



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

Tankvision Professional NXA85

Tank Gauging

Advanced tank gauging and inventory management system



Application

Tankvision Professional is specifically designed for operators of bulk storage facilities, marketing terminals, refineries and pipelines. It is designed to handle all the data acquisition, supervisory control and monitoring required in a single fully integrated solution.

Tankvision Professional integrates all major types of tank measurement instruments into one system.

All measured and calculated tank parameters are accessible to your tank farm and terminal operators as well as to connected host systems.

Multi-user operation is provided by the inbuilt Web Server offering the opportunity to access data at any connected location (local/remote) e.g. for administrative and accounting purposes.

Your benefits

- Approved for custody transfer applications according to NMI and PTB (in preparation)
- Integrated Web server
- Operates on standard PC under Microsoft Windows 2000, XP, Vista and Windows 7
- Intuitive User Friendly Graphical User Interface (GUI)
- Supports most types of Tank Gauge, Float/Transmitter, Servo, Radar, Hydrostatic, etc
- Provides Interfaces to most Legacy Host Systems
- Real-time & Historical Trending
- Scheduling of Gauge Commands, Reports and Backups
- 3rd party protocols (Enraf, Saab) and drivers available for virtually any Device
- Capable of handling 400 tanks
- Calculations for most used API/ASTM Tables
- Integrated SCADA Configuration capability
- OPC Data Access Server
- ODBC Connectivity based on SQL

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Function and system design

Application

Tankvision Professional is a scalable tank gauging and inventory management system for all kind of bulk storage facilities. Applications range from small authorized distributors through to the largest storage terminals and refineries.

It is designed to handle all the data acquisition, supervisory control and monitoring required for an easy and save management of the entire facility in a single fully integrated solution.

Its connectivity to both old legacy and new modern instrumentation facilitates the upgrade of existing installed base in convenient stages.

The system is available as a single standalone operator station or as a full client-server system. The system is designed to run on standard PCs with Windows XP, Vista or Windows7 operating systems and Windows server (e.g. 2005, 2008) platforms.

Tankvision Professional can be applied in a fully redundant architecture (hot standby).

Gauges

The system enables seamless integration of all major types of tank level, temperature and density/mass measurement gauges.

Tank gauges are connected via Tankvision Multi Scan, Tank Scanner, other 3rd party field communication and acquisition units or directly to according communication cards fitted into the Tankvision Professional workstation PC.

Display

Parameters such as level, temperature, pressure, density, mass, flow rate, gross and standard volumes are calculated continuously and displayed. Up to 400 tanks are supported¹⁾. Tankvision Professional offers numerous visualizations of tank inventory data, e.g. a complete overview of connected tanks in a graphical or grid view, real time or historical trending and some more specialized views. Most of these screens can be customized to user requirements.

In addition, Tankvision Professional offers SCADA functionality to create screens according to user requirements including valves, pipes, pumps and motors.

Connections

The data can be distributed using ODBC, OPC, Web based technologies and Modbus (TCP or RTU).

Approvals

A certification by NMI and PTB is in progress at the time of creation of this Technical Information.

Inventory Calculations

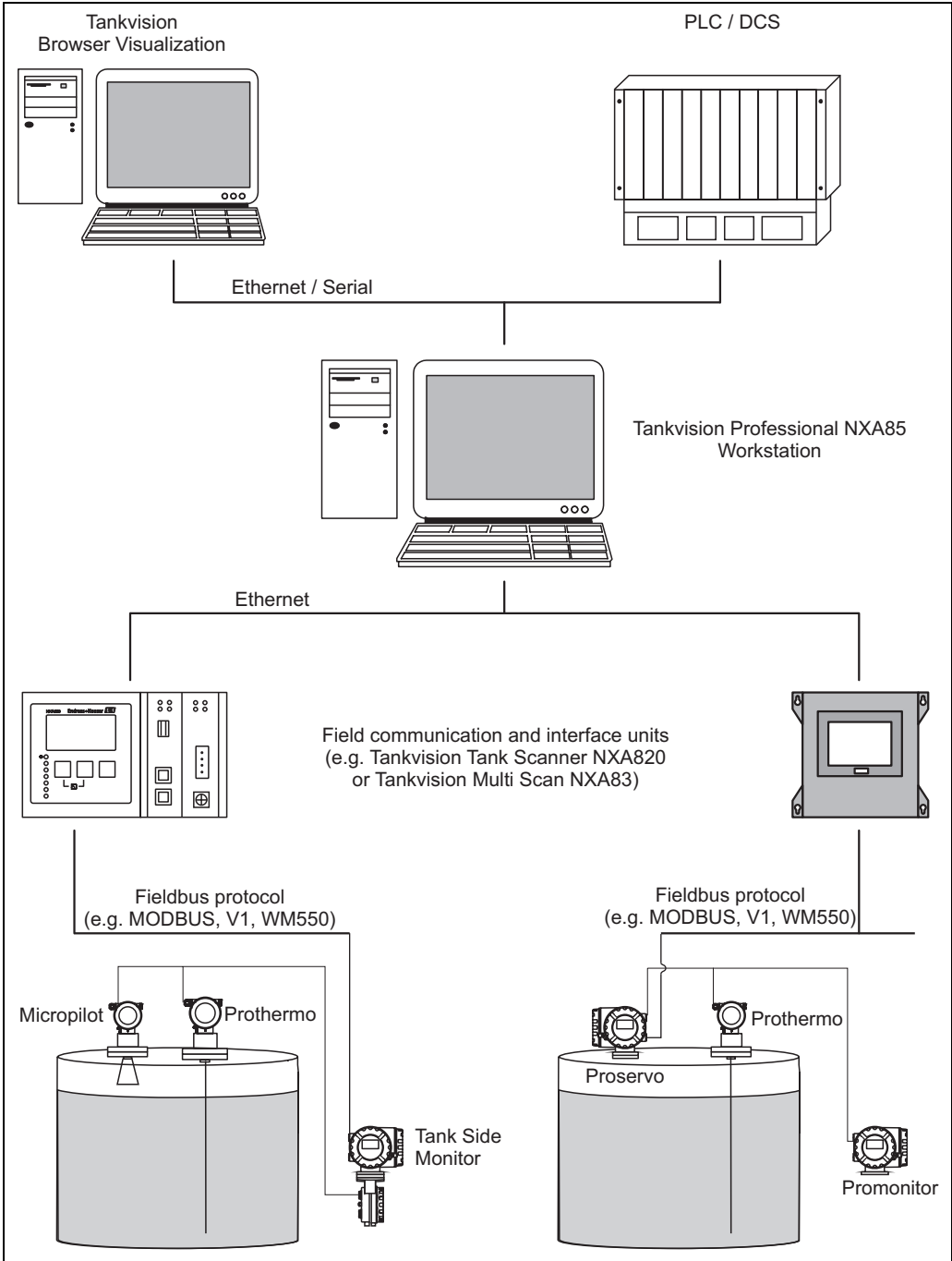
Tankvision Professional offers most used inventory calculations according international standards like API and ASTM.

1) 200 in fully redundant mode

System Overview

Stand alone

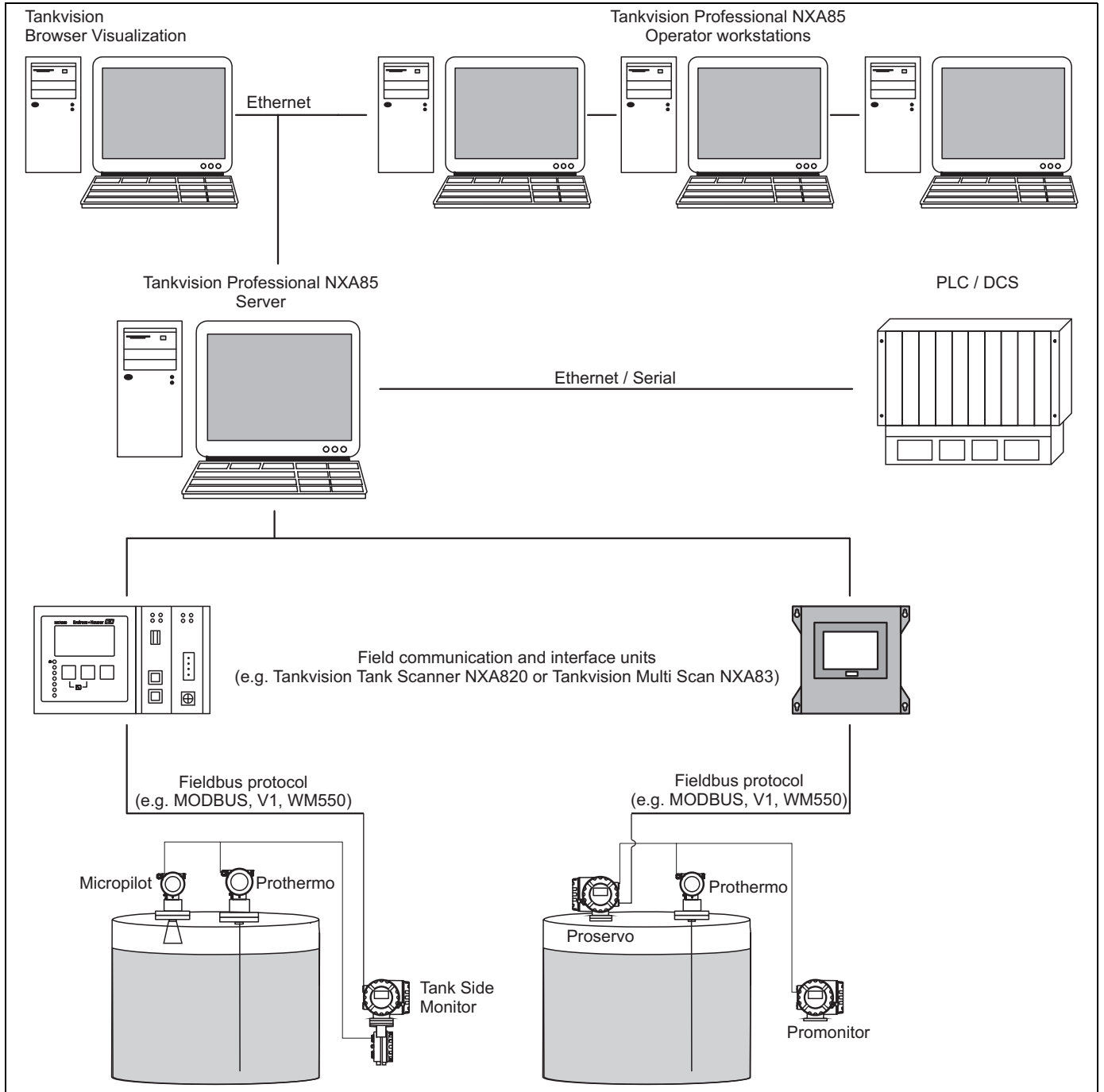
The following general architecture represents the common architecture for small depots, terminals and even small refineries. It consists of a single standalone operator work station, including a single PC using Microsoft Windows Operating System and running Tankvision Professional. The PC can be fitted with multiple serial ports and each port can be configured to act as a host or slave. A field interface is used to collect data from external devices such as level and temperature gauges. A host interface is used to provide data to a higher level system either via OPC, Modbus or Web interface generally for inventory management, stock control or process. Tankvision Professional is provided with a powerful web server. This allows the distribution of data to any desktop computer with a browser like Internet Explorer. The browser user interface includes most of the features available in Tankvision Professional. A number of screens are interactive and allow functions like sending gauge commands.



Server Client architecture

If multiple operator work stations are required, a client server architecture is normally provided. A central server is used to collect data, and make that available to a number of client operator stations via an Ethernet network. The server will run on a Windows Server platform, SQL Server and the client/server version of Tankvision Professional.

The Client Operator Stations are based on a standard PC's, running a windows operating system. Each Client Operator station has the full functionality of the Tankvision Professional software and operates just like the Standalone version.



Requirements Hardware / PC

Recommended PC Specifications

- Windows® XP (SP 3) / Windows® 2003 Server R2 / Windows® Vista / Windows® 7
- 40 GB of hard disk space
- 2 GB RAM (Windows® XP) / 4 GB RAM (Windows® 2003 Server / Vista / 7)
- 2 Ghz Dual Core processor
- 1,280 x 1,024 or higher monitor resolution
- CD-ROM
- If Enraf CIU656 GPU, CIU Prime GPU, Saab FCU2160 has to be connected, a serial port on the PC is required.

Operator Interface and functions

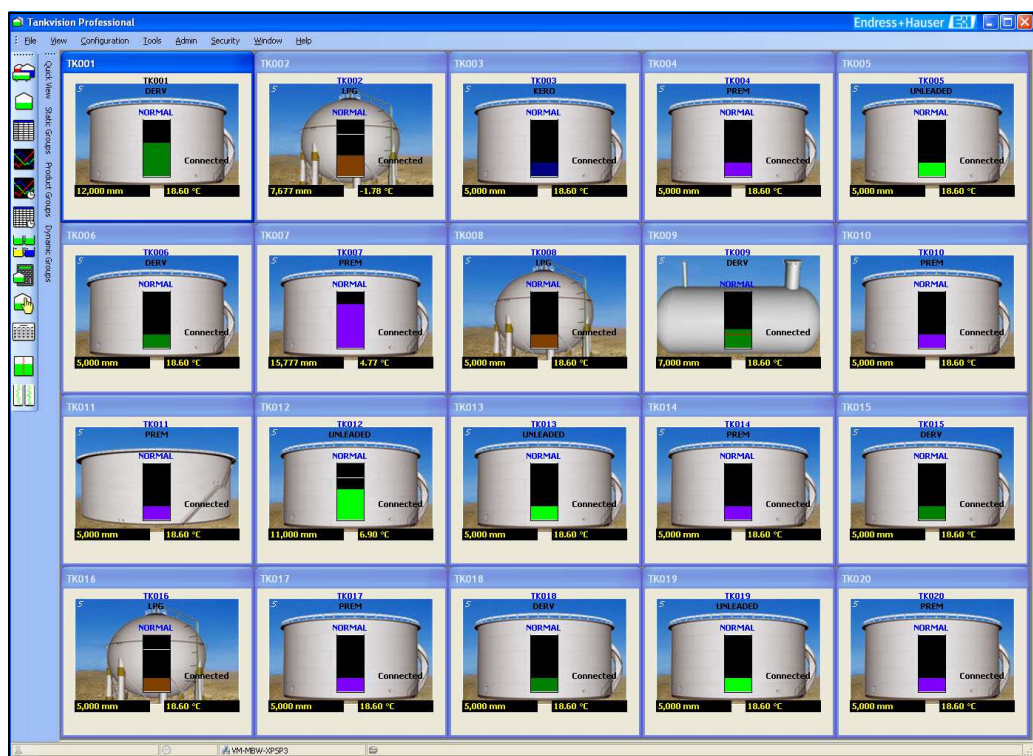
Operator Interface

Tankvision Professional takes advantage of the intuitive nature of Windows based Graphical User Interfaces (GUI's) and multi-tasking, allowing multiple Windows to be opened simultaneously and allowing the use of other third party applications such as Microsoft Office suite to be run simultaneously.

Displays are loaded very quickly, can be scaled, minimised, maximised and moved around so that the operator can set the desktop as required.

Main Page

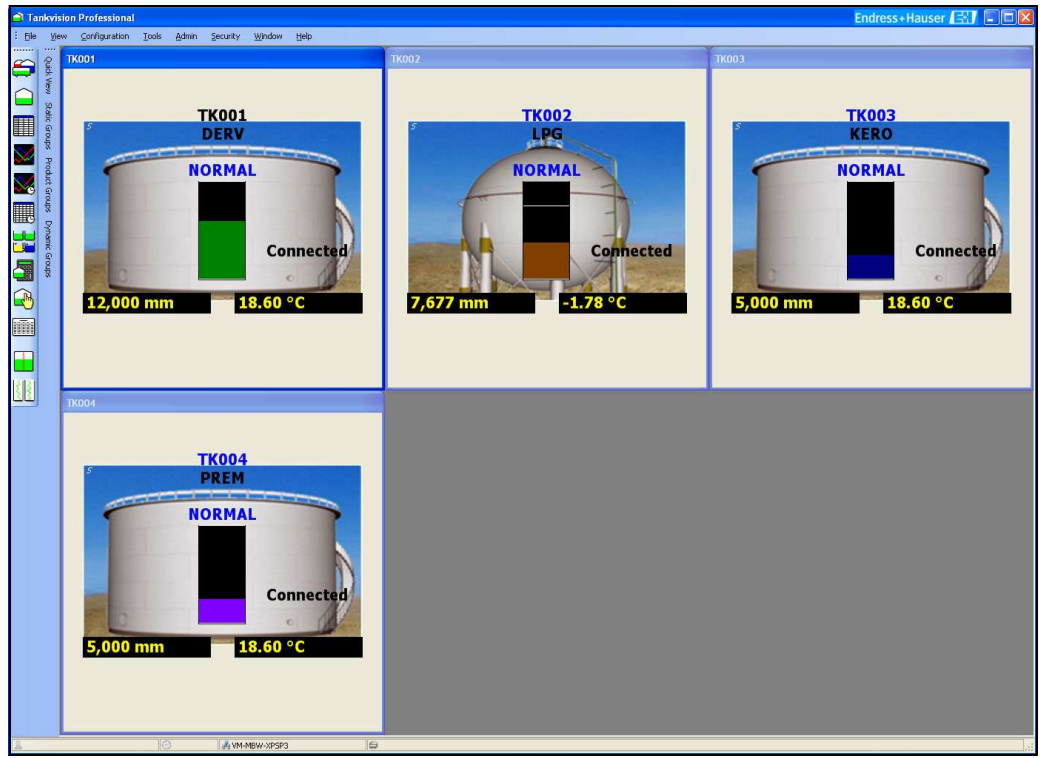
The first Graphical user Interface is the Main Page. This page provides an overview of all tanks in a set of sizable graphical Windows. The Main Page is the centre console from which all other functions can be quickly and easily accessed. Navigation through the different screens is simplified through the use of Toolbars, menus and short-cut links. From the Main Page the user can send gauge commands through a context sensitive pop-up menu. Tanks can be filtered on the Home Page using the Grouping features available.



Main_Page

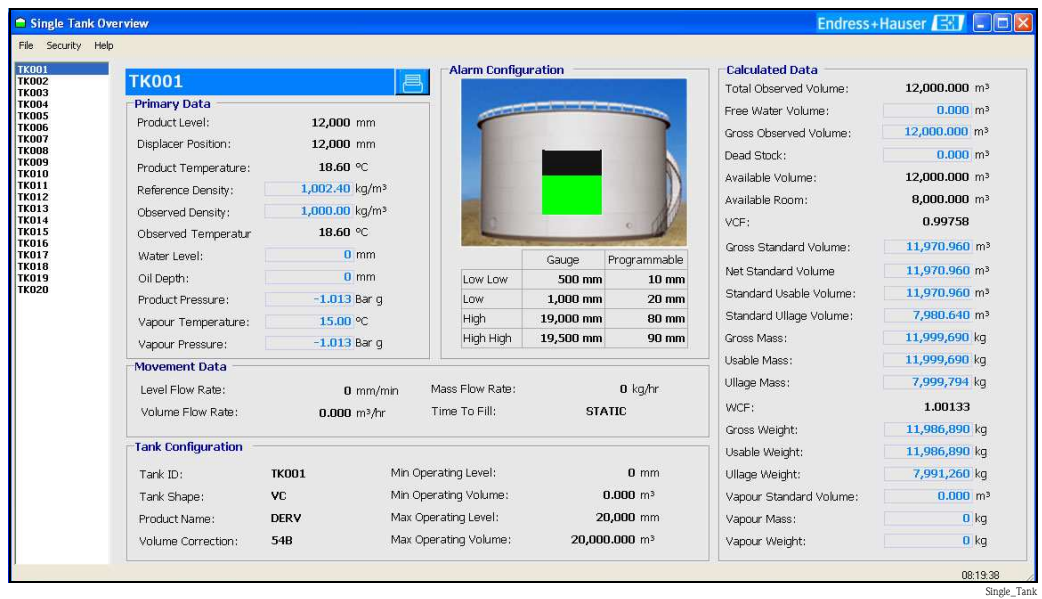
Grouping

The system has a range of different grouping strategies, some are user defined and others are automatic. User defined groups are configured by the user. Each group has a name, and the user defines which tanks will be displayed within that group. User Defined groups are available for use in the Home Page and Grid View. The Automatic groups are changing dynamically according to fixed criteria. For example, the 'Moving group' contains all tanks that are defined by the system to be moving.



Single Tank

The Single Tank Detail display provides a detailed overview of all data for a single tank. The data includes all live and calculated values, alarm levels, flow rates and other configuration parameters. In addition the Single Tank Detail screen provides quick access to the Density Profile and Temperature profile displays. The user can print a report of the single tank detail data.



Grid View

The Grid View display is a tabular list of tank data similar to a spreadsheet. The system comes with several pre-defined views and provides tools to the user to configure their own customised views. Gauge commands can be sent from Grid View using the pop-up menu.

Tank ID	Product Name	Alarm Status	Product Level mm	Product Temperature °C	Water Level mm	Reference Density kg/m³	TOV m³	Available Room m³	Level Flow Rate mm/min
TKD014	PREM	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD015	DERV	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD013	UNLEADED	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD011	PREM	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD012	UNLEADED	OK	11,000	6.90	0M	1,000.00M	11,000.000	4,000.000	0
TKD019	UNLEADED	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD020	PREM	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD018	DERV	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD016	LPG	OK	5,000	18.60	0M	1,000.00M	5,000.000	10,000.000	0
TKD017	PREM	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD004	PREM	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD005	UNLEADED	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD003	KERO	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD001	DERV	OK	12,000	18.60	0M	1,000.00M	12,000.000	8,000.000	0
TKD002	LPG	OK	7,677	-1.78	0M	1,000.00M	7,677.000	7,323.000	0
TKD009	DERV	OK	7,000	18.60	0M	1,000.00M	7,000.000	0.000	0
TKD010	PREM	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD008	LPG	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD006	DERV	OK	5,000	18.60	0M	1,000.00M	5,000.000	15,000.000	0
TKD007	PREM	OK	15,777	4.77	0M	1,000.00M	15,777.000	4,223.000	0

Alarm Event viewer

Alarms are displayed through a pop-up window. When a new alarm occurs the pop-up window is displayed showing the details of the alarm. The alarm can be acknowledged through the popup or the user can view the alarm details page for more information on the alarm. An audible warning and optional voice message can be configured to be annunciated with each alarm. In addition a relay contact can be in response to an alarm for drivers external sounders etc. All alarms are logged to a relational database in chronological order. When an alarm is acknowledged, the username of the currently logged on user and the date/time it was acknowledged are stored with the alarm record.

Severity	Description	First	Last	Active
Critical	Event Subsystem Failure	10/01/2010 12:00	10/06/2010 13:44	No
Low	Data Comms Host Started Successfully	06/10/2010 13:54	07/10/2010 08:32	No
Critical	TK001 - 1 : Hi Hi Alarm	07/10/2010 08:39		Yes
High	TK001 - 1 : Hi Alarm	07/10/2010 08:39		Yes

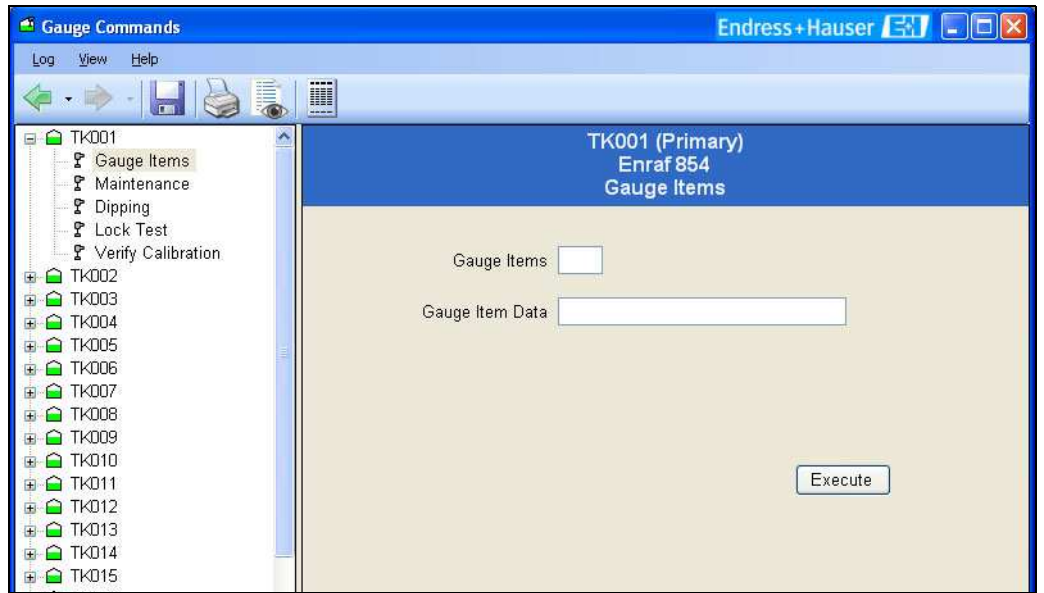
Alarm_Configuration

Alarm Configuration

Gauge and instrument alarms are normally raised at the gauge/instrument and communicated to the system over the field bus. All native gauge and instrument alarms are supported. In addition the system allows the user to configure a range of programmable alarms for product level, water level, temperature, density, flow rate, density and temperature deviation alarms, and difference alarms when a tank has two gauges fitted.

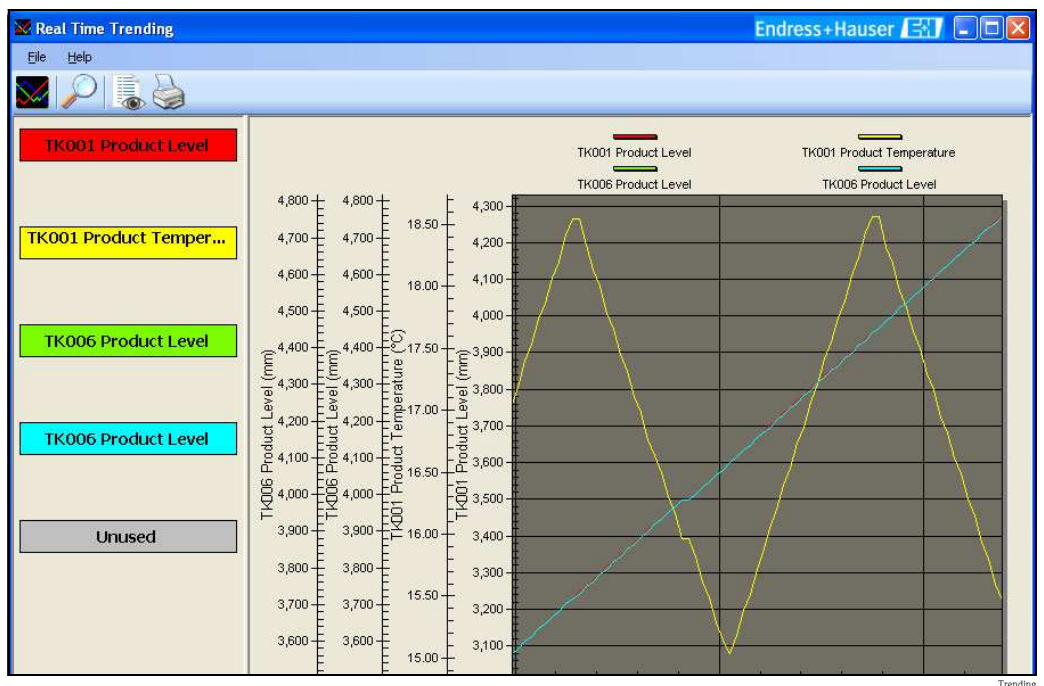
Gauge Commands

All the commands supported by the native instrument are generally supported by the system. A context sensitive pop-up menu is available from the Home Page or Grid View from which gauge commands can be selected. This module allows the user to schedule gauge commands. Gauge Commands can be sent to individual or groups of gauges and multiple schedules can be configured per day. Typically the scheduler is used to schedule a water and or density dip at a certain time of a day. The scheduler runs as a service.



Trending

Real-time and Historical trend views are available. The Real-time view allows the user to load up to the last 24 hours of history. The Historical trend view allows the user to view data between a start and end date. Trend data is produce by a Trend service, which logs data to the hard drive. Up to 6 trends can be displayed on the same graph. The Trend view modules also provide a zoom facility and a data cursor to identify the value of data points on the trend.



Reports

Reports can be printed on demand or scheduled. Reports are designed with Crystal Reports. The system comes with a number of pre-formatted reports, however, reports can be customised with the use of the Seagate Crystal Report Designer (has to be purchased separately). Alternatively Endress+Hauser supports you with a special customized report design service that is available as additional service.

Tank	Product	Product Level (mm)	Ullage Level (mm)	Water Level (mm)	Product Temp (°C)	Ref. Density (kg/m³)	Gross Observed Volume (m³)	Gross Standard Volume (m³)	Available Room (m³)	Usable Weight (kg)	Ullage Weight (kg)
TK001	DERV	12,000	8,000	0	18.6	1,000.00	12,000.000	11,970.960	8,000.000	11,986,890	7,991,260
TK002	LPG	7,677	7,323	0	-1.8	1,000.00	7,677.000	-0.001	7,323.000	DN 23	DN 23
TK003	KERO	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK004	PREM	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK005	UNLEADED	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK006	DERV	5,000	15,000	0	18.6	1,000.00	5,000.000	4,988.700	15,000.000	4,994,840	14,984,519
TK007	PREM	15,777	4,223	0	4.8	1,000.00	15,777.000	15,885.861	4,223.000	15,759,241	4,218,246
TK008	LPG	5,000	15,000	0	18.6	1,000.00	5,000.000	-0.001	15,000.000	DN 23	DN 23
TK009	DERV	7,000	0	0	18.6	1,000.00	7,000.000	6,984.180	0.000	6,992,776	0
TK010	PREM	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK011	PREM	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK012	UNLEADED	11,000	4,000	0	6.9	1,000.00	11,000.000	11,060.500	4,000.000	10,987,828	3,995,574
TK013	UNLEADED	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK014	PREM	5,000	15,000	0	18.6	1,000.00	5,000.000	4,987.900	15,000.000	4,994,538	14,983,613
TK015	DERV	5,000	15,000	0	18.6	1,000.00	5,000.000	4,988.700	15,000.000	4,994,840	14,984,519

Inventory Calculator

The system provides an Inventory Calculator which can be used as follows:

- To calculate tank inventory at user specified conditions.
- To calculate the effect of a receipt or load on current tank conditions.
- The Inventory Calculator can be used as a planning tool.

Entered		Calculated	
Tank ID	TK001	Total Observed Volume	12,000.000 m³
API /ASTM Table	54B	Water Volume	0.000 m³
Vapour Calculation	None	Gross Observed Volume	12,000.000 m³
Product Level	12,000 mm	Gross Standard Volume	11,970.960 m³
Water Level	0 mm	Available Volume	12,000.000 m³
Product Temperature	18.60 °C	Available Room	8,000.000 m³
Product Pressure	-1.012 Bar g	Gross Weight	11,986,890 kg
		Ullage Weight	7,991,260 kg
		VCF	0.99758

Web Server

Tankvision Professional provides by default a secondary data access via web server. All operator screens can be viewed with the use of standard web browser²⁾ (recommended is the use of Microsoft Internet Explorer). Issuing gauge commands is also possible through the web interface.

2) Microsoft Silverlight is required.

User Management

User Management

The system has a very flexible security system that includes from providing full access with no passwords to stringent controls on every relevant feature.

Users and their privileges are entered through the User Configuration Module.

This is essentially a group of features for each user.

For each user you can determine their access rights on a feature by feature basis.

Access rights can be No Access, Read Only, Edit or Full Access as an Administrator.

Configuration

Tank Characteristics

Tank Characteristics is used to allocate a product to a tank, set the volume correction method for the tank, enter the maximum and minimum operating levels of the tank, enter the details of the floating roof if fitted, and modify the behaviour of the inventory calculation engine.

Many of the settings are critical and access should normally be limited to certain personnel.

Gauge Integration

A wide range of different vendor gauges are supported.

Gauges are configured through the Gauge Configuration Module which allows the user to define the:

- gauge type, the tank the gauge is connected with,
- the gauge physical and logical addresses,
- gauge duty if applicable, and
- the data scans that are performed.

Different manufacturer gauges are configured slightly differently in the way that they are addressed and the format of the data scans.

When a gauge type is selected, the mandatory configuration data items are labeled and enabled as required.

Endress+Hauser	Enraf	Saab	Motherwell	Endress+Hauser Whessoe	Endress+Hauser Varec	L&J
<ul style="list-style-type: none"> ■ Proservo ■ Micropilot + Tank Side Monitor ■ Levelflex + Tank Side Monitor 	<ul style="list-style-type: none"> ■ 811 Servo ■ 854 Servo ■ 873 Radar 	<ul style="list-style-type: none"> ■ TRL2 Radar ■ Rex Radar ■ Pro Radar 	<ul style="list-style-type: none"> ■ 4000 Mark/Space ■ 2800i Servo 	<ul style="list-style-type: none"> ■ 1311/2006 Float + Tape WM500 ■ 1311/1140 Servo WM500 ■ 1315/2006 Float + Tape WM550 ■ 1315/1140/1141 Servo WM550 ■ ITG 50/60/70 	<ul style="list-style-type: none"> ■ 1800 Mark/Space ■ 1900 Mark/Space 	<ul style="list-style-type: none"> ■ TankWay

Inventory Calculations

Calculations

Tankvision Professional calculates tank inventory to all of the most used API/ASTM standards. The calculated data items are summarized below:

- Total Observed Volume (TOV)
- Gross Observed Volume (GOV)
- Water Volume
- Usable/Pumpable Volume
- Ullage Volume
- Gross Standard Volume
- Standard Usable Volume
- Gross Mass
- Usable Mass
- Ullage Mass
- Gross Weight
- Usable Weight
- Ullage Weight
- Vapour Gross Standard Volume
- Vapour Mass
- Dead Stock

If you want to include a parameter not mentioned here ask Endress+Hauser for availability.

Calculation Standards

- Manual VCF
- TCF
- DCF
- IP / API / ASTM D1250 1980 Table 6A
- IP / API / ASTM D1250 1980 Table 6B
- IP / API / ASTM D1250 1980 Table 6C
- IP / API / ASTM D1250 1980 Table 6D
- IP / API / ASTM D1250 1980 Table 24A
- IP / API / ASTM D1250 1980 Table 24B
- IP / API / ASTM D1250 1980 Table 24C
- IP / API / ASTM Light Hydrocarbon Liquids 1986 Table 54
- IP / API / ASTM D1250 1980 Table 54A
- IP / API / ASTM D1250 1980 Table 54B
- IP / API / ASTM D1250 1980 Table 54C
- IP / API / ASTM D1250 1980 Table 54D
- IP Petroleum Measurement Paper No.3 1988 Table 60A
- IP Petroleum Measurement Paper No.3 1988 Table 60B
- IP Petroleum Measurement Paper No.3 1988 Table 60D
- IP / API / ASTM D1250 1980 Table 6A, TREF 86 °F
- IP / API / ASTM D1250 1980 Table 6B, TREF 86 °F
- IP / API / ASTM D1250 1980 Table 6D, TREF 86 °F
- IP / API / ASTM D1250 1980 Table 6A, user TREF
- IP / API / ASTM D1250 1980 Table 6B, user TREF
- IP / API / ASTM D1250 1980 Table 6D, user TREF
- IP / API / ASTM D1250 1980 Table 54A, TREF 30 °C
- IP / API / ASTM D1250 1980 Table 54B, TREF 30 °C
- IP / API / ASTM D1250 1980 Table 54D, TREF 30 °C
- IP / API / ASTM D1250 1980 Table 54A, user TREF
- IP / API / ASTM D1250 1980 Table 54B, user TREF
- IP / API / ASTM D1250 1980 Table 54D, user TREF
- ASTM D4311 1990 Table 1
- ASTM D4311 1990 Table 2
- ASTM D4311 1996 Table 1
- Francis (LPG mixtures)
- API Research Project 44 : TREF 15 °C (LPG mixtures)
- API Research Project 44 : TREF 20 °C (LPG mixtures)
- COSTALD (LPG / LNG mixtures)
- COSTALD - Tai t (compressed density)

Application packages

Movements

Tankvision Professional can be provided with a comprehensive suite of tools to monitor and facilitate automation of product movements – enabling users to monitor loading and unloading of products to and from a variety of vessels. It provides alarms and warnings of planned and unplanned events and reports. Additionally it archives data in a movement log.

The system incorporates a comprehensive product movement module for monitoring the receipt, loading or transfer of product to/from ship, pipeline, tanks, road and rail.

The user specifies the parameters of the movement e.g. the amount of product to be moved, the source/receipt tanks, the alarms and warnings required etc.

When the movement is opened the system calculates the target level, estimated time to finish, and monitors the progress of the movement providing the user with some warnings and alarms as the movement nears completion.

A comprehensive report is available as a record of the product movement.

Backup Scheduler

This module allows the user to schedule backups of the system databases.

The data that makes a system unique is contained in several different formats.

The tank databases are stored in the system SQL database, the trend data is stored in disk files, and customization data is stored in the registry.

The backup scheduler can backup from all these data sources.

Multiple backup schedules can be configured per day.

The scheduler runs as a service and does not require an interactive session to run.

SCADA Run + Designtime

The custom screens can either replace or work alongside the supplied screens.

Each can contain custom graphics, text and data objects, and buttons to launch other applications or open further custom screens.

The SCADA Runtime Package allows the user to integrate their own screens, as an additional service provided by Endress+Hauser.

Redundancy

The Tankvision system is offering reliable and save management of your inventory data also trough redundancy on the various system layers. Please contact Endress+Hauser on the different possibilities of redundancy.

Ordering information

Product structure NXA85

020	Version
A	Stand alone
S	Server
030	Measuring
1	<= 10 tanks
2	<= 30 tanks
3	<= 50 tanks
4	<= 100 tanks
5	> 100 tanks
040	Operation Language
AA	English
AB	German (in preparation)
AC	French (in preparation)
AD	Spanish (in preparation)
AH	Polish (in preparation)
99	Special version, TSP-no. to be specified
540	Application Package (optional, multiple opitons can be selected)
EA	Product movements
EB	Backup Scheduler
EC	SCADA run time license
ED	SCADA design time license
EE	Redundancy support
EY	Special version, TSP-no. to be specified

541	Application Package Client (optional)
E1	... x Client
601	Input Multi Scan (optional)
MC	... x Multi Scan
605	Input Modbus (optional)
M4	... x Modbus
609	Input Whessoe WM550 (optional)
M1	... x Whessoe WM550
614	Input Enraf CIU 858 GPU/RS232 (optional)
MN	... x Enraf CIU 858 GPU/RS232
615	Input Enraf CIU Prime GPU/RS232 (optional)
MP	... x Enraf CIU Prime GPU/RS232
624	Input Saab FCU2160 (optional)
MX	... x Saab FCU 2160
630	Input OPC Client (optional)
NF	... x OPC Client
690	Input Special Version (optional)
N9	Special version, TSP-no. to be specified
705	Output Modbus RTU (optional)
R4	... x Modbus RTU
707	Output Modbus TCP (optional)
RJ	... x Modbus TCP
790	Output Special Version (optional)
S9	Special version, TSP-no. to be specified
800	OPC Server (Ethernet) Output (optional)
VA	Data Access 1x connection
VB	Data Access 2-5x connection concurrent
VC	Data Access >5x connection concurrent
810	Web Server Output (optional)
WB	2-5x connection concurrent
WC	6-10x connection concurrent
WD	11-15x connection concurrent
WE	>15x connection concurrent

Additional documentation

Operating Instructions

Document	Valid for	Content
BA00390G	<ul style="list-style-type: none"> ■ NXA85 ■ NXA86 	System Configuration
BA00391G	<ul style="list-style-type: none"> ■ NXA85 ■ NXA86 ■ NCA85 	Data Communications Controller Configuration
BA00392G	<ul style="list-style-type: none"> ■ NXA85 ■ NXA86 	Installation
BA00393G	<ul style="list-style-type: none"> ■ NXA85 ■ NXA86 	Maintenance
BA00394G	<ul style="list-style-type: none"> ■ NXA85 	Movements System Configuration
BA00395G	<ul style="list-style-type: none"> ■ NXA85 	Movements System Operation
BA00396G	<ul style="list-style-type: none"> ■ NXA85 	System Operation

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