Rissfox Multisensor

Rissfox Mini - Expansion for four additional crack sensors and flexible alarm function

- Add four (4x) additional crack sensor inputs to your Rissfox Mini system
- Resolution of the crack sensor: 5 µm
- Connection to the data logger via our smart / flexible „Universal Bus"
- Alarm output with many functions
- Can be combined with the Remotefox
- Zeroing via covered magnet switch
- System - Status - Display with LED
- Power supply via 4 x AA mignon cells
- Robust and water protected housing
- Dimensions: 88x160x50 mm (HxWxD)

Operating Instructions

Introduction to the Rissfox Multisensor

Dear customer,

Thank you for purchasing the *Rissfox Multisensor - Expansion module for the Rissfox Mini* by Scanntronik Mugrauer GmbH.

This expansion module for the *Rissfox Mini - Data Logger* was especially developed for recording crack displacements at up to four additional measuring points. The cracks that are to be observed are precisely monitored with the aid of high-resolution (5 μm = 0.005 mm) analytical sensors such that any possible changes can be recognized immediately. The readings are directly transmitted to the connected Rissfox Mini (data logger system), which is responsible for storing and managing the readings.

In addition, the system possesses a flexible and independent alarm output with the aid of which, e.g., an SMS alarm message can be sent if any excessive movement should be registered by one of the connected crack sensors.

If required, it is possible to speedily replace the four standard mignon batteries (AA) that are integrated in the Rissfox Multisensor so that any pending measuring task can commence without delay.

Within the scope of these operating instructions, we would like to convey to you a basic understanding of how to use the Rissfox Multisensor expansion module.

The core components for the use of the complete measuring system are the data logger hardware (Rissfox Mini), the expansion module (Rissfox Multisensor), the crack analysis sensor electronic (up to 1 + 4 = 5 crack sensors) as well as the PC software to configure and evaluate the complete system.

In addition to these, there are further optional components. These are amongst others an alarm system for SMS notification, an acoustic alarm, etc. However, these components will not be dealt with in detail in the context of these instructions.

To be able to set up the data logger and the expansion module for the next measuring task as required, it is necessary to install the PC software on your computer. With the software you have access, among other things, to all of the readings that have been taken and stored in the data logger's memory, and you can determine, e.g., the number of active crack sensor inputs of the Rissfox Multisensor. For this reason, one of the chapters below will deal with how to install the PC software.

When working with the Rissfox Multisensor, please refer to the Rissfox Mini instructions as well. The Rissfox Mini, as a data logger, is responsible for logging the readings taken and must be configured accordingly. This manual only covers the most important functions and settings of the Rissfox Mini.

Scope of Supply of the Expansion Module

The package of the expansion will contain the following components:

1. *Rissfox Multisensor* – Expansion module
2. *AA-Mignon batteries* (4 cells)
3. *Magnet* for sensor zeroing / tare
4. *Cable for connecting* the data logger
5. *Operating instructions* for the Rissfox Multisensor

Note: Crack analysis sensors are not included in the package.

If you have purchased the PC software together with the expansion module the package also contains the following components:

6. Data carrier (CD ROM) with PC software
7. PC interface cable

Installing the PC Software

Start your computer and wait until the operating system has been completely loaded. This may take a couple of minutes. If your computer is already switched on, please close all other applications to avoid possible conflicts during installation. You now see your operating system's desktop in front of you.

Figure 1: Desktop

This may be one of the following operating systems: Microsoft Windows® 98, NT, Me, 2000, XP, Vista or 7. More recent systems are also supported. Now insert the CD with the data logger software in your CD drive. Normally, the installation assistant that will accompany you through the following installation will start automatically. If it does not, your CD drive's automatic start function has probably been disabled. If that is the case, double-click on the "My Computer" symbol to open the desktop. Now double-click the symbol of the CD drive that holds the data logger software. The installation assistant is started.

Follow the instructions on the screen. You first have to specify a directory into which the software is to be installed. After that, you can specify the name of the folder that is to be created in your start menu during the installation process. During the last installation step you are given the opportunity to have a direct link created on the desktop and in the start bar. Before installation starts, you are provided with an overview of the installation options you have selected.

Figure 2: Installation assistant for the PC software

Once installation has been completed, you can access the software via the new entry in the start menu (program "SoftFOX"). After that, the program's welcome screen opens. Press the "O.K." button to start working with the software.

These operating instructions are to explain the exact procedure when working with the crack analysis system. Furthermore you will get a good overview of the most important software functions.

To obtain more detailed information about all of the software's properties and features, open the program's online help either by means of the "F1" button on your keyboard or by means of the menu item "Software - Help" under the "Help" menu.
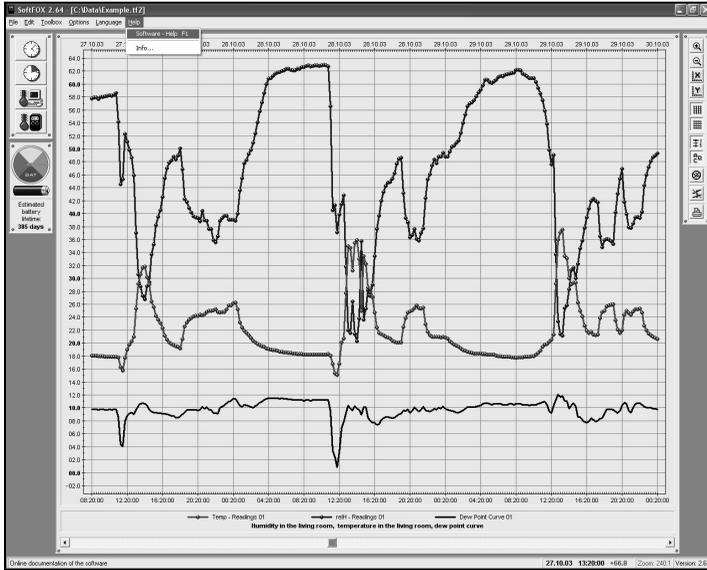
Figure 3: Accessing the online help function

To be able to use all the functions offered by software, the data logger and the expansion module, it makes sense to briefly deal with the online help. In this manner, you will learn how to purposefully use the software and all other components.

PC Software Configuration

Before the PC software can work in conjunction with the Rissfox Multisensor or the data logger, you need to connect the systems to your computer. The systems can be connected by means of either a USB cable or serial interface cable. Please note the enclosed installation manual when plugging in the USB cable, since you must also install the relevant interface driver at the same time.

Connect one end of the cable to your computer (USB jack or serial COM port) and plug the other end into the "Setup" or "PC" jack of your electronic measuring system.

Now you need to tell the PC software at which connection port the electronic measuring system is linked with the PC. This is done via the menu item "Program Settings…" under the "Options" menu. Enter the relevant port in the field "Communication Port".
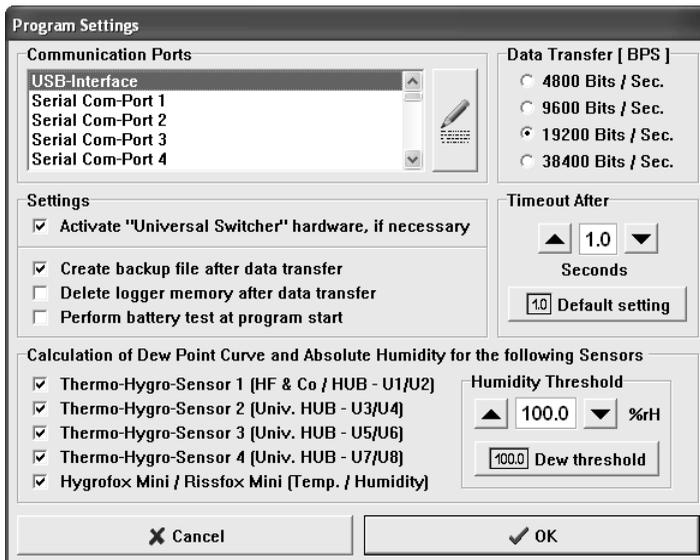
Figure 4: Configurating the interface

Once this is done, save the setting with the "OK" button. That way you only need to specify the communication port once. The PC software is now ready to configure the expansion module and/or read out the data logger.

Initial Operation and Replacing the Batteries of the Rissfox Multisensor

If you would like to put the Rissfox Multisensor into operation for the first time or if the system's batteries are empty, it is very easy to insert and/or replace the batteries yourself. To do so, you only need four standard 1,5V AA-Mignon batteries and a crosstip (Phillips head) screwdriver.

Open the two screw-covers at the left and right side of the Rissfox Multisensor housing. After that remove the four screws and open the system by lifting the top backwards. The bottom of the housing is connected to the top via two flexible links so that the top can't get lost. Remove the four old batteries and insert four new batteries in the corresponding holders.

Pay attention to the correct polarity, when inserting the batteries!

If the system is put into operation for the first time, the Rissfox Multisensor does of course not yet contain any batteries. Close the system housing again, tighten the four screws and protect them with the screw-covers. Do not use force to open the housing. After installing the four batteries, the "System Status LED" lights up and stays on for one second. This indicates that the Rissfox Multisensor system was switched on successfully.

The "System Status LED" remains off in passive (idle) state, i.e. when the Rissfox Multisensor is not taking any readings. If the Rissfox Multisensor is connected with the Rissfox Mini, the LED flashes briefly with every measurement taken. Typically, that happens every five seconds ("Basis Interval" setting). If the batteries in the Rissfox Multisensor are almost discharged, the LED stops flashing. In such a case, change all four batteries as soon as possible in order to prevent the measuring system from failing.

Tutorial for the Rissfox Multisensor

Now that you have successfully installed the PC software and inserted batteries into the system, the typical procedure to be followed when using the Rissfox Multisensor will be explained below.

Every measuring task starts with configurating and testing the measuring system. The state of charge of the Rissfox Multisensor batteries should be checked first in this connection. This is of particular importance if the measuring system is to record measuring data over a longer period of time. The system is subsequently configured according to your requirements with regard to number of active crack sensors, alarm conditions, etc.

To check the status of the batteries, open the configuration window of the expansion module by selecting the "Configure Rissfox Multisensor…" item in the "Options" menu.

Configure Rissfox Multisensor

Properties of all Crack - Sensor - Inputs

Input	Activated	Zeroing	Calibration	Alarm	Alarm Level
Sensor 1	Yes	1977 [Digits]	32434 [Digits]	Yes	380 [Digits] = ± 1,002 [mm]
Sensor 2	Yes	2136 [Digits]	31965 [Digits]	Yes	190 [Digits] = ± 0,501 [mm]
Sensor 3	Yes	2089 [Digits]	31745 [Digits]	No	190 [Digits] = ± 0,501 [mm]
Sensor 4	No	2048 [Digits]	32768 [Digits]	No	190 [Digits] = ± 0,501 [mm]

Properties of the selected Crack - Sensor - Input
☑ Activate the measurement for the sensor input ☑ Alarm Surveillance

Alarm Delay

Zeroing [Digits] ▲ 1977 ▼
Calibration [Digits] ▲ 32434 ▼
Alarm Level [Digits] ▲ 0380 ▼
Distance equivalent: ± 1,002 [mm]

00 : 15 : 00

Execute Zeroing   Execute Measurement

Status of the Batteries inside of the Extension Module [Power Supply]
The batteries of the system are still full

System - Mode
10 mm

✕ Cancel   ✔ OK

Figure 5: Configuration window of the Rissfox Multisensor

The field "Status of the Batteries inside of the Extension Module" shows whether the batteries have to be replaced or not.
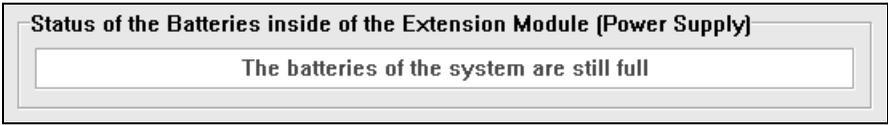
Figure 6: Battery indicator of the Rissfox Multisensor

The lifetime of the Rissfox Multisensor batteries directly depends on the measurement rhythm, the number of active sensors and the running measurement program. We recommend replacing the batteries anyway approximately every one to one and a half years.

The "System - Mode" field provides information about the type of crack sensors that can be connected to your expansion module. They are normally standard sensors with an effective measuring range of 10 mm (typically: +/- 5 mm).
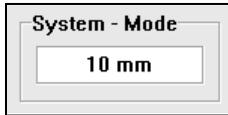
Figure 7: Measuring range of compatible crack sensors

The next step entails the configuration of the individual crack sensor inputs. In the window area "Properties of all Crack – Sensor - Inputs", you can see a list of the available channels and the relevant sensor settings.

Input	Activated	Zeroing	Calibration	Alarm	Alarm Level
Sensor 1	Yes	1977 [Digits]	32434 [Digits]	Yes	380 [Digits] = ± 1,002 [mm]
Sensor 2	Yes	2136 [Digits]	31965 [Digits]	Yes	190 [Digits] = ± 0,501 [mm]
Sensor 3	Yes	2089 [Digits]	31745 [Digits]	No	190 [Digits] = ± 0,501 [mm]
Sensor 4	No	2048 [Digits]	32768 [Digits]	No	190 [Digits] = ± 0,501 [mm]

Figure 8: Overview of all inputs and their configuration

To modify a sensor input, just click on the corresponding entry in the sensor list. The relevant settings are imported in the area "Properties of the selected Crack – Sensor – Input" and can be edited there according to your needs.

Figure 9: Configuration area of the selected sensor input

The most important function of every sensor input is whether this should be used or not. Switch the corresponding input on or off using the check box "Activate the measurement for the sensor input". Please always activate the crack sensor inputs in order, starting with "Sensor 1".

The "Zeroing [Digits]" field is a sensor-specific system parameter that is saved at the time of the sensor zeroing process (see further below). The zeroing value allows the Rissfox Multisensor expansion module to define the sensor position as zero point (00.000 mm) when the sensor is zeroed. After zeroing, all sensor movements are always interpreted in their relation to this zero point. That's why the measurement of all connected crack sensors typically starts with 00.000 mm.

The "Execute Zeroing" button is used to initiate the zeroing process of a selected sensor input. This defines the current position of the connected sensor and the associated zeroing value is imported as system parameter.

The result of the zeroing process is also indicated directly as new button label, among other things.

The "Calibration [Digits]" field is also a sensor-specific system parameter that normally should not be changed by the user. The calibration value is already defined and configured in the factory, during production, for every sensor input and the relevant sensor. Since not all sensors are absolutely identical and every sensor has its own characteristics, the calibration value can be used to finely adjust the respective sensor.

A current measurement of the sensor connected to the selected input can be initiated via the "Execute Measurement" button. The result of the measurement is displayed directly as a new button label. Please note that a changed calibration value is only active after all settings have been transmitted to the Rissfox Multisensor expansion module. All settings are transmitted with the "OK" button located at the bottom right-hand edge of the screen.

You can specify as last function for every sensor input whether alarm monitoring should be performed for it or not. To this end, simply select the check box "Alarm Surveillance" for the corresponding sensor input. The alarm signal is activated via the "Setup / Alarm / Switch" port of the Rissfox Multisensor. Many different alarming systems such as the "SMS Alarm System" or the "Acoustic Alarm System" can be connected to this port.

The relevant alarm condition / alarm threshold for the corresponding sensor input is specified via the "Alarm Level [Digits]" field. Just enter here the distance from the zero point (00.000 mm) at which an alarm should be triggered. It does not matter whether the crack width changes in positive or negative direction (+/-) from the zero point. If the alarm threshold ("Alarm Level") is exceeded, an alarm signal is emitted via the "Setup / Alarm / Switch" port of the Rissfox Multisensor.

The alarm signal stops once the crack sensor is within the alarm threshold again. You can see the associated "Distance Equivalent" for the entered digits under the "Alarm Level [Digits]" field. Change the digit value in the upper field, until you get the desired distance equivalent, i.e. the desired alarm threshold in mm.

Last but not least, you can also specify a generally applicable delay time for the alarm by using the "Alarm Delay" configuration area. If at least one of the crack sensor inputs detects an alarm situation, an alarm signal is normally emitted immediately. If this is not desired, the alarm signal can be delayed for a configurable period of time with the aid of the alarm delay. At least, one alarm situation must be present for the indicated alarm delay before the alarm is triggered. If all alarm situations disappear before the alarm delay has expired, no alarm is generated.

Figure 10: General alarm delay for all sensor inputs

After you have made all settings to suit your requirements, you can transmit these to the Rissfox Multisensor by clicking the "OK" button on the bottom right-hand edge of the screen. By doing so, the configuration of the expansion module is concluded and you can disconnect the system from the computer.

The next step is to prepare the *Rissfox Mini - Data Logger* so that it can be used with the Rissfox Multisensor expansion module. Use the "PC" jack to connect the data logger to the computer and open the configuration window by selecting the "Configure Sensors…" item in the "Options" menu.
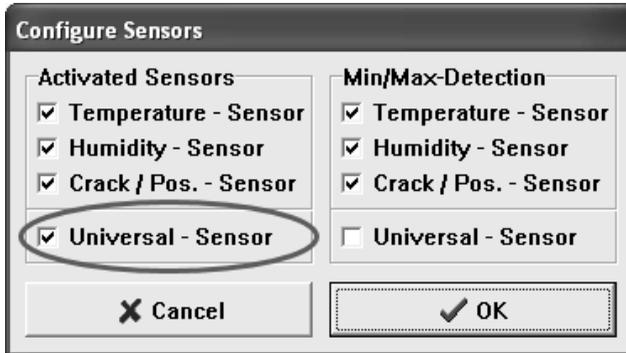
Figure 11: "Configure Sensors" window of the Rissfox Mini

Since the Rissfox Multisensor is a "Universal – Sensor" expansion module for our data loggers, please select the corresponding check box in the "Activated Sensors" area. The relevant "Min/Max-Detection" can remain deactivated, since this function is not available for the Rissfox Multisensor. Click the "OK" button to confirm the changed sensor configuration.

For all other settings relating to the Rissfox Mini such as "Configure Time / Date", "Configure Logging Interval", etc., please refer to the manual that came with the data logger.

The electronic measuring system is now ready for operation. The next step is to mount the crack analysis sensors over the cracks. You can connect up to four additional sensors to the Rissfox Multisensor. Please note that the sensors are not included in the scope of supply of the expansion module.

Each crack analysis sensor consists of the following three components:
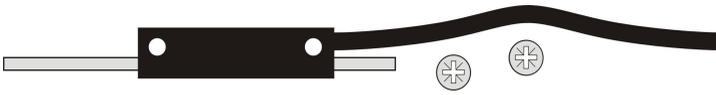
Figure 12: Crack sensor and mounting screws
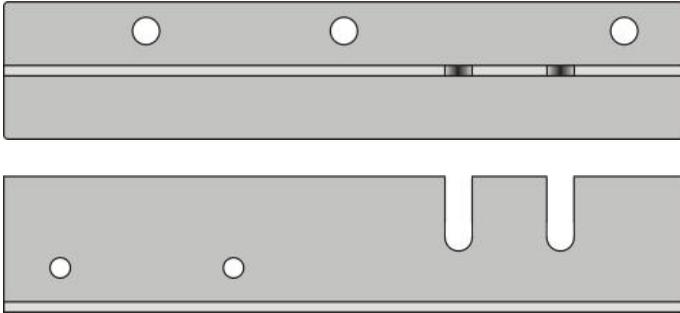
Figure 13: Sensor holder (top view and side view)
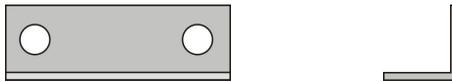
Figure 14: Sensor stopper (top view and side view)

The figure below shows the ready-to-use crack analysis sensor mounted over the crack.
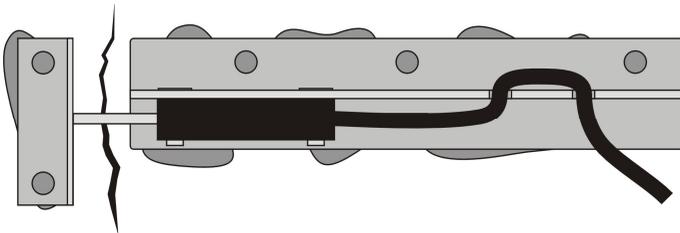
Figure 15: Ready-to-use crack analysis sensor (top view)

The sensor stopper is mounted on the one side of the crack (here: left), the sensor holder is mounted on the other side (here: right). Remove the sensor from the holder before you start to mount the holder on the wall. Reattach the sensor before you start the measurement task.

To mount the sensor holder as well as the sensor stopper on the wall, we recommend the use of the provided two-component wall glue. Using glue is uncomplicated and flexible. It is also possible to use screws or nails to mount the sensor holder and stopper on the wall. Please note that using screws or nails is much more laborious and you must assure that all components are solidly attached to the wall.

Mounting the crack analysis sensor on the wall:

1. Remove the sensor from the sensor holder
2. Clean the bottom side of the sensor holder, the sensor stopper as well as the wall surface. All elements have to be dry!
3. Mix the wall glue thoroughly for about 2-3 minutes. Also see glue instructions.
4. Apply enough glue onto the bottom side of the sensor holder and sensor stopper.
5. Fix the two components on the left and right side of the crack. The front side of the sensor stopper has to be clean. Pay attention to the distance between the sensor holder and the sensor stopper. The optimal distance is 10mm. The front side of both components should be parallel as shown below:
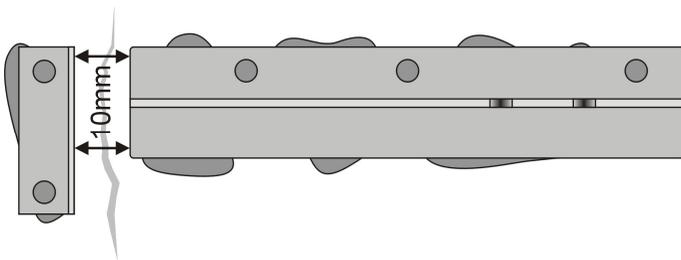
Figure 16: Sensor holder and sensor stopper glued to the wall

6. Wait until the glue fixes the components solidly to the wall. Mount the crack sensor on the sensor holder using the two provided screws. Tighten the screws. The spring born sensor nail touches the sensor stopper. Last but not least hook the sensor cord into the cord grip.
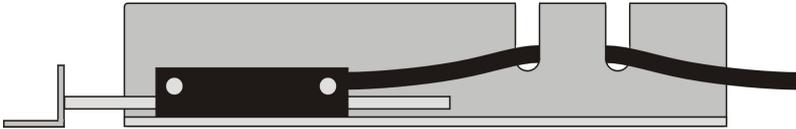
Figure 17: Crack sensor with cable screwed to the holder

After all the crack analysis sensors have been mounted over the relevant cracks, the sensors have to be connected to the inputs "1. Crack Analysis Sensor", "2. Crack Analysis Sensor", … of the expansion module.

The Rissfox Multisensor provides a so called "zeroing" function (tare function) similar to the one of the Rissfox Mini. By this means the expansion module starts the analysis of the crack displacements with exactly 00.000 mm.

Zeroing is implemented with the aid of the provided magnet. If this is kept flat, along the left wall of the housing (not on the decal above), until the "System Status LED" flashes one time, the system carries out the zeroing process for the first sensor input. Remove the magnet from the housing again. If you need to zero another sensor input, place and hold the magnet on the housing until the LED flashed as often as the number of the relevant sensor input. If the magnet is removed, e.g. after blinking three times, the third sensor input had been zeroed. To zero all sensor inputs at the same time, place the magnet on the housing and hold there until the "System Status LED" blinks five times (5x).

Last but not least, connect the Rissfox Multisensor to the Rissfox Mini. To do so, plug one end of the connection cable into the "Data Logger Port" jack of the expansion module and plug the other end of the cable into the "PC / Alarm / Switch" jack of the Rissfox Mini.

The system (Rissfox Mini + Rissfox Multisensor) is now measuring continuously and stores the measurements in the internal memory of the data logger. You may place the measuring system in an arbitrary position to use it for your measuring task.

At the end of the measuring task, reconnect the data logger to the computer using the "PC" jack and read out the collected measurements. You have to disconnect the expansion module before you can connect the computer.

Data may be read out either via the menu item "Transfer Data…" under the "Toolbox" menu or by clicking on the fourth button of the toolbar to the left of the diagram window.
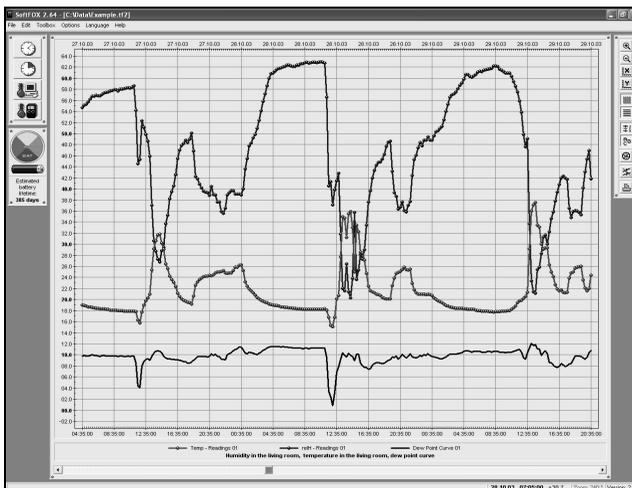
Figure 18: Read out measuring data

Once the measurements have been transferred to the computer, they are directly depicted in the form of a clearly laid out diagram. You can zoom-in the diagram by using the left mouse button. This is interesting and important for the crack curve in particular because crack displacements are often very small. By this means you can magnify the crack curve.

The measuring unit of the crack curve is millimeter [mm]. If you have also recorded climate data in addition to the crack data, the unit of the air humidity curve is percent [%rH] and the unit of the air temperature curve is degree Celsius [°C].

For a correct crack measurement data interpretation please note:

If the measured value of the crack sensor is positive, the crack has closed. If the measured value is negative, the crack has opened.

With the aid of the diagram tools to the right of the diagram window, you can change the diagram's appearance.

It is also a good idea to activate the "Diagram Legend" at this particular time in order to be able to recognize which measured curve belongs to which crack. Since the Rissfox Multisensor is a "Universal-Sensor", the standard curve description of the four connected crack analysis sensors is "U1 - Readings" to "U4 - Readings".

To save the data, use the menu item "Save Project As…" under the "File" menu.

More detailed information on how to operate the software and configure your data logger may be found under the online help function.

Guarantee Information and Liability

Scanntronik Mugrauer GmbH grants a 24 months guarantee on all its data loggers. Recalibration and battery replacement do not form part of the scope of guarantee. We will not assume liability for damages caused by the improper use or application of our devices.

Notes on the Rissfox Multisensor

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