

Flow Control 5000

Instruction Manual



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1. Technical data

Subject to modifications!

Specifications	
Measuring unit	Instrument for continuous pH, EC, TDS and temperature measurement
Housing	Splash-proof according to IP40, EN60529
Dimensions (w x h x d)	83 x 180 x 55 mm
Weight	0.3 kg (basic unit)
Operating temperature	0 – 40 °C
Display	Graphical display, 54 x 32 mm, 128 x 64 Pixel, transfective, contrast adjustable
Lighting	Can be switched on by pressing "OK"
Connector	8-pin plug (DIN 45326 for EC and temperature electrode); BNC (pH electrode); 3-pin jack socket 3.5 mm (relay output); DC-power-socket 5 mm (power supply)
Power	9 V with external power supply (for continuous operation) 9 V block battery (for short time operation)
Current consumption	approx. 25 mA (measurement), max 110 mA when exceeding or dropping below the limit values
Operation	Continuous operation with external power supply (battery indication $\geq 95\%$). Relay operation possible. Timer operation with automatic switch-off after 4 min. (battery indication $< 95\%$). Relay operation not possible.
Measurement time	0.5 s for temperature, 2 s for pH, EC, ppm
Switchover of measuring range	Automatic with floating point
Limit values	0.0–14.0 pH, 0.0–200.0 mS/cm

Alarm delay	0—255 s after exceeding or dropping below the limit values
Indication of limit values	with inverse value indication; reading can be fixed by pressing OK
Operation	4 keys: ON / OFF, MODE, SELECT, OK
Specifications	
Languages	German, English (other languages are optional)
Relay card	Can be installed optionally. Instructions for use see sheet: customer information
Isolation voltage	500 Vpp between the relay contacts and the FLOW CONTROL electronics
Relay output 1	1 contact 50 Vac / 1 A (switches on when dropping below the limit values)
Relay output 2	1 contact 50 Vac / 1 A (switches on when exceeding the limit values)
Guarantee	2 years

pH measurement	
Electrode	pH insertion probe, gel-filled with glass body
Measuring range	0—14 pH
Resolution	0.01 pH
Accuracy	0.02 pH
Lower limit value	0.02 pH
Upper limit value	14.00 pH
Temperature	-20 — +80 °C
Temp. compensation	Only in the pH-EC-version, in connection with the EC-Sensor
Meas. value acquisition	Analog
Measuring method	DC
Calibration	Automatic for pH 7, pH 4, optionally for pH 10

EC measurement / Temperature measurement	
Electrode	EC-plastic probe with platinum sensor and integrated NTC temperature sensor
Measuring range EC	0.001 – 200 mS/cm
Resolution EC	0.001 / 0.01 / 0.1 mS/cm depending on the measuring range
Accuracy EC	2 % of measured value
Lower limit value	0.02 mS/cm
Upper limit value	200.0 mS/cm
Calibration EC	Automatic with identification of calibration solution 0.084 mS/cm; 1.41 mS/cm; 5 mS/cm; 12.88 mS/cm; 111.8 mS/cm
Temp. compensation	with integrated NTC temperature sensor
Temperature measuring range	-20 – +80 °C
Temp. resolution	0.1 °C
Temp. accuracy	0.5 % of measured value
Measuring method	Multi-frequency sinusoidal AC-current
TDS (only in pH-EC-version)	
Electrode	Conversion from EC (mS/cm --> ppm), TDS-factor adjustable
Measuring range	0 – 106000 ppm
Resolution	1 ppm
Accuracy	2% of measured value
Temperature	-20 – +80 °C
Temp. compensation	with integrated NTC temperature sensor
Meas. value acquisition	Analog
Measuring method	Multi-frequency sinusoidal AC-current
Calibration	Automatic conversion from EC

2. General information

The contents of this manual were carefully verified and have been compiled to the best of our knowledge. However, the Manufacturer does not accept liability for possibly contained statements in this manual. In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions can be found on the manufacturer's website.

2.1. Safety information

Please read the entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

2.1.1. Use of hazard information



Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

 **ATTENTION**



Indicates a potentially hazardous situation that may result in minor or moderate injury.

REFERENCE

Indicates a situation, which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

2.1.2. Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	<p>Electrical equipment marked with this symbol may not be disposed of public disposal systems. Electrical equipment users must return old or end-of-life equipment to the Manufacturer for disposal at no charge to the user.</p>
	<p>This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.</p>

2.2. Product overview

The pH-EC Flow Control 5000 is a multi-functional instrument for continuous measuring of different parameters:

1. pH
2. EC (Electrical Conductivity in mS/cm)
3. TDS (Conversion of EC value in ppm)
4. Temperature in C°

The instrument has two interfaces for connecting of pH, EC and temperature electrodes. Upper and lower limits can be set for each electrode.

With an additional relay card (version with relay output), external warning systems can be connected to the integrated outputs with low voltage of max. 50 Vac or corresponding switching functions can be carried out.

When exceeding or dropping below the limit values, one or both attached valves and / or alarm, for example, will be operated.

The pH-EC Flow Control 5000 should always be powered by an external 9 V power supply.

Note: The Flow Control can also be supplied as a stand-alone instrument either for pH or EC measurement. Measured values are then displayed with slightly larger figures. All other functions remain the same. The EC Flow Control does not display TDS values.

Scope of delivery for standard set pH:

- Basic unit pH Flow Control 5000
- pH-flow-through electrode with tube-fitting kit
- Power supply and 9 V battery
- Buffer solution set pH 7 & 4, 100 ml each
- Manual

Scope of delivery for standard set EC:

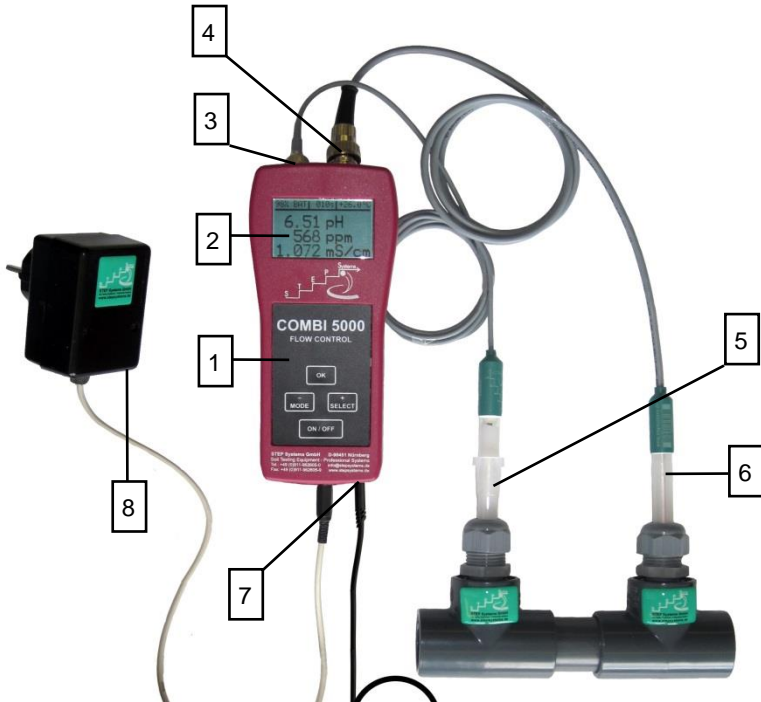
- Basic unit EC Flow Control 5000
- EC-flow-through electrode with tube-fitting kit
- Power supply and 9 V battery
- EC standard solution 1.41 mS, 50 ml
- Manual

Scope of delivery for standard set pH and EC:

- Basic unit pH-EC Flow Control 5000
- pH-flow-through electrode with tube-fitting kit
- EC- flow-through electrode with tube-fitting kit
- Power supply and 9 V battery
- Buffer solution set pH 7 & 4, 100 ml each
- EC standard solution 1.41 mS, 50 ml
- Manual

All sets can be also delivered with relay card.

Figure 1: Flow Control 5000

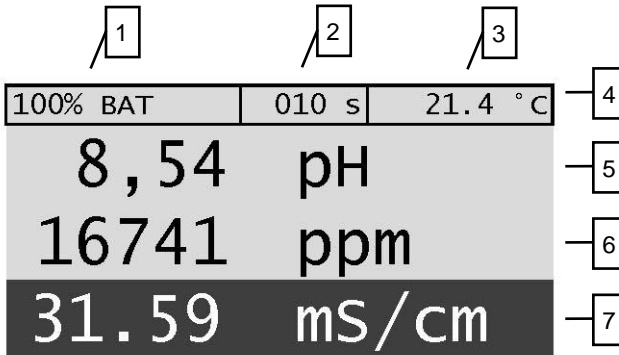


1. Keypad	2. Display
3. BNC plug for pH electrode	4. 8-pin plug for EC or temperature probe
5. pH electrode with mounting support	6. EC electrode with mounting support
7. Relay output	8. Power supply

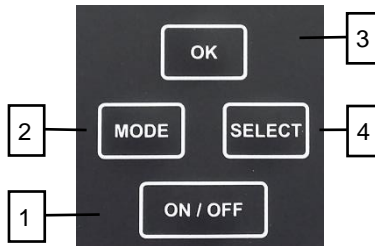
2.3. Display and Keys

Operation occurs via the graphic display of the menu and four keys.

Figure 2 **Display**



1. Battery capacity in % (a new battery shows up to 110% capacity)	2. Alarm delay in seconds
3. Temperature in °C	4. Status line
5. pH measuring value	6. TDS value, converted from EC
7. EC value, inverse indication shows exceeding or dropping below the limit values. The same is also valid for pH value.	

Figure 3**Keys**

1. ON/OFF	2. MODE
3. OK	4. SELECT

2.3.1. ON/OFF

Briefly press ON/OFF for switching the instrument on and off. Display shows the device type, version and manufacturer's address. Measurement mode for pH, EC and temperature starts automatically.

The instrument is switched off:

- by pressing ON/OFF or automatically after 4 minutes when battery voltage is <95%
- automatically after reduction of the battery voltage to 1%. Prior to this, the display will show "Low battery" for 10 seconds.

2.3.2. OK

Confirm with OK the displayed information in the info line 1.

Fix (for the time of pressing) with OK the current display indication with lighting.

2.3.3. SELECT

Confirm with SELECT the displayed selection in the info line 1.

Fix (for the time of pressing) with SELECT the current display without lighting.

2.3.4. Key MODE

Chose with MODE the limit values and other functions. Each function should be confirmed with SELECT.

MODE	
pH LIMIT VALUE	Set with +/- the upper and lower limits and confirm with OK.
EC LIMIT VALUE	Set with +/- the upper and lower limits and confirm with OK.
pH CALIBRATION	Starts pH calibration process.
EC CALIBRATION	Starts EC calibration process.
pH-SENSOR STATUS	Appears only with connected sensor. Display shows the slope in mV/pH and the current sensor voltage in mV.
TDS FACTOR	Is only displayed in pH-EC Flow Control. Set with +/- the conversion factor for mS/cm to ppm and confirm with OK.
ALARM DELAY	Set with +/- the alarm delay in seconds and confirm with OK.
DISPLAY CONTRAST	Change of the contrast (00025–00050). Factory setting: 30
LANGUAGE / SPRACHE	Selecting of the menu language (German, English).

3. Starting up

To start up the instrument please follow the steps:

1. Close the inflow and open the pipe to be measured at the desired point.
2. Install the mounting supports in the pipe to be measured so that the openings for the probes face up.
3. Insert the probes into the mounting supports with the probe tips immersed in the medium and being washed by it.
4. Open the inflow of the pipe and control its tightness.
5. Place the provided 9V battery into the battery holder inside the battery compartment in the rear bottom part of the unit. Pay attention to the correct polarity.
6. Plug the power unit to a socket 115/230 Vac with 50/60 Hz and connect it to the instrument.
7. Connect the electrodes to the instrument.
8. Connect the 3-pin jack socket (relay output) with the valves and / or the alarm device (horn, lamp).
Attention: maximum 50 Vac / 120 Vdc, 1 Ampere!
9. Set upper and lower limits, alarm delay etc.

4. Operation

After approx. 5 seconds the values get stable and can be read.

Readings outside the limits are shown in reverse with dark background. Hold function is switched on automatically and can be released (till next exceedance) by pressing OK. Not exceeded values remain active.

If a NTC temperature sensor is connected (either internal NTC sensor of the EC electrode or an external sensor) and in the same solution, pH value will be compensated to 25°C and displayed accordingly.

Measurements without temperature sensor are displayed as "-----°C" and the pH value is not temperature-compensated.

4.1. pH calibration

pH calibration is required regularly (at least each 7 days) and with each new probe. Stop the inflow and remove the pH electrode.

1. Immerse a clean pH electrode at first in buffer solution pH 7 and stir it slightly.
2. Select MODE > pH CALIBRATION.
3. Start calibration with SELECT. The display shows "please wait...".
4. The info line 1 indicates „calibrates with 7.00 pH“. Calibration process is displayed as a progress bar.
5. At the end of the pH 7 calibration, the display shows "now change to pH 4 and then start with OK".
6. Remove and clean the pH electrode. Immerse the electrode in the buffer solution pH 4 and stir it slightly. Then start calibration with OK. Display shows "please wait...".
7. The info line 1 indicates „calibrates with 4.00 pH“. Calibration process is displayed as a progress bar.
8. At the end of pH 4 calibration, the display shows "pH10 calibration? no = MODE yes = OK".
9. If a 3-point calibration is desired, remove and clean the electrode, immerse it in the buffer solution pH10 and stir it slightly. Then start calibration with OK. The display shows "please wait...".
10. The info line 1 indicates „calibrates with 10.00 pH“. Calibration process is displayed as a progress bar.
11. Calibration values are stored.
12. Calibration can be repeated as often as required.

False calibration sequence, false buffer solutions, defect of the pH electrode or other failure are displayed with "Check sensor/medium / confirm with OK".

A new pH electrode shows in pH 7 about 0 mV, in pH 4 about 170 mV. If the difference between 4 and 7 < 140 mV and if the electrode has a very slow response, it has to be changed.

The slope of the pH electrode [mV/pH] and the current sensor voltage [mV] can be called up any time under MODE>pH-SENSOR STATUS. If the values are < 55mV/pH and > 63 mV/pH the display shows additional message like "S= **value** mV / pH / confirm with OK". This message may e.g. point out that in the near future the sensor should be changed, or that a plausibility error of other reason exists.

4.2. EC calibration

EC calibration is required with each new probe. Calibration can be repeated as often as required and arranged in any sequence with calibration solutions 0.084 mS/cm, 1.4 mS/cm, 5 mS/cm, 12.88 mS/cm and 111.8 mS/cm. Stop the inflow and remove the EC electrode.

1. Insert the EC electrode in calibration solution for at least 10 s and stir it slightly. Accurate values are displayed after 20 s (temperature adjustment).
2. Select MODE > EC CALIBRATION.
3. Start calibration with SELECT.
4. The info line 1 shows the buffer solution. Calibration process is displayed as a progress bar.
5. Remove and clean the EC electrode. Confirm with OK.

False calibration solution, defect EC electrode or other failure is displayed with "Check sensor/medium / confirm with OK ".