

Operating Instructions

VEGA Inventory System

(VEGA Hosting)

Configuration, first steps



Document ID: 49696



VEGA

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for installation and commissioning. Please read this information before setting up the instrument and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

1.3 Symbols used



Document ID

This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on www.vega.com you will reach the document download.



Information, tip, note

This symbol indicates helpful additional information.



Caution: If this warning is ignored, faults or malfunctions can result.



Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



Ex applications

This symbol indicates special instructions for Ex applications.



SIL applications

This symbol indicates instructions for functional safety which must be taken into account particularly for safety-relevant applications.

• List

The dot set in front indicates a list with no implied sequence.

→ Action

This arrow indicates a single action.

1 Sequence of actions

Numbers set in front indicate successive steps in a procedure.

2 For your safety

2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

2.2 Appropriate use

VEGA Inventory System is a web-based software for simple recording, presentation and further processing of measured values. The measured values can be transmitted via network, internet or mobile network to the central server.

2.3 Warning about incorrect use

Improper or unconventional use can lead to application-specific hazards that can result in damage to property and persons or environmental contamination. The displayed measured values must only be used for visualisation and inventory monitoring. Automatic monitoring for overfill (overfill protection) or real-time process control are not allowed.

2.4 General safety instructions

Installation and use of the software are carried out at your own risk. We do not accept liability for consequential damage.

2.5 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Help us to meet with these requirements.

3 Product description

3.1 What is VMI/VEGA Inventory System?

VMI

VMI stands for Vendor Managed Inventory (supplier-controlled inventory). The supplier is responsible for the inventory of his products at the customer's location. He takes over inventory monitoring via remote enquiry and autonomously controls the delivery of replenishments.

VEGA Inventory System

VEGA Inventory System is a web-based software for easy remote inquiry, visualization and trend analysis. The stock of all storage tanks, silos and mobile containers can be easily monitored and managed. In addition, an alarm and a data export are available.

VEGA Inventory System is based on modern Web technologies, visualisation is carried out via any standard browser such as e.g. the Internet Explorer. This can be done locally via a local network as well as world-wide via the Internet. A local installation of application software or plug-ins for measured value indication is not necessary. The transmission of measured values is carried out either via network, Internet or mobile network. The protected area for measured value indication is only accessible with a password, the connection is established through the secure https protocol.

The measured values are provided by on-site sensors and collected and further processed by appropriate controllers and radio units. These controllers transmit (time-controlled) the measured values to the defined server. The display of measured values can be in the form of a bar graph or a table. Apart from the current measured values, history data are also available. The current measured values can also be sent cyclically at any time via e-mail or SMS. Event-controlled notification can also be configured.

Options are available for data exchange with other systems (ERP, SAP, etc.) or cloud platforms via a data client or a RESTful API.

VEGA Inventory System is available in two versions, centrally hosted at VEGA or locally installed at the customer's location.

Hosting at VEGA

VEGA provides the server for administration of the inventory data at its own computer centre. Through interruption-free power supply, redundant hardware and automatic backups, very high availability is guaranteed 365 days a year. Software installation, administration and future software updates are included in the price.

Local server

With this version, VEGA provides the instrument technology and software. Installation, setup and administration are carried out by the customer. Operation as well as maintenance, backup and software update also lie within the customer's responsibility. The precondition is that the customer must have his own IT infrastructure with appropriately qualified personnel.

4 Adjustment

4.1 Prerequisites

The following requirements must be fulfilled to use the VEGA Inventory System:

Inventory System account information

This document will be sent with the order confirmation. Fill in your company data including an appropriate contact person. In addition, a contact for the user account of the supervisor is required. Please send the completed document to the e-mail address stated in the form. VEGA will enter you as a plant operator and generate a supervisor account. You will then get your account information with a link for the first login by e-mail.

License agreement

You receive this document together with the account information. It contains the performances, responsibilities and liabilities of both contracting parties. Please return the signed licence agreement to VEGA, together with the completed account information.

Setup field devices

To display measured values in the VEGA Inventory System, suitable controllers and radio units must deliver the requested measured values "**Data transmission**").

Browser requirements

To display the measured values, each user requires one of the following browsers in the current version:

- Internet Explorer as of version 9
- Edge
- Firefox
- Chrome
- Safari
- Opera

4.2 Data transmission

The data can be transferred to the Inventory System server via Ethernet or mobile networks. Only VEGA instruments can send data to the Inventory System, the following constellations are possible.

- Controllers (VEGAMET, VEGASCAN) via Ethernet
- Controllers (VEGAMET, VEGASCAN) via Ethernet and wireless router
- Radio unit (PLICSMOBILE) via mobile networks

Each controller or radio unit is combined with the sensors and measuring points in a so-called device network. These device networks are configured manually in the Inventory System to allow data to be read in, see chapter "Device networks".

Before data transmission, the VEGA instrument must be put into operation and a data transmission event (measured value transmission) must be configured. Observe the respective operating instructions manual and the configuration software PACTware with online help. PACTware is available as download on the VEGA website.



Tip:

When using multiple controllers/radio units, it is recommended to provide their instrument and measurement loop TAGs with individual meaningful names. This makes configuration of the device networks and measuring points as well as possible notifications in the VEGA Inventory System much easier and clearer.

Data transmission can be unencrypted or encrypted (TLS/PSK). Unencrypted data is transmitted via Port 80 and encrypted data via Port 443.

Data transmission via LAN/WAN

Automatic addressing via DHCP is preset in every controller, i.e. the IP addr. must be assigned by a DHCP server. As an alternative, it is also possible to enter a static IP addr. with subnet mask and optional Gateway addr.

Ask your network administrator for the type of addressing required in your network and, if necessary, for further information. A description of the network setup can be found in the documentation of the controller or in the online help of the corresponding DTMs.

Data transmission via mobile network

For wireless data transmission, a wireless router or PLICSMOBILE with appropriate M2M SIM card and corresponding licence agreement is used. To avoid roaming costs, the SIM card should be bought for the country in which the measurement is carried out and where the router or PLICSMOBILE is installed.



Note:

Due to sanctions or technical reasons, SIM cards may not be used in all countries. If you use a SIM card from VEGA, exclusions apply. In case of doubt, please contact your VEGA sales office.

VEGA-Ident-Card

VEGA offers the service package "*Wireless data transmission*" to make the transmission of measured values and remote maintenance by VEGA service as easy as possible. This package consists of a pre-configured and activated M2M-SIM card with corresponding data volume and tariff.

Configure data transmission

Connect your adjustment tool (PACTware/VEGA Tools app) to the corresponding controller or radio unit. Select the menu item "*Event list*" and press the button "*New*". An assistant will now guide you through the configuration.

- Choose in the first window under "*Message type*" the list entry "*VEGA Inventory System (encrypted)*". Define under "*Event type*", if the measured value transmission should be carried out "*Time-controlled*" or "*Measured value/Time-controlled*".
- Enter in the second step the name of the server ("data-vis.vega.com").
- Define in the last step when or how often the measured values are to be transmitted. We recommend a combination of time and event-controlled data transmission. In mode "*Measured value/Time-controlled*" a measured value is transmitted cyclically at individually definable times.

- **Example:** The actual measured values are transmitted cyclically 4 times a day, once every 6 hours. With event control, an additional measured value is transmitted when the measured value difference is more than 5 %. These example values can be used as standard values for most applications.

- Transfer your settings to the controller.

After the configuration, you should start a test transmission to the server. Select the configured event and then the menu item "**Test**" via the right mouse key.



Information:

Note the serial number of the controller or PLICSMOBILE. This number is required when creating the device network. You can find further information about the measured value transmission in the documentation enclosed with the instruments.

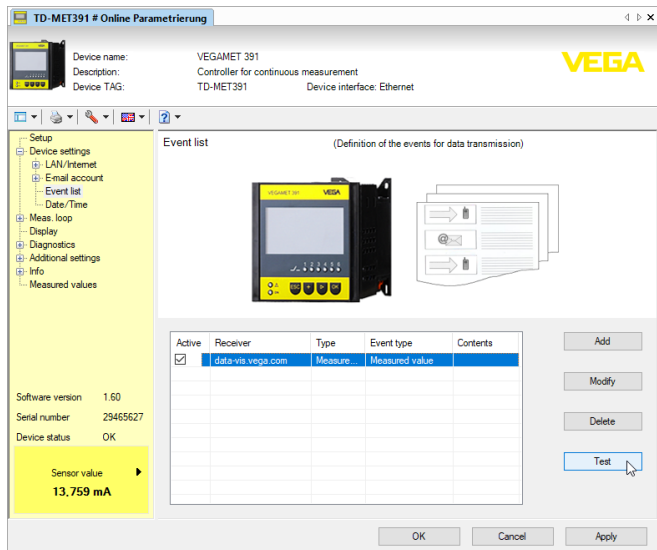


Fig. 1: Test transmission to the Inventory server

4.3 Start VEGA Inventory System for the first time

Login

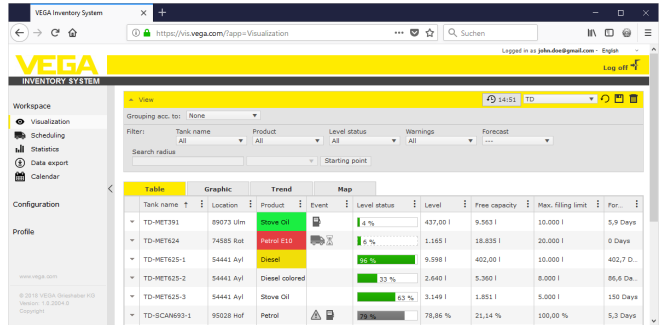
For the first registration as a supervisor, you will get an e-mail with a link from the Inventory System. By clicking this link, you reach automatically the login page. Your user name (e-mail address) will be entered automatically.

Now enter your requested password twice. It should consist of at least 8 characters incl. one special character. Terminate the process by pushing the button "*Reset password*". You will be passed on automatically to the starting page of the VEGA Inventory Systems.

Adjustment system

The graphic user interface (GUI) is divided into different sections. These sections fulfil the functions described below:

- **Dynamic navigation section:** Shows on the left side the appropriate menu items in dependence on the respective menu level
- **Header area:** Contains language changeover and the "Log off" button
- **Information and application area:** Shows measured values, events and information and allows user-specific settings and selection options

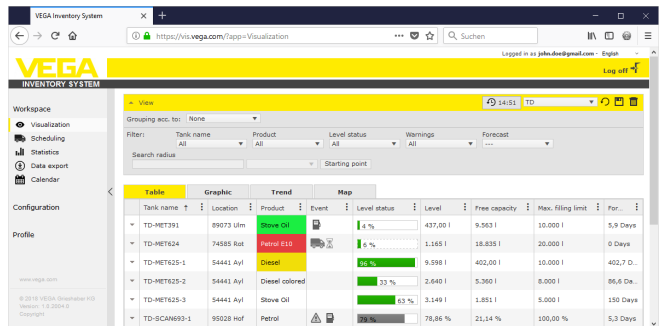


Tank name	Location	Product	Event	Level status	Level	Free capacity	Max. filling limit	Per.
TD-MET391	89073 Ulm	Stove Oil		4 %	437,00 l	9,563 l	10,000 l	5,9 Days
TD-MET624	74585 Rot	Paraffin E15		6 %	1,165 l	18,835 l	20,000 l	0 Days
TD-MET625-1	54441 Ayl	Diesel		10 %	9,598 l	402,00 l	10,000 l	402,7 D.
TD-MET625-2	54441 Ayl	Diesel colored		33 %	2,640 l	5,360 l	8,000 l	85,6 Da.
TD-MET625-3	54441 Ayl	Stove Oil		63 %	3,149 l	1,851 l	5,000 l	150 Days
TD-SCAN693-1	95028 Hof	Petrol		76 %	76,86 %	21,14 %	100,00 %	5,3 Days

Fig. 2: User interface

Show measured values

For measured value indication, select the menu item "Workplace - Visualisation" in the left navigation section. The measured values are then displayed in tabular form. By clicking on the downward pointing arrows, the measured value sequence and further information can be displayed or entered.



Tank name	Location	Product	Event	Level status	Level	Free capacity	Max. filling limit	Per.
TD-MET391	89073 Ulm	Stove Oil		4 %	437,00 l	9,563 l	10,000 l	5,9 Days
TD-MET624	74585 Rot	Paraffin E15		6 %	1,165 l	18,835 l	20,000 l	0 Days
TD-MET625-1	54441 Ayl	Diesel		10 %	9,598 l	402,00 l	10,000 l	402,7 D.
TD-MET625-2	54441 Ayl	Diesel colored		33 %	2,640 l	5,360 l	8,000 l	85,6 Da.
TD-MET625-3	54441 Ayl	Stove Oil		63 %	3,149 l	1,851 l	5,000 l	150 Days
TD-SCAN693-1	95028 Hof	Petrol		76 %	76,86 %	21,14 %	100,00 %	5,3 Days

Fig. 3: Measured value view

Filter function

On each page you'll find a filter and grouping function in the page header that you can use to sort or limit according to different criteria the measuring points and points listed on the page. Grouping is also possible, for example according to product or location. The criteria of the filter and group functions can be configured individually under "Configuration - Plant operator" in the tabs "Filter" and "Grouping".

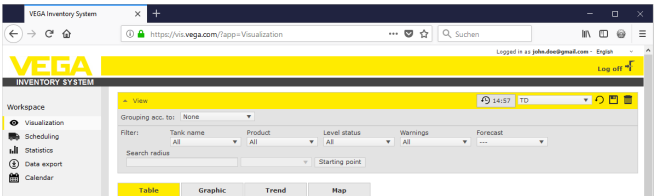


Fig. 4: Filter and grouping functions



Note:

The number of filters available depends on the amount of information you enter in the various menus, for example: Group names, product names, customer names, plant names, etc.

5 Log into the Inventory System

Start your web browser and enter the following URL:
<https://vis.vega.com>.

In the upper right section of the login page you'll find a list box for changing the menu language. You can also change the language any time after login without having to log in anew.

Enter your e-mail address under "User" and then the password you've created.

If there are no measurement loops available, you can select a demo plant to get acquainted with the system. To do this, select the menu item "Visit demo plant" in the login screen.

If you have forgotten your password, you can apply for a new one in the login screen. Select the menu item "Password forgotten". After entering your e-mail address and the displayed combination of letters/characters, a link is sent immediately through which you can assign a new password.

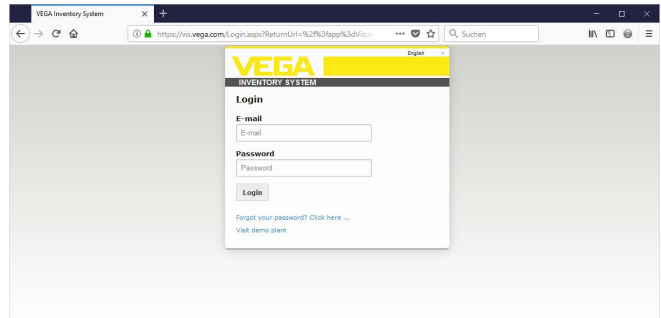


Fig. 5: Login to VEGA Inventory System

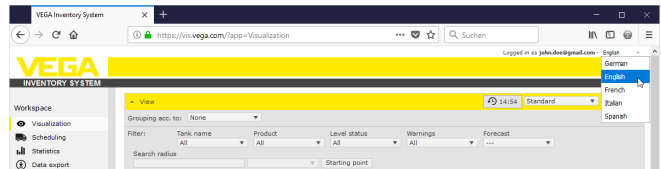


Fig. 6: Language switchover in the header area

6 Workplace

In the area "Workplace" all functions are available which are necessary for the daily visualization and planning. The workplace area is available for all users.

6.1 Dashboard

The dashboard gives an initial overview of the status and the configuration with the created users and measurement loops. All possibly occurring faults, events and system messages are also collected here and can be viewed at a glance. You can reach the dashboard via the navigation menu and the menu items "Workplace" or "Configuration".

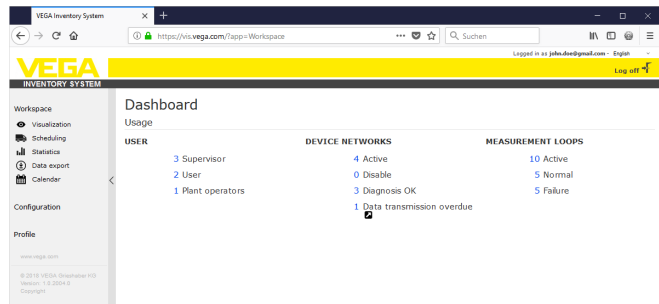


Fig. 7: Dashboard

6.2 Visualization

In the visualisation, all measuring points assigned to the respective user are displayed. These measuring points can be displayed in a table or as a bar graph. A progress diagram of the history data is also available. In addition, a location view is available on a map (Google Maps). The displayed measured values are shown in different colours depending on the level:

- **Green** "Normal operation", level in the requested operating range
- **Yellow:** Level has fallen below/exceeded reorder level (Hi/Lo alarm)
- **Red:** Level has fallen below/exceeded safety stock (HiHi/LoLo alarm)
- **Grey:** Indicates sensor, device or communication errors and missing data transmissions

Save/delete view

You can use the diskette symbol to save your individually configured layout under any name and call it up again at any time via the list box. You can also save layouts that are either only available for a specific plant operator or are available globally for all plant operators. You can delete saved views using the recycle bin icon.

Tabular view

This view displays the measured values in a clearly arranged table. With a mouse click on the table header, the data can easily be sorted alphanumerically. By clicking on the icon with the three points a menu with the column settings appears. You can select which information to

display in the table. The position and width of the columns can also be changed.

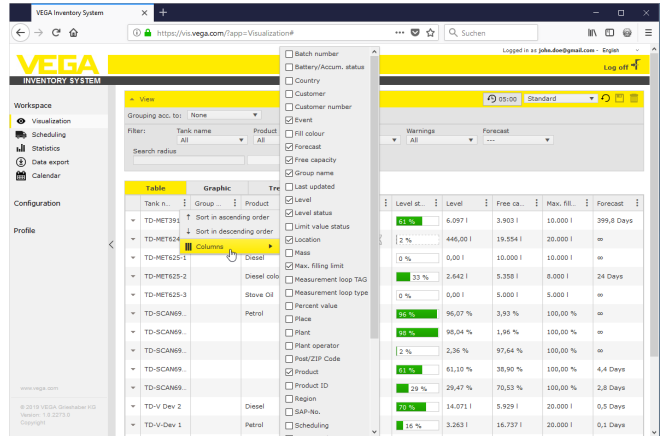


Fig. 8: Layout configuration

By clicking on the arrow symbol (left table column) of the corresponding measurement loop, further information such as location, settings, history, notes as well as details of the measurement loop and its contact persons can be called up and edited.

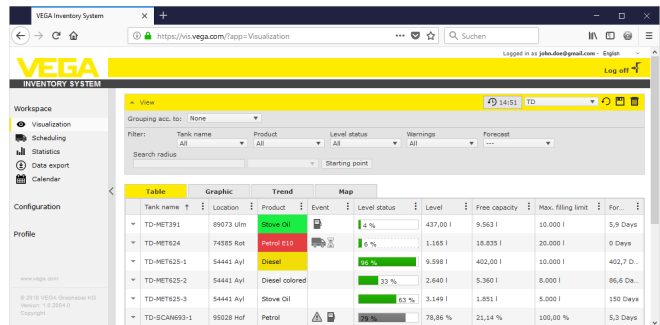


Fig. 9: Tabular view: Measured value display in tabular form

By clicking and dragging in the history diagram any period can be marked and displayed. The button "Show all" can be used to return to the entire available time period. If scheduling is activated, the calendar with the corresponding entries of the selected measurement loops is also available here.

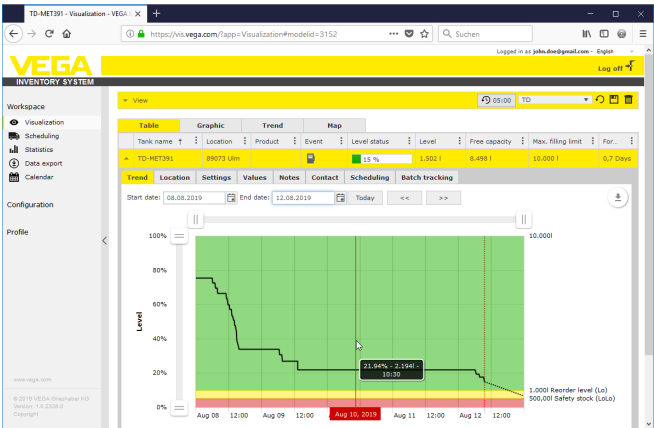


Fig. 10: Tabular view: Measured value display of the history diagram

Graphic view

In the graphic measured value view, the individual measuring points are displayed as bar graphs. Within the symbols, the exact levels and the free capacity are displayed. By clicking on the corresponding symbol, additional information can be displayed in a tooltip. If you move the mouse over the graphic symbol of a measuring point, further icons appear. Notes can be stored or called up via the pen icon. Via the trend icon you can call up the history view of this measuring point.

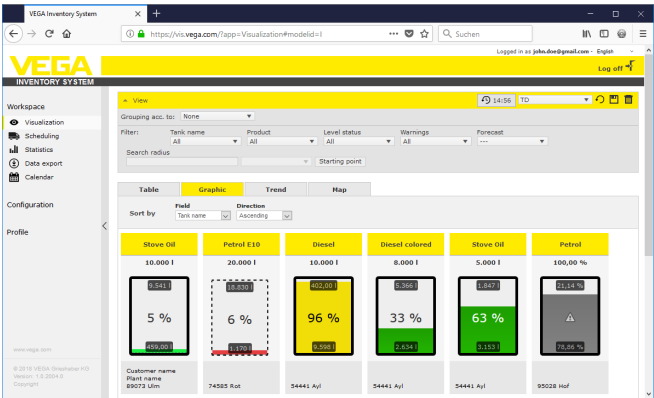


Fig. 11: Graphic view: Measured value display in the chart view

History

In the progression view, the historical progression of measured values can be displayed in up to 10 curves simultaneously. The requirement for this is that the same unit be defined for all measuring points.

By entering the start and end date, the requested period can be limited. By clicking and dragging in the history diagram, any section can be marked and displayed. As an alternative, you can have an individual section displayed via slide switch. Via the button "Show all" you can return to the completely available period.

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Via the arrow symbol the diagram can be exported. Here you can choose between the formats PNG, JPG and SVG. As an alternative you can also create a PDF with the respective frame data of the diagram.

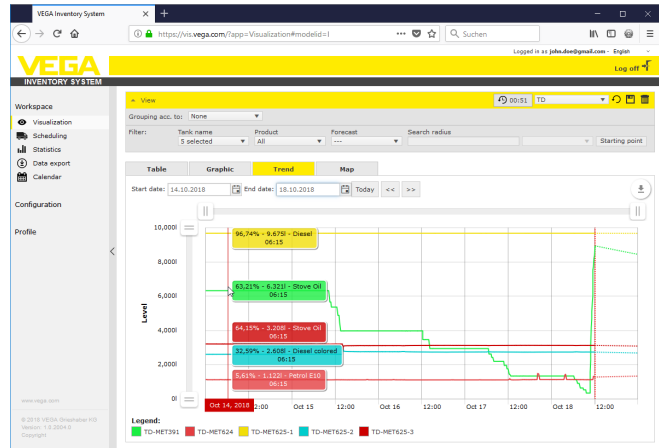


Fig. 12: History: Measured value display as history diagram

Map

In the map view, the location of each tank/silo is displayed on a map. The colour of the symbol changes depending on the level and error status. Through this visualization of the locations, delivery and tour planning, for example, can be easily optimized.

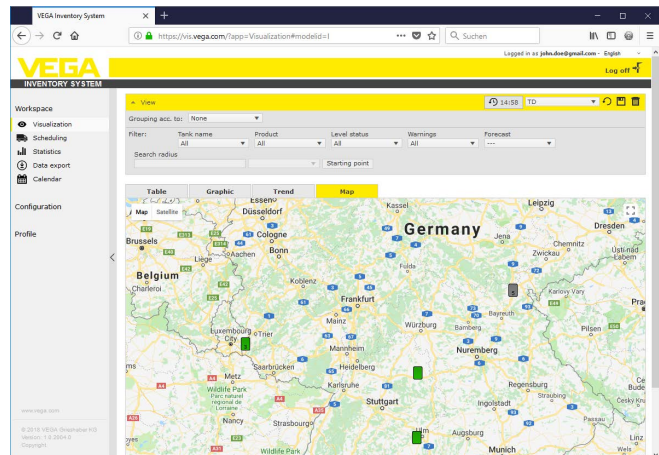


Fig. 13: Card: Measured value indication in card view

6.3 Scheduling

The scheduling function is a support tool with which planned deliveries/collections can be displayed in the calendar and visualization table.

A warning is generated if the forecast calculation shows that the forecast effective range is shorter than the planned transportation time. The calculated time until the safety stock is reached is the "Effective range".

In the event column of the visualization table a fuel pump symbol appears at the corresponding tank/silo. This indicates that immediate planning of a delivery or collection is required.

To be able to use function "Scheduling", the limit value function must be activated and a safety stock must be created. Both settings can be found under "Configuration" - "Measuring points". Select the desired measuring point and go to the tab "Settings".

- Activate the function "Lower limit values active" for standard tanks and silos and enter the desired value for the safety stock under "LoLo"
- Activate the function "Upper limit values" for recycling tanks and enter the desired value for the safety stock under "HiHi"

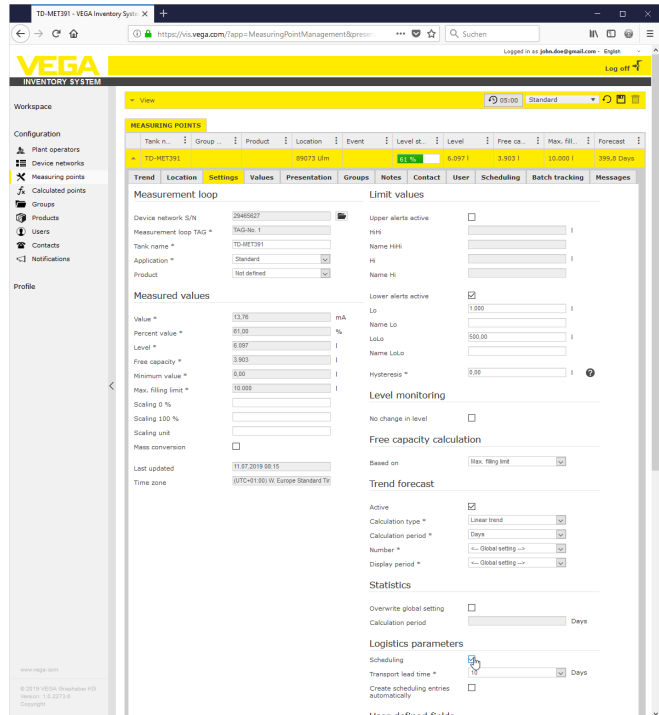


Fig. 14: Activate scheduling

If the defined reorder level is underrun, the fuel pump symbol appears in the "Visualization" under "Event". By moving the mouse over a fuel pump symbol, the message "Requires transport (effective rang < standard transport time)".

By clicking on this symbol you will receive a detailed message and can create a delivery or collection event via the button "Plan transport".

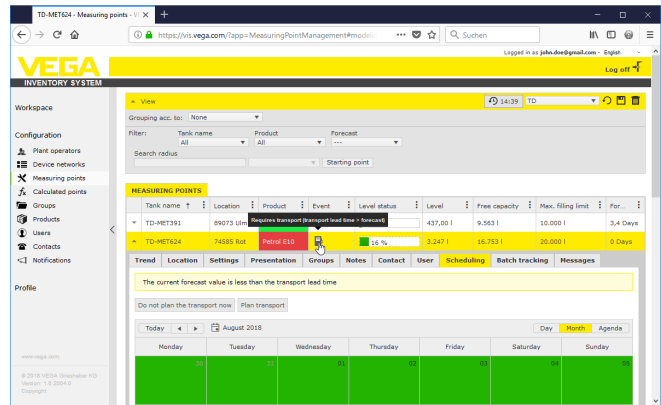


Fig. 15: Scheduling

By double clicking with the mouse on the requested date you can create a calendar entry. Via the watch symbol you can enter any specific time. Finish by entering the requested delivery quantity. If you want to fill the vessel completely to 100 %, click the button "Accept level". By means of the measured level and the known vessel volume, the missing quantity is calculated and automatically entered as delivery quantity.

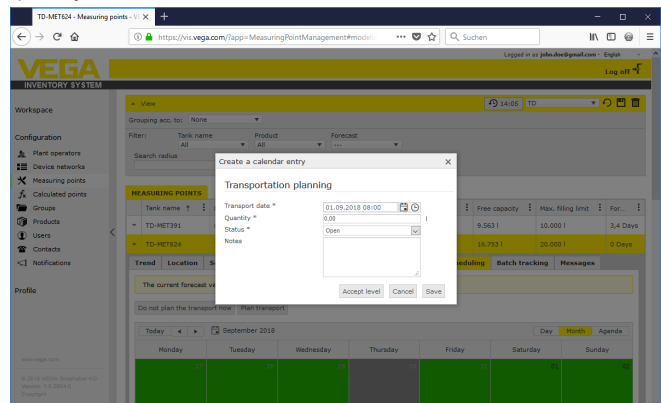


Fig. 16: Create a calendar entry

After saving your entries, a truck symbol stating the delivery quantity and time is stored under "Workplace" - "Visualisation" - "Scheduling".

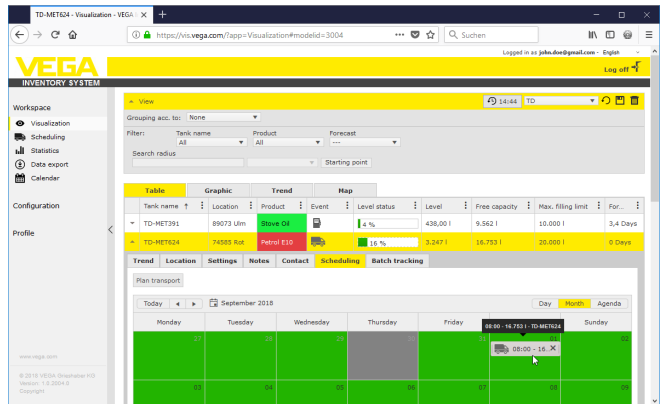


Fig. 17: Planned delivery in the measuring point visualisation

6.4 Statistics

Via the statistics you can get the following information for an individually defined period:

- **Max. level:** Max. level that occurred in the selected period
- **Min. level:** Min. level that occurred in the selected period
- **Ø Level:** Average level that occurred in the selected period
- **Ø Free capacity:** Average free capacity (free tank volume) that occurred in the selected period
- **Ø Daily usage:** Average daily quantity taken from the tank in the selected period
- **Ø Daily inflow:** Average daily quantity fed into the tank in the selected period
- **Total usage:** Sum of all usages in selected period
- **Total inflow:** Sum of all inflows in the selected period
- **Number of fillings:** Number of fillings in the selected period. Is calculated automatically, depending on the setting "Statistics" in the settings of the plant operator.
- **Days in the critical safety stock:** The number of days on which the critical safety stock (LoLo limit value) was underrun



Tip:

A statistical calculation for all vessels simultaneously is very resource-intensive. We recommend selecting via the filter function individual vessels or products. If the statistics of more than one vessel are generated, several statistics blocks can be displayed in dependence on the measuring unit defined in the controller. For example, when the measuring unit "percent" is defined in one controller and the measuring unit "litre" in another, the values cannot be calculated together and must hence be displayed separately.

→ When displaying the statistics, limit the number of measuring points via the filter. Then select the requested values under "Data selection" and set the requested period. To calculate and output the result, press the button "Update data".

In addition you can write the result into a PDF file by pushing the button "PDF export".

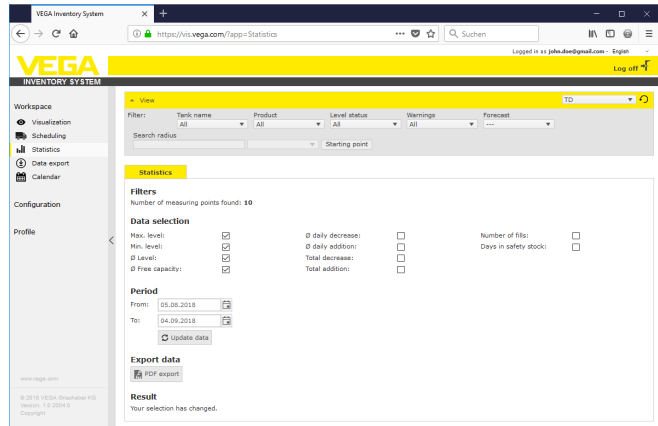


Fig. 18: Statistics

6.5 Data export

Data export

All relevant data of any measuring point can be exported to a file in Excel format.

With the filter function, the export can be optimized according to certain criteria, e.g. according to groups, products or selected measuring points. Select which data format and which data are to be included in the Excel file. In addition, select the desired period and the number of measured values to be included in the export. We recommend to select "alle".

The export procedure is started via the button "Export data".

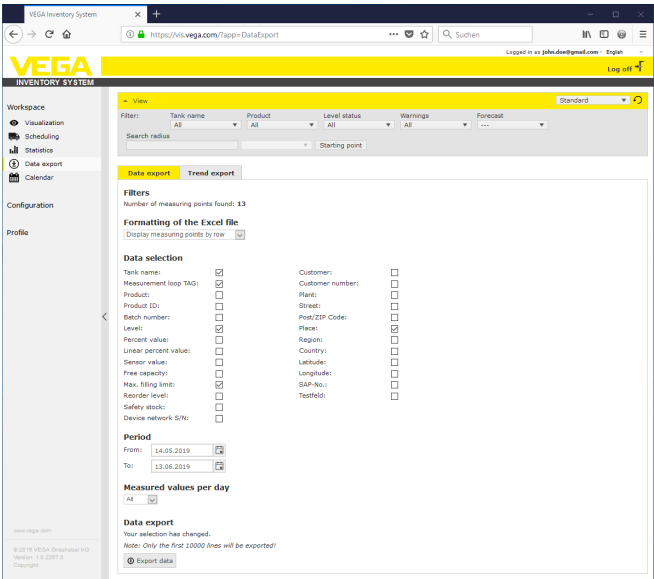


Fig. 19: Data export

History export

History diagrams can be exported in PDF format. With the filter functions, the export can be optimized according to certain criteria, e.g. according to groups, products or selected measuring points. Select the time period in which the trend data is to be included in the export.

The export process is started via the button "Export history" You will then receive an e-mail with a link to download the PDF file.

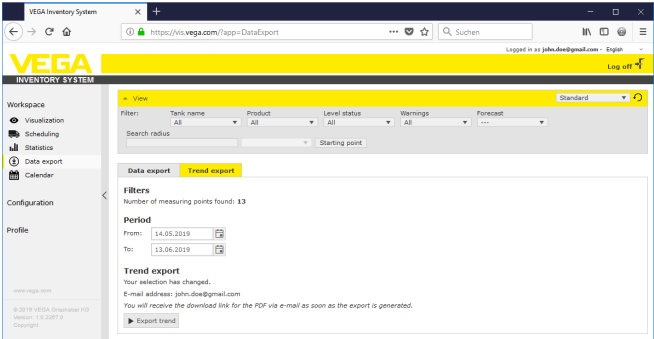


Fig. 20: History export

6.6 Calendar

The calendar displays all planned transport events (deliveries/collections) that are stored in the scheduling function. In addition, it can

be used to record notes about planned events (e.g. maintenance, downtime) or other information.

In addition, so-called "*stock-neutral*" days can be stored that are not taken into account by the forecast function. These are, for example, weekends, public holidays or planned plant shut-downs.

To create a calendar entry, double-click on the date with the mouse and fill in the corresponding fields. To accept the entries click on the button "*Store*".

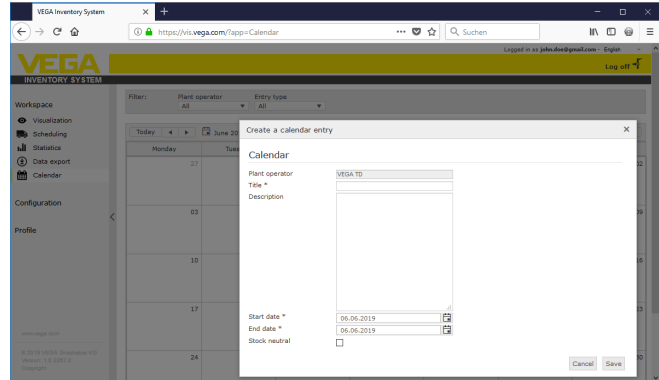


Fig. 21: Calendar entry

7 Configuration

In the area "*Configuration*" all necessary functions for setting up and commissioning the inventory system are available. Extended settings can be made that are not available in the "*Workplace*" area.

The configuration area is only available for users with the role "*Supervisor*" or higher.

7.1 Dashboard

The dashboard gives an initial overview of the status and the configuration with the created users and measurement loops. All possibly occurring faults, events and system messages are also collected here and can be viewed at a glance. You can reach the dashboard via the navigation menu and the menu items "*Workplace*" or "*Configuration*".

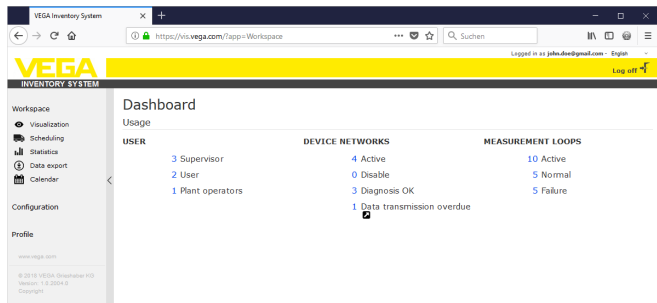


Fig. 22: Dashboard

7.2 System operator

A plant operator is at the top of the hierarchy in the Inventory System. Here you will find global settings with which you can control how information is displayed and managed. A plant operator is usually defined by the name of your company or organization.

Company details

In the tab "*Company details*" the stored information on the system operator are displayed. This includes for example: company name and location, contact person with e-mail address and phone numbers. The company name and country can only be changed by a VEGA administrator.

Personalization

In the tab "*Personalization*" the layout can be adapted according to your own needs. You can change the colour, the displayed company logo and the address as you wish. Your company/organization information can, for example, be assigned to the footer of all PDF documents.

Adjustments

In the tab "*Settings*" you can make settings for the profile type, data archiving/updating, effective range calculation and statistics. Furthermore, you can adapt the date, time and number format to your own needs or country-specific customs.

Profile

- **Profile type:** Defines the type of measurement e.g. tank/water level measurement, recycling, ... The profile type influences the behaviour of certain functions and adjusts the wording in the layout accordingly. In addition, certain functions are not available depending on the profile type selected.

Data archiving

- **Archiving period:** Period of the measured value archiving. Example 18 months: All measured values are stored for 18 months, after that the oldest measured values are deleted (FiFo method)

Update browser data

- **Updating Interval:** Time after which the website is automatically reloaded and new measured values are displayed

Range of coverage calculation

The range of coverage calculation predicts the future level trend and displays it as a dashed line in the history diagram. This trend forecast is based on average daily consumption (or access for recycling tanks) over a given period. In addition, time is calculated until the stock reaches the predefined safety stock limit. This value is referred to as the "Range".

- **Number:** Defines the number of past days taken into account for the range of coverage calculation. The stock-neutral days maintained in the calendar are also taken into account.
- **Display period:** The result of the range of coverage calculation is displayed in the selected unit. Depending on the emptying speed, hours, days or weeks can be useful
- **Number of decimal places:** Defines the number of decimal places for the range display
- **Rounding type:** Defines the type of rounding of the range of coverage calculation

Statistics

- **Filling detection threshold:** The threshold value for the detection of a filling. Example 25 %: Only when the level rises by at least 25 % (from min. level) does this get judged as a filling
- **Calculation period:** Standard period for statistical calculations (today minus x days)

Logistics parameter

- **Transportation time:** Select the number of days for the standard transportation time for all tanks/silos. The disposition function uses this value to generate the warning "Transport required", see chapter "Disposition".
- **Delivery days:** Select the weekdays on which the transports are to be carried out. Only these days are then taken into account for standard transportation time.

Formatting

- **Date format:** Selection of the desired display format for the date

- **Time format:** Selection of the desired display format for the time
- **Number format:** Selection of the desired display format for the numbers
- **Measurement loop name:** Selection of the desired measurement loop name, which is displayed in the messages



Note:

Formatting changes only take effect when the user logs on again.

Data protection

- **Google Analytics:** VEGA uses Google Analytics to find out which features and functions are used. This analysis is used to further develop and improve the software. You can deactivate the analysis of your entire account here.

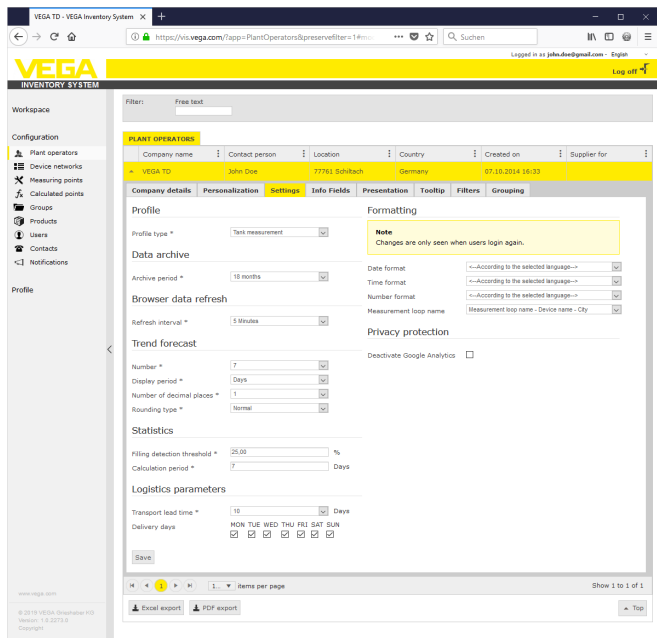


Fig. 23: Configuration plant operator - Settings

Info fields

In the tab "Info fields" additional customer-specific information can be entered and displayed, for example "Contract number" or "Location ID". This data can be displayed in the "Visualization" menu and can also be made available to other functions such as "Data export" or "Notification". Here you define the heading of this information field.

Measuring point info field 1 ... 4

The contents of this additional table field must be entered under "Configuration - Measuring points" in the tab "Settings" under "User-defined fields".

Device networks info field 1 ... 4

The contents of this additional table field must be entered under "Configuration - Device networks" in the tab "Location" under "User-defined fields".

Presentation

In the tab "Presentation" you will find various setting options for the presentation of the table and graphic view as well as for the history diagram. Here you can also define the colours for the different alarm messages.

Tabular view

The configuration possibilities affect the tab "Table" under the menu item "Workplace - Visualisation".

- **Show fill colour in the product column:** When activated, the product column is provided with a fill colour. The desired colour is set under "Configuration - Measuring points" in the tab "Presentation" under "Fill colour"
- **Totalizer function:** Display of the sum of all displayed measuring points (only useful if all measuring points are configured to the same unit)
- **Grouping:** Configuration such as "Groups" are displayed in the table view. If "Folded" is selected, only the name of the group is displayed, the measuring points are hidden
- **Sorting and filtering:** The set sorting affects the filter in the header
- **Status indication:** Defines the bar colour of the level status as long as no alarm with another defined colour is present

History diagram

The configuration possibilities affect the tab "History" under the menu item "Workplace - Visualisation".

- **Display past days:** Defines the number of past days displayed in the history diagram
- **Display future days:** Defines the number of future days displayed in the history diagram for range of coverage indication
- **Background colour:** Defines the background colour of the history diagram

Graphic view

The configuration possibilities affect the tab "Graphic" under the menu item "Workplace - Visualisation".

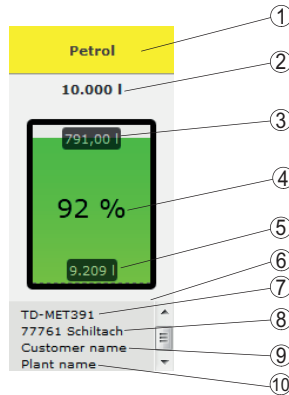


Fig. 24: Graphic view

- 1 Header with product, group or vessel name
- 2 Max. filling limit (usable volume)
- 3 Free capacity (calculated free volume)
- 4 Level (percent)
- 5 Level
- 6 Footer
- 7 Device name
- 8 System location
- 9 Customer name
- 10 System name

- **Header:** Defines the display of the product, vessel or group names in the header
- **Show percentage value:** Activates the display of the measured value in percent within the graphic symbol
- **Show free capacity:** Activates the display of the calculated free volume within the graphic symbol
- **Show max. filling limit:** Activates the display of the total volume above the graphic symbol
- **Display tank name/silo designation:** Activates the display of the vessel name in the footer
- **Show customer:** Activates the display of the customer name in the footer, if this was entered under "Configuration - Device network - Location"
- **Show plant:** Activates the display of the plant name in the footer if this was entered under "Configuration - Device network - Location"
- **Show address:** Activates the display of the plant address in the footer if this has been entered under "Configuration - Device network - Location"
- **Show location:** Activates the display of the plant location in the footer, if this has been entered under "Configuration - Device network - Location"
- **Scale symbol size:** The size of the graphic symbol in the graphic view is automatically scaled according to its size. This is particularly suitable if the vessel sizes do not differ by more than 50 %. In the case of very large deviations, however, small vessels are then

only shown as a narrow strip. By activating this option, these vessels are displayed enlarged

Alarm colours

In this area, an individual colour can be assigned to each alarm message type. All colours can be reset to the factory settings via the button "*Reset colours*".

Tooltip

In the tab "*Tooltip*" the tooltips displayed in the map and graphic view can be selected. These are, for example: Address, time stamp, free capacity, range, event, warning, device network S/N, groups, plant, user-defined fields.

Filter

In the tab "*Filter*" you can adapt the criteria of the filter section according to your requirements. The assigned criteria will be then available under the menu item "*Workplace - Visualisation - Filter*".

Grouping

In the tab "*Grouping*" you can adapt the criteria of the filter section according to your requirements. The assigned criteria will be then available under the menu item "*Workplace - Visualisation - Grouping according to*".

7.3 Device networks

Device networks supply data to the Inventory System. The serial number of this instrument is required for connection and authentication of instruments (e.g. VEGA controllers or PLICSMOBILE).



Information:

Even if the measured value transmission has not yet been set up on the controller, you can still create a device network, as far as the serial number is known. In such case, measured values cannot yet be displayed.

Choose in the left navigation section the menu item "*Configuration - Device networks*" and click to "*Add*".

Create device network

- **Instrument category:** Select one of the offered options:
 - **Standard:** Standard selection for all VEGA instruments (controllers, radio units such as PLICSMOBILE)
 - **Virtual:** Select "*Virtual*" if you want to execute one of the following two functions:
 - Additional calculations based on existing measuring points, e.g. summation or average functions (see chapter "*Calculated measuring points*")
 - You want to display a so-called "*Dummy tank*" and enter a level value. A *dummy tank* can be a vessel that does not have a level sensor or is not physically connected to the Inventory System
 - **Foreign device:** For special cases, e.g. for importing data from external systems, e.g. from the inbox of an e-mail server
- **Serial number:** Enter here the serial number of the VEGA instrument. You can find the serial number on the type label of the device or via the device software.
- **Plant operator:** Display of your account name (not editable)

- **Time zone:** Select the time zone where the plant with the controller/radio unit is located
- **Network access code (PSK):** The code (Pre Shared Key) is used to authenticate the device with the Inventory System. The entry of this code is only necessary in exceptional cases, e.g. after an update of the device software. The code can be found in the configuration menu of the device
- **Instrument name:** Enter any name for better identification of the device
- **Location:** Enter the address or location data of the device location here. It is not necessary to complete the latitude and longitude fields, this information is automatically inserted after entering the address data

User-defined fields

- **Customer:** Name of end customer or branch
- **customer number:** Customer or identification number
- **Plant:** Name of the plant or plant area in which the device is located

Accept your configuration via the button "Store"

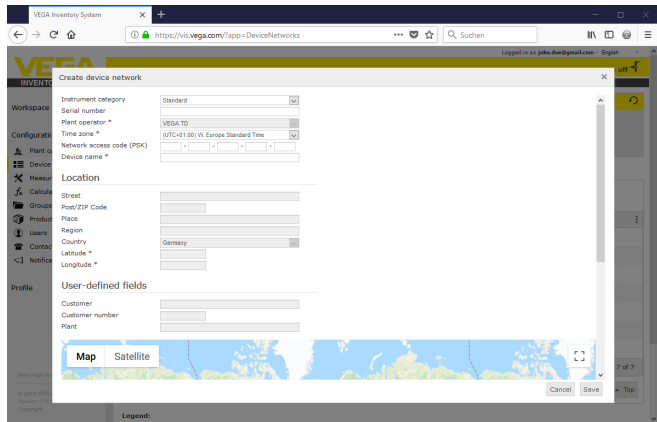


Fig. 25: Creation of a device network

Each device network already created is displayed in a table view. For further information and configuration options, click on the arrow symbol. These are, for example, device data, location, measuring points and messages. It is not necessary to add measuring points manually. They appear automatically if they are connected and configured with a data transmission unit (device network). Measuring points can always be deactivated/activated using the keys in the column "Actions".



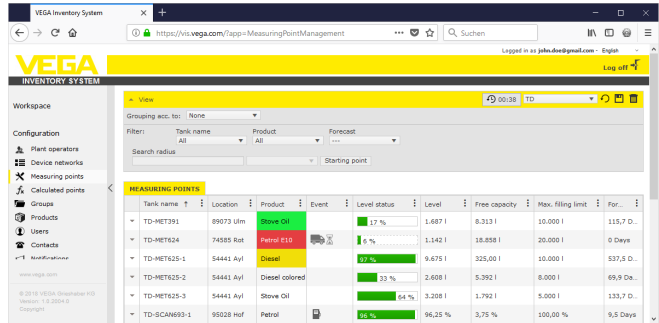
Information:

A device network that has been created can only be deleted by an administrator or subadministrator.

7.4 Measurement loops

In the measuring point configuration, you get an overview of all available measuring points with the corresponding measured values and event messages. Next to each measuring point name is an arrow symbol. By clicking on this arrow symbol, the information and configuration level of this measuring point is opened. Here you can view and configure, via different tabs, e.g. the measured value history and details of the measuring points. The assignment of groups, users and contacts is also carried out on this level. Notes can also be added here.

The limit value setting of the safety and reorder stocks for notifications as well as the activation of scheduling are also included in this menu item.



Tank name	Location	Product	Event	Level status	Level	Free capacity	Max. filling limit	For.
TD-MET731	89073 Uhm	Stove Oil		17 %	1,687 l	8,313 l	10,000 l	115,7 D.
TD-MET624	74585 Rot	Petrol 810		6 %	1,142 l	18,858 l	20,000 l	0 Days
TD-MET625-1	54441 Ayl	Diesel		73 %	9,475 l	325,00 l	10,000 l	537,5 D.
TD-MET625-2	54441 Ayl	Diesel colored		73 %	2,608 l	5,392 l	8,000 l	69,9 D.
TD-MET625-3	54441 Ayl	Stove Oil		64 %	3,208 l	1,792 l	5,000 l	133,7 D.
TD-SCAN693-1	95028 Hof	Petrol		10 %	96,25 %	3,75 %	100,00 %	9,5 Days

Fig. 26: Measuring point configuration

History

In the tab "History" you can show the progression of the measured values in the past. By entering the start and end date, the requested period can be limited. By clicking and dragging in the history diagram, any section can be marked and displayed. As an alternative, you can have an individual section displayed via slide switch. Via the button "Show all" you can return to the completely available period.

Via the arrow symbol the diagram can be exported. Here you can choose between the formats PNG, JPG and SVG. As an alternative you can also create a PDF with the respective frame data of the diagram.

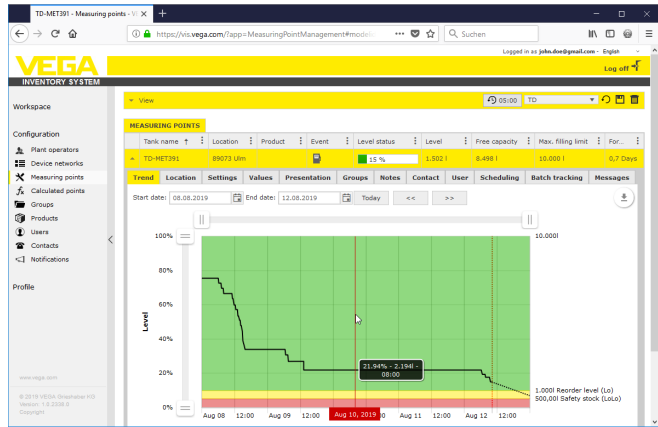


Fig. 27: Measuring point configuration - History

Location

In the tab "Location" the currently recorded location data of the plant are displayed. Via the button "Edit location" the data recorded in the device network can be changed.

Adjustments

In the tab "Settings" the basic configuration for the respective measuring points is adjusted.

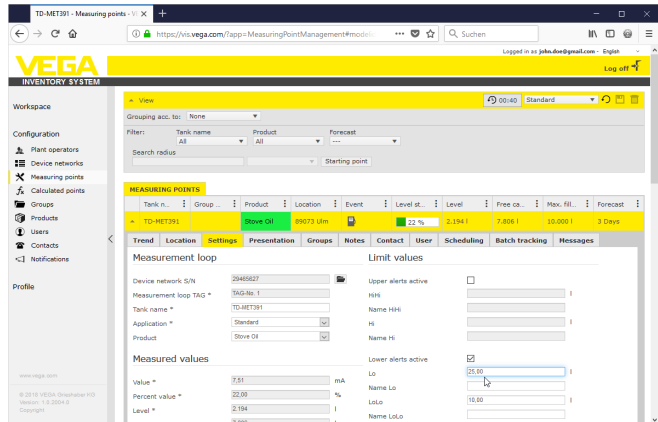


Fig. 28: Measurement loop configuration - Settings

Measurement loop

Basic information on the measurement is provided in the measurement loop section.

- **Device network S/N:** Display of the serial number of the device network or the controller that sends the measured values
- **Measurement loop TAG:** Display of the measurement loop name
- **Tank name:** Display and editing possibility of the tank name

- **Application:** Display and selection option of the application. A difference is made between "*Standard*", "*Recycling*" or "*Water level*". In a standard tank, the lower reorder or safety stock at low level (tank nearly empty) is relevant. In a recycling tank it is just the other way around; here the upper reorder and safety stock at high level (tank nearly full) is relevant. Accordingly, the change of colour on the product tank occurs when the level falls below the lower reorder/safety stock (Lo/LoLo), but on the disposal tank it occurs when the level exceeds the upper reorder/safety stock (Hi/HiHi). To allow immediate identification of the two tank types at first glance in each view, the level in the standard tank is framed by a continuous line, the level in the disposal tank by a dashed line.
- **Product:** Display and selection of the product name. If products have been created in the configuration, a product can be assigned to a tank/silo here. This function is interesting for a silo with changing bulk solids.

Measured values

In this area, the currently recorded measured values are displayed for information. If scaling by the Inventory System is desired, the corresponding values can be assigned here. The scaling function overwrites the min. and max. values and the system unit sent from the field device. This may be helpful if it is not practicable or economical to change the parameters in the field.

Limit values

In this area the alarms for HiHi, Hi, Lo, LoLo can be activated and provided with corresponding limit values. The standard markings can be overwritten if required. A hysteresis must also be entered here.



Tip:

A value of 1 % of the range is recommended.

Level monitoring

When "*Check level change*" is activated, the level is continuously monitored over an adjustable period of time. If no change is detected at any time in this time window, this is indicated in the table view in the column "*Event*". In this case, a notification can also be sent via e-mail or SMS.

Free capacity calculation

The basis for the calculation of the empty volume can be defined here. The max. filling limit of the vessel or one of the four alarm limit values are available for selection. This function is helpful, for example, if it is not practicable to change the value of 100 % (max. filling limit) in the field device. In this case, the empty volume can be related to the HiHi limit value.

Range of coverage calculation

In this area the range of coverage calculation for the selected measuring point can be activated/deactivated. If the global parameters are not suitable for the application, the parameters can be optimized individually. For example through faster level changes. The global

parameters can be found under "Configuration - Plant operator - Settings".

- **Calculation type:** Select "Linear trend" if the standard trend forecast is to be used. Select "Calculated consumption" if you want to use production planning entries.

Logistics parameter

In the logistics parameters, the scheduling function is activated for each measuring point. You can find the description of scheduling under "Workplace - Scheduling".

The transportation time defines the standard delivery time that a product has at the respective vendor. This has a direct effect on the scheduling function. If, for example, the range of coverage is less than the standard delivery time, the delivery will arrive too late. This is displayed in the table view and in the calendar as a truck symbol with an hourglass.

User-defined fields

Under "Configuration - Plant operator" user-defined info fields for the measuring point can be created in the tab "Info fields". For example, the first info field is already preset as "SAP-No.". Info fields that have already been defined can then be provided with any content in this area, e.g. with the SAP number "12345678". These contents can then be displayed in the visualization and other functions.

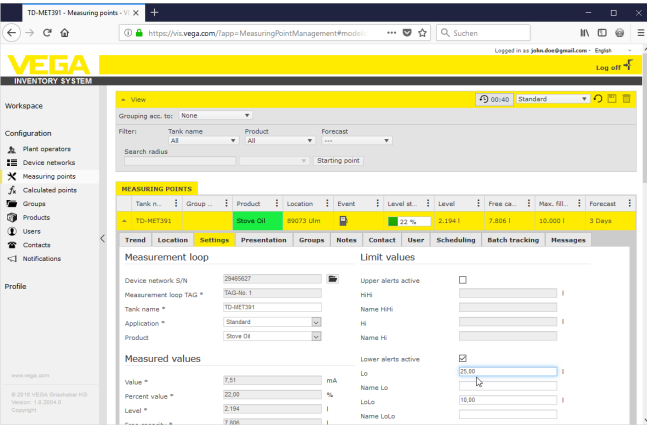


Fig. 29: Measurement loop configuration - Settings

Values

This menu item displays the basic data of the measuring points and their measured values. Statistical and forecast values are also provided.

Measurement loop

Basic information on the measurement is provided in the "Measuring point" section.

Measured values

In the "Measured values" section, the currently recorded measured values are displayed for information purposes.

Statistics

In addition to the global statistics function in the menu "Workplace", this function executes statistical calculations at local level. The statistics are automatically calculated according to the selected time frame and the following parameters:

- The delivery/emptying information is based on the values of "Filling detection threshold" under "Configuration - Plant operator - Settings".
- The level, consumption and growth statistics are based on historical level data.

Range of coverage calculation

These functions display the trend forecast calculations for the following time periods:

- Time to reorder level
- Time to safety stock
- Time until vessel is empty



Note:

If no limit values are configured for the reorder level and safety stock, no forecast value is displayed.

The screenshot displays the VEGA Inventory System web interface. The main content area shows the 'Values' tab for a measuring point configuration. The interface includes a sidebar with navigation options like 'Configuration', 'Plant operators', 'Device network', 'Measuring points', 'Calculated points', 'Groups', 'Products', 'Users', 'Contacts', and 'Notifications'. The main area is divided into several sections:

- Filtering:** A section with filters for Tank name (TD-MET391), Product (All), Level status (All), Warnings (All), and Forecast (All). It also includes a 'Search radius' and a 'Starting point' dropdown.
- MEASURING POINTS:** A table listing measuring points. The selected point is TD-MET391, located at 69073 Ulin, with a level of 45.00 %.
- Trend:** A section showing the measurement loop details, including the device network S/N (29465627), measurement loop TAG (TAG No. 1), tank name (TD-MET391), and last updated time (08.08.2019 14:30).
- Measured values:** A table displaying various measured values:

Value *	11.66 mA
Percent value *	45.00 %
Scaled value *	4.7881
Free capacity *	5.2121
Minimum value *	0.001
Max. filling limit *	10.0001
- Statistics:** A section showing statistical data for the selected measuring point, including the date of last delivery (07.08.2019), quantity of last delivery (4.3571), and various delivery and consumption statistics.
- Trend forecast:** A section showing the time to reorder level (7.7 Days), time to safety stock (8.7 Days), and time to empty (9.7 Days).

The interface also includes a footer with copyright information and a 'Show 1 to 1 of 1' indicator.

Fig. 30: Measuring point configuration - Values

Presentation	In the tab "<i>Presentation</i>" , any text can be defined for the labeling of the Y-axis of the displayed diagram under "<i>History diagram</i>". In the area "<i>Graphic view</i>" you can define the vessel form, frame type (continuous/dashed) and frame colour as well as the fill colour. These settings affect the display of the measured value bars under "<i>Workplace - Visualization</i>" in the tab "<i>Graphic</i>".
Groups	In the tab "<i>Groups</i>" the selected measuring point can be assigned to a certain group. This group must have been previously created under "<i>Configuration - Group</i>".
Notes	In the tab "<i>Notes</i>" you can store an individual note to the selected measuring point. In addition you can define where and when this note should be displayed. It is also possible to add a file attachment.
Contact person	In the tab "<i>Contact person</i>" a contact person with contact data for the selected measuring point can be created.
User	In the tab "<i>User</i>" you can assign users to the selected measuring point. These users must first be created under "<i>Configuration - User</i>". Administrators and sub-administrators cannot be displayed and assigned here.
Scheduling	In the tab "<i>Scheduling</i>" a support for planning deliveries or outgoing goods is available. You can find a detailed description under "<i>Workplace - Scheduling</i>".
Batch tracking	In some industries, such as the food industry, all processed raw materials must be traceable throughout the production cycle. With the function "<i>Batch tracking</i>" and the progress of the measuring point, it is possible to trace when the batch (medium) has been modified in the silo. Prerequisite for this function is that at least one "<i>Product</i>" has been created in the configuration menu. At the time of delivery, create a manual entry on the time axis of the history chart. A batch number can also be entered here.
Messages	In the tab "<i>Messages</i>" you can find all messages/events of the selected measuring point. It can be also exported as Excel or PDF file.

7.5 Calculated measuring points

Calculated measuring points can offset the measured values of several measuring points against each other and display the result as a new measuring point. This is used, for example, when multiple sensors are used to measure a large silo or storage location and an average level is required.

The requirement for a calculated measuring point is the same as for all other measuring points: the creation of a standard device network. In this case, create a virtual device network under "*Configuration - Device networks*". In the window "*Create device network*" you have to select under "*Instrument category*" the list box entry "*virtual*".

For creating the calculated measuring point move to "*Configuration - Calculated measuring points*" and assign a respective measuring point name.

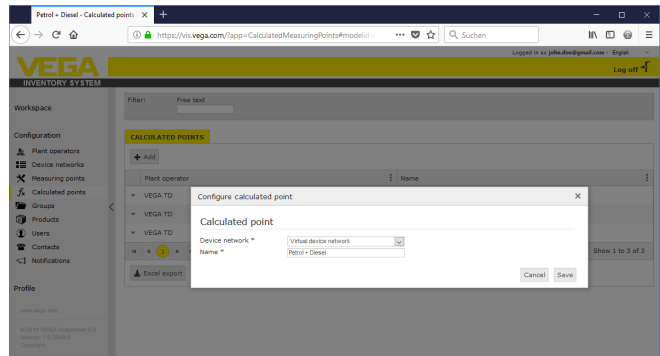


Fig. 31: Creating a calculated measuring point

After creating the calculated measuring point, move to tab "*Details*". Here you can select the requested calculation mode. The following calculations are available:

- **Summation:** The values of the selected measuring points are added
- **Average:** The average value is calculated with the values of the selected measuring points
- **Standard value:** The assignment of the measuring points is ignored and a fix value is expected in the entry field
- **User-defined:** The formula for the determination of values can be freely selected. The calculation is based on the programming language JavaScript. You can find a detailed description with application examples in the annex. The following options are also available for this calculation type:
 - **Allow exceeding of max. value:** Determines if warnings should be suppressed if a result of the calculated measuring point exceeds the max. filling limit
 - **Overwrite max. filling limit:** Determines if the max. filling limit is determined manually or calculated automatically. With the automatic calculation, the user-defined script is executed with the max. filling limits of all assigned measuring points
 - **Max. filling limit:** Manual entry of the max. filling limit. This field is only visible when the option "*Overwrite max. filling level*" is activated

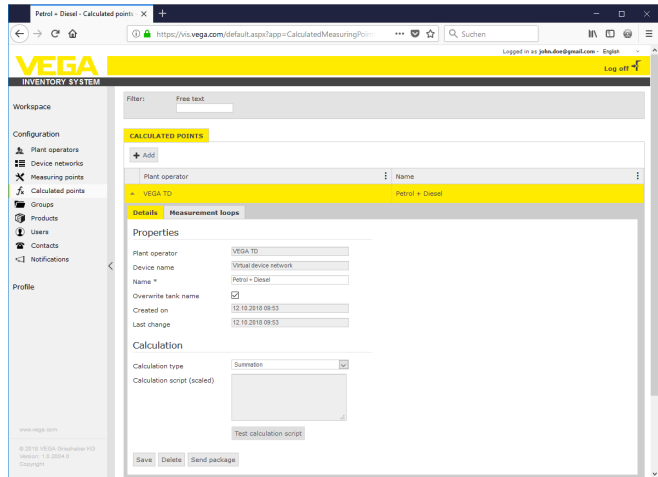


Fig. 32: Calculated measuring point - Selection of the calculation mode

As a last step, you select under the tab "Measuring points" the measuring points you want to use for calculation.

7.6 Groups

In this window you can create groups in order to group measuring points according to existing points of view. If there are many measuring points in use, this feature can be quite helpful in keeping track of everything. The grouping can be, for example, according to location in different plant areas or according to product properties.

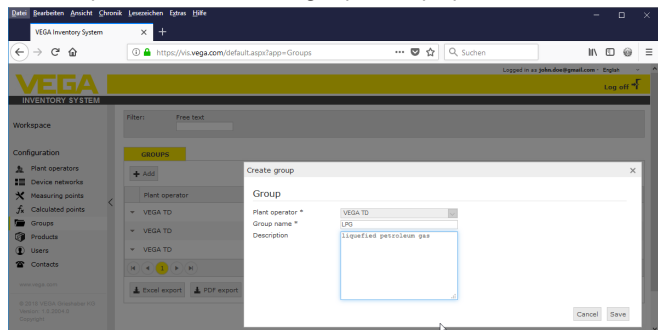


Fig. 33: Create a group

7.7 Products

On this page you can create products, i.e. assign product names which are then available for all requested tanks. In addition, you can assign a corresponding product number, e.g. the product ID stored in an SAP system. The allocation of a product to a measuring point is

then carried out under the navigation point "Configuration" - "Measuring points" on the page "Settings".

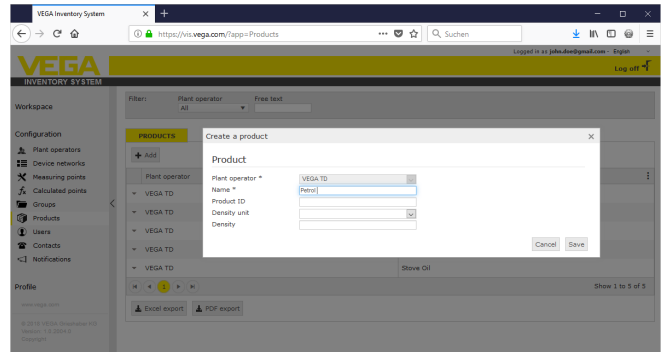


Fig. 34: Create a product

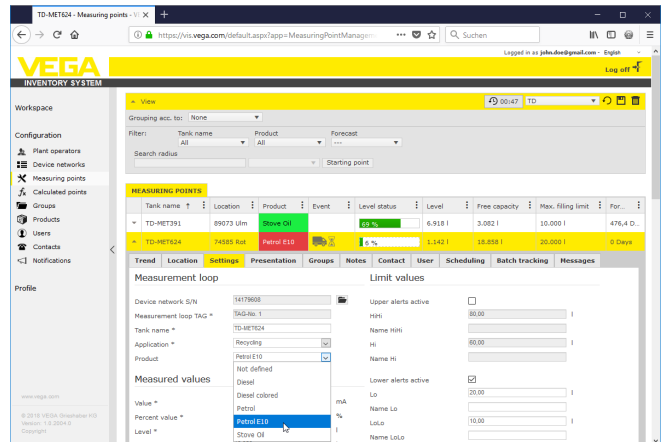


Fig. 35: Assign a product to a tank

7.8 User

VEGA Inventory System offers different user accounts that contain certain functions, tasks and rights. The following user modes are available:

Administrator

The administrator has all rights. He creates new plant operators and the responsible supervisor. The administrator role is reserved for the responsible VEGA service and support employees. The tasks of the administrator are:

- Account management
- User management
- Access and password management
- Configuration management
- Monitor dashboard

Sub-administrator

The sub-administrator level allows access to certain system operators assigned by the administrator. A sub-administrator can configure nearly all settings and create and manage all supervisor and user accounts. The sub-administrator role is reserved for the responsible VEGA employee. The tasks of the sub-administrator are:

- User management
- Access and password management
- Configuration management
- Monitor dashboard

Supervisor

The supervisor level allows access to specific plant operators assigned by the administrator or sub-administrator. The supervisor has access and control to the workplace menus and all essential functions of the configuration menu. The supervisor may e.g:

- Create/modify/delete user accounts
- Create/modify device networks
- Activate/deactivate/change measuring points
- Create/modify/delete messages
- Create/change/delete calculated measuring points
- Create/modify/delete products
- Create/modify/delete groups
- Create/modify/delete contacts
- View diagnosis and messages
- Monitor dashboard

User

A "*User*" has basic rights and can only access the areas "*Workplace*" and "*Profile*". The user has access to the following functions:

- Visualization menu
- Change/save own layout
- Statistics
- Data export
- Calendar
- Scheduling
- Receive notifications
- Change profile settings
- Reset password
- Monitor dashboard

Public

With a "*Public*" account you can directly access the Inventory System via a link, no access data is required. With this account a fast and simple access to the visualization data is possible, e.g. with a PC at which daily different persons want to see the data. It would not be practicable to constantly log on and off the various users here.

A "*Public*" user has limited reading rights in the visualization area. The user has access to the following functions:

- Grouping and filtering
- Tabular view
- History diagram at the measuring points
- Graphic view
- History

- Map

Establish a user account

To create a new user account, go to "Configuration - User" and select the button "Add". Enter the necessary data in the entry mask and click on the button "Generate new password". Complete the process with the button "Save".

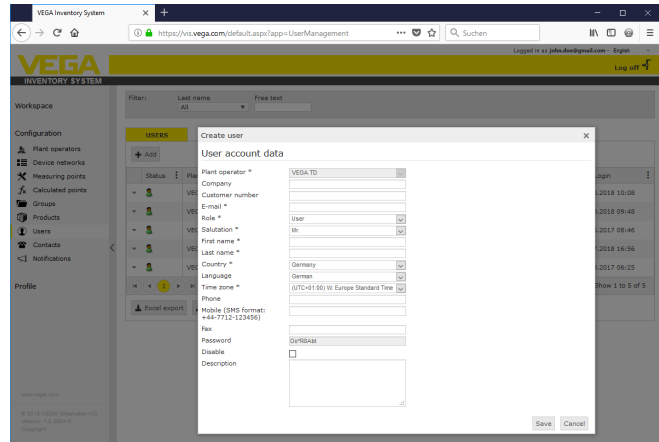


Fig. 36: Create a new user account

Now select the new user and go to the tab "General". Then click the button "Send change password link". The user now receives an e-mail from the Inventory System with a link with which he can log into the system and assign his own password.

Under "Configuration - Measuring points" change to the tab "User" and assign the measuring points intended for the user. In addition, the user can receive messages that can be configured under the menu item "Configuration - Notifications".

7.9 Contact person

Here you can store the contact data of the contact persons responsible for the measuring point(s) on site. In the second step, you can assign the respective measuring points to these contact persons. To do this, select the corresponding contact person and move to tab "Measuring points". The contact persons can also receive the messages configured under the menu item "Notifications".



Information:

As opposed to users, contact persons have no access to the VEGA Inventory System. They can only receive measured values, notifications and alarms via e-mail or SMS.

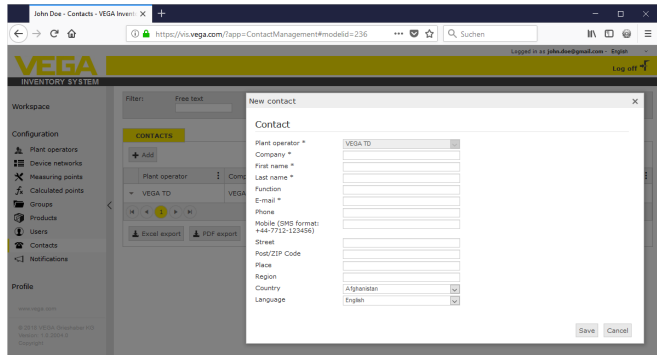


Fig. 37: Configuration of contact person

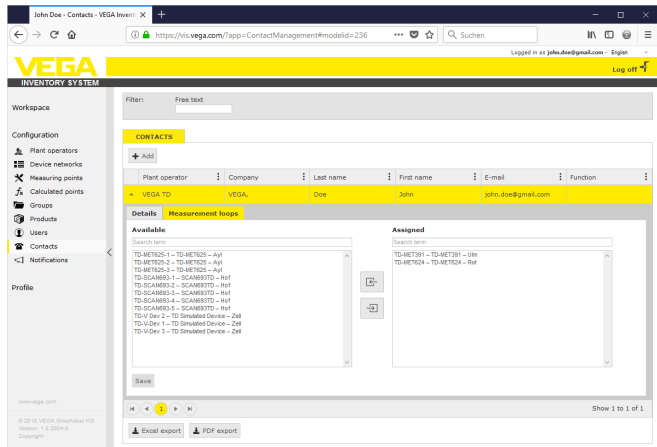


Fig. 38: Assignment contact person - Measuring point

7.10 Notifications

Notifications contain information about actual measured values or certain events such as alarm thresholds or faults. They can either be sent as via e-mail or SMS. In addition, the events are displayed via a corresponding symbol with tool tip in the menu items "Visualisation" and "Measuring points".

Notifications are grouped in categories "Alarm thresholds", "Time" and "Faults".

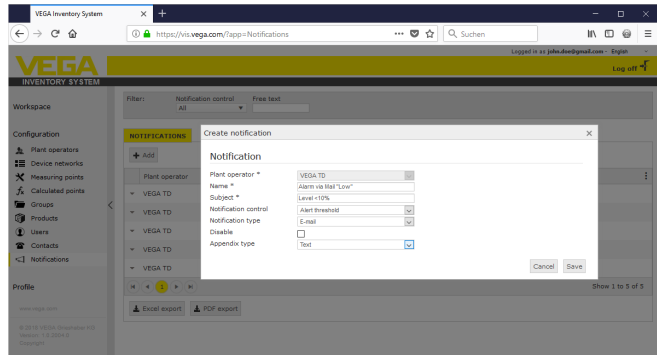


Fig. 39: Creating a notification

Message in case of alarm

An alarm is generated when a level exceeds or falls below a defined value. There are four selectable alarm thresholds which can be provided with individual limit level values:

- **Reorder level (Lo):** Sends an alarm when the level falls below a defined measured value
- **Safety stock (LoLo):** Sends an alarm when the level has fallen below a defined safety stock, e.g. if the level has already fallen below the Lo reorder level and an additional message should be sent
- **Reorder level (Hi):** Sends an alarm when the level exceeds a defined measurement value
- **Safety stock (HiHi):** Sends an alarm when the level has exceeded a defined safety stock, e.g. if the level has already exceeded the Hi reorder level and an additional message should be sent
- **Do not send messages when alarms are resolved:** Select this check box if you do not want to receive a message when the measured values return to the normal range.

To send an alarm, a value for the reorder or safety stock must first be entered. This configuration can be found in the navigation menu under "Configuration" - "Measuring points" on the page "Settings".

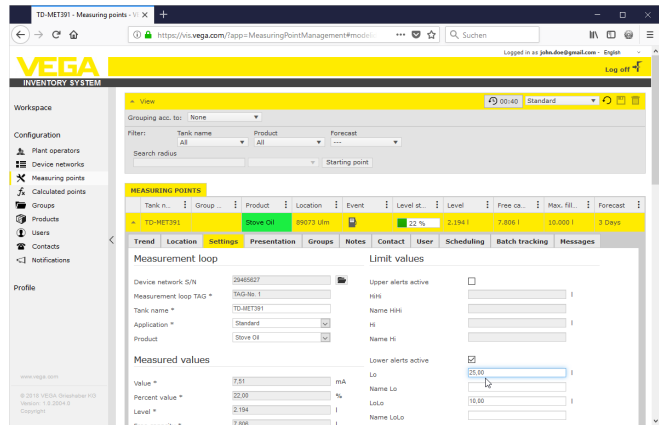


Fig. 40: Notification - define limit values

After the creation of a notification, an addressee must be assigned under "User" or "Contact person", so that the message can be sent via the desired forwarding method. If an SMS should be sent, a mobile phone number must be stored with the respective user. Select under "Measuring points" which measuring points this notification is to be sent for.

On the tab "Data selection" you can define which information should be sent with an alarm message.

Message time-controlled

The actual measured values/data are transmitted at defined times independent of the measuring result. The time control can be configured as follows:

- One time on any day and at any time
- On the hour every 1/2/3/6/8 hours
- Every minute every 15/30 minutes
- Daily/weekly at any time
- Monthly on any day and at any time
- Annually in any month, on any day and at any time

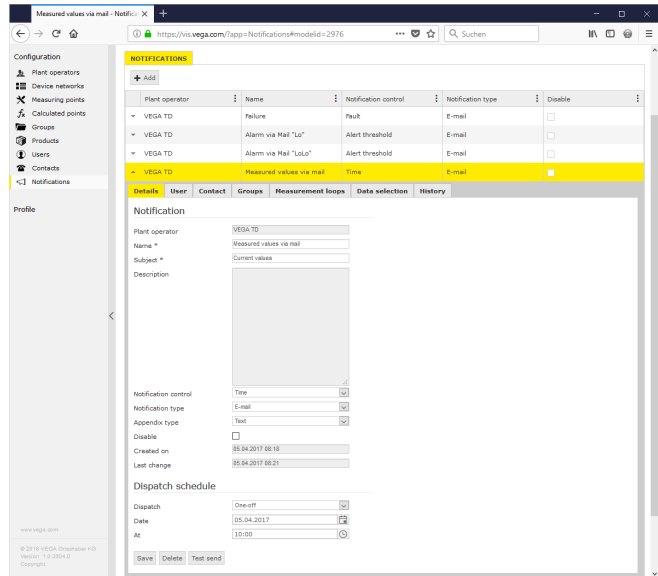


Fig. 41: Notification - time-controlled measured value transmission

After the creation of a notification, an addressee must be assigned under "User" or "Contact person", so that the message can be sent via the desired forwarding method. If an SMS should be sent, a mobile phone number must be stored with the respective user. In the last step, you select under "Measuring points" which tanks this notification is to be sent for.

Message in case of failure

A fault message can have different causes. The reaction to it can be different depending on the cause of the fault. For that reason, faults are classified into two categories:

- **Measurement loop failure:** The sensor or the measurement loop signals failure, no measured values are detected. Normally, action should be taken immediately and the error rectified as quickly as possible.
- **Communication error:** This is a pending data transmission. In most cases, the user can simply wait for the next data transmission cycle.

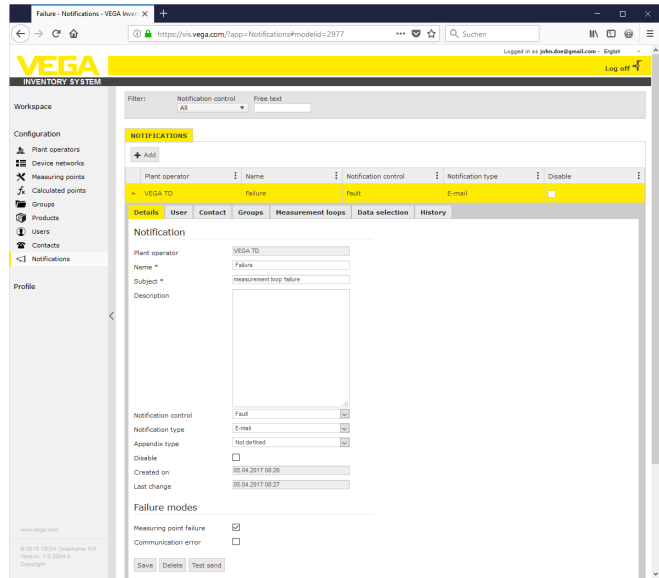


Fig. 42: Notification - Failure

After the creation of a notification, an addressee must be assigned under "User" or "Contact person", so that the message can be sent via the desired forwarding method. If an SMS should be sent, a mobile phone number must be stored with the respective user. In the last step, select under "Measuring points" which measuring points this notification is to be sent for.

Message for no level change

This function notifies you if there is no level change within a certain period of time, for example if no product has been added or removed from a vessel over a longer period of time. This can also be used, for example, to report a measurement error if a sensor outputs an incorrect level value (e.g. due to a false echo).

Battery condition alarm message

Some devices are operated with an external battery pack (e.g. PLICSMOBILE). An alarm can be triggered if the battery level falls below a fixed threshold. This function can be useful for planning battery replacement. The threshold value for the battery level must be set for the respective device under the menu item "Configuration - Device networks" under the tab "Device data".

8 Profile

8.1 Change password

In this menu item you can change the password you've used until now. The new password must have at least 8 characters and one special character.

Fig. 43: Change the login password

8.2 My settings

In this menu item you can define the page that should be displayed after login. Furthermore you can set the requested date and time format as well as a number format.

Fig. 44: Select start screen

9 Supplement

9.1 Calculated measuring points - user-defined calculation

With the user-defined calculation, the formula for determination of the values can be individually selected. The calculation is based on the programming language JavaScript.

The values of the assigned measuring points were specified by place holders in the format "[[Tank-name]]".

On all positions in this documentation where place holders are used, also fix values can be entered. The decimal separator in this case is a point ("1.5" instead of "1,5").

Mathematical operators

+	Addition
-	Subtraction
*	Multiplication
/	Division

Example of a simple formula for multiplication of two tanks (Tank1 * Tank2):

[[Tank 1]] * [[Tank 2]]

Functions

Math.pow (basis, exponent)	Calculates the power of the basis with the exponents
Math.max (Param1, Param2, ...)	Returns the largest number of the specified parameter
Math.min (Param1, Param2, ...)	Returns the smallest number of the specified parameter
Math.sqrt (Parameter)	Calculates the square root of the parameter
Math.abs (Parameter)	Calculates the absolute amount of the parameter

Example for function references (Tank1¹+Tank2²):

Math.pow([[Tank1]], 2) + Math.pow([[Tank2]], 2)

Branching processes

The values can also be calculated differently under certain conditions.

Thus you can use the following operators in the condition:

Operator	Example	Description
>	[[Tank 1]] > [[Tank 2]]	Greater than
<	[[Tank 1]] < [[Tank 2]]	Less than
==	[[Tank 1]] == [[Tank 2]]	Equal
!=	[[Tank 1]] != [[Tank 2]]	Unequal
&&	(([[Tank 1]] > [[Tank 2]]) && ([[Tank 3]] > [[Tank 4]])	AND
	(([[Tank 1]] > [[Tank 2]]) ([[Tank 3]] > [[Tank 4]])	OR
!	!([[Tank 1]] > [[Tank 2]])	NOT

The branching process is made through key words "if" (WHEN ... THAN) and "else" with curly

brackets for demarcation of the *if* and *else* blocks and for return of the result, the key word "*return*" is used. The end of each instruction is marked with a semicolon.

Example:

If Tank 1 greater than Tank 2, then return Tank 3 , otherwise return Tank 4.

As calculation script:

```
if ([[Tank 1]] > [[Tank 2]]) {  
  return [[Tank 3]];  
} else {  
  return [[Tank 4]];  
}
```

9.2 Industrial property rights

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