

LevelLog manuals



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Product manual



1 LevelLog application software

The LevelLog MDSW Application (mobile device software) enables you, using a (mobile) device, to:

- set up a LevelLog database with organisations, areas, measure wells, users and software and define, change and represent information for each of these sections
- share, import and export a datafile to exchange information between various users with various MDSW applications
- upload other software to a LevelLog, set date and time, restrict access and manage the data buffer
- set up a LevelLog unit with a measure process and location parameters, adjust the LevelLog and perform a single measurement
- read various status data from the LevelLog and present and export them
- keep track of logging data and present and export them
- read measurement data from the LevelLog and present and export them

For some of these functions a connection with a LevelLog is required.

1.1 Installation

The LevelLog MDSW application software is available through the website www.levellog.nl. It is suitable for desktop PC's, laptops and tablets using:

- Windows 7 or Windows 8
- 32 bits or 64 bits processors

The installation manual and installation files of the LevelLog MDSW application can be downloaded. To do this, follow the instructions in the MDSW Installation manual.

By activating the 'setup' installation file and answering the questions the LevelLog MDSW application will be installed on the device concerned. The LevelLog MDSW application and all related support files will be stored in the folder C:\Program Files..\Sigmax..\VRM LevelLog and for the datafiles (sub)folders will be created under C:\ProgramData\Sigmax..\VRM LevelLog.

After successful installation a shortcut to the LevelLog MDSW application with a LevelLog icon will appear on the desktop.

1.2 Starting up

The LevelLog MDSW application can be started by activating the LevelLog icon on the desktop of the device on which the application has been installed. After that the LevelLog MDSW application will start in a new window with the Login screen, which will be full screen size by default. The size and position of the LevelLog MDSW application window can be adjusted.

1.3 Login screen

In the header bar of the Login screen can be activated:

- About: Information window regarding MDSW version and contact data
- Help: Access to the manual
- Logout: Closing the LevelLog MDSW application

A user can get access to the MDSW application by entering a user name and password. The most recently used user name is shown when opening the Login screen. Only with a correct combination of user name and password the Login button will enable access. In that case the MDSW application opens with the Employ screen. An incorrect combination will be reported by a pop-up message after which a new attempt may be done.

Only a user with 'administrator' rights can assign user name and password to a user by means of an administrative function. If a user has lost his or her password a request shall be sent to the administrator for a new password.

Before logging in a preferred language can be selected in a menu. The selected language will affect:

- texts in the MDSW application screens
- texts for the Help function and Manual

After changing the language a restart of the MDSW application is required by closing it in the header bar of the Login screen and restarting the MDSW application using the LevelLog icon on the desktop. This will be reported by a pop-up message.

1.4 Employ screen and Admin screen

The screens have a fixed arrangement, consisting of:

- Header bar
- Column 1 (left) with fixed width
- Column 2 (middle) with fixed width
- Column 3 (right) with variable width

Column 1 (left) is mainly intended to select and navigate. Column 2 (middle) is mainly intended to represent and select meta data. Column 3 (right) is mainly intended to enter data, enter commands and represent detailed information.

1.4.1 Header bar

The header bar at the top side of the screen shows:

Left:	The LevelLog logo
Centre:	Information regarding communication with a LevelLog (connected) <ul style="list-style-type: none">• With which LevelLog a connection has been or is being made• Access to a log file with LevelLog communication information
Top right:	The name of the presently logged in user
Bottom right:	A number of general functions that can be selected: <ul style="list-style-type: none">• Employ: Navigate to the Employ screen• Admin: Navigate to the Admin screen• About: Information window for MDSW version and contact data• Help: Access to the manual• Logout: Closing the LevelLog MDSW application

1.4.2 Functions Employ screen

In the employ screen the authorised user can:

Related to organisations

- Define and remove organisations
- Connect a logo to an organisation
- Connect areas to an organisation
- Export to a datafile data regarding organisations, all areas and measure wells with all belonging measured data, status data and logging data.

Related to areas

- Define and remove areas
- Connect maps to an area
- Set standard settings for the area
- Connect measure wells to an area
- Connect and disconnect users to an area
- Export to a datafile data regarding the area and all measure wells with all belonging measurement data, status data and logging data.

Related to measure wells

- Define and remove measure wells
- Add pictures to a measure well
- Set access rights (a.o. PIN code) for a measure well and upload them to the LevelLog
- Select different software version and send it to the LevelLog
- Read out date and time and set it on the LevelLog
- Read out information regarding hardware-version and battery condition of the LevelLog
- Set and adjust a LevelLog to a measure well
- Set the measure process for a measure well and send it to the LevelLog
- Set the location parameters for a measure well and send them to the LevelLog
- Read out the data buffer status and reset the data buffer in the LevelLog
- Perform a single measurement using the LevelLog
- Read out and represent measurement data from the LevelLog
- Read out and represent status data from the LevelLog
- Add and represent logging data
- Remove measurement data, status data and logging data from the database
- Export to a datafile data regarding the measure well with all belonging measurement data, status data and logging data.

For many of the above mentioned functions a connection with a LevelLog is not needed. Without connected LevelLog an authorised user has access to all measurement data, status data, logging data and other information in the database.

A connection with a LevelLog is required to:

- Send something to a LevelLog like a software upload, a data buffer reset, setting a PIN code, date and time, measure process and location parameters
- Read out something from a LevelLog like software version, hardware version, battery condition, data buffer status, data status and measurement data
- Set or adjust a LevelLog, or perform a singular measurement

As soon as there is a connection with a LevelLog, there can be no other measure wells, areas or organisations selected in column 1. It is however possible to open the admin screen via the header bar.

1.4.3 Functions Admin screen

In the admin screen the authorised user can:

Related to users

- Define and remove users
- Connect and disconnect areas to a user
- Assign authorisation, user name and password to a user

Related to software versions

- Define or remove software versions
- Add new software files to an MDSW application for uploading to a LevelLog later

Related to database transfer

- Import a database part with related files
- Export database parts of an entire organisation, area or measure well including all related files
- Export a database part with user information
- Export a database part regarding software versions, including related files

These functions do not require a LevelLog to be connected.

1.4.4 Presentation and navigation

In column 1 a selection can be made for the different parts (top, centre, bottom). The selection will be assigned a red background colour. After a selection in column 1 there will mostly appear information related to this selection in column 2. By re-clicking a selection in column 1 the selection will be undone.

Column 2 contains information regarding a selection from column 1. This meta-information consist of a number of items. On the left in column 2 the title of the item is displayed and on the right more information regarding that item is displayed. If an item in column 2 is selected it will be assigned a red background colour, and column 3 will show more details regarding that item, parts can be added or removed, item values can be set or changed and/or specific functions can be activated.

To the left of an item in column 2 a white indicator shows that this file item does not yet have an actual content. If an incorrect / improper value is entered in column 3, the application will give a warning by means of a red text. In some situations the MDSW application will ask the user in a pop-up window if a specific action is wanted, whether or

not by deliberately entering a presented approval code.

For some functions that can be activated in column 3, a pop-up window is used to enter settings, present supporting information and/or present data in the form of tables or graphs. By double clicking a logo, map or picture in column 3 it will be displayed enlarged in a pop-up window. All pop-up windows can be resized as you like and can be closed using the 'close' button in the pop-up window or the red cross in the pop-up window header.

Depending upon the role of the user (administrator, specialist, collector) the MDSW application will or will not display specific information, provide access to specific sections of the database and enable the execution of specific functions.

The function keys that require a LevelLog connection are disabled and can not be activated if no LevelLog is connected. If there is a connection with a specific LevelLog it is not possible to navigate to information and data of another LevelLog.

As long as no executing function is activated the user can do other selections in column 1 or column 2 without any problem. It is also possible to switch freely between the employ screen and the admin screen by making selections in the header bar.

If a LevelLog is connected while working in the admin screen, the related employ screen is only opened after the user deliberately selects the employ screen in the header bar.

1.5 Help texts

The Help function in the header bar provides access to the complete manual of the LevelLog and the LevelLog MDSW application. This will be in the form of a separately opened Help window that can be closed again by clicking the red cross in the upper right corner of the Help window.

By activating the Help function in the header bar that part of the manual will be opened which contains an explanation of the specific function that is active. The Help function can also be activated by clicking the question mark (?) key within a pop-up window.

2 Employ

Access to the employ functions by selecting 'employ' in the header bar.

The employ functions enable you to define, remove, set, change, activate, monitor, present and export everything related to organisations, areas and measure wells.

See: Data structure

See: Employ functions

In column 1 (top) an organisation can be selected and the definition of a new organisation can be started. The meta-information of the selected organisation is shown in column 2 and by default the description of the organisation will show in column 3. After selection of an item in column 2, column 3 will show specific information about that item with possibilities to change things and/or activate functions.

In column 1 (centre) an area of the selected organisation can be selected and the definition of a new area can be started. The meta-information about the selected area will be shown in column 2 and by default the description of the area will show in column 3. After selection of an item in column 2, column 3 will show specific information about that item with possibilities to change things and/or activate functions.

In column 1 (bottom) a measure well of the selected area can be selected and the definition of a new measure well can be started. The meta-information about the selected measure well will be shown in column 2 and by default access to the measurement data of that measure well will show in column 3. After selection of an item in column 2, column 3 will show specific information about that item with possibilities to change things and/or activate functions.

A number of functions that require a connection with a LevelLog can only be activated if a LevelLog is connected. If a LevelLog is connected, the user has no access to the information of measure wells other than the measure well that is connected to the LevelLog.

2.1 Access rights

Every user has reading rights for all information regarding organisations, areas and measure wells, including measurement data, status data and logging data; however, a user acting as a 'collector' has access only to the measure wells of an area that has been linked to that user.

The authorisations to enter, change or delete information as well as the authorisations to use specific functions depend upon the role that has been assigned to that user, taking into account the areas that have been linked to that user.

- Administrator: All employ functions
- Specialist: All employ functions of areas linked to the specialist as user, except defining, setting and deleting of organisations, defining and deleting areas
- Collector: Only within areas linked to the collector as user; collecting and monitoring status data and measurement data, executing a singular measurement and adding and monitoring logging data, setting date/time, reading the battery condition, access to the data buffer as well as exporting measurement data, status data and logging data to a datafile and importing and exporting database parts.

2.2 Organisation

Entity having one or multiple areas, each with one or multiple measure wells.

An organisation is described by organisation Information and can be assigned a logo.

If you perform administrator activities yourself, then only one organisation will suffice. If a third party is administrator for several organisations, then multiple organisations will be required.

2.2.1 Entering information

Function in the employ screen to:

- Define and remove organisations
- Add a logo to an organisation
- Link areas to an organisation
- Export data regarding the organisation, all areas and measure wells with all belonging measurement data, status data and logging data to a datafile

In column 1 (top) an organisation can be selected and the definition of a new organisation can be started. The meta-information of the selected organisation is shown in column 2 and by default the description of the organisation will show in column 3. After selection of an item in column 2, column 3 will show specific information about that item with possibilities to change things and/or activate functions.

To define a new organisation select '+Organisation' in column 1. A definition cycle will start in column 2 that can be aborted. An organisation has been defined when at least the 'Name' has been set.

Organisation information:

- Column 2 (left): Title of the specific item
- Column 2 (right): Available information box for the specific item
- White indicator left: Indicator to show that no information has been entered yet

Setting or changing organisation information:

- Select in column 2
- More information and entering or changing in column 3

Function keys in column 3:

- Edit: Change the item
- Add: Add a logo
- Approve: Accept the changed item
- Cancel: No changes to the item
- Delete: Remove the logo or the entire organisation

Organisation information items

- Name: Name of the organisation (free text, unique, mandatory)
- Description: Additional information about the organisation (free text, optional)
- Logo: Logo of the organisation (jpg file, optional)
- Areas: Areas linked to the organisation (editable, optional)
- Measurement data: Possibility to export data to a datafile (optional)
- Last update: User and date/time of last modification of one of the items

All organisation information items are editable, except for the 'Last update' items.

In those fields the related user and the date/time are completed automatically. An organisation 'Name' already in use will not be accepted. An organisation, including all related organisation information, can be removed using the function 'delete' followed by a confirmation.

A logo can be added to the organisation by using the 'add' function and opening a jpg-file containing the desired logo. The logo is shown but will be saved only after clicking 'approve'. A logo can be removed using the function 'delete'.

To an Organisation no, one or multiple areas can be linked. Column 2 (right) shows the number at the item areas, column 3 (after selection in column 2) shows all areas linked to that organisation. Through column 3 areas can be linked to an organisation using the 'edit' function. Subsequently you may select the respective areas and click 'approve'.

2.2.2 Export datafile

The LevelLog MDSW application offers the possibility to export a selection of the measured data, status data and logging data of all measure wells linked to an organisation to a datafile for further processing and analysis.

After selecting the item 'Measured data' in column 2 at organisation information, column 3 will offer the possibility (through a pop/up window) to select the information from the database of the MDSW LevelLog application to be exported to a datafile.

- Select the data to be exported in a selection menu:
 - Only measured data of measure wells
 - Measured data and status data of measure wells
 - Measured data, status data and logging data of measure wells
- Enter a time frame:
 - From: Date + time
 - To: Date + time
- Indicate the folder and filename of the file to which the data from the database will be exported. You can do this by clicking the empty box behind 'File name' after which a window will be opened.
- Select 'Export'. The status of the export process will be shown (busy; ready).

The data will be exported to a datafile in CSV-format. The file can be opened in Windows and saved as for example an Excel file. In addition to the selected measured data, status data and logging data the available meta-information will be added about the specific organisation, the areas of that organisation and the measure wells linked to all those areas.

See also: Contents Export Datafile

2.3 Area

A geographical area with one or multiple measure wells linked to a specific organisation. An area is described by area Information, has Default Settings and can be assigned maps.

To an area multiple users can be linked.

2.3.1 Entering information

Function in the employ screen to:

- Define and remove areas
- Add maps to an area
- Enter default settings for an area
- Link measure wells to an area
- Link and remove users to/from an area
- Export data regarding the area and all measure wells with all belonging measurement data, status data and logging data to a datafile

In column 1 (centre) an area can be selected and the definition of a new area can be started. The meta-information of the selected area is shown in column 2 and by default the description of the organisation will show in column 3. After selection of an item in column 2, column 3 will show specific information about that item with possibilities to change things and/or activate functions.

To enter a new organisation select '+Area' in column 1. A definition cycle will start in column 3 that can be aborted. An area has been defined when at least the 'Name', 'Administrator', 'Default PIN code', 'Default Measure Process' and 'Default Location Parameters' have been set and a 'user' has been linked to the area.

Area information:

- Column 2 (left): Title of the specific item
- Column 2 (right): Available information box for the specific item
- White indicator left: Indicator to show that no information has been entered yet

Setting or changing area information:

- Select in column 2
- More information and entering or changing in column 3

Function keys in column 3:

- Edit: Change the item
- Add: Add a map
- Approve: Accept the changed item
- Cancel: No changes to the item
- Delete: Remove the logo or the entire area

Area information items

- Name: Name of the area (free text, unique, mandatory)
- Description: Additional information about the area (free text, optional)
- Organisation: Name of the organisation to which the area has been linked (not editable)
- Maps: Maps added to the area (jpg files, optional)
- Administrator: Name of the administrator of the area (selectable, mandatory)
- Std PIN code: Default PIN code for that area (adjustable, mandatory)
- Std Measureprocess: Default measure process for that area (adjustable, mandatory)
- Std Locationparam.: Default location parameters for that area (adjustable, mandatory)
- Users: Users linked to an area (editable, mandatory)
- Measure wells: Measure wells linked to the area (editable, mandatory)
- Measurement data: Possibility to export data to a datafile (optional)
- Last update: User and date/time of last modification of one of the items

All area information items are editable, except for the 'organisation' and 'Last update' items. In the 'Last update' field the related user and the date/time are completed automatically. An area 'Name' already in use will not be accepted. An area, including all related area information, can be removed using the function 'delete' followed by a confirmation.

To an area multiple maps can be added by repeatedly selecting the function 'Add' and opening a jpg file with the desired map. The maps are shown but will be saved only after clicking 'Approve'. To remove a map select it first, then click on 'Delete' and click on 'Approve'.

To an area one or multiple users can be linked. A user not linked to a specific area has no information about or access to measure wells in that area. Column 2 (right) shows the number and column 3 (after selection in column 2) shows all users linked to that area. Through column 3 users can be linked to or removed from an area using the 'edit' function. Subsequently you may select the respective users and click 'approve'.

To an area no, one or multiple measure wells can be linked. Column 2 (right) shows the number at the item measure wells, column 3 (after selection in column 2) shows all measure wells linked to that area. Through column 3 measure wells can be linked to an organisation using the 'edit' function. Subsequently you may select the respective measure wells and click 'approve'.

2.3.2 Standard parameters

For an area a number of default settings can be entered. These will be used as default values for the settings of the LevelLogs on the measure wells belonging to that area. When defining an area the MDSW application shows system default values; these can be adjusted as desired by the user using the 'edit' function.

PIN code

System default value:

- PIN code: 0000

Measure process

The following processes can be selected:

- No measurement: the LevelLog does not perform any measurements
- Measure with intervals: the LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval
- Measure with intervals during period: the LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval, during an editable period 1, after which the LevelLog will not measure during an editable period 2, after which measurements are resumed during period 1 etcetera, until the end time has been reached
- Test measurement: the LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval, without input securities and with a small measuring interval

Depending upon the selection made, various related parameters can be set. A measuring interval small than 1 minute is not accepted for standard parameters for an area. See also: Measure process.

System default values:

- Measure process: No measurement
- Measuring range: Standard
- Measure interval: 4 hours
- From: Actual date; 00:00 hr
- Until: Actual date; 00:00 hr
- Enable period: 24 hrs
- Disable period: 24 hrs

Location parameters

During installation of a LevelLog to a measure well a number of location dependent parameters must be set to enable correct measurements and correct level calculations. These location parameters can be similar for a complete area, like:

- Tube diameter
- Soil composition (most frequent)
- Average year temperature over the past years
- Amplitude year temperature cycle (50% top-top)
- Week number usually having the highest temperature of the year

The latter three parameters can not easily be determined on site, so when defining a new measure well it is wise that those parameters are represented as initial values from the standard area values. The website www.levellog.nl provides recommendations for appropriate values by region for these three parameters.

For the other location parameters it is best to select the system default value because they will differ per measure well and can easily be determined on site. This concerns:

- Position of tube adapter top related to ground level
- Distance between tube adapter top and ground level
- Distance between tube adapter top and first tube perforation (unperforated tube length)
- Local soil covering

See also: Location parameters

System default values:

- Position tube adapter top: Above ground level
- Distance to ground level: 0 cm
- Length unperforated tube: 0 m
- Tube diameter: Unknown
- Soil covering: Light vegetation / covering
- Soil composition: Dense sand

- Average year temperature: 10 °C
- Amplitude year temp. cycle: 8 °C
- Week number highest temp: 30

2.3.3 Export datafile

The LevelLog MDSW application offers the possibility to export a selection of the measured data, status data and logging data of all measure wells linked to an area to a datafile for further processing and analysis.

After selecting the item 'Measured data' in column 2 at area information, column 3 will offer the possibility (through a pop/up window) to select the information from the database of the MDSW LevelLog application to be exported to a datafile.

- Select the data to be exported in a selection menu:
 - Only measured data of measure wells
 - Measured data and status data of measure wells
 - Measured data, status data and logging data of measure wells
- Enter a time frame:
 - From: Date + time
 - To: Date + time
- Indicate the folder and filename of the file to which the data from the database will be exported. You can do this by clicking the empty box behind 'File name' after which a window will be opened.
- Select 'Export'. The status of the export process will be shown (busy; ready).

The data will be exported to a datafile in CSV-format. The file can be opened in Windows and saved as for example an Excel file. In addition to the selected measured data, status data and logging data the available meta-information will be added about the specific measure well, the specific areas and organisation.

See also: Contents Export Datafile

2.4 Measure well

Measuring well with a LevelLog in the specific area linked to an organisation.

A measure well is described by measure well information, including actual Settings for that measure well, and pictures can be added to a unit. Each measure well has measure data, Status data and Logging data.

2.4.1 Entering information

Function in the employ screen to:

- Define and remove measure wells
- Add pictures to a measure well
- Set access rights (a.o. PIN code) for a measure well and send them to the LevelLog
- Select different software version and send it to the LevelLog
- Read out date and time and set it on the LevelLog
- Read out information regarding hardware-version and battery condition of the LevelLog
- Set and adjust a LevelLog to a measure well
- Set the measure process for a measure well and send it to the LevelLog
- Set the location parameters for a measure well and send them to the LevelLog
- Read out the data buffer status and reset the data buffer in the LevelLog
- Perform a single measurement using the LevelLog
- Read out and represent measurement data from the LevelLog
- Read out and represent status data from the LevelLog
- Add and represent logging data
- Remove measurement data, status data and logging data from the database
- Export to a datafile data regarding the measure well with all belonging measurement data, status data and logging data.

For many of the above mentioned functions a connection with a LevelLog is not needed. Without connected LevelLog an authorised user has access to all measurement data, status data, logging data and other information in the database.

A connection with a LevelLog is required to:

- Send something to a LevelLog like a software upload, a data buffer reset, setting a PIN code, date and time, measure process and location parameters
- Read out something from a LevelLog like software version, hardware version, battery condition, data buffer status, data status and measurement data
- Set or adjust a LevelLog, or perform a singular measurement

In column 1 (bottom) a measure well can be selected and the definition of a new measure well can be started. The meta-information about the selected measure well will be shown in column 2 and by default a summary of the most recent status data and a simple table with the most recent measured level data will show in column 3. After selection of an item in column 2, column 3 will show specific information about that item with possibilities to change things and/or activate functions.

To enter a new measure well select '+measure well' in column 1. A definition cycle will start

in column 3 for setting Identification, PIN code, measure process and location parameters that can be aborted. For PIN code, measure process and location parameters by default the standard settings are shown of the area to which the measure well has been linked. A measure well has been defined when at least the 'Identification' has been set.

Measure well information:

- Column 2 (left): Title of the specific item
- Column 2 (right): Available information box for the specific item
- White indicator left: Indicator to show that no information has been entered yet

Setting or changing measure well information:

- Select in column 2
- More information and entering or changing in column 3

General function keys in column 3:

- Edit: Change the item
- Add: Add a picture
- Approve: Accept the changed item
- Cancel: No changes to the item
- Delete: Remove the logo or the entire measure well

Beside the general function keys there are special function keys that will be explained at the specific measure well item.

Measure well information items

- Identification: measure well identification (free text, unique, mandatory)
- Unit code: Unique code by LevelLog (16 characters, not editable)
- Readiness: LevelLog readiness (defined/set/adjusted, changeable)
- Measurement data: Read, present and export measurement data
- Status data: Read and present LevelLog status data
- Logging data: Add, remove and present logging data
- DINO number: DINO location number and well number (specific, editable, optional)
- Geo location: Geo coordinates (GPS and RD) (specific, editable, optional)
- Reference levels: NAP ref. of measure well and ground level (editable, optional)
- Drilling depth: Depth of measure well drilling (number, optional)
- Filter position: Position of filter in measure well (numbers, optional)
- Surroundings info: More information about the surroundings (free text, optional)
- Well info: More information about the measure well (free text, optional)
- Pictures: Pictures related to measure well and/or surroundings (jpg, optional)
- Well drilling: Date/time of installing the measure well (editable, optional)

- Unit installation: Date/time of first setting of measure well by LevelLog (automatically)
- PIN code: Setting PIN code and access limitations (editable, optional)
- Measure process: Measure process for that measure well (editable, mandatory)
- Location parameters: Location parameters for that measure well (editable, mandatory)
- Software version: Actual software version and downloaded new LevelLog software (editable)
- Hardware version: Information about hardware items (not editable)
- Battery status: Current battery condition (read only)
- Date/time: Read and set Date/Time of LevelLog (adjustable)
- Data buffer status: Actual information about data buffer in LevelLog (read only, resettable)
- Last contact: User and date/time of last contact with LevelLog
- Last update: User and date/time of last adjustment of one of the items

All measure well information items are editable, except the items 'Unit code', 'Unit installation', 'Hardware version', 'Last contact' and 'Last update'.

Item 'Unit code' will be completed after a first successful contact with the LevelLog.

Item 'Unit installation' will be completed after a first successful setting of the LevelLog.

Within the items 'Last contact' and 'Last update' the specific user and date/time will be completed automatically.

An measure well 'Identification' already in use will not be accepted. A measure well, including all related information, measured data, status data and logging data, can be removed using the function 'delete' followed by a confirmation.

To a measure well multiple pictures can be added by repeatedly using the 'add' function and opening a jpg file with the desired picture. Pictures will be shown but will be saved only after 'approve' has been clicked. To delete a picture, select it first and then click 'remove' and 'approve'.

Surroundings information, Well information, Well drilling, Drilling depth and Filter position are optionally editable measure well information items.

2.4.2 LevelLog unit code

Each LevelLog unit has a unique unit code encrypted in its electronics. As soon as a LevelLog is connected to a measure well in a setting cycle, this unit code is stored in the database of that specific measure well and will be shown in column 2 under measure well information.

After selection of the item unit code in column 2 for a measure well, column 3 will show the unit code with the possibility to disconnect the LevelLog from the measure well using the function 'Detach'.

Disconnecting a LevelLog is recommended if that LevelLog unit is removed from a measure well and will be used elsewhere. It is wise to export the available measured data from the LevelLog to a datafile.

A unit code consists of 16 characters. These will be added to all measured data, status data and logging data. If several LevelLog units have been used at a specific measure well, this can be seen from the unit codes in the information in the database.

2.4.3 Measure process

In a measure process you can define how a LevelLog shall perform its measurements, by setting a number of parameters. The initially set values during the definition of a measure well are obtained from the standard values from the specific area and/or system defaults. Both during the measure well definition cycle as well as at a later stage the user may change the measure process parameters using the 'edit' function in column 3.

If no LevelLog is connected, the entered adjustments will be stored in the database temporarily. As soon as the specific LevelLog is connected, the MDSW application will show the actual values from the LevelLog (status information) and the proposed new values (temporary database) after which the user may choose which settings shall be applied. Only after a confirmation the measure process of the LevelLog will be set.

Measure process

The following processes can be selected:

- No measurement: the LevelLog does not perform any measurements
- Measure with intervals: the Levellog performs measurements between an adjustable starting time and end time with an adjustable interval
- Measure with intervals during period: the LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval, during an editable period 1, after which the LevelLog will not measure during an editable period 2, after which measurements are resumed during period 1 etcetera, until the end time has been reached
- Test measurement: the LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval, without input securities and with a small measuring interval

Measure interval

Can be set in hours + minutes + seconds. Is not applicable if the measure process is set at 'no measurement'. Normally an interval can be chosen between 1 minute and several hours, depending upon the aim of the measured data sequence. If after selecting 'Measure with intervals' or 'Measure with intervals during period' a measure interval is set between 5 seconds and 1 minute, the MDSW application will propose a maximum measuring time. A warning will be shown for this.

From and Until

A date (day - month - year) and a time (hours + minutes + seconds) can be set. Is not applicable if the measure process is set at 'no measurement'. A maximum allowable measuring time applies for measure intervals smaller than 1 minute.

Enable period and Disable period

To be set in hours. Is only applicable if the measure process is set to 'Measure with intervals during period'. Within the measuring time (from to until) enable and disable periods can alternate; measurements are performed in enable periods only.

Measuring range

Select from:

- Economic
- Standard
- Maximum

For level measurements at relatively small depths it is recommended to select 'economic'. Only if measurements have to be performed at very large depths the selection should be 'maximum'. The selection will influence battery life, but not the measuring accuracy.

Feasible measuring ranges per tube diameter:

Tube diameter	Economic	Standard	Maximum
25 mm	15 m	20 m	25 m
32 mm	18 m	25 m	30 m
40 mm	22 m	35 m	40 m
50 mm	25 m	40 m	50 m
63 mm	30 m	45 m	60 m

2.4.4 Location parameters

When installing a LevelLog to a measure well a number of location dependent parameters must be set to ensure correct measurements and correct level calculations. The initially set values during the definition of a measure well are obtained by the LevelLog MDSW application from the standard values from the specific area and/or system defaults. Both during the measure well definition cycle as well as at a later stage the user may change the measure process parameters using the 'edit' function in column 3.

If no LevelLog is connected, the entered adjustments will be stored in the database temporarily. As soon as the specific LevelLog is connected, the MDSW application will show the actual values from the LevelLog (status information) and the proposed new values (temporary database) after which the user may choose which settings shall be applied. Only after a confirmation the measure process of the LevelLog will be set.

The location parameters are location and measure well dependent data that are of importance for proper measurements and for accurate and reliable level calculations. These parameters must be set correctly when installing a LevelLog to a measure well; if necessary use the proposed default values.

For the first three adjustable location parameters the MDSW application will show a pop-up screen with further information.

Position tube adapter top

Select from:

- Above ground level (1A)
- Below ground level (1B)

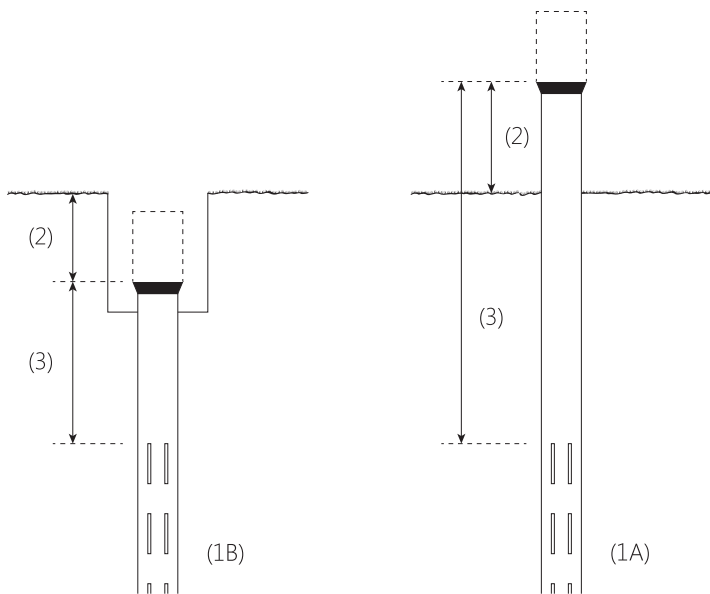
Reference point is the top side of the (orange) tube adapter flange. When using a LevelLog in a street well the selection will usually be 'Below ground level' and for application in a protective tube in the open field it will mostly be 'Above ground level'. For level measurements with tubes in surface water or completely above the ground it is recommended to always select 'Above ground level'.

Distance to ground level (2)

To be set in whole or parts of centimeters (xx,xx cm). This concerns a precise input of the distance between the top of the (orange) tube adapter flange and the local ground level. The position and distance of the tube adapter flange top with respect to ground level is of importance for determining the level with respect to ground level and making corrections to calculate the true level. For level measurements with vertically positioned tubes in surface water or entirely above the ground it is recommended to (minimally) enter the length of the tube.

Length unperforated tube (3)

To be set in whole or parts of meters (xx,xx m). This concerns an input of the distance between the top of the (orange) tube adapter flange and the position of the first tube perforation; the length of the unperforated tube. If value 'zero' is set then possible tube perforations are not taken into account. A long as the water level does not reach the highest positioned filter it will be no problem.



Tube diameter

The most commonly used tubes have an (outer) diameter of 25 mm, 32 mm, 40 mm, 50 mm or 63 mm. For a correct measurement and precise level calculation it is important to select the correct tube diameter range.

Select from:

- 22-28 mm
- 29-36 mm
- 37-45 mm
- 46-55 mm
- 56-65 mm
- Unknown

If diameter range 'unknown' is set at a LevelLog, measurements will take place but it is possible that not all measurements are successful and the calculated level will be less accurate than if the applied tube diameter had been set.

Soil covering

When calculating the level the type of soil covering is taken into account.

Select from:

- Heavy vegetation / covering (e.g. a forest or covered setup)
- Light vegetation / covering (e.g. a perk with bush)
- No vegetation / covering (e.g. a town square)

Soil composition

When calculating the level the (main) soil composition is taken into account.

Select from:

- Loose sand
- Wet sand
- Dense sand
- Clay
- Wet clay
- Loam
- Wet loam
- Wet marl
- Wet marsh

Average year temperature

When calculating the level the average year temperature is taken into account over the past few years in the area with the measure well used by the LevelLog.

To be set in whole or parts of degrees Celsius (xx,xx °C).

Amplitude of average year temperature cycle

When calculating the level the amplitude (50% top-top) is taken into account of the average year temperature cycle of the area with the measure well used by the LevelLog.

To be set in whole or parts of degrees Celsius (xx,xx °C).

Week number with highest temperature

When calculating the level the week number is taken into account that usually has the warmest day of the year of the area with the measure well used by the LevelLog.

To be set as an integer.

Information sources

The latter three parameters can not easily be determined on site, so it will be best to use values that apply to the whole area. The website www.levellog.nl contains recommendation for suitable values per region for these three parameters.

2.4.5 Use of measure well PIN and PUK codes

Access to a LevelLog for setting, adjusting and readout can be secured using a PIN code; this security can be activated and deactivated. The PIN code consists of 4 digits.

By default a LevelLog is set at PIN code <0000> which enables free access to the LevelLog. When defining a measure well the default PIN code for the area is shown and during the definition of a measure well the set PIN code will be sent to the LevelLog after confirmation.

For each contact of the LevelLog the MDSW will check, together with the LevelLog software, if the PIN code in the LevelLog matches the PIN code for that measure well in the database of the used MDSW application. In case of a mismatch the MDSW application will ask for the correct PIN code in a pop-up screen. This can be repeated 3 times, after which a PUK code is required to unlock the security.

As soon as there is a connection to the specific LevelLog the user will see, after selection of the PIN code item in column 2, the PIN status in column 3 and, depending upon the actual situation, a number of possible functions:

- Function 'PIN Status': Readout of the PIN status with:
 - PIN code activated: Yes / No
 - Access authorised: Yes / No
 - PIN code locked: Yes / No
 - PUK code locked: Yes / No
 - Number of PIN code attempts remaining: x
 - Number of PUK code attempts remaining: x
- Function 'New PIN': Assigning a new PIN code by entering the old PIN code, entering the new PIN code twice and confirming this by selecting 'Apply'
- Functions 'PIN on' and 'PIN off': Respectively activating / deactivating the PIN security by entering the current PIN code and confirming this by selecting 'Apply'

When changing the PIN code to 0000 then PIN=Off (not active) will be set simultaneously. When changing the PIN code to any code other than 0000 then PIN=On (active) will be set simultaneously.

It could happen that nobody recalls the correct PIN code for a LevelLog on a Measuring well. After 3 false PIN code input attempts the application will offer the possibility to enter a PUK code to unlock the security and a new PIN code can be set. The PUK code consists of 8 to 10 digits and can be requested by authorised persons at the supplier (see www.levellog.nl) by supplying the serial number and the LevelLogs Unique Code consisting of 16 characters as mentioned in the measure well information.

2.4.6 Software upload

The LevelLog uses embedded software. At its original supply the LevelLog has been equipped with software. Using the MDSW application it is possible to upload new LevelLog software to the unit. This can only be done if one or more LevelLog software versions are available in the database of the MDSW application.

Under 'measure well information' column 2 shows at 'Software version' the last known LevelLog software version. If a LevelLog is connected then after selection of the software version item in column 2 the actual software version will be read from the LevelLog and shown in column 3.

Authorised users can use column 3 to select another software version and upload it into the LevelLog if a unit has been connected. Available functions are:

- 'Read': The MDSW reads the software version from the LevelLog and shows it in column 3.
- 'Edit': A menu appears in column 3 with all software versions known and available in the database of the MDSW application. The user can make a selection in this menu.
- 'Update software': The selected software version will, after a confirmation, be sent to the LevelLog after which the LevelLog unit will be restarted. This may take several seconds.

After uploading a software version into a LevelLog it is recommended to wait until the LED on the LevelLog stops blinking. Subsequently automatically the correct organisation, the area and the measure well will be selected and column 2 will show the measure well information.

See also: Control software versions; Control transfer export software version; Control transfer import datafile

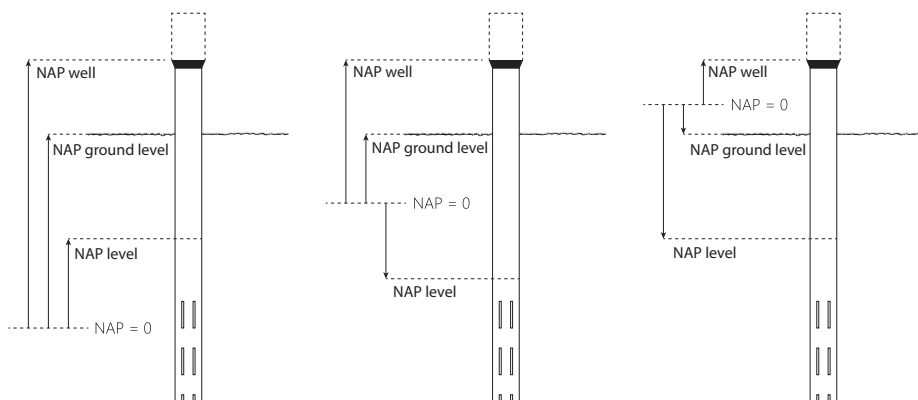
2.4.7 Reference values

In The Netherlands the NAP is used as reference. Using the MDSW application a measure well can be assigned:

- NAP value of tube adapter top
- NAP value of local ground level

Under 'measure well information' at the right of column 2 it is indicated if reference values have been set. When selecting the Reference level item in column 2 the user will be shown the current NAP reference values (if available) in column 3. Using the 'edit' and 'approve' functions one or both NAP Reference values can be entered or changed.

The NAP value of the tube adapter top is used to calculate the NAP value of the groundwater level when composing an Export Datafile. Without input of a NAP value for the measure well a value 'zero' will be used for the NAP value of the water level.



2.4.8 Geo location

To each measure well the users can assign Geo location coordinates using the MDSW application. Two methods can be used:

- GPS coordinates
- RD coordinates

When using one method, automatically the coordinates of the other method will be calculated and added. Under measure well information it is indicated on the right side of column 2 if Geo coordinates have been entered.

When selecting a Geo location item in column 2 the presently available coordinates are shown in column 3. Using the 'edit' and 'approve' function of a method both coordinates can be set or changed after which the coordinates of the other method will be calculated and stored. If the user supplies incorrect information the MDSW application will note that and request to change the input. Incorrect input will not be accepted.

Input

- GPS Latitude: ddd mm ss.nnnN or ddd mm ss.nnnS
- GPS Longitude: ddd mm ss.nnnE or ddd mm ss.nnnW
- RDX: 000000 till 280000
- RDY: 300000 till 625000

2.4.9 Data buffer

The LevelLog has a data buffer for storing status data and measured data. The data buffer has the capacity to store measured data of 3006 measurements. The data buffer can be reset and the status of the data buffer can be read and shown.

If a LevelLog is connected and under 'measure well information' in column 2 the item 'Data buffer status' is selected, this status will be read and shown.

- Used positions: xxxx of total 3006
- Read position: xxxx on <date> <time>
- Level of selective replacement: x

Using the function 'read actual' the user can reread the data buffer status from the LevelLog. Using the function 'clear' the user can, after a separate confirmation, reset the data buffer.

When during measuring all available data buffer positions have been used, the LevelLog will continue to measure and log data. An already used part of the data buffer will be made available in such a way that of the oldest measured data only one of two subsequent data records will be overwritten so that some information from that period will remain available.

The level of selective replacement is indicated in the data buffer status:

0 = no replacement

n = number of cycles of selective replacement

2.4.10 Date/Time

The LevelLog uses an internal clock with date and time. This is a.o. used to calculate groundwater levels and to connect status data and measured data to a time stamp. It makes use of standard time UTC (Universal Time Coordinate). When installing a LevelLog the MDSW application will send the actual date / time from the (mobile) device to the LevelLog. Automatically a conversion will take place from the local date/time to the standard UTC.

When a LevelLog has been connected the user can read the date / time and adjust it if required. When selecting under 'measure well information' the item 'Date / Time' in column 2 the MDSW application will read the date/time from the LevelLog and show it in column 3, simultaneously with the actual date/time of the (mobile) device. Using the function 'read actual' the date/time can be reread from the LevelLog and shown. Using the function 'automatic' the date/time in the LevelLog will be synchronised with the

date/time of the (mobile) device after a confirmation by clicking 'apply'. It is also possible to set the date/time of the LevelLog manually by using the function 'manual' after which the date and time can be entered so that, after confirmation by clicking 'apply', the LevelLog will be set with a UTC that has been derived from that date/time.

When presenting measured data, status data and logging data in column 3 the MDSW application shows the local date and time. The Export Datafile stores the standard UTC date and time as time stamp.

2.4.11 Battery status

The LevelLog uses a 3.5V replaceable battery. To get an indication of the battery status this can be read from the LevelLog and shown.

Under measure well information in column 2 the most recent battery status is mentioned. If a LevelLog is connected you can select the item Battery status and the battery status will be read and shown in column 3.

It will show:

- The last read battery status
- A graph showing the most recent battery statuses (from the status data)

By selecting the function 'read actual' the user can reread the battery status and refresh the presented information in column 3.

The graph shows the automatically scaled battery condition in time. By double clicking the graph it will be enlarged in a separate pop-up window. Within that window a period can be indicated of which the available battery data from the database shall be shown, so that after 'refresh' it can quickly be judged if the battery should be replaced.

2.4.12 Hardware information

The LevelLog has a number of properties that can be useful for service purposes. This information is read and stored in the status data by the MDSW application during communication with the LevelLog. All values are set during manufacturing and supply of the LevelLog. The user can not edit this information.

Under 'measure well information' in column 2 the Hardware version is shown after a communication with the LevelLog has occurred. When selecting the item 'Hardware version' in column 2 more information will be shown in column 3:

- Hardware version: HW: vx.x.x
- Pulse shift: PS:(+/-)x

- Boot loader version: BL:BLxx vx.x.x
- Building date: BD:<date> <time>

In case of any problems using the LevelLog this information may be asked for.

2.4.13 Readiness status

A LevelLog linked to a measure well knows three stages of readiness. It is shown in column 2 under 'measure well information' at the item 'Readiness'.

Defined

A LevelLog is defined when the measure well has been stored in the database with an Identification. Adding a new measure well can be done by selecting '+measure well' in column 1 after which a definition cycle will start in column 3. It is not required that a LevelLog is connected. If a LevelLog is connected which is unknown to the MDSW application, the definition cycle will automatically start.

Set

A LevelLog is set when, using the definition cycle or separately it has been arranged that:

- a PIN code has been sent to the LevelLog, and
- the date-time has been synchronised, and
- the LevelLog measure process has been set, and
- the LevelLog location parameters have been set.

This is only possible if a LevelLog is connected and the current readiness state is at least 'defined'. It is possible using the function 'Set' to (re)define an already defined or set LevelLog. In that case the definition cycle will start in column 3.

Adjusted

A LevelLog is adjusted if an adjustment cycle has been successfully completed. That is only possible if a LevelLog is connected and the current readiness state is at least 'set'. Using the function 'Adjust' it is possible to (re)adjust an already set or adjusted LevelLog. In that case the adjustment cycle will start in column 3.

After successfully defining the LevelLog it is ready to perform and store measurements. For performing accurate measurements it is recommended to also adjust the LevelLog correctly.

By means of white indicators at the left of column 2 the MDSW application shows that those specific items need further input or attention. E.g. the item 'Readiness' will have a white indicator as long as the readiness state is not yet 'adjusted'.

2.4.14 Define measure well

Defining a measure well means that within the database of the MDSW application a measure well is created and that an identification and measure well information is added to it. Defining a measure well is done using the definition cycle (a multi step wizard) after:

- '+measure well' is selected without connection to a LevelLog, or
- if a LevelLog is connected which is unknown to the MDSW application

Next a definition cycle is started under the measure well item 'Readiness' to define the measure well, during which will be asked to:

- enter an Identification: the user may e.g. use the text on the LevelLog label for this
- enter a PIN code for that LevelLog: the MDSW application shows the standard PIN code for that area
- enter the measure process for that LevelLog: the MDSW application shows the standard settings for the measure process of that area
- enter the location parameters for that LevelLog: the MDSW application shows the standard settings for location parameters of that area

During the above mentioned steps you may choose to accept the proposed default values or to enter your own values. After each step you'll have to confirm your choice. The definition cycle of a measure well can be aborted at any moment.

As soon as during the definition cycle of a measure well at least a valid Identification has been entered and confirmed, the new measure well will be added to the database. Items which have not been completed / confirmed keep a white indicator in column 2. Under 'Measure well information' in column 2 the items 'Readiness', 'Measure process' and 'Location parameters' will be set to 'defined' and the software version and PIN code will be assigned the entered values.

At the end of the definition cycle for a measure well the question will be asked whether to continue with a setting cycle for the LevelLog unit:

- If NO, the definition cycle will end and in column 2 and column 3 you may enter or adjust other measure well information items. Or you may choose to start another function. At any later moment it is possible to select the specific measure well; because the measure well is then already 'defined' the setting cycle for the measure well will start.
- If YES, then the setting cycle for a measure well will start under the item 'Readiness'. For this it is required that a LevelLog is connected.

2.4.15 Set measure well

Setting a measure well means that the LevelLog of that measure well will be set by the MDSW application using the desired parameters to assure correct functioning. Setting a measure well is only possible if a LevelLog is connected and the specific measure well has been defined in the MDSW database. It is not necessary that the LevelLog is installed on a measure well.

Setting is done using an input cycle (a multi step wizard) if:

- the user, in column 2 under selection 'Readiness' activates the function 'Set' in column 3, or
- at the end of the definition cycle for a measure well the user chooses to start the setting cycle, or
- a LevelLog is connected having a unit code which is not yet in the database and the user has selected one of the already defined measure wells, or
- a LevelLog on a measure well is replaced and the users wants to adopt the settings and information.

Next, under measure well item 'Readiness', an input cycle will be started to set a LevelLog of the specific measure well with the following steps:

- The PIN status is shown and a PIN code can be entered / changed for which the current PIN code must be known (default = 0000).
- Date/Time is shown and synchronised with the date/time of the mobile device.
- The Measure process is shown as available in the MDSW database and present in the LevelLog. A selection will be asked, after which the measure process parameters can be adjusted and confirmed.
- The location parameters are shown as available in the MDSW database and present in the LevelLog. A selection will be asked, after which the location parameters can be adjusted and confirmed.
- The data buffer status will be shown and the data buffer may be emptied if desired.

During above mentioned steps the presented values may be adopted or adjusted. After each step you'll have to confirm your choice. The setting cycle of a measure well can be aborted at any moment.

A measure well and related LevelLog will, under 'measure well information' in column 2, be set to readiness stage 'Set' if the MDSW application has sent a measure process and location parameters to the LevelLog. Under 'Measure well information' in column 2 the items 'Measure process' and 'Location parameters' will also be changed to 'Set' as soon as each of these have been sent to the LevelLog. The items software version and PIN code will

be assigned the entered values.

At the end of the setting cycle for a measure well the question will be asked whether to continue with an adjustment cycle for the LevelLog unit:

- If NO, the setting cycle will end and in column 2 and column 3 you may enter or adjust other measure well information items. Or you may choose to start another function. At any later moment it is possible to select the specific measure well.
- If YES, then the adjustment cycle for a Measure well will start under the item 'Readiness'.

All steps of an setting cycle for a measure well with LevelLog (PIN code, software version, Date/Time, Measure process, Location parameters, Data buffer) can be activated by the user at any other moment by selecting the specific item in column 2 and giving additional input using column 3.

2.4.16 Adjust

Adjusting a measure well means calibration of the LevelLog of that measure well by the MDSW application to assure an accurate calculation of the groundwater level at that location. Adjusting a measure well is only possible if the specific measure well has readiness stage 'Set' or 'Adjusted'. Also without adjustment the LevelLog can perform measurements.

For correct adjustment the LevelLog must be installed on a measure well on location and a precise (manual) measurement must be done of the water level at the moment of adjustment. If it is not possible to determine the water level accurately, it is better not to perform the adjustment procedure.

Adjustment is done using an input cycle (a multi step wizard) if:

- the user, in column 2 under selection 'Readiness' activates the function 'Calibrate' in column 3, or
- at the end of the setting cycle for a measure well the user chooses to start the adjustment cycle.

Next, under measure well item 'Readiness', an input cycle will be started to adjust a LevelLog of the specific measure well with the following steps:

- A check is done if:
 - Very recently and very accurately the groundwater level with respect to the tube adapter top has been measured (manually)
 - Subsequently the LevelLog unit has been repositioned correctly onto the measure well, has been activated (power-on), and a connection has been made to the mobile device.
 - The LevelLog unit has obtained the environmental temperature.

If YES the cycle will be continued. If NO the cycle will be aborted.

- The MDSW application checks the PIN code and reads the status data from the LevelLog, including the set location parameters. If the PIN code in the database does not match the PIN code in the LevelLog, then the user will first have to enter the correct PIN code.
- The location parameters are shown as present in the LevelLog. These location parameters can be edited or confirmed.
- The adjustment cycle is performed. On the top side of the screen appears:
Uncalibrated LevelLog measurement: Level = xxx,x cm Temperature = xx,x dgrC
Accurate manual measurement: Level = cm
The user is asked to enter the value of the manual measurement (in tenths of cm) and confirm it by activating the 'Calibrate' function to continue the adjustment cycle. If the entered value deviates too much from the value as measured by the LevelLog, the MDSW application will send a warning and a new manually measured value can be entered.

Subsequently the LevelLog will start a number of measurements and shows the calculated levels:

Calibrated LevelLog measurement: Level = xxx,x cm

The adjustment cycle ends if the last measured value deviates less than 5 mm from the entered value. If too many measurements are required for this, the MDSW application will give a notification and offer the possibility to repeat the adjustment cycle by entering an accurately manually measured value.

After each step you'll have to confirm your choice or input. The adjustment cycle of a measure well can be aborted at any moment.

As soon as a successful adjustment has been performed, the measure well with related LevelLog will obtain the readiness stage 'Adjusted'. If later other location parameters are sent to the LevelLog, the readiness stage will be changed to 'Set' and possibly a new adjustment will be required.

2.4.17 Measured data

Measured data are available of measure wells with connected LevelLog units. As soon as a LevelLog unit has been installed it will start performing measurements according to the set measure process, and measured data will be stored in the data buffer of the LevelLog. Using the MDSW application the user can read these measured data from the LevelLog and add them to the database. A measurement record in the database comprises:

- Groundwater level w.r.t. the tube adapter top (mm)
- Groundwater level w.r.t. the ground level (mm)
- Temperature of the LevelLog unit (°C)

- Measured reflection time (msec)
- Number of measurement repetitions

Each status record in the database is assigned, apart from the measure well identification and unit code of the LevelLog, also the date/time (in standard UTC) of readout. When exporting measured data to a datafile also the NAP level (m) of the groundwater is added. When presenting status data the MDSW application shows the local date/time.

As soon as a connection has been established to a LevelLog unit or after selecting the item 'measured data' in column 2 of the measure well information, column 3 will show a summary of the most recent status of the LevelLog unit with a.o. the software version, hardware items, data buffer status and battery status. Besides that, the MDSW application shows in column 3 a simplified table containing the last known groundwater levels.

Using function keys the user may activate the following functions:

- Perform and present a singular measurement (a connection is needed)
- Selective reading of measured data from the LevelLog into the database of the MDSW application (a connection is needed)
- Present a selection of measured data from the database in a table
- Present a selection of measured data from the database in a graph
- Remove a selection of measured data from the database
- Export a selection of measured data + status data + logging data from the database to a datafile

Singular measurement

After activating the function 'Singular measurement' the LevelLog will, independently from the actual measurement process, perform a measurement and present the results in column 3:

- Date/time: <date> <time>
- Level wrt tube adapter top: xxxx mm
- Level wrt ground level: xx,xx m
- Temperature unit: xx,xx °C
- Reflection time: xx,xxx msec.

This function can only be activated if a LevelLog is connected. Measured data will not be stored in the data buffer (LevelLog) or in the database (MDSW application).

Present last 10 measurements

After selecting the function 'Last 10 measurements' the MDSW application shows in column 3 a simplified table with the 10 most recent measured data {Date/Time + Tube

Level Tube (cm) + Ground Level (m) + Temperature (°C) + NAP level (m)). The NAP Level value is shown only if a NAP reference value has been set. Furthermore column 3 shows a summary of the last known status of the LevelLog unit, including the software version, hardware items, data buffer status and battery status.

Read measured data

After selecting the function 'Read measured data' a pop-up window appears in which the user can indicate:

- Method of readout:
 - only unread data
 - measured data from a specific period, stating the desired period
 - all available measured data
- Whether or not to make read data buffer positions available for reuse.

This function is only possible if a LevelLog unit is connected. When reading out unread measured data the related data buffer positions will always be made available for reuse. For the other two read methods the user may adjust the proposed choice for whether or not making the data buffer positions available for reuse.

After clicking 'confirm' the readout will start. In column 3 its progress will be displayed: Storing status database, Storing measured data in database, Ready. Once the measurements have been read column 3 shows:

- The result of the readout action: Total number of read measurement records; Already existing records in the database; Newly added records in database
- A summary of the most recent status of the LevelLog unit including the software version, hardware items, data buffer status and battery status.
- An automatically scaled graph of the last known groundwater levels relative to the tube adapter top.

Table

After activating the 'Table' function a separate pop-up window will appear with a table in which the results of the Measuring well identification are listed ordered by date/time with the most recent at the top. Within the pop-up screen, the user will have the possibility to:

- Enter a time period:
 - From: Date + time
 - Till: Date + time
- Use the 'Refresh' function to refresh the table containing measured data as available in the database for the specified period. .

The pop-up window can be resized as needed, and you can scroll horizontally and vertically within the table.

The table shows the following measured data side by side:

- Identification measure well
- Time stamp: <date> <time> (local)
- Tube level: xxxx (mm)
- Ground level: xx,xx (m)
- NAP level: xx,xx (m)
- Temperature: xx,xx (°C)
- Reflection time: xxx,xxx (msec)
- Repeats: x

The number of repetitions indicates how often a measurement has been redone before it was successful. If no successful measurement is performed within three attempts the Level-Log will abort that measurement and note 255 at repetitions.

Graphic

After activating the 'Graphic' function a separate pop-up window appears with a graph with which measured data can be presented. Within the pop-up screen, the user will have the possibility to:

- Select the measured value: ('Tube level' will always be shown)
 - Tube level (mm) Distance between tube adapter top and groundwater level
 - Ground level (m) Position of groundwater level below ground level
 - Temperature (°C)
 - Reflection time (msec)
- Enter a time period:
 - From: Date + time
 - Till: Date + time
- Use the 'Refresh' function to refresh the graph containing measured data as available in the database for the specified period.

The pop-up screen can be adjusted as needed in size. The axes are automatically scaled. The time axis of the graph can be zoomed in, zoomed out and shifted. The graph function can also be activated by double clicking the graph in column 3.

Delete

After activating the 'Delete' function a separate pop-up screen offers the user the possibility to select a period of which the measured data should be deleted from the database. After

clicking 'Approve' the user will receive information about the number of records to be deleted. Only after entering a confirmation code the measured data from the specified period, including all related information, will be deleted from the database.

Export

After selecting the 'Export' function a separate pop-up window offers the user the possibility to select the information to be exported from the database of the MDSW LevelLog application to a datafile.

- Select the data to be exported using a menu:
 - Only measured data
 - Measured data and status data
 - Measured data, status data and logging data
- Enter a time period:
 - From: Date + time
 - Till: Date + time
- Specify a folder and file name of the file to which the data from the database are to be exported. Do this by clicking the empty box behind 'Filename' after which a selection window will open.
- Click on 'Export'. The export progress status will be shown (busy; ready)

The data will be exported to a datafile in CSV-format. The file can be opened in Windows and saved as for example an Excel file. In addition to the selected measured data, status data and logging data the available meta-information will be added about the specific measure well, the specific areas and organisation.

See also: measure well Export Datafile

2.4.18 Status data

Of measure wells with a connected LevelLog unit status data are available. During communication with the LevelLog the MDSW application records these in the database. A user can also use the application to request the MDSW application to read status data from the LevelLog unit. A status record in the database comprises:

- Software version + Hardware items + Data buffer status + Battery status
- Measure process parameters
- Location parameters

Each status record in the database is assigned, apart from the measure well identification and unit code of the LevelLog, also the date/time (in standard UTC) of readout. When exporting measured data to a datafile also the NAP level (m) of the groundwater is added. When presenting status data the MDSW application shows the local date/time.

After selection of the item 'Status data' in column 2 of the measure well information, column 3 will show a summary of the most recent status with a.o. the software version, hardware items, data buffer status and battery status.

Using function keys the user may activate the following functions:

- Read actual status data from a LevelLog (a connection is needed)
- Read last 20 status data from a LevelLog (a connection is needed)
- Present a selection of status data from the database
- Delete a selection of status data from the database
- Export a selection of status from the database to a datafile

Read actual

After selecting the 'Read actual' function, all current status data are read from the LevelLog stored in the database. Column 3 shows a summary including the software version, hardware items, data buffer status and battery status. This function can only be activated if a LevelLog unit is connected.

Read last 10

After selecting the function 'Read last 10' the last 10 used location parameter sets recorded by the LevelLog are read and stored in the database. A pop-up window presents their contents. This function can only be activated if a LevelLog unit is connected.

Display

After selecting the 'Display' function a separate pop-up window appears containing a table showing all status data with measure well identification ordered by date/time with the most recent at the top. Within the pop-up screen, the user has the possibility to:

- Enter a time period for the measured groundwater levels:
 - From: Date + time
 - Till: Date + time
- Use the 'Refresh' function to refresh the table containing status data as available in the database for the specified period.

The pop-up window can be resized as needed and allows horizontal and vertical scrolling.

The table shows side by side the following LevelLog Status data:

- Identification measure well
- Time stamp: <date> <time> (local)
- Hardware version: vx.x.x

- Software version: vx.x.x
- Battery status: V
- Data buffer status: <total> <used> <unread> <reuse>
- Puls shift: PS(+/-)x
- Boot loader version: BLxx vx.x.x
- Building date: BD<date> <time>
- Measure process
- Start measurements: <date> <time>
- End measurements: <date> <time>
- Interval measurements: hrs:min:sec
- Measuring range
- Active Period: hours
- Inactive Period: hours
- Position ground level
- Distance ground level: cm
- Length unperforated tube: m
- Tube diameter: mm
- Soil covering
- Soil composition
- Average year temperature: °C
- Amplitude year temperature: °C
- Week number highest temp

Delete

After activating the 'Delete' function a separate pop-up screen offers the user the possibility to select a period of which the status data should be deleted from the database. After clicking 'Approve' the user will receive information about the number of records to be deleted. Only after entering a confirmation code the status data from the specified period, including all related information, will be deleted from the database.

Export

After selecting the 'Export' function a separate pop-up window offers the user the possibility to:

- Enter a time period:
 - From: Date + time
 - Till: Date + time
- Specify a folder and file name of the file to which the data from the database are to be exported. Do this by clicking the empty box behind 'Filename' after which a selection window will open.

- Click on 'Export'. The export progress status will be shown (busy; ready)

The data will be exported to a datafile in CSV-format. The file can be opened in Windows and saved as for example an Excel file. In addition to the selected status data the available meta-information will be added about the measure well, the specific area and organisation.

See also: Content Export Datafile

2.4.19 Logging data

To each measure well a logbook is linked in which a user (and the MDSW application) can enter relevant information. A logbook record consists of free text and the MDSW application adds to each record the date/time, the name of the user, the measure well identification and the unit code of the LevelLog.

After selection of the item 'Logging data' in column 2 of the monitoring well information, column 3 will show a list with the date/time of all previously entered logging data. The most recent is on top and the contents of that logbook record are shown. In case of multiple records it is possible to scroll through the list. After clicking on a different date/time, the contents of the selected record will be shown.

In the database and the export file, the default UTC date/time is recorded, but the MDSW application shows the local date/time. The user can use the available functions to 'Add' or 'Delete' a record, 'Display' multiple records and 'Export' part of the logging data to a datafile.

Add

The 'Add' function allows the user to create a logging record using free text. After clicking 'Approve' the record will be stored with the current date/time, user name, measure well identification and unit code of the LevelLog.

Delete

After activating the 'Delete' function a separate pop-up screen offers the user the possibility to select a period of which the logging data should be deleted from the database. After clicking 'Delete' the user will receive information about the number of records to be deleted. Only after entering a confirmation code the logging data from the specified period, including all related information, will be deleted from the database.

Display

After activating the 'Display' function a separate pop-up window enables the user to enter a period (date/time twice) of which the logging data shall be shown. After confirmation the logging data will be presented in a table, with the most recent at the top. Each logbook record contains the date/time of entry, the user who has entered it and the contents of the logbook record.

Export

After selecting the 'Export' function a separate pop-up window offers the user the possibility to:

- Enter a time period:
 - From: Date + time
 - Till: Date + time
- Specify a folder and file name of the file to which the data from the database are to be exported. Do this by clicking the empty box behind 'Filename' after which a selection window will open.
- Click on 'Export'. The export progress status will be shown (busy; ready)

The data will be exported to a datafile in CSV-format. The file can be opened in Windows and saved as for example an Excel file. In addition to the selected logging data the available meta-information will be added about the measure well, the specific area and organisation.

See also: Content Export Datafile

The MDSW application itself creates logbook records:

- From the moment a measure well has been successfully defined
- From the moment a LevelLog is connected to or disconnected from a measure well
- From the moment someone makes a connection to the LevelLog unit

2.4.20 Export datafile

The LevelLog MDSW application offers the option to export a selection of the measured data, status data and logging data of a measure well to a datafile for further processing and analysis.

After selecting the item 'Measured data' in column 2 of the measure well information the user can activate the function 'Export' in column 3 after which a pop-up window provides the possibility to select the information to be exported from the database of the MDSW LevelLog application to a datafile.

- Select the data to be exported in a menu
 - Only measured data of measure wells
 - Measured data and status data of measure wells
 - Measured data, status data and logging data of measure wells
- Enter a time period:
 - From: Date + time
 - Till: Date + time
- Specify a folder and file name of the file to which the data from the database are to be exported. Do this by clicking the empty box behind 'Filename' after which a selection window will open.
- Click on 'Export'. The export progress status will be shown (busy; ready).

The data will be exported to a datafile in CSV-format. The file can be opened in Windows and saved as for example an Excel file. In addition to the selected measured data, status data and logging data the available meta-information will be added about the measure well, the specific area and organisation.

See also: Content Export Datafile

2.4.21 DINO number

The DINO number is used to create a standardized (by the Dutch TNO institute) DINO file with groundwater level data. Only with a correct DINO number the MDSW application can create a DINO datafile.

The DINO number has two parts:

- DINO location code

• Type location:	1 letter	B (=measure well)
• Mappage:	2 digits + 1 letter	01-- 66 + A --G
• Number:	4 digits	0001 -- 9999
- DINO well number:

• Well number:	3 digits	000 -- 999
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Example: B39C0365001

At measure well information an assigned Dino number will be displayed in column 2.

When selecting the DINO number item in column 2 the user will be shown the actual DINO number (if available) in column 3. Using the 'edit' and 'approve' functions the DINO number can be entered or changed. The MDSW will indicate wrong information with a request to change the input. An incorrect DINO number is not accepted.

2.4.22 DINO file

With the LevelLog MDSW application it is possible to store the groundwater level data in a standardized (by the Dutch TNO institute) DINO file. The data of the groundwater level w.r.t. the tube adapter top (in whole centimetres) is entered in the DINO file.

After selecting the item 'Measured data' in column 2 of the measure well information the user can activate the function 'DINO file' in column 3 after which a pop-up window provides the possibility to select the information to be exported from the database of the MDSW LevelLog application to a DINO file.

1. Enter a time period:
 - From: Date + time
 - Till: Date + time
2. Specify a folder to which the data from the database are to be exported in a DINO file. Do this by clicking the empty box behind 'Filename' after which a selection window will open.
3. Click on 'Export'. The export progress status will be shown (busy; ready).

The name of the DINO file is fixed and is determined from the DINO location number and well number as set before in the measure well information. Without this information the MDSW application is not able to create a DINO file in which the groundwater level values are stored in a standardized way.

See also: Content DINO file

3 Admin

Access to administrative functions by selecting 'Admin' in the header bar.

Within the MDSW application there are three administrative functions:

- User mngt: To define users and give them authorisations
- Software mngt: To administer and make available software for the LevelLog
- Datafile transfer: To import or export (parts of) a datafile
- Data compare: To compare the data of a selected set of measure wells

Select a function in column 1 (top). Then options appear in column 1 (centre).

By clicking the selected function in column 1 (top) again, access is provided again to the other administrative functions.

3.1 Roles

Administrator:	All admin functions
Specialist:	Software admin and datafile transfer (import + export area + export measure well), if linked as a user to the specific area
Collector:	Datafile transfer (import + export area + export measure well), if linked as a user to the specific area

3.2 Users

Administrative function to define users and authorised them. Possibilities to change entered information and add or remove users.

Select in column 1 (centre):

- An already defined user
- Defining a new user

After selecting a user column 2 will show the already available user information for that user. By selecting an item in column 2, further information is shown in column 3 and of some items the contents may be changed. Information about 'last update' (user + date/time) is completed automatically.

Entering a new user can be done by selecting '+User'. In column 3 an input cycle starts that can be aborted. A user is defined when 'Name', 'Role', 'User name' and 'Password' have been set. Separately 'Contact info' and 'Description' can be entered and 'Areas' can be linked to the user.

3.2.1 Entering user information

User information:

- Column 2 (left): Title of the specific item
- Column 2 (right): Available information box for the specific item
- White indicator left: Indicator to show that no information has been entered yet

Setting or changing user information:

- Select in column 2
- More information and entering or changing in column 3

Function keys in column 3:

- Edit: Change the item
- Approve: Accept the changed item
- Cancel: No changes to the item
- Delete: Remove the user

User information items

- Name: Name of the user (free text, unique, mandatory)
- Contact info: Contact information (free text, optional)
- Role: Choose from 'Administrator', 'Specialist', 'Collector' (mandatory)
- User name: Name for MDSW access (free text, unique, mandatory)
- Password: Code for MDSW access (free text, mandatory)
- Description: Additional user information (free text, optional)
- Areas: Areas linked to a user (editable)
- Last update: User and date/time of last modification of one of the items

All user information items are editable, except for the 'Last update' items. A 'Name' or 'User name' already in use will not be accepted. A user, including all user information, can be removed using the function 'delete' followed by a confirmation.

Only the right combination of user name and password will allow a user to access the MDSW. A password is not displayed. If a user has forgotten the password a request shall be sent to the administrator for a new password.

To a user no, one or multiple areas can be linked. A user not linked to a specific area has no information about and no access to measure wells in that area. Column 2 (right) shows the number, and column 3 (after selection in column 2) shows all areas linked to that user. Through column 3 areas can be added to / removed from a user using the 'edit' function. You may then select the respective areas and click 'approve'.

3.3 Software versions

Administrative function to manage and make available software versions for LevelLog. Information supplied earlier can be changed, software versions can be added or deleted.

Select in column 1 (centre):

- One of earlier defined software versions
- Define a new software version

After selecting a software version in column 1, column 2 will show already available information of that software version. By selecting an item in column 2, further information is shown in column 3 and of some items the contents may be changed. Information about 'last update' (user + date/time) is completed automatically.

Entering a new software version can be done by selecting '+Software'. In column 3 an input cycle starts that can be aborted. A software version is defined when 'Version' and 'File' have been identified. Separately 'Description' can be completed.

After making the software version available an authorised user can upload the software into a LevelLog by selecting the specific organisation, area and measure well and activating the function 'load software'.

3.3.1 Entering software information

Software version information:

- Column 2 (left): Title of the specific item
- Column 2 (right): Available information box for the specific item
- White indicator left: Indicator to show that no information has been entered yet

Setting or changing software version information:

- Select in column 2
- More information and entering or changing in column 3

Function keys in column 3:

- Edit: Change the item
- Approve: Accept the changed item
- Cancel: No changes to the item
- Delete: Remove the software version

Software version information items

- Version: Identification of the software version (free text, unique, mandatory)
- Description: More information about the software version (free text, optional)
- File: Filename of a software version for the LevelLog (editable)
- Last update: User of last modification of one of the items
- Last update: Date/time of last modification of one of the items

All software version information items are editable, except for the 'Last update' items.

A 'Version' already in use will not be accepted. A software version, including all related information, can be removed using the function 'delete' followed by a confirmation.

After selecting 'file' in column 2, in column 3 under 'Filename' the file can be indicated with the specific software version for a LevelLog. After clicking 'Approve' this file will be linked to the MDSW application and in column 2 (right) it will show that it is available for upload to a LevelLog.

3.4 Datafile transfer

Administrative function to import or export (parts of) a database. This way data exchange between MDSW applications can take place and MDSW applications can be provided an initial and completed database.

Select a sub-function in column 1 (centre):

- Import datafile
- Export organisation
- Export area
- Export measure well
- Export user
- Export software

In column 3 the import or export can be specified.

For the export sub-functions in column 1 (bottom) it can be selected what to export: which organisation, which area, which measure well, which software version, which user. Then column 2 will show available meta-information about that organisation, that area, that measure well, that software version or that user.

In columns no selections or changes can be done.

When selecting the sub-function import datafile, column 2 remains empty.

Datafile export parts

Part	Organisation	Area	Meas. well	Software	User	Period
File	X	X	X			
Version	Sw	Sw	Sw	X		
User	Ur	Ur	Ur		X	
Organisation	X	Or	Or			
Area	X	X	Aa			
Meas. well info	X	X	X			
Logos	X	Or	Or			
Maps	X	X	Aa			
Pictures	X	X	X			
Meas. data	X	X	X			Yes
Status data	X	X	X			Yes
Logging data	X	X	X			Yes

X: Always completely into datafile

Yes: On request only specified period data or everything

Sw: Only SW versions linked to the organisation / area / unit

Or: Only organisation / logo linked to that area or unit

Aa: Only the area / maps linked to that unit

Ur: Only the users linked to the specific area or unit

A transfer datafile consists of:

- an SQL datafile ('filename')
- file folders with linked logos ('filename'-logos), maps ('filename'-maps), pictures ('filename'-pictures) and software ('filename'-software)

The transfer datafile and the related file folders must be in the same folder that you can choose.

In a transfer export function, the user must specify:

- the folder where the transfer files need to be
- 'filename' for the transfer datafile

In a transfer import function, the user must select:

- the folder where the transfer files are stored
- 'filename' for the transfer datafile

3.4.1 Transfer import datafile

The files to be imported must be put in advance at C:\Programdata\Sigmax.\VRM-LevelLog\Transfer (or another folder of your choice) with the file containing the datafile ('filename') and the folders for related logos ('filename'-logos), pictures ('filename'-pictures), maps ('filename'-maps) and software ('filename' software). Only files can be imported that have been created with a data export function of the LevelLog application.

After selecting 'Import database' in column 1 (centre), in column 3 the folder and file name can be indicated of the datafiles to be imported. After activating the 'import' function, the contents of that file will be merged with the information already present in the current database.

During merging new file records will be added and existing records will be modified if the imported data is more recent. For information items of organisation, area, measure well, user and software the last update date/time is regarded, and for measurement data, status data and logging data the associated date/time is regarded. New logos, maps, pictures and software files are added and existing ones replaced.

3.4.2 Transfer export organisation

Select in column 1 (bottom) the organisation(s) whose database parts should be exported. Exporting an organisation to a datafile means that also all areas linked to that organisation and all wells linked to those areas and all measured data, status data and logging data belonging to those wells, including all related files with logos, pictures and maps will be exported .

In column 3 can be selected:

- Export of all available data
- Export of data over a specified period (date and time)

After that, in column 3 the folder and filename can be specified for the transfer files in which the exported part of the database is to be inserted. After activating the 'export' function the datafile ('filename') will be created as well as the folders with the related logos ('filename'-logos), pictures ('filename'-pictures) and maps ('filename'-maps).

3.4.3 Transfer export area

Select in column 1 (bottom) the area(s) of which parts of the database are to be exported. Exporting an area to a datafile means that also all measure wells belonging to that area and all measured data, status data and logging data belonging to those wells, including all related files with logos, pictures and maps will be exported.

In column 3 can be selected:

- Export of all available data
- Export of data over a specified period (date and time)

After that, in column 3 the folder and filename can be specified for the transfer files in which the exported part of the database is to be inserted. After activating the 'export' function the transfer datafile ('filename') will be created as well as the folders with the related logos (filename'-logos), pictures (filename'-pictures) and maps (filename'-maps).

3.4.4. Transfer export measure well

Select in column 1 (bottom) the measure well(s) of which parts of the database are to be exported. Exporting a measure well to a datafile means that also all measured data, status data and logging data belonging to that well, including all related files with logos, pictures and maps will be exported.

In column 3 can be selected:

- Export of all available data
- Export of data over a specified period (date and time)

After that, in column 3 the folder and filename can be specified for the transfer files in which the exported part of the database is to be inserted. After activating the 'export' function the transfer datafile ('filename') will be created as well as the folders with the related logos ('filename'-logos), pictures ('filename'-pictures) and maps ('filename'-maps).

3.4.5 Transfer export user

Select in column 1 (bottom) the user(s) of which parts of the database are to be exported. Exporting a user to a datafile means that also all related information will be exported.

After that, in column 3 the folder and filename can be specified for the transfer files in which the exported part of the database is to be inserted. After activating the 'export' function the transfer datafile ('filename') will be created.

3.4.6 Transfer export software

Select in column 1 (bottom) the software version(s) of which parts of the database are to be exported. Exporting a software version to a datafile means that also all related information and software files will be exported.

After that, in column 3 the folder and filename can be specified for the transfer files in which the exported part of the database is to be inserted. After activating the 'export' function the transfer datafile ('filename') will be created as well as the folder with the related software ('filename'-software).

3.5 Data compare

This feature allows a user to compare measured data obtained from different measure wells and present them simultaneously in a graph on the screen. It is also possible to capture those measured data and export them to a data file for further analysis.

Each data compare set can be separately determined and stored.

A data compare set consists of:

- a name and a description
- a number of selected measure wells
- a time period between a start date/time and an end date/time
- a selected data record, to be selected from several options

In column 1 (centre) can be selected:

- one of the already predefined data compare sets
- defining a new data compare set

After selecting a data compare set in column 1, column 2 shows the already available information from that data compare set. By selecting an item in column 2, more information will be shown in column 3 and of some items the content can be changed. Information about 'last update' (user + date/time) is automatically completed.

To add a new data compare set select '+ Data compare'. An input cycle will start in column 3 that can be aborted. A data compare set is defined when 'Name', 'Description', 'measure well set', 'Period' and 'Data selection' have been entered. Then the user can start an 'Analysis' sequence, in which the measured data of the selected wells are presented simultaneously with the possibility to store them in a datafile.

3.5.1 Data compare information items

Data compare information:

- Column 2 (left): title of the item
- Column 2 (right): the available information about the item
- White indicator left: attention to indicate that the item has no content

Completing or changing data compare information:

- selection in column 2
- more information and completion or change in column 3

Function keys in column 3:

- Edit: change the item
- Approve: accept changed item
- Cancel: no changes to item
- Delete: delete data compare set

Data compare information items:

Name:	Identification of data compare set (free text, unique, mandatory)
Description:	More information about the data compare set (free text)
Measure well set:	Possibility to select measure wells for the data compare set
Period:	Possibility to indicate a period for the data compare set
Data selection:	Possibility to select the desired data record
Analysis:	For the presentation of a graph and exporting the data
Last update:	User of last update of one of the items
Last update:	Date/time of last update of one of the items

All information items can be activated, except the 'Last update' items. An already used name for a data compare set is not accepted. A data compare set with all the associated information can be deleted by activating the 'Name' item in column 2 and selecting the function 'delete' and a confirmation.

3.5.2 Measure well set

Column 2 (right) shows the number of wells included in the data compare set. After activating the item in column 2, column 3 will show a table with the already selected measure wells and a number of function keys.

After activating the function key 'Edit', column 3 will show a list with all measure wells of areas to which that user is linked. Of each measure well the identification name and area

name (between brackets) are shown. Previously selected wells are at the top of the list and have been sorted. Now you can:

- add another measure well to the data compare set (by ticking the check box)
- deleting a measure from the data compare set (by unselecting the check box)
- change the order in the presentation (using the '+' and '-' keys)

After activating the function key 'Approve' the selected wells will be included in the data compare set.

3.5.3 Period

Column 2 (right) indicates whether or not a time period for the data compare set has been defined. After activating the item in column 2, column 3 will show the previously defined period by a date and time for start and end times and a number of function keys.

Select the function key 'Edit' to change the period.

- From: date + time
- Until: date + time

After clicking 'Approve' the defined period will be included in the data compare set.

3.5.4 Data item selection

Column 2 (right) shows which data item has been selected for the data compare set. After activation of the item in column 2, column 3 will give the possibility to select a different data item. After having made the selection and clicking 'Approve' the selected data item is stored in the data compare set.

Possible Data items:

- Tube level: Ground level w.r.t. the tube adapter top (cm)
- Ground level: Groundwater level w.r.t. ground level (m)
- Temperature: Temperature of the LevelLog unit (°C)
- NAP level: Groundwater level w.r.t. NAP (m)
- Slope: Calculated value of two consecutive measure well values (cm/hr)

If no NAP value has been specified for a measure well then no NAP levels will be calculated.

The slope will have a value if there are two consecutive correct measurements.

$$\text{Slope} = (\text{Tube level 2} - \text{Tube level 1}) / (\text{time stamp 2} - \text{time stamp 1}).$$

The slope will get the time stamp of the first Tube level value.

3.5.5 Analysis

After activating the item 'Analyse' in column 2, a pop-up window appears with a graph in which the data of the created data compare set are presented. The graph shows the specified data item over the defined period of all measure wells in the measure well set. The various measure wells are shown on the top right next to the graph, in the order as defined in the measure well set.

The pop-up screen can be adjusted in size as needed. The axes are automatically scaled. The time axis of the graph can be zoomed in, zoomed out and shifted. Depending upon the number of selected wells, the period chosen and the measurement interval that is used for measuring, it may take several minutes before the plot has been constructed.

Within the pop-up window, the user will have the possibility to:

1. Select another data element (bottom right, next to the graph)

- Tube level (cm): Distance between tube adapter top and groundwater level
- Ground level (m): Groundwater level below ground level
- Temperature (°C): Temperature of the LevelLog
- NAP level (m): Groundwater level w.r.t. NAP
- Slope (cm/hr): Ascent or descent rate of the groundwater level

2 Specify a time period: (on the left below the graph)

- From: date + time
- Until: date + time

By clicking function button 'Refresh' the contents of the graph can be refreshed after a data item and/or period have been changed.

After clicking the function button 'Export' a pop-up window appears in which the user can store the data item values of the data compare set in a data file (CSV format) by specifying a folder and file name. The file can be opened in Windows and be saved as for example an Excel file.

The file is structured as follows:

- Title line: indicating the data item and the unit of the values
- measure well line: listing the identification names of the measure wells concerned
- Data lines: date/time and for each measure well the value of the data item

4 Explanations

4.1 Database structure

Organisation

Entity that has one or multiple areas, each with no or more measure wells. If you perform administrator activities yourself, then only one organisation will suffice. If a third party is administrator for several organisations, then multiple organisations will be required. An organisation is described by organisation Information and can be assigned with a logo.

Area

A geographical area with one or multiple measure wells linked to a specific organisation. An area is described by area Information, has Default Settings and can be assigned maps. To an area multiple users can be linked.

Measure well

Measuring well with a LevelLog in the specific area linked to an organisation. A measure well is described by Measure Well Information, including actual Settings for that measure well, and pictures can be added to a unit. Each measure well has Measure data, Status data and Logging data.

Measured data

Set of readings, each with its own time stamp, which have been read obtained from the LevelLog of a Measuring well.

Status data

Sets of status information, including the Settings and each with its own time stamp, which are read from a LevelLog of a measure well during communication with a LevelLog and when settings are changed.

Logging data

Information related to a monitoring well stored by the MDSW application or a user.

User

Person authorised to use the LevelLog MDSW application. A user is described with user Information. There are three types of users: Administrator + Specialist + Collector. The type determines the authorisation to use certain functions of the LevelLog application. A user can access the LevelLog application using his/her own user name and password assigned by an administrator. A user can be linked to multiple areas.

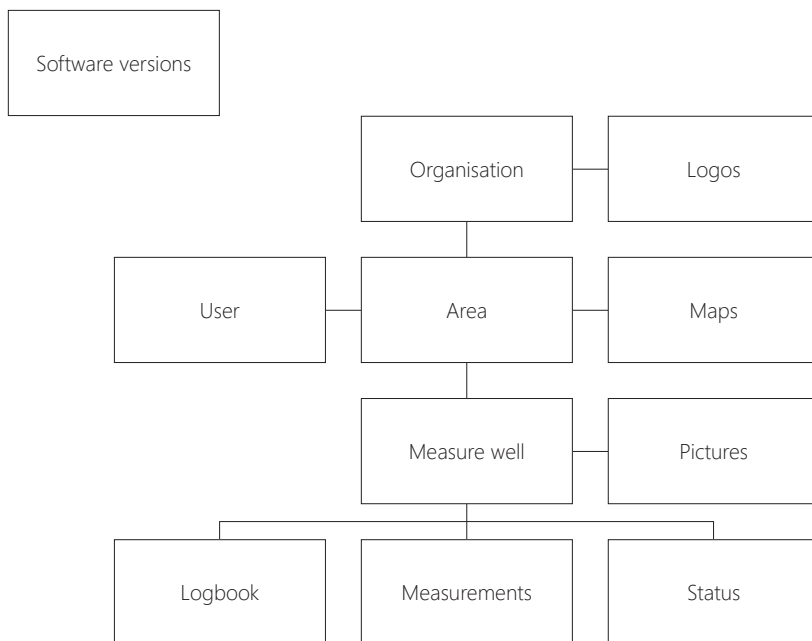
Software version

There are one or more software versions that can be loaded from the MDSW application into a LevelLog.

Each record of the measurement data and status information is given its own time stamp by the LevelLog. Each record in the logging data contains for each addition a time stamp and a reference to the user. After each change of information regarding organisation, area, measure well, user and software version, the following is recorded as part of the information: the user who implemented the change + date/time of that change.

Logos, maps and pictures

Jpg files can be used for this. In the file properties the 'Read Only' status should be turned off to avoid problems during the transfer of database parts.



When starting the LevelLog MDSW application with an empty database, then automatically will be created:

- An organisation named 'Organisation A'
- An area called 'Area A' as part of 'Organisation A' with default settings for PIN code, measure process and location parameters
- A user named 'User A' linked to 'Area A' with a role ('Administrator') and access codes for user name ('User A') and the password ('1234')

At first use the user can change the names and codes (preferred) or delete these records later, after other similar records have been created or imported. However, there shall always remain at least 1 organisation + 1 area + 1 user (with administrator role) in the database.

When importing database parts:

- For organisation, area, measure well, user and software version, the information is used with the latest time stamp
- In Measurement data, Status information and Logging data all records are merged, each with their original time stamp, and records with equal time stamps will be overwritten
- For logos, maps, pictures and software files are all available data are merged

4.2 File locations

The LevelLog MDSW application with all related support files will after installation on tablet, laptop or PC be placed in the folder C:\Program Files\...\VRM LevelLog. A shortcut to the LevelLog MDSW application will be placed on the desktop with a LevelLog icon.

The datafiles for the LevelLog MDSW application are in the folder C:\ProgramData\...\VRM LevelLog with sub-folders:

- Database: For the database
- Software: For the LevelLog software files
- Logos: For the logos
- Maps: For the maps
- Pictures: For the pictures
- Transfer: For the import and export transfer files (optional)
- Logs: For the logbook file (optional)

If while using the LevelLog MDSW application logos, maps, pictures and/or software versions are added, these files will be copied to the respective folders in the application data. To these locations will be referred from the database.

4.3 Standard parameter settings

After commissioning of the LevelLog MDSW application, the database contains

- 1 organisation ('Organisation A')
- 1 area ('Area A'), linked to organisation A
- 1 user ('User A'), linked to area A, with user name 'User A', password '1234' and role 'Administrator'

Each new area will be assigned system default values:

- PIN code: 0000
- Measure process:
 - Measure process: No measurement
 - Measuring range: Standard
 - Measure interval: 4 hours
 - From: Actual date; 00:00 hr
 - Until: Actual date; 00:00 hr
 - Enable period: 24 hrs
 - Disable period: 24 hrs

- Location parameters

• Position tube adapter top:	Above ground level
• Distance to ground level:	0 cm
• Length unperforated tube:	0 m (no)
• Tube diameter:	Unknown
• Soil covering:	Light vegetation / covering
• Soil composition:	Dense sand
• Average year temperature:	10 °C
• Amplitude year temp. cycle:	8 °C
• Week number highest temp:	30

The user can change the proposed default area settings in the definition cycle of an area or later. These changed values will from then on be used as the default starting values for (new) measure wells in that area.

4.4 Measure process

Using the measure process you can define how a LevelLog shall do measurements. This can be set by entering a number of parameters.

Measure process

The following processes can be selected:

- No measurement:

The LevelLog does not perform any measurements

- Measure with intervals:

The Levellog performs measurements between an adjustable starting time and end time with an adjustable interval

- Measure with intervals during period:

The LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval, during an editable period 1, after which the LevelLog will not measure during an editable period 2, after which measurements are resumed during period 1 etcetera, until the end time has been reached

- Test measurement:

The LevelLog performs measurements between an adjustable starting time and end time with an adjustable interval, without input securities with a small measuring interval

Measure interval

Can be set in hours + minutes + seconds. Is not applicable if the measure process is set at 'no measurement'. Normally an interval can be chosen between 1 minute and several hours, depending upon the aim of the measured data sequence. In between the LevelLog will be put in an energy-efficient mode to save the battery.

For special flow measurements it is possible to select a measure interval between 5 seconds and 1 minute. In that case the LevelLog will not be put in the energy-efficient mode and for 'Measure with intervals' and 'Measure with intervals during period' the maximum measure period (difference between from and until) will be limited to a specified maximum which depends upon the set measure interval. The user will be shown a notification for this.

From and Until

A date (day - month - year) and a time (hours + minutes + seconds) can be set. Is not applicable if the measure process is set at 'no measurement'. A maximum allowable measuring time applies for measure intervals smaller than 1 minute.

Enable period and Disable period

To be set in hours. Is only applicable if the measure process is set to 'Measure with intervals during period'.

Measuring range

Select from:

- Economic
- Standard
- Maximum

For level measurements at relatively small depths it is recommended to select 'economic'. Only if measurements have to be performed at very large depths the selection should be 'maximum'. The selection will influence battery life, but not the measurement accuracy.

Feasible measuring ranges per tube diameter:

Tube diameter	Economic	Standard	Maximum
25 mm	15 m	20 m	25 m
32 mm	18 m	25 m	30 m
40 mm	22 m	35 m	40 m
50 mm	25 m	40 m	50 m
63 mm	30 m	45 m	60 m
Accuracy	< +/- 0,5 cm	< +/- 0,5 cm	< +/- 0,5 cm

4.5 Location parameters

The location parameters are location and measure well dependent data that are of importance for proper measurements and for most precise and reliable level calculations. These parameters must be set correctly when installing a LevelLog to a measure well; if necessary use the proposed default values.

Position tube adapter top

Select from:

- Above ground level
- Below ground level

Reference point is the top side of the (orange) tube adapter flange. When using a LevelLog in a street well the selection will usually be 'Below ground level' and for application in a protective tube in the open field it will mostly be 'Above ground level'. For level measurements with tubes in surface water or completely above the ground it is recommended to always select 'Above ground level'.

Distance to ground level

To be set in whole or parts of centimeters (xx,xx cm). This concerns a precise input of the distance between the top of the (orange) tube adapter flange and the local ground level. The position and distance of the tube adapter flange top with respect to ground level is of importance for determining the level with respect to ground level and making corrections to calculate the true level. For level measurements with vertically positioned tubes in surface water or entirely above the ground it is recommended to (minimally) enter the length of the tube.

Length unperforated tube

To be set in whole or parts of meters (xx,xx m). This concerns an input of the distance between the top of the (orange) tube adapter flange and the position of the first tube perforation; the length of the unperforated tube. If value 'zero' is set then possible tube perforations are not taken into account. If the water level reaches a perforation there will be signal loss which will limit measuring range. By entering the blind tube length the LevelLog will take this into account and make extra efforts to increase the feasible measuring range.

Tube diameter

The most commonly used tubes have an (outer) diameter of 25 mm, 32 mm, 40 mm, 50 mm or 63 mm. For a correct measurement and precise level calculation it is important to enter the correct tube diameter range.

Select from:

- 22-28 mm
- 29-36 mm
- 37-45 mm
- 46-55 mm
- 56-65 mm
- Unknown

If diameter range 'unknown' is set at a LevelLog, measurements will take place but it is possible that not all measurements are successful and the calculated level will be less accurate than if the applied tube diameter had been set.

Soil covering

When calculating the level the type of soil covering is taken into account. It affects warming of the soil. Select from:

- Heavy vegetation / covering (e.g. a forest or covered setup)
- Light vegetation / covering (e.g. a perk with bush)
- No vegetation / covering (e.g. a town square)

Soil composition

When calculating the level the (main) soil composition is taken into account. It affects the heat transfer in the ground. Select from:

- Loose sand
- Wet sand
- Dense sand

- Clay
- Wet clay
- Loam
- Wet loam
- Wet marl
- Wet marsh

Average year temperature

When calculating the level the average year temperature is taken into account over the past few years in the area with the measure well used by the LevelLog.

To be set in whole or parts of degrees Celsius (xx,xx °C).

Amplitude of average year temperature cycle

When calculating the level the amplitude (50% top-top) is taken into account of the average year temperature cycle of the area with the measure well used by the LevelLog.

To be set in whole or parts of degrees Celsius (xx,xx °C).

Week number with highest temperature

When calculating the level the week number is taken into account that usually has the warmest day of the year of the area with the measure well used by the LevelLog.

To be set as an integer.

Information sources

During the installation of a LevelLog to a measure well the following data are known or can be easily determined:

- Position of tube adapter top related to ground level
- Distance between tube adapter top and ground level
- Distance between tube adapter top and first tube perforation (unperforated tube length)
- Tube diameter
- Local soil covering
- Soil composition (most frequent)

The following data vary by region and will be the same for a particular area. The website www.levellog.nl provides recommendations for appropriate values by region:

- Average year temperature over the past years
- Amplitude year temperature cycle (50% top-top)
- Week number usually having the highest temperature of the year

4.6 Scenarios related to a LevelLog

No LevelLog connected

- Scenario A: measure well known in database:
Normal situation. After selecting the specific measure well in column 1, column 2 will show the measure well information and column 3 will show the most recent measured data.
- Scenario B: Define new measure well in database:
Normal situation. After selecting '+measure well' in column 1, column 2 will show default settings for measure well information and in column 3 a measure well definition cycle will start during which relevant information and parameters can be entered. The MDSW application will take as a starting point the default settings for the area in which the measuring well is to be installed.

LevelLog connected, unique code known in database

- Scenario C: LevelLog on measure well with readiness stage 'set' or 'adjusted':
Normal situation when a LevelLog on a measuring well is operational and a connection is made. The MDSW application searches the associated measure well, reports the organisation, area and measure well in column 1 and shows the measure well information in column 2. Column 3 shows several actual status data from LevelLog and the last known measured data from the database. The user can a.o. read out the measured data and present and/or export these.
- Scenario D: LevelLog on measure well with readiness stage 'defined':
Abnormal situation that can occur if a LevelLog still has to be set while there has already been contact with it. The MDSW application searches the associated measure well, reports the organisation, area and measure well in column 1 and shows the measure well information in column 2. In column 3 the user can select the item 'Readiness' to activate the setting cycle for entering the relevant information and parameters and sending it to the LevelLog. The MDSW application will take as a starting point the information specified in the definition cycle of the measure well and/or the default settings for the area in which the measure well is to be installed.
- Scenario E: LevelLog linked to multiple measure wells in the database:
Abnormal situation that can occur if a LevelLog has been installed

on another measure well before. In this case, the MDSW application shows the measure well identifications and asks the user to make a selection. Then the application continues with scenario C. It is also advised to disconnect the LevelLog unit in the database from other measure wells. This can be done through the measure well information item 'Unicode'.

LevelLog connected, unique code unknown in database

The user will be shown a menu in column 3 with four selectable situations. Depending on the selection the user is asked to provide further selections and input:

- Initial installation of new LevelLog on measure well and measure well already defined in database
- Initial installation of new LevelLog on measure well and measure well is not yet known in database
- Existing and working LevelLog but LevelLog is not yet known in the database
- Replacing of old LevelLog by a new LevelLog on a measure well known in the database and making use of setting data from the previous LevelLog on that measure well

Below the four possibilities:

- Scenario F: Initial installation of a LevelLog on already defined measure well:
Normal situation if the measure well has been defined in advance (via scenario B) and a new LevelLog is connected. The user is asked to select the organisation, area and measure well in column 1, after which the MDSW application will link the LevelLog to the selected measure well. Then a setting cycle is started, with the possibility to also do the adjustment cycle. As a starting point for the parameters to be set the earlier set values or the default settings of the area are taken.
- Scenario G: Initial installation of a LevelLog a monitoring well still to be defined:
Normal situation if the measure well has not been defined in advance and a new LevelLog is connected. The user is asked to select the organisation, an area and '+measure well' in column 1. Then a measure well identification must be provided after which the application will start a setting cycle, with the possibility to also do the adjustment cycle. As a starting point for the parameters to be set the earlier set values or the default settings of the area are taken.
- Scenario H: Existing and operational LevelLog, but not yet known in the database:
Abnormal situation that can occur if the (operational) LevelLog is not yet known in the (new) database. The user is asked to select

the organisation, an area and '+measure well' in column 1. The application will then start the measure well definition cycle and the actual values for the settings will be taken from the LevelLog into the database. No adjustment cycle will follow, but in column 2 the measure well will be marked as 'set' (measure process, location parameters, readiness).

Scenario I :

Replacing an old LevelLog by a new LevelLog on the same measure well:

Abnormal situation if a (previous) LevelLog must be replaced by a (new) LevelLog on the same measure well which is already known in the database and of which the information and settings should be adopted. The user is asked to select the organisation, an area and the specific measure well in column 1. After confirmation, the unit code of the new LevelLog will be linked to the selected measure well. The application will continue with the setting cycle in which the actual values for the measure process and the location parameters of the measure well are sent from the database to the new LevelLog. The measure well is marked with readiness stage 'set' and the user may optionally start an adjustment cycle.

Using a known LevelLog on another measure well

Scenario J:

Knowingly moving a LevelLog from one measure well to another: In this case it is recommended to first read the data of the first measure well from the LevelLog and store them in the database. Then disconnect the LevelLog of the measure well by selecting the unit code item in column 2. Now it is possible to install the LevelLog to another measure well according to scenario F or G. If the LevelLog is not disconnected from the previous measure well it can not be installed on a different measure well using the same database.

4.7 PIN and PUK access

Access to a LevelLog can be secured by a PIN code consisting of 4 digits. By default the LevelLog PIN code is set to 0000, allowing full access to the LevelLog.

Through the MDSW application a user can assign a PIN code to a connected LevelLog by entering the new PIN code and the current PIN code using the 'Change PIN' function. This way it is also possible to change an existing PIN code.

When changing the PIN code to 0000 then PIN=Off (not active) will be set simultaneously. When changing the PIN code to any code other than 0000 then PIN=On (active) will be set simultaneously. Access security can also be activated using the 'PIN on' function and deactivated using the 'PIN off' function and entering the current PIN code of a connected LevelLog.

The current PIN code is stored in the measure well information in the MDSW database. When a LevelLog is connected the MDSW application checks whether the PIN code in the database matches the PIN code in the LevelLog. A user can use the 'PIN Status' function to check if his/her own PIN code does or does not match the one in the LevelLog and whether access security of the LevelLog has been activated.

If the PIN code in the MDSW database differs from the PIN code in the LevelLog and access security is active, the MDSW application will ask the user to enter the correct PIN code before allowing access the LevelLog. This could happen if multiple users with different MDSW application files have access to a particular measure well or if a user starts working with a new database.

It could happen that nobody recalls the correct PIN code for a LevelLog on a Measuring well. After 3 false PIN code input attempts the application will offer the possibility to enter a PUK code to unlock the security and a new PIN code can be set. The PUK code consists of 8 to 10 digits and can be requested by authorised persons at the supplier (see www.levellog.nl) by supplying the serial number and the LevelLogs Unique Code consisting of 16 characters as mentioned in the measure well information.

4.8 Content export datafile

With the LevelLog MDSW application it is possible to export data from the database to a datafile and to share these data with others, analyse measured data and/or use these data in a GIS file. Using the MDSW application a user can specify a free file name and folder where this file will be saved. The data will be exported to a datafile in CSV format. This file can be opened and saved in Windows as for example an Excel file.

From the LevelLog MDSW application the user can select which data from which period will be exported to a datafile:

- Scope:
 - From measure well: only the related measure well
 - From area: all measure wells of that area
 - From organisation: all measure wells of all areas of that organisation
- Data:
 - Only measured data of measure wells
 - Measured data and status data of measure wells
 - Measured data, status data and logging data of measure wells
- Period:
 - From: Date + time
 - Until: Date + time

In addition to the selected measured data, status data and logging data the available meta-information will be added about the specific measure well, area(s) and organisation.

Order and contents of data in the datafile

Organisation information:

- Titles (1 line) (4 items)
- Content (1 line) (4 items)

Area information:

- Titles (1 line) (6 items)
- Content (1 line) (6 items)

Measure well information:

- Titles (1 line) (22 items)
- Content (1 line) (22 items)

Status data: (optional)

- Titles (1 line) (24 items)
- Content (xx lines) (24 items)

Logging data:	(optional)
• Titles	(1 line) (5 items)
• Content	(xx lines) (5 items)
Measured data:	
• Titles	(1 line) (9 items)
• Content	(xx lines) (9 items)

Organisation information

Organisation + description + last update (UTC date/time) + last update (user)

Area information

Area + description + organisation + administrator + last update (UTC date/time)
+ last update (user)

Measure well information

Organisation + area + identification + unit code + readiness + location latitude + location longitude + location RDX + location RDY + reference level tube (nap) + reference level ground (nap) + drilling depth + filter position + well drilling date + LevelLog unit installation date + last contact (UTC date/time) + last contact (UTC date/time) + last update (UTC date/time) + last update (user) + description measure well + surroundings info

Logging data

In lines below each other in order of UTC time stamp: identification measure well + unit code LevelLog + time stamp (UTC date/time) + user + logging comment

Status data

In lines below each other in order of UTC time stamp: identification measure well + unit code LevelLog + time stamp (UTC date/time) + software version + hardware version / pulseshift + battery status + data buffer status + measure process + from time measurements+ until time measurements + interval + measuring range + enable period + disable period + position tube adapter top related to ground level + distance to ground level + length unperforated tube + tube diameter + soil covering + soil composition + average year temperature + amplitude year temperature cycle + week number with highest temperature + adjustment correction

Measured data

In lines below each other in order of UTC time stamp: identification measure well+ unit code

LevelLog + time stamp (UTC date/time) + tube top level (mm) + ground level (m)
+ NAP level (m) + temperature (°C) + reflection time (msec) + number of retries

The status data include the software and hardware versions of the LevelLog and the settings of the measure process and the location parameters at a specific moment. The UTC time stamp is indicated in seconds but usually presented in minutes in a file. For special flow measurements the time can be presented in seconds by changing the property of the related fields in the Excel file.

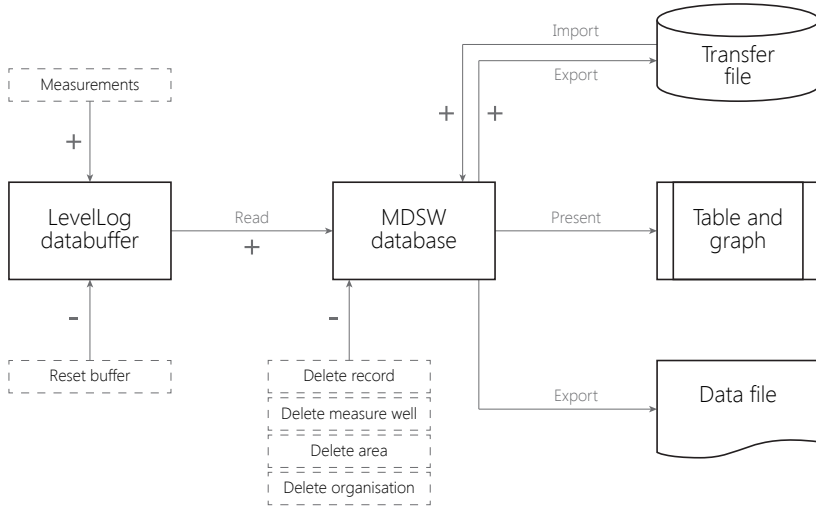
4.9 Storage of measured data

The information about measured data can appear at several locations and in different forms.

- In the data buffer of the LevelLog unit
- In the database of the MDSW application
- Temporarily as information in a table or graph of the MDSW application
- In an export datafile
- In an import / export transfer file

Data buffer LevelLog

- Can be reset by the user in the MDSW application
- By doing measurements the measured data are added to the data buffer
- If the data buffer is full, the oldest measured data will alternately be replaced by new data



MDSW Database

- By reading a LevelLog, measured data is added to the file in which equal, already present measured data will be overwritten
- The data can be accessed from the database by the MDSW application and presented in a graph and/or a table
- The measured data can be copied from the database by the application MDSW and exported to a datafile
- The user can use the MDSW application to delete one or more records of the measured data of a measure well from the database
- By deleting a measure well, area or organisation from the database, also all available data regarding the respective measure wells will be deleted from the database
- By exporting a measure well, area or organisation the measured data of the respective wells will be copied to a transfer file
- When importing a transfer file with measure wells, areas or organisations the measured data of the respective wells are added to the database, in which equal, already present measured data in the database will be overwritten

Installation manual



1 Introduction

1.1 Product description

The LevelLog water level indicator is used to measure the water level in measure wells. The LevelLog measures the distance between the top of the adapter and the water level using acoustic signals. The calculation of the water level takes into account the acoustic properties of the measure well and the actual temperature development during the measurement. The LevelLog is suitable for tubes with external diameters of 25 to 63 mm and can be detachably mounted on standard tube fittings with 1' or 1.5' thread.

The LevelLog can be set, adjusted and read using a Windows PC, laptop or tablet that can be connected to the LevelLog by a USB cable and which has the associated LevelLog application software installed. The LevelLog has a data memory with a storage capacity of 3000 measurements. Stored measurements will be retained when the LevelLog is switched off, when the battery is replaced or when a firmware upgrade is executed. The LevelLog features a high quality battery which in case of typical use (2 measurements per day) will last for 10 years of measurements. The sampling period and frequency can be adjusted.

Advantages of the LevelLog

- Prevents contamination problems, because there is no contact with the groundwater
- Easy to install and to (dis)connect to wells with various diameters
- Simple manual check measurements can be performed
- Minimum and maximum groundwater levels do not have to be taken into consideration
- The same unit can be used on all tube diameters from 20 cm up to the maximum range
- The measured water level is readily available with an accuracy of +/- 5 mm and a resolution of 1 mm
- No air pressure measurements and compensation calculations required
- Easy setting, adjustment and reading with a laptop or tablet (no special training required)
- In case of data memory overflow the LevelLog continues measuring and oldest measurement results will be alternately replaced by new results
- Suitable for street pit and protective pipe for groundwater measurements, and can also be used to measure open water level changes

⦿ Attention

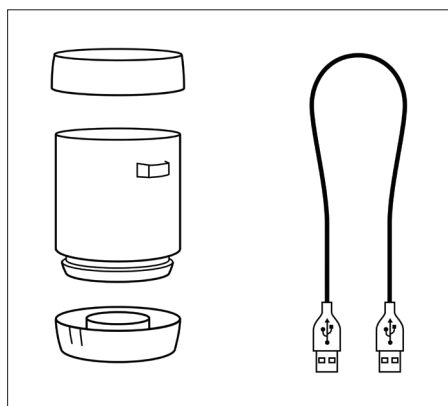
Perforations in a measure well (above the groundwater level) can limit the measuring range of the LevelLog if the LevelLog is not set correctly and/or the perforated area above the ground water level is too large.

1.2 Supply

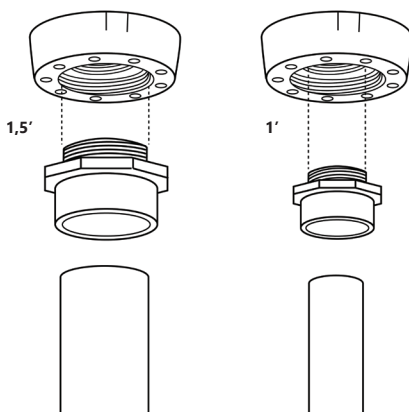
- LevelLog
- LevelLog swivel lid
- LevelLog adapter
- USB cable
- Manual

Separately available:

Tube flanges for tube outer diameters Ø 25, 32, 33, 40, 50, 60, 63 with 1' or 1,5' BSP outer thread.



in the box



Software for the LevelLog unit and the LevelLog Applicatie Software is available through www.levellog.nl.

2 Specifications

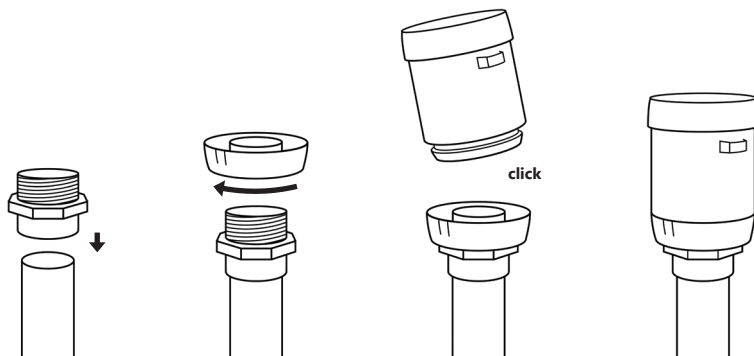
Scope	measure well diameter from 25 to 63 mm
Measuring range *	<ul style="list-style-type: none">• For Ø 25 a range of 20 meters• For Ø 32 a range of 25 meters• For Ø 40 a range of 30 meters• For Ø 50 a range of 40 meters• For Ø 63 a range of 50 meters
Measuring accuracy **	+/- 0,5 cm
Measuring resolution	1 mm
Battery type	Lithium 3.6V, 8.5 Ah
Battery life	Depending upon frequency and measuring distance; at least 30.000 measurements
Dimensions	90 x 90 x 125 mm
Weight	270 gram
Material	ABS / PC
Water resistance	IP-X6 (upright 30 cm under water for max. 1 hour)
Data memory	3000 measurements
Measurements	Measuring frequency and measuring period are adjustable

* Range can be checked by doing a test measurement

** The LevelLog has been optimised for autonomous measurements. Fluctuations in the supply of a connected mobile device may lead to small measurement inaccuracies.

3 Use

3.1 Installation



installation

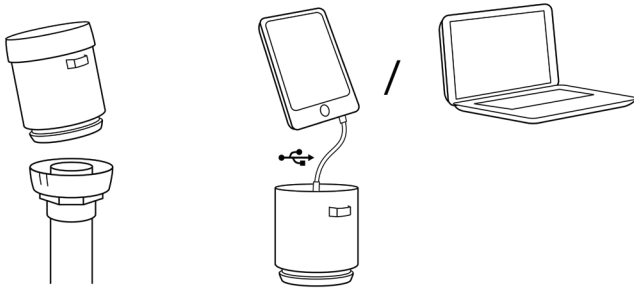
1. Check if the street pit or protective pipe offers enough space to install the LevelLog with adapter and tube flange. If necessary shorten the measure well.
2. Install the flange with 1" or 1,5" thread onto the measure well top. For optimal measurement results the flange should be pushed into the tube as far as possible.
3. Tighten the orange LevelLog adapter so that it clamps onto the tube flange.
4. Determine if the tube adapter top is above or below ground level and measure using a tapeline the distance between the tube adapter top of the LevelLog and ground level. Note down this information that you will need for setting.

Measure using a level ribbon as accurately as possible, the actual water level from the tube adapter top of the LevelLog. Make a note of the measured value that you will need for adjusting.

5. Click the LevelLog to the adapter and check if the LevelLog stands up straight.
6. Remove the swivel lid from the LevelLog.
7. Switch on the LevelLog by pressing the on / off switch. The LevelLog is now ready for setting and adjusting.

Ater installation the LevelLog can be set and adjusted using the USB cable and a laptop or tablet equipped with the LevelLog application software.

3.2 Setting, adjusting and reading



connecting to mobile device

1. Remove the LevelLog swivel lid.
2. Connect the LevelLog to a mobile device using a mini USB cable.
3. Follow the instructions as given by the LevelLog application on the device.
4. After use, disconnect the LevelLog and put the swivel lid back on.
5. Operation can be checked using a small magnet (see page 10).

⊙ Attention

The LevelLog is designed for installation in a street pit with bottom or a protective pipe. The LevelLog housing is waterproof and can withstand flooding of the street pit (30 cm) for a certain period of time (1 hour). The street pit with bottom or protective cover protects the LevelLog against other environmental influences such as mud, rain and wind and animals. It is recommended to close the street pit or protective tube with a lock.

⦿ Attention

The water resistance of the LevelLog is gone when the swivel lid is removed. Prevent rain water from falling onto the inner cover after removing the swivel lid. The measuring unit can simply be disconnected for setting or reading. This does not necessarily have to be done at the measurement location. Remove any drops on the inside cover with a dry cloth before closing the swivel lid.



⦿ Attention

For the calculation of the tube depth the LevelLog makes use of the current ambient temperature. For this purpose the LevelLog has an internal temperature sensor. If the LevelLog is moved from a cold to a warm environment (or vice versa) it requires some time to adapt to the new temperature (ΔT = the initial temperature difference).

ΔT	Required time
5 °C	15 minutes
10 °C	25 minutes
20 °C	30 minutes

⦿ Attention

It is recommended not to use the LevelLog in situations where the sun can heat the unit by radiation. In that case the measuring results will be less accurate. It is advised to shield from direct sun radiation or other external sources of heat or cold.

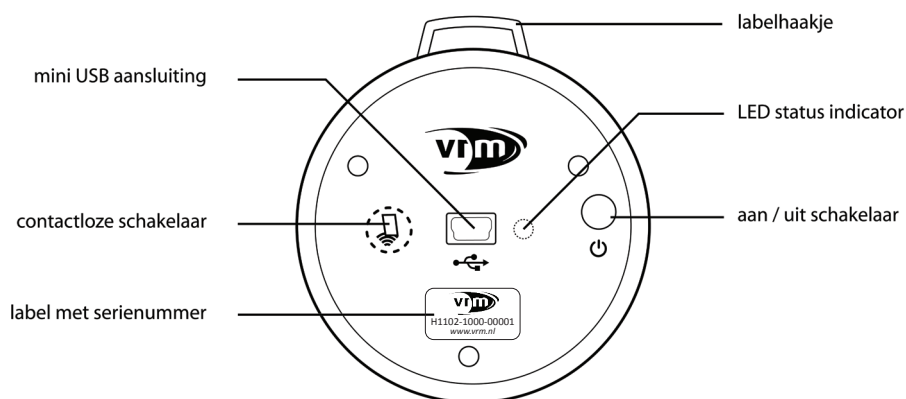
3.3 Interface operation

On top of the LevelLog you will find:

- On/off switch
- Contactless (magnet)switch
- LED status indicator
- Mini USB port
- Label hook
- Label with serial number

3.4 On/off switch

If LevelLog is turned off, the measurement data will be kept as well as all settings. After switching the LevelLog back on, it will continue the measurements in accordance with the previously set measure process and other parameters.



top view user interface

3.5 LED indication

When switching on the LevelLog, activating the contactless switch and when making a connection to a laptop or tablet the LED status indicator will give a few short signals. The meaning of these signals is:

	LED signaal			Communicatie dmv USB gaande
/	LED signaal			OK
/	LED signaal			Meting is incorrect
/	LED signaal			Hardware storing
/	LED signaal			Batterij niet OK

LED indicator scheme

To save energy, the indication is displayed only briefly. The indication can be repeated by switching the LevelLog off and on or by activating the contactless switch with a magnet.

4 Maintenance

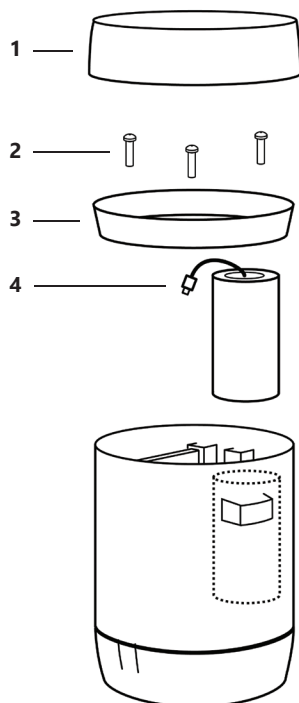
4.1 Cleaning

In normal use, in a street pit or protective pipe, the LevelLog requires no maintenance. If by flooding of a street pit the LevelLog has been temporarily under water, the LevelLog and adapter need to be cleaned. Mud residue can interfere with the operation of the LevelLog. The LevelLog is best cleaned with a well wrung damp cloth. For cleaning use a normal, non-aggressive detergent. Avoid a copious amount of water in the measuring head. The LevelLog adapter can be rinsed under a tap.

4.2 Battery replacement

Remove the inner lid of the LevelLog using a hand screwdriver. Do not use an electric screwdriver for opening and closing the cover because it may irreparably damage the plastic housing, so that the inner lid will possibly not close properly anymore.

Note that when changing the battery only use is made of a lithium 3.6 V, 8.5 Ah battery with cable and connector. This battery is available at VRM.



1. Remove the LevelLog swivel lid (1)
2. Switch off the LevelLog
3. Unscrew the 3 screws of the inner lid (2)
4. Remove the inner lid (3)
5. Carefully loosen the battery connector (4) on the circuit board. The circuit board does not need to be taken out of the housing for this
6. Remove the battery
7. Install the new battery and connect the connector to the circuit board. The connector can be mounted in only one way.
8. Screw the inner lid tight (note the notch)
9. Switch on the LevelLog and mount the swivel lid

5 Service and warranty

VRM warrants this product for 1 year. This warranty covers all serious defects of the unit that are assignable material or workmanship based. Warranty is not applicable to the battery of the LevelLog. Warranty occurs by delivery of a replacement product, at our option, if the following conditions are met:

- The unit has been handled properly and according to the recommendations in the manual.
- Neither the purchaser nor a third party have attempted to repair the unit.

This manufacturer's guarantee does not relate to the existing liability of the dealer / seller. In case of failure send the defective device, with a description of the fault, postage free to:

VRM

Antwoordnummer 1365

7300 VB Apeldoorn

The Netherlands

6 Useful tips

- Place the LevelLog in a lockable street pit or protective cover.
- Shorten the measure well if there is insufficient space for the LevelLog in the street pit or protective cover.
- At installation, position the tube flange up to the raised edge on the measure well.
- Avoid heating of the LevelLog by direct sun radiation or other heat sources.
- In bad weather conditions remove the LevelLog from the adapter for reading or setting at a sheltered location.
- At every inspection, check that the ventilation holes in the LevelLog adapter are clean and open.
- After inspection of the measure well or use of the LevelLog ensure that the LevelLog is well clicked onto the adapter and the swivel lid on the LevelLog has been tightened.
- Prior to performing an adjustment cycle, it is recommended to let the LevelLog adjust to the ambient temperature (approx. 30 min).
- If a precise manual reference measurement can not be performed, it is recommended not to adjust the LevelLog.
- The LevelLog can be switched off temporarily, and will continue to perform measurements according to the previously set measure process.

Software installation manual



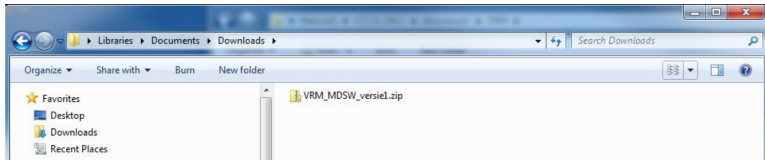
1 Initial installation

1.1 System requirements

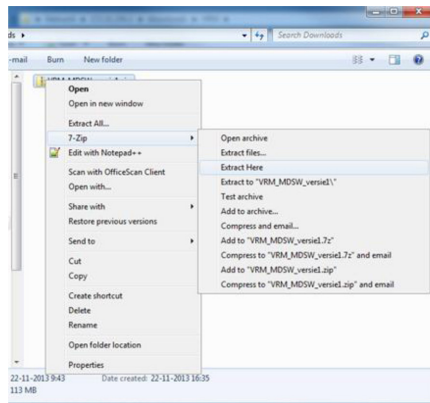
The program MDSW (software for the LevelLog) has been developed for computers with Windows 7 or 8, both 32-bits and 64-bits.

1.2 Installation preparations

The installation files come in a ZIP-file (for example: 'VRM_MDSW_version1.zip'). Navigate to this file in the Windows Explorer.

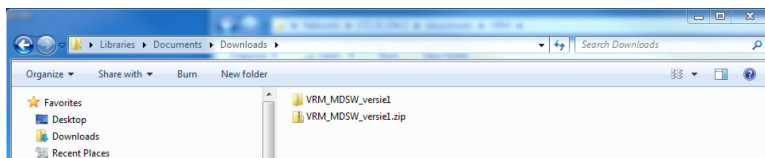


If 7-Zip has been installed on your computer¹: right click the zip-file and select in the menu of '7-Zip' ▢ 'Extract Here'



¹ If 7-Zip has not been installed, possibly similar software is available to unpack the zip-file.
In case of doubt contact your system administrator.

The contents of the zip-file will then be added to a subfolder in the same directory.



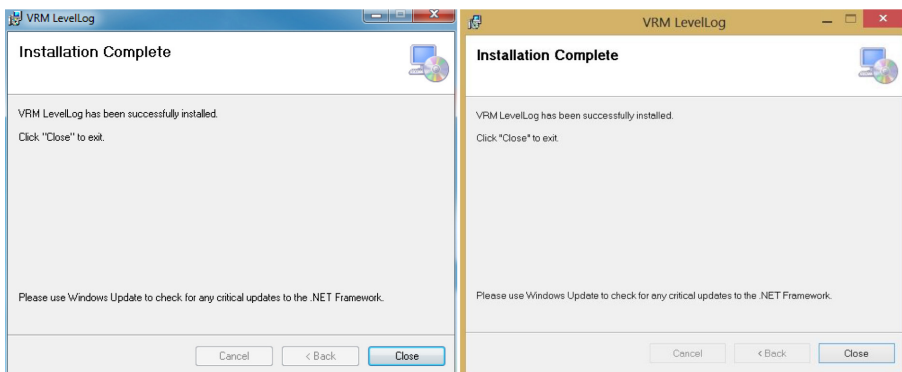
In the newly added subfolder 'VRM_MDSW_versie1' you will find all files required for installation or update of the MDSW application.

Note: do not change anything in this folder till after a successful installation. For the operation of a successfully installed MDSW these files are no longer needed.

1.3 Installation MDSW application (Windows 7, Windows 8)

Install the application following the steps described below. Depending on your user rights on the computer, you may be asked for permission to continue in between the steps. Answer these questions with 'Yes'.

The screenshots are based on Windows 7; in Windows 8 the screens are identical, but will have the looks of Windows 8. Below is an example of a Windows 7 and a Windows 8 screen side by side.



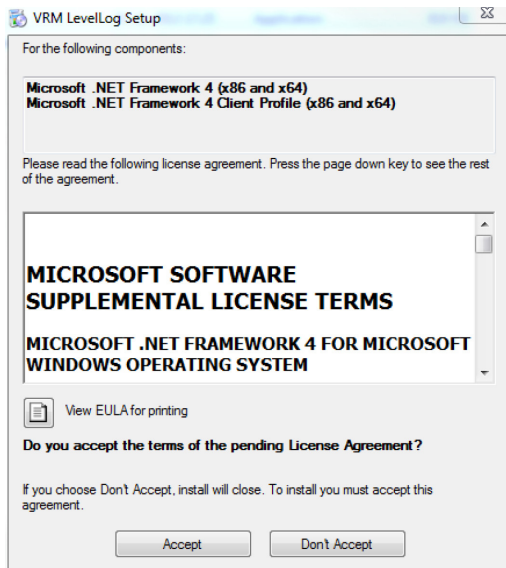
The installation starts with the components that the MDSW application requires:

- Microsoft SQL Server Compact;
- Microsoft .NET Framework.

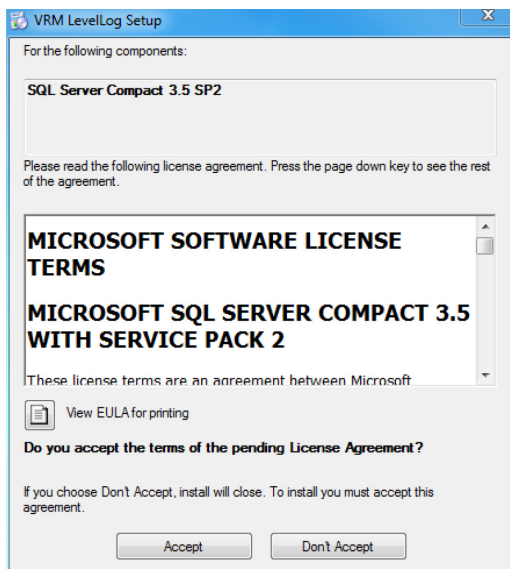
If these components have already been installed, the related installation steps will be skipped and the MDSW application will be installed directly.

The installation steps:

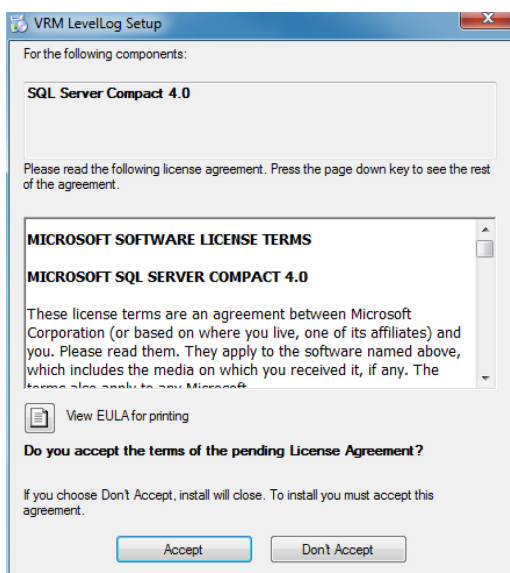
1. In the Windows Explorer find the file 'setup.exe' of the MDSW version to be installed.
2. Right click this file and select 'Run as administrator'. Successively a number of screens appear which ask to accept the terms of the installation.



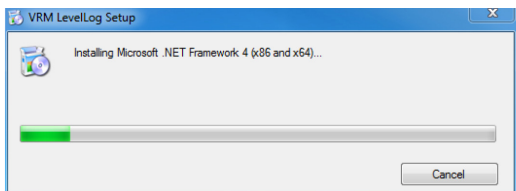
3. Click 'Accept'.



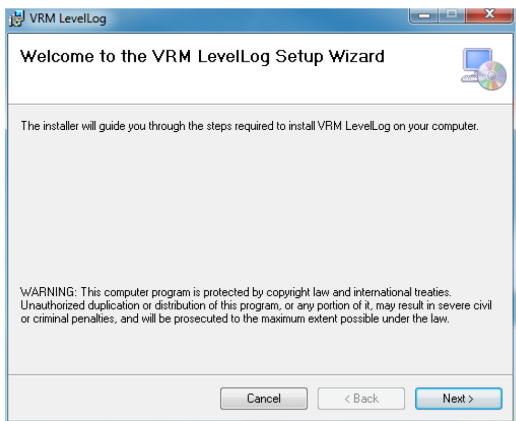
4. Click 'Accept'.



5. Click 'Accept'. The installation of software required to run MDSW² will be started now. Progress is shown by bars.

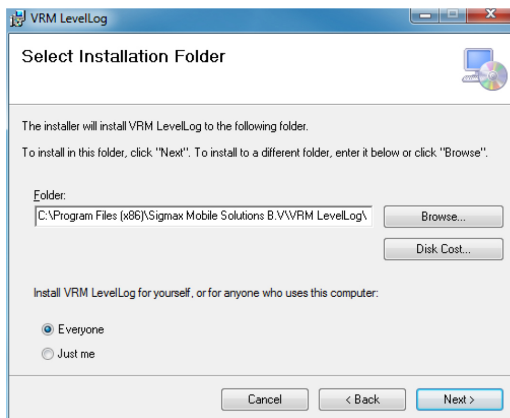


6. The installation of the MDSW can start now.

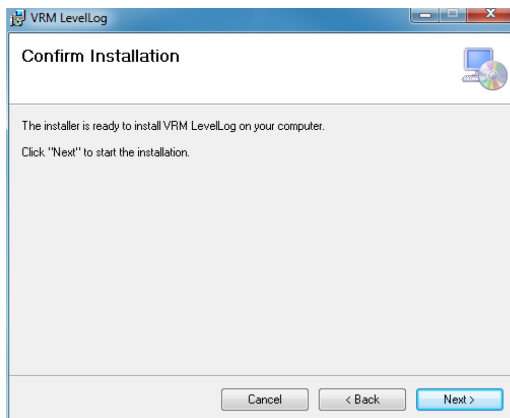


² Microsoft .NET, SQL. These will only be installed if they are not already installed on the specific computer.

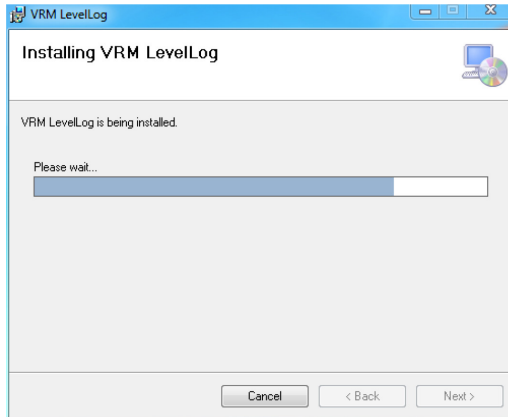
7. Click 'Next'.



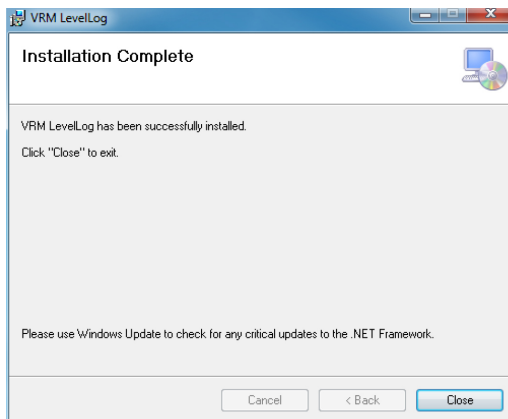
8. Leave the standard settings unchanged and click 'Next'



9. Click 'Next'.



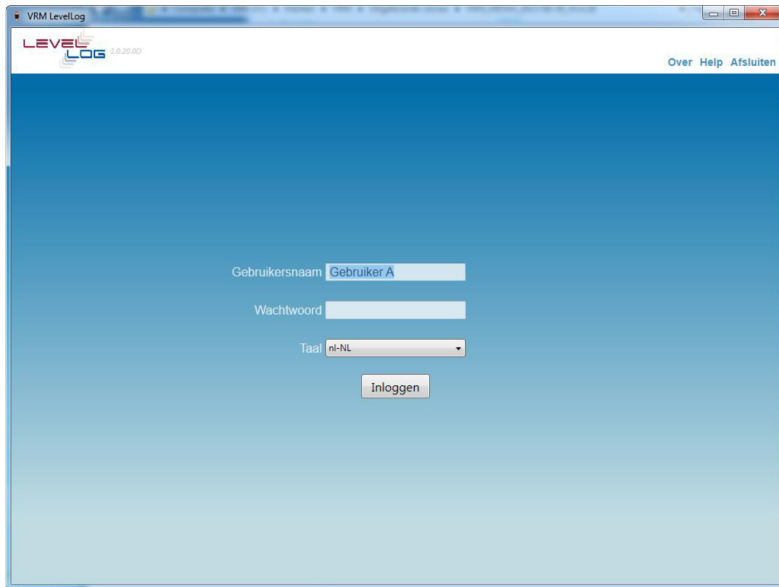
10. After completion of installation you will see below message.



11. Click 'Close'. On the desktop an icon has been added to start the application.



12. Dubbelclick the icon to start the application.



13. After a new installation you can log in using the standard username 'User A' and password '1234'. After an update (see chapter 2) the usernames and passwords that were already valid before the update can still be used to log in.

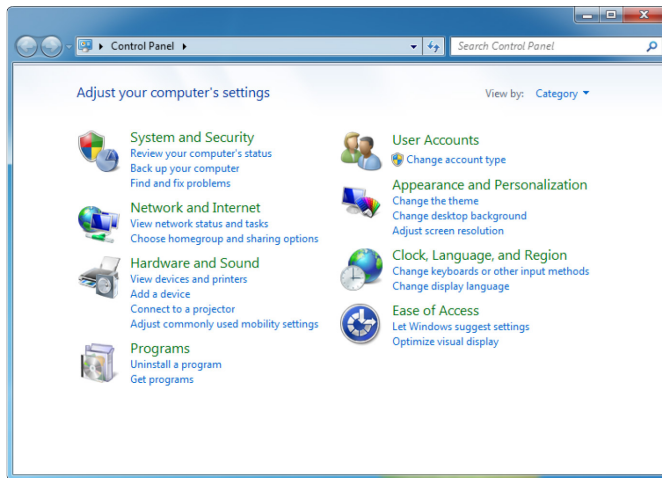
2 Version update MDSW application

In order to carry out an update, first the current version must be removed. Note: stored data are not deleted, and are available in the application again after the full update has been performed. Follow below steps to remove the current version.

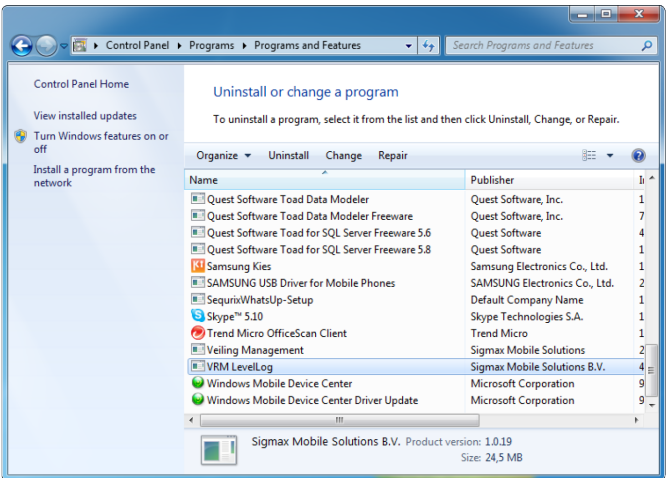
2.1 Removing MDSW application (Windows 7)

Remove the application following the steps described below. Depending on your user rights on the computer, you may be asked for permission to continue in between the steps. Answer these questions with 'Yes'.

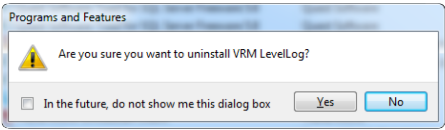
1. Open the 'Control Panel' of the computer.



2. Select 'Uninstall a program' (under Programs).



3. Select 'VRM LevelLog' and click 'Uninstall' in the menu bar.



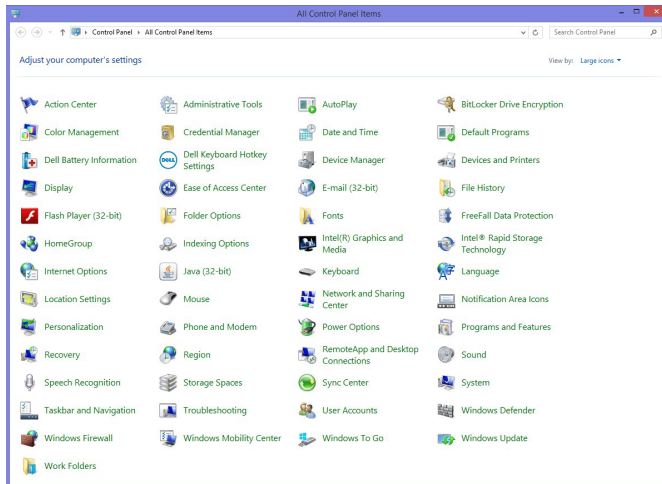
4. Click 'Yes'; the current version will be uninstalled.

5. Now install the new version as described in Section 1.3.

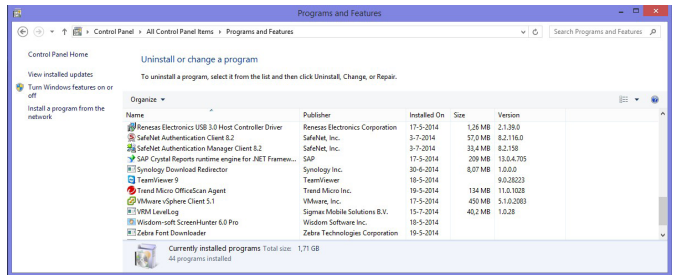
2.2 Removing MDSW application (Windows 8)

Remove the application following the steps described below. Depending on your user rights on the computer, you may be asked for permission to continue in between the steps. Answer these questions with 'Yes'.

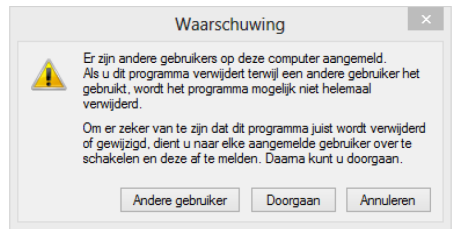
1. Open the 'Control Panel' of the computer.



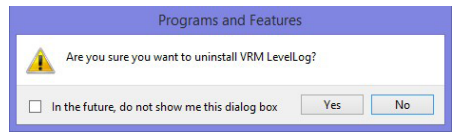
2. Select 'Uninstall a program' (under Programs) and select 'VRM LevelLog'



3. Select 'Uninstall' in the menu bar. Possibly a warning appears.



4. Click 'Yes'.



5. Click 'Yes' (the computer may ask for permission to uninstall: if so, select 'Yes'). The current version will be uninstalled.
6. Now install the new version as described in Section 1.3.

3 File locations

An installed MDSW application uses the following locations to store data:

Main directory for data (access to alle system users) is

C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog

Specific folders:

- Database: C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog\Database
- Logos: C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog\Logos
- Log files: C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog\Logs
- Maps: C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog\Maps
- Pictures: C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog\Pictures
- Software: C:\ProgramData\Sigmax Mobile Solutions B.V\VRMLevelLog\Software

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