FORKLIFT RFID READER

User Manual

Contents

Getting Started Guide

Who Should Read the Getting Started Guide

This section is intended for forklift drivers responsible for moving products within the warehouse. It provides essential information on the proper use, maintenance, and safety procedures related to the RFID reader system installed on the forklift. Understanding and following the guidelines in this manual will help ensure efficient and safe operations, as well as accurate inventory tracking.

Overview and Purpose

This is a quick guide that helps forklift operators understand how to start using the RFID reader system installed on their forklifts. By following this guide, users will learn how to power on the device, read RFID tags, and transmit data effectively to the warehouse system.
By the end of this guide, you will:

- Know how to start and use the RFID reader on the forklift.
- Understand how to interpret tag scans.
- Be aware of key maintenance and troubleshooting practices

Quick Start Tutorial: How to Use the RFID Reader

Step 1: Powering On the System

- Ensure the forklift is powered on.
- Ensure the power cable is connected to the vehicle battery
- The RFID reader will automatically boot up with the vehicle.
- Check the indicator lights on the reader to confirm power and readiness.

Step 2: Reading RFID Tags

- Drive the forklift to the newly arrived shipment
- Move the forklift to a specific product where the tag is in a readable range. (The maximum readable range is 10cm)
- The buzzer indicates the detection of the tag
- Move the product to the destination pallet
- Drive the forklift to a distance where it can detect the tag on the pallet
- After detecting the pallet, you can successfully load the product on to the pallet

All the data handling tasks throughout the above process is automated. All the details regarding the interaction with the website is explained in the following sections.

Always be cautious not to damage the reader while loading products onto the forklift.

Maintenance and Troubleshooting

Regular Maintenance:

- Wipe down RFID reader daily.
- Check all cable connections weekly for wear or loosening.
- Report any unusual noises or lights to the maintenance team.

Common Issues & Solutions:

- Reader not powering on: Check forklift battery and power cable connections.
- No tag reads: Ensure tag is within range and not damaged. Restart reader.
- Data not syncing: Confirm forklift is in a network coverage area.

Introduction

Purpose of the Manual

This manual provides comprehensive guidance on the operation, and maintenance of the forklift-mounted RFID reader system. It is designed to assist users in effectively utilizing the RFID technology to enhance warehouse operations, ensuring accurate tracking of goods, improved inventory management, and streamlined logistics processes.

Intended Audience

This manual is intended for the following personnel:

- Forklift Operators: Individuals responsible for the day-to-day operation of forklifts equipped with RFID readers.
- System Administrators: Staff overseeing the integration of the RFID system with warehouse management systems and ensuring data integrity.

Each section of this manual is tailored to provide relevant information to these user groups, facilitating safe and efficient use of the RFID reader system.

Overview of the RFID System

The forklift RFID reader system is an advanced solution designed to automate the identification and tracking of goods within a warehouse environment. By integrating RFID technology directly onto forklifts, the system enables real-time data capture as items are moved, loaded, or unloaded, thereby enhancing operational efficiency and accuracy.

Key components of the system include:

- RFID Reader Unit: Mounted on the forklift, it emits radio signals to detect RFID tags on goods.
- Display on Mobile App: Provides real-time feedback to the operator, displaying information such as tag reads and system status.
- Power Supply Integration: Connects to the forklift's power system, ensuring continuous operation without the need for separate charging.
- Data Communication Interface: Facilitates the transfer of collected data to the warehouse management system for processing and record-keeping.

By employing this system, warehouses can achieve improved inventory accuracy, reduced manual scanning errors, and enhanced visibility into the movement of goods.

Safety Information

General Safety Precautions

Ensuring safety during the operation and maintenance of the forklift RFID reader system is paramount. Adhere to the following precautions to prevent accidents and equipment damage:

- Training: Only trained and authorized personnel should operate forklifts equipped with RFID readers.
- Awareness: Be mindful of the RFID reader placements to avoid collisions with warehouse structures or other equipment.
- Load Handling: Exercise caution when lifting or lowering loads to prevent contact with RFID reader and to avoid damaging it during the process
- Maintenance: Regularly inspect the RFID system for signs of wear or damage. Report any issues to the maintenance team promptly.

Electrical Safety

The RFID reader system involves electrical components that require careful handling:

- Power Connection: Consult with the forklift maintenance provider before connecting the RFID system to the vehicle's power supply. Use a multi-conductor cable for power connections, ensuring compatibility with the forklift's electrical system.
- Battery Drain: Avoid connecting the RFID reader directly to the forklift battery without a means to control power flow. Continuous power draw can deplete the battery, potentially immobilizing the forklift. Implement a dedicated switch or integrate the system with the ignition switch to manage power effectively.
- Voltage Spikes: Use a DC/DC power supply kit to filter voltage spikes that may occur during forklift startup, protecting the RFID reader's internal components.

Mounting Considerations

Proper installation of the RFID reader is crucial for safe and efficient operation:

- Placement: Mount the RFID reader and antennas in locations that do not obstruct the operator's view or interfere with forklift operations.
- Secure Installation: Use appropriate mounting hardware to firmly attach components, preventing movement or detachment during operation.
- Cable Management: Route cables through protective conduits and secure them to avoid entanglement or damage from moving parts.

Operating Instructions

Powering On the System

To ensure the RFID reader system operates correctly, follow these steps to power it on:

1. Verify Power Connections: Ensure that the RFID reader is securely connected to the forklift's power supply through the multi-conductor cable integrated with the forklift's electrical system.
2. Ignition Activation: Turn the forklift's ignition key to the "ON" position. The RFID reader is designed to power on automatically with this ignition, ensuring synchronized operation.
3. System Initialization: Observe the RFID reader's status indicators:
    - Power LED: Should illuminate steadily, indicating that the reader is receiving power.
4. Navigate to the RFID reader App on the driver’s smartphone.

Reading RFID Tags

The RFID reader is designed to automatically detect and read RFID tags within its operational range. To effectively read tags:

1. Approach the Load: Drive the forklift towards the pallet or item equipped with RFID tags. Ensure that the tags are within 10cm range from the reader.
2. Optimal Positioning: Align the forklift so that the RFID tags are directly in front of the reader. Proper alignment ensures accurate and efficient reading.
3. Reading Process: Pause briefly to allow the reader to scan the tags. The mobile App indicates the successful detection of the RFID tag as well the buzzer inside the reader.
4. Data Verification: Check the mobile App to confirm that the correct tag information has been captured.
5. Proceed with Operation: Once tag data is verified, continue with the intended task, transporting the load to its designated location.

Note: Ensure that tags are not obstructed by metal objects or other materials that may interfere with radio frequency signals.

Data Transmission

After reading RFID tags, the system transmits the collected data to the warehouse management system (WMS) for processing and record-keeping. The transmission process involves:

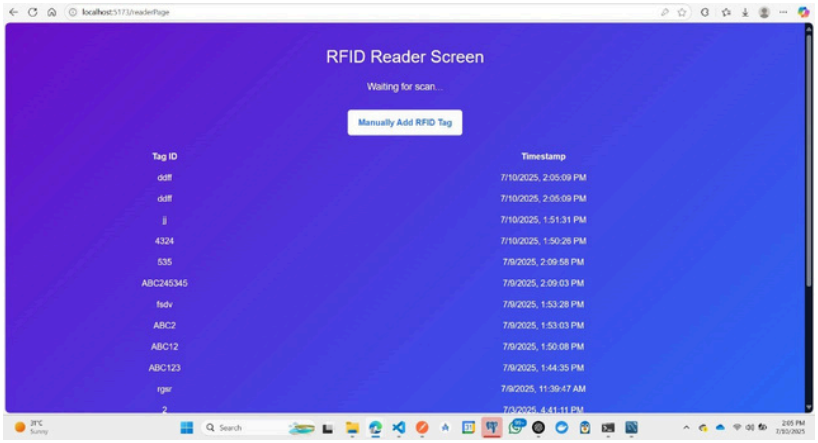
- Wireless Communication: The RFID reader communicates with the WMS via the warehouse's wireless local area network (WLAN), ensuring real-time data transfer.
- Data Formatting: Captured tag information is formatted to ensure compatibility with the WMS.
- Acknowledgment: The system confirms successful data transmission, which can be viewed on the mobile App status of the readers and tags (explained in the User Interface section).

Note: Ensure that the forklift remains within the coverage area of the WLAN to maintain uninterrupted communication with the WMS.

User Interface

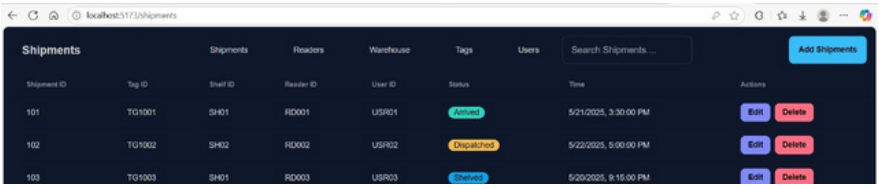
Tracking of the movements of the products is entirely automated. The status of the process at a particular moment can be understood through the client application in the mobile App and the warehouse management system. The client application in the mobile App and the warehouse management system has similar display and functionality.

You have to log in to the client application by entering your username and password. The system identifies whether you are a warehouse administrator or an RFID reader user and redirects you to the appropriate web page.

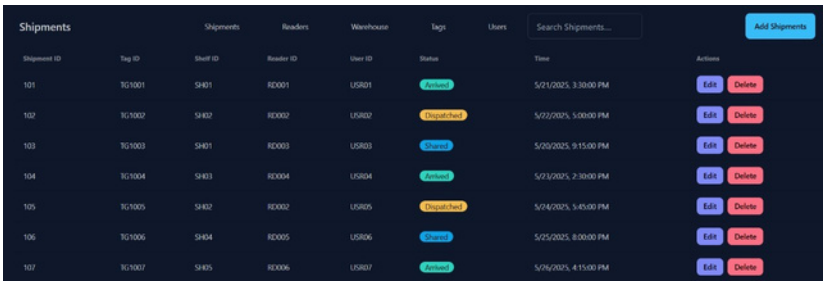


The web page redirected for RFID reader users is shown on the left. The user can view all the tags scanned so far with the tag name, scanned date, and time. You can also manually add RFID tags through the option at the top of the web page.

If you are a warehouse administrator, you will be redirected to the webpage shown on the right. Initially, you will be in the Shipments tab, one of the five main tabs: Shipments, Readers, Warehouse, Tags, and Users.



Shipments



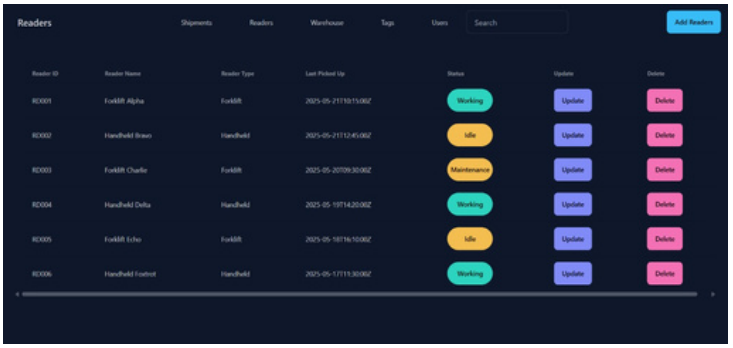
This tab contains all the information about a particular product in the warehouse. The id of the shipment which the product arrived, id of the tag assigned to it, id of the shelf if it's successfully loaded on to the corresponding pallet in the warehouse, id of the reader if its currently on the move on that corresponding reader, id of the user which is the forklift if its currently on the move on it, status which can be either indicating as arrived, dispatched or shelved.

When a new shipment arrives at the warehouse, the management should add the tag information to the warehouse through the Add Shipments option on the top right

The status of the product at this moment is displayed as arrived. Once a forklift reads that tag it changes the status into dispatched, and the forklift moves it to the intended pallet. When the forklift reads the id of the specific pallet the tag status changes to shelved and the forklift loads it to that pallet.

Readers

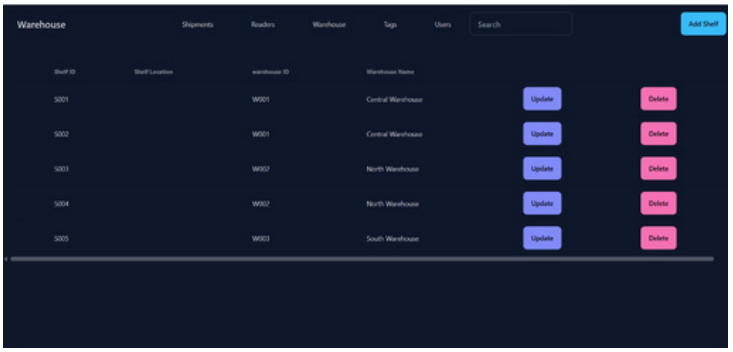
The reader can be forklift or handheld RFID which is indicated under the type. Each reader is given a specific id and a name. When a forklift reads a tag from a shipment its status is indicated as working. When it reads the id of a specific pallet before unloading the product on it, its status change into idle.



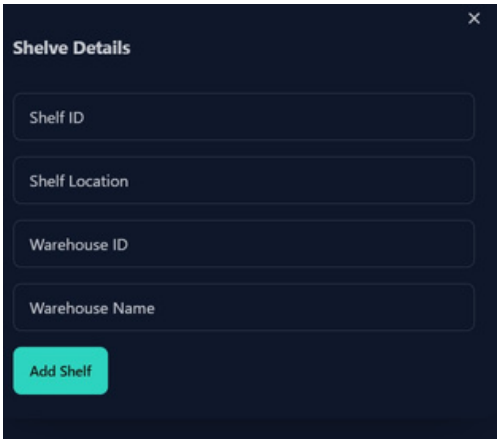
the warehouse management can add new readers through the Add Reader option on the top right.

Warehouse

Details of the warehouses in the complex can be found here. Each warehouse is given a specific id and a name. It also displays the information of the shelves located in it which includes the id of a particular shelf and the location of it in the warehouse.

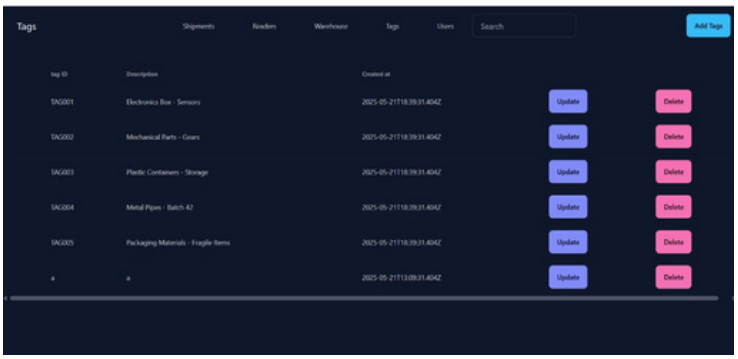


The warehouse management can add new warehouses through the Add Warehouse option on the top right.



Tags

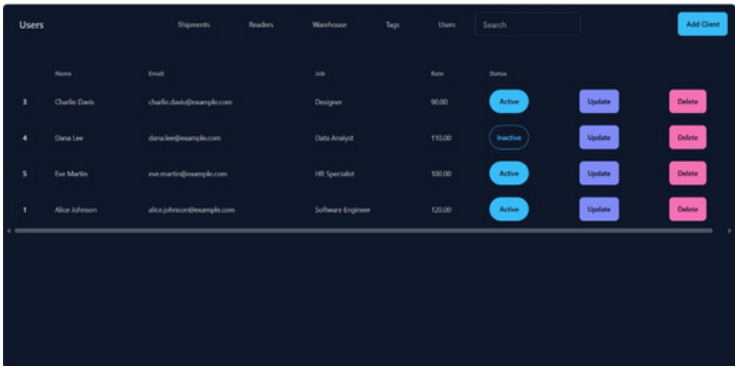
This tab contains all the information of the products that has been entered to the warehouse data base. It specifies the tag id along with type of the product that id.



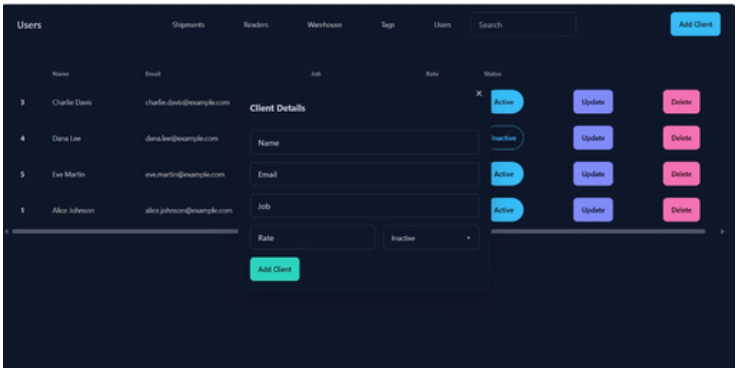
The warehouse management can add new tags through the Add Tag option on the top right.

Users

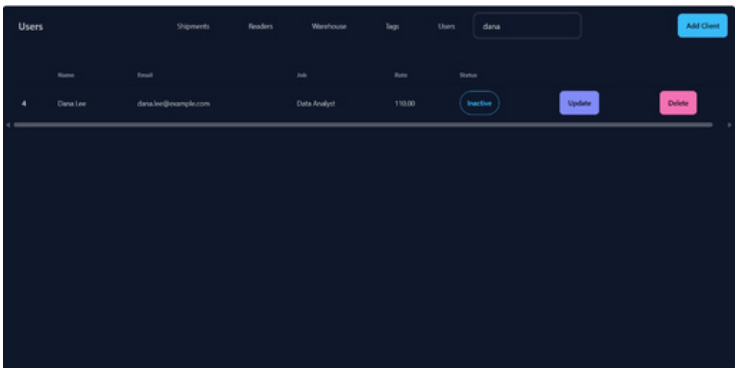
Details of the users of the RFID readers are included in this tab. They can be either forklifts or handheld RFIDs.



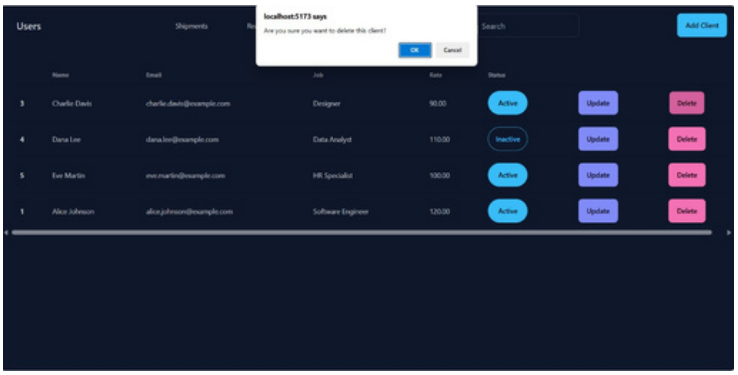
The warehouse management can add new users through the Add User option on the top right.



You can search a specific entry in each of the tabs through the search option on the top right



You can delete any entry from the data base on any tab through the delete option



Maintenance and Troubleshooting

Routine Maintenance

Regular maintenance ensures the longevity and optimal performance of the forklift RFID system. Implement the following practices:

- Visual Inspections: Periodically check RFID readers, antennas, and cables for signs of wear, damage, or loose connections.
- Cleaning: Gently clean RFID components using anti-static materials to remove dust and debris that may interfere with operation.
- Software Updates: Regularly update the firmware and software of RFID devices to ensure compatibility and incorporate performance enhancements.
- Environmental Monitoring: Ensure that RFID components are operating within the suitable environmental conditions, avoiding exposure to extreme temperatures, moisture, or corrosive substances.
- Cable Management: Secure and organize cables to prevent entanglement or damage from moving parts. Utilize cable trays or conduits where appropriate.

Common Issues and Solutions

The following table outlines potential issues with the RFID system and recommended solutions:

Issue	Possible Cause	Recommended Solution
Reader not powering on	Loose or disconnected power cable	Verify and secure all power connections
Reader not powering on	Faulty power supply	Test and replace the power supply if necessary
Inconsistent tag reads	Antenna misalignment	Adjust antenna positioning for optimal tag detection

Inconsistent tag reads	Interference from metal objects	Reposition tags or use on-metal RFID tags to mitigate interference
No data transmission to WMS	Network connectivity issues	Check network connections and configurations
System freezes or becomes unresponsive	Software glitches or memory overload	Restart the system and monitor for recurring issues; update software to the latest version
Reader does not pick up the tag	Faulty antenna	Test with a known good antenna to determine if replacement is necessary