MOBILE PULSED LASER CLEANING SYSTEM

BGC/BPC SERIES

OPERATION MANUAL



LUOYANG XINCHENG PRECISION MACHINERY CO.,LTD.

Notice

Before using this product, please ensure that the following items are in compliance with the product safety operation requirements. Otherwise, it is forbidden to turn on the system and perform cleaning operations.

	**It is prohibited to use this product in places with flammable and explosive materials.**
	**When cleaning highly reflective materials (copper, aluminum, etc.), it is forbidden to have people stand around to avoid damage caused by reflected light.**
	**It is forbidden to aim the cleaning head at the human body to avoid injury.**
	**It is forbidden to make the tip of the cleaning head upward. Pay attention to the dustproof of the lens.**
	Make sure that the equipment is reliably grounded.
	Clean combustible items carefully and equip with fire-fighting equipment.
	This product is a Class IV radiation laser. Goggles must be worn.
	Keep the lens clean
	The minimum bending radius of the integrated cable should be more than 200mm.
	**Laser-specific antifreeze must be used when the temperature is below 2°C. If the laser freezes, it will cause high maintenance fees.**

CONTENT

Notice.....1

Ⅰ Scope of application.....3

Ⅱ Product description.....3

Ⅲ Use instruction.....4

Ⅳ Operation process.....5

Ⅴ Laser controller interface description.....5

Ⅵ Fault analysis and troubleshooting.....13

Ⅶ Maintenance.....13

Ⅷ Warranty terms.....14

I Scope of application

This product can be used to remove attachments or coatings on the surface of objects, including rust, paint, oil stains, coatings, etc. (High-reflective materials need to be tested and verified). It has the advantages of non-contact, no chemical damage, mobility and high efficiency, etc.

II Product description

1.Equipment structure diagram

Water Cooling:





INTEGRATED CABLE

Air Cooling:





INTEGRATED CABLE

2.Main technical parameters

Model	BGC-300	BPC-300	BPC-500	BPC-1000
Laser Power	300W Single mode	300W Multi mode	500W Multi mode	1000W Multi mode
Laser Wavelength	1060-1080nm			
Output Method	Pulsed			
Modulation Frequency	1-3000KHz	1-1000KHz		
Pulse Duration	20-500ns	10-500ns	10-500ns	30-500ns
Integrated Cable Length	5m	10m		
Adjustable Width	10-100mm(Default F254 lens)			
Voltage	AC 220V±10%			
Input Power	≤2KW	≤3KW	≤4KW	≤7KW
Cooling Method	Air cooling	Water cooling (distilled water , deionized water or pure water as medium)		
Water Tank Capacity	——	16L (14-15L water needs to be added)		
Dimensions of machine	1010*600*1010mm			1050*670*1070mm
Net Weight	142kg	160kg	170kg	228kg

Ⅲ Use instruction

1.Installation and use requirements

1.1 This machine uses a 220V AC power supply. If this requirement is not met, please use the machine with a transformer.

1.2 The minimum bending radius of the integrated cable is 200mm.

1.3 Please keep at least 60cm of space around the machine to ensure good ventilation and to avoid affecting performance due to poor heat dissipation.

1.4 Ensure the air inlet of the machine is clean, and prevent foreign objects or large particles of dust from being sucked into the chassis.

1.5 The operating environment temperature range of the laser cleaning machine is 0 to 35°C. If it exceeds this range, it may cause the system to alarm.

2. Operation precautions

2.1 Please check and ensure that the equipment is powered off beforeinstalling/removing laser cleaning components and other operations.

2.2 It is recommended to dedust the lens and the cleaning head with clean air or wipe it with a lens cloth after each use to prevent dust or other pollution. Please cover the lens with a protective cover when the cleaning head is not working.

2.3 When transporting or handling, avoid knocking and overturning.

2.4 If the equipment is abnormal, check and troubleshoot in time or contact the aftersales service. Do not operate the machine to avoid unnecessary losses.

Ⅳ Operation process

1. Start up and prepare

1.1 Check the water level of the chiller to ensure that the water level is within the standard area(Please ignore this step for air cooling).

1.2 Connect the power cord (pay attention to grounding).

1.3 Start up: turn on the main power supply and emergency stop.

1.4 Take out the cleaning head and ensure that the minimum bending radius of the integrated cable is not less than 200mm.

2. Set the swing and laser parameters according to the target.
3. Click "Sway" and "Laser" to enter the cleaning preparation state.
4. Double-click the cleaning head button and keep pressing to start cleaning.
5. After cleaning, release the button to stop working.

Note: Different function combinations can be achieved by pressing the button multiple times: (this function needs to be set in the system)

Press the button twice and hold: laser on + power unchanged.

Press the button 3 times and hold: laser on + power increase (release and the power is updated).

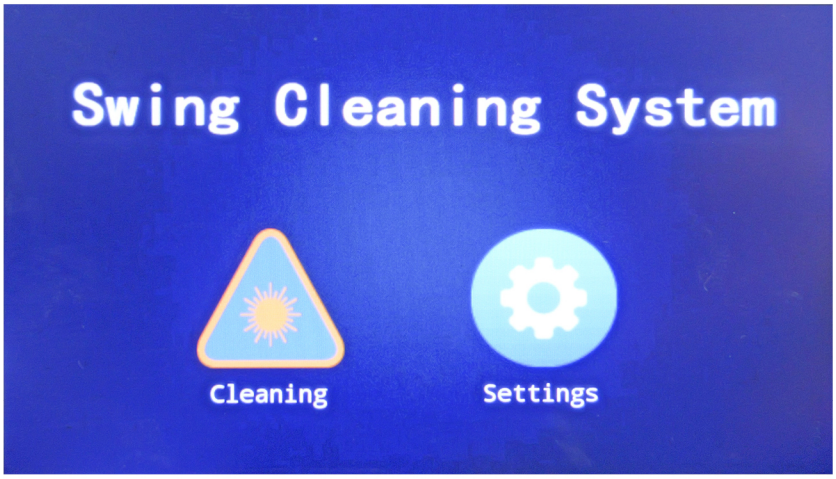
Press the button 4 times and hold: laser on + power decrease (release and the power is updated).

Ⅴ Laser controller interface description

After powering it on, the control screen enters the main operation interface of the handheld laser cleaning system.

1.User management

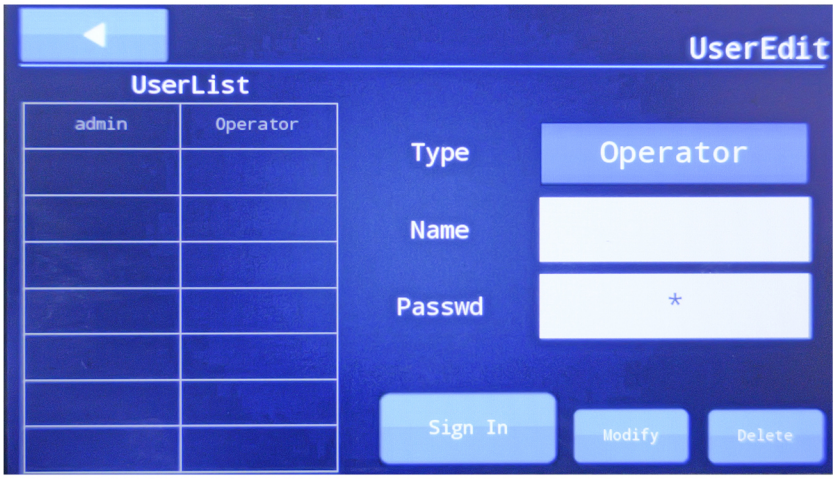
Click "Settings" to enter the system setting interface (default password: 6), click "User Management", and set the user type, user name and password in sequence to complete the user creation (the system has created an account: admin, password: 1).



Main operation interface



System Setting



User Management

2.Cleaning Management

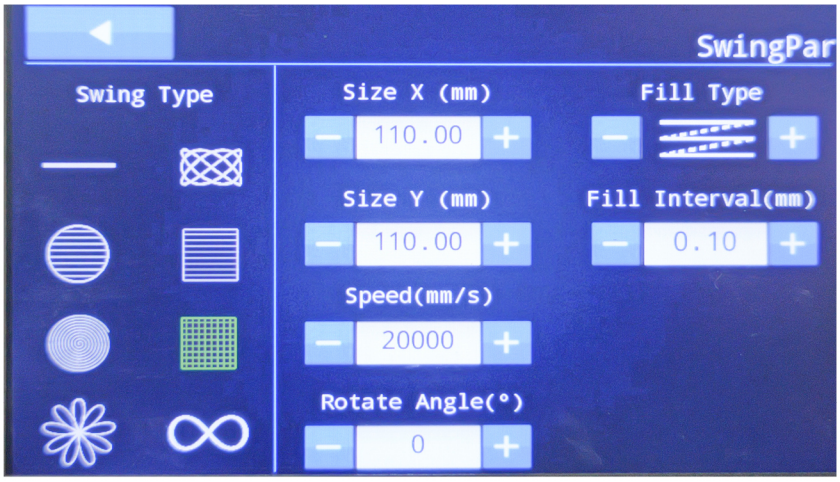
Click “Cleaning”, enter the password to enter the interface. Click “Swing” and “Power” to set the parameters. Please refer to 2.2 and 2.3 for parameter setting.

Click "Sway" and "Laser" to enter the cleaning preparation state. Aim the the cleaning head at the target with an interval of about 300mm (F254 field lens), and double-click the button of the cleaning head to start.

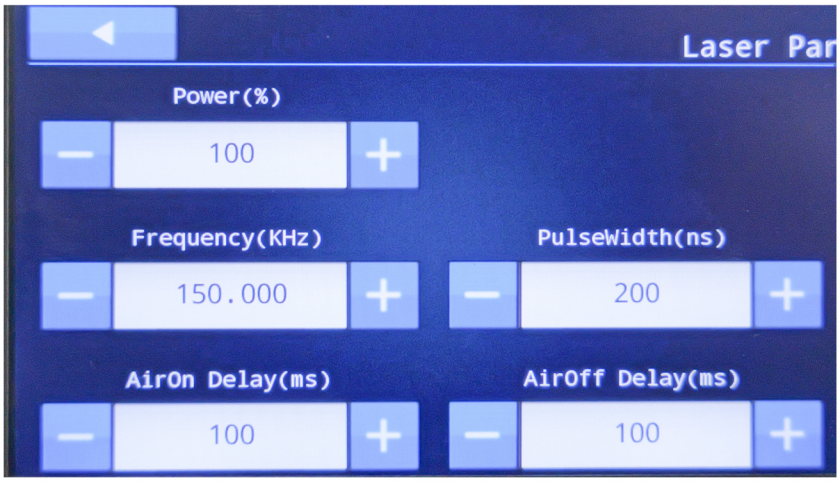
Note: In the process of cleaning, please pay attention to vacuuming. Otherwise the raised smoke and dust will cause damage to the lens!



Cleaning Management



Swing Par.



Laser Par.

2.1 Function description for swing parameter and laser parameter:

Item	Parameter	Function	Note
Swing parameter	Size X(mm)	Set the X-direction scan width	0-130mm (Depends on the lens)
	Size Y(mm)	Set the Y-direction scan width	
	Speed(mm/s)	Set the scanning speed of the cleaning head. Different tracks have different speed limits. The faster the speed, the more cleaning times per unit time.	
	Fill type	Types of Ellipse Fill and Rectangle Fill Lines	
	Fill interval	The interval between filling lines. The denser the filling, the better the cleaning effect, but the lower the efficiency.	
	Fill angle	The inclination angle of the fill line. It can be set in conjunction with the "rotate angle" parameter.	
	Rotate angle	The overall rotation angle of the scanned graphics (does not include fill line angle)	

Item	Parameter	Function	Note
Swing parameter	Phase move	The phase shift speed of the sine line.	
	Sine Num.	Density series of sinusoidal wavy lines	
Laser Parameter	Power（%）	Control the power output of the laser source. The greater the power, the greater the energy.	0-100%
	Duty（%）	Sets the duty cycle of the modulation signal period (It is valid for continuous laser sou	0-100%
	Frequency（KHz）	The number of laser pulse output per unit time. It is used to adjust the energy density and needs to be adjusted with the pulse width. For details, please refer to 2.4/2.5/2.6/2.7.	1-4000
	Pulse Width	The duration of a single pulse. It controls the energy of a single laser spot. It needs to be adjusted with the frequency. For details, please refer to 2.4/2.5/2.6/2.7.	10-500
	AirOn Delay（ms）	Set the air blowing time in advance before cleaning starts	
	AirOff Delay（ms）	Set the time to keep blowing after cleaning	

2.2 Swing parameter table

Scanning Width（mm）	Scanning Speed（mm/s）
20	2500
30	3500
40	5000
50	6000
60	7500
70	8500
80	10000
90	11000
100	12500
110	13500
120	15000
130	16000

Note: The scan width is directly proportional to the scan speed. The narrower the scan width, the corresponding scan speed needs to be reduced.At this time, the cleaning intensity will increase. It is recommended to adjust the scanning width and scanning speed referring to the above table. Otherwise it may cause the galvanometer motor to whistle or even cause damage.

2.3. Laser parameter setting instructions

2.3.1. Control the output energy by adjusting the power. The higher the power is, the higher the output energy is, and vice versa.

2.3.2. The frequency can adjust the speed of the pulsed laser. The higher the frequency, the faster the speed, and vice versa.

2.3.3. The pulse width can adjust the the single output energy. Thelarger the pulse width, the stronger the energy, and vice versa.

2.3.4. The pulse width and frequency need to be adjusted accordingly. See the laser parameter table for details.

2.4. BGC-300 laser parameter table

Pulse Width（ns）	Minimum Frequency（KHz）	Maximum Frequency	Pulse Energy（mJ）
1(CW)	/	/	/
20	1875	3000	0.16
30	1350	3000	0.22
40	1050	2000	0.29
50	900	2000	0.33
60	825	2000	0.36
70	735	2000	0.41
80	675	2000	0.44
90	645	1000	0.47
100	525	1000	0.57
150	300	1000	1.00
200	255	1000	1.18
250	225	600	1.33
350	195	600	1.54
450	165	600	1.80
500	165	500	1.80

2.5. BPC-300 laser parameter table

Pulse Width（ns）	Minimum Frequency（KHz）	Maximum Frequency	Pulse Energy（mJ）
10	480	1000	0.63
30	180		1.67
60	115		2.61
80	95		3.16
100	65		4.61
150	50		6
200	33		9.09
300	30	400	10
400	30		10
500	25		12

2.6. BPC-500 laser parameter table

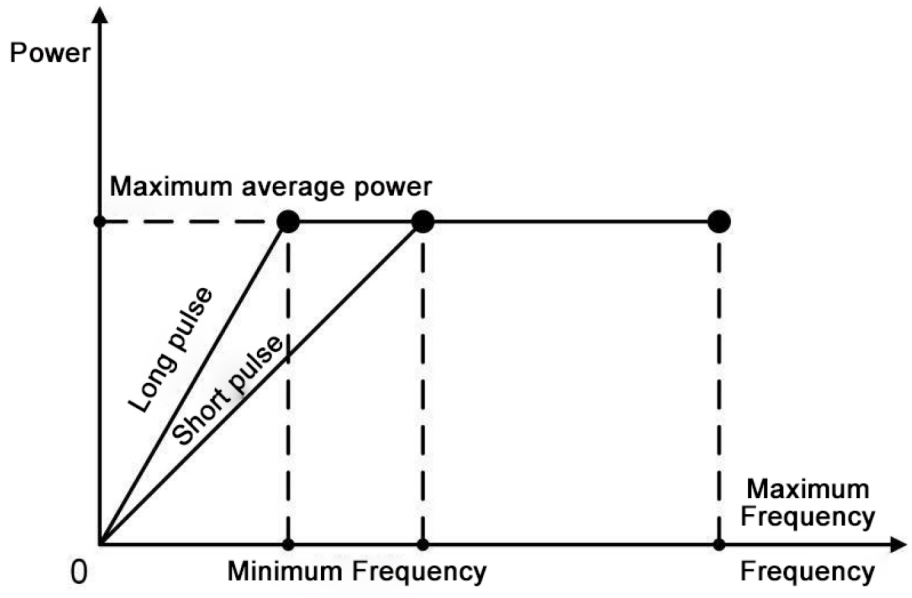
Pulse Width（ns）	Minimum Frequency（KHz）	Maximum Frequency	Pulse Energy（mJ）
10	800	1000	0.63
30	300		1.67
60	150		3.33
80	120		4.17
100	80		6.25
150	60		8.33
200	55		9
300	50	400	10
400	50		10
500	41		12

2.7. BPC-1000 laser parameter table

Pulse Width（ns）	Minimum Frequency（KHz）	Maximum Frequency	Pulse Energy（mJ）
30	600	1000	1.67
60	300		3.33
80	240		4.17
100	160		6.25
150	120		8.33
200	110		9
300	100	400	10
400	80		12.5
500	66		15.15

Note: When the pulse width is high and the frequency is low, the laser's single-point energy is high, which can quickly produce a strong cleaning effect. This mode is more suitable for situations where the surface quality requirements are not particularly strict, especially for rough cleaning on metal surfaces. When the pulse width is low and the frequency is high, the laser's single-point energy is relatively low, which means that the intensity of each cleaning is small, but it provides better control and reduces the risk of damaging the substrate. This mode is suitable for occasions with strict requirements on surface finish, such as cleaning of precision parts or in the protection of artworks and cultural relics, it is necessary to avoid any damage to the delicate surface.It is recommended to set according to Table 2.4/2.5/2.6/2.7 during cleaning, and the parameters can be fine-tuned according to the actual situation.

The relationship between laser output power and frequency



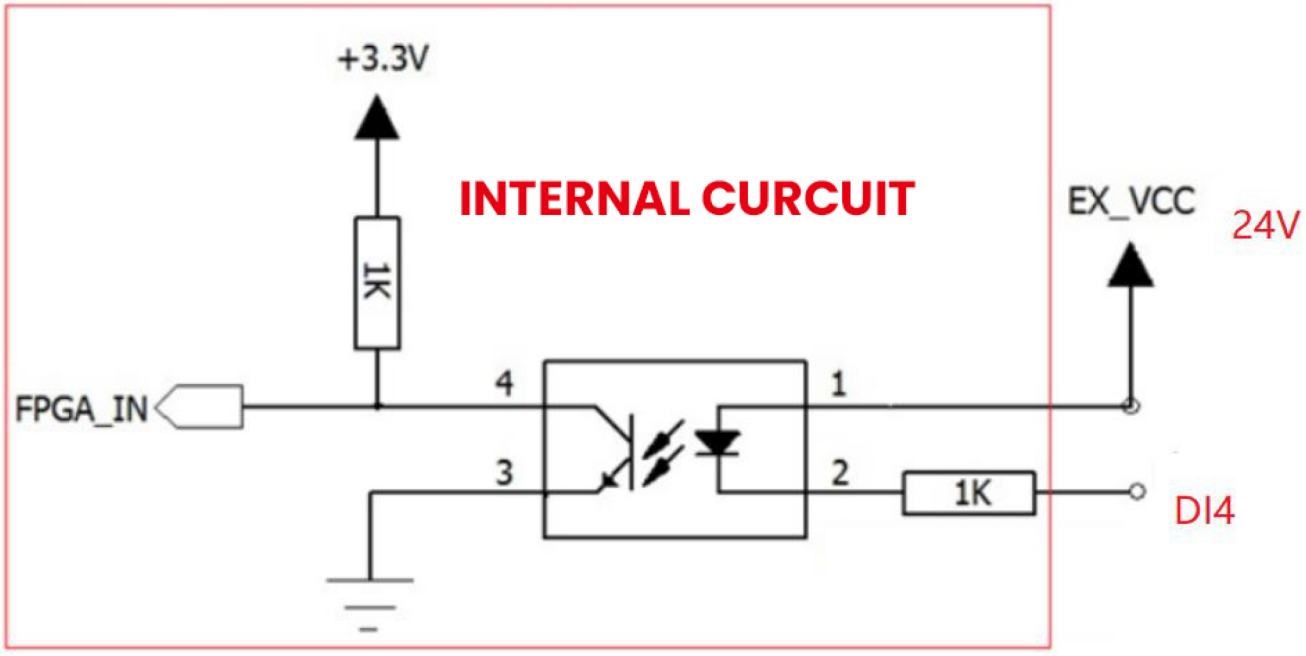
3. External IO triggers control start and stop

3.1. Connect the external control signal to DI4 (valid when low level)

3.2. Go to System Settings -> IO Settings, assign terminal DI4 function as "remote laser on" as shown in the figure below.

3.3. Return to the cleaning management page. After activating the sway and laser buttons, the cleaning head will be controlled to switch on and off through external signals.

3.4. Note: Before emitting laser, make sure that the cleaning head is firmly fixed to prevent it from falling off. The button of the cleaninghead and the external control signal cannot be used at the same time.





Ⅵ Fault analysis and troubleshooting

Fault phenomenon	Cause Analysis	Troubleshooting method
The spot does not swing	1. The control cable connector of the cleaning head is loose. 2. The motor or control card is damaged.	1. Tighten loose joints 2. Please contact us
Sudden loss of energy during cleaning	1. There are foreign objects or damage to the optical lens. 2. Laser failure or abnormality	1. If it is due to the protective lens, clean or replace it, and for other lenses please contact us. 2. Please contact us.
The cleaning head is hot	1. The optical lens is dirty or damaged 2. Optical path deflection	1. Clean or replace protective lenses. For other lenses, please contact us. 2. Check whether the connection between the optical fiber and the cleaning head is loose.
The cleaning effect before and after is inconsistent in the same condition	1. Power attenuation 2. The integrated cable is seriously bent	1. It is normal that the power attenuation is in the normal range. 2.The minimum bending radius of the integrated cable should be more than 200mm.

Ⅶ Maintenance

Note: In order to avoid personal injury and man-made damage, the maintenance of the handheld laser cleaning machine must be carried out by professionals.

1.Handheld cleaning head

1.1 Daily inspection: Check the protective lens. If there is foreign matter, clean with a lint-free cotton swab or wiper dipped in absolute alcohol or isopropyl alcohol. If there is coating damage or lens damage, please replace the protective lens in time to avoid burning other optical lenses.

1.2 Regular inspection: When the machine is used or not used for some time, first check the laser module, and make sure that each optical component is free from dust pollution, mildew, and other abnormal phenomena before turning it on.

1.3 Observing the light spot: The operator should often check the laser output light spot with black image paper. Once the spot is found to be uneven or skewed, it should be repaired in time.

2.Water chiller

2.1 The dust on the condenser and the dust filter needs to be cleaned regularly.

2.2 When the machine is transported or not used for a long time, the coolant should be drained.

2.3 When the temperature is lower than 2°C, Please use laser-specific antifreeze. please check and ensure that the chiller is working properly before using the machine to avoid damaging the laser tube, output head, and water chiller due to the solidification of the coolant.

2.4 The coolant must be replaced in the following cases

2.4.1 The filter element has been replaced.

2.4.2 After 3 months of use.

2.4.3 Use again after long-term non-use(3 months is recommended)

Ⅷ Warranty terms

1.The warranty period of this product is one year for the whole machine, and the warranty period for the laser source is two years:

1.1 From the date of purchasing this product, our company provides free warranty within one year(excluding non-warranty item). If the machine need to be returned to the factory for repair, the user only needs to bear the cost of two-way transportation.

1.2 This product is repaired free of charge for life, and the user only needs to bear the cost of spare parts and two-way transportation.

2.The following scopes are not covered by warranty:

2.1 Damage caused by improper use such as violent bumping, bending, etc.

2.2 Human-caused damage.

2.3 Disassemble or assemble ,replace electrical accessories, or adjust electrical circuits without permission.

2.4 Laser source, chiller and other accessories are damaged by freezing (mainly manifested as water leakage).

2.5 Consumable items such as optical accessories are not covered by the warranty (optical parts such as collimating lenses, galvanometers, field lenses, optical fibers, etc. are not covered by the warranty).

※ The relevant technical parameters listed in this manual are for reference only. The relevant product information is subject to change without prior notice. All technical parameters and agreements are subject to the terms of the sales contract.

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