2.8 Description of Parameters and Their Setting Procedures

Parameters refer to the variables used to set various measurement conditions so that the R687IE/E-DC obtains accurate measurements.
Before offering a description of the parameter setting procedures, we will first describe the keys necessary to set parameters.
Parameter settings are backed up by built-in batteries, and thus they do not disappear even when power is turned off.

[Initial value of each parameter]

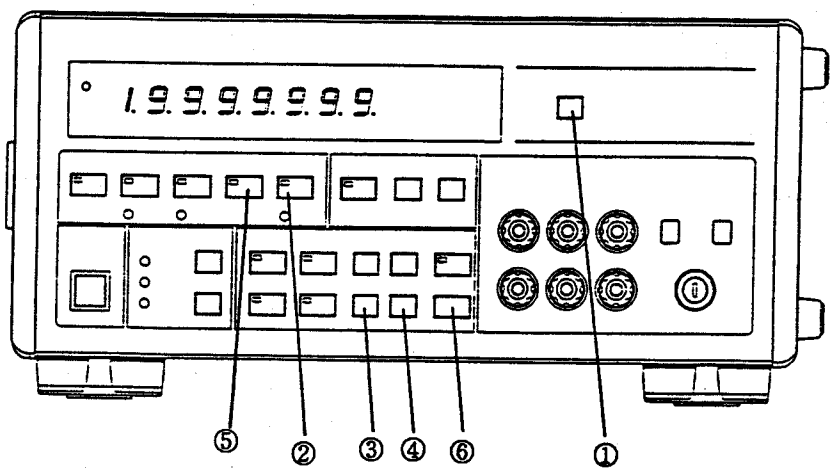
- GPIB — Cannot be initialized.
- LINE — Cannot be initialized.
- FUNCTION — ⎓ V DC
- RANGE — AUTO (20V range)
- SAMPLING MODE — RUN
- IT — 5PLC
- SI — 250msec
- A ZERO — ON
- A CAL — 1 minute
- BUZZER — OFF
- D OUT — Output mode 0 (Output to the entire output system)
- CF — 0-0 (OFF for both primary and secondary computation)
- RES — 6 1/2 digit mode
- DELAY — 0msec
- SLOW — ON (SLOW mode)
- N — 2

- SM TIME 10
- NS 1
- X/Y/Z X, Z = 1
  Y = 0
- HIGH/LOW HIGH1, HIGH2 = 1
  LOW1, LOW2 = 0
- LIMIT Reference value = 1
  %1, %2 = 10%

[Parameters that are automatically initialized at power-on]

- STORE
- RECALL
- COMPUTE
- NULL
- SMOOTH
- D OUT

To initialize the parameter, press
keys SHIFT MODE ENTER , in this order.
[keys necessary to set the parameter]



[These numbers indicate the following procedure numbers.]

① HO [ ] (HOME key)

This key is used to cancel the parameter data being set (that is, the data existing before the [ENTER] key is pressed) and thus allows measurement to be made in the normal mode using the old data of the corresponding parameter.

② CE [ ] (CE key)

This key is used to cancel the entire set of parameter data being input (that is, the data being displayed on the LED unit).

③ [CHANGE] (CHANGE key)

This key is used to change the data settings being displayed (that is, ON/OFF of various parameters, units, and the number of display digits).

④ SHIFT [ ] (SHIFT key)

This key has the following two functions:

(a) Calling on the display unit the RES, DELAY, SLOW, and other parameters that are printed in blue underneath the corresponding keys.

(b) Shifting the blinking display position.

⑤ MD [ ] (MD key)

This key sets the previously-tested value or the result of function as data for parameter. The key is enabled when X/Y/Z, HIGH/LOW, LIMIT, and parameter are set.

⑥ ENTER [ ] (ENTER key)

This key is used to store data settings into the internal memory.

(a) When using 0 [ ] (UP / DOUT) to S [ ] (SMOOTH / SM TIME) as numeric keys:

After the following parameters (the parameters that require setting of numerics) have been set, 0 [ ] (UP / DOUT) to 9 [ ] (SMOOTH / SM TIME) act as numeric keys:

A CAL
CF
DELAY
GPIB (address)
HIGH/LOW
LIMIT
N
NS
SI
SM TIME
X/Y/Z

This is, 0 [ ] (UP / DOUT) to 9 [ ] (SMOOTH / SM TIME) act as numeric keys after selection of a parameter that requires numerical setting.

(b) When setting the parameters that are printed in blue:

After pressing SHIFT / NS , press the key under which the desired parameter is printed.

2.8.1 IT : Integrate Time

[Functional description]

The IT parameter is used to set the integral time on which the R6871E/E-DC is to make an A/D conversion.

(1) Use of the IT parameter makes it possible for the integral time that matches measurement resolution and measurement speed to be selected from the following nine types:

100μs, 1ms, 10ms, 1PLC, 5PLC, 10PLC, 20PLC, 50PLC, 100PLC

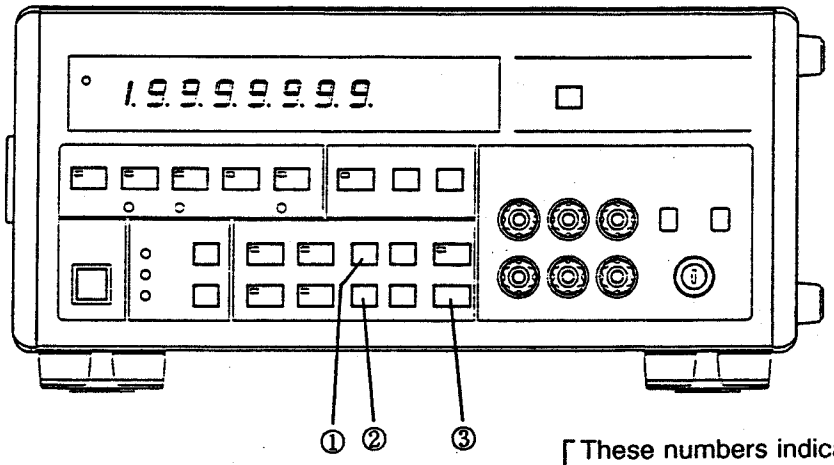
where PLC stands for Power-Line Cycle. The value of 1PLC changes as follows according to the power-line frequency selected:

For the power-line frequency of 50Hz, 1PLC = 20msec
For the power-line frequency of 60Hz, 1PLC = 16.7msec

Measurements highly resistant to noise can be obtained by setting a large value as integral time.

[Setting procedure]

The procedure for setting integral time is described below.

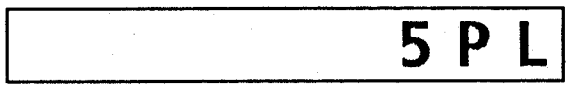


[These numbers indicate the following procedure numbers.]

Setting the IT parameter

① Press the IT key.

The integral time last set will then be displayed on the LED unit.



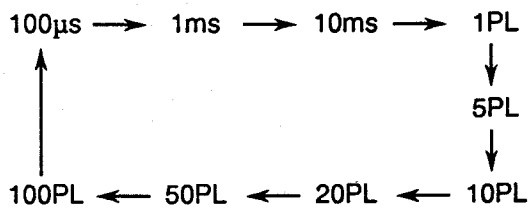
Selecting integral time

1 0 P L

② Select the desired integral time by pressing the CHANGE key.

Each time CHANGE is pressed,

the display on the LED unit changes as follows:



Display the desired integral time on the LED unit by pressing CHANGE .

Setting of integral time completed

③ Press the ENTER key.

This causes the displayed integral time to be stored in memory. Setting of the integral time is now complete.

2.8.2 SI: Sampling Interval

[Functional description]

The SI parameter is used to set the sampling time interval (hereinafter referred to as the sampling interval).
When the sampling interval is set using the SI parameter:

(1) In the RUN or MULTI sampling mode, measurement is performed at the sampling interval setting.

(2) Reading of the data that has been written using the data memory functions is also performed at the sampling interval setting. However, if the sampling interval setting is smaller than the repetition period (time from the start of measurement to output of data), then the minimum repetition period of the corresponding integral time becomes the sampling interval.

(3) The setting range is from 0 to 60,000msec in 1msec increments.

Figure 2-1 below shows an operation example that represents the relationship between the DELAY parameter and the SI parameter.

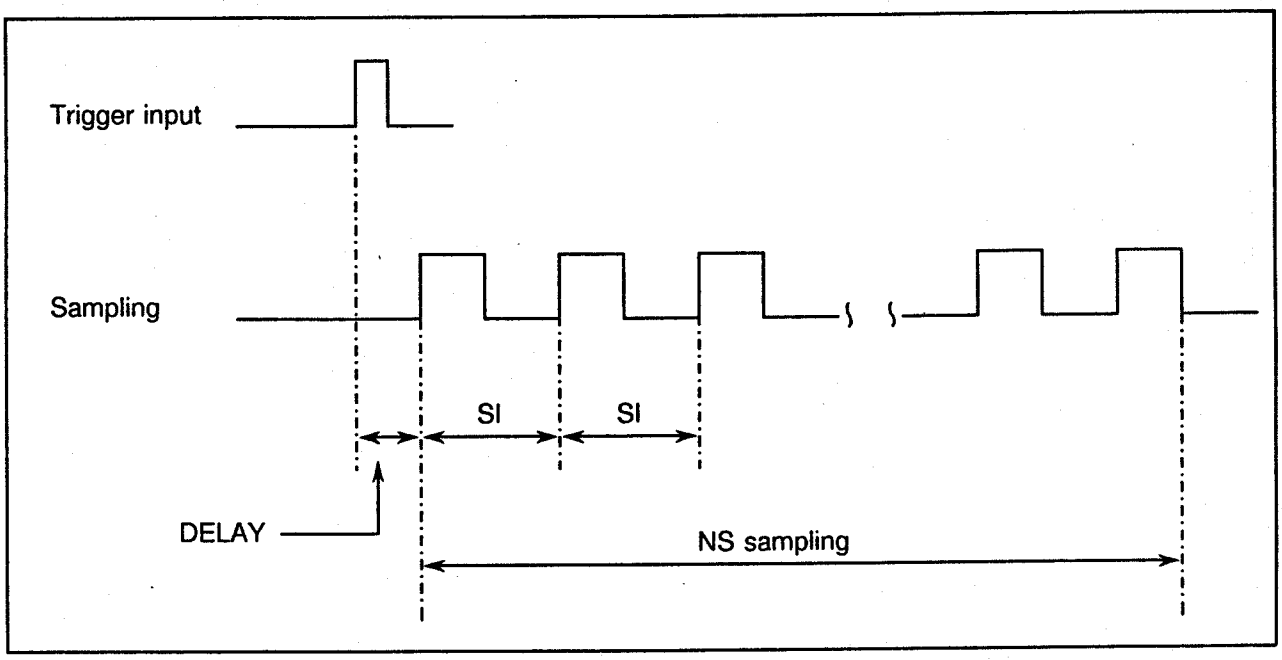
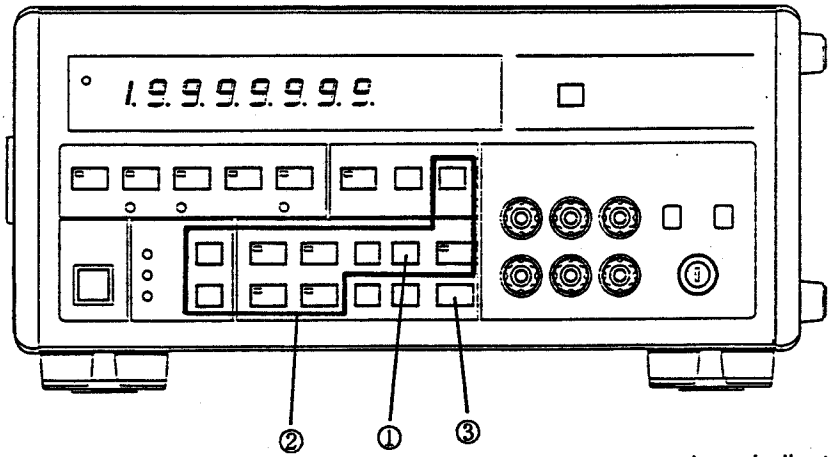


Figure 2-1 Operation Example That Represents the Relationship Between "DELAY" and "SI" (Sampling Mode: MULTI)

[Setting procedure]

The procedure for setting the sampling interval is described below.



[These numbers indicate the following procedure numbers.]

Setting of SI parameter

① Press the SI key.

The sampling interval last set will then be displayed on the LED unit.

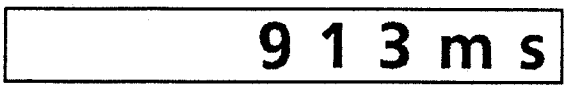
Setting of sampling interval value

② Set the sampling interval value

using the numeric keys 0 to 9 . For SI parameter setting,

0 to 9 act as numeric keys.

The value set here will be displayed on the LED unit.



(Example)

To set 913, press keys,

9 1 3 in this order.

Setting of the sampling interval completed

③ Press the ENTER key.

The displayed sampling interval value will then be displayed on the LED unit. This completes setting of the sampling interval.

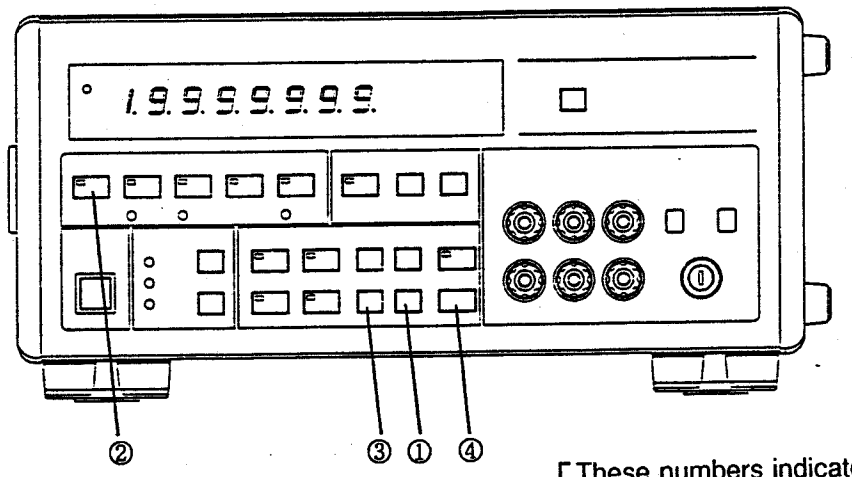
2.8.3 A ZERO : Auto Zero Calibration

[Functional description]

The A ZERO parameter is used to select whether or not offset errors in the analog circuitry of the R6871E/E-DC are to be automatically eliminated (Auto Zero Calibration).

[Setting procedure]

The ON/OFF setting procedure for the Auto Zero Calibration function is described below.



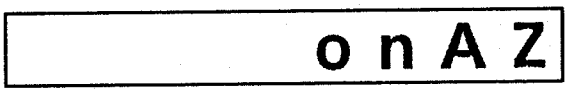
[These numbers indicate the following procedure numbers.]

A ZERO parameter setting

① Press the SHIFT key.

② Press the A ZERO key.

The previous ON/OFF setting of the A ZERO function will then be displayed on the LED unit.



A ZERO function ON/OFF setting

③ The ON and OFF states are alternately displayed on the LED unit each time CHANGE is pressed.

(a) To set the ON state, display "ON" on the LED unit using the CHANGE key and then proceed to step (4).

(b) To set the OFF state, display "OFF" on the LED unit using the CHANGE key and then proceed to step (4).

A ZERO function setting complete

④ Press the ENTER key.

This will cause the A ZERO function ON or OFF setting on the display to be stored in memory. ON/OFF setting of the A ZERO function is now complete.

If A ZERO is set in its ON state, measurement time becomes about twice that taken with A ZERO OFF, since the Auto Zero Calibration time (equal to integral measurement time) is required for each measurement operation.

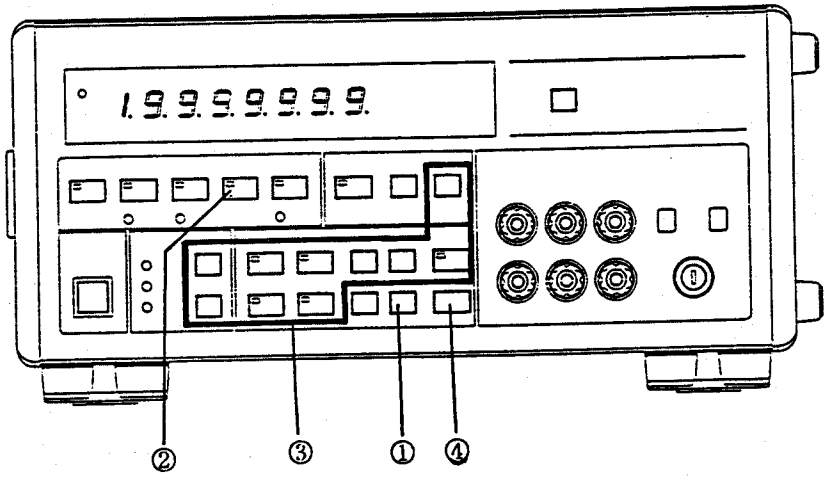
2.8.4 A CAL : Auto Calibration Interval

[Functional description]

The A CAL parameter is used to set the execution interval of Auto Calibration.
Based on the internal reference voltage, automatic calibration of the measuring system of the R6871E/E-DC takes place at fixed intervals to ensure constant stability of the measuring system.
The setting range is from 0 to 999 minutes in units of one minute. The A CAL function becomes invalid if the interval time is set to 0 minutes.

[Setting procedure]

The procedure for setting the execution interval value of the Auto Calibration function is described below.



[These numbers indicate the following procedure numbers.]

A CAL parameter setting

① Press the SHIFT key.

② Press the A CAL key.

The execution interval last set will then be displayed on the LED unit.

Execution interval value setting

③ Set the desired execution interval value using the numeric keys

0 [ ] to 9 [ ] .

For A CAL parameter setting,

0 [ ] to 9 [ ] act as numeric keys. The value set here will be displayed on the LED unit.

3 6 0 m n

(Example)

To set 360, press keys

3 [ ] 6 [ ] 0 [ ] , in this order.

Setting of the execution interval value completed

④ Press the ENTER [ ] key.

The displayed execution interval value will then be displayed on the LED unit. This completes setting of the execution interval.

2.8.5 BUZZER : Buzzer mode

[Functional description]

The BUZZER parameter is used to select whether or not the buzzer function is to be used. The following three modes of buzzer are available:

(1) OFF : The buzzer function is not used.

(2) ON-1 : If this mode is selected, the buzzer sounds when the results of comparator computation are either R(H2), R(H1), R(L1), or R(L2).

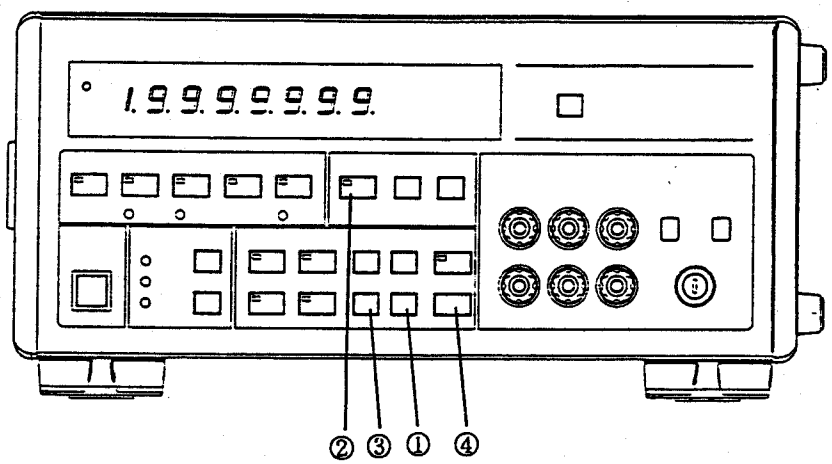
(3) ON-2 : If this mode is selected, the buzzer sounds when the results of comparator computation are R(PASS).

If mode (2) or (3) is selected, the buzzer also sounds in the following cases:

- When an error occurs
- When a panel key is pressed

[Setting procedure]

The BUZZER parameter setting procedure is described below.



[These numbers indicate the following procedure numbers.]

BUZZER parameter setting

① Press the SHIFT key.

② Press the BUZZER key.

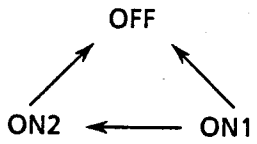
The buzzer mode last set will then be displayed on the LED unit.

oFF BU

Buzzer mode selection

③ Select the desired buzzer mode using the CHANGE key.

The available buzzer modes are OFF, ON1, and ON2.
The display changes as follows each time CHANGE is pressed:



In this way, display the desired mode name on the LED unit.

Buzzer mode setting complete

④ Press the ENTER key.

The mode name being displayed on the LED unit will then be stored in memory.
Setting of the buzzer mode is now complete.

2.8.6 D OUT : Data Output mode

[Function]

The D OUT is a parameter selecting the output system and high-speed measurement mode to be executed. The R6871E/E-DC has the display and GPIB to output data. The device considers that storing data in the internal data memory is a kind of data output. It can output data to all output systems in the normal measurement mode (D OUT mode 0), and especially outputs data to a certain output system for high-speed measurement.

The following explains the modes of the D OUT parameter.

Mode 0: Displays measured data or data after operational processing, then outputs it to the GPIB.

Mode 1: Outputs measured data or data after operational processing to the GPIB.
Stores measured data in data memory.

Mode 2: Stores measured data in data memory.

Mode 3: Stores measured data before the calculation of a true value in data memory at full speed mode.

Table 2-3 Relation Between the D OUT Mode and Data Processing

D OUT mode	NULL execution	SMOOTH execution	STORE/RECALL execution	COMPUTE execution	Output to output system
0	Enable	Enable	STORE enable	Enable	Displays and outputs to the GPIB
			RECALL enable	Enable	Displays and outputs to the GPIB
1	Enable	Enable	STORE enable	Enable	Outputs to the GPIB
			RECALL enable	Enable	Displays and outputs to the GPIB
2	Enable	Enable	Automatic STORE RECALL enable	Enable	Displays and outputs to the GPIB
3	Disable	Disable	Automatic STORE RECALL enable	Enable	Displays and outputs to the GPIB
→ Flow of processing (see Figure 7-1)					

CAUTION

1. The D OUT parameter is initialized (mode 0) when the R6871E/E-DC is powered on.
2. When mode 2 or 3 is set, the store function is automatically turned on. In this case, the output system that enables realtime output of measurement is data memory only. When the recall function is turned on, the store function is turned off and the data memory recall mode is set. In the recall mode, the operation can be executed and data can be output to output systems.
3. When the full speed mode is set, parameters are automatically set as follows.
   - FUNCTION : Fixed
   - RANGE : Fixed
   - SAMPLING MODE : RUN
   - STORE : ON
   - RECALL : OFF
   - COMPUTE : OFF
   - SMOOTH : OFF
   - IT : 100μs
   - SI : 0msec
   - A ZERO : OFF
   - A CAL : OFF
   - SLOW : OFF (FAST)
   - NULL : OFF
4. When the D OUT mode is changed, the content of data memory is initialized.
5. The single line signal (COMPLETE) is output regardless of the D OUT mode. It is also output when data memory is recalled.

2.8.7 CF : Computing Function

[Functional description]

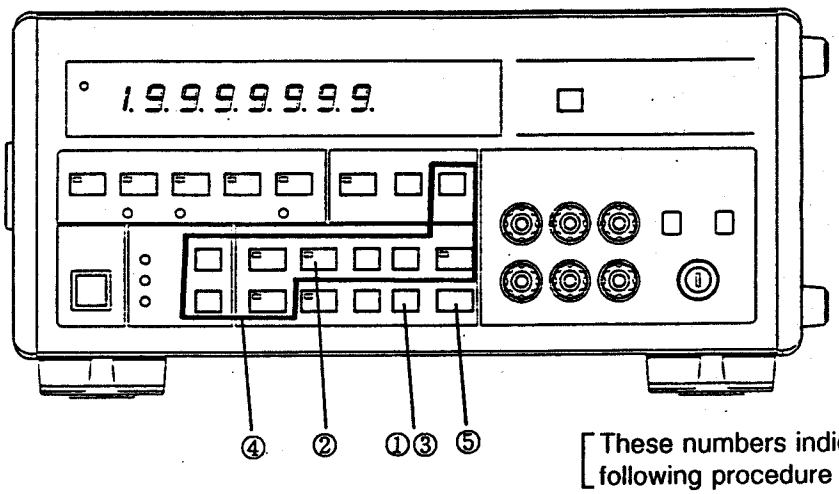
The CF parameter is used to select a computing function from among those provided by the R6871E/E-DC.
See section 3.1, "Computing Functions", for details of the computing functions.
Table 2-4 gives a listing of functions available for primary computation and secondary computation.

Table 2-4 Computing Functions

Data	Primary computation	Secondary computation
0	OFF	OFF
1	SCALING	COMPARATOR 1
2	%DEVIATION	COMPARATOR 2
3	DELTA	Statistical processing
4	MULTIPLY	
5	Decibel conversion	
6	RMS Value	
7	dBm conversion	
8	Resistance value temperature compensation	

[Setting procedures]

The procedures for setting the computing functions are described below.



[These numbers indicate the following procedure numbers.]

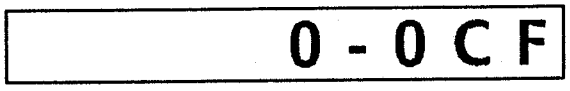
CF parameter setting

① Press the SHIFT key.

② Press the CF key.

The states last set for primary and secondary computation will then be displayed on the LED unit. The display of "0 - 0" blinks at this time.

Blinking
Primary computation
Secondary computation



Selection of computing functions

③ Setting computation functions involves setting those for primary computation and for secondary computation.
Here, select one of the two types of setting. The desired type of setting may come first, whichever you select.

Press the SHIFT key to select between setting of primary computation functions and setting of secondary computation function.
This allows the display of the desired type of setting to blink.

Each time SHIFT is pressed, the displays of the two types of setting blink alternately.

(Example)

- To set primary computation functions: Make the display of primary computation functions blink by pressing SHIFT .
- To set secondary computation functions:
  Make the display of secondary computation functions blink by pressing SHIFT .
  [If both primary and secondary computation functions are to be set]
  Functions for both primary and secondary computation can be set at one time. The setting method is described in step (4) below.

④ Set the identification numbers of the desired computing functions using the numeric keys 0 [ ] to 8 [ ].

Function numbers 0 through 8 can be set for primary computation, and function numbers 0 through 3 can be set for secondary computation.

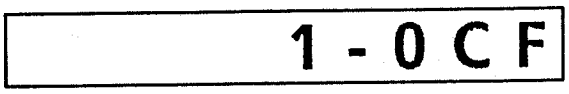
Functions being displayed in normal form (ON) or in blinking form (Blinking) can only be set.

(Example)

- To set the SCALING function used for primary computation:

  Press 1 [ ].

Blinking ON



- To set the COMPARATOR-2 function used for secondary computation:

  Press 2 [ ].

  See Table 2-2 for details of the primary and secondary computation function data.
  [If functions for both primary and secondary computation are to be set at one time]
  Set a primary (or secondary) computation function first.
  The display of primary computation will then come on and the display of secondary computation will blink.
  At this time, set a secondary computation function.
  This causes the display of secondary computation to come on once again and the display of primary computation to blink. After setting functions for both primary and secondary computation, ignore the blinking state of the display and proceed to step (5).

ON Blinking

0 - 2 C F

Setting of computing functions completed

⑤ Press the [ENTER] key.

The displayed ID number of the computing function will then be stored in memory. This completes setting of the computing functions.

2.8.8 RES : Resolution

[Functional description]

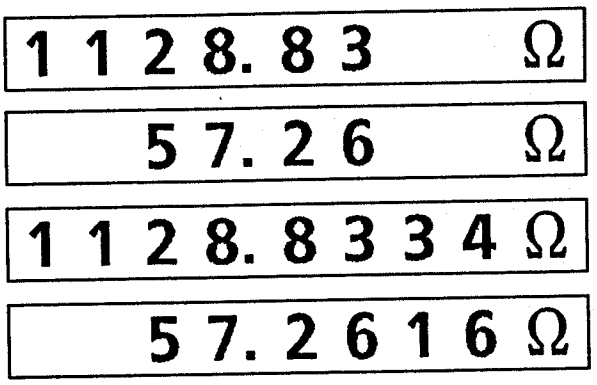
The RES parameter is used to set the number of display digits. The following describes the precautions to be taken when carrying out the setting operation:

(1) The number of digits that can be set is either 4 1/2 digits, 5 1/2 digits, 6 1/2 digits, or 7 1/2 digits.

(2) Notes on priority of the number of display digits.
For the number of display digits, priority is given to RES parameter setting over measurement function setting or IT (integral time) parameter setting.
The integral time, measurement functions, and the number of display digits are maintained in a predetermined relationship as listed in Table 2-5. That is, when the integral time is set to l00/sec using the IT parameter, the actual number of display digits becomes four and a half even if the number is set to six and a half digits using the RES parameter.

(3) Notes on the relationship between the number of display digits and the selected measurement range The number of digits in the integral part of the number of display digits becomes the same as the maximum number of digits in the selected measurement range.

(Example 1)
If 5 1/2 digit measurement is made using the 1000Ω range, the integral part and the decimal part become a 3 1/2 digit value (since 1000 takes 3 1/2 digits) and a 2-digit value, respectively, as shown on the right.



(Example 2)
If 7 1/2 digit measurement is made using the 1000Ω range, the integral part and the decimal part become a 3 1/2 digit value (since 1000 takes 3 1/2 digits) and a 4 digit value, respectively, as shown on the right.

(4) Meaning of the 1/2 digit in 7 1/2 measurements

If the 1000Ω range is selected, for example, the maximum value of data measurements obtained will be 1199.9999Ω. At this time, it is good enough just to display "1" for the most significant digit. In actuality, only "1" can be displayed. Thus, the most significant digit is taken as a 1/2 digit.

Table 2-5 Relationship Between Integral Time and Number of Digits Displayed

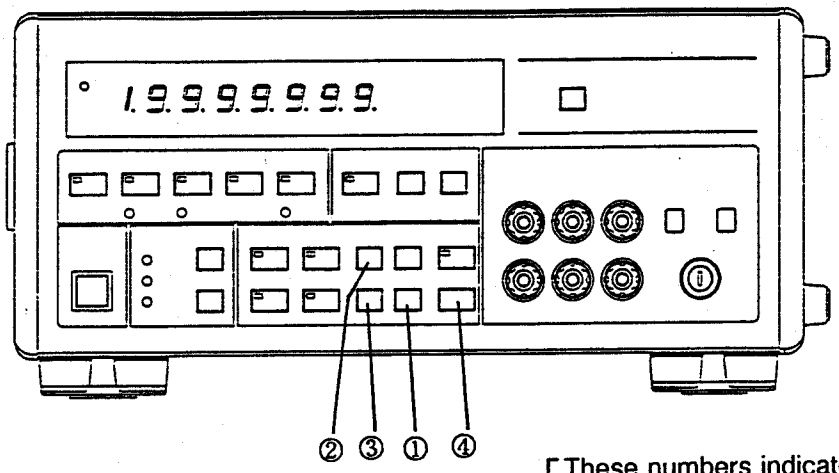
Measurement function \ Integral time	100µs	1ms	10ms	1PLC	5PLC	10PLC	20PLC	50PLC	100 PLC
DC voltage measurement	4 1/2 digit display								
		5 1/2 digit display							
			6 1/2 digit display						
					7 1/2 digit display				
DC current measurement*	4 1/2 digit display								
		5 1/2 digit display							
			6 1/2 digit display						
Resistance measurement (Common to 2-wire, 4-wire and NWΩ*2)	4 1/2 digit display								
		5 1/2 digit display							
			6 1/2 digit display						
					7 1/2 digit display				
AC voltage measurement*1 or DC + AC voltage measurement *1	4 1/2 digit display								
		5 1/2 digit display							
AC current measurement *1 or DC + AC current measurement *1	4 1/2 digit display								
		5 1/2 digit display							

*1 : Only the R6871E is enabled.

*2 : Only the R6871E-OHM is enabled.

[Setting procedure]

The procedure for setting the number of display digits is described below.



[These numbers indicate the following procedure numbers.]

RES parameter setting

① Press the SHIFT key.

② Press the RES key.

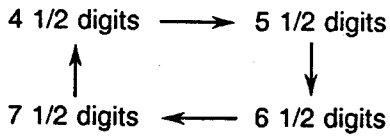
The number of display digits last set will then be displayed on the LED unit. 4 1/2 digit display appears as follows:

Selection of the number of display digits

③ Select the desired number of display digits (4 1/2 digits, 5 1/2 digits, 6 1/2 digits, or 7 1/2 digits).

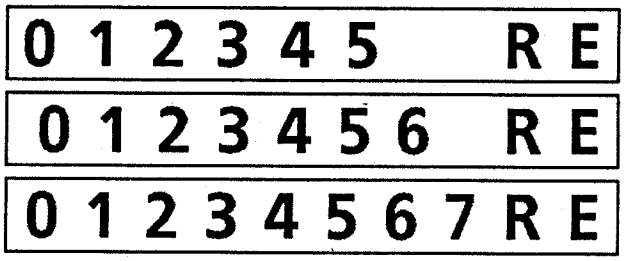
Use CHANGE to make the selection.

The display of the number of display digits changes as follows each time CHANGE is pressed:



The display of each digit is made as follows:

- 5 1/2 digits
- 6 1/2 digits
- 7 1/2 digits



In this way, display the number of display digits to be set.

Setting of the number of display digits completed

④ Press the ENTER key.

The displayed number of display digits will then be stored in memory. This completes setting of the number of display digits.

2.8.9 DELAY : Trigger Delay

[Functional description]

The DELAY parameter is used to set the delay time from input of the trigger signal to the start of the first sampling operation (this delay time will be hereinafter referred to as the trigger delay time).
When the trigger delay time is set using the DELAY parameter:

(1) In the SINGLE or MULTI mode, the first sampling operation begins after the lapse of the set trigger delay time which starts upon input of the trigger signal.

(2) In the RUN sampling mode, the trigger delay time setting is ignored.

(3) The setting range is from 0 to 60,000msec in units of 1msec.

Figure 2-2 below shows an operation example that represents the relationship between the DELAY parameter and the SI parameter.

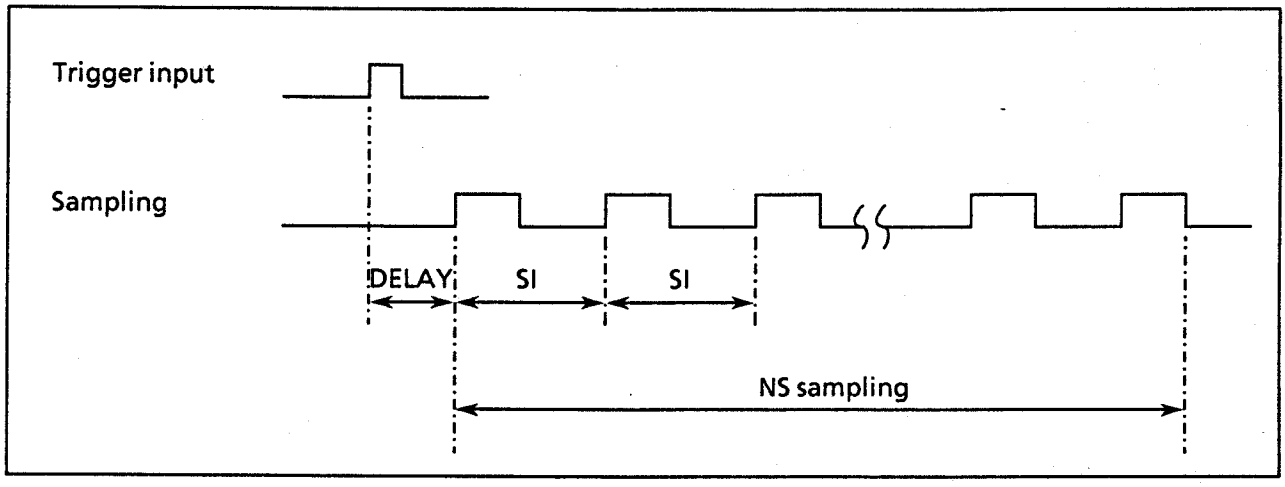
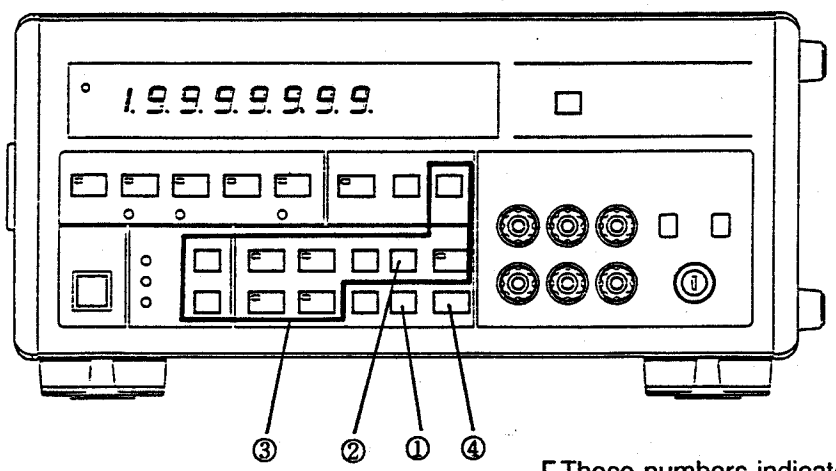


Figure 2-2 Operation Example That Represents the Relationship Between "DELAY" and "SI" (Sampling Mode : MULTI)

[Setting procedure]

The procedure for setting the trigger delay time is described below.



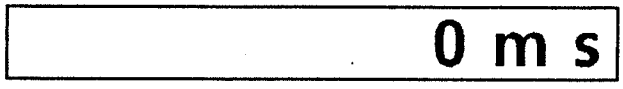
[These numbers indicate the following procedure numbers.]

Setting of DELAY parameter

① Press the SHIFT key.

② Press the DELAY key.

The trigger delay time last set will then be displayed on the LED unit.



Setting the trigger delay time

③ Set the desired trigger delay time using the numeric keys 0 [ ] to 9 [ ].
For DELAY parameter setting, 0 [ ] to 9 [ ] act as numeric keys. The value set here will be displayed on the LED unit.

(Example)
To set 842, press keys 8 [ ] 4 [ ] 2 [ ], in this order.

Setting of the trigger delay time completed

④ Press the ENTER [ ] key.
The displayed trigger delay time will then be stored in memory. This completes setting of the trigger delay time.

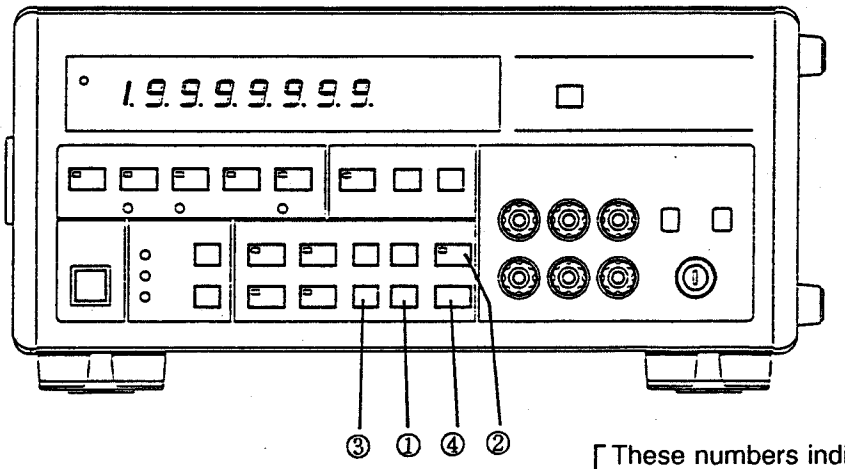
2.8.10 SLOW: AC Sampling SLOW/FAST

[Functional description]

The SLOW parameter key is used to select a frequency band for AC voltage measurement. For FAST, the selectable frequency band is from 300Hz to 1MHz. For SLOW, the selectable frequency band is from 20Hz to 1MHz. That is, SLOW should be set for a wider frequency band.

[Setting procedure]

The SLOW/FAST selection procedure for AC voltage measurement is described below.



[These numbers indicate the following procedure numbers.]

SLOW parameter setting

① Press the SHIFT key.

② Press the SLOW key.

The ON or OFF state of the SLOW parameter last set will then be displayed on the LED unit.

ON : SLOW
OFF : FAST

SLOW/FAST selection

③ Select SLOW or FAST with the CHANGE key. Each time CHANGE is pressed, the display changes as follows:
ON (SLOW) ⇆ OFF (FAST)
Display either ON or OFF on the LED unit in this manner.

SLOW parameter setting completed

④ Press ENTER .

The ON or OFF state being displayed on the LED unit will then be stored in memory. This completes setting of the SLOW parameter.

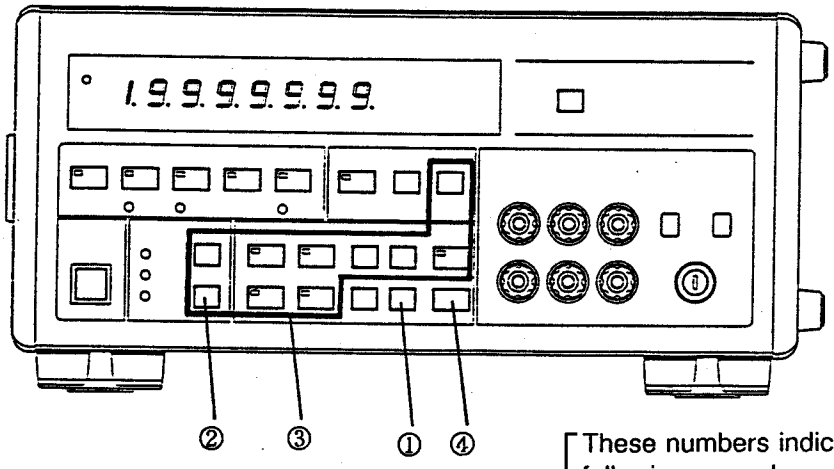
2.8.11 N

[Functional description]

The N parameter is used to set the number of times that data is to be set for statistical computation.
The setting number of times is from 2 to 10000.

[Setting procedure]

The procedure for setting the constant N is described below.



[These numbers indicate the following procedure numbers.]

N parameter setting

① Press SHIFT .

② Press N .

The value of the constant N last set will then be displayed on the LED unit.

Constant setting

③ Use numeric keys 0 [ ] to 9 [ ] to set the value of the constant N.

For N parameter setting, 0 [ ] to 9 [ ] act as numeric keys.

The value set here will be displayed on the LED unit.

(Example)

To set 63, press keys 6 [ ] 3 [ ] in this order.

Constant setting completed

④ Press [ENTER] .

The value being displayed on the LED unit will then be stored in memory.
Setting of the constant N is now complete.

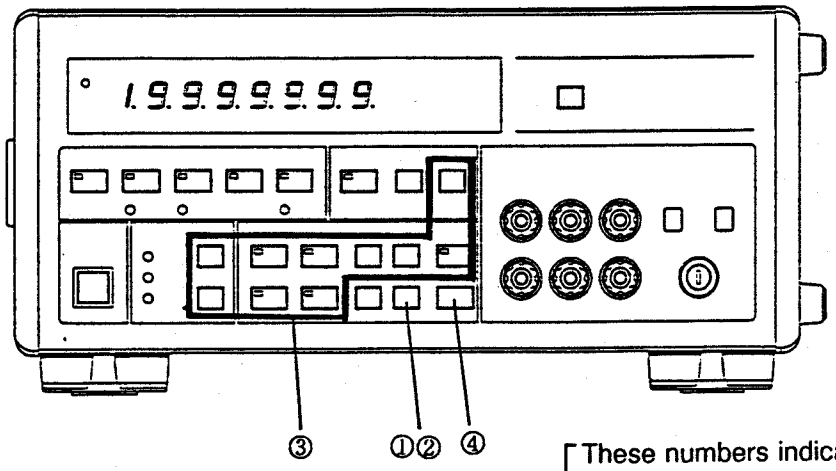
2.8.12 NS : Number of Samples

[Functional description]

The NS parameter is used to set the number of samples to be obtained in the MULTI sampling mode and the number of samples to be stored into the data memory.
The setting number of samples is from 1 to 10000.

[Setting procedure]

The procedure for setting the number of samples is described below.



[These numbers indicate the following procedure numbers.]

Setting the NS parameter

① Press SHIFT.

② Press NS.

The number of samples that was last set will then be displayed on the LED unit.

1 0 N S

Setting the number of samples

③ Use numeric keys 0 to 9 to set the number of samples.

For NS parameter setting, 0 to 9 act as numeric keys.
The value set here will be displayed on the LED unit.

(Example)
To set 25, press keys 2 5, in this order.

Setting of the number of samples completed

④ Press ENTER.
The value being displayed on the LED unit will then be stored in memory.
Setting of the NS parameter is now complete.

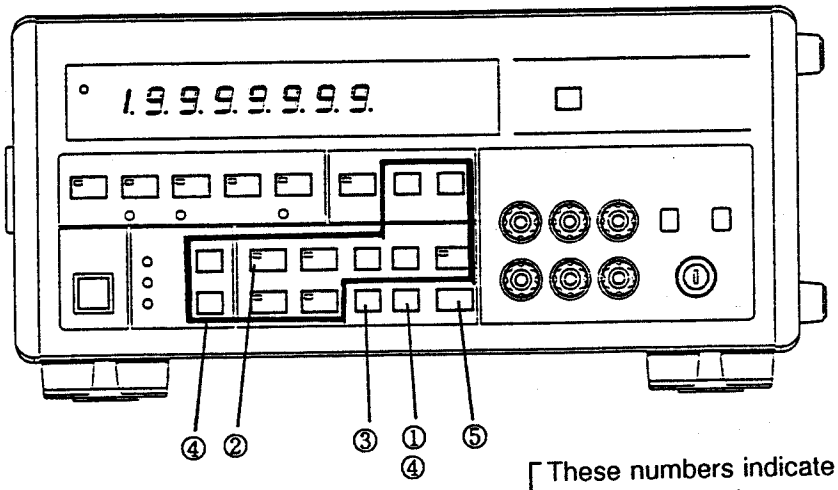
2.8.13 X/Y/Z

[Functional description]

The X/Y/Z parameter is used to set the constants to be included in arithmetic expressions.
In addition, use of the MD key allows the data last measured (or arithmetic results) to be set as constants.
The range of values that can be set is from ±19999999E-9 to ±19999999E+9.
Depending on the selected computation mode, either the X, the Y, or the Z parameter is to be used as the constant.
Therefore, check the appropriate type of parameter for the particular computation mode prior to setting. (See section 3.1, "Computing Functions", for details.)

[Setting procedure]

The procedure for setting the X, Y, or Z parameter is described below.



[These numbers indicate the following procedure numbers.]

X/Y/Z parameter setting

① Press the SHIFT key.

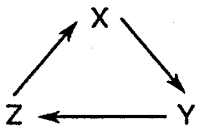
② Press the X/Y/Z key.

The value last set as the constant X will then be displayed on the LED unit.

Constant selection

③ Select the constant to be set using the CHANGE key.

The display changes as follows each time CHANGE is pressed:



In this way, display the desired constant on the LED unit.

(Example)

To set Y, press CHANGE once.

This causes Y to be displayed.

[If two or more constants are to be set]

Only one constant can be set during one setting operation. If three constants (X, Y, Z) are to be set, therefore, report the setting operation three times.

Constant setting

④ Set each of the mantissa part and exponential part separately, in that order, for one constant.

(a) Setting the mantissa part
The value that has been displayed during constant selection is the mantissa part of the constant. Set the mantissa part using numeric keys 0 [ ] to 9 [ ].
For X/Y/Z parameter setting, 0 [ ] to 9 [ ] act as numeric keys. The value set here will be displayed on the LED unit.

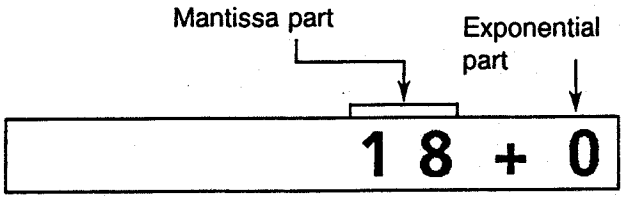
(Example)
To set 18, press keys 1 [ ] 8 [ ], in this order.

(b) Setting the exponential part

To set the exponential part, it is necessary firstly to display the exponential part on the LED unit.

This can be done by pressing the SHIFT key following the completion of setting the mantissa part.

This key action will change the display as follows:



Pressing a numeric key here will cause the value of the exponential part to change. Use numeric keys to display the desired value on the LED unit.

(Example)

To set -3, press keys - 3 , in this order.

Constant setting completed

⑤ Press the ENTER key.

This causes the displayed value to be stored in memory. Setting of the constant is now complete. Repeat the setting procedure from the beginning if another constant is to be set.

2.8.14 HIGH/LOW

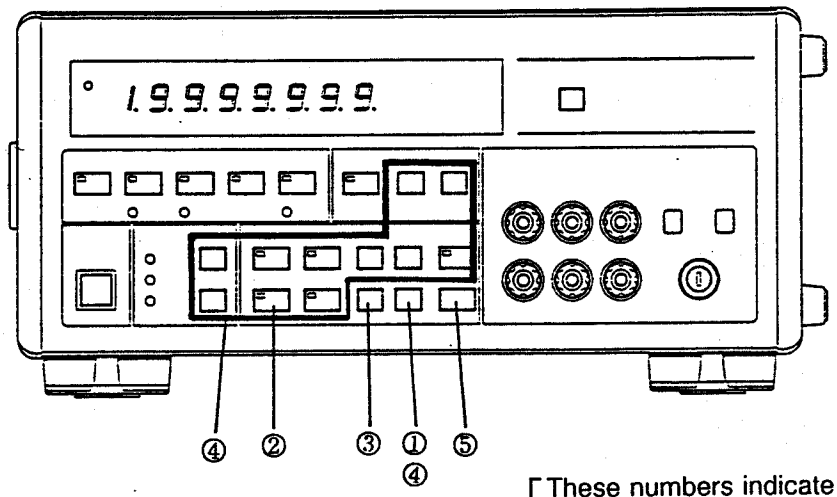
[Functional description]

The HIGH/LOW parameter is used to set the upper and lower limit values for COMPARATOR-1 computation.
The setting range is from ±19999999E-9 to ±19999999E+9.

These values are set so that they can be HIGH1≦HIGH2, LOW2≦LOW1 (HIGH<LOW is enabled). When the setting is improper, Error 5 occurs if the result of the function is executed.

[Setting procedure]

The setting procedure for constants HIGH-1, HIGH-2, LOW-1, or LOW-2 is described below.



[These numbers indicate the following procedure numbers.]

HIGH/LOW parameter setting

① Press the [SHIFT] key.

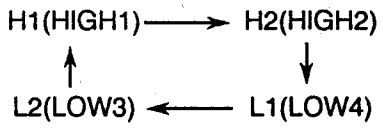
② Press the [HIGH/LOW] key.

The value last set for constant HIGH-1 (H1) will then be displayed on the LED unit.

1.0000000H1

Constant selection

③ Select the constant to be set using the CHANGE key.
The display changes as follows each time CHANGE is pressed:



In this way, display the desired constant on the LED unit.

(Example)

To set L2, press CHANGE three times in succession. This causes L2 to be displayed.

[If two or more constants are to be set]
Only one constant can be set during one setting operation.
Repeat the setting operation twice to set two constants (HIGH-1 and LOW-1, for example).

Constant setting

④ Set each of the mantissa part and exponential part separately, in that order, for one constant.

(a) Setting the mantissa part
The value that has been displayed during constant selection is the mantissa part of the constant.
Set the mantissa part using numeric keys 0 to 9.
For HIGH/LOW parameter setting, 0 to 9 act as numeric keys. The value set here will be displayed on the LED unit.

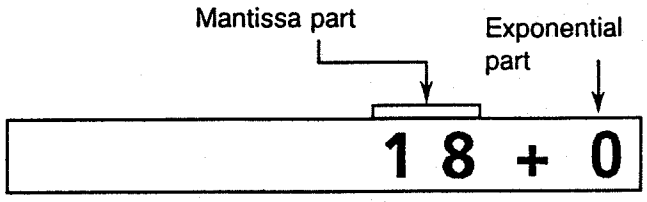
(Example)
To set 18, press keys 1 8, in this order.

(b) Setting the exponential part

To set the exponential part, it is necessary firstly to display the exponential part on the LED unit.

This can be done by pressing the SHIFT [ ] key following the completion of setting the mantissa part.

This key action will change the display as follows:



Pressing a numeric key here will cause the value of the exponential part to change. Use numeric keys to display the desired value on the LED unit.

(Example)

To set -3, press keys - [ ] 3 [ ], in this order.

Constant setting completed

⑤ Press the SHIFT [ ] key.

This causes the displayed value to be stored in memory. Setting of the constant is now complete. Repeat the setting procedure from the beginning if another constant is to be set.

2.8.15 LIMIT

[Functional description]

The LIMIT parameter is used to set the reference value and tolerance that are to be used for COMPARATOR-2 computation.
The setting ranges of both are:

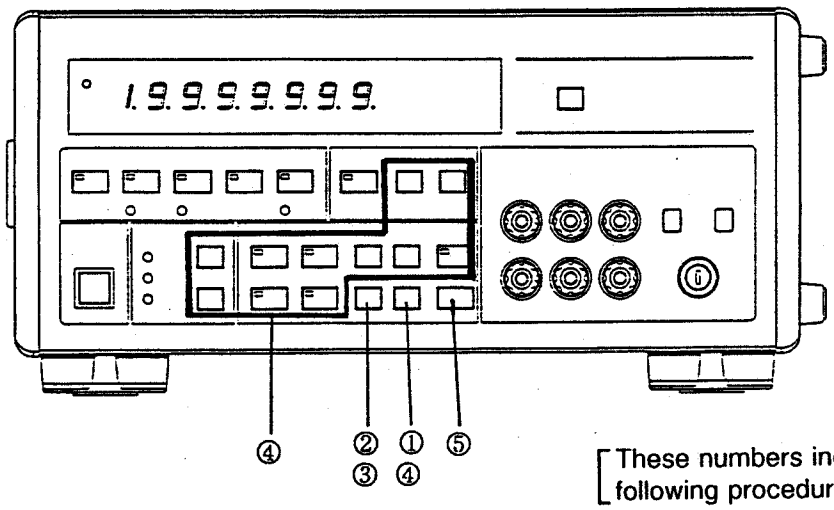
For reference value : from ±19999999E-9 to ±19999999E+9 (Except 0)

For tolerance (%) : from 0.000 to 100.0 (Real number consisting of four digits or less)

These values are set so that they can be %1≦%2. When the setting is improper, Error 5 occurs if the result of the function is executed.

[Setting procedure]

The setting procedure for LIMIT constants (reference value, %1, %2) is described below.



[These numbers indicate the following procedure numbers.]

LIMIT parameter setting

① Press the SHIFT key.

② Press the LIMIT key.

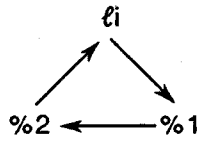
The value last set for reference value li will then be displayed on the LED unit.

Constant selection

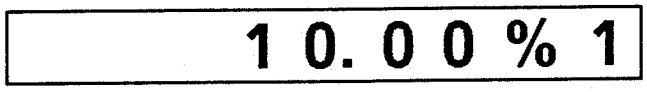
③ Select the constant to be set using the CHANGE key.

The display changes as follows each time CHANGE is pressed:

(Reference value)



In this way, display the desired constant on the LED unit.



(Example) To set %1, press CHANGE once.

This causes %1 to be displayed.

[If two or more constants are to be set]

Only one constant can be set during one setting operation. Repeat the setting operation three times to set three constants (reference value, %1, %2).

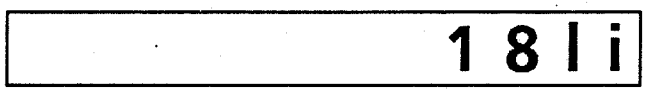
Contant setting

④ When setting the LIMIT parameter, either the reference value or %1/%2 must be set.

④-1 Setting the reference value
Set each of the mantissa part and exponential part separately, in that order, for the reference value.

(a) Setting the mantissa part
The value that has been displayed during constant selection is the mantissa part of the constant. Set the mantissa part using numeric keys
0 [ ] to 9 [ ].
For LIMIT parameter setting,
0 [ ] to 9 [ ] act as numeric keys. The value set here will be displayed on the LED unit.

(Example)
To set 18, press keys
1 [ ] 8 [ ], in this order.

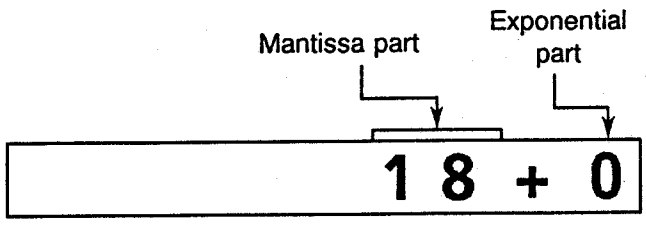


(b) Setting the exponential part

To set the exponential part, it is necessary firstly to display the exponential part on the LED unit.

This can be done by pressing the SHIFT key following the completion of setting the mantissa part.

This key action will change the display as follows:



Pressing a numeric key here will cause the value of the exponential part to change. Use numeric keys to display the desired value on the LED unit.

(Example)

To set -3, press keys - 3, in this order.

④-2 Setting %1 and %2

Set %1 and %2 using numeric keys 0 to 9.

For LIMIT parameter setting, 0 to 9 act as numeric keys. The value set here will be displayed on the LED unit.

(Example)

To set 25, press keys 2 5, in this order.

Setting of constant completed

⑤ Press the [ENTER] key.

This causes the displayed value to be stored in memory. Setting of the constant is now complete. Repeat the setting procedure from the beginning if another constant is to be set.

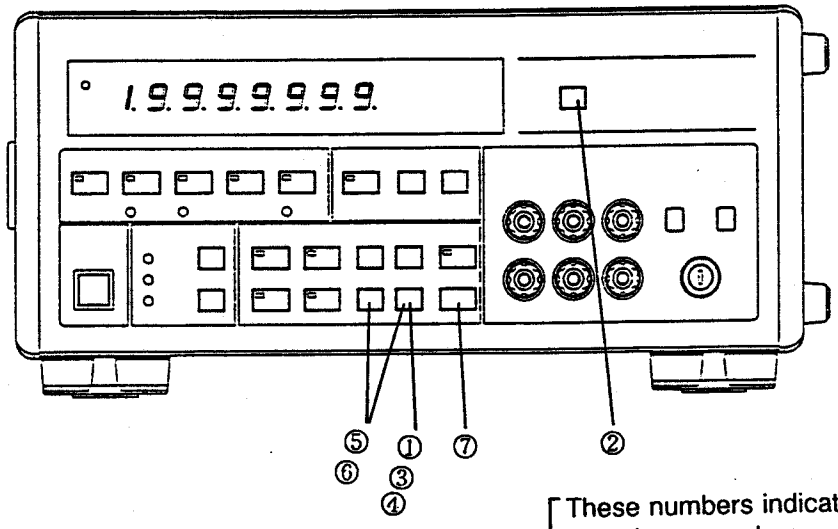
2.8.16 GPIB : GPIB Address Switch

[Functional description]

The GPIB parameter is used with GPIB to set the device address of the R6871E/E-DC, the address mode, and the format mode for output of measured data.
If "Addressable" is selected as the address mode, addressing from the controller becomes possible.
If "Talk only" is selected as the address mode, data transmission takes place, irrespective of addressing from external devices.
Values 0 through 30 can be set as addresses.

[Setting procedures]

The GPIB setting procedures are described below.



[These numbers indicate the following procedure numbers.]

GPIB parameter setting

① Press the SHIFT key.

② Press the GPIB key.

The GPIB address parameter data last set will then be displayed on the LED unit.

H - A - 0 1 G P

[Description of parameter data displayed on the LED unit]
Parameter data consists of the following three parts:
The part where "H" is displayed:
Format mode
The part where "A" is displayed:
Address mode
The part where "01" is displayed:
Address
Detailed description of each of these three parts is given below.

- Format mode
  In the format mode, the header assumes either an ON or an OFF state. "H" is displayed when the header is ON. "-" (underline) is displayed when the header is OFF.
- Address mode
  The address mode is either "Addressable or "Talk only". "A" is displayed for "Addressable", and "O" is displayed for "Talk only".
- Address
  The address can assume a two-digit number from "00" to "30".

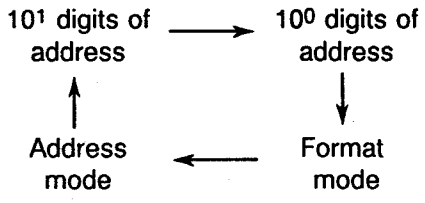
Parameter data selection

③ Select the type of parameter data to be set using the SHIFT key.

The available types of parameter data are : format mode, address mode, and address.

Selection of the desired type of parameter data causes the display of the data to blink.

Each time SHIFT is pressed, the blinking display position moves as follows:



Address setting

④ Press SHIFT [ ] to make the address display blink. This allows a value to be set in the blinking display position.
Either the 10^1 or the 10^0 digits of the address will be displayed in blinking form when the key is pressed. Set the desired value using numeric keys. At this time, the blinking display position shifts through one digit to the left or to the right.
(It shifts to the right if 10^1 -digit data is input, and shifts to the left if 10^0 -digit data is input.)
Set a 10^1 -digit or a 10^0 -digit value.

(Example)
To set the address to "25" in the following state:

First, press 2 [ ].

Next, press 5 [ ].

Blinking
H - A - 0 1 G P

Blinking
H - A - 2 1 G P

Blinking
H - A - 2 5 G P

Address mode setting

⑤ Make the display of the address mode blink by pressing the SHIFT key.
Either "A" or "0" is available as the address mode using the CHANGE key.
The display changes as follows each time CHANGE is pressed:

"A" ⇆ "0"

Format mode setting

⑥ Make the display of the address mode blink by pressing the SHIFT key.
Either "H" or "-" is available as the format mode. Using the CHANGE key.
The display changes as follows each time CHANGE is pressed:

"H" ⇆ "_"

GPIB parameter setting completed

⑦ Press the [ENTER] key.

The parameter data being displayed on the LED unit will then be stored in memory. This completes setting of the GPIB parameter.

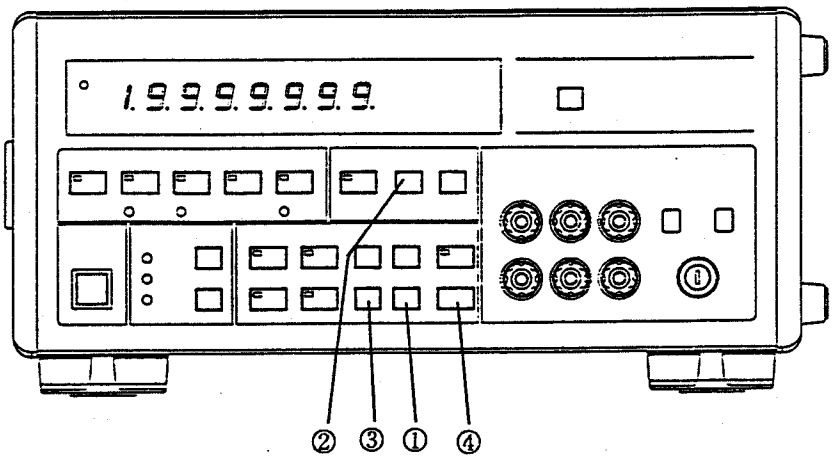
2.8.17 LINE : Line Frequency

[Functional description]

The LINE parameter is used to set the line frequency of 50Hz or 60Hz at which the R6871E/E-DC is to be operated.
The LINE parameter data is not initialized.

[Setting procedure]

The line frequency setting procedure is described below.



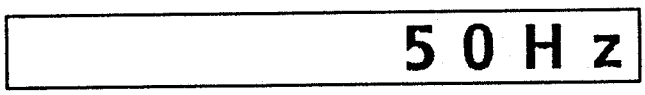
[These numbers indicate the following procedure numbers.]

LINE parameter setting

① Press the SHIFT key.

② Press the LINE key.

The line frequency last set will then be displayed on the LED unit.



Line frequency selection

③ Select a line frequency of either 50Hz or 60Hz using the CHANGE key. The display changes as follows each time the CHANGE key is pressed:

50Hz ⇆ 60Hz

In this way, display the required line frequency on the LED unit.

Line frequency setting completed

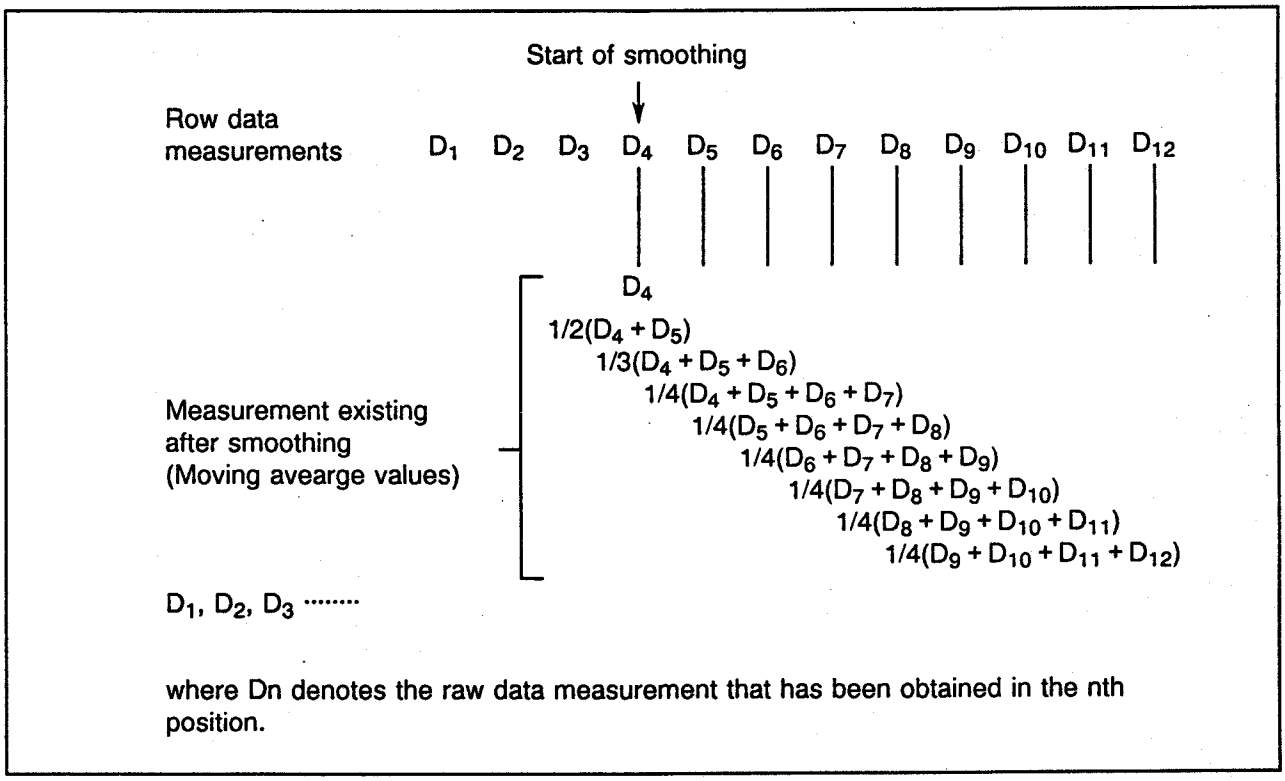
④ Press the ENTER key.

This causes the displayed line frequency value to be stored in memory. Setting of the line frequency is now complete.

2.8.18 SMOOTH

[Functional description]

The SMOOTH parameter is used to implement the smoothing function. The smoothing function is used to eliminate superimposed noise from measurement signals.
It allows dispersion in measured data to be reduced since the moving average values previously obtained from raw data measurements during the specified number of times of smoothing are taken as measured data.
The moving average values (measured data existing after smoothing) are described below.
The moving average values refer to the average values of T number of measurements which are the total of T-1 number of measurements existing prior to smoothing and the measurements to undergo smoothing. T indicates the specified number of times of smoothing. During the time from the start of smoothing to arrival of the specified number of times of smoothing.
The average values of all measurements obtained up to that time are displayed on the LED unit.
Figure 2-3 below shows the case of four times of smoothing.



where Dn denotes the raw data measurement that has been obtained in the nth position.

Figure 2-3 Relationship Between Raw Data Measurements and the Data Measurements Existing After Smoothing

In general, the nth data measurement D(sm) existing after smoothing has been performed is represented by:

$$D(sm) = \frac{1}{T} \sum_{i=n-T+1}^{n} D_i$$

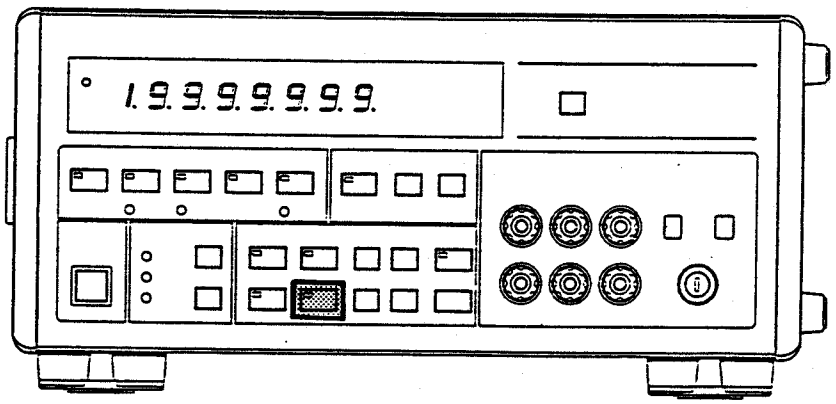
Di = measured data existing before smoothing
D(sm) = measured data existing after smoothing
T = Number of times that the smoothing operation has been performed (Integer from 2 to 100)

If the following parameters are changed during execution of the smoothing function, the smoothing data obtained up to that time will be initialized and the smoothing function will be performed once again from the beginning in accordance with the newly set number of times of smoothing:

- Measurement function
- Measurement range
- IT parameter
- SLOW parameter
- SM TIME parameter

[Setting procedure]

The procedure for setting the SMOOTH function on or off is described below.



SMOOTH function on/off setting

Set the SMOOTH function on or off using the SMOOTH key.

Each time the SMOOTH key is pressed, the lamp of the key alternates between on and off. When the lamp is on, this indicates that the SMOOTH function is set on. When the lamp is off, this indicates that the SMOOTH function is set off.

Setting is complete when the lamp is made to turn on or off to obtain the desired state.

The lamp, however, remains blinking until smoothing has been performed the specified number of times.

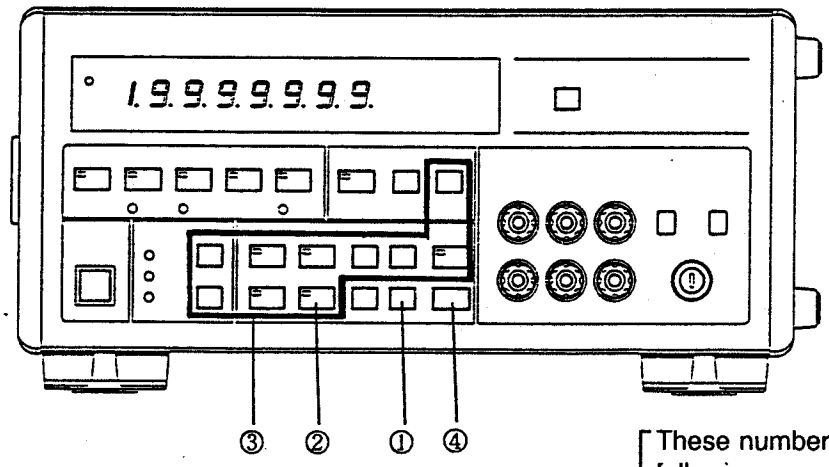
2.8.19 SM TIME: Smoothing Time

[Functional description]

The SM TIME parameter is used to set the number of times that the smoothing operation is to be performed.
See the description of the SMOOTH parameter for details of the smoothing function.
The setting range is from 2 to 100 times.

[Setting procedure]

The procedure for setting the number of times of smoothing is described below.



[These numbers indicate the following procedure numbers.]

Setting the SM TIME parameter

① Press the SHIFT key.

② Press the SM TIME key.

The number of times of smoothing that was last set will then be displayed on the LED unit.

Setting the number of times of smoothing

③ Set the desired number of times of smoothing using the numeric keys 0 [ ] to 9 [ ].
For SM TIME setting, 0 [ ] to 9 [ ] act as numeric keys. The value set here will be displayed on the LED unit.

(Example)
To set 12, press keys 1 [ ] 2 [ ], in this order.

Setting of the number of times of smoothing completed

④ Press the ENTER [ ] key.
This causes the displayed value (number of times of smoothing) to be stored in memory. Setting of the number of times of smoothing is now complete.

2.8.20 NULL

[Functional description]

The NULL parameter is used to specify whether or not computation is to be performed with offset values during calculation of measured data.

When the NULL key is pressed and the key lamp comes on, the NULL function becomes valid (ON).

The measurement object already connected to the input terminals at depression of the NULL key is measured and the measured values are taken as the NULL values. (Measurement is made over all ranges from the measurement range available for the specified function to the maximum range.) In subsequent measurement operations, measured values from which the NULL values have been subtracted become the measurement results.

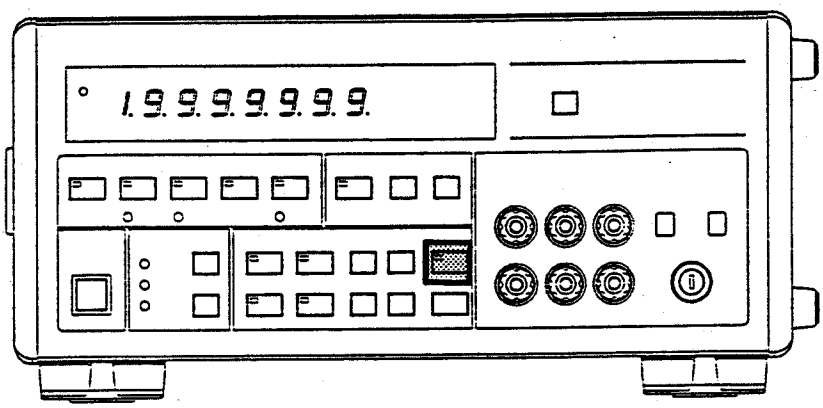
When the NULL key is pressed once again, the NULL function will turn off for all ranges.

Note 1 : The auto range function of the R6871E/E-DC is performed on measured data only: it is not performed on the results of NULL computation or smoothing computation.
Thus, an OVER error message may be displayed because of the auto range function even if measurement is not performed in the maximum range.

Note 2 : The NULL function becomes invalid (OFF) if input data is changed using a measurement function.

[Setting procedure]

The ON/OFF setting procedure for the NULL function is described below.



NULL function ON/OFF setting

Set the NULL function on or off using the NULL key.

NULL computation is peformed while the NULL key lamp stays lit.

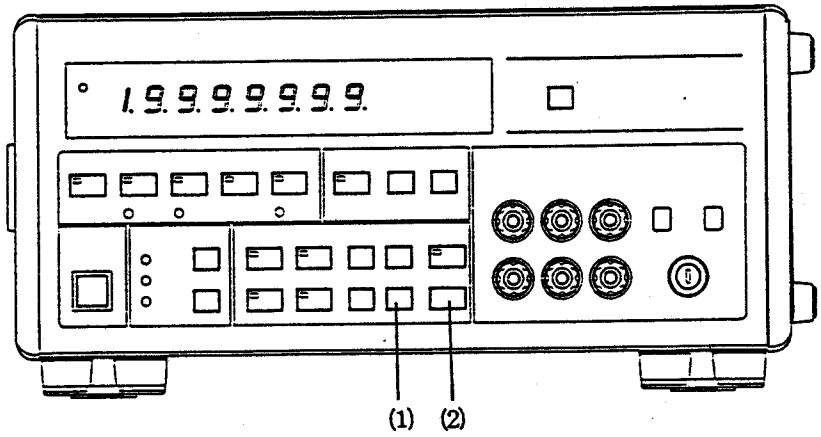
2.8.21 TEST

[Functional description]

The TEST parameter is used to set whether or not the self-tests of the R6871E/E-DC are to be performed.

[Setting procedure]

The operating procedure for the self-tests is described below.



[These numbers indicate the following procedure numbers.]

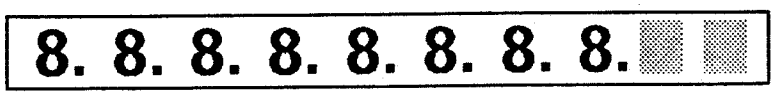
Execution of self-tests

① Press the SHIFT key.

② Press the TEST key.

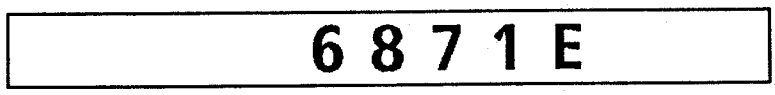
This causes the self-tests to be performed. Check the individual test items that are displayed in the following order:

(a) The entire display blinks five times at 1 sec intervals, and a buzzer sound is generated at the same intervals as the blinking intervals.

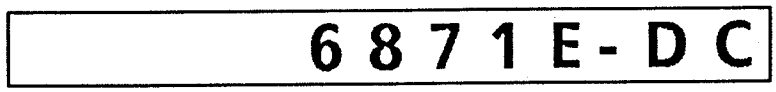


(b) The model name of R6871E/E-DC is displayed.

for R6871E



for R6871E-DC



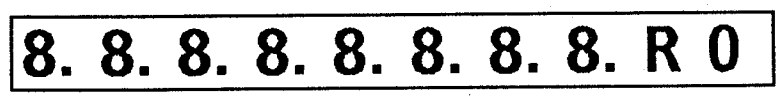
for R6871E-OHM

(c) The revision number of the software is displayed.

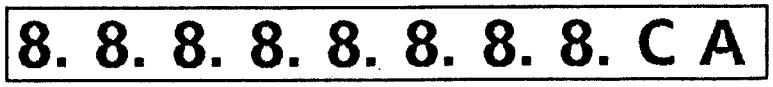
(d) The existing line frequency is displayed.

(e) The GPIB address of the R6871E/E-DC is displayed.

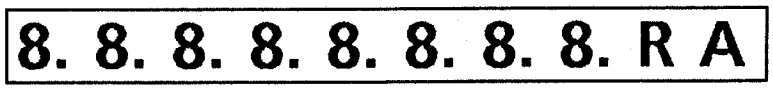
(f) The following display is made when the sum check of the program ROM shows correct results:



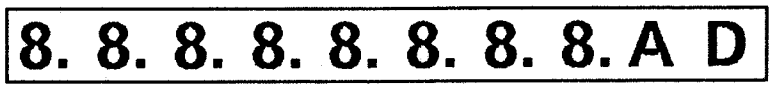
(g) The following display is made when the sum check of the calibration data saved within the R6871E/E-DC shows correct results:



(h) The following display is made when the READ/WRITE tests of the RAM show correct results:



(i) The following display is made when the test of the analog section shows correct results:



(j) Automatic calibration is performed and the results are displayed as follows:

(k) The entire display goes out.