Operating Instructions model GA11
SF_6-Quality-Analyser

Version 1.3

WIKA
Part of your business

Otto-Hahn-Straße 15
44227 Dortmund, Germany

Phone: +49 231 / 97 42 - 65 66
Fax: +49 231 / 97 42 - 65 55

E-Mail: info@wika.de
Internet: www.wika.de/sf6

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1 General Information

1.1 Information about the Operating Instructions

This document describes a safe and adequate handling of the SF_6-Quality-Analyser. Following the instructions of the indicated safety aspects and instructions as well as the national and/or local rules and general safety regulations concerning the prevention of accidents are absolutely imperative.
Before starting the work with the device read the manual completely and thoroughly particularly the chapter security and respective safety references. Assure that you/the operator comprehend the terms described.
The manual is part of the device. It has to be stored together with and next to the device at any time.

1.2 Explanation of Symbols

Important and safety-relevant references are characterized by symbols. These indications which are in-line with industrial safety must be respected and followed at any time.

Information!
This symbol calls information, which are to be considered for efficient and perfect handling of the equipment.

NOTE! Danger for real values!
This symbol indicates references, which can lead to damages, malfunctioning and/or loss of the device.

WARNING! Danger by electric current!
This symbol marks references, which can lead to health impairments, injuries, lasting body damages or to death due to electric current.

VERY DANGEROUS! Injury or mortal danger!
This symbol marks references, which can lead to health impairments, injuries, lasting body damage or to death.

1.3 Version

This document describes the status as of January 2013 of the SF_6-Qualtity Analyser GA11.
How to lookup firmware present in your device is described in chapter 6.4.1
Other Firmware versions may have different/additional features not described in this document.

1.4 Scope of Supply

Assure that you have received the full scope of supply. If there is any part missing, please contact the WIKA-hotline immediately.

consists of:

- SF_6-Quality-Analyser integrated in a rugged transport case
- fixed installed SF_6-Percentage and moisture sensor
- External Power supply with power cord
- Instrument's certificate of calibration
- 4 m long PTFE connecting hose with wire coating, self-closing stainless steel couplings on both ends
- Hose adaptor M20x1.5 with coupling valve DN8
- Hose adaptor M45x2 with coupling valve DN20
- Touch pen
- USB - Stick
- CD-ROM with "SFQA Measurement Viewer" software and PDF user manual
- Operating instructions of the SF_6-Quality-Analyser

Optional additional sensors

- SO_2-Sensor ;
  Standard Range: 0 … 500 ppm_V
  Other Ranges : 0 … 10 / 0 … 20/ 0 … 100 ppm_V
- HF – Sensor
  Standard Range: 0..10 ppm_V
  (only in combination with 0… 10 and 0 … 20 ppm_V SO_2 sensor

The unit is prepared for 3 more sensor connections for future electrochemical sensors.

1.5 Liability and Guarantee

All data and reference within this manual are compiled under the valid regulations, the state- of-the-art as well as WIKA experiences of several years.
The manual has to be stored together with and close to the device at any time and accessible to all persons, who work with it.
This manual must be read carefully before starting to work with the equipment!
WIKA does not overtake any liability for damage and disturbances, resulting from neglect or ignorance of the manual's instruction.
The text and graphics do not correspond necessarily to the scope of supply. The figures and/or diagrams do not correspond to the yardstick 1:1.
The actual scope of supply might deviate from special (customized) equipments, the recourse of additional order options or due to newest technical changes concerning the data and references described herein as well as the graphic representations. For questions please contact the WIKA -hotline.
WIKA reserves the right to realize technical changes of the product due to improvements without explicitly mentioning them.

1.6 Copyright

The manual is confidential. It is beyond doubt exclusively made and also meant for the personnel directly dealing with the equipment. All data, texts, designs, pictures and other representations within this manual are protected in the sense of the copyright law and are subject to further commercial patent rights. Each abuse is liable to prosecution.
Passing it on to third persons as well as duplications in any kind and form - also in part - as well as the use and/or report of contents are not permitted without written agreement of the manufacturer. Offences lead to payment of damages. We reserve ourselves the right for further legal actions as well as all further rights according to the practice of commercial patent rights.

1.7 Return and Disposal

For a professional redemption, the device or/and its equipment must be returned to the manufacturer or to a third party authorized by the manufacturer!

1.8 Customer Service

For questions concerning the equipment a customer service is available:
- Phone: ++49 231 / 97 42 - 65 66
- Fax: ++49 231 / 97 42 - 65 55
- E-Mail: info@wika.de

The telephone hotline is attainable from Monday to Friday
from 8:00 to 17:00 CET.
In urgent cases and if you use fax or email, please indicate your telephone number.

WIKA
Alexander Wiegand SE & Co. KG
Otto-Hahn-Straße 15
44227 Dortmund
http://www.wika.de/sf6

2 Transport, Packing and Storage

2.1 Inspection after Transport

Check the supply immediately after delivery concerning its completeness and/or transport damages. If you detect outwardly recognizable transport damage, do not receive the supply, or only under reservation. State the extent of the damage on the provided delivery note and/or the transportation documents of the feeder. Generate a complaint. Lodge a complaint of covered defect immediately after recognizing, as claims due to transport damages can only be made valid within the complaint periods (usually 7 days).

2.2 Transport

The instrument is integrated in a rugged transport case. To avoid transport damages we recommend to handle with care.

2.3 Packing

If no redemption agreement concerning the packing was agreed upon, separate the different materials according to kind and size and supply it to further use or recycling.

Information!
Dispose the packing material always environmentally friendly and according to the valid local regulations. If necessary, ask a recycling company.

2.4 Storage

Store the device only under the following conditions:

- Until the use of the equipment keep the case closed.
- Do not store unsecured
- Do not store outside
- Store only dry and dust free
- Avoid mechanical vibrations
- Do not expose the device to aggressive media
- Protect the device against sun exposure
- Storage temperature: -10 to 60 °C
- If you do not use the device, check the storage condition, regularly
- Protect against unauthorized access

3 Cleaning and Maintenance

Natural aging and the wear of certain components of the equipment require a regular cleaning and maintenance.

3.1 Cleaning

Clean the device only with a dry or easily damp cloth.

NOTE! Danger for real values!
Do not use cleaning agents, which contain solvents, acids or bases.

3.2 Maintenance

Except the exchange/addition of electrochemical sensors the maintenance of the device should only be carried out at WIKA or through specially trained and by WIKA authorized personnel.

3.3 Calibration

The SF_6-Quality-Analyser has to be calibrated and inspected concerning its functions every two years. To calibrate the device it has to be sent back to WIKA or realized through specially trained WIKA authorized personnel.
The optional electrochemical sensors (SO2, HF, …) can be replaced by the customer. 30 days prior to reach the sensors' end of lifetime the GA11 will display a warning message. Please contact WIKA for a new calibrated sensor and replace the old one. When turning on the SF_6-Quality-Analyser after the sensor change , the system check will recognize the new sensor configuration.

4 Security

This section gives an overview of all important safety aspects for an optimal protection of the personnel as well as for the safe and trouble free use of the device. Additionally, the individual chapters contain concrete safety references with respect to the prevention of direct dangers which are indicated by symbols.

4.1 Intended Use

The device may **not** be operated by introducing aggressive gases or liquids! The working reliability is only ensured when the equipment is applied for its purpose: To measure the moisture, the SF_6-concentration and the SO_2 / HF - concentration in SF_6 or other non-aggressive gases within the specified ranges!

NOTE! Danger for real values!
Each use of the device, that differs from the intended use is forbidden and will be regarded as “out of purpose”.

All claims or requirements of any kind against the manufacturer and/or its authorized persons that arise due to damages from a not intended use of the device will be rejected. All damages that arise from a not intended use are of the operator’s responsibility.

The intended use of the equipment and its correct handling according are described in the operating instructions of this manual. Other parts than the parts belonging to the scope of supply, may only be used after WIKAs approval.

4.2 Responsibility of the Operator

This manual must be kept in direct access and together with the device and accessible to the operating staff at any time. The hints, information and instructions are to be followed without any restrictions or reservation!
Besides the indicated safety references and instructions in this manual, the local rules for the prevention of accidents and the general safety regulations - valid for the area of application of the device - as well as the valid environmental-protection regulations are to be considered and respected.
The technical responsible as well as the operator should take care of a trouble free use of the device as well as of clear definitions of the competences during operation, maintenance and cleaning.

4.3 Requirements of Personnel

Only authorized and trained technical personnel may work with the instruments. The operator must have received an instruction over existing and all possible dangers and should be regularly instructed in safety procedures and environmental protection and that this personnel is fully aware of the complete operating instructions and particularly the safety notes. Personnel that might be

under the influence of drugs or alcohol are to be kept off the device at any time. Technical personnel in this context are defined as skilled employees who are knowledgeable due to their educational background. In case the foreseen personnel do not have the necessary qualifications to operate the instrument, it must be trained. Further to that non-authorized personnel should not operate the device.
The competencies for the work on and with the device must be specified and kept undoubtedly at any time so that with respect to security issues no unclear situation might come up.
Any changes of the equipment, which impair security of the personnel must immediately be reported to the operator and every person dealing with it.

4.4 Dangers

The equipment was subject to an endangerment analysis. The construction and execution of the device corresponds to the today's state-of-the-art. The device is reliable in service when operated according to its intended use.

VERY DANGEROUS! Injury or mortal danger!
The equipment is not certified for the employment in areas with explosive gas air mixtures (zone 0).

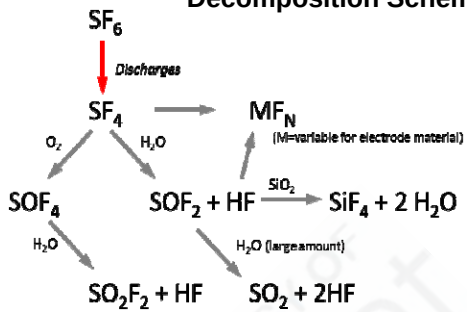
The maximum inlet pressure of the device must not exceed 35 bar absolute. Introducing a higher pressure into the device leads to damage of the unit. The max. outlet pressure is 10 bar absolute generated by the onboard compressor. For safety reasons the SF_6-Quality-Analyser automatically monitors the outlet pressure and in case of an overpressure closes the gas inlet and the measurement is aborted.

NOTE! Danger for real values!
The internal inlet valve only opens when executing a measurement. In case of an overpressure at the gas outlet the measurement is aborted and the gas inlet valve automatically closed to prevent further damages.

5 Introduction

The SF_6-Quality-Analyser is a multi-sensor device to check moisture, decomposition (SO_2 solely or both SO_2 and HF) and purity of SF_6. The base unit consists of an embedded computer with touch screen for data acquisition and storage. The necessary hardware to make a physical connection to gas insulated equipment is included. Optionally more sensors can be purchased for other chemical substances.

Decomposition Scheme of SF_6



Features:

- Integrated pump-back
- Compact, lightweight
- Highly sensitive
- No maintenance
- Automatically validates readings
- Not compromised by transport restrictions
- Fast test results, typically 7.5 minutes
- Integrated data acquisition and storage
- Measurement name list import from (see 6.4.4)
- Sensor upgrades
- No consumables
- Battery/Line power

With all sensors installed, the operator simply makes a connection to the equipment being tested and after analysis will receive test values for moisture, purity and with optional sensors installed decomposition products. The test values are internally compared to the CIGRE B3.02.01 or IEC standard for SF_6 contamination or reuse (or customer defined limits), and a pass/fail icon will show on the touch screen. All tests values will be stored on internal flash memory – which can later be downloaded to a USB storage device. For recalibration of humidity and purity sensors the unit has to be checked in a certified WIKA lab close to you. Be aware to check the device every 24 months for calibration. The electrochemical sensors (SO_2, HF, …) should be replaced every two years. This can be done by the customer.

Information!
The SO_2 and HF sensor have a lifetime of two years. Using the sensors for more than two years is not recommended as it might cause imprecise readings due to <2% per month of signal degradation.

Information!
For the operation with SF_6-CF_4 mixtures (or other) the SF_6-Percentage sensor needs a different calibration. In this case contact the manufacturer for further information.

5.1 Operation mode of the SO_2 and HF sensor

SO_2 sensor
The applied electro-chemical sensor incorporates a gold based, three electrodes and acid electrolyte system.
The introduced SF_6 diffuses into the SO_2 -sensor. Here it reacts at the sensing electrode through an oxidative process, according to the following equation:
Equation 1: **Sensing process:**

Sulphur Dioxide (SO_2): $SO_2 + 2H_2O = H_2SO_4 + 2H+ + 2e-$

The Counter electrode acts to balance the reaction at the sensing electrode, by means of an oxygen reduction forming water as a consequence.

Equation 2: **Counter reaction:**

Oxygen Reduction: $½O_2 + 2H+ + 2e^- = H_2O$

The two equations represent the overall cell reaction as follows:

$$SO_2 + ½\ O_2 + H_2O = H_2SO_4$$

In case of SO_2 presence within the SF_6 under inspection, equation 1 changes its electro-chemical potential and electrons are released consecutively. Thus a change of currency is detected and converted to ppm_v-values via a micro-processor.
The applied sensor carries a transmitter board that includes temperature compensation and a calibration in the specified range.

HF sensor
In an HF sensor, HF reacts with the electrolyte in the form of an electro-catalytic reduction that produces a pH change in the electrolyte. This change results in a potential change at the sensor's electrodes, which is converted into a concentration value (ppm_v values) by means of an electronic evaluation mechanism.

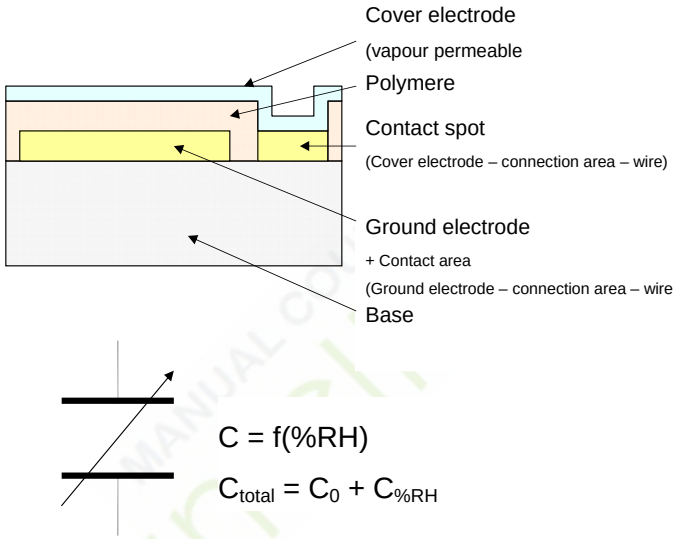
5.2 Operation mode of the percentage sensor

The measuring principle is based on the evaluation of different velocities of sound of gases. The velocity of sound in the air is about 330 m/s, while it is only about 130 m/s in pure SF_6 atmosphere. The velocity of sound measured in the measuring cell is temperature-compensated and converted into SF_6-volume content. The signal is interpreted from the central processor.

5.3 Operation mode of the moisture sensor

The moisture sensor is based on the absorption of water molecules in a special ceramic material. Only vapour penetrates the covering electrode by diffusion and agglomerate reversibly to the polymer. Therefore, the capacity of the sensor changes, which is registered by the evaluation electronics and is converted into a standard signal. This signal is transmitted to the central processor.

Capacitive polymere sensors



Schematic Diagram of the moisture sensor

5.4 SF_6 application and environmental aspects

Since 1900, when SF_6 gas was synthesized for the first time by Moissan and Lebeau, its industrial applications have gradually increased. The remarkable gas inertness and the chemical and dielectric properties caused the General Electric Company in 1937 to suggest its use in electrical equipment. The large-scale employment of SF_6 in electrical manufacturing started around 1960 in the U.S.A. and Europe. In that year the first use of SF_6 in circuit breakers and switches for high and very high voltages was reported. So far there is currently no suitable substitute for SF_6 as an arc suppressant in high and medium voltage electrical switchgear.
To protect the environment it is important to reduce the SF_6 emissions, because SF_6 is a gas with a global warming potential 22,200 times greater than CO_2 and an atmospheric life time of 3,200 years. Thus SF_6 is a potent greenhouse gas. Further SF_6 is one of the 6 named gases in the Kyoto Protocol giving reduction targets for 2008 –2012 and beyond that.
With the SF_6-Quality-Analyser the user is able to ensure a closed loop and therefore avoid SF_6-Emissions.

6 System Operation

6.1 Battery Operation

A fully loaded Lithium-Ion battery of the SF_6-Quality-Analyser allows a minimum of 5 measurements with the on-board compressor pumping the measured gas back into the tested compartment. The quantity of battery powered pump back cycles depends on the pressure inside the investigated tank. Internal monitoring of the battery voltage gives a battery warning message if the battery is low. If not recharged, the system executes an automatic shutdown to avoid damages and data loss.
The battery can be charged connecting the power plug to the power network. With line power, the system returns to be fully operational and charges the battery at the same time. Two signal lights in the front panel indicate the status of the power connection and the battery loading status. The green light turns on, if the GA11 is connected to line power. The red light turns on during the battery loading cycle and turns off after the loading cycle is finished.
The red light flashes quickly if the loading resulted in a failure.

6.2 Description of the measuring process

Fig 6.01

No.	Description
1	Inlet/outlet quick connection ① see 6.2.2
2	Outlet valve DN8 for external vessel ② see 6.2.4
3	Outlet quick connection for recovery bag ③ see 6.2.5
4	Power Button to switch unit ON
5	Power Connection

Press the power button on the upper right to start using the instrument. The embedded PC boots up and the unit runs several self-check cycles. After the initialization process, the menu with the simplified flow chart menu (Fig. 6.02) is shown.

The user interface is a touch-screen display which can be used preferably with the touch pen shipped with the unit.

Information!
The use of sharp pointing devices will damage the screen.

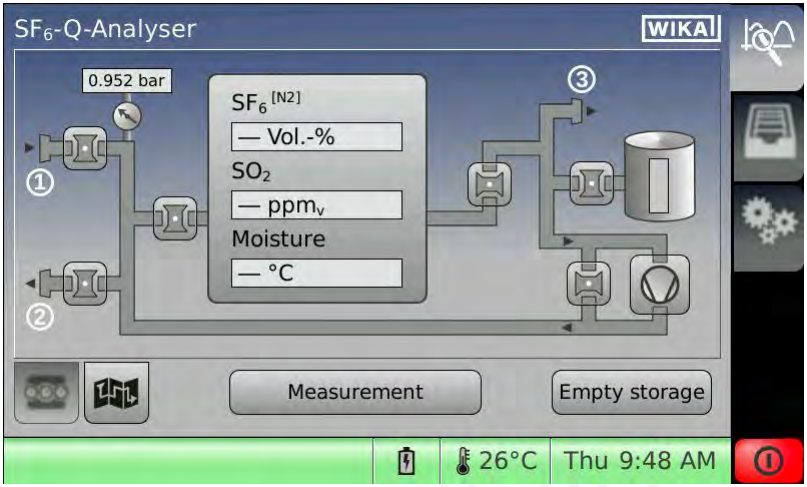


Fig. 6.02

The central screen of the menu structure shows all the possible functions and settings at one glance.
On the lower left you can toggle to a less detailed measurement view, hiding the simplified flow chart displaying the sensor data exclusively.

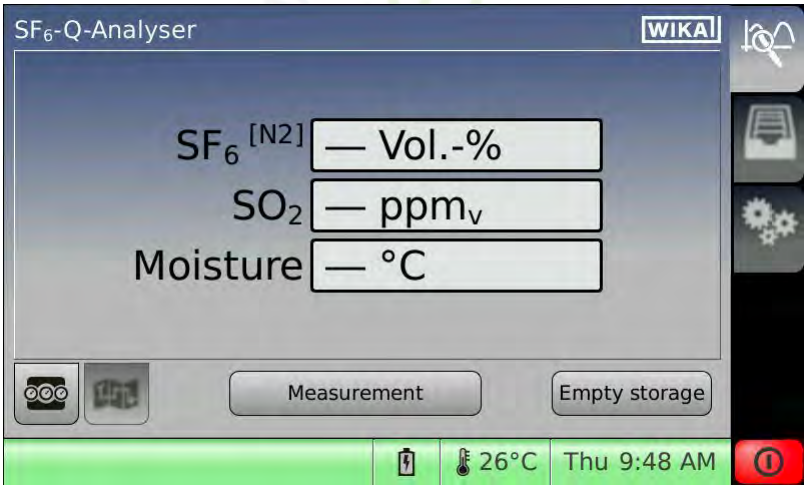


Fig. 6.03

A click on the red button on the lower right will shut down the system. On the right hand of the screen the user is able to choose from three tabs to go into the main screens :

Measurement		described here
Data Storage		see chapter 6.3
Settings		see chapter 6.4

6.2.1 Start the measurement

Make sure the compartment is connected properly to the inlet port ① and the sample gas is pressurized to a minimum of 1.3 bar absolute to perform the measurement. Start the measurement pressing the button on the touch screen. You will get two choices (see Fig. 6.04) what to do with the test gas. The default is to temporarily store it internally and decide after testing whether to pump back or to store it in an external vessel with pressures up to 10 bar absolute.
The other choice is to blow the test gas into a depressurized recovery bag on port ③.

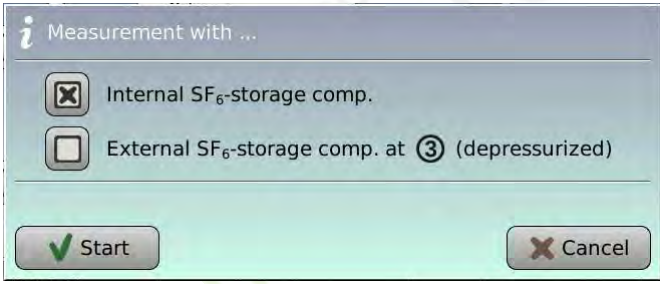


Fig. 6.04

6.2.2 Measuring with pump back functionality

After pressing the start button the measurement will be performed and the gas can flow from the inlet ① through the sensor chamber to the on-board storage.

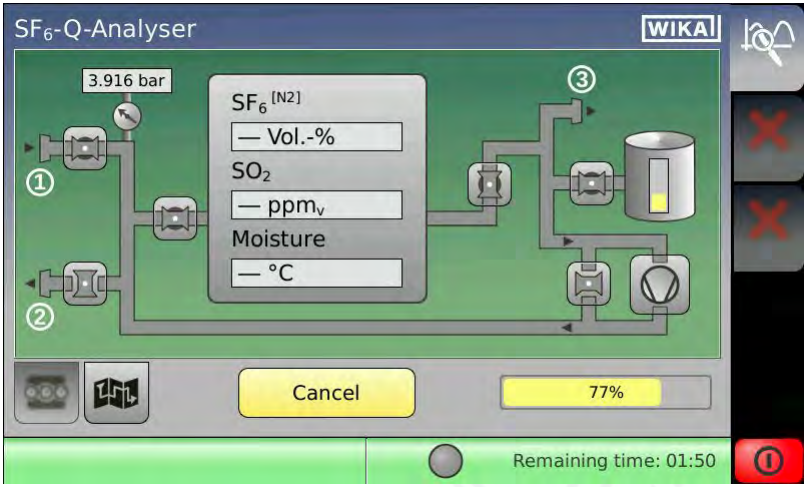


Fig. 6.05

After the measuring time passed the test result screen is displayed.

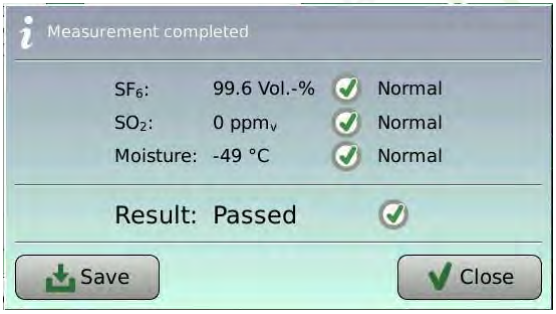


Fig. 6.06

Afterwards the test results can be stored in the internal memory with a user definable measurement name. Only if all 3 values are inside the limits the result is “Passed”. In case any of the values is exceeded, the result of the whole measurement is “Failed”.

6.2.3 Save the measurement data

The pick list will display previous given names to simplify the naming procedure. The easiest way to generate a name without using the touchscreen is to upload a PC edited name list from USB storage described in chapter 6.4.4.

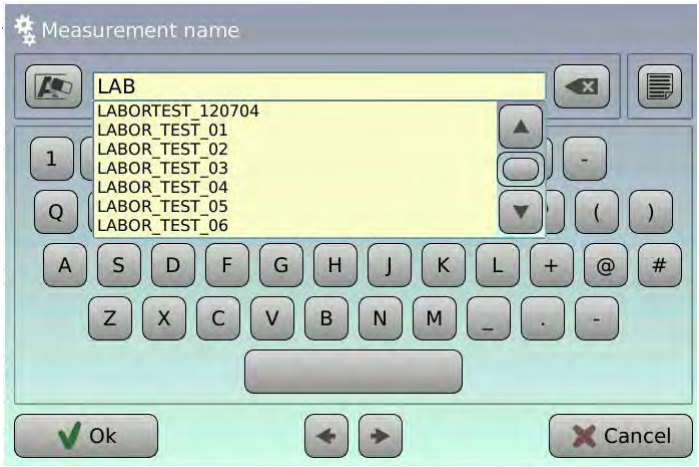


Fig. 6.07

After saving the GA11 is ready for pumping back the stored gas.

Fig. 6.08

Please choose the right destination for the stored gas in the above shown menu.

6.2.4 Use External storage compressed up to 10 bar abs

Choosing the second option (see Fig. 6.08) you will have to connect a pressure vessel able to withstand minimum 10 bar absolute to the correct outlet port ②.

Proceeding with the first option the monitor will show the pump back process like in the following screen.

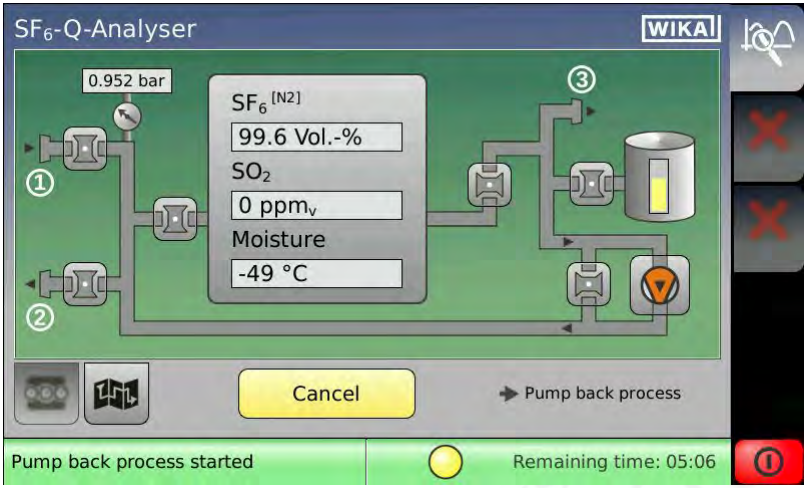


Fig. 6.09

6.2.5 Use External storage decompressed

By choosing the second option (see Fig. 6.04) you will have to connect a WIKA recovery bag model GA45 to the left quick connect outlet ③ with the matching hose of the recovery bag. In this case the gas directly flows to the connected bag with slight overpressure. Afterwards measurement can be saved (see Fig. 6.06).

6.2.6 Measurement aborted or cancelled

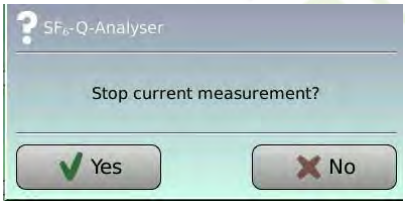


Fig 6.10
In case this happened and the test gas is stored on-board, it has to be cleared prior to a new measurement. Make test compartment connection again and press the “Empty storage” button in the measurement menu (see .Fig 6.02).

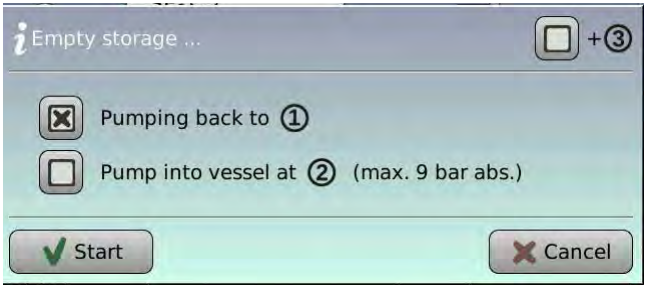


Fig 6.11

Choose the first option here and “Start” operation to pump back through the inlet port ①. In case you want to pump back into an external tank connect port ② to an external pressure vessel able to withstand a minimum of 10 bar absolute and choose “Pump into vessel at ②”.

6.2.7 Empty recovery bag in parallel to onboard storage

On the upper right of Figure 6.11 you can choose with “+ ③” to also empty a connected recovery bag GA45 in parallel to the onboard storage. This option can be chosen together with any pump back port ① or ②.

6.3 Description of the data management

6.3.1 Save data to the internal memory

The internal memory can save up to 500 datasets. According to the settings (see chapter 6.4) the system will display an error message reaching the end of storage capacity or overwrite the eldest measurement data automatically. You can transfer the data to an USB storage device.
Insert a storage device into the USB Port (e.g. USB stick in the scope of delivery).

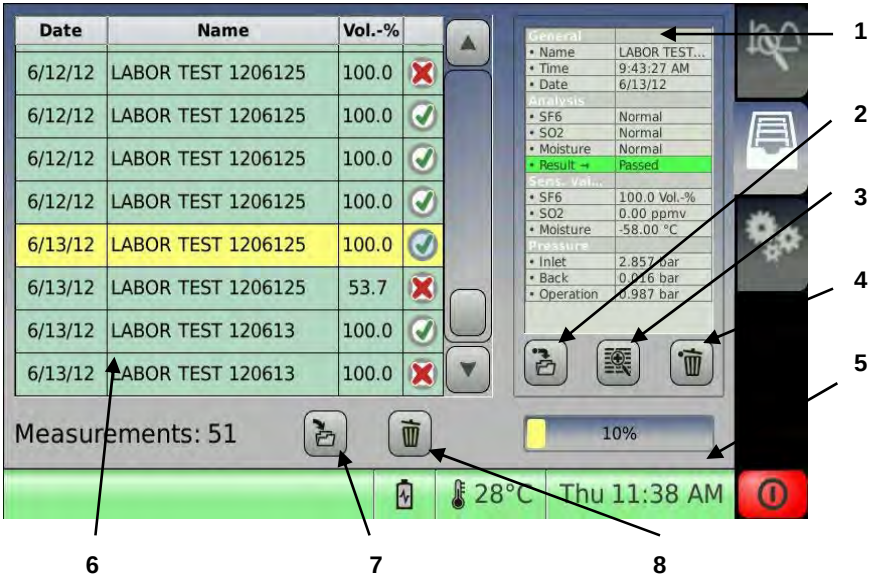


Fig. 6.12

No.	Description
1	Dataset preview
2	Transfer of highlighted dataset to USB storage device
3	Zoom into details of dataset
4	Delete highlighted dataset
5	Internal Memory Used
6	List of datasets
7	Transfer all datasets to USB storage device
8	Delete all datasets

Press the corresponding button on the touch screen to transfer either all datasets or only the selected dataset (highlighted with yellow bar) to the USB Stick.

Information!
Measurement names can be identical due to unique date/time stamp of the saving moment !

Pressing the “transfer actual dataset” button (2) the following menu will show.

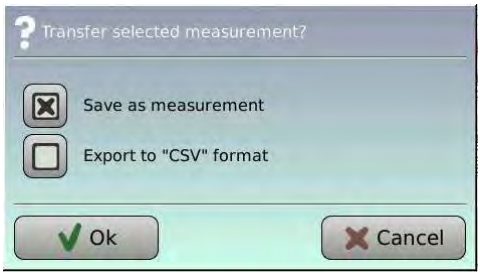


Fig 6.13

Acknowledge the message box in order to save the selected dataset in the proprietary measurement (*.mea) file format.
With the second option the export is done in “CSV” format which enables the user to directly load it into spreadsheet programs like Microsoft Excel ®.
Please wait until the hourglass display disappears from the screen.

Information!
Don’t unplug the stick during the saving process in order to prevent data loss !

6.4 Settings of the SF_6-Q-Analyser

6.4.1 System Settings

According to your local preferences the units of the sensors can be chosen.

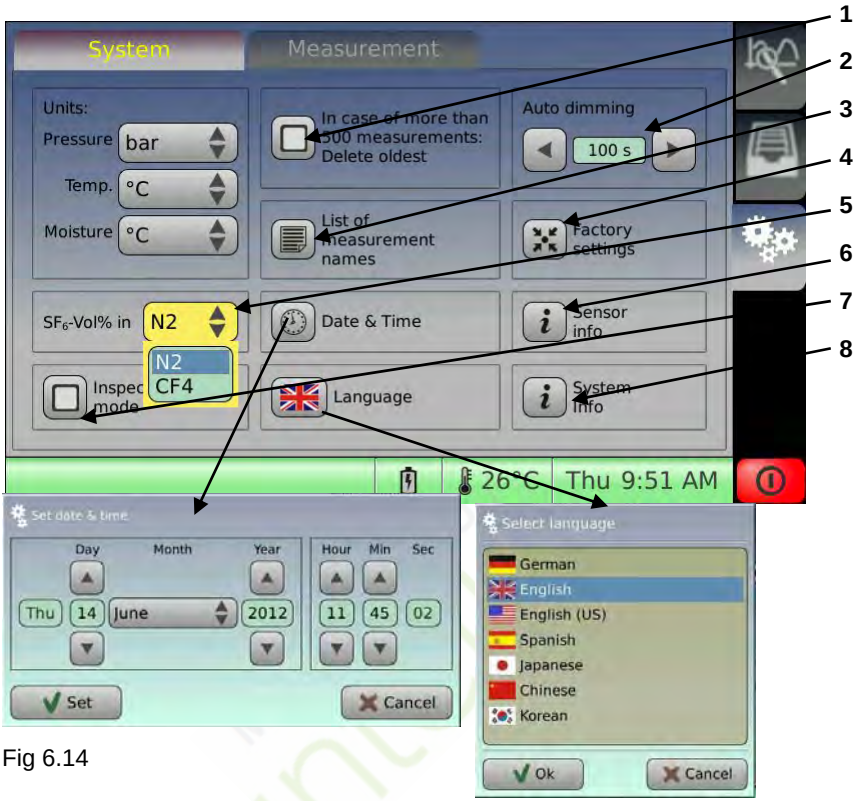


Fig 6.14

No.	Description
1	Saving behavior after on-board memory is full
2	Energy Saving by dimming the display after this time
3	Import/Export Measurement Name List (CSV) from/to USB storage device see 6.4.4
4	Reset to factory default settings
5	Calibration method for SF_6 Percentage sensor
6	Internal Sensor information
7	Change to Inspection Mode; only accessible with USB Key
8	Hardware Information (see next page)

With the tabs “System” and “Measurement” the setup of the instrument is defined.

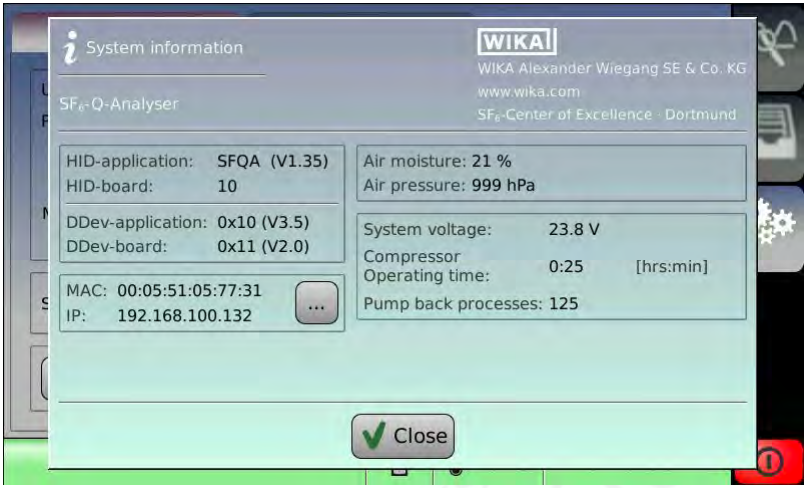


Fig 6.15
In this window all the versions of firmware and internal hardware information of the system is shown.

6.4.2 Firmware upgrade

The GA11 can be upgraded to implement new features e.g. more user languages.
To do this, download the newest firmware, accessible from the
WIKA website in the software area of the product page for the GA11.

http://en-co.wika.de/GA11_en_co.WIKA

Extract the zipped file into the subdirectory “\UPGRADE” on a USB device.

To install the new firmware to the GA11 do the following:

1. Plug the stick into the powered-off unit
2. Connect the GA11 to mains power
3. Start the GA11 by pressing the power button
4. Wait until the unit performs the firmware change. Following screen is displayed during the process

Fig 6.16

5. Follow instructions to calibrate the touchscreen by carefully hitting 5 crosshairs
6. Remove the USB device after you have seen the message that the software upgrade was successful.

NOTE!
Do not force the unit to shut down during the firmware flashing procedure, or you may damage the device.

6.4.3 Setting of the measurement limits

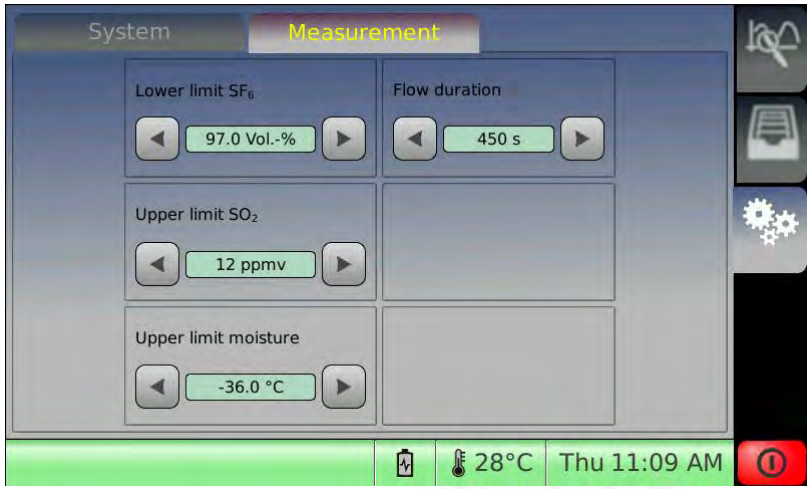


Fig 6.17

The measurement limits for the installed sensors are to be changed according to the users' guidelines. Factory settings are "Re-use gas" limits taken from Cigré and IEC 60480 guidelines.
The flow duration preset of 450s defines the measuring time in seconds.

6.4.4 Import or Export Measurement Name List to USB

The list has to be in CSV format (comma separated values).
Use any text editor (e.g. Microsoft-Word) and generate a list with measurement names separated by a comma as a *.csv file on your USB storage device.

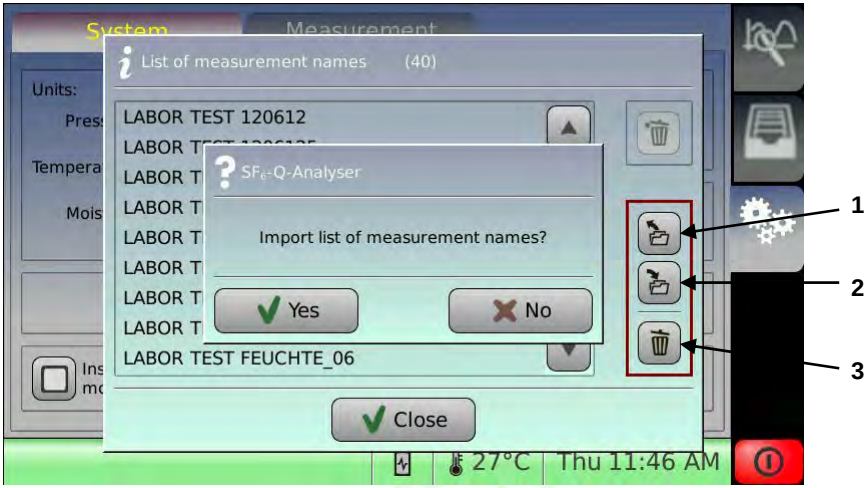


Fig 6.18

No.	Description
1	Import Measurement Name List (CSV) from USB storage device
2	Export Measurement Name List (CSV) to USB storage device
3	Delete list of measurement names

The list generated and saved can be imported from the USB storage device. Note that all previous names will disappear from the pick list of the saving menu see 6.2.3.
This pick list can be exported to the USB storage with the export button.

7 SFQA Measurement Viewer Software

7.1 Menu structure

The PC Software can be found on the USB-stick and on the CD delivered with the device. “SFQAmv” is designed for Windows operating systems and tested with Windows XP and Windows 7 in 32bit environments. This easy tool allows you to view, print and export as PDF or CSV the GA11 measurement data files (*.MEA). You can change the view to other the units than at the time the measurement was performed. The software will do the conversion up to your needs.

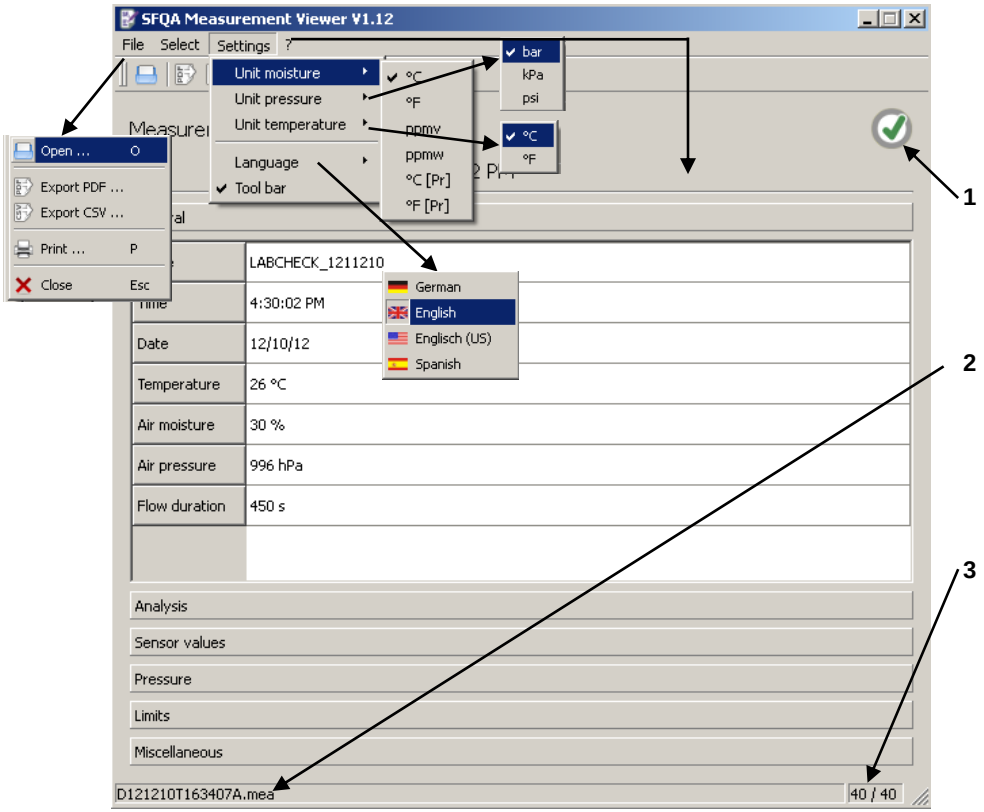


Fig 7.01

No.	Description
1	Measurement Result Status
2	Measurement file name
3	Present number of measurements inside viewer folder (here: dataset No. 40 from 40 total)

Clicking on the headline (e.g. Sensor values) the corresponding data is displayed.

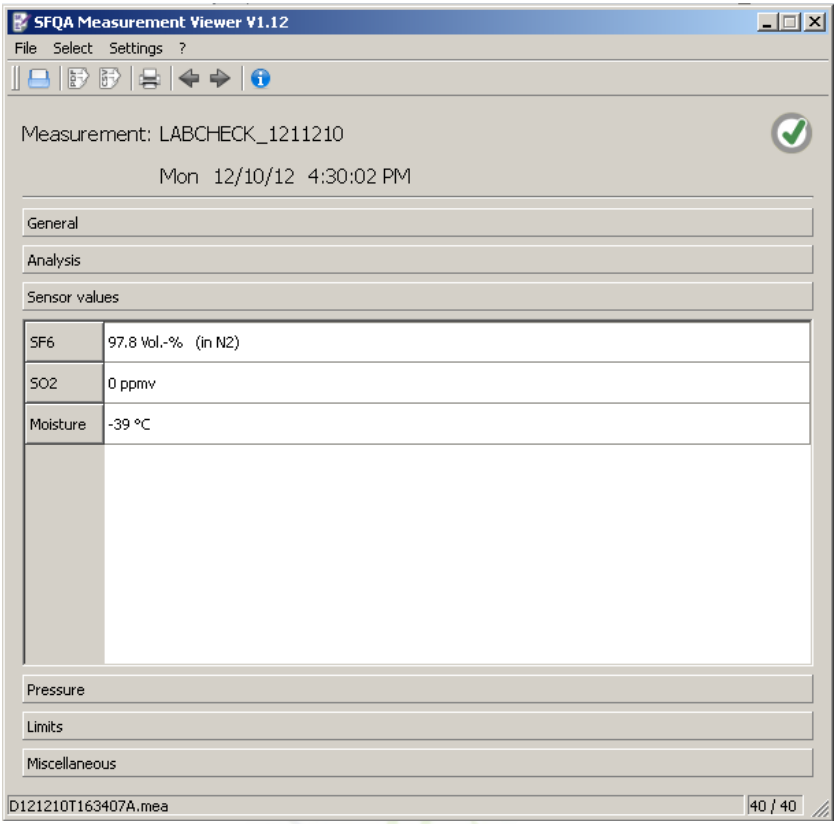
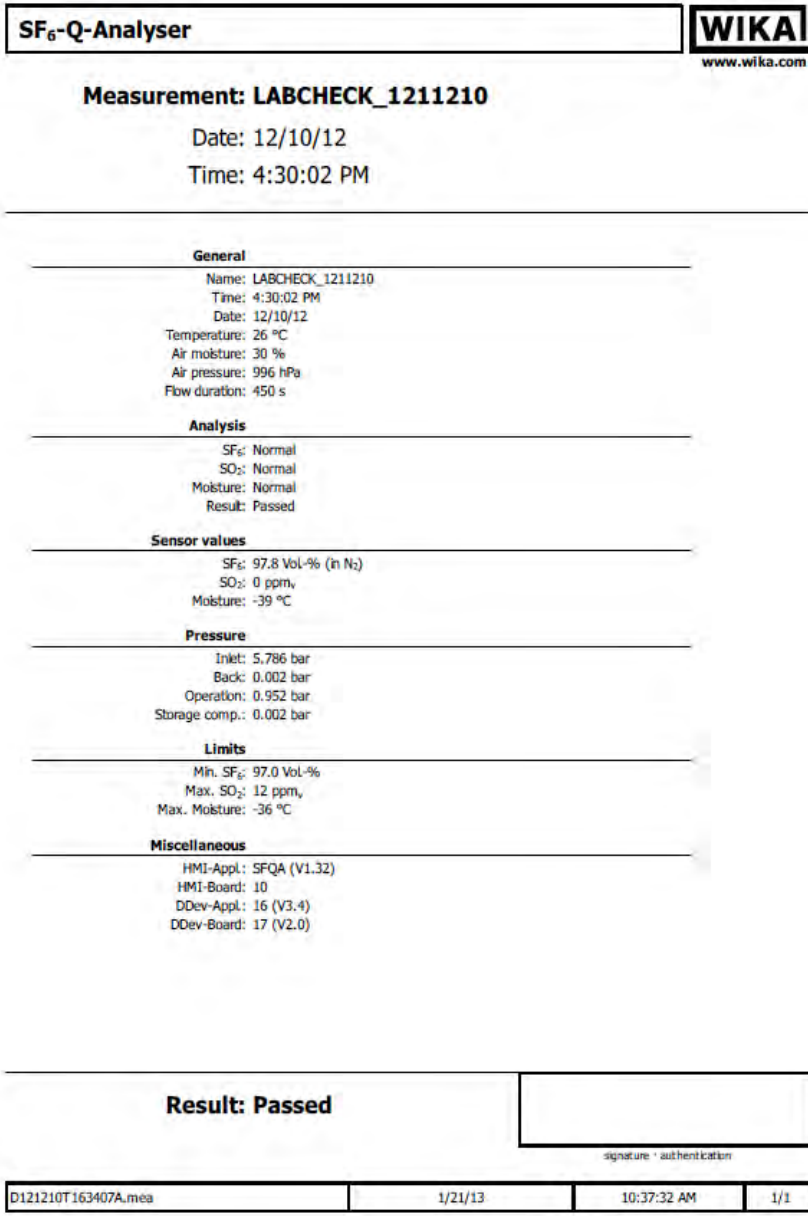


Fig. 7.02

7.2 Export or print test results

To save a PDF printout, click the button in the toolbar or “Export PDF…” via the File menu.
For further data analysis (e.g. Excel) export the data to comma separated values (CSV), which is a typical import format for all common spreadsheet programs.
Finally you can print the test result to your preferred printer.
The layout of the PDF and printer output is shown at Fig. 7.03.



SF_6-Q-Analyser

WIKA
www.wika.com

Measurement: LABCHECK_1211210

Date: 12/10/12

Time: 4:30:02 PM

General

Name:	LABCHECK_1211210
Time:	4:30:02 PM
Date:	12/10/12
Temperature:	26 °C
Air moisture:	30 %
Air pressure:	996 hPa
Flow duration:	450 s

Analysis

SF_6:	Normal
SO_2:	Normal
Moisture:	Normal
Result:	Passed

Sensor values

SF_6:	97.8 Vol-% (in N_2)
SO_2:	0 ppm_v
Moisture:	-39 °C

Pressure

Inlet:	5.786 bar
Back:	0.002 bar
Operation:	0.952 bar
Storage comp.:	0.002 bar

Limits

Min. SF_6:	97.0 Vol-%
Max. SO_2:	12 ppm_v
Max. Moisture:	-36 °C

Miscellaneous

HMI-Appl.:	SFQA (V1.32)
HMI-Board:	10
DDev-Appl.:	16 (V3.4)
DDev-Board:	17 (V2.0)

Result: Passed

signature / authentication

D121210T163407A.mea	1/21/13	10:37:32 AM	1/1

Fig. 7.03 Sample PDF Export of a measurement

8 Faults

8.1 Error Message List

Message	Explanation / Remedy
No USB storage device found	Insert USB storage device
No space left on storage device	USB storage is full Insert new device or delete files
USB storage device error:	Failure to access USB storage device. Re-insert USB storage or use other device
Content of USB storage device cannot be read	Failure to access USB storage device. Re-insert USB storage or use other device
Error transmitting measurement	Write Error, check storage device on PC, eventually reformat or repair device
No measurements available	No measurements found on the GA11 device
No files with extension ".csv" found	No name file (format: csv) found on the USB storage device
Transmission failed	Copy files to USB storage not successful. Check USB Storage device
Error saving measurement	Write Error. Re-Insert USB storage and try again
No space left in storage compartment	On-board storage full. Press “Empty storage” button to remove the gas (see 6.2.6).
High back pressure	The external gas storage is filled-up. Please connect another gas cylinder and press “Empty storage” button to remove the gas (see 6.2.6).
Low back pressure	The external gas back-pressure is too low. Minimum pressure is atmospheric pressure.
High inlet pressure	The pressure at the inlet valve was too high Remove inlet hose and reduce pressure below 35 bar $_{abs}$
Low inlet pressure	The pressure at the inlet valve was too low for a measurement.

High storage compartment pressure	On-board storage over pressure. Press “Empty storage” button to remove the gas (see 6.2.6).
The limit of 500 measurements is exceeded.	Please delete measurements or activate option "delete oldest" see 6.4.1.

If system is halted and does not react on any input please keep power button depressed for more than 7 seconds to shut down the device.

It is not recommended to carry out repair works of the SF_6-Quality-Analyser on your own, except for the replacement/addition of sensors. In case of malfunction contact us prior to return the device.

WIKA Alexander Wiegand SE & Co. KG
Otto-Hahn-Straße 15
44227 Dortmund, Germany
Phone: +49 231 / 97 42 - 65 66
Fax: +49 231 / 97 42 - 65 55

E-Mail: info@wika.de
Internet: www.wika.de/sf6

9 External SF_6 gas sample

The SF_6-Quality-Analyser is equipped with two gas outlets at the front plane that can be easily connected to either a pressure vessel ②(e.g. WIKA test cylinder) able to take a minimum of 10 bar abs with a brass DN8 connector or a recovery bag outlet where the gas can be taken directly during measurement at atmospheric pressure.
The optional accessory GA45 SF_6 recovery bag is delivered with the matching hose and quick connector to be used with this GA11 outlet port ③.

Fig 9.01

The internal pressure monitoring of the SF_6-Quality-Analyser executes an automatic abortion of a measurement in case of an overpressure caused by a filled up recovery vessel or bag in order to avoid any damages to the device and incorrect readings.
This technical design allows the SF_6-Quality-Analyser to be operated with zero emission pump-back or with SF_6 cylinder or bags for recovery of a gas sample for further testing (e.g. WIKA FTIR).

10 Technical Data

10.1 Hardware

Embedded PC

Display/keys
7" TFT color touchscreen 800 x 480,
1 Power button

Connection
Inlet/Outlet ①: Self-sealing quick connector and inlet valve
Outlet ②: DN8 brass valve
Outlet ③: Self-sealing quick connector with valve for recovery bag

Pressure
Inlet/Outlet ① : 1,3 … 35 bar_{abs} / 1,3 … 10 bar_{abs}
Outlet ②: 1,3 … 10 bar_{abs}
Outlet ③: <1,015 bar $_{abs}$ decompressed

Supply
Lithium-Ion battery
Stamina: 5 measurements with pump back
Line power: AC 90 ... 264 V (50/60 Hz),
Batterycan be charged during operation

Temperature
Storage: -20 ... 60 °C (-4 ... 140 °F)
Operation: -10 ... 50 °C (14 ... 122 °F)

Flow rate
20 litres/hour

Dimensions
W x H x L: 538 x 406 x 297 mm (21.2 x 16.0 x 11.7 in)

Weight
Approx. 25 kg (55 lbs)

10.2 Moisture sensor (fixed installed)

Measuring principle
Polymer based capacitive moisture sensor

Range
+20 ... -60 °C dew point

Accuracy
±2 °C dew point at +20 ... -40 °C dew point
±4 °C dew point at < -40 °C dew point

Resolution
1 °C

Units
In $°C_{td}$, $°F_{td,}$ ppm_v, ppm_w and $°C_{tdpr,}$ $°F_{tdpr}$ (dew point at compartment pressure), related to ambient pressure and temperature compensated to 20 °C (68 °F)

Calibration
Every 2 years

10.3 SF_6 percentage sensor (fixed installed)

Measuring principle
Velocity of sound

Range
0 … 100 %

Accuracy
±0.5 % based on SF_6/N_2 mixtures (calibration for SF_6/CF_4mixtures on request)

Resolution
0.1 %

10.4 SO_2 sensor (optional)

Measuring principle
Electrochemical SO_2 sensor

Range
0 ... 10 ppm_V
0 ... 20 ppm_V
0 ... 100 ppm_V
0 ... 500 ppm_V

Accuracy
±0.5 ppm_V (0 … 10)
±1 ppm_V (0 … 20)
±3 ppm_V (0 … 100)
±5 ppm_V (0 … 500)

Resolution
0.1 ppm_V

Humidity range
Up to 90 % (non-condensing)

Maximum zero shift
0.1 ppm_V

Long-term stability
< 1 % signal degradation per month (linear)
< 0.5 % at 0…500 ppm_V

Lifetime
2 years starting from installation

10.5 HF sensor (optional)

Measuring principle
Electrochemical HF sensor

Ranges
0 … 10 ppm_V (only in combination with 0 … 10 and 0 … 20 ppm_V SO_2 sensor)

Accuracy
±1 ppm_V

Resolution
0.1 ppm_V

Humidity range
Up to 90 % (non-condensing)

Maximum zero shift
0.1 ppm_V

Long-term stability
< 1 % signal degradation per month (linear)

Lifetime
2 year starting from installation

10.6 H_2S sensor (optional)

Measuring principle
Electrochemical H_2S sensor

Range
0 ... 100 ppm_V

Accuracy
±3 ppm_V

Resolution
0.1 ppm_V

Humidity range
Up to 90 % (non-condensing)

Maximum zero shift
0.1 ppm_V

Long-term stability
< 1 % signal degradation per month (linear)

Lifetime
2 years starting from installation

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WIKA Global

Argentina WIKA Argentina S.A.
Phone: (+54) 11/47 30 18 00
E-Mail: info@wika.com.ar

Australia WIKA Australia Pty. Ltd.
Phone: (+61) 2-88 45 52 22
E-Mail: sales@wika.com.au

Austria WIKA Messgerätevertrieb
Ursula Wiegand GmbH & Co. KG
Phone: (+43) 1/8 69 16 31
E-Mail: info@wika.at

Benelux WIKA Benelux
Netherlands Phone: (+31) 4 75/53 55 00
E-Mail: info@wika.nl

Brazil WIKA do Brasil Ind. e Com. Ltda.
Phone: (+55) 15-32 66 16 55
E-Mail: marketing@wika.com.br

Canada WIKA Instruments Ltd.
Phone: (+1) 780/463-7035
E-Mail: info@wika.ca

China WIKA International Trading
(Shanghai) Co., Ltd.
Phone: (+86) 21 53 85 25 73
E-Mail: info@wika.com.cn

Finland WIKA Finland Oy
Phone: (+358) 9/6 82 49 20
E-Mail: wika@wika.fi

France WIKA Instruments s.a.r.l.
Phone: (+33) 1/34 30 84 84
E-Mail: info@wika.fr

Germany WIKA Alexander Wiegand GmbH Co. KG
Phone: (+49) 93 72/13 20
E-Mail: info@wika.de

India WIKA Instruments India Pvt. Ltd.
Phone: (+91) 20/ 6629 3200
E-Mail: sales@wika.co.in

Italy WIKA Italiana SRL
Phone: (+39) 02/93 86 11
E-Mail: info@wika.it

Japan WIKA JAPAN K. K.
Phone: (+81) 3/54 39-66 73
E-Mail: t-shimane@wika.co.jp

Kazakhstan **T**OO WIKA Kazakhstan
Phone: (+7) 32 72/33 08 48
E-Mail: info@wika.kz

Korea WIKA Korea Ltd.
Phone: (+82) 2/8 69 05 05
E-Mail: info@wika.co.kr

Malaysia WIKA Instrumentation (M) Sdn. Bhd.
Phone: (+60) 3 56 36/88 58
E-Mail: info@wika.com.my

Poland WIKA Polska S.A.
Phone: (+48) 54 230 11 00
E-Mail: info@wikapolska.pl

Russia ZAO WIKA MERA
Phone: (+7) 495 - 648 01 80
E-Mail: info@wika.ru

Serbia WIKA Merna Tehnika d.o.o.
Phone: (+381) 11 2763 722
E-Mail: info@wika.co.yu

Singapore WIKA Instrumentation Pte. Ltd.
Phone: (+65) 68 44 55 06
info@wika.com.sg

South Africa WIKA Instruments (Pty.) Ltd.
Phone: (+27) 11/6 21 00 00
E-Mail: sales@wika.co.za

Spain Instrumentos WIKA S.A.
Phone: (+34) 902 902 577
E-Mail: info@wika.es

Switzerland Manometer AG
Phone: (+41) 41/9 19 72 72
E-Mail: info@manometer.ch

Taiwan WIKA Instrumentation Taiwan Ltd.
Phone: (+886) 34 20 60 52
E-Mail: info@wika.com.tw

Ukraine WIKA Pribor GmbH
Phone: (+38) 062 345 34 16
E-mail: info@wika.donetsk.ua

United Arab Emirates WIKA Middle East FZE
Phone: (+971) 4/883 90 90
E-Mail: wikame@emirates.net.ae

UK WIKA Instruments Ltd
Phone: (+44) 1737 644 008
E-Mail: info@wika.co.uk

U.S.A. WIKA Instrument Corporation
Phone: (+1) 770 / 5 13 82 00
E-Mail: info@wika.com

www.wika.de/sf6