

INSTRUCTION MANUAL FOR

Chlorine gas leak detector with battery back up

series M 4510 C

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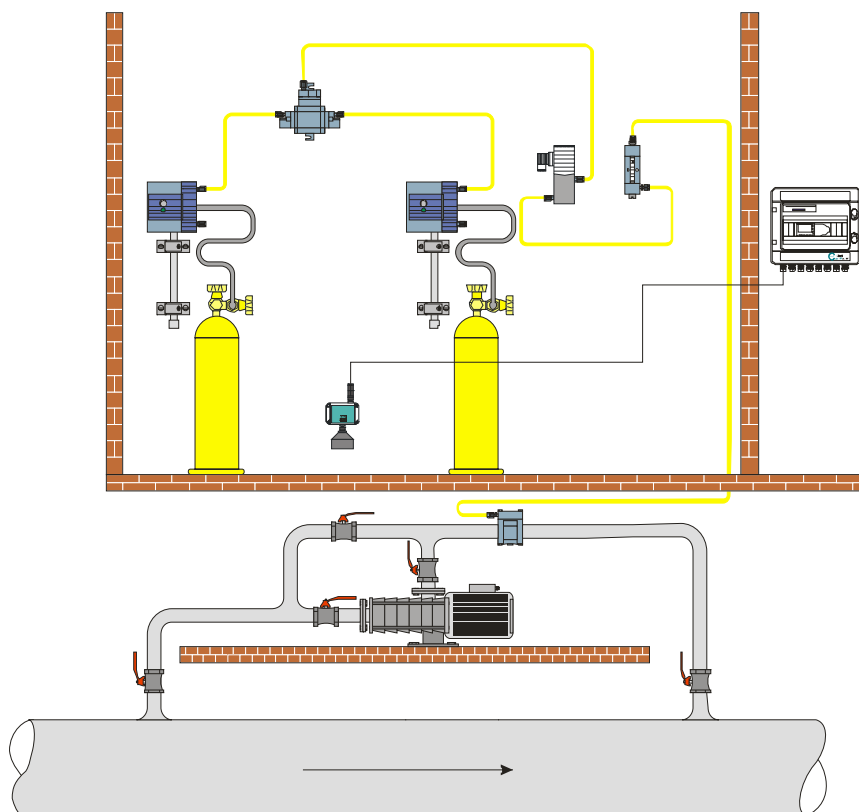
1.0 General description:

The M 4510 C series Controlmatik ABW leak detector is assembled as unit with display, two adjustable alarms and unit fault alarm, power supply module, battery back up and separate detection cell - probe.

The detection cell is mounted in IP 65 housing and features 4- 20 mA output which is connected to the signal evaluation unit. Two adjustable alarms can be set and following units can be activated in case of chlorine gas leak:

- Alarm horn
- Flashing light
- Ventilation system
- Neutralisation system

For detection cell see product information for Chlorine Gas measuring sensor M 2103 C.

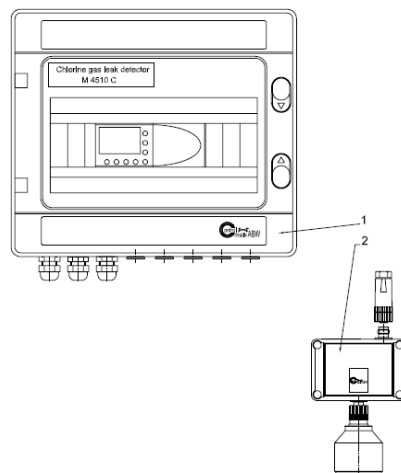


Typical use of chlorine gas leak detector

2.0 The Unit

The unit consists of:

POWER SUPPLY MODULE
SIGNAL EVALUATION MODULE
IP 65 HOUSING



The signal gas measuring sensor probe M 2103 C (2) is connected to the signal evaluation unit with display (1). The signal evaluation unit evaluates the signal and displays the value in PPM.

2.1 Principle of the system

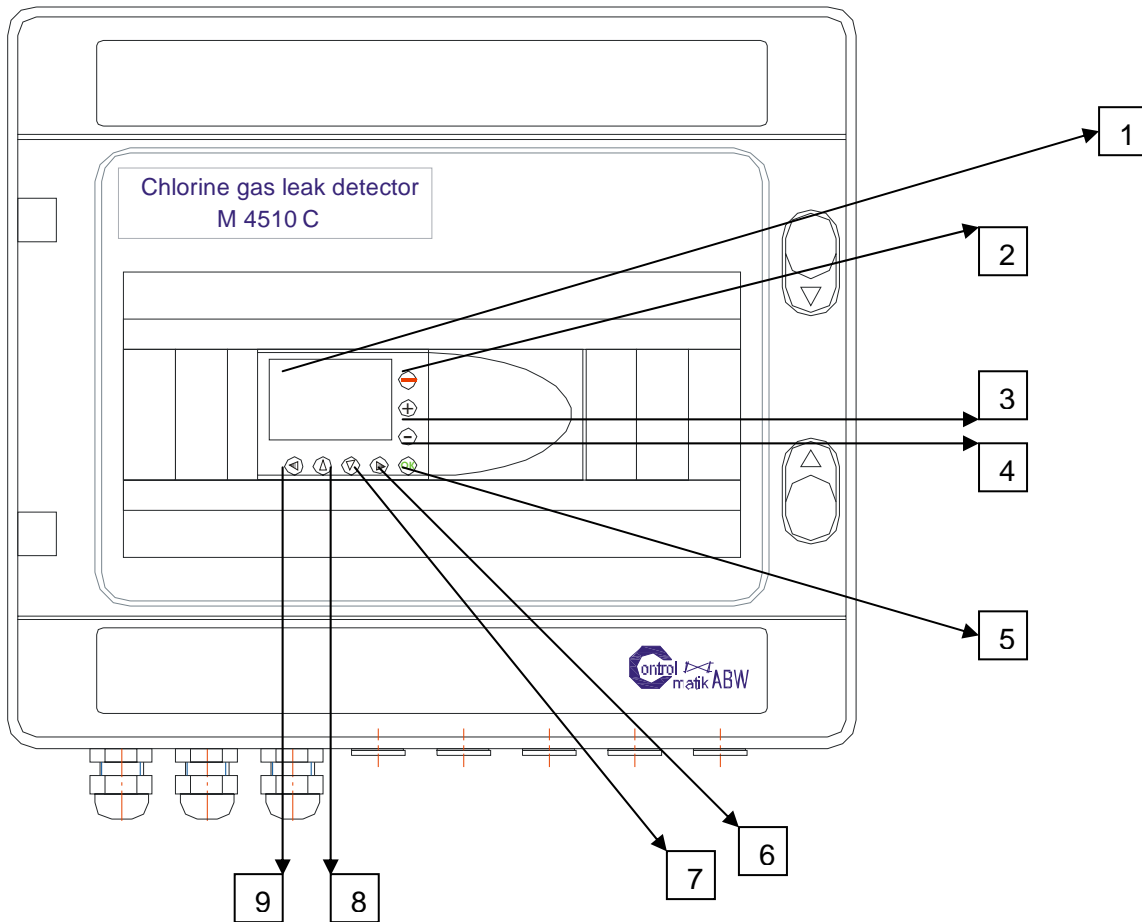
- The unit amplifies the current input signal from gas measuring sensor M 2103 C proportional to the gas concentration in the room air.
- Chlorine gas leak detection unit M 4510:
 - Amplifies the current from gas measuring sensor M 2103
 - Actuate the warning system when the set limit is exceeded
 - Outputs the measured concentration of both sensors as a signal of 4-20 mA via two current outputs

- **Display mode:**
When unit is switch ON it automatically starts with display mode in this mode you can:
 - Indicate the actual measured values
 - Indicate error messages

- **Set mode**
 - Set the parameters for two adjustable set point alarms
 - Check all test functions



- **Menu mode(Only for certificated Controlmatik ABW service)**
 - Set all parameters which are important for the normal operation of the device



3.0 Controls and Displays









Short preview of display and control keys!



- 1- LC display
 - ✓ Display is 12 characters and 4 lines
 - ✓ In the display mode, it shows actual measured values
 - ✓ In the menu mode, it shows adjustable parameters


- 2-  key
 - ✓ Turning OFF the relay outputs 4 and 5.
 - ✓ In combination with  key give us access to controller menu.
This menu is use only for certificated **Controlmatik ABW service!**

- 3 -  key
 - ✓ Showing the status of sensor relay outputs 1,3 and 4
 - ✓ In combination with  key, the real time and status of all inputs and outputs are displayed




- 4 -  key
 - ✓ Showing the status of sensor relay outputs 2,4 and 5
 - ✓ In combination with  key, the real time and status of all inputs and outputs are displayed

- 5 -  key
 - ✓ In combination with  or  key scrolling to all alarm (ALM1SENS1, ALM1SENS2, ALM2SENS1, ALM2SENS2) parameters set up.
 - ✓ In combination with  key give us access to controller menu. This menu is use only for certificated **Controlmatik ABW service!**

- 6 -  key
 - ✓ In combination with  key give scrolling for *alarm parameters* set up

- 7-  key
- ✓ Decreasing the alarm parameters
 - ✓ In combination with , testing the relay outputs

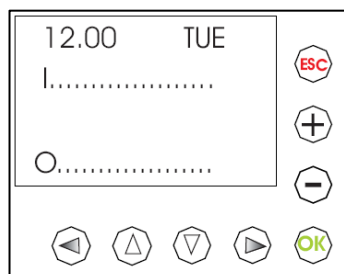
- 8-  key
- ✓ Increasing the alarm parameters
 - ✓ In combination with , testing the relay outputs

- 9-  key
- ✓ In combination with  key give scrolling for *alarm parameters set up*
 - ✓ In combination with  key give access and scrolling for *alarm parameters set up*

3.1 Start up

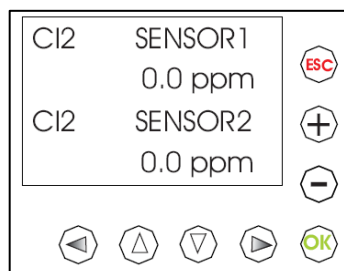
- **When the device is turned ON there are several options of display appearance:**

- **Sensors are not connected!**



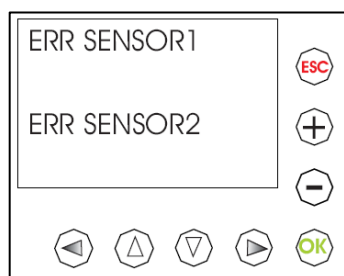
When device is turned **ON** and all **sensor inputs** are **disconnected** then the left screen is appeared. I/O list Indicates which **inputs/outputs** are **active**. **Output 2** is indicating if any sensor lost connection. Sensor must be connected for **5s**. If connection is lost after **5s** then **relay 1** will be active.

- **Both sensors are connected!**



When device is turned **ON** and all **sensor inputs** are **connected** then the left screen is appeared. It is **displaying** the **actual value** of measurement.

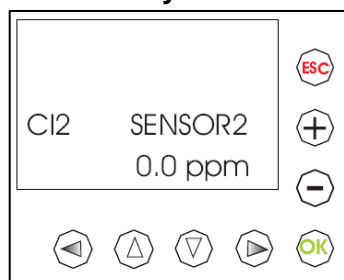
- **When sensors are not properly connected!**



If sensors inputs are connected and signal is between **1.0mA** and **3.6mA** then the left screen is appeared. This can appear in case that:

- Connected sensor is not working properly
- Connected sensor has **0-20mA** output instead of **4-20mA**

- **Only one sensor is connected!**

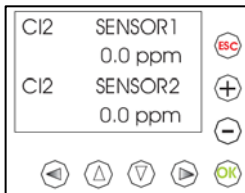


If only one sensor is connected then **ERROR** sign from the other sensor is not appeared

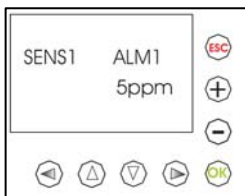
4.0 Set the limits for alarms

Two different alarms to set up. **Alarms A1 and A2** have minimum set point at **2ppm**. Factory setting for all alarms are at **5ppm**.

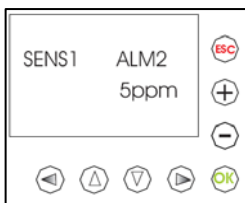
➤ Set the limits for sensor:



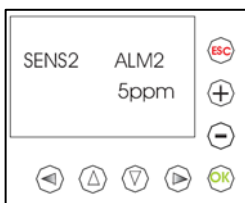
- Press and together to enter the alarm limit, **set up menu**



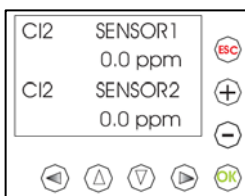
- Set alarm limit to desired by pressing and key (**from 2ppm to 20ppm**). Factory settings are set at 5ppm, to jump on minimum value 2ppm press .



- **Confirm** and moving to the next alarm limit set up by **pushing down** and **pressing** key



- With **above** described **procedure**, accessing set up for all 4. **alarms**



- To **exit the alarm limit** set up menu **push** key. Returns back to **display mode menu**

5.0 Test functions

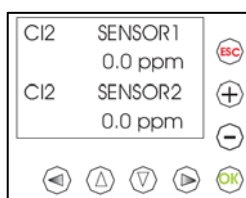
The Chlorine gas leak detector **M 4510 C** has 5 relay outputs. Output 2 is actuated when one of the sensors has lost connection or membrane of sensor is damaged. Outputs 3 and 4 are indication from **alarm1 (A1)** and **alarm2 (A2)** for **sensor 1**. Outputs 5 and 6 are indication from **alarm1 (A1)** and **alarm2 (A2)** from **sensor 2**. Each active output (3, 4, 5, 6) is indication for an working alarm.

On detector control panel is possibility to check all relay outputs, meanwhile also testing the connected warning and protection devices.

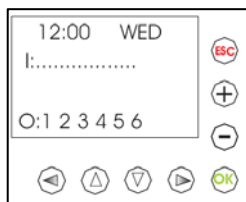


While testing relay outputs, the connected warning and protection device will also be activated!

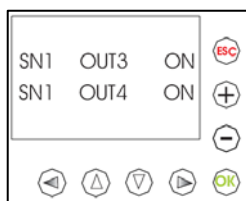
➤ Checking the relay sensors outputs



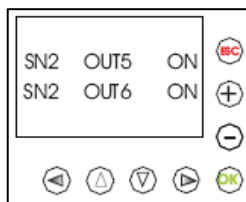
- While in **display mode** menu push and key together for 3s. **All relay outputs** (from 1-6) will be activated for **10s**.



- To check the activated relay outputs press and together



- To **check** activated relay outputs for **sensor 1** press

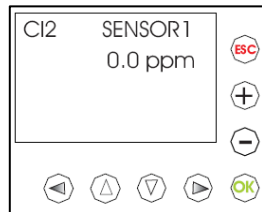


- To **check** activated relay outputs for **sensor 2** press

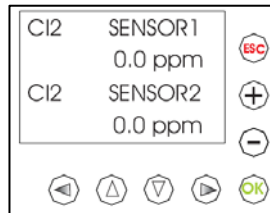
6.0 During operation

➤ In the **display mode** you can always read the **actual measured values**.

- If **one sensor** is connected

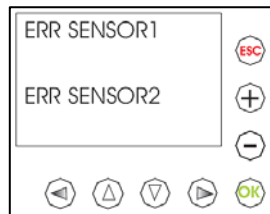


- If **two sensors** are connected

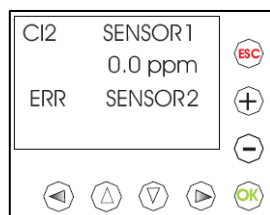


➤ Read **error messages**.

- If more than one error message is present, they are displayed one after the other.




- One sensor is working properly and one is in error, they are displayed one after the other.




7.0 Reset the alarm relay outputs

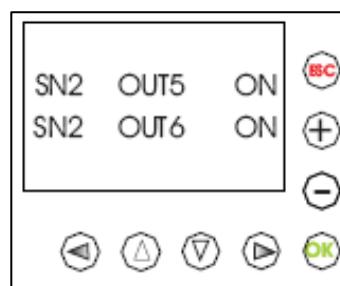
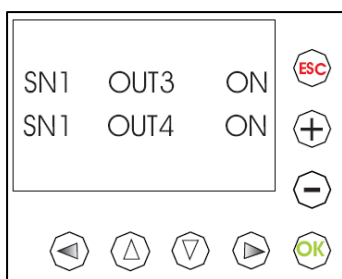
➤ RESET the alarm relay outputs

Relay output 2 is actuated when one of the sensors has lost the connection or membrane is damaged. It can only be **reseted** with  **key**.

When value of gas chlorine sensor in air, reach or overreach the stored value, **relay outputs are actuated after 5s**.

After the value of gas chlorine **SENSOR** in air drops under **1.5ppm** the **ALARM relays, OUTPUT 3 at SENSOR 1 and OUTPUT 5 at SENSOR 2, are RESETED**.

The relays, **OUTPUT 4 at SENSOR 1** and relay **OUTPUT 6 at SENSOR 2** can only be **rested** by pressing  **key**. After **reset**, the relays will not be actuated again unless the value drops under **set point value** and rise again to **set point value**.



- **Controlmatik ABW** recommends to connect the **neutralisation or sprinkling** system to alarm relay **OUTPUT 3 at SENSOR 1** or **OUTPUT 5 at SENSOR 2**. Signal **horn** alarm and **sound** alarm are recommended to connect on **OUTPUT 4 at SENSOR 1** and relay **OUTPUT 6 at SENSOR 2**

8.0 The Sensor

7.1 General description and technical info



The sensor and electronics are closed in a sealed casing resistant to aggressive gases and liquids. The sensor operates on the basis of a chemical cell and a diffuse capillary membrane, which has plenty of advantages:

- chemical additives are not necessary
- the hydrochloric acid concentrate based in chemical cell is regenerating during the chemical reaction, as well free oxygen is being released
- concentration of gas and signal are being proportional
- very stable measurement in a long period of time
- a long duration period (2 years on air)
- minimal maintenance costs
- temperature range : -20 -+55
- repeatability :2
- working area of pressure (mbar):900-1100
- working area of relative dampness – continuance(%):15-90
- working area of relative dampness-momentarily(%):0-99

Supply and transmission of the signal are flowing through shielded cable. The probe can be a part of chlorine gas in the air leak detector series M 4503 C or can be connected to the Aquaprocessor series M 5600 or directly on PLC.

- supply voltage :+12V..24V DC
- current output :4-20 mA
- measurement loop resistance :500Ohm

Gas in the air is measured in units (**in 1m³ of air=1cm³ of chlorine=1ppm**), those can be shown on the unit f of the leak detector series **M 4510 C**. Sensor of Cl₂ in the air has two years of lifetime on air. Lifetime of two years can be achieved if the sensor is placed where the moisture is relatively normal and the sensor is not constantly exposed to the high concentrations of Cl₂. Sensor sensitivity should be checked once per year. For simple sensitivity check, powdered chlorine can be used. Take a (100ml) plastic bottle than pour 50 ml of powdered chlorine in and as well so many drops of water until chlorine gets wet. Close the plastic bottle and shake it well. After one hour, open the bottle and put it under the sensor. The gas that comes out of the bottle should raise the sensor to the maximal value (20ppm) in couple of seconds. If the bottle is removed for 2 - 3 cm from the sensor, the concentration will be lower and the sensor will rise only for 4 - 5 PPM. At

lower concentration we can notice if the sensor is still sensitive. If we don't get any sensing, we have to change the sensor. The lifetime of the sensor can be shorter than two years if mayor leak occurs and if the sensor is damaged because of omission of the whole cylinder or container of chlorine.

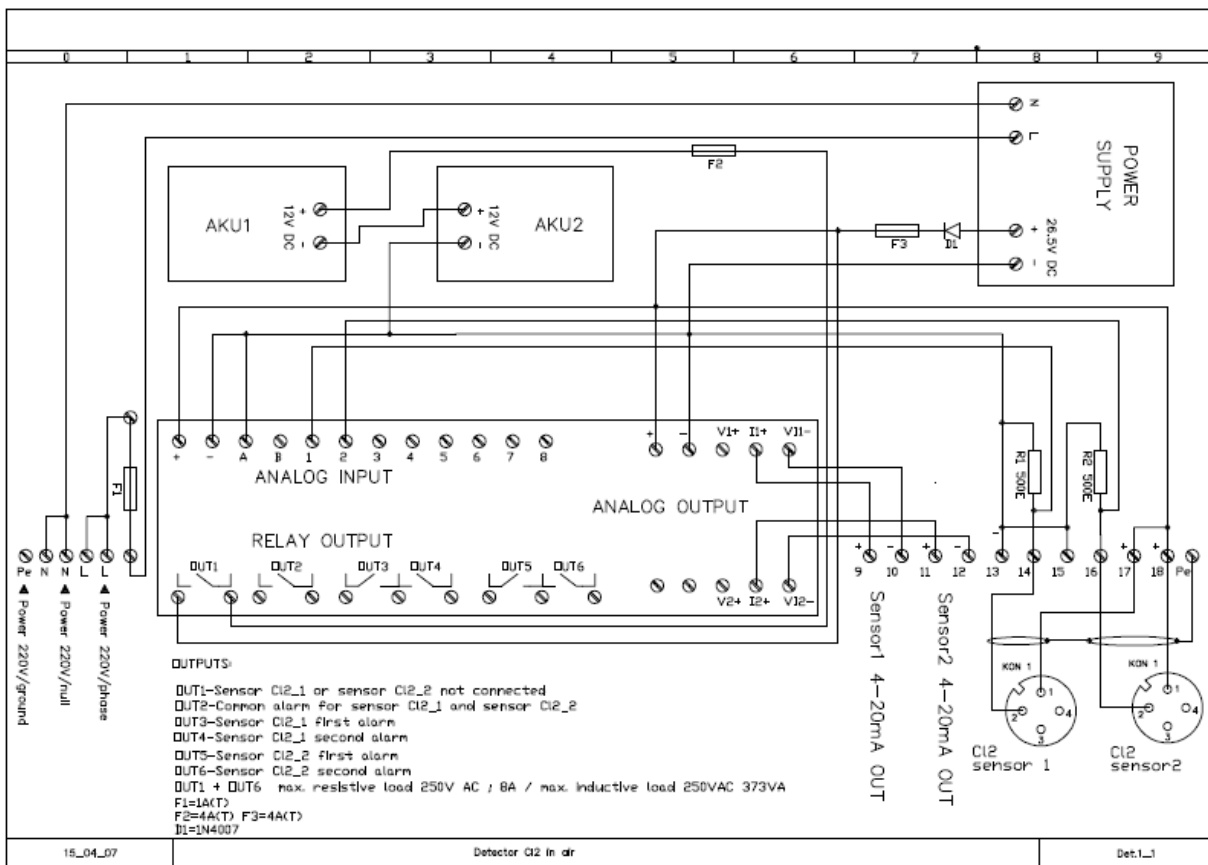
7.2 Installation

The probe includes one wall mounting holder and screws with wall insertion pieces. The probe must be mounted 50 – 70 cm from the ground. If only one probe is used in the chlorine gas storage room than it must be mounted near the gas source for rapid gas detection.

9.0 Connection scheme

➤ WARNING

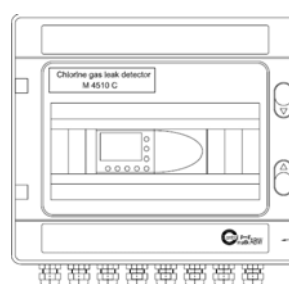
- **Disconnect power supply before connecting the sensors and relay contacts**
- **Due to safety reasons, the PE cable must be connected correctly**
- **Before connecting power supply:**
 - ✓ **Check power supply from technical data is correspondent to local supply**
 - ✓ **Protect the cable connections and plugs from corrosion and moisture**



- **Relay outputs connections depend on the type of warning and protection systems!**
- **Power supply connection**
 - Connect power supply to left terminal: **PE, N, L1**
- **Gas sensor 1**
 - Connect to terminal **14** and **17**
- **Gas sensor**
 - Connect to terminal **16** and **18**

10.0 Installation and mounting

- The IP 65 protection is only guaranteed with the transparent cover closed and with appropriate cable glands or dummy caps.
- To obtain IP 65 also protect the cable connection and plugs from corrosion and moisture
- While wall mounting do not damage the gasket to obtain IP 65



- Take off the cap cover
- Fix the device with screws
- Remount the clamp cover to obtain the IP65



11.0 Technical data

Technical data M 4510 C:

Probe unit (M 2103):

For data see M 2103 documentation

Detector unit (M 4510 C):

Measuring unit	PPM
Temperature range	from - 10 to + 50 °C
Resolution at 20 °C	0,1 PPM
Repeatability	2%
Measuring range	0 - 10 PPM or 0-20PPM
Supply voltage :	220V, 50/60Hz
Fuse :	125 mA
Analogue output:	2 x 4-20 mA
Output voltages :	0-10 V DC
Current input :	2 x 4 - 20 mA for sensor 1
and sensor 2	
Consumption :	approx. 4 VA
Response time:	T(80%) <90 sec
Recovery time:	T(5%) <90 sec
Battery backup (B) :	8 hours
Measuring loop resistance :	740Ohm
Display :	LCD 4 lines, 12 characters
Relay output :	4 relay output; max: 250V/8A
Weight:	M 4510: approx. 2.5 kg M 2103: 0,5 kg
Housing protection type:	IP 65

Technical data is subject to change without notice!