1. Specifications

- **DC Voltage Measurement**

<table>
<thead>
<tr>
<th>Model &amp; Range Code</th>
<th>Measuring Range</th>
<th>Maximum Resolution</th>
<th>Input Impedance</th>
<th>Maximum Allowable Input voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP-101-11</td>
<td>±1999mV</td>
<td>100mV</td>
<td>100kΩ</td>
<td>±250V</td>
</tr>
<tr>
<td>AP-101-12</td>
<td>±1999mV</td>
<td>10mV</td>
<td>100kΩ</td>
<td>±250V</td>
</tr>
<tr>
<td>AP-101-13</td>
<td>±1999mV</td>
<td>100μA</td>
<td>1kΩ</td>
<td>±10μA</td>
</tr>
<tr>
<td>AP-101-14</td>
<td>±1999mV</td>
<td>100μA</td>
<td>1kΩ</td>
<td>±5μA</td>
</tr>
</tbody>
</table>

Accuracy: ±(0.1% of reading ±1 digit) (at 23°C ±5°C from 35 to 85% RH)

- **DC Current Measurement**

<table>
<thead>
<tr>
<th>Model &amp; Range Code</th>
<th>Measuring Range</th>
<th>Maximum Resolution</th>
<th>Internal Resistance</th>
<th>Maximum Allowable Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP-101-21</td>
<td>±1999μA</td>
<td>100μA</td>
<td>1kΩ</td>
<td>±10μA</td>
</tr>
<tr>
<td>AP-101-22</td>
<td>±999μA</td>
<td>10μA</td>
<td>1μA</td>
<td>±5μA</td>
</tr>
<tr>
<td>AP-101-23</td>
<td>±1999μA</td>
<td>10μA</td>
<td>1μA</td>
<td>±10μA</td>
</tr>
<tr>
<td>AP-101-24</td>
<td>±999μA</td>
<td>1μA</td>
<td>1μA</td>
<td>±5μA</td>
</tr>
<tr>
<td>AP-101-25</td>
<td>±1999μA</td>
<td>1μA</td>
<td>1μA</td>
<td>±3μA</td>
</tr>
</tbody>
</table>

Accuracy: ±(0.2% of reading ±1 digit) (at 23°C ±5°C from 35 to 85% RH)

[±(0.3% of reading ±1 digit) only for AP-101-25]

- **Model Configuration**

(Example) AP-101-11-1

Power supply: 1. AC 90V to 132V
2. AC180V to 254V
3. DC 5V
4. DC 24V

- **Common Specifications**

1) Measuring function: DC voltage measurement. (For range codes -12, -13 and -14, internal socket selection is possible.) Specify one model from among 9 models.
2) Operation method: Dual slope integration.
3) Input circuit: Single-ended type (DC Voltage isolated)
4) Input bias current: 50pA (Typical)
5) Sampling speed: 2.5 times/sec.
6) Noise elimination: More than 40 dB (50/60Hz) (Typical)

7) Max. No. of display: 1999 digits
8) Overrange alarm: 1999 or -1999 flashes when an input exceeding the maximum display range is applied.
9) Display: LED (Light Emitting Diode) numeric element, height: 1.2mm red
10) Polarity: Automatic Polarity selection
11) Polarity display: "-" is displayed automatically if input signal becomes negative.
12) External control: External display hold A negative signal of 0V or a contact signal.
A positive pulse from 0V to +5V for more than 400 ms. or a contact signal (open)
13) Decimal point: Settable to any digit position
14) Operating temperature/humidity: 0 to +50°C/35% to 85%RH (Mode: Normal/Condenser)
15) Power supply: For AC, 90 to 132V 50/60 Hz
    Approx. 1.5VA (at 100V)
    180 to 264V (internal socket selection)
    For DC, 5V DC52.5 V 90 mA (Typical)
    24V DC ±20% 20mA (Typical)
16) Dimensions: 96mm(W) x 48mm(H) x 73mm(D)
17) Weight: For AC: Approx. 156g (Mainframe)
    For DC: Approx. 85g (Mainframe)
18) Dielectric strength: For AC: DC ±500V between input (I0) and grounding (E)
    1500VAC for 1 minute between power supply terminal and input
    terminal and grounding (E)/COMMON
    For DC: DC ±500V between input
    (I0) terminal and power terminal (0V)
19) Insulation resistance: More than 100MΩ at 500VDC
20) Accessories: Instruction manual, connector

3. Operation

3-1 General precautions and preparation prior to operation
1) This instrument should be used at an ambient temperature of 0°C to 50°C and a humidity of 80% or less, paying special attention to dew condensation.
2) It must be used at a location free of dust, dirt, gases and chemicals harmful to electronic components.
3) Care should be taken to prevent vibration and shock.
4) Noise (a) Electric circuit
Because it is difficult for such a small instrument as this to accommodate a perfect noise prevention circuit, use a surge absorbing circuit such as an external line filter or varistor to prevent excess surge when the instrument is used at a location where lightning frequently occurs or magnetic switches are likely to be actuated on the same power-line.
(b) Shielding
If noise causes a problem, connect the E terminal (11) for AC, or the power 0V terminal (17) for DC to the ground or equipment grounding terminal.
If space induction causes a problem, it can be prevented by covering the instrument case with a metal plate.

3-2 Mounting
1) Panel mounting
Make a rectangular cutout as shown in Fig. 1, insert the instrument in the panel as shown in Fig. 2, and then fully push the instrument into the panel.
(It is recommended that panel thickness be from 0.8 to 5mm)

2) Removal of internal board
Twist the bezel by inserting a screwdriver into each of two holes at the bottom of the bezel for its removal. Then, push the printed board from the back to pull it out of the front.
3.3 Connector connection

Insert the attached input/output connector in the rear of the panel meter. The connector is provided with an incorrect insertion prevention key, so it is easy to make sure that it is not connected upside down. After insertion, tighten the both sides with the attached screws.

1) Power connection

For AC, connect power to terminals 16 to 18. Operate the instrument at a power supply voltage of 90 to 120V, although 110 to 264V can also be used by selecting the internal shorting socket. (ST2)

For DC, connect power to terminals 17 to 18.

Power variation in this case is 5V DC±5% or 24V DC±20%
(Because this instrument is not provided with a power supply switch, it starts operating when power is supplied.)

2) Decimal-point setting

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

Decimal point

101

102

103

Decimal point at 1st digit

Decimal point at 2nd digit

3) Input connection

Connect an input signal (DC voltage or DC current) to terminals 1 to 3. Use a 2-core shielded cable and connect the shield to the input 10 side at one point near the signal source. If induction noise causes a problem, connect the grounding 1 terminal to the earth or case.

- Connector Connection Diagram

DC power supply

4) Display hold and external start

Displayed value is held to the value just after the hold (No. 8) and COMMON (No. 7) terminals are shorted. In addition, measurement starts when these terminals are opened at the necessary timing. (Positive pulse from 0V to +5V for more than 400ns, or contact signal opening)

The minimum time required for one measurement is about 400ms.

In addition, as the input (LO) and COMMON (7) terminals are connected and not DC-isolated, use a mechanical contact signal such as a relay or switch for control as much as possible. When performing control by TIL or transistor, add such an external circuit as Fig. 3. (This circuit is absolutely necessary for isolation when the input is floated.)

Sink current 0.5mA

Panel Meter

COM (7)

LO (3)

Hold or Start

5) COMMON terminal

This is the digital circuit COMMON terminal (No. 7) which is internally connected to the LO terminal. However, do not connect the digital circuit to the LO terminal to prevent measurement errors.

6) Grounding terminal (For AC drive)

The grounding terminal (No. 11) is connected to the input LO terminal and the COMMON terminal through a 4700pF capacitor (withstanding voltage: 560V). If noise causes a problem, connect the grounding terminal to the earth or case.

7) Range change

The range of Model AP-101-12, 13 or 14 can be changed. Remove the internal board in accordance with Item 4-2-2, then change the mounting location of the 2-pin shorting socket near the connector as shown in the following figure.

- Socket diagram at the printed board rear

When the range is changed, recalibrate the meter in accordance with Item 4-2.

4. Maintenance and Inspection

4-1 Caution for maintenance

The storage temperature of this instrument should be between -10°C and 70°C at a relative humidity of 60% or less. If the instrument is used at a dusty location, withdraw the meter assembly from the case occasionally and remove dust accumulated on the board. (Otherwise, the meter service life may be shortened due to a temperature rise on the internal board.) As the instrument case and bezel are made of molded plastic, do not use a volatile liquid such as thinner to clean them.

4-2 Calibration

- To maintain the initial accuracy of this instrument over a long period of time, it is recommended that the instrument be calibrated periodically by standards with an accuracy of 0.01%, or more.

- Calibrate the meter by the following steps:

1) Remove the front bezel.
2) Connect the power supply and after running for at least 20 minutes, start adjusting the instrument as instructed below.
3) Zero adjustment

Short the input HI and LO terminals, then check the display shows 0.00.
4) Span adjustment

Apply the input voltage (current) with polarity corresponding to the full scale (1000) to the input terminals then turn the span adjustment knob until the display shows 1000. Next, apply the same input voltage (current) with polarity to check that the display shows 999 ± 0.1% of rge digit.

5. 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 does not apply to the meter showing abuse or damage which has been altered or repaired by others except as authorized by Asahi Koki Co., Ltd.

6. After-sales Service

This meter is delivered after being manufactured, tested and inspected under strict quality control. However, if any problem occurs, contact your nearest Asahi sales agent giving as much information on problem as possible.