Schleibinger Slabtester

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1 Introduction

The Schleibinger Slabtester is a modern test chamber for freeze-thaw test of concrete, natural stone and other building materials. The Slab-Tester is a temperature and time controlled freeze-thaw system and allows freezing and thawing of the specimen according to the standards:

- CEN/TS 12390-9: Testing hardened concrete - Part 9: Freeze-thaw resistance with deicing salts - Scaling.
- EN 1338: Concrete paving blocks - Requirements and test methods.
- EN 1339: Concrete paving flags - Requirements and test methods.
- EN 1340: Concrete kerb units - Requirements and test methods.
- EN 1341: Slabs of natural stone for external paving - Requirements and test methods.

With the additional option **Freeze-Thaw Test with Flooding** further tests accodring to following standards are possible:

- EN 12371: Natural stone test methods - Determination of frost resistance.
- EN 12004-2: Adhesives for ceramic tiles - Part 2: Test methods.
- EN 1367-1: Tests for thermal and weathering properties of aggregates - Part 1: Determination of resistance to freezing and thawing.

With the option **Freeze-Thaw Test with Flooding and water circulation** tests according to CEN/TR 15177 Part 7 can be performed.

In addition, using the further feature for the Slabtester **Spraying option** test on bricks according to `CEN/TS 772-22: Methods of test for masonry units - Part 22: Determination of freeze-thaw resistance of clay masonry units` can be carried out.

For further questions, please, do not hesitate to contact us! We will be glad to help you!

2 The Slabtest equipment

The Slabtester from Schleibinger is made of stainless steel on the outside and inside. Operation of the Slabtester can be done via the built-in touchscreen or via computer via the built-in Ethernet interface. The temperature values can be read out or the temperature profiles can be entered via a web browser. Input of up to 8 different temperature profiles is possible.

The temperature progress of the last 24 hours will be displayed graphically.

Figure 1: Schleibinger Slabtester

In addition, Slabtester can be equipped with the Flooding function. This Flooding option contens of internal and external tanks made of stainless steel. The inner tank will be floaded or emptied according to the time program. The temperature of the water in the outer tank can be adjusted. Alternatively, Slabtester with the option **Preparation for the Flooding Option** for future installation of the Flooding option can be delivered (Chapter 2.8).

2.1 Safety instructions and warnings

- To prevent injury ore damage to the unit, the Slabtester should be unpacked and set by two people.
- Disconnect the Slabtester from the mains if any fault occurs. Pull out the plug, switch off and remove the fuse.
- Any repairs and work on the Slabtester should only be carried out by the customer service department of Schleibinger, as unauthorized work could be highly dangerous for the user.
- Do not stand on the plinth, drawers ore doors ore use them to support anything else.
- Do not let children play with the Slabtester, e.g. do not allow them to sit in the drawers ore swing on the door.
- Do not store food in the Slabtester!
- Do not store ore use explosives ore sprays in the Slabtester.

Attention!

- If using the flooding option, the heating element of the outer container should always be kept unter water! Do not touch the heater! Combustion danger!
- Do not operate the heater on cable drum. The connection load is 2.2 kW. Only connect the device to a socket with protective wire.

2.2 Setting up

- Avoid positioning the Slabtester in direct sunlight ore near cookers, radiators and similar sources of heat.
- The floor should be horizontal and level. To compensate of any unevenness, adjust the height of the feets of the Slabtester.
- At least 30 cm of space has to be between the Slabtester and the ceiling. Always make sure there is a good ventilation and that the air flowing outwards can escape.
- Remove the protective film from the outside of stainless steel appliances before use.

2.3 Connecting to the mains

2.3.1 230 V / 50 Hz

Connect the Slabtester to a socket which is cesured with a minimum of 10 A. Check the mains voltage with the information on the type plate lokated inside the cabinet at the top of the door. The socket should be ealily accessible, and not be behind the device.

The Schuko plug has a DI protection switch with tripping current 30 mA, disconnecting all poles. Make sure that it is switched on. For checking the funktion of the DI switch by pressing the test button (small button).

To ensure trouble-free operation, do not connect the Slabtester to the power supply until about 1 hour after delivery. Connect the Slabtester through a properly earthed plug and socket.

The Slabtester has a power consumption of a maximum of 1 kW. The flooding option has an additional power consumption of 2.2 kW. Operate the Slabtester and the Flooding option on 2 separately secured sockets!

2.3.2 120 V / 60 Hz

Power supply (AC) and voltage at the operating point of the external troansformer must comply with the details on the type plate of the transformer. The output of the transformer must comply with the input of the Slabteser. The type plate of the Slabtester is located at the top of the door inside. The 120 V / 60 Hz socket has a NEMA 5-20P connector and must be fused with a 20 A fuse ore higher. The socket should be easily accessible and not directly behind the Slabtester.

To ensure trouble-free operation, do not connect the Slabtester to the power supply until about 1 hour after delivery. Connect the Slabtester through a properly earthed plug and socket.

Remove the transformer from the mains if the Slabtetser is out of operation. The transformer has a built-in 20 A fuse. If the fuse is blown press
Attention! the fuse button to reset the fuse. **The transformer is NOT insulated**

The Slabtester has a power consumption of a maximum of 1 kW. The flooding option has an additional power consumption of 2.2 kW. Operate the Slabtester and the Flooding option on 2 separately secured sockets!

2.4 USB stick

Above the display is a slot for the included USB stick. The USB stick should not have more than 2 GB of storage space. Please, use the USB stick supplied with the equipment.

Attention! Do not force the stick!

2.5 Grids for the Slabtester

The samples will be placed on the grids. The maximum load capacity of the grid is 60 kg. Depending on the height, number and weight of the samples, the distance between the grids can be set in 43 mm increments.

Distribute the samples evenly on all grids in the cabinet. Do not load the cabinet above the mark on the back of the refrigerator. This is important to ensure a uniform air circulation, and thus a uniform temperature distribution.

Do not place samples directly on the bottom of the cabinet.

Attention! At the height of the additional fan use no or only a short support grid!

2.6 Additional fan

To ensure optimum air circulation, one (optional two) additional fan (24 V operation) is mounted in the cabinet (fig. 2). The fan shuts off when
Attention! the door is opened. At the height of the additional fan, no normal deep sample grid may be inserted! Do not use grid at the fan´s height or use ones with the reduced depth!

Figure 2: Additional fan for the Slabtester

2.7 Sample temperature sensor

The sample temperature sensor is the sensor with the red connection cable. If the test room is flooded, the additional temperature sensor with the gray cable is used as the reference sensor for the control. Place the gray sensor in the airspace above the sample container. Do not immerse it in the test container!

2.8 Slabtester - flood operation

2.8.1 Safety instructions for flood operation

- Do not pulled out or set to another position the inner container of the Slabtester.
- Attention danger of tipping when inner container is loosened and pulled out!

Attention!

- Always keep the heating element of the outer container under water when using the flooding option.

Attention!

Do not touch the heater! Combustion danger!

- Do not operate the heater on cable drum. The connection load is 2.2 kW. Only connect the device to a socket with protective wire.

2.8.2 Installation instructions Slabtester with flooding option

- Place the outer container at ground level next to Slabtester when using flooding option.
- Place the pump on the pump support plate (fig. 3, left)
- Connect the pump to the water passage in the tank.
- Connect the water passage to the engine valve on the back of the Slabtester (fig. 3, right)
- Close the drain cock of the tank.

- Connect the connection cable of the pump to the Powercon socket (gray and round) on the back of the Slabtester. Insert the plug and turn it to the right for approx. 30°. To unlock, pull back on the metal tab on the plug and turn the plug approx. 30° to the left (fig. 4, left).
- Connect the motor valve to the black socket on the back of the Slabtester (fig. 4, right). Turn the orange circlip after insertion approx. 90° to the right.
- Turn off the power switch to ensure the engine valve is closed.

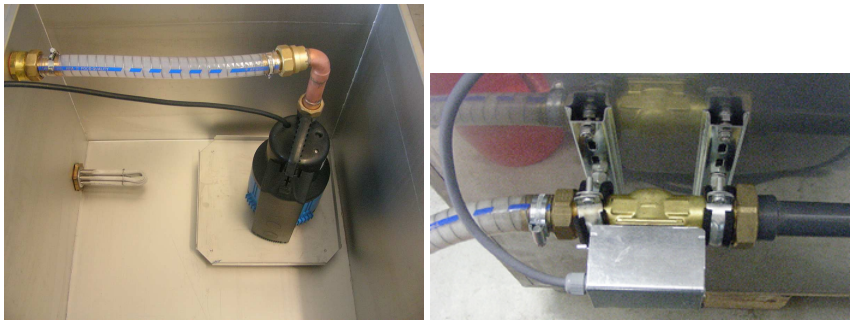

Figure 3: The pump in the outer container and the engine valve on the back of the Slabtester.

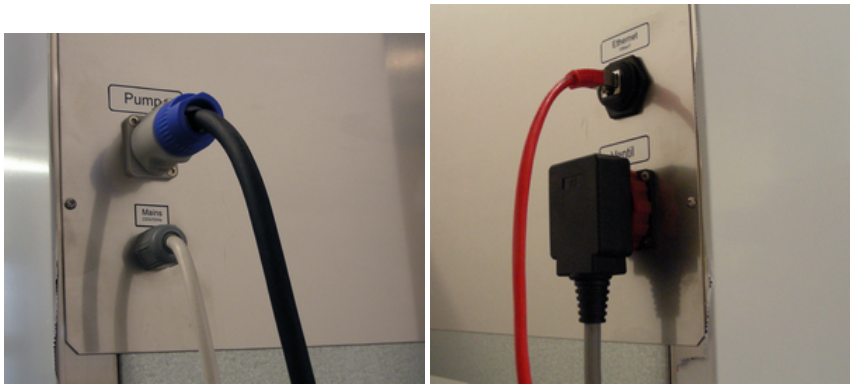

Figure 4: Connection for the pump at the back of the Slabtester.

2.8.3 Operating the flooding system

For the flooding operation, a stainless steel container is hung in the cabinet and the pipe is connected to the motor valve at the back of the cabinet. In the container special sized grids are inserted. Equip the container with samples as prescribed in the standard and place the reference probe (see also fig. 5).

- Turn off the Slabtester to make sure that the engine valve is closed.
- Add water to the required level.
- Switch the Slabtester on again. Then use the menu **setup**, **flooding** und **running empty** to empty the water into the (empty) outer container (fig. 6).
- Then pump the water back into the inner container by pressing the menu item **test flooding** (fig. 6).

- Refill the water level in the inner container to the required level, as there is always some residual water left in the outer container to prevent the heater from running dry.
- Check the heater in the outer container is covered with water.

Attention!

- Switch on the heater only when it is covered with water
- Set the required temperature on the heating adjustment ring (fig. 7). The desired temperature is the number above.
- The temperature control switches from the red temperature sensor to the gray additional temperature sensor if the inner container is flooded. Place the gray sensor in the air space above the inner container.

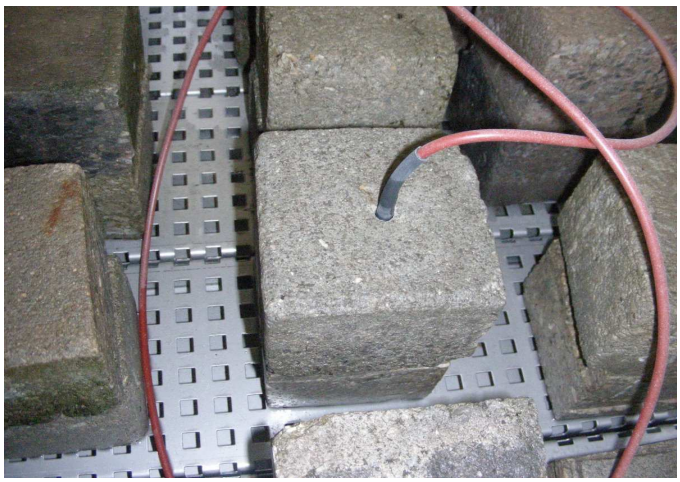

Figure 5: Inner container with the reference temperature sensor.

Figure 6: Menu bar for empty and floog by a hand.

Figure 7: Adjustment of the heating cartridge at the rear of the outer container.

2.8.4 Retrofit the Flooding Option

The flooding operation of the Slabtester can be retrofit. That requires the ”Option Preparation for the Flooding Option” (order number C01082).

The installation can be done as follows:

- Set the inner water container on the 6th grid position and the outflow direction to the rear (fig. 8).
- Fix the clamps on the back side of the Slabtester and insert the pipe including the insulation into the opening provided for this purpose (fig. 9)
- If the gap between the pipe and the insulation is too big, warp the tape supplied with the equipment around the pipe (fig. 10)
- Use sealing ring for the connection of the pipe with the outflow of the water container (fig. 11)
- Use sealing ring for the connection of the pipe with the motor valve on the back of the Slabtester (fig. 12)
- Fix the motor valve with the clamps and connect the water pipe for the outer water container (fig. 13)
- Fix the water pipe from the motor valve with the outer water container and clamp the cable from the pump in the opening provided for this purpose (fig. 14)
- Connect the cables with the Slabtester as described in chapter 2.8.2

Figure 8: Position of the water container in Slabtester

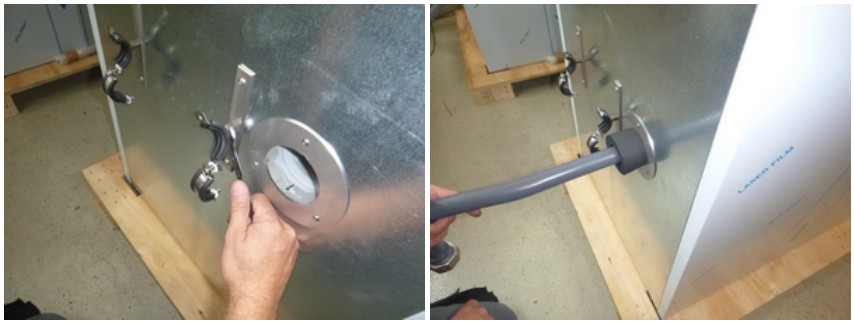

Figure 9: Fixing of the clamps and insert of the pipe

Figure 10: Fixing of the pipe

Figure 11: Fixing of the pipe in the Slabtester

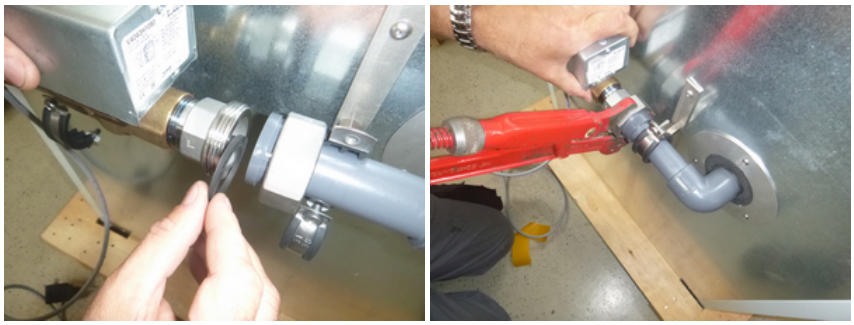

Figure 12: Fixing of the pipe with the motor valve on the back

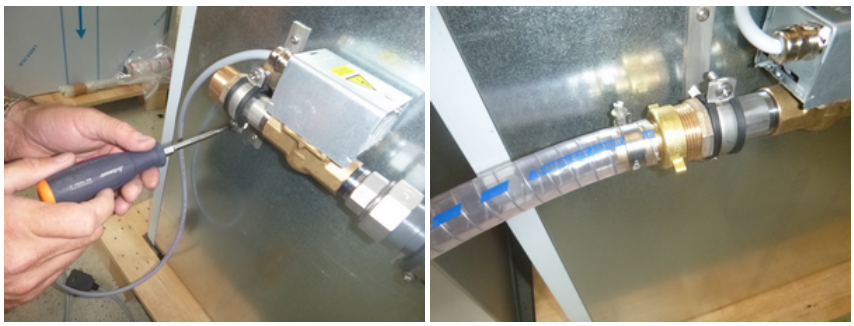

Figure 13: Fixing the motor valve on the back and connecting to the water pipe from the outer water container

Figure 14: Fixing the water pipe with the outer water container and clamping of the pump cable

For the flooding operation, the electrical wiring in the control cabinet is usually set at the factory and must be as follows (fig. 15):

- Cable positions 1, 2, 3, 6, 8, 9, 10, 11 and 12 are occupied.
- The blue switch box setting is off at the positions 1, 2, 3, 5, 7 and 8.

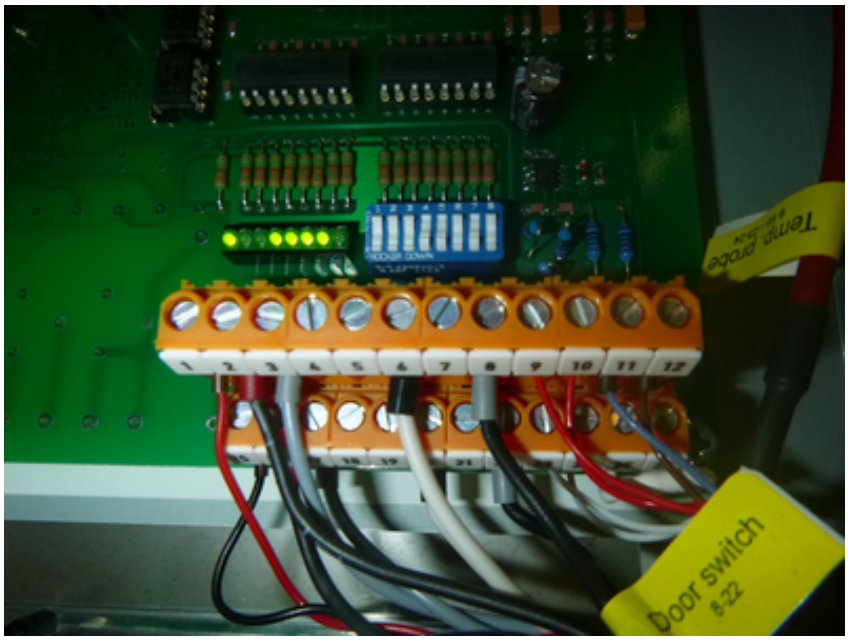

Figure 15: Electrical wiring for the flooding option

2.9 Flooding option with water circulation

The option **Flooding with water circulation** is a modification of the option **Flooding**. In addition to the flooding the water in the inner container is circulated. The water is tempered in the outer container and circulated from the outer to the inner container constantly. Thus, tests according to CEN/TR 15177 Part 7 are possible.

2.9.1 Safety instructions for flooding with water circulation

Attention!

- Attention danger of tipping!

  The inner container in the Slabtester can be pulled out of the Slabtester. Secure the device against tipping over! Attach the device to the wall and /or floor (fig. 16, 17, 18). Use the supplied materials for this.

- Always keep the heating element of the outer container under water when using the flooding option.

Attention!

Do not touch the heater! Combustion danger!

- Do not operate the heater on cable drum. The connection load is 2.2 kW. Only connect the device to a socket with protective wire.

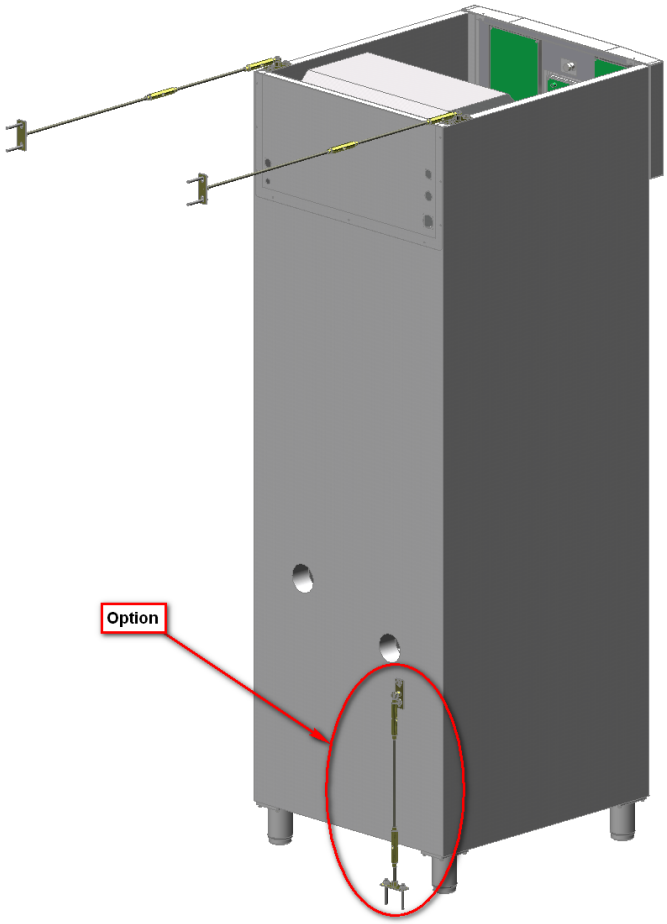

Figure 16: Attachment of the Slabtester against tipping over.

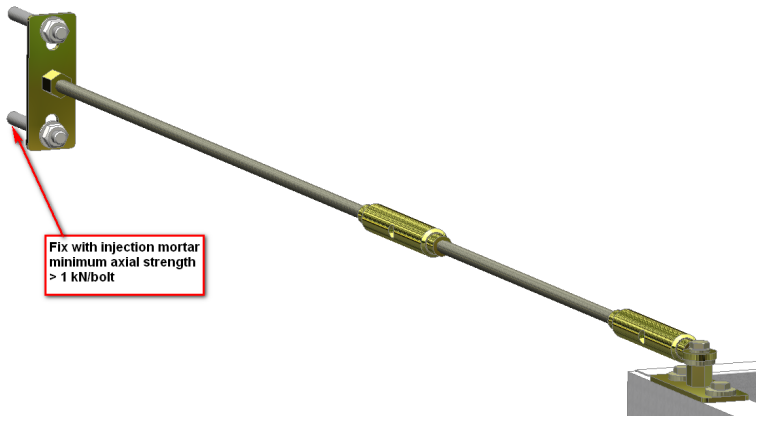

Figure 17: Fixing of the Slabtester on the wall. Use the supplied materials for this.

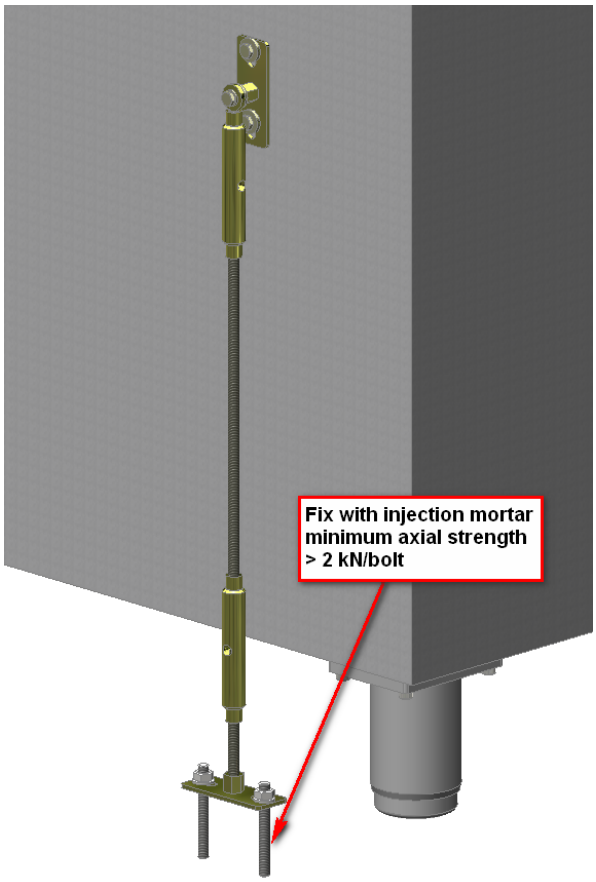

Figure 18: Fixing of the Slabtester on the floor. Use the supplied materials for this.

2.9.2 Installation instructions Slabtester with Flooding and water circulation

For the flooding option with water circulation, the stainless steel container in the Slabtester must be connected to the outer container. The hose for the drain is located in the outer container. The pump hose is fixed on one side to the inner container and is located in the Slabtester (fig. 19, 20) .

- Take the thicker hose and gasket out of the outer container and attach it to the rear wall of the outer container (fig. 21).
- Insert the other end of the drain hose through the corresponding opening in the back wall of the Slabtester (fig. 22, right).
- Slide the inner container out as far as possible. Make sure that the Slabtester does not tip over!

Attention!

- Insert a clamp at the end of the hose and attach it to the rear wall of the inner container (fig. 22, left, 23). The clamp should be placed as close to the inner container.
- Pass the second hose out of the inside groove of the Slabtester out through the smaller opening (fig. 24).
- Connect the pump hose to the corresponding port on the outer container (fig. 25).

Figure 19: Inner container of the Slabtester.

- Fill the outer container with water up to 3 cm below the edge. Compared to the flooding option only the water in the inner container is not retained and flows off automatically as soon as the pump is switched off.
- The circulation time is determined by teh flood setting and can be specified accordingly in the profile input (more details in chapter 4.5.6 and 5.3).
- Place the sampe in the inner container and switch on the Slabtester.
- Use the menu **setup**, **flooding** and **test flooding** to flood the inner container (fig. 6). Check the water level in the outer container. The heater must be covered with water!

Attention!

- Set the required temperature on the heating adjustment ring (fig. 7). The desired temperature is the number above.
- The temperature control switches from the red temperature sensor to the gray additional temperature sensor if the inner container is flooded. Place the gray sensor in the air space above the inner container.

Figure 20: Connecting hoses and the pump in the outer container.

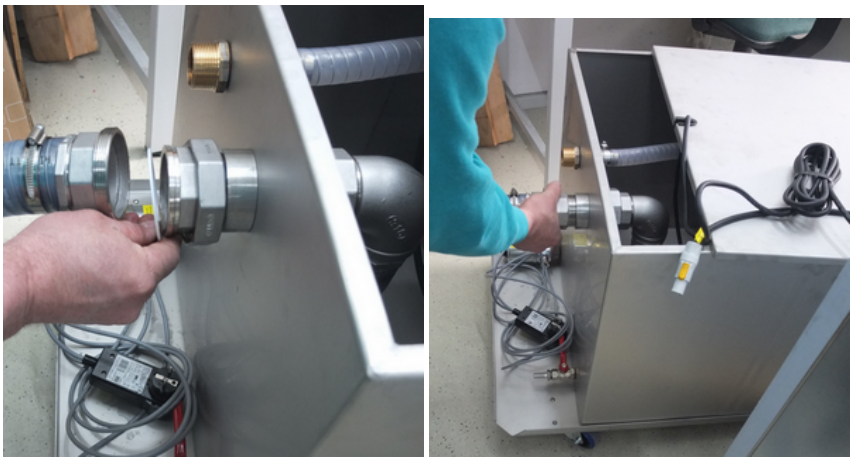

Figure 21: Connection of the drain hose to the outer container.

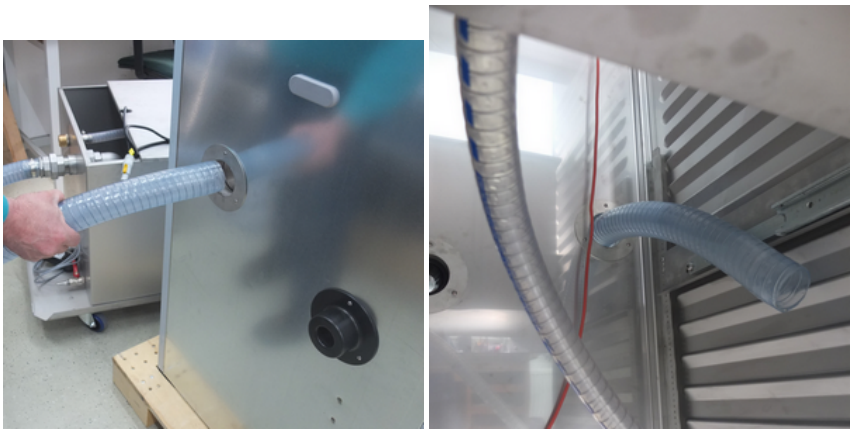

Figure 22: Connection ot the drain hose on and in the Slabtester.

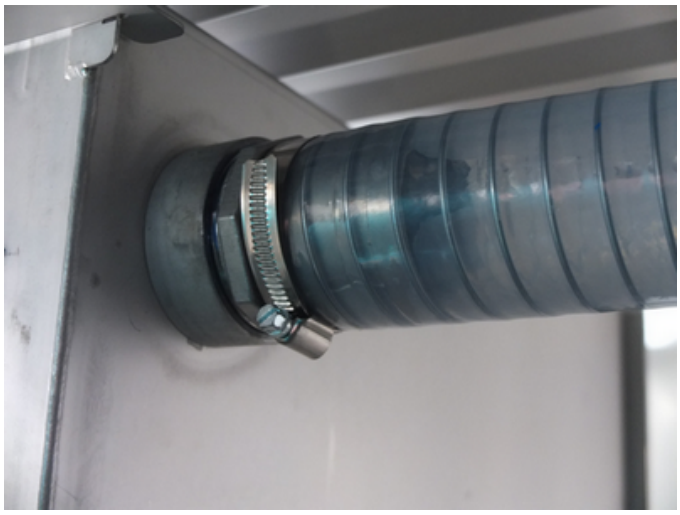

Figure 23: Connection of the drain hose with the inner container.

Figure 24: Carrying out the pump hose to the outside.

Figure 25: Connection of the outer container with the Slabtester.

2.10 Spraying option

2.10.1 Safety instructions for sprying option

Attention!

Attention danger of tipping!

The inner container in the Slabtester can be pulled out of the Slabtester. Secure the device against tipping over! Attach the device to the wall and /or floor (fig. 16, 17, 18). Use the supplied materials for this (see chapter 2.9.1).

Please, support the hose below the bottom of the container if you move the container. (see fig. 27).

The arm with the spraying nozzles and the arm for the temperature sensor may be adjusted as shown in picture 26.

Figure 26: Spraying arm for the masonry test.

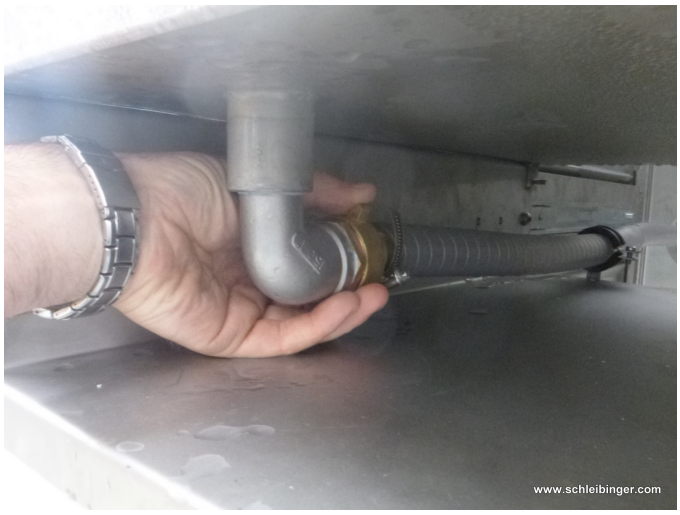

Figure 27: Support the hose when moving the inner container.

2.10.2 Theory of operation

For the masonry test, freezing and thawing is done by air. At the end of the the thawing period water is sprayed onto the test wall. Therefore the:

- Drain valve Y-drain is closed.
- The pump is switched on.
- The water valve Y-water is opened.
- The amount of water pumped up, the flow rate, is controlled by the valve Y-flow.

After the spray period:

- The drain valve Y-m is opened again.
- The water valve Y-water is closed.
- The pump is switched off.
- The valve Y-air is opened to press air inside the tubes, to press out all remaining water, otherwise the water would freeze inside the tubes and the small holes in the spray arm would be closed.
- The Y-air is closed again, and the Y-drain is opened.
- The pump is running 5 s to press out the air from the drain hoses.
- Pump stops, and the Y-drain is kept open during the test.

2.10.3 Setup

- Connect the compressor to the connector at the pressure regulator.
- Connect the compressor with the mains.
- Set the pressure at the pressure regulator of the compressor to about 4 bar (see figure 29.
- Set the pressure at the pressure regulator on the backside of the Slabtester to about 1 bar, see figure 28.
- Connect the Y-air valve to the connector at the rear panel of the Slabtester
- Connect the Y-water valve to the connector at the rear panel of the Slabtester (see figure 30.
- Take care that the valve / flow-controller is in the right position, adjust it if necessary, see figure 28
- Mount and adjust the sprayer and the temperature sensor as shown in picture 26.
- Disconnect the additional fan mounted on the bottom of the inner side of the door.

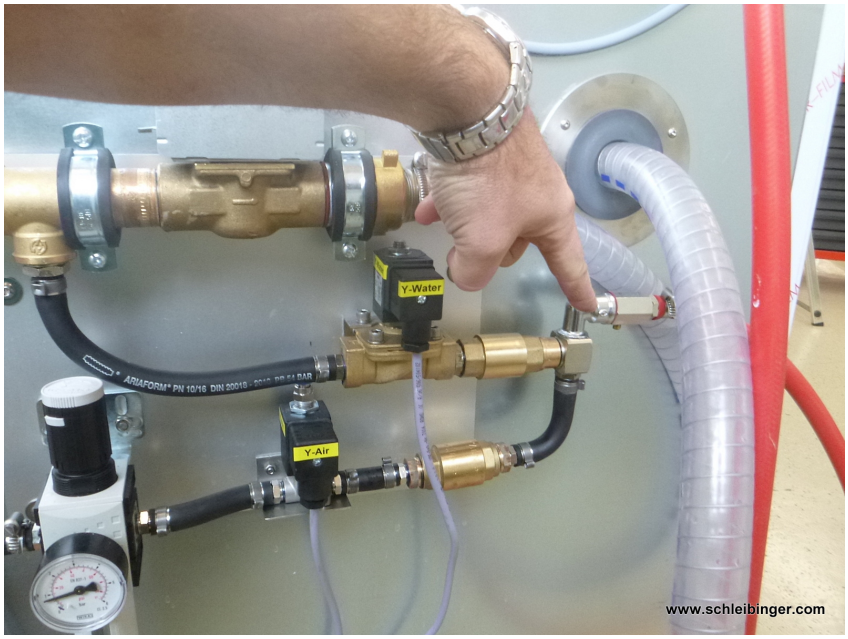

Figure 28: Check the position of the flow-controller, and set the pressure regulator to 1 bar

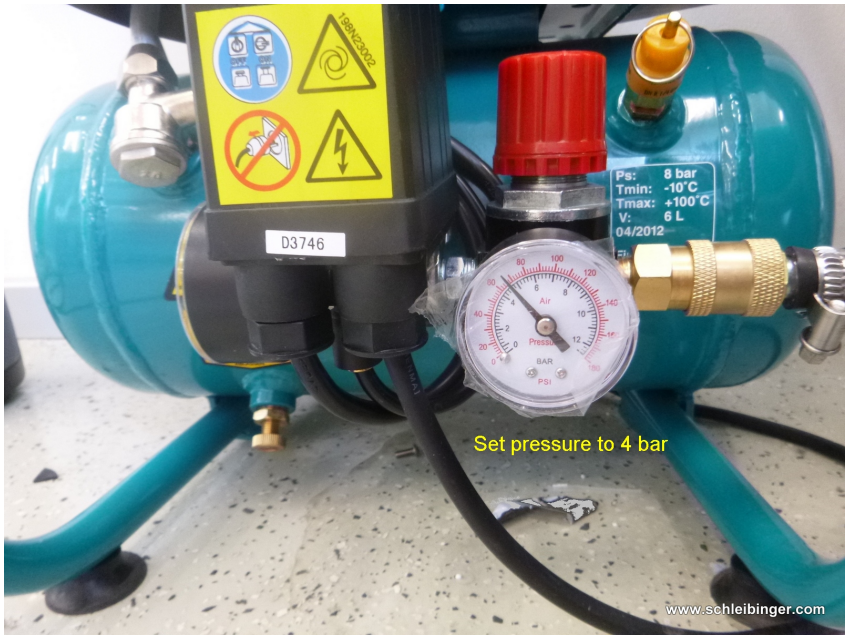

Figure 29: Set the manometer of the compressor to 4bar.

Figure 30: The valves and the connectors

3 Network interface

The Slabtester is delivered with an integrated data logger. The temperature measurement data are recorded autonomously on the data logger for up to 40 weeks and saved on an internal non-volatile memory.

The Slabtester is equipped with a network interface and can be integrated into a local network. With a appropriate network configuration, worldwide access is possible. The Slabtester needs a fixed IP address for integration.

Alternatively, the Slabtester can also be connected directly to a PC.

The operation of the Slabtester takes place primarily via the touch display. The temperature measurement data can be graphically displayed or read out and stored via a web browser. Alternatively, the data can be saved on the supplied USB stick.

The temperature input can also be done via the web browser. Start, stop and manual operations of the Slabtester are only possible via touch screen on the device itself.

- The network connection is lokated at the back of the Slabtester.
- For integration of the Slabtester into your network, the use of a switch is recommended.
- One free IP address is needed. The IP address at the delivery state is noted at the back of the device, next to the network interface.
- Use the supplied free programm Chiptool.exe to change the IP address or to switch to DHCP.

Fig. 31 is showing the networking.

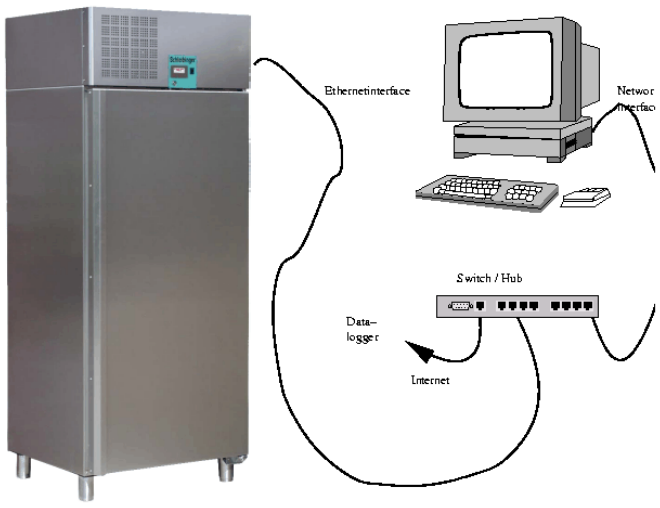

Figure 31: Connection of the Slabtester.

3.1 Configuration of the Network access

The Schleibinger data logger, the Slabtester, CDF machine and the ASR reactor are equipped with a *100 BaseT* network interface. It can be integrated within a local Intranet or globally into the Internet. The network configuration can be done with the program Chiptool which can be found on USB stick delivered with the equipment or downloaded from the page `www.schleibinger.com/chiptool`.

Example of Default Settings:

```
Device: Data logger for the shrinkage cone
Customer:  Miximaxi AG
Serial Nr: 201312324
MAC-ID: 00:30:56:90:7D:C3
Hostname: Scone_201312324
[]   Obtain an IP-Address automatically
[]   Use the following IP-Addresse: IP addresse:.......
Subnet mask:.......
```

3.2 Network configuration between the data logger and PC

There are two options for the network configuration of the data logger and PC available:

- by automatically getting an IP address = default setting at time of delivery
- by using a static IP address

Automatically getting IP address

Connection of the data logger into a local network with DHCP- and DNS-Server is the simplest and fastest method.

- Connect the equipment with your local network (switch) using the network cable which was delivered with the device and switch on the equipment.
- Enter the host name into the address line of your browser in a form "**http://...**". The host name can be found on the equipment, from the supplied document folder or can be read out using the program Chiptool (Fig. 32.)

A DHCP-Server assigns a free IP address to the data logger. Hint: DHCP server are scanning the network from time to time assigning a IP address and a symbolic name to all computers in the network. This procedure may take some time. So please wait some minutes until you try to access the data logger with its host name.

Alternatively, in the case the host name - DNS-server does not work or supported in your network the connection with the data logger can be done by using of the assigned IP address. This IP address can be found from the program Chiptool, mentioned above (Fig. 33).

Make sure the data logger always getting the same IP address from the DHCP server. Enter the IP address assigned by the DHCP server into the address line of the browser instead of the host name (Fig. 34).

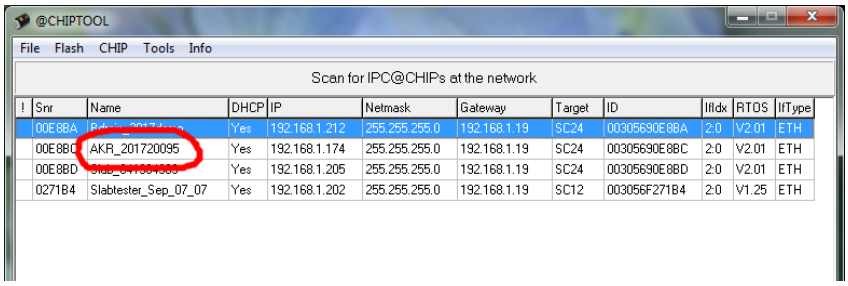

Figure 32: Reading out of the host name of the equipment.

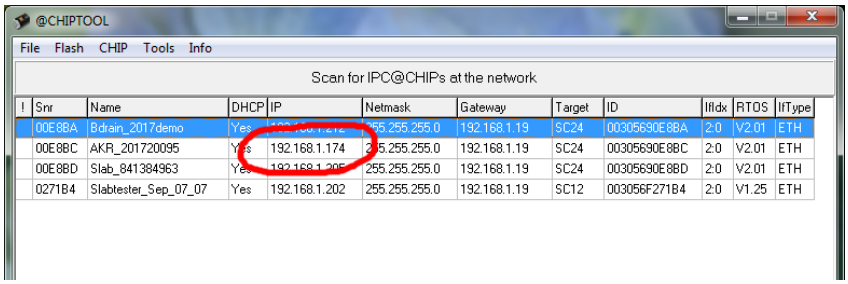

Figure 33: Readout the IP address to the data logger with the program chiptool.

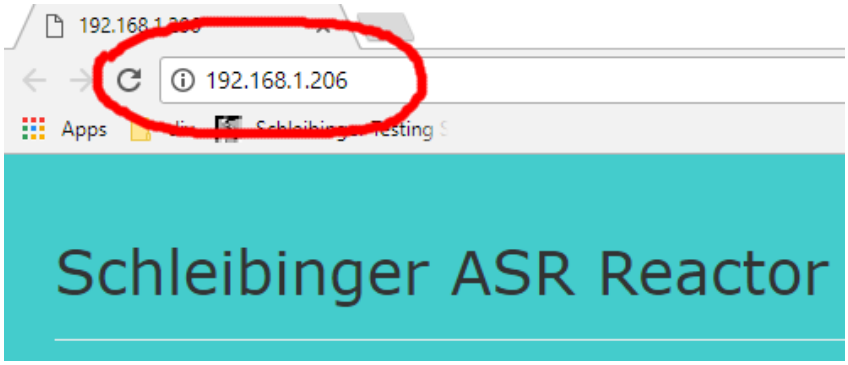

Figure 34: Accessing the data logger with a fix IP address.

using static IP address

If no network avaliable or you are not allowed to connect a measurement device into your local network, the Schleibinger data logger can be connected directly to a PC, e.g. with an older notebook. Most of the PCs are configured in a way, that they take an IP address automatically assigned by the DHCP server. In case of a direct connection between data logger and PC, both peers are missing the DHCP server. For this chase use a static IP address.

a) set static IP address on the computer:

Open `Control Panel` → `Network and Internet` → `LAN-Connection` → `Properties` and set a static IP-address from the so called private area e.g. `192.168.1.1` and a sub net mask `255.255.255.0`. Gateway doesn't has to be set. See figure 35

b) set static IP address on the data logger:

Connect the data logger and the PC with the static IP address with a cross-wired Ethernet cable (Cat5, RJ45)- not delivered with the equipment, and start the program chiptool. The program is searching for the data logger and if the PC is configured correctly and the right connection cable is used, the Schleibinger device appears in the window of the program.

Click with the right mouse button on the entry within the window and choose IP configuration. A small window appears. Enter an other static IP address from the same private area as well [Fig. 36). This IP address has to be different from one of PC e.g. `192.168.1.2` and the same sub net mask. Finally click on `Config`.

Enter the new IP address of the data logger in the header of the browser. The main page of the data logger should appear.

For the integration of the data logger into the network infrastruction, please, ask your network administrator.

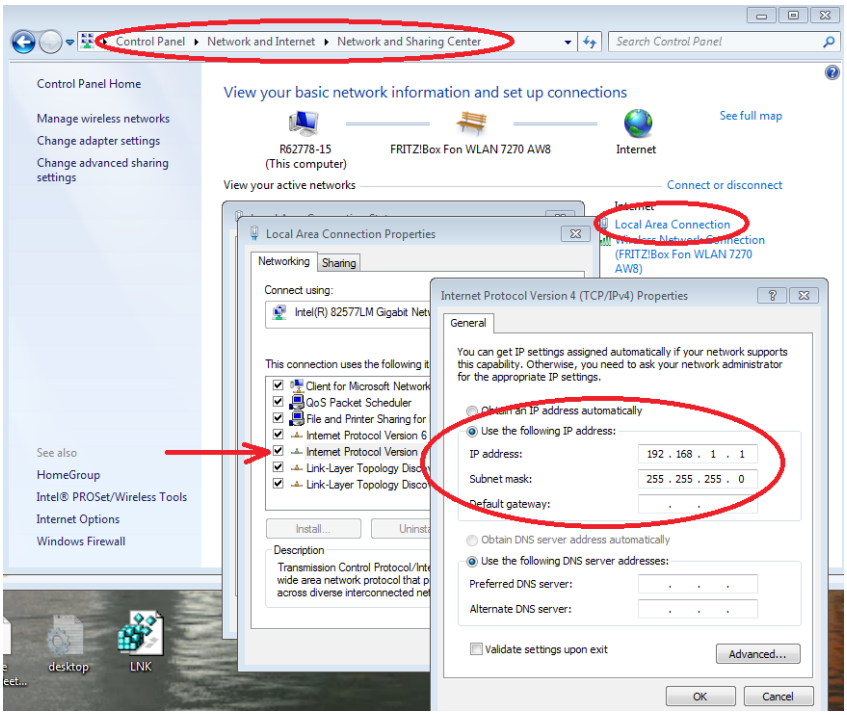

Figure 35: Configuration of PC for a direct connection with data logger.

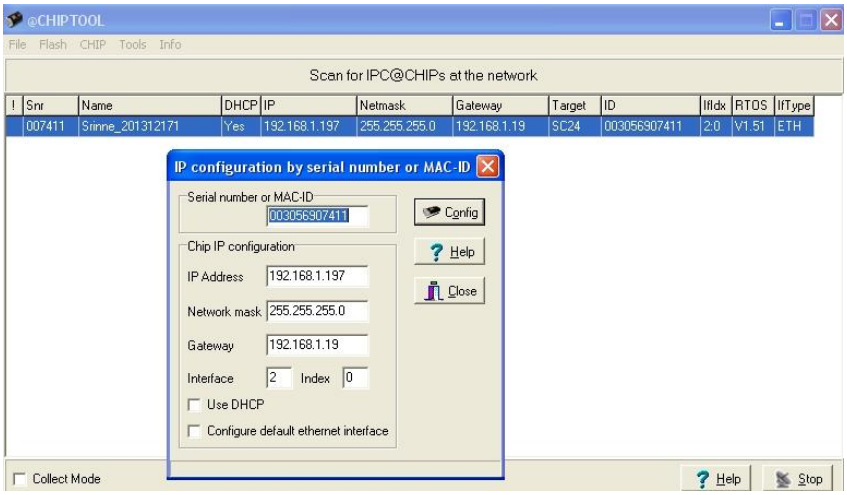

Figure 36: Configuration of the data logger for direct connection using program chiptool.

4 Operation of the Slabtester

For switching on of the Slabtester activate switch at the mains plug. After some seconds the picture 37 can be seen on the touch-screen display.

All functions are controlled via the color, touch-sensitive screen. This works as display and keyboard at the same time. Do not use any screwdrivers, pens or other sharp-edged objects.

Attention!

To tap on the screen, use the fingers or a special touch-pen only.

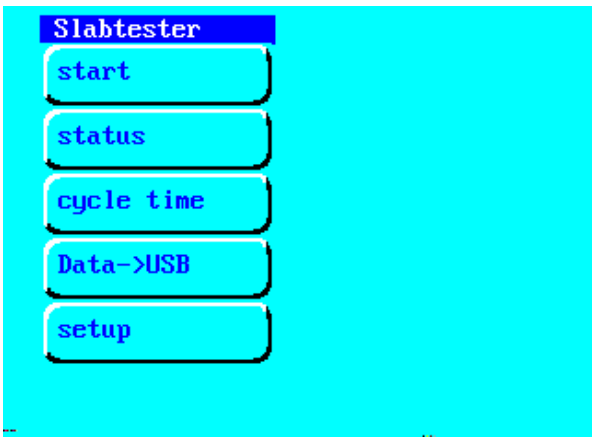

Figure 37: Main menu of the Slabtester.

button	function
start	starts the freeze-thaw cycle
status	displays the values of all temperaure sensors and all security switches
cycle time	for setting the current time of the freeze cycle as well as the cycle number.
Data → USB	copy the measurement data to USB stick).
setup	all other setup functions

4.1 Start

If all settings are correct, the Slabtester can be started here. The online display appears. After a few seconds, the refrigeration system starts. To stop the system, press anywhere on the display. A menu will appear in which the stop can be confirmed or canceled.

4.2 Status

For maintenance or control purposes, you can display all temperature values and switch inputs here.

button	function (fig. 38)
switcher inputs	shows all switching inputs, like the door and over-temperature.
temp-preas.	shows all four temperatures
graphic	make a short plot of the graphic display as configured
back	back to the last menu

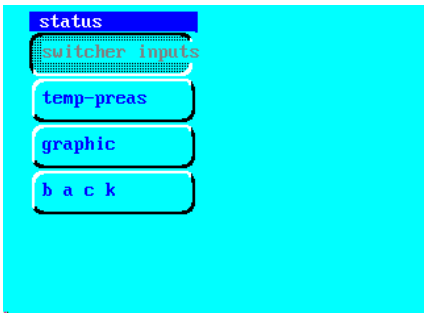

Figure 38: Status menu

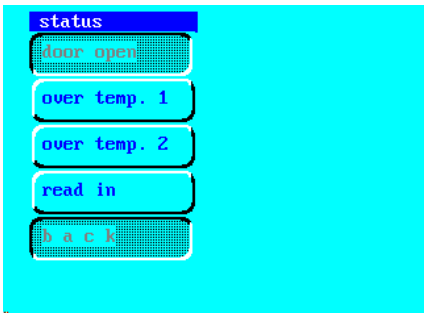

Figure 39: Switcher inputs.

4.2.1 Switcher inputs

The state of all switch inputs is shown under **status - switch input** (fig. 39). Usualy, all switches should be closed. Open switches are displayed in reverse / gray.

4.2.2 Temperature status - temp-preas

The status of the temperature sensors can be displayed in **temp-preas** (fig. 40).

Beneath the temperatures also the actual time is displayed. With the button **read-in** the values will be refreshed.

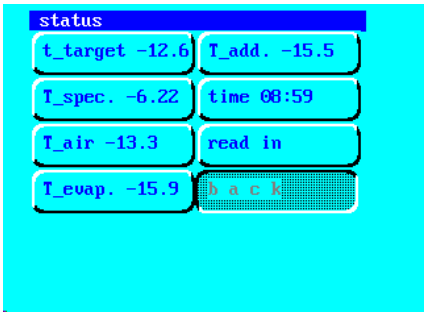

Figure 40: Temperature status.

button	function (fig. 40)
T-target	actual target temperature for the specimen surface
T_spec.	actual temp. of the specimen surface
T_air.	temperature at the output of the air circulation unit
T_evap.	temperature at the heat exchanger of the refrigerator
T_add.	temperature at the additional temp. sensor in the freezing chamber
time	time of the internal clock
read in	refresh the displayed values
back	back to the last menu

4.3 Cycle time

The Slabtester can store and handle several free programmable temperature profiles. Each profile on several points of a temperature profile which is repeated n-times. The standard profile for the slab-test needs 24h. It starts at 20°C. Then it comes down to -20°C in 12h , stay there for 4h and goes up again in 8h to +20°C. If you preset the cycle time you determine indirectly the target temperature. If you set for example the cycle time to 0 the target temperature will be at 20°C. If you set for example the cycle time to 12h the target temperature will be at -20°C.

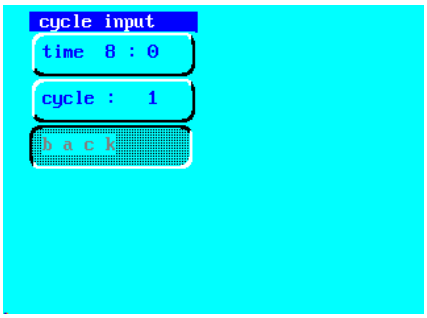

Figure 41: Input the cycle time

The actual cycle time is displayed on the first button. The cycle number is shown on the second one. If you press the time button an input field appears, where you can input between 0 and the length of the cycle defined in the actual profile. Use the backspace button (¡-) to erase an input. Use the big enter button to confirm an input.

4.4 Data → USB

The measured data can be copied to the USB stick. Select in the menu **Data** → **USB** for copy the data.

4.5 Setup

Slabtester settings are made in the menu **setup** (Abb. 42).

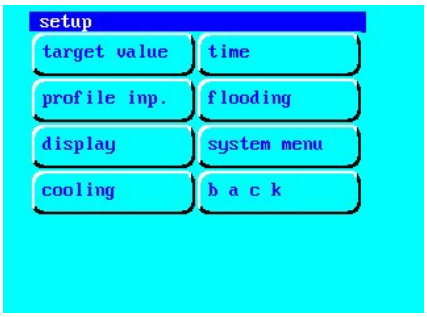

Figure 42: The setup menu.

button	function (fig. 42)
target value	here you can choose between a fix target value or target values defined by a profile. If you switch off the Slabtester the fix target value is disabled, and the last chosen profile is activated again.
profile inp	input of up to 8 profiles for several tests
display	configuring the touch screen display, as well as the online display
cooling	defining the kind of cooling machine, don't change
time	setting up the clock
filling	filling and emptying the specimen container for the natural stone test
system	system menu - call Schleibinger before you enter this menu
back	back to the last menu

4.5.1 Target value

For running the Slabtester at the fixed temperature value select **target value - fix value** (fig. 43).

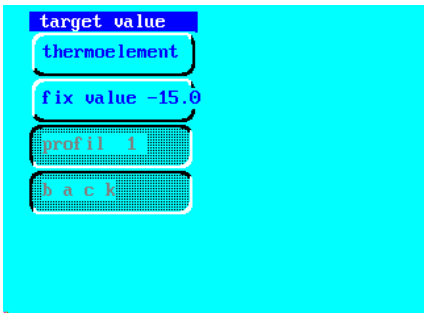

Figure 43: Source of the target value

button	function (fig. 43)
thermoelement	the target value can be determined by an external thermocouple (if available)
fix value	for running a constant temperature choose this option. Press the button for input a new value
profile X	the target value is determined by the actual profile. Select the actual profile in the menu **profile inp.**
back	back to the last menu

4.5.2 Profile Input

The selection of the temperature profile can be done from the menu **setup - profile inp.** (fig. 44).

A creation of a maximum of 8 different temperature profiles is possible. The profile input can be done from the touch screen or from the web browser (chapter 5.3). The name of the temperature profile can only be entered via the web browser. Make sure that the temperature limits are in the range!

Attention!

After choosing the temperature profile it will be highlighted inverse. For changing the profile select another one by choosing the corresponding menu tab.

Figure 44: Profile select

For changing the profile or for the profile input select this profile from the **profile inp. - profile select**. A new menu window appears (fig. 45):

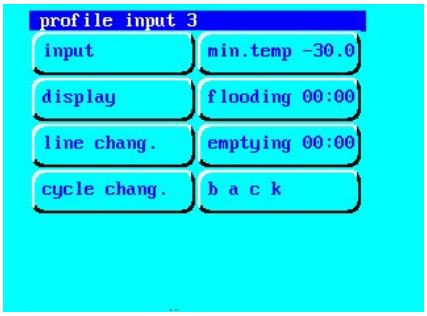

Figure 45: Profile input menu

input for entering of a new temperature profile choose **input**.

For changing the profile or for the profile input select this profile from the **profile inp. - profile select** and tap on **input** (fig. 45).

An example of possible temperature profile is shown in fig. 46. The profile is defined by 5 lines:

line	time / h	temperature / °C
1	0	20,0
2	4	-5,0
3	12	-20,0
4	16	-20,0
5	24	20,0

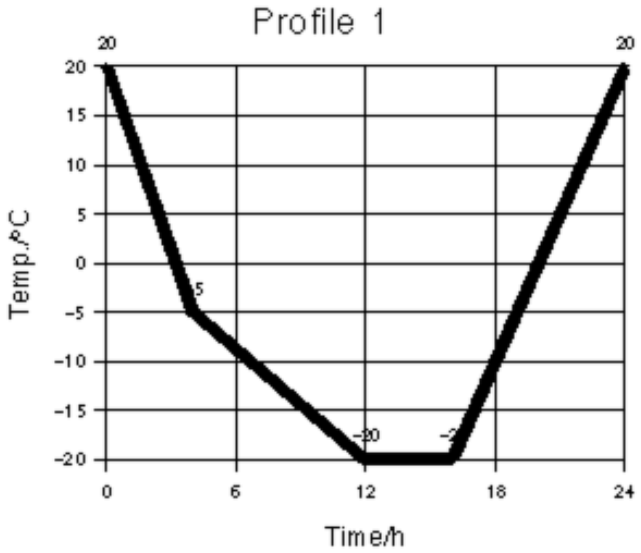

Figure 46: plotted profile

display for displaying of the selected temperature profile. The data of the profile will be displayed as a table time versus temperature (fig. 47).

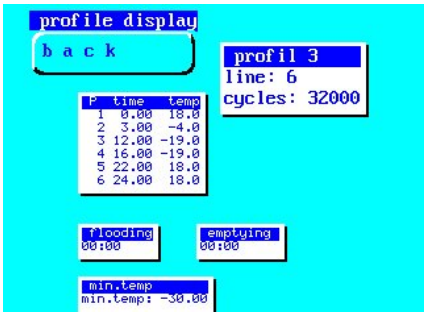

Figure 47: Display of profile

line chang. for changing of time and temperature of the selected profile.

cycle chang. for changing the number of cycles of the selected temperature profile. A maximum of 32000 cycles is possible. This means the Slabtester runs this profile with the length of for example 6 hours 32000 times (about 20 years). After the completion of the profile, the Slabtester set the temperature to a fixed temperature of 20 °C.

min. temp defines a minimum temperature in the Slabtester. This temperature must always be lower then the lowest temperature of the profile. This mimimum temperature will be not untershot by the control of Slabtester. If this setting is not needed, enter -50 °C as the minimum temperature.

flooding for the Slabtester with Flooding option the start time of flooding can be entered here. The value must be in the total cycle time of the temperature profile. The flooding can only be entered once per cycle

Attention!

emptying the start time for emptying can be set here. The value must be in the total cycle time of the temperature profile and higher than the flooding time.

Do not set the emptying time to the end of the profile. Otherwise there is no time left for draining. So the the emptying time should be at least 5 minutes before the profile is finished.

The repetition of flooding and emptying is determined by the number of cycles. The inner container will not flood if the start time of flooding and emptying is set to higher than the cycle time or is set to 0.

back for return to the previous menu.

4.5.3 Display Setup

The adjustment of the display can be done from the menu **display** (fig. 48).

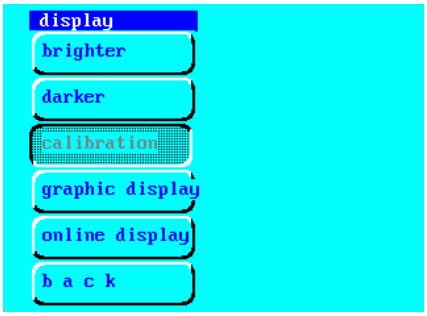

Figure 48: Setting up the display

button	function (fig. 48)
brighter	increase the back-light of the display
darker	decrease the back-light
calibration	calibrate the touch-screen
graphic display	all setups for the online graphic display
online display	select the kind of online display: graphical, text ore none
back	back to the last menu

Choose the back-light as dark as comfortable this will rise up the lifetime of the display.

Graphic display setup for the configuration of the online graphic display:

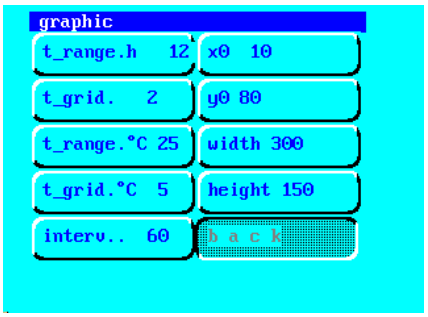

Figure 49: Graphic display setup

button	function (fig. 49)
t_range.h	width of the graphic in h
t_grid	grid of the x-axis in h
t_range.°C	range of the y-axis in ± °C 25 means from -25°C to +25°C
t_grid	grid of the y-axis in °C
interv..	the interval between each plotted point is x seconds
x0	position of the online display in pixels, the display has 320x234 pixel
y0	y-position of the graphic in pixels. The origin is in the upper left corner
width	Width of the graphic / pixel
height	Height of the graphic / pixel
back	back to the last menu

We recommend to leave this setup untouched as far as possible. Maybe you can change t_range h and t_range °C

Online Display Setup for selecting of online display type, which will be shown during the measurement (fig. 50).

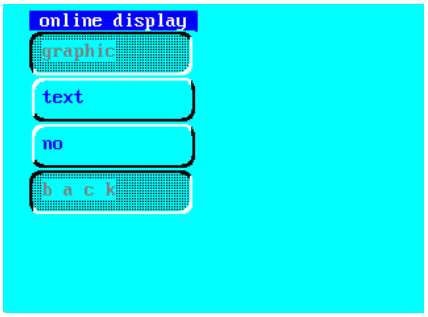

Figure 50: Online Display Setup

button	function (fig. 50)
graphic	you will get a graphical display of the temperatures over time during the test, similar to a dot strip recorder
text	the temperatures are displayed in an textual manner
no	an empty screen during the test runs
back	back to the last menu

4.5.4 Cooling source

For the selection of the cooling sourse.

Attention! **Do not change this setup!**

4.5.5 Time - Clock Setup

The Slabtester has a real-time-clock integrated. This may be set here (fig. 51). Do not change the setup during a test is running, this may cause inconsistent data. The clock is buffered by a small battery. This battery should be changed every two years..

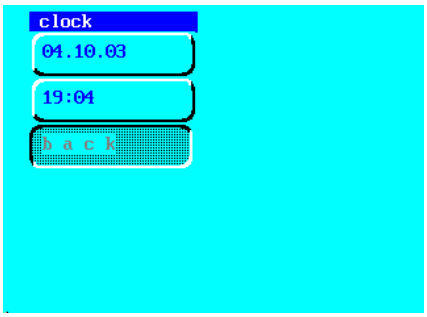

Figure 51: Clock Setup

4.5.6 Flooding

With the flooding option, the Slabtester can be flooded or emptied at pre-set cycle time. The flooding setup can be done in menu **flooding** (fig. 52).

Enter the flood times in profile input (see chapter 4.5.2). The times refer to the entire cycle time. The water temperature of the outer container is set directly on the heating catridge mounted there.

Figure 52: Setup for flooding the inner container

Button	Example	Unit	Function fig.. 52
flood time	6:30	hs:ms	time in the test program (profile) when flooding starts (this function is from October 2012 in the profile input)
emptying time	7:55	hs:ms	time in the test program (profile) when emptying / draining starts (this function is from October 2012 in the profile input) This time should be at least 5 minutes before the profile is finished.
flushing	20	minute	during the flooding period, each 20 minutes the inner vessel is exhausted and filled again.
empty time	120	seconds	the motor valve is opening 120s to exhaust the inner vessel. You may input a time between 0 and 600 seconds. This is also the duration of the air pressure period after the spraying time for the masonry test.
test flooding			the inner vessel is filled manually
running empty			the motor valve will be opened. Press this button again to close the valve again.
test emptying			The motor valve will be opened to exhaust the inner vessel, this function is more or less the same as the function in the line above.
no sens. switch			Normally during the flooding period the reference sensor is switched from the red one to the grey on. This is suppressed if this button is pressed.
flood/spray			To switch between flooding (natural stones, tile glues) and spraying (masonry units) use the button flood/spray. If the button is on (dark background) spraying is set otherwise flooding.
test spraying			Spraying for 20s

While the water in the outer container is electrically heated, the water in the inner container can not be heated. To ensure that the water in the inner container is not too cold during the thawing, the inner container can be rinsed briefly during the flooding phase. This can be done with the menu option **flushing**. Set the flushing time inbetween 10 and 50 min. Inputs less than 0 and greater than 59 minutes are discarded.

If the inner container is flooded, the control switches from the sensor with the red cable to the auxiliary sensor with the gray cable! The gray sensor must remain in the airspace!

important!

4.5.7 System Menu

Please, contact Schleibinger before you change setups in the system menu. This menu is mostly for maintenance and calibration.

Figure 53: System Menu

The system menu (fig. 53) is saved by a password. The recommended PIN is 2603 (fig. 54).

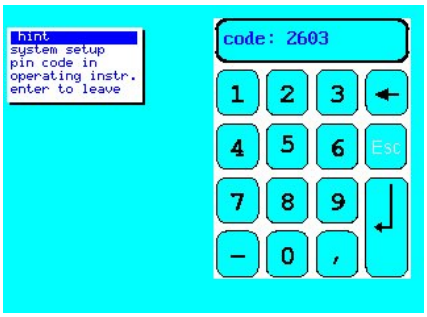

Figure 54: Input of the security PIN for the setup menu

A short survey of the basic functions:

button	function (fig. 53)
manual	starting and stopping all devices like compressor etc. by hand
controller	setup for the controller
temp-preas	test and calibration of the temperature sensors
ram-reset	reset all setup values to default
DA calib.	calibrating the analog outputs (optional)
diverse	automatic restart etc.
thawing	setting the start and end-temperature for automatic thawing
back	back to the last menu

Manual Control For testing all single parts of the Slabtester, like the cooling machine, the fans etc. you may switch on and off it individually by hand in the **man.control** (fig. 55).

You cannot switch on and off the cooler or the heater if the air circulation is off. The pump cannot run without water. Please test the heater and cooler only for 30 s maximum.

Figure 55: Menu tab manual control.

button	old label	explanation
fan evap.	circulation	starts the two fans near the heat exchanger. The heat exchanger is placed below the big white hood at the top of the machine.
heater		starts the electrical heater placed inside the heat exchanger. The circulation must be on before you start the heater
Cooler		starts the cooling machine. during the flooding period, each 20 minutes the inner vessel is exhausted and filled again.
thawing		not used yet.
air		only used with the spraying option. The magnetic valve is opened and pressured air is emptyying the spray arm.
fan door	fan	starts the fan at the condenser beneath the cooling machine.
fan condens	fan	starts the tangential fan mounted in the door of the Slabtester.
pump		starts the pump in the external water tank if the flooding option is installed.
valve		opens the motor valve for flooding or draining the Slabtester
water		not used

Thawing As any refrigerator also the Slabtester, need a period of thawing to melt the ice at the heat exchanger. If you are running a program with freezing and thawing periods, like the Slabtest, this is automatically done during the heating time.

If the Slabtester is running at constant low temperature, the melting procedure is automatically triggered, if the temperature is for a longer time lower then the temperature set in the thawing menu.

During the melting process the heat exchanger is heated up to the `max.temp` degrees. The fan is stopped. If the minimum temperature in the temperature profile is much higher then the `min.temp` then ice melting process is never started.

button	function
`min.time`	If the actual temperature is more then `min.time` seconds below `min.temp` then the melting process is started.
`max.time`	if the actual temperature at the heat exchanger is for `max.time` seconds higher then the `max.temp`, then the melting process is stopped.
`min.temp`	if the temperature at the heat exchanger is below `min.temp` the the melting process is started.
`max.temp`	if the temperature at the heat exchanger is higher then `max.temp` then the melting process is stopped.

Setup diverse for the further configurations.

Figure 56: Setup diverse

button	function (fig. 56)
restart	if selected, the Slabtester restarts automatically after the mains was off
max.temp	maximum temperature the Slabtester runs. Do not set over 40°C
key lock	100s after starting the test the touch-screen is locked
Info→USB	The Slabtester is recording internally about service infomation like alarm switches error conditions etc. This data are copied to an external USB drive. Please connect a max. 2 GByte USB drive to the Slabtester (delivered with the machine) before you start this function. If a subdirectory `/data` exists on the drive all data are stored in this subdirectory. Otherwise all data are stored in the root directory.
back	back to the last menu

5 Software Handling with Web Browser

The Slabtester can largely be controlled via its built-in network interface. The user interface on the PC is the web browser software. Enter the IP address of the Slabtester in the address field of the web browser for example 192.168.1.193. If the connection is successful, the start screen is displayed (fig. 57).

In the upper part of the window the menu bar is lokated showing different tabs: **Meas. Values, Data, Profiles, System** and **Help**. Click to open the subdirectories.

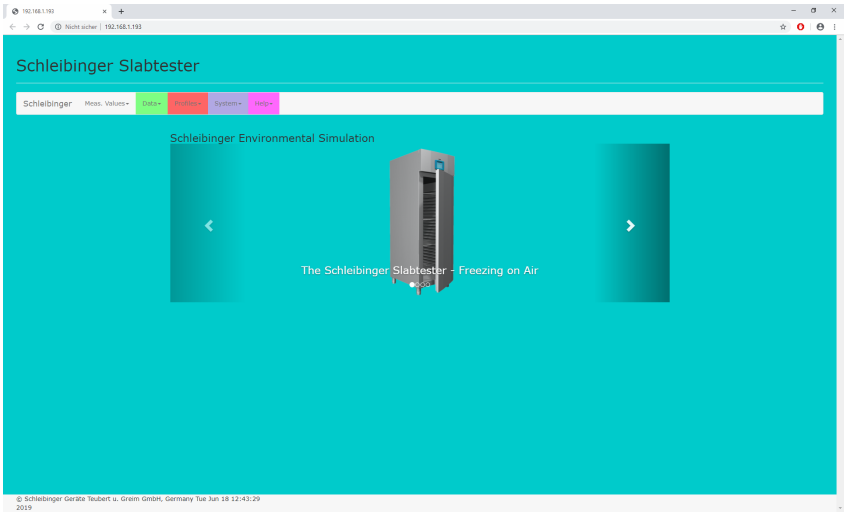

Figure 57: Start display.

5.1 Measured Values

The temperature values can be displayed in the submenu **Meas. Values** (fig. 58

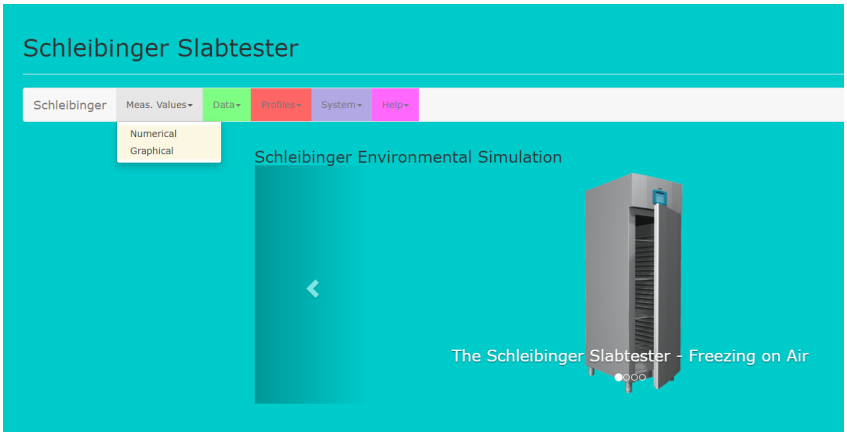

Figure 58: Submenu of meas. values.

For a numeric display of the current temperature data, select in submenu **Numerical** (fig. 59) and click on the tab **Start**. The current values will be displayed in tabular form.

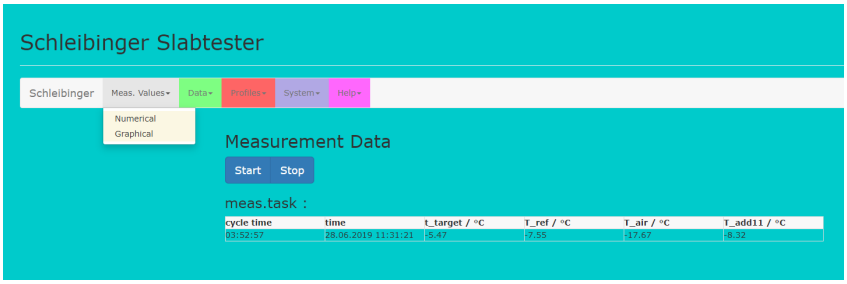

Figure 59: Anzeige der aktuellen Messwerte.

For a graphical display of the values choose the submenu **Graphical** (fig. 60).

The graphical presentation can be customized. The individual temperature readings can be switched on or off by ticking on or off at the corresponding tabs at the top of the chart.

The adjusment of the x-axix takes place in the chart window itself. For this, select with the mouse the area that should be displayed. The y-axis is adjusted via the input window above the chart window.

A caption window can be inserted into a chart window by selecting the `paper clip`. The update of the measured values will be done by selecting the `double-arrow symbol`. For the zoom out use the symbol `magnifying glass`.

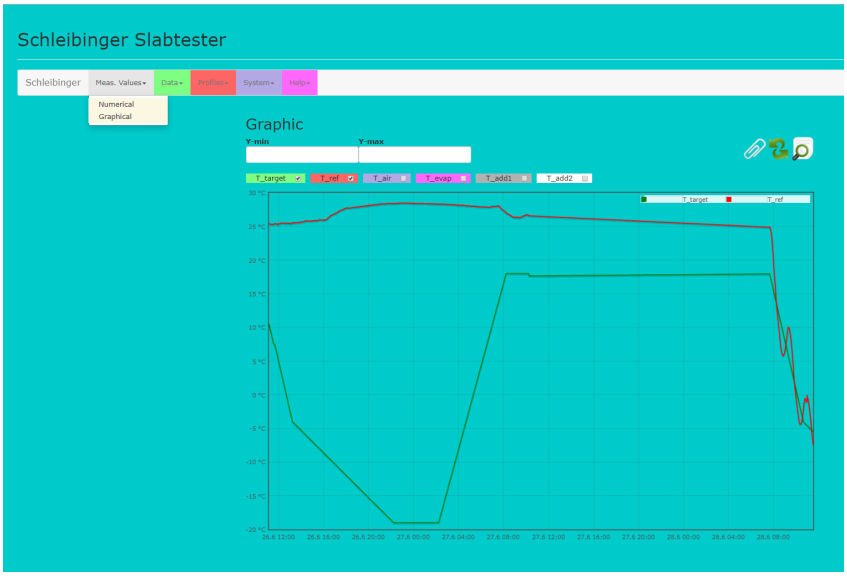

Figure 60: Graphical display of the current temperature values.

5.2 Data

5.2.1 Data - Text

The main menu **Data** contains the submenus `Text`, `Logfile` and `Clear Data`. All recorded measured values are displayed in tabular form after the selection **Data - Text - Load** (fig. 61).

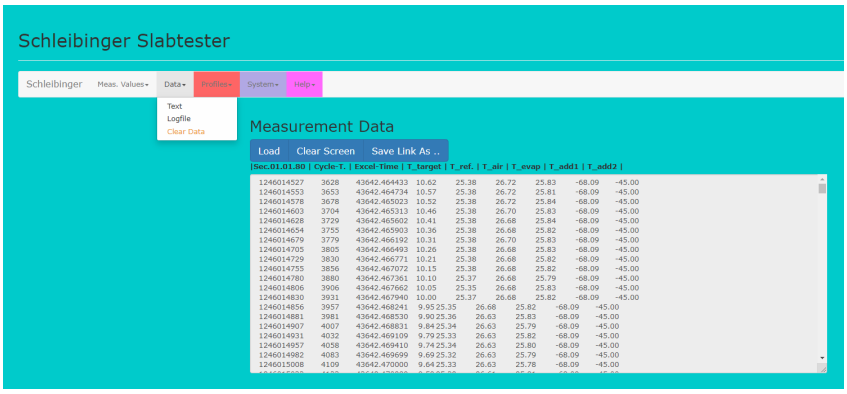

Figure 61: Measured values in tabular form.

In the first column the seconds since 01.01.1980 will be displayed. The second column is showing the cicle time in seconds. The date and time in format of Excel. Format this column after transfer the data into an Excel sheet as a date / time to get the current time. The data in the following columns are:

- target temperature
- sample temperature
- air temperature
- evaporator temperature
- temperature from the additional temperature sensor
- temperature from the second additional temperature sensor if available.

All columns are separated by a tab. The data can be copied directly into an Excel sheet, Word or similar.

Alternatively, the data can be read in Excel. Select the tab `Save Link as...`. A new window with the measured data opens (fig. 62).

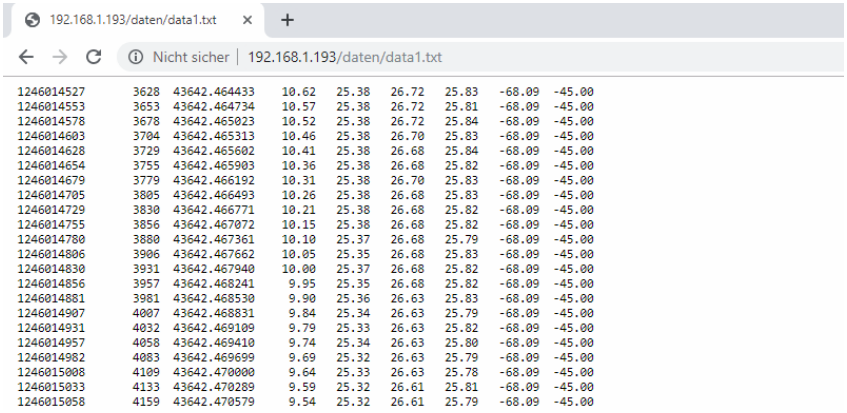

Figure 62: Measured values in tabular form for import.

Column	Data
epocht ime	Seconds since January, 1st 1980
cycle time	seconds in each cycle
Excel time	time in Excel format. Excel stores dates and times as a number representing the number of days since 1900-Jan-0, plus a fractional portion of a 24 hour day: ddddd.tttttt . This is called a serial date, or serial date-time. The fractional portion of the number, ttttt, represents the fractional portion of a 24 hour day. For example, 6:00 AM is stored as 0.25, or 25% of a 24 hour day. Similarly, 6PM is stored at 0.75, or 75% percent of a 24 hour day. As you can see, any date and time can be stored as the sum of the date and the time. For example, 3PM on 19-Jan-2000 is stored internally as 36544.625.
t_target	target temperature
t_specimen	temperature measured at the sensor with the red cable
t_air	temperature measured at the outlet of the cool air
t_evap	temperature measured at the evaporator or heat exchanger
t_add1	temperature measured at the sensor with the gray cable
t_add2	temperature measured at the 2nd senor with the gray cable (option)

Copy the address

for example: `http://192.168.1.193/DATEN/DATA1.TXT`

and import the link in Excel via `Data - from the web`.

Of course, if you use a different IP address for the Slabtester, you will need to use it.

Tapping on `Clear Screen` will hide the data.

5.2.2 FTP

The experienced user can also read the data with FTP (FileTransferProtocol). Log-in name is ftp, user name is also ftp. The data is in the directory /http/htdocs/daten. Do not use Internet Explorer for this. Explorer does not behave like ftp. Programs like Wise-FTP or smartftp are recommended.

5.2.3 Data - Logfile

All important processes - which are start or stop of the system, error messages etc. - are monitored after choosing the tab **Data - Logfile** (fig. 63).

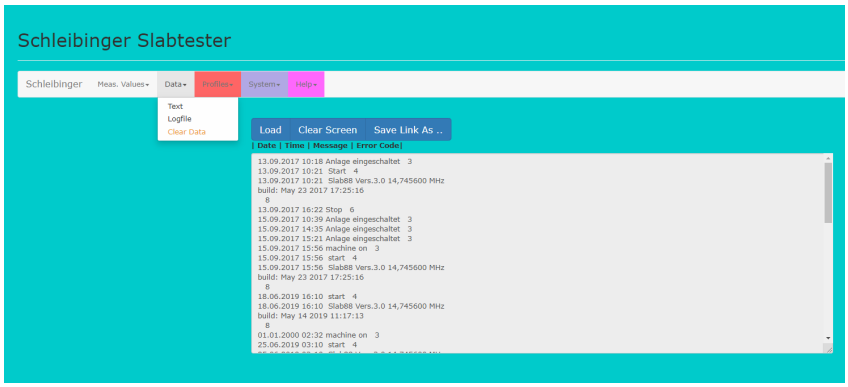

Figure 63: Slabtester Logfile.

5.2.4 Data - Clear Data

The measured data can be deleted in the submenu **Clear Data**. Select this menu and confirm the deletion by tipping on **Erase**. All previous measured values will be deleted.

5.3 Profile

Up to 8 temperature profiles can be defined in the menu **Profiles** (fig. 64. The individual temperature profiles can be entered or changed both on the Slabtester itself and via web browser. To do this, select the desired profile 1 to 8. The data can now be entered in the corresponding fields (fig. 65).

The profile name can be specified unter the profile number. Use short and concise names as they will be displayed later on Slabtester.

Figure 64: Selection of the temperature profile.

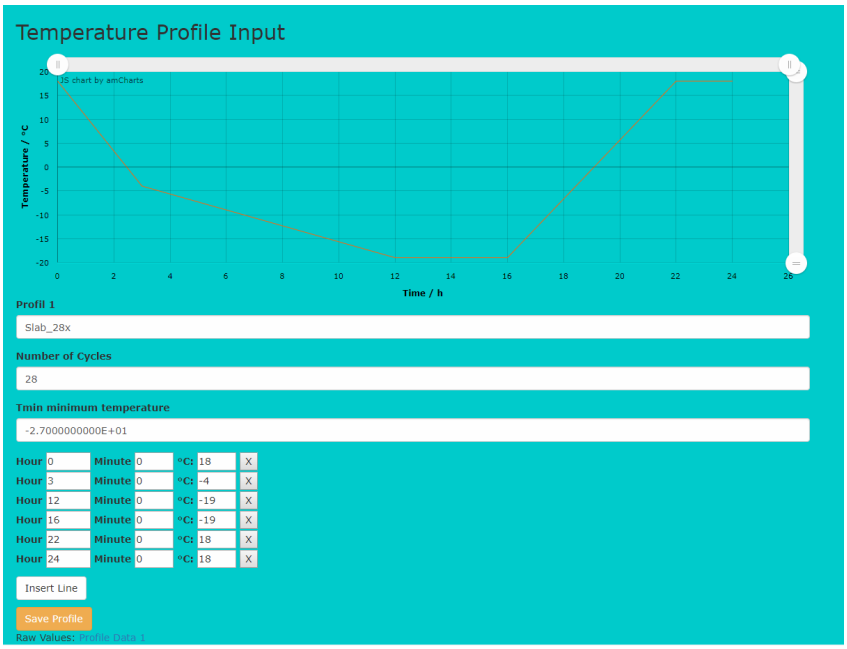

Figure 65: Entering of the temperature profile for the Slabtester.

Enter the number of cycles. If an endless process is desired, the maximum number of cycles **32000** can be entered. With the cycle length of 24 h, the duration would be about 87 years.

Each profile can be assigned a minimum temperature. This temperature is not undershot by the controller of Slabtester. If this setting is not needed, enter -50 °C as the minimum temperature.

If the Slabtester is to be flooded, the flood start and the flood end must be entered. The time range in which flooding is highlighted in blue in the graphic window above the input mask. If the start and end of flooding time is 0, the inner container will not be flooded. If the flooding option is not installed, this entry is of no importance.

Attention!

The flooding can only be entered once per cycle!

The temperature and the time can be defined in the lower input area. By selecting **insert line** an additional time-temperature-line can be inserted. To delete the line, click on the cross next to the respective line.

The profile input can be checked directly in graphic window above the input mask. If the entry is correct, the profile must be saved. Click on **Save Profile** below the input mask.

If the changed profile is already selected on the Slabtester, the change will not take effect until Slabtester is restarted (switch off and on again). If the new profile is to be driven, this profile must be selected via the touchscreen on the Slabtester itself.

5.4 System

The configuration data can be displayed after selecting **System - Show Setup** (fig. 66). To view, click on `Load`. To save the file, the procedure is similar to saving the measured data (see chapter 5.2.1).

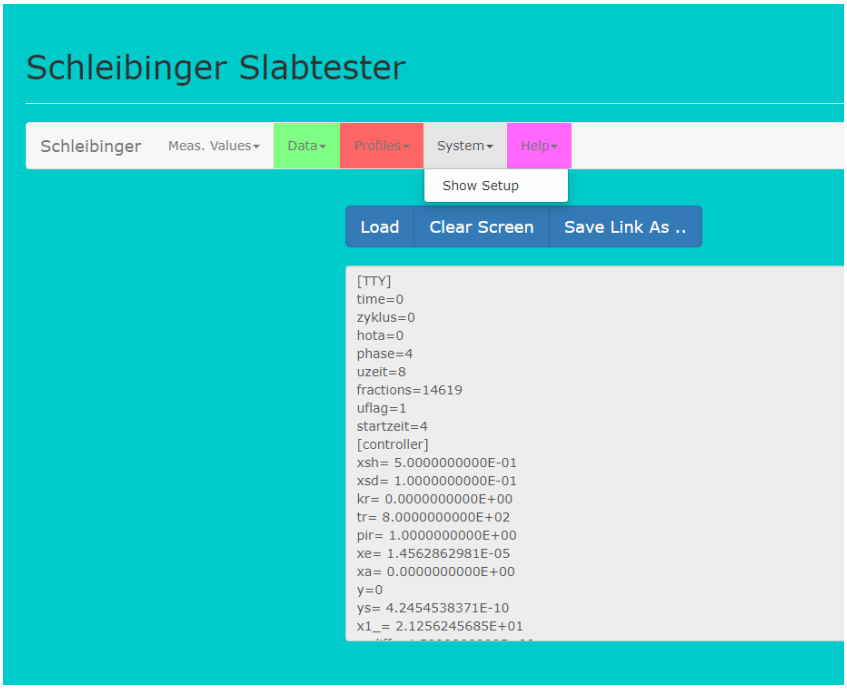

Figure 66: System setup of the Slabtester.

5.5 Hilfe

This manual is stored in the submenu **Help** (fig. 67). Click on `Open PDF Help File` to view or download the manual as a PDF file.

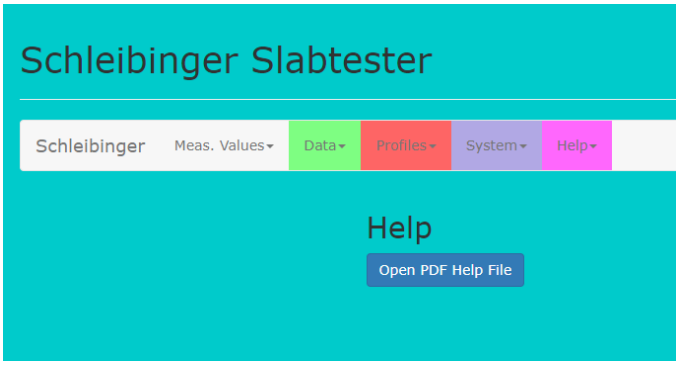

Figure 67: Manual for download.

6 Maintenance

6.1 Disposal notes

- The packaging is made of recyclable materials. Please return the packaging material to an official collection point.
- Ensure that the refrigerant circuit is not damaged when the Slabtester that is no longer needed is taken away for disposal.
- Details of the refrigerant used can be found on the type plate.
- Before switching the appliance on for the first time, plug the cleaning water drain opening in the floor of the appliance with the white plastic plug provided. This is important to ensure that the Slabtester works properly.
- A drain hose with an R3/4 connection can be fitted to the underside of the Slabtester. The water which collects in the interior during cleaning can be drained off this way. Close this hose by the plug delivered with the Slabtester during operation. Otherwise you will loos to much cooling power!

6.2 Changing doorstop

If necessary the doorstop can be changed (fig. 68).

- Open door by about 90°
- Remove hinge bracket (1) (support the door if necessary)
- Pull the door out at the bottom and lift off.
- Unscrew the top hinge bracket (2) and attach on the other side.
- Unscrew base mounting bracket (3) and attach on the other side.
- Take plastic mounting cover (4) of hinge bracket (1) and place on topmost square pin.
- Rotate door by 180°
- Keeping door open at 90°, suspend in square pin (support door if necessary).
- Insert hinge bracket (1) in lower door mounting and screw to base mounting bracket (3).

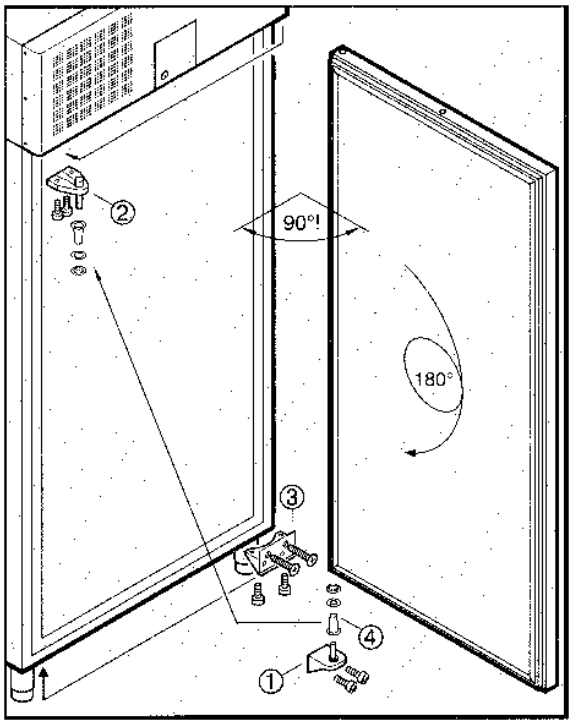

Figure 68: Changing doorstop.

6.3 Defrosting

The Slabtester defrosts automatically. The defrost water drains into an evaporation tray near the refrigeration unit, where the heat from the compressor causes it to evaporate.

6.4 Shutting down the Slabtester

If your Slabtester is to be shut down for any length of time, switch it off and disconnect the plug. Clean the Slabtester and leave the door open in order to avoid unpleasant smells. Disconnect the transformator (120V/230V) if available.

6.5 Cleaning

- Before cleaning always switch off the Slabtester.
- Pull out the mains plug ore remove the fuse.
- Empty the Slabtester
- Remove the storage shelves and the support rails.
- Clean the inside, equipment parts and outer walls with lukewarm water and a little detergent. Do not use abrasive ore acid cleaners ore chemical solvents. We recommend the use of an all-purpose cleaner with neutral pH.
- Ensure that no cleaning water penetrates into the electrical components ore ventilation grille.
- Dry all parts well with a cloth
- Do not use steam cleaners because of the risk of injury and damage!

6.6 Changing from Natural Stone or Masonry Test to the Slab-Test and vs.

You can use the Schleibinger Slabtester for the natural-stone test as well as for the slab-test for concrete.

- Exhaust the specimen vessel
- Disconnect the pump at the rear side of the Slabtester, by pressing the small metall interlock, and turning the connector a little bit counter clockwise.
- Open the brass valve connection at the bottom of the specimen container.
- Open the brass valve connection between the grey PVC valve and the motor valve.
- Remove the grey PVC valve
- Close the hole at the rear side by an appropriate plug.
- Remove the specimen vessel. Be carefull, the vessel is quite heavy.
- Mount the supports and shelves for the slabtest specimen.
- Set the filling and exhausting time in the profile menu to zero
- Switch in the profile menu to the appropriate profile (slabtest)

For removing the vessel for masonry test follow the pictures 69 and ff.

6.7 Malfunctions

You may be able to rectify the following faults by checking the possible causes yourself:

6.7.1 Slabtester does not work and the display is black.

- Is the Slabtester switched on?
- Is the plug correct fitted in the mains socket?
- Is the socket fuse intact?

6.7.2 Maintenance and Service Hints - Flooding option

The flooding option has an inner and outer vessel. In the outer vessel there is a heating unit wit a thermostat and a submersible pump. The submersible pump has an automatic level sensor. If the level in the vessel is too low (meaning below the most upper part of the heating unit) the pump is switched off automatically, independent from the control unit of the Slabtester. The control unit has a current sensor for the pump. If the pump is stopped by the level indicator the current is going to zero.

Both containers are connected by a hose. In the hose between the inner and outer vessel the is a electrical valve.

When power is applied this valve is opened by a motor. When the valve is totally open a feedback switch in the valve is opened. This is detected by the control unit. When power at valve is off, the valve is automatically closed by a spring. At the valve there is a small lever to open the valve by hand.

Figure 69: Removing the inner vessel for the masonry test I, Opening the Allen screws

Figure 70: Removing the inner vessel for the masonry test II, removing the hose

Figure 71: Removing the inner vessel for the masonry test III

Figure 72: Removing the inner vessel for the masonry test IV

Figure 73: Removing the inner vessel for the masonry test V

Figure 74: Removing the inner vessel for the masonry test VI

The valve opened by the control unit before the pump starts, and closed when the pump is stopped by the level switch and the pump current is going to zero.

For draining the valve is opened for XXX seconds. This time is defined in the variable `empty time`. Description in the table at page 38.

Please check the table below if there are some problems.

Problem	How to solve
The pump is not running at all	Check the connection from the pump to the Slabtester. Its a grey connector. It must be locked. Some pumps have an extra on/off switch. Check this switch. Start the pump in the System Setup Manual menu, see chapter: 4.5.7.
The pump is stopping after some seconds.	Check if there is enough water in the tank. Remove air in the pump by laying it on the side. Try to start the pump by switching it on with the button `pump` in the manual menu (see chapter: 4.5.7)
The Slabtester is not draining	Check if there is a crease in the hose. Go to the System Setup Manual menu, and open the valve with the button `valve`. Check if the `empty time` in the System Flooding menu is set to at least 120 s or longer.
The water is too cold or too hot	Check the setting at the thermostat at the outer vessel. Is the extra mains connection for the heater plugged in?

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