



# BW101 SERIES

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## 2KW Handheld Laser Welding Head -User Manual



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Thanks to choosing our products!

The manual describes the usage of BW101 in details, including connection definitions of accessories, controller and regular laser connection. Please contact us for more information.

Please read and understand this manual before using this series products and related equipment which will help you use the product better.

Due to constant update of product functions, the product you received may have some differences from the description in the manual. We hereby express our deep sorry for this matter!

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# 1 Overview

This manual covers general description of BW101 and the corresponding controls.

In the field of laser welding, hand-held laser welding is featured with fast speed, good surface forming, white welding seam and low radiation. It is environmentally-friendly and can replace most welding processes such as traditional TIG/MIG welding in metal materials like thin stainless steel, iron plate and galvanized sheet; In recent years, machines of hand-held laser welding are widely used in cabinets, kitchens and bathrooms, stairs, elevators, shelves, guardrails of stainless steel doors and windows, distribution boxes, stainless steel furniture and other industries.

## 1.1 Product Features

- Small volume, compact structure, conform to artificial engineering design, simple operation.
- Wobbling of beam spot, which adapts better to plate gap.
- Configurable wire feeder can adapt to different welding conditions.
- Multiple safety protection provided, allows it to automatically turn off the light when leaving the workpiece, together with high safety.
- The product is equipped with a variety of welding nozzles to meet different process requirements.
- All-round water-cooling, good stability.



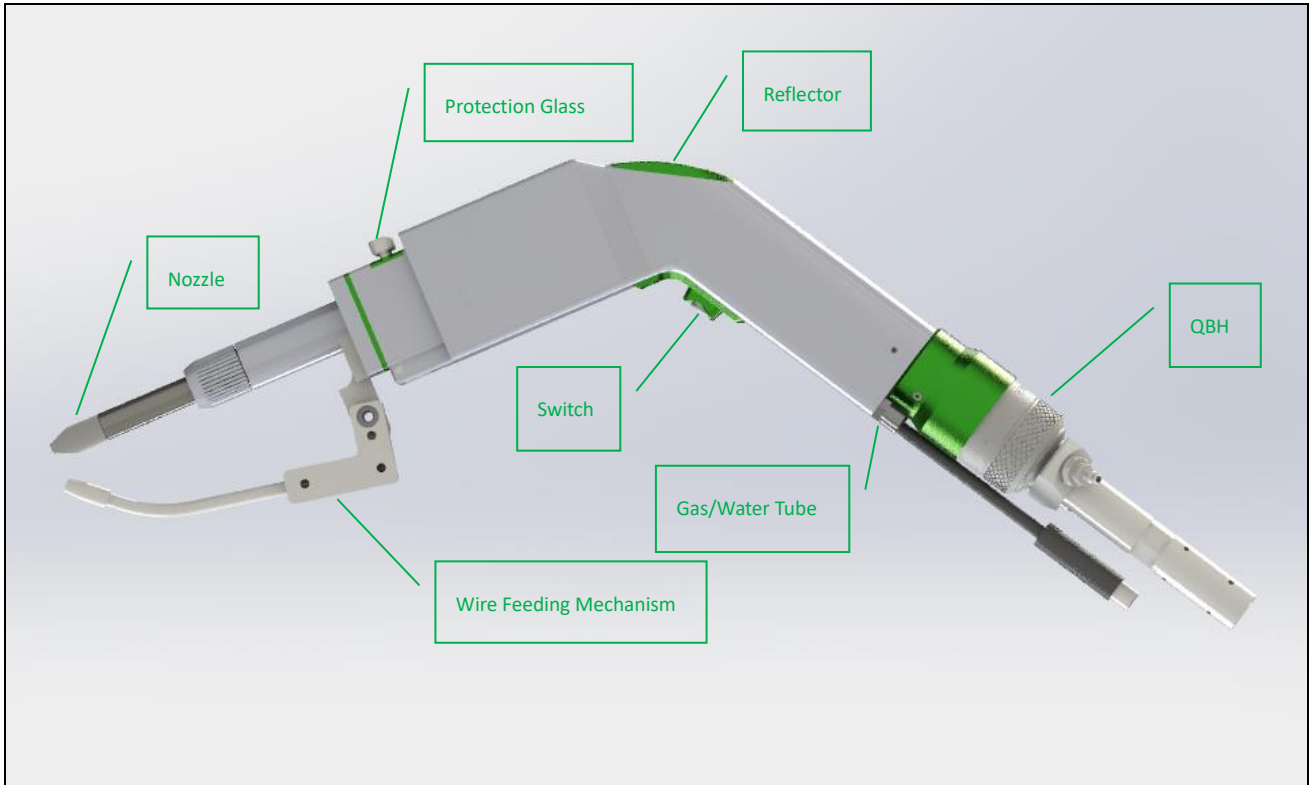
Figure 1 BW101 Structure Diagram

## 2 Product Description

### 2.1 List

Serial No.	Name	Qty	Serial No.	Name	Qty
1	Wobble welding head	1	10	Shallow U nozzle	1
2	HMI panel	1	11	Nozzle for wire feeding	1
3	Handheld welding controller	1	12	Deep U nozzle	1
4	Wire feeding clip	1	13	Downward welding nozzle	1
5	Protective glass	3	14	Tapered nozzle	1
6	Alligator clip	1	15	6-PIN plug extension cable	1
7	Controller power cable	1			
8	HMI panel power cable	1			
9	HMI panel communication cable	1			

### 2.2 Structure and Overall Look



## 2.3 Electrical Installation

### 2.3.1 Security and Maintenance

This product is one of the Class IV laser control products. Improper use will cause damage to eyes and skin. Please conform to the standard of EU EN 60825-1.

- Use it in a dry environment. When the electrical part gets water, it may cause electric shock or short circuit. When there are abnormal phenomena such as burnt odor, abnormal sound, heat and smoke, please turn off the power supply to stop running; otherwise it is easy to cause electric shock, fire and other dangers.
- After turning on the indicator light, do not expose your eyes to the light to avoid injury.
- The laser is infrared invisible light. After the laser is turning on, do not expose any part of the body to the laser to avoid personal injury.
- It is recommended to wear laser protective glasses during laser processing. Please select protective glasses according to the wavelength coverage of shielding. Do not hold the

gun at any part of the human body. After the end of processing, the welding workpiece is still in a high temperature, so please do not touch the workpiece to prevent heat injury.

- Please ensure that the PE line of the power line is earthed reliably to avoid losses.
- Please do not damage the anti-dismantle label on the controller shell, so as not to lose the warranty.

### 2.3.2 Mounting Size of Controller and HMI Panel

- The overall dimension of the controller is 310x180x70mm in length x width x height, and the mounting hole is 295x50mm.

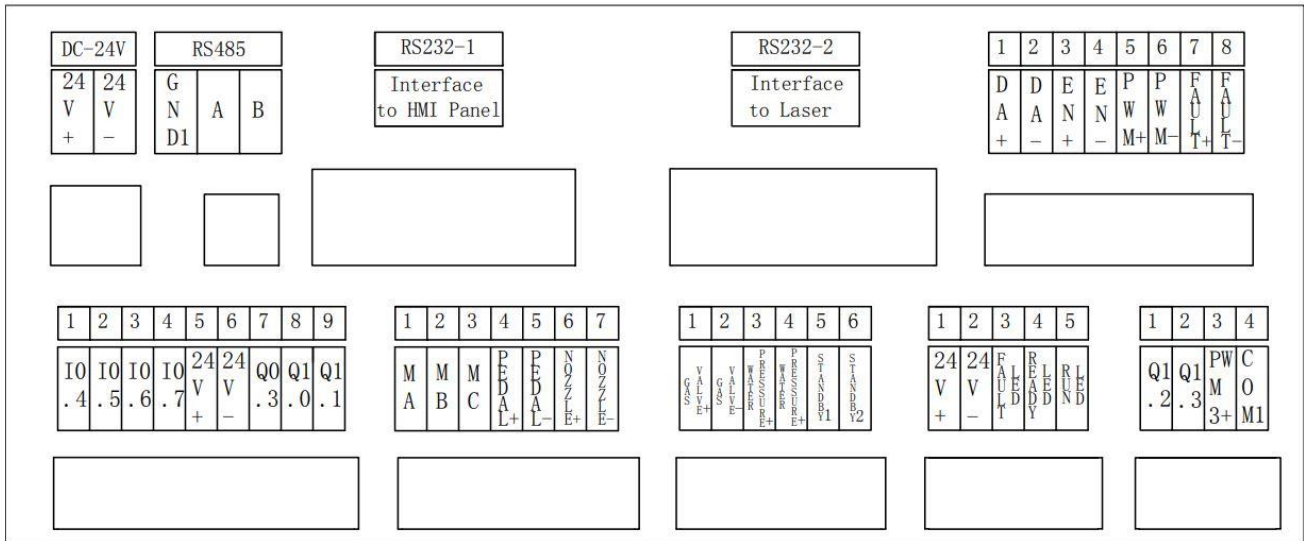


- HMI panel dimension is 203x149mm with opening size 192x138mm.

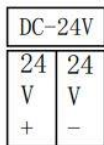


### 2.3.3 Wiring Diagram of Controller

### Controller Wiring Panel

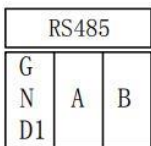


#### HMI Panel Power Supply DC-24V (FUUSE and anti-reverse connection)



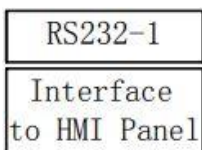
DC-24V provides 24V power for the HMI panel and uses anti-reverse connection terminals to directly connect HMI panel and controller by power cable.

#### RS485 Interface



Communication interface which can realize networking. A is DATA + and B is DATA-.

#### Communication Port RS232-1 to HMI Panel



It uses RS232 communication cable to enable communication between controller and HMI panel.



## Laser Communication Port RS232-2

RS232-2
Interface to Laser

It uses RS232 communication cable to enable communication between laser and controller and and detect running status of laser (alarm signal).

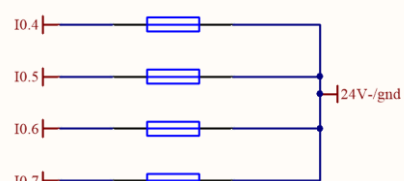
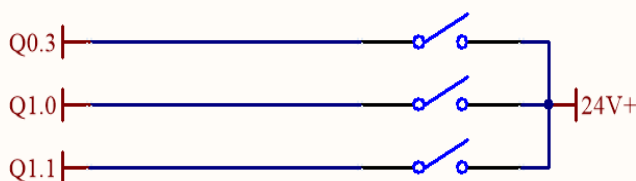
## IO Port to Laser

1	2	3	4	5	6	7	8
D A +	D A -	E N +	E N -	P W M+	P W M-	F A ULT+	F A ULT-

- **DA +/DA-**: corresponds to the laser analog positive/ground (0V), 0V-10V controls the output power of the laser, and 10V corresponds to 100% of the output power.
- **Enable +/Enable-**: External enable input signal positive/ground, PNP 24V active to control laser ON/OFF.
- **PWM +/PWM-**: Externally modulated input signal positive/ground, PNP 24V active.
- **Fault +/Fault-**: Fault signal output positive/ground, different laser connection is inconsistent, for details refer to the controller and laser wiring diagram.

## Spare IO Port

1	2	3	4	5	6	7	8	9
I0 .4	I0 .5	I0 .6	I0 .7	24 V +	24 V -	Q0 .3	Q1 .0	Q1 .1



QO: PNP 24V output active, the load terminal needs to be connected to 24V- separately.

IO: PNP 24V input active, a switching signal.

## Interface to Handheld Laser Welding Head

1	2	3	4	5	6	7
M A	M B	M C	P E D A L+	P E D A L-	N O Z Z L E+	N O Z Z L E-

Here is a 6-core aviation plug line which connects motor, switch button and nozzle of hand-held laser welding head.

- **MA/MB/MC:**

corresponds to three motor wires of hand-held welding head, which are connected with red, yellow and black wires in 6-core aviation plug. The three wires have no fixed direction and can be connected with MA/MB/MC at will.

- **Pedal +/Pedal-:**

corresponds to the switch button of hand-held welding head, and the green line of 6-core aviation plug corresponds to pedal + and the white line corresponds to pedal-.

- **Nozzle +/Nozzle-:**

the safety wire of Hand-held welding head, brown wire corresponding to Nozzle +, Nozzle- needs to be connected to the alligator clip by another wire to ensure that hand-held welding head contacts workpiece to allow beam shooting.

## Gas Valve and Water Pressure Terminal

1	2	3	4	5	6
G A S V A L V E+	G A S V A L V E-	W A T E R P R E S S U R E+	W A T E R P R E S S U R E-	S T A N D B Y1	S T A N D B Y2

- **Gas Valve +/Gas Valve-**

Gas Valve +: 24V+ Relay Output

Gas Valve-: 24V-

**Water Pressure +/Water Pressure-**

These two are switch signals. If there is no chiller alarm interface, both water pressure +/- can be short-circuited directly.

**Fault LED, Ready LED and Run LED**

1	2	3	4	5
24 V +	24 V -	F A L T L E D	R E A D Y L E D	R U N L E D

**Fault /Ready /Run LED:** PNP 24V output active.

**Control Terminal to Wire Feeder**

1	2	3	4
Q1 .2	Q1 .3	PW M 3+	C 0 M1

**Q1.2/Q1.3/PWM3+** are all PNP 24V output valid. The wire feeder needs to be used with a 24V relay. Either Q1.2 or Q1.3 can be connected to the relay coil together with COM1. SS1 and SS2 are connected to the normally open port of the relay.

**2.4 HMI**

**Homepage**



### 2.4.1 Definition

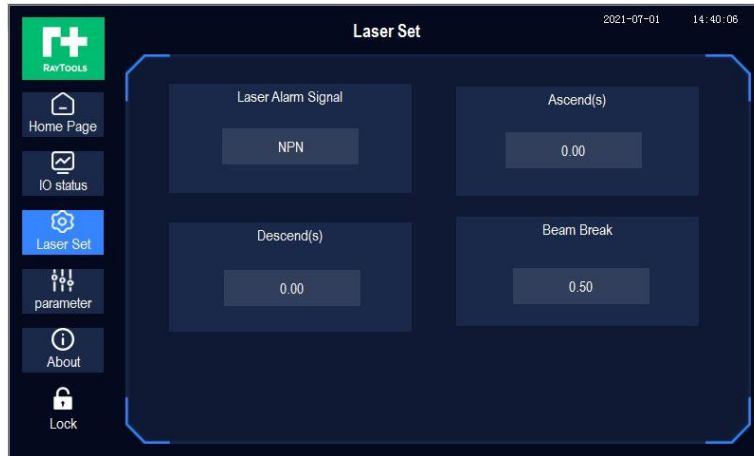
- Program: A total of 16 programs (1-16). Each program corresponds to a welding parameter including laser, protection gas and wire feeding parameters.
- Communication and alarm: After connecting the laser communication cable, the laser alarm signal can be detected.
- Power: The percentage of laser output power, i.e. 10% - 100%, corresponds to 0.1v-10v of laser analog voltage.
- Frequency: The number of laser pulses emitted by the laser per second.
- PWM: The ratio of pulse duration to pulse period.
- Gas in advance: The time of gas blowing in advance before turning on the laser.
- Gas delay: Gas blowing time after turning off the laser.
- Material and thickness: The material and thickness being welded can intuitively reflect the parameters of the welded material, which is convenient for the operator to call the parameters correctly.
- Laser: Turn on or off the laser.
- Wire feeding: Turn on or off the wire feeding.
- Wobble: Turn on or off the wobble function of the welding head. After the wobble is turned on, there will be a swing speed button, which can change the wobble speed of the welding head.

### 2.4.2 IO Status



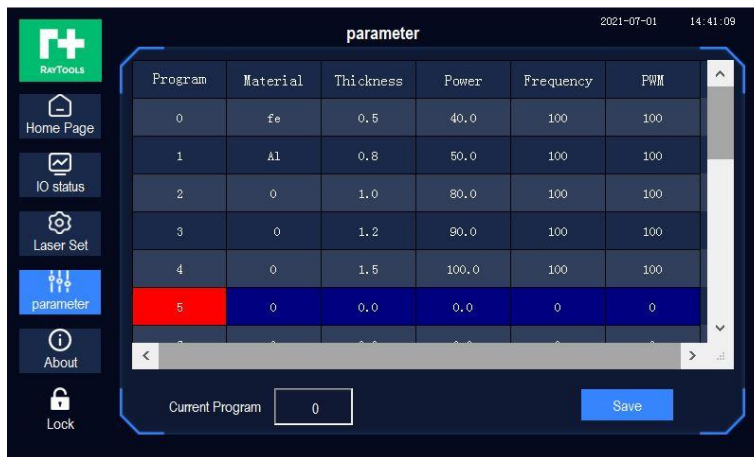
- IO.0 Display the status of the button switch of the handheld laser welding head
- IO.1 The failure state of the fiber laser.
- IO.2 The state of the chiller (IO.2 normally closed at a normal circumstance, open while something gets wrong).
- IO.3 Indicates whether the handheld welding head is in contact with the welding workpiece. Only when IO.3 is in contact can the beam be emitted for safe production.
- Q0.2 Output status of Laser enable signal.
- Q0.4 Gas valve output status.
- Q0.5 Output when the controller is faulty (output 24V voltage when there is a fault).
- Q0.6 The controller has no alarm and no processing status indication.
- Q0.7 Laser processing instructions.
- Q1.2 Feeding signal of wire feeder
- Q1.3 Unwinding signal of wire feeder

### 2.4.3 Laser Set



- Laser Alarm Signal: Select whether the laser alarm is active at NPN or PNP. Select ON as 24V PNP active.
- Ascend: The time it takes from the lowest power to set power after turning ON laser shooting.
- Descend: The time it takes from the set power to zero after turning OFF laser shooting.
- Beam Break: In case of poor contact between handheld welding head and workpiece, the laser beam will be stopped when the non-touch time of is longer than the beam break time.

### 2.4.4 Parameter



- Parameters: It can directly reflect the corresponding parameters of each program number including material, thickness, power, frequency and PWM.
- Current program: The program number in use, where you can select the program number you want to use here and the program number in the homepage will change accordingly.

### 2.4.5 About



Display the version of HMI panel and control card. Each generation of products has its own version.

### 2.4.6 Lock



**Lock:** To lock the screen and cannot operate HMI. It mainly prevents other people from touching the screen by mistake when the operator is operating, causing the laser beam turned off while welding or the laser beam is emitted when the operator is commissioning, so as to ensure the safety of the operator.