

阶段: L

版次: A1

科达光电塔式起重机交互终端
KEDA tower crane interactive
terminal
使用说明文档
Instructions for use

二〇二三年七月

科达光电起重机交互终端
KEDA tower crane interactive
terminal使用说明文档
Instructions for use

共 50 页(50 pages in total)

拟制(Draw up) _____

审核(To examine) _____

会签(Countersign) _____

标准化(Standardization) _____

批准(Approval) _____

版本修订历史 (Version revision history)

版次 (Revision)	修订日期 (Revision date)	作者 (Author)	修订说明 (Revision instructions)	状态说明 (Status description)
A1	2023-07-25	郭辅 GuoFu	初稿 First draft	创建文档 create documents

审阅

日期 (Date)	审阅者 (Reviewer)	意见 (Opinion)

目 录 (Directory)

目录

科达光电塔式起重机交互终端	1
KEDA tower crane interactive	1
terminal 使用说明文档	1
科达光电起重机交互终端	2
审阅	3
1. 概述 (OutLine)	5
1.1. 目的 (Purpose)	5
1.2. 范围 (Range)	5
1.3. 术语表 (Glossary)	5
2. 开机自检 (Automatic check after startup)	6
3. 主界面 (Main interface)	6
3.1. 视频显示 (Video display)	7
3.2. 运行状态显示 (Operation status display)	9
3.3. 数据可视化 (Data visualization)	10

3.4. 中英文切换(Switch between Chinese and English).....	11
3.5. 通信状态(Communication status).....	11
4. 设备状态查询(Equipment status query).....	12
4.1. 塔机类型和 IP 地址(Tower crane type and IP Address).....	12
4.2. 传感器、变频器、摄像头连接状态显示(Sensor, frequency converter.....	13
4.3. 告警记录(Alarm record query).....	13
5. 历史查询(Historical query).....	14
5.1. 数据记录(Data record).....	14
5.2. 告警记录(Alarm record).....	15
6. 系统设置入口界面(System setting entry interface).....	15
6.1. 普通登录入口(Common login portal).....	16
6.2. 密码登录入口(Passwd).....	17
7. 系统设置(System settings).....	17
7.1. 工况设置(Work settings).....	17
7.2. 调试标定(Commissioning calibration).....	18
7.2.2. 幅度标定(Travel calibration).....	19
7.2.3. 高度标定(Height calibration).....	21
7.2.4. 回转标定(Rotary calibration).....	22
7.2.5. 角度标定(Angle calibration).....	23
7.3. 告警设置(Alarm settings).....	24
8. 防碰撞(Anti collision).....	25
8.1. 告警类型(Alarm type).....	25
8.2. 坐标系(Coordinate system).....	28
8.3. 未扫描到同类型设备(No devices of the same type were scanned).....	33
8.4. 防碰撞设备设置(Anti collision equipment settings).....	34
8.5. 防碰撞可视化图形调整(Anti collision visualization graphics adjustment).....	34
9. 虚拟墙(Virtual wall).....	35
9.1. 坐标设置(Coordinate setting).....	35
9.2. 手动设置(Manual setting).....	36
9.3. 删除障碍物(Remove obstacles).....	37
10. 告警屏蔽(Alarm Lock).....	37
10.1. 吊点设置(Camera Settings).....	37
10.2. 人员信息(Person Information).....	39
11. 预警、告警显示(Early warning and alarm display).....	41

1. 概述(OutLine)

1.1. 目的(Purpose)

本文是科达光电塔式起重机交互终端的产品使用说明文档，让用户了解产品的使用。

This article is the product instruction document of KEDA tower crane interactive terminal, so that users can understand the use of the product.

1.2. 范围(Range)

本文对“科达光电塔式起重机交互终端”的组成和功能进行了描述，列出了塔式起重机交互终端所有功能的详细操作步骤。

This paper describes the composition and functions of "KEDA tower crane interactive terminal", and lists the detailed operation steps of all functions of the tower crane interactive terminal.

1.3. 术语表(Glossary)

表 1 缩略语(acronym)

序号 Serial number	缩略语 acronym	释义 interpretation	备注 remarks
1	I/O	输入/输出端口 Input / output port	是设备与外界通讯交流的出口 It is the outlet for communication between equipment and the outside world
2	PLC	可编程逻辑控制器 Programmable logic controller	一种具有微处理器的数字电子设备，用于自动化控制的数字逻辑控制器，可以将控制指令随时加载存储器内存储与运行。 A digital electronic device with a microprocessor. It is a digital logic controller for automatic control. It can load control instructions into memory at any time for storage and operation.
3	GPS	全球定位系统 Global positioning system	
4	IP	网络协议 Network protocol	

5	AD	模数转换器 Analog to digital converter	下文中表示当前编码器的模拟值 The following shows the analog value of the
---	----	--------------------------------------	---

2. 开机自检(Automatic check after startup)

设备通电后，会自动检测各模块的连接状态。

After the equipment is powered on, it will automatically detect the connection status of each module.

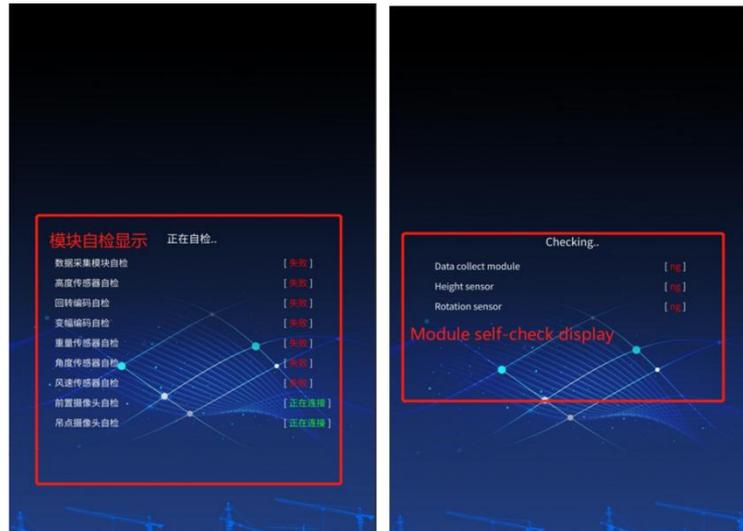


图 1 开机自检图例(Figure 1 power on self-test legend)

3. 主界面(Main interface)

主界面包含了视频的显示、日期时间显示、网络信号显示、塔机运行状态的实时数据显示、数据可视化显示、信息提示、中英文切换，当设备连接球机时，该界面还包含摄像头补偿值设定。

The main interface includes video display, date and time display, network signal display, real-time data display of tower crane operation status, data visualization display, information prompt, Chinese and English switching. When the equipment is connected to the ball machine, the interface also includes camera compensation value setting.



图 2 主界面图例 (Figure 2 main interface legend)

3.1. 视频显示(Video display)

3.1.1. 视频显示(Video display)

视频显示在主界面上方，若要放大右上角辅视频。直接点击右上方辅视频进行两个视频之间的切换。

The video is displayed on the top of the main interface. To zoom in to the auxiliary video in the upper right corner. Directly click the upper right auxiliary video to switch between the two videos.



3.1.2. 辅视频的显示与隐藏(Display and hide of secondary video)

点击视频显示右下方  图标可将右上方小视频的显示隐藏，隐藏后再次点击即可显示。

Click the  icon at the bottom right of the video display to hide the display of

the small video at the top right. After hiding, click again to display it.



3.1.3. 视频回放(Video playback)

视频回放在视频显示界面左下方，点击主视频左下角 ，再点击“确认回放”即可进行视频回放，用户可根据需求点击进度条，选择回放的时间。

Video playback is at the bottom left of the video display interface. Click , and then click "confirm playback" to perform video playback. Users can click the progress bar as required to select the playback time.



3.1.4. 摄像头调焦(Camera focusing)

视频显示界面“+”、“-”是对摄像头进行调焦，放大和缩小，点击  图标，摄像头回到原点。

The "+" and "-" in the video display interface are used to focus, zoom in and out the camera. Click the  icon to return the camera to the original point.



图 3 视频显示基本操作图例(Figure 3 basic operation legend of video display)

3.1.5. 摄像头补偿值设定(Camera compensation value setting)

设备上安装了球机，要对摄像头的补偿值进行设定，点击视频显示界面右下角  图标，根据设备的实际情况进行补偿值的设置，设置完成后点击“保存”即可完成设置。

A ball machine is installed on the equipment. To set the compensation value of the camera, click the  icon in the lower right corner of the video display interface to set the compensation value according to the actual situation of the equipment. After setting, click "save" to complete the setting.

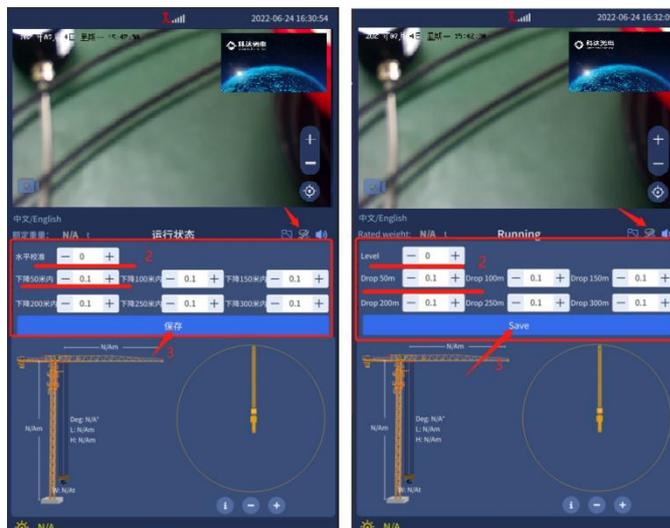


图 4 摄像头补偿值设置图例(Figure 4 legend of camera compensation value setting)

3.2. 运行状态显示(Operation status display)

该区域显示了塔机运作的实时数据，用户可通过该显示区的数据，知晓当前塔机运作的实时情况。

This area displays the real-time data of tower crane operation. Users can know the real-time situation of current tower crane operation through the data in this display area.



图 5 运行状态显示图例(Figure 5 operation status display legend)

3.3. 数据可视化(Data visualization)

3.3.1. 可视化区域的显示(Display of visualization area)

数据可视化区域可以清楚的通过图形看到塔机的工况数据，例如：塔高、吊重、臂长等。

The data visualization area can clearly see the working condition data of the tower crane through graphics, such as tower height, lifting weight, arm length, etc.



3.3.2. 信息提示区(Information prompt area)

若当前设备存在异常状态，在主界面最下方的信息提示区有提示。

If the current equipment is in an abnormal state, a prompt will appear in the information prompt area at the bottom of the main interface.



图 6 数据可视化图例(Figure 6 data visualization legend)

3.4. 中英文切换(Switch between Chinese and English)

视频显示界面左下角，点击“中文/English”即可完成中英文切换。

In the lower left corner of the video display interface, click "中文 /English" to switch between Chinese and English.



3.5. 通信状态(Communication status)

点击主界面最上方图标，跳出弹窗，可查看当前设备的详细信息，如：运营商、通信模式、信号强度、服务状态、通讯卡状态、连接状态、位置信息、

本地 IP、设备号。

Click the  icon at the top of the main interface to pop up a pop-up window to view the details of the current device, such as operator, communication mode, signal strength, service status, communication card status, connection status, location information, local IP and device number.

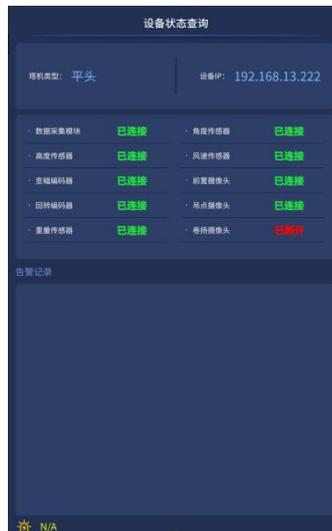


图 7 通信状态图例(Figure 7 legend of communication status)

4. 设备状态查询(Equipment status query)

主界面从右向左滑动一次就是设备状态查询界面。

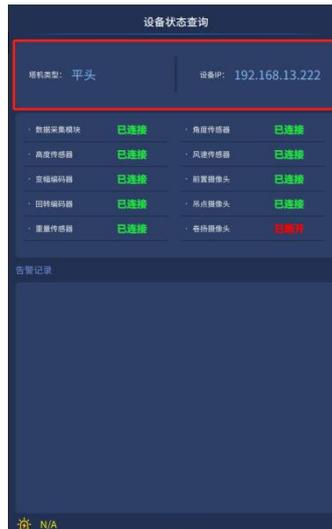
The main interface slides from right to left once, which is the device status query interface.



4.1. 塔机类型和 IP地址(Tower crane type and IP Address)

设备状态查询界面最上方的部分是塔机类型和该设备 IP 的显示。

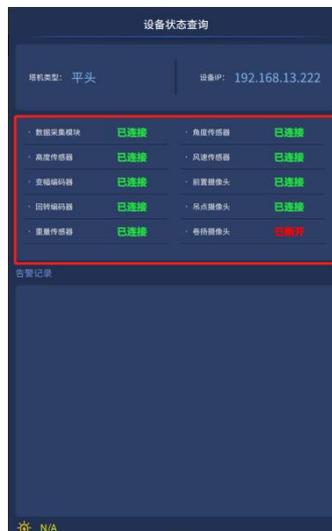
The top part of the equipment status query interface is the display of the tower crane type and the equipment IP.



4.2. 传感器、变频器、摄像头连接状态显示(Sensor, frequency converter and camera connection status display)

设备状态查询界面中间部分可查看到，当前塔机上安装的传感器、编码器、摄像头的连接状态。

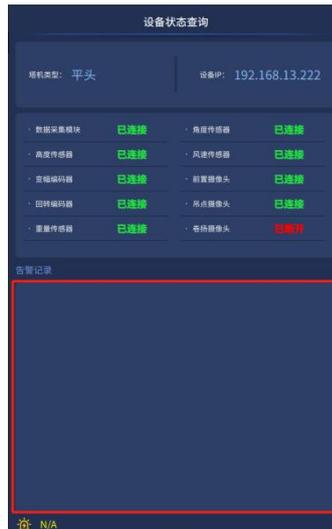
In the middle part of the equipment status query interface, you can view the connection status of the sensors, encoders and cameras currently installed on the tower crane.



4.3. 告警记录(Alarm record query)

设备状态查询界面最下方的部分为告警记录部分，可在该区域查看设备的当前告警项，以及之前的告警项的详细记录。

The lowest part of the equipment status query interface is the alarm record part, where you can view the current alarm items of the equipment and the detailed records of previous alarm items.



5. 历史查询(Historical query)

主界面从右向左滑动两次，或者设备状态查询界面从右往左滑动一次就是历史查询界面。

The main interface slides from right to left three times, or the equipment status query interface slides from right to left once, which is the history query interface.

5.1. 数据记录(Data record)

- 1、用户根据需求设置查询数据的时间；2、点击“开始查询”；
- 3、点击“数据记录”；
- 4、界面右下角“上一页”“下一页”可对数据记录显示界面进行翻页。

- 1、The user sets the time for querying data according to requirements;
- 2、Click “Start Query”;
- 3、Click “Data Record”;
- 4、The data record display interface can be flipped by "previous page" and "next page" in the lower right corner of the interface.



图 10 数据记录查询图例(Figure 10 data record query legend)

5.2. 告警记录(Alarm record)

- 1、用户根据需求设置查询数据的时间；
- 2、点击“开始查询”；
- 3、点击“告警记录”；
- 4、界面右下角“上一页”“下一页”可对数据记录显示界面进行翻页。

- 1、The user sets the time for querying data according to requirements;
- 2、Click “Start Query”
- 3、Click “Alarm Record”;
- 4、The data record display interface can be flipped by "previous page" and "next page" in the lower right corner of the interface.



图 11 告警记录查询图例(Figure 11 alarm record query legend)

6. 系统设置入口界面(System setting entry interface)

主界面从左向右滑动是系统设置入口，进入系统设置的方式有“普通登录入

口”、“密码登录入口”。

Sliding from left to right in the main interface is the system setting entry. There are "Setting" and "passwd" to enter the system setting.



6.1. 普通登录入口(Common login portal)

设备中有录入人员信息，该人员可通过界面的人脸识别登录进入，人脸识别成功后，该人员的信息会显示到界面中间位置的人员信息显示区域，点击“普通登录入口”即可进入系统设置界面。

There is information about the person entered in the equipment. The person can log in through face recognition on the interface. After face recognition is successful, the person's information will be displayed in the person information display area in the middle of the interface. Click "Setting" to enter the system setting interface.



6.2. 密码登录入口(Passwd)

设备未录入人员信息，进入系统设置页面需要通过密码登录进入，点击“密码登录入口”，输入正确密码，点击“确定”即可进入系统设置界面。

The personnel information is not entered in the equipment. To enter the system setting page, you need to log in with a password. Click "Passwd", enter the correct password, and click "OK" to enter the system setting interface.

图 12 系统设置入口图例(Figure 12 system setting entry legend)

7. 系统设置(System settings)

根据用户需求，点击相应图标即可对对应功能项进行设置，点击左上角“<”符号即可退出系统设置。

According to user requirements, click the corresponding icon to set the corresponding function item, and click the "<" symbol in the upper left corner to exit the system setting.



图 13 系统设置项目图例(Figure 13 legend of system setting items)

7.1. 工况设置(Work settings)

工况设置是对塔机的主臂长度、主臂宽度、安全距离、塔高、倍率进行设置，可直接双击加减号间的输入框，输入设定值，如果对设定值做细微的修改可通过“+”“-”进行修改，视频配置、塔机类型、人脸权限、远程遥控器的使用根据实际需求设置，常用设置里的所有项目设置完毕，点击“保存”。

The working condition setting is to set the length, width, safety distance, tower height and magnification of the main boom of the tower crane. You can directly double-click the input box between the plus and minus signs to enter the set value. If you make minor changes to the set value, you can modify it through "+" and "-". The video configuration, tower crane type, face permission and the use of remote control are set according to the actual needs. All items in the common settings are set, Click

“Save all”.



图 14 工况设置图例(Figure 14 legend of working condition setting)

7.2. 调试标定(Commissioning calibration)

调试标定可对重量、幅度、高度、回转、角度、延时参数标定。

The commissioning and calibration can calibrate the weight, travel, height, rotation, angle and delay parameters.

7.2.1. 重量标定(Weight calibration)

7.2.1.1. 标定异常(Calibration error)

界面上方选择重量标定，查看当前 AD 是否有值，AD 表示当前编码器的值，如果 AD 处没有数值，那么将无法进行标定。

Select weight calibration at the top of the interface to check whether the current AD has a value. AD represents the value of the current encoder. If there is no value at AD, calibration will not be possible.



7.2.1.2. 开始标定(Start calibration)

确定 AD 有数值，双击输入框，输入当前实际的重量值，输入完成，点击“确

认”，标定的值就会在下方标定记录中显示，可根据需求确定标定的次数。

Confirm that AD has a value, double-click the input box, input the current actual weight value, input it, and click "Save", the calibrated value will be displayed in the calibration record below, and the calibration times can be determined according to the demand.



7.2.1.3. 修改标定(Modify calibration)

如果标定错误，需要重新标定，点击要删除的标定项后的“清除”键，会跳出确认删除弹窗，点击“ok”即可删除该标定项。

If the calibration is wrong and needs to be recalibrated, click the "Clear" button after the calibration item to be deleted, and a confirmation pop-up window will pop up. Click "OK" to delete the calibration item.



图 15 重量标定图例(Figure 15 weight calibration legend)

7.2.2. 幅度标定(Travel calibration)

7.2.2.1. 标定异常(Calibration error)

界面上方选择幅度标定，查看当前 AD 是否有值，AD 表示当前编码器的值，如果 AD 处没有数值，那么将无法进行标定。

Select travel calibration at the top of the interface to check whether the current AD has a value. AD represents the value of the current encoder. If there is no value at AD, calibration will not be possible.



7.2.2.2. 开始标定(Start calibration)

确定 AD 有数值，双击输入框，输入当前实际的幅度值，输入完成，点击“确认”，标定的值就会在下方标定记录中显示，可根据需求确定标定的次数。

Confirm that AD has a value, double-click the input box, input the current actual travel value, input it, and click "Save", the calibrated value will be displayed in the calibration record below, and the calibration times can be determined according to the demand.



7.2.2.3. 修改标定(Modify calibration)

如果标定错误，需要重新标定，点击要删除的标定项后的“清除”键，会跳出确认删除弹窗，点击“ok”即可删除该标定项。

If the calibration is wrong and needs to be recalibrated, click the "Clear" button after the calibration item to be deleted, and a confirmation pop-up window will pop up. Click "OK" to delete the calibration item.



图 16 幅度标定图例(Figure 16 amplitude calibration legend)

7.2.3. 高度标定(Height calibration)

7.2.3.1. 标定异常(Calibration error)

界面上方选择高度标定，查看当前 AD 是否有值，AD 表示当前编码器的值，如果 AD 处没有数值，那么将无法进行标定。

Select height calibration at the top of the interface to check whether the current AD has a value. AD represents the value of the current encoder. If there is no value at AD, calibration will not be possible.



7.2.3.2. 开始标定(Start calibration)

确定 AD 有数值，双击输入框，输入当前实际的高度值，输入完成，点击“确认”，标定的值就会在下方标定记录中显示，可根据需求确定标定的次数。

Confirm that AD has a value, double-click the input box, input the current actual height value, input it, and click "Save", the calibrated value will be displayed in the calibration record below, and the calibration times can be determined according to the demand.



7.2.3.3. 修改标定(Modify calibration)

如果标定错误，需要重新标定，点击要删除的标定项后的“清除”键，会跳出确认删除弹窗，点击“ok”即可删除该标定项。

If the calibration is wrong and needs to be recalibrated, click the "Clear" button after the calibration item to be deleted, and a confirmation pop-up window will pop up. Click "OK" to delete the calibration item.



图 17 高度标定图例(Figure 17 height calibration legend)

7.2.4. 回转标定(Rotary calibration)

界面上方选择回转标定，点击“校零”即可。

Select rotation calibration at the top of the interface and click "Zerocorrection".



图 18 回转标定图例(Figure 18 rotation calibration legend)

7.2.5. 角度标定(Angle calibration)

7.2.5.1. 标定异常(Calibration error)

界面上方选择角度标定，查看当前 AD 是否有值，AD 表示当前编码器的值，如果 AD 处没有数值，那么将无法进行标定。

Select height calibration at the top of the interface to check whether the current AD has a value. AD represents the value of the current encoder. If there is no value at AD, calibration will not be possible.



7.2.5.2. 开始标定(Start calibration)

确定 AD 有数值，双击输入框，输入当前实际的角度值，输入完成，点击“确认”，标定的值就会在下方标定记录中显示，可根据需求确定标定的次数。

Confirm that AD has a value, double-click the input box, input the current actual angle value, input it, and click "Save", the calibrated value will be displayed in the calibration record below, and the calibration times can be determined according to the demand.



7.2.5.3. 修改标定(Modify calibration)

如果标定错误，需要重新标定，点击要删除的标定项后的“清除”键，会跳出确认删除弹窗，点击“ok”即可删除该标定项。

If the calibration is wrong and needs to be recalibrated, click the "Clear" button after the calibration item to be deleted, and a confirmation pop-up window will pop up. Click "OK" to delete the calibration item.



图 19 角度标定图例(Figure 19 angle calibration legend)

7.3. 告警设置(Alarm settings)

该界面包含了，力矩报警点设置、重量报警点设置、塔臂上小车行程报警点设置、起升报警点设置。

双击报警点设置项后对应的输入框，输入设定值，所有报警点设置完成后点击“保存”即可。

This interface includes torque alarm point setting, weight alarm point setting, trolley travel alarm point setting on tower arm and lifting alarm point setting.

Double click the corresponding input box behind the alarm point setting item, enter the set value, and click "Save" after all alarm points are set.



图 21 告警设置图例(Figure 21 alarm setting legend)

8. 防碰撞(Anti collision)

8.1. 告警类型(Alarm type)

8.1.1. 普通告警(Warning), 高度不碰撞(General alarm (warning), no collision at height)

8.1.1.1. 塔臂交错(Tower arms staggered)

相邻塔吊的塔臂不在同一水平面上, 工作时塔臂不会发生碰撞, 但是两塔臂会出现塔臂交错的情况, 设备告警提示。

The tower arms of adjacent tower cranes are not on the same horizontal plane, so the tower arms will not collide during operation, but the two tower arms will be staggered, and the equipment will give an alarm.

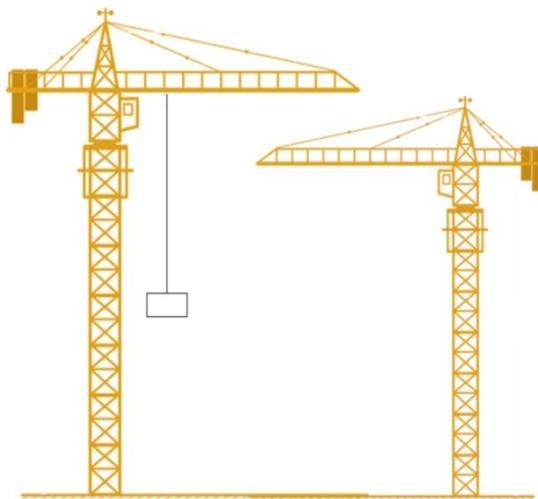


图 25 塔臂交错图例(Figure 25 legend of tower arm staggering)

8.1.1.2. 吊点交错(Staggered lifting points)

相邻塔吊的塔臂不在同一水平面上，不会发生碰撞，塔臂高一点的塔吊上的吊钩与塔臂低一点的塔吊也不会发生碰撞，设备告警提示。

The tower arms of adjacent tower cranes are not on the same horizontal plane, so there will be no collision. The hook on the tower crane with a higher tower arm will not collide with the tower crane with a lower tower arm, and the equipment will give an alarm.

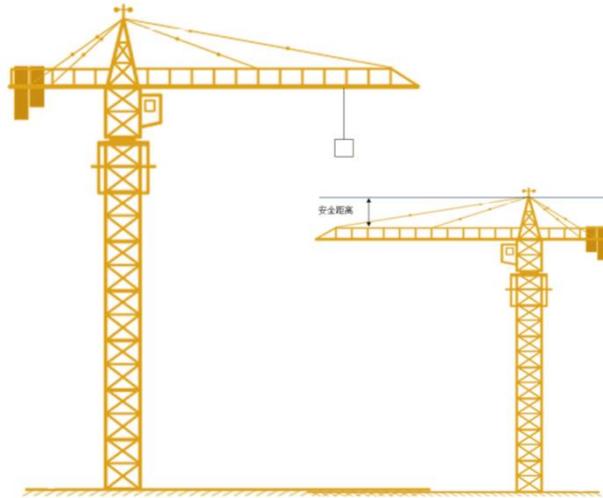


图 26 吊点交错图例(Figure 26 legend of staggered lifting points)

8.1.2. 严重告警(Error / Fatal)

8.1.2.1. 塔臂交错(Tower arms staggered)

相邻塔吊的塔臂在同一水平面上，在塔吊工作期间两塔吊的塔臂会发生碰撞，当两塔吊的塔臂进入设置的安全距离的范围时，设备严重警告提示，驾驶员应当立即停止当前操作，避免碰撞事故的发生。

The tower arms of adjacent tower cranes are on the same horizontal plane, and the tower arms of the two tower cranes will collide during the operation of the tower cranes. When the tower arms of the two tower cranes enter the set safe distance, the equipment will give a serious warning prompt, and the driver shall immediately stop the current operation to avoid the collision accident.

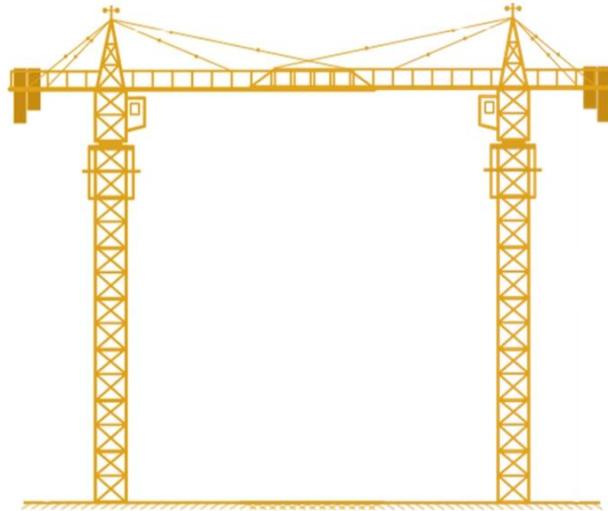


图 27 塔臂交错图例(Figure 27 legend of tower arm staggering)

8.1.2.2. 吊点交错(Staggered lifting points)

相邻塔吊的塔臂不在同一水平线上，工作时塔臂不会发生碰撞，但是高一点的塔臂上的吊钩在工作时与低一点的塔臂会发生碰撞，设备严重警告提示。

The tower arms of adjacent tower cranes are not on the same horizontal line, so the tower arms will not collide during operation, but the hook on the higher tower arm will collide with the lower tower arm during operation, so the equipment will give a serious warning.

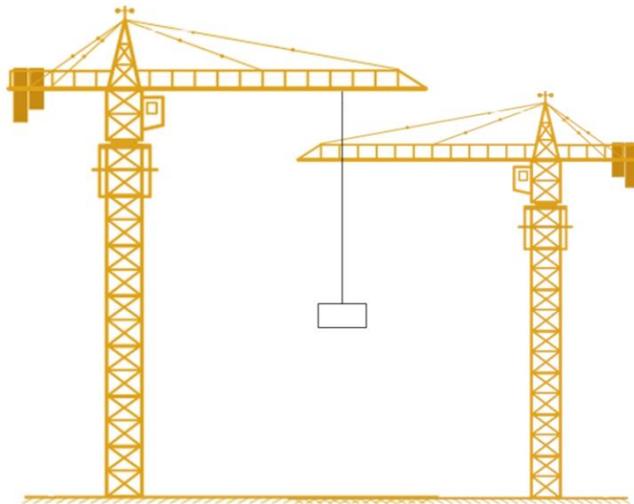


图 28 吊点交错图例(Figure 28 legend of staggered lifting points)

相邻塔吊的塔臂不在同一水平线上，工作时塔臂不会发生碰撞，但是高一点的塔臂上的吊钩在工作时，所吊物体进入下方塔吊的安全距离范围内，设备严重警告提示。

The tower arms of adjacent tower cranes are not on the same horizontal line, so the tower arms will not collide during operation. However, when the hook on the higher tower arm is working, the hoisted object will enter the safety distance of the lower tower crane, and the equipment will give a serious warning.

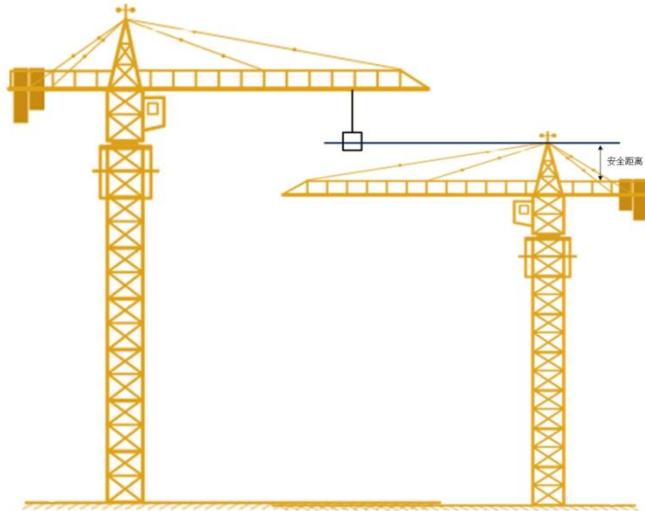


图 29 吊点交错图例(Figure 29 legend of staggered lifting points)

8.2. 坐标系(Coordinate system)

8.2.1. 坐标轴介绍(Coordinate axis introduction)

坐标轴是用来定义一个坐标系的一组直线或一组线；位于坐标轴上的点的位置由一个坐标值所唯一确定，坐标轴有横轴 X，纵轴 Y，两条轴线交点即为坐标原点 (0, 0)，原点坐标就是下文描述中的坐标零点。

以原点为中心，X、Y 轴为分界线，右上的称为第一象限，在终端中坐标轴的第一象限中的点横坐标(X)大于 0，纵坐标(Y)小于 0，即 (X, -Y)；左上的称为第二象限，此象限中的点的横坐标(X)小于 0，纵坐标(Y)小于 0，即 (-X, -Y)；左下的称为第三象限，此象限中的点的横坐标(X)小于 0，纵坐标(Y)大于 0，即 (-X, Y)；右下的称为第四象限，此象限中的点的横坐标(X)大于 0，纵坐标(Y)大于 0，即 (X, Y)；在对设备进行防碰撞的坐标设置的时候，需要根据平面布置图查看塔吊的实际位置来进行坐标设置。

A coordinate axis is a group of lines or lines used to define a coordinate system; The position of the point on the coordinate axis is uniquely determined by a coordinate value. The coordinate axis has horizontal axis X and vertical axis y. the intersection of the two axes is the coordinate origin (0, 0), and the origin coordinate is the coordinate zero in the following description.

With the origin as the center, the X and Y axes as the dividing line, the upper right is called the first quadrant, the abscissa (x) of the point in the first quadrant of the coordinate axis in the terminal is greater than 0, and the ordinate (y) is less than 0, that is (x, -y); The upper left quadrant is called the second quadrant. The abscissa (x) and ordinate (y) of the points in this quadrant are less than 0, that is (-x, -y); The lower left quadrant is called the third quadrant. The abscissa (x) of the point in this quadrant is less than 0, and the ordinate (y) is greater than 0, that is (-x, y); The lower right quadrant is called the fourth quadrant. The abscissa (x) of the point in this quadrant is greater than 0, and the ordinate (y) is greater than 0, that is (x, y); When setting the

coordinates for anti-collision of equipment, it is necessary to check the actual position of tower crane according to the layout plan to set the coordinates.

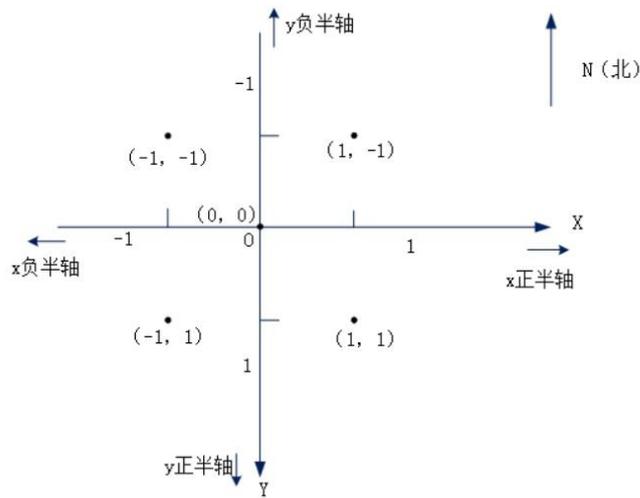


图 30 交互终端坐标系图例(Figure 30 legend of interactive terminal coordinate system)

8.2.2. 回转 0° 的设置(Setting of rotation 0°)

在交互终端上设置坐标与日常坐标上不同，设置往北正方向（y 负半轴）为塔机的回转 0°。

The coordinates set on the interactive terminal are different from the daily coordinates. The positive direction to the North (y negative half axis) is set as the rotation 0° of the tower crane.

8.2.3. 计算设备相对坐标(Calculate relative coordinates of equipment)

设置多台设备坐标，一般情况下以左上角设备为坐标零点，其余设备坐标根据实际坐标得出相对于坐标零点设备的坐标。

例如：

设置图 31 的 5 台塔吊坐标，在设置时将 1#号塔吊作为坐标零点，即 1#号塔吊的坐标为 (0, 0)，然后计算其余 4 台塔吊关于 1#号塔吊的相对坐标即可。

Set the coordinates of multiple equipment. Generally, the equipment in the upper left corner is taken as the coordinate zero point, and the coordinates of other equipment relative to the coordinate zero point are obtained according to the actual coordinates.

For example:

Set the coordinates of 5 tower cranes as shown in Figure 31. When setting, take No. 1# tower crane as the coordinate zero point, that is, the coordinates of No. 1# tower crane are (0, 0), and then calculate the relative coordinates of the remaining 4 tower cranes with respect to No. 1# tower crane.

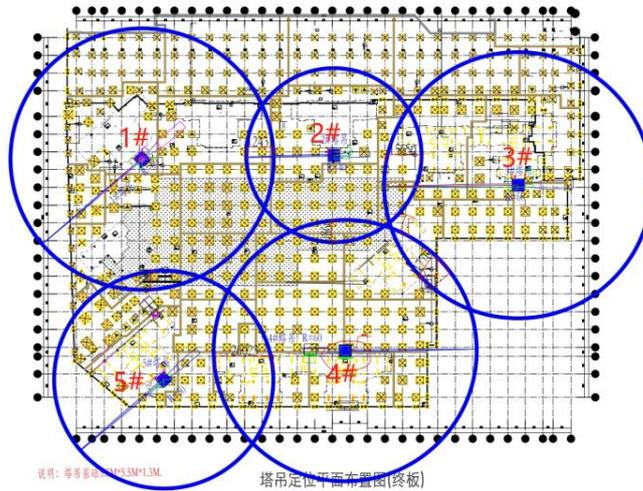


图 31 设备坐标设置图例(Figure 31 legend of equipment coordinate setting)

图 31 中的塔吊的实际坐标如下表（该坐标值为模拟数据，用户设置时需根据平面布置图上塔吊的实际坐标）：

The actual coordinates of the tower crane in Figure 31 are shown in the following table (the coordinates are analog data, and the user shall set them according to the actual coordinates of the tower crane on the layout plan):

表格 1 塔吊实际坐标(Table 1 actual coordinates of tower crane)

序号 serial number	塔机号 Tower crane No	X	Y
1	1#塔吊 1#tower	121.9	858.3
2	2#塔吊 2#tower	141.3	867.2
3	3#塔吊 3#tower	195.9	808.2
4	4#塔吊 4#tower	161.2	774.5
5	5#塔吊 5#tower	131.5	736.3

8.2.3.1. 计算相对坐标(Calculate relative coordinates)

将图 31 中的 1#号塔吊作为坐标零点，所以 1#号塔吊的坐标为 (0, 0)。

2#号塔吊相对于 1#号塔吊的坐标就是两个坐标相减，则：

Take No. 1# tower crane in Figure 31 as the coordinate zero point, so the coordinate of No. 1# tower crane is (0, 0).

The coordinates of No. 2# tower crane relative to No. 1# tower crane are two coordinates subtracted, then:

$$X: 141.3-121.9 = 19.4$$

$$Y: 867.2-858.3 = 8.9$$

即：2#号塔吊的坐标为（19.4， 8.9）。

Namely: the coordinates of No. 2# tower crane are (19.4, 8.9).

3#号塔吊相对于 1#号塔吊的坐标就是两个坐标相减， 则：

The coordinates of No. 3# tower crane relative to No. 1# tower crane are two coordinates subtracted, then:

$$X: 195.9-121.9 = 74$$

$$Y: 808.2-858.3 = -50.1$$

即：3#号塔吊的坐标为（74， -50.1）。

Namely: the coordinates of No. 3# tower crane are (74, -50.1).

4#号塔吊相对于 1#号塔吊的坐标就是两个坐标相减， 则：

The coordinates of No. 4# tower crane relative to No. 1# tower crane are two coordinates subtracted, then:

$$X: 161.2-121.9 = 39.3$$

$$Y: 774.5-858.3 = -83.8$$

即：4#号塔吊的坐标为（39.3， -83.8）。

Namely: the coordinates of No. 4# tower crane are (39.3, -83.8).

5#号塔吊相对于 1#号塔吊的坐标就是两个坐标相减， 则：

The coordinates of No. 5# tower crane relative to No. 1# tower crane are two coordinates subtracted, then:

$$X: 131.5-121.9 = 9.6$$

$$Y: 736.3-858.3 = -122$$

即：5#塔吊的坐标为（9.6， -122）。

Namely: the coordinates of No. 5# tower crane are (9.6, -122).

8.2.3.2. 写入交互终端的相对坐标符号变换(Relative coordinate symbol transformation written to interactive terminal)

由平面布置图可知，将 1#号塔吊作为坐标零点的时候，其余 4 台塔吊均在 1#号塔吊的右下方（第四象限），如果对象限不了解，详见“10.2.1.坐标轴介绍”，在交互终端中设置坐标所用的坐标轴与通常情况下的坐标轴不同，Y 轴的方向不同，而计算出的相对坐标按照标准坐标来的，所以在交互终端内设置设备坐标时应根据图 32 右边的坐标轴来，改变相对坐标的 y 值符号，保证防碰撞内设备位置的准确性，同时改变坐标值符号后，设备位置是否设置正确也可以在防碰撞可视化图形区域查看，设备位置是否与平面布置图一致，如果设备坐标未正确输入，则会导致防碰撞功能不能正常使用。

It can be seen from the layout plan that when the No. 1# tower crane is taken as the coordinate zero point, the other four tower cranes are located at the lower right of the No. 1# tower crane (the fourth quadrant). If you do not know the quadrant, see "10.2.1. Coordinate axis introduction " for details. The coordinate axis used to set the coordinates in the interactive terminal is different from the coordinate axis under normal conditions, and the direction of the Y axis is different, and the calculated relative coordinates are based on the standard coordinates, Therefore, when setting the equipment coordinates in the interactive terminal, the y-value symbol of the relative coordinates should be changed according to the coordinate axis on the right of figure 32 to ensure the accuracy of the equipment position in the anti-collision. At the same time, after changing the coordinate value symbol, whether the equipment position is correctly set can also be checked in the anti-collision visual graphics area. Whether the equipment position is consistent with the layout plan. If the equipment coordinates are not correctly input, The anti-collision function will not work normally.

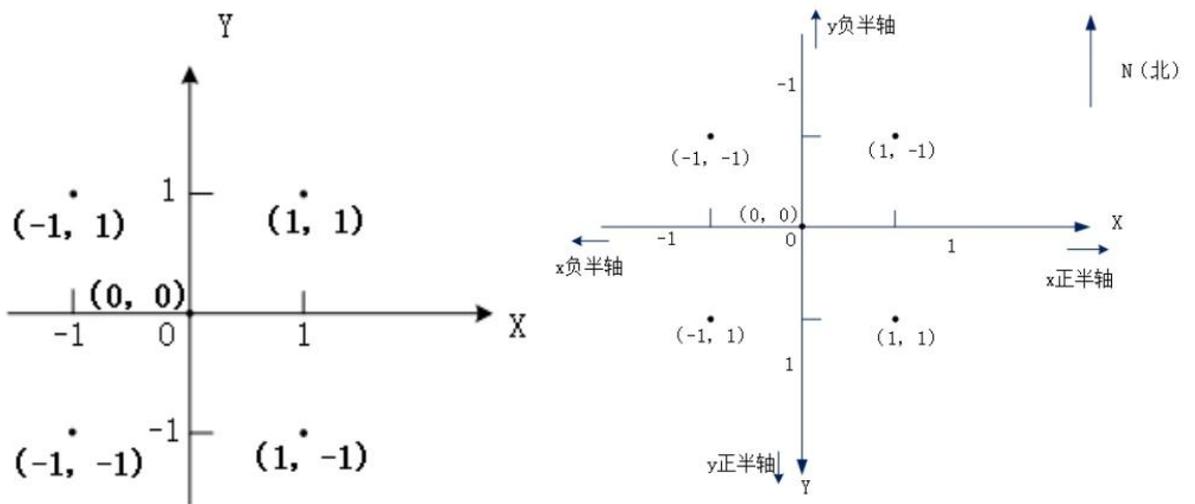


图 32 交互终端内坐标轴与标准坐标轴对比图（左为标准，右终端）
(Figure 32 comparison diagram of coordinate axis in interactive terminal and standard coordinate axis (left is standard, right terminal))

根据“10.2.3.1 计算相对坐标”得到的是标准坐标轴对应的坐标，由于在交

互终端中的坐标 Y 轴方向变化了，所以计算得到的所有相对坐标的 y 值应当取负值，如果有设备位置处于零点坐标塔吊的左边，那么该设备的横坐标（X）应当取负值，具体符号的改变应当根据实际情况来定，防碰撞可视化图形区域可直观看出位置的正确性，表格 2 即为图 31 中 2#、3#、4#、5#号塔吊关于 1#号塔吊的相对坐标（表中坐标为符号变换后的坐标，即可以直接对应设备填入交互终端的坐标值）。

According to "10.2.3.1 Calculate relative coordinates", the coordinates corresponding to the standard coordinate axis are obtained. Since the y-axis direction of the coordinates in the interactive terminal has changed, the y-value of all the calculated relative coordinates should be taken as a negative value. If any equipment is located on the left side of the zero coordinate tower crane, the abscissa (x) of the equipment should be taken as a negative value. The specific symbol change should be determined according to the actual situation, The correctness of the position can be seen visually in the anti-collision visual graphic area. Table 2 is the relative coordinates of No. 2#, 3#, 4# and 5# tower cranes with respect to No. 1# tower crane in Figure 31 (the coordinates in the table are the coordinates after symbol transformation, that is, the coordinate values of the interactive terminal can be directly filled in with the corresponding equipment).

表格 2 防碰撞坐标设置

序号 Serial number	塔机号 Tower crane No	X	Y
1	1#塔吊 1#tower	0	0
2	2#塔吊 2#tower	19.4	8.9
3	3#塔吊 3#tower	74	50.1
4	4#塔吊 4#tower	39.3	83.8
5	5#塔吊 5#tower	9.6	122

8.3. 未扫描到同类型设备(No devices of the same type were scanned)

当设备未扫描到同类型设备时，用户无法对设备进行防碰撞设置。

When a device of the same type is not scanned, the user cannot set anti-collision settings for the device.



图 33 防碰撞未扫描到设备图例(Figure 33 legend of equipment not scanned for anti-collision)

8.4. 防碰撞设备设置(Anti collision equipment settings)

设备扫描到同类型设备后，用户可直接双击设备号后面对应的“X”、“Y”输入框，输入该设备的坐标，然后点击“全部保存”，若不需要添加该设备到防碰撞，点击“全部清除”即可，设置保存之后的设备会在该界面下方显示当前设备所在位置，但是当设备不在线时，该界面不显示设备的塔臂的实时位置。

After the equipment is scanned to the same type of equipment, the user can directly double-click the corresponding "X" and "Y" input boxes behind the equipment number, enter the coordinates of the equipment, and then click "Save all". If it is not necessary to add the equipment to anti-collision, click "clear all". After setting the saved equipment, the current equipment location will be displayed at the bottom of the interface, but when the equipment is not online, This interface does not display the real-time position of the tower arm of the equipment.

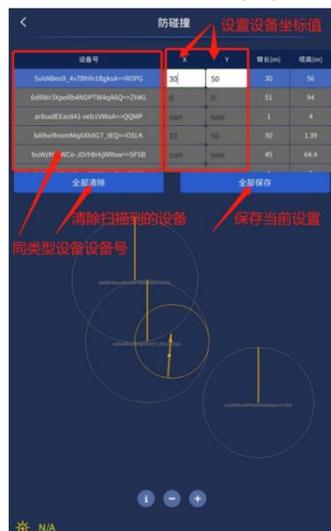


图 34 防碰撞图例(Figure 34 anti collision legend)

8.5. 防碰撞可视化图形调整(Anti collision visualization graphics adjustment)

防碰撞可视化界面“+”“—”是对界面图形放大、缩小调整，用户可根据需

求对界面显示图进行调整，点击“i”图标，使该界面回到初始位置。

The "+" and "-" of the anti-collision visual interface are used to enlarge and reduce the interface graphics. The user can adjust the interface display according to needs, and click the "I" icon to return the interface to its original position.

9. 虚拟墙(Virtual wall)

9.1. 坐标设置(Coordinate setting)

(1) 点击界面上方输入框，可直接双击输入框输入坐标点的值，如果需要对设定值进行细微修改可通过“+”、“-”进行修改。

(2) 设定值输入完成，点击“确定”，设定的障碍点可在障碍点坐标显示区查看。

(3) 设置障碍物是否绝对禁止，设置为“是”，当前设置的障碍物所处的整个扇形区域均为禁行区；设置为“否”，当前设置的障碍物区域为禁行区。

(4) 若该障碍物区域不是绝对禁止通行，点击障碍高度设置后的输入框，设置障碍高度，当设备高于障碍高度时该区域可通过。

(5) 点击“障碍物名称设置”后输入框，设置当前障碍物名称。

(6) 设置过程中障碍点输入错误，需要做修改，点击“删除设置点”即可删除之前设置的点，然后重新设置即可。

(7) 点击“完成图形”即可完成障碍物区域的设置。

(1) Click the input box at the top of the interface to directly double-click the input box to input the value of the coordinate point. If the setting value needs to be slightly modified, it can be modified through "+" and "-".

(2) After the set value is input, click "Save", and the set obstacle point can be viewed in the obstacle point coordinate display area.

(3) Whether the obstacles are absolutely prohibited is set to "Yes", and the entire sector where the currently set obstacles are located is a no go zone; If it is set to "No", the currently set obstacle area is a no go area.

(4) If the obstacle area is not absolutely forbidden to pass, click the input box after the obstacle height setting to set the obstacle height. When the equipment is higher than the obstacle height, the area can pass through.

(5) Click the input box after "Name" to set the name of the current obstacle.

(6) During the setting process, the obstacle points are input incorrectly and need to be modified. Click "Delete point" to delete the previously set points, and then reset them.

(7) Click "Finish graphics" to complete the setting of obstacle area.

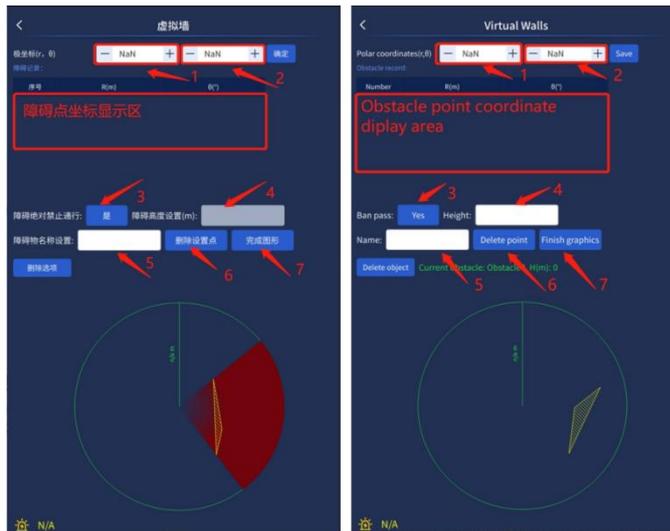


图 35 坐标设置图例(Figure 35 legend of coordinate setting)

9.2. 手动设置(Manual setting)

(1) 在界面下方的圆形中直接标记障碍物所在区域，形成一个多边形，手动标定的障碍点可在障碍点坐标显示区查看。

(2) 设置障碍物是否绝对禁止，设置为“是”，当前设置的障碍物所处的整个扇形区域均为禁行区；设置为“否”，当前设置的障碍物区域为禁行区。

(3) 若该障碍物区域不是绝对禁止通行，点击障碍高度设置后的输入框，设置障碍高度，当设备高于障碍高度时该区域可通过。

(4) 点击“障碍物名称设置”后输入框，设置当前障碍物名称。

(5) 设置过程中障碍点输入错误，需要做修改，点击“删除设置点”即可删除之前设置的点，然后重新标定即可。

(6) 点击“完成图形”即可完成障碍物区域的设置。

(1) Mark the area of the obstacle directly in the circle below the interface to form a polygon. The manually calibrated obstacle points can be viewed in the obstacle point coordinate display area.

(2) Whether the obstacles are absolutely prohibited is set to "Yes", and the entire sector where the currently set obstacles are located is a no go zone; If it is set to "No", the currently set obstacle area is a no go area.

(3) If the obstacle area is not absolutely forbidden to pass, click the input box after the obstacle height setting to set the obstacle height. When the equipment is higher than the obstacle height, the area can pass through.

(4) Click the input box after "Name" to set the name of the current obstacle.

(5) During the setting process, the obstacle points are input incorrectly and need to be modified. Click "Delete point" to delete the previously set points, and then reset them.

(6) Click "Finish graphics" to complete the setting of obstacle area.

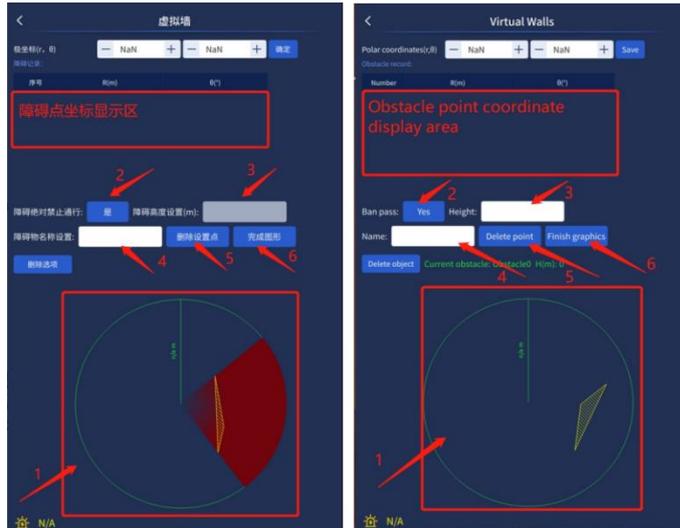


图 36 手动设置图例(Figure 36 legend of manual setting)

9.3. 删除障碍物(Remove obstacles)

界面下方圆形中选中需要删除的区域，点击“删除选项”即可。

Select the area to be deleted from the circle at the bottom of the interface and click "Delete object".

10. 告警屏蔽(Alarm Lock)

若要屏蔽某一个传感器的告警，在该界面左边选择需要屏蔽的传感器，并点击它，屏蔽成功后，左边被屏蔽的传感器那一项将变成红色，若要取消该传感器的屏蔽状态，点击右边需要解除屏蔽状态的传感器即可。

To shield a sensor, select the sensor to be shielded on the left of the interface and click it. After shielding is successful, the item of the shielded sensor on the left will turn red. To cancel the shielding status of the sensor, click the sensor to be shielded on the right.



图 38 防拆屏蔽图例(Figure 38 legend of anti disassembly shield)

10.1. 吊点设置(Camera Settings)

10.1.1. 吊点设置操作流程(Operation flow of lifting point setting)

吊点设置详细步骤:

(1) 回转中心、小车下方、臂头为摄像头安装位置，首先选中要修改摄像头的位置。

(2) 双击要设置的摄像头补偿值对应输入框进行设置。

(3) 设置完成，点击“保存”。

Detailed steps for lifting point setting:

(1) The rotation center, the lower part of the trolley and the arm head are the installation positions of the camera. First, select the position of the camera to be modified.

(2) Double click the input box corresponding to the camera compensation value to set.

(3) After setting, click "Save all".

10.1.2. 吊点设置位置变更(Change of lifting point setting position)

如果将其中一个位置的摄像头的吊点值设置完成之后，需要切换到另一个安装位置，先点击右上角“位置变更”，然后再点击要切换的位置。例如：将塔臂头部的补偿值和放大系数设置完成，需要切换到小车下方，则需要先点击“位置变更”，再点击“小车下方”，然后对其值进行设置。

If you need to switch to another installation position after setting the lifting point value of the camera in one position, first click "position change" in the upper right corner, and then click the position to be switched. For example, after setting the compensation value and amplification factor of the tower arm head, if you need to switch to the lower part of the trolley, you need to click "Changed position " first, then "lower part of the trolley", and then set its value.

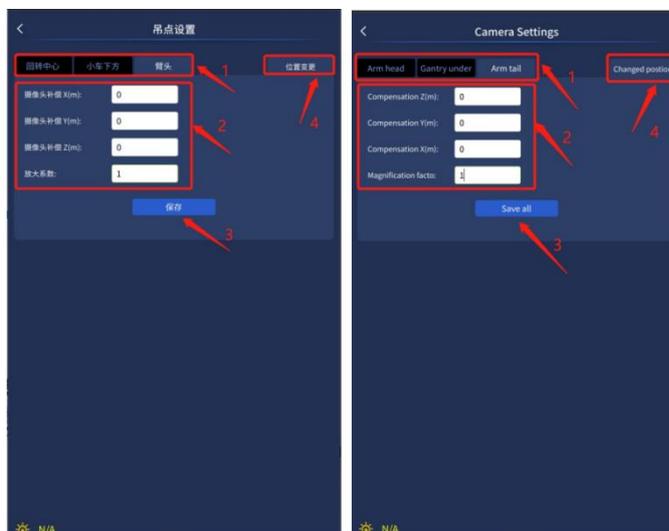


图 39 吊点设置图例(Figure 39 legend of lifting point setting)

10.2. 人员信息(Person Information)

在该界面录入人员信息后，进入系统设置可直接进行人脸识别进入系统设置。

After entering personnel information in this interface, you can enter the system settings to directly perform face recognition and enter the system settings.

10.2.1. 添加人员信息步骤(To add personnel information)

(1) 点击“+”进入添加人员状态。

(2) 录入人脸，识别成功。

(3) 人员信息，姓名、联系电话、工牌号码、身份证号均是手动输入，使用权限设置，点击带有“请选择”字样的输入框，根据该人员实际情况进行使用权限的选择，使用权限有两种，分别是驾驶员、管理员。

(4) 点击“保存”。

(5) 该人员是否添加成功，添加成功后，在人员列表会有对应的显示，点击人员列表中需要查看的人员，就可以查看到该人员的具体信息，同时也可以对信息进行修改。

(1) Click "+" to enter the status of adding personnel.

(2) Enter the face and the recognition is successful.

(3) The personnel information, name, contact number, job card number and ID number are all entered manually. For permission setting, click the input box with "please choose" to select the permission according to the actual situation of the person. There are two kinds of permission, namely, driver and administrator.

(4) Click "Save".

(5) Whether the person has been added successfully. After the person has been added successfully, the corresponding display will appear in the person list. Click the person to view in the person list to view the specific information of the person and modify the information.

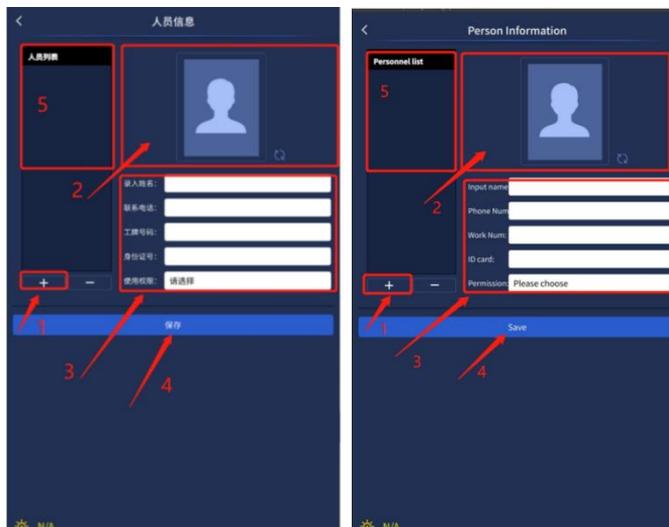


图 40 添加人员信息图例(Figure 40 legend of adding personnel information)

10.2.2. 删除人员信息(Delete personnel information)

在人员列表中选中要删除的人员，点击“-”，跳出确认删除弹框，点击“ok”即可删除，该人员信息删除后，列表将不会出现该人员即为删除成功。

Select the person to be deleted in the person list, click "-" to pop up the confirm deletion pop-up box, and click OK to delete. After deleting the information of the person, the person will not appear in the list, which means the deletion is successful.

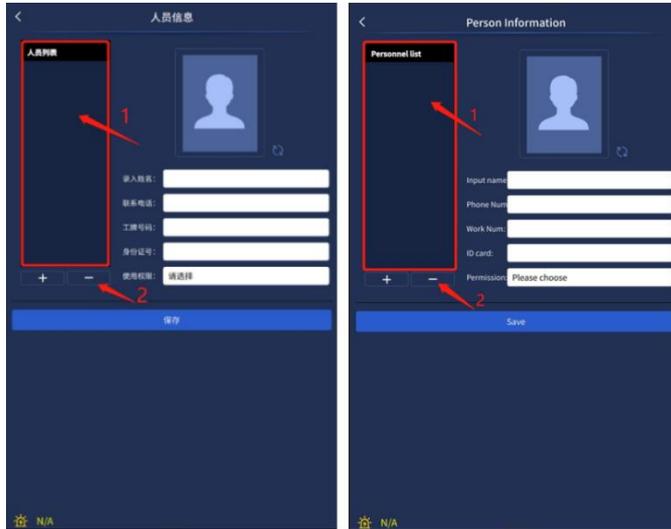


图 41 删除人员信息图例(Figure 41 legend of deleting personnel information)

10.2.3. 修改人员信息(Modify personnel information)

在人员列表中选中要修改信息的人员，选中以后，右边将会出现要选中人员的人员信息，这时用户就可以对人员进行修改，信息修改完成后，点击“保存”。

Select the person whose information you want to modify in the personnel list. After selecting it, the personnel information of the person to be selected will appear on the right. At this time, you can modify the personnel information. After modifying the information, click “Save”.

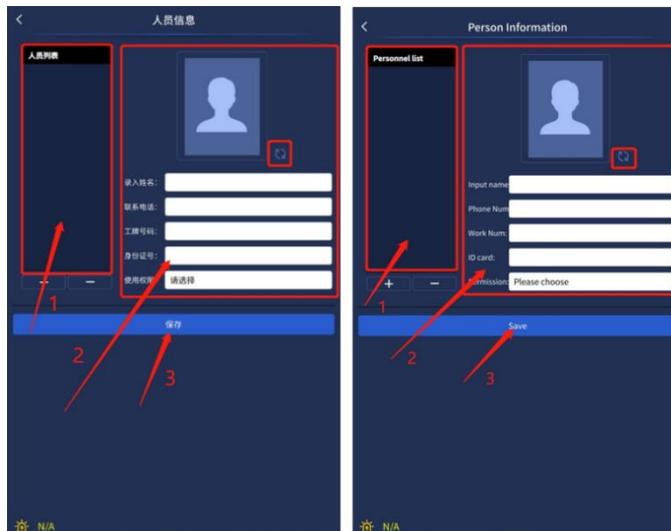


图 42 修改人员信息图例(Figure 42 legend of modifying personnel information)

11. 预警、告警显示(Early warning and alarm display)

结合告警设置，检测到塔机运作有异常情况，达到告警设置的告警值时，设备会将当前触发的告警项显示在终端界面的左上角，同时告警时还会伴有告警提示音，查看告警记录详情查看该文章‘5.3.告警记录查询’章节。

In combination with the alarm setting, it is detected that there is abnormal operation of the tower crane. When the alarm value set by the alarm is reached, the equipment will display the currently triggered alarm item in the upper left corner of the terminal interface. At the same time, the alarm will be accompanied by an alarm prompt tone. Check the alarm record details and see the chapter "5.3. Alarm record query " in this article.