

DM 9600

USER MANUAL



DUOTEC AS

MÅLEINSTRUMENTER TIL MILJØKONTROL

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Die leeren Seiten der Bedienungsanleitung sind kein Fehler
sondern herstellungsbedingt erforderlich!

The blank pages of the operating instructions are not a mistake
but due to manufacturing required!

Пустые страницы в инструкции по эксплуатации не ошибка,
а требуется производством!

Les pages vides sont pas fauses, mais dûs à la production requise!

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Inspect Shipment for Damage

Carefully inspect the entire shipment for damage in the presence of the shipper's agent, removing packaging material if necessary. Note any damage to packaging and/or goods on Packing List and have it signed by the shipper's agent prior to accepting the shipment. Submit damage claim to MRU immediately.

NOTE: Damage claims not received by MRU within 3 days of receipt of shipment will not be accepted.



Important notice!

This high quality electronic device utilizes batteries that discharge even when the device is not in use. Therefore, it is very important to charge the batteries every 6 months, even if the device is not in use.

Failing to follow these instructions will void your warranty!

Save the original box and the packing material for use if the device must be shipped in the future.

The products described in this manual are subject to continuous development and improvement and it is therefore acknowledged that this manual may contain errors or omissions. MRU encourages customer feedback and welcomes any comments or suggestions relating to the product or documentation.

Please forward all comments or suggestions to the Customer Feedback Department at the following address:

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Email: info@mru.de
Homepage: www.mru.eu

This manual is intended solely as a guide to the use of the product.

MRU shall not be liable for any loss or damage whatsoever arising from content errors or misinterpretation of information's from this manual or any miss-use resulting from the use of this manual.

1. General information

1.1. The company MRU GmbH

This device, **DM9600** 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 produces a wide range of instruments, from standard analyzers up to tailor made industrial analyzers. MRU GmbH contact details are listed on the previous page.



Plant 1: Sales, Service, R&D and administration



Plant 2: Production

1.2. Important notes for this operating manual

The operating manual is an important part of your delivery. It explains the usage and purpose of this device and ensures the safety of the user and the environment.

Every user has the obligation to read the complete manual and getting familiar with the device and follows all directions, especially those regarding safety.

Additional hints in other chapters will be clearly marked with an **ATTENTION** sign.



1.3. Intended usage

The **DM9600** is a manometer that is used for pressure measurements as well as temperature measurement of NON-explosive gases.

1.4. Security direction

The following security directions must be followed at any time.

They are essential and indispensable element of this manual.

Failing to follow these instructions will void your warranty!

Security directions

The **DM9600** may only be used for its intended purpose.

Our analyzers are checked according to the following regulations:

VDE 0411 (EN61010) and **DIN VDE 0701** before they leave the MRU GmbH factory.

MRU technical products are designed and manufactured according to **DIN 31000/ VDE 1000** and **UVV = VBG 4** of the professional guilds for fine mechanics and electrical engineering.

MRU GmbH assures that the analyzer complies to the essential requirements of the legal regulations of the member states of the electro-magnetic compatibility (**89/336/EWG**).



Specific security directions

Only use a suitable USB battery charger 5V/>0,7A

Metal parts and accessories may not be used as electric conductors.

The device may not be used under water.

The device may not be stored near fire or great heat.

The temperature range of the temperature sensors may not exceed their nominal ranges, this can destroy these sensors.

The measured pressure may not exceed the measuring range of the device.

Electronic devices will be damaged when dropped.

User directions for Li-Ion batteries



- The end-user has NO access to the internal battery.
- This rechargeable battery may only be used in the **DM9600**.
- Never throw the battery into fire.
Don't charge the battery at high temperatures
Don't store the battery in a hot location
- Don't deform the battery, don't short circuit or change the battery in any form!
- The battery may not be used in or under water.
- Don't stress the battery with high mechanical strain and don't throw the battery.
- Don't squeeze nor cut off the battery wires!
- Don't store nor carry the battery with any sharp items
- Don't connect the (+) contact with the (-) contact or contact with metal.
- Not following the above-mentioned directions may cause heat, fire and explosion.
- The life span of this battery is about 500 charging and dis charging cycles.

With increasing charging cycles the specified device running time will decrease with each charging cycle

1.5. Packaging

Packing regulation of 12.07.1991

If your local waste facility does not except MRU packing materials for disposal, you may return it to MRU or our local sales representative. Packing materials returned to MRU must be returned prepaid.

1.6. Return of hazardous waste - Waste Disposal/Returns/Warranty

MRU GmbH is required to accept the return of hazardous waste such as batteries that cannot be disposed of locally. Hazardous waste must be returned to MRU prepaid.

1.7. Return of analyzer according to ElektroG

MRU GmbH is required to accept the return, for proper disposal, of all analyzers delivered after 13th of August 2005. Analyzers must be returned to MRU prepaid.

2. DM9600 description

2.1. Introduction

The main task of the DM9600 is measuring pressure and temperature.

Optional with AUX port:

HC-probe for gas leak detection

External pressure sensor to measure higher pressures

2.2. The DM9600

The DM9600 has a compact and robust fiber-reinforced plastic enclosure.

It is entirely operated using the color touch screen.



1	Touch screen
2	Mini USB interface for data transfer and battery charging
3	Pressure port P1
4	Pressure port P2
5	IR interface for external IR Printer
6	Rear magnets for hands free operation
7	Micro-SD-card reader
8	Temperature port Temp 1
9	Temperature port Temp 2
10	AUX-port
11	Reset-button (on the rear side)



3. Operating the DM9600

3.1. Power on and power off

The DM9600 is powered up using the touch screen.
 Touch the blank screen, then press the appearing green ON button.
 The display will turn dark again if the green ON button is not pressed within 5 seconds.

You will use the context menu button to power the unit down.
 Press the context button then the appearing OFF button.



3.2. Zeroing

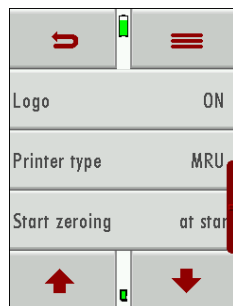
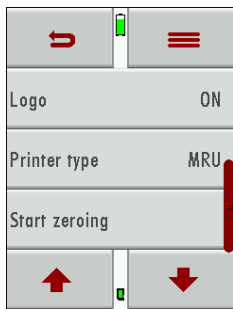
The zeroing is selectable between *last zeroing* and *zeroing during start up*

Last zeroing:

The unit will select the **last** zeroing of the pressure sensor.
 Using this mode might have inaccurate measurement results due to temperature influences (zero drift) and the unit will not ask to perform zeroing during start up.

Zeroing during start up:

The user will be asked to perform a zeroing when this mode is selected.
 The measurement accuracy is warranted once the zeroing was performed. The DM9600 will select last zeroing in case the zeroing was not performed -> **see last zeroing.**



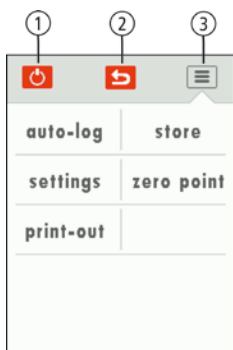
3.3. Function keys

Pre-defined function keys will appear on the upper and lower screen border – these keys will differ depending on the screen content.
 The upper border typically displays the return and context buttons.
 The lower border often displays the up and down buttons.

There can be additional or other buttons, depending which program or menu currently is used.

3.4. Context menu

The context menu button is an addition to the function keys. All available possibilities for the current displayed screen will be available for selection.
 Some of the available functions are: "power down the unit", "exit window", "close context menu without action" (just to name a few).

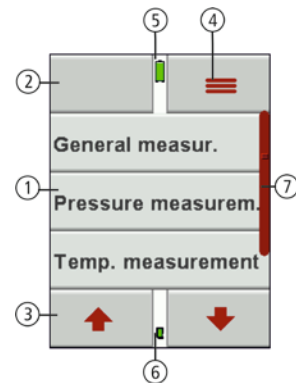


1	power down the unit
2	exit window
3	close context menu without action

3.5. Display

All information needed to operate the DM9600 will be displayed as follows:

1	Main menu
2	Function keys
3	Function keys
4	Context key
5	Battery charging condition (Lithium-Ion Battery)
6	SD-Carte inserted SD-Card reader GREEN symbol – read and write is possible YELLOW symbol – read only
7	Scroll bar indicator for the main menu



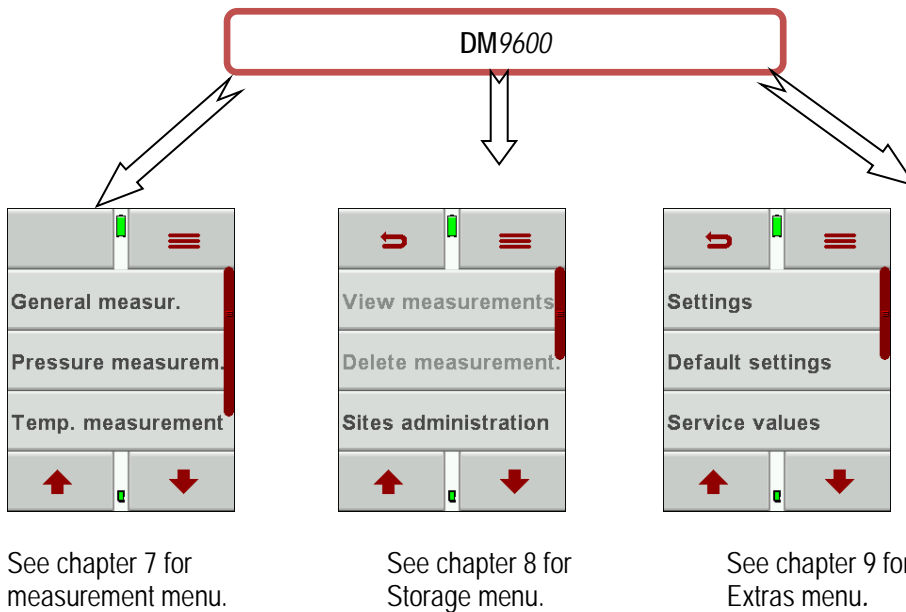
3.6. Menu structure

The DM9600 has 3 available main menus:

Measurement, Storage and Extras.

The context menu key lets you select the available main menus.

- Menu measurement:** All available measurement options will be displayed and can be selected here. This screen will only display installed and available options.
- Menu Storage:** All available storage options will be displayed here.
- Menu Extras:** All other options are displayed here, for example setting to adapt your DM9600.

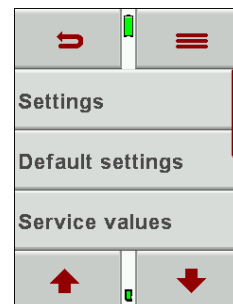


4. First startup

The DM9600 can be customized during the first start-up. Of course, all modifications can be also done at a later stage.

4.1. Readiness of the DM9600

- Unpack the DM9600, read the complete manual.
- The DM9600 is delivered fully assembled and ready to use. Nevertheless, check if the delivery is complete and that nothing is damaged.
- Recommendation: Charge the battery for 5 hours.
- Check date and time / modify if needed.



4.2. Equipment settings

The following adjustments can be made in the „Extras“ menu:

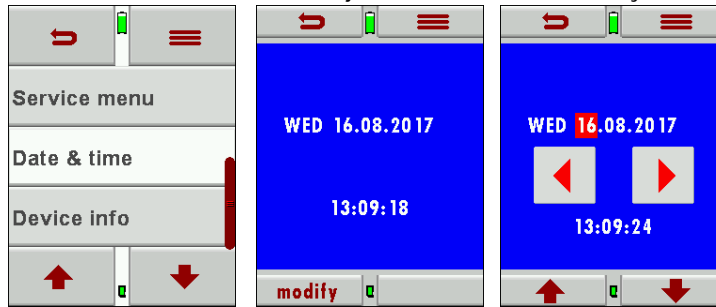
Country		When changing the country, country specific pre- settings and measurement procedures will be activated. Please pay special attention if the country specific settings and procedures are working according to their regulations.
Language		Select the operating language
LCD brightness [%]	5 – 100	The LCD brightness is depending on temperature and personal perspective of each user. 50% brightness are normal at 68°F (20°C)
Keyboard beep	ON / OFF	Turn the Keyboard beep ON or OFF
Helping hints	ON / OFF	Turn the feature Helping hints ON or OFF
Measurement		Select the units for pressure and temperature
Logo	ON / OFF	Select if the start logo should be displayed or nor
Printer type	MRU/HP	Select the between MRU protocol and HP protocol



Adjusting date and time

Date and time can be viewed and adjusted in the *EXTRAS / Date/Time menu*. This device automatically changes from winter to daylight savings time and back.

The date and time should be adjusted in the internal battery was completely drained.



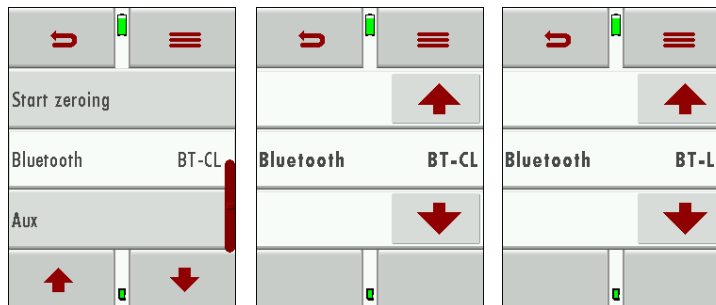
Modify the date and time with the buttons left/right and up/down

4.3. Bluetooth settings (optional)

The following MRU Software can be used:

MRU4u (Bluetooth) available in the Apple App Store and Google Play Store

The Bluetooth-Passkey (connection code) is: 1234



The Bluetooth mode can be viewed and selected in the *EXTRAS / Setting / Bluetooth* menu.

Please use BT-CL for connections to Android and BT-LE for connections to IOS.

5. Maintenance and care

5.1. Cleaning and care

The **DM9600** required only little maintenance:

- Charge the battery completely in case you will not use the analyzer over a longer period. Then recharge the battery every 6 months (using the included battery charger connected to the USB port).

6. Preparation for each measurement

6.1. Power supply

The **DM9600** can be operated optionally:

- With the built in Lithium-Ion battery
- With the included battery charger connected to the USB port

6.2. Automatic Auto-off function

The Auto-off function powers down the device if no key has been touched for 60 minutes. During measurement and/or battery charging the Auto-off function is deactivated.

The device will give an acoustic signal and will display that it wants to shut down, the shutdown can be prevented by touching the screen.

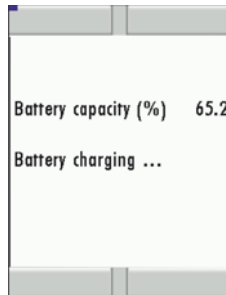


6.3. Measuring with grid power supply / Battery charging

The device can be charged by connecting the supplied charger 90...260 V / 50/ 60Hz to the USB port.

The device can be operated while it is charged.

The device will switch to trickle charge mode once the battery is fully charged.



6.4. Battery charge condition

The battery symbol indicates the battery capacity. The battery symbol will start to flash every second in red once the battery reaches a remaining operation time of +/- 60 minutes (depending on device configuration). The device will shut down if the batteries are not charged in time to prevent a total battery discharge.

6.5. Operating temperature

Please pay attention to the allowed operating temperatures for this device.

The device will display should you try and operate it whilst outside of the defined temperature ranges.



In case the **DM9600** was stored at a very cold location you will have to give the device time to adapt to the warmer environment before powering it up, this will avoid condensation!

The **DM9600** is not operable when not within the temperature parameters. After powering up the device will give acoustic signals during warm up.

6.6. Power up and zeroing

Touch the screen then press the green ON button

During zeroing the device will notice if there are defective sensors and will display an error message if there are defective sensors.

Repeat zeroing

The zeroing can be repeated at and time.

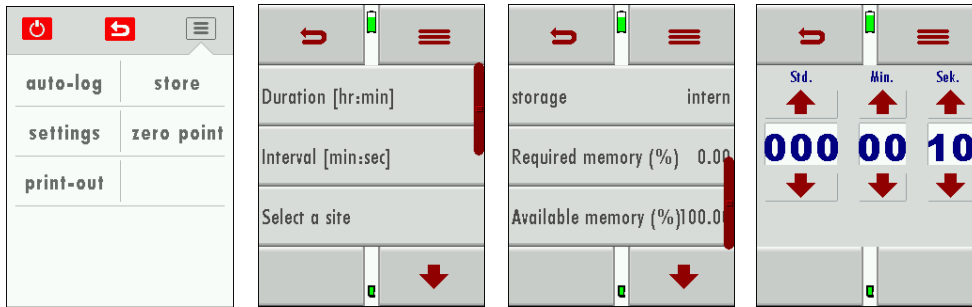
7. Performing a measurement

The DM9600 base version has the complete functionality for you to make pressure and temperature measurements.

For additional measurements additional accessories must be purchased and used.

7.1. Auto-Log function

The Auto-Log function allows you to define the measuring time and the measuring intervals.



Auto-Log settings:

Measuring time is the complete time for one measurement cycle.

Press the button measuring time to be able to set the measurement time (using the arrows up and down to change the time).

Press the button interval to select how frequently you want to save the results.

Press the Site Selection to determine to which site the results will be saved to.

Each interval will be saved to the selected site.

The Auto-Log can save results either on the internal memory or onto the SD Card.

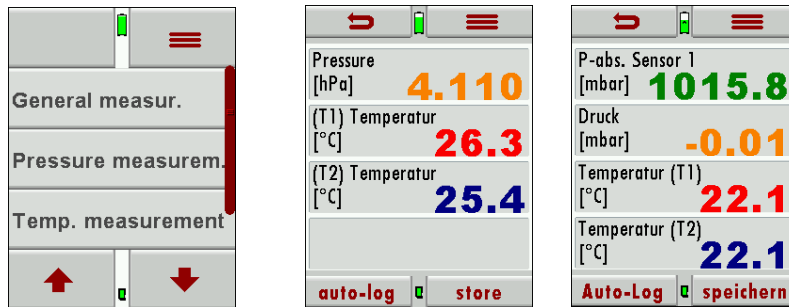
Press the Store button and then select where the results should be stored.

Please make sure that there is enough storage space available.

Press the start button to start the Auto-Log, it will end automatically after the defined measurement time has elapsed.

7.2. General measurement

During the general measurement, the measured pressure as well as measured temperature are displayed, the values can be Auto-logged and saved.



The absolute pressure can also be displayed (optional)

Context menu:

- Auto-Log: Measurements are being logged
- Store : Single measurements are saved
- Adjustm. : The units can be selected
- Zeroing : The pressure value is set to zero
- Print : The measurement results are being printed (IR printer is needed)

7.3. Pressure measurement

Press Pressure measurement to enter this menu.

On the first page of the pressure measurement 4 pressure values can be recorded.

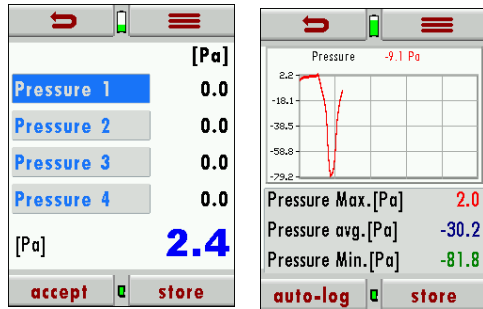
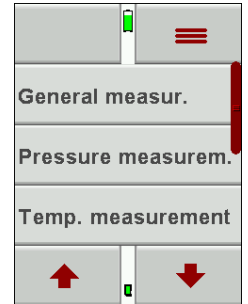
The current displayed pressure value can be assigned and saved to one of the 4 available spots.

The adjustments are done in the context menu.

The hose (e.g. draft measurement) will be connected to the draft port P1.

For differential pressure measurements, a second hose will be connected to the P2 port.

On the second page, the pressure flow is visualized in a graph. The pressure can be Auto-logged (see Auto-Log function). When saving results, the max and min values are saved as well as the pressure average.



Context menu

- Zeroing: The pressure value is set to zero
- Auto-Log: Measurements are being logged
- Store: Single measurements are saved
- Adjustm. : Units and damping time of the pressure measurement can be adjusted
- Page +: turn to next page

NOTE:

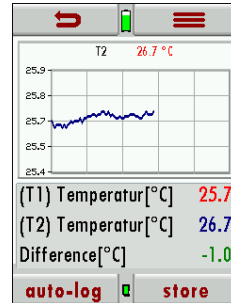
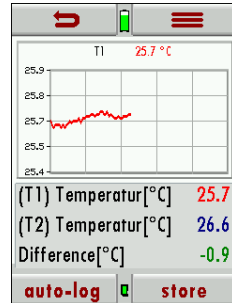
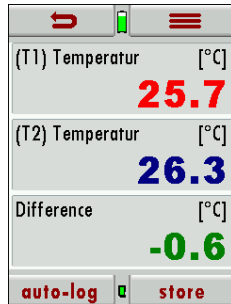
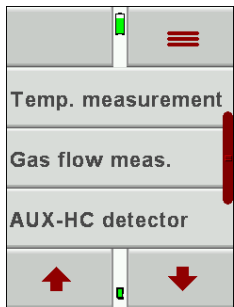
The pressure sensor will be destroyed if the supplied pressure is too high!

The following warning will be displayed:
 Error message "Pressure too high"
 There will also be an additional acoustic warn signal.



7.4. Temperature measurement

In the menu temperature measurement, 2 temperatures can be measured. The K-Type temperature sensors are connected at port T1 and T2 – the temperatures T1 and T2 will be displayed as well the temperature difference. The temperatures can be saved or Auto-logged. On pages 2 and 3 temperatures are displayed as graph.



Context menu

- Auto-Log: Measurements are logged
- Store: Measurements are saved
- Print: Measurements are printed (external IR printer)
- Page - : turn to previous page
- Page +: turn to next page



NOTE:

The measurement accuracy can only be granted with original MRU temperature sensors!

7.5. Flow velocity measurement (option)

In this menu, the flow velocity can be determined.

On page 1 the flow velocity as well as the norm volume are displayed. On page 2 the absolute pressure, the static pressure and differential pressure is displayed.

On page 3 the gas temperature, the gas density and the duct cross section is displayed. Measurements can be saved or Auto-logged.

Gas flow meas.	
v-flow [m/s]	2.2
Q-flow rate [l/s]	1728
Q-flow rate [Nm/s]	1577
settings	store

Gas flow meas.	
P-abs. [hPa]	1013.1
P-static [hPa]	-0.1
Diff.press. [Pa]	-561.4
settings	store

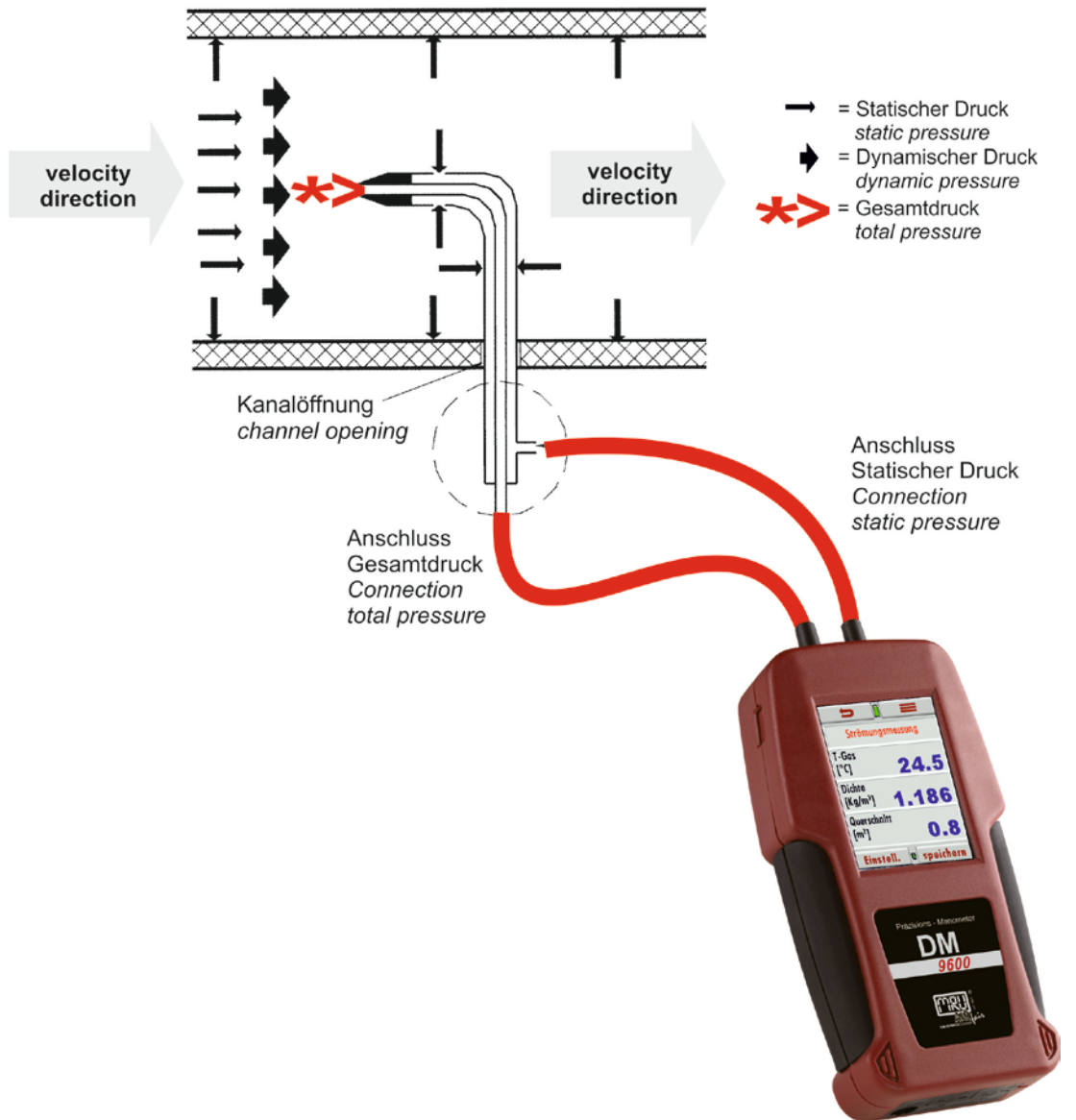
Gas flow meas.	
T-gas [°C]	27.0
Density [Kg/m ³]	1.176
Cross-sct. area [m ²]	0.8
settings	store

Gas flow meas.
AUX-HC detector
Let by and tightness
↑ ↓

Context menu:

- Settings: Set measurement units, gas density and pitot factor
- Store: Measurements can be staved
- Zero point: Pressure value will be set to zero
- Auto-Log: Measurements are logged
- Print out: Measurements are printed (external IR printer)
- Page - : turn to previous page
- Page +: turn to next page

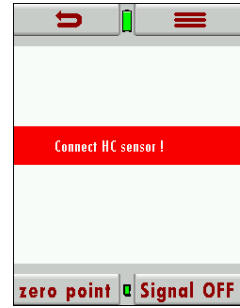
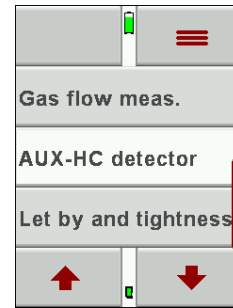
Connecting the Pitot tube:



7.6. Leak detection using the external HC-Probe (option)

The external HC probe can be connected to the AUX port (if equipped) and is used for leak detection.

Please make sure that the red dot on the AUX port and the red dot on the HC probe plug are aligned when connecting the HC probe to the DM9600.



There will be a red flashing information (connect HC probe) on the screen in case the HC probe has not been connected yet.

After the HC probe has been connected the red flashing information will be replaced with the serial number of the HC probe.

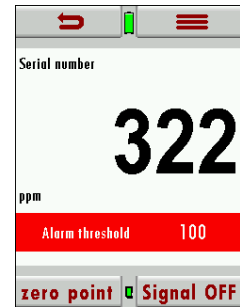
During the warm up phase (zeroing) you will see a count down from 30 to 0 on the display.



Performing a leak test

The HC probe will be ready after zeroing.

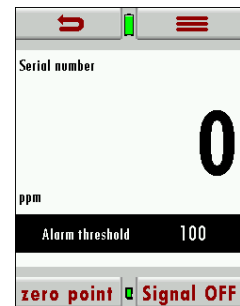
There are user definable alarm settings, values below the alarm value will be displayed in black and value above the alarm setting will be displayed in red. Additional to the red value there will be an acoustic signal to indicate that the value is above the threshold.



User definable alarm settings (threshold) and zeroing

Modifying the alarm threshold and zeroing

Zeroing
Threshold activate/deactivate
Gray bar: Threshold deactivated/Alarm OFF
Red bar: Threshold activated/Alarm ON



Peak value

The measured peak value will be displayed above the threshold bar.

This value can be reset with zero point.

The max value will also be set to zero during zeroing.

Maintenance

It is recommended to calibrate the HC sensor annually to ensure accurate readings. The functionality of the HC probe can be tested with the gas of a cigarette lighter (without flame) or a test gas from a gas cylinder.

7.7. Usage capability test (option)

What is the usage capability test?

The Usage capability test helps to determine and judge leakages (gas leakage) in low pressure gas pipes.

Tested will be all in operation or repaired pipes with all faucets, however without gas units and their regulators and security devices. The gas meter can be included in this test (using backward test).

The usage capabilities test may not be performed when:

New installed pipes (= pipes within warranty)

Pipes that had a limited usage capability or a NO usage capability and had been repaired to be used

Not in use pipes which want to be used again

Pipes in middle- and high-pressure range.

Test medium: Air or Methane

Test pressure: 23 mbar according to DVGW worksheet G600.

Unlimited usage capability: > 0 l/h to $< 1,0$ l/h

The pipe can be used for unlimited time without repair.

Limited usage capability: $> 1,0$ l/h up to $< 5,0$ l/h

The pipe may be used for a maximum of 4 weeks. Within these 4 weeks the pipe must be repaired to achieve Unlimited Usage Capacity again (Leak-tight test).

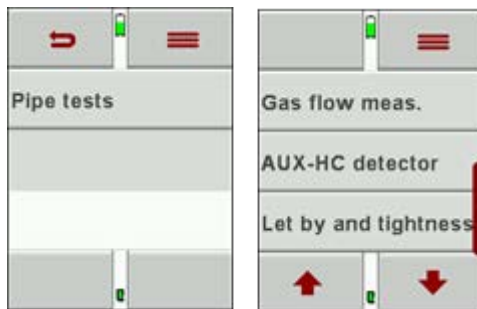
NO usage capability: $> 5,0$ l/h

The use of this pipe must be stopped immediately. Take action to determine the defect.

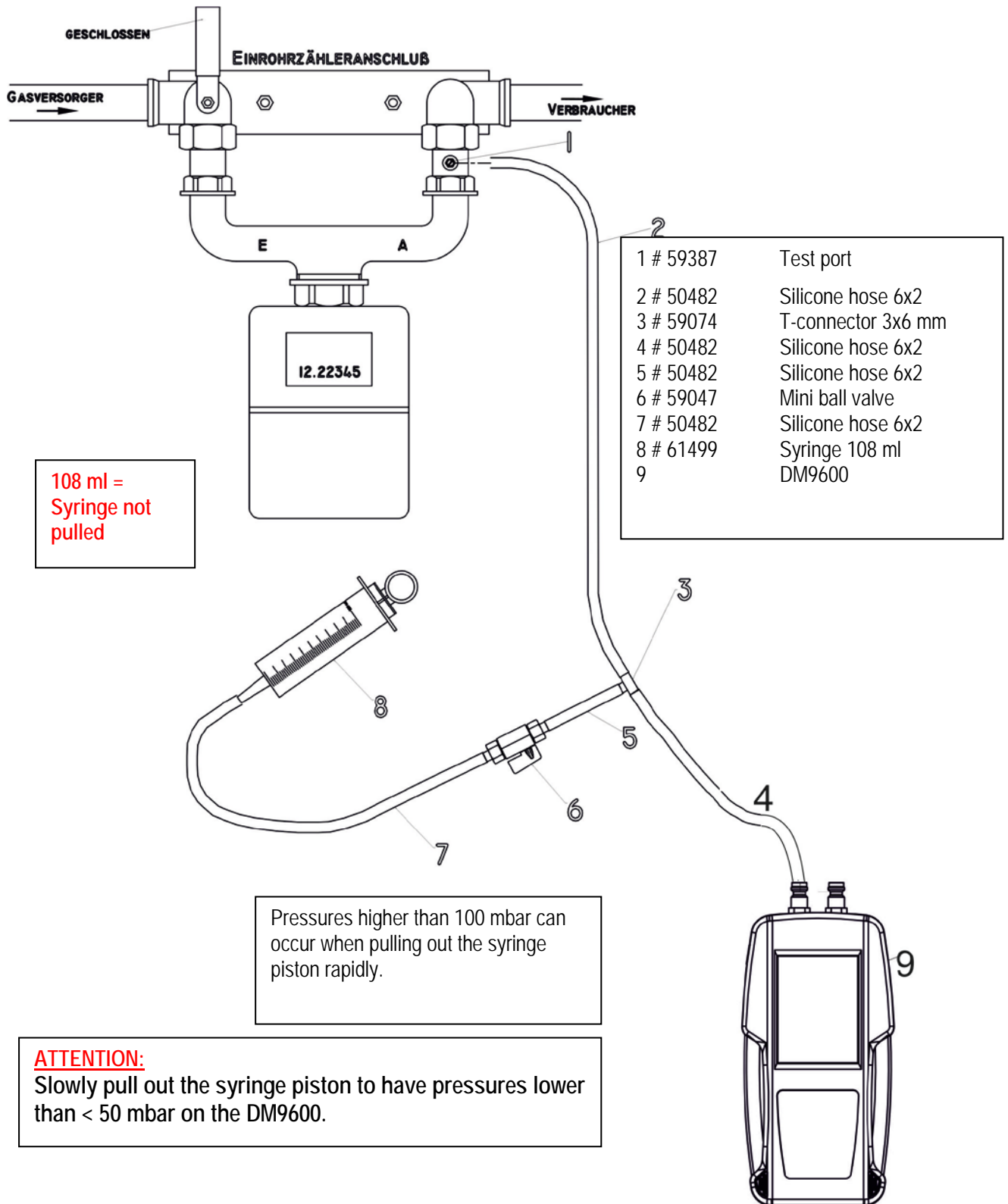
Important is the technical security judgment:

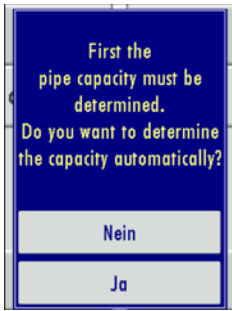
Also, a leak tight gas pipe can have limited or no usage capability. The physical condition must be considered as well!

Once you smell gas the system is leaking. The above-mentioned usage capability grading's do not apply.



Connection diagram usage capability test without dismantling gas meter





Operation

To be able to calculate the leakage rate first the pipe capacity must be determined. In the first screen of the usage capability test you are asked if you want to determine the pipe capacity automatically. As alternative you can insert the pipe capacity manually.

No - Enter pipe capacity manually




Automatic capacity determination

The capacity determination is done by extracting a defined volume from the closed pipe system using the syringe. The DM9600 uses the pressure drop to calculate the pipe volume.

Please follow the instructions on the DM9600 screen.



The syringe volume is not big enough to achieve the wanted differential pressure, if the pipe volume is bigger than (>200 Liter). This will be indicated with a red pressure value.

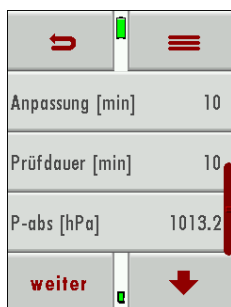
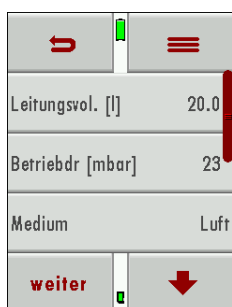
In this case the syringe volume can be increased using the  button and you can take an additional syringe volume. Continue with entering all additional parameters



Entering pipe volume manually

Enter the calculated pipe volume. Entering range is 3 to 1000 l (standard value is 20 l). The DM9600 will calculate with 3 l should the calculated value be smaller than 3 l.

Entering additional parameters



	Min value	Max value	Standard value
Operating pressure	15	100	23
Adaptation time	1	80	5
Test duration	1	20	1
P-abs	800	1200	1013

Entered operating pressure lower than 30 mbar – a reference operating pressure of 23 mbar will be used for calculations.

Entered operating pressure higher than 30 mbar – the actual entered value will be used for calculations.

Under "MEDIUM" you can select between air and Methane. It is important to select the medium that you are using to get the correct results. Methane can escape easier than air in a leakage situation.

The results are always based on Methane

Apply test pressure

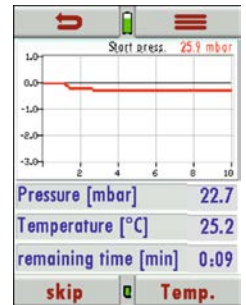
This window is used to pressurize the pipe section that needs to be tested. There will be a red bar should the pressure be below 20 mbar and there will be an error message when starting the test.



Adaption phase

The adaption phase can be shortened by using the "Skip" button. With the „Temp „button the temperature curve will be displayed.

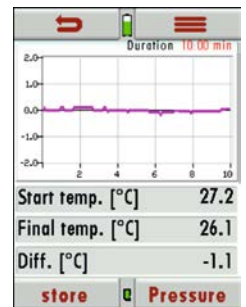
The test starts automatically at the end of the adaption phase



Test phase

The usage capability test is now active. With the „Temp “button the temperature curve will be displayed

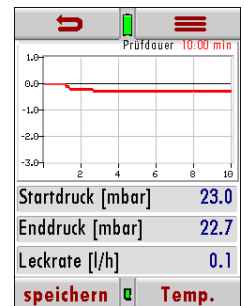
The temperature curve can be used to evaluate the test results. A drop of temperature during the test phase can be the reason for a slight pressure drop. There is not automatic temperature compensation for the pressure!



Display results

The start pressure, end pressure and the resulting leakage rate will be displayed at the end of the test.

Results can be saved using the „store „button



Storing test results

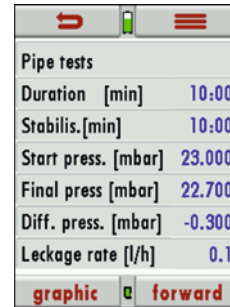
Results should be assigned to a site. Here you will assign your results to a site.

Results can be saved using the „store“button

With Back, you will reach the measurement menu

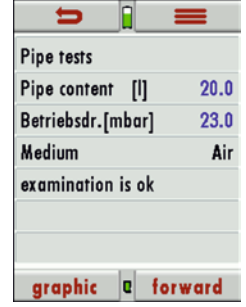


This is the bottom part of a test result



Results can be viewed once they have been stored.

Additional parameters can be viewed using the arrows up and down.

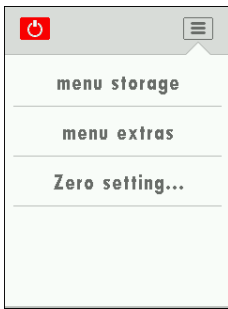


7.8. Printing measurement results

Measured results can be printed in all measurement programs using the print button in the context menu. All values will only be printed once even those which are displayed more than once.

8. Data storage

8.1. Data storage structure



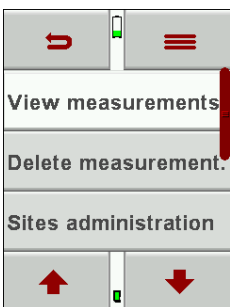
The main component of data storage is the site. Each site has a distinct site number and 8 user definable text components which can be used for the address, customer name and so on. The DM9600 can save up to 500 different sites.

New sites can be generated. Modifications and additions can be transferred using the PC program MRU Win.

Attention: Sites that have been created in the DM9600 will NOT be transferred back to the PC. Only measurement results will be transferred from the DM9600 to the PC which will be identified by the site number.

Measurement results are stored and must be assigned to a site.

8.2. Measurements in the data storage menu



View measurements

Measured results can be viewed in the menu „view measurements“.

Once selected you will see an overview of the different measurement modes with the number of saved results for each mode.

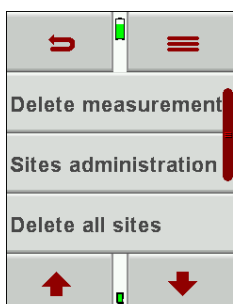
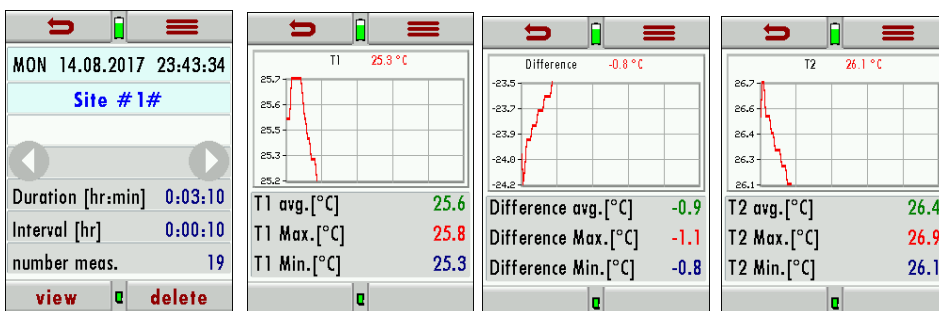
- Select one of the available modes.
- You will first see context information about the stored measurement. Use the arrow buttons to jump in between different stored measurements.
- Press „view“ to see the details of the selected measurement. Results will be displayed as they are defined in the measurement screen.

With „back „you will return to the context information screen.

Only logged measurements will display the measured time, the interval and the number of measurements.

Attention:

It may take a bit longer to read the results if the number of measurements or the logged measurements have a high data volume.



Delete measurements

You can:

- Delete single measurements when pressing the delete button while the measurement is being displayed.
- Or delete all measurements of a measurement mode. You will be asked to confirm your intention to delete all measurements.

8.3. Sites

In the menu sites, you can:

- View all data of the stored site
- Add new sites
- Delete sites
- Any modifications to the sites will not be transferred to the PC

Attention:

Sites created in the DM9600 will not be transferred to the PC.

View sites

In the menu „Sites administration“ each site will be displayed with:

- The distinct site number, which is displayed in blue to indicate its significance,
- And addition 8 user definable fields.

You can page through the sites using the arrow buttons left and right.

Add new sites

New sites can be added and modified in the „Sites administration“ menu.

Select “new” to add a new site. You will then see:

- The first line which must have a distinct site number for identification. The DM9600 can also create a new site number (the next available site number will be selected).
- All other lines are user definable lines for address, customer name and so on.

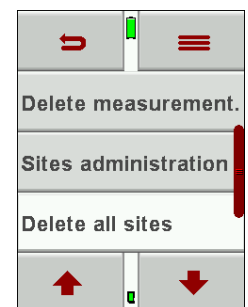
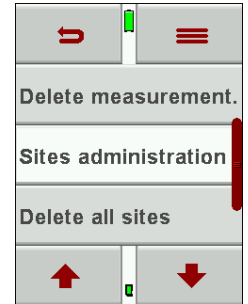
(These lines can only be filled with a PC program like the MRU4Win)

Delete sites

You can

- You can delete single sites in the menu „Sites administration“ by selecting delete in the context menu,
- Or you can delete all sites at once

You will be asked to confirm your intention to delete all sites.



8.4. Data transfer using the SD-Card

For data transfer, we use the CSV format

CSV is a simple file format used to store tabular data, such as a spreadsheet or database. Files in the CSV format can be imported to and exported from programs that store data in tables, such as Microsoft Excel or OpenOffice Calc. CSV stands for "comma-separated values"

- Import of sites Anlagen
- Export of sites
- Export of saves measurements

Import of sites

This function can be used to transfer a CSV file that has been created on a PC.

IMPORTANT: The file name must be "analgen.csv"!

The file may not contain any header information, meaning, the first line will contain actual data.

Each line that is not empty and which doesn't start with a comma (both would result in an empty site number which is not permitted) will be transferred.

Each line and/or data set a maximum of nine lines will be transferred. A maximum of 24 numbers and letters are allowed for each line, everything longer than 24 letters/numbers will be cut off.

A1-F1,A1-F2,A1-F3,A1-F4,A1-F5,A1-F6,A1-F7,A1-F8,A1-F9

A2-F1,A2-F2,A2-F3,A2-F4

A3-F1,A3-F2,,A3-F4,

A4-F1,,,A4-F4

A5-F1

Examples with 3 invalid sites: (reason for error)

,A1-F2,A1-F3,A1-F4,A1-F5,A1-F6,A1-F7,A1-F8,A1-F9 (Comma at the beginning)

(Space)

,A3-F2,A3-F3,A3-F4,A3-F5,A3-F6,A3-F7 (Comma at the beginning)

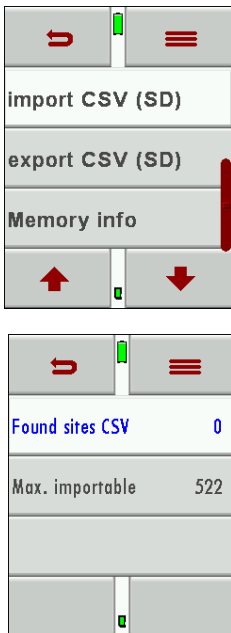
Important:

No check is performed inside the file or the DM9600 for duplicate site numbers (line1).

The DM9600 can handle duplicate numbers, however that can be difficulties later to assign measurements to site numbers when exporting these back to the PC.

(see also 3. + 4. Export of measurements)

The DM9600 will mark duplicate site numbers after import. If the same file is imported to the same DM9600 an indication will be displayed in red letters.



Exporting sites

This function can either be used as backup of the sites to a PC or to transfer them to a different DM9600. This is very useful especially when modifications (like modified telephone number, etc.) have been made manually in the Sites Administration of the DM9600 and these modifications need to be updated in the PC program. Or, if the same sites must be installed in a second DM9600.

The format of this file is identical as the one described in "Import of sites".

Only the file name is different, in this case "ANLxxxx.csv". The xxxx in the file name are consecutive numbers containing zeros. The exported file can be used to import the sites into another DM9600, however the name must be changed to "anlagen.CSV" before it can be used for import.

Exporting measurements

This function is used to export measurements to a PC.

Attention: this is not a backup function and the results can't be transferred to another DM9600!

The created file has the file name "TMPxxxx.csv" the xxxx in the file name are consecutive numbers containing zeros

The created file has a header with information like, Site number, Date/time, measuring values and units, all the information that is also stored inside the unit.

Here is an example:

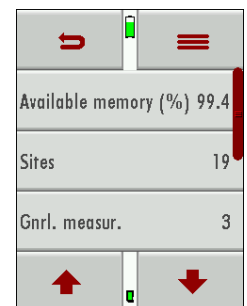
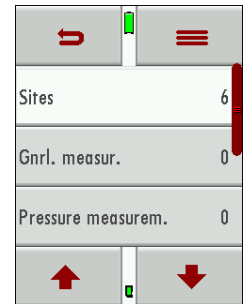
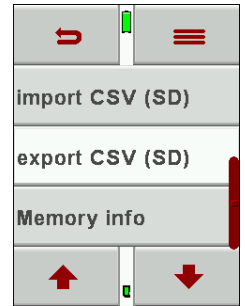
	A	B	C	D	E	F	G
1	Anlagen-Nr.	Speicherdatum	Speicheruhrz	Intervall	P-abs.	Druck	
2					[hPa]	[hPa]	
3	Anlage #0#	10.05.2017	10:01:59	00:00:01	1009,18	10,25	
4					1009,21	11,25	
5					1009,3	11,15	
6					1009,4	12,37	
7							
8							
9							
10							

Attention:

It can take up to 2 minutes to export measurements, depending on the number of measurements that are being exported.

8.5. Information about the data storage

In the „menu storage „you select „Memory info“ to get information about the available storage capacity of the unit. You will see the number of stored sites (max 500) and the number of stored measurements (max 1000).

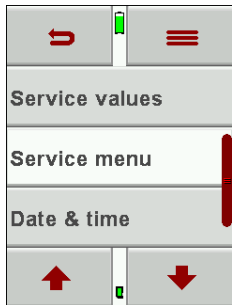


9. EXTRAS / Settings

The DM9600 leaves our factory with standard firmware settings, and in most cases, this will cover your daily needs. However, these settings are adjustable and customizable to make work even easier.

9.1. Service adjustment menu

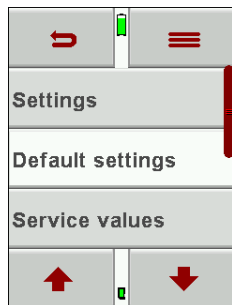
The service adjustment menu is PIN code protected. Only authorized and trained personnel may enter this menu.



You will be prompted back to the "settings menu" once you have entered a wrong PIN code. Please contact a MRU service partner (www.mru.eu) to get the correct PIN code.

9.2. Factory settings

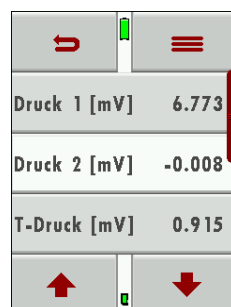
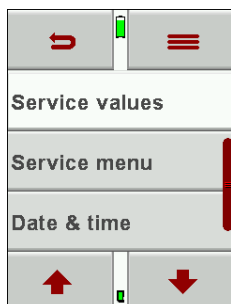
The DM9600 will be reset to factory settings:



Settings	
LCD brightness (%)	50
Helping hints	ON
Keyboard beep	ON

9.3. Service values

Device errors can often be determined by using the values in the "service vales" menu. The service values of all installed sensors are displayed here. Please contact your local MRU service partner in case you have a malfunction of your device. It's always handy to have the device next to you when make a service call, most likely the technician will ask you for these values and the serial number of the device.



10. Appendix

10.1. Technical details

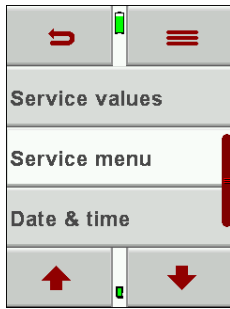
General data

Prüfmedien	non-aggressive gas	suitable for
Durchmesser Anschluß Druck-/Unterdruck	8,0 mm	Connector diameter
Größe Silikonschlauch	Ø 6 x 2 mm	Size silicone hose
Betriebstemperatur	5 to 40 °C 41 to 104°F	Operating temperature
Lagertemperatur	- 20 - + 50 °C -4° to 122°F	Storage temperature
Anzahl und Typ Batterien	Li-Ion	Qty and size of batteries
Betriebsdauer	20h	Operating time
Display	2,8" touch TFT	Display
Gehäusematerial	PA6GF30	Housing material
Schutzart	IP30	IP degree of protection
Gewicht	340 g 12 ounces / 0.7 lbs.	Mass
Maße	83x38x180 mm 3.27" x 1.50" x 7.08"	Size

Messgenauigkeit / Accuracy

Sensor	±75 hPa (mbar)	Sensor
Messbereich	-75,0 hPa ... +75,0 hPa	Range
Auflösung	0,1 Pa	Resolution
Genauigkeit abs / vom Messwert	± 2,0 Pa / 0,5%	Accuracy abs. / reading
Temperatureinfluß (typisch)	(0 ... 50 °C): ±0,4 % (32 ... 122°F): ±0.4 %	Temp. variation (typical)
Sensor	±150 hPa (mbar)	Sensor
Messbereich	-150,0 hPa ... +150,0 hPa	Range
Auflösung	0,01 hPa	Resolution
Genauigkeit abs. /vom Messwert	± 0,03 hPa / 0,5 %	Accuracy abs./reading
Temperatureinfluß (typisch)	(0 ... 50 °C): ±0,4 % (32 ... 122°F): ±0.4 %	Temp. variation (typical)
Sensor	±350 hPa (mbar)	Sensor
Messbereich	-350,0 hPa ... +350,0 hPa	Range
Auflösung	0,01 hPa	Resolution
Genauigkeit abs. /vom Messwert	± 0,3 hPa / 0,5 %	Accuracy abs./reading
Temperatureinfluß (typisch)	(0 ... 50 °C): ±0,5 % (32 ... 122°F): ±0.5 %	Temp. variation (typical)
Sensor	±1.000 hPa (mbar)	Sensor
Messbereich	-1000,0 hPa ... +1.000,0 hPa	Range
Auflösung	0,1 hPa	Resolution

Genauigkeit abs. /vom Messwert	$\pm 1,0 \text{ hPa} / 1\%$	Accuracy abs./reading
Temperatureinfluß (typisch)	(0 ... 50 °C): $\pm 0,5 \%$ (32 ... 122°F): $\pm 0.5 \%$	Temp. variation (typical)
Sensor	$\pm 7.000 \text{ hPa (mbar)}$	Sensor
Messbereich	-7,000 bar ... +7,000 bar	Range
Auflösung	1 hPa	Resolution
Genauigkeit abs. /vom Messwert	$\pm 1,0 \text{ hPa} / 1\%$	Accuracy abs./reading
Temperatureinfluß (typisch)	(0 ... 50 °C): $\pm 0,5 \%$ (32 ... 122°F): $\pm 0.5 \%$	Temp. variation (typical)
Temperaturmessung	T1, T2	Temperature Measurement
Anzahl der Thermoelement Typ K - Eingänge	2	Number of thermocouple type K input
Messbereich	-40 °C .. 1200 °C -40 °F .. 2192 °F	Measuring Range
Genauigkeit	$\pm 1^\circ\text{C} / 0,5\%$ $\pm 2^\circ\text{F} / 0,5\%$	Accuracy



10.2. Firmware update

How to install a new firmware into the DM9600

Turn on the device. Select the context menu / extras / device info

In the 3rd line you will see the current installed firmware version for example 1.00.05

We will need the following information from you in case something has gone wrong with the update.



Please write down the firmware version of your device _____

Please write down the serial number of your device _____

Performing and verification of an update

Preparing a SD card

Typically, you will receive an update by email. You will have to unzip the file in case you have received the file in a zip format (you would do this on your PC).

Now you will copy the unzipped file „1128.fwb“ onto the root directory of the SD card.

Performing the update:

- Copy the 1128.fwb file onto the root directory of the SC card
- Insert the SD card into the card reader of the device and startup the device

ATTENTION:

The SD card contact pins must face towards you when you insert them into the device and must snap into place once inserted.

Slightly push the SD card into the device and let go again to release the SD card!



- Please wait, until you see the message „New firmware...found“
- Select and confirm „install firmware“
- The update procedure will start...
- This will take about 45 seconds, don't press any keys during the update
- The device can be started again once the update has been installed
- You will get the information „Firmware update was performed...“ confirm with OK
- Done

How can I verify that the update was successfully?

Turn on the device. Select the context menu / extras / device info

In the 3rd line you will see the current installed firmware version for example 1.00.05

What can I do if see that the old firmware version number is still displayed?

Repeat the update procedure.

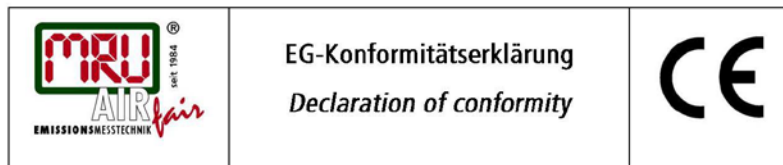
Who can help me if I can't perform an update?

Contact your local sales office or send an email to: info@mru.de

10.3. Trouble shooting

Device trouble shooting

1. Effect	2. Error	3. Reason	4. Solution
Device shows no reaction		Device doesn't react to any touch screen commands.	Press the reset button
Device is too cold and can't be used.	Display notice: "Device too cold" or A beep every 5 seconds	e.g. Device was stored in the trunk of a car during winter time.	Take the device into a warm room and give it time to adapt to the room temperature!
Device can't be turned on or doesn't react once powered up.		Battery drained.	Connect the device to the battery charger and charge the battery.
Wrong temperature measurement results	Gas temperature too high or jumping	K-Type plug not connected properly Broken wire or broken thermo-couple.	Check the connection Check the wire for damages Remove condensate drops from thermo-couple tip.

10.4. Declaration of conformity **DM9600**

MRU Messgeräte für Rauchgase und Umweltschutz GmbH

Fuchshalde 8 + 12

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Deutschland / Germany

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E-Mail / mail: info@mru.deInternet / site: www.mru.eu

Bevollmächtigte Person, für die Zusammenstellung der technischen Unterlagen

Person authorized to compile the technical documents

Name / name:	Dierk Ahrends
Funktion / function:	QM-Beauftragter / QM- Representative
Firmenname / company:	Messgeräte für Rauchgase und Umweltschutz GmbH
Straße / street:	Fuchshalde 8 + 12
Ort / city:	74172 Neckarsulm
Land / country:	Deutschland / Germany

Produkt/Product

Bezeichnung / designation:	Präzisions Digitalmanometer Digital Precision Manometer
Produktname / name:	DM9600
Funktion / function:	Druckmessung / Pressure measurement

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, 06.04.2017

Erwin Hintz, Geschäftsführer / *Managing Director*



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Technical data change w/o notice

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