

HH81 & HH82 DIGITAL THERMOMETERS



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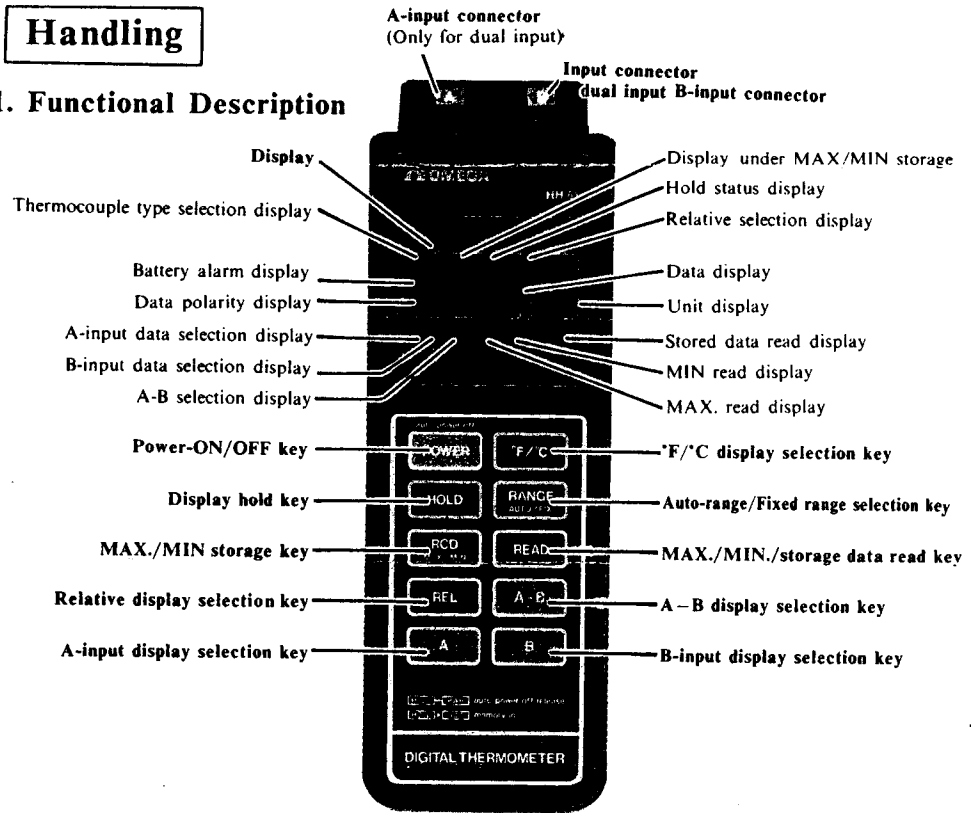
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M6⁵6/047

This instruction manual describes the Model HH82 with dual input. The HH81 is the same as the HH82 except that . The HH81 accepts only a single input.

Handling

1. Functional Description



Key	Operation and Functional Description	Displays lit in addition to numeric displays
<p>Power-ON</p> 	<p>Power ON/OFF key pressing this key turns the power ON. Pressing the key again turns the power OFF.</p> <ul style="list-style-type: none"> ● Since this instrument has the auto-power OFF function, the power is turned OFF 10 minutes after the last key is pressed. ● Pressing the  key while pressing the  key releases AUTO POWER-OFF and power is supplied continuously to the instrument. ● In addition, auto-power OFF is released even during RCD. In any case, after finishing the measurement, press the  key to turn the power OFF. 	<p>All displays light up after POWER-ON</p> <p> lights up to indicate that auto-power OFF is released. (Prevents power turn-OFF.)</p>
<p>Input select <small>(only for the dual input)</small></p>   	<p>A input display select key B input display select key A-B display select key</p> <p>Displays the value obtained by subtracting B input from A input.</p> <ul style="list-style-type: none"> ● When the power is turned ON again, any of the above A/B/A-B state starts from the state previously set. 	<p>A B A-B</p>
<p>Open probe</p>	<p>When the probe is not connected to the input connector, (or the sensor opens) an open probe mark is displayed. For the dual input type, when the probe is not connected to the input selected (A or B), the open probe indication is displayed.</p> <ul style="list-style-type: none"> ● If the input is open at any time, connect the probe, then turn the power OFF once and turn the power ON again to return the instrument to the normal operating condition. 	<p>Open probe display -----</p>
<p>Hold</p> 	<p>Display HOLD key Press this key to HOLD the data on the display. Pressing this key again releases the HOLD state and returns the instrument to the original measuring state.</p>	<p>HOLD "HOLD" disappears</p>
<p>Range select</p> 	<p>Auto-range/fixed range select key Every time this key is pressed, AUTO (automatic select) and FIX (fixed range) alternate.</p> <p>With RANGE AUTO selected, a display resolution of 0.1°C can be achieved at 199.9°C or less, and it becomes 1°C at 200°C or more. Display digit selection is automatically carried out. Display when A-B is displayed is selected by A or B whichever is greater.</p> <ul style="list-style-type: none"> ● At RANGE FIX, display resolution is fixed to 1°C regardless of input values. <p>If FIX is switched to AUTO, □□□.□°C is displayed for about 1 to 2 sec., then it returns to the original number of display digits.</p> <ul style="list-style-type: none"> ● The above setting starts from the previous state when the power is turned ON again after power turn-OFF. 	

2. Measuring sensor connection.

This instrument can connect any of 2 K or J thermocouples conforming to the ANSI/mc 96.1 NBS standard, but it is set to the Type K prior to factory shipment.

- (1) Check the thermocouple type now set on the instrument by turning the power ON.
- (2) Select thermocouple Type in accordance with the following procedures.
 - (i) Remove the bottom cover. (See Item, Battery replacement)
 - (ii) Move the small slide switch on the printed circuit board to select Type K or J.
 - (iii) The display shows either K or J selected.
- (3) After the above procedures, insert the specified sensor into the input connector.
 - With the dual input, only one type of sensor can also be used. In this case, use the key to correctly select either input channel A or B after the power is turned ON.

3. Measurement

- (1) **Press the power ON/OFF key to turn the power ON.**
 - This operation actuates auto-power OFF, but if continuous operation is required, press the **POWER** key while pressing the **HOLD** key. In this case, the **B** display lights up.
 - If the power is turned ON, all displays on the display unit light up for several seconds so that it is possible to check that the necessary segments are lit correctly.
- (2) **Check display items.**
 - After all displays are lit, a measured value is displayed. However, at this time only the following display should be seen.

Type K (or J), measured data and unit °C or °F
Input select display A (or B or A—B : Only for the dual input)
 - If the sensor opens or is not inserted securely, the open probe display (----) is shown. In this case, check the sensor side.
 - When only one sensor is used for the dual input type and the channel connected with the sensor is not selected correctly, the open probe display is shown.
- (3) **Select A or B channel.**

For the dual input type, select the input channel of **A** or **B**. Key operation produces a beep which indicates that the key is accepted.
- (4) **Select the range.**
 - Press **RANGE** for the desired AUTO or Fixed range.

Measure room temperature and check to see that the side displaying □□.□°C is the auto-select side. Pressing the key displays □□°C and fixes resolution to 1°C throughout the whole temperature range.
- (5) **After finishing the measurement, turn the power OFF by pressing the power ON/OFF key.**
 - The power may be turned OFF by the actuation of auto power OFF during measurement. In this case, press the **POWER** key to continue measurement.
 - If the power is turned OFF and turned ON again. RANGE AUTO/FIX, input select A/B/A—B and °F/°C start from the states previously set.
- (6) **Various operations**

For various operations such as display hold, relative display and MAX/MIN record/readout, see the key operation list.

Warning

The actuation of the keys is comparatively easy. Therefore, make sure that the instrument is not mistakenly set to a state other than that intended. Under normal operation, check to see that **HOLD**, **RCD**, **REL**, **MAX**, **MIN**, and **MEM** **B** are not displayed.

Operational cautions

- Since the thermometer is a non-isolated type, when used as the dual input type, always use it so that the potential difference between the 2 probes is less than 1 V.
- Do not use the probe in gas or liquid which may corrode probe material, or semi-solid particles and semi-viscous substances. After measurement, wipe the probe with a dry cloth.
- Do not bend the probe connector by applying force on either side.
- Do not bend the probe, and do not drop or strike surface type probes.
- When measuring surface temperature using a surface type probe, place the probe perpendicular to the measured object. Also, apply oil to the probe temperature sensing surface to facilitate good contact.
- When measuring non-metallic surface temperatures, take extra time, because of poor thermal conductivity.
- To ensure stable measurement, do not expose the instrument to rapid temperature change.
- This instrument is water resistant, not water proof, so do not immerse it in water. If it is immersed in water by mistake, immediately pull it out and check to ensure that there is no water in the unit.

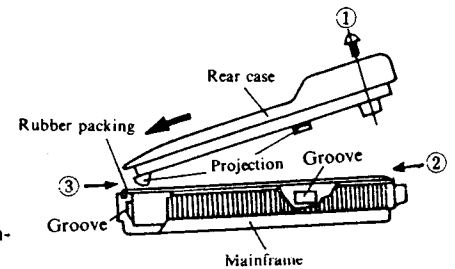
In addition, the instrument is so designed that water penetrating into the connector does not permeate into the internal circuit. However, the instrument should always be handled so that water has no chance of entering the connector.

Battery alarm and battery replacement

If battery voltage decreases below the rated value, the **B** display flashes. The instrument may be used for a while after the display flashes, but replace the battery as soon as possible. "Note that the **B** display lit continuously, indicates auto power off release, for continuous measurement. Not an indication of low battery voltage. When **B** display is not on, the unit is in the auto power off mode.

Following are the replacement procedures:

- (1) Rear case removal
Remove screw ①, and then insert a screwdriver into ② (the corner is most appropriate) to pry open the cover.
- (2) Remove the battery on the printed-circuit board. Note the polarity.
- (3) Rear case closure
Mate projection ③ with the groove in the mainframe, and then close the rear case.
- (4) When closing the bottom cover, make sure that the rubber packing embedded in the groove is fully secured.



Cautions

- When the instrument is to be stored for a long time, remove the battery.
- When the battery is dead, replace it immediately to prevent battery leakage, or use a no-leak high quality battery.

Maintenance

Storage conditions

- Temperature: -10 to 50°C
- Humidity: less than 85% R.H.
- When storing the instrument avoid the following locations where:
 - (1) Humidity is high.
 - (2) The instrument is exposed to direct rays of the sun.
 - (3) The instrument is exposed to high temperature.
 - (4) There are large amounts of vibration.
 - (5) Dust, salt, and/or corrosive gas are present.

The thermometer is made of resin. Therefore, do not clean with volatile solvent (thinner or benzene).

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. Before returning any instrument, please contact the OMEGA Customer Service Department to obtain an authorized return (AR) number. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. Returnee's name, address, and phone number.
2. Model and Serial numbers.
3. Repair instructions.

Specification

Model	HH81	HH82
No. of inputs	1	2
Sensor type	K, J (Internal switch selection)	
Measuring range (only the mainframe)	K : -160°C (-256°F) ~ +1372°C (+2502°F) J : -170°C (-274°F) ~ +1000°C (+1832°F)	
Resolution	+199.9°C (+391.8°F) or less : 0.1°C (0.2°F) +200°C (+392°F) or more : 1°C (1°F)	
Accuracy (only the mainframe)	0 ~ +199.9°C (391.8°F) : ±(0.1% of rdg + 0.7°C (1.3°F)) 200°C (392°F) or more } : ±(0.2% of rdg ± 1°C (1.8°F)) -0.1°C (31.8°F) or less }	
	At 23 ± 5°C	
	Calibration is in accordance with ANSI/mc 96.1 Reference Thermocouple e.m.f. table	
Temperature coefficient	±(0.015% of rdg + 0.03°C (0.06°F))/°C	
Measuring cycle	Approx. 1.2 sec./reading	Approx. 2 sec./reading
	However, when no range selection is provided.	
Operation function	Range Auto/Fixed (Resolution : 1°C), data hold, MAX./MIN. value record, data storage, relative	
		2-point (A, B) select display Display of temperature difference between 2 points
Display	HOLD, RCD, REL, MAX, MIN, MEM °C/°F, A, E, A-B, B Burnout, Battery alarm	
Working temperature and humidity ranges	0 ~ 50°C, 0 ~ 90% (0 ~ 35°C)	
Power supply	Dry battery 006P (9V)	
Battery life	Continuous operation : 450 hours with automatic power OFF function	
Dimensions	Approx. 196 × 67 × 35mm	
Weight	Approx. 270g	
Input connection	Miniature thermocouple connector:	
Accessories	Manual, battery, bead wire type K thermocouple (two supplied with HH82) sub miniature connectors (two supplied with HH82) TAS adaptor	

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 3 years from date of purchase. If the unit should malfunction, it must be returned to the factory for evaluation. Our Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive current, heat, moisture, vibration, or misuse. Components which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

THERE ARE NO WARRANTIES EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL OMEGA ENGINEERING, INC. BE LIABLE FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES. THE BUYER'S SOLE REMEDY FOR ANY BREACH OF THIS AGREEMENT BY OMEGA ENGINEERING, INC. OR ANY BREACH OF ANY WARRANTY BY OMEGA ENGINEERING, INC. SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE PURCHASER TO OMEGA ENGINEERING, INC. FOR THE UNIT OR UNITS OR EQUIPMENT DIRECTLY AFFECTED BY SUCH BREACH.

Relative



Relative display select key

Pressing this key displays the difference (relative value) between the measured value (D1) at the time the key is pressed (reference value) and the succeeding measured value (Dx).

$$\text{REL display} = D_x - D_1$$

Pressing this key again returns the instrument to normal measured value display.

- During REL display, the **RANGE**, **A** / **B** / **A B** keys do not function.

Observe that pressing the REL key deletes memory data.

- If the stored value is called up by pressing the READ key during REL (MEM lights up), reference value D1 is displayed.

REL

REL disappears.

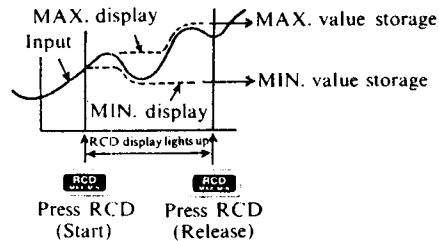
Max./Min. value storage



Max./Min. value storage key

If the **RCD** key is pressed, Max/Min value detection/storage is started. Pressing the **RCD** key again erases the **RCD** display and releases the MAX/MIN detection operation.

Press the **READ** key to read RCD data.



- Recorded data is stored in the internal memory even if RCD is released (The data can be read later). However, if RCD is started afresh, the previously stored MAX/MIN data is erased.
- When RCD is pressed during REL, the maximum and minimum measured values (Dx) instead of relative values are recorded.
- Even if the power is turned OFF, the MAX/MIN values are stored until RCD starts again.
- During RCD, AUTO-power OFF is released and data measured in succession. When measurement is finished, always turn the power OFF.
- During RCD, the **RANGE**, **A** / **B** / **A B** keys do not function.

RCD

Main memory



Store display in memory

First, hold measured data, then press the **RCD** key to store the data in the memory.

Simultaneously, the HOLD state is released to return the display to a new measured value display.

- During REL, data cannot be stored in the memory.
- Observe that pressing the **REL** key erases the data stored in the memory.
- The data thus stored can be reserved until the next data is stored or **RCD** is pressed.
- Press the **READ** key to read out the stored data.

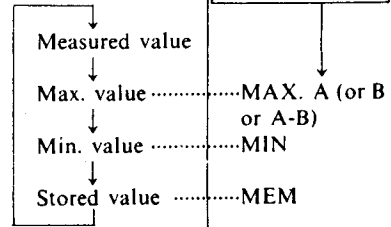
**MAX/MIN/
stored data
read**



MAX/MIN/stored data read key

Every time this key is pressed, displays change in the order shown at right.

- If the MEM value is read during REL display, the value stands for a reference value in relative measurement.



- MAX/MIN values can be read during RCD.

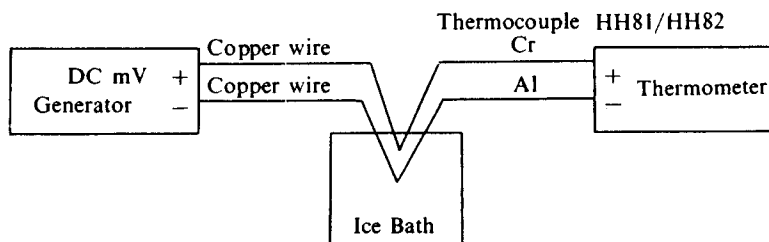
- The number of display digits of MAX/MIN/stored data is as follows regardless of the number of display digits obtained when the data is measured.

RANGE AUTO { Depending on the current input value 199.9°C or less □□□.□°C
More than 200°C □□□°C

RANGE □□□°C

Calibration

1. Connect the meter to a variable DC voltage supply. Set the DC power supply to 6 volts, turn on the thermometer and confirm that the indicator on the display is flashing. If not, adjust R25 for a flashing indication.
2. Set the DC supply to 9 volts. Insert into the thermocouple connector an OMEGA subminiature thermocouple connector, part number SMP-U-M, that has the two terminals shorted with copper wire. On the HH-82 adjust R10 for 0 volts between COM and J1, ± 1 millivolt.
3. Set up the equipment shown in the drawing below. Adjust the DC mV generator to 0 volts. Allow time for the instrument to stabilize to room temperature. Adjust R17 for a display of $0.0 \pm 0.1^\circ\text{C}$.



4. Adjust the DC millivolt generator to 46.985 mV and adjust R21 for an indication of 1150°C .
5. Set the DC millivolt generator to 6.137 mV and adjust R6 for a display of $150.0 \pm 0.1^\circ\text{C}$.

IM HH81E