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Types of Pallets and Trolleys

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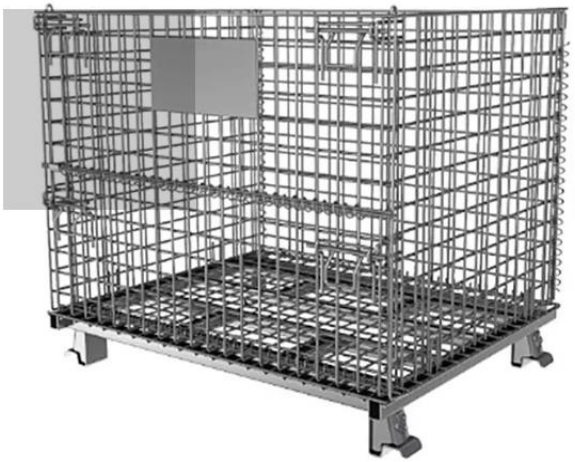

Pallet Mover

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Technical parameter	detail
Model	**PALLET MOVER (heighten mast)**
Navigation mode	Laser navigation
Vehicle dimension	1475mm（L）*735mm（W）*480mm（H）
Fork dimension	1154mm（L）*186mm（W）*60mm（Sickness）
the outer width of the forks	570mm
the fork height（the lowest level）	86mm
Drive mode	Differential speed
max load	1000Kg
the max lifting height	156mm
the minimum turning radius	1000mm
Width of the aisle	2000mm
Charging mode	Manual /automatic（with the automatic charging station）
Battery	48V/24Ah Lithium iron phosphate battery
Climbing capability	4（unload，unit：%）/1（full load，unit：%）
Communication mode	Wifi（2.4G/5G Dual frequency WIFI Or operator 5G）

AMR Specifications

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Technical parameters

Product name	Laser SLAM ground automatic forklift
Dynamic form	Electric
Driving mode	Automatic navigation
Navigation type	Laser SLAM
Tray type	3-stringer pallet
Rated load capacity	800kg
Load centre distance	600mm
Wheelbase	842mm
Dead weight (with battery)	210kg
Navigation position accuracy [1]	±10mm
Navigation angle accuracy [1]	±0.5°
Fork in-position accuracy [1]	/mm
Standard lifting height	70mm
Gantry height	/mm
Fork surface ground clearance (at the lowest position)	86/106±5mm
Navigation laser scanning height	1865mm
Vehicle size: length * width * height	1515*885*1885mm
Fork size: length * width * height	1150*186*60mm
Fork outer width	570/680mm
Right-angle stacking channel width, pallet 1000×1200 (1200 placed across forks)	1990mm
Right-angle stacking channel width, pallet 800×1200 (1200 placed along the fork)	1900mm
Map Area (Single)	≤ 400000m²
Minimum turning radius	1035mm

Battery parameters

Battery weight	15kg
Comprehensive battery life	8h
Charging time (10%-80%)	2h
Charging method	Manual/Automatic
Battery cycle number	> 500

Certifications

ISO 3691-4	×
EMC/ESD	√
UN38.3	√
RoHS	√
REACH	√

Function configurations

Lidar number	1 (P+F R2000) +1 (OLEI LR-1BS2-V2)
Wi-Fi roaming function	√
3D obstacle avoidance [3]	○
Remote emergency stop [4]	○
Pallet recognition [3]	○
Cage stack [3]	×
High shelf pallet recognition [3]	×
Pallet damage detection [3]	○
Pallet stacking and unstacking [5]	×
The HMI screen	×
Fork tooth distance sensor	√
Cargo weight detection	○

● **OPTIONAL**

AMR Dimension

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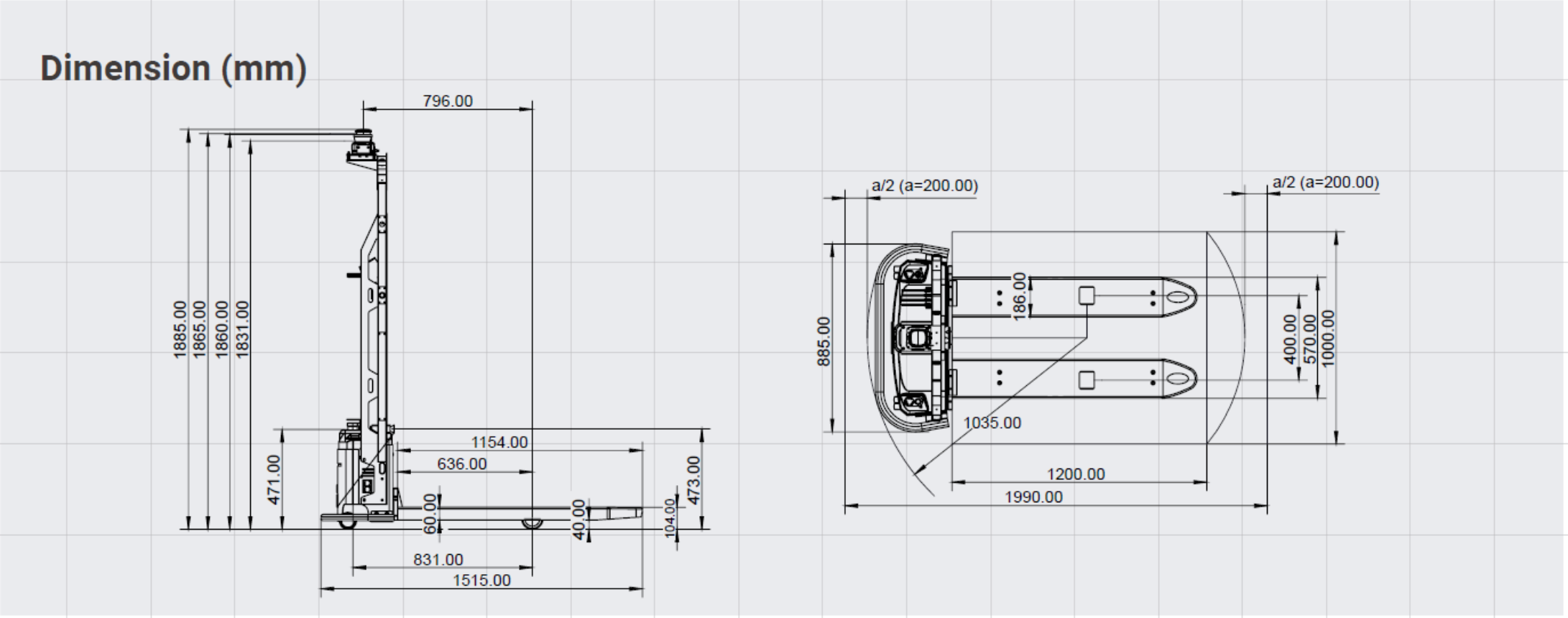
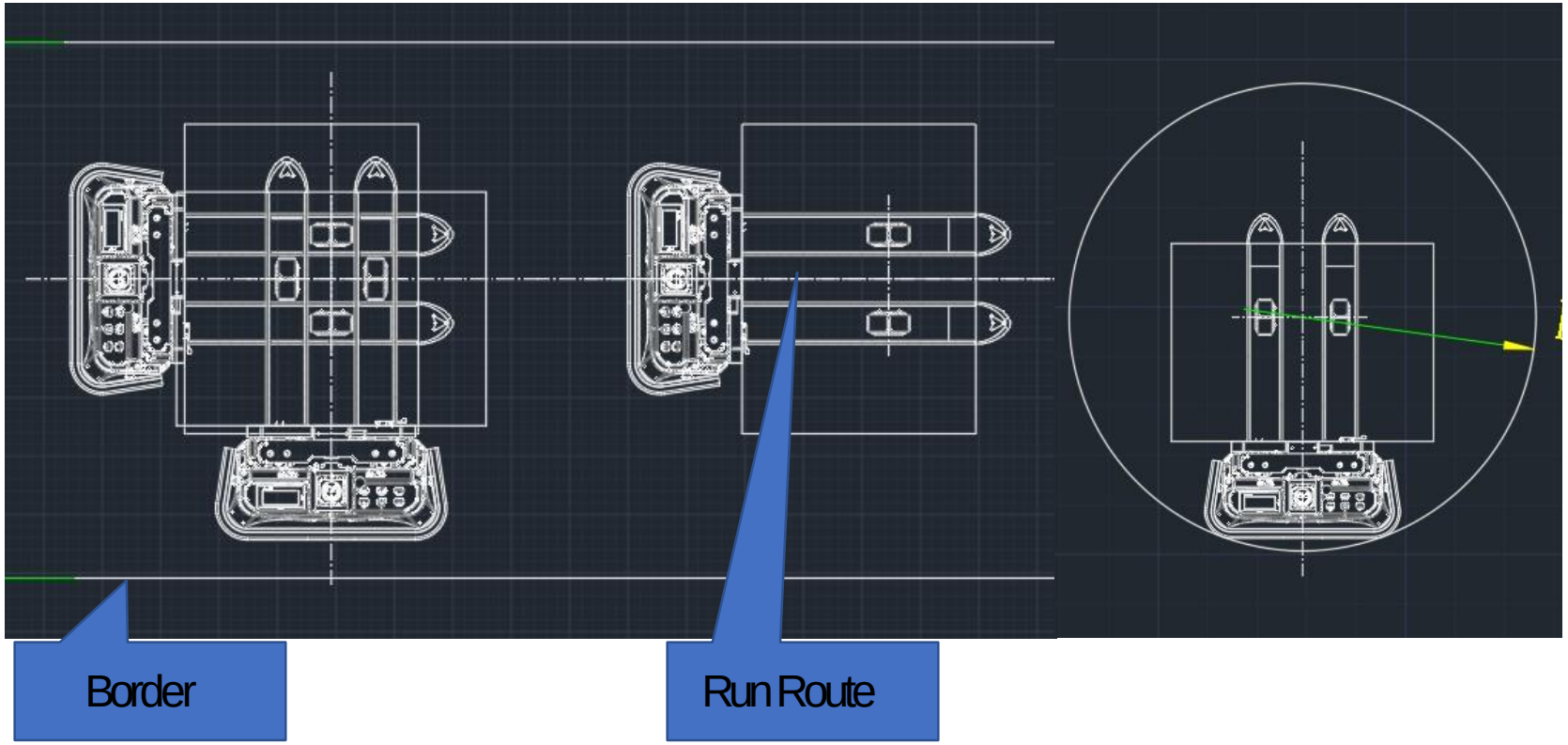


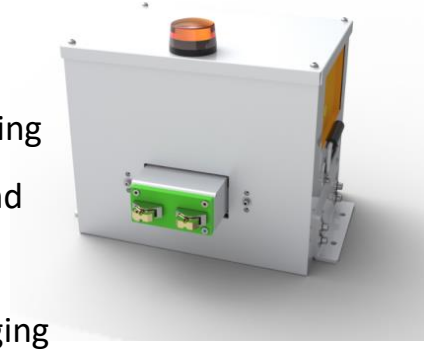
AMR Model



AGV charging character

Low battery value setting： When the battery volume is lower than the setting value(usually it is 20%,adjustable), the AGV would not receive the new task (the proceeded task would be finished) and would charge automatically at the charging station until the setting minimum value without receiving any task in the period. If the charging station is occupied, the AGV would wait in the resting position unit the charging station is available.

Charging value setting: In the charging process， if the AGV battery value is lower than one number（Usually it is 60%, adjustable)， the AGV would charge without receiving the new task. When the AGV power is higher than this threshold (60%), if a new task is released, the AGV will stop charging and accept and complete the new task.



Normal power threshold setting： Normal power threshold setting: if no new task is released during the whole autonomous charging process, the AGV will charge until the power is higher than a certain threshold (for example, 90%, this value can be configured), and then stop charging. After the AGV stops charging, it will return to the rest position and wait for the release of a new task.

Maintenance and charging: when the battery power reaches the specified charging times or time (for example, the specified charging reaches 100 times or weekly and quarterly), the system forces the AGV to fully charge to 100% and continuously supply power for more than 3 hours.。

AGV safety character

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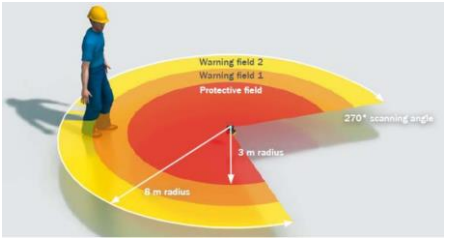
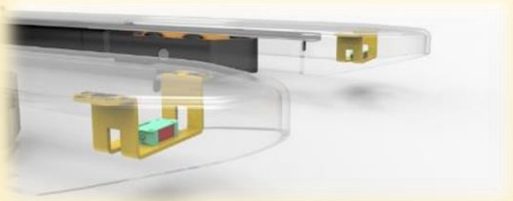
◆ **Laser anti-collision**

Cover all the areas of the AGV running direction. When the worker goes into some safety range (0-5m, adjustable),the safety protection would be triggered. The AGV would stop. When the worker leaves, the AGV would return to the normal operation.



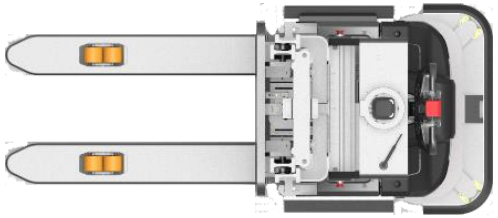
◆ **Photoelectric anti-collision**

It is installed on the AGV fork tip. AGV would stop once the distance value is reached between the AGV and the object. When the object is removed, AGV would return to the normal operation



◆ **Mechanical anti-collision**

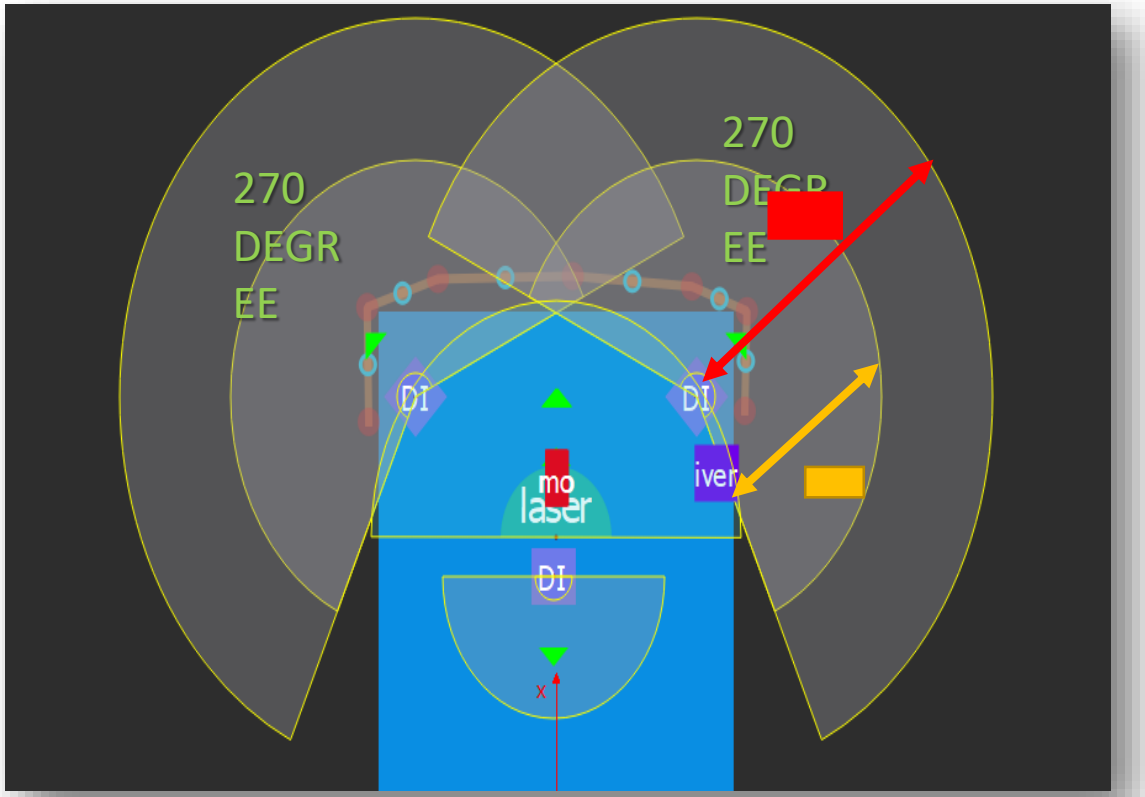
The AGV is equipped with mechanical anti-collision strips for multiple safety protection

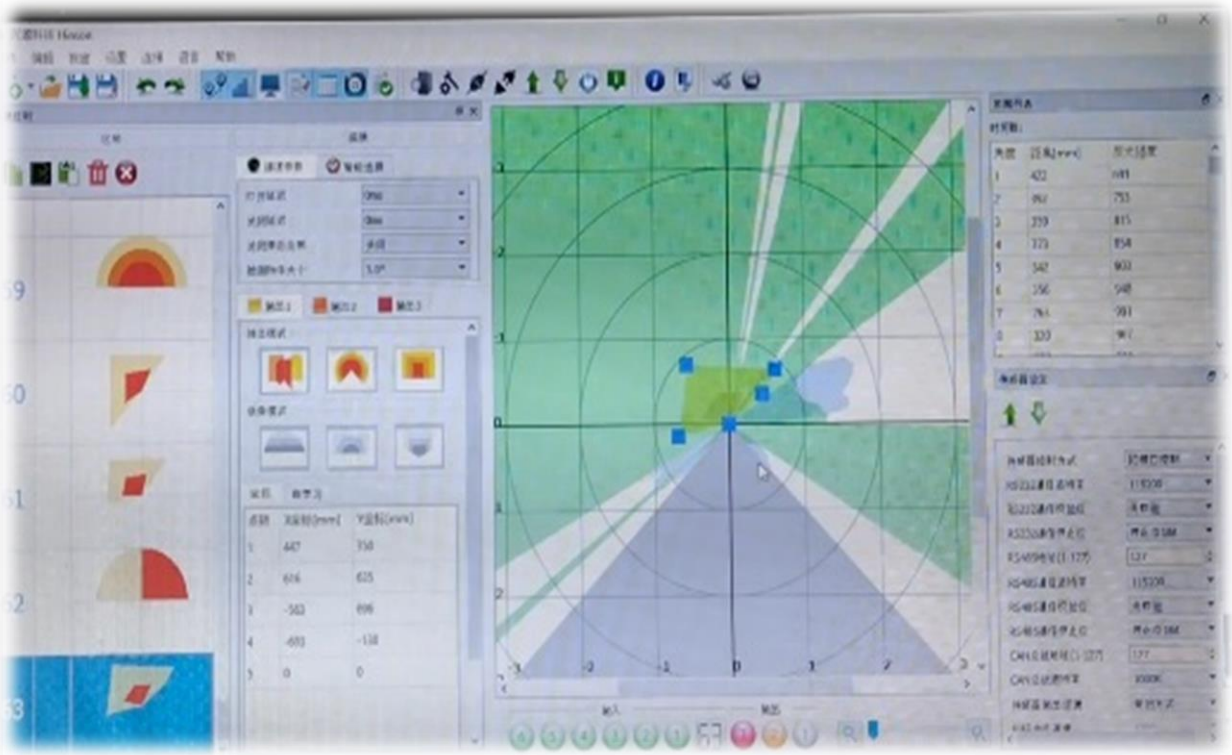


◆ **Audible and visual alarm, emergency stop button**

AWhen the AGV is driving, the warning music will be played and the warning light will flash continuously to remind workers to avoid in time. The effects of warning music and warning light are also different in different states of AGV.

Safety





SCANNING RANGE OF 5M

Green zone – No Action

Red zone – action 2

Orange zone – action 1

Blue zone – Blind Spot

AMR Features – Safer for multi Protection

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Obstacle Avoidance Lidar

Equipped with mainstream obstacle avoidance laser, SRC core controller is directly takes point cloud data of the laser for algorithm calculation. Compared with the traditional IO obstacle avoidance laser, it does not need to draw various areas such as deceleration areas and obstacle stopping areas, more convenient for project implementation.

3D Obstacle Avoidance Camera

A 3D obstacle avoidance camera is installed above the vehicle head for scanning obliquely in the forward direction. With the laser angle of view reaching 70.4 °, it covers the space in front of the vehicle head and can detect obstacles with a side length of more than 5cm, with a distance error of less than 2cm and an angle error of less than 0.1 °.

Safety edge touch - Node protection

The SRC core controller will enable the function of node protection (watch dog), which can detect and alarm the fault of CAN bus in real time, and stop the robot at the same time to ensure safety.

Distance Sensor

A distance sensor is installed at the bottom of the fork tip, which can avoid obstacles in the backward direction when the vehicle body performs the task of loading or unloading goods. Meanwhile, the adjustable obstacle avoidance distance, combined with the fork heel obstacle avoidance laser, forms a double insurance when the vehicle body retreats.

AMR Features – Load recognition and Precise Forking

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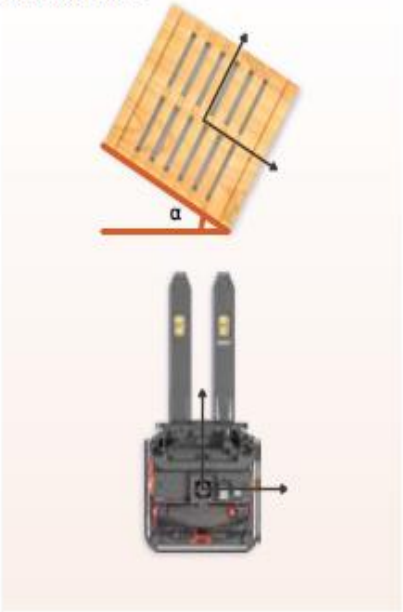
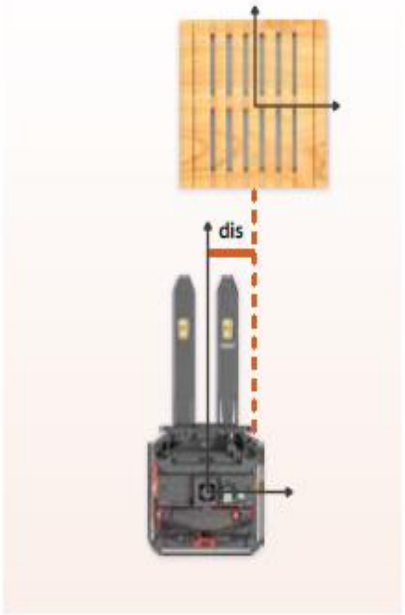
Pallet Recognition

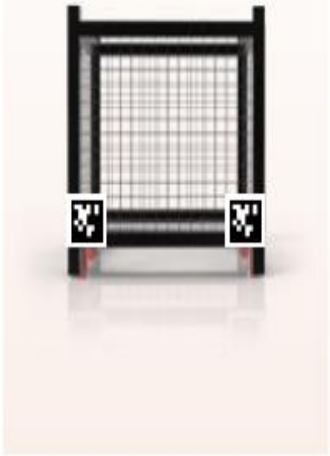
When the mechanical limit cannot be added to the ground, the advanced pallet recognition function can be configured, and for scenes with pallet angle deviation within ± 30°and position deviation within ± 30cm, the forked pallet can be accurately adjusted through identification.

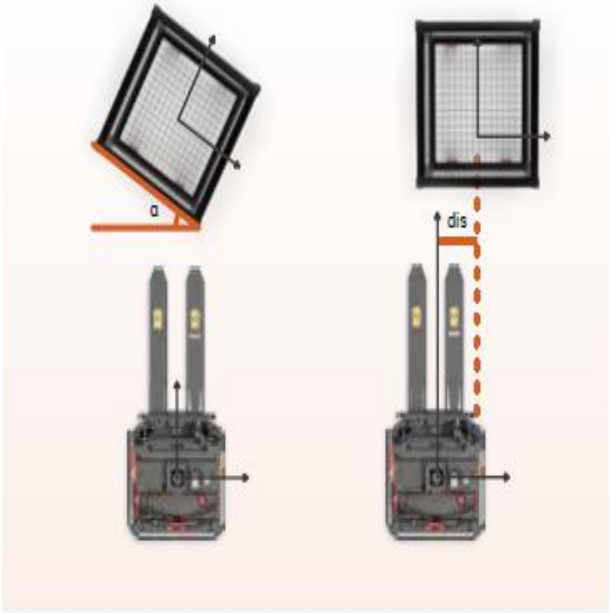




Cage Recognition

When the mechanical limit cannot be added to the ground, the advanced cage recognition function can be configured. Fix the QR code for recognition and location on the forking surface of the cage, and it will detect the position deviation of the cage through the camera, so as to realize recognition, correction and precise forking.





Software

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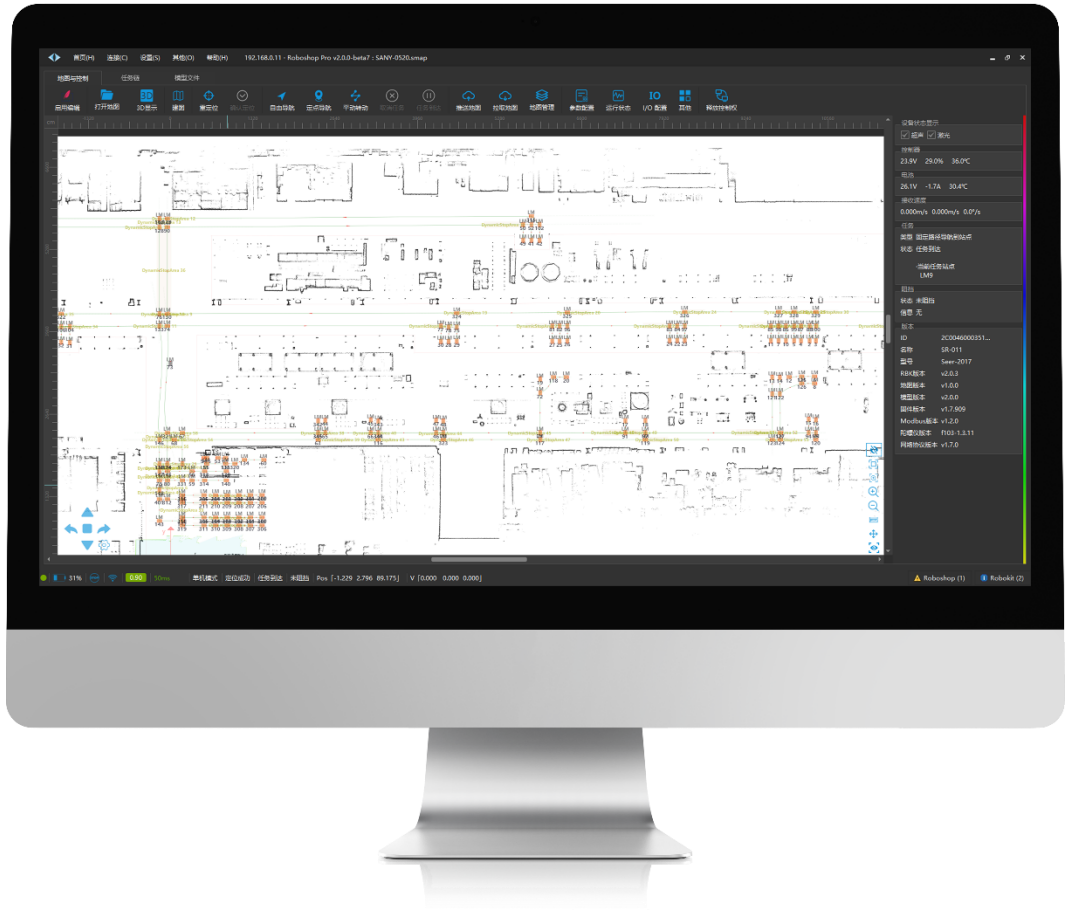
One-stop implementation flexible and convenient

- Rich Function Tips
- Smart Map Editing
- Robust network communications
- powerful configuration systems
- One-stop robot calibration, mapping, navigation, configuration, monitoring and other visual operations



Software

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Map Establish

- Environment map construction based on laser or depth sensors

Real time Location

- Taking the natural contour as reference, the coordinate of the robot is outputted in real time

Cruise route

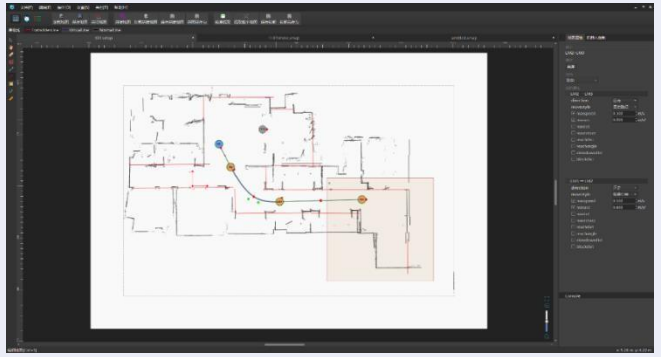
- Cruise according to established routes and information points

Automatic charging

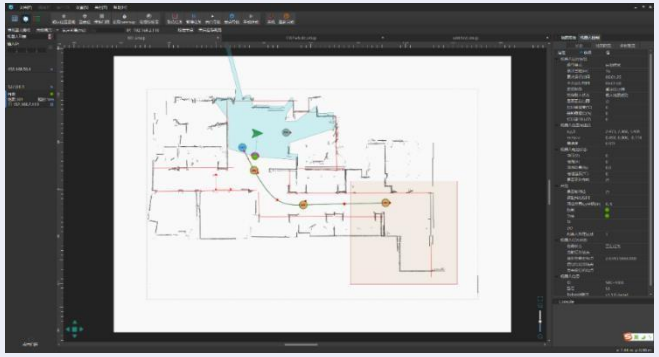
- When the electric quantity is low or when the return voyage information is received, it will automatically return to the pile for charging

Regional Settings

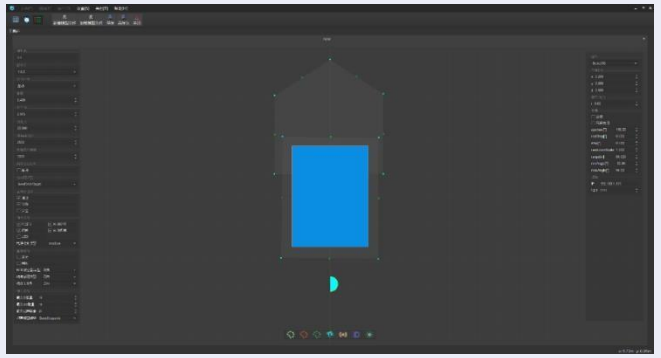
- The motion parameters and task types of AGV in different areas can be set according to the working conditions



Map Editing



Robot Dispatch



AGV Physical model editing

Real-time AGV parameters and status

Software

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Introduction of Multi-machine dispatch system

- Provides a multi - machine scheduling software, multi - machine collaborative work and MES seamless docking. Achieve multi-vehicle scheduling, planning, traffic control.

Machine Collaboration

- Can guide any robot using our controller to work together, no matter what it is, a forklift, a handling robot, or a composite robot.

Optimal Planning

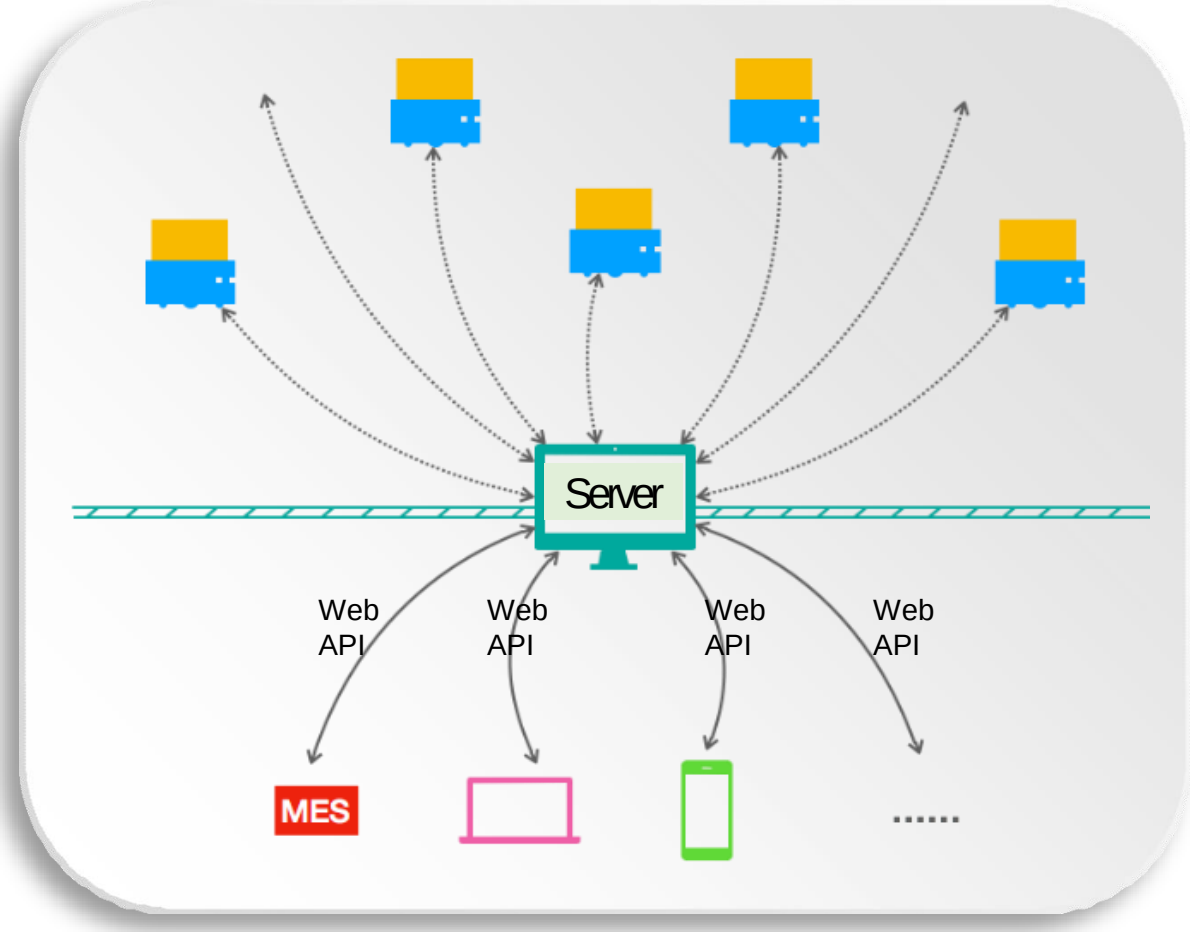
- Automatically select the most suitable robots to perform tasks and carry out path planning and traffic control in the entire plant environment.

Seamless Docking

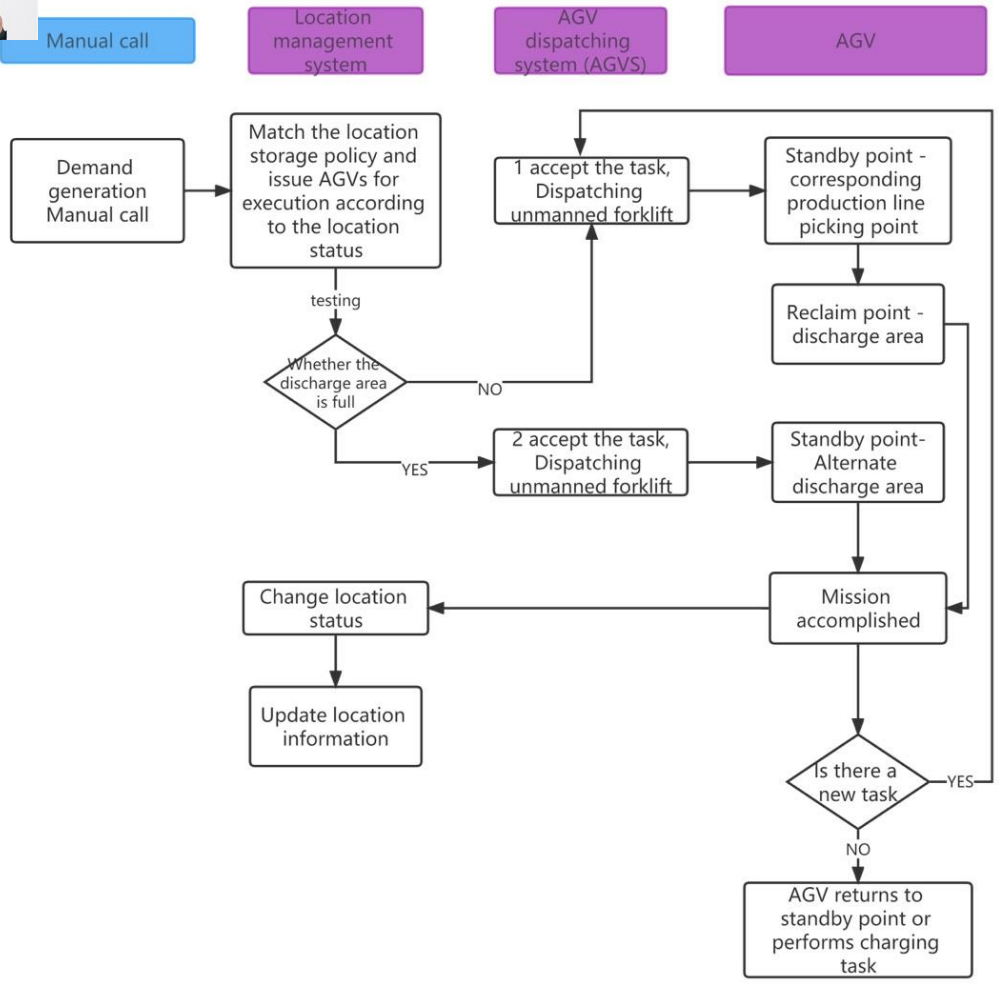
- Provide concise Web API network protocol, seamless docking with MES, WMS and other systems.

Easy operation

- AGV tasks can be adjusted and modified in a very short time



workflow



- When the demand is generated, the operator manually sends instructions to the dispatching system;
- The dispatching system accepts the task, dispatches the AGV, and issues the command to the on-board control system to control the operation of the AGV;
- According to the scanned map and station, AGV will transport the materials from the picking area to the unloading area according to the instructions. If the storage location in the unloading area is full, it will be transferred to the alternative unloading area;
- When an instruction is completed, the information is returned to the location management system layer by layer to change the location status;
- After an instruction is completed, if there is a new instruction, it will continue to be executed; If not, return to the standby point or perform the charging task

Basic ground running requirement

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1.Indoor temperature: 0℃～40℃;

2.Indoor relative humidity: <85% (no condensation);

3.There is no large amount of dust, smoke and other floating objects, cotton wool and other flammable substances and other flammable gases indoors;

4.No strong acid and strong alkali environment indoors;

5There is no oil or other slippery environment indoors;

Environment Requirements

Power requirement

1) The power of power supply circuit of single charging pile shall not be less than3000W;

2) Each set of charging pile includes a charging head and a charging station'

3) The power supply and communication line are connected between the charging head and the charging station, and the charging station is externally connected with external power supply;

4) Each charging pile is equipped with 25A air switch or fuse separately;

5) Charging station wiring red line to red stud, black line to black stud. Avoid reverse connection of positive and negative, causing short circuit or equipment damage。

6) The maximum relative humidity of the air shall not exceed 90%, and the air circulation is good

7) There is no conductive and explosive dust at the operation site, no corrosive metal, gas or steam damaging insulation, and no strong electromagnetic interference;

Special Requirements

Special requirements:

- High reflective material: Materials such as stainless steel table legs and glass need to be non-reflective treatment at a distance of 200-300mm from the ground.
- The change rate of the environment in the laser navigator's irradiation plane cannot exceed 30%.
- The road surface should be level, clean and free of obvious undulations. Slope 5% = arc tan(0.05) ≈ 2.8°. The robot cannot stop or turn at ramps, steps, or gaps, and can only quickly pass perpendicular to the ramp, steps, or gaps

Ground Requirements

Item	Requirements
Gound	The ground level, no damage, no empty drum, no oil, glue and other pollutants
Slope	No obvious slope, ≤3°
Step height	No Steps greater than 1cm

Network Requirements

Item	Requirements
Wireless network protocol	IEEE802.11 a/b/g/n Support channel: 2.412 to 2.472 GHz(13 channels), Specific channel No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 5.180 to 5.240 GHz(4 channels), Specific channel No. 36, 40, 44, 48 5.260 to 5.320 GHz(4 channels)*, Specific channel No. 52, 56, 60, 64 5.500 to 5.700 GHz(11 channels)*, Specific channel No. 100, 104, 108, 112, 116, 120 , 124, 128, 132, 136, 140 * Denotes DFS (Dynamic Frequency Selection) channel, please refer to national regulations.
Broadband speed value	≥100Mbits
Signal strength requirements	≥-60dBm
Network delay requirements	Average delay time ≤100ms

Manufacturing Main Unit (Robotic Division)

Headquarters: S.No 91 Annasalai, Nagelkeni,
Chrompet, Chennai-600044.

Branch Office: S.No.582/1, Plot No.62-A, Govinda Agraharam Road, Rajaji Layout, Sipcot Ph. I, Hosur-635126.

info@roboneticssolutions.com
sales@roboneticssolutions.com

+91-6379582983 (India)
+971-56-1952902 (Dubai)

https://www.roboneticssolutions.com/

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