

400GD

USER MANUAL



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Original user manual

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Edition: 2019-05-20, V03

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1 Introduction

- This manual is an important part of your delivery. It explains the usage and purpose of the MRU Multi-Gas detector **400GD**.
- Please read this manual carefully and make yourselves familiar with the **400GD** before using it.
- The **GD400** may only be used by skilled personnel and may only be used for its intended purpose.
- Please pay special attention to the security and warning signs, to avoid personal injuries and damaging the product.
- MRU can't be held responsible for damages or injuries, by not following the instructions in this manual.
- Always keep the manual near you when working with the analyzer, to be able to read instructions as needed.

1.1. Intended usage

The multi-purpose GD400 is available with different interchangeable sensor heads and can be used:

- Gas Leak detector to detect gas leaks in an installation area
- Spillage test to locate leaks at flue pipes

The analyzer detects measurement components and displays them.

The instrument was manufactured according relevant norms and regulations. It must be used within its intended use.

The analyzer may not be modified from the design or safety engineering. Modifications of any kind by the user will render the declaration of conformity.



This analyzer meets the requirements of the valid European and national regulations. You can find the declaration of conformity in the appendix.

1.2. The company MRU

The **400GD** is manufactured by the MRU GmbH in Neckarsulm, Germany (founded in 1984), a medium sized company that specializes in developing, producing and marketing high quality emission monitoring analyzers. MRU GmbH manufactures a wide range of instruments, from standard analyzers up to tailor made industrial analyzers



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2 Security and safety directions for the analyzer

2.1. Safety manual

All general information and safety precautions of MRU products are listed in the supplied separate safety manual.

Therefore, this manual must be read and observed before the first use of the analyzer.

Instrument-specific safety and warning requirements in this manual are prefixed before dangerous actions

2.2. Safety manual

The used categories of safety precautions are here explained once more



DANGER

Identifies an immediate, impending hazard that, if ignored, will result in severe bodily injuries or death.



WARNING

Identifies an immediate, impending hazard that, if ignored, may result in severe bodily injuries, material damage or death.



CAUTION

Identifies a possibly dangerous situation that, if ignored, may result in minor injuries.



ATTENTION

Identifies a possibly harmful situation that, if ignored, may result in damages to the device or its surroundings.



NOTE

Identifies user tips and other especially important information.

3 Description

3.1. Purpose

The main purpose of the 400GD multi-gas detector in combination with the exchangeable sensor heads is the detection of gases and flue gases in boiler rooms / heating installations and test:

- Surface mounted gas pipes
- Check ambient air for combustible gases
- Inspect manholes and cavities
- Soundness of combustion systems

The 400GD can be used for other measuring tasks.

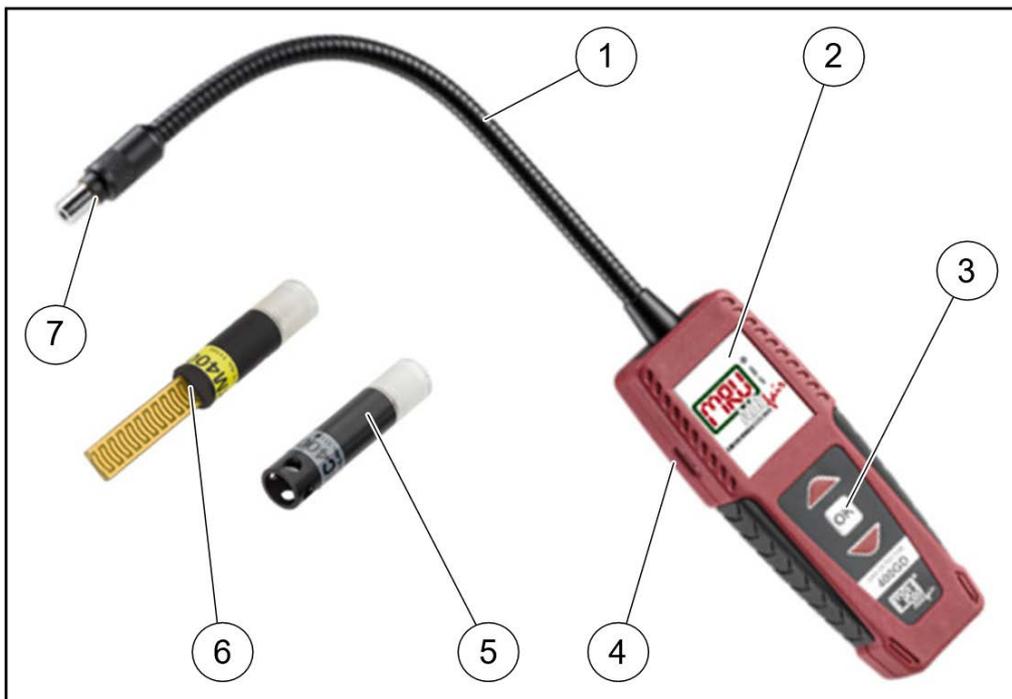
Interchangeable sensors:

- HC-sensors to detect leaks at gas pipes.
- Humidity sensor RM400 to detect leaks at flue pipes.
- Condensing humidity sensor RM400 for spillage tests on flue gas systems
- Infrared temperature sensor IR400 for contactless measurement of surface temperature
- Hygrometer sensor HM400 for the check of indoor climate
- Refrigerant detector RF400 for leak detection on air conditioning units

Visit our webpage www.mru.eu to see available options or talk to your MRU representative.

3.2. The Analyzer

The analyzer has a compact and sturdy fiber glass reinforced enclosure. The analyzer is operated using the key pad and values are displayed on the color display.



1	Flexible arm	2	Display
3	Keypad	4	Mini-USB port
5	HC sensor HC400 (option)	6	Humidity sensor RM400 (option)
7	Sensor connector		

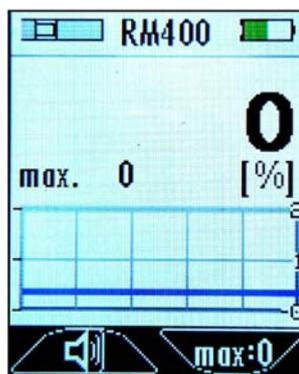
3.3. User interface

All functions are being displayed on the analyzer display. Operation is done using the keypad. "Below" each menu and displayed screen, there are submenus available.

Keypad



Start screen Measurement



3.4. Menu structure

All functions are available in the EXTRAS menu. After start up the measurement screen is available. You will navigate between menus using the arrow keys and OK key.



Start	Start a measurement
ON	Power down
Set Zero	Set to zero (for HC400)
Display	Display contrast, adjustable 25; 50; 75; 100%
Volume	Alarm volume, adjustable 25; 50; 75; 100%
Alarm	Alarm threshold, adjustable in steps of 10
Service	Status vales (Battery, USB ...)
Sensor	Values of the inserted sensor
Info	Information about the analyzer

4 Operation

4.1. Commissioning

The analyzer has been factory assembled, has been calibrated and is ready to be used.

- ▶ Check the instrument regarding condition and integrity after delivery.
- ▶ Charge the internal battery for at least 8 hours,  see 5.2.

4.2. Power up – analyzer without sensor

- ▶ Press and hold the OK key for at least 3 seconds.
 - ⇒ The MRU start screen appears.
 - ⇒ You are asked to connect a sensor.
- ▶ Connect the sensor  see 5.2
 - ⇒ The warm up phase is displayed (only HC400)
 - ⇒ The measurement menu is being displayed after warmup.
 - ⇒ The analyzer is ready to measure.

4.3. Power down

- ▶ Select OFF using the arrow keys.
- ▶ Press the OK key.
 - ⇒ The analyzer powers down.

or

- ▶ Press the OK key longer.
 - ⇒ The analyzer powers down.

4.4. Auto-off function

The screen below appears if the analyzer is not used over a period.



- ▶ Press ANY key to stop the count-down and the analyzer stays on.
- ▶ Analyzer powers down if no key is pressed.

4.5. Reset

Press both arrow keys at the same time to make a hardware reset, the analyzer powers down.

5 Measuring



DANGER

Danger when used improperly
Deadly accidents can be the result if the rules are not obeyed.

- ▶ The analyzer may only be used for its intended purpose.



DANGER

Explosion danger in EX zones
There is a possibility of explosion in an EX zone.

- ▶ The analyzer may only be used in explosion free zones.



ATTENTION

Damage to the device due to incorrect operation
Destruction of the HC sensor by exceeding the measuring range

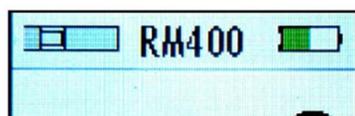
- ▶ Observe the meas. range of the HC sensor, do not exceed it.

5.1. Power supply

The analyzer is powered by an internal MRU battery.
The battery can be charged:

- With an optional USB charger (USB port)
- With USB cable connected to a PC

5.2. Battery status indicator

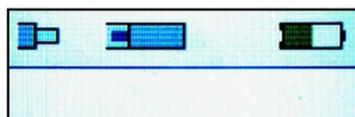


The battery symbol displays the capacity of the battery. The indicator changes its color from green to orange to red. About 60 minutes before the battery is empty, the battery status will start flashing in red.

The analyzer will shut down automatically once the battery is almost empty to avoid battery damages unless the battery is being charged within one minute.

5.3. Measurement

- ▶ Insert the sensor for your application until you hear the sensor click into its position.
- ▶ Power up the analyzer.  see 4.2.



The analyzer will display a missing sensor, if the analyzer is powered up without a sensor being connected

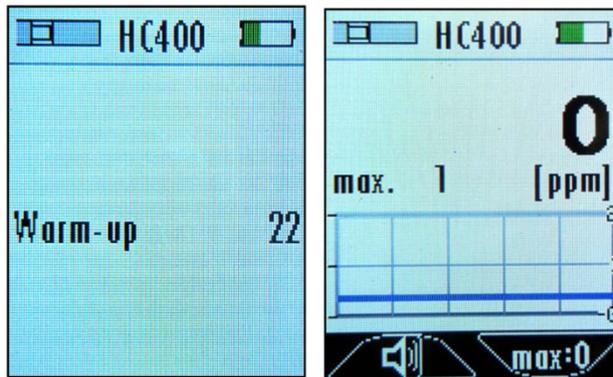
5.4. Measurement example with the HC-sensor HC400

Once powered up the sensor LED will flash and the analyzer displays „HC400“ and “Warm-up“.

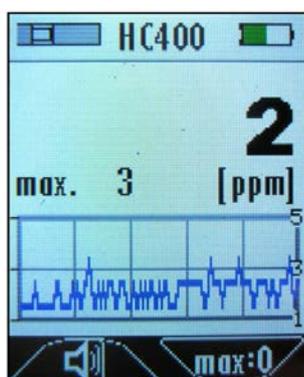
During the warm up phase, the sensor LED flashes and no measurement is possible.

Measurement mode is active once warm is completed.

⇒ A measurement value is displayed (gas concentration) and the measurement has started.

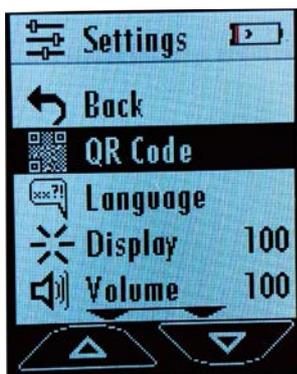


- ▶ Exit the measurement screen by pressing OK.
 - ▶ Use the arrow keys to select the alarm menu
 - ▶ Adjust the alarm threshold values with the arrow keys (e.g. 100 ppm)
 - ▶ Confirm the value with the OK key.
 - ▶ Reset to zero if needed in the zeroing menu.
 - ▶ Use the arrow keys to select the start menu.
 - ▶ Press the OK key.
 - ▶ Slowly move the sensor along the pipes that are being tested.
- ⇒ The measured value will change when a leakage is detected, a graph will be recorded, optical and acoustic signals indicate a gas leakage.



Measurement with different sensors are based on the same principle. The moisture sensor RM400, the Infrared temperature sensor IR400 and the hygrometer HM400 have no warm up phase.

5.5. QR-Code



The 400GD uses the QR code to transfer a simple "measurement protocol". To do this, the QR-mode must be set in Setting QR code menu.

The QR code (Quick Response, as a brand term "QR Code") is a two-dimensional code that serves to transfer data to a smartphone or PC.

For this purpose, a camera is used as a scanner. 400GD supports QR code from firmware version V1.00.20. If an older firmware version is installed, it can be updated.



The 400GD uses the QR code to transfer a simple "measurement protocol".

To do this, the QR-mode must be set in Settings/QR code menu.

Transferred will be:

- sensor name
- sensor serial number
- min. / max. values
- duration of the measurement

The QR code menu item is available a few seconds after starting a measurement.

There are the following modes:

- Text mode:
the protocol is transmitted in the form of a text module that can be pasted or saved in a document.
- E-mail mode:
the protocol is transmitted in the form of a text module. The text module is marked as an email, so a smartphone/PC automatically makes an e-mail draft.
- MRU mode:
not implemented yet! For the MRU4you app.

The protocol is created while measuring (start).
If you jump out of measure window, the logging will be interrupted.

If a zero point is taken or Max:0 is pressed, the current protocol is discarded and a new protocol will be created.

Many smartphone camera apps can scan QR codes (for example: Apple, Huawei). This Android app works well to: "Barcode Scanner" (Developer: ZXing Team)

The QR protocol cannot be saved in the 400GD. That means, it should be transferred to the smartphone immediately after the measurement, otherwise it will be lost when switching off, zeroing, max:0 will be pressed or sensor will be plugged off.

6 Maintenance and care

6.1. Maintenance

For accurate reading we suggest an annual service and calibration of the analyzer at a local authorized service location (www.mru.eu).

6.2. Care

This is a low maintenance analyzer:

- ▶ Charge the battery if the analyzer will not be used for a longer period, then recharge the batteries every 6 months.

6.3. Care hints for sensors

RM400:

**NOTE**

The RM400 sensors function is based upon a conducting surface, therefore the sensor may NOT be cleaned with alcohol or distilled water. Use a saline to clean the sensor and then let it dry.

7 Appendix

7.1. Technical data

Operating temperature	+5°C ... +50 °C
Rel. humidity, non-condensing	95%
Storage temperature	-20°C ... +60°C
Li-Ion internal battery pack, operating hours (depending on sensor type used)	Li-Ionen typ. 20h
Power supply	100 - 240 V / 5V DC / 500 mA
Weight	approx. 230g
Dimensions	50x25x135 mm
Housing material	PA6GF30
IP degree of protection	IP30
Display	45mm (1.8") TFT
Interface for battery charging and SW update function	Mini-USB
Alarm	optical, acoustic, vibration

7.2. Sensors

Gas leak detection HC400	No. 11138
Calibration gas	CH ₄
Measuring range	0 .. 44000 ppm
Resolution	1 ppm
Response time (until alarm)	≤ 5s
operating principle	gas-sensitive semiconductor
cross sensitivities	Alcohols, hydrocarbons, solvents
Recommended test interval	weekly
Test gas	1000ppm CH ₄ in air (50%rel.humidity)
Heat up time	30 sec
Operating temperature	+5°C ... +50 °C
Storage temperature	-20°C ... +60°C

Gas leak detection HC401	No. 11591
Calibration gas	CH ₄ , C ₃ H ₈
Measuring range CH ₄	0 .. 44000 ppm
Measuring range C ₃ H ₈	0 .. 17000 ppm
Resolution	1 ppm
Response time (until alarm)	≤ 5s
operating principle	gas-sensitive semiconductor

cross sensitivities	Alcohols, hydrocarbons, solvents
Recommended test interval	weekly
Test gas	1000ppm CH4 in Luft (50%rel.Feuchte)
Heat up time	30 sec.
Operating temperature	+5°C ... +50 °C
Storage temperature	-20°C ... +60°C

Gas leak detection HC402	No. 11733
Calibration gas	CH4, C3H8, H2
Measuring range CH4	0 .. 44000 ppm
Measuring range C3H8	0 .. 17000 ppm
Measuring range H2	0 .. 40000 ppm
Resolution	1 ppm
Response time (until alarm)	≤ 5s
operating principle	gas-sensitive semiconductor
cross sensitivities	Alcohols, hydrocarbons, solvents
Recommended test interval	weekly
Test gas	1000ppm CH4 in air (50%rel.humidity)
Heat up time	30 sec.
Operating temperature	+5°C ... +50 °C
Storage temperature	-20°C ... +60°C

Condensing humidity sensor RM400	No. 11191
Measuring range humidity	0 .. 100
Resolution	1
Response time	≤ 1s
operating principle	Resistance measurement (condensation)
Operating temperature	+5°C ... +50 °C
Storage temperature	-20°C ... +60°

Infrared temperature sensor IR400	No. 12121
Measuring range temperature	-70...380°C
Resolution	0,1°C
FOV (Filed of view)	35°
operating principle	Thermopile
Operating temperature	+5°C ... +50 °C
Storage Temperature	-20°C ... +60°

Hygrometer HM400	No. 11922
Ambient Humidity Range Resolution Accuracy	0...100%rH 0,1% +-3%rH (20...80%rH)
Temperature Range Resolution Accuracy	0...60°C 0,1 °C ± 01 °C
Ambient pressure Range Resolution Accuracy	300...1100hPa 0,1 hPa ±1hPa
Dewpoint calculated from temperature and humidity accuracy	±0,5 °C
Operating temperature	+5°C ... +50 °C
Storage temperature	-20°C ... +60°C

Refrigerant detector RF400	No. 11190
Measuring Range	0...1000ppm
Resolution	1 ppm
Calibration medium	R134a, R32, R1234ze, H2
sensitive to	FCKW, HFCKW, FKW, HFKW, HFKW, HFO
detection limit	3g/a (R134a)
Response time (until Alarm)	≤ 3s
operating principle	gas-sensitive semiconductor
cross sensitivities	Alcohols, hydrocarbons, solvents
Heat up time	55 sec
Operating temperature	+5°C ... +50 °C
Storage temperature	-20°C ... +60°C

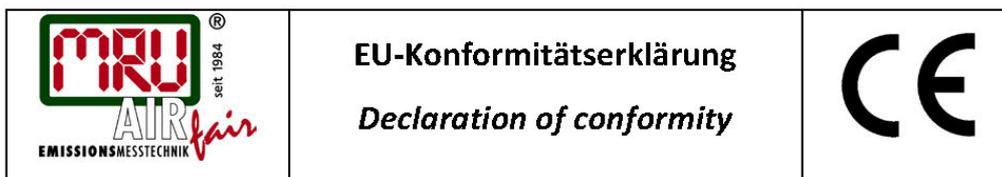
For future sensors, which are not listed here, the firmware can be updated.

7.3. Service menu

The service menu is for authorized personnel only and is password protected.



8 Declaration of conformity



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Produkt / Product

Bezeichnung / designation:	Multi Anzeigegerät / General Device		
Produktname / name:	400GD		
Funktion / function:	<table border="0"> <tr> <td style="vertical-align: top;"> Multifunktions Detektor In Kombination mit Wechselsensoren zur: <ul style="list-style-type: none"> • Gas-/ Abgasdetektion • _____ • _____ • _____ • _____ </td> <td style="vertical-align: top; padding-left: 20px;"> Multipurpose Detector In combination with switch sensors for: <ul style="list-style-type: none"> • Gas- /Fluegas detection • _____ • _____ • _____ • _____ </td> </tr> </table>	Multifunktions Detektor In Kombination mit Wechselsensoren zur: <ul style="list-style-type: none"> • Gas-/ Abgasdetektion • _____ • _____ • _____ • _____ 	Multipurpose Detector In combination with switch sensors for: <ul style="list-style-type: none"> • Gas- /Fluegas detection • _____ • _____ • _____ • _____
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Hiermit erklären wir, dass das oben beschriebene Produkt allen einschlägigen Bestimmungen entspricht, es erfüllt die Anforderungen der nachfolgend genannten Richtlinien und Normen:

We declare the conformity of the product with the applicable regulations listed below:

- EMV-Richtlinie / EMV-directive 2014/30/EU
- Niederspannungsrichtlinie / low voltage directive 2014/35/EU
- RoHS-Richtlinie / RoHS directive 2011/65/EU (RoHS II)

Neckarsulm, 06.07.2018



Erwin Hintz, Geschäftsführer / Managing Director