AIRFLOW

Digital Manometer
DM2, DM2L and DM30

Operating Instructions

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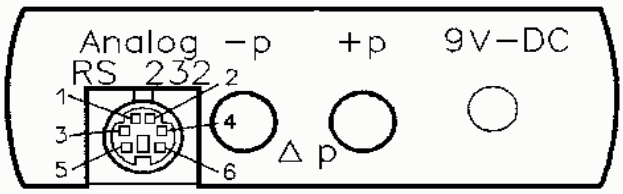
Modell:	**DM2**	**DM2L**	**DM30**
Catalogue No.:	39153	39141	391643
Measuring ranges :	-2000..0..+2000 mbar	-99,99..0..+99,99 mbar	-30,00..0..+30,00 mbar
(adjustable)	-200,0..0..+200,0 kPa	-10,00..0..+10,00 kPa	-3000..0..+3000 Pa
	-29,00..0..+29,00 psi	-1,450..0..+1,450 psi	
	1 oder 0,1 mbar	0,1 oder 0,01 mbar	0,01 oder 0,001 mbar
(adjustable)	0,1 oder 0,01 kPa	0,01 oder 0,001 kPa	1 oder 0,1 Pa
Maximal overload:	4 bar	750 mbar	750 mbar

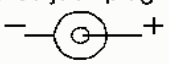
Display:	LCD 4-digit 7 segments with dot matrix and function texts.
Resolution: DM2L:	MR -100,0...0...+100,0 mbar = < 1 % FSP, ± 1 Digit
DM2:	MR -200,0...0...+200,0 mbar = < 0,5 % FSP, ± 1 Digit
	MR -2000....0...+2000 mbar = < 0,5 % FSP , ± 1 Digit
DM30:	MR -30,0....0....+30,0 mbar = < 0,5 % FSP, ± 1 Digit
	MR –9,999..0...+9,999 mbar = < 1,0 % FSP , ± 1 Digit
Interface:	serial (RS 232) and analog (-1 V...0...+1V)
Storage capacity:	750 measured values
Power supply:	9 V block battery, or mains adapter
Operating consumption:	0,09 W
Sensor:	piezoresistive
Temperature drift:	automatically compensated from 0 to 50°C (integrated sensor)
Low battery display:	below 7,5 V
Error message:	below 7,0 V
Auto power off:	battery voltage below approx. 5 V or adjustable by PC: to be set between 1 and 255 minutes or deactivated.
Zero setting:	automatically by pressing a key
Dimensions:	150 x 80 x 30 mm
Weight (incl. battery):	approx. 250 g
Scope of delivery:	unit incl. batteries, carry case and operation instructions
Optional accessories:	software MWelk (Windows 95) incl. IF cable (Cat.-No.: 39265) pneumatic female connector, self closing with outside thread (Cat.-No.: 39075) pneumatic female connector, self closing with hose stem (Cat.-No.: 39076) pneumatic male connector with hose stem (Cat.-No.: 39077) pneumatic male connector with outside thread (Cat.-No.: 39078) PVC-tubing 9 x 5 mm red (Cat.-No.: 55006) or blue (Cat.-No.: 55005) silicone tube 5,5 x 3 mm red (Cat.-No.: 55088) or blue (Cat.-No.: 55087)

Sketch of the connection side of the DM2, DM2L and DM30



1 Analog Ground
2 Not connected
3 Analog out (output)
4 RX (input)
5 Digital (Ground)
6 TX (output)

3,5 mm
stereo jack plug



OPERATION

With exception of the measuring ranges and range related details, all technical features, design, construction and operation of the DM2, DM2L and DM30 are identical. Even the operation software for both units is the same.

To switch on the meter:

Short pressing of the key [on /off enter] switches the meter on. After switching on, a segment test of the display is run for about 3 seconds.

To switch off the meter:

In order to avoid accidental operation, the key [on /off enter] has to be pressed for about 2 seconds to switch off the meter.
If the AutoPowerOff function is activated, the meter switches off automatically, when, after a preset time no key has been pressed. During data logging operation the AutoPowerOff function is not available, in order to avoid an unexpected stop of the measuring series. In this status the meter switches off automatically when the data memory is full. In order to avoid a complete discharge of batteries, the meter switches off at an operation voltage of about 5 V.

Temperature display:

The DM series of digital manometers are equipped with an internal temperature sensor to provide an automatic temperature drift compensation in the range of 0 to 50°C. This value can be read off from the display with an accuracy of ± 1,5°C after reaching an equilibrium with the environmental temperature and this information can also be used as measuring value.

Zero correction:

Press the key [mode] several times until "000" blinks in the display in alternation with the unit of the measuring range. Confirm this with [on /off enter] and the zero correction is effected.
The zero correction remains active until the meter is switched off or until the next zero correction. It can also be used to set an existing pressure to zero to make pressure differences more clear. This function is not available in the temperature measuring range.

Selection of the measuring range:

Press the key [mode] several times until the unit of the measuring range blinks in the display. Choose the requested measuring range with the keys [↑] or [↓] and confirm with the key [on /off enter] .

The measuring range that was activated when the unit was switched off is displayed again when the unit is reactivated.

Maximum value memory:

If the maximum value memory is switched on, the latest largest measuring value is always displayed. Press the key [mode] several times until ***MAX*** blinks in the upper line of the display. With the key [↑] the maximum value memory is activated. With the key [↓] an active maximum value memory can be switched off.

During the measurement the operation of the key [↓] resets the maximum value memory to the current measuring value. By pressing the key [mode] and confirming with the key [on /off enter] the maximum value memory is deactivated.

Minimum value memory:

If the minimum value memory is switched on, the latest smallest measuring value is always displayed.

Press the key [mode] several times until ***MIN*** blinks in the upper line of the display. With the key [↑] the active minimum value memory is activated. With the key [↓] an active minimum value memory can be switched off.
During the measurement the operation of the key [↓] resets the minimum value memory to the current measuring value.
By pressing the key [mode] and confirming with the key [on /off enter] the minimum value memory is deactivated.

Function HOLD:

The function ***"HOLD"*** keeps the last measured value until the function is switched off. Press the key [mode] several times until ***"HOLD"*** blinks in the display. With the key [↑] the function "HOLD" is activated. With the key [↓] the activated function "HOLD" can be switched off. In normal measuring ranges the operation of the key [↓] resets it to the current measuring value. By pressing the key [mode] and confirming with the key [on /off enter] the hold function is switched off.

Data logging function:

The meter has a non-volatile memory (EEPROM), in which up to 750 measuring values can be stored in freely programmable time intervals. For selection and data processing of the stored values a low cost software is available that operates on any PC under Microsoft Windows 95.
Setting of the intervals can be done on the keypad of the instrument or on the PC screen using the software. For the setting on the keypad press the key [Mode] several times until ***"m:s"*** blinks in the display. With the keys [↑] or [↓] the desired measuring time interval (minutes:seconds) can be selected.

A confirmation with [on /off enter] takes over the chosen time interval and activates the data logging mode. Now the meter can no longer be operated but it can be swichted off. If the memory capacity is exhausted, the meter switches off automatically. The measuring values are stored independent of the chosen measuring range.

The first measured value is stored immediately when the data logger is activated. The following measured values are stored when the respective measuring time interval is over. The current time interval can be seen on the display and at ***"00:00"*** the value that will be stored is displayed for about one second.

A possible error (too low battery voltage or too high pressure) is also stored and the meter switches off. The measuring values that have been stored before the error occured are <u>not</u> lost.

⚠ **An activated data logging mode automatically overwrites the values of the previous data logger recording without warning.**

"Low Battery"

At a battery voltage of about 7,5 V the display shows the symbol ***"Low Bat".*** <u>When this shows replace the batteries.</u> At a battery voltage of less than 7,0 V an error message is shown thus preventing the storage of wrong measuring values. If the battery voltage sinks below 5 V, the

instrument switches off automatically. When using the software the current condition of the batteries is displayed on the monitor.

Error messages:

The meter has functions that indicate a possible error. If the display shows the message ***"Er:xx"**** the key (on /off enter) has to be pressed in order to erase the error memory.If ***"LowBat"*** and ***"Er:80"*** are shown simultaneously, a new battery has to be installed immediately.

Interpretation of the error messages

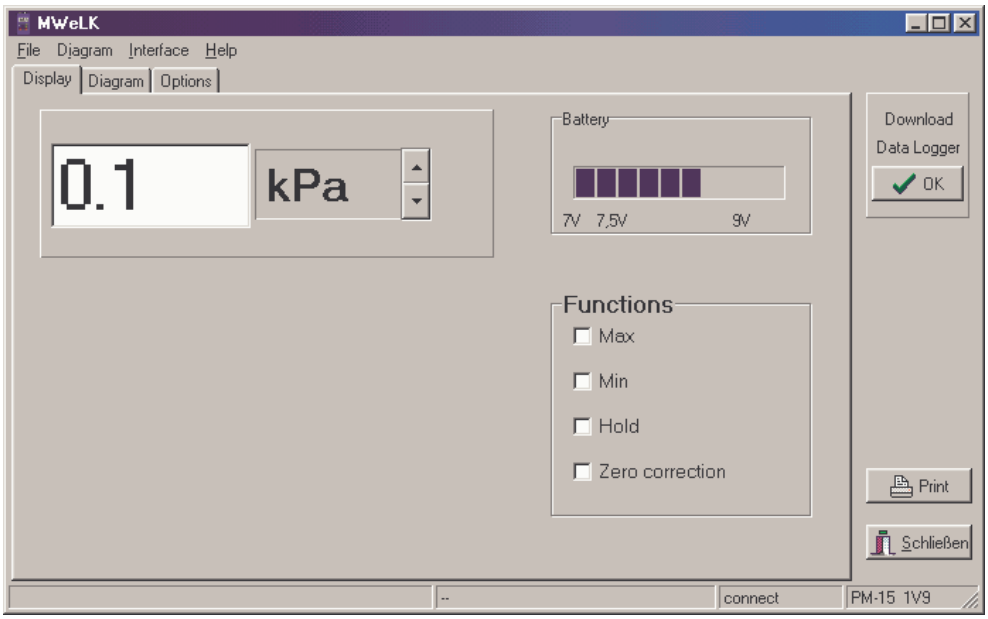
Er:01	serial interface (start/stopbit/puffer overflow	[RX_ERR]
Er:02	math. error (ASCII->HEX)	[MA_ERR]
Er:04	I2C-Bus error (EEPROM)	[I2C-ERR]
Er:08	Flag AD error (over/under pressure)	[AD_ERR]
Er:10	LCD controller error	[LCD_ERR]
Er:20	check sum of alignment EEPROMS-A false (alignment data)	[CSA_ERR]
Er:40	check sum of alignment EEPROMS-B false (alignment data)	[CSB_ERR]
Er:80	battery empty (false measuring value)	[BAT_ERR]

Software:

The software MWelk extends the functions of the instrument. First of all install the software from the 3,5" disk to the hard disk of your PC.

The software cable must be connected to the serial interface of the PC and to the corresponding socket on the DM2. Start the programme **"MWelk"**. By starting for the first time the interface number must be selected. When the unit is switched on **connect** is indicated in the foot note of the PC monitor.

Display:

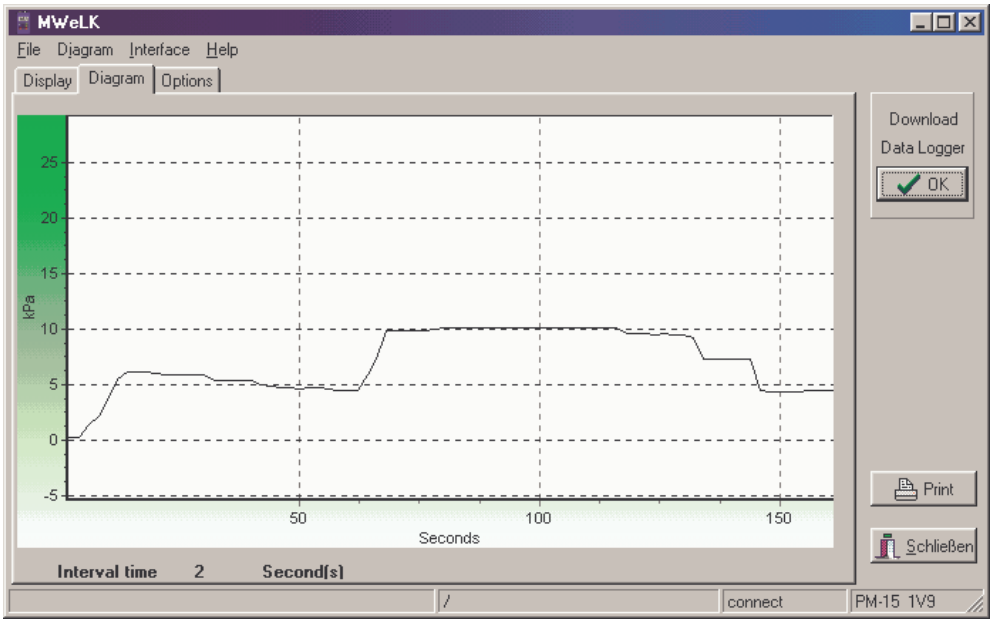


With the arrow keys next to the unit indicator, other units can be selected. The functions Min, Max, Hold and Zero correction can be activated or deactivated by mouse click. The current battery voltage is indicated by a bar graph.

The menu item **Download Datalogger** opens the window to which the stored measured values can be transferred. This file has to be named.

Then the values can be loaded. These values are stored as an ASCII file. This way you have the possibility to export the data into other programmes e.g.: MS Excel or others for further calculations or graphical display.

Diagram:

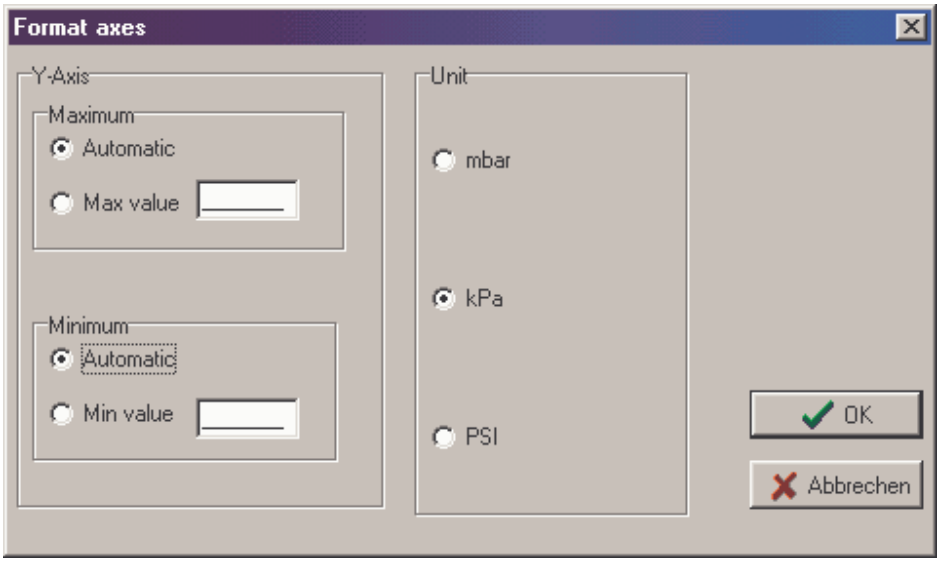


The loaded values are indicated as line graphics. As the software always indicates the stored values with the maximum scaling it is recommended to zoom, enabling specific extracts to be enlarged.

When the cursor is directed into the diagram field and the right mouse key is pressed the following functions can be selected:

- **Download Data Logger**
- **Axis formatting**
- **Headline and footline defination**
- **Delete row of data**

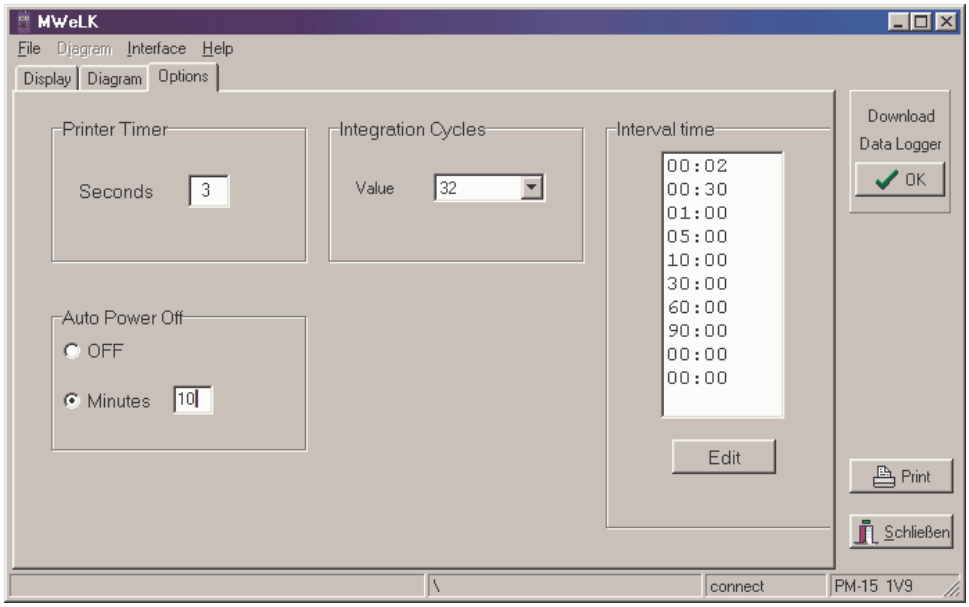
The function "Download Data Logger" is otherwise accessible over all other main screens. Under the function "Axis formatting" the Y Axis can be altered as required and the respective unit can be selected.



In the menu "Headline and Footline" the diagram can be sensibly captioned for the archives or for reports about the measurements.

The function "Delete row of data" is self explanatory.

Options:



The following parameters can be programmed under "Options":

- **Printer Timer:** the time interval when the data is transferred to the serial interface for printing on line. The print-out can be carried out on printers with serial interface (9600 Baut, 8 Bit, 1 Stopbit, no parity).
  Note: with laser printers individual lines are not immediately printed, only complete pages. Line printers are therefore preferable.
- **Auto Power Off:** Deactivating or activating as well as preselection of the time for the automatic switch-off device.
- **Integration cycles:** 2, 4, 8, 16, 32 or 64 cycles are selectable. A cycle is one call-off signal from the sensor. The display update is carried out every 0,5 seconds. Depending on the number of preselected cycles, a mean value of the cycles is then indicated during the next update. A larger number of cycles results in a steadier display (the mean value of 64 cycles takes about 2 seconds). As the minimum and maximum value memories are also using the mean values it depends on what the results are needed for, It may be advantageous to select a smaller number of cycles.
- **Intervals:** means the interval in which the measured values are stored in the internal data logger. 10 different intervals can be defined in minutes and seconds. With the input 00:00 the limit of the programmable memory intervals is restricted to this value. e.g.: if nine intervals are programmed at 00:00, the unit is programmed to one interval only without any further selection possibilities from the keypad of the instrument.

CE Mark and Guarantee

Digital Manometers of the DM series are conform with the European directives for electromagnetic compatibility and are CE marked.

A 12 month guarantee covers any material and production defects which are, or may arise on these manometers, as from the date of invoice.