Instruction Manual for A6000 Series Universal Digital Panel Meters

Process Signal Measurement Unit

Caution

(1) Applying a voltage or current exceeding its maximum permissible value may cause the unit to be damaged.
(2) Always use the unit within the specified voltage range; otherwise, it may cause a fire, electric shock or personal/equipment damage.
(3) For the purpose of functional improvement, the information written herein may be changed without prior notice.
(4) Information contained herein is considered accurate to the best of our knowledge. If you have any question or comment on the information, please contact us or our distributor.
(5) Read this manual carefully and thoroughly before starting to operate the unit, and keep the manual available for future reference.

1 Before Using the Unit

Thank you for purchasing our quality designed and manufactured A6000 Series. Before unpacking the unit, check for damages during transportation. If you have noticed any damage, directly contact us or our distributor.

1.1 Type Identification

Each model number of the A6000 series has its general specifications, and the following describes each note and the meaning. Before using the unit, check that the model number and specifications of the delivered unit match those of the product you ordered. For optional units, see the separate instruction Manuals.

A 6 □□□ – □□

Power supply unit (2 unit types)	:	1	Alternating current
		2	Direct current
Display unit (2 unit types)	:	1	Multi display
		2	Single display
Input unit (11 unit types)	:	1	DC voltage measurement
		2	DC current measurement (small electric current)
		3	DC current measurement (large electric current)
		4	AC voltage measurement
		5	AC current measurement (small electric current)
		6	AC current measurement (large electric current)
		7	Resistance measurement
		8	Temperature measurement
		9	Frequency measurement
		A	Load cell input
		B	Process signal measurement
Comparator out put unit (2 unit types)	:	0	None
		1	Relay contact output
		2	Photocoupler output
Option units (8 unit types)	:	0	None
		1	External control
		2	BCD output (TTL)+external control
		3	BCD output (open collector)+external control
		4	Analog output (PWM)+external control
		5	RS-232C
		6	RS-485
		7	RS-232C+analog output (PWM)
		8	RS-485+analog output (PWM)

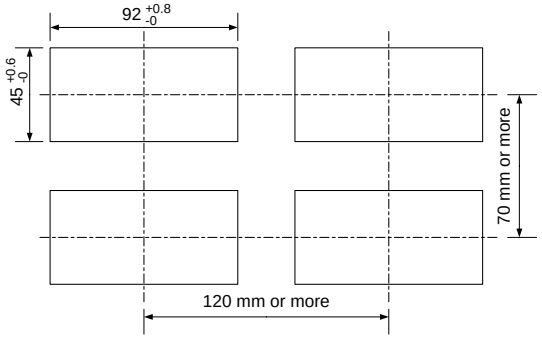
1.2 Accessories

Accessory	Quantity	Remarks
6-p terminal cover	2 or 3 each	2 without a comparator output 3 with a comparator output
Mounting band	2 pieces	
Unit indication label	1 each	

2 Mounting Method

2.1 Panel Cut Size

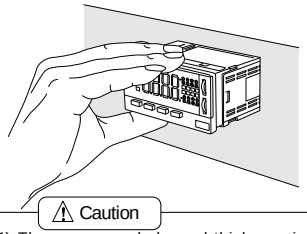
Cut the panel to mount the A6000 series in accordance with the illustration below:



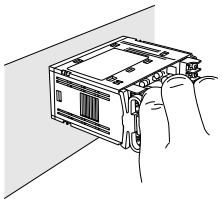
2.2 How to Mount the Unit on the Panel

Mount the A6000 series to the panel in accordance with the illustration below:

(1) Remove the mounting band and insert the case from the front of the panel.



(2) Fix the case using the mounting band from the rear of the panel.

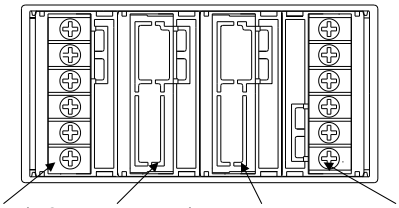


Caution

(1) The recommended panel thickness is 0.8 to 5mm.
(2) Do not install the unit in locations where it is exposed to direct sunlight; where ambient emperature or humidity doesn't meet the requirements below; or where a drastic change in temperature may ause condensation.
Ambient temperature: 0 to 50℃
Ambient humidity: 35 to 85%
(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℃ 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.

3 Terminals and Connections

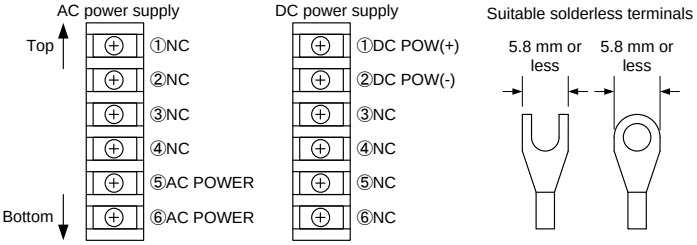
Illustration of the rear of the A6000



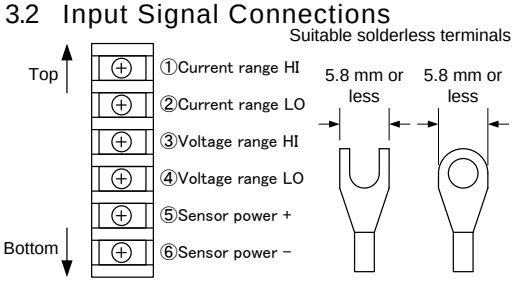
Caution

Each unit is not replaceable by the customer.

3.1 Power supply connections

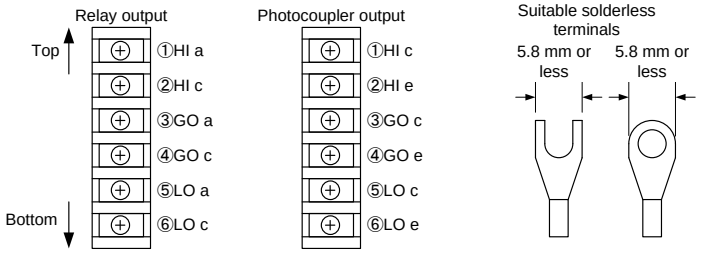


3.2 Input Signal Connections



*(2), (4) and (6) watch terminal are these potential.

3.3 Comparator Output Connections



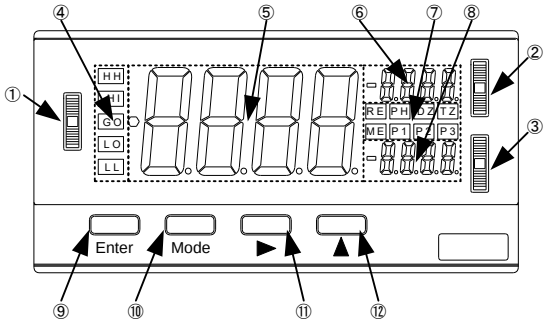
3.4 Option connections

For connections of the options, see separate optional function instruction Manuals.

4 Parameter Settings

4.1 Multi Display Unit

Names and major functions

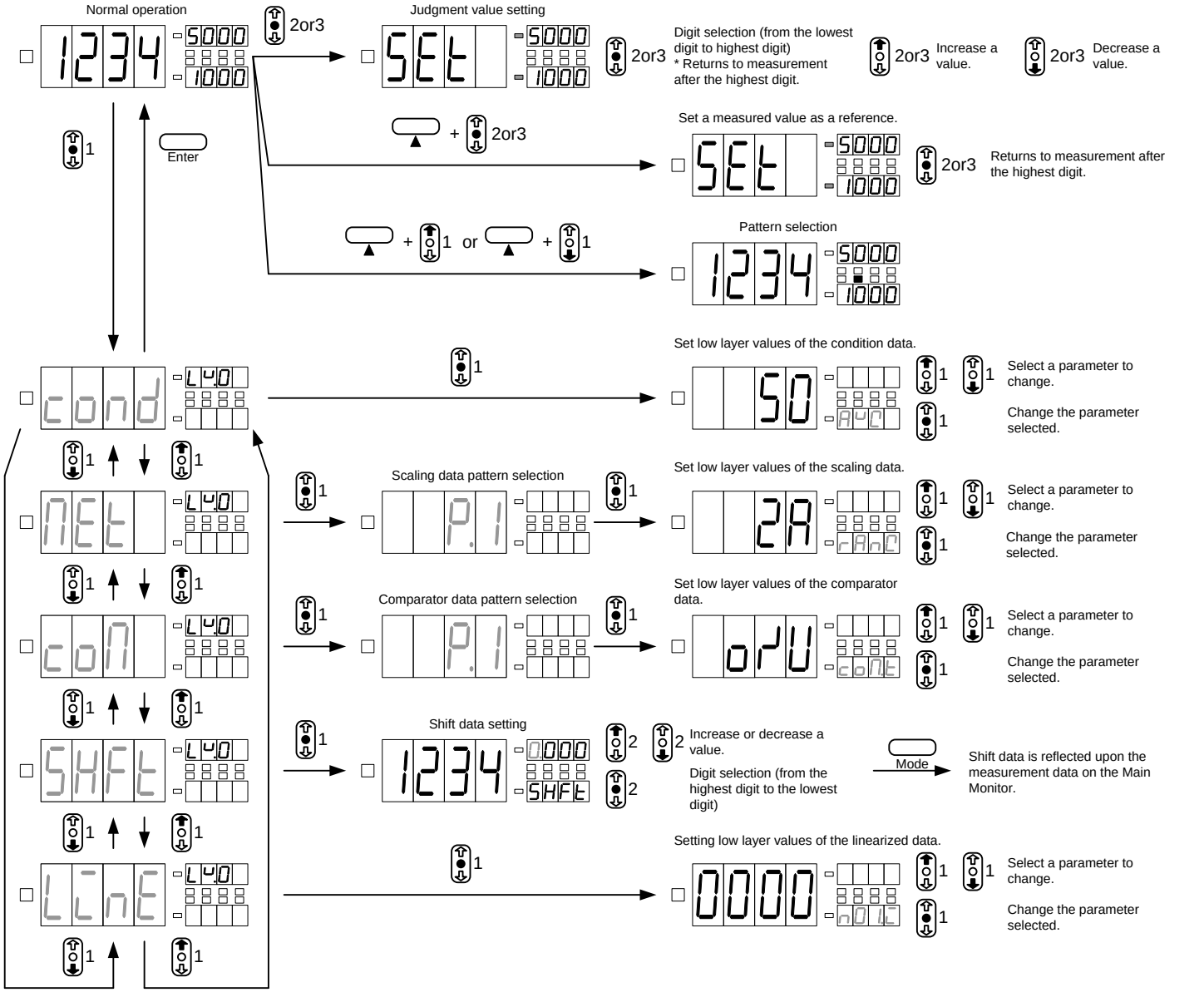


Location	Name	Major function
①	Jog 1	Menu and value selection at the time of parameter setting; pattern selection when used with Increment.
②	Jog 2	Changes judgment values when used with the meter relay; sets a current measurement value to a judgment value; switching maximum values, etc. when used without meter relay.
③	Jog 3	Changes judgment values when used with the meter relay; sets a current measurement value to a judgment value; switching maximum values, etc. when used without meter relay.
④	Judgment monitor	Displays results of judgment when used with meter relay.
⑤	Main monitor	Displays a measured value, menu name or a value at the time of parameter setting.
⑥	Sub monitor 1	Displays a judgment value when used with meter relay; displays a maximum value, etc. when used without meter relay.
⑦	Function monitor	RE: Illuminates when the unit is set to the remote mode via communication function. PH: Illuminates when peak hold, valley hold, or peak-valley hold is turned on. DZ: Illuminates when Digital Zero is turned on. TZ: Illuminates when Tracking Zero is turned on. ME: Illuminates when Digital Zero Backup is turned on.

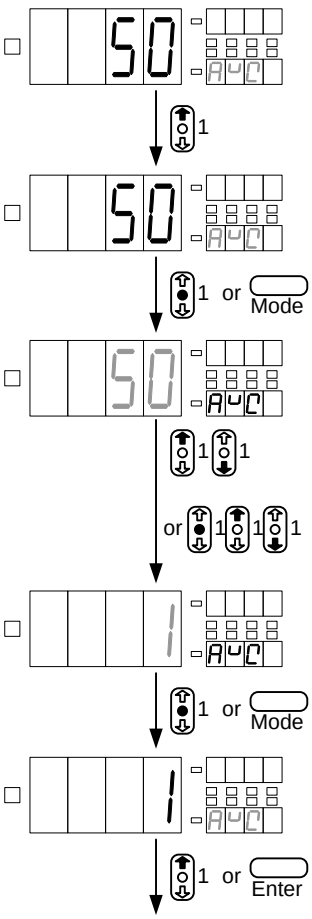
P1 P2 P3	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Pattern 7	Pattern 8
P1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
P2		OFF	ON			OFF	ON	
P3			OFF	OFF	ON	ON		

Location	Name	Major function
⑧	Sub monitor 2	Displays a judgment value when used with meter relay; displays a maximum value, etc. when used without meter relay.
⑨	Enter	Switches to the parameter setting mode.
⑩	Mode	Changes modes at the time of parameter setting; switches to the memory mode at the time of normal measurements (when this button is pushed and held.)
⑪	Shift	Selects digits at the time of parameter setting; DZ control at the time of normal measurements. (when this button is pushed and held.)
⑫	Increment	Changes values at the time of parameter setting; pattern selection at the time of normal measurements (when this button is pushed and held); special operations

Operation procedure diagram



How to set a low layer value (Condition data/scaling data/comparator data)



Select the name of a parameter (shown on Sub monitor 2) you want to change by turning Jog 1 up or down.

To change the selected parameter, push the center of Jog 1 or use the Mode key to move from the menu selection mode to value change mode.

*While Sub monitor 2 flashes in the menu selection mode, Main monitor will flash in the value change mode.

If the parameter requires a selection:

Turn Jog 1 up or down to choose a selection.

If the parameter requires a value entry:

Push the center of Jog 1 to choose the digit you want to change, and turn Jog 1 up or down to change the value.

Push the center of Jog 1 or use the Mode key to shift from the value change mode to the menu selection mode.

* While Sub monitor 2 flashes in the menu selection mode, Main monitor will flash in the value change mode.

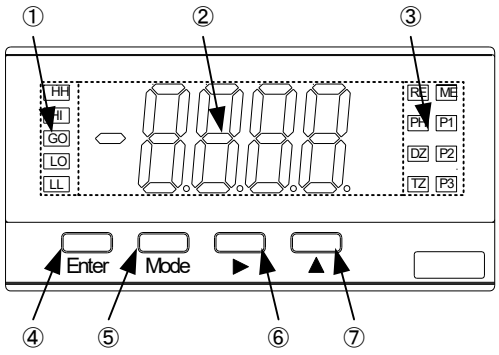
Turn Jog 1 up or down to select the menu name of the parameter you want to change (shown in Sub monitor 2) or return to measurement by pushing the Enter key.

Remarks:

※The multi display unit can also follow the operation procedure of the single display unit operation system.
※Comparator judgment values can be set not only from Jog 2 and Jog 3 but also from the low layers of the comparator data.
※For operation procedures in the memory mode (maximum value/minimum value/(maximum value-minimum value)), see the operation procedure diagram of the single display unit.

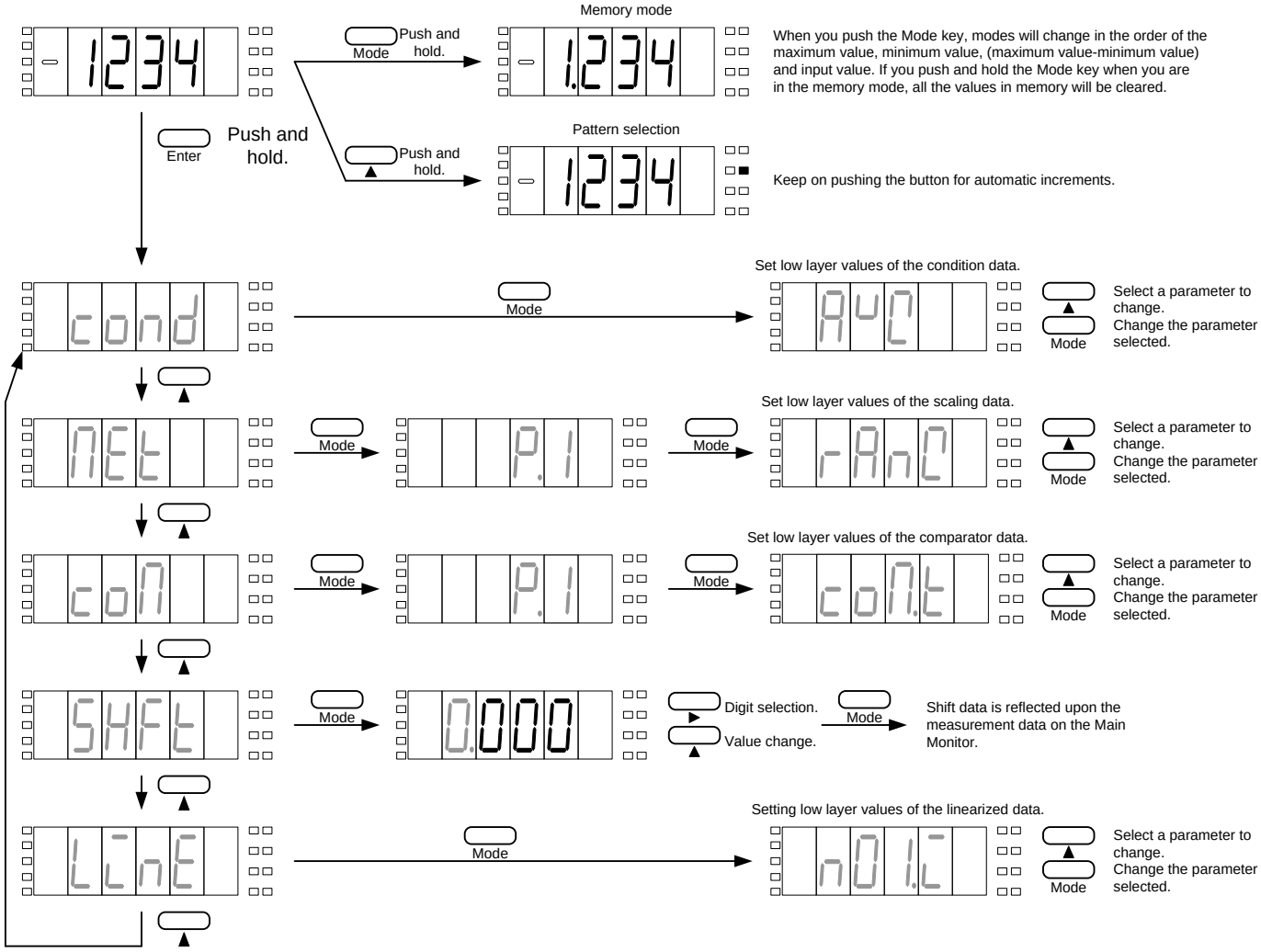
4.2 Single Display Unit

Names and major functions

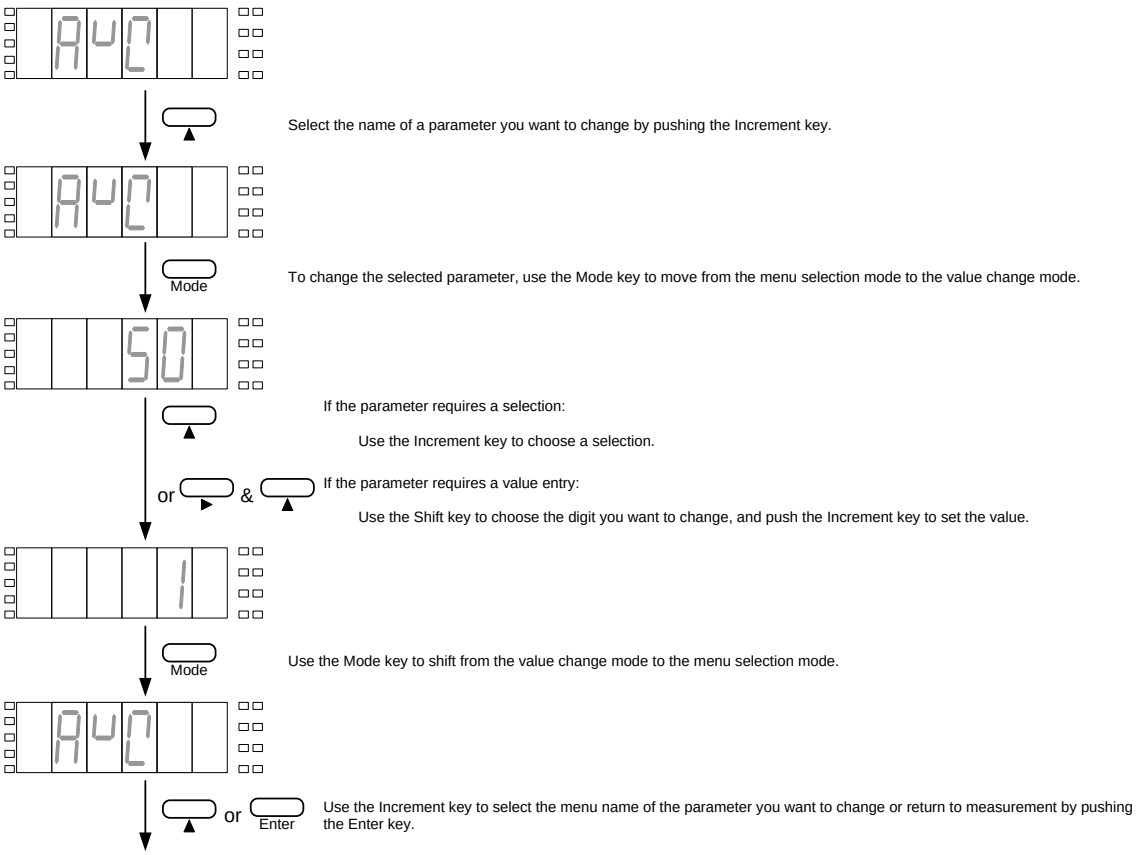


Location	Name	Major function								
①	Judgment monitor	Displays judgment results when used with meter relay.								
②	Main monitor	Displays a measured value as well as menu names and values at the time of parameter setting.								
③	Function monitor	RE	Illuminates when the unit is set to the remote mode via communication function.							
		PH	Illuminates when peak hold, valley hold, or peak-valley hold is turned on.							
		DZ	Illuminates when Digital Zero is turned on.							
		TZ	Illuminates when Tracking Zero is turned on.							
		ME	Illuminates when Digital Zero Backup is turned on.							
		P1 P2 P3		Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Pattern 7	Pattern 8
			P1	OFF	ON	OFF	ON	OFF	ON	OFF	ON
			P2		OFF	ON			OFF	ON	
			P3			OFF	OFF	ON	ON		
④	Enter	Switches to the parameter setting mode.								
⑤	Mode	Changes modes at the time of parameter setting; switches to the memory mode at the time of normal measurements (when this button is pushed and held.)								
⑥	Shift	Selects digits at the time of parameter setting; DZ control at the time of normal measurements. (when this button is pushed and held.)								
⑦	Increment	Changes values at the time of parameter setting; pattern selection at the time of normal measurements (when this button is pushed and held) ; special operations								

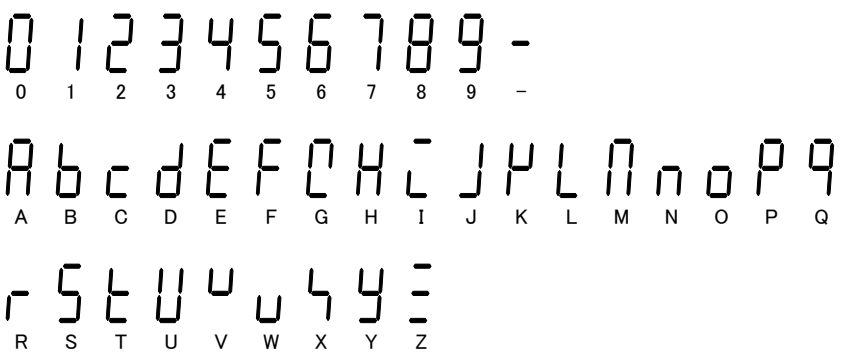
Operation procedure diagram



How to set a low layer value (Condition data/scaling data/comparator data)



4.3 Numeric and Character Indications



4.4 Protection Levels

Each parameter of the A6000 has an individual protection level, and by setting the protection level of the condition data, you can set an access level. (For the protect level of each parameter, see the P.L. column of the tables in Section 4.5.)

The higher the protection level is, the less the number of settable parameters will be. If you set the protection level to the strictest LV3, you can change the protection level only, and all the other parameters may not be changed. (No comparator judgment value can be changed using the jog switches in this case.)

*The protection level set at the time of shipment is LV1. (Settings of display colors, scaling and judgment-related values only are available.)

4.5 List of the Parameters

The parameters for the process signal measurement unit can be roughly divided into three types: condition data which deal with basic functions including sampling time; scaling data which control measurement including input range; and comparator data (for meter relay only) which deal with comparator output.

4.5.1 Condition Data

Menu indication	Parameter name	Initial value	P.L.	Setting range or alternatives	Major setting purpose and remarks
AVG	Average times	50	0	1/2/4/8/10/20/50/100/200/400/800/1000/2000/5000	Selects Conversion rate (average times of internal sampling; sampling time: approx. 1 millisecond)
MAV	Average times of movements	1	0	1/2/4/8/16/32	Selects the average times of movements.Filtering effects: Small<1(OFF)-2-4-8-16-32>Big
S.WD	Step wide	1	0	1/2/5/10	Selects the range of display changes to maintain image display consistency. (If this parameter is set to 5, the lowest digit will display either 0 or 5 only).
CLR	Display color	RED	1	RED/GREEN	Selects display colors.*Only when without meter relay.
CLR.T	Display color type	AUTO	1	AUTO/MANU	Selects automatic (red in the HI or LO mode or green in the GO mode) or manual setting for display color type. *Only when with meter relay.
HI.CL	HI display color	RED	1	RED/GREEN	Selects red or green as display color at the time of HI judgment.*Only when CLR.T is MANU.
GO.CL	GO display color	GREN	1	RED/GREEN	Selects red or green as display color at the time of GO judgment.*Only when CLR.T is MANU.
LO.CL	LO display color	RED	1	RED/GREEN	Selects red or green as display color at the time of LO judgment.*Only when CLR.T is MANU.
BLNK	Display blank level	OFF	0	OFF/LV1/LV2/LV3/ON	Selects the display brightness. <bright OFF-LV1-LV2-LV3-ON >turned off
J.SW	Jog SW	ON	0	ON/OFF	Selects whether the jog SW is used or not.*With the multi display unit only.
PVH	PH Selection	PH	0	PH/VH/PVH	Selects a type that operates when the PH function is turned on (peak hold/valley hold/peak-valley hold).
DZ.BU	DZ backup	OFF	0	OFF/ON	Selects whether the digital zero value is backed up or not at the time when the unit is turned off.
PS	P.SEL	1	0	1/2/4/8	Selects the number of patterns available for the pattern selection function.
LINE	Linearize	OFF	0	OFF/2/4/8/16	Selects whether the linearize function is enabled/disabled and sets the number of correction points.
TR.T	TZ time	000	0	000 to 999	Selects whether the tracking zero function is enabled/disabled and sets the correction time (setup value/conversion rate).
TR.W	TZ correction range	01	0	01 to 99	Sets the correction range of the tracking zero function.*Only when TR.T is set to a value other than 000.
P.ON	Power on delay time	0	0	0 to 9	Sets the time between the startup and actual start of measurements (setup value x 1 second).
PRO	Protection level	LV.1	3	Lv.0/LV.1/LV.2/LV.3	Selects the protection level to prevent operation mistakes.High< LV3-LV2-LV1-LV0 >Low
U-NO.	Unit number indication	OFF	0	OFF/ON	Selects whether the code of a unit mounted at the time of startup is displayed or not.
S/H.T	Start/hold type	A	0	A/B	Selects an operation type of start/hold (A: free run; B: one shot).*Only with the external control.
S/H.D	S/H delay time	0	0	0 to 9999	Sets the delay time at the time of startup (setup value x 1 ms).*Only with the external control.
PVH.T	PH type	A	0	A/B	Selects an operation type of peak hold (A: real-time display; B: results display).*Only with the external control.
DZ.C	DZ control	SW	0	SW/TERM	Selects a control method of Digital Zero (SW: front key; TERM: external control terminal).*Only with the external control.
PS.C	P.SEL control	SW	0	SW/TERM	Selects a control method of Pattern Selection (SW: front key; TERM: external control terminal).*Only with the external control.
BCD.L	BCD logic	N.LOG	0	N.LOG/P.LOG	Selects the BCD output logic (N: negative logic; P: positive logic).*Only when the BCD output is available.
BAUD	Baud rate	9600	1	2400/4800/9600/19200/38400	Sets a baud rate for communication.*Only when the communication function is available.
DATA	Data length	7	1	7/8	Selects the data length for communication.*Only when the communication function is available.
P.BIT	Parity bit	E	1	E/O/N	Selects the parity bit for communication.*Only when the communication function is available.
STP.B	Stop bit	2	1	1/2	Selects the stop bit for communication.*Only when the communication function is available.
T-	Delimiter	CR.LF	1	CR.LF/CR	Selects a delimiter for communication.*Only when the communication function is available.
ADR	Equipment ID	01	1	01 to 99	Selects the equipment ID for the RS-485 function.*Only when the RS-485 function is available.

4.5.2 Scaling Data

Menu indication	Parameter name	Initial value	P.L.	Setting range or alternatives	Major setting purpose and remarks
RANG	Input range	2A	1	1V/2V/2A/3A	Selects an input range.*Note that input terminals vary depending on the actual input range.
FSC	Full scale indication	9999	2	-9999 to +9999	Sets the relationship between the input signal and its indication.
FIN	Full scale input	9999	2	-9999 to +9999	
OFS	Offset indication	0	2	-9999 to +9999	
OIN	Offset input	0	2	-9999 to +9999	
DLHI	Digital limiter HI	9999	0	-9999 to +9999	Sets the upper limit of the displayable range. (Any value equal to or exceeding the digital limiter HI setting will not be updated and kept at the setup value.
DLLO	Digital limiter LO	-9999	0	-9999 to +9999	Sets the lower limit of the displayable range. (Any value equal to or below the digital limiter LO setting will not be updated and kept at the setup value.
A.OUT	Analog output type	0-1	1	0-1/0-10/1-5/4-20	Selects an analog output range.*Only when the analog output is available.
AOHI	Analog output HI	9999	1	-9999 to +9999	Sets the relationship between indications and analog outputs.*Only when the analog output is available.
AOLO	Analog output LO	0	1	-9999 to +9999	
DP	Decimal point	None	2	Each digit can be set independently.	Sets the position of the decimal point.

4.5.3 Comparator Data (for meter relay only)

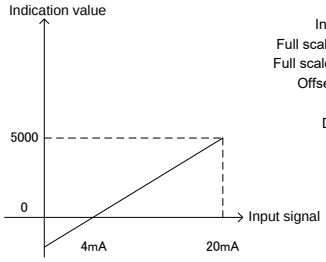
Menu indication	Parameter name	Initial value	P.L.	Setting range or alternatives	Major setting purpose and remarks
COM.T	Comparator output type	O/U	1	O/U/ERR	Select either [above or below] or error comparator types.
HI-S	HI judgment value	1000	2	-9999 to +9999	Sets a HI judgment value.*Only when COM.T is O/U.
LO-S	LO judgment value	500	2	-9999 to +9999	Sets a LO judgment value.*Only when COM.T is O/U.
N.VAL	Nominal value	5000	2	-9999 to +9999	Sets a nominal value.*Only when COM.T is ERR.
ERR1	Error 1	5.00	2	0.00 to 99.99	Sets an error.*Only when COM.T is ERR.
HI-H	HI hysteresis	0	1	0 to +999	Sets a HI hysteresis value *Only when COM.T is O/U.
LO-H	LO hysteresis	0	1	0 to +999	Sets a LO hysteresis value *Only when COM.T is O/U.
ER1.H	Error 1 hysteresis	1	1	0 to +999	Sets an error hysteresis *Only when COM.T is ERR.
HI-L	HI logic	N.O	0	N.O/N.C	Sets a HI output logic (N.O.=normally open or N.C.=normally closed)*Output when the power is OFF is always open (OFF).
GO-L	GO logic	N.O	0	N.O/N.C	Sets a GO output logic (N.O.=normally open or N.C.=normally closed)*Output when the power is OFF is always open (OFF).
LO-L	LO logic	N.O	0	N.O/N.C	Sets a LO output logic (N.O.=normally open or N.C.=normally closed)*Output when the power is OFF is always open (OFF).

5 Setting Examples

5.1 Calibration Data Setting Examples

Example 1

When the input signal varies between 4 to 20mA, corresponding indication values should be 0 to 5000.

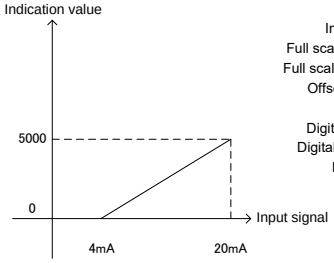


Input range (RANG) : 2A
Full scale indication (FSC) : 5000
Full scale input value (FIN) : 9999
Offset indication (OFS) : 0
Offset input (OIN) : 2000
Decimal point (DP) : None (Set to illuminate all the digits.)

※If an input signal is between 4 to 20mA or 1 to 5V, always set FIN to 9999 and OIN to 2000.

Example 2

When the input signal varies between 4 to 20mA, corresponding indication are changed from 0 to 5000 thereby limiting the indication range to between 0 and 5000.

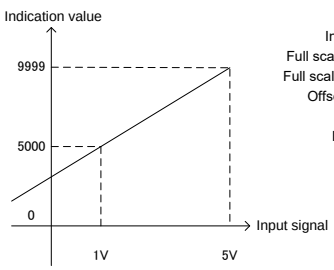


Input range (RANG) : 2A
Full scale indication (FSC) : 5000
Full scale input value (FIN) : 9999
Offset indication (OFS) : 0
Offset input (OIN) : 2000
Digital limiter HI (DLHI) : 5000
Digital limiter LO (DLLO) : 0
Decimal point (DP) : None (Set to illuminate all the digits.)

※If an input signal is between 4 to 20mA or 1 to 5V, always set FIN to 9999 and OIN to 2000.

Example 3

When the input signal varies between 1 to 5V, corresponding indication values should be 5000 to 9999.

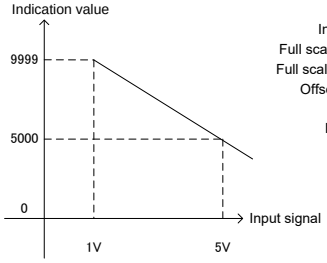


Input range (RANG) : 1V
Full scale indication (FSC) : 9999
Full scale input value (FIN) : 9999
Offset indication (OFS) : 5000
Offset input (OIN) : 2000
Decimal point (DP) : None (Set to illuminate all the digits.)

※If an input signal is between 4 to 20mA or 1 to 5V, always set FIN to 9999 and OIN to 2000.

Example 4

When the input signal varies between 1 to 5V, corresponding indication values should be 9999 to 5000.

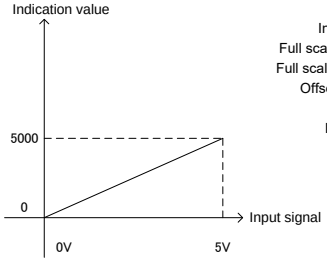


Input range (RANG) : 1V
Full scale indication (FSC) : 5000
Full scale input value (FIN) : 9999
Offset indication (OFS) : 9999
Offset input (OIN) : 2000
Decimal point (DP) : None (Set to illuminate all the digits.)

※If an input signal is between 4 to 20mA or 1 to 5V, always set FIN to 9999 and OIN to 2000.

Example 5

When the input signal varies between 0 to 5V, corresponding indication values should be 0.000 to 5.000.

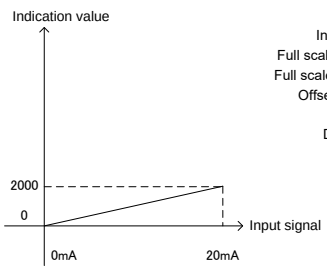


Input range (RANG) : 2V
Full scale indication (FSC) : 5000
Full scale input value (FIN) : 9999
Offset indication (OFS) : 0
Offset input (OIN) : 0
Decimal point (DP) : Illuminates at the third lowest digit.

※If an input signal is between 0 to 5V, perform calculations on the assumption that an input is 5V when FIN is set to 9999.

Example 6

When the input signal varies between 0 to 20mA, corresponding indication values should be 0.00 to 20.00.



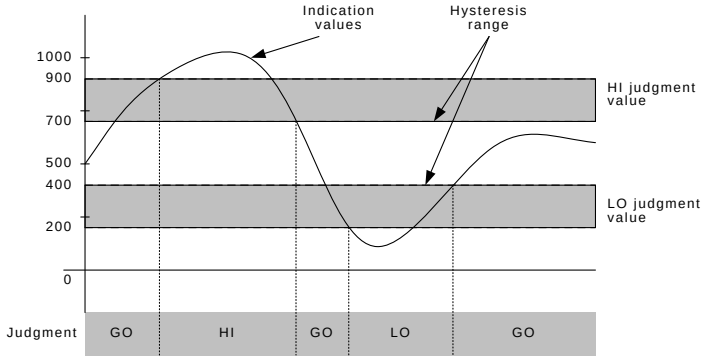
Input range (RANG) : 3A
Full scale indication (FSC) : 2000
Full scale input value (FIN) : 9999
Offset indication (OFS) : 0
Offset input (OIN) : 0
Decimal point (DP) : Illuminate at the second lowest digits.)

※If an input signal is between 0 to 20mA, perform calculations on the assumption that an input is 20mA when FIN is set to 9999.

5.2 Comparator Data Setting Examples (for meter relay only)

Example 1

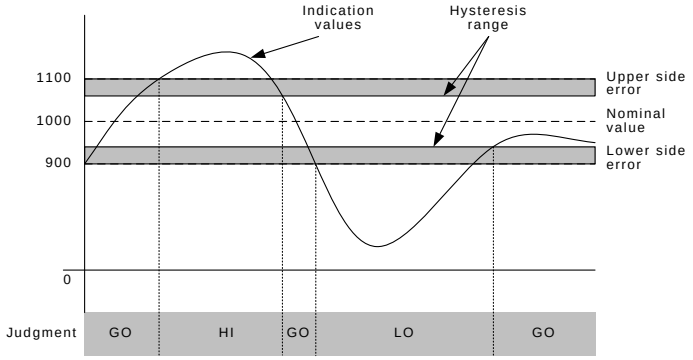
Above and below setup mode



※The hysteresis is effective either in the range lower than the HI judgment value or that higher than the LO judgment value.

Example 2

Error judgment mode



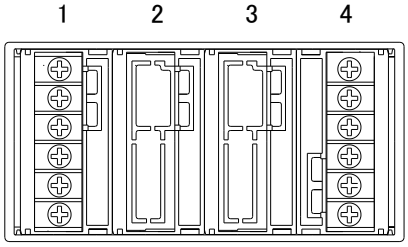
※Error is to be set as a percentage of the nominal value.

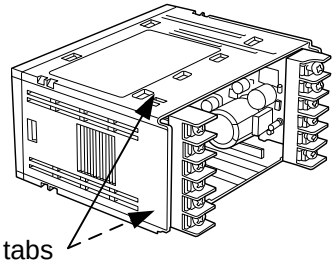
※The hysteresis is to be set as xx digits of the indication value.

※The hysteresis is effective either in the range lower than the upper side error or that higher than the lower side error.

5.3 How to Switch the Measuring Method

Position unmbers on the case surface

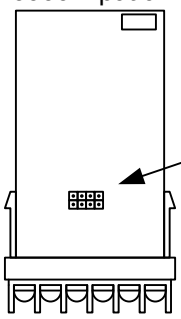




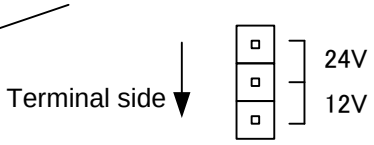
Protruding tabs
(Also on the bottom)

Pull the input unit out from the case with the protruding tabs on the top and bottom faces of the input unit held down.

A6000 input unit



Sensor power switching socket



※Upon shipment from the factory, the sensor power switching socket is set 24V side.
※When installing the input unit, slide it along the guides inside the main-unit case.
※Push the input unit into the case so that the input unit's connector (female) is securely fit into the display unit's connector (male).

6 Specifications and External Dimensions

6.1 Input Specifications

●Process signal measurements

Range	Measurement range	Indication	Error (23℃ ±5℃; 35 to 85%)	Input impedance	Maximum permissible input
1V	1 to 5V	Offset: ±9999 Full scale: ±9999	±(0.03% of rdg + 2digit)	Approx. 1MΩ	±100V
2V	±5V				
2A	4 to 20mA		±(0.1% of rdg + 3digit)	Approx. 10Ω	±50mA
3A	±20mA				

Sampling rate : Maximum approx. 1,000 times/second

Sensor power : 12V DC ±10% 50mA or 24V DC ±10% 25mA

※The error is applied when the sampling rate is 20 times/second or less.

⚠ Caution

(1) The sensor power supply is set at 24V upon shipment from the factory.(internal socket swiching)
(2) If a load exceeding the rated level is connected to the sensor power supply, the sensor power supply will be turned off (protection mode). To recover from the protection mode, ture the power on again.

6.2 General Specifications

Display : Multi display
Main display: Red/green 7-segment display (character height: approx. 20 mm)
Sub display: Red 7-segment display (character height: approx. 6 mm)
Single display
Red/green 7-segment display (character height: approx. 20 mm)

Display range : -9999 to 9999

Operational temperature : 0 to 50℃ 35 to 85%RH

Storage temperature : -10 to 70 ℃; 60%RH or less

Power supply : AC PS
AC 100 to 240V±10%
DC PS
DC 12 to 48V±10%

Power consumption : AC PS
Maximum load: Approx. 8 VA at 100 VAC
DC PS
Maximum load: Approx. 7 W at 24 VDC

External dimension : 48 mm (H) x 96 mm (W) x 97.5 mm (with no DX option unit mounted)

Weight : Approx. 450g

Withstand voltage : AC PS
PS-input, output: 1,500 VAC, 1 minute (AC PS)
Input-output: 500 VDC, 1 minute
Output-output: 500 VDC, 1 minute
Case-PS, input, output: 1,500 VAC, 1 minute
DC PS
PS-input, output: 500 VDC, 1 minute (DC PS)
Input-output: 500 VDC, 1 minute
Output-output: 500 VDC, 1 minute
Case-PS, input, output: 1,500 VAC, 1 minute

Insulation resistance : AC PS
Among the above terminals: 500 VDC 100 MΩ or more
DC PS
Among the above terminals: 500 VDC 100 MΩ or more

⚠ Caution

The PS voltage must be applied or shut down at once (not gradually).
Take at least a 10-second interval between a shutdown and startup.

6.3 Output Comparison Specifications (for meter relay only)

●Common specifications

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

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

●Relay contact output

Contact quantity : Relay contact ×3

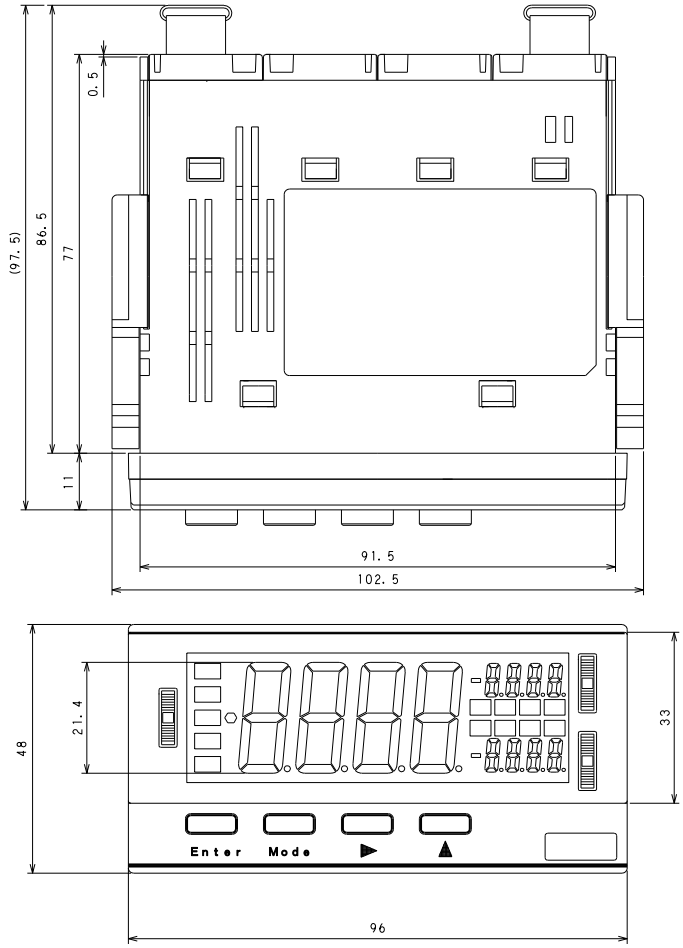
Contact rating : 250V AC 2A, 30V DC 2A

●Photo coupler output

Output quantity : Photo coupler ×3

Output rating : 30V DC 20mA

6.4 External Dimensions



7 Warranty and Service

7.1 Warranty

The manufacturer warrants to the original retail customer its A6000 series universal digital panel meter to be free of defects in material and workmanship for use under normal care and will repair or replace any meter at no charge to the customer during the one (1) year warranty period of the meter.

7.2 After Sales Service

Under strict quality control measures, this product was manufactured, tested, inspected and shipped. Should a defect in manufacture or workmanship be identified, please return the product to our distributor or directly to us. It would be highly appreciated if you could give a detailed account of the fault and enclose it with the product.

watanabe
WATANABE ELECTRIC INDUSTRY CO., LTD.

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(UV-33627r)

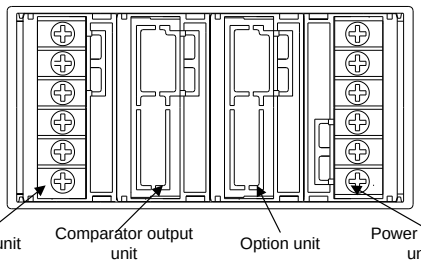
Instruction Manual for A6000 Series Universal Digital Panel Meters

External Control Unit

1 Before Using the Unit

This instruction manual is for the external control unit of the A6000 series. Read this manual along with the main unit's instruction manual before using the unit.

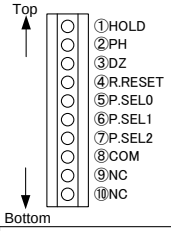
A6000's rear panel



⚠ Caution

None of the units are replaceable by the customer.

2 Terminals and Connections

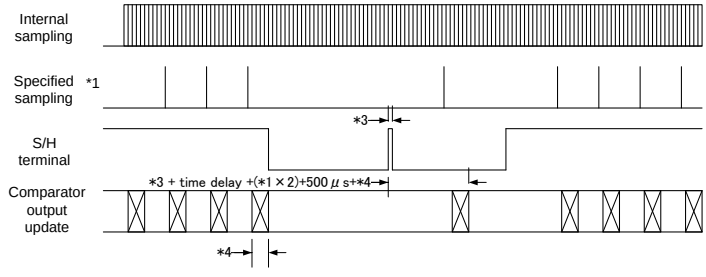


Terminal	Function
S/H	"Start/hold" control terminal. The "hold" state is turned on when this terminal is at the same potential as the COM terminal or short-circuited.
PH	"Peak hold" control terminal. The peak hold function is turned on when this terminal is at the same potential as the COM terminal or short-circuited.
DZ	"Digital zero" control terminal. The digital zero function is turned on when this terminal is at the same potential as the COM terminal or short-circuited. This setting is valid only when the external control terminal is selected as the control method for digital zero using condition data.
R.RESET	"Relay reset control terminal. The relay reset function is turned on (only for the meter relay) when this terminal is at the same potential as the COM terminal or short-circuited.
P.SEL0 P.SEL1 P.SEL2	"Pattern selection" control terminals. Patterns can be selected by setting these terminals at the same potential as the COM terminal or short-circuiting them as shown in the table below. These settings are valid only when the external control terminal is selected as the control method for pattern selection using condition data.
COM	External control's common terminals, which are at the same potential as the LO or AG terminal for the input circuit.

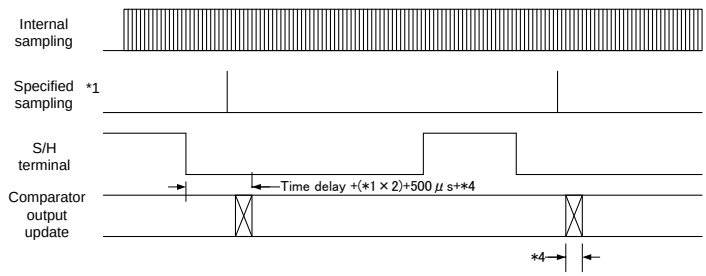
	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Pattern 7	Pattern 8
P.SEL0	Open	Short-circuited	Open	Short-circuited	Open	Short-circuited	Open	Short-circuited
P.SEL1		Open	Short-circuited			Open	Short-circuited	
P.SEL2			Open	Open	Short-circuited	Short-circuited		

3 Timing Charts

Start/hold type A



Start/hold type B



*1 Specified sampling

The sampling speed is determined by the AVG parameter setting of condition data as shown in the table below:

AVG setting	Sampling speed	Sampling cycle	AVG setting	Sampling speed	Sampling cycle
1	1041.65 times/sec	Approx. 960 μs	100	10.4165 times/sec	Approx. 96 ms
2	520.825 times/sec	Approx. 1.92 ms	200	5.20825 times/sec	Approx. 192 ms
4	260.4125 times/sec	Approx. 3.84 ms	400	2.604125 times/sec	Approx. 384 ms
8	130.20625 times/sec	Approx. 7.68 ms	800	1.3020625 times/sec	Approx. 768 ms
10	104.165 times/sec	Approx. 9.6 ms	1000	1.04165 times/sec	Approx. 960 ms
20	52.0825 times/sec	Approx. 19.2 ms	2000	0.520825 times/sec	Approx. 1.92 sec
50	20.833 times/sec	Approx. 48 ms	5000	0.20833 times/sec	Approx. 4.8 sec

※Using a temperature measuring unit, the sampling speed is half of the value in the table above when the RTD is selected and quarter of it when the TC is selected.

※It is different, and a frequency measurement unit is indication update time with a range. Please refer to input specifications (Clause 6.1) of an instruction manual for frequency measurement.

*3 External start signal

The width of the external start signal must be from between 500 μs to a specified sampling cycle. A time delay can be set for the external start using the S/H delay time parameter of the condition data.

*4 Time delay for comparator output

Relay output: 10 ms max., photocoupler output: 200 μs max.

4 Specifications and External Dimensions

●External control terminal

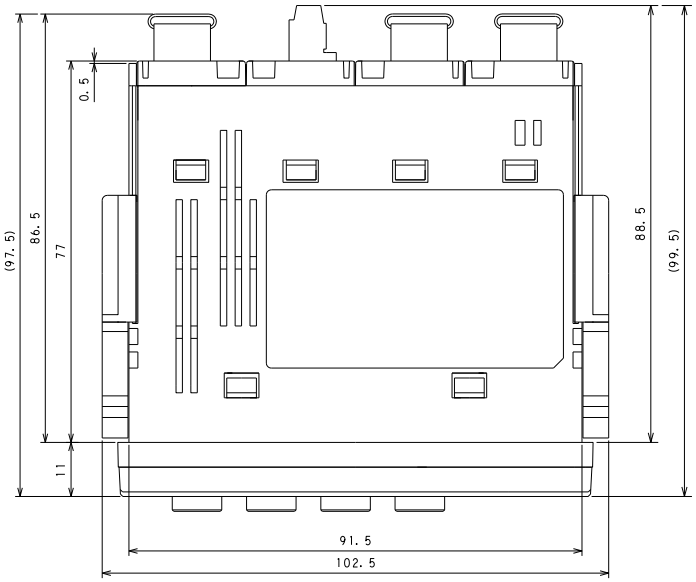
Internal circuit: Pulled up to approximately +5 V (through a 10 kΩ resistor).

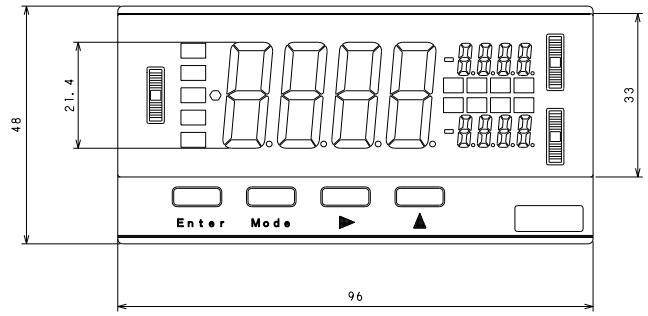
Control signal's HI level: 4.2 to 5 V relative to the COM terminal

Control signal's LO level: 0 to 0.4 V relative to the COM terminal

⚠ Caution

The external control circuit's COM terminals and the input circuit's LO or AG terminal are set at the same DC potential.





5 Warranty and Service

5.1 Warranty

The manufacturer grants a warranty to the original retail customer stating that its A6000 series universal digital panel meter is free of defects in material and workmanship for use under normal care, and will repair or replace the meter at no charge to the customer during the one (1) year warranty period.

5.2 After Sales Service

This product was manufactured, tested, inspected and shipped under strict quality control measures. Should a defect in manufacture or workmanship be identified, please return the product to our distributor or directly to us. It would be highly appreciated if you could give a detailed account of the problem and enclose it with the product.

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(UV-47964j)

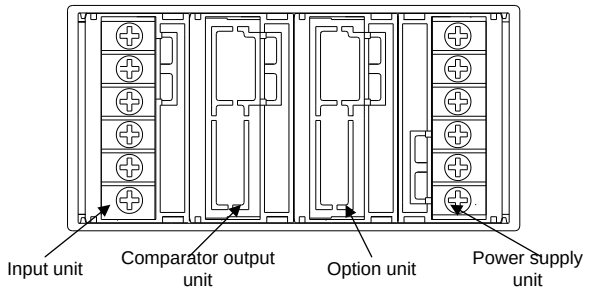
Instruction Manual for A6000 Series Universal Digital Panel Meters

BCD Output and External Control Unit

1 Before Using the Unit

This instruction manual is for the BCD output and external control unit of the A6000 series. Read this manual along with the main unit's instruction manual before using the unit.

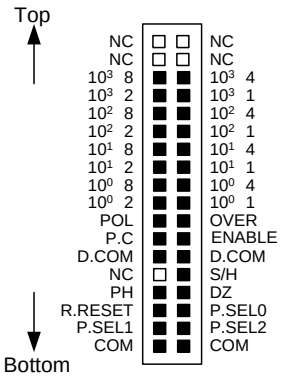
A6000's rear panel



⚠ Caution

None of the units are replaceable by the customer.

2 Terminals and Connections



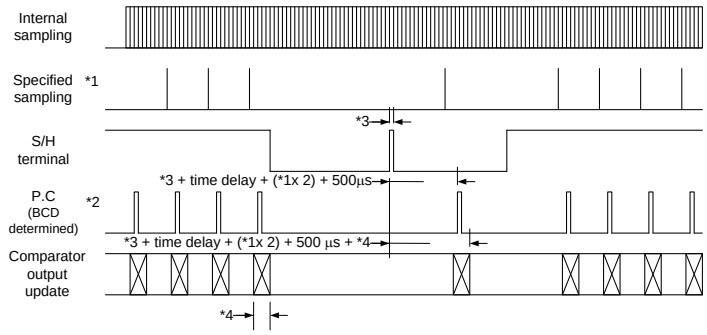
Suitable connector (receptacle):
KEL Corporation's 8822E-035-171-F

Terminal	Function
$10^0$1	Least significant bit output of least significant BCD digit. The output logic can be switched using condition data.
$10^0$2	Second least significant bit output of least significant BCD digit. The output logic can be switched using condition data.
$10^0$4	Second most significant bit output of least significant BCD digit. The output logic can be switched using condition data.
$10^0$8	Most significant bit output of least significant BCD digit. The output logic can be switched using condition data.
⋮	⋮
$10^3$1	Least significant bit output of most significant BCD digit. The output logic can be switched using condition data.
$10^3$2	Second least significant bit output of most significant BCD digit. The output logic can be switched using condition data.
$10^3$4	Second most significant bit output of most significant BCD digit. The output logic can be switched using condition data.
$10^3$8	Most significant bit output of most significant BCD digit. The output logic can be switched using condition data.
POL	BCD polarity output. The output logic can be switched using condition data.
OVER	BCD overflow output. The output logic can be switched using condition data.
P.C	BCD print instruction output.
ENABLE	"Enable BCD" control terminal. The BCD output is set to the high-impedance state or the transistor is turned off when this terminal is short-circuited or at the same potential as the D.COM terminal.
D.COM	BCD output• fs common terminals
S/H	"Start/hold" control terminal. The "hold" state is turned on when this terminal is at the same potential as the COM terminal or short-circuited.
PH	"Peak hold" control terminal. The peak hold function is turned on when this terminal is at the same potential as the COM terminal or short-circuited.
DZ	"Digital zero" control terminal. The digital zero function is turned on when this terminal is at the same potential as the COM terminal or short-circuited. This setting is valid only when the external control terminal is selected as the control method for digital zero using condition data.
R.RESET	"Relay reset control terminal. The relay reset function is turned on (only for the meter relay) when this terminal is at the same potential as the COM terminal or short-circuited.
P.SEL0 P.SEL1 P.SEL2	"Pattern selection" control terminals. Patterns can be selected by setting these terminals at the same potential as the COM terminal or short-circuiting them as shown in the table below. These settings are valid only when the external control terminal is selected as the control method for pattern selection using condition data.
COM	External control's common terminals, which are at the same potential as the LO or AG terminal for the input circuit.

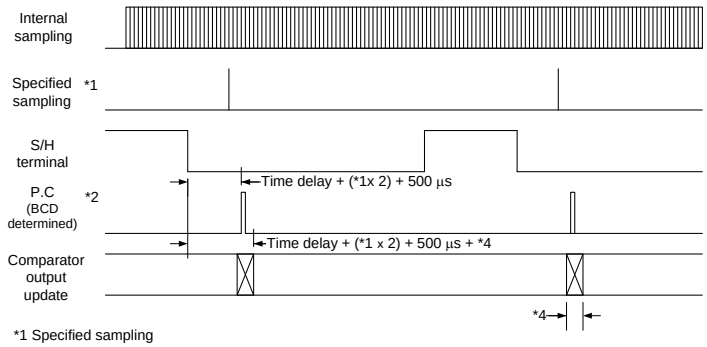
	Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6	Pattern 7	Pattern 8
P.SEL0	Open	Short-circuited	Open	Short-circuited	Open	Short-circuited	Open	Short-circuited
P.SEL1		Open	Short-circuited			Open	Short-circuited	
P.SEL2			Open	Open	Short-circuited	Short-circuited		

3 Timing Charts

Start/hold type A



Start/hold type B



*1 Specified sampling

The sampling speed is determined by the AVG parameter setting of condition data as shown in the table below:

AVG setting	Sampling speed	Sampling cycle	AVG setting	Sampling speed	Sampling cycle
1	1041.65 times/sec	Approx. 960 μs	100	10.4165 times/sec	Approx. 96 ms
2	520.825 times/sec	Approx. 1.92 ms	200	5.20825 times/sec	Approx. 192 ms
4	260.4125 times/sec	Approx. 3.84 ms	400	2.604125 times/sec	Approx. 384 ms
8	130.20625 times/sec	Approx. 7.68 ms	800	1.3020625 times/sec	Approx. 768 ms
10	104.165 times/sec	Approx. 9.6 ms	1000	1.04165 times/sec	Approx. 960 ms
20	52.0825 times/sec	Approx. 19.2 ms	2000	0.520825 times/sec	Approx. 1.92 sec
50	20.833 times/sec	Approx. 48 ms	5000	0.20833 times/sec	Approx. 4.8 sec

※Using a temperature measuring unit, the sampling speed is half of the value in the table above when the RTD is selected and quarter of it when the TC is selected.
※It is different, and a frequency measurement unit is indication update time with a range. Please refer to input specifications (Clause 6.1) of an instruction manual for frequency measurement.

*2 P.C output signal width

The output signal width is determined by the specified sampling setting as shown in the table below:

AVG setting	P.C output width	AVG setting	P.C output width
1	Approx. 220 μs	100	Approx. 30 ms
2	Approx. 0.25 ms	200	
4	Approx. 1.15 ms	400	
8	Approx. 2.3 ms	800	
10	Approx. 2.9 ms	1000	
20	Approx. 5.8 ms	2000	
50	Approx. 14.4 ms	5000	

※The output width is always 30 ms for the frequency measurement unit.

*3 External start signal

The width of the external start signal must be from between 500 μs to a specified sampling cycle. A time delay can be set for the external start using the S/H delay time parameter of the condition data.

*4 Time delay for comparator output

Relay output: 10 ms max., photocoupler output: 200 μs max.

4 Specifications and External Dimensions

●BCD output

Output type : open collector or TTL-compatible

Polarity : The applicable transistor (open collector) or polarity bit (TTL) turns on when negative values are indicated.

Overflow : The applicable transistor (open collector) or bit (TTL) turns on when the overflow state is indicated.

Output logic : Can be switched alternatively (the logic for the P.C bit cannot be changed).

Output rating : 30 V DC and 10 mA (open collector), or fan-out 2 (TTL)

⚠ Caution

The BCD output logic can be switched using the BCD logic parameter (BCD.L) of the condition data, which is positive when BCD.L is set to P.LOG and negative when BCD.L is set to N.LOG for an output type of Open collector. This logic is reversed if the output type is "TTL."

●External control terminal

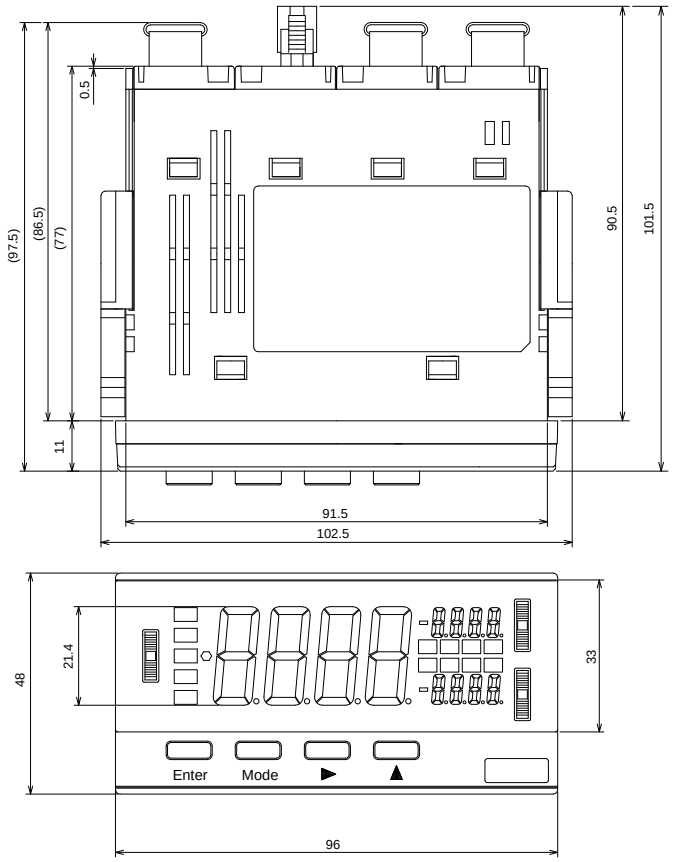
Internal circuit: Pulled up to approximately +5 V (through a 10 kΩ resistor).

Control signal's HI level: 4.2 to 5 V relative to the COM terminal

Control signal's LO level: 0 to 0.4 V relative to the COM terminal

⚠ Caution

1) The BCD output circuit and the external control circuit are electrically isolated from each other (withstand voltage: 500 V DC for one minute).
2) The external control circuit's COM terminals and the input circuit's LO or AG terminal are set at the same DC potential.



5 Warranty and Service

5.1 Warranty

The manufacturer grants a warranty to the original retail customer stating that its A6000 series universal digital panel meter is free of defects in material and workmanship for use under normal care, and will repair or replace the meter at no charge to the customer during the one (1) year warranty period.

5.2 After Sales Service

This product was manufactured, tested, inspected and shipped under strict quality control measures. Should a defect in manufacture or workmanship be identified, please return the product to our distributor or directly to us. It would be highly appreciated if you could give a detailed account of the problem and enclose it with the product.

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(UV-47983L)

Instruction Manual for A6000 Series Universal Digital Panel Meters

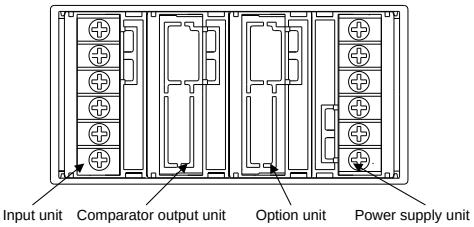
Analog Output and External Control Unit

1 Before Using the Unit

This instruction manual is for the analog output and external control unit of the A6000 series. Read this manual along with the main unit's instruction manual before using the unit.

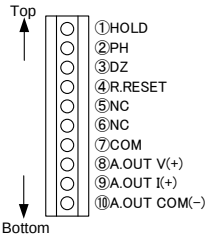
2 Terminals and Connections

A6000's rear panel



⚠ Caution

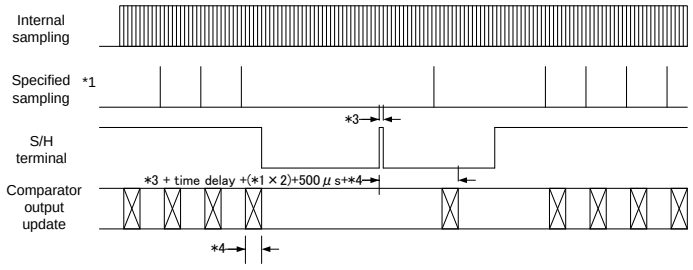
None of the units are replaceable by the customer.



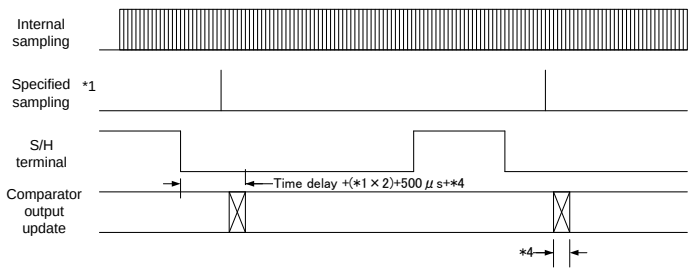
Terminal	Function
S/H	"Start/hold" control terminal. The "hold" state is turned on when this terminal is at the same potential as the COM terminal or short-circuited.
PH	"Peak hold" control terminal. The peak hold function is turned on when this terminal is at the same potential as the COM terminal or short-circuited.
DZ	"Digital zero" control terminal. The digital zero function is turned on when this terminal is at the same potential as the COM terminal or short-circuited. This setting is valid only when the external control terminal is selected as the control method for digital zero using condition data.
R.RESET	"Relay reset control terminal. The relay reset function is turned on (only for the meter relay) when this terminal is at the same potential as the COM terminal or short-circuited.
COM	External control's common terminals, which are at the same potential as the LO or AG terminal for the input circuit.
A.OUT V(+)	Voltage output terminal of analog output.
A.OUT I(+)	Current output terminal of analog output.
A.OUT COM(-)	Common terminal of analog output. Insulated from input LO or AG terminal/external control COM terminal.

3 Timing Charts

Start/hold type A



Start/hold type B



*1 Specified sampling

The sampling speed is determined by the AVG parameter setting of condition data as shown in the table below:

AVG setting	Sampling speed	Sampling cycle	AVG setting	Sampling speed	Sampling cycle
1	1041.65 times/sec	Approx. 960 μs	100	10.4165 times/sec	Approx. 96 ms
2	520.825 times/sec	Approx. 1.92 ms	200	5.20825 times/sec	Approx. 192 ms
4	260.4125 times/sec	Approx. 3.84 ms	400	2.604125 times/sec	Approx. 384 ms
8	130.20625 times/sec	Approx. 7.68 ms	800	1.3020625 times/sec	Approx. 768 ms
10	104.165 times/sec	Approx. 9.6 ms	1000	1.04165 times/sec	Approx. 960 ms
20	52.0825 times/sec	Approx. 19.2 ms	2000	0.520825 times/sec	Approx. 1.92 sec
50	20.833 times/sec	Approx. 48 ms	5000	0.20833 times/sec	Approx. 4.8 sec

※Using a temperature measuring unit, the sampling speed is half of the value in the table above when the RTD is selected and quarter of it when the TC is selected.

※It is different, and a frequency measurement unit is indication update time with a range. Please refer to input specifications (Clause 6.1) of an instruction manual for frequency measurement.

*3 External start signal

The width of the external start signal must be from between 500 μs to a specified sampling cycle. A time delay can be set for the external start using the S/H delay time parameter of the condition data.

*4 Time delay for alarm output

Relay output: 10 ms max., photocoupler output: 200 μs max.

4 Specifications and External Dimensions

●Analog output (PWM)

Output type	Load resistance	Accuracy	Response speed	Ripple
0 to 1V	10kΩ or more	±(0.5% of FS)	Approx. 0.5 second	50mVp-p
0 to 10V				
1 to 5V				
4 to 20mA	550Ω or less			25mVp-p

Conversion system : PWM conversion

Resolution : Equivalent to 14 bits

Scaling : Digital scaling

●External control terminal

Internal circuit : Pulled up to approximately +5V (through a 10kΩ resistor).

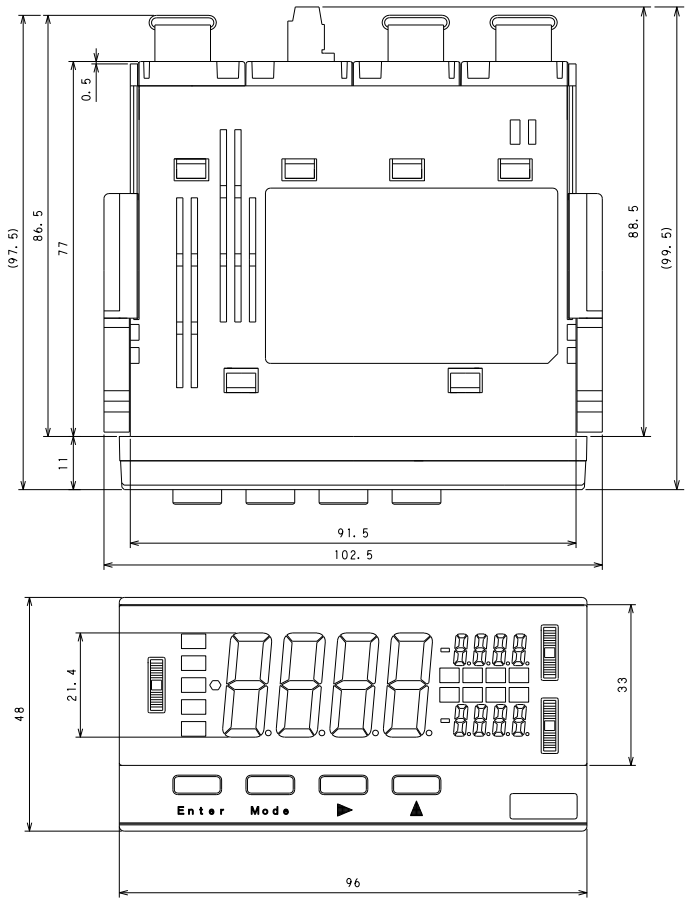
Control signal's HI level : 4.2 to 5V relative to the COM terminal

Control signal's LO level : 0 to 0.4V relative to the COM terminal

⚠ Caution

(1) Analog output circuits and external control circuits are insulated (withstand voltage 500V DC, one minute)

(2) COM terminals of external control circuits and LO terminals of input circuits have the same electric potential at direct current.



5 Warranty and Service

5.1 Warranty

The manufacturer grants a warranty to the original retail customer stating that its A6000 series universal digital panel meter is free of defects in material and workmanship for use under normal care, and will repair or replace the meter at no charge to the customer during the one (1) year warranty period.

5.2 After Sales Service

This product was manufactured, tested, inspected and shipped under strict quality control measures. Should a defect in manufacture or workmanship be identified, please return the product to our distributor or directly to us. It would be highly appreciated if you could give a detailed account of the problem and enclose it with the product.

watanabe

WATANABE ELECTRIC INDUSTRY CO., LTD.

6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan
Phone: (81)3-3400-6141
Homepage http://www.watanabe-electric.co.jp/en/

(UV-47984k)

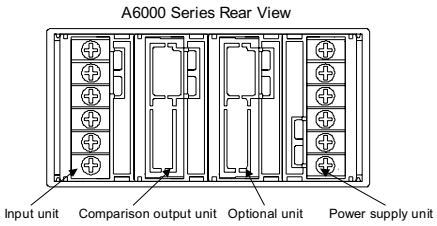
Instruction Manual for A6000 Series Universal Digital Panel Meter

~RS-232C/RS-485 and Analog Output Units~

1 Before Using the Unit

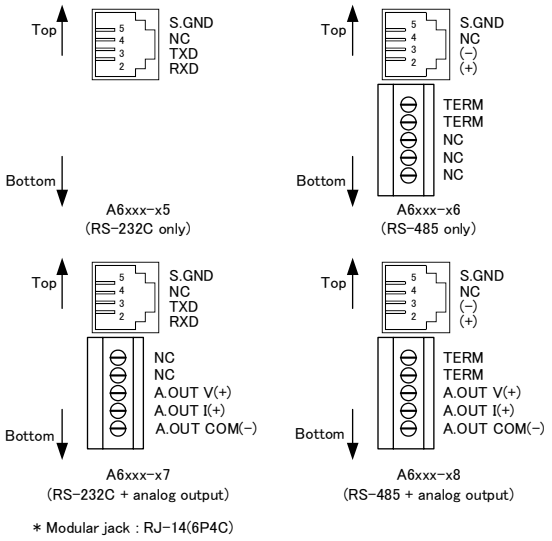
This Operation Manual corresponds to the communication function + analog output optional units of the A6000 Series Universal Digital Panel Meters. When using the instrument, please read through this manual in combination with the Operation Manual of the main unit.

2 Terminals and Connections



⚠ CAUTION

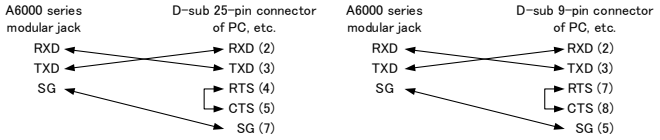
The A6000 series does not support replacement of each unit by the customer.



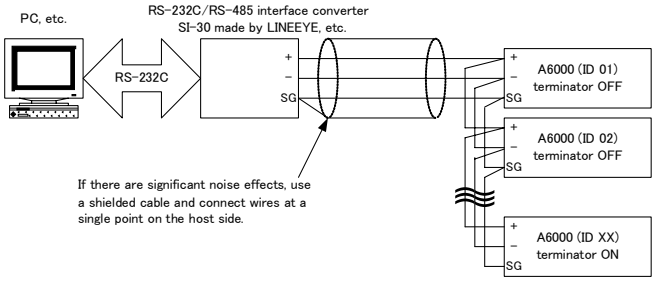
∗ Modular jack : RJ-14(6P4C)

3 Examples of Connections and Use

3.1 Connecting the RS-232C Interface



3.2 Connecting the RS-485 Interface



∗If cascade wiring is carried out with a RS-485 connection, use a commercially available Y-type split connector or the like.

∗To turn ON an RS-485 I/O unit's terminator (200 Ω), short-circuit the two TERM terminals.

3.3 Control Codes Used in RS-485 Interface

Code	Hexadecimal	Name
STX	02H	Start of Text
ETX	03H	End of Text
EOT	04H	End of Transmission
ENQ	05H	Enquiry
ACK	06H	Acknowledge

3.4 Establishing RS-485 Communication

Function	1	2	3	4	5	6	7	Char. Length	1	2	3	4	5	6	7	8	9	10	Char. Length
Establishing communication	ENQ	0	1	CR	LF			3	ACK	0	1	CR	LF						3
	*Device ID is specified in 2 digits (00 is invalid).								(Normal response) * Response time: 40 ms maximum (No response is made if the device ID is different.)										
Canceling communication	EOT	CR	LF					1	(No response is made to cancellation of communication.) * Response time: 20 ms maximum										
	*If another device ID is specified without canceling communication, communication is still possible.																		

3.5 RS-485 Communication formats

As a means of error detection, a block check character (BCC) checksum is added to the RS-485 communication function of the A6000 .
See the following illustrations for details on the transmission and reception formats.
(RS-232C communication format is same as the command table which is mentioned in the next section.)

Example of BCC Checksum for Transmission

Character	STX	D	S	P	ETX	A	E	CR	LF
Hexadecimal	02H	44H	53H	50H	03H	41H	45H	0DH	0AH
		[1]	[2]	[3]	[4]				

BCC H = Higher-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [4]
44H+53H+50H+03H=EAH

BCC L = Lower-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [4]
44H+53H+50H+03H=EAH

Example of BCC Checksum for Reception

Character	STX				5	0	0	0		H	I	ETX	9	D	CR	LF
	02H	20H	20H	20H	35H	30H	30H	30H	20H	48H	49H	03H	39H	44H	0DH	0AH
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]				

BCC L = Lower-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [11]
20H+20H+20H+35H+30H+30H+30H+20H+48H+49H+03H=1D9H

BCC H = Higher-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [11]
20H+20H+20H+35H+30H+30H+30H+20H+48H+49H+03H=1D9H

4 Communication Commands

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length
Measured value and comparison result responses	D	S	P	CR	LF											3
Measured value response A measurement condition such as peak hold, etc. or compression decision is not responded.	M	E	S	CR	LF											3
Judgment result response * A measurement condition is not responded.	J	G	M	CR	LF											3
Unit number response	U	N	I	CR	LF											3
Response of the maximum value, minimum value, or maximum and minimum values	M	A	X	CR	LF											3
Clear of the maximum value, minimum value, or maximum and minimum values	M	C	L		M	A	CR	LF								6
	M	C	L		M	I	CR	LF								6
	M	C	L		M	M	CR	LF								6
Key operation inhibition response	K	E	Y	CR	LF											3
Key operation inhibition setting	K	E	Y		O	F	F	CR	LF							7
	K	E	Y		O	N	CR	LF								6
Response of remote-controlled hold	S	T	H	CR	LF											3
Hold remote control	S	T	H		S	CR	LF									5
	S	T	H		H	CR	LF									5
Trigger input	T	CR	LF													1
Cancellation of hold remote control	E	S	M	CR	LF											3

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Measured value and comparison result responses				5	0	0	0			H	I	CR	LF						10
	("+" indication without decimal point)																		
		-	5	0	0	0			H	I	CR	LF							10
	("+" indication without decimal point)																		
			5	0	0	.	0		H	I	CR	LF							11
	("+" indication with a decimal point)																		
	<	=	9	8	0	0			H	I	CR	LF							10
	("+" side excess indication without decimal point)																		
	<	=	-	9	8	0	.	0	H	I	CR	LF							11
	("-" side excess indication with a decimal point)																		
	P	H	5	0	0	0			H	I	CR	LF							10
	(Peak hold indication without decimal point)																		
			5	0	0	0			A	L	1	CR	LF						11
	("+" indication without decimal point)																		
		-	5	0	0	0			A	L	2	CR	LF						11
	("-" indication without decimal point)																		
			5	0	0	.	0		A	L	3	CR	LF						12
	("+" indication with a decimal point)																		
Measured value response A measurement condition such as peak hold, etc. or compression decision is not responded.				0									CR	LF					12
	("0" indication without decimal point)																		
			0	.	0	1							CR	LF					12
	("0.01" indication with a decimal point)																		
		-	1										CR	LF					12
	("-1" indication without decimal point)																		
		-	0	.	0	0	5						CR	LF					12
	("-0.005" indication with a decimal point)																		
	<	=	9	8	0	.	5						CR	LF					12
	(Excess indication with a decimal point)																		
	<	=	-	9	8	0	.	5					CR	LF					12
	("-" side excess indication with a decimal point)																		
	* All responses have a fixed length of 12 characters.																		
Judgment result response * A measurement condition is not responded.	H	I														CR	LF		15
	(Response of a state in which the judgment result is HI)																		
	G	O														CR	LF		15
	(Response of a state in which the judgment result is GO)																		
	L	O														CR	LF		15
	(Response of a state in which the judgment result is LO)																		
	O	F	F													CR	LF		15
	(Response of a state in which the judgment results are all OFF)																		
	N	O	?	CR	LF														5
	(Response made if the relevant optional unit is not installed)																		
	* All responses have a fixed length of 15 characters with the exception of an error.																		
Unit number response	1	1	,	2	1	,	N	O	,	4	6	CR	LF						11
	(Response is made in the order of the display unit number, input unit number, comparison output unit number, and optional unit If the unit concerned is not installed, "NO" is returned.)																		
Response of the maximum value, minimum value, or maximum and minimum values	M	A	X		5	0	0	.	0	CR	LF								10
	(Response of maximum value)																		
	M	I	N		-	1	0	0	.	0	CR	LF							10
	(Response of minimum value)																		
	M	-	M		6	0	0	.	0	CR	LF								10
	(Response of maximum and minimum values) * These values are simultaneously responded by dividing them with a delimiter.																		
Clear of the maximum value, minimum value, or maximum and minimum values	Y	E	S			CR	LF												5
	(Clears the maximum value.)																		
	Y	E	S			CR	LF												5
	(Clears the minimum value.)																		
	Y	E	S			CR	LF												5
	(Clears the maximum and minimum values.)																		
Key operation inhibition response	O	F	F	CR	LF														3
	(Response of a state in which the key operation inhibition function is OFF)																		
	O	N	CR	LF															2
	(Response of a state in which the key operation inhibition function is ON)																		
Key operation inhibition setting	Y	E	S			CR	LF												5
	(Deactivates the key operation inhibition function.)																		
	Y	E	S			CR	LF												5
	(Activates the key operation inhibition function.)																		
Response of remote-controlled hold	S	T	A	R	T	CR	LF												5
	(Response of a state in which hold is deactivated by remote control)																		
	H	O	L	D	CR	LF													4
	(Response of a state in which hold is activated by remote control)																		
	L	O	C	CR	LF														3
	(Response of a state in which hold is not remote controlled)																		
Hold remote control	Y	E	S			CR	LF												5
	(Deactivates the hold function.)																		
	Y	E	S			CR	LF												5
	(Activates the hold function.)																		
Trigger input				5	0	0	.	0		H	I	CR	LF						11
	("+" indication with a decimal point) * The response format is the same as the DSP command.																		
Cancellation of hold remote control	Y	E	S			CR	LF												5

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Response of remote-controlled peak hold	P	V	H	CR	LF											3	P	H	-	O	F	F	CR	LF												6
																	(Response of a state in which peak hold is deactivated by remote control)																			
																	V	H	-	O	F	F	CR	LF												6
																	(Response of a state in which valley hold is deactivated by remote control)																			
																	P	V	-	O	F	F	CR	LF												6
																	(Response of a state in which peak & valley hold is deactivated by remote control)																			
																	P	H	-	O	N	CR	LF													5
																	(Response of a state in which peak hold is activated by remote control)																			
																	V	H	-	O	N	CR	LF													5
																	(Response of a state in which valley hold is activated by remote control)																			
																	P	V	-	O	N	CR	LF													5
																	(Response of a state in which peak & valley hold is activated by remote control)																			
																	L	O	C	CR	LF															3
																	(Response of a state in which peak hold is not remote controlled)																			
Peak hold selection setting	P	V	H		P	H	CR	LF								6	Y	E	S				CR	LF												5
	(Sets up peak hold.)																																		
	P	V	H		V	H	CR	LF								6	Y	E	S				CR	LF												5
	(Sets up valley hold.)																																		
	P	V	H		P	V	CR	LF								6	Y	E	S				CR	LF												5
	(Sets up peak and valley hold.)																																		
Peak hold remote control	P	V	H		O	N	CR	LF								6	Y	E	S				CR	LF												5
	(Activates the peak hold function.)																																		
	P	V	H		O	F	F	CR	LF							7	Y	E	S				CR	LF												5
	(Deactivates the peak hold function.)																																		
Peak-held value response	P	V	D	CR	LF											3	P	H				5	0	0	.	0	CR	LF								10
																	(Response of peak-held value)																			
																	V	H			-	1	0	0	.	0	CR	LF							10
																	(Response of valley-held value)																			
																	P	V	H			6	0	0	.	0	CR	LF							10
																	(Response of peak- and valley-held values)																			
Clear of peak-held value	P	C	L		P	H	CR	LF								6	Y	E	S				CR	LF												5
	(Clears a peak-held value.)																																		
	P	C	L		V	H	CR	LF								6	Y	E	S				CR	LF												5
	(Clears a valley-held value.)																																		
	P	C	L		P	V	CR	LF								6	Y	E	S				CR	LF												5
	(Clears peak- and valley-held values.)																																		
Cancellation of peak hold remote control	E	P	M	CR	LF											3	Y	E	S				CR	LF												5
Response of remote-controlled digital zero	D	Z	R	CR	LF											3	O	F	F	CR	LF														3
																	(Response of a state in which digital zero is deactivated by remote control)																			
																	1	0	0	0	CR	LF														5
																	(Response of a state in which digital zero is activated at 1000 by remote control)																			
																	-	1	0	0	0	CR	LF													5
																	(Response of a state in which digital zero is activated at -1000 by remote control)																			
																	* The value indicated when digital zero is activated is responded.																			
																	L	O	C	CR	LF															3
																	(Response of a state in which digital zero is not remote controlled)																			
Digital zero remote control	D	Z	R		O	N	CR	LF								6	Y	E	S				CR	LF												5
	(Activates digital zero.)																																		
	D	Z	R		O	F	F	CR	LF							7	Y	E	S				CR	LF												5
	(Deactivates digital zero.)																																		
	D	Z	R		1	0	0	0	CR	LF						8	Y	E	S				CR	LF												5
	(Activates digital zero at 1000.)																																		
Cancellation of digital zero remote control	E	Z	M	CR	LF											3	Y	E	S				CR	LF												5
Response of remote-controlled relay reset	R	E	S	CR	LF											3	O	F	F	CR	LF														3
																	(Response of a state in which relay reset is deactivated by remote control)																			
																	O	N	CR	LF															2
																	(Response of a state in which relay reset is activated by remote control)																			
																	L	O	C	CR	LF															3
																	(Response of a state in which relay reset is not remote controlled)																			
Relay reset remote control	R	E	S		O	N	CR	LF								6	Y	E	S				CR	LF												5
	(Activates relay reset.)																																		
	R	E	S		O	F	F	CR	LF							7	Y	E	S				CR	LF												5
	(Deactivates relay reset.)																																		
Cancellation of relay reset remote control	E	R	M	CR	LF											3	Y	E	S				CR	LF												5

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Response of remote-controlled comparison output	R	L	Y	CR	LF											3	O	F	F	CR	LF															3
	(Response of a state in which all outputs are turned OFF by remote control)																																		
																	H	I	CR	LF															2
	(Response of a state in which HI is turned ON by remote control)																																		
																	G	O	CR	LF															2
	(Response of a state in which GO is turned ON by remote control)																																		
																	L	O	CR	LF															2
	(Response of a state in which LO is turned ON by remote control)																																		
	* If multiple outputs are ON, response is made in the above order.																																		
																	L	O	C	CR	LF															3
	(Response of a state in which output is not remote controlled)																																		
																	N	O		?		CR	LF												5
	(Response made if the relevant optional unit is not installed)																																		
Comparison output remote control	R	L	Y		H	I	CR	LF								6	Y	E	S			CR	LF												5
	(Turns ON HI.)																																		
	R	L	Y		G	O	CR	LF								6	Y	E	S			CR	LF												5
	(Turns ON GO.)																																		
	R	L	Y		L	O	CR	LF								6	Y	E	S			CR	LF												5
	(Turns ON LO.)																																		
	R	L	Y		O	F	F	CR	LF							7	Y	E	S			CR	LF												5
	(Turns OFF all comparison outputs.)																																		
																	N	O		?		CR	LF												5
	(Response made if the relevant optional unit is not installed)																																		
	(Response made if the output concerned is not produced)																																		
Cancellation of comparison output remote control	R	C	M	CR	LF											3	Y	E	S			CR	LF												5
																	N	O		?		CR	LF												5
	(Response made if the relevant optional unit is not installed)																																		
Response of remote-controlled pattern select	P	S	L	CR	LF											3	1	CR	LF																1
	(Response of a state in which the pattern used by remote control is "1")																																		
																	8	CR	LF																1
	(Response of a state in which the pattern used by remote control is "8")																																		
																	L	O	C	CR	LF															3
	(Response of a state in which the pattern select is not remote controlled)																																		
Pattern select remote control	P	S	L		1	CR	LF									5	Y	E	S			CR	LF												5
	(Sets pattern in use to "1.")																																		
	P	S	L		8	CR	LF									5	Y	E	S			CR	LF												5
	(Sets pattern in use to "8.")																																		
Cancellation of pattern select remote control	P	S	M	CR	LF											3	Y	E	S			CR	LF												5
Remote control response	R	E	A	CR	LF											3	N	O		?		CR	LF												5
	(Response in a state in which no function is remote controlled)																																		
																	S	T	H	CR	LF														3
	(Response of a state in which the hold function is remote controlled)																																		
																	P	V	H	CR	LF														3
	(Response of a state in which the peak hold function is remote controlled)																																		
																	D	Z	R	CR	LF														3
	(Response of a state in which the digital zero function is remote controlled)																																		
																	R	E	S	CR	LF														3
	(Response of a state in which the relay reset function is remote controlled)																																		
																	R	L	Y	CR	LF														3
	(Response of a state in which the comparison output function is remote controlled)																																		
																	P	S	L	CR	LF														3
	(Response of a state in which the pattern select function is remote controlled)																																		
	* If multiple functions have been remote controlled, response is made with data divided by delimiters.																																		
Collective cancellation of remote control	L	O	C	CR	LF											3	Y	E	S			CR	LF												5
Response of the number of averaging times	A	V	G	CR	LF											3	1	CR	LF																1
	(Response of a state in which the number of averaging times is "1")																																		
																	5	0	0	0	CR	LF													4
	(Response of a state in which the number of averaging times is "5000")																																		
Setting of the number of averaging times	A	V	G		1	CR	LF									5	Y	E	S			CR	LF												5
	(Sets the number of averaging times to "1.")																																		
	A	V	G		5	0	0	0	CR	LF						8	Y	E	S			CR	LF												5
	(Sets the number of averaging times to "5000.")																* The number of averaging times is switched immediately after setting.																		
																	N	O		?		CR	LF												5
	(Response made if an unsettable number of averaging times is set)																																		
Response of the number of moving averaging times	M	A	V	CR	LF											3	O	F	F	CR	LF															3
	(Response of a state in which moving averaging is OFF)																																		
																	O	N	=	4	CR	LF													4
	(Response of a state in which the number of moving averaging times is 4)																																		
																	O	N	=	1	6	CR	LF												5
	(Response of a state in which the number of moving averaging times is 16)																																		
Setting of the number of moving averaging times	M	A	V		4	CR	LF									5	Y	E	S			CR	LF												5
	(Sets the number of moving averaging times to "4".)																																		
	M	A	V		1	6	CR	LF								6	Y	E	S			CR	LF												5
	(Sets the number of moving averaging times to "16".)																																		
	M	A	V		0	CR	LF									5	Y	E	S			CR	LF												5
	(Cancels (deactivates) the moving averaging function.)																* The number of moving averaging times is switched or moving averaging is deactivated immediately after setting.																		

Function		Char. Length		Char. Length
Step wide response	SWD CR LF	3	1 CR LF (Response of a state in which step wide is "1") 10 CR LF (Response of a state in which step wide is "10")	1 2
Step wide setting	SWD 1 CR LF (Sets step wide to "1.") SWD 10 CR LF (Sets step wide to "10.")	5 6	YES CR LF YES CR LF * Step wide is switched immediately after setting.	5 5
Display color response	CLR CR LF	3	RED CR LF (Response of a state in which the display color is red) GREEN CR LF (Response of a state in which the display color is green) NO ? CR LF (Response made if the comparison output unit is not installed)	3 5 5
Display color setting	CLR R CR LF (Sets display color to red.) CLR G CR LF (Sets display color to green.)	5 5	YES CR LF YES CR LF NO ? CR LF (Response made if the comparison output unit is not installed)	5 5 5
Display color type response	CLT CR LF	5	AUTO CR LF (Response of a state in which the display color type is Auto) MANUAL CR LF (Response of a state in which the display color type is Manual) NO ? CR LF (Response made if the comparison output unit is not installed)	4 6 5
Display color type setting	CLT A CR LF (Sets the display color type to Auto.) CLR M CR LF (Sets the display color type to Manual.)	5 5	YES CR LF YES CR LF * The display color type is switched immediately after setting. NO ? CR LF (Response made if the comparison output unit is not installed)	5 5 5
HI display color response	CHI CR LF	3	RED CR LF (Response of a state in which the HI display color is red) GREEN CR LF (Response of a state in which the HI display color is green) AUTO CR LF (Response of a state in which the display color type is Auto) NO ? CR LF (Response made if the comparison output unit is not installed)	3 5 4 5
HI display color setting	CHI R CR LF (Sets HI display color to red.) CHI G CR LF (Sets HI display color to green.)	5 5	YES CR LF YES CR LF * HI display color is switched immediately after setting. AUTO CR LF (Response of a state in which the display color type is Auto) NO ? CR LF (Response made if the comparison output unit is not installed) (Response of the state of independent judgment specifications)	5 5 4 5
GO display color response	CGO CR LF	3	RED CR LF (Response of a state in which the GO display color is red) GREEN CR LF (Response of a state in which the GO display color is green) AUTO CR LF (Response of a state in which the display color type is Auto) NO ? CR LF (Response made if the comparison output unit is not installed)	3 5 4 5
GO display color setting	CGO R CR LF (Sets GO display color to red.) CGO G CR LF (Sets GO display color to green.)	5 5	YES CR LF YES CR LF * GO display color is switched immediately after setting. AUTO CR LF (Response of a state in which the display color type is Auto) NO ? CR LF (Response made if the comparison output unit is not installed) (Response of the state of independent judgment specifications)	5 5 4 5
LO display color response	CLO CR LF	3	RED CR LF (Response of a state in which the LO display color is red) GREEN CR LF (Response of a state in which the LO display color is green) AUTO CR LF (Response of a state in which the display color type is Auto) NO ? CR LF (Response made if the comparison output unit is not installed)	3 5 4 5
LO display color setting	CLO R CR LF (Sets LO display color to red.) CLO G CR LF (Sets LO display color to green.)	5 5	YES CR LF YES CR LF * LO display color is switched immediately after setting. AUTO CR LF (Response of a state in which the display color type is Auto) NO ? CR LF (Response made if the comparison output unit is not installed) (Response of the state of independent judgment specifications)	5 5 4 5

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Display blank response	B	L	K	CR	LF											3	O	F	F	CR	LF															3
																	(Response of a state in which blank setting is OFF)																		
																	L	V	1	CR	LF															3
																	(Response of a state in which blank setting is at LV1)																		
																	L	V	2	CR	LF															3
																	(Response of a state in which blank setting is at LV2)																		
																	L	V	3	CR	LF															3
																	(Response of a state in which blank setting is at LV3)																		
																	O	N	CR	LF																	2
																	(Response of a state in which blank setting is ON)																		
Display blank setting	B	L	K		O	F	F	CR	LF							7	Y	E	S					CR	LF											5
	(Deactivates blank setting.)																																		
	B	L	K		L	V	1	CR	LF							7	Y	E	S					CR	LF											5
	(Sets blank setting to LV1.)																																		
	B	L	K		L	V	2	CR	LF							7	Y	E	S					CR	LF											5
	(Sets blank setting to LV2.)																																		
	B	L	K		L	V	3	CR	LF							7	Y	E	S					CR	LF											5
	(Sets blank setting to LV3.)																																		
	B	L	K		O	N	CR	LF								6	Y	E	S					CR	LF											5
	(Activates blank setting.)																																		
Jog switch response	J	S	W	CR	LF											3	O	N	CR	LF																	2
																	(Response of a state in which jog switch setting is ON)																		
																	O	F	F	CR	LF															3
																	(Response of a state in which jog switch setting is OFF)																		
																	N	O	?		CR	LF															5
																	(Response made if the relevant unit is not installed)																		
Jog switch setting	J	S	W		O	N	CR	LF								6	Y	E	S					CR	LF											5
	(Activates jog switch setting.)																																		
	J	S	W		O	F	F	CR	LF							7	Y	E	S					CR	LF											5
	(Deactivates jog switch setting.)																																		
																	N	O	?		CR	LF															5
																	(Response made if the relevant unit is not installed)																		
Digital zero backup response	B	D	Z	CR	LF											3	O	N	CR	LF																	2
																	(Response of a state in which digital zero backup is ON)																		
																	O	F	F	CR	LF															3
																	(Response of a state in which digital zero backup is OFF)																		
Digital zero backup control	B	D	Z		O	N	CR	LF								6	Y	E	S					CR	LF											5
	(Activates digital zero backup.)																																		
	B	D	Z		O	F	F	CR	LF							7	Y	E	S					CR	LF											5
	(Deactivates digital zero backup.)																																		
Digital zero data save command	S	A	V	CR	LF											3	Y	E	S					CR	LF											5
																	N	O	?		CR	LF													5
																	(Response made if the relevant unit is not installed)																		
Response of the number of patterns for pattern select	P	S	N	CR	LF											3	1	CR	LF																	1
																	(Response of a state in which the number of patterns for pattern select is "1")																		
																	8	CR	LF																	1
																	(Response of a state in which the number of patterns for pattern select is "8")																		
Control over the number of patterns for pattern select	P	S	N		1	CR	LF									5	Y	E	S					CR	LF											5
	(Sets the number of patterns for pattern select to "1.")																																		
	P	S	N		8	CR	LF									5	Y	E	S					CR	LF											5
	(Sets the number of patterns for pattern select to "8.")																																		
Linearize function status response	L	I	N	CR	LF											3	O	F	F	CR	LF																	3
																	(Response of a state in which the linearize function is OFF)																		
																	2	CR	LF																	1
																	(Response of a state in which the linearize correction point is "2")																		
																	1	6	CR	LF																	2
																	(Response of a state in which the linearize correction point is "16")																		
Linearize function status setting	L	I	N		O	F	F	CR	LF							7	Y	E	S					CR	LF											5
	(Deactivates the linearize function.)																																		
	L	I	N		2	CR	LF									5	Y	E	S					CR	LF											5
	(Sets linearize correction point to "2.")																																		
	L	I	N		1	6	CR	LF								6	Y	E	S					CR	LF											5
	(Sets linearize correction point to "16.")																																		
Tracking zero response	T	R	K	CR	LF											3	O	N		T	=	1		W	=	1	CR	LF								10
																	(Response of a state in which the tracking zero time is "1" and tracking zero width is "1")																		
																	O	N		T	=	9	9	W	=	9	9	CR	LF						12
																	(Response of a state in which the tracking zero time is "99" and tracking zero width is "99")																		
																	O	F	F	CR	LF															3
																	(Response of a state in which the tracking zero function is OFF)																		
Tracking zero setting	T	R	K		T	=	1	CR	LF							7	Y	E	S					CR	LF											5
	(Sets tracking zero time to "1.")																																		
	T	R	K		T	=	9	9	CR	LF						8	Y	E	S					CR	LF											5
	(Sets tracking zero time to "99.")																																		
	T	R	K		W	=	1	CR	LF							7	Y	E	S					CR	LF											5
	(Sets tracking zero width to 1 digit.)																																		
	T	R	K		W	=	9	9	CR	LF						8	Y	E	S					CR	LF											5
	(Sets tracking zero width to 99 digits.)																																		
	T	R	K		T	=	0	CR	LF							7	Y	E	S					CR	LF											5
	(Deactivates the tracking zero function.)																																		
	* In order to validate a tracking zero setup, please perform a number of times setup of an average continuously after carrying out a tracking zero setup.																																		

Function		Char. Length		Char. Length
Power-on delay time response	P O N CR LF	3	0 CR LF (Response of a state in which the power-on delay function is OFF)	1
			1 CR LF (Response of a state in which the power-on delay time is 1 second)	1
			9 CR LF (Response of a state in which the power-on delay time is 9 seconds)	1
Power-on delay time setting	P O N 1 CR LF (Sets power-on delay time to 1 second.)	5	Y E S CR LF	5
	P O N 9 CR LF (Sets power-on delay time to 9 seconds.)	5	Y E S CR LF	5
	P O N 0 CR LF (Deactivates the power-on delay function.)	5	Y E S CR LF	5
Protect level response	P R O CR LF	3	L V 0 CR LF (Response of a state in which the protect level is at LV0)	3
			L V 1 CR LF (Response of a state in which the protect level is at LV1)	3
			L V 2 CR LF (Response of a state in which the protect level is at LV2)	3
			L V 3 CR LF (Response of a state in which the protect level is at LV3)	3
Protect level setting	P R O L V 0 CR LF (Sets protect level to LV0.)	7	Y E S CR LF	5
	P R O L V 1 CR LF (Sets protect level to LV1.)	7	Y E S CR LF	5
	P R O L V 2 CR LF (Sets protect level to LV2.)	7	Y E S CR LF	5
	P R O L V 3 CR LF (Sets protect level to LV3.)	7	Y E S CR LF	5
Unit number indication response	U N O CR LF	3	O N CR LF (Response of a state in which the unit number indication is ON)	2
			O F F CR LF (Response of a state in which the unit number indication is OFF)	3
Unit number indication setting	U N O O N CR LF (Activates unit number indication.)	6	Y E S CR LF	5
	U N O O F F CR LF (Deactivates unit number indication.)	7	Y E S CR LF	5
Start hold type response	S T T CR LF	3	A CR LF (Response of a state in which the start hold type is A)	1
			B CR LF (Response of a state in which the start hold type is B)	1
Start hold type setting	S T T A CR LF (Sets start hold type to A.)	5	Y E S CR LF	5
	S T T B CR LF (Sets start hold type to B.)	5	Y E S CR LF	5
Peak hold type response	P V T CR LF	3	A CR LF (Response of a state in which the peak hold type is A)	1
			B CR LF (Response of a state in which the peak hold type is B)	1
Peak hold type setting	P V T A CR LF (Sets peak hold type to A.)	5	Y E S CR LF	5
	P V T B CR LF (Sets peak hold type to B.)	5	Y E S CR LF	5

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Baud rate response	B	A	U	CR	LF											3	2	4	0	0	CR	LF														4
																	(Response of a state in which the baud rate is 2400 bps)																		
																	4	8	0	0	CR	LF														4
																	(Response of a state in which the baud rate is 4800 bps)																		
																	9	6	0	0	CR	LF														4
																	(Response of a state in which the baud rate is 9600 bps)																		
																	1	9	2	0	0	CR	LF													5
																	(Response of a state in which the baud rate is 19200 bps)																		
																	3	8	4	0	0	CR	LF													5
																	(Response of a state in which the baud rate is 38400 bps)																		
	B	A	U		2	4	0	0	CR	LF						8	Y	E	S			CR	LF													5
	(Sets the baud rate to 2400 bps.)																* The baud rate is switched upon next power-up.																		
	B	A	U		4	8	0	0	CR	LF						8	Y	E	S			CR	LF													5
	(Sets the baud rate to 4800 bps.)																																		
	B	A	U		9	6	0	0	CR	LF						8	Y	E	S			CR	LF													5
	(Sets the baud rate to 9600 bps.)																																		
	B	A	U		1	9	2	0	0	CR	LF					9	Y	E	S			CR	LF													5
	(Sets the baud rate to 19200 bps.)																																		
	B	A	U		3	8	4	0	0	CR	LF					9	Y	E	S			CR	LF													5
	(Sets the baud rate to 38400 bps.)																																		
Data length response	D	A	T	CR	LF											3	7	CR	LF																	1
																	(Response of a state in which the data length is 7 bits)																		
																	8	CR	LF																	1
																	(Response of a state in which the data length is 8 bits)																		
	D	A	T		7	CR	LF									5	Y	E	S			CR	LF													5
	(Sets data length to 7 bits.)																																		
	D	A	T		8	CR	LF									5	Y	E	S			CR	LF													5
	(Sets data length to 8 bits.)																* The data length is switched upon next power-up.																		
Parity bit response	P	B	T	CR	LF											3	E	V	E	N	CR	LF														4
																	(Response of a state in which a parity bit is even parity)																		
																	O	D	D	CR	LF														3
																	(Response of a state in which a parity bit is odd parity)																		
																	N	O	CR	LF															2
																	(Response of a state in which a parity bit is none)																		
	P	B	T		E	CR	LF									5	Y	E	S			CR	LF													5
	(Sets a parity bit to even parity.)																																		
	P	B	T		O	CR	LF									5	Y	E	S			CR	LF													5
	(Sets a parity bit to odd parity.)																																		
	P	B	T		N	CR	LF									5	Y	E	S			CR	LF													5
	(Sets a parity bit to none.)																* A parity bit is switched upon next power-up.																		
Stop bit response	S	B	T	CR	LF											3	1	CR	LF																	1
																	(Response of a state in which a stop bit is 1 bit)																		
																	2	CR	LF																	1
																	(Response of a state in which a stop bit is 2 bits)																		
	S	B	T		1	CR	LF									5	Y	E	S			CR	LF													5
	(Sets a stop bit to 1 bit.)																																		
	S	B	T		2	CR	LF									5	Y	E	S			CR	LF													5
	(Sets a stop bit to 2 bits.)																* A stop bit is switched upon next power-up.																		
Delimiter response	D	L	M	CR	LF											3	C	R	+	L	F	CR	LF													5
																	(Response of a state in which a delimiter is CR + LF)																		
																	C	R	CR	LF															2
																	(Response of a state in which a delimiter is CR)																		
	D	L	M		C	L	CR	LF								6	Y	E	S			CR	LF													5
	(Sets a delimiter to CR + LF.)																																		
	D	L	M		C	CR	LF									5	Y	E	S			CR	LF													5
	(Sets a delimiter to CR.)																* A delimiter is switched upon next power-up.																		
Device ID response	A	D	R	CR	LF											3	1	CR	LF																	1
																	(Response of a state in which the device ID is "01")																		
																	9	9	CR	LF																2
																	(Response of a state in which the device ID is "99")																		
Device ID setting	A	D	R		1	CR	LF									5	Y	E	S			CR	LF													5
	(Sets device ID to "01".)																																		
	A	D	R		9	9	CR	LF								6	Y	E	S			CR	LF													5
	(Sets device ID to "99".)																* Device ID is switched upon next power-up.																		

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Condition data parameter response	A	L	1	CR	LF											3	A	V	G		1	CR	LF												5
																	(Response of a state in which the number of averaging times is "1")																		
																	M	A	V		O	F	F	CR	LF										7
																	(Response of a state in which the moving averaging function is OFF)																		
																	S	W	D		1	CR	LF												5
																	(Response of a state in which step wide is "1")																		
																	C	L	R		R	E	D	CR	LF										7
																	(Response of a state in which the display color is red)																		
																	C	L	T		M	A	N	U	A	L	CR	LF							10
																	(Response of a state in which the display color type is Manual)																		
																	C	H	H		R	E	D	CR	LF										7
																	(Response of a state in which the HH display color is red)																		
																	C	H	I		R	E	D	CR	LF										7
																	(Response of a state in which the HI display color is red)																		
																	C	G	O		R	E	D	CR	LF										7
																	(Response of a state in which the GO display color is red)																		
																	C	L	O		R	E	D	CR	LF										7
																	(Response of a state in which the LO display color is red)																		
																	C	L	L		R	E	D	CR	LF										7
																	(Response of a state in which the LL display color is red)																		
																	B	L	K		O	F	F	CR	LF										7
																	(Response of a state in which display blank is OFF)																		
																	J	S	W		O	N	CR	LF											6
																	(Response of a state in which the jog switch is ON)																		
																	P	V	H		P	H	-	O	F	F	CR	LF							10
																	(Response of a state in which peak hold select is OFF at PH)																		
																	B	D	Z		O	N	CR	LF											6
																	(Response of a state in which digital zero backup is ON)																		
																	P	S	N		1	CR	LF												5
																	(Response of a state in which pattern select is "1")																		
																	L	I	N		O	F	F	CR	LF										7
																	(Response of a state in which linearize is OFF)																		
																	T	R	K		O	F	F	CR	LF										7
																	(Response of a state in which tracking zero is OFF)																		
																	P	O	N		0	CR	LF												5
																	(Response of a state in which the delay time is "0")																		
																	P	R	O		L	V	0	CR	LF										7
																	(Response of a state in which the protect level is at LV0)																		
																	U	N	O		O	F	F	CR	LF										7
																	(Response of a state in which unit number indication is OFF)																		
																	S	T	T		A	CR	LF												5
																	(Response of a state in which the start hold type is A)																		
																	S	T	D																9
																	P	V	T		A	CR	LF												5
																	(Response of a state in which the peak hold type is A)																		
																	B	A	U		9	6	0	0	CR	LF									8
																	(Response of a state in which the baud rate is 9600 bps)																		
																	D	A	T		7	CR	LF												5
																	(Response of a state in which the data length is 7 bits)																		
																	P	B	T		E	V	E	N	CR	LF									8
																	(Response of a state in which a parity bit is even parity)																		
																	S	B	T		2	CR	LF												5
																	(Response of a state in which a stop bit is 2 bits)																		
																	D	L	M		C	R	+	L	F	CR	LF								9
																	(Response of a state in which a delimiter is CR + LF)																		
																	A	D	R		1	CR	LF												5
																	(Response of a state in which the device ID is 01)																		
Scaling data parameter response	A	L	2	CR	LF											3	P	-	1	CR	LF														3
																	(The pattern used previously is responded.)																		
																	R	A	N	G		2	A	CR	LF										7
																	(Response of a state in which the measurement range is 2 A)																		
																	I	S	E	L		O	.	C	CR	LF									8
																	(Response of a state in which the input type is open collector)																		
																	F	S	C			9	9	9	9	CR	LF								10
																	(Response of a state in which the full-scale indicated value is "9999")																		
																	F	I	N			9	9	9	9	CR	LF								10
																	(Response of a state in which the full-scale input value is "9999")																		
																	O	F	S						0	CR	LF								10
																	(Response of a state in which the offset indicated value is "0")																		
																	O	I	N						0	CR	LF								10
																	(Response of a state in which the offset input value is "0")																		
																	P	S		1	.	0	0	CR	LF										7
																	(Response of a state in which the pre-scale value is "1.00")																		
																	P	P	R		1	CR	LF												5
																	(Response of a state in which the frequency division value is "1")																		
																	D	L	H	I			9	9	9	9	CR	LF								10
																	(Response of a state in which the digital limiter HI value is "9999")																		
																	D	L	L	O		-	9	9	9	9	CR	LF								10
																	(Response of a state in which the digital limiter LO value is "-9999")																		
																	A	O	U	T		0	-	1	CR	LF									8
																	(Response of a state in which the analog output type is 0 to 1 V)																		
																	A	O	H	I		9	9	9	9	CR	LF								9
																	(Response of a state in which the analog output HI indicated value is "9999")																		
																	A	O	L	O		0	CR	LF												6
																	(Response of a state in which the analog output LO indicated value is "0")																		
																	U	N	I	T		C	CR	LF												6
																	(Response of a state in which the temperature indication unit is °C)																		
																	D	E	P		O	F	F	CR	LF										7
																	(Response of a state in which there is no decimal point)																		

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Comparator data parameter response *Case of the comparison output type is high-and low-limit setting	A	L	3	CR	LF											3	P	-	1	CR	LF														3
																	(The pattern used previously is responded.)																			
																	C	O	M	T		O	/	U	CR	LF									8
																	(Response of a state in which the comparison output type is of high- and low-limit setting)																			
																	H	I	-	S			1	0	0	0	CR	LF							10
																	(Response of a state in which the HI judgment value is "1000")																			
																	L	O	-	S				5	0	0	CR	LF							10
																	(Response of a state in which the LO judgment value is "500")																			
																	H	I	-	H						0	CR	LF							10
																	(Response of a state in which the HI hysteresis is "0")																			
																	L	O	-	H						0	CR	LF							10
																	(Response of a state in which the LO hysteresis is "0")																			
																	H	I	-	L		N	O	CR	LF										7
																	(Response of a state in which HI logic is normally open)																			
																	G	O	-	L		N	O	CR	LF										7
																	(Response of a state in which GO logic is normally open)																			
																	L	O	-	L		N	O	CR	LF										7
																	(Response of a state in which LO logic is normally open)																			
																	N	O		?				CR	LF										5
																	(Response made if the relevant input unit is not installed)																			
*Case of the comparison output type is the tolerance judgment	A	L	3	CR	LF											3	P	-	1	CR	LF														3
																	(The pattern used previously is responded.)																			
																	C	O	M	T		E	R	R	CR	LF									8
																	(Response of a state in which the comparison output type is of the tolerance judgment)																			
																	N	V	A	L			5	0	0	0	CR	LF							10
																	(Response of a state in which the nominal value is "5000")																			
																	E	R	R	1				5	.	0	0	CR	LF						11
																	(Response of a state in which tolerance 1 is "5.00")																			
																	E	R	1	H						0	CR	LF							10
																	(Response of a state in which the tolerance-1 hysteresis is "0")																			
																	H	I	-	L		N	O	CR	LF										7
																	(Response of a state in which HI logic is normally open)																			
																	G	O	-	L		N	O	CR	LF										7
																	(Response of a state in which GO logic is normally open)																			
																	L	O	-	L		N	O	CR	LF										7
																	(Response of a state in which LO logic is normally open)																			
																	N	O		?				CR	LF										5
																	(Response made if the relevant input unit is not installed)																			
Calibration data response	A	L	4	CR	LF											3	P	-	1	CR	LF														3
																	(The pattern used previously is responded.)																			
																	S	N	S	R				5	CR	LF									6
																	(Response of a state in which the sensor power is 5 V)																			
																	Z	R	I	N			0	.	0	0	CR	LF							10
																	(Response of a state in which the zero input value is "0.000")																			
																	Z	E	R	O				0	CR	LF									6
																	(Response of a state in which the zero indicated value is "0")																			
																	S	P	I	N			2	.	0	0	CR	LF							10
																	(Response of a state in which the span input value is "2.000")																			
																	S	P	A	N			9	9	9	9	CR	LF							9
																	(Response of a state in which the span indicated value is "9999")																			
																	N	O		?				CR	LF										5
																	(Response made if the relevant input unit is not installed)																			
Linearize data response	A	L	5	CR	LF											3	0	1		I	=	0	CR	LF												6
																	(Response of a state in which the linearize data N-01 input value is "0")																			
																	0	1		O	=	0	CR	LF											6
																	(Response of a state in which the linearize data N-01 output value is "0")																			
																	0	2		I	=	1	0	0	CR	LF									8
																	(Response of a state in which the linearize data N-02 input value is "100")																			
																	0	2		O	=	1	1	0	CR	LF									8
																	(Response of a state in which the linearize data N-02 output value is "110")																			
																	0	2		I	=	5	0	0	CR	LF									8
																	.																		
																	.																		
																	.																		
																	.																		
																	1	6		I	=	9	0	0	0	CR	LF									9
																	(Response of a state in which the linearize data N-16 input value is "9000")																			
																	1	6		O	=	9	2	0	0	CR	LF									9
																	(Response of a state in which the linearize data N-16 output value is "9200")																			
																	N	O		?				CR	LF										5
																	(Response of a state in which the linearize function is OFF)																			
Common response																	Y	E	S					CR	LF										5
																	(Normal response)																			
																	N	O		?				CR	LF										5
																	(Response to an undefined command, etc.)																			
																	(Response made if data not meeting the number of digits is input)																			
																	E	R	R	O	R		A	CR	LF										7
																	(Response to data out of the setting range or data not meeting the setting conditions)																			
																	(Response made if there is a communication parameter error)																			
																	* There are ERROR B to ERROR F as an equivalent response command.																			
																	* If there is a response of the ERROR X command, perform the same steps again. If this does not solve the problem, turn the meter supply OFF and then ON again.																			
Response made if internal memory data is abnormal * Generally, a response is made only once.																	D	A	T	A		L	O	S	T		C	O	N	D	CR	LF		14
																	(Response made if condition data is abnormal)																			
																	* Set condition data again.																			
																	D	A	T	A		L	O	S	T		C	O	M	CR	LF			13
																	(Response made if comparator data is abnormal)																			
																	* Set comparator data again.																			
																	D	A	T	A		L	O	S	T		M	E	T	CR	LF			13
																	(Response made if scaling data is abnormal)																			
																	* Set scaling data again.																			

Function		Char. Length		Char. Length
Scaling data setting	M E T CR LF * Indication becomes "MET" at the instant the MET command has been received.	3	P - 1 CR LF (The pattern used previously is responded.)	3
	2 CR LF (Sets data-setting pattern to "2.")	1	P - 2 CR LF	3
	M CR LF	2	R A N G 2 A CR LF	7
	1 V CR LF	2	R A N G 1 V CR LF	7
	(Sets the measurement range to 1 V.) M CR LF	1	F S C 9 9 9 9 CR LF	8
	8 0 0 0 CR LF	4	F S C 8 0 0 0 CR LF	8
	(Sets the full-scale indicated value to "8000.") M CR LF	1	O F S 0 CR LF	5
	2 0 CR LF	2	O F S 2 0 CR LF	6
	(Sets the offset indicated value to "20.") E CR LF	1	Y E S CR LF	5
	* Setting necessary data and then sending the E command causes data acquired up to that point to be return to measurement operation.		N O ? CR LF (Response made if a value out of the setting range is input)	5
Comparator data setting *Case of the companson output type is high-and low-limit setting. Sets data-setting pattern to "2" and HI logic to "8000",set LO logic to "-5000", and sets HI &LO logic to normally closed.	C O M CR LF * The main unit's indication becomes "COM" at the instant the COM command has been received.	3	P - 1 CR LF (The pattern used previously is responded.)	3
	2 CR LF (Sets data-setting pattern to "2.")	1	P - 2 CR LF	3
	M CR LF	1	C O M T O / U CR LF	8
	M CR LF	1	H I - S 1 0 0 0 CR LF	9
	8 0 0 0 CR LF	4	H I - S 8 0 0 0 CR LF	9
	(Sets HI logic to "8000.") M CR LF	1	L O - S 5 0 0 CR LF	8
	- 5 0 0 0 CR LF	5	L O - S - 5 0 0 0 CR LF	10
	(Sets LO logic to "-5000.") M CR LF	1	H I - H 0 CR LF	6
	M CR LF	1	L O - H 0 CR LF	6
	M CR LF	1	H I - L N O CR LF	7
	N C CR LF	2	H I - L N C CR LF	7
	(Sets HI logic to normally closed.) M CR LF	1	G O - L N O CR LF	7
	M CR LF	1	L O - L N O CR LF	7
	N C CR LF	2	L O - L N C CR LF	7
	(Sets LO logic to normally closed.) E CR LF	1	Y E S CR LF	5
	* A return to measurement operation using the E command (If the N command is sent, a return to side judgment value is made.)		E R R O R 0 CR LF (Response made if a value not meeting the setting conditions is input)	7
			N O ? CR LF (Response of a state in which the relevant input unit is not installed)	5
*Case of the compason output type is sets the nominal value to "8000", sets the tolerance 1 to "20.00".	C O M CR LF * The main unit's indication becomes "COM" at the	3	P - 1 CR LF (The pattern used previously is responded.)	3
	M CR LF	1	C O M T O / U CR LF	8
	E R R CR LF	6	C O M T E R R CR LF	8
	(Sets the comparator output type to tolerance judgment.) M CR LF	1	N V A L 5 0 0 0 CR LF	10
	8 0 0 0 CR LF	4	N V A L 8 0 0 0 CR LF	10
	(Sets the nominal value to "8000.") M CR LF	1	E R R 1 5 . 0 0 CR LF	11
	2 0 0 0 CR LF	5	E R R 1 2 0 . 0 0 CR LF	11
	(Sets tolerance 1 to "20.00.") M CR LF	1	E R 1 H 0 CR LF	10
	E CR LF	1	Y E S CR LF	5
	* A return to measurement operation using the E command (If the N command is sent, a return to side judgment value is made.)		E R R O R 0 CR LF (Response made if a value not meeting the setting conditions is input)	7
			N O ? CR LF (Response of a state in which the relevant input unit is not installed)	5

* The same setting methods as those above are also used for setting of other data (such as linearize data).

5 Specifications and Dimensions

●RS-232C

Baud rate	:	38400, 19200, 9600, 4800, or 2400 bps
Start bit	:	1 bit
Data length	:	7 bits or 8 bits
Parity	:	even, odd, or none
Stop bit	:	1 bit or 2 bits
Character code	:	ASCII code
Delimiter	:	CR or CR+LF

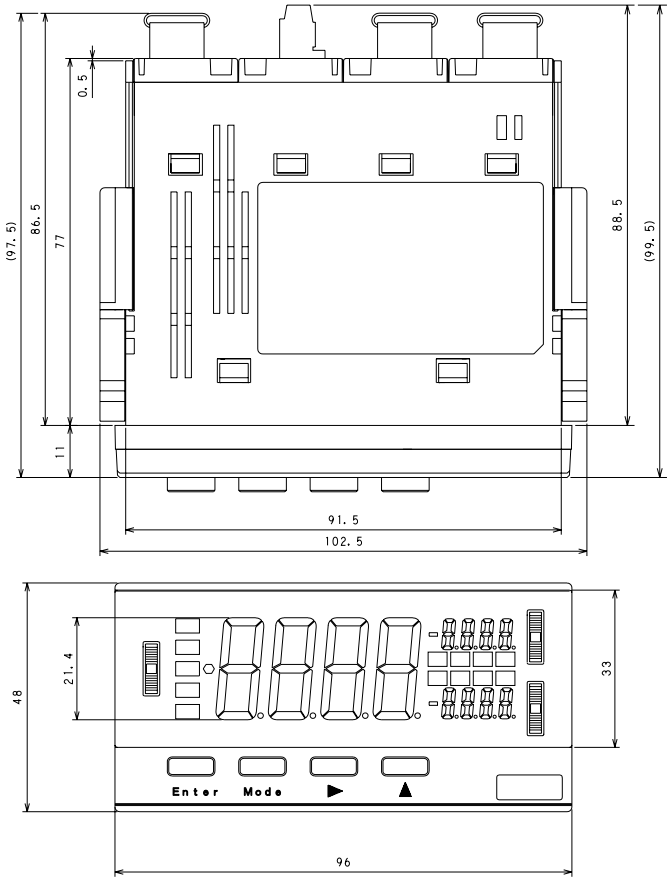
●RS-485

Baud rate	:	38400, 19200, 9600, 4800, or 2400 bps
Start bit	:	1 bit
Data length	:	7 bits or 8 bits
Parity	:	even, odd, or none
Stop bit	:	1 bit or 2 bits
Character code	:	ASCII code
Delimiter	:	CR or CR+LF
Error detection	:	BCC checksum
Number of instruments to be connected	:	31

●Analog Output (PWM)

Output	Load Resistance	Accuracy	Response Rate	Ripple
0 to 1V	10kΩ or more	±(0.5% of FS)	About 0.5 sec.	50mVp-p
0 to 10V				
1 to 5V				
4 to 20mA	550Ω or less			25mVp-p

Conversion method	:	PWM conversion system
Resolution	:	about 14 bits or equivalent
Scaling	:	digital scheduling



6 Warranty and After-sales Services

6.1 Warranty

The warranty period of this product is one year from the date of delivery. If a problem occurs during this warranty period and its cause is determined to be attributable to us, and will repair the product without charge.

6.2 After-sales Services

This product has been manufactured, tested, and inspected under strict quality control before shipment from the factory. If the product breaks down, contact your sales representative or our local office (or send it). In this case, write down the problem in detail and report it to your service representative (or enclose it with the product).

watanabe
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