



IO Communication

Instruction Manual for

GR Painting Robot Series.

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CMA

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Supplier of Intelligent Painting Robots

Statement

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The manual should be well kept during the life circle of the robot. An optional copy can be ordered from CMA if the original one is damaged or lost. The address of the new owner is required to be reported to CMA if the robot is resold or transferred.

This manual is an indispensable part of the whole manual collection and all the professionals involved in operation, teaching, maintenance, and inspection are required take CMA special training on the knowledge instructed by the following manuals:

- ☐ ZL-GR-001-V1: Safety Manual for GR Painting Robot Series.
- ☐ ZL-GR-002-V1: Maintenance Manual for GR Painting Robot Series.
- ☐ ZL-GR-003-V1: Explosion Protection Manual for GR Painting Robot Series.
- ☐ ZL-GR-004-V1: Remote Assistance Manual for GR Painting Robot Series.
- ☒ ZL-GR-005-V1: IO Communication Instruction Manual GR Painting Robot Series.
- ☐ ZL-GR-006-V1: Program Editor Instruction Manual for GR Painting Robot Series
- ☐ ZL-GR6150-001-V1 Installation and Connection Instruction Manual for GR6150 Painting Robot.
- ☐ ZL-GR6150-002-V1 Mechanical Operation and Maintenance Manual for GR6150 Painting Robot.
- ☐ ZL-GR6150-003-V1 Electrical Operation and Maintenance Manual for GR6150 Painting Robot.
- ☐ ZL-GR6150-004-V1: Electrical Schematic Diagram for GR6150 Painting Robot.

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About the Manual

The target readers of the manual include professionals involved in robot operation, maintenance and technical service. This manual intends to explain how to use the program editor for all the GR painting robots designed by CMA. The warning pictograms are classified into four categories, “danger”, “caution”, “attention” and “important” respectively. These warnings are relevant to safety and must be observed.

 Danger	Danger! This warning means death might occur, if an operation is not properly performed.
 Caution	Caution! This warning means death or severe physical injury might occur, if an operation is not properly performed.
 Attention	Attention! This warning means minor physical injury or minor material damage may occur, if an operation is not properly performed.
 Important	Important! This warning means special attention should be paid to a certain operation.

Warnings titled by “attention” might also lead to severe consequence in different cases. Therefore it is strongly recommended that anything titled by “attention” should be handled with extreme caution.

- Please read the manual and the files attached carefully and master all the required knowledge about the robot and the safety instructions before use.
- A cover or safety shield is taken out only for the purpose of illustration. Please ensure to restore the cover or safety shield before any operation.
- The figures and photos contained in this manual are for the purpose of illustration only and they might be different from the product purchased.

- The manual is subject to change without prior notice for the purpose of product improvement, specification change and instruction update.
- The manual will be reissued and a new version number will be specified if the contents are renewed.
- Contact the service department with the information printed on the back cover to purchase a new manual if the present one is damaged or lost.
- CMA is not responsible for any consequence caused by any unauthorized modification or change of the robot.



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Chapter One Overview

This manual is IO configuration manual, mainly including input (digital quantity) and output (digital quantity and relay type). In combination with worksite application, when robot needs to configure peripheral equipment signal, it can refer to the manual for relevant signal configuration.

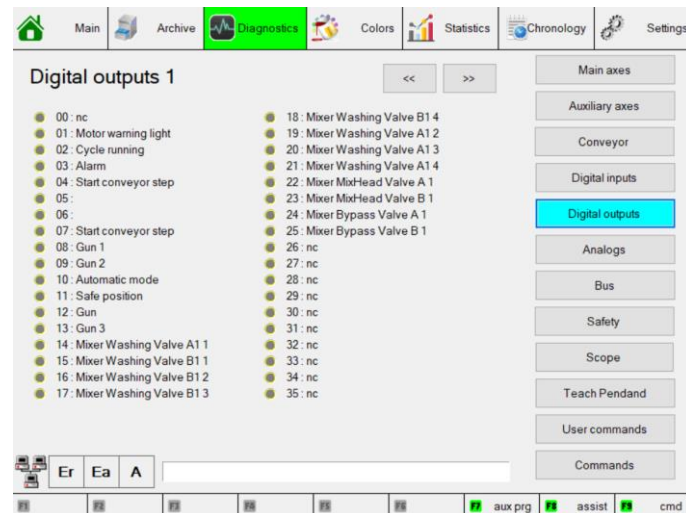
Chapter Two Digital input signal

The models of digital input modules are X20DIF371 and X20DI9371, of which X20DIF371 is a 16 input module and X20DI9371 is a 12 input module. The specific definitions are shown in the following figure:

模块1. 3-DI模块\X20DIF371							
端点	变量	端口定义	备注	端点	变量	端口定义	备注
1. 1	I0. 0	急停正常	接安全PLC-IM18点	1. 5	I0. 8	备用	未接线
2. 1	I0. 1	急停手动正常	接安全PLC-IM19点	2. 5	I0. 9	柜内温度正常	
1. 2	I0. 2	自动	接安全PLC-T2点	1. 6	I0. 10	开始信号	未接线
2. 2	I0. 3	备用	接安全PLC-T3点	2. 6	I0. 11	停止信号	未接线
1. 3	I0. 4	备用	接安全PLC-O3点	1. 7	I0. 12	伺服上电信号	未接线
2. 3	I0. 5	辅助电源正常		2. 7	I0. 13	循环启动信号	未接线
1. 4	I0. 6	外部辅助电源正常		1. 8	I0. 14	循环结束信号	未接线
2. 4	I0. 7	内部辅助电源正常		2. 8	I0. 15	故障复位信号	

模块1. 4-DI模块\X20DI9371							
端点	变量	端口定义	备注	端点	变量	端口定义	备注
1. 1	I0. 16	喷枪自动		1. 4	I0. 22	远程启动	接X2端子
2. 1	I0. 17	喷枪手动		2. 4	I0. 23	从传送带开始	接X2端子
1. 2	I0. 18	2号喷枪选择	接X2端子	1. 5	I0. 24	传送带单步/连续	接X2端子
2. 2	I0. 19	旋转件上/出YV+	接X2端子	2. 5	I0. 25	传送带现有位置检查	接X2端子
1. 3	I0. 20	旋转件下/出YV-	接X2端子	1. 6	I0. 26	旋转完成	接X2端子
2. 3	I0. 21	转台旋转	接X2端子	2. 6	I0. 27	开始洗涤循环	接X2端子

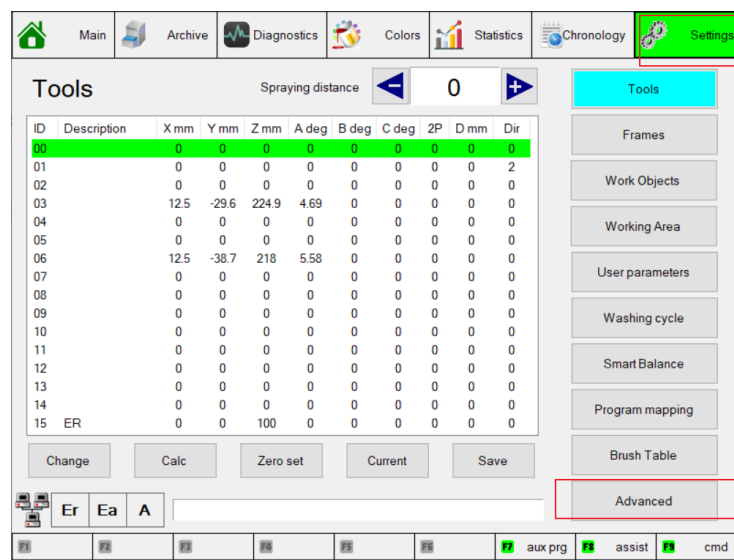
As shown in the figure above, the two categories: not wired and connected to X2 terminal can be freely configured by customers.



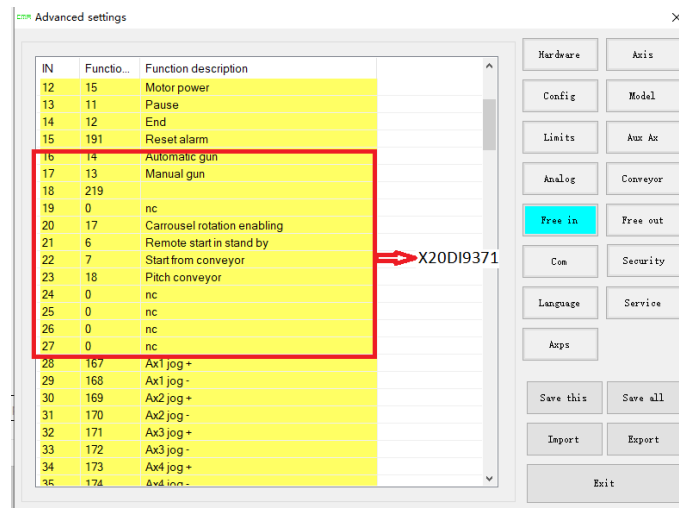
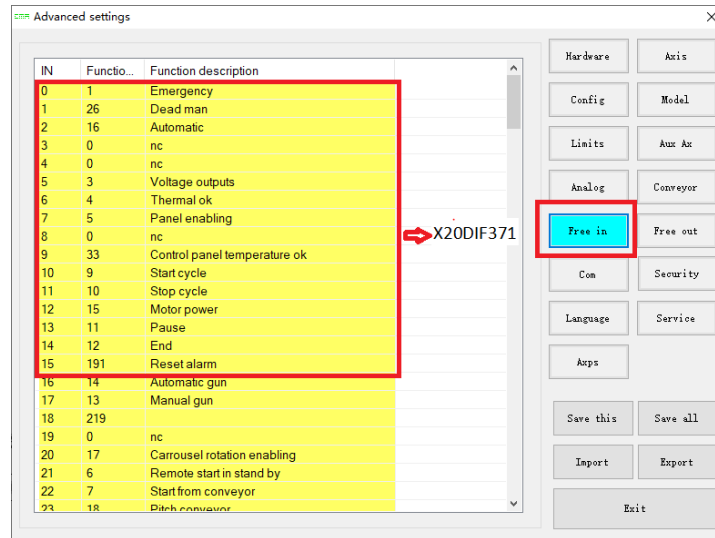
In the teach pendant diagnosis interface, open the digital input monitoring interface, where 00-15 corresponds to module X20DIF371 and 16-27 corresponds to module X20DI9371.

2.1 Free configuration of digital input

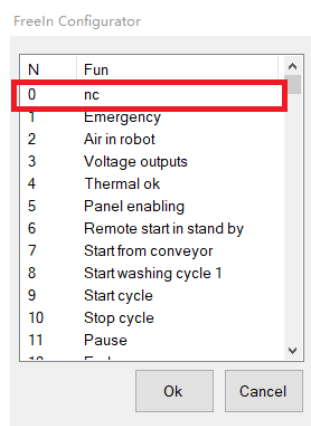
Step 1: enter the setting interface: turn the teach pendant to manual mode, enter the main interface, click "Settings" in the upper right corner of the screen, and select "advanced settings", as shown in the following figure:



Step 2: click "free in" to enter the digital quantity input free configuration interface: as shown above, 00-15 corresponds to X20DIF371 module, 16-27 corresponds to X20DI9371 module:

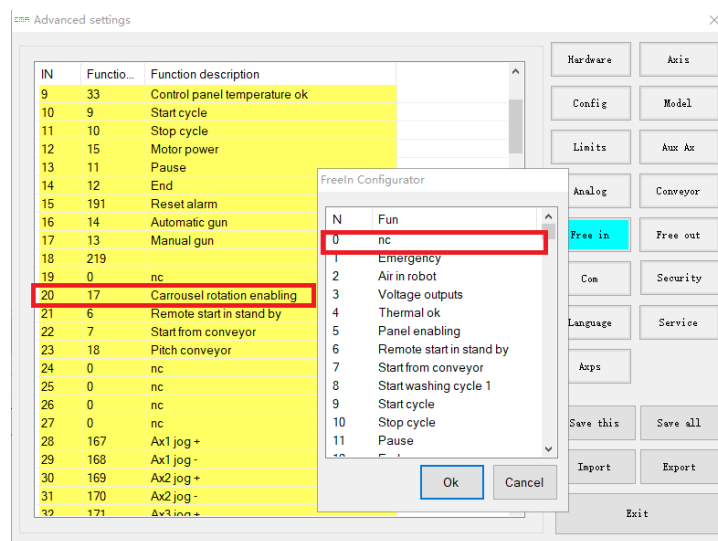


Step 3: select the input port you want to modify, and select the semaphore: 0: nc represents the variable defined by the customer, and the rest is the variable defined by the system (the system variable is for internal use of engineering configuration, please contact our company for configuration).

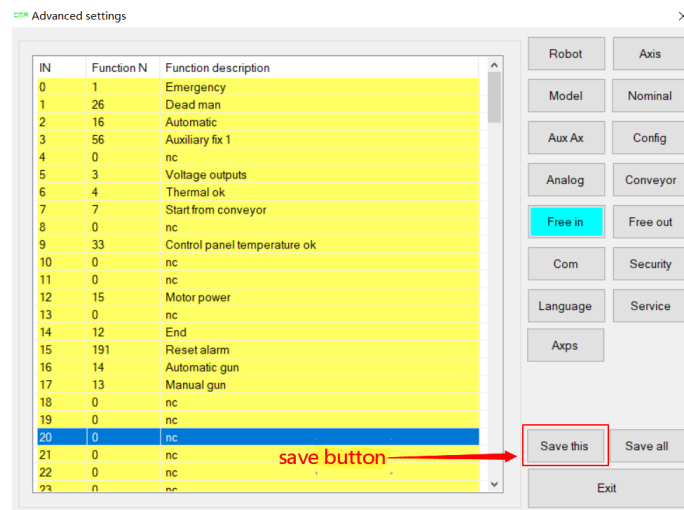


If we need to configure the 20-23 input port as a custom variable, the steps are as follows:

- (1) Click No. 20 input port, select 0: nc, and click "OK";

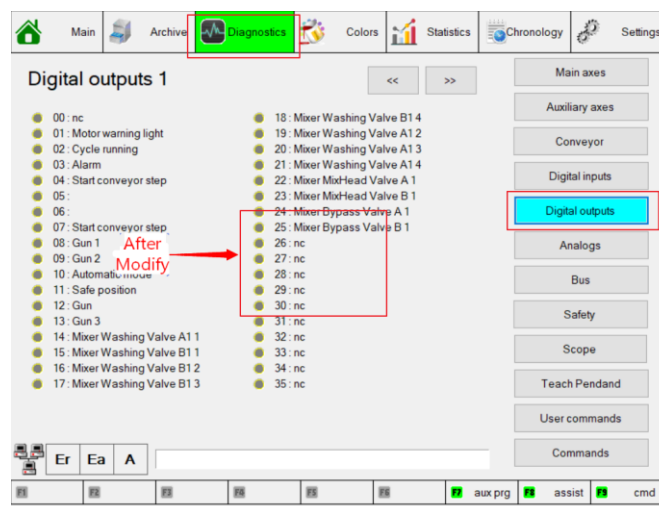


- (2) Choose 21, 22, 23 to modify, the results are as follows:



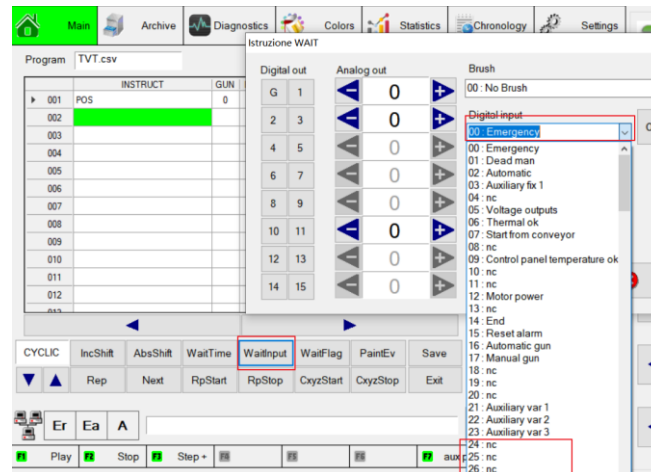
(3) Click the Save button to save the configuration.

Step 4: enter the diagnosis interface, check the digital input, and check whether the modification is successful



The modified nc is "not connected", which means the modification is successful.

Step 5: in program programming, select "digital input" through "wait input" instruction, and select freely configured variables as input quantity

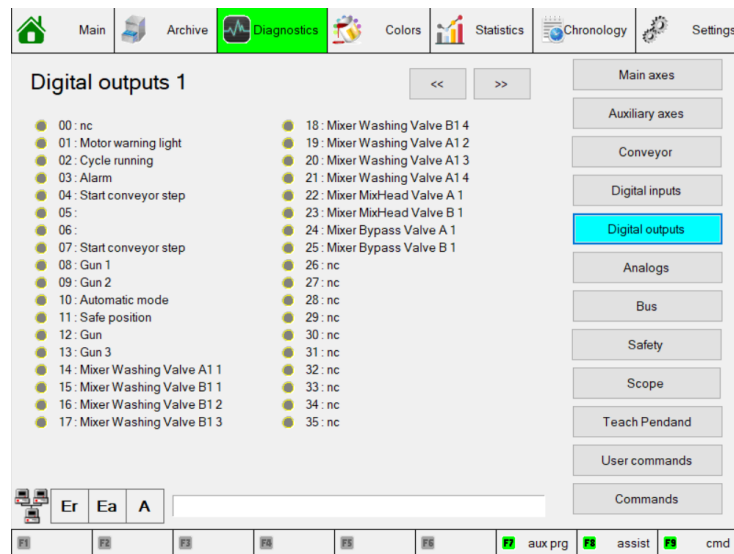


Chapter Three Digital output signal

The digital output module model is X20D09322, the relay type output module is X20D06529 and X20D02649, of which X20D09322 is 12 output module, X20D06529 is 6 output module, X20D02649 is 2 output module, among which the area of digital output module and relay output module is only different in wiring, and it is not distinguished when it is freely configured. Its specific definition is as shown in the following figure:

模块1. 5-D0模块\X20D09322							
端点	变量	端口定义	备注	端点	变量	端口定义	备注
1. 1	00. 0	开始显示	未接线	1. 4	00. 6	计时器	未接线
2. 1	00. 1	电源显示	未接线	2. 4	00. 7	门紧锁	接X13端子
1. 2	00. 2	循环显示	未接线	1. 5	00. 8	手压开关	未接线
2. 2	00. 3	故障显示	未接线	2. 5	00. 9	吊钩释放	未接线
1. 3	00. 4	灯1显示	接X3端子	1. 6	00. 10	旋转件上/出	未接线
2. 3	00. 5	灯2显示	接X3端子	2. 6	00. 11	旋转件上/进	未接线
模块1. 6-D0模块\X20D06529				模块1. 7-D0模块\X20D06529			
端点	变量	端口定义	备注	端点	变量	端口定义	备注
1. 1	00. 12	机器人待机	接X3端子	1. 1	00. 18	1号喷枪选择	接X3端子
1. 2				1. 2			
2. 1	00. 13	机器人工作	接X3端子	2. 1	00. 19	2号喷枪选择	接X3端子
2. 2				2. 2			
1. 3	00. 14	程序运行中	接X3端子	1. 3	00. 20	旋转件初始位置	接X3端子
1. 4				1. 4			
2. 3	00. 15	输送机单步	接X3端子	2. 3	00. 21	备用	接X3端子
2. 4				2. 4			
1. 5	00. 16	旋转棒	接X3端子	1. 5	00. 22	备用	接X3端子
1. 6				1. 6			
2. 5	00. 17	清洗位置	接X3端子	2. 5	00. 23	备用	接X3端子
2. 6				2. 6			
模块1. 8-D0模块\X20D062649				注: X2端子为外部输入端子, X3端子为外部输出端子 电柜所配模块在工程中全部已定义, 接X2、X3端子和未接线IO点为已定义未使用的点 如需自定义IO需添加模块			
端点	变量	端口定义	备注				
2. 2、2. 3	00. 24	输送机使能	接X3端子, KA31				
2. 5、2. 6	00. 25	静电装置	接X3端子				

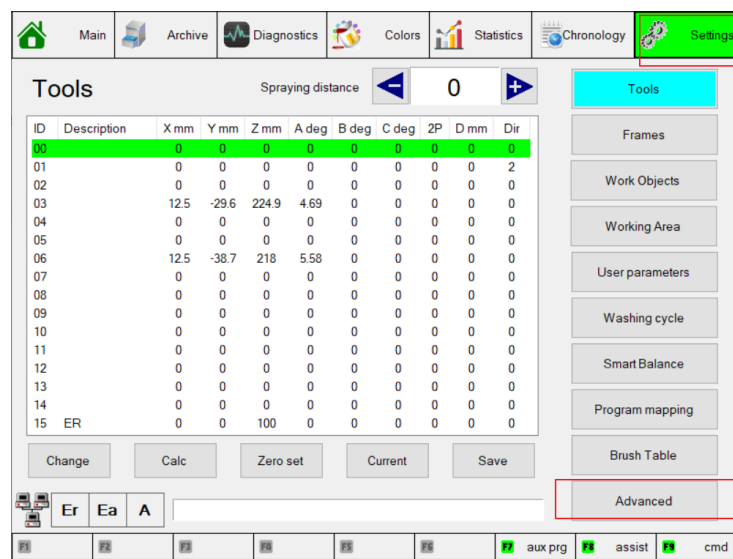
As shown in the figure above, those without wiring, connected to X3 terminal and X13 terminal can be freely configured by customers.



In the teach pendant diagnosis interface, open the digital input monitoring interface. 00-11 corresponds to X20D09322, 12-17 corresponds to the first X20D06529, 18-23 corresponds to the second X20D06529, and 24-25 corresponds to X20D02649.

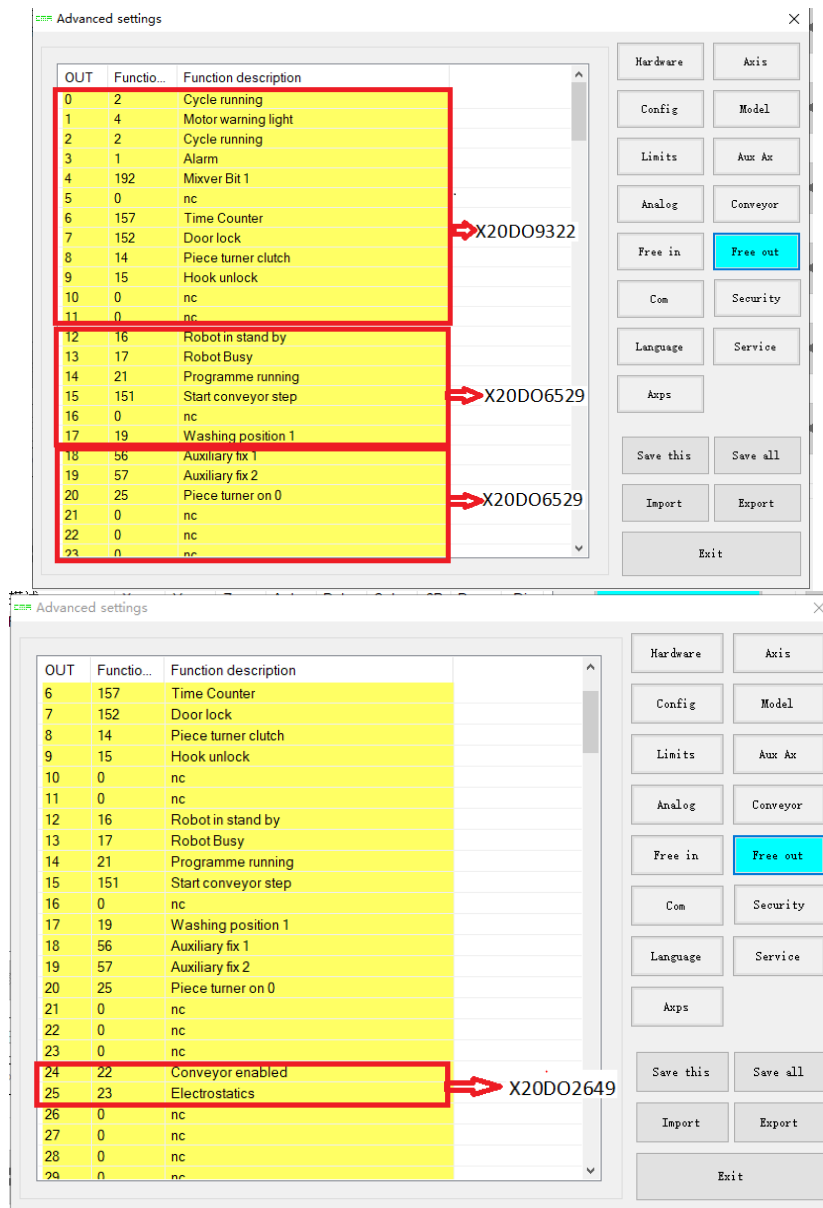
3.1 Free configuration of digital output

Step 1: enter the setting interface: turn the teach pendant to manual mode, enter the main interface, click "Settings" in the upper right corner of the screen, and select "advanced settings", as shown in the following figure:

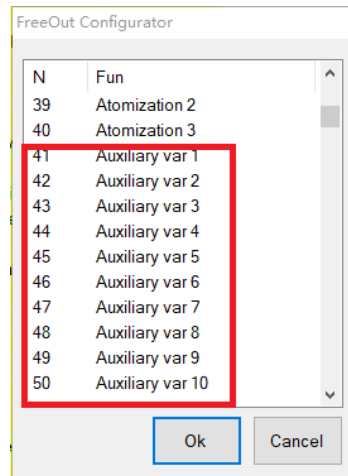


Step 2: click "free out" to enter the digital output free configuration interface: as shown above, 00-11 corresponds to x20do9322, 12-17 corresponds to the first x20do6529, 18-23

corresponds to the second x20do6529, and 24-25 corresponds to x20do2649.

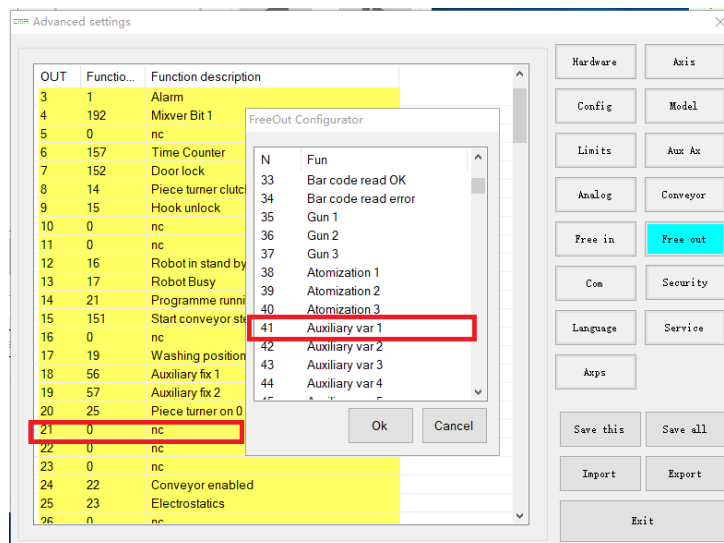


Step 3: select the output port you want to modify and select the semaphore: output variables are different from input variables. At present, the program only supports 15 output signal configurations, which are 41: auxiliary var 1 ~ 55: auxiliary var 15.

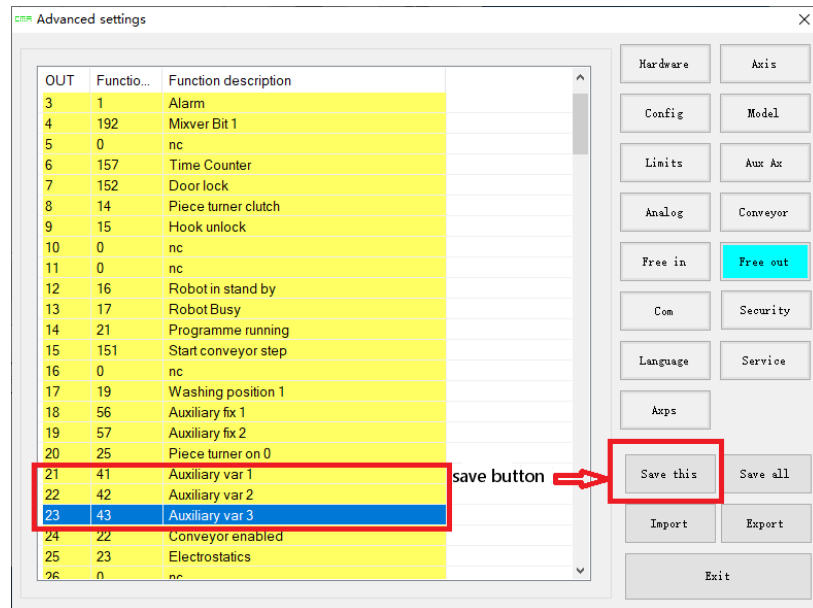


If we need to configure 21-23 output port as customer-defined variable, the steps are as follows:

- (1) Click output port 21, select auxiliary var1, and click "OK";

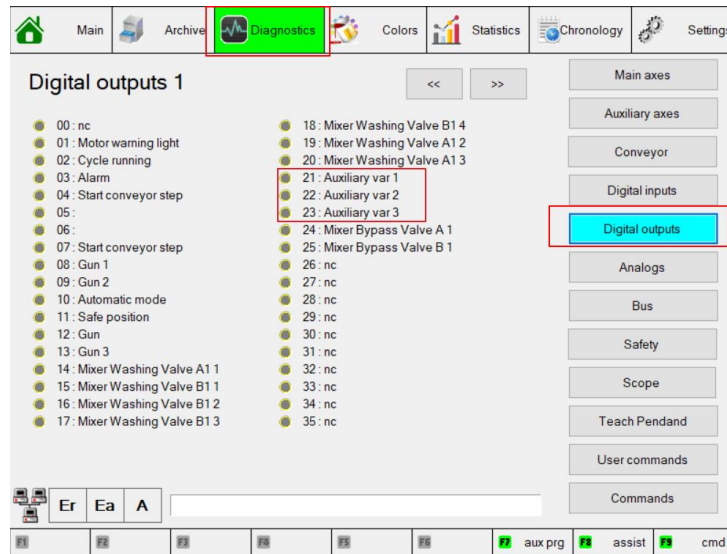


(2) 22 and 23 were selected to modify, and the results are as follows:



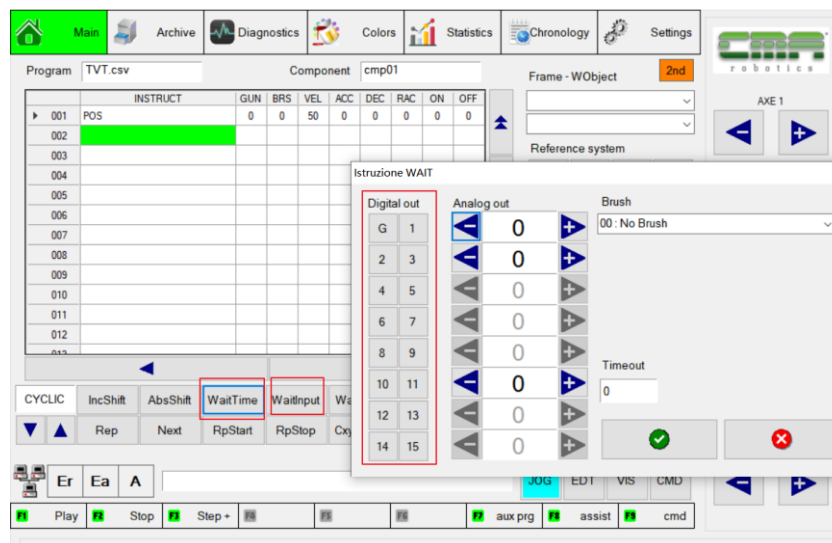
(3) Click the Save button to save the configuration.

Step 4: enter the diagnosis interface, check the digital output, and check whether the modification is successful



The modified output variable is expressed as "auxiliary variable 1 / 2 / 3", which indicates that the modification is successful.

Step 5: in programming, select "digital out" through "wait time" or "wait input" instruction, where 1-15 corresponds to the configured auxiliary var 1-auxiliary var 15:





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