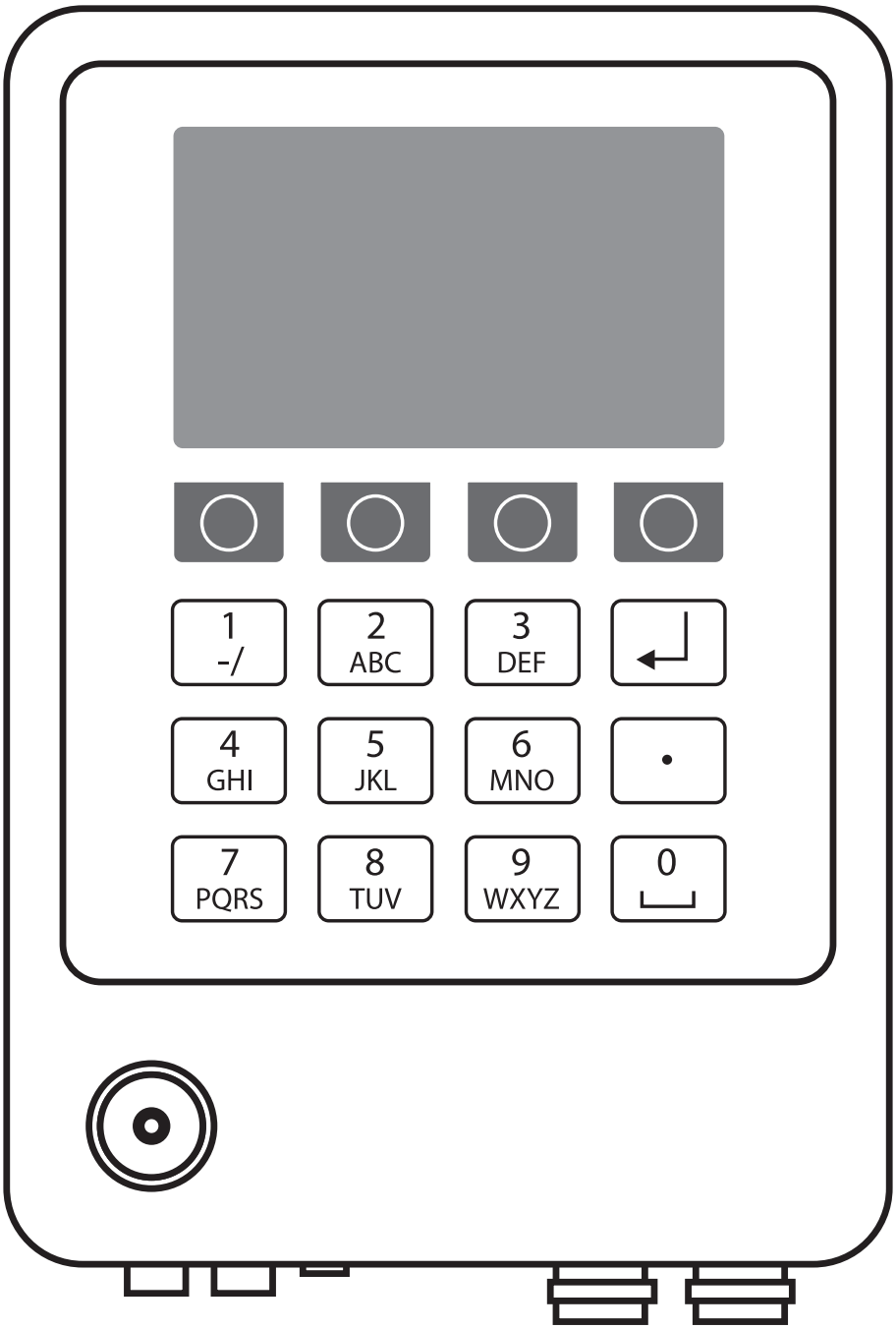
User Manual FMS

Fluid Management System



FMT Swiss AG

83 416 002 932 A801 GB

Table of contents

1. Preface 3
2. Synopsis 3
3. How to install FMS 4
3.1. Windows 4
3.1.1. Windows Vista and Windows 7 4
3.2. Linux 5
3.3. Uninstall FMS 5
3.4. FMS update 5
3.5. Backup of XML data files 5
3.6. FMS on Mac 5
4. How to use FMS 6
4.1. Starting FMS 6
4.1.1. Windows 6
4.1.2. Linux 6
4.2. Using tables 6
4.3. Main menu 6
4.4. Log in / out 7
4.5. General configuration 8
4.6. FMS management 10
4.6.1. Fuel types 14
4.7. Vehicle management 16
4.8. User management 17
4.8.1. Standard user 18
4.8.2. Supervisor 18
4.8.3. Service user 18
4.9. Export 19
4.10. Import 20
4.11. Tank data analysis 21
4.11.1. Data filters 21
4.11.2. Evaluation and printing 22
4.11.3. CSV export 23
4.11.4. Deleting tank data by date 23
4.11.5. Price maintenance for fuel types 24
4.12. AutoUpdate 25
5. How to modify FMS language files 26
5.1. Language files for PC application 26
5.2. Language files for station hardware 26
6. Configuration steps 28
7. Data-flow FMS Fluid Management System 30
8. General survey FMS Fluid Management System 32
9. Accessories for FMS Fluid Management System 34

1. Preface

This documentation is exclusively intended for the operating company and their staff.

Without our written consent, the content of this documentation (textes, figures, drawings, charts, diagrams etc.), must not be duplicated or distributed, neither in full or in part, utilized for the purpose of competition or passed on/made availabe to third parties.

We reserve the right to make design and product modifications, which serve to improve the product.

2. Synopsis

This document describes the installation, use and modification options of the PC application of FMS. This application is used to configure the hardware, manage users, vehicles and stations, and view the data collected by the hardware.
Throughout this document we will refer to the jar file and all other files used and managed on the PC as the **"FMS PC application"**. To all parts of the station hardware, including the iButton, the control unit, the firmware and anything else, we will refer to as the **"FMS hardware"**.

This document consists of three major parts:

- The first part in chapter 3 describes the **installation of the FMS PC application.**
- Chapter 4 in the second part describes how the **FMS is used**.
- The third part in chapter 5 describes how to **modify the files used by FMS**, if needed.

The FMS PC application is designed to run under Windows and Linux as well. There are some differences at these operating systems, the application has to care about. This will be discussed in separate subsections, one for Linux and one for Windows, wherever this affects the user.

Please note:
Names or commands in `code style like this` shall have to be typed-in exactly as they are written in this document.

3. How to install FMS

The FMS installation files are also available for Linux and Windows.

- FMSW32Setup.msi contains FMS installation for Windows
- FMS.tar.gz contains FMS installation for Linux

3.1 Windows

At first, please install the current Java Runtime Environment. Please use JRE 7 or a more recent version. We invite you to visit the following website: www.java.com/download.

The next step is to execute the FMSW32Setup.msi, which will install the FMS files and place the FMS.jar file and the FMSdata folder in the directory you selected during the installation. In addition, the programme creates an entry in the Windows „Start menu".

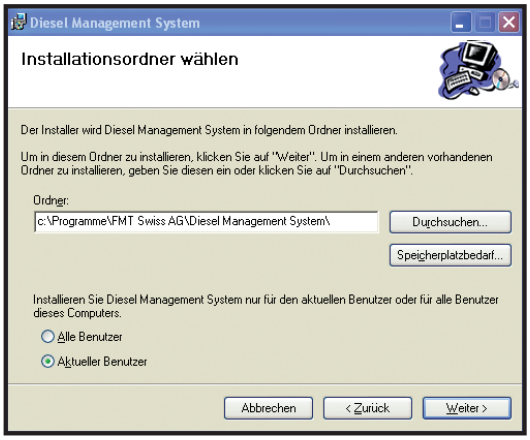
If you want to use the iButton reader with the FMS PC application (available from version V1.3 onwards), you have to install and set up the corresponding driver.

To do this, carry out the driver installation file delivered with the reader (e.g. install_1_wire_drivers_x86_v402.msi) and follow the instructions. Upon successful installation, configure the driver by executing under Start --> Programmes --> 1-Wire Drivers x86 --> Default 1-Wire Net.exe. Then click on the button „Auto Detect" in the window at the bottom left (whereby the reader must be connected). Confirm the interface found for the iButton. Now, you can read out iButtons in the FMS and allocate them directly to the users (refer to paragraph User management).

3.1.1. Windows Vista and Windows 7

The FMS software cannot be installed in the standard register C:\programme or C:\programme files of Windows Vista and Windows 7-systems.

During the installation the following dialog will be displayed:



Open instead of "C:\programme" another user-defined file, i.e. "C:\FMT\Fluid Management System".

3.2 Linux

Please update your Linux system and install the sun-java7-jre package or a similar software if available. The FMS PC application may not work correctly with other Java Runtime Environments than SUN JRE. Finally, please copy the file „FMS.tar.gz“ in the home directory of the intended FMS user. In order to unzip the Tar archive, simply enter „tar-xzf FMS.tar.gz“ into the Linux Shell, which will place the FMS.jar file and the FMSdata folder in the home directory.
It is not possible to use an iButton reader under Linux.

3.3 Uninstall FMS

To uninstall FMS go to Windows Control panel and open the “Software” assistant. Then select FMS and click “Remove”. This will remove the FMS PC application files. The XML files with the data will remain on the disk. To uninstall FMS under Linux delete the FMS.jar and the FMSdata folder. All files will be lost then.

3.4 FMS update

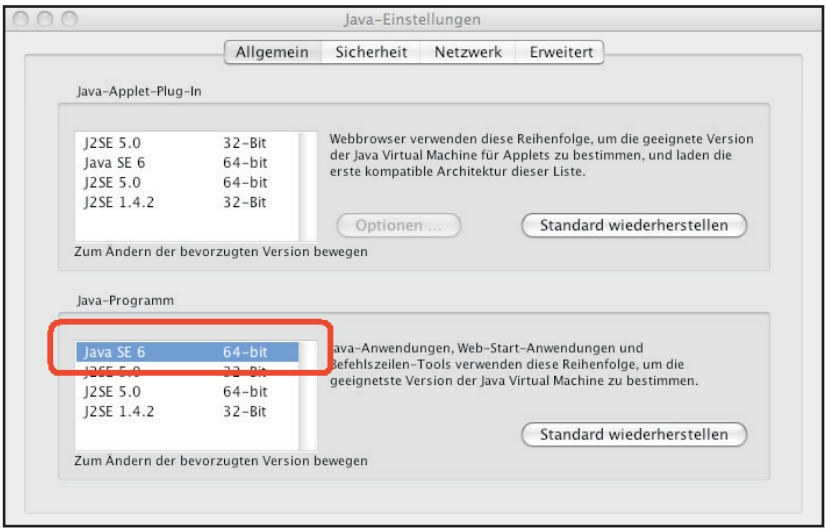
To update FMS under Linux do unpack the new FMS.tar.gz file similar to section 3.2.
To update FMS under Windows first uninstall FMS similar to section 3.3 and then install FMS using the new *.msi file similar to section 3.1.

3.5 Backup of XML data files

All data used by FMS PC application is stored in the FMSdata folder. You should at least backup all *.xml files in this folder. If you restore files from backup copy all files back to the FMSdata folder.

3.6 FMS on Mac

To use FMS on Mac you need JavaSE 6 (32-bit or 64-bit). These must in the first row of the “Java Preferences” -> “Java Applications” (see screenshot).
To install FMS, please copy the file FMS.tar.gz in a folder with write access and unzip the archive there. This will create the file FMS.jar and the FMSdata folder.
You can start FMS by typing `java -jar FMS.jar` on the console when in the installation folder.
Usage of the **iButton** reader is not possible on the Mac.



4. How to use FMS

4.1 Starting FMS

To start the FMS PC application run the FMS.jar. In the following we describe how this is done on the corresponding operating system.

4.1.1. Windows

If the Java Runtime Environment JRE 6 is installed properly you can start the FMS.jar by double clicking on it. If this does not work you can type `%jre%\bin\javaw -jar %fms% \FMS.jar` on the windows command prompt. Where `%jre%` is the path to your JRE installation and `%fms%` the path to your FMS installation. For example:

```
C:\Programme\Java\jre1.6.0\bin\javaw -jar C:\FMS\FMS.jar
```

The installation program of FMS will give you a batch file named FMS.bat, so you don't have to open a command prompt and type in all the paths every time. Just double click on the batch file.

4.1.2. Linux

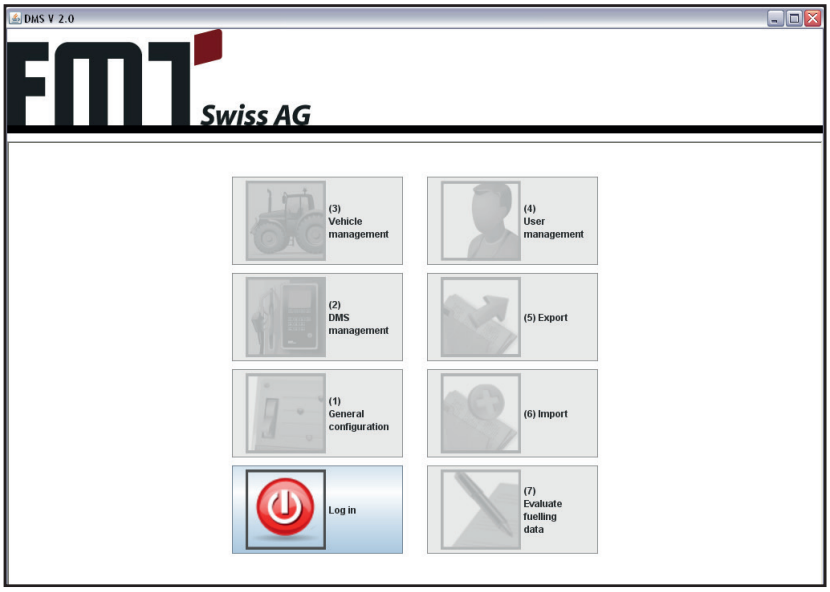
On modern Linux distributions you have a default program to open each type of file. So when you have installed the Sun Java package you can start the FMS.jar by just right click on it and choose "Open with Sun Java 6 Runtime".
If this is not possible, you can just type in `java -jar FMS.jar` in the Linux shell.

4.2 Using tables

All tables in the FMS PC application can be handled in the same way. If you want to delete, change or adjust a user, vehicle, station or something else, first select the according line, then click the change or delete button.
Each table can be sorted by clicking on the header of the column you want to sort. Click again to reverse the sorting order. Columns can also be resized by dragging the border of the column header.

4.3 Main menu

After starting the application you will see the main menu screen below. The most buttons are disabled for security reason. Before you can do anything you have to log in and verify yourself.
(See section 4.4 "Log in / out")



After you have logged in successfully you will see the main menu as shown below. Depending on your user type some buttons may still be disabled. (See section 4.5 "General configuration")

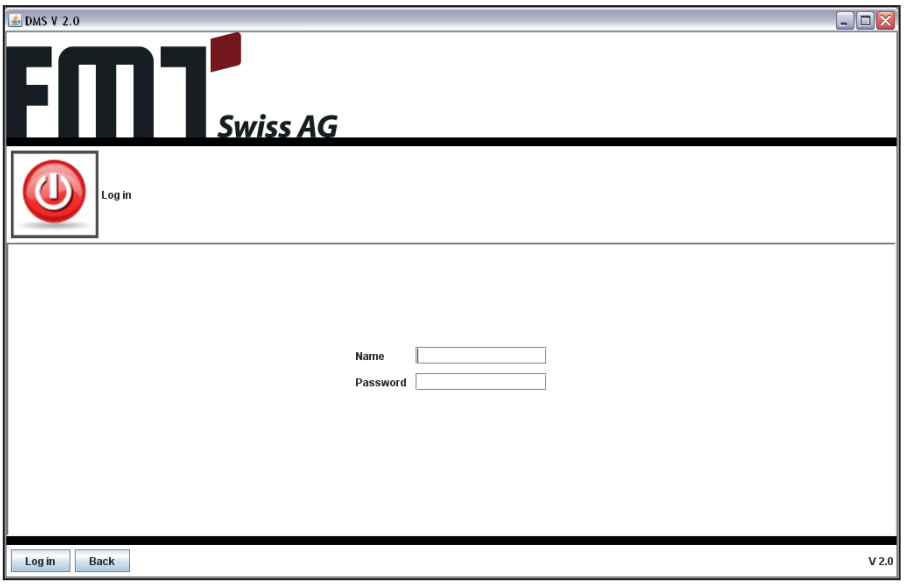


4.4 Log in / out

On the "Log in" screen you can type your FMS user name and your FMS password. If the name or password are incorrect or do not match, you will get a message.
If your name and password are correct you will automatically be led to the main menu. The buttons on main menu are active now, according to your user rights.

The "Log in" button now has changed to a "Log out" button. Pressing this button will log you out and deactivate all buttons except the "Log in" button.

Please pay attention to the following:
There is only one standard user with the name "Admin" and with the password "Admin" available when starting the FMS-PC application for the first time. Please change the password immediately and save the new password carefully. This user will unchangeable remain in the system forever. It cannot be deleted. Utilizing the user "Admin" und the (new) password you are permitted to login with supervisor authorisation at any time.

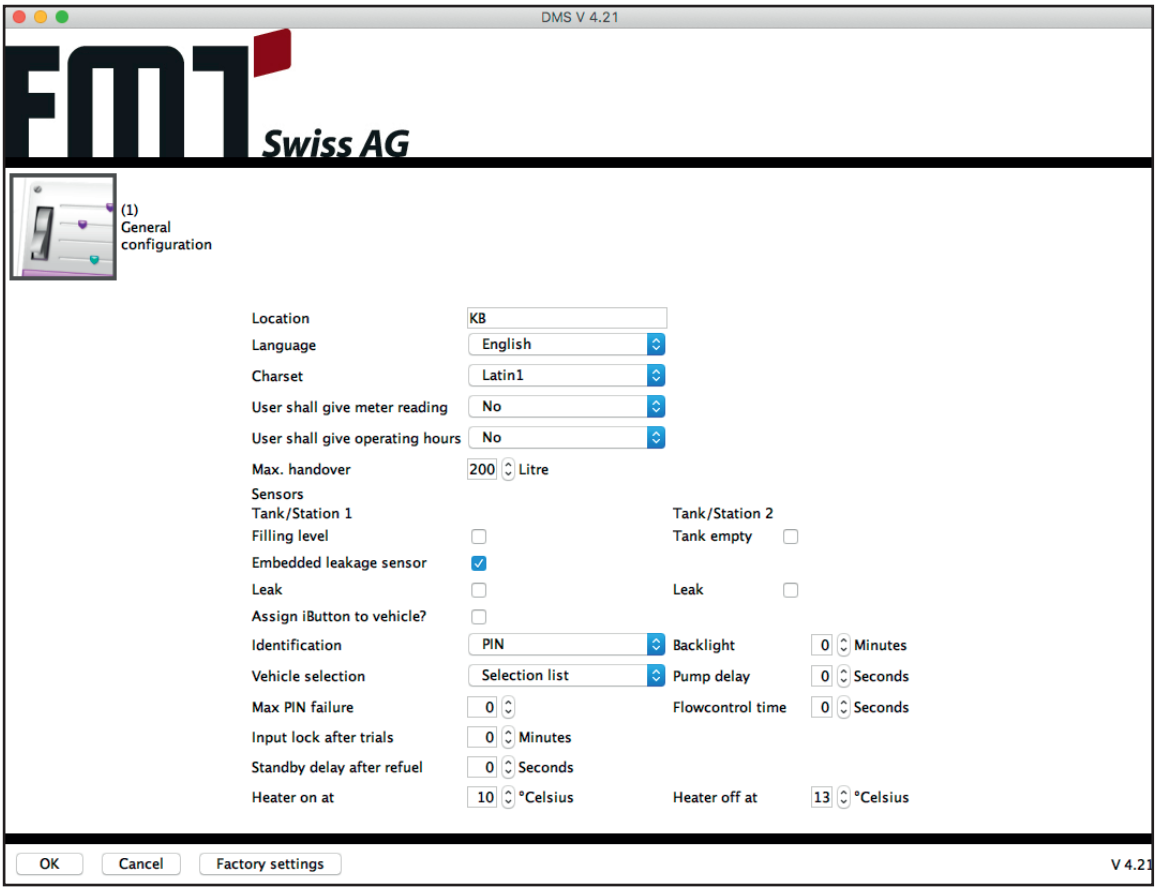


4.5 General configuration

The configuration display is only available for service engineers users, other users can view this screen, but cannot change anything.

Please note the following hints:

- In the language list all available languages for FMS are shown. Available means, there must be two language files for a language to be listed: *_pc.txt and *_fw.txt (for example engl_pc.txt and engl_fw.txt for English). Possible languages are English, French, German, Italian, Russian and Spanish. This selection does affect the language of the FMS PC application and the FMS hardware as well. (For file formats please refer to chapter 5 "How to modify FMS language files")
- The character set setting gives you the choice between "Latin1" and "Cyrillic". Set this to Cyrillic if you have text files with Cyrillic letters, like Russian texts, for the FMS hardware. The FMS PC application will automatically display Cyrillic texts (even without this selection menu).
- If you choose "Yes" for "User shall give odometer reading", then the user is forced to give the reading of his vehicles' odometer before he can make a draw on a FMS.
- If you choose "Yes" for "User shall give operating hours", then the user is forced to give the reading of his vehicle's hour meter before he can make a draw on a FMS.
- The maximum dispense volume on the FMS can be set from 0 (no maximum) up to 999 litres.
- The checkboxes in the sensors area activate the corresponding sensor on the hardware. For the first tank you can fix a min. and max. value for the temperature and pressure sensor. These min. values are matched to the lower bound of the sensors metering range, the max. value to upper bound. The thresholds give the value, at which an alert will occur.
- The user identification on the FMS is possible by PIN, iButton or both of them.
- The vehicle selection can be made by typing in the car license number or selecting the vehicle from a list given on the display.
- The "Max PIN failure" is the amount of trials the user can make before the login blocks for a specific time. This time is set by the "Input lock after trials" field. The maximum are 10 trials and 30 minutes of blocking time.
- The delay between the last draw and the hardware going to standby can be set up to 1000 seconds.
- The display backlight will shut off after the given time, which can be up to 30 minutes.
- The pump will start with a delay of up to 180 seconds after the nozzle is removed from the holder.
- The flow control time can be up to 120 seconds.
- The "Heater on"-temperature must be at least 3°Celsius below the "Heater off"-temperature.
- A user can be identified with an iButton by default. This correlation can be switched to the vehicle by selection of "iButton vehicle correlation".
  The user can identify himself by PIN only, if the iButton correlation has been switched from the user to the vehicle.If a user chooses the "iButton" attribute in the "Identification" step, the registration will be effected for the vehicle only, not for the user.
- It is necessary to configure the location in order to get the location / customer displayed in the update statistics. This is a mandatory field, i. e. the dialogue can only be left after completion of the field „Location".

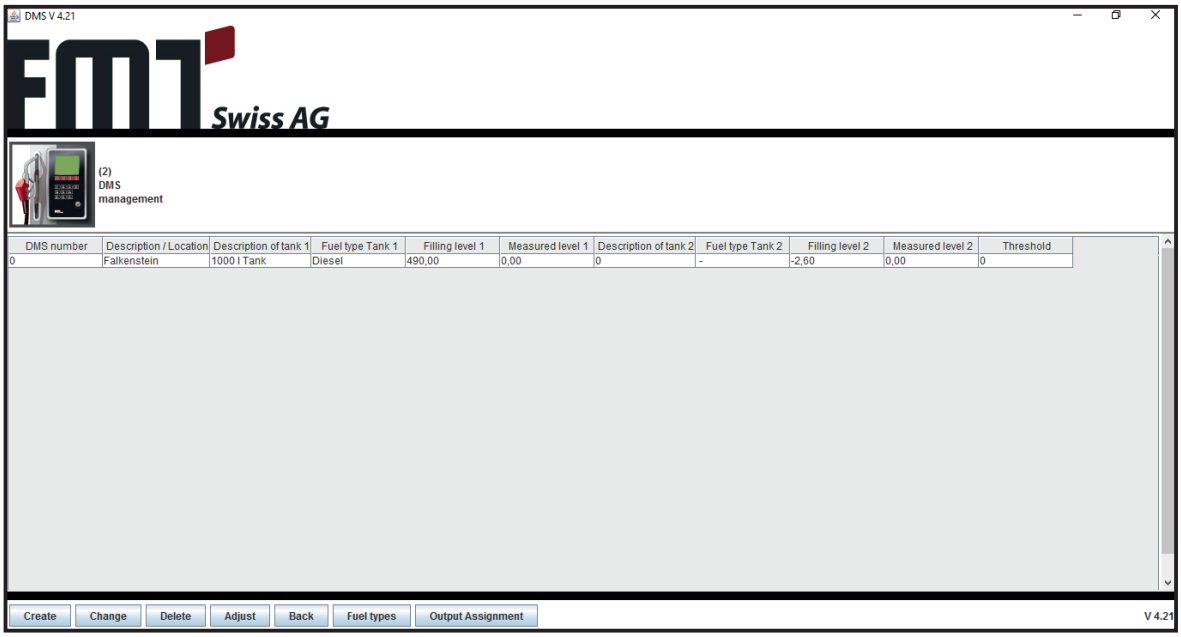


Using the button "Factory settings" you can reset all settings to factory settings in case factory settings have been delivered. These files are "config.xml" and "language.xml" in the subfolder "DMSDefaultData". If these files are not existing you cannot reset the settings.

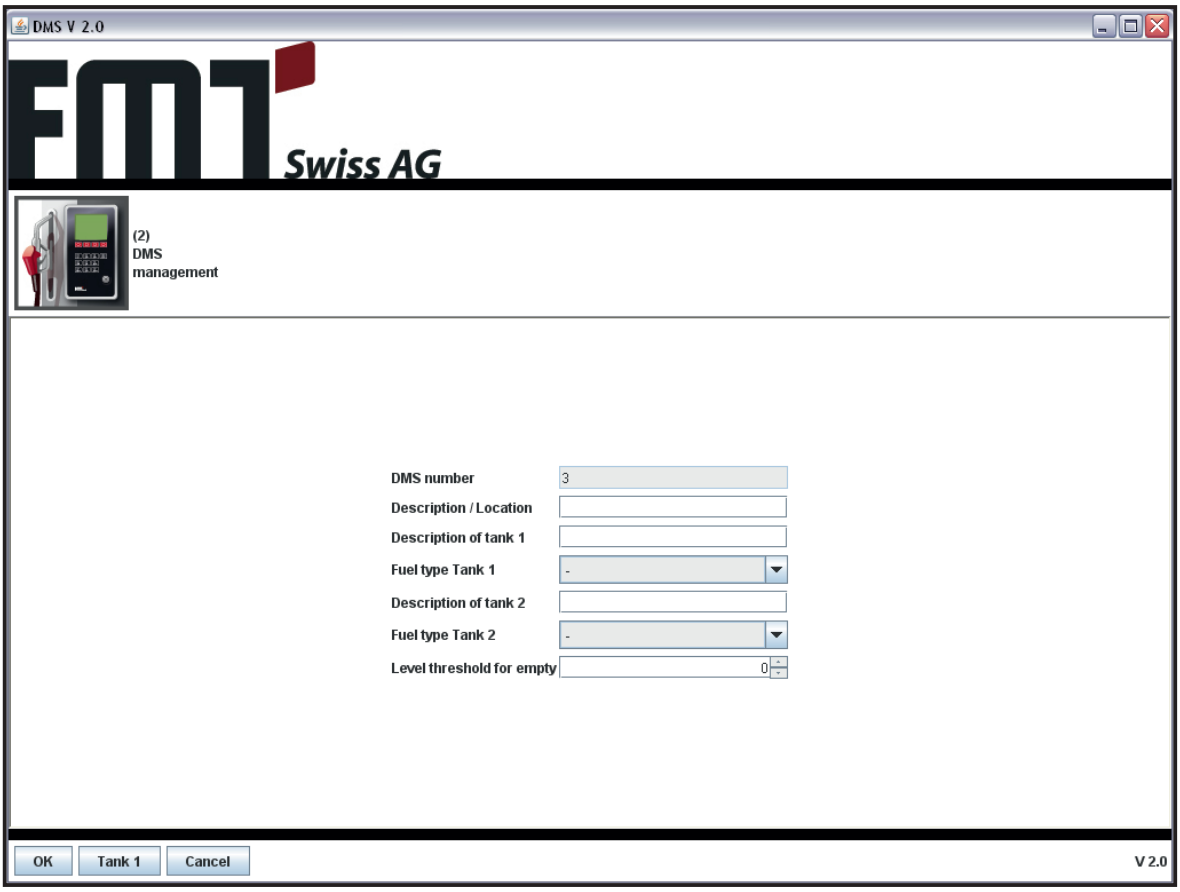
4.6 FMS Management

On the FMS management display you can create, change and delete stations and adjust the tank filling level.

The columns “Filling level 1” and “Filling level 2” show the calculated level of the first and second tank. This value will change upon each adjustment, or when importing data for that station. The columns “Measured level 1” and “Measured level 2” show the level like it is measured by the FMS hardware. This is shown for information purposes.



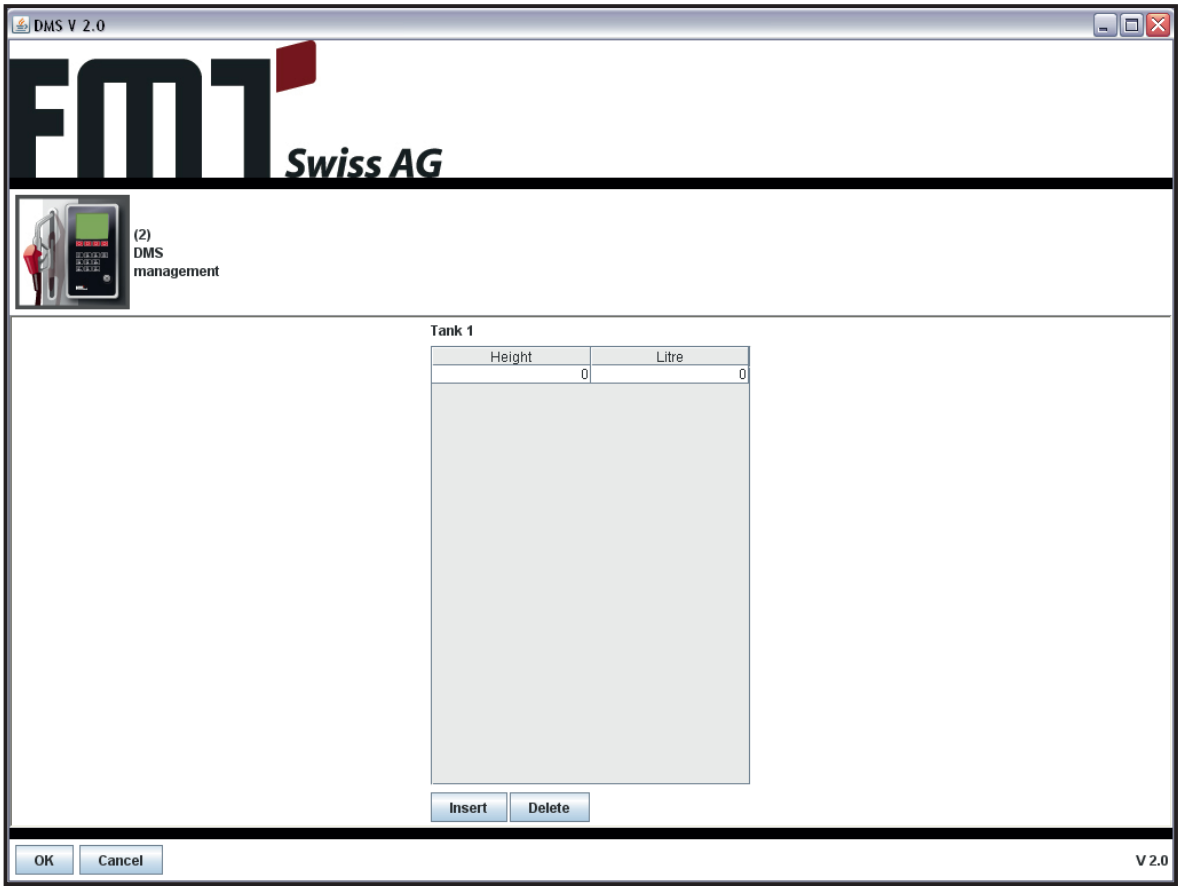
On the "change" display you can provide a description or a location for each station and also describe each tank separately. The threshold value is used by the FMS hardware to decide when to issue a "tank empty" alert. It can be set from 0 up to 999999 litres.



Use of a second tank and pump with this FMS

If you want to use a second tank (with a second type of fuel) with this FMS, you can enter here the corresponding designation for the second tank, which will appear, together with the first one, on the FMS terminal during the filling operation. The user chooses the fuel type / tank by picking up fuel nozzle 1 or 2.

If you click the "Tank 1" button in the change display will pop-up the tank display as shown below. You can edit the level - volume relation of the tank.
The height should start from 0 in the first line down to the internal height of the tank in centimetres. This describes the distance between the sensor at the inner top of the tank and the surface of the fuel.
The right column defines the tank filling level in litres according to the measured distance.
Clicking the insert button below the table, a new row is inserted above the selected row, or at the end, if no row is selected.
If you click the delete button below the table, the selected row is deleted.

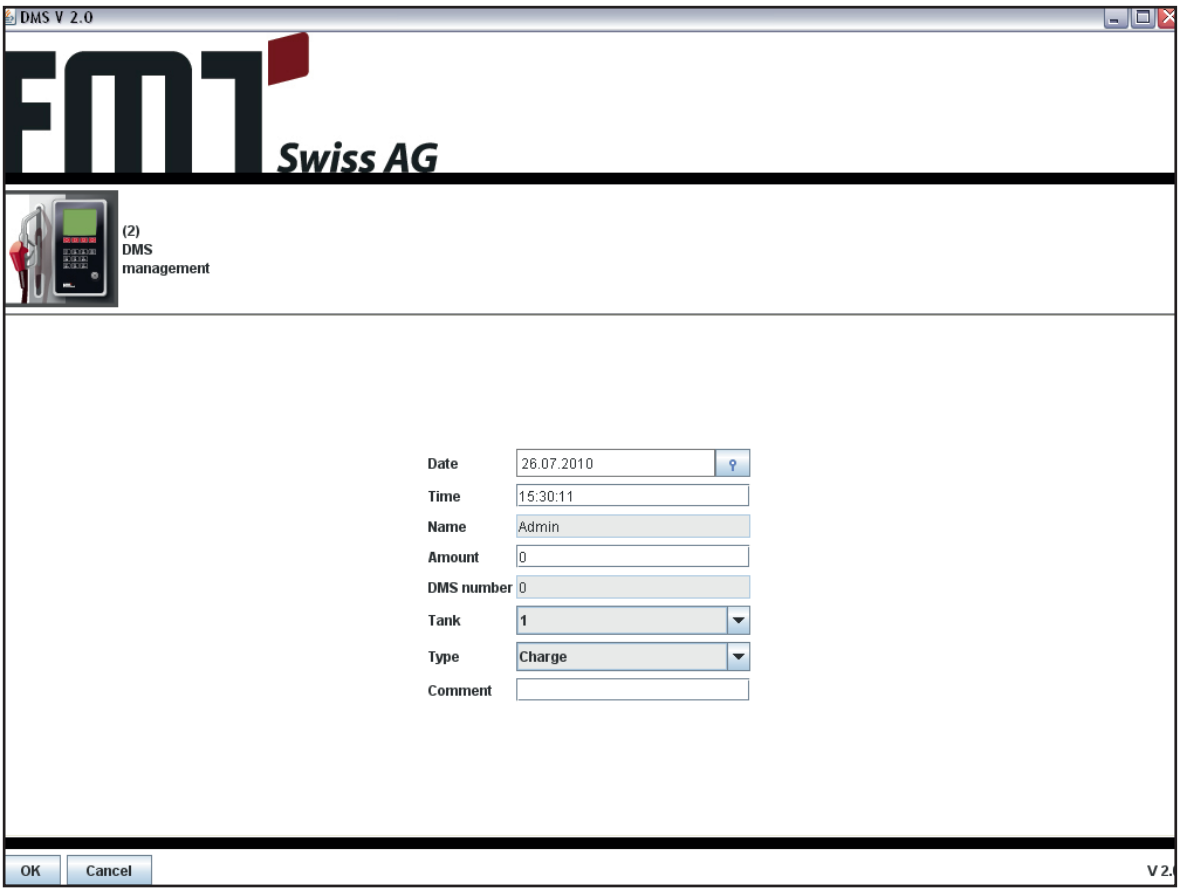


If you click the adjust button on "FMS Management" display, the "station adjust"display is shown. Here you can adjust on the filling level of each FMS stations' tanks.

Please note the following hints:

- The time and date are automatically set to current time and date, but you can change both to the time, the event is taking place.
- The user name cannot be changed, the user currently logged in is shown.
- The amount of the adjustment is given in litres with two decimal places.
- The station number is set by the selection you have made on the "Station management" display. It is not changeable here.
- Please do not forget to choose the correct tank.
- The type of the adjustment is one of the following: charge, post or adjust. Draw is not possible here. Draws will be reported using the import from the SD card.

A "charge" in this context means, you have discharged some fuel from a tank, the discharged volume will be automatically subtracted from the current level. A "post" means a refilling of the tank, the given amount will be added to the current level. An "adjust" means you just want to correct the level of the tank. In FMS you cannot set the level directly so you have to insert a positive or negative volume that will be added to the current level.

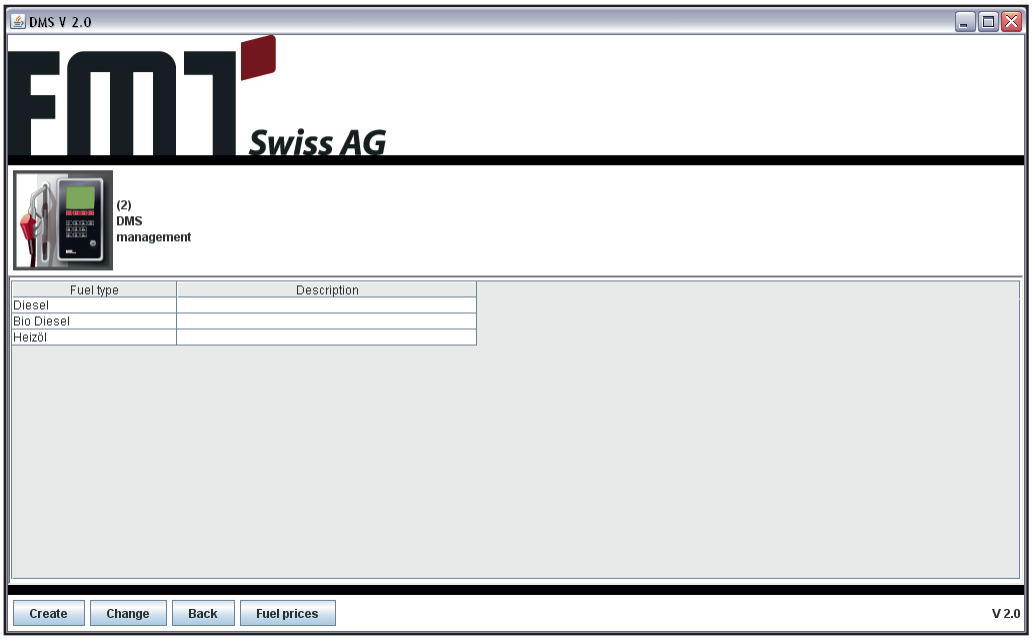


For a more comfortable reporting you will be able to correlate each bulk tank to a pre-defined fuel type. You can choose between “Fuel type tank 1“ and “Fuel type tank 2“.

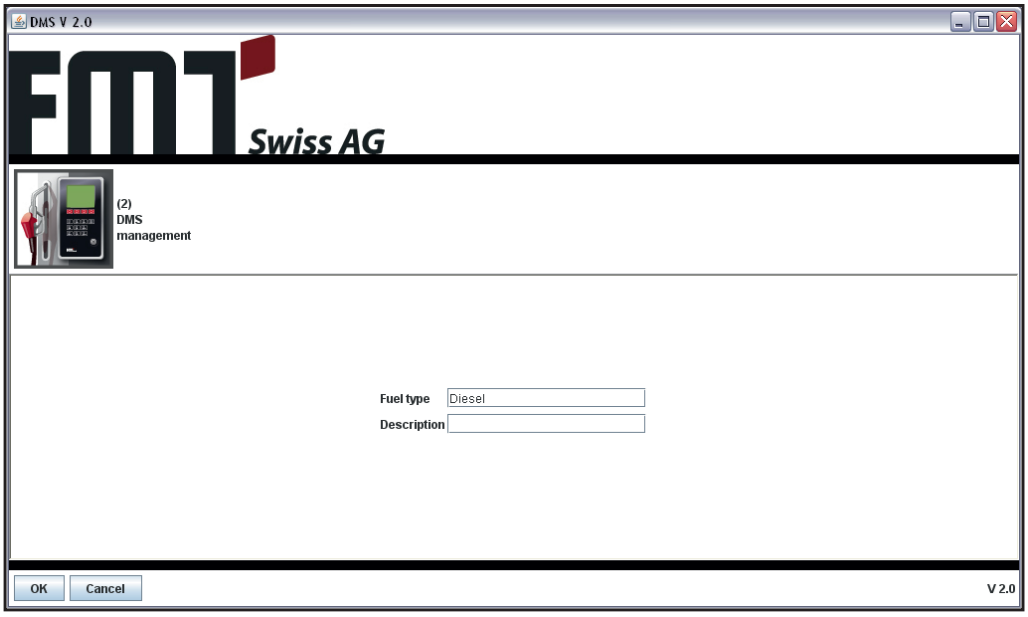
Please see chapter 4.6.1 how to import fuel types.

4.6.1. Fuel types

You are able to import various descriptions of different fuels to the FMS and to correlate them to a tank connected to a FMS terminal. The chart shown offers a summary of any fuel type imported in connection to the description given by you.

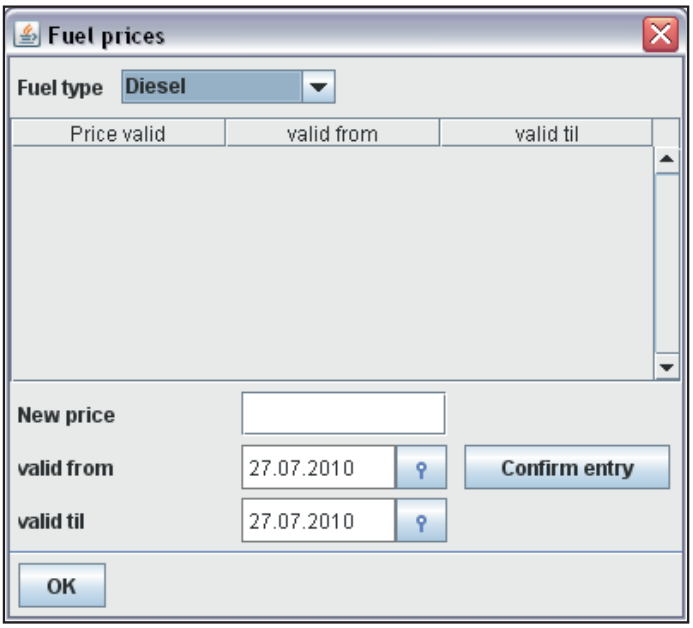


When clicking on “Change“ or “New“ you will enter the input dialog.



When entering "Back" you will leave the section import of fuel types and come back to the FMS administration.

For entering the pricing section click on "fuel prices".



In this section you are able to correlate each type of fuel, to be choosen under "Fuel type", to prices per litre valid for different time periods.

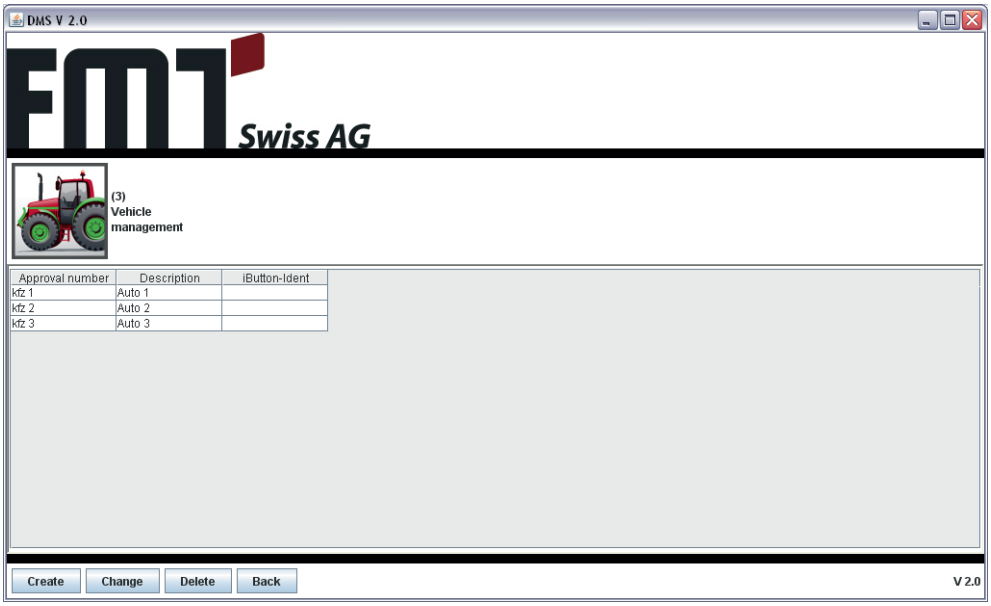
Proceed as follows:

- Choose the fuel type requested
- Import under "New price" the price per litre valid from now on.
- Select the period for the vailidity of the new price.
- Confirm with "Enter"

The price will get immediate validity. Differing prices valid for the period choosen will be replaced. Prices already existing can be updated with this method as well by importing a price for the same period again.

4.7 Vehicle Management

The "Vehicle management" display provides an overview of all vehicles managed by the FMS.



Supervisor or service engineers users can create, change or delete vehicles. If you create a new vehicle you have to type in the car license number. This number can not be changed later! If you delete a vehicle, all user assignments of this vehicle to any users will be deleted automatically.

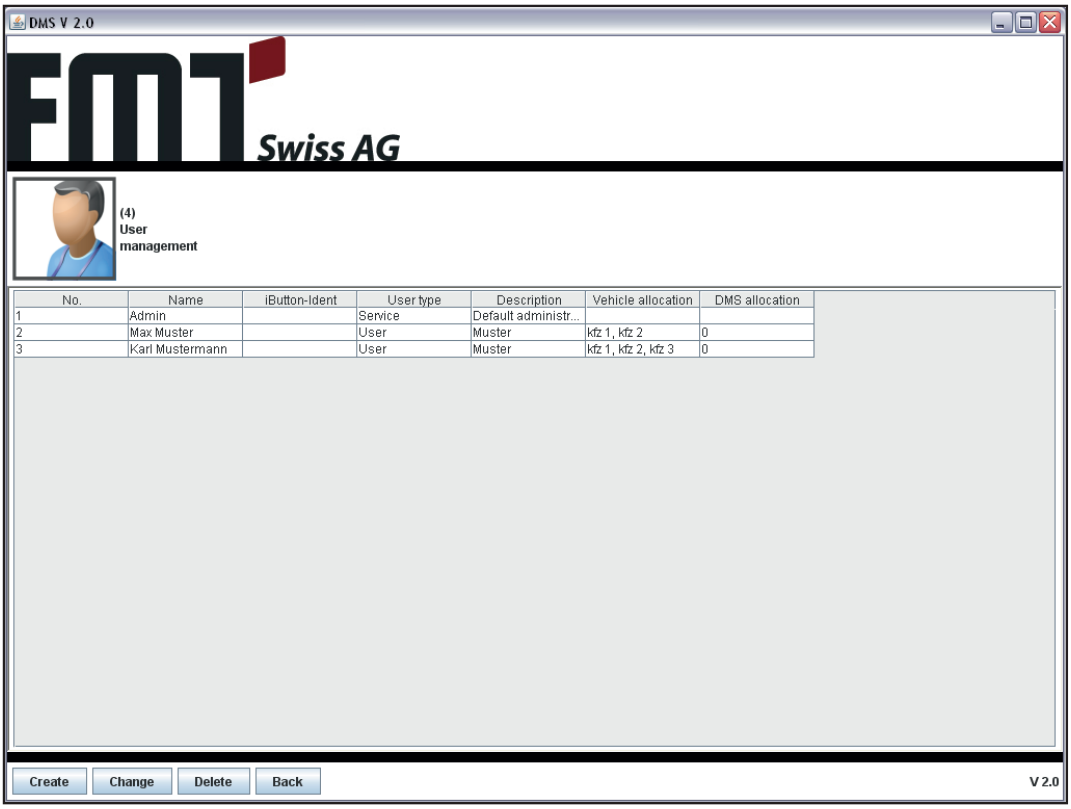


In case you have configurated your system in the section "General Configuration" so that the iButton is related to the vehicle and not to the user, so you will be able to adjust this relation as follows:

If you have connected and configurated an iButton reader to your computer (see FMS manual section "How to install FMS") you will be able to import the iButton ident from this iButton directly and to correlate this iButton ident to a vehicle. To do this, click on the button "Load iButton" and follow the instructions.

4.8 User management

The "User management" screen gives you an overview of all users and their properties. You can create new users, change existing ones or delete them.
User can be imported from SD card, see section 4.10 for details.
Different user types have different permissions and restrictions. They are discussed in detail in the subsections below.

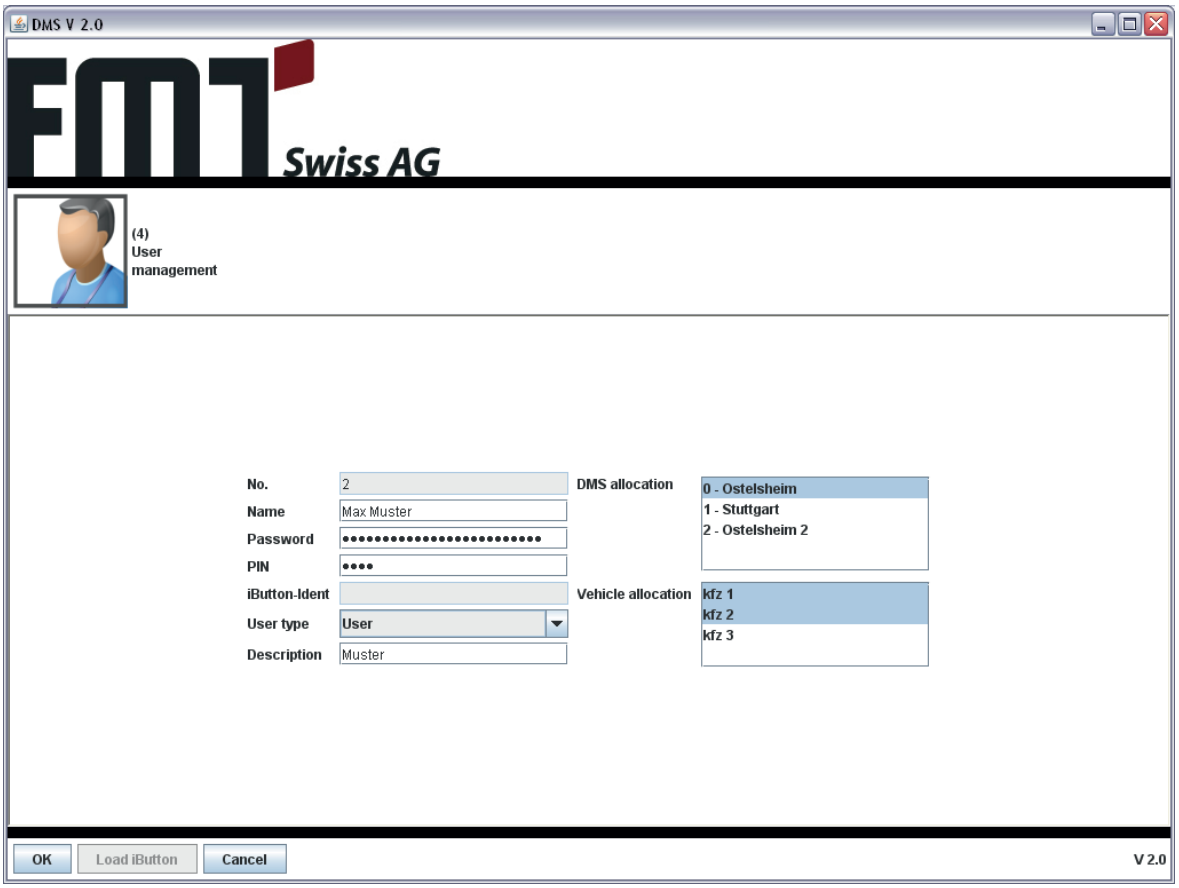


On the "change" display (which is the same as the create user display) you can edit the properties of each user.

Please note the following hints:

- The number can not be changed, it is managed internally.
- If no password has been stored the relevant and adjusted user will get no access to the FMS software. This is valid for the user-level "user" only.
- The PIN can be empty, otherwise it has to contain exactly four numerical digits.
- If at least one station is allocated, the PIN can not remain empty.
- The user "Admin" can not change his name and can not select refuelling stations.
- The iButton Ident can be empty; otherwise it has to contain exactly 16 hexadecimal digits (letters can be set in upper case or lower case). This number must match the code of the iButton the user is utilising.
- The user type "Service" can only be set by service engineers users.
- To select or deselect stations and vehicles, just hold the CTRL key, while clicking the stations or vehicles you want to assign to the user.

If you have connected the iButton to your computer (see section 3), you can read in the iButton Ident directly from the iButton and assign it to a user. Click on the button "Load iButton" and follow the instructions.



4.8.1. Standard user

The standard user is not able to change anything in the FMS PC application. He is allowed to view the data and configuration settings and to view users, stations and vehicles.
He is also allowed to make draws on the stations assigned to him with the vehicles assigned to him. The need for a PIN or iButton for this operation is subject to prior set up in the configuration display (see section 4.8 “General configuration”).

4.8.2. Supervisor

The supervisor is on the next level in the user hierarchy. The supervisor user is allowed to do everything the standard user is allowed to do. Additionally he is permitted to do the following additional actions:

- Import of the data from the stations (via SD card).
- Export of the the configurations and user setups to the stations (via SD card).
- Create, change and delete vehicles.
- Create, change and delete standard and supervisor users.
- Change service users, but not their user type.
- Create, change and delete stations and adjust their tank levels.

4.8.3. Service user

The service user rights have no limitation. He can do everything a supervisor can do and more:

- Create, change and delete service users.
- Change the general configuration.

4.9 Export

The calibration, the data file, the front files, the user list and the tank description can be exported to the FMS terminal on the display for data exporting.

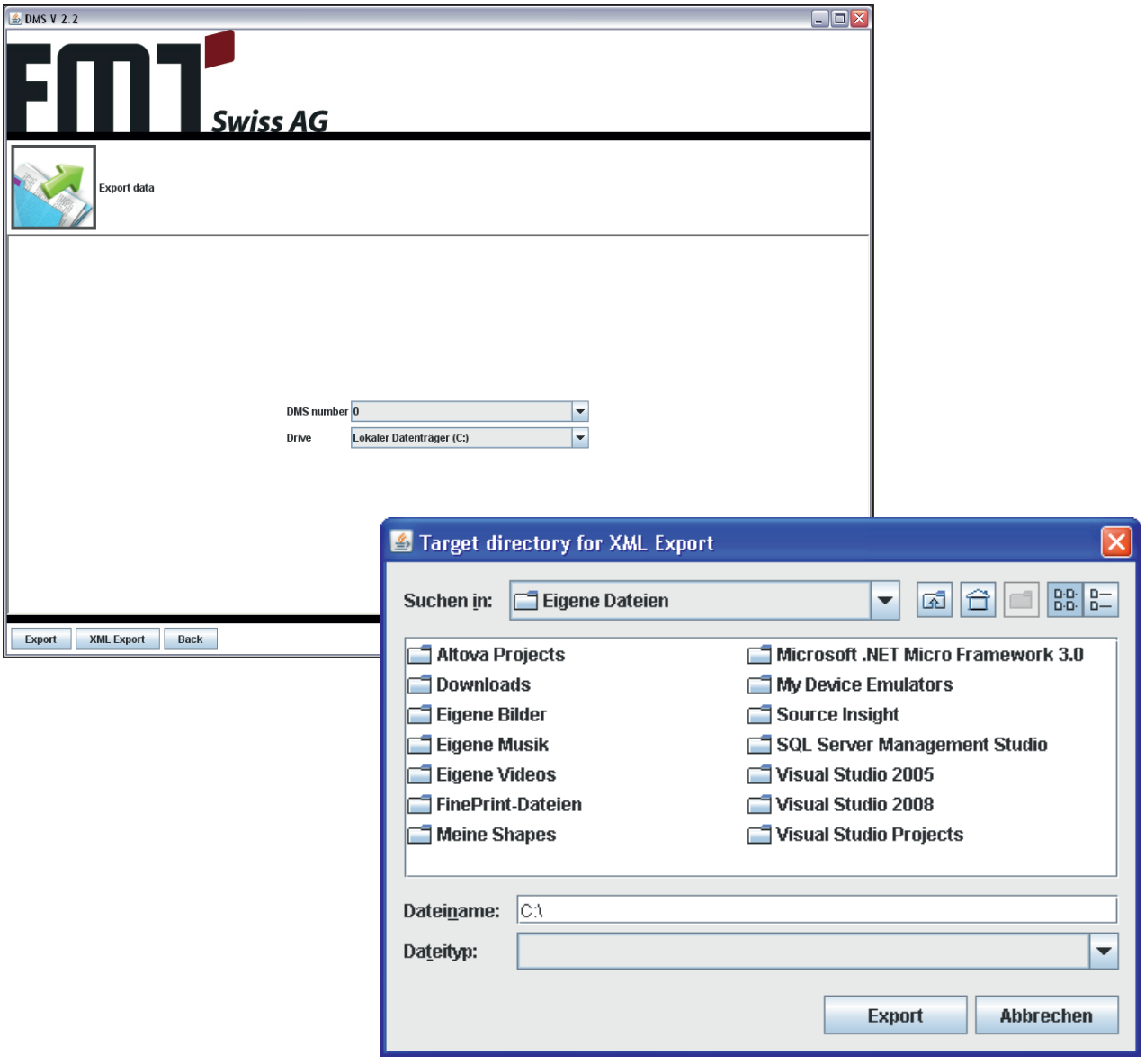
Select a FMS station to export to in the first list, then select the drive or mount point of the SD card to write the data to, then click the export button.

In case of a re-use of a SD card you will be asked prior to a new utilization if all old data can be deleted if the SD card has been used for another FMS system before.

The drive list will contain all available drives if running under Windows, or all available mount points from the /media and /mnt directories if running under Linux. If your SD card is not listed here, just make sure it is mounted correctly by accessing them using the Windows explorer or your standard Linux explorer. Under Linux you can try remounting it to either /media or /mnt.

If a file like the text file or font file is missing the export will stop and inform you.

With the button "XML Export" all files used by the Diesel Management System will be copied to a selected folder.



4.10 Import

On the import display you can import the fuelling data from the FMS hardware via the SD card. Just select the drive or mount point from the list and click import.

The drive list works exactly like the drive list on the export screen (section 4.9 "Export").

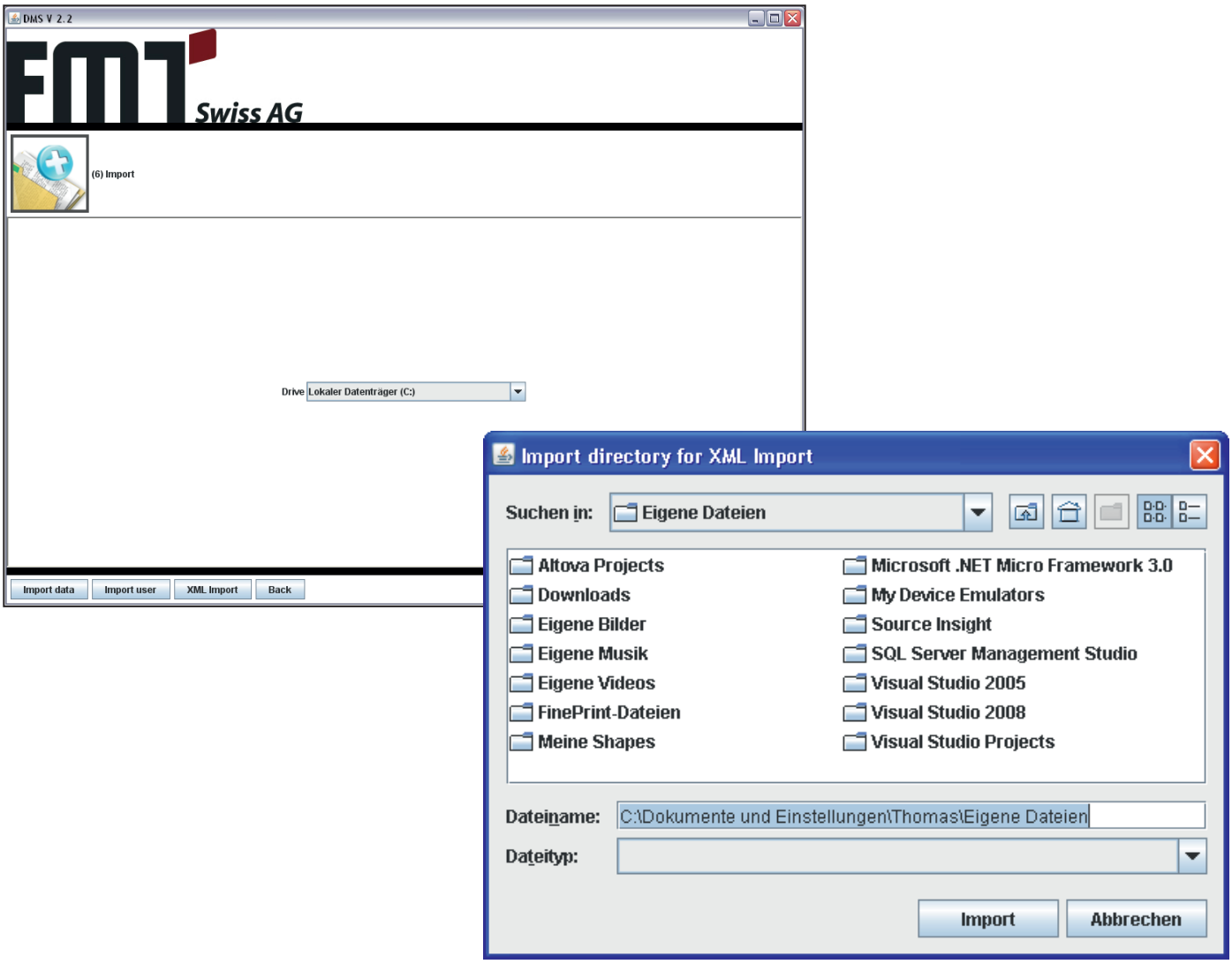
With the button "Import user" you can import users, that have been exported before. (When exporting a station, all users assigned to this station are exported, too).

If the PIN of a user to be imported is the same as the PIN of an existing user, you will be asked to override the existing user or to skip the import of this user. After the import you are informed of the total number of imported (new and overwritten) users.

During this import the station and all vehicles assigned to the users are imported too if they do not already exist.

Descriptions and passwords can not be imported.

With the button "XML Import" all files used by the Fluid Management System will be copied from a selected folder to the working folder. Existing files may be overwritten.

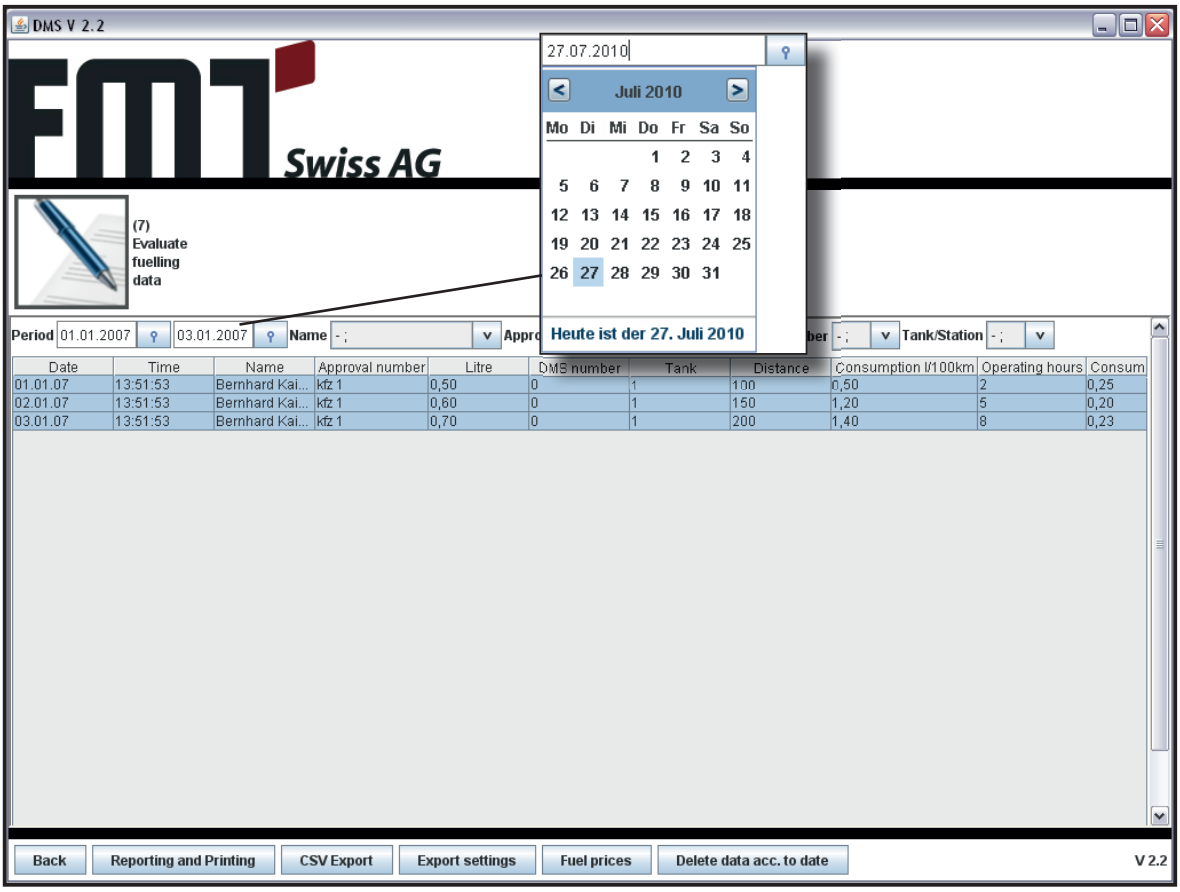


4.11 Tank data analysis

In the dialogue „Evaluate refuelling data“ you can carry out all actions required for the display and output of the refuelling data. These data have been imported into the FMS system as refuelling operation data or were entered as adjustments by the users.

4.11.1. Data filters

The period of displayed data can be limited. Enter a start and end-date for the period which will have to be analysed and press “Enter“ or select the period to be analysed in the calendar enclosed.

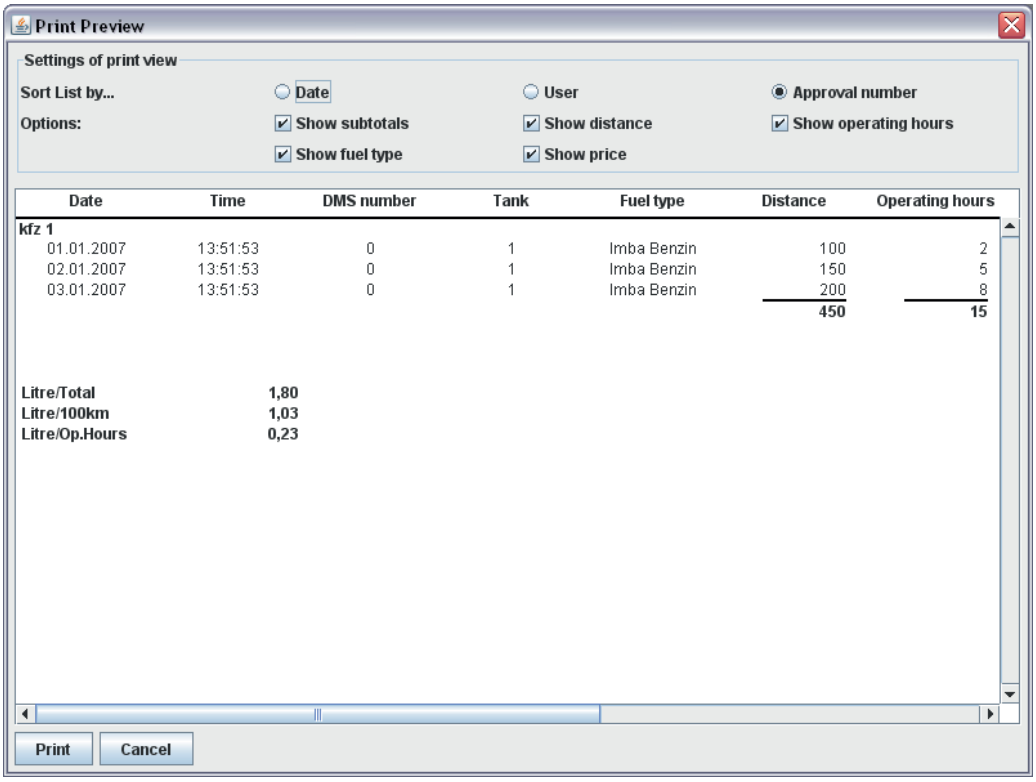


Choose the requested data base in the keyword list for analysing the stored data based on user name, car registration, FMS terminal number or tank. The data table presented will be sorted automatically. To reset the data filter choose the first element “-“.

All data filters will be effective for each printout and for any CSV-export as well.

4.11.2. Evaluation and printing

Proceed as follows to get a report display of the date choosen.



You can export any refilling data selectively for users, date (day) or for vehicles. A subtotal for each section can be edited by clicking the button "Subtotal"

The report shows a section of the relevant mileages if in the selection menu of the dialog "General configuration" the criteria "User shall input mileage" has been activated. You can choose wether the mileage shall be displayed or not.

The report shows a section of the relevant operating hours if in the selection menu of the dialog "General configuration" the criteria "User shall input operation hours" has been activated. You can choose wether the operation hours shall be displayed or not.

When selecting the data for vehicles, the report section "Mileage" and "Operating hours" are completed with totals and subtotals.

The display of the report sections "Price" and Fuel type" is optional and can be activated by marking the equivalent section with a little check mark on top of the section.

The total consumption (total of the section "Quantity"), the total consumption per 100 km (average of the consumed fuel of the non-empty fields in the section "consumption l/100km") and the total consumption per hour (average of the consumed fuel of the non-empty fields in the section "consumption l/h) will be displayed at the end of the list.

The button "Printer" opens the printer dialog of your system enabeling you to choose and to configurate the relevant printer and its configuration platform. This dialog will be displayed in your system language and not in the preset FMS language.

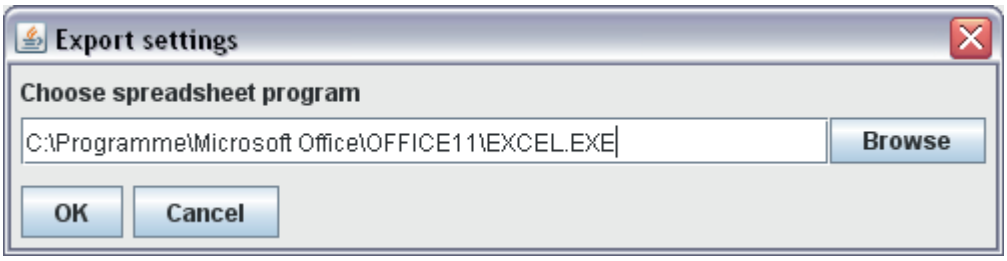
"Cancel" brings you back to the data display without printout.

4.11.3. CSV Export

The displayed table will be stored as CSV file (with semicolon as separator) when you click the "CSV export" button. A data select dialog appears for defining of the storage place and the relevant name of the data file. The file extension "CSV" will be added automatically.

This dialog will be displayed in your system language and not in the preset FMS language.

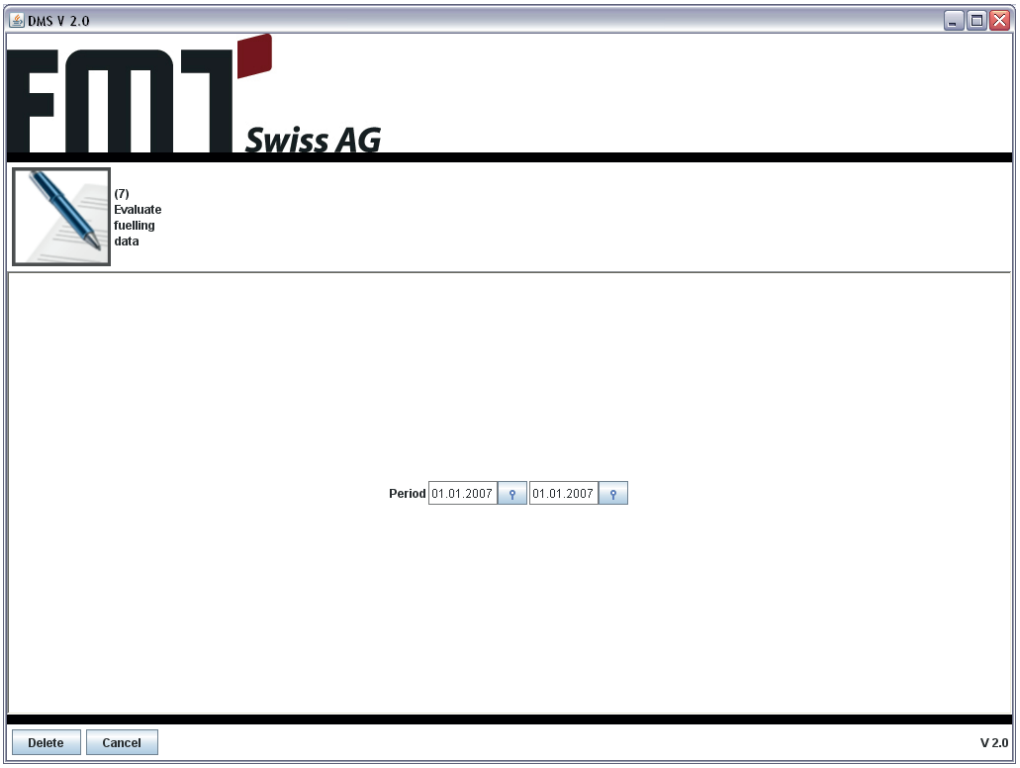
The total consumption (total of the section "Quantity"), the total consumption per 100 km (average of the consumed fuel of the non-empty fields in the section "consumption l/100 km") and the total consumption per hour (average of the consumed fuel of the non-empty fields in the section "consumption l/h) will be displayed at the end of the list.



In the section "Export configuration" you will find a program for data handling enabeling you to reprocess the data after the CSV export. The software with the exported CSV file opens automatically if you have choosen a configuration i.e. "C:\Programme\OpenOffice.org 3\program\scalc.exe" guiding you to Microsoft Excel or Open Office automatically.

4.11.4. Deleting tank data by date

Pressing the button "Delete of tank data per date" guides you to following dialog:



Importing a special period (date from … to) deletes the tank data for the period pre-selected.

Attention: Any data will be irrevocably deleted after pressing the corresponding delete button. Prior to final deletion, FMS will ask you whether you really want to delete the selected data. Confirming with "Yes" will delete the data irrevocably from the system.

4.11.5. Price maintenance for fuel types

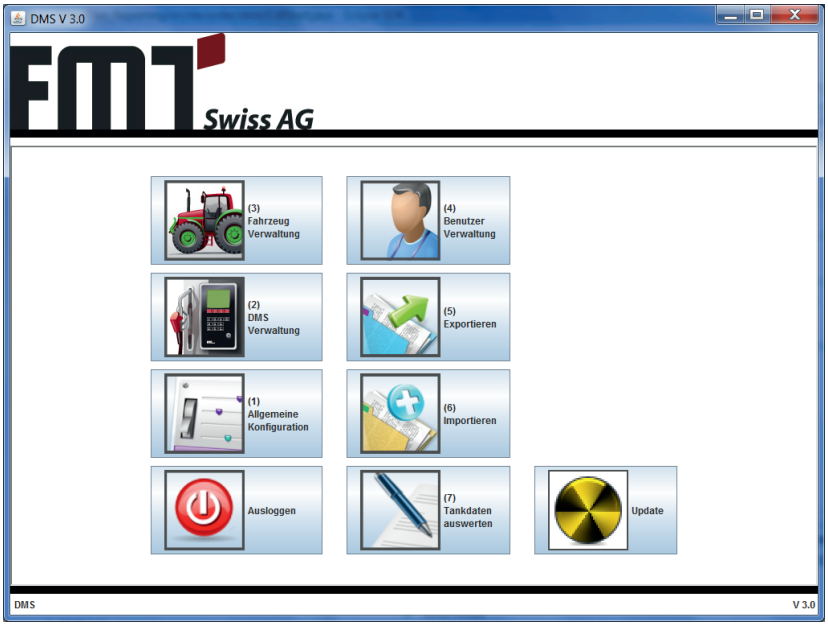
To get to the section price maintenace click on the button "Fuel prices".

The programme offers an identic dialog as specified in the section "FMS Administration". There is no need to switch back to FMS Administration when adjusting the prices before printout.

Please see chapter 4.6.1.

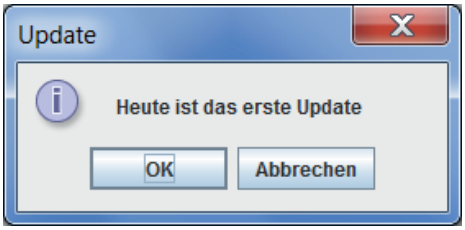
4.12 AutoUpdate

The AutoUpdate is available from version 3.0 or higher. The AutoUpdate works only with JRE 7 or a later version. Check the JRE version installed on your computer.

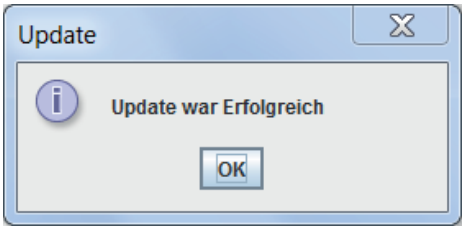


The FMS checks every 10 days whether an update is available on the server. If so, the update is indicated by the „Update“ button. Click on this button to execute the update.

A message appears informing on the reason for the update. Confirm with „OK“ to continue the update or click on „Cancel“ to stop the process.



At the end of the update, a message appears indicating whether the update could be successfully executed.



5. How to modify FMS language files

The language files used by the FMS hardware and PC application must match specific format constraints. In the following sections we describe how to create or manipulate the files.

5.1 Language files for PC application

The language files used by the FMS PC application are named with the language name in four letters and the postfix "_pc.txt" (for example `enlg_pc.txt`).
In the file each line starts with a three-digit-number, like "`001`", followed by a colon, and the translated text.
For example:

```
008:Create
009:Delete
010:Log in
011:Log out
```

Important:
When changing a file do not change the line numbers! If you did so the text line is possibly not loaded into the PC application and the default text is used instead. Default texts are German.

When saving the language file, make sure it is saved in the UTF-8 encoding. Most editors in Linux and Windows give you the encoding choice when using the "Save as" function.

Using the UTF-8 encoding makes it possible to type Cyrillic letters as well as Latin letters and special characters like German "ä", "ö", "ü" or French letters with accents. Using a different encoding will cause some texts to be displayed incorrectly.

5.2 Language files for station hardware

The language files used by the FMS hardware are named with the language name in four letters and the postfix "_fw.txt" (for example `engl_fw.txt`).
These file begin with some comment lines, starting with a semicolon. Do not change them!
All other lines consist of a three-digit-number, a colon and the translated text. The translated text should not be longer than 20 letters. For example:

```
026:Setup
027:Date
028:Time
029:Calibration
```

Important:
When changing a file do not change the line numbers! If you did so the text line is possibly not loaded to the hardware and will be missing!
When saving a language file containing text in Latin letters (not Cyrillic letters), make sure it is saved with the encoding ISO-8859-1 or CP1252 (also known as "Windows western"), which are both nearly the same.
When saving a language file containing text in Cyrillic letters, make sure it is saved with the encoding KOI8-R. Do not choose ISO-8859-5 or CP1251 (also known as "Windows cyrillic"), these are not supported by the FMS hardware.

Most editors in Linux and Windows give you the encoding choice when using the "Save as" function. If using "Standard", "ANSI" or "Platform" it is system dependent which encoding is used. Please use a high level text editor like *OpenOffice.org Writer* or *Microsoft Word* to get access to all encoding settings.

6. Configuration steps

Log-in

Name	Enter „Admin“	
Password	Enter „Admin“	Confirm with **OK**

Select **General configurations**

General configurations

Language	Select
Symbol set	Select
The user must enter the mileage	Select
The user must enter the operating hours	Select
Max. discharge volume	Max. 10
Pressure	Activate with intergral sensor only
Liquid level	Activate with intergral level indicator only
Integral leakage indicator	Activate with intergral leakage indicator only
Leakage	Activate with intergral leakage indicator only
Tank temperature	Activate with intergral temperature indicator only
Identification	Select
Selection of vehicles	Select
Number of PIN failiures	Max. 10
Time-out after PIN failiures	Max. 30 minutes
Waiting time between re-filling and idle-mode	Max. 1000 sec.
Heating on at	Enter temperature
Back-ground illumination	Max. 30 min.
Pump intermediate time	Max. 180 sec.
Flow-control time	Max. 120 sec
Heating shut-off at	Enter temperature

Confirm with **OK**

Continue at (2) ▶

FMS Administration



FMT Swiss AG

② ▶ Select **FMS Administration**

Select **Configuration**

FMS. No.	Will be pre-selected by the system
Description/location	Enter the location
Description of tank 1	Enter the type of liquid
Description of tank 2	If available only
Level indication for „empty“	Enter minimum level of liquid

Click on **Tank 1**
(If level indicator abvailable only)

Select **Paste**
(A line will be added. Enter height of liquid level and the equivalent litres.)

Confirm with **OK**

Select line **FMS (previously created)**

Select **Revision**

Date	Will be pre-selected by the system
Time	Will be pre-selected by the system
Name	The person indicated will be displayed
Volume	Enter re-filled volume
FMS.no.	Will be pre-selected by the system
Tank	Select
Type	Select
Remarks	Enter (optional)

Confirm with **OK**

Continue at ③ ▶

③ ▶ Select **Vehicle administration**

Vehicle administration



Select **Configuration**

Car registration number	Enter
Desctiption	Enter

Confirm with **OK**

Select **Back**

Select **User adminstration**

User adminstration



Select **Configuration**

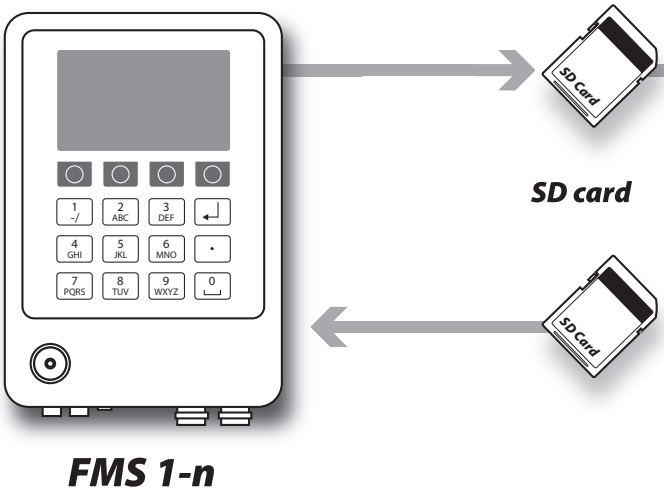
No.	Will be pre-selected by the system
Name	Enter
Password	Enter
PIN	Enter (4 digits)
iButton-Ident	Enter manually or use the iButton reader
Type of user	Select
Description	Enter (optional)
FMS correlation	Select
Vehicle correlation	Select

Confirm with **OK**

Select **Back**

Configuration is completed.

7. Data flow FMS Fluid Management System



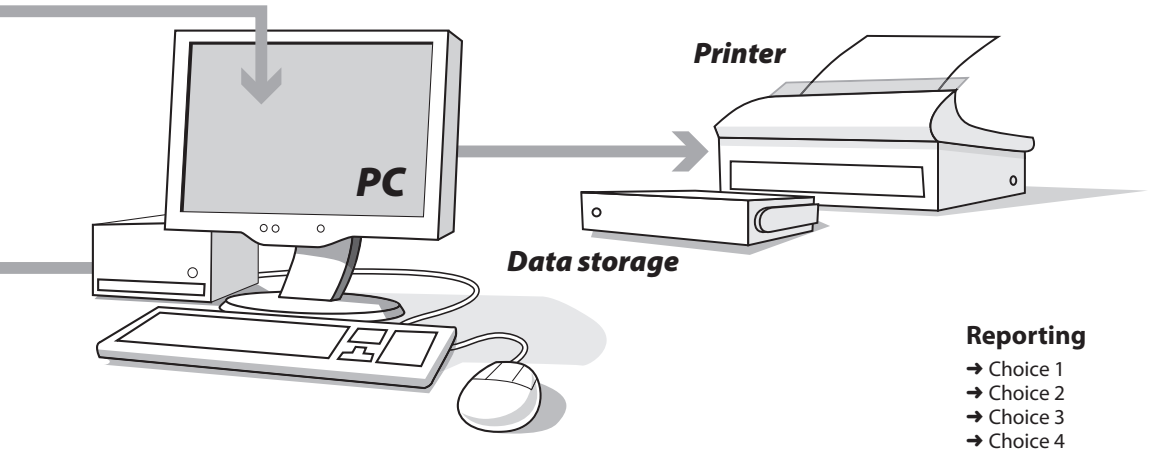
SD card

FMS 1-n

Import to PC adminstration software FMS from SD card

- ➜ FMS No. …
- ➜ Description of place
- ➜ Tank / refilling station No. …
- ➜ Date of refilling process
- ➜ Time of refilling process
- ➜ Name
- ➜ Litres
- ➜ Mileage
- ➜ Vehicle license number
- ➜ Operating hours

The configuration of the system will be transmitted with the SD card to the FMS



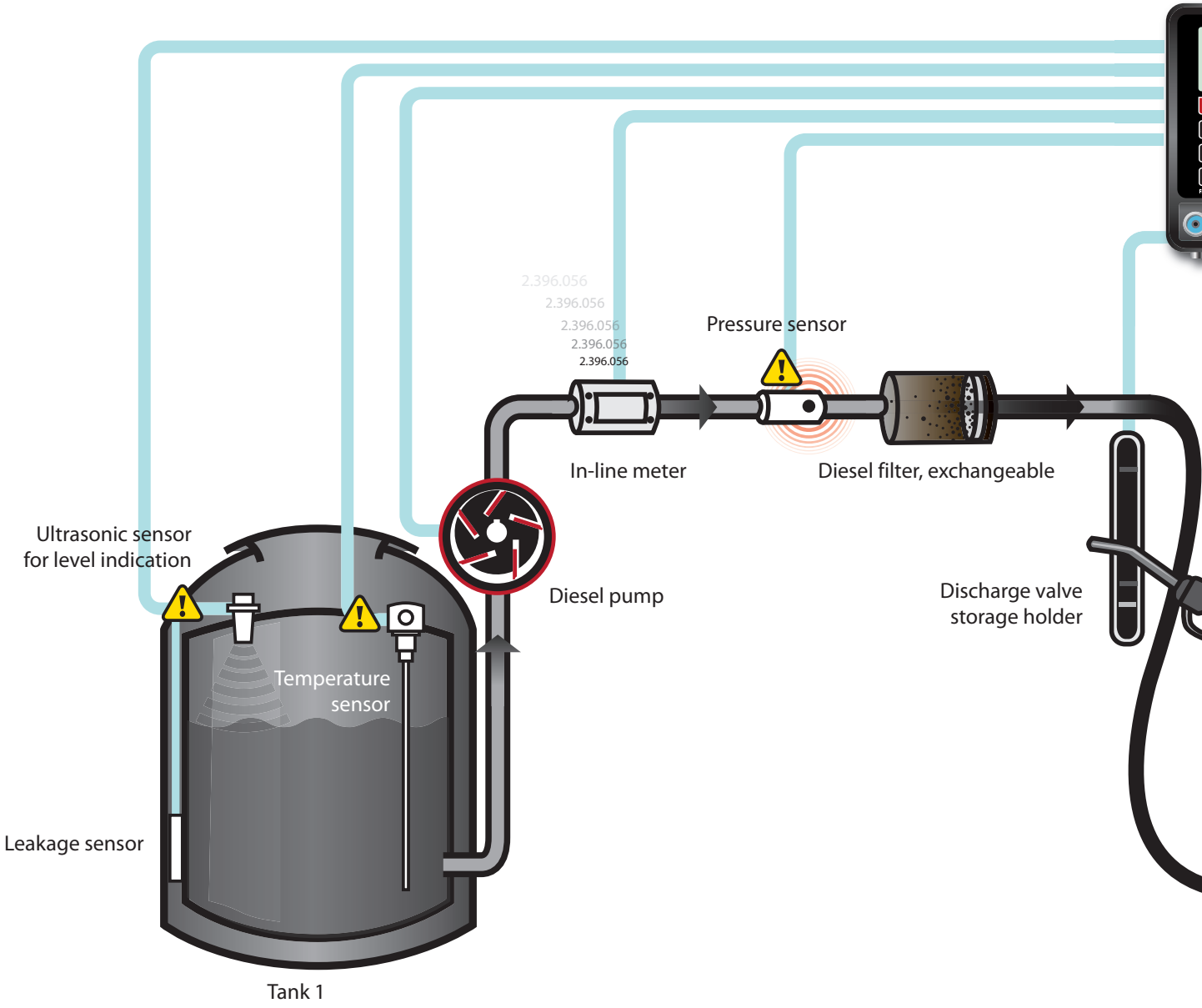
The configuration of the system will be generated on a PC and stored on the SD card

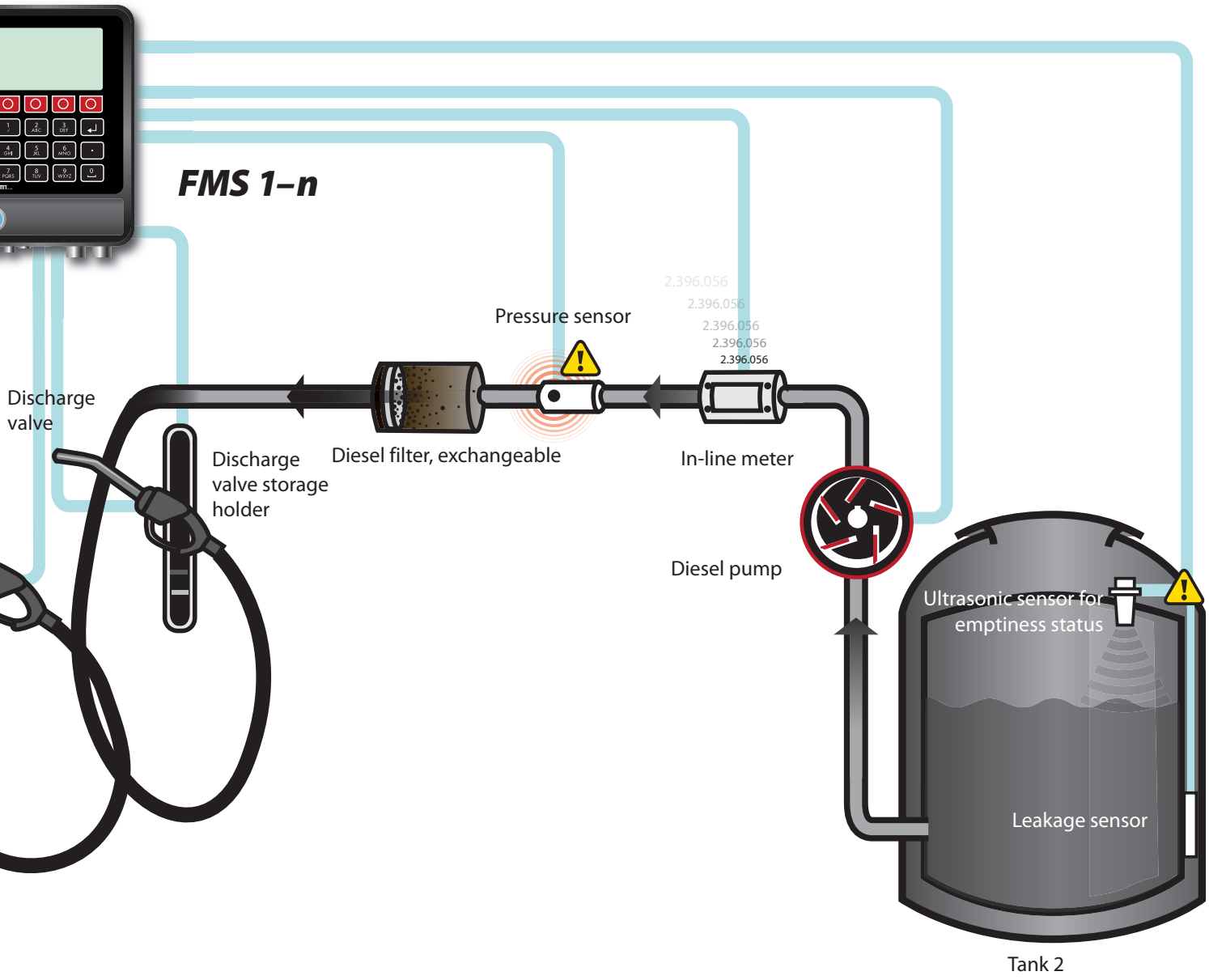
- ➜ Names of users
- ➜ Configuration of iButton ident
- ➜ Assignation of the iButton ident to a user
- ➜ Correlation of the iButton to a vehicle
- ➜ Correlation of a fuel type to a price (for a certain period of time)
- ➜ Number of permitted input failures (PIN)
- ➜ Time-out after permitted input failiures (min)
- ➜ Time between refuelling and non-operative time (sec)
- ➜ Configuration of user passwords
- ➜ Type of user, user related
- ➜ Classification of vehicles, user related
- ➜ Decription of vehicles
- ➜ Classification of refilling station = tank, user related
- ➜ Decription of refilling station = tank
- ➜ Minimum refilling level for empty tank 1 — metered
- ➜ Volume calibration = tank 1
- ➜ Volume adjustments
- ➜ Language
- ➜ Font
- ➜ Mileage input yes/no, user related
- ➜ Input of operating hours yes/no user related
- ➜ Max. refuelling voulme, all users
- ➜ Pressure = refilling station 1: yes/no — optional
- ➜ Pressure = refilling station 1 = FMS 1: minimum pressure — optional
- ➜ Pressure = refilling station 1 = FMS 1: maximum pressure — optional
- ➜ Pressure = refilling station 1 = FMS 1: pressure threshold — optional
- ➜ Liquid level tank 1: yes/no = FMS 1
- ➜ Integral leakage sensor: yes/no = FMS 1 = tank 1 — optional
- ➜ Leakage: yes/no = FMS 1 = tank 1 — optional
- ➜ Pressure = refilling station 2 = FMS 1: pressure threshold — optional
- ➜ Tank empty = tank 2 = FMS 1 — optional
- ➜ Tank leakage = tank 2 = FMS 1 — optional
- ➜ Temperature of tank 1: yes/no = FMS 1 — optional
- ➜ Temperature of tank 1: min = FMS 1 — optional
- ➜ Temperature of tank 1: max = FMS 1 — optional
- ➜ Temperature of tank 1: threshold = FMS 1 — optional
- ➜ FMS heating switch-on at (°C)
- ➜ FMS heating switch-off at (°C)
- ➜ Background illumination (min)
- ➜ Time delay of pump operation (sec)
- ➜ Liquid flow check time (sec)

Reporting

➜ Choice 1	specific time period
➜ Choice 2	name of refuelling person
➜ Choice 3	vehice license number
➜ Choice 4	FMS 1 … n
➜ Choice 5	tank / refilling station
➜ Result indication 1	date
➜ Result indication 2	time
➜ Result indication 3	FMS No.
➜ Result indication 4	tank
➜ Result indication 5	description of tank (optional)
➜ Result indication 6	fuel type (optional)
➜ Result indication 7	mileage (optional)
➜ Result indication 8	operating hours (optional)
➜ Result indication 9	name
➜ Result indication 10	vehicle license number
➜ Result indication 11	vehicle description (optional)
➜ Result indication 12	litres
➜ Result indication 13	fuel price (optional)

8. General survey FMS Fluid Management System




FMS 1–n
Pressure sensor
Discharge valve
Discharge valve storage holder
Diesel filter, exchangeable
In-line meter
Diesel pump
Ultrasonic sensor for emptiness status
Leakage sensor
Tank 2

9. Accessories for FMS Fluid Management System

Diesel
Pulse meter Item No. 23 820



Diesel
Pulse meter with display Item No. 23 829



Diesel
Nozzle support Item No. 23 066



Urea
Pulse meter Item No. 23 823



Urea
Pulse meter with display Item No. 23 829 870



Urea
Nozzle support Item No. 23 166



Level indicator and leak indicator
Item No. 23 068



iButton for user-black-set for 10 users
Item No. 23 069



iButton reader
Item No. 83 410



Urea electric diaphragm pump
Item No. 25 280



Diesel pump 60 l/min Item No. 23 430
Diesel pump 100 l/min Item No. 23 433

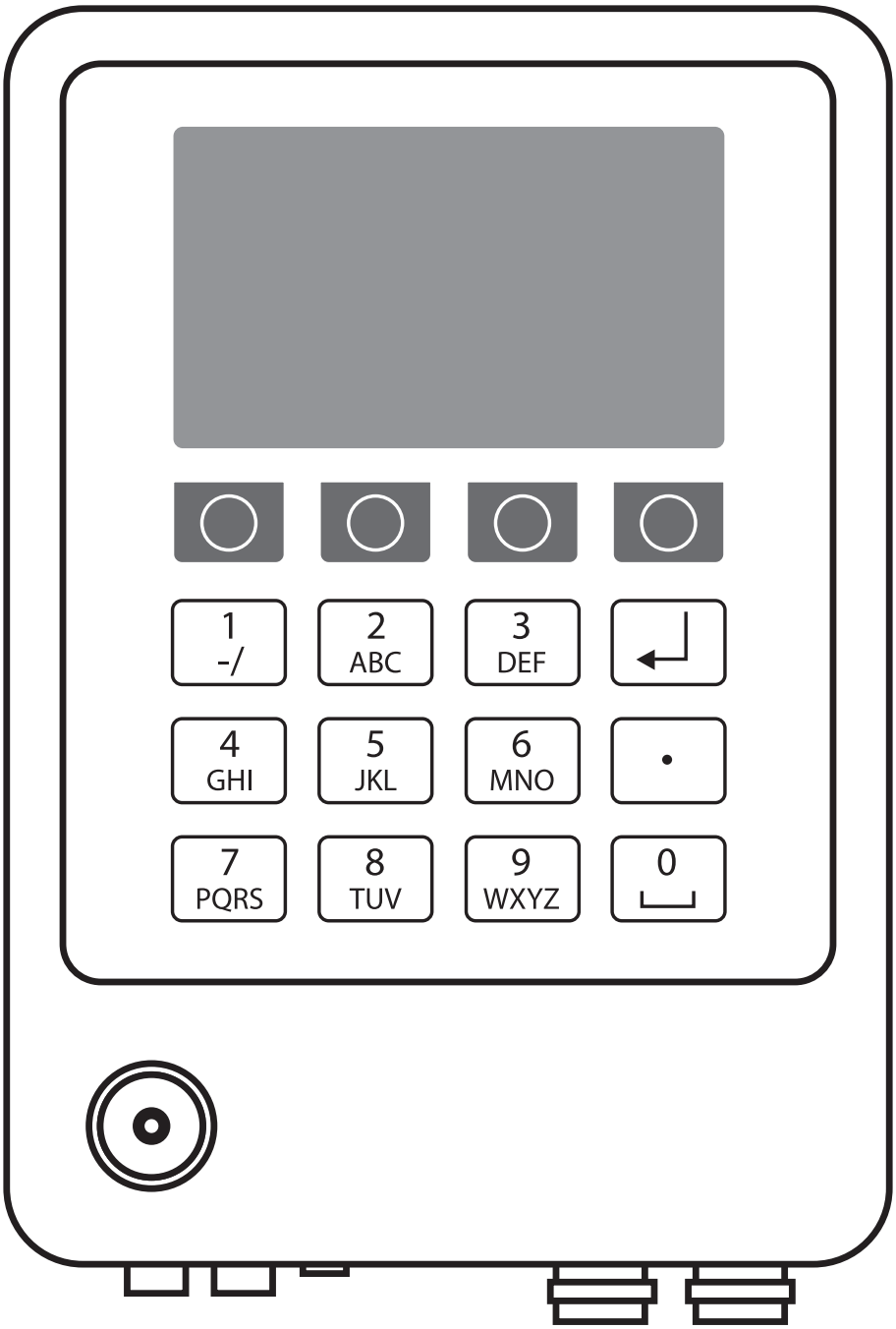


FMT Swiss AG
Fluid Management Technologies Swiss AG
Gewerbestraße 6
6330 Cham / Schweiz
Tel. +41 41 712 05 37
Fax +41 41 720 26 21
info@fmtag.com
www.fmtag.com

FMT Swiss AG

Service Manual FMS

Fluid Management System



83 416 001 932 A801 GB

FMT Swiss AG

Table of contents

1. Preface 3
2. Configuration 3
3. Identification 3
4. Vehicle selection 3
5. Mileage / input/consumption control 3
6. Input operating hours/consumption control 3
7. Refuelling 3
8. Supervisor 4
8.1. Date 4
8.2. Time 4
8.3. Calibration 4
8.4. Calibration A 4
9. Service 4
9.1. FW-Update 4
9.2. Inputs 4
9.3. Outputs 5
9.4. Display Test 4
10. SD card 5
10.1. Files on SD card 5
10.2. Data from PC application 5
10.3. Data to PC application 5
11. Timeouts 5
12. Status LED / Errors 6
13. Heater 7
14. Battery 7
15. Fuses 7
15.1. F1 / F2 Fuse power supply 230 V / 10 A 7
15.2. F3 Fuse power supply control unit 7
16. Printed circuit board 7
16.1. Connections on the printed circuit board 8
16.2. Lower part of housing 8
16.3. Programme download connector, X4 9
16.4. iButton connector, X6 9
16.5. Display connector, X11 9
16.6. Display backlight connector, X10 9
16.7. Keyboard connector, X9 9
16.8. Power connector, X1 10
16.9. Heater connector 250 V AC, X3 10
16.10. Pump connector 250 V AC / 10 A, X2 10
16.11. I/O connector, X13 10
16.12. Connection overview FMS 11
17. Supervisor menu 12
18. Service menu 18
19. Refuelling operation 23
20. Data flow FMS Fluid Management System 30
21. General survey FMS Fluid Management System 32
22. Accessories for FMS Fluid Management System 34

1. Preface

This documentation is exclusively intended for the operating company and their staff.

Without our written consent, the content of this documentation (textes, figures, drawings, charts, diagrams etc.), must not be duplicated or distributed, neither in full or in part, utilized for the purpose of competition or passed on/made availabe to third parties.

We reserve the right to make design and product modifications, which serve to improve the product.

2. Configuration

The configuration of the refilling station will be updated every time the SD card is inserted to the control unit.

3. Identification

The identification of the user will be executed with a PIN, the iButton or both. Determine by setup. The PIN is a 4-digit number. The iButton ID is a 16-digit hexadecimal number and is marked on the bottom of the key.
Depending on the user type, the user has different rights of access. A “standard” user can fill his vehicle, the supervisor can set date and time and can calibrate the control unit. The service engineer can arrange hardware tests like a display test, can verify the inputs and outputs and can update the system. The user type is will have be to configured by the FMS PC application for every user.

4. Vehicle selection

The vehicle selection can be effected either by a list of all assigned vehicles or with the manual input of the vehicle license number. If the selection is completed with the manual input of the license number, it will not be compared with the vehicles assigned by the PC application.

5. Mileage, input / consumption control

If the mileage is configured, the user has to enter the current mileage ahead of any refuelling process. With this input, the PC application is able to calculate an average consumption (per km) for the vehicle.

6. Input operating hours / fuel consumption control

If operating hours input is configured (alternatively or additionally to the mileage), the user has to enter the current reading of operating hours. With this input the PC application is able to calculate an average diesel-consumption (per operating hour) for the vehicle.

7. Refuelling

After removing the fuel nozzle, the pump will start with a certain delay set up in the PC application. This will prevent an overpressure, until the nozzle is placed in the vehicle tank.

During the filling, the amount of fuel discharged is shown at the display.

The pump stops automatically when meeting one of the following conditions:

- Tank level below minimum
- Leakage failure (leakage detected or no communication to TankAlert sensor)
- The user is not identified
- Maximum amount for filling is reached (selectable on PC-Application)
- The flow control does not determine a definite fuel flow for the specified time.
- The nozzle is placed back.

When the refuelling is completed and the nozzle is placed back correctly, all data are stored on the SD.

8. Supervisor

8.1 Date

On this display the date can be set. Pushing the left and right arrow allows to switch between the day, the month and the year. To confirm the new date, press the RETURN button.

8.2 Time

On this display the time can be set. Pushing the left and right arrow allows to switch between hours, minutes and seconds. To confirm the new time, press the RETURN button.

8.3 Calibration

The selected refuelling tap connection can be calibrated on this display. Remove the fuel nozzle and start filling a calibrated vessel. The amounts of flow rate counter pulses are shown on the display. After the vessel is filled, place back the fuel nozzle and enter the volume of the vessel. A pressing of the RETURN button will save the calibrated volume. If the fuel nozzle is not placed back correctly, and the RETURN button is pressed, the calibration will be aborted, also if no volume of the vessel is entered.

8.4 Calibration A

The selected pump can be calibrated in this display with entering the pulse amount and filling. To switch between the input fields, use the up/down cursor. For this calibration type, the nozzle valve must not be picked up. Pressing RETURN will save the calibrated volume. Volumes of zero are not allowed, they will abort the calibration.

To copy a calibration from one refilling station to another, copy the file "Calib.dat" from the SD card and place it on the SD card of the new refilling station.

9. Service

9.1 FW Update

This option is available, if a new firmware file exists on the SD card, only.
To make a firmware update the firmware file "FMS.bin" must be placed in the FMSdata folder of the PC application. Start an "export" of the data to the SD card. The "FMS.bin" is copied to the SD card. Now insert the SD card and login as a "Service engineer" user at the control unit. The menu item firmware update is now available. Select the menu item by pressing the 1.
To update the control unit, the RETURN key must be pressed in the update screen.
The control unit makes a restart and loads the new firmware. After the restart, you should see the new version on the top right side.

9.2 Inputs

This display shows all inputs of the control unit and their status, independent wether they are connected or not. If the input shows two columns, the first one shows the raw data read from the analogue input or the serial port. The second column shows the converted value.
For the leakage of tank 1, the first column shows the value of the digitial input X13/9, the second value is delivered from the TankAlert.
The "up" or "down" buttons allow to switch to the next / previous page.

9.3 Outputs

This display shows all outputs of the control unit and their status.
With the "up" or "down" key, it is possible to mark an output. This output can be set with the "1" key or can be reset with the "0" key.

9.4 Display Test

The display test will write the characters, fed in on the keyboard, to the display. It can be stopped by pressing RETURN.

10. SD card

The SD card is the storage place of all data of the refilling station.
All refuelling process data and the filling level are written and stored there. All variable data (refilling operations) as well as the current filling levels of the two tanks are stored there. The configuration, provided users and the text shown is read from it. So the SD card is designed to be used as the transport medium for the data between the refilling station and the PC application.

10.1 Files on the SD card

The following files are on the SD card.

Name	Creator	Description
Text.txt	PC application	Language text file
Config.dat	PC application	Configuration file
User.dat	PC application	User file
FMS.bin	PC application	Firmware file
Tank1.dat	PC application	File for tank level calculation
StationId.dat	PC application	Control unit / station ID file
Font.dat	PC application	Font file for control unit
Fuelling.dat	Refilling station	File with filling operation data
Tank.dat	Refilling station	Fill level file
Calib.dat	Refilling station	Calibration value file

10.2 Data from PC application

With the export function on the PC application, all necessary files are copied from the PC application to the SD card. The control unit detects the new SD card and imports all new files and reconfigures the unit.

10.3 Data to PC application

With the import function on the PC application, all necessary file are copied from the SD card to the PC application. The file "Fuelling.dat" is deleted on the SD card after it was read by the PC application.

11. Timeouts

Name / Description	Timeout
Pin Input	1 min
Vehicle selection	1 min
iButton connection after Pin input	1 min
Mileage input	1 min
Display tank name. Max. time to wait until fuel nozzle will have to be removed	1 min
Service acknowledgement time. Max. time until a service function is selected	1 min
Supervisor acknowledgement time. Max time until a supervisor function is selected	1 min

12. Status LED / Errors

The Status LED is permanentely active, if the system runs trouble-free. In case of an error the LED will blink. Each error is shown with its own amount of blink states. After each error, there is a delay of 2 sec.

Blinks	Description	Correction of the defects
1	SD card missing	Insert SD card or remove and insert it again.
2	Configuration file error	The control unit cannot read the configuration file. Try to export data again from PC application.
3	Language text file error	The language text file cannot be read. Try to export data again from PC application.
4	User file error	The user file cannot be read. The user tried to access to the control unit was unknown or the user file was missing on the SD card.
5	Refuelling operation file error	The refuelling data file could not be written. SD not inserted or SD card is full.
6	Calibration error	The control unit is not calibrated. The supervisor must calibrate the system.
7	Font file error	The font file cannot be read. Try to export data again from PC application.
8	Tank level table file error	The file for the conversion of the filling height into the volume cannot be read. Check on the PC application whether the table was created and try to export data again from PC application.
9	Tank level file error	The tank level cannot not be written into the file.
13	Tank 1 pressure / filter error	Check the filter.
14	Tank 1 minimum filling level reached	Check the tank level. Minimum is reached.
15	Tank 1 leakage error	The tank has a leakage. Fix the leakage.
16	Tank 1 temperature error	Excessive tank temperature. Check the reason for this error.
17	Tank 1 level sensor error	Check the cable to the TankAlert.
18	Tank 1 temperature cable failure	Check the cable to the tank temperature sensor
19	Tank 1 pressure cable failure	Check the cable to the pressure sensor
21	Tank 2 pressure / filter error	Check the filter.
22	Tank 2 minimum filling level reached	Check the tank level. Minimum is reached.
23	Tank 2 leakage error	The tank has a leakage. Fix the leakage.

13. Heater

The heater is optional. It is recommended, if the temperature can get very low. The display is specified for a temperature from -20°C to +70°C. If the temperature can get below this range, it is necessary to place the heater unit.
The heater is switched on if the temperature falls below a limit [°C] configurable in the PC application. (turn-off threshold). If the inside temperature of the tank reaches a second limit, caused by the heating, the heater switcheds off again automatically (turn-off threshold). Both limits should be set appr. 10°C apart from each other to avoid a too frequent on-off switch of the heater.
Possible pre-set data: turn-off threshold 0°C, turn-off threshold +10°C
The heater unit is self-controlling.

14. Battery

The battery is provided to store the date / time on the control unit, if there is no external power supply.
The battery is designed for a lifetime of 5 years.

15. Fuses

The control unit is secured by 3 fuses.

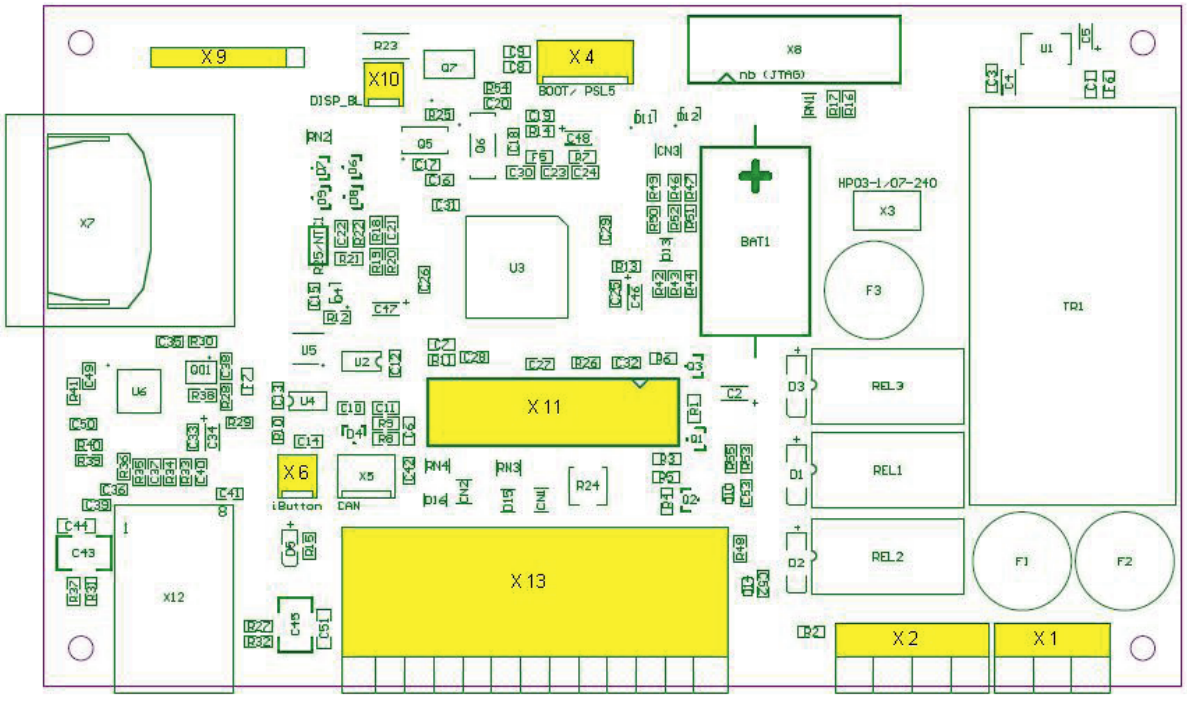
15.1 F1 / F2 fuse power supply 230 V / 10 A

The fuses F1 and F2 secure the power supply and should be designed for 230 V~ and 10 A. With these fuses the pumps are protected.

15.2 F3 fuse power supply control unit

The fuse F3 secures the power supply of the control unit and should be designed for 230 V~ and 1.5 A.

16. Printed circuit board



14	15	16	17	18	19	20	21	22	23	24	25	26
1	2	3	4	5	6	7	8	9	10	11	12	13

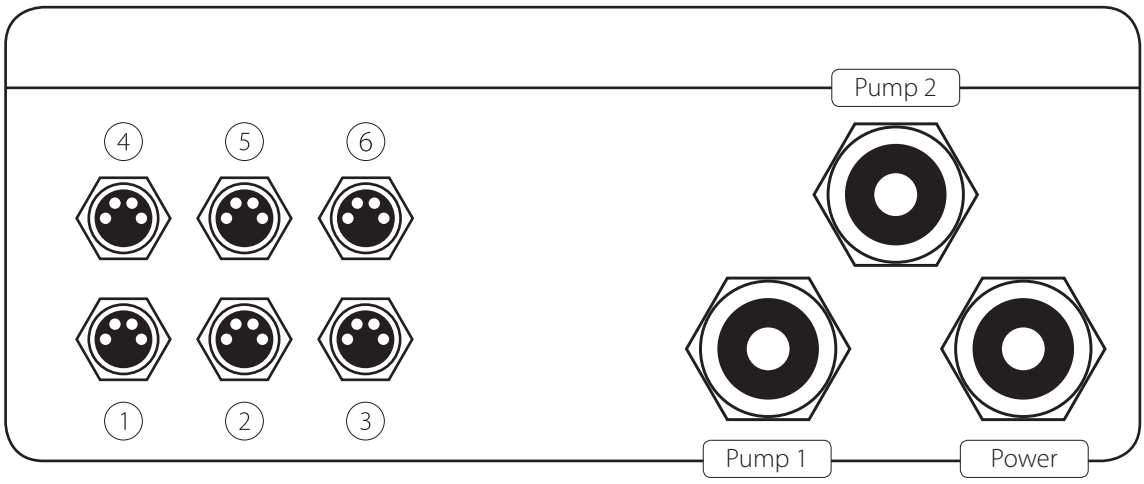
1	2	3	4

1	2	3

16.1 Connections on the printed circuit board

Terminals on the PCB	Cabling to the plug at the housing	Plugs at the outside of the housing
X 1		
PIN 1 → Voltage supply	N	Cable gland
PIN 2 → Voltage supply	PE	Cable gland
PIN 3 → Voltage supply	L	Cable gland
X 2		
PIN 1 → Pump 1	L	Cable gland
PIN 2 → Pump 1	N	Cable gland
PIN 3 → Pump 2	L	Cable gland
PIN 4 → Pump 2	N	Cable gland
X 3		
PIN 1 → Fuel nozzle 1	Cable blue	1
PIN 2 → Fuel nozzle 1	Cable white	
PIN 3 → Pulse meter 1	Cable blue	2
PIN 4 → Pulse meter 1	Cable white	
PIN 11 → Filling level indicator 1	Cable blue	3
PIN 12 → Filling level indicator 1	Cable white	
PIN 13 → Filling level indicator 1	Cable brown	
PIN 14 → Fuel nozzle 2	Cable blue	4
PIN 15 → Fuel nozzle 2	Cable white	
PIN 16 → Pulse meter 2	Cable blue	5
PIN 17 → Pulse meter 2	Cable white	
PIN 22 → Leakage sensor 2	Cable blue	6
PIN 23 → Leakage sensor 2	Cable white	

16.2 Lower part of housing



16.3 Programme download connector, X4

Pin	Description
1	5 V output
2	TxD
3	RxD
4	Reset
5	Ground

16.4 iButton connector, X6

Pin	Description
1	Signal
2	Ground

16.5 Display connector, X11

To adjust the contrast of the display, use the R24 potentiometer placed between the display connector X11 and the IO connector X13.

Pin	Description
1	FG
2	VSS
3	VCC
4	V adj
5	VEE
6	-WR
7	-RD
8	-CE
9	C/-D
10	-HALT
11	-RESET
12	D0
13	D1
14	D2
15	D3
16	D4
17	D5
18	D6
19	D7
20	NC

16.6 Display backlight connector, X10

Pin	Description
1	5 V
2	GND

16.7 Keyboard connector, X9

Pin	Description
1	Ret 0
2	Ret 1
3	Ret 2
4	Ret 3
5	Scan 0

6	Scan 1
7	Scan 2
8	Scan 3

16.8 Power connector, X1

Pin	Description
1	N
2	PE
3	L

16.9 Heater connector 250 VAC, X3

Pin	Description
1	L
2	N

16.10 Pump connector 250 VAC / 10 A, X2

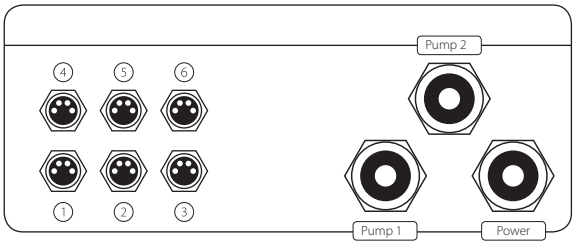
Pin	Description
1	L Pump 1
2	N Pump 1
3	L Pump 2
4	N Pump 2

16.11 I/O connector, X13

Pin	Description	Contact
1	Tank 1 fuel nozzle (digital input)	Normally closed
2	Ground	
3	Tank 1 flow control (digital input)	Don't care, pulse
4	Ground	
5	Tank 1 pressure (analog input, 4 – 20 mA)	
6	Ground	
7	Tank 1 tank temperature (analog input, 4 – 20 mA)	
8	Ground	
9	Tank 1 leakage (digital input)	Normally open
10	Ground	
11	Tank 1 level sensor (signal input)	Blue
12	Ground	Black
13	3,3 V / 5 V output supply	Red
14	Tank 2 fuel nozzle (digital input)	Normally closed
15	Ground	
16	Tank 2 flow control (digital input)	Don't care, pulse
17	Ground	
18	Tank 2 pressure threshold (digital input)	Normally open
19	Ground	
20	Tank 2 tank minimum (digital input)	Normally open
21	Ground	
22	Tank 2 leakage (digital input)	Normally open
23	Ground	
24	Reserve	
25	Ground	
26	Reserve	

16.12 Connection overview FMS





System plug 1



System plug 2



System plug 3



Pump 1



System plug 4



System plug 5



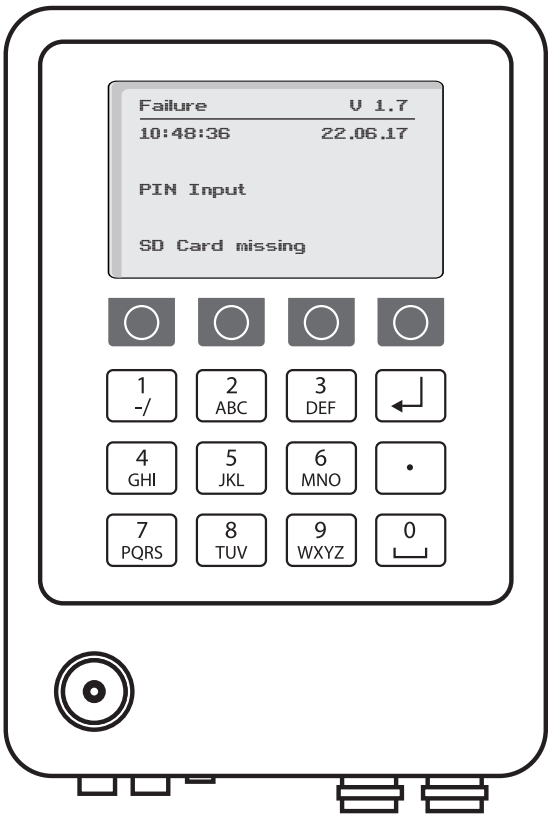
System plug 6

Pump 2

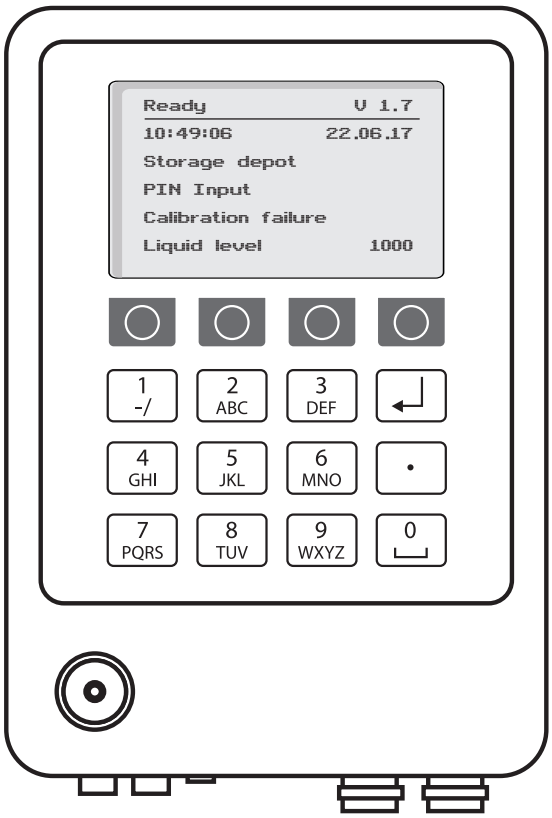


17. Supervisor-Menü

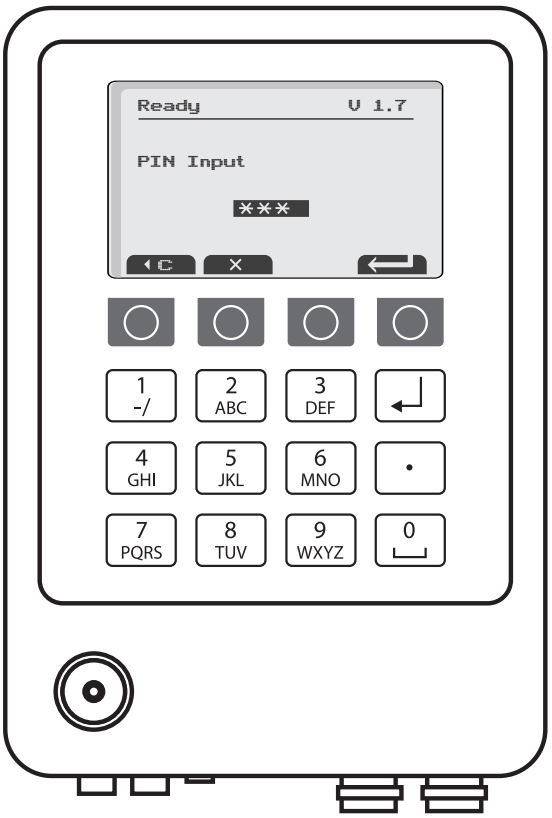
Start of installation



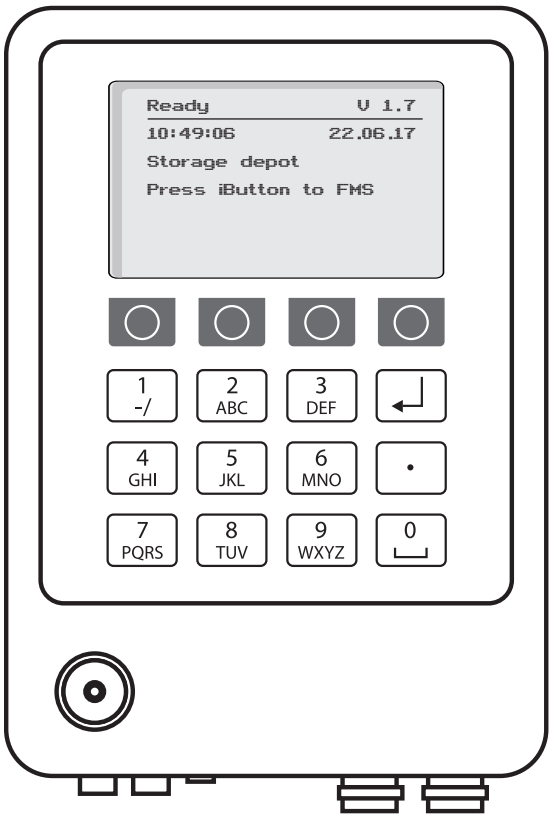
Insert SD Card into the FMS (PRESS any button for illumination)



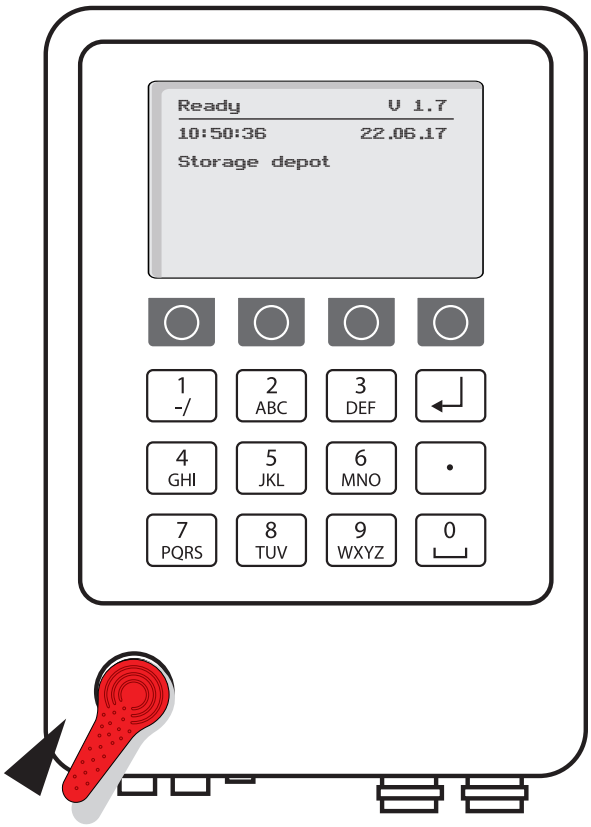
Request for PIN input and calibration of the system (if not existing already)



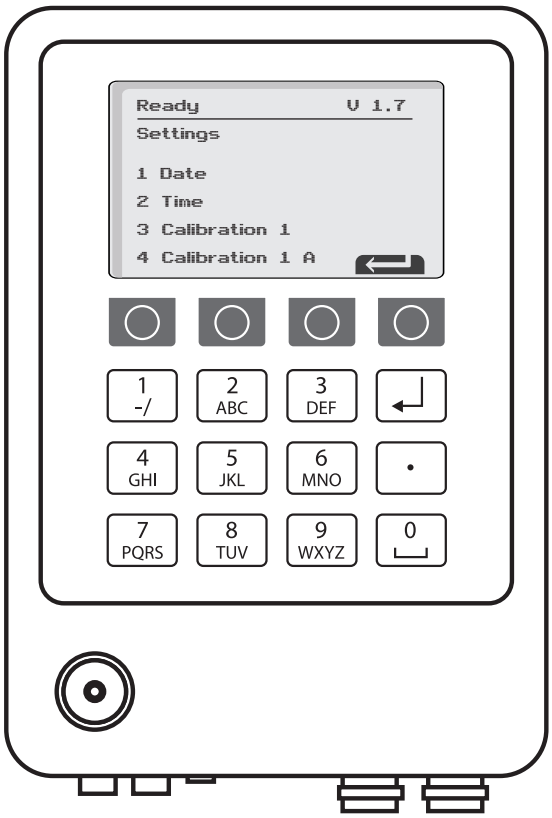
Enter four-digit supervisor PIN and press return button



Request for iButton connection



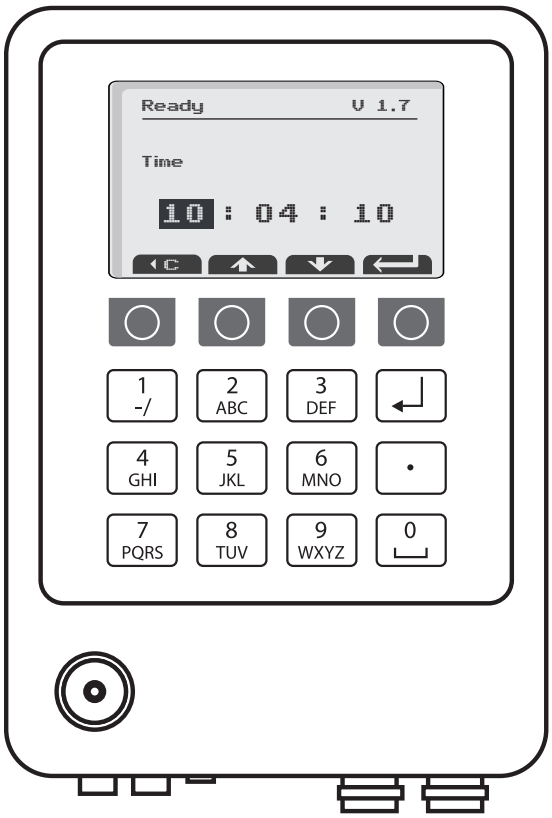
Connect red supervisor iButton



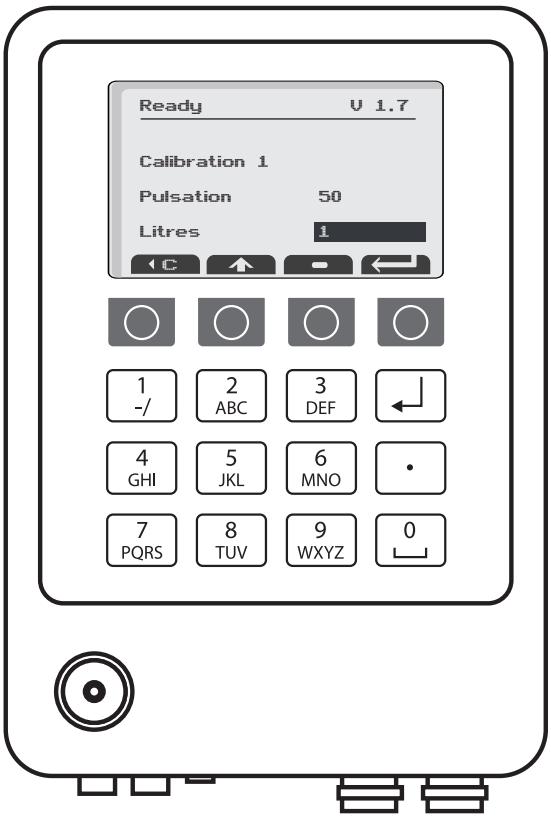
The display shows any configurations to be done. Press buttons 1-4



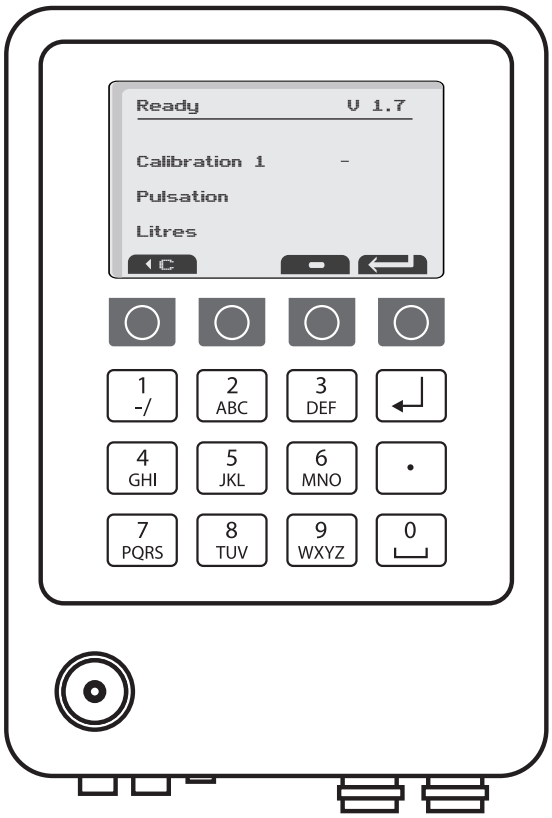
Enter date using the number keys. Confirm with the return button



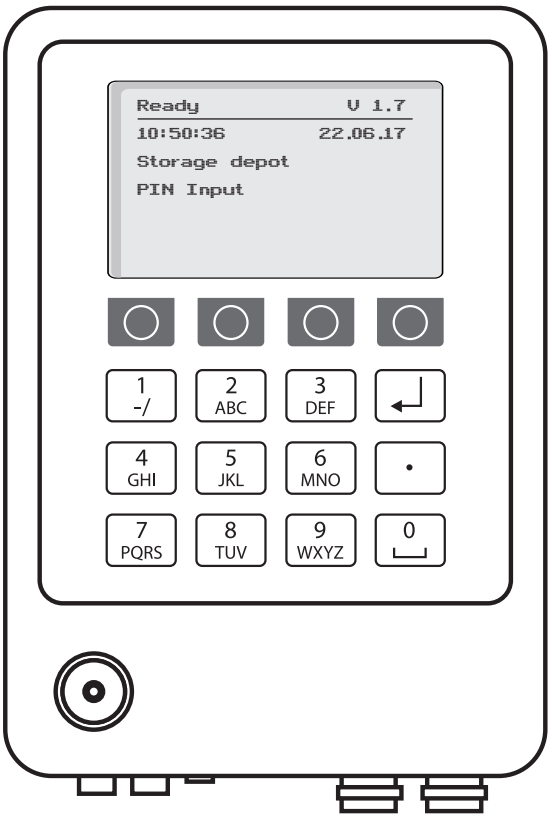
Enter time using the number keys. Confirm with the return button



Calibration according to the demands



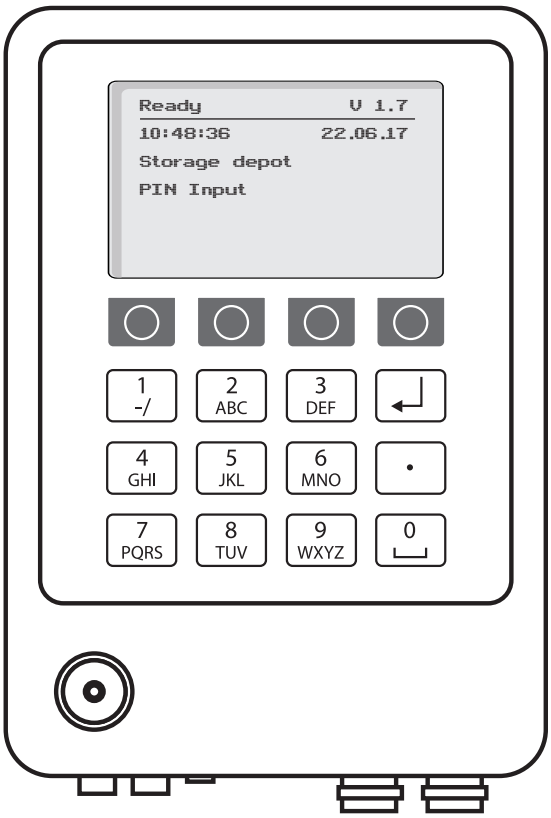
Confirm calibration by a refilling process (see page 4, 8.4). Confirm with return button



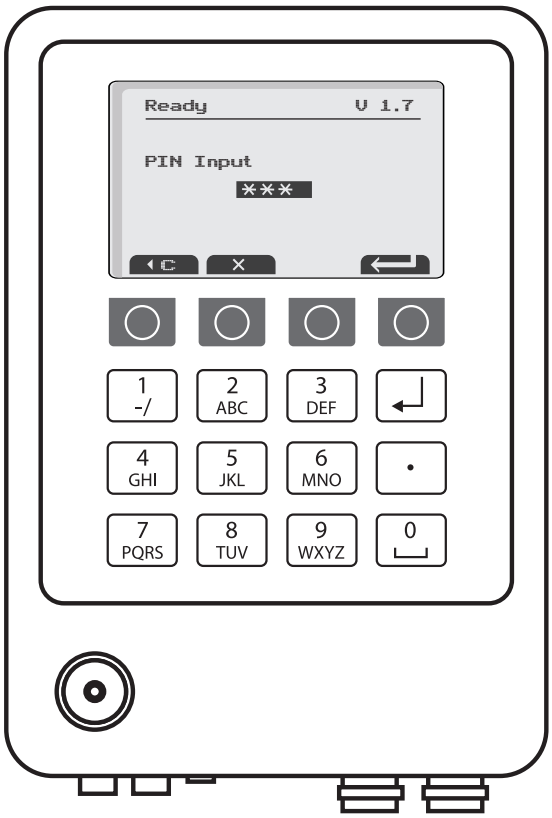
Back at start menu 1

18. Service Menu

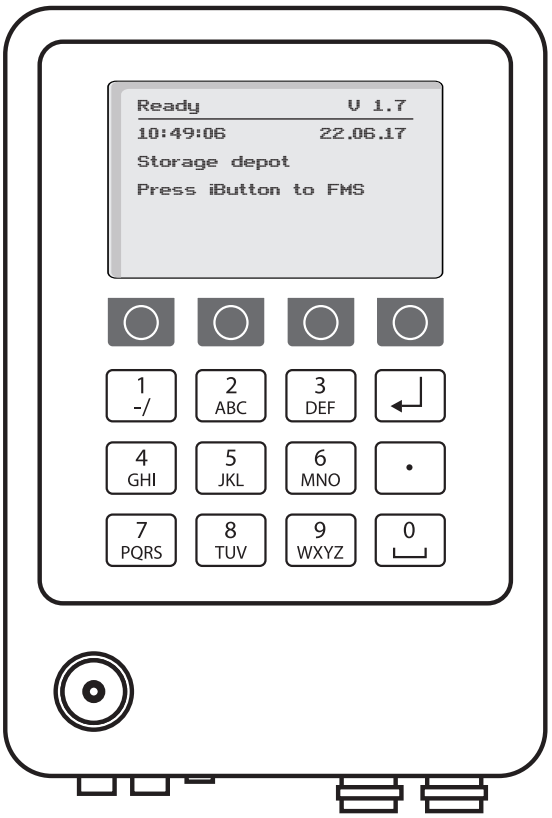
(Check-up of the system and of the emergency functions)



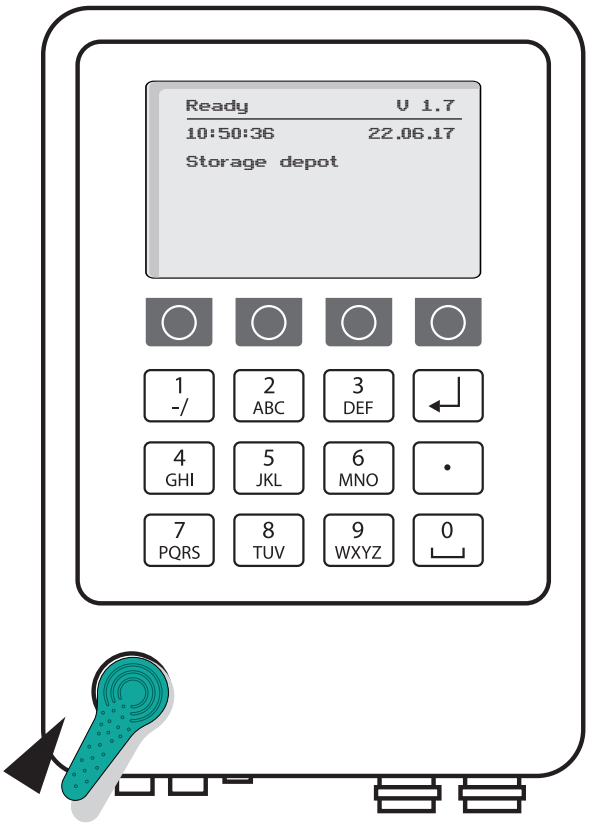
Request for PIN input



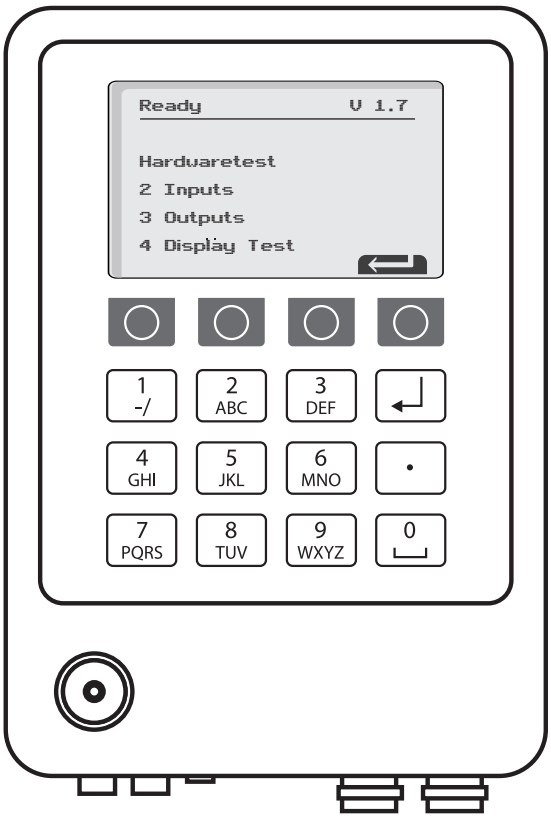
Enter four-digit service PIN and press return button



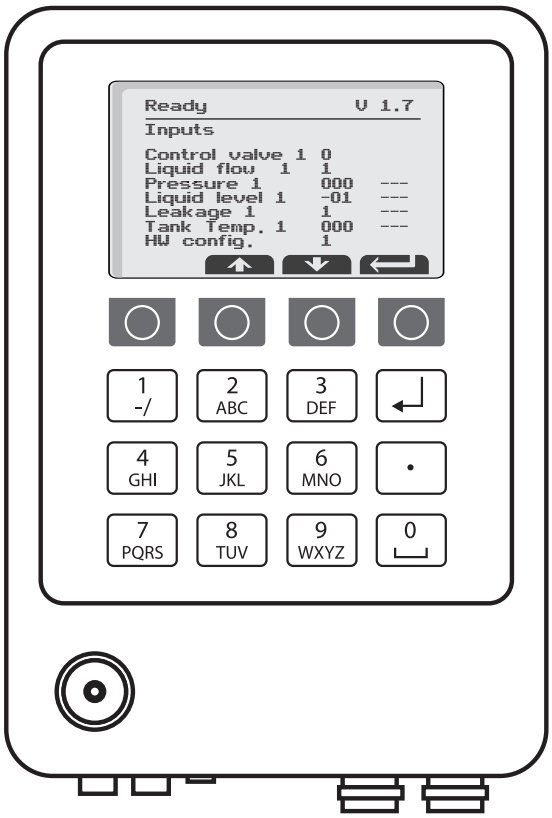
Request for iButton connection



Connect green service iButton

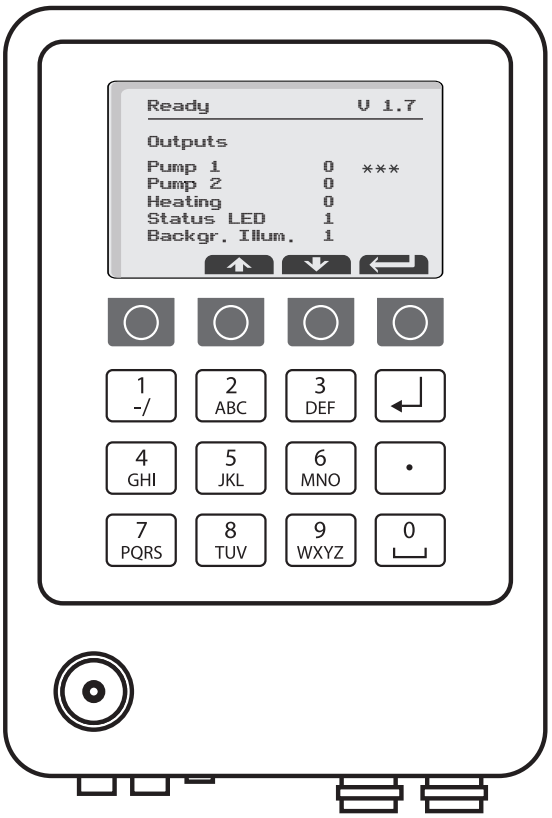


The display shows any configurations to be done. Press buttons 2-4



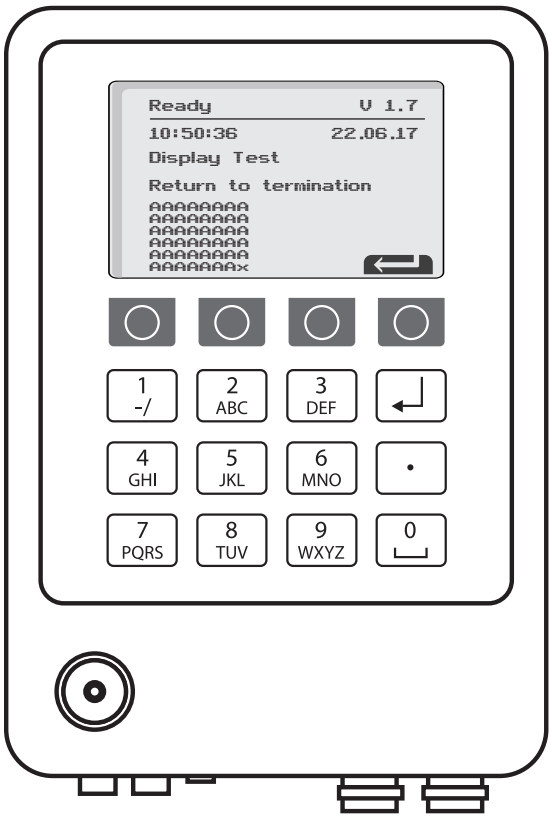
Check inputs

By operating the different components 1 or 0 will appear



Check outputs

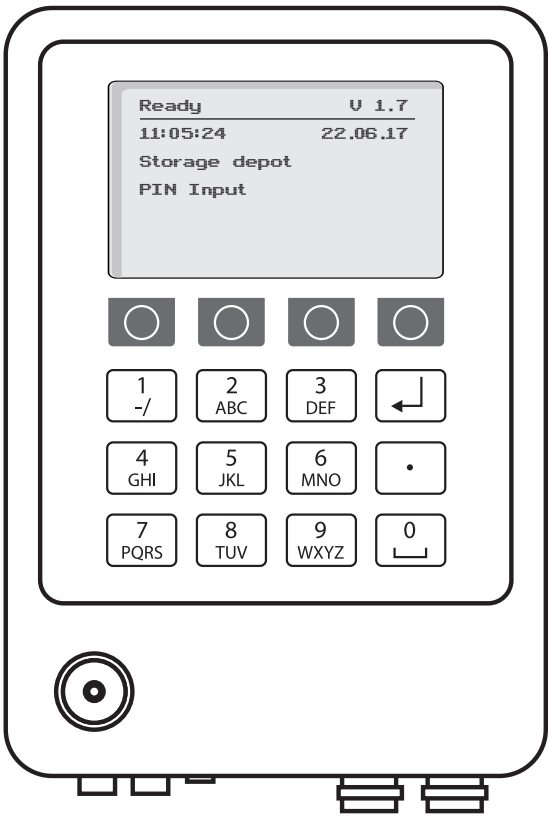
The selected component will go on line, i.e. the pump shall start operating, if you set 1 (Emergency function if a tank leak is indicated)



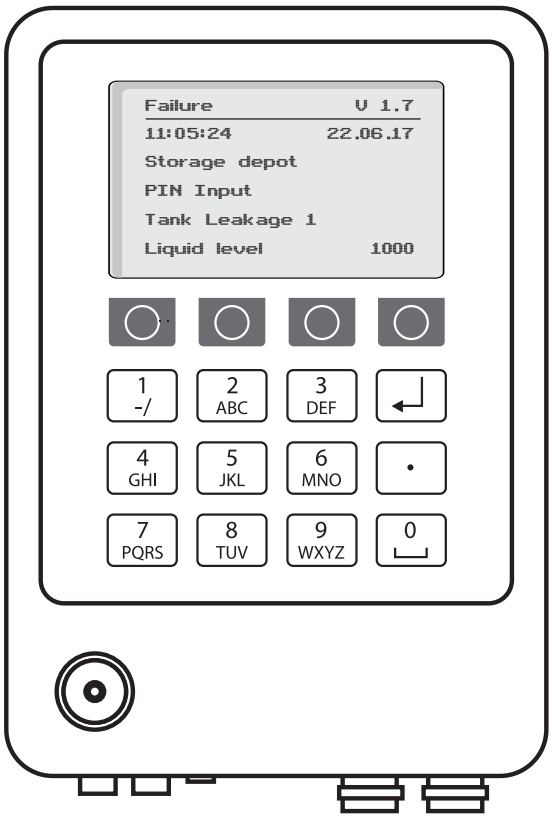
Check the complete display

Go back to starting menu by pressing the return button

Emergency function to empty a leaking tank



Back at start menu 1

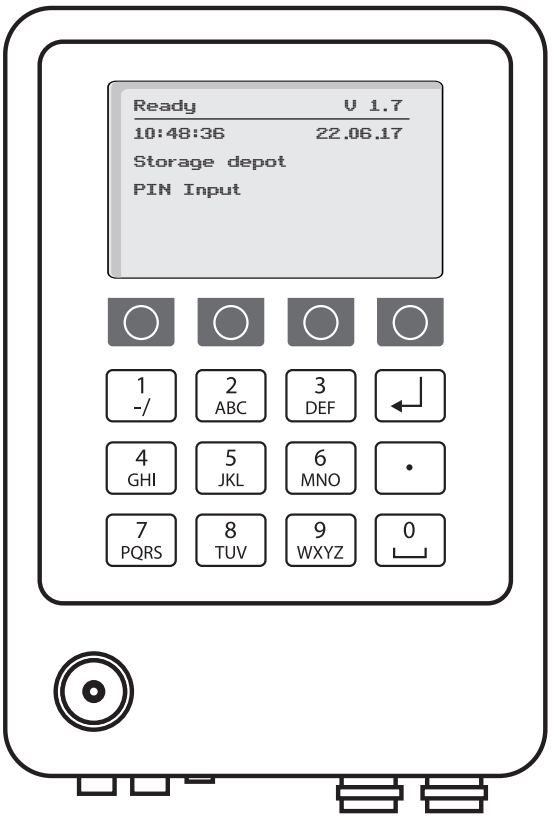


The display shows „Tank leakage“
(The complete tank installation is out of order.)

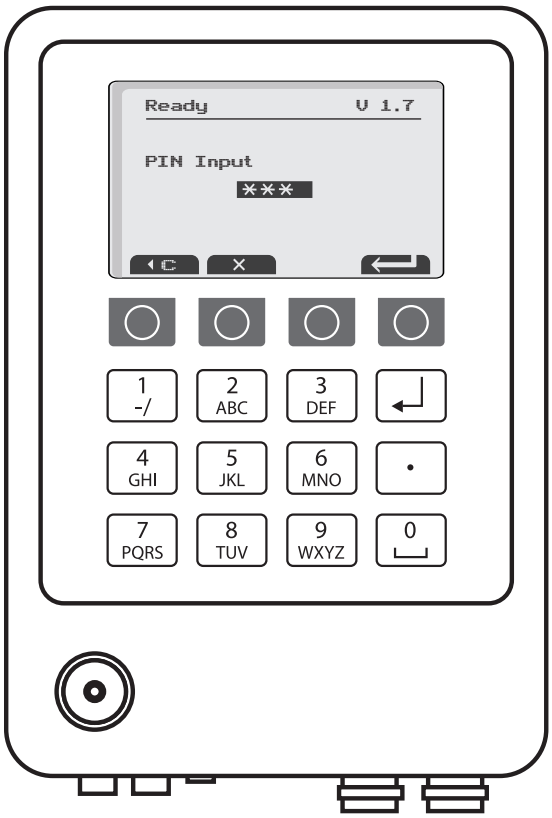
This situation occurs if a tank leaks. Noticing the leak the pre-set leakage sensor blocks the complete installation

The leaking tank can be emptied by a manual switch on of the pump with the function“Check outputs“ in the service menu

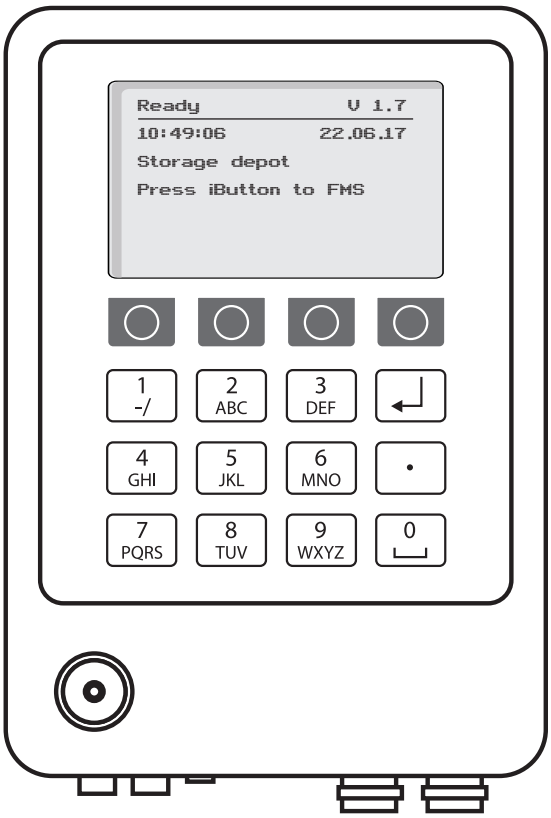
19. Refuelling operation



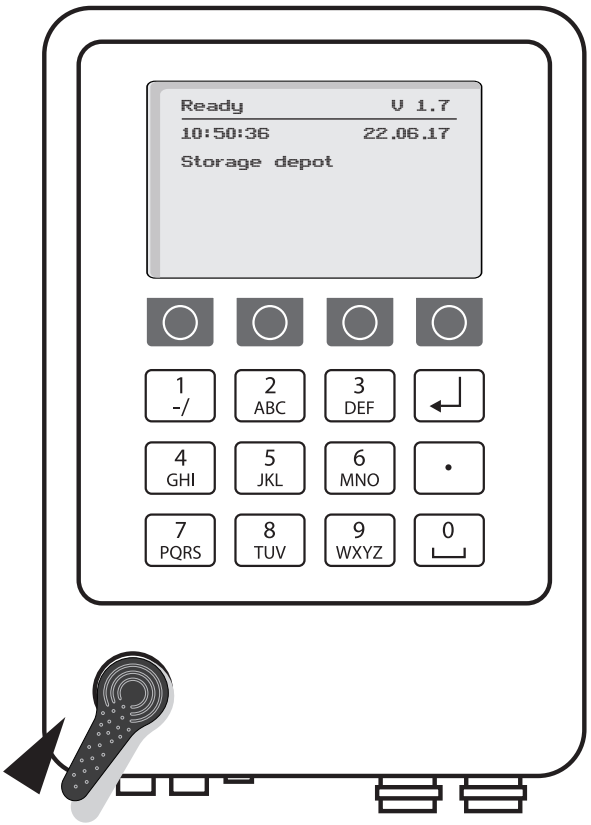
Request for PIN input



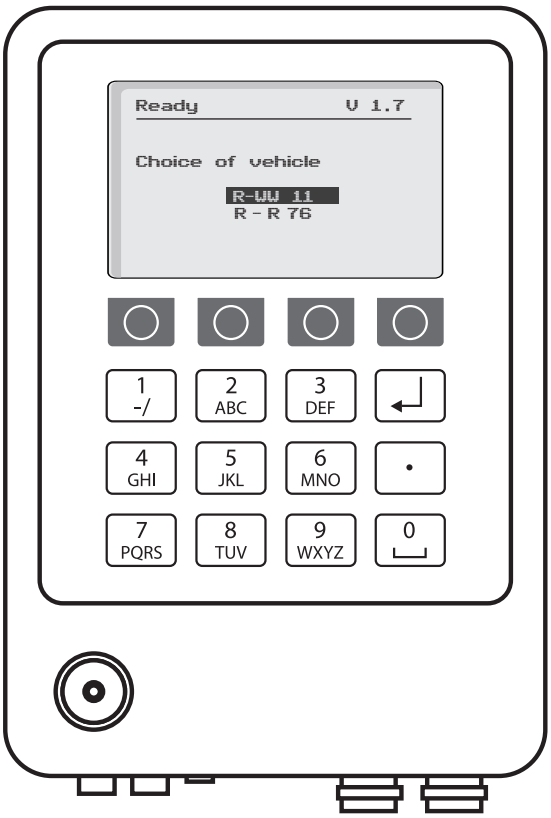
Enter four-digit user PIN and press return button



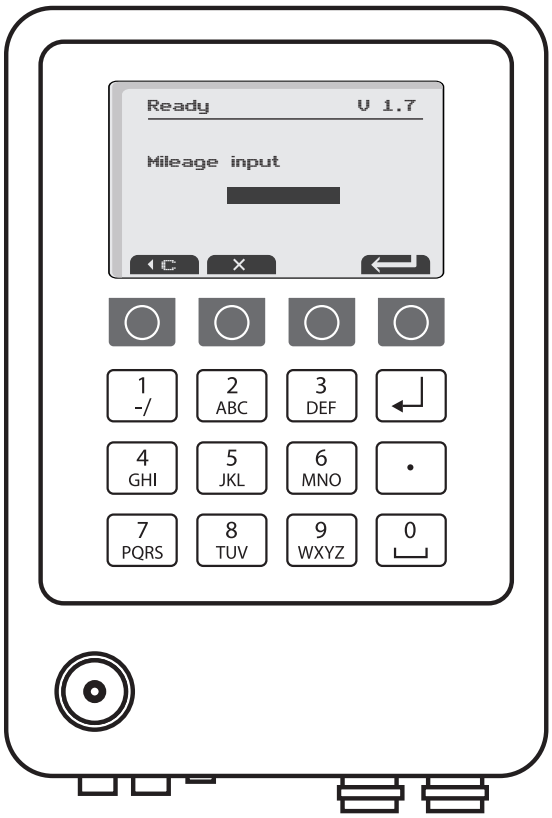
Request for iButton connection
(in case iButton is pre-defined)



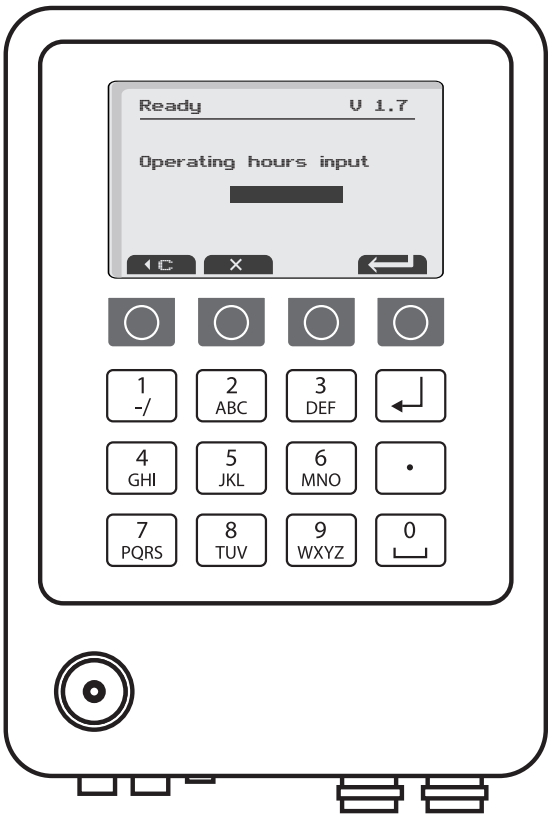
Connect black user iButton



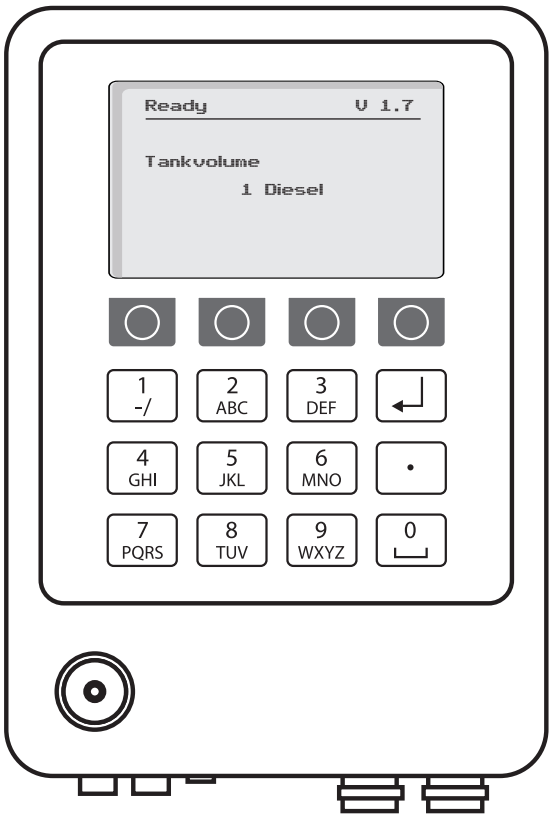
Select vehicle identification number (if pre-defined).



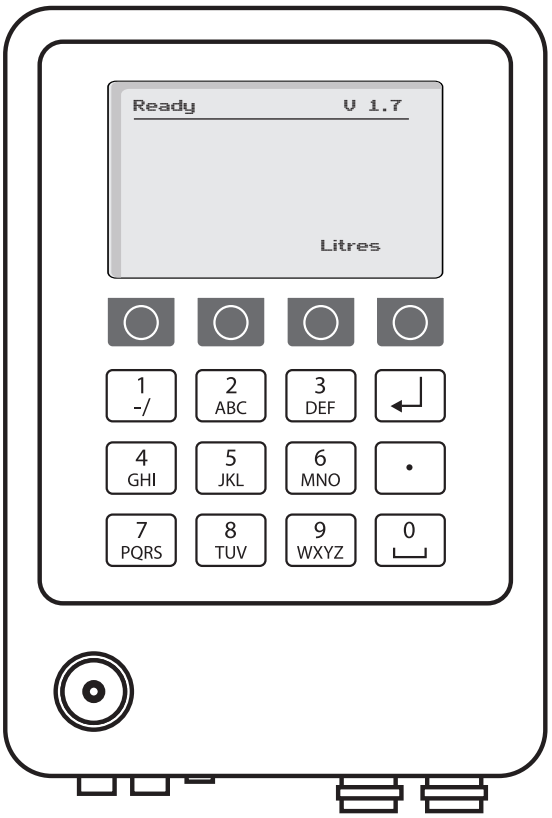
Enter mileage (if the input of the mileage is requested)



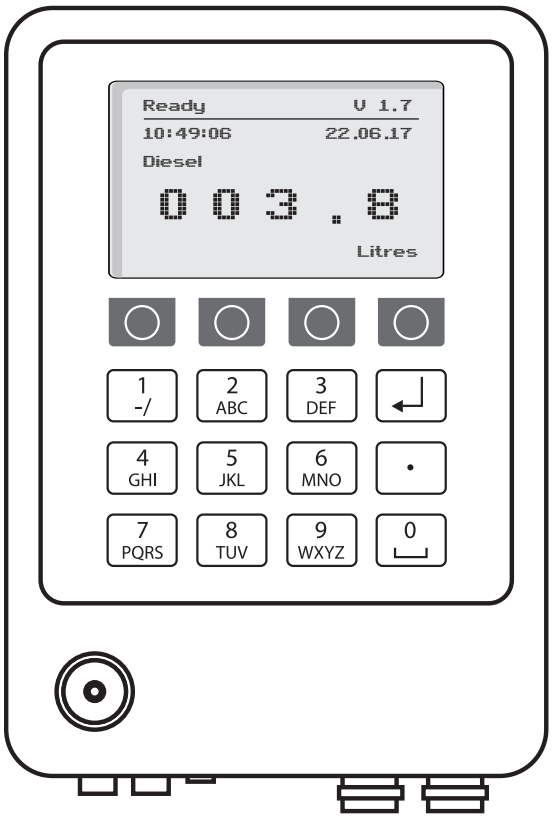
Enter operating hours (if the input of the operating hours is requested)



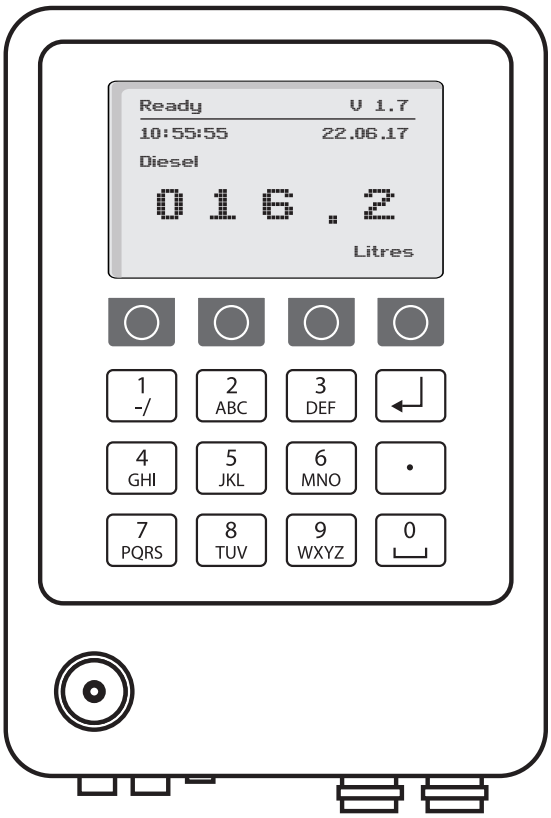
Tank level is displayed



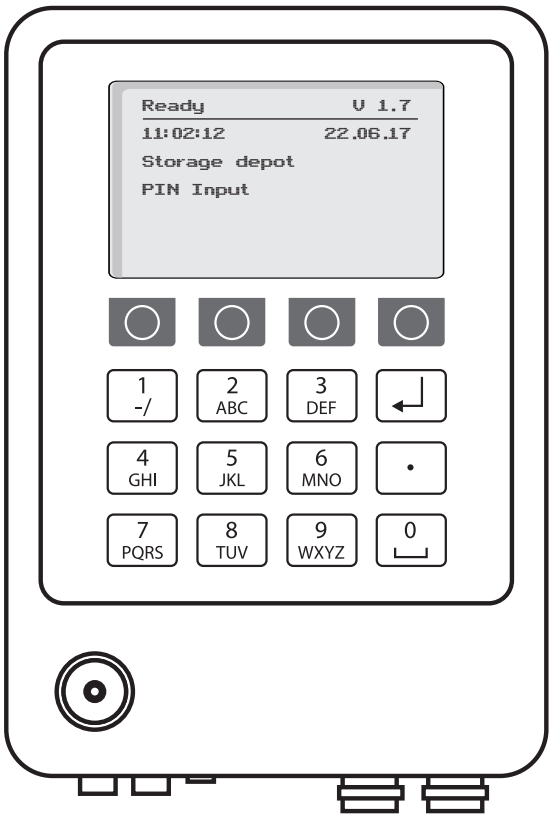
The display waits for the start of refuelling



Refuelling in operation

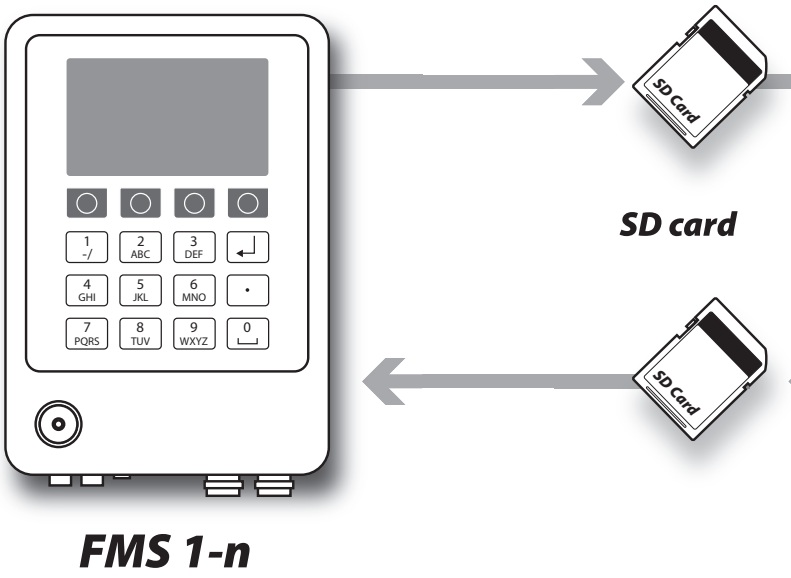


The total refuelled volume will be shown in litres after the refuelling process has been ended



The display automatically sets back to the starting menu according to the pre-set time of the system

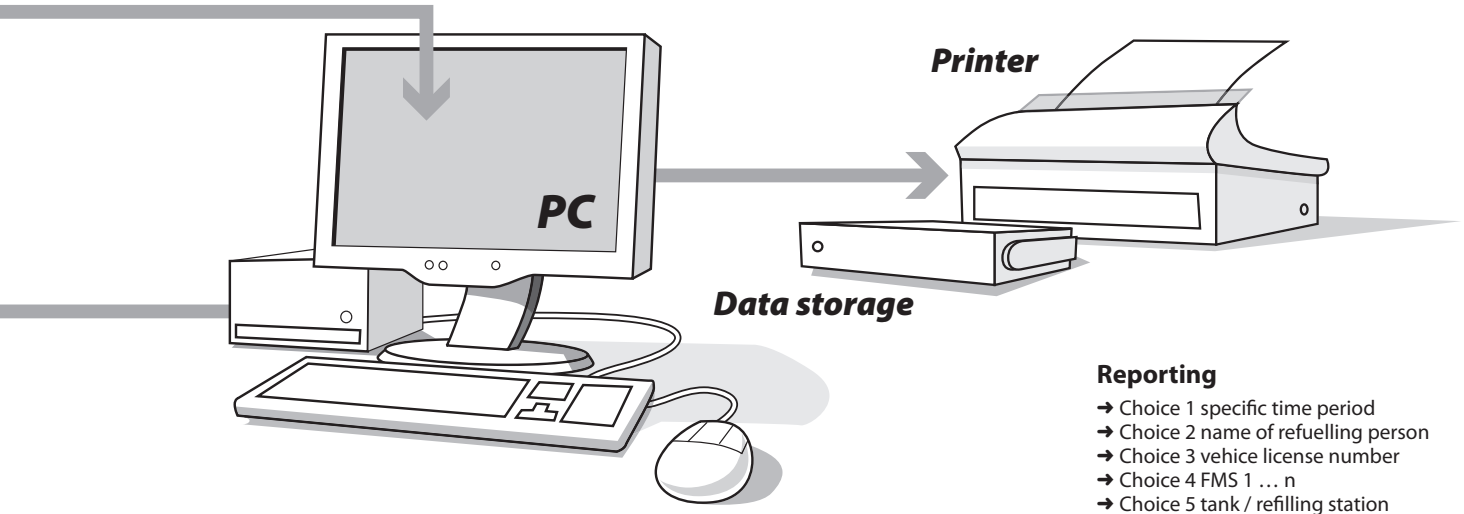
20. Data flow FMS Fluid Management System



Import to PC adminstration software FMS from SD Card

- ➜ FMS No. …
- ➜ Description of place
- ➜ Tank / refilling station No. …
- ➜ Date of refilling process
- ➜ Time of refilling process
- ➜ Name
- ➜ Litres
- ➜ Mileage
- ➜ Vehicle license number
- ➜ Operating hours

The configuration of the system will be transmitted with the SD Card to the FMS



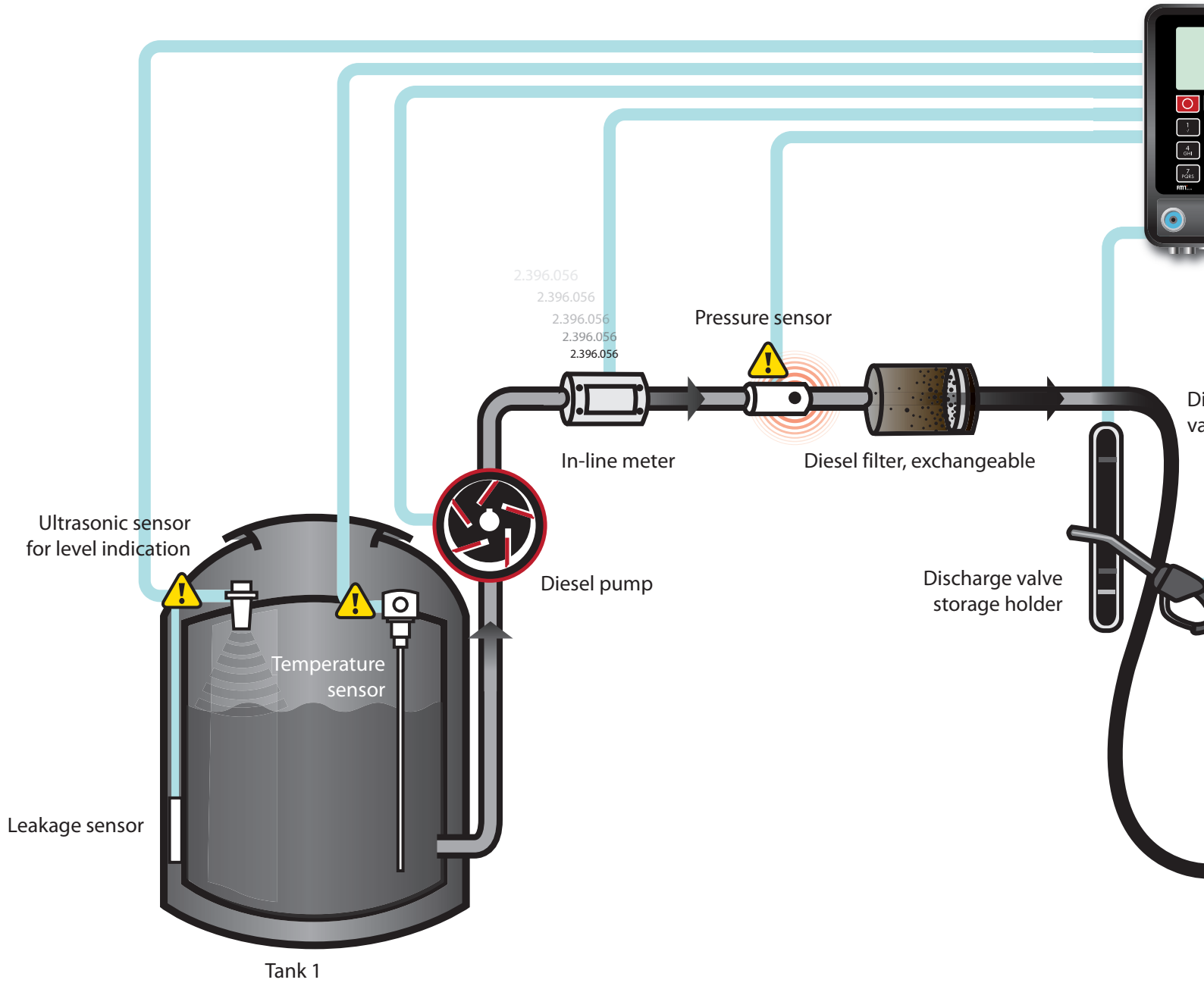
Reporting

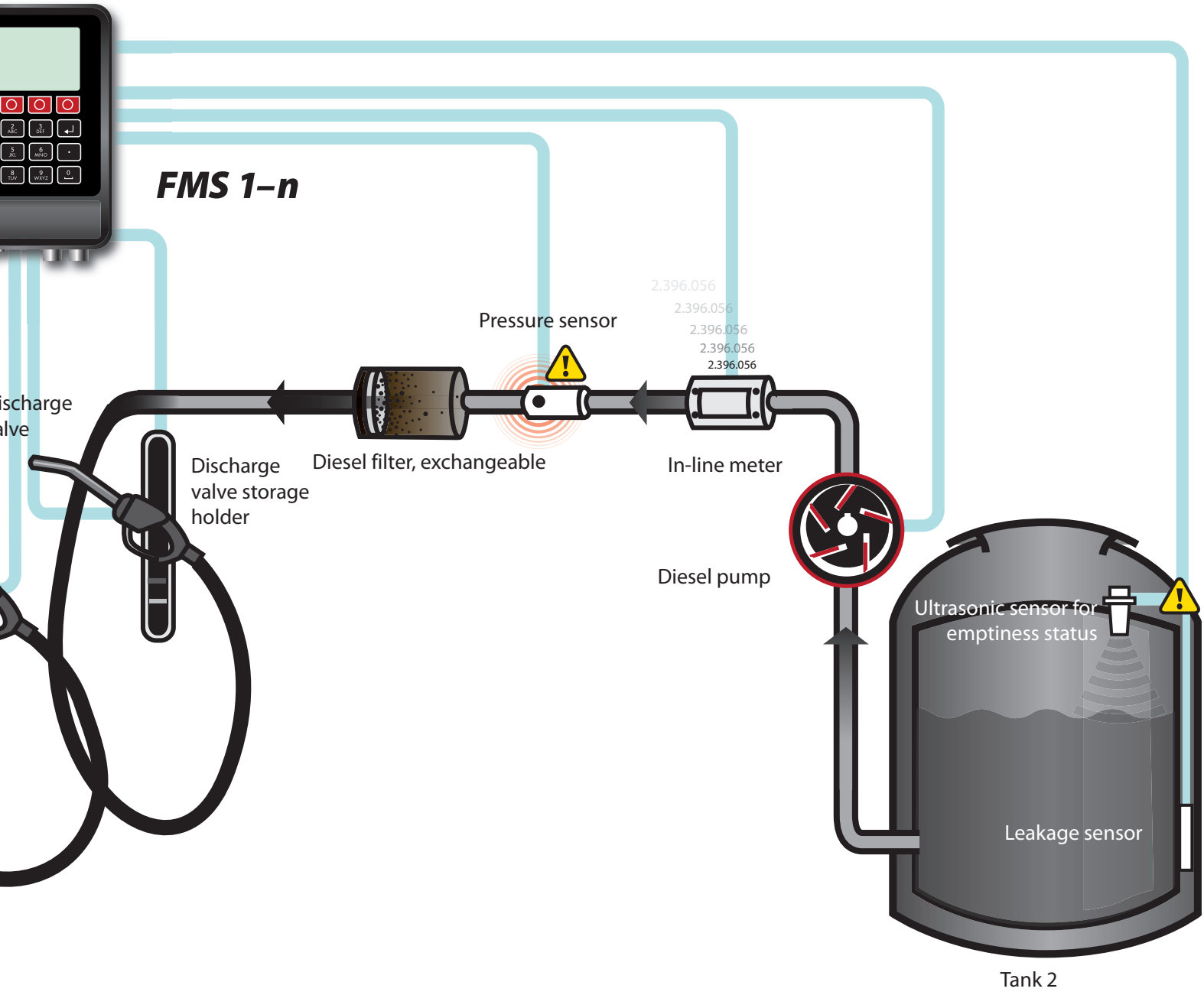
- ➜ Choice 1 specific time period
- ➜ Choice 2 name of refuelling person
- ➜ Choice 3 vehice license number
- ➜ Choice 4 FMS 1 … n
- ➜ Choice 5 tank / refilling station
- ➜ Result indication 1 date
- ➜ Result indication 2 time
- ➜ Result indication 3 name
- ➜ Result indication 4 vehicle license number
- ➜ Result indication 5 volume discharged
- ➜ Result indication 6 refilling station/tank
- ➜ Result indication 7 mileage
- ➜ Result indication 8 consumption / 100 km
- ➜ Result indication 9 operating hours
- ➜ Result indication 10 consumption l/h
- ➜ Result indication 11 remarks
- ➜ Result indication 12 description

The configuration of the system will be generated on a PC and stored on the SD Card

➜ Names of users	
➜ Configuration of iButton ident	
➜ Assignation of the iButton ident to a user	
➜ Number of permitted input failures (PIN)	
➜ Time-out after permitted input failiures (min)	
➜ Time between refuelling and non-operative time (sec)	
➜ Configuration of user passwords	
➜ Type of user, user related	
➜ Classification of vehicles, user related	
➜ Decription of vehicles	
➜ Classification of refilling station = tank, user related	
➜ Decription of refilling station = tank	
➜ Minimum refilling level for empty tank 1	metered
➜ Volume calibration = tank 1	
➜ Volume adjustments	
➜ Language	
➜ Font	
➜ Mileage input yes/no, user related	
➜ Input of operating hours yes/no user related	
➜ Max. refuelling voulme, all users	
➜ Pressure = refilling station 1: yes/no	optional
➜ Pressure = refilling station 1 = FMS 1: minimum pressure	optional
➜ Pressure = refilling station 1 = FMS 1: maximum pressure	optional
➜ Pressure = refilling station 1 = FMS 1: pressure threshold	optional
➜ Liquid level tank 1: yes/no = FMS 1	
➜ Integral leakage sensor: yes/no = FMS 1 = tank 1	optional
➜ Leakage: yes/no = FMS 1 = tank 1	optional
➜ Pressure = refilling station 2 = FMS 1: pressure threshold	optional
➜ Tank empty = tank 2 = FMS 1	optional
➜ Tank leakage = tank 2 = FMS 1	optional
➜ Temperature of tank 1: yes/no = FMS 1	optional
➜ Temperature of tank 1: min = FMS 1	optional
➜ Temperature of tank 1: max = FMS 1	optional
➜ Temperature of tank 1: threshold = FMS 1	optional
➜ FMS heating switch-on at (°C)	
➜ FMS heating switch-off at (°C)	
➜ Background illumination (min)	
➜ Time delay of pump operation (sec)	
➜ Liquid flow check time (sec)	

21. General survey FMS




FMS 1–n
2.396.056
2.396.056
2.396.056
2.396.056
2.396.056
Pressure sensor
ischarge
alve
Discharge
valve storage
holder
Diesel filter, exchangeable
In-line meter
Diesel pump
Ultrasonic sensor for
emptiness status
Leakage sensor
Tank 2

22. Accessories for FMS Fluid Management System

Diesel
Pulse meter Item No. 23 820



Diesel
Pulse meter with display Item No. 23 829



Diesel
Nozzle support Item No. 23 066



Urea
Pulse meter Item No. 23 823



Urea
Pulse meter with display Item No. 23 829 870



Urea
Nozzle support Item No. 23 166



Level indicator and leak indicator
Item No. 23 068



iButton for user-black-set for 10 users
Item No. 23 069



iButton reader
Item No. 83 410



Urea electric diaphragm pump
Item No. 25 280



Diesel pump 60 l/min Item No. 23 430
Diesel pump 100 l/min Item No. 23 433



FMT Swiss AG
Fluid Management Technologies Swiss AG
Gewerbestraße 6
6330 Cham / Schweiz
Tel. +41 41 712 05 37
Fax +41 41 720 26 21
info@fmtag.com
www.fmtag.com

FMT Swiss AG