Smart Monitoring

Kingspan Access – Fuel Terminal

Technical Documentation and Service Manual

ENG

kingspanenergymanagement.com

Kingspan®

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Warnings and safety instructions

To avoid problems during operation of the terminal it is recommended to read the manual before using the system.
Do not change construction of the device nor carry out unauthorized repairs, in particular with regard to components and elements!
Configuration, calibration or repairs of the terminal may be carried out only by authorized personnel (installer or service).

Caution!
Connection should be carried out by a person authorized and trained in the field of electrical installations!
The manufacturer is not liable for damages resulting from improper connection of the system! Since the terminal is ~230 V AC powered, carelessness or improper connection may result in electric shock and pose a threat to health and life! Therefore, maximum caution should be maintained during connection of the terminal.
The wire during installation and connection of the terminal can not be live!
If the terminal is not connected to power by inserting plug into mains socket, but directly to current circuit, before connecting the terminal to the circuit it is important to isolate voltage!

Caution!
Because the terminal does not have isolation switch, it is important to advise the user how to isolate the device (e.g. by removing the plug or indicating the terminal circuit fuse).

Caution!
When operating the terminal it is important to follow fuel tank manual prepared by the manufacturer of the tank.
When operating the terminal it is important to remember that switching on/off fuel pump goes automatically after login/logout the cards.

Caution!
The terminal should be permanently connected to power supply. The lack of power supply makes it impossible to send data to and from the terminal. The lack of data transfer results in the lack of access to current data and makes it impossible to send archival data.

This symbol indicates that this product must not be disposed of with other waste, as it can cause negative effects on the environment and human health. The user is responsible for disposing of used equipment to designated collection point for waste electrical and electronic equipment. Detailed information on recycling is available at local city office, municipal enterprise or at the place of purchase. Segregation of electrical waste and electronic equipment, appropriate processing and disposal of hazardous substances protect the environment from pollution and contamination.

1. Introduction

Kingspan Access terminal is a device for fuel tanks that uses RFID identification – proximity cards with unique codes - and wireless data transmission to a server via GSM, WiFi or LAN connection.

The fuel terminal due to two-step authorization (eg vehicle/driver, administrator/employee) controls access to fuel tank, turns on and off fuel pump (230 V AC), registers data on users' login and allows to:

- **control the amount of fuel** dispensed from fuel tank (after connecting flow meter),
- **monitor fuel level in tank** (after installation of hydrostatic probe PR36-X),
- **enter current odometer readings** before refueling (option set in terminal setup),
- **save users and vehicles** base authorized to log in and remote update of the database,
- **location control** - thanks to built-in GPS module,
- **personal settings** such as displayed parameters, minimum fuel level enabling refueling, allowed idle time,
- **monitor fuel level** in several tanks (optional),
- **monitor hatch opening/closing** (after installing additional reed sensor),
- **monitor leaks of fuel** to interstitial space on a basis of signal from leakage reed sensor (option prepared on special order),
- **enter individual calibration** table to the terminal.

All data collected by Kingspan Access terminal is available online via internet. Access is protected by a password, so the data is only available for authorized persons.

Thanks to GPS technology it is possible to see position of tanks on a digital map. This is particularly important for companies frequently changing position of tanks and for fuel suppliers. The possibility to localize the tank on a map together with automatic notifications via email allow to automate process of ordering fuel supplies.

At defined minimum level of fuel an email could be automatically sent to a fuel wholesaler, indicating the need for a new delivery.

2. Technical specification

Terminal casing
- **length:** 190 mm
- **width:** 190 mm
- **height:** 55 mm
- **material:** polycarbonate (PC)
- **colour:** light gray with transparent cover
- **degree of protection:** IP 65

Working parameters
- **power:** 230 V AC
- **working temperature:** -20°C ÷ +50°C

LCD display
- **type:** TFT
- **pixels colour:** colourful
- **diagonal:** 5,7 inch
- **definition:** 640x480 pixels
- **active area:** 115,2 x 86,4 mm
- **numer of colours:** 262 000

Connectors
- **2 external connectors SMA** to connect GSM and GPS antennas
- **internal list to connect power** supply enabling the connection of:
  - flow meter
  - hydrostatic probe PR36X
  - fuel pump supplied with single-phase voltage (~230 V AC) with maximum current consumption 8A
  - reed sensor (eg. to monitor hatch position)

Standard equipment
- 26-button keyboard
- in built GPS module (location, clock synchronization)
- internal GPRS (GSM) modem (wireless communication)
- internal RFID reader UNIQUE 125 kHz (user identification)
- internal supplier 12 V DC
- software controlled DPDT AC 250 V 8A transmitter (for single-phase fuel pump)

3. General information

3.1. Power supply

The terminal should be permanently connected to power supply. The lack of power supply makes it impossible to send data to and from the terminal. The lack of data transfer results in the lack of access to current data and makes it impossible to send archival data.

3.2. Refueling

To start refueling it is necessary to authorize two cards from the same group: **MASTER** and **USER**. **MASTER** card should be authorized as the first one. If within 30 seconds after logging in **MASTER** card **USER** card is not authorized, **MASTER** card is logged out.

If after logging in two cards the terminal asks to enter odometer readings, please enter current odometer readings and confirm with **OK**.

After approving current odometer readings a window to enter a note displays. Enter a note, confirm with **OK**, then **Refueling** screen displays with details about refueling.

Next switch the pump power on by pressing **F8** key (the pump can be switched on automatically after authorizing **USER** card and raising the nozzle, if the nozzle sensor is connected) and start refueling.

Display screen asking the number of kilometers and notes is optional and you can customize these settings.

It is also possible to customize waiting time to log in the cards.

After the pump starts working the user has specified time (configurable) to start refueling. If in a certain period of time no action occurs, the user is automatically logged out, and the pump is turned off.

The level of currently dispensed fuel is displayed in the middle of the screen before the capital letter **„L"**.

After refueling the **USER** card should be logged out! Logging out results in saving refueling data.

After refueling by all users MASTER card should also be logged out!

If the cards are not logged out by pressing key on keyboard, after a certain period of inactivity they are logged out automatically (idle time is configurable).

3.2. Refueling

Correct order of operations during refueling.

The tank manufacturer recommends to first of all switch off the pump after refueling and then, when the fuel does not flow, to release the fuel nozzle handle.

Reversed order causes pressurized fuel left in distribution cable, which is not preferred.

In addition, permissible operating time of fuel pump with closed fuel nozzle is very short.

Taking the above into consideration proper refueling should proceed as follows:

1. logging in **MASTER** card
2. logging in **USER** card
3. entering current odometer readings
4. entering notes or selecting template from the list (option, selection in settings)
5. switching on the pump power by pressing **F8** key (if nozzle sensor is not connected)
6. opening the fuel nozzle (start of refueling)
7. switching off the pump with a switch (starting refueling)
8. switching off the pump with a switch (if nozzle sensor is not connected)
9. switching off the fuel nozzle after fuel stops to flow (end of refueling)
10. logging out cards (using **F1** button on terminal keyboard)

Caution! Not following the above order has a negative impact on equipment and may result in its failure!

After logging out by pressing **F1** information about logging off is displayed on the screen for 3 seconds and then the terminal automatically goes to standby mode.

3.3. Logging in cards

To log in a card put it close to the terminal casing in marked area as presented on the left.

After logging in cards a short sound is generated and information about logged in cards is displayed.

3.4. Logging off cards

To log off **USER** card press **F5** on keyboard. After logging off **USER** card the fuel pump power is switched off.

To log off **MASTER** card press **F1** on the keyboard.

After each logging out the screen displays appropriate message. After logging off **USER** card the fuel pump is switched off!

3.5. Writing notes

Writing notes is possible after logging in two cards from the same group: **MASTER** and **USER.**

To write a note press **F4** after logging in the cards.

Then a word processor opens, where notes could be written like text messages in a cell phone.

After closing the word processor with a note, time of entering the note is saved together with numbers of logged in cards.

It is also possible to enter a note defined by the manufacturer from the list of notes by pressing **F5** button.

3.6. Fuel delivery

To register fuel delivery before the delivery press **F1** and log in **ADMIN** or **USER** card, then after the delivery enter the amount of delivered fuel.

3.7. Information about status of the terminal

In standby mode before authorizing **MASTER** card additional information may be displayed:

- **Terminal ID** (eg. 0567t0123) and software version,
- **Level of GSM signal** and Internnet connection status,
- **GPS coordinates** of the terminal,
- **Number of cards** in device memory,
- **Information about the last refueling** (this information is optional, whether it is available or not depends on the configuration),
- **Fuel level and temperature in the tanks** (this information is optional, whether it is available or not depends on the configuration),
- **Displaying current value of TOTAL** counter (this information is optional, whether it is available or not depends on the configuration).

3.8. Downloading a new list of cards from the terminal

Downloads configuration and a new list of cards from the defined server.

3.9. Changing language

It allows to select and change language in the terminal.

The symbol of the national flag informs about currently set language.

3.10. Minimum and maximum fuel level

If the terminal is connected to fuel probe and minimum level is configured as above zero the pump could work only when fuel level in the tank equals defined minimum or more!

Such a requirement is a safeguard against aeration of distribution system and should prevent the pump from running dry, which could result in damage to the pump!

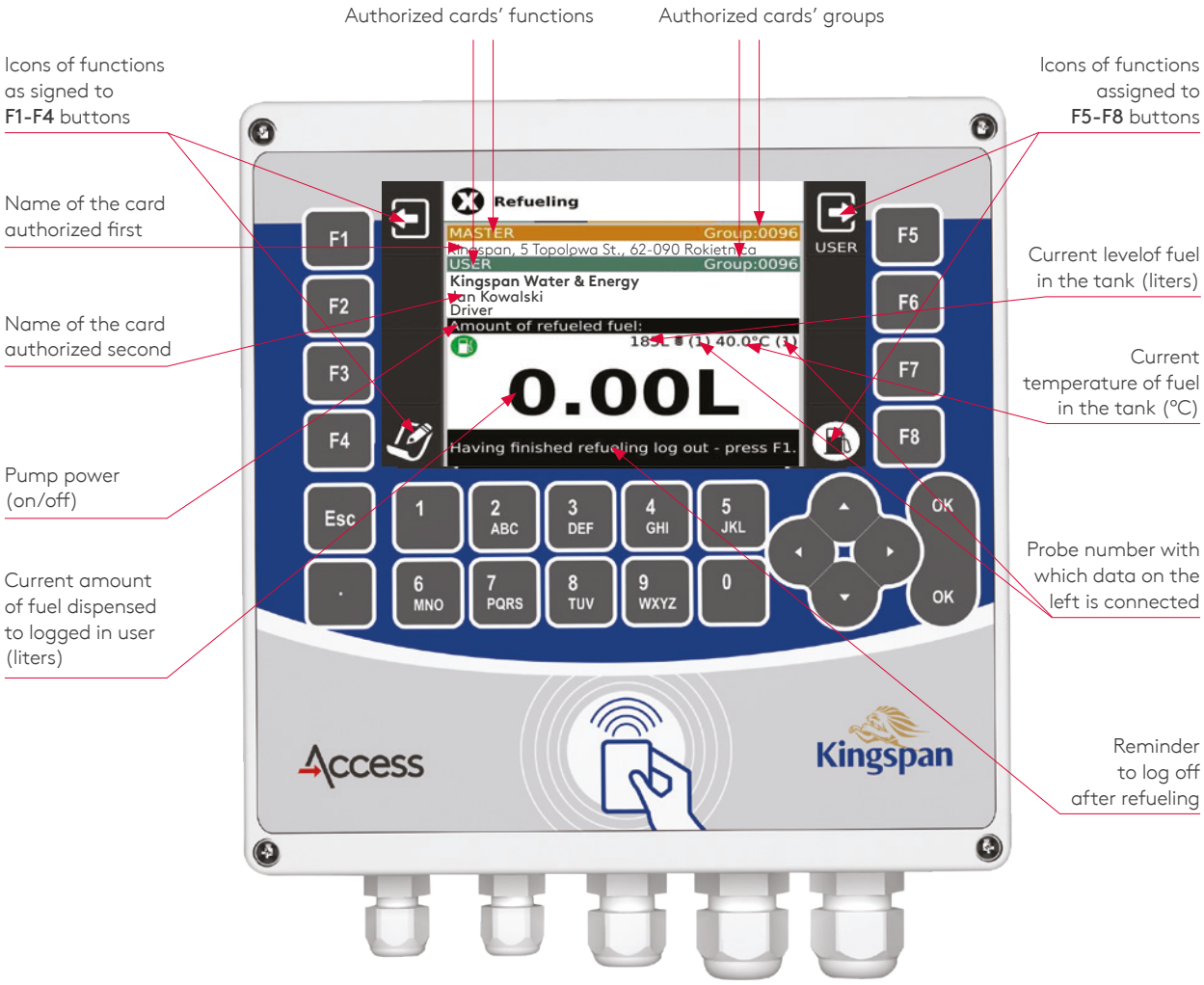
Setting the maximum level results in displaying a message and generating an audible signal after exceeding the set threshold. The alarm disappears when the level falls below the set value.

3.11. Additional comments

Authorized **USER** and **MASTER** cards have to be assigned to the same group.

The attempt to log in two cards from different groups will fail.

4. The screen after authorizing MASTER and USER cards



4.1. Optional general information

Displaying additional information connected with icons described below is optional.

They can be displayed on the screen or not - it depends on hardware and software setup.

Pump power

pump power is off,
pump dispenser cannot start operating

pump power is on,
pump dispenser can start operating

Fuel level in tank

Current fuel level in liters is displayed on the screen on the left side of the icon .

Fuel temperature in the tank

Fuel temperature in the tank in C is displayed on the left side of the icon **°C**.

Probe number

On the right side of the icon on a black background the probe number is displayed to which fuel level on the left side of the icon is connected.

On the right side of the icon **°C** on a black background the probe number is displayed with which temperature on the left side of the icon is connected.

Changing probe number (only in case of multiple probes installation)

When multiple probes are connected to the terminal, probe number which data (fuel level and temperature) is displayed on the screen can be changed by pressing left/right arrows.

5. Detailed user information

5.1. Waiting for logging in MASTER card

After turning on power and after logging off cards the terminal is in standby mode before logging in **MASTER** card.

In standby mode the display backlighting is turned off. It turns on after logging in first card or after pressing button on the keyboard, to which one of active functions is assigned.

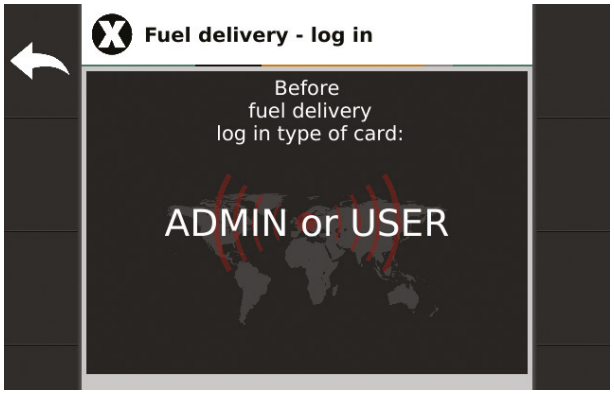
The screen in standby mode looks as below:

5.2. Fuel delivery

In standby mode additional functions are available:

F1 -Fuel delivery
To register a new fuel delivery press **F1** before.

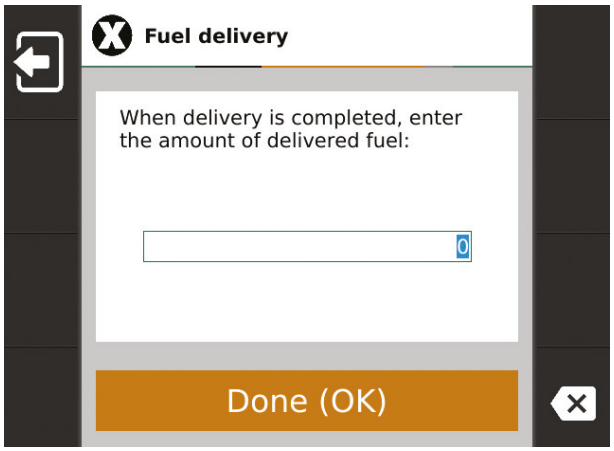
The screen displays the below information:



Now log in **ADMIN** or **USER** card. If neither of cards is logged in, after some time the terminal automatically enters standby mode.

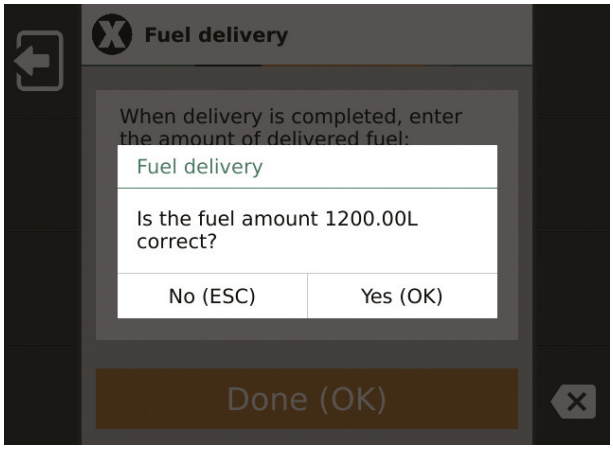
At any time it is possible to enter standby mode manually by pressing **F1**.

After logging in **ADMIN** or **USER** card screen looks as below:



Start refueling. Having finished enter the amount of added fuel using the keyboard and press **OK**. The amount of fuel must be confirmed.

It is possible to add a note to the delivery by pressing the **F4** key. This note will be visible in the system (it can be, for example, the price per liter of fuel).



If the amount is not correct, press **ESC** and e-enter the amount.

If the amount is correct press **OK**. The terminal will automatically go to standby mode.

F5 - Downloading a new list of cards and setup from the Server
The terminal automatically and periodically checks whether a new list of cards and setup are available on the server. To download a new list at any time, press **F5**. While connecting to the server the screen displays information about the status of actions.

5.3. Communication with the server, information about state of the terminal

Caution! The list is downloaded if it has previously been prepared and is available on the server!

After pressing **F5** the screen looks as below:

After downloading the file the terminal has to update it in its memory. After the update the screen displays the number of items on the newly updated list:

No files on the server
If there are no files available on the server the attempt fails and the below message appears:

F4 - Information about state of the terminal
In standby mode before authorizing **MASTER** card additional information may be displayed:

- **Terminal ID**
  Each terminal has a unique identifier, which consists of eight digits separated by the letter t. It may look like: 0567t0123.

- **Modem**


symbol indicating the lack of a SIM card,


symbol indicating a blocked SIM card (eg no PIN or incorrect PIN),


symbol indicating lack of GSM network coverage,


symbols indicating GSM signal strength,


symbol indicating a problem with the internet connection using GSM network (eg no active transmission, incorrect APN),


symbol indicating connection of the terminal to the LAN,


symbol indicating a problem with internet connection using LAN (eg no IP address terminala do sieci WiFi, obtained),


symbol indicating connection of the terminal to the WiFi network,


symbol indicating a problem with internet connection using WiFi network,


symbol indicating correct data transmission to the system,


symbol indicating no data transmission.

5.3. Communication with the server, information about state of the terminal

- **GPS**
  Coordinates of the geographical location where the terminal is located.

Note! If the signal is weak there could be no coordinates.

- **Size of list**
  Number of cards currently uploaded to the terminal.

- **Last refueling**
  This function is optional and is not always available (it depends on the settings of displayed parameters). If the function is available, it displays information about the last refueling (if login was without refueling, the value of 0.00 is displayed).

- **Fuel level and temperature in tanks**
  This function is optional and is not always available (it depends on the settings of displayed parameters).
  If the function is available, it displays fuel level in litres on the left side of the icon .

  The current temperature in the tank in degrees Celsius is displayed on the screen on the left side of the symbol **°C**.

  On the right side of the icon on a black background probe number is displayed, to which level on the left side of the icon refers. When connecting several probes into the terminal by pressing left/right up/down arrows you can change the number of probe for which level and temperature are displayed.

- **TOTAL**
  This function is optional and is not always available (it depends on the settings of displayed parameters). If the function is available, it displays current information about **TOTAL** counter (total amount of dispensed fuel in litres).

5.4. Logging in cards

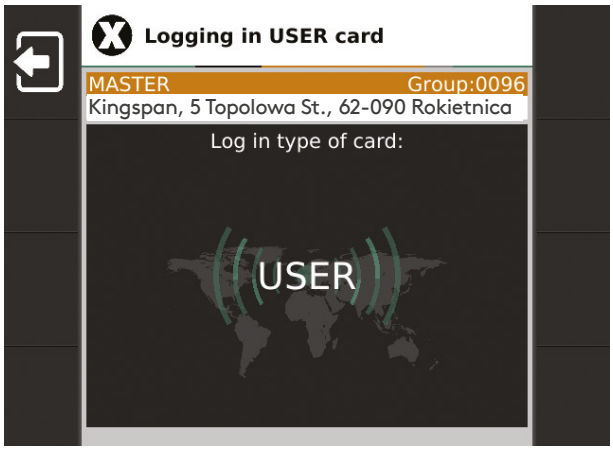
To log in a card put it close to the terminal casing in the marked area. After logging in the cards a short sound is generated, the screen displays information about the logged in card.

The picture on the right shows examples of cards and key rings supported by Kingspan Access terminal.

5.5. Logging in MASTER RFID card

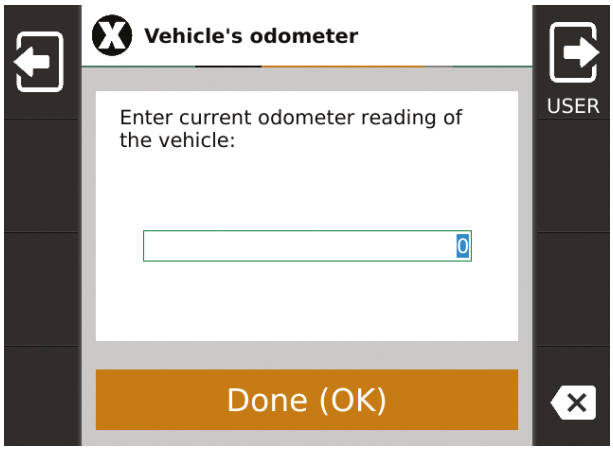
After logging **MASTER** card, the screen displays data assigned to the card and information to log **USER** card to start refueling.

Below is an example of the terminal screen after logging **MASTER** card:



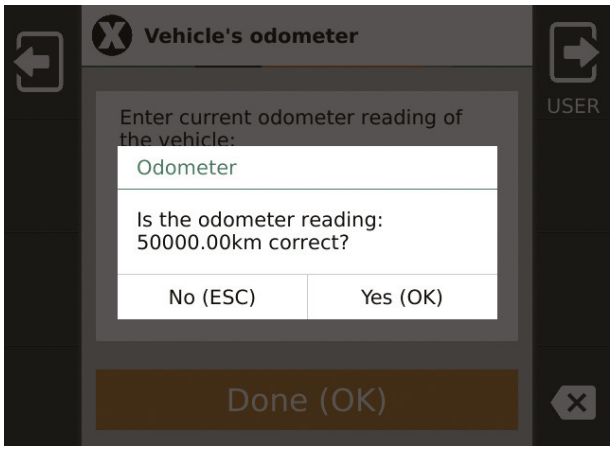
5.6. Logging in USER card

After logging in **USER** card a window for entering current odometer readings may appear on the screen (this depends on the configuration settings of displayed parameters):



When entering odometer readings it is possible to log off by pressing **F1** (there is also an option of automatic logging out after a period of inactivity).

After entering odometer readings press **OK**. The value should be confirmed:



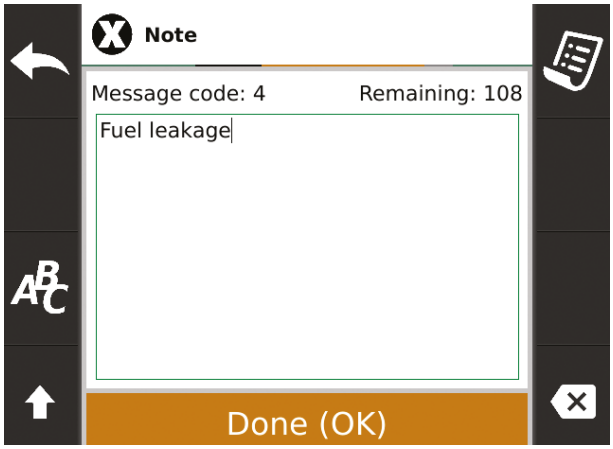
5.6. Logging in USER card

If odometer readings are not correct, press **ESC** and re-enter the value. If odometer readings are correct, confirm by pressing **OK** - the pump power is turned on and the screen displays refueling window.

Below is an example of the terminal screen after authorizing **MASTER** and **USER** cards and entering odometer readings:

5.7. Writing notes (F4)

After selecting this option the screen displays edit window and menu on the left and right. In the top line of the edit window information about current position of the cursor and the number of characters left is displayed. Finish editing and exit the editor by pressing **OK** or **ESC**.



Functions available from editor menu:

F1 - Exit the editor

F3 - Switching between text input modes:
alphanumeric and numeric. In alphanumeric mode, the user can, as in the case of a mobile phone, enter text using numeric keys. Each digit corresponds to several letters (description on the keyboard) and the number on the button.

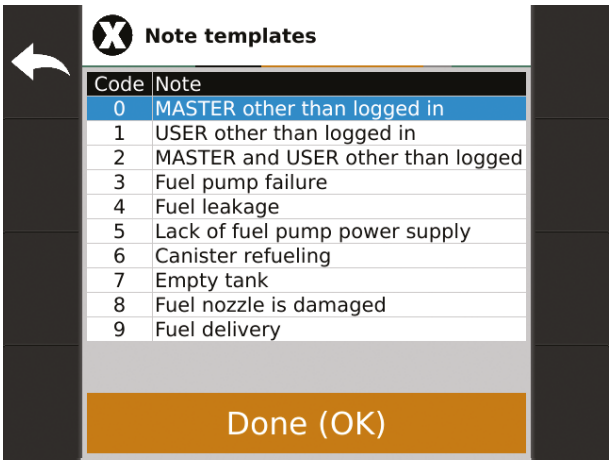
Choose a letter by pressing a numeric key - the screen displays a set of available characters and currently selected character is highlighted in black. Pressing **0** inserts a space, button **1** inserts punctuation marks: **, . : ;** In numeric mode you can enter only numbers assigned to individual keys.

F4 - „Shift" button changes size of letters

5.7. Writing notes (F4)

F5 - List of preprepared template notes
On the displayed list by using up/down arrows you can select the appropriate template and confirm by pressing **OK**. It will be placed in input field. Quick template selection - you can also quickly select a template by pressing the digit number, which is located up the left side, in the line with the desired note.

F8 - „Backspace" button
Deletes the character on the left side of the cursor.

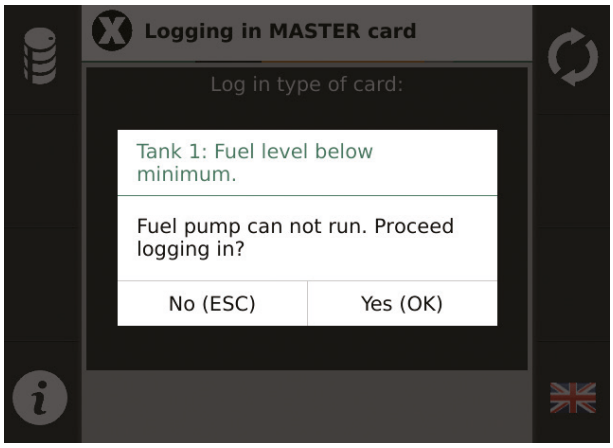


6. Minimum and maximum fuel level in the tank, leak sensor

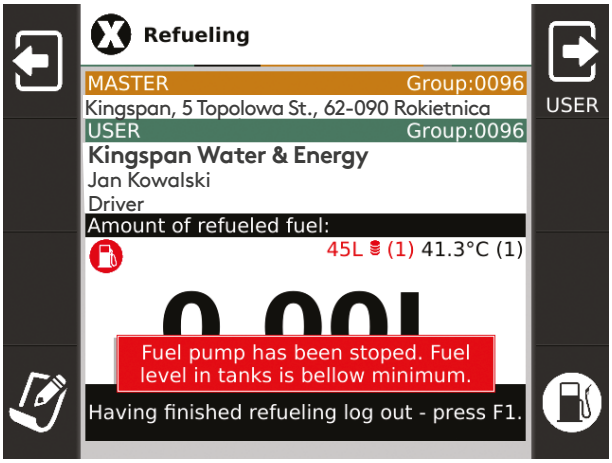
6.1. Minimum fuel level

If current fuel level is below the defined minimum, the pump operation and refueling will not be possible. This is to protect the pump from running dry and the hydraulic system from aeration.

When current fuel level is below the defined minimum **MASTER** and **USER** cards can be logged in, but the pump cannot operate! After logging in the cards the following message displays:



After confirming, the cards are logged in, but the pump does not operate and it is impossible to start refueling.



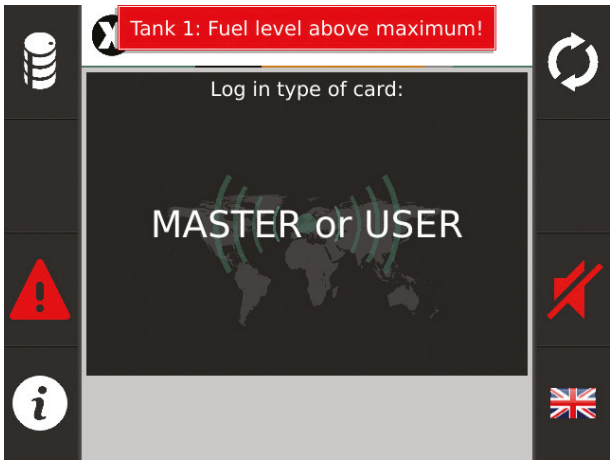
When multiple probes are connected to one terminal additional information about the minimum level can be found in Section 8.1.

6.2. Maximum fuel level

If the current fuel level is above the defined maximum, a message and an audible signal are generated. The audible signal can be turned off by pressing the **F7** key.

The message on the display will remain until the cause of the alarm ceases, i.e. until the level is less than the defined one. Pressing **F3** will display a list of current alarms.

In a situation where the level is above the defined maximum you can log **MASTER** and **USER** cards and perform refueling as usual.



6.3. Leak sensor

The terminal has the option of connecting a leak sensor to one of 5 inputs.

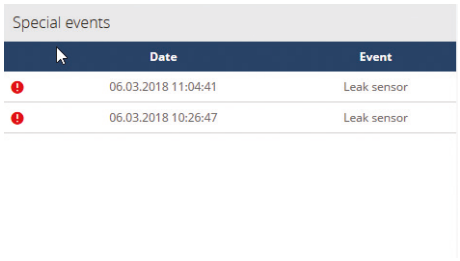
Detecting a leak through the sensor is signaled by an audible signal and a message on the terminal screen, e.g. **"Leak sensor 1. Leak detected":**

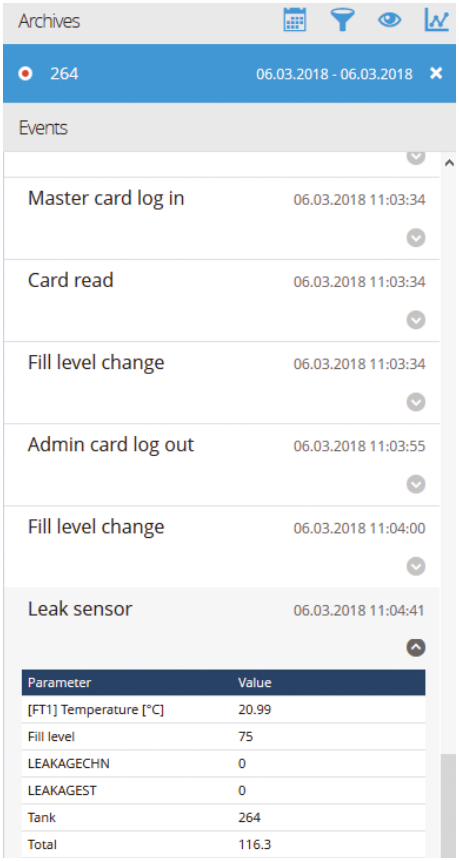
It is possible to turn off the sound signaling by pressing the **F7** key.

The message on the display will remain until the cause of the alarm is removed. Pressing **F3** will display a list of current alarms:

6.3. Leak sensor

In addition, the Kingspan Connect system shows events informing about the leak both on the main panel and in the archive.





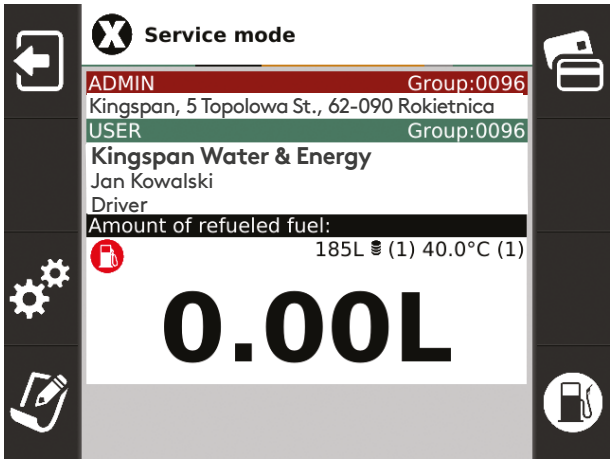
7. Detailed information for administrator and service

7.1. Service mode

Service mode is available after two step authorization **ADMIN/MASTER** or **ADMIN/USER**. **ADMIN** card should be authorized as the first one. If within 30 seconds after logging **ADMIN** card **MASTER** or **USER** card is not authorized, **ADMIN** card is logged out.

If within 30 seconds after entering the service mode no action is taken, this mode automatically closes, which means logging out all the cards.

Below is an example of the terminal screen in service mode:



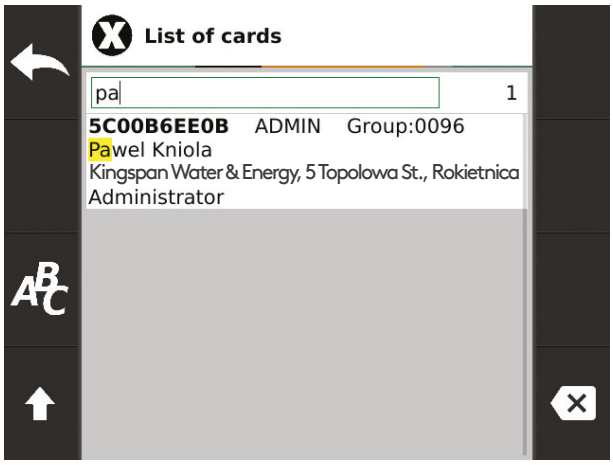
7.1. Service mode

F1 - Closing service mode
After pressing F1 all logged in cards are logged out.

F3 - Entering settings menu
It allows access to all available service settings. The screen displays information that identifies the terminal and all service data.

F4 - Writing notes
Described in Section 5.5 Writing notes (**F4**).

F5 - List of cards
Displays active list of users from the terminal memory. After selecting this option a table with detailed information on the cards displays.



In **"Search list"** field you can enter a searched phrase keyword. The search operates in real time in all the fields: card number, group, card type, description etc. Found matching phrases are highlighted, and the list of cards is limited to the cards with the key word.

F8 - Turn on/off pump power
Pressing **F8** changes the status: **turn on/off the pump power**.

7.2. Menu in settings mode

Menu structure in settings mode:

- F1 - Return to the previous screen
- F2 - System configuration
  - F1 - Return to the previous screen
  - F5 - Restore factory settings
  - F5 - Deleting the last „Backspace" character
- F3 - Displayed parameters
  - F1 - Return to the previous screen
  - F5 - Restore factory settings
- F4 - Wi-Fi configuration
  - F1 - Return to the previous screen
  - F4 - Information on the status of the WiFi network
    - F1 - Return to the previous screen
  - F5 - Choice/Network modification
  - F1 - Return to the previous screen
    - F3 - Switch between alphanumeric and numeric text input mode
    - F4 - Change in the size of letters entered
    - F8 - Delete the last „Backspace" character
  - F6 - Forget the network
- F5 - Calibration tarin
  Resetting the current net valu
- F6 - Calibration of the flow meter
  - F1 - Return to the previous screen
  - F4 - Wizard for determining the flowmeter coefficient
    - F1 - Return to the previous screen
    - F2 - Editi the amount of fuel delivered in the current row
    - F4 - Switch on/off the fuel pump
    - F5 - Reset the number of pulses in the current row
    - F8 - Delete the last „Backspace" character
  - F5 - Restore factory settings
- F7 - Fuel tanks
  - F1 - Return to the previous screen
  - F2 - Edit the table (litres table selection, edition edition, level min and max)
  - F3 - Configuration of leak sensors
    - F1 - Return to the previous screen
    - F5 - Restore factory settings
  - F4 - The minus sign
  - F5 - Pressure per liter conversion tables

7.2. Menu in settings mode

F1 - Return to the previous screen

F2 - Edit the table

F3 - Switch between the alphanumeric and numeric text input mode

F4 - Change in the size of letters entered

F5 - Insert a new item above the selected on

F6 - Insert a new item below the selected on

F7 - Delete the selected item

F8 - Delete the last „Backspace" character

F6 - Addres the new probe

F7 - Delete the selected probe from the system

F8 - Delete the last „Backspace" character

F8 - SIM card configuration

F1 - Return to the previous screen

F4 - Configuration of APN, username and password

F1 - Return to the previous screen

F3 - Switch between the alphanumeric and numeric text input mode

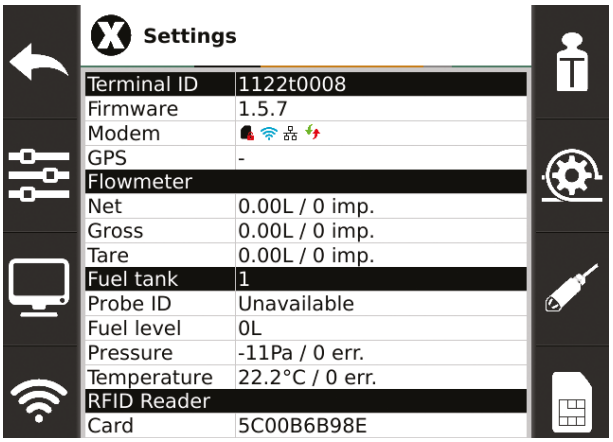
F4 - Change in the size of letters entered

F5 - Restore factory settings

F8 - Delete the last „Backspace" character

F8 - Delete the last „Backspace" character

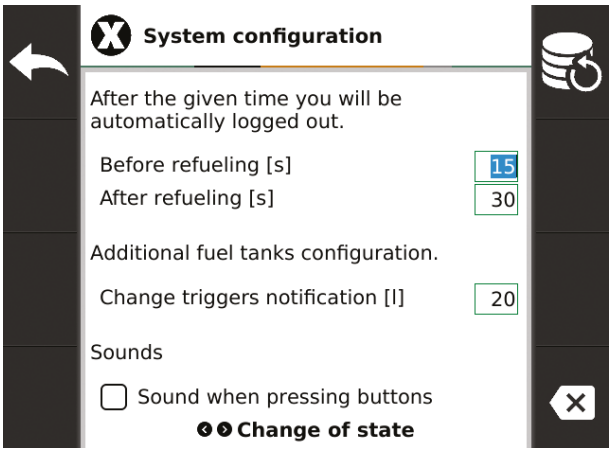
Screen in the settings menu:



Menu options in settings menu:

F1 - Exit settings mode
Return to the previous screen

F2 - System configuration
Allows configuration of the below terminal parameters:



7.2. Menu in settings mode

Before refueling [s]
– maximum time [in seconds] the user has to start refueling from authorizing **USER** card.

After refueling [s]
– maximum idle time [in seconds] from finishing refueling to automatic log out.

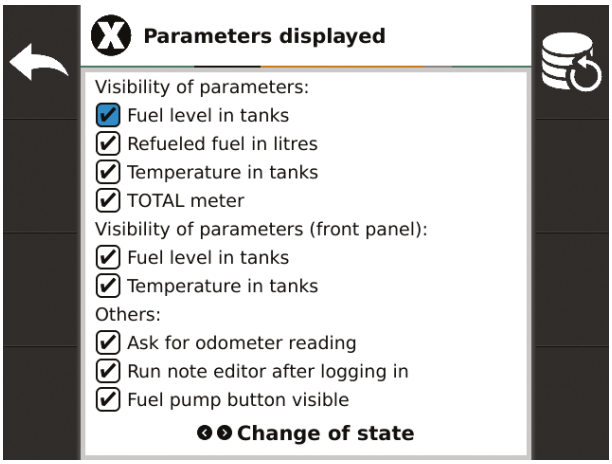
Change causing record [l]
– change of level expressed in liters, after which a note with information about current fuel level automatically generates. (Terminal connected to power supply constantly monitors fuel level and periodically generates notes indicating the current level).

Sound when pressing keys
– activating the sound when pressing the keys.

Ustawienia fabryczne:

Nr	Parameter	Value
1	Before refueling [s]	30
2	After refueling [s]	30
3	Change causing record [l]	20
4	Sound when pressing keys	no

F3 - Displayed parameters
You can define which parameters are displayed on the terminal screen. To change the settings use **left/right arrows**.



1. **Fuel level in tanks** – display current fuel level in tank after authorizing cards?
2. **Refueled litres** – display information about how many liters have been fueled during and after refueling?
3. **Temperature in tanks** – display current fuel temperature in tank after authorizing cards?
4. **TOTAL counter** – display current TOTAL counter value in standby mode?
5. **Fuel level in tanks** – display current fuel level in tank before authorizing cards?
6. **Temperature in tanks** – display current fuel temperature in tank before authorizing cards?
7. **Ask for odometer readings** – display question about current odometer readings after authorizing USER card?
8. **Run notes editor after authorization** – run notes editor after USER card authorization?
9. **Pump control button visible** – whether the pump control button should be visible after logging in? (when logging in with the ADMIN card it is always visible).

7.2. Menu in settings mode

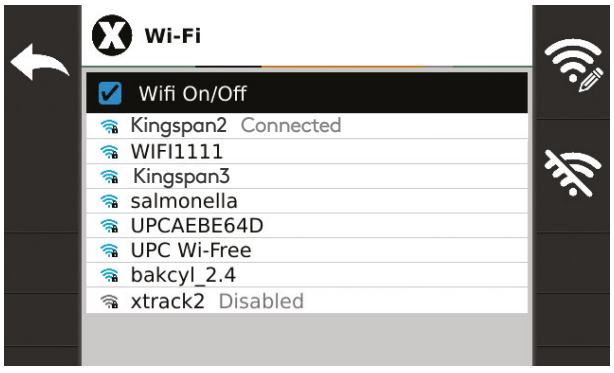
Factory settings:

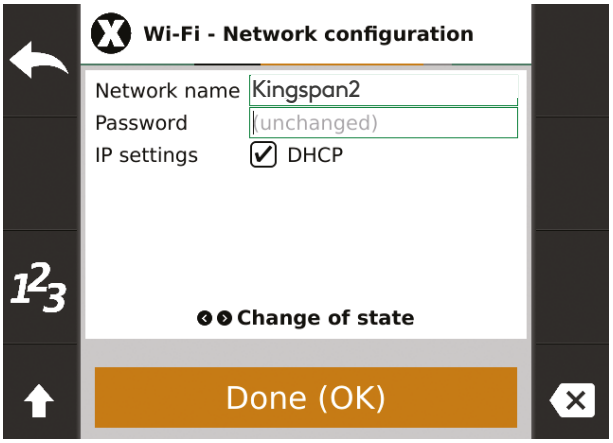
Nr	Parametrer	Value
1	Fuel level in tanks	yes
2	Refueled litres	yes
3	Temperature in tanks	yes
4	TOTAL counter	yes
5	Fuel level in tanks	yes
6	Temperature in tanks	yes
7	Ask for odometer readings	yes
8	Run notes editor after authorization	yes
9	Pump control button visible	yes

F4 - Wi-Fi configuration

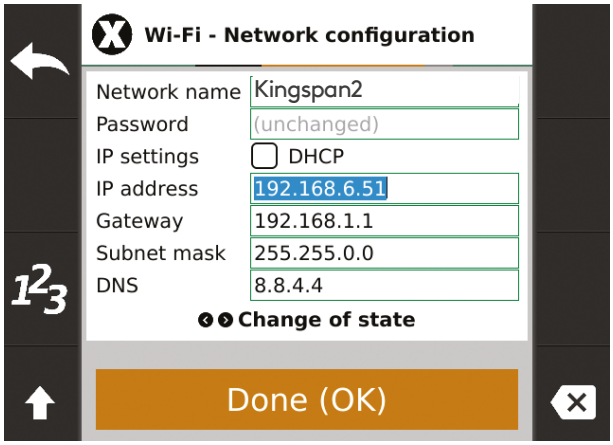
Selecting access point and wireless network connection configuration. The terminal can be equipped with a wireless Wi-Fi communication module. If the module is installed in the terminal it could be switched on by pressing **OK** button.

From the list of available networks choose the destination network, enter the password or leave it blank if the network is unsecured.
If the target network is hidden, select **„Other ...”** and manually enter its name.





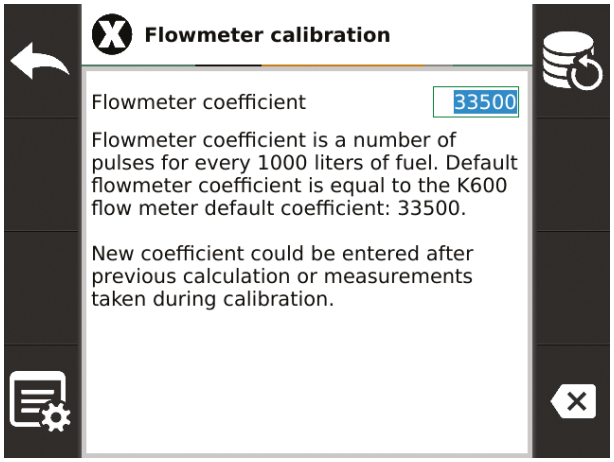
Advanced network settings can be configured by deselecting DHCP options



Information about the network status is visible after pressing **F4**.

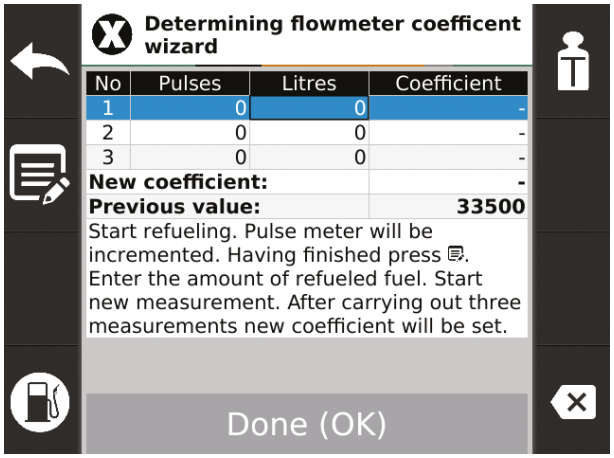
7.2. Menu in settings mode

F6 - Flow meter calibration
Defining flow meter coefficient (number of pulses per 1000 litres of fuel).



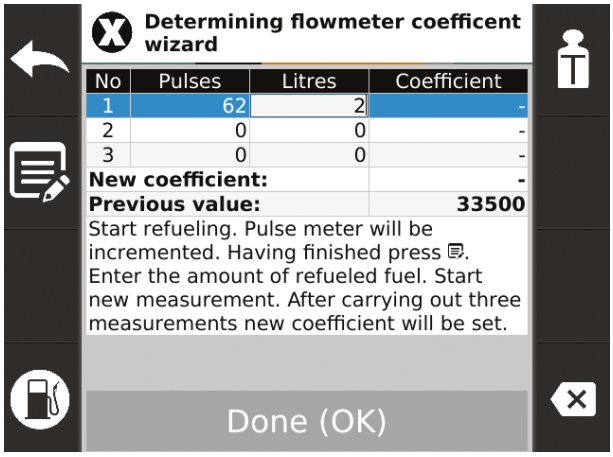
Enter the new value ratio in edit box.

F4 - Flow meter determination wizard
It is possible to determine flow meter coefficient while calibration with fuel flask. Before the procedure tare the pulses by pressing **F5 - the value in „Pulses" column should indicate 0!**



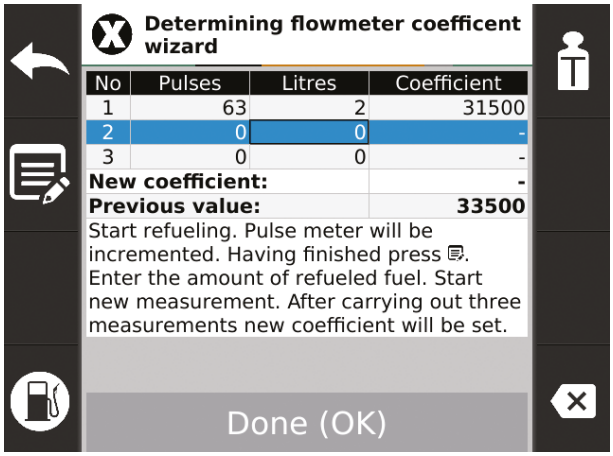
The line with current measurement is highlighted. When filling the flask with fuel the terminal counts pulses and displays them in **"Pulses"** column.

Having finished filling the flask with fuel press **F2** and enter how many liters have been poured into the flask:



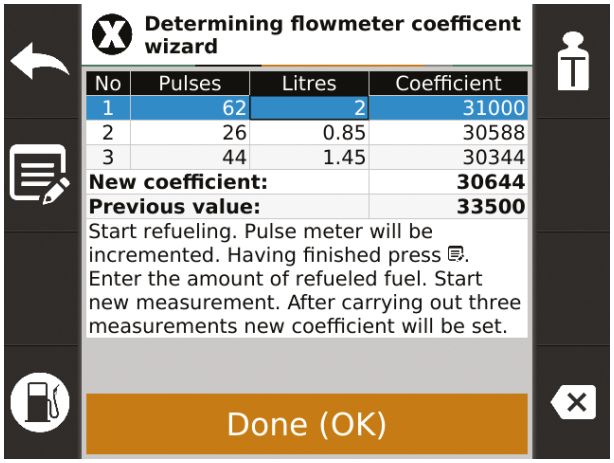
The value is saved in **"Liters"** column and after approving it coefficient value is automatically calculated and displayed in **Coefficient** column. The last row of the table shows the proposed value of the new ratio calculated as arithmetic mean of the measurements.

To go to the next measurement press the down arrow. You can always go back to the previous line to improve the measurement by pressing up arrow.

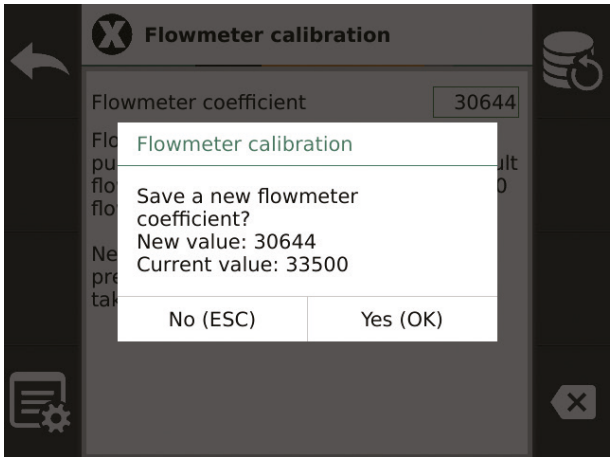


7.2. Menu in settings mode

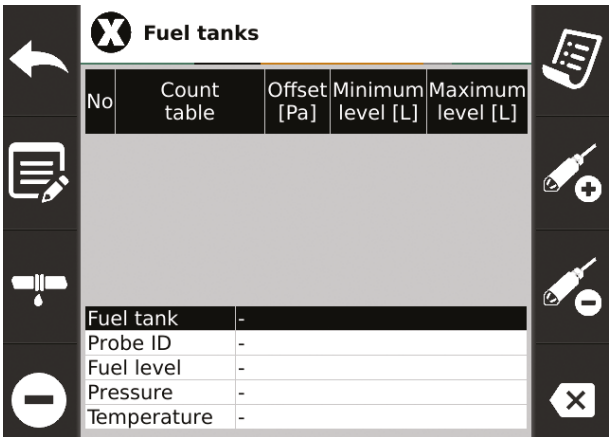
After taking 3 measurements the table might look like this:



To save calculated value of the new ratio press **OK**. If you do not want to save it press **ESC** or **F1**. To save the changes exit flow meter calibration menu by pressing **ESC** or **F1** and confirm changing the coefficient by pressing **OK**.



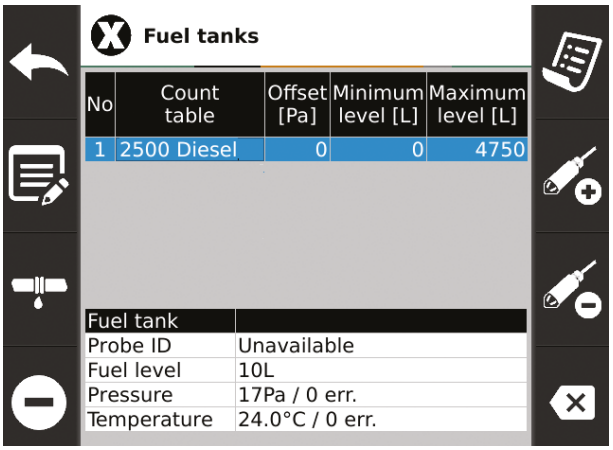
F7 - Fuel tanks. Fuel probes and fuel tanks calibration
Fuel level probes configuration icon.



When you first start the terminal no fuel probes are visible. They must first be addressed.
To address the probe connect it to the terminal.

Warning! Only one probe can be connected while addressing, the other probes should be disconnected. Make sure that the probe is (or all probes are) on the bottom of the tank: lie on or touch the bottom!

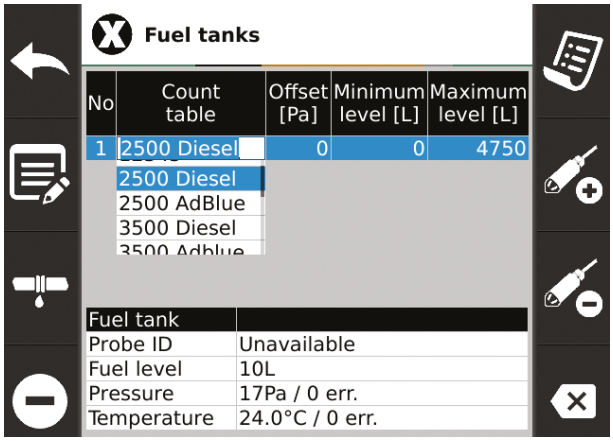
Then press **F6** and confirm with **OK**. The terminal will try to address a new probe.
When the operation is successful a new row is added to the table.



7.2. Menu in settings mode

Setting values of the probe and fuel tank can be edited by pressing **F2**.

Conversion table - to correctly read the level select the appropriate conversion table pressure liters:



After pressing **F2** (field edit mode) select appropriate options depending on tank capacity by using **up/down arrows** (standard tables for the selected containers are saved) and type of fuel stored in it (diesel or ad-blue).

Another option is linear approximation that works best for tanks in the shape of a perfect cylinder:

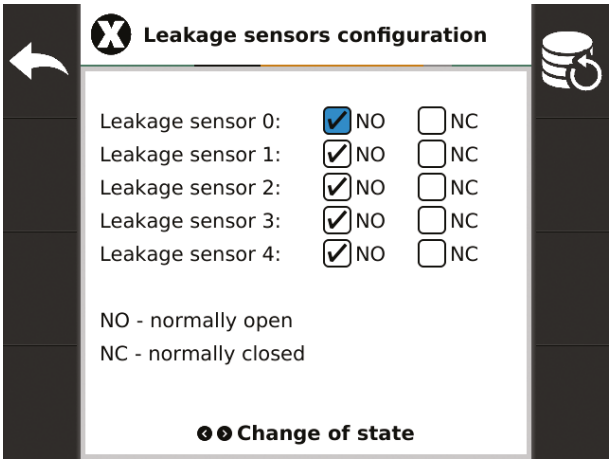
Offset - sometimes probe which is not immersed can indicate some value. To take this into account and increase accuracy of measurement you can save indication of the probe in free state. You need to manually rewrite the value from Pressure field to Offset when the probe is not immersed. The minus sign is available by pressing **F4**.

Minimal level - Minimal fuel level in tank. If fuel level drops below this value, fuel pump is stopped and is not able to run until fuel in the tank reaches the minimum level.

Maximum level - This is the value above which the terminal will signal exceeding the defined value with a message and an audible signal.

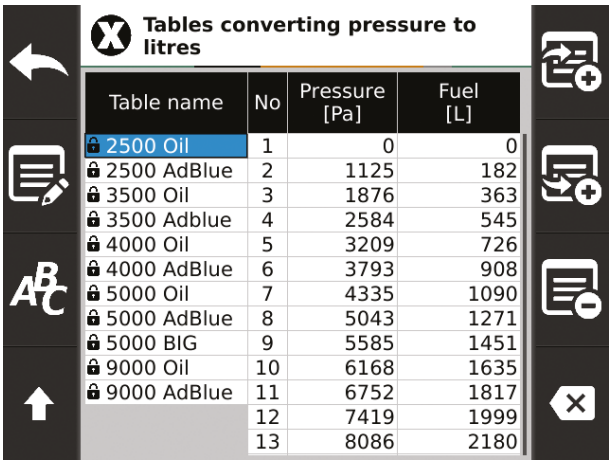
F3 - Configuration of leak sensors

Setting whether the sensor is normally open or normally closed.



F5 - Tables converting pressure to litres

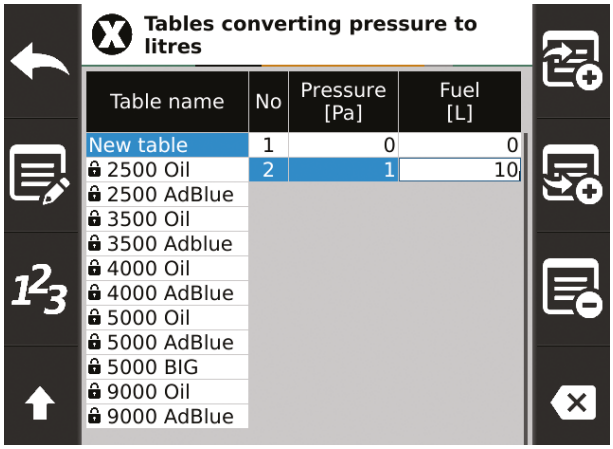
Overview and edition of tables converting pressure to litres.



Standard conversion tables cannot be edited. They are marked with 🔒.

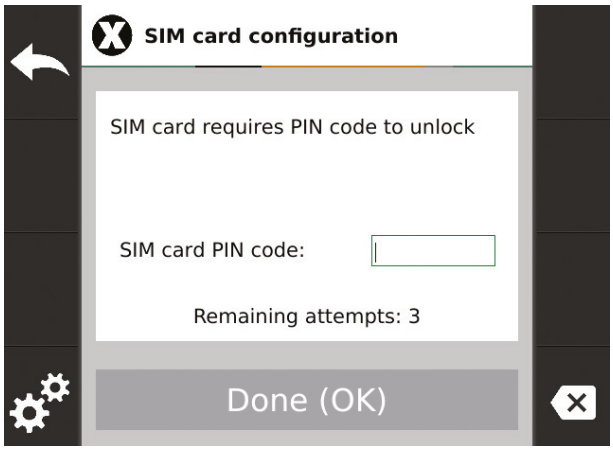
7.2. Menu in settings mode

You can define your own pressure to liters conversion table. To do this, add a new table by pressing **F5** or **F6**. Changing its name and value is possible by pressing **F2**.



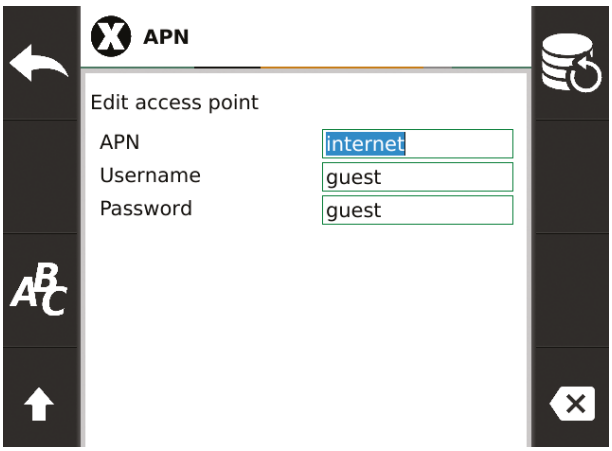
F8 - SIM card configuration

Changing the SIM card requires entering the PIN code of the card (if applicable).



After entering the PIN under the **F4** key, the configuration of transmission parameters via the GSM network of the given operator is available.

Setting the correct APN parameters, login and password for a given GSM network is necessary for data transmission to the system.



To exit any configuration menu press **ESC** or **F1**. If changes have been made message asking about the record will be displayed.

To save the changes press **OK**. If you do not want to save the changes press **ESC**. Then you will exit the menu and return to the previous settings.

8. Operating multiple probes

Fuel terminal operates with one fuel probe as a standard option. Multiple probes could be connected to Kingspan Access terminal.
This additional functionality requires addressing of all the probes as well as adaptation and additional terminal configuration. This service is provided by submitting a need of additional functionality to support multiple probes to Kingspan Water & Energy Service Team.

8.1. Minimum fuel level in multiple probes configuration

If a probe indicates a level below the minimum, information on this is displayed on the screen. The fuel level in the tank and the tank number are red. Refueling in the event of a drop below the minimum level on any of the probes will be interrupted.

Refueling is possible despite the message, but the person operating the tank must be sure that the fuel will be taken from the tank in which the level is above the minimum level.

9. Flow meter calibration

Fuel flask allowing to precisely determine the level of collected fuel is necessary for calibration.

The calibration ratio can be determined automatically during calibration or calculated manually.

9. Flow meter calibration

Calibration with manual determination of the ratio:

1. Log in **ADMIN** and any other card **MASTER** or **USER**),
2. Enter settings window (press **F3**),
3. Fill the calibration flask with fuel to the specified level and write down this value,
4. Save number of pulses form **Net row in Flow** meter table,
5. Reset the terminal (press **F5**),
6. Empty the fuel flask,
7. Steps 3 to 6 should be repeated at least three times by filling the flask always to the same level,
8. If there are differences between flask and terminal readings, set a new ratio.

Please see the example:

Lp.	A / Liters flask	B / Imp.net	C / Calculations
1	19,98	692	34634
2	20,05	694	34613
3	20,01	693	34632

In Calculations column enter the value for each row separately, according to the formula:

$$\text{Calculations } (C) = \left(\frac{\text{Imp.net } (B)}{\text{Liters flask } (A)} \right) \times 1000$$

Then calculate the average of column **C** values. The average is the new value of the calibration ratio.

For example:

$$\text{Calib. ratio} = \frac{C_1+C_2+C_3}{3} = \frac{34634+34613+34632}{3}$$

$$= 34626$$

New value of the ratio in this case is 34626.

9. To check whether the new ratio has been saved correctly choose again Flowmeter calibration (**F6**), enter it into the terminal (after entering the correct value approve it as described),
10. To validate the calibration log in to the terminal, refuel calibration flask and make sure that the indications are correct. If there are discrepancies, repeat the calibration process.

Calibration with automatic determination of the ratio:

1. Log in **ADMIN** and any other card (**MASTER** or **USER**),
2. Enter the window (press **F3**),
3. Choose **„Calibration"** (press **F2**),
4. Choose **F2** – determine measurement ratio,
5. Reset impulses (press **F5**),
6. Fill the calibration flask to the specified level and check the value,
7. Enter **"liters"** from the flask to the table in the terminal (press **"F1-enter liters from the flask"** and enter the value),
8. To go to the next measurement (press **F4**),
9. Repeat steps 5-8 until 3 measurements are completed and the last row in the table **"New ratio="** is highlighted black,

9. Flow meter calibration

10. Decide whether value of the new ratio should be saved (press **OK**) or not (press **ESC**),
11. Exit service menu (press **ESC**),
12. Decide whether the new value of the ratio should be saved as current ratio used for conversion (press **OK**) or keep the current ratio unchanged (**ESC**),
13. The calibration is completed. Log out from the terminal,
14. To validate the calibration log in to the terminal, refuel calibration flask and make sure that the indications are correct. If there are discrepancies, repeat the calibration process.

10. Warranty

1. Kingspan Water & Energy sp. z o. o. with its registered office in Rokietnica, 5 Topolowa St., entered into the Register of Entrepreneurs of the National Court Register kept by the District Court Poznań Nowe Miasto i Wilda in Poznań, IX Commercial Department of the National Court Register under number 0000032871, Tax ID no. 779 20 57 260 (hereinafter referred to as the Guarantor) grants a guarantee for the fuel terminal, in the scope and on the terms provided for in these Warranty Terms.

2. The Guarantor guarantees the correct operation of the fuel terminal manufactured by the Guarantor (device), used in accordance with the intended use and rules of use specified in the instruction manual, thus the Guarantor undertakes to remove physical defects caused by the reasons in the device, which will be disclosed and will be notified before the end of the warranty period, subject to the other provisions of these Warranty Terms.

3. The guarantee is granted for a period of 24 months from the date of sale, but not longer than 36 months from the date of manufacturing (the date of manufacturing is shown in the serial number of the device). The date of the sale of the devices covered by the warranty is the date of technical acceptance of the installed device confirmed by the assembly protocol or the date of handover protocol, and in the absence of the protocols and the inability to set the date of assembly or handover, the date of sale is the date resulting from the invoice documenting the sale of the device.

4. The guarantee is valid on the territory of the European Union.

5. The entity authorized from the guarantee is the buyer who bought the device from the Guarantor is entitled to the warranty.

6. The entity authorized from the guarantee is obliged to inform the Guarantor about the breakdown/ defect of the device immediately, but not later than within 7 days after it occurred, under pain of losing the rights under the guarantee. The report must be made before the end of the Warranty period.

10. Warranty

7. The Purchaser, in order to exercise the rights arising from the guarantee, should immediately notify about any failure/malfunction of the Guarantor's device using the XSS system. Other channels can only be used if the XSS system is not available. The implementation of warranty service begins at the moment of submitting the correct service request through the available channels. The request is deemed to be correct if it contains the necessary identification data of the device, such as: ID number, serial number and description of the detected failure/ malfunction, as well as the entity using the device. Channel Details Request window (availability).

   Contact:
   E: sensoreu@kingspan.com
   Tel: +48 61 814 44 00 on working days: Mon-Fri 8:00 - 16:00

8. The device in order to perform warranty services by the Guarantor must be sent to the Guarantor's office, while the authorized entity is obliged to disconnect the device beforehand by a qualified installer, in accordance with the applicable standards.

9. In the event of a physical defect of the device covered by the warranty and its correct notification before the end of the warranty, the Guarantor will perform a free repair of the device. If the defects can not be removed or the costs associated with the repair are disproportionate to the value of the device, then the Guarantor will, at its option, replace the device or refund the whole or a relevant part of the device price.

10. The Guarantor will perform his duties within 14 days, however if the failure/malfunction requires a physical contact of the service technician with the device, this period runs from the date of delivery of the device to the place specified in point. 8. In justified cases, the repair period may be extended to 30 days if it is necessary to obtain spare parts or spare parts from an external supplier or the repair is particularly complicated.

11. In the absence of grounds to take into account the claim formulated by the authorized entity, the Guarantor shall inform the authorized entity thereof.

12. The warranty does not cover claims for technical parameters of the device, as long as they are consistent with those provided by the Guarantor.

13. The warranty does not cover additional devices cooperating with the fuel terminal.

14. The warranty covers only physical defects in the device, in particular does not include damage caused by fault and ignorance of the user, both intended and unintentional, in particular:
    a) defects arising as a result of using the equipment in a manner inconsistent with the purpose or operating instructions, including defects resulting from improper storage, installation inconsistent with the applicable rules, including those resulting from law, failure to inspect, improper maintenance;
    b) defects resulting from mechanical, chemical and thermal damage as well as from external forces (lightning, voltage spikes), including connection to malfunctioning electrical installation.

10. Warranty

15. The warranty excludes defects caused as a result of force majeure, fortuitous events (eg flooding, fire, contamination of the equipment or foreign bodies, mechanical damage).

16. The guarantee expires in the event of any attempts to repair the device by unauthorized entities that do not have the Guarantor authorization, adaptation, alteration, seals or other security devices or parts thereof and other unauthorized interference with the device not in accordance with the instruction manual.

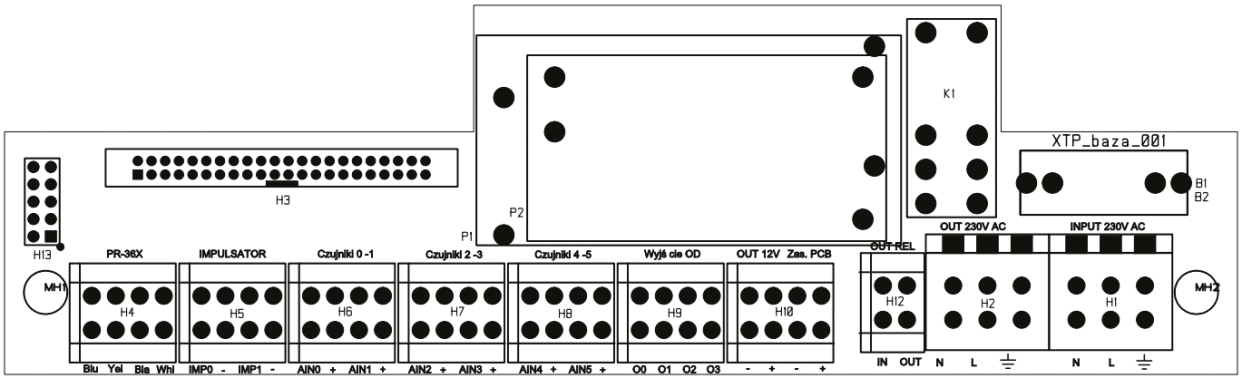
17. The customer bears the cost of repair or replacement of damaged components, if the lack of proper operation of the device did not result from the reasons in the device, in accordance with the price lists valid for the Guarantor.

18. The obligations of the Guarantor resulting from this guarantee are limited only to the benefits described in point 2 and 9 of these Warranty Terms.

19. In the event of a dispute, the general principles of art. 6 of the Civil Code.

11. Electrical wiring diagram

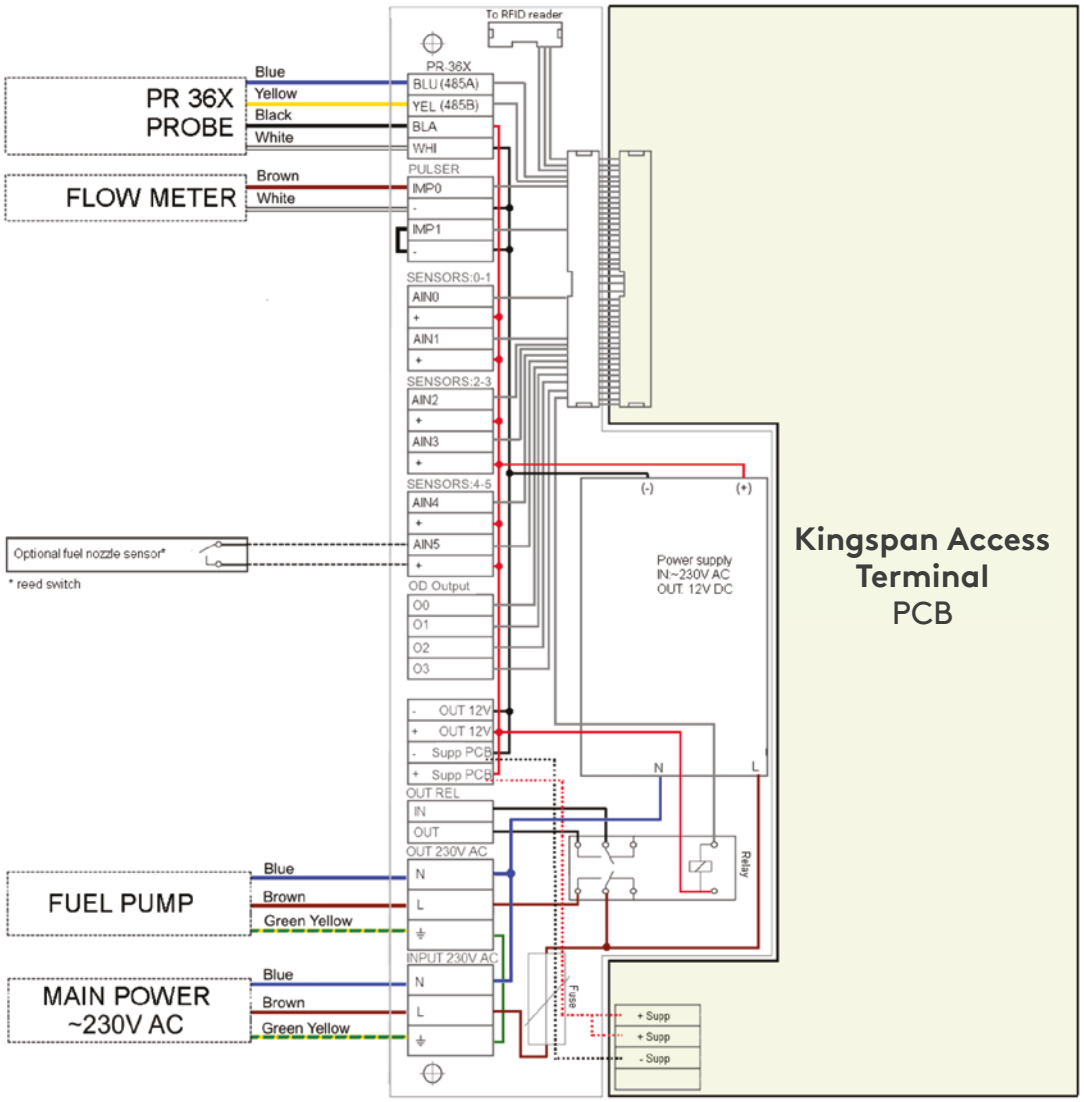
Printed Circuit Board TP_base_n_001



11. Electrical wiring diagram

1. Standard version of the system:
   a) Main power supply
   b) PR36X digital probe
   c) Fuel pump
   d) Flow meter

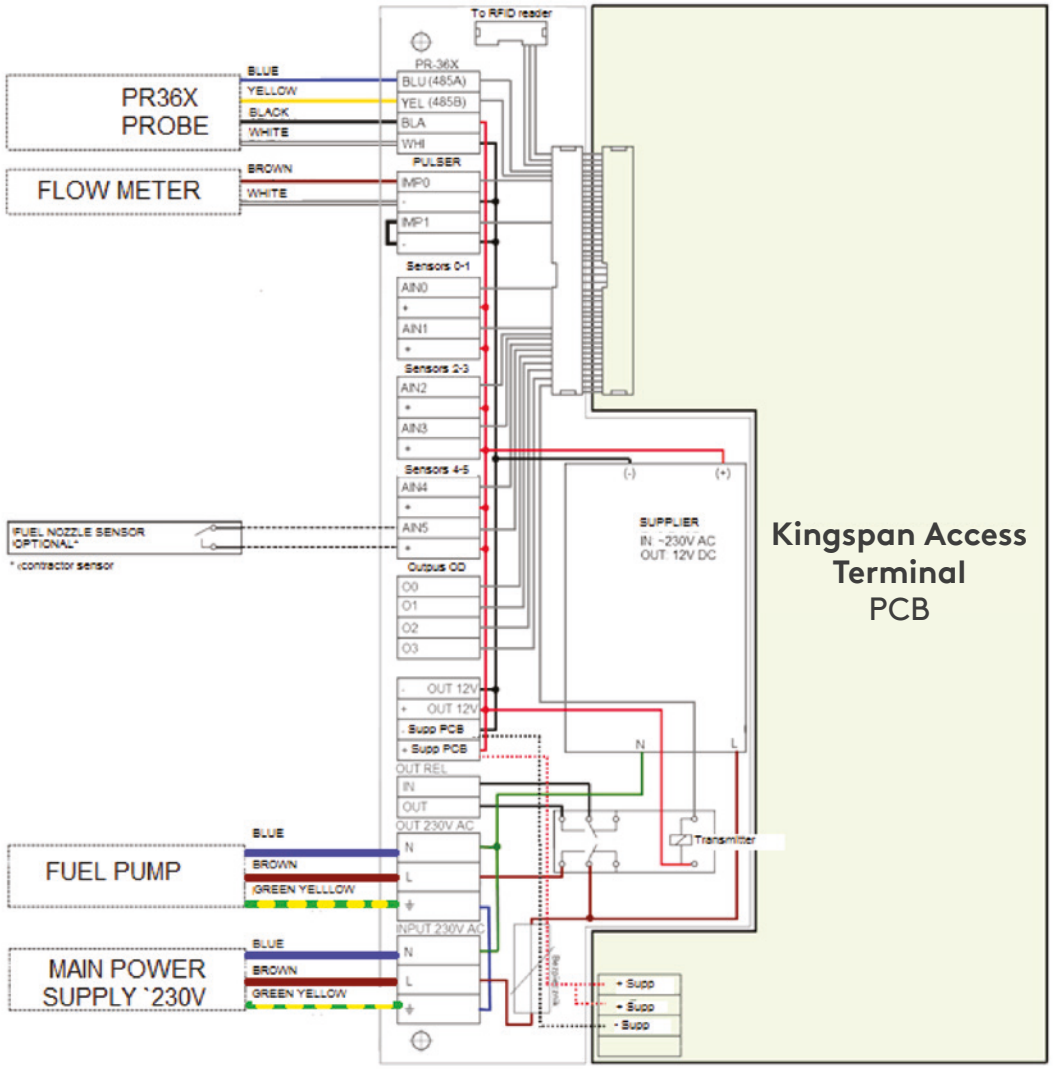
Scheme



11. Electrical wiring diagram

2. **Standard version with fuel nozzle sensor:**
   - **a)** Main power supply
   - **b)** PR36X digital probe
   - **c)** Fuel pump
   - **d)** Flow meter
   - **e)** Fuel nozzle sensor

Scheme



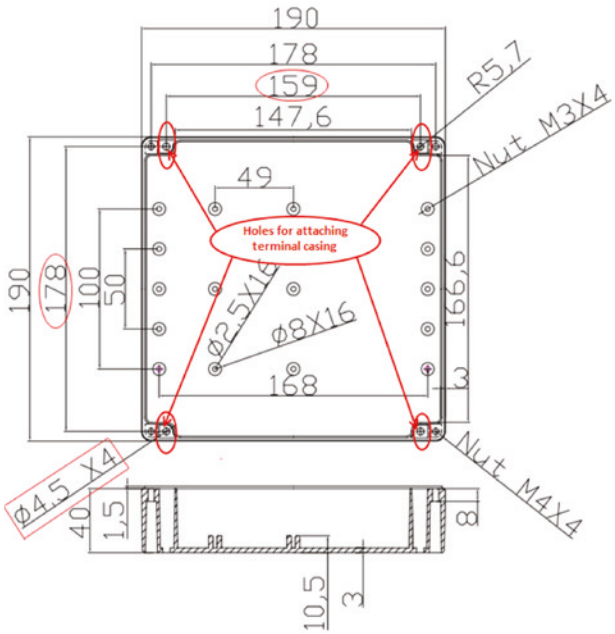
12. Installation and launching - a list of actions

Installation		
No.	**Action**	**Status**
1	Attaching the terminal	
2	PR36X fuel probe installation	
3	Check whether the probe is in the bottom of the tank (lying on the bottom or touching it)	
4	Flow meter installation	
5	Fuel pump installation	
6	GPS antenna installation	
7	GSM antenna installation	
8	Removing protective film	
Launching		
1	Logging in the cards	
2	Turning on/off fuel pump	
3	GPS readings	
4	Modem status	
5	Flow meter readings	
6	Fuel probe configuration	
7	PR36X fuel probe readings	
8	Additional configuration (minimum level, acceptable idle times, displayed parameters)	

13. Attaching terminal casing

Terminal is attached with 4 screws and holes in the bottom of the casing.

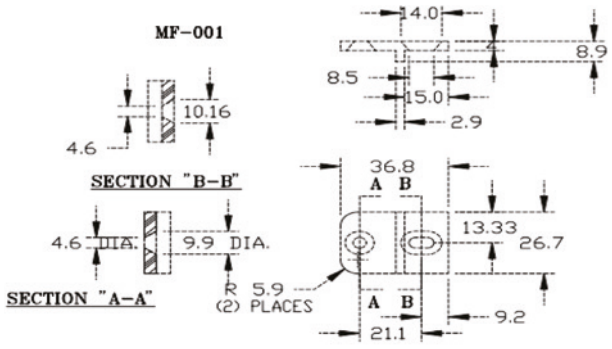
Mounting holes:



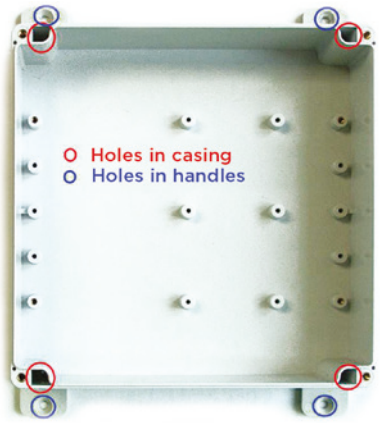
Alternatively to attach the terminal use 4 extra handles, which prior to installation should be screwed from the bottom of the casing.

Handles allow attaching terminal casing without removing the cover, because the handle holes are beyond the terminal casing.

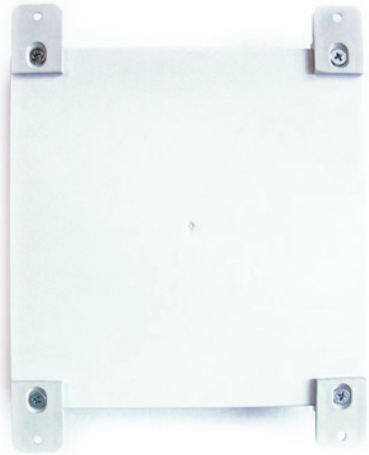
Mounting handles – dimensions:



Mounting holes:



Handles seen from the bottom of the casing:



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