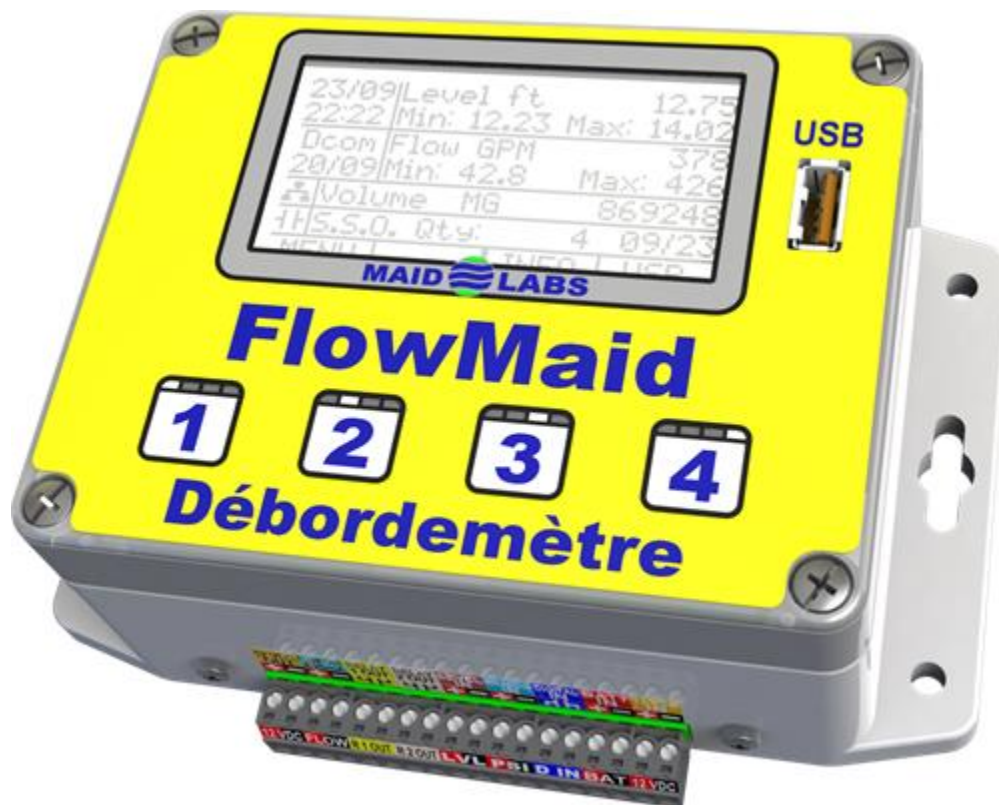# FlowMaid



# User Manual

## Level Monitor and Open Channel Flow Meter

# Registration

Equipment designed by Maid Labs Technologies inc. are the result of several years of research and development. They are the sum of ideas and suggestions received by people like you who use this type of product or are in need.

At Maid Labs Technologies inc., we have made every effort to write a manual that is easy to use and understanding. However, it is always possible those errors may occur, or that the devices have sudden hardware or software changes that are not updated in this manual. In these cases, we are sorry. Check if a new version of the manual and firmware are available on our website www.maidlabs.com .

The internal software of products manufactured by Maid Labs Technologies inc. can be updated easily. This means that you will be able to enjoy the majority of the improvements we make in the following years to firmware upgrade, provided that the hardware is compatible. To access the updates, you must complete the *Registration* section on www.maidlabs.com website.

**Our services and warrantees are available only for registered products. If you have more than one product, please register them all.**

# Warranty

Municipal And Industrial Data Labs inc. (hereinafter called "MAID Labs") states the following warranty for any new Maid Labs product, sold by our authorized representatives.

MAID Labs guarantees that this product is free under normal use and maintenance of all manufacturing defects, and is subject to the following terms and conditions:

1. To obtain warranty service:
    (a) The product was registered within 14 (fourteen) days from the date of shipment.
    (b) The registration form must be completed fully and returned.
    (c) The product must be shipped to Maid Labs main office or to an approved maintenance and repair service center for maintenance. Shipping is at the customer's expense.

2. Limitations: This warranty does not apply to:
    (a) Repair or replacement of all cabinets, batteries, connecting wires, antennas and accessories.
    (b) Any defect or repair as a result of abuse, neglect, inadequate care and/or misuse.
    (c) Any defect or repair due to failure to follow the recommendations in the user manual.
    (d) Any modification, adjustment or repair to Maid Labs products by any other company other than Maid Labs authorized maintenance and repair centers.
    (e) All Maid Labs products, whose serial number has been damaged, altered or removed.
    (f) The maintenance, cleaning or periodic verifications.
    (g) All Maid Labs products that are not the property of the original owner.
    (h) Products purchased from a bankrupt, insolvent or non-approved representative.
    (i) Any damages caused by fire, flood, lightning, power surges or other events beyond the control of Maid Labs (acts of God).
    (j) The warranty does not cover the elimination of static or electrical interference, adjustments or costs of labor associated with removal or reinstallation of the unit for repair.
    (k) The warranty does not cover damage caused by high humidity, water or leaking batteries.

3. If a Maid Labs product is defective under applied conditions, necessary repairs will be performed, at no additional cost, for parts and labor where Maid Labs recognizes that such defects are caused by materials or manufacturing.

4. This warranty constitutes the entire expressed warranty given by Maid Labs for Maid Labs products. No representative or service maintenance employee is authorized to extend this warranty on behalf of Maid Labs

5. Since each installation may incorporate malfunctions, preventing Maid Labs from ensuring the smooth operation of its devices in all circumstances, Maid Labs will not refund nor exchange the instruments that were caused by connections to any problematic installation.

6. The warranty period is one year on parts and labor from the date of shipment.

7. LIMITATION OF DAMAGES: To the extent permitted by applicable law, under no circumstances MAID Labs or its affiliates be liable to you, to a user or a third party for any indirect, special, consequential, or punitive damages of any kind whether in contract or civil, including but not limited to, personal injury, loss of revenue, loss of goodwill, loss of business opportunities, loss of data, whatever may have been the predictability of such damages. And in no case may the total responsibility of Maid Labs or its affiliates exceed the equipment purchase price received from you, from a user or from a third party, regardless of the laws by which the cause of action was brought. The foregoing does not affect your territory's statutory rights.

# Table of contents

## Contacts

**MAID Labs Inc.**
944, André-Liné, Granby, Québec, Canada, J2J 1E2,  **T** 450-375-2144
Web : www.maidlabs.com          Email : info@maidlabs.com

## Product Application

Unless otherwise specified, this manual contains the information required to install, operate and maintain the FlowMaid device and its accessories. The information on the application of the instruments manufactured by Maid Labs Technologies inc. is on the website of the company.

## Product Description

The FlowMaid is a small monitoring device recording level, volume and flow. Data is transferred by USB in a text format with separator (csv) or via Internet to the MaidMaps application, which shows the level, and if applicable, the real-time flow and volume since the beginning of the overflow event.

The municipality could strategically deploy the technology in all overflow structures to monitor the volume of water lost during these events. When the level or amount of water discharged exceeds acceptable limits, the icon representing this information on MaidMaps changes color and a warning email is sent.

The device has a relay output that can be activated by level. This function could be used to open or close valves or generate an alarm.

The USB key can be used to change the device settings and update its firmware. These settings can also be changed remotely via the Internet. When the FlowMaid is connected to the web, its firmware will update automatically.

The backlit display allows you to view important information such as the level and flow.

## Options / Accessories

Power supply 120V – 12 VDC 2A **MLPS2**
Rechargeable Battery  12VDC 15 Amp/h **MLBATRECH12V-15AH**
Battery charger **MLPSBAT12**
Submersible case for cellular modem or Wi-Fi module hosting **MLENCHMD**
Level sensors by pressure for wastewater **MLPLG, MLPLR, MLPNL**
Ultrasonic sensors **MLUS-1,3M, MLUS-6M**
Resistive level sensor **MLSNR**

## Dimensions



130 mm
5 1/8"

USB

65 mm
2 9/16"

MAID LABS

1  2  3  4

Do not use this image as a template

30 mm
1 3/16"
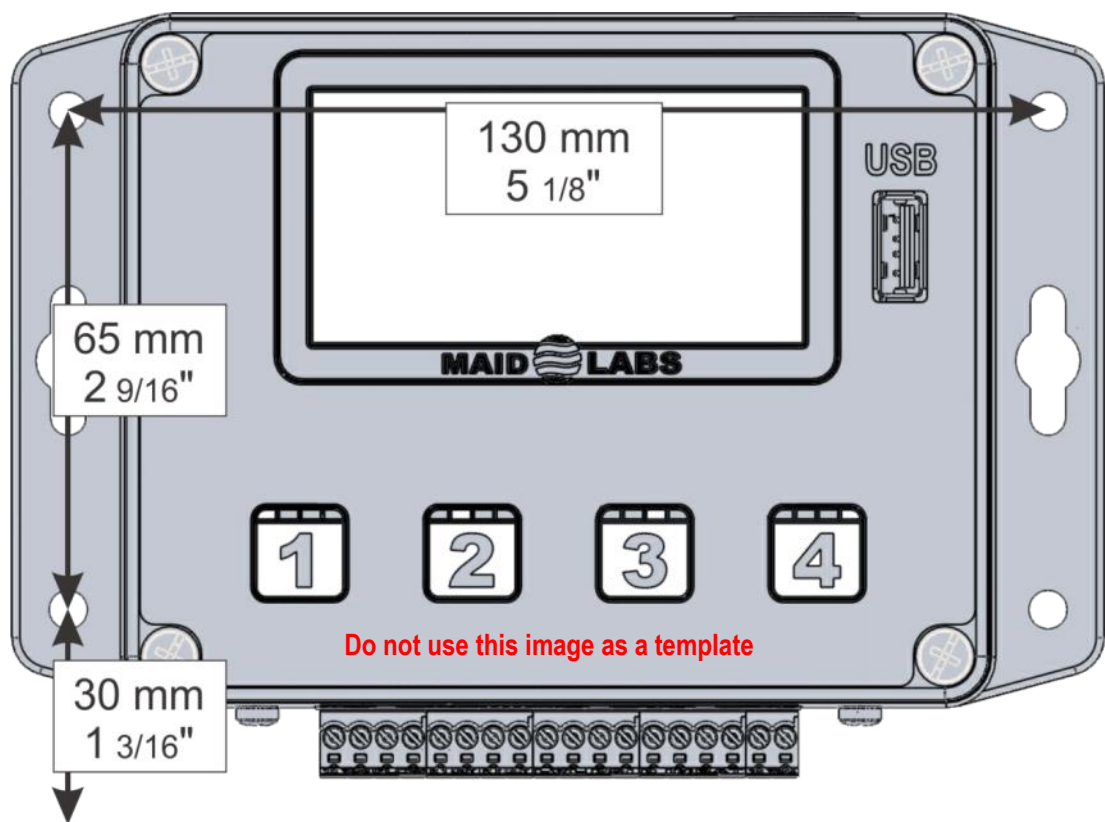
When installing the instrument, provide enough space above it for the Ethernet port on the top, and below it for the connector and wires input.



04/25 | Level (cm)        0.00
14:51 | Min:0.00  Max:0.00
Lcom | Flow (l/s)          N/A
04/25 | Min:N/A    Max:N/A
·· | Volume (US gal)     N/A
⊞ | Overflows        0 --/--
MENU | RT | INFO | USB

MAID LABS

**FlowMaid**

1  2  3  4

**Débordemètre**
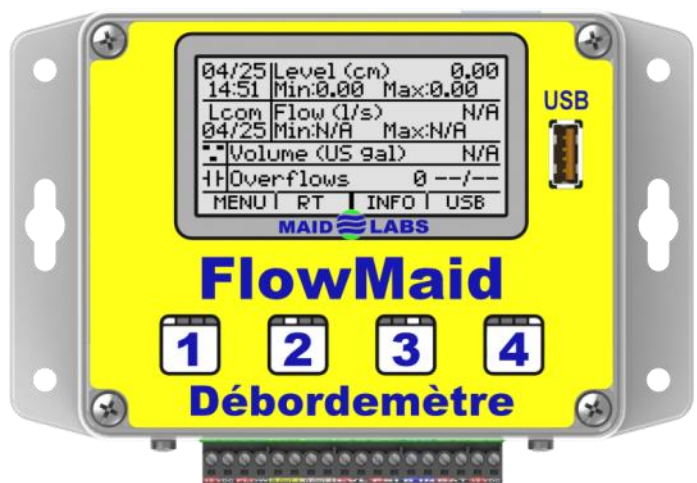
Length 5.7 in, Width 3.94 in

Height 2.24 in, Length 5.7 in
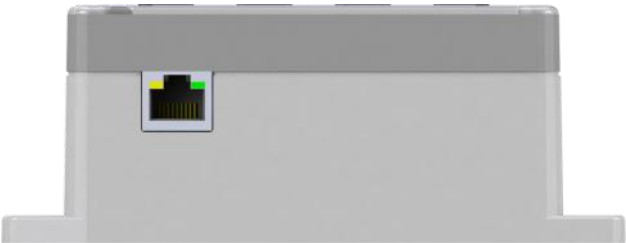
# Use and Maintenance

## Environmental Conditions

It is the user's responsibility to ensure that this product is not exposed to an environment for which it is not designed. These conditions may include a range of extreme operating temperatures, extreme humidity, vibration or abnormal shock, extended submersion or potentially explosive atmospheres.

## Cleaning

If the sensor measurements are not what they should be, this can be caused by fouling of the sensor. Periodic cleaning is recommended. It is important to follow the sensor manufacturer's recommendations.

## Electrical Conditions

Each Maid Labs product is designed to operate correctly in a specific range of electrical conditions. The product label identifies the main parameters of connection. All entries are designed to resist reverse polarity, as well as higher voltage to a certain extent. It is the user's responsibility to ensure that all electrical connections are made to the products in accordance with the recommendations of MAID Labs and the local electrical code. **The user should read this manual before connecting the device.**

## Power and Batteries

This product can operate with an external 12 VDC power supply (**MLPS2**, 120VAC/12VDC 2A) or external 12V rechargeable battery **MLBATRECH12V-15AH**. It is strongly recommended to check the polarity of the wires before connecting it. <span style="color:red">**THE 12V EXTERNAL BATTERY MUST BE FULLY CHARGED BEFORE INSTALLATION**</span>. Use with power at the input "12v In" the unit will reload itself and maintain the battery charged to address a possible power failure. In the case where the voltage of the external battery is too low and the unit is not powered by the entry "In 12v", the unit will stop recording data.

## Operating time on batteries

The device is designed to operate up to 1 year on an external battery. However, the operating time of the device depends on the level interval and the accessories powered by it, for example, a cellular modem.

# Installation

The FlowMaid is not waterproof. Avoid placing it in wet locations where liquids could inter the product or condensation is a problem. Damage caused by water or excessive humidity voids the Maid Labs warranty. The instrument must be placed in a location where there is no risk of being hit or dropped. A label is supplied to cover the Ethernet port to minimize the risk of damaging the port from insects or infiltration.

A desiccant bag is placed inside the instrument in order to minimize or delay damage related to humidity that affects all electronic products. When you open the case to change the batteries, be sure to replace the desiccant bag. If you think it is inefficient, you can order additional desiccant from Maid Labs.

## Wiring diagram
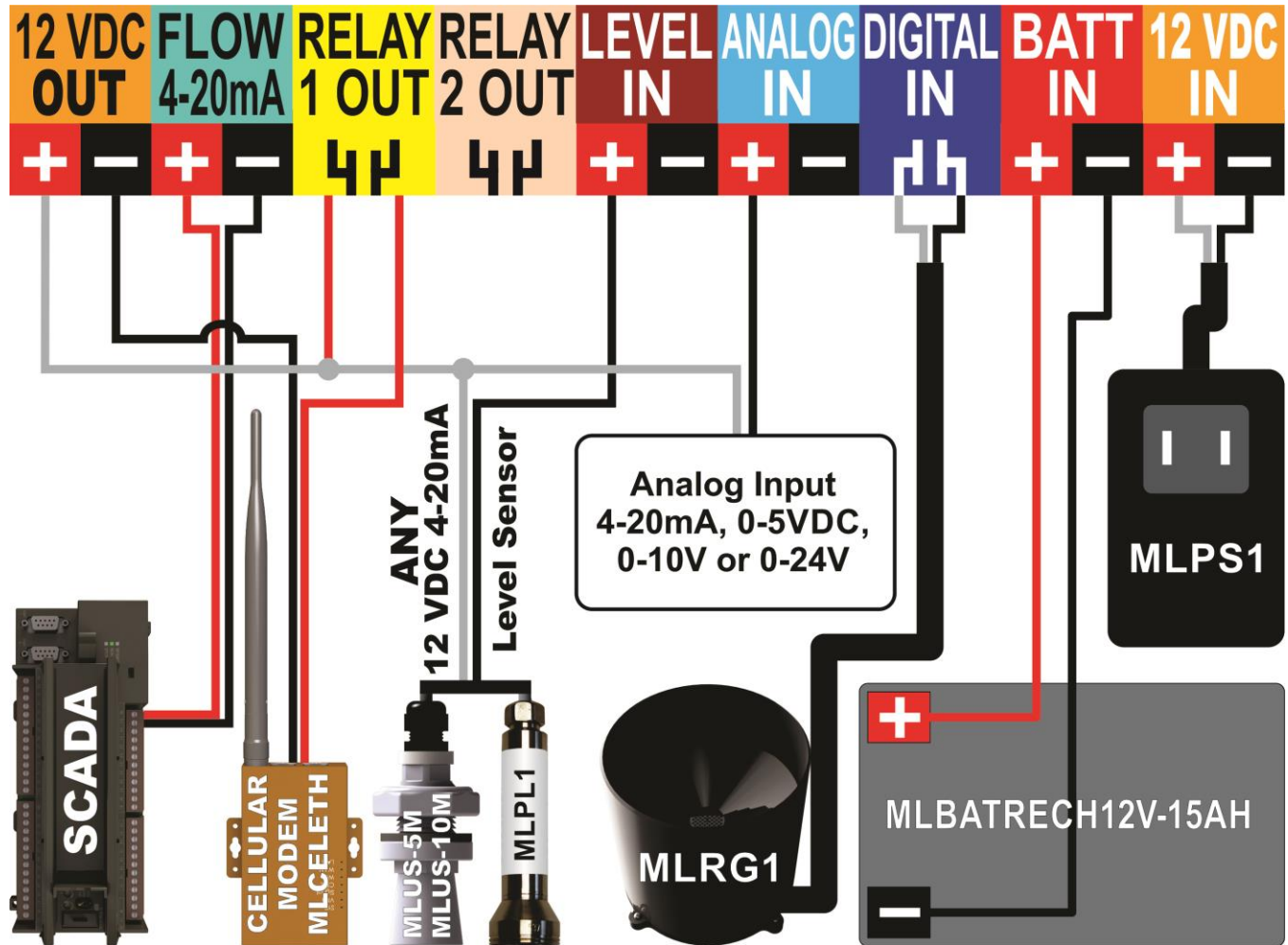


## Inputs and outputs description

**12 VDC OUT** The 12 VDC output provides power to the sensors when taking measurements and activate a cellular modem if the device is configured to communicate with MaidMaps .

**FLOW 4-20mA** 4-20mA Flow output: Outputs a signal varying in proportion to the rate of overflow. The 4-20mA output is available only when the unit is powered by the entry "12v in."

**RELAY 1 OUT** RELAY 1 OUT output is a relay contact that can be used to open or close valves, generating an alarm, check the power of a sensor or cellular modem to save energy when the unit is running on battery or issue a pulse each time a certain volume is reached.

**RELAY 2 OUT** As the RELAY 1 OUT, RELAY 2 OUT is a relay contact that can be used to open or close valves, control power sensors or Ethernet modem to save power when operating battery or outputting a pulse each time a certain volume is reached.

**LEVEL IN** The LEVEL input is an analog input for a level sensor. It can be configured as 4-20 mA, 0-5 V, 0-10 V or 0-24 V depending on the sensor used.

**ANALOG IN** Second analog input for the registration of another sensor. It can be configured as 4-20 mA, 0-5 V, 0-10 V or 0-24 V depending on the sensor used.

**DIGITAL IN** The digital input allows recording simple state changes, such as a float level, or pulse like those from a rain gauge.

**BATT IN** The battery input is used to power the FlowMaid in a battery operating mode or as a battery backup during power failures by plugging in a rechargable lead acid type 12V battery. The FlowMaid measures and records the remaining energy in an external battery to alert the user when it is time to recharge or replace.

**12 VDC IN** The 12VDC power supply must come from a stable power supply that can provide 2 Amps.

## Installation of the FlowMaid on external battery

1. The first step is to prepare the configuration file of the device with the MaidDevices Configuration software on page 27. Simply create a new file, select the FlowMaid and enter its serial number (only the numbers).

   a. Following this, select "External battery" in the section "General information" and continue configuration for your set up.
      i. FlowMaid with level sensor: make sure that the configuration of the level sensor is compliant with the probe you are using.
      ii. FlowMaid with fleet: you must disable the 'Level' input and select "Overflow (fleet)" under the "Rain" input. Note that the overflow calculation is not possible this way.
   b. In the "Level setup" window, it is necessary to configure the overflow by checking the option "Overflow level" and entering the overflow level.  Then if desired, configure the Flow computation method.
   c. Continue the configuration to the "External battery options" window. Don't forget that the readings are fast, which makes the external battery discharge faster. For the regular analog readings, it is recommended to use the longest time possible, since the level reading is not important when we are away from the overflow level. If you use the level sensor supplied by Maid Labs, "Number of reading" should be 10 and 'Wait' to 500ms with the option "Close relay before reading" checked.

d. The "Fast reading" section is used to have more frequent readings and a better accuracy of the flow calculation when overflow events occur. The "Threshold safety margin" determines from what level readings will be faster. Example: «Overflow Level » to 3 m, "Threshold safety margin" to 0,20 m, therefore the level sensor fast readings will be at the interval determined in the "Fast reading" section starting from level 2.80 m.

e. Complete the configuration and save the configuration file in the root directory of a USB key. Don't forget that the USB must operate with a FAT or FAT32 file system. NTFS is not supported.

2. The second step is to make the connections of the device. It is important that the external 12V battery has been fully charged. The connection of the appliance must be carried out according to the diagram on page 9.

## Digital input

The digital input is a dry contact format. Which means that the contact provided by the sensor must be closed or open and no tension same as the contacts of a relay or a fleet. The instrument generates a low voltage in one of the two connection wires, the other is the return. When the instrument detects its own voltage, the contact is closed. Any sensor generating pulses, as rain gauges or flow meters can be used with the FlowMaid.

The types of sensors can be floats, opening valve detectors, relays or any type of equipment generating a dry contact, when active, provided that the frequency of change is not greater than 2 per second (10 Hz).

## Communication

The devices communicate with a web server via a continuous internet connection. There is no configuration to do when connecting to Maid Labs. The devices use port 80 (standard port for all web pages) to communicate with the MaidMaps server. If the computer in the network is capable of browsing the internet, then the communication will work.

Devices are DHCP clients and require no special configuration with the exception of having a DHCP server in the network (present in all standard networks). It is impossible at the moment to enter a fixed IP address to a device. It is possible to connect the unit to a Wi-Fi connection using an external module sold by Maid Labs. Configuration of the module is required using a computer. To know the IP address of the device or its MAC address, please refer to the *IP Information* section, page 23.

# Instrument start-up

When the instrument is powered by sufficiently charged batteries or functional external power, the instrument automatically saves the digital input changes even if the screen is off, as in the case of battery operation.

If the device is running on battery only, the display is closed to minimize the energy consumption of the device. The backlight is functioning when the keyboard is active and ceases after a few seconds of inactivity (see *Display* page 14), depending on whether the device is running on batteries or is powered by a 12 VDC adapter.

## To turn on the screen of a battery-operated device

With your bare fingers touch on any button for 20 seconds, if the device does not wake up then change button.

# The menus

## *The contextual menu*

The keys are touch sensitive when they are pressed. Do not press more than one key at a time. The use of keys is dependent on the current screen.

## Alarm Screen

```
┌─────────────────────────┐
│        Alarmes          │
├─────────────────────────┤
│ Nom:        Redemarrage │
│ Debut.: 15/04/14 08:30:08│
│ Fin:    15/04/14 08:30:08│
│ Nombre de fois:       1 │
├─────────────────────────┤
│ACK ALL│ ← │ │ → │ │ ACK │
└─────────────────────────┘
```

When unusual event occurs, the device can generate an alarm. It is displayed as a window covering the main screen. This alarm can occur, for example, when the device restarts after a power failure. The user must acknowledge the alarm by pressing `ACK` ④ key before returning to the current screen. The user can also navigate into the alarms with keys ② and ③ if there are several, or recognize it all at once by pressing `ACK ALL` ①.

It is then possible to review alarms already recognized, by going through the main screen, following the path with `INFO` / `Alarms Report` and selecting the correct date.

## Main Screen for analog measures

```
┌─────────────────────────┐
│04/25│Level (cm)    0.00 │
│14:51│Min:0.00  Max:0.00 │
│ Lcom│Flow (l/s)     N/A │
│04/25│Min:N/A   Max:N/A  │
│ .:. │Volume (US gal) N/A│
│ ╫╫  │Overflows   0 --/-- │
│ MENU│ RT │ INFO │ USB   │
└─────────────────────────┘
```

`23/10` `19:27` Date and time shown should be good during the reading of the instrument. If not, press the ① key to access the `MENU` / `Configuration` / `Date & Time setup`, and then follow the instructions in this section on page 14.

`Level (m)` indicates the virtual level depending on the unit selected by the user (see *Inputs/Outputs* on page 15). The virtual level is the level that the pumps stop. `Min:0,00` and `Max:0,00` displays the minimum and maximum reading by the level sensor since the last restart of the device, or since the last *Reset total events* data.

`Lcom` `--/--` Represents the date (day/month) that there was a communication with the MaidMaps server or a transfer of data on a USB stick.

`Flow (l/s)` corresponds to the flow, depending on the unit selected by the user (see *Inputs/Outputs* on page 15). If the device is set to digital mode, `N/A` (not available) symbol will be displayed on the screen. `Min:0,00` and `Max:0,00` displays the minimum flow and the maximum since the last restart of the device or the last *Reset of the cumulative* data.

This image on the top is the Ethernet connection. When the 3 boxes are linked, it means that the Ethernet cable is connected and that the IP address is valid (the communication is not necessarily functional). The bottom icon is the universal sign of a relay and represents the state of the internal relays of the FlowMaid. It is normally open. But when there is a diagonal line in the Middle, the relay is closed.

`Volume (US gal)` displays the amount of total water overflowed since the last *Reset total events* data (on page 21). If the device is set to digital mode, `N/A` (not available) symbol will be displayed on the screen.

`Overflows` `0 --/--` indicates the number of overflow since the last *Reset total events* and the date (`Day/Month`) of the last event (overflow).

## Main Screen for digital measures

```
04/16 | Not overflowing
13:58 |
Lcom | Last Duration
04/16 |          0:00:00
Y|Since MMDDYY   04/07/14
+H+|Overflows     4 04/16
 MENU |  RT  | INFO | USB
```

Just like the main screen for analog measurement, the main screen displays the current digital measurement time, the time of the last data communication (MaidMaps or USB), the icons representing the "Ethernet" connection and the main relay and the number of overflows and the date of the last. Since this is a digital measure of overflow, the level information, the flow and the total volume is not available. However, the display space is utilized to clearly indicate whether or not there if an overflow occurs, the duration of the present overflow or the last overflow that took place and the date from which the overflows are cumulative.

From the main screen, digital or analog display, the four keys on the device are used to access various menus.

The MENU 1 button allows configuring the instrument or having information on the device.

```
          MENU
Configuration
Device Info
IP Informations
Communication test
Lock screen
 BACK |  ▲  |  ▼  |ENTER
```

```
Internal Info
Digital Overflow
Analog Overflow

 BACK |  ▲  |  ▼  |ENTER
```

RT (real time) button 2 displays additional data available in real time.

The INFO 3 button displays details of the registered events and alarms (reports).

```
         Reports
Events Report
Alarms Report
Overflows report

 BACK |  ▲  |  ▼  |ENTER
```

```
          USB
Reports
Copy User Manual
MerMaid Data
Raw Data
Technician Data
 BACK |  ▲  |  ▼  |ENTER
```

The USB 4 key allows creating, on the USB stick different files, including one in CSV format containing the monthly report compatible to Excel™.

## Numbers selection screen

The setting of the device is done easily using the *MaidDevices Configurator* software (on page 29). However, it is possible to do so from the screen. A scale from 0 to 9 to enter the value desired, moving with the buttons 2 (left) and 3 (right). To select the first digit, press ENTER 4.

```
0 1 2 3 4 5 [6] 7 8 9 . ←↵

            0

CANCEL|  ←  |  →  |ENTER
```

← To correct or erase a number, select this arrow.
↵ To accept the number and exit the submenu, use this sign.

When the cursor is on + press 4 to change the negative number.

A negative value may be necessary for some parameters in the overflow equations. It is important to note that according to the case, it is not possible to enter any number. An error message might appear below the window in such a case. The user will be limited to the number of digits after the point also.
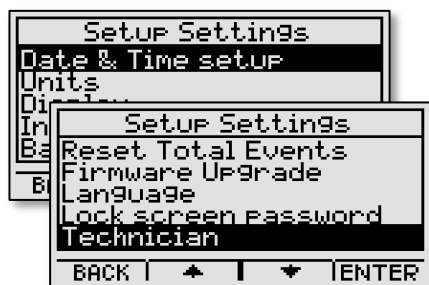
## MENU 1

Pressing the MENU 1 button displays five options, configure the device, display the hardware and the software of the device, reveal IP addresses, testing of communication with the instrument, and locking the screen.

```
          MENU
Configuration
Device Info
IP Informations
Communication test
Lock screen
 BACK |  ▲  |  ▼  |ENTER
```

# Instrument setup

From the main screen, press the MENU ① button to enter the menu, and then ENTER ④ to reach the configuration menu. The latter allows changing all the items listed below. Scroll through the menu with the keys ② and ③, and then press ENTER ④ to move to the action. Once the action is completed press RETURN ① back to return to the Setup menu. The list of submenus is longer than what is displayed on the initial screen.

You can use the ***MaidDevices Configurator*** software provided with the instrument to configure the instrument. It facilitates and accelerates the configuration (page 29).

## Date & Time setup

This menu displays the time, date, and the difference with the universal time (UTC), also known as Greenwich Mean Time (GMT). The unit, with an Ethernet connection, updates automatically all day with the internet time. It is possible to force the update by internet with the SET ③ button. When communication is disabled, the weather modification is possible with the keys – + and NEXT.
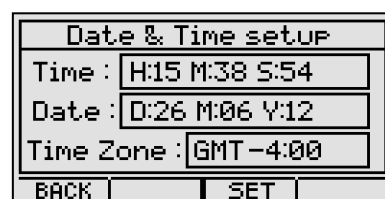
A cursor appears below the first number which can be changed. The keys ② and ③ changes the value and/or NEXT ④ to switch to the next variable.

Data is recorded at Greenwich Mean Time (GMT) and then adjusted to the local time, for the creation of files and reports. This prevents the loss of data caused by changes in daylight savings time, to standard time and vice versa.

Changing the time or date can cause loss of data when the time or date entered is remote. When this happens, the data changes will be lost. In this case, the following message will appear. Change the (GMT) this will  not cause loss of data

## Units

In the FlowMaid different types of units can be selected according to the Length, Volume and Flow settings. The length can be in meters (m), inches (inch), feet (ft) or centimeters (cm).  The volume unit can be selected between Litre (l), gallon US (US gal), in cubic meters (m$^3$) or cubic foot (ft$^3$). As for the flow, it is expressed in liters per second (l/s), in US gallons per minute (GPM), in million US gallon per day (MGD), in cubic meter per day (m$^3$PD), cubic foot by second (ft$^3$PS)
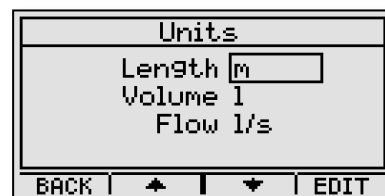
Press the CHANGE ④ key to move from one unit to another and press ② or ③ to move from one parameter to the next.
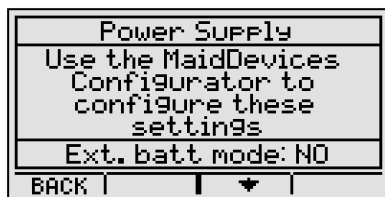
## Display

Apart from the use of the USB key, the backlight of the screen is the largest energy usage of the instrument. To maximize the duration of the batteries press ENTER ④ to select the Brightness setting, then ② or ③ to make
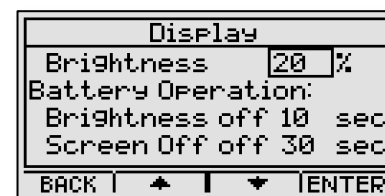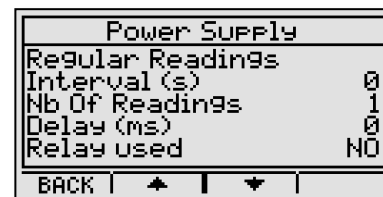
them vary between 0 (off) % and 100% in increments of 20%, and then [4] again to accept the choice.

It is possible to close the backlight (Brightness off) and the screen (Screen off) after an amount of seconds determined by the user. Press the `ENTER` [4] button to accept the selection, then [2] or [3] to modify it, followed by [4] to accept the selection.

## Power supply

```
   Power Supply
Use the MaidDevices
  Configurator to
  configure these
     settings
 Ext. batt mode: NO
BACK │     │  ✦  │
```
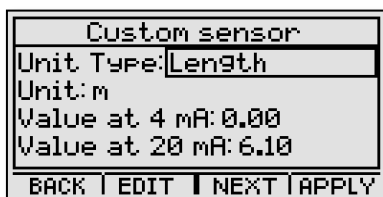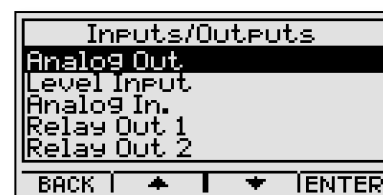
According to the type of power supply chosen for the device, you will be prompted to use the configuration software *MaidDevices Configurator* page 29.

```
    Power Supply
Regular Readings
Interval (s)        0
Nb Of Readings      1
Delay (ms)          0
Relay used         NO
BACK │  ✦  │  ✦  │
```

## Inputs/Outputs

The FlowMaid has a digital input and an analog input. No configuration is required for the digital input, but is required for the analog input. To use the analog input, a 4-20mA sensor must be connected inside the instrument. The *Installation* section on page 8 shows where to connect the wires.

```
    Inputs/Outputs
Analog Out.
Level Input
Analog In.
Relay Out 1
Relay Out 2
BACK │  ✦  │  ✦  │ENTER
```

Press `ENTER` [4] to access the selection of the level sensor (`Level Input`) and again press `ENTER` [4] to access the selection `Level`. There is a choice directory when entering [3]: the `0-10 m` sensor, the `0-20 ft` (foot) sensor or the `Custom sensor`. In the case of custom sensor, a choice of four inputs is available: `4-20mA`, `0-5V`, `0-10V` or `0-24V`, that the user can configure itself by entering the settings in the window below.

```
     Hardware
4-20mA
0-5v
0-10v
0-24v
BACK │  ✦  │  ✦  │ENTER
```

```
   Custom sensor
Unit Type:Length
Unit: m
Value at 4 mA: 0.00
Value at 20 mA: 6.10
BACK │ EDIT │ NEXT │APPLY
```

The `Unit type` can be in `Length`, `Volume` or `Flow`. To move a type from one unit to another, use the `EDIT` [2] key and to accept the choice, go to the field with the `NEXT` [3] button. When the unit type is selected, the corresponding units will be displayed automatically, e.g: Length = `m`, `cm`, `in`, `ft`, Volume = `l`, `gal`, Flow = `l/s`, `GPM`, Temperature = `F`, `°C`. To enter the values for the 4-20 mA sensor, press `EDIT` [2], the numbers selection screen appears. When all the settings are properly selected, the `APPLY` [4] button will return to the main inputs/outputs screen.

## Level setup

```
    Level setup
Real Level: 0.00
Computed Level: 0.00
    Zero level
    0  = 0.00
BACK │ EDIT │ GET │APPLY
```

The `Real Level` is the water level from the position of the level sensor. The `Computed Level` is the level from a Zero level chosen, for example, `0 m` = stop level of the pumps. It is possible to read the current level with the `GET` button, for example, if the current level is zero. However, it is possible to enter a value manually using `EDIT` [2] key. The numbers selection screen will appear at this time, press `APPLY` [4] to save the data.

## Open Channel Flow (Overflow) Setup

```
      Overflow Setup
Overflow:digital

 BACK │ EDIT │   ▼  │APPLY
```

The configuration of overflow can be in a `digital`, `analog` or `combined` mode. The digital mode is a dry contact by which a float level will be connected to the digital input. On the analog side, the level sensor is connected to the 4-20mA pressure input of the device. In combined mode, both sensors are installed. This mode can be useful to have a second opinion on the readings if the sensor would tend to clog rapidly resulting in erroneous readings.

```
      Overflow Setup
Overflow:analog
Level: (m):0.00
Overflow level:
        0.00 m
 BACK │ EDIT │   ▼  │APPLY
```

In the analog mode window, `Level` (m) is the level that the unit reads in real time, and the `Overflow level` is the level at which the overflow begins. The value of this overflow level is the only one that the user can define itself by pressing `EDIT` ②  and using the *Numbers selection screen* (page 13) and then accepting the value by the `APPLY` ④ key. At this time an `Overflow Computation` window will appear.

## Equations for Open Channel Flow (Overflow)

According to the type of Weir being used you will have to choose among 9 equations:

```
 Overflow Computation
None
Manning part. pipe
Manning Open Channel
V Notch Weir
Cont. Rect. Weir
 BACK │  ▲  │   ▼  │ENTER
```

```
 Overflow Computation
Trapezoidal Weir
California Pipe
Standard Formula
Polynomial Formula
Look-up Table
 BACK │  ▲  │   ▼  │ENTER
```

## Flow calculation formulas

All flow calculation formulas have their advantages and their disadvantages. None[1] provides 100% accuracy. Choose the one that gives the best results taking into account restrictions on facilities and space debris, risk is the responsibility of the user. Being satisfied that a bad result is better than a good calculation (Marcel Roche in HYDROLOGY of SURFACE), never hesitate to measure.

Make sure that the unit of measure used is displayed in the input of the parameters screen.

**Conditions of implementation of the Weirs:**

- The plate must be perfectly vertical and perpendicular to the walls of the approach channel, waterproof and crushproof.

- The approach channel should be straight, uniform, and rectangular with constant slope 10 times longer than the width of the blade overflowing to the maximum load.

- The water level in the channel downstream must be sufficiently below the ridge to ensure a free and fully aerated flow.

[1] The volumetric calculation provides an accurate 100% average flow rate, provided that the volume and time are 100% accurate.

## *Manning equations for partially filled pipes*

This equation is the easiest to use to assess the loss of volume and flow during an overflow. The Manning equation usually has the following expression:

$$Q = \frac{KAR^{\frac{2}{3}}S^{\frac{2}{3}}}{n}$$

$Q$ = Flow
$K$ = Relative constant to the units used in the equation
$A$ = Area of the part of the submerged pipe
$R$ = A divided by the perimeter of the submerged section
$S$ = Angle of the pipe (slope)
$n$ = Constant that represents the degree of roughness of the hose wall.

The Manning equation is used to estimate flow in open channel situations where it is not practical to build a Weir or a channel to measure the flow with increased accuracy.

This equation has been developed to calculate the flow in places where water flows to a velocity relative to the angle of the pipe, its roughness and height of the water. When water is part of a tank, as with an overflow pipe located in a manhole or a pump station, an error could be induced, because the equation is not optimized for this type of installation but is the only one available.

When Manning for partially filled pipes is selected, the following settings are required:
- Diameter of the pipe enter this manually.
- Coefficient of roughness to select from a list
- Tilt of the pipe (distance/height): the distance by height, enter this manually
- Basic level of the hose: the level input having been calibrated in another menu (Menu/Configuration/Level setup) specify here how high the bottom of the pipe is located.

## *Manning equation  for open channel*

This type of channel is often encountered in structures that allows the flow of water to overflow. When this function is selected, the following settings are required:
- Width at the bottom of the channel
- Roughness Coefficient, to select from the list
- Pipe angle (distance/height): distance by the height, enter this manually
- Angle of the sloped sides of the channel, in degrees
- Basic level of the channel: the entry level having been calibrated in another menu (Menu/Configuration/Level setup), specify here how high the bottom of the pipe is located.
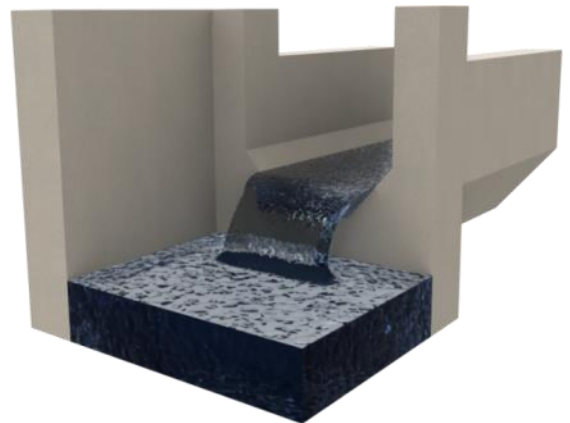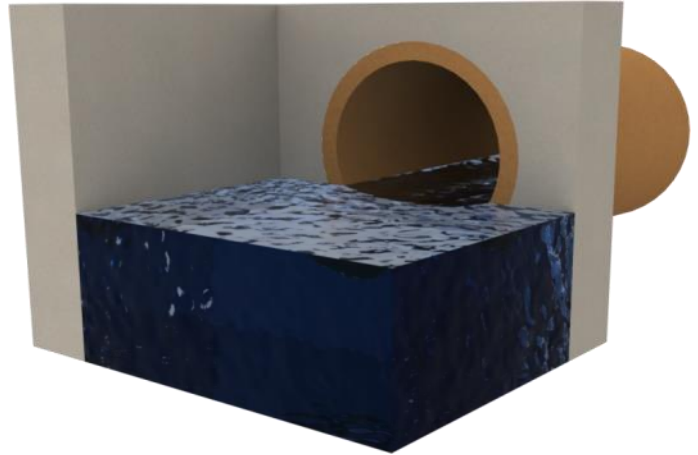
## V notch Weir

- The accuracy of the triangular Weir is 1-2% on the flow coefficient when all conditions are met. To maximize the chances for this degree of precision:
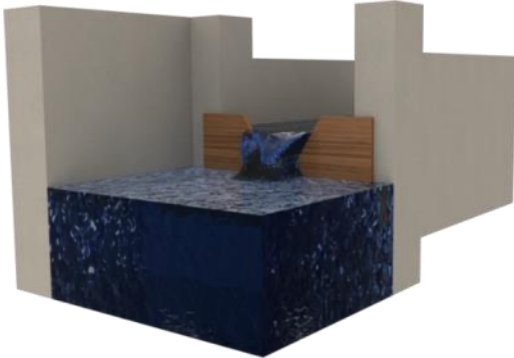
  - The distance between the base of channel and point of V must be double the distance between tip of V and the surface of the water above the V.
  - The distance between the sides of the channel and the top of the V should be double the distance between tip of V and the surface of the water above the V.
  - The distance between the base of channel and point of V must be double of distance between tip of V and the surface of the water above the V.
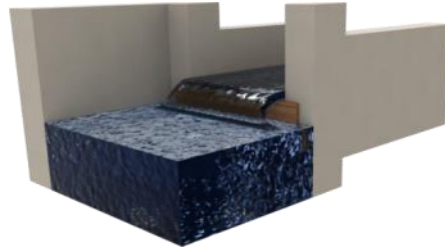
When this function is selected the following settings are required: Angle of the V in degrees, level from which a state of overflow is considered.

## Contracted or Supressed rectangular Weir
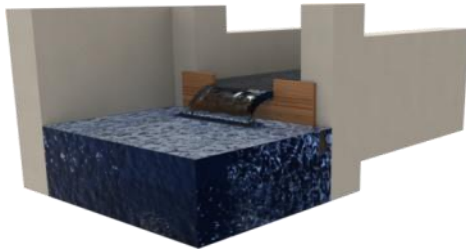
Erreur ! Signet non défini.

The accuracy of rectangular weirs, with or without contractions, is in the order of 1 to 4% on the flow coefficient when all conditions are met. The following parameters must be entered in the instrument:

- Width of the Weir
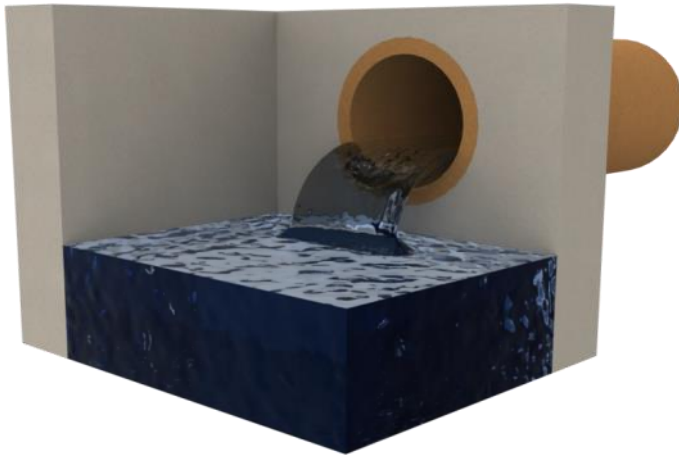- Level at which overflow is considered

## Trapezoïdal Weir (Cipoletti)

The accuracy of the trapezoidal Weir or Cipoletti is in the order of 1 to 4% on the flow coefficient when all conditions are met. The following settings are required:

- Width of lateral contraction to the base.
- Level from which a state of overflow is considered.
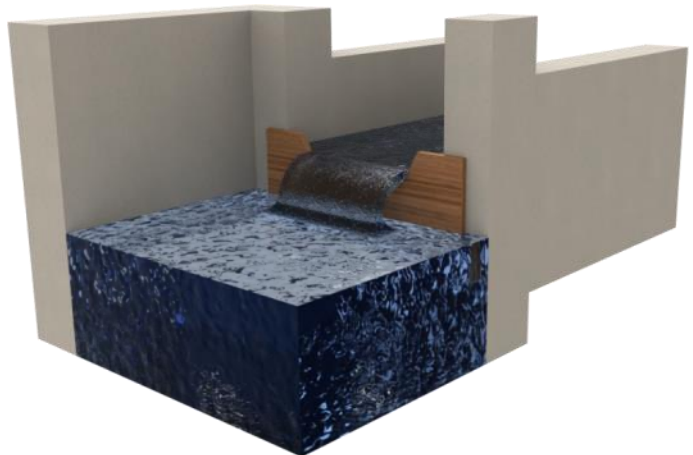
## California pipe

This method measures the output of the open end partially filled horizontal pipe which will discharge freely into the air. This method is sometimes considered to be a method of trajectory. However, the measure is really based on the depth at the end of the pipe.

The following settings are required:

- Diameter of pipe
- Level from which a state of overflow is considered.

.

## Polynomial Formula

$Q = A + Bh + Ch^2 + Dh^3$

The majority of the formulas of flow can be summarized in two equations, standard flow and polynomial flow. Note that the settings of the following units are in feet (ft) for the height and cubic foot (ft$^3$) for flow.

## Standard Formula

$Q = A*(B + Ch)^D$

All the following tables are based on this formula, with the exception of the Polynomial formula

**Channels**

| H Channel | A | B | C | D |
|---|---|---|---|---|
| 0.50 | 1.60 | 0 | 1 | 2.2 |
| 0.75 | 1.77 | 0 | 1 | 2.23 |
| 1.00 | 1.95 | 0 | 1 | 2.30 |
| 1.5 | 2.12 | 0 | 1 | 2.30 |
| 2 | 2.37 | 0 | 1 | 2.23 |

| Parshall | A | B | C | D |
|---|---|---|---|---|
| 1" | 0.338 | 0 | 1 | 1.55 |
| 2" | 0.676 | 0 | 1 | 1.55 |
| 3" | 0.992 | 0 | 1 | 1.55 |
| 6" | 2.060 | 0 | 1 | 1.58 |
| 9" | 3.070 | 0 | 1 | 1.53 |
| 12" | 3.950 | 0 | 1 | 1.55 |
| 24" | 8 | 0 | 1 | 1.55 |
| 36" | 12 | 0 | 1 | 1.57 |
| 48" | 16 | 0 | 1 | 1.58 |
| 60" | 20 | 0 | 1 | 1.59 |
| 72" | 24 | 0 | 1 | 1.59 |

| Palmer-Bowlus | A | B | C | D |
|---|---|---|---|---|
| 4" | 1.73 | 0.00588 | 1 | 1.957 |
| 6" | 2.071 | 0.005421 | 1 | 1.903 |
| 8" | 2.837 | 0.01456 | 1 | 1.972 |
| 10" | 2.843 | 0.01616 | 1 | 1.953 |
| 12" | 3.142 | 0.017 | 1 | 1.936 |
| 15" | 3.574 | 0.0168 | 1 | 1.906 |
| 18" | 3.988 | 0.01875 | 1 | 1.898 |
| 24" | 4.574 | 0.0408 | 1 | 1.950 |
| 30" | 5.022 | 0.0625 | 1 | 1.966 |
| 36" | 5.462 | 0.08 | 1 | 1.991 |

| Trapezoïdal | A | B | C | D |
|---|---|---|---|---|
| 60⁰ | 1.55 | 0 | 1 | 2.58 |

| Polynomial | A | B | C | D |
|---|---|---|---|---|
| 0.4HS | −3.48e-5 | 2.1e-3 | 3.52e-1 | 4.40e-1 |
| 0.6HS | -7.52e-5 | 8.3e-3 | 4.02e-1 | 3.79e-1 |

**Weirs**

| Triangular | A | B | C | D |
|---|---|---|---|---|
| 22.5º | 0.505 | 0 | 1 | 2.500 |
| 30º | 0.676 | 0 | 1 | 2.500 |
| 45 º | 1.028 | 0 | 1 | 2.500 |
| 60 º | 1.420 | 0 | 1 | 2.440 |
| 90 º | 2.490 | 0 | 1 | 2.475 |
| 120 º | 4.333 | 0 | 1 | 2.500 |

| Trapezoïdal | A | B | C | D |
|---|---|---|---|---|
| 0.5' | 1.684 | 0 | 1 | 1.5 |
| 1.0' | 3.367 | 0 | 1 | 1.5 |
| 1.5' | 5.051 | 0 | 1 | 1.5 |
| 2' | 6.374 | 0 | 1 | 1.5 |
| 3' | 10.101 | 0 | 1 | 1.5 |
| 4' | 13.468 | 0 | 1 | 1.5 |

| Rectangular | A | B | C | D |
|---|---|---|---|---|
| 1' | 3.333 | 0 | 1 | 1.5 |
| 2' | 6.667 | 0 | 1 | 1.5 |
| 3' | 10.00 | 0 | 1 | 1.5 |

## Look-up table

When type of Weir or channel does not calculate the flow rate with reasonable accuracy, but a known rate proportional to the height of the liquid is known, then the look-up table is the function to use. The following settings are required:

Enter the desired (0-100) table size: n
- Enter level #1
- Enter the flow for level #1
- Enter level  #n
- Enter the flow for level #n
- Level from which a state of overflow is considered

## Bandwidth setup

The bandwidth setup screen allows changing four parameters for communication with the MaidMaps web server.

The first parameter determines whether or not to activate the communication with the MaidMaps server.

The second indicates the delay between Event data sending to MaidMaps. These data allows displaying sensor values on the map and generating graphs from the web interface.

```
     Bandwidth setup
Server com.:   Enabled
MaidMaps:        Daily
Files:           Daily
Major change:     Send
 BACK │NEXT │  +  │APPLY
```

The third parameter defines the delay between files sending. This applies to both .csv reports generated by the instrument and useful for the user, and technicians files allowing a detailed monitoring of the operation of the device.
The last parameter allows, when an overflow, sending data faster.

## Alarms setup

When the "Relay Out 1" output is setup in an alarm mode, the relay contact closes when the alarm is activated and opens when the alarm ends. Press the EDIT 4 key to select the type of alarm to configure. There are 5 options for the `Alarm type` field: `Off`, `Min`, `Max`, `Min/Max` and `Remote`. The displayed length unit will be `m`, `cm`, `in` or `ft`.

```
      Alarms setup
AlarmType: Min/Max
Min:0.00  Max:0.00    PSI
Min. alarm duration
   H:0   M:0  S:0
 BACK │  ♠  │  ♦  │ EDIT
```

When `Off` is selected, it means that no alarm will be generated. `Min` means that an alarm is generated under the minimum value, while an alarm is generated above the maximum value when `Max` is chosen. `Min/Max` indicates that the `Min` and `Max` alarms are active. Note that the values of `Min`,

`Max`, or `Min/Max` are always displayed, but are valid only if the alarm is activated. The fifth option, `Remote`, allows the MaidMaps software to manage the alarms, where an Ethernet communication is previously required. However, the bandwidth options can affect the speed at which the alarm will be received by the device.

To accept the chosen alarm type and to move from one field to the next, press the arrow ③. To enter or edit a value, press `EDIT` ④ and the *Numbers selection screen* (page 13) will appear.

## *Download settings*

To read the file created by **MaidDevices Configurator**, select `Read conf. file`, then `ENTER` ④. Follow the instructions on the screen.

The settings can also be configured from the **MaidDevices Configurator** software. This software can be copied to a USB key from the instrument. Simply select from the configuration menu, `Download Settings`, then `Copy software`, then `ENTER` ④. A USB key is required in the instrument.

```
Download settings
Read conf.file
Copy software


BACK  |  ▲  |  ▼  |ENTER
```
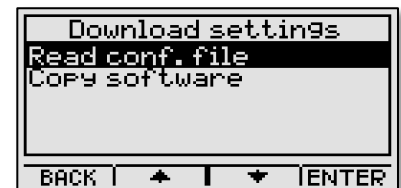
The **Config.zip** compressed file will be copied to the root directory of the USB stick. Double-click on the top should unpack it. Click on **Config.exe** to run the application. The explanation *MaidDevices Configurator* software is on page 29.

## *Reset total events*

This function resets the total events contained in the main screen. After selecting this function, press `YES` ③ to confirm the deletion of the data from the main screen or `CANCEL` ① to return to the previous screen.

To reset to zero all the total events of the instrument, go to the *Factory Reset* function on page 23.

```
Are you sure you want
to reset Total events
    count to 0


CANCEL|      |  YES  |
```
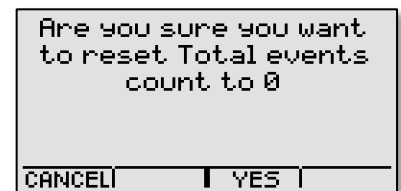
## *Firmware Upgrade*

Maid Labs continually improves its products and especially the internal softwares of its instruments, because improvements are suggested, because bugs are found, despite all the tests that have been performed on the instrument.

The latest version of the internal software can be obtained from the website www.maidlabs.com for devices having been registered.

Make sure of the reliability of the energy source before beginning the programming of the instrument.

If the unit is running on external power there must not be any power loss during the update. To reduce this risk, make sure that the 12V external battery is correctly connected to the device "IN BATT" input and that its charge is equal to or greater than 12V. The battery voltage can be checked on the main display  by selecting the `RT` ② and `Internal info`.

After selecting `MENU` ①, `Setup, Firmware update`, insert a USB stick that contains the **flowmaid.hex** file in the root directory. As soon as this file is detected, the programming begins.

The software is first copied to the internal memory of the instrument, and then the actual update begins. A percentage indicates the progress of each of these steps. The instrument restarts when everything is completed.

## Language

```
        Language
 ┌─────────────────────┐
 │ English             │
 └─────────────────────┘

 BACK │   ▼   │   ▲   │ APPLY
```

The instrument can work in French or in English. Press ②  or ③ to select the language, then `APPLY` ④ to accept the displayed language.

## Lock screen password

```
 The current password
          is:
         1234


 BACK │ ERASE │ EDIT │
```

By default, if no key lock has been configured, simply press 1234 to have full access to the menus of the device. To create a custom locking key, press `EDIT` ③ and enter a 5-digit code between 1 and 4.

## Reports setup

```
    Min event time

      00:00:01


 BACK │   ▲   │   ▼   │ ENTER
```

This menu allows you to configure a minimum event the time to be included in the reports. The + ② and - ③ keys allows to change the value by progressive increment while the ENTER ④ button allows to confirm your choice.

This option allows you to create visually more informative reports. For example, consider a position where the water level is slightly below the overflow level. Several small events spaced in time could be saved simply because the swirl of water. These small events are not significant and draw the reader's attention from the real overflow. In the contrary, in a case where the water level is slightly above the overflow level, the swirl could create a separation in several events of what is actually a continuous overflow. This option allows you to overcome these two problems.

In summary, if the time between two or more events is less than the minimum time set, they will be bonded into one. If the duration of a single event or agglomerated events does not reach the minimum time, it will not be mentioned in the report.

If you do not want to take this option and prefer more raw data, but more difficult to analyze, simply set this minimum event time value to one second. Otherwise, it is advisable to choose a value from a few tens of seconds for rapid position changes to several minutes for slower positions variations.
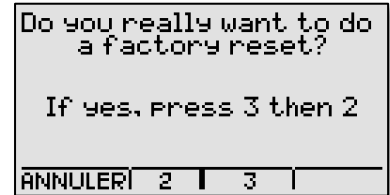
## Technician

```
       Technicien
 ┌─────────────────────┐
 │ Factory Reset       │
 │ Erase Files         │
 │ SD card Info        │
 │ Copy Manual From USB│
 │ Copy App From Usb   │
 └─────────────────────┘
 RETOUR │   ▲   │   ▼   │ ENTRER
```

The technician menu can do operations and access to functions that are normally reserved for an experienced technician who knows what he is doing. In this menu, there are functions that could totally erase the memory of the instrument.

## Factory Reset

This resets the device to the same condition that it was when new and never installed. If this is what you want, press in the order 3 and 2. Nothing will be in the internal memory after this execution. It is equivalent to formatting the disk of a computer.

```
Do you really want to do
     a factory reset?

  If yes, press 3 then 2

ANNULER|  2  |  3  |
```

## Erase File

```
       Delete File
Assert
Digital
H|       Delete File
E|Ethernet buffer
A|Alarm
R|Overflow
  MerMaid file
  Old MerMaid files
RETOUR|  ↑  |  ↓  |ENTRER
```

This function allows to select the file to delete from the memory.

**Assert** is a file to track bugs if necessary. The **Digital** files, and **TempBatt** are explained in the *Raw data* section on page 28. **Level** is the level readings file, **http** file is bugs in communication and **Ethernet buffer** file is temporary registration file of the data to send to MaidMaps when the communication is not possible. **Alarm** is the file of the alarms while **Overflow** is the overflow file.

When the file to be deleted is selected, press ENTER 4 to access the next screen, then OK 2 to confirm.

## SD Card Info

This function allows you to check the amount of memory for internal memory and free space. With 2 GB of memory, there is enough memory for the lifetime of the instrument, or more than 10 years.

```
       SD card Info
KB total drive space:
1949376
KB available:
1936352

BACK |     |     |
```

# Device info

```
Product:  Debordemetre
Serial No:       DM113011
Name:            DM113011
Hardware Version:       5
Software Version:      58
Compil Date:  Apr 24 2013
  BACK |     |     |
```
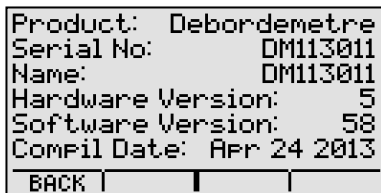
From the main screen, press MENU 1 to enter the menu, then the arrow 3 and ENTER 4 to display the product information.

# IP Information

```
IP address:
169.254.1.1
Network Mask:
255.255.0.0
Gateway:
169.254.1.1
  BACK |     |  ↓  |
```

From the main screen, press MENU 1 to enter the menu, then the arrow 3 and ENTER 4 to display the IP information.

```
Primary DNS:
169.254.1.1
MAC address:
00:04:A3:16:7B:4B
DHCP:
ON
  BACK |  ↑  |     |
```

## Communication test

From the main screen, press MENU `1` to enter the menu, then the arrow `3` and ENTER `4` to initiate the communication test. The TEST`4` button allows to manually repeat the test to observe the commands that are sent.

```
Successful Comm.
26/09 10 :10, 4. 0
```
Information appearing under the "Successful Communication" status is the date and time of the last communication, the command sent (represented by a digit) and the replies received. This information is not important to the user but allowed the technician to better diagnose a problem.

From the main screen, press the MENU `1` button to enter the menu, then `3` and ENTER `4` to display the information.

## Analog output test

```
Analog Out Test

Value: 4.00mA

BACK |  −  |  +  |
```
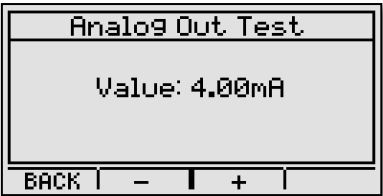
This menu enables the analog output to verify correct operation during the installation of a device. Use the keys `2` and `3` to change the intensity of the current between 4 and 20mA. The key `1` allows returning to the previous menu. The output remains active when you leave the menu. It is then possible, by connecting the 4-20mA output to the LEVEL input, after setting the LEVEL input into a 4-20mA mode, to confirm the proper functioning of these two ports by simply checking the level value displayed on the main screen in the analog mode. It is important to note that the analog output can only be activated if the 12V DC IN is connected to a power supply. It will not work if the unit is only powered by an external battery.

## Relay test

```
Press on button 3 to
open and button 4 to
   close the relays.

Relays state:⊣⊢⊣⊢

BACK |  |  3  |  4
```
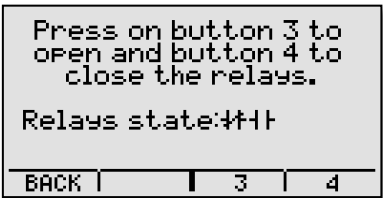
Allows to manually activating the relays for testing purposes.

## Lock screen

Lock screen allows restricting access to the device in the main menu. By default, if no lock key has been configured, simply press 1234 to have full access to the menus of the unit. If the lock key has been configured (*lock screen password*, page 22), just grab it with the buttons. The device automatically locks the screen after 30 seconds.

## Shutdown device

This procedure is recommended when there is maintenance to do on the device, for example, a battery change. This avoids the possibility of loss of recent data that has not yet been stored. This function causes a stop of all operations of the device. To return to normal operation, simply remove the power including the batteries and reconnect after a few seconds.

## RT ②

### Internal Info

This screen provides access to other useful information updated in real time like the battery voltage or the internal temperature of the device.

```
┌──────────────────────────────┐
│ Internal Info                │
│ Digital Overflow             │
│ Analog Overflow              │
│                              │
│ BACK │  ▲  │  ▼  │ENTER      │
└──────────────────────────────┘
```
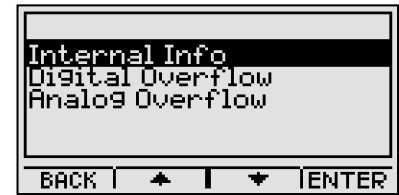
### Digital Overflow

Specifies the device to use the real-time display, optimized for digital measures as the main screen information display.

### Analog Overflow

Specifies the device to use the real-time display, optimized for analog measures as the main screen information display.

## INFO ③

```
┌──────────────────────────────┐
│          Reports             │
│ Events Report                │
│ Alarms Report                │
│ Overflows report             │
│                              │
│ BACK │  ▲  │  ▼  │ENTER      │
└──────────────────────────────┘
```

From the main screen, enter the desired report type: `Events report` shows the events from the digital input (Digital In), `Alarms report` or `Overflows report`, displays the overflow recorded by the level sensor (Pressure). Press `ENTRER` ④ to move to the next step.

```
┌──────────────────────────────┐
│       Events Report          │
│                              │
│        Show Month            │
│     May          2012        │
│                              │
│ BACK │MONTH│ YEAR │ENTER      │
└──────────────────────────────┘
```

The current month is automatically pre-selected. Press `MONTH` ② or `YEAR` ③ to select the month or the year to edit, and ② and ③ to vary among months and years for which data is recorded, and press `ENTER` ④.

The following window shows for the desired month, the amount and duration of events each day of the month. To display the detail of each of the events for the selected month, select a day by pressing the arrow keys ② and ③ then press `ENTER` ④ to view the details.

```
┌──────────────────────────────┐
│ Events      Qty       Dur.   │
│ MM/DD/YY              HH:MM   │
│ 06/01/12     0        00:00   │
│ 06/02/12     0        00:00   │
│ 06/03/12     0        00:00   │
│ 06/04/12     0        00:00   │
│ BACK │  ▲  │  ▼  │ENTER      │
└──────────────────────────────┘
```

```
┌──────────────────────────────┐
│ Events   Start      Dur.     │
│ MM/DD/YY HH:MM    HH:MM:SS    │
│ 04/20/12 00:00    00:00:00    │
│ 05/08/12 00:05    00:05:12    │
│                              │
│ BACK │  ▲  │  ▼  │           │
└──────────────────────────────┘
```

The detailed report displays the date and time at which the event started, followed by the duration of the event in Hour: Minute. Note that an event with a duration of `00:00` means that it lasted less than 60 seconds. In the case of an overflow report, the `Flow`, according to the units previously chosen by the user, will also be displayed. By pressing the `Next` ④ button the last column shows the `Volume`, according to selected units.

If no day is selected, the first event of the month will be displayed, as well as the following. In all cases, press ② and ③ to scroll through all events in the selected month.

# USB ④

To copy to the USB key reports, user manual, raw data or technician data, from the main screen, press the USB ④ button.

`Monthly events` displays the events in the digital input (Digital In), `Monthly overflows`, displays overflows recorded by the level sensor (Pressure).

Use a USB drive formatted in FAT16 or FAT32. The amount of files located on the key influences the time of copying files. It is best to reserve use of a USB key devices just for MAID Labs downloads.

Insert a USB key when prompted.

When the transfer completes, a message indicating that you can remove the key will be displayed.
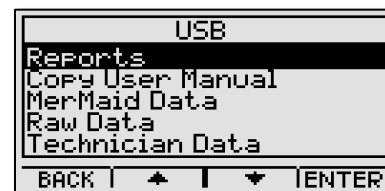
## *Monthly Reports*

Monthly event reports will be on the USB stick, in the monthly subdirectory reports, which is located under the directory with the name given to the instrument or its serial number in the root directory. See *Device name* on page 29.

| | | Events | Average flow | Total volume | |
|---|---|---|---|---|---|
| Date | Duration | Quantity | l/s | L | |
| 1 | 00:00 | 0 | 0 | 0 | |
| 2 | 00:00 | 0 | 0 | 0 | |
| 3 | 00:00 | 0 | 0 | 0 | |
| 4 | 00:00 | 0 | 0 | 0 | |
| 5 | 00:00 | 0 | 0 | 0 | |
| 6 | 00:00 | 0 | 0 | 0 | |
| 7 | 14:31 | 2 | 2,3 | 122474,7 | |
| 8 | 00:02 | 1 | 2,4 | 238,5 | |
| 9 | 00:00 | 0 | 0 | 0 | |
| 10 | 00:00 | 0 | 0 | 0 | |
| 11 | 00:00 | 0 | 0 | 0 | |
| 12 | 00:00 | 0 | 0 | 0 | |
| 13 | 00:00 | 0 | 0 | 0 | |
| 14 | 00:00 | 0 | 0 | 0 | |
| 15 | 00:00 | 0 | 0 | 0 | |
| 16 | 00:00 | 0 | 0 | 0 | |
| 17 | 00:00 | 0 | 0 | 0 | |
| 18 | 00:00 | 0 | 0 | 0 | |
| 19 | 00:00 | 0 | 0 | 0 | |
| 20 | 00:00 | 0 | 0 | 0 | |
| 21 | 00:00 | 0 | 0 | 0 | |
| 22 | 00:00 | 0 | 0 | 0 | |
| 23 | 00:00 | 0 | 0 | 0 | |
| 24 | 00:00 | 0 | 0 | 0 | |
| 25 | 00:00 | 0 | 0 | 0 | |
| 26 | 00:00 | 0 | 0 | 0 | |
| 27 | 00:00 | 0 | 0 | 0 | |
| 28 | 00:00 | 0 | 0 | 0 | |
| 29 | 00:00 | 0 | 0 | 0 | |
| 30 | 00:00 | 0 | 0 | 0 | |
| 31 | 00:00 | 0 | 0 | 0 | |
| Total: | 14:33 | 3 | 2,35 | 122713,2 | |

Report generated on 04/22/2014 at 00:01,
www.maidlabs.com Phone: 450-375-2144,

| Device name: | 133003 |
| Serial number: | DM133003 |
| Report: | Overflow |
| Month: | March 2014 |

*Warning, this report doesn't consider events lasting less than 00:00:10*

A file is created for each month of operation of the instrument, unless all data has been erased using the *Technician* menu on page 22.

The monthly reports are in CSV format. If Excel is installed on the computer, the monthly reports will load automatically. The name of the file consists of an identifier, or the name or serial number, the year and the month for which it was created. Note that if the language of the device is different from that of your computer, the data may not be presented properly. To remedy this problem, simply select the proper separator when importing the spreadsheet (Excel).

For the present month, the dates following the day of creation of the monthly report are not displayed. This and the date of the file creation are two ways to know of the time of creation of the monthly report.

If the FlowMaid is not installed the first day of the month, N/A will appear on the lines for those dates.

The next monthly report has been formatted in Excel, to center columns and display the titles correctly on a single page.

As a result the daily report begins with a report on each event.

| Date | From | To | Duration | Average flow | Total volume |
|---|---|---|---|---|---|
| 7 | 00:00:00 | 14:25:41 | 14:25:41 | 2,3 | 121787,4 |
| 7 | 23:55:07 | 23:59:59 | 00:04:52 | 2,4 | 687,2 |
| 8 | 23:58:21 | 23:59:59 | 00:01:38 | 2,4 | 238,5 |

### Copy User Manual

This function copies the PDF version of the user manual of the registered user in the internal memory of the instrument on a USB key, which is required when significant updates of the internal software take place.



### MerMaid Data

This menu allows you to export the complete file of all the events recorded by the FlowMaid on a USB stick in an encrypted format. Although unreadable directly, you will usually need to send this file to a technician Maid Labs Technologies if you call technical support to solve a problem.

### Raw Data

The raw data is saved in a simple format in a text file. For each selection, the entire file can be copied, for last week or last month.



Data recorded at the hour in universal time (UTC). The *Date & time* section on page 14 explains how to see the difference with the  local time (GMT).
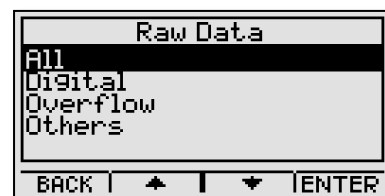


`All` allows you to copy the digital data, the voltage of the batteries, the instrument temperature and the analog input on the USB stick.

Selecting `Digital`, file **Digital.txt** will be created. This is the list of all digital events recorded in the format:**2011-02-10  15:57:44.666  1.** The last « **1** »

means that the contact is open and « **0** » that the contact is closed. It is possible to see several **1** or **0** since the state of the input is registered at the start of the instrument, like when the batteries are changed.

In the case of `Overflow`, the **overflow.txt** file is created and it contains the overflow in the selected unit.
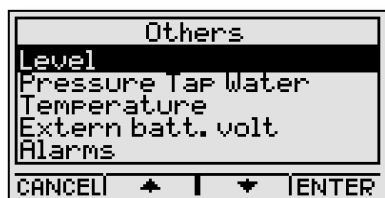


By selecting "`Others`", you have access to a new list of items. It includes among other things: `Level`, `Pressure`, internal `Temperature` of the device, `External battery voltage`, etc. By selecting an item, it allows to retrieve in a dated list format, all records that the device made for this type of data. The device creates on a USB key in the "Device Name" folder/Monthly report/ a file for current month and one file for the month before as the "Event Type" _ReportFromMldata_ "date ".

### *Download settings*

Like the menu with the same name in `MENU / Configuration`, this choice allows you to import a configuration file. mlcfg from the USB key.

### *Firmware upgrade*

Like the « `Download settings` » option, « `Firmware upgrade`», is also available in `MENU / Configuration`. For more information, see section *Firmware upgrade* on page 21.

## MaidDevices Configurator Software

*The last version of the Configurator is available at the following address:*
http://maidlabs.com/upgrades/MaidDevicesConfigurator.zip

Read the *USB* section on page 26 to learn how to copy the configuration software to a USB key.

**MaidDevices Configurator** allows the setup of the following instruments:

- **EE-400**  Event encoder
- **FlowMaid** level monitor and open chanel flowmeter
- **PressureMaid** tap water pressure monitor
- **Volucalc VS** Fixed and Variable Speed flowmeter

At any time, in the configuration software, three actions are permitted:
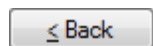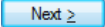
| | |
|---|---|
| ≤ Back | Returns to the previous window without saving the values of the current window. |
| Next ≥ | Allows you to continue with the configuration to the next window. |
| Cancel | Closes the MaidDevices configuration software. |
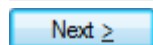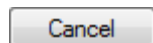
Configurator allows **Create a new file**, **Open an existing file** if the configuration of the device has already been performed or **Create from an existing file**, which allows you to enter the parameters of a device already created. By default, the Configurator starts the process of creating a new file when the button Next ≥ is selected.

For a first configuration, you may select the **Options** link on the bottom left corner of the window. Two menus are available: **General** and **Units** (examples of the two windows are below). By default, it will open on the **Units** menu. If you select **United States**, the standard units seen in the USA will immediatly appear. However, it is possible to change them to fit your needs.

Press the **Apply** button when the units selection is complete.

The General menu helps you choose the desired language. The configurator will appear in the language of your computer (**Default**), but it is possible to change to **French** or **English** at anytime.
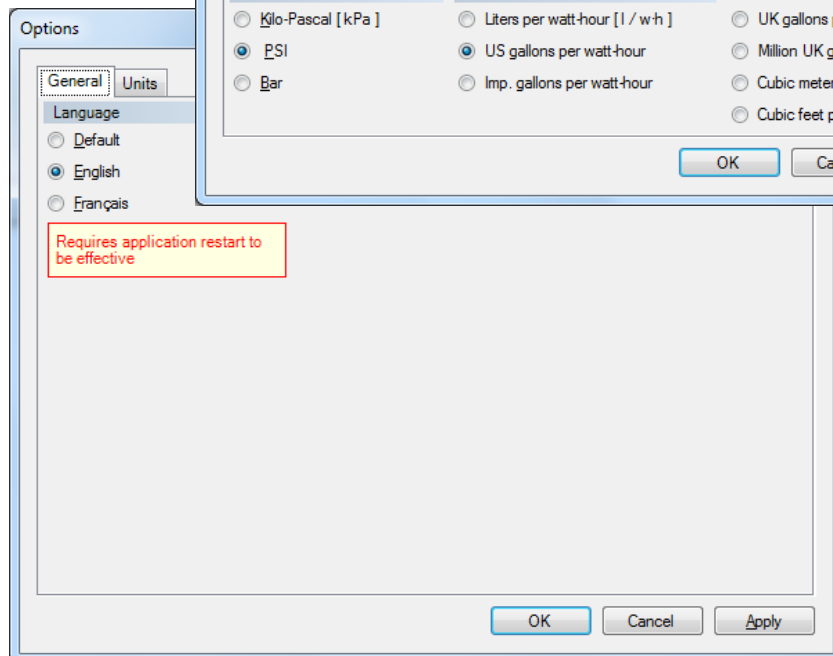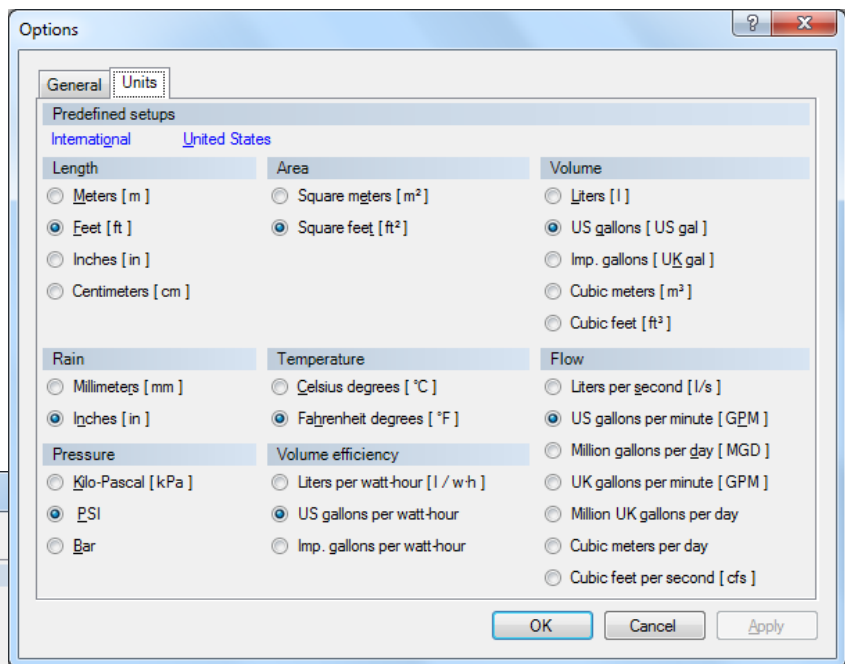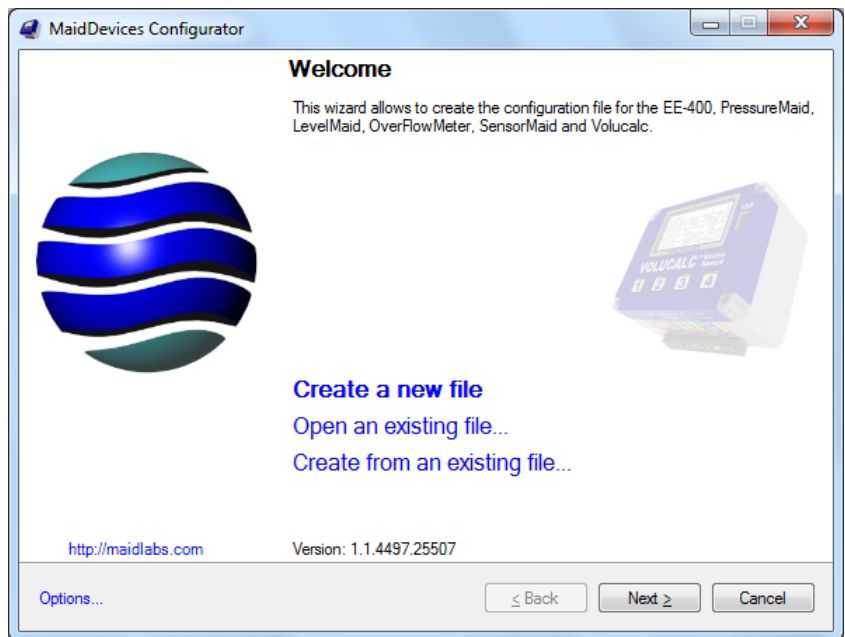
Click on the icon of the desired device. In this case "FlowMaid". Enter the serial number of the device. This number is on the label underneath the device and also appears on the *Device Info* screen (see p. 23). If the serial number is incorrect, the instrument will not be able to read the configuration intended for it.

The configuration file created by MaidDevices Configurator in the main directory of the USB drive is called FMxxxx, where xxxx is the serial number of the instrument.
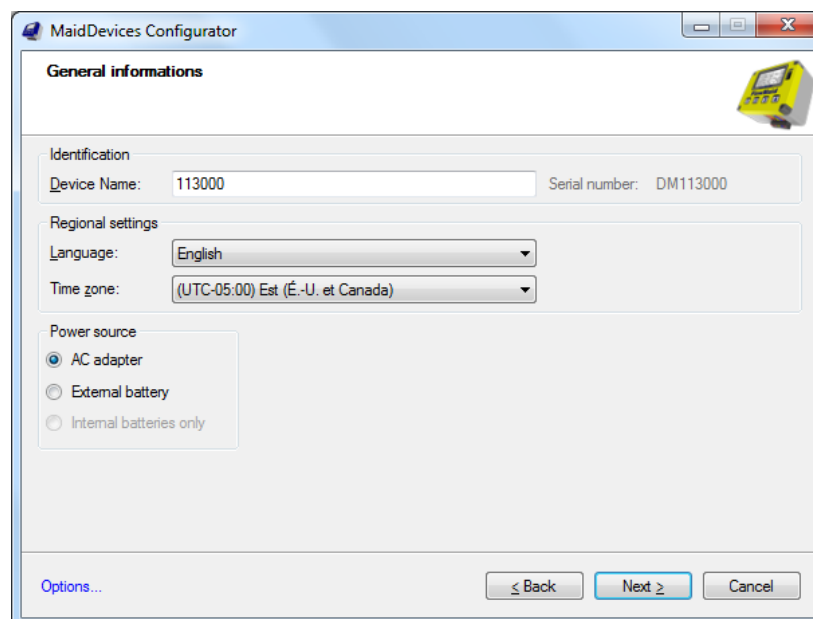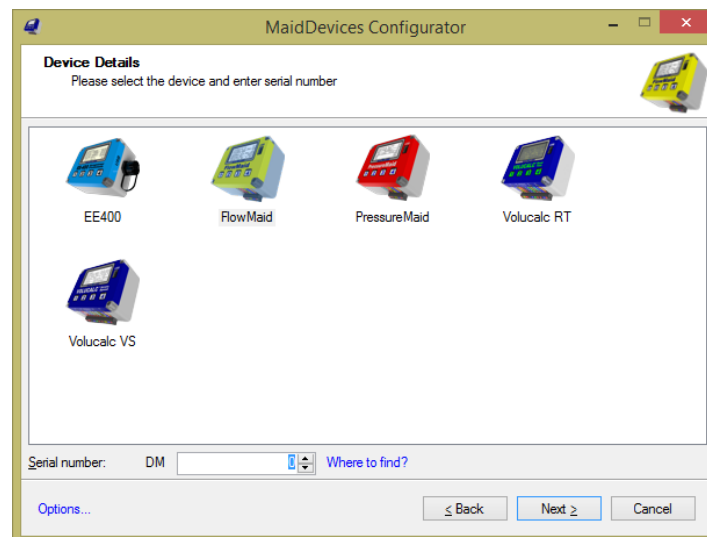




The **Device Name**: will be used to identify data files copied to the USB drive. This is necessary when a key is used for multiple devices.

**Language**: is the one for the operation and the device display. French or English.

The `Time zone`: is automatically adjusted to that of the computer that is running MaidDevices Configurator.

The `Power Source` section allows to select the type of device power: AC adapter or external battery.

Options for operating on external battery, it is necessary to use the MaidDevices configurator software. The options are not all configurable from the device. It is also important to select `Power on External battery` otherwise the life of the external battery will be a lot shorter and the device will not work in External Battery mode.
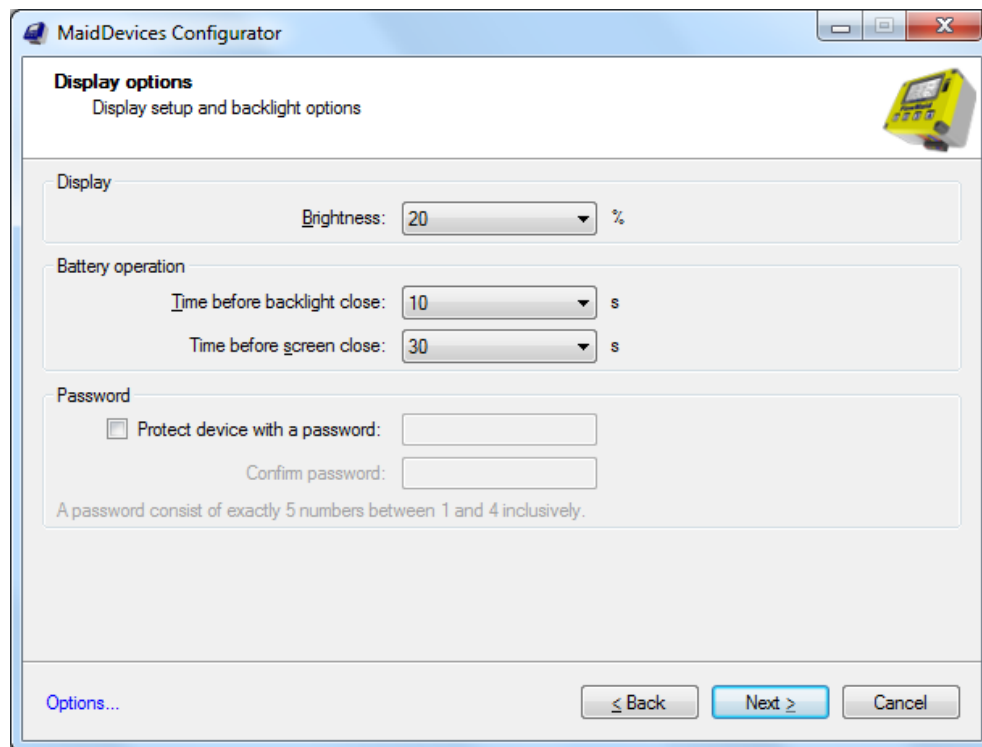


The `Display (backlight)` can be adjusted between 0% and 100% of brightness in increments of 20%. The default value is 20%.

To maximize the operating time on battery, the `Time before backlight close` function can be selected: where the choices are `0`, `10` and `30` seconds, while those for the `Time before screen close` function: are `10`, `30`, `60` or `300` seconds.

Creating a lock screen password is also possible at this point. Just create a code of 5 numbers between 1 and 4, as explained in  the *Lock screen password setup* section (p. 22).

**MaidDevices Configurator** — Inputs and outputs

Configure usage and sensors for each input and output.

| Hardware | ⇔ | Function | Sensor | Range | I/O |
|---|---|---|---|---|---|
| 12 VDC out | ‹ | Controlled power | Controlled equipment | | 12 VDC |
| Flow | | *Not used* | | | *Disabled* |
| Relay out 1 | ← | Alarm out | *Relay* | | Digital |
| Relay out 2 | | *Not used* | | | *Disabled* |
| Level | → | Level | 0-10 m | 0 to 1000 cm | 4-20 mA |
| Analog 1 | | *Not used* | | | *Disabled* |
| Digital in | | *Not used* ∨ | | | *Disabled* |
| Batt. in | › | External battery | 12V battery | | 12V batt. |
| 12 VDC in | › | AC | AC adapter | | 12 VDC |

Options...          ‹ Back    Next ›    Cancel

**12 VDC out** — Setup for device power

**Flow** — Configurable analog 4 to 20 mA output which outputs the overflow or other flow only when the 12vdc power input is present. The following setup window will appear by selecting the **Range** field:



Custom Sensor Setup

Measure Type: Length
Hardware I/O: 4-20 mA
Value at 4 mA: 0.00 m
Value at 20 mA: 1.00 m
Options...     OK     Cancel

In the side window shown, the values at 4 mA and 20 mA (or the type of input/output selected), can be selected or changed using the arrows or directly through the device keypad.

When setup is complete, press OK.

**Relay out 1** — The Relay out 1 is a relay contact that can be used to open or close valves, generating an alarm, control sensor power or cellular modem to save power when the unit is running on battery or transmit a pulse each time a certain volume is reached.

**Relay out 2** — Like the Relay out 1, this Relay out 2 is a relay contact that can be used to open or close valves, generating an alarm, control sensor power or cellular modem to save power when the unit is running on battery or transmit a pulse each time a certain volume is reached.

**Level** — Configurable analog input 4-20 mA, 0-5V, 0-10V or 0-24V can record the level. A choice of two sensors (**0-10 m** or the **0-20 ft**) are available or a **Custom level** setup to access another range of measures. In this case, the following setup window will appear by selecting in the **Range** field:

| | |
|---|---|
| **Analog 1** | Second analog input for another sensor. This input is configurable in 4-20 mA, 0-5V, 0-10V or 0-24V, depending on the sensor used. |
| **Digital in** | This entry may have different functions depending on the choice of drop down menu. Depending on the case, a choice of sensor and range are available. |
| **Batt. in** | Input power from a 12V lead-acid battery when operating on batteries or backup power. |
| **12 VDC in** | Input for the device 12 VDC power. |



This window allows the setup of zero level and overflow level according to different flow computatino methods. A choice of 9 overflow equations are available :

- California Pipe (page 19)
- Trapezoidal Weir (Cipoletti) (en page 1818)
- Contracted Rectangular Weir (en page 1818)
- Look-up table (page 20)
- Manning equation (Open channel) (sur la page 1717)
- Manning equation (Partially filled pipe) (sur la page 1717)
- Polynomial flow formula (en page 1919)
- Standard flow formula (**Erreur ! Signet non défini.**19)
- Supressed Rectangular Weir (en page 20)
- V Notch Weir (en page 1918)

In case that **None** is chosen, the level sensor records the overflow but no flow is calculated.

If the **Lookup table** (sur la page 20) is selected, the Level and the Flow will have to be manually entered in the corresponding fields:



When the alarm type is set to **Disabled**, no alarm will be generated and this means that the entry is in manual control, as selected in the previous step. **Alarm on the minimum value only** means that an alarm is generated below the minimum input, while an alarm is generated above the maximum value when selecting **Alarm on the maximum value only**. **Alarm on the minimum and maximum values** indicates that the minimum and maximum alarms are active.
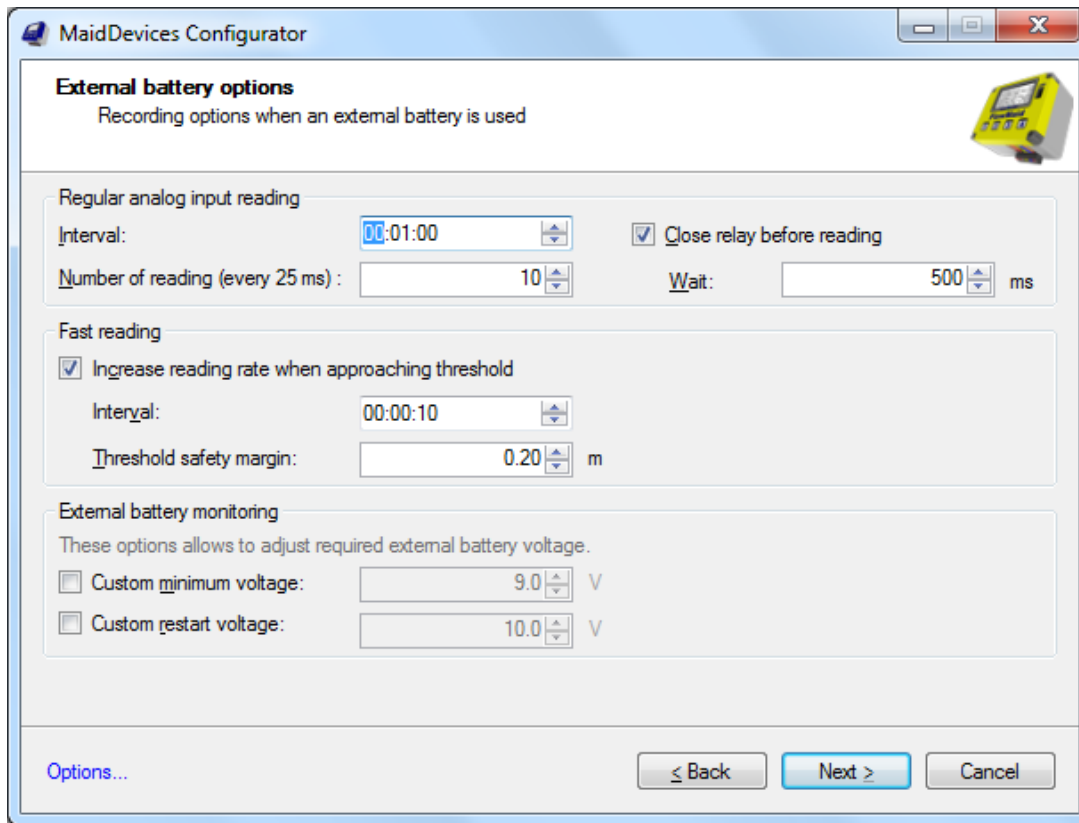
When the instrument runs on an external battery, here are the setup options available:



**Regular analog input reading**:

**Interval** is the time between the readings of the pressure entry where the level sensor is connected.

**Number of reading** is the number of readings the device will do in intervals of 25 millisecond to the sensor. We recommend that you make more than one for a better stability of the reading.

**Close relay before reading** means that the relay is used to power the sensor (as all 4-20mA sensors). This could be unchecked if the sensor is supplied with permanent power or if no power is needed.

**Wait** gives a delay in milliseconds for the initialization of the sensor. By default the Maid Labs sensor must be 500ms. If the time is shorter, the readings will be not good.

**Fast reading** :

By selecting **Increase reading rate when approaching threshold this** allows to reduce the delay between readings when we approach the level of overflow for better accuracy. When the level is at the overflow level, minus the threshold safety margin, there will be accelerated readings from this level to the level of overflow, according to the defined interval. For example: overflow at 3m and safety margin at 0.5m, immediate readings will be done from the moment that the level is more than 2.5 m.

**External battery monitoring**:

The default values are used by the device when this section is not configured. The configuration is useful when using a battery with different operating voltage of type "Gelcel" (lead-acid) batteries.
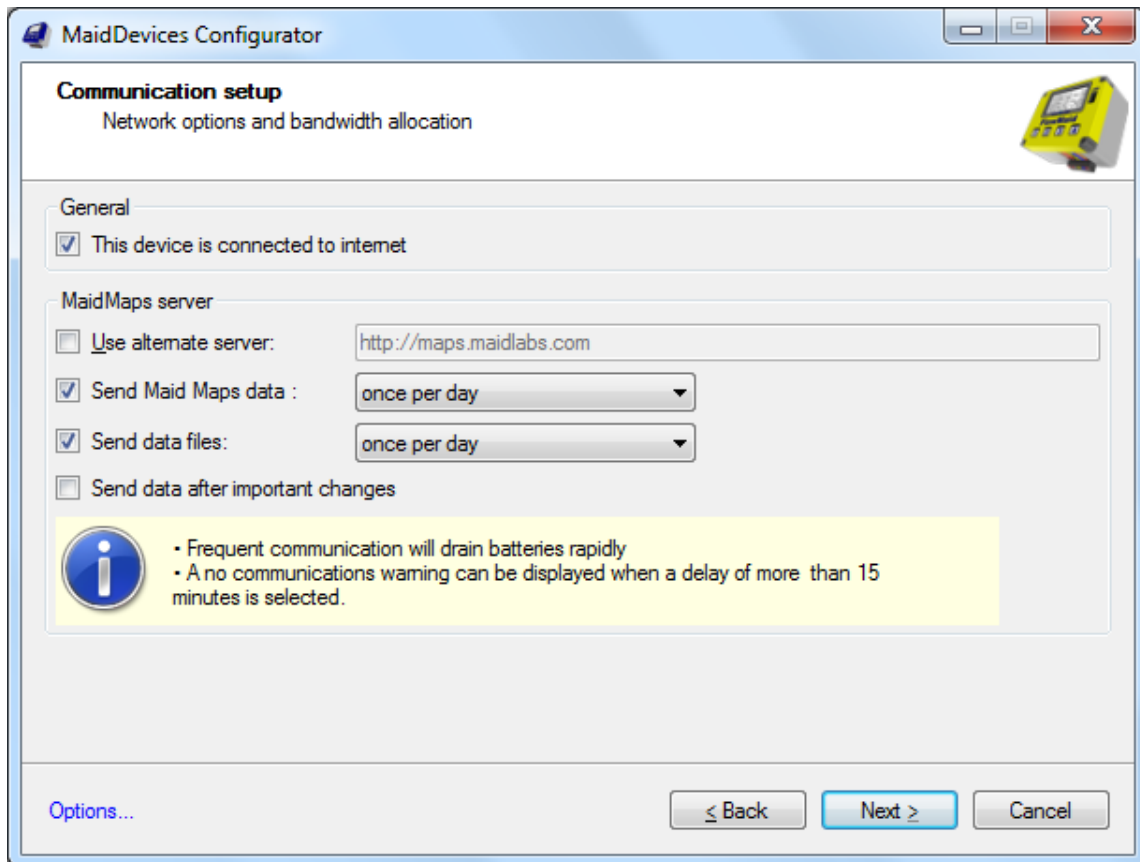
Depending on the bandwidth quality, communication with the server will be fast or slow. In the **General** section, if checkbox **The device is connected to the Internet** is not checked, the communication will not work. This mode also disables the Ethernet module, which reduces consumption of the device and allows options in an "offline" mode to manually adjust the time. By checking this box, different configuration options appear.

By default, the server uses the MaidMaps link http://maps.maidlabs.com. However, it is possible to use another server by checking the box indicating the connection and the server to use.
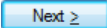
**Send MaidMaps data** can be done in **real time, every 1, 2, 5, 10, 15** or **30 minutes, every hour, every 3 hours, once per day, once per week, every 2 weeks** and **once per month.**

**Send data files** can be done **every 15** or **30 minutes, every hour** or **3 hours, once per day, once per week, every 2 weeks** and **once per month.**

The **Send data after important changes** option can be selected if desired, and means that the communication with MaidMaps will be forced when overflow occurs.

The minimum duration of an overflow event is 3 minutes. If the overflow is shorter than that, no events will be sent to maidmaps.
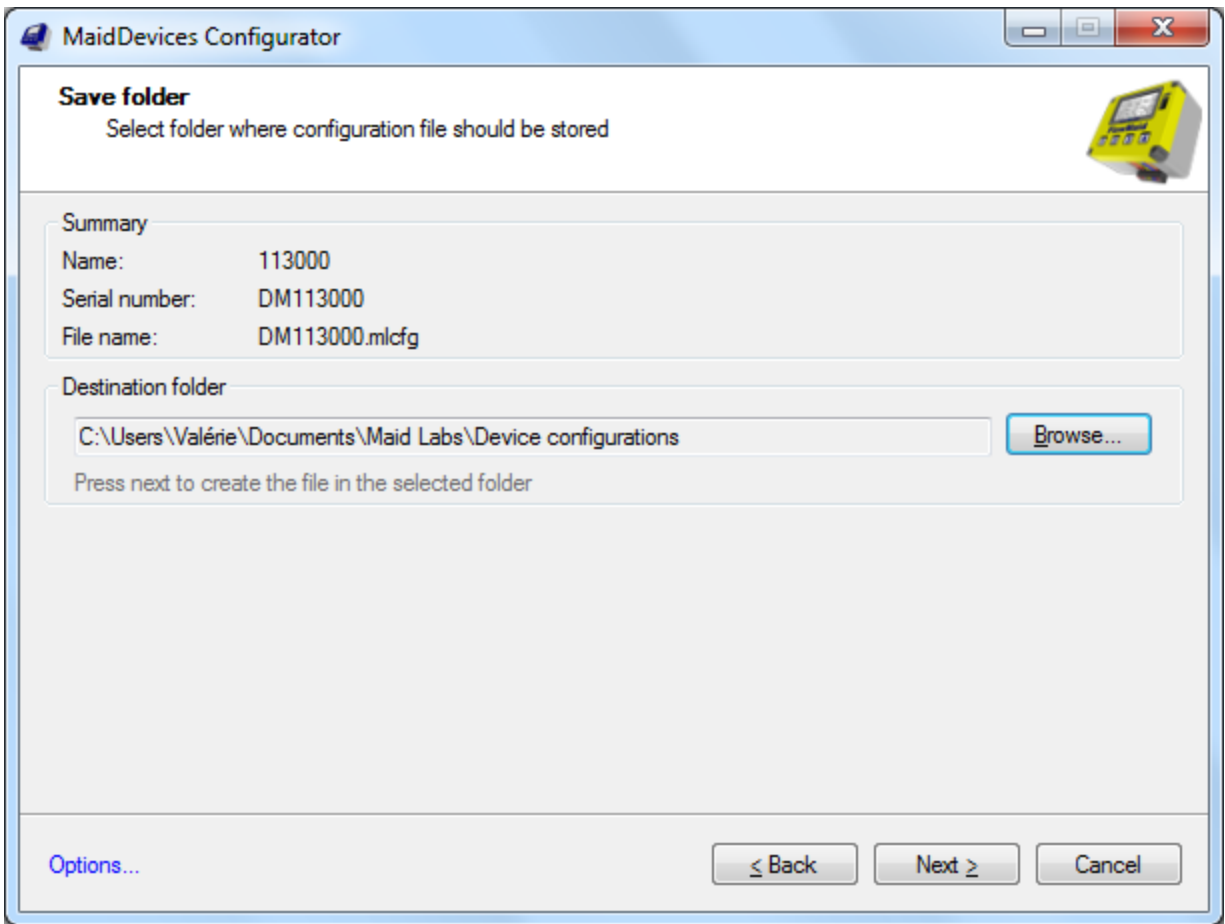
Choose a destination folder and press [ Next ≥ ] to complete the configuration of the device. For the unit to read the configuration file, the .mlcfg must be in the root directory of the USB key and the file name should not change.

# MaidMaps web server

MaidMaps is a Web based application that allows users to remotely view the information displayed and recorded by Maid Labs devices. This SCADA software indicates on a user editable map the location of the instrument and the current measurement value.



The following instruments are compatible with MaidMaps.



| PressureMaid | FlowMaid | Volucalc VS | Volucalc RT |
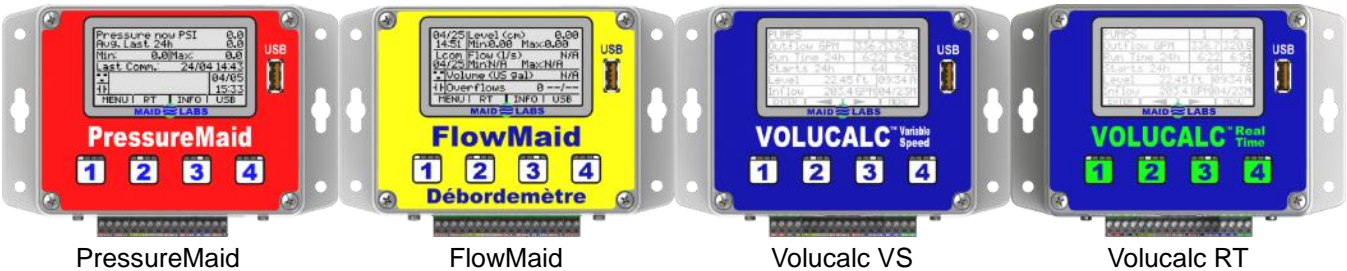
The PressureMaid, FlowMaid, Volucalc VS and Volucalc RT communicate via the Internet to our MaidMaps server, or to a server of your choosing. The instruments access the server like a computer accesses a web page. This way, the server does not need to break through firewalls to get the data from private locations. Instead of requesting a web page, the instrument transmits its latest data and receives back orders, if necessary.

The instruments can be connected directly through the Ethernet port, through Wifi, or Cellular modem. The data are transmitted to the server in real time or on a time based frequency. When a value exceeds a warning or alarm limit, the reading frequency is increased and the values are immediately transferred to the MaidMaps server, which can send a SMS or email to the right person. Even the voltage of the battery can generate a warning reminding it is time to replace it by a recharged battery.

Icons are added to the instrument's symbol to visually inform of problems related to communication (✖), alarms (🔔) or alarming situation going on (instrument's background color).

To access MaidMaps, click on http://maps.maidlabs.com. The user name is "demo" and the password is "123456". This is not a simulated web site. You have access to everything, other than configurations and alarms. The names of the locations, values or alarms are given by the user. In this case, this is a Quebec French city. Pression = Pressure, Niveau = Level, Débit = Flow. Selecting "All projects" displays the map.
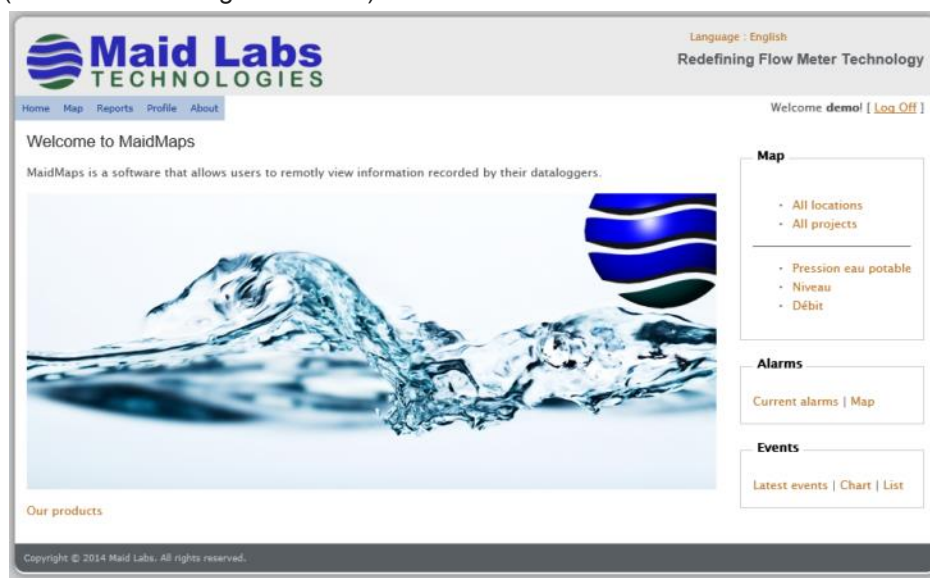
All default types of measurements are displayed, but it is possible to display them based on the type of instrument and type of data displayed. This way, tap water pressure is not displayed on the waste water flow screen.

Left clicking on an instrument's symbol displays added information, which can be access through few links, including the related alarms. The Alarm log displays all alarms in chronological order and who took care of it based on their login access.

Alarms log details for Granby : 212 Items

| Actions | Alarm limit name | Severity | Location | Alarm start time ▾ | Alarm end time | State | Must acknowledge | Acknowledge time | Acknowledged by | Condition | Threshold | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Details | Absence de communication | Warning | Poste Drummond VS | 3/8/2014 11:12:22 AM | 3/8/2014 1:00:54 PM | Completed | | 3/10/2014 3:34:46 PM | cteoperateur | | | |
| Details | Absence de communication | Warning | Poste Drummond VS | 3/4/2014 5:47:51 PM | 3/5/2014 10:34:01 AM | Completed | | 3/10/2014 3:34:49 PM | cteoperateur | | | |
| Details | Absence de communication | Warning | Poste Drummond VS | 2/27/2014 3:02:51 PM | 2/28/2014 2:17:12 PM | Completed | | 3/10/2014 3:34:52 PM | cteoperateur | | | |
| Details | Absence de communication | Warning | Hotel de ville | 2/19/2014 12:27:03 PM | 2/19/2014 1:24:50 PM | Completed | | 2/19/2014 1:33:35 PM | cteoperateur | | | |
| Details | Basse pression | Critical | Usine d'épuration | 2/5/2014 9:55:00 AM | 2/5/2014 10:19:00 AM | Completed | | 2/5/2014 1:27:39 PM | cteoperateur | Below | 20 | PSI |
| Details | Absence de communication | Warning | Hotel de ville | 2/3/2014 10:47:07 AM | 2/6/2014 8:52:58 AM | Completed | | 2/3/2014 11:10:47 AM | cteoperateur | | | |

The following chart displays the level at a lift station during a high level condition. It is easy to zoom in. The same type of chart can be used to display any data recorded or computed by the Maid Labs instruments.
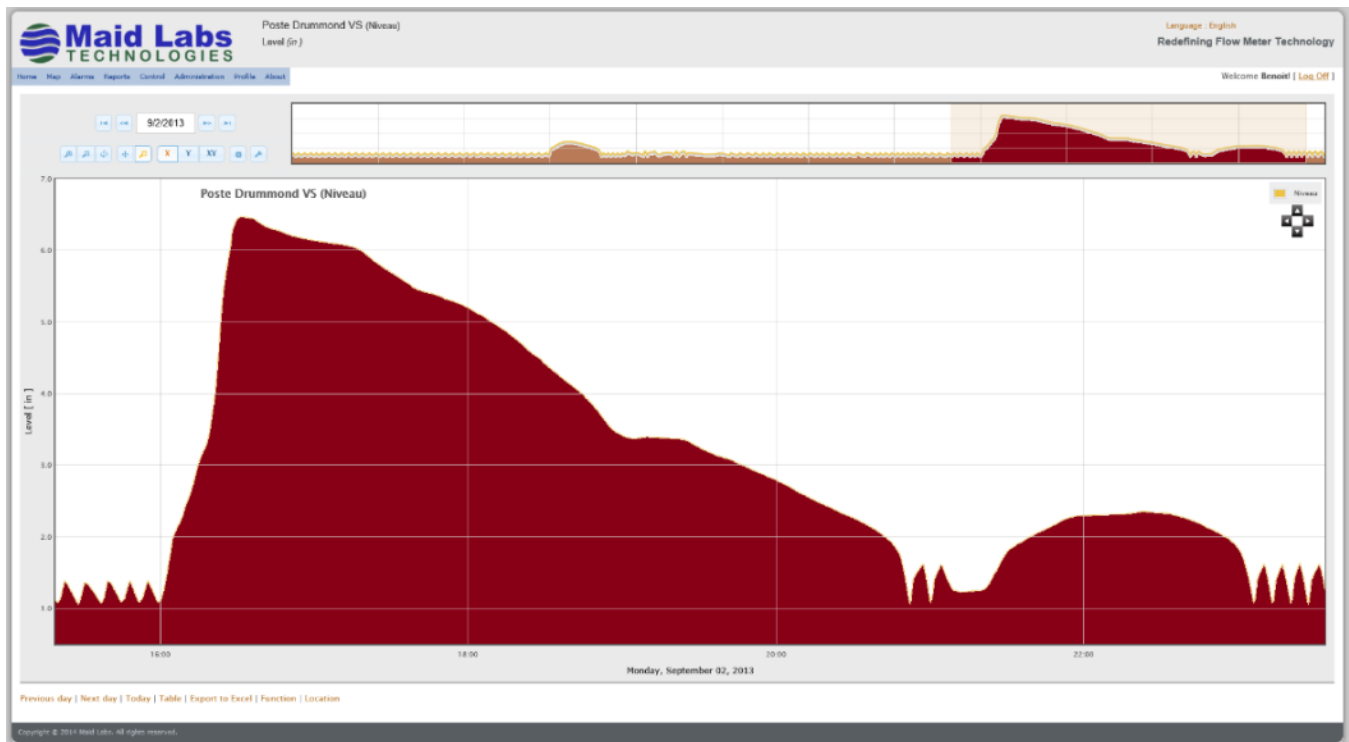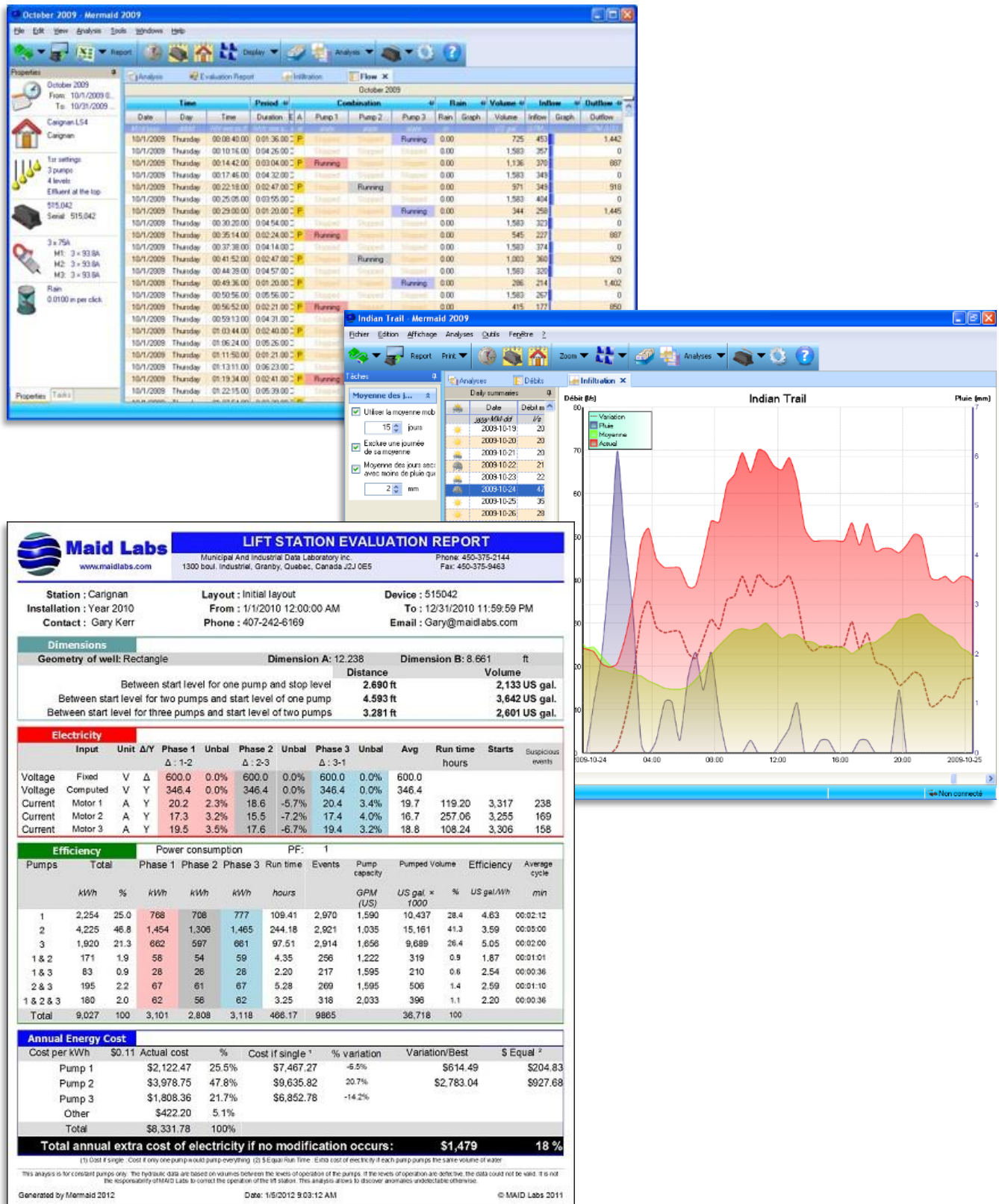
Tables are used to present more detailed data, like the level values in 15 seconds increments, unless the value didn't change enough. All can be exported to Excel.



Events

Organization: Granby
Time zone: (UTC–05:00) Eastern Time (US & Canada) *Daylight saving will be applied when required*

Poste Drummond VS : 2005 Items

| Local time ▲ | Measurement | Value | Unit | Serial | Product name | Project | Measurement | Measure type | Installation | Projec | Time (UTC) | Original value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12:00:15 AM | Level | 52.99 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:0( | 1.3458251953125 |
| 12:01:00 AM | Level | 54.72 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:01 | 1.38998413085938 |
| 12:01:30 AM | Level | 53.25 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:01 | 1.35247802734375 |
| 12:02:00 AM | Level | 50.95 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:02 | 1.29415893554688 |
| 12:02:15 AM | Level | 49.70 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:02 | 1.26248168945313 |
| 12:02:30 AM | Level | 48.42 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:02 | 1.22998046875 |
| 12:02:45 AM | Level | 47.21 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:02 | 1.19915771484375 |
| 12:03:15 AM | Level | 44.75 | in | 129001 | Volucalc VS | Niveau | 6 | Length | 97 | 6 | 9/2/2013 4:02 | 1.13665771484375 |

MaidMaps can be used to download MerMaid compatible files from the Volucalc VS and RT. MerMaid is a lift station diagnostic software. It was used to generate these reports

# Index