FLASHPOINT
TESTER

MINIFLASH *FP(H) Vision*

OPERATION MANUAL

M-V1.01 SW-V4.00

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1 GENERAL SAFETY SUMMARY

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.
Only qualified, service-trained personnel who are aware of the hazards involved should remove the cover from the instrument.

> CAUTION!
> If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

To avoid Fire or Personal Injury:

- Use Proper Power Cord
  Use only the power cord specified for this product and certified for the country of use. Avoid bending or stretching the power cord. Don't replace the detachable mains supply cord by inadequately rated cords.

- Ground the Product
  This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground.

- Do Not Operate Without Covers
  Do not operate this product with covers or panels removed.

- Do Not Operate With Suspected Failures
  If you suspect there is damage to this product, have it inspected by qualified service personnel. Do not ignore warnings on the display or warning signals. Please read the manual or call our representative if you are not sure what to do.

- Provide Proper Ventilation
  Do not cover the ventilation slots. Place the instrument so that proper ventilation is guaranteed.

- Place the instruments so that the main power switch is accessible every time

- Do Not Operate in Wet/Damp Conditions
  To avoid electric shock, do not operate this product in wet or damp conditions.

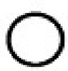
- Do Not Operate in an Explosive Atmosphere
  To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

- Keep Product Surfaces Clean and Dry

- Operate with proper protective Clothing **(**goggles, gloves, lab coat**)**

- Be careful with flammable liquids
  Flammable liquids should only be used by qualified employees. These substances should be used with constant regard to the danger they pose to life and property. Under normal circumstances they should always be used in a fume-hood away from possible sources of ignition. For further information read the safety data sheet of the substance.

Instrument symbols

 Danger High Voltage	**Attention – Dangerous high voltage**
 Protective Ground (Earth) Terminal	**Protective Ground connection**
 Danger heated surface	**Take care when touching – Hot surface**
 Mains Disconnected OFF (Power)	**No mains connection. Instrument is turned off**
Mains Connected ON (Power)	**Mains connected. Instrument is turned on**

Manual symbols

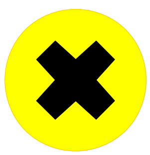
Caution!
This symbol indicates danger and that the user has to follow the instructions or to be careful, as the instrument can be damaged when not handled according to instructions.

This symbol indicates what must not be done in order not to harm people or instrument.

This symbol refers to other chapters in this manual that give detailed information about a topic. It also highlights short and important information.

General symbols

Attention! Toxic substance!

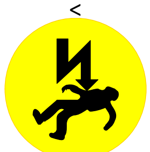


Attention! Hazardous substance!

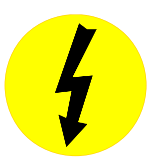
Attention! Corrosive and caustic substance!

Attention! Flammable substance!

<



Attention! Lethal voltage!
When opening the instrument and violation of safety rules, there is a risk of injury and death. Before opening the instrument disconnect unit from mains!



Attention! High voltage!

3 GENERAL INFORMATION

The flash point of a sample is a measure of the tendency to form a flammable mixture with air.
Flash point is used in shipping and safety regulations to define flammable and combustible materials. Flash points can also show the possible presence of highly volatile and flammable materials in a relatively non-volatile and non-flammable liquid (fuel dilution of engine oil).

Definition of the flash point according to ASTM:

Flash point - The lowest temperature corrected to a pressure of 101.3 kPa (760 mm Hg) at which application of an ignition source causes the vapors of a specimen of the sample to ignite under specified conditions of the test.

Our definition of the flash point:

The flash point of a substance can be defined as the lowest temperature, at which the substance produces a flammable mixture with air so, that a propagating flame is covering at least 75% of the substance surface.
There are several standardized methods established: manual methods and automatic flash point testers.
Manual methods represent low cost versions, since the user has to observe a possible flash point visually after the ignition with a flame, a glowing wire or an electric arc. The repeatability of this measurement is not very good, since visual observation is always dependent on the individual who is doing the test. Manual flash point testers can be of an open or closed cup design.

Automatic flash point testers usually consist of a heatable cup, some kind of ignition like a flame, a glowing wire or an electric arc and an automatic flame detector like a heat sensor or an ionization detector.
The sample is heated to a starting point and afterwards the temperature is increased in a constant rate. In equidistant steps of the temperature the vapor-air mixture in the cup is ignited and a possible flash is detected.

MINIFLASH FP(H) VISION is a fully automatic flash point tester, only the sample has to be filled manually into the sample cup, with significant features.

Only 1 mL of sample for measuring according to ASTM D 6450 or 2 mL for measuring according to ASTM D7094 is necessary for a flash point test, saving expensive sample. The cup is continuously closed during the test and is not opened for the flash test to prevent open flames in the laboratory.

No open flame and minimizing offensive smells.

The way of heating the sample cup from the top cover prevents condensation of a high volatile part of the sample on the oven surface.

No condensation of high volatile substances due to heating the sample from the top.

The arc ignition is accomplished with a high-performance ignition coil and two electrodes inside the measuring chamber close to the surface of the sample.

No gas bottle, no wear out of ignition wire.

Automatic recognition of the flash point:

For the automatic recognition of a flash a new method has been developed. Since the measuring chamber is completely closed, a pressure increase due to the hot flame inside the chamber can always be assumed. The pressure increase depends strongly on the size of the flame that originates the big benefit of being able to adjust the automatic flash detector to the flame size.

Simulation of standard closed cup test methods:

Programming the same test conditions like initial temperature, heating rate and ignition steps and adjusting the value of introduced air (programmable), MINIFLASH FP(H) VISION can be adjusted to give values close to various standard methods using a closed cup.
The simulation of open cup methods cannot be expected since these methods suffer from evaporation of the flammable components.

MINIFLASH FP(H) VISION operates fully automatically. Only the sample has to be filled manually into the sample cup.

MINIFLASH FP(H) VISION is a compact instrument with the illuminated touch-screen display on top of the front panel. The display leads you through all functions and programming possibilities.

The oven is installed inside the instrument and contains all necessary items for the automatic flash point detection. It is made out of a circular brass disc of a diameter of 50 mm (approx. 2").

The thermoelectric modules are located above the block. The cooling of the hot side of the elements is done with two high performance electrical fans. These fans draw in the air from the rear side, so please do not close the air feed on the back panel.
In the temperature-controlled brass disc two electrodes for the high voltage arc are installed. Do not bend the two pins to keep the distance in proper length of 2 mm.

To measure the sample temperature, a thermocouple sensor (NiCr-Ni in stainless steel) of 1 mm in diameter is emerging approx. 14 mm (0.5 ") from the heating block. This sensor is sensitive against bending, so please be careful not to bend the sensor.

The pressure measurement is outside the hot oven and is connected to the inside of the chamber with a 2 mm stainless steel cannula and a plastic tubing.

The surface from the oven outside the heat shield should be clean to give a good heat contact to the sample cup. This surface should be cleaned regularly with tissue paper and some solvent.

3.1 Measuring standards

To have a high flexibility, MINIFLASH FP(H) VISION offers you five different measuring modes:

Two of them are ASTM Standard methods: ASTM D6450 and ASTM D7094

Standard method ASTM D6450

The ASTM D 6450 method was published in year 1999 after a round robin test to compare ASTM D 93 and ASTM D 6450. The correlation between these two methods is without significant bias.
The repeatability and reproducibility is even better for ASTM D 6450 (r = 1.9°C, R = 3.1°C).

3.1.2 Standard method ASTM D7094

In year 2001 a new round robin test was performed to test not only pure substances. There were also contaminated samples included. The next table shows a few results from the round robin test.

Sample		Method		
Substance	Gasoline	D93 A /°C	D7094 /°C	dT /°C
Jet A(1)	0.25%	47.4	47.3	-0.1
Jet A(2)	0.4%	42.9	43.3	0.4
Jet A(2)	0.7%	39.8	39.0	- 0.8
Diesel(2)	0.3%	55.2	55.8	0.5
Diesel(1)	0.5%	47.7	48.4	0.7
repeatability		4.1	4.1	
reproducibility		6.9	5.5	

The results of this round robin showed an excellent correlation between ASTM D 93 and ASTM D 6450 even for contaminated samples. Since measuring parameters for ASTM D6450 were slightly changed and a new sample cup for 2 ml sample had been used a new revision of the standard was published in year 2004. This revised standard is called ASTM D7094.
As there is no bias between ASTM D7094 and ASTM D93 A the following note is part of ASTM D7094.

Based on the sample set used in the 2001 cooperative test program, no statistically significant bias was observed in the temperature range from 35°C to 150°C between this method and ASTM Test Method D93 A. The repeatability and reproducibility for D93 A for this sample set (excluding lube oils) were r=4.1°C and R=6.9°C.

In comparison, the repeatability and reproducibility of ASTM D7094 was r = 4.1°C and R = 5.5°C.
ASTM D7094 repeatability and reproducibility was calculated including lube oils.

For more information on round robin tests and the standard methods ASTM D6450 and ASTM D7094 feel free to ask the local representative or directly Grabner Instruments.

3.2 MINIFLASH versions

For different temperature ranges from -25°C up to 400°C (-50°F to 752°F) multiple MINIFLASH versions are available.

3.2.1 FP *VISION* – Standard Temperature Version Type 440

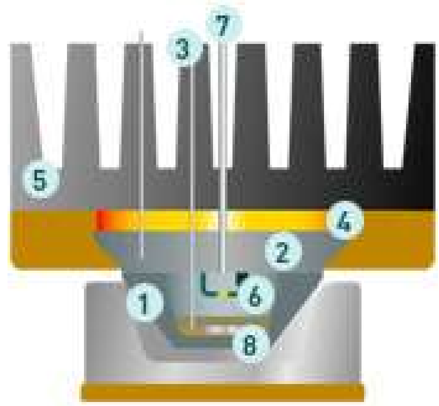
For flash points around -25°C up to 120°C (-13°F to 248°F), the touch-screen version FP VISION is available. The oven of this tester consists of two heating cartridges to achieve temperatures as high as 120°C. Also, the oven consists of two high performance Peltier elements to assure fast cooling of the tester.

3.2.2 FPH *VISION* - High temperature version Type 441

For flash points around 10°C to 400°C (50°F to 752°F), the high temperature touch-screen version FPH *VISION* is available. The oven of this tester consists of four heating cartridges to achieve temperatures as high as 400°C. The oven consists of Peltier elements mounted on a patented cooling block to assure the cooling of the tester. However, this high temperature range can only be achieved with a very special technical arrangement.

Note: Flashpoint standards usually require starting at least 18°C below the expected flashpoint for standard compliant flashpoint measurements.

3.3 Measuring method



A Ni-plated aluminum cup (1) with a sample is resting in the sample cup holder. For the test, the sample cup is lifted to the temperature-controlled oven (2), forming the test-chamber with a metal to metal seal. A thermocouple (3) is immersed into the sample to measure the temperature. The temperature of the oven is controlled by Peltier elements (4) and an air-cooled heat sink (5). The vapor is ignited by a high voltage arc (6) inside the test-chamber. At the flash point, the pressure inside the sealed measuring chamber is increased significantly, which is detected by a built-in pressure transducer (7). A rotating magnet and a small magnet (8) inside the the sample cup provides stirring.

The measuring program is adjusted. Even though MINIFLASH FP(H) VISION measures according to a standardized method (ASTM D 6450 or ASTM D 7094), all parameters can be programmed freely.

3.4 Patent

The MINIFLASH FP(H) Vision is protected by following patents:

- WO 2011140576
- US 8950934
- EP 2569617
- AT 509743

You can search for the patents here:

- Espacenet http://worldwide.espacenet.com
- United States Patent and Trademark Office http://patft.uspto.gov/

4 FEATURES MINIFLASH FP(H) VISION

- Only 1 or 2 ml (depending on measuring standard) of sample for a measurement
- No open flame
- No offensive fumes
- Measurement is fully automatic
- Accurate and reliable determination of flash points
- Fully automatic barometric pressure correction
- Safe operation due to completely closed cup (Ignition Protection Technology)
- No accessories required
- Wide temperature range:
- **FP VISION:** -25°C to 120°C (-13°F to 248°F) with external cooling
- **FPH VISION:** 10°C to 400°C (50°F to 752°F)
- Built-in diagnostic and safety features
- Lightweight and compact, portable
- Power from car battery via power converter
- Intuitive Menu Navigation on large 10" Color Touch-Screen
- Runs on Linux software
- Interfaces:
- 4x USB for data transfer, printer, mouse, keyboard and BARCODE-Reader connection
- 2x LAN for full network, PC, LIMS and remote operation
- 2x HDMI
- USB printer support and data transfer
- COCKPIT interface
- Combustion Analysis, Peltier Protection Technology
- 64GB Harddisc for result storage
- Automatic Ignition Cleaning Program
- Multilingual display

4.1 Technical data

Instrument Data	
Units of measurement	° Celsius or ° Fahrenheit
Communication languages	Multilingual (English, German, French, et. al.).
Power requirements	100/110/120/230/240 V AC; 50/60 Hz; FP *VISION*: 125 W, FPH *VISION*: 235 W
Environmental Certificates	EN 60068-2-1, EN 60068-2-78, EN 60068-2-14
Shockproof	EN 60068-2-6 (Requ. IEC 60721-3-2, Class 2M2)
Vibration Resistant	EN 60068-2-27 (Requ. IEC 60721-3-2, Class 2M2)
Optional	DC / AC Power converter for use with car battery
Fuse	Type FST 5 x 20 mm time lag T2A/250V, IR35A/250V, AC IEC 60127-2/3
Temperature range	**FP *VISION*** -25°C to 120°C (-13°F to 248°F) with external cooling **FPH *VISION*** 10°C to 400°C (50°F to 752°F)
Accuracy of temperature reading	± 0.1°C (± 0.2°F)
Pressure sensor accuracy	± 0.5 kPa (± 0.073psi)
Physical dimensions	W x H x D = 253 x 368 x 277 mm W x H x D = 10 x 14.5 x 10.9 inches
Environmental Specifications	Operating Temperature: 0°C to 50°C (32°F to 122°F) Operational humidity: ≤ 90% RH non condensing
Weight	FP(H) *VISION* 11 kg (26 pounds)

5 UNPACKING

The instrument is originally shipped with a special designed shock proof box. Please keep this box. You might need it someday to ship the instrument back to us for service.

	1 Flashpoint analyzer: MINIFLASH FP(H) VISION	FP VISION FPH VISION
	1 Sample cup standard 4 mL (Aluminum, Nickel plated) for the measurement acc. to ASTM D 6450	FL-M071016.02
	1 Sample cup standard 7 mL (Aluminum, Nickel plated) for the measurement acc. to ASTM D 7094	FL-M041021.01
	1 Sample cup carrier	FPV-SUB022
	1 Stirring magnet	MAGNET-D3X13
	Removing nipper	FPV-SUB034
	Service dish assy	FPV-SUB037

	LAN Cable	KA-RJ45-1,5M
	1 Brass eraser	FL-RADIERER-MESSING
	10 pcs. one-time use pipette 3ml	PIPETTE-3ML
 	1 Power supply cable (left EU or right US)	NK-498/13-SVT3X18AWG (115V) NK-H05VVF3G0.75/2 (230V)
	2 x 1m 6/4 hoses for water cooling, Max. filling pressure: 7.5 bar!!!! **FP Vision only**	SCHL-PFAM 6/4
	1 Operation manual	
	1 Test certificate	
	1 Shipping Case	SHIPPING-CASE-BIG

Options:

	DC/AC power converter 12V/230 DC/AC power converter 12V/115 for 12V vehicle battery operation	DC/AC-WANDLER12V/230 DC/AC-WANDLER12V/115
 	Sample cup 4 mL (stainless steel) for the measurement of aggressive samples acc. to ASTM D 6450	FL-M920206.05-SS
 	Sample cup 7 mL (stainless steel) for the measurement of aggressive samples acc. to ASTM D 7094	FL-M041021.01-SS
	BIOHIT Pipette	SPRITZE-BIOHIT1

5.1 MINIFLASH FP(H) VISION front panel

5.2 MINIFLASH FP(H) VISION rear panel

Fan

Power supply
and main switch

Water cooling
Connection
(FP Vision only!)

Max. Pressure:
7.5 bar!

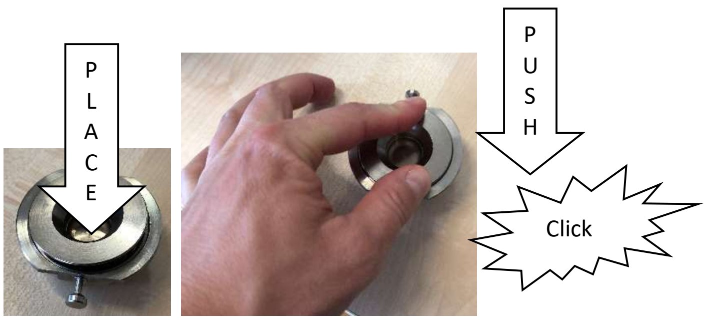
- 4x USB, LAN Interface,
  HDMI
  Network, PC, LIMS

5.3 Installation

Place MINIFLASH FP(H) VISION on a bench top and connect the power supply cable to the power inlet on the rear side of the instrument and the main voltage.

When the instrument was exposed to low temperatures before powering up the unit leave it for a while for room temperature equilibrium. Condensations inside the instrument can cause an electric short cut when turning on.

Sample Cup Installation



5.3.2 Installation of water cooling (FP Vision only)

Attach the water hoses to the back of the instrument. Connect the upper hose (inlet) to tap water and lead the lower hose (outlet) to a sink.

Max. inlet (filling) pressure: 7.5 bar!

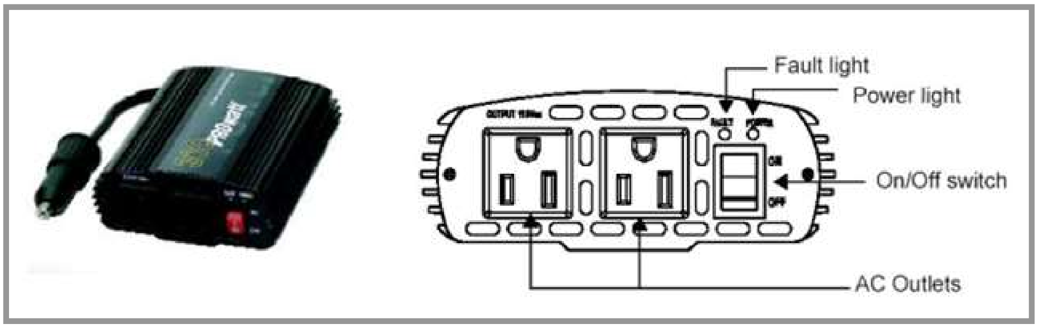
5.3.3 External Keyboard Installation

On the rear panel of the instrument you find 4 USB connectors for a USB-sticks and USB-printers

5.3.4 Preinstalled Printer Drivers

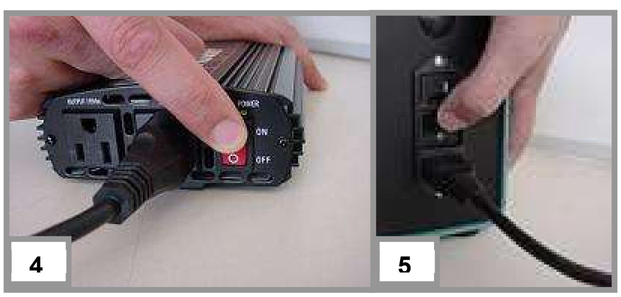
Hewlett Packard Series M530 is pre-installed on the device and the only tested printer. Other printers can be installed upon service request.

5.3.5 DC/AC power converter PROwatt 300 Installation



1. Connect the analyzer with the supply cable to the power converter on one of the AC outlets.
2. Connect the power converter via plug to the cigarette lighter slot.

3. Turn on the power converter by switching the On/Off switch.
4. Turn on the instrument.
5. The analyzer is ready for operation.



5.3.6 Mobile installation

The flashpoint tester can be used in the field particularly in mobile laboratories mounted on vibration lowered mounting plates. When used in mobile laboratories mains is available. If operated in the field with a car battery a power converter available for the analyzer can be used to power up the instrument.

For more information of using the instrument with the car battery see chapter „DC/AC power converter”

6 USER MANAGEMENT

MINIFLASH FP(H) VISION has a Linux software preinstalled, which facilitates easy menu navigation via a big 10” color touch-screen.

The user interface has been designed by including user favorable aspects, with button sizes big enough to navigate by using fingers instead of a stylus or a pen. Thus, the risk of scratching the touch-screen surface is minimized and the lifetime of the touch-screen optimized.

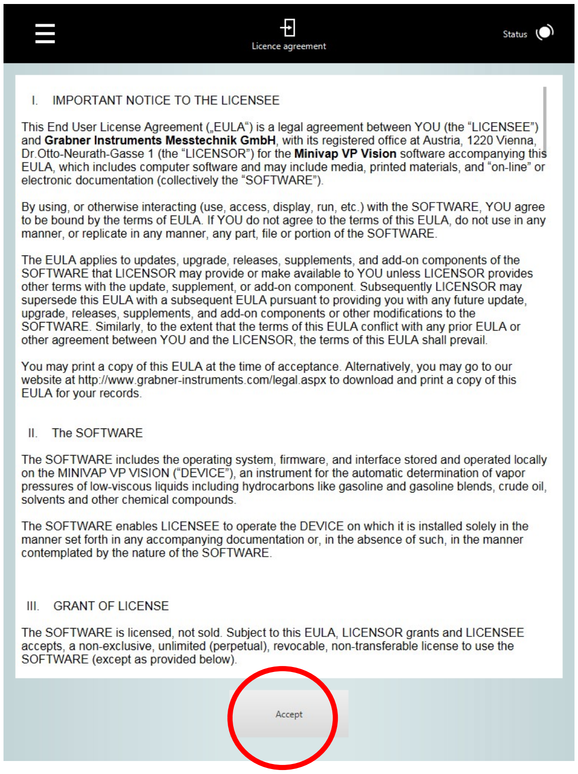
6.1 Simplicity and Flexibility

The concept of the MINIVAP FP VISION intends to provide users with a simple and easy to use measuring solution (the instrument) and to allow lab managers and administrators to manage more complex processes via a PC Software, the GI COCKPIT.

FP VISION: Simply run tests on the instrument	Cockpit: Manage Flexibility
Login / Logout Perform Measurements View Results Basic Maintenance (Rinsing, IP Address, …) Basic Settings (Date, Time, …)	Adjust Calibration Adjust Device Configuration Create, Collect and Distribute Data Handle User Management Backup and Update

6.2 End User License Agreement

Before first use you have to accept the End User License Agreement.



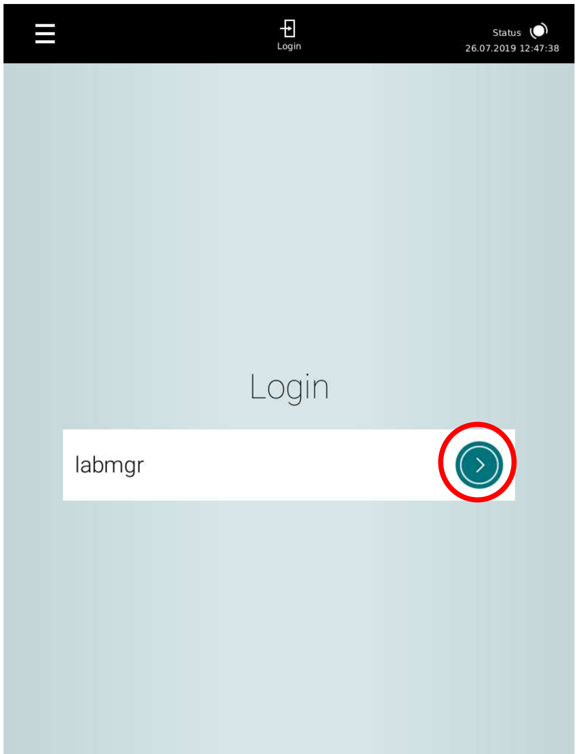
Press >Accept> to complete the registration.

Full information about the End User License Agreement (EULA) for the MINIVAP VP Vision can be reviewed, downloaded and printed here:

http://www.grabner-instruments.com/legal/index.aspx

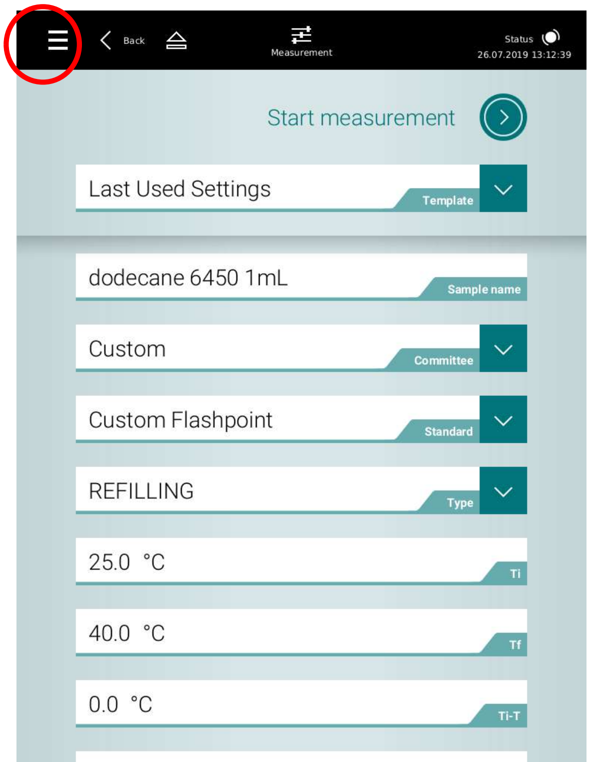
6.3 Login

If you are using MINIFLASH FP(H) VISION for the first time, please log in as labmgr.
As labmanager you can setup multiple standard and advanced users accounts.

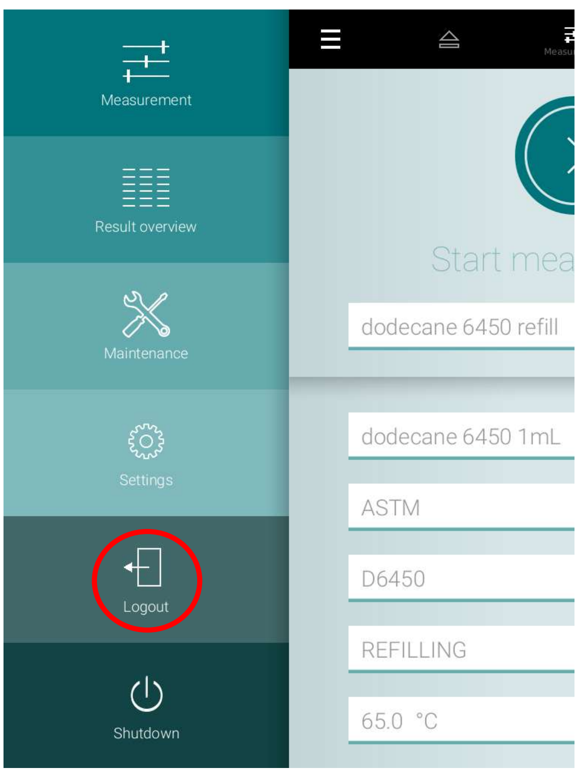


It is only possible to log in to the shown users. In case other users are needed, please see the manual for the COCKPIT to add additional users to the device.

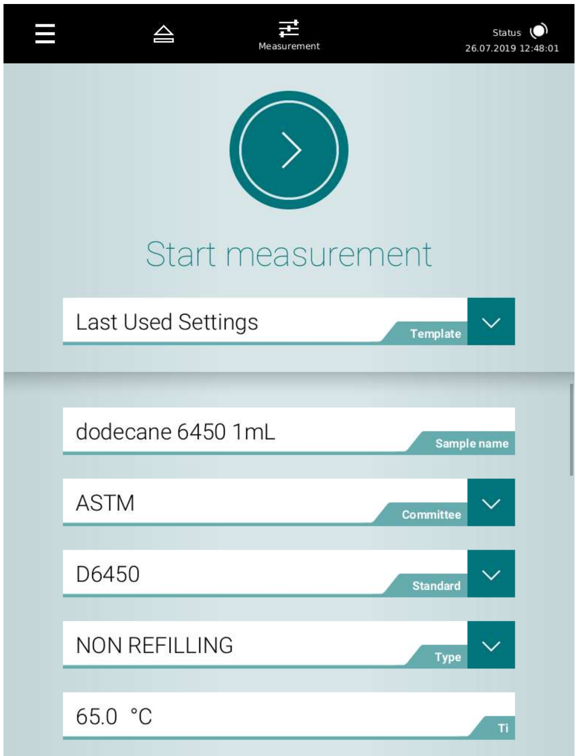
6.4 Logout



Press the “Menu” button

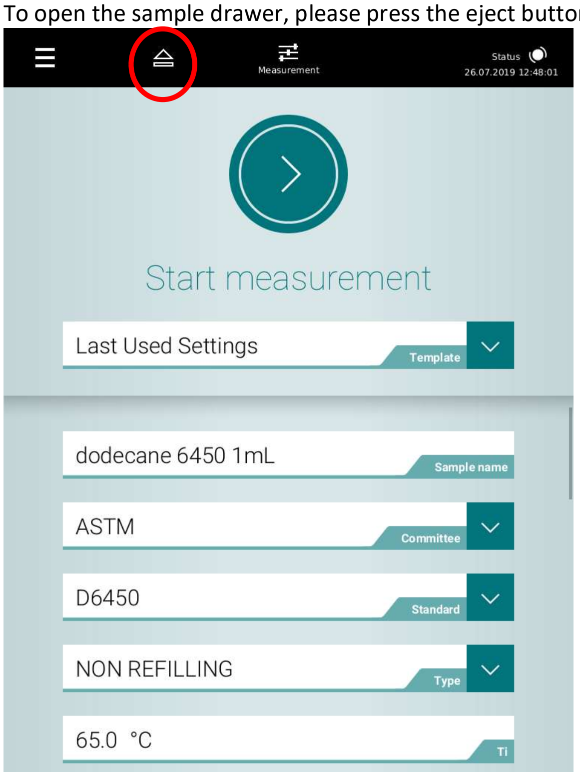


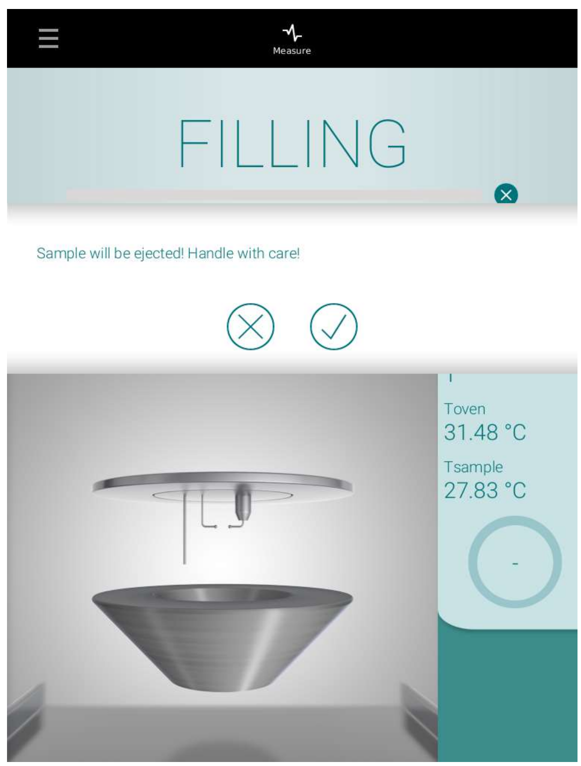
Press “Logout



After first start of the device and the login as labmgr, Last Used Settings is selected.
In the bottom section of the screen the last used template is loaded and displayed.

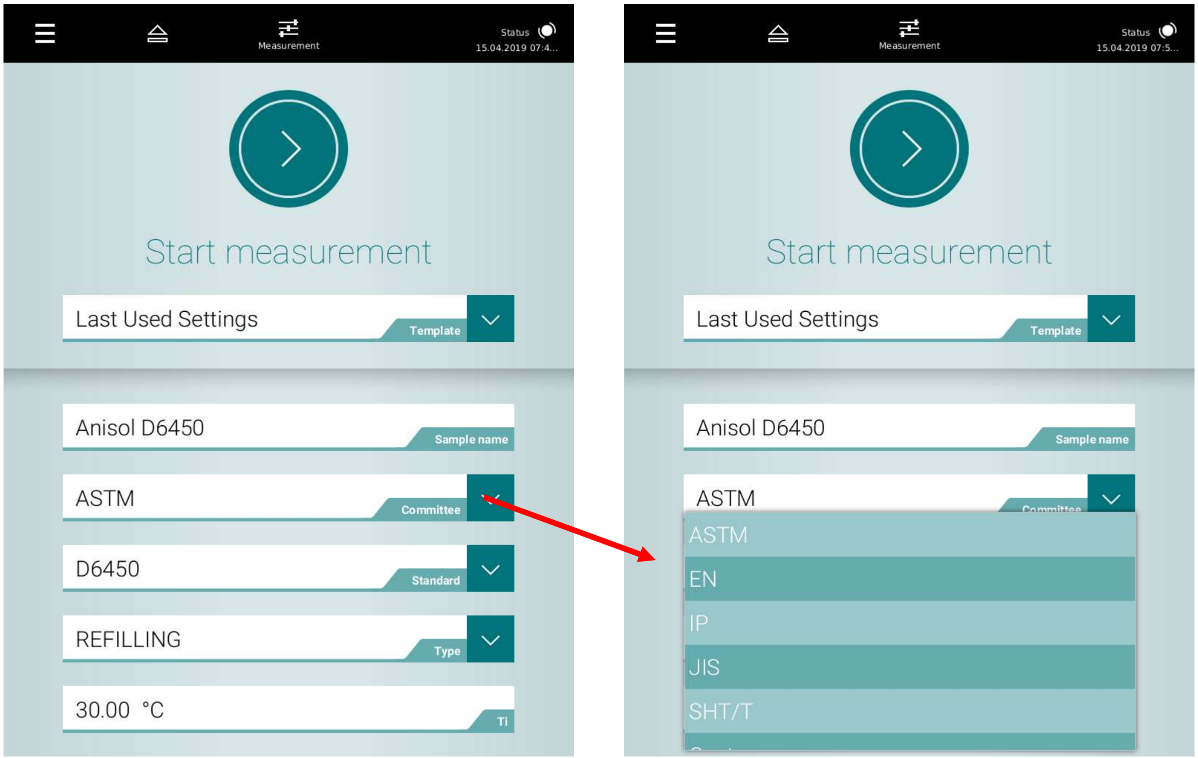
To open the sample drawer, please press the eject button.



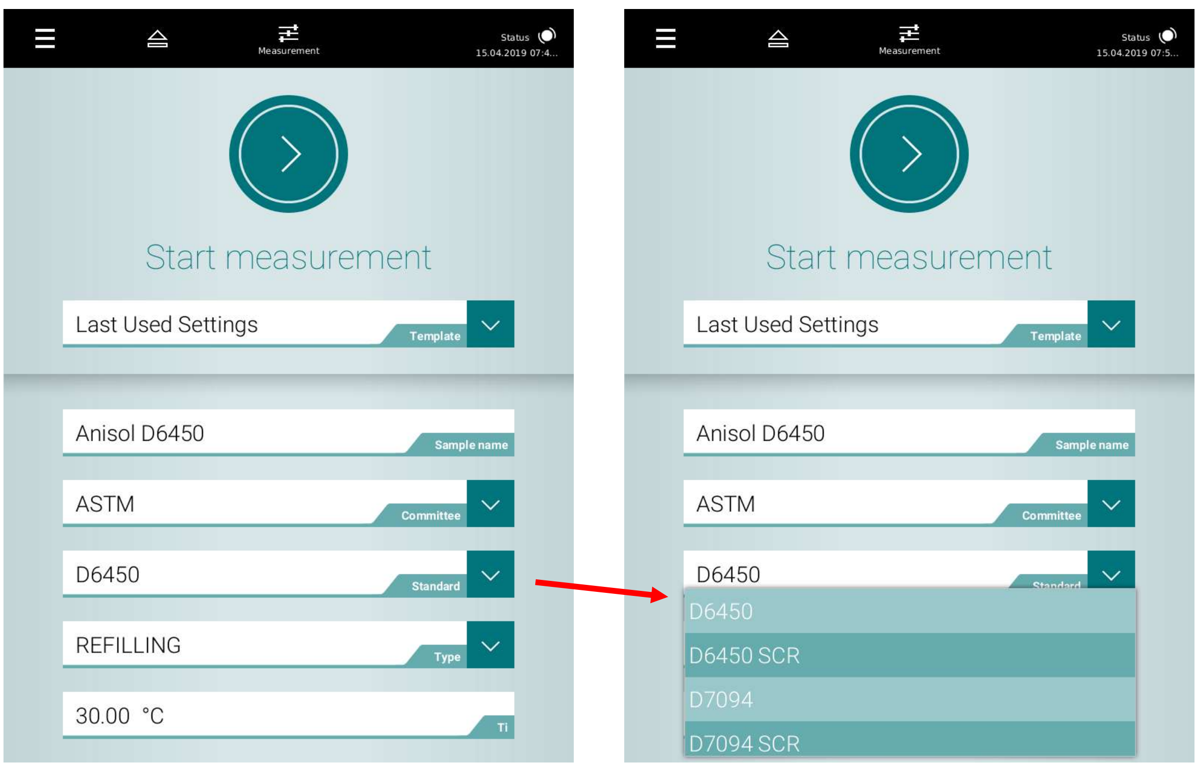


Every manual ejection of the sample drawer must be done carefully. The sample placed on the sample cup holder might be still hot and can lead to burnings of the operator!

Sample name: here it is possible to enter a name or number for the sample which is to be tested. Please use the display keyboard to type in the desired sample name. As well an external keyboard or barcode reader can be used.

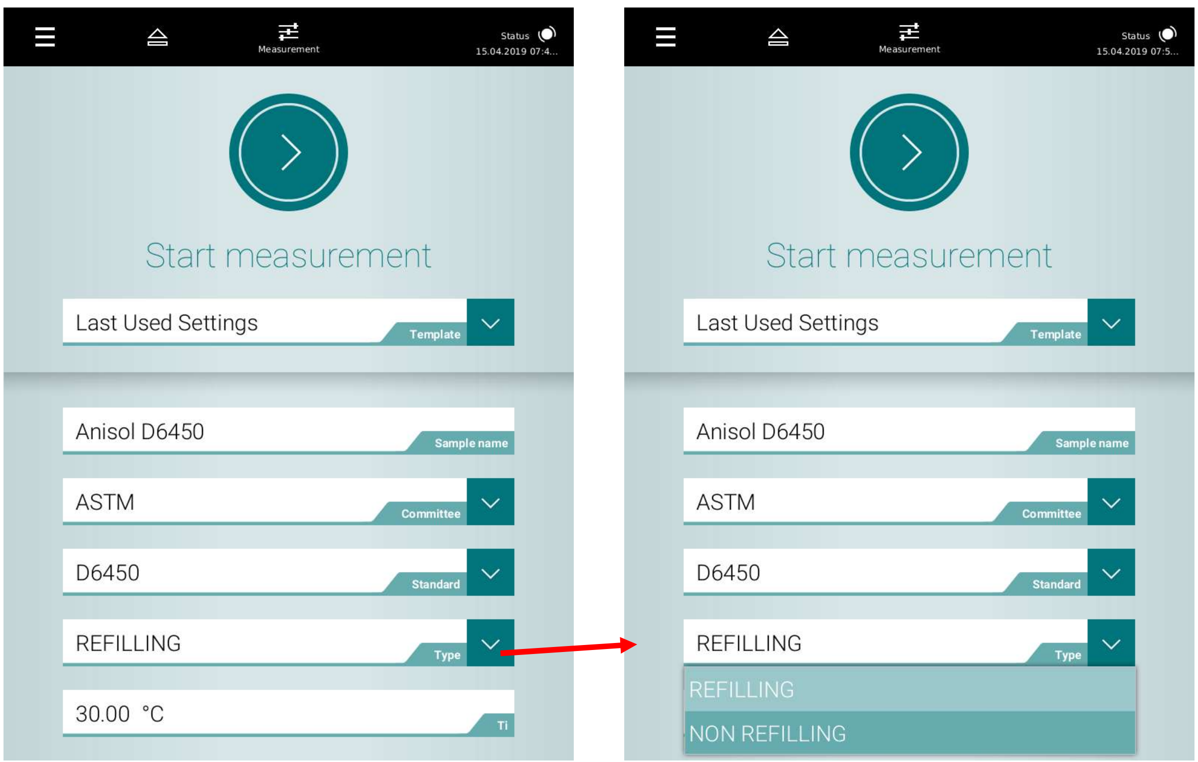


Committee: with the committee section you can select the method for the sample test procedure. Available committees are ASTM, EN, IP, JIS, SHT/T, GB-T, Navy and Custom.

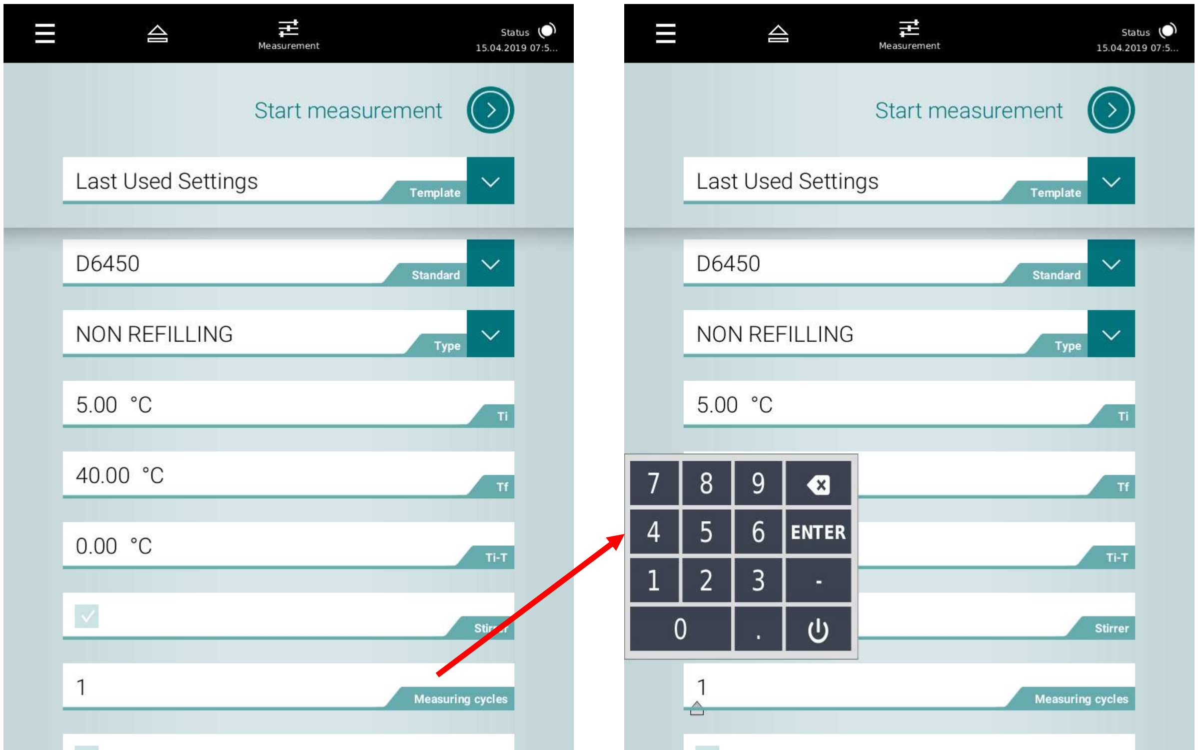


Standard: with the standard selection you can select the following standards.

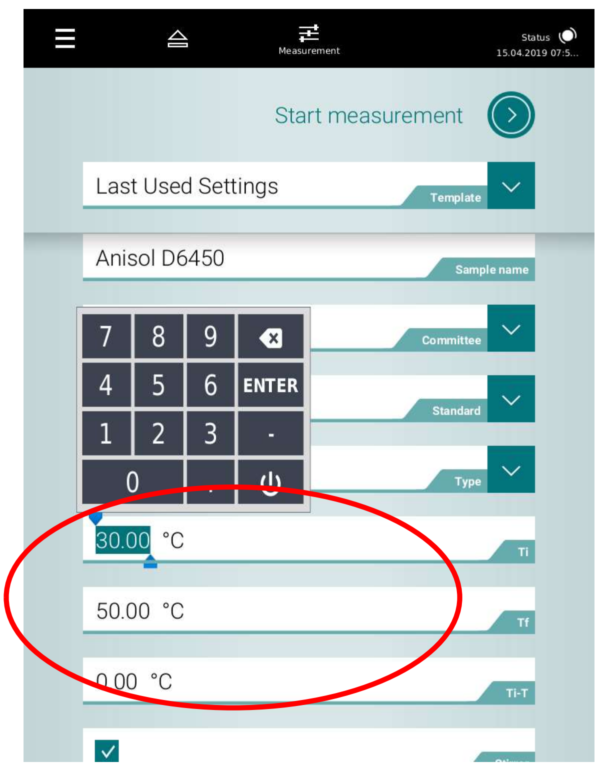
Committee	Standard	Method
ASTM	D6450	Direct
ASTM	D6450 SCR	Direct
ASTM IP	D7094 620	Direct
ASTM	D7094 SCR	Direct
ASTM EN IP JIS	D93A ISO 2719A 34A 2265-3A	Correlation Method
ASTM EN IP JIS	D93B ISO 2719B 34B 2265-3B	Correlation Method
ASTM EN IP	93C ISO 2719C 34C	Correlation Method
ASTM	D56	Correlation Method
ASTM EN IP	3828A ISO 3680 524	Correlation Method
EN IP	ISO 13736 170	Correlation Method
SH/T	768	Direct
CUSTOM	Flashpoint	Custom
CUSTOM – Only FPH Vision	Dilution	Custom
NAVY – Only FPH Vision	JP5	Custom
NAVY – Only FPH Vision	F76	Custom



Type: with the menu you can select either REFILLING or NON REFILLING. REFILLING is for measurements according to standards and NON-REFILLING is for repeated measurements with the same sample, e.g. for test runs with pure components.



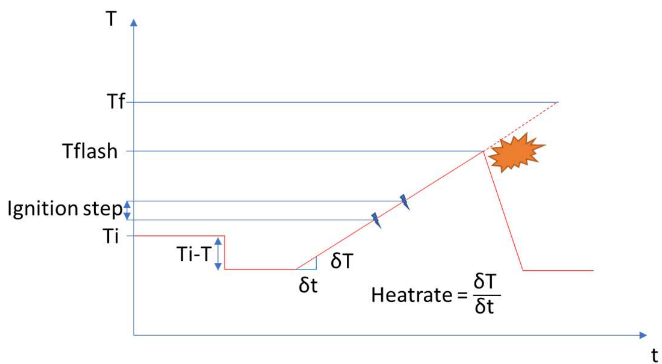
Measurement cycles: here the number of continuous measurements can be entered.
NOTE: every measurement cycle is completed with the amount of cycles entered.



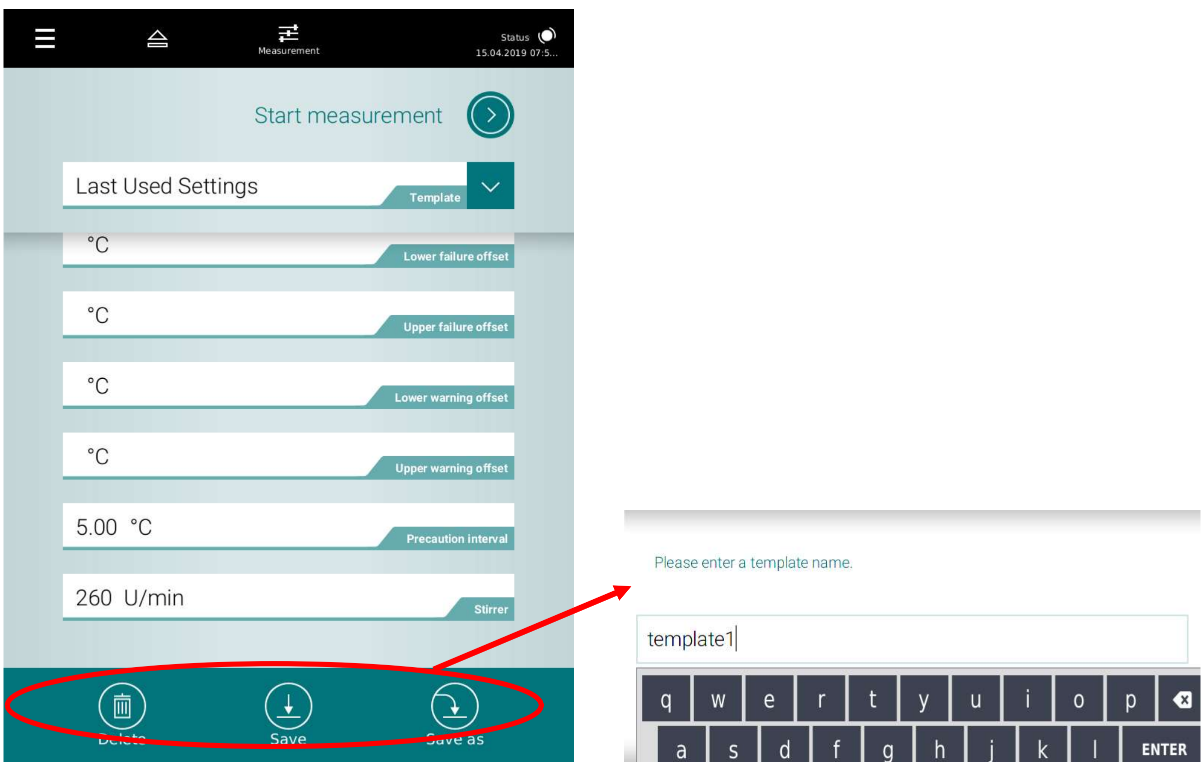
Ti is the initial temperature starting point for the measurement cycle.

According to ASTM standard D6450 and D7094, the start temperature must be 18 °C (64,4 °F) below the expected flashpoint.

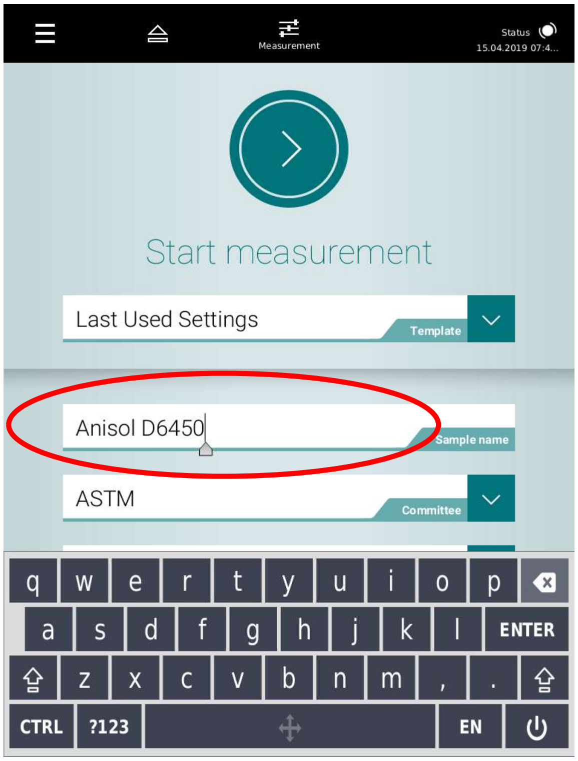
If the flashpoint is not known enter 10°C for the start temperature for the first time. The result should be taken as an approximate one. Perform a test again with a start temperature 18 °C (64,4 °F) below the flashpoint. If the start temperature is set too high, above the flashpoint of the sample, the true flashpoint can't be detected since it is somewhere below the adjusted start temperature.
If the start temperature is set to low, the test time is unnecessarily long. For a quick estimate of the flashpoint of a sample the faster screening method can be used to evaluate the range where the flashpoint is present to get an adequate measuring range.
Tf is the final heating temperature. Tf must be above the expected flashpoint of the sample, otherwise the device will finish the measurement with the result "no flash".
Ti-T: This parameter cools the oven below the set temperature before starting the measurement cycle. The possible settings are 0-9°C.



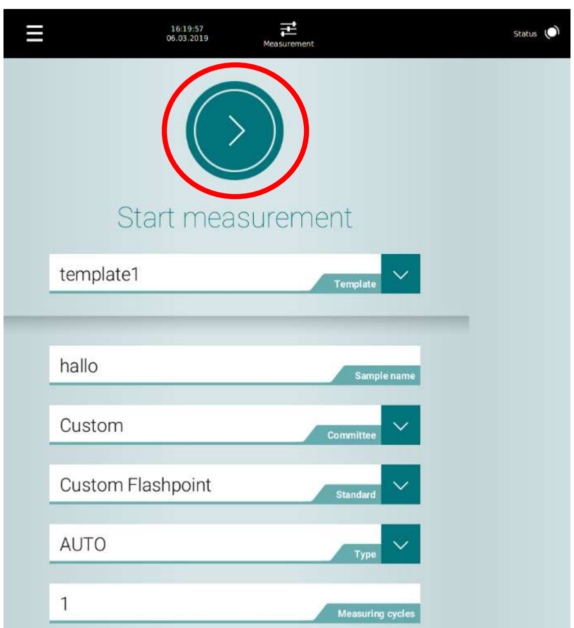
Schematic heating diagram with the description of the adjustable parameters



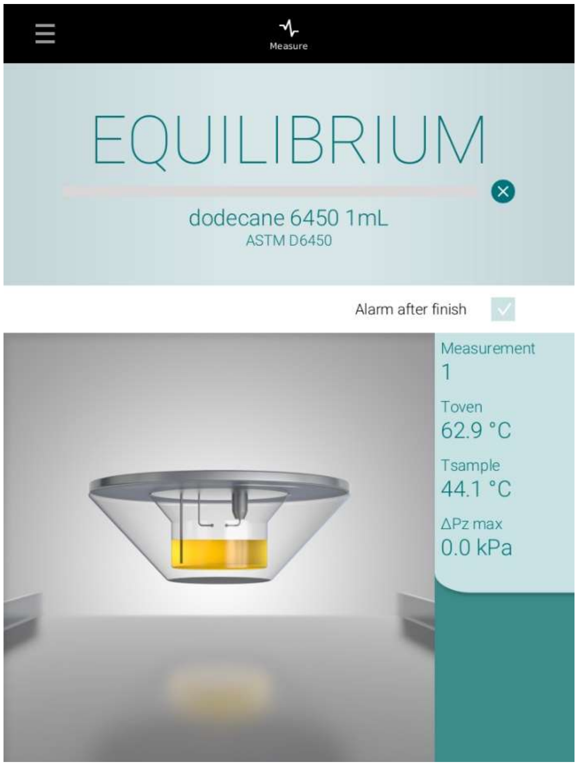
Every different adjustment for different samples can be saved as a new template on the unit with different names. This should allow the user to create own templates which can be overwritten and deleted from the unit.



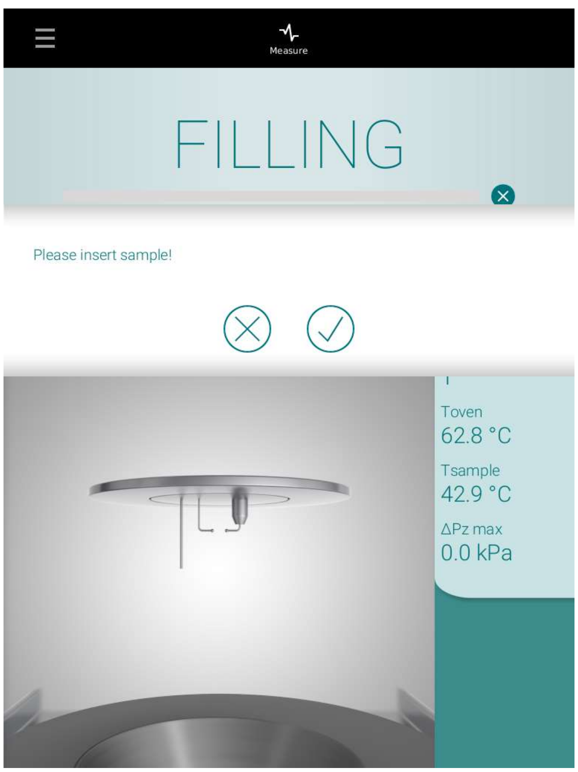
The sample name must be typed in before the measurement is started using the onscreen keyboard.



Start measurement:
With this button you start the measurement according to the previously selected settings. Then the measurement overview is shown.

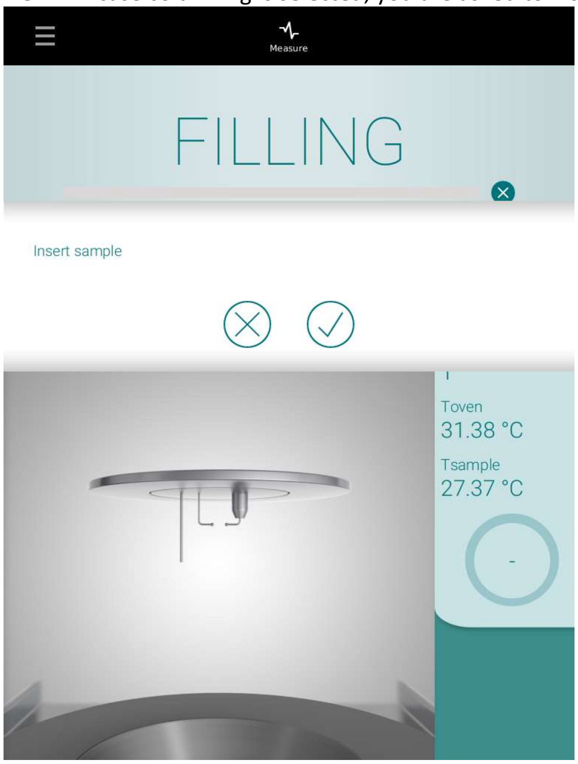


Measurement overview: on the right side the temperature of the oven is shown and as well the temperature of the sample.
Once Ti is reached, the analyzer asks the operator to insert the sample. Please confirm the opening of the drawer.



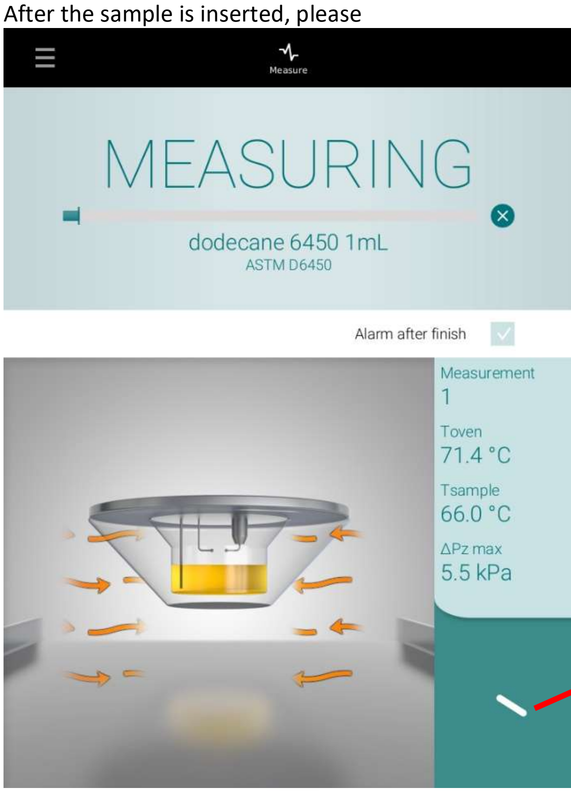
After confirmation, the drawer is opened and ready that the operator puts the sample cup on the drawer.

NOTE: in case cold filling is selected, you are asked to insert an empty sample cup!



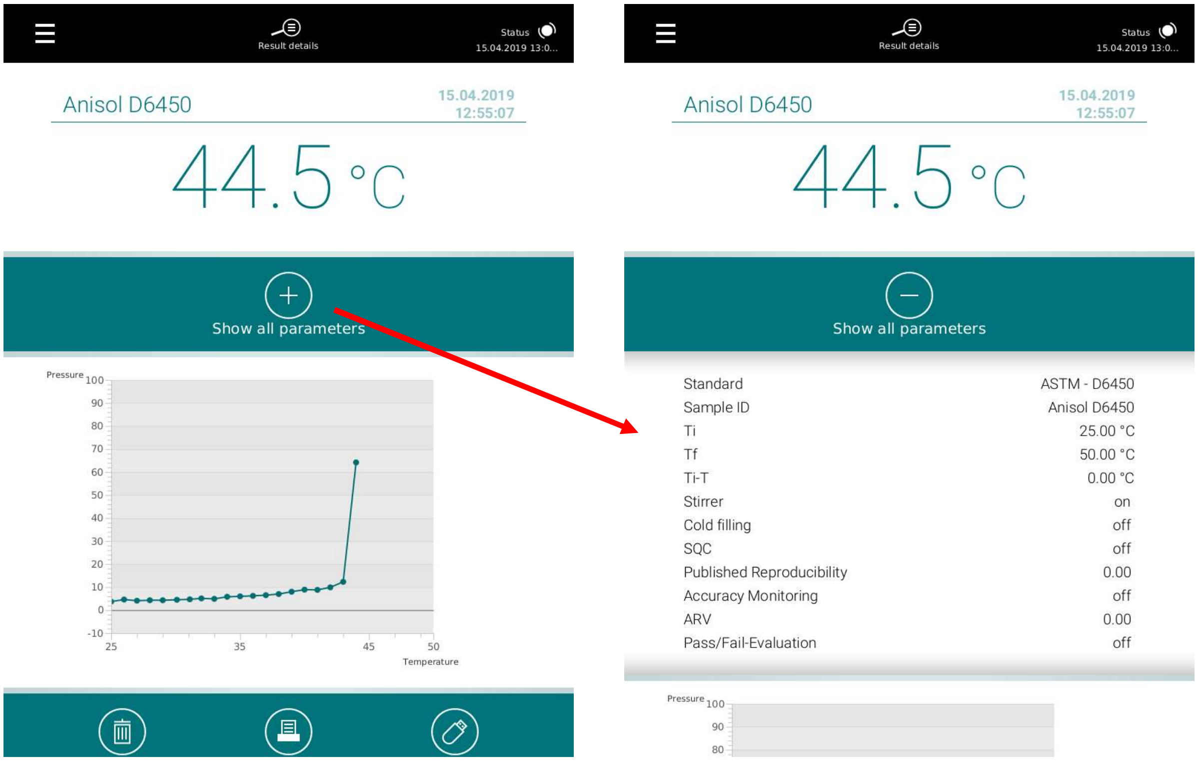
Once the sample is in the drawer, the user has to confirm that the device can close the drawer and starts the measurement process.

After the sample is inserted, please



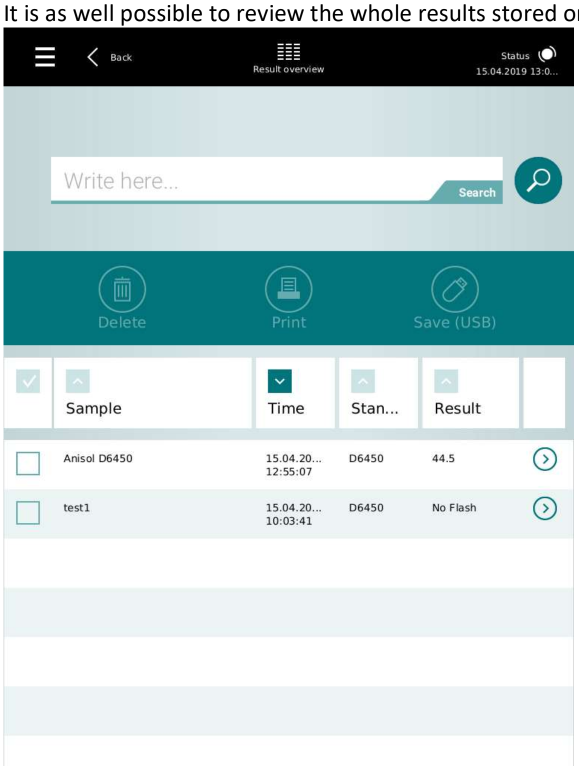
The moving stick shows that the stirrer is activated

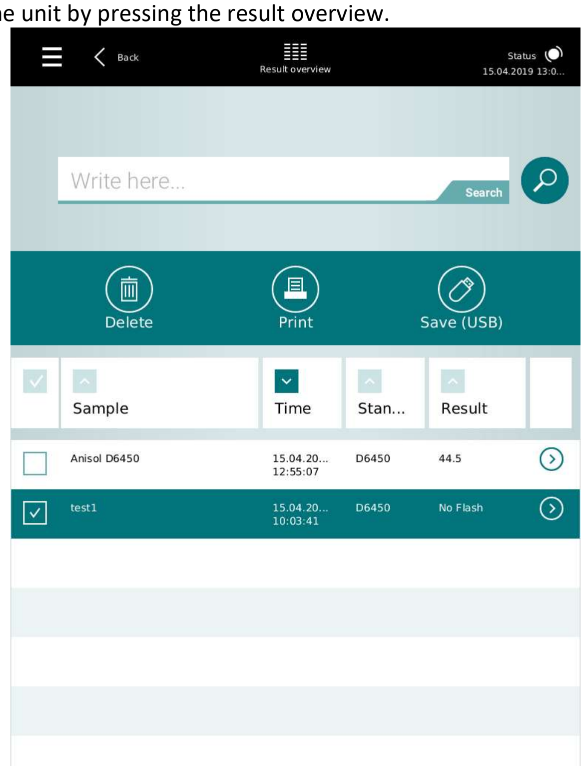
During an ignition, the sample cup is blue colored. Only in case a flashpoint is detected, or no flash occurred until Tf is reached, the screen changes to the result page.



On the result page the measured flash point temperature is indicated on top. Below the user can select show all parameters of the measurement by pressing "+".
The bottom part shows the pressure graph of the whole measurement cycle.

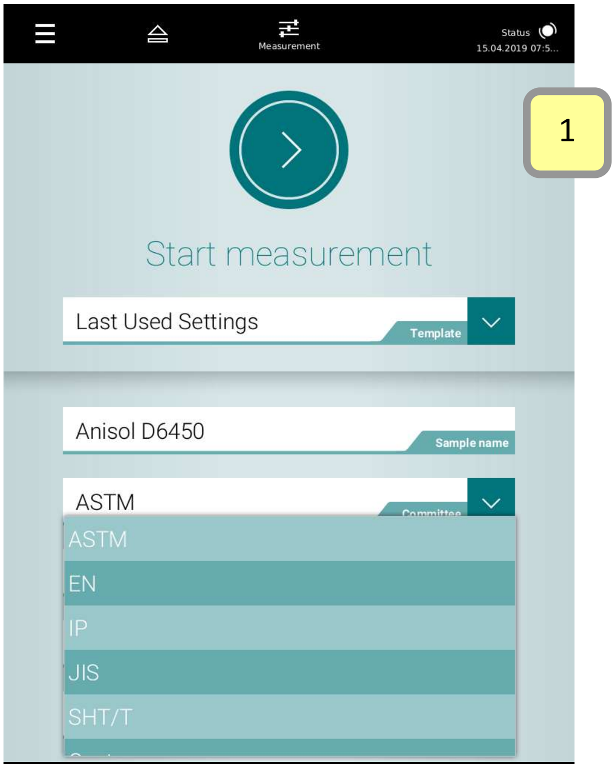
By scrolling down the screen, it is possible to delete the measurement, print the measurement result and save it to an USB stick.
With New measurement, the unit goes back to the start screen.
It is as well possible to review the whole results stored on the unit by pressing the result overview.



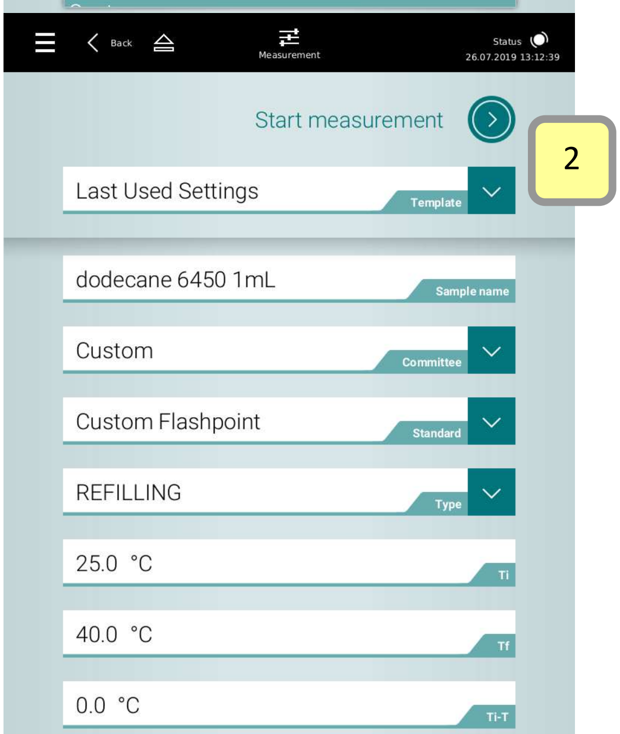


The results overview is showing all measurement results stored on the unit. By selecting one or more results, those can be deleted, printed and exported. There is as well a search function available to search through the results. There are as well the options to filter and sort the results.

8 CREATE A CUSTOM MEASUREMENT



1 … In the Main Menu choose at Committee custom to create a new custom program

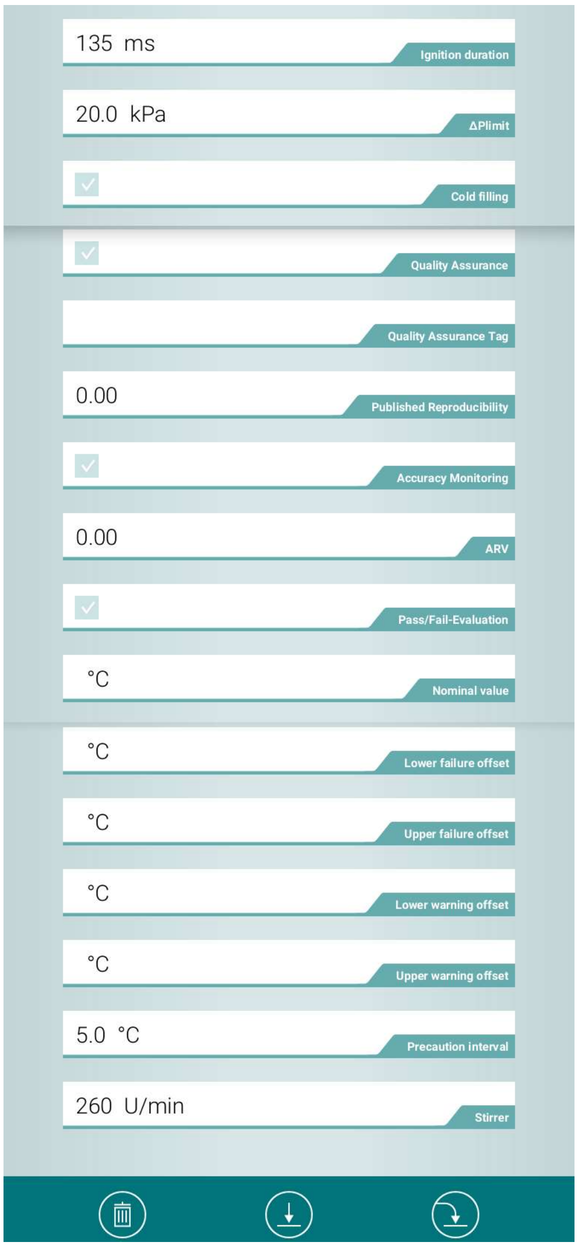


2 … Then the parameter section is extended and the whole parameters appear

Ti … Initial temperature where the measurement starts. The oven will be preheated to this temperature before the cup is lifted.

Tf … Final temperature where the measurement cycle stops. In case a flashpoint is detected, this temperature won't be reached. In case no flashpoint is detected, the measurement is stopped with the result No flash.

Ti-T … this is the parameter to cool the sample in case the measurement has to start below ambient temperature.



Step … this temperature step defines the interval for every ignition.

Heatrate … This temperature defines the heating ramp of the sample.

Air … amount of air which is introduced in the measurement chamber after every ignition.

Stirrer … Check box to activate the stirrer

Ignition duration … this sets the length of the ignition pulse

ΔPmax … this sets the limit where a flashpoint is detected. The default value is 20 kPa

Cold filling … This check box activates the sample cup cooling. The procedure for the measurement will change, the empty cup will be pre-cooled before the actual sample can be introduced in the measurement cup.

Quality assurance … This activates the statistical quality control according to D6299

Quality assurance Tag … Insert the name for the SQC Tag here

Published Reproducibility … Enter the published reproducibility from the ASTM standard here

Accuracy monitoring … activate the monitoring of the measurement

ARV … Accepted Reference Value

Pass/Fail- Evaluation … the pass/fail evaluation selector on/off

Nominal value … expected flash point of the specimen

Lower failure offset and Upper failure offset … value to show the result red marked

Lower warning and Upper warning offset … values to show the result yellow marked

Precaution interval … interval for safety ignition when the sample is colder than Ti. The measurement is stopped in case a flashpoint is detected during the heating to Ti.

Stirrer … The speed of the magnetic stirrer can be adjusted between 50-450rpm

Further explanation towards custom methods:

Ignition interval

The ignition interval indicates when an arc in the measuring chamber is generated. If the interval is 2°C, every 2°C of temperature increase an ignition is activated.

If the parameter STEP is set too high, the resolution of the flashpoint is too low. That means if the STEP interval is too high the results are imprecise. For higher STEP intervals the resolution of the detected flashpoint is decreasing:
(e.g.: Ignition interval=3°C; real flashpoint=78°C; measured flashpoint=81°C)
If this parameter is set too low, a reasonable sample- air mixture can't be accumulated since the ignition is igniting ("burning") the mixture too often. Thus, the pressure increase is too low to detect a flashpoint.

In the methods ASTM D7094 + Screen D7094 the ignition interval is defined with 1 °C.
In the methods ASTM D6450 + Screen D6450 the ignition interval is defined with 1 °C.
In the freely programmable methods, the ignition interval can be freely adjusted.

In the methods ASTM D7094 + Screen D7094 the ignition time is defined with 19msec
In the methods ASTM D6450 + Screen D6450 the ignition interval is defined with 43msec
In the freely programmable methods, the ignition time is defined within 10-150msec

Heat rate

The programmed heating rate indicates the heating speed (temperature increase per minute).
A Heating rate setting too high inhibits a proper temperature equilibrium and good evaporation of the flammable contents of the sample.
A Heating rate setting too low on the other hand increases the measuring time.

In the method ASTM D7094 the heating rate is defined with 2.5 °C/min (5 °F/min).
In the method Screen D7094 the heating rate can be adjusted.
In the method ASTM D6450 the heating rate is defined with 5.5 °C/min (10 °F/min).
In the method Screen D6450 the heating rate can be adjusted.
In the free programmable method, the heating rate can be freely adjusted.

Air

After each ignition fresh air must be introduced into the measuring chamber in order to get a proper flashpoint. The amount of air that is needed depends on the evaporation behavior of the measured sample.

Strongly fuming samples need more air then pure liquids since fume is adulterating or is avoiding the flashpoint.
It is strongly recommended to be careful when adjusting the air ventilation. It leads to a higher flashpoint because of too much air and this causes a fast disappearance of flammable vapors in the measuring chamber.

In the method ASTM D7094 + Screen D7094 the air ventilation is defined with:

Sample temperature (°C)	Air (ml)
below 80	0.0
80 to 150	0.5
150 to 200	1.0
200 to 300	1.5
300 and above	2.0

In the method ASTM D6450 + Screen D6450 the air ventilation is defined with 1,5ml.
In the free programmable method, the air ventilation can be freely adjusted.

In preconfigured methods ASTM D6450 and D7094, ignition interval, heat rate and air ventilation are predefined and cannot be changed.

8.1 Fuel Dilution Curve

The measurement of fuel dilution in diesel engines is one of the strongest features of MINIFLASH FP(H) VISION.
The flash point of used engine oil is a very good measure of the diesel contamination.
The lower the flash point of the specimen, the higher the contamination.
The relationship between flash point and fuel dilution is non-linear and has to be evaluated experimentally.

8.1.1 Fixed installed dilution curve (Navy JP6 and F75)

Following curves are available:

JP6

Tflash[°F]	**Dilution[%]**
259,1	5
263,3	4,5
268	4
273,5	3,5
280	3
287,8	2,5
297,7	2
310,1	1,5
330,5	1
366,7	0,5

F75

Tflash[°F]	**Dilution[%]**
310,6	5
313,9	4,5
317,7	4
322,0	3,5
327,0	3
333,1	2,5
340,7	2
350,8	1,5
365,5	1
392,2	0,5

8.1.2 Custom fuel dilution curve

MINIFLASH FP(H) VISION is being used in order to evaluate the percentage of volatile substances in low volatile liquids such as lubricant oil in machines or motors.

Prepare samples of different fuel dilutions with the oil and fuel in use, either per weight- or volume-percent and determine the flash point.
Use therefore the same measuring program with the same parameters always to get the best results.
Perform for each sample with its concentration a test and note the results.

For the dilution analysis based on the flash point results following correlation is implemented:

$$dilution = e^{\left(a+b*T_{flash}+c*T_{flash}^{2}\right)}$$

Dilution [%]
Tflash [°C]
a [1]
b [1/°C]
c [1/°C²]

For the definition of the polynomial parameters a, b and c a minimum of 3 measurements with known dilution values are necessary. A higher number would increase the accuracy. Based on measurement results and corresponding dilution values, a, b and c can be easily calculated using a least square analysis.

The color flags on the instruments have the purpose to display contamination in a simple way after a measurement was done. Red, yellow and green can be shown. These colors display 3 quality ranges for the fuel dilution curve.

The sequence for programming the color flags proceed from the lowest flashpoint (red) over the middle range of the flashpoint (yellow) to the highest range of the flashpoint (green).
The higher the measured flashpoint is the lower the contamination is present in the sample.
e.g.: 1% Diesel in oil causes a higher flashpoint (because of the oil) than 5% Diesel in oil.

● Shows that the sample (e.g. oil with Diesel) is good for being used as a lubricant e.g.: in an engine. – within 2% from nominal value

● Shows that the sample (e.g. oil with Diesel) can be still used as a lubricant e.g.: in an engine. – between 2% to 5% from nominal value

● Shows that the sample (e.g. oil with Diesel) is not good for being used as a lubricant e.g.: in an engine. – above 5% from nominal value

8.2 Methods

8.2.1 Measuring according to ASTM D7094

This test method covers the determination of the flash point of pure chemicals, fuels (pure and contaminated), fuel oils, lube oils (pure and contaminated), solvents, and other liquids.

This method measures the flashpoint with static measuring parameters that can't be changed by users in order to properly follow the ASTM D7094.

If measuring settings like sample ID, Temperature range and dilution curve were adjusted already the method can be selected.

When all parameter were adjusted, prepare the samples and the sample cup (2 ml cup volume) for the test.

Sample stirring is automatically activated for this method. Please do not forget to place the magnetic stirrer in the sample cup prior to starting the measurement!

8.2.2 Screening method for ASTM D7094

In order to check the flashpoint of an unknown sample a fast screening method with ASTM D7094 SCR features can be used to get a quick idea of the liquid before the proper ASTM D7094 method can be used. To get the information at which temperature the flashpoint occurs the temperature range must be entered where the flashpoint is expected.

The heating rate can be changed to get a quick idea in what range the flashpoint of the unknown sample appears.

When all parameter have been adjusted, prepare the sample and the sample cup (2 ml cup) for the test.

8.2.3 Measuring according to ASTM D6450

This test method covers the determination of the flash point of pure chemicals, pure hydrocarbons, fuels, fuel oils, lube oils, solvents, and other liquids.

This method measures the flashpoint with static measuring parameters that can't be changed by users in order to properly follow the ASTM D6450.

If measuring settings like sample ID, Temperature range and dilution curve were adjusted already the method can be selected.

When all parameter have been adjusted, prepare your sample and the sample cup (1 ml cup volume) for the test.

Sample stirring is automatically activated for this method. Please do not forget to place the magnetic stirrer in the sample cup prior to starting the measurement!

8.2.4 Screening Method for ASTM 6450

In order to check the flashpoint of an unknown sample a fast screening method with ASTM D6450 SCR features can be used to get a quick idea of the liquid before the proper ASTM D6450 method can be used. To get the information at which temperature the flashpoint occurs the temperature range must be entered where the flashpoint is expected.

The heating rate can be changed to get a quick idea in what range the flashpoint of the unknown sample appears. When all parameter were adjusted prepare your sample and the sample cup (1 ml cup volume) for the test.

8.2.5 ASTM D93A / ISO 2719A Correlation Method (Pensky Martens Closed Cup)

Please use the ASTM D7094 method for generating results equivalent to ASTM D93A.

According to the official ASTM Committee Statement "… there is no statistically significant bias observed between ASTM D7094 and ASTM D93A." This statement is based on the results of extensive Round Robin tests.

8.2.6 EN ISO 3679/3680 Correlation Method (ASTM D3828, IP 523/524)

These methods use the temperature equilibrium time and ignition steps specified in the closed cup standards EN ISO 3679/3680. ASTM D3828A/B and IP523/524 methods are technically equivalent to the ISO 3679/3680 methods.

Opposed to other closed cup methods, the ISO 3679/3680 method

- does not measure sample temperature, but measures the oven temperature only
- does not have a stirrer for rapid equilibrium
- requires a fresh sample for every ignition
- starts the test at the expected flashpoint

Temperatures >100°C require more sample and a longer equilibrium time and the resulting flashpoint is slightly higher than for other methods.

Sample	ISO 3679	ASTM D7094
Hexadecane	134 (±4.4°C)	131°C
Diethylene Glycol	142.2°C (± 4.5°C)	141°C

For better simulation of the delay in ISO 3679 /3680 flashpoint temperature adaption above 100°C, we suggest to

- use a cool 2 mL stainless steel cup
- adapt ignition time to 10ms for temperatures >100°C
- refrain from using a stirrer

ISO 3679 / 3680 simulation

Temperature	Sample Cup	Ignition time	Stirrer
≤ 100°C	Regular 2 mL, cool	15 ms	No
> 100°C	Stainless Steel 2 mL, cool	10 ms	No

Some test results of the adapted ISO 3679 simulation for temperatures >100°C (energy = 10 ms):

Sample	ISO 3679	ISO 3679 Simulation Average
Hexadecane	134 (±4.4°C)	133.5°C
Diethylene Glycol	142.2°C (± 4.5°C)	143°C

Set the sample name, the initial temperature (expected flashpoint), the temperature range and the energy. Then use a cool 2 mL sample cup and start the test. Ignition steps are programmed and follow the ISO 3679 / 3680 correlation method.

Please use the 2 mL sample cup to simulate EN ISO 3679/3680 rapid equilibrium flashpoint tests.

8.2.7 ASTM D93B / ISO 2719B Correlation Method (Pensky Martens Closed Cup)

This method can be used for fuel oils, cutback residuals, used lubricating oils and other viscous petroleum mixtures. It is based on ASTM D7094 with slightly different settings.

The ASTM D93B Correlation Method can easily be programmed into the MINIFLASH FP(H) VISION analyzer.

8.2.8 ASTM D93C Correlation Method (Pensky Martens Closed Cup)

This method can be used for Biodiesel (FAME, B100) flash point determination.

8.2.9 ASTM D56 Correlation Method (TAG Closed Cup)

This method can be used for low viscous liquids. Typically it is used for jet fuels.

8.2.10 ISO 13736 / IP 170 Correlation Method (ABEL Closed Cup)

This method can be used for flash points up to 70°C.
A comparison between ASTM D7094 and ISO 13736 / IP 170 revealed a close correlation of results:

Sample	ISO 13736 / IP 170 Average	D7094 Average
Arctic Diesel Fuel	57.5°C	58.3°C
Jet Fuel JP-8	48.2°C	46.3°C
Jet Fuel JP-5	63.3°C	63.3°C

8.2.11 Performing FLASH/NO-FLASH tests

MINIFLASH FP(H) VISION is also used to do fast and simple FLASH/NO-FLASH tests. The principle is to test samples if they are in a limit of permitted flashpoints less than knowing the true flashpoint. The limit is set by the user.

FLASH/NO-FLASH tests can be performed with the preinstalled correlation methods for EN ISO 3680, ASTM D3828 Method A, IP 524 or by adjusting the flashpoint limits when using the methods ASTM D6450 or D7094, respectively.

Example: Transport safety of flammable liquids

For all tested samples, the flashpoints must be above a specified limit e.g.: 80°C (176°F)

The sample is filled into the cup and put into the instrument. The instrument is regulated to the start temperature e.g.: 80°C (176°F). The sample cup is elevated to the heating device and a temperature equilibrium is started. That means the sample is getting the same temperature as the adjusted start temperature. An ignition is activated.

If no flashpoint appears at the first ignition at the limit of e.g.: 80°C (176°F) the sample is ok for our example and therefore “NO-FLASH”. If a flashpoint is detected, the true flashpoint is somewhere below the limit of 80°C (176°F) and therefore “FLASH”.

This FLASH/NO-FLASH test can be done with method ASTM D7094. (2 ml sample volume)
This FLASH/NO-FLASH test can be done with method ASTM D6450. (1 ml sample volume)

It is recommended to measure mixtures and contaminated samples using the magnetic stirrer.
Adjust the start temperature e.g.: Ti=80 and the end temperature just one degree higher Tf=81.
If no flashpoint is detected at Ti=80 the sample is according to the requirements.

8.2.12 Non-Refilling Option

With this method a number of consecutive runs can be performed on the same sample in a continuous run, without changing the sample in between measurements.

Unlike most multi-component substances, certain pure substances do not change their flashpoint, even if tested several times. The batch run method can be used for ASTM D6450, ASTM D7094 and custom flash point method, which is used in the MINIFLASH FP(H) VISION.

Possible applications include:

- Testing instrument performance and stability: This is the main application. Pure substances like Dodecane can be tested several times, and the flashpoint will remain stable, although the amount of sample in the cup is diminished (burned or vaporized).

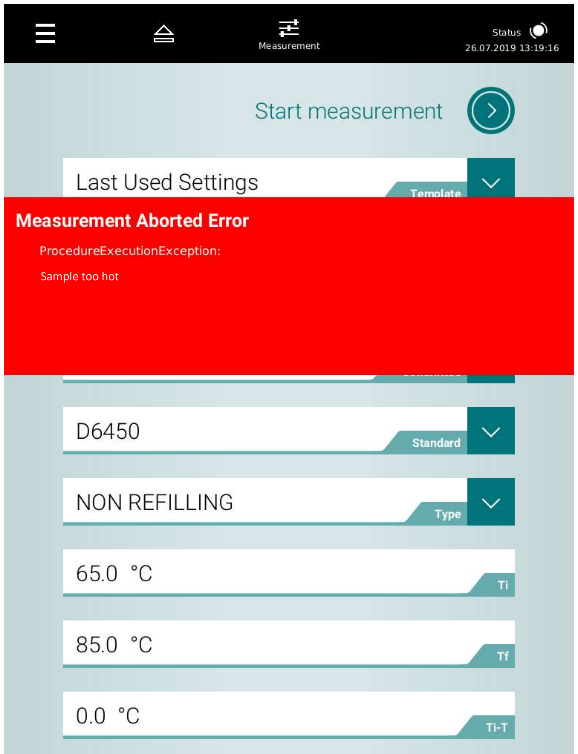
- R&D purposes, such as Pure Substance Test: The batch screening can e.g. be used to find out, whether their sample is pure or if contaminations within the pure substance lower the flashpoint. If this is the case, then the first run might show a lower flashpoint and all of the following runs might show a higher flashpoint, depending on the quantity of the contamination and whether all of the contamination was burned during the first test.

  In the example below a Batch Run with 95% Dodecane, mixed with 5% Diesel has been performed with 2 ml test sample. Pure Dodecane flash point is 78.6°C (±2.1°C) when tested per ASTM D7094. In the Batch Run the first flashpoint clearly shows the contamination (flashpoint at 76.1°C), whereas the second test already produces a 78.1°C result, as expected for pure dodecane.

To select a batch run, please select “Non-Refilling” as option during the setup of the measurement.

8.3 Start Temperature Adjustment (Ti-T)

If the initial temperature of the sample is near or below ambient temperature, a refrigerator is necessary to cool the sample because the temperature of the sample has to be below the initial temperature to start the measuring routine. Otherwise the instrument will report an error:



To be able to cool the sample well below the initial temperature before the measuring routine starts, the starting temperature can be set up to 0-15°C or 0-27°F below the initial temperature.

By setting the **Start Temperature Ti-T** to >0, the analyzer starts to actively cool the sample prior to measurement. This feature is primarily intended to be used for using **MINIFLASH FP(H) VISION** in the field, where no refrigerator is available.

Example: Room temperature and sample temperature is 20°C and the test has to be started at 18°C. If you insert the sample and press RUN, the instrument will report an error, as it is not actively cooling. If you set the **Start Temperature Ti-T** to 5°C, the analyzer will cool the sample to 18-5 = 13°C and be able to start the measurement.

8.4 Pressure threshold adjustment Δp Limit (Custom Programs only)

The standard value 20.0 kPa for the pressure threshold detects flames that cover 50% to 90% of the surface with a thickness of approx. 3 mm. This ensures reliable flash detection. A low limit for pressure increase degrades the repeatability. For testing flashpoint according to standards, the pressure threshold for flashpoint tests must be 20 kPa.

If you are using the standard methods ASTM D6450 and ASTM D7094, the pressure threshold is locked to 20 kPa and cannot be changed.

9 MEASURING

9.1 Magnetic stirrer

Stirring is required by most standard flashpoint tests. As such the magnetic stirrer should always be used. If inhomogeneous, diluted or contaminated samples are be tested, use the stirring magnet which is provided with the instrument's accessories.

Before the samples are filled into cups place one magnet into each cup that is filled with sample.

Use only stirring magnets provided with the instrument's accessories only.

9.2 Start measurement

Press START MEASUREMENT to start the measurement. Three strong arcs for automatic cleaning the electrodes are initialized, and the sample cup is pressed onto the oven plate by the sample cup lift.

9.2.1 Checking the sample temperature

After a few seconds the sample temperature is checked and if it is higher than the initial temperature, the measurement is interrupted, because no regular measurement can be carried out. Together with this check, arcs are being produced to check for a possible flash point below the starting temperature. In case a flashpoint is registered, the initial temperature Ti was set too high for this sample.

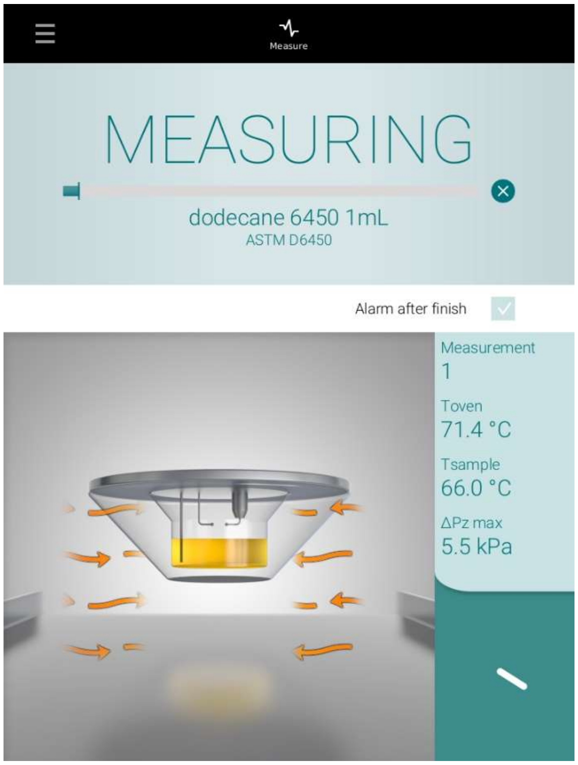
Pre-cooling of the sample can be performed by setting Ti-T in the measurement screen. The analyzer will then actively cool the sample to a temperature below the initial temperature (Ti).

9.2.2 Check of sample and initial temperature

An equilibrium time is started to heat the sample close to 3°C (5°F) of the oven temperature. During the increase of the sample temperature arcs are initiated each step of 5°C (9°F) to avoid over saturation of the vapor in case the initial temperature was set too high for this sample. If the equilibrium time expires without reaching this temperature, the measurement is interrupted.

9.2.3 Flash point test

After this checks the oven temperature is raised with the programmed heating rate.
When the sample has reached the starting temperature, the first ignition for a flash test is initiated and the pressure increase is monitored. If it is below the threshold the measurement is continued.



9.2.4 Air introduction into the measuring chamber

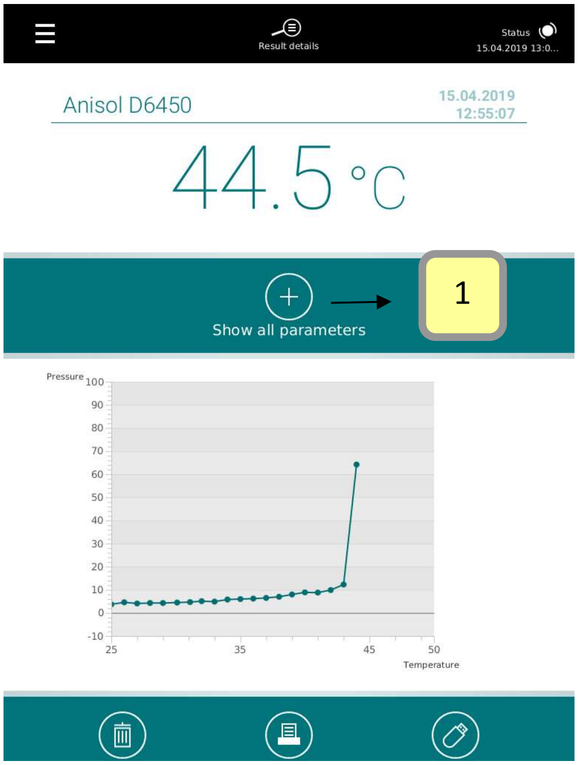
To have enough oxygen for each arc to develop a flame, a small amount of air is introduced into the measuring chamber after each ignition. This is especially important for heavily fuming samples and also simulates standardized closed cup methods where the measuring chamber is opened to introduce the flame or glowing wire.

9.2.5 Flash point detection

The measuring procedure is continued until the pressure increase after an arc exceeds the programmed threshold.

9.2.6 End of test

After detection of a flash point or reaching the final temperature the measurement is stopped and the oven is cooled down fast to the starting temperature Ti.
The sample cup is lowered automatically when the temperature of the oven is at Ti-(Ti-T).



1 … Press + (1) to review results saved in the memory

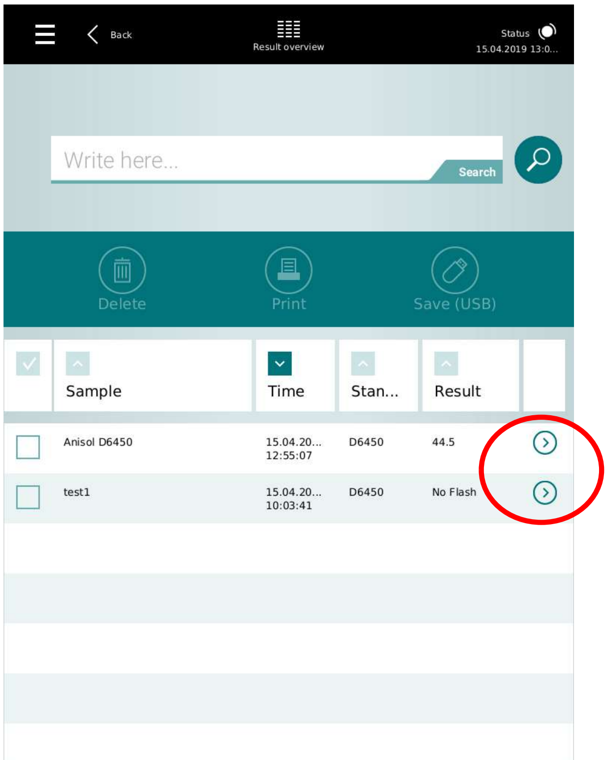
9.2.7 Stand by

The oven temperature is kept at the level of the starting temperature for further 30 minutes. If no measurement is started within these 30 minutes the temperature regulation of the oven is switched off.

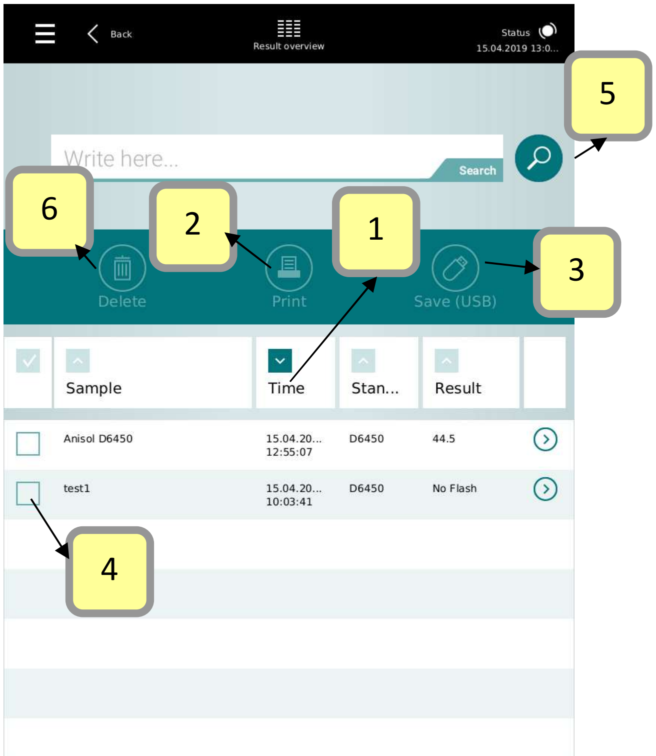
10 RESULTS

10.1 Result List

The Result overview is listed in the Main Menu, during the measurement and after measurements are finished. The result list can be accessed by tapping the arrow button on the bottom right corner.



Scroll through the result list by moving the results up and down with your finger.



1 … Filter Results for Date
2 … Print selected result
3 … Save all selected results to USB
4 … Select results
5 … Search a specific sample by name
6 … Delete selected results

10.2 Details for combustion analysis

Please see the COCKPIT for combustion analysis

11 STATUS

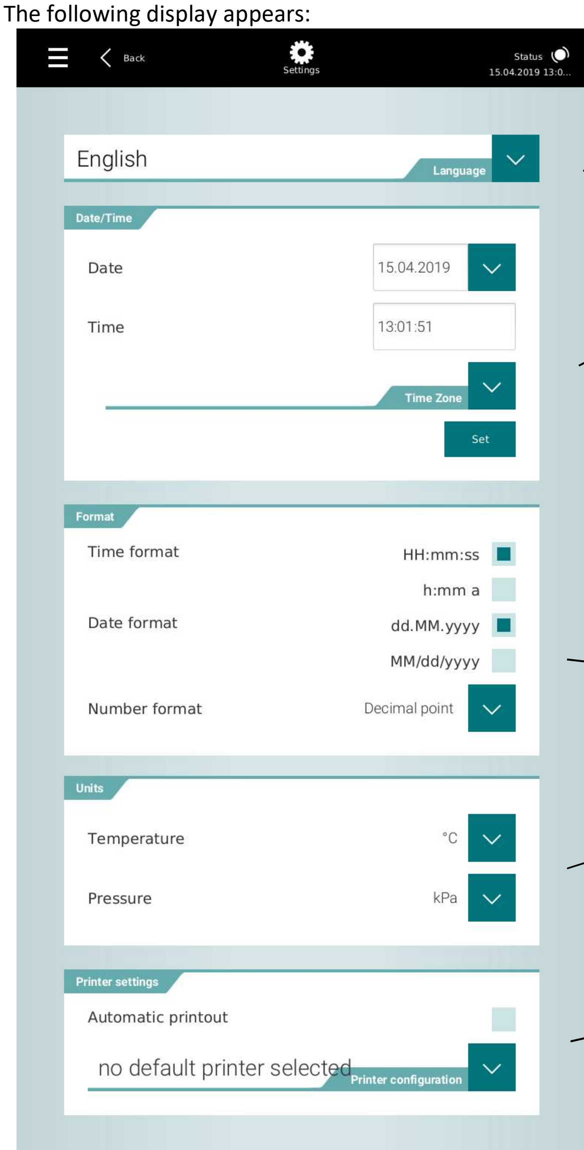
11.1 Statuspage

This page shows the status of the device.

12.1 Settings Menu

To change the settings, click on the MENU on settings.

The following display appears:



1 … Change language

2 … Change date, time and time zone – press Set immediately after setting the date, time and time zone because the instrument will restart to activate the changes.

3 … Select time format

4 … Change units

5 … Select printer

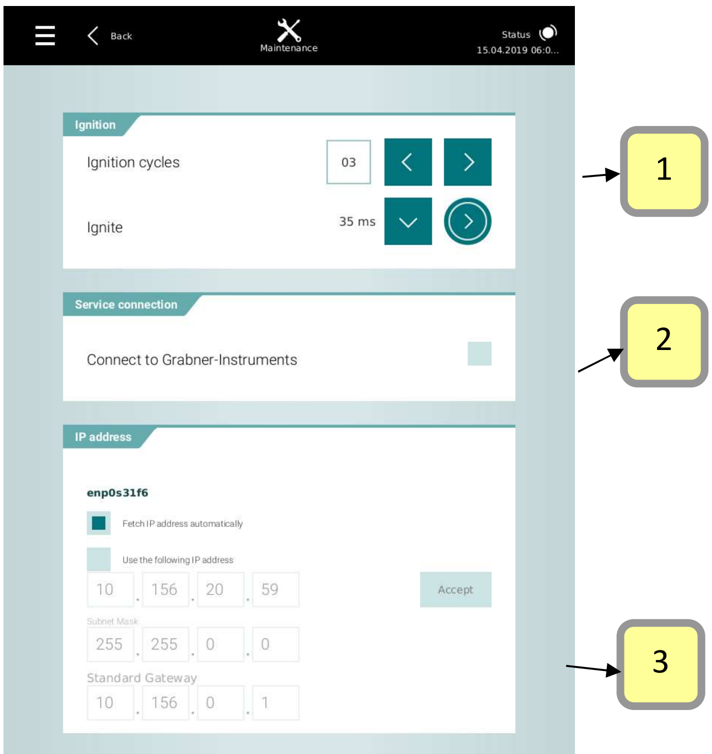
MAINTENANCE

12.2 NETWORK Connection

12.2.1 Requirements

A network cable has to be connected to the available network.

Connecting the MINIFLASH FP(H) VISION to a network is very easy. Therefore, please open the service menu on the unit.



1 … Ignition Test

2 … Connect to Grabner Instruments selector

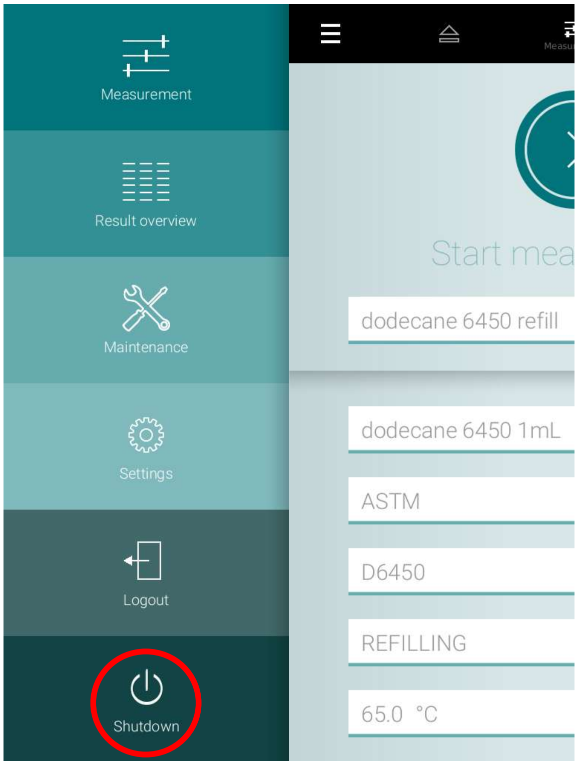
3 … Setup of IP Address – if the instrument is not connected to a network, the IP address field shows just an empty line

12.3 CONNECT to Grabner-Instruments

This selection is to open the remote connection that Grabner Instruments service technicians can assist you directly on the device.

13 SHUT DOWN

To shut down the analyzer, please press the shutdown button in the menu section.



ATTENTION:
Prevent burning of the next user. Shut down the instrument only AFTER the sample cup has COOLED to ambient temperature.

14 Cockpit Software

14.1 Grant of Cockpit™ Software License

Thank you for purchasing a premium product from **GRABNER INSTRUMENTS.** The sale of this analyzer is connected to the grant of license for applicable **Cockpit™ software**, which is available for download at http://www.grabner-instruments.com/salesandsupport/cockpitdownload. The grant of the software license is subject to accepting the latest version of the End User License Agreement (EULA), which is available for download and print from our website: http://www.grabner-instruments.com/aboutus/legalinformation.

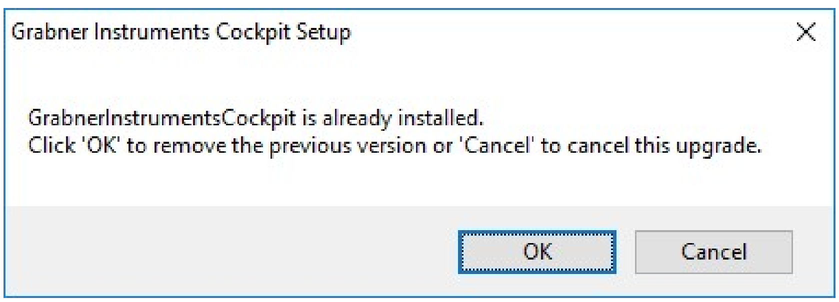
14.2 Software Update

The MINIFLASH FP(H) Vision is updated via the Cockpit™ PC software.

Register and download the latest version of the Cockpit™ software from our website to your PC:

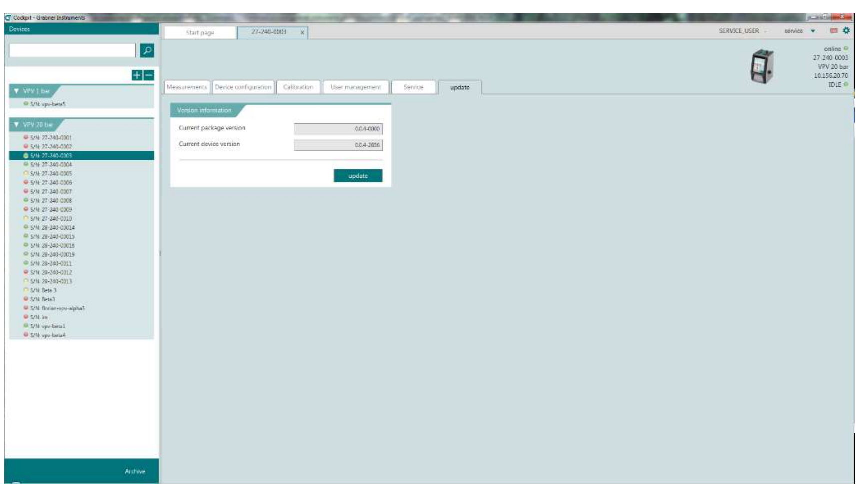
http://www.grabner-instruments.com/registration/index.aspx

Install the Cockpit™ software on your PC. The software will automatically check, if previous versions of the Cockpit™ software are installed on your PC and then update the installation.



Then make sure your PC is connected to the FP(H) Vision analyzer via Ethernet cable.

Once the update is finished, the Cockpit™ software will detect whether connected Vision instruments need to be updated. An <Update> tab will appear for instruments that require an update:

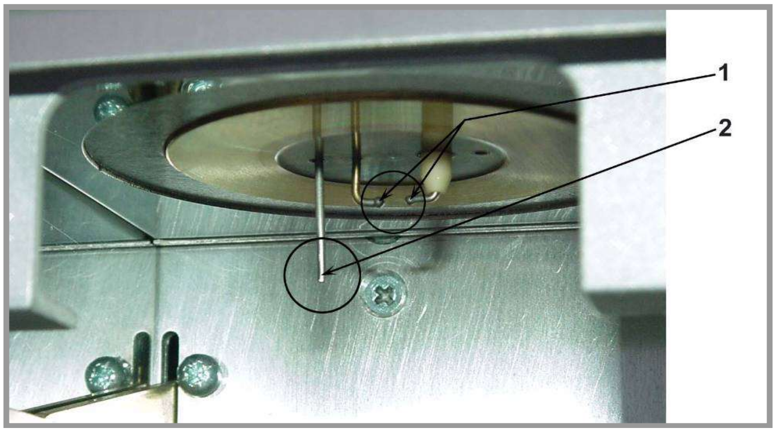


Click on <Update> to update the Vision analyzer to the latest version.

15 PREVENTIVE MAINTENANCE

15.1 Clean heater

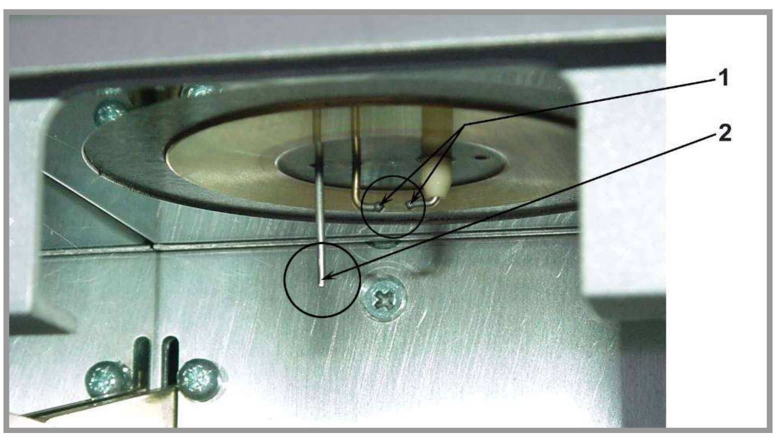
The surface of the heater must be free of residuals and scratches for good heat contact.
Use a tissue in order to clean the surface of the heater.



When doing so take care not to bend the temperature sensor (2) or the arc pins (1).

15.2 Clean arc pins

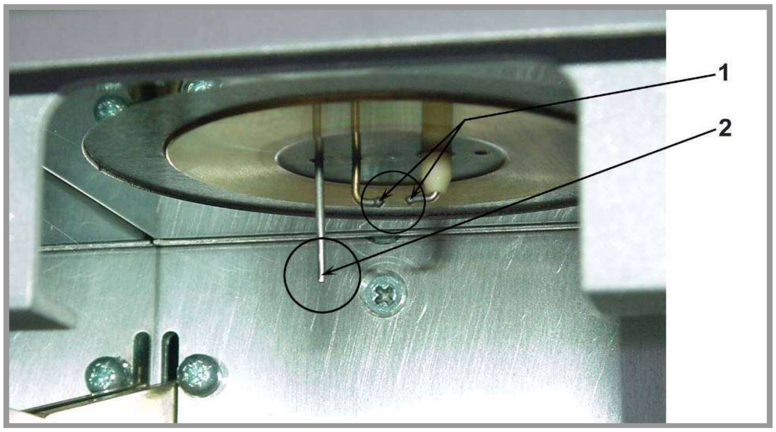
In order to get accurate ignitions for tests the arc pins must be cleaned regularly. Therefore use the brass brush to free the arc pins from soot or other residuals.



When doing so take care not to bend the temperature sensor (2) or the arc pins (1).

15.3 Clean temperature probe

In order to get accurate temperature readings for tests the temperature probe must be cleaned regularly. Therefore, use the brass brush to free the temperature probe from residuals.



When doing so take care not to bend the temperature sensor (2) or the arc pins (1).

15.4 Cleaning of the sample cup

In order to get accurate flashpoints for tests the sample cup must be cleaned properly after each test. Therefore, use disposable tissues in combination with a cleaning agent to clean the cups from its sample residuals.

Take care that cleaning agents are evaporated already prior filling with fresh sample.

If cleaning of a sample cup is not done properly, wrong flashpoints are detected due to contaminations of previous tested samples.

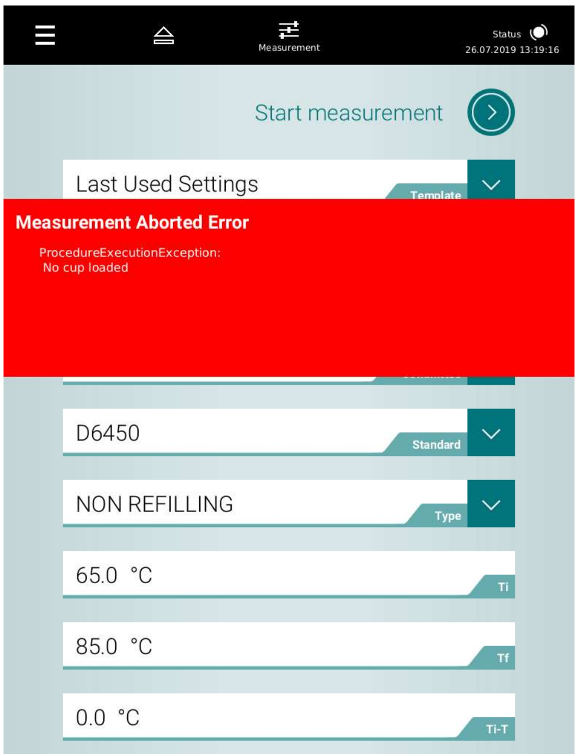
16 ERROR MESSAGES AND TROUBLESHOOTING

To have some information about the proper functioning of the instrument there are several error messages and indications displaying a malfunctioning of two devices: the automatic lift and the temperature sensors.

16.1 Sample Cup Lift

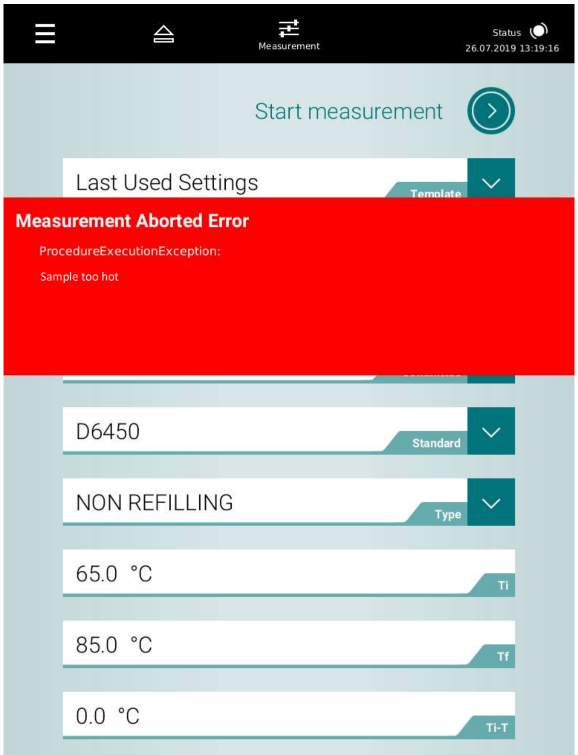
If the sample cup does not reach its proposed positions, the instrument displays no sample cup loaded.
The lift is going down again. If this happens please check the position of the sample cup.

If the sample cup is placed correctly and the lift still goes down several times, then the initial lift position needs to be recalibrated. Contact the local representative or Grabner Instruments directly.



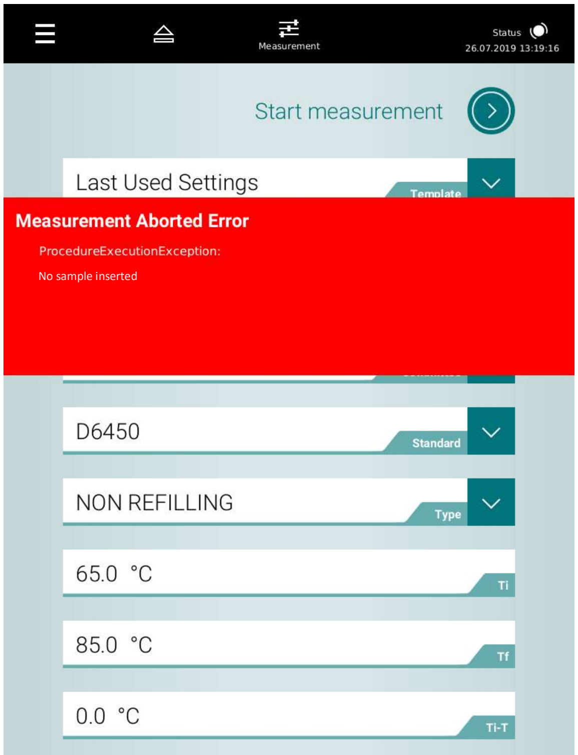
16.2 Sample too hot

If the sample in the sample cup is too warm (T_{Sample} > Ti) to allow a measurement according standard, the instrument gives a warning as follows:



If tests are done near or below environmental temperature, cool your sample cup prior filling the sample into the cup and use the cold-filling option.

16.3 Missing sample



Missing sample is detected when the temperature gradient difference between the oven temperature and the sample temperature is unequal.

16.4 Instrument does not show values according to the literature

If the instrument shows results of samples that doesn't comply with your literature do following checks.

- Check the actuality of your literature.
- Clean the oven surface and clean arc pins according to chapter "MAINTENANCE"
- Check if the sample cup has deep scratches.
- Check the parameter if they are correct.
- Check if magnetic stirring is necessary for the sample.
- Get sure that no contamination with residuals of other samples is present in the sample cup.

If the checks are done start a test again.

If this problem shows up repeatedly contact our local representative or Grabner Instruments directly.

16.5 Arc problems

- **The arc between both arc pins can't be observed.**
  Clean arc pins as described in chapter "MAINTENANCE"

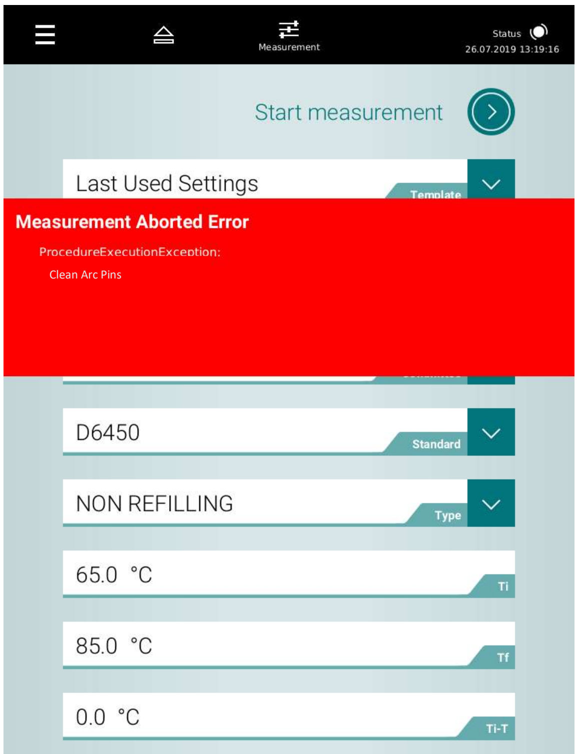
- **No arc between both arc pins but a soft ignition sound can be heard.**
  Please check if the arc pins are clean and without any liquid accumulation. Please clean the arc pins.

  The ceramic insulation of the arc pin in the oven seems to be broken. The insulation against the oven is not present anymore, thus the arc is deduced on the oven instead of the second arc pin.

The ceramic must be exchanged.

- **The arc pins itself are damaged and can't produce an arc.**
  The arc pins must be exchanged.

In case the dPmax is less than 1,0kPa during two ignition cycles, the warning to clean the arc pins is shown to the operator.



If the problem can't be solved with cleaning the arc pins contact our local representative or Grabner Instruments directly for further assistance.

16.6 Pressure detection problems

If the Delta p values are very low or zero during the measurement and even at a flash do the following:

- Check if the ignition system is working
- Check if the air pump is working, if all tubing is ok and connected
- Check if the calibration constants are equal to the constants of the last certificate
- Be sure that the sample cup is not scratched
- Check if the measuring chamber is leaking

If you have done all these things and there is still the same as before, please contact your nearest service partner or Grabner Instruments.

16.7 Temperature problems

The temperature is fluctuating strongly, or it doesn't follow the temperature regulation:
Check if the sample temperature sensor is bent or broken.
If the differences between sample temperature and oven temperature are too high (>7°C – cup filled with sample and in upper position) check the position of the sample temperature sensor.

If the problem remains, contact our local representative or Grabner Instruments directly for further assistance.

16.8 Other Errors

For any other error message displayed on the device, please restart the analyzer. In case the restart does not solve the problem, please contact your nearest service partner or Grabner Instruments directly. Thank you.

17 CE Declaration

CE

EU-KONFORMITÄTS-ERKLÄRUNG

DECLARATION OF CONFORMITY

FLASHPOINT TESTER
Produkt (Product)

MINIFLASH FP (H) - Vision
Type (Type)

Dieses Instrument wurde nach den Qualitätsrichtlinien **ISO 9001 von GRABNER INSTRUMENTS** entwickelt und produziert und in unserer Prüfabteilung getestet.

This instrument was developed and manufactured according the international quality standardization **ISO 9001 of GRABNER INSTRUMENTS** and it was tested in our quality control department.

EU-Konformitätserklärung

Das oben beschriebene Produkt erfüllt die Schutzanforderungen der folgenden EU-Richtlinien, **2014/30/EU (EMC), 2014/35/EU (LVD), 2011/65/EU (RoHS)** und ist konform mit:

Elektromagnetische Verträglichkeit (EMV):
EN 61326-1:2013
EN 55011:2009 + A1:2010
EN 61000-3-2:2006 + A1:2009 + A2:2009
EN 61000-3-3:2008
EN 61000-4-2:2009
EN 61000-4-3:2006 + A1:2008 + A2 :2010
EN 61000-4-4:2004 + A1:2010
EN 61000-4-5:2006
EN 61000-4-6:2009
EN 61000-4-8:2010
EN 61000-4-11:2004

Elektrische Sicherheit
IEC 61010-1:2010 + AMD1:2016
EN 61010-1:2010 + A1:2016
IEC 61010-2-010:2019
EN 61010-2-010:2014

Zusätzlich Angaben:
QM System nach EN ISO DIN 9001:2015
Certificate Nr.: 1089-QM-02-001 (BVCH SAS UK Branch)

Vienna, Sept. 2019

Managing Director | Grabner Instruments
Dr. Oliver Sauer

Declaration of conformity

The product described above complies with to the following EC-rules, **2014/30/EU (EMC), 2014/35/EU (LVD), 2011/65/EU (RoHS)** and is in conformity with:

Electromagnetic Compatibility (EMC):
EN 61326-1:2013
EN 55011:2009 + A1:2010
EN 61000-3-2:2006 + A1:2009 + A2:2009
EN 61000-3-3:2008
EN 61000-4-2:2009
EN 61000-4-3:2006 + A1:2008 + A2 :2010
EN 61000-4-4:2004 + A1:2010
EN 61000-4-5:2006
EN 61000-4-6:2009
EN 61000-4-8:2010
EN 61000-4-11:2004

Electrical Safety:
IEC 61010-1:2010 + AMD1:2016
EN 61010-1:2010 + A1:2016
IEC 61010-2-010:2019
EN 61010-2-010:2014

Additional Information:
QM System according to EN ISO DIN 9001:2015
Zertifikats Nr.: 1089-QM-02-001 (BVCH SAS UK Branch)

D. Schwarzinger

Electronic Engineer | Grabner Instruments
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GRABNER INSTRUMENTS
AMETEK OIL & GAS

18 CUSTOMER SUPPORT AND INFORMATION

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Internet:	www.grabner-instruments.com

For technical support, register and create at ticket online at:

www.grabner-care.com

Representatives and Distributors:

www.grabner-instruments.com

MINIFLASH FP(H) VISION MANUAL REVISION			
Version #	**Date**	**Editor**	**Changes**
1.00	09/13/2019	Hadl	First Version
1.01	01/29/2020	Hadl	Update of max temp FPH Vision