Special Series Flexible Cobot Welding Process Package Manual

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Contents

I. summary:

1. Preface:

CooperationRobot, This software is a free teaching software, through the use of advanced welding algorithm to automatically generate welding track function, to automatic welding. This software can simplify the welding process, reduce the complexity of manual teaching, and improve the quality and efficiency of welding. The software can also provide intelligent functions for the welding robot, enabling it to adapt to different welding scenarios more flexibly, improving production efficiency and flexibility. By combining collaborative robots and advanced software algorithms, a higher level of automated welding can be achieved, thus bringing greater value and competitive advantage to the manufacturing industry. This manual mainly introduces the use of software, operation process, welding function and the use of welding process library.

2. Runtime environment

Software environment: 64-bit Windows 10 and above

Hardware environment: processor: Core i7-10700 or Ryzen 7 5800.

Memory: 16GB. Storage: 50 GB SSD.

3. Target groups

This manual is mainly for the users who use robots for automatic welding operations.

II. Interface and function description:

1. Welding operations

1.1 Brief description:

This interface is the most commonly used operation interface in robot welding. It is mainly used for the entry of the starting point and end of welding, the selection of welding method, the robot dragging, the welding machine operation, and the opening and closing of welding.

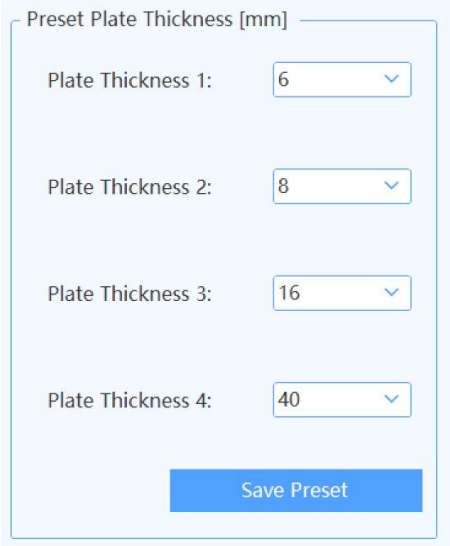
1.2 Use process:

First, you need to select the appropriate plate thickness and weld seam type; determine the point motion mode; then click "enable dragging" to move the robot to the appropriate welding start position; click "arc start"; move the robot to the appropriate welding end position, then click "arc end" to form a reasonable welding track, the track will appear at the bottom of the page; finally, use the "start welding" button on the right to start welding.

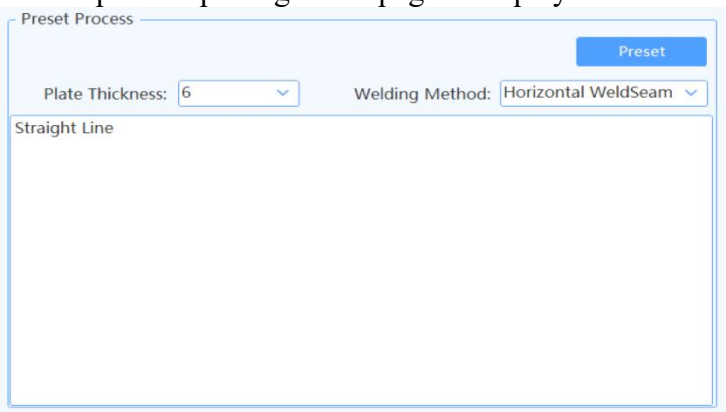
1.3 Introduction of interface functions:

(1) This part is commonly used plate thickness, and the plate thickness value can be customized in the settings.

The page is displayed as follows:



(2) This part is the choice of weld seam type, which can also use manual selection to apply a specific process package. The page is displayed as follows:



(3) This part is a record of the welding process

Arcing start: the starting point of welding;

Weld point: point points during the welding process;

Arc end: welding end point;

Note: When using different process packages for multiple tracks, you need to switch process packages before the start of the next track.

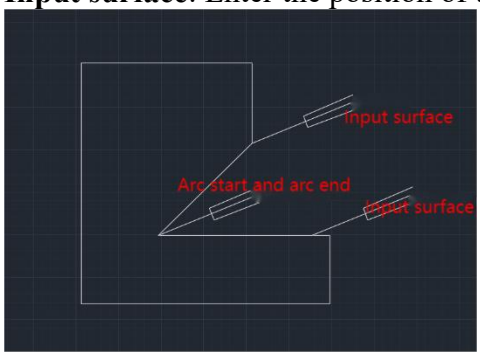
(4) This part is the operation of the process

Transition point: Transition point outside of the welding process

Straight line: point type switch, i. e., straight line and arc switch

Delay: stay time, which can be modified in the settings

Input surface: Enter the position of the actual groove surface



(5) This part is the common function area of welders and robots,

Quick simulation: it is according to the set simulation speed, only running track, no welding. Can be run multiple times;

Start welding: start welding according to the setting parameters of the process package, and the track will be automatically emptied for the next track record.

Enable dragging: after opening, all the movements of the robot are manually controlled by the user, so that the user can drag the robot to record the point;

Delete point: delete the currently selected point,

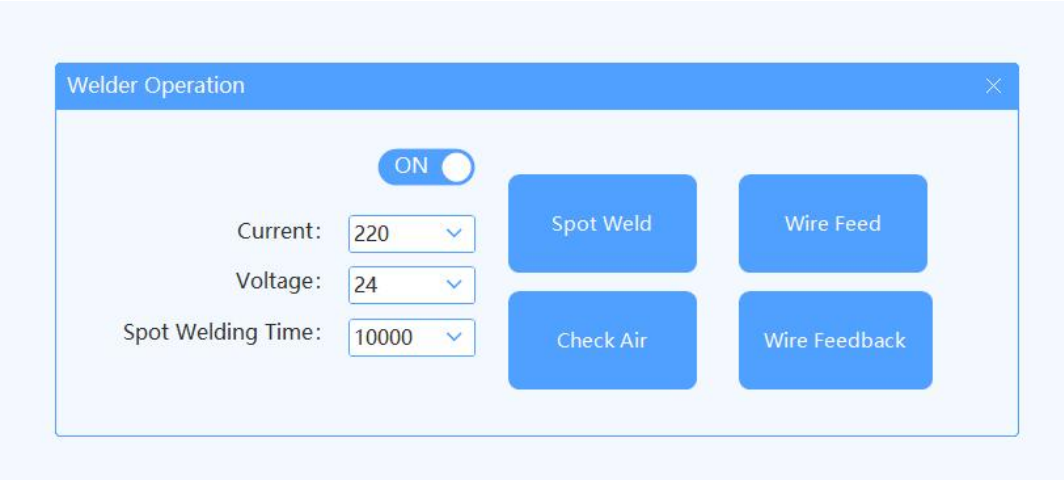
Stop operation: Stop all the current operations and reset the status, including the action of the robot and the welder. Note: the control of the equipment depends on the normal communication. If the dangerous situation occurs in abnormal communication, please take the physical emergency stop button or cut the power supply off.

Clear alarms: clear the regular robot instruction device error.

Wire feed: The time can be set in the advanced parameters in the settings.

Welding operations: both are the operation part of the welding machine. This page after clicking "welder operation" is presented separately.

The page is as follows:



Spot welding: start the welding at a point for a period of time, and the current voltage and time of the spot welding can be adjusted on the left side in milliseconds.

Gas check: check whether the gas is opened normally. Click the gas check will open the gas for a period of time.

Wire feed: after clicking, it will continue to click again to stop the wire feed.

Tap: Click to tap again to stop thread.

The track record at the bottom of the page is presented as follows:

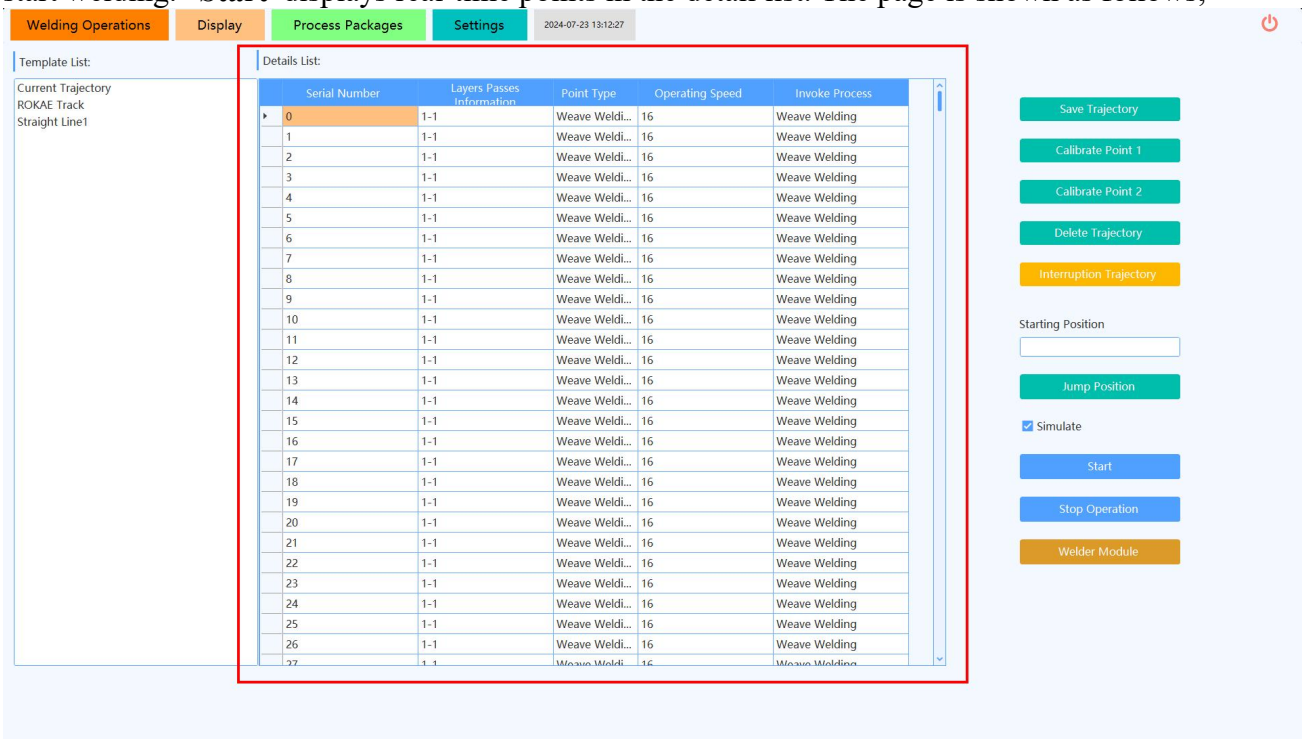
2. Display

2.1 Brief description:

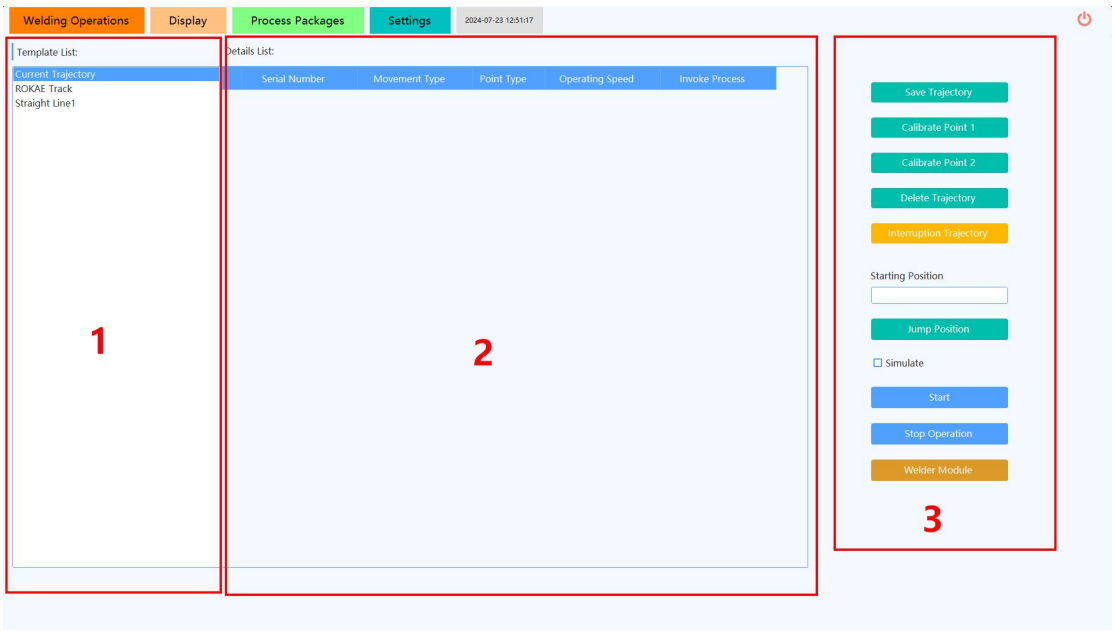
This interface is mainly for the operation of the track, such as record of saving, modifying and updating the point of the arc start and arc end, real-time displaying the point of the track, real-time modifying the current voltage and saving the point of the current trajectory after interruption.

2.2 Use process:

Select the specified track on the left (the track recorded in the welding operation interface will be temporarily stored in the current trajectory on this page). If you need to save, select the current trajectory and click save trajectory to quick simulation. Uncheck "**Simulation**" and click "**Start**" to start welding. "**Start**"displays real-time points in the detail list. The page is shown as follows;

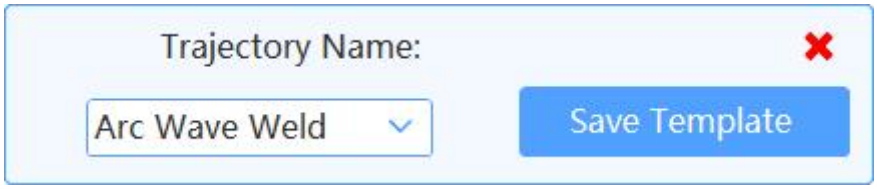


2.3 Introduction of interface functions:



(1) Template list: store the current trajectory and all the saved tracks.
(2) Details list: show some details of the track, in which the operating speed and invoke process can be changed and saved independently. You can also update the point information in the track through the calibration point bar on the right to achieve the effect of track reuse. Display the real-time track during the startup operation
(3) Function module: save trajectory, effect the point, and delete trajectory is the operation of the track itself

The save page displays as follows:



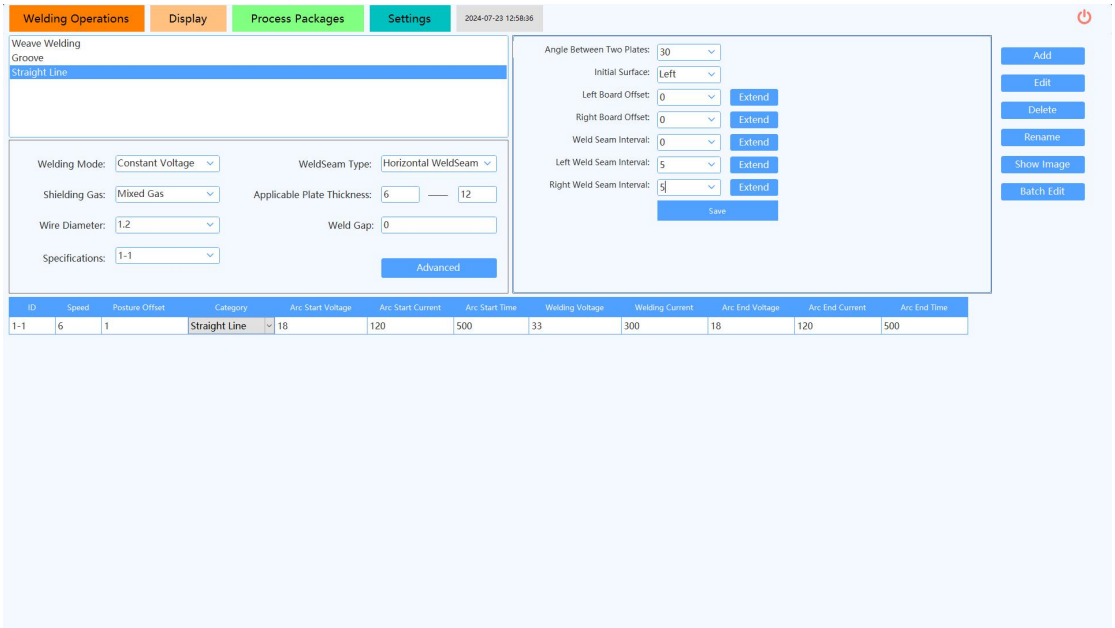
Interrupt track, jump position, start and stop operation are the operation of the welding track.
Interrupt track: During the pause of the track, click the interrupt save to save the point of the current trajectory. The next time, you can choose the point run of the last interrupted save.
Jump position: Enter the line number where you want to jump to the point and click the jump program pointer to jump to the point and start running.
Stop operation: end the current welding procedure.
Welder module: it is consistent with the welder module function on the welding operation page.

3. Process packages

3.1 Brief description:

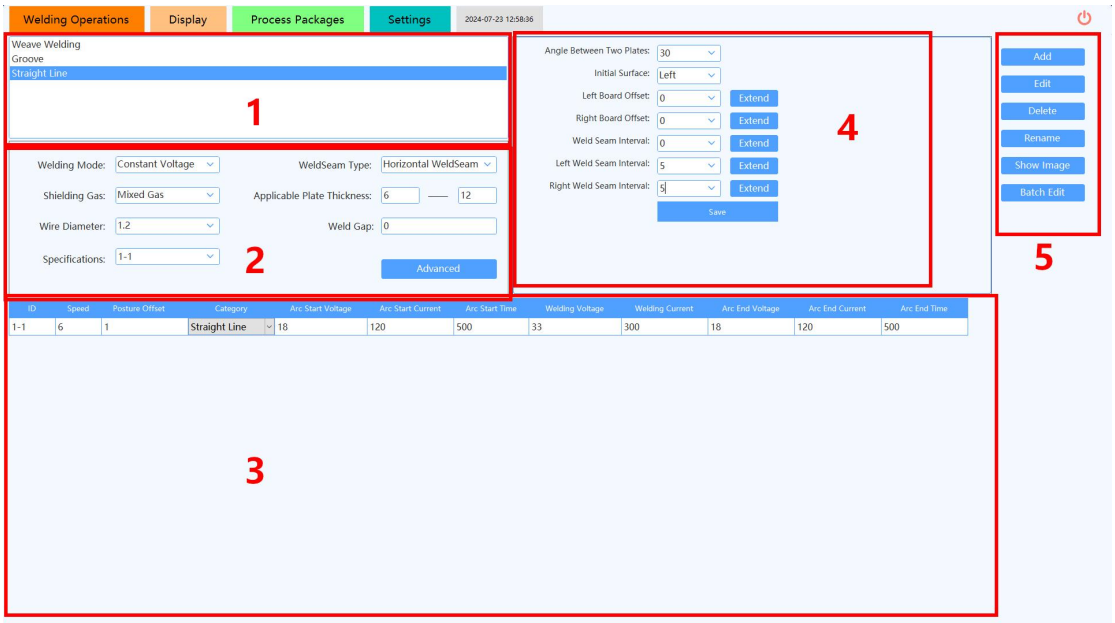
This page is a welding process library, where users can add or modify process packages. Process package contains many process parameters and movement types. The corresponding process package should be added according to the specific weld requirements.

3.2 Use process:



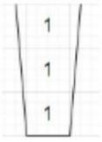
Entering the process packages, the first process package will be displayed by default, with the currently selected process package configuration parameters below. It is divided into welding mode, welding seam type and shielding gas preconditions, welding type (weave welding or straight line) speed in the welding process, the current, voltage and time in the arc start and arc end and the current voltage in the welding process. Through the right operation bar, you can add, modify, delete, rename the process package and other operation, and the batch modification is for the welding parameters in the table below.

3.3 Introduction of interface functions:

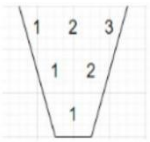


(1) Process package list: show the existing process library, and select the detailed parameters of the current process library

(2) Preconditions in the process library: including the mode of welding machine, welding seam type, shielding gas, applicable plate thickness, wire diameter, weld gap (refers to the dry elongation change at the default calibration length of 20mm) and applicable specifications are visually displayed as follows:

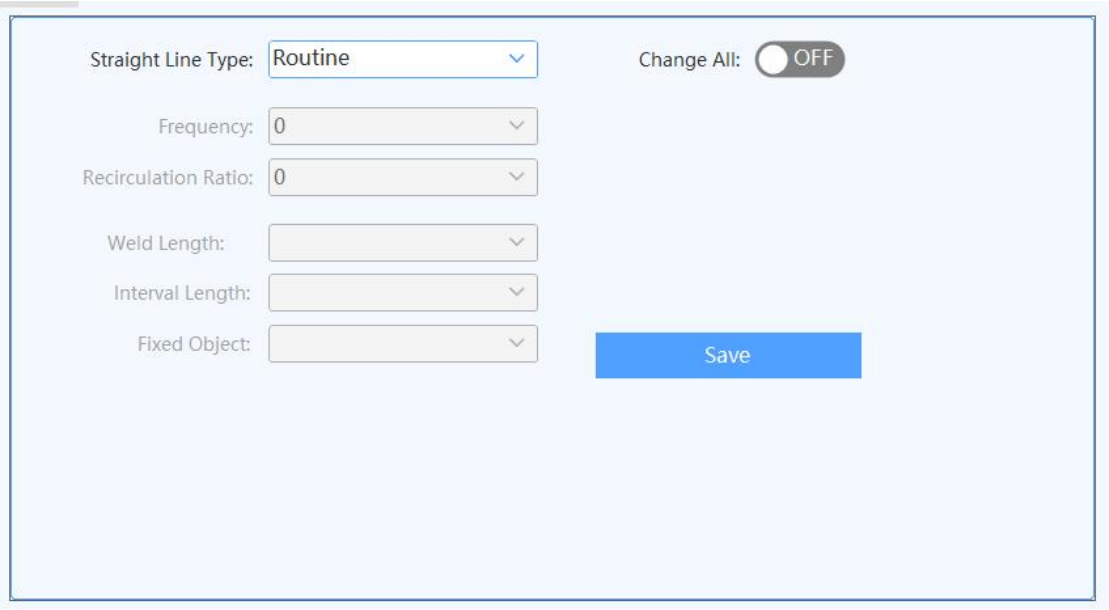


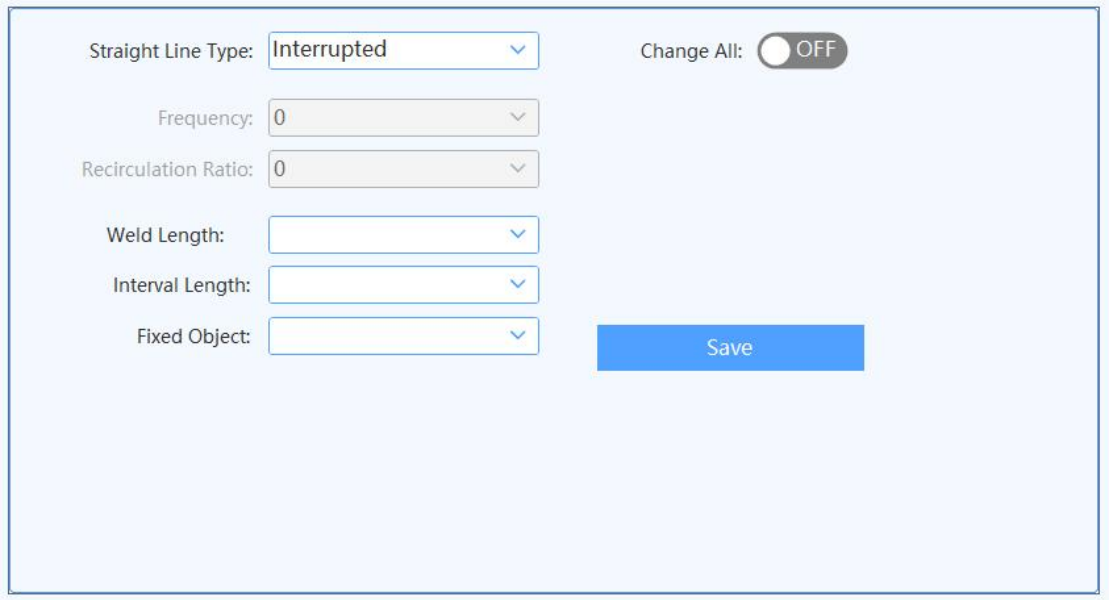
1-1-1, three layers three passes



1-2-3, three layers six passes

(3) Welding parameters: The list of welding parameters shows the speed, type, the current voltage in the arc start and arc end, and the current voltage in the welding. The welding parameters can be directly modified in the list. There are straight line and weave welding, the straight line is the point-to-point linear movement of the cooperative robot, and the weave welding is the simulation of swing welding operation of the human hand through algorithm calculation. The straight line and weave welding page is shown as follows:





The straight line type can be selected;

Regular: regular straight motion, other parameters are not set.

Reciprocating: You can move back and forth along a straight line, such as in 2 back 1. Parameters include frequency and reciprocating ratio

Frequency: number of cycles within 10 mm, or several back and forth movements.

Reciprocating ratio: the ratio of advance and retreat, such as advance 2 retreat 1, reciprocating ratio is 0.5.

Intermittent: you can weld for a distance between a distance and then weld for a distance.

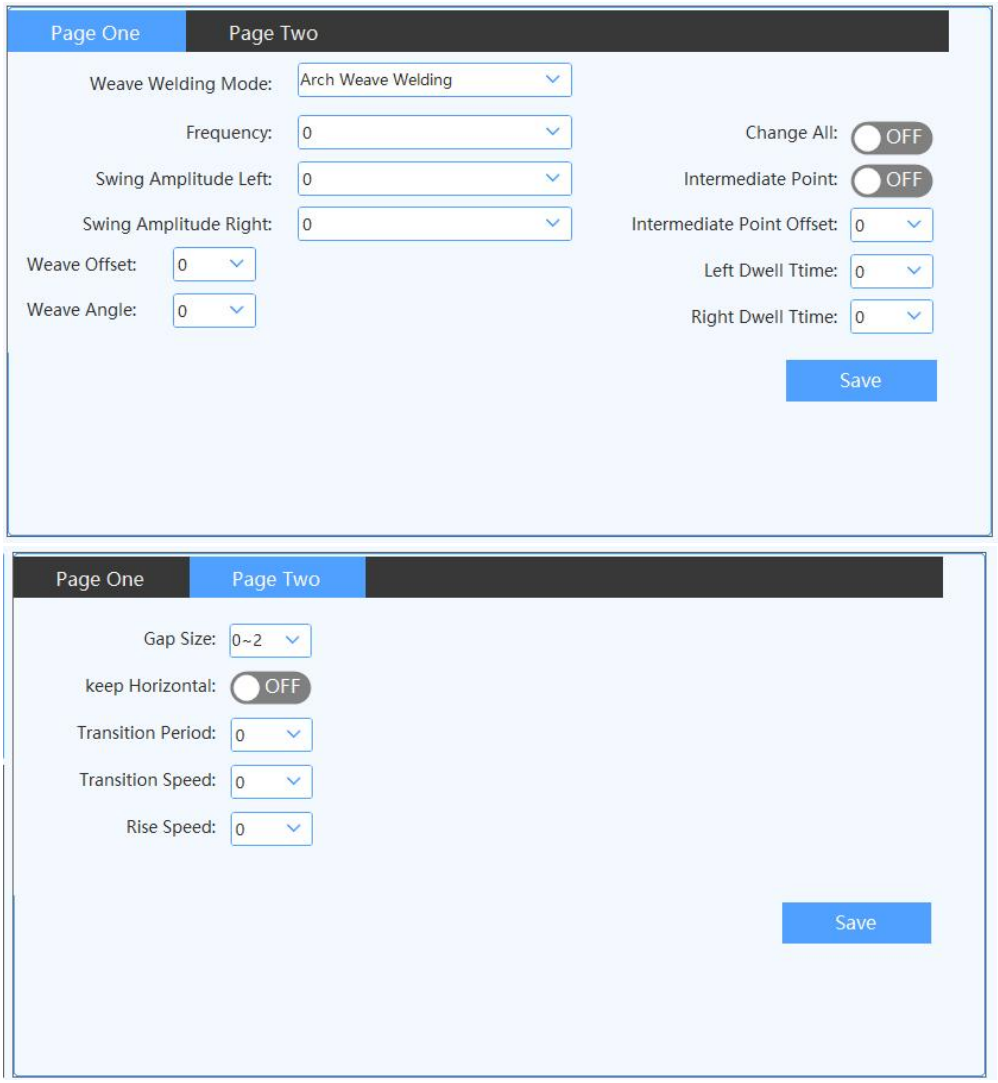
Weld length: Set the length of the weld joint.

Interval length: set the length.

Fixed object: in a distance, the length of the weld and no weld can not be equally divided, the priority to ensure the weld or interval.

Modify all: change the welds of all straight line types in the current process package to the parameters of the current interface.

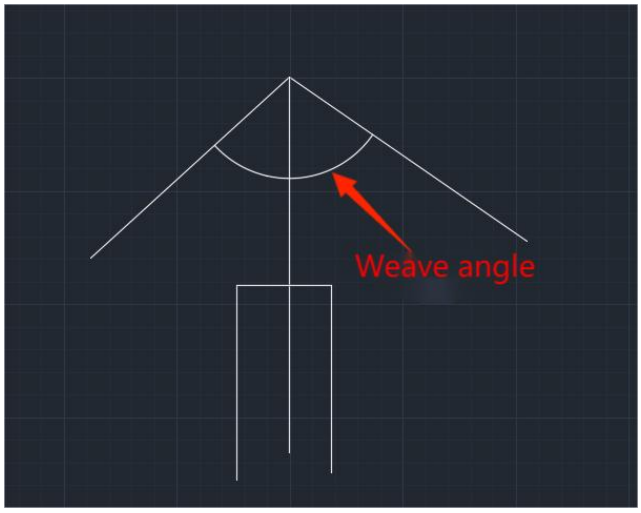
Weave welding:



Weave pattern: choose different weave patterns according to the type of welding joint. Arc weave is generally used for corner weld vertical welding, forward triangle is generally used with slope groove vertical welding, lightning weave welding is generally used for horizontal groove.

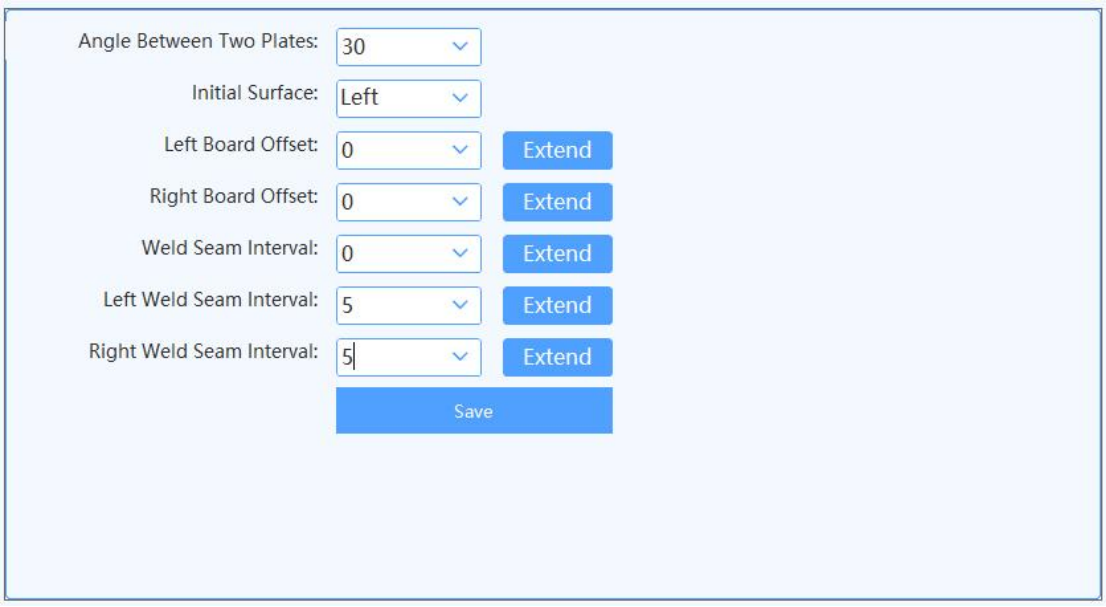
Gap size: When the vertical weld has a gap, different process packages can be set according to different gap size.

Weave angle: the Angle of the movement trajectory during the swing process

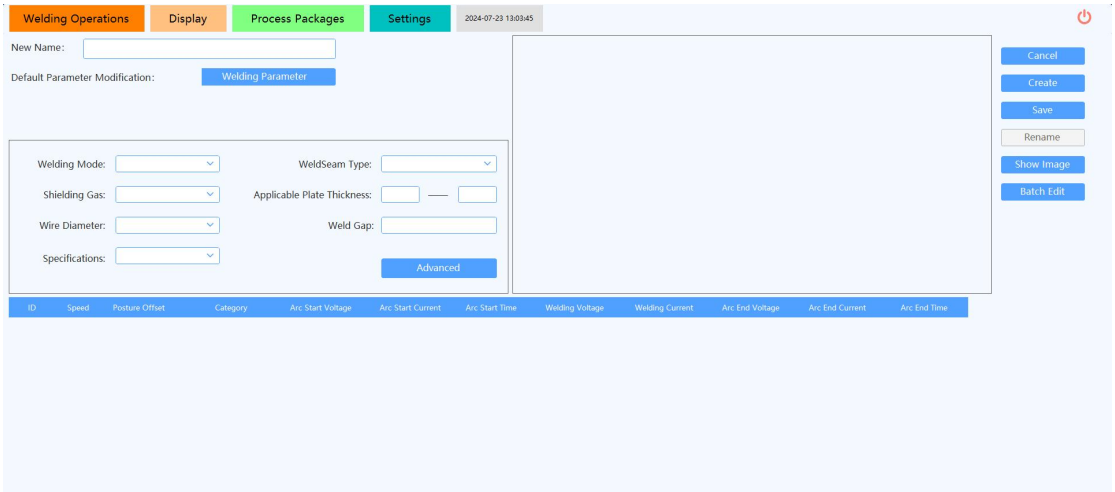


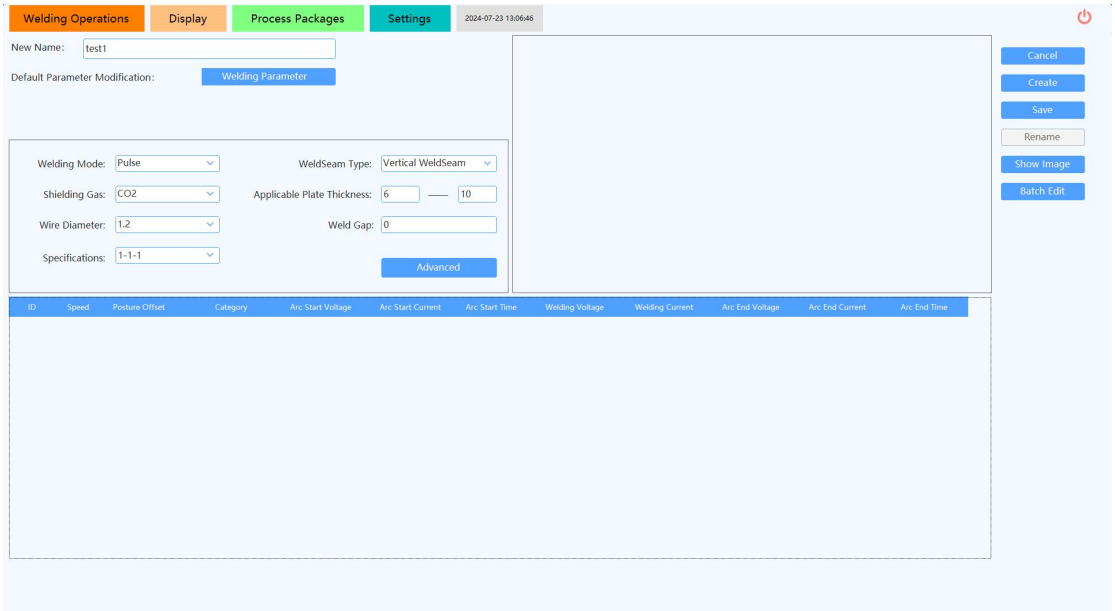
Transition period, transition speed: at the beginning of the weave welding, set the speed of the first few cycles to ensure the welding forming. Generally used for vertical welding.
Middle point offset: where the middle point exits from the wire direction.
Left dwell time: the time when the weave welding stays on the left side.
Right dwell time: the time the weave welding stays on the right.
Modify all: is it necessary to change all the weave welding of the current process package to the parameters set now.
Maintain level: is it necessary to keep the trajectory parallel to the robot coordinate system when welding the inclined weld.
Middle point: is not to move to the corner of the weld during the weave welding.
Start weave width; the swing amplitude of the starting point.
End weave width; the swing amplitude of the end-point.

（4）After clicking the advanced parameters, the window on the right appears and the parameters are explained one by one.

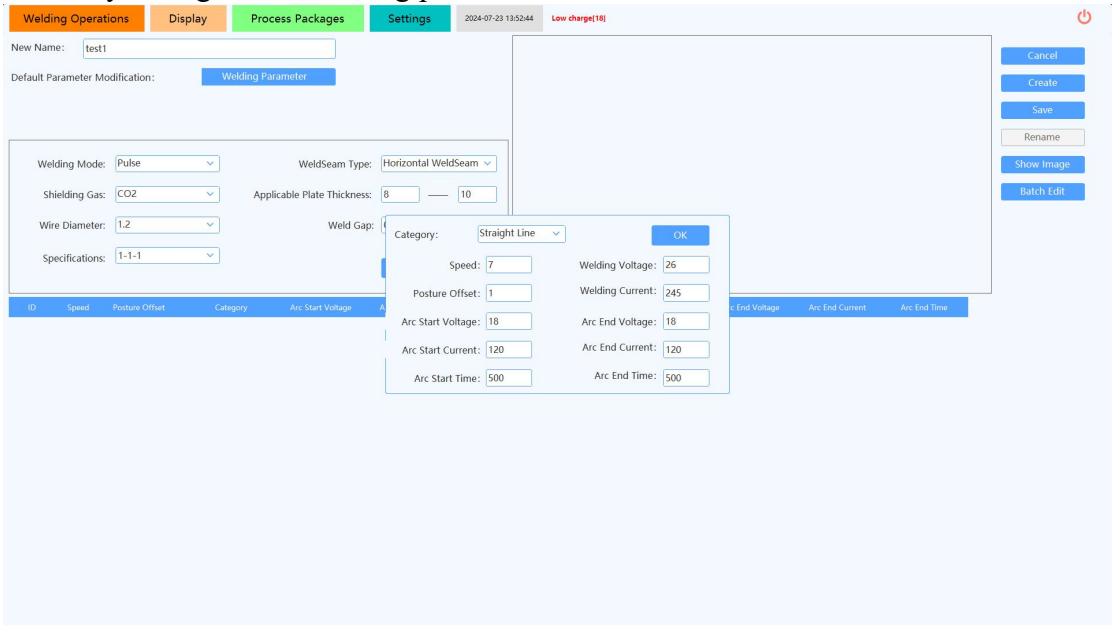


Angle: the angle of the two sides of the weld.
Starting surface: after more than one layer, the welding begins. We are at the beginning of the weld and facing the end of the weld. Left hand side is left and right hand side is right.
Left plate offset: the distance of the left point offset of the weld, input positive value, offset to the weld inside the test, input negative value, offset to the outside of the weld.
Right plate offset: the distance of the right point offset of the weld, input positive value, offset to the weld inside the test, input negative value, offset to the outside of the weld.
Weld gap: the distance between each piece of the same layer, default zero, vertical welding is not effective.
Left weld spacing: the distance between each layer on the left.
Right weld spacing: the distance between each layer on the right side.
(5) Operation bar on the right side of the process library: the operation bar integrates the functions of adding, modifying, deleting and renaming the process library.
Add: switch to the add page, manually add a process library input parameters, click save to add a new process library, the effect is as follows:

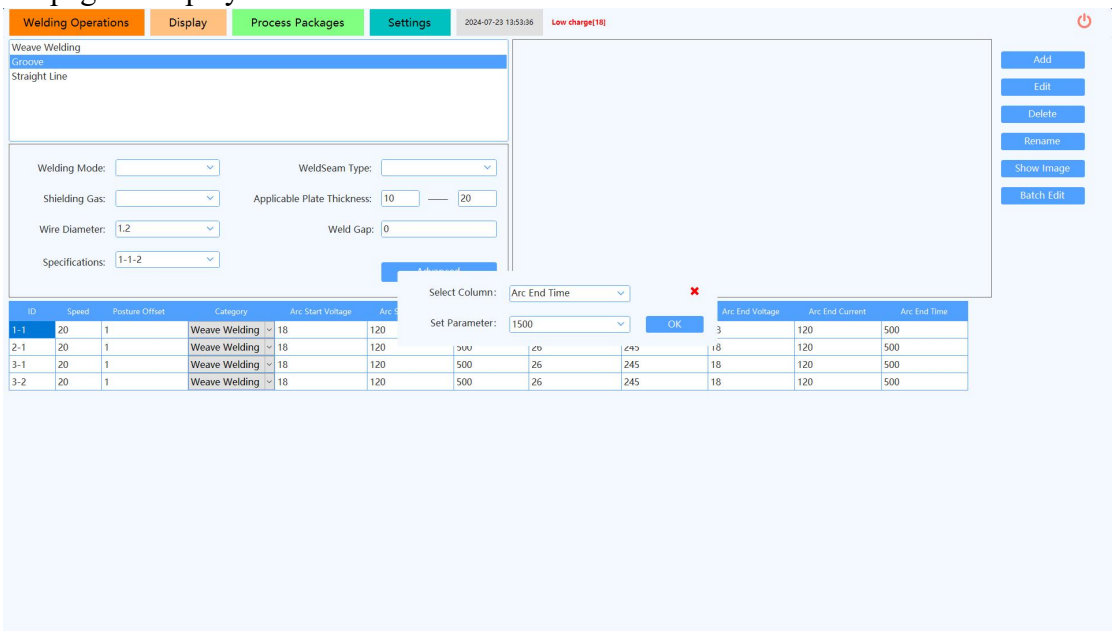




The creation function in the page is to generate the default welding parameters according to the filled specifications.(The default welding parameters can also be modified by the welding parameters)
The figure above shows that manually creating a process package from scratch allows you to manually configure the welding parameters



Batch modification can be realized through the batch modification button. The parameters in the list, the page is displayed as follows:



Modification: Select the process package that you want to modify in the process package list, modify it directly on the page, and then click to modify it.

Delete: Select the specified process package, click Delete, complete the second confirmation to delete. Note: Unrecoverable after deletion.

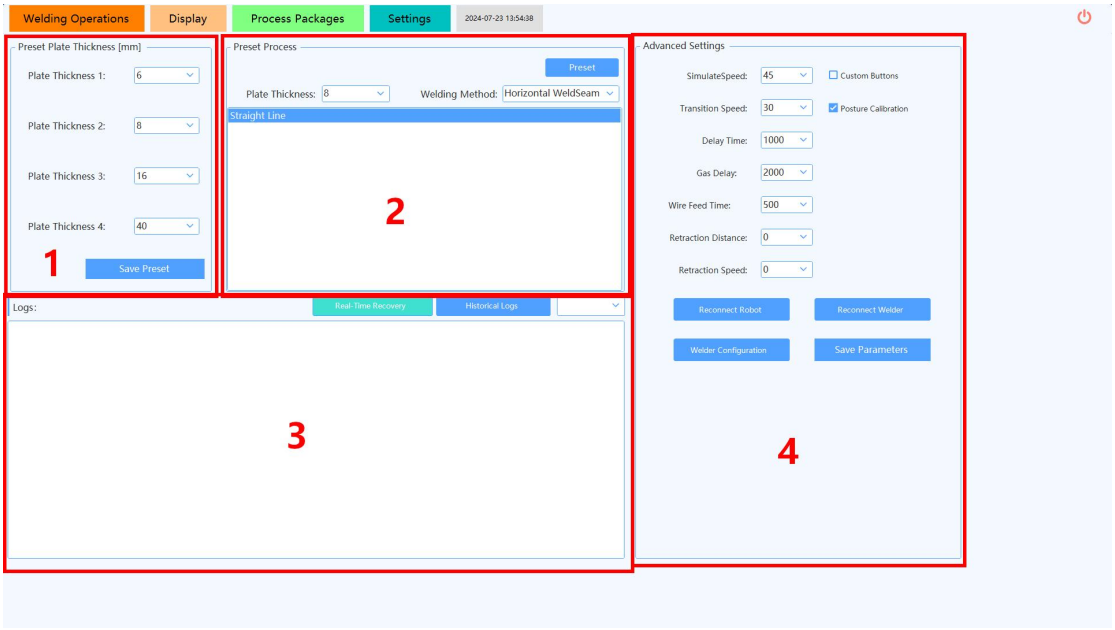
Rename: Select a process package to reenter a new name for renaming.

4. Settings

4.1 Brief description:

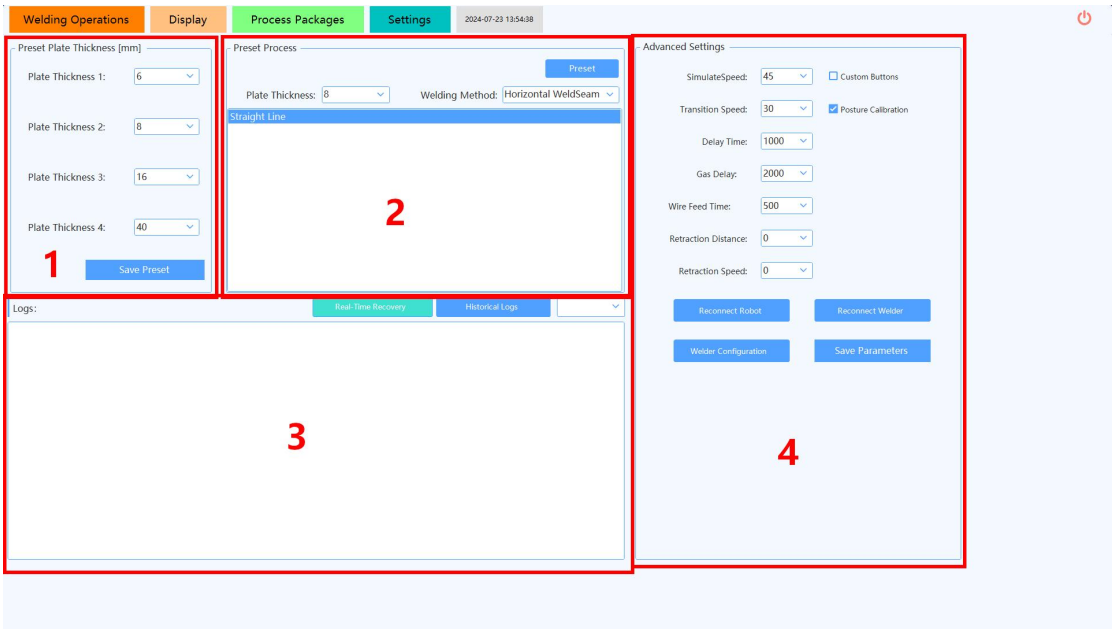
The main functions of this interface are the setting of advanced parameters, and the preset of plate thickness, process preset, log display page and equipment connection function.

4.2 Use process:



On this page, set the plate thickness, preset the process, configure the simulation speed, the transition speed, and the welding machine wire feeding and air supply parameters.

4.3 Introduction of interface functions:



(1) **Preset plate thickness**: set the commonly used plate thickness, and take effect on the welding operation page after saving.

(2) **Preset process**: When there are multiple process packages under the same plate thickness and welding method, the appropriate process can be selected through the preset process package.

(3) **Log list**: display the log information of the whole software, including debugging, information, warning, error, fatal, and log information.

You can find different types of log information in different time periods through button switch and drop-down list change to facilitate finding location logs.

(4) **Advanced settings**:

Simulation speed: operating speed in the quick simulation.

Transition speed: the operating speed to the transition point.

Wire feed time: the duration of wire feed at the welding operation interface.

Pause time: the pause time after each welding execution.

Retraction distance: a distance taken back from the end point after the welding.

Retraction speed: the speed of a distance back from the end point after the welding execution.

Gas delay: after the end of each weld, stay at the arc end point of gas supply time.

Posture offset: used to change whether the calibration point on the display page is only the calibration position, or the position and posture together.

Custom buttons: After checking, you can change the position, size and color of the button on the welder operation page. The button function is blocked during this period.

III. Safety:

1. Precautions

1. Check the equipment to work properly before using the robot.
2. Determine the integrity of the welding logic before starting the welding.
3. Before the robot starts welding, confirm that the current position will not collide from the starting point.
4. Check whether the protection gas is opened before welding.
5. Determine whether the software is connected to the robot and the welder.
6. Determine whether the dry extension length is reasonable.
7. The grounding wire must be well connected.

2. Safety matters

The following principles must be followed for the safe operation of the welding robot:
1. Pay attention to the welding gun installed on the robot. Make sure that the robot is not in operation before approaching the robot.
2. Pay attention to the surface of the workpiece or the robot welding torch. After working for a long time, the robot welding torch temperature is high, and gloves should be worn during operation.
3. Users must operate the robot while ensuring their own safety.
4. Ensure that the magnetic suction base of the cooperative robot is stable and firm.
5. Ensure that the surrounding environment does not affect the network signal of the robot.
6. Non-machine operators are prohibited from entering the robot working area.

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