Quick Manual

Temperature Measuring Digital Meter Relay, Model 452B

I-01613

1. Preface

Thank you for purchasing our digital meter relay 452B series.
Before use, read this manual carefully and thoroughly, and keep this manual available for routine reference.
Please check contents of the package you received as outlined below.
(1) 452B itself (2) packing (3) This manual (4) Unit label (5) Indication label
(6) Connector with 2m flat cable (BCD output option)

For safe use of this product, please observe the following warning and caution.
In order to help the users' safe use of the products, the following symbol marks are used in this manual.

⚠ WARNING This is the warning to avoid the danger when it is assumed that such danger as may cause fatal accident or severe injure to a user occurs in case that the product is mishandled.

⚠ CAUTION This is the caution to avoid the danger when it is assumed that such danger as may cause minor injure to a user or generate only physical obstacle occurs in case that the product is mishandled.

⚠ WARNING

● There is no power on-off switch on the model 452B. It immediately starts to operate after turning the power.
● Do not touch terminals when turning the power on.

⚠ CAUTION

Preserve followings for your safety.
● The rated data is, however, defines with more than 15 minutes warming-up times.
● When the product is installed in the cabinet, perform the appropriate heat radiation to keep less than 50 °C in it.
● Avoid the close-contacted mounting of the meter relay. The rise of internal temperature affects the life of product.
● Do not install under the following conditions.
- **●Where it is exposed to direct sunlight, dust, corrosive gases, rain, etc.**
- **●Where ambient temperature or humidity is high.**
- **●Where it is exposed to excessive noise or static electricity.**
- **●Where there is constant vibration or shock**

● Store the instrument within the specified temperature range for storage (-20~70°C).
● When the front panel or the case becomes dirty, wipe it with soft cloth.
For heavy dirt, wipe it lightly with the soft cloth wetted with the neutral cleaner thinned by water, and finish the cleaning with dry cloth. Do not use organic solvent like benzene or paint thinner as they may deform or discolor the case.

2. Specifications

2.1 Installation Specifications

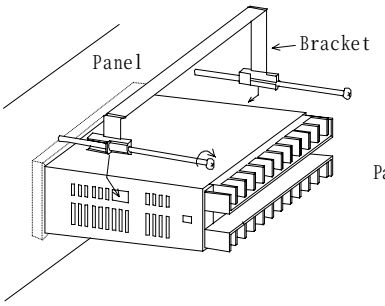
Power Supply	:	AC100 to 240V (90-250V) 50/60Hz, DC12 to 24V (9-32V), DC110V (100-170V)
Power Consumption	:	Approx. 9VA at 100VAC, 11.5VA at 200VAC, 400mA at 12VDC, 200mA at 24VDC, 40mA at 110VDC.
Comparator output	:	Relay output 4-SPST (NO) for AL1 to AL4, and 1-SPDT for GO Contact capacity (resistive): AC250V 1A, DC30V 1A Min. 10^5 electrical operation life (ON-OFF 1200 times / hr) Min. $20x10^6$ mechanical operation life (ON-OFF 18000 times / hr) Open Collector output 5-NPN for AL1 to AL4, and GO Contact rating: Max. DC30V 30mA, saturation voltage: Max. DC 1.6V
Operating Temperature	:	0 to 50°C
Storage Temperature	:	-20 to 70°C
Weight	:	Approx. 300g
Mounting Method	:	Panel mount with the bracket

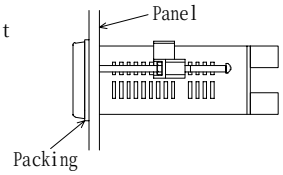
2.2 General Specifications

Display	:	0~99999, "-" polarity, with zero-suppress function. PV: red or green LED (character height 15.2mm) SV1 and SV2: red LED (character height 7.6mm)
Input sensor	:	Selectable
Unit (^{o}C / ^{o}F)	:	Selectable by the parameter setting (^{o}F = ^{o}C × 9/5+32)
Over-range indication	:	Blinking with minimum or maximum value of display range
Burnout	:	RTD input: Blinking with maximum value of display range Thermocouple input: Blinking with minimum or maximum value of display range (programmable)
Resolution	:	RTD input: 0.1 ^{o}C (0.01^{o}C when Pt100Ω range 2) Thermocouple input: 0.1 ^{o}C
External resistance	:	500Ω Max. for Thermocouple input
Wire resistance	:	5Ω Max. per wire for Thermocouple input
Sampling rate	:	Approx. 5 times / sec.
Noise Rejection	:	Normal mode (NMR) - 50dB or more. Common mode (CMR) - 110dB or more.
Noise Through Power Supply Line	:	1000V (at AC voltage power supply)
Insulation Resistance	:	DC500V 100MΩ or more.
Withstanding Voltage	:	Input terminals - Case : AC2000V each for 1 min. Power supply terminals - Case : AC2000V each for 1 min. Power supply terminals - Input and output terminals : AC1500V each for 1min. Input terminals - Output terminals : AC500V each for 1 min.
Housing protection	:	IP65 for the front panel, IP20 for the rear case, IP00 for terminals

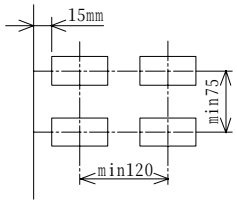
3. Mounting

Insert the case with the suitable gasket from the panel front.
Fix the case using the mounting bracket.
Cut the panel to mount the case in accordance with the illustration.





Fixing pitch



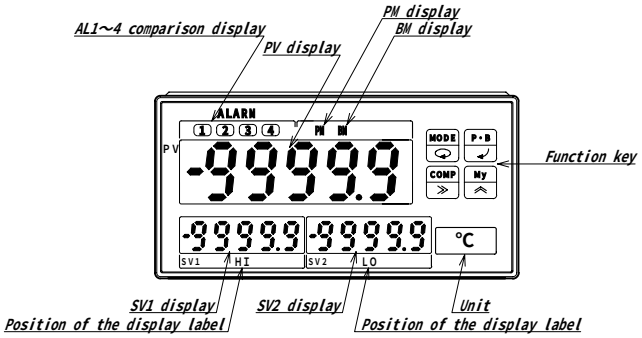
Panel cut dimension: $92^{+0.8/-0}$ × $45^{+0.6/-0}$ mm
Recommended panel thickness is 0.6 to 6mm.
For light panel, such as aluminum, should be 1.5mm or more to avoid deform.
Fasten torque of the mounting bracket is 0.2 to 0.3N･m.

⚠ CAUTION

- **Do not overtighten the mounting bracket.**
- **When plural mounting, pay attention to ventilation to cool down in the panel.**

4. Nomenclature

4.1 Front panel



4.2 Function key

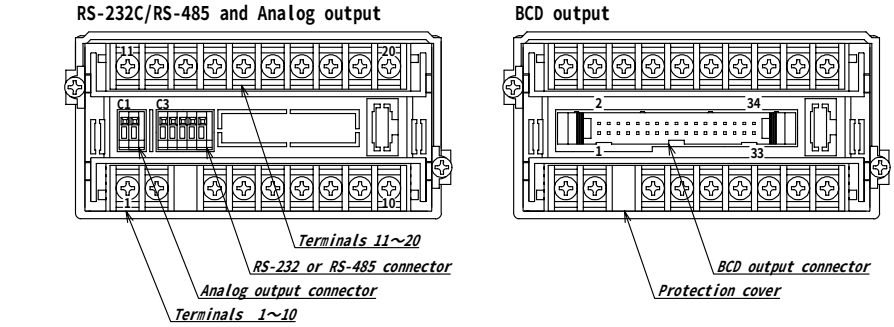
MODE ･･･Switch the measuring, the parameter setting, and the calibration mode.
･･･Switch modes during the parameter setting mode.

P・B ･･･Switch indications during the measuring mode.
･･･Enter the input value during the parameter setting mode.

COMP ･･･Switch alarm points during the measuring mode.
･･･Shift among the digits during the parameter setting mode.

My ･･･Switch to My mode during the measuring mode.
･･･Change values during the parameter setting mode.

4.3 Rear panel



5. Connections

5.1 Terminals and Connections

⚠ WARNING

- **To avoid an electrical shock, turn the power off when wiring.**
- **Do not wire with moistened hands. Locate away from the wet place.**
- **Do not touch terminals when turning the power on.**

⚠ CAUTION

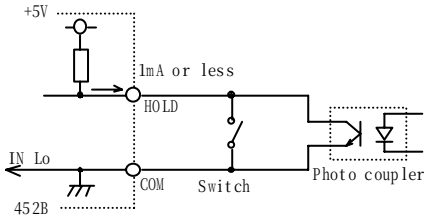
- **Power supply and load should be within the suitable range.**
- **Power supply should be rapidly reach the rated power within few seconds.**
- **When the power is turned OFF and ON again soon after, provide the downtime of 10 seconds or more.**
- **Do not miswiring.**

• Note for wiring

(1) Lay the input cable and the power cable separately.
Otherwise indication may be fluctuated.

(2) Provide appropriate noise protection when operating solenoid or large relay by using the relay output.
Sealed case or power line filter or isolated transformer may be effective.

(3) COM, HOLD, MR and ALRESET terminals are not insulated.
Terminals shall be wired to photo coupler, relay, switch, and so on.
Each meter shall be insulated when plural mounting.



■Terminals

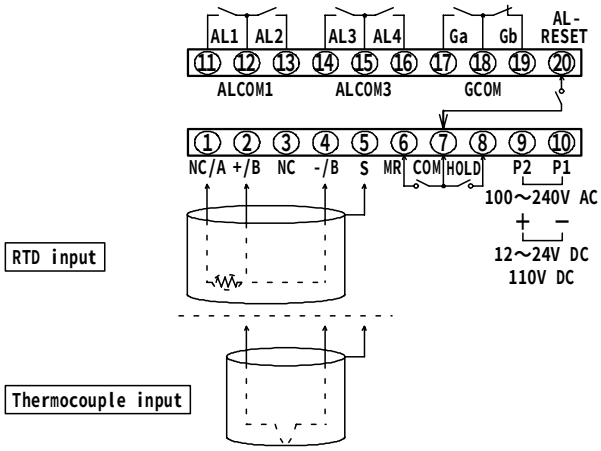
Terminals are not insulated from the input.

Active "L" $I_{IL} \leqq$-1mA、"L"=0～1.5V、"H"=3.5～5V

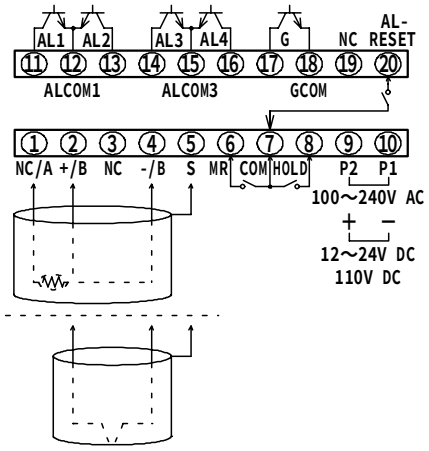
- Hold : Hold display, data output, current value, peak memory, bottom memory, and display amplitude. Hold the data when the hold input is active.
- MR : Rest peak memory, bottom memory, and jump width.
- ALRESET : Release (OFF) alarm outputs and GO outputs.

●Terminals

Relay output

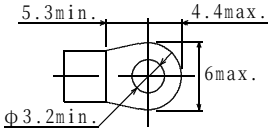


Open collector output

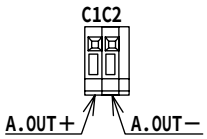


The screw is not provided on the terminal No.3.
Do not remove the protection cover on the terminal No.3.

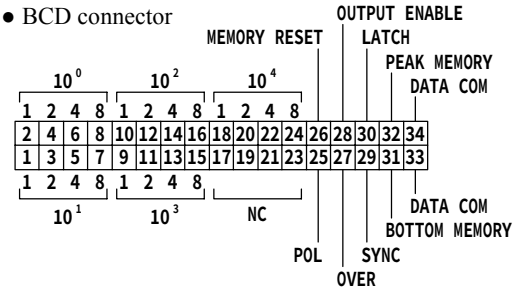
Terminal screws : M3
Fastening torque : 0.46~0.62N・m
Crimped terminal : Refer to the figure at the above.



● Analog output connector

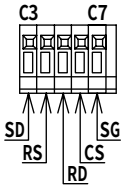


● BCD connector

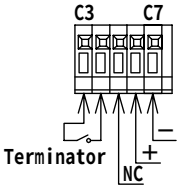


Suitable connector
XG4M-3430-T:OMRON Corp.
with 2m cable

● RS-232C output connector



● RS-485 output connector



Recommended wire { Solid wire : AWG28 to 22
Twisted wire : AWG28 to 22
O.D. 0.125 min.

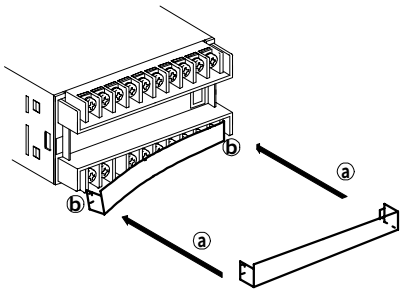
Strip-off length: 9 to 10mm

5.2 Attaching and detaching of terminal block cover

● Assemble procedures

(1) Direct the claws of the cover to the terminal blocks. “a”

(2) Insert the claw on either side of the cover as the figure shows. “b”
Insert the claw on another side until it clicks.
Thus, the attaching is completed.

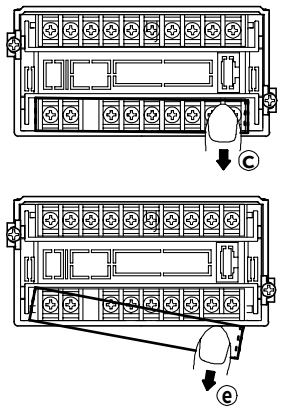


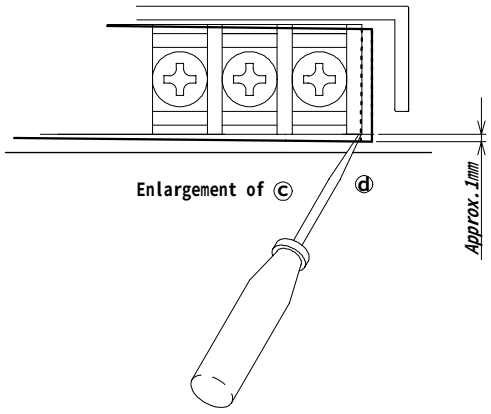
● Disassemble procedures

(1) Pressing the surface on one side of the cover, slightly slide it downwards. “c”

(2) Insert a small screwdriver into the gap made between the side wall of the terminal blocks and the claw of the cover, and stretch it outward. “d”

(3) Move whole the cover downwards, then the claw on another side is departed from the terminal blocks. “e”





6. Function

6.1 Parameter list

● Display function

No.	Function	Display	Contents	Default
04	Input sensor	SEn.	K, J, R, E, T, B, N, Pt100Ω range 1, Pt100Ω range 2, JPt100Ω	K
05	Display cycle	rATE.	200ms, 400ms, 1s, 2s, 4s, 5s	200ms (SP1)
06	Average calculation	MAuE.	OFF, ON, 2, 4, 8, 16, and 32 times	OFF
07	Unit (°C / °F)	C.F.	°C, °F	°C
08	Burnout	bo.	+ burnout, - burnout	+ burnout
11	PV Display color	CoLor.	RR, RG, GR, GG	RG*
12	SV1 Display	SUb. 1	OFF, AL1 to 4, RM, PM, BM, PB	AL3
13	SV2 Display	SUb. 2	OFF, AL1 to 4, RM, PM, BM, PB	AL2
14	Display shutoff timer (Setting of light out time for PV, SV1 and SV2)	TUrn	ON, OFF, 0 to 99 min.	0, 0, 0, 01 (0: OFF)

*R G
Green when all AL turn OFF.
Red when any AL from 1 to 4 ON.

Use an attached display label when changing the display.

● Alarm Output

No.	Function	Display	Contents	Default
40	Power On delay	P.dLY.	2 to 99 seconds	02
41	Comparison data	C.SEL.	RM, PM, BM, PB	RM (current value)
42	AL1 Comparison value	AL. 1	-9999.9 to +9999.9	200.0
43	AL2 Comparison value	AL. 2	-9999.9 to +9999.9	300.0
44	AL3 Comparison value	AL. 3	-9999.9 to +9999.9	700.0
45	AL4 Comparison value	AL. 4	-9999.9 to +9999.9	800.0
46	AL1 Hysteresis	HYS. 1	1 to 999	001
47	AL2 Hysteresis	HYS. 2	1 to 999	001
48	AL3 Hysteresis	HYS. 3	1 to 999	001
49	AL4 Hysteresis	HYS. 4	1 to 999	001
50	AL1 Comparison method	ForM.1	OFF, HI, LO	OFF
51	AL2 Comparison method	ForM.2	OFF, HI, LO	LO
52	AL3 Comparison method	ForM.3	OFF, HI, LO	HI
53	AL4 Comparison method	ForM.4	OFF, HI, LO	OFF
54	Output Delay	odLY.	0 to 99 seconds	00
55	Comparison conditions	EQUAL.	GO, NG	NG
56	Zone setting	ZonE.	ON, OFF	OFF

● BCD output

No.	Function	Display	Contents	Default
70	BCD output sampling	bCdSP.	SAMP, DISP (sampling cycle or display cycle)	DISP (Display cycle)

● Analog output

No.	Function	Display	Contents	Default
75	Output switching	ASEL.	RM, PM, BM, PB	RM (current value)
76	Min. value	AMIn.	-09: 0 to 9.9 V -29: 0 to 19.9mA	-09: 01.0 V -29: 04.0 mA
77	Max. value	AMAx.	-09: 0.1 to 10.0 V -29: 0.1 to 20.0mA	-09: 05.0 V -29: 20.0 mA
78	Offset	AoFFS.	-9999.9 to +9999.9	0000.0
79	Full scale	AFULL.	-9999.9 to +9999.9	1999.9

NOTE: After changing parameter 76 and/or 77, analog output data at the calibration mode resets to default value.

● RS-232C / RS-485

No.	Function	Display	Contents	Default
80	Baud rate	bAUd.	4800, 9600, 19200, 38400 bps	9600 bps
81	Data length	LEnGT.	8 bit, 7 bit	8 bit
82	Parity	PArIT.	None, Odd, Even	None
83	Stop bit	StoP.	2 bit, 1 bit	1 bit
84	BCC switching	bCC.	ON, OFF	OFF
85	Unit number	rSno.	0 to 99	00

● My setting mode

No.	Function	Display	Contents	Default
99	Code registration	MY.	00 to 98 (00 for non-registration)	

● My setting mode

Registration No.	Code No.	Function
1	42	AL1
2	43	AL2
3	44	AL3
4	45	AL4
5	00	NC
6	00	NC
7	00	NC
8	00	NC

6.2 Explanation of function

● Display function

Parameter 04 : Select the input sensor

Display	Sensor
SEn. 0	K
SEn. 1	J
SEn. 2	R
SEn. 3	E
SEn. 4	T
SEn. 5	B
SEn. 6	N
SEn. 10	Pt100Ω range 1
SEn. 11	Pt100Ω range 2
SEn. 12	JPt100Ω

Parameter 05 : Select the display rate.
SP1:200ms、SP2:400ms、SP3:1s、SP4:2s、SP5:4s、SP6:5s (Becomes 200ms at the moving average.)

Parameter 06 : Select the numbers of average calculation.
OFF: No average calculation
ON: Sectional average
2, 4, 8, 16, 32 : Numbers of data of moving average

Parameter 07 : Choose temperature unit, °C or °F.

Parameter 08 : FixSelect + burnout or – burnout when using thermocouple (+burnout only for RTD).

Display	burnout
bo. 0	+burnout
bo. 1	–burnout

Parameter 11 : Select the PV display color.

Parameter 12 : Select any SV1 display from setting value, current value, peak memory, bottom memory, display amplitude, and shut-off .

Parameter 13 : Select any SV2 display from setting value, current value, peak memory, bottom memory, display amplitude, and shut-off .

Parameter 14 : Select the shut-off time of the display after the switch operation.

● Comparison output

Parameter 40 : Select the stand-by time for AL 1 to 4 and GO after supplying the power.

Parameter 41 : Select any comparison data from setting value, current value, peak memory, bottom memory, display amplitude, and shut-off .

Parameter 42 - 45 : Select the comparison data of the AL1, AL2, AL3, and AL4.

Parameter 46 - 49 : Select hysteresis of the AL1, AL2, AL3, and AL4.

Parameter 50 - 53 : Select any comparison method of the AL1, AL2, AL3, and AL4 from HI, LO to OFF.

Parameter 54 : Select the ON delay time for AL 1 to AL 4.

Parameter 55 : Select the comparison condition for AL 1 to AL 4 whether equal NG or equal GO.

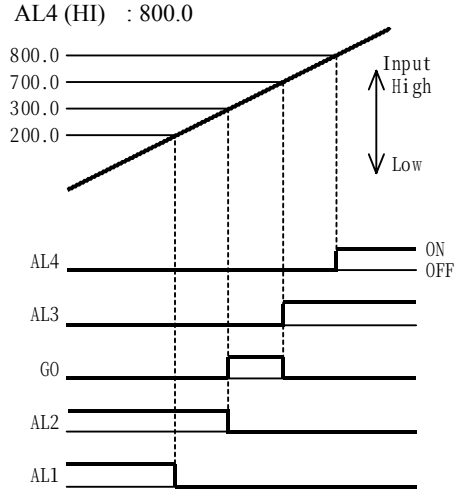
Equal NG	Equal GO
Display value≧Max. setting value・・・・・・・・・・・・・・・・・・・・HI	Display value＞Max. setting value・・・・・・・・・・・・・・・・・・・・HI
Min. setting value＜Display value＜Max. setting value・・・GO	Min. setting value≦Display value≦Max. setting value・・・GO
Display value≦Min. setting value・・・・・・・・・・・・・・・・・・・・LO	Display value＜Min. setting value・・・・・・・・・・・・・・・・・・・・LO

Parameter 56 : Select the judgment of the comparison output whether standard or zone.

○Judgment example

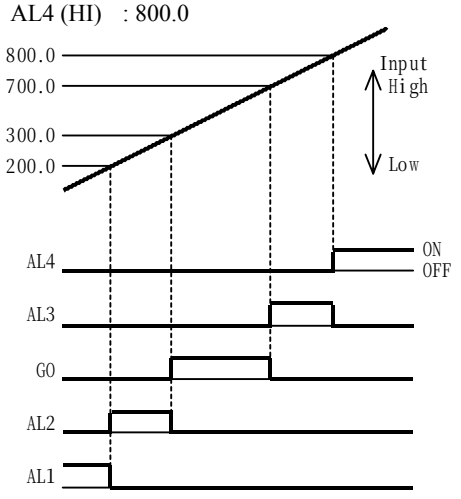
Standard: There is no limitation, large and small, for AL1, AL2, AL3 and AL4.

AL1 (LO)
AL2 (LO)
AL3 (HI) : 700.0
AL4 (HI) : 800.0



Zone: AL1 ＜ AL2 ＜ AL3 ＜ AL4.

: 200.0 AL1 (LO) : 200.0
: 300.0 AL2 (LO) : 300.0
AL3 (HI) : 700.0
AL4 (HI) : 800.0



● BCD output

Parameter 70	:	Select the BCD data, whether display cycle or sampling rate. Disable P-06 at the sampling rate.

● Analog output

Parameter 75	:	Switch the analog output.
Parameter 76	:	Set the output value at the 0% input.
Parameter 77	:	Set the output value at the 100% input.
Parameter 78	:	Set the display value at the 0% input.
Parameter 79	:	Set the display value at the 100% input.

● RS-232C / RS-485

Parameter 80	:	Select the Baud rate
Parameter 81	:	Select the Data length.
Parameter 82	:	Select the Parity.
Parameter 83	:	Select the Stop bit.
Parameter 84	:	Disable / Enable the BCC.
Parameter 85	:	Select the Unit number.

● My setting mode

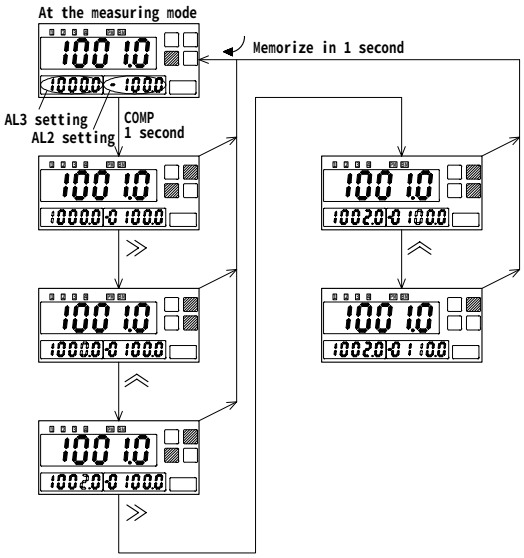
Parameter 99	:	Register well-used 8 code numbers in the setting mode.

7. Parameter Setting

7.1 How to change the comparison setting value

During the measuring mode, the comparison value of the SV1 and SV2 is changeable by pushing COMP key.

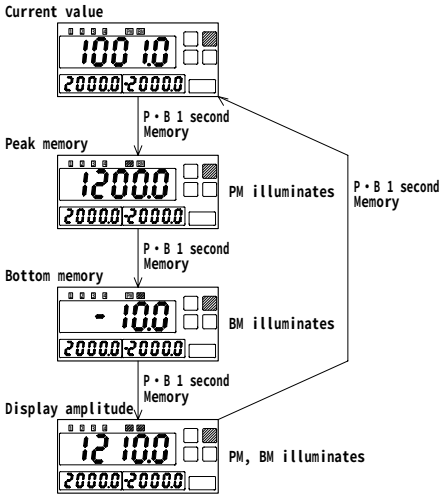
Setting example: Changes AL3 to 1002.0 and AL2 to -110.0 when the comparison setting is AL3 and AL2 for the SV1 and SV2.



※This function is only available when SV1 and SV2 selecting to comparison setting value.

7.2 PV Display switching

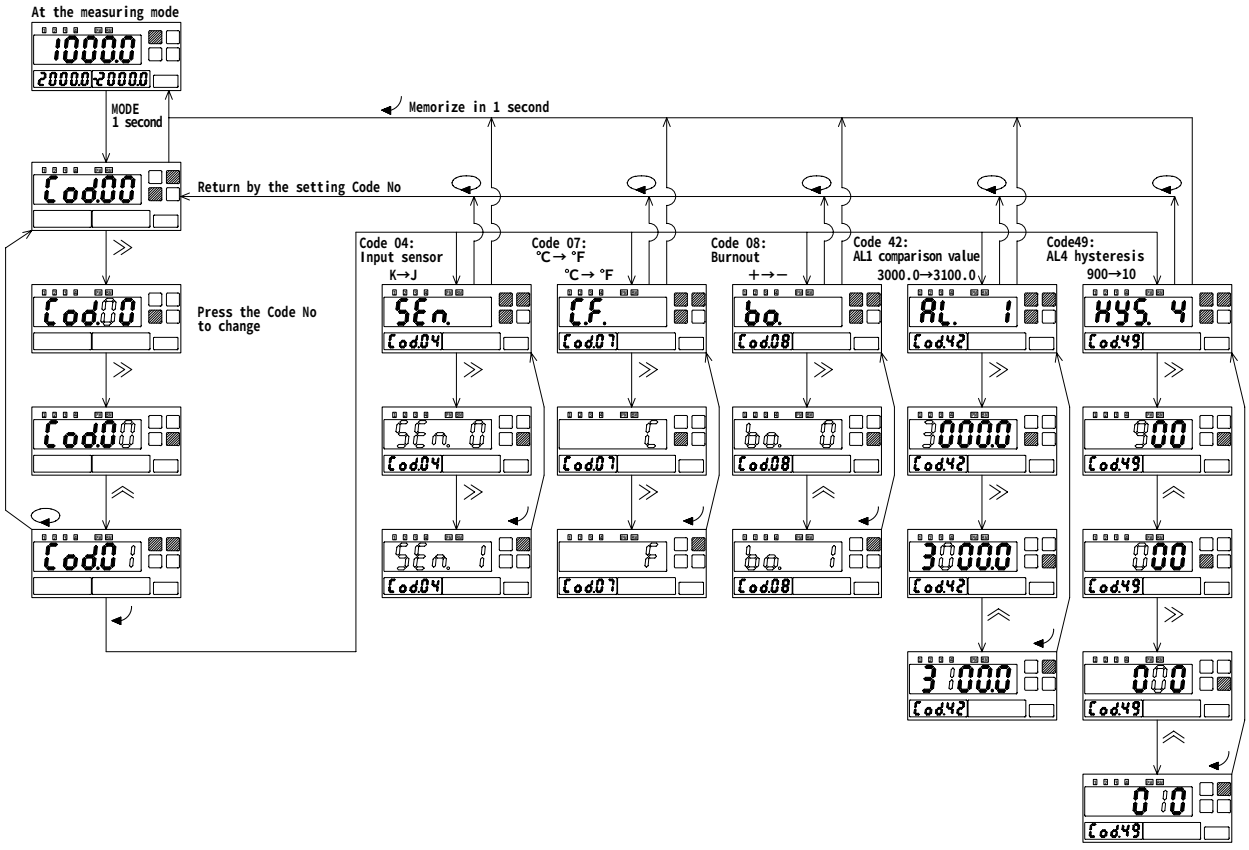
During the measuring mode, the display switches from current value to peak memory, bottom memory, display amplitude, and current value, by pushing P·B key.



※During If keep the P·B key pushing more than 3 seconds, memory will be reset after switching the display.

7.3 Parameter setting mode

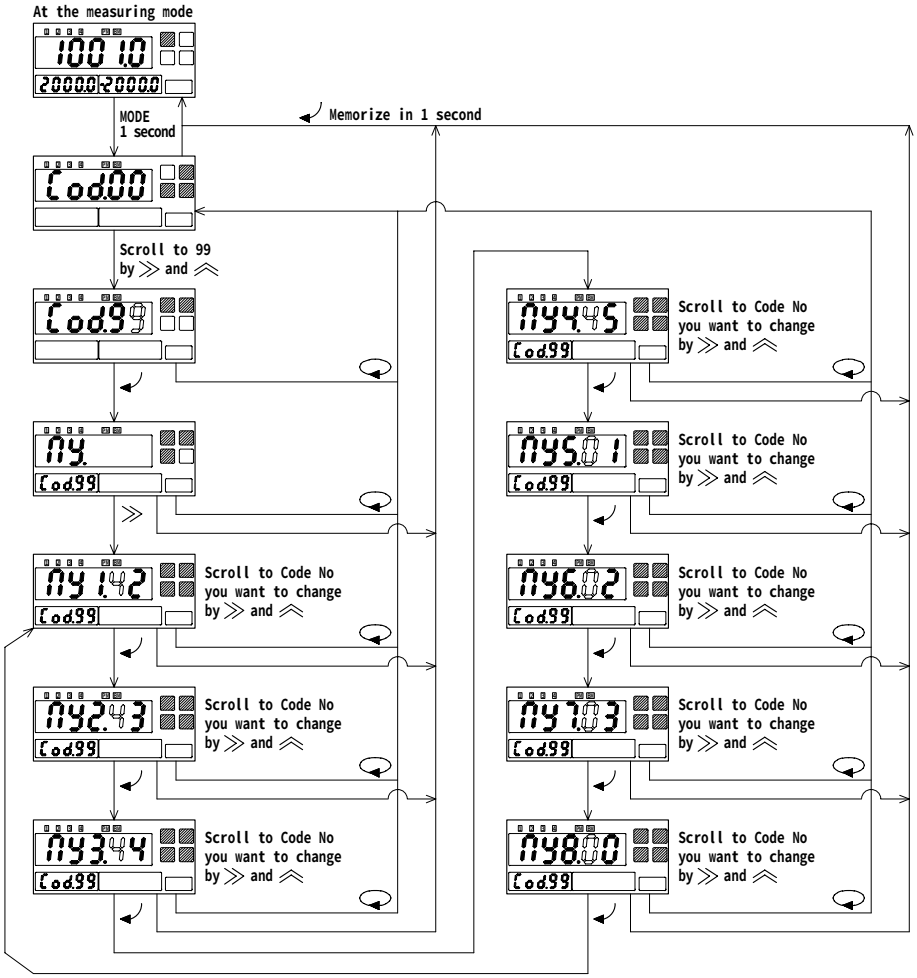
During the measuring mode, the display shows "Cod.00" and switches to the parameter setting mode, by pushing the MODE key.



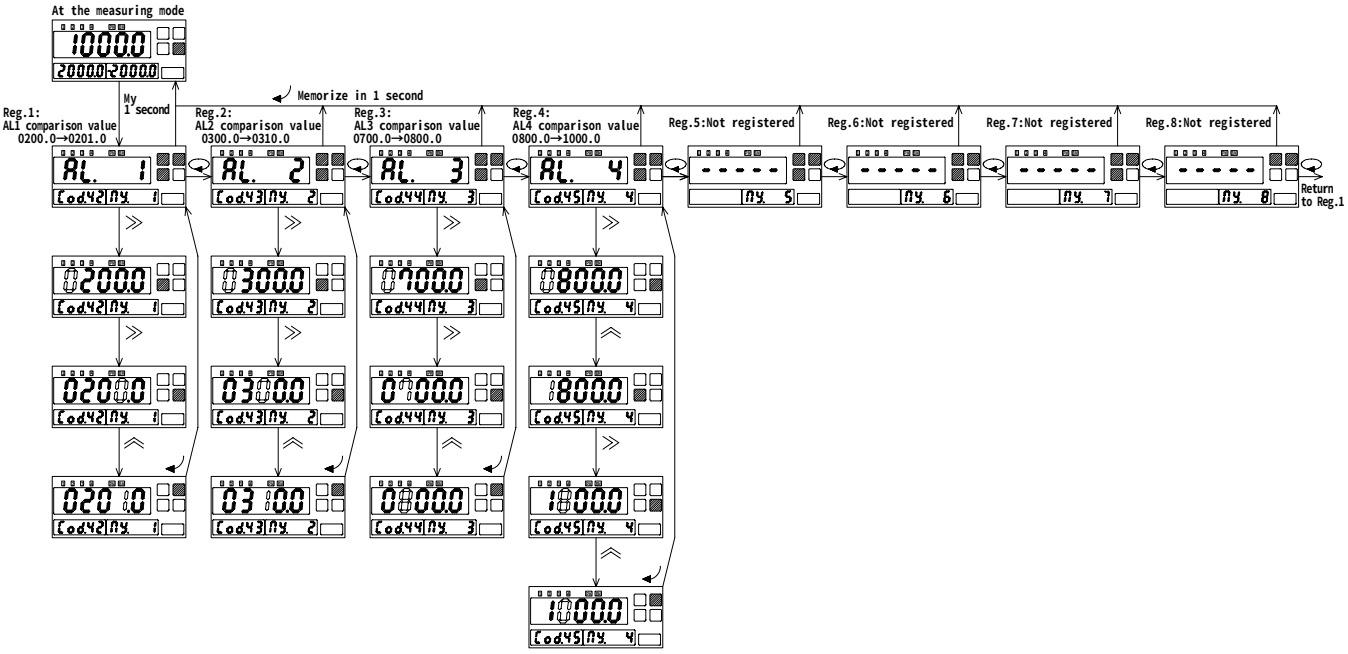
7.4 My setting mode

For your convenience, register well-used 8 code numbers in the setting mode.
During the measuring mode, the display switches the My setting mode by pushing [My] key.
The setting can be simplified by registering only the necessary function.

● How to register codes



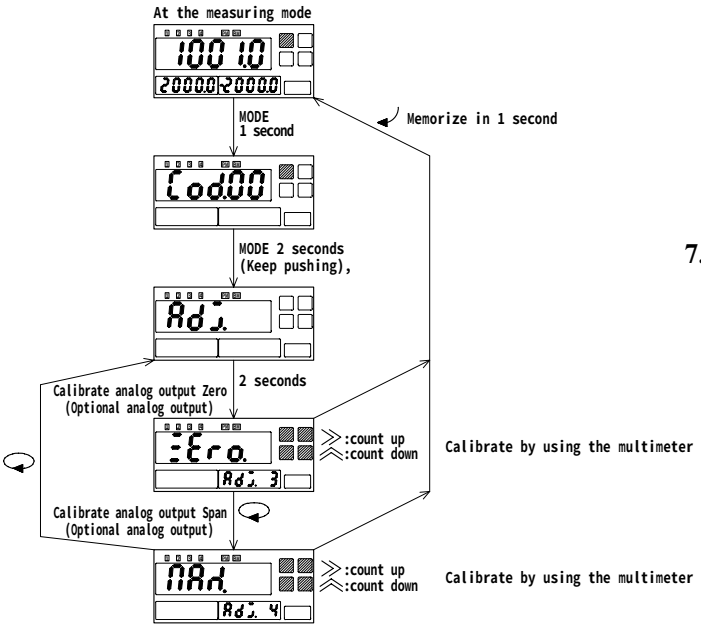
● How to change setting value



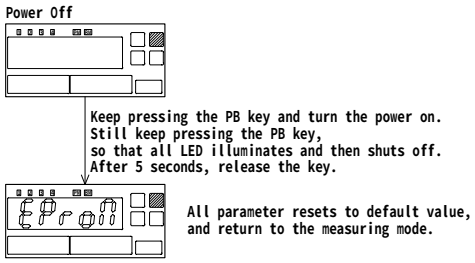
7.5 Calibration mode

This mode is ideal for fine calibration of the display and the optional analog output.

During the measuring mode, the display shows "Adj" and switches the Calibration mode by pushing **MODE** key.



7.6 Reset to Default value



7.7 Error message

Display	Cause of trouble	Countermeasure
Err 1	Entered Code No. is not applicable.	Enter correct Code No.
Err 2	Entered value is out of range.	Enter correct value

※ During the parameter setting mode and the My setting mode, return automatically to the measuring mode if you do not touch the switch more than 5 minutes. Changed value does not memorize in this case.

7.8 Verification mode

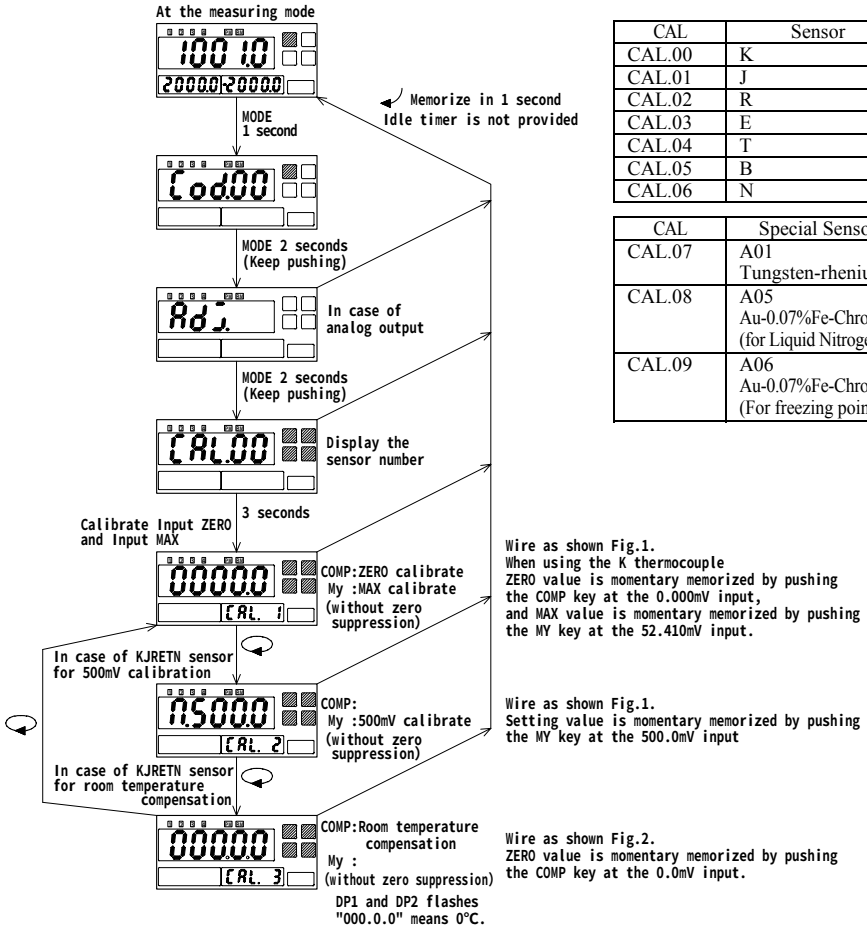
Calibrate annually to keep accuracy.

Calibration should be done under the condition of 23°C+/-5°C, 75%RH.

● Thermocouple

Prepare the voltage-base generator, the cold contact circuit, and the base thermocouple.

We recommend to make the cold contact circuit by putting ice water in the pot.



CAL	Sensor	ZERO		MAX	
CAL.00	K	0.0 °C	0.000mV	1300.0 °C	52.410mV
CAL.01	J	0.0 °C	0.000mV	1200.0 °C	69.553mV
CAL.02	R	0.0 °C	0.000mV	1700.0 °C	20.222mV
CAL.03	E	0.0 °C	0.000mV	1000.0 °C	76.373mV
CAL.04	T	0.0 °C	0.000mV	400.0 °C	20.872mV
CAL.05	B	0.0 °C	0.000mV	1800.0 °C	13.591mV
CAL.06	N	0.0 °C	0.000mV	1300.0 °C	47.513mV

CAL	Special Sensor	ZERO		MAX	
CAL.07	A01 Tungsten-rhenium	0 °C	0.000mV	2000.0 °C	33.66mV
CAL.08	A05 Au-0.07%Fe-Chromer (for Liquid Nitrogen)	77.4K	0.000mV	300.0 K	4.619mV
CAL.09	A06 Au-0.07%Fe-Chromer (For freezing point)	273.1K	0.000mV	10.0 K	-5.155mV

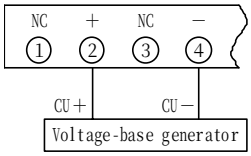


Fig.1

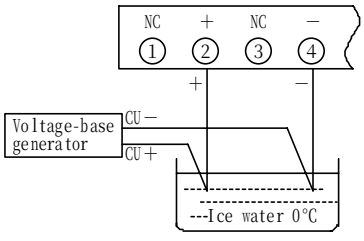
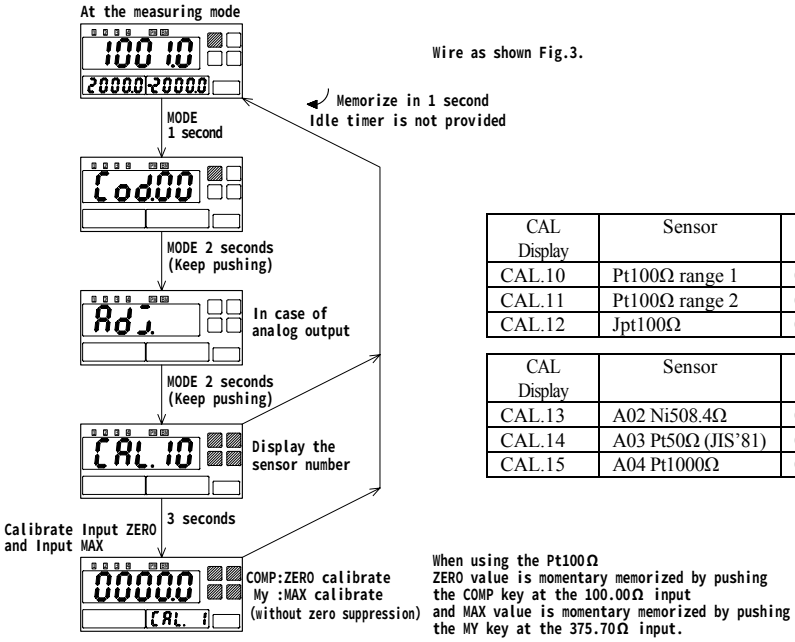


Fig.2

● RTD

Prepare the base variable resister.



CAL Display	Sensor	ZERO		MAX	
CAL.10	Pt100Ω range 1	0.0 °C	100.00Ω	800.0 °C	375.70Ω
CAL.11	Pt100Ω range 2	0.00 °C	100.00Ω	150.00 °C	157.33Ω
CAL.12	Jpt100Ω	0.0 °C	100.00Ω	600.0 °C	317.28Ω

CAL Display	Sensor	ZERO		MAX	
CAL.13	A02 Ni508.4Ω	0.0 °C	508.40Ω	280.0 °C	1440.03Ω
CAL.14	A03 Pt50Ω (JIS'81)	0.0 °C	50.00Ω	600.0 °C	158.64Ω
CAL.15	A04 Pt1000Ω	0.0 °C	1000Ω	500.0 °C	2809.8Ω

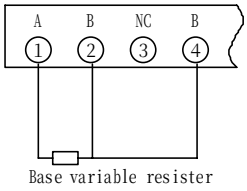
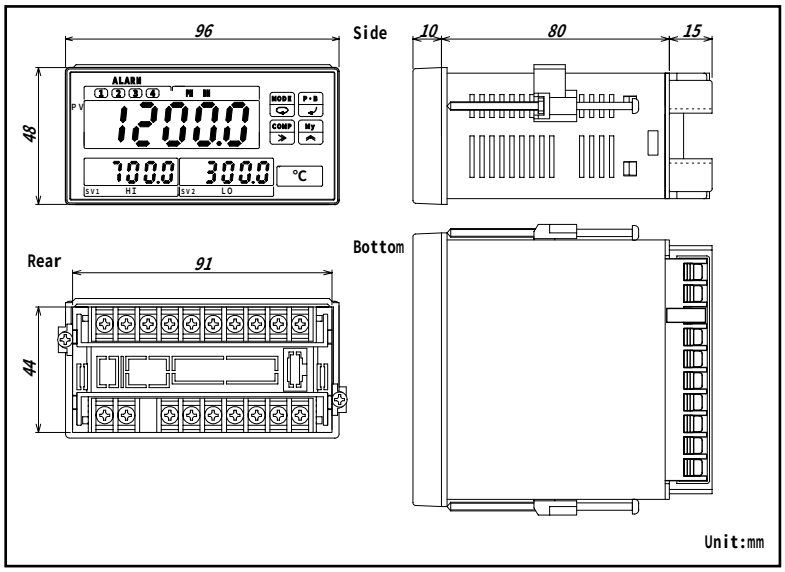


Fig.3

7.9 Numeric and Character Indications

8. External Dimensions



9. Model Numbering

452B–(1)–(2)–(3)–(4) –(5)

[1] Power Supply Voltage

Code	Power Source Voltage
A	AC100 to 240V
B	DC 12 to 24V
C	DC110V

[2] Data Output 1

Code	Specifications	Impedance	Max. Load
Null	No output		
09	Analog voltage (positive input side outputs) DC 0-10V (Available scaling, Default: 1-5V)	Max. 0.1Ω	Min. 100Ω at DC 0-1V Min. 1kΩ at DC 0-10V Min. 500Ω at DC 1-5V
29	Analog current (positive input side outputs) DC 0-20mA (Available scaling, Default: 4-20mA)	Min. 5MΩ	Max. 2.4kΩ at DC 0-5mA Max. 600Ω at DC 0-20mA Max. 600Ω at DC 4-20mA
BP	BCD output (TTL level positive logic)		
BN	BCD output (TTL level negative logic)		
DP	BCD output (transistor output, source type)		
DN	BCD output (transistor output, sink type)		
E0	RS-232C		
E1	RS-485		

[3] Data Output 2 (Available -09 and -29 of Data output 1 only)

Code	Specifications
Blank	No output
E0	RS-232C
E1	RS-485

[4] Comparison output

Code	Specifications
Blank	Relay output
TN	Open collector output (NPN)

[5] Special sensor (Optional)

Code	Special Sensor
Blank	Standard sensor
A01	Tungsten-rhenium 5% (WRe5-26, Tungsten-rhenium 26% thermocouple)
A02	Nickel RTD
A03	Pt50Ω
A04	Pt1000Ω
A05	Au-0.07%Fe-Chromer thermocouple (for Liquid Nitrogen)
A06	Au-0.07%Fe-Chromer thermocouple (for freezing point)

※ A special sensor cannot be switched.

9.1 Standard Sensor and Measuring Input

Thermocouple

Sensor	Measuring Range	Display	Error (23ºC±5ºC, 45~75%RH)
R	100.0 to 1700.0 ºC	-50.0 to 1800.0 ºC	±(0.1% of rdg + 0.6 ºC) (100.0 to 500.0 ºC)
			±(0.1% of rdg + 0.5 ºC) (500.0 to 1700.0 ºC)
K	-100.0 to 1300.0 ºC	-200.0 to 1400.0 ºC	±(0.1% of rdg + 0.6 ºC) (-100.0 to 0.0 ºC)
			±(0.1% of rdg + 0.5 ºC) (0.0 to 1300.0 ºC)
E	-130.0 to 1000.0 ºC	-250.0 to 1050.0 ºC	±(0.1% of rdg + 0.5 ºC)
J	-140.0 to 1200.0 ºC	-210.0 to 1250.0 ºC	±(0.1% of rdg + 0.5 ºC)
T	-200.0 to 400.0 ºC	-250.0 to 420.0 ºC	±(0.1% of rdg + 0.5 ºC)
B	600.0 to 1800.0 ºC	-20.0 to 1820.0 ºC	±(0.1% of rdg + 0.6 ºC)
N	-100.0 to 1300.0 ºC	-230.0 to 1350.0 ºC	±(0.1% of rdg + 0.5 ºC)

Temperature coefficient: 0 to 50ºC, ±50ppm/ºC
Base contact compensation: 0 to 50ºC, ±1.0ºC
Vivificates by inputting base thermal EMF mV in conjunction with JIS C 1602-1995.

RTD

Sensor	Measuring Range	Display	Error (23ºC±5ºC, 45~75%RH)
Pt100Ω range 1	-200.0 to 850.0 ºC	-200.0 to 870.0 ºC	±(0.1% of rdg + 0.2 ºC) (0.0 to 100.0 ºC)
			±(0.2% of rdg + 0.3 ºC) (-200.0 to 0.0 ºC) (100.0 to 850.0 ºC)
Pt100Ω range 2	-150.00 to 150.00 ºC	-180.00 to 180.00 ºC	±(0.1% of rdg + 0.2 ºC) (0.00 to 100.00 ºC)
			±(0.2% of rdg + 0.3 ºC) (-150.00 to 0.00 ºC) (100.00 to 150.00 ºC)
JPt100 Ω	-200.0 to 645.0 ºC	-200.0 to 660.0 ºC	±(0.1% of rdg + 0.2 ºC) (0.0 to 100. 0 ºC)
			±(0.2% of rdg + 0.3 ºC) (-200.0 to 0.0 ºC) (100.0 to 645.0 ºC)

Temperature coefficient: 0 to 50ºC, ±50ppm/ºC (±100ppm/ºC when range 2)
Vivificates by base resistance in conjunction with JIS C 1602-1997.

9.2 Special Sensor and Measuring Input

Thermocouple

Sensor	Measuring Range	Display	Error (23ºC±5ºC, 45~75%RH)
-A01 Tungsten-rhenium	0 to 2320 ºC	-20 to 2350 ºC	±(0.3% of rdg + 1 ºC) (0 to 2320 ºC)
-A05 Au-0.07%Fe-Chromer (for Liquid Nitrogen)	-270.0 to 27.0 ºC	-273.1 to 50. 0 ºC	±2.0 ºC (-270.0 to 27.0 ºC)
-A06 Au-0.07%Fe-Chromer (for freezing point)	-270.0 to 27.0 ºC	-273.1 to 50. 0 ºC	±2.0 ºC (-270.0 to 27.0 ºC)

Temperature coefficient: 0 to 50ºC, ±50ppm/ºC
Base contact compensation: 0 to 50ºC, ±1.0ºC
No compensation of cold contact for the –A05 and –A06

RTD

Sensor	Measuring Range	Display	Error (23ºC±5ºC, 45~75%RH)
-A02 Ni508.4Ω	-50.0 to 280.0 ºC	-50.0 to 300.0 ºC	±(0.2% of rdg + 0.3 ºC) (-50.0 to 280.0 ºC)
-A03 Pt50Ω (JIS'81)	-200.0 to 649.0 ºC	-200.0 to 660.0 ºC	±(0.2% of rdg + 0. 3 ºC) (-200.0 to 649. 0 ºC)
-A04 Pt1000Ω	-200.0 to 550.0 ºC	-200.0 to 600.0 ºC	±(0.2% of rdg + 0. 3 ºC) (-200.0 to 550. 0 ºC)

Temperature coefficient: 0 to 50ºC, ±50ppm/ºC

NOTES:
1) The sensor switching by the front keys is impossible.
2) Resistance value of the –A04 Pt1000Ω is 10 times against base resistance of the Pt100Ω in conjunction with JIS C 1604-1997.
3) When using the –A05 and –A06, code No.07 changes ºC/K.

Contact Information

Name : Tsuruga Electric Corporation
Address : 1-3-23 Minami-Sumiyoshi, Sumiyoshi-ku, Osaka-shi
558-0041 Japan

Quick Manual

Digital Panel Meter, Model 451B / Meter Relay, Model 452B
BCD Output

I-01614

1. Data Output Code

Code	Specifications
BP	BCD output (TTL level positive logic)
BN	BCD output (TTL level negative logic)
DP	BCD output (transistor output, source type)
DN	BCD output (transistor output, sink type)

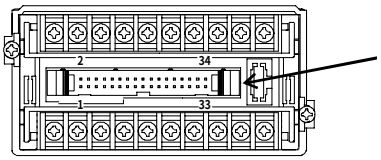
2. Terminals and Connections

⚠ WARNING

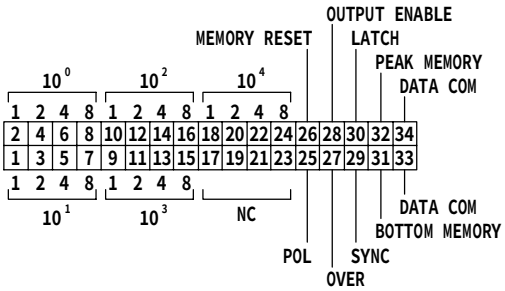
- **To avoid an electrical shock, turn the power off when wiring.**
- **Do not wire with moistened hands. Locate away from the wet place.**
- **Do not touch terminals when turning the power on.**

⚠ CAUTION

- **Do not miswiring. Otherwise, the meter may be broken.**



2.1 Connections



Suitable connector (attached)
XG4M-3430-T:OMRON Corp.
with 2m cable

2.2 TTL output

● Input / Output rating

Signal		Type -BP	Type -BN	Rating
Output	$\times 10^0$ to $\times 10^4$	Positive logic	Negaive logic	TTL level Fo=2 CMOS compatible
	POL	+=H, -=L	+=L, -=H	
	OVER	H at over	L at over	
	SYNC	L pulse of 10ms		
Input	LATCH	Hold at L (short-circuit)		$I_{IL} \leqq$-1mA L = 0 to 1.5V H = 3.5 to 5.0V
	ENABLE	Enable at H (open), Disable at L (short-circuit)		
	MEMORY RESET	Reset at L (short-circuit)		
	PEAK/BOTTOM MEMORY	Refer to each item		

● Measuring data output ($\times 10^0$ to $\times 10^4$)
Parallel BCD (1-2-4-8) code, latch output. The output is Tri-state type, so a connection to the data bus is easy.

● Polarity Output (POL)
Outputs data polarity to No.25 pin.

● Over Output (OVER)
Outputs over display to No. 27 pin.
When exceeded 130% display, outputs both 130% display and over data. When exceeded 99999, outputs 0 data and over data.

● Synchronization (SYNC)
Outputs L pulse of 10ms, which synchronizes display cycle, to No. 29 pin. Readouts the data on the rising edge of this SYNC. Wired OR connection is possible when connecting several data bus.

● Data enable input (OUTPUT ENABLE)
Outputs datum, includes POL and OVER, when opening (setting to H) No. 28 pin. When short-circuiting (setting to L) with DATA COM between No. 33 and No.34 pin, DATA, includes POL and OVER, changes to high impedance condition. In this state, SYNC output is prohibited and the connection to the data bus is easy.

● Latch input (LATCH)
Latches BCD data by short-circuiting between No. 30 and DATA COM (No. 33 and No. 34 pins) or setting to L. Display does not latch.

● PEAK MEMORY and BOTTOM MEMORY
Switches output data to current value, peak memory value, bottom memory value, and amplitude value, by the operation of No. 31 to No. 34 pins.

Signal	Current value	Peak memory value	Bottom memory value	Amplitude value
No. 32 pin (Peak memory)	Open H	Short-circuit L	Open H	Short-circuit L
No. 31 pin (Bottom memory)	Open H	Open H	Short-circuit L	Short-circuit L

● MEMORY RESET
Switches peak memory and bottom memory to current value by short-circuiting between No. 26 pin and DATA COM (No. 33 and No. 34 pins).

● Data common (DATA COM)
No. 33 and No. 34 pins are common for measuring data output, POL, OVER, SNYC, LATCH, OUTPUT ENABLE, PEAK MEMORY, BOTTOM MEMORY, and MEMORY RESET.

● NC
Do not use non-occupied NC pin for junction purpose.

※Do not apply 5V DC or more due to uniform to TTL level of data output and control signal. Arrange the wiring of data output and control input/output lines apart from the power source line, relays or magnet switches, etc. of big capacity, as well as the input line.

2.3 Transistor output

Wired OR connection is possible for the measuring data, including POL and OVER, and SYNC when connecting several BCD outputs to a PC.

● Input / Output rating

Signal		Item	Type -DP	Type -DN
Output	$\times 10^0$ to $\times 10^4$	Output	Source type	Sink type
Output	POL OVER SYNC	Output capacity	DC30V 30mA Max., Saturation Voltage: 1.6V Max.	
Input	LATCH ENABLE MEMORY RESET PEAK MEMORY BOTTOM MEMORY	Signal level	Input current: Max. 1mA OFF (H) = 3.5 to 5.0V, ON (L) = 0 to 1.5V	

● Measuring data output ($\times 10^0$ to $\times 10^4$)
Parallel BCD code (1-2-4-8), Latch output.
Transistor turns on (ON) at 1 measuring data.
Transistor turns off (OFF) at 0 measuring data.

● Polarity Output (POL)
Outputs data polarity to No.25 pin.
Transistor turns on (ON) at (+) display value.
Transistor turns off (OFF) at (-) display value.

● Over Output (OVER)
Outputs over display to No. 27 pin.
Transistor turns on (ON) at over display.
When exceeded 130% display, outputs both 130% display and over data. When exceeded 99999, outputs 0 data and over data.

● Synchronization (SYNC)
Outputs L pulse of 10ms, which synchronizes display cycle, to No. 29 pin.
Readouts the data on the rising edge of this SYNC.

● Data enable input (OUTPUT ENABLE)
Outputs datum, includes POL and OVER, when opening (setting to H) No. 28 pin.
When short-circuiting (ON) with DATA COM between No. 33 and No.34 pin, DATA, includes POL and OVER, changes to OFF condition. In this state, SYNC output is prohibited and the connection to the data bus is easy.

● Latch input (LATCH)
Latches BCD data by short-circuiting between No. 30 and DATA COM (No. 33 and No. 34 pins). Display does not latch.

● PEAK MEMORY and BOTTOM MEMORY
Switches output data to current value, peak memory value, bottom memory value, and amplitude value, by the operation of No. 31 to No. 34 pins.

Signal	Current value	Peak memory value	Bottom memory value	Amplitude value
No. 32 pin (Peak memory)	Open	Short-circuit	Open	Short-circuit
No. 31 pin (Bottom memory)	Open	Open	Short-circuit	Short-circuit

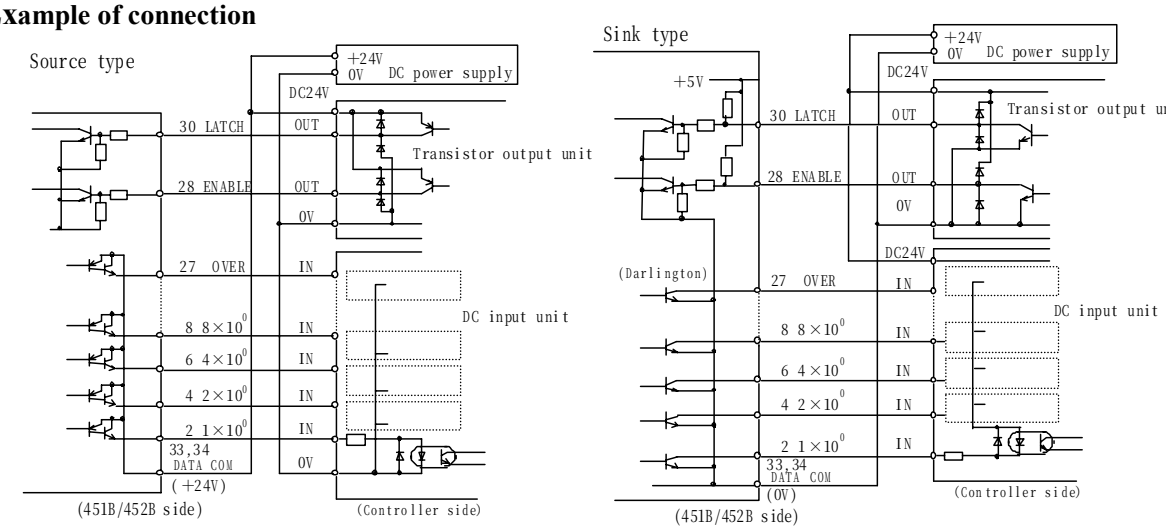
● MEMORY RESET
Switches peak memory and bottom memory to current value by short-circuiting between No. 26 pin and DATA COM (No. 33 and No. 34 pins).

● Data common (DATA COM)
No. 33 and No. 34 pins are common for measuring data output, POL, OVER, SNYC, LATCH, OUTPUT ENABLE, PEAK MEMORY, BOTTOM MEMORY, and MEMORY RESET.

● NC
Do not use non-occupied NC pin for junction purpose.

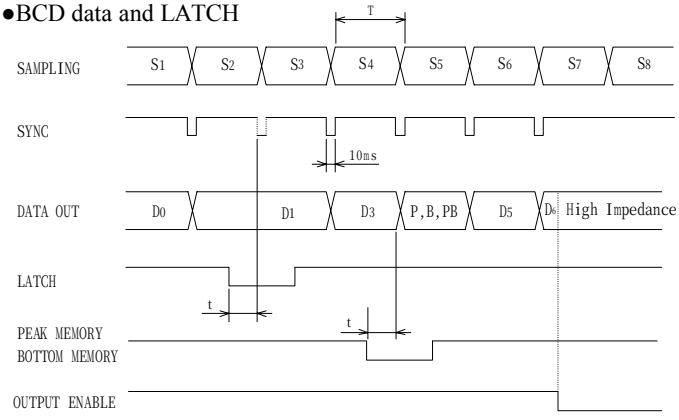
※Arrange the wiring of data output and control input/output lines apart from the power source line, relays or magnet switches, etc. of big capacity, as well as the input line.

3.Example of connection



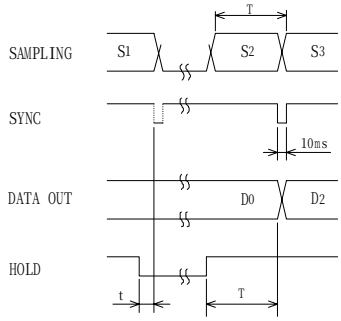
4.Timing chart

●BCD data and LATCH



PorB: Peak memory value, Bottom memory value or amplitude value
t: internal operation time approx. 15ms
T: display cycle or sampling cycle (200ms)

●BCD data and HOLD



t: internal operation time approx. 15ms
T: display cycle or sampling cycle

5. Switch BCD output cycle

BCD output cycle is possible to choose whether display cycle or sampling cycle (200ms).
Refer to our Quick manual, I-01612 and I-01613, for detailed setting procedures.

Contact Information
Name : Tsuruga Electric Corporation
Address : 1-3-23 Minami-Sumiyoshi, Sumiyoshi-ku, Osaka-shi 558-0041 Japan