



FUNCTIONS

CRYOGENIC-GASES TERMINAL AUTOMATION SYSTEM

DESCRIPTION

CRYO.TAS is a freely scalable terminal automation system. It can be purchased as a turn-key overall system with our standard hardware, or integrated into your present system in parts. Below, you will find an overview of the functions of a CRYO.TAS system in the full development.

Further information on additional modules can be taken from the respective data sheets. The latest information is available at www.cryotas.com

FUNCTION OVERVIEW

- Graphical User Interface (GUI)
- Processing Functions
- Quality Management
- Logistic Functions
- System Functions

GRAPHICAL USER INTERFACE

COCKPIT

The cockpit permits a quick overview of the current status of a loading plant.

COCKPIT VIEWS:

- Active alarms and events of the overall system
- Released loading points
- Locked loading points
- Active loadings
- Pre-scheduled loadings
- Available products
- Locked products
- Last tank analyses
- Last filling point analyses
- Day balancing of all product groups



MASTER DATA

This processing area is used for administration of the company data, system users and their links to specific properties and rights.

FUNCTION OVERVIEW:

- Administration of the company and address data with definition of the company properties
- Definition of all users with rights
- Administration of the ID-system for persons and vehicles
- Allocation and administration

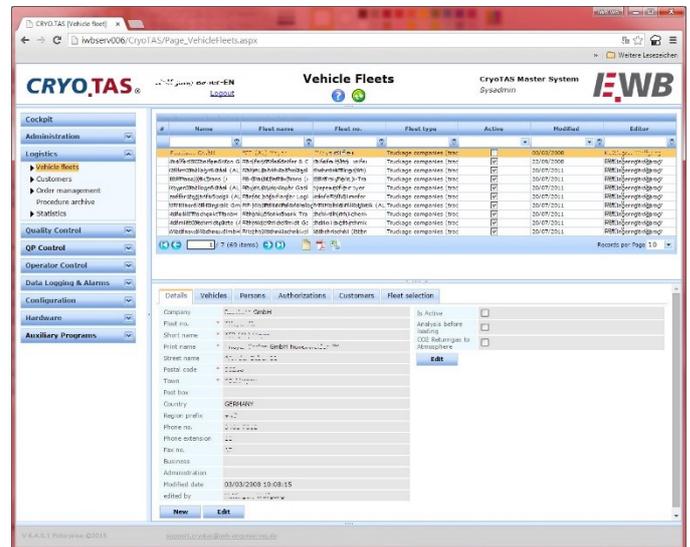


LOGISTICS

Here, you can find the administration of your customer data, the customer tanks and the fleets with vehicles. Loading orders can be pre-scheduled or manually entered subsequently in case of network failure.

FUNCTION OVERVIEW:

- Customer definitions with "Customer type allocation" (e.g. standard customer or third-party collector)
- Customer tank management, product assignment, delivery locations
- Vehicle and fleet administration, fleet management
- Definition of the delivery rights and selection limitations for forwarders
- Vehicle administration with definition of the permitted products, ADR data and vehicle data
- Scheduling temporary loading orders with up to ten delivery locations
- Assumption of loading orders from third-party systems
- Manual tracking of loadings according to the network or service failure
- Order archive with loading details
- Statistic evaluations: Product ranking, customer ranking
- Report generation

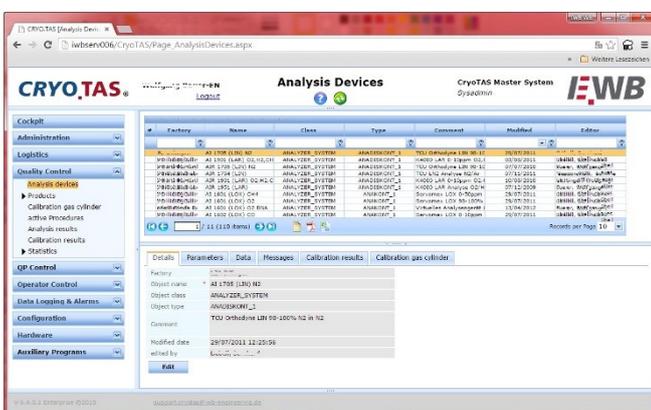


QUALITY MANAGEMENT

Quality control of the stored products, loaded products and the required test equipment is an important part of CRYO.TAS.

FUNCTION OVERVIEW:

- Administration: Definition and administration of all test equipment (analysis devices), product sources (storage tanks, pipelines), analysis tapping points and the calibration gases.
- All objects named can be freely parameterized. Objects with active alarms/events are marked in color.
- Product management: Product specifications and product assignments for product sources and tank vehi-



cles .

- Loading point assignment for product sources.
- Monitoring of the calibration gas cylinders for remaining gas pressure. Validation of all test gases. Unvalidated test gases are automatically locked for use.

MONITORING/SAFETY

CRYO.TAS has been specifically developed for use in unmanned systems. All processes run fully automated and are seamlessly monitored. Safety systems across several functional levels ensured compliance with all safety provisions and the loader obligations purs. to the ADR provisions.

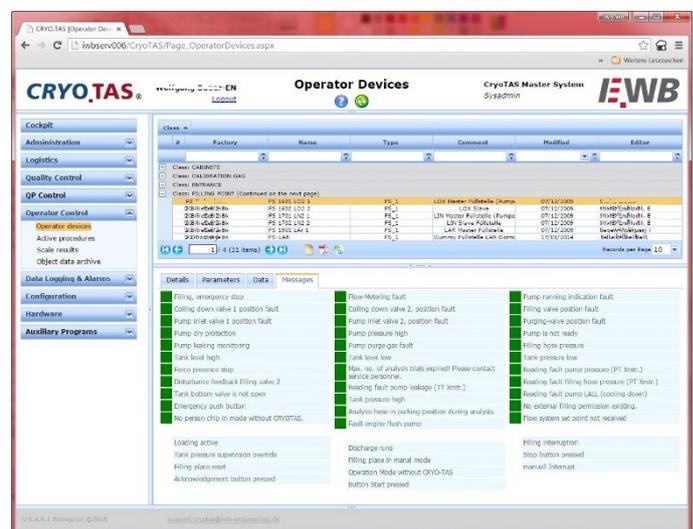
Possible system faults can be identified and localized quickly.

Production-relevant data are cyclically archived and can be recalled at any time. Filter functions permit limitation of data and simplify searches for production-relevant data, messages, events or alarms.

FUNCTION OVERVIEW:

- Monitoring of all objects (cabinets, loading points, factory gates,...). Defective objects are displayed with a red background and included in the alarm and event list. Every CRYO.TAS object can be called on a virtual alarm panel in the front end.
- Monitoring of active loadings with archiving of all process steps.
- Video monitoring of active loadings.
- Archiving of all object data (tank stands, production quantities,...).
- Transfer of loading-order related special notes for drivers.
- Transfer of delivery-site-related special notes for drivers.
- Remote control for released objects (e.g. open factory gates, triggering calibration or measurement, resetting a loading point or analysis point, filling a back-up tank, confirming alarms).

- Loading process monitoring for product purity with subsequent acceptance test certificate generation.
- Data archiving: Analysis results, calibration results
- Report generation



CONFIGURATION

CRYO.TAS is a relational data base system and works using object classes, object types and objects. Every object type has properties assigned that "inherit" newly created objects of the same type. This permits simple adjustments to special customer processes or changed framework conditions, e.g. due to changes to the law.

FUNCTION OVERVIEW:

- Factory and plant configuration:
 - Definition of the responsibilities
 - Configuration email dispatch
 - Definition of communication connections
 - Assignment of order types to a factory
- Order configuration (loading orders):
Orders are structured in logistics steps. Every logistics step is a self-enclosed unit. For order generation, logistics steps from the library can be combined into a new order type.
- Configuration of the safety messages:
Safety messages can be individually assigned to a loading point and an order type. This ensures that the associated messages for every loading type are generated and issued.
- Analysis configuration:
 - Definition of product groups (basic products)
 - Substance library with indication of the hazard class, hazard number and UN number
 - Configuration of the calibration gas types
 - Configuration of the analysis components
 - Configuration of the analysis points
 - Generation of batch analysis orders
- Logistics configuration:
 - Configuration of different customer types
 - Configuration of allocation management
 - Configuration of fleet types and vehicle types
- Translations:
Language library for all safety messages, system messages, system dialogs, master data contents and test certificate texts. The number of available languages can be chosen freely. At most, all operating system languages are available. The number of languages used is determined with the definition of the culture circles.
- Country configuration:
This section contains all country-specific master data. This includes possible weight limitations for road traffic or other statutory limitations and provisions. The parameters necessary for this can be controlled individually.
- Certificates and documents:
Definition and generation of the document templates for weighing vouchers, acceptance test certificates, batch certificates, etc.
- User management:
Generation of user roles and their assignment to system users.
- Authorization configuration:
Processing and generation of authorization types (e.g. ADR test, loading rights,...)
- Responsibility configuration:
Definition of responsibility roles for a factory. Assigned persons are informed automatically by email on various system conditions or system evaluations.

PROCESSING FUNCTIONS

EXAMPLE LOADING PROCESS

FACTORY ACCESS

CRYO.TAS checks the works access permit based on the driver or vehicle identification. All access rights can be limited in time. Third-party collectors require a valid booking code in addition to their personal RFID transponder. This booking code is automatically generated at scheduling of a loading order and entitles to a one-time loading.

Inspections:



- valid RFID transponder
- third-party collector with valid booking code

INBOUND WEIGHING

The driver must identify at the SCALE.TAS terminal. This also applies to all vehicle parts. After identification, CRYO.TAS checks all rights. If these rights are not met, the user can call a pre-scheduled loading order or generate a loading order with the corresponding rights. Exclusion criteria under competition law prevent insight into third-party data (competitors). Only customers assigned to the forwarder can be selected. Based on the customer tank master data, CRYO.TAS will automatically recognize the required product and loading type.

Then an inbound weighing is tripped automatically. The weight data and the vehicle data are used to calculate the remaining amount in the vehicle. The system checks the weight limits from the vehicle data and the road traffic rules of the site and determines the maximum payload from this. A volumetric inspection of the container is also

performed and used for loading quantity calculation. All results are interim-saved in the system and archived .

Inspections:

- Order generation rights for operators
- Valid ADR certification for driver and vehicle parts



- Weight inspection, volumetric inspection
- Residual quantity determination

LOADING OADING

After inbound weighing, filling of the vehicle may start at the loading point. For this, the container vehicle and the driver/operator must be identified again. Identification ensures that there no mistakes of the analysis removal point, the loading point and the associated acceptance test certificate are possible. This is also a basic requirements of GMP Appendix 6.

Inspections:

- Loading order with inbound weighing present?
- ADR inspection of the logged-on operator.
- Inspection of the loading authorization of

the logged-on operator.



- Inspection for valid certifications of the operator in loading orders for medical or food-technical products.

FUNCTIONS OF LOADING

When all prerequisites are met, the driver is shown safety messages in the driver's/operator's native language, depending on loading type. Each of these messages must be confirmed. Every display and confirmation is archived in the system. All parameters needed for loadings (target values, etc.) are now handed over to the loading control of the CRYO.TAS system.

Possible loading types:

- Loading only (without quality review)
- Analysis only (quality test of the tank content)
- Loading with pre- and post-analysis
- Loading with post-analysis
- Loading with pre- and post-analysis with product blending (for mixed products)
- Unloading with pre-analysis
- Third-party weighing

Depending on the loading type needed, the analysis system is started automatically on demand. All analysis results must meet the specifications. If this is not the case, the process cannot be continued. In an emergency, a product downgrade by the scheduling is possible if a specification is not met. When all necessary steps are properly executed, loading can be completed. Deactivation in CRYO.TAS systems takes place automatically with quantity recording.

Additional function loading point:

- Loading process control
- Emergency exit system
- Forced presence monitoring or optionally deadman switch
- Quantity recording

OUTBOUND WEIGHING

If loading has been correctly completed, the outbound weighing can be performed. For this, the operator uses the scale terminal, as in inbound weighing. The system uses identification of the container and inspection of the completed logistics steps for an automatic outbound weighing. All weighing data are also achieved in the system. After weighing, all necessary weight tests are performed. Only when no limitations are violated can all loading documents be printed. If an interface for data export has been defined, all data are exported for invoicing at once.

Inspections:

- Weight inspection according to road traffic rules
- Printout of the loading documents and test certificates
- Locking at overloading

QUALITY MANAGEMENT

TEST MEDIA/VALIDATION

Correct and proper function of the test equipment is a basic prerequisite for quality assurance. For this, CRYO.TAS offers comprehensive test routines and evaluations.

FUNCTION OVERVIEW:

- Generation of free calibration intervals for every test equipment
- Automatic test gas activation
- Evaluation of the measuring data before calibration end (validation)
- Long-term recording and archiving of the measured values for determination of device drifts
- Monitoring and validation of the test gases
Expired test gases are locked. In this case, no calibration is possible anymore and the affected test medium is locked automatically.
- Residual gas pressure monitoring of the test gas cylinders
- Defective calibrations or device faults lead to locking of the affected test equipment and thus locking of the affected products.

QUALITY ASSURANCE

CRYO.TAS shall automatically monitor all available products, generate the product availability of the work from this and automatically generate batch certificates for medical and/or food-technical products.

FUNCTION OVERVIEW:

- Cyclic storage tank analyses with specification tests of the assigned products. Unmet specifications lock the respective products.
- Batch tracking for medical and food-technical gases.
- Automatic vehicle container analysis based on the customer tank data after

the end of filling.

- Freely configurable repeat rate at defective analyses or non-compliance with specifications.
- Different free threshold definitions for pre- and post-analysis.
- Evaluation with error analysis
- Statistic evaluation
- Individual flushing time parameterization
- Archiving of all analysis results (history) with graphical evaluation for each analysis sampling point.
- Deactivation of analysis devices for maintenance work.



ACCEPTANCE TEST CERTIFICATES

As a result of the quality review of the different analysis sampling points, the system generates the acceptance test certificates for loadings or batch protocols of many different products in the storage tanks. All documents are archived in PDF format in the database system and are applied with a unique document number and order number.

FUNCTION OVERVIEW:

- Generation of 3.1 (Standard) and 3.2 acceptance test certificates
- Archiving of all documents with unique order assignment in the system.
- Generation of customer-specific test certificates in the respective local language of the customer.
- Automatic email dispatch of acceptance test certificates to customers.
- Automatic email dispatch of batch certificates to authorization office.

Produktspezifikation		LDA 2.5 / ...	
Produktmerkmal	Anforderung	Geplanter Rang	
CO2	% (WV) <= 89,50		
CH4	ppm (WV) <= 80,00		
CnHy	ppm (WV) <= 20,00		verfahrensbedingt
CO	ppm (WV) <= 5,00		
CO2	ppm (WV) <= 10,00		
H2O	ppm (WV) <= 5,00		verfahrensbedingt

removed automatically.

- Own scheduling of loading orders by drivers with the corresponding authorizations right at the scale terminal.
- Allocation management for third-party collectors per work, for product group or product.
- Definition of minimum quantities in storage tanks
- Time recording of all actions during a loading order.
- Product downgrade if a specification is not met.
- Monitoring of all loader obligations pursuant to hazardous goods regulations.

THIRD-PARTY ADMINISTRATION

CRYO.TAS offers the system owner additional function for reduction of the administrative effort for master data maintenance. Forwarders and third-party fleets can independently update the data of their vehicles and drivers. With the definition of the access rights for third-party administration, third-party companies have access to the required data of the system.

Separate client software is not needed for this function. The add-on module of third-party administration permits this function.

LOGISTICS FUNCTIONS

SCHEDULING

CRYO.TAS can be used both as a dedicated scheduling system or in connection with third-party systems.

FUNCTION OVERVIEW:

- Definition of up to 10 delivery sites per loading order.
- Train formation, container loading and combined traffic; EKW loading.
- Generation of booking codes for loadings of third-party collectors.
- Free definition of time windows for loading orders. Unexpected loading orders are

FUNCTION OVERVIEW:

- Administration and data maintenance of all vehicles assigned to the fleet.
- Administration and data maintenance of all drivers assigned to the company.
- Maintenance of the global authorizations (ADR, loading authorizations for medical or food-technical products,...).
- Automatic transmission of the reserved booking code of the owner and reporting the current loading status.
- Insight into the current quantities of the assigned product allocations.
- Reporting all vehicles and drivers the authorizations of which expire within a

SYSTEM FUNCTIONS

CRYO.TAS can not only be used for loading cryogenic air gases, but also for loading liquefied CO₂, H₂ and gaseous H₂. The integrated "Multifactory function" permits processing different loadings within a work site. If several loading works are present, all data may be synchronized via a central server. The smart synchronization means that only data relevant for a works type will be reconciled.

FUNCTION OVERVIEW:

- Free scalability of the overall system.
- Individual adjustment to company-specific logistics processes without structure changes.

- Intelligent data exchange in use at several sites by differentiation between factory type and global and local data.
- Country-comprehensive use by multiple languages within the service cluster.
- Export of settlement-relevant data in third-party systems (ERP-systems).
- Simple integration into the present IT structures.
- Simple connection of present third-party controls using OPC servers.

CRYO.TAS THE OVERALL CONCEPT

Tank-Management

- Product availability monitoring
- Lock and unlock of products
- Batch creation
- Special functions for medical- and food-products
- Calculation of loaded quantities

Analysis

- Automated gas path switching
- Test equipment- and calibration gas monitoring
- Auto-calibration
- Locking and unlocking of test equipment
- Connectivity to a wide range of sample point types (e.g. pipeline)

Entrance

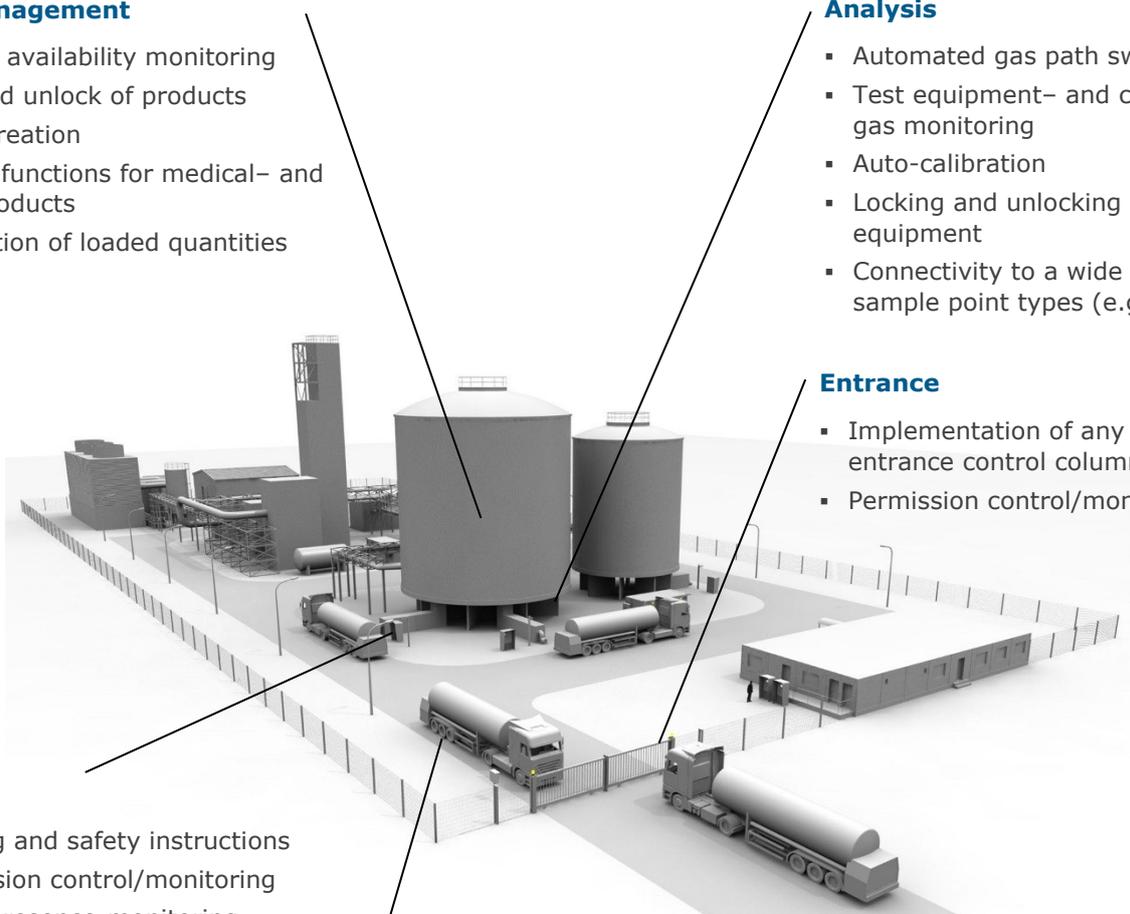
- Implementation of any number of entrance control columns
- Permission control/monitoring

Loading

- Loading and safety instructions
- Permission control/monitoring
- Force-presence-monitoring
- Quality assurance/analysis
- Blending functionality
- Off-loading
- Special functions for medical products
- Control of all field devices

SCALE.TAS

- Usage of any number of weigh bridges
- Free usage of entry- or exit weigh bridge, or both
- Creation of loading/transportation documents
- Quota control



INFORMATION

Would you like more information about the CRYO.TAS system? On the Internet you always get the latest information, or contact us directly. We are always ready to show you the performance of the system in a live presentation.

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