

Technical Information

Tankvision Multi Scan NXA83

Inventory Management System
with completely integrated software

Valid from SW version 3.0.10



Application

Tankvision is a dedicated tank inventory system. It is ideally suited for tank farms with various protocols used for communicating with the installed field devices and/or redundancy needs.

Tankvision Multi Scan performs the following tasks:

- scanning of parameters from tank gauges
- performing tank calculations
- provides data to host systems (such as PLC or DCS) via Modbus and/or OPC

Your benefits

- Approved for custody transfer applications according to NMI and PTB (in preparation)
- Global system engineering and service support
- A robust industrial operating system with embedded software ensures high stability and availability.
- Legacy protocol management; allowing gradual upgrades
- No hard disc or fans - no wear out
- Volume calculations and correction included according to international standards (API/ASTM/IP tables)
- Predefined or customized operator screens via the optional touch display for typical operation of a tank farm.
- Built in web server for basic tank farm operations
- Connects to Tankvision Professional for additional functionality

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Applications

Inventory control

By using Tankvision Multi Scan to monitor the tank level and stored volume of valuable liquids remotely, owners or operators of tank farms or terminals for petroleum products and chemicals (liquids) can visualize the volume of the stored medium in real time. The data can be used to plan the inventory and distribution. The data can also be used to manage tank farm operations like pumping or transferring products. Tankvision has its unique concept using network technology. Without using proprietary software, the users can visualize and manage their valuable liquids stored in the tanks by a web browser. Tankvision Multi Scan is a flexible and cost effective solution due to its scalable architecture. The application coverage goes from small depots with only a few tanks up to refineries.

Inventory Calculations

Tankvision Multi Scan calculates inventories based on measured variables and tank capacity tables:

- Observed/Gross volumes,
- Net volumes and
- Mass

of products like

- Hydrocarbons,
- Liquefied gases,
- Asphalt.

They are corrected according to international standards, including API/ASTM tables 5/6A/B/C, 23/24A/B/C, 53/54A/B/C, 23/24E, LPG and others.

This includes temperature corrections at 15 °C and 60 °F. Additionally, available pumpable volumes and water volume are calculated.

Remote configuration of measuring equipment

Some on-site operations can be avoided using remote configuration of measuring equipment during commissioning or maintenance (the availability of this feature may depend on the system configuration).

Application areas

- Tank farms in refineries
- Ship loading terminals
- Marketing and distribution terminals
- Pipeline terminals
- Logistic terminals for tanks storing products like crude oils, refined white and black products, chemicals, LPG

Function and system design

System design

Tankvision Multi Scan is designed for applications in two quite diverse use cases:

1. Acting as gateway for legacy tank instrumentation into recent Tank Inventory software (e.g. Tankvision Professional) or control systems (DCS or PLC). Where required also the redundant collection and distribution of tank parameters is managed by Tankvision Multi Scan.
2. Forming a comprehensive all-in-one solution for smaller tank farms, realized by data access via the inbuilt Web Server functionality and optional touch screen operation.

System configuration

Tankvision Multi Scan is configured without any special software only by standard Microsoft Windows tools (Remote desktop). Network access to the Multi Scan is password protected.

Configuration of connected tank gauges/sensors

Different vendor's tools can be used to configure gauges by tunneling through the Multi Scan.

Features

- Representation of tank data
Tank data can be represented graphically or in tables.
- Definition and management of products
Product characteristics can be defined.

- Alarms
Limit alarms (high-high, high, low, low-low and other programmable alarms) can be defined for measured certain tank parameters.
 - Reports
Reports can be sent to a printer (network printer or directly connected via USB) at scheduled time intervals or on demand.
 - Volume calculation and correction
Calculation tables according to API, ASTM and IP are integrated.
 - Graphical User Interface (GUI)
Tankvision uses an intuitive and optimized user interface.
 - Remote access
Any PC with the specified requirements in the Intranet can be connected to Tankvision.
 - Redundancy
Hot standby with automatic switchover, various switching rules.
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Security

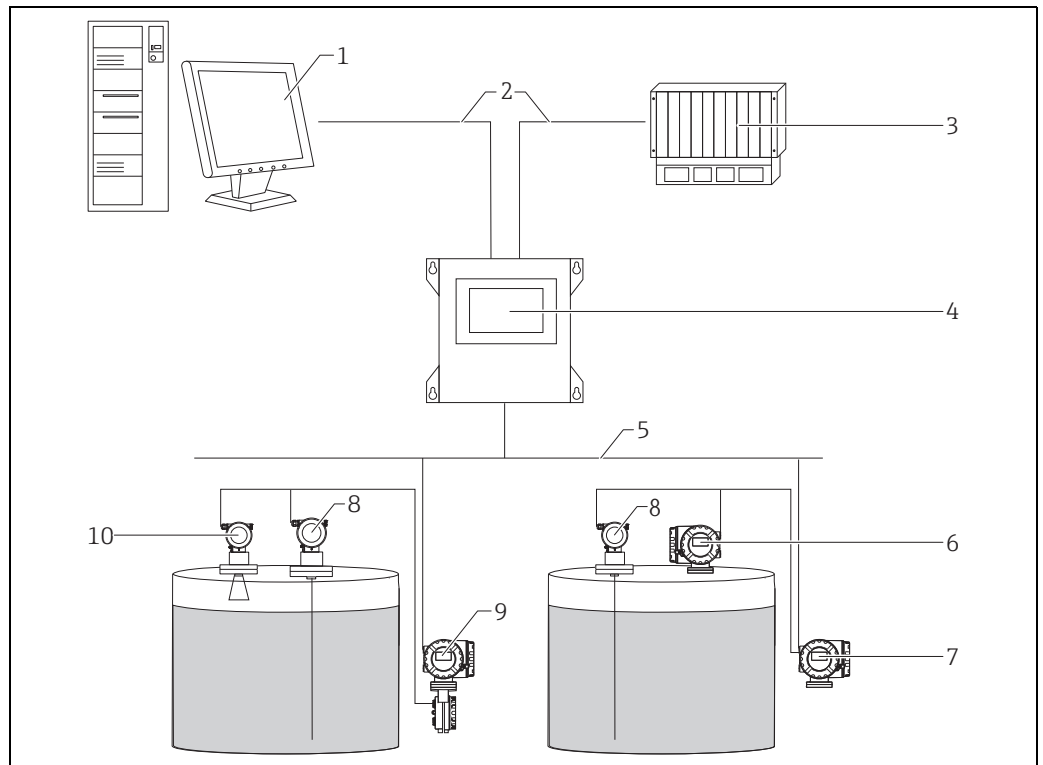
IT security

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

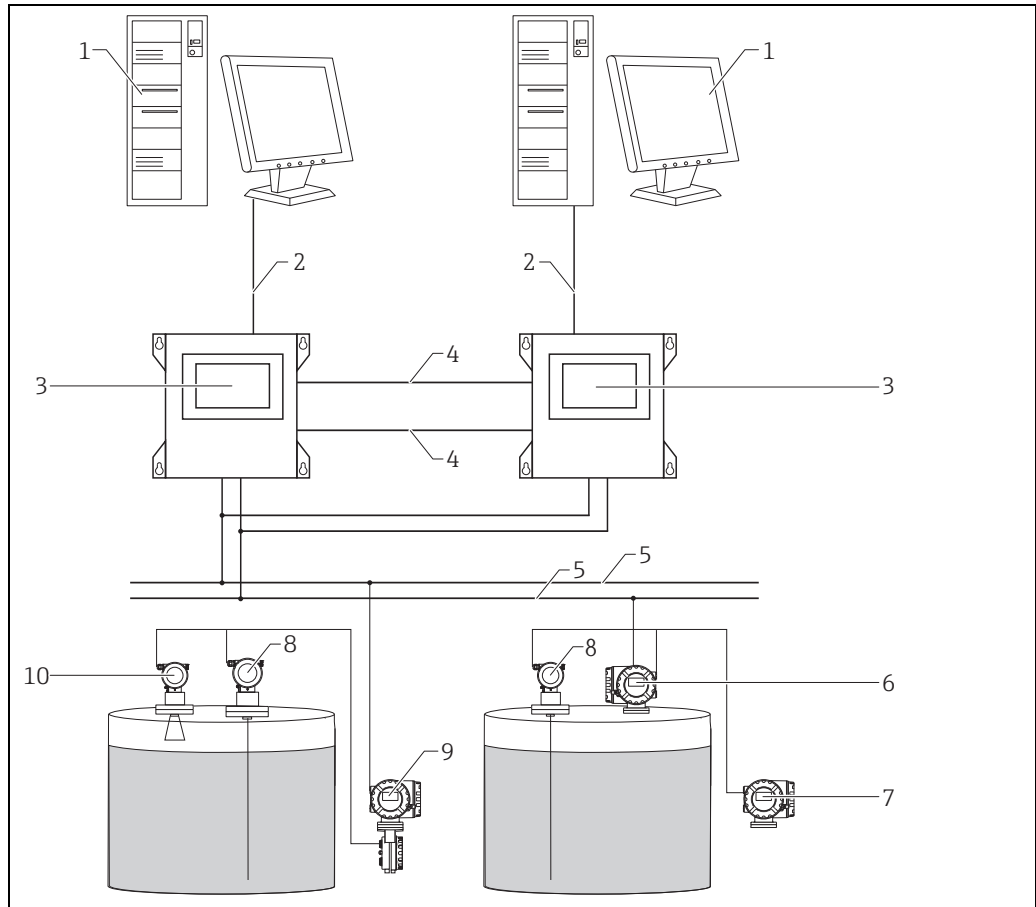
Endress+Hauser can be contacted to provide support in performing this task.

Typical system architecture



- 1 Tankvision Professional NXA85 Workstation
- 2 Ethernet/Serial
- 3 DCS/PLC (Distributed control system/Programmable logic controlled)
- 4 Tankvision Multi Scan NXA83
- 5 Fieldbus protocol (Modbus, Sakura V1, Whessoe WM550)
- 6 Proservo
- 7 Promonitor
- 8 Prothermo
- 9 Tank Side Monitor
- 10 Micropilot

**Tankvision Multi Scan in
Switch By System redundancy
mode**



NXA83_System-configuration_Switch-by-system

- 1 Tankvision Professional NXA85 Workstation
- 2 Ethernet
- 3 Tankvision Multi Scan NXA83
- 4 Control link RS232
- 5 Fieldbus protocol
- 6 Proservo
- 7 Promonitor
- 8 Prothermo
- 9 Tank Side Monitor
- 10 Micropilot

Inputs and Outputs

Power supply

Supply voltage	Frequency	Power consumption	Current consumption
100 to 240 V _{AC}	50 to 60 Hz	40 VA	max. 0.8 A

The Multi Scan contains a 20 x 5 mm cartridge fuse protecting the mains input. The fuse is rated at 3.15 A, time delay (antisurge/slow blow). The fuse is suitable for use at 240 V_{ac}.

Interfaces

The Multi Scan is available in two versions:

- 1 to 8 serial ports

The ports can be configured to be either inputs (from the field/host ports) or outputs (to host systems/slave ports).

Multi Scan support the following electrical interfaces:

- RS232
- RS485
- Bi-Phase Mark
- Current Loop

In addition an Ethernet port and two USB ports are also provided.

Multi Scan has an LED module, one pair for each of the serial ports, to indicate communication activity. One LED indicates transmission and the other one indicates the receipt of data.

Non isolated (bus ground = Multi Scan chassis ground):

- RS-232

Optocoupler isolated:

- RS-485
- Current Loop (GPE/Whessoe)
- L&J
- Varec

Transformer isolated:

- Enraf BPM
- "SAAB"/Rosemount TRL/2

Supported Input protocols (from the field)

- Modbus (RS485 2-wire, RS232)
- Sakura V1
- Whessoe WM550
- Protocol compatible to Enraf GPU (Bi-Phase Mark, RS232, RS485 2 and 4 wire)
- Protocol compatible to Saab TRL/2
- Protocol compatible to VAREC Mark/Space
- Protocol compatible to Scientific Instruments (RS485)

Additional protocols and variants upon request.

Device support

The Multi Scan is designed to interface to the following gauge and transmitter types.

Endress+Hauser:

- Micropilot S + Tank Side Monitor
- Proservo

Enraf:

- 811 Servo Gauge
- 813 Mechanical Gauge Transmitter
- 854 Servo Gauge
- 872 Radar Gauge
- 873 Radar Gauge
- 865 Temperature Selector

Whessoe:

- 1311 Transmitter/1071 Outstation
- 1315 Transmitter/2006 Mechanical float gauge, 1140 Servo gauge
- ITG 50/60/70 Servo gauges

Saab:

- TRL2, Rex, Pro Radar Gauges

Varec:

- 1800/1900 Mark/Space Transmitters

Other devices supported upon request.

A range of gauge commands are supported but the availability of these commands depends on the gauge types.

The host and field communication parameters are configurable, however, a number of the above devices operate with fixed parameters.

A total of 256 devices can be supported.

**Supported output/
communication (to host
system)**

- Native driver to connect to Tankvision Professional (Ethernet, RS485, RS232)
- Modbus RTU (RS485, RS232)
- Modbus TCP (Ethernet)
- OPC DA Server to connect to Clients using version 1.0, 2.0, 3.0 (Ethernet)

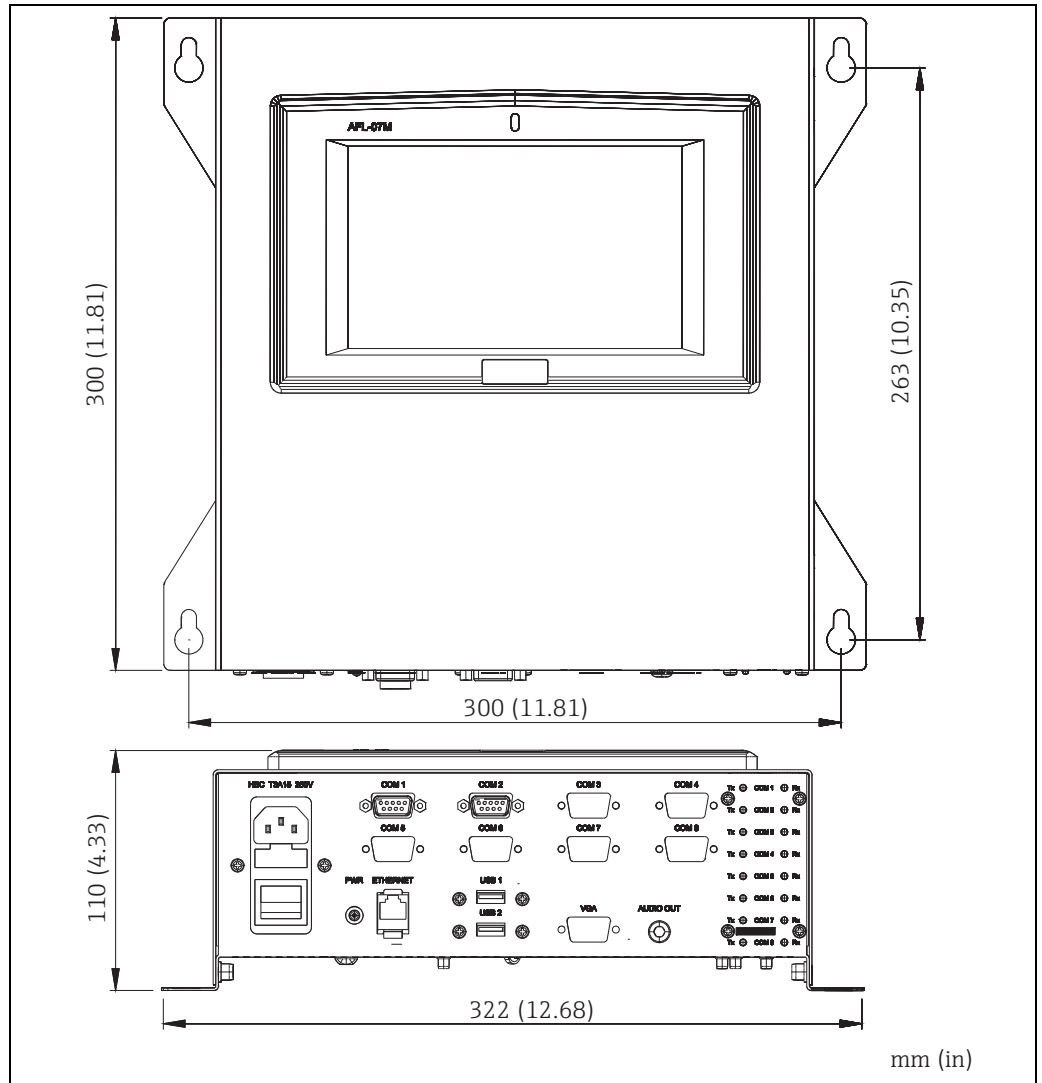
Additional protocols and variants upon request.

Environment

Mounting location	Indoor
Ambient temperature	0 to +40 °C (+32 to +104 °F)
Storage temperature	0 to +70 °C (+32 to +158 °F)
Relative humidity	max. 90 % at +25 °C (+77 °F) (non-condensing)
Electromagnetic compatibility (EMC)	EMC according to the requirements of the EN 61326-series and the NAMUR-recommendation EMC (NE21). Details can be found in the Declaration of Conformity.

Mechanical construction

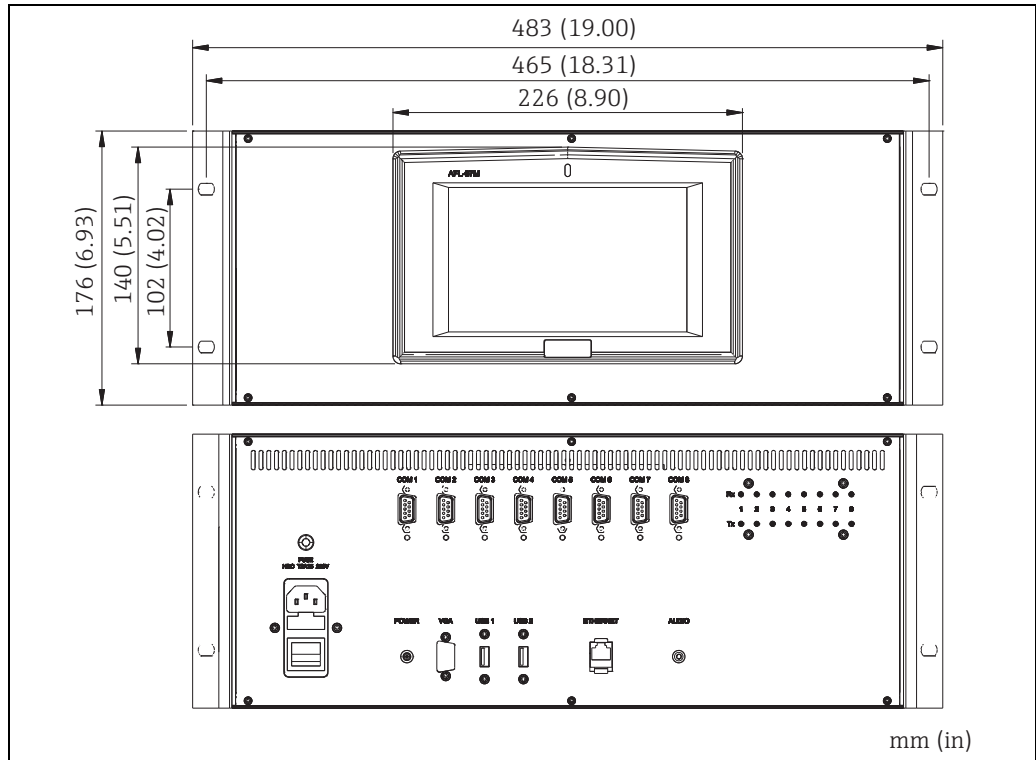
Wall mounted version	<p>The wall mount version is housed in a stainless steel enclosure, suitable for wall mounting via 4 fixing holes designed to accept M6 bolts.</p> <p>All connectors for power and signals are located on the bottom face of the enclosure. The unit should always be mounted with this face at the bottom.</p>
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NXA83_WallMount_Measurements

Rack mounted version

The rack mount version is housed in an aluminum 4U 19 in case, which has 4 front fixing holes suitable for M6 bolts.
 All power and signal connectors are located on the rear panel of the enclosure.

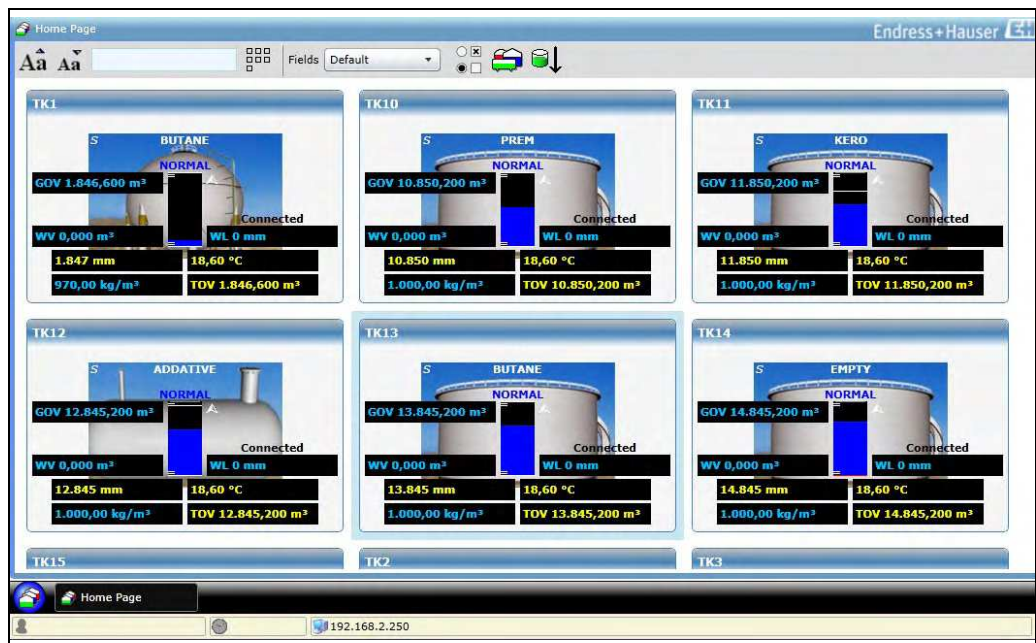


Depth of enclosure: 260 mm (10.24 in)

Human interface

Web Server

The Web Client can be provided on any Windows station with a network connection to the device. The installation of Microsoft Silverlight is necessary to operate the web client screens.



Home Page

NXA83_Web-Server_Tank-Detail

Single Tank Overview

Severity	Description	First	Last	Active
High	TK2 - 2 : Programmable Alarm: High	01.10.2012 07:17		Yes
Critical	TK2 - 2 : Programmable Alarm: High High	01.10.2012 07:17		Yes

NXA83_Web-Server_Alarm-Event-Viewer

Alarm Event Viewer

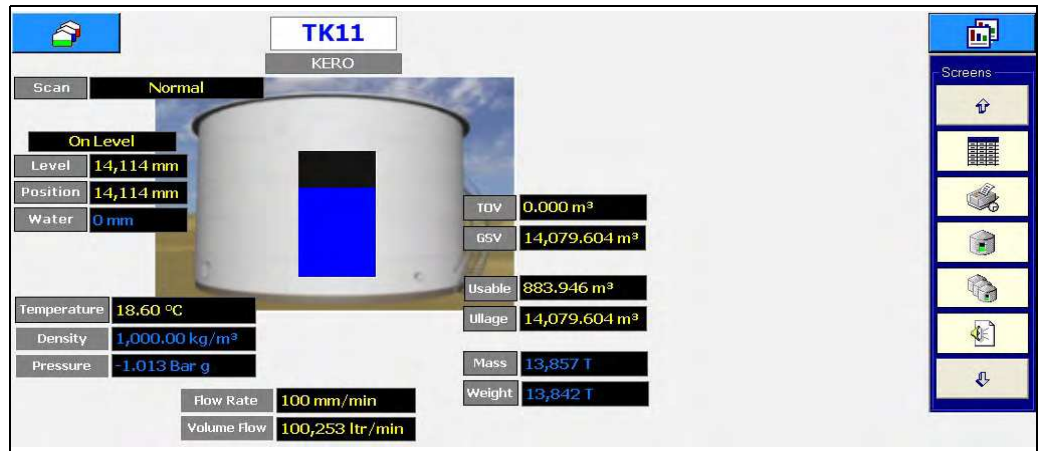
Tank ID	Product Name	Alarm Status	Product Level (mm)	Product Temperature (°C)	Water Level (mm)	Reference Density (kg/m³)	T.O.V (m³)	Available Room (m³)	Level Flow Rate (mm/min)
TK1	BUTANE	OK	2.262	18,60	0M	970,00M	2.261,700	17.738,300	100
TK2	KERO	LAH	16.739	18,60	0M	1.000,00M	16.738,801	0,000	-100
TK3	BUTANE	OK	4.263	18,60	0M	1.000,00M	4.263,400	9.736,600	100
TK4	PREM	OK	5.263	18,60	0M	1.000,00M	5.263,200	14.368,200	50
TK5	DERV	OK	4.737	18,60	0M	1.000,00M	4.736,800	15.263,200	-100
TK6	DERV	OK	5.737	18,60	0M	1.000,00M	5.736,800	13.263,200	-100
TK7	PREM	OK	9.265	18,60	0M	1.000,00M	9.265,200	10.734,800	100
TK8	DERV	OK	7.735	18,60	0M	1.000,00M	7.734,900	11.265,100	-100
TK9	PREM	OK	11.265	18,60	0M	1.000,00M	11.265,200	8.734,800	100
TK10	KERO	OK	12.265	18,60	0M	1.000,00M	12.265,200	2.734,800	100
TK11	ADDATIVE	OK	13.265	18,60	0M	1.000,00M	13.265,200	5.734,800	100
TK12	BUTANE	OK	14.267	18,60	0M	1.000,00M	14.266,900	5.733,100	100
TK13	EMPTY	OK	15.267	18,60	0M	1.000,00M	15.266,900	0,000	100
TK14	EMPTY	OK	16.257	18,60	0M	1.000,00M	16.256,900	0,000	100
TK15	EMPTY	OK	16.257	18,60	0M	1.000,00M	16.256,900	0,000	100

NXA83_Web-Server_Grid-View

Grid View

LCD display (optional)

The Multi Scan is available with a 7 in Widescreen LCD screen built into the front of the device, with navigation via a touch screen.



Single Tank View

The screenshot displays the 'GridView' interface, which shows a table of tank data. The table has the following columns: TankID, Product, Level mm, Temp. °C, TOV ltr, and Gauge Status.

TankID	Product	Level mm	Temp. °C	TOV ltr	Gauge Status
TK1	BUTANE	2,322	18.60	2,321,700	On Level
TK10	PREM	11,320	18.60	11,320,300	On Level
TK11	KERO	12,320	18.60	12,320,300	On Level
TK12	ADDATIVE	13,322	18.60	13,321,900	On Level
TK13	BUTANE	14,322	18.60	14,321,900	On Level
TK14	EMPTY	15,322	18.60	15,321,900	On Level
TK15	EMPTY	16,322	18.60	16,321,900	On Level
TK2	KERO	16,677	18.60	16,677,201	On Level
TK3	BUTANE	4,323	18.60	4,323,400	On Level
TK4	PREM	5,323	18.60	5,323,200	On Level
TK5	DERV	5,662	18.60	5,661,800	On Level
TK6	DERV	4,677	18.60	4,676,800	On Level
TK7	DERV	5,675	18.60	5,675,100	On Level
TK8	PREM	9,325	18.60	9,325,200	On Level
TK9	DERV	7,680	18.60	7,679,900	On Level
Totals				144,592,50	

Grid View

Remote desktop

The Remote desktop is used for configuration purpose only. It is offering a standard Windows XP operating user interface.

Installation considerations



It is recommended to take the information contained in the Operating Instructions into consideration when designing the system architecture (→ 14).

System requirements of user PC

Check the latest information on hardware and software requirements.
Please contact your local Endress+Hauser Sales Center.

Network requirements

Network switches **must** always be used to interconnect Tankvision components (Network hubs **must never** be used).
Only use screened cables (Category 5 or higher).

NOTICE

EMC requirements

The legal EMC requirements are fulfilled **only** when

- ▶ a screened LAN cable is used and
- ▶ the cable screen is properly terminated to screened RJ45 connectors.

NOTICE

Harsh environments

Most commercial and IT infrastructure networking switches (and components) are not designed to be used within harsh environments (e.g. temperatures below +5 °C, dusty or with high levels of EMC or electrical noise).

- ▶ It is therefore recommended that **only** networking components specifically designed for industrial control purposes be used within the control room (or control cabinet) environment as part of the Tankvision system.

Shielding and Grounding

When planning the shielding and grounding for a fieldbus system, there are three important points to consider:

- Electromagnetic compatibility (EMC)
- Explosion protection
- Safety of the personnel

To ensure the optimum electromagnetic compatibility of systems, it is important that the system components and all cables, which connect the components, are shielded and that no portion of the system is unshielded. Ideally, the cable shields are connected to the normal metal housings of the connected field devices. Since these are generally connected to the protective earth, the shield of the bus cable is grounded many times. Keep the stripped and twisted lengths of cable shield to the terminals as short as possible.

This approach, which provides the best electromagnetic compatibility and personnel safety, can be used without restriction in systems with good potential equalization.

In the case of systems without potential equalization, a power supply frequency (50/60 Hz) equalizing current can flow between two grounding points which, in unfavourable cases, e.g. when it exceeds the permissible shield current, may destroy the cable.

To suppress the low frequency equalizing currents on systems without potential equalization, it is therefore recommended to connect the cable shield directly to the building ground (or protective earth) at one end only and to use capacitive coupling to connect all other grounding points.

NOTICE

EMC requirements

The legal EMC requirements are fulfilled **only** when

- ▶ the cable shield is grounded on both sides!

Certificates and approvals

CE mark

The measuring system meets the legal requirements of the EC-guidelines.
Endress+Hauser confirms the instrument passing the required tests by attaching the CE-mark.

Ordering information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide



Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Documentation

Operating Instructions

BA01288G

Operation manual

BA01290G

Installation and Maintenance manual

BA01291G

Configuration manual

BA01292G

DCC Communications Configuration

BA01289G

OPC Tank Data Server

BA01287G

Weights and Measures Additions

BA01297G

Web Client System Operation

BA01296G

Redundancy manual

Registered trademarks

MODBUS	MODBUS is a registered trademark of the MODBUS-IDA, Hopkinton, MA, USA
Microsoft, Windows, Silverlight	Microsoft, Windows and Silverlight are registered trademarks of the Microsoft Corporation
HART®	Registered trademark of HART Communication Foundation, Austin, USA
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