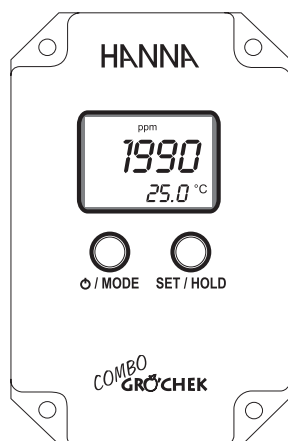


Instruction Manual

COMBO GRÖCHEK

(HI 991404 - HI 991405)



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Compliance with CE
Directives

WARRANTY

HI 991404 and HI 991405 are warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. The probes are warranted for a period of six months. This warranty is limited to repair or replacement free of charge.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

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Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

Dear Customer,
Thank you for choosing a Hanna product. This manual will provide you with the necessary information for a correct operation. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.
These instruments are in compliance with the **CE** directives.

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully. If any damage has occurred during shipment, immediately notify your Dealer or the nearest Hanna Customer Service Center.

The meters are supplied with:

- pH 4.01 and 7.01 buffer solutions (20 mL each);
- HI 70031 1413 $\mu\text{S}/\text{cm}$ calibration solution, for HI 991404;
- HI 70030 12.88 mS/cm calibration solution, for HI 991405;
- HI 1293D pH-electrode with differential input signal;
- Hanna 12 VDC power adapter;
- Instruction manual.

Note: Conserve all packing material until the instrument has been observed to function correctly. Any defective item must be returned in its original packing.

GENERAL DESCRIPTION

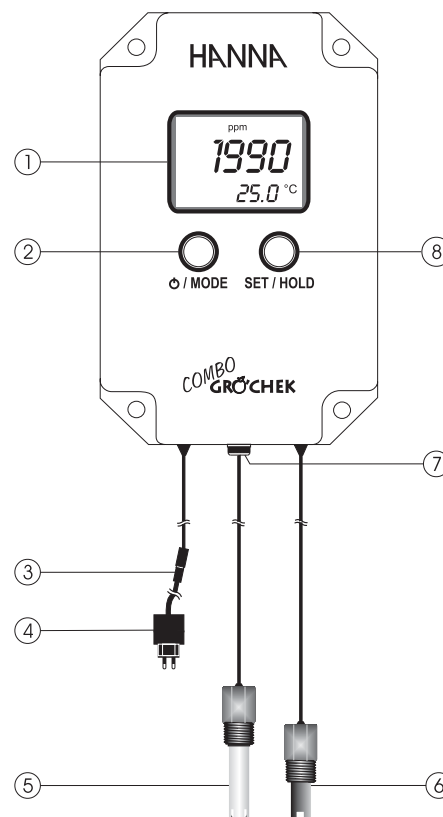
COMBO GRÖCHEK is a combined pH/temperature/EC/TDS meter specially designed to meet the needs of growers in greenhouses and hydroponic applications.

You can simply install the meter above the sample to be tested for continuous measurement.

The HI 1293D pH-electrode & the EC/TDS/Temperature probe have been molded with pipe thread (1/2" NPT), which allows the user to attach them to an in-line system.

Measurements are accurate and the meter can be calibrated at one or two points for pH and at single point for EC/TDS. You no longer need to worry about battery changes either: the unit runs without interruption on 12 VDC power supply.

FUNCTIONAL DESCRIPTION



1. Liquid Crystal Display
2. ON/OFF/MODE button
3. Power supply connector
4. 12 VDC power adapter
5. HI 1293D pH-electrode with differential input, pipe thread 1/2" NPT
6. EC/TDS/Temperature probe, pipe thread 1/2" NPT (works also as matching pin for pH-electrode)
7. DIN connector
8. SET/HOLD button

SPECIFICATIONS

HI 991404

EC/TDS Range	0 to 3999 $\mu\text{S}/\text{cm}$ - 0 to 2000 ppm
Resolution	1 $\mu\text{S}/\text{cm}$ - 1 ppm
Accuracy (@20°C/68°F)	$\pm 2\%$ f.s.
Typical EMC Deviation	± 2.5 f.s.

HI 991405

EC/TDS Range	0.00 to 20.00 mS/cm - 0.00 to 10.00 ppt
Resolution	0.01 mS/cm - 0.01 ppt
Accuracy (@20°C/68°F)	$\pm 2\%$ f.s.
Typical EMC deviation	$\pm 2.5\%$ f.s.

Common specifications

pH Range	0.0 to 14.0 pH
Temperature Range	0.0 to 60°C (32.0 to 140°F)
Resolution	0.1 pH 0.1°C or 0.1°F
Accuracy (@20°C/68°F)	± 0.1 pH ± 0.5 °C or ± 1 °F
Typical EMC Deviation	± 0.1 pH ± 1 °C or ± 2 °F

Temp. Compensation	pH Automatic
EC/TDS	$\beta = 0.0$ to 2.4%/°C

TDS Conversion factor	0.45 to 1.00 (CONV)
pH electrode	HI 1293D (included)
pH Calibration	At 1 or 2 points with auto-buffer recognition
EC/TDS Calibration	Automatic at 1 point
Power supply	12VDC power adapter (included)
Environment	0 to 50°C (32 to 122°F); RH 95% non-condensing

Dimensions (meter only)	160 x 105 x 31 mm (6.2 x 4.1 x 1.2")
Weight (meter only)	190 g (6.7 oz.)

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used. Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment.

The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all times. During operation, ESD wrist straps should be worn to avoid possible damage to the electrode by electrostatic discharges.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance.

To avoid electrical shock, do not use this instrument when voltages at the measurement surface exceed 24 VAC or 60 VDC. To avoid damages or burns, do not perform any measurement in microwave ovens.

OPERATIONAL GUIDE

To turn the meter on

Connect the pH electrode to the meter.

Connect the 12VDC adapter to the meter and to the mains; the display will lit. Press and hold the MODE button for 2-3 seconds. All the used segments on the LCD will be visible for a few seconds.

To change the temperature unit

To change the temperature unit (from °C to °F), from measurement mode, press and hold the MODE button until **TEMP** and the current temperature unit are displayed on the lower LCD. Eg. **TEMP °C**.

Use the SET/HOLD button to change the temperature unit, and then press MODE button twice to return to normal measurement mode.

To freeze the display

Press and hold the SET/HOLD button for 2-3 seconds until **HOLD** appears on the secondary display.

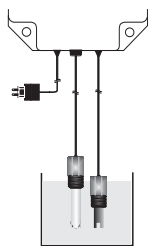
Press either button to return to normal mode.

Taking measurements

Select the pH, EC or TDS mode with the SET/HOLD button.

Immerse the probes in the solution to be tested. In order to ensure better accuracy, probes should not touch or stand close to the walls or bottom of the sample vessel.

The pH, EC or TDS value automatically compensated for temperature is shown on the primary LCD while the secondary LCD shows the temperature of the sample.



The measurements should be taken when the stability symbol $\odot$ on the top left of the LCD disappears.

Note:

Measurements have to be taken with both probes (pH-electrode and EC/TDS/temperature probe) immersed in the same vessel.

To change the EC/TDS conversion factor (CONV) and the temperature compensation coefficient β (BETA)

- From measurement mode, press and hold the MODE button until **TEMP** and the current temperature unit are displayed on the lower LCD. Eg. **TEMP °C**.

- Press the MODE button again to show the current conversion factor. Eg. **0.50 CONV**.

- Press the SET/HOLD button to change the conversion factor.

- Press the MODE button to show the current temperature compensation coefficient β . Eg. **2.1 BETA**.

- Press the SET/HOLD button to change the temperature compensation coefficient β .

- Press the MODE button to return to normal measuring mode.

To turn the meter off

Press the MODE button while in normal measurement mode. **OFF** will appear on the lower part of the display. Release the button. The display still lits, until the power supply is connected.

Notes:

- Before taking any measurement make sure the meter has been calibrated.

- To clear a previous calibration, press the MODE button after entering the calibration mode. The lower LCD will display **ESC** for 1 second and the meter will return to normal measurement mode. The **CAL** symbol on the LCD will disappear. The meter will be reset to the default calibration.

- If measurements are taken in different samples successively, rinse the probes thoroughly to eliminate cross-contamination; and after cleaning, rinse the probes with some of the sample to be measured.

CALIBRATION

pH calibration buffer set

- From pH measurement mode, press and hold the MODE button until **TEMP** and the current temperature unit are displayed on the lower LCD. Eg. **TEMP °C**.

- Press the MODE button again to show the current buffer set: **pH 7.01 BUFF** (for 4.01/7.01/10.01 calibration) or **pH 6.86 BUFF** (for NIST 4.01/6.86/9.18 calibration).

- Press the SET/HOLD button to change the buffer value.
- Press the MODE button to return to normal measuring mode.

pH calibration procedure

From pH measurement mode, press and hold the MODE button until **CAL** is displayed on the lower LCD. Release the button. The LCD will display **pH 7.01 USE** (or **pH 6.86 USE** if you have selected the NIST buffer set). The **CAL** tag blinks on the LCD.

- For a single-point pH calibration, place the electrode and the probe in any buffer from the selected buffer set (eg. pH 7.01 or pH 4.01 or pH 10.01). The meter will recognize the buffer value automatically.

If using pH 4.01 or pH 10.01, the meter will display **OK** for 1 second and then return to measurement mode.

If using pH 7.01, after recognition of the buffer the meter will ask for pH 4.01 as second calibration point. Press the MODE button to return to measurement mode or, if desired, proceed with the 2-point calibration as explained below.

Note: for better accuracy it is always recommended to carry out a two-point calibration.

- For a two-point pH calibration, place the electrode and the probe in pH 7.01 (or 6.86 if you have selected the NIST buffer set). The meter will recognize the buffer value and then display **pH 4.01 USE**.

Rinse the electrode thoroughly to eliminate cross-contamination.

Place the electrode in the second buffer value (pH 4.01 or 10.01, or, if using NIST, pH 4.01 or 9.18). When the second buffer is recognized, the LCD will display **OK** for 1 second and the meter will return to normal measurement mode.

Note: for storing calibration data in the non-volatile memory, turn the meter OFF and then ON again through the MODE button.

The **CAL** symbol on the LCD means that the meter is calibrated.

EC calibration procedure

- From EC measurement mode, press and hold the MODE button until **CAL** is displayed on the lower LCD.

- Release the button and immerse the probe in the proper calibration solution: **HI 70031** (1413 $\mu\text{S}/\text{cm}$) for **HI 991404** and **HI 70030** (12.88 mS/cm) for **HI 991405**.

- Once the calibration has been automatically performed, the LCD will display **OK** for 1 second and the meter will return to normal measurement mode.

- Since there is a known relationship between EC and TDS readings, it is not necessary to calibrate the meter in TDS

Note: for storing calibration data in the non-volatile memory, turn the meter OFF and then ON again through the MODE button.

The **CAL** symbol on the LCD means that the meter is calibrated.

pH ELECTRODE MAINTENANCE

- When not in use, rinse the electrode with water to minimize contamination and store it with a few drops of storage (**HI 70300**) or pH 7 (**HI 7007**) solution in the protective cap after use. DO NOT USE DISTILLED OR DEIONIZED WATER FOR STORAGE PURPOSES.

- If the electrode has been left dry, soak in a storage or pH 7 solution for at least one hour to reactivate it.

- To prolong the life of the pH electrode, it is recommended to clean it monthly by immersing it in the **HI 7061** cleaning solution for half an hour. Afterwards, rinse it thoroughly with tap water and recalibrate the meter.

ACCESSORIES

HI 1293D	Replaceable pH electrode with differential input & DIN
HI 70004P	pH 4.01 solution, 20 mL sachet (25 pcs)
HI 70006P	pH 6.86 solution, 20 mL sachet (25 pcs)
HI 70007P	pH 7.01 solution, 20 mL sachet (25 pcs)
HI 70009P	pH 9.18 solution, 20 mL sachet (25 pcs)
HI 70010P	pH 10.01 solution, 20 mL sachet (25 pcs)
HI 77400P	pH 4 & 7 solutions, 20 mL sachet (5 each)
HI 7004M	pH 4.01 solution, 230 mL bottle
HI 7006M	pH 6.86 solution, 230 mL bottle
HI 7007M	pH 7.01 solution, 230 mL bottle
HI 7009M	pH 9.18 solution, 230 mL bottle
HI 7010M	pH 10.01 solution, 230 mL bottle
HI 70030P	12.88 mS/cm @25°C cal. solution, 20 mL sachet (25 pcs)
HI 70031P	1413 $\mu\text{S}/\text{cm}$ @25°C cal. solution, 20 mL sachet (25 pcs)
HI 70032P	1382 ppm @25°C cal. solution, 20 mL sachet (25 pcs)
HI 70038P	6.44 ppt @25°C cal. solution, 20 mL sachet (25 pcs)
HI 70442P	1500 ppm @25°C cal. solution, 20 mL sachet (25 pcs)
HI 7061M	Electrode cleaning solution, 230 mL bottle
HI 70300M	Electrode storage solution, 230 mL bottle
HI 710005	12VDC power adapter, US plug
HI 710006	12VDC power adapter, European plug
HI 710012	12VDC power adapter, Australian plug
HI 710013	12VDC power adapter, Southern Africa plug
HI 710014	12VDC power adapter, UK plug