1kW, 1.5kW, 2kW, 3kW
Handheld Laser Welding Machine
User Manual



Security Information

A.Safety signs

	May cause serious personal injury or even endanger life.
	May cause general personal injury or damage to the product or equipment.

B.Laser safety level

According to the European standard EN 60825-1, clause 9, the equipment internal lasers belong to class 4 lasers. The product emits laser radiation at wavelengths around 1064nm or 1080nm, causing damage to the eyes and skin directly or indirectly exposed to such light intensity. Although the invisible beam still causes irreversible damage to the retina or the cornea. Suitable and certified laser protection glasses must be worn while the laser is running.

	Wear laser safety glasses when operating the product. Laser safety protection glasses have laser wavelength protection selectivity, so please choose the laser safety protection glasses that meet the laser output band of the product. **When the laser welding machine is energized, it is forbidden to position the laser output head to someone, and prohibit the laser output head to illuminate the mirror surface of the strongly reflective material.**

C.safety signs



Laser warning label



Fiber do not fold label

D.Electrical safety

① Please connect the PE wire to ground, and ensure the connection is firm and reliable.

The grounding break meeting causes the electrification of the product shell, which may cause personal injury to the operator.

② Ensure that the AC power supply is normal.

Wrong input power or power voltage will cause unrecoverable damage to the laser source or controller.

1.The preface

Thank you for choosing Heavth MS-1000/1500/2000/3000HLW handheld laser welding machine products, This manual provides you with important safety, operation, maintenance and other matters needing attention. Before using this machine, please carefully read this user manual and keep it properly. Please observe the following precautions and warnings to ensure operational safety and optimal condition of the machine.

This user manual is not a quality guarantee. Correction of printed errors, modifications to the information, and improvements to the product shall be explained by Heavth at any time without prior notice. The corrections will be included in the reissued user manual.

2.Product Introduction

Laser welding is the process of using the laser beam as a heat source to heat the work-piece to be welded to form a welding joint to achieve welding as shown in Figure 2.1.

Laser welding has the following advantages:

(1) Heat input is small, small heat impact area, weld depth and width ratio is large.

(2) Cooling speed is fast, the weld organization is fine, and the joint performance is good.

(3) Fast welding speed, small welding deformation, high reliability, high adaptability, good accuracy, high efficiency, easy to achieve automation.

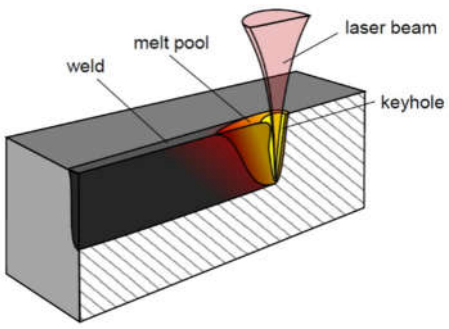


Figure 2.1

Laser welding can effectively solve the traditional arc welding slow speed, deformation, difficult labor and other problems, but the traditional laser welding equipment cost is high, poor flexibility, make many traditional industries prohibitive!

The fiber laser hand-held welding machine produced by Heavth is a new generation of laser welding. It is easy to install and simple to operate. It can be widely used in kitchen utensils, door and window guardrails, stair elevators, stainless steel furniture, metal sheet metal, advertising, craft gifts, auto repair, automobile manufacturing, rail transit and aerospace and other industries welding.

2.1 Equipment features and implementation standards

(1) Equipment features

◎**Ergonomic design**, the hand-held head is light in weight, the grip is good, and the operation labor intensity is greatly reduced.

◎The welding head is integrated with the control board, which is simple and compact.

◎**Safety design:** multi-interlock protection of touch screen buttons and mechanical buttons, safety circuit protection (the laser can only trigger when the nozzle touches the metal), Special nozzle tip anti-splash and anti-reflection.

◎**Big brand:** lasers source, water chiller, electrical components, mechanical structural parts, etc. are all selected from international or domestic famous brands.

◎The laser welding system is stable and almost no requires maintenance.

◎Welding spot energy distribution is uniform, with the high-quality light spot required for welding characteristics.

◎Adapted to a variety of metal materials seam weld splicing.

◎Uses optical fiber laser, excellent beam quality, maintenance-free, photoelectric conversion efficiency is more than 30%, the laser source service life is more than 100,000 hours.

◎The welding speed is fast.

◎Thermal deformation and thermal impact area is small (suitable for processing high melting point, high hardness, special materials).

◎Parts can be heat treated locally.

◎It can process complex-shaped parts and tiny parts, and can also process in vacuum.

◎No noise during processing and no pollution to the environment.

◎Combined with automatic control and computer technology, the automation of processing can be realized.

◎Due to advanced processing methods, existing product structures and materials can be improved.

◎The fiber laser welding head adopts water cooling method to ensure the stability of the long-term processing laser.

(2) Products implementation standards

Heavth has passed the ISO9001 international quality management system certification, and has formed a quality assurance system for the design, production and service of laser equipment.

Heavth has formulated detailed standards for the working environment and working conditions, basic technical requirements, cooling requirements, laser amplitude emission safety, electrical safety, test methods, inspection and acceptance, packaging and transportation in the production process. The national standards quoted in this standard are:

Electrical Safety of the GB10320 Laser Equipment and Facilities

Radiation Safety, Equipment Classification, Requirements, and User Guide for GB7247 laser products

GB2421 Electronics Basic Environmental Test Procedures

GB2828-2829-87 Check the sampling procedure and sampling table

2.2 Technical Parameters:

Operating environment				
Model	MS-1000W	MS-1500W	MS-2000W	MS-3000W
Input power	AC220V-1PH	AC220V-1PH	AC380-3PH	AC380-3PH
Total power	6kW	7kW	9.5kW	12kW
Working temperature	0℃~40℃			
Working Humidity	≤70%			
Average laser power	1kW	1.5kW	2kW	3kW
Power stability	Better than 2%			
Laser working mode	Continuous (Adjustable)			
Maximum frequency	20kHz			
Beam mass(BPP)	Better than 6mm*mrad			
Power adjustment range(%)	10%-100%(gradient-adjustable)			
Fiber cable length	10m			
Cooling method	Built-in water cooling			Independent
Continuous working hours	24 hour			
Mode of operation	Hand held type			
The Wobble parameter	Frequency:0-300Hz, spot diameter:0.5-5mm			
Fiber interface	QBH			
Protective lens	18*2mm			
Shielding gas	Argon, Nitrogen, Air			
Maximum gas pressure	5bar			
Focal distance(mm)	120/150mm			
Overall size (length*width*height)	850*450*630mm			700*960*960mm
The weight of the machine	About 115Kg	About 120Kg	About 130Kg	About 260Kg

2.3 Product structure and welding effect

（1）Structure of welding head

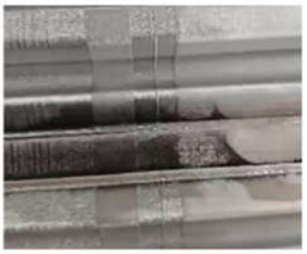
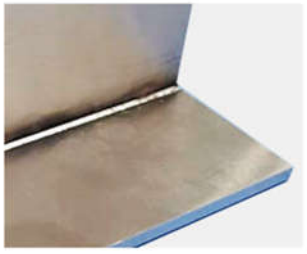


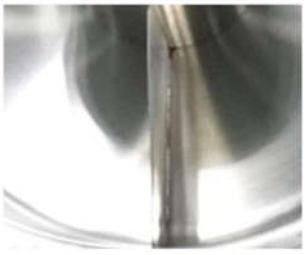
（2）Welding nozzle kit



（3）Welding effect show





(4) Welding parameters table

Material	Thickness (mm)	Feeding speed (mm/s)	Wobble Width (mm)	Laser power (W)	Weld wire diameter (mm)	Welding penetration	Protective gas
Stainless steel	1	80	2.5	350	ER304 1.0	90%	Nitrogen/ Argon
	2	80	3.0	500	ER304 1.2	100%	
	3	70	3.0	700	ER304 1.2	100%	
	4	65	3.5	1000	ER304 1.2	100%	
	5	60	3.5	1500	ER304 1.6	100%	
	6	60	4	1600	ER304 1.6	80%	
	7	60	3.5	2000	ER304 1.6	100%	
	8	50	3.5	2800	ER304 1.6	100%	
Carbon steel	0.5	45	2.5	250	ER 0.8	80%	Air mixture
	1	80	2.5	380	ER 1.0	90%	
	2	70	3.0	700	ER 1.2	100%	
	3	65	3.0	1200	ER 1.2	100%	
	4	60	3.5	1500	ER 1.2	100%	
	5	60	3.5	1700	ER 1.6	100%	
	6	60	4	2000	ER 1.6	80%	
	7	50	3.5	2600	ER 1.6	100%	
	8	45	3.5	3000	ER 1.6	100%	
Aluminum	1	80	2.5	450	AL 1.0	90%	Nitrogen
	2	70	3.0	900	AL 1.2	100%	
	3	65	3.0	1500	AL 1.2	100%	
	4	60	3.5	1800	AL 1.2	100%	
	5	60	3.5	2200	AL 1.6	100%	
	6	55	3.5	2800	AL 1.6	80%	

Default: Scanning speed=Scan width*100, Duty cycle:100%, Frequency:1000Hz

The protective gas pressure is set to 0.2MPa by adjusting the pressure regulator.

3. Installation and use handheld laser welding machine

- Check whether the appearance of the equipment is abnormal, and whether the output cable is bent and damaged;
- Please ensure that the power plug contacts well;
- Check and ensure the dust-free pollution inside and outside of the welding protection lens;
- Check and ensure the normal status of all buttons and switches on the whole machine;

3.1 Installation of wire feeder

A. Installation of welding wire roll

1. Weld wire is ordinary welding wire, common 5KG-30KG can be installed, but do not use medicine core welding wire.

2. Adjust the strength of the roller through the inner hexagon, so that it is not too tight or too loose, and send the silk without a jam (usually do not need to adjust)

3. Cover the cap after adjustment (Figure 1)



Figure 1



Figure 2

B. Wire feed roll installation

1. There are 4 wire wheels (0.8/1.0/1.2/1.6mm), two sides are different models and different core diameter. Please install same diameter wheels. If use 1.2mm welding wire, please install the wire wheel mark 1.2mm is outside (Figure 2)

2. When installation, stick the welding wire in the slot and then clamp again (Figure 3)



Figure 3



Figure 4

C. Wire feeding tube installation

1. After placing the wire into the feeding tube, insert, then tighten the screw (Figure 4)
2. When installing the wire feeding pipe, remove the copper nozzle and match the corresponding copper nozzle (Figure 5)



Figure 5



Figure 6

D. Signal and power supply interface.

1. At the behind of the wire feeder, there are two connecters, The 2-pins are wire feeder signal connected to the wire feeder interface of the cabinet. This signal is a short signal, This wire is often closed and not 24V input.
2. The other 3-pin connecter for the power supply, Input AC220V power.

E. Operation panel

1. The home page value shows the wire feeding speed, adjust it through the upper and lower keys, and keep the run button green state when using it.
2. Manual wire feeding: After press, the wire feeding machine starts to feed wire, and the manual wire feeding speed depends on the background setting (Figure 7)



Figure 7



Figure 8

3. Press setting to set the parameters of wire feeder.
4. Press save when all Settings are completed (Figure 8)
5. Set the feed speed of the page as the default feed speed, that is the switch remains unchanged.
6. Start-up delay: The delay time before feeding.
7. Withdrawal length and supplement length: set according to the actual usage.

When the welding switch released, the wire feeder will first withdraw a length then stop feeding. When the welding switch pressed, the wire feeder will supplement a length then start feeding. If the

wire is too long before welding, please set the withdraw length longer than the supplement length.

3.2 Operation steps



Figure 1



Figure 2

Step 1: Turn on the main power switch (Figure 1) Check the emergency stop button on the front panel (Figure 2) Add water (distilled or pure water) to the chiller (When the temperature is lower than 4℃, special laser antifreeze is required)



Figure 3



Figure 4

Step 2: Turn on the key switch on the front panel, press the "power on" green button;

Step 3: Open the switch behind the laser source (Figure 3) and open the water chiller (Figure 4)

Step 4: After the system is started, set the laser welding parameters through the touch screen (see Chapter 3.2 for specific settings);

Step 5: After the laser parameters are set, turn on the laser enable switch on the touch screen;

Step 6: Wear the laser protection glasses, clip the safety ground clamp while the handheld welding head on the work piece (ensure conductivity), the welding head contacts the work piece at the part to be welded, and the finger presses the button on the handle of the handheld head, the head will start welding work.

Step 7: After use, release the welding button, release the safety ground clamp, turn off the laser enable switch on the touch screen, press the power off button on the front panel. Close the power

switch on the back of the machine, put the welding head back to the host placement.

3.3 Parameter setting

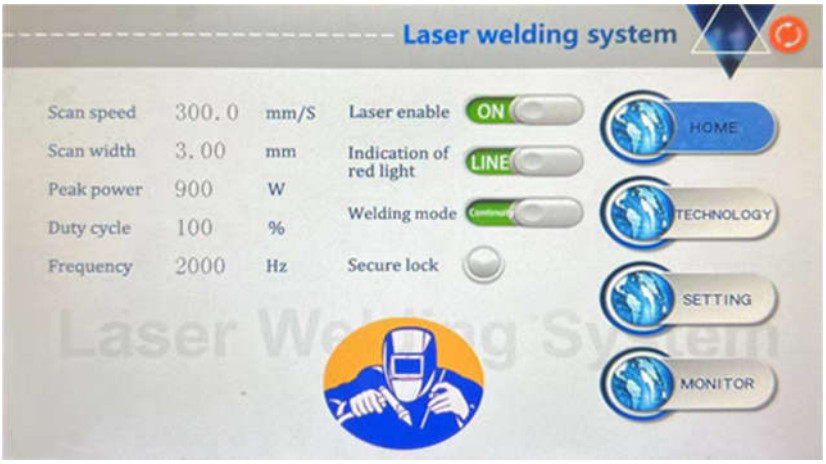


Figure 5

1. The home page shows the adjusted process parameters shown in Figure 5, click "Technology" enter the parameters setting. Adjust the above parameters according to the Process Parameters Table. There are 9 parameters card, it can save parameters according to their own different welding products.

2. After setting the parameters, click "Save", and then click "Import" click "Back" to home page. Figure 6

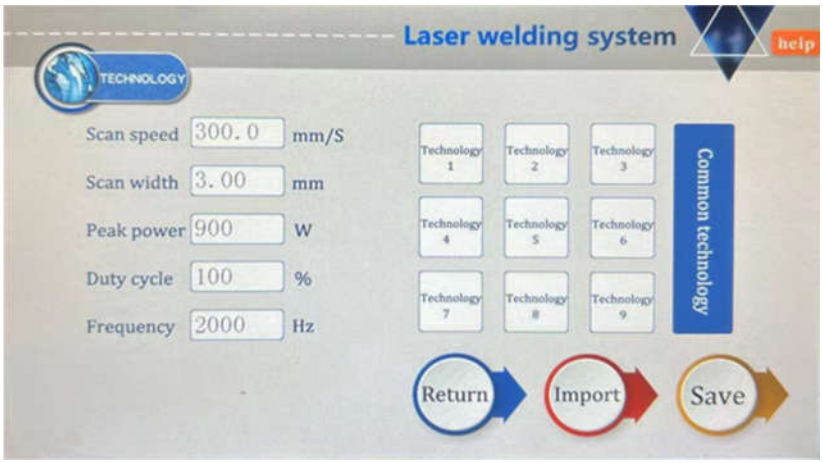


Figure 6

3. To adjust the red light, you need to check whether the red light is in the center of the outlet of the welding nozzle. If there is a left-right offset, you need to click the "Settings" button to adjust. The first step is to click "Settings" and enter the password:123456 to enter as shown in the figure 7, adjust the left and right movement of the red light by adjusting the laser center offset, the negative number of "-" means the light goes to the left.

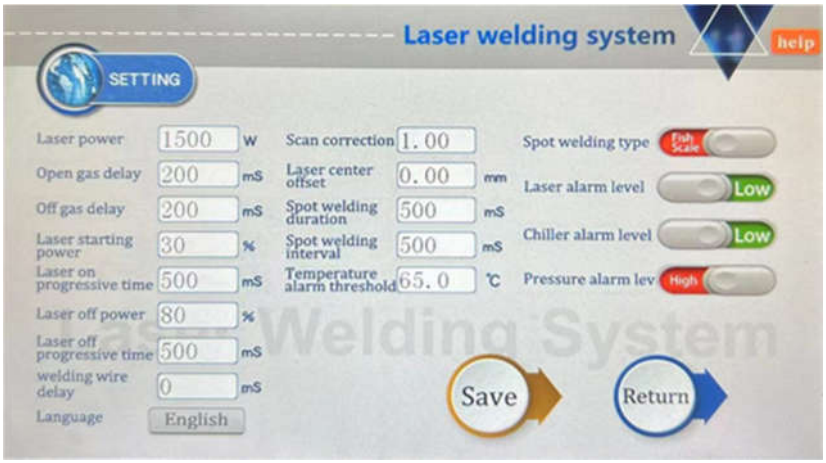


Figure 7

4. Positive number means to the right, each adjustment 0.5mm, after the parameters are adjusted, click the "Save" button to observe the change of the position of the red light.

3.3 Structural function introduction of handheld welding head

1. Copper nozzle: the customer can replace the corresponding nozzle (negative copper nozzle, positive copper nozzle, wire copper nozzle) according to different welding process.
2. Graduated tube: Use to adjust the focal length, adjustable distance value of ±10mm.
3. Shield gas tube: protective gas mouthpiece.
4. Ground wire clamp: Connect to the welding nozzle while using, play a safety protection role.
5. Protection lens installation port: the protection lens adds water and cooling structure, and the service life of the protection lens is more lasting. It is recommended to wipe the dust of the protection lens with an alcohol dust-free cotton swab once a day.
6. Cycle water route: the cold water circulation structure is used to cool down the internal structure of the mirror plate and the head body.
7. LCD: used to display the parameters and other signals.
8. Head handle: alumina process, light and comfortable grip.
9. Welding trigger button: after changing the handle structure and the position of the trigger button can be applied to the left and right hand operation.
10. QBH lock sleeve: connect to the QBH connecter, pay attention to cleaning during installation, to avoid dust entering the head body
11. Emergency stop: When the emergency stop button is pressed, the input power will be cut off.

3.4 Maintenance instructions of welding machine

（1）Cracks appear during the welding of the laser welding machine

1）The flow of protective gas is too large, which can reduce the flow of protective gas to solve.

2）The cooling speed of work piece is too fast, the temperature of cooling water on the clamp is to low, increase the water temperature.

3）The work piece is not cleaned and needs to be cleaned again.

4）The coordination gap between work pieces is too large or has burr, so the processing accuracy of work piece should be improved.

（2）The melting depth of the laser welding machine is not enough

1）Laser energy is not enough, check whether the parameters are set correctly;

2）If the defocus amount of the focus mirror is wrong, the copper nozzle at the front end of the handheld head should be adjusted or the copper nozzle should be replaced (see Article 6 of this section);

3）Protection lenses, contaminated or damaged, shall be wiped or replaced (see Article 7 of this section);

（3）Water cooling machine alarm

1）Check whether the water level of the water chiller is normal, please replenish water if necessary (there are water supply interface and switch on the control panel of the water cooler);

2）Check whether the waterways of water cooler and laser and welding head are in normal access state:

（4）Laser source alarm

1）Check whether the water cooler temperature setting and the actual water cooling is normal;

2）Check whether the water flow rate of the water cooler is normal;

3）Check whether the QBH is loose;

（5）Take care of using the hand-held welding head

1）Protective gas or compressed air with a pressure of no less than 1.5Mpa shall be used;

2）A handheld head can not be aimed at people;

3）Ensure the cleanliness of optical components inside;

（6）Instructions for replacement of handheld head

1）Unscrew the lock cover from head and take it out;

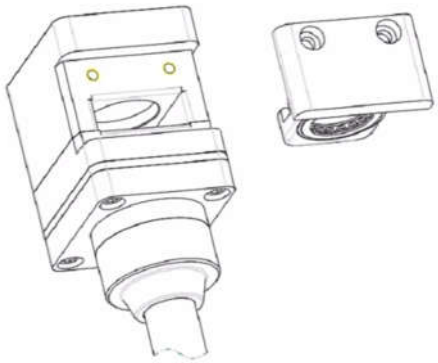
2）Remove the copper nozzle and replace it with a new one;

3）Screw the lock cover.

（7）Hand-held head protection lens replacement instructions

The process characteristics of laser welding need clean optical component, we need regular maintenance of the lens every day, if the lens inside is burn, please replace it.

1）Lens cleaning technology is extremely important, Improper cleaning will lead to lens performance decline. Please do it in a clean and dust-free environment. So always be very careful when cleaning the lenses.



2）Before cleaning, prepare balloon (tiger), a set of spanner, dust-free and non-adhesive tape, anhydrous skim cotton, more than 99% industrial alcohol, sleeve or rubber gloves, mirror paper.

Maintenance and replacement method of protective lens:

1）Before operation, wash your hands with detergent, and wipe your hands again with sticky alcoholic cotton.

2）Unscrew the screw, pull out the protective lens bracket, wipe the warehouse mouth and the inside of the warehouse cover with a cotton ball dipped in alcohol, and quickly close the warehouse cover after cleaning.

3）Take the removed protective lens holder to a dust-free place to operate.

4）Check the protective lens first. (If there is an obvious burning point on the surface, it is recommended to replace it directly.）

5）Then check the white force seal ring under the protective lens (If any scratch or deformation of the sealing ring cannot be used, it must be replaced immediately. Continuing the use will cause damage to the focus and collimated lens groups.）

6）When maintenance, use the mirror paper clean the surface of the protection frame, buckle, then the protection lens pressure ring and the protection lens.

3.5 Notices for using the welding machine

If this laser welding machine is used other than the method specified in the manual, it may reduce the reliability and service life of the product. Please read the following requirements and precautions carefully, and refer to the relevant specifications when using them.

a）The power supply of this welding machine is AC220V-1PH 50Hz or AC380V-3PH 50Hz;

b）A ventilation distance of about 20cm shall be left before and after the equipment. Insufficient ventilation distance may cause internal laser failure to function!

c）The normal operating temperature range of this welding machine is 0~40℃, beyond this operating temperature range may cause the internal laser system to alarm without light, which is a protective behavior and can effectively protect the long-term use reliability of the equipment.

d）The welding machine requires high environmental cleanliness. When using or moving the welding machine, please carefully protect the welding head to prevent dust or other pollution.

Cover the laser output port without working condition. Dust on the output end of the handheld head may cause the lens to heat and damage, resulting in the equipment output power decay or unable to light.

e）Cleaning and maintenance equipment and handheld head operation shall be checked to ensure that the equipment is power off.

f）During the operation, the labor protective articles should be worn according to the regulations, and the conforming protective glasses must be worn near the laser beam.

g）When the laser welding machine is energized, do not directly watch the laser output head, turn it to the orientation of someone, and prohibit the laser output head to illuminate the high reverse material mirror at will.

h）Do not place inflammable and explosive items near the welding machine! Such items should avoid the direct radiation or reflection of the laser light!

i）Excessive bending of cable bending radius of 100mm to prevent damage to optical fiber.

4.Pre-sale and after-sales service

4.1 Service commitment

Heavth Science & Technology Co., Ltd. adheres to the customer as the center, fully understand the customer needs, to provide customers with perfect, personalized installation, debugging, training, maintenance and other pre-sales and after-sales services.

（1）Pre-sale service

Before signing the contract, the company will provide customers with various production process solutions, and provide laser welding equipment for technical consultation, sample testing, equipment selection and other services.

（2）Installation and trial run

According to the contract, our company will safely transport the equipment to the installation place designated by the user within the specified time, and provide installation and use video, online technical service to install it. ensure the installation and debugging successful.

（3）After-sales training

After the installation and debugging, the company shall provide free technical training. until the operators can use the equipment independently. The main training contents are as follows:

- Basic principles of laser welding technology
- Main structure of laser welding equipment
- Use of laser welding equipment for operation
- Adjustment of laser welding process parameters
- Maintenance of the laser welding equipment

（4）After-sales commitment

- Free equipment warranty for one year (excluding man-made damage, optical fiber broken);
- Free technical consultation, process and software upgrade services;
- Response time of customer service is within 3 hours;
- Provide lifetime maintenance service, only for the parts cost charge;
- Extensive hardware and software support for machine life.

4.2 Limitations of the warranty

Damage to products and their components (including optical fibers) caused by tampering, opening, removal, miss assembly, and improvement caused by non - Heavth personnel, or damage caused by misuse, negligence, or accident, abnormal installation and maintenance, misuse or information and warnings in the user's manual are not covered by the warranty. The customer is responsible to understand and follow the operation instructions in the user manual and operation scope, and the damage caused by the incorrect operation is not guaranteed. Accessories and other parts are not covered by the warranty.

4.3 Technical Support and Product Maintenance

There are no other built-in accessories for user maintenance except those provided, so the maintenance outside the accessories provided shall be carried out by Heavth technicians.

In case of any fault during the process of use, and do the trouble shooting.

All repair and replacement products must be placed in the original package provided, otherwise Heavth will be entitled to repair any product damage caused.

When you receive the Heavth product, please check whether the product is intact and the accessories are complete. If there is any abnormal situation, please contact the carrier and Heavth in time. Heavth will continue to develop new products. The product information listed in the manual is subject to change without notice. All technical parameters shall be subject to the contract terms.

The above warranty and service terms of Heavth for the products are for user reference only, and the formal service and warranty content shall be subject to the treaty in the contract.

4.4 Contact information

Heavth Science & Technology Co., Ltd.
Tel: 0086-0519-89182619
Email: Sales@heavth.com
Http://www.heavth.com
Address: No.55,Feilong West Road, Changzhou City, China 213012