

Operating Instructions
for
Manual Pressure Measuring Devices with
External and Integrated Pressure
Sensors

Model: HND-P215



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfill the EG-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Manual Pressure Measuring Devices with External and Integrated Pressure Sensors model: HND-P215

4. Regulation Use

Any use of the Manual Pressure Measuring Devices with External and Integrated Pressure Sensors, model: HND-P215, which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The KOBOLD manual pressure measuring devices HND-P215 are highly precise, compact pressure measuring devices that can be used universally. In conjunction with the appropriate external pressure sensors, precise measurement results over the entire measuring range can be achieved.

Various pressure sensors are available for a multitude of measuring tasks and special applications. The respective measurement task determines which combination is selected. Naturally, these first-rate KOBOLD-measuring units can display more than just pressure. All devices in this series allow for minimum/maximum value memory, hold function, automatic self-shut-off, or zero point offset entry for all connected pressure sensors, for example. The HND-P215 type also has a logger function, a peak value memory, or a minimum/maximum alarm. A special characteristic of the type HND-P215 is the possibility of connecting two external pressure sensors.

6. Electrical Connection

6.1 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 12 V-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 HND-Z002. 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.

7. Operation / Configuration / Adjustments

7.1 General

7.1.1 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 *10 Technical Information*.
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. When connecting the device to other devices the connection has to be designed most thoroughly as internal connections in third-party devices (e.g. connection GND with protective earth) may lead to undesired voltage potentials that can lead to malfunctions or destroying of the device and the connected devices.



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).

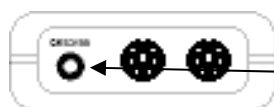
5. If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting.

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.

7.2 Connections



Connections for **pressure sensors** of the HND-PS-family (p.r.t. chapter 8)

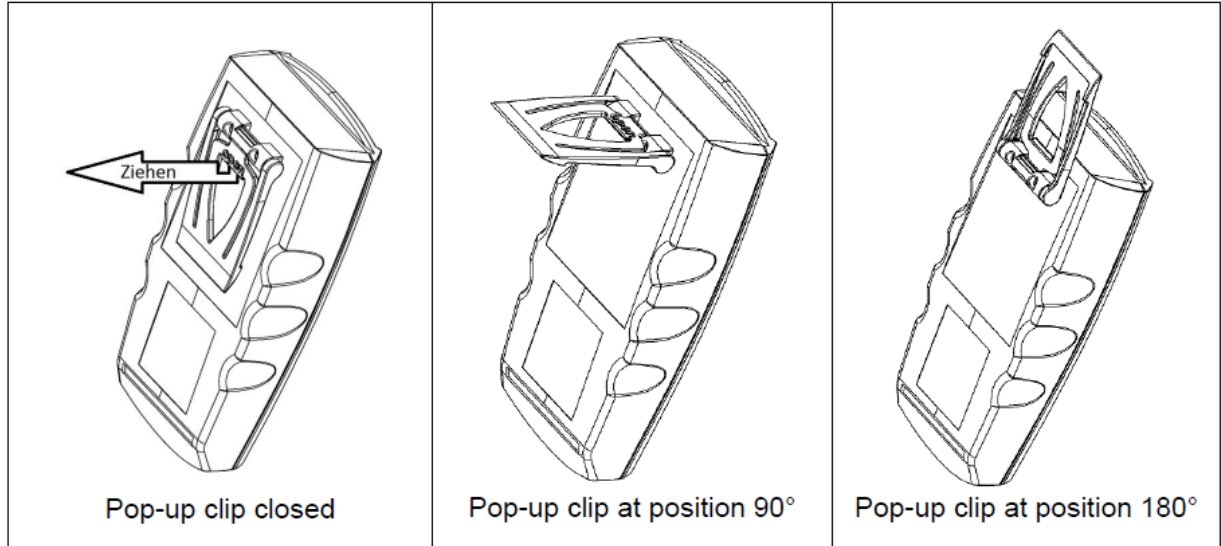
Interface: Connection for el. isolated interface adapter (p.r.t. chapter 8.1 *The Serial Interface*)

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

7.3 Pop-up clip

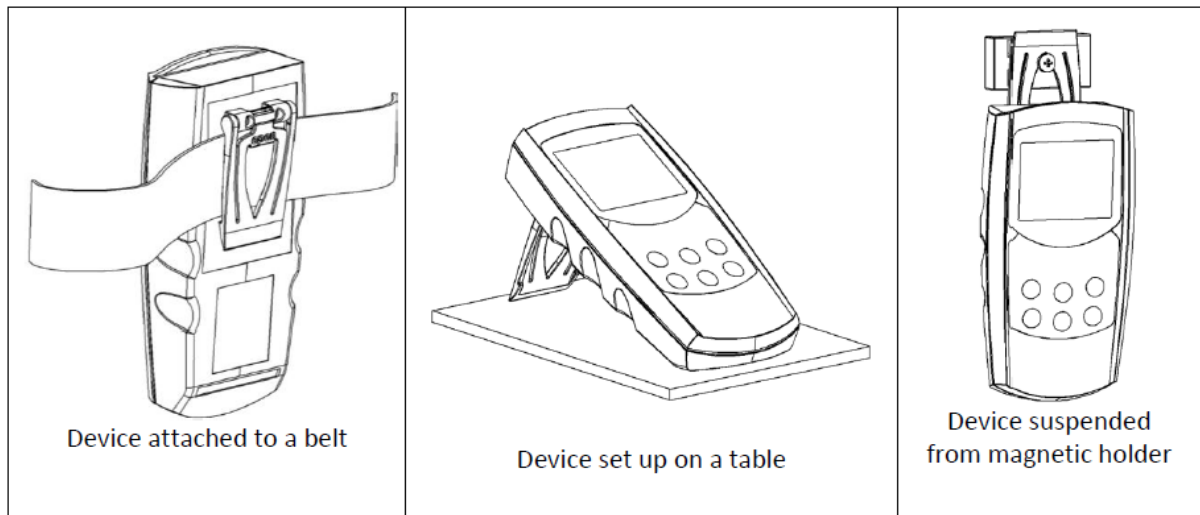
Handling:

- Pull at label “open” in order to swing open the pop-up clip.
- Pull at label “open” again to swing open the pop-up clip further.

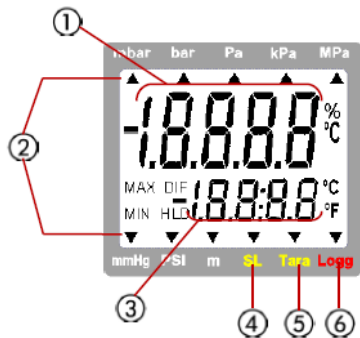


Function:

- The device with a closed pop-up clip can be plainly laid onto a table or attached to a belt, etc.
- The device with pop-up clip at position 90° can be set up on a table, etc.
- The device with pop-up clip at position 180° can be suspended from a screw or the magnetic holder.



7.4 Display



- 1 **Main display:** measuring value of sensor 1
- 2 Arrow points to the chosen measuring unit
- 3 **Secondary display:** measuring value of sensor 2 or difference sensor 1 – sensor 2
- 4 **SL:** appears if sea-level-correction is activated
- 5 **Tara:** appears if tara-function is activated
- 6 **Logg:** appears if logger function is chosen, flashes while logger is running

7.5 Basic Operation



On / Off



min/max bei Messung:

press short: shows the min./max. value

+

press again: hides min./max. value



press 2 sec.: clears particular value

Tara, zero-point adjustment:

press short: display will be set to 0



The following measuring will be relatively displayed to the set tara value

press 2 sec.: deactivates tara-function

press 5 sec.: Zero-Point Adjustment¹⁾

Set/Menu:



press short: Choose secondary display: **Sensor 2 or difference sensor 1 – sensor 2** or calling of configuration

Store/Quit:



press short: hold-function, the last measuring value will be held in the secondary display.

press again: hides the value

at active logger: invokes logger functions


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

¹⁾ **Zero-Point Adjustment:** If there is no pressure or zero-pressure (absolute) 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 (Auto Null will be displayed shortly). The adjustment is done via the OFFSET-value of the sensor (referring configuration menu).

To recall the manufacturer's calibration press button 3 for approx. 15 seconds. *Please note: - A zero-point adjustment can only be carried out if the difference between the values on display is less than 500 digits!*

- If a zero point adjustment was carried out the display shows "Corr" after a restart .

7.6 Operation

Connect sensor, turn on device via  key.



After segment test the device displays some configuration:

If 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 7.7). After that the device is ready for measuring.

7.7 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	KEY	KEY		
Menu	▶	▲ or ▼		
SEt	Set Configuration: Generic Configurations			
Conf	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 7.7.1)	*
		Slo	Slow measuring rate (4 Hz filtered, low power consumption)	*
		FASt	Fast measuring rate, filtered (>1000Hz)	*
		P.dEt	Peak detection: fast measuring rate, unfiltered (>1000Hz)	*
	t.AVG	1-120	Averaging period in seconds, used by the averaging function	
		oFF	Averaging function deactivated	
	P.oFF	1-120	Auto Power Off time in minutes	
		oFF	Auto Power Off deactivated	
	Out	oFF	Function of the output: No output function, lowest power consumption	
		Ser	Output is serial interface	
		dAC	Output is analogue output 0...1 V	

Menu	Parameter	Values	Meaning	
KEY Menu	KEY	KEY ▲ or ▼		
SEt ConF	Set Configuration: Generic Configurations			
	Adr.	01,11..91	Base address of interface (if Out=Ser)	
	dAC.	CH1, CH2, or CH DIF	Choice of the input to be the source for the analogue output (if Out=dAC)	
	dAC.0	eg. -5.00..5.00 mbar	Enter desired value at which the analogue output potential should be 0 V (if Out=dAC)	
	dAC.1	eg. -5.00...5.00 mbar	Enter desired value at which the analogue output potential should be 1 V (if Out=dAC)	
SEt CAL	Set Calibration: Adjustment of Sensors			
	OFS.1	Sensordep., e.g. -5.00...5.00 mbar	The offset of sensor 1 will be displaced by this value to compensate for deviations in the probe or in the measuring device.	
		OFF	Zero displacement is inactive (=0.0°)	
	SCL.1	-2.000...2.000	The measuring scale of sensor 1 will be changed by this factor [%] to compensate deviations of temperature probe or measuring device.	
		OFF	Scale correction factor inactive (=0.000)	
	OFS.2	Sensordep., e.g. -5.00...5.00 mbar	The offset of sensor 2 will be displaced by this value to compensate for deviations in the probe or in the measuring device.	
		oFF	Zero displacement inactive (=0.0°)	
	SCL.2	-2.000...2.000	The measuring scale of sensor 2 will be changed by this factor [%] to compensate deviations of temperature probe or measuring device.	
		oFF	Scale correction factor inactive (=0.000)	
SEt AL.	Set Alarm: Settings Of Alarm Function			
	AL.1	On	Alarm sensor 1 on, with buzzer sound	
		no.S0	Alarm sensor 1 on, without buzzer sound	
		oFF	no alarm function for sensor 1	
	AL.Lo/AL.1	Sensor1-Min... AL.1-Hi	Min alarm rail Sensor 1 (not when AL.1 oFF) Sensor1-Min is the lower display range of sensor 1	
	AL.Hi/AL.1	AL.1-Lo... Sensor1-Max	Max alarm rail Sensor 1 (not when AL.1 oFF) Sensor1-Max is the upper display range of sensor 1	
	AL.2	On	Alarm sensor 2 on, with buzzer sound	
		no.S0	Alarm sensor 2 on, without buzzer sound	
		oFF	no alarm function for sensor 2	
	AL.Lo/AL.2	Sensor2-Min... AL.2-Hi	Min alarm rail Sensor 2 (not when AL.2 oFF) Sensor2-Min is the lower display range of sensor 2	
	AL.Hi/AL.2	AL.2-Lo... Sensor2-Max	Max alarm rail Sensor 2 (not when AL.2 oFF) Sensor2-Max is the upper display range of sensor 2	
	AL.DIF	On	Alarm sensor difference on, with buzzer sound	
		no.S0	Alarm sensor difference on, without buzzer sound	
		oFF	no alarm function for sensor difference	
	AL.Lo DIF	-19999..AL.DIF-Hi	Min alarm rail of difference (not when AL.DIF oFF)	
	AL.Hi DIF	AL.DIF-Lo..19999	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. 7.8 Operation Of Logger)

() 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.**

Note: When using the logger function some settings in the menu may not be accessible (). If these settings should be changed, the logger has to be stopped before, eventually the logger data has to be cleared. (p.r.t. chapter 7.8)*

7.7.1 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 1000 measurings per second.

7.7.1.1 rAtE-Slo: Standard Measuring

Measuring rate 4 Hz, 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.

7.7.1.2 rAtE-P.dEt: Peak detection

Measuring rate >1000 Hz, the value is displayed unfiltered.

Application with logger function: Measuring of short pressure peaks or fast changing pressures with a resolution of < 1 ms. 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,..).

7.7.1.3 rAtE-FASt: Fast filtered measuring

Measuring rate >1000 Hz, 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.

7.7.2 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“. 10 m of water are roughly 1 bar over pressure. Measurements 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).

7.7.3 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 7.7 *Configuration*, 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 7.7 *Configuration*). 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

7.7.4 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 averaging 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). (>1000 Hz)

7.7.5 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.

7.7.6 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.

7.7.7 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.

7.8 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 HND-Z034 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.

7.8.1 „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 HND-Z034-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 measurements 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 ▼.

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

The Logger-Cycle-Time is setable (p.r.t. 7.7 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: 4000

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..4000.

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 logger operation will be called:

The display will show:  By pressing the keys ▲ (key 2) or

▼ (key 5) the display will change to 

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



Clear all recordings



Clear the last recording sequence



Clear nothing (cancel menu)

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

8. Output

The output can be used as serial interface (HND-Z031 or HND-Z032 interface adapters) or as analog output (0-1V).

If none of both is needed, we suggest to switch the output off, because battery life then is extended.

8.1 The Serial Interface

By means of the serial interface and a suitable electrically isolated interface adapter (HND-Z031) the device can be connected to a computer for data transfer. To avoid transmission errors, there are several security checks implemented e.g. CRC.

The following standard software packages are available:

- **HND-Z034:** Operation and read out of logger function, data display in diagrams and tables
- **BUS-S20M:** 20-channel software to display the measuring values

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The device has 9 channels:

- Channel 1: sensor 1 current measuring value (base address)
- Channel 2: sensor 1 min peak (p.r.t. 7.8 Operation Of Logger)
- Channel 3: sensor 1 max peak (p.r.t. 7.8 Operation Of Logger)
- Channel 4: sensor 2 current measuring value (base address)
- Channel 5: sensor 2 min peak (p.r.t. 7.8 Operation Of Logger)
- Channel 6: sensor 2 max peak (p.r.t. 7.8 Operation Of Logger)
- 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 7.8 Operation Of Logger)
- Channel 9: difference sensor 1 – sensor 2 sensor 1 max peak (p.r.t. chapter 7.8 Operation Of Logger)



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	208	Read # of channels
x x x	3	Read system state	x	222	Read power off time (Conf-P.oFF)
x	12	Read ID number	x	223	Set power off time (Conf-P.oFF)
x	22	Read min alarm rail (AL. - AL.Lo)	x x x	224	Logger: Read data of CYCL- Logger
x	23	Read max alarm rail (AL. - AL.Hi)	x	225	Logger: Read cycle time (LoGG - CYCL)
x	32	Read configuration flag BitPeakDetection:33; BitFastFiltered:34; BitLoggerOn:50; BitCyclicLogger:51; BitLowPowerLogger:52	x	226	Logger: set cycle time (LoGG - CYCL)
			x	227	Logger: start recording
			x	228	Logger: Read # of recordings made
			x	229	Logger: Read state
			x	231	Logger: Read stop time
x	160	Set configuration flag (refer to 32)	x	233	Read real time clock (CLOC)
x x x	176	Read min measuring range	x	234	Set real time clock (CLOC)
x x x	177	Read max measuring range	x	236	Read logger memory size
x x x	178	Read measuring range unit	x	237	Read logger filecount
x x x	179	Read measuring range decimal point	x	238	Read logger filepointer
x x x	180	Read kind of measuring of sensor	x	239	Read logger file info
			x	240	Reset
x x x	199	Read kind of measuring of display	x	254	Program version
x x x	200	Read min display range	x	260	Logger: read data of STOR Logger
x x x	201	Read max display range	x x x	263	Read logger channel info
x x x	202	Read display range - unit			
x x x	204	Read display range – decimal point			

8.2 Analogue Output – Scaling with DAC.0 and DAC.1

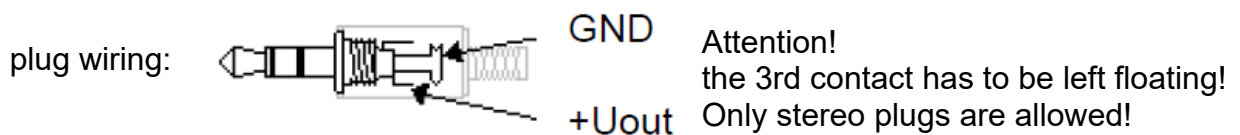
Note: Analogue output cannot be used during logger recordings

With the DAC.0 and DAC.1 value the output can be rapidly scaled to your efforts. Keep in mind not to connect low-resistive loads to the output, otherwise the output value will be wrong and battery life is decreased. Loads above ca 10kOhm are uncritical.

If the display exceeds the value set by DAC.1, then the device will apply 1V to the output

If the display falls below the value set by DAC.0, then the device will apply 0V to the output

In case of an error (Err.1, Err.2, no sensor, etc.) the device will apply slightly above 1V to the output.



8.3 Instrument Adjustment

8.3.1 Zero Displacement Sensor 1 ('OFS.1') and Sensor 2 ('OFS.2')

A zero displacement can be carried out for the measured value:

value displayed = value measured - offset

Standard setting: 'off' = 0.0°, i.e. no zero displacement will be carried out. Together with the scale correction (see below) this factor is mainly used to compensate for sensor deviations. Input is in the display unit.

8.3.2 Scale Correction Sensor 1 ('SCL.1') and Sensor 2 ('SCL.2')

The scale of the measuring can be influenced by this setting (factor is in %):

displayed value = measured value * (1+Scal/100)

Standard setting: 'off' =0.000, i.e. value is not corrected. Together with the zero displacement (see above) this factor is mainly used to compensate for sensor deviations.

8.4 Pressure Connection to the Sensors

The device is designed to be connected to the sensors of the HND-PS...-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...1000 bar absolute pressure can be connected to the device.

8.5 Relative Pressure Sensors (Types: HND-PS01...-PS05, HND-PS09)

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

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

- **For measurements of under pressure:** (with higher negative measuring range)

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

Pressure sensors HND-PS01, HND-PS02 and HND-PS03 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 HND-PS02: 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).

Note: All values are displayed now as positive values. No minus sign will be shown. Example: it is possible to measure under pressure down to -25.00 mbar, the display shows then the value 25.00 (no minus sign).

For measurements of differential pressure:

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".


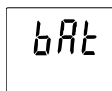
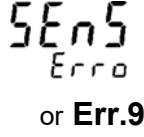
Stainless steel pressure sensors: (types: HND-PS01...-PS30)

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 differential pressure with two sensors

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

8.6 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	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 2nd sensor available, check if device is ok. Return defective device/sensor to manufacturer for repair
	Value extremely out of measuring range	Check: pressure not within sensor range?
No display or confused characters, device does not react on keypress	Battery empty	Replace battery
	Mains operation: 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
Err.1	Measured value above allowable range	Check: pressure not within sensor range? -> measuring value to high!
	Sensor defective	Return to manufacturer for repair
Err.2	Measured value below allowable range	Check: pressure not within sensor range? -> measuring value to low!
	Sensor defective	Return to manufacturer for repair
Err.3	Display range overflow	Check: value above 19999 -> to high to be displayed!
Err.4	Display range underflow	Check: value below 19999 (Tara?) -> to low!
Er.11	Value could not be calculated	Choose different unit
	Calculation overflow happened	Choose different unit
Err.7	System error	Return to manufacturer for repair
----	Sensor not present/recognized	Reconnect sensor, During logging: stop the logger and restart it
	Could not calculate value	Suitable sensor/unit combination necessary

8.7 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!

9. Maintenance


9.1 Battery Operation

If 'bAt' is shown in the lower display the battery has been used up and needs to be replaced. However, the device will operate correctly for a certain 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 taking out battery if device is not used for a longer period of time! After recommissioning the real time clock has to be set again.

10. Technical Information


Measurement input:	for pressure sensor HND-PS
Measuring range:	depending upon the pressure sensor
Accuracy:	$\pm 0.1 \% \text{ F.S. } \pm 1 \text{ Digit}$ (at nominal temperature 25 °C)
Resolution:	depending upon the sensor
Display range:	-19999 ... +19999
Operating temperatur.:	-25 to +50 °C
Storage temperatur.:	-25 to +70 °C
Storage humidity:	0 to 95% r.H. (non-condensing)
Probe connection:	6-pin shielded Mini-DIN plug, autom. sensor recognition, and measuring range adjustment
Output:	3.5mm audio plug, stereo
Output function:	selectable as serial interface or analog output
Interface:	Serial interface (3.5mm jack) can be connected to USB or RS232 interface of a PC via electrically isolated interface adapter, HND-Z031 or HND-Z032 (see accessories)
Analog output:	0...1 Volt, freely scaleable (resolution 12 bit)
Power supply:	9V battery, type IEC 6F22 (included in scope of delivery) as well as additional d.c. connector (diameter of internal pin 1.9mm) for external 10.5-12 V direct voltage supply.  (suitable power supply: HND-Z002)
Power consumption:	Slow measuring rate: <1.8 mA Fast measuring rate: <7.0 mA Low-Power-Logger: <0.3 mA (for cycle time >30s, without interface communication active and no alarm horn sounding) up to 0.8 mA (at cycle time 1s) 'bat'
Low battery warning:	
Working conditions:	-20...+50 °C, 0...95% RH (not condensing)
Storage temperature:	-20...+70 °C
Housing:	impact-resistance ABS, membrane keyboard, transparent panel, Front side IP65
Dimensions:	142x71x26 mm (LxWxD)
Weight:	approx. 170 g

11. Order Codes

Order-no.	Housing design
HND-P...	2 x pressure sensor inputs with additional functions (see techn. data)


HND-P215

11.1 Pressure sensors

Measuring range	Accuracy	Resolution	Overload	Working-Temperature	Connection	Order-no.
1.999...2.500 mbar	$\pm 0.2\%$ EW / $\pm 1.0\%$ EW*	0.001 mbar	max. 200 mbar	0...+50 °C	Nylon spigot for hose 6 x1 mm 	HND-PS01**
19.99...25 mbar	$\pm 0.2\%$ EW/ $\pm 0.5\%$ EW*	0.01 mbar	max. 300 mbar			HND-PS02**
199.9...350.0 mbar	$\pm 0.2\%$ EW/ $\pm 0.4\%$ EW*	0.1 mbar	max. 1 bar			HND-PS03**
1000...2000 mbar		1 mbar	max. 4 bar			HND-PS04**
-1...10 bar		10 mbar	max. 10.34 bar			HND-PS05**
0...1300 mbar abs.		1 mbar	max. 4 bar abs.			HND-PS06**
0...2000 mbar abs.		10 mbar	max. 10 bar abs.			HND-PS07**
0...7.00 bar abs.		0.1 mbar	max. 1.4 bar			HND-PS08**
0...350.0 mbar rel.		0...+70 °C	1 mbar	max. 4 bar abs.	HND-PS09	
0...1000 mbar abs.				max. 14 bar abs.	HND-PS10	
0...3500 mbar abs.	max. 14 bar rel.			HND-PS11		
0...3500 mbar rel.	max. 28 bar abs.			HND-PS12		
0...7000 mbar abs.	10 mbar		max. 140 bar abs.	HND-PS13		
0...35.00 bar abs.			max. 280 bar abs.	HND-PS14		
0...70.00 bar abs.			0.1 bar	max. 600 bar abs	HND-PS15	
0...160.0 bar abs.				HND-PS16		
0...250.0 bar abs.	HND-PS17					
0...400.0 bar abs.	HND-PS18					
0...400 mbar rel.	0...+70 °C	0.1 mbar	max. 2 bar rel.	HND-PS19		
0...1000 mbar rel.			max. 5 bar rel.	HND-PS20		
0...2500 mbar rel.			max. 10 bar rel.	HND-PS21		
0...4000 mbar rel.			max. 17 bar rel.	HND-PS22		
0...6000 mbar rel.		10 mbar	max. 35 bar rel.	HND-PS23		
0...10 bar rel.			max. 50 bar rel.	HND-PS24		
0...250 bar rel.			max. 80 bar rel.	HND-PS25		
0...40.0 bar rel.			max. 120 bar rel.	HND-PS26		
0...60 bar rel.	0.1 bar	max. 200 bar rel.	HND-PS27			
0...100 bar rel.		max. 320 bar rel.	HND-PS28			
0...160 bar rel.		max. 500 bar rel.	HND-PS29			
0...250 bar rel.		max. 800 bar rel.	HND-PS30			
0...400 bar rel.	10 mbar	max. 1200 bar rel.	HND-PS31			
0...600 bar rel.	0.1 bar	max. 1500 bar rel.	HND-PS32			
0...1000 bar rel.	1 bar		HND-PS33			

* in the range from 0 to +50 °C

** Pressure sensors HND-PS01 up to HND-PS08 are only suitable for air and non corrosive/non ionizing gases and liquids, not for water.

Accessories for HND-PS19...PA23		Model and Code
1.2 m PVC-cable with 6-pin Mini-DIN plug and M16 socket (IP 54)		HND-K31

11.2 Accessories

Order-no.	Description
HND-Z002	Plug power supply unit (220/240 V, 50/60 Hz), 10,5 V/10 mA
HND-Z011	Equipment protective housing bag, nappa leather, with 1 cut-out for round sensor connection
HND-Z012	Equipment protective housing bag, nappa leather, with 2 cut-outs for round sensor connection
HND-Z021*	Case with recess (275 x 229 x 83 mm)
HND-Z022*	Universal case with egg crate foam (275 x 229 x 83 mm)
HND-Z023*	Large case with recess (394 x 294 x 106 mm)
HND-Z031	Interface converter on RS232, galvanically isolated
HND-Z032	Interface converter on USB, galvanically isolated
HND-Z033	Adapter RS232 converter on USB- interface
HND-Z034	Windows software for setting and data read- and print-out of instruments of the HND- series with logger function
HND-Z081	Double nozzle for hose $\frac{6}{4}$ on hose $\frac{6}{4}$
HND-Z082	Hose clamp for hose $\frac{6}{4}$
HND-Z083	Adapter made of brass for G $\frac{1}{4}$ internal threads on hose $\frac{6}{4}$
HND-Z084	PVC-hose (5 bar), 6 mm external / 4 mm internal
HND-Z085	PE-hose (10 bar), 6 mm external / 4 mm internal
HND-Z086	PU-hose (9 bar), 6 mm external / 4 mm internal
HND-Z087	PA-hose (25 bar), 6 mm external / 4 mm internal
HND-K31	1.2 m PVC-cable with 6-pin Mini-DIN plug and M16 socket (IP 54)

* observe instrument dimensions

Additional accessories on request

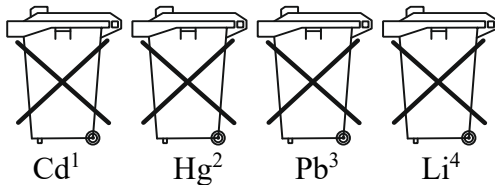
12. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

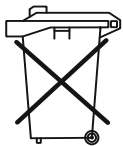
Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



13. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Manual Pressure Measuring Devices with External and Integrated Pressure Sensors model: HND-P215

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013

Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN IEC 63000:2018

Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EU guidelines are fulfilled:

2014/30/EU	Electromagnetic compatibility
2011/65/EU	RoHS (category 9)
2015/863/EU	Delegated Directive (RoHS III)

Hofheim, 23 Nov. 2021



H. Volz
General Manager



M. Wenzel
Proxy Holder