INSTRUCTION MANUAL
Model AM-74X Series
Intelligent Digital Meter Relay

Thank you very much for purchasing our AM-74X Series Digital Meter Relay. Be sure to check the meter specifications by referring to those in this instruction manual, which should be read thoroughly before commencing operations.

OUTLINE

The AM-74X Series Digital Meter Relay is a multi-function intelligent meter relay with a built-in 8-bit microcomputer, and Models 741 and 742 make 2 and 4-step setting possible, respectively. The A/D converter uses a dual slope integration 4-1/2 digit one-chip LSI and each output uses a custom gate array. The use of the microcomputer also achieves a wide reduction in the number of parts to increase reliability and reduce size. Parallel BCD output, analog output and ASCII serial output are also available to facilitate an interface with a printer and/or a computer.

Scaling and comparator settings are made by the front sheet switches, thereby eliminating the need for an adjustment screwdriver or parts replacements due to specification changes. For the Model AM-74X, any one of 12, 13 and 14 ranges can be selected by internal terminal selection, and the input/output employs screw terminals that can be removed from the main-frame to facilitate the necessary wiring. The use of a metal case results in a noise resistance construction which is useful for instrumentation in automation and labor saving applications.

2. SPECIFICATIONS

● DC Voltage Measurement

Model & Range Codes	Measuring Range	Max. Resolution	Input Impedance	Max. allowable Input Voltage
AM-74X-11	±199.99 mV	10 μV	100 MΩ	± 250 V
AM-74X-12	±1.9999 V	100 μV	100 MΩ	± 250 V
AM-74X-13	±19.999 V	1 mV	1 MΩ	± 250 V
AM-74X-14	±199.99 V	10 mV	1 MΩ	± 500 V

Accuracy: ±0.03% rdg. ±1 digit (At 23°C±5°C)

● DC Current Measurement

Model & Range Codes	Measuring Range	Max. Resolution	Internal Resistance	Max. allowable Input Current
AM-74X-21	±199.99 μA	10 nA	1KΩ	± 10mA
AM-74X-22	±1.9999mA	100 nA	100 Ω	± 50mA
AM-74X-23	±19.999mA	1 μA	10 Ω	± 150mA
AM-74X-24	±199.99mA	10 μA	1 Ω	± 500mA
AM-74X-25	±1.9999 A	100 μA	0.1 Ω	± 3 A

Accuracy: ±0.1% rdg. ±1 digit (At 23°C ±5°C)
Only for AM-74X-25: ±0.3% rdg. ±1 digit.

● Standardized Signal Input

1 – 5V

Model & Range Codes	Measuring Range	Display	Input Impedance	Max. Allowable Input Voltage
AM-74X-1V	1 to 5V	0 to ±0 to 19999	1MΩ	±100V

Accuracy: ±0.03% rdg. ±2 digit (At 23°C ±5°C)

4-20mA

Model & Range Codes	Measuring Range	Display	Internal Resistance	Max. Allowable Input Voltage
AM-74X-2A	4–20mA	0 to ±0 to 19999	10Ω	±150mA

Accuracy: 0.1% rdg. ±2 digit (At 23°C±5°)

● Model Configuration

AM-74X-□□-□□

- Output and sampling speed — 2.5 times/sec.
  - 1. DISPLAY ONLY
  - 2. BCD, ASCII SERIAL
  - 3. ANALOG, ASCII SERIAL
  - 4. BCD, ANALOG, ASCII SERIAL
  - 5. DISPLAY ONLY — 6.25 times/sec. (50 Hz) / 7.5 times/sec. (60 Hz)
  - 6. BCD, ASCII SERIAL
  - 7. ANALOG, ASCII SERIAL
  - 8. BCD, ANALOG, ASCII SERIAL
- Power
  - 1. 90V to 130V AC
  - 2. 180V to 260V AC
- Range code
  - 11. ±199.99mV … 1V. 1-5V, 2A. 4-20mA
  - 14. ±199.99V
  - 21. ±199.99μA
  - 25. ±1.9999A
- Series name
  - 741. 2-step setting (HI, GO, LO)
  - 742. 4-step setting (HH, HI, GO, LO, LL)
- Basic Model

(Example) AM-741-[1][3] - [1][2]

3. GENERAL SPECIFICATIONS

● Measuring Section

1. Measuring Function: DC voltage measurement. (Any one of 12, 13 and 14 ranges is selectable by internal socket location change.) DC current measurement. Specify one of 11 models.
2. Operation Method: Dual slope integration.
3. Input Circuit: Single-ended type.
4. Input Bias Current: 100PA (Typical).
5. Sampling Speed: Approx. 2.5 times/sec. Optional 6.25 times/sec. (50 Hz) 7.5 times/sec. (60 Hz)
6. Noise Rejection Ratio: NMR – More than 50 dB (50/60 Hz).
7. Overflow Display Aalarm: For input signal corresponding to maximum display: "OFLO" or "–OFLO" flashes.
8. Display: LED numeric display. Height 14.2 mm
9. Polarity Display: A "–" is displayed automaticaly if the input signal becomes nagative.
10. Zero Display: Leading "zero" suppression.
11. Decimal Point: Can be set to any position. (By front sheet switch).
12. External Control: HOLD; Started with COMMON and HOLD terminals shorted. START; Positive pulse from 0V to +5V in pulse widths of 1 ms or more or open.
13. Maximum or Minimum Value Display: By front sheet switch.
14. Serial Data Output: Set-point and measured value outputs (ASCII) are selectable.
15. Scale Factor: When fullscale value (y_1), off-set value (b) and input voltage (x_1) corresponding to fullscale are set by front sheet switches, the operation of $y = ax+b$ is performed internally and the result (y) is displayed.

● Comparator

1. Control Method: 8-bit microcomputer.
2. Setting Range: High and low limit settings including polarity. –19999 to 0 to +19999

3. Comparator Conditions:

Comparator Conditions	Compared Result	
	AM-741	AM-742
Displayed value > High /high limit set value	–	HH
High /high limit set value ≦ Displayed value > High limit set value	HI	HI
High limit set value ≧ Displayed value ≧ Low limit set value	GO	GO
Low limit set value > Displayed value ≧ Low/Low limit set value	LO	LO
Low /Low limit set value > Displayed value	–	LL

4. Comparison Display: As a result of comparison, the relevant light emitting diode lights up.

5. Comparison Relay Output: HH, HI, GO, LO, LL
Contact capacity of each relay
AC 250V 0.1A
AC 120V 0.5A
DC 28V 1 A
Resistive load

6. Hysteresis: Settable up to 5% of fullscale (999 digits).

● Common Specifications

1. Back-up Battery: Lithium battery: Life – More than 5 years. (At 23°C ±5°C)
2. Working Temperature Range: 0 to 50°C
3. Power: 90 to 130V AC 50/60 Hz
180 to 260V AC 50/60 Hz
(Jumper wire selection.)
Power consumption: Approx. 2.5VA (At 100V AC).
4. Di-electric Strength: ±500V DC between input and grounding E (Case).
±500V DC between input terminal/ COMMON and relay output.
1 minute at 1500V between power supply terminal/input terminal, grounding E (Case), COMMON, digital COMMON and relay output.
5. Insulation Resistance: More than 100MΩ at 500V DC. between each terminal described above.
6. Weight: 600 g (mainframe)
7. Accessories: Input/output connectors 2 pcs.
Instruction manual 1 copy
8. Options: Try-state BCD output (Latched and isolated). Negative logic is also available.
: Analog output (isolated) 0 to ±2V output.
Resolution 12 bits.
Accuracy 0.2% of FS (At 23°C ±5°C)
: Serial data output (isolated) ASCII (8 bits) Baud rate 4800 B.P.S. (fixed)
(BCD: Provided as standard for analog output type).
: For engineering unit, contact us.

4. HANDLING

4.1 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 tighten the instrument from the rear using a metal band.

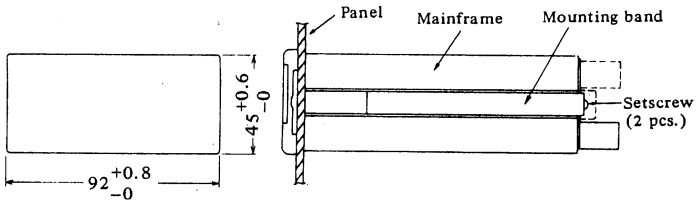


Fig. 1 Panel Cutout

Fig. 2 Side Panel

2) Acrylic plate replacement
To remove the front bezel, lightly twist it while inserting a screwdriver blade into the holes at bottom of the front. Next, push the front panel in the direction of the black arrow to pull the plate out from the rear of the panel.
To insert the plate, first set the plate bottom to the front switch side, push the front panel in the direction of the black arrow, and then push the plate to the front panel.

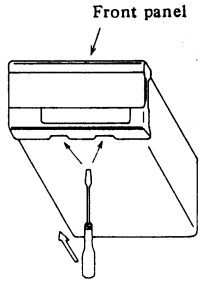


Fig. 3

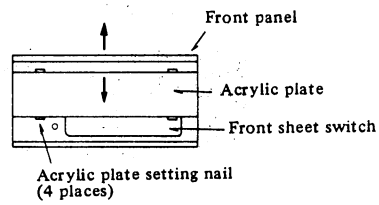


Fig. 4

3) Removal of the internal printed circuit-board
i) Remove the input/output connector (top and bottom).
ii) Remove the 4 side setscrews securing the rear plates.
iii) Remove the 2 slotting setscrews securing the mainframe.
iv) Remove the 2 optional board mounting screws.
v) Push the printed circuit board backward to pull it out from the rear.
Note: Do not pull out the optional board only.

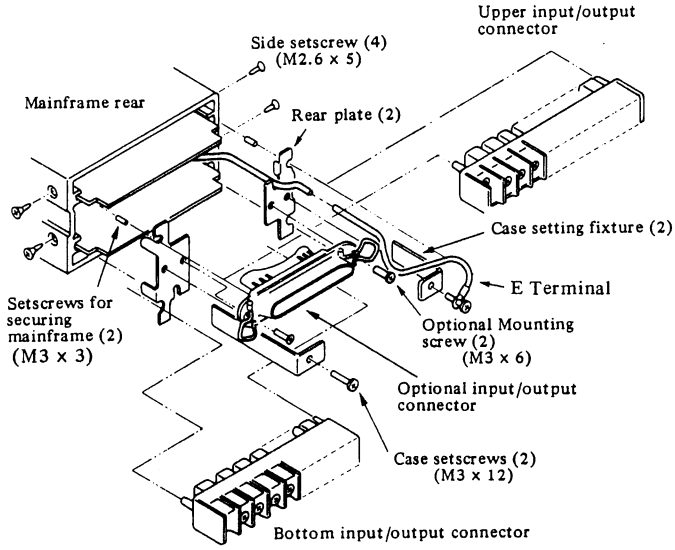
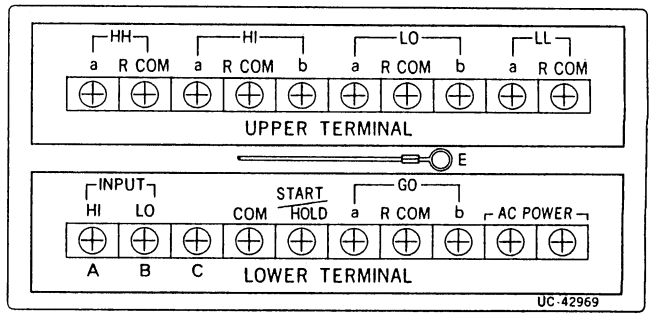


Fig. 5

4.2 Terminal Connection



* The input/output connector is provided with a key to prevent incorrect insertion.

Fig. 6 Input/Output Connector

1) Power connection: POWER
Connect the power to the "POWER" terminals at the terminal bottom. Since no power switch is attached to this meter, it is ready to operate when the power is supplied.

2) Input signal connection
Connect input signal (DC voltage or current) to terminals INPUT HI (+) INPUT LO (–).
   i) Shorten the input signal wires as much as possible, and separate them from the other signal or power wires (50 cm or more from power cables.)
   ii) Use a 2-core shielded cable for the input signal when it passes through a location with a lot of external noise, and connect its outer shieth at one point to the LO side at a signal source.
   iii) If the input signal is superimposed with high-frequency noise, use a low-pass filter in the input signal line.
   However, in this case, response time lag may occur due to filter time constant. Therefore, pay close attention to the meter's operating condition.
   iv) Do not apply input voltage or current exceeding the maximum allowable input voltage or current to the meter.
   v) To measure current, a measured signal may be grounded or floated. However, if the signal is grounded, connect the input signal to the meter at the point of the lowest potential possible.

3) E terminal
If the meter is affected by external noise, ground the E terminal to the earth. Note, however, that large grounding resistance may induce noise. (See Fig. 5.)

4) External start/hold: START/HOLD
External Hold: Display and data output can be held with the START/HOLD and COM terminals shorted. However, measurement starts if they are opened at the appropriate time.
External Start: If the START/HOLD and COM terminals are shorted and opened for more than 1 ms then shorted again, or a positive pulse (of more than 1 ms) is applied from TTL level "0", then set to the "0" level again, only one sampling is made by the external start signal before being held again.
Sink current; 1 mA, ON voltage: +0.5V or less.

5) Samplying speed change (only for high-speed sampling Model) by power frequency.
First, remove the front panel in accordance with Item 4.1.2, then short the terminals at the upper right of the numeric display LED to set it. (See Fig. 8.)

4.3 Range Selection

Any one of 12, 13 and 14 ranges of the AM-74X can be selected by changing the internal terminal connections. First, pull out the internal printed circuit-board in accordance with Item 4.1.3. Change the insertion of the shorting socket at S1 on the lower circuit-board so as to obtain any of the 12, 13 and 14 ranges. (After range change, always re-calibrate the meter in accordance with Item 11-2.)

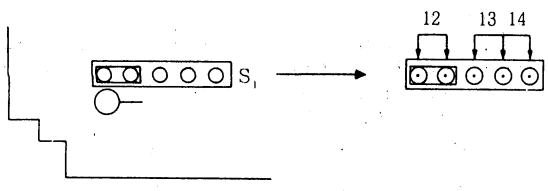


Fig. 7

5. FUNCTIONAL DESCRIPTION

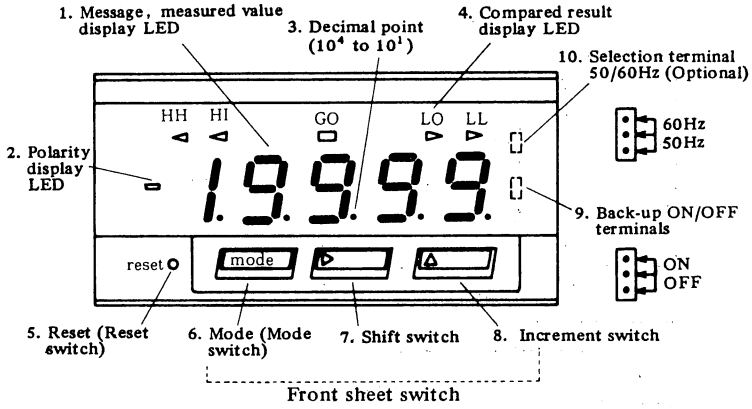


Fig. 8

1. Displays a message and the measured value during data setting.
2. When the computed result is negative, this LED lights up.
3. Decimal point (can be set to any position. However, no decimal point lights up at the 10^0 digit.)
4. Lights up as a result of comparison.
5. Reset switch
Used when:
   i) Measurement is started after each data setting.
   ii) Measurement is re-started when the data is changed after measurement start.
   iii) Display is returned back to measured value display after setting maximum value/minimum value display, as well as data check from measured value display.
6. Mode switch
Used when:
   i) The mode is selected during various data settings.
   ii) Data is stored into the memory after data setting.
   iii) Set data needs to be checked during measurement.
   iv) Maximum/minimum measured data are called up and their displays are selected.
7. Shift switch
The digit position is selected in the set mode, and the position selected flashes.
Digit position moves endlessly from the 10^4 to the 10^0 digits.
8. Increment switch
Used when:
   i) Numeric data is set in the digit position selected by the shift SW. (Incremented from 0 to 9 endlessly.)
   ii) Maximum/minimum values are cleared.
9. Back-up connection/disconnection (ON/OFF) terminals.
The back-up battery is turned ON after each data setting.
10. 50/60 Hz (Power frequency) selection terminals (Optional)

6. DATA SETTING (" " indicates message)

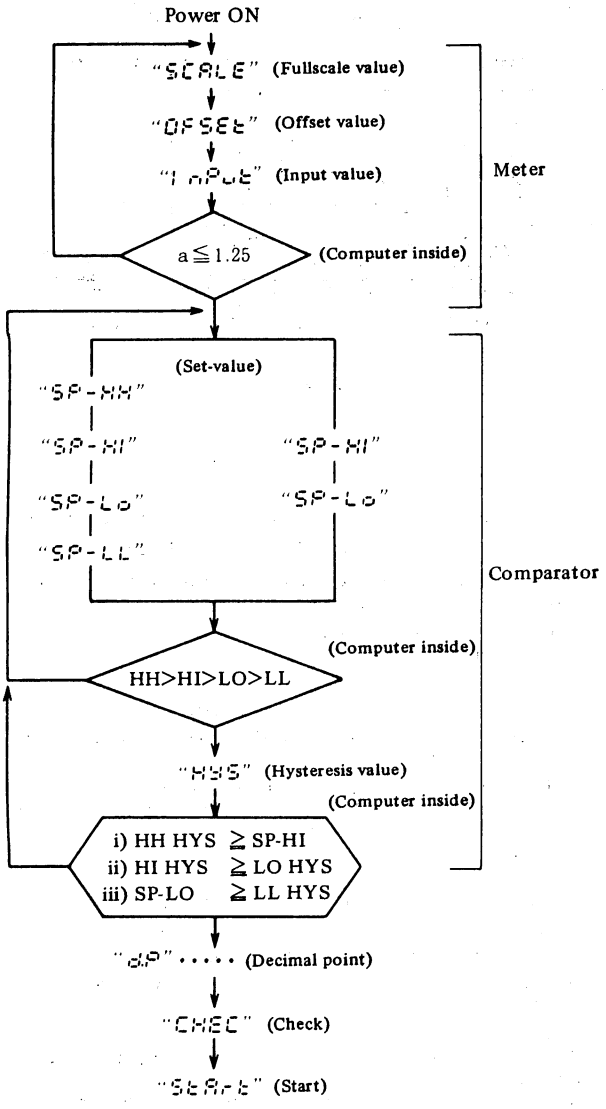


Fig. 9 Data Setting Flowchart

6.1 Meter

Following is a description of each setting and message.

i) FullscaleValue (y_1) "SCALE"
Maximum display value can be set from 0 to ±19999 for each range.

ii) Offset (b) "OFSEt" (OFFSET)
The displayed value at zero input can be set from 0 to ±19999. (For the standardized input signal, the displayed value at 1V or 4mA can be set.)

iii) Input Value (x_1) " InPut "
(The A/D converter input voltage unit is V.)
Full scale voltage values from 0 to ±1.9999 can be set for display.

After each data has been set in accordance with the above, coefficient a is obtained internally.
$a = (y_1 - y_2)/x_1$ y_2 = b (offset).
(Settings are not made except a ≦ 1.25.)
Next, y = ax+b is calculated to display y.
(x = A/D converter output).

*1 The input of each range is converted to 0 to ±2V internally for input to the A/D converter. The input includes a standardized signal of 1 to 5V or 4 to 20 mA.

*2 Display (y) is possible up to 32,767 from the above setting. Note that porality is reversed when the above value is exceeded.

6.2 Comparator

a) Comparison set-value
Up to 4 steps can be set. (For AM-741: 2 steps.)
The following messages correspond to each set-point.

High/high limits	"SP-HH"	(SETPOINT HIGH-HIGH)
High/limit	"SP-HI"	(SETPOINT HIGH)
Low limit	"SP-Lo"	(SETPOINT LOW)
Low/low limits	"SP-LL"	(SETPOINT LOW-LOW)

While setting can be made from 0 to ±19999, the following condition must be satisfied.
SP-HH > SP-HI > SP-LO > SP-LL

b) Hysteresis setting
The message is as follows:
Hysteresis "HYS" (HYSTERESIS)
Setting can be made up to 5% of full scale (0 to 999).
The relationship between hysteresis and each set-point become as follows:

SP-HH – Hysteresis set-value = HH HYS
SP-HI – " " = HI "
SP-LO + " " = LO "
SP-LL + " " = LL "

When the hysteresis value is set, the following condition must be satisfied.
i) HH HYS ≧ SP-HI
ii) HI HYS ≧ LO HYS
iii) SP-LO ≧ LL HYS
The hysteresis set-value cannot be crossed with other set-points, but the former can be equal to the latter.

6.3 Decimal Point

Following is the message relating to the decimal point.
Decimal point " dP " (DECIMAL POINT).

7. OPERATION PROCEDURE (See Fig. 9 Data Setting Flowchart.)

Set-point Ex. (When the power is turned ON for the first time after meter purchase.)

SCALE	19999
OF SET	00000
INPUT	1.9999
SP-HH	15000
SP-HI	10000
SP-LO	-05000
SP-LL	-13000
HYS	00150
D.P	Set to the 10^4 digit.

7.1 Back-up Battery Turned ON

Prior to meter shipment, the back-up battery is turned OFF, so it needs to be turned ON before data setting.
Remove the front panel in accordance with Item 4.2 to expose the shorting socket at the bottom right and change the socket to the ON side.

*Turn on the back-up battery with the power always applied. (See Fig. 8).

7.2 Meter Setting

a) SCALE
1. Apply the power, and the message " SCALE " will appear on the display.
2. Press the mode switch.
3. 0000 is displayed, and the 10^4 digit position flashes. (The digit which is flashing becomes the data setting digit.)
4. Press the increment switch to set data.
   [In the 10^4 digit 0→1→-0→-1 is repeated.
   In the 10^3 to 10^0 digits 0→9 is repeated.]
5. Press the shift key to shift the data setting digit. (Every time this switch is pressed, the digit shifts from the 10^4 digit to the 10^0 digit repeatedly.)
6. Repeat the procedures in Items 4 and 5 to set the desired value. (In this example, 19999 is set).
7. Press the mode switch. (Before pressing the mode switch, 19999 now dispalyed is stored in the memory, and the data to be set next is displayed.)

b) OFSET (OFFSET)
1. The display shows message "OFSEt".
2. Press the mode switch.
3. 0000 is displayed and the 10^4 digit position flashes. (In this example, OFSET is set to 0 before moving to the next procedure.)
4. Press the mode switch. (0000 is stored in the memory.)

c) INPUT (See SCALE setting.)
1. The display now shows "InPut".
2. Press the mode switch.

3. Repeat the procedures in Item 7.2.a, 3, 4, 5 and 6 to set the display to the desired value.
(In this example, 1.9999 is set.)
4. Press the mode switch.
(1.9999 is stored in the memory.)
5. Setting condition check (Micro-processor inside.) "a" is calculated in accordance with the data set so far.
If a ≦1.25, the data message to be set next, "SP-HH" or "SP-HI", is displayed. Otherwise, "SCALE" is dispalyed again. In this case, pressing the mode switch displays set-data followed by the message. Therefore, press the mode switch to revise only incorrect locations. If the data message to be set next, "SP-HH" or "SP-HI", is displayed, the meter setting will end.

7.3 Comparator Setting

a) SP-HH (High/high limit setting).
1. The display shows "SP-HH"
2. Press the mode switch.
3. The displays shows 0.0000 and the 10^4 digit flashes to become the data setting digit.
4. Press the increment switch to set data.
[In the 10^4 digit, 0→1→0→1 is repeated, while
In the 10^3 to 10^0 digits, 0→9 is repeated.]
5. Press the shift key to shift the data setting digit.
(Every time this key is pressed, data digits move from the 10^4 digit to the 10^0 digit repeatedly.)
6. Repeat Items 4 and 5 to set data to the desired value.
(In this example, data is set to 15000.)
7. Press the mode switch.
(15000 is stored in the memory, then the data message to be set next is displayed.)

b) SP-HI (High limit setting)
1. The display shows "SP-HI".
2. Press the mode switch.
3. Repeat Items 7.3.a, 3, 4, 5 and 6 to set data to the desired value.
(In this example, "10000" is set.)
4. Press the mode switch.
("10000" is stored in the memory).

c) SP-LO (Low limit setting)
1. The display shows "SP-Lo".
2. Press the mode switch.
3. Repeat Items 7.3.a, 3, 4, 5 and 6 to set the desired value.
(In this example, -05000 is set.)
4. Press the mode switch.
(-05000 is stored in the memory.)

d) SP-LL (Low/low limit setting)
1. The display shows "SP-LL".
2. Press the mode switch.
3. Repeat Items 7.3.a, 3, 4, 5 and 6 to set the desired value.
(In this example, -13000 is set.)
4. Press the mode switch.
(-13000 is stored in the memory.)
5. Check to see that SP-HH > SP-HI > SP-LO > SP-LL (in the micro-processor.)
If the data set so far satisfies the above condition, the data message to be set next, "HYS", is dispalyed. Otherwise, message "SP-HH" or "SP-HI" is displayed again.
Even in this case, pressing the mode switch displays the set-data next to the message. Therefore, revise the incorrect locations, then press the mode switch and if the data message to be set next "HYS" is displayed, comparator setting ends.

e) (Hysteresis) HYS
1. The display shows "HYS".
2. Press the mode SW.
3. The display shows 0.0000 and the 10^2 digit flashes to become the data setting digit.
4. Press the increment switch to set data (absolute value).
5. Press the shift switch to shift the data setting digit.
(Every time the switch is pressed, digits move from the 10^2 digit to the 10^0 digit repeatedly.)
6. Repeat Items 4 and 5 to set data to the desired value.
(In this example, 00150 is set.)
7. Press the mode switch.
(00150 is stored in the memory.)
8. Check the setting conditions including the hysteresis band (Micro-processor inside.)
i) HH HYS ≧ SP-HI
ii) HI HYS ≧ LO HYS } See Item 6.2.b).
iii) SP-LO ≧ LL HYS

If the above conditions are satisfied, the message showing the decimal point to be set next, "dP" is displayed.
However, if the conditions are not satisfied, "SP-HH" or "SP-HI" is displayed again.
In this case, the hysteresis set-value crosses with the other value, making it necessary to change the comparator set-value or hysteresis band by pressing the mode switch to display the set data followed by the message. Therefore, follow the instructions.
If the display shows the decimal-point setting "dP" message, the comparator setting ends.

7.4 Decimal-point Setting

1. Press the mode switch.
2. 0.0000 is displayed and the 10^1 digit flashes to become the decimal-point setting digit.
3. Press the shift switch to move the flashing digit to the desired position.
In this example, the decimal-point is set to the 10^4 digit. However, if no decimal-point is required, set it to the 10^0 digit.
4. Press the mode switch.
(The decimal-point position is stored in the memory.)

7.5 All-data Setting Ends

1. The display shows "CHEC" for setting to the data check mode.
2. Every time the mode switch is pressed, the message and set data are displayed to enable set-value check.
3. Press the reset switch (lightly with a ball-point pen.)
4. The display shows "SEArt" to indicate the start of measurement, and the compared result is output after one sampling ends.

7.6 Set Data Change After Start

1. Press the reset switch.
2. The display shows "SCALE" to turn OFF the comparison output.
3. Display the changing section using the mode switch.
(The display next to each message display corresponds to the set data.)
4. Change the set data using the shift and increment switches.
5. After set data change, press the reset switch.
6. The display shows "SEArt" to start measurement.

7.7 Set Data Check After Measurement Start

1. Press the mode switch for more than 2 sec.
2. The display shows "CHEC" which flashes.
3. Every time the mode switch is pressed, the message and then the data display flash.
4. After the above checks, press the reset switch.
5. The display shows "SEArt" to return to normal measurement.
* During checking, internal measurement comparison is made and the result output.

7.8 Operation Example (From Setting Example)

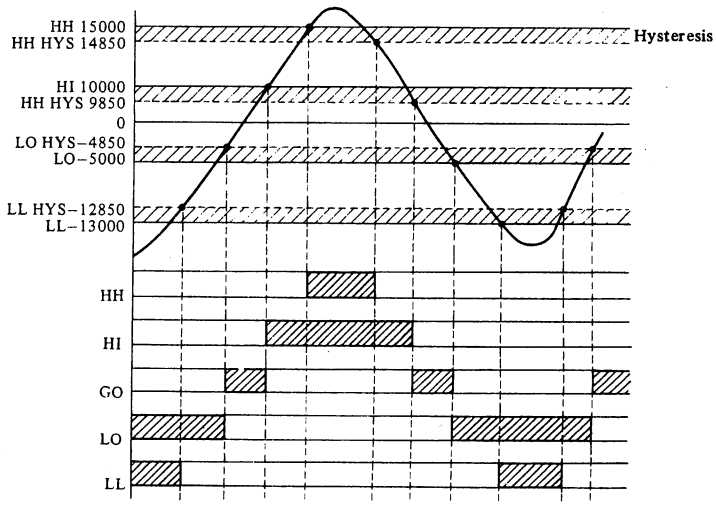


Fig. 10 Comparator Output

8. OPTIONAL DATA OUTPUT (Refer to Fig. 11.)

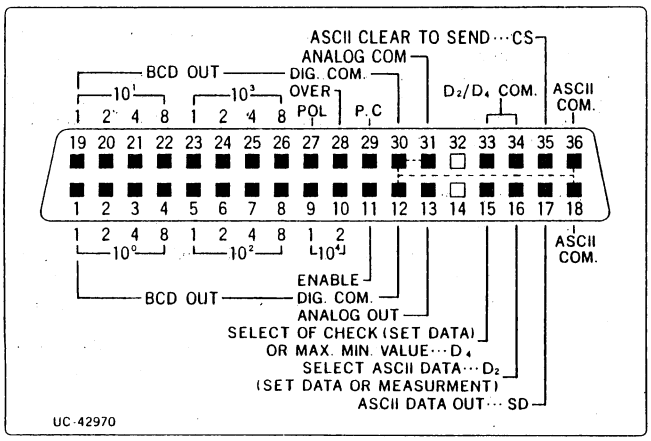


Fig. 11 Input/Output Connector (Amphenol: 57-40360)

8.1 BCD Output (Applicable Plug: Amphenol 57-30360)

Data output is isolated (500V DC) from input LO and is provided with latching.

i) Data output
1-2-4-8 (Binary coded decimal) code.
TTL level fan out 2. Positive logic.

ii) Polarity output: POL
At + input voltage (added with the computed result); Logic "O"
TTL level fan out 2

iii) Overrange output: OVER
When input overvoltage or overcurrent is applied; Logic "1"
TTL level fan out 2

iv) Print-out command output: PC
At the latch re-write end after measurement end: Positive pulse about 1ms wide
TTL level fan out 2

v) Enable: ENABLE
If the enable terminal (11) and digital COMMON (12 and 30) are shorted, or TTL level is set to "O", the 1-2-4-8, polarity and OVER terminals in the 10^0 to 10^4 digits change to the try-state high-impendance state.
Sink current 0.1mA, ON-voltage; Less than 0.5V.

vi) Digital COMMON: DIG COM.
The digital COMMON terminals (12 and 30) are common to the above input/output terminals.

Note: During ± overflow, all BCD output is set to all "zeros". During data setting, no BCD latch re-write is made.

8.2 Analog Output (Applicable Plug: Amphenol 57-30360)

This is isolated from input LO. (500V DC)

i) Output: ±0 to 2V. Accuracy: ±0.2% F.S. (23°C ± 5°C)

ii) Resolution: 12 bits.

iii) External resistance: More than 20kΩ.

iv) Overflow voltage during ± overflow. Approx. 4.0V.

Note: During data setting, analog output stops at the previous output.

8.3 ASCII Serial Output (Applicable Plug: Amphenol 57-30360)

This is isolated from input LO. (500V DC)

(a) Interface specifications
i) Baud rate: 4800 B.P.S. (fixed)
ii) Synchronization: Start-stop
iii) Data length: 8 bits
iv) Parity check: None
v) Start bit: 1 start bit
vi) Stop bit: 2 stop bits

Serial Input/Output Signal Name

Pin No.	Signal Name	Signal Direction Outside the Instrument	Description
17	TX	→	Send data RS-232C level
35	CS	←	Send request from external device. Sendable at signal "HIGH" level. Sending stops at "LOW" level.
18 36	S.G		Signal grounding.

(b) Measured value output and external set data output
Short D_2 (No. 16 pin) of the Amphenol input/output connector with D_2/D_4 COM (Nos. 33 and 34 pins) normally using external dry contact. (Shorted when unused.)
i) Measured value is output for every sampling when shorted.
ii) The set data set in Item 7 is output when the shorted condition in i) is opened at less than sampling intervals of more than 100ms.

(c) Output format
- Measured value
  - 199.99 HH HICRLF (For + input, the position of a sign becomes a space.)
  - OVER CRLF (During overflow)
- External set data (In the example in item 7.)

SCALE	19999
OFSET	00000
INPUT	1.9999
SP-HH	15000
SP-HI	10000
SP-LO	−05000
SP-LL	−13000
HYS	00150
MAX	*
MIN	* * Max. and min. measured values.

Note: During data checking after start, no ASCII SERIAL is output.

9. OTHER FUNCTIONS (When Options are Provided.)

9.1 Maximum and Minimum Value Displays and Outputs

Since this meter always stores the maximum and minimum values of the measured results in the memory, they can be called up when required.

i) Pressing the mode switch for more than 2 sec. flashes the most significant digit to dispaly the numbers. The displayed result is the maximum value.

ii) Pressing the mode switch again flashes the least significant digit to display numbers. The displayed result is the minimum value. (Every time the mode switch is pressed, the maximum and minimum values are displayed in due order.)

iii) Clear
Pressing the increment switch in state i) above, clears the maximum value.
Pressing the increment switch in state ii) above, clears the minimum value.

Note: When cleared, the display shows the present measured value being input.

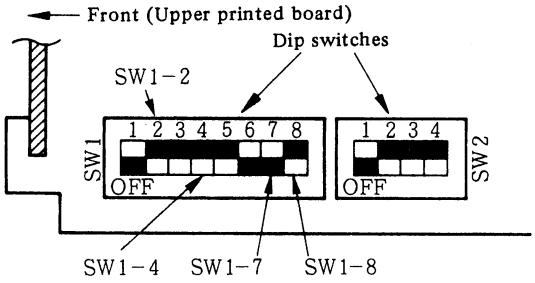
iv) BCD, ASCII serial and analog output are also available for max. and min. outputs.
The ASCII serial output formats are as follows:
Maximum value (>) 15000 > HH HICRLF
Minimum value (<) −15000 < LO LLCRLF

v) Press the reset switch to return to normal operations.

9.2 Display Selection (Optional)

The display shows the set data in Item 7, or the maximum or minimum value, while measurement continues.
If Amphenol connector D_4 (No. 15 pin) and D_2/D_4 COM (Pin Nos. 33 and 34) are:
Shorted by dry contact → Set data is displayed.
Opened by dry contact → Maximum and minimum value are displayed. (Refer to Item 9.1)
To display set data, keep pressing the mode switch for more than 2 sec. to flash "CHEC" on the display. Every time the mode switch is pressed, each message is displayed, then the data is displayed continuously.
Press the reset switch to return to normal operations.

10. DIP SWITCHES AND ERROR MESSAGE



If the internal printed-board is removed in accordance with Item 4.1.3), the above dip switches are shown on the upper printed board. These dip switch positions are for AM-742. For AM-741, dip switch SW1-7 is turned ON and dip switch SW1-8 is tuned OFF.
In normal operations, it is not necessary to change dip switch setting positions, but if they are changed by mistake, re-confirm their positions in accordance with the above Fig.

* If the power is turned ON with the dip switches changed by mistake, the display may show "Error", in which case, re-confirm the positions in accordance with the above Fig. (Note: When the optional function is provided, SW1-2 and SW1-4 are turned OFF.)

11. MAINTENANCE AND INSPECTION

11.1 Caution

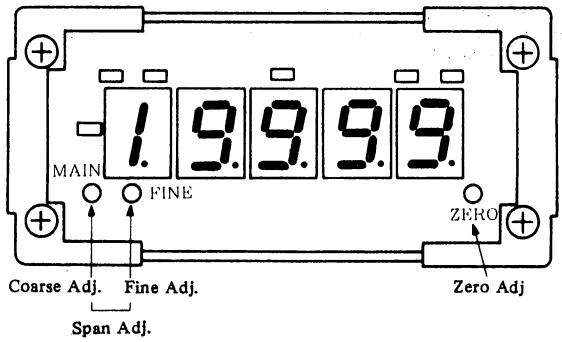
Store the meter where ambient temperature is between -10°C and +70°C, and humidity is less than 60%. Since the bezel is made of plastic, do not wipe stains off with volatile liquids such as thinners.

11.2 Calibration

In order to assure the initial accuracy over a long period of time, it is recommended that the meter be calibrated periodically. When the meter is calibrated, it is necessary to use standard equipment with an accuracy of 0.01% or less.

Calibration procedures are as follows:

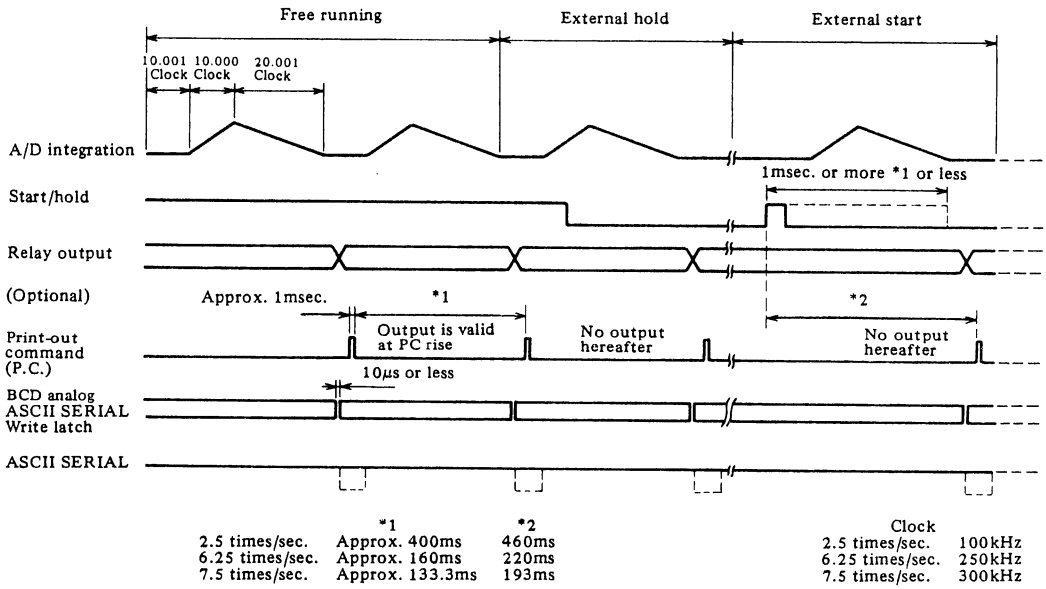
1) Remove the front bezel.
2) Connect the power to the meter for a warm up of 10 minutes or more prior to adjustment in accordance with Item 6.1, so that a = 1.
3) Zero adjustment
   Short input terminals HI and LO to check that the display shows 0.0.
   Otherwise, turn the zero adjuster VR until the display shows 0.0.
4) Span adjustment
   Apply voltage or current to the input corresponding to the full scale (19900), then turn the span adjuster VR until the display shows 19900.
   Next, apply voltage (or current) with-polarity to check that the display shows within -19900 ± 0.03% rdg. ±1 digit (for current, 0.1% rdg. ±1 digit).



5) Calibration for standardized signal input
   Set the data as follows in accordance with Item 7.

SCALE	16000
OFSET	00000
INPUT	1.9999

   i) Zero adjustment
   Check that the display shows 0.0 when IV or 4mA is applied to the input. Otherwise, turn the zero adjuster VR until the display shows 0.0.
   ii) Fullscale adjustment
   Check that the display shows 16000 when 5V or 20mA is applied to the input. Otherwise, turn the span adjuster VR until the display shows 16000.



	*1	*2
2.5 times/sec.	Approx. 400ms	460ms
6.25 times/sec.	Approx. 160ms	220ms
7.5 times/sec.	Approx. 133.3ms	193ms

Clock	
2.5 times/sec.	100kHz
6.25 times/sec.	250kHz
7.5 times/sec.	300kHz

Fig. 12 Timing Chart