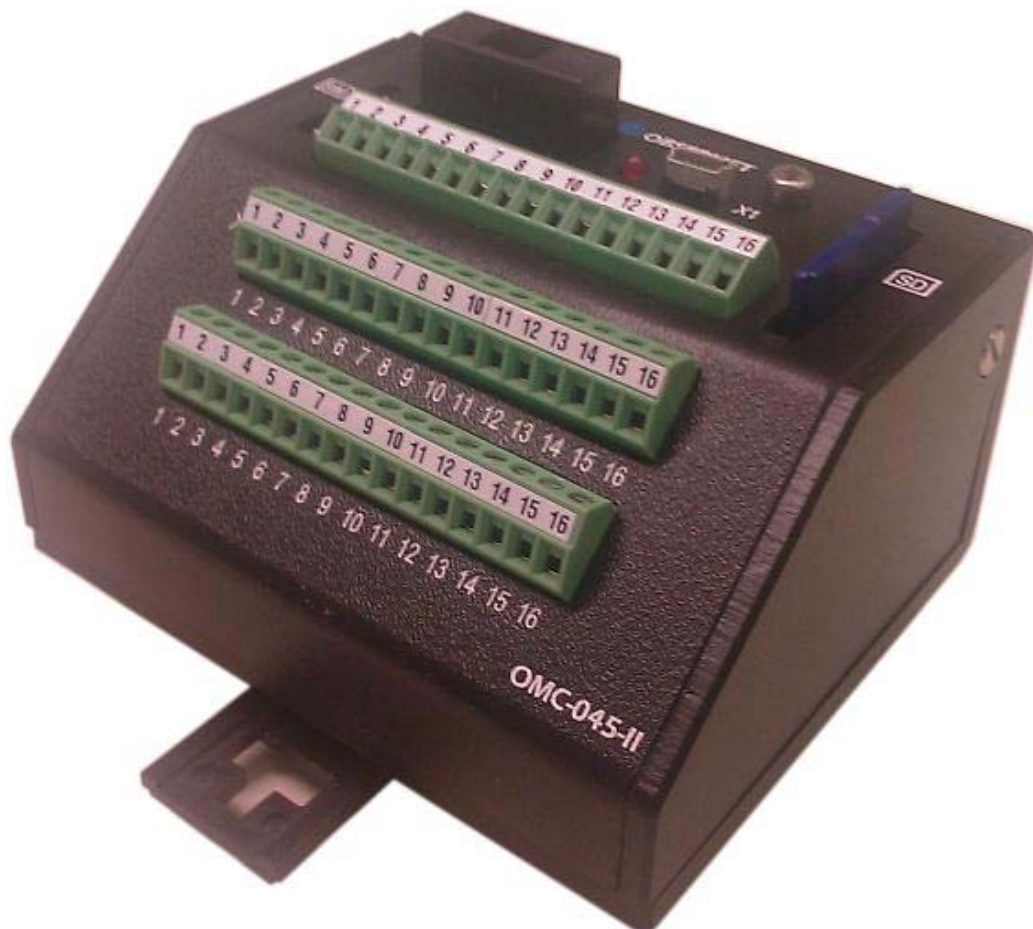


# OMC-045-II Technical User Manual



**Version** : 1.03  
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**Editor** : TDC-HB  
**Datum** : 26-08-2009

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## Foreword

This manual must be used in conjunction with the OMC-Programmer manual  
This manual describes the (hardware) installation.  
OMC-Programmer is used for the necessary software configuration of the OMC-045-II.

This manual is useful for system planning, installation and reference on the OMC-045-II. It covers the hardware aspects of the OMC-045-II.

We recommend you to read this manual carefully before installation of the OMC-045-II.



This symbol is for important information

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## Preface

The OMC-045-II is used for collecting data and processing it. The data can be send through GPRS. For this function you need a SIM card.

### Important:



- Disable the PIN code (use a mobile phone to check / disable the code)
- Check the settings of the mobile provider
- Check the settings for the communication with the FTP/Mail server
- Check if the mobile provider accepts FTP/Mail communication

Mechanical changes to the OMC-045-II, has to be preformed inside a protected surrounding. Contact with high air humidity, sweet and salt water has to be avoided



**Warning ESD:** By ignoring the ESD instructions, you can damage the OMC-045-II. This can create indefinable behavior. This is difficult or impossible to repair.

The OMC-045-II has to be assembled inside a cabin on a DIN rail. In case this cabin is located outside, it has to be IP65. For (near) sea / offshore locations, it must be IP66!

It is required to have knowledge of the sensors you would like to connect, since you have to configure them via OMC-programmer.  
Examples can be found in the appendix.

# 1 Description

## 1.1 General

The OMC-045-II is a multipurpose data acquisition platform with integrated GPRS modem and GPS receiver. The OMC/045-II is intended for measurement of environmental parameters, e.g. for hydrological and meteorological applications.

The connections are divided over three clasping connector rows.

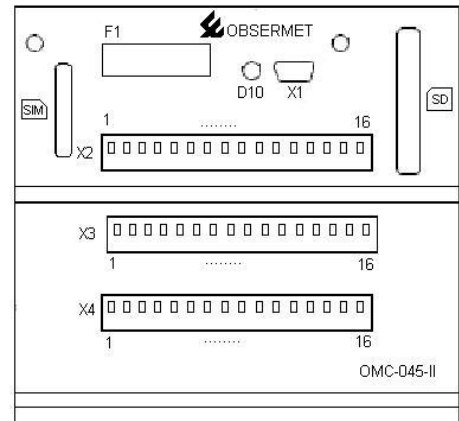
- X2 The row that contains mostly power connectors.
- X3 The row that contains digital inputs and serial communication
- X4 The row that contains connections for analog sensors and alarm contacts.

All configurations are been made through port X1. This is a USB connection. This connection has to be connected to a PC, with an A to mini B USB cable. OMC-Programmer uses this connection to read and write configuration to the OMC-045-II

The dimensions of the housing are L x W x H 84 x 92 x 55 mm. The extending objects are calculated in these dimensions. These are the SD card, X2 mini USB connector and the fuse holder. Also the DIN rail connector is not calculated in the dimensions.

The needed dimensions to connect all the connectors when the OMC-045-II is connected in the DIN rail are L x W x H 120 x 92 x 55. This is because on the back of the OMC-045-II, there are 2 antenna connectors. On the top there is no extra space needed, because if connected in a DIN rail the front is open and accessible.

Depending if an antenna cable is used, there is more or less space required on the backside of the OMC-045-II.



Color	Connector Type	Network	Frequency
Gold	SMA	GPS	
Silver/Grey	FME	GSM/GPRS	900 / 1800 Mhz

The fuse holder makes it simple to replace a burnt fuse.

Through the LED D10, the status of the OMC-045-II can be seen through the blinking of the LED. The status can be recognized without connecting the PC. In chapter 8.10 the function of the LED is explained.

## 1.2 Versions

The OMC-045-II is available as standard unit for DIN rail mounting, or enclosed in a box. The following versions are available

type	description	remarks	
OMC-045-II-DIN	Version for EN-55022 rail mounting	Standard	
OMC-045-II-Rain	Version enclosed in IP-65 box with 3.6V Lithium battery	Fits in OMC-210 rain gauge	
OMC-045-II-Lithium	Version enclosed in IP65 box 210x55x75mm, with 14.4V Lithium battery pack enclosed	Not rechargeable	
OMC-045-II-Shoebox	Version enclosed in an IP65 polyester box for outdoor use, with enclosed rechargeable VRLA battery 12V/7Ah		

The electronics for all these versions is the same. This manual applies to all versions. Only electromechanical [aspects] vary, as well as hardware settings.

### 1.2.1 What's in the box?

An OMC-045-II datalogger.

USB A-mini B cable 3 m

See Chapter 6, for more information.

### 1.2.2 OMC-045-II-DIN

Always mount in a dry environment (RH<90%)

### 1.2.3 OMC-045-II-Rain

A small bag of silica gel is present, do not remove.

Close the box with the 4 screws carefully, so no moisture comes inside.

### 1.2.4 OMC-045-II-Lithium

A small bag of silica gel is present, do not remove.

Close the box with the 4 screws carefully, so no moisture comes inside

### 1.2.5 OMC-045-II-Shoebox

No need to open the box.

A small bag of silica gel is present, do not remove.

Close the box with the 4 screws carefully, so no moisture comes inside



### 1.3 Type serial plate/sticker

Example:



---

## 2 Starting with the OMC-045-II

### 2.1 Handling precautions

No user-serviceable parts inside.

For connecting the connections on the OMC-045-II datalogger, a screwdriver type 0.4 x 2.5 is needed. Other types, then this screwdriver, damage the connectors. Damaged connectors are less reliable.

All cables should be connected using cable shoes.

### 2.2 Qualification of the engineer

#### Installation

When connecting the sensors, check the voltages and interfaces of the datalogger and the sensor. Not all sensors are protected against faulty wiring. The datalogger could also be damaged if electrical specifications are exceeded. For example draw to many current or deliver a high output voltage.



**Warning ESD:** The OMC-045-II must be handled with care and never exposed to ESD discharges. When installing a sensor or other wiring, make sure there is no power on both devices. ESD discharges could cause invisible damage, which endangers long term stability and proper operation. For more information see chapter 3.2

### 2.3 Preparation

The wireless data functions will only work when an activated SIM with a valid subscription is placed in the OMC-045-II. In OMC-Programmer the configuration and network settings must also match those supplied by the provider. The pin code of the SIM card must be removed, before insertion in the data logger. To prevent problems with the SIM card it can be inserted in a mobile phone or GSM data modem. In a Mobile phone or GSM modem the GPRS, SMS and GSM data functionality can be tested.

For placement of SD card, Read the procedure in 7.6.2 .

The SD card is not Windows compatible formatted. Prior of insertion of a **new** SD card it must be specially formatted in Obsermet format. All the sectors on the Card must be filled with "0x00". In some application this is called a zero fill. For more information read chapter 7.6.2 .

#### **The included SD card is already formatted!**

Prior to connecting the data logger to a PC OMC-Programmer must be successfully installed. The setup also installs a driver for the USB virtual comport. If this driver is not present when a OMC-045-II is connected to a PC, conflicts may occur.

Check for the latest version of OMC-programmer the support page of [www.observator.com](http://www.observator.com) (Meteo & Hydro).

### 2.4 Power on for the first time

The OMC-045-II is factory programmed with the necessary system information. This information is visible in OMC-Programmer. The OMC-045-II is ready to use out of the box if the following is checked.:

- SIM card is compatible
- SD card is formatted in Observator format (the included SD-card is)

In case sensors are already connected, the wiring has to be checked. Please check the Appendix for the information of the sensor. With a serial sensor, it is assumed that they are configured according a certain profile.

- Configurations Sensor
- Wiring
- Maximal and minimum Voltage
- Maximal absorbed top and continue power



**Warning:** The switched power supply for the sensors is equal to the OMC-045-II's own power supply. Take note the sensor has to be compatible with the power supplied by the OMC-045-II. If the sensor is not compatible, it has to be powered by an external source.



**Warning:** In case the sensor is powered external and not by the OMC-045-II, the ground of the external power source and the ground of the OMC-045 have to be connected.

### 2.5 Connect to a PC

OS compatibility: The OMC-045 can connect to any PC with USB 1.2 or USB 2.0 running on Microsoft Windows 2000 & Windows XP

Windows should recognize now the FTDI USB interface, and Windows will create a "USB Serial Port" with a COM number. This new port must be set during installation / configuration of OMC-Programmer

The OMC-045-II will synchronize the following parameters while connected to the pc, so check them on your pc before connecting the OMC-045-II:

- Date
- Time
- Time zone



**Warning:** while OMC-Programmer transfers the configuration to the OMC-045-II, and while the configuration is transferred to Flash Rom, the power supply must NOT be interrupted.

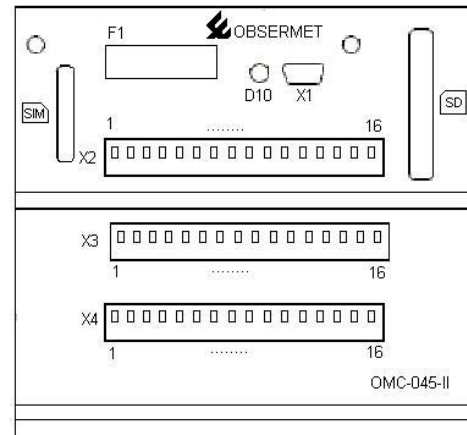


**Warning:** You have to be sure the PC and the OMC-045-II don't have a power difference on the ground before the OMC-045-II is connected to a PC through the USB connector.. If this is the case, this has first to be solved before connecting and using the USB connector. These power differences can damage the OMC-045-II.

### 2.6 Connections (general)

GPS antenna  
 GPRS antenna  
 3.6V battery connector

FUSE  
 X1 USB mini-B connector.  
 SIM card holder  
 SD card holder  
 X2  
 X3  
 X4



#### X2 Connector Layout: power inputs, power outputs, and display

terminal	name	Description	
X2.1	GND	Power supply input for 10-30V	
X2.2	VIN	(not used for OMC-045-II-regen)	
X2.3	GND	Switched power supply output for sensors (output 1)	
X2.4	VOUT1+	Terminals X2.4 and X2.6 are internally interconnected	
X2.6	VOUT1+		
X2.7	GND	Switched power supply output for sensors (output 2)	
X2.8	VOUT2+	Terminals X2.8 and X2.10 are internally interconnected	
X2.10	VOUT2+		
X2.11	GND	Connection for external red LED. LED function is identical to the LED on the top of the OMC-045-II	
X2.12	LEDOUT		
X2.13	GND	Reserved for connections of an external display	
X2.14	VOUTCONT		
X2.15	TXDIS		Data logger → Display
X2.16	RXDIS		Data logger ← Display



**Warning:** The voltage on VOUT1, VOUT2, and VOUTCONT is (almost) equal to the power supply voltage. Take care that this voltage is compatible to the connected sensors

**X3 Connector Layout: digital inputs and communication ports**

terminal	name	Description	
X3.1	GND	Status input for connection of a passive switch	
X3.2	DIN1		
X3.3	GND	Rain gauge input; Pulse input for connection of passive switch sensors	
X3.4	DIN2		
X3.5	GND	RS232 PORT 1	
X3.6	TX1		Data logger → Sensor
X3.7	RX1		Data logger ← Sensor
X3.8	GND		
X3.9	TX2	RS232 PORT 2	Data logger → Sensor
X3.10	RX2		Data logger ← Sensor
X3.11	GND	RS232 PORT 3	
X3.12	TX3		Data logger → Sensor
X3.13	RX3		Data logger ← Sensor
X3.14	GND		
X3.15	TX4 / A	RS232 PORT 4 or RS422/RS485 Software-selected in the configuration	Tx Data logger → Sensor
X3.16	RX4 / B		Rx Data logger ← Sensor

**X4 Connector Layout: analogue inputs and alarm outputs**

terminal	name	Description	
X4.1	GND	4-20 mA input channel A1	
X4.2	AI1		
X4.3	GND	4-20 mA input channel A2	
X4.4	AI2		
X4.5	GND	4-20 mA input channel A3	
X4.6	AI3		
X4.7	GND	4-20 mA input channel A4	
X4.8	AI4		
X4.9	GND	Potentiometer input channel A5	
X4.10	AI5		Max 2,5 Volt in
X4.11	VREF		2,5 Volt out
X4.12	GND	0-10V input channel A6	
X4.13	AI6		
X4.14	DOUT1	Alarm outputs DOUT1 and DOUT 2. These are open drain outputs.	
X4.15	DOUT2		
X4.16	GND		



**Warning:** The alarm outputs are open drain output, which means that they are internally connected to GND (through a FET); an indicating device should be connected between DOUT1 or DOUT 2 and an external supply voltage of max 20V

---

## 3 Safety

### 3.1 Power supply

The OMC-045-II is protected against reversed polarity of the power. For the 9 – 24 volt connection there is an easy accessible fuse. When the fuse melts it needs to be replaced with a “5A T 230 V 5 X 20” type.

If the OMC-045-II is power with 3.6 Volt, then it is secured by a SMD fuse. If the SMD fuse is defect, it has to be replaced by the service department of Observator Instruments.

### 3.2 ESD



**Warning:** The OMC-045-II is sensitive to ESD. This discharge has to be avoided by working ESD safe and in an ESD safe environment.

ESD stands for Electro Static Discharge.

Everybody knows the static discharge that you feel when you step out of a car, brushing your hair and the sparking sound when you take of a sweater. Also lightning is an electro static discharge. For people is ESD harmless (except for lightning). It can charge up to 40.000 Volt and discharge in a few nanoseconds, but still then it is harmless for humans. However for some electro components and prints, this is different. These components are sensitive to discharges. A discharge of 10 Volt can already damage a component!

#### Consequences

Research proves that ESD is a costly problem in companies that work with electro technical components and prints. The consequences for a company are:

- Higher costs by failure and/or damage
- Not reliable products
- Dissatisfied customers, bad reputation and market loss
- Higher service costs (repair / replacement)
- More disturbance

Also the electro static discharge (spark), can have the following consequence:

- Fire
- Explosions
- Electromagnetic interference (EMI)
- Heat
- Light
- Sound waves
- Attracting dust particles

Like lightning is for a tree, ESD are for IC's (Integrated Circuits / Chips). Inside the IC the ESD makes a little explosion which can cause short-circuit and/or the disconnecting of a line. Because components get smaller and smaller, the lines also get smaller inside the IC's. The sensitivity of these chips only increases, the smaller they become. Damaged IC's doesn't have to be defective right away, but as longer the product is in service, the bigger the damage can get without seeing it. We call this a “Pregnant IC”. The damage occurs not by the supplier, but by the customer, when the product is used in the field.

### Transport and Storage

The following conditions apply for storing and transporting the OMC-045-II

Storage:

Humidity	< 95% (not condensing)
Temp	10 – 30 °C

Transport:

Humidity	< 95% (not condensing)
Temp	10 – 30 °C

The OMC-045-II is delivered in a protecting box. It has to be kept in the box until it gets placed. Storage and transport is only carried out, when the OMC-045-II is in the protecting box. When the OMC-045-II is build in a system cabinet, the humidity values still have to be completed

---

## **4 Mounting and installation**

### **4.1 What is in the box**

- OMC-045-II
- Getting started manual
- CD with OMC-Programmer + OMC-Data online
- USB A to Mini B cable
- SD card 2GB

### **4.2 Vibrations**

The OMC-045-II may not be exposed to vibrations. Long term vibrations can cause the SD card to come lose, or cause bad connection. The SD card is essential for the working of the OMC-045-II so this can cause unexpected behavior.

### **4.3 Connectors**

Use for all connections the correct cable shoes, depending on the cable diameter, you have to use the white or blue shoes for the connectors. For tightening the shoe, proper pliers have to be used. The cable shoe has to be tightened around all angles, only pushing the shoe flat isn't reliable. Use for tightening the screws, only a 0.4 X 2.5 mm screwdriver. Larger or smaller can damage the screws.

### **4.4 DIN Rail**

Assemble the OMC-045-II on a DIN rail. Make sure it is placed in a logical place in the cabin, so the cable can be kept as short as possible.

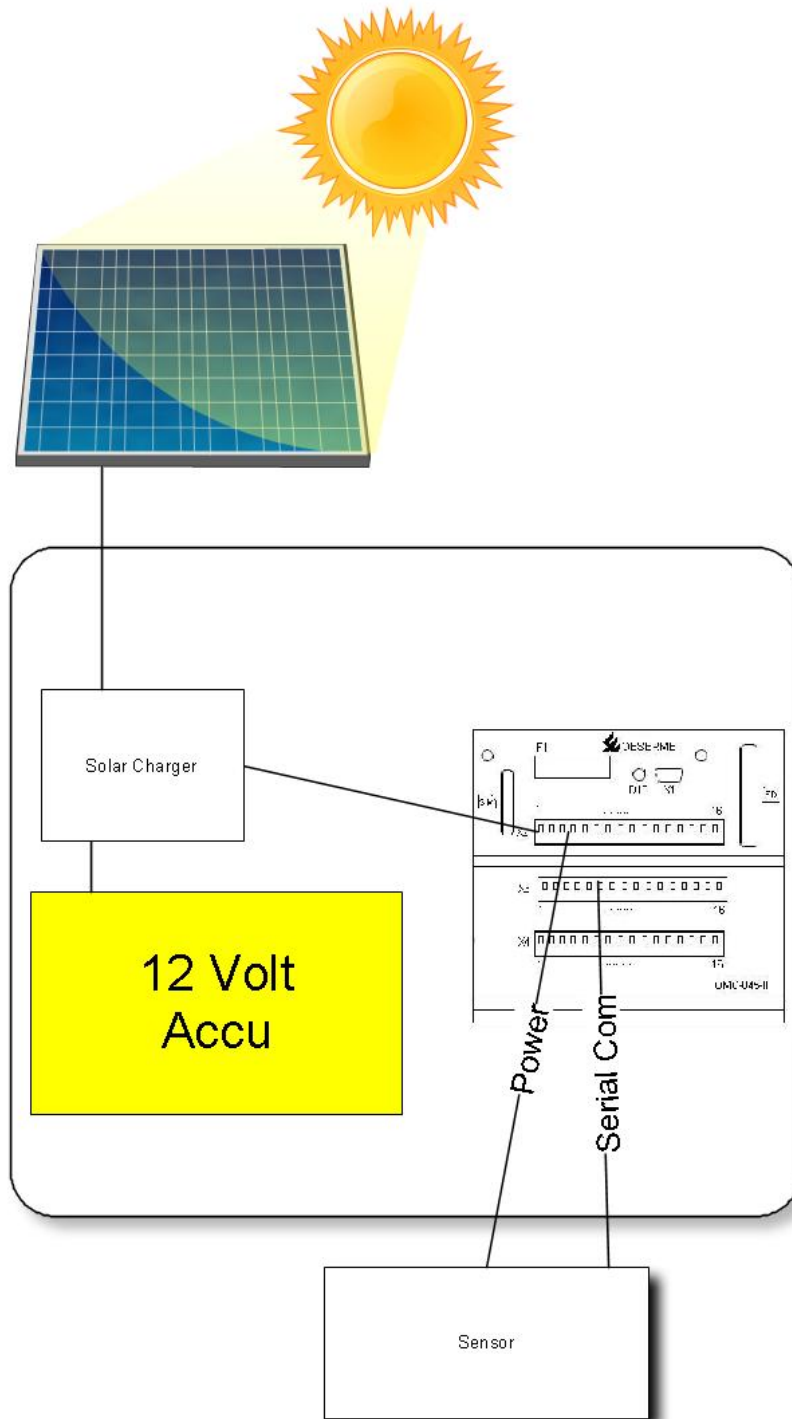
### **4.5 Cabinet**

Use a suitable cabinet for the location where the OMC-045-II is going to be used. The air humidity may not be above 95% and the forming of condense in the system cabinet is forbidden. If this does form, action has to be taken, to avoid repeating the problem. A small bag of silica gel can help, but keep track of the consumption of the silica gel.



#### 4.6 Example System Cabinet

Drawing example of how the OMC-045-II system can be placed in a cabinet.



---

## 5 To put in use

When the OMC-045-II is powered, control the next things:

- Power and polarity
- If the power supply can deliver the maximum power
- Are the sensors connected, like the associated drawing
- Are the sensors correct configured /calibrated
- Power to the sensors and polarity
- Is the SD correctly formatted and is it correctly inserted in the OMC-045-II
- Is the PIN code disabled on the SIM card
- Is the SIM card tested on SMS / GPRS / GSM-Data in a mobile phone
- Is the SIM card correctly inserted in the OMC-045-II

To safely test the OMC-045-II use (if available) an adjustable power supply on which you can limit the maximum supplied current.

If everything above is checked, you can connect the power supply. Keep a close eye on the voltage and current usage. If the current is higher than expected, disconnect the power supply then check where the source of the current leak is. If the Voltage goes down, this means the maximum current is reached. This is a sign of an overload. Disconnect the power supply and solve the overload problem first, before reconnecting. Disconnect all sensors and reconnect one by one to find the problem.

Configure the OMC-045-II with the OMC-Programmer. You can read how to configure the OMC-045-II by looking in the help files (via [F1]). An USB connection between the PC and de OMC-045-II is needed for these instructions

When configuring the OMC-045-II the power consumption can change. Sensors won't be powered until this is configured (if they are powered via the OMC-045-II).

## 6 Controlling and usage of the data logger

The “data logger” is controlled / configured by OMC-Programmer. Through this program, you can control the OMC-045-II if it is working and read the actual values of the sensors. You need an USB connection between the OMC-045-II and the PC for this.

You can perform the following tasks:

- Configure
- Updating Firmware
- Check the GSM signal strength
- Check the GPS location
- Check the actual values
- Communicating with the serial port, if necessary
- Look at what the OMC-045-II is doing

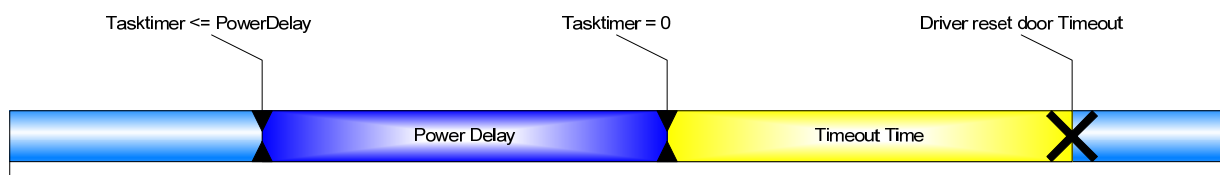
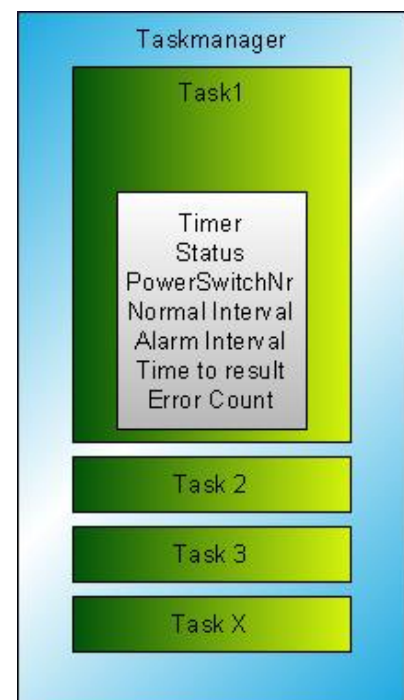
Help with using OMC-programmer, can be found in the Manual and in the help files (via function key [F1]).

### 6.1 The data logger

The OMC-045-II uses a scheduler to plan all his tasks and run the tasks in a periodical time. These tasks are controlled by the task manager. The task manager keeps track of every status of all tasks. The task manager knows when a certain task has to be executed, by means of a task timer. Furthermore the task manager knows how many times a task preformed a timeout and which “power switch” they use.

#### 6.1.1 Power Delay

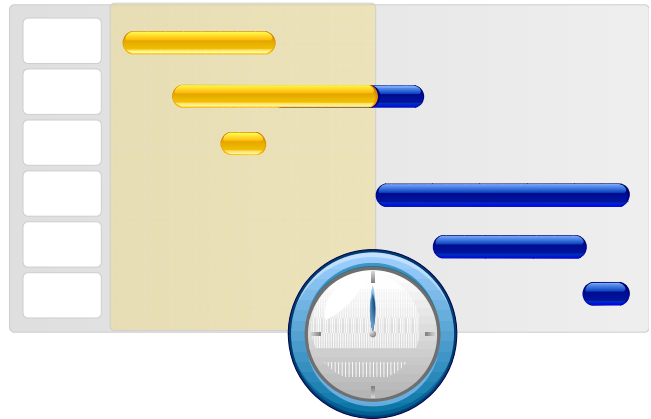
As soon as the task timer of an input task gets in its power delay time, the used “power switch” of that input task is activated. A power delay is a period between the activation of a sensor and when the data is trustworthy enough to be read. This can be warming up time for analog sensor. There is a power delay for every switched Voltage output.



## 6.2 Working of the scheduler

### 6.2.1 Synchronization

The scheduler plans the tasks of the OMC-045-II, with use of a real time clock. All tasks are synchronized with this clock. If a task has to be preformed every 10 seconds, the task will preformed on 00, 10, 20, 40, 50 s of the clock.

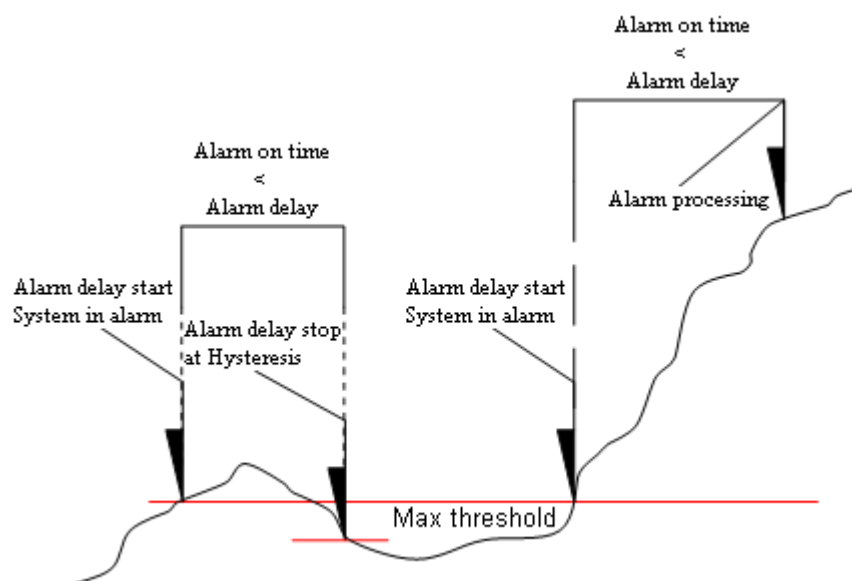


Sync method	Interval	Sync on divide number off
1	< 1 sec	N.A.
2	<= 60 sec	60 sec
3	> 1 min < 1 hour	60 min
4	> 1 hour	24 hour

### 6.2.2 Alarm

The system is controlled if it is in Alarm mode or not. If an Alarm setting is reached, the interval switches from "Normal interval" to "Alarm interval". When it switches to Alarm interval, all tasks are synchronized with the new interval.

You can configure an alarm on all measured and calculated data.



### 6.2.3 Scheduling Input task

If a task doesn't get its data on time, a time out will occur. When a timeout occurs the "power switch" will be switched off and on. In case the task doesn't make use of a "power switch", only the task will be reset, the task is rescheduled. If the interval is smaller than 5 seconds, then the task will be put on 5 seconds for only one time, after that it takes its normal interval again.

### 6.2.4 Scheduling Output task

Depending on the system, if it is in "Alarm mode" or not, the interval of the task is synchronized with the clock of the OMC-045-II. There are no timeouts on an output task. Timeouts are only copied from an input task. The output drivers only use data that is received from an input driver. If the data is not visible, because a timeout had occurred, it will show in the data that there was a timeout.

If the "Operating mode" from a system is set on "Low power", the output drivers will react differently than when the system is on "Full power". In a "Full power" system, the actual data is used as long as it is made available. In a "Low power" system, the output driver will wait until all data is made available by the input drivers. The data is available if it is refreshing or has a time out status.



**Warning:** An output task is delayed if the data is not available, in "Low power" mode.

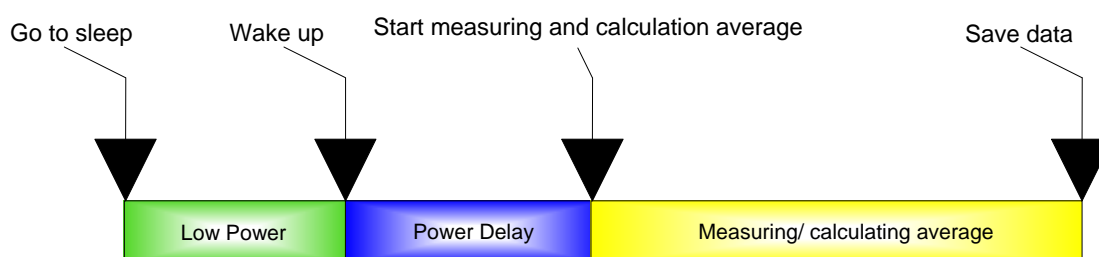
### 6.2.5 Scheduling Editing task

Example, the operator edits the configuration for the calculation of the average of a measurement and sets it to 10 min. The scheduler then knows that the data from the average driver is available after 10 min. The scheduler takes this into account when the task starts for the first time. This is the "Time to result". By scheduling the task, the scheduler takes into account that some have a calculation period. In that period the scheduler knows that he cannot sample the data and samples it after the calculation.

### 6.2.6 Synchronization Editing and output tasks

If an editing task is configured, the data will most likely be used by an output task. To make this all work smoothly, it's important to make a smart choice about the output intervals.

If the shortest output interval is (for example) 15 min and the average calculation interval 10 min, the average calculation driver would be activated every 10 min of every 15 min. This is a smart way to synchronize, when the OMC-045-II is in the low power mode, because, for the other 5 min, the system can go to sleep mode and save power. This means that in one hour the system only wakes up 4 times for 10 min and sleeps 4 times for 5 min. So the system sleeps 20 min every hour and works only 40 min every hour. This can save a lot of power.



## 6.3 Operating Mode

It is possible to optimize the currents from the OMC-045-II, through the “operating mode”. There are three parts that can be optimized, these are: System, Sensor and Modem. These can be configured separately to “Full power” mode or to “Low Power” mode.

The combinations are:

	Description	System	Sensor	Modem
0	Low Power	Low Power	Low Power	Low Power
1	System always on	Always On	Low Power	Low Power
3	System + sensor always on	Always On	Always On	Low Power
4	Modem always on	Low Power	Low Power	Always On
7	Full Power	Always On	Always On	Always On

If one of the parts are set in “Low Power mode, the part will be disabled when it is not in use.

### 6.3.1 Operating Mode System Low Power

The system goes to sleep, if there are no tasks to perform.

### 6.3.2 Operating Mode System always on

If the system is configured in “Always on” mode, it will not go to sleep, even if there are no tasks to perform.

### 6.3.3 Operating Mode Sensor always on

If the “Operating Mode Sensor” is set in “Always On”, the sensor will continuously get power, after the system is powered. Except if an error occurs, the system will be shut down for 5 sec and powered back on after the 5 sec.

### 6.3.4 Operating Mode Sensor Low Power

In “Low Power” mode, the system and sensors will only be powered if something has to be measured or if the system needs to calculate or read the data. With this the required “Power Delay” is taken into account.

### 6.3.5 Operating Mode Modem Always On

If the modem is configured for “Always On”, the modem is always on and is always externally reachable. This option is used if the system is remotely controlled. It is possible to reconfigure the station with firmware updates or for data collection. **In the OMC-045-II, the modem will be put in Slow Idle mode, to preserve power.**

### 6.3.6 Operating Mode Modem Low Power

The modem is powered down, if it isn’t used for tasks for 15 seconds.

## 6.4 System Tasks

### 6.4.1 Low power

The system goes to sleep if all conditions are met:

- All editing tasks are Idle.
- All output tasks are Idle.
- No task in the “Power delay” that has to be completed.
- No PC connection is connected.
- No modem activity.

If a task is Idle, this means that it is finished. And depending on its interval, not have to perform again.

Once in sleep, the system can wake up on several inputs. Namely: in incoming call, floater alarm, PC connection and when the system has tasks to perform.

In sleep, the system can only wake up on an incoming call if the Operating mode Modem is configured on “Always on” mode. A modem that is switched off is not reachable.

### 6.4.2 Modem

The modem makes it possible to send data over an FTP or Mail connection, if there is an external call. For the OMC-045-II the same handling can be used as through the USB connection. The system can be controlled on functioning through the modem.

It is possible that the modem is temporary not reachable, because the system detected a modem error en powered the modem down for a short while. Also when the system is using the modem for Mail, FTP, SMS etc, the modem can not be reached. If the modem is busy with GPRS of another network task, the modem can accept the connection, but can't handle it. The network or FTP task will be reset after a while by making the modem powerless for a short while. As long the modem is in use, it will not switch to “Low power” mode and go to sleep.

### 6.4.3 Alarms

The measured and calculated values can be controlled on alarm thresholds. When a threshold is broken, the system will switch over to “Alarm Mode”. In alarm mode the scheduler uses the alarm intervals. This is to make sure the data that generates the alarm, can be measured more times. Alarms can directly send a notification when a threshold is broken, or can send it after a delay with an “Alarm delay”. In both cases the system is in alarm mode, but only the time on which the alarm is processed is different. With an “Alarm delay” it is possible to filter some peaks. This is strongly dependable on the measured velocity and sensor.

### 6.4.4 System Error SMS

There are several notifications from the system that can be send through SMS. What these are, are described in another document. The SMS functionality can be disabled in OMC-Programmer, by not filling in a phone number by Alarm receiver

### 6.4.5 PC Communication

Through this connection, the user can read and configure the OMC-045-II. He can update to the newest firmware version and configure serial sensors in case the sensor is appropriate for this.

OMC-045-II	USB virtual COM port
OMC-410	RS232



**Warning:** The driver for the virtual comport, has to be installed correctly, before the OMC-045-II is connected to the PC.

### 6.4.6 Completing SD card

All data that will be written on the SD card, is first buffered on the OMC-045-II. The system controls periodically if new data has to be send to the SD card from the SD buffer. In case there is no activity for 250 ms, when the data is send to the SD card, the data still in the buffer is written away to the SD card for safety reasons.

Warning: The SD card doesn't use a windows FAT system en is not directly readable on a PC. For this a special program is needed to do this. In the appendix is written how to.



## 6.5 Log File

The Log file on the SD card is written in ASCII signs. There are several different line types. In the appendix is an example of the log of the SD card.

### 6.5.1 Data lines

The data Lines follows after the header. The data on the lines isn't always the same. The register interval of every data can be different. In a data line, there are several data:

1. D
2. Time
3. Address
4. Measured Data
5. Status
6. Address
7. Measured Data
8. Status
9. Etc,
10. Etc.

A data line can be written to the log file on 2 ways.

It can be directed by the task manager. The logger only logs the data through a set interval.

Data lines from different drivers are written to the log, to process all read and processed data. This mechanism is used for storing data from sensor that sends its data on irregular times. This can be switched on or off in OMC-programmer.

### 6.5.2 X Data lines

On every data line (except the D) there is an X on the start of the line. This is for filtering off data by sending it to the user. X line has all the data from one sensor. As an example all the values off an average value.

### 6.5.3 System lines

Next to data lines, there are lines with information about the functions of the system.

1. S
2. Time
3. Field 1
4. Field 2
5. Field 3
6. Optional text field

The text field is used for displaying error messages.

## 6.6 Sending the log file

By sending data through FTP the data that is going to be send can be filtered to some data. With this, the system messages and X records can be removed to limit the data traffic. Keep in mind, when filtering data, there isn't always data send over the FTP connection. This goes wrong when filtering data as long as the maximum FTP idle time no data is been send to the FTP server. If the timeout time is set on 2 min and the OMC-045-II only finds X and S records in that time, it goes wrong. These messages only have header information.

## 6.7 Data buffer

The data buffer contains all recent read and calculated data. All tasks in the OMC-045-II use the general data buffer to published measured and calculated data.

The data buffer is divided through a memory map. OMC-Programmer asks the memory map to display all actual data on screen, with the right name and unit.

### Example

Address	Data	Status	Meaning status
25	123	32	SmalLogged
26	12.1	32	SmalLogged
27	23.6	64	SerialOut
28	44	64	SerialOut
29	60	3	Data Invalid + Above Boundry

The status of the data is a binary coded number.

Bit	Init	1	0	Error / OK
0	1	Never Updated	Once Updated	Error
1	0	Data Invalid	Data Valid	Error
2	0	Above Boundry	Not Above Boundry	Error
3	0	Below Boundry	Not Below Boundry	Error
4	0	WatchDogTimeout	No WatchDogTimeout	Error
5	0	SmalLogged	Not SmalLogged	OK
6	1	SerialOut	Not Logged	OK
7	1	Logged	Not Logged	OK

More about the memory map is available in the appendix about the e-mail format. The memory map is set on the start of every e-mail and ftp file.

For the output and editing tasks, use the status of the used data to control if the data is useful.

## 6.8 Input drivers

The input drivers get data from the sensors. Analog and digital sensors can both be read. If a heating time or engaging time is necessary, it can be programmed in the switched voltage output by means of a "Power delay". The power delay has a maximum of 15 min.

### 6.8.1 Analog sensors

The analog inputs are calibrated for a specified range, in which it can be used. The possible inputs are: 4 - 20 mA for the current inputs and 0 - 2.5 V (2.5 Volt referential for a potentiometer) and a 0 – 10 V input. The used ADC is a 12 bit with over sampling, to increase the stability and accuracy. The heating time of a sensor can be set by setting a "Power Delay" on a switched voltage output. This has to be configured to the analog input.

If a "Power delay" is used, the measuring will start after the delay.

		<b>Ma Voltage</b>	<b>Error detection</b>	<b>Impedance</b>
4-20 mA	4	0 – 2.5 V	If < 4 mA	120 Ohm
0- 2.5 V	1	0 – 2.5 V	X	1 Meg Ohm
0-10 V	1	0 – 10 V	X	430 K Ohm
Temp	1 intern	X	X	X
V bat	1 intern	9 – 30 V	X	7 Meg Ohm

### 6.8.2 Digital sensors

#### Rain meter

The rain meter connection, works by connecting an external switch. It makes a short connection between the 2 connections, which makes the signal short circuit for a short while. This is seen as a down going flank. These flanks are counted and processed. As example: Every flank is 0.2 mm rain. If there are 4 flanks, this means  $4 \cdot 0.2 = 0.8$  mm rain.

#### Float lever

The Float lever works with an external switch. If there is a connection between both connections, it will be seen as an alarm phase. Through OMC-Programmer, the behavior of the float lever can be configured. The minimal switch on and off time can be configured. If the system is in sleep mode and an alarm goes off, the system wakes up. There is a Float lever alarm, when the float lever is in alarm mode during the switching on time.

### Serial sensors

Sensors that send their data automatically will be read if the send data and format is compatible. There are a total of 4 serial inputs available and can be divided over the used sensors. It is possible to configure a sensor through the terminal of OMC-Programmer, but the sensor has to have this option supported. Also through the terminal it is possible to check the value of the data out of the sensors.

### Wind information

NMEA MWV message is supported, with and without checksum. The control is on the "Valid" flag and the unit on which the speed is displayed. In the processor the OMC-045-II calculates with m/s, so the unit's knopen and KM are calculated back to m/s. Also, if present, it controls the checksum field and the validation flag. More about MVW messages can be found in the NMEA specification.

All MWV messages incoming after the "Power delay" has passed are processed. Even there are more messages than one coming in. It's not known when a NMEA message comes in.

### Generic Serial interface

The other messages that come in through a programmed format can be decoded. The message had to apply to the following demands:

- One start character
- Optional second start character
- One separating character for data fields
- One character for decimal dot
- One stop character

The data fields may contain the number Zero. In case a field with data is not usable, the field must contain the text "NUL" Only then the field will be seen as not available data and processed in data status as "invalid".

If there are extra spaces in the message, outside the separating character, these will be filtered. In case the space is a separating character and several spaces are after each other, then the others are filtered also.

This is possible if a message is lined out with spaces, to be displayed in the terminal.

In case a data field begins with a character and it is not the "NUL" text, it can be stepped over when counting the columns of the message. The separating character is used to divide the characters on a line in several columns. The column numbers are important for the configuration in OMC-Programmer.

Two after each other placed field / column separating characters without data or "NUL" will be skipped over and not be counted as Column numbering.

As supporting safety, there is an adjustable minimal string length. This makes the possibility to reading half data, slim to none.

Through this method, YSI, Sontek "only first data line" and Nortek AWAY are all readable.

All messages coming in after a "Power delay" are processed. It doesn't matter if they are multiple messages or received sooner. This makes the data in the OMC-045-II up to date and makes the chance of a buffer overflow slim.

The processed data can be logged directly as an X or D record, this function is optional.

## 6.9 Power supply, power connections, backup power, power consumption

The OMC-045-II is supplied with a power supply voltage of 8-30V OR 3.6V (only rain gauge)

### 6.9.1 Connection of 8 – 30 V power

Connect a voltage between 8 and 30 Volt.

Some ripple is allowed. E.g. 12V battery with online charger

Beware of 24V battery with an online charger, as peaks might exceed 30V with some chargers



If you connect the power to X2.1 and X2.2 the wrong way, the fuse will blow  
 Internal electronics might be damaged.

### 6.9.2 Connection of 3.6V power

The OMC-045-II-rain is always supplied complete with battery holder

Observe polarity when mounting the battery.

The OMC-045-II is running as soon as the battery is placed.

If the battery is placed the wrong way around, the OMC-45-II must be returned to Obsermet as the on board SMD fuse F2 will blow and can only be replaced by a service engineer.

Changing the power supply voltage is done at the service department of Observator Instruments.



**Warning:** There is no overvoltage protection on the 3,6 Volt power circuit. Voltages above 3,6 Volt will damage the data logger beyond repair possibilities.

### 6.9.3 Internal RTC backup battery

The OMC-045-II contains an internal battery to keep the internal real-time-clock running. The lifetime of the battery is at least 10-20 years, so this battery requires no exchange during the lifetime of the OMC-045-II. The battery is a Li/MNO2 coin cell (which does not contain toxic substances) and is soldered to the printed circuit board.

## 6.10 LED function

The LED indicates the status of the OMC-045-II according to the table

**Table 1. Indication LED**

Frequency	Function
Continue on	"Boot software mode"
1 blinks every 0,75 sec	"Configuration error"
1 blinks every 8 sec	"Low power mode" deployment not started
1 blinks every 4 sec	"Low power mode"
0.5 sec on/ 0,5 sec off	"OMC-045-II is active"
1 blinks every 1 sec	"OMC-045-II halted"
$\frac{1}{24}$ sec on / $\frac{1}{24}$ sec off	"Uploading firmware"
1 blinks every 16 sec	"bat low mode"

## 6.11 Sensor connections

### 6.11.1 Digital inputs:

#### Status switch

Only 30 uA / 3.6V.

Examples are given in the appendices

It is an active low input which can be inverted by software. This setting can be made in OMC-Programmer.

terminal	Name	Description	
X3.1	GND	Status input for connection of a passive	
X3.2	DIN1	switch	

#### OMC-210 rain gauge

Digital inputs:

Only 30 uA / 3.6V

Examples are given in the appendices

terminal	Name	Description	
X3.3	GND	Rain gauge input; Pulse input for	
X3.4	DIN2	connection of passive switch sensors	

### 6.11.2 Analogue

#### OMC-350 water level meter (potentiometer)

The auto calibrate option in OMC-Programmer is available if an extra known sensor offset must be calculated. Examples can be found in the appendices.

terminal	Name	Description	
X4.9	GND	Potentiometer input channel A5	
X4.10	AI5		Loper
X4.11	VREF		

#### 4-20 mA sensor (2-wire)

Up to 4 channels can be used to measure 4 – 20 mA sensors. The inputs are calibrated at 4 – 20 mA and scaled using the setting from OMC-Programmer. The auto calibrate option in OMC-Programmer is available if an unknown sensor offset must be calculated. Examples can be found in the appendices.

terminal	name	Description	
X4.1	GND	4-20 mA input channel A1	
X4.2	AI1		
X4.3	GND	4-20 mA input channel A2	
X4.4	AI2		
X4.5	GND	4-20 mA input channel A3	
X4.6	AI3		
X4.7	GND	4-20 mA input channel A4	
X4.8	AI4		

#### OMC-506

terminal	name	Description	Color
X4.1	GND	4-20 mA input channel A1	
X4.2	AI1		White (power -)
X2.3	GND	Switched power supply output for sensors (output 1) Terminals X2.4 and X2.6 are internally interconnected	
X2.4	VOUT1+		Black (power +)
X2.5	GND		
X2.6	VOUT1+		

Vout2 can also be used.

### 6.11.3 Serial

#### YSI 6-series

terminal	name	Description	
X3.5	GND	RS232 PORT 1	
X3.6	TX1		Data logger → YSI "orange"
X3.7	RX1		Data logger ← YSI "yellow"
X2.3	GND	Switched power supply output for sensors (output 1) Terminals X2.4 and X2.6 are internally interconnected	
X2.4	VOUT1+		Red (power +)
X2.5	GND		Black (power -)
X2.6	VOUT1+		

#### SONTEK Argonaut

terminal	name	Description	
X3.5	GND	RS232 PORT 1	
X3.6	TX1		Data logger → Sontek
X3.7	RX1		Data logger ← Sontek
X2.3	GND	Switched power supply output for sensors (output 1) Terminals X2.4 and X2.6 are internally interconnected	
X2.4	VOUT1+		Red (power +)
X2.5	GND		Black (power -)
X2.6	VOUT1+		

#### Nortek AWAC

For the Nortek AWAC, two serial ports are used. This enables to read the C and W messages.

terminal	name	Description	
X3.5	GND	RS232 PORT 1	
X3.6	TX1		Data logger → Convertor
X3.7	RX1		Data logger ← Convertor
X3.8	GND	RS232 PORT 2	
X3.9	TX2		
X3.8	RX2		Data logger ← Convertor



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## 7 Errors

You can check the functioning of the OMC-045-II with OMC-Programmer.

Ask for the actual values in OMC-Programmer. These are refreshed on the sampling interval from the configuration.

See appendix for configuration of the sensors. See Chapter XX for the connection schematics

Switch the OMC-045-II on. You should first check the fuse, if the OMC-045-II doesn't work. The OMC-045-II should be working and the indication LED should be blinking.

### 7.1 Analog sensor

When the sensor does not give the correct value, you should first measure the voltage or current from the sensor.

This is different for every sensor.

Possible errors:

- Scaling error in configuration
- Error in calibration of the analog input
- Wiring not correct
- Analog circuit is defect

### 7.2 Digital Input

The digital input does not react on pulse/status of a switch. Check the voltage on the switch. This should be in resting stage, 3.6 Volt. If the switch is activated it should be 0 Volt.

Possible errors:

- Wiring not correct
- Configuration error
- Defect on input.

### 7.3 Serial input

Values are missing or are not coming in. This can be caused by the following things.

By opening the Terminal of OMC-Programmer, you can see the data that are from the serial sensors.

If the sensor supports it, it can be configured through the Terminal. One of the demands is that the baud rate is correctly configured. If the baud rate is not correct, the text in the terminal will be unreadable.

On the Tx from the sensor, there should be a voltage between -5 and -12 Volt comparing it to the ground.

Possible errors

- Wiring not correct
- Configuration error "baud rate", "how many parameters" and/or "position parameters"
- Configuration error in the sensor
- Sensor is not powered
- Defect on the input or power supply

### 7.4 GPRS, GSM and SIM card

If no values can be send over a GPRS connection, control the following things.

- Is the SIM card connected correctly in the OMC-045-II?
- Is the antenna connected?
- Is the modem able to connect to the mobile network?
- Is the signal strength >80%?

In case the text "Modem Power DOWN" appears, an error has occurred. Through the overview under the text, you can see what the error is and where it occurred. The last message before the "Modem Power DOWN" message is important for this.



**Warning:** Do not touch the golden contacts of the SIM and SD card. By means of ESD the card can get defect. Or the connections can oxidize.

#### GSM

		In case the message doesn't appear	
Modem Init start	Start modem initialization		
ATE0 s			
ATE0 Ok r		Modem is not reachable	
AT S			
AT Ok r		Modem is not reachable	
AT+Creg? S			
AT+Creg? Ok r		Signal strength error	
AT+CSQ s			
AT+CSQ ok r		Signal strength error, SIM card error of antenna error	
AT+W32K=1 s			
AT+W32K=1 Ok r		na	

**GPRS**

Bericht	In case the message doesn't appear
AT+WOPEN=1 s	
AT+WOPEN=1 Ok r	Open AT error
AT+WIPCFG=1 s	
AT+WIPCFG=1 Ok r	WIP error
AT+WIPBR=1,6 s	
AT+WIPBR=1,6 Ok r	
AT+WIPBR=2,6,11,"NAP" s	Nap is invalid formatted
NAP Ok r	
AT+WIPBR=2,6,0,"nap user" s	Nap user invalid formatted
AT+WIPBR=2,6,0, Ok r	
AT+WIPBR=2,6,1,"nap password" s	Nap password invalid formatted
AT+WIPBR=2,6,1, Ok r	
AT+WIPBR=4,6,0 s	GPRS error NAP settings not accepted or service not available
AT+WIPBR=4,6,0 Ok r	
AT+WIPBR=5,6 s	na (not applicable)
bearer stop ok r	
AT+WIPBR=0,6 s	na
bearer close ok	
AT+WIPCFG=0 s	na
wip stop r	

**FTP**

Bericht	In case the message doesn't appear
AT+WIPCREATE=4,1,"server", "port", "user", "password"	Configuration is wrong or cannot reach the server
wip create Ok r	
AT+WIPOPT=4,1,2,41,0	ftp active modus not supported
AT+WIPOPT Ok	
AT+WIPFILE=4,1,2,"./file"	Upload not allowed
AT+WIPFILE=4,1,2 r	
end FTP s	na
end ftp ok r	
AT+WIPCLOSE=4,1 s	na
serv disc 2	
serv disc ok r	

### 7.4.1 FTP messages without data

See chapter 8.9. If only the header is present in the mail, the connection has been broken. This can happen because of a ftp timeout on the server. If the file is completely blank, there are network problems. A file that has been corrupted by a network timeout won't be closed with the following data:

ulLastBlockMail	1586	ulMMC_R_CurrentBlock	1586
uiMailDataIndex	62	ulMMC_CurrentBlock	1587
		uiMMC_BufIndexW	62

### 7.4.2 Antenna placement and field strength

An antenna required for GPRS and GSM operation. The OMC-045 cannot operate without a GSM/GPRS antenna.

Normally you will require a dual-band antenna suitable for 900 MHz and 1800 MHz.

Note that the OMC-045-II can also operate with 900 MHz only, where 1800 MHz is not available. In this case, a 900MHz antenna will fulfill.

Depending on local field strength a simple whip antenna direct connected to the OMC-045-II can work, or a better antenna and/or better antenna placement might be required.

### 7.4.3 Field strength

You can monitor the actual field strength through the OMC-Programmer configuration software.

The field strength might vary on atmospheric conditions, so we recommend you to make sure that the indication is far in the green at installation

The field strength might also vary on the growth of vegetation (trees tend to block the signal)

We also recommend configuring the OMC-045-II in such a way that the GPRS (actually GSM) field strength is recorded. In this way you can get an early warning when the field strength gets poorer.

What to do to get a better field strength signal. Some hints:

- Make sure the antenna is mounted in accordance with the manufacturer's instructions. Note there are antennas (whip antennas) that require a metal surface below the antenna; others (dipole antennas) do not.
- Make sure that all connectors on the antenna and antenna cable are tightened and free of moisture.
- Make sure the antenna is in vertical position; as the GSM and GPRS radio signals are vertically polarize, the antenna should be vertical positioned for maximum performance.
- Do not place the antenna near metal surfaces or structures. Be aware that various building structures contain metal (e.g. steel mesh as reinforcement for concrete)
- Place the antenna outdoor
- Identify the nearest GSM tower of your provider. Place the antenna in a location that provides a free line-of-sight to the tower.
- If you cannot identify the nearest GSM tower of your provider, place the antenna on a higher position; generally, higher is better.
- Use a good quality (low-loss) antenna cables. Generally, the thicker the cable, the better.
- Avoid unnecessary adaptors and connectors in the antenna cable, as every "joint" cause a significant signal loss (0.5 to 1 dB).
- Use an antenna with a higher antenna gain (simple stubby antennas can have a gain of -9db, a rod antenna can have an antenna gain of 0 or 4 dB or higher; Note that the allowed radio power is limited to 1W/2W. An antenna with a higher gain is only allowed when this only compensates for the cable and connector losses). Directional antennas can have a very high gain in just one direction, and are normally not allowed.

### 7.4.4 SIM card Compatibility

Make sure the SIM you intend to use is compatible

Hardware compatibility: 3V and 1.8V SIM card will work.  
Old 5V SIM card will not work

Functional compatibility

The SIM service must be compatible with the services that you intend to use  
OMC-045-II can use the following services  
GSM data 900 or 1800 networks  
GPRS data 1800 networks

### 7.4.5 (Re)Placement of the SIM

Place the SIM



**Warning:** Do NOT place the SIM card while the OMC-045-II is in service.  
First disconnect the battery power

The SIM card holder is of the “push-push”-type

Carefully insert the SIM card in the SIM card slot on the left hand side of the module as indicated on top.  
Press the SIM card down using your fingernail until you hear and feel a click. The top of the SIM card should be on the same height as the top surface of the module.

To remove the SIM card:



**Warning:** Do NOT remove the SIM card while the OMC-045-II is in service.  
First disconnect the battery power

Press the SIM card further down in the SIM card holder using you finger nail, and it will come out, so you can easily remove the card

## 7.5 GPS Errors

Open a COM port by using the Terminal window of OMC-Programmer. As soon you open the port, the NMEA messages should be visible. Keep in mind that the GPS antenna should have enough signals. Put the antenna preferably outside or near the glass of a window.

Sample messages:

```
$GPGSA,A,3,08,25,19,27,,,,,,,,,4.4,4.2,1.0*37  
$GPGSV,3,1,12,19,53,290,37,27,13,299,38,08,12,326,38,25,09,277,40*78  
$GPGSV,3,2,12,07,86,218,,03,78,273,31,18,50,088,,15,36,064,*7E  
$GPGSV,3,3,12,21,23,065,,26,12,042,,16,08,166,,10,06,034,*74  
$GPRMC,083341.000,A,5152.5110,N,00437.1426,E,0.38,296.31,040308,,,A*6F  
$GPGGA,083342.000,5152.5105,N,00437.1449,E,1,04,4.2,22.7,M,47.2,M,,0000*6C
```

When the data comes in, in the terminal, the GPS is functioning. In the GPS test screen of OMC-Programmer, you can control if a GPS fix location can be asked. If you can't it can mean you are having antenna problems. In optimal conditions the GPS has a fix within 40 seconds. The \$GPGGA message is used to get its data and time synchronization.

## 7.6 Storing Data log

The OMC-045-II uses a specially formatted SD card. This must be correctly configured in OMC-programmer. Is the log interval correct? In case there isn't any log interval, this should be corrected. You can find how to do this in the help of the OMC-Programmer.

If you are connecting through the terminal, the following messages are important:

String in Terminal	Description	Error - OK	Action
SD_W	SD buffer write ok	OK	
SD_W_Err	SD buffer write error	Error	(Re)place SD card
SD_F	SD card is Full	Error	Replace SD card
SD_sW	SD smallog write ok	OK	
SD write Error	SD write error	Error	(Re)place SD card
SD forced write Error	SD auto backup error	Error	(Re)place SD card
SD forced write OK	SD auto backup Ok	OK	
SD write OK	SD buffer to SD write OK	OK	
SD Card size Error !!!	Unsupported SD card in config	Error	Check SD card config
SD cir buf error	SD backup buffer overflow	Error	Lower the datalog interval
MMC read Error	SD read error	Error	(Re)place SD card

If an SD error occurs in the terminal, there is no reason for panic. If it continues to give SD errors, then there is a problem. If a write action to the SD card is repeated and it fails, the message is repeated. Between each try to write the data, the data is stored in the buffer. The buffer is 1024 bytes and if the OMC-045-II doesn't log too many parameters, it's enough to catch the error.

### 7.6.1 Media compatibility

The OMC-045-II has been tested with the following SD cards:

Brand	Type	Size	Remarks
Sandisk	Standard SD card SDSDB-1024-A10	1 GB	
Sandisk	Standard SD card SDSDB-2048-A10	2 GB	
Sandisk	Ultra® II SD™ Plus USB SDSDPH-1024-901	1 GB	

### 7.6.2 Placement / replacement procedure for SD card



**Warning:** Never try to insert a mini-SD or micro-SD card or any other card except the standard SD card of the types as stated in table above

Placement: Carefully insert the SD card in the SD card slot on the right-hand of the module as indicated on top. When fully inserted, the SD card will remain about 5 mm above the surface



**Warning:** Do not use an SD card directly out-of-the-package as the SD cards are initialized with a file system by the SD card manufacturer. The SD card needs special initialization (fill-up with all 0x00). The cards supplied by Observator are initialized.

See appendix for formatting instructions.

## 7.7 Data retrieval from SD card

The data can be directly retrieved from SD via OMC-Programmer, you have 2 options.

Option 1: Via the OMC-045-2

This will give you the option to select a period and which data to download, but is slow. It also gives you the option to download in .csv format.

Option 2: Via a SD-card reader

Make sure the Write protect switch of the SD-card is on, so no data can be written to it (this could make the card unusable without formatting it for the OMC-045-II). Data retrieval is fast, but all data will be downloaded. No selection is possible.

## 7.8 System errors

Diagnose:      The OMC-045-II falls in sleep

Possible causes.

The OMC-045-II can be configured to work on a later time. If the programmed date and time isn't reached yet, it will go to sleep. This is recognizable, because the LED will blink every 8 seconds.

If the RTC had the wrong time, for example 1 Jan 2000, the system will go to sleep also. De set time when the OMC-045-II should work, should be set minimally on 2007.

If the LED blinking every 4 seconds, it is in his normal sleep mode ("Low Power" mode).



## 8 Maintenance en cleaning

Replace the RTC battery  
 Recalibration  
 Replacing the SD card  
 Replacing the SIM card

### 8.1 Configuration via HyperTerminal

When you have started up OMC-045-II, you'll have to type 'Ctrl A' then 'Shift R' then 'Ctrl D', to enter the modem configuration.

Explanation: to send Ctrl A you hold the Ctrl key and type 'a' so it is a two key combination.

To see characters you'll have to type "ATE1" Enter

AT&W Save settings

This is helpful for testing the modem manually.

### 8.2 Configuration and Firmware Upgrade procedures

The OMC-045-II contains software and settings the as shown in the following table software and settings. The table does also show update possibilities through the OMC-Programmer configuration software

	USB	Over-the-air		
		GPRS	GSM-data	
Configuration	Yes	No	Yes	
OMC-045-II Firmware	Yes	No	Yes	
Internal GPRS modem firmware	Yes	No	No	

Upgrade procedures are incorporated in the documentation that comes with the OMC-Programmer configuration software.

## **9 Environment and disposal**

The OMC-045-II is manufactured in compliance with the RoHS directive (Reduction of Hazardous Substances) EU directive 2002/95/EC, which means in popular terms that the product is "lead free".

When the OMC-045-II is taken out of service, dispose the OMC-045-II in accordance to the local regulations at the time the product is disposed.

Regulations for disposal of batteries may be different. Remove the batteries and dispose them in accordance to the local regulations for batteries

## 10 Specifications

Wireless Connectivity & wired communications

Inputs  
 General

subject	value	remarks
Power supply voltage	3.2 - 4.2 V 9 - 30 V	Only OMC-045-II-rain Other versions

Connectivity

subject	value	remarks
GPRS	Internal Quad-band GPRS class 10 capable modem 2Watt EGSM900/GSM850 1Watt GSM1800/GSM1900	
SIM	3V or 1.8V SIM interface is compliant to GSM 11.11	
USB port	Slave port Mini-B connection USB 1.2 and 2.0	

GPS

subject	value	remarks
Chipset Output Power	SiRFstar III NMEA GGA	40 sec to first fix

Current Consumption @ Vbat 12,6 Volt

<b>Subject</b>	<b>Value</b>	<b>Remarks</b>
Datalogger Low power	250 $\mu$ A	
Modem sleep	2 mA	Needs good GSM signal
Datalogger Active	30 mA	
FTP Mail Transfer	70 mA	
GPS		Needs good GPS signal

Current Consumption @ Vbat 3,6 Volt

<b>Subject</b>	<b>Value</b>	<b>Remarks</b>
Datalogger Low power	Xx $\mu$ A	
Modem sleep	Xx mA	Needs good GSM signal
Datalogger Active	Xx mA	
FTP Mail Transfer	Xx mA	
GPS		Needs good GPS signal

## 11 EU Declaration of Conformity



Observator instruments B.V.

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The Netherlands

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Tel: +31 (0) 180 463422  
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### DECLARATION OF CONFORMITY

The manufacturer:

Observator instruments B.V.

Herewith declares the

**OBSERMET OMC-045-II GPRS logger**

Is in compliance with the EMC directive 2004/108/EEC

Compliance with Essential Requirements of the directive has been assured by compliance with:

EN 61326-1:2006      EN 61000-6-1:2001      EN 61000-6-3:2001

Ridderkerk, 01<sup>st</sup> October, 2007  
Observator instruments b.v.

R. de Vries  
General Manager



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## 12 Appendix

### Index for all Appendixes

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### 12.1 Explanation email format OMC-410 and OMC-045-II

As for the OMC-410 and the OMC-045-II, they both use the same email format.

The email will contain the following parts:

The Header

*Line 1 the addresses*

T;25;26;27;28;29;30;31;32;33;34;35;36;

*Line 2 the parameter name for the addresses (Tag-name).*

Timestamp;Wind Direction;Wind Speed;Temperature;Potmeter;Solar Rad;V  
bat;Baro Pressure;Humidity;Temperatrure;Rain;QFE;QNH;

*Line 3 the unit for the parameter.*

yy/mm/dd hh:mm:ss;deg;m/s;C;%;w/m2;V;mB;%;C;mm;mB;mB;

*Line 4 the short name for the parameter name, also called TAG-code.*

Time;WDIR;WSP;TPT1;POT;SOL;BAT;BAR;HUMM;TMP;TB1;QFE;QNH;

Data lines

After the header, the next information in the mail, are the data lines. The data in the data lines are not always the same. The registry interval for every parameter can be different. In a data line you will see the following values:

1. D
2. Time
3. Address
4. Measured value
5. Status
6. Address
7. Measured value
8. Status
9. Etc.
10. Etc,

X Data lines

Equal to the data lines, there are X data lines. On these lines are an X in staid of an D. This is for filtering data, when sending it to the user. X lines certain all data from one specified sensor.

As example the values over which the average is calculated.

System lines

Next to data lines there are also lines about the functioning of the system, these are the system lines.

1. S
2. Tijdstip
3. Field 1
4. Field 2
5. Field 3
6. Optional text field

The letters 'D' and 'S' on the beginning of the row, informs if the line is a Data or System line. The letter 'E' is reserved for event lines.

#### Status Byte

The status byte displays a binary status of some information field.

Bit	Init	1	0
0	1	Never Updated	Once Updated
1	0	Data Invalid	Data Valid
2	0	Above Boundry	Not Above Boundry
3	0	Below Boundry	Not Below Boundry
4	0	WatchDogTimeout	No WatchDogTimeout
5	0	SmallLogged	Not SmallLogged
6	1	SerialOut	Not Logged
7	1	Logged	Not Logged

Bit 0 to 4 are errors. Bit 5 to 7 are information.

X Data & System lines can be switched off in the setup. This will limit the amount of data transmission.



## 12.2 Example 1 Email

T;25;26;27;28;29;30;31;32;33;34;35;36;  
Timestamp;Wind Direction;Wind Speed;Temperature;Potmeter;Solar Rad;V  
bat;Baro Pressure;Humidity;Temperatrure;Rain;QFE;QNH;  
yy/mm/dd hh:mm:ss;deg;m/s;C;%/m2;V;mB;%;C;mm;mB;mB;  
Time;WDIR;WSP;TPT1;POT;SOL;BAT;BAR;HUMM;TMP;TB1;QFE;QNH;  
D;7/5/15 15:41:8;25;0.0000;16;26;0.0000;16;27;23.6252;16;35;1012.8690;66;36;1018.6470;66;30;13.5948;0;31;1013.8100;16;32;35.5586;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:10;25;0.0000;16;26;0.0000;16;27;23.6249;16;35;1012.8690;66;36;1018.6470;66;30;13.5971;0;31;1013.8200;16;32;35.6875;16;33;25.4727;16;34;0.0000;0;  
D;7/5/15 15:41:12;25;0.0000;80;26;0.0000;80;27;23.6238;0;35;1012.8690;64;36;1018.6470;64;30;13.5942;0;31;1013.8300;64;32;35.7383;64;33;25.4727;64;34;0.0000;0;  
D;7/5/15 15:41:15;25;0.0000;16;26;0.0000;16;27;23.6382;16;35;1012.8490;64;36;1018.6270;64;30;13.5936;0;31;1013.8100;16;32;35.8242;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:16;25;0.0000;16;26;0.0000;16;27;23.6214;16;35;1012.8490;66;36;1018.6270;66;30;13.5936;0;31;1013.8100;16;32;35.8242;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:18;25;0.0000;16;26;0.0000;16;27;23.6254;16;35;1012.8490;66;36;1018.6270;66;30;13.5930;0;31;1013.8100;16;32;35.8516;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:20;25;0.0000;16;26;0.0000;16;27;23.6351;16;35;1012.8490;66;36;1018.6270;66;30;13.5913;0;31;1013.8100;16;32;35.8516;16;33;25.4727;16;34;0.0000;0;  
D;7/5/15 15:41:22;25;0.0000;16;26;0.0000;16;27;23.6350;16;35;1012.8490;66;36;1018.6270;66;30;13.5942;0;31;1013.8100;16;32;35.8125;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:24;25;0.0000;16;26;0.0000;16;27;23.6300;16;35;1012.8490;66;36;1018.6270;66;30;13.5930;0;31;1013.8100;16;32;35.7227;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:26;25;0.0000;80;26;0.0000;80;27;23.6302;0;35;1012.8490;64;36;1018.6270;64;30;13.5930;0;31;1013.8100;64;32;35.6719;64;33;25.4727;64;34;0.0000;0;  
D;7/5/15 15:41:30;25;0.0000;16;26;0.0000;16;27;23.6450;16;35;1012.8590;64;36;1018.6370;64;30;13.5936;0;31;1013.8200;16;32;35.5586;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:32;25;0.0000;16;26;0.0000;16;27;23.6405;16;35;1012.8590;66;36;1018.6370;66;30;13.5924;0;31;1013.8200;16;32;35.6328;16;33;25.5156;16;34;0.0000;0;  
D;7/5/15 15:41:34;25;0.0000;16;26;0.0000;16;27;23.6381;16;35;1012.8590;66;36;1018.6370;66;30;13.5919;0;31;1013.8200;16;32;35.7500;16;33;25.5000;16;34;0.0000;0;  
D;7/5/15 15:41:36;25;0.0000;16;26;0.0000;16;27;23.6441;16;35;1012.8590;66;36;1018.6370;66;30;13.5948;0;31;1013.8500;16;32;35.9648;16;33;25.5000;16;34;0.0000;0;

---

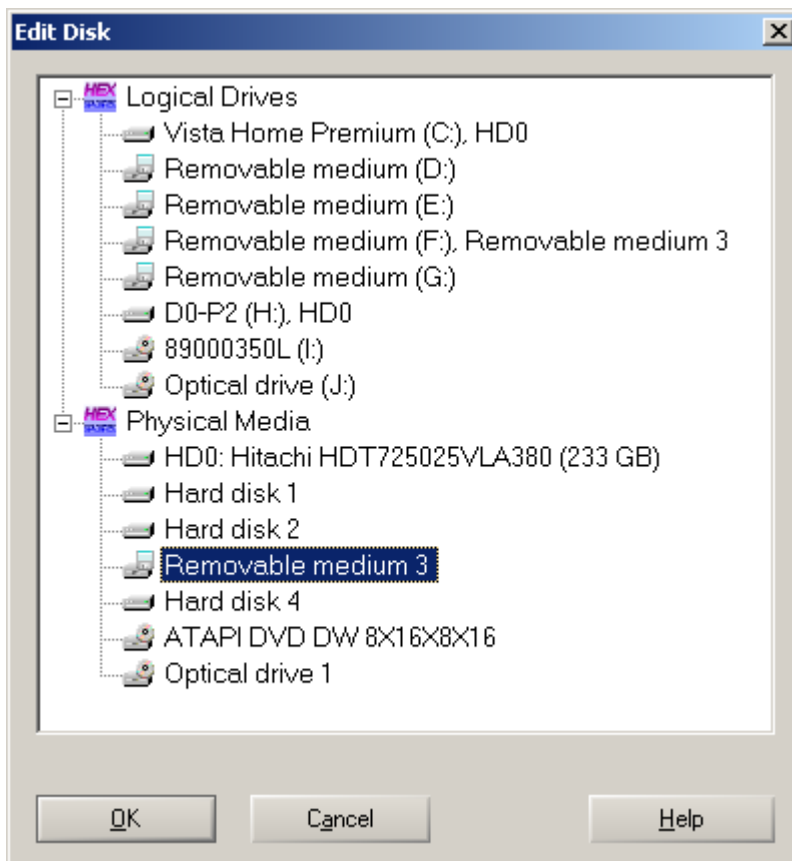
## 12.3 Example 2 E-mail with system lines

```
T;25;26;27;28;29;30;31;32;33;34;35;36;37;38;39;40;41;42;43;44;45;46;47;48;49;50;51;52;53;54;
Timestamp;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;
yy/mm/dd hh:mm:ss;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;ABC;
Time;T0;T1;T2;T3;T4;T5;T6;T7;T8;T9;T10;T11;T12;T13;T14;T15;T16;T17;T18;T19;T20;T21;T22;T23;T24;T25;T26;T27;T28;T29;
S;07/08/17 12:56:00;1;6;1;;
D;07/08/17 12:56:00;25;149.00;192;26;0.08;192;27;24.34;64;28;4.01;64;29;0.00;72;30;24.05;64;31;1017.07;64;32;41.25;64;33;3.20;64;34;0.00;64;35;-
9.99;64;36;0.00;64;37;0.00;64;38;0.00;64;39;0.00;64;40;-0.30;64;41;5.70;64;42;81.74;64;43;-17.10;64;44;0.00;64;45;0.00;64;46;-
1.00;64;47;0.00;64;48;0.00;64;49;0.00;64;50;0.00;64;51;27.19;64;52;0.00;64;53;-1.00;64;54;87.10;64;
S;07/08/17 12:58:00;1;6;1;;
D;07/08/17 12:58:00;25;156.00;64;26;0.08;64;27;24.28;64;28;4.01;64;29;0.00;72;30;16.91;64;31;1017.06;64;32;41.65;64;33;3.20;64;34;0.00;64;35;-
9.99;64;36;0.00;64;37;0.00;64;38;0.00;64;39;0.00;64;40;-0.31;64;41;2.80;64;42;77.41;64;43;-17.10;64;44;0.00;64;45;0.00;64;46;-
1.00;64;47;0.00;64;48;0.00;64;49;0.00;64;50;0.00;64;51;27.21;64;52;0.00;64;53;-1.00;64;54;90.32;64;
S;07/08/17 13:00:00;1;4;1;;
D;07/08/17 13:00:00;25;156.00;192;26;0.08;192;27;24.26;64;28;4.01;64;29;0.00;72;30;17.09;64;31;1017.29;64;32;41.95;64;33;3.20;64;34;0.00;64;35;-
9.99;64;36;0.00;64;37;0.00;64;38;0.00;64;39;0.00;64;40;-0.30;64;41;13.00;64;42;103.20;64;43;-17.10;64;44;0.00;64;45;0.00;64;46;-
1.00;64;47;0.00;64;48;0.00;64;49;0.00;64;50;0.00;64;51;27.23;64;52;0.00;64;53;-1.00;64;54;87.10;64;
S;07/08/17 13:00:13;1;4;3;OK;
S;07/08/17 13:00:13;1;4;3;+CREG: 0,1;
```

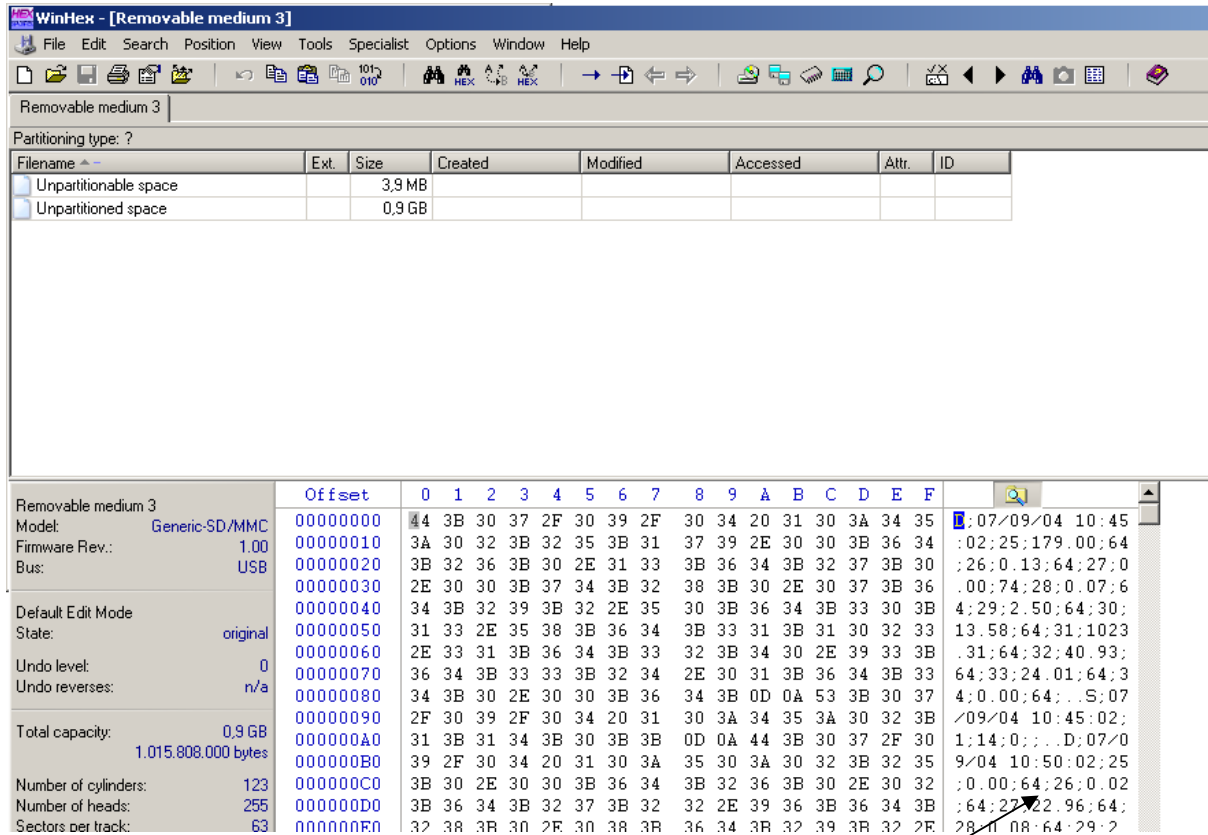
## 12.4 Instructions to format an SD for use in the OMC-045-II Using WinHex.

Winhex is a commercial program. SD cards can also be pre-formatted ordered from Observator.

We have tested with Sandisk SD cards, we can not guarantee other brands will work.



Be sure you have the correct removable selected then ok



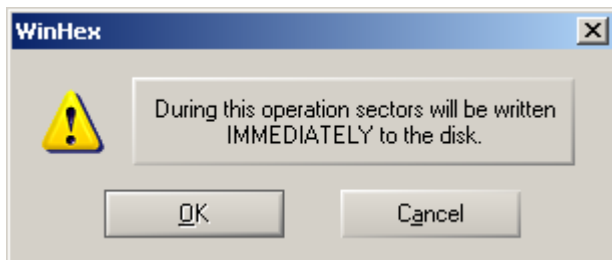
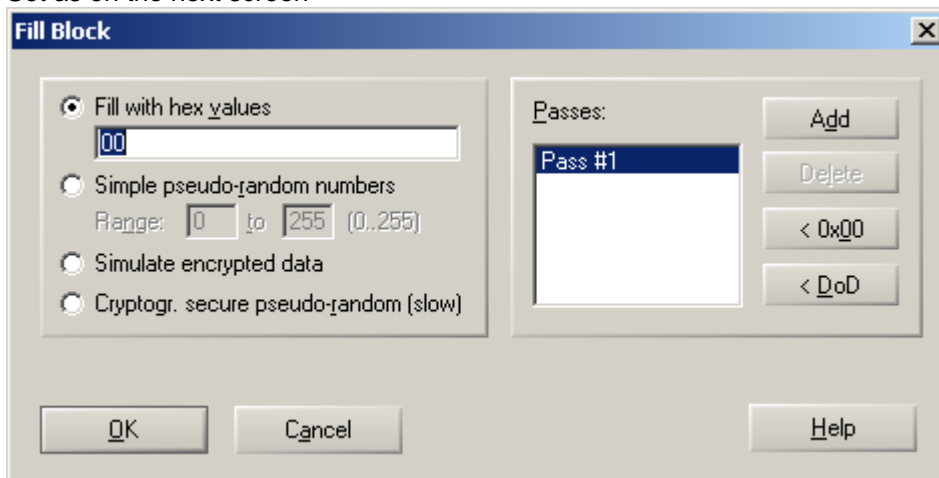
The screen will look like this

Total capacity will be the same for your SD card

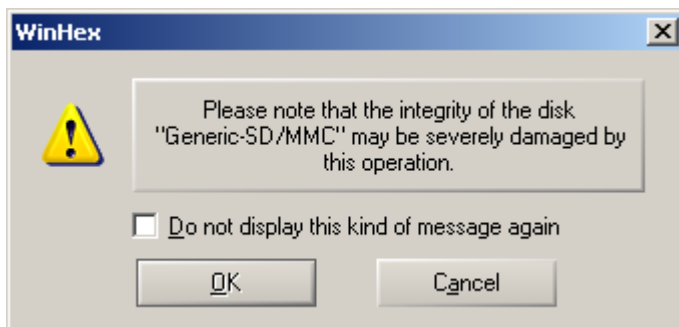
Formatting the card

- Click somewhere in the data field
- Ctrl-A to select all data
- Right click on the data select edit
- Then select Fill Block

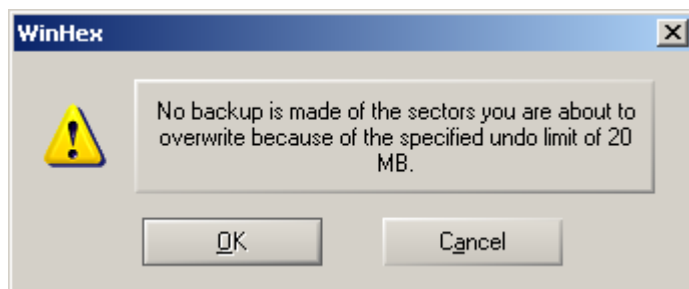
Set as on the next screen



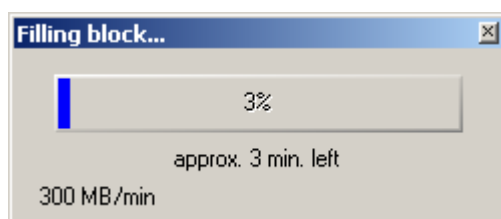
OK



Ok



Ok



When it is finished, the card will be formatted OK

All the data on the card should be '0'



## 12.5 Sensor specific information

### Index sensors

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### 12.5.1 OMC-210 rain gauge

In OMC-Programmer the setting of the used rain gauge can be configured.

Settings

1	Bucket size	0.1, 0.2 mm etc.
2	Reset time	None or Daily
3	Intensity Period	Min, Hour



## 12.5.2 Nortek AWAC

For the Nortek AWAC, you need extra hardware.

The AWAC is connected to the data logger with a baud rate converter. The baud rate converter is configured to receive data from the AWAC on 9600 baud. It communicates with the data logger at 1200 baud. The data logger uses two serial inputs to receive both the Current and Wave data. If the Sensor data must be processed as well a third serial input must be used. Each serial input is configured to trigger on a different start character.

Start Character	Information sentence
W	Wave
C	Current
S	Sensor

On "Port X" read W message  
On "Port Y" read C message

X and Y are one of the Ports 1 to 4.

Port X  
Start char 'W'  
Sperator ','  
Decaimal point '.'  
End char '\R'  
Min String lengte 15

Smallog aan type D record.

Port Y  
Start char 'C'  
Sperator ','  
Decaimal point '.'  
End char '\R'  
Min String lengte 15

Smallog aan type D record.

C message contains  
Low number, direction, speed

W message contains  
H3, Dir Mean, Tm02

Sampling interval

W message has an interval every 4 hours	interval in sensor every 2 hours
C message has an interval every 20 min	interval in sensor every 10 min

This is to make sure that there aren't too many timeout problems, when the sensor is not running synchronized with the OMC-045-II

Don't tag the data in the tag list, to be logged. This is because it already does it through Smallog. Because there are 20 cells configured, Smallog reads and process every 10 min 20 C Lines.