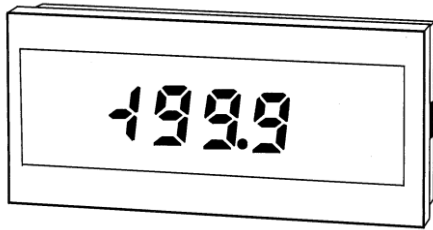


INSTRUCTION MANUAL

Digital Panel Meter

MODEL AP-502A 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) 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 AP-502A Series Digital Panel Meter is high reliable 3-1/2 digit display meter based on a custom LSI. It is light weight and has a low-profile (1") case. It is powered by an isolated +5V DC supply and has large, 56" LED numeric display.

In addition, it has a hold function and serial data output.

2. SPECIFICATIONS

●DC Voltage Measurement

Model range code	Measuring Range	Maximum Resolution	Input Impedance	Maximum Allowable Voltage
AP-502A-11	$\pm 199.9\text{mV}$	$100\ \mu\text{V}$	$100\text{M}\Omega$	$\pm 250\text{V}$
AP-502A-12	$\pm 1.999\text{V}$	1mV	$100\text{M}\Omega$	$\pm 250\text{V}$
AP-502A-13	$\pm 19.99\text{V}$	10mV	$10\text{M}\Omega$	$\pm 250\text{V}$
AP-502A-14	$\pm 199.9\text{V}$	100mV	$10\text{M}\Omega$	$\pm 500\text{V}$

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

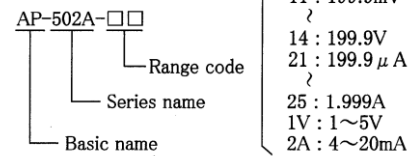
●DC Current Measurement

Model range code	Measuring Range	Maximum Resolution	Input Resistance	Maximum Allowable Current
AP-502A-21	$\pm 199.9\ \mu\text{A}$	100nA	$1\text{k}\Omega$	$\pm 10\text{mA}$
AP-502A-22	$\pm 1.999\text{mA}$	$1\ \mu\text{A}$	100Ω	$\pm 50\text{mA}$
AP-502A-23	$\pm 19.99\text{mA}$	$10\ \mu\text{A}$	10Ω	$\pm 150\text{mA}$
AP-502A-24	$\pm 199.9\text{mA}$	$100\ \mu\text{A}$	1Ω	$\pm 500\text{mA}$
AP-502A-25	$\pm 1.999\text{A}$	1mA	0.1Ω	$\pm 3\text{A}$

Accuracy: $\pm (0.2\% \text{ of rdg} + 1\text{digit}) (23^\circ\text{C} \pm 5^\circ\text{C}, 35 \text{ to } 85\% \text{ RH})$

$\pm (0.3\% \text{ of rdg} + 1\text{digit})$ for AP-502A-25 only

●Model Code



Example) AP-502A-11

3. COMMON SPECIFICATIONS

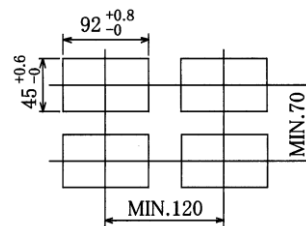
Measurement	: DC voltage, Current measurement
Operation Method	: Dual slope A/D conversion
Input Circuit	: Single Ended
Input Bias Current	: 50pA (TYP)
Sampling Speed	: 2.5 times/sec.
Noise Elimination	: NMR 40dB (TYP.) (50/60Hz)
Maximum Display	: 1999
Overrange Indication	: Input signal exceeding maximum indication range will flicker 1999 or -1999
Display	: LED (light emitting diode numeric element) with a height of 14.2mm
Polarity Indication	: Automatic indication of minus sign (-) for a negative input
External Control	: Hold; short between COM Decimal point; Can be freely set to any position
Ambient temperature	: 0 to 50°C, 35 to 85%RH (Nodew-Condense)
Power Supply	: DC 5V $\pm 5\%$ 130mA (TYP)
External Dimensions	: 96mm(W) \times 48mm(H) \times 33mm(D) DIN size
Weight	: Approx. 60g
Accessories	: Instruction manual, connector
Option	: Input 1 to 5V Display 000~1999 Input 4 to 20mA Display 000~1999 Engineering untie for display \rightarrow Please contact us.
Dielectric strength	: Between input terminal (LO) and power supply terminal (OV), $\pm 500\text{V}$
Insulation resistance	: Between the above terminal and case More than 100M Ω at 500V DC

4. MOUNTING

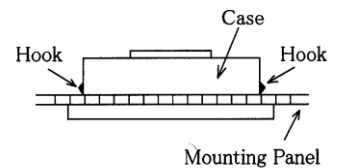
4-1 Panel Mounting

1) Mounting of meter to Panel

Make a cutout on the panel as specified in Fig.1 and insert the meter into the cutout from the front side of the panel. (Make the panel thickness 1.0 to 3.2mm)



[Fig.1]



[Fig.2] Upper view

2) Removal from Panel

Pushing the hook shown in Fig.2 toward the inside of the meter then push the meter out of the front side of the panel.

4-2 Connector Connection

Insert the attached input/output connector at the rear of the panel meter.

1) Power Connection

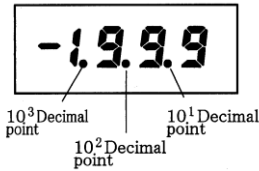
Connect power to connector terminals No. 21 (or 22) and 25 (or 26). Use a DC voltage of 5V $\pm 5\%$ as the power supply.

(Note that because this instrument is not provided with a power supply switch, it starts operating when power is supplied.)

No fuse is provided in the instrument. If the fuse is required for safety reason, install a 0.2A fuse outside the instrument.

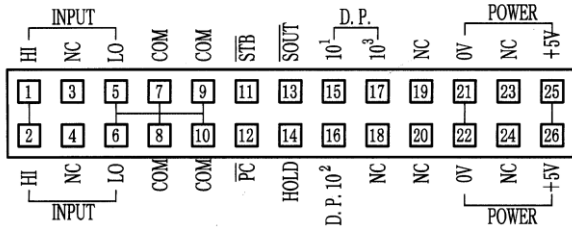
2) Decimal point setting

The decimal point can be set to any position when the following connector terminals are shorted. Because the decimal point is not set prior to shipment, it must be set at the appropriate position by the customer.



Decimal Point Lit	Connector Terminal Nos.Connected
10 ¹	15-(7~10)
10 ²	16-(7~10)
10 ³	17-(7~10)

■ Connector Connection Diagram



Caution

NC indicates a vacant terminal. However, do not use it as a junction terminal.

4) Start/Hold

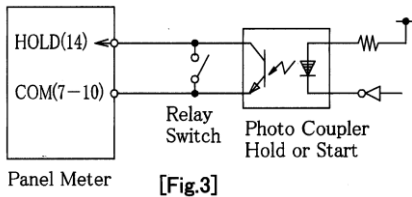
The displayed value can be held by shorting the HOLD (No. 14) terminals with the COM (No. 7 to 10) terminal, or by setting the HOLD terminal to level "0". Measurement also starts by opening these terminals or by setting the HOLD terminal to level "1" at the necessary timing.

The minimum time required to measure a contact signal (open) is about 400ms.

In addition, the input L0 (5, 6) and COM (7-10) terminal are connected and not DC isolated, so that control can be achieved using mechanical contact signal such as a relay or switch. When controlling by TTL or transistor, add the external circuit in Fig.3.

(This is absolutely necessary for isolation when the input is floated.)

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



[Fig.3]

5) Serial Output

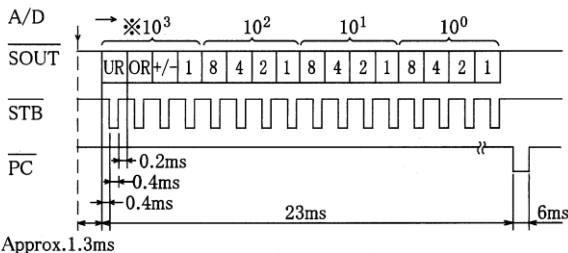
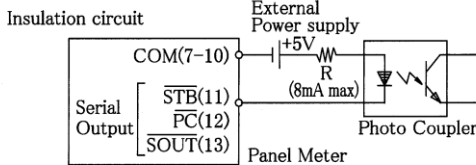
A/D-converted data is output as a serial signal (negative logic).

In addition, only 4 wires are required for data transmission (including COM).

Please drive Photo Coupler by using an external power supply when the insulation between I/O is necessary.

○ SOUT, STB, PC Drive Current

MIN.	MAX.
-0.5mA	-1.0mA (V _{OH} 4.6V)
4.0mA	8.0mA (V _{OL} 3.0V)



Approx. 1.3ms

SOUT: A/D-converted data
 STB : Data read synchronous pulse
 PC : Latch pulse

※ UR : When the display -179 to 179, logic is "0"
 ※ OR : When input is excessive, logic is "0"
 ※ +/- : When input is plus, logic is "0"
 ※※ Data output at over is "1999"

[Fig.4]

5. MAINTENANCE AND INSPECTION

5-1 Caution for Maintenance

The storage temperature of this instrument should be within the range of -10°C to +70°C with relative humidity not higher than 60%. If the instrument is used in dusty location, withdraw the meter assembly from the case at certain intervals of time and brush off dust. (The combination of dust and high temperature will shorten the life of meter parts)

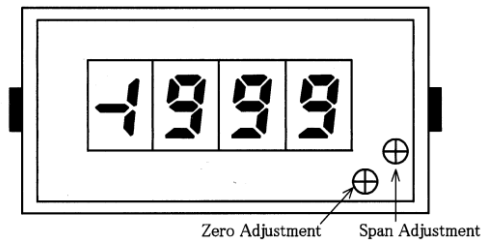
The instrument case and bezel are molded plastic, do not use a volatile liquid such as thinner to clean them.

5-2 Calibration

To maintain the initial accuracy of this instrument over an extended period, it is recommended that it be calibrated periodically by a standard reference device with an accuracy of 0.01%.

Calibrate the meter by taking the following steps.

- (1) Detach the front bezel.
- (2) Connect the power supply and after warming up for at least 20 minutes, start adjusting the instrument as instructed below.
- (3) Zero Adjustment
Short input terminal HI and L0 and check the display shows "000".



(4) Span Adjustment

Apply voltage (current) with "+" polarity corresponding to the fullscale (1990) to the input terminals and turn the span adjustment VR to display "1990". Next, apply voltage (current) with "-" polarity to check that display shows -1990 ± 0.1% of rdg + 1 digit.

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 does 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.

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.

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