
User's Manual

Handheld Double-Pressure-Meter

GMH3155

Version 1.3

for 2 GMSD – Pressure Sensors



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1 General

1.1 Safety Requirements

This device has been designed and tested in accordance with the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under "Specification".
2. Device and sensors have to be handled with care (don't throw, hit, etc.). Protect plugs and sockets from soiling.
3. If the device is transported from a cold to a warm environment condensation may cause in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.
4. If device is to be connected to other devices (e.g. via serial interface) the circuitry has to be designed most carefully. Internal connection in third party devices (e.g. connection GND and earth) may result in not-permissible voltages impairing or destroying the device or another device connected.

Warning: If device is operated with a defective mains power supply (e.g. short circuit from mains voltage to output voltage) this may result in hazardous voltages at the device (e.g. at sensor socket or interface).

5. If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting.

Operator safety may be a risk if:

- there is visible damage to the device
- the device is not working as specified
- the device has been stored under unsuitable conditions for a longer period of time.

In case of doubt, please return device to manufacturer for repair or maintenance.

1.2 Operation And Maintenance Advice

• Battery Operation

If Δ and 'bAt' are shown in the secondary display the battery has been used up and needs to be replaced. The device will, however, operate correctly for a certain amount of time. If 'bAt' is shown in the upper display the voltage is too low to operate the device; the battery has been completely used up.

Please note: *The battery has to be taken out, when storing device above 50°C.*

We recommend to take out battery if device is not used for a longer period of time!

The real time clock has to be set again after reconnect to the battery.

• Mains Operation With Power Supply

Warning: When using a power supply please note that operating voltage has to be 10.5 to 12 V DC. Do not apply overvoltage!! Cheap 12V-power supplies often have excessive no-load voltage.

We, therefore, recommend using regulated voltage power supplies. Trouble-free operation is guaranteed by our power supply GNG10/3000.

Prior to connecting the power supply to the mains make sure that the operating voltage stated at the power supply is identical to the mains voltage.

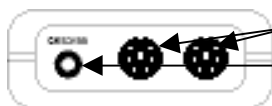
▪ Connecting/Changing Sensors

Do not use insuitable sensors. Connecting other devices/sensors as specified may cause a damage to the instrument and device/sensor! Switch off device before changing the sensor.

Connect sensors before switching on the device, otherwise the sensor may not be detected correctly.

When connecting the sensor the connector may not lock correctly. In such case take the plug not at the casing but at the buckling protection at the end of the plug. If plug is entered correctly, it will slide in smoothly. To disconnect sensors do not pull at the cable but at the plug (to open locking mechanism).

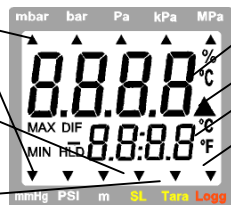
1.3 Connections



Connections for **pressure sensors** of the GMSD-family (p.r.t. chapter 9)
Interface: Connection for el. isolated interface adapter (p.r.t. chapter 4)
 The mains adapter socket is located at the left side of the device.

1.4 Display

Units: an arrow points to the chosen measuring unit
SL: appears if sea-level-correction is activated
Tara: appears if tara-function is activated

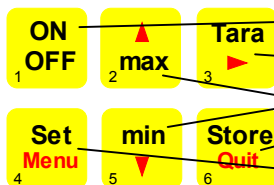


main display: measuring value of Sensorr 1
 Δ: indicates weak battery or other warnings
secondary display: measuring value of **sensor 2** or **difference sensor 1 – sensor 2** (selection with key ‚Set‘)
Logg: appears, if a logger function is chosen

1.5 Basic Operation

When **switching on** the device and the logger function is not off the time of the integrated clock will shortly be displayed. If a **zero point adjustment** was carried out the display shows shortly „nuLL Corr“. The selected kind of measuring will also be shortly displayed.

After changing the battery the clock-setting menu is activated automatically (‚CLOC‘). Check the clock and adjust, if necessary (p.r.t. chapter 2).



On-/Off-Switch
Tara: Calling of tara function, zero point adjustment
min/max: Showing the min- resp. max-memory
Store/Quit: Calling of hold function resp. calling of logger functions (p.r.t. chapter 3)
Set/Menu: Choose secondary display: **Sensor2** or **difference sensor1 – sensor2** or calling of configuration

Tare Function: By pressing ‚Tara‘ (key 3) the displays will be set to 0. All measurements from then on will be displayed relatively to the set tare values. When the tare function is activated, the arrow "Tara" appears in the display. To deactivate tare function press ‚Tara‘ for >2 seconds.

Please Note: Activating/deactivating tara clears the max- & min-memories.

Zero-Point Adjustment: (for rel. pressure sensors only) If there is no pressure applied to the pressure ports the device will display 0. If there is a permanent deviation (and device is operated under steady conditions), a permanent zero point adjustment can be carried out.

To carry out the adjustment press button 3 for approx. 5 seconds. The adjustment will be stored in the sensors.

(Please note: A zero-point adjustment can only be carried out if the difference between the value on display and the value calibrated on site is less than 2%! E.g. for the measuring range of -1.00 ..+25.00mbar, =>zero-point adjustment up to 0.50mbar possible)

To recall the manufacturer`s calibration press button 3 for approx. 7 seconds.

Note: If a zero-point adjustment was carried out for a sensor, this will be signalled by

shortly displaying of „NuLL Corr“ when switching on the device.

Max Memory: Pressing ‚max‘ (key 2) shows the maximums of the measured values. Pressing it again hides them. To clear the max memories press key ‚max‘ for >2 seconds.

Min Memory: Pressing ‚min‘ (key 5) shows the minimums of the measured values. Pressing it again hides them. To clear the min memories press key ‚min‘ for >2 seconds.

Hold Function: By pressing ‚Store/Quit‘ (key 6) the last measuring values will be held in the display. Pressing it again hides them. (only when logger = ‚off‘).

2 Configuration

To change device settings, press **Menu** (key 4) for 2 seconds. This will activate the configuration menu (main display: „SET“).

Pressing key **Menu** changes between the menus, pressing **▶** (key 3) jumps to the referring parameters, which can be selected with key **▶** (key 3).

The parameters can be changed with **▲** (key 2) or **▼** (key 5).

Pressing **Menu** again jumps back to the main configuration menu and saves the settings.

Quit (key 6) finishes the configuration and returns to standard measuring operation.

Menu	Parameter	Values	Meaning	
KEY Menu	KEY ▶	KEY ▲ or ▼		
SEt Conf	Set Configuration: Generic Configurations			
	Unit	mbar, bar..	Unit: Unit of display (given by sensor 1 when using 2 sensors)	**
	SL	oFF/on	Sea level correction: on or off (only for Sensor 1)	**
	Alti	-2000..9999	Altitude above sea level [m] (only for Sensor1 and if SL)	**
	rAtE		Rate: Measuring rate (p.r.t. chapter 2.1)	*
		Slo	Slow measuring rate (4Hz filtered, low power consumption)	*
		FASt	Fast measuring rate, filtered (>100Hz)	*
		P.dEt	Peak detection: fast measuring rate, unfiltered (>100Hz)	*
	P.oFF	1-120	Auto Power Off time in minutes	
		oFF	Auto Power Off deactivated	
	Adr.	01, 11..91	Base address of interface	
SEt AL.	Set Alarm: Settings Of Alarm Function			
	AL. 1	On	Alarm sensor 1 on, with buzzer sound	
		no.So	Alarm sensor 1 on, without buzzer sound	
		oFF	no alarm function for sensor 1	
	AL.Lo/AL.1	Sensor1-Min...	Min alarm rail Sensor 1 (not when AL.1 oFF)	
		AL.1-Hi	Sensor1-Min is the lower display range of sensor 1	
	AL.Hi/AL.1	AL.1-Lo...	Max alarm rail Sensor 1 (not when AL.1 oFF)	
		Sensor1-Max	Sensor1-Max is the upper display range of sensor 1	
	AL. 2	On	Alarm sensor 2 on, with buzzer sound	
		no.So	Alarm sensor 2 on, without buzzer sound	
		oFF	no alarm function for sensor 2	
	AL.Lo/AL.2	Sensor2-Min...	Min alarm rail Sensor 2 (not when AL.2 oFF)	
		AL.2-Hi	Sensor2-Min is the lower display range of sensor 2	
	AL.Hi/AL.2	AL.2-Lo...	Max alarm rail Sensor 2 (not when AL.2 oFF)	
		Sensor2-Max	Sensor2-Max is the upper display range of sensor 2	
	AL.DIF	On	Alarm sensor difference on, with buzzer sound	
		no.So	Alarm sensor difference on, without buzzer sound	
		oFF	no alarm function for sensor difference	
	AL.Lo DIF	-2000..AL.DIF-Hi	Min alarm rail of difference (not when AL.DIF oFF)	
	AL.Hi DIF	AL.DIF-Lo..9999	Max alarm rail of difference (not when AL.DIF oFF)	
SEt LoGG	Set Logger: Configuration Of Logger Function			
	Func	CYCL	Cyclic: logger function 'cyclic logger'	*
		Stor	Store: logger function 'individual value logger'	*
		oFF	no logger function	*
	CYCL	1..3600	Cycle time of cyclic logger [seconds]	*
	Lo.Po	on/oFF	Low-power logger with very low power consumption (only for cyclic logger and slow measuring rate)	*
SEt CLOC	Set Clock: Setting Of Real Time Clock			
	CLOC	HH:MM	Clock: Setting of time	hours:minutes
	dAtE	TT.MM	Date:	day.month
	YEAr	YYYY	Year	

(*) **This menu can only be invoked if the logger memory contains no data! If parameter should be changed the logger memory has to be cleared before! (key 6, p.r.t. chapter 3)**

(**) **This menu can only be invoked if a referring sensor is connected to connection 1. When using a second referring sensor at connection 2 then changes are taken over.**

2.1 Different Kinds Of Measuring: „rAtE-Slo, -P.dEt, -FASt“

Three different kinds of measuring pressure are supported. Two of them (P.dEt and FASt) are working with high measuring frequency of more than 100 measurings per second.

2.1.1 rAtE-Slo: Standard Measuring

Measuring rate 4Hz, averaging and filter functions are active.

Application: Measuring of slowly changing or static pressures, e.g. measuring of leakproofness, atmospheric pressure... Highest accuracy, high noise immunity (EMI and unstable measuring signals), low power consumption.

2.1.2 rAtE-P.dEt: Peak detection

Measuring rate >100Hz, the value is displayed unfiltered.

Application with logger function: Measuring of short pressure peaks or fast changing pressures with a resolution of < 10ms. The cyclic logger function records the arithmetic mean value, the highest and the lowest peak of the referring time interval.

Attention: higher power consumption, measuring is sensitive to noise (EMI,...).

2.1.3 rAtE-FASt: Fast filtered measuring

Measuring rate >100Hz, the value is filtered slightly (higher noise immunity than P.dEt, small peaks will be filtered out), apart from that identical behaviour like P.dEt.

2.2 Measuring Of Water Level – Display Unit [m]

When using suitable waterproof pressure sensors the unit [m] for meters of water can be set in the menu "Unit". 10m of water are roughly 1 bar over pressure. Measurings can be made e.g. like described below :

- With one abs. pressure sensor (SL oFF!): Press ‚Tara‘ when sensor is at ambient air and then bring sensor to the depth to be measured. The display shows now the depth in [m].
- With two abs. pressure sensors (SL oFF!): Sensor 2 at ambient air (does not have to be waterproof), waterproof sensor 1 at water depth to be measured. Don't press ‚Tara‘, the depth can already read from the DIF-display and is compensated for pressure changes in ambient air.
- With one rel pressure sensor: bring tube connection for lower press. in contact to ambient air by means of a tube (no water contact!) and bring the sensor with its open press. connection for higher pressure to water depth to be measured (display and is compensated for pressure changes in ambient air).

2.3 Sea Level Correction For Absolute Pressure Sensors

The device displays the absolute pressure. This is not necessarily the same like the values given by weather stations! The weather stations' values are giving the pressure at sea level. Usually the sensor is placed above sea level and therefore, if the value at sea level(zero) is to be measured, the pressure loss resulting from the actual level above sea level has to be considered! To correct the measuring display activate the „Sea-Level-Function“ (SL, p.r.t. chapter 2, setting is only possible, if the abs. pressure sensor is connected to sensor socket 1). Then enter the altitude above sea level of the sensor's location in meters (Alti, p.r.t. chapter 2). When activated, the display shows the SL-arrow and the device displays the pressure value at sea level.

Please note: When two absolute pressure sensors are connected, the sea level function for both is corresponding to the setting of sensor 1

2.4 Power Off Time

If there won't be pressed any key and no interface communication takes place for the time of the power off time setting (P.Off), the device will be switched off automatically to save battery power.

If P.oFF = oFF then the automatic switch off is deactivated.

2.5 Address

Up to 10 devices of the GMH3xxx- handheld-family can be connected to a serial interface at once (depending on interface converter, e.g. GRS3105: 5 devices). To get access to each device the base addresses of the devices have to be different. For example choose 01 for the first, 11 for the second device and so on. See also chapter 4.

2.6 Alarm

3 possible settings per channel: Alarm off (AL.oFF), on with horn sound (AL.on), on without horn (AL.no.So). Following conditions will display an alarm, when the function is activated (on or no.So):

- Value is below lower (AL. Lo) or above upper alarm rail (AL.Hi).
- Sensor error (Sens Erro)
- Low battery (bAt)
- Fe 7: System error (always with sound)

In case of an alarm, and when polling the interface the prio-flag is set in the returned interface message. If the horn sound of one channel will be switched on/off (on or no.So), then this horn sound setting will automatically be copied to the other activated channels.

2.7 Real Time Clock

The real time clock is used for the logger function: Recorded values are also containing the point of time, when they were measured. Please check the settings when necessary. If the battery was replaced the referring menu ‚CLOC‘ will automatically be started.

3 Operation Of Logger

The device supports two different logger functions:

- „Func-Stor“: each time when „store“ (key 6) is pressed a measurement will be recorded.
- „Func-CYCL“: measurements will automatically be recorded each interval, which was set in the logger menu ‚CYCL‘ until the logger will be stopped or the logger memory is full. The recording is started by pressing „Store“ 2 seconds.

The logger records 3 measurement results each time:

- current or mean value (depending on logger setting, see below), min peak and max peak of sensor 1
- current or mean value (depending on logger setting, see below), min peak and max peak of sensor 2
- current or mean value (dep. on logger setting), min peak and max peak of sensor 1 - sensor 2

Min and max peak are the minimum resp. the maximum of the measured values since the last recording.

Using them allows f.e. analysis of fluctuating pressures. For the evaluation of the data the software GSOFT3050 has to be used. The software also allows easy configuration and starting of the logger.

When the logger is activated (Func Stor or Func CYCL) the hold function is no more available, the key 6 is solely used for the operation of the logger functions.

Please note: When reading out loggerdata either the sensor connected during logging or no sensor should be connected. Otherwise the measuring unit of the data may be corrupted.

3.1 „Func-Stor“: Storing Single Measurements

Each time when „store“ (key 6) is pressed a measurement and its time stamp will be recorded.

The recorded data can be viewed either in the display (when calling the configuration an additional menu ‚REAd LoGG“ is displayed, see below) or by means of the interface and a PC with GSOFT3050-software.

Max. number of measurings: 99

A measuring contains:

- sensor 1, current measuring value at the time of recording
- sensor 1, min peak since the last recording
- sensor 1, max peak since the last recording
- sensor 2, current measuring value at the time of recording
- sensor 2, min peak since the last recording
- sensor 2, max peak since the last recording
- difference sensor 1 - sensor 2, current measuring value at time of recording
- difference sensor 1 - sensor 2, min peak since the last recording
- difference sensor 1 - sensor 2, max peak since the last recording
- time and date of the recording

After each recording „St. XX“ will be displayed for a short time. XX represents the number of the recording.

If logger memory contains recordings already:

When „Store“ is pressed for 2 seconds, the choice for clearing the logger memory will be displayed:



Clear all recordings



Clear the last recording



Clear nothing (cancel menu)

The selection can be made by ▲ (key 2) and ▼ (key 5). "Quit" (key 6) enters the choice.

If the logger memory is full, the display will show:



Viewing Recorded Measurements

Within the „LoGG Stor“ function the measurings can be viewed directly in the display not only by means of a computer (like at „Func CYCL“): press 2 seconds „Set“ (key 4): The first menu displayed now is „rEAd LoGG“ (read logger data). After pressing ▶ (key 3) the measurement recorded last will be displayed, changing between the different values referring to the measurement also is done by pressing ▶.

Changing the measurement is done by pressing the keys ▲ or ▼.

3.2 „Func-CYCL“: Automatic Recording With Selectable Logger-Cycle-Time

The Logger-Cycle-Time is setable (p.r.t. Configuration). For example „CYCL“ = 60: A measuring is recorded after each 60 seconds.

When the slow measurement "rAtE-Slo" is chosen, additionally a low power function is available: „Lo.Po“. If „Lo.Po“ is on, the device only will take a measurement at the point of time of the recording. In between the recordings the measuring shut's down. This decreases the power consumption enormously and therefore is recommended e.g. for long time recordings where no mains adapter is available.

Max. number of measurements: 3600


Cycle time: 1...3600 seconds (=1h), selectable in the configuration

A measuring contains:

- slow measuring rate (rAtE Slo):
 - sensor 1, current measuring value at the time of recording
 - sensor 1, min peak, max peak since the last recording
 - sensor 2, current measuring value at the time of recording
 - sensor 2, min peak, max peak since the last recording
 - difference sensor 1 – sensor 2, current measuring value at time of recording
 - difference sensor 1 – sensor 2, min peak, max peak since the last recording
- fast measuring rates (rAtE FASt,P.dEt):
 - sensor 1, arithmetic mean value since the last recording
 - sensor 1 min peak, max peak since the last recording
 - sensor 2, arithmetic mean value since the last recording
 - sensor 2 min peak, max peak since the last recording
 - difference sensor 1 – sensor 2, arithmetic mean value since the last recording
 - difference sensor 1 – sensor 2, min peak, max peak since the last recording

Starting a recording:

By pressing "Store" (key 6) for 2 seconds the recording will be initiated. After that the display shows 'St.XXXX' for a short time whenever a measuring is recorded. XXXX is the number of the measuring 1..3600.

If the logger memory is full, the display will show:  The recording automatically will be stopped.

If Low-Power-Logger-Function „Lo.Po = on“ the device switches itself off as soon as the memory gets filled.

Stopping the recording manually:

By pressing "Store" (key 6) the recording can be stopped manually. Then the following choice appears:



Stop the recording



Do not stop the recording

The selection can be made by ▲ (key 2) and ▼ (key 5). "Quit" (key 6) enters the choice.

Note: *If you try to switch off the instrument in the cyclic recording operation You will be asked once again if the recording is to be stopped.*

The device can only be switched off after the recording has been stopped!

The Auto-Power-Off-function is deactivated during recording!

Clear Recordings:

When „Store“ is pressed for 2 seconds, the choice for clearing the logger memory will be displayed:



Clear all recordings



Clear nothing (cancel menu)

The selection can be made by ▲ (key 2) and ▼ (key 5). "Quit" (key 6) enters the choice.

4 The Serial Interface

By means of the serial interface and a suitable electrically isolated interface adapter (GRS3100 or GRS3105) the device can be connected to a computer for data transfer. With the GRS3105 up to 5 devices of the GMH3xxx- series can be connected to one interface (see also manual of GRS3100 or GRS3105)

To avoid transmission errors, there are several security checks implemented e.g. CRC.

The following standard software packages are available:

- **GSOFT3050:** Operation and read out of logger function, data display in diagrams and tables
- **EBS9M:** 9-channel software to display the measuring values
- **EASYCONTROL:** Universal multi channel software (EASYBUS-, RS485-, or GMH3000- operation possible) for real-time recording and presentation of measuring data of one GMH3xxx device in the ACCESS®-data base format

In case you want to develop your own software we offer a **GMH3000-development package** including:

- a universally applicable Windows functions library ('GMH3000.DLL') with documentation that can be used by the most programming languages.
- Programming examples Visual Basic 4.0, Testpoint (Keithley Windows measuring software)

In addition to the operation at a PC the device can be operated with the **GAM3000-device**, to use the alarm function for simple supervision and controlling applications. Just connect a GAM3000 to the interface, activate the alarm function of the GMH and the relays output is operating.

The device has 9 channels:

- Channel 1: sensor 1 current measuring value (base address)
- Channel 2: sensor 1 min peak (p.r.t. chapter 3)
- Channel 3: sensor 1 max peak (p.r.t. chapter 3)
- Channel 4: sensor 2 current measuring value (base address)
- Channel 5: sensor 2 min peak (p.r.t. chapter 3)
- Channel 6: sensor 2 max peak (p.r.t. chapter 3)
- Channel 7: difference sensor 1 – sensor 2 current measuring value (base address)
- Channel 8: difference sensor 1 – sensor 2 min peak (p.r.t. chapter 3)
- Channel 9: difference sensor 1 – sensor 2 sensor 1 max peak (p.r.t. chapter 3)

Note: *The measuring-/ alarm- and display range values read back from the interface are always in the selected measurement unit (mbar, bar...)!*

Supported functions:

Channel	Code	Name/Function	Channel	Code	Name/Function
1	4, 7	2,3,5 6,8,9	1	4, 7	2,3,5 6,8,9
x x x	0	Read measurement value	x x x	202	Read display range - unit
x x x	3	Read system state	x x x	204	Read display range – decimal point
			x	208	Read # of channels
			x	220	Read altitude (only abs. press sensors)
x x x	12	Read ID number	x	221	Set altitude (only abs. press sensors)
x	22	Read min alarm rail (AL. - AL.Lo)	x	222	Read power off time (Conf-P.oFF)
x	23	Read max alarm rail (AL. - AL.Hi)	x	223	Set power off time (Conf-P.oFF)
x	32	Read configuration flag BitPeakDetection:33; BitFastFiltered:34; BitLoggerOn:50; BitCyclicLogger:51; BitLowPowerLogger:52	x x x	224	Logger: Read data of CYCL- Logger
			x	225	Logger: Read cycle time (LoGG - CYCL)
			x	226	Logger: set cycle time (LoGG - CYCL)
x	160	Set configuration flag (refer to 32)	x	227	Logger: start recording
x x x	176	Read min measuring range	x	228	Logger: Read # of recordings made
x x x	177	Read max measuring range	x	229	Logger: Read state
x x x	178	Read measuring range unit	x	231	Logger: Read stop time
x x x	179	Read measuring range decimal point	x	233	Read real time clock (CLOC)
x x x	180	Read kind of measuring of sensor	x	234	Set real time clock (CLOC)
x	194	Set display unit	x	236	Read logger memory size
x x x	199	Read kind of measuring of display	x	240	Reset
x x x	200	Read min display range	x	254	Program version
x x x	201	Read max display range	x	260	Logger: read data of STOR Logger

5 Pressure Connection To The Sensors

The device is designed to be connected to the sensors of the GMSD...-series without a new calibration being necessary. Therefore a great variety of replaceable sensors of e.g. -1.999...2.500 mbar relative up to 0...400.0 bar absolute pressure can be connected to the device (p.r.t. chapter 9)

Relative Pressure Sensors (Types: GMSD...MR. GMSD...BR)

- **For measurements of over- or under pressure:**

Connect plastic tube with internal dia of 4 mm to pressure port "B". Port "A" will not be used!

Pressure sensors GMSD 2,5 MR, GMSD 25 MR and GMSD 350 MR allow for measurements of under pressure up to the entire over pressure measuring range by re-plugging the tube to pressure port "A". Please note that all values are displayed as positive values. No minus sign will be shown. (Example for GMSD 25 MR: For tube connection "B" the measuring range covers -19.99 to 25.00 mbar. If you replug to port "A" under pressure measurements down to -25.00 mbar could be carried out with the display showing the value 25.00 (no minus sign).

- **For measurements of pressure differences:**

Connect both plastic tubes with an internal dia of 4 mm to pressure port "B" and "A"; make sure to apply higher pressure to port "B".

Absolute pressure sensors: (types: GMSD...BA)

Connect plastic tube with an internal dia of 4 mm to pressure port "A". (Port "B" is not used.)



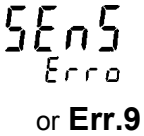
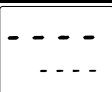
Stainless steel pressure sensors: (types: GMSD...MRE, GMSD...BRE, GMSD...BAE)

For measurements of over-, under- or absolute pressure screw sensor to G1/4" pressure terminal or plug plastic tube to a suitable adapter.

Measurements of pressure differences with two sensors

By means of the calculation sensor 1 – sensor 2 (DIF) press. differences of any sensor combinations can be measured.

6 Error And System Messages

Display	Meaning	What to do?
	Low battery power, device will only continue operation for a short period of time	Replace battery
	Battery empty Mains operation without battery: wrong voltage	Replace battery Check power supply, replace it when necessary
	No sensor connected Connected sensor or device defective Value extremely out of measuring range	Switch off device and connect sensor If 2nd sensor available, check if device is ok. Return defective device/sensor to manufacturer for repair Check: pressure not within sensor range?
	Logger data are read by the interface	When transfer completed the device will automatically return to normal measuring display, no remedy necessary
No display or confused characters, device does not react on keypress	Battery empty Mains operation: wrong voltage or polarity System error Device defective	Replace battery Check power supply, replace it when necessary Disconnect battery and power supplies, wait shortly, then reconnect Return to manufacturer for repair
Err.1	Measured value above allowable range Sensor defective	Check: pressure not within sensor range? -> measuring value to high! Return to manufacturer for repair
Err.2	Measured value below allowable range Sensor defective	Check: pressure not within sensor range? -> measuring value to low! Return to manufacturer for repair
Err.3	Display range overflow	Check: value above 9999 -> to high to be displayed!
Err.4	Display range underflow	Check: value below 2000 (Tara?) -> to low!
Er.11	Value coul not be calculated Calculation overflow happened	Choose different unit Choose different unit
Err.7	System error	Return to manufacturer for repair

7 Calibration Services

Calibration certificates – DKD-certificates – other certificates:

If device should be certificated for its accuracy, it is the best solution to return it with the referring sensors to the manufacturer.

Only the manufacturer is capable to do efficient recalibration if necessary to get results of highest accuracy!

8 Specification

Measuring ranges:

Display range: max. -1999...9999 digit, depending on connected sensor

Resolution: depending on connected sensor

Pressure units: mbar, bar, kPa, MPa, mmHg, PSI, mH₂O
selectable depending on connected sensor

Accuracy: (typ.) $\pm 0,1\%$ FS (at nominal temperature)

(FASt and P.dET: $\pm 0.5\%$ FS)

Measuring rate: slow: 4 meas./sec (ConF-Rate = Slow)

fast: >100 meas./sec (ConF-Rate = FASt and P.dET)

Nominal temperature: 25°C

Sensor: All sensors of the GMSD...series without recalibration can be connected

Connection: Mini-DIN-Socket with locking mechanism

The sensor will automatically be detected, the measurement range settings are set referring to to sensor data

Additional Functions:

Power-Off-Function: Device will be automatically switched off if no key is pressed/no interface communication takes place for the time of the power-off delay. The power-off delay can be set to values between 1 and 120 min.; it can be completely deactivated.

Min/Max-Alarm: The measuring values can be monitored constantly for the min. and max. rails set Alarming is done by integrated horn, display and interface

Real time clock: Integrated clock with date and year

Logger: 2 Functions: individual value logger („Func–Stor“) and cyclic logger („Func–CYCL“)

Memory: Stor: 99 data sets; CYCL: 3600 data sets

Cycle time CYCL: 1...3600 seconds (= 1h)

Display: 2 four digit LCDs (12.4mm high and 7 mm high) for measuring values, and for min/max memories, hold function, etc. as well as additional functional arrows.

Pushbuttons: 6 membrane keys

Interface: Serial interface (3.5mm jack) can be connected to RS232 interface of a PC via electrically isolated interface adapter GRS3100 or GRS3105 (see accessories).

Power supply: 9V battery, type: IEC 6F22 (included in scope of supply)
as well as additional d.c.connector (diameter of internal pin 1.9 mm) for external 10.5-12V direct voltage supply. (suitable power supply: GNG10/3000)

Power consumption: Slow measuring rate: < 2.0 mA
Fast measuring rate: < 5.3 mA
Low-Power-Logger: < 0.1 mA (for cycle time>30s, without interface communication active and no alarm horn sounding) up to 0.8 mA (at cycle time 1s)

Low battery warning: Δ -display and ' bAt '

Housing: impact-resistant ABS, membrane keyboard, transparent panel, Front side IP65

Dimensions: 142 x 71 x 26 mm (L x W x D)

Working temperature: 0...+50°C

Allowable rel. humidity: 0...95 % r.H. (not condensing)

Storage temperature: -20...+70°C

EMC: The GMH3155 device corresponds to the essential protection ratings established in the Regulations of the Council for the Approximation of Legislation for the member countries regarding electromagnetic compatibility (89/336/EWG).

Additional fault: <1%

9 Sensors (09/2004)

Type	Measuring Range	Resolution	Overload	Description
GMSD 2.5 MR	-1.999 ... +2.500 mbar rel.	0.001 mbar	200 mbar rel.	A
GMSD 25 MR	-19.99 ... +25.00 mbar rel.	0.01 mbar	300 mbar rel.	A
GMSD 350 MR	-199.9 ... +350.0 mbar rel.	0.1 mbar	1 bar rel.	A
GMSD 2 BR	-1.000 ... +2.000 bar rel.	1 mbar	4 bar rel.	A
GMSD 10 BR	-1.00 ... +10.00 bar rel.	10 mbar	10.34 bar rel.	A
GMSD 1.3 BA	0 ... 1300 mbar abs.	1 mbar	4 bar abs.	A
GMSD 2 BA	0 ... 2000 mbar abs.	1 mbar	4 bar abs.	A
GMSD 7 BA	0.00 ... 7.00 bar abs.	10 mbar	10 bar abs.	A
GMSD 350 MRE	0.0 ... 350.0 mbar rel.	0.1 mbar	1.4 bar rel.	B
GMSD 3.5 BRE	0 ... 3500 mbar rel.	1 mbar	14 bar abs.	B
GMSD 1 BAE	0 ... 1000 mbar abs.	1 mbar	2 bar abs.	B
GMSD 3.5 BAE	0 ... 3500 mbar abs.	1 mbar	14 bar abs.	B
GMSD 7 BAE	0 ... 7000 mbar abs.	1 mbar	28 bar abs.	B
GMSD 35 BAE	0.00 ... 35.00 bar abs.	10 mbar	140 bar abs.	C
GMSD 70 BAE	0.00 ... 70.00 bar abs.	10 mbar	280 bar abs.	C
GMSD 160 BAE	0.0 ... 160.0 bar abs.	0.1 bar	600 bar. abs.	C
GMSD 250 BAE	0.0 ... 250.0 bar abs.	0.1 bar	600 bar. abs.	C
GMSD 400 BAE	0.0 ... 400.0 bar abs.	0.1 bar	600 bar. abs.	C

Description A: Sensor is suitable for air, non corrosive and non ionising gases and liquids
 Pressure connection: 2 nylon pressure ports for connection to 6 x 1 mm tubes
 Housing ABS with mounting eyelet, dimensions 68 x 32.5 x 27.5 mm

Description B: Stainless steel sensor. Suitable for aggressive media, water, etc.
 Pressure connection: Threading G $\frac{1}{4}$ ", for open ended spanner size: 27mm
 Stainless steel housing, dimensions ca. Ø26 x 103 mm

Description C: Stainless steel sensor. Suitable for aggressive media, water, etc.
 Pressure connection: Threading G $\frac{1}{4}$ ", for open ended spanner size: 27mm
 Stainless steel housing, dimensions ca. Ø26 x 110 mm

10 Accessories

- GKK3000** Suitcase (275 x 229 x 83 mm) with punched lining suitable for the GMH3xxx-series.
GKK3100 Suitcase (275 x 229 x 83 mm) with foam lining for universal applications.
GMH1300 Magnet holder
GAK9V Rechargeable accu 9V
GLG1300 Accu charger for recharging 2 accus at one time
GNG10/3000 power supply 10V/10mA
GRS3100 Interface converter, electrically isolated
GRS3105 5-way interface converter, electrically isolated
GAM3000 Control device for GMH3xxx-devices with alarm function
GSOFT3050 Operation and read out of logger function, data display in diagrams and tables
GMH3000.DLL universally applicable windows functions library ('GMH3000.DLL') with documentation for your own software applications.

