

Conductivity Measuring Instrument

GLF 100 RW

as of version 1.2

Operating Manual



WEEE-Reg.-Nr. DE 93889386

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1 Intended use

Precise measurements of conductivity in pure water applications

Applications

- Fresh and seawater aquaristics
 - Fish farming
 - Drinking water monitoring
- etc.

2 General advice

Read through this document attentively and make yourself familiar to the operation of the device before you use it. Keep this document in a ready-to-hand way in order to be able to look up in the case of doubt.

3 Safety instructions

This device has been designed and tested in accordance to 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 it.

1. Trouble-free operation and reliability of the device can only be guaranteed if it is not subjected to any other climatic conditions than those stated under "Specification".
2. Transporting the device from a cold to a warm environment condensation may result 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.
3. The circuitry has to be designed most carefully if the device should be connected to other devices. 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. Whenever there may be 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 or the device is not working as specified
 - the device has been stored under unsuitable conditions for a longer timeIn case of doubt, please return device to manufacturer for repair or maintenance.
5. **Warning:** Do not use this product as safety or emergency stop device, or in any other application where failure of the product could result in personal injury or material damage. Failure to comply with these instructions could result in death or serious injury and material damage.

4 Operation and Maintenance

- If the symbol "**BAT**" is displayed at the left side of display, the battery is weak, measuring can be continued for a short period. If "**bAt**" is displayed in the main display the battery is used up and needs to be replaced. Measuring is no more possible.
- The battery has to be removed, when storing device above 50 °C.

Hint: We recommend removing the battery if device is not used for a longer period of time! Risk of Leakage

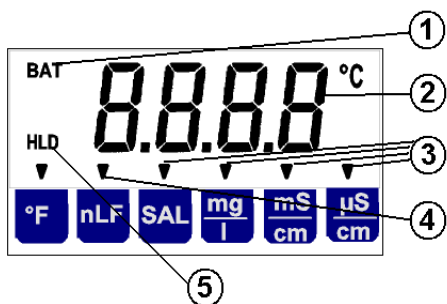
- Treat device and probes carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect from soiling.
- After switching on the instrument a segment test (all segments) is displayed, followed by "P.off",
if auto power off function is activated (please refer to configuration)

5 Disposal notes



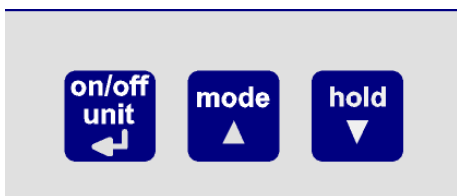
Dispense exhausted batteries at destined gathering places.
 This device must not be disposed as “residual waste”.
 To dispose this device, please send it directly to us (adequately stamped).
 We will dispose it appropriately and environmentally friendly.

6 Display elements



1. BAT	Indicates low battery
2. Measurement display	Consider additional arrows and symbols in display!
3. Unit arrows	TDS measurement in mg/l or conductivity measurement in µS/cm or mS/cm or Salinity
4. nLF	Non linear temperature compensation is active
5. HLD	Measure value is “frozen”

7 Pushbuttons



on/off	Press long: off; Press short: Show temperature
mode	Choose between measuring value / Min value / Max value press 2s: reset Min and Max value
hold:	Hold current measuring value (“HLD” in display)

7.1 Min-/max- value memory

The lowest and highest measured value since the turning-on of the device will be stored. The stored values consist of a pair of values, the conductivity, and the associated temperature.

Watch Min value (Lo):	press shortly key mode once	display changes between “Lo” and Min value
Watch Max value (Hi):	press shortly mode once again	display changes between “Hi” and Max value
Restore current value:	press shortly mode once again	current value of the chosen unit is displayed
Delete Min / Max-value:	press mode for 2 sec.	Min and Max values will be deleted, the display shows shortly “CLr” (clear)







After switching off and turning on again all Min- / Max-values will be deleted.




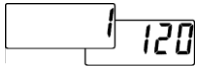
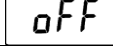
7.2 Hold – function


When the **hold** key is pressed, the current measured value will be “frozen” (display symbol: HLD) until the key is pressed again. Then the device will measure in its normal way again.

8 Configuration of the instrument

To configure the instruments according to Your needs proceed like follows:

- Switch off the instrument.
- Switch on the instrument and press mode-key () during the segment test () until the display shows the first parameter "P_oF"
- If a parameter should be edited, press key up or down ( ), the setting of the parameter will be shown.
You can be changed via up/down keys and receipt the changed parameter with .
- Jump to the next parameter with .

Parameter	Value	Meaning
Key 	Key  	
P_oF	Auto Power-Off <i>factory setting: 20 min.</i>	
		Auto Power-Off in minutes. If there won't be pressed any key for the time of the power off time setting, the device will be switched off automatically to save battery power (adjustable range 1 to 120 min)
		automatic power-off is deactivated (continuous operating)
Unit	Unit and range of display <i>factory setting: Auto</i>	
	Auto µS/cm+mS/cm	Measuring of conductivity with auto-range
	100.0 mS/cm	Measuring of conductivity, range 0.0 ... 100.0 mS/cm (no auto-range)
	20.00 mS/cm	Measuring of conductivity, range 0.00 ... 20.00 mS/cm (no auto-range)
	2000 µS/cm	Measuring of conductivity, range 0 ... 2000 µS/cm (no auto-range)
	2000 mg/l	Measuring of TDS, 0 ... 2000 mg/l
	50.0 SAL	Measuring of Salinity, 0.0 .. 50.0 g/kg
t.Uni	Unit of temperature display <i>factory setting: °C</i>	
	°C	temperature is displayed in °C (factory setting)
	°F	temperature is displayed in °F
t.Cor	Temperature compensation (only for µS/cm and mS/cm, p.r.t. note below) <i>factory setting: nLF</i>	
	oFF	No temperature compensation of conductivity measuring
	nLF	non-linear temperature compensation for natural water acc. to EN 27888 (ISO 7888) to measure ground water, surface water, drinking water and purest water (factory setting)
t.rEF	Reference temperature of temp. compensation (only for t.Cor <=> oFF) <i>factory setting: 25 °C</i>	
	25 °C / 77 °F	Reference temperature 25 °C / 77 °F
	20 °C / 68 °F	Reference temperature 20 °C / 68 °F
C.tDS	Setting of TDS-factor <i>factory setting: 0.40</i>	
	0.40...1.00	Setting of factor of the TDS measurement
Ini t	Restore to factory settings	
	no	Settings are kept
	YES	Restoring device to factory settings

Pressing  again stores the settings, the instruments restarts (segment test)

Please note: *If there is no key pressed within the menu mode within 2 minutes, the configuration will be cancelled, the entered settings are lost!*







Note for temperature compensation: *To measure the TDS value always use non-linear temperature compensation for natural water (reference temperature = 25 °C). To measure salinity the instrument automatically switches over to the non-linear temperature compensation acc. to IOT (reference temperature = 15 °C)..*





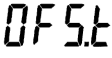

9 Adjusting of the instrument


The cell correction may change due to natural ageing or deposits at the measuring cell. In case you have an accurate reference liquid, you may adjust the instrument by changing the cells scale correction accordingly.

The temperature measuring is very stable and has to be adjusted in very seldom cases only.

To adjust the instruments according to Your needs proceed like follows::

- Switch off instrument.
- Switch on the instrument and press hold-key () during the segment test () until the display shows the first parameter "P_oF"
- If a parameter should be edited, press key up or down ( ), the setting of the parameter will be shown.
You can be changed via up/down keys and receipt the changed parameter with .
- Jump to the next parameter with key 

Parameter	Value	Meaning
key 	key  	
	Scale correction of measuring cell	
	0.800...1.200	Adjustment of the measuring cells scale correction
	Offset of temperature	
	-2.0...2.0 °C -3.6...3.6 °F	Offset setting of temperature measurement (see below)
	Scale correction of temperature	
	-5.00...5.00 %	Scale adjustment of temperature measurement <i>Display = (measured value - offset) * (1 + scale adjustment / 100)</i>

Pressing  again stores the settings, the instruments restarts (segment test)

Please note: If there is no key pressed within the menu mode within 2 minutes, the adjusting will be cancelled, the entered settings are lost!

10 System Messages

- Er. 1 = Measuring range has been exceeded
- = Sensor Error
- Er. 7 = System fault - the device has detected a system fault (defective or far outside allowable ambient temperature range)
- Er. 9 = Cable break - please return the device to the manufacturer

If "BAT" is displayed at the left side of display, the battery is weak, measuring can be continued for a short period.

If "bAt" is displayed in the main display the battery is used up and needs to be replaced. Measuring is no more possible.

11 Inspection of the accuracy / Adjustment Services

Accuracy can be inspected with test-solutions (extra equipment).

If the precision is not more within the admissible range, we suggest to send the device to the manufacturer for a new adjustment.

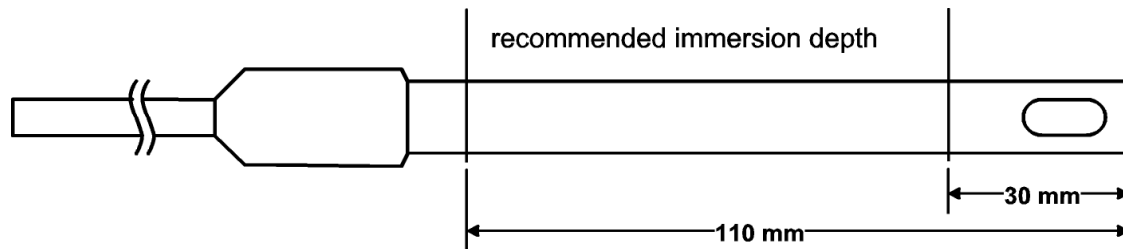
It is also possible to order a factory calibration certificate.

12 General information about conductivity measuring

12.1 The Conductivity Measuring Cell

During the measurement, the conductivity measuring cell must be dipped at least in so far, that at least 30 mm beginning from the top of the measuring cell, is located in the medium.

The maximum immersion depth for continuous operation should not exceed 110 mm.



The measuring cell can either be stored dry or in water. After dry storage wetting time will be prolonged slightly. If changing over from one liquid to another with conductivities varying widely make sure to properly rinse and shake dry measuring cell.

Attention: Measuring cell must never come into contact with water-repellent materials such as oil or silicone.

If conductivity measured is much higher or lower than expected this may be due to the electrode being soiled with non-conducting or conducting foreign materials. Measuring cell has to be cleaned with a watery soap solution.

When measuring media with low conductivities the electrode has to be stirred sufficiently.

12.2 Measuring hints

Conductivity measuring is comparably easy to perform, the precision of the instrument is very constant if it is used as intended. Depending on the necessary accuracy the instruments can be used up to several years without recalibration of the cell constant.

If the accuracy should be controlled or improved, this is done by means of suitable reference solutions and the adjusting of the cell factor.

Attention! Wrong handling of reference solution can make them useless very fast.

12.3 Measuring procedure

Especially when measuring low conductivity: Before immersion to the measuring solution, rinse the electrode with deionised water, dry with a paper towel and shake remaining water out. The measuring is speeded up considerably, if the electrode is immersed and pulled out the solution several times.

Especially when measuring low conductivity the electrode needs sufficient flow during the measuring, e.g via stirring the solution.

When temperature compensation is activated, the electrode needs enough time to adjust to the actual temperature of the measuring solution to work accurate.

12.4 Temperature compensation

The conductivity of aqueous solution is temperature dependent. The dependency itself is strongly dependent on the kind of solution. For the most applications e.g. in fish farming etc., the non linear temperature compensation of natural waters is precise ("nLF" according to EN 27888). The most common reference temperature is 25 °C.

13 Specification

Measuring

Principle	Conductivity measuring via 2 pole graphite electrode	
Meas. Ranges	Range	Resolution
Conductivity	0 ... 2000 $\mu\text{S/cm}$	1 $\mu\text{S/cm}$
	0.01 ... 20.00 mS/cm	0.01 mS/cm
	0.1 ... 100.0 mS/cm	0.1 mS/cm
TDS	0 ... 1999 mg/l	1 mg/l
Salinity	0.0 ... 50.0 g/kg	0.1 g/kg
Temperature	-5.0 ... 100.0 $^{\circ}\text{C}$	
Electrode	2 pole graphite electrode, integrated temperature sensor Electrode material: special graphite Dimensions: dia. 12 mm, length 120 mm, min immersion depth 30 mm Cable length ca. 1.2 m	
Guarantee	12 month (assuming appropriate usage)	
Accuracy	± 1 Digit (at nominal-temperature)	
Conductivity	± 0.5 % of m.v. ± 0.5 % FS	
TDS, Salinity	± 0.5 % of m.v. ± 0.5 % FS	
Temperature	± 0.3 K	
T.-compensation	non-linear temperature compensation according to EN 27888, reference temperatures 20 $^{\circ}\text{C}$ and 25 $^{\circ}\text{C}$	
Nominal temperature	25 $^{\circ}\text{C}$	
Ambient	Temperature instrument -25 ... +50 $^{\circ}\text{C}$ Temperature cell -5 ... +80 $^{\circ}\text{C}$ (short time 100 $^{\circ}\text{C}$) Relative humidity instrument 0 ... 95 %RH (non condensing)	
Storage temperature	-5 ... +50 $^{\circ}\text{C}$	
Housing	Dimension: 110 x 67 x 30 mm (H x W x D) impact resistant ABS, membrane keyboard, transparent panel Front side IP65	
Weight	approx. 155 g	
Power Supply	9V-Battery, typ 6F22 (zinc-carbon battery included) Operating time with zinc-carbon battery >200 hours	
Power Consumption	<1.5 mA	
Display	ca. 11 mm high, 4½-digit LCD display with additional segments	
Pushbuttons	3 membrane keys for on/off switch, menu operation, min / max/ hold function etc.	
Hold Function	Press key to store current value.	
Automatic-Off-Function	Device will be automatically switched off if not operated for longer time (adjustable from 1...120 min)	

EMC:

The device corresponds to the essential protection ratings established in the Directives of the European Parliament and of the council on the approximation of the laws of the member states relating to the electromagnetic compatibility (2004/108/EC).

EN 61326-1 : 2013 (table 3, class B), additional error: < 1% FS.