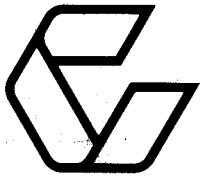


CRISON

instruction manual

microp H 2001

index

introduction

The CRISON micropH 2001 microprocessor controlled pH-meter.

An imaginative software ensures and simplifies the instrument calibration. The micropH 2001, by means of its autocalibration system, automatically recognizes the pH buffers 7.02, 4.00, 2.00 and 9.26 (at 20 °C).

Able to work with Automatic Temperature Compensation, useful when there are significant differences in temperature in the different samples to be measured.

Completely watertight front panel with only the basic keys including one to check the Electrode.

packing list

The Cat. N.º 00 2001 1 includes:

Cat. N.º	Item	Quantity
00 2001 0	micropH 2001 pH-meter	1
104023311	Ingold combined pH electrode	1
10030107	Cable with connector for electrode	1
23-110-02	pH 4.00 buffer solution (1 × 250 ml)	1
23-111-02	pH 7.02 buffer solution (1 × 250 ml)	1
23-130-02	KCl 3M + AgCl solution (1 × 250 ml)	1
22-974-01	Flexible electrode holder	1
00 2001 M	Instruction manual	1
	Guarantee card	1

NOTE: To operate with Automatic Temperature Compensation, the corresponding probe ATC Cat. No. 21-910-01 is needed.

instrument description

front panel *(see fig. 1)*

Keys

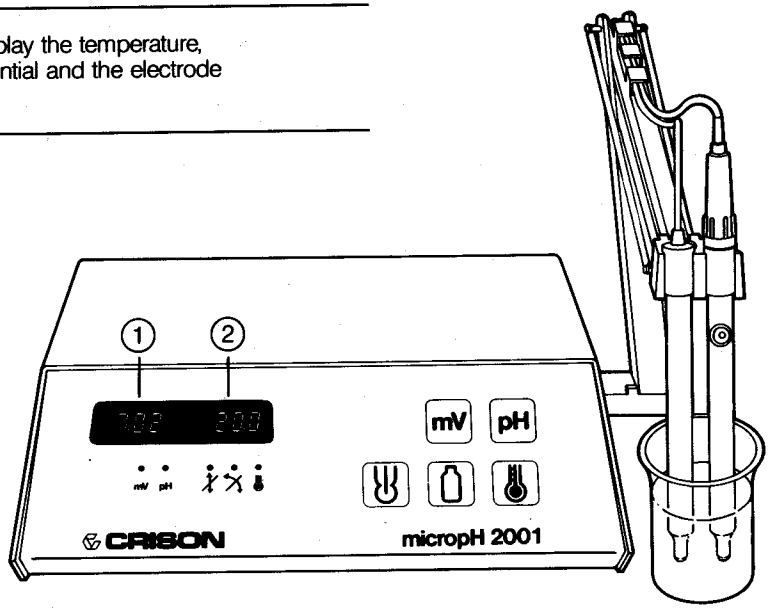
pH	To activate pH mode.
mV	To activate mV mode.
	Changes temperature on display (2), if A.T.C. not connected.
	Starts pH calibration process.
	Starts the electrode checking process.

Display

(1)	Measuring digits
(2)	Auxiliary digits to display the temperature, the assymmetry potential and the electrode slope.

Pilots

pH	Mode indicator.
mV	Mode indicator.
	Related to electrode assymmetry potential.
	Related to slope, *see page 12.*
	Lights up when is pressed and also if A.T.C. connected.



Figu

anel *(see fig. 2)*

ctrode input —combined or indicator—.

ctrode input —reference—.

put current for Karl Fischer.

alog output for recorder.

E Automatic Temperature Compensator input. *See note page 3.*

F RS 232 C output —optional—. *(See page 15).*

M Cable to mains.

S ON/OFF switch.

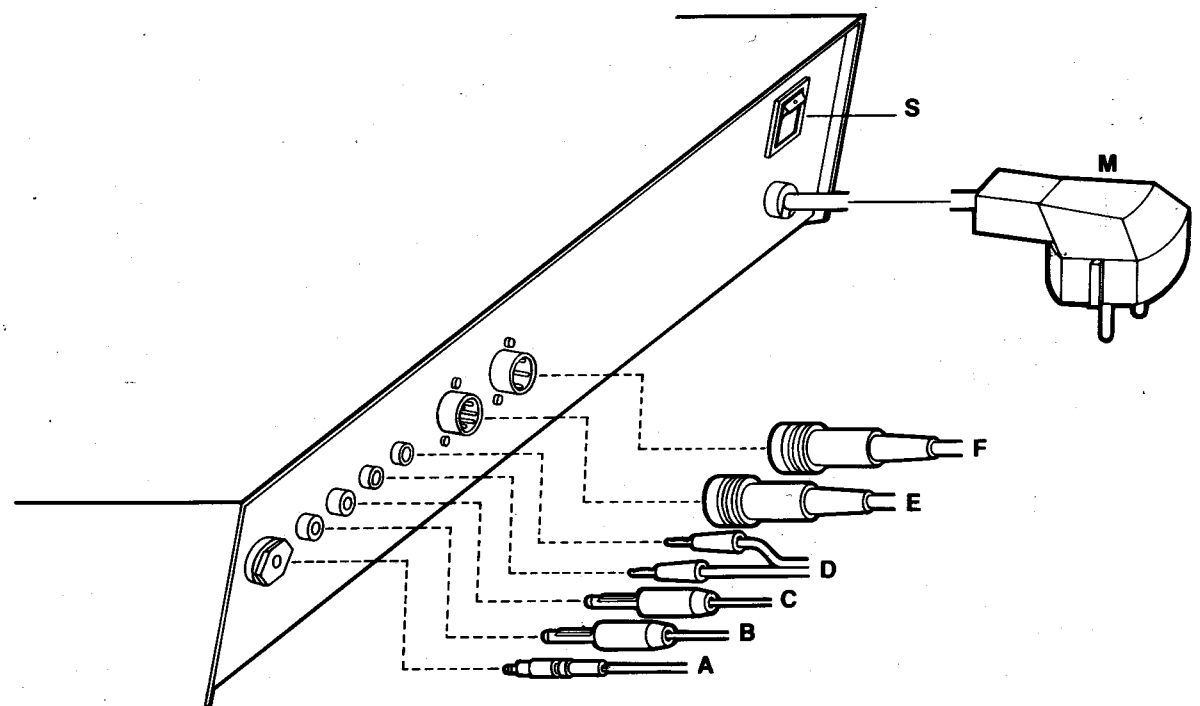


Figure 2

instrument set-up *(see fig. 2, 3 and 4)*

connection to mains

1. Connect the instrument to mains, 220V if not otherwise indicated.

2. Push power switch (S) to ON position.

3. Wait about 10 minutes for the system to reach a stable temperature.

electrode holder

1. Place electrode holder on its base.

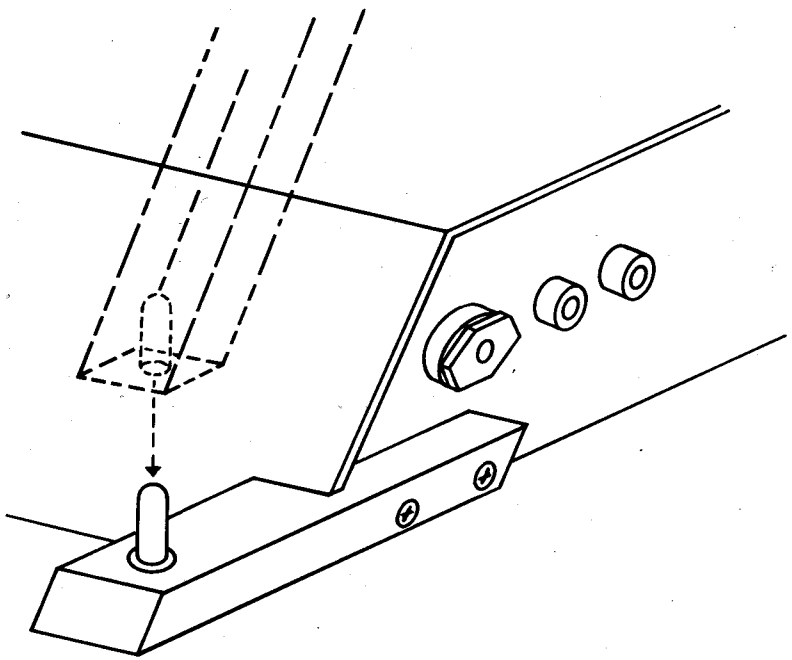


Figure 3

pH calibration

introduction

For accurate pH measurement, calibrate the instrument-electrode system by using buffer solutions of known pH.

You are recommended to calibrate the instrument at the beginning of each day, before proceeding to make any measurements. If many measurements are made you are advised to recalibrate every 2 or 3 hours to compensate for a possible electrode drift (assymmetry potential) or a loss of sensibility (slope).

The CRISON micropH 2001 are autocalibrating. Stored in their memory they have the most commonly used buffer solution values – pH 7.02, 4.00, 2.00 and 9.26 at 20 °C –. *See table on page. 18.*

with buffers pH 7.02, pH 4.00 and manual temperature compensation

(To use different values, see page 13).

1. Push power switch to ON position.

Wait about 10 minutes for the instrument to be ready for use.

CAUTION: You are advised to keep the instrument connected if working in a high humidity ambient.

2. Press [thermometer] to select the temperature according to buffers.

Press upper half to increase it.

Press lower half to decrease it.

3. Press [ ] and **pH**

4. Sink the electrode in pH 7.02 solution and shake slightly.

5. Press [ ]

Wait 5 seconds for readout to stabilize.

6. Automatic change of readout.

The instrument shows the buffer solution value at the selected temperature for 2.5 seconds. During this time, can be pressed [ ] *again to make sure readout is completely stable. This value is then stored in memory.*

7. Automatically the instrument suggests using pH 4.00 buffer.

8. Rinse electrode with distilled water and place in pH 4.00 buffer solution.

9. Press [ ]

Wait for a stable pH readout. Same procedure as described in point 5.

10. Automatic change of readout.

Procedure as described in point 6.

11. Automatically the instrument shows...

12. Rinse electrode with distilled water.

The instrument is ready to measure pH.

calibration with automatic temperature compensation

1. Connect A.T.C. probe.

Display (2) acts as a thermometer.
The key [ ] has stopped working. The pilot remains lighted.

2. Press [ ] and [pH]

3. Proceed as indicated above points 4,5... 12.

pH measurement

An accurate pH measurement, should always be preceded by a system calibration.

The micropH 2001 has two possibilities:

single reading, after pressing pH or mV the instrument is in measuring mode with a «stability criteria» incorporated in software. The readout is memorized – fixed – in display when instrument detects that it has not changed during 5 sec. The corresponding pilot goes from intermitent to fixed light.

continuous reading, after pressing the same key twice, pH pH or mV mV, the instrument is in continuous measuring mode like a conventional equipment.

important. To unable a higher speed and repeated measures, a magnetic or mechanical stirrer is advisable.

single reading, manual temperature compensation

1. Press [🌡] to select the temperature according to sample.

Press upper half to increase it.

Press lower half to decrease it.

2. Inmerse electrode in sample and shake slightly.

3. Press [pH] — *Readout in evolution.*

4. Freeze of readout. — *The display will freeze on the last measurement value.*

continuous reading, manual temperature compensation

1. Proceed as in **single reading** points 1 and 2.

2. Press [pH] [pH] — *Instrument in measuring mode.*

3. Press [pH] to stop this process.

pH measurement with automatic temperature compensation

1. Connect A.T.C. probe.

2. Proceed as in **single reading** and **continuous reading.**

mV measurement

The oxidation-reduction potential measurements and the potentiometric titrations performed with metal electrodes – Pt, Au, Ag, etc – Ion Selective or pH, are expressed in mV.

Knowing the method and using the correct electrode, proceed as follows:

1. Immerse electrode in sample, whatever the readout on display.

No temperature compensation made when instrument in mV mode.

The result is not altered whichever value appears on temperature display.

2. Press **mV** – single measure –.

3. Press **mV** **mV** – continuous reading –.

4. Press **mV** to stop this process.

warning signals

The instrument software includes warning signals to guide the user or warn him of possible errors.

flashing lights

1. Flashing measurement digits.	*pH measurement is being carried out without previous calibration of the instrument.*
2. Flashing of a pilot – pH, mV –.	*Instrument in measuring mode. When flashing stops, process has ended.*
3. Flashing of  pilot after calibrating with pH 7.02 buffer solution.	*Electrode assymmetry potential surpassing ± 20 mV.* *Implies some irregularity in the electrode or in the buffer solution.* *Make sure that the pH 7.02 buffer solution used is in good condition.*
4. Flashing of  pilot after calibrating with «second buffer».	*Electrode slope lower than 50 mV/pH or higher than 65 mV/pH, at 20 °C.* *Check second buffer.* *Make sure that both temperatures, display and buffer, are the same.* *Clean electrode (see* **maintenance** *page 18).*

reappearance of 7 or 4 (2 or 9) on display

1. Calibration unable to proceed *(points 6 and 10).*	*The buffer used is the wrong one or it shows signs of irregularity.* *Once buffer checked, if problem persists, the electrode is at fault.*

other possibilities

pH measurement without previous calibration

The instrument can be used directly without previous calibration to obtain relative, comparative or merely orientation measurements.

Measurements will be obtained by assuming an ideal electrode (assymmetry potential 0 mV and slope 58,16 mV/pH at 20 °C).

Procedure:

1. Sink electrode in sample.

2. Select temperature value of sample.

3. Press **pH** – Single reading –.

4. Press **pH** **pH** – Continuous reading –.

All digits will flash
*(see **warning signals**, page 12).*

calibration with pH 2.00 or 9.26 buffers

When a particular working method requires an instrument calibration with an alkaline or very acid «second buffer», the calibration procedure is slightly different than normal.

As «first buffer» it is essential to use pH 7.02.

1. Follow same procedure as for normal calibration described on *page 8*, points 1 to 7.

2. Press **pH**

The instrument suggests using pH 2.00 buffer.

3. Press **pH**

The instrument suggests using pH 9.26 buffer.

4. Press **pH**

«4» will be displayed. Selection cycle for «second buffer» is established.

5. Once «second buffer» selected, proceed as in «pH calibration», points 8 to 12, changing the value 4 for 2 or 9.

pH electrode checking

The microp H 2001 will inform you of the state of your electrode at any moment.

1. Press [ ] [pH]

Value of ASSYMMETRY POTENTIAL in mV. Normal values are between ±20 mV. The pilot lights up.

2. Press [ ]

Value of ELECTRODE SLOPE in mV/pH. Normal values fluctuate between 53 and 60 mV/pH. The pilot lights up.

3. Pressing [ ] again, the instrument goes back to point 1.

4. Press [pH] or [mV] to escape.

polarization of platinum electrode for KARL FISCHER

The microp H 2001 can be used as an end point detector system for Karl Fischer reaction method.

Use a double platinum electrode and connect it as per *figure 5.*

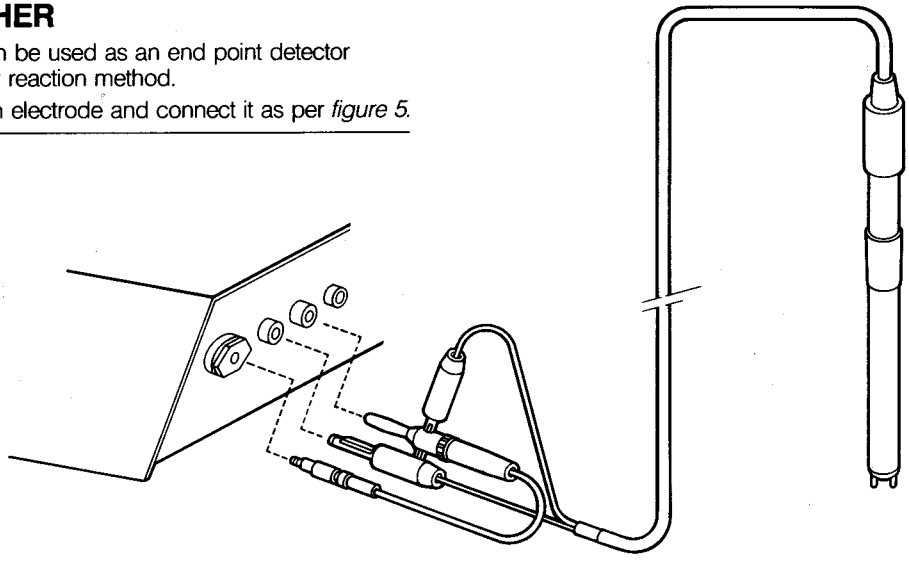


Figure 5

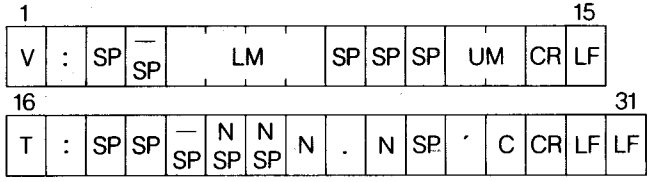
RS 232 C output —option—

specifications

Synchronization system	Asynchronous
Bit rate	1200 baud
Word length	
start bit	1 bit
data bit	8 bits
parity bit	None
stop bit	2 bit length
Signal polarity	
mark	Logic «1» (– 3 ~ – 15V)
space	Logic «0» (+3 ~ +15V)
Connection	Pin 1: output datum Pin 2: OV

data format

The micropH 2001 transmitts information in:
Single reading: at the end of each measure.
Continuous reading: every 3 sec. aprox.



Being:

N	Number
SP	Space
CR	Return
LF	Line Feed
LM	Readout: NNNN (mV), NN.NN (pH)
UM	Measuring unit (mV, pH)

V, T, ', C, —, . and : ASCII Codes.

specifications

Measuring units:	pH, 0 ... 14.00 mV, – 1999 ... 1999 °C, – 20.0 ... 150.0 °C, (using the A.T.C., optional).
Resolution:	0.01 pH, 1 mV, 0.1 °C.
Manual temperature compensation:	– 20 ... 125 °C.
Automatic temperature compensation:	– 20 ... 150 °C, Pt-100 probe.
Stability criterion:	Maximum variation of 0.1 mV in 5 sec.
Display:	Fluorescent. 3½ digits for measuring, 3½ digits for temperature.
Input impedance:	10^{12} Ohms
Thermal drift:	0.002 pH/°C
Inputs:	Indicator or combined electrode. Reference electrode. Automatic Temperature Compensation.
Outputs:	Polarization current for Karl Fischer. Analog signal for recorder (electrode potential follower). RS 232 C *(see page 15)*.
Autocalibration:	Recognizes buffer solutions pH 7.02, pH 4.00, pH 2.00 and pH 9.26.
Assymmetry potential:	Accepted 0 ... ± 20 mV. Accepted with «WARNING» ± 20 ... 70 mV. Rejected > ± 70 mV.
Slope:	Accepted 53 ... 65 mV/pH. Accepted with «WARNING» 48 ... 53 mV/pH. 65 ... 70 mV/pH. Rejected < 48 mV/pH Rejected > ± 70 mV/pH
Environmental requirements:	Temperature 0-50 °C. Relative humidity 90%, non condensing.
Mains:	220V. 50/60 Hz. 110V if ordered.
Dimensions:	305 × 80 × 220 mm.
Weight:	2,5 Kg.

electrode

The pH electrode is the most delicate part of the instrument and requires some care to ensure accuracy and long life.

description

The standard pH electrode supplied with the instrument is a combined electrode, that is a **glass** indicator electrode and a **reference** electrode, assembled in a single body.

Its principal parts are: *(see fig. 6)*.

(1) **Membrane,** sensible to ion H_3O^+.

(2) **Internal buffer,** inaccessible.

(3) **Diaphragm,** porous ceramic element allowing a small electrolyte flow to the electrode exterior, establishing the electrical circuit necessary for measuring.

(4) **Reference element,** consists of a silver bar covered with AgCl.

(5) **Reference electrolyte.** This is actually the intermediate electrolyte between the reference element and the exterior.

preparation

1 Connect cable to electrode cap and to instrument.

2 Remove protector (P) and rubber cap (T), only used during transport and storage.

3 Check reference electrolyte level. It should be near filling port to ensure good electrolyte flow through diaphragm.

4 If bubbles are seen in membrane area (1) shake electrode downward .

5 Rinse electrode with distilled water.

6 Place electrode in buffer solution pH 7.02 or distilled water adding a few drops of KCl.

NOTE: Before calibrating, it is advisable to leave electrode about 10 minutes as described in point 6 with instrument connected to mains.

specifications

Membrane: Glass U type.
Resistance 250 MΩ at 25 °C.
pH range 0-14.

Diaphragm: Ceramic ∅1 mm.
Electrolyte flow 1 ml/24 h (at 1 m head of water, at 25 °C).

Reference system: Ag/AgCl.

Reference electrolyte: KCl 3M+AgCl.

Working temperature: 0-80 °C, sporadically up to 100 °C.

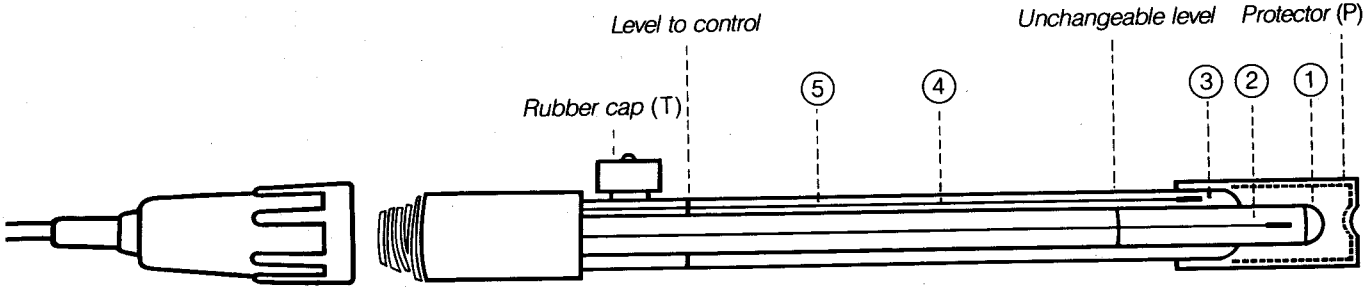


Figure 6

applications

The majority of aqueous solutions can be measured with the standard electrode.

They can also be used sporadically in solutions with organic solvents such as methanol or benzene. For further information ask for the CRISON application bulletin «pH electrodes in non-aqueous media».

An important limitation are low conductivity samples such as distilled water or solutions containing colloidal particles, paints, colourings, cremes, soaps, sewage, etc.

See list of optional electrodes *(see page 19)*

measuring hints

- Use always fresh buffer for calibration. Buffers can be affected by time, heat, light and specially by contamination.
- Solution used for calibration should never be returned to buffer flask. Use little flasks supplied by CRISON.
- Between measurements, rinse electrodes with distilled water and then with the next solution to be measured in order to obtain a quick response.
- When not measuring, always place electrode in solution as indicated in point 6 of PREPARATION.
- It is very wise, though not imperative, to stir all buffers and samples.
- Avoid rubbing or wiping electrode membrane to reduce possibility of errors due to electrostatic charge.
- Avoid to scratch membrane with rubbing, knocks, etc.

maintenance

Electrolyte level: Check periodically and refill with KCl 3M + AgCl.

Cleaning: Frequently electrodes get dirty or coated with the substances measured causing them to give a slow response or false measurements. It is not sufficient merely to rinse them with water.

According to the type of deposit, different solutions can be used: common detergents for general coatings, acid solution for inorganic substances, complexing agent for metal compound, acetone or alcohol for oils and greases, pepsin at 5% in 0.1 Mol HCl for proteins. For highly resistant deposits, use bleach or oxygenated water. See solutions *(page 19)*.

After any of these cleaning procedures, rinse the electrode with distilled water, then drain and refill the reference electrolyte.

temperature effects

On the electrode: Its response varies according to its temperature. This variation is well known (Nernst equation) and is compensated by the pH-meter either manually or automatically.

On the buffer solutions: It is known that their pH value varies according to the temperature. This variation depends on the chemical equilibrium of the products contained. CRISON series 2000 pH-meters store in memory the table of buffer solutions pH 7.02, pH 4.00, pH 2.00 and pH 9.26, so that the instrument calibrates automatically the value of each buffer according to its temperature.

On the samples: It is impossible to know the exact behaviour of the chemical equilibrium of each sample at different temperatures. It is necessary to always refer to the sample pH value at the temperature at which it has been taken.

CRISON buffer pH value according their temperature

°C	pH value			
0	2.03	4.01	7.12	9.52
10	2.01	4.00	7.06	9.38
20	2.00	4.00	7.02	9.26
25	2.00	4.01	7.00	9.21
30	1.99	4.02	6.99	9.16
40	1.98	4.03	6.97	9.06
50	1.98	4.06	6.97	8.99
60	1.98	4.10	6.98	8.93
70	1.99	4.16	7.00	8.88
80	2.00	4.22	7.04	8.83
90	2.00	4.30	7.09	8.79

accesories

	Cat. N.º	
solutions	23-110-02	1 x 250 ml pH 4.00 buffer
	23-111-02	1 x 250 ml pH 7.02 buffer
	23-112-02	1 x 250 ml pH 9.26 buffer
	23-130-02	1 x 250 ml electrolyte KCl 3M + AgCl
	109816250	1 x 250 ml electrolyte high temp. VISCOLYTE
	109817250	1 x 250 ml electrolyte low temp. FRISCOLYTE
	23-120-02	1 x 250 ml redox standard 450 mV
	23-132-02	1 x 250 ml LiCl saturated in ethanol.
	23-133-02	1 x 250 ml diaphragm-cleaning
	23-134-02	1 x 250 ml electrode-cleaning HCl O.1M
	23-140-02	1 x 250 ml proteins-cleaning HCl + pepsin
pH combined electrodes (AS7 screw cap)	104023311	Standard
	104013667	Low temperatures
	104023414	Microsamples
	104023485	Viscous medium and low conductivity
	104054365	High alkalinity at high temperatures
	104054132	High temperatures
	104063119	Penetration ∅ 6 mm.
	104063120	Penetration ∅ 4 mm.
	104063121	Penetration ∅ 3 mm.
	104533003	Flat surfaces
	104553017	Epoxy body, gel electrolyte
metal combined electrodes (fixed cable)	105053189	Platinum (redox)
	105053301	Silver (argentometric)
cable	10030107	For above electrodes, with CRISON plug.
magnetic stirrer	29-2038-1	microSTIRRER 2038
	21-970-04	Holder for 3 electrodes
	106052000	Reaction vessel top with 5 inlets.
automatic temperature compensator	21-910-01	Automatic Temperature Compensator (Pt100)

instrument guarantee

CRISON INSTRUMENTS, S.A. GUARANTEES that this instrument complies with the specifications published at the time of dispatch.

CRISON INSTRUMENTS ARE GUARANTEED against possible failures for two years from the date of dispatch.

CRISON DEALERS will repair or replace, FREE OF CHARGE, the deffective parts of the instrument that, during the period of GUARANTEE, have been sent, prepaid freight, to the nearest CRISON dealer.

This GUARANTEE loses validity in case of damage caused by accident, misuse or internal manipulation by unauthorized people.

This GUARANTEE will in no way cover breakages caused by accident.

Before this GUARANTEE becomes valid, it is necessary to complete the attached card and send it to CRISON within fifteen days of receipt of instrument.

The sensor elements —electrodes, probes, conductivity cells— are only guaranteed by CRISON during the following month from shipment date.

service

Contact your usual agent or CRISON's technical department:

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Tel. 343 - 555 71 61
Telex 93715 CRSN E