Short Manual GMH 5530 / -50
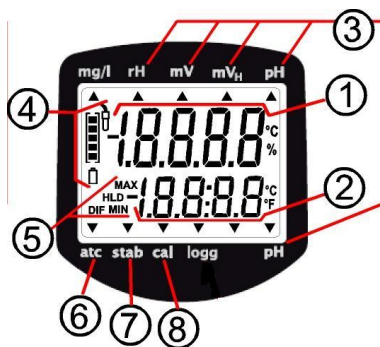## pH / ORP measuring device

H80.0.02.6HC-06

1 Display elements

1	**Main display**:	pH value, ORP value (mV, mV$_H$), rH value
2	**Secondary display**:	temperature value
3	Arrows to display selected **measuring unit**	
4	Rating of electrode state or battery status	
5	Display elements to show minimum / maximum / memorized measuring value	
6	**atc arrow**:	indicates active **automatic temperature compensation**
7	**stab arrow**:	indicates stable measuring value
8	**cal arrow**:	indicates a running calibration (at operation mode '**pH**').

2 Pushbuttons

On / off key (press and hold)**,**
backlight (press shortly)

max and **min**
press shortly: Max- / Min- value – display
press for 2 s: delete corresponding value

cal: only at mode 'pH':
press shortly: display of electrode state rating
press for 2 s: start pH calibration

t / menu:
press shortly: manual temperature input
       additionally at 'rH':
       manual input of pH value
press for 2 s: invoke configuration menu
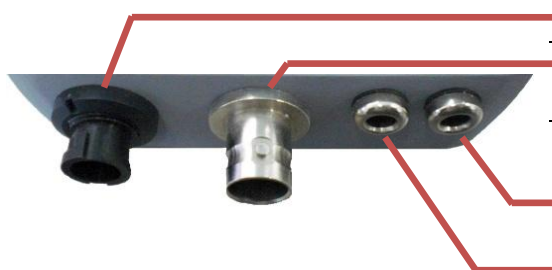

store / enter:
Measuring: hold and save current measuring
       value ('HLD' is displayed)
Set/Menu: confirm setting,
       return to measuring

3 Connections

Universal output: interface, supply

BNC socket: connection of pH or ORP electrode; with adequate cable waterproof IP67!

Banana sockets:
Connection of Pt1000 or NTC10k temperature probe
Electrodes with integrated temperature sensor:
the banana plug is connected here

Separately lead through reference electrode:
 it is connected here

4 Start Operation

Connect electrodes, turn device on via ⏻ key.
After segment test the device displays some configuration.
Remove protective cap from electrode (Attention: cap should be filled with KCL3M or storage solution).
After that the device is ready for measuring.

5 Basics

The pH measurement is highly precise but also very sensitive. Therefore you should measure with greatest possible diligence, take care of the electrode and calibrate it at adequate intervals.

Attention: Different electrodes are needed for pH and ORP measurements.

Error messages:

Err. 1 (or Err. 2)	Value exceeding measuring range, value too high (or low)
Err. 7	System error – the device has detected a system error (device defective or not within working temperature)
>CAL<	CAL flashing in main display: either preset calibration interval has expired or last calibration is not valid. Device has to be calibrated!

If **"bAt"** is flashing the battery will be exhausted soon. Further measurements are possible for short time.
If **"bAt"** is displayed continuously the battery is ultimately exhausted and has to be replaced.

6   Configuration

To change device settings, press **"menu"** menu for 2 seconds. This will activate the configuration menu (main display: "Set"). This menu consists of the following points: "SEt ConF", "SEt Corr", "SEt CLOC", "rEAd CAL".

Press menu as many times until **"SEt ConF"** is displayed and change with cal to the submenu "Set Configuration".
The submenu "Set ConF" consists of the following points (in this order): "InP", "rES", "CAL", "CAL.P", "C.int", "t.InP", "Unit t", "Auto", "P.oFF", "LitE", "Out", "Adr.". Depending on current configuration some menu points may be locked and therefore not displayed. Change the displayed parameter with max or min, go to the next point with cal.
menu gets you back to the main menu and with store you quit the configuration.
The following table shows the most important parameters, a compete overview of all menus and parameter can be found in the manual.

| Menu	Parameter	Value	Description
set menu	cal ►	max or min	
SEt ConF	**Set Configuration: General configurations**		
	InP	**Input: Selection of measured variable**	
		Arrow **"rH"**	rH value measurement (p.r.t. manual)
		Arrow **"mV"**	mV value measurement (REDOX or ORP)
		Arrow **"mV$_H$"**	mV value measurement referring to standard hydrogen system
		Arrow **"pH"**	pH value measurement
	rES ^{pH}	**Resolution pH: Resolution of ph display**	
		0.1 .. 0.001	tenth pH … thousandth pH
	CAL	**Calibration: Select number of calibration points**	
		1-Pt	1-point (only offset calibration, slope = -59.2 mV/pH)
		2-Pt	2- point (neutral + another one)
		3-Pt	3- point (neutral + one acid + one alkaline buffer)
	CAL.P	**Calibration: Select buffer series**	
		GPH	Technical Buffer series: GPH-Capsules (pH7, pH4, pH10)
		PHL	Technical liquid buffer series: PHL (pH7, pH4, pH10)
		dIn	DIN 19266 buffer series
		Edit	Arbitrary buffer, manual input

7 Calibration of pH measurement

pH electrodes for pH measurements have to be calibrated regularly.
For ORB measurement there is no calibration like that for pH measurements.
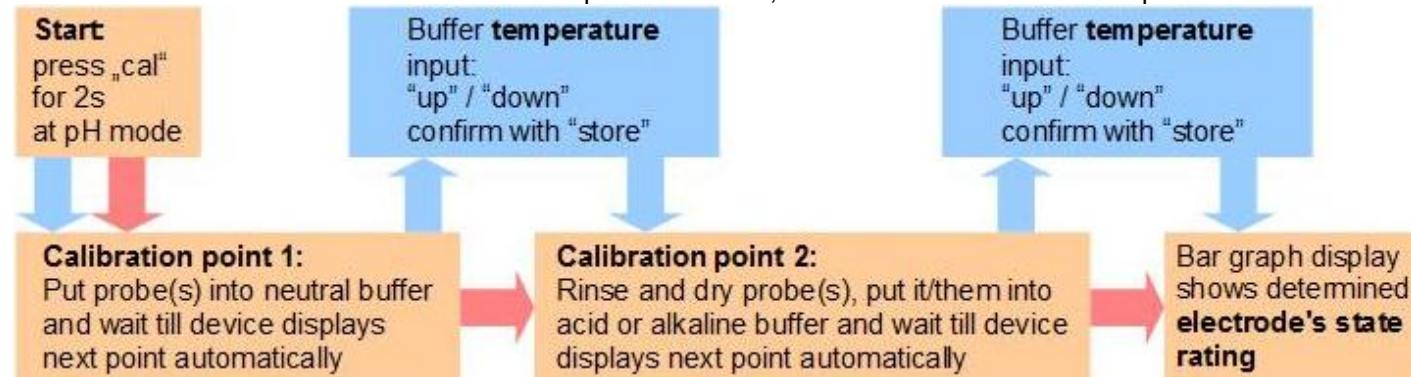
The following buffers can be used for calibration:
technical buffer series „**CAL.P PHL**", standard series „**CAL.P GPH**", DIN series „**CAL.P dIn**",
arbitrary buffer „**CAL.P Edit**"

The used buffer series and the number of calibration points can be selected at the configuration menu.
The following diagram shows the procedure of a 2-point calibration with standard series buffer.

Red arrows ⇨: calibration with connected temperature sensor, blue arrows ⇨: without temp. sensor

Start press „cal" for 2s at pH mode		**Buffer temperature** input: "up" / "down" confirm with "store"		**Buffer temperature** input: "up" / "down" confirm with "store"	
Calibration point 1: Put probe(s) into neutral buffer and wait till device displays next point automatically		**Calibration point 2:** Rinse and dry probe(s), put it/them into acid or alkaline buffer and wait till device displays next point automatically		Bar graph display shows determined **electrode's state rating**	

1- and 3- point calibration are done alike, but there is no calibration point 2 or there is an additional point 3.

Error messages of pH calibration:		**Error correction**
CAL Err.1	Neutral buffer not permissible	Clean electrode, replace electrode, always use neutral buffer as first solution, use new buffer solution
CAL Err.2 / 3	Slope is too low / high	Replace electrode, use new buffer solution
CAL Err.4	Incorrect calibration temperature	Calibration can only be done at 0…60 °C

Permissible electrodes' data: asymmetry: ±55 mV, slope: -62...-45 mV/pH