

PORTABLE TYPE ULTRASONIC FLOWMETER

Basic Instruction Manual



without printer

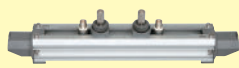


with printer

■ Detector: Flow velocity distribution measurement detector

Outer appearance		Type
Small		FSDP2
Medium		FSDP1
Large		FSDP0

■ Detector: Transit time detector

Outer appearance		New type	Old type
Small diameter		FSSD1	FSD22
Small type		FSSD3	FSD12
Extendable type		FSSC	—
High temp.		FSSH	FSD32
Large diameter		FSSE	FSD51

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Thank you for purchasing our product. This Basic Instruction Manual outlines the proper operation procedure.
Please take a few moments to read this manual thoroughly before use and read the Instruction Manual on the enclosed CD as well.

1. Does the bore diameter of pipe being measured correspond with the sensor type?

Transit time detector				
Detector	New type	Old type	Diameter (mm)	Temp. range (°C)
Small diameter	FSSD1	FSD22	13 to 100	-40 to 100
	FSSD3	—	13 to 300	-40 to 100
Small type	—	FSD12	50 to 400	-40 to 120
Extendable type	FSSC	—	50 to 1200	-40 to 120
Large diameter	FSSH	FSD32	50 to 400	-40 to 200
High temp.	FSSE	FSD51	200 to 6000	-40 to 80

Flow velocity distribution measurement detector			
Detector	Type	Diameter (mm)	Temp. range (°C)
Small	FSDP2	40 to 200	-40 to 100
Medium	FSDP1	100 to 400	-40 to 80
Large	FSDP0	200 to 1000	-40 to 80

Note:

Table of flow transmitter and old/new detector combination

Flowmeter Revision No.	Detector (New type)					Detector (Old type)			
	FSSD1	FSSD3	FSSC	FSSH	FSSE	FSD22	FSD12	FSD32	FSD51
FSC-1	○	○	×	○	○	○	○	○	○
FSC-2 and after	○	○	○	○	○	○	○	○	○

○: Applicable

×: Non Applicable.

Transmitter software is updated.

Software updates are available on our website.

http://www.fujielectric.com/products/instruments/products/flow_ultra/FSC_FLD_FSD.html

2. Is there enough straight pipe portion on the upstream and downstream side of the sensor mounting position?

- The place where a strait pipe portion is 10D or more on the upstream side and 5D or more on the downstream side.
- The place where no factors to disturb the flow (pumps or valves) exists within about 30D on the upstream side.

3. Is the pipe setup (such as, outer diameter, material, thickness) correct?

- Sensor mounting dimension is not calculated correctly. Therefore, errors, such as "Window scanning "(waveform out of the receiving range) and "No received signal" occur.

4. Is the sensor mounted correctly?

- Apply sufficient silicone grease over the whole transmitting surface of the sensor. Otherwise, errors, such as "Received signal is unstable " and "No received signal" occur.
- If the connection between the upstream side and the downstream side are reversed, flow rate is displayed with is minus "-".

5. Did you perform the zero adjustment before start measurement? <See page 4>

- Fill the pipe with the fluid being measured, and perform "ZERO ADJUSTMENT" manually in a situation where the flow is stopped. Otherwise, measurement can not be performed. (If you can not stop the flow, "CLEAR" the adjustment. However, it reduces the accuracy a bit.)

6. Are two or more signal indicators displayed at the top right of the measurement screen?

<See page 7>

- If only one or less indicator is displayed, raise the transmission voltage level.

7. Is the range setting of analog output correct? <See page 21>

- Even if the analog output is not used, make a proper range setting. Otherwise, "E4: RANGE OVER" occurs.
(Proper setting: MENU→SYSTEM→ANALOG INPUT/OUTPUT→"NOT USED")
Factory setting is "NOT USED".

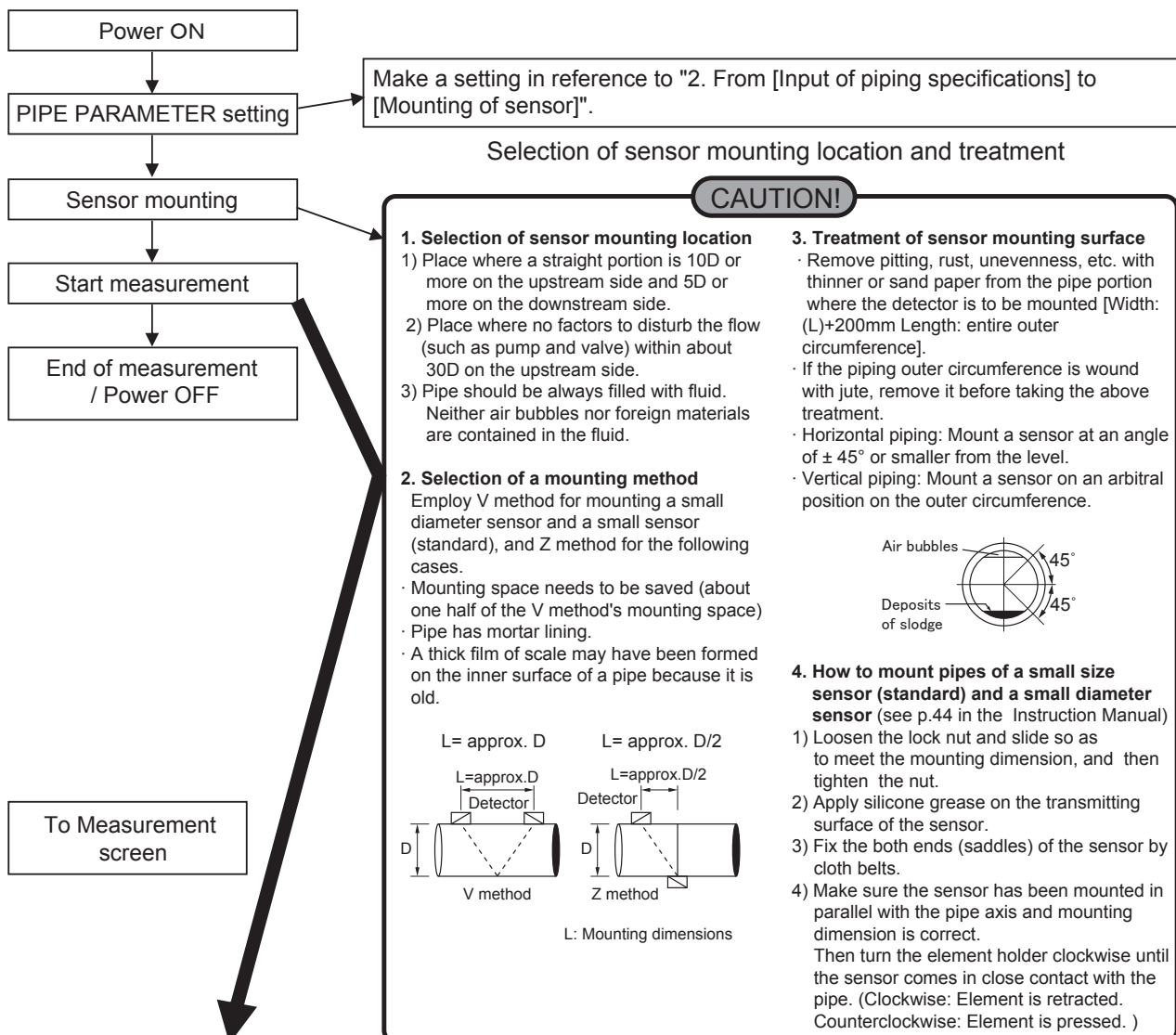
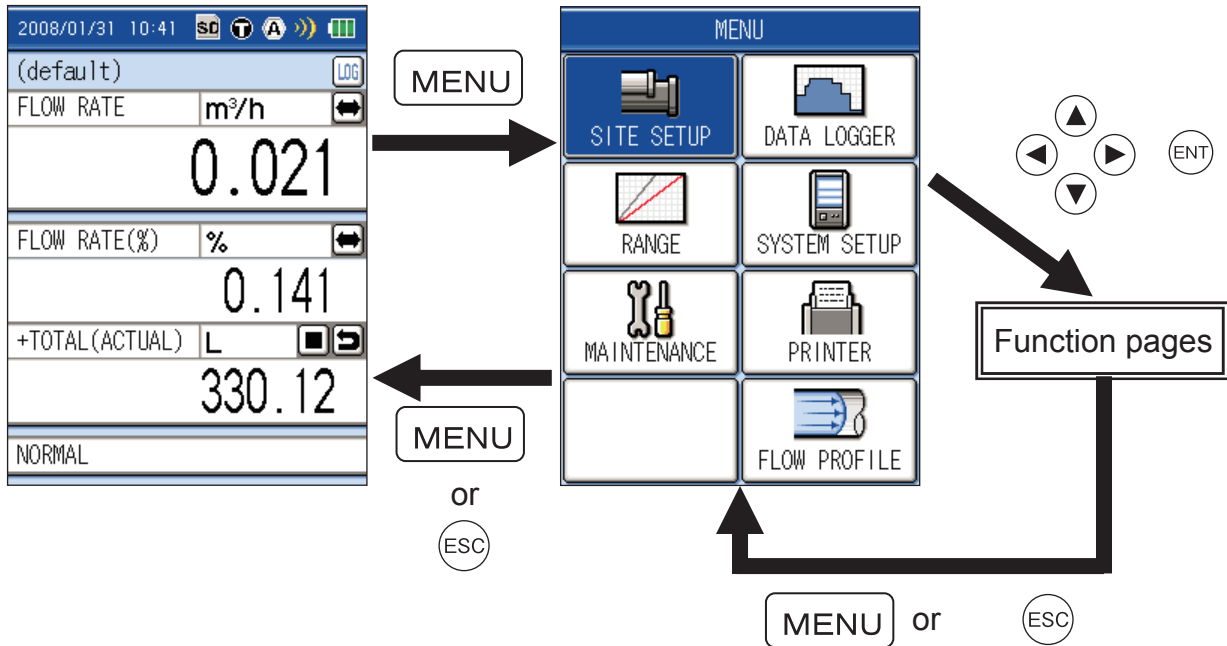
☆ Now preparation for measurement is complete. Make settings of TOTALIZER, DATA LOGGER, and PRINTER if needed.

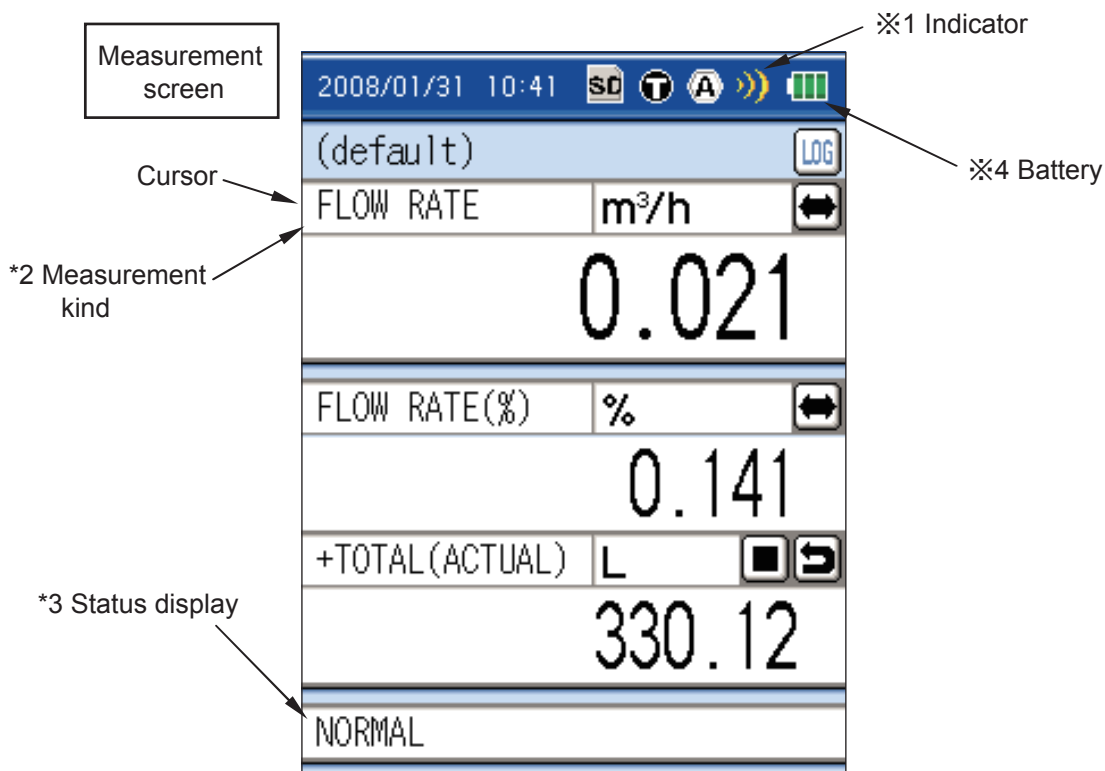
Is correct flow rate displayed? If an error message appears, move the cursor to "Status display" on the measurement screen press the "ENT" key.

Errors, causes and actions are displayed. Take actions according to the display.

1. Preparation for measurement

(1) Measurement procedure



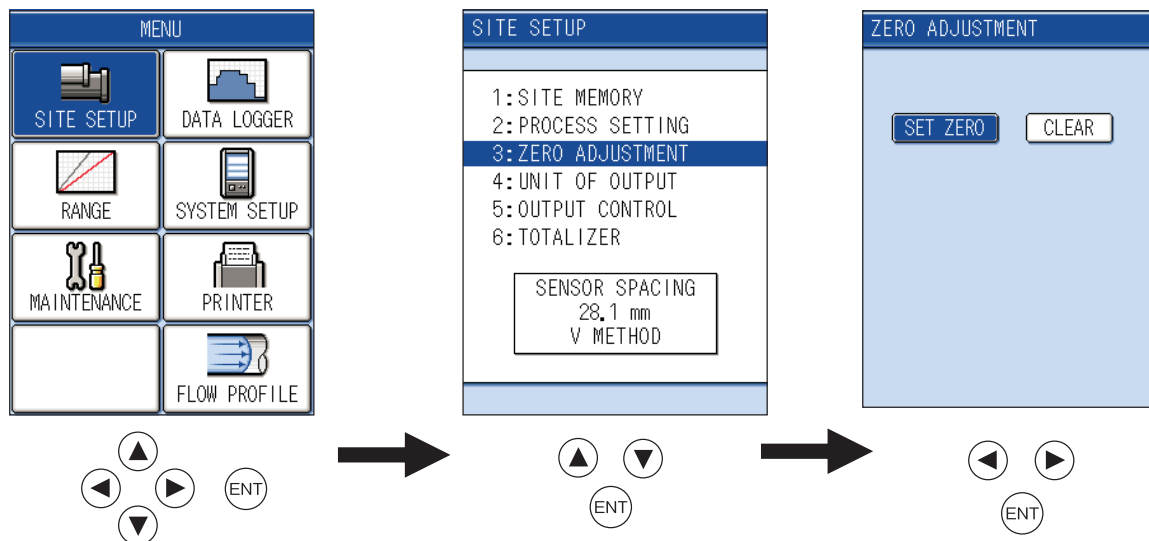


CAUTION!

- 1) Did you remove paint and rust on the piping surface?
- 2) Did you apply sufficient grease on the sensor surface?
- 3) Is there no air bubbles in the pipe?
- 4) Even if raise the transmission voltage, number of indicators does not increase due to, such as rust, scale and peeled lining in the pipe. Change the installation site.
- 5) If raise the transmission voltage, consumption of battery for operation measurement increases a bit. (No problem with measurement)

- *1 Indicator Shows the intensity of ultrasonic receiving signal in four levels. If signal decay is less than one, raise the transmission voltage. [See page 7]
- *2 Measurement kind ... Kind of measurement on the measurement screen can be changed. Move the cursor to the desired item and press the **ENT** key. Then the selection screen appears.
- Select from VELOCITY, FLOW RATE, FLOW RATE (%), +TOTAL, -TOTAL, ANALOG INPUT1, AND ANALOG INPUT2.
- *3 Status display If "NORMAL" is displayed with the sensor connected to a cable (for mounting only), there is no problem. If other messages are displayed, move the cursor to the Status display, and press the **ENT** key. Then the screen for corrective action appears. If there are several pages, **[▶]** is displayed in the lower right of the screen. Refer to displayed corrective actions and "12. ERROR AND REMEDY" in the Instruction Manual.
- *4 Battery Displays the remaining battery charge. Connect a attached AC power adapter to charge a battery.
- If the power of instrument is OFF, about three hours is required for charge.
 - If the power of instrument is ON, trickle charge is performed.

(2) Perform zero adjustment in a situation where the flow is stopped.

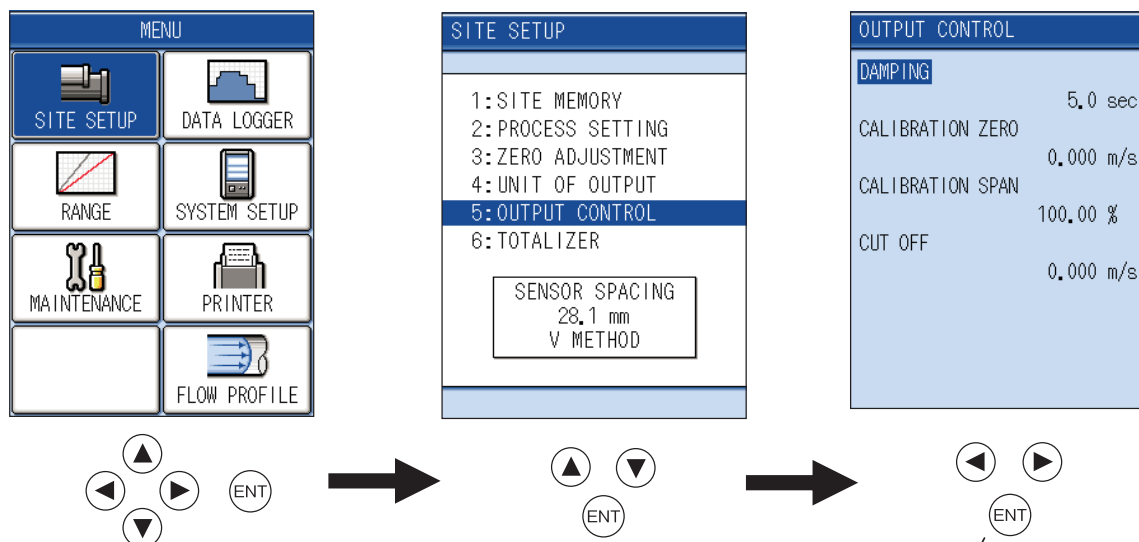


* "SET ZERO" should be performed in a situation where the flow is stopped, and "CLEAR" cancels adjustment.

CAUTION!

When PROCESS SETTING (ex. From NORMAL MODE to ANTI-DISTURBANCE MODE) is changed, make sure to perform zero adjustment (See page 94 in the Instruction Manual for details).

(3) Adjustment of indication fluctuation and CUT OFF

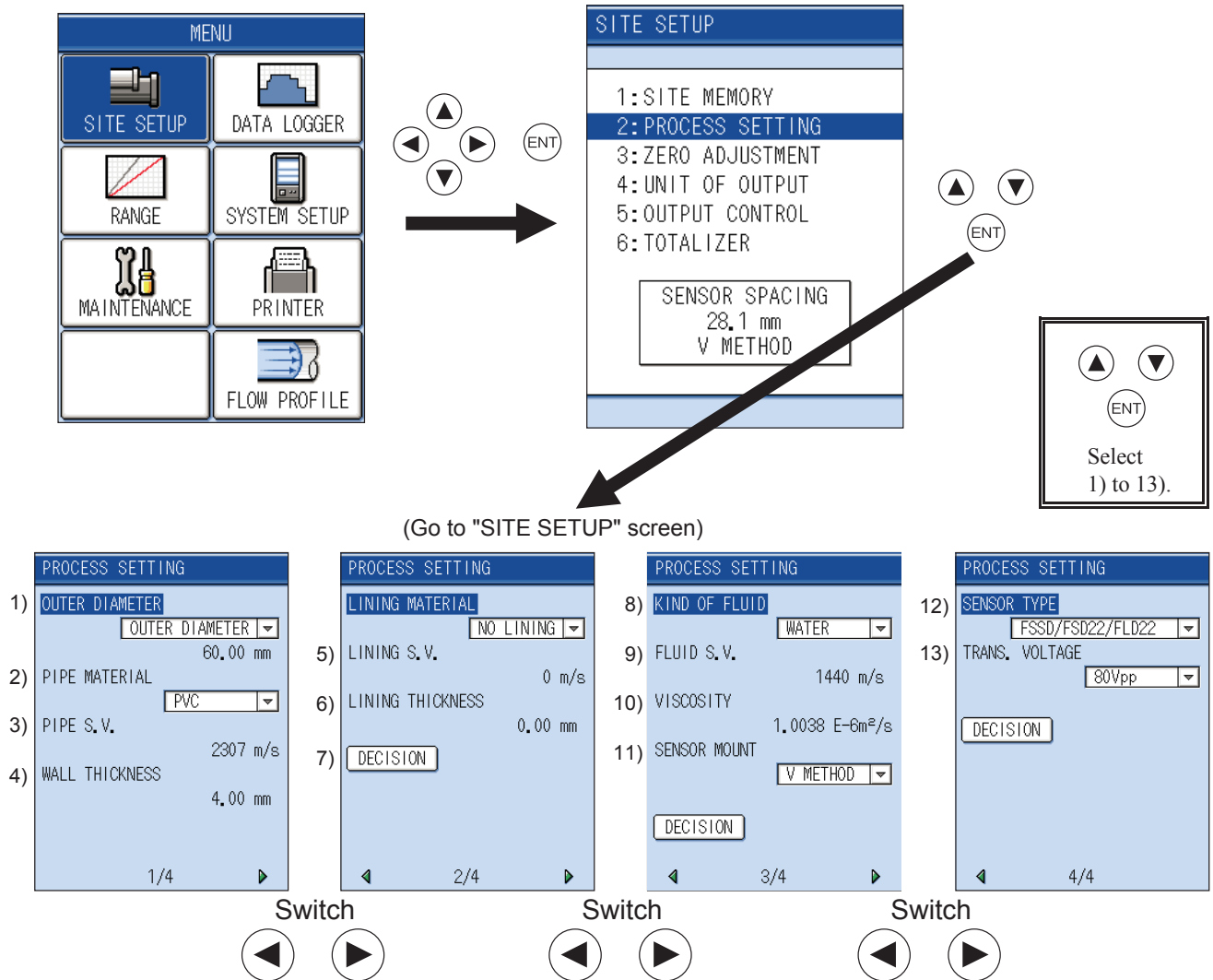


CAUTION!

* Output calibration
If this value is changed, output shifts according to the change.
For example, if 0.0% is set to SPAN, instantaneous flow rate does not change as 0.0.

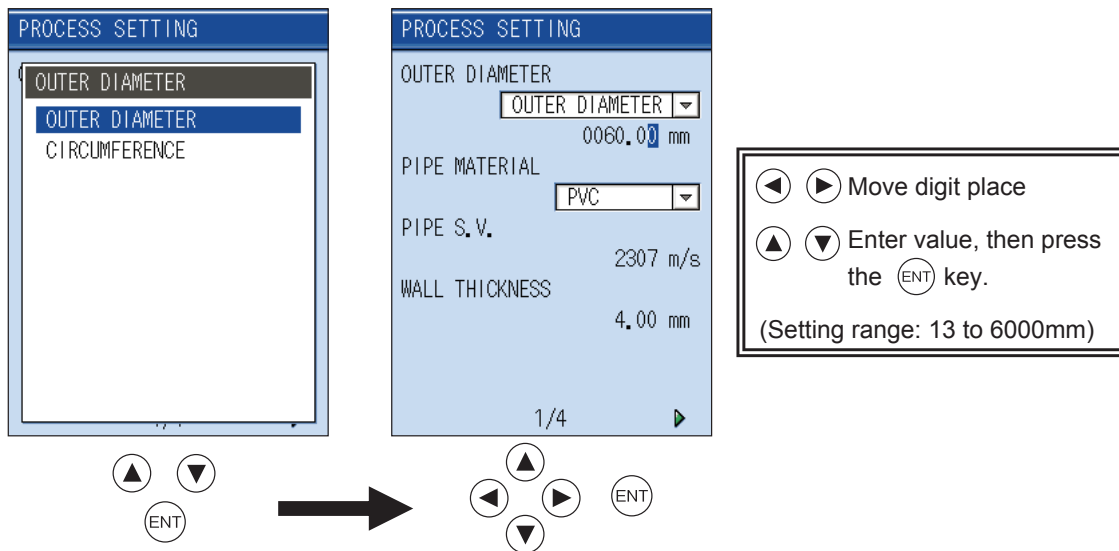
Indication fluctuation → NORMAL, DAMPING 3.0 to 5.0 sec.
Output calibration → NORMAL, CALIBRATION ZERO: 0.000m/s,
CALIBRATION SPAN: 100.00%.
CUT OFF → NORMAL, 0.010 to 0.030m/s.

2. From "Input of piping specifications" to "Mounting of sensor"



1) OUTER DIAMETER of piping

... Select OUTER DIAMETER or CIRCUMFERENCE, and input its dimension.



2) PIPE MATERIAL

PROCESS SETTING

OUTER DIAMETER

PIPE MATERIAL

- CARBON STEEL
- STAINLESS STEEL
- PVC
- COPPER
- CAST IRON
- ALUMINUM
- FRP
- DUCTILE IRON
- PEEK
- PVDF

▲ ▼

ENT

3) PIPE SOUND VELOCITY

PROCESS SETTING

OUTER DIAMETER

OUTER DIAMETER ▼

318.50 mm

PIPE MATERIAL

OTHERS ▼

PIPE S.V.

If set PIPE MATERIAL to "OTHERS", enter the value to "PIPE S.V.". (Setting range: 1000 to 3700m/s)

4) WALL THICKNESS

PROCESS SETTING

OUTER DIAMETER

OUTER DIAMETER ▼

318.50 mm

PIPE MATERIAL

CAST IRON ▼

PIPE S.V.

2604 m/s

WALL THICKNESS

004.00 mm

1/4

▲ ▼

◀ ▶

ENT

(Setting range: 0.01 to 100.00mm)

◀ ▶ Move a digit place

▲ ▼ Enter a value, then press the ENT key.

5) LINING MATERIAL

PROCESS SETTING

LINING MATERIAL

- NO LINING
- TAR EPOXY
- MORTAR
- RUBBER
- TEFLON
- PYREX GLASS
- PVC
- OTHERS

▲ ▼

ENT

6) LINING SOUND VELOCITY

LINING MATERIAL

OTHERS ▼

LINING S.V.

1000 m/s

LINING THICKNESS

0.01 mm

If set PIPE MATERIAL to "OTHERS", enter the value to "LINING S.V.". (Setting range: 1000 to 3700m/s)

7) LINING THICKNESS

PROCESS SETTING

LINING MATERIAL

MORTAR ▼

LINING S.V.

3000 m/s

LINING THICKNESS

000.01 mm

DECISION

2/4

▲ ▼

◀ ▶

ENT

(Setting range: 0.01 to 100.00mm)

◀ ▶ Move a digit place

▲ ▼ Enter a value, then press the ENT key.

8) KIND OF FLUID

PROCESS SETTING

KIND OF FLUID

WATER

SEAWATER

DIST. WATER

AMMONIA

ALCOHOL

BENZENE

BROMIDE

ETHANOL

GLYCOL

KEROSENE

▲ ▼

ENT

9) FLUID SOUND VELOCITY

KIND OF FLUID OTHERS

FLUID S.V. 1000 m/s

VISCOSITY 1.0038 E-6m²/s

SENSOR MOUNT V METHOD

If set "OTHERS" to KIND OF FLUID, enter the value to "FLUID S.V".

(Setting range: 500 to 2500m/s)

10) VISCOSITY

PROCESS SETTING

KIND OF FLUID OTHERS

FLUID S.V. 1000 m/s

VISCOSITY 001.0038 E-6m²/s

SENSOR MOUNT V METHOD

DECISION

3/4

▲ ▼

ENT

(Setting range: 0.001×10^{-6} to 999.999×10^{-6})

◀ ▶ Move a digit place

▲ ▼ Enter a value, then press the ENT key.

11) SENSOR MOUNT

PROCESS SETTING

SENSOR MOUNT

V METHOD

Z METHOD

▲ ▼

ENT

Select V method generally.
Select Z method for the following cases.

- Not enough mounting space
- High turbidity
- Weak wave receiving
- Thick scale inside a pipe

12) KIND OF SENSOR

PROCESS SETTING

SENSOR TYPE

FSD12/FLD12

FSSD/FSD22/FLD22

FSSH

FSSC

FSSF

FLD11/FSG31

FSG32

FSD32/FLD32

FSD41/FLD41/FSG41

FSD51/FLD51/FSG51

▲ ▼

ENT

13) TRANSMISSION VOLTAGE

PROCESS SETTING

TRANS. VOLTAGE

20Vpp

40Vpp

80Vpp

160Vpp

▲ ▼

ENT

Raise the transmission voltage so that 2 or more indicators turn on.
Set 40 or 80Vpp for general use.

14) DISPLAY OF MOUNTING DIMENSIONS

After you finish the site setting on establish site screen, "Decision" is reversed from white to blue by pressing ENT key.

Display the message "After sensor installation, please adjust "Zero point", turn back to "SITE SETUP" screen.

At the last line the "SENSOR SPACING" value is display. Install the sensor according to the mounting dimension is as displayed on the last time.

Reference "Data of various fluids"

* Sound velocity and density various fluids

Name of liquid	T°C	$\rho g/cm^3$	Vm/s
Acetone	20	0.7905	1190
Aniline	20	1.0216	1659
Alcohol	20	0.7893	1168
Ether	20	0.7135	1006
Ethylene glycol	20	1.1131	1666
n-octane	20	0.7021	1192
o-xylene	20	0.871	1360
Chloroform	20	1.4870	1001
Chlorobenzene	20	1.1042	1289
Glycerin	20	1.2613	1923
Acetic acid	20	1.0495	1159
Methyl acetate	20	0.928	1181
Ethyl acetate	20	0.900	1164
Cyclohexane	20	0.779	1284
Dithionic acid	20	1.033	1389
Heavy water	20	1.1053	1388
Carbon tetrachloride	20	1.5942	938
Mercury	20	13.5955	1451
Nitrobenzene	20	1.207	1473
Carbon disulfide	20	1.2634	1158
Chloroform	20	2.8904	931
n-propyl alcohol	20	0.8045	1225
n-pentane	20	0.6260	1032
n-hexane	20	0.654	1083
Light oil	25	0.81	1324
Transformer oil	32.5	0.859	1425
Spindle oil	32	0.905	1342
Petroleum	34	0.825	1295
Gasoline	34	0.803	1250
Water	13.5	1.	1460
Sea water (salinity: 3.5%)	16	1.	1510

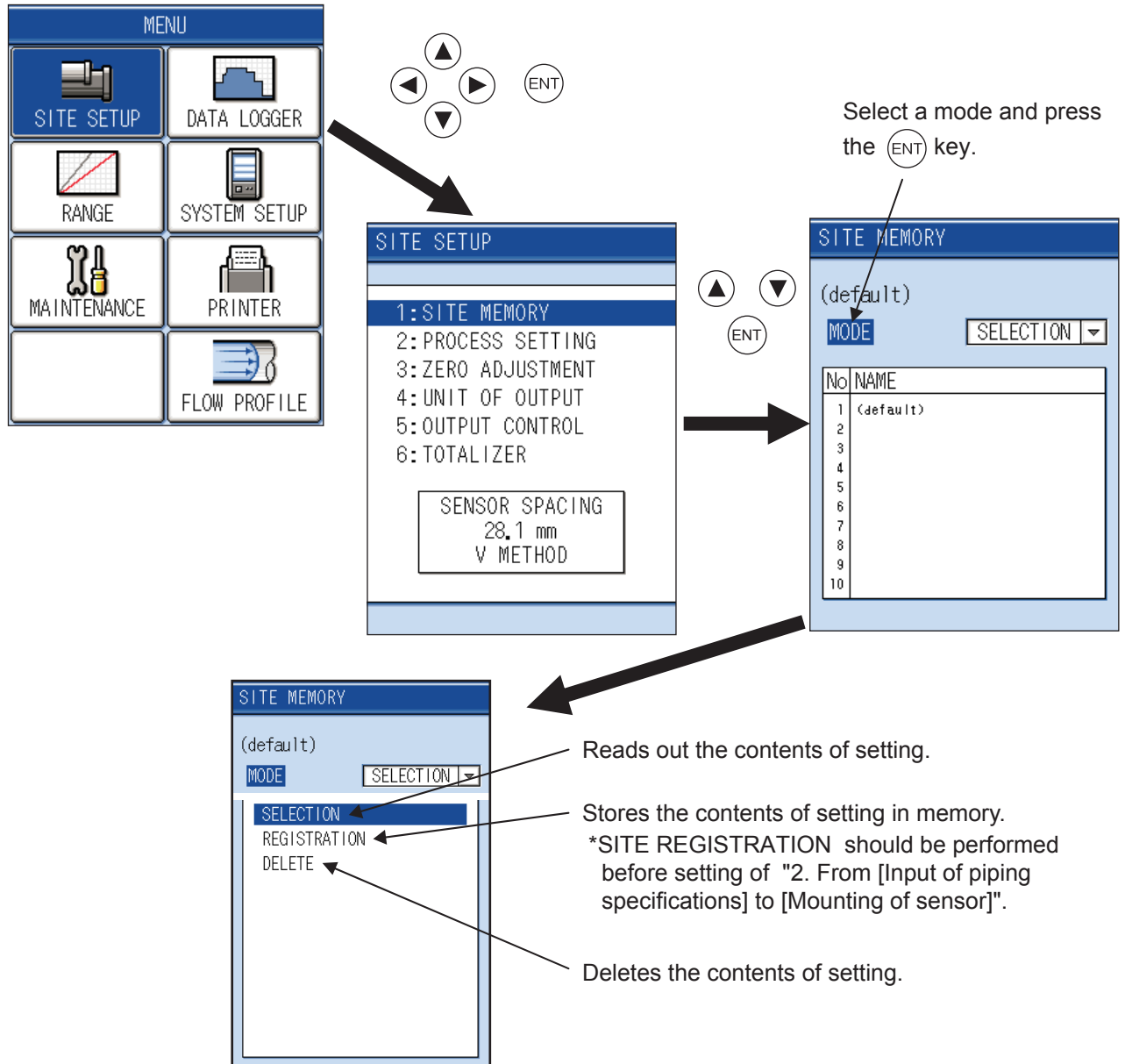
* Sound velocity per piping material

Material	Vm/s
Steel	3000
Ductile cast iron	3000
Cast iron	2604
Stainless steel	3141
Copper	2260
Lead	2170
Aluminum	3080
Brass	2050
Vinylchloride	2307
Acrylics	2644
FRP	2505
Mortar	3000
Tar epoxy	2505
Polyethylene	1900
Teflon	1240
Rubber	1510
Ryrex glass	3280

* Dynamic viscosity coefficient of various fluids

Name of liquid	T°C	$\rho g/cm^3$	Vm/s	$\nu (\times 10^{-6} m^2/s)$
Acetone	20	0.7905	1190	0.407
Aniline	20	1.0216	1659	1.762
Ether	20	0.7135	1006	0.336
Ethylene glycol	20	1.1131	1666	21.112
Chloroform	20	1.4870	1001	0.383
Glycerin	20	1.2613	1923	1188.5
Acetic acid	20	1.0495	1159	1.162
Methyl acetate	20	0.928	1181	0.411
Ethyl acetate	20	0.900	1164	0.499
Heavy water	20	1.1053	1388	1.129
Carbon tetrachloride	20	1.5942	938	0.608
Mercury	20	13.5955	1451	0.114
Nitrobenzene	20	1.207	1473	1.665
Carbon disulfide	20	1.2634	1158	0.290
n-pentane	20	0.6260	1032	0.366
n-hexane	20	0.654	1083	0.489
Spindle oil	32	0.905	1324	15.7
Gasoline	34	0.803	1250	0.4 to 0.5
Water	13.5	1.	1460	1.004(20°C)

3. How to register and read out set data



(1) How to read out set data from SITE MEMORY

1) Select "SELECTION".

SITE MEMORY

MODE

SELECTION

REGISTRATION

DELETE

2) Select a desired "SITE Name".

SITE MEMORY

PV1

MODE

SELECTION

No NAME

1 (default)

2 PV1

3

4

5

6

7

8

9

10

3) Press **ENT** to start read out.

SITE MEMORY

PV1

MODE

SELECTION

No NAME

1 (default)

2 PV1

3

4

5

6

7

8

9

10

(2) How to register site data to the memory

* SITE REGISTRATION should be performed before setting of "2. From [Input of piping specifications] to [Mounting of sensor]".

1) Select "REGISTRATION".

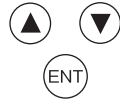
SITE MEMORY

MODE

SELECTION

REGISTRATION

DELETE



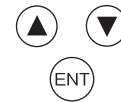
2) Select a desire "No.".

SITE MEMORY

PV1

MODE **REGISTRATION**

No	NAME
1	(default)
2	PV1
3	
4	
5	
6	
7	
8	
9	
10	



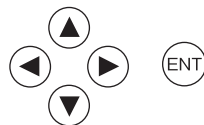
4) Press **ENT** to register set data.

SITE MEMORY

PV2

MODE **SELECTION**

No	NAME
1	(default)
2	PV1
3	PV2
4	
5	
6	
7	
8	
9	
10	



3) Enter a SITE NAME.

REGISTRATION

PV2

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890@_

BS CAN **END**

After entry, select "END" and press **ENT** the key.

(3) How to delete set data from SITE MEMORY

1) Select "DELETE".

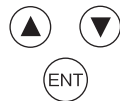
SITE MEMORY

MODE

SELECTION

REGISTRATION

DELETE



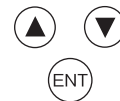
2) Select a "No." to be deleted.

SITE MEMORY

PV2

MODE **DELETE**

No	NAME
1	(default)
2	PV1
3	PV2
4	
5	
6	
7	
8	
9	
10	



3) Press "YES" to delete.

SITE MEMORY

PV2

MODE **DELETE**

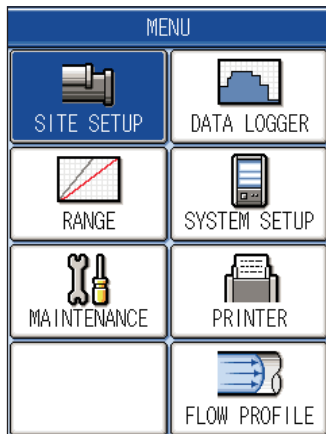
No	NAME
1	(default)
2	PV1
3	PV2
4	
5	
6	
7	
8	
9	
10	

DELETE?

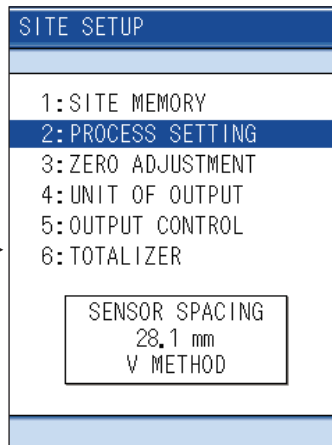
NO YES

4. Measurement of fluid which sound velocity is unknown

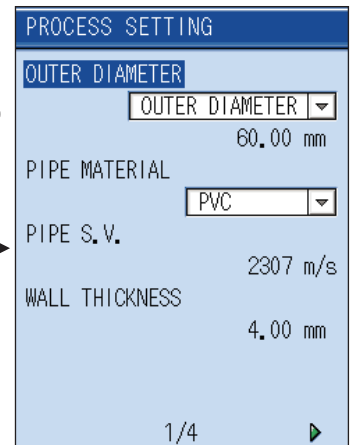
1) Select "SITE SETUP" from "MENU".



2) Select "PROCESS SETTING".



3) Set each item.



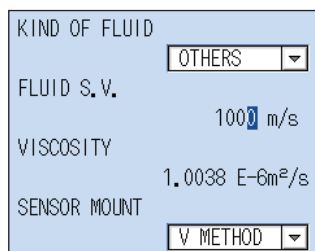
Refer to the section "Input procedure of PIPE PARAMETER" for details.

4) Measurement of unknown fluid

Set the sound velocity and dynamic viscosity coefficient of approximate fluid (soluble fluid is water) provisionally. (Refer to "Data of various fluids" in page 8)

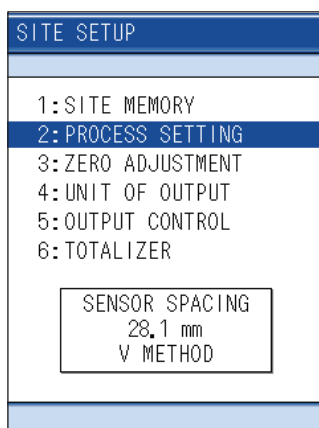
If sound velocity is unclear, set the sound velocity provisionally within the range between 500 to 2500m/s in a staircase pattern.

2500($\times 0.84$) $\rightarrow$ 2100($\times 0.84$)...in the same way $\rightarrow$ 1764 $\rightarrow$ 1482 $\rightarrow$ 1245 $\rightarrow$ 1046 $\rightarrow$ 878 $\rightarrow$ 738 $\rightarrow$ 620 $\rightarrow$ 521m/s



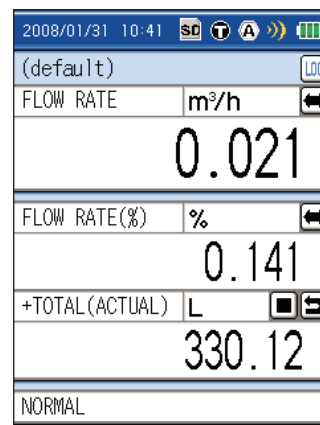
For example, when acetic acid concentration is 60%, enter the sound velocity (1159m/s) and dynamic viscosity coefficient ($1.162 \times 10^{-6} \text{ m}^2/\text{s}$) according to the "Data of various fluids" in page 8.

5) Sensor mounting



After PIPE PARAMETER input, check dimension and then mount a sensor.
 $\Phi 50$: 1mm difference is approx. 1% error
 $\Phi 500$: 1mm difference is approx. 0.1% error.

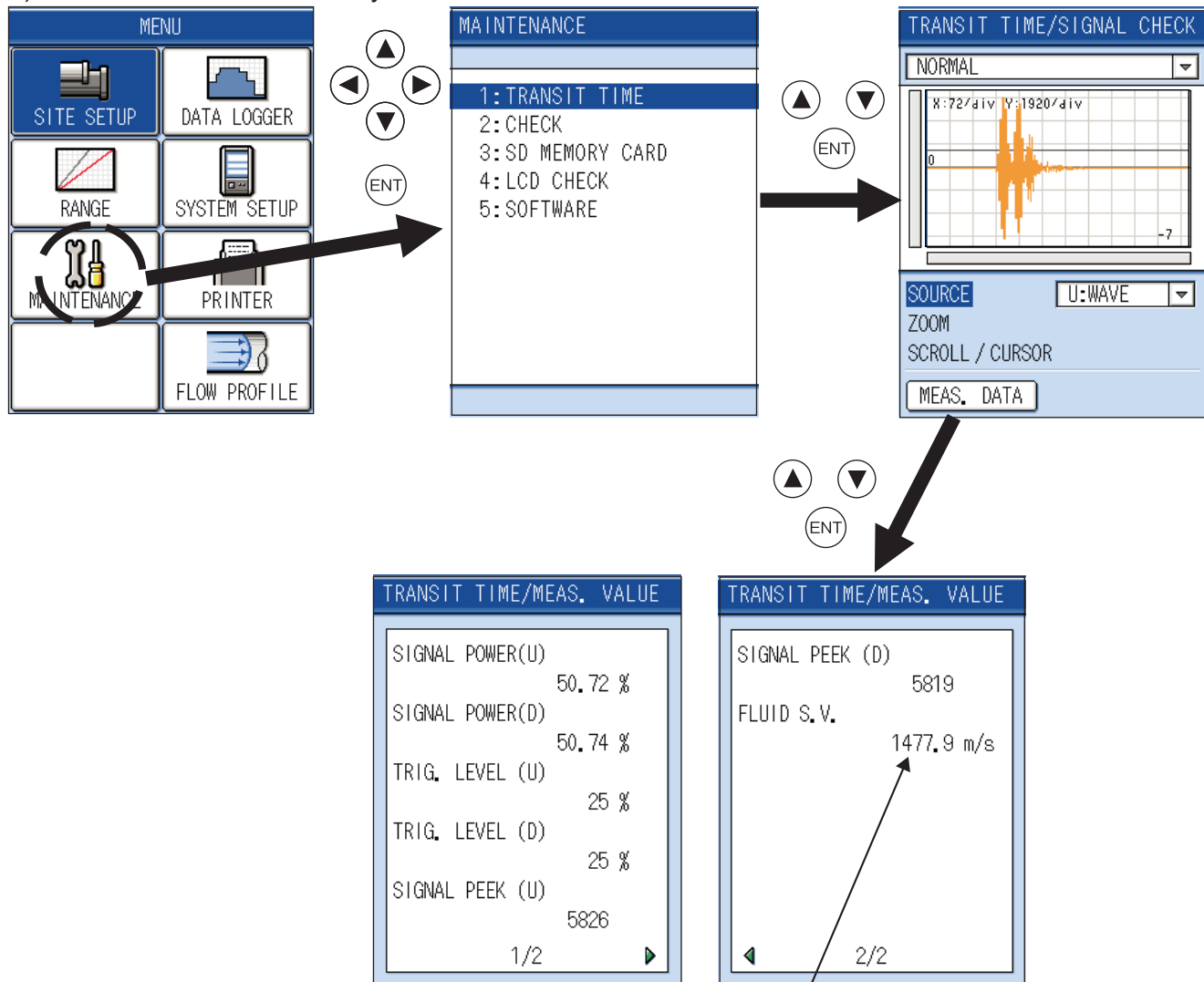
6) Check of receiving signal strength and status display



If the following errors occur, repeat the procedure 4) and 5) until "NORMAL" is displayed.

- No received signal
- Window scanning
- Received signal is over flow is displayed,

7) Check of fluid sound velocity

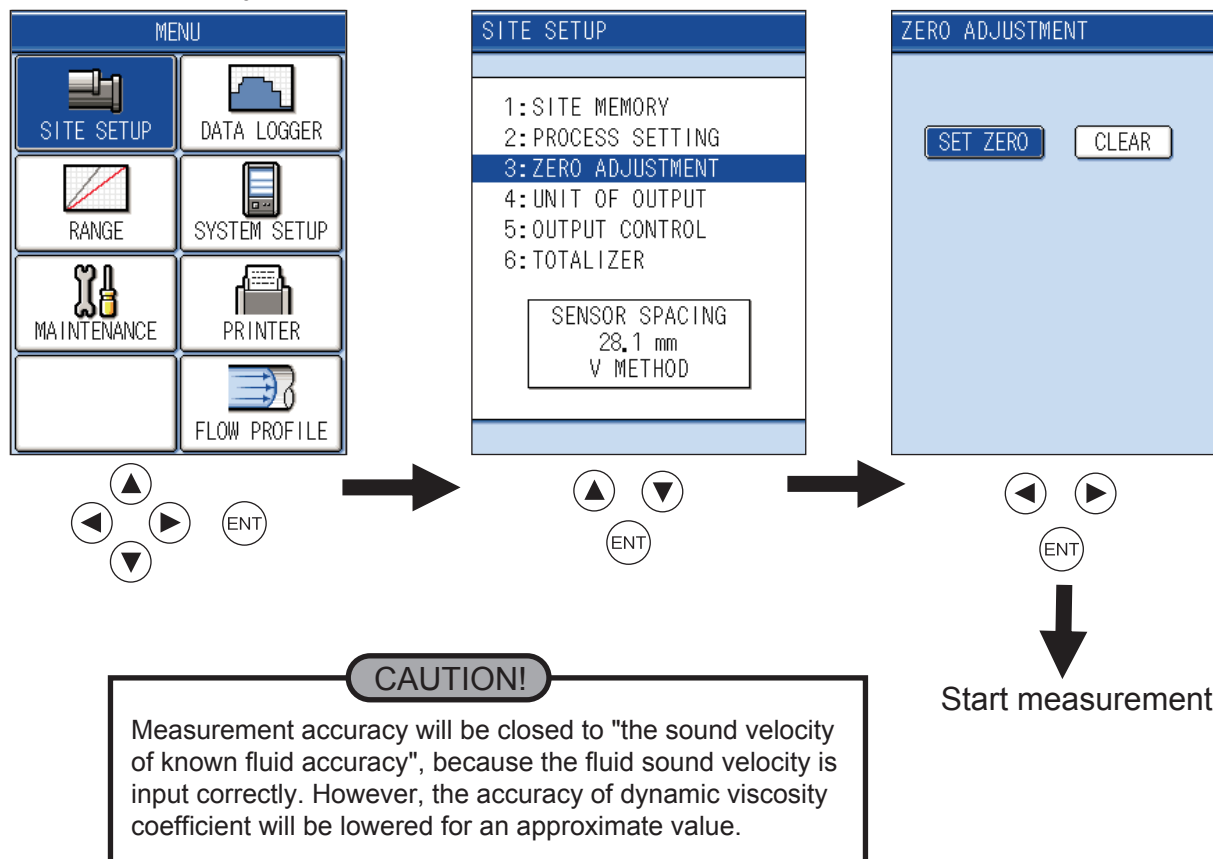


8) Set the "S.V." and "VISCOSITY" of unknown fluid

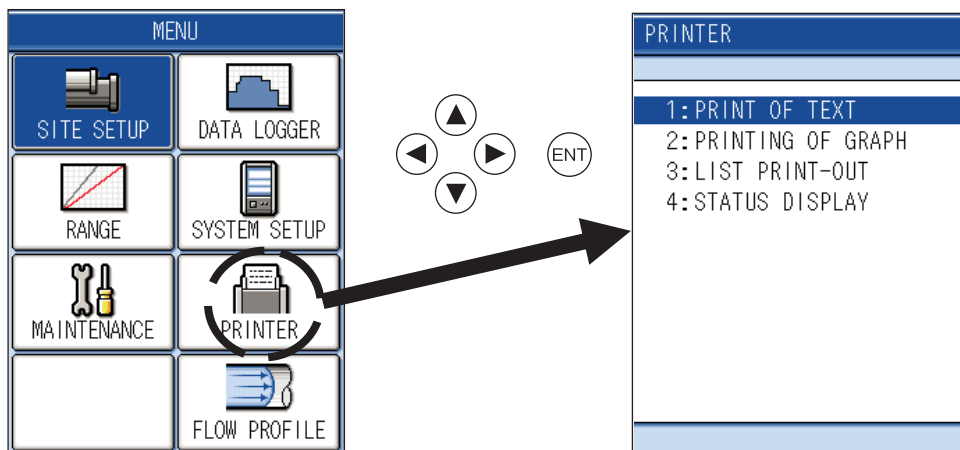
KIND OF FLUID	OTHERS
FLUID S.V.	1000 m/s
VISCOSITY	1.0038 E-6m ² /s
SENSOR MOUNT	V METHOD

Enter the FLUID S.V. written down in the procedure 7) to the FLUID V.S. in the PROCESS SETTING screen.
Set the dynamic viscosity coefficient of unknown fluid and approximate fluid according to "Data of various fluids" in page 8.
(Note that it is not an actually-measured dynamic viscosity coefficient of fluid)

9) Perform zero adjustment in a situation where the flow is stopped.



5. Printing mode selection (optional)



1: Printing of text → Prints text data for selected KIND in industrial value.

1) Check the box of desired item.

PRINT OF TEXT

KIND TIMER

☐ VELOCITY

☒ FLOW RATE

☐ FLOW RATE(%)

☐ +TOTALIZER

☐ -TOTALIZER

☐ AI CHANNEL 1

☐ AI CHANNEL 2

1/2

2) Check the box of desired item.

PRINT OF TEXT

KIND TIMER

☒ SUPPLY TEMP.

☐ RETURN TEMP.

☐ TEMP DIFFERENCE

☐ THERMAL FLOW

☐ THERMAL FLOW(%)

☐ +TOTAL(THERMAL)

☐ -TOTAL(THERMAL)

2/2

3) Set a TIMER MODE and CYCLE.

PRINT OF TEXT

KIND TIMER

MODE

☒ MANUAL

☐ FIXED TIME 00:30

☐ TIMER

START TIME 2008/07/17 10:01

STOP TIME 2008/07/17 10:51

CYCLE 00:01

START

4) Press START to start printing.

PRINT OF TEXT

KIND TIMER

MODE

☒ MANUAL

☐ FIXED TIME 00:30

☐ TIMER

START TIME 2008/07/17 10:01

STOP TIME 2008/07/17 10:51

CYCLE 00:01

START

Setting range: 1min. to 24hrs.

MANUAL : Press "START" to start printing.
 FIXED TIME : Press "START" to perform printing during selected time.
 TIMER : Print by specifying START TIME, STOP TIME, and CYCLE.

When start printing, "START" button will change to "STOP".

Printing of text

PRINT OF TEXT

START DATE: 2008/07/17

TIME: 09:58:15

CYCLE: 00:01

KIND: FLOW RATE

2008/07/17 09:58:15

+0.0123 m3/h

NORMAL

Print cycle

Measurement condition

Selected type

2: Printing of graph → Print data for selected KIND in graph.

1) Check the box of desired item.

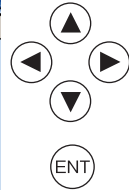
2) Set the min/max value.

3) Set a TIMER MODE and CYCLE.

PRINTING OF GRAPH

KIND SCALE TIMER

☒ VELOCITY
☐ FLOW RATE
☐ FLOW RATE(%)
☐ AI CHANNEL 1
☐ AI CHANNEL 2
☐ SUPPLY TEMP.
☐ RETURN TEMP.
☐ TEMP DIFFERENCE
☐ THERMAL FLOW
☐ THERMAL FLOW(%)

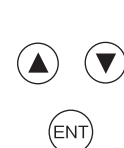


PRINTING OF GRAPH

KIND SCALE TIMER

MAXIMUM VALUE OF DATA
100 m/s

MINIMUM VALUE OF DATA
0 m/s



PRINTING OF GRAPH

KIND SCALE TIMER

MODE
☒ MANUAL
☐ FIXED TIME 00:30
☐ TIMER

START TIME
2008/07/17 10:20

STOP TIME
2008/07/17 11:10

CYCLE
00:00:01

START

4) Press START to start printing.

PRINTING OF GRAPH

KIND SCALE TIMER

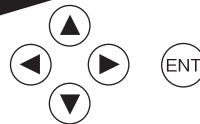
MODE
☒ MANUAL
☐ FIXED TIME 00:30
☐ TIMER

START TIME
2008/07/17 10:20

STOP TIME
2008/07/17 11:10

CYCLE
00:00:01

START

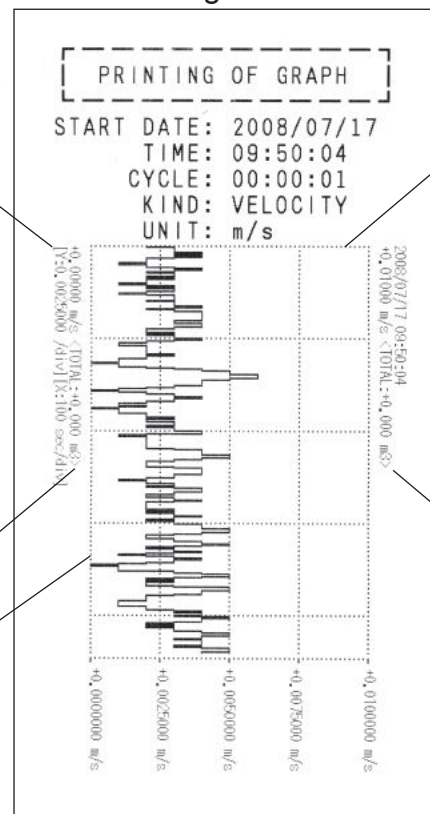


Setting range: 1sec. to 24hrs.

MANUAL : Press "START" to start printing.
 FIXED TIME: Press "START" to perform printing during selected time.
 TIMER : Print by specifying START TIME, STOP TIME, and CYCLE.

When start printing, "START" button will change to "STOP".

Printing of text



4: STATUS DISPLAY→ Display the status of printer and perform test printing.

LIST PRINT-OUT

LIST KIND

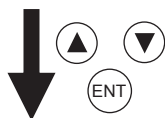
☐ SITE SETTING

NAME >(default)

☐ RANGE

☐ SYSTEM

START



```

[-----]
LIST PRINT-OUT
[-----]

[ SITE SETUP ]
< SITE MEMORY >
[ SITE No. ] 1 / 32
[ SITE NAME ] (default)

< PROCESS SETTING >
[ OUTER DIAMETER ]
[ CIRCUMFERENCE ] 157.08 mm
[ PIPE MATERIAL ] ACRYLIC

[ RANGE ]

< INPUT RANGE >
[ CH1 ]
[ BASE SCALE ] +0.000
[ FULL SCALE ] +100.000

[ SYSTEM SETUP ]

< BASIC SETUP >
[ DATE DISPLAY ] YYYY/MM/DD
[ SYSTEM UNIT ] METRIC
[ LCD POWER OFF ] 0
[ DEF. OF PRINT KEY ] SD MEMORY

```



STATUS DISPLAY

STATUS INFO : NORMAL

TEST PRINT

↓ (ENT)

```
SAM-1245 Interface
[ Ver. 1.11 ] 26.Mar.2001
Copyright(C) : SII
*****
* FUNCTION SELECT *
1..4)Data Input:Serial
    Parity=None / 38400bps.
5)Bit length:8bit
6)Data control:Busy
* Head Rank:B
* Extend RAM:32KByte
* Kanji char. enable
* User-defined char.
    enable
* Download char. enable

* TEST PRINT *
!"#$%&'()*+,-./01234567
89:;<=>?@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[¥]^_`abcdefg
hijklmnopqrstuvwxyz{|}~_
■■■■■| | | | | + + + + + - - - | l r
「」、「」、・アイウエオヤヨツヅ
アイウエオカキクケコサシスセソタチツテナニヌネ
ノハヒフヘホマミムメモヤヨロリルレロワッ°°=
■▲▼◆♥♦♣●○／×年月日時分秒〒
```

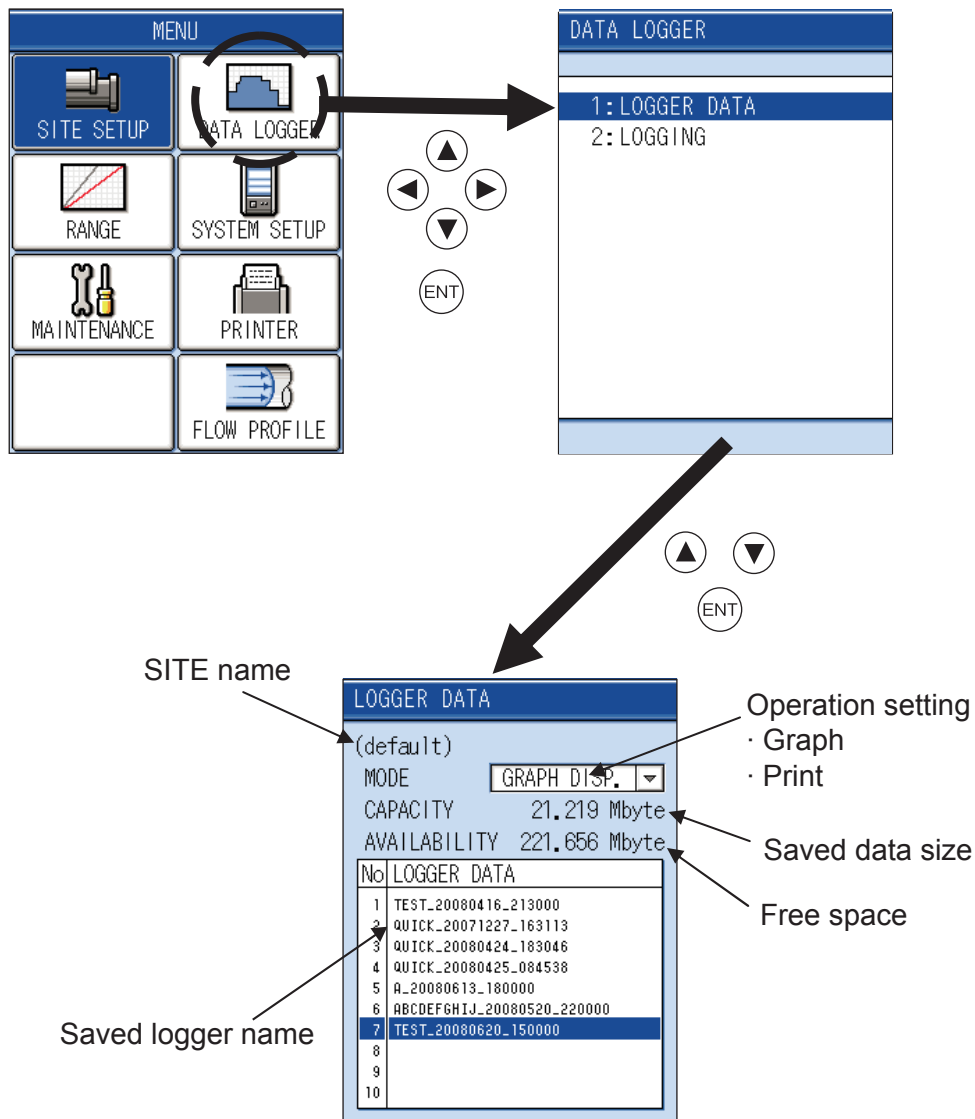
6. Data logger setting

Logging (recording) function setting ... This function allows you to display or print out saved data after measurement.

CAUTION

SD card is required to set the logging function.

Recording capacity ... SD card (256MB): data for approx. a year can be saved, if saving cycle is 30sec. and data being saved is 14 types.



(1) Logging of measured data

1) Select "LOGGING" and press the **ENT** key

DATA LOGGER	
1: LOGGER DATA	
2: LOGGING	

2) Register the place or the pipe name for logging.

LOGGING	
NAME	KIND
A B C D E F G H I J K L M	
N O P Q R S T U V W X Y Z	
a b c d e f g h i j k l m	
n o p q r s t u v w x y z	
1 2 3 4 5 6 7 8 9 0 @ _	
BS CAN END	

3) Select a KIND of data.

LOGGING	
NAME	KIND
☒	VELOCITY
☒	FLOW RATE
☒	FLOW RATE(%)
☒	+TOTAL(ACTUAL)
☒	-TOTAL(ACTUAL)
☐	ANALOG INPUT 1
☐	ANALOG INPUT 2

1/2

5) This is the logger mode selection screen.

CONTINUOUS mode
This mode is to perform logging in a fixed period from start date and time to stop date and time.
INTERNAL: 10sec. to 24hrs.

SET TIME mode
This is the mode to perform logging only during a certain time zone of a day between the start date and stop date.
INTERNAL: 10sec. to 23hrs.

LOGGING	
NAME	KIND
CONTINUOUS.	SET TIME
START TIME	2008/07/16 14:34
STOP TIME	2008/07/16 15:24
INTERVAL	00:00:10
START	

4) Select a KIND of data.

LOGGING	
NAME	KIND
☐	SUPPLY TEMP.
☐	RETURN TEMP.
☐	TEMP DIFFERENCE
☐	THERMAL FLOW
☐	THERMAL FLOW(%)
☐	+TOTAL(THERMAL)
☐	-TOTAL(THERMAL)

2/2

6) Select a mode and set START/STOP TIME or INTERNAL.

LOGGING	
NAME	KIND
CONTINUOUS.	SET TIME
PERIOD	2008/07/16 - 2008/07/16
START TIME	00:00
STOP TIME	00:00
INTERVAL	00:00:10
START	

After setting, select "START" and press the **ENT** key.

Start logging

CAUTION

- In case of ENERGY MODE is "NOT USED", settings are invalid even if SUPPLY TEMP. and subsequent items have been selected.
- Even if unit is changed after start of logging, unit at start is used for logging.
- Logging can not start, if the set time has passed the time of the main unit clock. Have a margin of time for START TIME setting.

(2) Logged data checking and printing

- 1) Select "LOGGER DATA" and press the  key.

[illegible]

- 2) Select "MODE" and press the  key.

LOGGER DATA

(default)

MODE GRAPH DISP.

CAPACITY 21.219 Mbyte

AVAILABILITY 221.656 Mbyte

No	LOGGER DATA
1	TEST_20080416_213000
2	QUICK_20071227_163113
3	QUICK_20080424_183046
4	QUICK_20080425_084538
5	A_20080613_180000
6	ABCDEFGHJIJ_20080520_220000
7	TEST_20080620_150000
8	
9	
10	

- 3) Select "GRAPH" and press the ENT key.

- 5) Press "PRINT" to start printing.

LOGGER DATA

TEST_20080620_150000

2008/06/20 15:00 - 2008/06/30 23:00

INTERVAL : 00:00:10

X:5/div Y:0.008/div

0.0075 m³/h

SOURCE FLOW RATE

ZOOM

SCROLL / CURSOR

PRINT

- 4) Select data to be check and press the  key.

LOGGER DATA

(default)

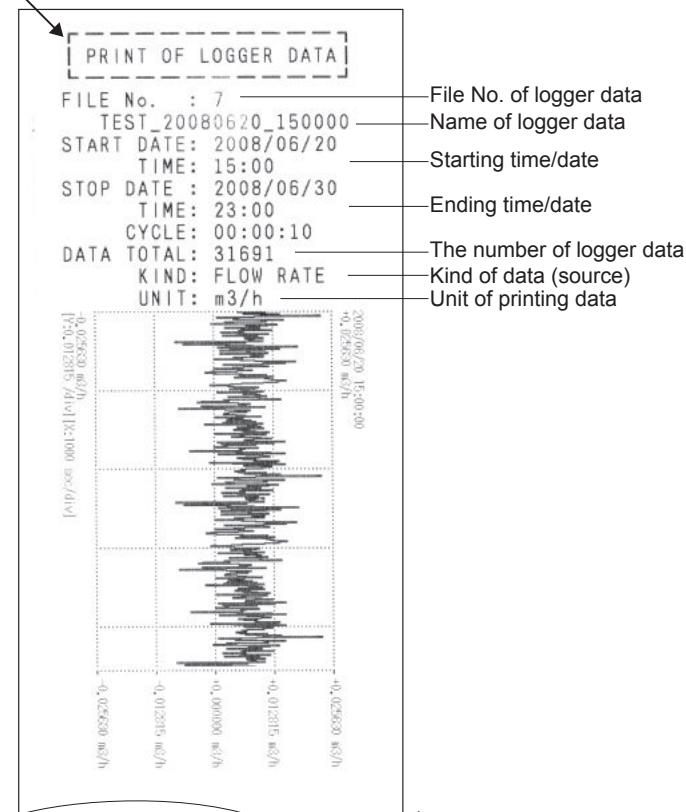
MODE GRAPH DISP.

CAPACITY 21.219 Mbyte

AVAILABILITY 221.656 Mbyte

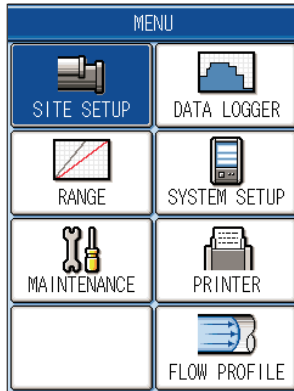
No	LOGGER DATA
1	TEST_20080416_213000
2	QUICK_20071227_163113
3	QUICK_20080424_183046
4	QUICK_20080425_084538
5	A_20080613_180000
6	ABCDEFGH IJ_20080520_220000
7	TEST_20080620_150000
8	
9	
10	

IF PRINT is selected, data is printed out in a text format. Refer to 10.2.4 (2) in the Instruction Manual.

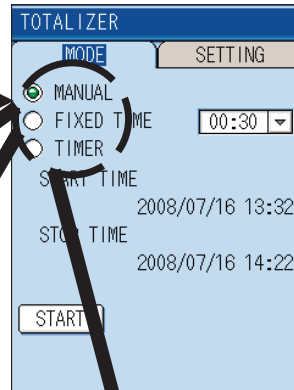
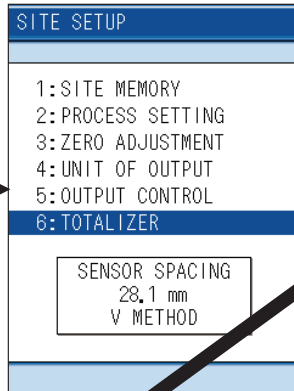


7. How to start and stop totalizing of flow rate

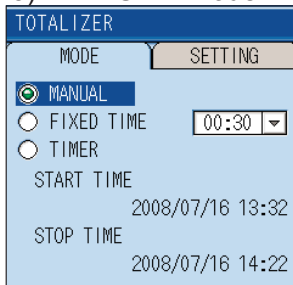
1) Select "SITE SET UP" from MENU.



2) Select "TOTALIZER".

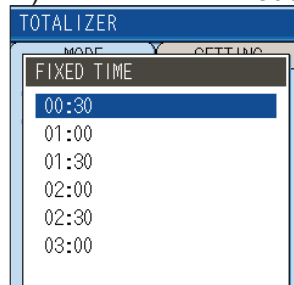


3) "MANUAL" mode



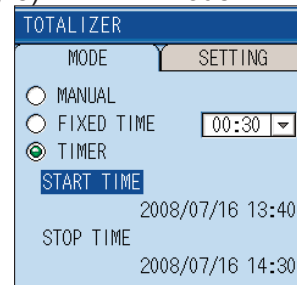
When press "START", totalizing will start, and operation continues until "STOP" is pressed.

4) "FIXED TIME" mode



When press "START", totalizing will start. Totalizing is performed only during a selected period and stopped automatically.

5) "TIMER" mode

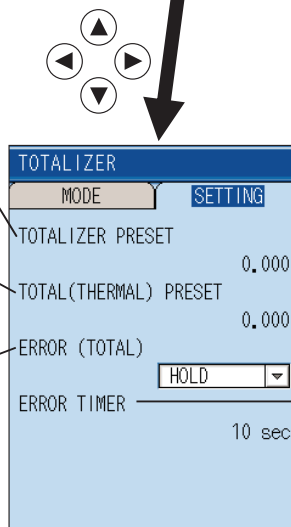


Set a time to start and to stop, and press "START" to start. Totalizing is performed during a set period.

Presets a flow rate total to restart totalizing. (Setting range: 0.000 to 9999999999)

Presets a total heat quantity to restart totalizing. (Setting range: 0.000 to 9999999999. Refer to 10.3.3 in the Instruction Manual for Energy Mode.)

Sets a totalizing process at error occurrence on the measurement status.
HOLD → Stops totalizing.
NOT USED → Uses the flow rate before error occurrence.

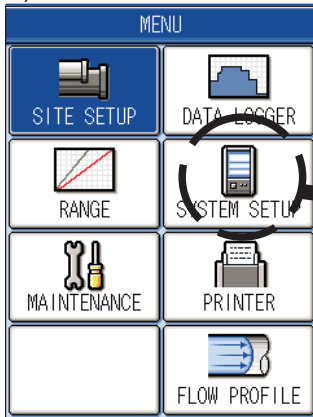


Set a time from error occurrence to the start of error processing. (Setting range: 0 to 900sec.)

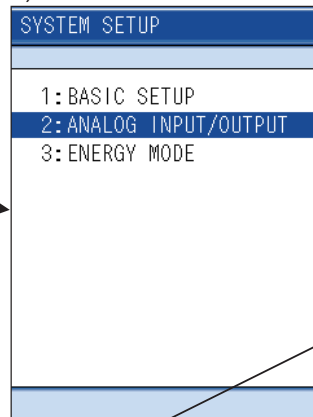
8. Analog input/output setting

(1) Basic set up

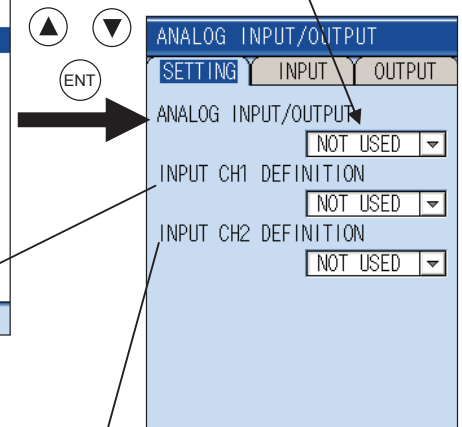
1) Select "SYSTEM" from "MENU".



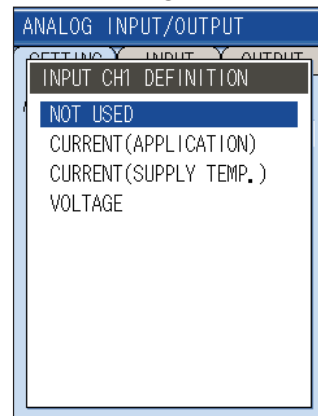
2) Select "ANALOG INPUT/OUTPUT".



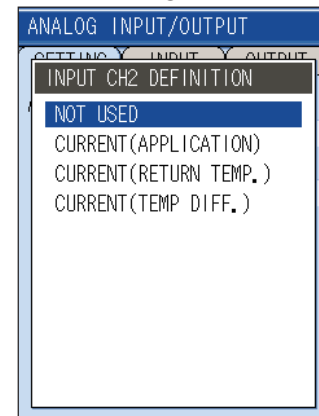
Select "USED" when you use analog input or output.



4) Select an INPUT CH1 DEFINITION.

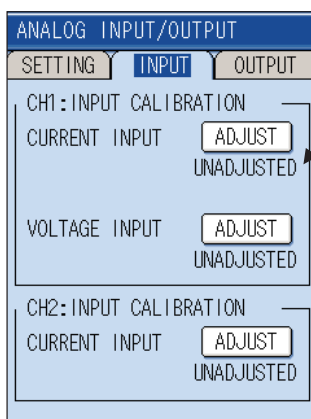


5) Select an INPUT CH2 DEFINITION.



(2) Input channel calibration

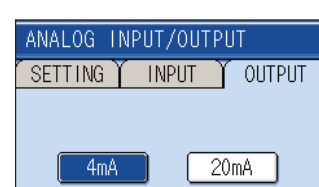
Perform zero/span calibration of input signals.
A current generator is required for calibration.



Display calibration status
Adjusted: Calibrated
Unadjusted: Not calibrated

(3) Output channel calibration

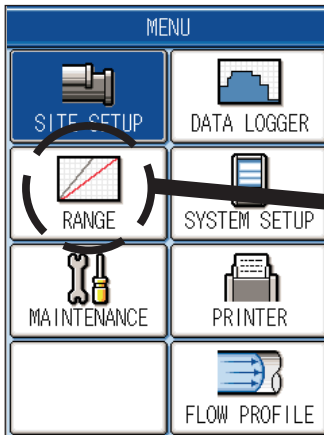
Perform zero/span calibration of output signals.
A current generator is required for calibration.



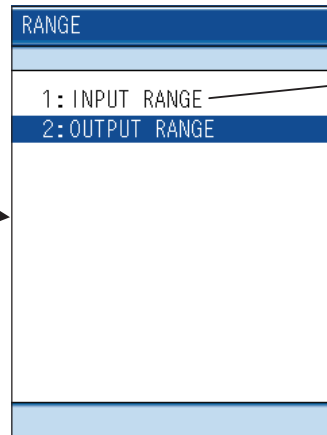
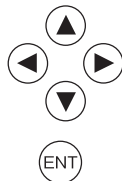
◀ ▶ Select 4mA or 20mA.
↓
ENT Determine.
↓
▲ ▼ Calibrate to 4mA or 20mA
↓
ENT Determine.

(4) Range setting

1) Select "RANGE" from "MENU".



2) Select "OUTPUT RANGE".



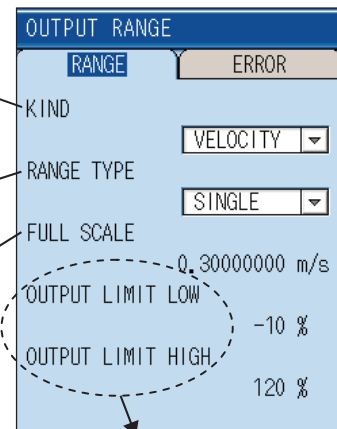
Refer to 10.4.1 in the Instruction Manual for Analog input range.



Set a KIND (VELOCITY, FLOW RATE, or THERMAL FLOW) of analog output range.

Set a RANGE TYPE of analog output.
SINGLE RANGE: Outputs the one direction (positive direction) within the range between 0 to 100%.
BI-DIRECTION: Outputs also the opposite direction within the range between 0 to 100%
(Refer to 10.4.2 in the Instruction Manual for details).

Set a full scale value for output range.
(Setting range: 0.000, ± 0.300 to ± 32.000 m/s, flow velocity conversion)

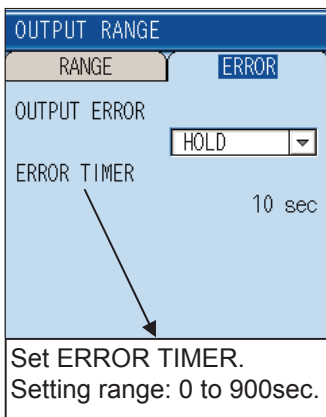


Set an upper limit and lower limit of analog output.
☆ Setting range
LOW: -10 to 0%
HIGH: 100 to 120%

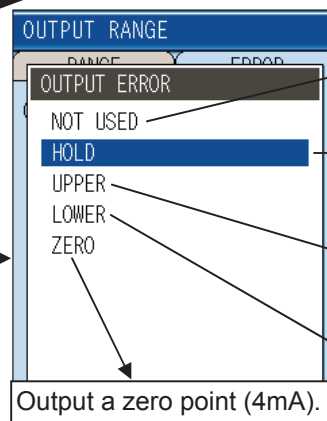
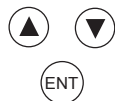
(5) Process at error occurrence



Set an analog output at error occurrence.



Set ERROR TIMER.
Setting range: 0 to 900sec.



Outputs as an indication.

Holds an output indication before error occurrence.

The value set to "OUTPUT LIMIT HIGH" of "OUTPUT RANGE" is output.

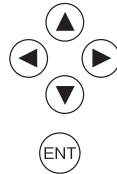
The value set to "OUTPUT LIMIT LOW" of "OUTPUT RANGE" is output.

Output a zero point (4mA).

(6) Output unit setting

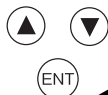
1) Select "SITE SETUP" from "MENU".

MENU	
 SITE SETUP	 DATA LOGGER
 RANGE	 SYSTEM SETUP
 MAINTENANCE	 PRINTER
	 FLOW PROFILE



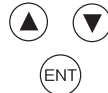
2) Select "UNIT OF OUTPUT".

SITE SETUP	
1: SITE MEMORY	
2: PROCESS SETTING	
3: ZERO ADJUSTMENT	
4: UNIT OF OUTPUT	
5: OUTPUT CONTROL	
6: TOTALIZER	
SENSOR SPACING 28.1 mm V METHOD	



3) Select a desired item.

UNIT OF OUTPUT	
FLOW UNIT	L/d
TOTAL UNIT	mBBL
TEMPERATURE	°C
THERMAL FLOW UNIT	kBTU/h
TOTAL UNIT(THERMAL)	BTU



4) Select a desired unit and press the (ENT) key.

UNIT OF OUTPUT
FLOW UNIT
L/s
L/min
L/h
L/d
kL/d
ML/d
m³/s
m³/min
m³/h
m³/d



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