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**Sicherheitshinweise**  
**Ergänzung zur Bedienungsanleitung**  
für

**GMH31xx - ex**

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**Safety Instructions**  
**Supplement to User's Manual**  
for

**GMH31xx - ex**

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Typen/Types: GMH3110 - ex,  
GMH3150 - ex,  
GMH3160-01 - ex,  
GMH3160-07 - ex,  
GMH3160-12 - ex,  
GMH3160-13 - ex,  
GMH3180-01 - ex,  
GMH3180-07 - ex,  
GMH3180-12 - ex,  
GMH3180-13 - ex



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## Betriebshinweise:

- **Batteriebetrieb:**



*Es dürfen nur 9V Batterien des Typ IEC6F22 in Zink-Kohle-Technologie verwendet werden!  
Der Batterietausch darf nur außerhalb des explosionsgefährdeten Bereiches erfolgen!*

- **Netzgerätebetrieb:**

Die in der Bedienungsanleitung beschriebene Netzgerätebuchse ist bei den Geräten der GMH31XX - ex - Serie nicht vorhanden.

- **Drucksensor:** (für GMH3110 und GMH3150)

Es dürfen nur Sensoren der GMSD...-ex -Serie verwendet werden!  
Mit anderen Sensoren kann es zur Zerstörung des Meßgerätes und des Sensors kommen.

- **Alarmfunktion:** (nur bei GMH3150-ex und GMH3180-...-ex)

Die in der Bedienungsanleitung beschriebene Hupe ist bei diesen Geräten nicht vorhanden.  
Die Alarmeinstellung "on" verhält sich somit wie "no.So."

- **Schnittstellenanschluß:**



Als Schnittstellenwandler dürfen nur die Typen GRS3100 und GRS3105 verwendet werden.  
*Der Betrieb der seriellen Schnittstelle ist im Ex-Bereich nicht zulässig.*

- **Ex-Betrieb:**



*Das Gerät darf im Ex-Bereich nur in der zugehörigen Ledertasche betrieben werden!*

- **Temperaturbereich:**



*Das Gerät darf unter 0°C nicht betrieben werden.  
Zulässige Umgebungstemperatur: 0°C bis +50°C*

## Sicherheitshinweise:

Dieses Gerät ist gemäß den Sicherheitsbestimmungen für elektronische Meßgeräte gebaut und geprüft. Die Funktion und Betriebssicherheit des Gerätes kann nur dann gewährleistet werden, wenn die allgemein üblichen Sicherheitsvorkehrungen sowie die Sicherheitshinweise der Bedienungsanleitung beachtet werden.

1. Die einwandfreie Funktion und Betriebssicherheit des Gerätes kann nur unter den klimatischen Verhältnissen, die im Kapitel "Technische Daten" der Bedienungsanleitung spezifiziert sind, eingehalten werden. Wird das Gerät von einer kalten in eine warme Umgebung transportiert, so kann durch Kondensatbildung eine Störung der Gerätefunktion eintreten. In diesem Fall muß die Angleichung der Gerätetemperatur an die Raumtemperatur vor einer erneuten Inbetriebnahme abgewartet werden.
2. **Beachten Sie die Betriebshinweise sowie die jeweiligen Landesvorschriften bezüglich Ex-Einsatz (z.B. VDE0165)**
3. Konzipieren Sie die Beschaltung besonders sorgfältig beim Anschluß an andere Geräte (z.B. über serielle Schnittstelle). Unter Umständen können interne Verbindungen in Fremdgeräten (z.B. Verbindung GND mit Erde ) zu nicht erlaubten Spannungspotentialen führen, die das Gerät selbst oder ein angeschlossenes Gerät in seiner Funktion beeinträchtigen oder sogar zerstören können.
4. Wenn anzunehmen ist, daß das Gerät nicht mehr gefahrlos betrieben werden kann, so ist es außer Betrieb zu setzen und vor einer Wiederinbetriebnahme durch Kennzeichnung zu sichern. Die Sicherheit des Benutzers kann durch das Gerät beeinträchtigt sein, wenn es zum Beispiel:
  - sichtbare Schäden aufweist.
  - nicht mehr wie vorgeschrieben arbeitet.
  - längere Zeit unter ungeeigneten Bedingungen gelagert wurde.
 In Zweifelsfällen das Gerät grundsätzlich an den Hersteller zur Reparatur bzw. Wartung einschicken.
5. Es dürfen am Gerät **keine** Veränderungen oder Reparaturen vom Kunden vorgenommen werden. Zur Wartung oder Reparatur muß das Gerät zum Hersteller eingeschickt werden.

## Operating Instructions:

- **Battery operation:**



***Only the usage of zinc-carbon batteries of the type IEC6F22 is allowed!  
Battery exchange must only be made outside of the hazardous area!***

- **Mains operation:**

The mains adapter socket described in the users manual is not existing in members of the GMH31XX - ex series.

- **Pressure sensor:** (for GMH3110 and GMH3150)

You must only use sensors of the GMSD...-ex series!

Usage of other sensors may result in destruction of sensor and device.

- **Alarm function:** (for GMH3150-ex and GMH3180-...-ex)

The horn sound described in the users manual is not existing in these devices.

The setting Alarm "on" therefore is identical to setting Alarm "no.So."

- **Serial Interface:**

Only use convertors of the type GRS3100 and GRS3105!



***The operation of serial interface is not allowed in Ex Protection-Zone.***

- **Ex-Zone operation:**



***The operation in Ex-Zone is only allowed in the accompanying leather case!***

- **Temperature range:**




***The operation is not allowed below 0°C.***

***The permissible ambient temperature range is 0°C to +50°C***

## Safety Instructions:

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 the operating 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" in the operating manual.  
If the device is transported from a cold to a warm environment condensation may cause 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.
2. **Consider the operating instructions and the regulations referring the use of electrical equipment for hazardous areas (e.g. VDE0165)**
3. 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.
4. 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 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 time.
 In case of doubt, please return device to manufacturer for repair or maintenance.
5. Any changes or repair of the device is not allowed.  
Please return device to manufacturer for repair or maintenance.



**Prüf- und Zertifizierungsstelle**  
**ZELM Ex**



(1) **EG-Baumusterprüfbescheinigung**

(2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen – **Richtlinie 94/9/EG**

(3) EG-Baumusterprüfbescheinigungsnummer

**ZELM 03 ATEX 0136 X**

(4) Gerät: **Digital-Druck-Handmessgerät Typ GMH31... – ex und Sensoren Typ GMSD...- ex**

(5) Hersteller: **GREISINGER electronic GmbH**

(6) Anschrift: **Hans-Sachs-Straße 26, D-93128 Regenstau**

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Prüf- und Zertifizierungsstelle ZELM Ex bescheinigt als benannte Stelle Nr. 0820 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.  
Die Ergebnisse der Prüfung sind in dem vertraulichen Prüfbericht Nr. ZELM Ex 0170315178 festgelegt.


(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

**EN 50 014: 1997+A1+A2 EN 50020: 1994**

(10) Falls das Zeichen "X" hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.

(11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konstruktion, Überprüfung und Tests des spezifizierten Gerätes oder Schutzsystems in Übereinstimmung mit Richtlinie 94/9/EG. Weitere Anforderungen der Richtlinie können für das Herstellungsverfahren und die Lieferung dieses Gerätes oder Schutzsystems gelten. Diese sind von vorliegender Bescheinigung nicht abgedeckt.

(12) Die Kennzeichnung des Gerätes muß die folgenden Angaben enthalten:



Zertifizierungsstelle ZELM Ex


*Adolf Gruber*



Zertifizierungsstelle ZELM Ex  
Braunschweig, 27.04.2003

Seite 1/2

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Stempel haben keine Gültigkeit.  
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.  
Auszüge oder Änderungen bedürfen der Genehmigung der Prüf- und Zertifizierungsstelle ZELM Ex.  
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**EG - Konformitätserklärung**

Für die folgend bezeichneten Erzeugnisse

**GMH 3110-ex, GMH 3150-ex, GMSD...-ex,  
GMH 3160-...-ex, GMH 3180-...-ex**

wird hiermit bestätigt, daß es den wesentlichen Schutzanforderungen entspricht, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit (89/336/EWG, 92/31/EWG, 93/68/EWG), der Niederspannungsrichtlinie (73/23/EWG, 93/68/EWG) und der Verwendung in explosionsfähigen Atmosphären (RL 94/9/EG) festgelegt sind.  
Für die Beurteilung des Erzeugnisses hinsichtlich elektromagnetischer Verträglichkeit und dem Einsatz in explosionsfähigen Atmosphären wurden folgende Normen herangezogen:

EMV: EN 61326 +A1 +A2  
Ex: EN 50 014 : 1997 +A1 +A2  
EN 50 020 : 1994

Diese Erklärung wird verantwortlich für den Hersteller

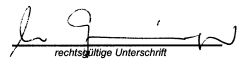
**GREISINGER electronic GmbH**  
Hans-Sachs-Straße 26  
D - 93128 Regenstau

abgegeben durch


Greisinger, Otmar  
Geschäftsführer

Regenstau  
Ort


08.04.2003  
Datum



rechtmäßige Unterschrift



**Prüf- und Zertifizierungsstelle**  
**ZELM Ex**



(1) **EC-TYPE-EXAMINATION CERTIFICATE**

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC-TYPE-EXAMINATION CERTIFICATE Number:

**ZELM 03 ATEX 0136 X**

(4) Equipment: **Handheld Digital Pressure-Meter type GMH31...- ex and sensors type GMSD...- ex**

(5) Manufacturer: **GREISINGER electronic GmbH**

(6) Address: **Hans-Sachs-Straße 26, D-93128 Regenstau**

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Prüf- und Zertifizierungsstelle ZELM Ex, notified body No. 0820 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.  
The examination and test results are recorded in the confidential report ZELM Ex 0170315178


(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 50 014: 1997+A1+A2 EN 50020: 1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.


(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this Certificate.

(12) The marking of the equipment shall include the following:



Zertifizierungsstelle ZELM Ex


*Adolf Gruber*



Zertifizierungsstelle ZELM Ex  
Braunschweig, April 27, 2003

Sheet 1/2

EC-type-examination Certificates without signature and stamp are not valid. The certificates may only be circulated without alteration. Extracts or alterations are subject to approval by the Prüf- und Zertifizierungsstelle ZELM Ex.  
This English version is based on the German text. In the case of dispute, the German text shall prevail.  
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**EC – Declaration of Conformity**

**GREISINGER electronic GmbH, Hans-Sachs-Straße 26, D-93128 Regenstau**  
declares in solo responsibility that the products

**GMH 3110-ex, GMH 3150-ex, GMSD...-ex,  
GMH 3160-...-ex, GMH 3180-...-ex**

are conform with the prescription of the following European directives


EMC Directives: 89/336/EWG, 92/31/EWG, 93/68/EWG  
LV Directives : 73/23/EWG, 93/68/EWG  
Ex Directive : 94/9/EC

**The conformity are verified under observance of following standards or standard documents:**


EMC: EN 61326 +A1 +A2  
Ex: EN 50 014 : 1997 +A1 +A2  
EN 50 020 : 1994

Regenstau  
Place

2003-04-08  
Date



Managing Director



**GREISINGER electronic GmbH**  
Hans-Sachs-Straße 26, D-93128 Regenstau

# User's Manual

## Handheld Digital Pressure-Meter

# GMH3150

Version 5.1

for GMSD – Pressure Sensors



**GREISINGER electronic GmbH**

D - 93128 Regenstauf, Hans-Sachs-Straße 26

# CONTENTS

<b>1 GENERAL</b> .....	<b>2</b>
1.1 SAFETY REQUIREMENTS.....	2
1.2 OPERATION AND MAINTAINANCE ADVICE.....	3
1.3 CONNECTIONS.....	3
1.4 DISPLAY.....	3
1.5 BASIC OPERATION.....	3
<b>2 CONFIGURATION</b> .....	<b>4</b>
2.1 DIFFERENT KINDS OF MEASURING: „RATE-SLO, -P.DET, -FAST“.....	5
2.1.1 rAtE-Slo: Standard Measuring.....	5
2.1.2 rAtE-P.dEt: Peak detection.....	5
2.1.3 rAtE-FAST: Fast filtered measuring.....	5
2.2 SEA LEVEL CORRECTION FOR ABSOLUTE PRESSURE SENSORS.....	5
2.3 AVERAGING FUNCTION.....	5
2.4 POWER OFF TIME.....	5
2.5 ADDRESS.....	5
2.6 ALARM.....	6
2.7 REAL TIME CLOCK.....	6
<b>3 MEASURING OF WATER LEVEL – DISPLAY UNIT [M]</b> .....	<b>6</b>
<b>4 OPERATION OF LOGGER</b> .....	<b>7</b>
4.1 „FUNC-STOR“: STORING SINGLE MEASUREMENTS.....	7
4.2 „FUNC-CYCL“: AUTOMATIC RECORDING WITH SELECTABLE LOGGER-CYCLE-TIME.....	8
<b>5 THE SERIAL INTERFACE</b> .....	<b>9</b>
<b>6 PRESSURE CONNECTION TO THE SENSORS</b> .....	<b>10</b>
<b>7 ERROR AND SYSTEM MESSAGES</b> .....	<b>10</b>
<b>8 CALIBRATION SERVICES</b> .....	<b>11</b>
<b>9 SPECIFICATION</b> .....	<b>11</b>
<b>10 SENSORS (03/2005)</b> .....	<b>12</b>
<b>11 ACCESSORIES</b> .....	<b>12</b>

## 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  $\Delta$  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. The battery has to be taken out, when storing device above 50°C.

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

### • 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.

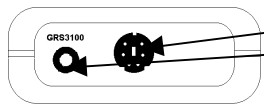
### ▪ Connecting/Changing Sensors

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 sensor 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 sensor do not pull at the cable but at the plug (to open locking mechanism).

## 1.3 Connections



Connection for pressure sensors of the GMSD-family (p.r.t. chapter 10)

Interface: Connection for el. isolated interface adapter (p.r.t. chapter 5)

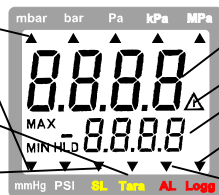
The mains adapter socket is located at the left side of the device.

## 1.4 Display

**Units:** an arrow points to the chosen measuring unit

**Tara:** appears if tara-function is activated.

**SL:** appears if sea-level-correction is activated



**main display:** shows measuring value.

$\Delta$ : indicates weak battery or other warnings

**secondary display:** min-, max- or hold value

**Logg:** appears, if logger function is chosen, flashes when logger is running

**AL:** (not at all devices) flashes, if alarm exists

## 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“.

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

			<b>On-/Off-Switch</b>
			<b>Tara:</b> Calling of tara function, zero point adjustment
			<b>min/max:</b> Showing the min- resp. max-memory in sec. display
			<b>Store/Quit:</b> Calling of hold function resp. calling of logger functions (p.r.t. chapter 4)
			<b>Set/Menu:</b> Calling of configuration

**Max Memory:** Pressing 'max' (key 2) shows the maximum of the measured values. Pressing it again hides it. To clear the max memory press key 'max' for >2 seconds.

**Min Memory:** Pressing 'min' (key 5) shows the minimum of the measured values. Pressing it again hides it. To clear the min memory press key 'min' for >2 seconds.

**Hold Function:** By pressing 'Store/Quit' (key 6) the last measuring value will be held in the secondary display. Pressing it again hides it. (only when logger = ,off').

**Tare Function:** By pressing 'Tara' (key 3) the display will be set to 0. All measurements from then on will be displayed relatively to the set tare value. When tara 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. (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, this will be signalled by the short displaying of „NuLL Corr“ when switching on the device.*

## 2 Configuration

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

**Note:** *If the logger memory contains data already, the menus/parameters marked with (\*) can not be invoked! If these should be altered the logger memory has to be cleared before! (key 6, p.r.t. chapter 4)*



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

Three different kinds of measuring pressure are supported. Two of them are working with high measuring frequency of more than 100 measurings per second. If one of them was chosen in the configuration (see above), this will be displayed in the secondary display: „P.dEt“ or „FASt“.

### 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 Sea Level Correction For Absolute Pressure Sensors

The device displays the absolute pressure measured at the sensor. 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). 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.

## 2.3 Averaging Function

The averaging function concerns the display values (LCD and interface). It is completely independent from the averaging of the logger function, please don't mix them up!

The averaging integrates the measuring values during a selectable period of time and then calculates the average display value. It is independent from the selected kind of measuring (slow, fast, peak detect) .

As long as not enough values are collected (selected averaging time) to calculate a average value, the upper display shows "----", the lower display a 'countdown'.

During an active low-power-logging procedure the averring is always deactivated

Function of min/max-value memory during averaging:

- If averaging is activated and slow measuring is selected (rAtE-Slo), the min-/max-value memory refers to the average display value.
- If averaging is activated and fast measuring is selected (rAtE-FASt or P.dEt) , the min-/max-value memory refers to the internal measured values (fast peaks can be detected).

## 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 5.

## 2.6 Alarm

There are three possible settings: Alarm off (AL. oFF), on with horn sound (AL. on), on without sound (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.

## 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 Measuring Of Water Level – Display Unit [m]

(only for devices with ,m' printed below the display)

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

- With 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 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).

## 4 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.

**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.

### 4.1 „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:
- current measuring value at the time of recording
  - min peak, 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 ▼.

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

The Logger-Cycle-Time is settable (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 measurings: 9999  
Cycle time: 1...3600 seconds (=1h), selectable in the configuration

A measuring contains:

- rAtE SLo:
  - current measuring value at the time of recording
  - min peak, max peak since the last recording
- rAtE FASt,P.dEt
  - arithmetic mean value since the last recording
  - 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..9999.

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.

## 5 The Serial Interface

By means of the serial interface and a suitable electrically isolated interface adapter (GRS3100, GRS3105 or USB3100) 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, GRS3105 or USB3100) 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 3 channels:

- 1: current measuring value (base address)
- 2: min peak (p.r.t. chapter 4)
- 3: max peak (p.r.t. chapter 4)

**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 2 3			1 2 3		
x x x	0	Read measurement value	x x x	199	Read kind of measuring of display
x x x	3	Read system state	x x x	200	Read min display range
x	6	Read min memory	x x x	201	Read max display range
x	7	Read max memory	x x x	202	Read display range - unit
x x x	12	Read ID number	x x x	204	Read display range – decimal point
x	22	Read min alarm rail (AL. - AL.Lo)	x	208	Read # of channels
x	23	Read max alarm rail (AL. - AL.Hi)	x	220	Read altitude (only abs. press sensors)
x	32	Read configuration flag BitAlarmOn:1; BitAlarmSound:3; BitCorrectToSealevel:32 (only abs. press. Sensors); BitPeakDetection:33; BitFastFiltered:34; BitLoggerOn:50; BitCyclicLogger:51; BitLowPowerLogger:52	x	221	Set altitude (only abs. press sensors)
			x	222	Read power off time (Conf-P.oFF)
			x	223	Set power off time (Conf-P.oFF)
			x x x	224	Logger: Read data of CYCL- Logger
			x	225	Logger: Read cycle time (LoGG - CYCL)
x	102	Set min alarm rail (AL. - AL.Lo)	x	226	Logger: set cycle time (LoGG - CYCL)
x	103	Set max alarm rail (AL. - AL.Hi)	x	227	Logger: start recording
x	160	Set configuration flag (refer to 32)	x	228	Logger: Read # of recordings made
x	174	Clear min memory	x	229	Logger: Read state
x	175	Clear max memory	x	231	Logger: Read stop time
x x x	176	Read min measuring range	x	233	Read real time clock (CLOC)
x x x	177	Read max measuring range	x	234	Set real time clock (CLOC)
x x x	178	Read measuring range – measuring unit	x	236	Read logger memory size
x x x	179	Read measuring range – decimal point	x	240	Reset
x x x	180	Read kind of measuring of sensor	x	254	Program version
x	194	Set display unit	x	260	Logger: read data of STOR Logger

## 6 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 10)

### 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".




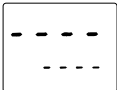
### Absolute pressure sensors: (types: GMSD...BA)

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.

## 7 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	Replace battery
	Mains operation without battery: wrong voltage	Check power supply, replace it when necessary
	No sensor connected	Switch off device and connect sensor
	Connected sensor or device defective	If second sensor available, check if device is ok. Return defective device/sensor to manufacturer for repair
<b>Err.9</b>	Measured value far out of allowable range	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	Replace battery
	Mains operation without battery: wrong voltage or polarity	Check power supply, replace it when necessary
	System error	Disconnect battery and power supplies, wait shortly, then reconnect
	Device defective	Return to manufacturer for repair
<b>Err.4</b>	Value is too low to be displayed, tara is set	Check: display below -2000 (tara?)?
<b>Err.1</b>	Measured value above allowable range	Check: pressure not within sensor range? -> measuring value to high
	Sensor defective	Return to manufacturer for repair
<b>Err.2</b>	Measured value below allowable range	Check: pressure not within sensor range? -> measuring value to low
	Sensor defective	Return to manufacturer for repair
<b>Err.7</b>	System error	Return to manufacturer for repair

## 8 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!

## 9 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 mH <sub>2</sub> O (only for devices with ,m' printed below display), selectable depending on connected sensor
Accuracy: (typ.)	±0,1%FS (at nominal temperature) (FASt and P.dET: ±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
<b>Sensor:</b>	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 value is constantly monitored 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
<b>Logger:</b>	2 Functions: individual value logger („Func–Stor“) and cyclic logger („Func–CYCL“)
Memory:	Stor: 99 data sets; CYCL: 9999 data sets
Cycle time CYCL:	1...3600 seconds
<b>Display:</b>	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.
<b>Pushbuttons:</b>	6 membrane keys
<b>Interface:</b>	Serial interface (3.5mm jack) can be connected to RS232 or USB interface of a PC via electrically isolated interface adapter GRS3100, GRS3105 or USB3100 (see accessories).
<b>Power supply:</b>	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: < 1.5 mA Fast measuring rate: < 3.0 mA Low-Power-Logger: < 0.1 mA (for cycle time>30s, without interface communication active and no alarm horn sounding) up to 0.4 mA (at cycle time 1s)
Low battery warning:	 -display and ' bAt '
<b>Housing:</b>	impact-resistant ABS, membrane keyboard, transparent panel, Front side IP65
Dimensions:	142 x 71 x 26 mm (L x W x D)
Working temperature:	-25...+50°C
Allowable rel. humidity:	0...95 % RH (not condensing)
Storage temperature:	-25...+70°C
<b>EMC:</b>	The 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 (2004/108/EG).
Additional fault:	<1%

## 10 Sensors (03/2005)

Type	Measuring Range	Resolution	Overload	Description
GMSD 2.5 MR	-1.999 ... +2.500 mbar rel.	0.001 mbar	250 mbar rel.	A
GMSD 25 MR	-19.99 ... +25.00 mbar rel.	0.01 mbar	350 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	13.5 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	1.3 bar rel.	B
GMSD 3.5 BRE	0 ... 3500 mbar rel.	1 mbar	7 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	7 bar abs.	B
GMSD 7 BAE	0 ... 7000 mbar abs.	1 mbar	13.5 bar abs.	B
GMSD 35 BAE	0.00 ... 35.00 bar abs.	10 mbar	58 bar abs.	C
GMSD 70 BAE	0.00 ... 70.00 bar abs.	10 mbar	100 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: 27 mm  
 Housing ABS, dimensions ca. Ø26 (31) 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  
 Steel housing, dimensions ca. Ø26 (31) x 110 mm

## 11 Accessories

<b>GKK3000</b>	Suitcase (275 x 229 x 83 mm) with punched lining suitable for the GMH3xxx-series.
<b>GKK3100</b>	Suitcase (275 x 229 x 83 mm) with foam lining for universal applications.
<b>GMH1300</b>	Magnet holder
<b>GAK9V</b>	Rechargeable accu 9V
<b>GLG1300</b>	Accu charger for recharging 2 accus at one time
<b>GNG10/3000</b>	power supply 10V/10mA
<b>GRS3100</b>	Interface converter, electrically isolated
<b>GRS3105</b>	5-way interface converter, electrically isolated
<b>GAM3000</b>	Control device for GMH3xxx-devices with alarm function
<b>GSOFT3050</b>	Operation and read out of logger function, data display in diagrams and tables
<b>EBS9M</b>	9-channel software to display the measuring values
<b>GMH3000.DLL</b>	universally applicable windows functions library ('GMH3000.DLL') with documentation for your own software applications