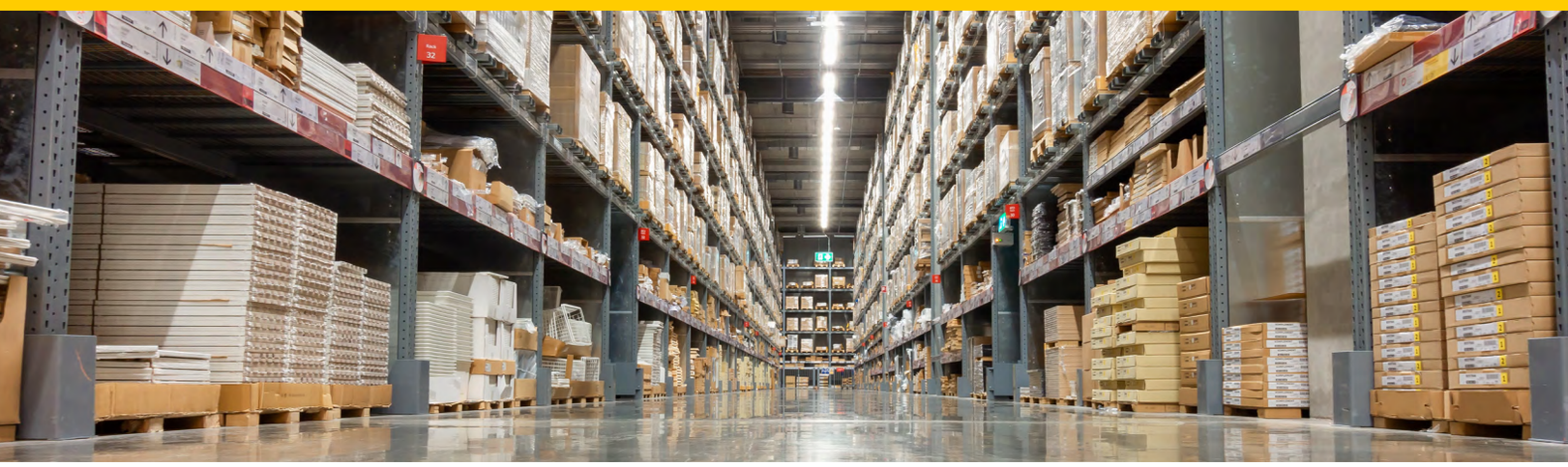
TURCK

Your Global Automation Partner

RFID for the Next Generation of Logistics & Manufacturing

AUTOMATION E-BOOK

Contents



Setting the Standard in Supply Chain Efficiency: The RFID Mandate 2.0

In 2003, Walmart significantly disrupted the retail and supply chain landscape by announcing that its top suppliers would be required to label cases and pallets with RFID tags. Although RFID had already been around for years, Walmart's significant influence and the sheer size of its store operations forced suppliers to take the technology seriously. This marked one of the first large-scale efforts to implement RFID technology in the retail industry.
At the time, the driving factor for retailers to use RFID tagged products was that it made inventory management easier and more accurate. Those benefits hold true today. Although the mandate initially lost momentum due to high implementation costs, a steep learning curve, and fast turn-around time, the situation has since improved. RFID tags are now more affordable, systems are easier to implement, and our ability to use the captured data has significantly advanced and expanded.

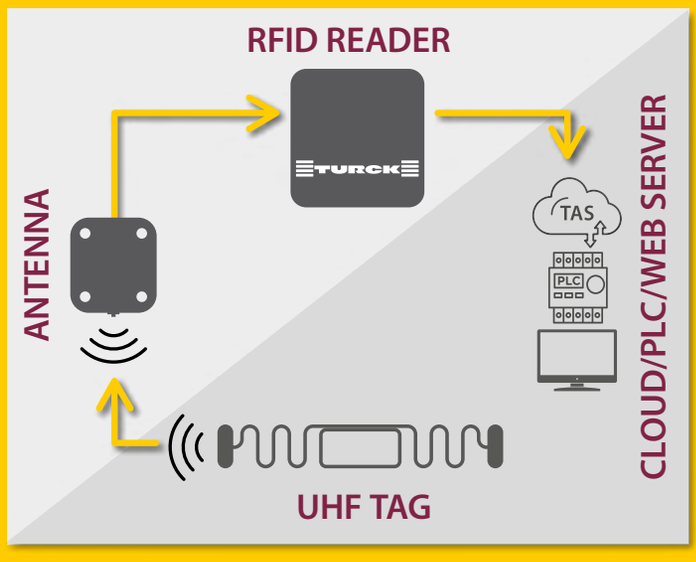
The tagging mandate has been revived since those early days and Walmart has successfully added more categories to their growing list like clothing and general merchandise (sporting goods, toys, entertainment, etc.).

RFID technology is here to stay and in industries far beyond the retail sector. Let TURCK show you how to tap into the benefits of RFID with our stand-alone and turnkey systems for conveyors, loading docks, fork trucks, inventory systems and asset management applications.

Say goodbye to chaos & inefficieny & welcome a digital supply chain

RFID {
- **Eliminates Shipping Mistakes**
- **Provides More Inventory Visibility**
- **Ensures Material Availability**

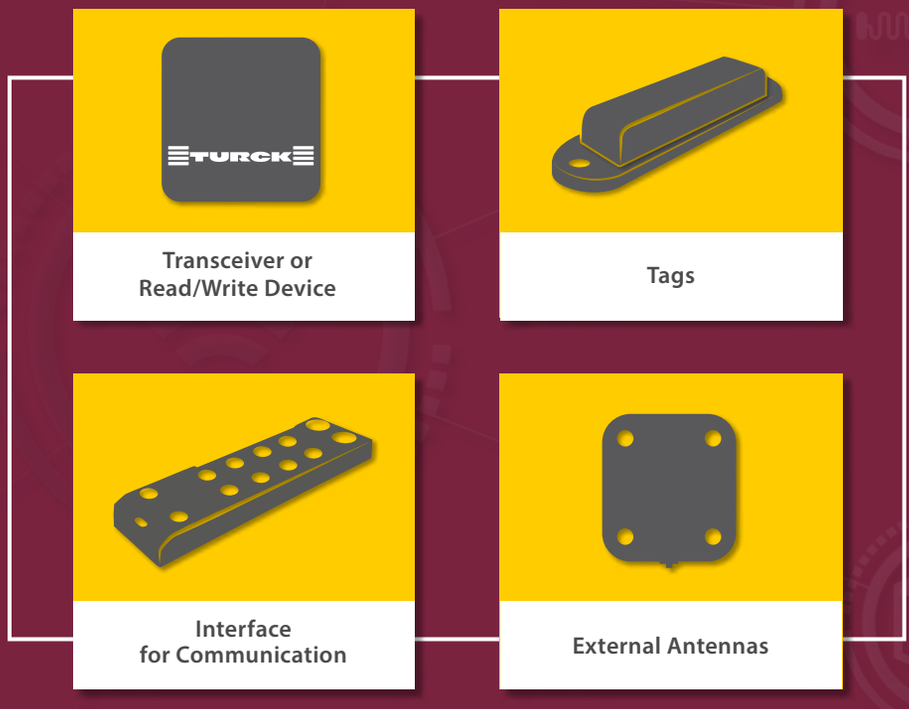
Technology Overview & **Implementation Considerations**



How does an RFID-System work?

A Radio Frequency Identification (RFID) system is made up of a read/write device (transceiver), an antenna, and one or more tags (transponders). RFID uses electromagnetic coupling (radio waves) between a reader and a tag, enabling non-contact real-time wireless data exchange (air ineterface). The tags contain data about the product. Tags can be placed on products, pallets, boxes, totes, clothing, car bodies, high-value assets, and much more to identify and track objects. The reader sends out a radio signal using an antenna, which can be integrated or separate, depending on the chosen solution. When a tag comes within range, data is transferred to the reader. The data can be sent to a PLC, Middleware, or an ERP System. **See the UHF example in the diagram to the left.**

RFID systems have four primary Components:



Click each box to learn more

Technology Overview & **Implementation Considerations**

Barcode, data matrix & RFID

In factories, logistics and warehouse operations, barcode scanners, RFID readers, and Data Matrix code readers each offer distinct advantages, depending on the application. Barcode scanners, which have been around for decades, are the most widely used due to their low cost and simplicity. This technology relies on optical line-of-sight to read printed 1D or 2D codes—ideal for basic inventory and pallet tracking. RFID readers, by contrast, use radio waves to detect tags without requiring line-of-sight, enabling bulk reading and real-time tracking across larger distances, making them well-suited for high-throughput environments and automated inventory systems. Data Matrix code readers specialize in decoding compact, high-density 2D codes, often applied directly to parts (via direct part marking), providing robust traceability for small or durable items in sectors like aerospace and manufacturing. Each technology serves a different operational niche, balancing cost, environmental tolerance, and data handling needs.

Code Type:	RFID	Barcode	Data Matrix Code
Line of Sight:	Not Required	Required	Required
Data Storage Capacity:	24 to 138 bytes	10 - 20 bytes	2 KB
Tag Durability:	High IP Rating & High Temperature Variants Available	Low (Affected By Dirt/Damage)	Moderate (Some Tolerance To Damage/Scratches)
Bulk Reading:	Yes	No	No
Write Capability:	Multiple Writes	Single Write	Single Write
Example Applications:	Pallet Tracking, Inventory Tracking, Automated Sorting, Asset Tracking, Shipping Verification	Individual Product/Shelf Labels, Automated Sorting and Pallet Tracking	Asset Tracking, Direct Part Mark, Automated Sorting
Security:	More Secure (read-write capability, encryption)	Easily Replicated	Moderate (less tamper-prone than barcodes)
Scanner Technology:	Radio Waves	Optical/Laser	Camera/DPM Reader
System Cost:	Higher Upfront Cost	Low	Moderate

Benefits of RFID

Enhanced Visibility to Inventory: Provides inventory tracking, reduces stock discrepancies and improves inventory accuracy.

Faster processing: RFID provides quicker identification and tracking of assets, parts or ingredients compared to traditional methods, speeding up shipping, receiving, picking, and packing.

Reduced labor costs: Automated data capture using RFID minimizes the need for manual data entry, lowering labor costs and errors.

Better assett tracking: RFID helps track manufacturing equipment, tools, and other assets, pinpointing correct location in the facility, ensuring their proper use and maintenance.

Improved quality control: RFID systems can monitor production processes, ensuring that the correct parts and materials are used, thus minimizing errors.

It's important to understand the differences between RFID technologies like low frequency, high frequency and ultra-high frequency to choose the right solution. Each application has unique demands, requiring knowledge of speed, range, read/write operations, environment, and the number of tags needed. **View the comparision.**

Let the experts at TURCK help you choose the right RFID technology based on your application.

Comparing LF, HF & UHF

RFID systems operate across different frequency ranges, mainly Low Frequency (LF), High Frequency (HF), and Ultra-High Frequency (UHF). Each of these frequency ranges offers unique characteristics and advantages suitable for specific applications.

Materials like water and metal can affect RFID performance. For example, LF signals penetrate these materials well, however, they have limited range and slower data transfer. HF offers faster read rates and works up to 20 inches, making it ideal for mid-range applications. UHF provides even greater range and speed, handling more tags, but uses more power and the frequencies are less likely to penetrate materials.

Another consideration when selecting the appropriate frequency for an application is the amount of electromagnetic interference (EMI). This key factor makes it more difficult to obtain a clear signal. Machines like motors, conveyors, and robots can emit EMI, disrupting RFID signals. Shielding may be necessary in manufacturing settings.

Choosing the appropriate RFID frequency depends on the specific application requirements. Please see the table below for a quick look at the specifications and capabilities of these technologies:

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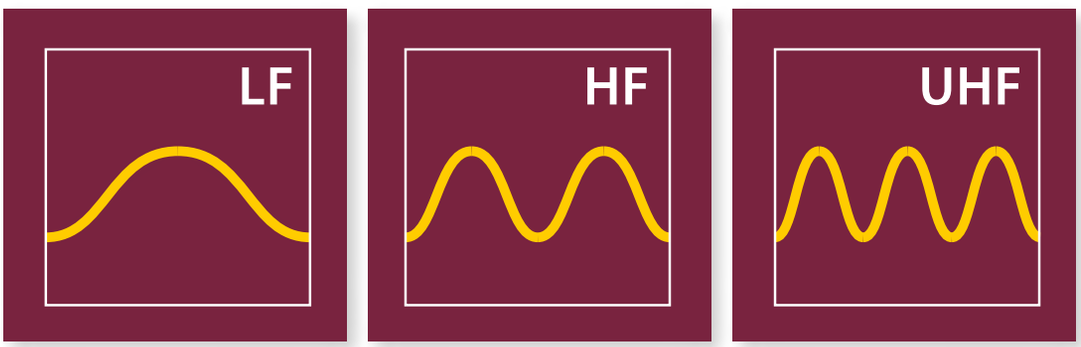


	LF – 125-134 MHz	HF – 13.56 MHz	UHF – 860-960 MHz
Communication Range:	Ranges in inches	Up to 20 inches	Up to 10 feet
Communication Technology Between Read/Write Head and Tag:	Inductive coupling	Inductive coupling	Passive backscatter
Field for Tag Identification:	Uniform magnetic field	Uniform magnetic field	Non-uniform electromagnetic field
Environmental Influences:	Mildly influenced by surrounding environment	Moderately influenced by surrounding environment	Highly influenced by surrounding environment
Sources of Interference:	EMF common in industrial environments (e.g. VFDs)	Metal in the environment; EMF common in industrial environments (e.g. VFDs)	Metal and liquids in the environment
Multi-tag Reading:	Yes, some	Yes, several	Yes, over one hundred
Tag Memory Sizes:	10 bytes to 2 KB	64 bytes to 8 KB	24 to 138 bytes
Standards:	ISO/IEC 18000-2	ISO 15693	EPC Global Gen 2 – ISO 18000-63

The Role of TURCK's RFID in the Industrial Internet of Things IIoT

As the IIoT continues to reshape the manufacturing and logistics landscape, data-driven automation and real-time process transparency are essential now more than ever. TURCK's RFID solutions play a vital role in enabling these capabilities by providing reliable, decentralized data collection and seamless communication across industrial networks.

RFID with TAS

TURCK's Automation Suite (TAS) is an IIoT platform designed to streamline the configuration and management of TURCK devices within industrial Ethernet networks. It allows users to configure and manage all RFID devices from one interface. It simplifies the commissioning process through intuitive visualizations and accelerates it with batch functions such as bulk firmware updates and IP address assignments. This centralized approach adds value by giving customers a clear overview of all connected devices, which they can manage from a single platform.

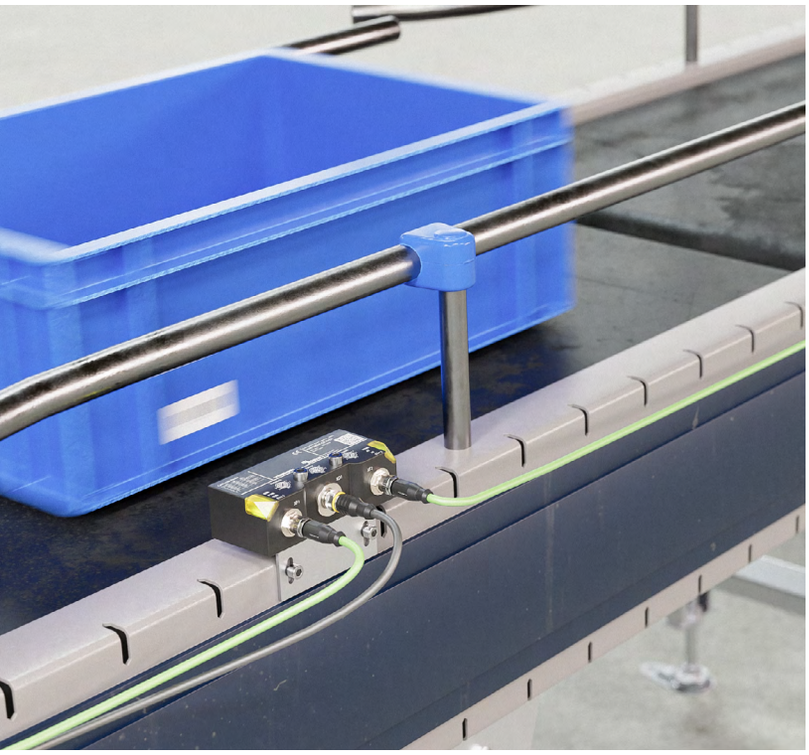
Seamless integration with RFID

In smart warehouses, distribution centers and factories, TURCK's RFID integrates easily with ERP systems, middleware, and the Cloud, making it a vital backbone technology for predictive maintenance and process optimization. A standout feature of TURCK's RFID technology is its seamless integration with industrial Ethernet and fieldbus protocols. This allows RFID readers to be deployed without complex middleware, enabling direct communication with PLCs and ERP systems.

RFID with IO-Link

TURCK's also offers HF RFID readers with IO-Link. In IO-Link mode, bidirectional communication takes place between an IO-Link master and the read/write heads. For greater insights into system operation and condition monitoring, diagnostics and identification messages can also be requested via IO-Link.

HF or UHF: Which ONE is Right for **My Application?**



Key factors every engineer should consider

Whether you're engineering a new system from the ground up or upgrading an existing solution, one of the first decisions you'll face is choosing between High Frequency (HF) and Ultra-High Frequency (UHF) RFID.

HIGH-FREQUENCY (HF) RFID is among the most used track and trace technology in industrial applications and is often implemented because of its reliable operation. HF RFID tags use inductive coupling to communicate between read/write heads and transponders. The reader emits a magnetic field, and when a transponder passes through, an electric current is created that powers the RFID tags and transmits data.

ULTRA-HIGH FREQUENCY (UHF) RFID offers both near-field and far-field read ranges. Near field RFID operates similarly to HF RFID, where the antennas generate a magnetic field. Since the tag is closer to the antenna, near-field UHF has a narrower field of view and a shorter read range (comparable to HF RFID). For an additional performance advantage, near-field UHF features an antenna that reduces magnetic shielding, enabling it to block visibility of other tags in close proximity.

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Let's break it down and review when and why to choose HF or UHF RFID, helping you determine which RFID frequency is the right fit for your application.

Key Considerations

Take a look at some of the key considerations for making an RFID technology selection. Important points include application read range, speed requirements, environment and cost considerations. Consult with a TURCK RFID expert for other important considerations.

1. Read range

HF

- Read range: 1 cm to 50 cm
- Example applications: conveyor read points, load detection for autonomous mobile robots, tote tracking, tool tracking

UHF

- Read range: Up to 10+ meters
- Example applications: asset tracking, shipment verification, real-time location tracking, inventory management, batch processing

Key engineering takeaway

Use close-proximity or harsh environments (e.g., conveyors, robotics). UHF excels in long-range tracking (e.g., warehouse pallets, asset tracking).

2. Speed requirements – single read vs multiple reads

HF

- Shorter read range
- Best for close-proximity scans or single-object reads

UHF

- Long-range and capable of reading multiple tags per second
- Ideal for high-throughput environments

Key engineering takeaway

If your system needs to identify many moving objects quickly and from a distance—like at a dock door—UHF is often the better choice.

3. Enviromental conditions: RF interference & materials

HF

- Performs better against interference from liquids
- Applications near EMI sources require grounding

UHF

- Offers longer read ranges but is more susceptible to signal interference from metal and liquid environments
- UHF read field (output power) is configurable

Key engineering takeaway

Use HF in harsh, close-proximity environments (e.g., conveyors, autonomous robotics). UHF excels in open-air, long-range tracking (e.g., warehouse, pallets, dock doors).

4. Cost considerations

HF

- Often less expensive due to simpler integration
- Shorter read range means simpler antenna design and and reliable detection

UHF

- Often more expensive, depending on reading point and tag numbers
- If needed, infrastructure such as software/hardware can add to cost

Key engineering takeaway

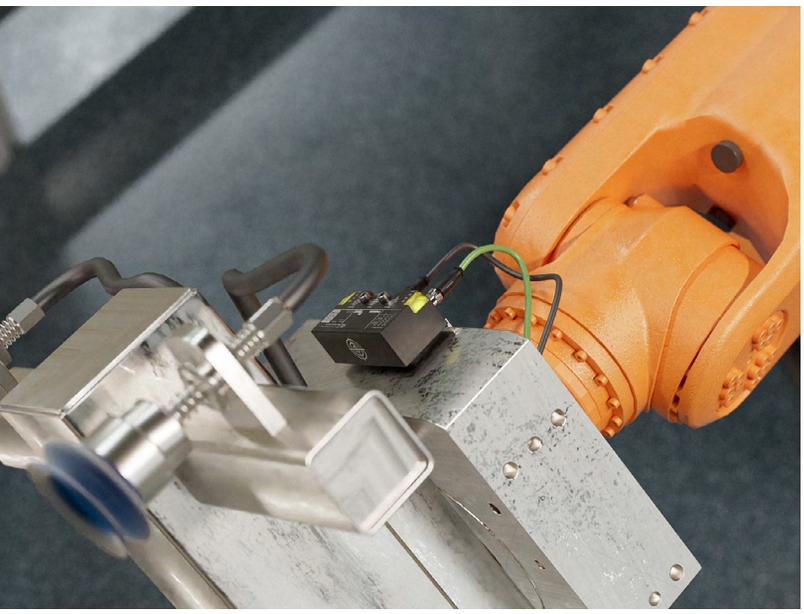
UHF RFID offers lower tag costs and better scalability for large-scale use, while HF systems are less expensive to set up and better suited for smaller, short-range applications.

Determine Number of Read Points:
Single Read Point or Multiple?

The decision between single and multiple read points depends heavily on the **size and shape of the read zone**. A single antenna is usually sufficient for small, controlled areas, but multiple antennas are necessary when monitoring larger spaces such as warehouses or irregularly shaped zones.

Another important factor is **tag density and orientation**. In applications where the number of tags is small and oriented consistently, a single antenna can achieve reliable reads. However, when tag density is high or orientations vary, multiple antennas improve accuracy by covering more angles.

Movement patterns also play a role. When items move in a linear, predictable manner such on a conveyor line, one read point is typically enough. In environments where movement is multi-directional or unpredictable, multiple read points are required to ensure coverage.



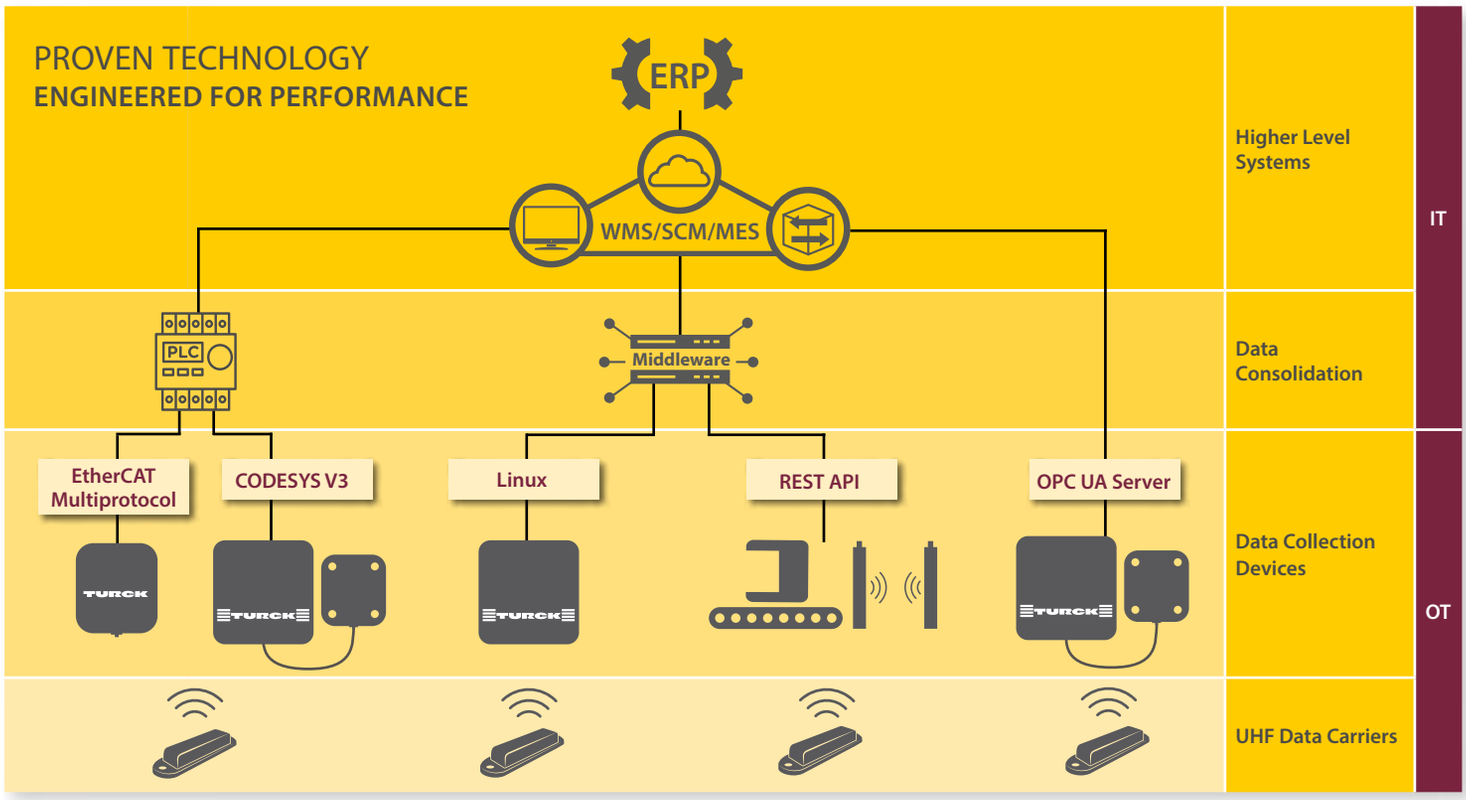
Single read point
One antenna/reader is used to capture RFID tag data within a defined read zone.

Multiple read points
Multiple antennas/ readers are deployed to cover larger, complex, or segmented areas, often integrated to provide continuous coverage or directional information.

RFID Tags
Tags carry specific product data that has been pre-programmed onto a microchip. An RFID reader sends a signal out via radio waves which is then received by the tags within its range. The tags then send a signal back to the reader, which then captures all the product data. Read more in our whitepaper.

READ WHITEPAPER VIEW TAGS

RFID Configuration Options:
Smarter RFID Integration starts here



TURCK's RFID hardware and system configuration options provide a powerful, flexible framework tailored to meet the complex demands of today's automatic identification applications. Whether you're optimizing warehouse operations, streamlining supply chains, or improving asset control in manufacturing, TURCK provides a scalable solution designed with your goals in mind. Let us help you select the system that fits your needs.

Our multiple configuration options enable seamless data flow and integration in whichever framework you choose. Whether you need a solution that communicates directly back to a PLC, connects via middleware for data consolidation, or an OPC UA server, TURCK works to create a flexible solution that provides reliable identification data. TURCK's RFID portfolio:

- works with various communication protocols and architectures. Connect effortlessly to higher-level systems using proven protocols. This gives you more options and enables flexible use when choosing between different system components.
- offers seamless data flow and integration plus the assurance of future-proof capabilities. TURCK's partners with you to provide a solid framework for implementing these technologies in real-world applications today and in the future – no matter which configuration you choose.
- enables flexibility with both integrated and separate antennas. Devices with integrated antennas simplify installation and reduce space requirements, while separate antennas can offer better range and adaptability in varied environments.
- provides a wide range of passive tag types (HF and UHF) and design (hard tags, smart labels, etc.). We also offer specialized tags for high-temperature applications and temperature sensor tags for applications that require strict thermal compliance. For more information about tags, read the whitepaper.

Smart Solutions for RFID Applications

RFID Hardware

Q180/Q300 UHF Reader

These standalone UHF readers with Ethernet support up to 4 external antennas. They feature an integrated CODESYS runtime for on-device logic and a web server with test tools for setup and diagnostics. OPC-UA and Linux versions available.

Q180 Q300

Q150 UHF Reader

This compact, all-in-one UHF reader is rated IP67 for harsh environments. An integrated web server and a web-based UHF test tool enables remote setup and air-interface diagnostics without external utilities. Profinet, Modbus TCP EtherNet/IP and EtherCAT protocols available.

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Q130 HF Read/Write Head

This HF read/write head supports Ethernet protocols and offers a high IP rating up to IP69K for demanding applications. Features like S2 system redundancy, an integrated web server, and TAS software setup ensure reliable high-speed tag reading.

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UHF Antennas

TURCK's UHF RFID antennas are rugged, IP67-rated solutions designed for readers like the Q180 and Q300. Available in compact (150 mm) and larger (250 mm) sizes, they enable reliable long-range or zone-specific tag detection in logistics, conveyor and gate applications.

LEARN MORE

HF Read/Write Heads - standard range

TURCK's RFID communication protocol, BL ident, offers fast data transfer between the transceiver and interface module with high information fidelity. The range is up to 145 mm, depending on form factor.

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HF Read/Write Heads - long range

TURCK's long-range, compact HF transceivers are designed with an active face positioned on top. An ATEX variant is available. They are suitable for applications that require reliable performance and straightforward integration. The range is up to 360 mm, depending on form factor.

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HF Read/Write Heads - super long range

These HF transceivers are designed for longer ranges up to 500 mm, depending on form factor. All devices operate at 13.56 MHz, mount non-flush with active face on top and connect via an interface module.

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HF Read/Write Heads - IO-Link

These high frequency read-write heads use IO-Link instead of BL ident communication protocol. These devices have all the benefits of IO-Link, including easy setup and diagnostic information, and can use the same data carriers as BL ident read/write heads.

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Smart Solutions for RFID Applications

RFID Hardware (continued)

Interfaces - Block

These solutions enable seamless data communication between RFID read/write heads and higher-level control systems. TURCK's block RFID interfaces are based on its block I/O families. They can distribute control using ARGEE, TURCK's programming environment.

LEARN MORE

Interfaces - Programmable

Programmable interfaces can be used as autonomous PLCs for control tasks or as network devices for fast signal preprocessing in the periphery. This can be done through CODESYS, the standard programming tool for all programmable TURCK devices.

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RFID Standardized solutions

RFID Gate system

TURCK's RFID Gate is a turnkey UHF RFID solution designed to automatically capture tag reads as goods pass through gates such as dock doors or entry/exit points. It integrates with ERP, WMS or MES systems to give real-time inventory visibility.

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RFID Tunnel system

The RFID Tunnel is a turnkey detection solution designed to automatically capture tag reads on a conveyor belt. The system comprises a UHF reader paired with multiple antennas, cables, and a tunnel housing that encloses the read zone to prevent stray reads.

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RFID Customizable solutions

RFID Forklift system

The Forklift System is a non-contact, asset tracking system mounted on an existing forklift. TURCK RFID readers and UHF antennas enable reliable tracking as the forklift moves throughout the facility. Proprietary software minimizes stray reads.

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RFID Conveyer system

TURCK's Conveyor System is a stationary read-point solution optimized for high-speed product flow on conveyors. The system is designed for real-time readouts at critical process points to reduce errors in order picking, minimize delivery mistakes and help detect bottlenecks.

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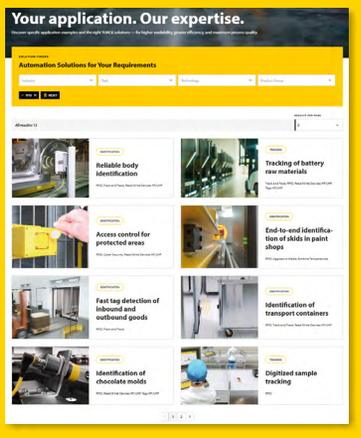
RFID Applications
to Enhance Efficiency



Our SOLUTION FINDER shows what matters: Just select TECHNOLOGY/RFID to discover efficiency potential.

SOLUTIONS

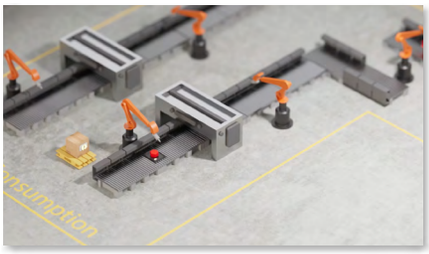
In fast-paced warehouse and distribution environments, system reliability, traceability, and real-time data access are essential to maintaining performance. TURCK's RFID technology delivers the tools engineers need to design and implement robust intralogistics systems that reduce manual processes, increase visibility, and support seamless integration with existing high-level platforms.

Explore real-world applications where TURCK RFID systems are solving common intralogistics challenges—demonstrating how digitization improves system performance, reduces downtime, and increases throughput in demanding logistics environments.

4 Wins in 4 Intralogistics Applications

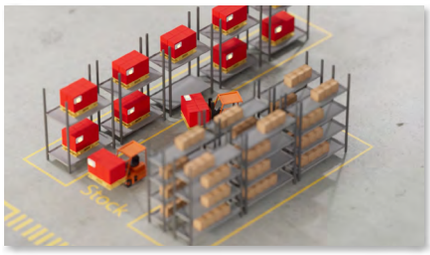
Material tracking

- Ideal for automating tracking of incoming goods and inventory management
- Automated order processing provides product replenishment on demand



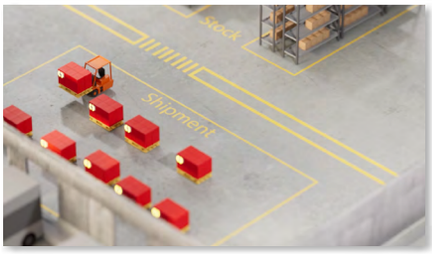
Production tracking

- Monitor production conditions and quality as well as material flow with tool identification at the machine
- Reliable material assignment ensures high production quality and fewer rejects



Warehouse management

- Products, trays, skids, workpiece holders are identified via a unique ID
- Provides end-to-end traceability of routes and location for goods and production



Picking & shipping

- Enables robots or warehouse vehicles fitted with RFID to pick items automatically
- The digital order picking list ensures the content of each shipment and reduces complaints due to incorrect orders

WATCH VIDEO

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How Forklifts, Conveyors & RFID
Work Together to Boost Material Flow

Forklifts and conveyors play a crucial interconnected role in material handling applications, ensuring seamless movement of products and materials within warehouses, distribution centers, and manufacturing facilities. It's no secret that forklifts provide the "muscle" to transport heavy loads across varying distances, feeding materials onto conveyors for continuous, automated transport. But what if you could gain more insight into your inventory location, inbound/outbound shipment status, and faster, more precise tracking capabilities? When you add RFID to both the forklift and conveyor - together they can be a game-changer for logistics operations.

TURCK offers a flexible UHF RFID tunnel for conveyor belt applications that is ready for immediate use.

SEE THE PRODUCT WATCH VIDEO

RFID Forklift system

From retail distribution center warehouses to manufacturing plants, it is vital to track inventory and assets using automatic identification technology. Modern forklifts equipped with RFID ensure reliable and up-to-date information. No matter if you are moving pallets of goods or a single high-value asset, a smart RFID system from TURCK Vilant knows what the forklift is transporting at all times.

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Application Success Story
ABB Power Electronics & Automation

See how material tagging helps with factory automation and plays a part in increasing factory throughput.

The challenge:

In 2011, ABB's Breakers and Switches factory in Vaasa, Finland aimed to significantly increase its productivity. As a key manufacturing site, representing 80% of all ABB products in its category, the management set a critical initiative to enhance factory output. This required a comprehensive automation plan that integrated all aspects of material handling, from inbound logistics to outbound delivery, to ensure smooth production and achieve ambitious throughput goals.

The outcome:

The factory is now nearly fully automated, integrating RFID with 20+ robots and automated forklift trucks. This comprehensive automation has led to a 60% increase in factory productivity and growing volumes. Beyond these gains, the reduction of manual tasks by RFID significantly improved employee satisfaction, reducing sick calls and allowing personnel to shift to higher-value roles.

By implementing RFID, ABB achieved seamless automated material flow, leading to a remarkable 60% increase in factory throughput.

60%

READ THE ARTICLE

The solution:

ABB implemented an RFID-based solution as a key element in its factory-wide automation strategy, driving automated material flow throughout:

- RFID-Enabled Inbound Logistics: RFID readers automatically register incoming delivery items directly into ABB's SAP system as trucks arrive at the factory. This provides instant availability information for all incoming materials.
- Automated Outbound Logistics: Each handling unit for customer orders is monitored with RFID. After paperwork is finalized in SAP, units are moved to the outbound freight area and loaded onto delivery trucks, with RFID monitoring and verifying the loading process to ensure it is error-free.
- Seamless Material Integration: RFID seamlessly connects and optimizes material flow within the factory's highly automated ecosystem, which also includes 20+ robots and automated forklift trucks.

TRACK & TRACE GUIDEBOOK

RFID & Automotive Applications

The introduction of RFID for car manufacturing ensures full visibility on material consumption, finished goods and their location, and helps manage in- and outbound shipments.

Materials: Optimized inventory management ensures cost-effective JIT / JOT deliveries and minimizes component overstocking.

Time: Replacing barcodes in production line doubles the production speed, as automatic identification needs no manual work.

Extra mileage: Reducing shipment errors helps avoid unnecessary back-and-forth deliveries.

Excess in production: Tracking material input at the beginning of the production line and comparing used materials to final product quality helps minimize scrap.

Applications

End-to-End Vehicle Identification in Production
RFID replaces paper-based or fragmented identification processes in automotive production and enables reliable, end-to-end vehicle identification for transparent, data-driven workflows.

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Simplified System Architecture in Battery Production
The RFID bus mode ensures stable processes and short cycle times in lithium-ion battery manufacturing. End-to-end RFID communication reduces costs and facilitates production scaling.

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Reliable RFID identification under extreme conditions
Robust RFID systems ensure end-to-end identification in paint shops—even at high temperatures and in the presence of aggressive chemicals. This increases process reliability and facilitates system integration.

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Embedded Control: Capture, Filter & Process RFID Tag Data Locally

Turck Vilant node for off-the-shelf UHF RFID solutions

For customers who are using Middleware to communicate back to their ERP, we offer TURCK Vilant Node. This software is a license-free embedded control solution to enhance functionality for off-the-shelf UHF RFID readers. This software provides a standard REST API interface, buffering, control logic, and stray read removal - enabling automation applications in IIoT/Industry 4.0 systems. It has 30+ ready applications that can be used to configure use cases.

How Turck Vilant node works

- **Edge computing:** Vilant Node is installed directly on select, fixed RFID readers. This allows the software to capture, filter and process RFID tag data locally, before sending it to a central server or ERP.
- **Configurable applications:** The software has pre-defined filters and functions that can be configured for specific use cases without needing to be programmed from scratch.
- **System integration:** Once TURCK Vilant Node collects data for aggregation and management, it can integrate directly with a customer's ERP or WMS.
- **Deployment flexibility:** The "Node" version runs autonomously on fixed readers. Users can reconfigure the RFID logic if the application changes. Adding or removing antennas, for example, is possible so users aren't locked in to how the reader processes tag data.
- **GUI for programming:** It offers various software modules that can be connected to implement features like software or hardware triggering inventories via sensor inputs, RSSI based filtering and much more.

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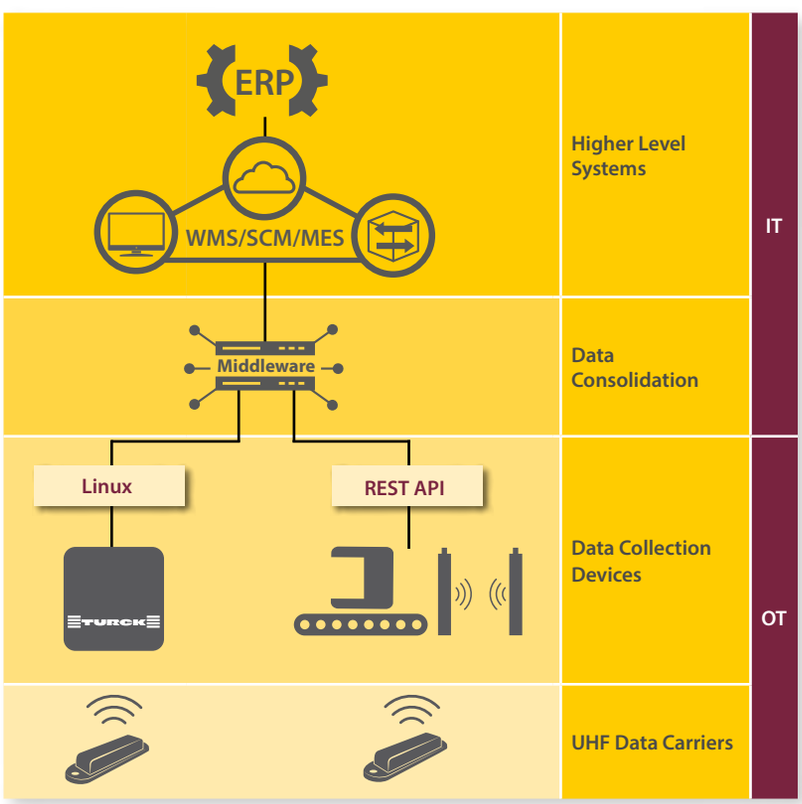

- **Gate and dock door tracking:** An RFID gate, fitted with a TURCK Vilant Node, can be installed over a dock door to automatically register inbound and outbound goods.
- **Conveyor systems:** For high-volume automated lines, RFID read points with a Vilant Node can track items as they move.
- **Item verification:** In manufacturing, a Vilant Node on an RFID reader can verify that the correct parts are being used. It can link finished parts with their containers in the Warehouse Management System (WMS), making objects identifiable at any time.

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Your Global Automation Partner

Creating a Sustainable Supply Chain for the Future

Prevent delivery errors & reduce CO_2

As more and more companies embrace methods to improve sustainability, RFID technology has become a tool to help accomplish that goal. TURCK recognizes that promoting greater sustainability in logistics and production, companies can reduce waste and emissions through more efficient operations. Key benefits include fewer errors and returns, optimized transport and energy use, and improved tracking of reusable transport items (RTIs), all contributing to a lower ecological footprint. TURCK offers solutions like shipment calculators and RFID systems for warehouse, RTI, and supply chain management to help companies drive toward these sustainability goals.

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Three methods to improve Sustainability

1. Loading control

RFID-supported loading control guarantees the correct handling of shipments and transparent shipping processes even at peak times.

Key sustainability impact

Loading errors lead to return shipments and additional deliveries, which can be easily prevented with RFID support.

2. Warehouse management

RFID-supported warehouse and inventory management ensures locatable goods and up-to-date stock levels at all times.

Key sustainability impact

Accurate inventory data allows precise planning for the energy-efficient utilization of production facilities and transport vehicles.

3. RTI management

RFID-supported management of pools for returnable transport items (RTIs) uses item transparency for better return rates and on-time supply.

Key sustainability impact

RTIs are more sustainable than disposable packaging. RFID-supported RTI management ensures more efficient transport.

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Together, we'll shape your Smart Factory

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