






# Instruction manual GMS\_3CH Gas mixing system

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### Intended use

<p>Before operation this instruction manual has to be read. During installation, operation, maintenance and shut-off this instruction manual has to be observed.</p> <p>The GMS_3CH is designed for use of the following gases :</p> <ul style="list-style-type: none"> <li>• Air</li> <li>• Nitrogen</li> <li>• Oxygen</li> <li>• Carbon Dioxide</li> <li>• other non-corrosive gases</li> </ul> <p><b>All used gases must be free of particles</b></p>	
<p>When the GMS_3CH is operated with toxic, ignitable, combustible or explosive substances all safety instruction for these substances have to be observed carefully.</p> <p>In case of an accident :</p> <ol style="list-style-type: none"> <li>1. turn OFF the power switch.</li> <li>2. turn OFF all power switches of peripheral units.</li> <li>3. close all main valves of connected gases.</li> <li>4. unplug the power cable.</li> </ol>	  
<p>When the GMS_3CH is operated with substances, not listed above, the materials compatibility has to be checked for all sample wetted components.</p>	

### Important notice :

For all gases the standard volume relates to 0 °C and 1013.25 hPa.

Abbreviations and symbols :

MFC = thermal massflow controller for gases



WARNING - important notice



information

### **Technical Data**

Mains power :	88 ~ 264 V AC, 47 ~ 63 Hz
Current consumption :	max. 2 A, fused ( 5 x 20 mm, 3,15 A )
Ambient conditions :	15 ° C to 40°C, 0 to 95% rH
Gas inlet conditions :	particle-free gases, max. inlet pressure : 6 bar(g)
Dimensions :	250 x 250 x 128 mm
Weight :	3 kg

### **Installation**

The GMS\_3CH has an USB port for connection to the PC :



Fig.1: USB connections

#### **Driver installation for USB connections**

The driver can be found in the directory / driver.

Install the driver according to the WINDOWS operating system, then connect the GMS\_3CH with the USB cable to the PC. After connection a new COM ( serial ) port will be installed. The COM - port number - shown in the WINDOWS device manager - has to be registered in the GMS\_3CH software.

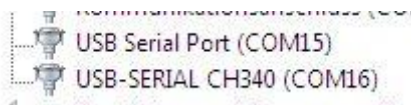


Fig.2: COM port for USB connection GMS\_3CH : USB Serial Port ( COMx)

#### **Software – Installation**

The GMS\_3CH software has to be installed by executing setup.exe from the /setup directory.



For operation MS EXCEL® ( MS Office 2010 or later ) must be installed on the computer.

#### **Installation of GMS\_3CH ( hardware )**

##### **1. Electrical connection**

Connect the mains plug to mains voltage : 88 ~ 264 V AC, 47 ~ 63 Hz.

The GMS\_3CH is switched ON / OFF by the red mains switch.

## 2. Gas connections



SWAGELOK fittings : For assembly of tube fittings the Swagelok instructions manual has to be observed.



For installation of tubings the bulkhead union has to be fixed according to Fig.3 with a suitable wrench.

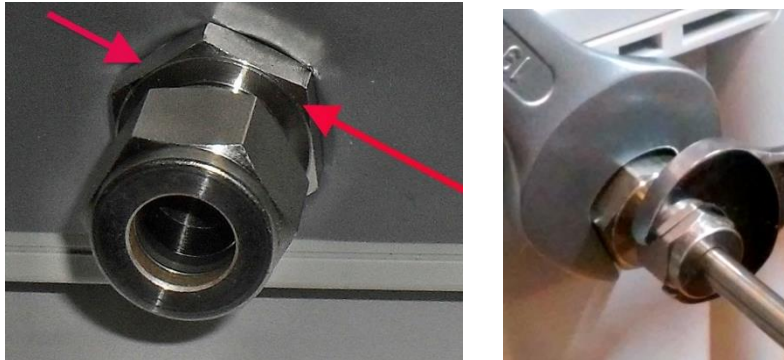


Fig. 3: fixing



Maximum inlet pressure : 10 bar(g)



Maximum outlet pressure : 9 bar(g). Minimum pressure difference : 1 bar(g)



When the operation is finished : close all valves at the gas containers !

### ***Decommission***

If the GMS\_3CH is not operated for a long time the valves on the gas cylinders must be closed.

### ***Maintenance***

The enclosure can be cleaned with a mild detergent.



Avoid any moisture or particles inside the gas tubings - that can lead to serious damage of the MFCs.

The alarm module functions should be tested from the GMS software at least once per year.

## Calibration

The (re)calibration can be performed by the user. A reliable reference device is necessary for every gas type.



The calibration data are stored in the MS EXCEL file `GMS_3CH.xlsx`. There is a worksheet for each MFC and for each gas, that can be edited by the user.

Only the yellow fields are editable – the others are locked. They contain the measurement data from each MFC and the corresponding reference data :

Flow\_ref/Ncm<sup>3</sup>/Minute : gas flow of the reference instrument / reference method

Flow\_GMS/Ncm<sup>3</sup>/Minute : gas flow from the `GMS_3CH`.

32 calibration points for each gas are required.



All data from the MFCs refer to 0°C and 1013,25 hPa, so the reference data must also refer to these conditions.

	A	B	C	D	E	F	G
1		GAS : air			Flow = slope_i x Flow_GMS + zero_i		
2		<i>ascending values !</i>					
3		Flow_ref/Ncm <sup>3</sup> /Minute	Flow_GMS/Ncm <sup>3</sup> /Minute	slope	zero		reference
4	1	0,000	0,000	1	0	1	Zirox
5	2	0,200	0,200	1	0	2	Zirox
6	3	0,400	0,400	1	0	3	Zirox
7	4	0,600	0,600	1	0	4	Zirox

Fig.5 : Calibration data `GMS_3CH`

When the `GMS_3CH` is started again the program will automatically read the new calibration data.

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## EU Konformitätserklärung

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erklärt hiermit, dass das Produkt :

### **Labor – Gasmischer GMS\_3CH\_HP**

Gasmischer mit drei Gas - Eingangskanälen für die Gase Stickstoff, Sauerstoff, Kohlendioxid und einem Gas – Ausgangskanal für das Gasgemisch - mit speziellen Sicherheitseinrichtungen.

Serien Nr. : 2021 214 bis 2021 216

Handelsbezeichnung : GMS\_3CH\_HP

den Bestimmungen der Richtlinie 2014 / 30 / EU ( Richtlinie über die elektromagnetische Verträglichkeit (EMV) ) entspricht.

Die folgenden harmonisierten Normen wurden angewandt :

DIN EN ISO 12100 - Sicherheit von Maschinen

DIN EN 60204-1 (VDE 0113-1) - Sicherheit von Maschinen – Elektrische Ausrüstungen von Maschinen

DIN EN ISO 13849-1:2016-06 Sicherheit von Maschinen - Sicherheitsbezogene Teile von Steuerungen

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