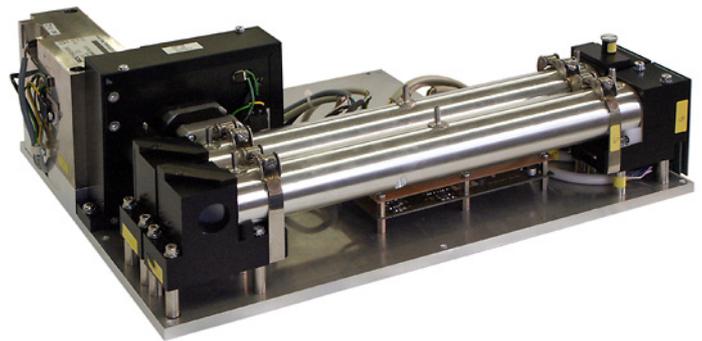


SUPPLEMENTARY OPERATING INSTRUCTIONS

Analyzer Module DEFOR for Series GMS800



Description
Operating Functions
Technical Data



Document Information

Described Product

Product name: Analyzer Module DEFOR
Basic device: Series GMS800 gas analyzers

Document ID

Title: Supplementary Operating Instructions DEFOR
Part No.: 8013029
Version: 2.0
Release: 2012-12

Manufacturer

SICK AG
Erwin-Sick-Str. 1 · D-79183 Waldkirch · Germany
Phone: +49 7641 469-0
Fax: +49 7641 469-1149
E-mail: info.pa@sick.de

Trademarks

Viton is a trademark of DuPont Performance Elastomers.
Other product names used in this document may be trademarks and are only used for identification purposes.

Original documents

The English edition 8013029 of this document is an original document of the manufacturer.

SICK AG assumes no liability for the correctness of an unauthorized translation.

Please contact the manufacturer in case of doubt.

Legal information

Subject to change without notice

© SICK AG. All rights reserved.

Glossary

Cl ₂	Chlorine (gaseous)
H ₂ S	Hydrogen sulfide
IFC	Interference Filter Correlation: Optical measurement method using two wavelength ranges.
NH ₃	Ammonia (gaseous)
NO	Nitrogen monoxide
NO ₂	Nitrogen dioxide
SO ₂	Sulphur dioxide
SOPAS	SICK Open Portal for Applications and Systems: Family of computer programs to set parameters, capture and calculate data.
SOPAS ET	SOPAS Engineering Tool: PC application program to configure modular system components.
PC	Personal Computer
PTFE	Polytetrafluorethylene
PVDF	Polyvinylidene fluoride

Warning Symbols



Hazard (general)



Hazard by corrosive substances



Hazard by high temperature or hot surfaces

Signal Words

CAUTION

Hazard or unsafe practice which *could* result in personal injury or property damage.

NOTICE

Hazard which *could* result in property damage.

Information Symbols



Important technical information for this product



Nice to know



Supplementary information



Link to information at another place

1	Important Information	5
1.1	Main operating information	6
1.1.1	Noises	6
1.1.2	UV lamp service life	6
1.2	Application limitations	6
1.3	Additional documentation/information	6
2	Product Description	7
2.1	Measuring system	9
2.2	Options	10
2.2.1	Adjustment unit	10
2.2.2	Process cuvette	10
3	Installation Information	11
3.1	Sample gas feed	12
3.2	Purge gas feed for process cuvette	12
4	Functions in SOPAS ET	13
4.1	Menu tree in SOPAS ET	14
4.2	Explanation of the menus in SOPAS ET	16
4.3	Explanation of functions	18
4.3.1	Logbook in SOPAS ET	18
4.3.2	Upload (data synchronization)	18
4.3.3	Damping	19
4.3.4	Drift limit values	20
4.3.5	Deleting adjustment results	20
4.4	Adjustment Information	21
5	Technical Data	23
5.1	Installation location requirements	24
5.2	Metrological specifications	24
5.3	Technical gas specifications	25
5.3.1	Sample gas	25
5.3.2	Purge gas	25
5.4	Materials with sample gas contact	25
5.5	Measuring ranges	26
5.6	Approvals	26
5.7	UV lamp	26
5.8	Auxiliary power supply for the module	26

DEFOR

1 Important Information

Operating information
Application limitations
Additional documentation

1.1 Main operating information

1.1.1 Noises

- Rhythmic noises are normal during operation.
- Specific noises can occur for several minutes after start-up.

1.1.2 UV lamp service life

The Analyzer module DEFOR uses a UV lamp as light source. The UV lamp has a limited service life and probably needs to be replaced several times during the overall operating time. Status messages of increasing importance are activated automatically when the light intensity of the UV lamp weakens (→ p. 16 [7]).



- UV lamp service life → p. 26, §5.7
- Display of the operating hours with the PC software “SOPAS ET” → p. 14, §4.1

1.2 Application limitations

It is possible that another gas component contained in the sample gas can influence the analysis of the desired measuring component (cross-sensitivity).

In such a case, a constant concentration of the “interfering gas” creates a constant deviation from the true measured value every time (constant characteristic curve offset). The deviation varies accordingly when the interfering gas concentration fluctuates.



- Cross-sensitivity against a certain gas is minimized automatically when the DEFOR also measures the concentration of this gas.
- The cross-sensitivity can be minimized through computation in the control unit when the interfering gas concentration is measured with a different Analyzer module in the GMS800.

1.3 Additional documentation/information

This document supplements the Operating Instructions for GMS800 gas analyzers. It extends the “GMS800“ Operating Instructions with technical information on the DEFOR.

- ▶ Observe the delivered “GMS800” Operating Instructions.



The “GMS800” Operating Instructions also specify all further documents belonging to the individual device.



NOTICE:

- ▶ Pay primary attention to any individual information provided.

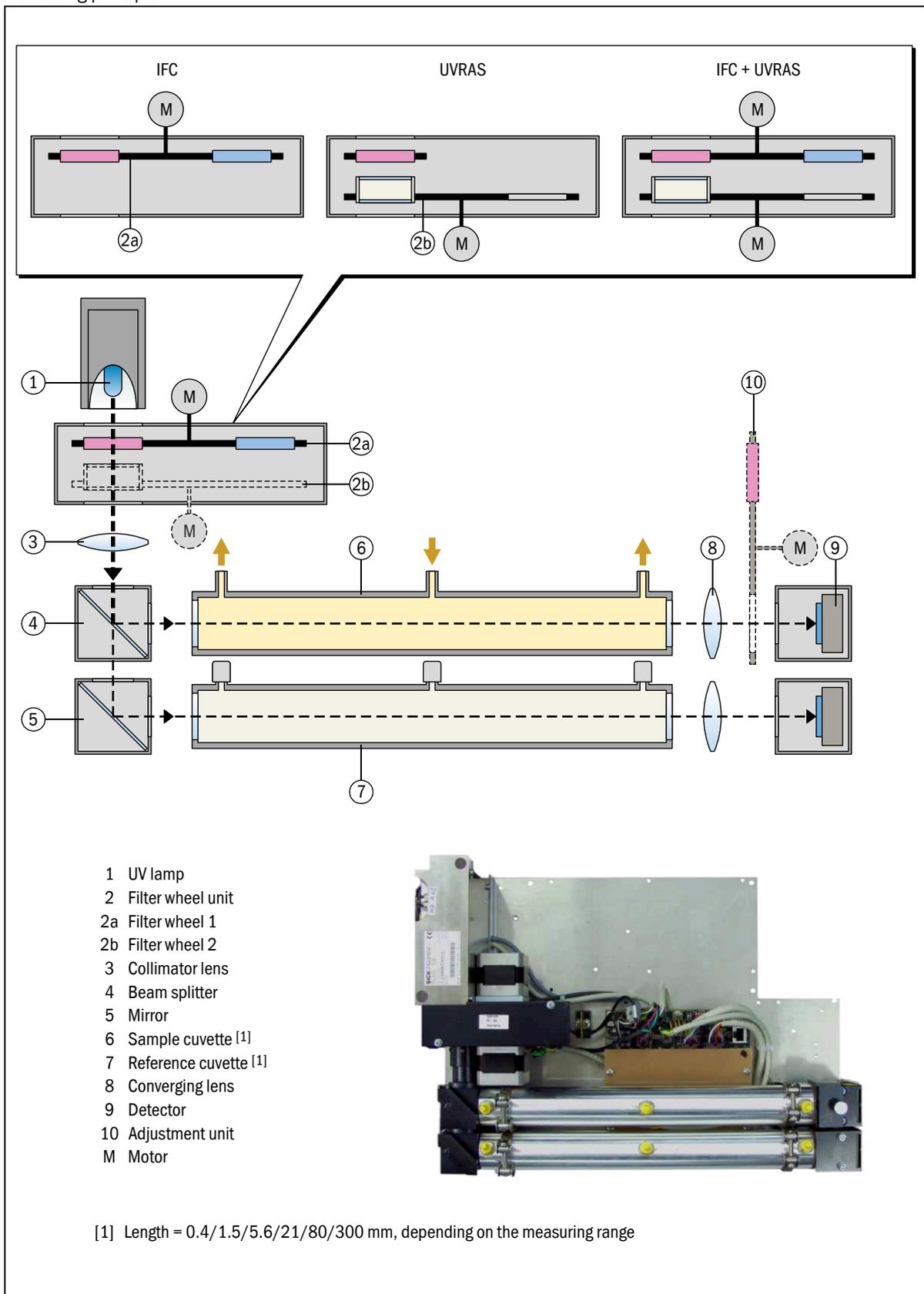
DEFOR

2 Product Description

Measuring principle

Measuring ranges

Fig. 1 Measuring principle



Subject to change without notice

2.1

Measuring system

Measuring principle

The Analyzer module DEFOR uses the fact that some gases have a specific absorption characteristic in the ultraviolet light range. For this purpose, UV light is radiated through the sample gas. The concentration of a gas component in a gas mixture can be determined through suitable selection of the light wavelength and selective absorption measurement. The Analyzer module DEFOR can, in this way, analyze the concentration of the gases Cl₂, H₂S, NO, NO₂, NH₃, SO₂ and further gases.

The Analyzer module DEFOR can simultaneously measure up to 3 gas components.

Measuring method

- The Analyzer module DEFOR uses interference filter correlation (IFC) for most gas components. Measuring and reference radiation are created alternately by swiveling two different interference filters into the beam path (filter wheel [2a]).
- Gas filter correlation (UVRAS) is used for NO. This method creates the reference radiation by swiveling a gas filter filled with the relevant gas into the beam path (filter wheel [2b]).
- Both measuring methods are combined for joint measurement of NO and other gases (both filter wheels [2a]+[2b] are used).
- The physical state of the measuring system is captured and compensated using a reference beam path through a reference cuvette.

Analyzer module layout

- Beam source is a special UV gas discharge lamp (→ p. 8, Fig. 1 [1]) that emits both broad-band as well as NO-specific radiation components.
- Thermostat-controlled filter wheel unit [2] keeps the optic filters at a constant temperature. This minimizes the influence of external temperature changes.
- Lenses [3][8], beam splitter [4] and mirror [5] direct the beam path.
- Sample gas flows through sample cuvette [6]. Reference cuvette [7] is either filled with a neutral gas or has span gas flowing through (option).
- Detectors [9] capture the radiation intensity created with the various filters.
- Measurement signals are amplified electronically and digitally evaluated. The structure symmetry compensates proportional and symmetric signal drifts in the best possible way.
- The measuring system can be fitted with an adjustment unit ([10] → p. 10, §2.2.1).



The specific properties of the desired measuring components and the desired physical measuring range each demand an individual metrological concept for the Analyzer module.

2.2 Options

2.2.1 Adjustment unit

The adjustment unit simplifies and accelerates routine adjustments.

Zero gas flows through the Analyzer module during an adjustment procedure with an adjustment unit. The first step is a zero point adjustment. An optical filter is swiveled automatically into the beam path of the sample cuvette for the subsequent reference point adjustment – and thus simulates the presence of a span gas in the sample cuvette. The nominal values of this simulation are determined at the manufacturer's factory.

This means only a zero gas is required for an adjustment procedure with adjustment unit; a span gas for reference point adjustment is not necessary. The procedure can be started manually or can run automatically (requires automated zero gas feed).



The adjustment unit should be checked and readjusted in larger intervals during operation (recommendation: Every 6 months). For this purpose, the Analyzer module must be adjusted with real test gases beforehand.

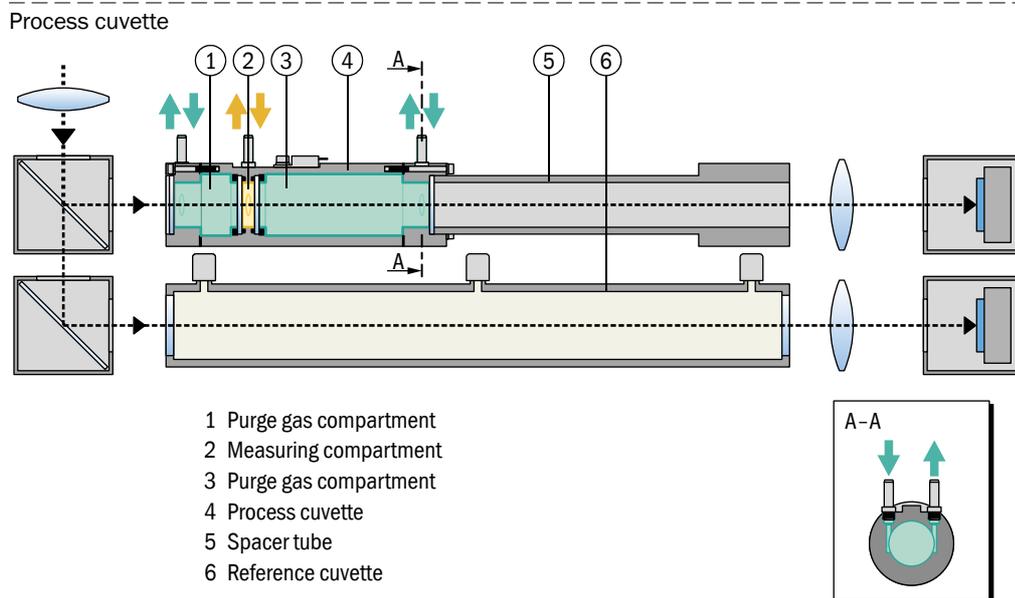
2.2.2 Process cuvette

The versions with process cuvette are intended for applications with dangerous sample gases where it must be ensured the sample gas does not flow into the gas analyzer when a window of the sample cuvette becomes leaky.

In the process cuvette, the measuring compartment is flanked by purge gas compartments through which purge gas flows continuously (→ Fig. 2). When a measuring compartment window is leaky, the emerging sample gas flows into the purge gas compartment and from there out of the gas analyzer with the purge gas.

The GMS800 therefore requires continuous purge gas for versions with a process cuvette (→ p. 12, §3.2).

Fig. 2



DEFOR

3 Installation Information

Sample gas feed
Purge gas feed for process cuvette

3.1 **Sample gas feed**

- ▶ Observe the information on sample gas feed in the “Series GMS800” Operating Instructions.

3.2 **Purge gas feed for process cuvette**

Only valid for versions with process cuvette (option → p. 10, §2.2.2)

In versions with process cuvette, the GMS800 enclosure has additional “purge gas inlet” und “purge gas outlet” gas connections.



Gas connections type and version → Supplementary Operating Instructions for Enclosure

- 1 Install an external continuous purge gas supply for GMS800.
Suitable purge gas: Chemically neutral gas (inert gas) or gas mixture suitable for diluting and transporting the measured gas without danger.
- 2 Feed the purge gas through the “purge gas inlet” gas connection on the enclosure.
Allowable pressure and volume flow: → p. 25, §5.3.2
- 3 Install a gas line on the “purge gas outlet” through which the purge gas and emerged sample gas are reliably discharged.
 - ▶ Lead the gas line to a safe position where emerged sample gas cannot create any danger.
 - ▶ *Recommendation:* Attach appropriate warning signs to the gas line or gas outlet informing about the hazardousness of the sample gas.

DEFOR

4 Functions in SOPAS ET

Menu functions in the PC program “SOPAS ET”

Menu tree

Explanations



- Instructions for the PC program “SOPAS ET” → User Information for the program
- Exemplary menu representations → Technical Information “Basic Control Unit (BCU)” (contains information for operating with SOPAS ET)

4.1 Menu tree in SOPAS ET

Directory	Menu contents	O	A	Explanation
S800_DEFOR				
Measured value display				
Measuring component 1	Component	<input type="radio"/>	<input type="radio"/>	
	Measured value	<input type="radio"/>	<input type="radio"/>	→ p. 16 [1]
	Unit	<input type="radio"/>	<input type="radio"/>	→ p. 16 [2]
		<input type="radio"/>	<input type="radio"/>	→ p. 16 [3]
Measuring component 2 [1]		<input type="radio"/>	<input type="radio"/>	
↓				
Measuring component 10 [1]		<input type="radio"/>	<input type="radio"/>	
Diagnosis				
Module state	Failure	<input type="radio"/>	<input type="radio"/>	
	Maintenance request	<input type="radio"/>	<input type="radio"/>	→ p. 16 [4]
	Function(s) active	<input type="radio"/>	<input type="radio"/>	
	Uncertain state	<input type="radio"/>	<input type="radio"/>	
Logbook	Pos. Date Source ...	-	<input type="radio"/>	
Operating hours		-	<input type="radio"/>	
Lamp	h	-	<input type="radio"/>	→ p. 16 [5]
Measuring component 1		<input type="radio"/>	<input type="radio"/>	
Name / unit	Component	<input type="radio"/>	<input checked="" type="radio"/>	→ p. 16 [1]
	Unit	<input type="radio"/>	<input type="radio"/>	→ p. 16 [2]
State	Failure	<input type="radio"/>	<input type="radio"/>	→ p. 16 [4]
	Maintenance request	<input type="radio"/>	<input type="radio"/>	
	Function(s) active	<input type="radio"/>	<input type="radio"/>	
	Uncertain state	<input type="radio"/>	<input type="radio"/>	
Validation measurement (QAL3)	Zero point	<input type="radio"/>	<input type="radio"/>	
	Reference point	<input type="radio"/>	<input type="radio"/>	
Measuring component 2 [1]		<input type="radio"/>	<input type="radio"/>	
↓				
Measuring component 10 [1]		<input type="radio"/>	<input type="radio"/>	
UV lamp		-	<input type="radio"/>	
Physical component 1	Intensity ...%	-	<input type="radio"/>	→ p. 16 [6]
	Failure	-	<input type="radio"/>	→ p. 16 [7]
	Uncertain	-	<input type="radio"/>	
	Maintenance	-	<input type="radio"/>	
	OK	-	<input type="radio"/>	
Physical component 2 [1]		-	<input type="radio"/>	
Physical component 3 [1]		-	<input type="radio"/>	
Parameter				
Sampling point	Description	-	<input checked="" type="radio"/>	→ p. 16 [8]
RS485 interface	Module address	-	<input type="radio"/>	→ p. 16 [9]
	Baud rate	-	<input checked="" type="radio"/>	→ p. 16 [10]
	Data bits	-	<input checked="" type="radio"/>	
	Stop bits	-	<input checked="" type="radio"/>	
	Parity	-	<input checked="" type="radio"/>	
Operating mode	Actual	-	<input type="radio"/>	→ p. 16 [11]
	Target	-	<input type="radio"/>	→ p. 16 [12]
Measuring component 1		<input type="radio"/>	<input type="radio"/>	
Physical meas. range	Component	<input type="radio"/>	<input checked="" type="radio"/>	→ p. 16 [1]
	Unit	<input type="radio"/>	<input type="radio"/>	→ p. 16 [3]
	Start value	<input type="radio"/>	<input type="radio"/>	→ p. 16 [13]
	End value	<input type="radio"/>	<input type="radio"/>	→ p. 16 [14]
	Base value	<input type="radio"/>	<input type="radio"/>	→ p. 16 [15]
	Measuring channel	<input type="radio"/>	<input type="radio"/>	→ p. 16 [16]
	Precision	<input type="radio"/>	<input type="radio"/>	→ p. 17 [17]

Directory	Menu contents	O	A	Explanation
Damping		-	●	
Damping (el. T90%)	Time constant [s]	-	●	→ p. 19, §4.3.3
Dynamic damping	Status [On/Off]	-	●	
	Time constant [s]	-	●	
	Threshold	-	●	
Measuring component 2 [1]		○	○	
↓				
Measuring component 10 [1]		○	○	
Adjustment		○	○	
Measuring component 1		○	○	
Drift limit value	Zero point	-	○	→ p. 20, §4.3.4
	Reference point	-	○	
Adjustment results		○	○	
Adjustment result	Zero point	○	○	→ p. 17 [18]
	Reference point	○	○	
Drifts	Zero point	○	○	
Delete results	Reference point	○	○	→ p. 20, §4.3.5
	[Delete]	-	●	
Measuring component 2 [1]		○	○	
↓				
Measuring component 10 [1]		○	○	
Maintenance		-	○	
Maintenance flag	[On]/[Off]	-	●	→ p. 17 [20]
Settings		-	○	
User settings	[Backup]	-	●	→ p. 17 [21]
	[Restore last user settings]	-	●	
	[Restore next to last user settings]	-	●	
Factory settings	[Restore]	-	●	→ p. 17 [22]
Factory settings		○	○	
Identification		○	○	
ID numbers	Serial number	○	○	→ p. 17 [23]
	Material No.	○	○	
	Hardware version	○	○	
	Software version	○	○	
	Software date	○	○	
Production release	Year Month Day	-	○	→ p. 17 [24]

[1] If fitted.

4.2

Explanation of the menus in SOPAS ET

No.	Description	Explanation
1	Component	Name of measuring component
2	Measured value	Actual measured value of measuring component
3	Unit	Physical unit of measured value
4	Failure	LED symbol <ul style="list-style-type: none"> ● <i>Significance</i>: Module not ready for operation ● <i>Possible causes</i>: Malfunction, defect
	Maintenance request	LED symbol <ul style="list-style-type: none"> ● <i>Significance</i>: Advance warning before internal technical limits reached. ● <i>Possible causes</i>: Drift limit, operating hours, lamp intensity
	Function(s) active	LED symbol <ul style="list-style-type: none"> ● <i>Significance</i>: At least one internal function active that impairs or hinders normal module measuring function. ● <i>Possible causes</i>: Adjustment procedure running, validation measurement running
	Uncertain state	LED symbol <ul style="list-style-type: none"> ● <i>Significance</i>: Actual measured values are unreliable. ● <i>Possible causes</i>: Heating up phase, internal over/under temperature, adjustment procedure programming not plausible
5	Operating hours	Number of operating hours of the UV lamp fitted
6	Intensity ...%	Actual light intensity in the reference beam path for the associated measured component (with the specific optical filter in the beam path) relative to the new condition of the UV lamp; evaluated automatically (→ [7]; UV lamp service life → p. 26, 5.7)
7	Failure	UV lamp status (evaluation of intensity); "OK" = full intensity, "Maintenance" = UV lamp replacement recommended; "Uncertain" = correct measuring function questionable; "Failure" = measurement no longer possible. The module status flags are activated accordingly (→ [4]).
	Uncertain	
	Maintenance	
	OK	
8	Description	Freely selectable text for module name
9	Module address	Internal CAN bus address of module (defined by hardware setting in module)
10	Baud rate	Transfer speed (standard: 9600)
	Data bits	Number of data bits (standard: 8) The GMS800 only uses the 7-bit range (ASCII code 0 ... 127) but can also communicate in 8-bit format.
	Stop bits	Number of stop bits (1 or 2; standard: 2)
	Parity	Additional identification for automatic monitoring of character transfers; [Even], [Odd], [None]. - Standard: None
11	Actual	Internal operating module state: <ul style="list-style-type: none"> ● [Heating] = heating up phase (measured values unreliable) ● [Measuring] = measuring operation (normal operating mode) ● [Halt] = stopped electronically (not ready for operation)
12	Target	Default operating mode through entry or software function; should become actual operating mode after a certain time (can take up to 1 hour during the heating up time after start-up).
13	Start value	Start value of physical measuring range
14	End value	End value of physical measuring range
15	Base value	Internal physical base value of measuring range
16	Measuring channel	Internal measuring channel for measuring component

No.	Description	Explanation
17	Precision	[On] = higher measuring precision is available for measuring range 2 (effective in range 0 ... 20% of physical measuring range)
18	Drifts	<ul style="list-style-type: none"> ● Last = since last adjustment ● Total = since last drift calculation initialization
19	Delete results	[Delete] = Set all drift values to "0".
20	Maintenance flag	[On] = Status "Maintenance" is activated (here as signal for active maintenance work)
21	User settings	<ul style="list-style-type: none"> ● Backup = save a copy of the actual module settings. ● Restore = overwrite the actual module settings with the saved copy. [1]
22	Factory settings	Overwrite the actual module settings with the original settings from the factory.[1] ► <i>Recommendation:</i> Save the current module settings first (→ "User settings").
23	Serial number	Individual module serial number
	Material No.	Identification number of module version
	Hardware version	Module electronics version number
	Software version	Module software version number
	Software date	Module software revision
24	Production release	Module date of manufacture

[1] A warm start is then done automatically.

4.3 Explanation of functions

4.3.1 Logbook in SOPAS ET

The Logbook Table shows the last 20 internal messages.

Fig. 3 Menu “[Module name]/Diagnosis/Logbook” in PC program “SOPAS-ET” (example)

①	②	③	④	⑤	⑥	⑦
Position	Date	Time	Source	Message No.	Status	Count
1	12-07-02	08:19:10	UNOR-MUL...	E gas pump off	Off	1
2	12-07-02	08:19:09	UNOR-MUL...	U temperatures	Off	1
3	12-07-02	08:19:09	UNOR-MUL...	U heater 1	Off	1
4	12-07-02	08:11:47	UNOR-MUL...	U heater 2	Off	1
5	12-07-02	08:10:21	UNOR-MUL...	U heater 3	Off	1
6	12-07-02	08:09:04	UNOR-MUL...	U heater 5	Off	1
7	12-07-02	08:08:05	UNOR-MUL...	U heater 4	Off	1
8	12-07-02	08:06:32	UNOR-MUL...	C start check	Off	1
9	12-07-02	08:06:32	UNOR-MUL...	U start check	Off	1
10	12-07-02	08:04:37	UNOR-MUL...	C adjustment cuvette ac...	Off	1
11						0
12						n

Column	Meaning
1	Sequential number in Logbook
2	Time of last message change
3	
4	“System” = measuring system (hardware) “MV” = measuring component (measurement)
5	Short message text, e.g. “F measured value”. The character prefix classifies the message: F = Failure C = Check (adjustment/validation) U = Uncertain (extra information) M = Maintenance E = Extended (status message)
6	Current message status
7	Total count of activations

4.3.2 Upload (data synchronization)

Only applicable when the “SOPAS ET” PC software is used. Not applicable for systems without control unit (special versions).

The new data are not transferred automatically to “SOPAS ET” after settings for a module have been changed with the menu functions of the control unit. “SOPAS ET” continues using the previous data.

- To transfer the current data of a module to “SOPAS ET”: Start the “Upload all parameters from device” function in “SOPAS ET” once.

4.3.3

Damping

Constant damping

When “damping” has been programmed, the average value from the current measured value and the previous measured values (floating averaging) are displayed instead of the current measured value.

Possible uses include:

- Damping metrological measured value fluctuations (noise)
- Smoothing fluctuating measured values when only the average value is relevant

Damping is done in the Analyzer module and therefore affects all measured value displays and outputs. It is also active during an adjustment procedure.



- Increasing damping normally increases the reaction time (90% time) of the gas analysis system accordingly.
- Reducing damping can possibly increase the measurement signal “noise” (measuring turbulence).
- Time constant = 0 s means: No damping.



CAUTION: Risk of incorrect adjustment

The “Measuring time, test gas” must be at least 150% of the set damping time constant during adjustments.

- ▶ *When damping has been reset or increased:* Check whether adjustment settings need to be adapted.

Dynamic damping

“Dynamic damping” serves to compensate measured value fluctuations without significantly increasing the reaction time. Dynamic damping is automatically deactivated when the measured value changes rapidly and strongly as against “normal” damping. This allows “smoothing” continuous minor measured value fluctuations but rapid measured value changes are still displayed without delay. Dynamic behavior is determined with the “Threshold” parameter:

- When the measured values change only slowly, dynamic damping functions as constant damping.
- When the difference of successive measured values is greater than the set limit, dynamic damping is terminated automatically and remains disabled as long as the measured values continue to change rapidly.
- Dynamic damping is active again when measured value differences are below the limit again (which means measured values changes remain slight).

Dynamic damping also affects all measured value displays and outputs.

4.3.4 Drift limit values

Purpose

Analyzer module drifts are caused, for example, by contamination, mechanical changes or aging effects. The total drift (i.e. the deviation from original state) increases gradually. It is not practical to keep compensating an ever increasing total drift through computation. Inspect and reset the Analyzer module when total drift has become very large.

Drift limit values monitor total drift automatically. These also protect against erroneous adjustments.

Functionality

After every adjustment, an Analyzer module compares the calculated total drift with the drift limit value. Drift limit value violation is reported in two stages:

- Status “M” (Maintenance request) is activated when the total drift reaches 100 ... 120% of the drift limit value.
- Status “F” (Failure) is activated when the total drift reaches more than 120% of the drift limit value.
- When an adjustment procedure shows that a calculated drift has reached more than 150% of the drift limit value, the result from this adjustment procedure is ignored and the previous adjustment remains valid.



- The drift limit values are set in the factory (standard value: 10%).
- A Service function is available to reset all drift values to “0” (Drift reset). This is useful after Analyzer module maintenance when this has established a new original state.

4.3.5 Deleting adjustment results

The “Delete results” function deletes all determined drift values of a measuring component. Drift limit values then refer to new drift values.

The data of the previous adjustment which was performed before are then no longer displayed. Test gas settings (e. g. nominal value) are not changed.



CAUTION: Risk of incorrect adjustment

If very large drift values are displayed after a manual adjustment procedure (→ Operating Instructions “Basic Control Unit (BCU)”), a test gas used probably did not match the relevant test gas setting or gas feed was interrupted – and the adjustment result was still accepted.

- ▶ Do not delete incorrect adjustment results, but repeat the adjustment carefully.



- ▶ Do not use the deletion of adjustment results to nullify large drift values caused by extensive physical changes of an Analyzer module. Instead, clean the Analyzer module or perform an adjustment.^[1]
- ▶ *After an Analyzer module has been cleaned, altered or exchanged:* Delete the relevant adjustment results and perform an adjustment.

[1] By the manufacturer's Customer Service or authorized skilled persons with appropriate training.

4.4

Adjustment Information

The control unit controls the adjustments.

- ▶ Individual adjustment of each shown measuring component and each measuring range.
- ▶ Information concerning purpose, prerequisites and frequency of adjustments → Operating Instructions “Series GMS800”
- ▶ Programming of the adjustment parameters for each measuring component of the GMS800 → Technical Information “Basic Control Unit (BCU)”
- ▶ Manual start of an adjustment procedure → Operating Instructions of the control unit

DEFOR

5 Technical Data

Ambient conditions
Sample gas specifications
Metrological specifications

5.1 Installation location requirements

Geographic height at installation location:	≤ 2500 m altitude [1]
Ambient air pressure:	700 ... 1200 hPa
Allowable oscillations/jolts	
– Displacement:	0.035 mm (in range 5 ... 59 Hz)
– Activation acceleration amplitude:	5 m·s ⁻² (in range 59 ... 160 Hz)
Usage position:	Max. ±15° tilt to every spatial axis [2]

[1] Higher altitudes can be realized (option); compensation for height influence.

[2] Allowable surface tilt during operation; keep constant during operation; readjust after changing the tilt.

5.2 Metrological specifications

Measured variable:	Volume concentration of a gas component [1]
Measuring ranges:	See specification for individual device [2]
Detection limit (2σ): [3]	
– Standard measuring ranges:	< 0.5% of measurement span
– Small measuring ranges: [4]	< 1% of measurement span
Linearity deviation:	< 1% of measurement span
Zero point drift	
– Standard measuring ranges:	< 1% of measurement span per week
– Small measuring ranges: [4]	< 2% of measurement span per week
– Measured components NO, NO ₂ , SO ₂ :	< 1% of measurement span per day
Reference point drift:	< 1% of measurement span per week
Ambient temperature influence:	
– Standard measuring ranges:	< 1% ^[5] / 10 K
– Small measuring ranges: [4]	< 2% ^[5] / 10 K
Setting time (t ₉₀):	4 s [6]
Run-in time:	< 60 minutes

[1] → p. 26, § 5.5

[2] Possible measuring ranges → p. 26, § 5.5.

[3] Values valid with constant damping T_{90, el.} = 10 s; for measuring component NO: With constant damping T_{90, el.} = 10 s + dynamic damping T_{90, dyn.} = 60 s.

[4] Valid for measuring ranges < 2x smallest measuring range.

[5] Of respective measuring range.

[6] Typical value for sample gas volume flow = 60 l/h and T_{90, el.} = 1 s; depending on cuvette length and sample gas volume flow.



If not specified otherwise, the metrological specifications in relation to the physical measuring range are applicable (see order documents). The physical measuring range is usually identical with the largest measuring range. The same values apply for all other measuring ranges.

If, however, the Analyzer module was manufactured with “higher measuring precision” (option), measuring precision is increased in range 0 ... 20% of the physical measuring range. The measurement specifications in this range are then applicable in relation to 20% of the physical measuring range.

5.3 Technical gas specifications

5.3.1 Sample gas

Allowable sample gas temperature: [1] – Minimum: – Maximum:	5 °C (41 °F) [2] 55 °C (131 °F) [3]
Allowable sample gas dew point:	Below ambient temperature
Particles in the sample gas:	Sample gas should be free from dust and aerosols [4]
Allowable sample gas pressure [5]	-200 ... +300 hPa (-0.2 ... +0.3 bar)
Sample gas volume flow [1] – Minimum: – Maximum: – Recommended: – Standard:	20 l/h (333 cm ³ /min) 120 l/h (2000 cm ³ /min) 30 ... 60 l/h (500 ... 1000 cm ³ /min) 30 l/h (500 cm ³ /min)

[1] On the sample gas inlet. Keep constant during operation.

[2] When a sample gas cooler is used: Always above the cooler temperature (dew point).

[3] With "heated sample gas path" option: Up to +80 °C, depending on the temperature set.

[4] On the sample gas inlet.

[5] Relative to the ambient/atmospheric air pressure.

5.3.2 Purge gas

Only valid for version with process cuvette (→ p. 10, §2.2.2)

Suitable purge gas:	Dry inert gas (chemically neutral gas/gas mixture without condensable components)
Allowable purge gas pressure [1]	15 ... 30 hPa
Purge gas volume flow – Minimum: – Maximum: – Recommended: – Standard:	20 l/h (333 cm ³ /min) 100 l/h (167 cm ³ /min) 20 ... 60 l/h (333 ... 1000 cm ³ /min) 30 l/h (500 cm ³ /min)

[1] Relative to the ambient/atmospheric air pressure.

5.4 Materials with sample gas contact

Component	Material
Cuvette:	Aluminium or stainless steel [1]
Optical window:	CaF ₂ or quartz [1]
Synthetics:	Viton B, PVDF, PTFE [1]

[1] Depending on version.

5.5 Measuring ranges

Measuring component	Smallest measuring range			Largest measuring range
	Technical		Performance-tested ^[1]	
	ppm	mg/m ³	ppm	% by vol.
Cl ₂	125	400	-	100
COS	250	670	-	100
CS ₂	50	170	-	30
H ₂ S	25	40	-	100
NH ₃	50	40	-	100
NO	10	15	50	100
NO ₂	50 (10) ^[2]	105 (20) ^[2]	50	100
SO ₂	25 (10) ^[2]	75 (30) ^[2]	75	100

[1] Approvals → p. 26, § 5.6.

[2] For operation in air-conditioned environment (±2 °C temperature deviation) and daily zero point adjustment.



- Conversion from ppm to mg/m³ relative to 20 °C, 1013 hPa.
- All specifications valid for a mixture of the measuring components and N₂.

5.6 Approvals

Conformities	DEFOR
EN 15267-3	●
EN 14181	●
2000/76/EC (17th BImSchV)	●
2001/80/EC (13th BImSchV)	●
27th BImSchV	●

5.7 UV lamp

Design:	Electrode-less discharge lamp, EDL
Service life:	Approx. 2 years (= 17500 hours)

5.8 Auxiliary power supply for the module

Voltage supply:	24 VDC
Power input:	≤ 134 W

... Empty page ...

A		
Actual (display)	16	
Adjustment result	15	
Adjustment results	15	
Approvals	26	
Auxiliary power supply	26	
B		
Backup (user settings)	15	
Backup copy (user settings)	15	
Base value (display)	16	
Baud rate	16	
C		
Conformities	26	
Constant damping	19	
D		
Damping		
- Constant damping (el. T90%)	19	
- Dynamic damping	15, 19	
- el. T90% (constant damping)	15	
Data bits	16	
Detection limit	24	
Diagnosis	14	
Drift		
- Specifications	24	
- Viewing actual values	15	
- Viewing drift limit values	15	
Drift limit values	20	
- Purpose, functionality	20	
Dynamic damping	15, 19	
E		
el. T90% (constant damping)	19	
End value (display)	16	
F		
Factory settings, restoring	15	
Failure	16	
FICA	26	
Filter wheel	9	
Flow (volume flow)		
- Purge gas	25	
- Sample gas	25	
Function(s) active	16	
Functions in SOPAS ET	13	
G		
Gas filter correlation	9	
Glossary	2	
H		
Hardware version (display)	15	
I		
ID numbers	15	
Identification	15	
IFC	9	
Information symbols	2	
Installation information	11	
Intensity ...%	16	
Interference filter (correlation)	9	
L		
Logbook	14, 18	
M		
Maintenance	16	
Maintenance flag	15	
Maintenance request	16	
Material No.	15	
Materials	25	
Materials with sample gas contact	25	
Measured value display		
- Constant damping	19	
- Dynamic damping	19	
- In SOPAS ET	14	
Measuring channel (display)	16	
Measuring components		
- Display name and physical unit	14	
- Displaying physical measuring ranges	14	
- Measuring ranges	26	
- Show status	14	
Measuring principle	9	
Measuring ranges	26	
Menu tree	14	
Menus in SOPAS ET	13	
Module address	16	
Module state	14	
N		
Name (sampling point)	16	
Noises	6	
O		
OK (status)	16	
Measuring range 2	14	
Operating mode	14	
Options	10	

P	
Parity	16
Power input	26
Precision (display)	17
Pressure	
- Purge gas	25
- Sample gas	25
Process cuvette	
- Description	10
- Purge gas feed	12
Product description	7
Product variants	10
Production release	15
Purge gas	
- Connections, feed	12
- Purpose (process cuvette)	10
- Specifications	25
Q	
QAL3	14
R	
Reference cuvette	9
RS485 interface	14
S	
Safety information	
- Drift reset	20
Sample cuvette	9
Sample gas feed	12
Serial number	15
Settings	15
Settings, back up/restore	15
Signal words	2
Software date	15
Software version	15
SOPAS ET (important information)	18
SOPAS ET	13
Start value (display)	16
Stop bits	16
Symbols (explanation)	2
T	
Target (display)	16
Technical data	23
- Materials with sample gas contact	25
- Measuring ranges	26
- Metrological specifications	24
- Power input	26
- Technical gas specifications	25
- UV lamp	26
- Voltage supply	26
Temperature	
- Purge gas	25
- Sample gas	25
Threshold (dynamic damping)	15
Time constant	
- el. T90% (constant damping)	15
- for dynamic damping	15
U	
Uncertain	16
Uncertain state	16
Upload all parameters from device	18
User settings, back up/restore	15
UV lamp	9
- Operating hours, display	14
- Service life	26
- Service life (important information)	6
- Show status	14
UVRAS	9
V	
Validation measurement (result)	14
Voltage supply	26
Volume flow	
- Purge gas	25
- Sample gas	25
W	
Warning symbols, warning levels	2

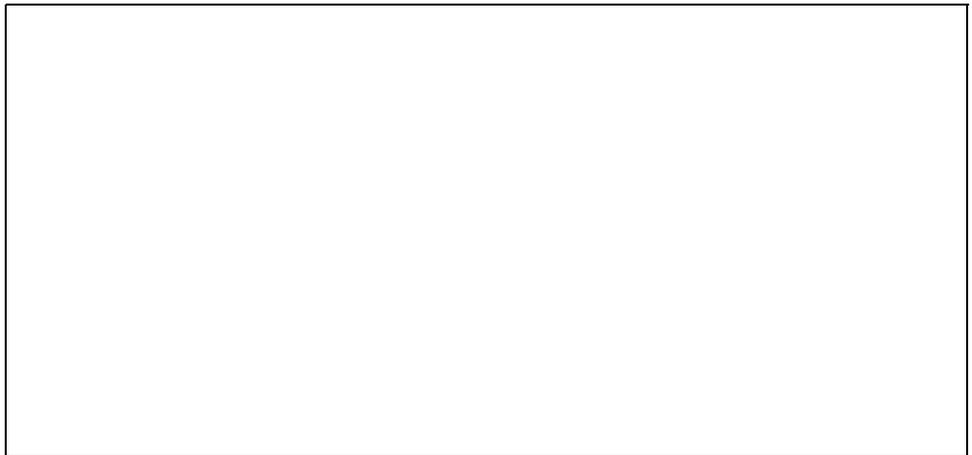
DEFOR

8013029/V.2.0/2012-12 | Subject to change without notice

SICK worldwide

You will find our local subsidiary
or agency at:

www.sick.com



Your local sales and service partner