

Manual

ODOR on-line

Version 12/2023



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1 Introduction

1.1 Intended use

Dear customer,

By purchasing the ODOR on-line, you now own a device that can be used for a wide range of applications. The ODOR on-line was developed as a gas chromatograph for the determination of sulfur components in gas. Typical application areas are odorization control and the measurement of natural sulfur compounds in natural gas. You can find out more about the measuring principle of the ODOR on-line in chapter 17. Operating Principle

In odorization control, the ODOR on-line can be used to determine all odorants containing sulfur. Typical odorants are, for example

- Tetrahydrothiophene (THT)
- Tertiary butyl mercaptan (TBM)
- Mixtures of mercaptans and/or sulfides (Scentinel™ E, Spotleak™ 1005)

When determining natural sulfur, the ODOR on-line can be used to measure the following components:

- Hydrogen sulfide (H₂S)
- Natural mercaptans (e.g. ethyl mercaptan, methyl mercaptan)
- Natural sulfides (e.g. dimethyl sulfide)

Only in special appliance version:

- Carbonyl sulfide (COS)

The installation is usually stationary, but for odorization control, it is possible to have a mobile unit in the field in an appropriate vehicle.

Of course, an instruction manual cannot describe all these applications in detail. You will therefore only see the use of the ODOR on-line for determining THT described on the following pages. If you intend to use the device for a different application, please note that the following parameters may change: Calibration gas, column type, column temperature and carrier gas flow.

This manual does not contain a description of the ODOR control software. The software has its own online help, which can be accessed after installing ODOR control.

We generally recommend installation and instruction by our customer service team. We offer in-house training for experienced users.

Your AXEL SEMRAU GmbH

1.2 The Manual

The manual contains all the required information about operating elements, handling, maintenance and adjustment procedures as well as all technical data.

The manual is an integral part of the ODOR on-line. Therefore, please keep the manual within easy reach so that it is accessible at all times.

Read the operating instructions carefully. The instructions must be read, understood and observed in all points by all persons who are responsible for the installation, operation and repair of the measuring device.

1.3 Additional documents

Please also refer to the safety data sheets and operating instructions.

2 Safety instructions

Symbols and signal words indicate usage and impact of safety information.

- ▲ DANGER** Draws your attention to a dangerous situation, that **will** result in serious injury or death if it is not avoided.

- ▲ WARNING** Draws your attention to a dangerous situation, that **may** result in serious injury or death if it is not avoided.

- ▲ CAUTION** Draws your attention to a dangerous situation, that may result in a minor to moderate injury if it is not avoided.

- NOTICE:** Indicates possible material damage and other important information.

3 Scope of delivery ODOR on-line

- 1 - Funnel
- 2 - small bottle with 450ml filling mark
- 3 - Large bottle of distilled water
- 4 - Attachment for wash bottle
- 5 - Measuring cup 500 ml



Illustration 1

- 6 - Open-end wrench 7/16"
- 7 - Open-end wrench 27/32 mm
- 8 - Screwdriver
- 9 - Mains cable
- 10 - 9 pin serial cable



Illustration 2

- 10 - 25 pin Sub D socket with housing
- 11 - 5 pin DIN plug
- 12 - Cable with plug for a car cigarette lighter



Illustration 3

- 13 - Detector
- 14 - Detector feed



Illustration 4

- 15 - Hair dryer



Illustration 5

3.1 Other accessories

Additionally required:

Chromium(VI) oxide solution 10% pure in water, 500 ml, is included in the scope of delivery, but will be sent separately as a hazardous substance or brought to the installation by Axel Semrau customer service.

These accessories can be ordered directly from AS with the ODOR on-line:

Carrier gas: dry, oil-free compressed air
or
Nitrogen

Pressure 2 bar, flow 2 l/h to 60 l/h (depending on the application)
AS supplies suitable compressors.

Calibration gas: Preferably all substances to be measured in N₂, concentration close to the concentration in the gas to be measured.
Low adsorption pressure reducer
Consumption approx. 200 ml per calibration

PC/laptop: For the minimum configuration, please refer to our current Installation Requirements document.

Recommended:
Back up option
Internet access (for updates, remote maintenance)

Connection lines: 1/8" Teflon line

4 Installation

⚠ DANGER Installation and commissioning may only be carried out by trained personnel. Connections to gas pipes and electrical connections must be made. Furthermore hazardous substances are used.

NOTE: We recommend installation by Axel Semrau customer service.

4.1 Installation requirements

The current installation requirements are included with the device shipment.

4.2 Flow diagram

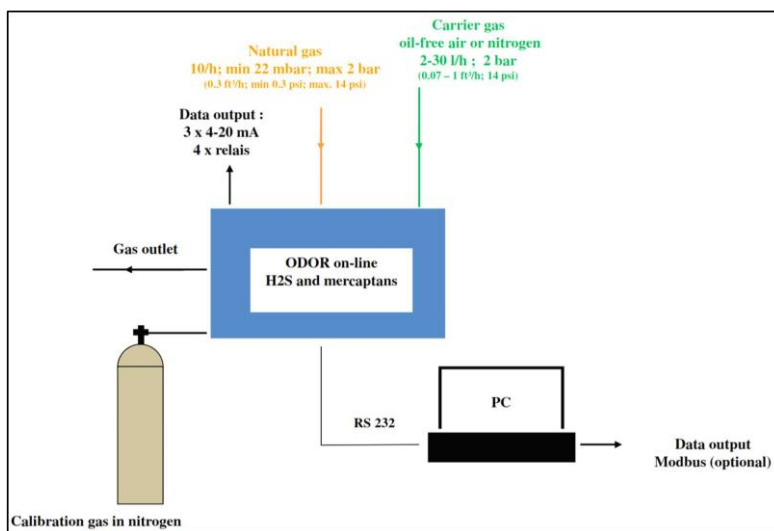


Figure 6

4.3 Installation example

Figure 7 shows a typical installation of an ODOR on-line in a measuring station.



Figure 7

4.4 Making gas connections

The following connections are located on the rear of the ODOR on-line:

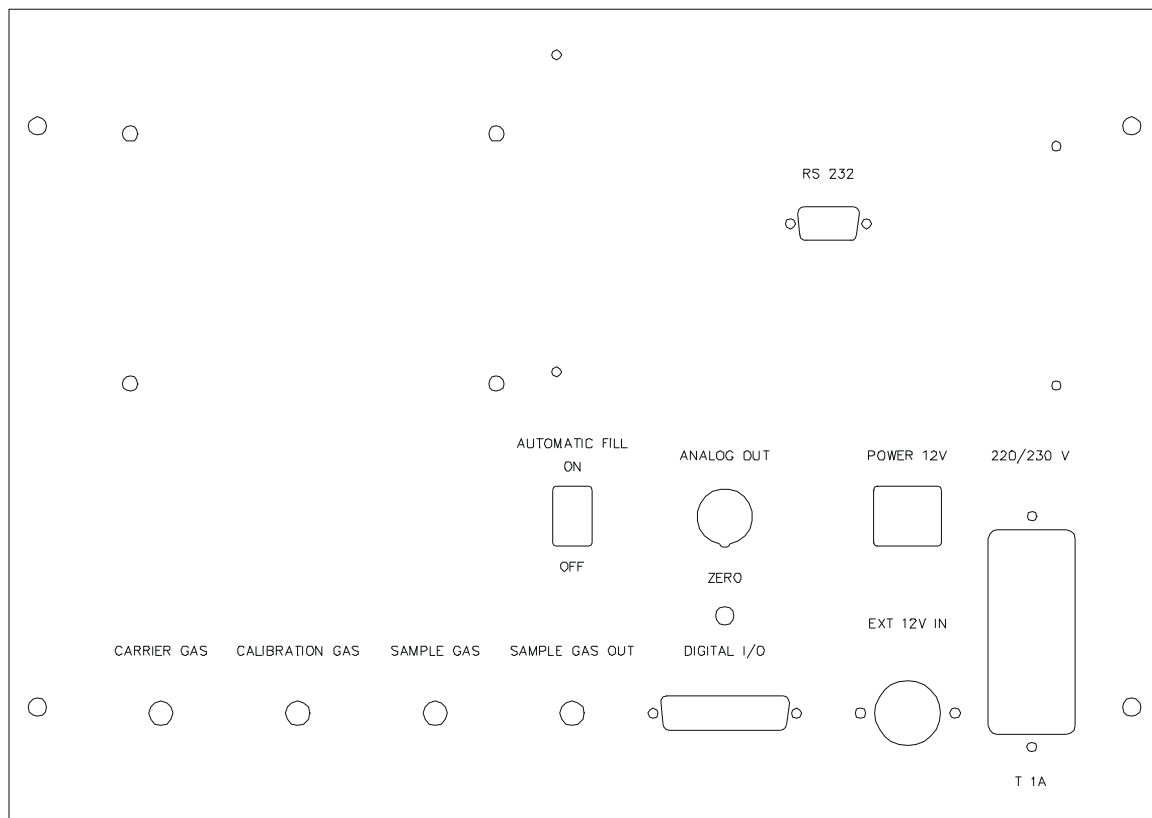


Figure 8

Use a 1/8" PTFE hose to make the following connections:

- 1) SAMPLE GAS OUT to the exhaust air duct (flow rate 10 l/h)
- 2) SAMPLE GAS to the natural gas pipeline (maximum pressure 1 bar)
- 3) CALIBRATION GAS to the pressure reducer of the calibration gas cylinder (maximum pressure 1 bar)
- 4) From the side-mounted pressure reducing unit (Illustration 9) to the carrier gas supply (pressure 2 bar)



Figure 9

4.5 Fill in chromium(VI) oxide solution

▲ DANGER Chromium (VI) oxide solution is a hazardous substance.
Always observe the safety data sheet.

NOTE: We recommend that filling is only carried out by Axel Semrau customer service. Personal protective equipment (lab coat, safety goggles, protective gloves) should be worn when carrying out the activity described below.

450 ml of chromium (VI) oxide solution is prepared using the funnel (No. 1 Illustration 1) into the tank (No. 1 Figure 10).

▲ WARNING: Do not pour the solution into the storage tank for distilled water. This will cause irreparable damage to the instrument.

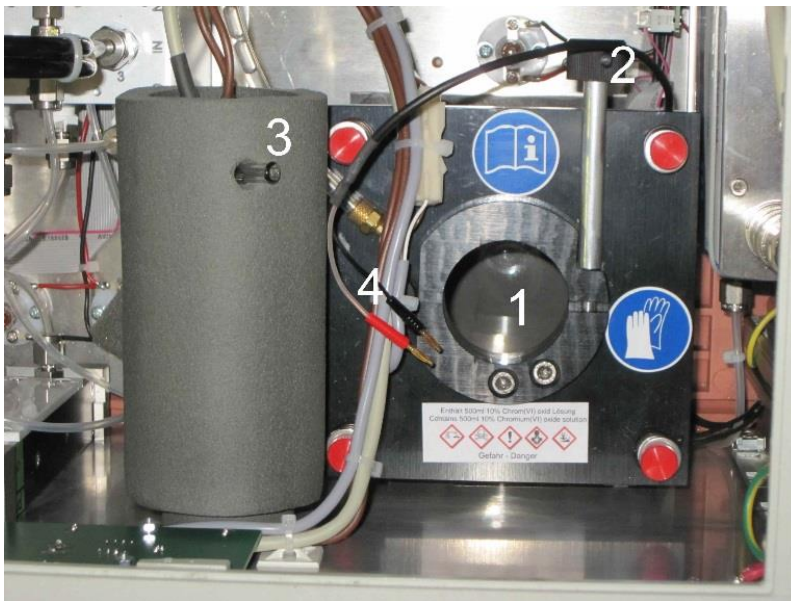


Figure 10

4.6 Inserting the detector

▲ **CAUTION:** The detector is made of glass and is therefore breakable. Never touch the platinum mesh with your fingers or a tool.

Insert the detector (without detector feed!) into the tank and slowly lower it to the bottom of the tank.

The detector must never be lowered completely when the detector feed is still in it.

The solution only passes through the platinum meshes unhindered when they are completely dry.

Now slowly raise the detector again until the upper platinum mesh is approx. 1 cm above the fill level.

The chromium(VI) oxide solution is raised as well by the surface tension.

Now carefully lock the detector in place with the adjusting screw (No. 2 Figure 10) of the fixing ring.

Next, insert the detector feed into the detector and screw it tight. The end of the flexible tube is simply inserted into the outlet of the separation column (No. 3 Figure 10).

There must be no large air bubbles under the platinum nets! If this is the case, the detector must be removed and cleaned (see 15.1. Cleaning the detector).

Now plug in the red and black plugs (No. 4 Figure 10) into the detector.

Finally, fill the storage tank with distilled water.

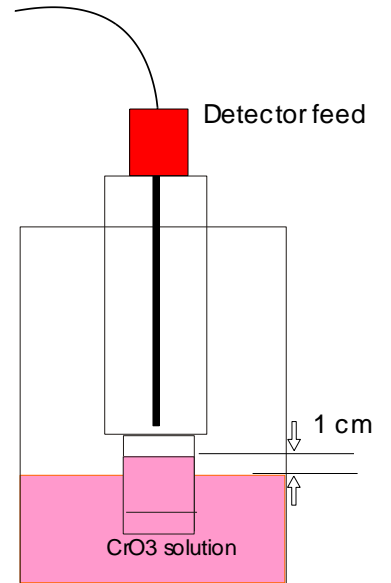


Figure 11

4.7 Electrical connections

4.7.1 Connection PC/laptop and ODOR on-line

Use the supplied serial cable (Illustration 2, No. 10) to establish a connection between the serial interface of your PC/laptop and the RS232 connection on the rear of the ODOR on-line.

4.7.2 Remote transmission 4-20mA

Connect your cable for remote transmission (4-20mA) to the supplied plug (No. 11, Illustration 3) and plug it into the "ANALOG OUT" connection on the back of the device. A detailed description of the pin assignment can be found in chapter "18.4 Analog **outputs**".

4.7.3 MIN MAX warning

A target window can be defined for a substance in the software.

If the concentration falls below the minimum concentration, relay 2 is activated.

If the maximum concentration is exceeded, relay 3 is activated.

You can connect your signal cable with the supplied 25-pin Sub D connector (No. 10, Illustration 3). A detailed description of the pin assignment can be found in chapter "18.5 Relay **outputs**" on page 41.

4.7.4 General fault relay

A common alarm is supplied on relay 1. If the communication between ODOR on-line and the PC breaks down, a corresponding alarm is triggered.

You can connect your signal cable with the supplied 25-pin Sub D connector (No. 10, Illustration 3). A detailed description of the pin assignment can be found in chapter "18.5 Relay outputs" on page 41.

4.7.5 Water level alarm

When the water level in the storage tank falls below a certain minimum, a red LED (LEVEL CHECK) lights up on the front of the ODOR on-line. This signal can also be tapped via the 25-pin Sub D connector. However, this is **not** a relay contact!

A detailed description of the pin assignment can be found in chapter "18.6 Digital inputs" on page 42.

4.7.6 External start

If the ODOR on-line is to be synchronized with another device, it is possible for the ODOR on-line to wait for an external start signal. This must be programmed accordingly in the ODOR control software.

You can connect your signal cable with the supplied 25-pin Sub D connector (No. 10, Illustration 3). A detailed description of the pin assignment can be found in chapter "18.6 Digital inputs" on page 42.

4.7.7 Relay for controlling external devices

Relay 4 can be switched during a measurement or calibration. This allows the status of the ODOR on-lines to be signaled to external devices. Relay 4 is programmed in the ODOR control software.

You can connect your signal cable with the supplied 25-pin Sub D connector (No. 10, Illustration 3). A detailed description of the pin assignment can be found in chapter "18.5 Relay **outputs**" on page 41.

4.7.8 Mains cable

The ODOR on-line can be operated with either alternating current or direct current. For AC operation, check whether the device is designed for 230V operation or 115V operation.

Please check the labeling on the back before plugging in the mains plug. Conversion from 230V to 115V can only be carried out by qualified personnel.

If the device is to be operated via 12 V, the corresponding cable (No. 12, Illustration 3) must be used. It is connected to the "Ext. 12 V in" connection on the back of the ODOR on-lines and can be connected to the cigarette lighter of a car.

5 Commissioning

▲ DANGER Installation and commissioning may only be carried out by trained personnel. Connections to gas pipes and electrical connections must be made. Furthermore hazardous substances are used.

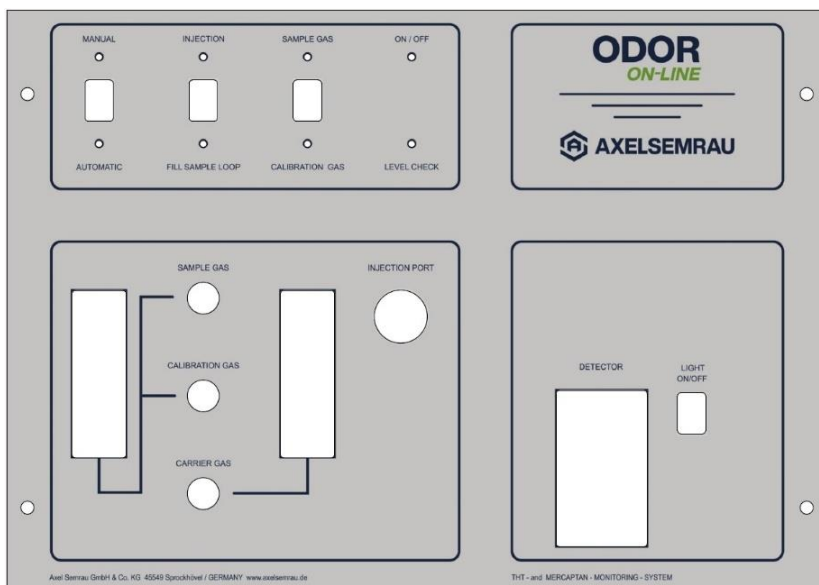
NOTE: We recommend installation by Axel Semrau customer service.

Make sure that the detector is in the correct position. The distance between the upper platinum mesh and the chromium(VI) oxide solution should be approx. 1 cm. The detector feed must be inserted and connected to the separation column (see chapter "4.6 Inserting the detector", page 12).

All gases must be connected as described in chapter 4.4.

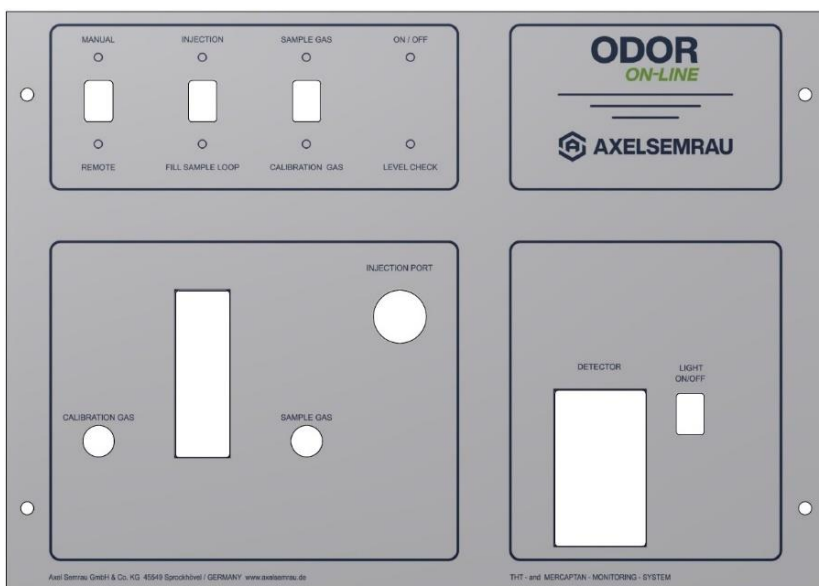
5.1 Carrier gas setting

There are two different versions of the ODOR on-line. In the standard version, the carrier gas (CARRIER GAS) must be set manually via a needle valve. The current setting can be read off the right-hand rotameter. The value depends on the measuring task and the type of separation column installed and can vary between 2 l/h and 60 l/h.



Standard version ODOR on-line

In the version with electronic mass flow controller, the carrier gas flow is set via the ODOR control software. Here, the setting also depends on the measuring task and the type of separation column installed and can vary between 2 l/h and 60 l/h.



Version with electronic mass flow controller

If the desired carrier gas flow (CARRIER GAS) cannot be set, there may be two reasons for this. Either the inlet pressure on the pressure reducer attached to the side is too low or your separating column does not allow a higher flow.

5.2 Sample gas setting

The flow of natural gas (SAMPLE GAS) must be set to 10 l/h with the corresponding needle valve. Please use the scale calibrated to CH₄ (methane).

5.3 Calibration gas setting

The flow of calibration gas (CALIBRATION GAS) must also be set to 10 l/h. To do this, proceed as follows:

Press the SAMPLE GAS/CALIBRATION GAS button to the CALIBRATION GAS position and keep it pressed.

Set a value of 10 l/h using the corresponding needle valve. Use the scale on the rotameter, which is calibrated to AIR (air).

5.4 MANUAL/REMOTE switch (Automatic)

Finally, make sure that the MANUAL/REMOTE (Automatic) switch is in the REMOTE (Automatic) position. This is the only way the PC can switch the valves on the ODOR on-line.

6 Starting an automatic measurement

The prerequisite is that all settings have been made as described in chapter "4 Installation" and chapter "5 Commissioning" have been carried out.

Only a rudimentary description of the operation of the software is given here. Detailed help can be called up at any time in the ODOR control software by pressing F1.

Start the ODOR control program.

Press the "Start measurement" button.

Fill in all the fields in the new window. Our customer service will have created a customized method for you during installation. Select this method or use one of our sample methods from the USB stick.

Press the "Start" button.

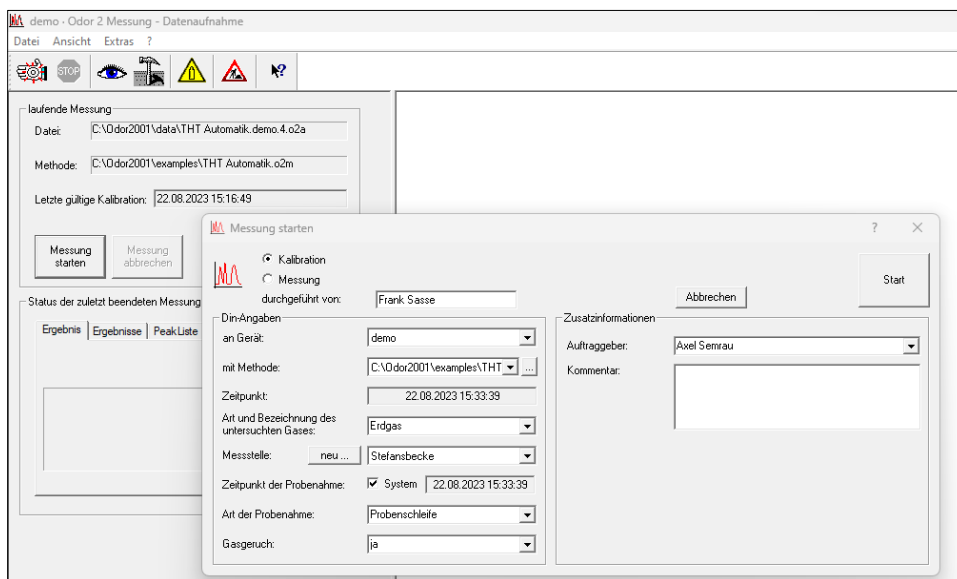


Figure 12

Calibration and measurement now run according to the schedule defined in the method. A typical sequence for automatic operation is as follows:

Calibration:

- Flushing the calibration gas line for 45 seconds
- Filling the gas dosing loop for 15 seconds
- Analysis of the calibration gas.

Measurement:

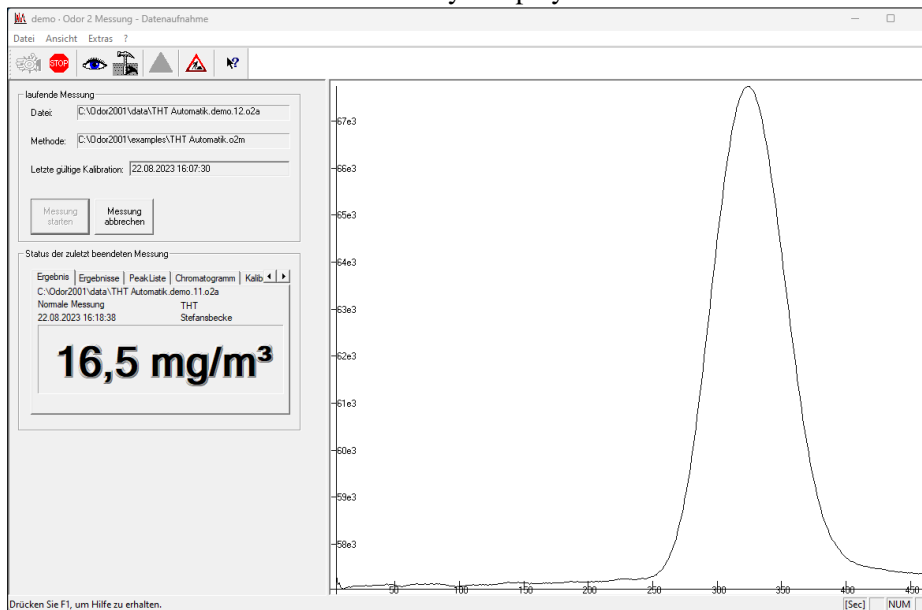
- Filling the gas dosing loop for 15 seconds
- Analysis of the gas

Start of the next measurement

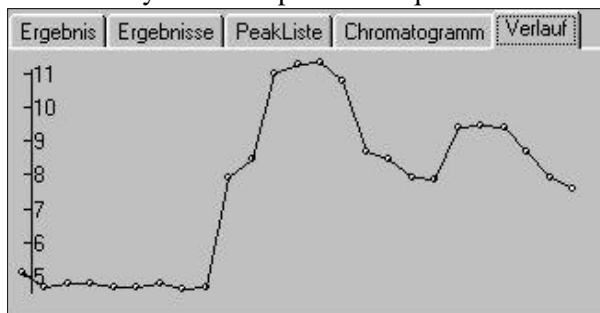
Repetition of the calibration after one hour

6.1 Display measurements

The current measured values are always displayed on the main screen.



The "History" window provides a quick look back at the last measured values.



The data management is available for a comprehensive review. There are also other functions here (e.g. export to Excel, reprocessing, etc.). The data management is started using the eye symbol.

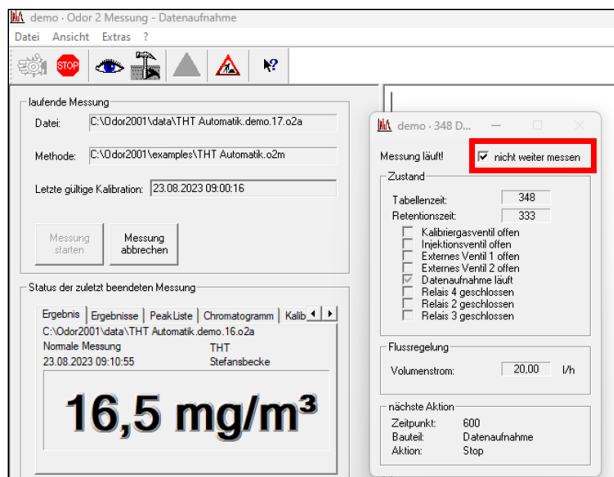



7 Changing the calibration gas cylinder

NOTE: The calibration gas cylinder should be replaced as soon as the **pressure drops below 10 bar**. At lower pressures, it is no longer certain that the calibration gas has the specified concentration!

NOTE: The calibration gas cylinder must also be replaced when the **shelf life is exceeded**. Please refer to the corresponding note on your calibration gas certificate for the shelf life of your calibration gas.

- The measurement should be stopped before changing the calibration gas bottle. End the current measurement by marking the function *Do not continue measurement*. Once the active calibration or measurement has ended, no further measurement will be carried out.



If your method contains a long waiting time, it is advisable to end the current measurement by *canceling the measurement* or .

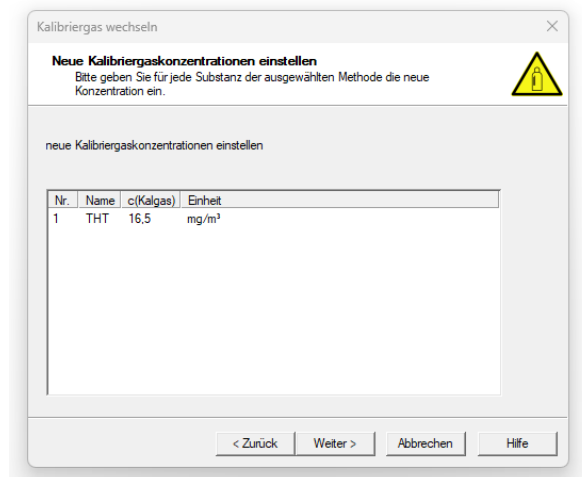
- Each time you change the calibration gas cylinder, check that the seal on the pressure reducer is still in perfect condition.
- Flush the pressure reducer at least three times.
- After changing the calibration gas bottle, check whether the calibration gas flow is still correct. Proceed as follows:
Press the SAMPLE GAS/CALIBRATION GAS button to the CALIBRATION GAS position and keep it pressed.
- Set a value of 10 l/h using the corresponding needle valve. Use the scale on the rotameter, which is calibrated to AIR (air).

In the last step, the current calibration gas concentration must be communicated to the ODOR control software. This is done using the "Change calibration gas bottle" function.

- To do this, open the method editor via the "Cal gas bottle" icon
- Open the measurement method you are using.



- Enter the new calibration gas concentration here. After you have overwritten the old value, press "Next" and "Finish" to save the concentration of the new calibration gas bottle.



Restart calibration and measurement.

8 Measurements of external samples from gas sampling bulb or sampling bag

With ODOR on-line you have the option of measuring samples from other measuring points. Gas samples can be taken either in gas sampling bulbs made of glass or in Tedlar sampling bags made of plastic. This gives you the opportunity to obtain accurate chromatographic ODOR on-line data from all relevant measuring points in your gas network.

Gas sampling bulbs are robust and can be reused indefinitely, but a gas-tight syringe must be used when taking samples. Tedlar bags, on the other hand, are easier to handle because they can be connected directly to the ODOR on-line. The biggest disadvantage of Tedlar bags is their limited shelf life, as they tend to leak over time.

In general, samples should be measured as soon as possible after sampling. For THT measurements with the ODOR on-line, Tedlar bags should be measured within 24-48 hours after sampling. Samples in glass gas sampling bulbs generally have a slightly longer shelf life.

Gas sampling bulbs, Tedlar sampling bags, transport cases and all the necessary accessories are available from Axel Semrau.

When measuring external samples from gas sampling bulbs or sampling bags, particular attention must be paid to correct sampling and sample introduction into ODOR on-line. The exact procedures are described in the following chapters 8.1 and 8.2 below.

8.1 Measurement with gas sampling bulb

The sample is taken manually from a gas sampling bulb using a gas-tight syringe. To take a sample, the gas sampling bulb must be flushed with gas for a sufficiently long time. At 22 mbar line pressure, flushing should take at least 4 - 5 minutes, as the flow rate is approximately 0.5 l/h.

8.1.1 Sampling using a gas sampling bulb

- Open the sealing cap 1 and valves 2 and 3.
- Connect the gas mouse to the gas line using an adsorption-free hose and allow the gas to flow through for several minutes. The gas sample should flow through the gas mouse from top to bottom so that the air is displaced from the gas mouse faster and more effectively.
- Close the gas mouse in the following order: valve 3, valve 2, sealing cap 1.

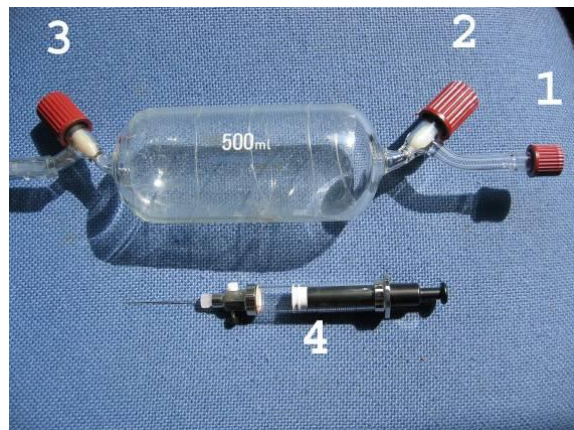


Figure 13

8.1.2 Sampling from a gas sampling bulb

- Open the valve 2.
- Use the gas-tight syringe to pierce through the septum in the sealing cap 1.
- Draw up the syringe fully several times to flush and empty it back into the gas sampling bulb without pulling the needle out of the gas sampling bulb.
- Draw up the syringe one last time and wait 10 seconds until the pressure has equalized.
- Now pull the syringe out of the gas sampling bulb.
- Press the excess amount out of the syringe.
- Close the small valve on the gas-tight syringe.
- Finally close the valve 2.

8.1.3 Injection of a glass bulb sample

It is very important that you inject the same amount of gas during manual measurement as during calibration. In principle, there are two possibilities:

A *The calibration gas is also injected manually with a syringe.*

During calibration, 10 ml of gas is injected; during the subsequent measurement, 10 ml of natural gas is injected as well. It is important to ensure that the method used contains the correct concentration of the calibration gas.

B *The calibration gas is injected automatically.*

In this case, the amount of gas that is injected during automatic calibration must first be determined. This quantity of gas is referred to as the equivalent volume and is usually between 7 ml and 11 ml. The equivalent volume must be determined individually for each device (see chapter 9 Equivalent volume).

When the natural gas sample is injected, the equivalent volume is injected.

Here too, it is important to ensure that the method used contains the correct concentration of the calibration gas.

- Start your measuring method for gas sampling bulb measurement.
- Follow the instructions on the screen.
- Insert the syringe into the injector of the ODOR on-lines as far as it will go. In this process, the needle pierces the septum in the injector.
- Open the sealing valve on the gas-tight syringe.
Caution: A pressure of up to 2 bar is now created inside the syringe. Hold the plunger of the syringe firmly so that it does not fly out backwards!
- Inject the volume of the syringe quickly.
- Wait 4 seconds before pulling the syringe out again.

- 1 Gas-tight syringe
- 2 Injector
- 3 Septum
- 4 Syringe needle
- 5 Separating column

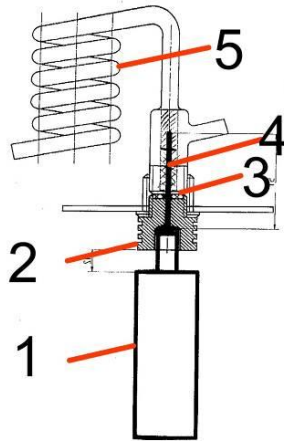


Figure 14

8.1.4 Septum replacement

The septum in the injector should be replaced after about 10 injections.

⚠ WARNING: Before carrying out this work, the separating column must be depressurized, otherwise serious damage to the instrument may occur!

- Switch off the carrier gas supply (compressor or nitrogen cylinder).
- Wait until the side-mounted control unit (Illustration 9) displays 0 bar.
- Now unscrew the injector.
- Replace the septum.
- Tighten the injector again by hand.
- Switch the carrier gas supply back on.

1 septum



Figure 15

8.2 Measurement with sampling bags

5L Tedlar sampling bags with a protective cover are used for sampling at natural gas measuring points. Tedlar bags have a short plastic connection piece for a ¼" hose and a shut-off valve (Figure 16).



Figure 16

8.2.1. Sampling with Tedlar sampling bag

A hose connection from the measuring point to the connection piece of the Tedlar bag is required for sampling.

- Flush the hose connection with natural gas to displace the air from the hose.
- Push the hose onto the connection piece.
- Open the valve so that the Tedlarbag is filled with natural gas. The valve should be opened by a maximum of one turn. Close the valve when the sampling bag is full.

NOTE: Tedlar bags should only be filled to approx. 80% capacity and **not with excess pressure**, as excessive gas pressure significantly shortens the service life. If the bag has been filled for too long, the excess pressure can simply be released by briefly opening the valve.

8.2.2. Connecting the Tedlar bag to the ODOR on-line

You can connect Tedlar sampling bags directly to the sample gas connection on the back of the ODOR on-lines device. If you want to switch frequently between the measurement of external samples and the online measurement from a gas measuring point, Axel Semrau offers a 3-way ball valve for mounting on the right-hand side of the device. The 3-way ball valve makes it easy to switch from the local gas line to Tedlarbags, eliminating the need to connect and disconnect the permanent gas supply line to the sample gas connection on the back of the device.



Figure 17

8.2.3. Measurement with sampling bag

- Open the valve of the Tedlar bag.
- Apply slight pressure to the Tedlarbag, e.g. by placing a book or similar object on it.
- Adjust the flow of sample gas to 10 l/h using the needle valve.
- Start the measurement.

NOTE: Depending on the measurement method, sample feeding from the Tedlar bag can be terminated after a short time. This allows several measurements to be taken with one sample if required.

8.2.4. Preparation of the Tedlar bag for the next sampling

- Open the valve.
- Squeeze the sample gas out of the sampling bag as completely as possible. A good way to do this is to pull the opened bag over the edge of a table.
- Close the valve.

9. Equivalent volume

The equivalent volume is required if samples are injected manually but calibration is to be performed automatically from the calibration gas bottle.

The equivalent volume is the amount of gas that is dispensed during an automatic injection. In addition to the volume of the sample loop, it also contains the dead volume of the valves and lines.

The equivalent volume must be determined individually for each device.

To determine the equivalent volume, calibration gas is injected several times automatically and manually. The equivalent volume is then calculated using the areas of the peaks.

Example:	Automatic injection of calibration gas	Result: Area 8,100
	Manual injection of 10 ml calibration gas	Result: Area 10,100
	Automatic injection of calibration gas	Result: Area 8,000
	Manual injection of 10 ml calibration gas	Result: Area 10,000
	Automatic injection of calibration gas	Result: Area 7,900
	Manual injection of 10 ml calibration gas	Result: Area 9,900

Average values

Automatic injection of calibration gas	Result: Area 8,000
Manual injection of 10 ml calibration gas	Result: Area 10,000

$$\text{Equivalent volume: } \frac{\text{Automatic injection area}}{\text{Area manual injection}} * 10 \text{ ml} = 8 \text{ ml}$$

10. Mobile Use

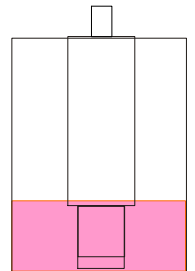
The ODOR on-line has been used successfully for odorization control in mobile measuring vehicles for a long time. There are a few things that need to be taken into account.

10.1. Lowering the detector

The detector must be lowered into the "park position" while driving so that the liquid film does not break off during the journey.

Proceed as follows:

- Pull the end of the detector supply line out of the separating column (no. 3, Figure 10).
- Unscrew the detector feed from the detector and remove it.
- Loosen the fixing screw of the adjusting screw (no. 2, Figure 10) of the fastening ring.
- Lower the detector.



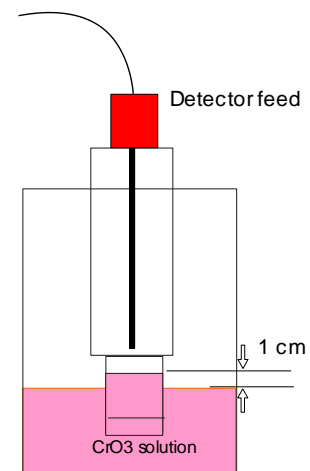
⚠ CAUTION The detector must never be fully lowered if the detector feed is still inserted in it.

At the new location, the detector is then first pulled back into the "working position".

Proceed as follows:

- Pull the detector up until the upper platinum mesh is approx. 1 cm above the fill level.
- The surface tension of the solution also raises the chromium(VI) oxide solution.
- Now carefully lock the detector with the adjusting screw (no. 2, Figure 10) of the fixing ring.
- Next, insert the detector feed into the detector and screw it tight. The end of the flexible tube is simply inserted into the outlet of the separation column (no. 3, Figure 10).

NOTE: *There* must be no large air bubbles under the platinum nets! If this is the case, the detector must be removed and cleaned. (see chapter 15.1. Cleaning the detector)



10.2. Automatic Fill switch

The ODOR on-line has a fill level control in the detector tank. If the fill level has dropped too low due to evaporation of the distilled water, distilled water is automatically refilled from the storage tank. The switch is always in the ON position on a stationary ODOR on-line.

During the journey from measuring point to measuring point, the ODOR on-line usually remains switched on so that the separating column is kept at temperature.

▲ CAUTION: However, the "Automatic Fill" function must be switched off while driving, as otherwise water would always be refilled when cornering.

It is sufficient to turn on the Automatic Fill switch once or twice a week for one minute.

10.3. Temperature

The ambient temperature can fluctuate extremely in the measuring vehicle. However, this is not a problem. If there are significant shifts in the retention time, it must simply be adjusted to the new conditions. (see chapter 16.1. Adjusting the retention time)

▲ WARNING: Ensure that the ambient temperature does not reach freezing point. The instrument contains water, which will then freeze and cause damage to the ODOR on-line!

NOTE: For reliable operation of the ODOR on-line in the measuring vehicle, a constant temperature of the detector is advantageous, as the sensitivity of the detector is temperature dependent. To achieve stable measurement operation more quickly, especially at low outside temperatures, we recommend the use of a tank heater, which is available from Axel Semrau as an option for the ODOR on-line.

The retention time depends to a large extent on the temperature of the separation column. The setting of the column temperature is described in chapter 18.7 **Heating**. If the measuring method permits, the column temperature should be 10 °C above the ambient temperature to minimize fluctuations in the retention time.

11. Double system

The ODOR on-line is also available as a dual system for measuring natural sulfur. The substances hydrogen sulfide (H₂S), mercaptans and sulfides can be measured on the first system.

Carbonyl sulfide (COS) is measured on the second system. The COS system uses a 15% potassium hydroxide solution as a reagent instead of the chromium(VI) oxide solution. A filter is also installed.

▲ DANGER Potassium hydroxide solution is a hazardous substance. Always observe the safety data sheet.

The two systems are wired in such a way that the first system gives a start signal for the second.

The maintenance work and maintenance intervals of the COS system differ from those of the chromium (VI) oxide solution system.

Please contact our customer service if necessary.

12. Liquid injections

You also have the option of carrying out liquid injections with the ODOR on-line. The liquid injection is used as a reference standard in the production of calibration gas.

In contrast to calibration gas cylinders, liquid standards can be produced with greater accuracy.

Calibration solution, syringes and further information are available from Axel Semrau GmbH.

13. Power failure

The ODOR on-line and the ODOR control software are designed so that the system restarts automatically after a power failure. It starts with a calibration and then continues to work with the current measuring method.

Please follow the instructions for the settings on your PC/laptop, which you can find in the online help for the ODOR control software.

14. Visual inspections

The following visual inspections should be carried out regularly:

- Calibration gas: Pressure of the calibration gas cylinder > 10 bar
Calibration gas flow 10 l/h (see chapter 5.3 Calibration gas setting, page 17)
- Natural gas: Sample gas flow 10 l/h (see chapter 5.2 Sample gas setting, page 17)
- Carrier gas: Pressure at the side pressure reducing unit 2 to 2.5 bar
For devices without a mass flow controller, the flow must also be checked (see chapter 5.1 Carrier gas setting, page 15).

Condensate from the pressure reducing unit

When carrier gas is supplied using ambient air, water collects in the water separator of the pressure reducing unit over time. This can be drained by pressing on the drain opening.



Fill level of the storage tank for distilled water

The storage container for distilled water has a volume of approx. 1 l and lasts for several months at normal humidity.

If the fill level is too low, this is indicated by a corresponding "Level Check" light on the front of the ODOR on-lines. In this case, the reservoir must be refilled with distilled water.

▲ CAUTION There are electrical components in the appliance. Fill with water with caution.

15. Maintenance

The German DVGW regulations require annual maintenance of the gas chromatograph in its worksheet G465-4.

▲ DANGER This maintenance may only be carried out by qualified personnel.

The following work is carried out during annual maintenance:

- Adsorption test
- Reproducibility test
- Two-channel test
- Visual inspection of the chromatographic separation column and replacement if necessary
- Change of the chromium(VI) oxide solution (if necessary).

15.1. Cleaning the detector

The detector should be cleaned as soon as there are large air bubbles under the platinum mesh or if there are other problems with the measurement.

▲ DANGER Chromium(VI) oxide solution is a hazardous substance, as is Potassium hydroxide solution. Always observe the safety data sheet.

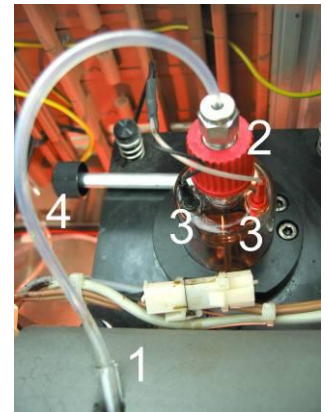
You need to clean the detector:

- Vessel (e.g. measuring cup)
- Syringe bottle with distilled water
- Hair dryer
- Gown, gloves and safety goggles
- Cloth for wiping up drops of chromium (VI) oxide solution

Please note that the chromium (VI) oxide solution is harmful to health. Avoid any skin contact.

15.2. Removing the detector

- Switch off the device.
- Pull the end of the detector feed (no. 1) out of the separating column.
- Unscrew the detector feed (no. 2) from the detector.
- Pull the red and black plugs (no. 3) out of the detector.
- Loosen the adjusting screw (no. 4) of the fastening ring.
- Remove the detector and place it in the vessel.



15.3. Rinsing and drying the detector

Now rinse the inside and outside of the detector thoroughly with distilled water.

▲ Caution: The detector is made of glass and is therefore breakable. Never touch the sensitive platinum meshes. Especially not with the tip of the syringe bottle.

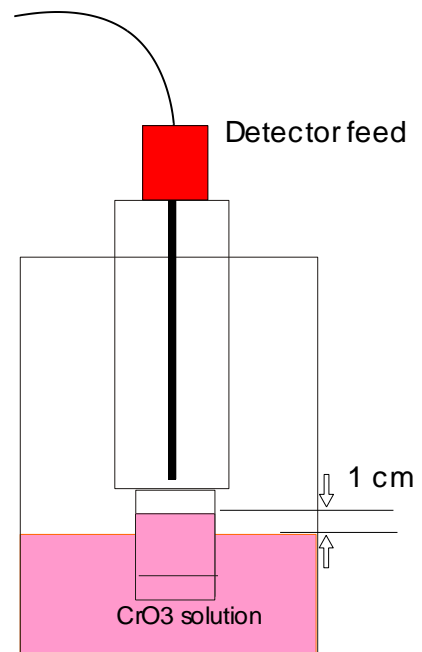
Now dry the detector with a hair dryer. It is important that the platinum meshes are completely dry. It takes several minutes until the inner platinum mesh is also dry.

Only a detector with dry platinum mesh can be properly reinstalled.

15.4. Reinserting the detector

- Insert the detector (without detector feed!) into the tank and slowly lower it to the bottom of the tank. The solution only passes unhindered through the platinum nets when they are completely dry.
- Now slowly raise the detector again until the upper platinum mesh is approx. 1 cm above the level. The chromium(VI) oxide solution is also raised due to the surface tension.
- Now carefully lock the detector in place using the adjusting screw on the fastening ring.
- Next, insert the detector feed into the detector and screw it tight.
- Insert the end of the flexible hose back into the separating column.
- Now plug the red and black plugs back into the detector.

After cleaning, the detector needs several hours to regain its full sensitivity.



16. Troubleshooting

The ODOR on-line is a robust and reliable measuring instrument. If errors do occur, they can often be fixed by the user.

Here is a list of possible errors with instructions on how to fix them:

No peaks

- Are all electrical connections made correctly?
- Is the Manual/Remote(Automatic) switch set to REMOTE(Automatic)?
- Is the pressure of the carrier gas set correctly?
- Is the flow rate of the carrier gas set correctly?
- Is the flow rate of the calibration gas set correctly?
- Is the flow rate of the sample gas (natural gas) set correctly?
- Is the septum at the injection port tight?

If necessary, the detector must be cleaned (see chapter 15.1. Cleaning the detector).

Peak present, but result zero

If a peak is visible but 0 is displayed as the result, a shift in the retention time is probably the cause. The reason for a shift in the retention time is usually a major change in the room temperature or a change in the carrier gas settings (pressure, flow rate). The problem can be solved either by correcting the measuring conditions (ambient temperature, carrier gas setting) or by adjusting the retention time (section 16.1.).

Peak is not through to the end of the measurement.

If the peak is no longer fully recorded, the retention time has obviously increased. A major change in the ambient temperature or a change in the carrier gas settings may be the cause. If the cause of the delay cannot be eliminated, the analysis time can be extended and the retention time adjusted (section 16.1.).

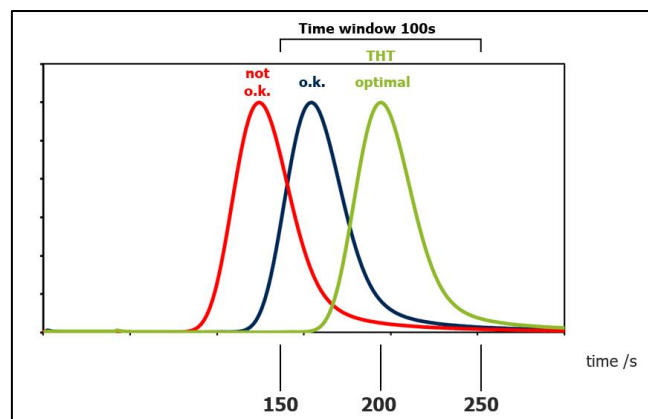
Noisy baseline

- The detector may need time to stabilize. A measurement of several calibrations shows the trend and the stability and reproducibility of the measurement.
- THT in the ambient air may be the cause.
- An unsteady baseline can be caused by electromagnetic interference (other machines, cell phone).

16.1. Adjusting the retention time

If the result of a measurement is zero, a shift in the retention time may be the cause (see chapter 17.1. Evaluation of the measurement via retention time and peak area). The retention time can shift due to a change in the room temperature or the carrier gas flow.

For the ODOR control software to recognize the THT in the measurement, the THT peak must lie within the window of the retention time that is saved in the measurement method (see also chapter 17.1.).

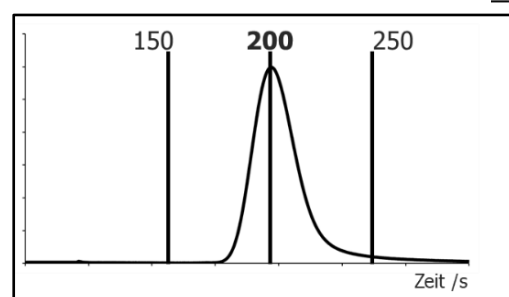


The retention time in the ODOR control software is adjusted in the method on the "Calibration" tab. To do this, open the method editor via the "Hammer" icon.

Select the measurement method you are using and enter the new retention time on the "Calibration" tab. Save the changes.



No.	Name	Retention time	Time window	Reference	Factor	Precision	c(Calgas)	Unit	Are
1	H2S	70	50		1	3,2	mg/m ³	153	
2	MeSH	600	200		0	2	mg/m ³	0	



The retention time depends to a large extent on the temperature of the separation column. The setting of the column temperature is described in chapter 18.7. **Heating.**

If the measuring method permits, the column temperature should be 10 °C above the ambient temperature to minimize fluctuations in the retention time.

17. Operating Principle

The ODOR on-line is a gas chromatograph that operates according to the following standards: ISO 6323 T2, ISO 19379, DIN 51855 part 7 and reference method according to DVGW worksheet G280.

The challenge of odorization control is that the concentration of the odorant must be determined accurately and reliably regardless of the composition of the natural gas. The advantage of a gas chromatograph such as the ODOR on-line is that a gas mixture such as the natural gas sample to be measured is first separated into its individual components. The separation is followed by the actual measurement with a detector that only shows components containing sulfur. In addition to the odorant (e.g. THT), other sulfur compounds such as H_2S can also be measured.

Due to the combination of separation and detection, gas chromatography is more accurate and reliable than other analysis methods and is therefore required in DVGW worksheet G280 for recorded measurements.

As soon as the device is connected to natural gas, a constant flow of 10 l/h natural gas passes through the ODOR on-line. A sample of approx. 10 ml is automatically taken from this gas flow at regular intervals. This is done by means of electromagnetic valves and the gas dosing loop.

The sample is flushed with a carrier gas flow through a packed and isothermally heated separation column and separated into its components. In ODOR on-line, the carrier gas is a constant flow of air, which is usually generated by a compressor. The odorized natural gas sample is a mixture of different gases that besides methane contains ethane, H_2S or THT. These gases remain in the separation column for different lengths of time, resulting in a separation over time.

An electrochemical detector is connected to the output of the separation column. This detector only reacts to sulfur compounds and not to all other gas components. A peak is therefore obtained for each individual sulfur component. The measurement is therefore a sequence of peaks over time, also known as a chromatogram.

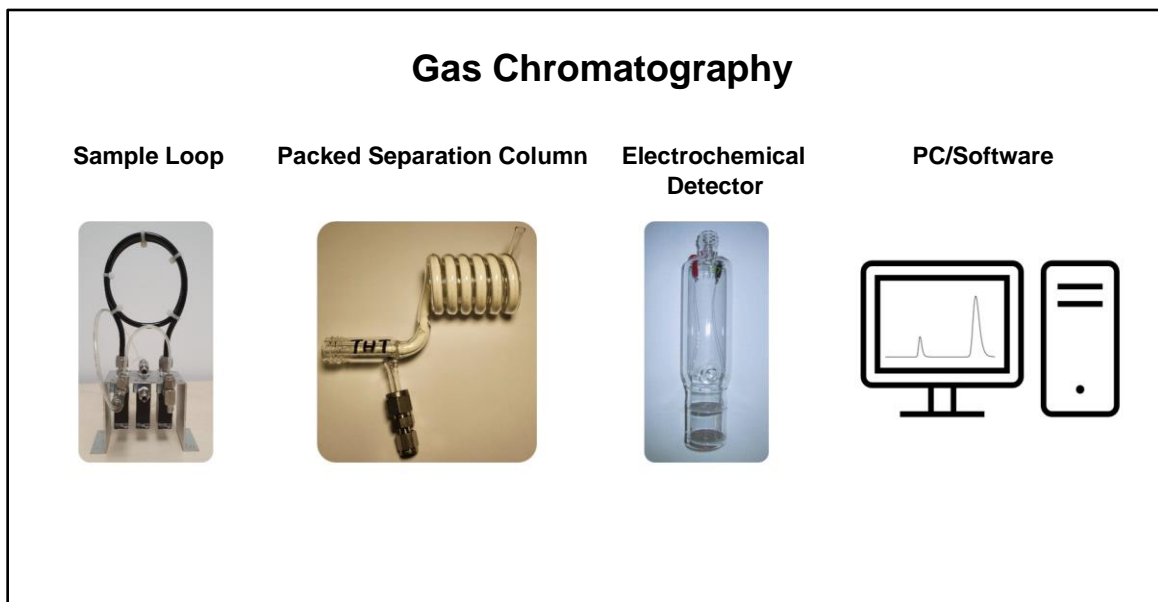
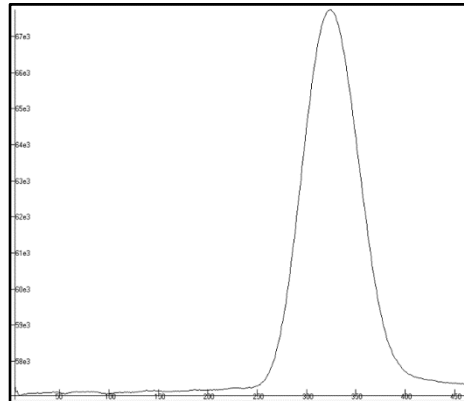


Figure 18

17.1. Analysis of the measurement via retention time and peak area

The measurement of the ODOR on-line, the chromatogram, shows the detector signal as a function of time.



The individual sulfur components (e.g. H₂S or THT) of the gas sample are identified via the retention time. The retention time is the residence time of the component in the separation column; it is measured as the time between injection of the sample and detection of the component in the detector.

The retention time of a component in the ODOR on-line depends on the measuring conditions; the properties of the separation column, but also the temperature and the flow rate of the carrier gas are important (see also chapter 10.3 **Temperature**).

To reliably identify and accurately determine the concentration of THT in natural gas, the ODOR on-line must be calibrated. Calibration is performed by measuring a calibration gas, i.e. a gas sample with a precisely known THT concentration in nitrogen.

Calibration gas cylinders for THT with certificate of analysis are available from Axel Semrau.

During the data analysis, the THT is then identified with the retention time and the concentration is determined by comparison of the peak area by with the area of the calibration gas peak. The ODOR on-line calibrates itself automatically at set intervals. For this purpose, a sample is taken from the connected calibration gas bottle.

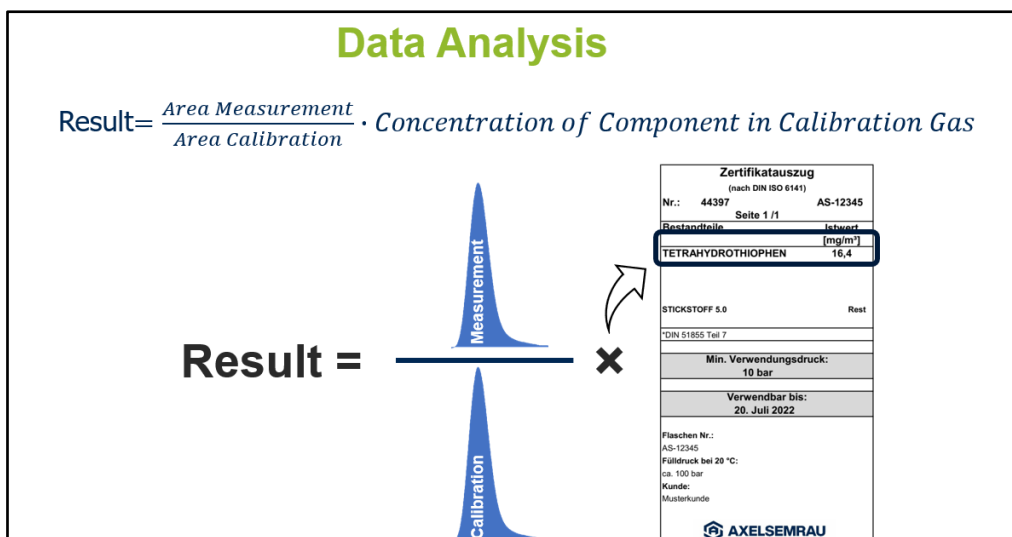


Figure 19

All data is stored on a PC/laptop. The ODOR control software, which controls all ODOR on-line processes, runs on this PC. The PC must be permanently connected for operation. Communication takes place via the serial interface.

The ODOR on-line has relay outputs and current interfaces for remote transmission. In addition, Modbus software is available for the transmission of measurement results and alarms.

In addition to automatic sample injection, the ODOR on-line also has an injector for manual injection of gas samples.

18. Technical data

18.1. Type plate

The rating plate is located on the back of the instrument.



18.2. General electrical data

Mains operation 230V AC:

Supply voltage:	230 V AC / +- 10% / 50 - 60 Hz
Maximum current:	500mA
Fuses:	Rear panel: 1 AT
	Processor card: F1 2 AT
	F2 100 mAT
	Analog card: F1 5 AT
	F2 315 mAT

Mains operation 115 V AC: **conversion required**

Supply voltage:	115 V AC / +- 10% / 50 - 60 Hz
Maximum current:	1A
Fuses:	Rear panel: 1 AT
	Processor card: F1 2 AT
	F2 200 mAT
	Analog card: F1 5 AT
	F2 630 mAT

Mobile operation 12 V DC:

Supply voltage:	12 V DC / +- 10 %
Maximum current:	6 A
Fuses:	internally not fused, External protection must be guaranteed

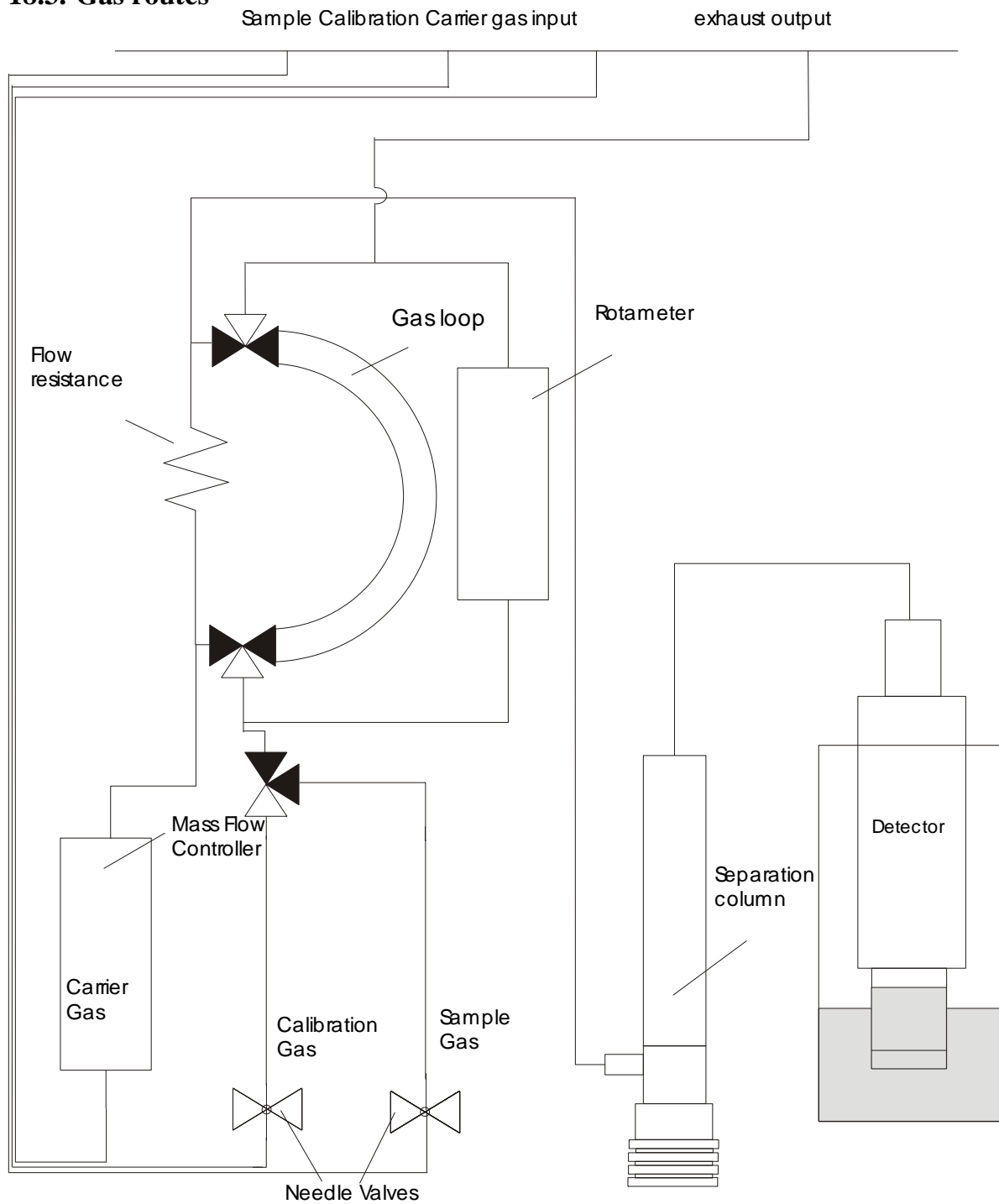
Relay outputs: 4 x UM
per contact: max. 30V / 1A

Inputs: 6 x
Actuation by external NO contact,
5 V / 1 mA

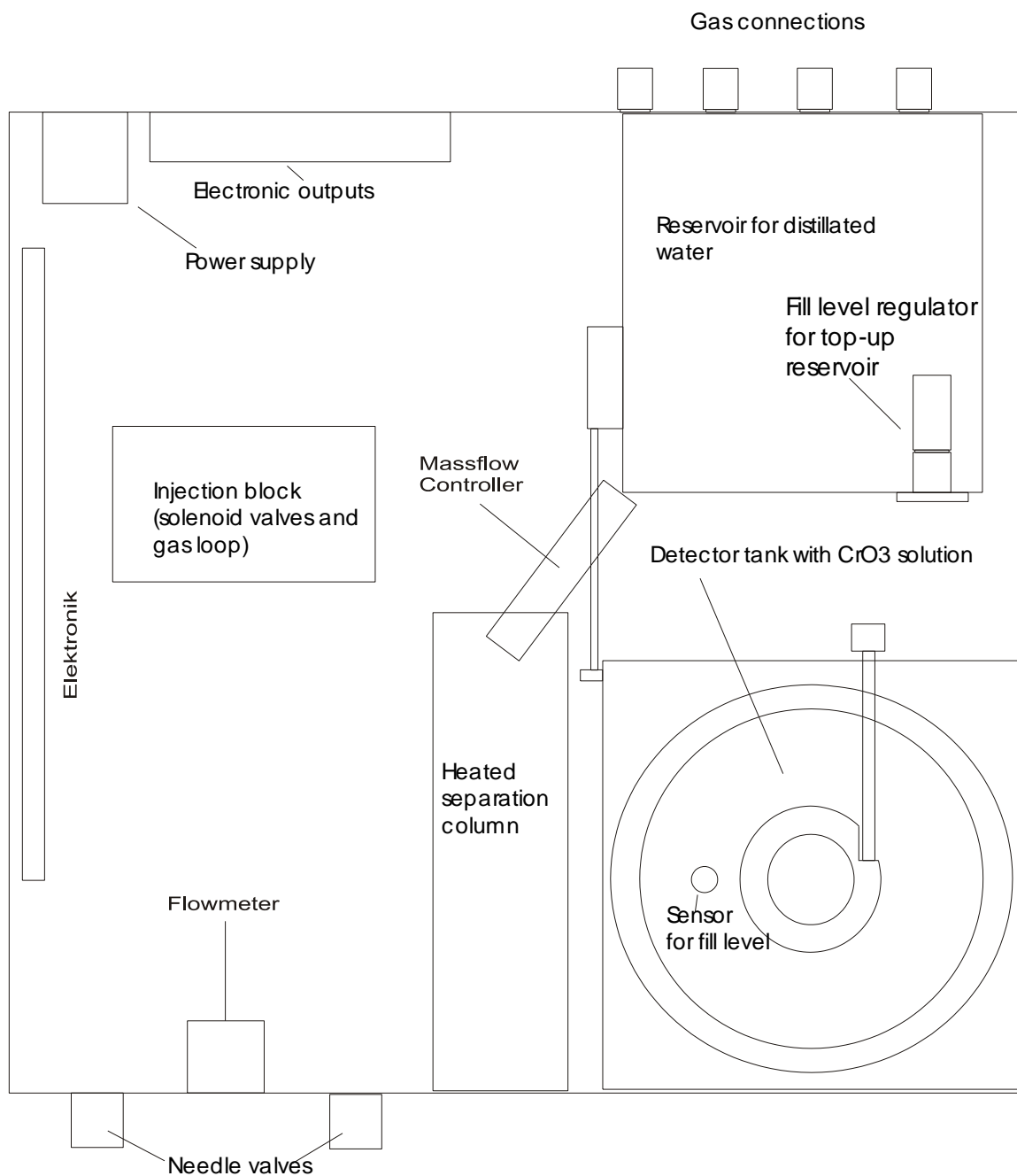
Current outputs: 3 x 0..20 mA or 4-20 mA
12 bit DA each
galvanically isolated
max. external impedance 500 Ohm

Reserve valves: 12 V / 4 W suppressed (freewheeling diode directly on the valve)

18.3. Gas routes



Schematic plan



18.4. Analog outputs

The analog outputs can be tapped on the 5-pin DIN connector on the rear panel. Pin 1 is the common ground, pins 2 to 5 correspond to output channels 1 to 4. As these are 0-20 mA or 4-20 mA signals, they are short-circuit-proof. However, the external impedance should not exceed 500 Ohm.

The assignment of the output channels to substances such as THT is done in the ODOR control software. Here, it is also possible to define if 0-20 or 4-20mA are supplied. If the communication with the PC is interrupted for unforeseen reasons, all four channels are set to 0. The resolution of each channel is 12 bits.

Function	5-pin DIN socket Back panel ODOR on-line
Common ground	1
0-20 mA channel 1	2
0-20 mA channel 2	3
0-20 mA Channel 3	4
0-20 mA channel 4 (used internally for mass flow controller)	5

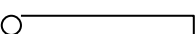
18.5. Relay outputs


Four relay outputs are available, some with predefined functions.

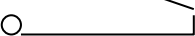
- Relay 1: general fault relay, drops down in the event of an error.
- Relay 2: Alarm relay when the concentration falls below a minimum level
- Relay 3: Alarm relay when a maximum concentration is exceeded
- Relay 4: freely available in the software

Each relay has a normally closed contact and a normally open contact (1 x um), which can be equipped with 30 V and 1 A.

In ODOR online, these outputs are wired via a 25-pin Sub D connector in the rear panel.

NO  Relay contact on the circuit board

MK 

NC 

Function		25-pin Sub D connector Rear panel
Relay 1 general fault	NO	1
Relay 1 general fault	MK	14
Relay 1	NC	2
Relay 2 Min Alarm	NO	15
Relay 2 Min Alarm	MK	3
Relay 2	NC	16
Relay 3 Max alarm	NO	4
Relay 3 Max alarm	MK	17
Relay 3	NC	5
Relay 4 Freely available	NO	18
Relay 4 Freely available	MK	6
Relay 4	NC	19

18.6. Digital inputs

The states of the digital inputs are transmitted to the PC every 100 ms and must also be processed there. They can be tapped at the 25-pin Sub D on the rear panel.

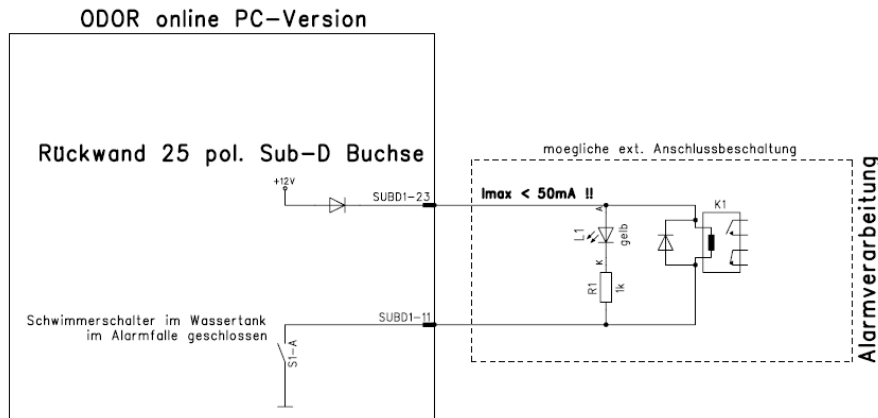
Input 6 is already reserved for an external start signal. (Waits for the state of digital input No. 6 to change, pins 22 and 10 on the 25-pin Sub D connector on the rear of the instrument).

Inputs 7 and 8 are also assigned: 7 sends the water refill alarm and 8 sends the status of the auto/manual switch on the front panel to the PC.

Logic state 1 is generated for inputs 1 to 6 by connecting the input pin to the common ground (external potential-free contact).

Function		25-pin Sub D plug Back wall
Input 1	ES	7
Input 2	ES	20
Input 3	ES	8
Input 4	ES	21
Input 5	ES	9
Input 6 [external start]	ES	22
Input mass		10
ext. +12 V		23
Input 7 [Level check alarm]	M	11
Input 8 [Auto/Man]	M	24

ES = external contact closed to input ground, M = switched ground of the external 12 V for input 7 and input 8



Possible wiring for water alarm

18.7. Heating

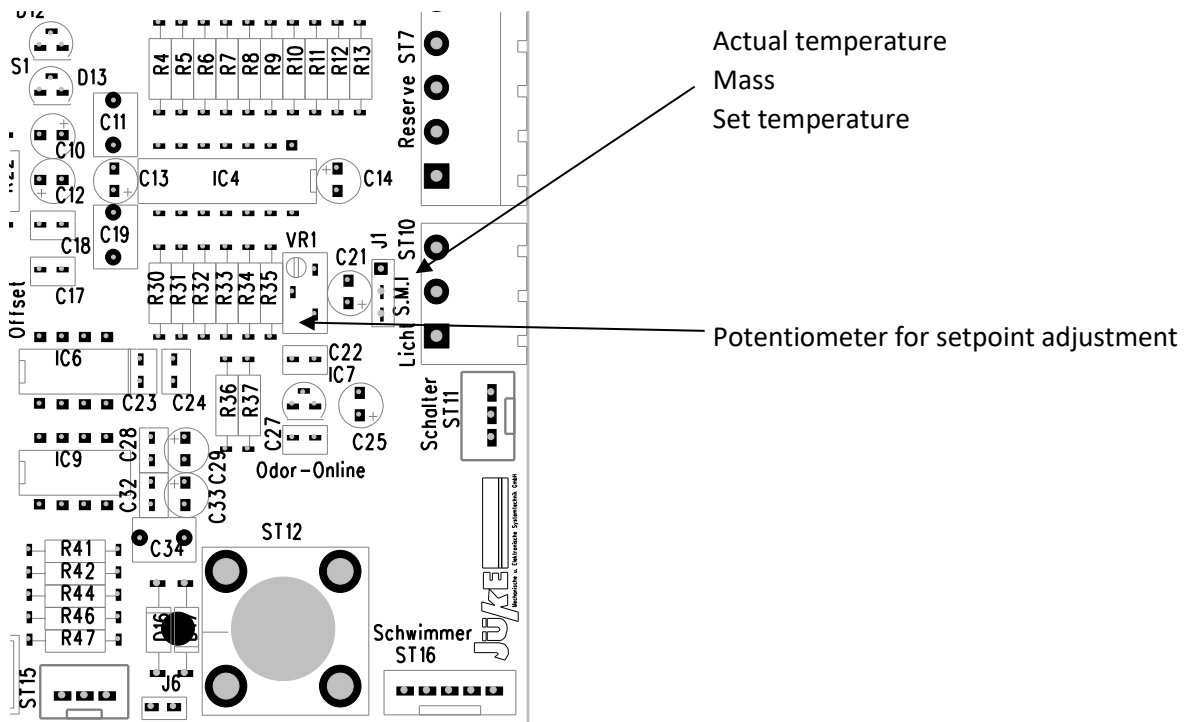
The heater is used exclusively to control the temperature of the separation column. Stable retention times can only be obtained if the column temperature remains constant.

The separating column (glass tube) is arranged in a spiral on an aluminum cylinder. It is also surrounded by an insulating material to stabilize the temperature. As a heating element, an 8.2 Ohm resistor is incorporated into the cylinder together with a temperature sensor.

The control is implemented on the analog board. The pin connector J1 (see circuit board description) has three contacts "Set temperature", "Ground" and "Actual temperature". These are labeled "S.M.I" on the circuit board. These are analog output variables, whereby 1 °C corresponds to 10 mV. The setpoint temperature is set via VR1.

The setpoint must always be above the room temperature. When this temperature is reached, the red LED (LED1) flashes continuously. This is a reliable sign of active control.

The ambient temperature must be taken into account when setting the set temperature. The separation and retention times of the desired components can be optimized by adjusting the set temperature.



18.8. Amplifier

This is a two-stage amplifier that must be adapted to the respective application. With J6 (see circuit board), the input impedance of the amplifier can be reduced from 3K ohms (open) to 560 ohms (closed, default).

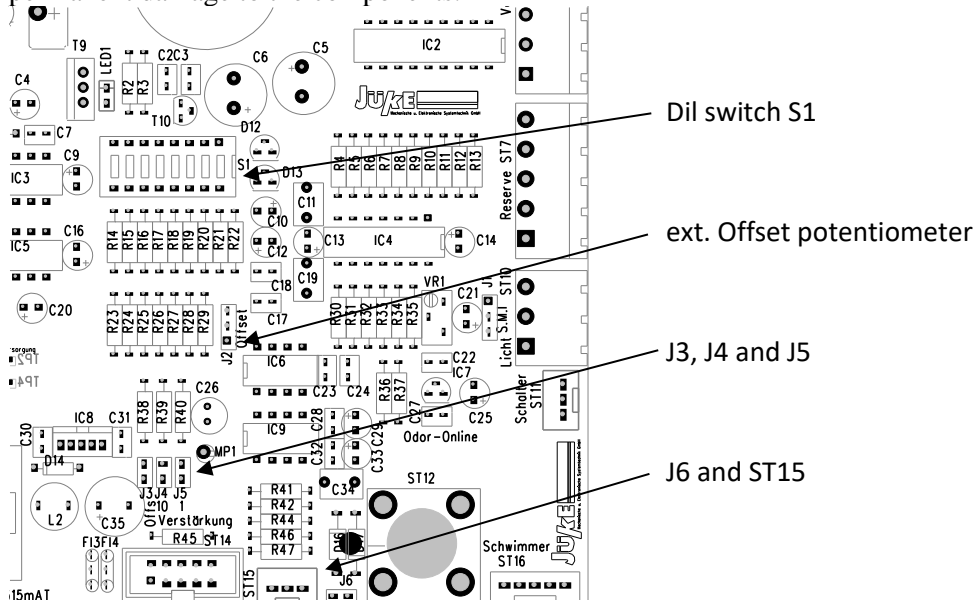
The first amplifier stage has a gain of $V1=2000$ as standard, which can be attenuated using jumpers J4 ($V1=10$) and J5 ($V1=1$).

The second amplifier can now be adjusted with eight DIL switches. The total amplification of the circuit is calculated by multiplying the two amplifications ($V_{ges}=V1 * V2$). To obtain the following amplification factors, only the designated switch may be set to "ON".

Reinforcements:	V1	J4	J5
	2000	open	open
	10	closed	open
	1	xxx	closed
	V2	DIL switch S1 (on)	
	1	1	
	2	2	
	3	4	
	4	6	
	5	8	
	6	10	
	7	15	
	8	20	

The external offset potentiometer is located on the rear panel and is connected via J2. If the offset range is not sufficient, it can be extended via J3 (close).

The analogue output signal should be normalized to +/- 1 V maximum deflection. The signal can be tapped at ST15 (pin 3 plus pin 2 minus). This level should be strictly adhered to when connecting to a processor card. Higher voltages lead to undefined states on the AD converter and possibly also to permanent damage to the components.



19. Declaration of conformity



EU – Konformitätserklärung

(CE Konformität)

Hiermit erklären wir, dass die Bauart des nachfolgend bezeichneten Gerätes in der von uns in den Verkehr gebrachten Ausführung den unten genannten einschlägigen EU-Richtlinien entspricht.

Durch nicht mit uns abgestimmte Änderungen verliert diese Erklärung ihre Gültigkeit.

Bezeichnung: ODOR on-line
Gerätetyp: ODO/5
Einschlägige EU-Richtlinien:
Niederspannungsrichtlinie: 2014/35/EU
EMV-Richtlinie: 2014/30/EU

Angewendete harmonisierte Normen:

EN 61010-1 Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte
Teil 1: Allgemeine Anforderungen

EN 61326-1 Elektrische Mess-, Steuer-, Regel und Laborgeräte, EMV-Anforderungen
Teil 1: Allgemeine Anforderungen

RoHS-Konformitätserklärung

Hiermit erklären wir, dass das in dieser Erklärung beschriebene Produkt die Vorschriften der Richtlinie 2011/65/EU des Europäischen Parlaments und des Rates vom 8. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten, unter Berücksichtigung der delegierten Richtlinie (EU) 2015/863 vom 31.03.2015 zur Änderung des Anhang II der Richtlinie 2011/65/EU, erfüllt.

Frank Sasse
Geschäftsführer
Leiter des Geschäftsbereiches
Erdgas-Analytik/Odorierungskontrolle

08/2023

45549 Sprockhövel
Germany
Tel. +49 23 39 12 09-0
info@axelsemrau.de

VAT Reg No DE35158340
Steuer-Nr. 323/5851/0084
Gerichtsstand Haltingen

IBAN DE16 3022 0190 0022 7967 98
BIC HYVEDEMM414

Dr. Andreas Bruchmann

www.axelsemrau.de

Part of the TRAJAN Family


20. Waste disposal

- ▲ **DANGER** The instrument contains chromium (VI) oxide solution or caustic potash solution, which before disposal of the instrument must be removed by qualified personnel and disposed of separately.



Note: The device contains electronic components and must be disposed of properly.

21. Safety data sheet Chromium(VI) oxide solution

 an analytichem brand	Sicherheitsdatenblatt gemäß Verordnung (EG) Nr. 1907/2006	AnalytiChem GmbH
Chrom(VI)-oxid-Lösung 10 % reinst in Wasser		
Überarbeitet am: 14.07.2023	Materialnummer: 23058	Seite 1 von 13
ABSCHNITT 1: Bezeichnung des Stoffs beziehungsweise des Gemischs und des Unternehmens		
1.1. Produktidentifikator Chrom(VI)-oxid-Lösung 10 % reinst in Wasser		
1.2. Relevante identifizierte Verwendungen des Stoffs oder Gemischs und Verwendungen, von denen abgeraten wird		
Verwendung des Stoffs/des Gemischs Laborchemikalien Industrielle Verwendungen: Verwendungen von Stoffen als solche oder in Zubereitungen an Industriestandorten Gewerbliche Verwendungen: Öffentlicher Bereich (Verwaltung, Bildung, Unterhaltung, Dienstleistungen, Handwerk)		
Verwendungen, von denen abgeraten wird Nicht für private Zwecke (Haushalt) verwenden.		
1.3. Einzelheiten zum Lieferanten, der das Sicherheitsdatenblatt bereitstellt		
Firmenname:	AnalytiChem GmbH	
Straße:	Stempelstraße 6	
Ort:	D-47167 Duisburg	
Telefon:	0203/5194-0	Telefax: 0203/5194-290
E-Mail:	info@analytichem.de	
Ansprechpartner:	Abteilung Produktsicherheit	Telefon: 0203/5194-107/117
E-Mail:	produktsicherheit@analytichem.de	
Internet:	www.analytichem.de	
Auskunftgebender Bereich:	Abteilung Produktsicherheit	
1.4. Notrufnummer:	Giftnotruf Berlin 030 30686 700	
Weitere Angaben Gemische sind nicht registrierungspflichtig. Die Registrierungsnummern der Inhaltsstoffe (soweit vorhanden) wurden im Abschnitt 3 angegeben.		
ABSCHNITT 2: Mögliche Gefahren		
2.1. Einstufung des Stoffs oder Gemischs		
Verordnung (EG) Nr. 1272/2008 Acute Tox. 2; H330 Acute Tox. 3; H311 Acute Tox. 4; H302 Skin Corr. 1A; H314 Eye Dam. 1; H318 Resp. Sens. 1; H334 Skin Sens. 1; H317 Muta. 1B; H340 Carc. 1A; H350 Repr. 2; H361f STOT SE 3; H335 STOT RE 1; H372 Aquatic Chronic 2; H411		
Wortlaut der Gefahrenhinweise: siehe ABSCHNITT 16.		
2.2. Kennzeichnungselemente		
Verordnung (EG) Nr. 1272/2008		
Gefahrbestimmende Komponenten zur Etikettierung Chromtrioxid		
Revisions-Nr.: 1,03 - Ersetzt die Version: 1,02	D - de	Druckdatum: 14.07.2023

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Signalwort: Gefahr

Piktogramme:



Gefahrenhinweise

- H302 Gesundheitsschädlich bei Verschlucken.
- H311 Giftig bei Hautkontakt.
- H314 Verursacht schwere Verätzungen der Haut und schwere Augenschäden.
- H317 Kann allergische Hautreaktionen verursachen.
- H330 Lebensgefahr bei Einatmen.
- H334 Kann bei Einatmen Allergie, asthmaartige Symptome oder Atembeschwerden verursachen.
- H335 Kann die Atemwege reizen.
- H340 Kann genetische Defekte verursachen.
- H350 Kann Krebs erzeugen.
- H361f Kann vermutlich die Fruchtbarkeit beeinträchtigen.
- H372 Schädigt die Organe bei längerer oder wiederholter Exposition.
- H411 Giftig für Wasserorganismen, mit langfristiger Wirkung.

Sicherheitshinweise

- P260 Staub/Rauch/Gas/Nebel/Dampf/Aerosol nicht einatmen.
- P280 Schutzhandschuhe/Schutzkleidung/Augenschutz/Gesichtsschutz/Gehörschutz tragen.
- P303+P361+P353 BEI BERÜHRUNG MIT DER HAUT (oder dem Haar): Alle kontaminierten Kleidungsstücke sofort ausziehen. Haut mit Wasser abwaschen oder duschen.
- P305+P351+P338 BEI KONTAKT MIT DEN AUGEN: Einige Minuten lang behutsam mit Wasser ausspülen. Eventuell vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter ausspülen.
- P310 Sofort GIFTINFORMATIONSZENTRUM/Arzt anrufen.

Besondere Kennzeichnung bestimmter Gemische

Nur für gewerbliche Anwender.

2.3. Sonstige Gefahren

Keine Daten verfügbar

ABSCHNITT 3: Zusammensetzung/Angaben zu Bestandteilen

3.2. Gemische

Chemische Charakterisierung

Gemische in wässriger Lösung

Gefährliche Inhaltsstoffe

CAS-Nr.	Stoffname			Anteil
	EG-Nr.	Index-Nr.	REACH-Nr.	
	Einstufung (Verordnung (EG) Nr. 1272/2008)			
1333-82-0	Chromtrioxid			10 - < 15 %
	215-607-8	024-001-00-0		
	Ox. Sol. 1, Carc. 1A, Muta. 1B, Repr. 2, Acute Tox. 2, Acute Tox. 3, Acute Tox. 3, Skin Corr. 1A, Resp. Sens. 1, Skin Sens. 1, STOT SE 3, STOT RE 1, Aquatic Acute 1, Aquatic Chronic 1; H271 H350 H340 H361f H330 H311 H301 H314 H334 H317 H335 H372 H400 H410			

Wortlaut der H- und EUH-Sätze: siehe Abschnitt 16.

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Spezifische Konzentrationsgrenzen, M-Faktoren und ATE

CAS-Nr.	EG-Nr.	Stoffname	Anteil
		Spezifische Konzentrationsgrenzen, M-Faktoren und ATE	
1333-82-0	215-607-8	Chromtrioxid	10 - < 15 %
		inhalativ: ATE = 0,5 mg/l (Dämpfe); inhalativ: ATE = 0,05 mg/l (Stäube oder Nebel); dermal: LD50 = 57 mg/kg; oral: LD50 = 52 mg/kg STOT SE 3; H335: >= 1 - 100	

Weitere Angaben

Das Gemisch enthält die folgenden besonders besorgniserregenden Stoffe (SVHC), die zulassungspflichtig gemäß REACH, Anhang XIV sind: Chromtrioxid

ABSCHNITT 4: Erste-Hilfe-Maßnahmen

4.1. Beschreibung der Erste-Hilfe-Maßnahmen

Allgemeine Hinweise

Selbstschutz des Ersthelfers

Nach Einatmen

Für Frischluft sorgen.
Bei Atembeschwerden oder Atemstillstand künstliche Beatmung einleiten.
Sofort Arzt hinzuziehen.

Nach Hautkontakt

Sofort abwaschen mit: Wasser
Alle kontaminierten Kleidungsstücke sofort ausziehen und vor erneutem Tragen waschen.
Sofort Arzt hinzuziehen.

Nach Augenkontakt

Bei Berührung mit den Augen sofort bei geöffnetem Lidspalt 10 bis 15 Minuten mit fließendem Wasser spülen und Augenarzt aufsuchen.
Eventuell vorhandene Kontaktlinsen nach Möglichkeit entfernen. Weiter ausspülen.
Unverletztes Auge schützen.

Nach Verschlucken

Sofort Mund ausspülen und reichlich Wasser nachtrinken.
Kein Neutralisationsmittel trinken lassen.
Sofort Arzt hinzuziehen.

4.2. Wichtigste akute und verzögert auftretende Symptome und Wirkungen

Reizend
ätzend
Husten
Atemnot
Allergische Reaktionen
Gefahr ernster Augenschäden.
Magen-Darm-Beschwerden
Pneumonie
Krämpfe
Kreislaufkollaps
Bewusstlosigkeit
Methämoglobinbildung

4.3. Hinweise auf ärztliche Soforthilfe oder Spezialbehandlung

Keine Daten verfügbar

ABSCHNITT 5: Maßnahmen zur Brandbekämpfung

5.1. Löschmittel

Geeignete Löschmittel

Löschmaßnahmen auf die Umgebung abstimmen.

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Ungeeignete Löschmittel

keine Beschränkung

5.2. Besondere vom Stoff oder Gemisch ausgehende Gefahren

Nicht brennbare Flüssigkeiten
Gefährliche Verbrennungsprodukte
Im Brandfall können entstehen: Giftiger Metalloxidrauch

5.3. Hinweise für die Brandbekämpfung

Explosions- und Brandgase nicht einatmen.
Kontakt mit Haut, Augen und Kleidung vermeiden.
Im Brandfall: Umgebungsluftunabhängiges Atemschutzgerät tragen.

Zusätzliche Hinweise

Gase/Dämpfe/Nebel mit Wassersprühstrahl niederschlagen.
Kontaminiertes Löschwasser getrennt sammeln. Nicht in die Kanalisation oder Gewässer gelangen lassen.
Wenn gefahrlos möglich, unbeschädigte Behälter aus der Gefahrenzone entfernen.
Zum Schutz von Personen und zur Kühlung von Behältern im Gefahrenbereich Wassersprühstrahl einsetzen.

ABSCHNITT 6: Maßnahmen bei unbeabsichtigter Freisetzung

6.1. Personenbezogene Vorsichtsmaßnahmen, Schutzausrüstungen und in Notfällen anzuwendende

Verfahren

Nicht für Notfälle geschultes Personal

Für ausreichende Lüftung sorgen.
Persönliche Schutzausrüstung verwenden.
Kontakt mit Haut, Augen und Kleidung vermeiden.
Personen in Sicherheit bringen.
Notfallpläne
Sachkundige hinzuziehen.
Staub/Rauch/Gas/Nebel/Dampf/Aerosol nicht einatmen.

Einsatzkräfte

Sicherheitshinweise Einsatzkräfte : Persönliche Schutzausrüstung: siehe Abschnitt 8

6.2. Umweltschutzmaßnahmen

Nicht in die Kanalisation oder Gewässer gelangen lassen.

6.3. Methoden und Material für Rückhaltung und Reinigung

Für Rückhaltung

Kanalisation abdecken.
Flächenmäßige Ausdehnung verhindern (z.B. durch Eindämmen oder Ölsperren).
In geeigneten, geschlossenen Behältern sammeln und zur Entsorgung bringen.
Mit flüssigkeitsbindendem Material (Sand, Kieselgur, Säurebinder, Universalbinder) aufnehmen.

Für Reinigung

Verschmutzte Gegenstände und Fußboden unter Beachtung der Umweltvorschriften gründlich reinigen.

Weitere Angaben

Für ausreichende Lüftung sorgen.
Staub/Rauch/Gas/Nebel/Dampf/Aerosol nicht einatmen.
Bei Einwirkungen von Dämpfen, Stäuben und Aerosolen ist Atemschutz zu verwenden.

6.4. Verweis auf andere Abschnitte

Sichere Handhabung: siehe Abschnitt 7
Persönliche Schutzausrüstung: siehe Abschnitt 8
Entsorgung: siehe Abschnitt 13

ABSCHNITT 7: Handhabung und Lagerung

7.1. Schutzmaßnahmen zur sicheren Handhabung

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Hinweise zum sicheren Umgang

Exposition vermeiden - vor Gebrauch besondere Anweisungen einholen.
Vor Gebrauch Kennzeichnungsetikett lesen. Behälter mit Vorsicht öffnen und handhaben.
Dampf/Aerosol nicht einatmen.
Am Arbeitsplatz nicht essen, trinken, rauchen, schnupfen. Behälter dicht geschlossen halten.
Persönliche Schutzausrüstung verwenden. Abzug verwenden (Labor).
Für ausreichende Lüftung sorgen. Kontakt mit Haut, Augen und Kleidung vermeiden.

Hinweise zum Brand- und Explosionsschutz

Übliche Maßnahmen des vorbeugenden Brandschutzes.

Hinweise zu allgemeinen Hygienemaßnahmen am Arbeitsplatz

Von Nahrungsmitteln, Getränken und Futtermitteln fernhalten. Ausreichende Waschgelegenheiten zur Verfügung stehen
Beschmutzte, getränkte Kleidung sofort ausziehen. Hautschutzplan erstellen und beachten! Vor den Pausen und bei Arbeitende Hände und Gesicht gründlich waschen, ggf. duschen. Bei der Arbeit nicht essen und trinken.

Weitere Angaben zur Handhabung

Hautschutzplan erstellen und beachten!
Vor den Pausen und bei Arbeitende Hände und Gesicht gründlich waschen, ggf. duschen.
Alle kontaminierten Kleidungsstücke sofort ausziehen und vor erneutem Tragen waschen.
Bei offenem Umgang sind Vorrichtungen mit lokaler Absaugung zu verwenden.

7.2. Bedingungen zur sicheren Lagerung unter Berücksichtigung von Unverträglichkeiten

Anforderungen an Lagerräume und Behälter

An einem gut belüfteten Ort aufbewahren. Behälter dicht verschlossen halten.
An einem Platz lagern, der nur berechtigten Personen zugänglich ist.

Zusammenlagerungshinweise

TRGS 510 beachten

Weitere Angaben zu den Lagerbedingungen

An einem trockenen Ort aufbewahren.

Lagerklasse nach TRGS 510: 6.1B (Nicht brennbare, akut toxische Kat. 1 und 2/sehr giftige Gefahrstoffe)

7.3. Spezifische Endanwendungen

Laborchemikalien

ABSCHNITT 8: Begrenzung und Überwachung der Exposition/Persönliche Schutzausrüstungen

8.1. Zu überwachende Parameter

PNEC-Werte

CAS-Nr.	Bezeichnung	Wert
	Umweltkompartiment	
1333-82-0	Chromtrioxid	
	Süßwasser	0,003 mg/l
	Meerwasser	0,003 mg/l
	Süßwassersediment	0,15 mg/kg
	Sekundärvergiftung	17000000 mg/kg
	Mikroorganismen in Kläranlagen	0,21 mg/l
	Boden	0,031 mg/kg

8.2. Begrenzung und Überwachung der Exposition

Geeignete technische Steuerungseinrichtungen

Technische Maßnahmen und die Anwendung geeigneter Arbeitsverfahren haben Vorrang vor dem Einsatz

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persönlicher Schutzausrüstungen.

Bei offenem Umgang sind Vorrichtungen mit lokaler Absaugung zu verwenden.

Staubbildung vermeiden. Staub nicht einatmen.

Individuelle Schutzmaßnahmen, zum Beispiel persönliche Schutzausrüstung

Augen-/Gesichtsschutz

Korbbrille

Augenschutz/Gesichtsschutz tragen.

Handschutz

Geeignet sind beispielsweise Schutzhandschuhe der Firma KCL GmbH, D-36124 Eichenzell, email: vertrieb@kcl.de mit folgender Spezifikation (Prüfung erfolgte nach EN374):

Bei häufigerem Handkontakt

Handelsname/Bezeichnung KCL 741 Dermatril® L

Geeignetes Material: NBR (Nitrilkautschuk) 0,11 mm

Tragedauer bei permanentem Kontakt: > 480 min

Bei kurzzeitigem Handkontakt

Handelsname/Bezeichnung KCL 741 Dermatril® L

Geeignetes Material: NBR (Nitrilkautschuk) 0,11 mm

Tragedauer bei gelegentlichem Kontakt (Spritzer): > 480 min

Die oben genannten Durchbruchzeiten wurden mit Materialproben der empfohlenen Handschuhtypen in Labormessungen von KCL nach EN374 ermittelt. Diese Empfehlung gilt nur für das im Sicherheitsdatenblatt genannte Produkt, das von uns geliefert wird und den von uns angegebenen Verwendungszweck. Bei der Lösung in oder bei der Vermischung mit anderen Substanzen und bei von der EN374 abweichenden Bedingungen müssen Sie sich an den Lieferanten von CE-genehmigten Handschuhen wenden (z.B. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Körperschutz

Bei der Arbeit geeignete Schutzkleidung tragen.

Beschmutzte, getränkte Kleidung sofort ausziehen.

Vor den Pausen und bei Arbeitsende Hände waschen.

Die Wahl der Körperschutzmittel ist von der Gefahrstoffkonzentration und -menge abhängig. Die chemische Beständigkeit der Schutzmittel sollte mit deren Lieferanten geklärt werden.

Atemschutz

Bei Einwirkungen von Dämpfen, Stäuben und Aerosolen ist Atemschutz zu verwenden.

Der Unternehmer hat dafür zu sorgen, dass Instandhaltung, Reinigung und Prüfung von Atemschutzgeräten nach den Benutzerinformationen des Herstellers ausgeführt und entsprechend dokumentiert werden.

Begrenzung und Überwachung der Umweltexposition

Nicht in die Kanalisation oder Gewässer gelangen lassen.

ABSCHNITT 9: Physikalische und chemische Eigenschaften

9.1. Angaben zu den grundlegenden physikalischen und chemischen Eigenschaften

Aggregatzustand:	Flüssig	
Farbe:	klar	
Geruch:	geruchlos	
Geruchsschwelle:	Keine Daten verfügbar	
Schmelzpunkt/Gefrierpunkt:		Keine Daten verfügbar
Siedepunkt oder Siedebeginn und Siedebereich:		Keine Daten verfügbar
Entzündbarkeit:		Keine Daten verfügbar
Untere Explosionsgrenze:		Keine Daten verfügbar
Obere Explosionsgrenze:		Keine Daten verfügbar

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Flammpunkt:	Keine Daten verfügbar
Zündtemperatur:	Keine Daten verfügbar
Zersetzungstemperatur:	Keine Daten verfügbar
pH-Wert:	Keine Daten verfügbar
Kinematische Viskosität:	Keine Daten verfügbar
Wasserlöslichkeit:	Keine Daten verfügbar
Löslichkeit in anderen Lösungsmitteln	
Keine Daten verfügbar	
Lösungsgeschwindigkeit:	Keine Daten verfügbar
Verteilungskoeffizient	Keine Daten verfügbar
n-Oktanol/Wasser:	
Dispersionsstabilität:	Keine Daten verfügbar
Dampfdruck:	Keine Daten verfügbar
Dampfdruck:	Keine Daten verfügbar
Dichte:	1,07486 g/cm ³
Relative Dichte:	Keine Daten verfügbar
Schüttdichte:	Keine Daten verfügbar
Relative Dampfdichte:	Keine Daten verfügbar
Partikeleigenschaften:	Keine Daten verfügbar

9.2. Sonstige Angaben

Angaben über physikalische Gefahrenklassen

Explosionsgefahren	
Keine Daten verfügbar	
Weiterbrennbarkeit:	Keine Daten verfügbar
Selbstentzündungstemperatur	
Feststoff:	Keine Daten verfügbar
Gas:	Keine Daten verfügbar
Oxidierende Eigenschaften	
Oxidationsmittel, stark	

Sonstige sicherheitstechnische Kenngrößen

Verdampfungsgeschwindigkeit:	Keine Daten verfügbar
Lösemitteltrennprüfung:	Keine Daten verfügbar
Lösemittelgehalt:	0
Festkörpergehalt:	0
Sublimationstemperatur:	Keine Daten verfügbar
Erweichungspunkt:	Keine Daten verfügbar
Pourpoint:	Keine Daten verfügbar
Keine Daten verfügbar:	
Dynamische Viskosität:	Keine Daten verfügbar
Auslaufzeit:	Keine Daten verfügbar

Weitere Angaben

Keine Daten verfügbar

ABSCHNITT 10: Stabilität und Reaktivität

10.1. Reaktivität

Keine Daten verfügbar

10.2. Chemische Stabilität

Das Produkt ist bei Lagerung bei normalen Umgebungstemperaturen stabil.

10.3. Möglichkeit gefährlicher Reaktionen

Alkalimetalle
Ammoniak

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Hydrazin
NO3
Reduktionsmittel
Salpetersäure

10.4. Zu vermeidende Bedingungen

Hitze

10.5. Unverträgliche Materialien

Keine Daten verfügbar

10.6. Gefährliche Zersetzungsprodukte

Im Brandfall können entstehen:
beim Brand siehe: ABSCHNITT 5: Maßnahmen zur Brandbekämpfung

Weitere Angaben

Keine Daten verfügbar

ABSCHNITT 11: Toxikologische Angaben

11.1. Angaben zu den Gefahrenklassen im Sinne der Verordnung (EG) Nr. 1272/2008

Toxikokinetik, Stoffwechsel und Verteilung

Es sind keine Daten für die Zubereitung/das Gemisch verfügbar.

Akute Toxizität

Lebensgefahr bei Einatmen.
Giffig bei Hautkontakt.
Gesundheitsschädlich bei Verschlucken.

ATEmix berechnet

ATE (oral) 520,0 mg/kg; ATE (dermal) 570,0 mg/kg; ATE (inhalativ Dampf) 5,000 mg/l; ATE (inhalativ Staub/Nebel) 0,5000 mg/l

CAS-Nr.	Bezeichnung					
	Expositionsweg	Dosis	Spezies	Quelle	Methode	
1333-82-0	Chromtrioxid					
	oral	LD50 52 mg/kg	Ratte	Other company data (1967)	OECD Guideline 401	
	dermal	LD50 57 mg/kg	Kaninchen	Other company data (1967)	OECD Guideline 402	
	inhalativ Dampf	ATE 0,5 mg/l				
	inhalativ Staub/Nebel	ATE 0,05 mg/l				

Reiz- und Ätzwirkung

Verursacht schwere Verätzungen der Haut und schwere Augenschäden.
Verursacht schwere Augenschäden.
Beim Verschlucken besteht die Gefahr der Perforation der Speiseröhre und des Magens (starke Ätzwirkung).

Sensibilisierende Wirkungen

Kann bei Einatmen Allergie, asthmaartige Symptome oder Atembeschwerden verursachen. (Chromtrioxid)
Kann allergische Hautreaktionen verursachen. (Chromtrioxid)

Krebserzeugende, erbgutverändernde und fortpflanzungsgefährdende Wirkungen

Kann genetische Defekte verursachen. (Chromtrioxid)
Kann Krebs erzeugen. (Chromtrioxid)
Kann vermutlich die Fruchtbarkeit beeinträchtigen. (Chromtrioxid)

Spezifische Zielorgan-Toxizität bei einmaliger Exposition

Kann die Atemwege reizen. (Chromtrioxid)

Spezifische Zielorgan-Toxizität bei wiederholter Exposition

Schädigt die Organe bei längerer oder wiederholter Exposition. (Chromtrioxid)

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Aspirationsgefahr

Aufgrund der verfügbaren Daten sind die Einstufungskriterien nicht erfüllt.

Keine Daten verfügbar

Spezifische Wirkungen im Tierversuch

Keine Daten verfügbar

Sonstige Angaben zu Prüfungen

Keine Daten verfügbar

Erfahrungen aus der Praxis

Keine Daten verfügbar

11.2. Angaben über sonstige Gefahren

Endokrinschädliche Eigenschaften

Dieses Produkt enthält keinen Stoff, der gegenüber dem Menschen endokrine Eigenschaften aufweist, da kein Inhaltsstoff die Kriterien erfüllt.

Sonstige Angaben

Keine Daten verfügbar

Allgemeine Bemerkungen

Reizend

ätzend

Husten

Atemnot

Allergische Reaktionen

Gefahr ernster Augenschäden.

Magen-Darm-Beschwerden

Pneumonie

Krämpfe

Kreislaufkollaps

Bewusstlosigkeit

Methämoglobinbildung

ABSCHNITT 12: Umweltbezogene Angaben

12.1. Toxizität

Giftig für Wasserorganismen, mit langfristiger Wirkung.

12.2. Persistenz und Abbaubarkeit

Die Methoden zur Bestimmung der biologischen Abbaubarkeit sind bei anorganischen Substanzen nicht anwendbar.

12.3. Bioakkumulationspotenzial

Keine Daten verfügbar

12.4. Mobilität im Boden

Keine Daten verfügbar

12.5. Ergebnisse der PBT- und vPvB-Beurteilung

Die Stoffe im Gemisch erfüllen nicht die PBT/vPvB Kriterien gemäß REACH, Anhang XIII.

12.6. Endokrinschädliche Eigenschaften

Dieses Produkt enthält keinen Stoff, der gegenüber Nichtzielorganismen endokrine Eigenschaften aufweist, da kein Inhaltsstoff die Kriterien erfüllt.

12.7. Andere schädliche Wirkungen

Ein Eintrag in die Umwelt ist zu vermeiden.

Schädigende Wirkung durch pH Verschiebung

Weltere Hinweise

Nicht in die Kanalisation oder Gewässer gelangen lassen.

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ABSCHNITT 13: Hinweise zur Entsorgung

13.1. Verfahren der Abfallbehandlung

Empfehlungen zur Entsorgung

Entsorgung gemäß Richtlinie 2008/98/EG über Abfälle und gefährliche Abfälle.

Unter Beachtung behördlicher Vorschriften einer chemisch/physikalischen Behandlungsanlage zuführen.

Nicht in die Kanalisation oder Gewässer gelangen lassen.

Entsorgung ungereinigter Verpackung und empfohlene Reinigungsmittel

Die Zuordnung der Abfallschlüsselnummern/Abfallbezeichnungen ist entsprechend EAKV branchen- und prozessspezifisch durchzuführen.

Kontaminierte Verpackungen sind wie der Stoff zu behandeln.

ABSCHNITT 14: Angaben zum Transport

Landtransport (ADR/RID)

14.1. UN-Nummer oder ID-Nummer:	UN 3289
14.2. Ordnungsgemäße	GIFTIGER ANORGANISCHER FLÜSSIGER STOFF, ÄTZEND, N.A.G.
UN-Versandbezeichnung:	(Chrom(VI)trioxid; Chromsäureanhydrid)
14.3. Transportgefahrenklassen:	6.1
14.4. Verpackungsgruppe:	II
Gefahrzettel:	6.1+8
Klassifizierungscode:	TC3
Sondervorschriften:	274
Begrenzte Menge (LQ):	100 mL
Freigestellte Menge:	E4
Beförderungskategorie:	2
Gefahnummer:	68
Tunnelbeschränkungscode:	D/E

Binnenschifftransport (ADN)

14.1. UN-Nummer oder ID-Nummer:	UN 3289
14.2. Ordnungsgemäße	GIFTIGER ANORGANISCHER FLÜSSIGER STOFF, ÄTZEND, N.A.G.
UN-Versandbezeichnung:	(Chrom(VI)trioxid; Chromsäureanhydrid)
14.3. Transportgefahrenklassen:	6.1
14.4. Verpackungsgruppe:	II
Gefahrzettel:	6.1+8
Klassifizierungscode:	TC3
Sondervorschriften:	274 802
Begrenzte Menge (LQ):	100 mL
Freigestellte Menge:	E4

Seeschifftransport (IMDG)

14.1. UN-Nummer oder ID-Nummer:	UN 3289
14.2. Ordnungsgemäße	TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S. (chromium trioxide)
UN-Versandbezeichnung:	
14.3. Transportgefahrenklassen:	6.1
14.4. Verpackungsgruppe:	II
Gefahrzettel:	6.1+8
Sondervorschriften:	274
Begrenzte Menge (LQ):	100 mL
Freigestellte Menge:	E4
EmS:	F-A, S-B

Lufttransport (ICAO-TI/IATA-DGR)

14.1. UN-Nummer oder ID-Nummer:	UN 3289
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14.2. Ordnungsgemäße UN-Versandbezeichnung:	TOXIC LIQUID, CORROSIVE, INORGANIC, N.O.S. (chromium trioxide)	
14.3. Transportgefahrenklassen:	6.1	
14.4. Verpackungsgruppe:	II	
Gefahrzettel:	6.1+8	
Sondervorschriften:	A4 A137	
Begrenzte Menge (LQ) Passenger:	0.5 L	
Passenger LQ:	Y640	
Freigestellte Menge:	E4	
IATA-Verpackungsanweisung - Passenger:	653	
IATA-Maximale Menge - Passenger:	1 L	
IATA-Verpackungsanweisung - Cargo:	660	
IATA-Maximale Menge - Cargo:	30 L	

14.5. Umweltgefahren

UMWELTGEFÄHRDEND:	Ja
Gefahrslöser:	chromium trioxide

ABSCHNITT 15: Rechtsvorschriften

15.1. Vorschriften zu Sicherheit, Gesundheits- und Umweltschutz/spezifische Rechtsvorschriften für den Stoff oder das Gemisch

EU-Vorschriften

Zulassungen (REACH, Anhang XIV):

Chromtrioxid

Verwendungsbeschränkungen (REACH, Anhang XVII):

Eintrag 3, Eintrag 28, Eintrag 75

Angaben zur SEVESO III-Richtlinie 2012/18/EU:

Zusätzliche Angaben: E2

Nationale Vorschriften

Beschäftigungsbeschränkung: Beschäftigungsbeschränkungen für Jugendliche beachten (§ 22 JArbSchG). Beschäftigungsbeschränkungen für werdende und stillende Mütter beachten (§§ 11 und 12 MuSchG). Beschäftigungsbeschränkungen für Frauen im gebärfähigen Alter beachten.

Wassergefährdungsklasse: 3 - stark wassergefährdend

Status: Einstufung von Gemischen gemäß Anlage 1, Nr. 5 AwSV

ABSCHNITT 16: Sonstige Angaben

Änderungen

Dieses Datenblatt enthält Änderungen zur vorherigen Version in dem/den Abschnitt(en): 11,12.

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Abkürzungen und Akronyme

- Ox. Sol: Oxidierende Feststoffe
- Acute Tox: Akute Toxizität
- Skin Corr: Ätzwirkung auf die Haut
- Eye Dam: Schwere Augenschädigung
- Resp. Sens: Sensibilisierung der Atemwege
- Skin Sens: Sensibilisierung der Haut
- Muta: Keimzellmutagenität
- Carc: Karzinogenität
- Repr: Reproduktionstoxizität
- STOT SE: Spezifische Zielorgan-Toxizität (einmalige Exposition)
- STOT RE: Spezifische Zielorgan-Toxizität (wiederholte Exposition)
- Aquatic Acute: Akut gewässergefährdend
- Aquatic Chronic: Chronisch gewässergefährdend

Einstufung von Gemischen und verwendete Bewertungsmethode gemäß Verordnung (EG) Nr. 1272/2008

[CLP]

Einstufung	Einstufungsverfahren
Acute Tox. 2; H330	Berechnungsverfahren
Acute Tox. 3; H311	Berechnungsverfahren
Acute Tox. 4; H302	Berechnungsverfahren
Skin Corr. 1A; H314	Berechnungsverfahren
Eye Dam. 1; H318	Berechnungsverfahren
Resp. Sens. 1; H334	Berechnungsverfahren
Skin Sens. 1; H317	Berechnungsverfahren
Muta. 1B; H340	Berechnungsverfahren
Carc. 1A; H350	Berechnungsverfahren
Repr. 2; H361f	Berechnungsverfahren
STOT SE 3; H335	Berechnungsverfahren
STOT RE 1; H372	Berechnungsverfahren
Aquatic Chronic 2; H411	Berechnungsverfahren

Wortlaut der H- und EUH-Sätze (Nummer und Volltext)

- H271 Kann Brand oder Explosion verursachen; starkes Oxidationsmittel.
- H301 Giftig bei Verschlucken.
- H302 Gesundheitsschädlich bei Verschlucken.
- H311 Giftig bei Hautkontakt.
- H314 Verursacht schwere Verätzungen der Haut und schwere Augenschäden.
- H317 Kann allergische Hautreaktionen verursachen.
- H318 Verursacht schwere Augenschäden.
- H330 Lebensgefahr bei Einatmen.
- H334 Kann bei Einatmen Allergie, asthmaartige Symptome oder Atembeschwerden verursachen.
- H335 Kann die Atemwege reizen.
- H340 Kann genetische Defekte verursachen.
- H350 Kann Krebs erzeugen.
- H361f Kann vermutlich die Fruchtbarkeit beeinträchtigen.
- H372 Schädigt die Organe bei längerer oder wiederholter Exposition.
- H400 Sehr giftig für Wasserorganismen.
- H410 Sehr giftig für Wasserorganismen mit langfristiger Wirkung.
- H411 Giftig für Wasserorganismen, mit langfristiger Wirkung.

Weitere Angaben

Für angemessene Informationen, Anweisungen und Ausbildung der Verwender sorgen

Sicherheitsdatenblatt

gemäß Verordnung (EG) Nr. 1907/2006

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Die Angaben in diesem Sicherheitsdatenblatt entsprechen nach bestem Wissen unseren Erkenntnissen bei Drucklegung. Die Informationen sollen Ihnen Anhaltspunkte für den sicheren Umgang mit dem in diesem Sicherheitsdatenblatt genannten Produkt bei Lagerung, Verarbeitung, Transport und Entsorgung geben. Die Angaben sind nicht übertragbar auf andere Produkte. Soweit das Produkt mit anderen Materialien vermengt, vermischt oder verarbeitet wird, oder einer Bearbeitung unterzogen wird, können die Angaben in diesem Sicherheitsdatenblatt, soweit sich hieraus nicht ausdrücklich etwas anderes ergibt, nicht auf das so gefertigte neue Material übertragen werden.

Die Angaben stützen sich auf den heutigen Stand unserer Kenntnisse, sie stellen jedoch keine Zusicherung von Produkteigenschaften dar und begründen kein vertragliches Rechtsverhältnis. Bestehende Gesetze und Bestimmungen sind vom Empfänger unserer Produkte in eigener Verantwortung zu beachten.

(Die Daten der gefährlichen Inhaltsstoffe wurden jeweils dem letztgültigen Sicherheitsdatenblatt des Vorlieferanten entnommen.)