters.

Start Marking

- Below the screen of the software, click the Mark button or press F2 to start marking.

3.2 Emergency Stop

Emergency Stop

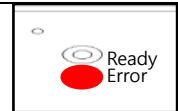
- Press the "Emergency Stop" button on the front panel when unexpected situations occur
- When pressed, the error LED will light.



3.3 Emergency Stop Release

Turn Off the Laser Source Power

- Turn OFF the key switch on the controller's front panel.
- Soon the error LED will light up.

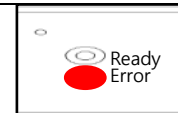


Environmental Inspection after Emergency Stop

- Inspect the cause of the emergency stop and the nearby environment to rearrange.

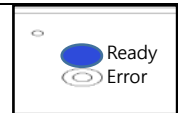
Releasing the Emergency Stop

- Turn the emergency stop button on the controller's front panel to return to its normal state.
- Soon the error LED will light up.



Laser Preparation after Emergency Stop

- On the front panel, turn ON the key switch to power the laser source.
- The error LED will go out and ready LED will light up.
- Check your target and start marking again.



4. User Interface

4.1 User Interface Pin Map (D-SUB 25P Connector)

| Pin No. | Pin Name | Type |
|---------|----------------|------|
| 1 | Not used | |
| 2 | Not used | |
| 3 | Not used | |
| 4 | Not used | |
| 5 | INCOM | IN |
| 6 | Binary 8 | IN |
| 7 | Binary 7 | IN |
| 8 | Binary 6 | IN |
| 9 | Binary 5 | IN |
| 10 | Binary 4 | IN |
| 11 | Binary 3 | IN |
| 12 | Binary 2 | IN |
| 13 | Binary 1 | IN |
| 14 | G24V | OUT |
| 15 | Marking Start | IN |
| 16 | P24V | OUT |
| 17 | Not used | |
| 18 | Interlock Stop | IN |
| 19 | Interlock COM | IN |
| 20 | Not used | |
| 21 | Not used | |
| 22 | OUTCOM | IN |
| 23 | Marking Done | OUT |
| 24 | Marking Ing | OUT |
| 25 | Software Ready | OUT |

4.2 User Interface (Pin description)

| Pin Name | Pin Description |
|-----------------------------|---|
| • INCOM(5) | COMMON terminal for the user input signals. This terminal is used with binary combination when selection message signals are used. |
| • Binary 1~8(6~13) | The message selection signal designated from user. User can select the message with binary combination using these bits. A maximum of 256 messages can be allocated and users can choose either the exterior control message to mark. Pins of Binary 1 ~ 8 and INCOM pins are interconnected. |
| • G24V(14) | A ground sensor power input for marking start operation. (Do not use for any other purpose than supplying power to the sensor. It could cause damage to the equipment.) |
| • Marking Start(15) | Sensor signal input for marking start signal. (Connects only NPN type) |
| • P24V(16) | A +24V Sensor Power input for marking start operation. (Do not use for any other purpose than supplying power to the sensor. It could cause damage to the equipment.) |
| • Interlock Stop(18) | This is the interlock pin. The two pins must be interconnected to operate the laser. |
| • Interlock COM(19) | |
| • OUTCOM(22) | COMMON terminal for the user output signals. The common terminal reads off the state of the laser equipment and where the supplied voltage to the OUTCOM terminal has been activated, the relevant signal goes through the internal relay and meets. (Use external power unit +24V or GND) |
| • Marking Done(23) | The output signal after completion of printing. User can change the signal output time in software settings. |
| • Marking Ing(24) | The output signal while laser is printing. (Marking head LED turns on and prints concurrently) |
| • Software Ready(25) | The output signal notifying that software is at normal state and ready. |

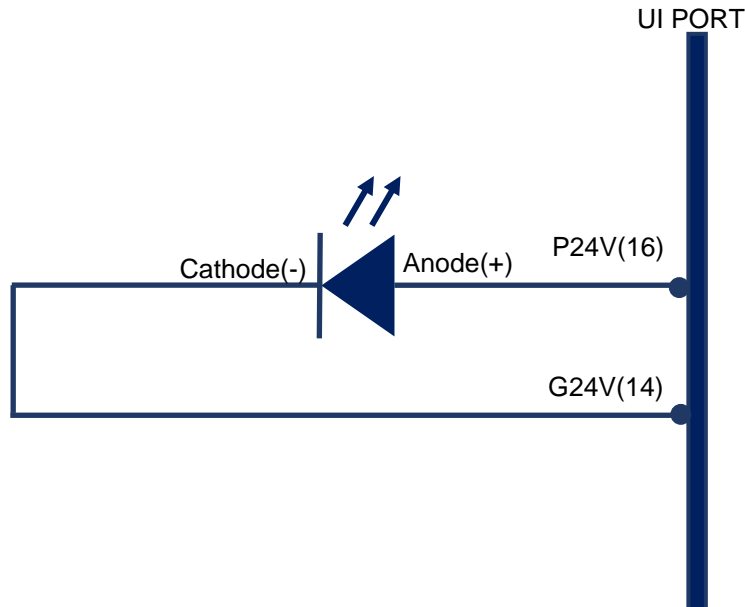
4.3 Binary Input Signal Table

The user input signals are designed to allow the simple automatic operation. Through the implementation of binary codes (See the bottom table), there are a maximum of 255 signal table. With selected bits you can mark by selecting a certain message number. Please refer to the software manual for detailed information.

| Bit 8 | Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Position in Table |
|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| . | . | . | . | . | . | . | . | . |
| . | . | . | . | . | . | . | . | . |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 254 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 255 |

4.4 User Interface Connection Examples

Machine Status LED Example



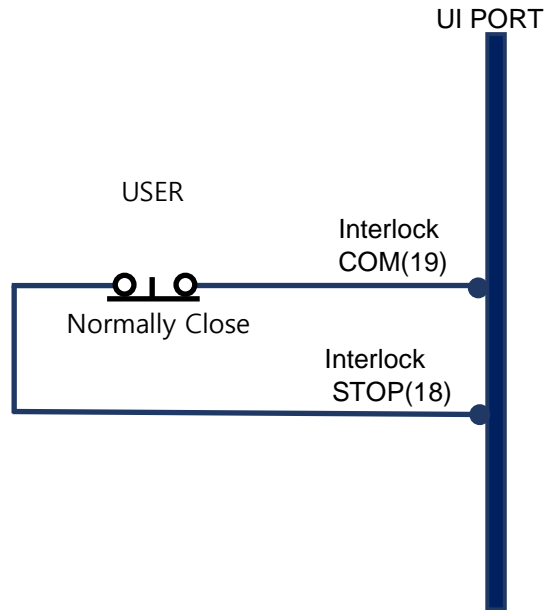
- Connect P24V pin to Anode(+) pin, and connect G24V pin to Cathode(-) pin.
 - LED will light when the laser system's main power is at normal input state.
-

※ Warning



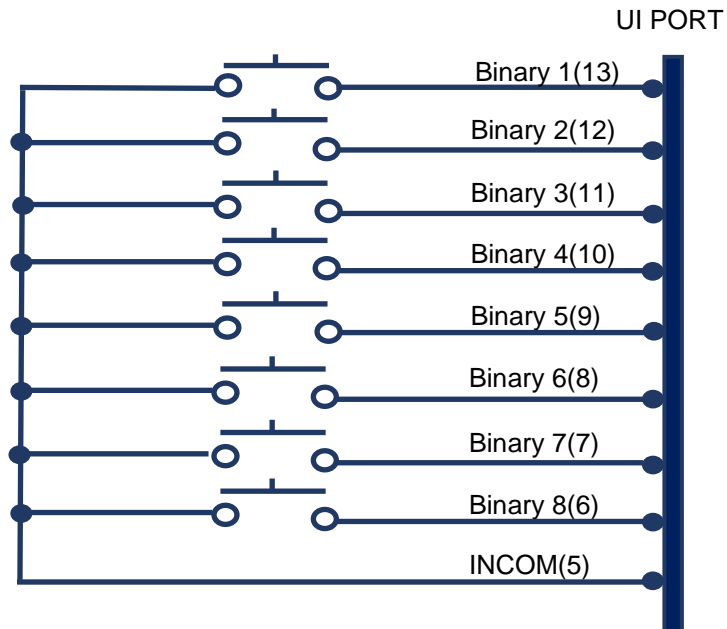
The above figure is an example of an LED connection. Such devices other than LED can be installed under the user's request. (refer to page 22) Please be aware this part of the UI connection is pre-installed by the manufacturer and thus should not be arbitrarily removed or replaced.

Interlock Example



- Connect the Interlock STOP pin and the Interlock COM pin.
- Laser system stops when both pins are open.
- **Caution : Laser system will operate when both pins are connected. (Normally Close)**

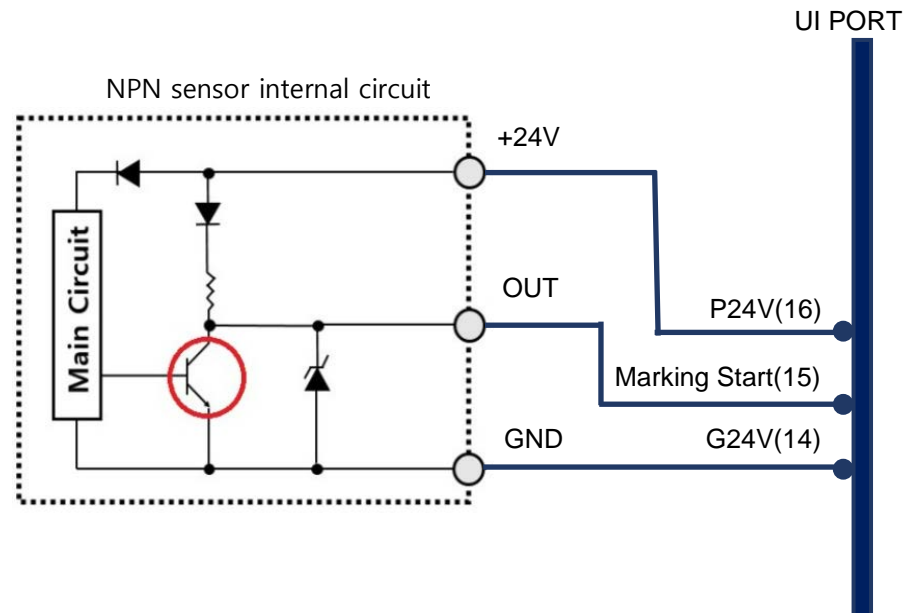
Input Pin (Binary) Example



- Connect the binary pins to INCOM pin.
- **Caution : INCOM pin must not be connected to external powers. (System will malfunction)**

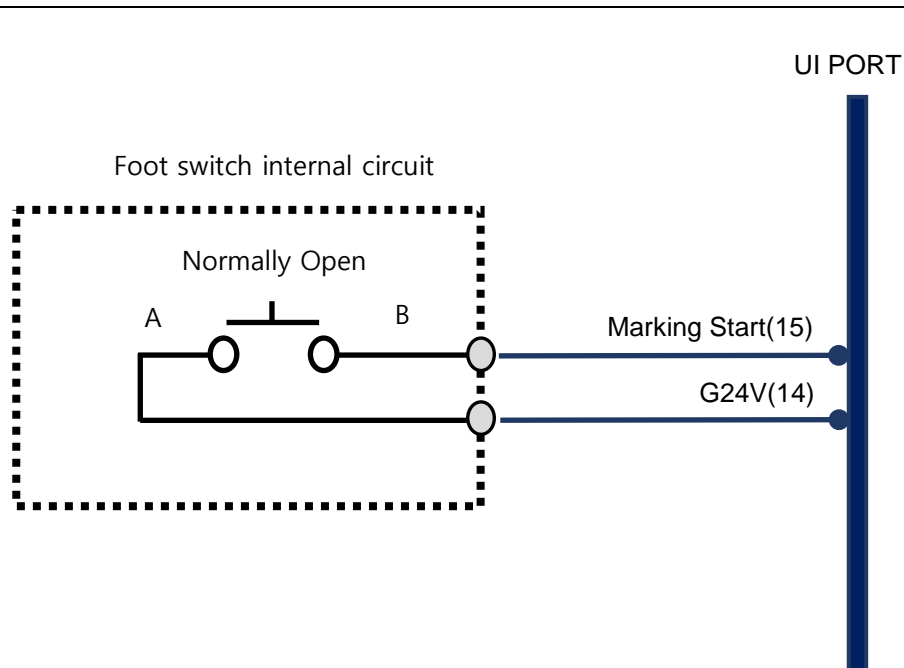
Input Pin (Marking Start) Example

NPN Sensor



- Joint the P24V and G24V to the sensor's power supply pin, and connect the sensor's output pin to the marking start pin.

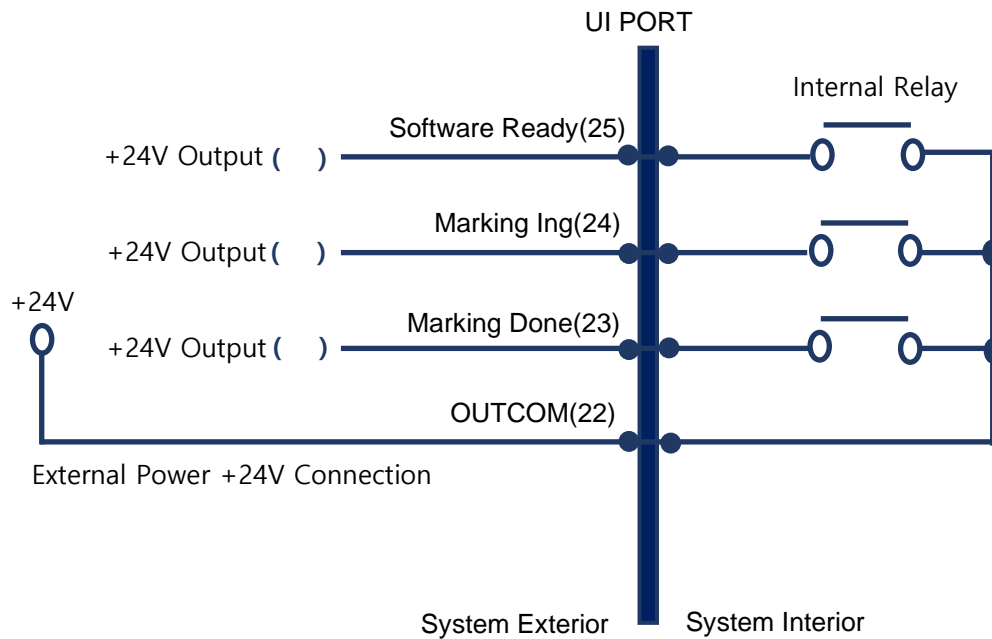
Foot Switch



- Joint the G24V pin to the "A" pin (Pole or COM), and connect the "B" pin (Normally Open) to the marking start pin.

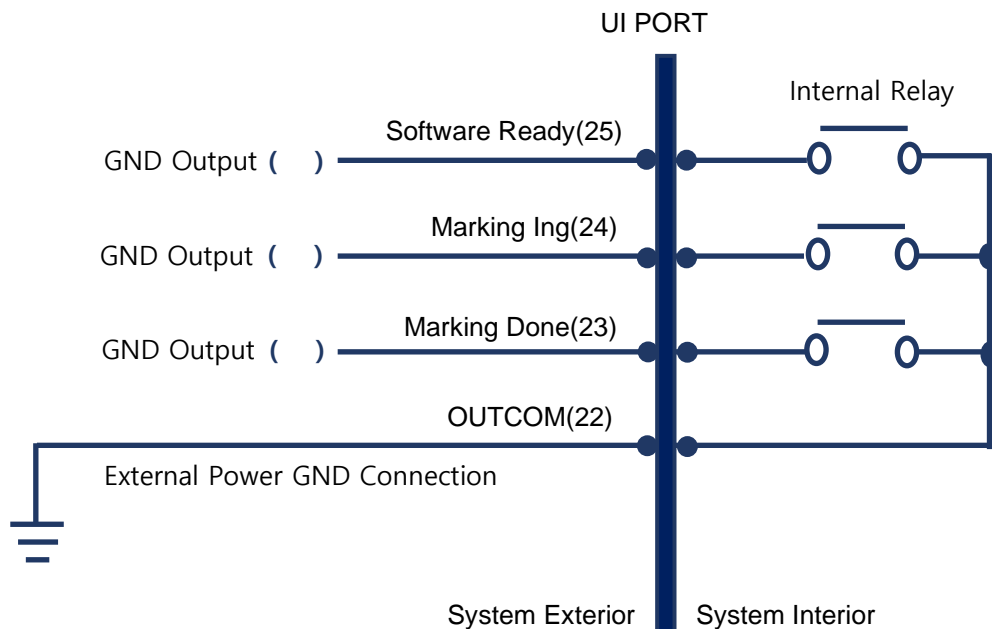
Output Pin Example

External Power +24V



- When OUTCOM pin and +24V is connected, the +24V connected to the OUTCOM will output.

External Power GND



- When OUTCOM pin and GND is connected, the GND connected to the OUTCOM will output.

4.5 Encoder (D-SUB 9P connector)

| Pin No. | Pin Name | Type |
|---------|------------|------|
| 1 | P24V | OUT |
| 2 | Not used | |
| 3 | Encoder A+ | IN |
| 4 | Encoder B+ | IN |
| 5 | Not used | |
| 6 | Not used | |
| 7 | Not used | |
| 8 | G24V | OUT |
| 9 | G24V | OUT |

※ Only 24V Open collector type encoder can be used.

5. Hardware

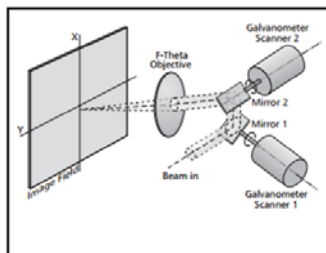
5.1 Laser Source

| Laser Source Main Specifications | | |
|----------------------------------|-----|--------------------------|
| M ² | | <1.5 |
| Delivery Cable Length | m | 2 |
| Average Output Power | W | >20 |
| Maximum Pulse energy | mJ | 0.8 |
| Pulse Frequency Range | KHz | 1-600 |
| Full Power Frequency Range | kHz | 25-600 |
| Pulse Width | ns | 200 |
| Output Power Instability | % | <5 |
| Cooling Method | | Air Cooled |
| Power Supply Voltage | V | 24(DC) |
| Power Consumption | W | <110 |
| Power Supply Current requirement | A | >5 |
| Central Wavelength | nm | 1064 |
| Emission Bandwidth (FWHM) | nm | <15 |
| Polarization | | Random |
| Anti-Reflection Protection | | Yes |
| Output Beam Diameter | mm | 7.0 ±0.5 |
| Output Power Range | % | 0-100 |
| Ambient Temperature Range | °C | 0-40 |
| Storage Temperature Range | °C | -10-60 |
| Dimensions | mm | 245*200*65 |
| Package Size | mm | 365*310*135 |
| Weight | Kg | Net: 3.75 Gross: 4.35 |

IZI-CODE laser consists of a body and head assembly, and these two parts are connected by a scanner cable and a fiber optic cable. Therefore, it requires extra care because the source will be unusable if this cable is severely bent or cut. This laser generator unit monitors the oscillator, detects overheating and laser reflection volume, etc. to automatically create an error signal and stop the laser generator whenever a negative influence is caused to the laser source.

5.2 Scanner

The laser beam's marking speed and precision are completely dependent on the scanner mirror movements because it has nearly no mass or any transposition. Therefore, the laser marking controller operates by receiving the position data from the electro-current sensors connected to the X, Y Galvanometer fixed on the scanner axis. The angular movement of mirrors corresponds with one of the axis (X or Y) and one of the message dots of X/Y polar coordinate. In the case of dynamic printing, while creating the message properties the mirrors will move as the conveyor moves.



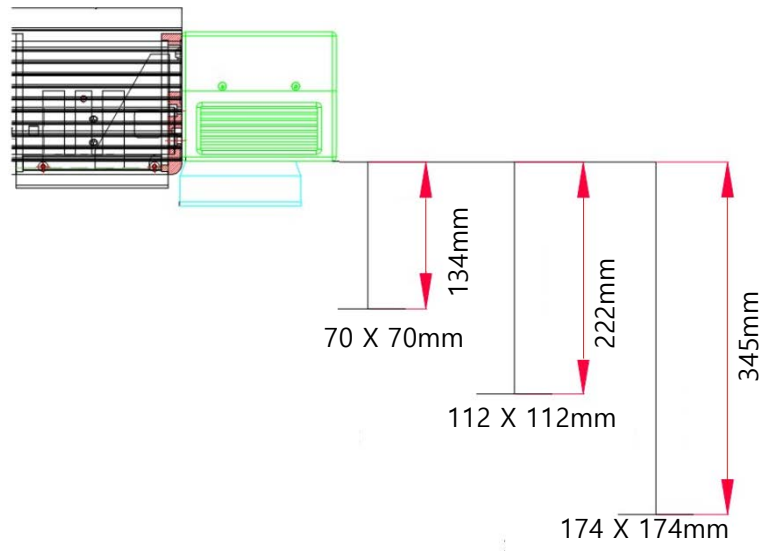
Scanner Specifications

| | Type | Normal | High Speed |
|-----------------------|------------------------|---------------------|---------------------|
| • Basic Performance | Aperture | 10mm | 10mm |
| | Wavelength | 10.6 μm | |
| | Galvo Protocol | XY2-100 | |
| • Dynamic Performance | Repeatability | <22 μrad | <8 μrad |
| | 1%Of Full Scale | 0.3ms | 0.21ms |
| | 10%Of Full Scale | 0.7ms | 0.71ms |
| | Non-Linearity | <0.4% | <0.2% |
| | Drift Over 8 Hours | <0.3mrad | <0.5mrad |
| • Typical Speeds | Max. Scanning Speed | 6000mm/s | 12000mm/s |
| | Max. Positioning Speed | 15m/s | 23m/s |
| • Optical Performance | Gain Error | <5mrad | <5mrad |
| | Zero Offset | <5mrad | <5mrad |
| | Operating Temperature | 10-40°C | 0-45°C |
| | Power Requirements | $\pm 15\text{V}$ 3A | $\pm 15\text{V}$ 2A |
| | Weight | 1.9kg | 1.95kg |

5.3 Lens

The F-theta lens concentrates the laser wavelength's focus radiating from the laser generator to apply markings on the product surface. The F-theta lenses are categorized according to the size of the lens, and each lens size has varying marking areas and focal lengths. Check the focal length according to your lens size to adjust the distance between the scanner and the marking product. Also, the focal length is fundamentally set to have two scanner guide beams correspond. (Refer to the figure below) There are three lens size: 70mm X 70mm, 112mm X 112mm and 174mm X 174mm. Users can select a product with their desired specification. Lenses are very fragile so it requires extra care for maintenance and handling. Refrain from making any contact with the lens surface and it must be cleaned with optical tissues and designated solvents (acetone or alcohol).

Focal Length



Cleaning Sequence for Lens and Scanner Mirror

Laser Off



Remove the lens from the head scanner and move to a safe spot



Carefully clean the lens surface using clean paper and acetone.



Use ethanol to clean the inside of the scanner mirror.

(Using acetone to clean the mirror could remove the surface coating)



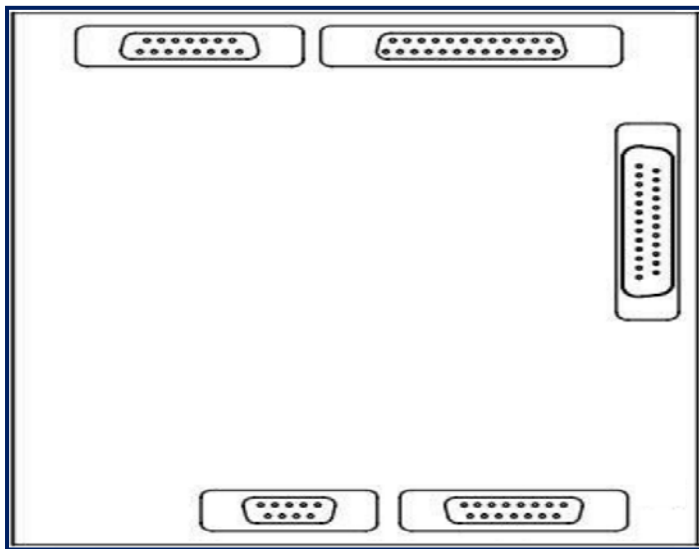
Repeat until the lens is completely clean. Check the status of the lens surface and reassemble

※ The lens and scanner must be cleaned on a regular basis to prevent pollution. Contaminants on the lens surface may reduce the lens transmission rate and it may lead to the degradation of marking power and quality.

5.4 Control Board

The control board is inserted into the Controller and it must be connected to the laser system using cables. The scanner's X and Y axis movement is controlled according to the supply of the digital signal format sent from the internal control board. Moreover, the laser generator's output control and user interface port, encoder, sensor etc. are synchronized through the exterior signals which allows to control the laser system.

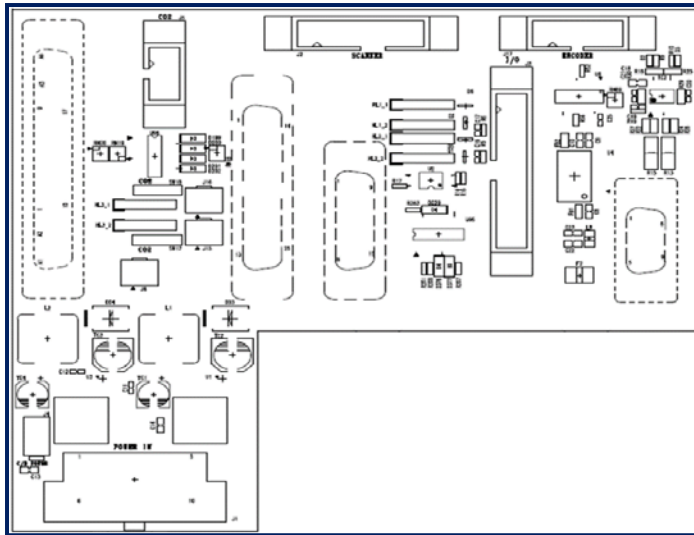
Control Board Drawing



5.5 Interface Board

The internal Interface board is designed to transmit signals using photo couplers and diodes to ensure the safety of each component. It is an integrated signal transmission board designed to control various types of input signals.

Interface Board Drawing



5.6 Power Supply

Each part of the laser system requires maintaining a stabilized and adequate volume of power supply

Power Supplier Main Specifications

| | | |
|--------------------------------|------------------|----------------------------------|
| • Laser Source & Internal Main | Input Spec | 88~264 VAC / 124~370VAC, 50/60Hz |
| | Output Spec | 24VDC (20~26.4V), 13.4A |
| | Working Temp | -30~+70°C |
| | Working Humidity | 20~90% RH non-condensing |
| • Scanner | Input Spec | 100~264 VAC, 50/60Hz |
| | Output Spec | 15VDC, 5A |
| | Working Temp | -30~+70°C |
| | Working Humidity | 20~90% RH non-condensing |
| • PC | Input Spec | 100~264 VAC, 50/60Hz |
| | Output Spec | 12VDC, 4.2A |
| | Working Temp | -30~+70°C |
| | Working Humidity | 20~90% RH non-condensing |

5.7 Cooling System

Since laser generation produces high temperatures, it is necessary to maintain an adequate system temperature using a cooling system. Fail to do so may cause overheating of the equipment, which may lead to system malfunction. To prevent such incidents, IZI-CODE laser system has 2 fans installed inside the controller.

Cooling System Main Specifications

| | |
|---------------------------|------------------------|
| • Rated Voltage | 24VDC |
| • Operating Voltage Range | 14 to 26.4VDC |
| • Input Current | 0.4A(max 0.5) |
| • Input Power | 9.6W |
| • Speed | 4800RPM |
| • Max. Air flow | 102.59 (Min 92.33) CFM |
| • Size | 92mm * 92mm * 25mm |

6. Maintenance and Repair

| Frequent Inspection | Regular Inspection |
|-----------------------|--|
| Lens contaminants | Check once a week |
| CONTROLLER NET FILTER | Check once a month |
| Equipment exterior | Check once a month |
| Computer | Frequently scan virus and back up computer |



※ Caution - Use of control or maintenance and repair of equipment may result in hazardous radiation exposure.

7. Troubleshooting

7.1 Level.1 Abstract

The manual is comprised with useful information for IZI-Code laser users to cope with common technical issues. Our objective is to ensure user safety along with protecting the laser system from undergoing severe damage.

Troubleshooting Level 1 provides a procedure of what users should check to handle the equipment properly. It is a basic procedure for users to effectively solve problems sequentially by referring to the questionnaires. We recommend users to deal with certain issues by following through this troubleshooting process.

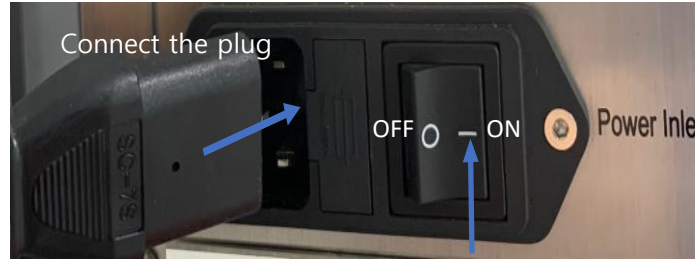
If users cannot solve the issue or needs further information, please send an RMA to our CS department for inquiry and request. (RMA form is on the last page)

7.2 Level.1 Main Power Failure

① Status check · Procedure

Unsolved ↓

Check the EMC power module switch



Turn ON the EMC power module switch

Solved
↓
Normal

② Status check · Procedure

Unsolved ↓

Check the fuse socket



Solved
↓
Normal

③ Status check · Procedure

Unsolved ↓

Check the electricity supply

Inspect the assembly lines that shares the same electricity.

Solved
↓
Normal

④ RMA Application



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Pentarium IX Tower #A3109, Republic of Korea

7.3 Level.1 · Key Switch Error

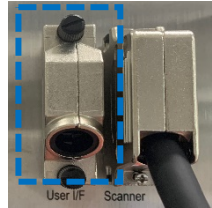
- Ready LED Malfunction
- Consistent error LED

① Status check · Procedure

Check the rear panel connection

Unsolved ↓

① Check interlock key connection.



①-2 Connect the interlock pin if using a UI cable.



Solved
↓
Normal

② Status check · Procedure

Did you reset the emergency switch?

Unsolved ↓



Solved
↓
Normal

③ RMA Application



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7.4 Level.1 Laser Shooting Error

① Status check

· Procedure

Unsolved ↓

Are there lights emitting in Ready LED?

※Refer to Troubleshooting (Page 39)

- Level.1 Key Switch Error
- Ready LED Malfunction.
- Consistent error LED.

Solved



Normal

② Status check

· Procedure

Unsolved ↓

Check the lens cover

Remove the lens cover.



Solved



Normal

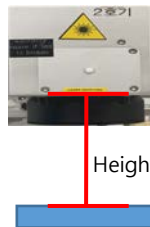
③ Status check

· Procedure

Unsolved ↓

How's the marking distance?

Adjust the distance of marking product and laser scanner.



| Lens Size | 70x70 | 112x112 | 174x174 |
|-----------|-------|---------|---------|
| Height | 134mm | 222mm | 345mm |

※ The lens size indicated are standard.

Height may differ depending on the lens size

Solved



Normal

④ RMA Application



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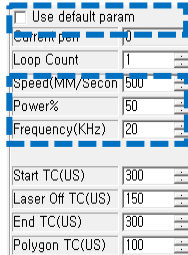
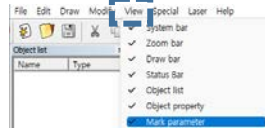
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7.5 Level.1 Marking Power Adjustment

① Status check · Procedure

Check software settings

Check marking parameter



- ① 'Uncheck' User default param
- ② Increase power(%) to appropriate rate
- ③ Decrease frequency and speed(mm/s) value

Solved
↓
Normal

Unsolved ↓

② Status check · Procedure

Check marking distance

Adjust the distance of marking product and laser scanner



Height

| Lens Size | 70x70 | 112x112 | 174x174 |
|-----------|-------|---------|---------|
| Height | 134mm | 222mm | 345mm |

※ The lens size indicated are standard.

Height may differ depending on the lens size

Solved
↓
Normal

Unsolved ↓

③ Status check · Procedure

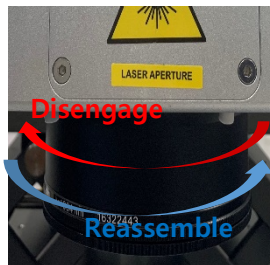
Are there any contaminants in lens?

Clean the lens

- ① Turn OFF the engine and disengage the lens
- ② Use acetone and paper towel to clean lens
*Wipe it out by moving your hands clockwise, counterclockwise.
Keep cleaning until all contaminants are removed.
- ③ Assemble the lens back to the scanner

Solved
↓
Normal

Unsolved ↓



④ RMA Application



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7.6 Level.1 PC Start Failure

① Status check

· Procedure

Unsolved ↓

Check PC's power switch

Look at the front panel to confirm that the ON/OFF switch operates



When OFF

When ON

Solved



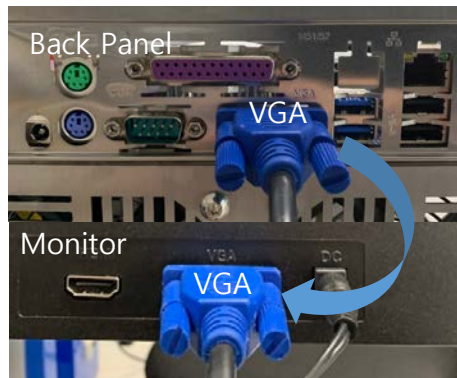
Normal

② Status check

· Procedure

Unsolved ↓

Check PC monitor cable



① Re-connect the cable that are plugged on the back panel.

② Re-connect the cable that are plugged onto the monitor

③ Replace a new cable

※HDMI cannot be used.

Solved



Normal

③ RMA Application



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7.7 Level.1 EZCAD2 Software Driver Error Imc_OpenDriver Fail

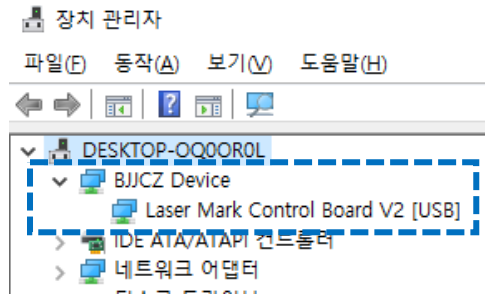
① Status Check

· Procedure

Check PC driver

Verify driver installation:

Device manager → Bjjcz device → Laser mark control board V2 (USB)



Unsolved



Solved



Normal

② Status Check

· Procedure

Reboot your PC and open the program

Unsolved



Solved



Normal

③ RMA Application



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8. RMA

Found any mechanical flaws or repairment is needed, please fill in the form below and reach to our closest service center or contact TAECHU ENGINEERING CO., LTD.

Return Material Authorization

Customer information

| | | | |
|--------------|--|----------------|--|
| Company name | | Contact person | |
| Street | | City | |
| State | | Zip code | |

IZI-CODE information

| | | | | | |
|------------------|--|-------|--|------------|--|
| Date Of Purchase | | Model | | Serial No. | |
|------------------|--|-------|--|------------|--|

Product State

| | | | | | |
|------------------------|----------------------------------|-------------|----------------------------------|------------------------|----------------------------------|
| Damage | <input type="checkbox"/> NO | impact | <input type="checkbox"/> No | Warranty sticker state | <input type="checkbox"/> Pass |
| | <input type="checkbox"/> YES() | | <input type="checkbox"/> YES() | | <input type="checkbox"/> Fail() |
| F-theta lens pollution | <input type="checkbox"/> Pass | Fiber state | <input type="checkbox"/> Pass | Fuse state | <input type="checkbox"/> Pass |
| | <input type="checkbox"/> Fail() | | <input type="checkbox"/> Fail() | | <input type="checkbox"/> Fail() |

Picture

| Description |
|-------------|
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9. Customer Inquiries

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R&D Center: 27, Dongtancheomdansaneop 1-ro, Hwaseong-si, Gyeonggi-do, Geumgang-Pentarium IX Tower #A3109, Republic of Korea

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