Waterproof Multifunction Meter
CPC-401

SECHANG INSTRUMENTS

I. Introduction

1.

.   ,
.

.

2

CPC- 401   :

;

/   ;

1 ~ 5 pH   ;

pH   ;

;

pH   ;

3   ;

(autorange);

(NaCl or KCl)   ;

TDS   ;

(K),   ;

;

& , 200   ;

;

RS- 232   ;

;

;

OFF ( );

3.

CPC- 401   (pH)   ,   (Oxidation Reduction
Potential (mV))   ,   (µS/cm or mS/cm)   ,
.   (g/l or %)   .
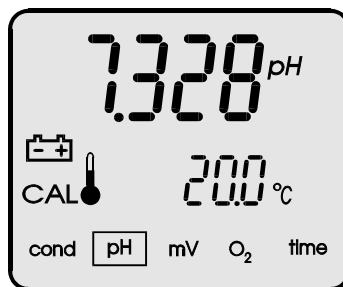   NaCl, KCl or TDS   .

CPC- 401   ,   ,   ,
              .   BNC- 50 connector   pH   ,
                                    . Pt- 1000   Chinch
connector   .

  200   ,   ,
RS- 232   PC   .

Caution: ,   EI- 401
                    .

4.

                              LCD   (1)   :
*   ,   ;   *pH   ;
*mV   ;
*   .

(logo) b   .
                              : **cond** , **pH, mV,** or **time.**

      (°C)   .
                    .

      1.

CAL

(MODE)

(. 2)   .   ON/OFF,
,   ,   ,   ,
          .

:

(FUNCTION) -   ,   ON/OFF.

(CAL) -   , MODE/P.CAL
                    .

(CAL) -   ,   (CAL
).   .

(MEM/PRINT) -
                      ,   ,
          ,   .

(MEM/PRINT) -
                      ,   .

(MODE) -
                    .

(◄) , (►) -
                                    .

.

F (left)   - BNC- 50 :   pH   , ORP   , Oxygen   .

F1   - BNC- 50 :   .

T   - Chinch :   .

RS   - RS- 232 : PC   .

P   -   (9V)

. 2.

5.

ON   . ON
,   .

. 3

,   .

HELP   ,   .

ON   1.5

,   .

(Standard Characteristics):

shift = 0 pH, characteristic slope = 100% for pH electrode;

constant K = 1.000 cm^{-1} for conductivity cell;

,   .

pH,   ,   .

oFF   OFF
.   OFF
.

6.

:

-        **P**   ;

- pH   , ORP   ,   BNC- 50   **F**
;

- BNC- 50 **F1** ;
- , Chinch **t**
;
- PC , EI- 401
CP- 4XX- PC RS .
- (FUNCTION) ON .

CAUTION: pH , .

6. 1.

.
,
.

🌡 →

✋ → , (←)(→) .

6. 2

(Resolution) .

(MODE) .
rE5(resolution) (. 4)
(←)or(→) :
Lo - (low) ;
Hi - (high) .

```
rE5
Lo
cond  pH  mV  O₂  time
```

. 4

*pH :
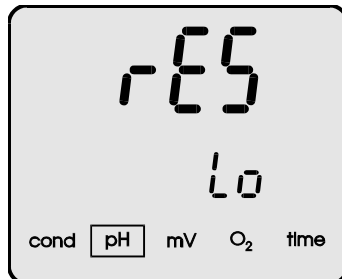
Lo -   0.01 pH;

Hi -   0.001 pH.

*   :

Lo -   3½digits;

Hi -   4½digits.

*   :

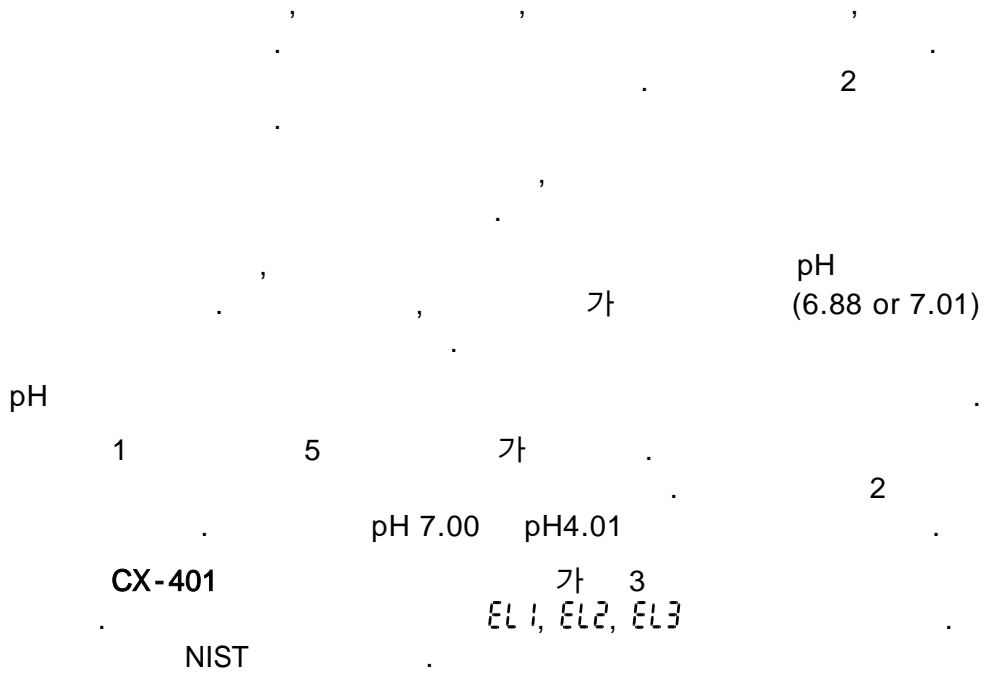Lo -   1% or 0,1mg/l;

Hi -   0.1% or 0.01 mg/l.

➔   (FUNCTION)   .

II. pH

7.

.
:

➢   ,   KCl   5
                        :
➢   .
                                                .

                           .
➢   ,   Holder   .
                                                      .
                                                    .   ,
                           .
                                        .   ,   2
                           .

CAUTION: ,   ,
                .

8.

'   '   '

.   .

.   2

.

'

.   .

'   pH

.   ,   (6.88 or 7.01)

.

pH   .

1   5   .

.   2

.   pH 7.00   pH4.01   .

CX-401   3

.   EL1, EL2, EL3   .

NIST   .

.

8.1.

(table 1)

.

Point of Calibration	Resolution 0.001	Resolution 0.01
1	1.675	1.68
2	4.002	4.00
3	6.881	6.88
4	9.225	9.22
5	12.627	12.63

Table 1

Table 2   .

.

Table 2.

Calibration point	Range
1	0.800 ~ 2.100
2	3.900 ~ 4.100
3	6.800 ~ 7.100
4	8.900 ~ 9.400
5	11.500 ~ 14.000

8.2

Table3   .
8.3   .
.

Table 3.

Temp. ⁰C	Kind of buffer solution				
	1 oxalate	2 phthalate	3 phosphate	4 di-sodium tetraborate	5 calcium hydroxide
0	1.666	4.003	6.984	9.464	13.423
5	1.668	3.999	6.951	9.395	13.207
10	1.670	3.998	6.923	9.332	13.003
15	1.672	3.999	6.900	9.276	12.810
20	**1.675**	**4.002**	**6.881**	**9.225**	**12.627**
25	1.679	4.008	6.865	9.180	12.454
30	1.683	4.015	6.853	9.139	12.289
35	1.688	4.024	6.844	9.102	12.133
40	1.694	4.030	6.838	9.063	11.984
45	1.700	4.047	6.834	9.038	11.841
50	1.707	4.060	6.833	9.011	11.705
55	1.715	4.075	6.834	8.985	11.574
60	1.723	4.091	6.836	8.962	11.449

8.3

:

.

(FUNCTION)   pH   .   (MODE)   .

rES (Resolution)   .

(←) or (→)   :

Lo - (low)   0.01 pH;

Hi - (high)   0.001 pH.

(MODE)   .   (←) or (→)   (*EL1, EL2,*

EL3)   .   :

CLr -   .

SEt -   .

bAd -

(MODE)   , *P.CAL*   (points of calibration)

Mode   .   (←) or (→)

       :

Aut – [Table 3],   pH

      .(   )

USt – [Table 2],   .

```
P.CAL
     Aut
cond  [pH]  mV  O₂   time
```

. 5

Aut   ,   (FUNCTION)   " 8.3   8.4 "

         .   .

USE   , " 8.3   "   .

USE (   )   ,   ,
                          ,   CAL   .
                    pH   ,
                    .
              P1 (1   )   .
                                              (. 6).   ◀ ▶
                                                                              .

[Table 2]   .

$$1.675$$

P 1

| cond | pH | mV | O₂ | time |

. 6.
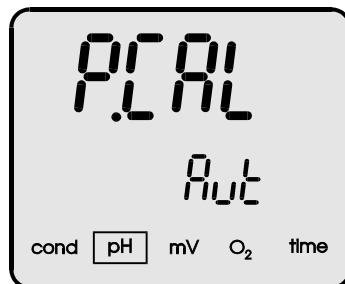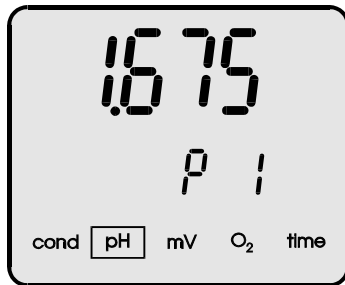
                                              CAL   .
       P2   .   2
                                    .
              pH   ,   MODE
(Aut / USE,)   ,   FUNCTION   pH
                    .

                                                              .
          . (EL1, EL2, EL3).

                                        . (F and t)(. 2).
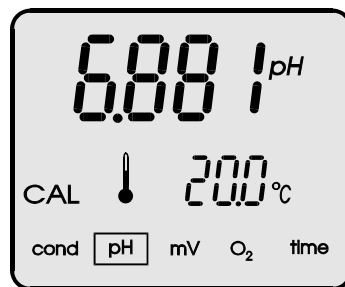
     pH
              .
                          ,   FUNCTION   ,   .
                    3   .
                          .

8.4.   (with   )

pH   :

a. *CAL*   *CAL(. 7)*   .
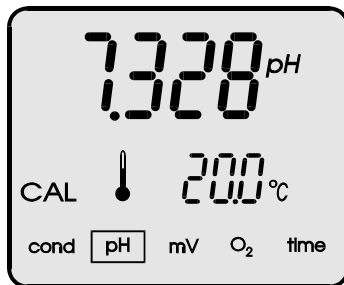
b. **pH**

. 7.

            , *CAL* .

. (8).

Err   ,   ,

. 8.

c.   *FUNCTION*   .

        b.   .

8.5.   (with   )

(   )   .   ⊘⊘

pH   .   8. 4

Caution: ⊘⊘   20 ^{o}C   .

9.

. (EL 1,

EL2, EL3)

.

9. 1.

. pH

MODE   .   .

bAd   .

.

10. pH

6   7   .

,

(8.3   ).

(6.2   ).

10.1.   (with   )

pH   .

.

ON   ON   ,
(pH, mV, etc)   .
.

.

NOTICE: .

10.2   (with   )

.   .

.

⊗⊘   ,

.

10.1   .

Caution: ⊗⊘   20 ^{0}C   .

11.
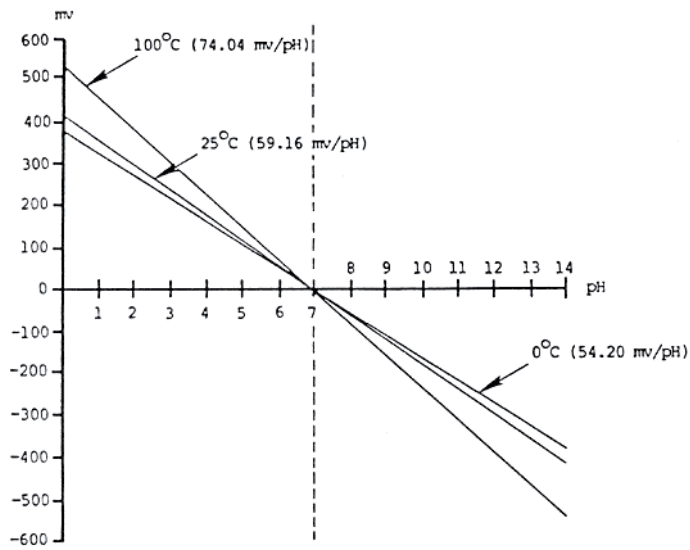
CX401   K   .

k=0.198422 T

III.

12.

.　　　K　　　　　　　　　　　　　　　　　　　,

K = 0,1 cm⁻·¹ ~ K= 10 cm⁻·¹　　　　　　　.

μS/cm　　　mS/cm

,　　　μS　　mS　　　　　.

,

.　　　　　　　　　α coefficient　　　　.

13.

&　　　, 6　　　　　　　　　　　　.

.

13. 1.

.　　NaCl, KCl, TDS

content　　　　　　　　　.　　　　%　　g/L

.

(MODE)　　　　　　　.　MODE

Unt(unit)　　　　　　　.

(◄)(►)　　　　　(Cond, NaCl, KCl, TDS)

. :

Cond　　-　　　　　　(. 9);
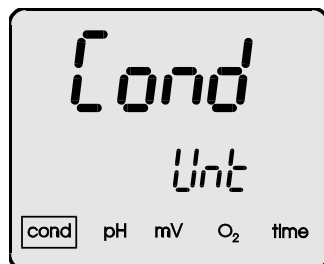
. 9.

NACL　　-　　NaCl(g/l)　　　　(. 10);
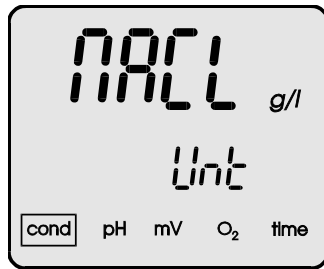
. 10.

⊦CL   -   KCl (**g/l**)   (. 11);

. 11.

tdS   -   TDS(**g/l**)   (. 12).
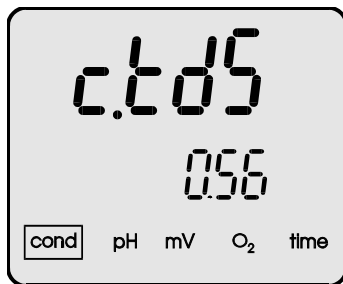

. 12.
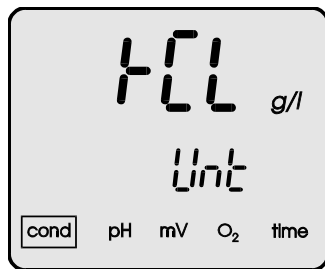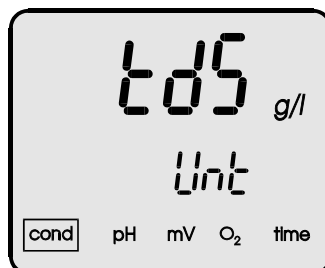
            (∏ACL, ⊦CL or tdS), (CAL)   %   g/l
                    .

        (FUNCTION)   .

    %   Weight Concentration
            .

    1% of Weight Concentration (C) = 10 000 ppm = 10 ppt%   (Weight
Concentration)   0.001% or 10 ppm   .

13. 2. W_TDS

, TDS   , W$_{TDS}$ coefficient
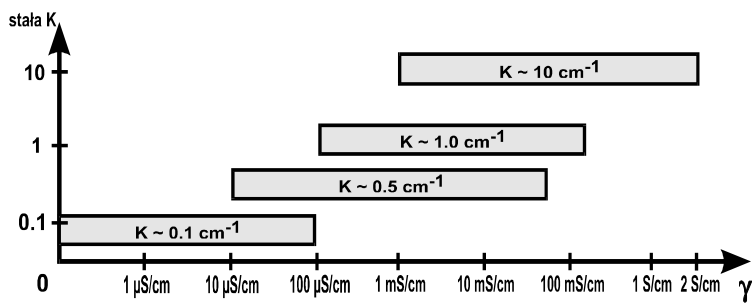.   .

-   c.td5
   MODE   . (. 13);

-                                TDS   .

-   .

c.td5

0.56

| cond | pH | mV | O$_2$ | time |

. 13.

W$_{TDS}$ coefficient   18. 2   .

14.

14. 1.

CX- 401   0 ~ 1999 mS/cm   .

(BNC- 50 connector)

.   3

.

.

. 14.

K   0,1 cm $^{-1}$.

,   .

14. 2

.

.

.

.

1:1

.

15.

3   3
. (𝑃𝑟 1, 𝑃𝑟2, 𝑃𝑟3)

15.1.   (without   )

CX 401   .

K   .

K   (MODE)   .

(. 15).

(←)(→)   ,   (𝑃𝑟 1, 𝑃𝑟2, 𝑃𝑟3)

(CAL)   .   *CAL*   .

(←)(→)   K   .

    , (MODE)   ,

(FUNCTION)   .
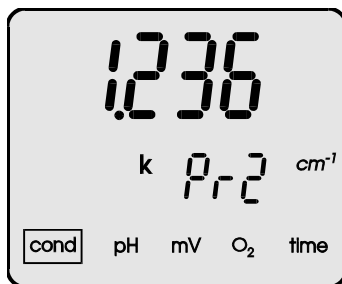
. 15.

15.2   (with   ) (   )

1   .   K

15.2.1.

:

12.1   .

(MODE)   CAL   (   )
                   . (16)

(←)(→)   .

(FUNCTION)   .

```
 1.488  mS

  CAL

cond  pH  mV  O₂  time
```

. 16.

15.2.2   (with   )
                :
    15.2.1   .

                                                   .

                                          .
                            1 cm   .
                                      .

                        .
        (CAL)   CAL   .
                            . (. 17).

*   .
            .   .
                                      .   (CAL)   .
                                              . Err

                                      .

                    (FUNCTION)   .

```
 1.410  mS

CAL🌡  25.0 ℃

cond  pH  mV  O₂  time
```

. 17.

                                    .

15.2.3   *(with   )*

                              :
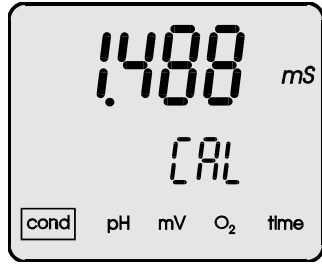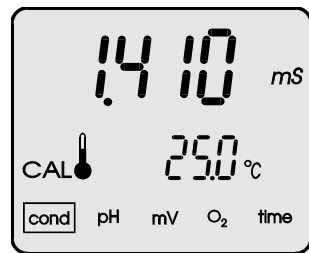
⬭FUNCTION   ON   .

                              . (subchapter 13.1);

⬭◀ ⬭▶   . (15.2.1   )

          .   1 cm   .

                                        .

          .

                         25 °C   .

⬭CAL   *CAL*   (. 17).

                                   , ⬭CAL   .

                                   . *Err*

          .

                    ⬭FUNCTION   .

                    ,   .

*   *

          .   .

16. α

α   .

Table 4.

substance	Weight Concentr.	α Coefficient
HCl	10 %	1.56
KCl	10 %	1.88
H_2SO_4	50 %	1.93
NaCl	10%	2.14
HF	1.5 %	7.20
HNO_3	31 %	1.39

5   α   .

Table 5.

temp.	α coefficient			
	KCl solution			Saturated NaCl
	0.01M	0.1M	1.0M	
5	2.68	2.68	2.39	2.77
10	2.45	2.36	2.20	2.53
15	2.27	2.19	2.04	2.38
20	2.11	2.06	1.89	2.21
25	1.91	1.86	1.75	2.03
30	1.80	1.77	-	1.91

α

.

:

1.   .   25 ^{0}C
         .

2.   25 ^{0}C
              ,   (G$_{25}$)   .

3.   ,   20 ^{0}C   .

4.   .

5.   25 ^{0}C   .

6.   . (20 ^{0}C   )
        (G$_{Tx}$)   25 ^{0}C (G$_{25}$)   .

7.   α   .

$$\alpha = [\ (G_{25} - G_{Tx}) / \{G_{25}\,(25 - T_X)\}\ ]\ \times\ 100(\%/\ )$$

T$_x$ -   ( )

G$_{25}$ -   25   .

G$_{Tx}$ -   (25)   (T$_x$)   .

                    (T$_x$)   .

17. α

(α)   0.01 ~ 10.00%   .

α = 2 % / ºC

.

:

- MODE   α coefficient   (. 18)
  . t.coF (temperature coefficient α)
  .

- 🡠🡢   ,   .

- FUNCTION   .

t.coF

α 2.37 %/ºC

cond   pH   mV   O₂   time
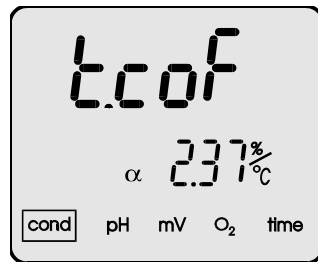
. 18.

.

18.

18. 1.   (without   )

25 ºC

⊗ ⊘

-            . (**F1** and **t**) (. 2)

- FUNCTION   ON   .

-          ,   . (13.1)

-             15

-          .

-        25 ºC   .

-           . (. 19).
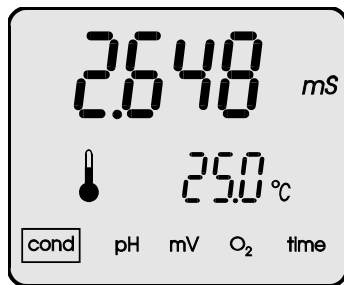
. 19.

18. 2   (with   )

-           . **F1** and **t** (. 2);

- FUNCTION   ON   .

-          ,   . (13.1)

-          15   .

-          .

2.00%   .

-   .
                          .   .

-   ,   . (. 20).

. 20.

Notice: ,

          ,   .   ,

         (hand icon)   .

18. 3.   (with   )

                                        ,
                  .
                  .

-                              **F1**   . (. 2)
-    (FUNCTION icon)   ON   .
-   ,   . (13.1)
-   ,   . 15   .
-                              . (   )
-   ,
         ,   .
-   ,   (arrow icons)
                  .
-                              . (. 21).

Notice: ⊘⊘   25   .

```
 ┌─────────────────────┐
 │                     │
 │     2.342   mS      │
 │                     │
 │   ✋   22.3 ℃       │
 │                     │
 │ ┌────┐              │
 │ │cond│ pH mV O₂ time│
 │ └────┘              │
 └─────────────────────┘
```

. 21.

19.

.

,   .

(g/l or %).   TDS (Total

Dissolved Solids)   .   ,

,   .

0.5   ,

.

,

.
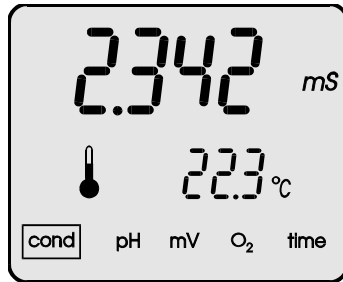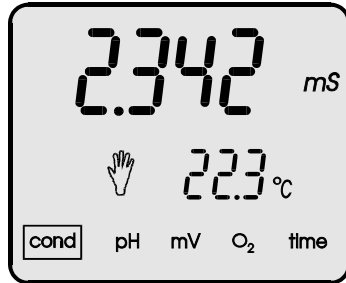
Table 6   .

Table 6.

Conductivity (mS/cm)	Real salinity (g/l)	Salinity (g/l) Counted for coefficient = 0.5	Error (%) by using the coefficient = 0.5
1.00	0.495	0.500	0.01
2.00	1.006	1.000	0.60
4.00	1.976	2.000	1.21
10.00	5.400	5.000	7.40
30.00	18.174	15.000	17.46

(NaCl,

KCl).   NaCl

.   ,   TDS

.   TDS

W_{TDS} coefficient   .

Total Dissolved Solids   .

.

.

,   103 ~ 105

.   ,

.

19.1   (with conversion to NaCl or KCl content)

(NaCl or KCl   ):

-     13.1   .
-       (g/l or %).
-       (18   ).
-                .

19.2   W$_{TDS}$

TDS   ,   .

1.   ➔   g/l

$$\boxed{W_{TDS} = TDS /}$$

W$_{TDS}$ -   TDS coefficient

TDS   -   Total Dissolved Solids in g/l;

γ-   conductivity of the sample in mS/cm;

Caution: TDS   1L   .

2.   ➔ % of weight concentration:

W$_{TDS}$ = TDS /

W$_{TDS}$ -   TDS coefficient

TDS   -   Total Dissolved Solids in g/kg;

γ-   conductivity of the sample in   mS/cm;

Caution: TDS   1kg   .

19.3   (with conversion to TDS)

- 13.1   TDS   (t.TdS)   .
                              .
         .

- 13.1   TDS   .
    .(g/l or %);
-                              (18   ).
-                              . (g/l or %)

IV. ORP

20. ORP(voltage)

CX-401   mV meter (Oxidation Reduction Potential)   .
Redox   .   _{FUNCTION}   mV
    . (. 27).
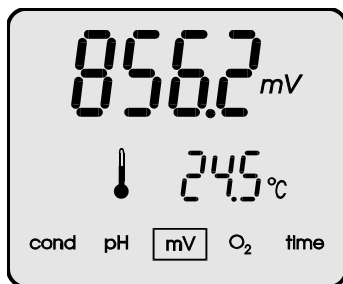
```
 856.2 mV

   🌡  24.5 ℃

 cond   pH   │mV│   O₂   time
```

. 27.

21.

-                           .
-   _{FUNCTION}   ON   .
-                  .
-                          .

          PT-1000   .

🌡 :   ,   .

✋ :   ,   .

(MODE)   bAtt

(. 29).   %

.   bAtt   , SUPP

100%   .
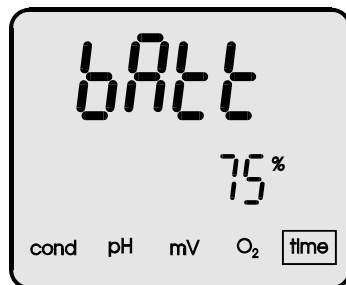
(FUNCTION)   .

22. 5.   &

,   (CAL)   CAL

.   (←)(→)

.   (CAL)

.

23.

23. 1.   Or

200   ,   (Readout),

.   EEPROM   ,

.

EI- 401   .   ,

,   .

23. 2.   &

(Readout mode)   .

(MEM PRINT)   .

            " -

- - - " ,   ,   " nOOX "

.

(MODE)   .

A   SEr -   (Series)   ,   .   Single results

,   .

```
        SEr

         on

cond  pH  mV  O₂  time
```
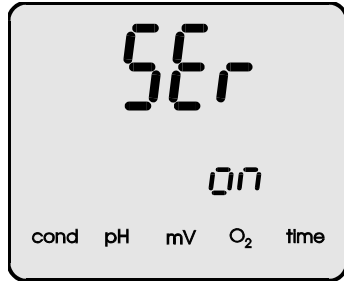
. 30

⊘ ⊘   on or oFF   (. 30)

on   ,   (Series)   ,

oFF   , ⊘   .**(Single results)**

B   Int -   . (.31).

```
        01.25

         Int

cond  pH  mV  O₂  time
```

. 31.

⊘ ⊘   1   60   .

SEr   oFF   ,   .

C   Prt -   - yes or no.

⊘ ⊘   , on   ,   , oFF   ,

          .

D   ALL -

on -   ,   ,   ,

oFF -   ,

⊘ ⊘   .

                               ⊘   .

                               ⊘   .

23. 3.

single results   .   ,   (MEM/PRINT)

,   29.6   .

(MEM/PRINT)   , End   ,

.

23. 4.

200   .

- 29.2.A   .
- 29.2.B   .
-     (29.6   )
- (FUNCTION)   .
-     (FUNCTION)   .
- (FUNCTION)   .
- (MEM/PRINT)   (series)   . (
    : Prt -   - no)

.

.   (FUNCTION) or (MEM/PRINT)

200

.

23. 5.

    .   (MEM/PRINT)

,   .

,   . (←)(→)

. ALL   ,

. (29.2.B   ).

(FUNCTION)   .

24.

RS- 232   Centronics
EI – RS232   .

24. 1

:

-                                    .

-                ON   .

-                    (*Prt*)   *on*   (29. 2. c)

-                                    (29. 2. d),   **single or serial**   (29. 2. a)

-                        ON   .

- **Single**   (*SEr - oFF*)   ,
                               .

- **Series**   (*SEr - on*)   ,
                               .

                   ,   *ALL*   *on*   ,   ,   ,
                                        .

Series   ,   or   .

24. 2

:

-                                    .

-                                ON   .

-                        (29. 2. d),   serial or single   (29. 2. a)

-   . (29. 5),

                                    .

                                        .

SEr   *on*   ,   .
SEr   *oFF*   ,   .
ALL   *on*   ,   ,   .

25.

9V   ,   P   (.2)
.   .

26. Co-operation with PC

CX-401

.

RS-232 connector   Jack 2.5 mm   Connector
Typically COM2   9 pin 25pin
9600 b/s   5   7
8 bit   2   3
1 even bit   3   2
1 stop bit   7   4
                                                         8   5
                                                         4   6
                                                         6   20

. 32.

                                                        ,
      -   .

(Prt)   on   ,   🌐
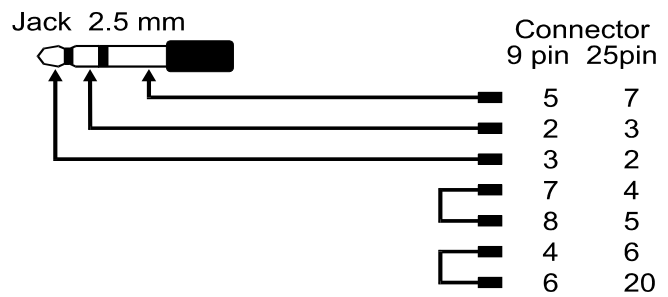   .

Caution: RS232   .

27. Technical DATA

pH MEASUREMENT:

Range	Resolution	Accuracy (±1 digit)
-2.000 ~ 16.000 pH	0.001 / 0.01 pH	±0.002 pH

:		10^{12} Ω
:		manual/automatic
:		-5.0 ~ 110.0
pH	:	automatic, in 1 ~ 5 points

pH

Calibration point	Range
1	0.800 ~ 2.100
2	3.900 ~ 4.100
3	6.800 ~ 7.100
4	8.900 ~ 9.400
5	11.500 ~ 14.000

mV MEASUREMENT:

Ranges	Resolution	Accuracy (±1 digit)
-1000 ~ 1000 mV	0.1 mV	±0.1 mV

:	10^{12} Ω

CONDUCTIVITY MEASUREMENT:

Ranges	Resolution	Accuracy (±1 digit)	Frequency
0.000 ~ 19.999 µS/cm	0.001 / 0.01 µS/cm	± 0.1 %	100 Hz
20.00 ~ 199.99 µS/cm	0.01 / 0.1 µS/cm	± 0.1 %	1 kHz
200.0 ~ 1999.9 µS/cm	0.1 / 1 µS/cm	± 0.1 %	2 kHz
2.000 ~ 19.999 mS/cm	0.001 / 0.01 mS/cm	± 0.1 %	5 kHz
20.00 ~ 199.99 mS/cm	0.01 / 0.1 mS/cm	± 0.25 %	10 kHz
200.0 ~ 1999.9 mS/cm	0.1 / 1 mS/cm	± 0.25 %	10 kHz

*   Accuracy given for the end value of the range.

Ranges of frequency changes were given for constant K = 1. For other values of the constant K the values will change proportionally to changes of this constant.

	:	manual/automatic
	:	- 5.0 ~ 70.0
K	:	0.010 ~ 19.999 cm^{-1}
	:	0.00 ~ 10.00 %/
TDS	:	0.20 ~ 1.00
KCl	:	0 ~ 200 g/l
NaCl	:	0 ~ 250 g/l
	:	one point
	1.	K .
	2.	.

TEMPERATURE MEASUREMENT:

Range	Resolution	Accuracy* (± 1 digit)
- 50.0 ~ 199.9	0.1	± 0.1

* accuracy of the meter. Final accuracy of the measurement depends on the accuracy of the used PT-1000 probe

: platinum resistor Pt-1000

: 0 ~ 100

FOR PT1000B RESISTOR: ± 0.8

FOR PT1000$^{1}/_{3}$B RESISTOR: ± 0.27

OTHER:

: - 5 ~ 45

: 1. 9V battery type 6F22

2. stabilised power adapter 9V

: 60 mW

: Custom LCD 55 x 45 mm

: 149 x 82 x 22 mm

: 222 g (with battery)

Standard:

1.   Pt-1000B (standard);
2.
3.
4.

Options:

1.   pH   (glass membrane)
2.   (   )
3.   12V
4.   ORP
5.   RS-232C Cable
6.   PC   Software
7.   (   )