

User Manual

MR3000C MR3000TR

Firmware Version 2.0.x

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1. INTRODUCTION

The MR3000 is a family of compact vibration and motion measurement system. As such it meets all user expectations in a state-of-the-art device and thus is a highly reliable and efficient instrument for various application fields.

The main instrument is the MR3000C, which is the first system that has been developed and the most known among the customers all over the world. For this reason, in the user manual, its name will appear many times. The MR3000TR is a product directly derived from the MR3000C with the addition of 2 relay outputs and 1 trigger input.

The instruments of the MR3000 family are equipped with a newest generation of electronic components, which allows a strong reduction in power consumption while increasing the computing power. The MR3000 keeps the best features of the MR2002, with many new features, namely a reduced size and lighter weight, high-speed communication (Ethernet and Wi-Fi) and an integrated 3G modem device (optional).

No special hardware or software is needed to communicate with the MR3000C – any device with a Web browser and Internet connectivity (such as a Laptop or a Tablet) will do the job. The user can set-up the unit, download files via any type of network connection (LAN, Wi-Fi or via 2G, 3G network). The famous alerting feature of the MR2002 has been enhanced – alarm messages can be sent as text-message (SMS) or E-Mail.

It is possible to connect the MR3000C/TR to the SCS cloud software (scs.bartec-syscom.com), in order to visualize and post-process data coming from different devices. It is also possible to remotely change the most important parameters of the instruments. In this way, it is possible to manage many vibration surveys directly from the personal office.

The memory storage capacity of the MR3000 has been increased using off-the-shelf SD Flashcard. The data-storage is managed by a file-system.

The MR3000 systems are pre-configured for the use with internal or external sensor. The configuration presented in this document corresponds to the option with internal sensor.

The 3 orthogonally oriented sensors pick up the vibration and transform it into an electrical signal which is proportional to velocity or acceleration. The signals of the sensors are continuously digitized and stored in the ring-buffer memory. If the vibration exceeds the threshold level (trigger criteria are fulfilled), the contents of the ring-buffer memory is written to the internal SD Flashcard.

The MR3000 may optionally be equipped with an external GPS antenna for a precise timing. By default, the internal clock is synchronized by an NTP time-server using the Internet connection.

MR3000 devices may optionally be interconnected in a network with other MR3000 instruments. The Master device provides additional network functionality, such as common trigger (simultaneous recording in all MRs in the network) and common alarm (alarm voting logic, e.g. 2 out of 4).

The MR3000 is water and shock resistant. An external rechargeable lead-acid battery ensures continuous operation during power interruptions.

The MR3000C/TR, that sometimes will be called simply MR, is very easy to operate and requires minimal maintenance. Routine maintenance and operation does not require a specialist.

1.1 Features

Major feature are:

- Compact unit with integrated sensor, digital recorder, wired and wireless connectivity
- ARM/DSP Technology
- Removable SD Card storage (up to 32 GB)
- Integrated Web server
- Precise timing using NTP (Network Time Protocol), GPS is optional
- Power over Ethernet (PoE, IEEE.802.3af)
- Wide dynamic range (130 dB @ 250 sps)
- Sampling rates up to 2000 Hz
- Simple installation
- Easy operation
- High reliability
- Low maintenance
- Compatibility with SCS cloud software

1.2 Specifications

Wireless technology Protocol IEEE802.11 b, g, n

Mobile network:

Europe: Dual-Band UMTS/HSPA+ 900/2100MHz
Quad-Band GSM/GPRS/EDGE 850/900/1800/1900MHz

America: Dual-Band UMTS/HSPA+ 850/1900MHz
Quad-Band GSM/GPRS/EDGE 850/900/1800/1900MHz

Operating Temperature: -20°C up to 70°C

Operating Humidity: up to 100% RH

1.3 Applications

- Civil Engineering
 - Industrial Vibrations
 - Construction Site Monitoring
 - Tunneling
 - Truck and Rail Traffic

- Blasting Monitoring
 - Model Verification
- Earthquake Engineering
 - Building Monitoring
 - Monitoring of Structures (e.g., Dams, Bridges)
- Geology – Soil Characterization
- Earth Science – Earthquake Monitoring

1.4 Norm compliance

The MR3000C/TR can be used to measure vibrations according to the following norms:

Construction sites

- DIN 4150-2 and DIN 4150-3 (Germany)
- SN 640312a (Switzerland)
- Circulaire du 23/07/1986 (France)
- BS 5228 (UK)
- UNE 22-381 (Spain)
- NP 2074 (Portugal)

Blasting

- RI 8507 & OSM Regulation (USA)
- AS 2187-2 (Australia)
- Arrêté du 1994 (France)
- BS 7385-2 (UK)

2. HARDWARE

2.1 Mechanical Drawing – Overview

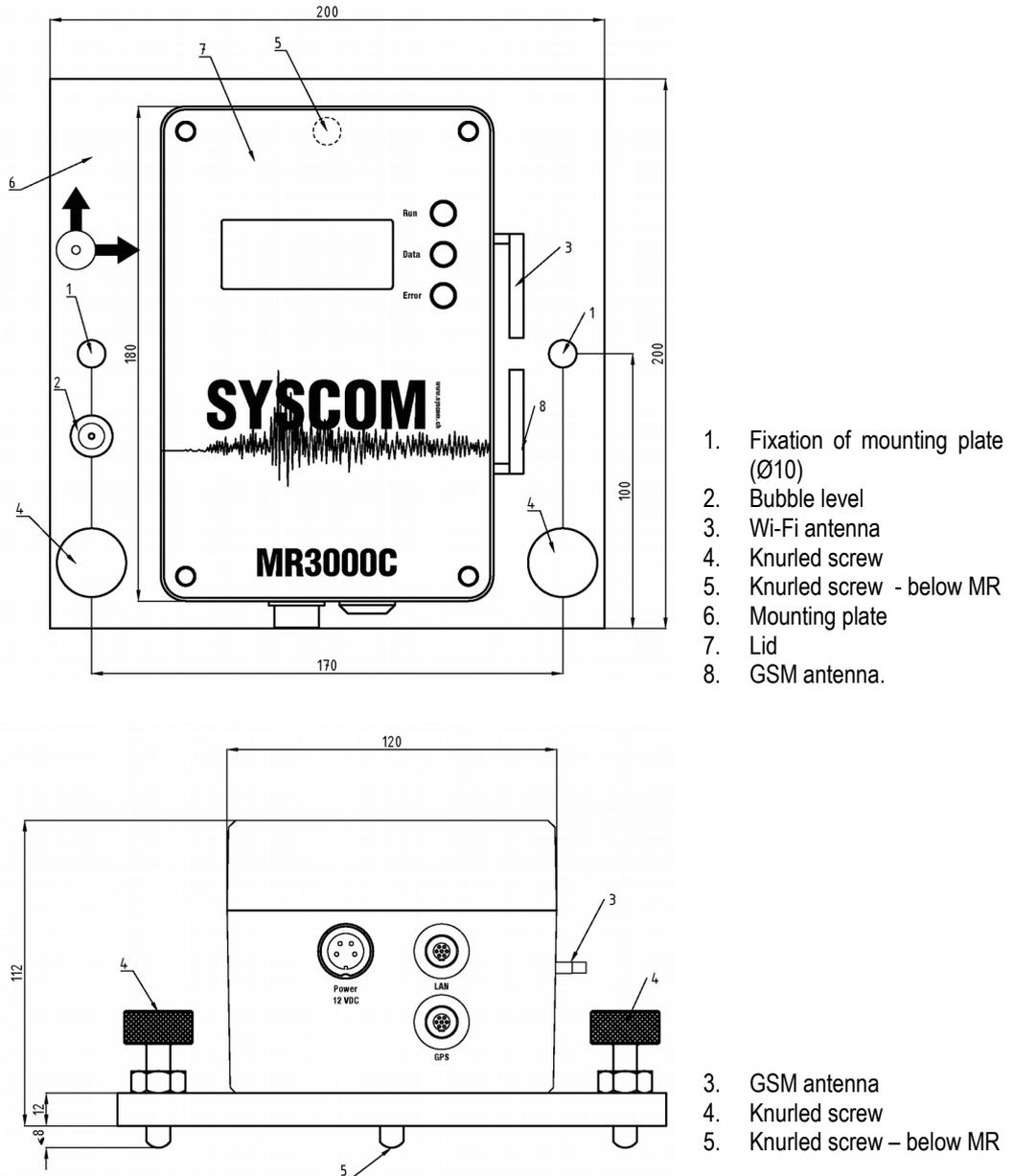


Figure 2.1.1. Mechanical drawing of the MR3000C – Top view and side view.

2.2 Connectors

The MR3000C provides two rugged push-pull connectors, as it is shown in Figure 2.2.1a, namely, **Power** for power supply and **LAN** for communication and power using PoE (Power over Ethernet). For old versions and in case the GPS (optional) is ordered, there is an additional connector to hook-up an external GPS antenna (Figure 2.2.1b).

The LAN port is also referred as the **Ethernet** port.

The MR3000TR has one supplementary connector (AUX) dedicated to the connection to the relays (Figure 2.2.1b).



Figure 2.2.1. Front view of: a) MR3000C showing the two sockets for power and LAN; b) MR3000 face with GPS connector; c) MR3000TR showing connectors for power, LAN, AUX and GPS (with cap).

2.2.1 Power

Here you connect either the external AC/DC adapter, the external battery pack (provided by Bartec Syscom) or an external battery.

NOTE: There is no internal battery in the MR3000C/TR.

2.2.2 LAN

Here you connect the Ethernet cable (wired communication via router or direct connection to your PC) – for further detail check chapter 3.1.2 and 3.1.3. The MR3000 interfaces to a standard 10/100-BASE LAN.

If you hook-up the MR3000 to a router with PoE (Power over Ethernet), the MR is powered over this connection and no additional supply power is needed. You may however connect an additional power source for redundancy.

2.2.3 GPS (optional)

Here you connect to an appropriate GPS module for time synchronization.

2.2.4 AUX

The AUX connector is available only for the MR3000TR, and it is dedicated to the relay cable 81000580. In the MR3000TR there are:

- 2 relay outputs, for the connection to external devices;
- 1 hardware trigger input, to start the measure with an external trigger.

The relay cable contains the connections for both the relay and the hardware trigger.

The MR3000TR can be connected to an external **Alarm Box**, whose application note is provided at the following webpage: <http://www.syscom.ch/products/mr3000tr/>.

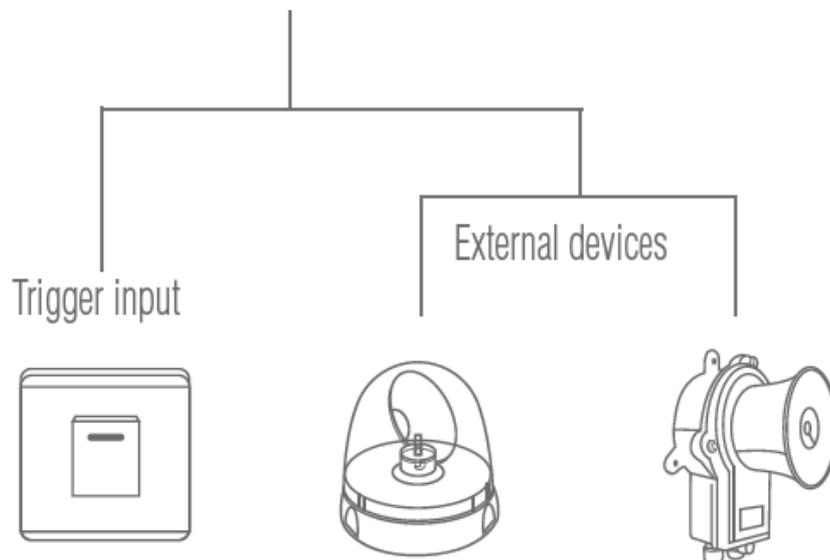


Figure 2.2.2. Relay cable 81000580 and possible connections.

Table 2.2.1. Electric scheme of the relay cable 81000580.

Pin	Signal name	Colour
1	Relay1 NC	Red
2	Relay1 NO	Blue
3	Relay1 COM	Pink
4	Relay2 NC	Grey
5	Relay2 NO	Yellow
6	Relay2 COM	Green
7	TRIGGER	Brown
8	GND	White

2.3 Display (LCD)

The LCD of the MR3000C shows the most important settings and parameters. In particular, there are two types of screen, that are changing constantly. The first one, as can be seen in Figure 2.2.2, indicates general parameters related to the MR3000C:

- LINE 1. Typology of the instrument, together with the battery voltage
- LINE 2. IP address of the instrument. When the 3G module is up and there is no LAN connection then the display shows the characteristics of the mobile signal.
- LINE 3. Values set for the trigger on the three axes. When trigger is 'disabled' or its mode is 'STA/LTA', this is clearly shown on the LCD display
- LINE 4. Number of events recorded on the SD card.

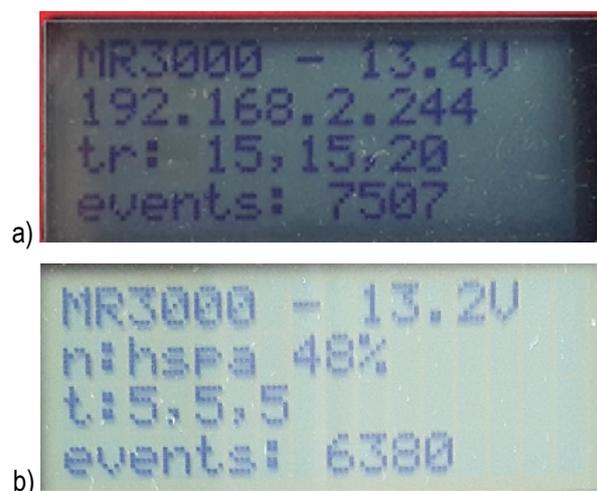


Figure 2.3.1. First screen of the MR3000C /TR with general information, in case of: a) LAN connection; b) GPRS active and LAN not active.

The second screen, as can be seen in Figure 2.3.2, shows the information related to the last event:

LINE 1. Day and time of the event

LINE 2. Vibration values on the three axes. "A" means amplitude (mm/s, in/s, mg, ...)

LINE 3. Dominant frequency calculated on the three axes. "F" means frequency (Hz)

The first screen last 10 seconds while the second screen lasts 15 seconds.



Figure 2.3.2. Second screen of the MR3000C/TR with event information.

2.4 Status LEDs

On the right side of the display, as shown in Figure 2.3.1, there are three status LEDs.

The green **RUN** LED is on if the MR is active and blinking while the unit is starting up.

The yellow **DATA** LED is on if the MR is recording and event.

The red **ERROR** LED indicates if any error or warning occurs on the MR3000. If it blinks slowly, then a warning has been detected, if it is permanently ON (red colour) then an error has been detected.

2.4.1 List of errors and warnings

In the following, a list of the warnings and errors is presented, corresponding to the activation of the Error LED.

SD card

- No SD card detected ERROR
- Capacity is less the 20% WARNING
- No more free space ERROR
- Lifetime is less than 20% WARNING
- Lifetime expired ERROR

Battery

- Battery is not powered WARNING
- Voltage Pleas refer to Section 4.3.15

SMS limit

- Limit is reached WARNING

Test pulse

- Test pulse did not succeeded WARNING

2.5 Opening the Lid

WARNING – Static Electricity

The MR3000 contains CMOS devices and when serviced, care must be taken to prevent damage due to static electricity. Disconnect DC supply power before opening the MR housing.

2.5.1 3G module

The MR3000C/TR may be optionally equipped with a 3G modem device – covering GPRS, EDGE and UMTS standard. This device is used to establish communication if the MR is out in the field.

To use the 3G module you have to insert a SIM card inside the MR.



Figure 2.5.1. Inserting a SIM card in the MR.

The procedure is quite simple:

- Ensure the MR is turned off.
- Unscrew and open the lid.
- Pull out the SIM card tray by pushing the button at the left side.
- Insert a SIM card in the tray, and put the tray back in its place.

2.5.2 SD card

The MR3000 contains an SD card slot. The SD Flashcard in this slot is used to store the recordings. The SD card used is a Swissbit industrial SD card. To remove the card, you have to push it down, it will then pop up.

NOTE: Ensure the MR is turned off before removing and re-inserting the SD Flashcard.

Inserting the SD Card in the card-reader of your PC allows you a fast access to all the data of the MR3000. If you have copied all the data, you can format the SD Card.

2.5.3 Internal backup-battery

The MR is equipped with a real-time clock with back-up lithium battery. Even if the MR is switched off, the clock continues working.

The lithium battery is located on the main board (at the lower right end). Replacement by the user is possible without any special tools.



Figure 2.5.2. Removing the SD Flashcard from the MR.



Figure 2.5.3. The internal lithium battery on the main board.

2.5.4 Relay board

NOTE: This subsection is related only to MR3000TR.

The MR3000TR is equipped with a relay board, as shown in Figure 2.5.4.

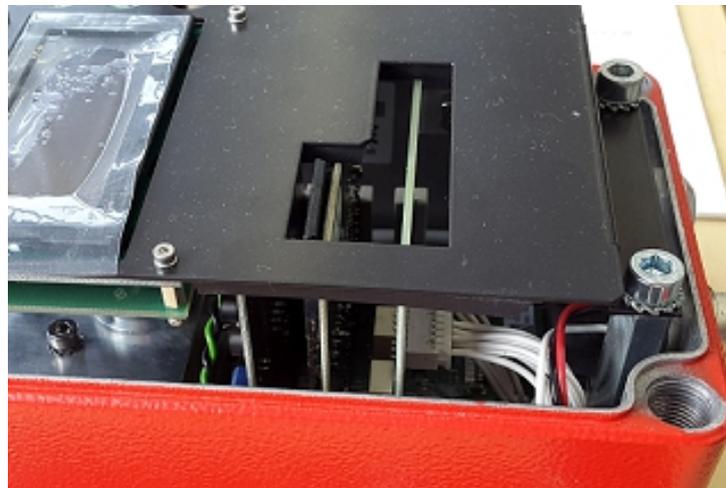


Figure 2.5.4 The relay board of the MR3000TR.

The relay board allows to have:

- two relay outputs, to connect external devices, typically for alarming (like sirens, gyrophares), with current 2 A and tension 30 VDC.
- one hardware trigger input, to trigger the instrument with an external device (see Table 2.2.1).

An alarm box is available in case a higher power is needed. Please visit <http://www.syscom.ch/products/mr3000tr/> our contact support@bartec-syscom.com to have further information on it.

2.5.5 Sensors

The MR3000C and the MR3000TR can be equipped with:

- an internal triaxial velocity sensor (as presented in Figure 2.5.5)
- an external triaxial velocity sensor
- three external uniaxial velocity sensors

Moreover, the MR3000C can also be equipped with

- an internal triaxial accelerometer,
- an external triaxial accelerometer

Concerning the orientation, the MR3000 and the external sensors can be ordered for horizontal mounting (typically on the ground) or for vertical mounting (on the walls).

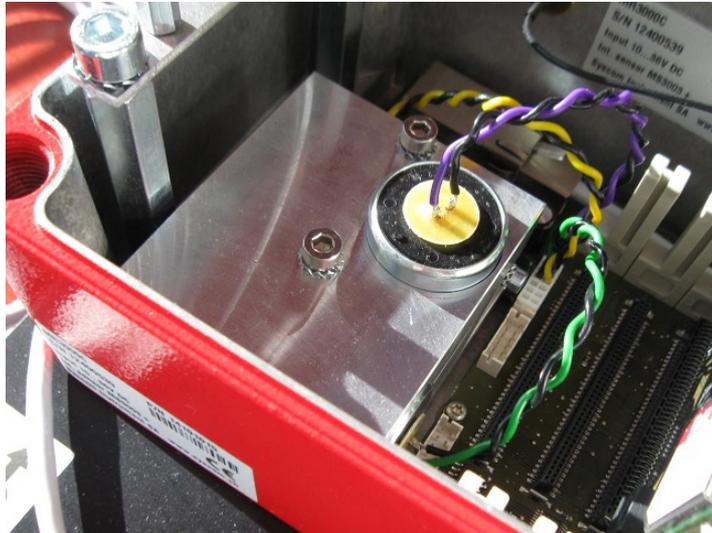


Figure 2.5.5 The internal triaxial velocity sensor is located at the rear end of the housing.

2.6 Battery pack (optional)

An external battery can be used together with the MR3000C/TR. It is a lead-acid gel cell 5 Ah with integrated battery charger: AC 90-264 V / 47-63 Hz.



Figure 2.6.1 The external battery pack with integrated charger.

3. SET-UP of the MR3000

Connect a power source to the MR3000 (Battery pack, AC/DC converter to the power socket or a PoE source to the LAN socket).

All 3 LEDs (green, yellow, red) are on and the 1st and 3rd line of the LCD become black during start-up of the MR3000. Then all the 3 LEDs go off. The green LED is blinking while the MR3000 updates the database of the files on the SD card.

Once the unit is started, only the green POWER LED remains on. Now you can establish communication with the MR3000 using any of the 3 methods described below.

3.1 Connecting to the MR3000 for the first time (direct connection)

To communicate with the MR3000 you do not need any special software: any Web browser will do the job. We assume that the MR3000 is in our workshop and we would like to set-up the parameters for later field use. There are 3 methods for direct connection:

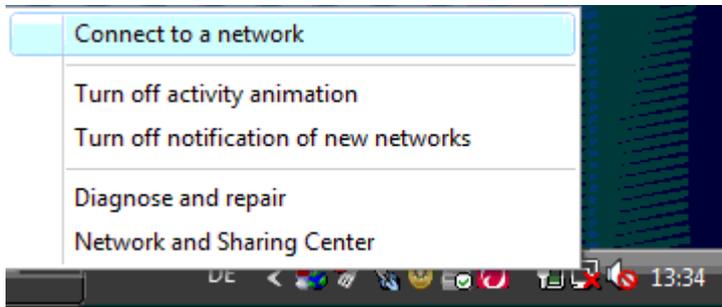
- **Wireless (Wi-Fi):** You can establish connection using your PC or your tablet. This method is intended to set-up the parameters or to look at some files if you are out in the field. You don't need a cable to talk to the MR3000. The disadvantage is that you can only talk to a single MR3000 at a time.
- **Wired connection (via router):** This method offers the most possibilities and needs no configuration at start-up, but you need a router. If the router has access to the Internet, you can do everything with your MR3000, including firmware upgrades. If you have a router with PoE (Power over Ethernet) feature the MR3000 is powered through the LAN cable. You can attach many MRs to the router and talk to all of them simultaneously. The disadvantage of this method is that you need an additional device that you probably won't carry out in the field...
- **Wired connection (direct):** As there is no router involved you will have to adjust the network settings of the PC. Obviously, you can talk only to one MR3000 at a time.

Depending on the method you choose, the IP address of the MR will be different. The following paragraphs describe these methods in detail.

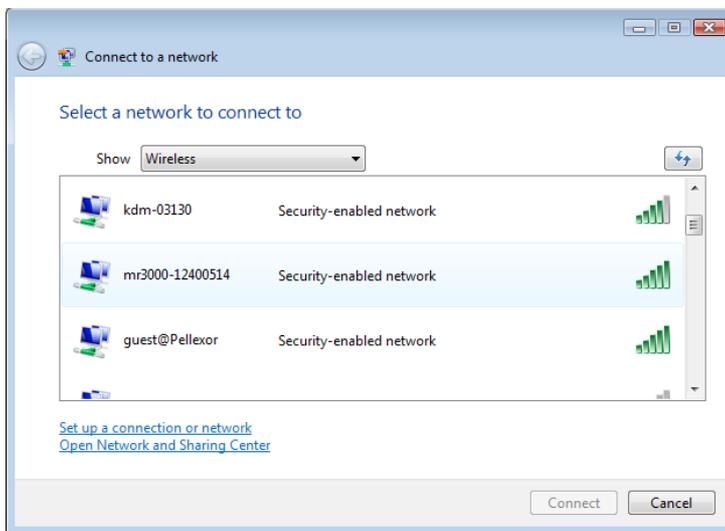
3.1.1 Wireless connection

The MR3000 acts as a Wi-Fi access point. The procedure to establish Wi-Fi connection to the MR is the same as connecting your PC or tablet to a Wi-Fi hot-spot. Scan the available Wi-Fi networks for a network named "MR3000", followed by a dash and the serial number. By default WPA2 encryption is enabled, the password is **swissmade**.

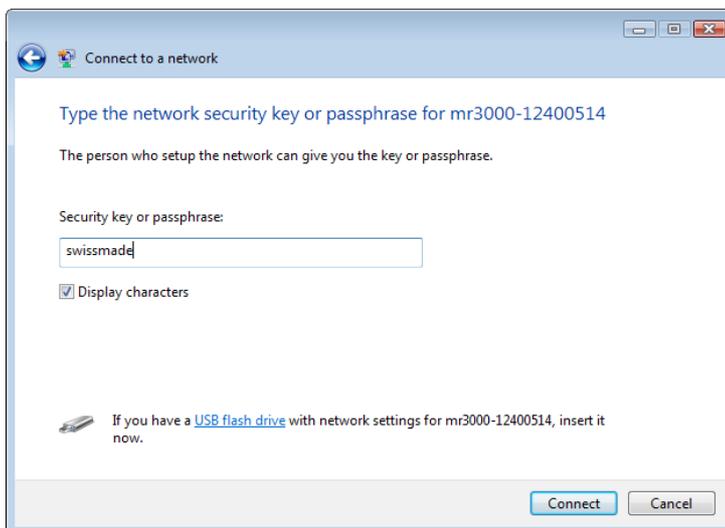
The following step by step instruction shows how to establish a Wi-Fi connection to the MR using a WINDOWS PC or a smartphone.



Click with the right mouse button on the network icon on the lower right edge of your screen and select Connect to a network – If you are already connected to another network you will have to disconnect from this network first.

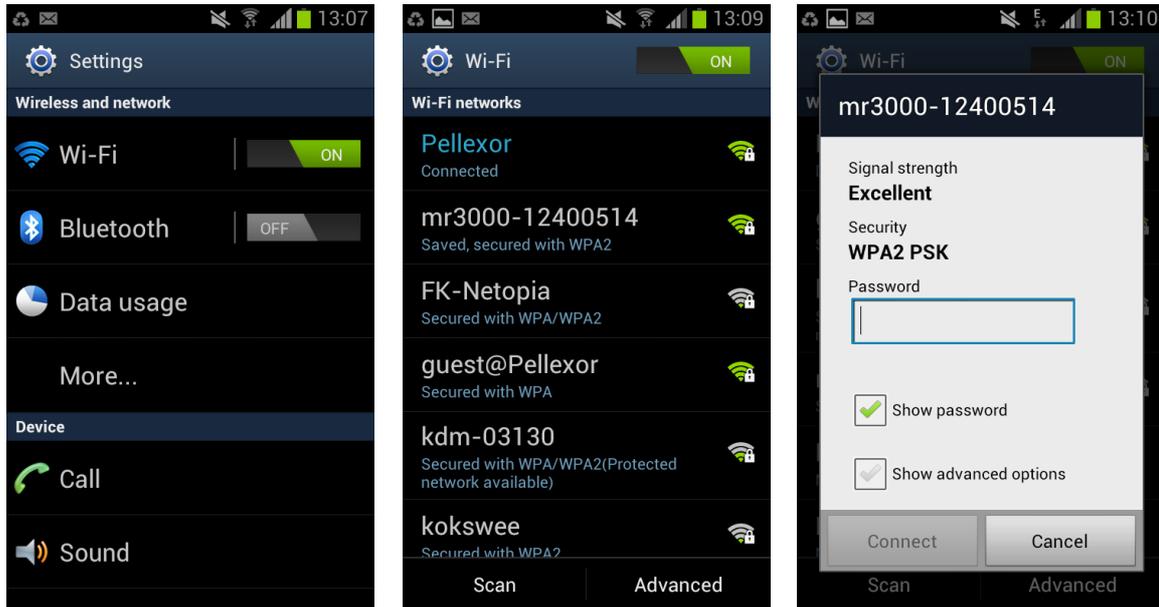


Select the MR3000 network and click connect and....



.. enter the passphrase and click connect.

Figure 3.1.1 Wi-fi settings for Windows.



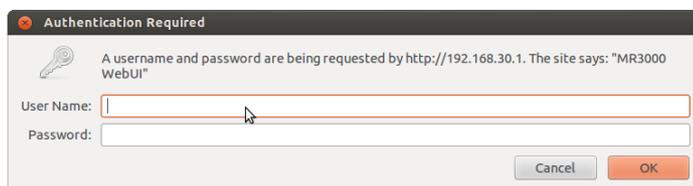
Tap on the Settings icon and in the settings screen on the Wi-Fi field. Make sure Wi-Fi is enabled.

Disconnect any existing Wi-Fi connection and tap on the SSID of the MR3000

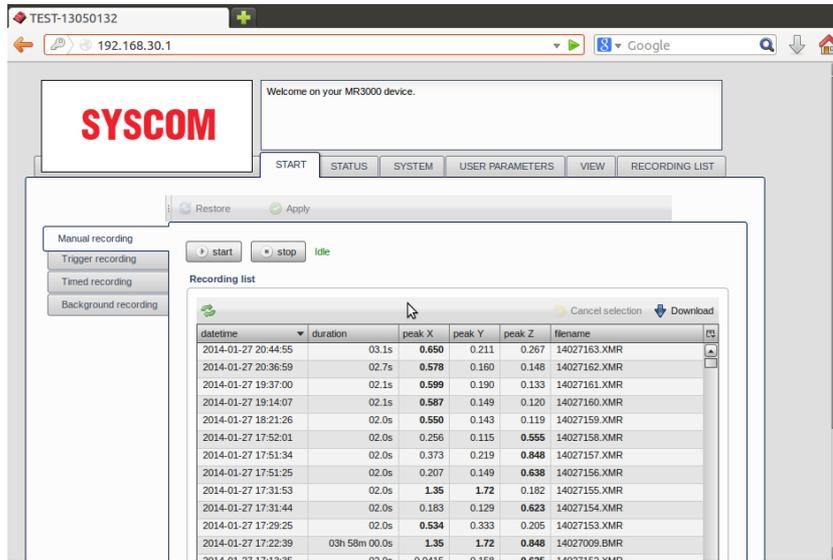
Enter the pass-phrase (enable 'show password') and tap on the connect field

Figure 3.1.2 Wi-fi settings for Smartphone.

Once you have established the Wi-Fi connection you start the Web browser to talk to the MR3000. Enter the IP address of the MR (always **192.168.30.1** for the Wi-Fi connection) in the Web-Browser. You will then be prompted for the user name (**user**) and the password (**serial number of your MR**, e.g. 13050130). After a successful authentication, the main page of the **Start** screen is shown.



First you have to enter user name and password.. if your credentials are ok...



..you will see the main page of the **Start** screen

Figure 3.1.3. Procedure to enter in the Web User Interface.

3.1.2 Wired connection via Router

Use the cable RJ45/LEMO provided with the MR (see Fig. 3.1.4, below). On the MR side, plug the LEMO connector into the “LAN” socket. On the other side, you connect the RJ45 receptacle to one of the LAN ports of your router. Your PC needs a connection to the same router (wired or Wi-Fi). Make sure to disable any other LAN connections on your PC.



Figure 3.1.4. RJ45 connector on top, LEMO connector below.

After connecting the MR to the router, the LCD of your MR3000 says *Sending DHCP requests...* After a few seconds the MR3000 shows the IP address on the LCD, e.g. *NET 192.168.1.27*. This IP address has been assigned by the router.

The DHCP feature of the router makes sure your PC has acquired an IP address in the same subnet and communication between MR3000 and PC is possible. Now, you can simply enter the IP address displayed on the LCD of the MR3000 in your Web browser.

We recommend you to purchase and install a router in your workshop for the exclusive work with your MR3000.

Generally your workshop router should have the following features:

- 4 or more LAN ports
- 1 WAN port to have Internet access (optional, but recommended e.g. for firmware upgrades)
- DHCP (DHCP = Dynamic Host Configuration Protocol – i.e. the router assigns the IP addresses) feature
- Wi-Fi access point (optional, but convenient, as you don't need a wired connection to your PC)
- PoE capabilities (optional – if the router has PoE, the MR3000 is powered over the LAN connection and you don't have to hook-up an additional cable for supply power).

3.1.3 Wired connection without router

If you connect the MR directly to your computer, you must then configure the IP address of your computer. The default IP address of the MR is 192.168.1.2, and is displayed on the LCD. Therefore you must assign a static IP address to your computer, on the same sub-network as the MR. For example, 192.168.1.3.

Zeroconfig address assignment using APIPA (Automatic Private IP Address Assignment) is not supported.

3.2 Connecting to the MR3000 in the field (remote connection)

For a remote connection (for example from your office to the MR at site) you need Internet access and you have to use of the following possibilities:

- connect to the SCS (Syscom Cloud software)
- enable the OpenVPN or DDNS service.

For the Internet access you have to use the packet data service of a GSM or UMTS network (GPRS/EDGE or HSPA) to access the Internet. (see chapter 4.3.5).

SCS cloud software

The SCS (Syscom Cloud Software) allows to change the most important parameters of the MR without requiring any additional services like OpenVPN or DDNS. The procedure is the following:

1. Log in the SCS at scs.bartec-syscom.com
2. Create a project
3. Link the MR3000 in one project
4. Click on the recorder name to access its setting

More details can be found at scs.bartec-syscom.com or at the dedicated [webpage](#) on the Bartec Syscom website.

OpenVPN and DDNS Service

Concerning OpenVPN and DDNS, as the MR is not accessible through the real IP address in both cases, you will have to enable one of the two services to communicate with your MR through the WebUI. To establish communication with the MR3000 you have to enter the Domain Name (DDNS) or the virtual address (OpenVPN) in the Web browser. For OpenVPN you have to install the OpenVPN client on your PC (or smartphone) with the appropriate certificates, as well. To communicate with the MR, you have to start the VPN service on the PC. For installation of the VPN client on your PC, please refer to Appendix A or contact support@bartec-syscom.com.

4. The Web User Interface (WebUI)

Once the connection with the MR is established, and the IP address of the MR is known, opening the Web user interface (WebUI) is quite easy. Just launch your favorite Web browser, and enter the IP address of the MR in the address bar. Depending on your Web browser, you may have to enter the letters “http://” before the IP address.

You are prompted for the Login / password. By default the Login is **user** and the password is the **serialnumber** of the MR – as shown on the housing.

The interface is divided in 7 main tabs:

- **Start** allows you to configure all parameters related to recording and allows you to easily retrieve the most recently recorded files.
- **Status** displays status information.
- **System** allows you to configure the interfaces and some services related to it.
- **User Parameters** contains the parameters related to alarms and alerting and other general parameters not related to recording. Relays can be configured in this tab as well.
- **View** allows a real-time graphical display of the waveform data or the vibration level (background recording)
- **Master** allows you to set-up a network of MR3000C/MR3000TR to perform common trigger and common alarm. This feature is only available if the Master/Slave option is activated on this recorder, which is called the master.
- **Recording List** shows the content of the memory card with all the recorded events. Here you may select files for immediate download.

After you modified some settings on a page, you can:

- Click **Apply** to validate your changes. It means that the content of the page is sent to the MR, which will restart all services accordingly.
- Click **Restore** if you want to discard your changes.

NOTE: If you don't click **Apply** and leave the tab, your changes are lost.

4.1 Start

In this part you will find all the settings related to data acquisition and recording. When we speak about “signal” in this chapter, it actually means “the signal coming from the sensor”.

4.1.1 Manual recording

You can start recording an event by clicking on the **start** button, and stop the recording with **stop**. When the MR is recording, the yellow LED turns on. The current recording status and the recording duration are shown.

In the table **Recording list** below all recordings currently stored on the SD card are shown. New files show up after clicking on the refresh icon. Double-clicking on a file starts the download of the file and the waveform is shown using the PC software EAWLight (only available for WINDOWS PCs). You may select one or many files for download and further analysis on the PC.

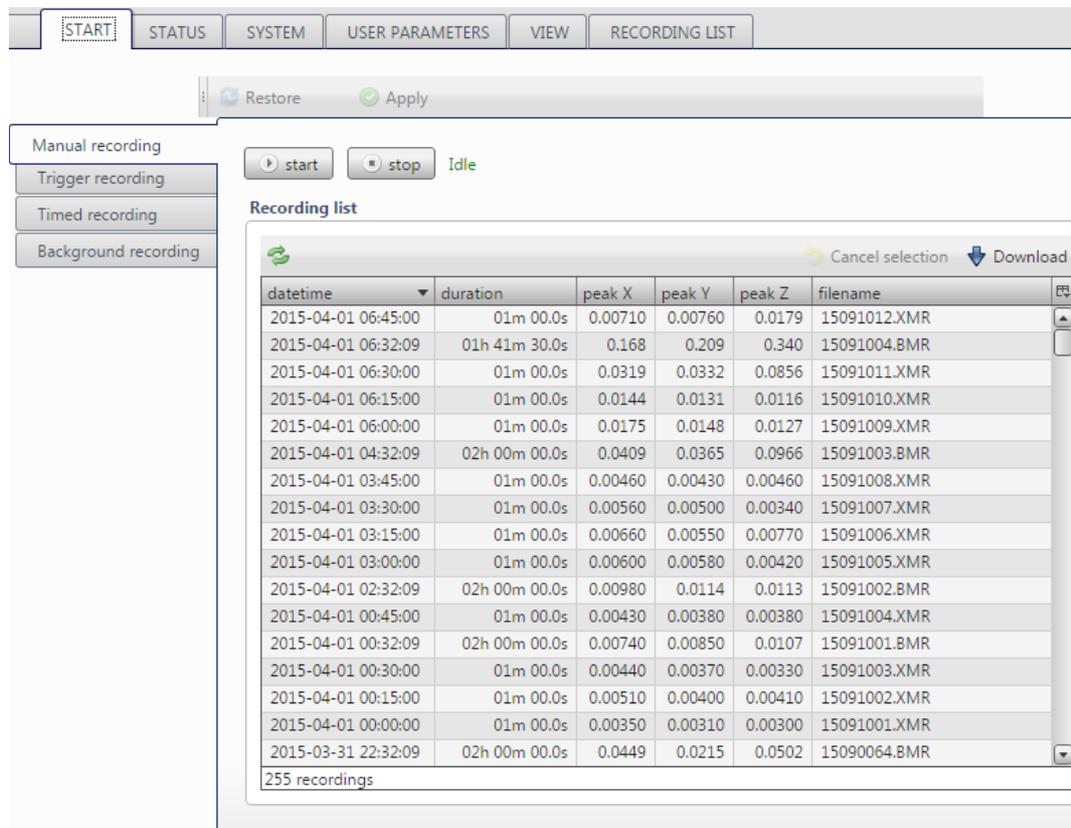


Figure 4.1.1. Manual recording interface.

4.1.2 Trigger recording

The trigger is a feature that allows the MR to start recording if the signal reaches the threshold level. In this case the MR3000 is “triggered”. When the signal comes back below the threshold level, the trigger is “idle” – see section **Activity** on the **Status** screen.

Velocity sensor

Let's discuss about the standard case of velocity sensor (internal or external).

You can disable the threshold trigger if you just want to do some manual or timed recording. For a normal construction site or blasting monitoring the trigger must be **Enabled**.

In the **Time** section you can set-up the duration of the recording

- With the **Pre-event** time, you set-up how long you want to record before the MR is triggered. You can record up to 30 seconds backward.
- With the **Post-event**, you set-up how long you want to continue recording after the trigger has become idle. If the MR is triggered again during the post-event time, the post-event countdown will restart from the beginning and the MR keeps on recording in the same file. The maximum value for the post-event is 100 s.
- The **Maximum length** setting allows you to choose the maximum length of an event file. If this limit is reached, the MR closes the file. If the MR is still triggered it will start recording a new file. The maximum value is 1800 s.

NOTE: The maximum length is a fundamental setting for alerting service – see chapter 4.4.3.

NOTE: The sum between pre-event and the post-event duration should not exceed the max event length, in order to have only one file created. Otherwise, the event will be divided in more than one file.

Each channel (X, Y horizontal and Z vertical) has its own trigger threshold level that is set-up in the section **Level**. If the vibration exceeds the threshold level on a specific channel, the trigger condition becomes true for this channel.

In the section **Combination** you choose which channels are needed to fulfill the general trigger condition and subsequently lead the instrument to start recording. You may consider only 1 axis (=channel, e.g. Z vertical), or more. If you consider more than one **Axes**, you can decide if the MR is triggered when all the axes are above the level, or just one of them. You choose it with the **AND/OR Logic**. A common setting is to consider all 3 axes, and trigger when any of them has reached the trigger level (“**OR**”).

The trigger level may be automatically adjusted to the actual level of vibration if you activate the **Trigger increment** option. After each event or when the **Maximum length** of the recording is reached (see above), the trigger level is increased by the amount given as **Increment step**. It is decreased by the same amount after the period specified in **Decrement Time** has elapsed and no further event has been recorded.

Figure 4.1.2. Trigger recording interface, in case of velocity sensor.

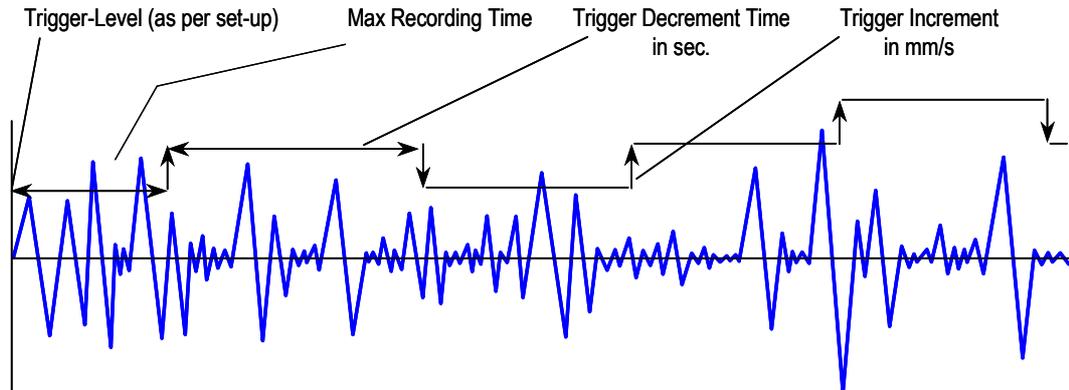


Figure 4.1.3. Trigger increment.

Acceleration sensor

In case of acceleration sensor, there is an additional selection: the trigger mode. The choice is between **Level** and the **STA/LTA**.

In both cases, before applying the trigger mode, a **band-pass trigger filter** between 0.5 and 15 Hz is applied on the signal. This means that an event is created only if both the conditions are fulfilled:

- the trigger condition is exceeded;
- the peak is associated to a frequency in the range 0.5 – 15 Hz.

In case of **Level**, the acceleration threshold for the trigger activation can be chosen on each of the three axes.

NOTE: Due to the presence of the trigger filter, values exceeding the trigger threshold do not necessarily lead to an event creation.

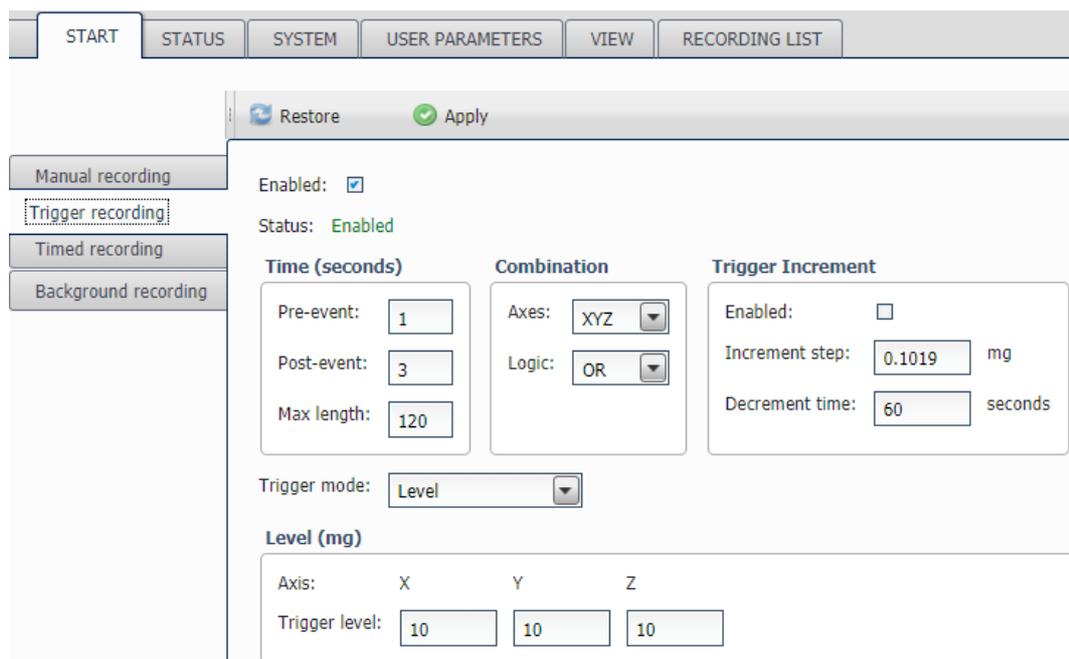


Figure 4.1.4. Trigger recording interface, in case of acceleration sensor.

STA/LTA is a trigger algorithm usually used in the field of weak-motion seismology. The STA/LTA continuously calculates the average values of the absolute amplitude of a seismic signal in two consecutive moving-time windows. The short time window (STA) is sensitive to seismic events while the long time window (LTA) provides information about the temporal amplitude of seismic noise at the site. When the ratio of both exceeds a predefined value, the trigger is activated and an event is recorded.

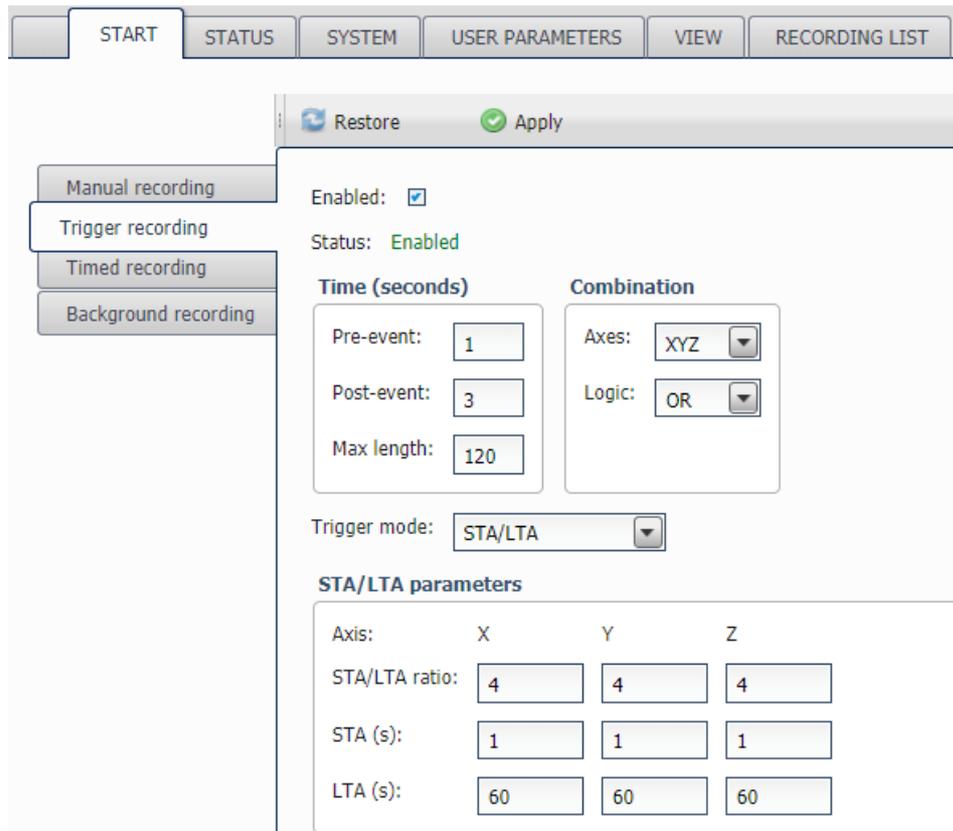


Figure 4.1.5. Trigger recording interface, in case of selection of STA/LTA as trigger mode.

4.1.3 Hardware recording

This section is dedicated only to MR3000TR.

In case of MR3000TR, an additional section is present regarding the settings for the hardware trigger, since the instrument can be triggered via hardware, by using an external input.

The input must be a digital hardware trigger. The user should short the signal Trigger and GND to start a trigger (consider the datasheet of the MR3000TR and the application note on the Alarm box at the following web page <http://www.syscom.ch/products/mr3000tr/> as reference). It is important not to apply any input voltage on the trigger signal, in order not to damage it.

In this section, the user can set the pre-trigger, the post-trigger and the maximum duration, analogously to the section 4.1.2.

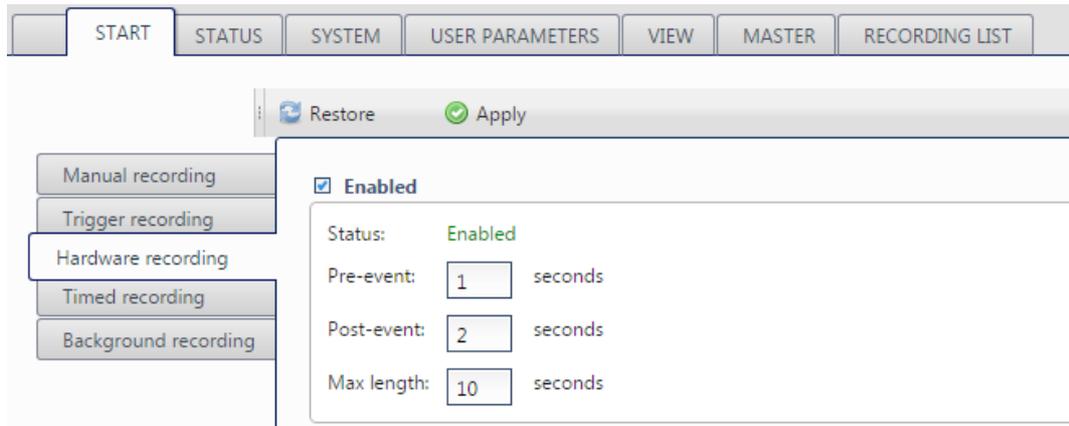


Figure 4.1.6. Hardware recording interface.

4.1.4 Timed recording

In the section timed recording you can set-up a timetable to record files automatically (in addition or independent of the trigger). You set-up a **Starting time**, e.g. every Monday at 10 am (select **Weekly > Monday > once a week > 10 > 00**) or now (select **Hourly > Every hour > minutes: 1** minute from now). The expert mode provides you with the features of CRON (as it is known on LINUX systems) to set-up the start time.

At the **Starting time**, the MR starts recording according to the settings in the **Parameters** section. Every **Period between recordings** starts with a recording of **Recording duration**. The rest of the period, the MR is idle. **Number of recordings** tells the MR how often this procedure will be repeated.

NOTE: Timed recording continues until you disable it or the unite is switched off.

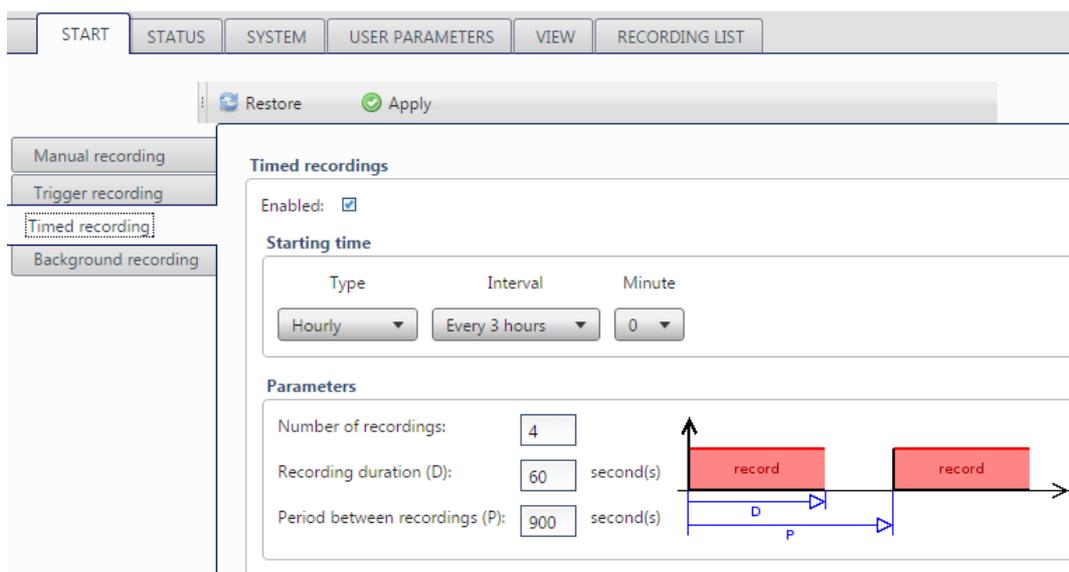


Figure 4.1.7. Timed recording interface.

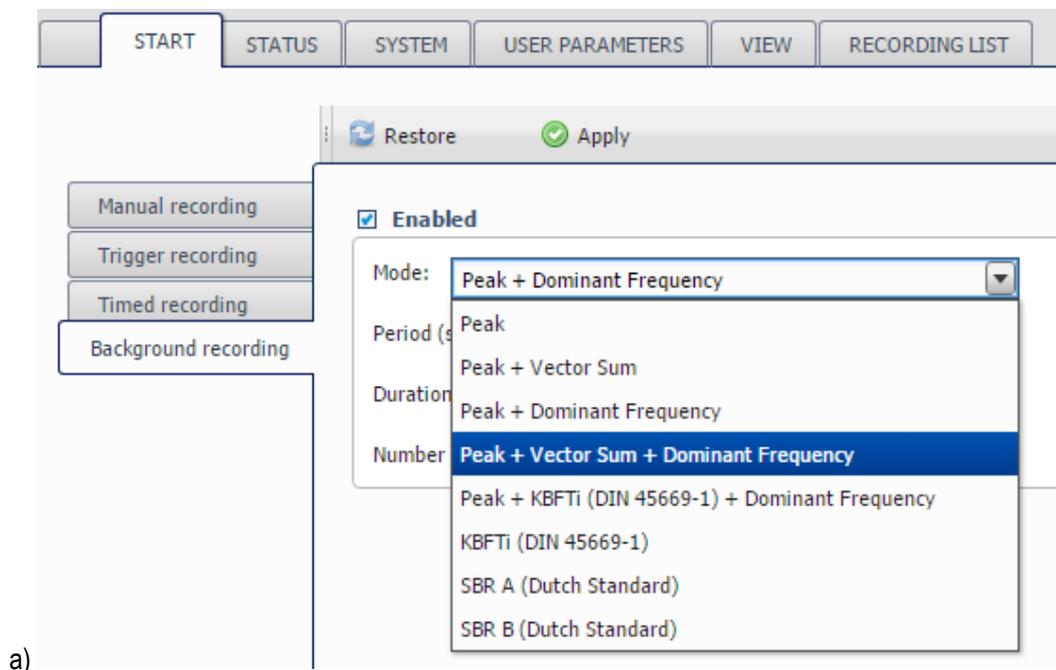
4.1.5 Background recording

In background recording mode the MR records the peak values within a given time window. Please note that the background recording is not affected by the trigger recording – both services may run simultaneously.

In the field **Mode** you choose what kind of peaks should be recorded:

- **Peak** is the maximum value of the signal during each period (as defined below).
- **Peak + Vector Sum** includes the maximum of the vector sum of the 3 channels
- **Peak + Dominant Frequency** includes the dominant frequency for each period
- **Peak + Vector Sum + Dominant Frequency** allows to simultaneously save the peaks of signal, vector sum and dominant frequency.
- **Peak + KBFTi + Dominant Frequency** allows to simultaneously save the peaks of signal, KBFTi and dominant frequency, where KBFTi represents the maximum of the moving average of the weighted vibration severity for each period (by default 30 seconds) according to DIN 45669-1 and DIN 4150 part 2
- **KBFTi** according to DIN 45669-1 and DIN 4150 part 2.
- **SBR A** according to the Dutch standard
- **SBR B** according to the Dutch standard

You have to set-up the **Period** and the total **Duration** of a file. For verification purposes, the MR shows the number of periods in one file of the given duration as **Number of samples in file**.



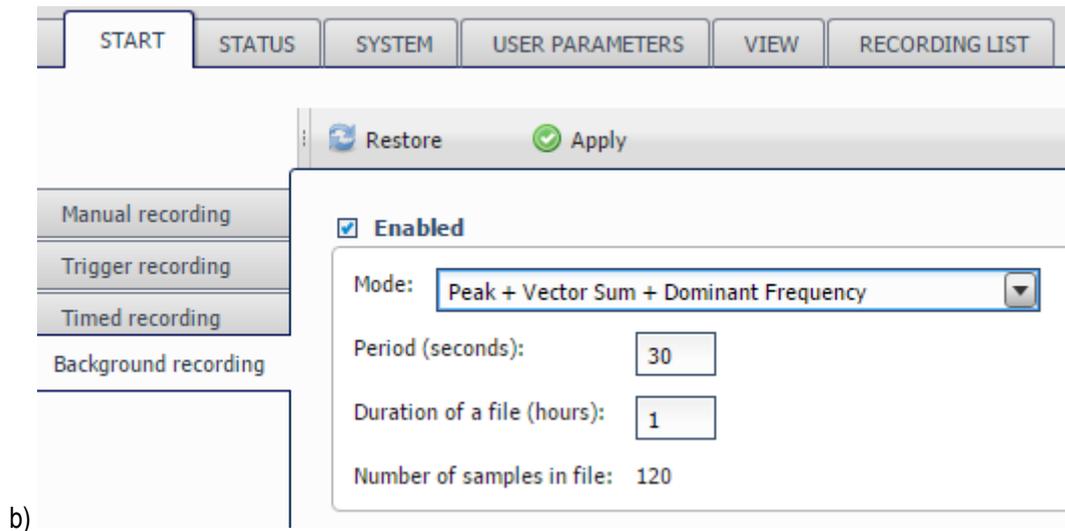


Figure 4.1.8. Background recording interface.

NOTE: The modes **Peak + Vector Sum + Dominant Frequency** and **Peak + KBFTi + Dominant Frequency** can be recorded only with ASCII format. Please refer to section 4.4.8 for more details.

NOTE: In case of acceleration sensor, only the following modes are available:

- Peak
- Peak + Vector Sum
- Peak + Dominant Frequency
- Peak + Vector Sum + Dominant Frequency.

4.2 Status

This page displays information about the MR. The page is updated automatically.

- **ID** contains:
 - *Name* of the MR3000 (by default this is MR3000, followed by a dash and its serial number). You may change the name, according to your needs (see Section 4.4.1).
 - *Comment*: a description of the location where you have installed the MR. This text is shown together with the name in the messages (see Section 4.4.1).
 - *UID* unit ID (serial number) – can not be changed
 - firmware version.
- **Sensor** tells you for which sensor the MR is configured.
- **Activity** reports the current activity of the data acquisition services:
 - *Trigger* shows 3 different states:

- Enabled: the trigger recording is activated but the MR is not recording an event
- Recording: the MR is currently recording an event
- Triggering: one of the trigger conditions is fulfilled and the MR is recording until the post-event time is elapsed.
- *Background*: this shows if the MR is currently recording a peak file (file name) or not (idle).
- *FTP backup*: shows 4 different states:
 - in progress: currently a file is sent to the FTP server.
 - errors: errors occurred when communicating to the FTP server.
 - idle: service is active, but there is no new file to be copied.
 - disabled: service is not active.
- *FTP push*: shows 4 different states:
 - Pushing N files: after starting the service the number of files to be sent is shown.
 - N files pending: N files are waiting to be sent in case of trouble or many files have been recorded recently and have not been transferred yet, eg. due to slow communication.
 - idle: service is active, but no scheduled push is currently going on.
 - disabled: service is not active.
- *Timed recordings*: shows 3 different status:
 - active: the MR is either recording (see trigger status above) or in the period between two scheduled recordings.
 - idle: service is active, but start time has not been reached yet.
 - disabled: service is not active.
- **LAN** displays the **IP** address of the MR on the Ethernet port, and the **MAC** address of the interface.
- **Wi-Fi** shows the Wi-Fi status, the **IP** and **MAC** address of the interface.
- **Mobile** shows:
 - *Status* of the GSM (to send SMS) and GPRS (to communicate with the MR) connection. Moreover, in case the connection is enabled:
 - *Signal strength* and the **Network** (name of GSM operator) is shown.
 - *PPP status* and *PPP address* are shown if a GPRS connection is active.
- **Dynamic DNS** shows 5 different states:
 - *up*: service is active
 - *starting*: service is starting up
 - *error_server*: communication problem with the server
 - *updated*: the service has updated the DNS address. In this case an additional field with the WAN address that is related to the DNS entry is shown

- *down*: service is not active.
- **OpenVPN** shows the **Status** and the **IP** address of the Virtual Private Network.
- **Clock** displays the current date and time on the MR. **Last update** shows when the clock has been synchronized the last time.
- **SD Card** shows the total size and the free size on the SD Card, together with the lifetime, calculated on the remaining erase cycles (this functionality is available only with the Swissbit SD cards). It also shows the number of events on the MR.
- **Indicators** shows the current temperature inside the MR, the input voltage and the uptime (time since the last boot of the system).

If any error is present in the system, it is highlighted in red. If a warning is present, it will be highlighted in yellow.

The screenshot displays the 'STATUS' interface for an MR3000 device. The interface is organized into several sections:

- ID**: Name: mr3000-test-R.D., Comment: , UID: 15090001, Firmware: MR3000-MAIN 1.7.0
- Sensor**: Model: MS2003+ 100mm/s, Type: velocity
- Activity**: Trigger: Enabled, Background: Recording (16187009.BMR), FTP backup: Disabled, FTP push: Disabled, Timed recordings: Disabled, Hardware recordings: Disabled
- LAN**: IP: 192.168.2.246, Mac: 00:50:c2:f0:09:56
- Wi-Fi**: Status: up, IP: 192.168.30.1, Mac: 00:50:c2:f0:09:58
- Mobile**: Status: online, Signal: 35 %, Network: Swisscom, PPP status: up, PPP addr: 10.77.211.3
- Dynamic DNS (DDNS)**: Status: down
- OpenVPN**: Status: down
- Clock**: Date: 05/07/2016, Time: 15:50:05, Last update: 05/07/2016 15:42:26
- SD-Card**: Size: 3784 MB, Available: 3172 MB (84%), Lifetime: 81%, Events: 6380
- Indicators**: Temperature: 39 °C, Voltage: 13.3 V, Uptime: 10 days, 23:15

Figure 4.2.1. Status interface.

4.3 System

In this part, you find all the settings of the different hardware interfaces and software services of the MR3000.

4.3.1 SD Card

This subsection shows the capacity of the memory card and the amount of memory available. Moreover, an indication of the remaining lifetime is displayed. This functionality is available only with the SWISSBIT SD cards.

You can format the memory SD card with the relative button: this erases ALL the data memorized on the card. A dialog box pops up and asks for confirmation.

Wait until the formatting is done – takes approx. 10 seconds.

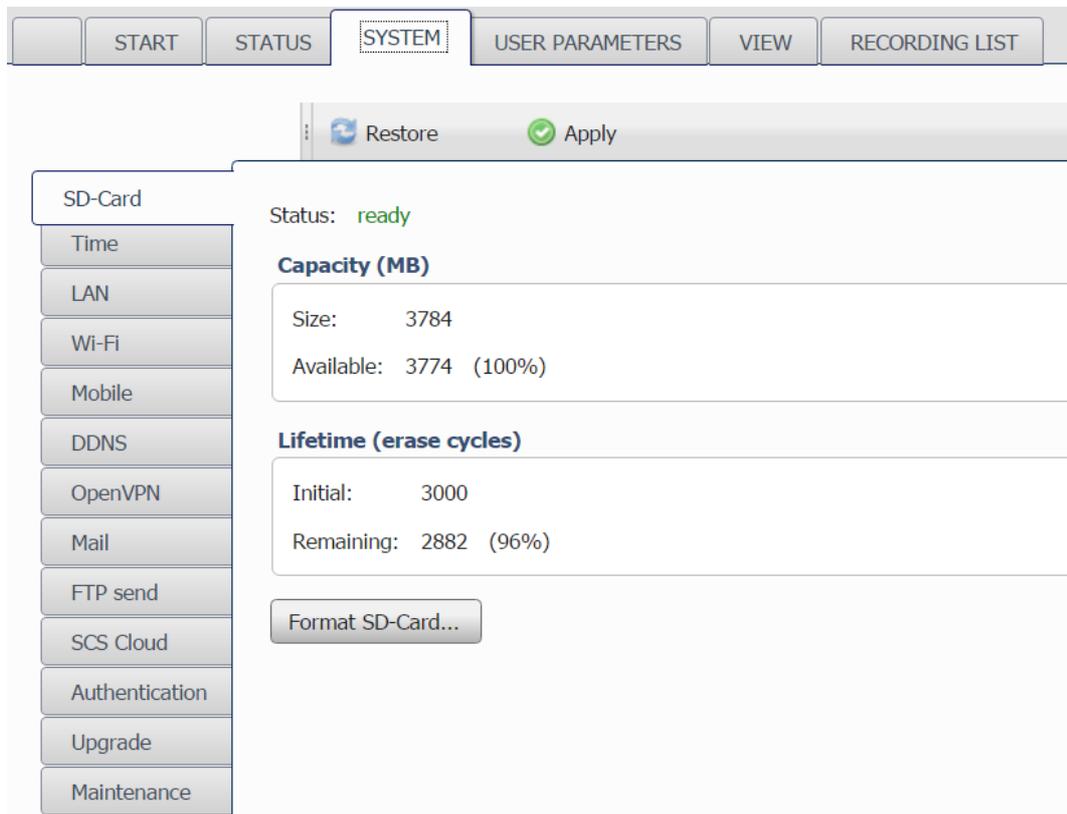


Figure 4.3.1. Subsection dedicated to SD card.

4.3.2 Time

In this tab you configure the timing services of the MR.

In the **Status** section, the following information are shown:

- Local time
- UTC time

- Last clock update

In the **Timezone** section you can choose whether you prefer the MR to work with UTC time or local time.

In the **Time synchronization** section you activate the synchronization with an external source.

- **Disabled** means that you don't need *continuous* synchronization. The internal clock keeps the time even when the unit is powered off. However, electronics component involved in timekeeping always have a drift, depending on unpredictable factors like temperature. As a consequence, the MR will slowly drift away from the right time.

You may adjust the clock at once with an NTP server using the Internet connection. In the pop-up windows you have to set-up appropriate NTP servers.

Alternatively you can set the time manually, which is not very handy and accurate, but works in every situation (i.e. without connection to the Internet).

- **Network (NTP)** means that the clock will *continuously* be synchronized using the Internet connection. You can specify 1 up to 4 NTP servers. The more servers are used, the better precision you'll get.

It takes a variable time period – depending on the difference of the internal clock and the accurate time – to synchronize the clock once a valid NTP server is set-up and Internet connectivity is available. If the synchronization was successful, the time of the synchronization is shown as **Last clock update** in the **Status** section.

The accuracy of the synchronization depends on the quality of the Internet connection, and also of the servers you choose. The closer you are to the servers, the better precision you get. The typical accuracy on the Internet ranges from about 5ms to 100ms, possibly varying with network delays.

The 4 default servers (*0.pool.ntp.org*, *1.pool.ntp.org* and so on) are in fact 4 servers randomly picked up around the world. It always works, but if you want a better accuracy, you should put in these fields servers from your country. For example, if the MR is in Switzerland, you should set the 4 servers to *0.ch.pool.ntp.org*, *1.ch.pool.ntp.org* and so on. It will pick up 4 servers randomly in Switzerland.

You can find more information about the NTP servers available in your country on the Web site pool.ntp.org.

- If you ordered the **GPS** option with your MR, you need to select that. Then the MR will keep its time synchronized with the GPS time, the accuracy being around 1ms.

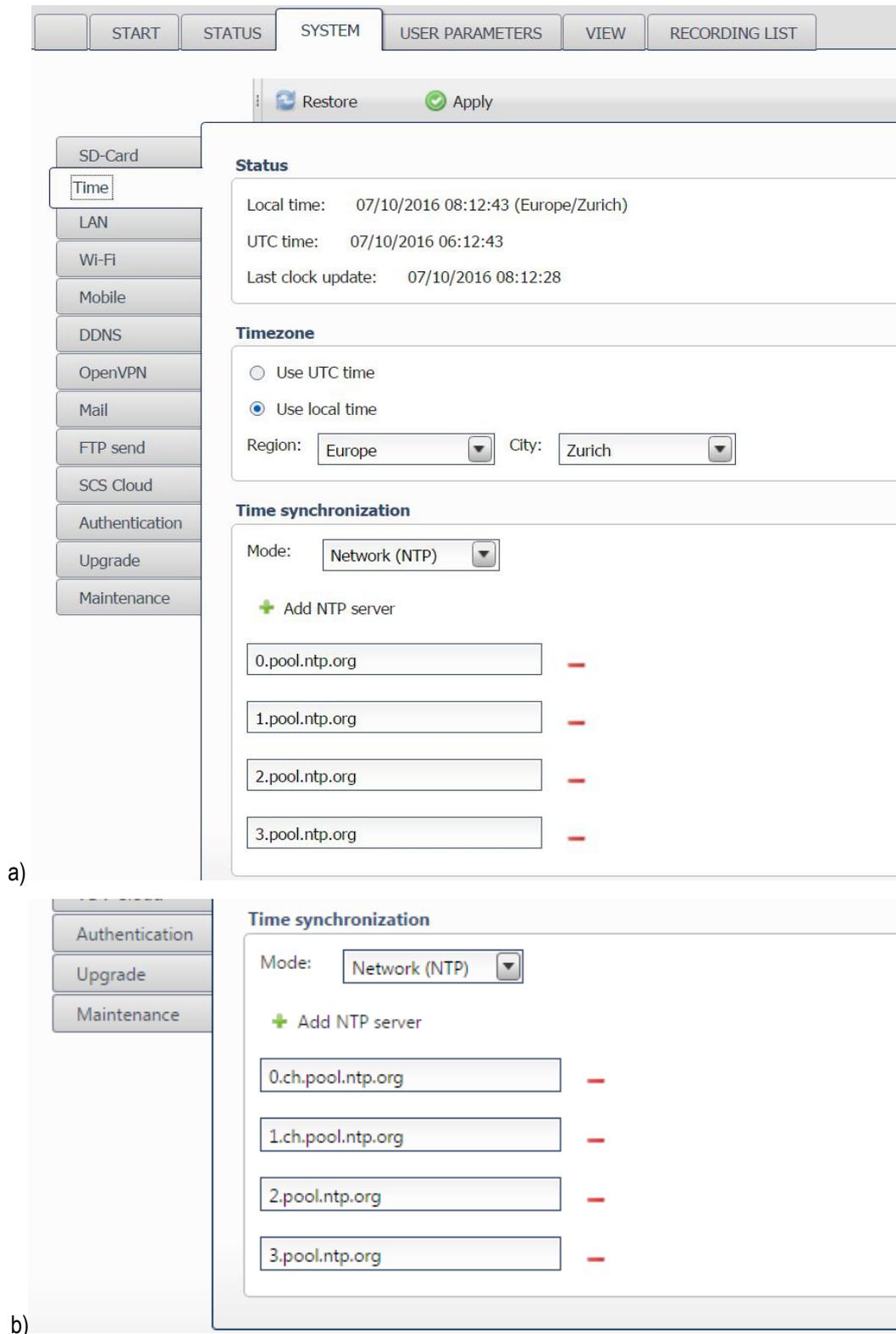


Figure 4.3.2. Subsection dedicated to the time synchronization in case of mode “Disabled” and mode “Network (NTP)”.

4.3.3 LAN

In this tab are the settings for the Ethernet port (interface for wired connection) are shown.

Mode is as follows:

- **DHCP** means that the MR will try to get an IP address by sending DHCP requests. Select this option if you connect the MR to a network with a DHCP server. For example, your company network, or any network with a router. All settings for the LAN connection are made by the DHCP server and no further configuration is needed.

If this network provides Internet access, the MR will be connected to Internet. You can check that with the ping button (see chapter 4.3.12).

If the MR fails to receive a reply of the DHCP request, the settings for the **Static configuration** are used if the case **Fallback to static IP if DHCP fails** is checked.

- **Static** means that the MR will use the static IP address provided below. You should select this option if:
 - you plug the MR directly to your computer. You also need to configure your computer accordingly, i.e. assign a different IP address from the same range and the same netmask.
 - you plug the MR to a network without DHCP server.

The screenshot shows a web-based configuration interface for LAN settings. At the top, there are navigation tabs: START, STATUS, SYSTEM (selected), USER PARAMETERS, VIEW, and RECORDING LIST. Below the tabs is a sidebar menu with options: SD-Card, Time, LAN (selected), Wi-Fi, Mobile, DDNS, OpenVPN, Mail, FTP send, SCS Cloud, Authentication, Upgrade, and Maintenance. The main content area is titled 'LAN' and contains a 'Mode' section with radio buttons for 'DHCP' (selected) and 'Static'. A checkbox 'Fallback to static IP address if DHCP fails' is checked. Below this is a 'Static configuration' section with input fields for IP address (192.168.1.2), Netmask (255.255.255.0), Gateway (empty), and Nameserver (8.8.8.8). At the top of the configuration area, there are 'Restore' and 'Apply' buttons.

Figure 4.3.3. Subsection dedicated to the LAN communication.

In static mode, you must configure all the parameters manually - to do so you will probably need the assistance of your IT support.

If you plugged the MR directly to your computer, only the **IP address** is relevant. If you plugged it to a network, you must fill all the parameters if you want the MR to be able to reach Internet.

The most important setting is the **IP address** that you want to give to the MR. It should be a private address within one of the following ranges:

- 192.168.0.0 to 192.168.255.255
- 172.16.0.0 to 172.31.255.255
- 10.0.0.0 to 10.255.255.255

The **Netmask** is 255.255.255.0 by default, and should remain like this except if you know exactly what you're doing.

The **Gateway** address must be filled if you connect the MR on a network. This is the IP address of the router.

Same thing for the **Nameserver**. The default is 8.8.8.8 and should work fine.

NOTE: After you changed the IP address of the MR and clicked Apply, you're not connected to the MR anymore. You need to enter this new IP address in the address bar of your Web browser in order to reconnect to the WebUI. Check the LCD of the MR to know the IP address of the MR.

4.3.4 Wi-Fi

You can enable the Wi-Fi service and the Wi-Fi hardware by checking the **Enabled** checkbox.

When enabled, the MR behaves as a Wi-Fi access point. This means it broadcasts a network name (**SSID**), and you can connect to it with your Laptop or Smartphone. The MR uses a static IP address (**192.168.30.1**), and will give a dynamic IP address to your Laptop/Smartphone when the connection is established – it acts as a DHCP server.

You can configure the **SSID** (Service Set Identifier, it's the network name broadcasted by the MR). If none is provided, the default SSID is "MR3000-12345678" (where 12345678 is the serial number of the MR).

You can also configure the **Channel**, between 1 and 11. You can check which channels are used by the different access points nearby, and choose the less used to have better performance.

We recommend enabling **Encryption**. Do not use an open connection, as anybody could connect to the MR3000 and tamper with the instrument. The WPA2 is the latest version of the encryption protocol and the recommended choice. Use the WPA mode only if your computer doesn't support the WPA2.

Encryption (WPA2 or WPA) requires a **Password**. The default password is **swissmade**. We recommend to change this password.

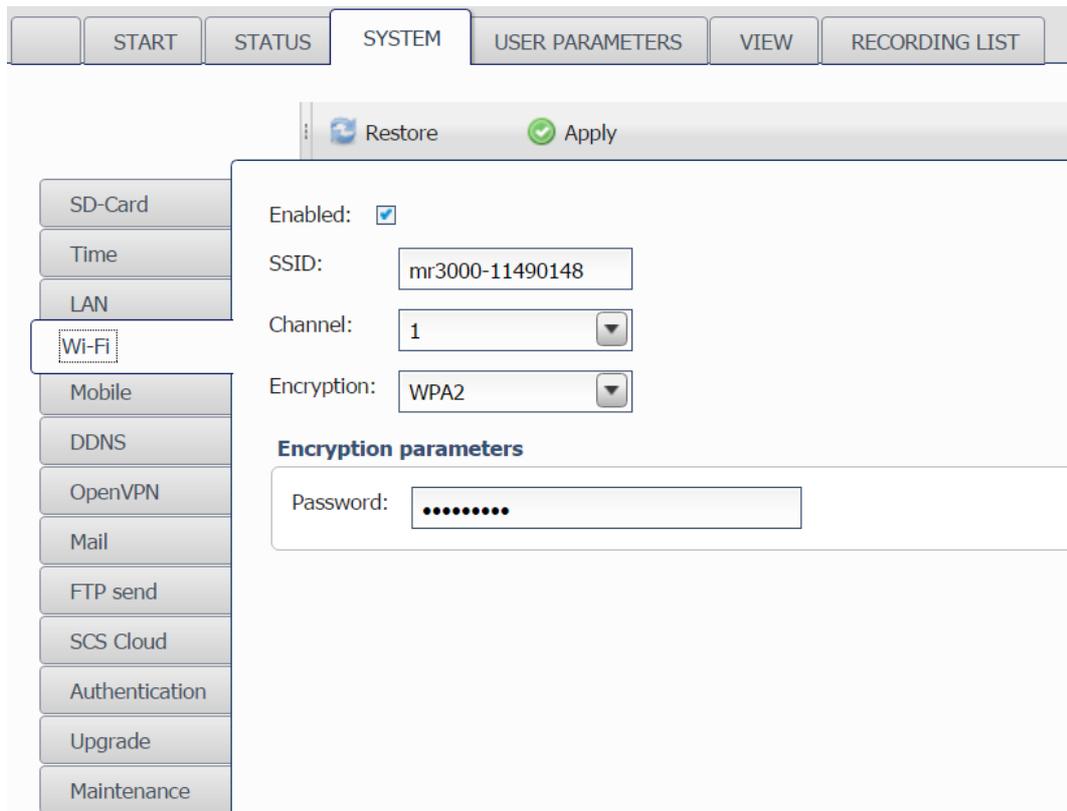


Figure 4.3.4. Subsection dedicated to the Wi-Fi communication.

4.3.5 Mobile

Use the **Enabled** checkbox to enable or disable the mobile communication interface. Be sure to insert a SIM card in the MR before trying to bring the mobile communication to work (see chapter 2.5.1). After you checked this field, don't forget to click on the "Apply" button. The mobile chipset takes between 30 seconds and 1 minute to start.

The **Status** shows if the 3G module is either down (offline), connecting or online.

In the **Activation** section, you can choose when the 3G module is active. Actually, it could be switched on only when desired, in order to reduce the consumption. The mode can be either "Always activated" (the module is always ON) or "Time Scheduling". In the second case, you can choose at which time it automatically switches on and off.

If some files have been recorded during the rest period of the 3G module, they will be sent when it is switched on (see also chapter 4.4.4) to (based on what has been configured):

- pre-configured e-mail address
- SCS cloud software
- FTP

In the **Network** section, appearing only if a SIM card has been recognized, there is information about:

1. the status of the SIM card, which is normally on "registered";
2. the name of the provider of the SIM card;

3. the technology used for the connection (HSPA or UMTS);
4. the signal strength

If the SIM card is protected by a **PIN code**, you must enter it in the field. Otherwise, just leave it blank.

The mobile communication interface offers two types of service, which are completely different and independent: the SMS and the data traffic.

The **SMS** (Short Message Service) is well known in the GSM networks. The telephone number of the **Center number** (= "SMS service center") is needed to send an SMS. Most of the time, this information is already present in the SIM card and shown here. If this is the case you can leave this field untouched. However, if sending the SMS with the test button fails, you may need to enter a valid number in this field. This number is provided with your SIM card documentation.

If you are not sure if the settings are correct or if the service is working properly, you may send yourself an SMS using the **Check SMS sending** button.

In the **Data Network** section, the settings regarding the network connection are present. The module inside the MR3000C allows you to send data with 2G or 3G connection. If you wish to enable the 2G/3G connection, click on the **Enabled** box. You also have to enter the **Access point name**, which is provided with your SIM card documentation. Certain GSM providers require a **Username** and a **Password**. You can also choose to allow roaming and to choose if the mobile connection is the preferred default internet access.

If the 3G module is enabled, the MR has access to the Internet. If you enabled the GPRS service, it enables automatically the SMS service.

The last section is dedicated to **Data network watchdog**. This functionality allows to check the connection through GPRS in the interval desired by the user (**Interval in hours**), trying to ping the address written in **Host to ping**. In case the connection is no more active, then the GPRS module is rebooted.

WARNING: Please note that some settings related to data acquisition and communication can lead to unexpected high data consumption of your device using the SIM card. Check regularly the data consumption in order not to exceed your monthly data package.

START STATUS SYSTEM USER PARAMETERS VIEW RECORDING LIST

Restore Apply

SD-Card

Time

Wi-Fi

Mobile

DDNS

OpenVPN

Mail

FTP send

SCS Cloud

Authentication

Upgrade

Maintenance

Sensor

Enabled:

Status: online

Activation

Mode: Time scheduling

Activated from: 13 : 30 To 16 : 59

Network

Status: registered

Name: Swisscom

Technology: hspa

Strength: 48 %

SIM

PIN code: 3051

SMS

Limit per day: 5 Already sent: 2 Reset

Center number: +41794999000

Check SMS sending

Data network

Enabled:

Status: up

Access point name: gprs.swisscom.ch

Username: gprs

Password: gprs

Roaming allowed:

Prefered default internet access:

Data network watchdog

Enabled:

Host to ping: a.root-servers.net

Interval in hours (1-24 hours): 24

Figure 4.3.5. Subsection dedicated to the mobile communication.

4.3.6 DDNS

DDNS stands for Dynamic DNS, a method to update a name server in the Domain Name System. Without going into technical details, DDNS allows you to communicate with an MR that is out in the field where it does neither have a public (accessible from the WEB) nor a static (not changing) IP address. The router where the MR is connected to needs a public IP address – this is the case for most ADSL or cable TV routers you find in private houses. You have to set-up port-forwarding in the configuration of the router to reach the MR in the network. The DDNS service makes sure that you can access your MR through a persistent domain name (e.g. mymr.dyndns.org).

Communication with the DDNS service needs an Internet connection – check with the PING function as described in chapter 4.3.12.

For further details, please check the web-site of the DDNS service provider of your choice, the MR supports the following services:

- dyndns
- no-ip
- ovh
- dyndnsit
- changeip
- sitelutions

NOTE: Using DDNS services is possible only if your provider gives you a public IP address. OpenVPN (see below, chapter 4.3.7) provides another solution to deal with dynamic IP addresses.

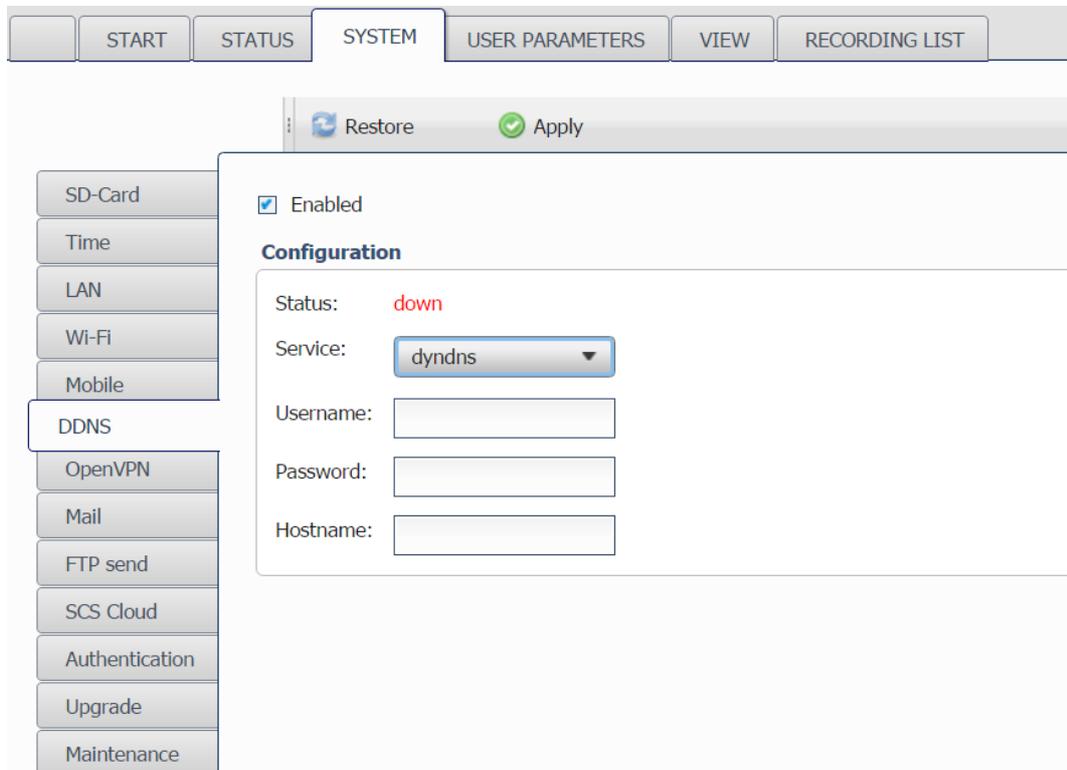


Figure 4.3.6. Subsection dedicated to the DDNS.

4.3.7 OpenVPN

VPN stands for Virtual Private Network. With this service, you will be able to communicate with the MR when it is out in the field where it neither has a public (accessible from the WEB) nor a static (not changing) IP address. The OpenVPN service makes sure that you can access your MR through a persistent IP address. OpenVPN service works nicely if you attach the MR to a DSL or cable TV router you find in private houses. No further settings on the router (e.g. port-forwarding as for DDNS) are required.

The VPN interface uses not the real, but a virtual IP address. This address remains always the same (or – depending of the configuration of the OpenVPN server – the address is at least known by the OpenVPN server) regardless of the real IP address and if the MR is connected via 3G connection or via wired connection. The virtual address is shown here and on the **Status** screen in the VPN section.

The configuration is fairly easy, you just have to click the **Enabled** box, then upload the 4 configuration files on the MR, and click on Apply. The configuration files (sometimes referred as VPN keys) are provided by the provider of the VPN service.

Communication with the VPN service needs an Internet connection – check with the PING function as described in chapter 4.3.12. The data stream for interactive communication through the WebUI are routed via the OpenVPN server. The communication between your PC and the MR is encrypted.

The other data (FTP push, NTP time synchronization, E-Mail, Firmware-upgrade) are not routed through the VPN tunnel, but use the normal Internet access.

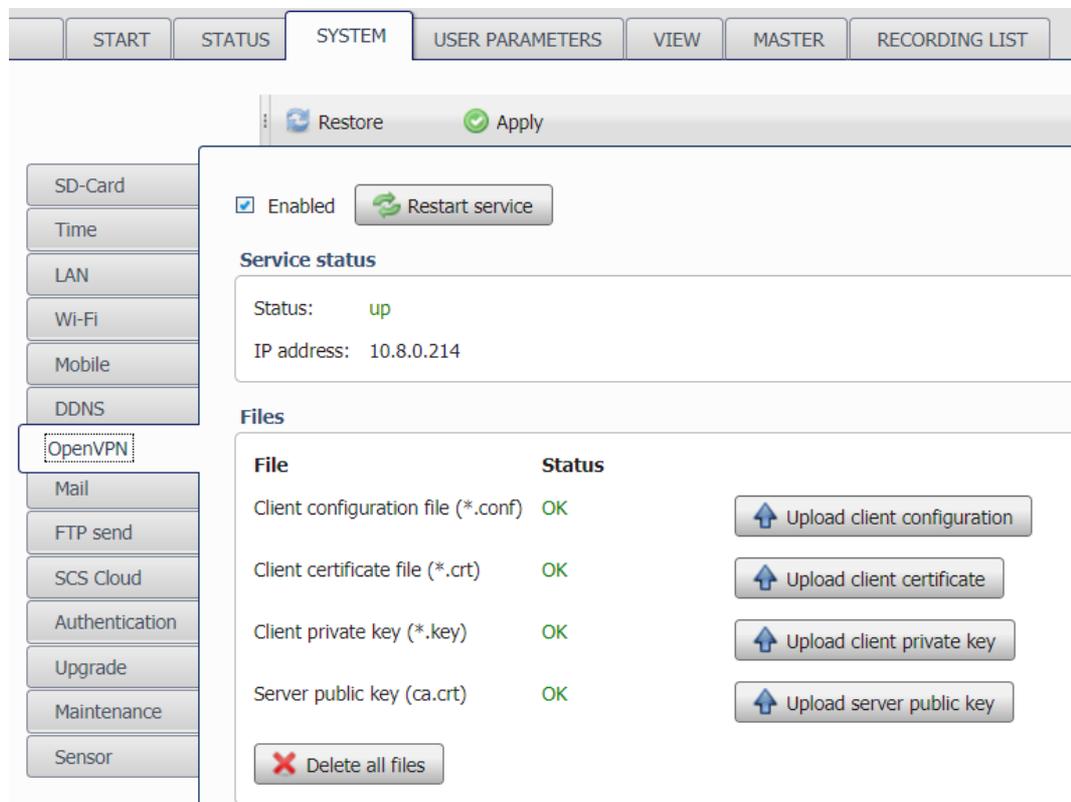


Figure 4.3.7. Subsection dedicated to the OpenVPN.

4.3.8 Mail

In this section, you can configure the e-mail settings, in order to receive automatically mails from the MR3000. For this purpose you need an e-mail account and Internet access for the MR3000 — check with the PING function as described in Section 4.3.12.

You have to enter the access data of your e-mail account, i.e. **User address** (e-mail address of your e-mail account) and the **Password** in the section User identity. In the section SMTP server you have to enter the **URL** (name or IP address of the SMTP server) and the **Port**. Moreover, you can choose the authentication method (automatic is the default option).

A unique e-mail account for all devices can be used, since it is only used to send e-mails.

To illustrate that, let's show an example using GMAIL. If you use a different e-mail service you will have to check the documentation of your service provider to figure out the URL and the port of the SMTP server.

- Create an address, e.g. mr3k.syscom@gmail.com on the Gmail Web site
- Enter this address as **User address** together with **Password** in the section User identity
- The settings for the SMTP server can be found on the GMAIL site. To quickly explain, enter **smtp.gmail.com** for the URL, **25** for the Port and enable **TLS** encryption.

NOTE: The quality of the mail service varies with the provider.

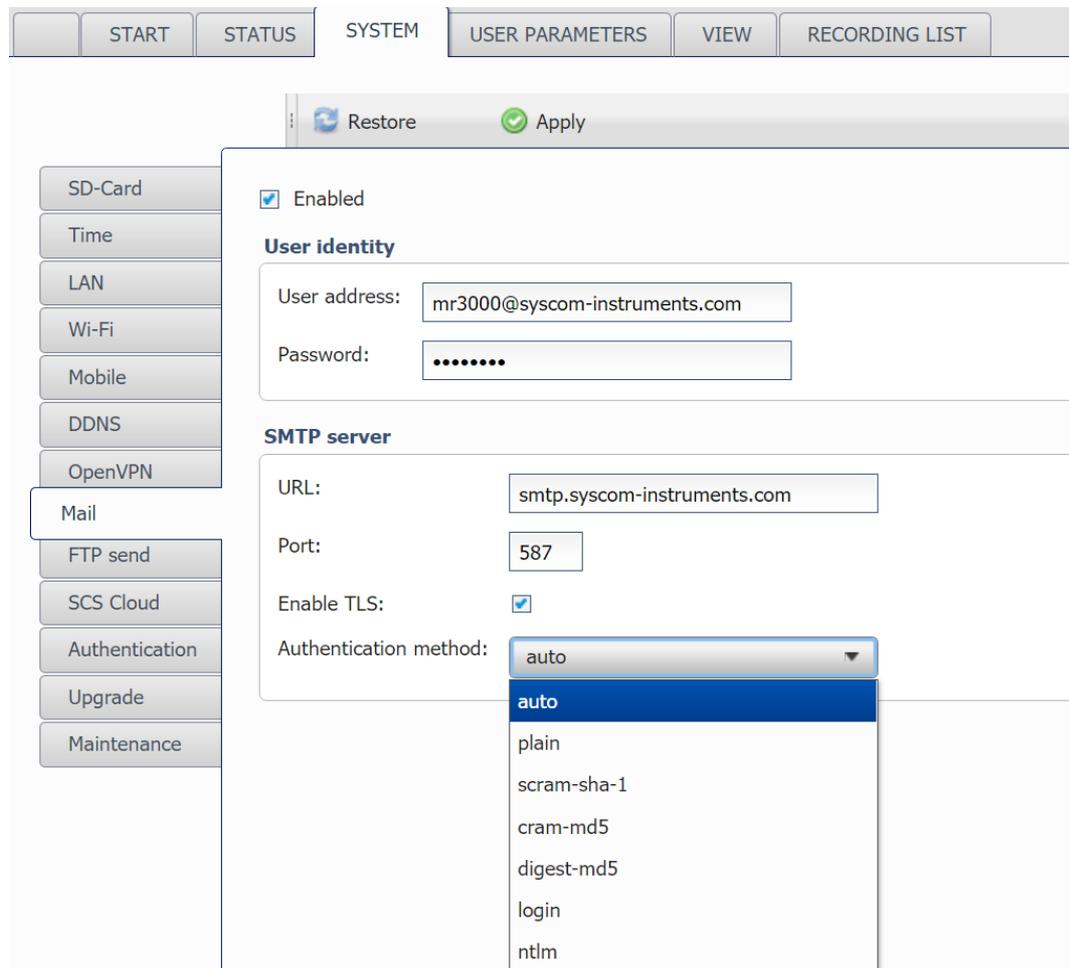


Figure 4.3.8. Subsection dedicated to the mail.

4.3.9 FTP send

If this service is enabled, the MR will periodically connect to a remote FTP server and copy its data to it. This feature has two main purposes:

- a permanent backup – your data exist both on the MR and the server.
- a way to make the MR's data easily available, as the access to the data on the server is much faster than to retrieve the data from the MR3000.

First you have to set-up the access to your FTP server in the **FTP server settings**:

- **Host** is the URL (e.g. myftphost.com) or the IP address of your FTP server (without the ftp:// prefix). You may add a specific subdirectory to the host name (e.g. myftphost.com/mydir/mr) in this case, the MR will create the corresponding subdirectory on the FTP server.
- **Sub directory** for this specific MR. This directory is created below the main directory, as set-up under **Host**. By default the **Name** of the MR is used (see chapter 4.4.1), alternatively you may use the UID (Serial number of the MR – see chapter 4.2) or you may enter a specific directory name. The right choice depends on the setting of you FTP server.
- **Username** is your login for this server
- **Password** is used to authenticate the user on this server.

The screenshot shows the MR3000 web interface with the 'SYSTEM' tab selected. A sidebar on the left contains various system settings, with 'FTP send' highlighted. The main content area is titled 'FTP server settings' and includes the following fields and options:

- Host:** ftp.syscom.ch
- Sub-directory:** Custom (dropdown), MR3000C
- Username:** test
- Password:** [masked with dots]
- Test FTP server:** [button]
- Push mode:**
 - Preserve SD-Card hierarchy
- Backup mode:**

Type	Interval	Hour	Minute
Daily	once a day	7	0

Figure 4.3.9. Subsection dedicated to the FTP.

It is highly recommended to test your settings with the **Test FTP server** button. Your MR needs Internet access to perform the test.

The **FTP send** service has two options – both can be active:

- In **Push mode** the MR will push a new event file to the FTP server as soon as recording of the file is done. The current background file may be updated continuously on the FTP server. In **User paramters > Advanced settings** – see chapter 4.4.8 you specify how often the current background file is updated on the FTP server.

Preserve SD Card hierarchy means that you have the same directory structure on the FTP server as in the MR `./events/2015/01/09/` - year,month,day and `/background/2014/01` –year month. If this option is not checked, the files are copied to the directories `/events` and `/background`.

- In **Backup mode** the MR will keep the FTP server synchronized with its data. At each connection, the MR will compare its own data to the FTP data, and any missing file on the FTP will be copied. This option can be combined with the **Push mode**. It checks the integrity of the data on the FTP server in scheduled time intervals.

Backup mode always maintains the hierarchy on the SD Card. If you have not checked this option above and both, **Push mode** and **Backup mode** are enabled, you will have two copies of the same file on your FTP server – of course this also doubles the amount of data sent to the FTP server.

NOTE: The name of the main directory for a specific MR (`main-dir/events/2014/...`) is what you have set-up as **Sub directory Name** of the MR. If you change this setting, the MR will generate a new directory on the FTP server.

4.3.10 SCS Cloud

SCS

The MR3000 can be connected to the **SCS (Syscom Cloud Software)** to easily visualize the data coming from it. The web address of the cloud software is <http://scs.bartec-syscom.com>. The MR must have internet connection to communicate with the SCS. Please see the related tutorial video “LINK A MR3000 TO THE SCS” on the dedicated [webpage](#) to have more information about the peering MR3000-SCS.

In case of connection MR3000-SCS, the data are stored in a Swiss server.

NOTE: The Cloud option and the FTP send option (Section 4.3.9) can be activated in parallel.

NOTE: When using the SCS, please set the MR time to NTP (refer to Section 4.3.2).

In the **Service** subsection, it is possible to see if the connection to the SCS is enabled or not.

In the **Peering** subsection, a code generated from the SCS cloud must be inserted. This allows connecting the MR3000 to the SCS cloud software. The command “Unpeering” allows eliminating the connection.

In the **Synchronization** subsection, the user can

- check the synchronization status with the SCS
- check the last synchronization to the cloud software
- select the interval between two synchronizations with the cloud software.

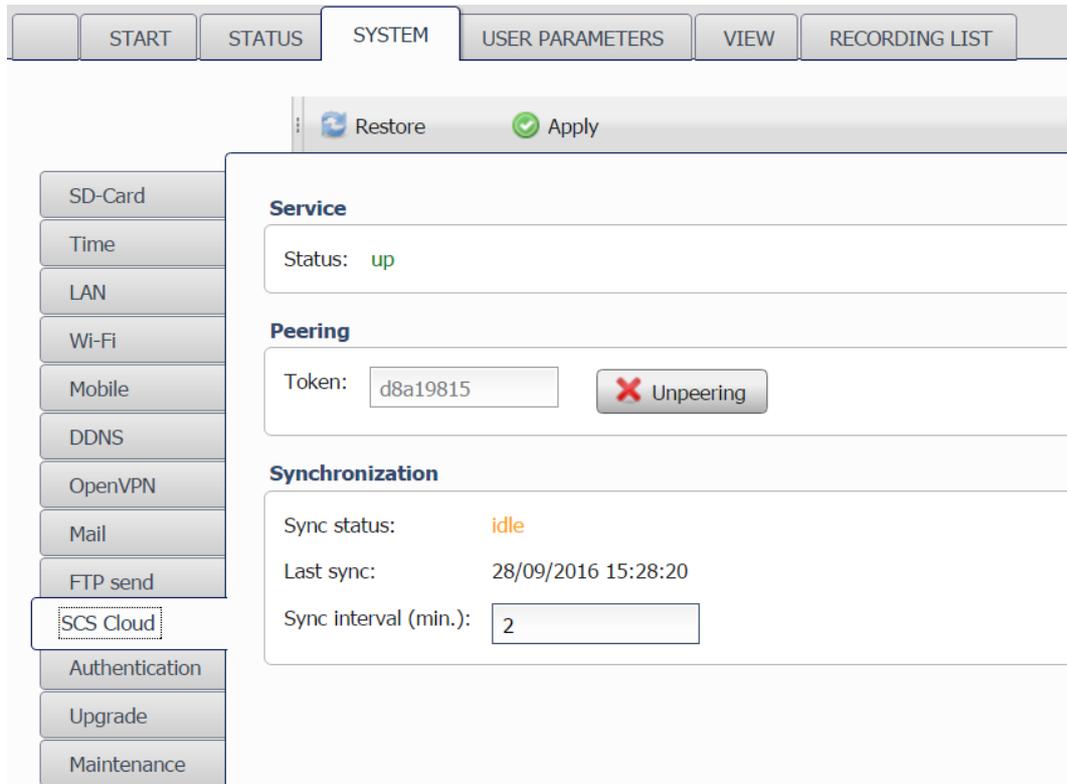


Figure 4.3.10. Subsection dedicated to the SCS Cloud.

The synchronization with the cloud software is necessary because certain parameters related to the measurements can be also modified in the SCS cloud software. These parameters are:

- Name of the device
- Comment
- Trigger levels
- Alarm 1 parameters
- Alarm 2 parameters
- Background settings

During the synchronization, both the MR3000C/TR firmware and the SCS check if the parameters have been changed. There are three cases:

1. The parameters have been changed only in the firmware → the SCS is updated during the synchronization;
2. The parameters have been changed only in the SCS → the firmware is updated during the synchronization;

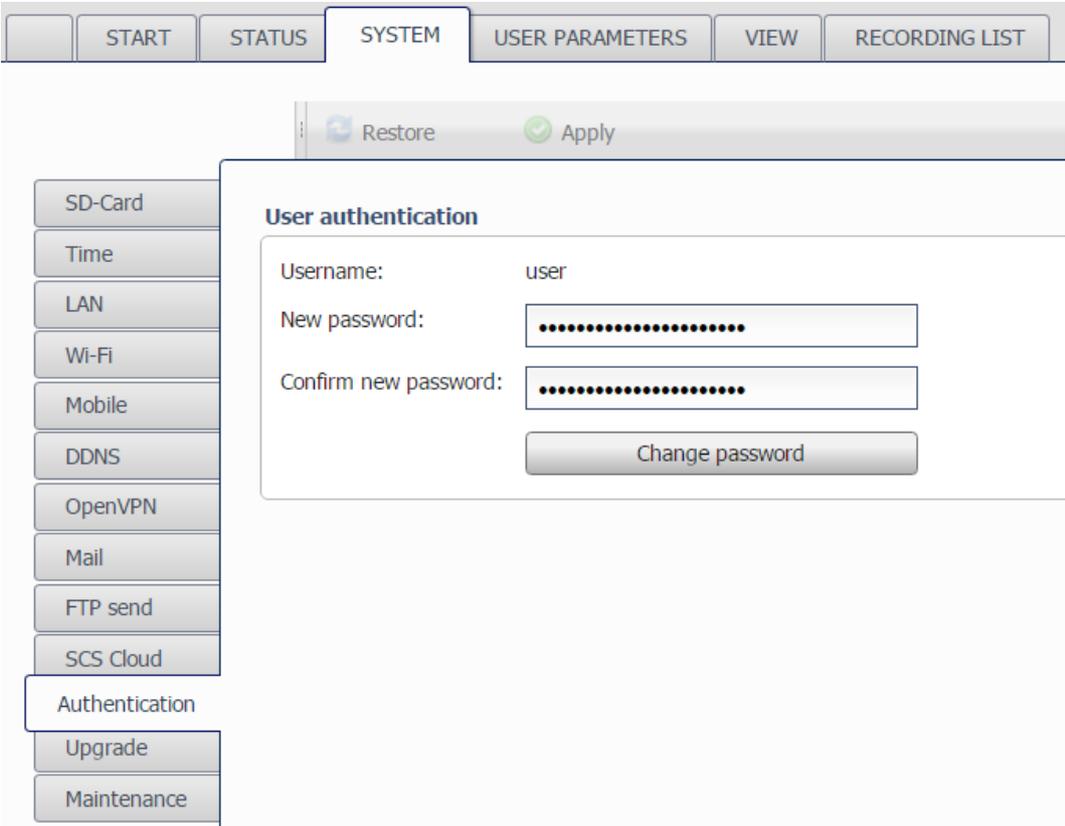
3. The parameters have been changed in the firmware and in the SCS → the firmware has the priority, therefore the last values registered in the firmware are uploaded on the SCS during the synchronization.

For any additional information on the SCS cloud software, please refer to the dedicated page on the [website](#) or visit <http://scs.bartec-syscom.com>.

4.3.11 Authentication

Here you can change the password of the MR. The password is used for the WebUI access and for the SFTP service (see chapter 5.3.1). By default, the password is the serial number of the MR – shown as **UID** on the Status screen (see chapter 4.2).

NOTE: please make sure that the new password will be remembered.



The screenshot shows a web interface with a top navigation bar containing buttons for START, STATUS, SYSTEM, USER PARAMETERS, VIEW, and RECORDING LIST. The SYSTEM button is selected. Below the navigation bar is a sidebar with buttons for SD-Card, Time, LAN, Wi-Fi, Mobile, DDNS, OpenVPN, Mail, FTP send, SCS Cloud, Authentication, Upgrade, and Maintenance. The Authentication button is selected. The main content area displays the 'User authentication' configuration page. At the top of this page are 'Restore' and 'Apply' buttons. The configuration includes a 'Username:' field with the value 'user', a 'New password:' field with a masked password, and a 'Confirm new password:' field with a masked password. A 'Change password' button is located at the bottom of the form.

Figure 4.3.11. Subsection dedicated to the authentication.

4.3.12 Upgrade

In this section, you find:

- The **Ping** button allows you to send a ping request to a Web site. It's useful if you want to know whether the MR has Internet connectivity. If you can ping a well-known Web site (e.g. *wikipedia.org*), if it succeeds, the Internet connection is working.

- The **Upgrade from remote server** part is used to do an upgrade of the MR's firmware. The MR needs an Internet connection for that. In order to upgrade to a new firmware, you need to know the URL for this upgrade. This is provided by SYSCOM when a new firmware is issued. For example:

firmware.syscom-instruments.com/mr3000/2.0.2/mr3000-main-upgrade.json

Once you entered this URL in the field, click on the **Start** button. Upgrade takes usually between 1 and 2 minutes, but it can be longer if the Internet connection is slow. You should just be patient, and never turn off the MR while an upgrade is in progress. If an error happens, a message will be displayed on the LCD screen of the MR.

NOTE: It is recommended to upgrade the MR3000 at the end of a monitoring session.

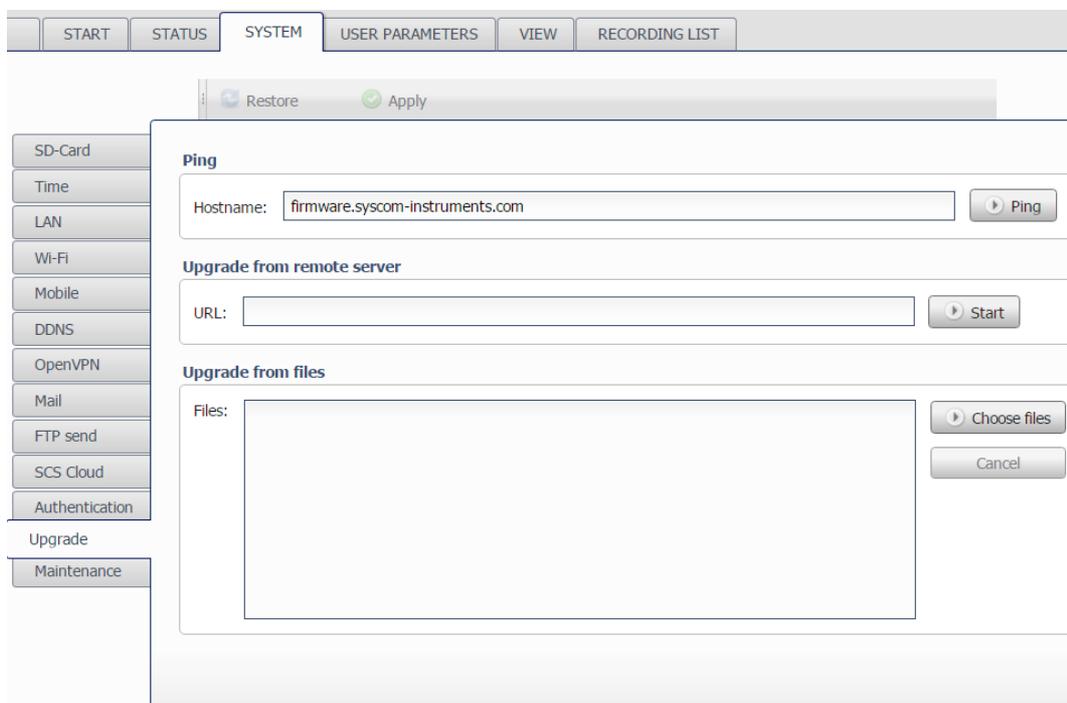


Figure 4.3.12. Subsection dedicated to the Upgrade.

- The **Upgrade from files** feature allows to flash a new firmware directly from your PC, without Internet access on the MR. The internet access is needed only on your PC. In this case, please open a browser on your PC and insert the URL given by Syscom but without the final part. For example:

Entire URL: firmware.syscom-instruments.com/mr3000/2.0.2/mr3000-main-upgrade.json

To be inserted in the browser: firmware.syscom-instruments.com/mr3000/2.0.2

Then download the 6 files on your PC and successively upload them on the section "Upgrade from files". If the extension **.txt** is automatically added by your operating system (e.g. Windows), please delete it.

Please contact support@bartec-syscom.com for further clarifications.

4.3.13 Maintenance

In the section **Diagnostic**, you may generate a report of the system to make further investigations in case of trouble. Please click on *download diag report* and email it to support@bartec-syscom.com for further investigations.

NOTE: The log files and other variables used to generate the Diagnostic report are in volatile memory, do not switch off the MR before the report is generated. Make a report as soon as a problem has been encountered. If you wait for too long time, the interesting part of the log file might be overwritten. If the standard interface for communication is not available, you may use the Wi-Fi access to communicate with the MR.

The **Reboot** button initiates a warm start of the MR.

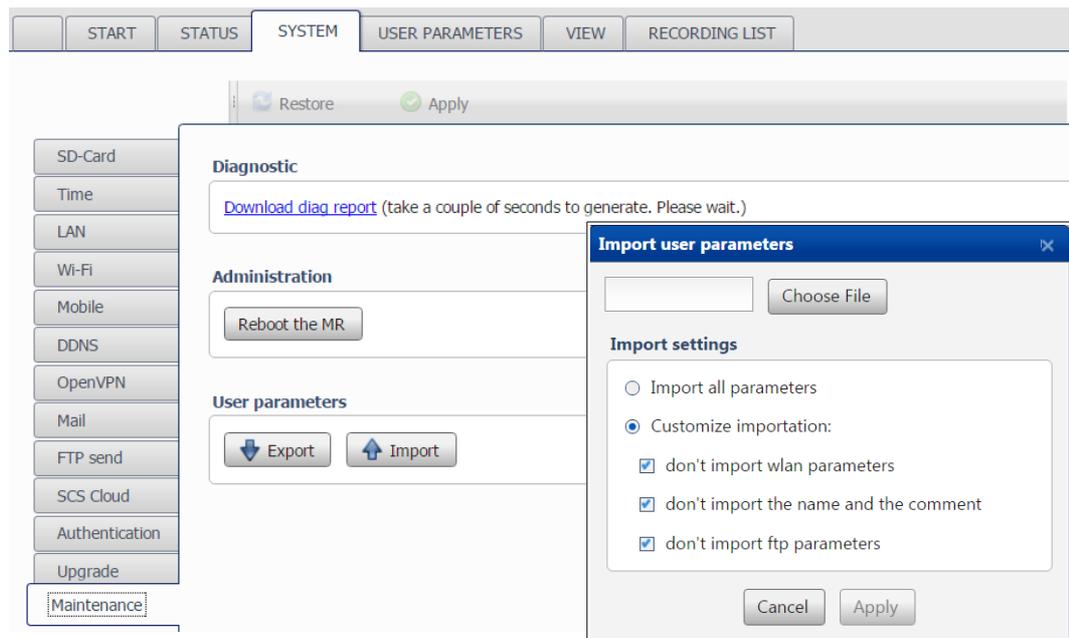


Figure 4.3.13. Subsection dedicated to the Maintenance and details on the import section.

The **User Parameters** section is useful to import user parameters defined in other devices (or even in the same device), and to export them for future use. During the import phase, you can choose between a standard import operation, with all the parameters, and a custom importation, where you select not to modify the current WLAN setting, all the name and comment settings, and the ftp parameters.

IMPORTANT: If the parameters must be imported from MR1 to MR2, it is necessary that MR2 have the same firmware version of MR1 or a more recent version.

4.3.14 Sensor

Inside the current section, there is one subsection dedicated to the sensor of the MR3000. For the MR3000C, the sensor can be a velocity meter or an accelerometer and it could be internal or external. For the MR3000TR, the sensor is always a velocity meter and it can be internal or external (triaxial or 3 triaxial ones).

Inside this section, the sensor model, the type, unit of measure and the serial number are indicated.

With **modify settings** you can modify the unit of measure of the sensor. As you can see in Figure 4.3.14b, it is possible to select metric or imperial units, in particular mm/s (default value) or in/s.

NOTE: if you do not want to change the settings please click on CANCEL, because otherwise the MR will reboot.

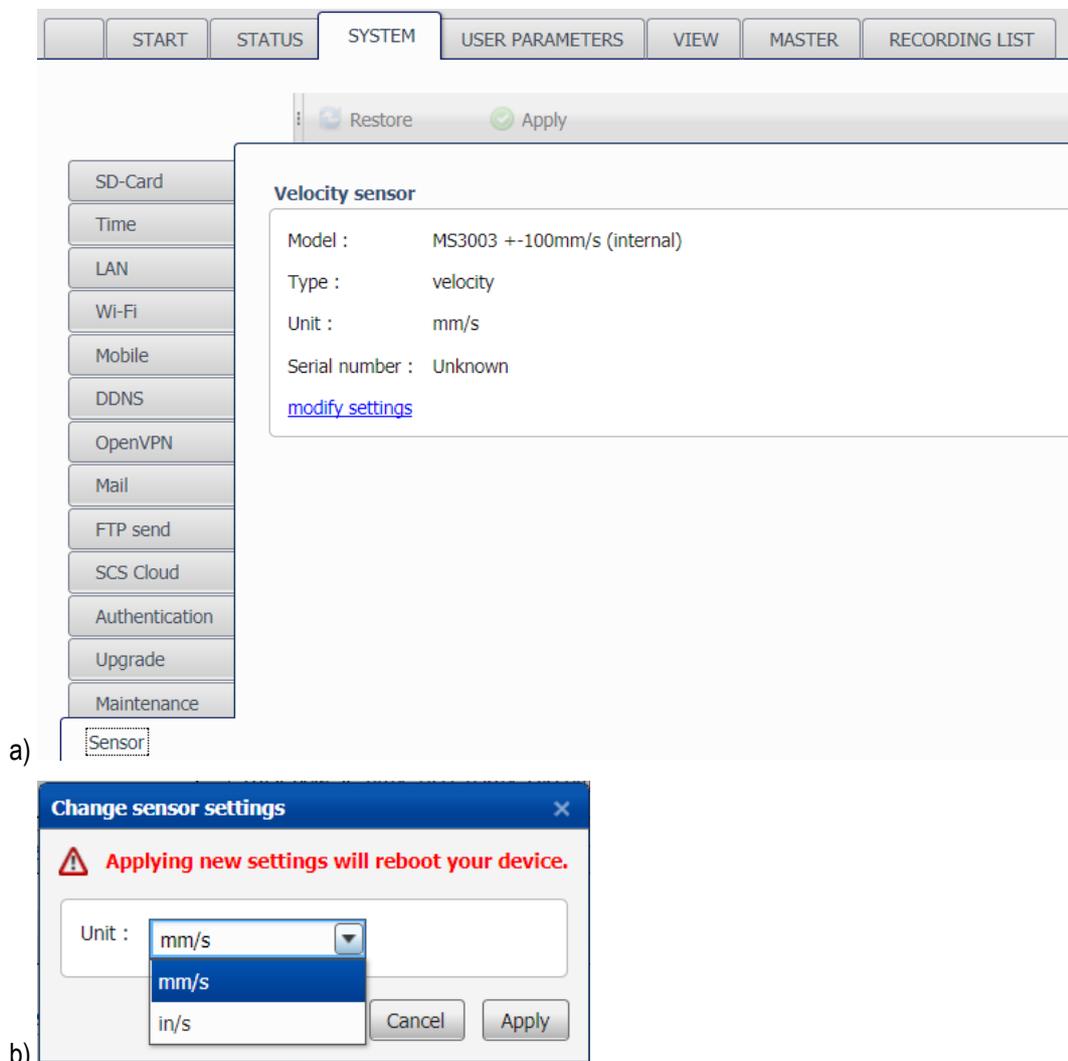


Figure 4.3.14. Subsection dedicated to the sensor settings: a) the entire section; b) selection of the desired unit of measurement in case of velocity sensor.

4.3.15 Monitoring

The section Monitoring has been added in firmware version 2.0.7. It includes the possibility to choose the warning level of the power supply voltage of the device.

In particular, two threshold levels must be indicated by the user:

- **warning threshold**, meaning that a warning is created when the voltage measured decreases below this level.
- **release threshold**, meaning that the warning condition is released when this level is exceeded.

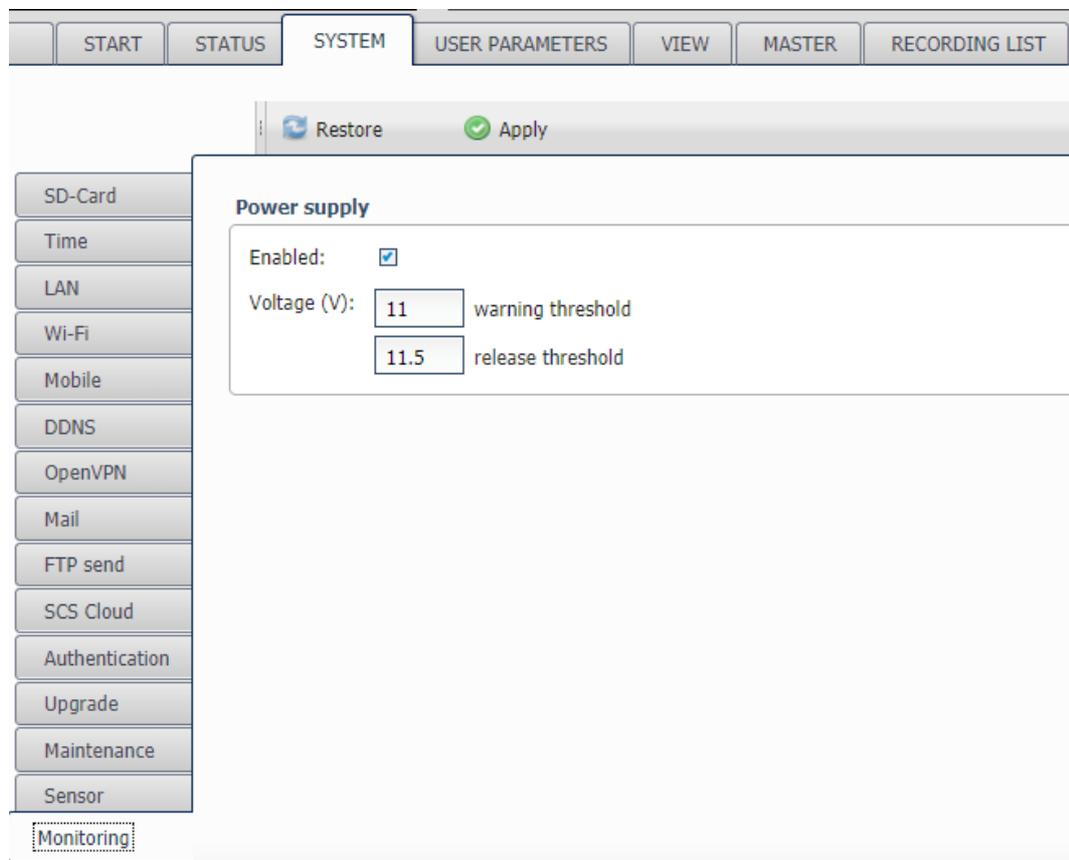


Figure 4.3.15. Subsection dedicated to the system monitoring.

4.4 User Parameters

In this part you set-up the general parameters of the system.

4.4.1 General

Here you can modify the **Name** (ID) of the MR (by default mr3000, followed by a dash and the serial number UID of the MR) and the **Comment** string.

- The **Name** may be used as the root-directory for the FTP service. No special characters and no spaces are allowed for the **Name**. The **Name** is written in the Header of each XMR / BMR file.
- The **Comment** string should describe the location of the MR. It is intended to be included the alarm messages. Special characters are allowed, but use extra space if the alarm message is sent as SMS.

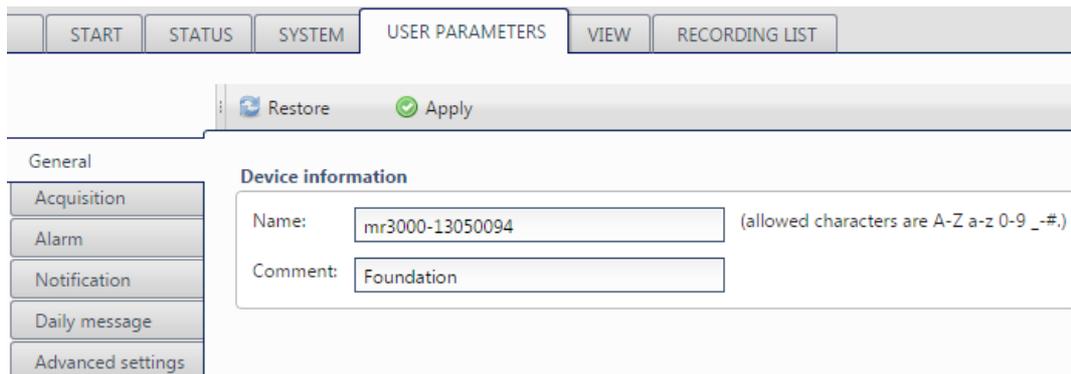


Figure 4.4.1. Subsection dedicated to the general settings.

4.4.2 Acquisition

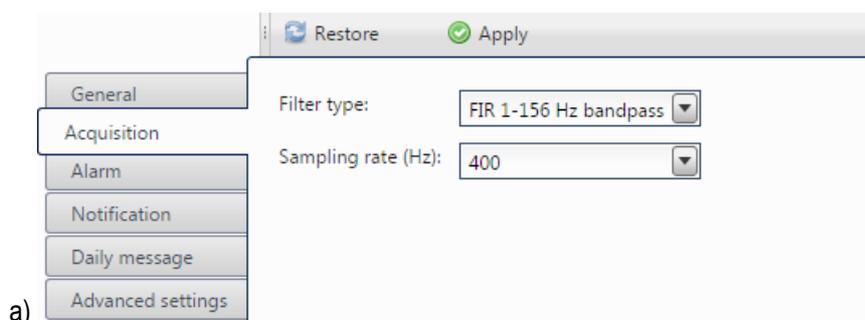
In the acquisition settings, it is possible to select the desired filter applied on the raw signal and the sampling rate (Figure 4.4.2a).

Velocity sensor

In case of velocity sensor, the pre-defined **Filter types** can be selected among the choices shown in 4.4.2b. It is important to select the adequate filter for the desired application. The filter “Bandpass of the sensor” means that there is only the anti-aliasing filter applied on the signal, which cuts off the frequency contents above 80 % of Nyquist frequency (= half of the sampling rate).

Moreover, you can choose the **Sampling rate**, which is the number of samples per second. For the MR3000C/TR, the selection is between 50 Hz and 2000 Hz.

NOTE: Higher sampling rates accumulate more data and create larger files.



a)

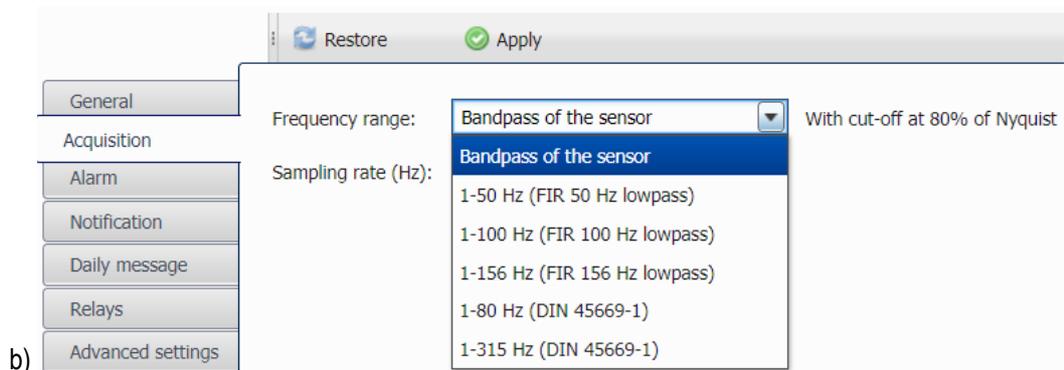


Figure 4.4.2. a) Subsection dedicated to the acquisition for a velocity sensor; b) possible filter selections.

Acceleration sensor

In case of acceleration sensor, the unique selection available is related to the sampling rate. Indeed, there is a band-pass trigger filter on the data between 0.5 and 15 Hz. This means that the trigger condition is reached only if the two following conditions are fulfilled:

- the trigger level is exceeded;
- the peak is associated to a frequency in the range 0.5 – 15 Hz.

NOTE: Values exceeding the trigger threshold do not necessarily lead to an event creation.

4.4.3 Alarm

The alarm service checks if the vibration exceeds the defined alarm threshold levels. In this case, the notification service of the MR3000 sends an e-mail or SMS to the people listed in contacts where Alarm 1 or Alarm 2 have been checked (see chapter 4.4.4).

Indicator time (seconds) is the period between the first exceeding of the alarm threshold and the end of the alarm condition. For event related alarms this setting is not relevant. For the difference between Alarm based and event based messages see chapter 4.4.4.

It is possible to define two levels of alarms: alarms 1 and alarm 2. They can be configured completely independently.

In the field “Based on”, the alarm can be activated on the trigger or on the background recording. In the following, let us analyze the two situations separately.

The alarm functionality explained in this section is related to the case of velocity sensor (internal or external).

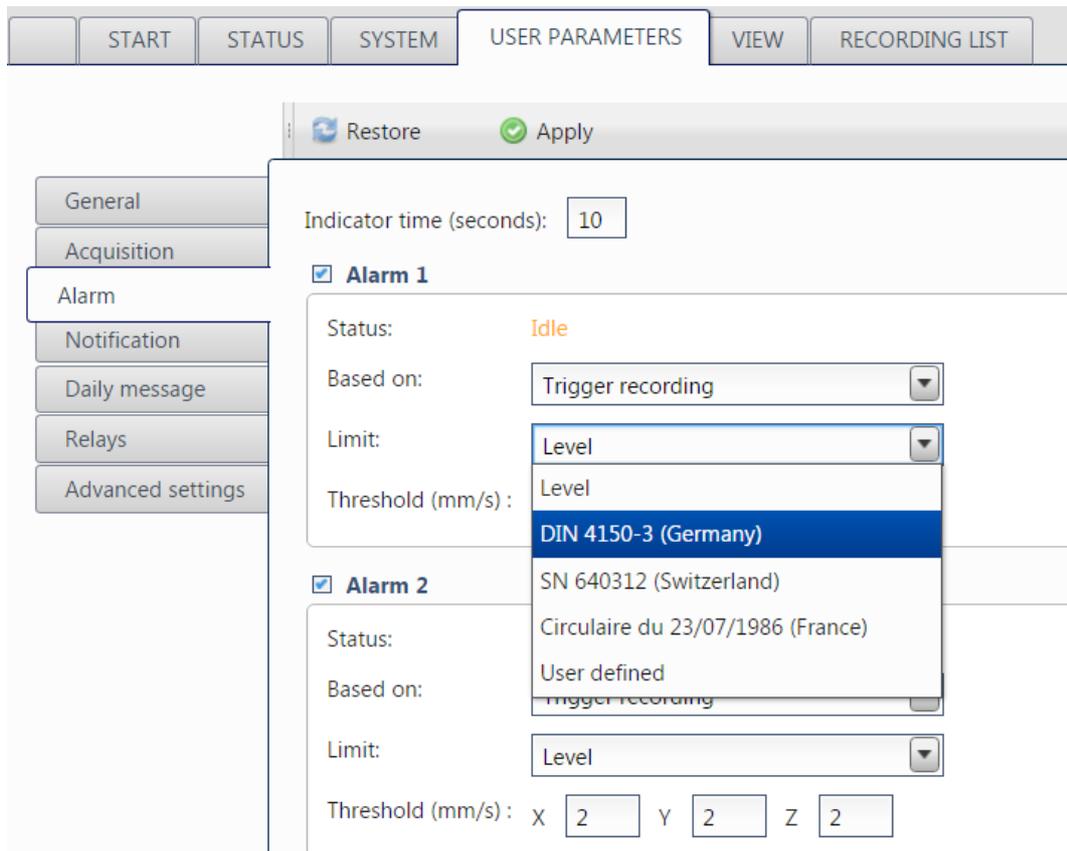


Figure 4.4.3. Subsection dedicated to the alarm settings.

Trigger recording

Figure 4.4.3 shows the possibilities for the choice of the alarm limit, when the alarm has been selected on the trigger recording. The possibilities are:

- **Level**
- **DIN 4150-3 (Germany)**
- **SN 640312 (Switzerland)**
- **Circulaire du 23/07/1986 (France)**
- **User defined**

In case of "Level", a threshold level for the 3 channels must be defined. The alarm is triggered if at least one of the three axes exceeds the limit value.

In all the other four cases, not only the velocity peaks are taken into account but also the frequency values. In other words, the regulations define velocity limits that are depending on the frequency. For this reason, the maximum peak and the relative dominant frequency constitutes a unique point to be placed on the graph and to be compared with the limit curve. In Fig. 4.4.4, the limit values defined by the German curve for the vibration at foundation are shown. In general, the international regulations define limits that are generally based on location, building type and expected vibration type.

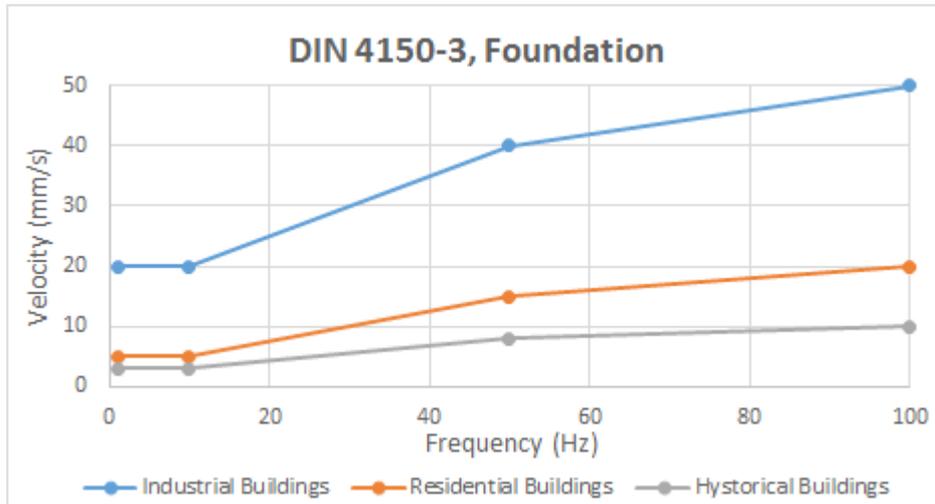


Figure 4.4.4. Limit values for the German DIN 4150-3, vibration at foundation.

In case one of the predefined norms (DIN 4150-3, SN 640312, Circulaire du 23/07/1986) has been selected, then in the field "Setting" after having clicked on "Edit" a windows appears on the screen. On it, the desired limit curve can be chosen, among those defined by the norm. An example is shown in Figure 4.4.5 for the DIN 4150-3, where the curves are divided according to denomination defined in the norm. The button "Restore" allows to come back to the default configuration of the concerned norm.

If the German or the French regulation is selected, the control of the limit values is done on each of the three axes. The alarm is activated if at least one of the three axes exceeds the limit values.

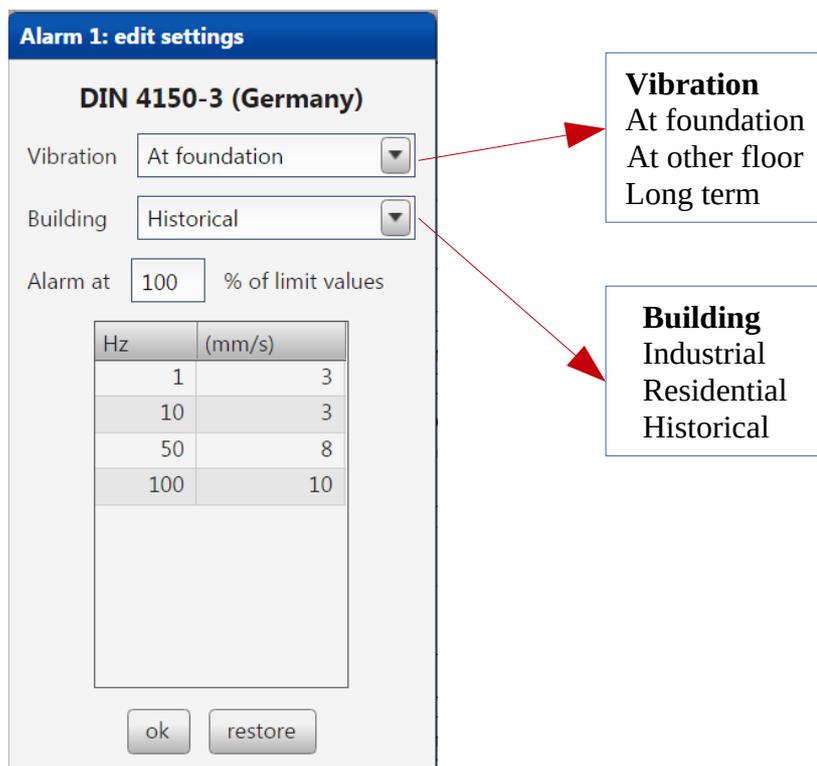


Figure 4.4.5. Choice of the limit curve, for DIN 4150-3 (Germany).

In case the Swiss regulation has been selected, the comparison is done on the Vector Sum and not on each single axis. The algorithm defined by the norm and implemented in the MR3000C/TR is the following:

1. Calculation of the Vector Sum of the event
2. Detection of the velocity peak of the Vector Sum. Let's call it Vmax.
3. Identification of the axis giving the largest contribution to Vmax.
4. Calculation of the dominant frequency related to this axis. Let's call it Fmax.
5. The parameters to consider for the comparison with the limit values are then Vmax and Fmax.

If two axes have the same maximum value, then that with the lowest value of the dominant frequency is considered.

Once chosen the desired reference curve, it is possible to see the values in the underlying table (Fig. 4.4.5). Moreover, the alarm can be set as a curve having the same trend of the reference norm selected but with reduced values. The reduction (in percentage) can be chosen from 1 to 100%. This option can be used for a lower alarm level, for example a warning level.

NOTE: In case the MR3000 has an internal accelerometer, the regulations implemented (DIN 4150-2, SN 640312, Circulaire du 23/07/1986) are not shown because all the limits are defined in velocity and not in acceleration. The user-defined norm is always available.

Alarm 2: edit settings

User defined

Name

Help!

- Right click on a table to insert or remove values
- Double click on a row of a table for editing
- Values must have **at most two digits** after decimal point
- Frequencies must be entered in **ascending order**

X		Y		Z	
Hz	(mm/s)	Hz	(mm/s)	Hz	(mm/s)
5	12	5	4		
100	12	15	5		
		35	6		
		100	10		

Figure 4.4.6. Settings of the user-defined norm.

If the choice of the alarm is “User-defined”, then clicking on “Edit” in the field “Settings” leads to another window, shown in Fig. 4.4.6. It is possible to give a name to the norm and then to add the desired number of points for each channel. A maximum number of 8 points can be set for each channel. Moreover, each channel can be set completely independently, meaning that X can have 2 points, Y can have 4 points and Z no points. The button “Restore” allows to reset the name and the values defined.

In case a norm (already implemented or user-defined) has been chosen, the summary of the most important information are shown in the main page “Alarm” (see Fig. 4.4.7).

Figure 4.4.7. Subsection dedicated to the alarm settings, with information on the norm selected.

NOTE: If an alarm is defined on an implemented or on a user-defined norm, it is not possible to set the trigger value higher than the alarm threshold. The reason is the fact that the frequency must be calculated and therefore an event must be created. Contrarily, in case the alarm is based on “Level”, the trigger can be chosen even higher than the alarm level.

Background recording

The alarms can be based also on background recording. It is possible to have simultaneously an alarm on the background recording and another one on the trigger recording.

The possibilities for the background recording are:

- **Vector Sum**
- **SBR-A (Dutch)**

- **User defined**

In case of “Vector Sum”, a threshold level for the Vector Sum must be defined. If this option is activated, in the section Start → Background recording, the mode “Peak + Vector sum” must be activated (Subsection 4.1.5).

In case SBR-A is selected, the alarm is configured according to the Dutch code SBR-A. This option must be also active in the background recording (see Section 4.1.5).

If the choice of the alarm is the “User-defined” norm, then clicking on “Edit” in the field “Settings” leads to another window, shown in Fig. 4.4.8. It is possible to give a name to the norm and then to add the desired number of points for each channel. A maximum number of 8 points can be set for each channel. Moreover, each channel can be set completely independently, meaning that X can have 4 points, Y no points and Z 3 points. The button “Restore” allows to reset the name and the values defined.

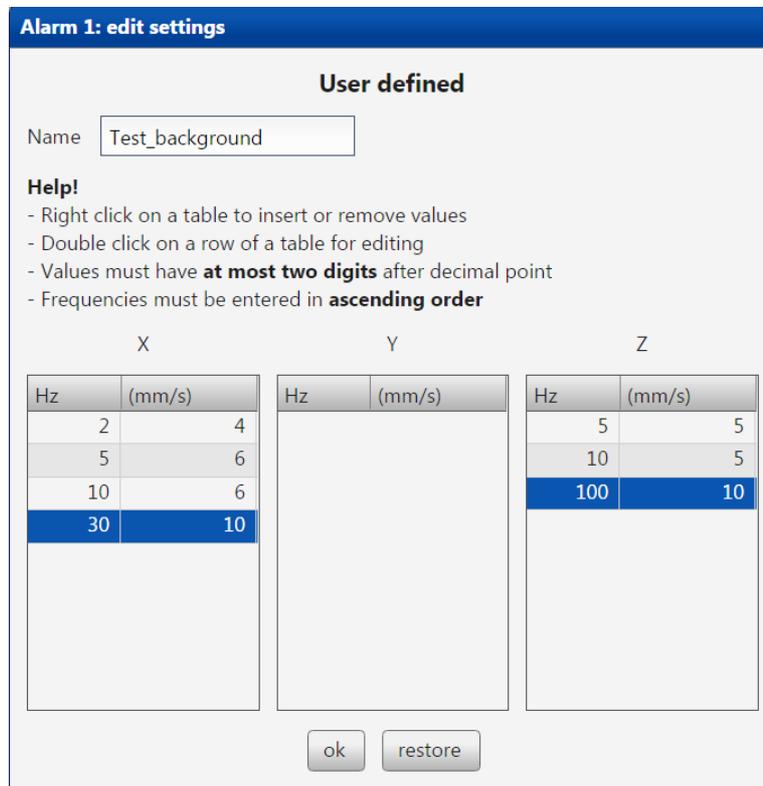


Figure 4.4.8. Settings for a user-defined norm for a background recording.

If the user defined norm is activated, in the section Start → Background recording, the mode “Peak + Dominant frequency” must be also activated (Subsection 4.1.5).

NOTE: Please check the trigger and background setting compared to the alarms. For example, a configuration like in Fig. 4.4.9 is not correct since the option “Peak + Dominant Frequency” has been selected, then a warning indicating that Alarm 1 cannot happen is shown (Fig. 4.4.10). Indeed, Alarm 1 concerns the Vector Sum that is not recorded with this background mode.

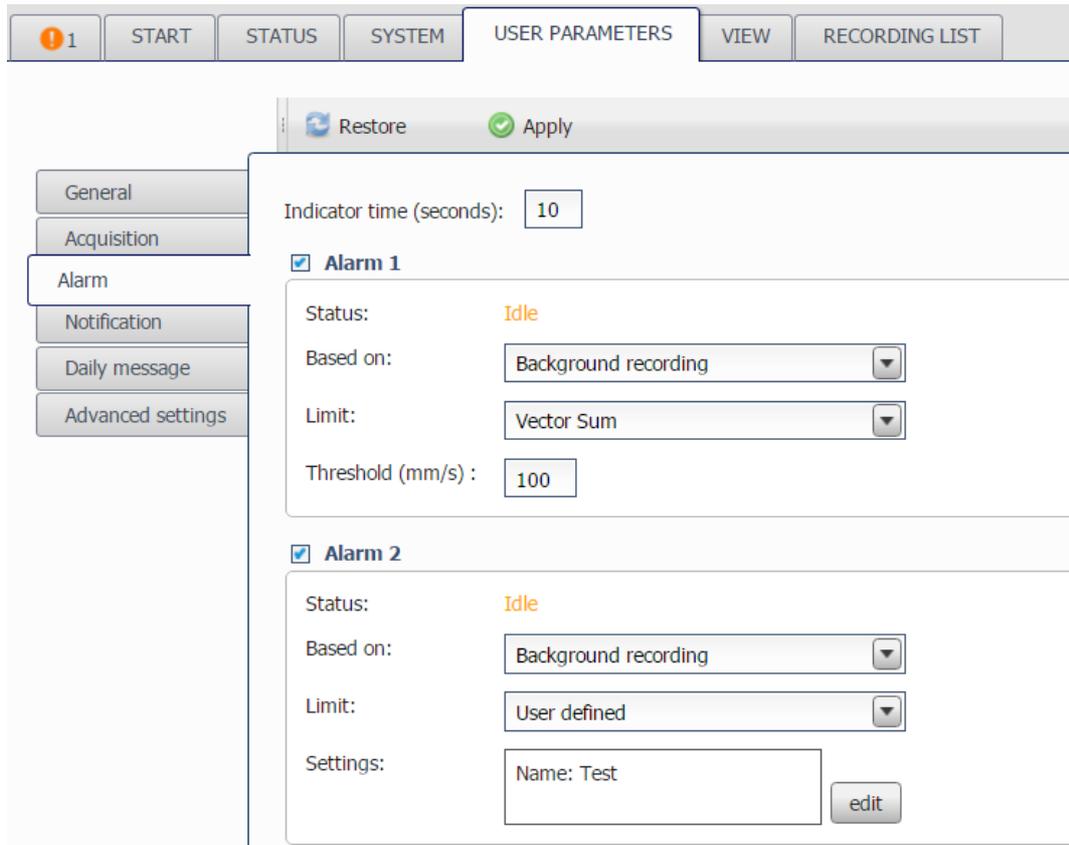


Figure 4.4.9. Configuration of the alarms causing a warning.

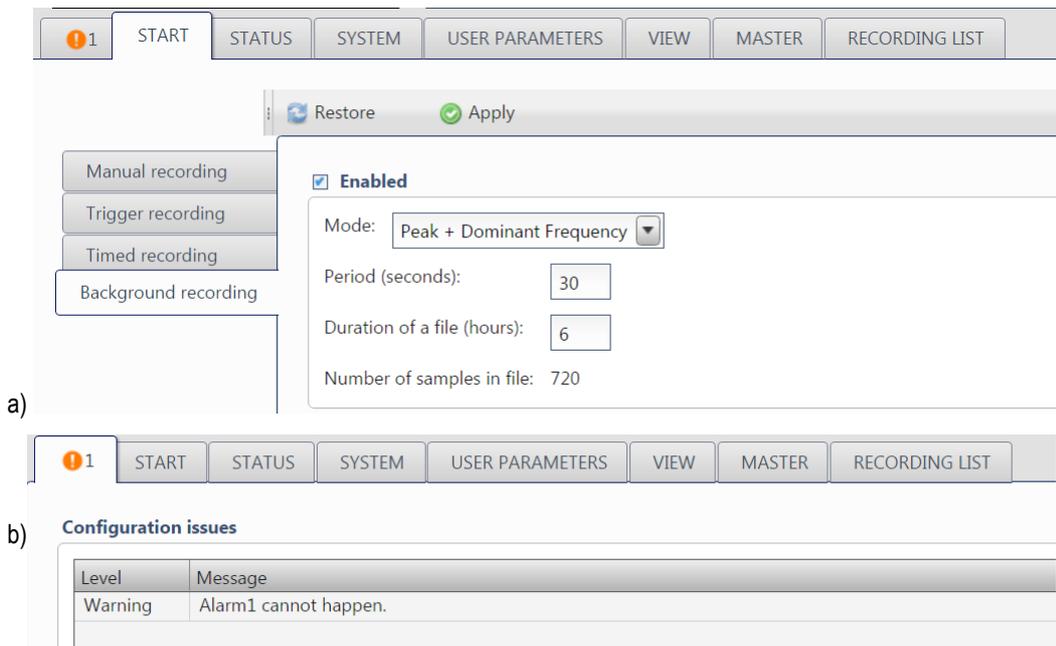


Figure 4.4.10. a) Setting of the background recording; b) Warning message caused by the definition of the alarm as in Fig. 4.4.9.

In Figure 4.4.11 the alarm settings in case of accelerometer are shown.

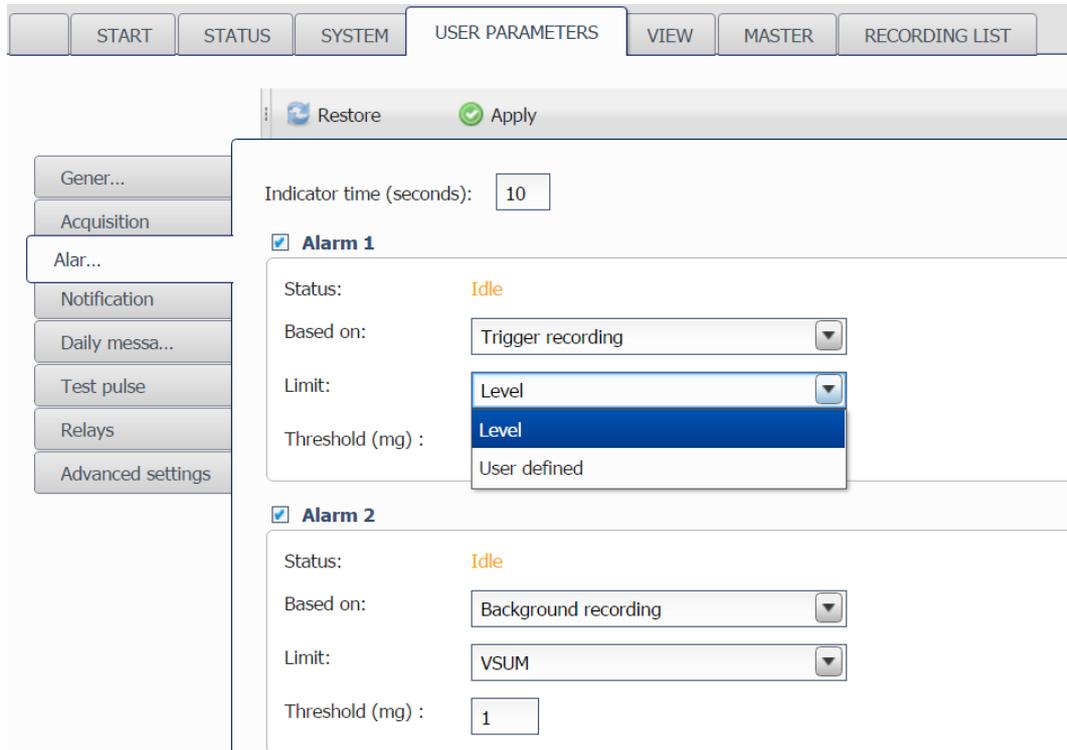


Figure 4.4.11. Alarm settings in case of MR3000C with accelerometer.

4.4.4 Notification

In this section it is possible to:

- Create contacts to whom the emails/SMS related to the monitoring are sent. The subsection is called "Contacts".
- Decide how to configure the notification messages. The subsection is called "Messages".

The MR3000 is able to automatically send emails and SMS with the desired options to the user-defined contacts.

Contacts

In this subsection, it is possible to add Contacts for the notification service. Contacts are people who receive notification from the MR3000C/TR. To add a new contact click on the **Add** button. To edit a contact, just click the corresponding line. Clicking the **Del** button will delete the corresponding contact.

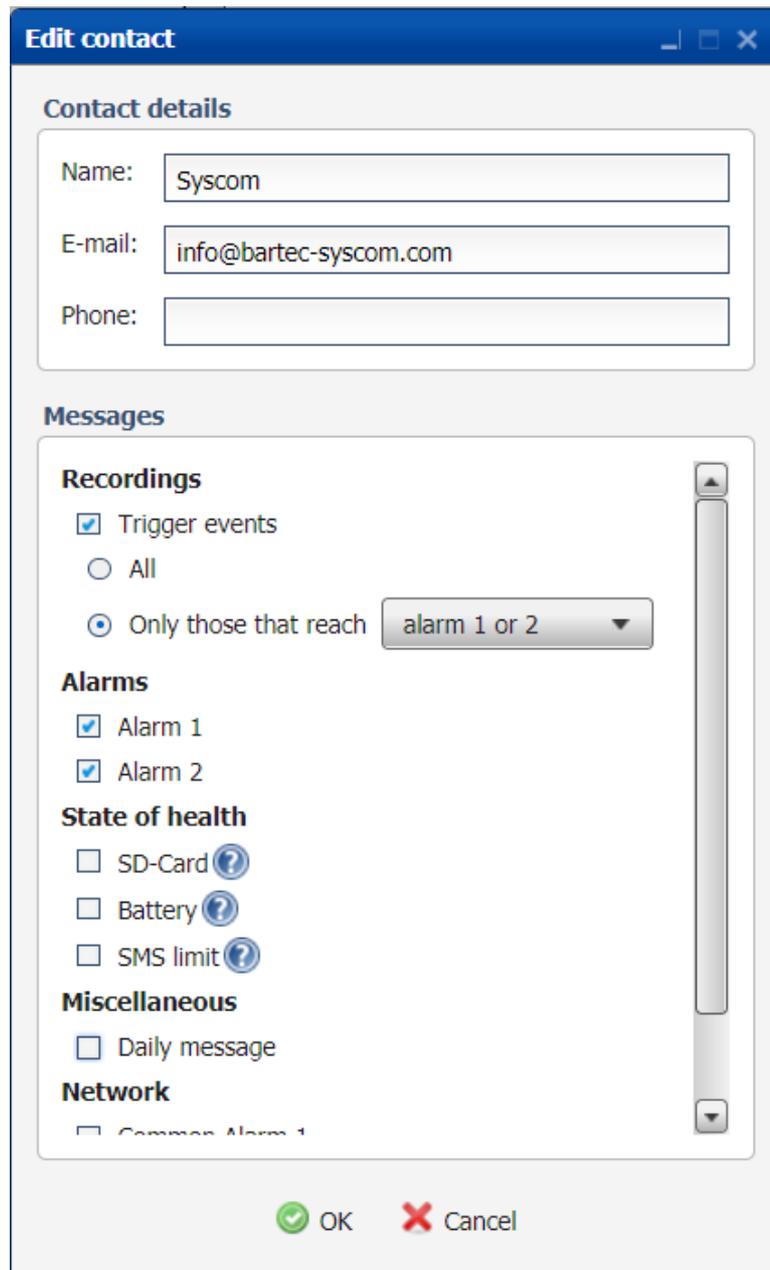


Figure 4.4.12. Setting of a contact with related messages.

Once clicked on a contact line or on the add button, a window like in Fig. 4.4.12 is shown. In the first part (**Contact details**), it is possible to insert name, e-mail and phone number of the contact. In the second part (**Messages**), the user can choose the desired messages to be sent to the contact.

The condition to trigger a message can either be related to **Event recording** or – regardless of the recording of an event – when the vibration reaches the **Alarm** threshold (see Section 4.4.3). The difference between the two methods is:

- Alarm messages related to Event recording include additional information, such as the peak of the event, peak of the vector sum of the event and the dominant frequency of the event. To use this option, you have to make sure that the trigger threshold is below the alarm threshold. Such messages are sent immediately after the event is recorded, i.e. the vibration

is again below the threshold level or the max recording time has elapsed (see Section 4.1.2).

Messages sent to an E-Mail address may additionally include a graphical presentation of the waveform data (PNG graphics). The waveform data and the FFT are NOT calculated if the duration of the event exceeds 60 seconds (@ 1000 sps sampling rate).

- Alarm messages based on the **Alarm** threshold are independent from event recording. They are sent immediately after the alarm threshold is exceeded. In that case, the alarm threshold can be also set below the alarm threshold.

Additionally you may send other information to any of the contacts, as for example a **Daily Message** (see Section 4.4.5), as you can see in the following section “Messages”.

If the **Network** option is active, there are additional messages for common Alarm and common trigger (see Section 4.6).

After having changed something on the contact list, don't forget to click on the Apply button.

In Fig. 4.4.13 the main page related to contacts is displayed. In each line, the selected messages for the related contact are highlighted.

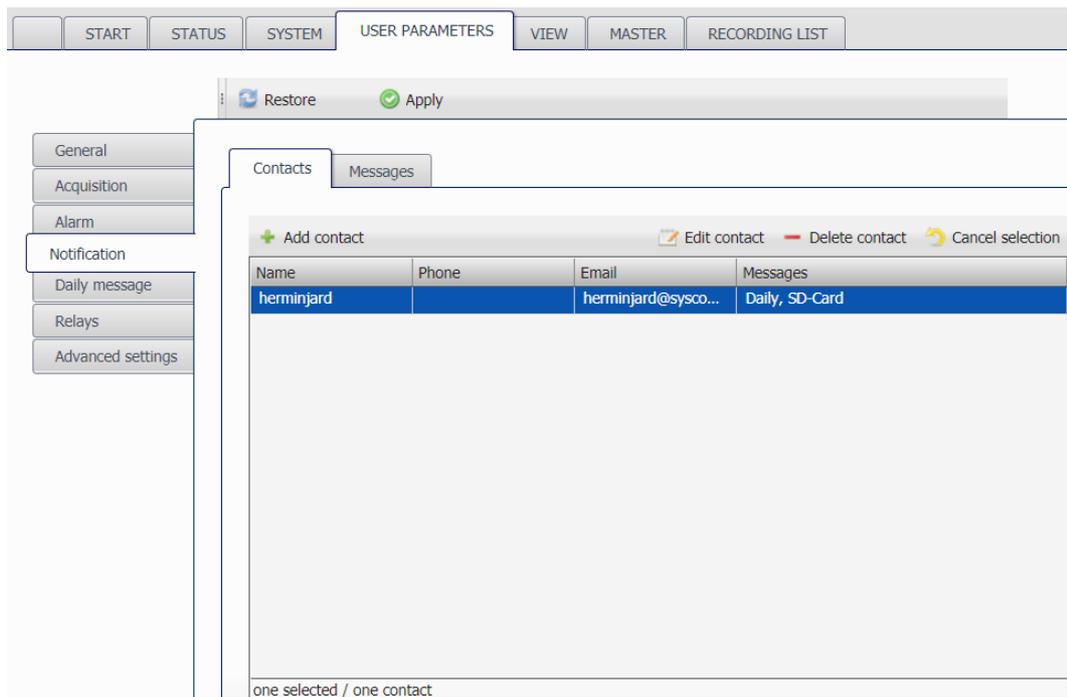


Figure 4.4.13. Summary of contact definition.

Messages

In this section the user can configure each type of notification by inserting the desired information. In details, it is possible to set the following messages:

- Trigger event
- Alarm 1
- Alarm 2

- Daily messages
- SD Card state of health
- Battery state of health

In Fig. 4.4.14, two windows related to the different messages are shown. In case of Alarm 1, Alarm 2 and Daily message, the user can also add a comment, that will be displayed in the message.

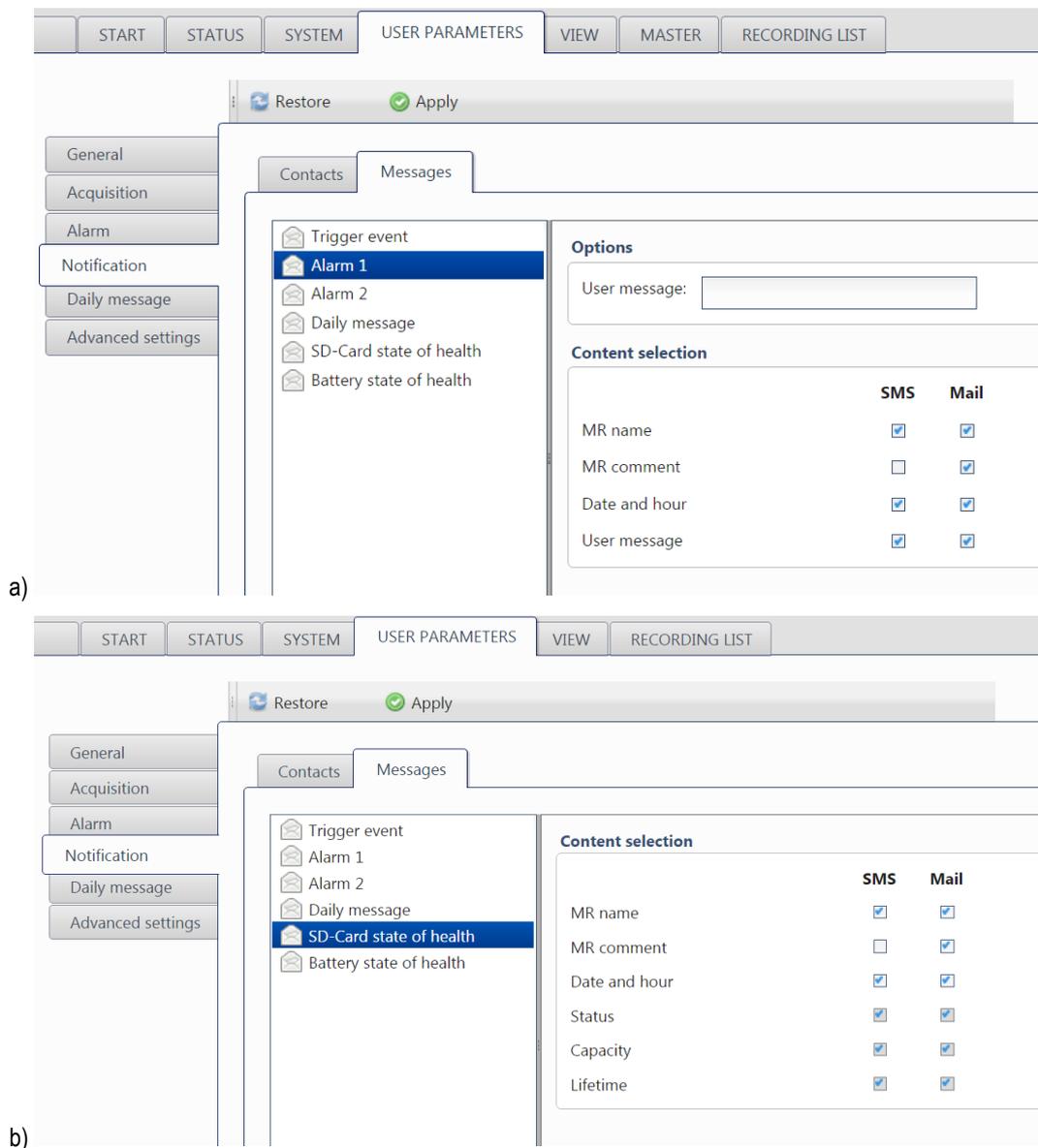


Figure 4.4.14. Subsection dedicated the notifications, for the selection of messages.

4.4.5 Daily message

This service sends you an e-mail and an SMS notification every day. You can set-up the **Time** when you wish to receive this notification. Some information is automatically appended: the number of events and the free size on the SD Card, and the background mode.

The recipients of this message are set-up in the section 4.4.4.

The user can also decide to receive the daily message at boot.

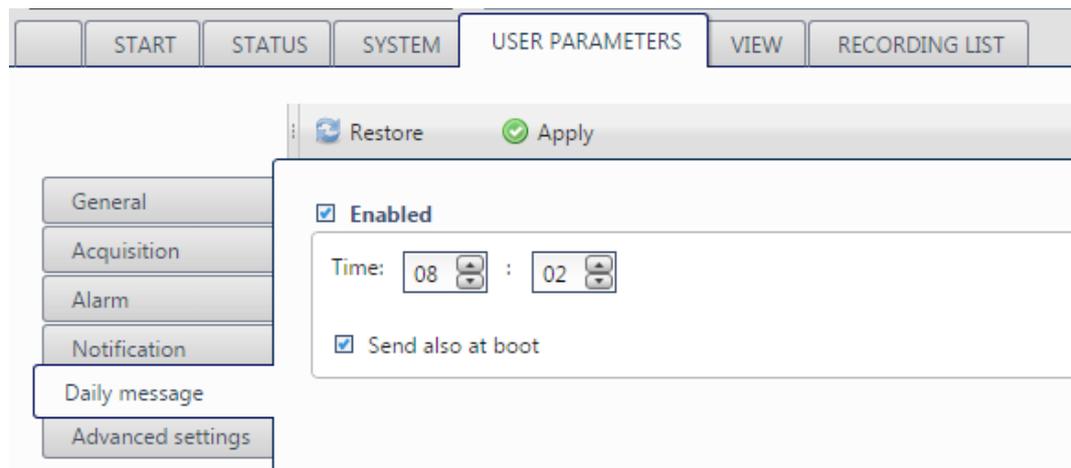


Figure 4.4.15. Subsection dedicated to the daily message.

4.4.6 Test Pulse

NOTE: This subsection is present only if an accelerometer (internal or external) or an external velocity meter is used together with the MR.

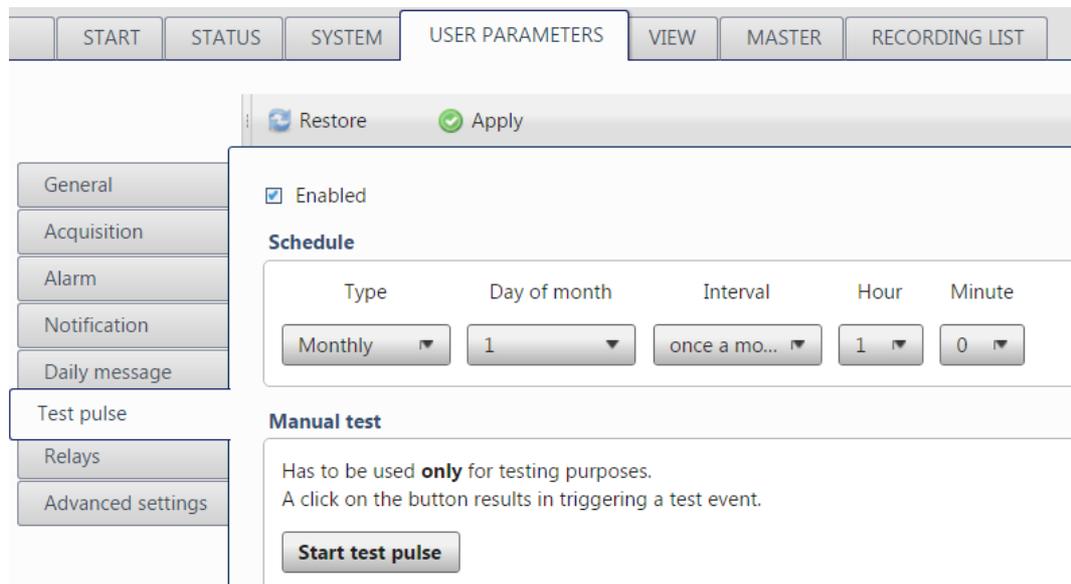


Figure 4.4.16. Subsection dedicated to the test pulse.

The test pulse function is useful to test the instrument by creating a pulse. You can do that:

- periodically, by indicating the desired interval between successive tests
- manually, by clicking on the “Start test pulse” button.

4.4.7 Relays

NOTE: This section is present only for the MR3000TR.

In the section dedicated to relays, you can configure each of the relays present inside the MR3000. In particular:

- The parameter connected to a certain relay:
 - **Alarm 1 and Alarm 2:** the relay is activated when the related alarm threshold is exceeded.
 - **Trigger:** the relay is activated when an event (created by a trigger) is recorded.
 - **Error:** the relay is activated when an error is detected
 - **Error and warning:** the relay is activated when an error or a warning is detected.
 - **Recording:** the relay is activated at the beginning of a recording of a manual recording, a timed recording, a trigger recording, a common trigger recording or a hardware trigger recording. The test pulse is not taken into account.
 - **Common Alarm 1, common Alarm 2 and common trigger** are available only for the master device in a network of different interconnected devices.
- How long the relay remains activated (Holding time), if the latch condition is not selected.
- If the relay is latched.
- If in the default state the relay is powered or unpowered.

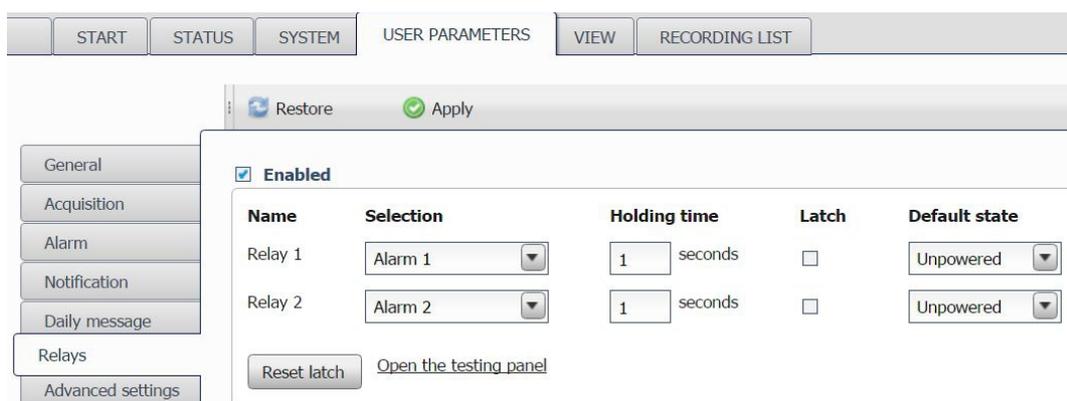


Figure 4.4.17. Subsection dedicated to the relays.

4.4.8 Advanced settings

This section is divided in Recording settings and Traffic settings.

In **Event recording settings** you can choose between two file formats:

- **XMR**, the proprietary format prepared by Bartec Syscom for events.

- **ASCII**, a simple format where all the data recorded is put in a simple text file. It is convenient if you plan to use software like *GNU Octave*, *Matlab* or other commercial software to view and process your data.

Moreover, you can choose the maximum duration for manual events. This means that if you do not stop the measure, the entire measure is divided in files having the duration set at this point. Limitation for triggered recordings can be set in chapter 4.1.2.

In **Background recording settings** you can choose between two file formats:

- **BMR**, the proprietary format prepared by Bartec Syscom for background files.
- **ASCII** format

In **Traffic settings** you can set-up how often the background files are pushed to the server, choosing a value included from 1 to 60 minutes. Moreover, you can choose to push the files after a trigger event.

The screenshot displays the 'Advanced settings' configuration page. At the top, there are navigation tabs: START, STATUS, SYSTEM, USER PARAMETERS (active), VIEW, MASTER, and RECORDING LIST. Below the tabs is a toolbar with 'Restore' and 'Apply' buttons. A left-hand menu lists various settings categories: General, Acquisition, Alarm, Notification, Daily message, Relays, and Advanced settings (highlighted). The main content area is divided into three sections:

- Event recording settings:** 'File format' is set to ASCII; 'Max file length for manual events' is set to 600 seconds.
- Background recording settings:** 'File format' is set to ASCII.
- Traffic settings for ftp and cloud:** 'Push background files every' is set to 15 minutes; the checkbox 'Also after a trigger event' is checked.

Figure 4.4.18. Subsection dedicated to the advanced settings.

4.5 VIEW

4.5.1 Acquisition

This service provides a real-time display of the waveform data, as they are recorded if the trigger criteria (see chapter 4.1.2) are fulfilled. The data are filtered and the sampling rate is as set in Acquisition (see chapter 4.4.2).

Each axis is can be unselected, so that you can display only one axis if you want.

The **Query refresh period** is the period between two requests from your computer to the MR. If you set it to a small value (like 100ms), the display is smooth, but also requires a fast communication to the MR3000C/TR (direct connection, not via GPRS) and more CPU time on your

computer. If you see that the display is slow, you should increase the query refresh period to e.g. 10 seconds.

The **Sample grouping** tells how many samples represent 1 pixel. If you set it to 1, the line displayed represents exactly the signal, but it also goes at the same rate. This means very fast. If you want to have time to see what's happening, you must increase this value. As a result, the display is slower, and the line becomes an approximation of the signal – one pixel represents the mean value of a group of samples – this has the same effect as applying a low-pass filter to the signal. Behind the line, with the same color but lighter shade, the envelope of the signal (with the true peaks) is drawn.

The **Vertical zooming**, or simply zoom, is exactly what its name suggests. A value of 1 means no zooming; a value of 100 means that signal is multiplied by 100.



Figure 4.5.1. Real-time visualization of data.

4.5.2 Background

This service provides a real-time display of the vibration level of the past (background file). This presumes that background recording is active (see chapter 4.1.5).

The settings are the same as for the waveform display (Acquisition – see above). Additionally you can move the display with the arrows. You can see at least one day back in time, probably more. It depends on the period you set in the background settings. The simple arrows allow you to move

forward or backward, and the double arrows send you back at the beginning or the end of the graph.

If you are positioned at the end of the graph, it will scroll by itself when a new sample arrives.

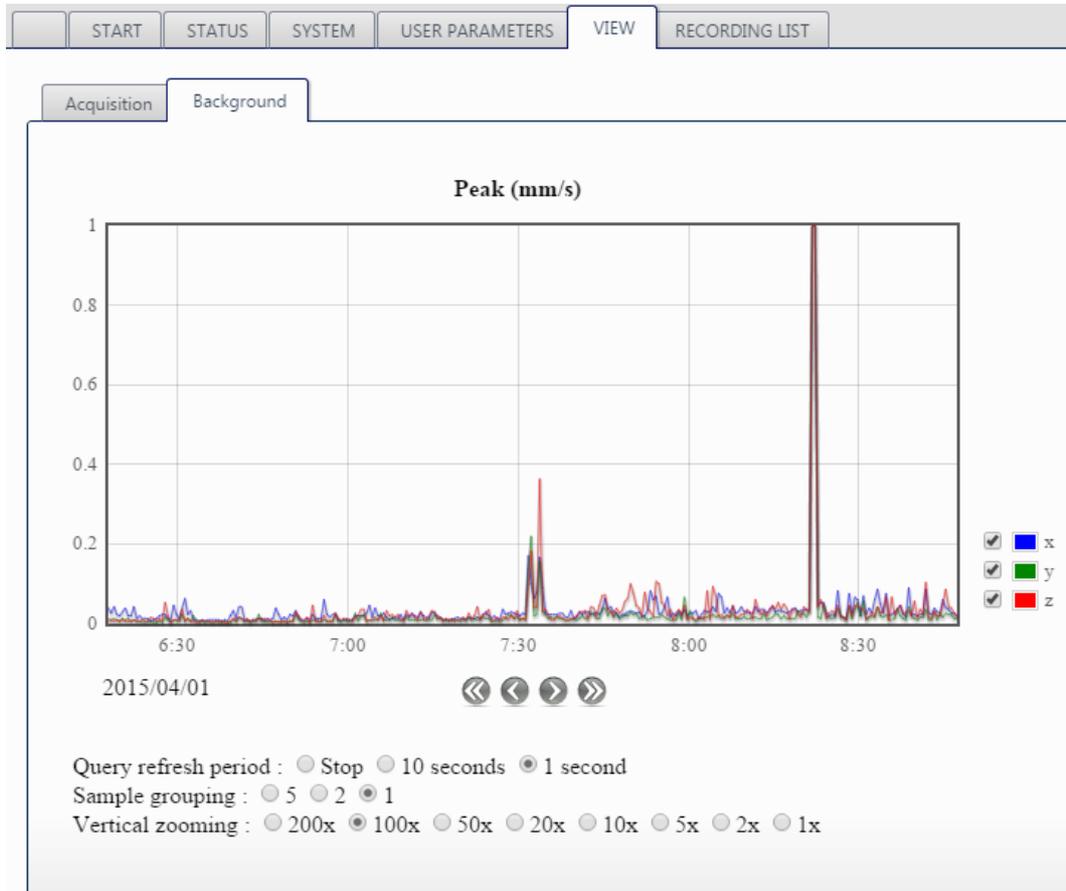


Figure 4.5.2. Real-time visualization of background data.

4.6 Master functionality

The “Master” functionality is an optional feature – on a standard instrument this tab is not available. To use this feature the option must be activated in one of the instruments present in the same network: it is called the **Master**. The other instruments are standard instruments, called **Slaves**. Communication in the network is handled by the Master.

With this feature some MRs (up to 32) can be integrated in a network to perform common trigger and common alarm.

In case of Master functionality, a good synchronization among the MRs in the network is highly recommended. This is achieved by synchronizing the clocks of all MRs in the network by one single MR (not necessarily the Master). This MR may be equipped with a GPS clock or itself be synchronized by an NTP server.

Common trigger means that all MRs in the network start recording if a single MR or a group of MRs meet the trigger criteria. A group is defined by a logical AND combination of individual MRs. It is possible to define several groups. The groups are combined with a logical OR condition.

Common alarm provides an alarm voting logic. The set-up is – similar to the common trigger – made by logical AND and OR combinations.

4.6.1 Config / Status

Here you define which MRs are part of the network. Simply **add** the IP address of the MR. The Master itself *must* be included (simply check the **itself** box). The IP address of the Master could be shown as 127.0.0.1 (localhost) or as its own IP address (Figure 4.6.1).

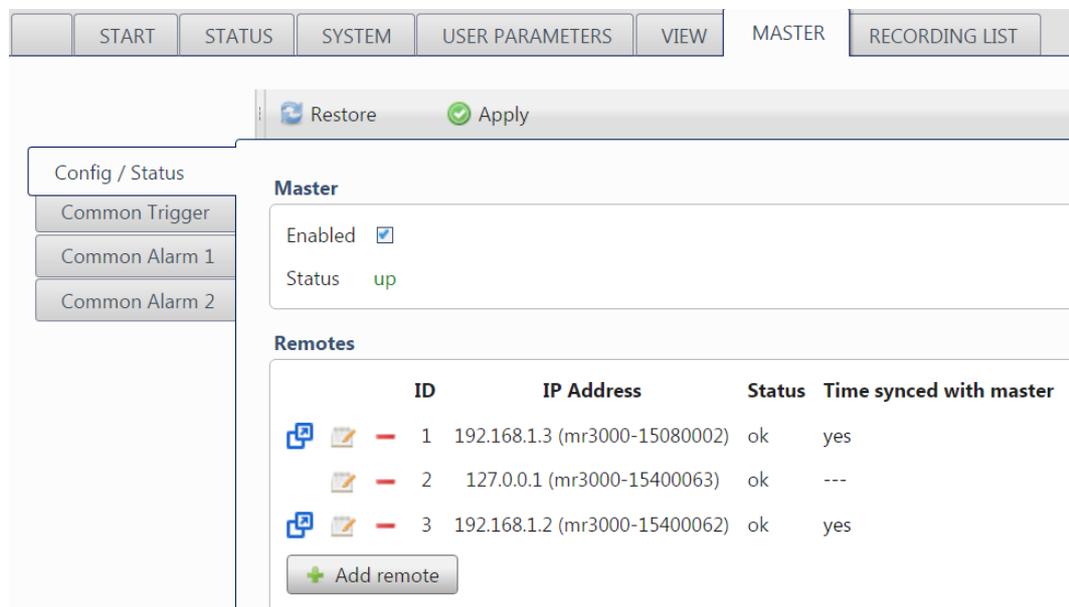


Figure 4.6.1. Subsection dedicated to the configuration of the network.

If the MRs are connected by wire in the same physical network, you use the real IP address (as shown on the LCD of each MR). If the MRs have a virtual address (VPN address) in addition to the physical address, you have to use the virtual address. Don't forget to check the **Enabled** box and click on **Apply**.

The column **MRs status** should show ok: this means the Master is able to communicate with the Slave. The column **Time synced with master** should show **yes**. This means the time difference in the corresponding MR is less than 3 seconds compared to the Master. This is usually the case if all MRs have access to a NTP server in the Internet or if a specific MR in the network is acting as time server. If you have an MR as internal time server, configure all other MRs to use the IP address of this MR as NTP server. (see chapter 4.3.2).

In the example proposed in Figure 4.6.1, three MRs are connected on the same local network, and the IP address has been changed manually.

NOTE: the time synchronization might take few minutes to be synchronized at start.

4.6.2 Common Trigger

Here you define the conditions for a common trigger, named recording in all MRs in the network. Each line contains a condition, the lines are logically OR combined. A condition might be a single MR or a group of different MRs. If more than 1 MR is defined, the trigger condition in the single MR must occur within 3 seconds.

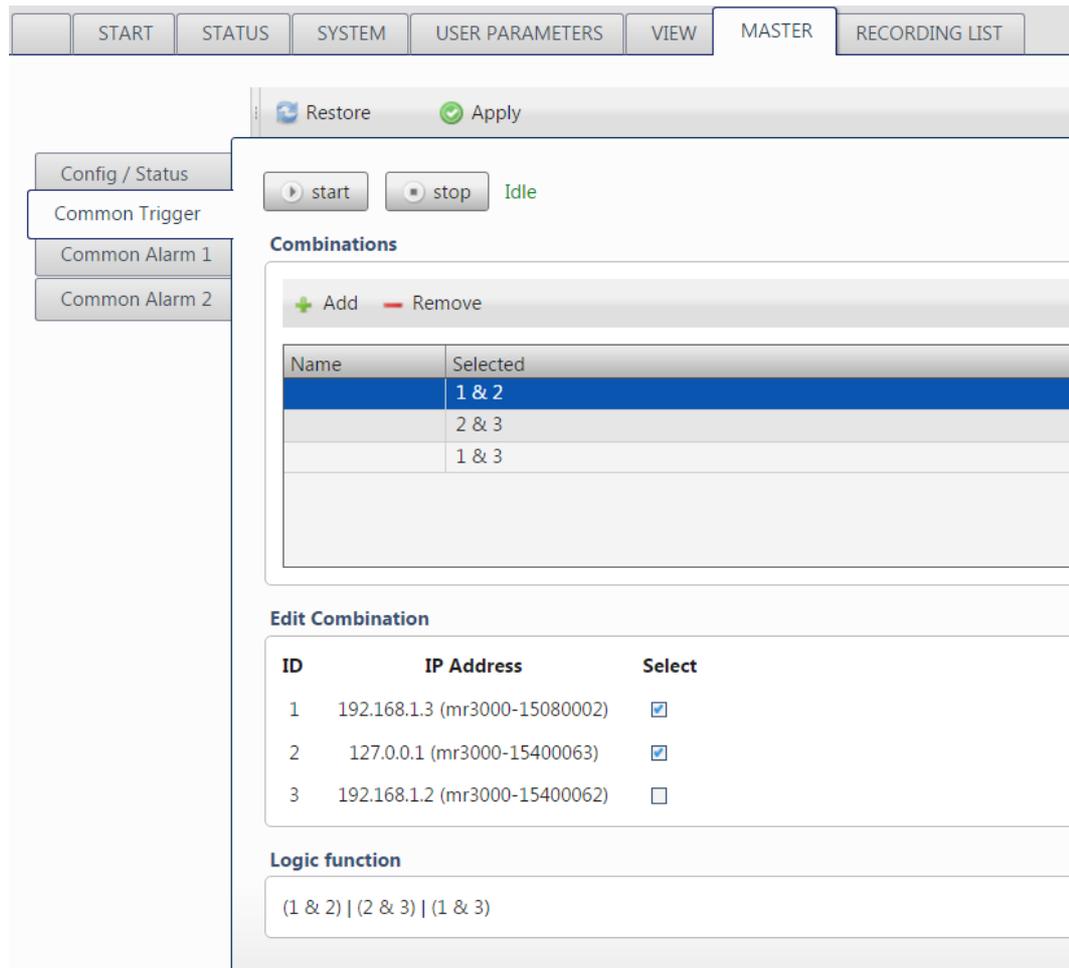


Figure 4.6.2. Subsection dedicated to the setting of the common trigger.

Click on the **Add** button to set-up a new condition. Click in the **Edit combination** section the **select** box for the single MRs. In the column **Name** you may enter a mnemonic for this condition (e.g. MR in cellar). In the column **Selected** the logical combination of this condition is shown. The logical combination of all conditions is shown in the section **Logic function**.

A simple example: You have to install 3 instruments to monitor the vibration in a 5 story building. 1 MR is in the cellar, one MR at the middle of the building height and one on the 5th floor. As there is a lot of activity in the rooms from 2nd to the 5th floor, you do not want to use a trigger (disable the trigger) on these instruments, but you would like to have a recording on these instruments if the vibration in the cellar exceeds the threshold level. For this simple example, the MR in the cellar alone can issue a common trigger, so you have one single condition and you check only the MR in the cellar.

If a file is recorded due to a common trigger condition, this is shown in the **Recording List** (chapter 4.7) with the entry **Common** in the column **Reason**. If at the same time in the corresponding MR also the local criteria for triggering were met, there will be 2 recordings of the same time history, but with different starting time and duration – the file recorded due to the common trigger overlaps the file due to the local trigger. The files due to common trigger have the same start time and the same duration in all the MRs in the network.

To get only files due to a common trigger from the **Recording list**, you will have to apply a filter for the **Reason** (chapter 4.7).

With the button **Start** and **Stop**, you can also start a new recording among all the sensors present in the network without waiting for the activation of the common trigger.

4.6.3 Common Alarm 1 and 2

Common Alarm means that there is a voting logic for the alarms. Here you define the conditions for the voting logic. The procedure is exactly the same as for the common trigger. Make sure to activate the **Common Alarm** in the tab Contacts to get a message if there is a common alarm.

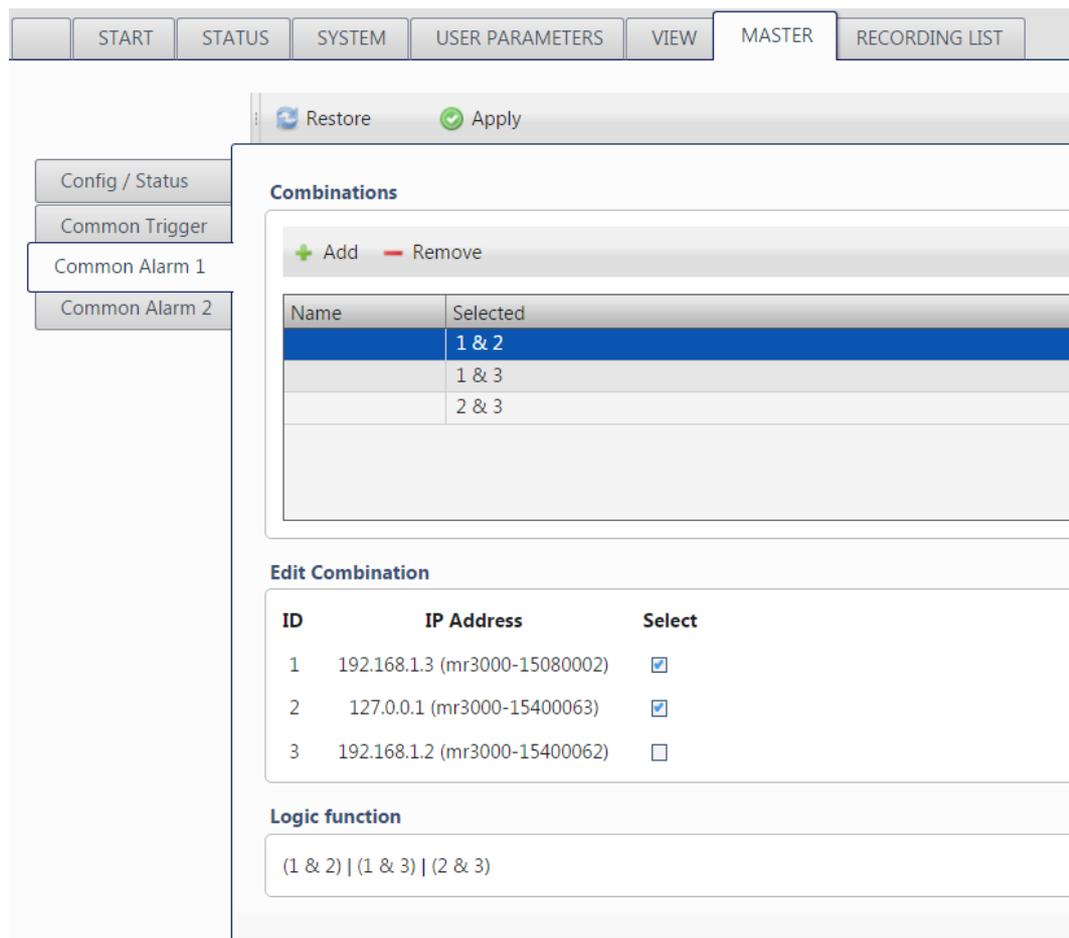


Figure 4.6.3. Subsection dedicated to the common alarms.

4.7 Recording List

On this tab you may select single files for immediate download – it is called “interactive mode” (similar as VIEW > EVENT for the MR2002). All the files in the memory are presented in chronological order (default). You may change the sorting order by clicking on the corresponding column title. For each file the **Peak** values, the recording **Duration**, the file **Type** and the **Reason** for the recording are shown.

Use the arrow keys << >> at the upper right edge to go to the first / last page, the simple arrows < > go to the next/previous page.

If you move the mouse over a single line, additional detail information for this file is shown. Clicking on the line will start an immediate download of the file. If you have EAWlight (the WINDOWS software to visualize the data) installed, the file (peak or event) is shown immediately. You may use EAWlight to perform a Frequency Analysis (FFT) of the waveform and to print the waveform.

The screenshot shows the 'Recording list' tab in the software interface. At the top, there are navigation tabs: START, STATUS, SYSTEM, USER PARAMETERS, VIEW, and RECORDING LIST. Below the tabs, the 'Recording list' section displays the number of recordings (11857) and a UTC checkbox. A table lists recordings with columns: Sel, Type, Reason, Date / Time, Duration, Peak X, Peak Y, and Peak Z. A tooltip is shown over a row with the following details: Date / Time: 2015-07-07 10:39:05, Type: Event, Reason: Trigger, File: /events/2015/07/07/15188002.XMR, Size: 7.3 kB, Number of sample: 801, Sample rate: 400, Duration: 2.0025 [s], Peaks: 8.40 / 18.8 / 1.68 [mm/s]. Below the table is a 'Selected recording list' section with 'Number of selected recordings: 0' and 'Total size: 0'. It includes a 'Download' button and 'Select all' / 'Deselect all' links.

Sel	Type	Reason	Date / Time	Duration	Peak X	Peak Y	Peak Z
<input type="checkbox"/>	B	Continuous	2015-07-07 20:15:03	01h 00m 00.0s	0.143	0.0949	0.165
<input type="checkbox"/>	B	Continuous	2015-07-07 19:15:03	01h 00m 00.0s	0.559	0.343	0.253
<input type="checkbox"/>	B	Continuous	2015-07-07 18:15:03	01h 00m 00.0s	0.306	0.168	0.105
<input type="checkbox"/>	B	Continuous	2015-07-07 17:15:03	01h 00m 00.0s	0.745	0.352	0.295
<input type="checkbox"/>	B	Continuous	2015-07-07 16:15:03	01h 00m 00.0s	0.359	0.357	0.545
<input type="checkbox"/>	B	Continuous	2015-07-07 15:15:03	01h 00m 00.0s	0.368	0.227	0.157
<input type="checkbox"/>	B	Continuous	2015-07-07 14:15:03	01h 00m 00.0s	0.443	0.263	0.188
<input type="checkbox"/>	B	Continuous	2015-07-07 13:15:03	01h 00m 00.0s	0.298	0.224	0.190
<input type="checkbox"/>	B	Continuous	2015-07-07 12:15:03	01h 00m 00.0s	0.460	0.336	0.344
<input checked="" type="checkbox"/>	E	Trigger	2015-07-07 10:39:05	02.0s	8.40	18.8	1.68
<input type="checkbox"/>	E	Trigger	2015-07-07 10:39:05	02.3s	5.54	22.9	3.81
<input type="checkbox"/>	B	Continuous	2015-07-07 03h 12m 00.0s	03h 12m 00.0s	8.40	22.9	3.81
<input type="checkbox"/>	B	Continuous	2015-07-07 24h 00m 00.0s	24h 00m 00.0s	9.21	9.35	5.46
<input type="checkbox"/>	B	Continuous	2015-07-07 24h 00m 00.0s	24h 00m 00.0s	0.450	0.287	0.317

Figure 4.7.1. Section dedicated to the recording list.

You may select several files and then click on the **Download** button. The files are packed in a single Zip-File and transferred to the PC. The Zip-File is stored in the DOWNLOAD directory of the PC.

A more sophisticated method is to enable the **Filters** section and to click on the **Add** button (see Figure 4.7.2). You may then select all the files matching certain criteria (e.g. all the files that have been recorded since a specific date). You may use more than one line to narrow down your selection.

NOTE: We recommend to erase the SD card at the beginning of the measurements at a specific location and to keep all the files on the SD card throughout the whole monitoring period. In order to have seamless (without any interruption) recordings (peak files if the vibration level was below the trigger threshold or additionally event files if the vibration level exceeds the trigger threshold) throughout the whole monitoring period, it is NOT possible to erase single files. The SD card is considered as documentary evidence.

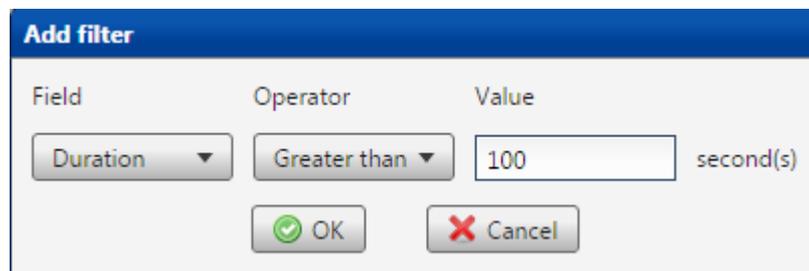


Figure 4.7.2. Subsection dedicated to the filters for the recording list.

4.8 System warnings

In case there are anomalous or incoherent settings about the parameters of the MR3000C/TR, some warnings will be displayed in order to alert the user.

For example, if the user does not activate the alarms but he wants to receive the mails also with notification of the alarm, then, immediately after confirmed the operation with the “Apply” button, the program will show a warning at the top left of the user interface.

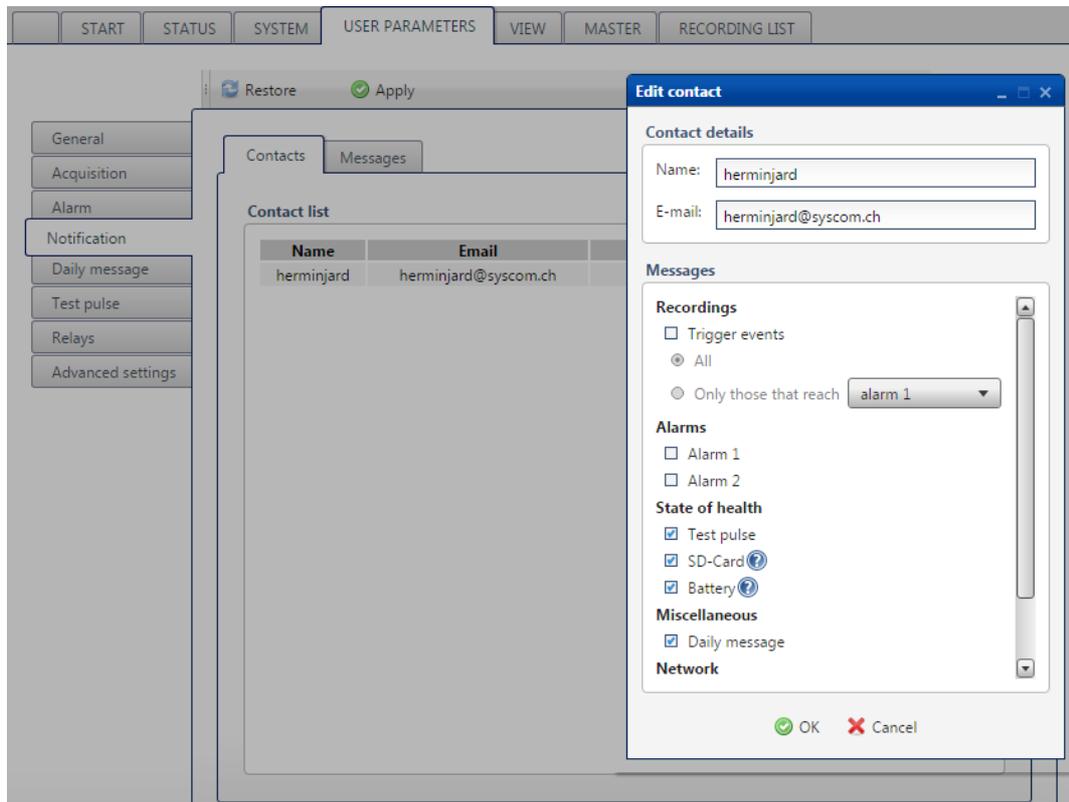


Figure 4.8.1. Setting of the messages desired for a contact, where the Alarm 1 has been selected even if it has not been considered in the “User Parameters” section.

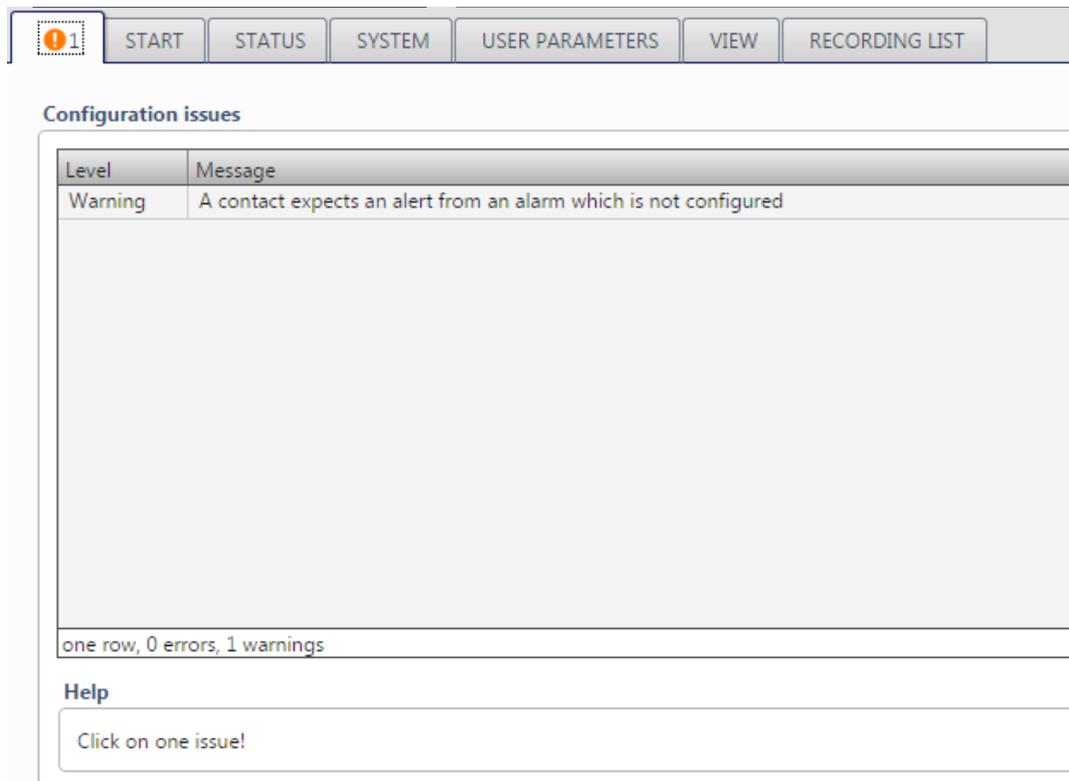


Figure 4.8.2. Automatic warning produced by the software, related to the wrong settings shown in Figure 4.8.1.

Another example is given by setting Alarm 2 based on the vector sum VSUM (see Figure 4.8.3) while this value is not calculated in the software, because in the background file this has not been activated (see Figure 4.8.4, where the signal peak and the dominant frequency are calculated but not the vector sum). If the setting Mode is change to “Peak + Vector Sum”, then the warning disappears (see Figure 4.8.5).

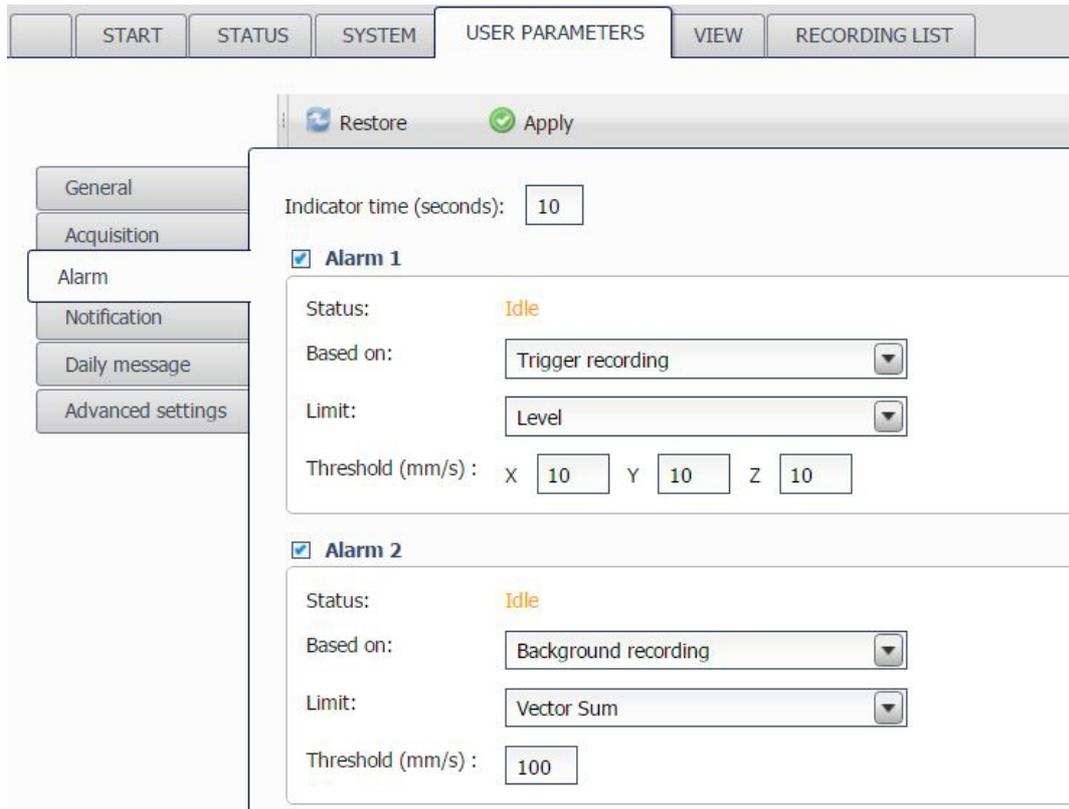


Figure 4.8.3. Setting of the alarm, where the Alarm 2 is based on the Vector Sum.

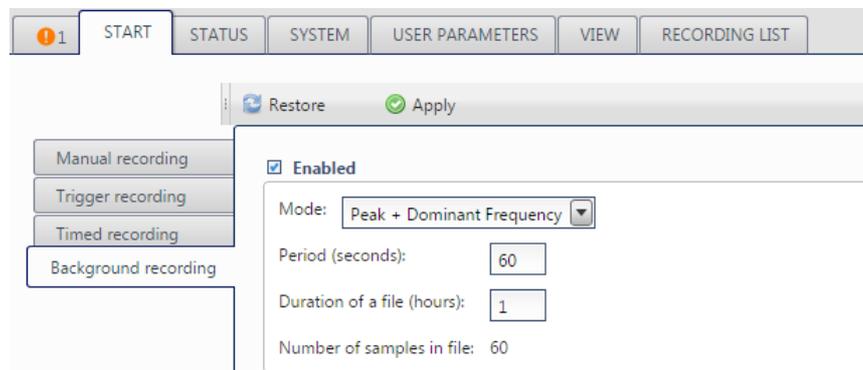


Figure 4.8.4. Settings of background recording, with selection of the peak and the dominant frequency, that causes a conflict with the alarm settings.

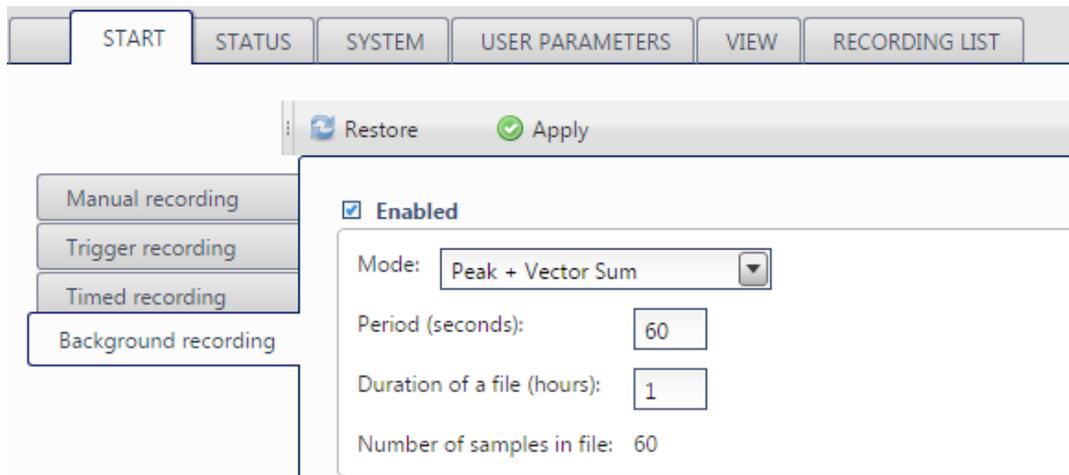


Figure 4.8.5. Settings of background recording, with selection of the peak and the vector sum, that does not cause a conflict with the alarm settings.

4.9 Rest API

The REST API functionality for firmware 1.6 and above. Please contact Bartec Syscom for more information at support@bartec-syscom.com.

5. OPERATING WITH THE MR3000C/TR

In this section some aspects of the work with the MR3000C /TR are described in details.

5.1 Preparing the MR for field use

We recommend to set-up the MR3000 in the office for the use in the field. Depending on the measurement task, you may consider the different power options:

- connection to AC power by means of the AC/DC cable
- connection to external battery
- Power over Ethernet (PoE)

For a long-term installation you may check the availability of an existing Internet connection you may share (e.g. you can easily hook-up your MR3000 to a DSL or cable TV router). If you plan to use a 3G connection we recommend you to check the network coverage at the site, maybe an antenna with extension lead may be needed.

We recommend you to clear any obsolete files on the SD card before you use the MR for a specific measurement. And we also recommend you to collect all the data once the measurement is finished.

We suggest you to use the SCS Cloud Software to manage the data coming from the MR3000. For more information, please:

- visit the web address: <http://scs.bartec-syscom.com>
- visit the dedicated website page: <http://www.syscom.ch/products/software/scs-cloud-software/>
- contact Bartec Syscom at info@bartec-syscom.com

In the following, we will present the operational procedure for a typical application with the MR3000C/TR.

5.1.1 Construction site monitoring

Let us suppose that for the monitoring of a construction site we need 4-5 MR3000C to equip all the nearby buildings. We do not know if we can use an existing Internet connection, so we use MRs with the 3G modem option and equip the units with a SIM card (see chapter 2.5.1). AC power is available at all the sites – nevertheless we use the external battery pack in order to be warned if somebody unplugs the device – if we had no battery pack, the unit is dead if the mains is disconnected.

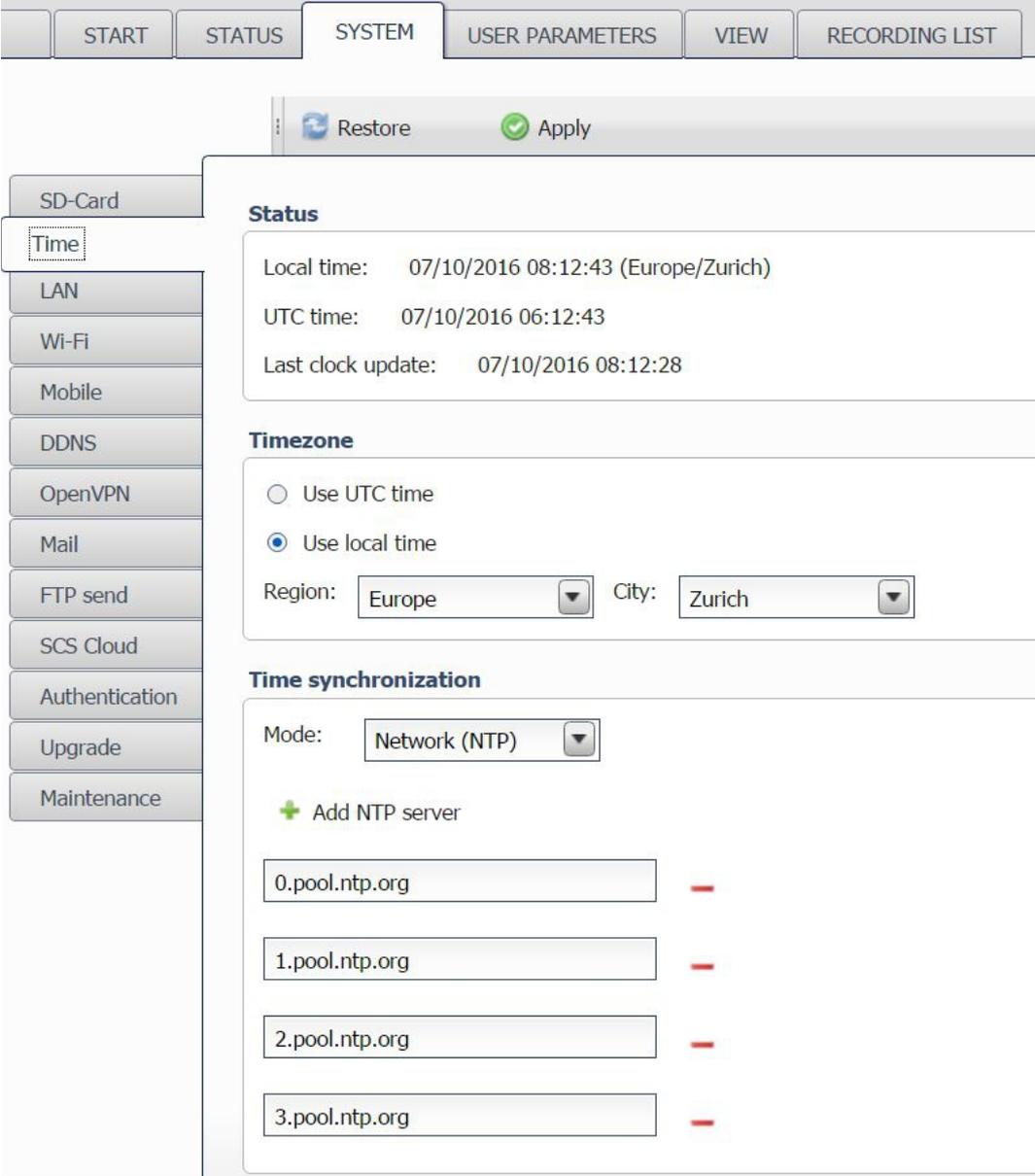
First we set-up all the communication parameters, to make sure that we are able to communicate with our MR once it is installed in the field.

We establish communication to the devices – as described in chapter 3.1 and set-up the units as follows.

STEP 1. Time settings

- Choose the local time of the city where the MR3000 will be installed

For more information, please refer to chapter 4.3.2.



The screenshot displays the 'SYSTEM' configuration page for the MR3000 device. The left sidebar contains a menu with 'Time' selected. The main panel is divided into three sections: 'Status', 'Timezone', and 'Time synchronization'. The 'Status' section shows the local time as 07/10/2016 08:12:43 (Europe/Zurich), the UTC time as 07/10/2016 06:12:43, and the last clock update as 07/10/2016 08:12:28. The 'Timezone' section has 'Use local time' selected, with 'Region' set to 'Europe' and 'City' set to 'Zurich'. The 'Time synchronization' section has 'Mode' set to 'Network (NTP)' and includes an 'Add NTP server' button. Below this are four NTP server fields, each containing a pool.ntp.org address (0, 1, 2, and 3) and a red minus sign to its right.

Figure 5.1.1. Time settings.

STEP 2. Settings of the 3G module

NOTE: This step is necessary in case a SIM card is used.

- Turn off the MR3000, insert the SIM card and then turn it on.
- If requested, insert the PIN code of the SIM card
- Choose the activation interval of the 3G module. We suggest to activate it

START
STATUS
SYSTEM
USER PARAMETERS
VIEW
RECORDING LIST

Restore
Apply

SD-Card

Time

Wi-Fi

Mobile

DDNS

OpenVPN

Mail

FTP send

SCS Cloud

Authentication

Upgrade

Maintenance

Sensor

Enabled:

Status: online

Activation

Mode: Time scheduling

Activated from: 13 : 30 To 16 : 59

Network

Status: registered

Name: Swisscom

Technology: hspa

Strength: 48 %

SIM

PIN code: 3051

SMS

Limit per day: 5 Already sent: 2 Reset

Center number: +41794999000

Check SMS sending

Data network

Enabled:

Status: up

Access point name: gprs.swisscom.ch

Username: gprs

Password: gprs

Roaming allowed:

Preferred default internet access:

Data network watchdog

Enabled:

Host to ping: a.root-servers.ne

Interval in hours (1-24 hours): 24

Figure 5.1.2. Settings of the 3G module.

- In a short time interval at the end of the day, if an immediate communication of the recorded values is not needed

- During the working hours on the site, if an immediate communication of the recorded values is needed
- Set-up and activate the SMS feature (for the Alarm notification), and test it with the dedicated button.
- Check/insert the data network settings.

For more information, please refer to chapter 4.3.5.

STEP 3. Acquisition parameters

- Choose the desired filter for the velocity sensor.
- Choose the sampling rate. We suggest to select a sampling rate which does not exceed 10 times the maximum frequencies expected in the measurement.

For further details, please refer to chapter 4.4.2.



Figure 5.1.3. Settings of acquisition parameters.

STEP 4. Trigger recording

- Choose the pre- and post- event duration.
- Choose the max length.
- Choose the trigger combination. We suggest to trigger when the threshold on one of the three axes is exceeded (X or Y or Z)
- We suggest not to activate the trigger increment
- We suggest to choose the trigger levels after a site evaluation.

For further details, please refer to chapter 4.1.2.

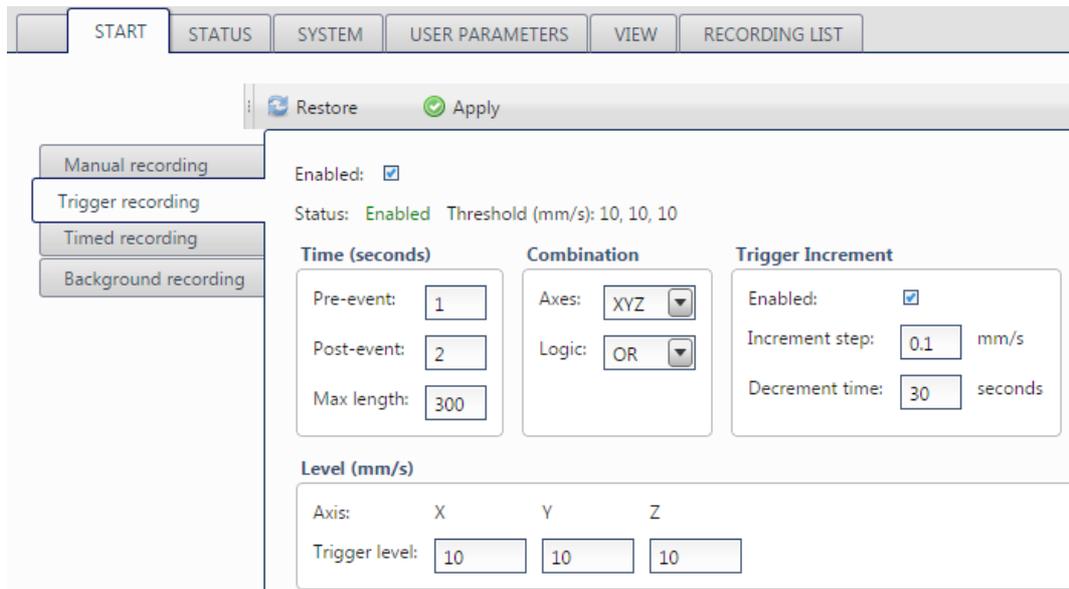


Figure 5.1.4. Settings of the trigger recording.

STEP 5. Alarm levels

- Configure alarm 1 based on the desired recording mode and on the reference norm.
- Configure alarm 2 based on the same principles.

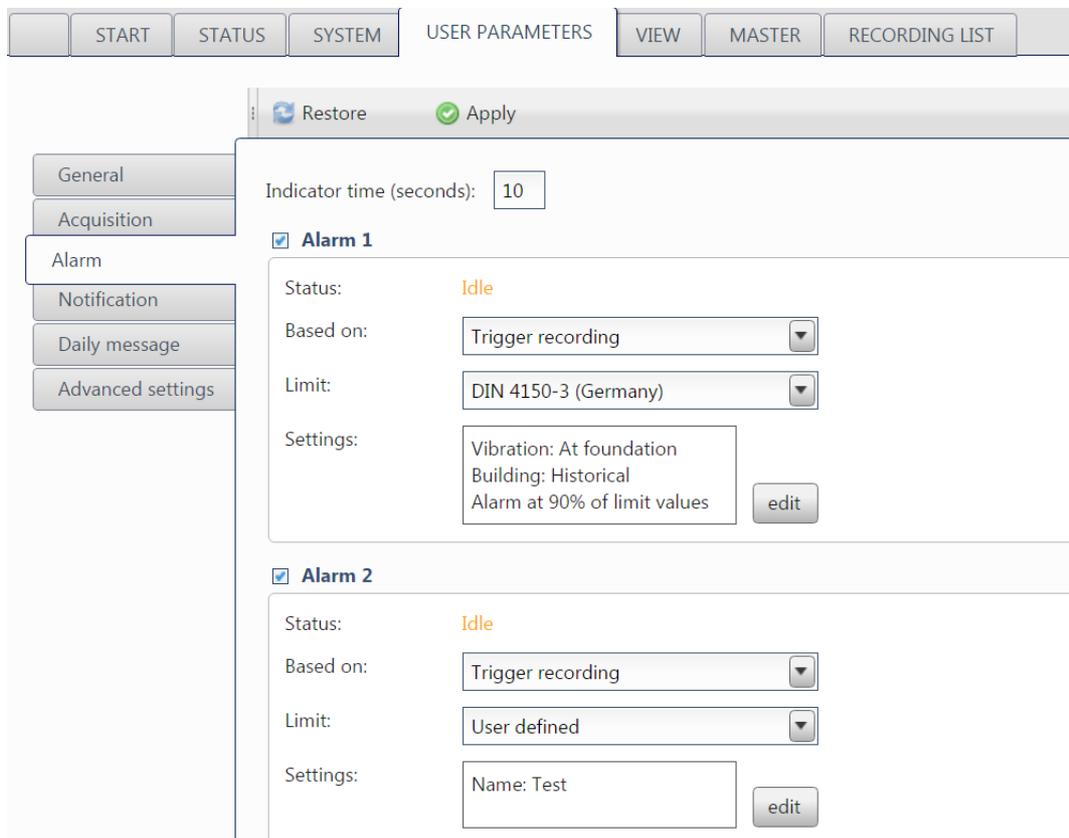


Figure 5.1.5. Settings of the alarm.

In the example, the limits of alarm 1 have been set based on the German norm DIN 4150-3, at 90% of its values. This means that the real values are reduced by 10% to create a warning threshold. The limits of alarm 2 have been set to user-defined values.

STEP 6. Notifications

NOTE: This step is useful only in case the MR3000 has an internet connection.

- Insert the contacts concerned in the monitoring
- Select the information that each contact should receive

In particular, let us suppose that you want to send an SMS to the site supervisor if the vibration level exceeds the alarm thresholds. Moreover, we add a new contact called Operator, that will be informed about every specific notification on the system. More details can be found in chapter 4.4.4.

In particular, in case a message should be sent to site supervisor if vibration level is exceeding the alarm threshold, then a dedicated contact can be created in the WebUI (Figure 5.1.6 on the left), while other contacts with other kinds of messages can be created, for example for an operator (Figure 5.1.6 on the right).

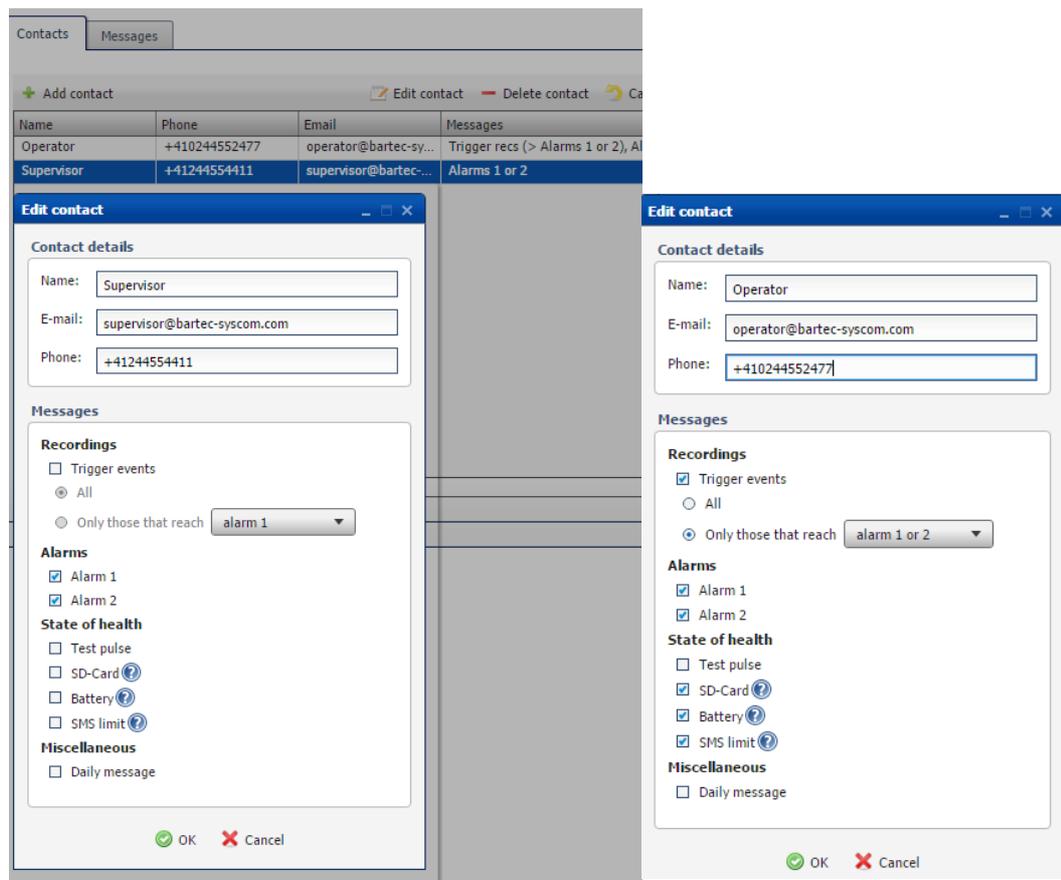


Figure 5.1.6. Settings of the contact.

STEP 7. Connection to the SCS

The SCS (Syscom Cloud Software) is the cloud software provided by Bartec Syscom for the management and the visualization of the data coming from the MR3000 instruments.

The connection to the SCS is fundamental:

- to visualize and process all the data
- to remotely control the units

To configure the connection MR3000-SCS, access the section System / SCS cloud on the Web User Interface and then insert the token generated by the SCS. Once the unit is connected to the cloud, select the time interval between two successive synchronizations between the MR3000 and the SCS. Refer to chapter 4.3.10 for more details.

For more information about the SCS and the creation of a new account, please visit the [SCS website](#) or the dedicated [webpage](#) on the Bartec Syscom website.

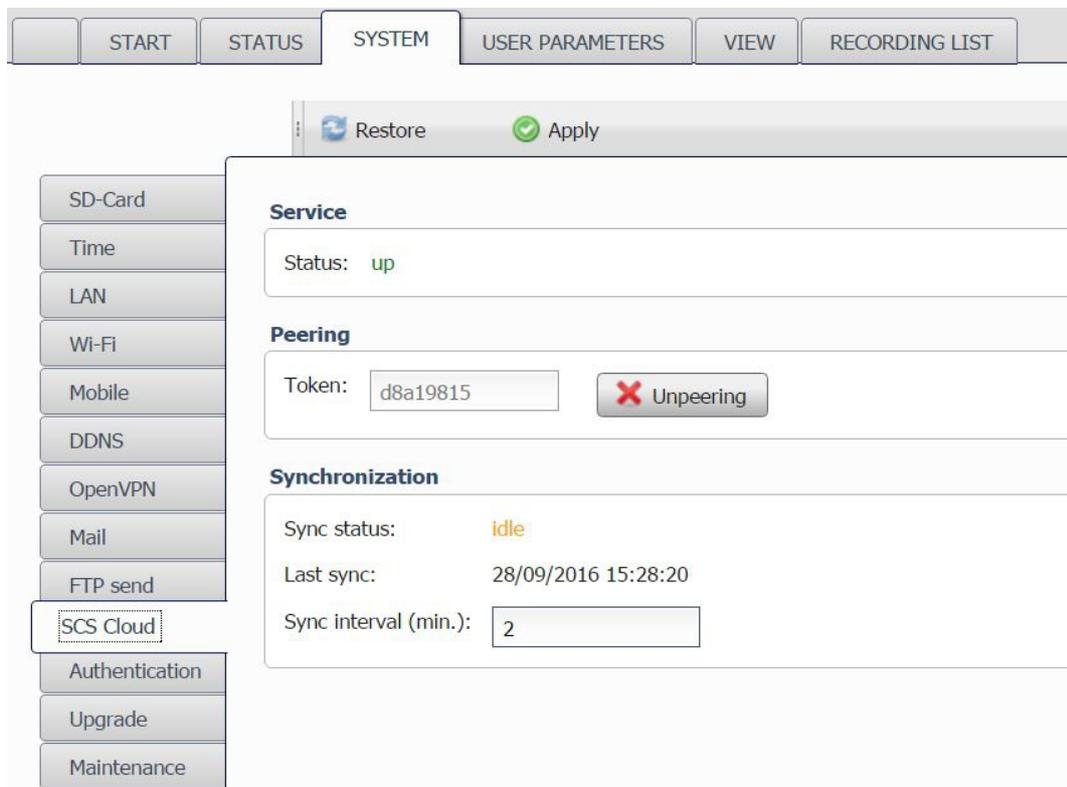


Figure 5.1.7. Settings of the connection MR3000-SCS.

STEP 8. Installation at site

You should choose a convenient place where an AC power plug is available (in case of a long monitoring) and with a reasonably good GSM/UMTS coverage. The sensor must be installed in a perfect horizontal or vertical position, depending on the sensor that has been purchased (Section 2.5.5 for more details).

Once the unit is started up make a final check with your smartphone/tablet/PC before leaving the place. In particular, the page relative to the Status (see chapter 4.2) gives many useful information.

Finally, it is possible to open the page relative to the Status (see chapter 4.2) to check:

1. The status of the Mobile connection. We see that the status is up – even if the signal is weak – and that the MR has an acquired an IP address.
2. The status of the supply power.

Before leaving the place we suggest to shut down the Wi-Fi connection to save battery capacity and to make sure that nobody attempts to tamper with the unit.

5.2 Power Options

The MR3000C/TR can be powered by:

- 12 VDC from a battery or solar panel
- Syscom battery pack with internal charger
- AC/DC converter
- Power over Ethernet (PoE) according to IEEE 802.3af,
or a combination of them.

5.2.1 External 12 VDC Battery

Any 12 V battery may be used as long as it meets the capacity requirements of the application. The battery may be charged by a solar panel with a battery charger. The input voltage range of the MR3000C/TR is from 9 V to 13.5 V DC.

5.2.2 Battery Pack

The battery pack (see Fig. 5.2.1) contains a lead acid gel battery and a battery charger. The battery capacity is 5 Ah. Depending on the hardware and services you are using, this results in an autonomy shown in the following table:

Normal operation (LAN interface active):	25 hours
Normal operation (LAN + Wi-Fi)	21 hours
Normal operation (LAN + Wi-Fi + GPRS idle)	17 hours
Normal operation (LAN + Wi-Fi + GPRS communicating)	15 hours



Figure 5.2.1. MR3000C connected to the SYSCOM battery pack

5.2.3 External AC/DC Power Supply

Alternatively, the MR3000C/TR may be powered by a 12 VDC AC/DC supply. In case of power interruption, the MR3000C/TR will shut down without any notification.



Figure 5.2.2. MR3000C connected to an external AC/DC supply.

5.2.4 Power over Ethernet

The MR3000C/TR provides the option to be used as a Powered Device (PD) using Power over Ethernet (PoE) according to IEEE 802.3af standard. An appropriate commercial/industrial PoE switch along with a 48 VDC supply allows you to use the LAN connector as a combined communication/power plug.

The PoE switch injects the 48 VDC into the data lines which are then extracted by the MR3000C/TR. According to the selected PoE switch, multiple instruments may be linked to a combined communication/power network. Optionally a battery or UPS may be hooked to the PoE switch to accommodate for power interruptions.

Note: A PoE surge protection may be added close to the MR3000 for internal PoE protection.



Figure 5.2.3. MR3000C and a laptop being powered from a PoE switch, via LAN connectors.

5.2.5 Combined Power Options

The MR3000 may also be powered by a combination of PoE and an auxiliary external 12 VDC supply (battery or AC/DC). In this case, the MR3000 automatically manages the power sources.

5.3 Additional services

This section describes the download of files from the MR without using the interactive method in the tab **Recording List** in the WebUI (see chapter 4.7). The files can be also downloaded in the Section Manual Recording (see Section 4.1.1).

5.3.1 Embedded SFTP server

The MR has an embedded SFTP server that allows you to easily download events and background files from the MR to your computer. SFTP stands for Secure File Transfer Protocol (FTP using SSH connection).

Do not mix up the SFTP server described here with the FTP send service described in chapter 4.3.9. FTP send pushes the files in given time intervals to a remote server, the SFTP server allows you to interactively download the files on your PC.

To use SFTP you must install a SFTP *client* on your PC. Then you connect to the MR (which is the *server*), and you can browse the events and background files. The log-in and password you need to know are:

Log-in: **user**

Password (default): **serial number of the MR**

NOTE: Every SFTP client has a refresh button somewhere. When you browse through the content of the MR, and you don't see the files that are supposed to be there, just click the refresh button.

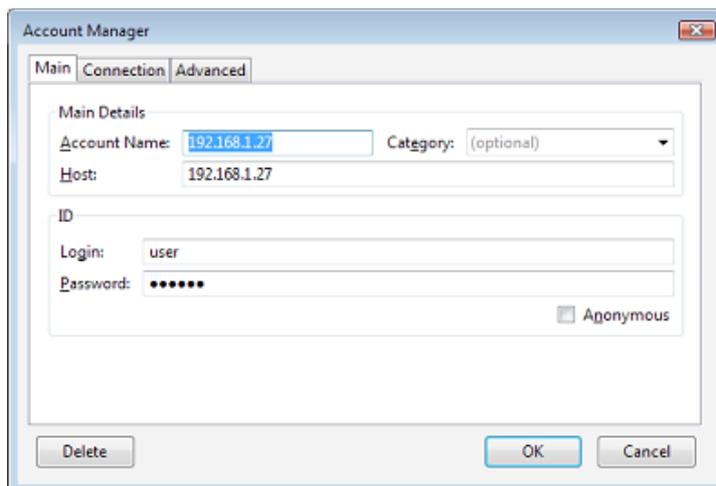
Below you will find a list of SFTP clients with a quick explanation on how to use it. All these software are free, and widely available on the Internet.

5.3.1.1 FireFTP

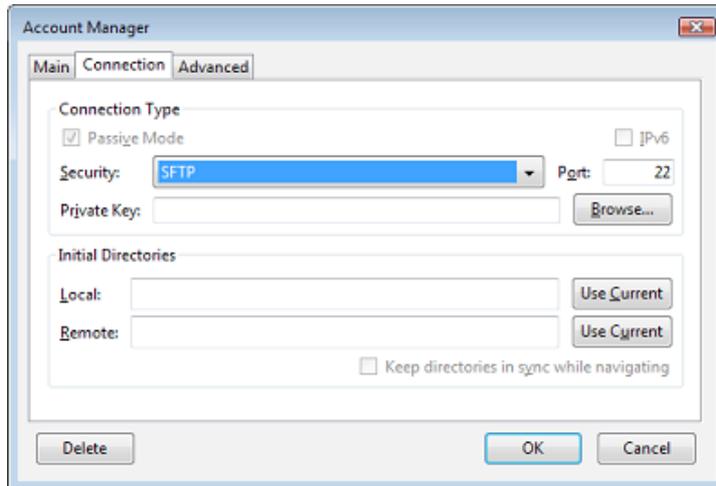
If you are using Firefox as Web browser, this is the favored SFTP client. You have to install the add-on FireFTP. This SFTP client is directly integrated into your Web browser.

To install it, launch Firefox, and click on **Tools->Add-ons**. Then choose and install FireFTP, and restart Firefox. Then you need to add a button for a convenient access to FireFTP: just click on **View->Toolbars->Customize**, find the FireFTP button, and drag/drop it to the toolbar somewhere.

Click on this button now, the FireFTP tab will appear. Select **"Create an account"**.

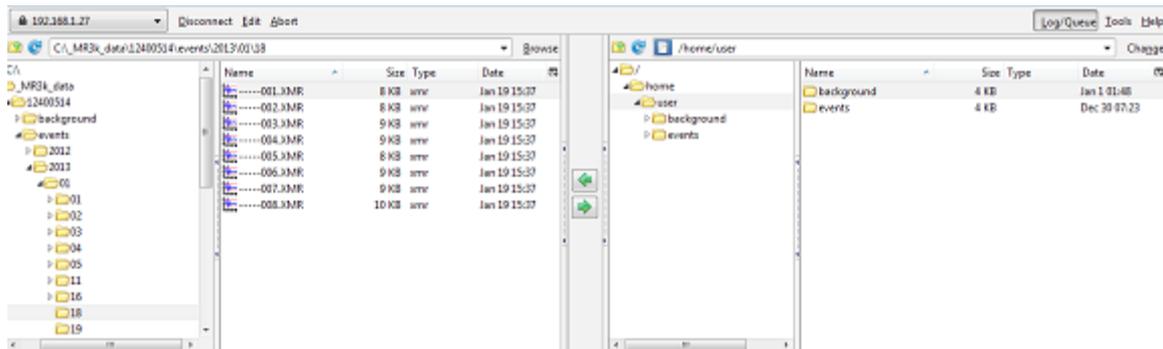


In the Main tab enter an account name (whatever you want to name this connection)
In the field **host** you enter the IP address of the MR (real address for direct connection, VPN address for remote connection)
login and **password** as mentioned above.



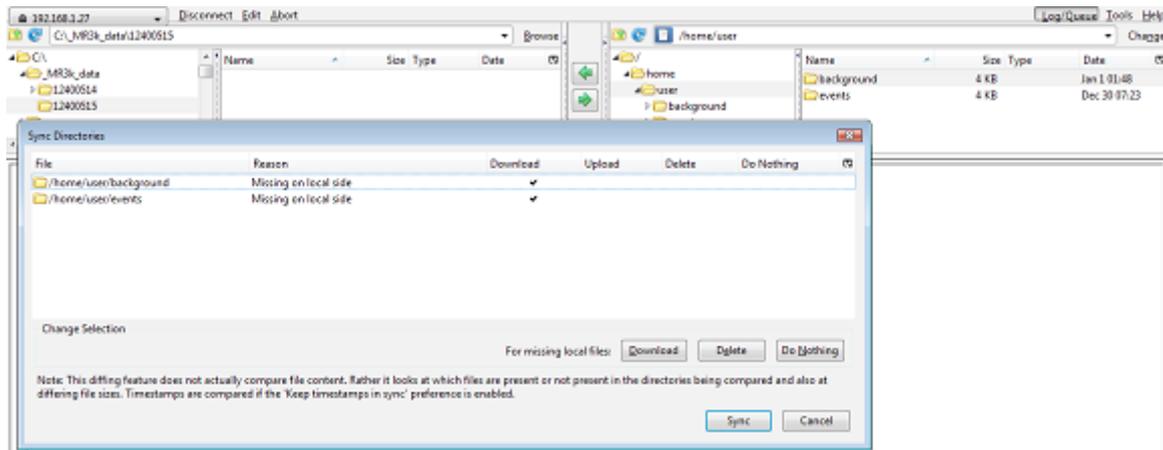
Then you go to the Connection tab and choose SFTP in the Security drop down menu. All other fields remain blank. There is nothing to edit in the Advanced tab.

Now click on the Connect button and the following main screen appears. On the left side you see the file system of your PC on the right side the file system of the MR3000. On the PC you should create a specific directory for each MR.



To quickly retrieve ALL the data from the MR, you navigate on the left hand panel (PC) to the directory of this MR, on the right hand panel you navigate to the directory “user”. Then you open the menu Tools and select Sync Directories & Sub-Directories... As shown in the picture below, the tool has already pre-selected the desired action, i.e. to Download both directories (background and events) to the local side. By clicking the Sync button, the transfer is started. Within a few seconds you have transferred ALL the files from the MR3000 to the local PC.

If there are new files in the MR, just sync again.



5.3.1.2 Filezilla

It's the most famous stand-alone FTP/SFTP client. You can download it at this address:

<http://filezilla-project.org/download.php?type=client>

The first time you launch it, click on **File->Site Manager...**, then click on **New Site**. In the **host** field, enter the IP address of the MR3K. For the **protocol**, choose SFTP. For the **logon type**, choose normal. Then, enter your login and password, and click **Connect**.

5.3.1.3 WinSCP

As an alternative to Filezilla, there is WinSCP. You can get it at this address:

<http://winscp.net/eng/download.php>

The first time you launch it, click on the **New** button.

6. Firmware history

The list of the changes in the firmware can be seen at the following URL:

[MR3000 firmware release note.pdf](#)

Appendix A: Internet access for the MR

We often talk about the MR having an Internet access on this manual, so let's clarify this point a little bit.

First, why should the MR have an Internet access? Well, there are various reasons:

- some services, like the NTP time synchronization, the connection to the SCS cloud software or the FTP synchronization, can't work without that.
- if the MR is out in the field (so basically, when you're not configuring but using it), you can't reach it from your office unless the MR has Internet access.

Now, how to have Internet access? If you read carefully the previous sections, you noticed that there are two ways to achieve that:

- through the Ethernet interface.
- through the radio packet service of the mobile GSM / UMTS network (GPRS/EDGE, or HSPA)

You also remember that you can't use these two modes together (see the note in chapter 4.3.5).

How to test if the MR can access the Internet? There is a ping button in the WebUI (see chapter 4.3.12). A ping is basically a request sent to a Web site, to check if it's available. It's a common way to see whether you can reach Internet: if you can ping a Web site, you're connected to Internet.

Now, what does really mean "having an Internet access"? That's a little bit more complicated than the expected. When a MR accesses the Internet, it's a little bit like if it was in a bubble: the LAN (or Local Area Network). From this bubble, the MR can reach the outside world (Internet) and e.g. push data to the FTP server, but you can't reach the MR from the outside world. We don't want to enter into thorough explanations about the WHY you can't reach it. It's a question of IP addresses, deep understanding of what is a LAN, and other technical details that are not subject of this manual.

To reach the MR from the outside world you additionally need a software that will allow you to communicate with the MR. OpenVPN is such a software, and Dynamic DNS (DDNS) is another, both are implemented as services in the MR.

Let's discuss three possible scenarios:

1. You use an existing DSL or Cable-TV router in a private house. Typically such a router offers the following features:

- share a single Internet connection (i.e. a single public and in most cases dynamic IP address) to different devices connected via Ethernet cable and/or Wi-Fi connection.
- DHCP server to automatically configure the network settings of the attached devices – we assume DHCP is active.

Result:

- FTP push service and the NTP service work nicely, but you can not reach the MR to change parameters. By activating the OpenVPN service, access from the outside world is possible without any additional settings. To make use of DDNS you have to change the settings of the router (activate port-forwarding).
- The SCS cloud software allows to both collect all the data coming from many MR3000 and to remotely change parameters on the devices.

The use of the WLAN hot-spot offered by the router is not possible, as the MR does not offer a Wi-Fi client service.

2. You use the 3G service with an ordinary SIM card:

The MR acquires a private (not accessible from the outside world) and dynamic (changing often) IP address.

Result:

FTP push service and the NTP service work nicely, but you can not reach the MR to change parameters. By activating the OpenVPN service, access from the outside world is possible without any additional settings. The use of DDNS is not possible.

3. You use the 3G service with a special SIM card (providing a public IP address):

The MR acquires a public (accessible from the outside world) and dynamic (changing often) IP address.

Result:

FTP push service, SCS and the NTP service work nicely, and you can remotely change parameters with the SCS. If the SCS is not used or for a complete remote control of the device, then the activation of either the OpenVPN service or the DDNS service is necessary.

Appendix B: SAFETY INSTRUCTIONS

Introduction

Thank you for choosing this Bartec Syscom product. Before operating it, please read this manual thoroughly and retain it for future reference.

Note

- Before operating the product, please read "Safety information".
- Pictures and illustrations used in this manual are for reference only and may differ from actual product appearance.

Location of the identification label

A label indicating the Model No. (P/N) and Serial No. (S/N) is located on the left hand side of the product.

Warning

To prevent the spread of fire, keep open flames away from this product at all times.
When present, batteries must not be exposed to excessive heat such as fire.

Important notice

This product has been manufactured by:

Syscom Instruments SA, Rue de l'Industrie 21, 1450 Sainte-Croix, Switzerland

Inquiries related to product compliance based on European Union legislation shall be addressed to your authorized representative. For any service or guarantee matters, please refer to your representative or to the factory.

Notice for Wireless Signal

Hereby, Syscom Instruments SA declares that this unit is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

Installation / Set-up

Install and use the product in accordance with the instructions below in order to avoid any risk of fire, electrical shock or damage and/or injuries.

Installation

- The product should be installed near an easily accessible power supply.
- Install the product on a stable, level surface to avoid it from falling down and cause personal injury or damage to the product.
- Install the product where it can not be pulled, pushed or knocked over.
- Only qualified personal should operate the product.
- The product is not intended to be operated by children.

Transporting

- Before transporting the product, disconnect all cables.
- When transporting the product for repairs or when moving, pack it using the original packing material.

Mains lead

Some products have an AC powering (mains) cable and socket.

If applicable, handle the mains lead and socket as follows in order to avoid any risk of fire, electrical shock or damage and/or injuries:

- Insert the plug fully into the mains socket.
- Operate the product on an appropriate supply.
- When wiring cables, be sure to unplug the mains lead for your safety and take care not to catch your feet on the cables.

- Disconnect the mains lead from the mains socket before working on or moving the product.
- Keep the mains lead away from heat sources.
- Unplug the mains plug and clean it regularly. If the plug is covered with dust and it picks up moisture, its insulation may deteriorate, which could result in a fire.

Note

- Do not use the supplied mains lead on any other equipment.
- Do not pinch, bend or twist the mains lead excessively. The core conductors may be damaged, exposed or broken.
- Do not modify the mains lead.
- Do not put anything heavy on the mains lead.
- Do not pull on the mains lead itself when disconnecting the mains lead.
- Do not connect too many appliances to the same mains socket.
- Do not use a poor fitting mains socket.

Prohibited Usage

Do not install the product in locations, environments or situations such as those listed below or the product may malfunction and cause a fire, electrical shock, damage and/or injuries.

Location

- Do not place the product under water.
- Avoid moving the product from a cold area to a warm area. Sudden surrounding temperature changes may cause moisture condensation. This may cause the product to show malfunctions.

Environment

- Do not place the product in a room with oily smoke or steam. Fire, electric shock or warping may result.
- Do not heat the case of a product with an internal lead battery above 50°C. Such condition may damage the internal lead battery casing.

Situation

- Do not use the product when your hands are wet, with the cover removed or with attachments not recommended by the manufacturer.
- Disconnect the product from mains socket during lightning storms.
- Do not install the product so that it impair travelling along usual paths. Injury or damage to a person or object bumping into the product may result.

Broken pieces

- Do not throw anything at the product. The impact may break an antenna, a connector or the screen glass (when present).

For children

- Do not allow children to play near the product.
- Keep small accessories out of the reach of children, so they are not mistakenly swallowed.

Description

This product is a vibration measuring instrument. It can be equipped with a Wi-Fi interface and/or a GPRS interface (according to configuration).

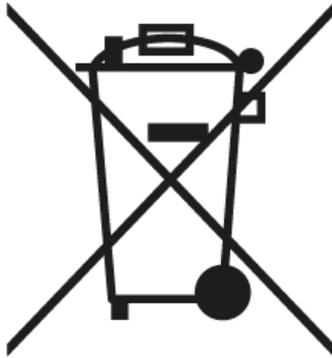
The Wi-Fi interface is intended for product configuration.

The GPRS interface is mainly intended for data transfer.

This product uses internationally harmonised frequencies.

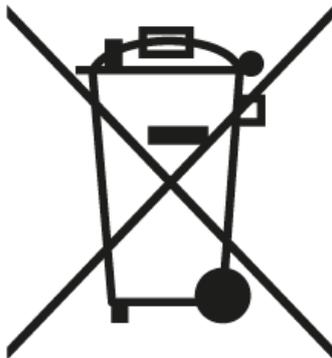
This product may be used in a domestic or industrial environment.

Disposal of the product



Disposal of Old Electrical & Electronic Equipment (Applicable in the European Union and other European countries with separate collection systems)

This symbol indicates that the product shall not be treated as household waste. Instead it shall be handed over to the applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. The recycling of materials will help to conserve natural resources. For more detailed information about recycling of this product, please contact the company where you purchased the product.



Disposal of waste batteries (Applicable in the European Union and other European countries with separate collection systems)

This symbol indicates that the battery provided with this product shall not be treated as household waste. On certain batteries this symbol might be used in combination with a chemical symbol. The chemical symbols for mercury (Hg) or lead (Pb) are added if the battery contains more than 0.0005% mercury or 0.004% lead. By ensuring these batteries are disposed of correctly, you will prevent potentially negative consequences for the environment and human health which could otherwise be caused by inappropriate waste handling of the battery. The recycling of materials will help to conserve natural resources. In case of products that for safety, performance or data integrity reasons require a permanent connection with an incorporated battery, this battery should be replaced by qualified service staff only. To ensure that the battery will be treated properly, hand over the product at end-of-life to the applicable collection point for the recycling of electrical and electronic equipment. For all other batteries, please view the section on how to remove the battery from the product safely. Hand the battery over to the applicable collection point for the recycling of waste batteries. For more detailed information about recycling of this product, please contact the company where you purchased the product.

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EU Declaration of Conformity
Déclaration UE de conformité**

Wir	We	Nous
	SYSCOM Instruments SA	
erklären in alleiniger Verantwortung, dass das Produkt	declare under our sole responsibility that the product	déclarons sous notre seule responsabilité que le produit
	Vibration Monitoring System MR3000C, types starting with: MR3000C-2003...	
den Bestimmungen der folgenden EG Richtlinien entspricht:	is in conformance with the requirements of the European Council Directive listed below:	est conforme aux exigences des directives du Conseil Européen suivantes:
2011/65/EU 2014/30/EU 2014/35/EU 2014/53/EU	2011/65/EU 2014/30/EU 2014/35/EU 2014/53/EU	2011/65/UE 2014/30/UE 2014/35/UE 2014/53/UE
und mit folgenden Normen	and is in conformity with the following standards	et est conforme aux normes ci-dessous
	EN 61010-1 : 2010 EN 61326-1 : 2013 EN 300 328 : 2015 EN 301 489-1 : 2012 EN 301 489-7 : 2006 EN 301 489-24 : 2011 EN 301 511 : 2015 EN 301 908-1 : 2015 EN 301 908-2 : 2016	

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erklären in alleiniger Verantwortung, dass das Produkt	declare under our sole responsibility that the product	déclarons sous notre seule responsabilité que le produit
	Vibration Monitoring System MR3000TR, types starting with: MR3000TR-2003...	
den Bestimmungen der folgenden EG Richtlinien entspricht:	is in conformance with the requirements of the European Council Directive listed below:	est conforme aux exigences des directives du Conseil Européen suivantes:
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