

HANDHELD ION/pH METER

Model: IM-22P

These instruments form part of the P20 series family of hand-held, waterproof meters.

**FEATURES**

**Waterproof construction (IP67)**

Can be used outside in all weather conditions, no need to worry if the meter is dropped into rivers, lakes or seas. Sensor can be immersed to a depth of 10m (excluding certain special sensors).

**Full validation supporting functions**

Supports ISO-14000/9001.

**Built-in clock function**

Time and measured value are constantly displayed allowing real-time observation. Data storage enables recalling of measurement times. Easy confirmation of previous calibration time.

**Data storage function built into sensor itself**

The sensor itself can store information including type, lot no. and calibration data. This information can be printed out when connected to an optional printer.

**Calibration data display**

The latest calibration data and results can be displayed. In addition, data from previous calibration history is available from the built-in memory sensor "Calibration Memo". These features provide smooth operation and instrument management.

**Calibration error display**

The sensor condition is automatically determined during calibration and an error code is displayed if a problem is detected. Maintenance and sensor replacement can be carried out exactly when required optimising instrument management.

**Dual channel versions available.**

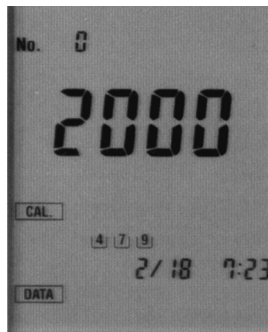
Ion/pH version is available that can measure 2 parameters simultaneously.

**Wide range of standard optional features.**

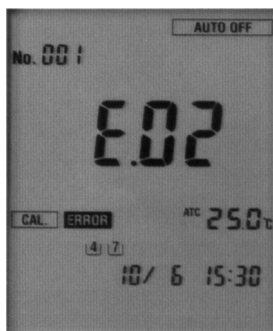
- Auto power off function on/off setting.
- JIS/International standards for pH solution selectable (pH meter).
- Keypad lock function.
- Temperature Calibration function (single point).
- Auto-hold function for automatic stability judgement of measured value.
- Optional external printer (uses plain paper).
- Optional data acquisition software (G-LOG2) allows data to be transferred to PC (CSV format). Once transferred to PC, the data can be manipulated and presented using third party software such as spreadsheets etc.



Time is always displayed.



Latest calibrated update.



Error No. display.



**EXPANDABLE FUNCTIONS**

Function	Specifications
AC adapter	: Uses an exclusive adapter
Printer output *	: Printer output
RS-232C interface*	
Communication method	: start/stop transmission.
Baud rate	: 9,600 bps Character.
Length	: 8 bit
Parity	: None
Stop bit	: 2
Specified PC connecting cable	
Analog output pH	: pH0~14→ ± 700mV.
ORP	: 1999mV→ ± 1V
Temp.	: 0~99.9°C→ 0~1V.
Specified analog output cable	

\* Cannot be used simultaneously.

## OPTIONS

For smooth field measurement, indoor measurement and/or data processing needs.

- **External printer EPS-G**

Uses normal paper suitable for long-term storage. 60mm effective chart.

- **Data acquisition software G-LOG2**

This enables the data to be downloaded in CSV format into a PC, enabling data management using third party software such as spreadsheets, databases etc..

- **RS-232C cable 2m long**

D-sub9P type connector at PC side.

- **AC adapter OAA00001**

- **Electrode stand OIF00001**

- **Electrode holder OIB00001**

- **Electrode attachment tip OIB00007**

- **Stick holder OIB00009**

Sensor with 5m or more lead wire is required.

- **Twin stick holder OIB00010**

Enables use of two electrodes.

- **Anchor OIC00001**

For waterproof type pH, ORP, DO sensor or conductivity cell.

- **DC drive stirrer ST-15**

For DO-21P or IM-22P.

- **Carrying case ODA00001**

Meter, sensor etc... are encased in this case.

- **Soft case SC-10P**

The meter with sensor connected is encased.

- **Analog output cable**

For connecting to recorder.

- **pH checker PC-1G**

- **Temp. check plug TC-1G**

\*\* Disconnectable from HM-20P/RM-20P

## SPECIFICATIONS

<b>Measuring Method</b>	: glass & ion electrode
<b>Measuring Range</b>	: pH0.00~14.00, ORP: 0~±1999mV, 0.1µg/L~999g/L
<b>Repeatability</b>	: pH: ±0.02pH, ORP: ±2mV, Ion: ±1% rgd. ±1 digit
<b>Temperature</b>	: pH/ORP: 0~99.9°C, Ion: 0~45.0°C
<b>Temperature Compensation</b>	
pH	: auto/manual
ORP/ion	: Nil
<b>Calibration</b>	
pH/ion	: up to 3 points
<b>Data Storage</b>	: 200 data x 2
<b>Temperature Calibration</b>	: 1 point calibration
<b>2ch Display</b>	: provided (1ch only available)
<b>Auto Hold Function</b>	: provided
<b>Interval Function</b>	: provided (5 secs.~99min.59secs.)
<b>Clock Function</b>	: provided
<b>Power Source</b>	: AA size dry battery x 2pcs.
<b>RS-232C Output</b>	: provided
<b>Analogue Output</b>	: provided
<b>Water Proof</b>	: IP67
<b>Ambient Temperature</b>	: 0~40°C
<b>Dimensions</b>	: Approx. 187.5(w) x 37.5(h) x 75(w) mm
<b>Weight</b>	: Approx. 320g

## STANDARD ACCESSORIES

pH electrode GST-2729C (lead length 1m)	1 ea.
pH standard solution, 100ml, pH4.01	1 ea.
pH standard solution, 100ml, pH6.86	1 ea.
3.3mol/L KCL solution, 50ml	1 ea.
AA size dry battery	2 ea.

Selective ion electrodes and ORP electrode are separately sold.

## OPTIONS

Sodium, chloride, bromide, iodide, cyanide, copper, silver, sulphur, fluoride, potassium, calcium, nitrate, ammonium, carbon dioxide electrodes

ORP electrode PST-2729C

External printer

AC adapter

Analogue output cable

Stick holder

Carrying case

**TABLE OF SELECTIVE ION ELECTRODE \*1**

Type	Range	Temp. range	Optimum pH range	Replacable ion electrode tip membrane	Influence of coexisting ions (selective coefficient at 10 <sup>-1</sup> mol/L) *2. *3
Sodium ion NA-2011	10 <sup>-4</sup> to 10 <sup>0</sup> mol/L 2.3 to 23,000mg/L	0-60°C	pH10-11	NA-100B	Mg <sup>2+</sup> ,Ca <sup>2+</sup> .NH <sub>4</sub> <sup>+</sup> ,Li <sup>+</sup> ,K <sup>+</sup> = 10 <sup>3</sup>
Chloride ion CL-2021	3x10 <sup>-5</sup> to 10 <sup>0</sup> mol/L 1 to 35,000mg/L	0-50°C	pH5-6	CL-200B	S <sup>2-</sup> must be absent. CN <sup>-</sup> ,I <sup>-</sup> =10 <sup>-5</sup> ,Br <sup>-</sup> ,S <sub>2</sub> SO <sub>3</sub> <sup>2-</sup> =10 <sup>-2</sup> F <sup>-</sup> ,NO <sub>3</sub> <sup>-</sup> ,SO <sub>4</sub> <sup>2-</sup> ,CO <sub>3</sub> <sup>2-</sup> ,PO <sub>4</sub> <sup>3-</sup> =10 <sup>3</sup> F <sup>-</sup> ,NO <sub>3</sub> <sup>-</sup> ,SO <sub>4</sub> <sup>2-</sup> ,CO <sub>3</sub> <sup>2-</sup> ,PO <sub>4</sub> <sup>3-</sup> =10 <sup>4</sup>
Bromide ion BR-2021	10 <sup>-5</sup> to 10 <sup>0</sup> mol/L 0.8 to 80,000mg/L	0-50°C	pH5-6	BR-200	S <sup>2-</sup> must be absent. CN <sup>-</sup> ,I <sup>-</sup> =10 <sup>-4</sup> ,S <sub>2</sub> SO <sub>3</sub> <sup>2-</sup> SCN <sup>-</sup> =10 <sup>0</sup> Cl <sup>-</sup> =10 <sup>2</sup> ,NO <sub>3</sub> <sup>-</sup> ,SO <sub>4</sub> <sup>2-</sup> ,CO <sub>3</sub> <sup>2-</sup> F <sup>-</sup> =10 <sup>4</sup>
Iodide ion I-2021	10 <sup>-7</sup> to100mol/L 0.013 to 127,000mg/L	0-50°C	pH5-6	I-200	S <sup>2-</sup> must be absent. CN <sup>-</sup> =10 <sup>0</sup> ,S <sub>2</sub> SO <sub>3</sub> <sup>2-</sup> =10 <sup>1</sup> SCN <sup>-</sup> =10 <sup>3</sup> , Br <sup>-</sup> =10 <sup>4</sup> ,NO <sub>3</sub> <sup>-</sup> ,CO <sub>3</sub> <sup>2-</sup> , PO <sub>4</sub> <sup>3-</sup> , Cl <sup>-</sup> ,F <sup>-</sup> =10 <sup>5</sup>
Cyanide ion CN-2021	10 <sup>-7</sup> to 10 <sup>-2</sup> mol/L 0.003 to 260mg/L	0-50°C	pH12-13	CN-200B	S <sup>2-</sup> must be absent. I <sup>-</sup> =10 <sup>-1</sup> ,S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> =10 <sup>1</sup> ,Br <sup>-</sup> =10 <sup>3</sup> NO <sub>3</sub> <sup>-</sup> ,SO <sub>4</sub> <sup>2-</sup> ,PO <sub>4</sub> <sup>3-</sup> =10 <sup>4</sup> , CO <sub>3</sub> <sup>2-</sup> ,Cl <sup>-</sup> F <sup>-</sup> =10 <sup>5</sup> (at 10 mol/L)
Cadmium ion CD-2021	10 <sup>-7</sup> to 10 <sup>-2</sup> mo/L 0.01 to 1,120mg/L	0-50°C	pH5-6	CD-200	Hg <sup>2+</sup> , Ag <sup>2+</sup> ,Cu <sup>2+</sup> must be absent. Pb <sup>2+</sup> ,Fe <sup>3+</sup> =10 <sup>0</sup> Cr <sup>3+</sup> =10 <sup>2</sup> , Na <sup>+</sup> ,K <sup>+</sup> ,Mg <sup>2+</sup> ,Ca <sup>2+</sup> , Zn <sup>2+</sup> ,Al <sup>3+</sup> =10 <sup>5</sup>
Copper ion CU-2021	10 <sup>-6</sup> to 10 <sup>-2</sup> mol/L 0.06 to 630mg/L	0-50°C	pH5-6	CU-200	Hg <sup>2+</sup> ,Ag <sup>2+</sup> must be absent. Fe <sup>3+</sup> =10 <sup>-1</sup> ,Al <sup>3+</sup> =10 <sup>1</sup> ,Cr <sup>3+</sup> =10 <sup>2</sup> . Na <sup>+</sup> ,K <sup>+</sup> ,Mg <sup>2+</sup> ,Zn <sup>2+</sup> ,Al <sup>3+</sup> =10 <sup>5</sup>
Silver ion AG-2021	10 <sup>-6</sup> to 10 <sup>0</sup> mol/L 0.06to108,000mg/L	0-50°C	pH5-6	AG-200	Hg <sup>2+</sup> must be absent. Mg <sup>2+</sup> =10 <sup>3</sup> , Ca <sup>2+</sup> ,Cu <sup>2+</sup> ,Pb <sup>2+</sup> ,Cd <sup>2+</sup> ,Zn <sup>2+</sup> =10 <sup>4</sup> Na <sup>+</sup> ,K <sup>+</sup> =10 <sup>6</sup>
Sulfur ion S-2021	10 <sup>-5</sup> to10 <sup>0</sup> mol/L 0.3 to 32,000mg/L	0-50°C	pH13 or more	S-200	-----
Fluoride ion F-2021	10 <sup>-6</sup> to10 <sup>0</sup> mol/L 0.019 to 19,000mg/L	0-50°C	pH5-6	F-200	OH <sup>-</sup> =10 <sup>1</sup> HPO <sub>4</sub> <sup>2-</sup> ,HCO <sub>3</sub> <sup>-</sup> =10 <sup>3</sup> (pH7-8) Cl <sup>-</sup> ,Br <sup>-</sup> ,I <sup>-</sup> ,NO <sub>3</sub> <sup>-</sup> ,SO <sub>4</sub> <sup>2-</sup> ,S <sub>2</sub> O <sub>3</sub> <sup>2-</sup> =10 <sup>5</sup>
Potassium ion K-2031	10 <sup>-5</sup> to 10 <sup>-1</sup> mol/L 0.39 to 3,900mg/L	0-50°C	pH5-6	K-300B	H <sup>+</sup> =1 0 <sup>2</sup> , NH <sub>4</sub> <sup>+</sup> =3x10 <sup>2</sup> Na <sup>+</sup> =2x10 <sup>3</sup> Li=10 <sup>4</sup>
Calcium ion CA-2031	10 <sup>-5</sup> to 10 <sup>0</sup> mol/L 0.4 to 40,000mg/L	0-50°C	pH5-6	CA-300	Pb <sup>2+</sup> =33 Zn <sup>2+</sup> =45 Mn <sup>2+</sup> =1.7x10 <sup>2</sup> Cd <sup>2+</sup> =8.8x10 <sup>2</sup> Fe <sup>2+</sup> =1.2x10 <sup>3</sup> Mg <sup>2+</sup> =1.8x10 <sup>3</sup> Ba <sup>2+</sup> =1.9x10 <sup>3</sup> Cu <sup>2+</sup> =2.7x10 <sup>3</sup> Ni <sup>2+</sup> =9.0x10 <sup>3</sup>
Nitrate ion N-2031	10 <sup>-5</sup> to 10 <sup>0</sup> mol/L 0.62 to 62,000mg/L	0-50°C	pH5-6	N-300	I <sup>-</sup> =7x10 <sup>-2</sup> Br <sup>-</sup> =1.7 NO <sub>2</sub> <sup>-</sup> =4.5 Cl <sup>-</sup> =2x10 CH <sub>3</sub> COO=1.2x10 <sup>2</sup> SO <sub>4</sub> <sup>2-</sup> ,CO <sub>3</sub> <sup>2-</sup> =1.7x10 <sup>2</sup> F <sup>-</sup> =2x10 <sup>2</sup>
Ammonium ion AE-2041	5x10 <sup>-5</sup> to 10 <sup>-1</sup> mol/L 0.09 to 1,800mg/L	0-50°C	pH12 or more	membrane AE-FILM (10 sheets)	-----
CO <sub>2</sub> gas CE-2041	Dissoved gas: 3x10 <sup>-5</sup> to3x10 <sup>-2</sup> mol/L Gas in air:0.1 to 100%	0-50°C	-----	membrane cartridge CTC-211 (4pcs)	dissolved gas: volatile weak acid Gas in air: acid gas

**Notes:**

\*1 Ion sensors listed above are not compatible with water-proof construction.

\*2 When measuring sample with coexisting ion, it is required to remove the interference by pretreatment.

\*3 Selective coefficient: It represents the degree that coexisting ions in sample influences the ion being measured as error. Ex. Selective interference 10<sup>2</sup> to 1mol/L measuring ion denotes that a concentration of interfering ion that is 100 times of 1mol/L will show same indication as 1mol/L of measuring one.

**STANDARD SOLUTION & ION STRENGTH ADJUSTER**

	Inner chamber's solution		Outer chamber's solution		Standard solution	Ionic strength adjuster	
	100mL	50mLx3	100mL	50mLx3		500mL	500ml
Sodium ion	KCL-100C	OBG00001	RE-2	OBG00003	NA-1000	ISA-NA	OBA00003
Chloride ion					CL-1000	ISA-CL	OBA00004
Bromide ion					BR-1000		
Iodide ion			KCL-100C	OBG00001	I-1000		
Cyanide ion			RE-2	OBG00003	CN-100	ISA-CN	OBA00005
Cadmium ion					CD-100	ISA-CU	OBA00007
Copper ion					CU-100		
Silver ion			*1		ISA-CL	---	
Sulphur ion			KCL-100C	OBG00001	*1	---	
Fluoride ion			KCL-100C	OBG00001	F-1000	TISAB-01 *2	OBA00001
			RE-2	OBG00003		TISAB-11 *3	OBA00002
Potassium ion			RE-3	OBG00004	K-1000	ISA-K	OBA00010
Calcium ion			KCL-100C	OBG00001	CA-1000	ISA-CA	OBA00009
Nitrate ion Nitrate nitrogen			RE-3	OBG00004	NO <sub>3</sub> -1000 NO <sub>3</sub> -N	ISA-NO	OBA00008
Ammonium ion			Inner solution RE-11 (500mL)	inner solution OBG00005	/	NH <sub>4</sub> -1000	ISA-NH
Ammonium-nitrogen	NH <sub>4</sub> -N						
Carbon dioxide	OBG00006	CGS-111 (Powder: 10 bags, bag for 1L)				ISA-CO	OBA00011

**Notes:**

- Standard solution: For 2-point calibration use undiluted and 10 or 100 times diluted ones.
- Standard solutions for silver and sulfur ions are easily changed in conc. and are not available. \*1
- Ionic strength adjuster: TISAB-01 for general use, but TISAB-11 for sample containing coexisting materials of aluminum or iron. \*2,3
- Outer chamber's solution: Select suitable one according to the sample. KCL-100C (Sat. KCL), RE-2 (10% potassium nitrate KNO<sub>3</sub>) or RE-3 (10% lithium acetate CH<sub>3</sub>COOLi).

## DKK-TOA CORPORATION



## CAUTION

Do not operate products before consulting instruction manual.

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Information and specifications are for a typical system and are subject to change without notice.