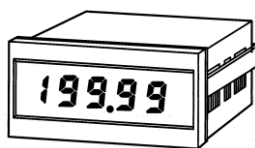


DIGITAL PANEL METER MODEL AP-341 Series INSTRUCTION MANUAL



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) The 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) After read this manual, please keep it as anytime can see.

1. Introduction

Thank you purchasing our AP-341 digital panel meter. Although this meter is manufactured under strict quality control, prior to using it, check it to make sure that it has not been damaged during transportation and/ or there are no mistakes in the specification. If any defect in respect of its quality and specification is found, contact our local representatives or our head office at earliest data.

2. Features

This meter is a small-size 4-1/2 digits display meter with its dimensions of 36mm×72mm fully complying with DIN standards. Wide range of power supply may be used: from 90V AC to 132V and from 180V to 262V (by changing a jumper). A measured result is displayed with large LED numeric elements (with character height of 14.2mm). A desired measuring range may be selected from four voltage measuring ranges. Also, open collector output and TTL output are available by mounting the BCD parallel output board as an option.

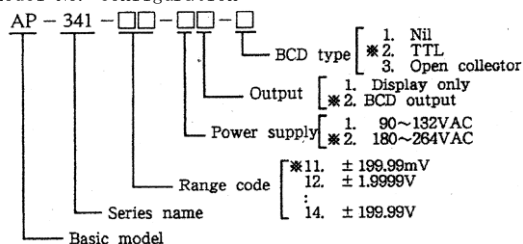
3. Specification

■ DC voltage measurement

Model No. & Range Code	Measuring Range	Max. Resolution	Input Impedance	Max. allowable Input Voltage
AP-341-11	±199.9mV	10μV	100MΩ	±250V
AP-341-12	±1.999V	100μV	100MΩ	±250V
AP-341-13	±19.99V	1mV	1MΩ	±250V
AP-341-14	±199.9V	10mV	1MΩ	±500V

Accuracy ± (0.03% rdg + 1digit) (23°C ± 5°C, 35 to 85%RH)

■ Model No. Configuration



4. General Specifications

Measurement function	: Specify one model out of four DC voltage measurement models (Ranges 12, 13 and 14 can be selected by switching the internal socket).
Operation method	: Dual slope
Input circuit	: Single-ended type
Input bias current	: 100pA (Typical)
Sampling speed	: 2.5 times/sec
Noise rejection ratio	: More than NMR50dB (50/60Hz)
Maximum display	: 19999
Overrange warning	: For input signal exceeding the maximum display, 0000 flashes at each digit.
Display	: LED numeric elements Character height 14.2mm
Polarity display	: The display unit shows “-” automatically when input signal is negative
Decimal point	: Any decimal-point position is settable (by the shorting socket on the front panel).
Output	: BCD output which is isolated from the input terminal I/O. Open collector and TTL specification are available as option

External control	: External hold; Negative 0V signal or contact signal Enable; Output of 10 ⁰ to 10 ⁴ digit with over-polarity turn height impedance with negative 0V signal or contact signal. (This function is available with BCD and TTL specifications.)
Operating temperature	: 0 to 50°C
Power supply	: 90V AC to 132V, Approx 2VA (When 100V is used) 180V AC to 264V (by changing internal jumper)
Dimensions	: 36mm (H) × 72mm (W) × 110mm (D) DIN size
Weight	: Approx 230g
Dielectric strength	: ±500V DC between input (I/O) and grounding (E) terminals, and 1,500V AC for 1 minute between the power supply terminal and input terminal, common terminal and case
Insulating resistance	: 500V DC, 100MΩ or more between the above terminals.
Accessories	: Instruction Manual (For BCD output, connector and connector mount screws are supplied.)
Others	: For unit display, standard ranges, etc., contact our local representatives.

5. Handling

5-1 Preparation Required Prior to Operation and General Precautions

- 1) Use this meter at ambient temperature of between 0 to 50°C and in humidity of up to 85%. Do not expose the meter to dew condensation.
- 2) Use the meter only where there is no dust or chemicals and gases harmful to electrical components and parts.
- 3) Do not subject the meter to vibration and shock.
- 4) Noise

a) Power circuit

As it is very difficult to build a complete noise rejection circuit into a small device such as this meter, use a surge absorption circuit such as an external line filter, varistor to prevent excess surge when using it on the same power line as magnet switches and/ or where lightning occurs frequently. In addition, electricity can be got from another line.

b) Shield

When noise causes a problem, connect the E terminal to the earth or grounding terminal. If air induction causes a problem, enclose the molded mainframe case in a metal case. Since the E terminal is charged with neutral potential of supply voltage, pay attention so that it does not contact other input terminals.

5-2 Mounting and Functions

1) Panel mounting

Make a panel cutout as shown in Figure 1, insert the mainframe into the panel from the front of the panel and tighten the mainframe with a band from the rear as shown in Figure 2.

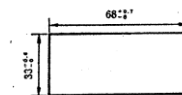


Figure 1

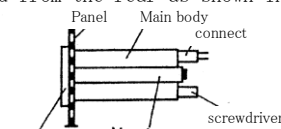


Figure 2 Side View

2) Pulling out the internal assembly

Insert a screwdriver into each of rectangular holes at the bottom of the mainframe to force out the inner front panel. Inserting a screwdriver into holes of threaded terminals on the rear side, gently move the terminals up and down to widen front side of the case and push the threaded terminals from the rear side. (Refer to Figure 3.)

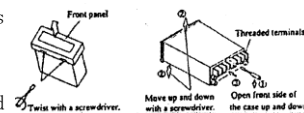
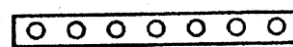


Figure 3

5-3 Decimal-point selection

Remove the panel from the front of the case in accordance with 5-2-2). Then, change the shorting socket at upper left of the numeric element LED to illuminate a desired digit.



5-4 Terminal connection

Connect wires properly in accordance with the procedure described below.

1) Power connection

Connect the power wires to Terminal 7 or 8 on the connector. Use power supply from 90V to 132V AC, and voltages from 180V to 264V AC can be used by internal jumper selection. (Since this meter is not provided with a power switch, it is ready to operate as soon as it is connected to a power supply.)

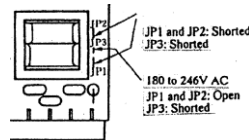
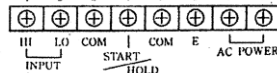


Figure 4 Change of power supply

2) Input signal connection

- Connect the input signal (DC voltage) to terminals HI (No.1) and LO (No.2).
- When input signal wires pass through an area with a lot of external noise, use a 2-core shielded cable and connect its outer sheath to a signal source at one point on the LO side.
- Never apply voltage of more than the maximum allowable value to the input terminals. •Connector Connection Diagram



Note: Input LO and COM have a same potential.

3) START/HOLD

Shorting the HOLD (No.4) and COM (No.3 and 5) terminals holds the compared result and the value just before shorting. Also, opening the above terminals starts measurement. Minimum time required for measuring (positive +5V pulse from 0V for more than 1ms or a contact signal(open) is about 400ms. Since the input terminal (LO) and COM terminal of this meter are connected internally with a same potential, control these terminals with a mechanical relay switch such as a relay switch as far as possible.

When controlling them with TTL or transistor, mount the circuit shown in Figure 5 externally. (Insulate the circuit when input signals float.)

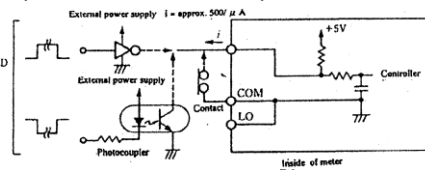


Figure 5

Meters of models fitted with the BCD output board (available as option) are provided with the START and HOLD terminals at the upper terminal, which requires no isolation circuit shown in Figure 5 as it is isolated.

4) Common terminals(COM)

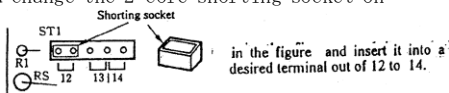
Terminals (No.3 and No.5) common to the START and HOLD terminals. Although connected internally with the input LO terminal, do not connect them to a digital circuit as it may cause a measurement error.

5) Earthing terminal(E)

When the meter is influenced by external noise connect the earthing terminal (E) to the earth or the grounding terminal of the meter. Since the terminal (E) is charged with neutral potential of supply voltage, Pay attention so that it does not contact with other input terminals.

6) Range Selection

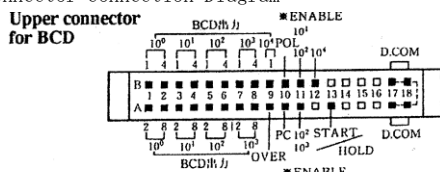
Any range can be selected. Pull out the internal assembly in accordance with 5-2-2) and change the 2-core shorting socket on the connector as follows.



When the range is changed, always conduct calibration in accordance with item 7-2.

6. BCD parallel output option (upper connector)

■ I/O Connector Connection Diagram



(※ Not connected for the open collector output.)
BCD outputs are isolated from the input signal (LO).

6-1 Specification of open collector

- Measurement data : Negative logic. When logic is "1", transistor is turned ON.
- Polarity signal : When positive polarity is received, transistor is turned ON.
- Overrange signal : When overrange signal is received, transistor is turned ON.
- Print command signal : Transistor is turned ON for about 1ms following completion of each measurement.
- Transistor output capacity : Applied voltage-max. 30V.
current-max. 10mA. Lower than 1.2V when output saturation voltage is 10mA.

6-2 Specification of TTL output (available at special order)

- Measurement data : Positive logic latch output of tristate parallel BCD
- Polarity signal : Level "1" when positive signal is received.
- Overrange signal : Level "1" when overrange signal is received.
- Print command signal : Positive pulse of about 1ms following completion of each measurement.

Above signals : TTL Level, fanout 2

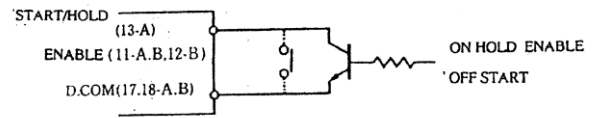
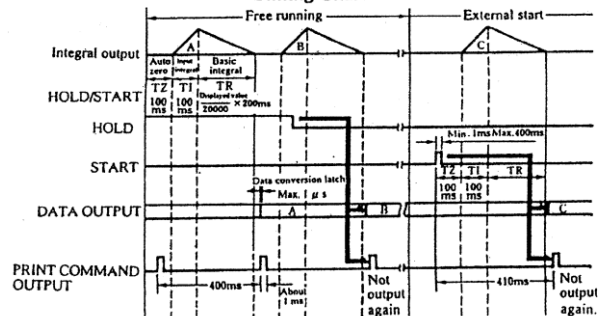
※Above signals may be changed to negative logic.

6-3 ENABLE *Available to TTL specification only

Opening 11-B of 10⁰ and 10¹ terminals, 11-A or terminals 10² and 10³ and 12-B of the terminal 10⁴ or turning them to TTL Level "1" provides BCD data, polarity and overrange of the terminals. When ENABLE terminals are shorted with D and COM (17, 18-B or 17, 18-A) terminals or turned to TTL Level "0". BCD data output terminal is in tristate high impedance. When 10⁴ terminal is controlled output of 10⁴ digit data, polarity and overrange terminals is put in high impedance.

Sink current: 0.5mA ON voltage: Lower than +0.5V

When relays and switches are controlled with mechanical signals, pay attention not to cause chattering. When controlled with TTL or transistor, mount the circuit shown in Figure 6 externally.

Figure 6
Timing Chart

7. Maintenance and Inspection

7-1 Cautions in maintenance

Store the meter where ambient temperature is from -10°C to +70°C and humidity is less than 60%. When it is used at a dusty location, occasionally pull out the internal assembly from the case to remove the dust on the assembly. (temperature rise on internal parts may shorten service life.) Do not wipe the mainframe case with thinner, etc. to remove dust since they are made of molded plastic.

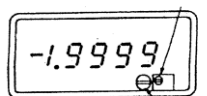
7-2 Calibration and Scalling

©In order to maintain the initial accuracy for a long time, it is recommended that periodic calibration be conducted.

Note that a standard instrument with an accuracy of more than 0.01% is required to calibrate this meter.

©Conduct calibration as follows

- (1) Remove the front panel from the meter.
- (2) Connect the power to warm up the meter for more than 10 minutes, then adjust the meter.
- (3) Zero adjustment
Short the HI and LO input terminals. Then, turn the zero adjustment VR until the display shows 000.
- (4) Span adjustment
Apply voltage or current corresponding to full scale (19900). then turn the span adjustment VR until the display shows 19900. Next, apply voltage with minus polarity to check that the display shows -19900 ± (0.03% of rdg + 1 digit)



Zero adjustment

8. Warranty

Any trouble which occurs in one year following the delivery of this meter due to our fault is covered by the warranty free of charge to user.

9. After-care Service

This meter is manufactured, tested and inspected in accordance with our strict quality control standards. Should any fault occur, contact our local representatives or direct to our head office in Japan. (Specify symptoms of the fault as much in detail as possible.)

watanabe

WATANABE ELECTRIC INDUSTRY CO., LTD.

6-16-19, Jingumae, Shibuya-ku, Tokyo 150-0001, Japan

Phone: (81)3-3400-6141

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