# Quick Manual

## DC Voltage & Current Digital Meter Relay, Model 452A

I-01594

## 1. Preface

Thank you for purchasing our digital meter relay 452A 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) 452A itself (2) packing (3) This manual (4) Unit label (5) Indication label
(6) Sensor power supply unit (Sensor power supply option) (7) 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 452A. 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

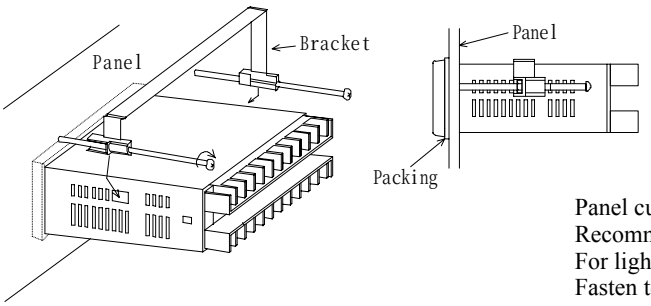
Power Supply : AC 100 to 240V (90-250V) 50/60Hz, DC12 to 24V (9-32V), DC110V (100-170V)
Power Consumption : 452A itself
Approx. 9VA at 100VAC, 11.5VA at 200VAC, 400mA at 12VDC, 200mA at 24VDC, 40mA at 110VDC.
Sensor power supply unit
Approx. 7VA at 100VAC, 9VA at 200VAC, 200mA at 12VDC, 100mA at 24VDC, 30mA 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 (60g of the sensor power supply unit)
Mounting Method : Panel mount with the bracket

### 2.2 General Specifications

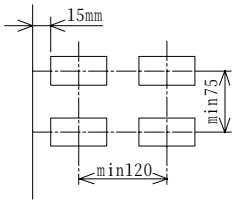
| | | |
|---|---|---|
| Display | : | 0~99999, "-" polarity, with zero-suppress function.<br>PV: red or green LED (character height 15.2mm)<br>SV1 and SV2: red LED (character height 7.6mm) |
| Decimal Point | : | Programmable (No external control). |
| Over-range indication | : | Blinking with 130% display. When exceeded 99999, blinking with 00000.<br>In case of 699.9V measuring, when exceeded 699.9V, blinking with full scale value. |
| Resolution | : | 1/100000 |
| Sampling rate | : | Approx. 15 times / sec. |
| Noise Rejection | : | Normal mode (NMR) - 50dB or more.<br>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.<br>Power supply terminals - Case : AC2000V each for 1 min.<br>Power supply terminals - Input and output terminals : AC1500V each for 1min.<br>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



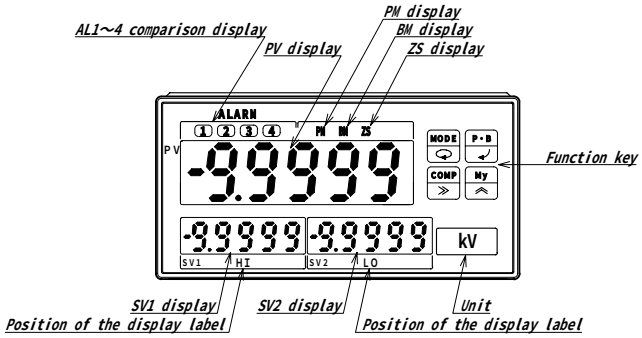

Panel cut dimension: $92^{+0.8/-0}$ ×$45^{+0.6/-0}$ mm
Recommended panel thickness is 0.6 to 6mm.
For light panel, such as aluminum, should be 1.5mm or more to avoid deform.
Fasten torque of the mounting bracket is 0.2 to 0.3N･m.

**⚠ 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

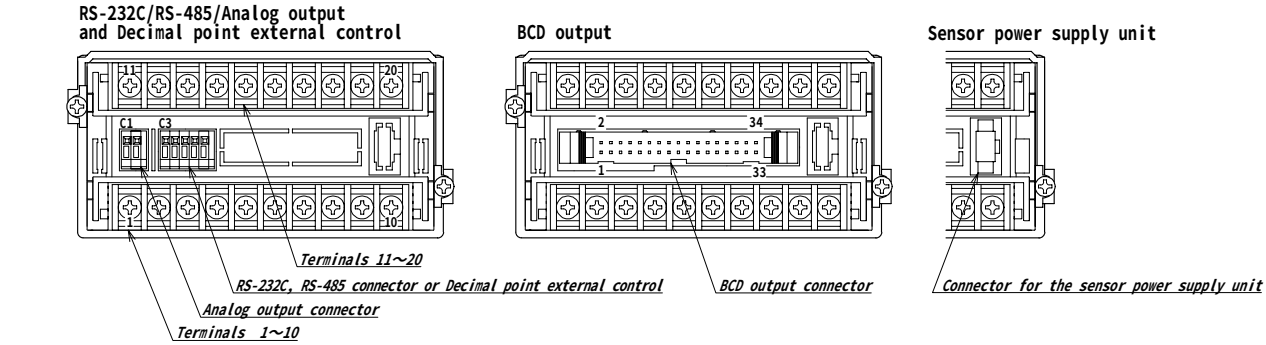
**MODE** ·····Switch the measuring, the parameter setting, and the calibration mode.
·····Switch modes during the parameter setting mode.

**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**

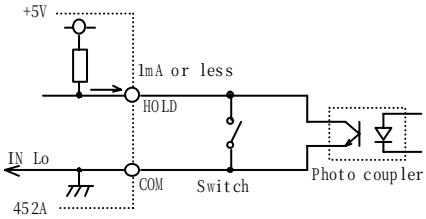
- **Power supply and load should be within the suitable range.**
- **Power supply should be rapidly reach the rated power within few seconds.**
- **When the power is turned OFF and ON again soon after, provide the downtime of 10 seconds or more.**
- **Do not miswiring.**

• 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, ZS , 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.



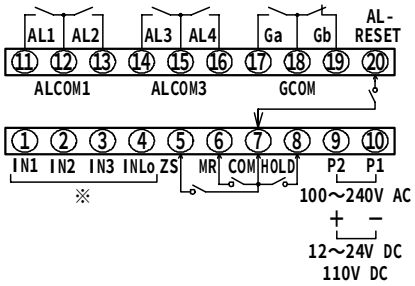

### ■Terminals

Terminals are not insulated from the input.
Active "L" $I_{IL} \leqq$-1mA、"L"=0～1.5V、"H"=3.5～5V

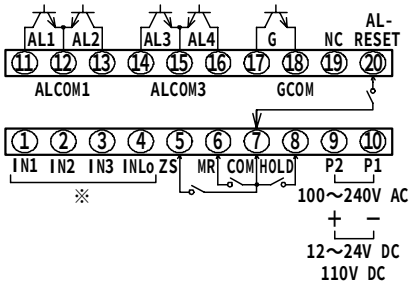
- Hold : Hold display, data output, current value, peak memory, bottom memory, display amplitude and comparator output.
  Hold the data when the hold input is active.
- ZS : Offset the electrical input value at ZERO. The ZS LED is lit when the Zero set function is effective.
- MR : Rest peak memory, bottom memory, and jump width.
- ALRESET : Release (OFF) alarm outputs and GO outputs.

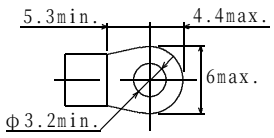
●Terminals

Relay output




Open collector output



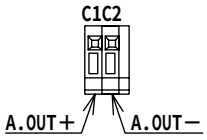

Terminal screws : M3
Fastening torque : 0.46~0.62N・m
Crimped terminal : Refer to the figure at the above.

※Refer to terminal number on page 12.

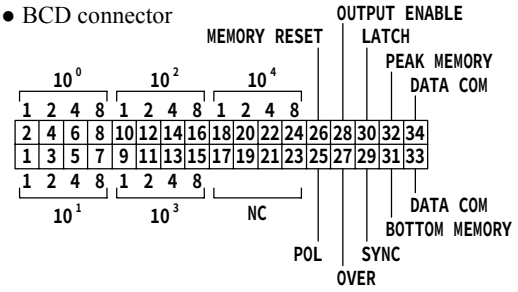
**⚠ CAUTION**

**Make a connection between only one terminal among the terminal No.1 to 3, and the terminal No.4, depending upon the type and range of measuring input.**
**More than one terminal of the terminal No.1 to 3 must not be used at a time.**
**Improper connection of the terminal may cause damage, breakdown, malfunction or other trouble of this product.**

● Analog output connector

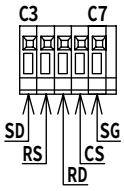



● BCD connector

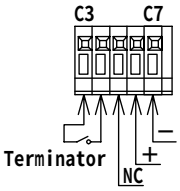



Suitable connector
XG4M-3430-T:OMRON Corp.
with 2m cable

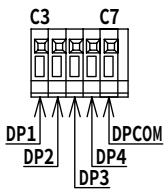
● RS-232C output connector




● RS-485 output connector



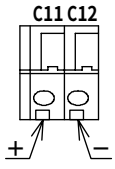

● Decimal point external control connector




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

Strip-off length: 9 to 10mm

● Sensor power supply unit




Recommended wire { Solid wire : AWG26 to 16
Twisted wire : AWG22 to 20 O.D. 0.125 min.

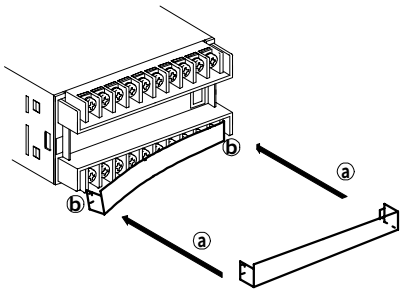
Strip-off length: 9mm

## 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.

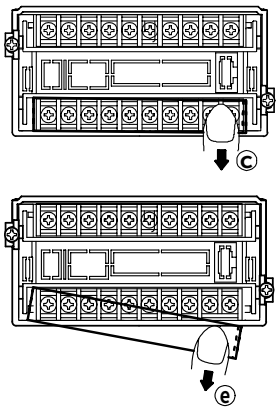


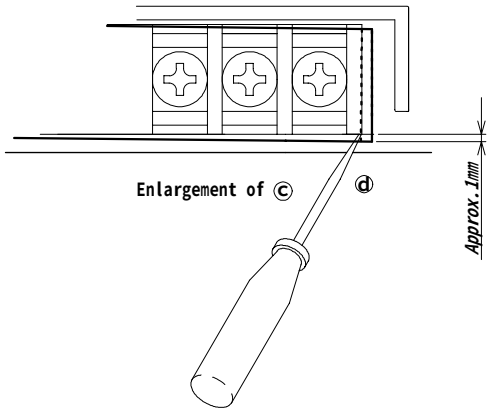

● Disassemble procedures

(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”




## 5.3 How to mount the sensor power supply unit

● Assemble procedures

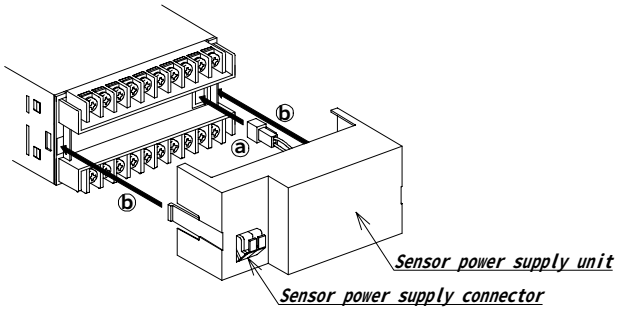
(1) Make sure that there is no miswiring to the case.

(2) Connect the connector of the sensor power supply unit to the case. “a”

(3) Hook up the unit to the case. “b”

**⚠ CAUTION**

**● Make sure that the supply voltage and serial number matches to that of the case. Wrong voltage or miss-combination will damage the unit.**

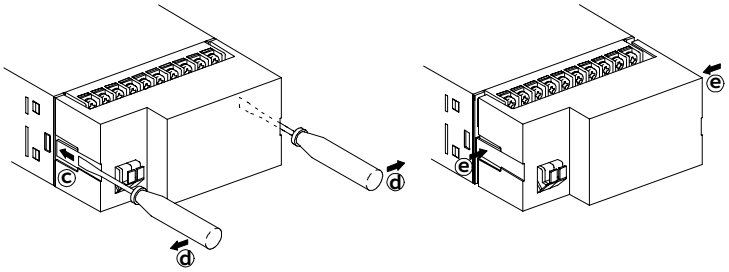



● Disassemble procedures

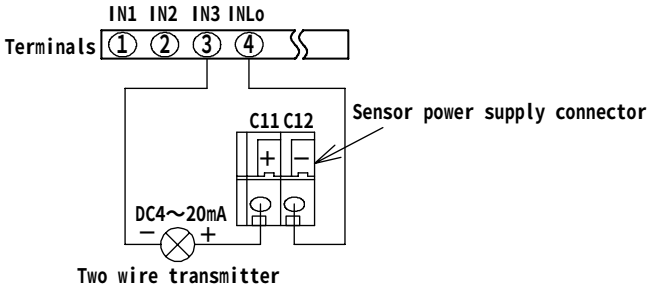
(1) Insert the slotted blade driver to the “c” position on the drawing, and turn it outward as “d”.

(2) After hooking off the hook of the sensor power supply unit, pull it out as “e”.

(3) Disconnect the connector.




● Example of connection of two wire transmitter



# 6. Function

## 6.1 Parameter list

● Display function

| No. | Function | Display | Contents | Default |
|---|---|---|---|---|
| 01 | Scaling offset | ▪ ▪ ▪ ▪ | -99999 to +99999 | 00000 |
| 02 | Scaling full scale | ▪ ▪ ▪ ▪ | -99999 to +99999 | 19999 |
| 03 | Decimal point | ▪ ▪ | 0, 0.0, 0.00, 0.000, 0.0000 | 0 |
| 04 | Input range<br>Changeable –04, -14 and -49 | ▪ ▪ | CH1 to CH3<br>Others are indicated by Err1 message | CH1<br>(-49:CH3) |
| 05 | Display cycle | ▪ ▪ ▪ ▪ | 67ms, 400ms, 1s, 2s, 4s, 5s | 67ms (SP1) |
| 06 | Average calculation | ▪ ▪ ▪ ▪ | OFF, ON, 2, 4, 8, 16, and 32 times | OFF |
| 07 | Offset fixing | ▪ ▪ ▪ ▪ ▪ | ON, OFF | OFF |
| 08 | Zero fixing of $10^0$ digit | ▪ ▪ ▪ ▪ ▪ | ON, OFF | OFF |
| 09 | Cut-off | ▪ ▪ ▪ | 00.00 to 19.99% | 00.00 |
| 10 | Zero set | ▪ ▪ ▪ ▪ | ON, OFF | OFF |
| 11 | PV Display color | ▪ ▪ ▪ ▪ ▪ | RR, RG, GR, GG | RG* |
| 12 | SV1 Display | ▪ ▪ ▪ ▪ | OFF, AL1 to 4, RM, PM, BM, PB | AL3 |
| 13 | SV2 Display | ▪ ▪ ▪ ▪ | OFF, AL1 to 4, RM, PM, BM, PB | AL2 |
| 14 | Display shutoff timer<br>(Setting of light out time for PV, SV1 and SV2) | ▪ ▪ ▪ ▪ | ON, OFF, 0 to 99 min. | 0, 0, 0, 01<br>(0: OFF) |

*R G
- R: Green when all AL turn OFF.
- G: 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 | ▪ ▪ ▪ ▪ | 2 to 99 seconds | 02 |
| 41 | Comparison data | ▪ ▪ ▪ ▪ | RM, PM, BM, PB | RM (current value) |
| 42 | AL1 Comparison value | ▪ ▪ ▪ | -99999 to +99999 | 2000 |
| 43 | AL2 Comparison value | ▪ ▪ ▪ | -99999 to +99999 | 3000 |
| 44 | AL3 Comparison value | ▪ ▪ ▪ | -99999 to +99999 | 7000 |
| 45 | AL4 Comparison value | ▪ ▪ ▪ | -99999 to +99999 | 8000 |
| 46 | AL1 Hysteresis | ▪ ▪ ▪ ▪ | 1 to 9999 | 0001 |
| 47 | AL2 Hysteresis | ▪ ▪ ▪ ▪ | 1 to 9999 | 0001 |
| 48 | AL3 Hysteresis | ▪ ▪ ▪ ▪ | 1 to 9999 | 0001 |
| 49 | AL4 Hysteresis | ▪ ▪ ▪ ▪ | 1 to 9999 | 0001 |
| 50 | AL1 Comparison method | ▪ ▪ ▪ ▪ ▪ | OFF, HI, LO | OFF |
| 51 | AL2 Comparison method | ▪ ▪ ▪ ▪ ▪ | OFF, HI, LO | LO |
| 52 | AL3 Comparison method | ▪ ▪ ▪ ▪ ▪ | OFF, HI, LO | HI |
| 53 | AL4 Comparison method | ▪ ▪ ▪ ▪ ▪ | OFF, HI, LO | OFF |
| 54 | Output Delay | ▪ ▪ ▪ ▪ | 0 to 99 seconds | 00 |
| 55 | Comparison conditions | ▪ ▪ ▪ ▪ ▪ | GO, NG | NG |
| 56 | Zone setting | ▪ ▪ ▪ ▪ | ON, OFF | OFF |

● BCD output

| No. | Function | Display | Contents | Default |
|---|---|---|---|---|
| 70 | BCD output sampling | ▪ ▪ ▪ ▪ ▪ | SAMP, DISP<br>(sampling cycle or display cycle) | DISP<br>(Display cycle) |

● Analog output

| No. | Function | Display | Contents | Default |
|---|---|---|---|---|
| 75 | Output switching | ▪ ▪ ▪ ▪ | RM, PM, BM, PB | RM (current value) |
| 76 | Min. value | ▪ ▪ ▪ ▪ | -09: 0 to 9.9 V<br>-29: 0 to 19.9mA | -09: 01.0 V<br>-29: 04.0 mA |
| 77 | Max. value | ▪ ▪ ▪ ▪ | -09: 0.1 to 10.0 V<br>-29: 0.1 to 20.0mA | -09: 05.0 V<br>-29: 20.0 mA |
| 78 | Offset | ▪ ▪ ▪ ▪ ▪ | -99999 to +99999 | 00000 |
| 79 | Full scale | ▪ ▪ ▪ ▪ ▪ | -99999 to +99999 | 19999 |

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 | ▪ ▪ ▪ ▪ | 4800, 9600, 19200, 38400 bps | 9600 bps |
| 81 | Data length | ▪ ▪ ▪ ▪ ▪ | 8 bit, 7 bit | 8 bit |
| 82 | Parity | ▪ ▪ ▪ ▪ ▪ | None, Odd, Even | None |
| 83 | Stop bit | ▪ ▪ ▪ ▪ | 2 bit, 1 bit | 1 bit |
| 84 | BCC switching | ▪ ▪ ▪ | ON, OFF | OFF |
| 85 | Unit number | ▪ ▪ ▪ ▪ | 0 to 99 | 00 |

● My setting mode

| No. | Function | Display | Contents | Default |
|---|---|---|---|---|
| 99 | Code registration | ▪ ▪ | 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 | 01 | Offset |
| 6 | 02 | Full scale |
| 7 | 03 | Decimal point |
| 8 | 00 | NC |

## 6.2 Explanation of function

● Display function

Parameter 01 : Select the scaled offset display.
Parameter 02 : Select the scaled full scale display.
Parameter 03 : Select the decimal point position.
Parameter 04 : Select the input range (for -04, -14, and -49 only)

| Setting | Input | | |
|---|---|---|---|
| | -04 | -14 | -49 |
| CH1 | ±1.9999 V | ±1.9999 mA | 1 to 5 V |
| CH2 | ±19.999 V | ±19.999 mA | 0 to 5 V |
| CH3 | ±399.9 V | ±199.99 mA | 4 to 20 mA |

Parameter 05 : Select the display rate.
SP1:67ms、SP2:400ms、SP3:1s、SP4:2s、SP5:4s、SP6:5s (Becomes 67ms 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 : Fix the display equivalent to 0% input.
Display can be fixed to the offset value when the input value is lower than the offset value.
Parameter 08 : Fix the display of $10^0$ digit to 0.
Parameter 09 : Cut an unstable zone around 0%.
The cut area becomes offset value.
Parameter 10 : Offset the initial input value to 0%.
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

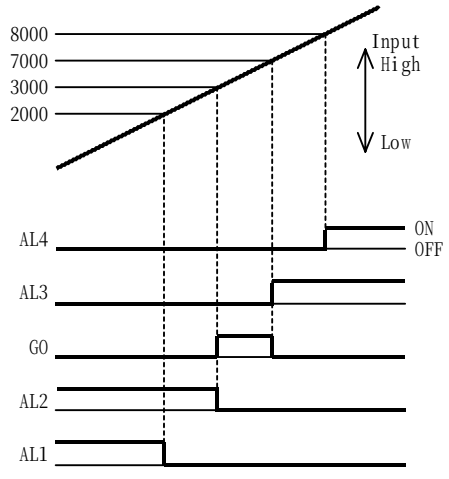
Parameter 40 : Select the stand-by time for AL 1 to 4 and GO after supplying the power.
Parameter 41 : Select any comparison data from setting value, current value, peak memory, bottom memory, display amplitude, and shut-off .
Parameter 42 - 45 : Select the comparison data of the AL1, AL2, AL3, and AL4.
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.

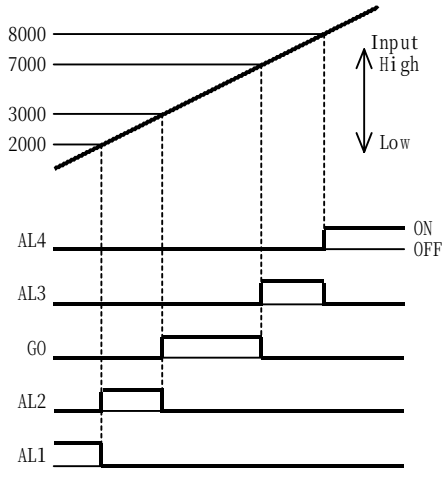
○Judgment example

Standard: There is no limitation, large and small, for AL1, AL2, AL3 and AL4.
AL1 (LO)
AL2 (LO)
AL3 (HI) : 7000
AL4 (HI) : 8000




Zone: AL1 ＜ AL2 ＜ AL3 ＜ AL4.

: 2000 AL1 (LO) : 2000
: 3000 AL2 (LO) : 3000
AL3 (HI) : 7000
AL4 (HI) : 8000



● BCD output

Parameter 70 : Select the BCD data, whether display cycle or sampling rate.
Disable P-06 and -08 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

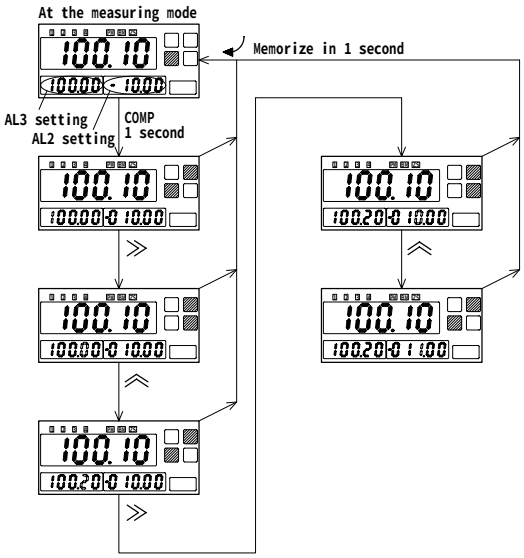
Parameter 99 : Register well-used 8 code numbers in the setting mode.

# 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.

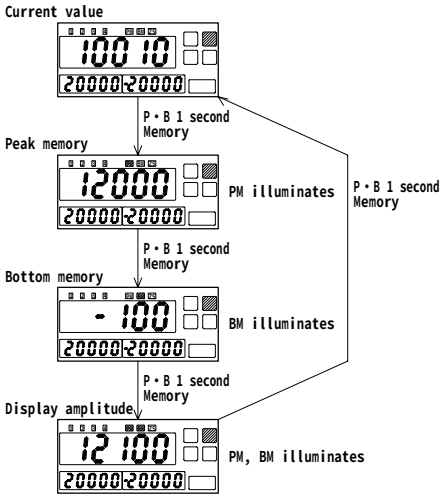
Setting example: Changes AL3 to 100.20 and AL2 to -11.00 when the comparison setting is AL3 and AL2 for the SV1 and SV2.




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

## 7.2 PV Display switching

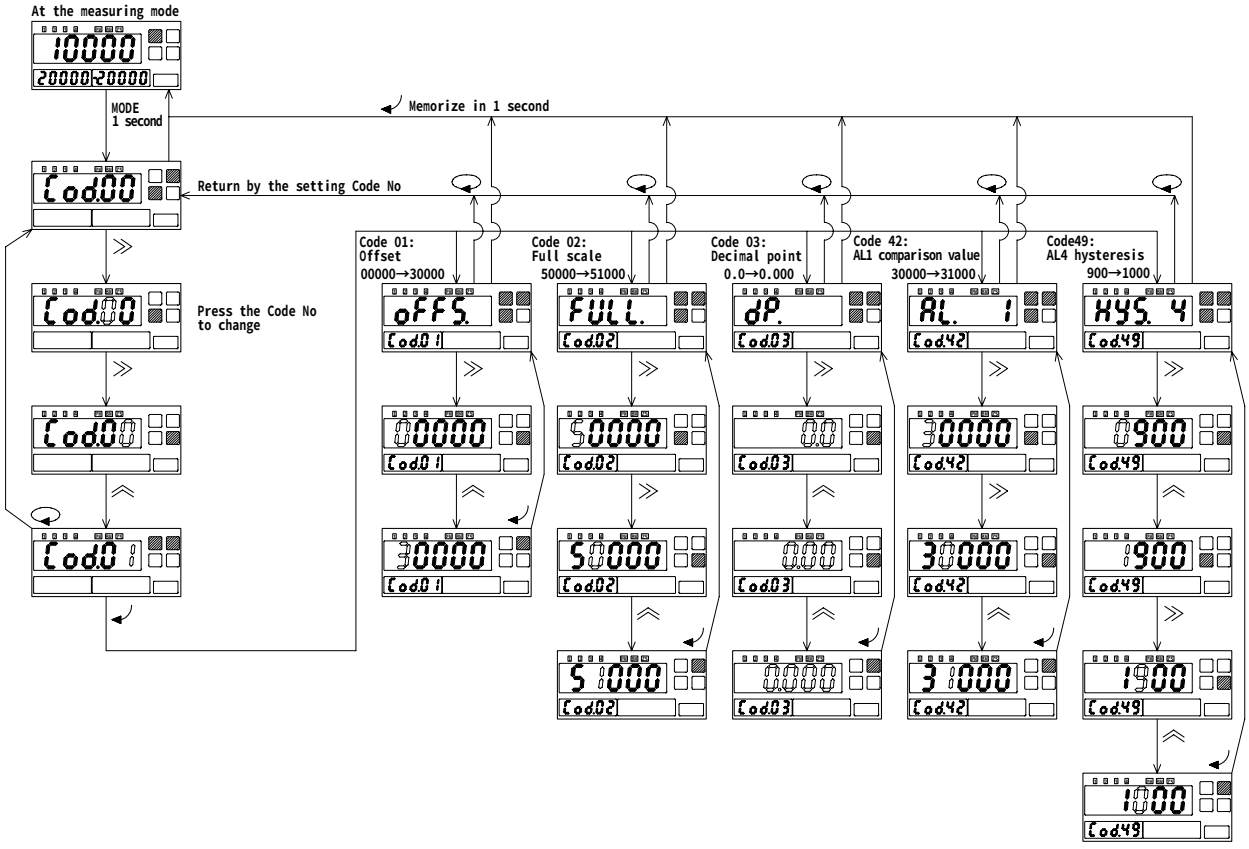
During the measuring mode, the display switches from current value to peak memory, bottom memory, display amplitude, and current value, by pushing P·B key.




※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

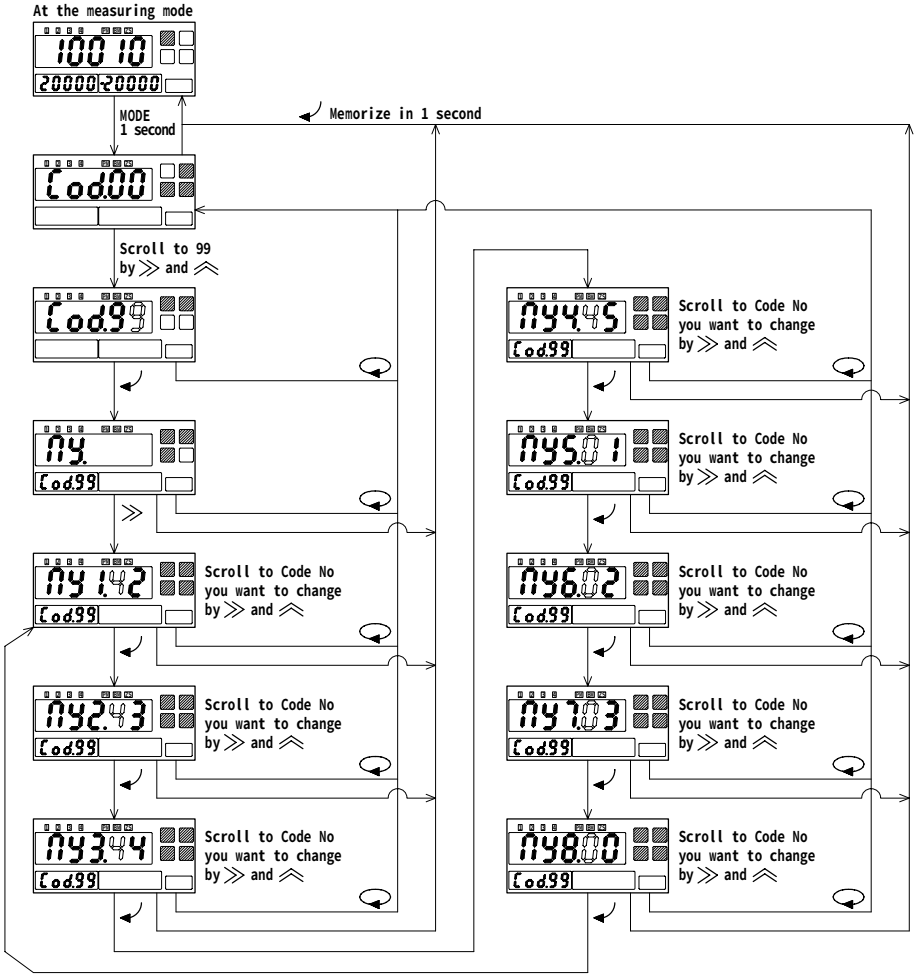
During the measuring mode, the display shows "・・・・・" and switches to the parameter setting mode, by pushing the MODE key.



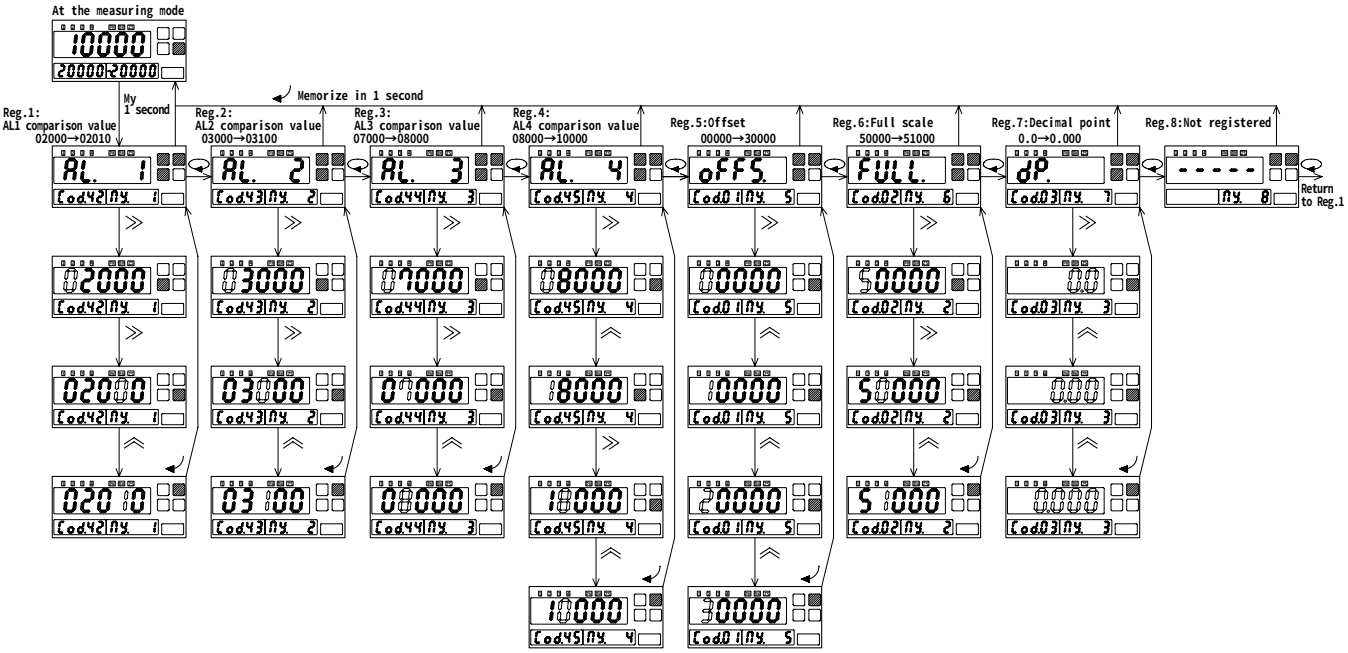
## 7.4 My setting mode

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



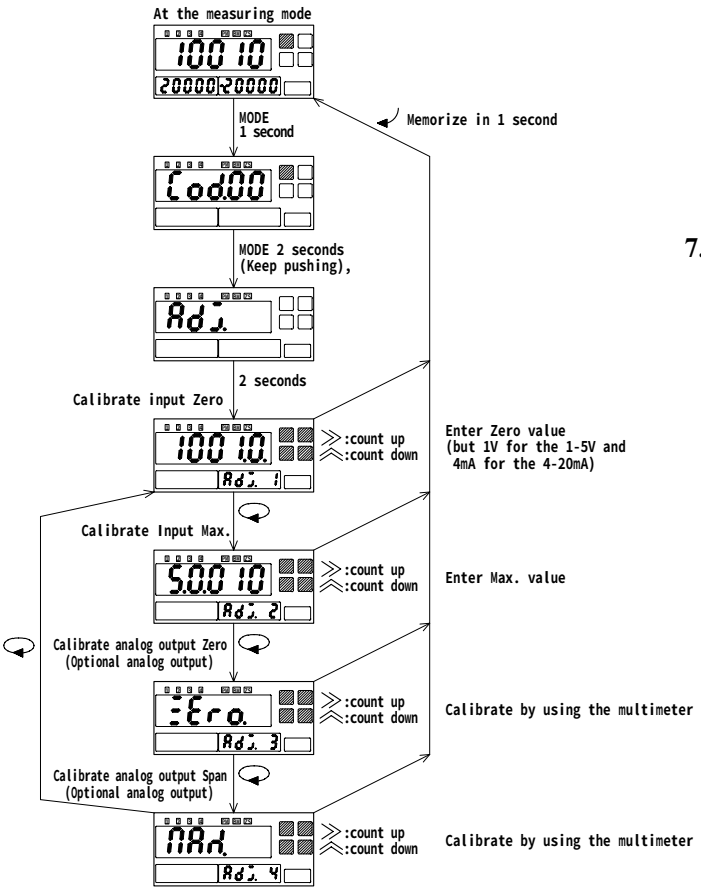

● How to change setting value



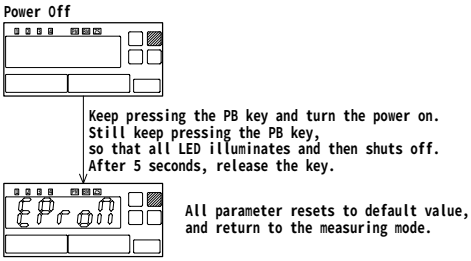
### 7.5 Calibration mode

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

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




### 7.6 Reset to Default value



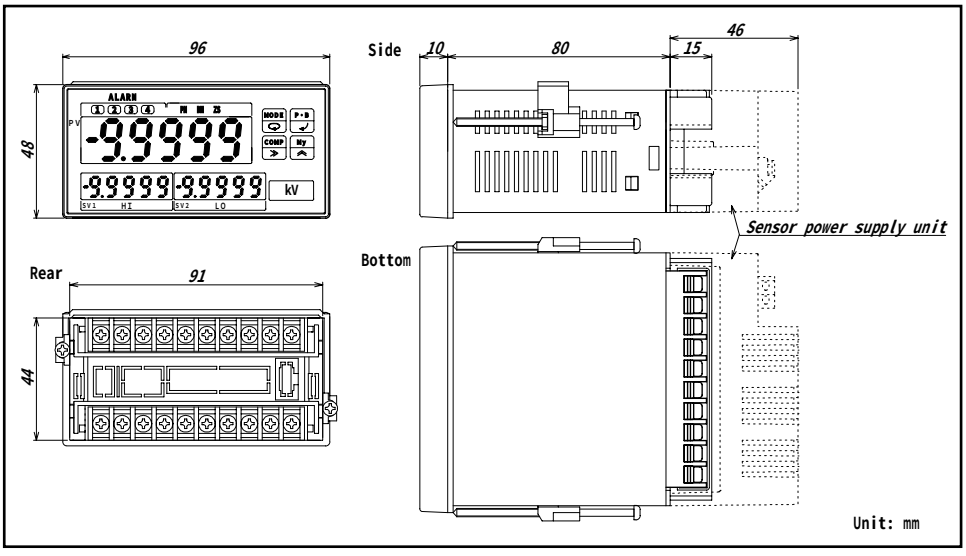

### 7.7 Error message

| Display | Cause of trouble | Countermeasure |
|---|---|---|
| - - - - | Entered Code No. is not applicable. | Enter correct Code No. |
| - - - - | 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 Numeric and Character Indications


## 8. External Dimensions



# 9. Model Numbering

**452A–(1)–(2)–(3)–(4)–(5)-(6)**

## [1] Measuring Input

| Model | Measuring Range | Input Resistance | Error *1 | Overload | Terminals |
|---|---|---|---|---|---|
| 452A-01 | ±19.999mV | 5MΩ | ±(0.05% of rdg + 5 digits) | DC±50V | 1 – 4 |
| 452A-V1 | ±100.00mV | 5MΩ | ±(0.05% of rdg + 5 digits) | DC±50V | 1 – 4 |
| 452A-02 | ±199.99mV | 120kΩ | ±(0.05% of rdg + 3 digits) | DC±50V | 1 – 4 |
| 452A-04 | ±1.9999V | 1MΩ | ±(0.1% of rdg + 1 digits) | DC±250V | 1 – 4 |
| | ±19.999V | 10MΩ | ±(0.1% of rdg + 1 digits) | DC±250V | 2 – 4 |
| | ±399.9V | 10MΩ | ±(0.1% of rdg + 3 digits) | DC±750V | 3 – 4 |
| 452A-06 | ±699.9V | 10MΩ | ±(0.1% of rdg + 3 digits) | DC±750V | 3 – 4 |
| 452A-11 | ±19.999μA | 10kΩ | ±(0.05% of rdg + 3 digits) | DC±2mA | 1 – 4 |
| 452A-12 | ±199.99μA | 1kΩ | ±(0.05% of rdg + 3 digits) | DC±20mA | 1 – 4 |
| 452A-14 | ±1.9999mA | 100Ω | ±(0.1% of rdg + 1 digits) | DC±50mA | 1 – 4 |
| | ±19.999mA | 11Ω | ±(0.1% of rdg + 1 digits) | DC±150mA | 2 – 4 |
| | ±199.99mA | 1Ω | ±(0.1% of rdg + 1 digits) | DC±500mA | 3 – 4 |
| 452A-49 | DC1-5V | 1MΩ | ±(0.1% of rdg + 1 digits) | DC±250V | 1 – 4 |
| | DC0-5V | 1MΩ | ±(0.1% of rdg + 1 digits) | DC±250V | 2 – 4 |
| | DC4-20mA | 12.4Ω | ±(0.1% of rdg + 1 digits) | DC±150mA | 3 – 4 |
| 452A-49R | DC4-20mA | 250Ω | ±(0.1% of rdg + 3 digits) | DC±40mA | 1 – 4 |

*1 Error (23ºC±5ºC, 45~75%RH)
+□digit is defined within the resolution of 1/20000.

*2 Temperature coefficient (0 to 50ºC):
452A-01, -V1 …. ±100ppm/ºC
452A-02,-04 -06,-11,-12,-13,-14 … ±160ppm/ºC
452A-49, -49R …. ±150ppm/ºC

## [2] Power Supply Voltage

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

## [3] Sensor power supply unit

| Code | Power Source Voltage | Output Current |
|---|---|---|
| Null | Not provided | |
| 2 | DC +5V ±10% | 100mA |
| 3 | DC +12V ±5% | 150mA (100mA for the DC12 to 24V power supply) |
| 5 | DC +24V ±5% | 100mA (50mA for the DC12 to 24V power supply) |

## [4] Data Output 1

| Code | Specifications | Impedance | Max. Load |
|---|---|---|---|
| Null | No output | | |
| 09 | Analog voltage (positive input side outputs)<br>DC 0-10V (Available scaling, Default: 1-5V) | Max. 0.1Ω | Min. 100Ω at DC 0-1V<br>Min. 1kΩ at DC 0-10V<br>Min. 500Ω at DC 1-5V |
| 29 | Analog current (positive input side outputs)<br>DC 0-20mA (Available scaling, Default: 4-20mA) | Min. 5MΩ | Max. 2.4kΩ at DC 0-5mA<br>Max. 600Ω at DC 0-20mA<br>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 | | |
| EC | Decimal point external control | | |

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

| Code | Specifications |
|---|---|
| Blank | No output |
| E0 | RS-232C |
| E1 | RS-485 |
| EC | Decimal point external control |

## [6] Comparison output

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

**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 451A / Meter Relay, Model 452A
## BCD Output

I-01595

## 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) |

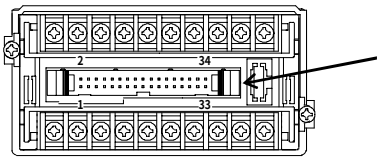
## 2. Connector and Connections

**⚠ 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.**

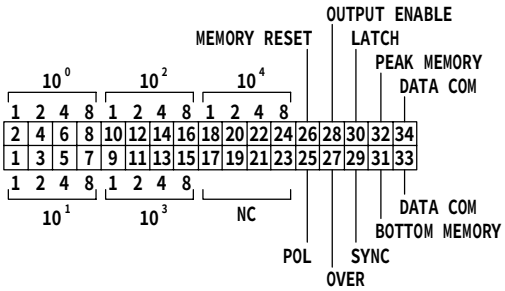
**⚠ CAUTION**

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



BCD output connector

### 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<br>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<br>L = 0 to 1.5V<br>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<br>OVER<br>SYNC | Output capacity | DC30V 30mA Max., Saturation Voltage: 1.6V Max. | |
| Input | LATCH<br>ENABLE<br>MEMORY RESET<br>PEAK MEMORY<br>BOTTOM MEMORY | Signal level | Input current: Max. 1mA<br>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 |

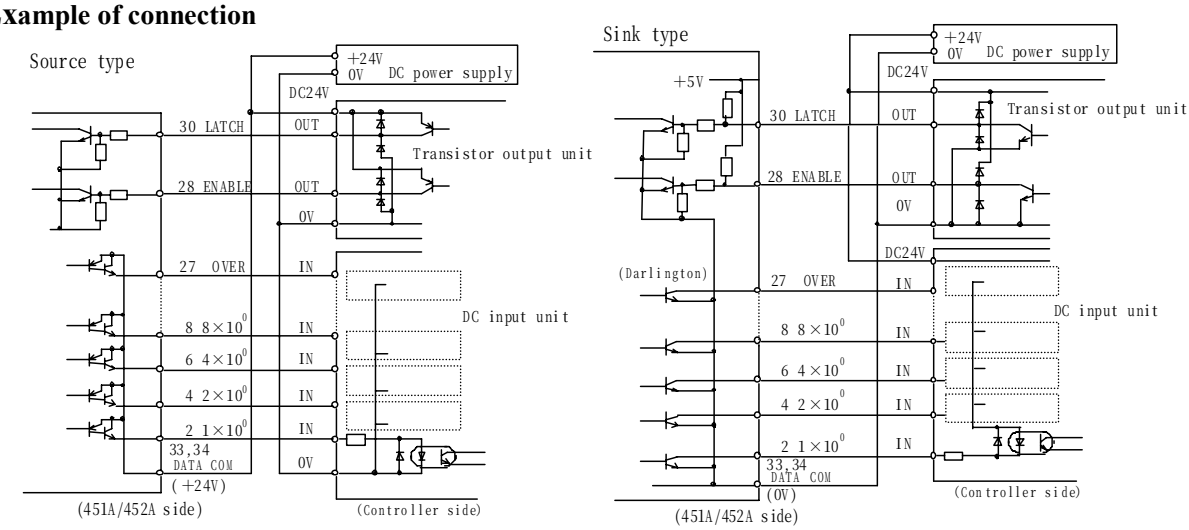
● MEMORY RESET
Switches peak memory and bottom memory to current value by short-circuiting between No. 26 pin and DATA COM (No. 33 and No. 34 pins).

● 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.

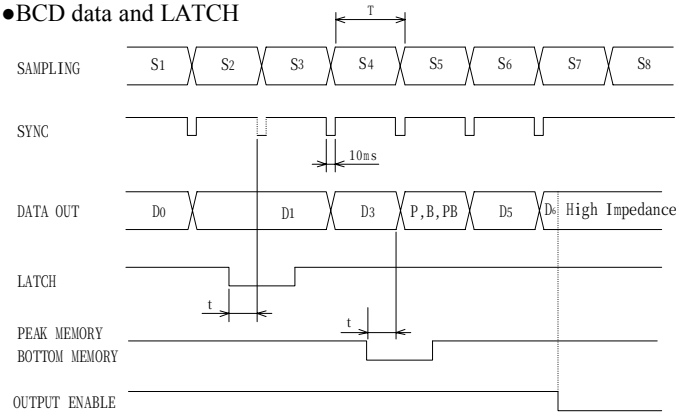
※Arrange the wiring of data output and control input/output lines apart from the power source line, relays or magnet switches, etc. of big capacity, as well as the input line.

## 3.Example of connection

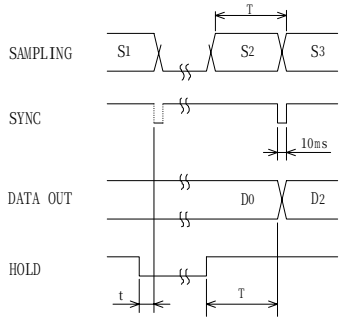



## 4.Timing chart

●BCD data and LATCH




●BCD data and HOLD




PorB: Peak memory value, Bottom memory value or amplitude value
t: internal operation time approx. 15ms
T: display cycle or sampling cycle (67ms)

t: internal operation time approx. 15ms
T: display cycle or sampling cycle (67ms)

## 5. Switch BCD output cycle

BCD output cycle is possible to choose whether display cycle or sampling cycle (67ms).
Refer to our Quick manual, I-01593 and I-01594, for detailed setting procedures.


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

# Quick Manual

## RS-232C / RS-485 Output Digital Panel Meter, Model 451A / Meter Relay, Model 452A

I-01597

## 1. Data Output Code

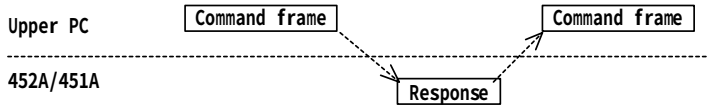
| Code | Output |
|---|---|
| E0 | RS-232C |
| E1 | RS-485 |

## 2. Specifications

### 2.1 Common specifications for RS-232C and RS-485

The measuring input and the RS-232C and RS-485 output is insulated.

Transmission : Start-Stop half-duplex transmission
Transmission speed : 4800, 9600, 19200, 38400 bps
Data length : 7bit / 8bit
Parity : None, Odd, Even
Stop bit : 1bit / 2bit
Data : In conjunction with JIS 8 units code
X parameter : None
Error detection : Parity (Choose BCC availability) Operation results of exclusive logic sum just after STX to ETX
Control character : STX (02H) start of text / ETX (03H) end of text
Device No. : 00 to 99 Set the device No. to each device, and match each command of device
Transmission character : Max. 32
Transmission process : Ignored
452A/451A transmits response in accordance with command frame from the upper PC.

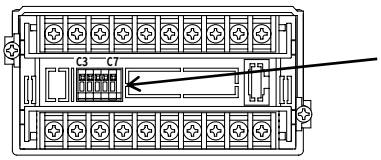



● RS-485

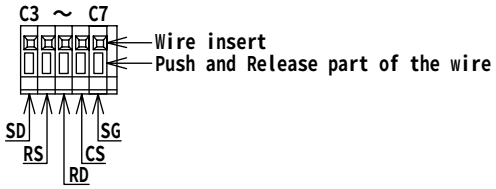
Connected device numbers : Max. 32, including the upper PC
Line length : Up to 500 m by using shielded twisted-pair cable, AWG28 to 22.
Terminator : Switched by the jumper at the terminal, terminated at 200Ω

NOTE followings for the use of multi-drop.
・Unify the transmission format.
・Do not duplicate the device number.

## 3.Terminals and Connections

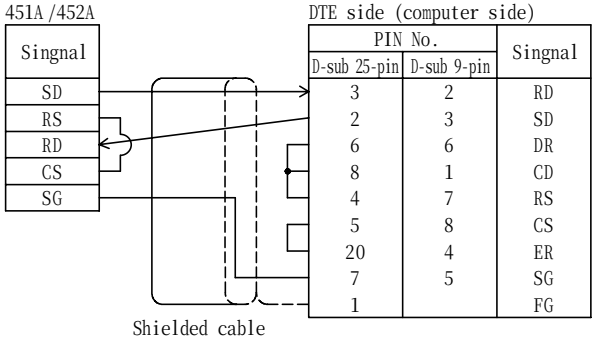



### 3.1 RS-232C

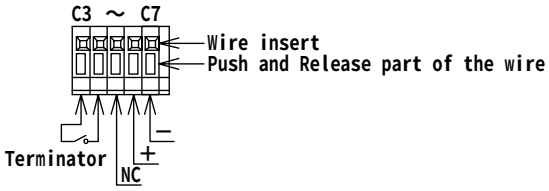



Recommended wire { Solid wire : AWG28 to 22
Twisted wire : AWG28 to 22
O.D. 0.125 min.

Strip-off length: 9 to 10mm



### 3.2 RS-485




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

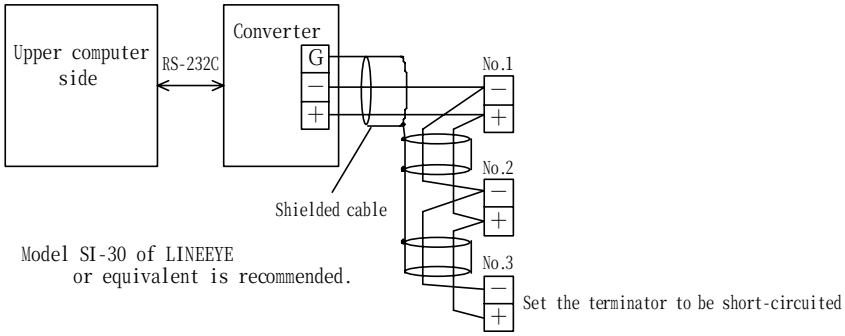
Strip-off length: 9 to 10mm

**※ In case of multi-drop connection, strand twisted wire AWG28 to AWG22 and insert.**

Terminator: When sort-circuiting the connector, 200Ω resistor is connected in parallel to the line
Input/Output: "+" is non-inverse output, and "-" is inverse output.

● Connection

In case of RS-485 connection, up to 32 devices, includes the upper computer, are possible to connect. Specify the end station for both ends of device on the line. Set the terminator to be short-circuited for the identification of the end station. Lead wire for short-circuit is not attached. Use the converter for another identification to set the terminator.




### 3.3 Communication setting

Use keys on the front panel for communication setting. Refer to I-01593 or I-01594 for key operation.

・Transmission speed, Data length, Parity, Stop bit, BCC availability

・Device number

## 4. Communication command

### 4.1 Notes for Command

1) BCC should be added after ETX if BCC function is available.
2) All frame of command
   Command: STX device No., Command or Command frame, ETX (BCC)
   Response: STX device No., End code, Response, ETX (BCC)
3) Character of command is effective with 4-character from the top. Ex)RLATCH → RLAT
4) Both figure and character is effective. Ex) WC07 0 or WC07 OFF
5) End code
   Return the receive condition of the command frame.

| End code | Contents |
|---|---|
| A (41H) | Normal end |
| B (42H) | During setting (communicates during setting) |
| C (43H) | Setting error (out of setting range or error) |
| D (44H) | BCC error (with BCC function) |
| P (50H) | Command error (impossible to analyze the received command) |

Response at the command error

| STX | Device No. | | End code | ETX | (BCC) |
|---|---|---|---|---|---|
| (02H) | (30H) | (30H) | (50H) | (03H) | |

Device No. 00

Response during setting

| STX | Device No. | | End code | ETX | (BCC) |
|---|---|---|---|---|---|
| (02H) | (30H) | (30H) | (42H) | (03H) | |

Device No. 00

## 4.2 Command / Responce

● Measuring command

Command : DATA?, The current data, Request to judge
Response : response to DATA?, Collect the current data, judgment
Command : RMREad, request to the current data
Response : response to RMREad, Collect the current data
Command : PMREad, request to the peak memory data
Response : response to PMREad, Collect the peak memory data
Command : BMREad, request to the bottom memory data
Response : response to BMREad, Collect the bottom memory data
Command : PBREad, request to the amplitude
Response : response to PBREad, Collect the amplitude measuring data

Data format

__+1.9999E+0
| └──── Measuring value
└──── __(20H space): within the range, *(2AH): over the range

Command : DATA?, The current data, Request to judge
Response : response to DATA?
+1.9999 ····· 451A
-1.9999 AL1, AL2, ON····· 452A

Command frame

| STX | Device No. | | D | A | T | A | ? | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 44H | 41H | 54H | 41H | 3FH | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 20H | 2BH | 31H | 2EH | 39H | 39H | 39H | 39H | 45H | 2BH | 30H | 03H | | ·····451A |

| STX | Device No. | | ↓ | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 20H | 2DH | 31H | 2EH | 39H | 39H | 39H | 39H | 45H | 2BH | 31H | 2CH | 30H | 33H | 03H | | ·····452A |

Command : PMREAD, Request to peak memory data
Response : response to PMREAD
+9.9999

Command frame

| STX | Device No. | | P | M | R | E | A | D | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 50H | 4DH | 52H | 45H | 41H | 44H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 20H | 2BH | 39H | 2EH | 39H | 39H | 39H | 39H | 45H | 2BH | 30H | 03H | |

● Readout the device information

Command : IDNT?, Read out the device information
Response : response to IDNT?
452A-04-29-E0, No.495-000 (Model No. Soft registration No. (Tsuruga))

Command frame

| STX | Device No. | | I | D | N | T | ? | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 49H | 44H | 4EH | 54H | 3FH | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 34H | 35H | 32H | 41H | 2DH | 30H | 34H | 2DH | 32H | 39H | 2DH |

| E | 0 | , | N | o | . | 4 | 9 | 5 | - | 0 | 0 | 0 | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45H | 30H | 2CH | 4EH | 6FH | 2EH | 34H | 39H | 35H | 2DH | 30H | 30H | 30H | 03H | |

● Readout the judgment

Command : ALARm, Read out the judgment
Response : response to ALARm
16 (GO output)

Command frame

| STX | Device No. | | A | L | A | R | M | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 4CH | 41H | 52H | 4DH | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | | | |
|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 31H | 36H | 03H | |

● Readout the setting data

Command : RC01, Read out the offset setting
Response : response to RC01.
00000

Command frame

| STX | Device No. | | R | C | 0 | 1 | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 49H | 44H | 30H | 31H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | | | | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 30H | 30H | 30H | 30H | 03H | |

● Set the function command data

Command : WC01_00000, Set the offset
Response : response to WC01_00000.
00000

Command frame (End code ↓)

| STX | Device No. | | ↓ | W | C | 0 | 1 | _ | 0 | 0 | 0 | 0 | 0 | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 57H | 43H | 30H | 31H | 20H | 30H | 30H | 30H | 30H | 30H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | | | | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 30H | 30H | 30H | 30H | 03H | |

● Readout the control command data

Command : RLATch, Read out the latching
Response : response to RLATch.
0 (OFF)

Command frame

| STX | Device No. | | R | L | A | T | C | H | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 52H | 4CH | 41H | 54H | 43H | 48H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | ETX | (BCC) |
|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 30H | 03H | |

● Set the control command data

Command : WLATch_0, Set the offset
Response : response to WLATch_0.
0 (OFF)

Command frame

| STX | Device No. | | W | L | A | T | C | H | _ | 0 | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 57H | 4CH | 41H | 54H | 42H | 48H | 20H | 30H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | | ETX | (BCC) |
|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 30H | 03H | |

● Memory control command

・Write command: Write the setting data into the EEPROM.

Command : STOR
Response : End code

Command frame

| STX | Device No. | | S | T | O | R | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 53H | 54H | 4FH | 52H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | ETX | (BCC) |
|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 03H | |

Normal end

・Memory initialization: Setting datum resets to default, except of transmission speed, data length, stop bit, BCC switch, and device No.

Command : DEFAult
Response : End code

Command frame

| STX | Device No. | | D | E | F | A | U | L | T | ETX | (BCC) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 02H | 30H | 30H | 44H | 45H | 46H | 41H | 55H | 4CH | 54H | 03H | |

Device No. 00

Response (End code ↓)

| STX | Device No. | | ↓ | ETX | (BCC) |
|---|---|---|---|---|---|
| 02H | 30H | 30H | 41H | 03H | |

Normal end

## 4.3 Command table

● Setting command

| Function | Requested command | | Specified command | | | Applicable Model |
|---|---|---|---|---|---|---|
| | Command | Response | Command frame | Response | Function, range | |
| Scaling offset | RC01 | 00000 | WC01_00000 | 00000 | -99999 to 99999 | Common |
| Scaling full scale | RC02 | 19999 | WC02_99999 | 99999 | -99999 to 99999 | |
| Decimal point | RC03 | 0 | WC03_0 | 0 | 0:0, 1:0.0, 2:0.00, 3:0.000, 4:0.0000 | |
| Input range selection | RC04 | 1 | WC04_1 | 1 | 1, 2, 3 | |
| Display cycle | RC05 | 1 | WC05_1 | 1 | 0:67ms, 1:400ms, 2:1s, 3:2s, 4:4s, 5:5s | |
| Average calculation (Section, Moving) | RC06 | 0 | WC06_0 | 0 | 0:OFF, 1:ON, 2:2, 3:4, 4:8, 5:16, 6:32 times | |
| Offset fixing | RC07 | 0 | WC07_0 | 0 | 1:ON, 0:OFF | |
| Zero fixing of $10^0$ digit | RC08 | 0 | WC08_0 | 0 | 1:ON, 0:OFF | |
| Cut-off | RC09 | 00.00 | WC09_10.00 | 10.00 | 0.00 to 19.99 | |
| Zero set | RC10 | 0 | WC10_1 | 1 | 1:ON, 0:OFF | |
| PV Display color | RC11<br>RC11 | 1<br>3 | WC11_3<br>WC11_3 | 3<br>3 | 0:RR, 1:RG, 2:GR, 3:GG<br>0:RR, 3:GG | 452A<br>451A |
| SV1 Display | RC12 | 3 | WC12_0 | 0 | 0:OFF, 1;AL1, 2;AL2, 3;AL3, 4:AL4, 5:RM, 6:PM, 7:BM, 8:PB | 452A |
| SV2 Display | RC13 | 2 | WC13_1 | 1 | 0:OFF, 1;AL1, 2;AL2, 3;AL3, 4:AL4, 5:RM, 6:PM, 7:BM, 8:PB | |
| Display shutoff timer (Setting of light out time for PV, SV1 and SV2) | RC14<br>RC14 | 1, 1, 1, 99<br>1, 99 | WC14_1, 1, 1, 99<br>WC14_1, 99 | 1, 1, 1, 99<br>1, 99 | 1:ON, 0:OFF, 0 to 99<br>1:ON, 0:OFF, 0 to 99 | 452A<br>451A |
| Power On delay | RC40 | 2 | WC40_99 | 99 | 2 to 99 | 452A |
| Comparison data | RC41 | 5 | WC41_5 | 5 | 5:RM, 6:PM, 7:BM, 8:PB | |
| AL1 Comparison value | RC42 | 2000 | WC42_99999 | 99999 | -99999 ot 99999 | |
| AL2 Comparison value | RC43 | 3000 | WC43_99999 | 99999 | -99999 to 99999 | |
| AL3 Comparison value | RC44 | 7000 | WC44_99999 | 99999 | -99999 to 99999 | |
| AL4 Comparison value | RC45 | 8000 | WC45_99999 | 99999 | -99999 to 99999 | |
| AL1 Hysteresis | RC46 | 1 | WC46_9999 | 9999 | 1 to 9999 | |
| AL2 Hysteresis | RC47 | 1 | WC47_9999 | 9999 | 1 to 9999 | |
| AL3 Hysteresis | RC48 | 1 | WC48_9999 | 9999 | 1 to 9999 | |
| AL4 Hysteresis | RC49 | 1 | WC49_9999 | 9999 | 1 to 9999 | |
| AL1 Comparison method | RC50 | 0 | WC50_0 | 0 | 0:OFF, 1:HI, 2:LO | |
| AL2 Comparison method | RC51 | 2 | WC51_2 | 2 | 0:OFF, 1:HI, 2:LO | |
| AL3 Comparison method | RC52 | 1 | WC52_1 | 1 | 0:OFF, 1:HI, 2:LO | |
| AL4 Comparison method | RC53 | 0 | WC53_0 | 0 | 0:OFF, 1:HI, 2:LO | |
| Output Delay | RC54 | 0 | WC54_99 | 99 | 0 to 99 | |
| Comparison conditions | RC55 | 0 | WC55_1 | 1 | 1:GO, 0:NG | |
| Zone setting | RC56 | 0 | WC56_1 | 1 | 1:ON, 0:OFF | |
| Analog output switching | RC75 | 5 | WC75_6 | 6 | 5:RM, 6:PM, 7:BM, 8:PB | Common |
| Analog output offset | RC78 | 00000 | WC78_99999 | 99999 | -99999 to 99999 | |
| Analog output full scale | RC79 | 19999 | WC79_99999 | 99999 | -99999 to 99999 | |
| Code registration of My setting mode | RC99<br>RC99 | 42, 43, 44, 45, 01, 02, 03, 00<br>01, 02, 03, 00, 00, 00, 00, 00 | WC99_42, 43, 44, 45, 01, 02, 03, 00<br>WC99_01, 02, 03, 00, 00, 00, 00, 00 | 42, 43, 44, 45, 01, 02, 03, 00<br>01, 02, 03, 00, 00, 00, 00, 00 | 00 to 98 | 452A<br>451A |

● Measuring command

| Function | Requested command | | | Applicable Model |
|---|---|---|---|---|
| | Command | Response | | |
| Current value data | DATA?<br>DATA? | _+9.9999E+0, 16<br>_+9.9999E+0 | | 452A<br>451A |
| Current value data | RMREad | _+9.9999E+0 | | Common |
| Peak data | PMREad | _+9.9999E+0 | | |
| Bottom data | BMREad | _+9.9999E+0 | | |
| Amplitude data | PBREad | _+9.9999E+0 | | |

● Judgment command

| Function | Requested command | | | | Applicable Model |
|---|---|---|---|---|---|
| | Command | Response | Item | | |
| AL1 to AL4, GO | ALARm | 16<br>(00 at ALRESET) | Output<br>AL1<br>AL2<br>AL3<br>AL4<br>GO | Weight of data<br>01<br>02<br>04<br>08<br>16 | 452A |

● Control command

| Function | Requested command | | Specified command | | | Applicable Model |
|---|---|---|---|---|---|---|
| | Command | Response | Command frame | Response | Item | |
| Latch | RLATch | 1 | WLATch 1 | 1 | 1:ON, 0:OFF | Common |
| Hold | RHOLd | 0 | WHOLd 1 | 1 | 1:ON, 0:OFF | |
| Alarm reset | RALRst | 1 | WALRst 1 | 1 | 1:ON, 0:OFF | 452A |
| Memory reset | | | MR | End code | | Common |

● Memory control command

| Function | Requested command | | Specified command | | | Applicable Model |
|---|---|---|---|---|---|---|
| | Command | Response | Command frame | Response | Item | |
| Write | | | STOR | End code | | Common |
| Default | | | DEFAult | End code | | |

**Contact Information**

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# Quick Manual

## Digital Panel Meter, Model 451A / Meter Relay, Model 452A
## Analog Output

I-01596

## 1. Data Output Code

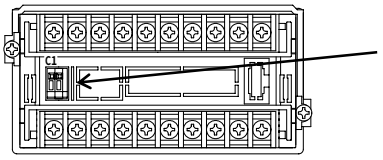
| Code | Specifications | Output Impedance | Max. Load |
|---|---|---|---|
| 09 | Analog voltage (positive input side outputs) * DC 0-10V (Available scaling, Default: 1-5V) | Max. 0.1Ω | Min. 100Ω at DC 0-1V<br>Min. 1kΩ at DC 0-10V<br>Min. 500Ω at DC 1-5V |
| 29 | Analog current (positive input side outputs) * DC 0-20mA (Available scaling, Default: 4-20mA) | Min. 5MΩ | Max. 2.4kΩ at DC 0-5mA<br>Max. 600Ω at DC 0-20mA<br>Max. 600Ω at DC 4-20mA |

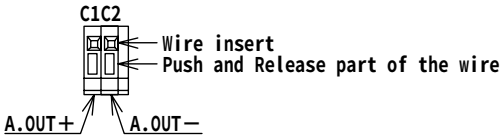
* Outputs the positive input side

Example: Input signal is ±1.9999V, and analog output is 0-20mA DC.

| Input | Output |
|---|---|
| 0V | 0mA |
| 1.9999V | 20mA |

## 2. Connector and Connections




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

Strip-off length: 9 to 10mm

Outputs voltage and current is in proportional to input signal.

**⚠ CAUTION**

**●Do not apply voltage to the analog output connector. Otherwise, the meter may be broken.**

## 3. Functions

Refer to our Quick manual, I-01593 and I-01594, for detailed setting procedures.

●Output switching : (Parameter 75) Switch the analog output.
Select any data from current value, peak memory, bottom memory, and display amplitude.

●Min. / Max. Value : (Parameter 76 and 77) Set the output value at the 0% input and 100% input.
Example 1: Switch the output of the -09 from 0-10V to 0-2V / 1-5V.

| | Parameter 76 | Parameter 77 |
|---|---|---|
| 0-10V | 00.0V | 10.0V |
| 0-2V | 00.0V | 02.0V |
| 1-5V | 01.0V | 05.0V |

Example 2: Switch the output of the -29 from 0-20mA to 0-10mA / 4-20mA.

| | Parameter 76 | Parameter 77 |
|---|---|---|
| 0-20mA | 00.0mA | 20.0mA |
| 0-10mA | 00.0mA | 10.0mA |
| 4-20mA | 04.0mA | 20.0mA |

●Offset / Full scale : (Parameter 78 and 79) Set the display value at the 0% input and 100% input.
Example 1: Output 4-20mA in proportional to 10000 - 50000 display.
Example 2: Output 1-5V in proportional to -10000 – (+) 10000 display.

| | Data output code | Parameter | | | |
|---|---|---|---|---|---|
| | | 76 | 77 | 78 | 79 |
| Example 1 | -29 | 04.0mA | 20.0mA | 10000 | 50000 |
| Example 2 | -09 | 01.0V | 05.0V | -10000 | 10000 |

The offset value may be lower or higher than the full scale value.

## 4. Calibration

In order to maintain long term accuracy, periodical calibration at an interval of about one year is recommended.
Make a calibration in the ambient condition of 23°C±5°C, 75%RH or less. Refer to our Quick manual, I-01593 and I-01594, for detailed calibration procedures.

## 5. Specifications

The measuring input and the analog output is insulated. Outputs the positive input side.

| | | |
|---|---|---|
| Conversion | : | PWM conversion system |
| Allowable Error | : | ±0.15% of Span at 23°C±2°C |
| Temperature coefficient | : | ±200ppm/°C |
| Linearity | : | 0.1 % of Span |
| Resolution | : | 1/10000 (for 0-10V DC and 0-20mA DC output) |
| Output periodicity | : | 67ms |

※ If the input signal is over full scale, output is saturated at 100%.
Example: Saturated 20mA at 4-20mA setting, and 5V at 1-5V setting.

**Contact Information**

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# Quick Manual

## Digital Panel Meter, Model 451A / Meter Relay, Model 452A
## Decimal Point External Control

I-01689

## 1. Data Output Code

| Code | Specifications |
|---|---|
| EC | Decimal point external control |

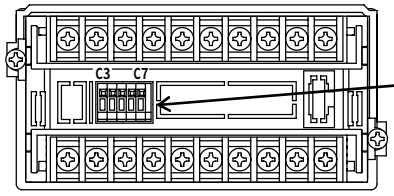
## 2. Connector and Connections

**⚠ 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.**

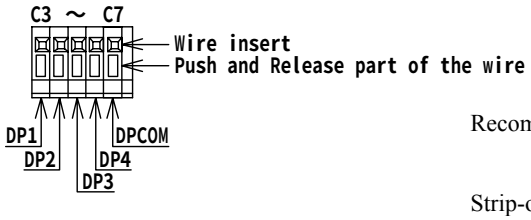
**⚠ CAUTION**

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




Decimal point external control connector

### 2.1 Connections




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

Strip-off length: 9 to 10mm

### 2.2 Specifications

●Setting: Decimal point is programmable from the front panel or external control.

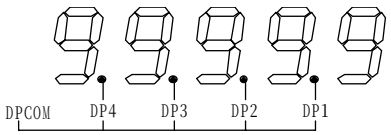
・Front panel setting: selectable by the front panel key. Refer to the quick manual, I-01593 for the 451A, or I-01594 for the 452A.

・External control (DP1 to DP4)

Decimal point is programmable at your desired position by setting the external control mode.

Short-circuit between $10^1$ to $10^4$ digit (DP1 to DP4) and DPCOM (Active "L").

Decimal point does not light up when overlapping DP1 to DP4 one another.

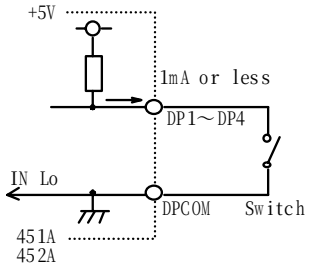



●Electrical specifications: Input terminal and external control terminal are insulated.

Those are insulated from ZS, MR, and HOLD terminal.

Active "L", $I_{IL}$ ≦-1mA, "L"=0 to 0.8V, "H"=3.5 to 5.0V

## 2.3 Input circuit



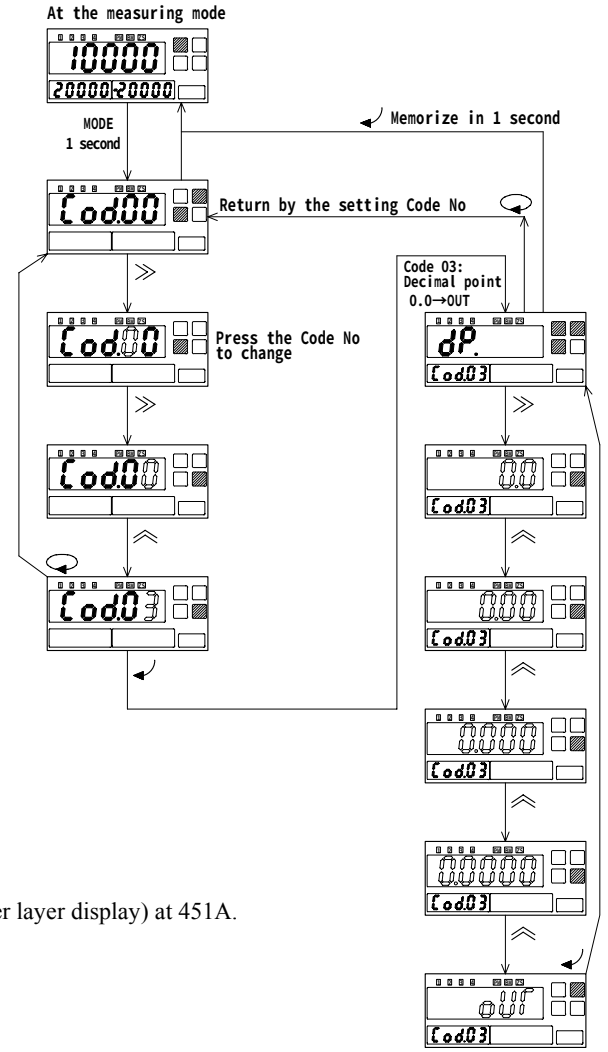

## 2.4 Function

Programmable external control by selecting OUT for the decimal point.

| No. | Function | Display | Contents | Default |
|---|---|---|---|---|
| 03 | Decimal point | dP. | 0, 0.0, 0.00, 0.000, 0.0000,OUT | OUT |

## 2.5 Parameter setting mode

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




∗No SV display (lower layer display) at 451A.


| Contact Information |
|---|
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