Main menu of RIGAMO V4. x (“System Configuration”)

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The detailed software manual can be downloaded here:

https://www.ritter.de/en/download/rigamo-manual/

1. Features

1.1. General

- Unified Windows® software for **measurement data acquisition** from RITTER products
- Support of multi-core processors
- Graphical and tabular display of measurement data
- Storing of data to both SD card (inbuilt in Signal Interface Module »SIM«) and computer
- Print out of measurement data as ...
  - diagram
  - in tabular form
- Export of stored data to Microsoft Excel® spread-sheet

1.2. Measurement of Gas Volume

- Data acquisition of gas volume and flow rate from up to 18 RITTER gas meters
- Measurement of **gas temperature** for recalculation to norm temperature (normalization)
  Please note: With the actual version of the »SIM« only one temperature probe can be connected to one »SIM« unit.
- Measurement of **atmospheric pressure** for recalculation to norm pressure (normalization)
- Compensation of **humidity**
- Automatic correction of the dynamic (flow rate dependent) measurement error (MilliGascounter only)

1.3. Operation with Biogas Batch Fermentation System »BBFS«

- **Temperature Control** of Heating Oven
- **Speed Control** of stirring units of fermentation bottle incl. interval mode
- **Real-time status of CO_2 absorption** for up to 18 CO_2 absorption bottles (for optional accessory “CO_2 Absorption System” of Biogas Batch Fermentation System “BBFS”):
  - Display of actual CO_2 absorption capacity for each absorption bottle
  - Display of remaining CO_2 absorption for each absorption bottle
  - Alarm function for each absorption bottle if the CO_2 absorption capacity falls below a freely selectable level

1.4. Gas Analysis with »RITTER MultiGas« Sensors (in preparation)

2. System Requirements

- Signal Interface Module »SIM«
- Operating system Windows® ~7 / ~8 / ~10
- Microsoft Excel® 2003 or higher for data export to Excel®
- Recommended processor performance: ≥ 2 GHz
- Random access memory (RAM): ≥ 4 GB
- 1 free USB port
- Monitor: 17” or larger; optimised for a resolution of 1280x 1024 pixel or higher
- Mouse / mouse pointer

3. Components / Scope of Supply

(1) Signal Interface Module »SIM«

(2) USB memory card with ...
- ... Rigamo software V4.x
- ... Documentation. The detailed manual can be dowloaded here: https://www.ritter.de/en/download/rigamo-manual/

(3) Temperature sensor
Left photo: Sensor with adapter for drum-type meters »TG«
Right photo: Sensor with adapter for MilliGascounters »MGC«

Please note:

- With the actual version of the »SIM« only one temperature sensor can be connected to one »SIM« unit. If several gas meters are connected to one "SIM" unit, the temperature compensation ("normalization") performed by the "Rigamo" software will only take into account the gas temperature of the connected gas meter.

  In this case, it is recommended to install the temperature sensor in the gas meter that can be used as a reference temperature for all connected gas meters. If this is not possible, an additional "SIM" unit must be installed for each gas meter, each connected to the first "master" "SIM" unit.

- **The temperature sensor is not approved for use in ex-proof areas!**

(4) Power supply unit 12 V DC / 230 V AC

(5) USB cable for connection of »SIM« to computer,
1 x plug USB “A”, 1 x plug USB “B”, length: 5 m

4. Signal Interface Module »SIM«

4.1. Features

a) The Signal Interface Module »SIM« is the **central unit for data transfer** from and to:

- All RITTER Gas meters
  (drum-type meter “TG” / Bellows-type meter “BG” / MilliGascounter “MGC")
- Computer with data acquisition software “RIGAMO 4x”
- Biogas Batch Fermentation System “BBFS”:
  - Temperature control of heating oven
  - Speed control / interval mode for stirring units of fermentation bottles
  - Management of CO_2 absorption from biogas (optional accessory)
- Temperature sensor **for recalculation of the actual gas temperature to norm temperature** 273.15 K (“normalization”).
  Type: PT 1000, ±0,1°C

b) The Signal Interface Module »SIM« contains an **absolute pressure sensor for recalculation of the atmospheric air pressure to norm pressure** 1013.25 mbar (“normalization”).
Type: Bosch, BMP280, 950 ~1050 hPa abs., ~ ±1 hPa

c) Integrated SD memory card (16 GB) for permanent, captive storage of the measurement data, independent of the storage of the measurement data on the computer.

- Minimum storage interval of measurement data to computer: 1 min
- Storage interval of measurement data to SD memory card: 4 min

d) The Signal Interface Module »SIM« is not approved for use in ex-proof area!

4.2. Available Configurations

The Signal Interface Module »SIM« is available for data acquisition from up to 18 RITTER Gas Meters. For operation of the »SIM« the data acquisition software RIGAMO V4.x is mandatory. Furthermore, the gas meter must be equipped with the option “Pulse Generator”. Each gas meter is connected to the »SIM« through an individual input port. Available port numbers:

Type	Number of Ports
SIM-1Ch	1
SIM-3Ch	3
SIM-6Ch	6
SIM-9Ch	9
SIM-12Ch	12
SIM-15Ch	15
SIM-18Ch	18

SIM-1CH

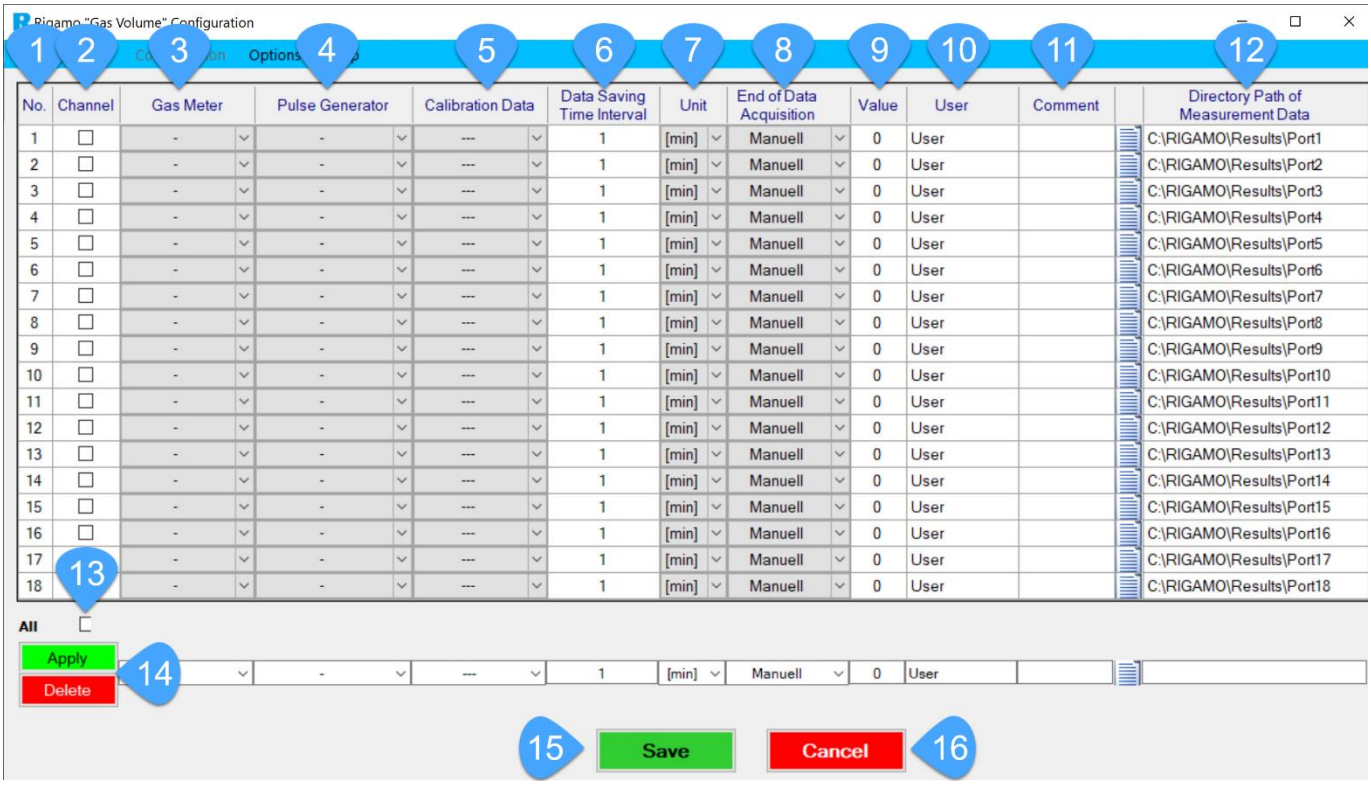
SIM-9CH

SIM-18CH

5. Application “Gas Volume”

- Requirement: Gas meter with built-in Pulse Generator

5.1. Window “Configuration”



(1) Consecutive number of signal input ports / channels
(2) Checkboxes for selecting / deselecting of single channels (needed for “master line” (14) only)
(3) Assignment of Gas Meter type to each port
(4) Selection of Pulse Generator type for each Gas Meter
(5) Selection of calibration data file for each Gas Meter (MilliGascounter only)
(6) Input of time interval value for saving of measurement data
(7) Selection of time interval unit for saving of measurement data
(8) Selection of mode for termination of data acquisition
(9) Input of value for termination of data acquisition (if applicable for selected mode)
(10) Optional field for specifying an identifier for test run (number, person in charge, laboratory, department etc.)
(11) Optional description or comment for test run
(12) Directory path for measurement data
(13) Checkbox for selecting / deselecting of all ports / channels
(14) Master line for simultaneous entry / deletion of parameters for all selected ports / channels
(15) Saves entered parameters and closes *Configuration* window
(16) Closes *Configuration* window without saving entered parameters

5.2. Window “Recording”

(1) Area 1: Display of port status

⇒ Bue: No function

⇒ Grey: Ports are not available at connected SIM unit
More available ports may be displayed than are actually available on the connected SIM. Please check the number of available ports on the connected SIM.

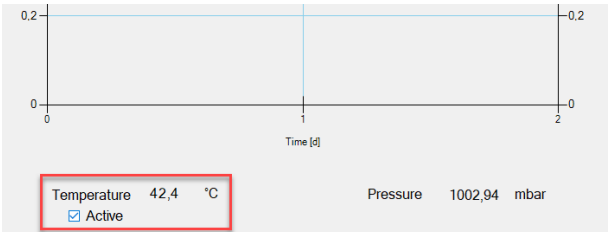
⇒ Red: Inactive

⇒ Green: Active, data acquisition started

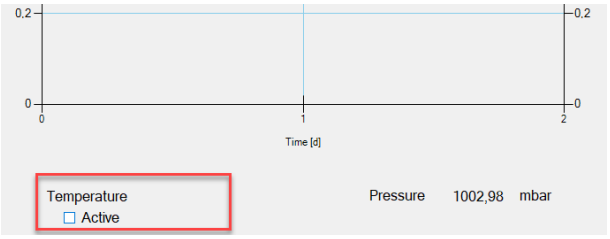
- Area 2: Tabular display of data for respective ports in real time
- Area 3: Tick boxes for displaying or hiding of graphs
- Area 4: Zooming tools for diagram area
- Area 5: Legend for graphs of gas volume and flow rate
- Area 6: Diagram area for gas volume and flow rate
  left y axis ⇒ gas volume
  right y axis ⇒ flow rate
- Area 7: Marking / demarking of all ports
- Area 8: Buttons “Start/Stop“ of data acquisition
- Area 9: Closing of *Recording Window*
- Area 10: Indication of gas temperature
  Activation / inactivation of temperature normalisation

- Area 11: Indication of atmospheric pressure
  Activation / inactivation of pressure normalisation

Please note: In general, the temperature measurement is active for recalculation of the actual gas temperature to norm temperature 273.15 K (“normalization”):

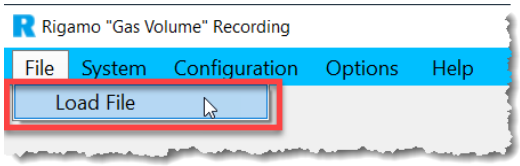


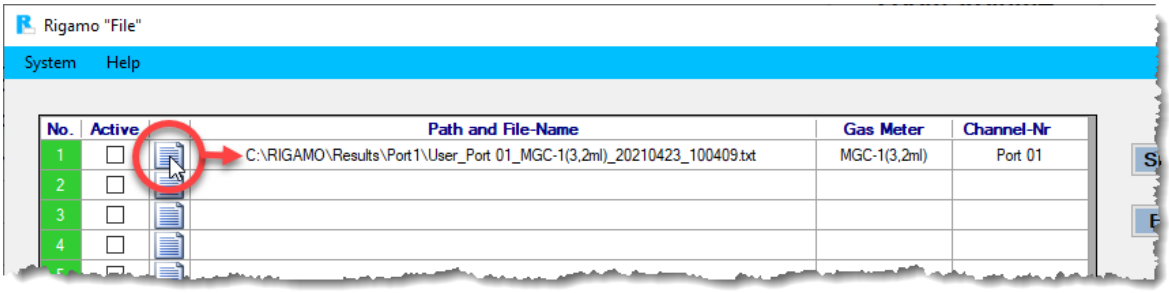
If a temperature measurement is not required or possible (**for example when the gas meter is placed in an ex-proof area**) the temperature measurement must be deactivated by clicking the tick box “Active”:

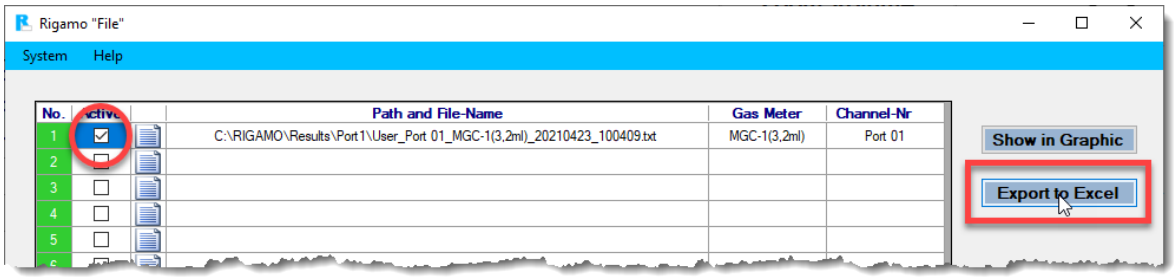


If the temperature measurement is active without a temperature probe being connected to the »SIM«, the measurement results of the gas volume will be incorrect.

5.3. Data Export to Microsoft Excel®



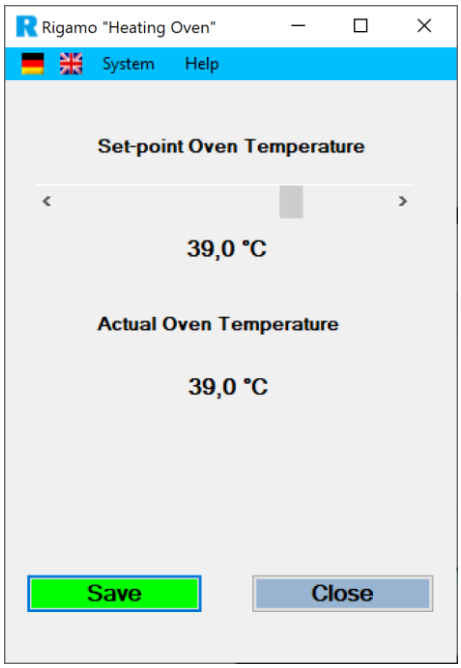


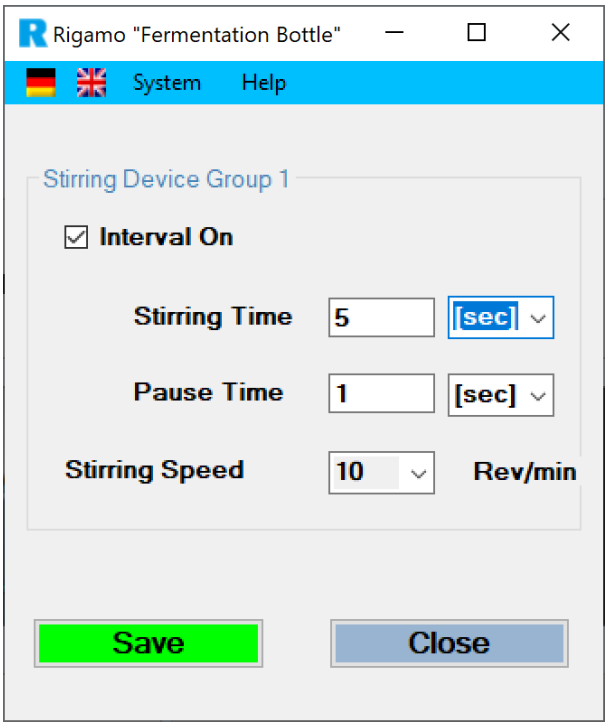


	A	B	C	D	E	F	G	H	I	J	K	L
1	User	User										
2	Filepath	C:\RIGAMO\Results\Port1										
3	Start	Date	04.05.2021									
4	Start	Time	19:31:05									
5	Gas	Meter	TG	1								
6	Pulse	Generator	V3.2	[TG/BG]								
7	Smoothing	Factor	5									
8	Sampling	Time	Interval	[sec]	1							
9	Comment											
10	End	of	Measurement	(Type)	Manuell							
11	End	of	Measurement	(Number)	0							
12	Startblock	SD	0									
13												
14												
15												
16												
17	Date	Time	Runtime-[min]	Vol-norm-[ltr]	Flow-norm-[ltr/h]	Pulse-[-]	Vol-dynErr-[ltr]	Flow-dynErr-[ltr/h]	Vol-raw-[ltr]	Flow-raw-[ltr/h]	P-[mbar]	T-[C]
18	04.05.2021	19:31:05	0,0045	0,0000	0,000	0	0,0000	0,000	0,0000	0,000	986,26	21,6
19	04.05.2021	19:31:06	0,0170	0,0096	17,244	2	0,0100	18,000	0,0100	18,000	986,26	21,6
20	04.05.2021	19:31:07	0,0335	0,0287	43,111	6	0,0300	45,000	0,0300	45,000	986,26	21,6
21	04.05.2021	19:31:08	0,0498	0,0479	68,977	10	0,0500	72,000	0,0500	72,000	986,26	21,6
22	04.05.2021	19:31:09	0,0662	0,0671	68,977	14	0,0700	72,000	0,0700	72,000	986,26	21,6
23	04.05.2021	19:31:10	0,0826	0,0910	73,288	19	0,0950	76,500	0,0950	76,500	986,26	21,6
24	04.05.2021	19:31:11	0,1009	0,1102	72,426	23	0,1150	75,600	0,1150	75,600	986,26	21,6

6. Application “Heating Oven”

- Setting and display of Oven Temperature



7. Application “Fermentation Bottle”

- Setting of Interval Mode On / Off
- Setting of Stirring / Pause Time
- Setting of Stirring Speed