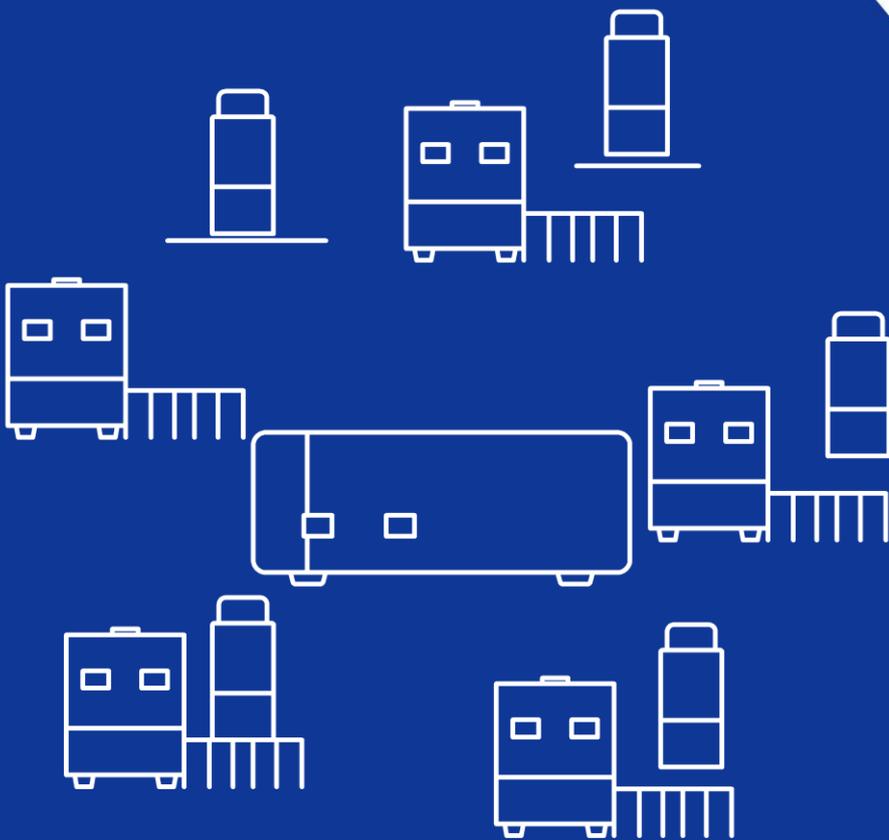


SPECIFICATIONS

VIP Checker

HC-121



EKO

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2. Introduction

Inspection for vacuum leakages and insulation effectiveness for Vacuum Insulation Panel (it is made with polymer film with aluminum foil, which is vacuumed on a thermal resistance material; it is called as VIP in this text) used to be processed by heat-flow method (which is used on EKO HC-074) for measuring the thermal conductivity; however, it is not so efficient for managing quality control for mass quantity of VIP production since it would take about 1~2 hours to measure just one VIP. The VIP (Vacuum Insulation Panel) Checker HC-121 is now possible to measure one VIP within 1 minute because it checks the VIP's by simplified method.

1. Quick Evaluation for VIP

HC-121 measures the loss of the heat which is caused from the difference in thermal conductivity of VIP to evaluate the VIP performance by OK/NG. This measurement method takes much shorter time for evaluation compared to the traditional method. HC-121 has sensor head, which is the heat source with detector that measures the heat loss. With a most common method, it usually takes more than 1 hour for evaluation; however with HC-121, it only takes approximately 1 minute and is applicable for quality control process.

2. Up to 5 Sensor Head Connection

VIP is a high performance insulator; however, if any vacuum leakage occurs, it will lose its performance. HC-121 is developed to check the VIP vacuum leakage, and the VIP are evaluated by comparing against the reference VIPs that are already known for each OK, n-NG, and NG conditions. Up to 5 units of sensor units can be connected, and each of these sensor head can be operated individually.

3. Calibration and Determining Evaluation Threshold

HC-121 can be used by calibrating per individual sensor by reference VIPs which are produced in the identical configuration with the VIPs to be evaluated.

If there are three samples of VIPs, which are in same size, made from same material and their thermal conductivities are already known but different, the thermal conductivity of same type of VIP values can be estimated from the standard graph by giving value to the sensor using calibration function. The calibration software is used for such calibrations.

4. Easiest Solution for VIP Quality Control

As mentioned above, since HC-121 takes only about 1 minute per one sample to evaluate VIPs compared to the common stable method, which takes more than 1 hour, it is best suited for VIP quality control in production line.

5. Barcode Reader (Option)

The control software controls the sensor and used for measurement data managements. In order to register and identify all the VIP samples, the barcode reader can be connected.

3. Specifications

3-1. Specifications

Table 3-1. Specifications

Characteristics		Details
Test Sample Size Requirements	Width:	±50mm difference against reference VIP (when the reference VIP is over 200x200mm)
	Thickness:	±5mm difference against reference VIP (when the reference VIP is over 10mm)
Measurement Conditions		Room temperature: Within 25+/-2°C, temperature controlled
		Humidity: Within 40%+/-5%, stabilized
		Air from air conditioner does not blow VIP samples directly.
		No vibration, dust, high voltage equipment, high electro-magnetic and electrostatic

Table 3-2. Each Unit Specifications

Characteristics	Details
HC-121 Measurement Unit	
Sensor Input	Differential Thermocouple (Thermopile type), Output in mV
Input Range	10mV fixed
Measurement Accuracy	±0.025mV
Heater Current	160mA (per each Sensor Unit channel)
Input Channels	5 channels
Measurement Time	60sec/1ch for standard: <ul style="list-style-type: none"> Standby Time: [Standard 20sec.] (Can be changed above 20 sec.) Cooling Time: [Standard 30sec.] (Can be changed above 30 sec.) Heating Time: [Standard 10sec.] (Cannot be changed)
Buzzer	Beeps at completion of a measurement.
Communication	RS-232C
PC Connection Port	RS-232C
Barcode Reader Connection Port	BAR CODE READER
Size	320(W) x 120(H) x 220(D) mm
Weight	3kg
Power Source	AC100 - 240V, 50/60Hz, Fuse: 3A

Table 3-3. Each Unit Specifications - Continued

Characteristics	Details
Sensor Unit	
Heater	Approximately 85Ω (Approx. 10W)
Insulator	EPS
Differential Thermocouple	Copper-Constantan
Cable	4-pin Shield Cable, 1.8m, D-sub9 pin (male) with connector
Size	φ52 x 117 (H) mm
Weight	1kg
Display Unit	
Start Button	Illuminated pushbutton (Yellow when light, white when not light) Lights up when starting measurements or cooling. Push the button once to light off.
OK Lamp	Lights up when inspection pass. (Green)
NG Lamp	Lights up when inspection fail. (Red)
Sensor Heat sink	Aluminum heatsink
Cable	12-pin Shield Cable, 4.5m, Centronics 14pin (male) with connector
Size	200(W) x 130(H) x 120(D) mm
Weight	800g
Barcode Reader (Optional)	Honeywell MS5145-RS or equivalent
Interface	RS-232C
Connector	D-sub 9 pins, Female
Baud Rate	9600bps
Data Bits	8 bits
Parity	none
Stop Bit	1 bit
Terminator code	only CR (Carriage Return)
Available Digits	Less than 13 digits
Available Codes	JAN-8, CODE39, CODE128, ITF
Power Supply	AC adaptor AC100V+/-10% (6VA)
Volume	Approximately 160g (without cable)

3-2. Software Specifications

Table 3-4. Software Specifications

	Details
Software Versions	Calibration Software: Ver. 3.4.x.x Measurement Software: Ver. 7.4.x.x
Applicable OS	Windows 7 / 8 / 8.1 / 10
Operation Environment	<p>CPU: Pentium/Celeron equivalent, more than 100MHz</p> <p>Memories: 64MByte or more</p> <p>HHD Capacity: 300MByte or more</p> <p>Display Resolution: 1024x768 dot or more</p> <p>Interface: RS-232C Port (COM1 to 16); Make sure 1 port is available.</p> <p>* There should be no unnecessary resident software operating when using this software.</p> <p>* Turn OFF power management function and screen saver (may lead to unsuccessful data collection)</p>
Software Function	<p>Calibration Software (TCCal_V34xx.exe)</p> <ul style="list-style-type: none"> • This is software to calibrate the 5 sensors. Prepare 3 types of samples that thermal conductivities are known (each, Ok/nNG/NG in thermal conductivity) and perform calibration process. Take measurements, 5 channels for 3 times, total of 15 times. • Seek for straight-line approximation in relationships between the differential thermocouple and output electric voltage. • The calibration results will be saved in a file and read by the measurement software. <p>Measurement Software (TCDac_V74xx.exe)</p> <ul style="list-style-type: none"> • This is software to control the Measurement Unit. This software can give signal for starting measurements, monitoring the measurements, displaying and saving the measurement results. • It can easily manage the measurement results by using barcodes. • The measurement results are saved as text files in the HDD.

- Measurement Software CSV Data Format (TCDac_Vxxxx.exe)

①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪
YYYY/MM/DD	hh/mm/ss	VIP Serial No.	Sensor ID	Rambda [mW/mK]	Output	Coefficient A	Coefficient B	R ²	Judge	
2023/4/20	16:10:34	S230420No0001	1	1068423.9	0.037	-6.15844	-6.42168	1	OK	
2023/4/20	16:10:40	S230420No0002	2	1068423.9	0.037	-6.15844	-6.42168	1	OK	
2023/4/20	16:10:46	S230420No0003	3	1016588.7	0.0373	-6.15844	-6.42168	1	OK	
2023/4/20	16:10:52	S230420No0004	4	1068423.9	0.037	-6.15844	-6.42168	1	OK	
2023/4/20	16:10:58	S230420No0005	5	1123356.8	0.0367	-6.15844	-6.42168	1	NG	
2023/4/20	16:11:04	S230420No0006	1	1068423.9	0.037	-6.15844	-6.42168	1	OK	

- ① YYYY/MM/DD Measured Date
 - ② hh/mm/ss Measured Time
 - ③ VIP Serial No., Always 13 characters, in upper scale alphabets and arabic numerals
Scan the barcode and read this value
 - ④ Sensor ID 1 to 99 (Prepared with 2 digits for considering the future expansion)
 - ⑤ Rambda [mW/mK] 0.0 to 99.9[mW/mK]
 - ⑥ Output 0.0001~9.9999
 - ⑦ Coefficient A Slope value of thermal conductivity conversion formula -99.99 to 99.9
 - ⑧ Coefficient B Intercept value of thermal conductivity conversion formula 000.000 to 999.999
 - ⑨ R² Determination Coefficient
 - ⑩ Judge Passed: OK Failed: NG
 - ⑪ CR LF Carriage Retrun + Line Feed
- * All data is separated by comma (,)

- The CSV Data format for Calibration Software (TCCal_Vxxx.exe) is in same format as Measurement Software CSV format, but without the item (10) Judge.

3-3. Cables Specifications

Table 3-5. Cable Specifications

Cables	Details
Power Cable	7A-125V 2.5m 3-pin Plug ↔ IEC60320 C13 type socket
Communication Cable	RS-232C Cross cable, 1.5m Dsub9pin Female ↔ Dsub9pin Female

3-4. Dimensions

1. Measurement Unit

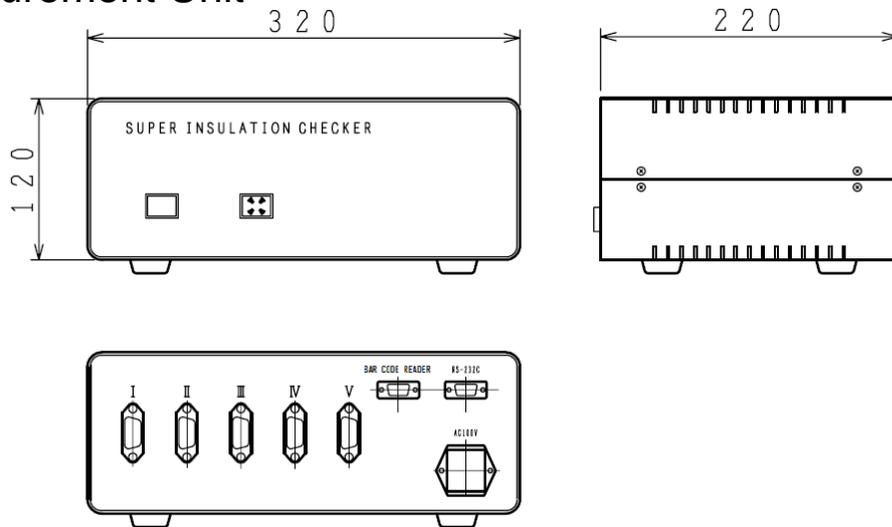


Figure 3-1. Measurement Unit Dimension

2. Display Unit

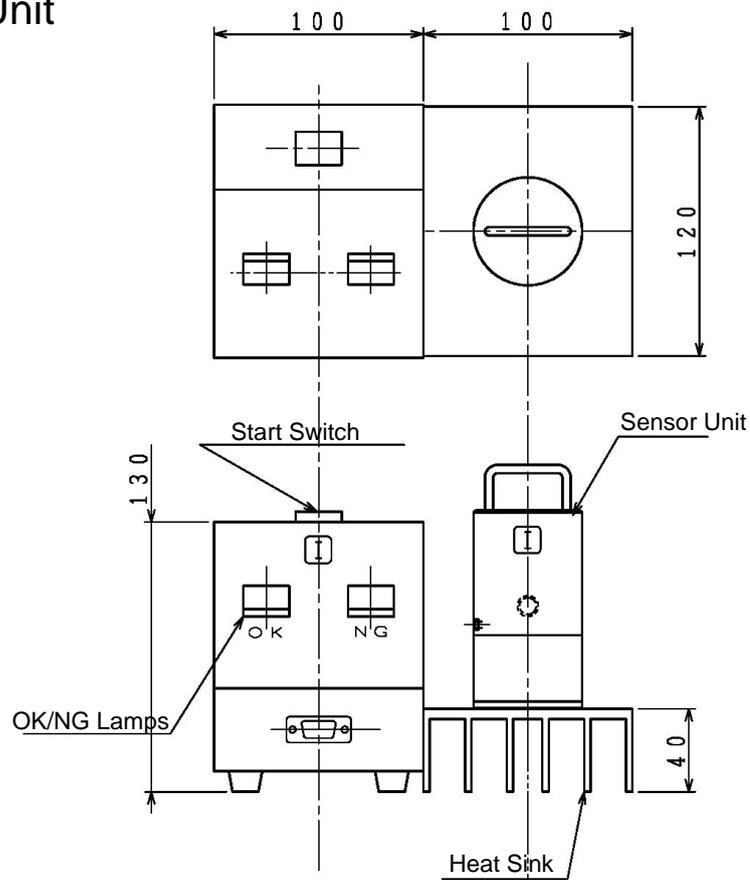


Figure 3-2. Display Unit Dimension

3. Sensor Unit

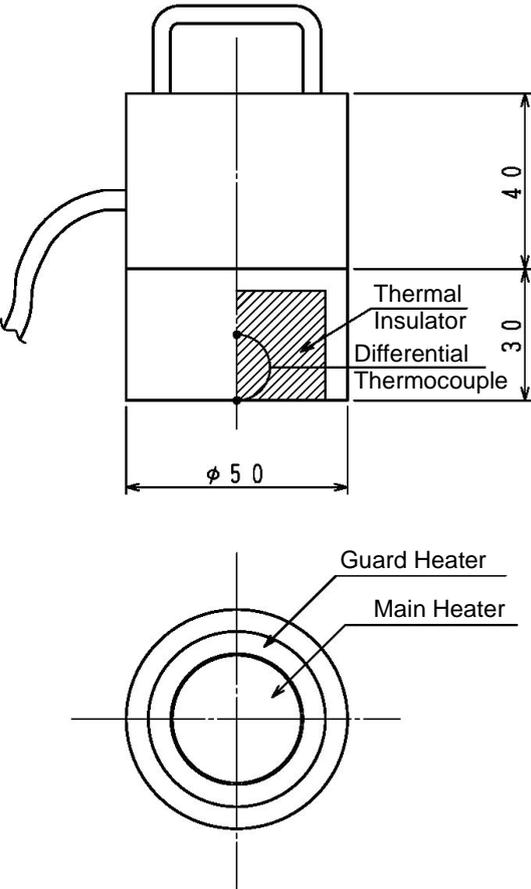


Figure 3-3. Sensor Unit Dimension

4. Standard Items & Accessories

Table 4-1. Package Contents

Standard Items	Qty.	Remarks
Measuring Unit	1	With power supply cable, RS-232C cable
Display Unit	5	
Sensor Units	5 sets	5 sets of Weight and Sensor Head
Barcode Reader	1	Optional: with power adapter and RS-232C cable
Computer	1	Optional
PC software & Instruction Manual	1	CD-ROM
Instruction Manual	1	
Inspection Report	1	Inspection results of sensor heads

Table 4-2. Accessories List

Option Items	Remarks
Computer	
Barcode Reader	MS-5145-RS (Honeywell) With set of power supply adapter and RS-232C cable for barcode reader
RS-232C Extension Cable	for Barcode Reader 4m Dsub9pin (Female) ←→ Dsub9pin (Male)
AC Cable (Corresponding plugs for each country)	Power Supply Cable for AC100V to 240V

5. APPENDIX

5-1. Warranty and Liability

For warranty terms and conditions, contact EKO or your distributor for further details.

EKO guarantees that the product delivered to customer has been verified, checked and tested to ensure that the product meets the appropriate specifications. The product warranty is valid only if the product has been installed and used according to the directives provided in this instruction manual.

In case of any manufacturing defect, the product will be repaired or replaced under warranty. However, the warranty does not apply if:

- Any modification or repair was done by any person or organization other than EKO service personnel.
- The damage or defect is caused by not respecting the instructions of use as given on the product brochure or the instruction manual.

5-2. Environment

1. WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product is not subjected to WEEE Directive 2002/96/EC however it should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product(s) to designated collection points.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

2. RoHS Directive 2002/95/EC

EKO Instruments has completed a comprehensive evaluation of its product range to ensure compliance with RoHS Directive 2002/95/EC regarding maximum concentration values for substances. As a result all products are manufactured using raw materials that do not contain any of the restricted substances referred to in the RoHS Directive 2002/95/EC at concentration levels in excess of those permitted under the RoHS Directive 2002/95/EC, or up to levels allowed in excess of these concentrations by the Annex to the RoHS Directive 2002/95/EC.



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