

DIGITAL PANEL METER MODEL AP-202A SERIES INSTRUCTION MANUAL



Caution

- (1) The application of voltage or current exceeding its maximum allowable value to the input terminals may result in instrument damage.
- (2) The supply of power out of its allowable range may cause fire, electric shock or instrument failure.
- (3) The content of this manual may subject to change without prior notice for product improvement.
- (4) This manual is carefully prepared. However, if any question arises, or any mistake, omission or suggestion is found in the content of this manual, contact your nearest our sales agent.
- (5) Make this manual available easily anytime.

1. Introduction

This AP-202A Series digital panel meter is a mini-size, 3-1/2 digit indicator meeting DIN external-dimension standards, provided with our originally developed LSI and driven by 5V, 12V, and 24V DC. Isolated from input LO terminals, the indicator part has medium size LEDs (light emitting diode numeric elements) whose height is 10.2mm and maximum indication is 1999. The mini-size meter is equipped optionally with the isolation parallel BCD output tri-state control and collector output.

2. Specifications

■ DC voltage measurement

Model No.	Measuring range	Max. resolution	Input impedance	Max. allowable input voltage
AP-202A-11	±199.9mV	100 μV	100MΩ	±100V
AP-202A-12	±1.999V	1mV	100MΩ	±100V
AP-202A-13	±19.99V	10mV	10MΩ	±250V
AP-202A-14	±199.9V	100mV	10MΩ	±500V

Accuracy: ±(0.1% of rdg +1digit) (23°C±5°C)

■ DC current measurement

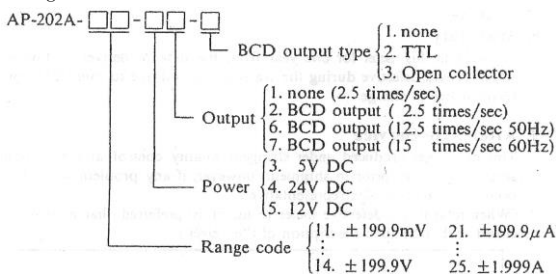
Model No.	Measuring range	Max. resolution	Internal resistance	Max. allowable input current
AP-202A-21	±199.9 μA	100 μA	1kΩ	±10mA
AP-202A-22	±1.999mA	1 μA	100Ω	±50mA
AP-202A-23	±19.99mA	10 μA	10Ω	±150mA
AP-202A-24	±199.9mA	100 μA	1Ω	±500mA
AP-202A-25	±1.999A	1mA	※0.1Ω	±3A

Accuracy: ±(0.2% of rdg +1digit) (23°C±5°C)

However ±(0.3% of rdg +1digit) only for AP-202A-25

Value with *in the internal resistance column is that of the external resistance.

■ Configuration of model No.



3. Common Specifications

Measuring function	: DC voltage measurement, DC current measurement
Operating principle	: Double integral method
Input circuit	: Single ended circuit (power isolation)
Input bias current	: 50pA (TYP)
Sampling rate	: Approx. 2.5 time/sec, 12.5 time/sec (50Hz) or 15 times/sec. (60Hz)
Normal mode noise rejection ratio	: 40dB (TYP) (50/60Hz)
Maximum indication	: 1999
Over range warning	: For an input signal exceeding the maximum indication, the indication 1999 flashes.

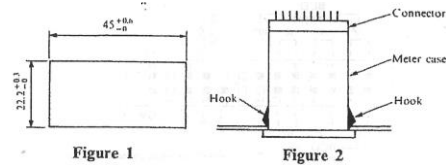
Display	: LED (light emitting diode numeric element) with a height of 10.2mm
Polarity indication	: Automatic indication of minus sign (-) for a negative input
External control	: Signal is held by connecting the hold terminal with the power (0V) terminal. Decimal point is set at any position by connecting the terminals provided for the decimal point. Signal is blanked by connecting the terminal with the power (0V) terminal.
Ambient temperature	: 0 to 50°C
Power supply	: DC5V ±5% 120mA (TYP) DC12V ±10% 50mA (TYP) DC24V ±20% 25mA (TYP)
Power consumption	: 600mW
External dimensions	: 48mm (W) × 24mm (H) × 73mm (D) DIN size
Weight	: Approx. 50g
Withstand voltages	: ±500V DC between input terminal (LO) and power (0V) terminal
Data output	: Isolated parallel BCD output, TTL, or open collector
Accessories	: Connectors, instruction manual

4. Installation

4-1 Installation

1) Panel mounting

Make a cutout on a panel as shown in Figure 1 (panel thickness is 0.8mm to 3.5mm), and insert the meter into the cutout from the front of the panel as shown in Figure 2.

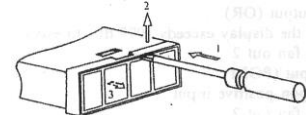


2) Dismounting the meter from the panel

Pressing the hooks on both sides of the meter case using fingers, push the meter to the front of the panel.

3) Pulling out the internal assembly

First, remove the front panel from the meter using a screwdriver which can be inserted into a bottom slit between the meter case and the front panel. Second, pull out the connector from the back of the meter. Third, insert a screwdriver between the case and the LED assembly as shown in Figure 3 to pry the case upward. Thus the hook of the printed circuit board is released, and the board can be drawn out by pushing the meter back.



4-2 Connector mounting

Insert the connector attached for input/output signals into the back of the meter.

Exercise care in inserting the connector not to change the top and bottom of the connector because it is a signal side contact connector.

1) Power supply connection

Connect power supply to the terminals of 9 (0V) and 10 (+). The power should be 5V DC±5%, 12V DC±10%, or 24V DC±20% according to the type of your meter. Confirming the type of our meter, connect the power accordingly. (Since the meter has no power switch, the meter activates just after power is connected.)

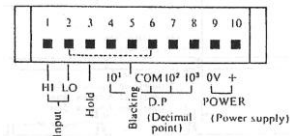
2) Decimal point

The decimal point can be set at any position by connecting the terminals shown in the table below. The terminals are not connected when shipped from the factory. The position is to be selected by the user.

Lighting decimal point	Terminal No. to be connected
10 ¹	4-6
10 ²	7-6
10 ³	8-6

3) Input signal

Connect input signal lines (DC voltage and current) to terminals Hi (1) and LO (2).



4) Holding and Blanking (BL)

An indication is held by a short circuit between the terminals of holding (3) and COM (6). Measurement restarts by breaking the short circuit at an arbitrary timing. The minimum time required to update a measured value is approx. 400ms (2.5 times/sec.)

An indication is distinguished by a short circuit between the terminals of blanking(5) and COM(6). This connection is for power saving. However, polarity indication(-) and decimal point is not distinguished. Because the input terminal(LO), and common terminal(COM) are not insulated from one another for direct currents in the meter, a mechanical contact such as a relay switch is preferred for control signals. To control the meter with a TTL or a transistor, use a circuit with a photo-coupler as shown in Figure 4.

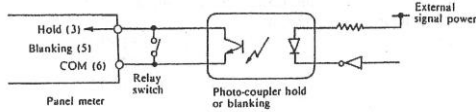


Figure 4

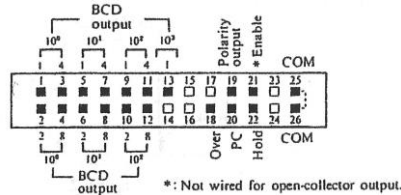
Models with BCD output(option) have holding terminal for upper terminal. Since this terminal is isolated, a circuit as shown in Figure 4 is not necessary.

5)DC Current Measurement

DC current can be measured for the 21 to 24 range of the meter. However, to measure it for the 25 range, optional resistance must be connected to Hi terminal(1) and Lo terminal(2) in parallel because the shunt resistance is an external resistance.

5)BCD parallel Output Option(Upper Connector)

●Connector connection diagram



5-1 TTL level specifications

- 1)Data output changes to new data just before printing command signal(PC) rises after integral action is finished. Synchronize data read by the printing command signal(PC). BCD(1-2-4-8)code, positive logic
 - TTL level fan out 2
- 2)Printing command output (PC)
 - Positive pulse of approx. 1 ms width is obtained when integral action is finished and new data is re-written.
 - TTL level fan out 2
- 3)Overrange output (OR)
 - Logic "1" if the display exceeds 1999 due to excessive input.
 - TTL level fan out 2
- 4)Polarity output (POL)
 - Logic "1" upon positive input
 - TTL level fan out 2
- 5)External hold and ENABLE

With the HOLD (22) and COM terminals (25 and 26) shorted, the display and data output content are held. Opening these terminals at the necessary timing starts measurement.

When the ENABLE terminal (21) and the respective digital common terminals(25 and 26) are shorted, all output terminals are in the high-impedance status and generates no outputs.

For control using mechanical signals such as relays, switches, etc, avoid the chattering. For control by TTL or transistor, add a circuit in Figure 5 externally.

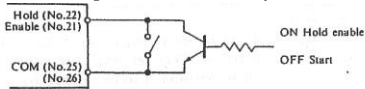
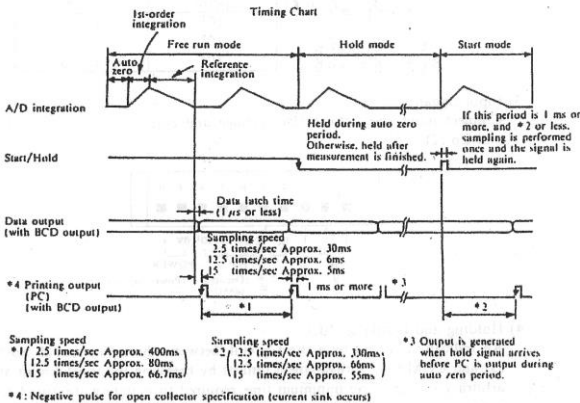


Figure 5

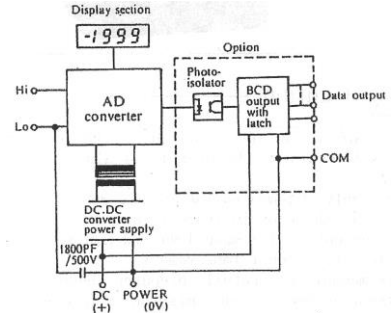


5-2 Open Collector Specifications

Transistor: Withstanding voltage between collector and emitter: 30V (MAX.)
 Sink current: 15mA (MAX.)
 Output saturation voltage: 1.2V or less (at 15mA sink current)

BCD data output	: 10 ⁰ to 10 ³ (3-1/2 digits), (1-2-4-8)code, negative logic
Printing command output(PC)	: Current sinks for approx. 1ms when measurement is finished.
Over output (OR)	: Current sinks when the display exceeds 1999 due to excessive input.
Polarity output (POL)	: Current sinks when polarity display is positive.
External hold ENABLE	: Same as TTL level specifications : Only for TTL level specifications (Not provided for the open collector specifications.)

6. Structure



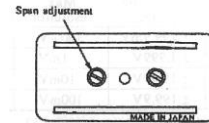
7. Maintenance and Calibration

7-1 Notes on maintenance

When the meter is not used, store it in a location with an temperature of -10°C to +70°C and a humidity of less than 60%. If the meter is used in dusty surroundings, remove the dust frequently from the internal assembly. (Dust may impede heat release from the assembly and shorten its life.) The meter case and front panel materials are plastic molding, thus do not apply thinner or other volatile liquids in cleaning them.

7-2 Calibration

◎To maintain the initial accuracy for an extended period, periodic calibration is recommended. A standard instrument with an accuracy of 0.01% or more is necessary to calibrate the meter.



◎Calibrate the meter in the order shown below:

- (1)Supply power to the meter, and start adjustment after 10 min for test running.
- (2)Zero-point confirmation
 - Make a short circuit across the input terminals Hi and Lo, and confirm the indication is 000. Zero-point adjusting VR must be adjusted so that indication should be 000 when 1V input is applied to input terminals for 1V (1 to 5V) range (or when 4mA input is applied to input terminals for 2A (4 to 20mA) range.
- (3) Input a positive(+) polarity voltage corresponding to the full scale indication (1990), and adjust the span adjusting VR to obtain 1990 indication. Then input a negative(-) polarity voltage, and confirm the indication is -1990±0.1% rdg±1 digit. For 1V(1 to 5V) range, 4.98V input is applied and for 2A (4 to 20mA) range 19.92 mA is applied and adjust the VR so that indication should be 1990 as mentioned above.

8. Warranty

We warrant this meter for one year from the date of delivery. For a meter which proves defective during the warranty period due to our fault, we will repair it free of charge.

9. After-Sale Service

This meter was produced under stringent quality control and has undergone severe inspections prior to shipment; however, if any problem with the meter occurs, contact the sales representative. (When returning a defective meter to us, it is preferred that a memo be enclosed with a detailed description of the defect.)

watanabe

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