

Instruction Manual for A6000 Series Universal Digital Panel Meters

Units for Measurement of Large DC and AC Currents

Caution

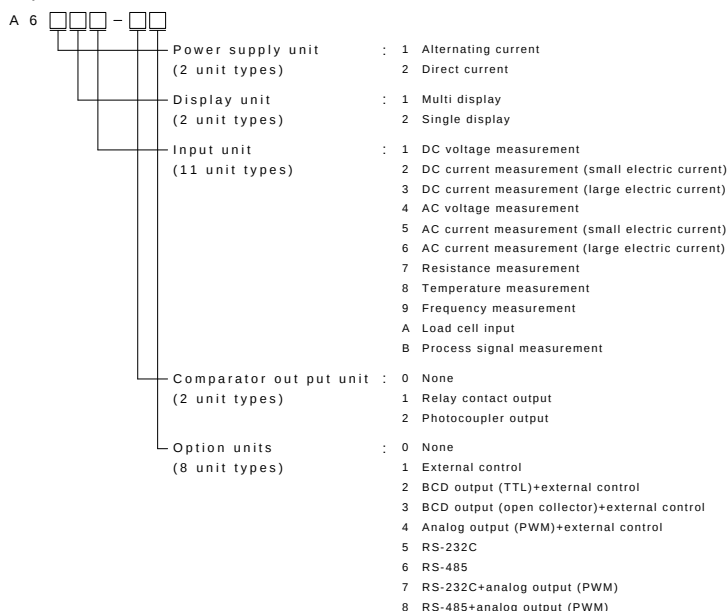
- (1) Applying a voltage or current exceeding its maximum permissible value may cause the unit to be damaged.
- (2) Always use the unit within the specified voltage range; otherwise, it may cause a fire, electric shock or personal/equipment damage.
- (3) For the purpose of functional improvement, the 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.



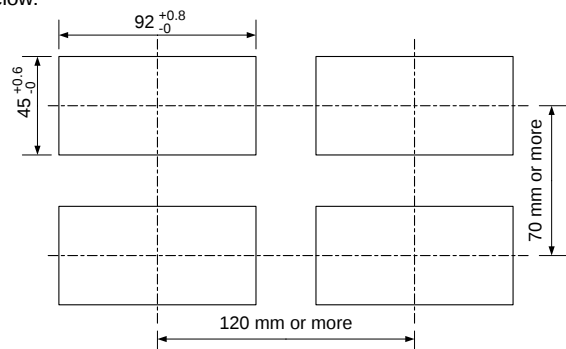
1.2 Accessories

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

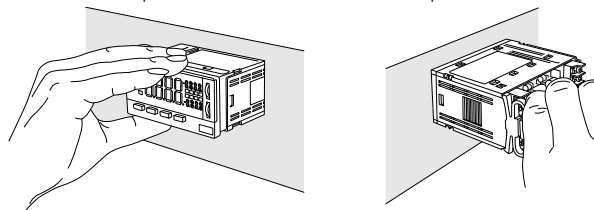
Cut the panel to mount the A6000 series in accordance with the illustration below.



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.

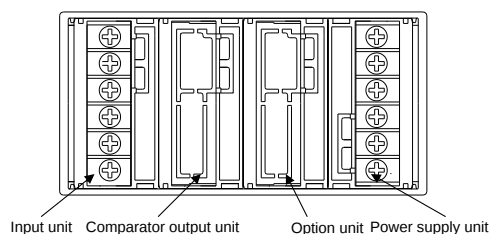


Caution

- (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 temperature or humidity doesn't meet the requirements below; or where a drastic change in temperature may cause condensation.
Ambient temperature: 0 to 50°C
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°C or below.
- (5) Do not install the unit where it is exposed to excessive vibration or shock.
- (6) Install the unit horizontally; otherwise, ventilation will be adversely affected and may result in deterioration.

3 Terminals and Connections

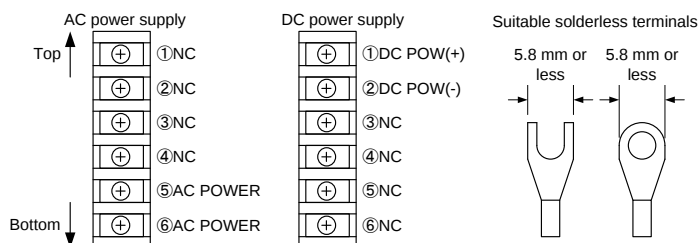
Illustration of the rear of the A6000



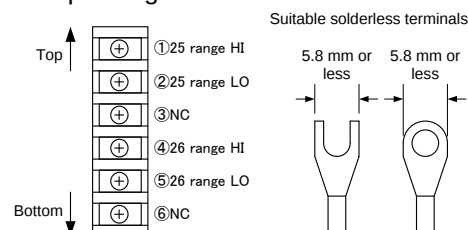
Caution

Each unit is not replaceable by the customer.

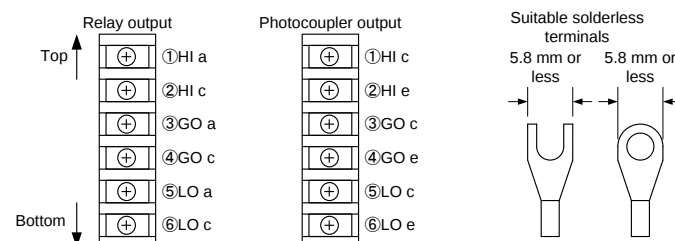
3.1 Power supply connections



3.2 Input Signal Connections



3.3 Comparator Output Connections



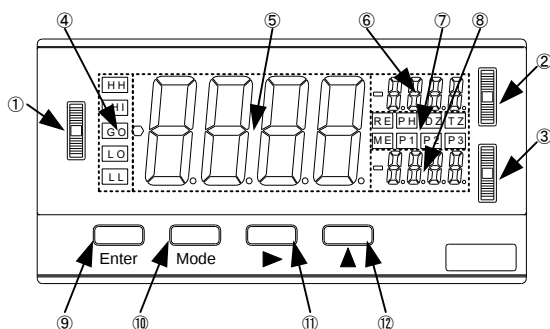
3.4 Option connections

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

4 Parameter Settings

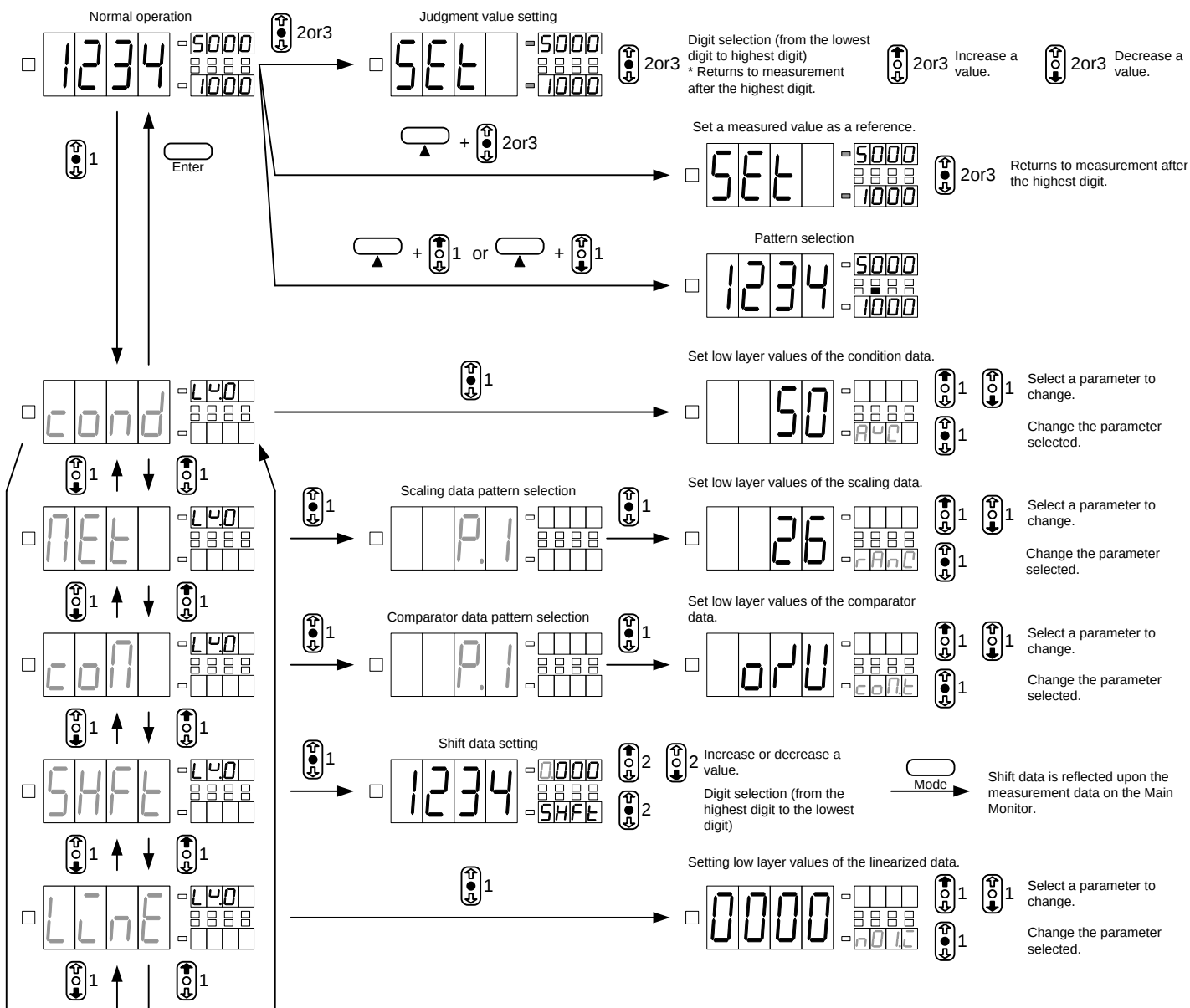
4.1 Multi Display Unit

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

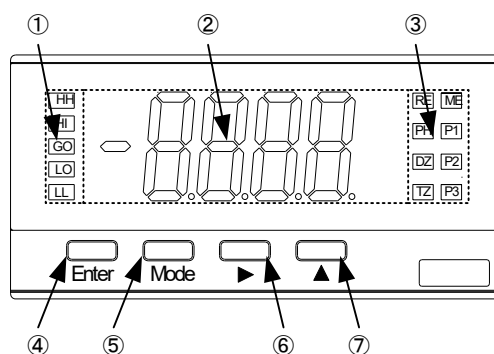
Operation procedure diagram



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.

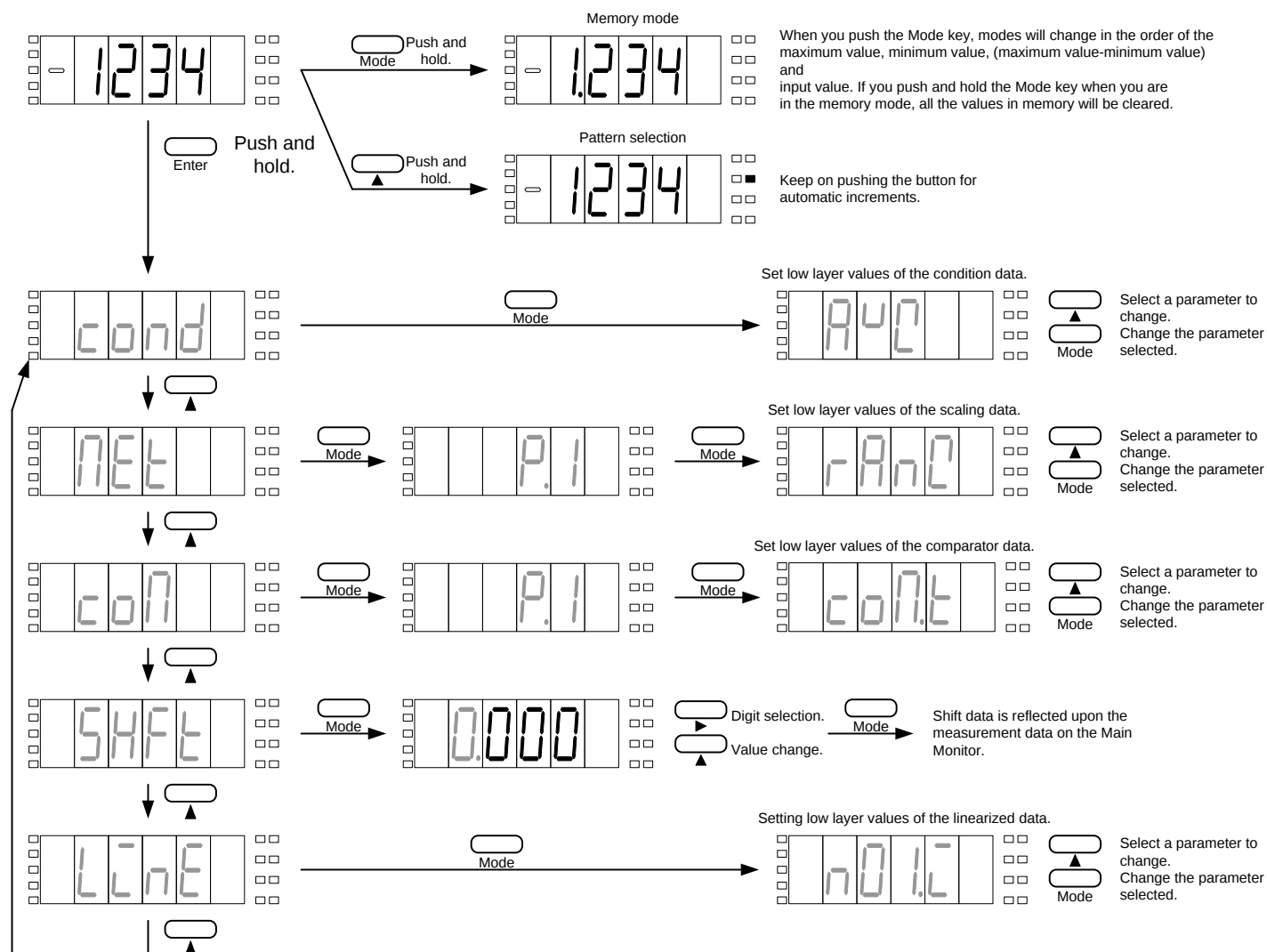
- ※The multi display unit can also follow the operation procedure of the single display unit operation system.
- ※Comparator judgment values can be set not only from Jog 2 and Jog 3 but also from the low layers of the comparator data.
- ※For operation procedures in the memory mode (maximum value/minimum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

Names and major functions

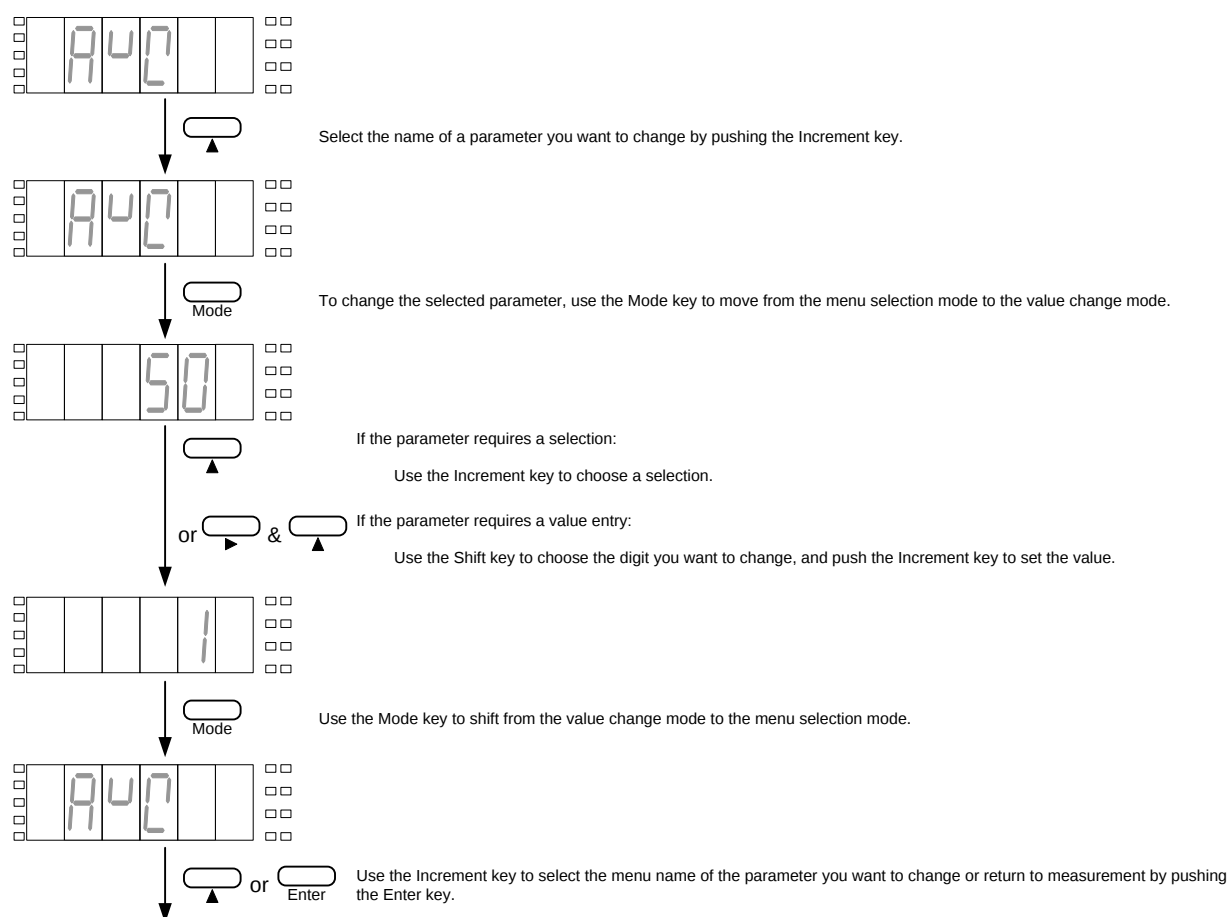


Location	Name	Major function									
①	Judgment monitor	Displays judgment results when used with meter relay.									
②	Main monitor	Displays a measured value as well as menu names and values at the time of parameter setting.									
③	Function monitor	RE	Illuminates when the unit is set to the remote 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	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; parameter selection at the time of normal measurements (when this button is pushed and held) ; special operations									

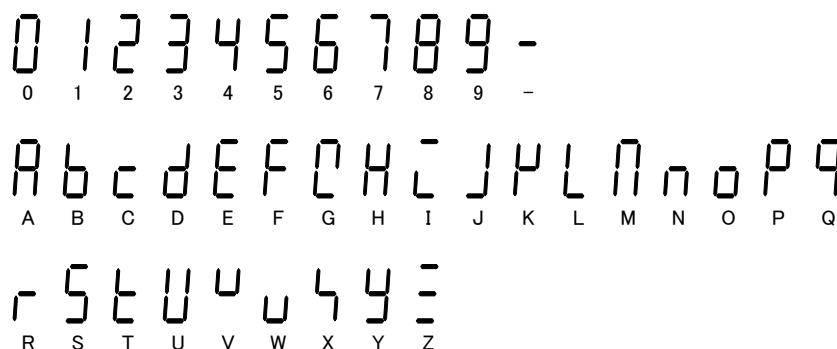
Operation procedure diagram



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) *For the AC measurement unit, the max is 400 times on average (approx. 2.5 times/second).(Initial Value 400)
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	GREEN	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.
P.S	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.
P.S.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	26	1	25/26	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. * In the case of AC input, please use it by "+" setting by all means. It is not displayed normally when I use it by "-" setting.
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.O.U.T	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)

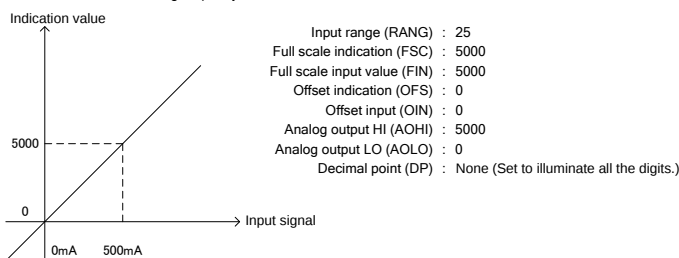
Menu indication	Parameter name	Initial value	P.L.	Setting range or alternatives	Major setting purpose and remarks
COM.T	Comparator output type	O/U	1	O/U/ERR	Select either [above or below] or error comparator types.
HI-S	HI judgment value	1000	2	-9999 to +9999	Sets a HI judgment value.*Only when COM.T 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 Scaling Data Setting Examples

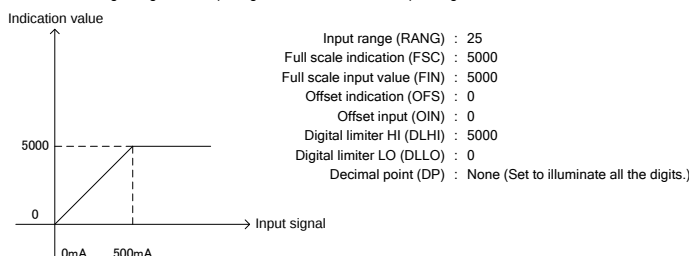
Example 1

When the voltage range of the input signal is 0 to 500mA, corresponding indication values should be 0 to 5000. It wants to makes an analog output by 4~20mA then.



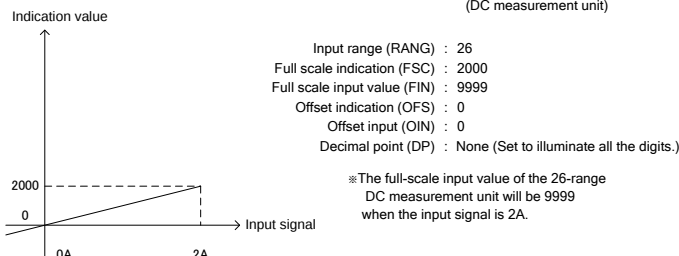
Example 2

When the voltage range of the input signal is 0 to 500mA, corresponding indication values should be 0 to 5000.



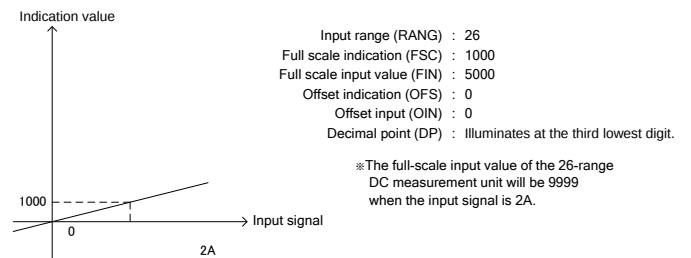
Example 3

When the input signal varies between 0 to 2A, corresponding indication values should be 0 to 2000. (DC measurement unit)



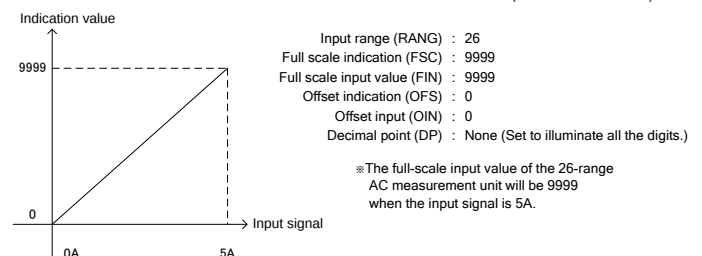
Example 4

When the voltage range of the input signal is 0 to 1A, corresponding indication values should be 0.000 to 1.000. (DC measurement unit)



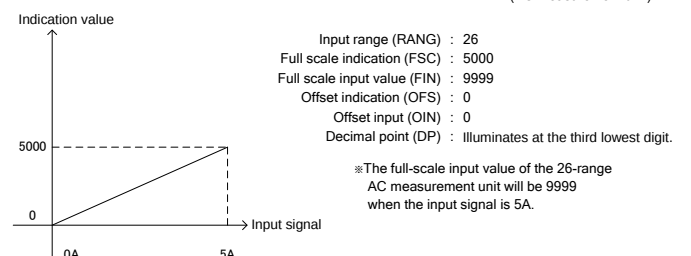
Example 5

When the voltage range of the input signal is 0 to 5A, corresponding indication values should be 0 to 9999. (AC measurement unit)

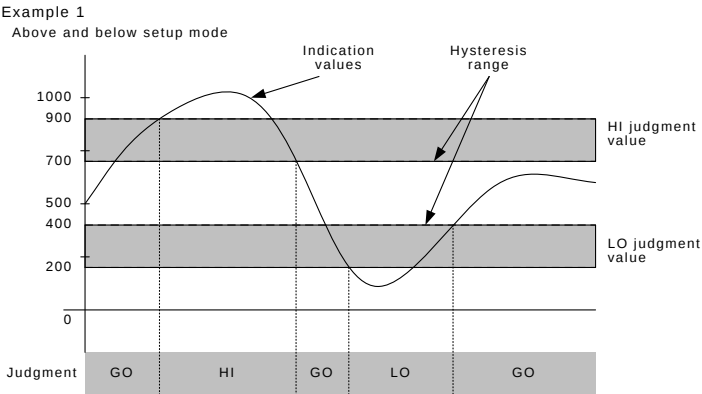


Example 6

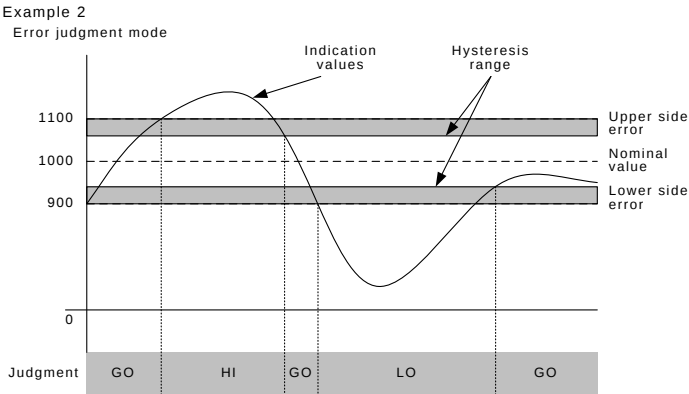
When the voltage range of the input signal is 0 to 5A, corresponding indication values should be 0.000 to 5.000. (AC measurement unit)



5.2 Comparator Data Setting Examples (for meter relay only)



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



※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.

6 Specifications and Measurements

6.1 Input Specifications

●DC current measurements (Large electric current)

Range	Measurement range	Indication	Error (23°C ±5°C; 35 to 85%)	Input impedance	Maximum permissible input
25	±999.9mA	Offset: ±9999	±(0.1% of rdg + 2digit)	Approx. 0.1Ω	±3A
26	±2.000A	Full scale: ±9999		Approx. 0.01Ω	

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

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

●AC current measurements (Large electric current)

Range	Measurement range	Indication	Error (23°C ±5°C; 35 to 85%)	Input impedance	Maximum permissible input
25	999.9mA	Offset: ±9999	±(0.7% of rdg + 20digit)	Approx. 0.1Ω	3A
26	5A	Full scale: ±9999		(CT)	8A

Sampling rate : Maximum approx. 2.5 times/second

Measurement method : True rms value calculation

Frequency range : 40Hz to 1kHz (25range), 50Hz or 60Hz (26range)

Response speed : Approx. 1 second (10% to 90%)



Caution

Less than 0.5% of an FSC set point are dead zone, and, as for the AC measurement unit, indication always becomes 0.

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°C 35 to 85%RH
Storage temperature	: -10 to 70 °C: 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 for 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

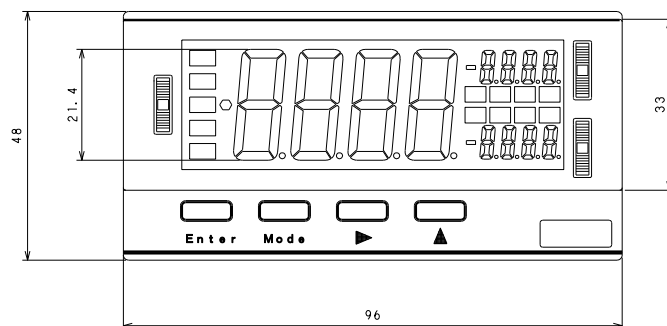
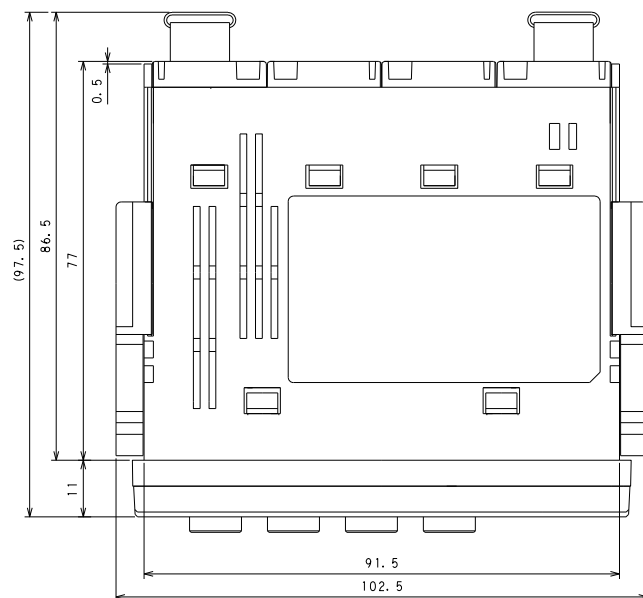
Contact rating : 250V AC 2A, 30V DC 2A

●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.

6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan
Phone: (81)3-3400-6141

Homepage <http://www.watanabe-electric.co.jp/en/>

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

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Phone: (81)3-3400-6141

Homepage <http://www.watanabe-electric.co.jp/en/>

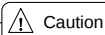
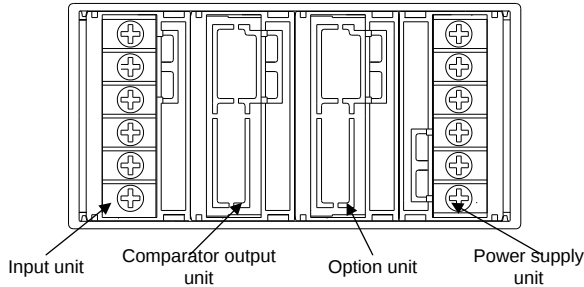
Instruction Manual for A6000 Series Universal Digital Panel Meters

BCD Output and External Control Unit

1 Before Using the Unit

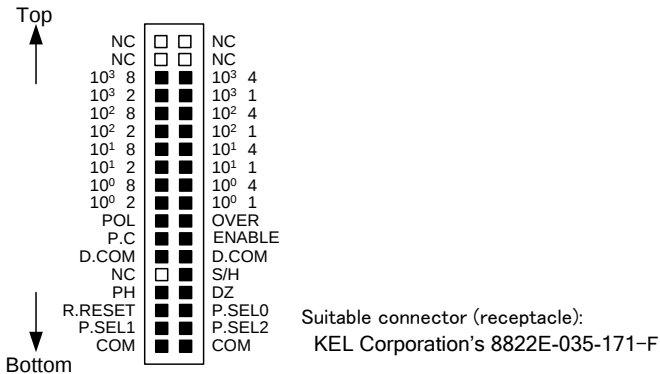
This instruction manual is for the BCD output and external control unit of the A6000 series. Read this manual along with the main unit's instruction manual before using the unit.

A6000's rear panel



None of the units are replaceable by the customer.

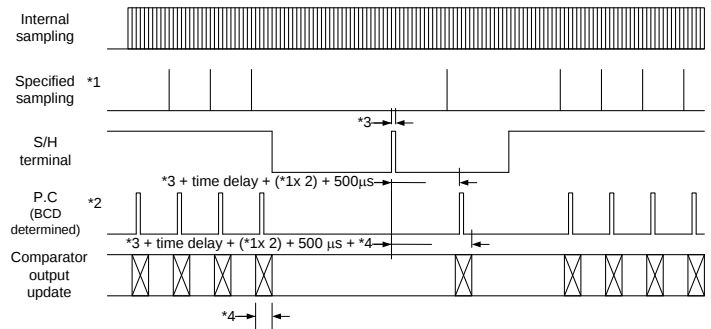
2 Terminals and Connections



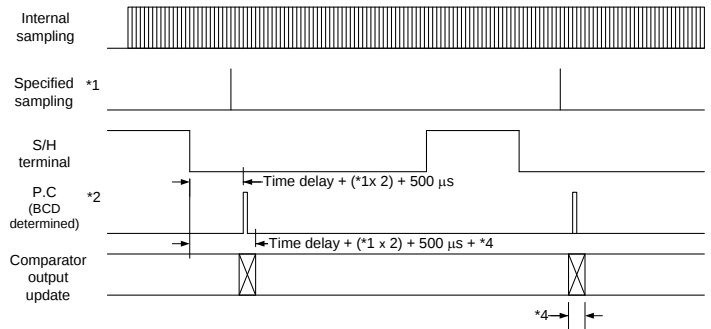
Terminal	Function
10 ⁰ 1	Least significant bit output of least significant BCD digit. The output logic can be switched using condition data.
10 ⁰ 2	Second least significant bit output of least significant BCD digit. The output logic can be switched using condition data.
10 ⁰ 4	Second most significant 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's 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 pattern selection 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.

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

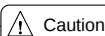
Output type : open collector or TTL-compatible

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)



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

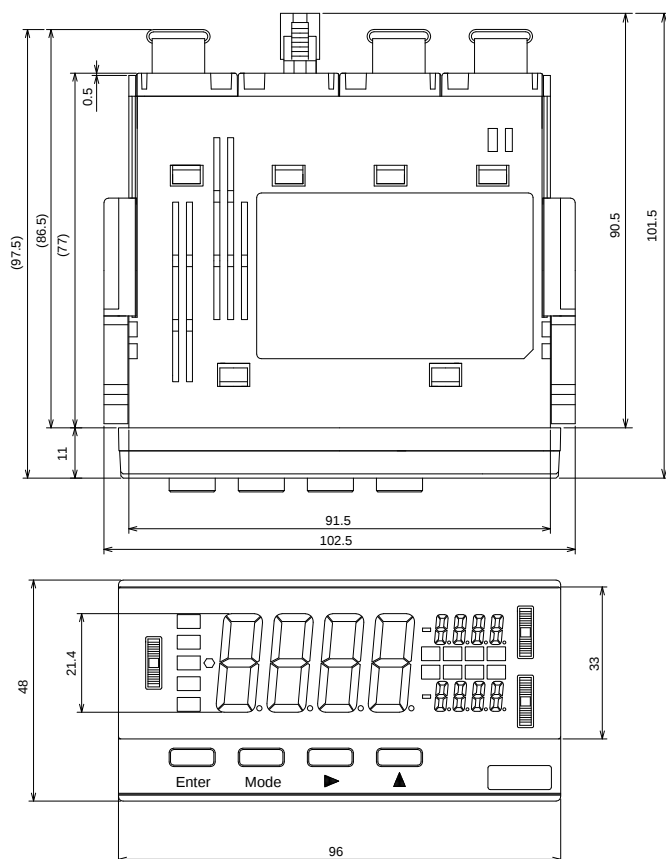
Internal circuit: Pulled up to approximately +5 V (through a 10 kΩ resistor).

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.

watanabe

WATANABE ELECTRIC INDUSTRY CO., LTD.

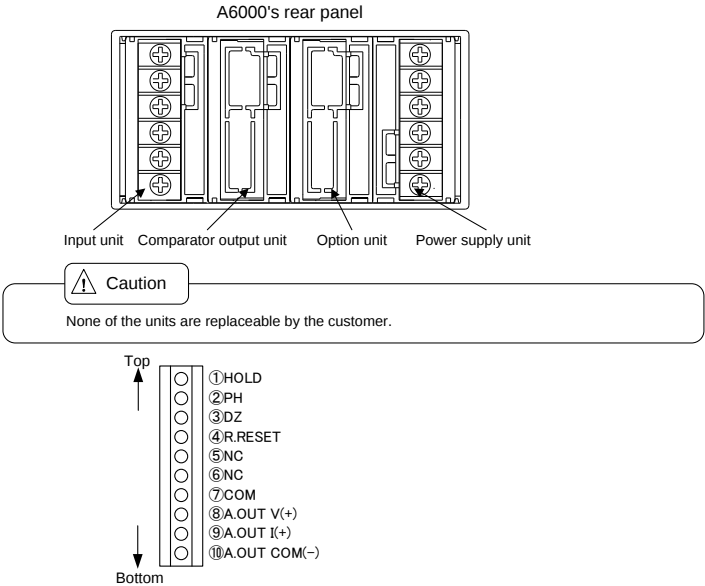
6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan
 Phone: (81)3-3400-6141
 Homepage <http://www.watanabe-electric.co.jp/en/>

Instruction Manual for A6000 Series
Universal Digital Panel Meters
Analog Output and External Control Unit

1 Before Using the Unit

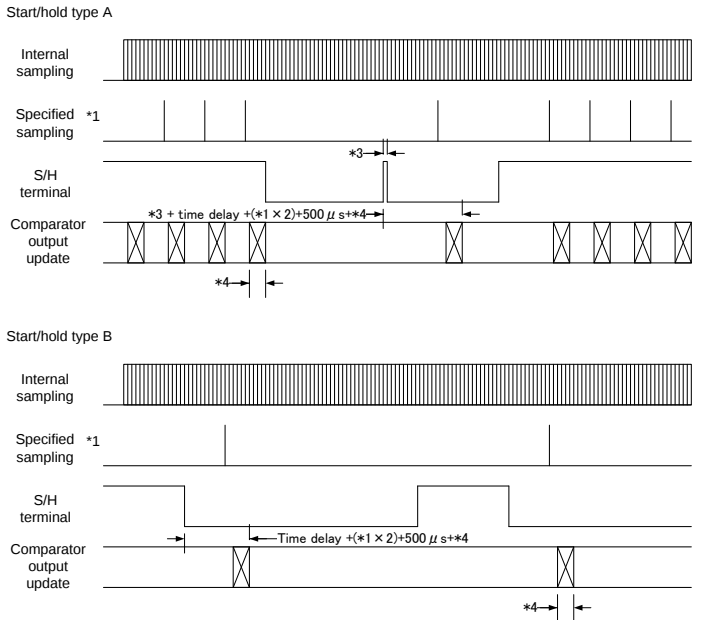
This instruction manual is for the analog output and external control unit of the A6000 series. Read this manual along with the main unit's instruction manual before using the unit.

2 Terminals and Connections



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



*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
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※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)

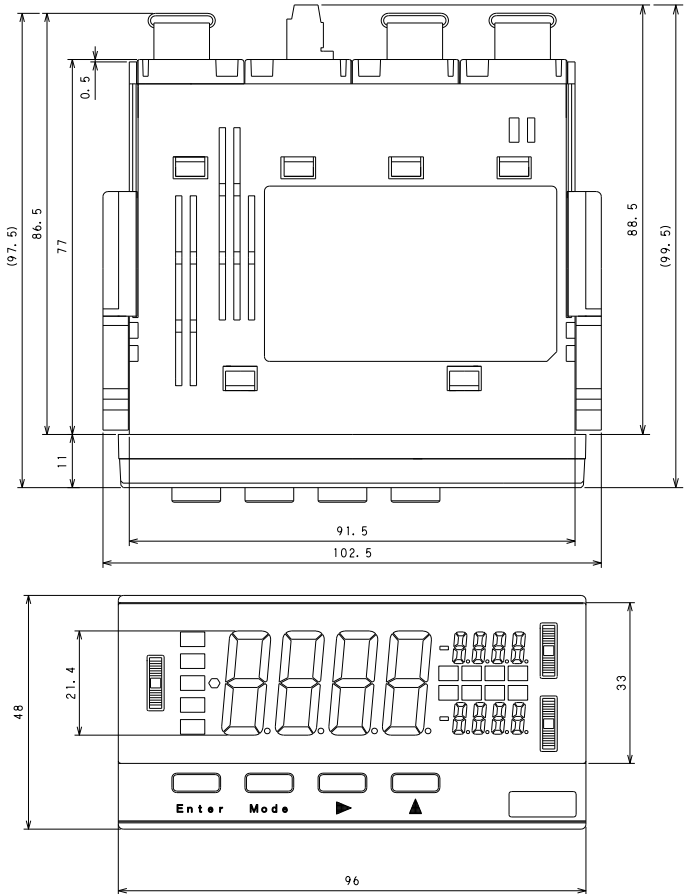
Output type	Load resistance	Accuracy	Response speed	Ripple
0 to 1V	10kΩ or more	±(0.5% of FS)	Approx. 0.5 second	50mVp-p
0 to 10V				
1 to 5V				25mVp-p
4 to 20mA	550Ω or less			

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.

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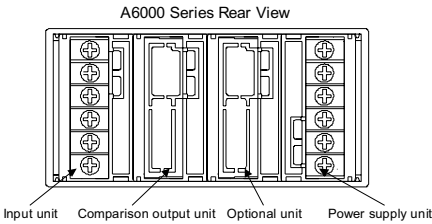
Instruction Manual for A6000 Series
Universal Digital Panel Meter

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

1 Before Using the Unit

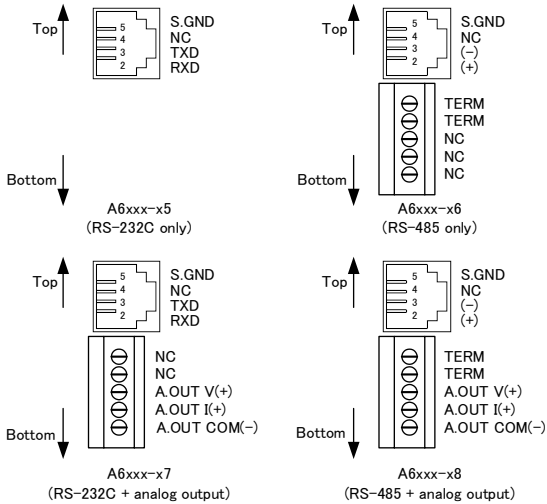
This Operation Manual corresponds to the communication function + analog output optional units of the A6000 Series Universal Digital Panel Meters. When using the instrument, please read through this manual in combination with the Operation Manual of the main unit.

2 Terminals and Connections



CAUTION

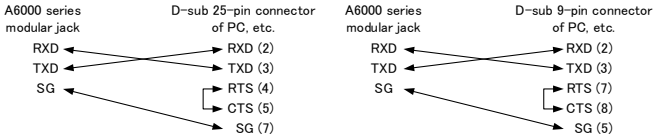
The A6000 series does not support replacement of each unit by the customer.



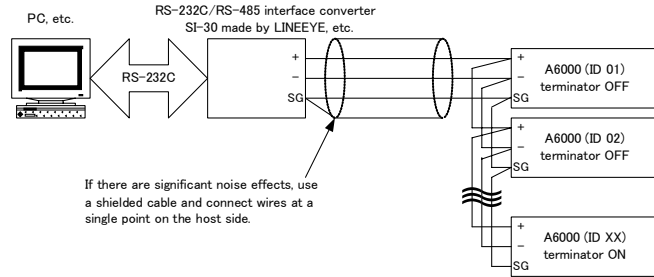
* Modular jack : RJ-14(6P4C)

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

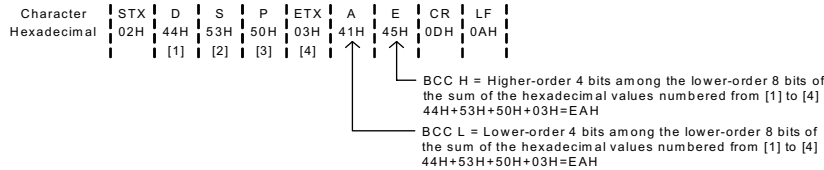
3.4 Establishing RS-485 Communication

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.)										
Cancelling 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.																		

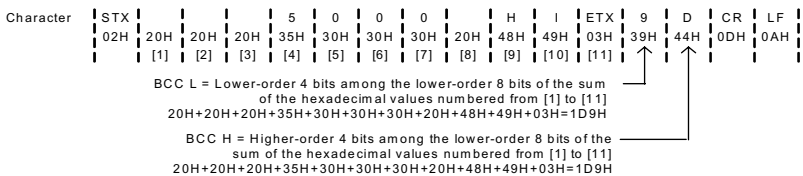
3.5 RS-485 Communication formats

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



Example of BCC Checksum for Reception



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	C	R	L	F									3	10 ("+" indication without decimal point) - 5 0 0 0 0 H I C R L F ("+" indication without decimal point) 5 0 0 . 0 H I C R L F ("+" indication with a decimal point) < = 9 8 0 0 0 H I C R L F ("+" side excess indication without decimal point) < = - 9 8 0 . 0 H I C R L F ("-" side excess indication with a decimal point) P H 5 0 0 0 0 H I C R L F (Peak hold indication without decimal point) 5 0 0 0 0 A L 1 C R L F ("+" indication without decimal point) - 5 0 0 0 0 A L 2 C R L F ("-" indication without decimal point) 5 0 0 . 0 A L 3 C R L F ("+" indication with a decimal point)	10 10 11 10 11 10 11 11 12
Measured value response * A measurement condition such as peak hold, etc. or compression decision is not responded.	M	E	S	C	R	L	F									3	12 ("0" indication without decimal point) 0 . 0 1 C R L F ("0.01" indication with a decimal point) - 1 C R L F (" -1" indication without decimal point) - 0 . 0 0 5 C R L F (" -0.005" indication with a decimal point) < = 9 8 0 . 5 C R L F (Excess indication with a decimal point) < = - 9 8 0 . 5 C R L F ("-" side excess indication with a decimal point) * All responses have a fixed length of 12 characters.	12 12 12 12 12 12 12
Judgment result response * A measurement condition is not responded.	J	G	O	L	O	F	F	N	O	?						3	15 H I C R L F (Response of a state in which the judgment result is HI) G O C R L F (Response of a state in which the judgment result is GO) L O C R L F (Response of a state in which the judgment result is LO) O F F C R L F (Response of a state in which the judgment results are all OFF) N O ? C R L F (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.	15 15 15 15 5
Unit number response	U	N	I													3	11 1 1 , 2 1 , N O , 4 6 C R L F (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.)	11
Response of the maximum value, minimum value, or maximum and minimum values	M	A	X													3	10 M A X 5 0 0 . 0 C R L F (Response of maximum value) M I N - 1 0 0 . 0 C R L F (Response of minimum value) M - M 6 0 0 . 0 C R L F (Response of maximum and minimum values) * These values are simultaneously responded by dividing them with a delimiter.	10 10 10
Clear of the maximum value, minimum value, or maximum and minimum values	M	C	L		M	A										6	5 Y E S C R L F (Clears the maximum value.)	5
	M	C	L		M	I										6	5 Y E S C R L F (Clears the minimum value.)	5
	M	C	L		M	M										6	5 Y E S C R L F (Clears the maximum and minimum values.)	5
Key operation inhibition response	K	E	Y													3	3 O F F C R L F (Response of a state in which the key operation inhibition function is OFF) O N C R L F (Response of a state in which the key operation inhibition function is ON)	3 2
Key operation inhibition setting	K	E	Y		O	F	F									7	5 Y E S C R L F (Deactivates the key operation inhibition function.)	5
	K	E	Y		O	N										6	5 Y E S C R L F (Activates the key operation inhibition function.)	5
Response of remote-controlled hold	S	T	H													3	5 S T A R T C R L F (Response of a state in which hold is deactivated by remote control) H O L D C R L F (Response of a state in which hold is activated by remote control) L O C C R L F (Response of a state in which hold is not remote controlled)	5 4 3
Hold remote control	S	T	H		S											5	5 Y E S C R L F (Deactivates the hold function.)	5
	S	T	H		H											5	5 Y E S C R L F (Activates the hold function.)	5
Trigger input	T															1	11 5 0 0 . 0 H I C R L F ("+" indication with a decimal point) * The response format is the same as the DSP command.	11
Cancellation of hold remote control	E	S	M													3	5 Y E S C R L F	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	C	R	L	F									3	P	H	-	O	F	F	C	R	L	F									6
																		(Response of a state in which peak hold is deactivated by remote control)																	
	V	H	-	O	F	F	C	R	L	F							6	V	H	-	O	F	F	C	R	L	F								
																			(Response of a state in which valley hold is deactivated by remote control)																
	P	V	-	O	F	F	C	R	L	F							6	P	V	-	O	F	F	C	R	L	F								
																			(Response of a state in which peak & valley hold is deactivated by remote control)																
	P	H	-	O	N	C	R	L	F								5	P	H	-	O	N	C	R	L	F									
																			(Response of a state in which peak hold is activated by remote control)																
	V	H	-	O	N	C	R	L	F								5	V	H	-	O	N	C	R	L	F									
																			(Response of a state in which valley hold is activated by remote control)																
	P	V	-	O	N	C	R	L	F								5	P	V	-	O	N	C	R	L	F									
																		(Response of a state in which peak & valley hold is activated by remote control)																	
	L	O	C	C	R	L	F									3	L	O	C	C	R	L	F												
																		(Response of a state in which peak hold is not remote controlled)																	
Peak hold selection setting	P	V	H		P	H	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Sets up peak hold.)																	
	P	V	H		V	H	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Sets up valley hold.)																	
	P	V	H		P	V	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Sets up peak and valley hold.)																	
Peak hold remote control	P	V	H		O	N	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Activates the peak hold function.)																	
	P	V	H		O	F	F	C	R	L	F					7	Y	E	S					C	R	L	F								5
																		(Deactivates the peak hold function.)																	
Peak-held value response	P	V	D	C	R	L	F									3	P	H																	10
																		(Response of peak-held value)																	
	V	H																V	H																10
																			(Response of valley-held value)																
	P	V	H															P	V	H														10	
																			(Response of peak- and valley-held values)																
Clear of peak-held value	P	C	L		P	H	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Clears a peak-held value.)																	
	P	C	L		V	H	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Clears a valley-held value.)																	
	P	C	L		P	V	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Clears peak- and valley-held values.)																	
Cancellation of peak hold remote control	E	P	M	C	R	L	F									3	Y	E	S					C	R	L	F								5
Response of remote-controlled digital zero	D	Z	R	C	R	L	F									3	O	F	F	C	R	L	F												3
																		(Response of a state in which digital zero is deactivated by remote control)																	
	1	0	0	0	C	R	L	F									5	1	0	0	0	C	R	L	F										
																			(Response of a state in which digital zero is activated at 1000 by remote control)																
	-	1	0	0	0	C	R	L	F								5	-	1	0	0	0	C	R	L	F									
																			(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	C	R	L	F										3	L	O	C	C	R	L	F												
																		(Response of a state in which digital zero is not remote controlled)																	
Digital zero remote control	D	Z	R		O	N	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Activates digital zero.)																	
	D	Z	R		O	F	F	C	R	L	F					7	Y	E	S					C	R	L	F								5
																		(Deactivates digital zero.)																	
	D	Z	R		1	0	0	0	C	R	L	F				8	Y	E	S					C	R	L	F								5
																		(Activates digital zero at 1000.)																	
Cancellation of digital zero remote control	E	Z	M	C	R	L	F									3	Y	E	S					C	R	L	F								5
Response of remote-controlled relay reset	R	E	S	C	R	L	F									3	O	F	F	C	R	L	F												3
																		(Response of a state in which relay reset is deactivated by remote control)																	
	O	N	C	R	L	F											2	O	N	C	R	L	F												
																			(Response of a state in which relay reset is activated by remote control)																
	L	O	C	C	R	L	F										3	L	O	C	C	R	L	F											
																		(Response of a state in which relay reset is not remote controlled)																	
Relay reset remote control	R	E	S		O	N	C	R	L	F						6	Y	E	S					C	R	L	F								5
																		(Activates relay reset.)																	
	R	E	S		O	F	F	C	R	L	F					7	Y	E	S					C	R	L	F								5
																		(Deactivates relay reset.)																	
Cancellation of relay reset remote control	E	R	M	C	R	L	F									3	Y	E	S					C	R	L	F								5

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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
																																			3
																																			3
																																			3
																																			2
																																			5
Display blank setting	B	L	K		O	F	F	CR	LF							7	Y	E	S			CR	LF												5
																																			5
																																			5
																																			5
																																			5
Jog switch response	J	S	W	CR	LF											3	O	N	CR	LF															2
																																			3
																																			5
Jog switch setting	J	S	W		O	N	CR	LF								6	Y	E	S			CR	LF												5
																																			5
																																			5
Digital zero backup response	B	D	Z	CR	LF											3	O	N	CR	LF															2
																																			3
Digital zero backup control	B	D	Z		O	N	CR	LF								6	Y	E	S			CR	LF												5
																																			5
Digital zero data save command	S	A	V	CR	LF											3	Y	E	S			CR	LF												5
																																			5
Response of the number of patterns for pattern select	P	S	N	CR	LF											3	1	CR	LF																1
																																			1
Control over the number of patterns for pattern select	P	S	N		1	CR	LF									5	Y	E	S			CR	LF												5
																																			5
Linearize function status response	L	I	N	CR	LF											3	O	F	F	CR	LF														3
																																			1
																																			2
Linearize function status setting	L	I	N		O	F	F	CR	LF							7	Y	E	S			CR	LF												5
																																			5
																																			5
Tracking zero response	T	R	K	CR	LF											3	O	N		T = 1		W = 1	CR	LF											10
																																			12
																																			3
Tracking zero setting	T	R	K		T = 1	CR	LF									7	Y	E	S			CR	LF												5
																																			5
																																			5
																																			5
																																			5

* 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	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
Power-on delay time response	P	O	N	CR	LF											3	0	CR	LF															1	
					</																														

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	C	R	L	F									3	2	4	0	0	C	R	L	F											4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	(Response of a state in which the baud rate is 2400 bps.)																																						4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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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 (The pattern used previously is responded.) C O M T O / U CR LF (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 (Response of a state in which the HI judgment value is "1000") L O - S 5 0 0 CR LF (Response of a state in which the LO judgment value is "500") H I - H 0 CR LF (Response of a state in which the HI hysteresis is "0") L O - H 0 CR LF (Response of a state in which the LO hysteresis is "0") H I - L N O CR LF (Response of a state in which HI logic is normally open) G O - L N O CR LF (Response of a state in which GO logic is normally open) L O - L N O CR LF (Response of a state in which LO logic is normally open) N O ? CR LF (Response made if the relevant input unit is not installed)	3																																3
*Case of the comparison output type is the tolerance judgment	A	L	3	CR	LF											3	P - 1 CR LF (The pattern used previously is responded.) C O M T E R R CR LF (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 (Response of a state in which the nominal value is "5000") E R R 1 5 . 0 0 CR LF (Response of a state in which tolerance 1 is "5.00") E R 1 H 0 CR LF (Response of a state in which the tolerance-1 hysteresis is "0") H I - L N O CR LF (Response of a state in which HI logic is normally open) G O - L N O CR LF (Response of a state in which GO logic is normally open) L O - L N O CR LF (Response of a state in which LO logic is normally open) N O ? CR LF (Response made if the relevant input unit is not installed)	3																																3
Calibration data response	A	L	4	CR	LF											3	P - 1 CR LF (The pattern used previously is responded.) S N S R 5 CR LF (Response of a state in which the sensor power is 5 V) Z R I N 0 . 0 0 0 CR LF (Response of a state in which the zero input value is "0.000") Z E R O 0 CR LF (Response of a state in which the zero indicated value is "0") S P I N 2 . 0 0 0 CR LF (Response of a state in which the span input value is "2.000") S P A N 9 9 9 9 CR LF (Response of a state in which the span indicated value is "9999") N O ? CR LF (Response made if the relevant input unit is not installed)	3																																3
Linearize data response	A	L	5	CR	LF											3	0 1 I = 0 CR LF (Response of a state in which the linearize data N-01 input value is "0") 0 1 O = 0 CR LF (Response of a state in which the linearize data N-01 output value is "0") 0 2 I = 1 0 0 CR LF (Response of a state in which the linearize data N-02 input value is "100") 0 2 O = 1 1 0 CR LF (Response of a state in which the linearize data N-02 output value is "110") 0 2 I = 5 0 0 CR LF . . . 1 6 I = 9 0 0 0 CR LF (Response of a state in which the linearize data N-16 input value is "9000") 1 6 O = 9 2 0 0 CR LF (Response of a state in which the linearize data N-16 output value is "9200") N O ? CR LF (Response of a state in which the linearize function is OFF)	3																																6
Common response																	Y E S CR LF (Normal response) N O ? CR LF (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 (Response to data out of the setting range or data not meeting the setting conditions) * 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. D A T A L O S T C O N D CR LF (Response made if condition data is abnormal) * Set condition data again. D A T A L O S T C O M CR LF (Response made if comparator data is abnormal) * Set comparator data again. D A T A L O S T M E T CR LF (Response made if scaling data is abnormal) * Set scaling data again.																																	5
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 (Response made if condition data is abnormal) * Set condition data again. D A T A L O S T C O M CR LF (Response made if comparator data is abnormal) * Set comparator data again. D A T A L O S T M E T CR LF (Response made if scaling data is abnormal) * Set scaling data again.																																	14
																	D A T A L O S T C O M CR LF (Response made if comparator data is abnormal) * Set comparator data again. D A T A L O S T M E T CR LF (Response made if scaling data is abnormal) * Set scaling data again.																													13				
																	D A T A L O S T M E T CR LF (Response made if scaling data is abnormal) * Set scaling data again.																													13				

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. 2 CR LF (Sets data-setting pattern to "2.") M: CR LF 1 V CR LF (Sets the measurement range to 1 V.) M: CR LF 8 0 0 0 CR LF (Sets the full-scale indicated value to "8000.") M: CR LF 2 0 CR LF (Sets the offset indicated value to "20.") E: CR LF * Setting necessary data and then sending the E command causes data acquired up to that point to be return to measurement operation.	3	P - 1 CR LF (The pattern used previously is responded.) 1 P - 2 CR LF 2 R A N G 2 A CR LF 2 R A N G 1 V CR LF 1 F S C 9 9 9 9 CR LF 4 F S C 8 0 0 0 CR LF 1 O F S 0 CR LF 2 O F S 2 0 CR LF 1 Y E S CR LF N O ? CR LF (Response made if a value out of the setting range is input)	3	3
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. 2 CR LF (Sets data-setting pattern to "2.") M: CR LF M: CR LF 8 0 0 0 CR LF (Sets HI logic to "8000.") M: CR LF - 5 0 0 0 CR LF (Sets LO logic to "-5000.") M: CR LF M: CR LF M: CR LF N C CR LF (Sets HI logic to normally closed.) M: CR LF M: CR LF N C CR LF (Sets LO logic to normally closed.) E: CR LF * A return to measurement operation using the E command (If the N command is sent, a return to side judgment value is made.)	3	P - 1 CR LF (The pattern used previously is responded.) 1 P - 2 CR LF 1 C O M T O / U CR LF 1 H I - S 1 0 0 0 CR LF 4 H I - S 8 0 0 0 CR LF 1 L O - S 5 0 0 0 CR LF 5 L O - S - 5 0 0 0 CR LF 1 H I - H 0 CR LF 1 L O - H 0 CR LF 1 H I - L N O CR LF 2 H I - L N C CR LF 1 G O - L N O CR LF 1 L O - L N O CR LF 2 L O - L N C CR LF 1 Y E S CR LF E R R O R 0 CR LF (Response made if a value not meeting the setting conditions is input) N O ? CR LF (Response of a state in which the relevant input unit is not installed)	3	3
*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 M: CR LF E R R CR LF (Sets the comparator output type to tolerance judgment.) M: CR LF 8 0 0 0 CR LF (Sets the nominal value to "8000.") M: CR LF 2 0 0 0 CR LF (Sets tolerance 1 to "20.00") M: CR LF E: CR LF * A return to measurement operation using the E command (If the N command is sent, a return to side judgment value is made.)	3	P - 1 CR LF (The pattern used previously is responded.) 1 C O M T O / U CR LF 6 C O M T E R R CR LF 1 N V A L 5 0 0 0 CR LF 4 N V A L 8 0 0 0 CR LF 1 E R R 1 5 . 0 0 0 CR LF 5 E R R 1 2 0 . 0 0 0 CR LF 1 E R 1 H 0 CR LF 1 Y E S CR LF E R R O R 0 CR LF (Response made if a value not meeting the setting conditions is input) N O ? CR LF (Response of a state in which the relevant input unit is not installed)	3	3

* 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		●RS-485	
Baud rate	: 38400, 19200, 9600, 4800, or 2400 bps	Baud rate	: 38400, 19200, 9600, 4800, or 2400 bps
Start bit	: 1 bit	Start bit	: 1 bit
Data length	: 7 bits or 8 bits	Data length	: 7 bits or 8 bits
Parity	: even, odd, or none	Parity	: even, odd, or none
Stop bit	: 1 bit or 2 bits	Stop bit	: 1 bit or 2 bits
Character code	: ASCII code	Character code	: ASCII code
Delimiter	: CR or CR+LF	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

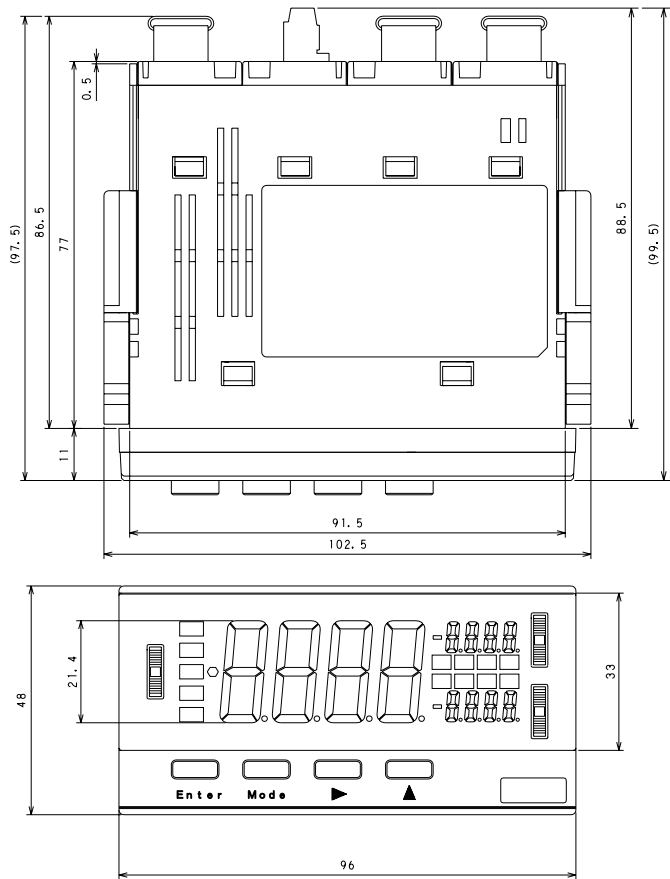
6 Warranty and After-sales Services

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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