TraXync Server

User Manual

Contents

1. Product Introduction

1.1 Introduction to TraXync Server

Traxync system is an innovative interactive control solution designed for professional stage environments such as theaters, concert halls, and live performances.

Powered by AI algorithms, wireless sensing, and computing technologies, the system delivers fluid stage performances with perfectly synchronized lighting effects, creating unprecedented audience immersion.

TraXync Server goes beyond lighting tracking by integrating with immersive audio and video servers to enable synchronized sound and visual tracking, delivering multidimensional, all-round functionality for stage performances. It offers both UWB and vision-based tracking systems, with simple and fast installation and commissioning for real-time 3D positioning.

1.2 Features of TraXync Server

Tracking range:

Compatible with UWB and vision positioning for a high-precision, low-latency tracking ecosystem across different scenarios.

UWB Positioning Tracking:

Wireless coverage up to 20 m radius, 100 m for PRO.

Stable anti-interference, latency ≤20 ms.

Adopting advanced positioning technology, capable of tracking up to 8 interactive objects simultaneously (PRO version up to 255).

Visual positioning tracking:

Flexible replacement of telephoto/wide-angle lenses to adapt to different spatial ranges.

Focal length 2.8mm, image size Φ 9 mm (1/1.8 "), aperture range (D/f ') F1.6-F16, field of view angle (D/H/V) 172 °× 160 °× 108 °

Focal length 3.5mm, surface image size Φ 9 mm (1/1.8 "), aperture range (D/f ') F2.4-C, field of view angle (D/H/V) 104.5 °× 94.3 °× 78 °

Focal length 6mm, image size Φ 9 mm (1/1.8 "), aperture range (D/f ') F2.8-16, field of view angle (D/H/V) 73.49 °× 63.11 °× 44.59 °

Stable anti-interference ability, with a positioning delay range of ≤ 10mS.

High precision positioning technology tracks 8 independent targets simultaneously (the PRO version can track up to 255 independent targets at the same time), with each target having a unique identifier.

Intelligent Control:

Supports PosiStageNet, ArtNet, DMX, and OSC protocols, enabling seamless integration with mainstream international lighting consoles, immersive audio servers, and video servers.

Custom partition tracking can autonomously divide 3D space according to needs, defining different lighting effects, sound, and video materials for each interactive object.

Multi-Interactive:

Combines sound tracking and light tracking for flexible integration into stage performances..

Multi-light, multi-object presets: assign single or multiple fixtures to track interactive objects simultaneously.

AI powered:

Dual-beacon ultra-high-accuracy correction algorithms deliver precise interaction and positioning data for stage performances.

The system automatically adjusts spotlight aperture based on the real-time location of tracked subjects.

Applicable scenarios:

Theaters, Concert Halls, Live Shows, Cultural Tourism, Award Ceremonies, Fashion Shows, TV Productions, Film Shoots, etc.

1.3 TraXync Server Product Diagram

1.4 Traxync Server Product Specifications

Processing core:	Intel 64bit 2Core CPU	**Memory & Storage::**	8GB RAM，128GB SSD
Control Protocols:	OSC，RS485，RS232，UDP，Artnet,DMX512	**Control Ports:**	1 x RS485，1 x RS232
DMX512:	1024(2 x RJ45)		
Artnet input:	16 domains	**Artnet output:**	16 domains
Network interface:	1 x WAN，7 x LAN	**USB:**	2 x USB2.0
Video interface:	1 x HDMI	**power supply**	DC12V-3A
Size:	482mm x 248mm x 46mm	**Weight:**	3.3kg

1.5 UWB positioning accessory parameters

3-Axis EM Tag

Spatial Positioning Base

TTL - Network Receiver

Features

Based on UWB (Ultra Wideband) communication technology.

Three modes: local positioning, distributed ranging, and data transmission.

All nodes automatically form a wireless network – no cabling or server required; the module performs real-time calculations.

Integrated positioning, navigation, timing, and communication (PNTC); the same hardware can be configured as a tag, base station, console, node, master, or slave.

Positioning latency ≤20ms.

Specifications: 3-Axis EM Tag

Protection Rating: IP66 Communication: Supports USB communication

Positioning accuracy: 30cm @ precision, 15cm @ standard deviation

Optimal Frequency Bands: [3744,4243], [4243,4742]

Power supply: Built in battery 2000mA, USB 5V charging

Weight: Approximately 75g Size: 70mm * 46mm * 18.5mm

Specifications: Spatial Positioning Base

Monitoring: Voltage monitoring, reverse polarity protection

Communication: Supports UART, USB communication

Power supply: [3.6, 5.5]V @ LTP-AC/LTP-B

Power consumption: 1.1W @ LTP-AC; 1.35W @ LTP-B

Frequency: 6.5GHz, 6 RF bands, transmit gain adjustable from 0 to 33.5dB

Coverage: Up to 20m radius (PRO version up to 100m)

Weight: Approximately 45g

Size: 46.3mm * 56mm * 12mm

1.6 Visual Positioning Accessory Specifications

MD Beacon

Hyper-Sense Tracker

MD Hyper-Sense Processor

Feature: Hyper Sense Tracker

Supports fully waterproof connectors with IP67 protection.

Equipped with a precise temperature control system for fast thermal balancing.

Uses multispectral fusion technology and supports automatic color correction.

The Gigabit Ethernet interface supports transmission up to 100 m without relay.

Compatible with GigE Vision V2.0 and GenICam for seamless access to third-party software.

Specifications: Hyper-Sense Tracker:

Sensor Type: COMS, Global Shutter

Sensor Model: Stacked BSI

Target size: 1/2.9 "

Pixel format: Mono8/10/10Packaged/12/12Packaged

Exposure time: 23 μ s~10 sec

Mirror: Supports horizontal and vertical mirror output

Digital I/O: 1 optocoupler isolated input (Line0), 1 optocoupler isolated output (Line1), 1 bidirectional configurable non-isolated I/O (Line2)

OS Support: Windows 7/10 32/64bits, Windows 11 64bits, Linux 32/64bits

Resolution: 1440 × 1080

Maximum frame rate: 180 fps @ 1440 × 1080 Mono8

Dynamic Range / SNR: 68.5 dB/44 dB

Gain: 0 dB~24 dB

Power supply: 9 – 24 VDC, PoE supported

Protection Rating: IP67 (with correct installation of lens, cover, and cable)

Data interface: 8-pin M12 X-Code waterproof aviation plug, Gigabit Ethernet (1000 Mbit/s) compatible with Fast, Ethernet (100 Mbit/s)

Weight: Approximately 124g

Features: MD Beacon

Determines the spatial position of a target by detecting its infrared radiation, enabling precise positioning and trajectory tracking in space.

In specific infrared bands, the signal is less affected by complex electromagnetic environments and offers strong anti-interference capability.

Specifications: Multi-Dimensional Beacon:

Power supply: Built in 3.7V 2000mAh lithium battery, supports Type-C fast charging

Physical interfaces: 3 SMA RF interfaces, 1 Type-C charging/data port

Weight: Approximately 100g

Size: 96mm * 66mm * 25mm

Features: Multi-Dimensional Hyper-Sense Processor

Single-Cable Connection: One cable carries both power and communication for simple and efficient deployment.

Multi-Target Tracking: Tracks 256 independent targets at the same time, and each target has a unique identity.

6DoF Pose Solving: For rigid-body targets with markers, it fully solves spatial position and orientation.

Modular Framework: Can be flexibly configured according to different sites, improving adaptability.

Applicable Scenarios:

Motion Capture: Records and analyzes human and animal motion for animation and rehabilitation.

Robot Navigation: Supports multi-robot positioning, autonomous navigation, and path planning.

Industrial Automation: Enables assembly monitoring, precision inspection, and safety intrusion warning.

Virtual Reality: Provides spatial positioning for headsets, controllers, and other interactive devices.

Determines the spatial position of a target by detecting its infrared radiation, enabling.

Sports Science: Captures athlete motion and posture data for analysis and training optimization.

Specifications: Multi-Dimensional Hyper-Sense Processor

Processing core: Intel 64bit 8core CPU

Memory & Storage: 8GB RAM, 512GB SSD

Control Protocol: OSC, UDP

Spatial Information: X, Y, Z, Yaw, Pitch, Roll

Max Movement Speed: 80km/h

Capture frequency: 100Hz

Visual Sensor Input: 255ch

Video interface: 1 x HDMI

USB: 4 x USB 3.0

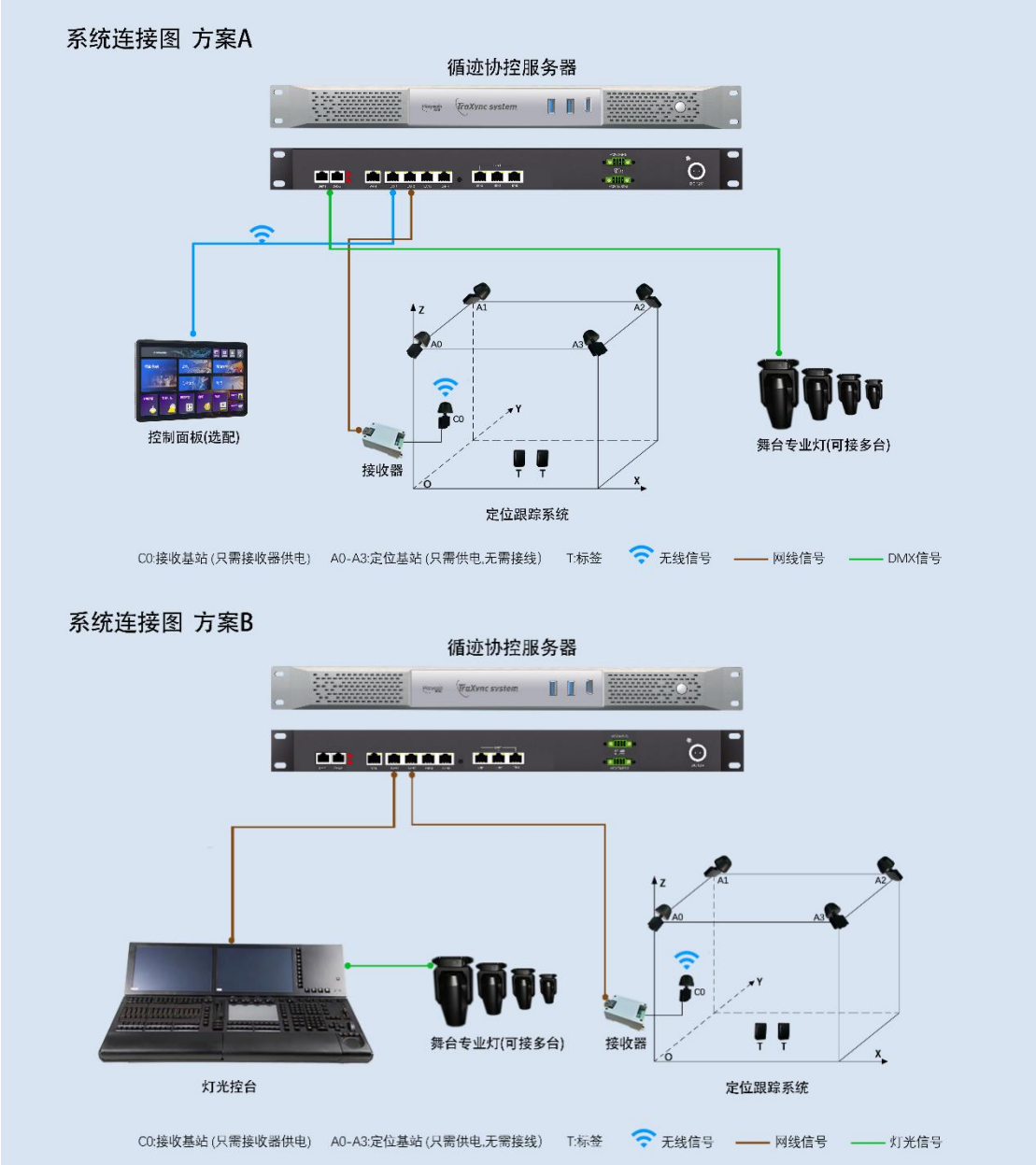
Network interface: 1 x RJ45, 1Gbps

Weight: 7.6kg

Size: 430mm x 385mm x 90mm

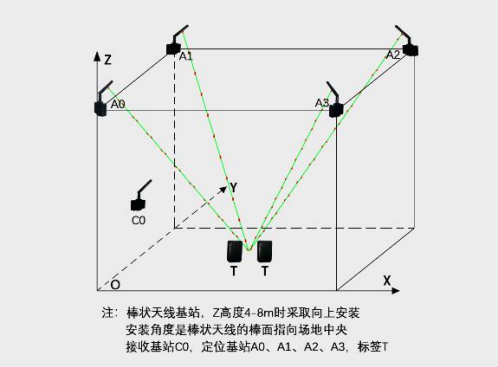
2. Traxync Server Operation Tutorial

2.1 System wiring diagram

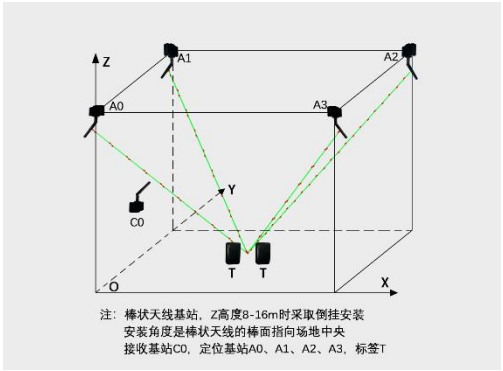


2.2 Setup and Installation

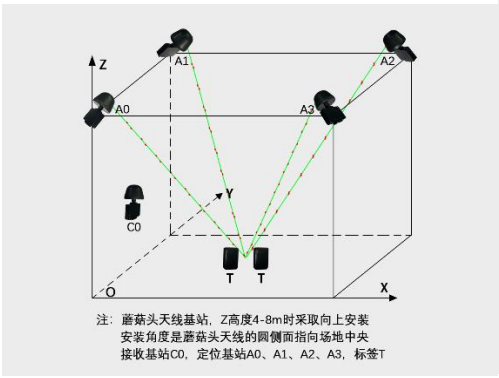
1. Base station installation:



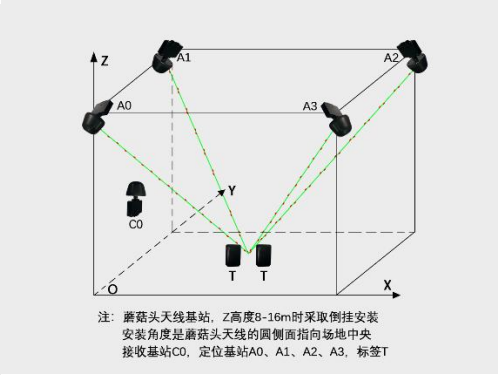
注：棒状天线基站，Z高度4-8m时采取向上安装
安装角度是棒状天线的棒面指向场地中央
接收基站C0，定位基站A0、A1、A2、A3，标签T



注：棒状天线基站，Z高度8-16m时采取倒挂安装
安装角度是棒状天线的棒面指向场地中央
接收基站C0，定位基站A0、A1、A2、A3，标签T



注：蘑菇头天线基站，Z高度4-8m时采取向上安装
安装角度是蘑菇头天线的圆侧面指向场地中央
接收基站C0，定位基站A0、A1、A2、A3，标签T



注：蘑菇头天线基站，Z高度8-16m时采取倒挂安装
安装角度是蘑菇头天线的圆侧面指向场地中央
接收基站C0，定位基站A0、A1、A2、A3，标签T

Positioning Base Stations – The 4 positioning base stations are powered by 5V phone chargers with Type-C cables. Each base station requires a 220V outlet at its installation location. Base stations should be installed away from metal, glass, and LED screens, with no obstructions. As shown in the diagram, take the lower-left corner of the venue as the origin A0. Install A0, A1, A2, A3 clockwise at the four corners of the tracking area. The four base stations should be placed as close to a rectangle as possible (some deviation is acceptable). The length-to-width ratio of the base station coverage area should be less than 2:1. All four base stations should be installed at the same horizontal height (height difference generally not exceeding 20 cm). The mounting height should be between 4m and 16m (depending on space size – larger spaces require greater height). Adjust the antenna tilt (rod antennas should point toward the center of the venue; mushroom antennas should have their cylindrical side facing the center).

Receiver Base Station – One receiver base station C0 should be installed in a location with no obstructions from the positioning base stations, within communication

range, and at a height above 1m. Provide a 220V outlet and one Ethernet cable at the installation location (receiver base station C0 connects to the receiver, which powers C0; the receiver is connected to power, and its Ethernet port connects to the LAN port of the Traxync Server host).

2. Base station coordinate calibration:

Disconnect base station C0 from the receiver. Use a USB Type-C cable to connect directly to a computer. Install the NAssistant host software on the computer to calibrate base station coordinates. Supports both one-click calibration and manual calibration.

One-click calibration-Open NAssistant software, and the module will automatically connect to the C0 base station after successful recognized. If the identification is not successful, you can also click the connect button to connect to the C0 base station. Then click the settings button to enter the settings page.

First, click the Wireless Settings button on the left to enter wireless settings and check that whether all base stations are online. If any base station is offline, check its power supply. If all are online, click the Wireless Settings button again to exit wireless settings (clicking again is the correct way to exit the wireless settings instead of directly clicking the cross on the page). Then click the One-Click Calibration button to begin coordinate calibration. You will see the coordinate values for A0–A3 change

on the right. Wait until the coordinates stop changing completely, then verify that the XY values roughly match the actual distances between base stations. Go to the [2D] interface and use the mouse wheel to adjust the view. If the base station icons roughly match their actual installation positions, one-click auto-calibration is successful.

Manual Calibration – If calibration repeatedly fails and a timeout error appears, it is usually due to obstructions between base stations or the base stations being too close to large metal objects or LED screens. In this case, use manual calibration. Measure the coordinates (X, Y) of A0–A3 manually using a tape measure, laser rangefinder, or similar device, with A0 as the origin (0, 0). Then enter these values into the base station coordinate fields on the right side of the settings page (unit: meters).

Finally, click the Write Parameters button on the left to enter the A0–A3 coordinate parameters to base station C0. Take a photo of the coordinate parameters on the right for reference.

Signal Test – Turn on all tags and walk within the base station coverage area while wearing a tag to test signal communication. If normal, reconnect base station C0 to the receiver.

2.3 Router IP Address Setting

Router IP configuration steps:

Connect the computer to the Traxync Server LAN port via Ethernet cable. Enter the router IP address 2.0.0.1 in a browser, as shown. (Note: Username: admin, Password: ZgeT20200613@)

Enter the main interface of the router to view the networking status and port usage. Click [Advanced Settings] to configure device IP addresses. (Note: After changing parameters on any page, click [OK] to save.)

System status: You can view the IP address, gateway, and other status information of the router's WAN and LAN.

WAN Settings – Set the WAN port access type. Typically, select "Dynamic IP" for public network access.

LAN Settings – Modify the router IP address. When a fixed IP address is needed for devices connected to this router, the subnet must match the router. Enter a valid IP address (within the DHCP server address range). The IP address range can be customized, from .X to .254, where X is the next octet after the router IP. To allow the upstream router to assign IP addresses instead of this router, disable the DHCP server.

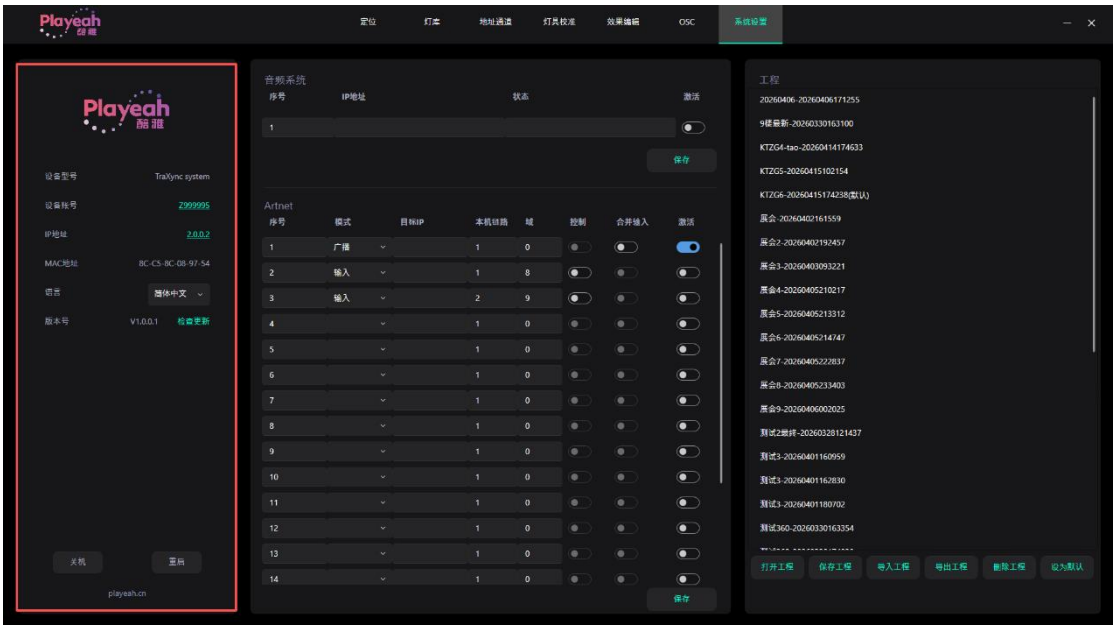
Click [Show Clients] to view the IP and MAC addresses of currently connected devices.

Click [Set DHCP] to enter the static IP address configuration window.

Check "Enable Static DHCP". Enter the IP address and corresponding MAC address, then click [OK]. The router will restart for the changes to take effect. The Static DHCP List displays the fixed IP and MAC addresses of devices.

Install the LANcontrol software on the computer to connect to the Traxync Server for interface operation and debugging.

2.4 Traxync Server System Settings



User Information:

Displays device name, account, IP/MAC address, current version, etc..

1、System IP – To set a static system IP, click on the IP address to enter [IP Settings], select Manual IP, enter the IP address, gateway, etc., and click Set.

2、System Version – Click [Check for Updates] to update the system. If a message "Already up to date" appears, no update is needed. (Note: Before updating, ensure the external network is connected properly.)

3、System language - can switch system text to Chinese or English.

4、Shutdown/Restart - Click the button to shut down/restart.

Audio system:

Connects to the immersive audio system for real-time audio source positioning and tracking. Enter the immersive audio system IP address (e.g., 2.0.0.10) in the IP field, check [Activate], and click [Save] below.

Artnet settings:

Configure according to the system wiring diagram. Option A or Option B can be selected.

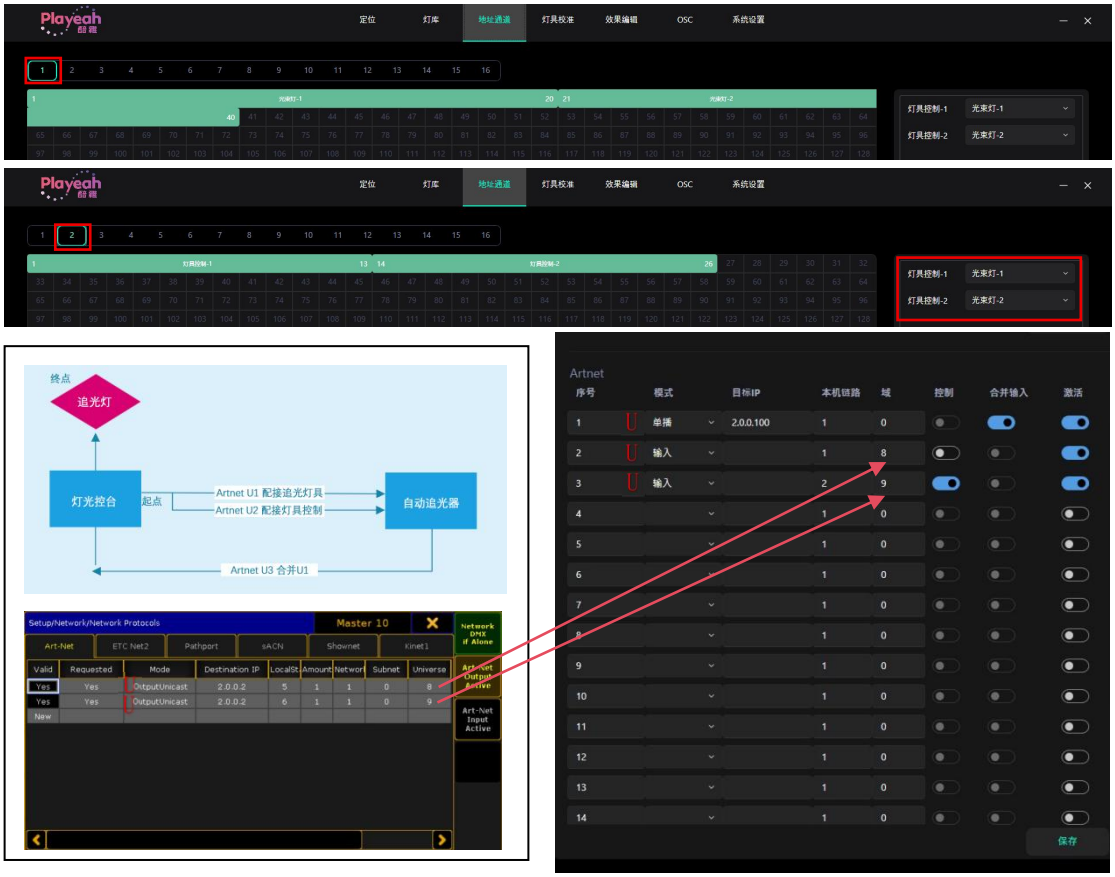
Solution A: Tracking lights directly controlled by Traxync Server

Connect tracking lights to the two Artnet-to-DMX interfaces on the Traxync Server. The default IP is 2.0.0.253, Artnet universes 0–1.

Connect to DMX Port 1: Set to Unicast mode, Target IP: 2.0.0.253, Local Link: 1, Universe: 0, check [Activate]

Connect to DMX Port 2: Set to Unicast mode, Target IP: 2.0.0.253, Local Link: 2, Universe: 1, check [Activate]

After completing the settings, click on 'Save' below.



Solution B: Tracking lights compatible with both lighting console and Traxync Server

Hardware Connection**:** Connect tracking lights to a dedicated Artnet universe on an Artnet network expander. They can share the same link as other non-tracking lights. For example: network expander IP 2.0.0.100, tracking lights connected to universe 0 of the expander.

System Link Assignment:

"Tracking Lights" can share a link with non-tracking lights (not forced to be dedicated)

"Lighting Control" (the built-in fixture control function) must be assigned to a dedicated link and must bind the tracking lights for control.

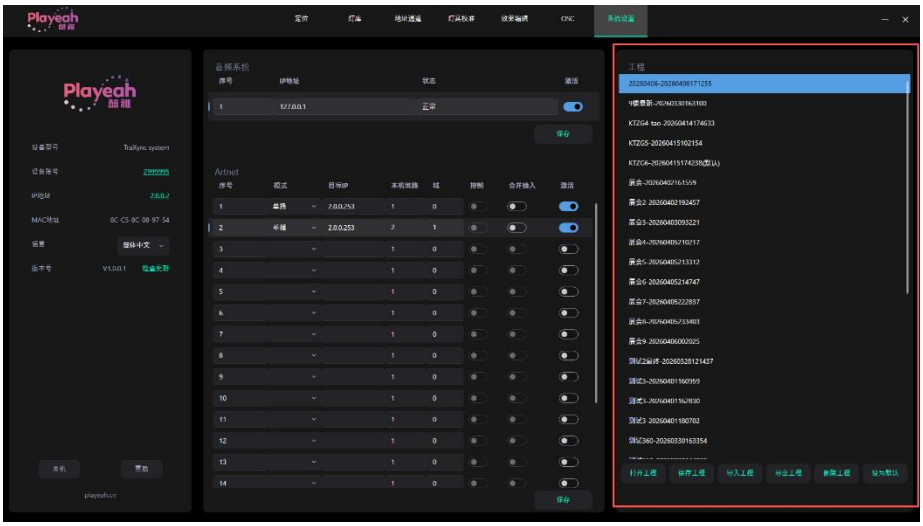
Lighting Console Patching**:** Patch both the "Tracking Lights" and "Lighting Control" fixture libraries to separate unused links (e.g., Tracking Lights on link 5, Lighting Control on link 6).

Signal sent to the tracking cooperative control system (from two unused Artnet domains):

chasing light fixture signal: sent from the 8th domain.
For Traxync Server U1 – Artnet mode: [Input], Local Link: 1, Universe: 8, check [Activate].

Lighting control signal: sent from the 9th domain.
For Traxync Server U2 – Artnet mode: [Input], Local Link: 2, Universe: 9. Since this is a control fixture library, check [Control], then check [Activate].

Merge and Return Configuration:
The tracking coordination control system U3 needs to merge the chasing light signals of U1 and return them to the light console.
Set U3 – Artnet mode: [Unicast], Target IP: enter the network expander IP (e.g., 2.0.0.100), Local Link: 1, Universe: expander’s universe (e.g., 0). Since U1 input needs to be merged, check [Merge Input], then check [Activate]



Project Management:

1、Project selection bar - allows selection of displayed projects.

2、Open/Save Project – Click [Save Project] to save fixture libraries, channels, effects, and other parameters. After a project is saved, click [Open Project] to switch to it.

3、Import/Export Project – Click [Import Project]/[Export Project] to load external projects or save the current project. Projects can be saved to "Internal Storage" or a "Removable Disk (USB drive)".

4、Delete/Default Project – Click [Delete Project] to remove unwanted projects. Click [Set as Default] to set a project as the default; it will load automatically on reboot.

(Note: It is recommended to save your work frequently during editing. Each save creates a new project. The last saved project should be set as the default. It is also recommended to export the final project to a USB drive as a backup.)

2.5 Fixture Library Usage Management

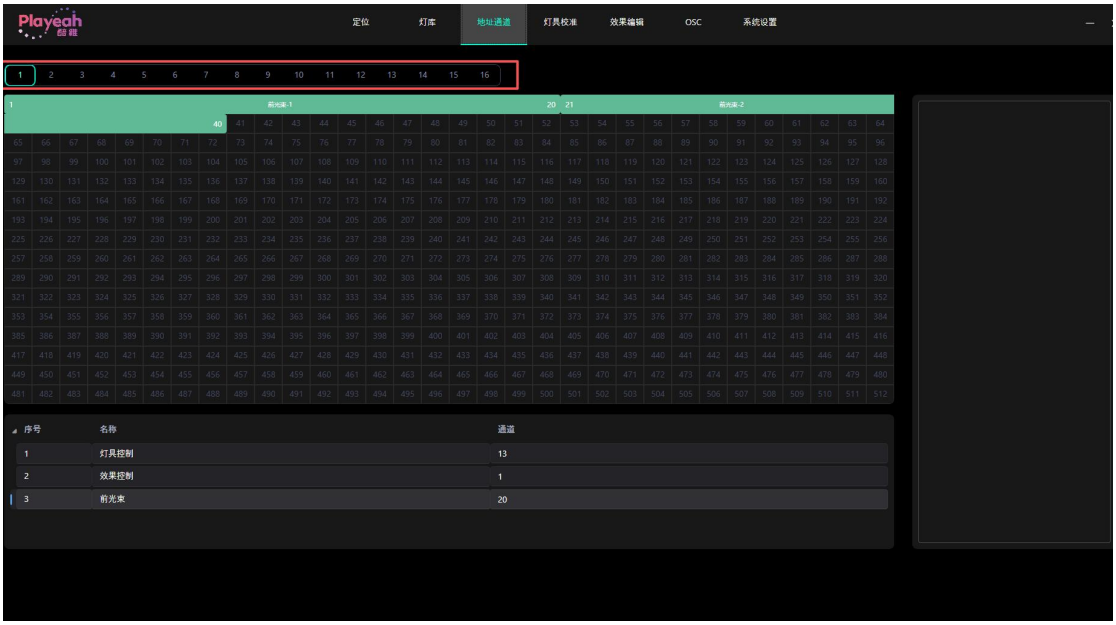
Click [Add] to add fixtures. Enter a name and channel count, click  to delete a fixture, and click to edit  to edit fixture channel parameters.

Add and modify content according to the number of fixture channels

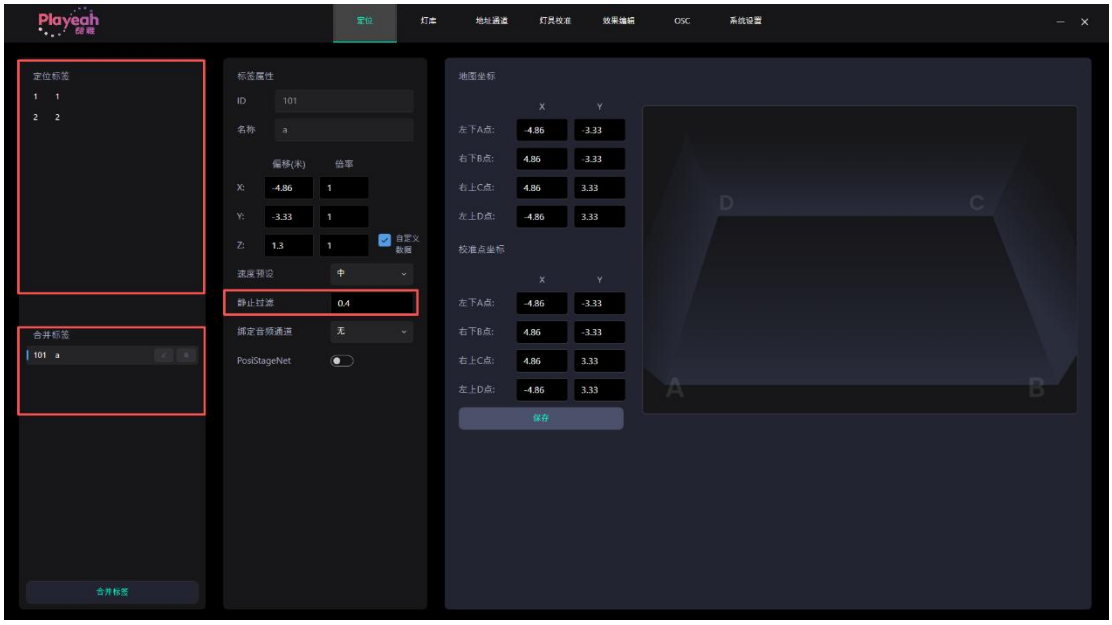
When writing the fixture library channel table, note that if a channel corresponds to a system built-in function, select the built-in option. If no suitable option is available, select Custom and name the channel accordingly. (Note: The range values for Pan and Tilt axes should be filled in according to actual specifications. Typically, Pan range is –270 to 270, Tilt range is –135 to 135.)

2.6 Address & Channel Settings

Users need to add the fixtures they are using to the channel table for subsequent editing. The system provides 16 links for user use. Address and channel are assigned based on the fixture's address code and the signal line domain. DMX1 of Traxync Server corresponds to domain 1 in the address/channel table; DMX2 corresponds to domain 2



2.7 Positioning Tag Configuration



After the base stations are set up, turn on the beacons. Configure and debug according to the number of beacons displayed (e.g., merge tags, X/Y/Z offset values, stationary filter values, etc.)

To convert the coordinates of calibration points, the coordinates of points A, B, C and D need to be converted by the coordinates of base stations A0, A1, A2 and A3 (Note: convert the origin from the lower left corner to the center of the site).

Access the Traxync Server IP:1880/ui in a browser (e.g., 2.0.0.2:1880/ui). Enter the XY coordinates of A0–A3 and click Calculate. You will obtain the converted coordinates of points A, B, C, D and the XY offset values for the tags. Click [Save]. Then enter the ABCD point coordinates into the calibration point coordinates field on the Traxync Server. Copy the same coordinates to the map coordinates field above. Click [Save].

If a tracked target wears two tags, these two tags need to be merged into a pair. Click Merge Tags, select Tag 1 and Tag 2, name the pair, and click [Merge]. Then select the merged tag. In the tag properties, fill in the previously calculated XY offset

values for the merged tag. Fill in the Z offset value based on the tag’s wearing height (typically waist height is about 1.3m). Finally, check Custom Data.

The stationary filter value means that when the label moves close to stationary for more than 2 seconds, the label position is freezed, and the aperture position of light chasing is locked. Real-time light chasing is not resumed until the label moves beyond the range of "circle with stationary filter value as radius". The unit of stationary filter value is meters, and it is filled in according to the application requirements.

Bind Audio Channel**:** Used with an immersive audio tracking system. Select "None" if not used

The function of PosiStageNet is to send the tag positioning information to the MA lamp console, and realize light-chasing debugging in the MA lamp console. If the MA lamp console is not used, the closed state will be selected.

PosiStageNet**:** Sends tag positioning information to an MA lighting console for tracking light debugging. Select "Off" if not using an MA console

2.8 Fixture Calibration and Adjustment

Select the fixture to be calibrated. First perform channel operations such as turning the lamp on/off, moving the Pan/Tilt axes, etc. Once the fixture is confirmed to be functioning normally, proceed with calibration.

Calibrate the value of the P axis according to the hanging method of the fixture. If the fixture's Tilt axis rotates front-to-back, enter 0. If the Tilt axis rotates left-to-right, enter 90. Determine whether Pan inversion is needed (if the positive Pan value rotates the fixture counterclockwise, do not check Invert; otherwise, check Invert). Determine whether Tilt inversion is needed (with Tilt inversion, the CD side is defined as the front. If a positive Tilt value rotates the fixture forward, do not check Invert; otherwise, check Invert). Tilt also requires calibration of the value for the fixture body parallel to the base. Fixtures are rarely mounted horizontally, so visually align the beam with the fixture body to calibrate the Tilt value.

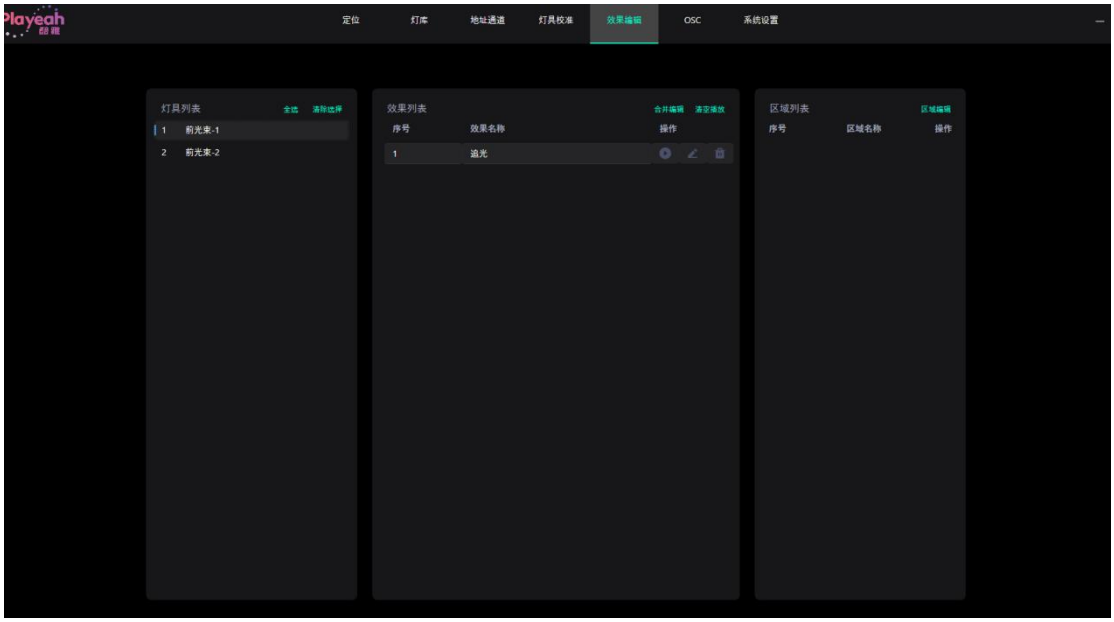
After calibrating the Pan and Tilt axes, calibrate the fixture's position in space. The method is to adjust the fixture to its smallest beam size and aim it at the points on the ground directly below the four positioning base stations. Record the Pan/Tilt values for points A, B, C, and D. Click the A, B, C, and D buttons below to verify. Then click Calculate Position to determine the fixture's coordinates and orientation. Next, turn on the lamp, reduce the beam size (can be slightly increased if needed), select a tracking tag, turn on auto-tracking, and wear the tag to test the actual deviation of the beam from the target. This deviation can be adjusted by fine-tuning the fixture's XYZ coordinates and the tag XY offset multiplier on the positioning page

The deviation adjustment method of the aperture tracking tag target: Walk left-to-right along the X-axis centerline and front-to-back along the Y-axis centerline to observe the beam deviation direction. First, when walking on the X-axis, If the beam is consistently left of the target, move the fixture's position left (reduce its X coordinate; If consistently right, move the fixture right (increase its X coordinate); If the beam drifts further left as you move left, and further right as you move right, decrease the tag X offset multiplier to pull the beam inward; Otherwise, adjust the X magnification of the label to increase; The same applies to walking observation and adjustment on the y-axis.

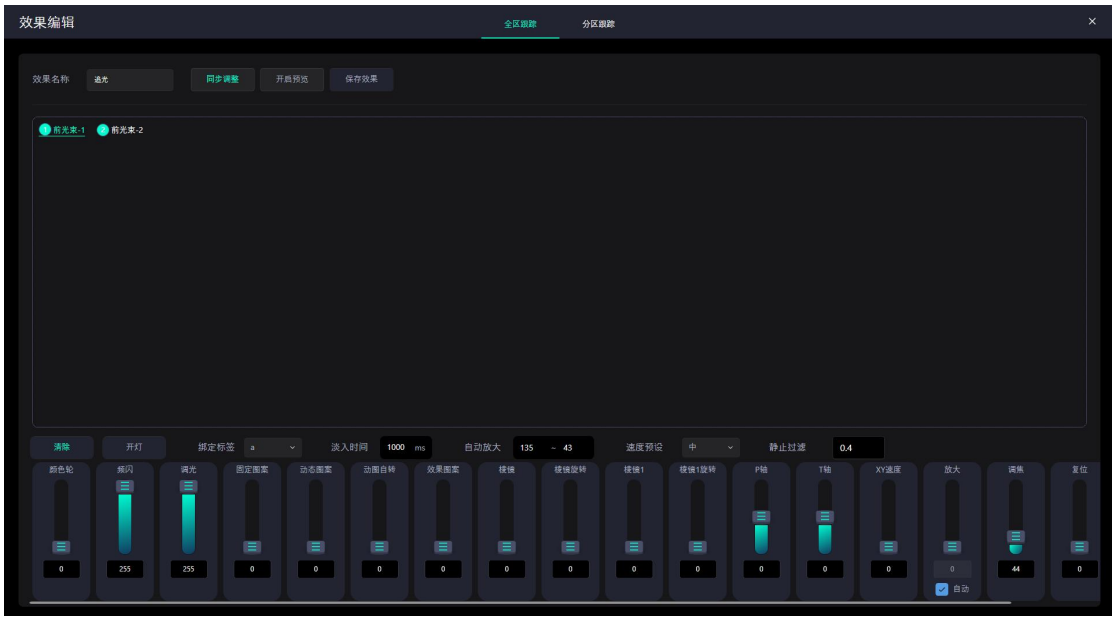
Auto Zoom Distance Range Measurement: Turn on the test tag, click Start Measurement, walk around the tracking area once, then click Stop Measurement to obtain the shortest and longest distances from the fixture to the ground. Go to the shortest distance position and adjust the zoom channel until the beam size matches the desired size. Record that value as the left side of the zoom range. Go to the longest distance position and adjust the zoom channel to achieve the same beam size. Record that value as the right side of the zoom range. Then clear and turn the lamp back on. Check the Auto box for the zoom channel. Select the test tag and turn it on. Test by moving from the shortest distance to the longest distance.

Lamp Off Default Position: Enter the desired XYZ coordinates in the coordinate space for the lamp-off position..

2.9 Effect Editing



In the fixture list, select the fixtures to be programmed. You can edit individually or in groups. Click [Merge Edit] to create and name an effect. The effect list displays created effects. Click  to modify an effect. After editing, test the effect by clicking  to play and pause. To delete an effect, click  .

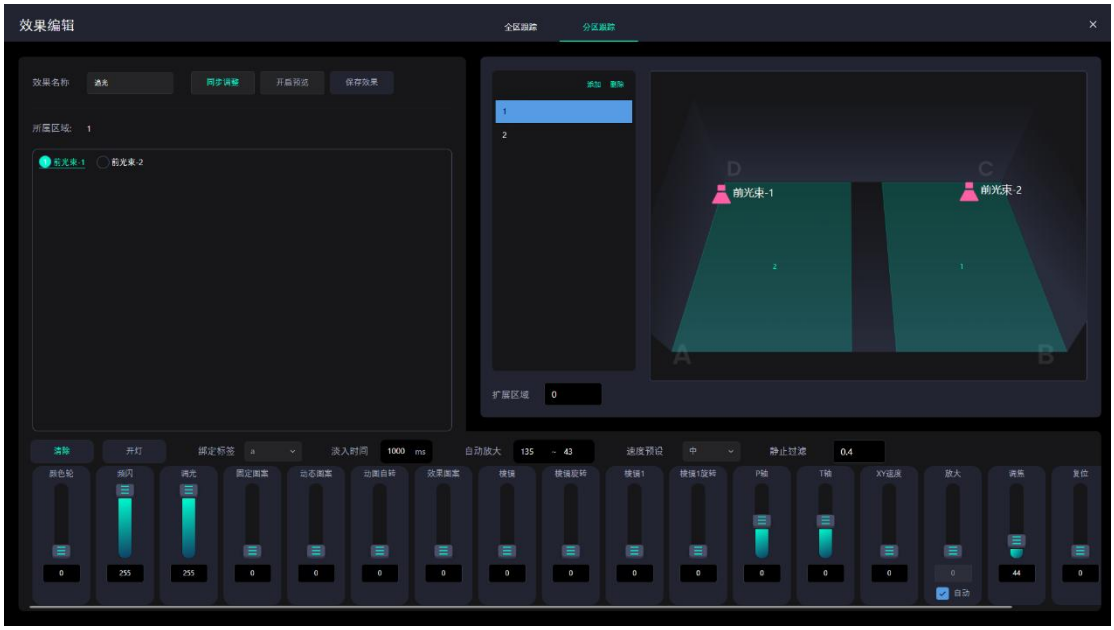


Click  to enter the edit interface. Users can choose to create an "Area Tracking" or "Zone Tracking" effect. If multiple fixtures track the same tag and have consistent lighting effects, select all fixtures and click Sync Adjustment. If the effect involves a single fixture or multiple fixtures tracking different tags with different lighting effects, select fixtures individually.

Click [Turn on Light]. Edit the desired lighting effect for the channels below. Check Auto for the zoom channel. Select the tag to be bound. Fade-in time is the gradual brightness increase time for the effect. Set as needed or the recommended value of 1000ms.

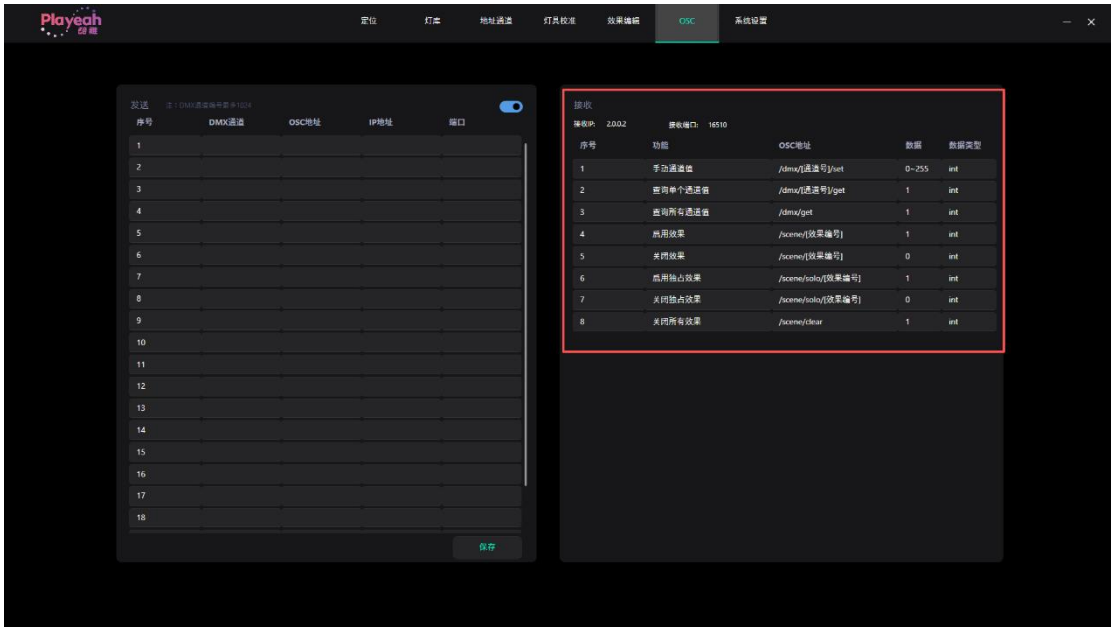
Speed Preset**:** Select based on the target’s movement speed in the application. For most scenarios, Medium speed is recommended for broad compatibility.

Stationary Filter**:** When a tag remains nearly stationary for more than 2 seconds, this freezes and locks the tracking light's beam position until the tag moves beyond the radius defined by the stationary filter value, at which point real-time tracking resumes. The unit is meters. Fill in according to application requirements.



To achieve the effect of zoning tracking, first select the fixtures in the first zone you want to define. Click [Add]. Name the zone and confirm. Select the zone, then left-click and drag on the map on the right to define the zone. In the defined zone, tracking is active; outside the zone, tracking is off. You can fill in an [Extended Zone] value (unit: meters). Add additional zones with the same steps. Click [Enable Preview] to test the effect. Finally, click [Save] to save the effect.

2.10 OSC Control Settings



Fill in the corresponding commands according to the OSC command list. Ensure that the receiving IP and port are correct. Supports third-party OSC protocol control for playing and stopping tracking effects on the Traxync Server