

# ***FD5000Series***

## ***Users Manual***

Fuji Electric Systems Co., Ltd.

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<b>Safety Precautions</b>	

 **Caution**

- (1) Do not apply a voltage or current exceeding the maximum allowable value; otherwise, it may damage the equipment.
- (2) Use a power voltage within the operation range; otherwise, it may result in a fire, electrical shock, or malfunction.
- (3) The contents of this manual are subject to change without notice.
- (4) Although the contents of this manual have been prepared with extra care, if you have any questions, or find errors or missing information, contact the sales agent from which you purchased the products.
- (5) After reading this manual thoroughly, keep it in a convenient place for future reference.

## 1. Before Using the Product

### 1.1 Checking Each Unit Type and Its Accessories

The type of each unit of the FD5000 series panel meters is as shown in the table below. Check that all the necessary accessories for the product received have been included.

Unit Type	Description	Accessories
<b>Power supply units</b>		
YFD5100	AC power unit	Case x 1, front panel x 1 Case-fastening hardware x 2, Case-fastening hardware fixing screw x 2 Rear panel x 1, Rear panel-fixing screw x 4 Type label x 1, Connector label x 1, Blind seal x 1 2-pin connector x 1, 4-pin connector x 1, Operation manual for the main unit (this manual) x 1
YFD5200	DC power unit	Case x 1, Front panel x 1 Case-fastening hardware x 2, Case-fastening hardware fixing screw x 2 Rear panel x 1, Rear panel-fixing screw x 4 Type label x 1, Connector label x 1, Blind seal x 1 2-pin connector x 1, 4-pin connector x 1, Operation manual for the main unit (this manual) x 1
<b>Display units</b>		
YFD5010-XX	Single display unit	Front sheet (without judgment monitor) x 1 Front sheet (with judgment monitor) x 1
YFD5020-XX	Multi-display unit	Front sheet x 1
<b>Output units</b>		
YFD5001-XX	Comparison output unit	8-pin connector x 1, Output unit-fixing screw x 1
YFD5002-XX	Analog output unit	3-pin connector (for analog output) x 1, Output unit-fixing screw x 1
YFD5003-XX	RS-232C unit	Output unit-fixing screw x 1, Communication function operation manual x 1
YFD5004-XX	RS-485 unit	Output unit-fixing screw x 1, Communication function operation manual x 1
YFD5005-XX	Comparison output + Analog output units	8-pin connector x 1, 3-pin connector (for analog output) x 1 Output unit-fixing screw x 1
YFD5006-XX	Comparison output + Analog output + RS-232C units	8-pin connector x 1, 3-pin connector (for analog output) x 1 Output unit-fixing screw x 1, Communication function operation manual x 1
YFD5007-XX	Comparison output + Analog output + RS-485 units	8-pin connector x 1, 3-pin connector (for analog output) x 1 Output unit-fixing screw x 1, Communication function operation manual x 1
<b>Input units</b>		
YFD5001-01	DC voltage-measuring unit (11 ranges)	3-pin connector x 1, Input label x 1
YFD5001-02	DC voltage-measuring unit (12 to 15 ranges)	5-pin connector x 1, Input label x 1
YFD5001-03	DC current-measuring unit (23 to 25 ranges)	5-pin connector x 1, Input label x 1
YFD5001-04	AC voltage-measuring unit (averaged-value detection, 11 to 13 ranges)	3-pin connector x 1, Input label x 1
YFD5001-05	AC voltage-measuring unit (averaged-value detection, 14 and 15 ranges)	3-pin connector x 1, Input label x 1
YFD5001-06	AC voltage-measuring unit (true rms, 11 to 13 ranges)	3-pin connector x 1, input label x 1
YFD5001-07	AC voltage-measuring unit (true rms, 14 and 15 ranges)	3-pin connector x 1, Input label x 1
YFD5001-08	AC current-measuring unit (averaged-value detection, 23 to 25 ranges)	5-pin connector x 1, Input label x 1
YFD5001-09	AC current-measuring unit (averaged-value detection, 26 ranges)	Terminal cover x 1, Input label x 1
YFD5001-10	AC current-measuring unit (true rms, 23 to 25 ranges)	5-pin connector x 1, Input label x 1
YFD5001-11	AC current-measuring unit (true rms, 26 ranges)	Terminal cover x 1, Input label x 1
YFD5001-12	Resistance-measuring unit	5-pin connector x 1, Input label x 1
YFD5001-13	Temperature-measuring unit (thermocouple)	3-pin connector x 1, Input label x 1
YFD5001-14	Temperature-measuring unit (RTD)	3-pin connector x 1, Input label x 1
YFD5001-15	Frequency-measuring unit (OC, LOG, MG)	5-pin connector x 1, Input label x 1
YFD5001-16	Frequency-measuring unit (500 V)	3-pin connector x 1, Input label x 1
YFD5001-17	Strain gauge input unit	5-pin connector x 1, Input label x 1
YFD5001-18	Process input unit	3-pin connector x 1, Input label x 1

### 1.2 Check Before Use

Examine the product for damage caused by transportation or any other defects. If you find any damage or defects, contact the sales agent from which you purchased the products.

## 2 About Assembly

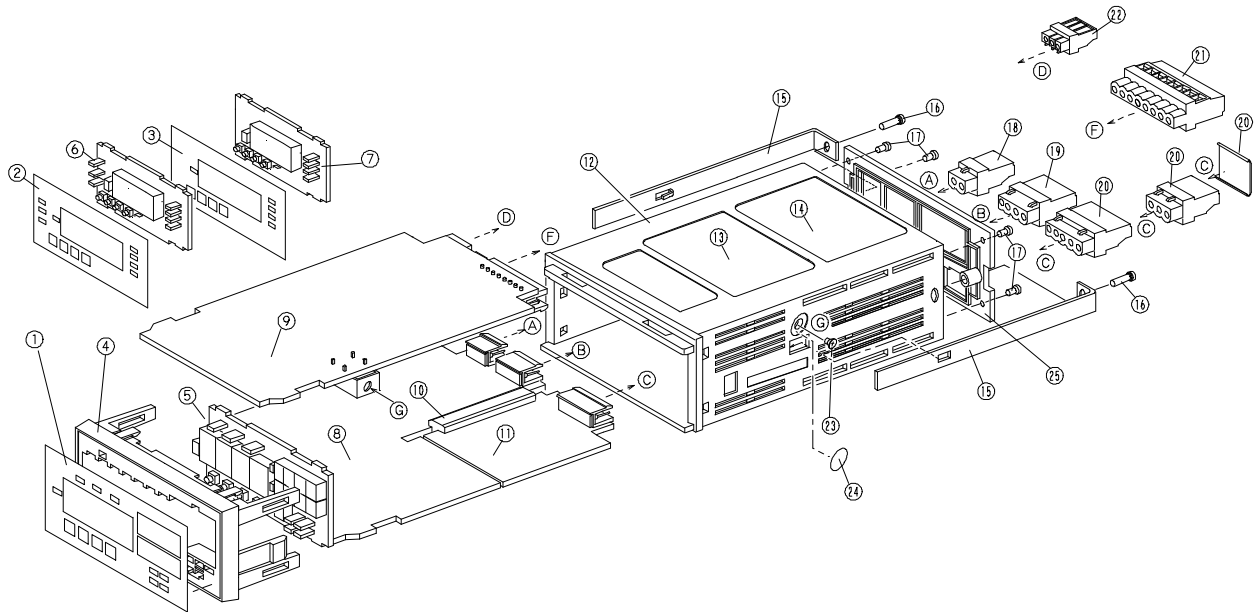
The FD5000 series panel meter allows the customer to change over (add) a function by replacing the corresponding unit with the desired one (or installing it).

### 2.1 Assembly Method

When replacing the unit, follow the figure below to assemble it into the meter.

To take each unit from the case, remove the hooks of the front panel from the hook-fastening holes at the front of the side-faces of the case. (If an output unit has been installed, unscrew the output unit-fixing screws [number 21 in the figure below] and then take this step.)

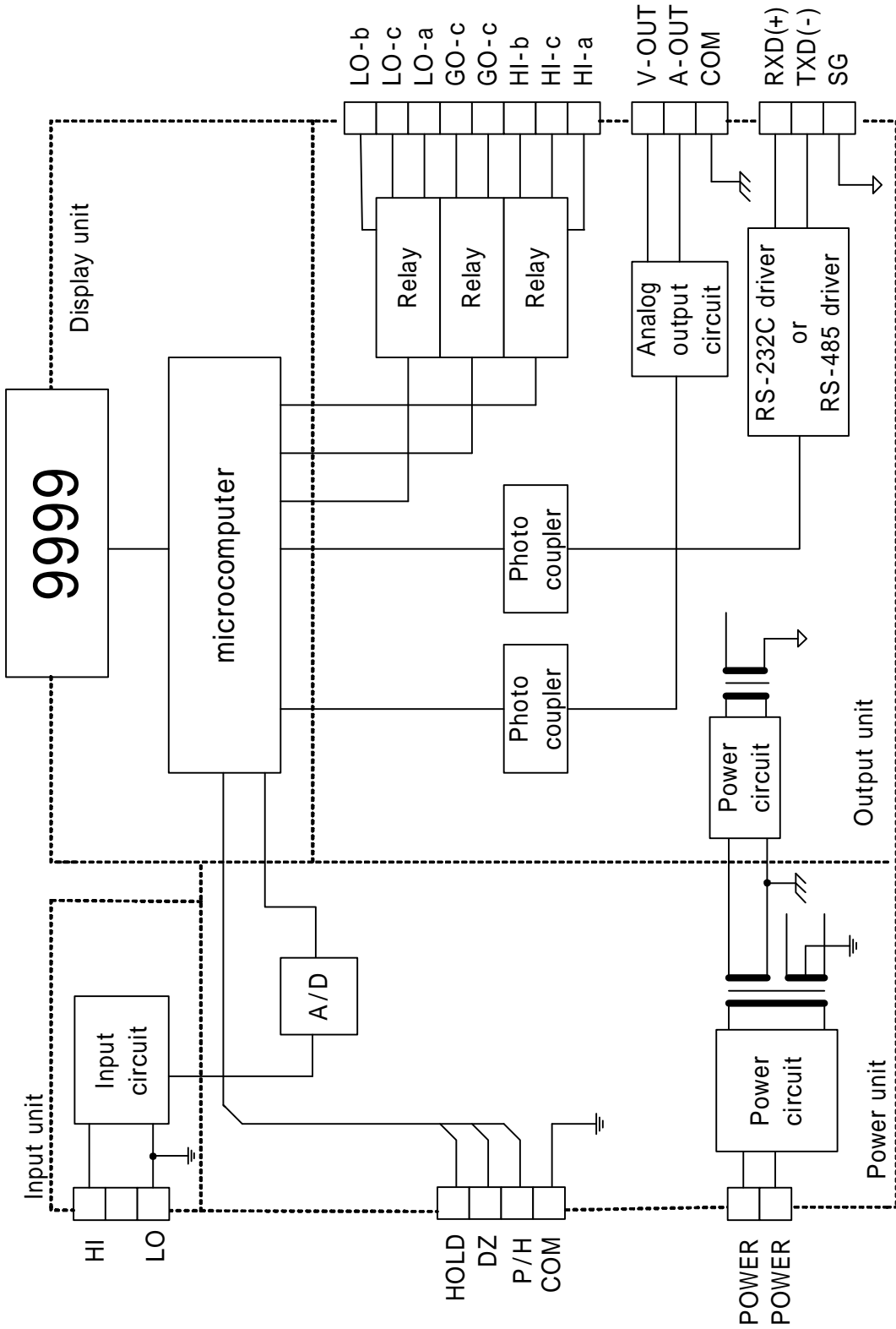
\* Before replacing the unit, always disconnect the FD5000 series panel meter from the power supply.



No.	Description	No.	Description
1	Front sheet (for multi-display)	13	Case-fastening hardware
2	Front sheet (for single display)	14	Case-fastening hardware fixing screw
3	Front panel	15	Rear panel-fixing screw
4	Display unit (for multi-display)	16	Power-connecting connector
5	Display unit (for single display)	17	Control line-connecting connector
6	Power supply unit	18	Input-connecting connector (with a terminal cover for 26 ranges)
7	Output unit	19	Comparison output-connecting connector
8	Printed board guides	20	Analog output-connecting connector
9	Input unit	21	Output unit-fixing screw
10	Case	22	Blind seal
11	Type label	23	Rear panel
12	Connector label		

### 3 Block Diagram

Note that an input unit's connector and input circuit vary depending on the input unit to be installed.

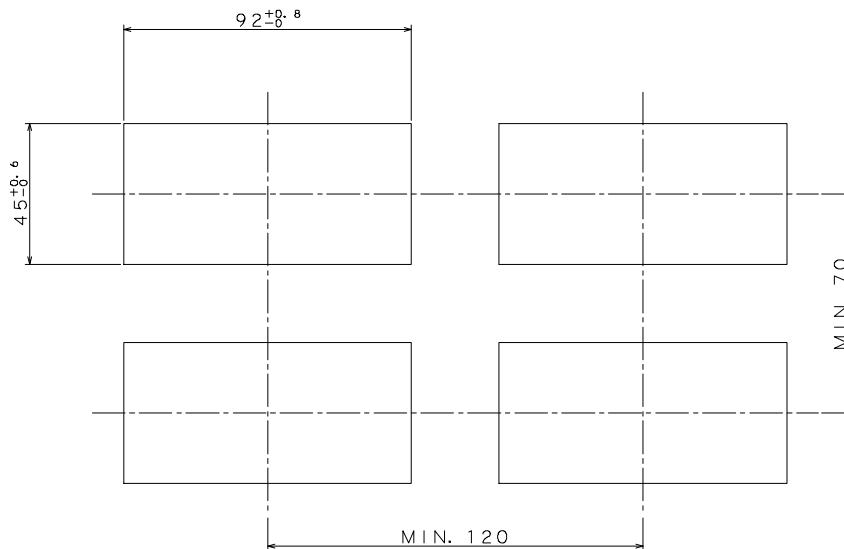


## 4 Mounting the Product

### 4.1 Mounting The Product To The Panel

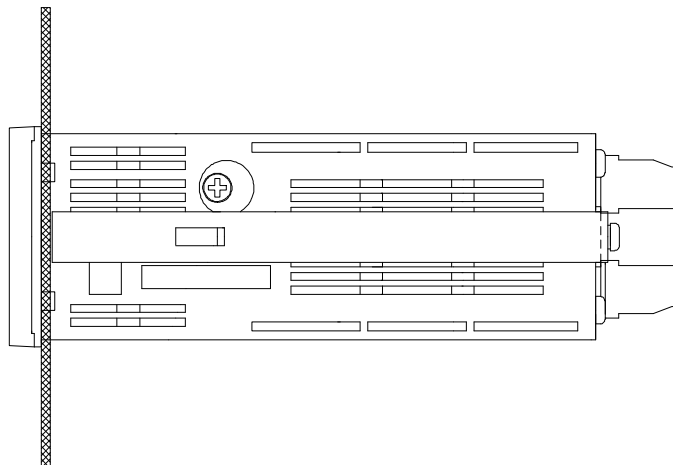
#### 4.1.1 Panel Cut Size

Cut the panel to mount the FD5000 series in accordance with the illustration below:



#### 4.1.2 How to Mount the Unit on the Panel

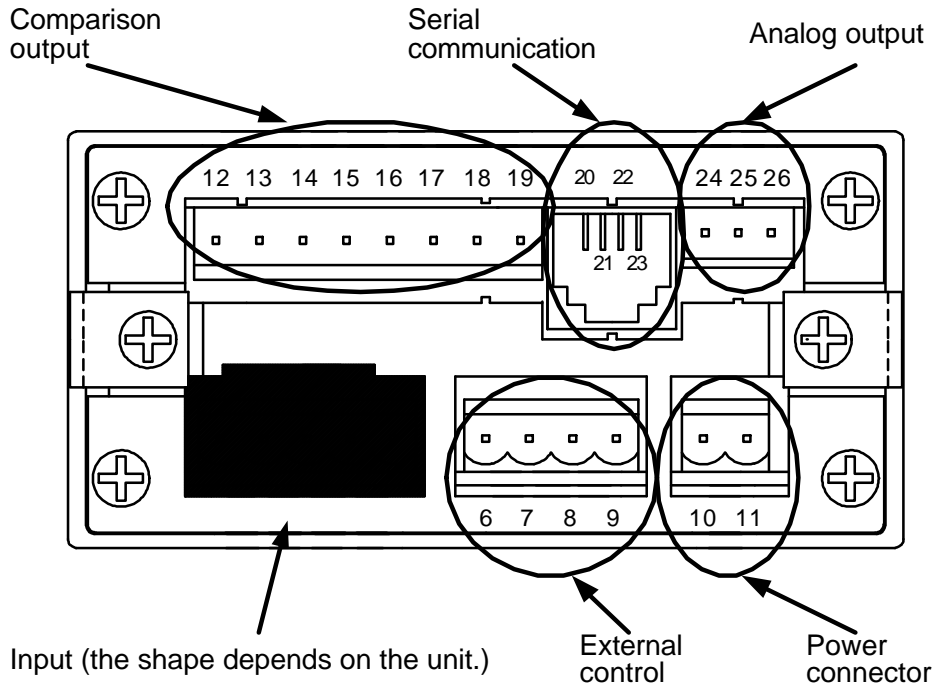
To mount the FD5000 to the panel, remove its fittings and insert it through the hole in the front of the panel. From the back of the panel, fix the product to the panel with the fittings



#### ⚠ Caution

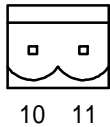
- (1) The recommended panel thickness is 0.8 to 5mm. The tightening torque should be approximately 0.39 to 0.49N·m (4 to 5kgf·cm).
- (2) Do not install the instrument in locations exposed to direct sunlight, an environment where the ambient temperature goes beyond the range of 0 to 50 °C or the ambient humidity goes beyond the range of 35 to 85%, or places where dew condensation is formed due to rapid temperature changes.
- (3) Do not install the unit where it is exposed to dust, particles, chemicals harmful to electric components, corrosive gases, etc.
- (4) When this unit is installed inside other equipment, pay attention to the heat radiation and keep the heat inside the equipment 50 °C or below.
- (5) Do not install the unit where it is exposed to excessive vibration or shock.
- (6) Install the unit horizontally; otherwise, ventilation will be adversely affected and may result in deterioration.

## 5 Terminal Description and Connection Method



\* The overall length of each wire should be 30m or less with the exception of the power cable. If the wiring exceeds 30m, the EN/IEC standards will not be met.

### 5.1 Connecting Power



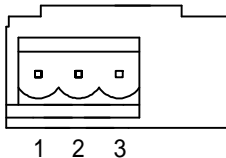
No.	Name	Description
10	POWER	Power terminal without polarity for both DC and AC
11	POWER	Power terminal without polarity for both DC and AC

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

### 5.2 Connecting Input Signal

The input signal connection terminal of the FD5000 series has a different shape and connection terminal depending on the unit. Note that units with multiple measurement ranges require that the measurement ranges be set up using condition data. (For condition data, see 7.7.2, Setting the Measurement Ranges.)

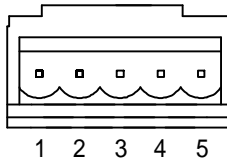
#### 5.2.1 DC Voltage Measuring Unit (Range 11)



No.	Name	Description
1	HI	Positive input terminal
2	NC	Do not connect this terminal.
3	LO	Negative input terminal

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

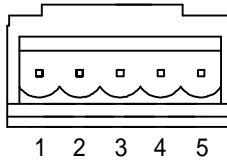
### 5.2.2 DC Voltage Measuring Unit (Range 12 to 15)



No.	Name	Description
1	12	Positive input terminal for range 12 ( $\pm 999.9$ mV)
2	13	Positive input terminal for range 13 ( $\pm 9.999$ V)
3	14	Positive input terminal for range 14 ( $\pm 99.99$ V)
4	15	Positive input terminal for range 15 ( $\pm 600$ V)
5	LO	Negative input terminal

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

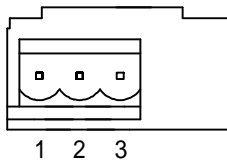
### 5.2.3 DC Current Measuring Unit



No.	Name	Description
1	23	Positive input terminal for range 23 ( $\pm 9.999$ mA)
2	24	Positive input terminal for range 24 ( $\pm 99.99$ mA)
3	25	Positive input terminal for range 25 ( $\pm 999.9$ mA)
4	LO	Negative input terminal
5		

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

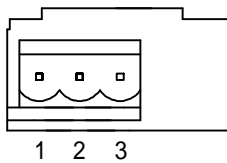
### 5.2.4 AC Voltage Measuring Unit (Ranges 11 to 13)



No.	Name	Description
1	11-12	Positive input terminal for ranges 11 (99.99 mV) and 12 (999.9 mV)
2	13	Positive input terminal for range 13 (9.999 V)
3	LO	Common input terminal

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

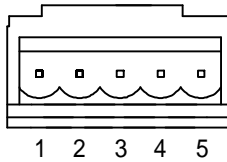
### 5.2.5 AC Voltage Measuring Unit (Ranges 14 and 15)



No.	Name	Description
1	14	Positive input terminal for range 14 (99.99 V)
2	15	Positive input terminal for range 15 (600 V)
3	LO	Common input terminal

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

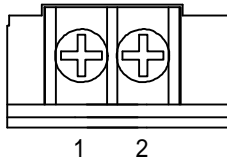
### 5.2.6 AC Current Measuring Unit (Ranges 23 to 25)



No.	Name	Description
1	23	Positive input terminal for range 23 (9.999 mA)
2	24	Positive input terminal for range 24 (99.99 mA)
3	25	Positive input terminal for range 25 (999.9 mA)
4	LO	Negative input terminal
5		

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

### 5.2.7 AC Current Measuring Unit (Range 26)



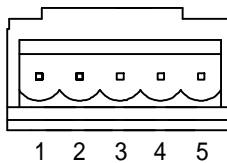
No.	Name	Description
1	HI	Input terminal
2	LO	Input terminal

Applicable solderless terminals



\* For crimp-on terminals, use the type shown in the figure above.

### 5.2.8 Resistance Measuring Unit Changing the measurement method (2-wire type or 4-wire type)

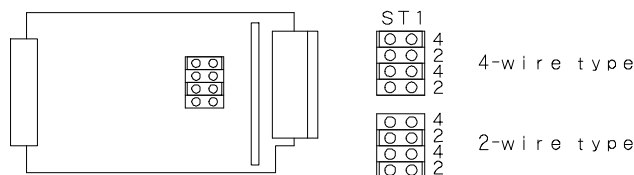


No.	Name	Description
1	HI	Input terminal for all ranges
2	LO	Input terminal for all ranges
3	+S	Constant current for four-wire resistance measurement(positive)
4	-S	Constant current for four-wire resistance measurement(negative)
5	LO	Common terminal (grounding terminal for input circuit)

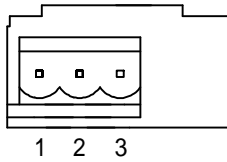
To change the measurement method, change the ST1 socket position of the resistance-measuring unit. For removal of the unit, see 2.1, Assembly Method.

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

When changing into 2-wire type, the socket of ST1 is changed into the position of "2".

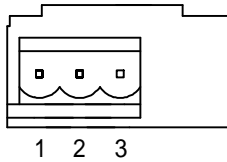


### 5.2.9 Temperature Measuring Unit (TC)



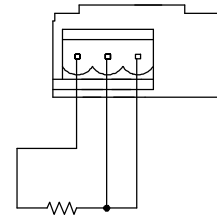
No.	Name	Description
1	+	Positive terminal for thermocouple
2	NC	Do not connect this terminal.
3	-	Negative terminal for thermocouple

### 5.2.10 Temperature Measuring Unit (RTD)



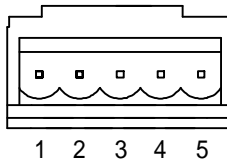
No.	Name	Description
1	A	Resistance sensor wire
2	B	Resistance sensor wire
3	C	Elimination of wire resistance

Connection of three-wire sensor



\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

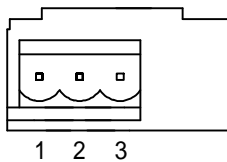
### 5.2.11 Frequency Measuring Unit (Open collector, logic, and magnet)



No.	Name	Description
1	HI	Positive input terminal
2	LO	Negative input terminal
3	+15V	Power output for sensor (positive)
4	0V	Power output for sensor (negative)
5	COM	Common terminal (grounding terminal for input circuit)

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

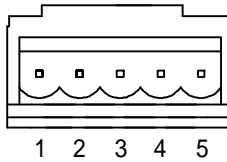
### 5.2.12 Frequency Measuring Unit (AC voltage 500 Vrms max.)



No.	Name	Description
1	HI	Input terminal
2	NC	Do not connect this terminal.
3	LO	Input terminal

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

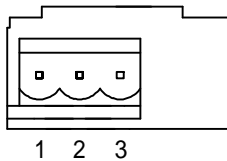
### 5.2.13 Strain Gauge Input Unit (Load cell)



No.	Name	Description
1	+SIG	Positive input terminal
2	-SIG	Negative input terminal
3	+EXC	Power output for sensor (positive)
4	-EXC	Power output for sensor (negative)
5	COM	Common terminal (grounding terminal for input circuit)

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

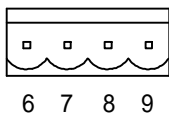
### 5.2.14 Process Input Measuring Unit



No.	Name	Description
1	V-IN	Positive input terminal for 1 to 5 V range
2	A-IN	Positive input terminal for 4 to 20 mA range
3	LO	Negative input terminal

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

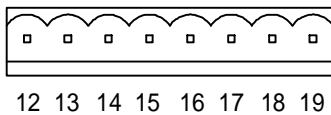
### 5.3 Connecting External Controls



No.	Name	Description
6	HOLD	Control for hold function. Enabled when short-circuited or at the same potential as COM.
7	DZ	Control for digital zero function. Enabled when short-circuited or at the same potential as COM.
8	PH	Control for peak hold function. Enabled when short-circuited or at the same potential as COM.
9	COM	Common for all external control terminals.

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

### 5.4 Connecting Comparison Output

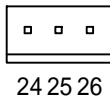


No.	Name	Description
12	LO-b	LO output terminal (b contact)
13	LO-c	Common terminal for LO output
14	LO-a	LO output terminal (a contact)
15	GO-c	Common terminal for GO output
16	GO-a	GO output terminal (a contact)
17	HI-b	HI output terminal (b contact)
18	HI-c	Common terminal for HI output
19	HI-a	HI output terminal (a contact)

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

### 5.5 Connecting Analog Output

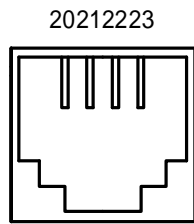
The analog output connection terminal of the FD5000 series panel meter requires that the output type be set up using condition data because the analog output supports multiple output types. (For condition data, see 7.7.13. Setting the Analog Output Type.)



No.	Name	Description
24	COM	Common terminal for analog output
25	A-OUT	Current output terminal (4 to 20 mA)
26	V-OUT	Voltage output terminal (1 to 5 V, 0 to 1 V, and 0 to 10 V)

\* Wires should be single wires of AWG28 to 12, or stranded wires of AWG30 to 12.

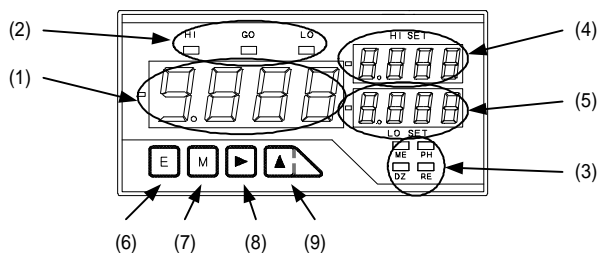
### 5.6 Connecting Serial Communication



No.	Name	Description
20	RXD(+)	RS-232C: transmission; RS-485: Non-reverse output
21	TXD(-)	RS-232C: reception; RS-485: Reverse output
22	NC	Do not connect this terminal.
23	SG	Common terminal for communications

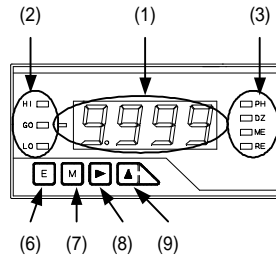
## 6 Components and Their Functions

### 6.1 Multi Display



No.	Name	Main Functions		
		During measurement	During parameter setup	
(1)	Main display	Indicates the measured value.	Indicates information on the parameter to be set.	
(2)	Judgment indicators	HI	Indicates the result of judgment and turns on if the measured value > HI judgment value.	
		GO	Indicates the result of judgment and turns on if LO judgment value the measured value HI judgment value.	
		LO	Indicates the result of judgment and turns on if the measured value < LO judgment value.	
(3)	Function indicators	ME	Turns on if "digital zero backup" is on.	
		PH	Turns on if "peak hold/valley hold/peak - valley hold" is on.	
		DZ	Turns on if "digital zero" is on.	
		RE	Turns on if remote control is being performed through RS-232C or RS-485 interface.	
(4)	Sub-display 1	Indicates the HI side judgment value. Indicates the item in the maximum/minimum/(maximum-minimum)/input value monitoring mode.		
(5)	Sub-display 2	Indicates the LO side judgment value. Indicates information on the item in the maximum/minimum/(maximum-minimum)/input value monitoring mode.	Indicates the item to be set.	
(6)	Enter key	Pressing the Enter and Mode keys together changes to the parameter setting mode.	Returns to the measurement mode.	
		Pressing the Enter and Increment keys together changes to the maximum/minimum/(maximum-minimum)/input value monitoring mode.		
		Switches from the maximum/minimum/(maximum-maximum/minimum/(maximum-minimum)/input value monitoring mode to the comparative judgment reading mode.		
(7)	Mode key	Pressing the Mode and Enter keys together changes to the parameter setting mode.	Selects the item to be set.	
		Pressing the Mode and Shift keys together changes to the shift function setup mode.		
		Pressing the Mode and Incremental keys together turns on/off the "Digital zero" indicator.		
(8)	Shift key	Pressing the Shift and Enter keys together changes to the parameter checking mode. (Comparator data can be set.)	Changes the digit to be set.	
		Pressing the Shift and Mode keys together changes to the shift function setup mode.		
		Selects from items in the maximum/minimum/(maximum-minimum)/input value monitoring mode. (Hold down the key for about one second.)		
(9)	Increment key	Pressing the Increment and Mode keys together turns on/off the "Digital zero" indicator.	Changes the value or content of a selected digit. (Increments the value)	
		Pressing the Increment and Enter keys changes to the maximum/minimum/(maximum-minimum)/input value monitoring mode.		
		Resets the maximum/minimum/(maximum-minimum)/input value monitoring mode. (Hold down the key for about one second.)		

## 6.2 Single Display



No.	Name	Main Functions		
		During measurement	During parameter setup	
(1)	Main display	Indicates the measured value. Indicates information on the item in the maximum/minimum/(maximum-minimum)/input value monitoring mode.	Indicates information on the parameter to be set.	
(2)	Judgment indicators	HI	Indicates the result of judgment and turns on if the measured value > HI judgment value.	
		GO	Indicates the result of judgment and turns on if LO judgment value the measured value HI judgment value.	
		LO	Indicates the result of judgment and turns on if the measured value < LO judgment value.	
(3)	Function indicators	PH	Turns on if "peak hold/valley hold/peak - valley hold" is on.	
		DZ	Turns on if "digital zero" is on. Flashes when linearization data output values are set.	
		ME	Turns on if "digital zero backup" is on.	
		RE	Turns on if remote control is being performed through RS-232C or RS-485 interface. Flashes when linearization data input values are set.	
(6)	Enter key	Pressing the Mode and Enter keys together changes to the parameter setting mode.	Returns to the measurement mode.	
		Pressing the Enter and Increment keys together changes to the maximum/minimum/(maximum-minimum)/input value monitoring mode.		
		Switches from the maximum/minimum/(maximum-maximum/minimum/(maximum-minimum)/input value monitoring mode to the comparative judgment reading mode.		
(7)	Mode key	Pressing the Mode and Enter keys together changes to the parameter setting mode.	Selects the item to be set.	
		Pressing the Mode and Shift keys together changes to the shift function setup mode.		
		Pressing the Mode and Incremental keys together turns on/off the "Digital zero" indicator.		
(8)	Shift key	Pressing the Shift and Enter keys together changes to the parameter checking mode. (Comparator data can be set.)	Changes the digit to be set.	
		Pressing the Shift and Mode keys together changes to the shift function setup mode.		
		Holding down the Shift key for about one second moves to the HI judgment value indicator.		
		Selects from items in the maximum/minimum/(maximum-minimum)/input value monitoring mode. (Hold down the key for about one second.)		
(9)	Increment key	Pressing the Increment and Mode keys together turns on/off the "Digital zero" indicator.	Changes the value or content of a selected digit. (Increments the value)	
		Holding down the Increment key for about one second moves to the LO judgment value indicator.		
		Pressing the Increment and Enter keys changes to the maximum/minimum/(maximum-minimum)/input value monitoring mode.		
		Resets the maximum/minimum/(maximum-minimum)/input value monitoring mode. (Hold down the key for about one second.)		

## 7 Parameter Setup

### 7.1 Parameter Group

The FD5000 series' parameters are broadly classified into groups depending on their use and operational system. The groups of parameters are as shown in the table below.

Group name	Description
Condition data	A group of the parameters concerning basic operations (such as measurement range power supply frequency, and sampling speed) and the operations of special functions and optional functions.
Comparator data	A group of parameters concerning comparison operations such as HI/LO comparison judgment value and hysteresis.
Scaling data	A group of parameters for setting the correlations between input signals and a displays, the correlations between displays and analog outputs etc.
Linearize data	A group of parameters concerning the linearize (linearity correction) function.
Calibration data	A group of parameters concerning sensor calibrations when strain gauge input units are mounted.

### 7.2 LED Display Method

The FD5000 series' display section uses a 7-segment display unit and thus, the indication of numbers and letters is as shown in the table below. Note that this Operation Manual also represents these numbers and letters based on this table.

0	1	2	3	4	5	6	7	8	9	-		
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

### 7.3 Each Unit and Unit Number

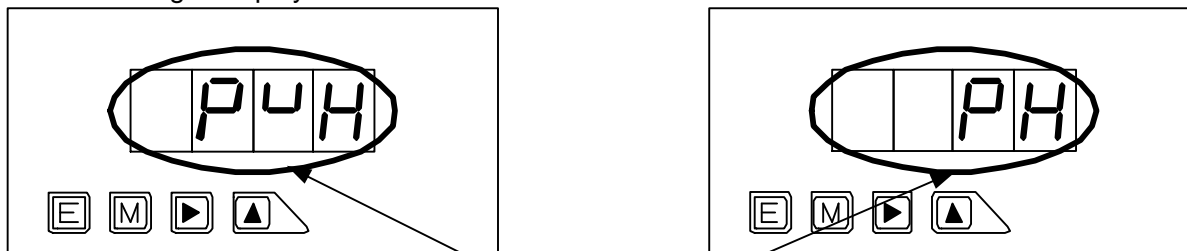
In the FD5000 series, the parameters to be displayed vary depending on the input and output units installed in the meter. Each unit is identified by a relevant number given in the table below. The numbers of the units installed will be displayed in the form of "I-XX" or "O-X" when the power is turned ON. (It is also possible to make a unit number invisible by setting the relevant parameter.)

Input unit		Output unit	
NO.	Description	NO.	Description
01	DC voltage measuring unit (range 11)	0	None
02	DC voltage measuring unit (range 12 to 15)	1	Comparison output
03	DC current measuring unit (range 23 to 25)	2	Analog output
04	AC voltage measuring unit (Average rms range 11 to 13)	3	RS-232C
05	AC voltage measuring unit (Average rms range 14,15)	4	RS-485
06	AC voltage measuring unit (True rms range 11 to 13)	5	Comparison output and analog output
07	AC voltage measuring unit (True rms range 14,15)	6	Comparison output, analog output and RS-232C
08	AC current measuring unit (Average rms range 23 to 25)	7	Comparison output, analog output and RS-485
09	AC current measuring unit (Average rms range 26)		
10	AC current measuring unit (True rms range 23 to 25)		
11	AC current measuring unit (True rms range 26)		
12	Resistance measuring unit		
13	Temperature measuring unit (TC)		
14	Temperature measuring unit (RTD)		
15	Frequency measuring unit (Open collector, logic and magnet)		
16	Frequency measuring unit (50 to 500Vrms)		
17	Strain gauge input unit		
18	Process input unit (4 to 20mA, 1 to 5V)		



## 7.5 Differences Between Display Units

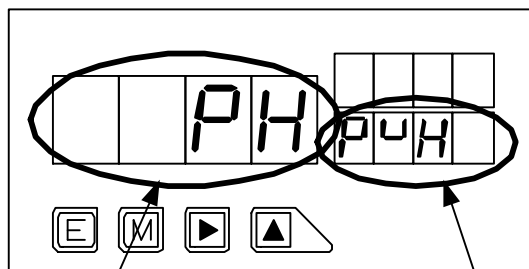
### 7.5.1 Single Display Unit



Setup contents and parameter name

- \* Pressing the mode key with the parameter name shown changes the display to the parameter information indication. If there is no key operation for about one second when the parameter name is shown, the display automatically changes to the parameter information indication (however, this change does not automatically occur for parameters PH/S-HI/FSC, etc., right after COND/COM/MET is indicated).
- \* Pressing the Mode key when the parameter information indication is shown results in the next parameter being displayed.
- \* If there is no key operation for about 8 seconds with the parameter information indication shown, the display returns to the parameter name indication.

### 7.5.2 Multi Display Unit



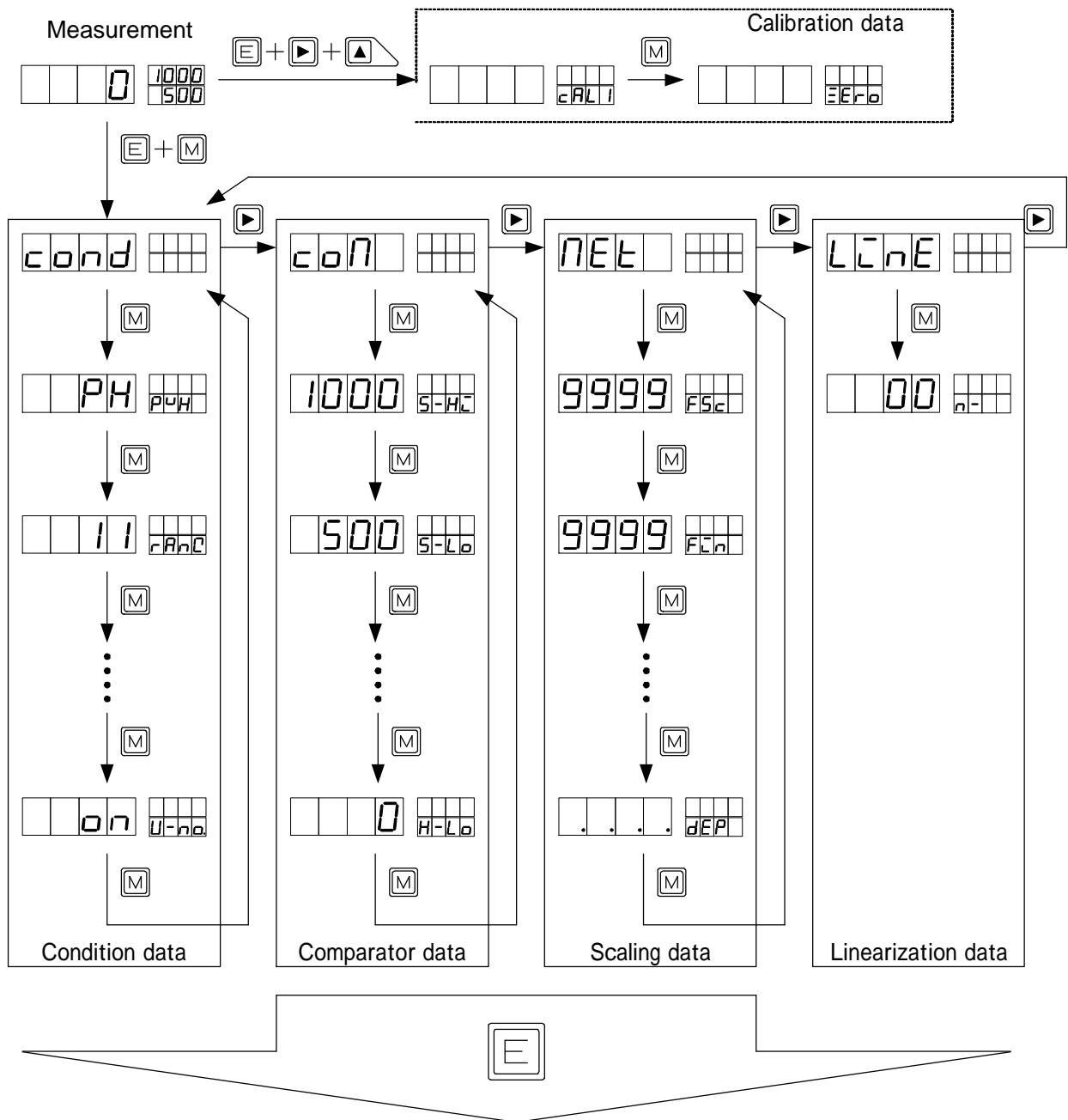
Setup contents

Parameter name

- \* Pressing the Mode key displays the next parameter.

## 7.6 Operation Flow

The basic operation flow applied in setting each parameter of the FD5000 series panel meter is as shown below. The individual setting method and description of each parameter are separately described later.



Pressing the ENTER key saves the data and returns to the measurement mode.

(Data are backed up with EEPROM even when the power is turned off.)

- \* The figure above pertains to "the multi-display unit," but the same operation flow applies to the single-display unit.
- \* The figure above pertains to "the multi-display unit," but the same operation flow applies to the single-display unit.

## 7.7 Condition Data

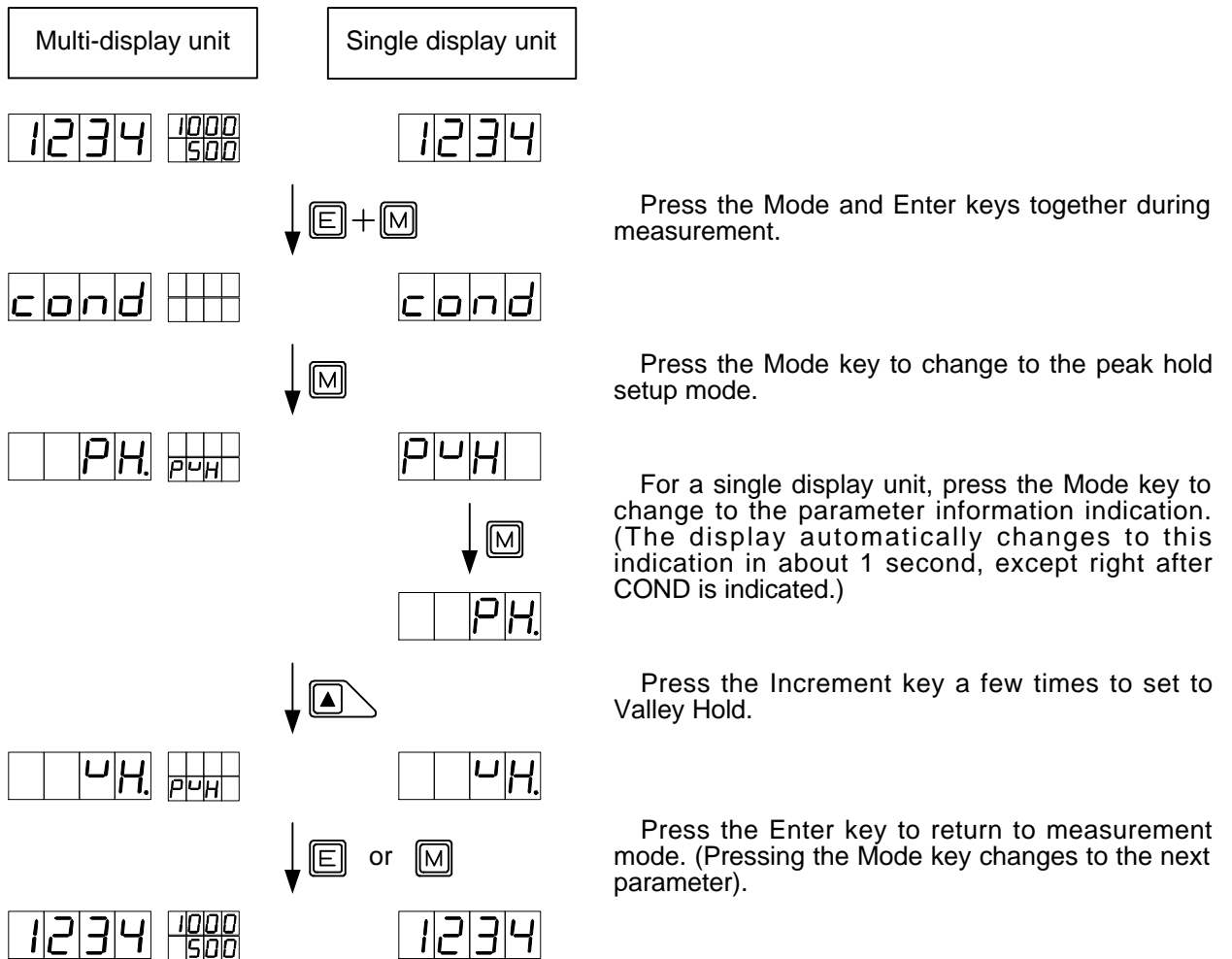
### 7.7.1 Setting the Peak Hold Type

This subsection lets you make settings relating to the FD5000 series peak holding function. The peak holding function holds the maximum value (peak hold), the minimum value (valley hold), or the maximum and minimum values (peak and valley hold) by performing control through an external control terminal, and it produces each output with respect to the relevant value.

List of the display and description (The \* denotes the default.)

Display	Description	
PH	Peak hold	*
VH	Valley hold	
PVH	Peak valley hold	

\* The figure below shows how to set the peak hold type to valley hold.



## 7.7.2 Setting the Measurement Ranges

This subsection lets you make settings relating to the FD5000 series measurement ranges. The setting of this parameter differs depending on the input unit installed.

List of the display and description (The \*denotes the default.)

Input unit No.01:DC voltage measuring unit

Display	Description	
11	Range 11 ( $\pm 99.99\text{mV}$ )	*

Input unit No.02:DC voltage measuring unit

Display	Description	
12	Range 12 ( $\pm 999.9\text{mV}$ )	
13	Range 13 ( $\pm 9999.\text{V}$ )	
14	Range 14 ( $\pm 99.99\text{V}$ )	
15	Range 15 ( $\pm 600\text{V}$ )	*

Input unit No.03:DC current measuring unit

Display	Description	
23	Range 23 ( $\pm 9.999\text{mA}$ )	
24	Range 24 ( $\pm 99.99\text{mA}$ )	
25	Range 25 ( $\pm 999.9\text{mA}$ )	*

Input unit No.04:AC voltage measuring unit (AVG)

Display	Description	
11	Range 11 ( $99.99\text{mV}$ )	
12	Range 12 ( $999.9\text{mV}$ )	
13	Range 13 ( $9.999\text{V}$ )	*

Input unit No.05:AC voltage measuring unit (AVG)

Display	Description	
14	Range 14 ( $99.99\text{V}$ )	
15	Range 15 ( $600\text{V}$ )	*

Input unit No.08:AC current measuring unit (AVG)

Display	Description	
23	Range 23 ( $9.999\text{mA}$ )	
24	Range 24 ( $99.99\text{mA}$ )	
25	Range 25 ( $999.9\text{mA}$ )	*

Input unit No.09:AC current measuring unit (AVG)

Display	Description	
26	Range 26 ( $5\text{A}$ )	*

Input unit No.12:Resistance measuring unit

Display	Description	
12	Range 12 ( $99.99$ )	
13	Range 13 ( $999.9$ )	
14	Range 14 ( $9.999\text{k}$ )	
15	Range 15 ( $99.99\text{k}$ )	*

Input unit No.13:Temperature measuring unit (TC)

Display	Description	
KA	-50.0 to 199.9	
KB	-50 to 1200	
J	-50 to 1000	
T	-50 to 400	
S	0 to 1700	
R	-10 to 1700	
B	100 to 1800	*

Input unit No.14:Temperature measuring unit (RTD)

Display	Description	
PA	-100.0 to 199.9	
PB	-100 to 600	
JPA	-100.0 to 199.9	
JPB	-100 to 600	*

Input unit No.15:Frequency measuring unit

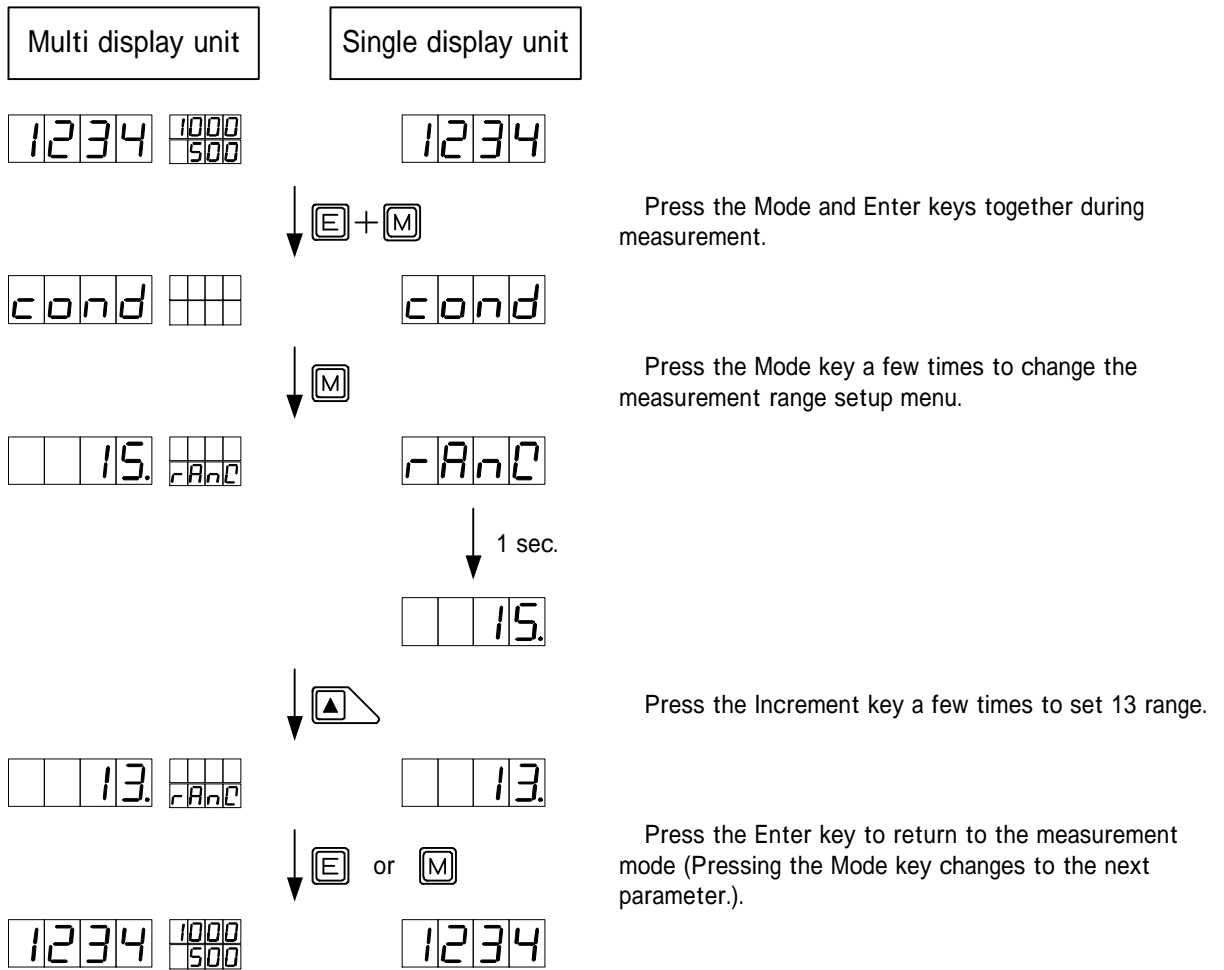
Display	Description	
11	0.1 to 200Hz	
12	1 to 2000Hz	
13	0.01 to 20kHz	
14	0.1 to 200kHz	*

Input unit No.18:Process single measuring unit

Display	Description	
1V	1 to 5V	
2A	4 to 20mA	*

\* For letters of a message actually displayed, check them by referring to 7.2. LED Display Method.

The figure below shows how to set the measurement range of the DC voltage-measuring unit (12 to 15 ranges) to range 13.



\* For units equipped with multiple measurement ranges, setting up (changing) a measurement range also causes the terminal to which the relevant input signal is connected to be changed. (For the terminal to be connected, see Chapter 5. Terminal Description and Connection Method.)

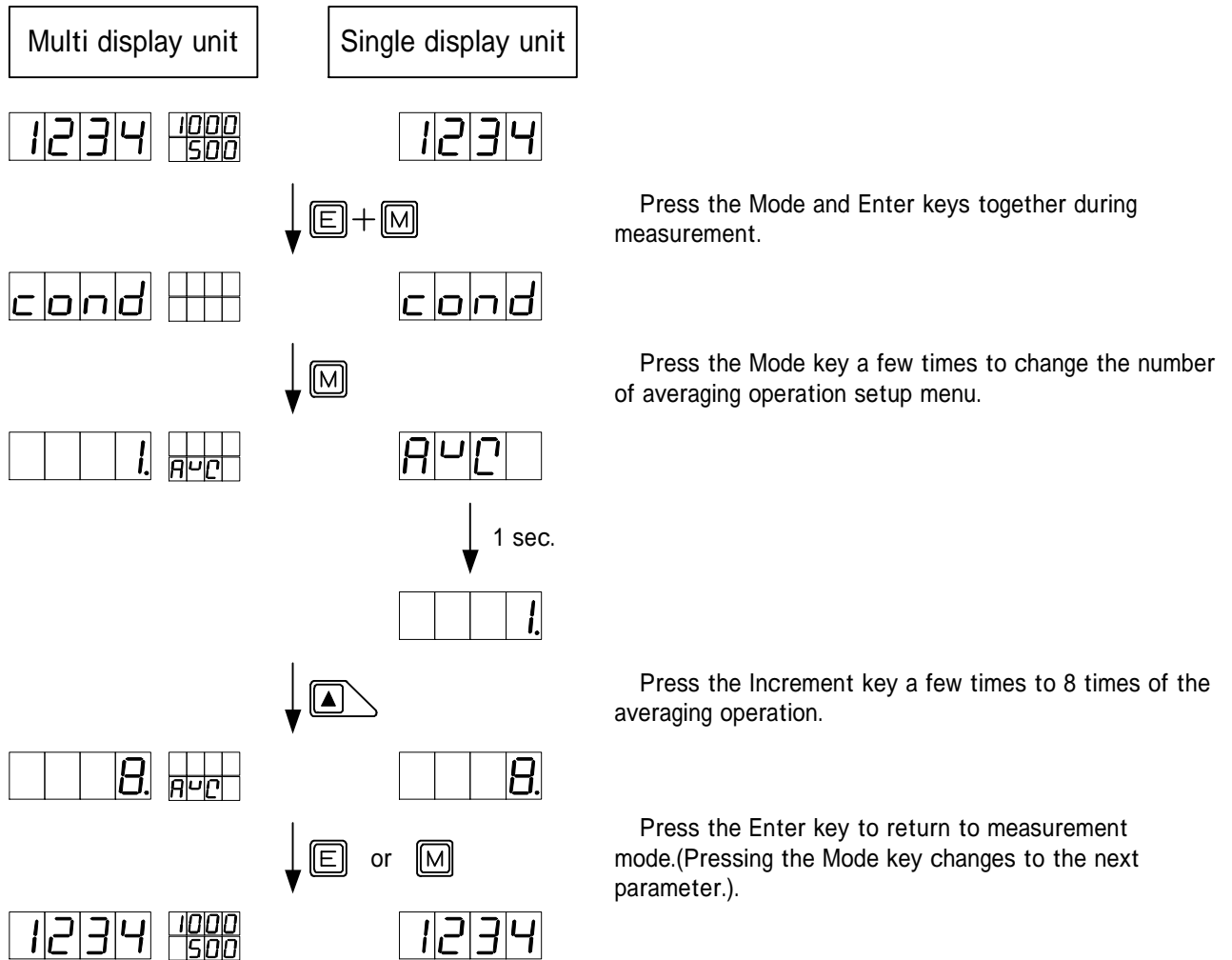
### 7.7.3 Setting the Number of Averaging Times

This subsection lets you make settings relating to the number of averaging times (sampling rate) of the FD5000 series. Setting of this parameter differs depending on the input unit installed.

List of the display and description (The \* denotes the default.)  
For input units other than the frequency measuring units

Display	Description	Display	Description	
1	Single averaging (sampling rate :12.5 times/s)	*	10	10-time averaging (sampling rate :1.25 times/s)
2	Double averaging (sampling rate :6.25 times/s)	20	20-time averaging (sampling rate approx. 0.6 times/s)	
4	Four-time averaging (sampling rate approx.3.1 times/s)	40	40-time averaging (sampling rate approx. 0.3 times/s)	
8	Eight-time averaging (sampling rate approx.1.6 times/s)	80	80-time averaging (sampling rate approx. 0.1 times/s)	

The figure below shows how to set the number of averaging times (sampling rate) of the temperature-measuring unit (thermocouple) to 8 times (approx. 1.6 times/s).



- \* The sampling rate of the FD5000 series power meter is controlled by the simple number of samplings of the basic sampling rate (12.5 times/s).
- \* For cases where the change of a signal under measurement is slow, such as temperature measurement, or cases where the instrument is used in an environment subject to significant noise effects, reducing the number of averaging times (increasing the sampling rate) inadvertently may cause the display to flutter.
- \* For the frequency-measuring units, the number-of-averaging-times parameter will not be displayed.

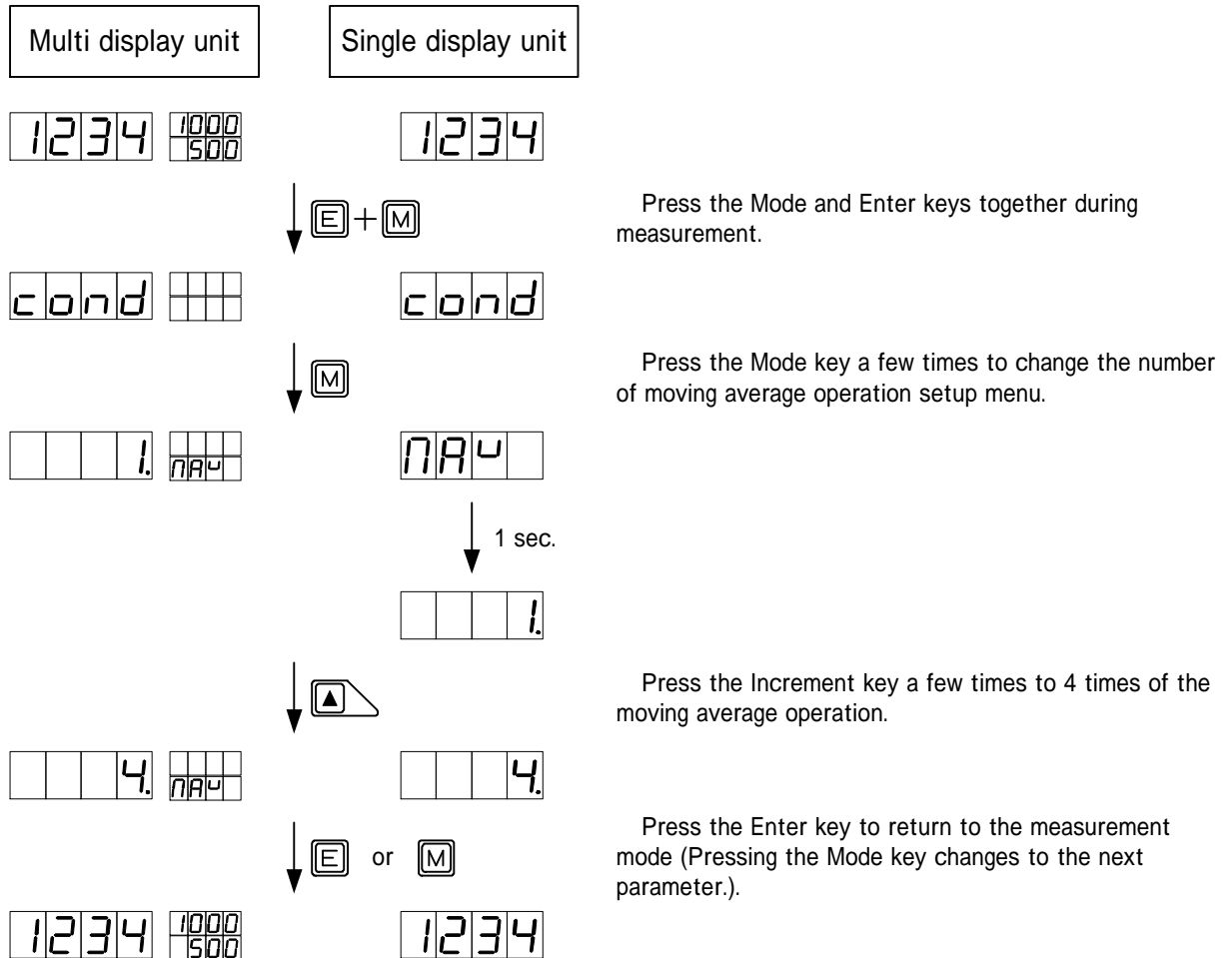
### 7.7.4 Setting the Number of Moving Averaging Times

This subsection deals with settings relating to the number of moving averaging times of the FD5000 series. Unlike simple averaging, the moving averaging function offers filtering effects without reducing the sampling rate.

List of the display and description (The \* denotes the default.)

Display	Description		Display	Description
OFF	Without moving averaging	*	8	Eight-time moving averaging
2	Double moving averaging		16	16-time moving averaging
4	Four-time moving averaging		32	32-time moving averaging

The figure below shows how to set the number of moving averaging times to four times.



\* Increasing the number of moving averaging times allows the filtering effects to improve. However, this causes the response to a change of a transient input signal to be accordingly slow. Use this function at an appropriate moving averaging count in consideration of the signal to be measured and the number of averaging times (sampling rate) noted in the previous subsection.

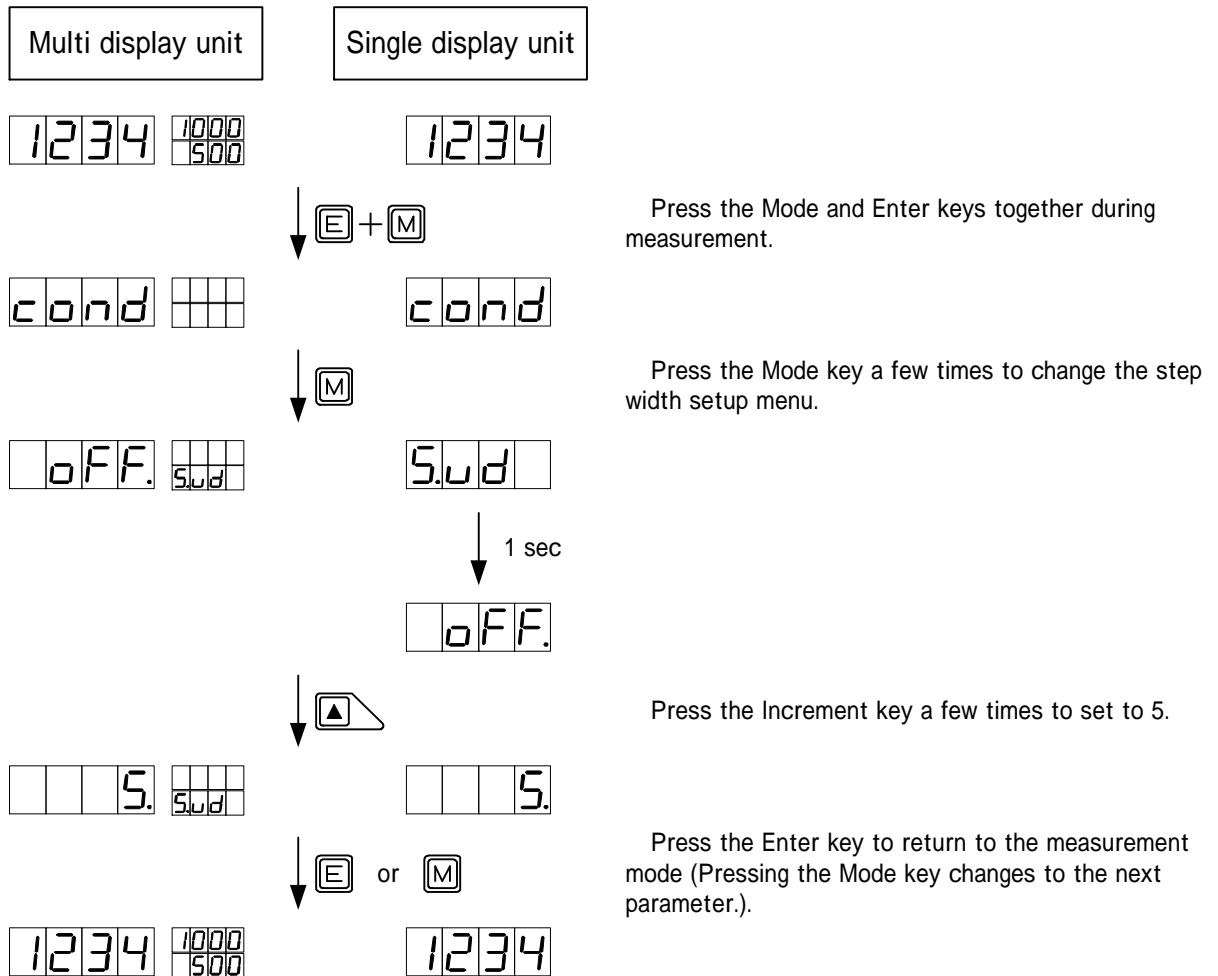
### 7.7.5 Setting Step Wide

This subsection deals with settings relating to the FD5000 series step wise function. The step wide function forces the resolution of the least significant digit to change in order to prevent display drift, etc.

List of the display and description (The \* denotes the default.)

Display	Description	
1	Least significant digit's resolution 1	*
2	Least significant digit's resolution 2	
5	Least significant digit's resolution 5	
0	Least significant digit's resolution 0 (resolution 1/10)	

The figure below shows how to set the step wide function to "5."



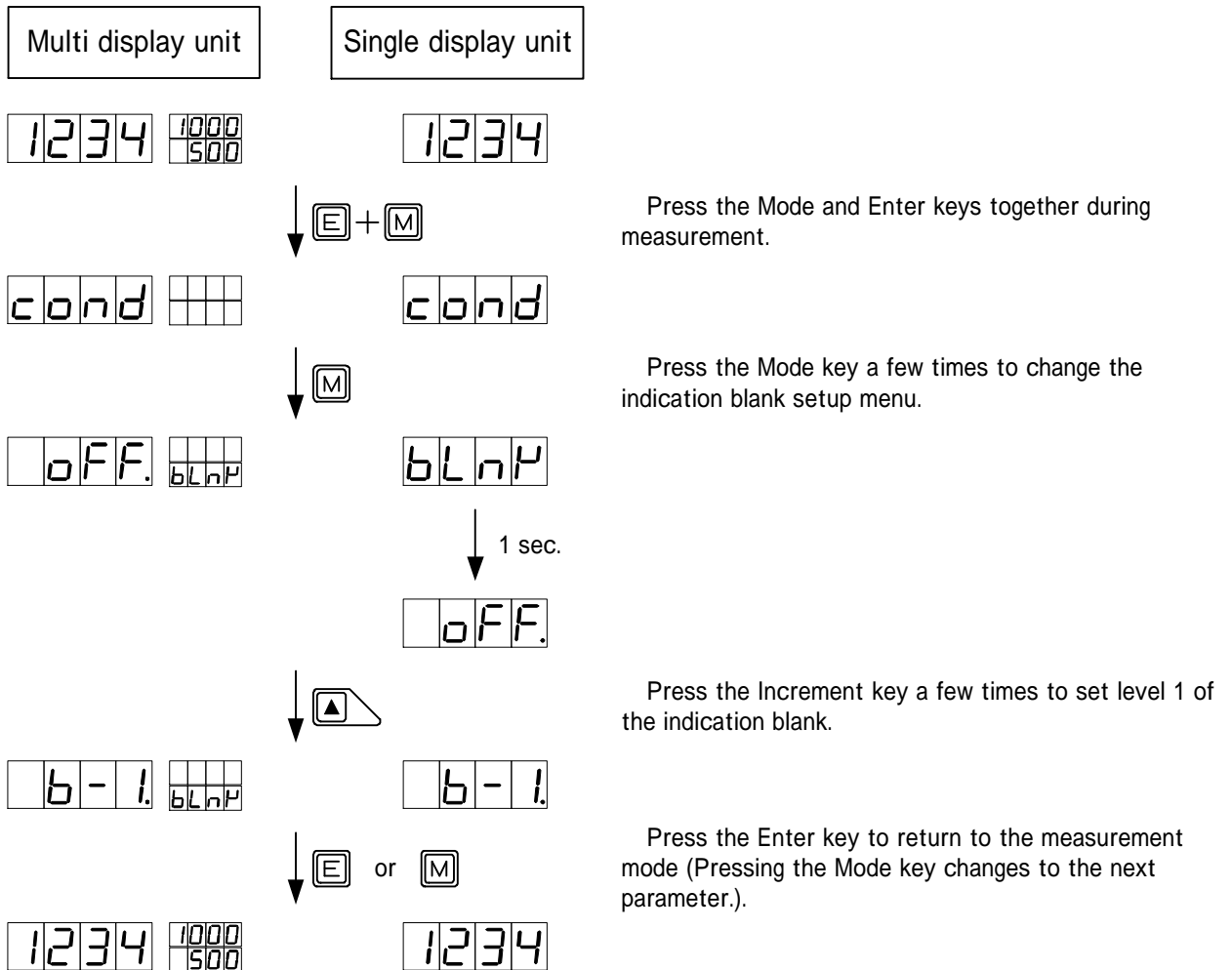
### 7.7.6 Setting up Display Blank

This subsection lets you make settings relating to the FD5000 series display blank function. The display blank function allows you to adjust the brightness of the display.

List of the display and description (The \* denotes the default.)

Display	Description	
OFF	Display blank function OFF	*
B-3	Display blank level 3 (slightly dark)	
B-2	Display blank level 2 (dark)	
B-1	Display blank level 1 (very dark)	
ON	Display blank function ON (extinguished)	

The figure below shows how to set the display blank function to display blank level 1.



\* If the display blank function is activated, the main monitor and sub-monitor (only for the multi-display type) are completely extinguished. (When setting a parameter, the display blank function is OFF and the monitor(s) is lit.)

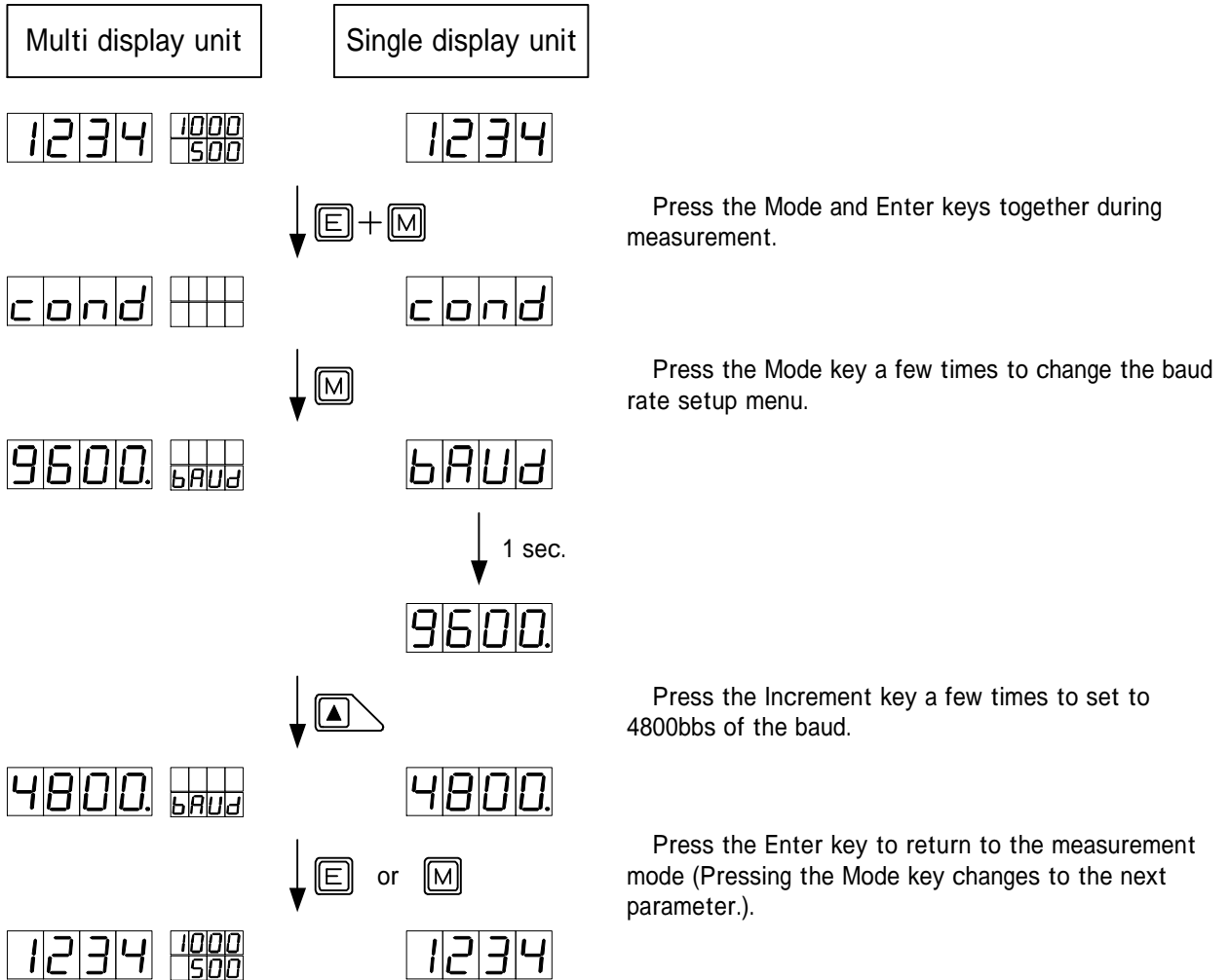
### 7.7.7 Setting the Baud Rate

This subsection lets you make settings relating to the baud rate of the FD5000 series communication functions. This parameter is displayed only when an output unit with communication functions has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
9600	9600bps	*
4800	4800bps	
2400	2400bps	
384-	38400bps	
192-	19200bps	

The figure below shows how to set the baud rate to 4800 bps.



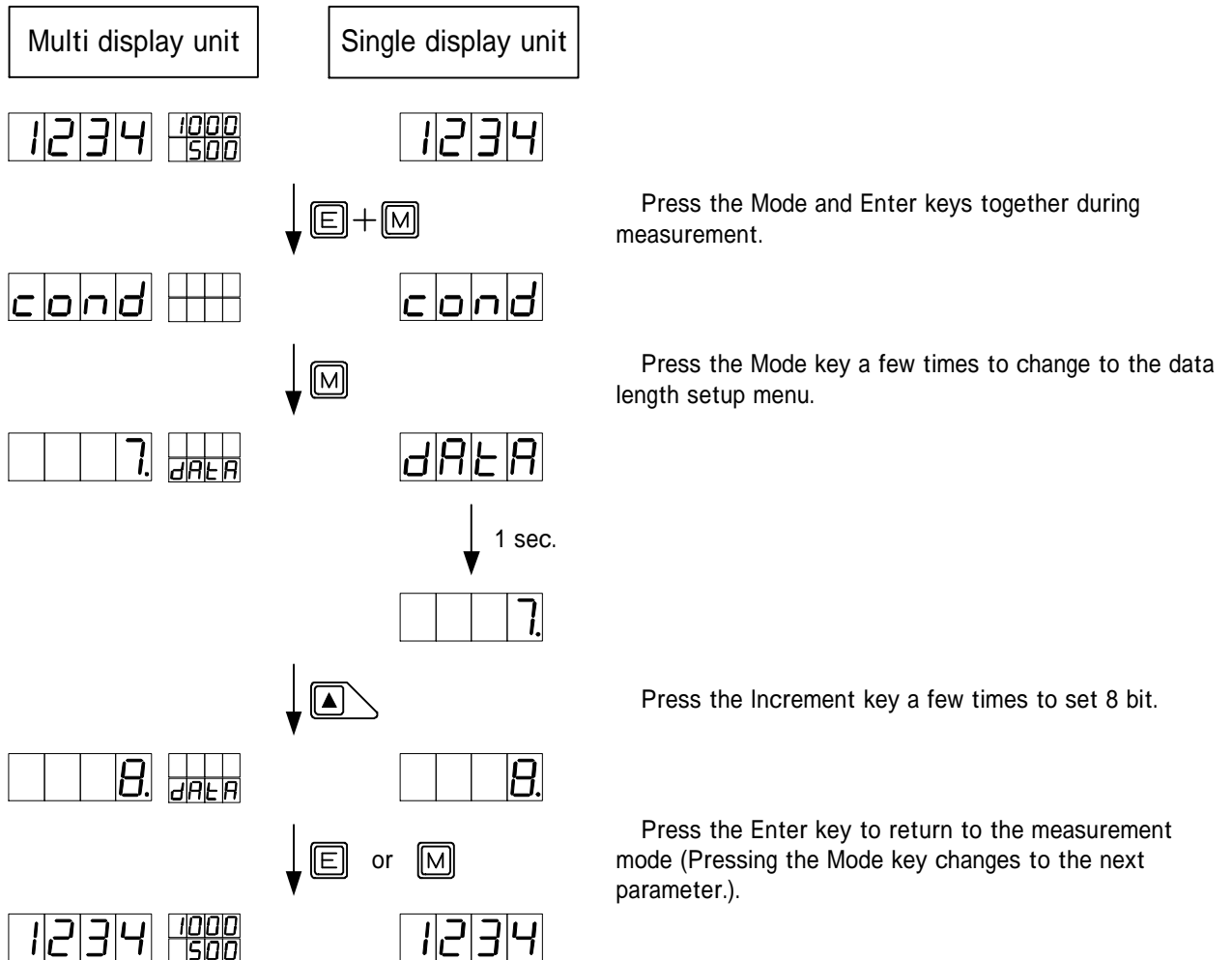
### 7.7.8 Setting the Data Length

This subsection lets you make settings relating to the data length of the FD5000 series communication functions. This parameter is displayed only when an output unit with communication functions has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
7	7bits	*
8	8bits	

The figure below shows how to set the data length to 8 bits.



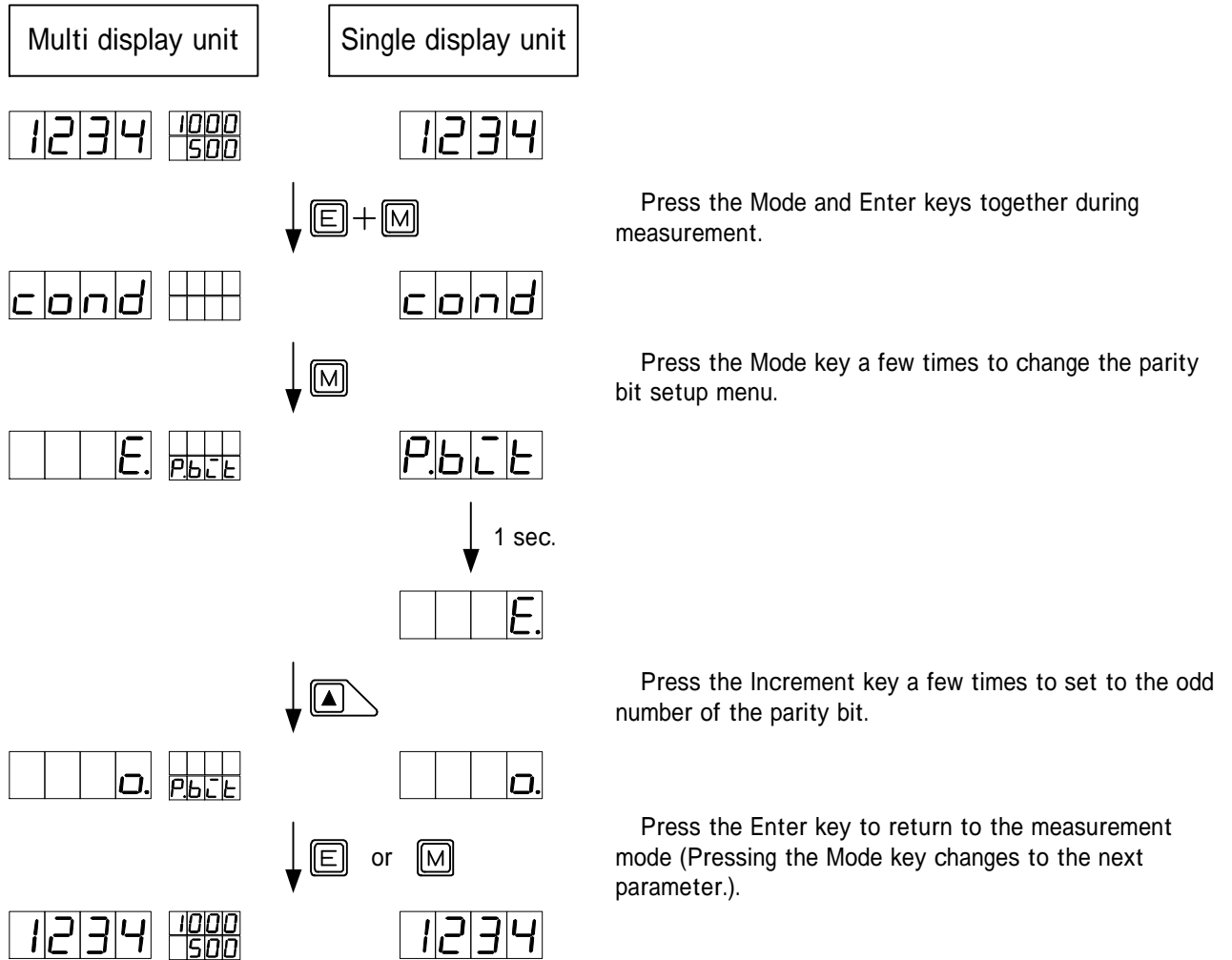
### 7.7.9 Setting the Parity Bit

This subsection makes settings relating to the parity bit of the FD5000 series communication functions. This parameter is displayed only when an output unit with communication functions has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
E	Even parity	*
O	Odd parity	
N	No parity	

The figure below shows how to set the parity bit to odd parity.



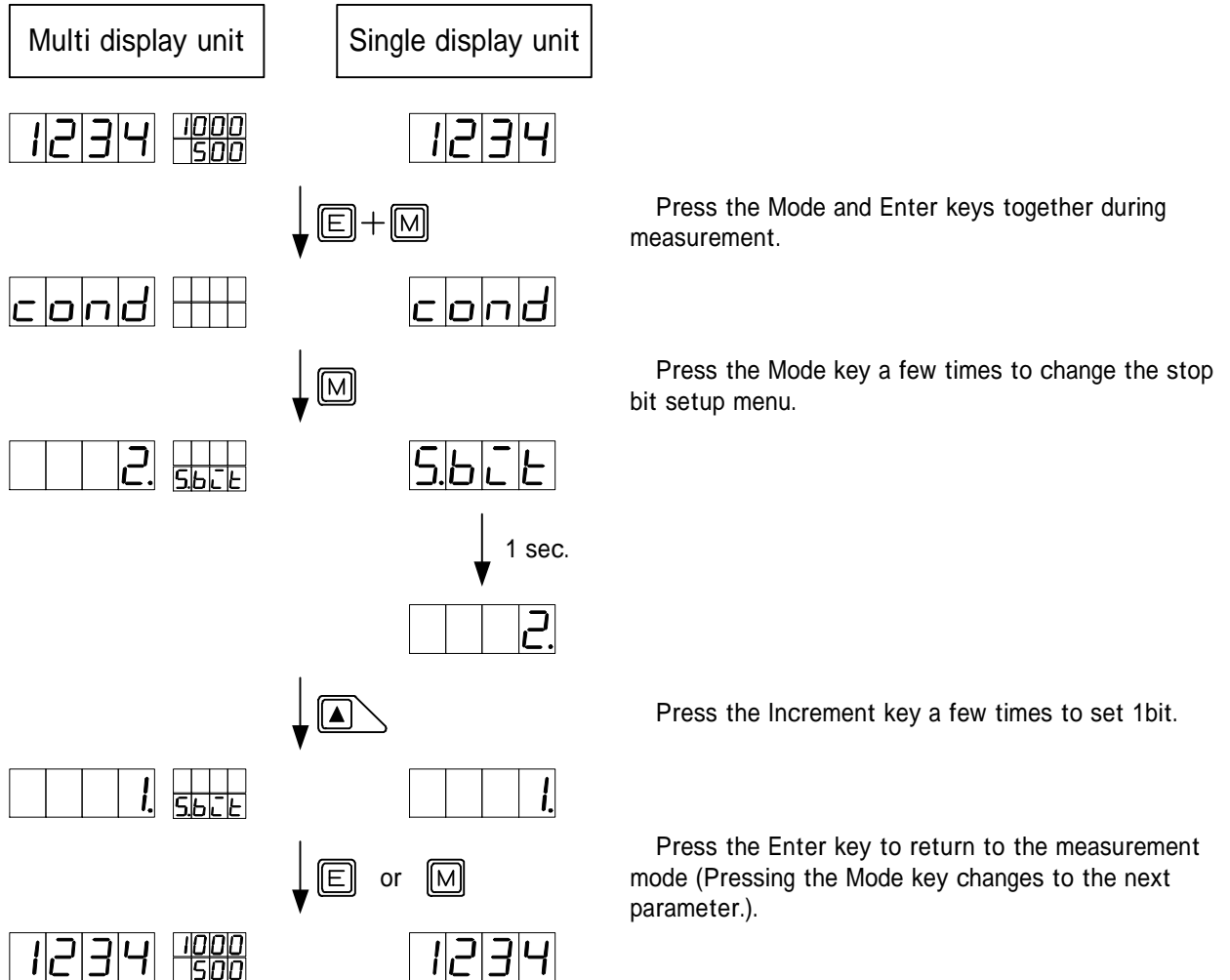
### 7.7.10 Setting the Stop Bit

This subsection lets you make settings relating to the stop bit of the FD5000 series communication functions. This parameter is indicated only when an output unit with communication functions has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
2	2bits	*
1	1bit	

The figure below shows how to set the stop bit to 1 bit.



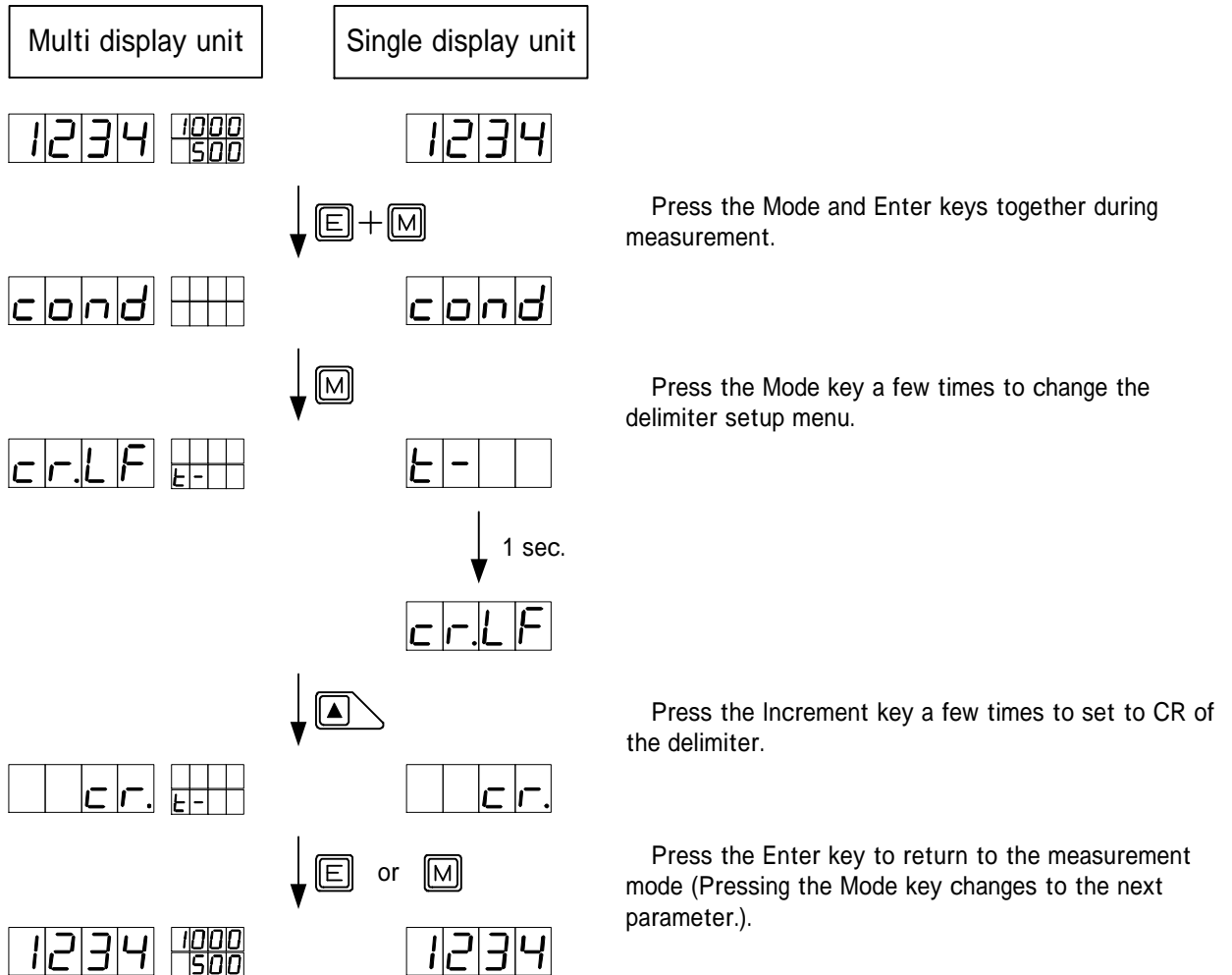
### 7.7.11 Setting the Delimiter

In this subsection, you can make settings relating to the delimiter of the FD5000 series communication functions. This parameter is indicated only when an output unit with communication functions has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
CR.LF	CR and LF	*
CR.	CR.	

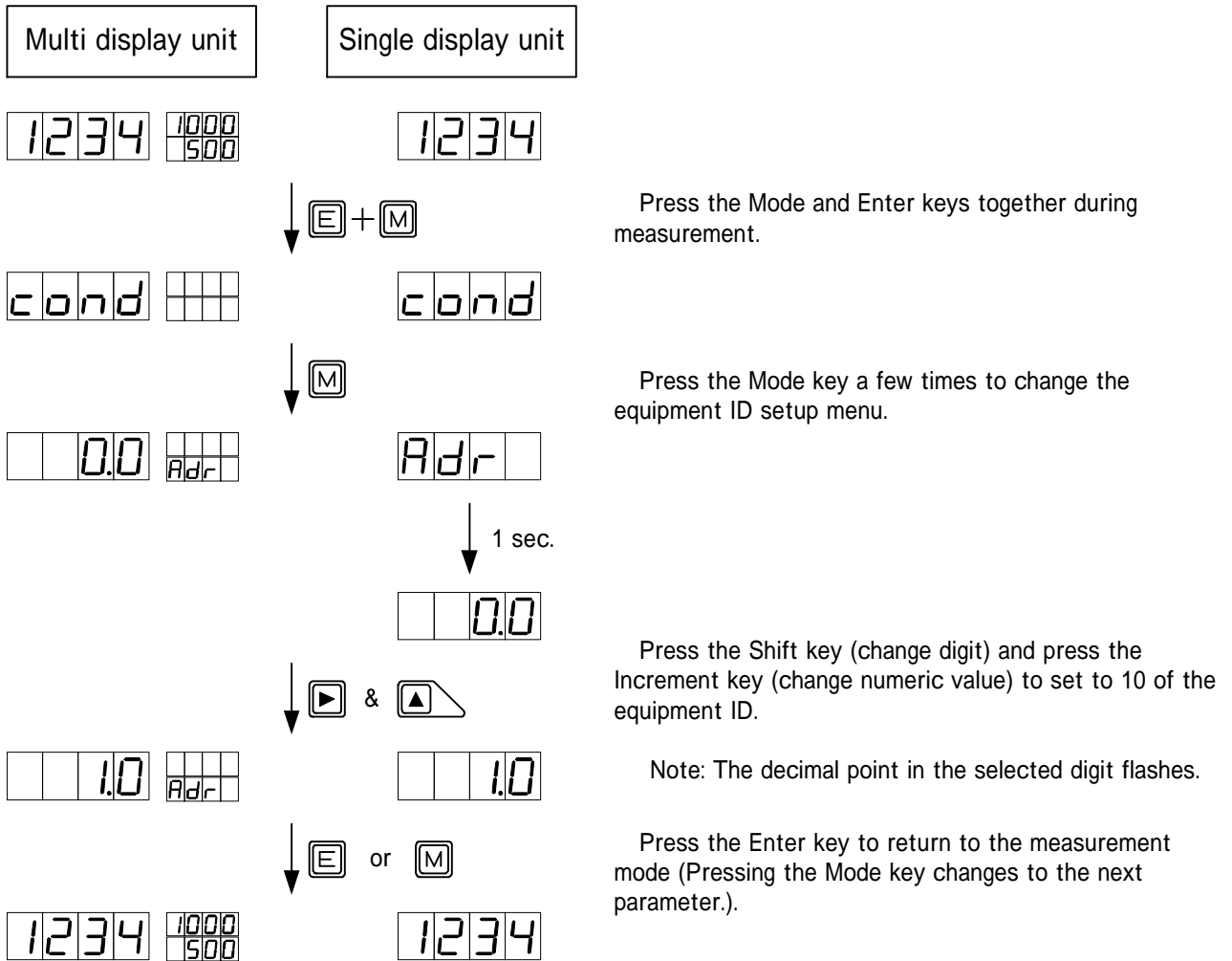
The figure below shows how to set the delimiter to CR.



### 7.7.12 Setting the Equipment ID

This subsection lets you make settings relating to the equipment ID of the FD5000 series RS-485 function. This parameter is displayed only when an output unit with an RS-485 interface function has been installed.

The figure below shows how to set the equipment ID to "10."



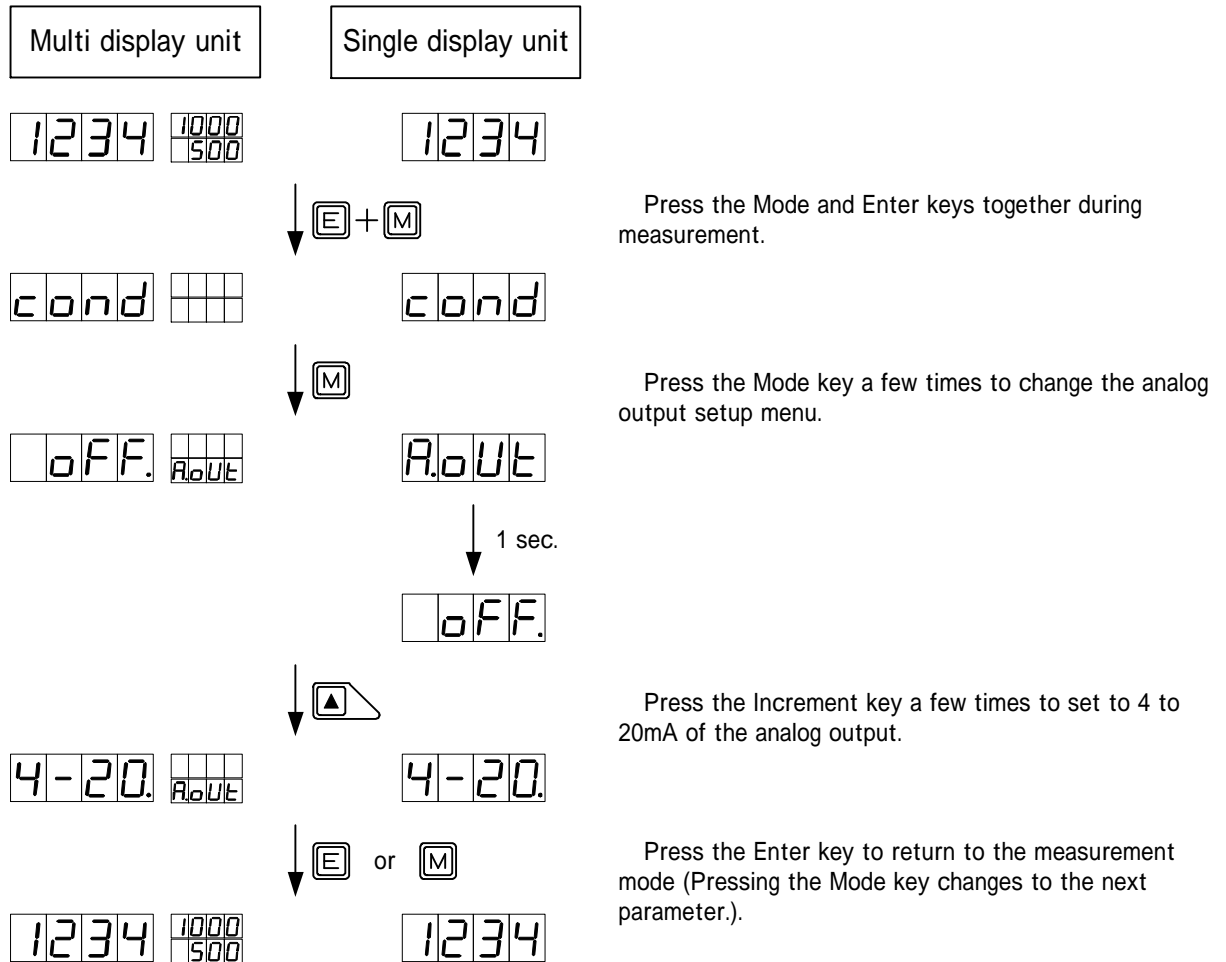
### 7.7.13 Setting the Analog Output Type

This subsection lets you make settings relating to the output type of the FD5000 series analog output function. This parameter is displayed only when an output unit with an analog output function has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
OFF	Without analog output	*
0-1	0 to 1V output	
0-10	0 to 10V output	
1-5	1 to 5V output	
4-20	4 to 20mA output	

The figure below shows how to set the analog output type to 4 to 20 mA.



\* Setting up (changing) the analog output type also causes the terminal to which connections are to be made to change (for the terminal to which connections are to be made, see Chapter 5. Terminal Description and Connection Method).

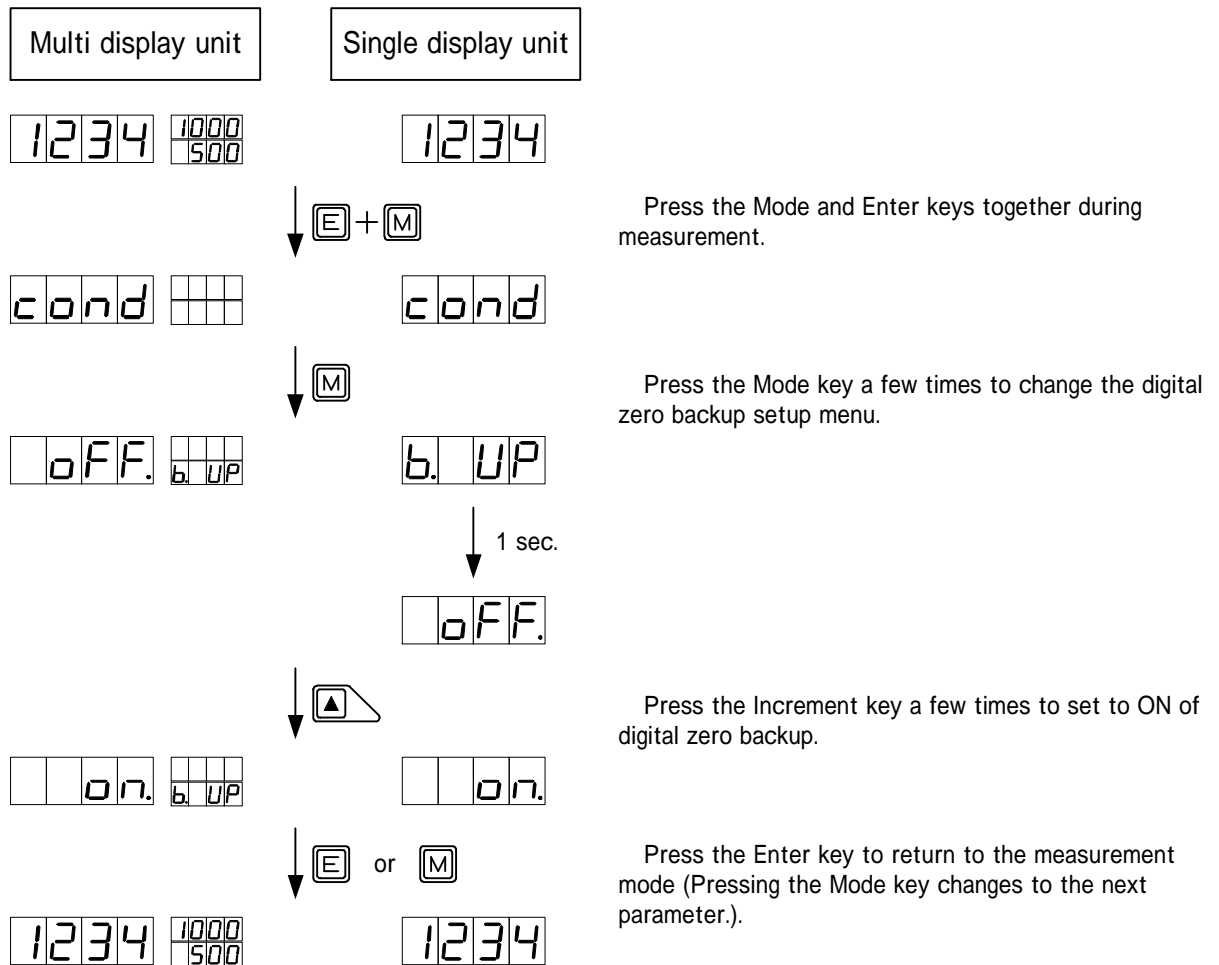
### 7.7.14 Setting Digital Zero Backup

This subsection deals with settings relating to the digital zero backup function of the FD5000 series. The digital zero backup function writes a digital zero value to EEPROM (memory) at the instant the digital zero terminal is turned ON. This stored value takes effect when the instrument is started with the digital zero terminal turned ON. The assured number of writes to the EEPROM is 100,000.

List of the display and description (The \* denotes the default.)

Display	Description	
OFF	Digital zero backup OFF	*
ON	Digital zero backup ON	

The figure below shows how to set the digital zero backup function to ON.



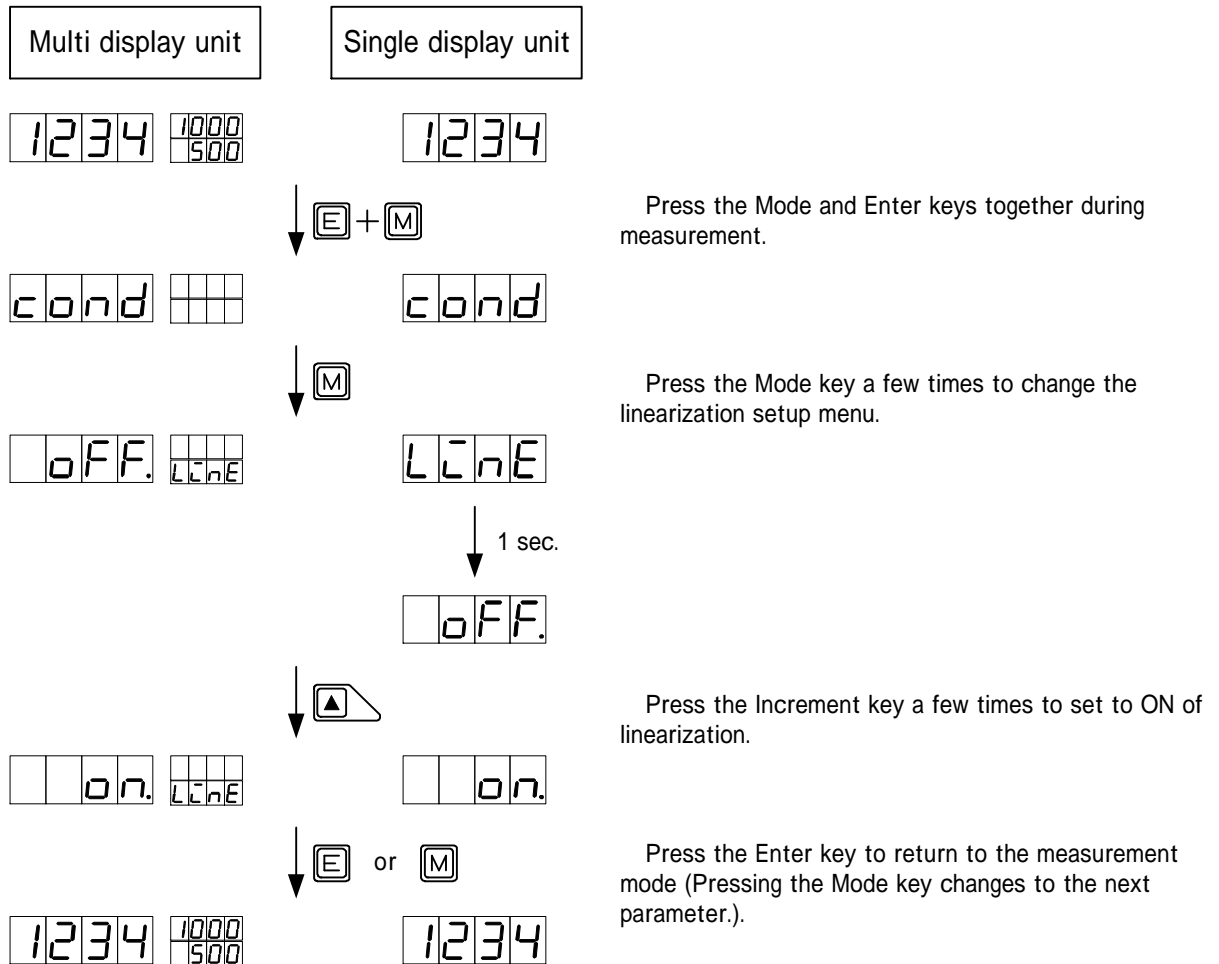
### 7.7.15 Setting Linearize Function

In this subsection, you can make settings relating to the FD5000 series linearize function. The linearize function corrects the linear relation between input and display at any point to change the gradient.

List of the display and description (The \* denotes the default.)

Display	Description	
OFF	Linearize OFF	*
ON	Linearize ON	

The figure below shows how to set the linearize function to ON.



\* This parameter sets whether to use the linearize function. For the specific method of setting up the linearize function, see 7.10. Linearize Data.

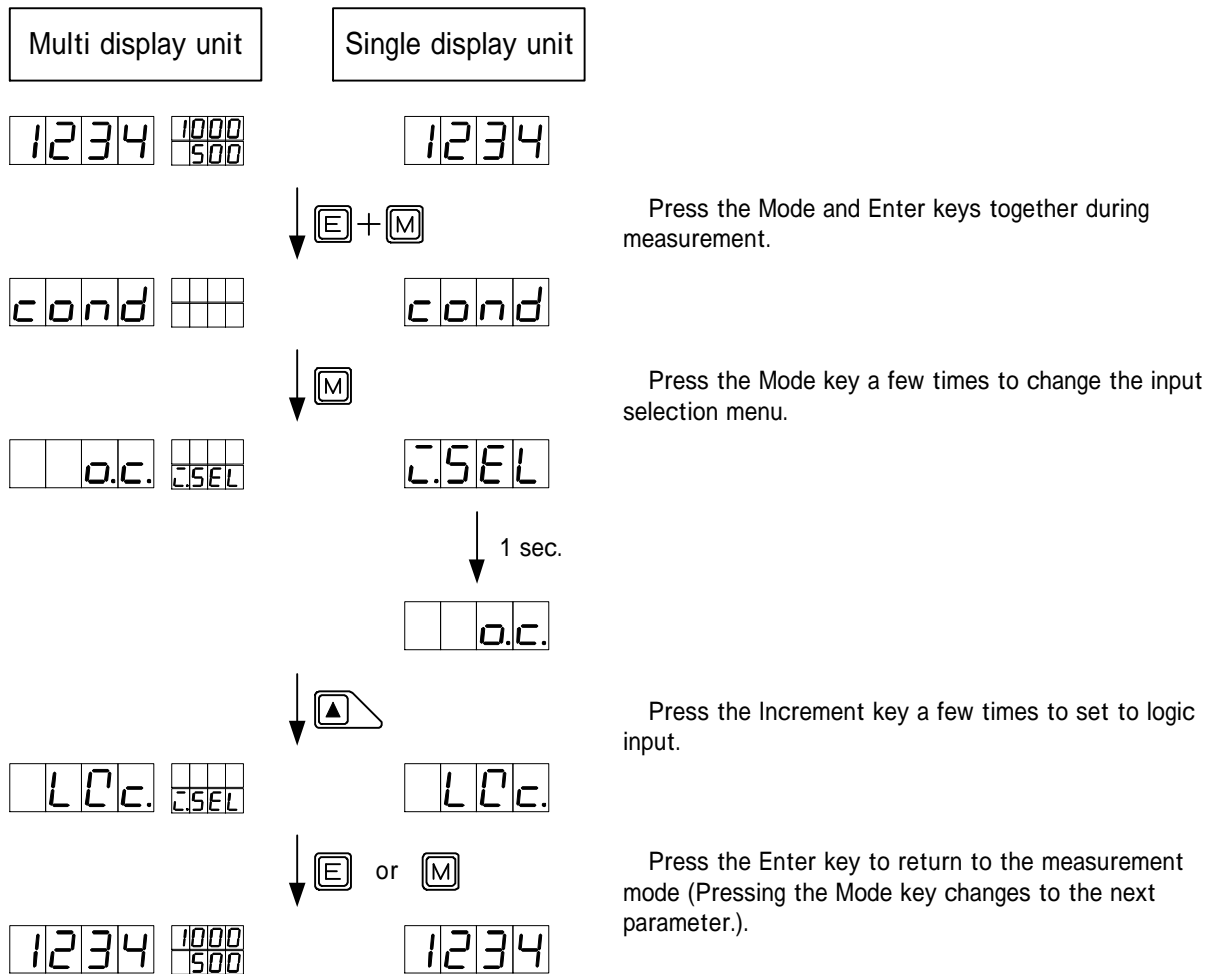
### 7.7.16 Setting Input Switching

This subsection lets you make settings relating to the input type of the FD5000 series frequency-measuring unit. The input type function allows you to select the input type (open collector, logic, or magnet) of the frequency-measuring unit. This parameter is displayed only when the frequency-measuring unit (open collector, logic, or magnet) has been installed.

List of the display and description (The \* denotes the default.)

Display	Description	
O.C	Open collector input	*
LGC	Logic input	
MAG	Magnet input	

The figure below shows how to set input switching to logic input.

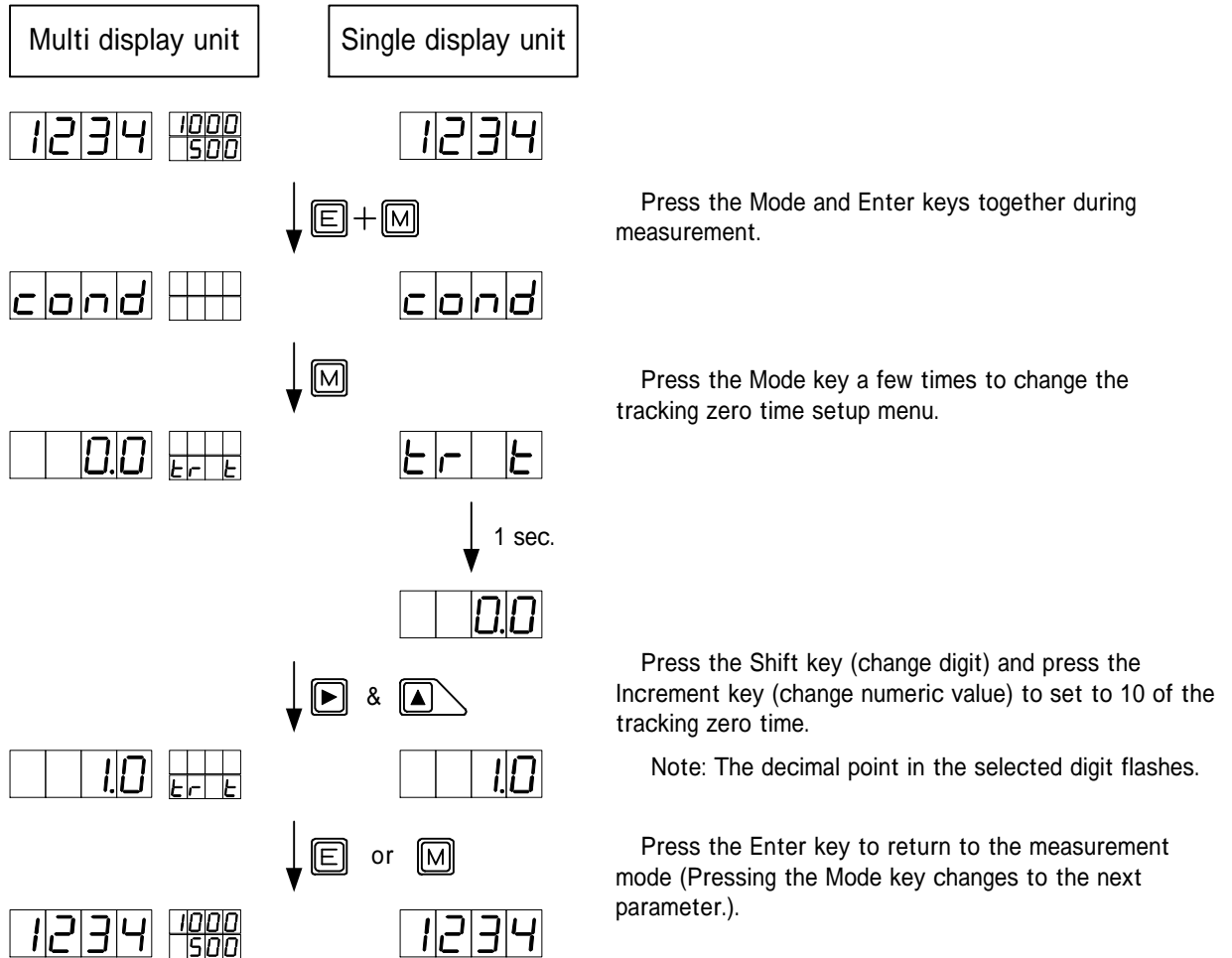


### 7.7.17 Setting Tracking Zero Time

This subsection lets you make settings relating to correction time of the FD5000 series tracking zero function. The correction time is set within the range of the number of sampling, 0 to 99. If the correction time is set to "0", the tracking function is turned OFF.

The figure below shows how to set tracking zero time to "10."

\* The default value is "0."

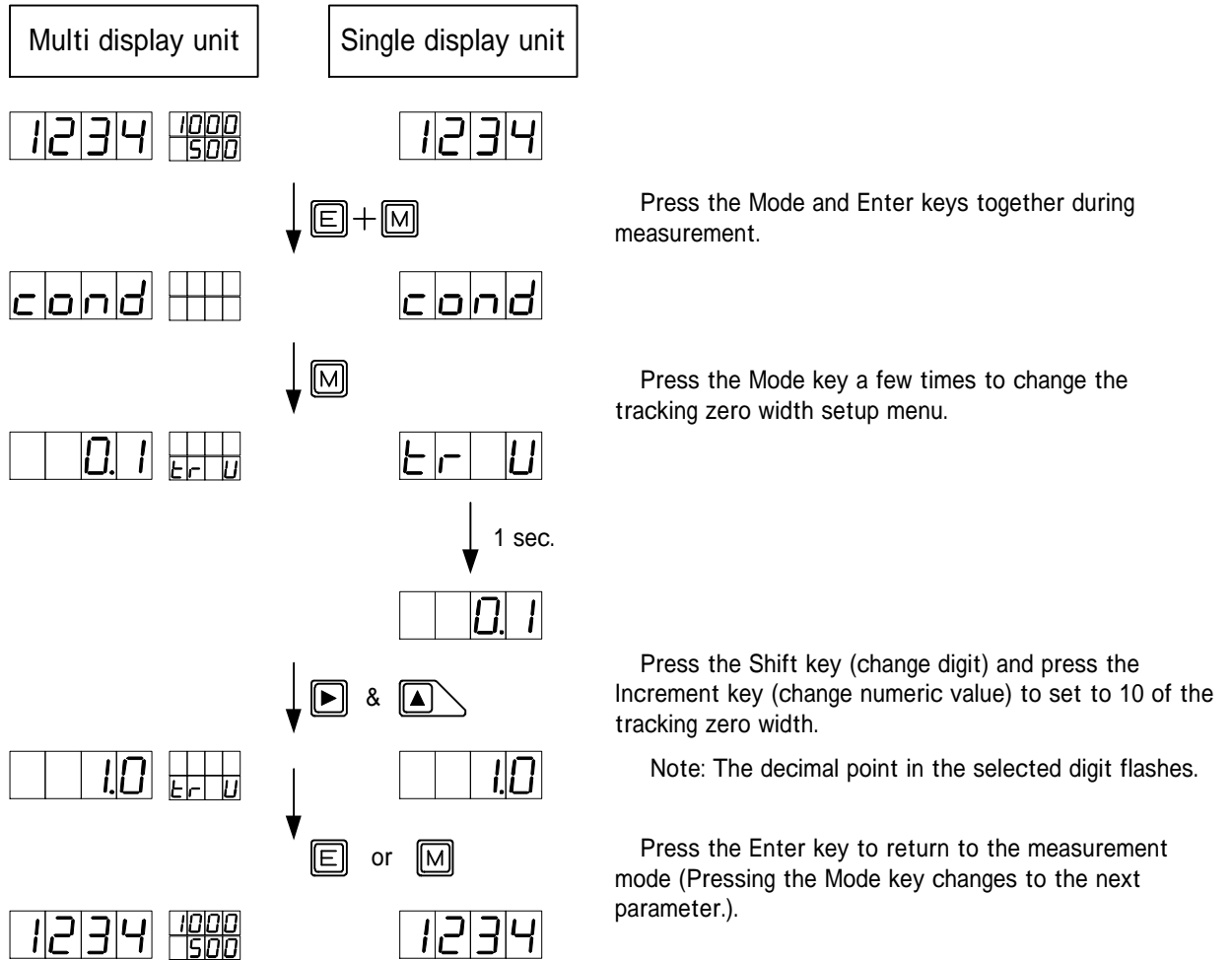


### 7.7.18 Setting Tracking Zero Width

This subsection lets you make settings relating to a correction width of the FD5000 series tracking zero function. This parameter appears only when the setting of tracking zero time has been setup. The setting range is from 1 to 99 digits.

The figure below shows how to set the tracking zero width to 10 digits.

\* The default value is "1."



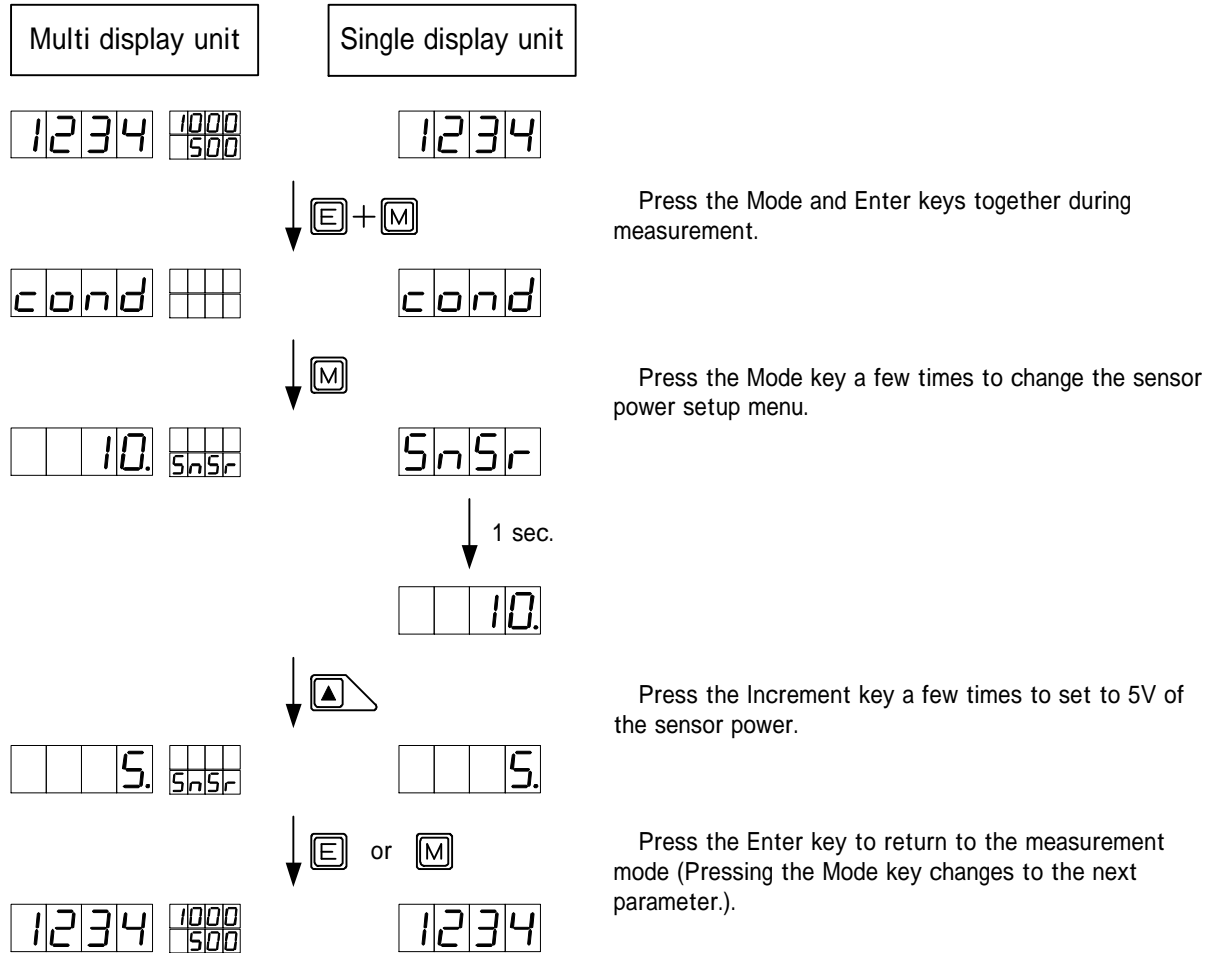
### 7.7.19 Setting Sensor Power

In this subsection, you can make settings relating to the sensor power supply (supply voltage to the sensor) of the FD5000 series strain gauge input unit. This parameter appears only when the strain gauge input unit has been installed in the meter.

List of the display and description (The \* denotes the default.)

Display	Description	
10	10V (30mA)	*
5	5V (15mA)	

The figure below shows how to set the sensor voltage to 5 V.



\* The sensor power-connecting terminal is the same for either 10V or 5V. Check the maximum application voltage of the load cell, etc. first and then set the sensor power to the correct voltage.

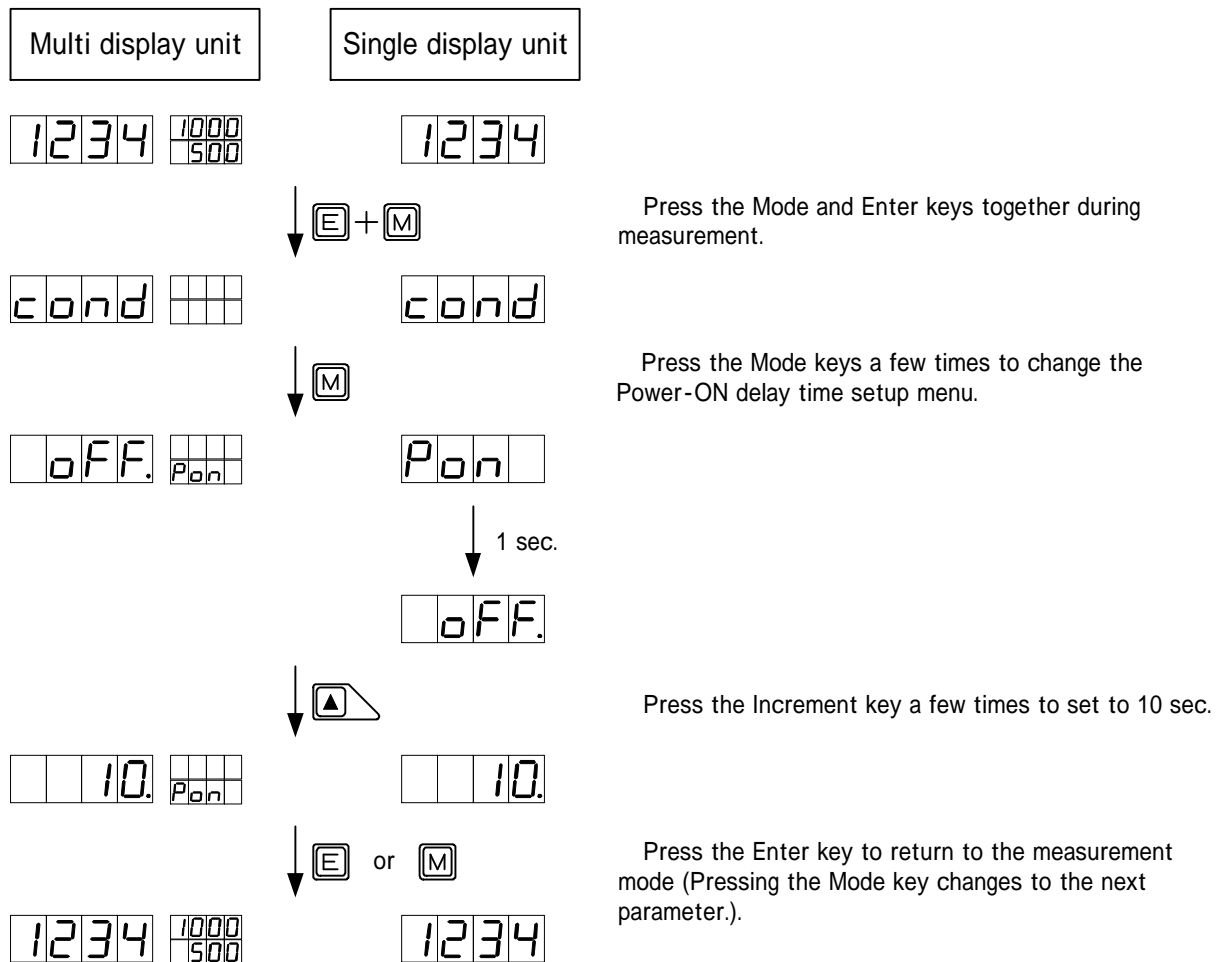
### 7.7.20 Setting Power-ON Delay Time

This subsection deals with settings relating to the FD5000 series power-ON delay function. The power-ON delay function stops operation for a given time when the power is turned ON (in that case, all the displays become "----").

List of the display and description (The \* denotes the default.)

Display	Description	Display	Description
OFF	Power-ON delay function OFF	*	16 "----" displayed for approx. 16 seconds
1	"----" displayed for approx. 1 second	17	"----" displayed for approx. 17 seconds
2	"----" displayed for approx. 2 seconds	18	"----" displayed for approx. 18 seconds
3	"----" displayed for approx. 3 seconds	19	"----" displayed for approx. 19 seconds
4	"----" displayed for approx. 4 seconds	20	"----" displayed for approx. 20 seconds
5	"----" displayed for approx. 5 seconds	21	"----" displayed for approx. 21 seconds
6	"----" displayed for approx. 6 seconds	22	"----" displayed for approx. 22 seconds
7	"----" displayed for approx. 7 seconds	23	"----" displayed for approx. 23 seconds
8	"----" displayed for approx. 8 seconds	24	"----" displayed for approx. 24 seconds
9	"----" displayed for approx. 9 second	25	"----" displayed for approx. 25 seconds
10	"----" displayed for approx. 10 seconds	26	"----" displayed for approx. 26 seconds
11	"----" displayed for approx. 11 seconds	27	"----" displayed for approx. 27 seconds
12	"----" displayed for approx. 12 seconds	28	"----" displayed for approx. 28 seconds
13	"----" displayed for approx. 13 seconds	29	"----" displayed for approx. 29 seconds
14	"----" displayed for approx. 14 seconds	30	"----" displayed for approx. 30 seconds
15	"----" displayed for approx. 15 seconds		

The figure below shows how to set the power-ON delay time to approx. 10 seconds.



\* If the power-ON delay time is set up, the operation is activated in the order of segment check immediately after power ON, i.e., elapsing of delayed time, unit number display, and then measurement operation.

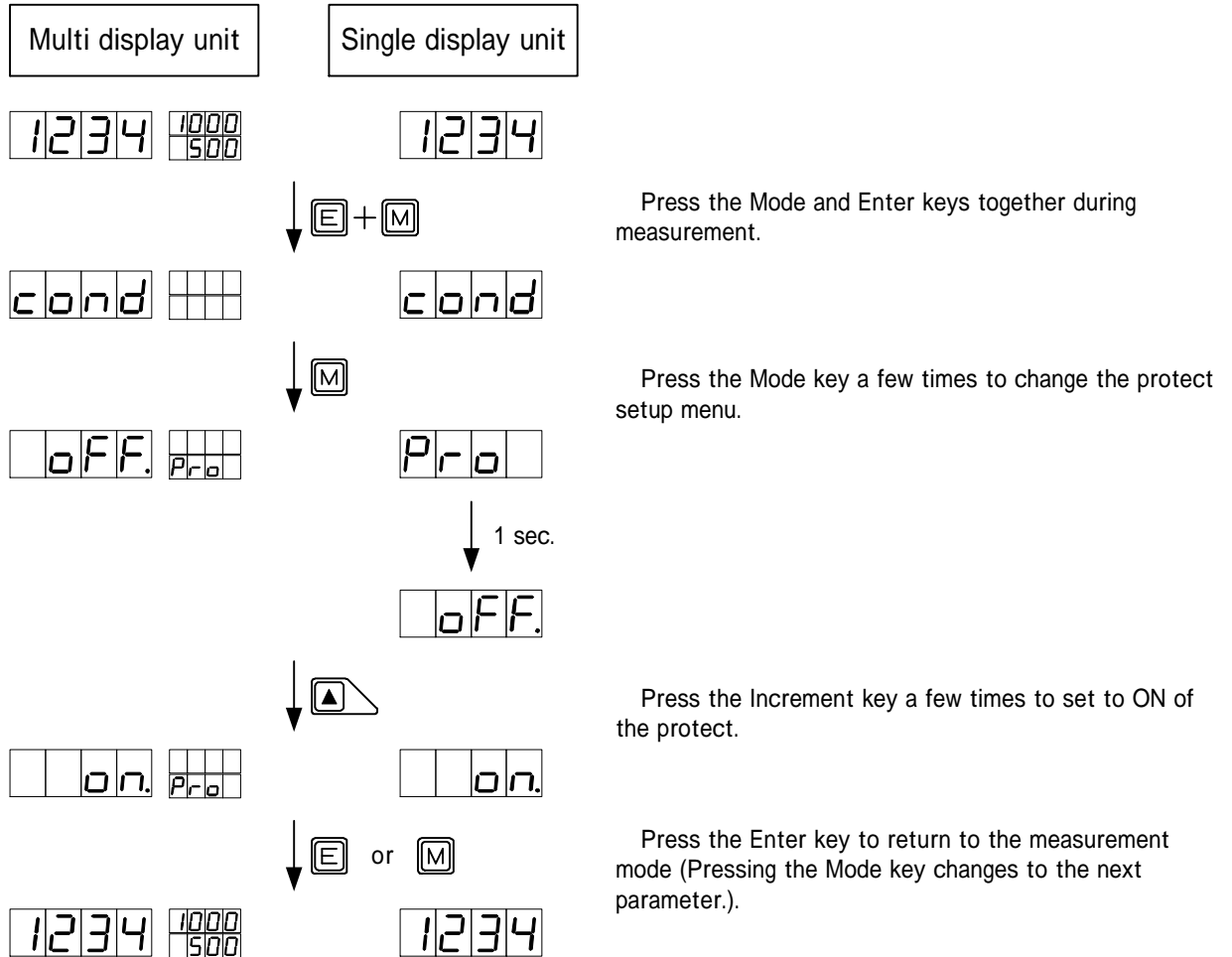
### 7.7.21 Setting Protect Function

This subsection lets you make settings relating to the FD5000 series protect function. The protect function prevents changes being made to all of the parameters with the exception of condition data.

List of the display and description (The \* denotes the default.)

Display	Description	
OFF	Protect OFF	*
ON	Protect ON	

The figure below shows how to set the protect function to ON.



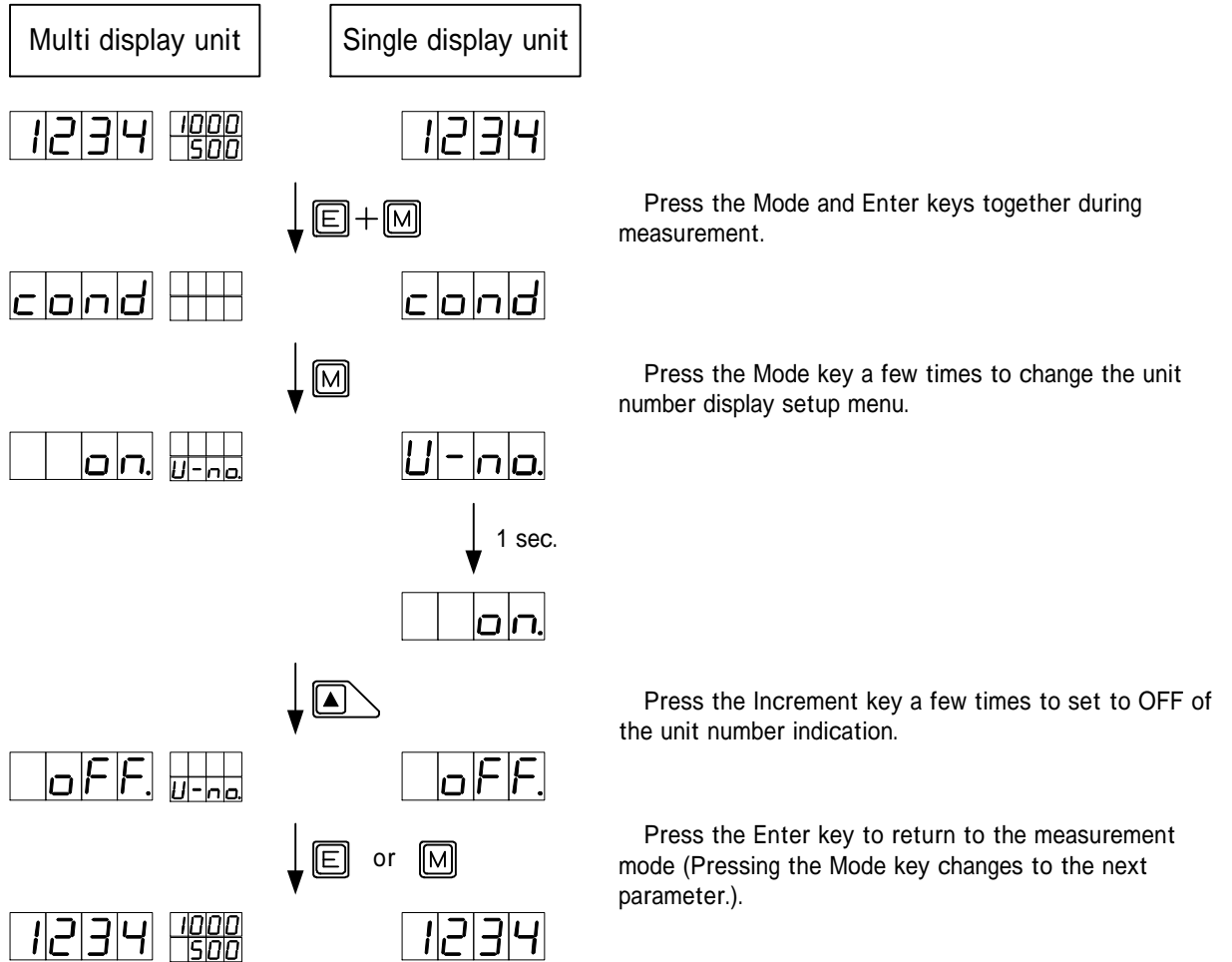
### 7.7.22 Setting Unit Number Display

This subsection lets you make settings relating to the FD5000 series unit number display function. The unit number display function displays the numbers of the installed units when the power is turned ON.

List of the display and description (The \* denotes the default.)

Display	Description	
ON	Unit number display ON	*
OFF	Unit number display OFF	

The figure below shows how to set the unit number display to OFF.

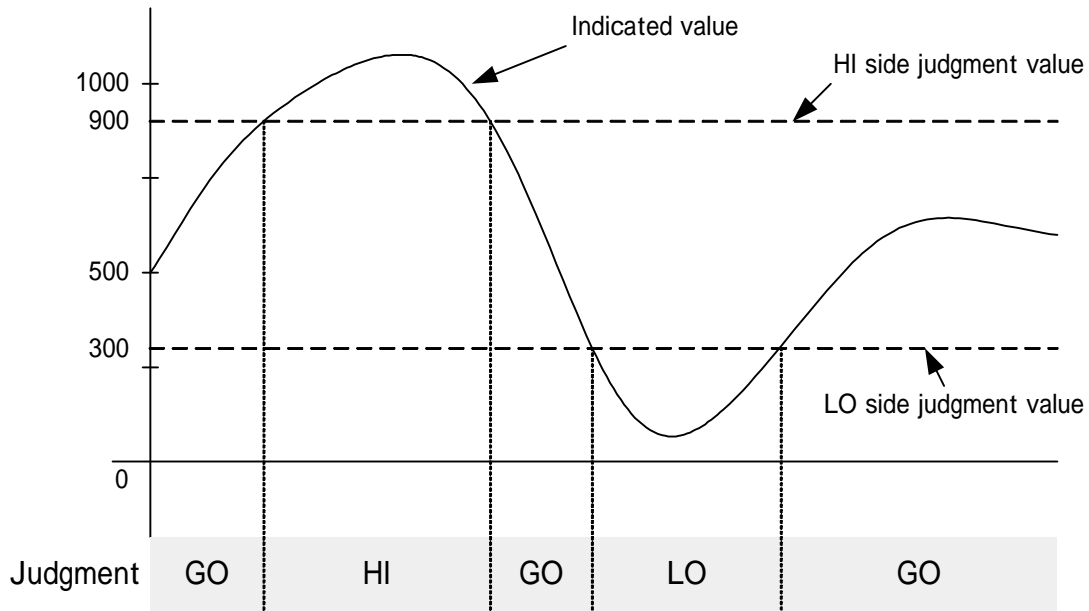


## 7.8 Comparator Data

In this section, you can set parameters relating to the FD5000 series comparison output function. This parameter is displayed only when the comparison output unit has been installed in the meter.

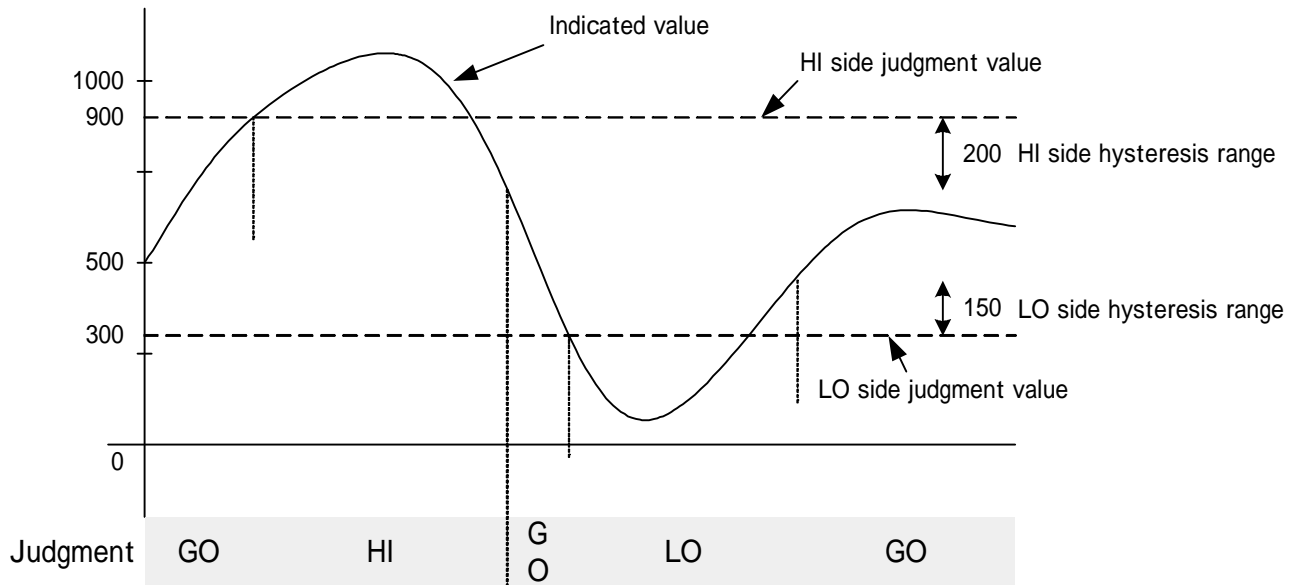
### 7.8.1 Example of Operations Available When Hysteresis is not Used

HI side judgment value : 900  
 HI side hysteresis value : 0  
 LO side judgment value : 300  
 LO side hysteresis value : 0



### 7.8.2 Example of Operations Available When Hysteresis is Used

HI side judgment value : 900  
 HI side hysteresis value : 200  
 LO side judgment value : 300  
 LO side hysteresis value : 150



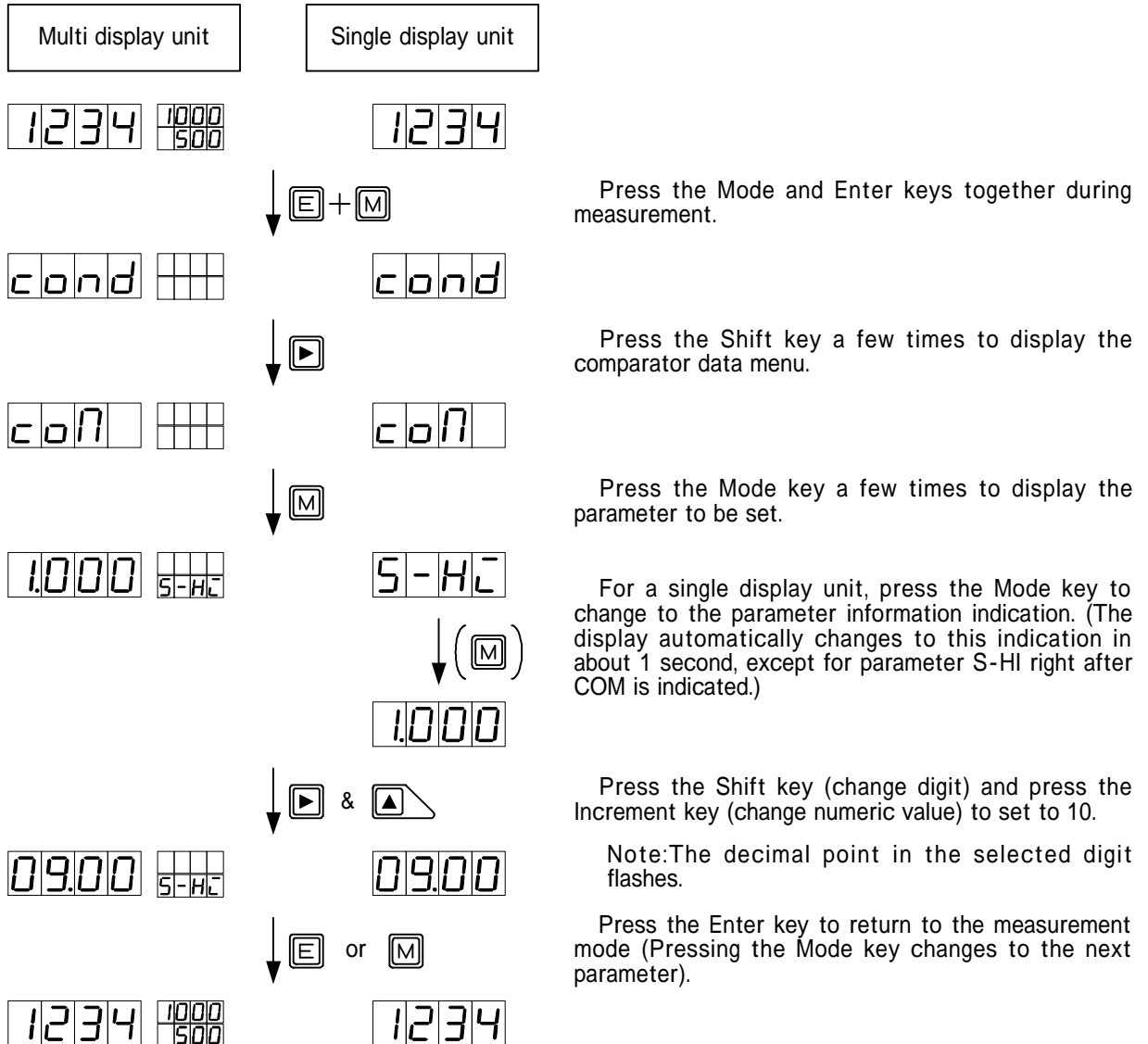
### 7.8.3 Setting Method

The method of setting comparator data is common to all comparator data.

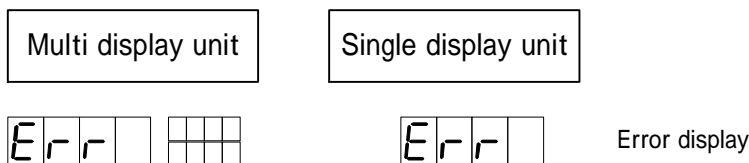
The display of each parameter, and the list of the description

Display	Description	Default
S-HI	HI side judgment value	1000
S-LO	LO side judgment value	500
H-HI	HI side hysteresis value	0
H-LO	LO side hysteresis value	0

The figure below shows how to set the HI judgment value to "900."



\* The setup conditions are HI side judgment value > LO side judgment value, HI side judgment value > LO side judgment value + LO side hysteresis, and LO side judgment value > HI side judgment value - HI side hysteresis. If these conditions are not satisfied, an error indication appears and the display returns to the HI side judgment value setup.



## 7.9 Scaling Data

In this section, you can set parameters relating to display or analog output with respect to an input signal of the FD5000 series. Note that for the strain gauge input unit, display scaling data (FSC, FIN, OFS, or OIN) is not indicated. (For more information, see 7.11. Calibration Data.)

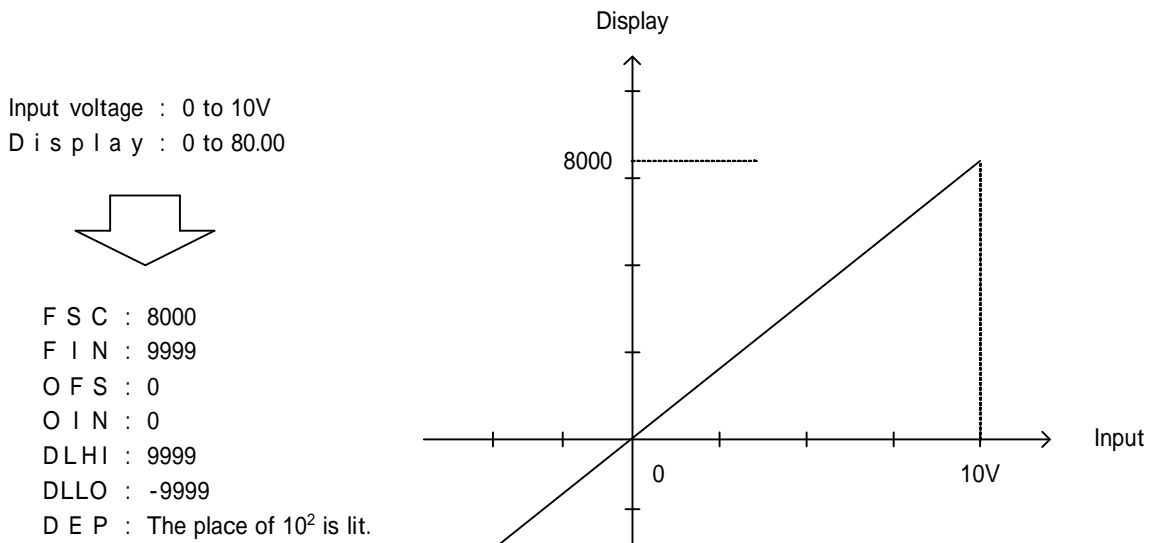
\* The FD5000 series panel meter has the linearize function as standard that corrects the linear relation between input and display at any point to modify the gradient. For the specific method of setting up the linearize function, see 7.10, Linearize Data.

### 7.9.1 Display Scaling of Input Units Other Than Frequency-measuring Units

If an input unit other than the frequency-measuring unit has been installed, the panel meter achieves display scaling using the FSC, FIN, OFS, and OIN parameters. (Note that parameters PS and PPR are not indicated.)

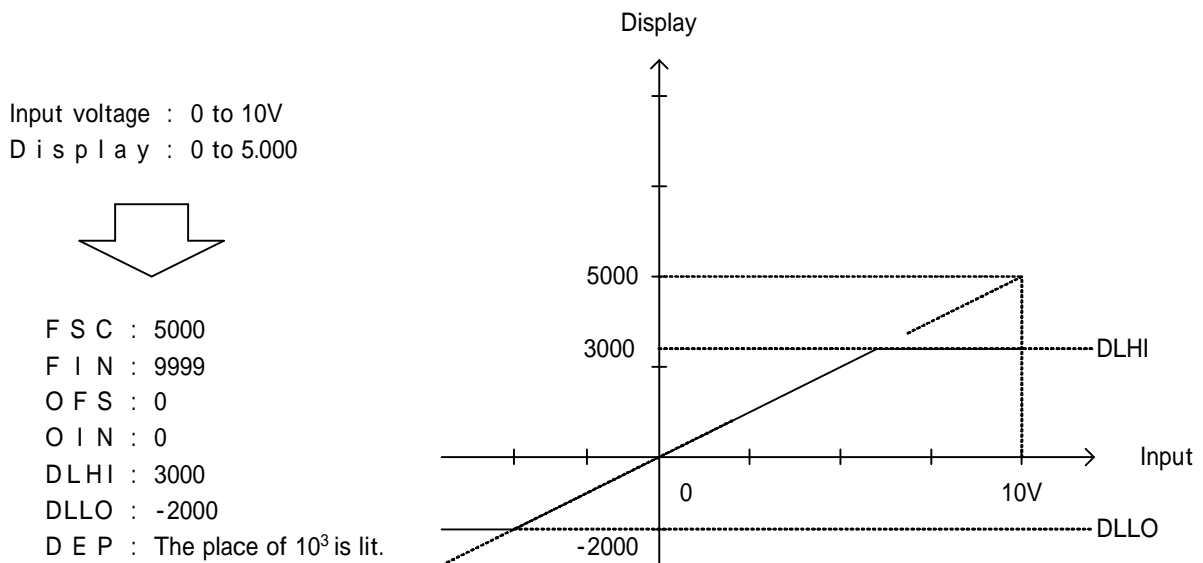
#### 7.9.1.1 Scaling Setting Example 1

Of the DC voltage-measuring unit's ranges (12 to 15 ranges), range 13 is used.



#### 7.9.1.2 Scaling Setting Example 2

Of the DC current-measuring unit's ranges (12 to 15 ranges), range 13 is used.

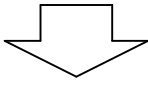


\* If a digital limiter is set up, a value exceeding the range of DLHI to DLLO is not displayed and is held at DLHI (or DLLO). (Note that if an input signal exceeds the range, a range excess is displayed.)

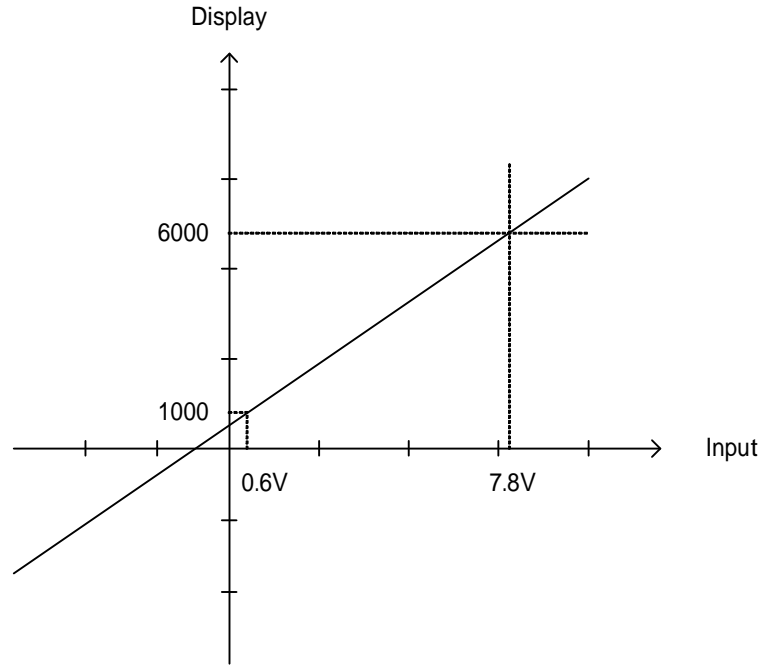
### 7.9.1.3 Scaling Setting Example 3

Of the DC voltage-measuring unit's ranges (12 to 15 ranges), range 13 is used.

Input voltage : 0.6 to 7.8V  
 Display : 10.00 to 60.00



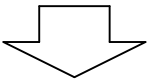
F S C : 6000  
 F I N : 7800  
 O F S : 1000  
 O I N : 600  
 DLHI : 9999  
 DLLO : -9999  
 D E P : The place of  $10^2$  is lit.



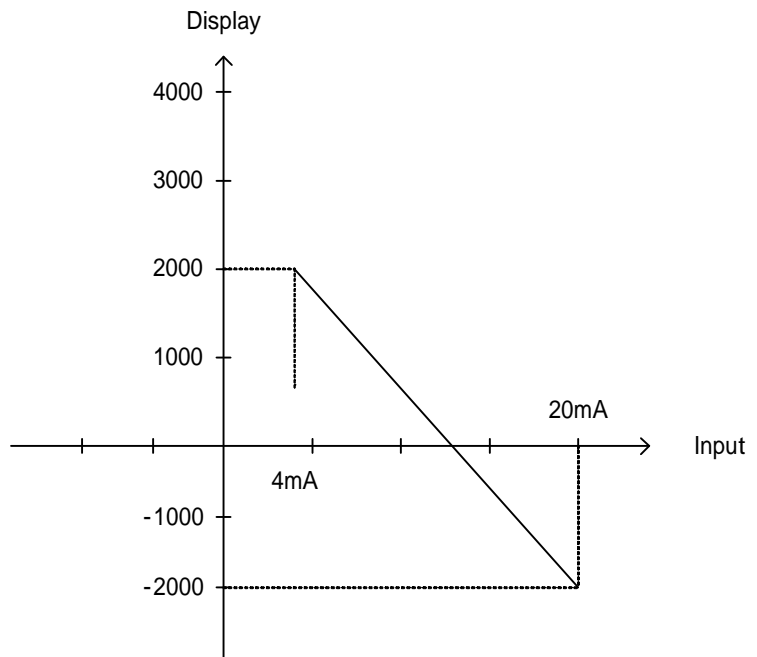
### 7.9.1.4 Scaling Setting Example 4

Of the process-measuring unit's ranges, range 2A is used.

Input voltage : 4 to 20mA  
 Display : 200.0 to -200.0



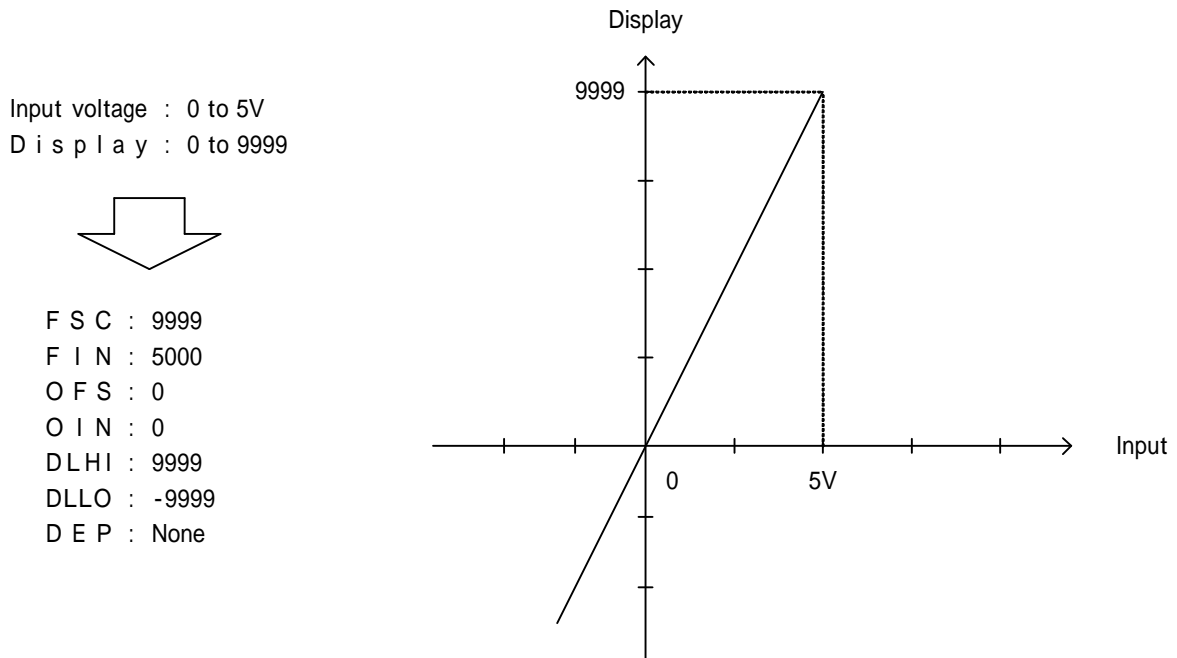
F S C : -2000  
 F I N : 20.00  
 O F S : 2000  
 O I N : 4.00  
 DLHI : 9999  
 DLLO : -9999  
 D E P : The place of  $10^1$  is lit.



\* Inverse gradient scaling is also possible.

### 7.9.1.5 Scaling Setting Example 5

Of the DC voltage-measuring unit's ranges (12 to 15 ranges), range 13 is used.



\* In this example, the resolution of the least significant digit is  $(5V / 9999) = \text{approx. } 0.5mV$ , exceeding the maximum resolution (1mV) of range 13. Thus, the indication of the least significant digit will be removed (however, it can be set).

### 7.9.2 Display Scaling of the Frequency-measuring Units

When a frequency-measuring unit has been installed, the panel meter achieves display scaling using the PS and PPR parameters (parameters FSC, FIN, OFS, and OIN are not indicated).

Determining the revolution speed (rpm) using the rotary encoder set to 30 pulses per minute:

(1) Determine the measurement range by calculating the maximum frequency.

The figure below shows an example where the revolution rises to a maximum speed of about 100 rpm.

$$\frac{30 \times 100}{60} = 50$$

Number of pulses per second  
 Revolution speed per second  
 Number of pulses per revolution at the rotary encoder

(2) Since the number of pulses determined in (1) is 50 per second (50 Hz), set the range to range 11 (for how to set the range, see the section on setting condition data).

(3) The display unit shows 500 if 50 Hz pulse input is measured under range 11 (when PS=1 and PPR=1 by default). Therefore, the parameters should be set as PS=2 and PPR=1 so that the decimal point is positioned in the  $10^1$  digit (100.0 is indicated 50 Hz input).

#### 7.9.2.1 Example of Setting Pre-scale/Frequency Division

\* The pre-scale/frequency division settable range is  $0 < PS \leq 5.000$  or  $1 \leq PPR \leq 100$ . (If  $PS \geq 5$  or  $PPR \geq 100$  is set, the panel meter causes  $PS = 5.000$  or  $PPR = 100$  to be set).

\* In this example, the least significant digit resolution is 0.05 Hz, exceeding the maximum resolution (0.1 Hz) of range 11. Thus, the indication of the least significant digit is removed.

### 7.9.3 Analog Output Scaling

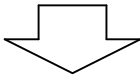
Analog output scaling is set up using the AOHI and AOLO parameters. Set the value indicated when 1 V (10 V, 5 V, or 20 mA) is output to AOHI and the value indicated when 0 V (1 V or 4 mA) is output to AOLO.

These parameters are displayed only when an output unit with an analog output function has been installed.

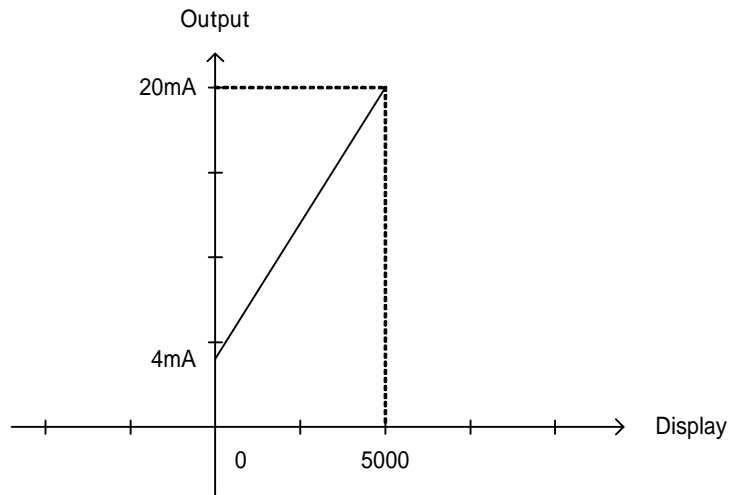
#### 7.9.3.1 Scaling Setting Example 1

Use the analog output type in 4 to 20mA.

Display : 0.0 to 500.0  
Output : 4 to 20mA



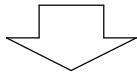
AOHI : 5000  
AOLO : 0



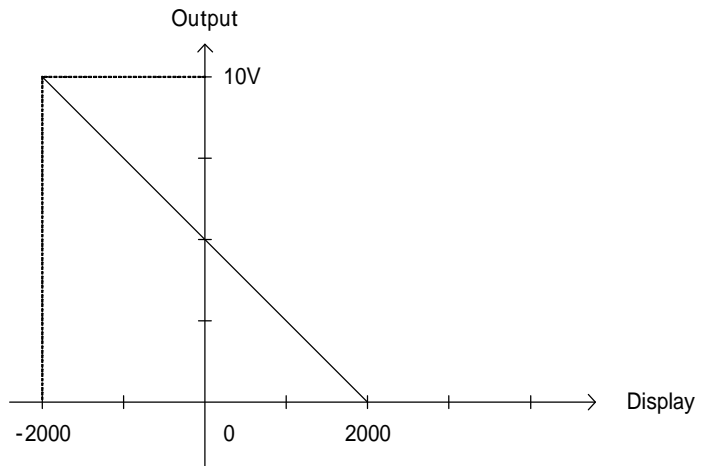
#### 7.9.3.2 Scaling Setting Example 2

Use the analog output type in 0 to 10V.

Display : 200.0 to -200.0  
Output : 0 to 10V



AOHI : -2000  
AOLO : 2000



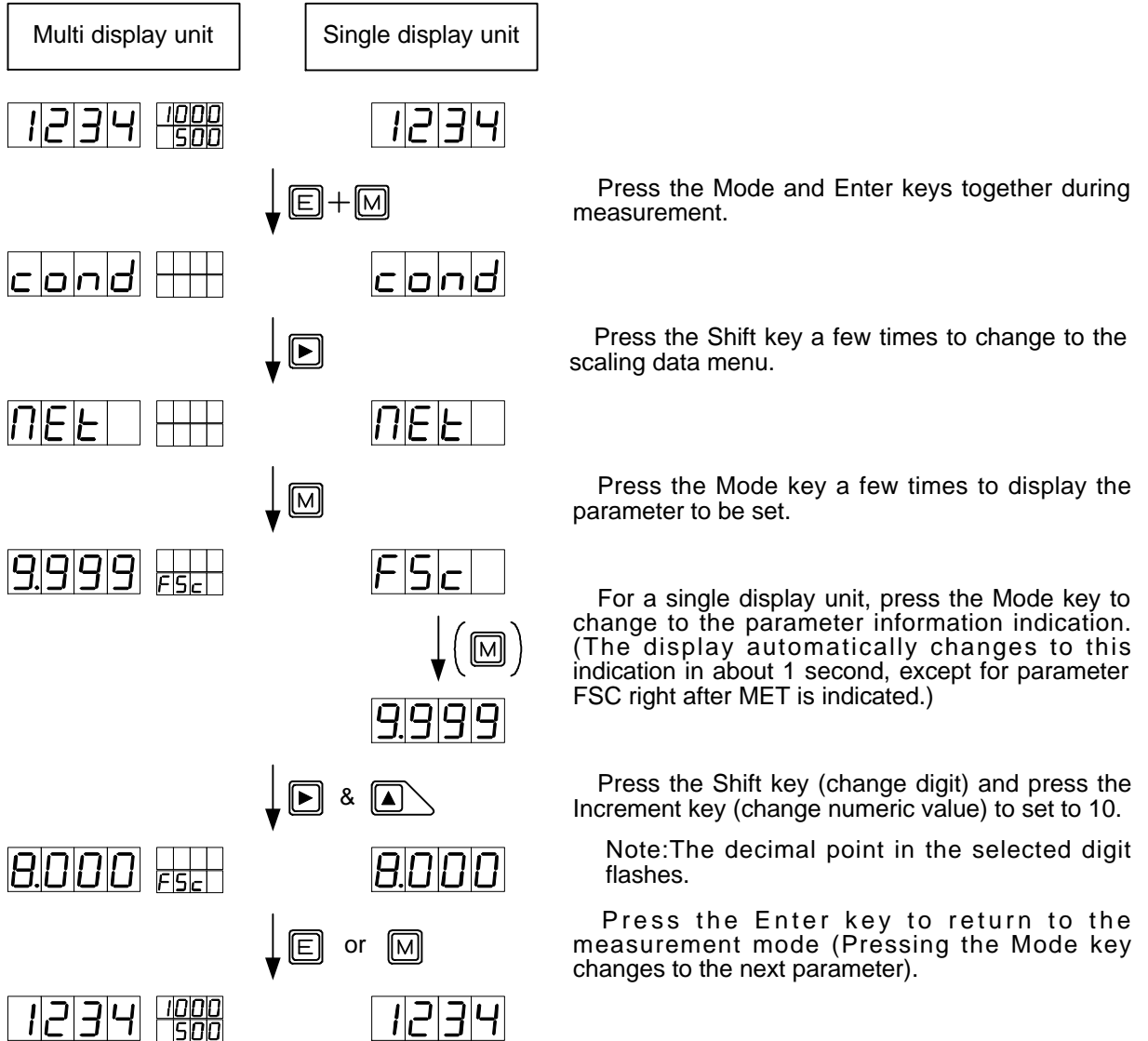
\* Inverse gradient scaling is also possible.

### 7.9.4 Setting Method

The method of setting up scaling data is common to all scaling data.

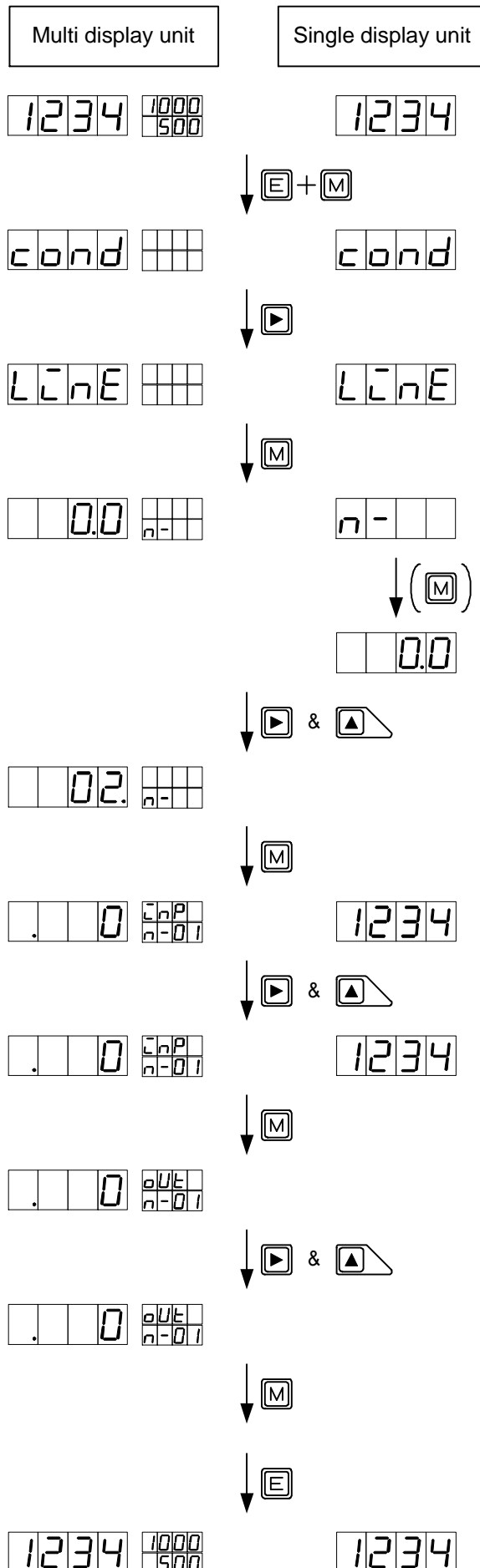
Display	Description	Default	Display	Description	Default
FSC	Full-scale indicated value	9999	DLHI	Digital limit HI set value	9999
FIN	Full-scale input value	9999	DLLO	Digital limit LO set value	-9999
OFS	Offset indicated value	0	AOHI	Analog output HI set value	9999
OIN	Offset input value	0	AOLO	Analog output LO set value	0
PS	Pre-scale value	1.000	DEP	Decimal-point position	None
PPR	Frequency division value	1			

The figure below shows how to set the full scale value to 8000.



## 7.10 Linearization Data

In this subsection, you make settings relating to the FD5000 series linearization function. The linearization function means a function that changes the slope of straight lines in the relationship between the input and indication by correcting the relations at arbitrary points.



Press the Mode key and the Enter key during measurement.

Press the Shift key a few times to move to the linearization data menu.

Press the Mode key to move to the setup for the number of data to be corrected. The number of correction data is 2 to 16 sets.

For single display, press the Mode key to move to the parameter information display status (this move is automatically achieved immediately after LINE display in approximately 1 second for cases other than N-).

Using the Shift key (digit change) and Increment key (value change), set the number of correction data to 2. (As an example, set the number of correction data to 2 sets.)

Note: The decimal point in the selected digit flashes.

Press the Mode key to move to the input-value setting of the first correction data.

Note: An input value is the indicated value pertaining to an input immediately before execution of linearization.

Using the Shift key (digit change) and Increment key (value change), set the number of correction data to the desired value.

Press the Mode key to move to the output-value setting of the correction data.

Note: An output value is the indicated value pertaining to an input immediately after execution of linearization.

Using the Shift key (digit change) and Increment key (value change), set the number of correction data to the desired value.

Press the Mode key to move to the input-value setting of next correction data (after that, repeat these steps until the last correction data is set).

When all the settings have been made, press the Enter key to return to the measurement mode.

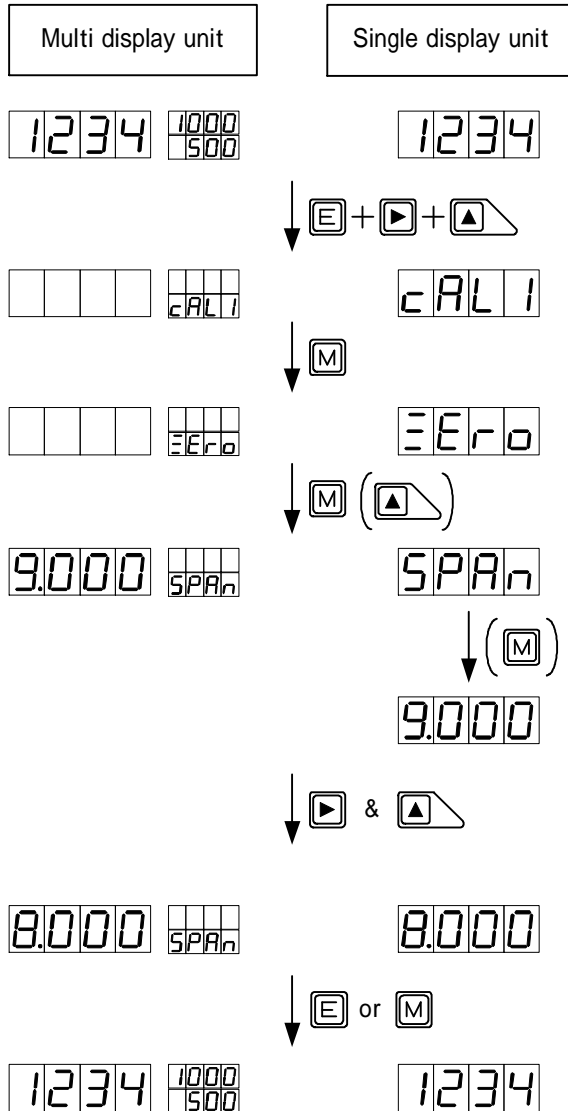
## 7.11 Calibration Data

In this subsection, you make settings relating to the FD5000 series calibration function. This parameter appears only when the strain gauge input unit has been installed in the instrument.

### 7.11.1 Method of Setting Actual Load Calibration

Actual load calibration means that calibration is carried out by applying actually measured pressure to a sensor such as a load cell connected to the meter.

The figure below shows how to set the display to 8000 when any pressure is applied



Press the Shift, Increment, and Enter keys together during measurement.

Press the Mode key to change to the actual load calibration mode.

Press the Mode key while applying pressure that will cause the display to show zero.

Err1: When the input at the time of zero calibration is below  $-0.3\text{mV/V}$ , it displays.

Err2: When the input at the time of zero calibration is more than  $1\text{mV/V}$ , it displays.

For a single display unit, press the Mode key to change to the parameter information indication.

Press the Shift key (change digit) and Increment key (change numeric value) to set 8000.

Note: The decimal point in the selected digit flashes.

Err3: It is the same as that of the time of being an input at the time of span calibration at the zero proofreading time, or when small, it displays.

Err4: When the input at the time of span calibration is more than  $3.3\text{mV/V}$ , it displays.

Err5: When the setup more than the highest decomposition ability is performed, it displays.

Press the Mode key to return to the measurement mode.

## 7.11.2 Method of Setting Equivalent Calibration

Equivalent calibration means that calibration is carried out according to the ratings (specifications) of such a sensor as a load cell. It is not necessary to connect the sensor or to apply pressure to the sensor. The figure below shows how to set the display to 20.00 when the specifications of the load cell to be connected are a rated pressure of 20 MPa, a zero balance of 0.004 mV/V, and a rated output of 2.002 mV/V (the decimal point is set using scaling data).

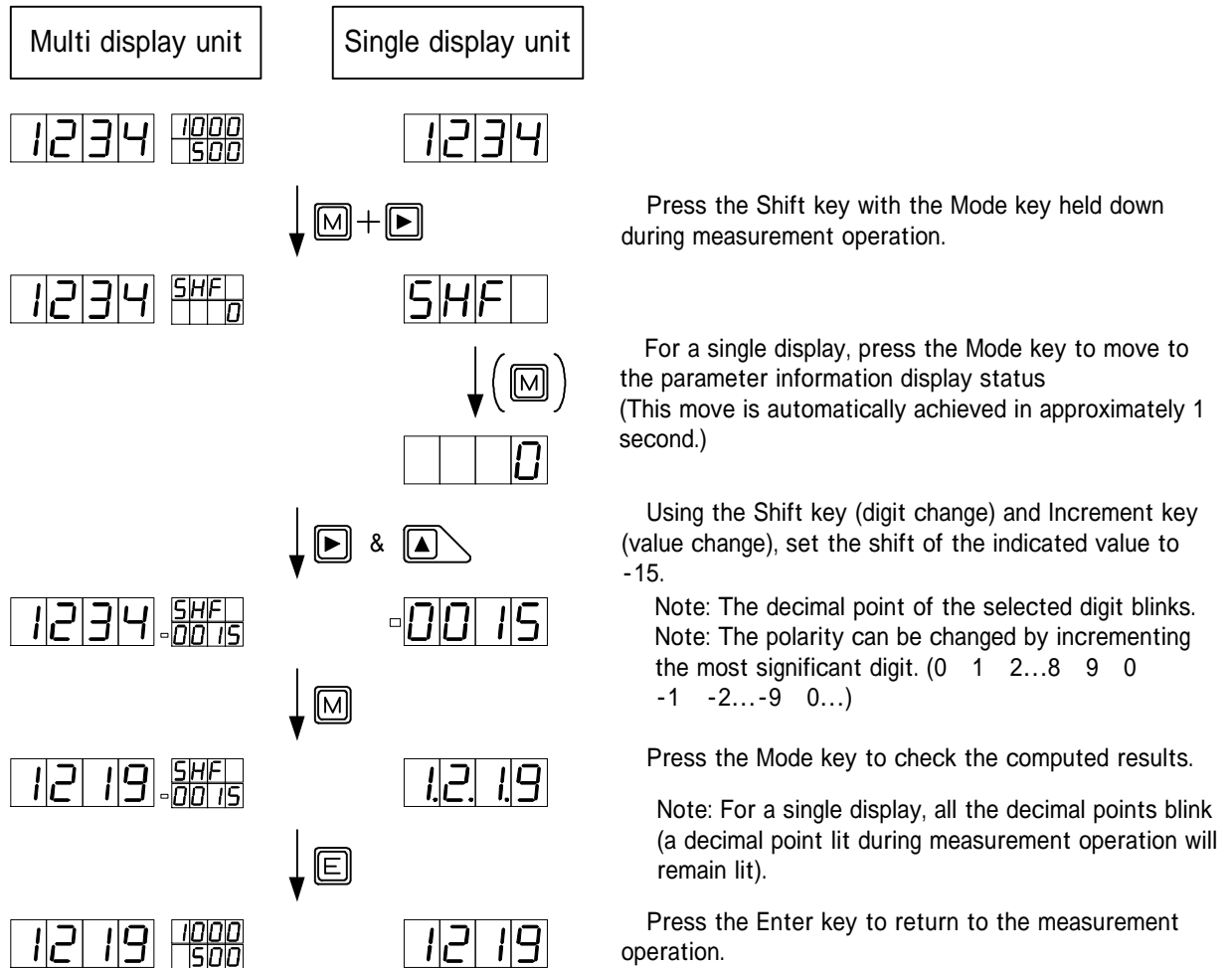
Multi display unit	Single display unit	
1234 1000 500	1234	
	↓	Press the Shift, Increment, and Enter key together during measurement.
[ ][ ][ ][ ] cAL1	cAL1	
	↓	Press the Increment key to select the equivalent calibration mode.
[ ][ ][ ][ ] cAL2	cAL2	
	↓	Press the Mode key to move to the equivalent calibration mode.
[ ][ ][ ][ ] EEr0	EEr0	
	↓	Press the Shift key to display the zero-input setup mode.
0.000 EEr0	0.000	Note: For a single display unit, the unit automatically returns to ZERO indication if there is no key operation for about 8 seconds. In such a case, press the Mode key to return to the numerical value indication.
	↓	Press the Shift key (change digit) and the Increment key (change numeric value) to set 0.004.
0.004 EEr0	0.004	Note: The decimal point in the selected digit flashes.
	↓	Press the Mode key to change to the span input value setup mode.
2.000 SPEn	SPEn	Err1: When the input at the time of zero calibration is below -0.3mV/V, it displays. Err2: When the input at the time of zero calibration is more than 1mV/V, it displays.
	↓	For a single display unit, press the mode key to display the parameter information indication.
[ ][ ][ ][ ] 2.000	2.000	
	↓	Press the Shift key (change digit) and the Increment key (change numeric value) to set 1.002.
1.002 SPEn	1.002	
	↓	Press the Mode key to change to the span indicating value setup mode.
9.000 SPAn	SPAn	
	↓	For a single display unit, press the Mode key to display the parameter information indication.
[ ][ ][ ][ ] 9.000	9.000	
	↓	Press the Shift key (change digit) and the Increment key (change numeric value) to set 2000.
2000 SPAn	2000	Note: The decimal point in the selected digit flashes.
	↓	Err3: It is the same as that of the time of being an input at the time of span calibration at the zero proofreading time, or when small, it displays. Err4: When the input at the time of span calibration is more than 3.3mV/V, it displays. Err5: When the setup more than the highest decomposition ability is performed, it displays.
1234 1000 500	1234	Press the Mode key to return to the measurement mode.

## 8 Other Functions

### 8.1 The Display Shift Function

The display shift function arbitrarily shifts the display only, without changing the gradient of the input signal. Press the Shift key for approximately 2 seconds with the Mode key held down to enter the setting conditions. Then use the Shift key and Increment key to set up any shift.

The figure below shows how to set up shifting of the indicated value by -15 digits.



\* To cancel the display shift function, set the parameter to "0."

### 8.2 Monitor Mode

The FD5000 series panel meter is capable of displaying the maximum value, minimum value, maximum value–minimum value, and input value in the monitor display block.

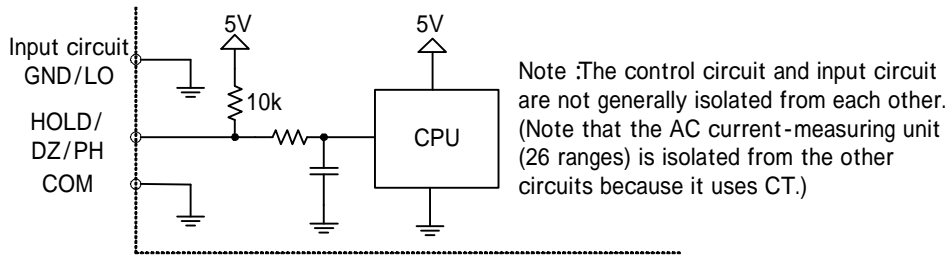
Press the Increment key with the Enter key held down to enter the display status in each mode. To return to ordinary display, press the Enter key. Which mode is used to display a value is determined by the previous display status in the Monitor mode. (If the instrument's power supply is turned OFF, maximum-value display is activated in this mode when the power supply is turned ON next time.) To change to each value-display mode, press the Shift key.

The maximum value, minimum value, and maximum value–minimum value are always stored in the memory with respect to the measurement results. To clear these data items, use the Increment key.

## 9 Control Functions

### 9.1 About Control Function

The FD5000 series panel meter has the hold, digital zero, and peak hold control functions.



### 9.2 Hold Function

The Hold function temporarily retains the indication. The hold function is enabled by short circuiting the HOLD and COM terminals or setting both terminals to the same voltage level. As a result the display unit retains the indication given at that moment.

### 9.3 Digital Zero Function

The Digital Zero function zeros the indication given at an arbitrary timing. Thereafter, the function shows the amount of change from the point of zeroing. However, this function serves as an indication resetting function for a frequency measuring unit. Thus, the Digital Zero function can be used to reset the indication when there is no input signal at all.

Note that, the on/off control of the Digital Zero function can be achieved by means of terminal control or front panel keys.

\* Operation with the control terminals takes priority over operation with the front panel keys. (The Digital Zero function is disabled if the control terminals are made to go through the off-on-off sequence with the function enabled by means of the front panel keys.)

#### 9.3.1 Terminal Control

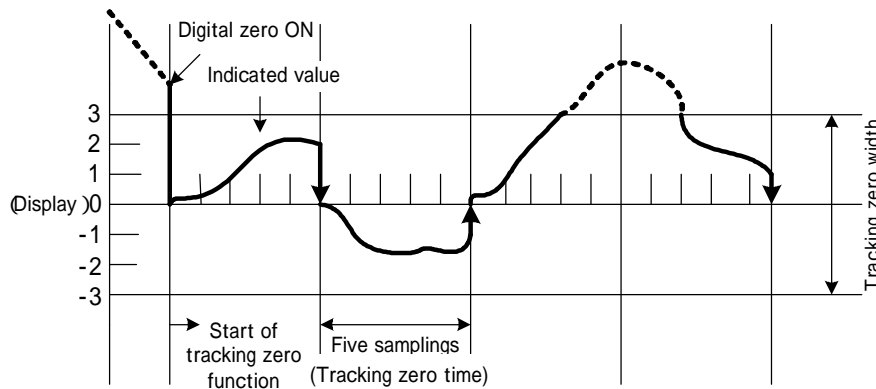
When the DZ terminal and COM terminal are short-circuited or set at the same potential, the digital zero function is activated. This causes the display shown at that point to be zero.

#### 9.3.2 Front Key Control

If the Increment key is pressed for approximately 1 second with the Mode key held down, the display shown at that point becomes zero.

#### 9.3.3 Tracking Zero

The tracking zero function automatically digitally corrects zero-point movement internally. This function starts working from the instant when the digital zero function has been activated. Correction is made according to the values set by tracking zero time setting and tracking zero width setting in condition data setting.



Digital zero function is activated. The indicated value becomes zero.

Because the indicated value is less than 3 digits at 5th sampling, correction is made to display zero.

No correction is made since the indicated value exceeds the correction value.

Because the indicated value is less than 3 digits, correction is made to display zero.

Setting example : Tracking zero time setting 5 (correction at every five sampling)  
Tracking zero width setting 3 (correction value 3 digits)

#### 9.4 Peak Hold Function

The Peak Hold function retains one of the maximum (peak hold)/minimum (valley hold)/maximum - minimum (peak-valley hold) values and provides output for that value. Selection from these values is made using the condition data. The peak hold function is enabled by short circuiting the PH and COM terminals or setting both terminals to the same voltage level.

## 10 Output Functions

#### 10.1 Comparison Output Function

The FD5000 series of unit meters is designed so that the two judgment values HI and LO can be set for the measured (indicated) value to provide the results of judgment as relay contact output. (This function is effective when the meter is equipped with a comparison output unit.) For details on the contact ratings and other specifications, refer to the section "Output Specifications."

#### 10.2 Analog Output Function

The FD5000 series of unit meters can output an analog signal for an indicated value (when the meter is equipped with an analog output unit). There are four output ranges, 0 to 1 V/0 to 10 V/1 to 5 V/4 to 20mA, from which a selection can be made using the condition data. In addition, the analog output of the FD5000 series allows for arbitrary output scaling. This scaling can be achieved by setting the indication value for an output of the maximum scale value (20mA for 4-20mA output range) in the AOHI parameter of the scaling data.

#### 10.3 RS-485 Interface Function

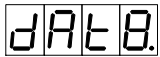
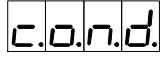
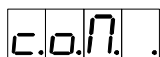
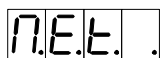
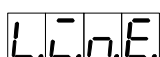
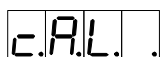
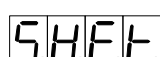
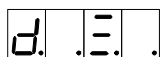

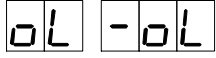
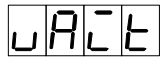
The FD5000 series can be equipped with an RS-485 interface (when the meter is provided with an RS-485 unit). For details on the RS-485 function, see the 13. Detailed Communications Specifications.

#### 10.4 RS-232C Interface Function

The FD5000 series can be equipped with an RS-232C interface (when the meter is provided with an RS-232C unit). For details on the RS-232C function, see 13. Detailed Communications Specifications.

## 11 Error Messages

The table below describes the inspection points, remedies, etc. taken if abnormal displays or erroneous operating conditions occur during use of the FD5000 series panel meter.

	Display	Error description	Remedy
1	 One of segments "a" to "g" of the least significant digit lights up.	The meter's internal memory error	Turn the power supply OFF and then ON again. If this does not solve the problem, contact your sales representative or our sales department directly.
2		Condition data error	Set condition data again. * Modify one or more data and cycle through the parameter sequence at least once.
3		Comparator data error	Set comparator data again. * Modify one or more data and cycle through the parameter sequence at least once.
4		Scaling data error	Set scaling data again. If the input unit is the frequency input type (YA5000-15), set the pre-scale and frequency division values again. * Modify one or more data and cycle through the parameter sequence at least once.
5		Linearize data error	Set linearize data again. * Modify one or more data and cycle through the parameter sequence at least once.
6		Calibration data error	Set calibration data again. * Modify one or more data and cycle through the parameter sequence at least once.
7		Shift data error	Using the display shift function, set shift data again.
8		Digital zero value backup data error	Write the digital zero value.
9		An input value or indicated value has exceeded the measurement range during peak hold action.	Cancel peak hold action once.
10		An input value or indicated value has exceeded the measurement range.	Use the meter within the measurement range and display range of a specified range.
11		Condition in which the microcomputer is ready for data entry.	If setting is modified while hold or peak hold is ON, cancel the relevant action once.

Note If any of indications 1 to 6 appears frequently, the panel meter can be assumed to be being affected by noise, etc. Take appropriate measures against noise.

## 12 Specifications and External Dimensions

### 12.1 Input Specifications

#### 12.1.1 DC voltage measuring unit (range 11)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
11	± 99.99mV	Offset : ± 9999 Full scale : 0 to ± 9999	10 μ V	About 100M	± 100V	± (0.1% of FS)

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Noise rejection ratio : NMR (normal mode rejection) 50 dB or more (50 or 60 Hz)

#### 12.1.2 DC voltage measuring unit (ranges 12 to 15)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
12	± 999.9mV	Offset : ± 9999 Full scale : 0 to ± 9999	100 μ V	About 100M	± 100V	± (0.1% of FS)
13	± 9.999V		1mV	About 1M	± 250V	
14	± 99.99V		10mV	About 10M	± 250V	
15	± 600.0V		100mV	About 10M	± 600V	± (0.15% of FS)

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Noise rejection ratio : NMR (normal mode rejection) 50 dB or more (50 or 60 Hz)

#### 12.1.3 DC current measuring unit (ranges 23 to 25)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
23	± 9.999mA	Offset : ± 9999 Full scale : 0 to ± 9999	1 μ A	About 10	± 100mA	± (0.2% of FS)
24	± 99.99mA		10 μ A	About 1	± 500mA	
25	± 999.9mA		100 μ A	About 0.1	± 3A	± (0.3% of FS)

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Noise rejection ratio : NMR (normal mode rejection) 50 dB or more (50 or 60 Hz)

#### 12.1.4 AC voltage measuring unit (average value detection: ranges 11 to 13)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
11	99.99mV	Offset : ± 9999 Full scale : 0 to ± 9999	10 μ V	1M or more	± 100V	± (0.2% of FS +10digit)
12	999.9mV		100 μ V			
13	9.999V		1mV		± 250V	

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Frequency range : 40 Hz to 1 kHz

Response speed : About 1 second

Dead zone : 0 to 99 digits (0 display fixation)

12.1.5 AC voltage measuring unit (average value detection: ranges 14 and 15)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
14	99.99V	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	10mV	1M or more	250V	$\pm (0.2\% \text{ of FS} + 10\text{digit})$
15	600.0V		100mV		600V	$\pm (0.3\% \text{ of FS} + 10\text{digit})$

Input circuit : Single ended type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 40 Hz to 1 kHz  
 Response speed : About 1 second  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.6 AC voltage measuring unit (true rms value: ranges 11 to 13)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
11	99.99mV	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	10 $\mu$ V	1M or more	$\pm 100$ V $\pm 250$ V	$\pm (0.2\% \text{ of FS} + 20\text{digit})$
12	999.9mV		100 $\mu$ V			
13	9.999V		1mV			

Input circuit : Single ended type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 40 Hz to 1 kHz  
 Response speed : About 1 second  
 Crest factor : 4:1 at full scale  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.7 AC voltage measuring unit (true rms value: ranges 14 and 15)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
14	99.99V	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	10mV	1M or more	250V	$\pm (0.2\% \text{ of FS} + 20\text{digit})$
15	600.0V		100mV		600V	$\pm (0.3\% \text{ of FS} + 20\text{digit})$

Input circuit : Single ended type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 40 Hz to 1 kHz  
 Response speed : About 1 second  
 Crest factor : 4:1 at full scale  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.8 AC current measuring unit (average value detection: ranges 23 to 25)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
23	9.999mA	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	1 $\mu$ A	About 10	100mA	$\pm (0.5\% \text{ of FS} + 10\text{digit})$
24	99.99mA		10 $\mu$ A	About 1	500mA	
25	999.9mA		100 $\mu$ A	About 0.1	3A	

Input circuit : Single ended type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 40 Hz to 1 kHz  
 Response speed : About 1 second  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.9 AC current measuring unit (average value detection: range 26)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
26	5A	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	1mA	(CT)	8A	$\pm (0.5\% \text{ of FS} + 10\text{digit})$

Input circuit : CT isoration type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 50 Hz or 60Hz  
 Response speed : About 1 second  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.10 AC current measuring unit (true rms value: ranges 23 to 25)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
23	9.999mA	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	1 $\mu$ A	About 10	100mA	$\pm (0.5\% \text{ of FS} + 20\text{digit})$
24	99.99mA		10 $\mu$ A	About 1	500mA	
25	999.9mA		100 $\mu$ A	About 0.1	3A	

Input circuit : Single ended type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 40 Hz to 1 kHz  
 Response speed : About 1 second  
 Crest factor : 4:1 at full scale  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.11 AC current measuring unit (true rms value: range 26)

Range	Measurement range	Indication	Highest resolution	Input impedance	Maximum permissible input	Accuracy
26	5A	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	1mA	(CT)	8A	$\pm (0.5\% \text{ of FS} + 20\text{digit})$

Input circuit : CT isoration type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Frequency range : 50 Hz or 60Hz  
 Response speed : About 1 second  
 Crest factor : 4:1 at full scale  
 Dead zone : 0 to 99 digits (0 display fixation)

12.1.12 Resistance measuring unit

Range	Measurement range	Indication	Highest resolution	Circuit current	Accuracy
11	99.99	Offset : $\pm 9999$ Full scale : 0 to $\pm 9999$	10m	About 5mA	$\pm (0.2\% \text{ of FS})$
12	999.9		100m	About 500 $\mu$ A	
13	9.999k		1	About 50 $\mu$ A	
14	99.99k		10	About 5 $\mu$ A	

Input circuit : Single ended type  
 Operating system : conversion  
 Maximum sampling rate : 12.5 times per second  
 Measuring system : Two-wire system or four-wire system (internal socket change-over)  
 Open-circuit voltage : About 5V

12.1.13 Temperature measuring unit (TC)

Range	Input sensor	Indication	Highest resolution	Accuracy
KA	K	-50.0 to 199.9	0.1	± (0.5% of FS)
KB	K	-50 to 1200	1	± (0.2% of FS) ± (0.6% of FS) ± (0.4% of FS) Note : The accuracy of range B is applicable to temperatures of 500 or more.
J	J	-50 to 1000		
T	T	-50 to 400		
S	S	0 to 1700		
R	R	-10 to 1700		
B	B	100 to 1800		

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 6.25 times per second

Cold junction compensation error : ± 2 (at 10 to 40 )

Internal resistance of sensor : 50 or less

Linearizer : Digital linearizer

Burnout alarm : It blinks by ---- display.

12.1.14 Temperature measuring unit (RTD)

Range	Input sensor	Indication	Highest resolution	Accuracy
PA	PT100	-100.0 to 199.9	0.1	± (0.15% of FS)
JPA	JPt100			
PB	PT100	-100 to 600	1	± (0.3% of FS)
JPB	JPt100			

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Current through RTD : About 1mA

External resistance : 10 or less per wire

Linearizer : Digital linearizer

Burnout alarm : It blinks by ---- display.

12.1.15 Frequency measuring unit (open collector, logic, and magnet)

Range	Measurement range	Indication	Highest resolution	Renewal time of a display	Accuracy
11	0.1 to 200Hz	Pre-scale : 0.001 to 5 Frequency division : 1 to 100	0.1Hz	0 to 10s	± (0.2% of FS)
12	1 to 2000Hz		1Hz	1s	
13	0.01 to 20kHz		10Hz	100ms	
14	0.1 to 200kHz		100Hz		

Input type	Input voltage level	Maximum permissible input
Open collector	LO : 1V or less (5V : 2.2k pull up)	30V
Logic	LO : 1V or less, HI : 2.5 to 15V	15V
Magnet	0.3 to 30Vp-p	

Duty ratio : 50%

12.1.16 Frequency measuring unit (AC voltage 500 Vrms)

Range	Measurement range	Indication	Highest resolution	Renewal time of a display	Accuracy
11	0.1 to 200Hz	Pre-scale : 0.001 to 5 Frequency division : 1 to 100	0.1Hz	0 to 10s	± (0.2% of FS)
12	1 to 2000Hz		1Hz	1s	
13	0.01 to 20kHz		10Hz	100ms	
14	0.1 to 200kHz		100Hz		

Input type	Input voltage level	Maximum permissible input
Voltage	50 to 500Vrms	500V

Duty ratio : 50%

### 12.1.17 Strain gage input unit (load cell)

Sensor power	Zero adjusting range	Span adjusting range	Highest resolution	Accuracy
5V	-0.3 to +1mV/V	1 to 3mV/V	0.5 $\mu$ V/digit	$\pm$ (0.1% of FS +2digit)
10V			1 $\mu$ V/digit	

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Conformity sensor : 350

Sensor power : 5V  $\pm$  5% (within 15mA) or 10V  $\pm$  5% (within 30mA)

### 12.1.18 Process input unit

Range	Measurement range	Indication	Input impedance	Maximum permissible input	Accuracy
1V	1 to 5V	Offset : $\pm$ 9999 Full scale : 0 to $\pm$ 9999	About 100M	$\pm$ 100V	$\pm$ (0.2% of FS)
2A	4 to 20mA		About 10	$\pm$ 100mA	

Input circuit : Single ended type

Operating system : conversion

Maximum sampling rate : 12.5 times per second

Noise rejection ratio : NMR (normal mode rejection) 50 dB or more (50 or 60 Hz)

## 12.2 Common Specifications

Display : 7-segment LED display (character height : 14.2mm on main display and 8mm on sub-display)

Polarity indication : Automatically indicated when the calculated result is negative.

Indication range : -9999 to 9999

Over-range alarm : OL or -OL for input signals outside the indication range

Decimal point : Can be set at an arbitrary digit.

Zero indication : Leading zero suppression

External control : HOLD, PH, DZ (reset for frequency measuring unit)

Operating temperature and humidity range : 0 to 50 , 35 to 83% RH (non-condensing)

Storage temperature and humidity range : -10 to 70 , 60% RH or less

Power supply : 100 to 240V AC  $\pm$  10% for AC power supply unit  
9 to 60V DC for DC power supply unit

Power consumption : 7VA max. (AC power supply)  
7W max. (DC power supply)

External dimensions : 96 mm (W) x 48 mm (H) x 146.5 mm (D)  
Note: Depth (D) denotes the maximum value.

Weight : 450g

Withstand voltage : 2000 V AC for 1 min. between power terminals and input terminal, and (AC power supply) between power terminals and each output terminal

Withstand voltage : 500 V DC for 1 min. between power terminals and input terminal, and (DC power supply) between power terminals and each output terminal

Withstand voltage : 500 V DC for 1 min. between input terminal and each output terminal, (common) and between analog output terminal and communication terminals  
2000 VAC for 1 min between case and each output terminal (common to both AC and DC supply)

Insulation resistance : 100M between the above terminals when 500V DC is applied

Conformity standard : EN61000-6-2, EN50081-2, IEC1010-1  
It applies only to the product with which CE mark is indicated on the label.

Grounding environment : Category , Pollution degree 2

Altitude : 2000m max

Fuse : K19372 1.0A (DC power supply)

## 12.3 Output Specifications

### 12.3.1 Output for Comparison

Conditions for comparison	Judgment result
Indicated value > Upper limit judgment value	HI
Lower limit judgment value < Indicated value < Upper limit judgment value	GO
Lower limit judgment value > Indicated value	LO

Control system : Micro computer operating system

Judgment value setup range : -9999 to +9999

Hysteresis : Can be set in the range of 1 to 999 digits for each judgment value

Operating speed : Depends on the sampling rate.

Output method : Relay contact output (Make and break contacts for HI and LO and make contacts for GO)

Output rating : 240V AC, 8A (resistive load) and 30V DC, 8A (resistive load)

Mechanical life : 20,000,000 times or more

Electric life : 100,000 times or more (Resistance load)

### 12.3.2 Analog Output

Output type	Load resistance	Accuracy	Ripple
0 to 1V	10k or more	± (0.5% of FS)	± 50mVp-p
0 to 10V	10k or more		
1 to 5V	10k or more		
4 to 20mA	550 or less		

Note: The ripple ratings for the 4 to 20mA output are when the load resistance of 250 and the output current of 20mA are applied.

Conversion system : PWM conversion

Resolution : Equivalent to 13 bits

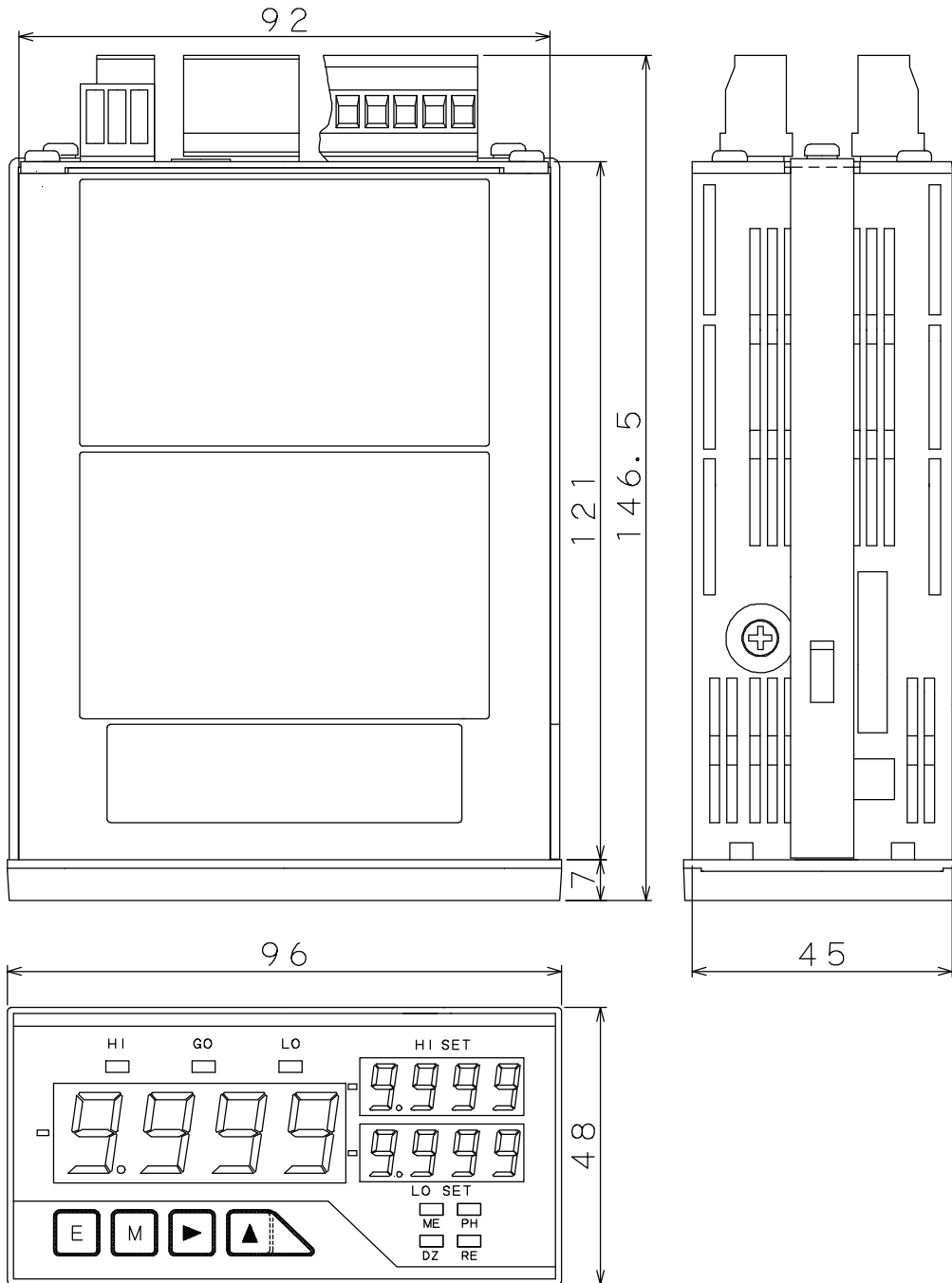
Scaling : Digital scaling

Response speed : About 0.5 second

### 12.3.3 Communicating function

	RS-232C (Compatible with EIA RS-232C)	RS-485 (Compatible with EIA RS-485)
Synchronization	Start-stop	
Communication method	Full-duplex	Two-wire half-duplex (polling/selecting)
Transmission rate	2400,4800,9600,19200,38400 bps	
Number of start bits	1 bit	
Data length	7 bits / 8 bits	
Error detection	Even parity, odd parity, or no parity	
		Block check character (BCC) checksum
Number of stop bits	1 bit / 2 bits	
Character code	ASCII	
Transmission control procedure	Non-pecedural	
Signal name used	TXD,RXD,SG	Non-inverting (+), inverting (-)
Number of units that can be connected	1	31 for meters
Transmission line length	15m	500m max. (overall length) * In EN/IEC conformity, it is under 30m
Delimiter	CR+LF/CR	

## 12.4 External Dimensions

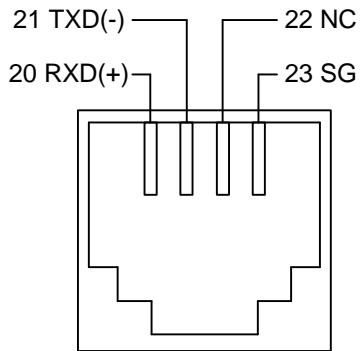


## 13 Detailed Communications Specifications

### 13.1 Terminal Assignments and Connection Method

The communication connector of the FD5000 series is a modular jack connector compatible with the FCC68 standard. Use a modular plug connector also compatible with the FCC68 standard when connecting the panelmeter.

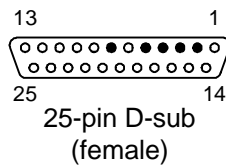
#### 13.1.1 Terminal Assignments



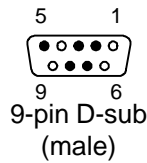
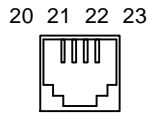
RS-232C/RS-485 connector

Terminal No.	Name	Description
20	RXD(+)	RS-232C: Receive Data terminal; RS-485: Non-inverting output
21	TXD(-)	RS-232C: Transmit Data terminal; RS-485: Inverting output
22	NC	Do not connect.
23	SG	Common terminal for the communication functions

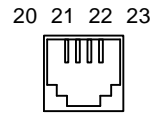
#### 13.1.2 Example of RS-232C Connection



Pin 2: TXD ————— Pin 20: RXD  
 Pin 3: RXD ————— Pin 21: TXD  
 Pin 4: RTS } Note: Connect at the  
 Pin 5: CTS } communication connector\*  
 Pin 7: SG ————— Pin 23: SG



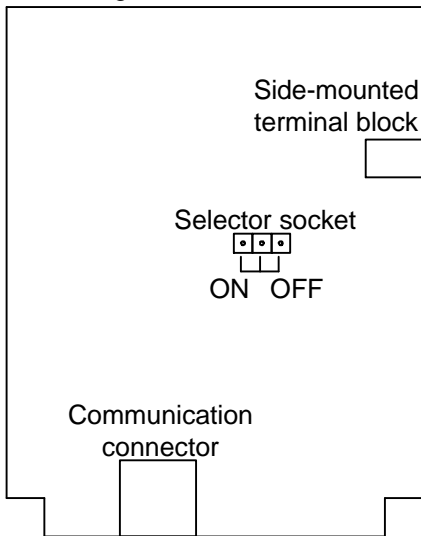
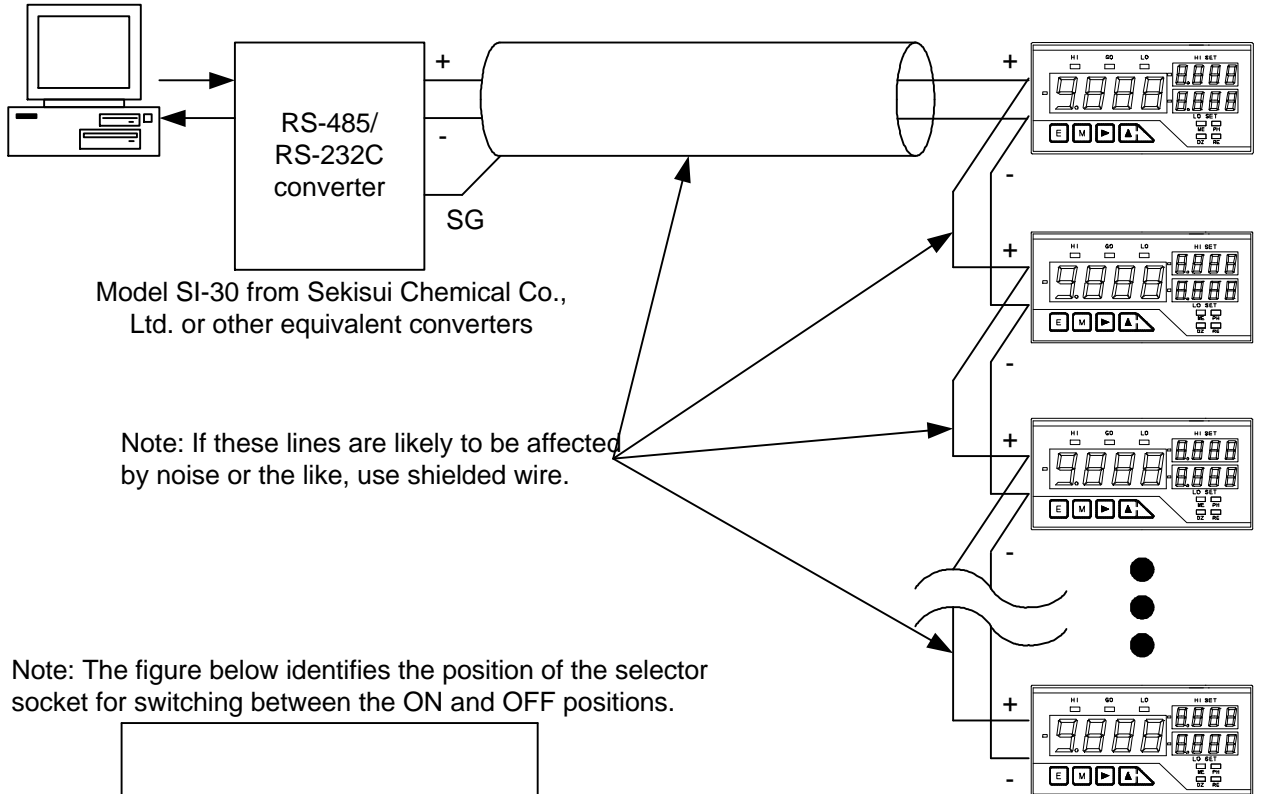
Pin 2: RXD ————— Pin 21: TXD  
 Pin 3: TXD ————— Pin 20: RXD  
 Pin 7: RTS } Note: Connect at the  
 Pin 8: CTS } communication connector\*  
 Pin 5: SG ————— Pin 23: SG



\* The above-illustrated connection of the CTS and RTS terminals on the host side is only a typical example for hardware control. Consult your system designer for further details on how to cope with the terminals.

### 13.1.3 Example of RS-485 Connection

If the panelmeter is positioned to be an end station as the result of an RS-485 connection, set the terminator to ON by using the selector socket in the FD5000 output unit.



Note: If the panelmeter is an end station, set the terminator to ON.

### 13.2 Communication Function Parameters

The baud rate, data length, parity bit, stop bit, delimiter, and device ID (RS-485 only) are the user-selectable parameters of the communication functions provided by the FD5000 panelmeter.

### 13.3 RS-485 Transmission/Reception Formats

#### 13.3.1 Establishing and Releasing the Communication Link

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Char. Length		
Establishment of communication link	END	0	1	CR	LF																			3	ACK	0	1	CR	LF														3				
	Note: Set a two-digit number as the device ID (00 is void).																								Note: The response time is 40 ms maximum. (No response is made if the device ID is wrong.)																						
Release of communication link	EOT	CR	LF																					1																							
	Note: Communication is still possible when another device ID is specified without releasing the communication link.																								Note: (No response is made for release.) Note: The response time is 20 ms maximum.																						











