AkdenizRack®
warehouse & storage systems

# PALLET SHUTTLE SYSTEMS

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# PALLET SHUTTLE SYSTEM

The pallet shuttle system is a semi-autonomous storage solution that allows for fast, safe, and highly efficient stocking of products.

This racking system maximizes pallet storage capacity within a minimal space. It operates on the principle of automatically stacking pallets along channels with the help of a shuttle machine, eliminating the need for forklifts or other stacking machines to move around inside the warehouse.

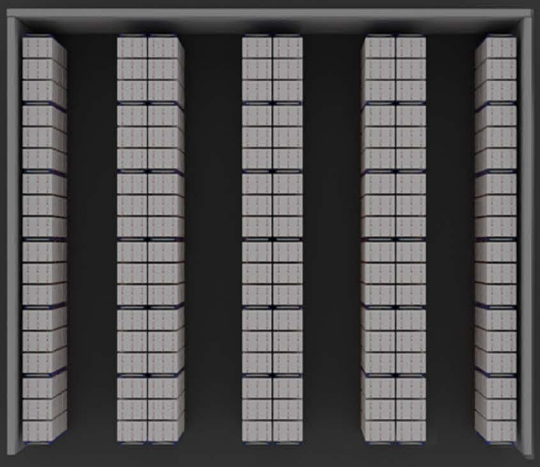
With its ability to store goods in multi-level and deep channels, this racking system ensures automatic pallet transportation, significantly increasing loading and unloading speeds compared to manual racking systems.

# FEATURES OF SHUTTLE

- Ensures balanced and safe loading and unloading of pallets within the racking system.
- Features various pallet loading capabilities such as semi-automatic pallet loading/unloading, fully automatic pallet loading/unloading, and FIFO (First In, First Out) or FILO (First In, Last Out) operations.
- Operates efficiently in temperatures ranging from +55°C to -30°C.
- Shuttles perform loading and unloading at a speed of 1m/s, providing effective mobility for the processes.
- Instant device intervention is possible thanks to remote access capability.

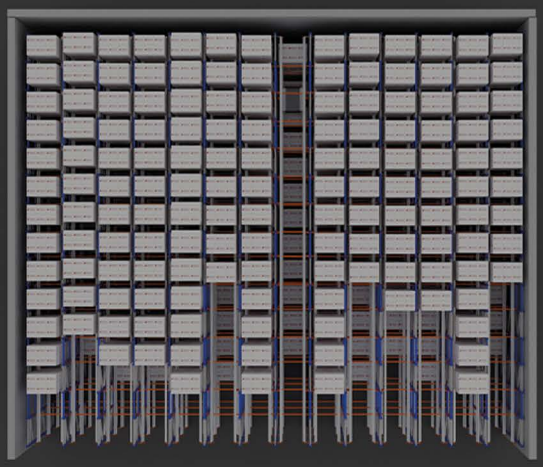
- Can be operated in Manual Mode, allowing for operator control.
- The shuttle racking system offers a high-density storage solution.
- ·Advantages include space savings, reduced labor costs, and minimized product damage.
- Works seamlessly and safely with collision safety sensors, rack-end and start control sensors, and other sensors.

Use your storage space efficiently by eliminating aisles!



*Conventional Pallet Racking Systems*

*Pallet Capacity : 320*



*Pallet Shuttle Systems*

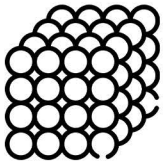
*Pallet Capacity : 650*

# DIFFERENCES BETWEEN SHUTTLE RACKING SYSTEM AND BACK-TO-BACK RACKING SYSTEM

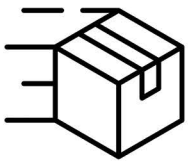
The shuttle system, preferred in storage areas for its high technology and user-friendly operation, is a storage solution that provides fast workflow and high mobility within the warehouse. In this system, forklifts do not need to enter the aisles within the warehouse.

In a Back-to-Back racking system, with dimensions of 18,300 x 19,900, 330 pallets can be stored, while in the Shuttle racking system, this number increases to 648 pallets. Therefore, the shuttle racking system offers nearly double the storage capacity compared to the Back-to-Back racking system.

With the use of shuttles, inventory counts, which can cause difficulties and errors in other racking systems, are also possible in this system. The number of pallets within the channels can be monitored and updated in real time. Devices can be integrated with warehouse management systems to carry out automatic counting processes.



Higher Storage Density



Fast and Easy Access

Time Savings

# CAPACITY-CONTROLLED SHUTTLES

Thanks to the sensors inside the shuttle, the system continuously measures the load on the pallet. When the requested weight limit is exceeded, the system generates a warning signal, and the lifting operation is not performed. This protects the shuttle lifting mechanism from overloading, ensuring long-lasting and safe operation.

## System Benefits

- ✔ *Overload Protection:* Prevents damage to the shuttle system.
- ✔ *Automatic Stop:* Stops operation when excessive load is detected, preventing accidents.
- ✔ *Longer Equipment Life:* Mechanical parts are protected from overload, reducing maintenance costs.

# SECTORS USING SHUTTLE SYSTEMS

| FOOD & BEVERAGE | LOGISTICS | PHARMACEUTICAL | COLD STORAGE |
|---|---|---|---|

Although the storage sectors typically preferred are listed above, the shuttle system is also suitable for use in other industries. Additionally, specialized work can be done to adapt the shuttle equipment for storing products that require unique storage conditions beyond the standard.


# SHUTTLE AND STANDARD PALLET DIMENSIONS

The Shuttle System supports most standard pallet types (Euro Pallet, American Pallet, etc.). If issues are detected with effective operation using these pallet dimensions, the system can be adapted to work with custom pallet sizes.

| | |
|---|---|
| *AKD800* | 800x1200 |
| *AKD1000* | 800x1200, 1000x1200 |
| *AKD1200* | 800x1200, 1000x1200, 1200x1200 |

# SHUTTLE OPERATING SPEEDS

*Empty Pallet Shuttle Speed* ---------- 60 m/min

*Loaded Pallet Shuttle Speed* ---------- 46 m/min

*Manual Mode Speed* ---- 15 m/min

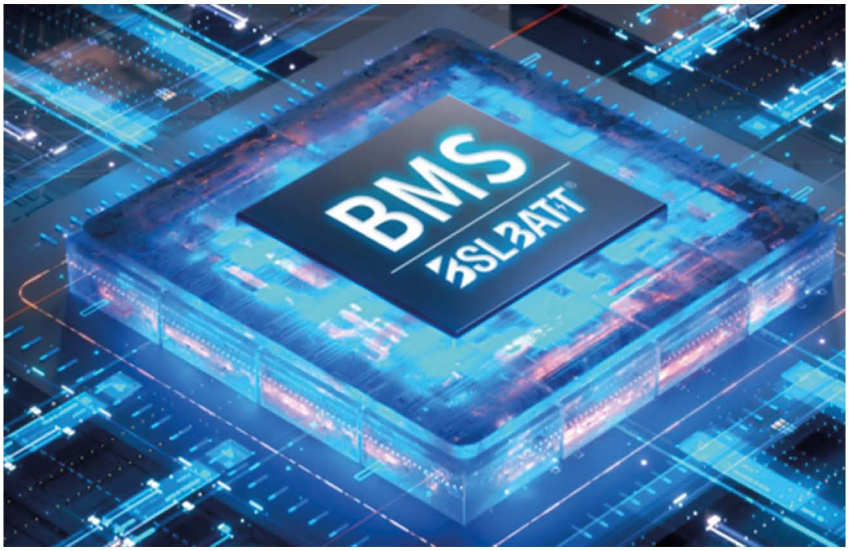
*Lifting Speed* ---------- 4 sec

*Pallet Acceleration* ---------- 7 sec

*Non-Pallet Acceleration* --- 3 sec

# BATTERY INFORMATION

With advanced Lithium Battery Technology, shuttles are now safer, longer-lasting, and more powerful, providing ease of use for the operator. The BMS (Battery Management System) cards in the batteries ensure that charging is stopped for batteries that have been left charging for an extended period. The system also protects the battery from issues like unbalanced voltage, excessive temperature, or short circuits. These features make the system a secure and reliable option.

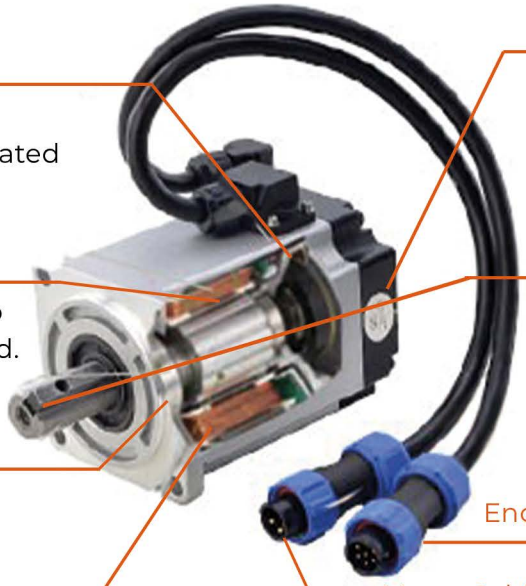




The Lithium batteries used in shuttle devices may have varying operating hours depending on the weight of the pallet to be stored and the length of the rail. Based on our R&D work and field observations, the operating time for a fully charged battery, with a reference weight of 800 kg and a 20-meter rail length, is confirmed to be 8 hours. Operations can continue without interruption with backup batteries. A fully discharged battery requires 5 hours to recharge.

The Lithium batteries used in the shuttle weigh 15 kg and can be easily transported for replacement or charging. The red and green lights on the charger indicate whether the battery is fully charged or still charging.

# MOTOR INFORMATION

High-precision servo motors with a power of 750W are used in the Drive and Lifting systems. These motors can provide instant rotation, allowing the system to operate at its optimum point. They can function in temperatures ranging from +55°C to -30°C. By design, servo motors are quiet.
The motors continuously send information to the drivers about the temperatures they generate. When they reach a specified temperature level, the motors enter a protective mode. Thanks to this feature, the servo motors have a longer lifespan. The encoder inside the motor sends 2500 pulses per second, allowing the motor's instant movement to be controlled and ensuring stable operation.



**Stator**

From the position of the rotor, a rotating magnetic field is created to efficiently generate torque.

**Winding**

Current flows in the winding to create a rotating magnetic field.

**Bearing**

Ball Bearing

**Rotor**

**Encoder**

The optical encoder always watches the number of rotations and the position of the shaft.

**Shaft**

This part transmits the motor output power. The load is driven through the transfer mechanism (such as the coupling).

**Encoder Cable**

**Motor Cable**

# LIFTING CAPACITY AND MECHANICAL FEATURES

- The shuttle device has a mechanical lifting system. Thanks to this lifting system, high load capacity is achieved, and the absence of oil leakage or seepage makes it suitable for use in the food industry.

- With this lifting system, pallets of different weights up to 1500 kg can be transported smoothly and efficiently.

- The device, due to its design, can tolerate pallet deflections of up to 40 mm.

- Thanks to the flexible and rugged polyurethane wheels, issues such as slipping or misalignment are not encountered in cold storage rooms.

- Non-slip plates on the upper cover minimize the risk during pallet transport.

- Devices with different load capacities such as 800 kg, 1000 kg, and 1500 kg all have an overload warning. In case of excessive loading, the device switches to protection mode to prevent damage to the mechanisms.

- Depending on customer requirements and the area to be used, the device can be perfectly suited to the operating environment and the pallets it needs to carry, with different drive configurations like 4x2, 4x4, 6x6, and 6x2.

# SERVICE-MAINTENANCE AND SPARE PARTS

Annual maintenance, depending on usage, allows the shuttle devices to operate smoothly for many years. The frequency of annual maintenance may vary depending on the operating conditions of the business.
For example, in businesses where the device operates 8 hours a day, maintenance should be done once a year; in businesses where it operates 16 hours a day, twice a year; and in businesses operating 24 hours a day, it is recommended to perform maintenance three times a year.

## Increased Efficiency

Annual maintenance ensures that the shuttles operate more efficiently. The shuttles are serviced to perform at their best, which increases overall efficiency.

## Reduced Risk of Failure

Regular maintenance means early detection of potential failures. Small issues can be resolved in time, preventing larger and more costly failures.

## Longevity

Annual maintenance extends the lifespan of machines or devices. Regular system maintenance reduces wear and tear, ensuring longer operational life.

## Lower Repair Costs

Since small issues are detected early, major repairs are avoided. This helps reduce maintenance and repair costs in the long term. Early intervention prevents costly major failures.

## Safety Assurance

Annual maintenance reduces safety risks. A malfunctioning shuttle can lead to workplace accidents. Annual maintenance minimizes such risks.

## Business Continuity

Especially for businesses, annual maintenance prevents disruptions in production or services. When maintenance is performed on time, shuttles continue to work, and operations proceed without interruption.

## Warranty Period

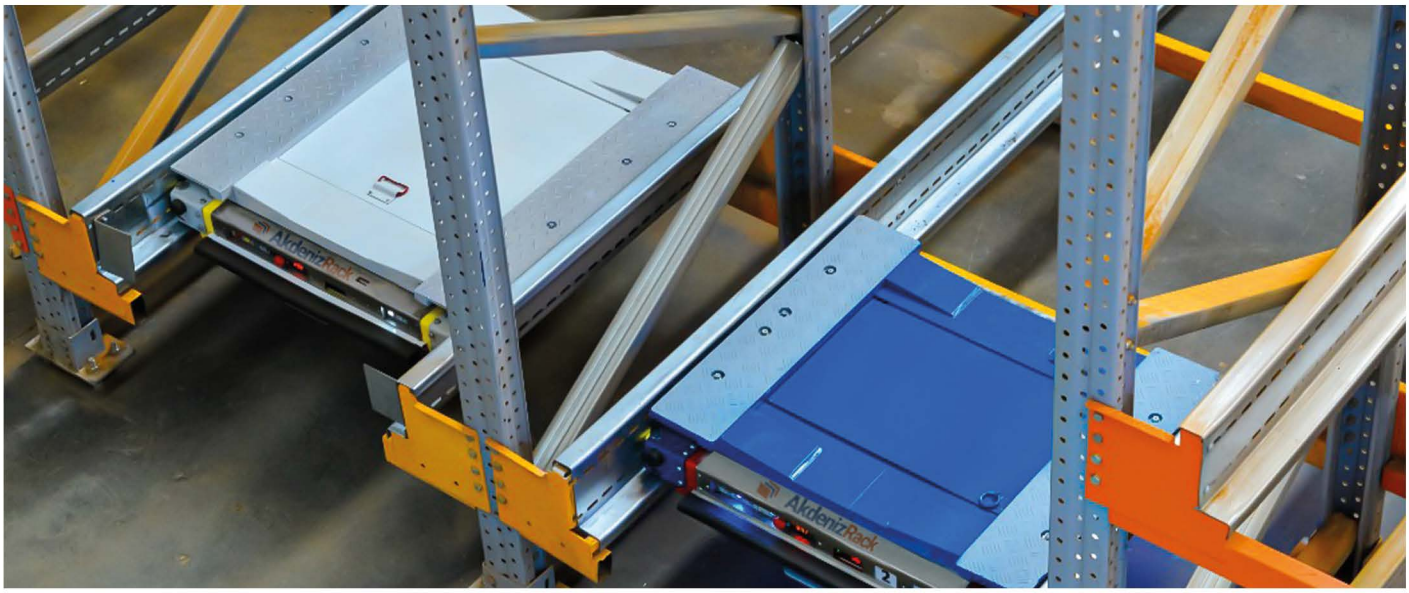
The warranty period for shuttle machines is 1 year.

## Performance Continuity

After the maintenance process, shuttles always operate at peak performance. This contributes to the smooth and efficient completion of tasks.

## Time and Labor Savings

Regular maintenance of the shuttle system prevents time loss due to unexpected breakdowns. This allows employees and businesses to use their time efficiently.




# SPARE PARTS

Electrical and mechanical parts used in the shuttle are kept in stock, ensuring immediate solutions for users. Any product installed in the service, provided there is no issue caused by the user, is covered by a 1-year warranty.

# PERIODIC MAINTENANCE

## *Daily Checklist*

- Clean the laser distance and photoelectric sensors.
- If the shuttle has finished use, the controller should be placed on charge.
- Check the battery for damage during replacement by hand and visually.
- Inspect the audible and visual warning devices.
- Check the shuttle buffers for any impact damage.
- Check the battery charge. If necessary, replace the battery.
- During battery replacement, check the cover piston.
- Inspect the cover for any impact damage.
- Check the wheels for any impact, cracks, or breakage.

## *Weekly Checklist*

- Check the buffer bolts.
- Check the guide wheels.
- Inspect the front panel bolts.
- Inspect the cover bolts.
- Check the wheel bolts.

## *Monthly Checklist*

- Check the diameter of the drive wheels.
- Inspect the bolts and fasteners of the lifting system parts.
- Apply grease to the lifting arms, drive group bearings, and short arm grease fittings.

# WORKING ENVIRONMENT AND TEMPERATURE CONDITIONS

Shuttle devices are capable of operating in cold rooms as low as -30°C. To prevent issues during operation in cold storage environments, specific precautions are implemented. Some of the measures taken to ensure full compatibility in cold storage are as follows:

- Compatibility of sensors and sensor cables with the environment,
- Heater resistors for locations requiring heating,
- Insulation against internal temperature and external factors such as water,
- Galvanized shuttle parts for resistance against corrosion.

Shuttles can operate continuously for 24 hours in cold storage environments.

# Shuttle Remote Control System

The shuttle device is controlled via simple and user-friendly radio controllers.

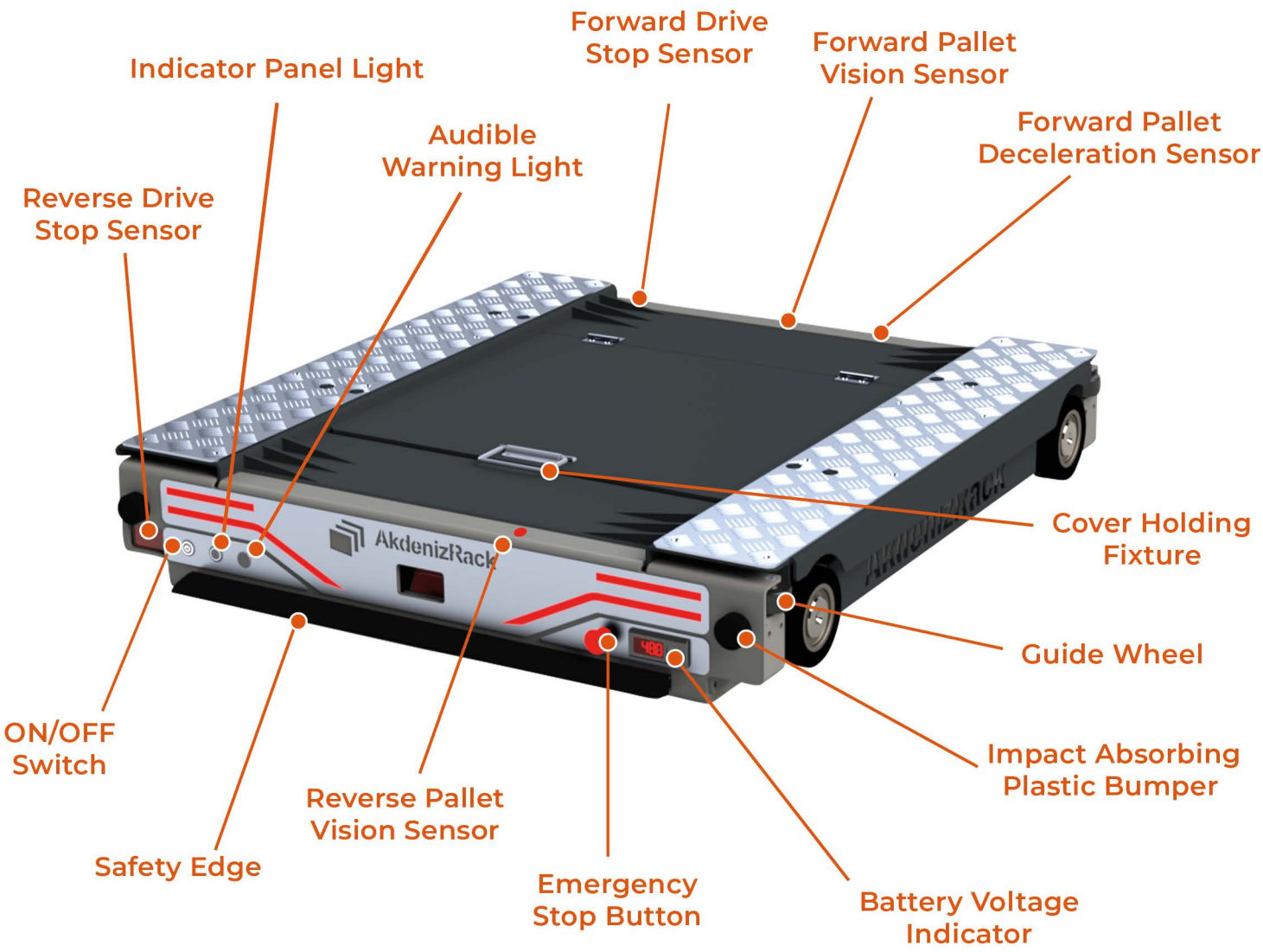
The 10-button, screen-less, 2.4 GHz, 16-channel IP67 controller ensures reliable command transmission without interruptions, regardless of warehouse size. Since the controllers are battery-powered, operations can continue seamlessly by replacing the batteries if there is a power loss or shutdown.

*Dimensions*
65 x 112 x 35 mm

*Temperature Range*
-30°C / +55 °C


As an optional feature, the shuttle can count pallets. During physical warehouse inventory counting, the shuttle counts all the pallets loaded on the track, providing convenience to the user.
Using mobile devices and simply scanning a QR code, the user can quickly access shuttle data such as pallet count information, operation time, and total loading/unloading numbers.

# SHUTTLE COMPONENTS



# Shuttle Rescue Vehicles

Shuttle rescue vehicles are designed to intervene safely and effectively in the event of a malfunction or when shuttles cannot move within rail systems. The primary causes of shuttle movement failure include stretch films hanging from pallets, products falling into the rails, or technical malfunctions.

Developed in compliance with occupational safety regulations, these rescue vehicles allow operators to intervene without entering the rail system. These vehicles are produced in two different types based on their working principles:

- Battery-Powered and Controlled Rescue Vehicles: These vehicles are controlled via a remote control, providing a safe and quick intervention.
- Manual Rescue Vehicles: Featuring a simpler mechanism, these are manually operated by the user.

Both models can be manufactured with different load capacities and design features based on the specific needs of the businesses.


# FEATURES OF SHUTTLE

| PARAMETERS | AKD 800-1000-1200 |
|---|---|
| Lifting Capacity | 1000 KG |
| Loaded Shuttle Speed | 60m/min |
| Unloaded Shuttle Speed | 45m/min |
| Motor Type | Brushless Servo Motor |
| Drive Motor | 48 V 750W |
| Lifting Motor | 48 V 750W |
| Pallet Lifting Speed | 4 sec |
| Maximum Acceleration Time | 7 sec |
| Sensor Brands | SICK, WENGLOR |
| Control System Unit | SIEMENS S7-1200 |
| Remote System | 10-Button Screenless |
| Battery System | Lithium Battery |
| Battery Capacity | 48V 40AH |
| Operating Time | 8 to 10 Hours |
| Charging Time | 4 to 5 Hours |
| Operating Temperature | -30°C / +50 °C |

# SHUTTLE OPTIONS AND FEATURES

## Standard Shuttle

- 10-Button Screenless Controller
- 2-Wheel Drive, designed for dry rooms
- 48V 40Ah Painted Steel Sheet Battery
- Other conditions are fixed

## Pallet Counting

- Ability to see how many euro pallets are in a channel on a 10-button screen controller

## Cold Room

- Suitability for operation in -30°C environmental conditions
- Waterproof and moisture-proof internal wiring and insulation
- 4-Wheel Drive with power on all wheels
- *48V 48Ah Stainless Steel Battery

## Custom Designed Shuttles

Ability to design according to the current rail dimensions based on the customer's request and suitability conditions

- Ability to design and revise for non-standard pallet sizes
- Production of shuttles based on customer requests and requirements

## FIFO

- Software for implementing the first in, first out principle based on customer unloading preferences
- Transfer of all pallets within the channel according to the unloading direction (Forward stacking - reverse stacking)
- When the option is activated, the customer can use both sides for loading or unloading

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