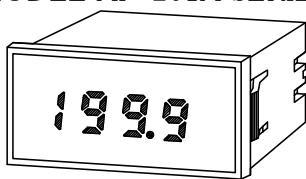


INSTRUCTION MANUAL

DIGITAL PANEL METER

MODEL AP-201A SERIES



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-201A Series digital panel meter is a mini-size, 3-1/2 digit DC voltage indicator meeting DIN external-dimension standards, and driven by 5V DC. The indicator part has medium size LEDs (light emitting diode numeric elements) whose height is 10.2mm and maximum indication is 1999. The meter is equipped with automatic zero-adjusting circuit, automatic polarity-transferring function and signal-holding function.

2. Specifications

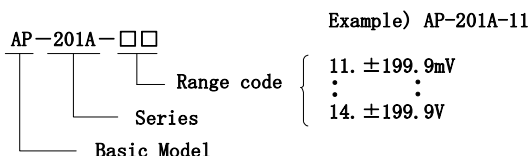
● DC Voltage

Model No.	Measuring range	Maximum resolution	Input impedance	Maximum allowable input voltage
AP-201A-11	$\pm 199.9\text{mV}$	$100\mu\text{V}$	$100\text{M}\Omega$	$\pm 100\text{V}$
AP-201A-12	$\pm 1.999\text{V}$	1mV	$100\text{M}\Omega$	$\pm 100\text{V}$
AP-201A-13	$\pm 19.99\text{V}$	10mV	$10\text{M}\Omega$	$\pm 250\text{V}$
AP-201A-14	$\pm 199.9\text{V}$	100mV	$10\text{M}\Omega$	$\pm 500\text{V}$

Accuracy: $\pm 0.1\%$ of rdg +1digit (at $23^\circ\text{C} \pm 5^\circ\text{C}$, 35 to 85%RH)

Indication stability only for AP-201A-11 is maximum 2 digits.

3. Model Configuration



4. Common Specifications

Measuring function	: DC voltage measurement
Operating principle	: Double integral method
Input circuit	: Automatic zero-adjusting circuit
Floating voltage	: Voltage between L0 (terminal 2) and 0V (terminal 9) ranged in $\pm 1\text{V}$
Input bias current	: 50pA (TYP)
Sampling rate	: Approx. 2.5 time/sec
Maximum indication	: 1999
Over range warning	: For an input signal exceeding the maximum indication, the indication 1 or-1 flashes, and the succeeding 3 digits extinguish. The decimal point also flashes.
Display	: LED (light emitting diode numeric element) with a height of 10.2mm (red)

Polarity indication	: Automatic indication of minus sign(-) for a negative input
External control	: Signal is hold by connecting HOLD (terminal 3) with 0V (terminal 9). Decimal point is set at any position by connecting the terminals provided for the decimal point.
Ambient temperature	: 0 to 50°C , 35 to 85%RH (Typical)
Storage temperature	: -10 to 70°C , 60%RH max.
Power supply	: $\text{DC}5\text{V} \pm 5\%$, 60mA (TYP)
Power consumption	: 300mW
External dimensions	: 48mm(W) \times 24mm(H) \times 73mm(D) DIN size
Weight	: Approx. 30g
Withstand voltage	: 1500V AC between input terminal L0 (terminal 2) and a mounting panel
Insulation resistance	: More than $100\text{M}\Omega$ between the above terminals.

5. Installation

5-1 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.

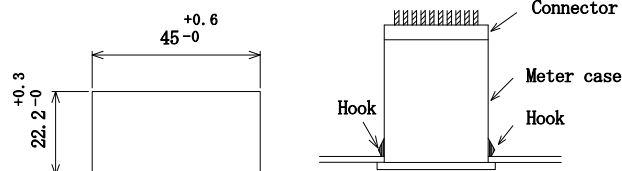


Fig. 1

Fig. 2

2) Dismounting the meter from the panel

Pressing the hooks on both sides of the meter case using the fingers. Push the meter back 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 Fig. 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.

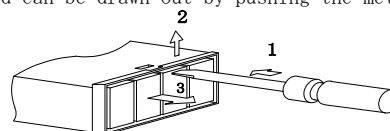


Fig. 3

5-2 Connector mounting

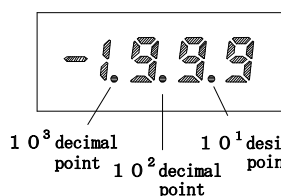
Insert the connector attached for input/output signals into the back of the meter. Exercise care in inserting the connector not to change the top and bottom of the connector.

1) Power supply connection

Connect power supply to 0V (terminal 9) and +5V (terminal 10). The power should be $\text{DC}5\text{V} \pm 5\%$ (Since the meter has no power switch, the meter activates just after power is connected.) Because the meter also has no fuse, install a fuse (for 0.1A) outside of the meter, if necessary.

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, and the position is to be selected by the user.

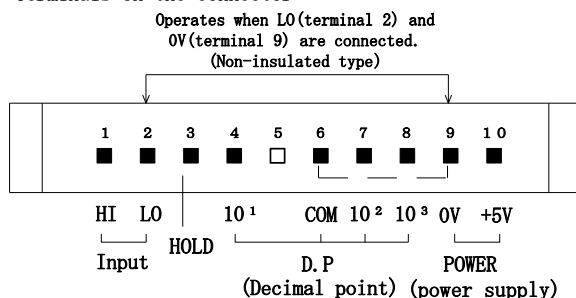


Lighting decimal point	Terminal No. to be connected
1 0 ¹	4 - 6
1 0 ²	7 - 6
1 0 ³	8 - 6

3) Input signal

Connect input signal lines to HI (terminal 1) and LO (terminal 2), also connect LO (terminal 2) with 0V (terminal 9) to complete the measuring circuit. The signal line to LO must be grounded at a point near to the signal source; at the same point, the power line (0V) must be grounded.

• Terminals on the connector



4) Holding or starting indication by external signal

An indication is held by a short circuit between HOLD (terminal 3) and 0V (terminal 9). The signal obtained just after making a short circuit is held in the display. Measurement restarts by breaking the short circuit at an arbitrary timing. The time required to update a measured value is approx. 400ms. LO (terminal 2), 0V (terminal 9), and COM (terminal 6) are not insulated in the meter, a mechanical contact sure as a relay switch is preferred for control signals. To control the meter with a TTL or a transistor, will recommend isolation circuit as Fig. 4.

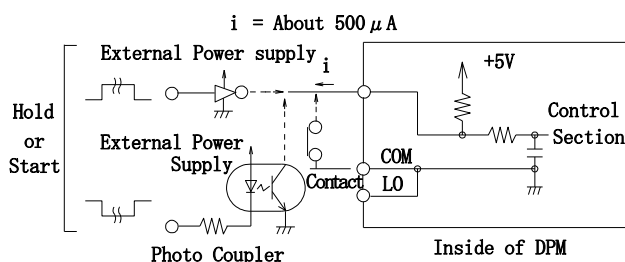
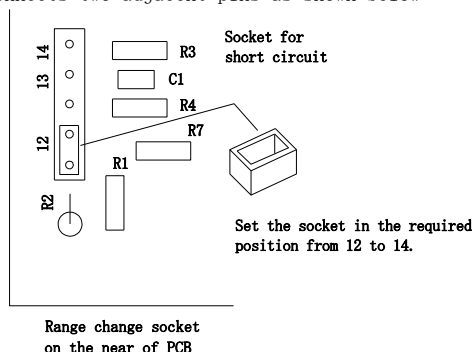


Fig. 4

6. Range Change

Model AP-201A-12, 13, and 14 can change measuring ranges. To change the range, first pull out the internal assembly as described in 4-1-3. The circuit board (PCB) has range change connector pind near to the connector. Next, make a short circuit with the socket which connects two adjacent pins as shown below:



If the range is changed, calibrate the meter referring to 7-2

7. Maintenance and Calibration

7-1 Notes on maintenance

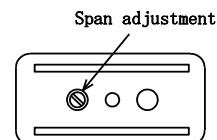
When the meter is not used, store it in a location with an ambient temperature of -10°C to $+70^{\circ}\text{C}$ and a humidity of less than 60%. If the meter is used in dusty surroundings, remove the dust frequently from the internal assembly. (Dust may impede heat release from the assembly and shorten 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 the order shown below:

- (1) Supply power to the meter, and start adjustment after 20min for test running.
- (2) Zero point confirmation Make a short circuit across the input terminals HI (terminal 1) and LO (terminal 2), and confirm the indication is 000.
- (3) Input a positive (+) polarity voltage 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 $-1990 \pm 0.1\%$ of rdg +1digit.



8. Warranty

This meter is warranted for a period of one year from date of delivery. Any defect which occurs in this period and is undoubtedly caused by Asahi's faults will be remedied free of charge.

This warranty dose not apply to the meter showing abuse or damage which has been altered or repaired by others except as authorized by WATANABE ELECTRIC INDUSTRY CO., LTD.

9. AFTER-SALE SERVICE

This meter is delivered after being manufactured, tested inspected under strict quality control.

However, if any problem does occur, contact your nearest Watanabe sales agent or Watanabe directly giving as much information on problem as possible.

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