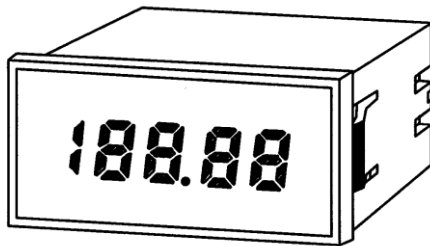


# DIGITAL PANEL METER MODEL AP-242A Series INSTRUCTION MANUAL



## 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. Outline

The Model AP-242A Series digital panel meter is an extremely small 4 1/2-digit meter used only for display, and satisfies the DIN size.

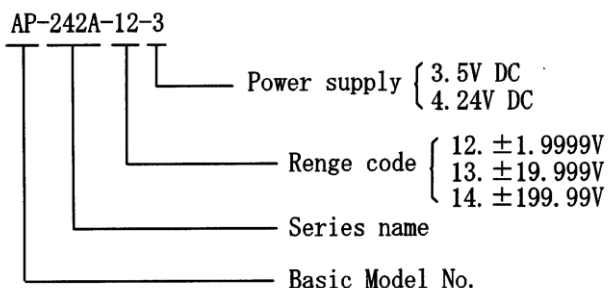
As its power supply voltage, both 5V DC and 24V DC are available. For both, input terminals are isolated from power supply terminals. And one measuring range code can be selected from among three measuring range codes depending on the measuring range. For A/D conversion, this meter employs the double integral method and has various functions such as differential input(for the range code of "-12") holding, etc.

## 2. Specifications

Model and Range codes	Measured range	Highest resolution	Input impedance	Max. allowable Input Voltage
AP-242A-12	$\pm 1.9999V$	$100 \mu V$	$100M\Omega$	$\pm 100V$
AP-242A-13	$\pm 19.999V$	$1mV$	$1M\Omega$	$\pm 250V$
AP-242A-14	$\pm 199.99V$	$10mV$	$1M\Omega$	$\pm 500V$

Accuracy:  $\pm (0.03\% \text{ of rdg} + 1\text{digit})$  ( $23^\circ C \pm 5^\circ C$  and 35 to 85% RH)

### Model NO. Configuration



## 3. Common Specifications

Measurement function	: Specify one Model from among three DC voltage measurement models.
Operation method	: Double integral

Input type	: Differential input (For the "-12") Single-ended type (For the "-13" and "-14")
In-phase voltage	: $\pm 1V$ max (For "-12")
Input bias current	: $100pA$ (TYP.)
Sampling speed	: 2.5 times/sec.
Noise rejection ratio	: NMR 50dB (TYP) (50/60Hz)
Maximum display	: 19999
Overrange warning	: "0000" flashes for any digit for input signal exceeding the maximum display.
Display	: Red LED numeric elements character height -8mm
Polarity	: Automatic polarity selection.
Polarity display	: " - " is automatically displayed when input signal is negative.
External control	: START/HOLD 0V signal or contact signal. (shorting) External start: Positive pulse starting from 0V to +5V for more than 1 ms or contact signal. (open)
Decimal point	: Can be set to any position.
Operating temperature/humidity range	: 0 to $50^\circ C$ 35 to 85%RH (No dew-condensing)
Power supply	: 5V DC $\pm 5\%$ or 24V DC $\pm 20\%$
Consuming current	: For 5V DC: $110mA$ (TYP.) For 24V DC: $25mA$ (TYP.)
Dimensions	: $48(W) \times 24(H) \times 73(D)mm$
Weight	: Approx. 55g
Dielectric strength	: Between input terminal (LO) and mounting panel, For 1 min. at 1500V AC Between input terminal (LO) and power supply terminal (0V): For 1 min. at 500V DC
Accessories	: Connector 1pc. Instruction manual 1 copy

## 4. Operation

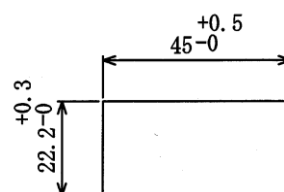
### 4-1 Mounting

#### 1) Mounting the meter on panel surface

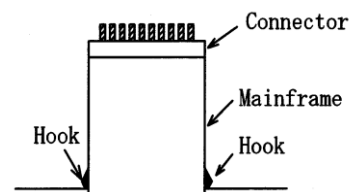
Make the panel cutout as shown in Fig. 1, then insert the meter in the cutout as shown in Fig. 2.  
(Recommended panel thickness: 0.8 to 3.5mm)

#### 2) Removing the meter from the panel surface

Push out the meter from the rear side toward the panel from while holding the hooks shown in Fig. 2 with the thumb and middle finger.



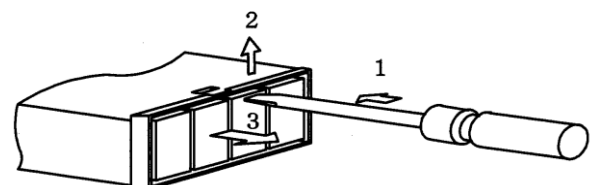
[Fig. 1]



[Fig. 2]

#### 3) Removing internal board from case

Insert a screwdriver in the hole at the bottom of the meter, then slowly twist it in the hole to remove the front panel from the meter. Next, disconnect the connector, then expand the front of the case vertically with the screwdriver inserted between the LED display window and case as shown in Fig. 3. Thus, the hook is disengaged from the printed circuit board, and as a result the printed circuit board comes to the front if pushed from the rear side.



[Fig. 3]

## 4-2 Connecting connector

Connect the attached input/ output connector to the rear of the panel meter.

As the connector contact surface perfectly touches the other only when its connecting direction is correct, pay sttention to its connecting direction.

## 1) Connecting power to power input terminals

Connect power to terminal No.9(0V) and 10(+).

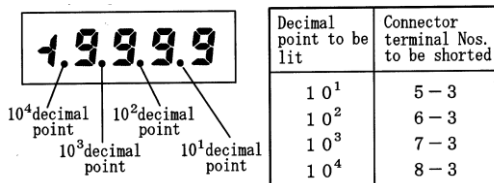
For 5V DC, use the meter at 5V DC $\pm$ 5%, and for 24V DC, at 24VDC $\pm$ 20%.

(As this meter in not provided with a power supply switch, the meter is ready to operate just when the power is connected to the meter.)

In addition, this meter is not internally provided with a power fuse. If it is necessary to install a power fuse for safety, externally install it with a rated current of 0.2A.

## 2) The decimal point can be freely set to any position by connecting the following terminals.

As the decimal point is not set to any position prior to factory shipment, set it to the desired position in the field.



## 3) Connecting input signal to input terminals

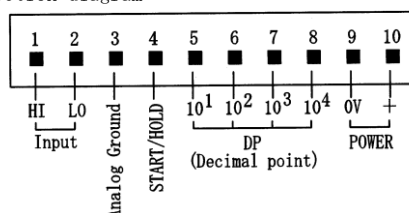
For the single-ended input type, connect input signal to HI(1) and LO(2) for any range. For the range code of "-12" always connect LO(2) and Analog Ground(3) if there is no in-phase voltage.

In order to lessen an effect by noise, use a shielded 2-core cable, then connect the LO terminal to the Analog Ground terminal and connect the shield to the Analog Ground terminals. For the DC voltage range code of "-12" even differential input can be accepted.

In this case, if input signal E1 is connected between HI(1) and Analog Ground(3), and E2, between LO(2) and Analog Ground(3) differential input voltage E1-E2=Ei is measured.

For input signal use a shielded 2-core cable and connect the shield to Analog Ground. Use the LO terminal at in-phase voltage  $\pm$ 1V or less compared to voltage on the Analog Ground terminal. Never apply voltage exceeding the maximum allowable voltage between the input terminals[HI and LO], and between the input and Analog Ground terminal.

## ■ Connector connection diagram



## 4) START/HOLD

The displayed value can be held by shorting the HOLD terminal (No.4) with the COM terminal (No.3), or by setting the HOLD terminal to level "0".

Measurement also starts by opening these terminals or by setting the HOLD terminal to level "1" at the necessary timing. The minimum time required for one measurement of [positive pulse starting from 0V to +5V for more than 1ms or contact signal(open)] is approx. 400ms.

Level "0" 0 to 1.5V, Level "1" 3.5 to 5V

## 5. Maintenance and inspection

## 5-1 Caution for maintenance

Store the meter at a storage temperature of -10°C to +70°C and a relative humidity of less than 60%.

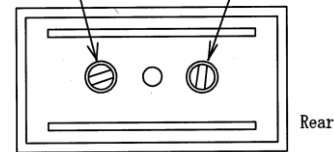
If the meter is used at a dusty location, occasionally remove the internal board from the case, then remove dust accumulated on the board.

(Otherwise a rise in temperatures of internal parts may shorten a mater service life.)

As the case and panel are molded by plastics, do not remove stains from them with a volatile liquid such as thinner.

## 5-2 Calibration

Zero adjuster  
(Only for "-13" and "-14") Span adjuster



- ① In order to assure the initial accuracy of the meter for a long period of time, it is recommended that the meter be periodically calibrated. For calibrating this meter, a standard voltage generator with an accuracy of 0.01% or higher is required.

- ② For calibration, take the following steps.

- (1) Connect the power to the meter to warm up the meter for more than 20 minutes, then adjust the meter.

- (2) Zero check and adjustment

Short the HI, LO and Signal Ground terminals, then check whether or not the display unit shows 0000.

For the meter with the range code of "-13" or "-14" the zero adjuster is provided.

Therefore, if the display unit does not show 0000, turn the zero adjuster until the display unit shows 0000.

- (3) Span adjustment

Apply voltage with the plus polarity corresponding to the fullscale(19900) to the input terminals, then turn the span adjuster until the display unit shows +19900.

Next, apply the same voltage as described above but with the minus polarity, then check the display unit shows -19900 $\pm$ (0.03% rdg  $\pm$ 1digit).

## 6. 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 Watanabe Electric Industry 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.

## 7. After-sale service

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

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

**watanabe**

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