LabSwift-aw

Operating Instructions

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1. Introduction

1.1 Starting out

Thank you for having purchased an instrument of the **Novasina *Lab*Swift-aw** system for measuring **water activity**. You have opted for a highly accurate and reliable instrument representing the latest state of the art in electronics and software design when it comes to highest precision in aw (water activity) measuring.

To get the most out of all the possibilities of your Novasina ***Lab*Swift-aw** and to guarantee safe, reliable operation, please read these operating instructions before setting the unit into operation carefully.

Please keep this manual in a safe place where it will be at hand whenever you need it. If you lose the manual, please contact your Novasina representative for immediate replacement.

1.2. Important Notes

Intended use

The Novasina ***Lab*Swift-aw** is exclusively intended for measuring **WATER ACTIVITY** under strict adherence to the information and notes given in this manual. Any use beyond this scope is considered to be a violation of the intended purpose and may endanger your safety or could result in the product being damaged. Any use of this Novasina instrument other than as intended is at the customer's own risk and by no means will the manufacturer or supplier be liable for any resulting damage.

Safety instructions

- The Novasina ***Lab*Swift-aw** system should be serviced, maintained and repaired only by qualified people who are familiar with the equipment.
- The ***Lab*Swift-aw** system must not be used in hazardous zones or similar areas. The design was made only for the laboratory field.
- No explosive materials and no highly inflammable substances may be measured in the measurement chamber system.
- Before connecting the unit to the mains, ensure that:
- The mains voltage is within 90...260V, at 50 or 60Hz. Please check the type plate of the system!
- The power cable between the mains and the instrument is not damaged.
- The Novasina ***Lab*Swift-aw** system may be used only under the specified operating conditions (see chapter 10).
- Observe and strictly adhere to the local regulations regarding the handling of mains- powered devices.
- Use only genuine accessories and spare parts available from your Novasina supplier or visit the homepage www.novasina.com.
- This instrument must not be modified in any way without the written consent of the manufacturer.
- Never open the instrument without removing the mains power cable first to avoid any risk of dangerous currents.

2. General Product Description

2.1. System Overview

The ***Lab*Swift-aw** system has been specially developed for determining the fraction of **free water** in a test sample like food, cosmetics or pharmaceuticals. This fraction is also known as **„water activity“** in the foodstuffs industry and may not be confused with the water content (g water / g substrate). The water activity of a sample is indicated by the so called a_w-value and is within the range of 0 (absolute dryness) and 1 (condensing humidity).

Only this part takes actively part to the exchange with the ambient humidity and has a big importance regarding the microbiological stability respectively the biological functions of microorganisms. The water activity is also influencing considerably the chemical properties of foodstuff.

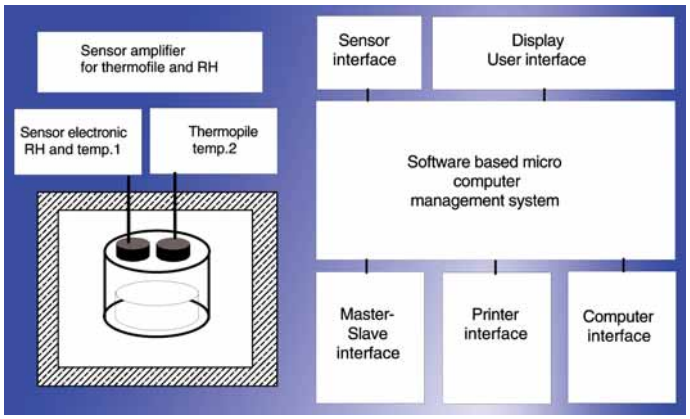
For the a_w-value determination, the equilibrium air humidity over a sample *(water-vapour pressure)* is measured . This behaves proportional to the a_w-value. The fundamental requisite for determining water activity quickly and with extreme precision is an excellent moisture sensor that reaches an exact, reproducible measurement over a very wide range *(moisture from 0....100% RH)*. Further important properties are an exact, reproducible measurement result and a good chemical robustness. Novasina has been developing special electrolytic moisture sensors that stand out for such unique properties for more than 50 years.

The integrated, resistive electrolytic ***Lab*Swift-aw** sensor is based on the new chemical substance of the Novasina „Novalyte Technology“, which achieves an outstanding accuracy and reproducibility.

The complete ***Lab*Swift-aw** system comprises various software options and can be optimally adapted to the customer and his requirements.

***Lab*Swift-aw**

2.2. System Architecture



The ***Lab*Swift-aw** consists of modular assemblies in combination with the unique resistive electrolytic Novasina measurement technology, which is built inside the aW sensor. The aW measurement signal is electronically processed together with the IR (infrared) measurement and an additional temperature measurement. Afterwards it is further processed by a high capacity micro controller. This is handling the LCD display unit and stores data on an external removable SD-card. The mains are supplying the whole electronics with power.

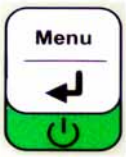
The ***Lab*Swift-aw** does not dispose of an internal temperature control, but has a surface temperature sensor based on an infrared measurement. For checking and adjusting the aW values, humidity standards (see chapter 6) can be used.

2.3. Overview

2.3.1. Function keys

Each function key has 3 markings. On top the measurement mode function (standard operation). The central mark shows the configuration menu function. The lower, green symbol shows the function, which can be selected by pressing the key during the measurement mode (approx. 1s).

2.3.2. Function key < Menu >



Measurement mode

- With this key the device is switched on
- Access to menu
- Device is switched off if pressed for a long time

Menu mode

- Carries out the selected function or enables the parameter setting
- Adapts the set parameters
- By pressing for a long time you get from each menu point directly to the measurement mode

2.3.3. Function key < Actual/Stable >

Measurement mode

- Switches over between the actual measurement value and the stable value
- By pressing for a long time you get the following view :
  - upper display line; number of measurement
  - lower display line; actual measuring time (actual) and stability time (stable)

Menu mode

- Switches a menu point downwards
- Decreases a flashing displayed digit

2.3.4. Function key <Start Stop >

Measurement mode

- Starts the measurement
- Interrupts the current measurement
- By pressing for a long time the protocol of the actual measurement (actual) is generated

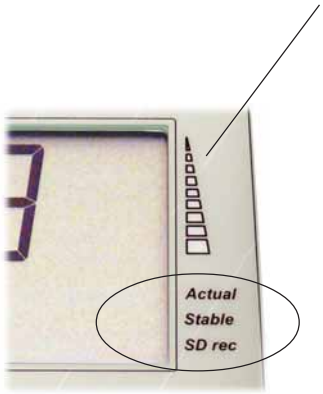
Menu mode

- Switches a menu point upwards
- Increases a flashing displayed digit

2.3.5. Display - symbols

Displays the stability grade;

As soon as the measurement has started, the 1st symbol is displayed. When the stability is reached, all 5 symbols are displayed contemporaneously.



Actual
Symbol appears, when the actual measurement is displayed.
The symbol is diplayed flashing.

Stable
Symbol appears, when the stable measurement value is displayed.

SD rec
The logger function is activated. The SD-card must not be removed.
The symbol flashes if the SD-card is not disposable.

A ***Lab*Swift-aw** is used as a stand-alone device. The power supply for the ***Lab*Swift-aw** is done by an external power cable or by an optional Lithium-Ion battery. This allows a versatile employment with continuous operation as well as in places without electric supply.

The ***Lab*Swift-aw** stores measurement data and protocols on a SD-card. These data may be readout and processed on a PC or Notebook by an optional Windows based software.

2.4. Standard scope of Delivery

Novasina ***Lab*Swift-aw**
A_w- measurement instrument with accurate sample chamber. This instrument stands out by its new design and its intuitive handling. Using the integrated SD-card, measurement results can be stored and processed.

Standard accessories :

- Carrying case
- Power supply EU or USA
- 3 pcs various humidity standards : SAL-T 11, 58, 84%
- 40 pcs standardised disposable sample dishes
- Operating manual in English and German
- Factory calibration certificate
- SD-card 2 GB
- Tension ring
- 5 pcs pre-filter (white)

2.5. Optional accessories

Mechanical filter

Pre-filter white, which protects the measurement cell mechanically e.g. when the sample cup is overfilled. This filter should be replaced when it is dirty as otherwise it could influence the measurement.

Chemical protection filter

Depending on the application, the ***LabSwift-aw*** precision measuring cell has to be protected from damaging, gaseous substances. Novasina provides for this various filter systems. Please consult the data sheet for Novasina protection filter systems or contact your local Novasina distribution partner. Thanks to these filter systems the measurement cell lifetime can be extended considerably. Should you use such filter systems, please make sure that they are checked and if necessary replaced periodically. Especially chemical filters have the property to saturate after a certain operation time and therefore to become ineffective.

⚠ **Note:** Further information are available from your local distributor or on the Novasina homepage (filter systems).

Lithium-Ion Battery

For the ***LabSwift-aw*** device a Lithium-Ion battery is available. This allows a mobile use of the instrument for more than 20 hours at places without electric supply.
The battery can, if ordered, be delivered already mounted inside the ***LabSwift-aw*** or can be upgraded later by a Novasina distributor.
The later battery assembly may only be made by a Novasina distributor.

Novalog MC/SD Software

This optional Windows software allows the analysis and graphic design of the stored data on the SD-card.

3. Putting into Operation

3.1. Packaging / Installation

The ***Lab*Swift-aw** measurement instrument is delivered in a solid carrying case including all necessary accessories. Please use this carrying case for the transport of the device. Upon receipt, please check first to make sure everything is present, and immediately notify your Novasina sales partner if anything is missing or broken. Do not put damaged or incomplete measuring instruments into operation.
The equipment must be installed in a laboratory on an even surface, avoiding vibrations, strong heat radiation, air flow and dust.
The ***Lab*Swift-aw** device shall be put on a sufficiently big and even surface. Chose an installation place without any vibrations, heat and cold radiation, air flow and dust.

3.2. Putting into Operation

- Check if the local mains voltage matches with the identification plate of the supplied external power supply and plug it to the socket.
- Plug the external power supply cable to the instrument socket on the back of the ***Lab*Swift-aw**.
- Afterwards you can switch on the instrument by pushing the right function key. A start display (self test) appears shortly and the software version is displayed on the upper display line.

Note:

The ***Lab*Swift-aw** is very efficient and requires only little electrical power. The power supply fits with the latest norms (fulfills „energy star level IV“). That's why the instrument can be switched on permanently and kept ready for measurements at any time. For accurate aw-value measurements the instrument should be in a temperature equilibrium. For this reason the ***Lab*Swift-aw** should be only switched off, when no measurements are performed for a longer period.

3.3. Quick Introduction

3.3.1. Putting into operation

After switching on, the ***Lab*Swift-aw** needs a certain time before the sensor is heated up. During this time the display shows the „WARMUP“ message. After this time (normally 2 minutes) the display switched automatically to the measurement mode. During the warm up period the device can be configured or measurements can be activated by pushing the „Start/Stop“ button. The measurement though starts only after the termination of the warm up period.

3.3.2. Starting a measurement

Fill the sample dish with the sample. Make sure that the sample dish is well filled but never above the upper rim. **Do not compact orcompress** the sample which would reduce the surface area. The larger the ovall surface area, the faster and more accurate the aw value detection. in no case the sample material. Put the sample dish in the measurement chamber. Close the chamber by pushing it down until the fastener engages. You can now read the actual value in „**aw** / **%RH**“ or „**°C** / **°F**“ on the display.

The measurement is started by pushing the **„Start/Stop“** button. When the device is in the „Autostart“ mode, the measurement (analysis) starts after closing the measurement chamber. With that the analysis function starts and the flashing display shows **„ANALIZING“**.
As long as it is flashing alternately (Analizing/ ...°C) the aw-value and the temperature are not stable. The result can be read at earliest when the „**stable**“-value is displayed. Depending on the configuration also an acoustic signal may sound. The analysis function can be optimised (see 5.4.).

During the analysis the display shows permanently the current a_w-value and on the 2nd display line alternately the sample temperature and stability setting. As soon as the analysis function has terminated, the stable value is displayed. Likewise the stability indicator arrows are displayed. Should the measurement chamber be open or not completely closed, the analysis function will either not start or will be interrupted immediately.

3.3.3. Switching over the measurement display

The ***Lab*Swift-aw** has 2 different display modes for the current or stable aw-value. The mode can be selected by the function button **„Actual/Stable“.** If no stable value is reached, the symbol **„ - -.- „** is displayed in the „Stable“-view. Also the current measuring time respectively the stability time and sample number can be called up by pushing the Actual/Stable button for a longer time.

The current mode is shown by an arrow in the lower right display area („Actual“ or „Stable“).

3.3.4. Stability parameter setting

For the measurement speed optimisation it is possible to set the measurement stability criteria according to the sample. For that, various stability parameter settings are available. On the one hand 3 fix settings are defined; mode **S** (slow), **A** (average) or **F** (fast). On the other hand the stability parameter can be set manually from 1 ... 30 min. (mode **O**). During the defined stability time the measurement value variation must be < 0.001 aw. Otherwise a stable a_w-value won't never be reached. The ***LabSwift-aw*** announces as soon as the measurement is stable. For more information please see chapter 5.4.

MODE functions :

S	=	Slow measurement; stability time 6 min.
A	=	Average measurement; stability time 4 min.
F	=	Fast measurement; stability time 2 min.
0	=	The stability time can be set between 1 and 30 min. under the menu point „OBSTIME“

Stability time

The stability is shown, when during the stability time the a_w-value variation is lower than +/- 0.001 aw.

Note :
When the measurement is started the last set stability parameter is taken over.

3.3.5. Switching off the system

Remove the sample from the measurement chamber (if applicable) and switch off the device by pushing the „Menu / Enter“ button by a longer time.
In order to avoid any loss of data stored on the SD-card, switch always off the ***Lab*Swift-aw** before the power supply is interrupted.

Note:

Thanks to the use of modern technology, the power consumption is extremely low. Therefore we recommend to always keep the ***Lab*Swift-aw** switched on when connected to the power supply.

4. Description of Instrument Functions

The ***LabSwift-aw*** system is a simple to use laboratory measurement instrument, which can be powered with a Lithium-Ion rechargeable battery (option). The device can be adjusted to the user's needs by the parameter settings explained in this chapter.

4.1. Measurement Instrument / Operation

4.1.1. Starting the system

The system performs an extensive function check of the internal modules as well as of important software function during the start-up and operation. Observed failures are shown on the display.

After a warm-up phase the device is ready and the display switches over to the **measurement mode**.

In the measurement mode the following functions are available :

- Button [Start/Stop]: **Start the measurement**
  - o Starts a measurement -> **„ANALYZE"**
    It is recommended to start the **„ANALYZE"** function after the insert of each sample.

Note:

The instrument can be configured, in order to start „**ANALYZE**" automatically after closing the cover. See also chapter 4.2.2.

Simultaneously with the beginning of the measurement also the **LOG function** on the SD card get started.

  - o Stops ongoing measurements without stopping the **LOG- function**.

Note:

An ongoing measurement is stopped together with the LOG function as soon as the measurement chamber is opened.

- Button [Start/Stop] (push button for a longer time):
  Storage of the actual protocol
  - o A protocol with the current measurement values is stored on the SD-card.
  - o Per each measurement, which means that max. 255 protocols can be stored.

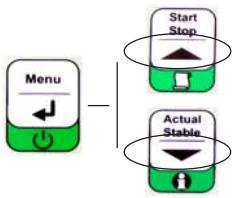
- Button [Actual/Stable]: **Switchover of the display**
  - o A switchover is made between the actual measurement values and the stored stable value.
- Button [Actual/Stable] (push button for a longer time): **Information display**
  - o On the upper line of the info display, the measurement number, which is used for the definition of the data name on the SD-card is displayed.
  - o On the lower line the time since the start of the measurement (actual) or the time until reaching the stability is displayed (from 99:59:59h, —.—.— is displayed).

- Button [Menu]: **Switch to configuration menu**
  - o The various parameters are explained in the next chapter.
  - o The configuration menu can be quit at any time by pushing the [Menu] button for a longer time.
- Button [Menu] (push button for a longer time): **Switch off the device**
  - o With this function all SD-card data are closed and the system is shut down.

Note:

The instrument should not be switched off by just pulling out the power plug, as otherwise problems with the SD-card (file system) may happen.

4.2. Configuration menu



By pushing the button [*Menu*] you get to the configuration menu, where you can select the single menu points using the button (up) (down). Following the menu points are described in detail.

4.2.1. Submenu „SD-Eject“ - „M EJECT“

SD-card data files are closed, so that the card can be taken out. The display symbol „SD rec“ disappears and the SD-card can be removed safely.

Note :

Do not take out the SD-card whilst the SD symbol is displayed.

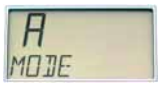
4.2.2. Submenu „Stability factor“ - „* STAB“

After starting a measurement, the analysis phase of the aw measurement is activated. The observation time, during which the aw-value variation has to be < 0.001 a_w can be optimised for each sample. This is, together with a constant temperature during the measurement, the **most important** criteria for an accurate, reliable and stable value.

„MODE“

S (slow) :
Mode for samples with slow humidity exchange. Stability time is fixed at **6 min** setting.

A (average) :
Mode for samples with average humidity exchange. Stability time is fixed at **4 min** setting.



F (fast) :
Mode for samples with fast humidity exchange. Stability time is fixed at **2 min** setting.

0
Mode for manual stability factor setting. The observation time can be set between 1 and 30 min. under the submenu „OSBTIME“.

„—“
No mode defined. When the measurement starts the user is asked about the mode to be used.

Note:

If the „Autostart“ function is activated, the user is asked about the wanted stability mode immediately after closing the measurement chamber.

„OBSTIME“

If mode „0“ is selected, the stability time can be set manually. The „**Observation time**“ time range is 1.... 30 min.

„AUTOST“

If the Autostart function is selected, the measurement starts immediately after closing the measurement chamber. No other button has to be pushed. The lastly used stability mode is kept.
Exception see „Note“ under Mode „—“.

„BEEPDUR“

Setting of the duration of the acoustic signal once the stability has been reached.

Acoustig signal („**beep**“) at stability :
Duration of the acoustic signal („beep“) : **0...10 min; 0 = OFF**

„EXIT“

Quit the submenu „Stability factor“.

4.2.3. Submenu „Calibration“ - „* CALIB“

With this function the ***Lab*Swift-aw** can be checked periodically and if necessary adjusted at different aw points with the Novasina humidity standards „SAL-T“. For this purpose various SAL-T humidity standards are enclosed to each ***Lab*Swift-aw**. This multiple use salt tablets can be inserted at the place of a sample inside the measurement chamber and generate well defined aw values as for example 0.113 aw, 0.328 aw, 0.576 aw, 0.753 aw, 0.843 aw or 0.901 aw.

For further information please consult chapter 6.2..

„CAL XX“

The deviation between the actual measurement value and the chosen reference value (=calibration point) is displayed. The instrument defines automatically the used humidity reference as soon as the menu is activated. The temperature influence on the humidity reference is also taken into account. With the buttons [up] or [down] other calibration points can be selected. If a value has not been calibrated, the display flashes. If then „**Enter**“ is pressed, the value is calibrated after a query.

Note:

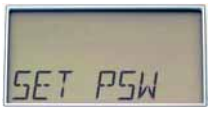
If a **password** is set, it will be asked prior to the calibration.

„CAL CLR“

Under this menu point single or all calibration points can be cancelled:

CLR Cxx	=	cancels a single point (xx)
ALL	=	cancels all calibration points
no	=	no calibration point is cancelled

„SET PSW“



It is possible to protect the calibration values stored on the sensor by a 4-digit number code.

With setting „**0 0 0 0**“ the password is deactivated.

Attention:

A forgotten password can only be reset by Novasina!

Factory sensor setting: „ **8808** „

„EXIT“

Quit the submenu „Calibration“

4.2.4. Submenu „Display settings“- „* LCD“

Under this menu point the contrast and displayed units can be defined.

„CONTRA“

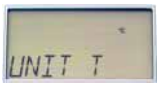
For an optimal display reading the contrast can be adapted individually.

LC-Display contrast: **0....9**

„UNIT“

The ***Lab*Swift-*aw*** can display the measured values (results) in various units.

„UNIT H“
Humidity / AW: **aw**-value or relative humidity in **% RH**



„UNIT T“
Temperature: **°C** or **°F**

„EXIT“

Quit the submenu „Display settings“

4.2.5. Submenu „SD-card“ - „* SD LOG“

„S_NUMB“

Free number setting (format 0000-9999) as start number and for generation of a data number in order to match the data to the correspondent measurement. After each measurement this number is increased by 1.

„S_INT“

The data storage interval on the SD-card can be selected in minutes and seconds (0:00). For standard measurements and analysis with the Novalog MC software a 10 seconds (0:10) interval is recommended. For data import to Excel, longer interval periods might be wiser in order to reduce the data quantity.

„EXIT“

Quits the submenu „SD-card“

4.3. Reset to factory settings

All settings are reset to factory settings except the stored calibration values on the CM-2 measurement cells. This function can be performed as following:

For this purpose keep the button [up] whilst switching on the instrument. The message „**FA SET?**“ appears on the display. Select „**YES**“ and the confirmation message „Done“ appears and the device is switched off.
If you answer the question with „**NO**“, no data are reset and the device is switched off „**OFF**“.

5. Water activity measurement

5.1. Carrying out „aw“-measurements

- Switch on the ***Lab*Swift-*aw*** as described in chapter 3.2..
- The system carries out a self-test („S TST“). Thereby the software version is shown on the upper display line.
- After the self-test the sensor is warming up („WARMUP“). Has the warm-up finished the instrument is ready for the first aw-measurements of a sample.

Note :

The warm-up time mainly depends on the present humidity and the ambient temperature. Generally this time is 2 to 3 minutes.

- During the warm-up stage the measurement can be already started. But there will be no output of measurement data until the warm-up is finished.
- Fill the sample cup with the material to be measured. The sample cup must be completely clean and dry (rub dry with tissue paper if necessary)! Ideally, always use a fresh cup and dispose of it after use.

Important!

Fill the sample cup to approximately 2/3 with the product to be measured. **Do not overfill the sample cups** ! Bulkier material must be suitably crushed or manually cut into small pieces. Products consisting of several layers, or an outer coating, must also be crushed (e.g. confectionery products). Prolonged hand contact with the product must be avoided (falsification of measured value!). A grinder, if used, must not warm up the product.

- While placing the sample in the measuring chamber, open the cover and place the sample dish carefully inside. Be aware about powder samples that the product will not contact the measuring head or measuring cell.

Note:

Do not move the instrument while a sample is in it, to avoid overflow.

- Close the cover of the ***Lab*Swift-aw** instantly again.

Important!

(only if no protection filter is inserted) After the closure of the instrument an IR temperature measurement is done right away. Is the sample **4°C hotter** than the system, the information „**OPEN CH**“ is shown on the display. Simultaneously a beep sounds for 30 seconds! (That can be interrupted by pushing any key)

In this case, the sample should be removed **as quick as possible** from the measurement chamber of the ***Lab*Swift-aw** to prevent a condensation inside the chamber. Otherwise this could lead to a limitation of the measurement accuracy for a longer period.
Let the sample cool down before you start another measurement.

Note:

This warning function is not working if the IR measurement is inactivated due to an inserted protection filter (option).

The Display of the *Lab*Swift-aw

The Novasina ***Lab*Swift-aw** instrument shows on a big LC-display continuously the actual water activity value (**aw**) and the temperature (**°C**) of the probe.

5.2. Activation of the stability function

Depending on the configuration the measurement will start automatically after the closing of the cover. Otherwise the measurement starts manually by pushing the „**Start/Stop**“ function key. The analysis function is activated and the display shows alternating the indication „**Analyzing**“ and the temperature (°C). Beside the temperature on the left, the mode of the stability parameter is displayed. The top <stb> symbol appears. Automatically the actual a_w-value is shown.
With increasing stability more and more <stb> symbols appear. After the achievement of the selected stability parameter all <stb> symbols are shown. The display indication changes to the stable value. A beep sounds for several seconds according to the menu setting. The stable protocol is saved automatically on the SD-card.

Exchange of the test sample

Read first the measuring value before you open the instrument. The stable value indication disappears as soon as the measurement chamber is opened.

- Open the measuring chamber after termination of the measurement.
- Remove the measured material from the measurement chamber and close it immediately with the sample cover.
- Close the cover of the instrument.

Tip :

If the sample contains high concentrations of glycol, glycerine or different acids, it would make sense to let open the measuring chamber during hours. In this way the sensor can recover.

Tip :

Let the ***Lab*Swift-aw** running all the time. In this way you safe time during the warm-up of a restart. The energy consumption is very low.

5.3. Important Notes About The Sensor

The sensor supplied with the Novasina *LabSwift-aw* was factory tested and then calibrated at the following six a_w-value reference points : **0.11aw, 0.33aw, 0.58aw, 0.75aw, 0.84aw and 0.90aw**.

Humidity sensors are subject to certain ageing phenomena, which manifest themselves in deviations from the original value. For the most part, these deviations can be compensated by recalibration. We therefore recommend you to periodically check the accuracy at the humidity reference points and to recalibrate the instrument if required. The standards are reusable and have a long lifetime with adequate handling. All calibration data are stored on the intelligent sensor. Thus a new sensor can be used directly without calibrating the ***Lab*Swift-aw** afterwards.

Correct handling of the sensor :

Note :

Before starting the measurement. The Novasina sensor is a highly sensitive precision device. Please observe the following rules in order to avoid measuring errors or even destruction of the sensor :

- Do not let fall the measurement element or the ***Lab*Swift-aw** or physically shock it. The sensor may not be moisturized (cleaning)
- Do not process a measurement if the white sinter filter is not mounted.
- Use Novasina protection filters, which can be mounted in front of the sensor, if you may measure aggressive substances as acids, alcohols or aromas. The protection filters help to keep away such substances. Otherwise the system might drift away permanently. Contact your local Novasina dealer for the suitable filter protection.
- Sensors that are not used should be stored in a dust free, neutral atmosphere at room temperature and ambient humidity.
- At non-use of the ***Lab*Swift-aw** the measurement chamber should be kept empty and closed.
- Never open or take the measuring cell apart or clean the sensor with any chemical or mechanical parts! The sensor itself cannot be cleaned. All attempt will expire the warranty.
- Under no circumstances connect the sensor to an Ohmmeter or such like. This may damage the sensor and will expire the warranty of the sensor!

Any warranty will expire if one or more of the previous mentioned points counteracts !!

Measurements up to +/- 1.000 aw

The new sensor of the ***Lab*Swift-aw** is capable of measurements up to 1.00 aw (100%rh). A built-in heating system protects the measuring cell from saturation and therefore against destruction.

- The instrument must be switched on before a product sample is placed into the measuring chamber.
- **Always first remove** the sample from the measuring chamber before the instrument is switched off.

Note:

If possible always leave the ***Lab*Swift-aw** switched ON. The integrated heating system protects the sensor from saturation and the instrument is always ready for the next measurement.

5.4. Function Principle of Stability Observation

The stability observation function, if activated, observes the changes in $\mathbf{a_w}$ over a time unit. Stability will be shown when the change of the a_w-value within a selected time frame is less than **< 0.001aw**. The shortest time window („OBSTIME“) is **1 minute**. This window can be increased up to **30 minutes** or a fix stability mode S, A and F can be selected. The optimal observation time depends on the product sample and can be optimized stepwise.

```
****************************************
*       N O V A S I N A                *
*        Water activity meter          *
****************************************

Instrument:      LabSwift-aw #0000000
  Software:      V00.01

SensorType:      CM-2.09 spezial
  Serial number: 0605538

Laboratory: ..............................

Product:    ..............................

Notes:      ..............................

Sample number:   #0514

                 STABLE VALUES
Duration (rel):  00:00:06
Temperature:     25.1°C
Actual:          0.749aw

———————————————————— SIG:7CAA15CB
```

"Stable" protocol

```
****************************************
*       N O V A S I N A                *
*        Water activity meter          *
****************************************

Instrument:      LabSwift-aw #0000000
  Software:      V00.01

SensorType:      CM-2.09 spezial
  Serial number: 0605538

Laboratory: ..............................

Product:    ..............................

Notes:      ..............................

Sample number:   #0514

                 ACTUAL VALUES
Duration (rel):  00:00:04
Temperature:     25.0°C
Actual:          0.529aw

———————————————————— SIG:7CFA13BB
```

"Actual" protocol

5.5. Setting the Stability Observation Factor

- Go to the menu „**STAB“** to set the stability observation factor
- In the menu item „**STAB**“ you can either select the fix mode **„S“, „A“ and „F“** or a selectable stability time with the mode **„O“**.

Some experienced data of the factors can be found in the table below :

Examples of products	*Stability setting*
fruits, jams, tomato sauce	**F**
chocolate, salmon, pharmaceuticals	**A**
dried meat, bakery products	**S**
cheese	**S**
butter, diary products	**S**

Recommendation: To find efficiently a suitable setting we recommend to measure the sample for the first time with the mode „A“. After the stability signal let the sample in the instrument. Switch then after a certain time with the button [Actual/Stable] between the actual and stable value. If you see that the „stable“ value deviates too much from the final value, then the stability factor may be increased (mode „S“).If you require a faster result and thereby wave the highest precision, you can select the mode „F“. For more complicated samples it could be necessary to select the mode „O“ to reach an adequate observation time.

The optional PC software **NovaLog MC** can simplify the setting of the observation time by the graphical illustration of the measurement values.

6. Calibration

6.1. Factory Calibration, Delivery Status

Every ***LabSwift-aw*** , as well as every new replacement sensor „CM-2“ is delivered already factory calibrated at 6 points: 0.11, 0.33, 0.58, 0.75, 0.84 and 0.90 with a factory certificate. A ***LabSwift-aw*** has its full accuracy after the exchange of a new sensor, without calibration by the customer. Nevertheless for the best performance of your instrument we recommend you to verify the sensor after the mounting. For the verification and a possible calibration of the ***LabSwift-aw*** there are 3 SAL-T salt tablets included. If required, up to 3 additional SAL-T standards are available as accessories. These multiple-use standards generate defined and reproducible humidity- respectively a_w- values. Please consult the enclosed data sheet for the correct handling and the visual self-control of the standards. Novasina recommends a periodic verification of the system and if necessary a recalibration. You don’t need to calibrate any point of the instrument over the whole aw-range each time. If you measure your product only in small ranges, it will be enough to control the instrument within the measurement range (minimum 2 -3 aw-values).

Note :

Define a standard quality process for your aw-measurements and start first with shorter verification intervals. Afterwards you increase it according to the results and deviation. Possible deviations occur by contamination, pollution, vibration or general aging of the sensor.

Generally a recalibration at several aw-value points is simple to handle thanks to the unique Novasina SAL-T humidity standards.

6.2. The Calibration Process

Before calibrating the instrument, the following points should be considered:

- The calibration can only be processed **between 15°C - 30°C**.
- An adequate visual control and the right handling of the SAL-T standards has to be done in advance.
- Please shake the SAL-T before you place it in the measuring chamber. Thereby the standard is activated and salt crystals which possibly stick at the membrane are released.

Please place always at first the **SAL-T 75** or **SAL-T 58** into the chamber. After closing the measuring chamber the analysis starts by pushing the function key „**Start/Stop**".Set the stability parameter to 5 minutes („**MODE S**" or „**MODE 5**") or wait for at least 45 minutes before you carry out a calibration at this point. This time is necessary to reach the equilibrium in humidity and get a high precision. Afterwards you can proceed:

The calibration function is seleceted in the menu: **„* CALIB" -> „CAL xx"".**

The system automatically shows you the reference value, which is nearby the calibration point. Check if the displayed value effectively corresponds to the inserted SAL-T salt in the chamber. If necessary use the button [up] or [down] to select the correct reference.

- - - - The deviation between the actual measurement value and the selected reference value (= calibration point) is shown now.

The temperature influence on the humidity reference is taken into account. Activate the calibration by pushing the „**enter**" key.

If a sensor password is set (factory setting „**8808**"), it has to be set on demand, otherwise the system ignores the calibration.

For safety reason you will now be asked again, if the calibration at this point really should be carried out - „**SAVE ?**". Answer this question with „**Yes**" by pushing on [up] or [down]. The system safes now the new calibration on the sensor and shows „DONE" on the display after successful storage.

Now you can go forward with the calibration of further points in the same modality. A general order of the calibration points is not specified. Define internal calibration regulations in your quality process, to assure that the procedure is always equal.

We recommend to start a new calibration with the SAL-T 75%. After that go up to 84% and 90% and than forward with 58%, 33% and finally11%. This procedure is reliable.

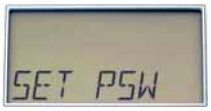
Novasina offers additional SAL-T humidity standards which are not included in the delivery. Further information are provided by your official Novasina dealer or on www.novasina.com .

6.3. Clear Calibration Points

This function clears all calibration points, which are irrevocably saved on the measuring sensor. If a calibration point was calibrated wrong a single or all calibration points can be cleared. The function is performed when you enter the menu:

„*** CALIB“** -> „**CAL CLR“**“. By selection of the adequate menu point the function is carried out.

6.4. Set Sensor Password



Factory setting

" 8808 "

Every sensor unit **CM-2** Sensor has the possibility to protect the internal calibration points by a password. This prevents the sensor to be adjusted by unauthorized or not qualified persons. If a sensor password is set (factory setting „**8808**“) it has to be entered for the calibration of one or more calibration points. A forgotten password can only be set back at the factory.

The measuring sensor can be protected under the menu point „SET PSW“ by a 4-digit numerical code. This code is directly stored on the sensor.

If the password is set, it will be required before the changing of the calibration data or for the modification (clear) of the calibration values.

To deactivate the password protection the settings can be set on „**0000“.**

TIP:

Store the password on a secured place!

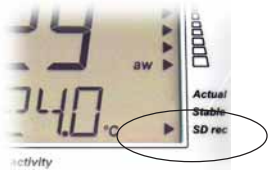
Attention :

A **forgotten password** means to send the sensor or the instrument back to Novasina (Switzerland). There is **no way** to reset the sensor!

7. The „SD Memory card“ as information memory

The ***Lab*Swift-aw** allows the recording of measurement data and measurement protocols on a commercial SD-card. These recorded data files can be viewed using a text editor and subsequently be imported to e.g. Excel. With the optional PC software ***Nova*Log MC** the data can be displayed graphically. The measurement protocols contain an electronic signature. Consequently the PC software can recognize illegal modifications.

Handling of the SD-card



- **Never** remove the SD-card from the instrument as long as the symbol <SD> is displayed. Otherwise open data files can become unreadable or several MB memory capacity can get lost.

Note:

- Always activate „M EJECT“ before removing the SD-card, open the measuring chamber or switch off the instrument.
- If the SD-card is regularly removed „illegal“, it can be restored on the full capacity by e.g. formate the card on a PC.
- Preferably use a SD-card with few taken memory capacity. The waiting time „WAIT“ to prepare the logging process can be considerably reduced.

Tip :

By a periodic formatting of the SD-card on a PC, the card will get the full capacity again.

7.1. Recommended cards & formatting

The ***LabSwift-aw*** is compatible SD and SD_{HC} cards. FAT-16 formatted cards enable a better performance than FAT-32 formatted SD_{HC} cards. Generally the FAT-16 cards should be favoured for speed reasons.

Sample number

- To each measurement an unique number (0001 ... 9999) is assigned which is increased by 1 after a new start of a measurement.
- Correspondent to the „Sample no“ also the measurement and protocol data are recorded on the SD-card. These data can be analyzed and printed out with e.g. Excel, a text editor or with the optional Novalog MC software.
- The number for the next sample can be adjusted in the menu „**SD LOG**" -> „**S NUMB**" and can be set on any initial value.

Note:

The logger will be automatically stopped after opening the measuring chamber, after the storage or more than 60’000 data sets (Excel capacity). The removing of the SD-card will also stop the logger.

7.2. File names

LOG-files:

- The measuring data are saved as **„XXXXLOG.txt“** file, whereas XXXX correspond to the sample number.

Protocol-files :

Stable and actual protocols are saved as **„XXXXPRO.txt“** file. The stable protocol is generated automatically as soon as the stability is reached. If required the user can generate additional (actual) protocols. For that purpose the [Start/Stop]-key has to be pressed longer time, whereby the actual protocol is generated.

The last lines of the protocol contain an electronic signature by what the PC program ***Nova*Log MC** is able to prove the authenticity of the protocol. A maximum of 255 protocols can be output in the same protocol file!

Data format :

Detailed information concerning the data format are available on demand at Novasina AG.

8. The battery

To the ***Lab*Swift-aw** instrument there is a Lithium-Ion battery available. This allows the operation of the instrument at places without power supply for over 20 hours.

8.1. Operation

If the battery is low the information „**LOW BATT**“ is displayed and the instrument gives 5 short beep. In this state there is normally enough time to finish the current measurement. Certainly the charging can be directly started by connecting the line adapter.

Is the battery totally discharged, the message „**LOW BATT**“ will be displayed for 2 seconds followed by a permanent beep and the instrument is switched off.

Note:

Do not let the instrument in this status (with discharged battery) standing around for longer time. The battery might be damaged.

8.2. Charging

The charging can be done while the instrument is switched on or off. Ideally the charging is made when the instrurment is switched off to prevent a heating of the chamber temperature. The charge of battery is indicated with a 2-colour LED on the backside of the ***Lab*Swift-aw** :

- **red** the battery is charging
- **green** the battery is fully charged

Akku LED

Stays the LED switched-off during the charging of the battery, there could be the following reasons:

- There is no voltage at the power jack
- The tolerable temperature range was left
- The battery module is defective

The maximum charging time of the battery is 4 hours.

Warning :
!! By ignoring one of the remarks below there can be the risk of fire or explosion !!

- The instrument is always energized if a battery is mounted.
- The battery module should only be changed or repaird by a Novasina dealer.
- No other battery type can be used because the used battery contains a security relevant protective circuit.
- Never lay down the battery on a conductive ground or pack it in a conductive packaging material!

8.3 . Battery life time

The battery should be charged at ambient temperature between 0°C and 40°C. Outside of this temperature the charging could be interrupted or the battery might be damaged. Due to the fact that after full charge the charging is electronically disconnected, the battery can be connected permanently at the mains .

Note :

Charge the battery at least every half year to avoid deep discharge!

9. Maintenance

9.1. Cleaning of the instrument

Use for the cleaning of the whole instrument a soft and slightly humid cloth. If it is necessary to clean the table of the measuring chamber with a damp cloth, please consider the kind of you cleaning agent. It should not contain any aggressive substances. If possible use water as cleaining agent. Air the measurement chamber afterwards. For the other parts of the instrument you can use cleaning cloth as available on the market. Make sure that no liquid goes inside the instrument. Also the connectors on the backside has to be clear of wetness.

Caution !

Before cleaning, switch off the ***LabSwift-aw*** and **disconnect it from the mains**.

9.2. Cleaning of the aw-measurement cell „CM-2“

Please do NEVER clean the sensor CM-2 itself. The sensor is a very sensitive element with a chemical filter protection on the top. Every cleaning with chemical or mechanical means (touch, blow by air pressure, etc.) will destroy the measuring sensor inevitably. Possible warranty demands expire instantly.

9.3. Cleaning of the Infrared „IR“ sensor

Clean the IR sensor with a slight humid cotton bud. Do not press strongly on the window of the IR-sensor. A contaminated IR-sensor leads to longer measurement times but not to wrong measurements.

9.4. Periodic Recalibration with Humidity Standards

Like all precision measurement instruments, the *LabSwift-aw* must be checked periodically and if necessary recalibrated. This procedure was already described in the chapter 6. Only in this way you can secure the accuracy of your measurements. The Novasina SAL-T humidity standards are applicable for this procedure. If required the standards can be provided with an international accredited certificate.

There are no general rules for the periodic control of the system. This mainly depends on the product character, the frequency of measurement, further ambient conditions and the aging of the sensor. Novasina recommends the following steps:

- Verify the instrument monthly at the beginning. Increase the interval step by step dependent on the correspondent results.
- Check before and after the measurement of problematic samples the aw-range with the nearest SAL-T.

Further information can be find in the chapter 6.2.

9.5. Replacing Protective Filters

Always use protection filters to protect the measuring sensor from undesired particles or aggressive substances. If your samples could emit volatiles it is necessary to use chemical protection fitlers. The filters can be fit with the tension ring and provide protection against different substances in gaseous form.

Such chemical protection filters have to be replaced periodically, due to the fact that they get saturated. Filters can increase the measurement time and they incativate the IR-temperature measurement.

Novasina provides filters for the protection of the measuring sensor against alcohol, aromes, acids, base, etc. Please read our special information sheet or contact your local Novasina dealer.

9.5.1. General rule for protection

Chemical filters have to be used if the admissible workplace concentrations (MAK-values) are exceeded.

Some examples :

sulphur dioxide	2 ppm
formaldehyde	2 ppm
hydrogen sulfide	3 ppm
ethanol	300 ppm

Novasina provides the following protection filters for the ***Lab*Swift-aw** :

- **eVC-21 filter :**

  Chemical filter : protects against hydrogen peroxide, acid gases, diluted acetic and formic acid, sulfur dioxide, chlorine.

- **eVC-26 filter :**

  Chemical filter : protects against a multitude or aggressive substances, e.g. nitrogen oxides, amines, aldehyde solvents, aromatic hydrocarbons, oil vapours, fine dust particles.

- **eVALC-1 alcohol filter :**

  Chemical - mechanical filter : protects against fine dust or alcohol.

9.5.2. Filter replacement

Chemical filters must be periodically replaced. Saturated filters falsify the measuring results and the protective effect of chemical filters also deteriorates.
No generally valid guidelines can be given concerning the filter service intervals as this mainly depends on the **concentration** of harmful substances and the operating temperature.
Replace a new filter carefully into the depression in the measuring head. Do not bend or break the filter. A tension ring helps to fix the filter at the adequate position.

Attention !

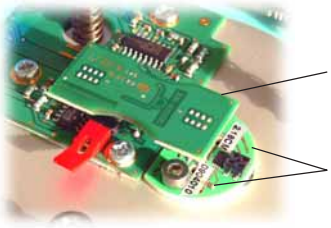
Defective or wrong mounted filters do not fullfil their function and endanger the measuring sensor or instrument. Such a filter must be replaced immediately.

9.6. Replacing a CM-2 Sensor Unit

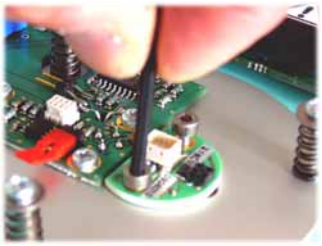
Note:

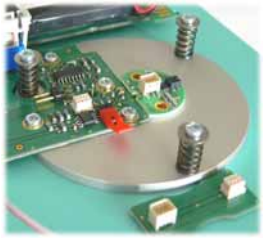
The ***LabSwift-aw*** contains susceptible electronic assemblies. Please pay attention to protect these items from discharge. You can achieve this by discharging yourself at a grounded, conductive surface (e.g. radiator) before you open the housing of the instrument.

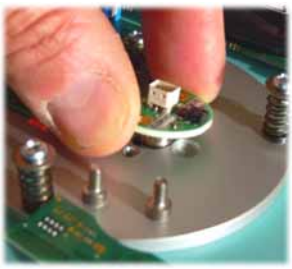
- Switch off the instrument and disconnect the mains from the system.
- Open the instrument cover and remove the 4 screws of the cover plate.
- The housing cover can be set or inclined aside carefully
- The cover plate is still connected to the housing cover by a ribbon cable. Do not unfix it!



- Afterwards you can unplug the connecting PCB. Therfore hold the PCB at the long side and lift it carefully.
- Remove now the two screws, which fix the actual sensor in the measuring head and lift the sensor unit completely out of the head.







Tip:

Exchange at the same time the white sinter filter in front of the sensor. Press the sinter filter downwards and insert a new one.

- Insert now the new purchased measuring sensor in the same place and fix it with the screws.

Warning !

- Never press with fingers or any other item on the top of the measuring cell, this might damage the sensor protection filter and leads to the damage of the sensor
- Always remove the measuring sensor during the exchange of the sinter filter. Otherwise there may be the risk that the sensor get dampaged during the removal or mounting of the filter.

Every measuring sensor is protected with a password. The factory-setting is „**8808**“. Do not forget to adjust the password according to your requirements, otherwise the protection can’t be assured.

10. Technical Specifications

10.1. Technical Specifications of the LabSwift-aw

General :

Supply	:	5VDC +/- 6%, max. 4W (during charging of battery) Normal operation < 0.5W
Line adapter*	:	90 - 264 VAC, 50/60 Hz, output 5VDC (Novasina part no. 260 0505) * can only be operated in the range of 0...+40°C

Permissible ambient :

Operating temperature	:	5 ... 45 °C (during charging max. 40°C)
Humidity range	:	5 ... 95%rh, not saturated
Dimensions (instrument)	:	225x140x85 mm
Weight (instrument)	:	1.2 kg
Protection class	:	IP 30

Temperature measurement :

Measuring principle	:	IR(infrared) surface temperature measurement & NTC
Measuring range	:	5 ... 45 °C (IR-compensated > +/- 10 K)
Accuracy	:	+/- 0.15 °C (NTC)
Resolution	:	0.1 °C

Humidity measurement :

Measuring principle	:	Resistive-elektrolytic sensor
Measuring range	:	0.003 ... 1.00 aw
Measuring accuracy after	:	+/- 0.01aw (within the calibration range)
5-point-calibration		between 15 ... 30 °C
Resolution	:	0.001aw (0.1%rh)
Repeatability	:	+/- 0.003 aw

SD-card :

Type	:	SD / SDHC
File system	:	FAT-16 (recommended) / FAT-32

Display :

Type	:	reflectible LC-Display wiht adjustable contrast
Dimensions	:	35x69 mm

Battery (Ooption) :

Type	:	Lithium-Ion battery (1700 mAh)
Charging time	:	typical < 4h (at 23°C)
Running time	:	> 20 h (at 23°C)

Instrument standards :

Tested CE standards	:	The LabSwift-aw instrument fulfills the followed actual CE standards, EC 61000-6-1:2005, EN 61000-6-1:2005, IEC 61000-6-3: 2006, EN 61000-6-3:2007

Emitted electromagnetic radiatons with frequency in the range of 320...340 Mhz might have an temporary influence on the temperature (IR) measurement up to 1,5 K during the radiation!

10.2. Equilibrium humidity values of the SAL-T humidity source

Bez. des Standards	Novasina Typ	EU Gef. Klasse	Farbe des Salz	Chemische Symbole	% relative Feuchte in Relation zur Remperatur (x / 100 in a_w)				Literatur Referenz
					15°C	20°C	25°C	30°C	
SAL-T / 4	SC-4	T	weiss	CsF (>25%)	4.3	3.8	3.4	3.0	A
SAL-T / 6	SC-6	Xn	weiss	LiBr	6.9	6.6	6.4	6.2	A
SAL-T / 11	SC-11	Xn	weiss	LiCl	11.3	11.3	11.3	11.3	A
SAL-T / 33	SC-33	--	blau	$MgCl_2$-$6H_2O$	33.3	33.1	32.8	32.4	A
SAL-T / 53	SC-53	O	grün	$Mg(NO_3)_2$-$6H_2O$	55.9	54.4	52.9	51.4	A
SAL-T / 75	SC-75	--	violett	NaCl	75.6	75.5	75.3	75.1	A/B
SAL-T / 90	SC-90	T	weiss	$Ba(Cl)_2$-$2H_2O$	90.9	90.5	90.1	89.9	C
SAL-T / 97	SC-97	--	gelb	K_2SO_4 (>20%)	97.9	97.6	97.3	97.0	A
SAL-T / 98	SC-98	T+/N	orange	$K_2Cr_2O_7$	98.5	98.2	98.0	98.0	A

Lit : A : Greenspan, Humidity Fixed points of Binary Saturated Aequeous Solutions
Journal of Research of the National Bureau of Standards Vol. 81A, No1 01/02 1977
B : Robinson R.A. and Stokes R.H. Electrolyte Solutions, Butterworths London 1959
C : Wexler, Humidity and Moisture Vol.3, Fundamentals and Standards, Robert E.Krieger,

11. Troubleshooting

11.1. What is wrong when ....?

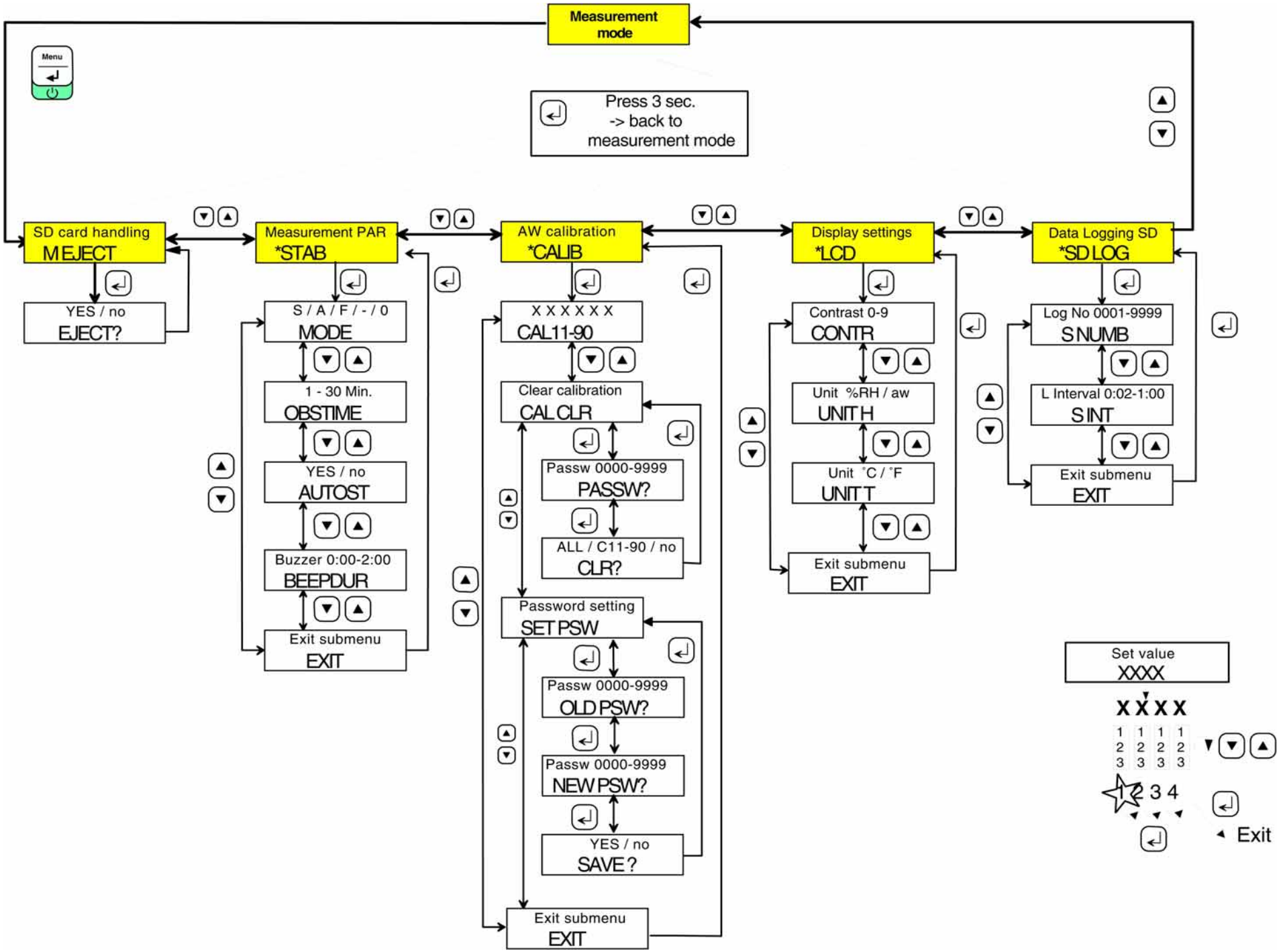
The calibration of the aw-value is not possible?	1. The sensor is protected by a password 2. The sensor is defective or contaminated and has to be repalced
You have a drift of the aw-value after completing the analyzing process?	1. The stability obsevation factor is set too short 2. The temperature of the probe is not in equilibrium 3. The probe has a second sorption step
Reading of the LCD screen is very bad?	1. The contrast of the screen is very low 2. The ambient light is bad. Please change the place of the instrument

11.2. Error message screens

If any error message appears on the ***Lab*Swift-aw** screen, please proceed as follows:

Please write down the error message carefully. Switch the instrument off and restart. If the error message recurs, please follow the instructions on the table and/or contact your Novasina representative (www.novasina.com)

Error report	Error description	Needed action
„DEW“ ERROR	The reference/sample is too hot	Pay attention that at high humidities the reference is not hotter than the instrument!
„MCARD“ ERROR	SD-card can’t be written	Push up the write-protection slide of the SD-card and formate it new!
„PASSW“ ERROR	A wrong password was	A forgotten password can only be set back at entered Novasina!
„RANGE“ ERROR	The measuremnt point is outside	Check the humidity standard.Check if the right of the calbiration range humidity point was choosen. Replace the sensor!
„SPACE“ ERROR	Calibration point lays to close	Check if the right humidity point was selected!
„TEMP“ ERROR	The temperature for calibration	Only calibrate in the temperature range of 15°C is outside of the required range to 30°C. Consider the ambient temperature!
„XX SENSOR“ ERROR	Error of the humidity sensor	The used humidity sensor is not compatible or an error of the instrument occurs. Exchange the sensor or update the instrument software!
„NO SENS“	The humidity sensor is not	Install a humidity sensor and switch off and restart recognized the instrument!
„FATAL“	An intenal error occured	Switch off and restart the instrument. If the error repeats please contact Novasina.



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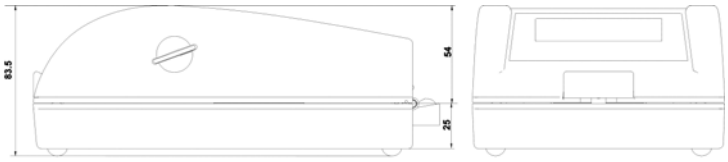

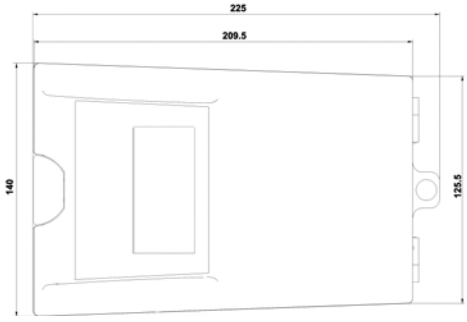

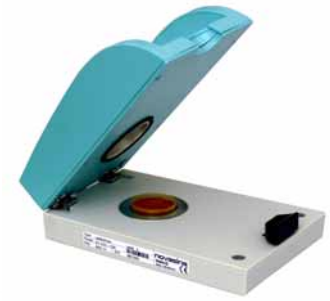

The Novasina team would like to thank you for your confidence and hope you will enjoy and obtain successful measurements with the new LabSwift-aw for high performance quality measurement of the water activity and its manifold options. You have now a powerful water activity meter with outstanding options, simple handling and best reproducebility for your special application in quality measurements.

In case of any further questions, Novasina and its agencies will be happy to advise you at any time.

your Novasina team

Consulting, Sales and Service:

Manufacturer :

Novasina AG, Neuheimstrasse 12, 8853 Lachen, Switzerland

Telephone +41-55-642-67-67, Fax +41-55-642-67-70, e-mail: info@novasina.ch, www.novasina.com

novasina
The Art of Precision Measurement

ISO 9001 : P 2001 certified since 1996