

01 LASER modbus instructions

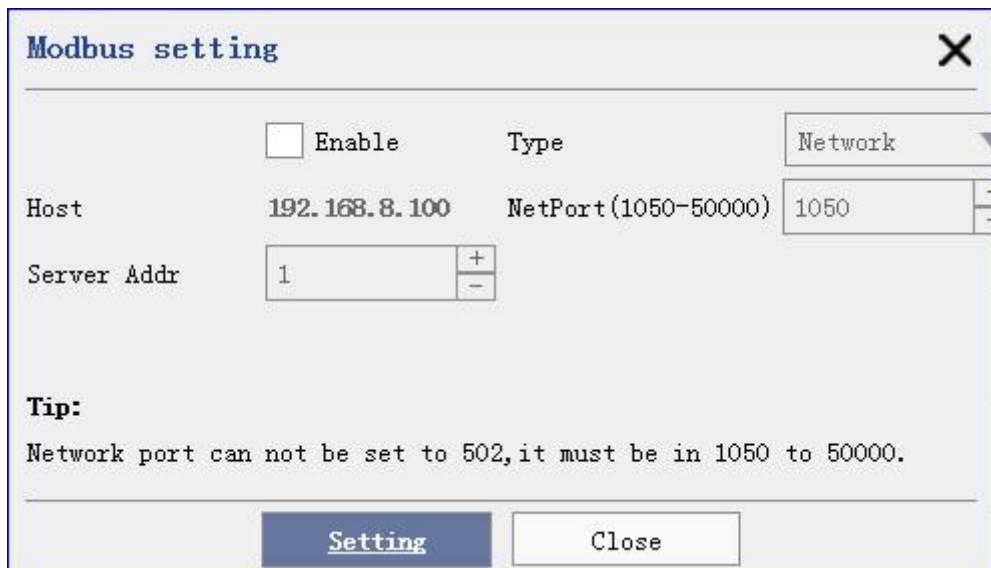
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Version	Date	Log
V1.0	2022/6/22	Add version.
V1.1	2022/08/12	1. Add heartbeat status, abnormal status register. 2. Complete the description in Section 2.6 about selecting print.
V1.2	2022/9/13	1. Change the description of the register address, starting with 0.
V1.3	2023/1/5	Add 2106 register.
V1.4	2023/1/11	Add Mark Completed Output regiseter.

In order to facilitate PLC users to quickly communicate with the laser board through the PLC, this manual is hereby written. The board will operate as an RTU (slave) end.

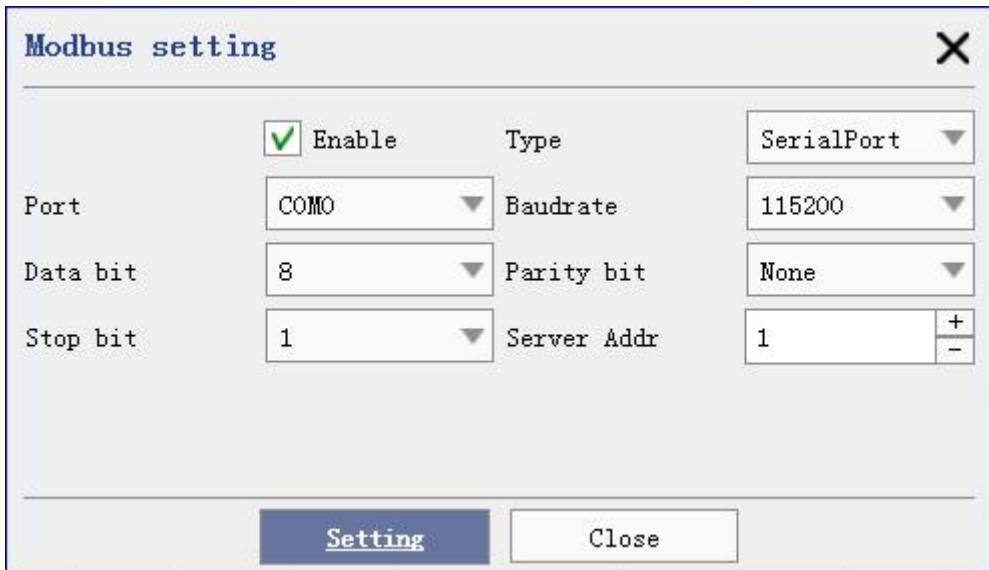
1. Interface settings

Clickd“Settings - Modbus”, open Modbus settings page.



At present, Modbus communication supports network communication and serial communication. After clicking Enable, the interface changes to a settable mode.

Network: In network mode, the IP address already obtained by the current board will be automatically obtained as the current host address. The port needs to be set to a port address different from the network communication. The service address must be consistent with the master side.



SerialPort : The serial port mode needs to set the connection information of the serial port, and the rest is consistent with the network mode.

After the setting is complete, click Settings, if the setting information is correct, you can open Modbus communication. Modbus will not automatically shut down when the settings are correct, and it will automatically start the next time the board is started, until it is manually closed or the setting is wrong (such as network interruption or port number occupation, etc.).

2.Protocol

Currently, the Modbus protocol uses Holding Registers (holding registers).

2.1 Edit marked content

At present, the Modbus protocol supports the modification of 10

marked contents. The length of each mark content should not exceed 100 words (English and numbers are counted as one word).

During initialization, the master needs to send a 03 command to refresh the content information of the current board. After receiving the 03 command, the board will update the current mark content and document name and other information into the holding register before it can be read by the PLC take.

The registers are defined as follows :

Name	Register address (decimal)	Description
The first mark in the Entity list	999-1098	Support unicode Chinese; Each number and English occupies an address.
The second mark in the Entity list	1099-1198	
The third mark in the Entity list	1199-1298	
The fourth mark in the Entity list	1299-1398	
The fifth mark in the Entity list	1399-1498	
The sixth mark in the Entity list	1499-1598	
The seventh mark in the Entity list	1599-1698	
The eighth mark in the Entity list	1699-1798	
The ninth mark in the Entity list	1799-1898	
The tenth mark in the Entity list	1899-1998	

Modifying the content of the mark only needs to modify the corresponding register address.

When the combined text mark is read, the complete mark content will be read, but only the content of the first submark can be modified during

modification.

If it is marked as a serial number and other content that has been changed by the rules, it cannot be modified through this agreement. Need to manually modify in the interface.

2.2 Open document

Similar to the marked content, the master needs to send a 03 command to refresh the register content to get the current document name.

The registers are defined as follows :

Name	Register address(decimal)	Description
Current marking document name	1999-2098	Only the name is required, no suffix is required

2.3 Marking operation

Currently supports start/stop marking, start/stop red light preview, preprocessing and marking status output. It is defined as follows:

Name	Register address(decimal)	Description
Print	2099	Write 1 to start marking
Infrared Preview	2100	Write 1 to start Infrared Preview
Stop (print, infrared)	2101	Write 1 to start stop
Marking status output	2102	Update after executing the 03 command, it is 0 during marking and 1 in non-marking state
Preprocess	2103	Write 1 to perform preprocessing
Query heartbeat status.	2104	Status is 1 or 0. It will change every second.
Query abnormal status.	2105	Reference:Abnormal List.
Mark completed	2106	When marking completed, this register's value will be set 1.

Abnormal List:

ErrorCode	Description
0	No error.
1	Machine is printing. Repeat to print.
2	No mark object can print.
3	No content can print.
4	Program start exception.
5	Program control exception.

6	Start printing error.
7	Stop printing error.
8	Infrared Preview error.
9	Serial number is finished.
10	Database is finished.
11	The number of document plans has been completed.
12	Prepare to mark the next error.
13	Content's position beyond the Galvo's area.
14	Equipment has expired.
15	Exceeds the minimum marking speed range.
16	Exceeds the maximum marking speed range.
17	Communication with underlying program alarm error.
18	The number of documents in the underlying program communication is wrong.
19	The printing mode in the underlying program communication is wrong.
20	The underlying program communication transmitted data incorrectly.
21	The underlying program communication started marking error.
22	The underlying program communication stoped marking error.
23	IO signal disable marking alarm.
24	RepeatWithoutBreak mode not support big document error.
25	The frequency is out of the setting range.
26	Initialization of the analog laser power error
27	[Fly mode] Interval delay distance too small error.
28	[LinePipe mode] Meter length calculation error.
29	Sync start signal and trigger signal IO input port error.

30	Rotation axis and extension axis conflict error.
31	Extension axis soft limit error.

2.4 Marking Layer Operation

The layer parameter is used to set parameters such as marking speed and laser power. 10 groups are supported (layer 0-layer 9). The following is the definition of the first group of pen number parameters (layer 0):

Name	Register Addr. (Decimal)	Description
Speed	4499-4500	0-20000, 32-bit floating point number, CD AB format
Power	4501-4502	0-100, 32-bit floating point number, CD AB format
Frequency	4503-4504	Unit KHz, 32-bit floating point number, CD AB format
Marking count	4505-4506	Set the marking times of the current pen number, write the hexadecimal value of the required marking times, such as 10 times, write 0x0000, 0x000A
Open delay	4507-4508	-2000-2000, 32-bit floating point number, CD AB format, in microseconds
Close delay	4509-4510	-2000-2000, 32-bit floating point number, CD AB format, in microseconds
End delay	4511-4512	Unit microsecond, 32-bit floating point number, CD AB format

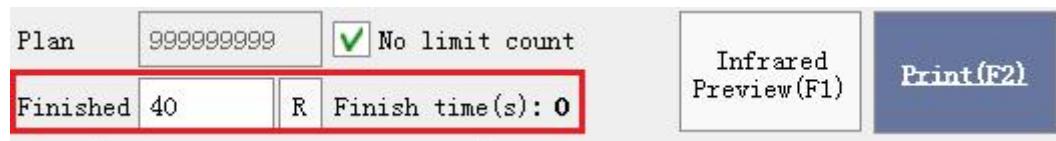
Corner delay	4513-4514	Unit microsecond, 32-bit floating point number, CD AB format
Jump speed	4515-4516	Unit millimeters per second, 32-bit floating-point number, CD AB format
Min jump delay	4517-4518	Unit of microseconds, 32-bit floating-point number, CD AB format
Max jump delay	4519-4520	Unit of microseconds, 32-bit floating-point number, CD AB format
Max jump length	4521-4522	Unit millimeter, 32-bit floating-point number, CD AB format
Dot type	4523	Write 0x0000, corresponding to "Time" mode Write 0x0001, corresponding to "Pulse" mode Write 0x0002, corresponding to "Diamond" mode
Dot time	4524-4525	The unit is microseconds. For the "Time" mode, write the value in hexadecimal format. If 100000, then write 0x0001, 0x86A0
Dot pulses	4526-4527	For "Pulse" mode, write the value in hexadecimal format. If 100000, then write 0x0001, 0x86A0
Dot size	4528-4529	For "Diamond" mode.32-bit floating-point number.CD AB format.
Pulse width	4530-4531	The unit is microseconds.32-bit floating-point number.CD AB format.

For the register address table of other pen number parameters, please refer to the Appendix.

Example: Suppose the marking speed needs to be changed to 3000, and the register addresses 4499 and 4500 need to be written. The 32-bit hexadecimal value of 3000 is 45 3B 80 00, because the CD AB format supported by Zero One software needs to be written to 4499 and 4500 Write 0x8000 and 0x453B.

2.5 Finished marking

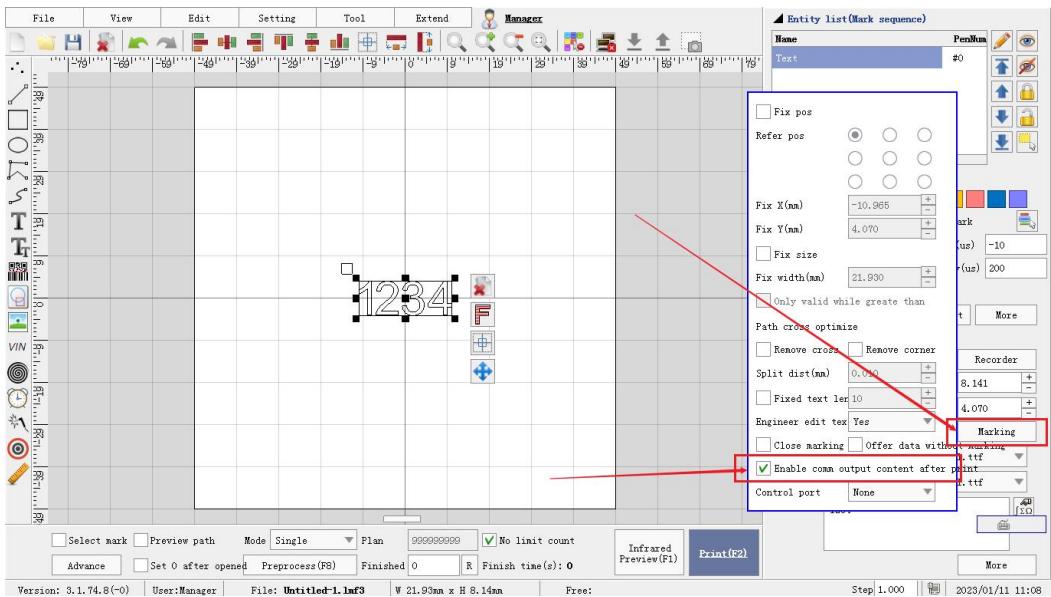
Used to query (03 function code) the marking time of the current document and the number of documents marked.



Defined as follows:

Name	Register Add. (Decimal)	Description
Marking time	2159-2160	Returns the marking time of the document, in seconds
Number of documents marked	2161-2162	Returns the number of completed documents
Mark Completed Output	4899-4998	When marking finish, software updates the contents of these registers to the marker contents.

More details about **Mark Completed Output**: We should check the **Enable comm content output after print** in the software. If there is a case of checking more than one, only the first content will be updated to the register.



2.6 Infrared Preview and Print

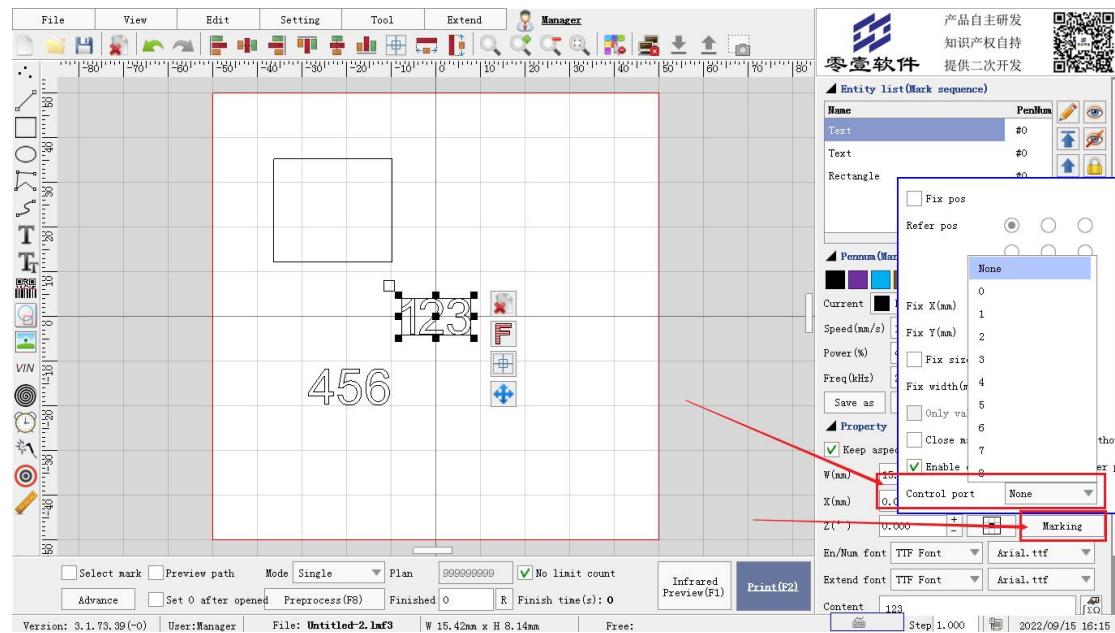
Name	Register Add. (Decimal)	Description
Offset and Rotate Document Marking Parameters	4829-4830	Horizontal offset
	4831-4832	vertical offset
	4833-4834	Rotation angle
	4835-4836	Horizontal offset
	4837-4838	vertical offset
	4839-4840	Rotation angle
	4841-4842	Horizontal offset
	4843-4844	vertical offset
	4845-4846	Rotation angle
	4847-4848	Horizontal offset
	4849-4850	vertical offset
	4851-4852	Rotation angle
	4853-4854	Horizontal offset
	4855-4856	vertical offset

	4857-4858	Rotation angle
	4859-4860	Horizontal offset
	4861-4862	vertical offset
	4863-4864	Rotation angle
	4865-4866	Horizontal offset
	4867-4868	vertical offset
	4869-4870	Rotation angle
	4871-4872	Horizontal offset
	4873-4874	vertical offset
	4875-4876	Rotation angle
	4877-4878	Horizontal offset
	4879-4880	vertical offset
	4881-4882	Rotation angle
	4883-4884	Horizontal offset
	4885-4886	vertical offset
	4887-4888	Rotation angle
Start rotary marking	2173	Start offset and rotation marking after writing 1
Group label marking	2183	Write 1 to start group marking
	2184	for writing group numbers
Select Marking	2185	Start selecting marking
	3099-3138	the name of the selected tag
Query marking status	2186	03 (function code) instruction query

Up to 10 sets of "offset and Rotate Document Marking Parameters" can be set (depending on the actual requirements). For example, if you need to mark 4 times, then set 4 groups of parameters (write 4 groups of horizontal offset, vertical offset and rotation angle to 4829-4852 respectively). After setting the "rotation and offset

document marking parameters", write 1 to the 2173 register, the software will vibrate the center of the mirror as the reference, marking 4 times.

For "Group label marking", it is necessary to set the group number for the marker in advance in the software, as shown in the figure.



When using, first write the group number to be marked to 2184 register (0 write 0x00, 1 write 0x01 and so on), and then write 0x01 to 2183 register will be marked with the corresponding group number.

For "Select Marking", you need to write the mark's name to 3099-3138 register (you can see it in the **Entity list** after selecting the mark), and then write 0x01 to 2185 register for marking.

Appendix

The second group of Layer parameters (Layer 1) register address definition:

Name	Register Add. (Decimal)
Speed	4532-4533
Power	4534-4535
Frequency	4536-4537

Marking count	4538-4539
Open delay	4540-4541
Close delay	4542-4543
End delay	4544-4545
Corner delay	4546-4547
Jump speed	4548-4549
Min jump delay	4550-4551
Max jump delay	4552-4553
Max jump length	4554-4555
Dot type	4556
Dot time	4557-4558
Dot pulses	4559-4560
Dot size	4561-4562
Pulse width	4563-4564

The third group of Layer parameters (Layer 2) register address definition:

Name	Register Add. (Decimal)
Speed	4565-4566
Power	4567-4568
Frequency	4569-4570
Marking count	4571-4572
Open delay	4573-4574
Close delay	4575-4576
End delay	4577-4578
Corner delay	4579-4580
Jump speed	4581-4582
Min jump delay	4583-4584
Max jump delay	4585-4586
Max jump length	4587-4588
Dot type	4589

Dot time	4590-4591
Dot pulses	4592-4593
Dot size	4594-4595
Pulse width	4596-4597

The fourth group of Lyaer parameters (Layer 3) register address definition:

Speed	Register Add. (Decimal)
Power	4598-4599
Frequency	4600-4601
Marking count	4602-4603
Open delay	4604-4605
Close delay	4606-4607
End delay	4608-4609
Corner delay	4610-4611
Jump speed	4612-4613
Min jump delay	4614-4615
Max jump delay	4616-4617
Max jump length	4618-4619
Dot type	4620-4621
Dot time	4622
Dot pulses	4623-4624
Dot size	4625-4626
Pulse width	4627-4628
Speed	4629-4630

The fifth group of Layer parameters (Layer 4) register address definition:

Name	Register Add. (Decimal)
Speed	4631-4632
Power	4633-4634
Frequency	4635-4636
Marking count	4637-4638

Open delay	4639-4640
Close delay	4641-4642
End delay	4643-4644
Corner delay	4645-4646
Jump speed	4647-4648
Min jump delay	4649-4650
Max jump delay	4651-4652
Max jump length	4653-4654
Dot type	4655
Dot time	4656-4657
Dot pulses	4658-4659
Dot size	4660-4661
Pulse width	4662-4663

The sixth group of Layer parameters (Layer 5) register address definition:

Name	Register Add. (Decimal)
Speed	4664-4665
Power	4666-4667
Frequency	4668-4669
Marking count	4670-4671
Open delay	4672-4673
Close delay	4674-4675
End delay	4676-4677
Corner delay	4678-4679
Jump speed	4680-4681
Min jump delay	4682-4683
Max jump delay	4684-4685
Max jump length	4686-4687
Dot type	4688

Dot time	4689-4690
Dot pulses	4691-4692
Dot size	4693-4694
Pulse width	4695-4696

The seventh group of Layer parameters (Layer 6) register address definition:

Name	Register Add. (Decimal)
Speed	4697-4698
Power	4699-4700
Frequency	4701-4702
Marking count	4703-4704
Open delay	4705-4706
Close delay	4707-4708
End delay	4709-4710
Corner delay	4711-4712
Jump speed	4713-4714
Min jump delay	4715-4716
Max jump delay	4717-4718
Max jump length	4719-4720
Dot type	4721
Dot time	4722-4723
Dot pulses	4724-4725
Dot size	4726-4727
Pulse width	4728-4729

The eighth group of Layer parameters (Layer 7) register address definition:

Name	Register Add. (Decimal)
Speed	4730-4731
Power	4732-4733
Frequency	4734-4735
Marking count	4736-4737

Open delay	4738-4739
Close delay	4740-4741
End delay	4742-4743
Corner delay	4744-4745
Jump speed	4746-4747
Min jump delay	4748-4749
Max jump delay	4750-4751
Max jump length	4752-4753
Dot type	4754
Dot time	4755-4756
Dot pulses	4757-4758
Dot size	4759-4760
Pulse width	4761-4762

The ninth group of Layer parameters (Layer 8) register address definition:

Name	Register Add. (Decimal)
Speed	4763-4764
Power	4765-4766
Frequency	4767-4768
Marking count	4769-4770
Open delay	4771-4772
Close delay	4773-4774
End delay	4775-4776
Corner delay	4777-4778
Jump speed	4779-4780
Min jump delay	4781-4782
Max jump delay	4783-4784
Max jump length	4785-4786
Dot type	4787

Dot time	4788-4789
Dot pulses	4790-4791
Dot size	4792-4793
Pulse width	4794-4795

The tenth group of Layer parameters (Layer 9) register address definition:

Name	Register Add. (Decimal)
Speed	4796-4797
Power	4798-4799
Frequency	4800-4801
Marking count	4802-4803
Open delay	4804-4805
Close delay	4806-4807
End delay	4808-4809
Corner delay	4810-4811
Jump speed	4812-4813
Min jump delay	4814-4815
Max jump delay	4816-4817
Max jump length	4818-4819
Dot type	4820
Dot time	4821-4822
Dot pulses	4823-4824
Dot size	4825-4826
Pulse width	4827-4828

