

# T-MAC Plus technical solution

**Architecture**

It includes: workstations, engineering stations, servers, printers and communication with field elements like: presets, card readers, weight bridge or tank gauging system. It is also possible to interface with ERP, besides DCS, ESD and F&G.

**800xA System**

System 800xA's 'xA' stands for Extended Automation and utilizes the Industrial IT architecture. It is an integration platform with unparalleled connectivity to enterprise and plant systems, applications, devices that improves operations, engineering, control and maintenance to provide a collaborative environment where real-time decision making is a reality.

**Redundancy**

Terminal Management System is designed over redundant and fault tolerant servers, making the system reliable and safety in this critical process. Servers such as Aspect, Connectivity & T-MAC Plus server. Server that manage T-MAC Plus application is redundant and fault tolerant without data loss. When one server fails, the failover to redundant server won't require any user intervention.

**Available protocols**

- Spec Card readers
- Helios Card readers
- Accuload III
- Microload
- Contrec
- Vega II
- Toledo weighbridge
- Saab TGS
- Enraf TGS

Additional protocols required can be developed. For more information please contact to your local ABB office.



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**ERP Connection**

Focused on improving the data management T-MAC Plus is able to communicate with Enterprise Resource Planning (such SAP) using web services as standard interface method, helping to increase accuracy and speed in execution and invoice cycle.

**Centralized system**

When different facilities have to be communicated to or from central dispatching, this structure can be managed with T-MAC Plus, ensuring the correct operation and monitoring the receipt and dispatch of product at all times, through the remote communication with each facility.

**Web forms**

T-MAC Plus provides a set of forms to enable the operator to enter and view data. The forms are configured according to the functionality required in access control, inspection, sealing, order entry, etc. Customer will be able to change easily the information displayed according to new requirements using the tool "T-MAC Plus Framework", included in the product.

**Service support for customers**

As terminal automation contributes to operational success in safety and efficiency mode by increasing profitability, service support has become one of our strengths considering our worldwide presence.

Services Support options:

- Telephone support 24/365
- Software upgrades
- Preventive & corrective maintenance

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# T-MAC Plus Terminal Management System solution for oil, gas and chemical industries

# T-MAC Plus The solution to achieve success in your process

ABB is provider of Terminal Management System with a solution of software and hardware named T-MAC Plus, created as a result of more than 20 years of experience in the field and our knowledge in automation systems for oil and gas businesses. Terminal management system procedures involve processes such as the access control, loading, printing, product movement, balance, inventory, ERP Connection or site exit.

- Traditionally, terminals were manually operated but with new technology available now it is possible to increase efficiency, safety and security during the operation process while reducing risk and costs.
- Improve terminal efficiency: reduce inventory, more flexible operations, minimize downtime.
  - Improve terminal safety, for reliable operations in hazardous environment.
  - Reduce risk of loading incorrect quantity of product.
  - Real time control of product amount delivered.
  - Communication between local terminals and headquarters facilities.

**T-MAC Plus the best option available**

- Scalable: It is possible to start from one simple plant with access control and load control and grow to manage a set of complex plants with one central dispatching.
- Compatible: T-MAC Plus gives also the interface with the ERP system used by the customer. The method to be used into the interface with ERP can be adjusted to the requirements of each project.
- Flexible: It is structured in functional modules which guaranties all the terminal operations, from access control to generation of reports.
- Complete: It is possible to configure and install separately the Terminal Management System and the Control System depending on the project, however ABB can offer a total solution including: T-MAC Plus, DCS, F&G and ESD.

**References**

Important customers around the world confirm the high quality of the product, supported by a deep know-how in terminal automation field. References encompass all types of distribution, storage and bulk terminals such as: chemical, petrochemical, refinery, biofuel and marine facilities.

**T-MAC Plus Modules**

- Receipt / dispatch by truck
- Receipt / dispatch by barge
- Receipt / dispatch by rail wagons
- Receipt / dispatch by pipeline
- Access control
- Inspections
- Kiosk functionality
- Automatic bay/berth allocation
- Sealing
- Blending in loading arm/ in tank/ in line
- Additive in loading arm / in line
- Automatic tank farm control
- Movements Scheduling
- Hand held functionality
- Self-consuming
- Product balance
- Multi-operator management
- Rebranding
- Graphics
- Reports

# Provide a complete automation solution in your terminal facility with T-MAC Plus

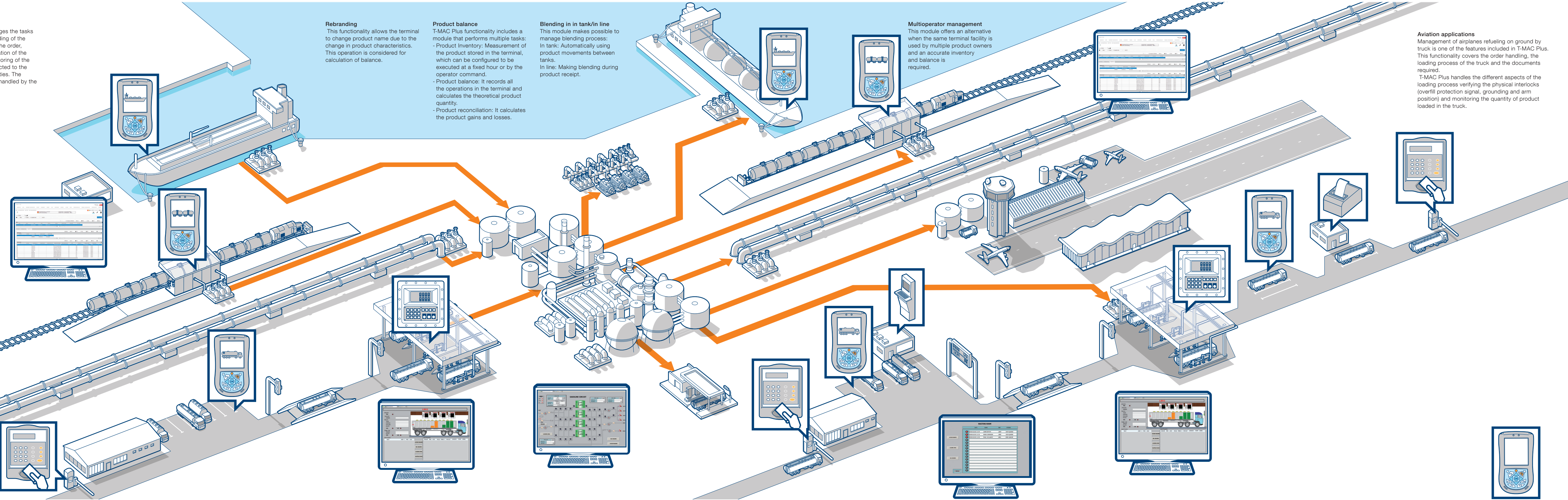
**Receipt / dispatch by rail wagons**  
 Module for rail wagons receipts and dispatched controls and monitors the operations implicated in this process, including order handling and different ways to measure the quantity of product: it calculates the quantity based on the changes in the tank connected to the rail train or using electronic presets. The wagons are identified by the operator and the information stored in the system to be managed by Access control module. T-MAC Plus also verifies the compatibility of the product stored in the tank connected to the wagon with the product to be received.

**Receipt / dispatch by pipeline**  
 The operations needed to receive and dispatch the product using pipelines are managed by this module. T-MAC Plus handles the order, monitors the volume change in the tank connected to the pipeline to calculate product quantities for stock and balance, it also verifies the compatibility between the product stored in the tank and the product available in the pipeline.

**Additive in line**  
 This module manage the additive process at different points in the terminal:  
 In line: Additive process during product receipt.

**Receipt / dispatch by truck**  
 T-MAC Plus provides the functionality needed to monitor and control the loading and unloading of the product by truck. The module includes all the operations involved in the process starting with the verification of the order, the identification of the truck, trailer and driver at the loading bay. If required, the communication with the electronic preset to be informed of product quantities, the monitoring of the physical interlocks (grounding, overfill protection, vapor recovery arm position and loading arm position) as well as the generation and printing of the bill of lading and other required documents. In case of solid or heavy products, the quantities are calculated via weighbridge.

**Receipt / dispatch by barge**  
 This module in T-MAC Plus manages the tasks to perform the loading and unloading of the product by barge: verification of the order, monitoring of the process, generation of the transaction documentation, monitoring of the volume change in the tank connected to the barge to calculate product quantities. The identification of the barge will be handled by the Access control module.



**Access control module**  
 The access control module allows the trucks to entry and exit the plant, ensuring the security by validating driver access through card readers. Sometimes an access control can be required at loading bay or weight stations inside the facility. The module also checks data for ship or train to load or unload in the terminal. Several card reader devices are used: Proximity, RFID, iris scanner, etc.

**Inspections module**  
 For safety and security reasons a certain number of physical checks of the vehicles (trucks, trailers, rail wagons or barges) must be required by the terminal procedures. This inspection list may vary from each customer and therefore, this module gives a configurable solution to be adapted to almost every terminal: The data to verify that the inspection list is fulfilled can be introduced in the system using the application web forms or by a handheld device communicated with the system.

**Automatic tank farm control**  
 This functionality makes possible the integration of the tank gauging system with T-MAC Plus to obtain information about temperature, net volume, gross volume, level, etc. with the aim to calculate product inventory, balance and stock reconciliation. Calculation by strapping table is also available. Furthermore, product movements between tanks can be monitor/control also with this module. Custody transfer certificate may be can be required by local authorities.

**Movements scheduling**  
 This feature provides a valuable tool to manage the movement operations in the terminal facility. All Inter tank transfer operations product receipt or product dispatch orders are managed by the system and shown in a Gant chart in order to help you to improve the efficiency of the terminal. The module gives alarms in case that the same route is being used to perform different movements at the same time, etc.

**Self-consuming**  
 Other activity than can be done inside a terminal facility is product dispatch for terminal own requirements like heating, diesel pumps etc. or internal loads for vehicles that operate in the terminal. T-MAC Plus handles quantity of product and type of product to be considered in the balance.

**Kiosk module**  
 With this module it is possible for the driver to prepare the loading disposal before going to the loading bay. The loading orders available for the driver are shown so that the driver may select the proper one and distribute the quantities in the different compartments.

**Automatic bay/berth allocation**  
 Truck driver is informed of the suitable loading bay for his loading order, according product and bay availability. This information is shown at indoor or outdoor display. The system is also able to schedule berths allocation for loading and unloading operations at the port based on product type, physic characteristics of barge, etc.

**Blending in loading arm**  
 T-MAC Plus manages the mix of different products stored in the terminal to generate a new product. Blending can be done mixing the different products:  
 In loading arm: During loading process.

**Additive in loading arm**  
 This module manage the additive process at different points in the terminal:  
 In loading arm: Together with the product dispatch process.

**Sealing**  
 After loading process, compartments can be sealed (e.g using a plastic stripe identified by a bar code) for security reasons. This module manages the seal associated to each compartment of the truck. This information is printed in the bill of lading (BOL).

**Hand held functionality**  
 The Handheld module of T-MAC Plus allows the use of a hand held device to perform manual tasks by the operator such as inspection, sealing, etc. The hand held device may be connected to the system via a Wi-fi connection (on line mode) or store the information internally and download it later in system (off line mode).

**Rebranding**  
 This functionality allows the terminal to change product name due to the change in product characteristics. This operation is considered for calculation of balance.

**Product balance**  
 T-MAC Plus functionality includes a module that performs multiple tasks:  
 - Product Inventory: Measurement of the product stored in the terminal, which can be configured to be executed at a fixed hour or by the operator command.  
 - Product balance: It records all the operations in the terminal and calculates the theoretical product quantity.  
 - Product reconciliation: It calculates the product gains and losses.

**Blending in tank/in line**  
 This module makes possible to manage blending process:  
 In tank: Automatically using product movements between tanks.  
 In line: Making blending during product receipt.

**Multipoperator management**  
 This module offers an alternative when the same terminal facility is used by multiple product owners and an accurate inventory and balance is required.

**Aviation applications**  
 Management of airplanes refueling on ground by truck is one of the features included in T-MAC Plus. This functionality covers the order handling, the loading process of the truck and the documents required.  
 T-MAC Plus handles the different aspects of the loading process verifying the physical interlocks (overfill protection signal, grounding and arm position) and monitoring the quantity of product loaded in the truck.