- MODEL No: HMS5300 -

*** Product Name : Hall Effect Measurement System in variable temperature from 80K to 350K by using AMP 55 Kit including SH80350K/ from RT to 573K by using AHT55T3 Kit.**

- Manual version: ver 5.11-

www.ecopia21.co.kr

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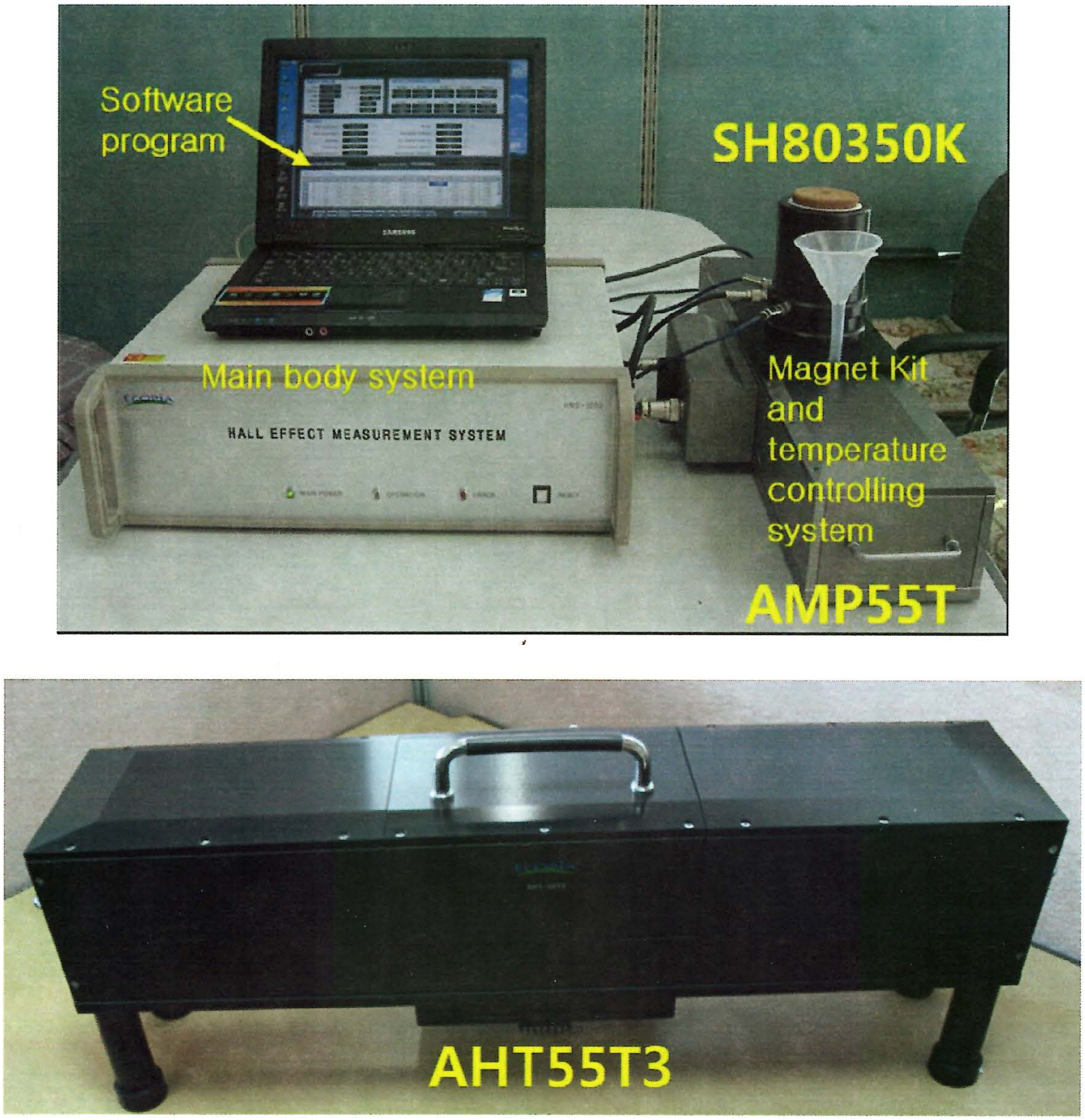
1. Hardware installation.

1) HMS5300 consists of.


Software program
SH80350K
Main body system
HALL EFFECT MEASUREMENT SYSTEM
Magnet Kit and temperature controlling system
AMP55T
AHT55T3

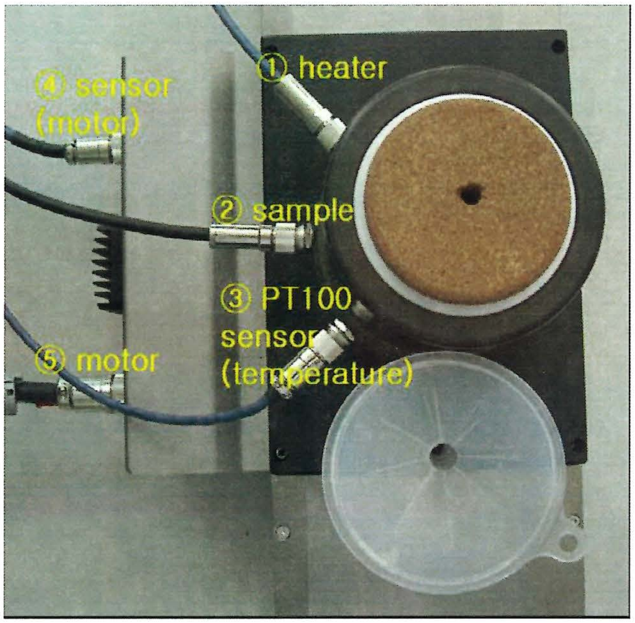
< Pic# 1. HMS5300 system full set view >

HMS5300 system mainly consists of "Main body System", "Magnet for 80K-350K(AMP55T)", "Sample Holder(SH80350K)", "Magnet for RT-573K(AHT55T3)" and "software program"

2) Cable connections.

2-1) Testing on 80K-350K (Using AMP55T)

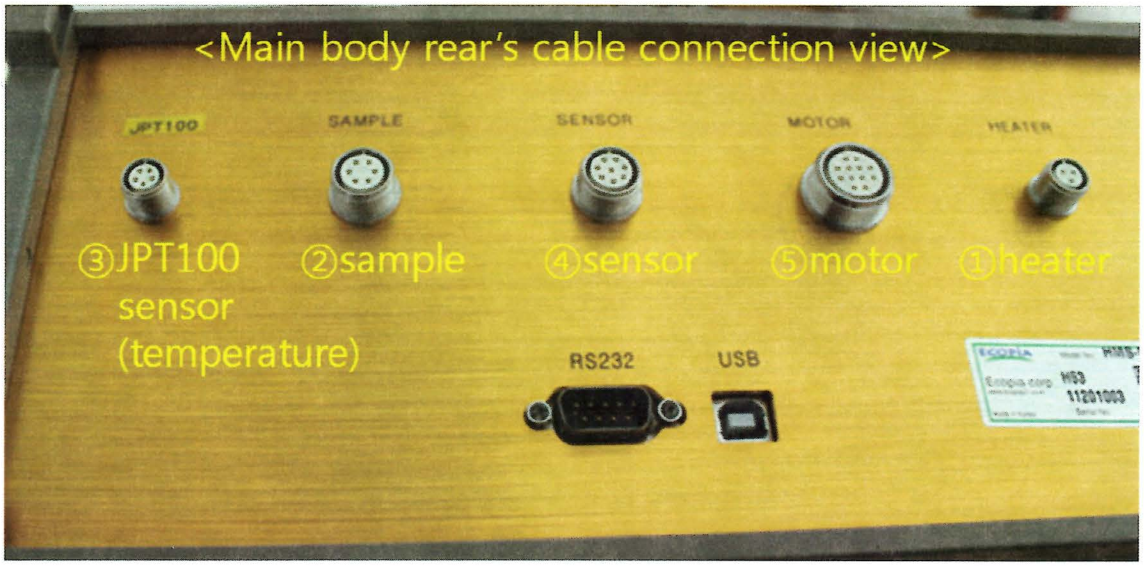
First of all, you need to connect many cables successfully as below images.


① heater
④ sensor (motor)
② sample
③ PT100 sensor (temperature)
⑤ motor

< Pic#2 LN2 tank top view >

You need to take care ①,②,③ cable connectors are water-proof but the other side of ①,②,③ cable connectors are non-water proof. Water proof connectors are little longer than the other side connectors.

The reason why we use wafer-proof connectors for connecting to LN2 tank is for more safety issue. Because, LN2 tank surface will be dewy , whenever measuring in low temperature.

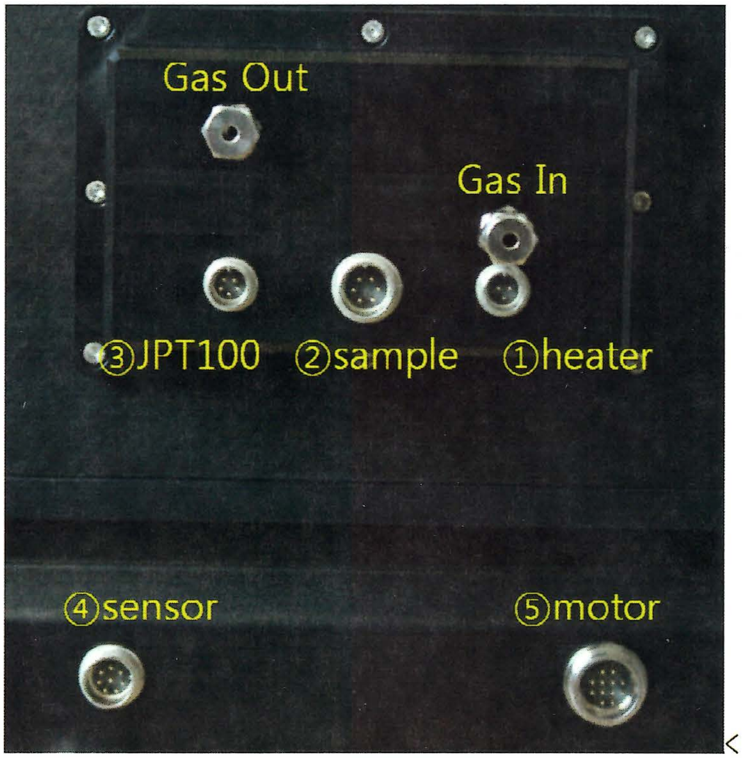

<Main body rear's cable connection view>
JPT100
SAMPLE
SENSOR
MOTOR
HEATER
③JPT100 sensor (temperature)
②sample
④sensor
⑤motor
①heater
RS232
USB
ECOPIA

< Pic#3. Cable connectors in main body's rear side panel >

And, either USB or RS232 cable also must be connected between your computer and main body system's back panel's connector.
And, "voltage rate switch" also must be selected as per your electrical environment.

2-2) Testing on RT-573K (Using AHT55T3)

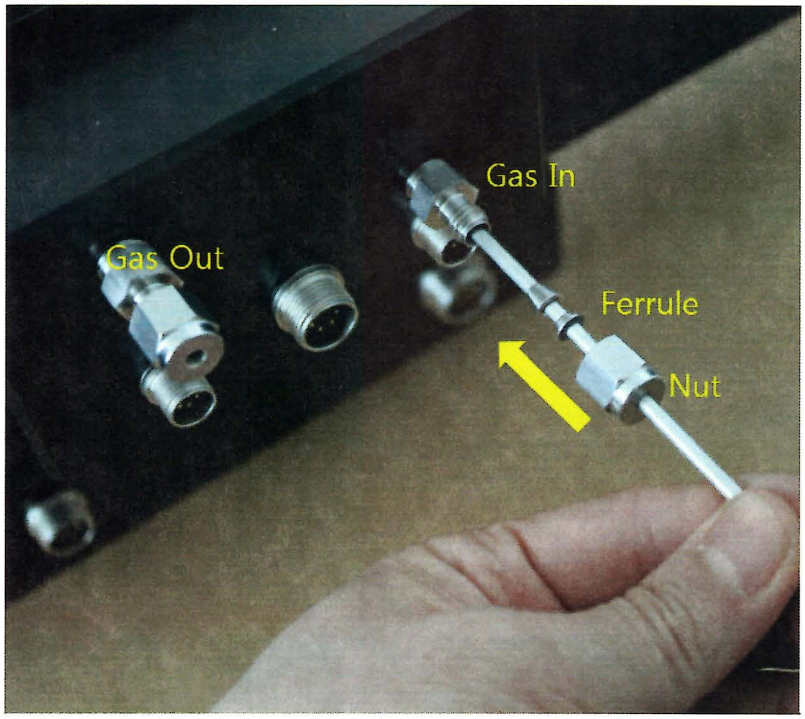
First of all, you need to connect many cables with below AHT55T3


Gas Out
Gas In
③JPT100
②sample
①heater
④sensor
⑤motor

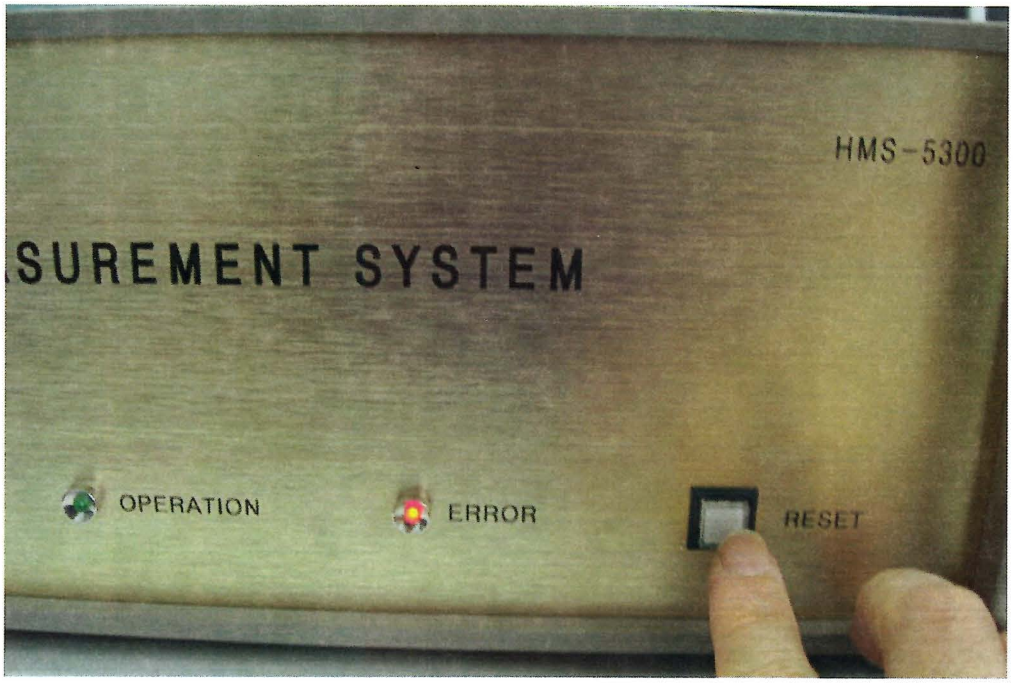
< Pic#4 AHT55T3 rear view >

2-3) How to input the gas valve

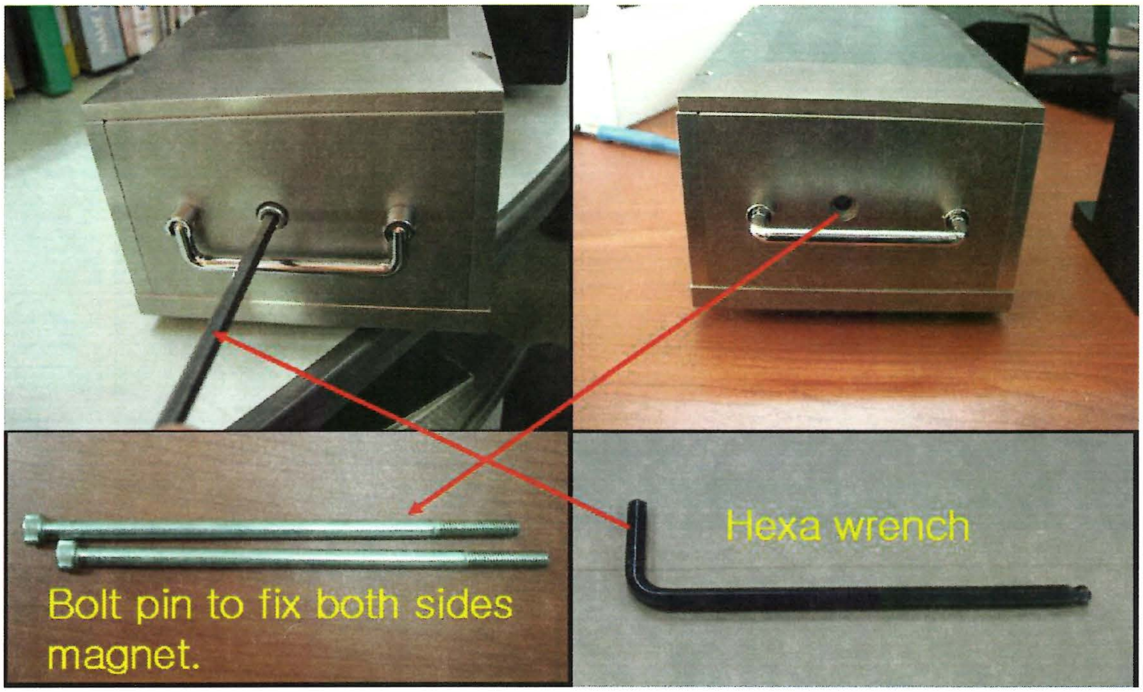
Insert the pipe into 'Gas In' and 'Gas Out' with nut and ferrules as the below picture.


Gas In
Gas Out
Ferrule
Nut

※ When you finish the test of low temp with AMP55T Kit and then intend to measure high temp with AHT55T3, you can'see the red bulb of 'ERROR' in front of Main Body. At this time, please push a button of 'RESET', so that it will be back to normal status.

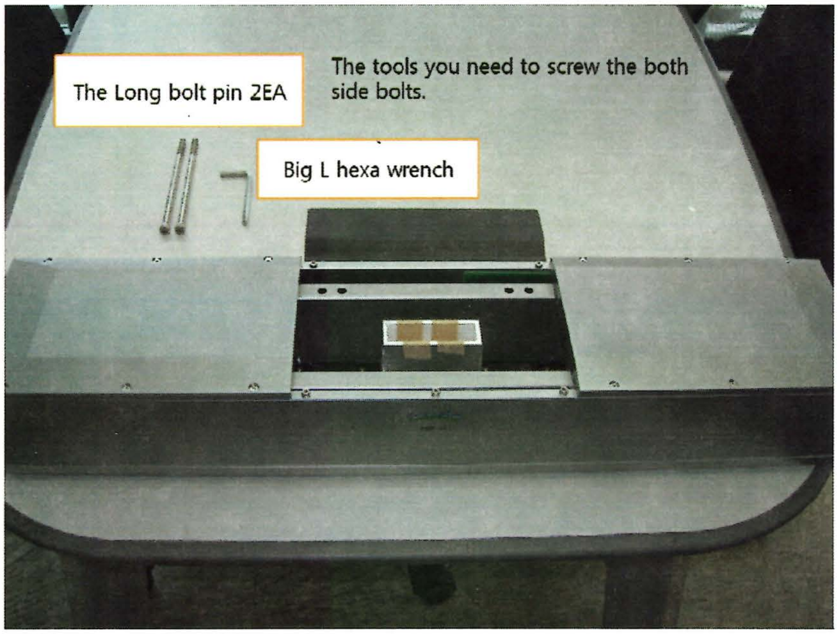

HMS-5300
SUREMENT SYSTEM
OPERATION
ERROR
RESET

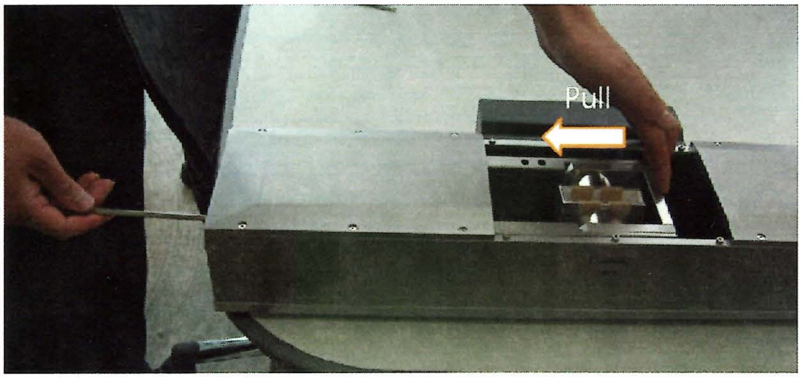
3) Bolt screw in and out , to lock in and lock out magnet


Bolt pin to fix both sides magnet.
Hexa wrench

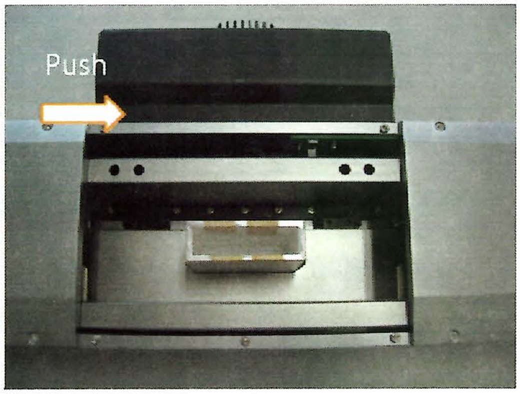
< Pic#5, please remove two bolt screw pin on both sides magnet as shown above >

As shown in above image, you have to screw bolt out , first of all, before you start to test. If not, magnet does not move at all and it causes noise sounds. If you meet this noise sounds, rush to push "power off" button and get rid of two bolts on both magnet sides, left and right.

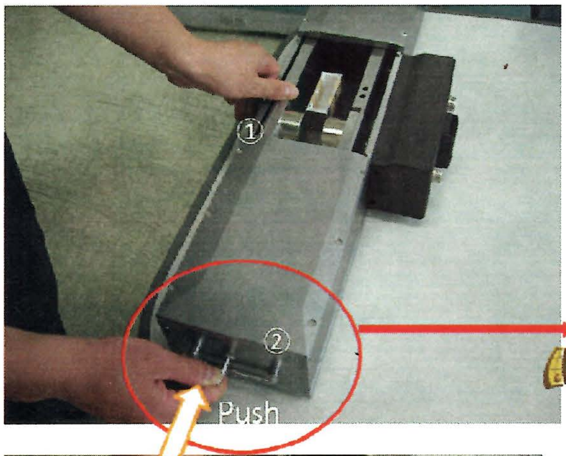

The Long bolt pin 2EA
The tools you need to screw the both side bolts.
Big L hexa wrench



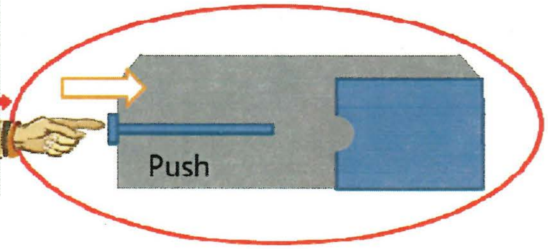
1. Pull to the end of left, and insert the 'long bolt pin'.
   Turn the long bolt pin to the right.(About 10~15 turns)

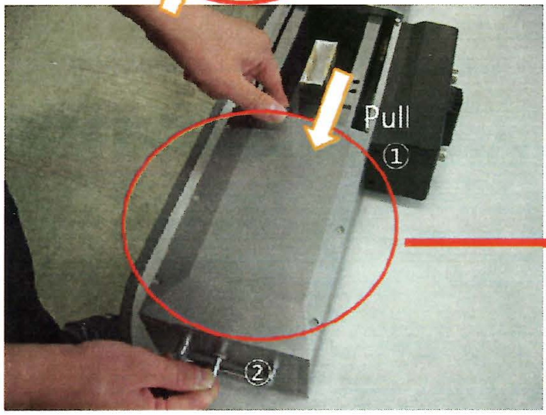


2. When you push the magnet to the middle, if you see the tool is located in middle as the left picture, you turn the bolt appropriately.

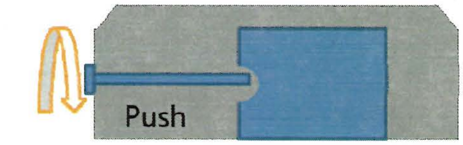


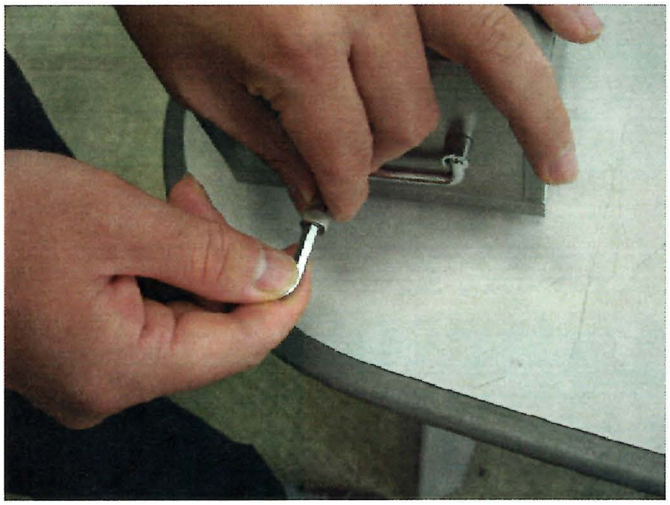
3. It is time to turn the right side.
   ① Again, move the magnet slightly to the left side.
   ② Push the bolt pin to be straight.





4. ① Pull the magnet slightly to the right side.
   ② When the bolt pin meets the hole, turn to the right.





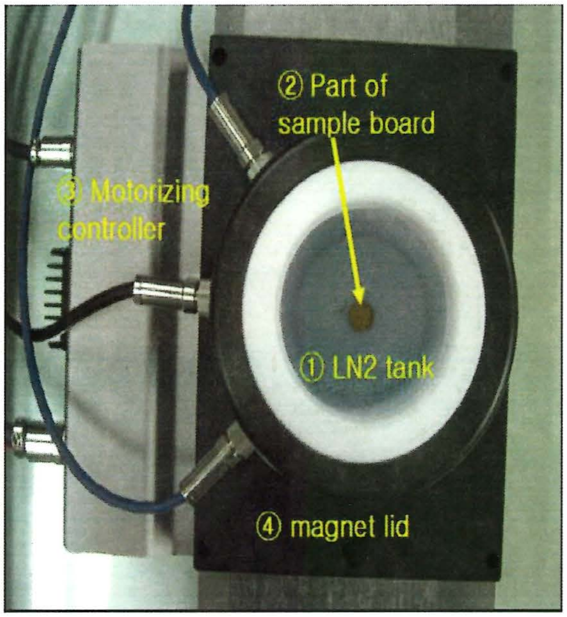
5. You may need the 'Big L hexa wrench' to work these jobs.

< Pic#6. both sides bolt should be screw in to lock magnet movement >

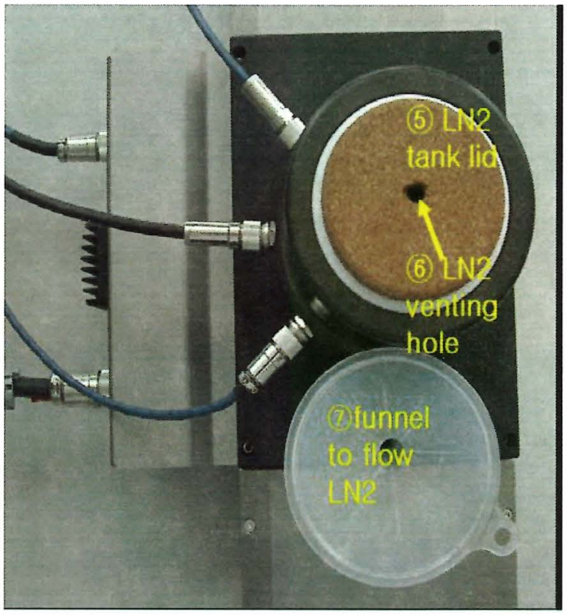
Both of bolt must be screw in and firmly fixed , in order to prevent the magnet from moving on both sides out of control in a process of shipping. Please screw bolt in whenever you move magnet for long journey. If not, magnet move left and right sides out of control and it may be the reason of shorter magnet life time , and magnet may be broken or not operated by serious shockness.

And, if the magnet is not standing on initial position, push "RESET" button in the main body system's front panel. If so, magnet comes to initial position automatically. Magnet is ready to run successfully.

4) LN2 tank and sample board construction.


② Part of sample board
③ Motorizing controller
① LN2 tank
④ magnet lid

< Pic# 6. LN2 tank top view and it's construction>


⑤ LN2 tank lid
⑥ LN2 venting hole
⑦funnel to flow LN2

< Pic#7. LN2 tank lid and funnel >

Above image is to show top view of LN2 tank with magnet kit.

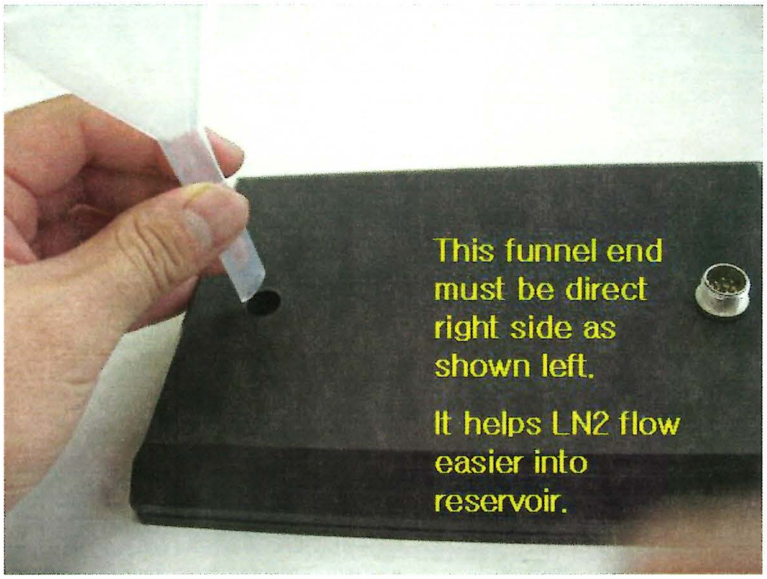
LN2 must be poured into "**① LN2 tank**" to test in variable temperature. And, it can make it possible to maintain LN2 temperature during test.

" **② part of sample board**" is top end of sample board. Sample board was made of "Oxygen-free bronze" shank and it was coated by gold.

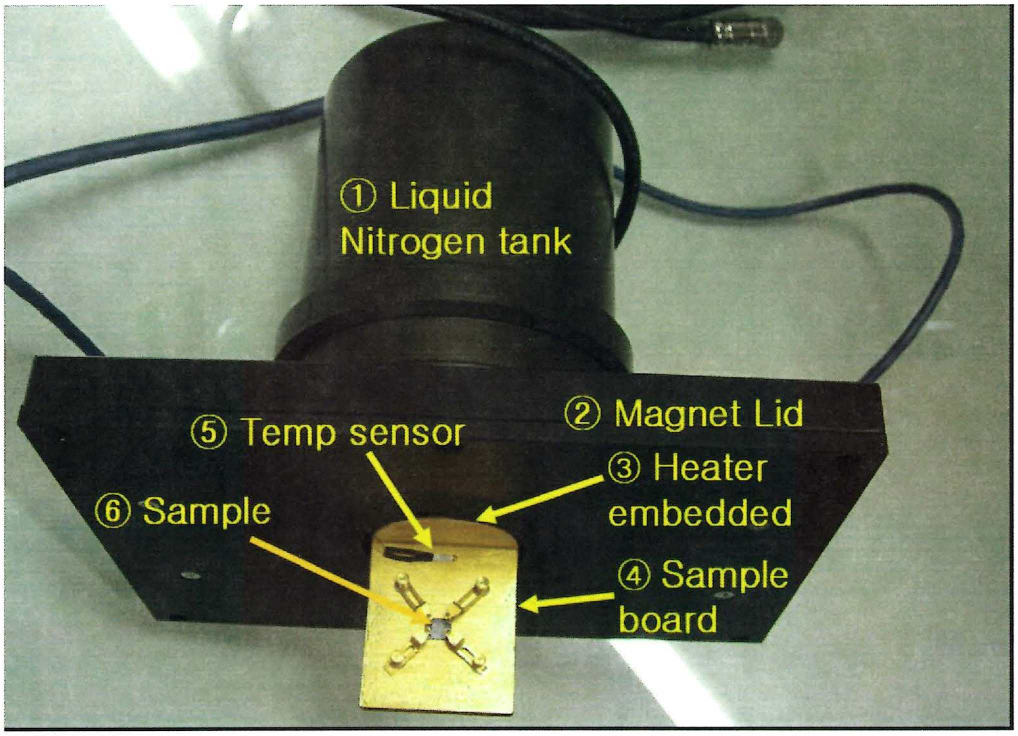
Oxygen-free bronze is very good to respond for temperature variation very fast. And, coated-gold can prevent sample board from getting rusty.

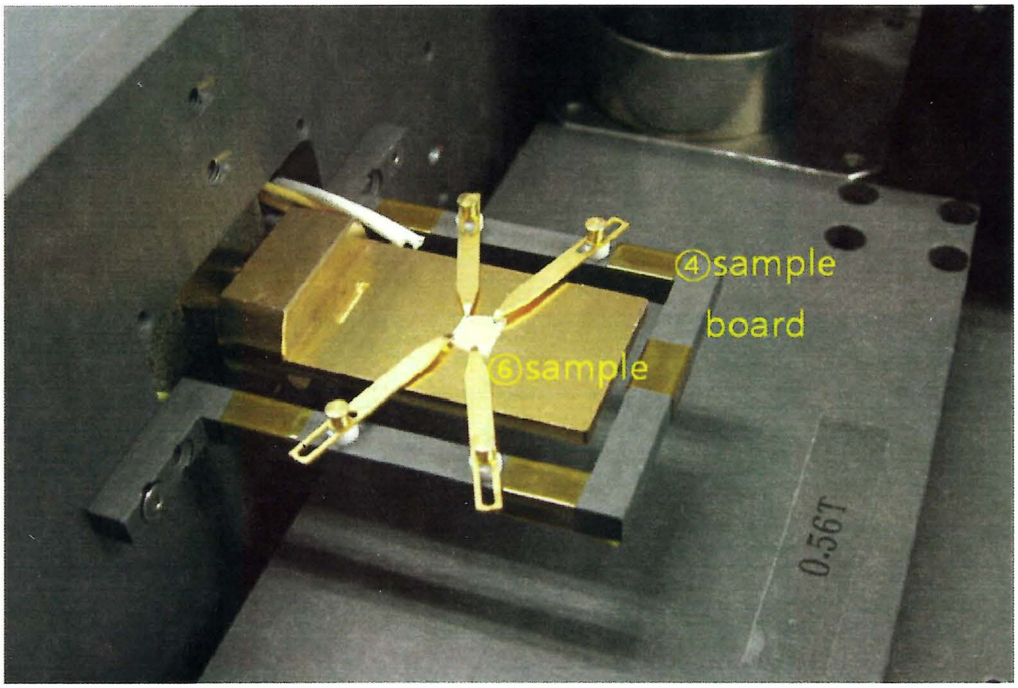
" **③ motorizing controller**" is to make it possible to move magnet left and right side automatically during test.

" **⑤ LN2 tank lid**" should be closed as above image right after pouring LN2, in order to keep LN2 for longer time. If not, LN2 does boil and evaporate faster.


This funnel end must be direct right side as shown left.
It helps LN2 flow easier into reservoir.

" ⑦ **Funnel**" is to make it possible to flow LN2 into square type LN2 tank which is centered on both round magnet.


① Liquid Nitrogen tank
② Magnet Lid
⑤ Temp sensor
③ Heater embedded
⑥ Sample
④ Sample board


④sample board
⑥sample
0.56T

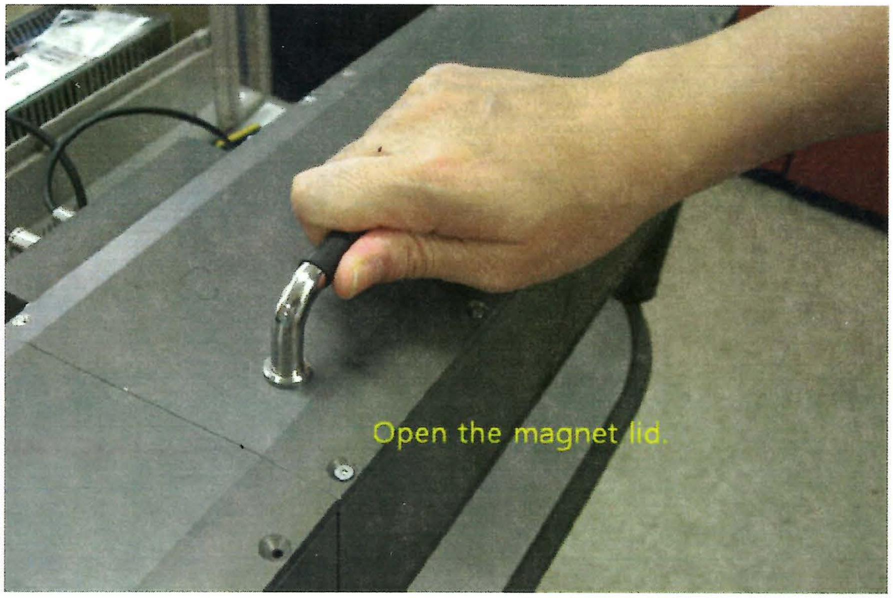
< Pic# 8. sample board for low temp(SH80350K-above) and sample board in AHT55T3(below) >

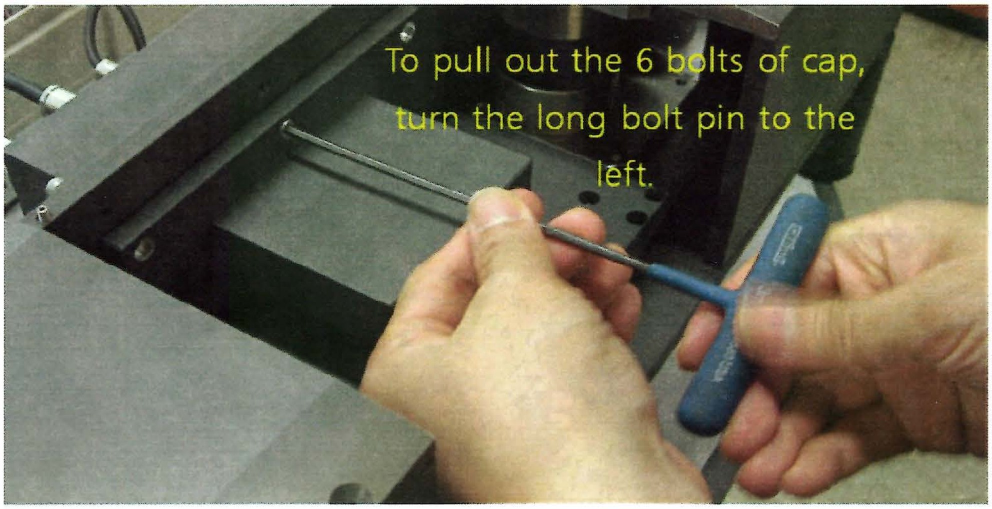
Above images are to show sample board. And, those are not detachable each other. Please do not try to take it to pieces by force.

"③ **Heater**" was embedded in sample board inside. It can make it possible to raise the temperature goes up by getting signal from electrical power.
And, ④ AMP55T: **"sample board"** is heated by heater and cooled down by LN2.
AHT55T3: **"sample board"** is only heated by heater.
" ⑤ **Temperature sensor**" reads temperature currently on the real time basis, and send signal to main body system.
"⑥ **sample**" must be mounted on sample board successfully. It is very important process. If sample mounted on sample board loosely, connection between each probe tip and sample's four point edge may be disconnected during test , esp in low temperature.
So, please try to check each connection was successfully done.

If you finished all the cable connections, voltage rate switch selection, USB/RS232 connection and mounting sample on board, you can power main body system on.

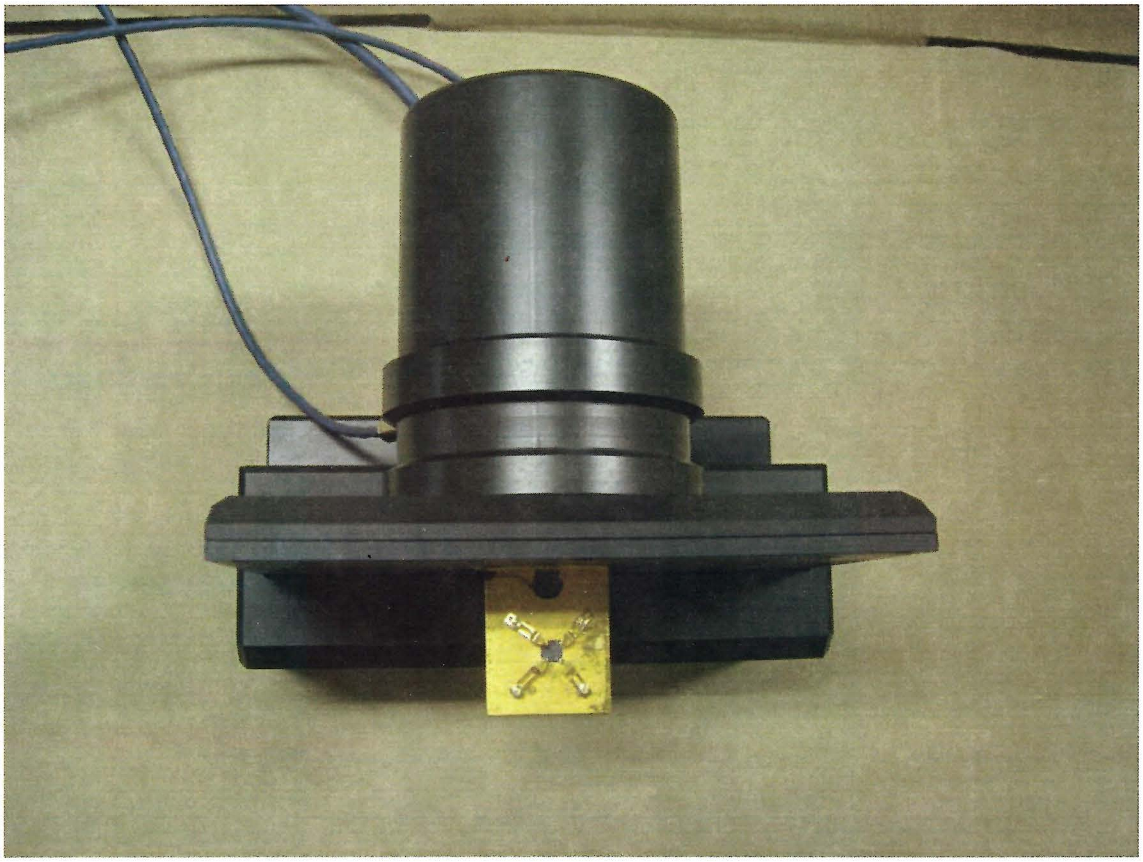
When a tester uses AHT55T3, the tester should open and close the magnet lid and cap.





To pull out the 6 bolts of cap, turn the long bolt pin to the left.

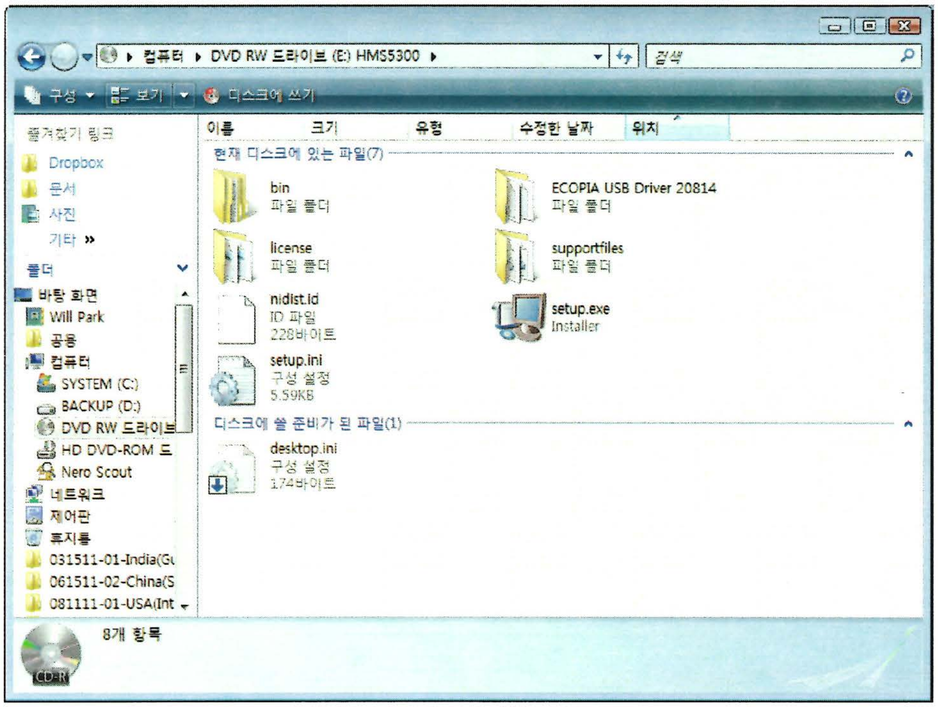
5) Sample holding kit supporter.



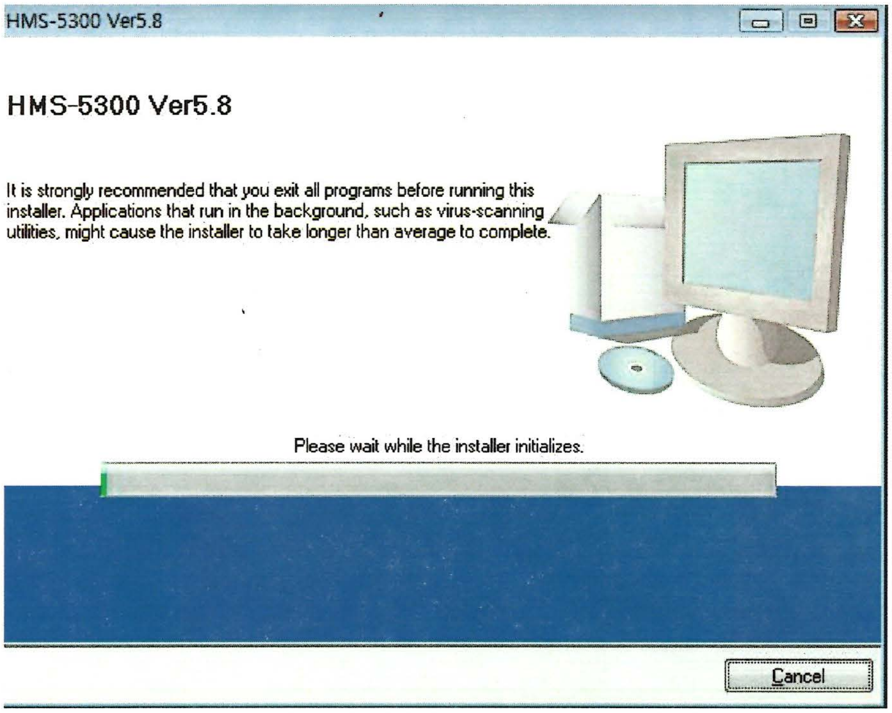
< Pic#9. Sample holding kit supporter >

Sample holding kit can be put on supporting base as shown above. It makes easier and more convenient to mount sample on sample board and exchange samples.

2. S/W program installation.


컴퓨터 ▸ DVD RW 드라이브 (E:) HMS5300 ▸
검색
구성
보기
디스크에 쓰기
즐겨찾기 링크
Dropbox
문서
사진
기타 »
폴더
바탕 화면
Will Park
공용
컴퓨터
SYSTEM (C:)
BACKUP (D:)
DVD RW 드라이브
HD DVD-ROM 드
Nero Scout
네트워크
제어판
휴지통
031511-01-India(Gu
061511-02-China(S
081111-01-USA(Int
이름
크기
유형
수정한 날짜
위치
현재 디스크에 있는 파일(7)
bin
파일 폴더
ECOPIA USB Driver 20814
파일 폴더
license
파일 폴더
supportfiles
파일 폴더
nidist.id
ID 파일
228바이트
setup.exe
Installer
setup.ini
구성 설정
5.59KB
디스크에 쓸 준비가 된 파일(1)
desktop.ini
구성 설정
174바이트
8개 항목
CD-R

Click **"setup.exe"** file to start HMS5300 installation program.

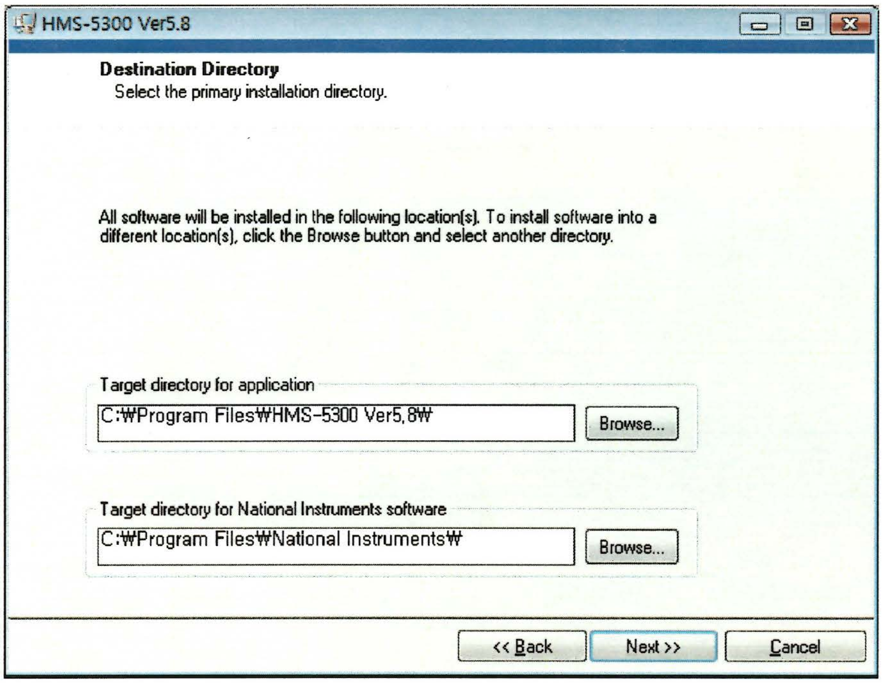

HMS-5300 Ver5.8
Cancel

HMS-5300 Ver5.8

It is strongly recommended that you exit all programs before running this installer. Applications that run in the background, such as virus-scanning utilities, might cause the installer to take longer than average to complete.

Please wait while the installer initializes.

It automatically goes on as above.



Destination Directory

Select the primary installation directory.

All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory.

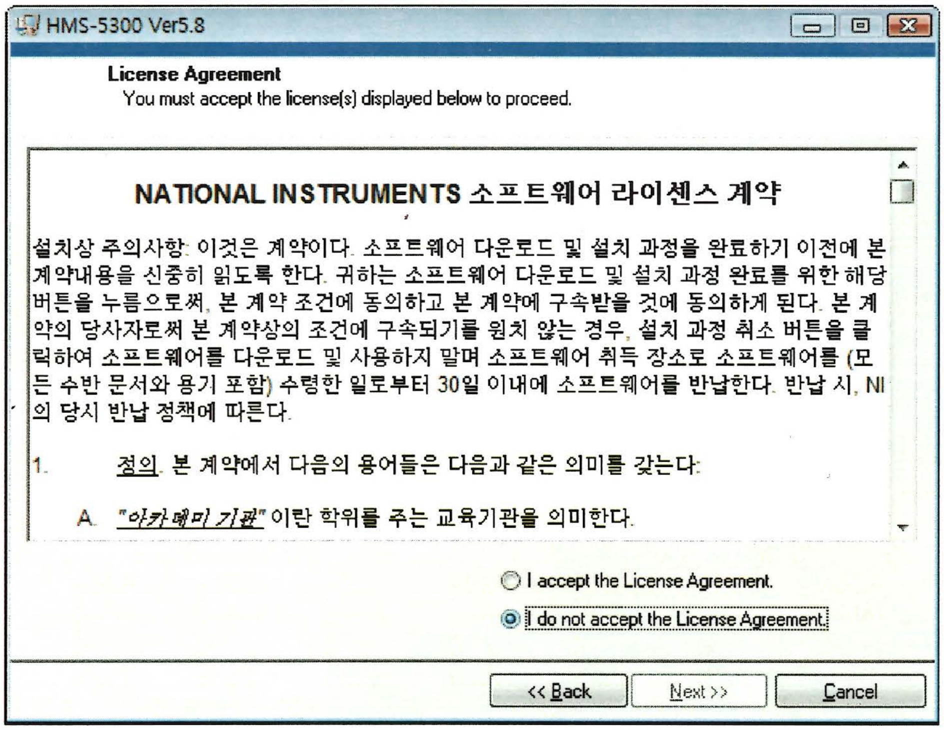
Target directory for application

C:₩Program Files₩HMS-5300 Ver5.8₩

Target directory for National Instruments software

C:₩Program Files₩National Instruments₩

Click **"Next"** button.



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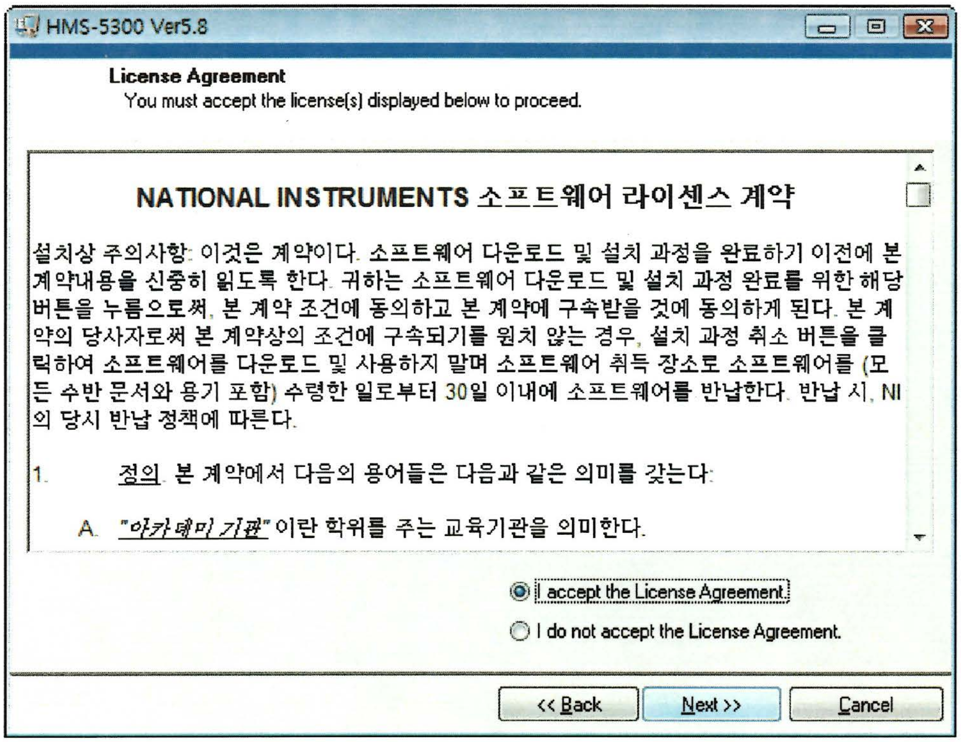
1. 정의. 본 계약에서 다음의 용어들은 다음과 같은 의미를 갖는다:

A. *"아카데미 기관"* 이란 학위를 주는 교육기관을 의미한다.

○ I accept the License Agreement.

● I do not accept the License Agreement.

Click " I accept the License Agreement(s)".



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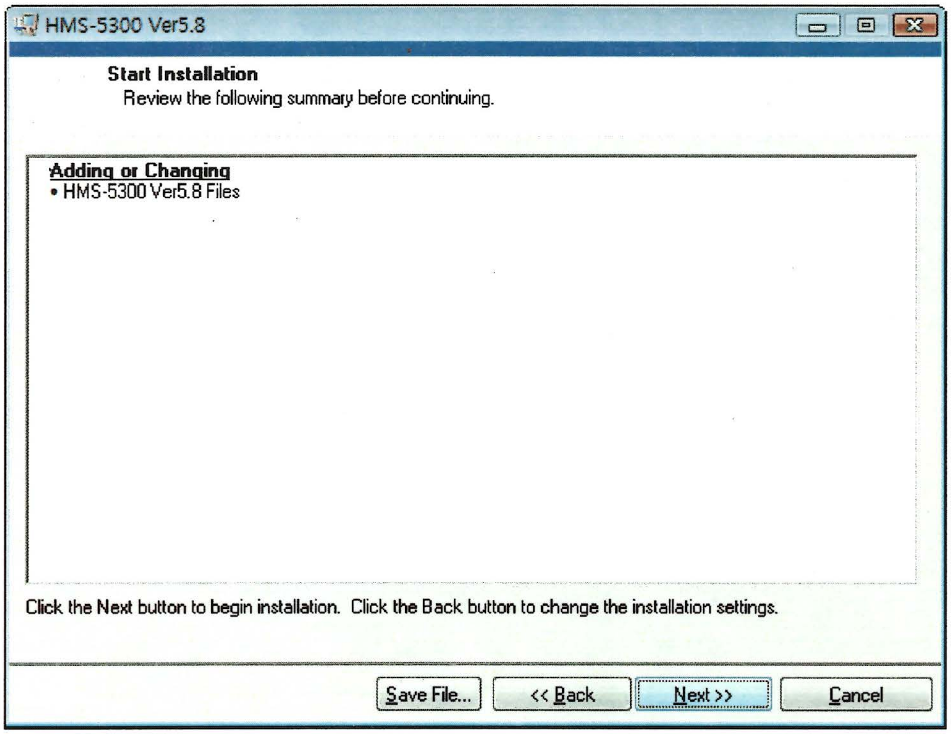
○ I do not accept the License Agreement.

Click **"Next"** button.



Start Installation

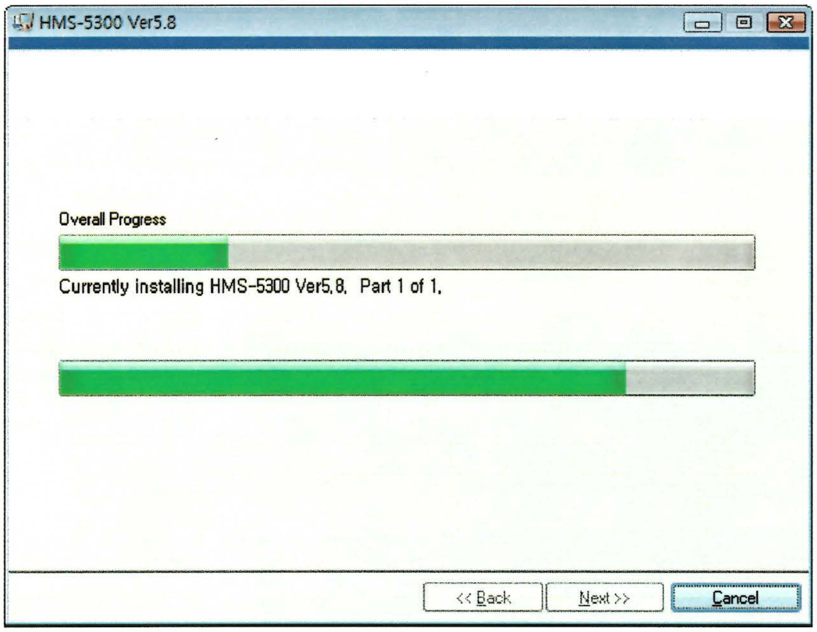
Review the following summary before continuing.

Adding or Changing

- HMS-5300 Ver5.8 Files

Click the Next button to begin installation. Click the Back button to change the installation settings.

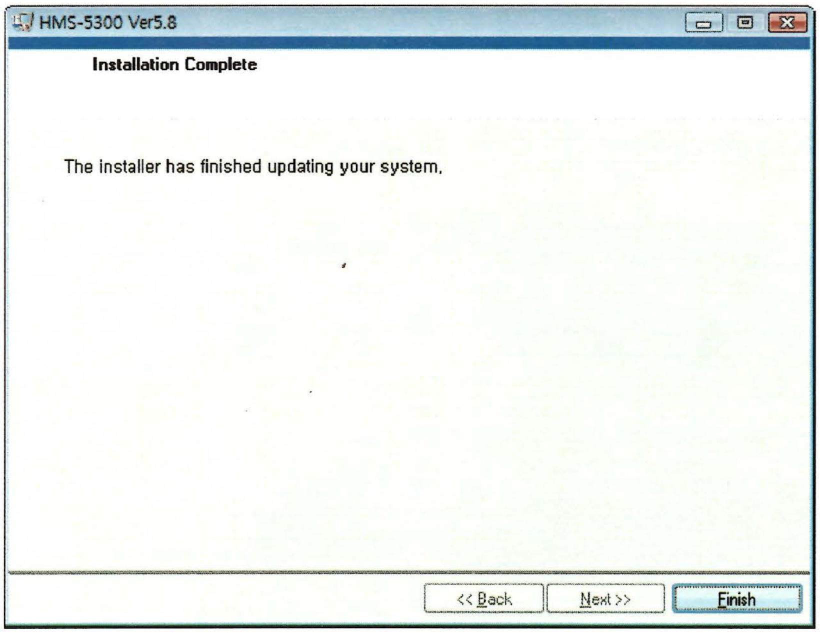
Click **"Next"** button.


HMS-5300 Ver5.8
<< Back
Next >>
Cancel

Overall Progress

Currently installing HMS-5300 Ver5.8. Part 1 of 1.

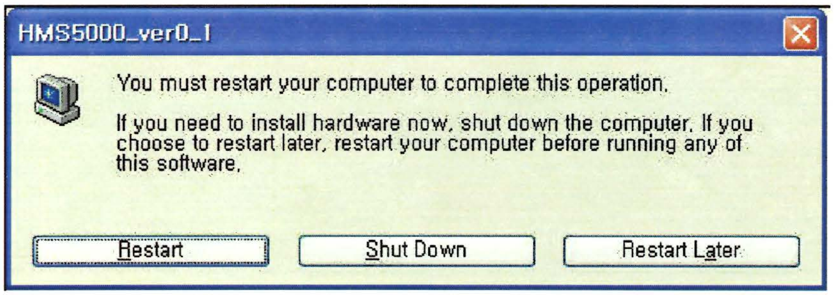
It **is installing** program files.


HMS-5300 Ver5.8
<< Back
Next >>
Finish

Installation Complete

The installer has finished updating your system.

Click “**Finish**”. Installation process was finished.


HMS5000_ver0_1
Restart
Shut Down
Restart Later

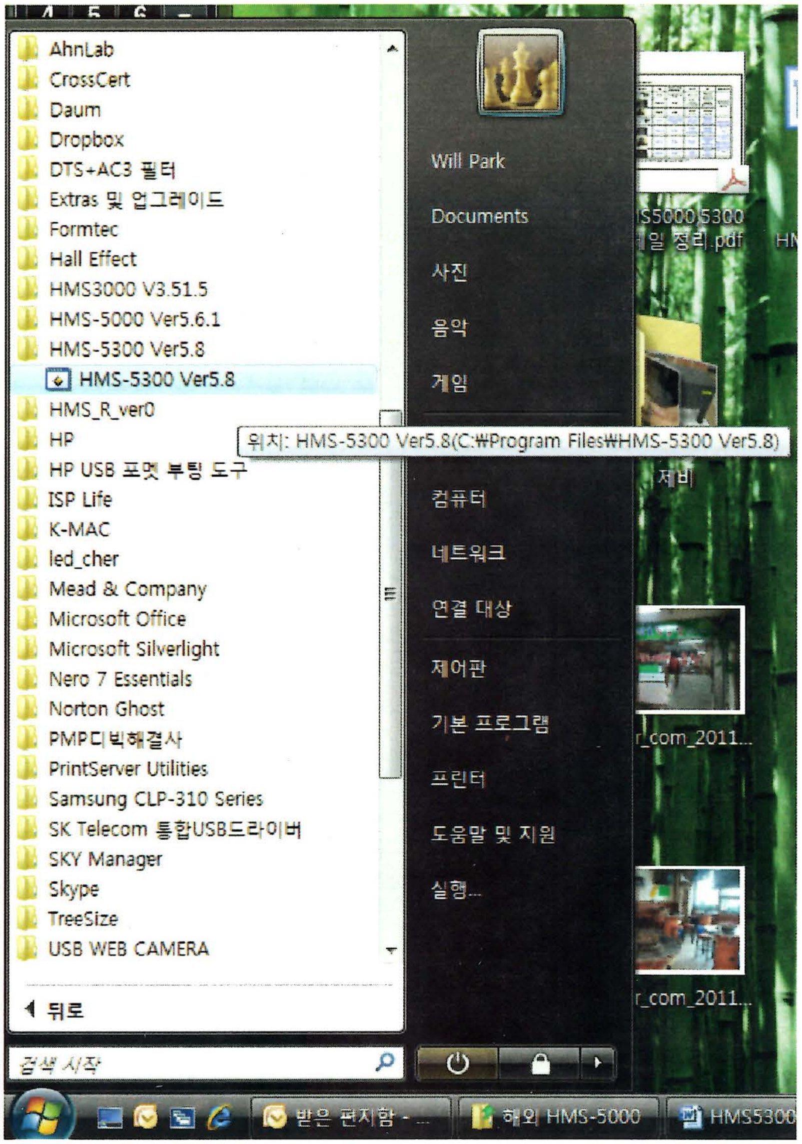
You must restart your computer to complete this operation.

If you need to install hardware now, shut down the computer. If you choose to restart later, restart your computer before running any of this software.

Click “**Restart**” and before that, please save the data in advance that is on operating.

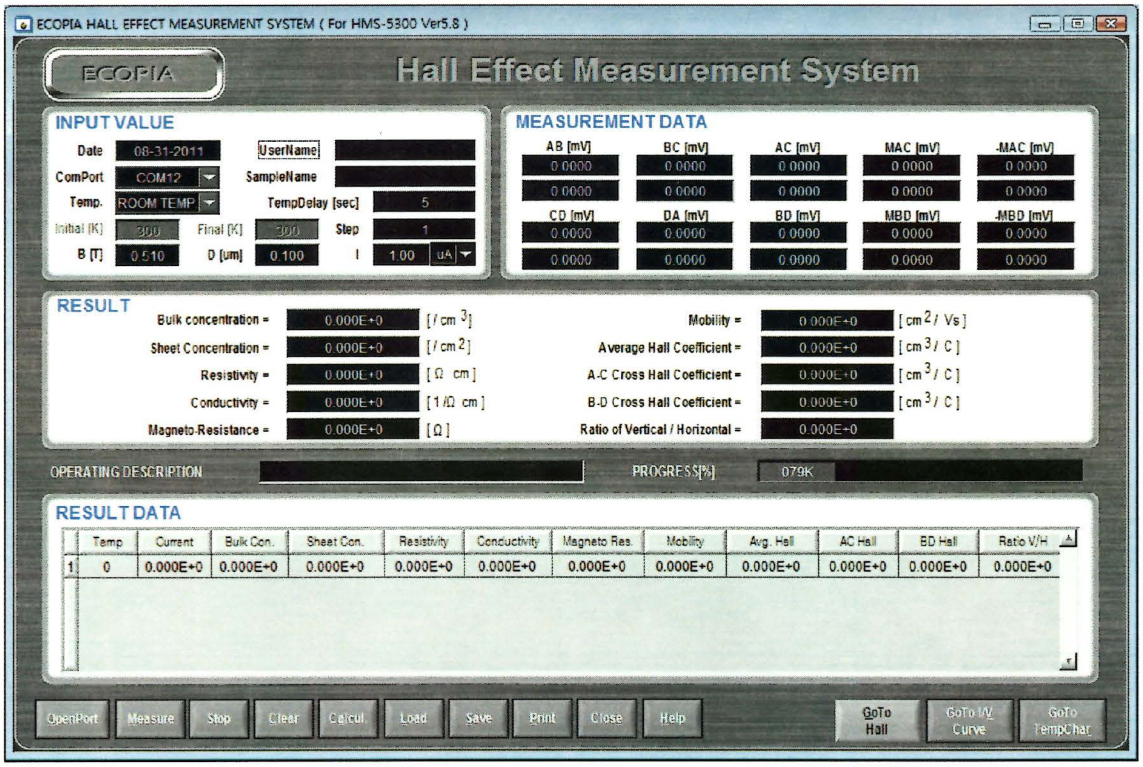
3. How to measure

Start the program.


AhnLab
CrossCert
Daum
Dropbox
DTS+AC3 필터
Extras 및 업그레이드
Formtec
Hall Effect
HMS3000 V3.51.5
HMS-5000 Ver5.6.1
HMS-5300 Ver5.8
HMS-5300 Ver5.8
HMS_R_ver0
HP
HP USB 포맷 부팅 도구
ISP Life
K-MAC
led_cher
Mead & Company
Microsoft Office
Microsoft Silverlight
Nero 7 Essentials
Norton Ghost
PMP디빅해결사
PrintServer Utilities
Samsung CLP-310 Series
SK Telecom 통합USB드라이버
SKY Manager
Skype
TreeSize
USB WEB CAMERA
뒤로
검색 시작
위치: HMS-5300 Ver5.8(C:₩Program Files₩HMS-5300 Ver5.8)
Will Park
Documents
사진
음악
게임
컴퓨터
네트워크
연결 대상
제어판
기본 프로그램
프린터
도움말 및 지원
실행...
받은 편지함 - ...
해외 HMS-5000
HMS5300

1) The first main page of hall effect measurement system

If all the hardware connections and s/w program was successfully installed, start to open measurement page.


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
Hall Effect Measurement System
INPUT VALUE
MEASUREMENT DATA
RESULT
RESULT DATA
OpenPort
Measure
Stop
Clear
Calcul.
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

Date 08-31-2011
ComPort COM12
Temp. ROOM TEMP
Initial [K] 300
Final [K] 300
B [T] 0.510
D [um] 0.100
UserName
SampleName
TempDelay [sec] 5
Step 1
I 1.00 uA

AB [mV]	BC [mV]	AC [mV]	MAC [mV]	-MAC [mV]
0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000

CD [mV]	DA [mV]	BD [mV]	MBD [mV]	-MBD [mV]
0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000

Bulk concentration = 0.000E+0 [/cm ^{3}]
Sheet Concentration = 0.000E+0 [/cm ^{2}]
Resistivity = 0.000E+0 [Ω cm]
Conductivity = 0.000E+0 [1/Ω cm]
Magneto-Resistance = 0.000E+0 [Ω]
Mobility = 0.000E+0 [cm ^{2} / Vs]
Average Hall Coefficient = 0.000E+0 [cm ^{3} / C]
A-C Cross Hall Coefficient = 0.000E+0 [cm ^{3} / C]
B-D Cross Hall Coefficient = 0.000E+0 [cm ^{3} / C]
Ratio of Vertical / Horizontal = 0.000E+0

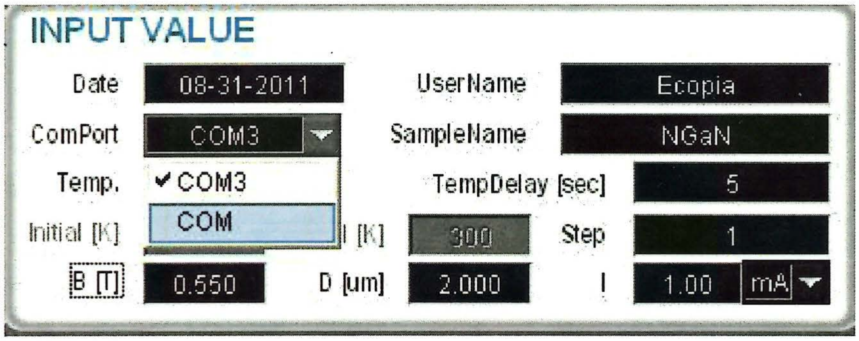
OPERATING DESCRIPTION
PROGRESS[%] 079K

	Temp	Current	Bulk Con.	Sheet Con.	Resistivity	Conductivity	Magneto Res.	Mobility	Avg. Hall	AC Hall	BD Hall	Ratio V/H
1	0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0

< Pic# 1. Initial test page >

Above pic#1) is to show initial measurement page.

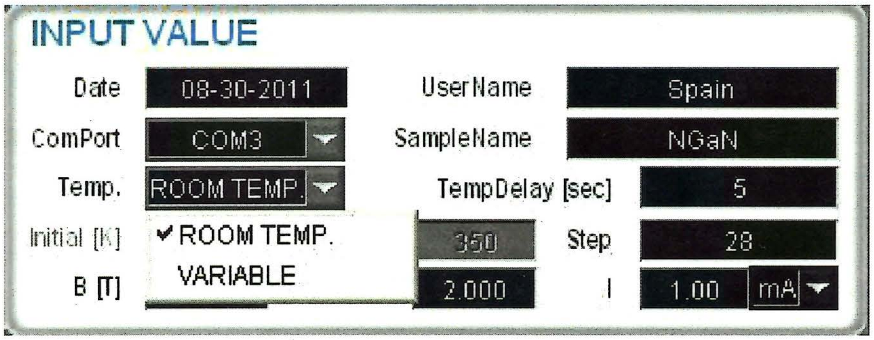
(1) Input value


INPUT VALUE
✔COM3
COM

Date 08-31-2011
ComPort COM3
Temp.
Initial [K]
[K] 300
B [T] 0.550
D [um] 2.000
UserName Ecopia
SampleName NGaN
TempDelay [sec] 5
Step 1
I 1.00 mA

< Pic#2. COM PORT selection>

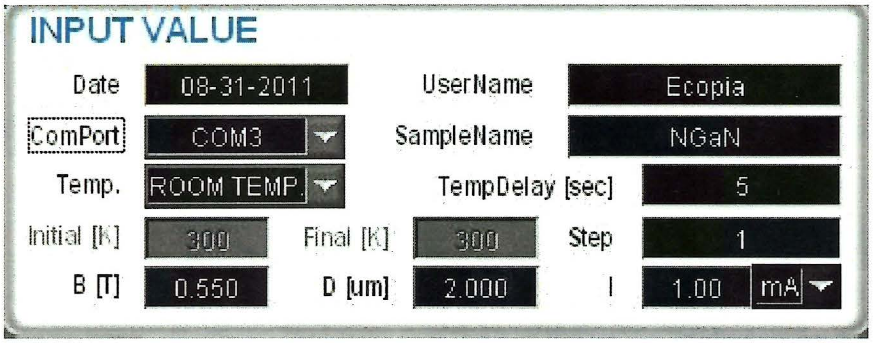
Pic#2 is to show selecting **COM PORT** by pull-down menu bar. It is automatically selected but if not, click COM3 except for COM1.



Date 08-30-2011
UserName Spain
ComPort COM3
SampleName NGaN
Temp. ROOM TEMP.
TempDelay [sec] 5
Initial [K]
350
Step 28
B [T]
2.000
I 1.00 mA

< Pic#3, **TEMPERATURE** selection and temp range set up>

You can select **"ROOM TEMP"** or **"VARIABLE TEMP"** as per your test purpose.



Date 08-31-2011
UserName Ecopia
ComPort COM3
SampleName NGaN
Temp. ROOM TEMP.
TempDelay [sec] 5
Initial [K] 300
Final [K] 300
Step 1
B [T] 0.550
D [um] 2.000
I 1.00 mA

< Pic# 4. **Input current** >

" I " means **input current** value. You can fill it from 1nA to 20mA as per the sample's electrical properties. If it is too high resistive sample, you will have to fill it lower, on the other hand, if it is high conductivity sample, input current must be 10mA or 15, or higher.

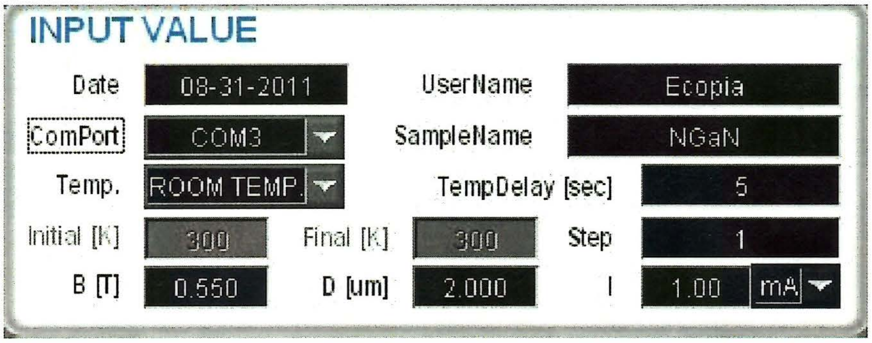
"D" is **doped - sample thickness layer.** You have to know it in advance by testing with your ellipsometer or other instruments.

"B" is **magneto flux density.** We usually offer 0.55Tesla magnet but it may be little stronger or little weaker. It will be range of 0.57T ~ 0.53T and we will test and label actual magneto flux density in magnet kit before shipment.

This is because our permanent magnet is very sensitive to air gap between both round magnet.

"INITIAL" and **"FINAL"** means variable temperature set-up range in which user likes to test. Limit temperature of AMP55T is **80K** for "INITIAL" and **350K** for "FINAL" temp . and temperature of AHT55T3 is upto **573K**.

"STEP" means actual testing point. In Pic#4, we filled "11" and "INITIAL" temp is 300K and "FINAL" temp is 320K. If so, our system will measure at 300K, 302K, 304K,,,,,, 318K and 320K. It measures 11 number of point at each 2K interval variation.

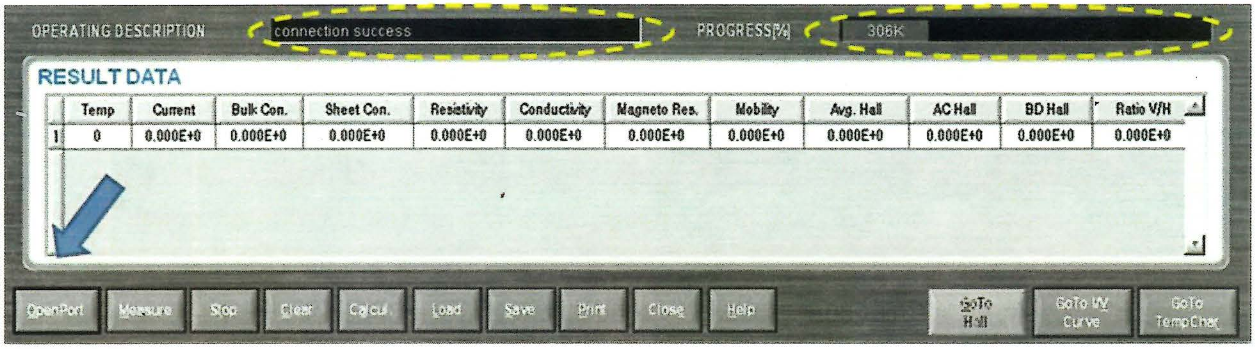


INPUT VALUE

Date: 08-31-2011
UserName: Ecopia
ComPort: COM3
SampleName: NGaN
Temp.: ROOM TEMP.
TempDelay [sec]: 5
Initial [K]: 300
Final [K]: 300
Step: 1
B [T]: 0.550
D [um]: 2.000
I: 1.00 mA

< Pic#5. complete input value >

(2) Open port



OPERATING DESCRIPTION: connection success
PROGRESS[%]: 306K

RESULT DATA

	Temp	Current	Bulk Con.	Sheet Con.	Resistivity	Conductivity	Magneto Res.	Mobility	Avg. Hall	AC Hall	BD Hall	Ratio V/H
1	0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0	0.000E+0

< Pic# 6 click **"OPEN PORT"** >

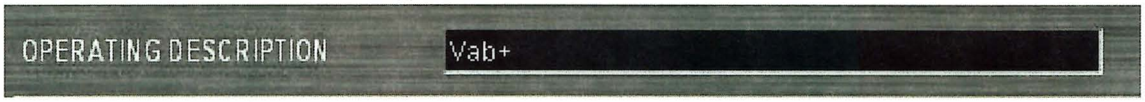
If you filled all menu in input value, you have to click **"OPEN PORT"** to see if connection is successful.

Above Pic# 6 is to show **"connection success"** and you can also see currently real-time temperature in progress. It now indicates 297K. If it reach to 300K, the system will start to run , after system wait **5 seconds** of maintaining time at 300K.

If you see **"connection fail"**, you need to check hardware(cable) connections.

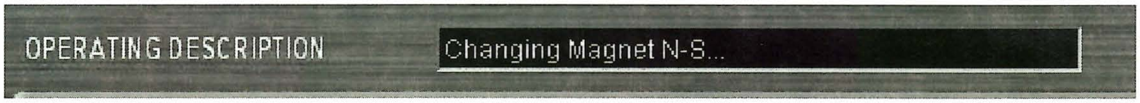
If you see **"connection success"**, click **"MEASURE"** button, and it starts to run successfully.

(3) Measure


OPERATING DESCRIPTION Vab+

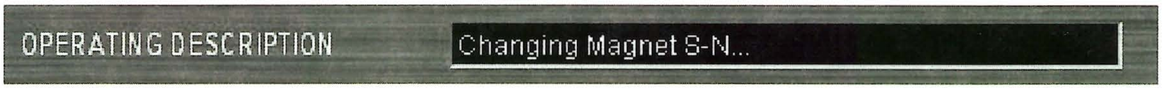
< Pic# 7. It is testing and reads raw data >

It is testing now and it reads and displays raw data, Vab, Vbc, Vac, Vcd, Vda, Vbd.


OPERATING DESCRIPTION Changing Magnet N-S...

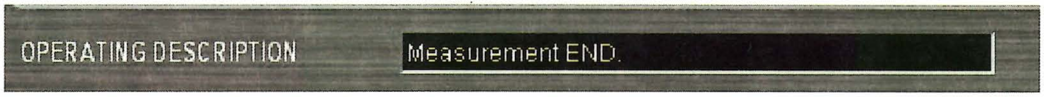
< Pic# 8. Magnet system is inserting **Magnet N to S** >

Now, magnet system is inserting **magnet N to S automatically** by motorizing system. And then right after that, system reads and displays data of **MAC and MBD.**


OPERATING DESCRIPTION Changing Magnet S-N...

< Pic# 9. Magnet system is inserting **Magnet S to N** >

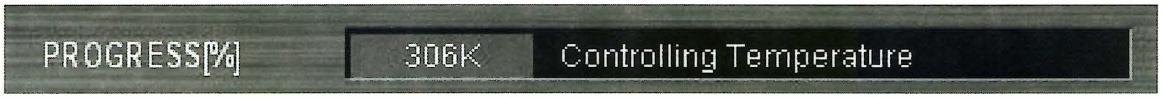
Now magnet system is inserting **magnet S to N automatically** by motorizing system. And then right after that, system reads and display data of **-MAC and -MBD.**


OPERATING DESCRIPTION Measurement END.

< Pic# 10. Measurement END >

Measurement was finished and you can see below "MEASUREMENT DATA" in Pic#12, "RESULT" in Pic#12.

(4) Raising temperature automatically by heating up sample board.



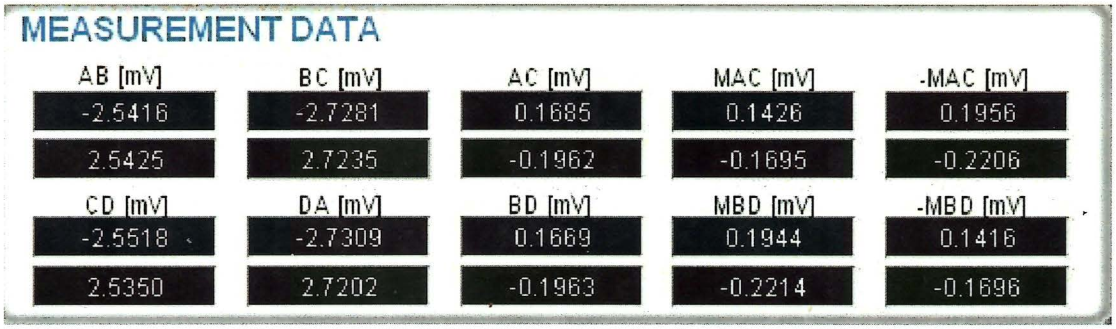
PROGRESS[%]

306K Controlling Temperature

< Pic#11. The system is raising temperature >

If the system finish measurement at the first step temperature, system raise temperature automatically by **heating up bronze sample board** to reach to next step temperature. The system starts to repeat measuring process when it goes on to the next goal temperature.

(5) Test results



MEASUREMENT DATA

AB [mV]	BC [mV]	AC [mV]	MAC [mV]	-MAC [mV]
-2.5416	-2.7281	0.1685	0.1426	0.1956
2.5425	2.7235	-0.1962	-0.1695	-0.2206

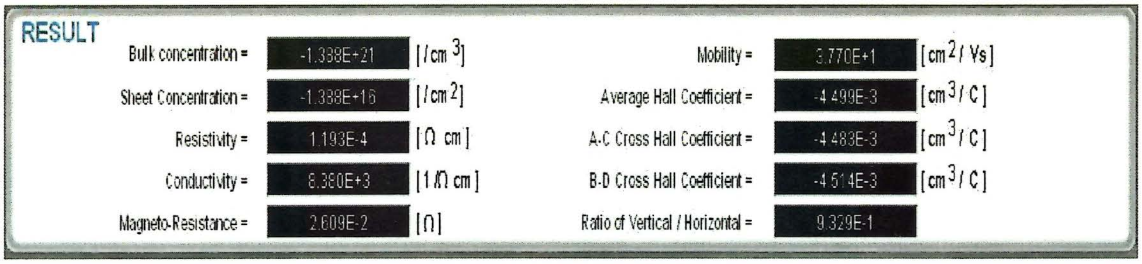
CD [mV]	DA [mV]	BD [mV]	MBD [mV]	-MBD [mV]
-2.5518	-2.7309	0.1669	0.1944	0.1416
2.5350	2.7202	-0.1963	-0.2214	-0.1696

< Pic#12, "MEASUREMENT DATA". It is raw data >

Pic# 12 is to show raw data and these values are based on calculating below "RESULT" values such as bulk concentration, mobility, resistivity and so on.

And, in the first row of black colr box, system applied **forward current.** In the second row of gray color box, on the other hand, system applied **reverse current.**

And, you can also see whether **ohmic contact** is good or not ,by taking a look at absolute values of each pair(forward and reverse value). Now in Pic#12, please see **Vab.** Each values are **"-2.5416"** and **"2.5425"**, and absolute values of each other are very similar. So you can see ohmic contact is good.



RESULT

Bulk concentration = -1.388E+21 [/cm ^{3}]

Sheet Concentration = -1.388E+16 [/cm ^{2}]

Resistivity = 1.193E-4 [Ω cm]

Conductivity = 8.380E+3 [1/Ω cm]

Magneto-Resistance = 2.609E-2 [Ω]

Mobility = 3.770E+1 [cm ^{2}/ Vs]

Average Hall Coefficient = -4.499E-3 [cm ^{3}/ C]

A-C Cross Hall Coefficient = -4.483E-3 [cm ^{3}/ C]

B-D Cross Hall Coefficient = -4.514E-3 [cm ^{3}/ C]

Ratio of Vertical / Horizontal = 9.329E-1

< Pic# 13. "RESULT" >

After final test, it displays

Bult concentration,

Sheet concentration,

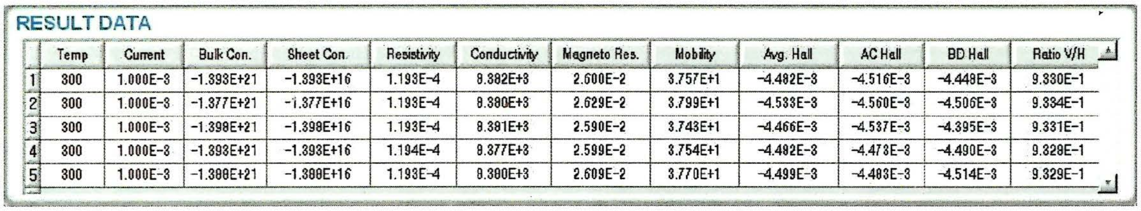
Resistivity, Conductivity,

Magneto-Resistance,

Mobility,

Average Hall Coefficient, A-C Cross Hall Coefficient, B-D Cross Hall Coefficient,

Ratio of Vertical/ Horizontal



RESULT DATA

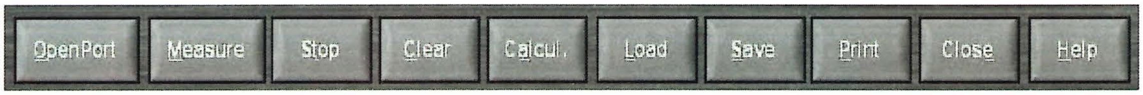
	Temp	Current	Bulk Con.	Sheet Con.	Resistivity	Conductivity	Magneto Res.	Mobility	Avg. Hall	AC Hall	BD Hall	Ratio V/H
1	300	1.000E-3	-1.393E+21	-1.393E+16	1.193E-4	8.382E+3	2.600E-2	3.757E+1	-4.482E-3	-4.516E-3	-4.448E-3	9.330E-1
2	300	1.000E-3	-1.377E+21	-1.377E+16	1.193E-4	8.380E+3	2.629E-2	3.799E+1	-4.533E-3	-4.560E-3	-4.506E-3	9.334E-1
3	300	1.000E-3	-1.398E+21	-1.398E+16	1.193E-4	8.381E+3	2.590E-2	3.743E+1	-4.466E-3	-4.537E-3	-4.395E-3	9.331E-1
4	300	1.000E-3	-1.393E+21	-1.393E+16	1.194E-4	8.377E+3	2.599E-2	3.754E+1	-4.482E-3	-4.473E-3	-4.490E-3	9.328E-1
5	300	1.000E-3	-1.388E+21	-1.388E+16	1.193E-4	8.380E+3	2.609E-2	3.770E+1	-4.499E-3	-4.483E-3	-4.514E-3	9.329E-1

< Pic# 14. " RESULT DATA" >

In Pic# 14. " **RESULT DATA**", it shows **Temp and Current** as well as RESULT values in Pic# 13.

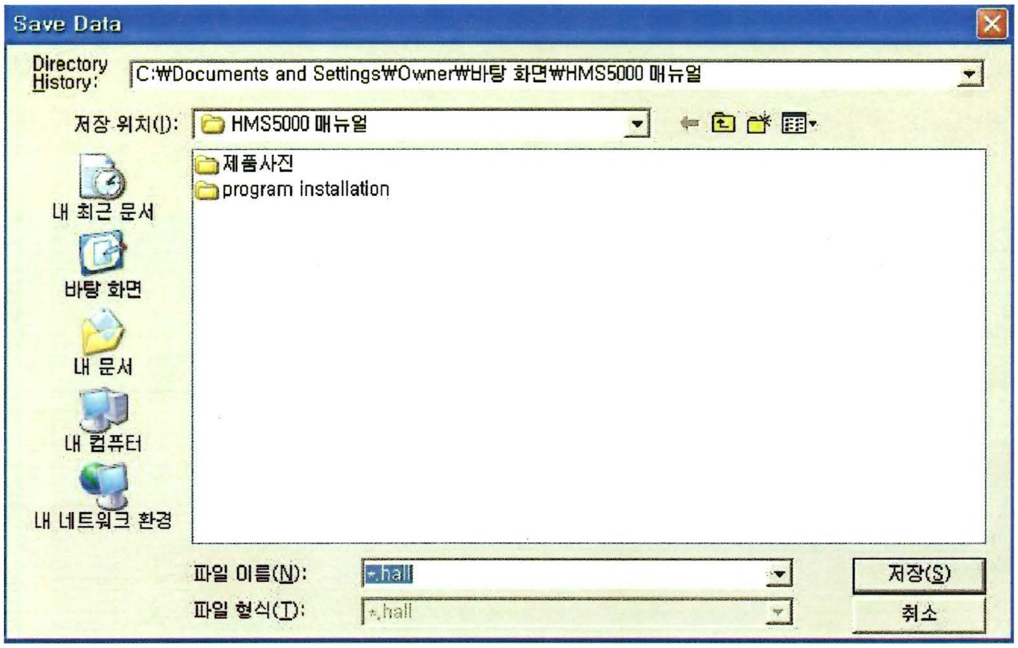
(6) SAVE the measured data.

If you finished all test process, click **"SAVE"** button below.



< Pic# 15. menu bar in the first main page >

It can save data as below.


Save Data
Directory History:
저장 위치(I):
내 최근 문서
바탕 화면
내 문서
내 컴퓨터
내 네트워크 환경
파일 이름(N):
파일 형식(T):
저장(S)
취소

Directory History: C:₩Documents and Settings₩Owner₩바탕 화면₩HMS5000 매뉴얼

저장 위치(I): HMS5000 매뉴얼

제품사진
program installation

파일 이름(N): *.hall

파일 형식(T): *.hall

< Pic# 16. save data window >

And, saved data can be transformed to excel file **by opening saved data file(~ .hall) in excel file.**

(7) LOAD menu.

If you like to see existingly saved data in the first test page, click "LOAD" menu in Pic# 15.

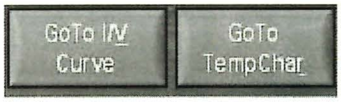
(8) CALCUL menu.

If you made a mistake to fill incorrect D (doped sample thickness layer), or incorrect B(Magneto flux density), you don't have to re-measure again.

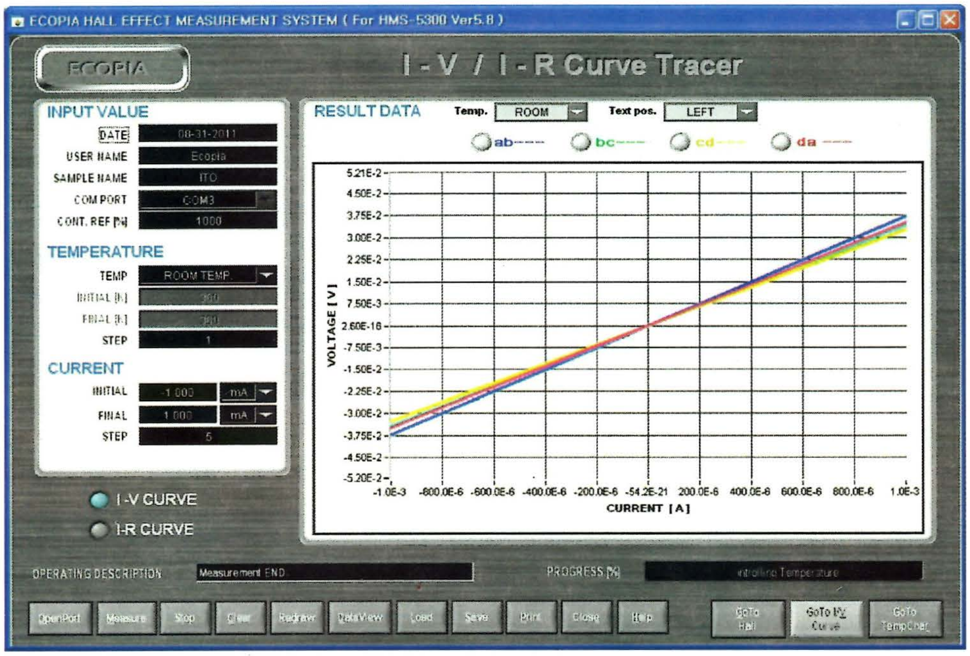
Please just fill actually correct D or B in input value, and then click **"CALCUL"** button. If so, system calculate it automatically.

2) The second page
(I/V, I/R measurement and graph plotting)

If you like to see I/V, I/R plotting graph, click "Go To I/V CURVE" as below.

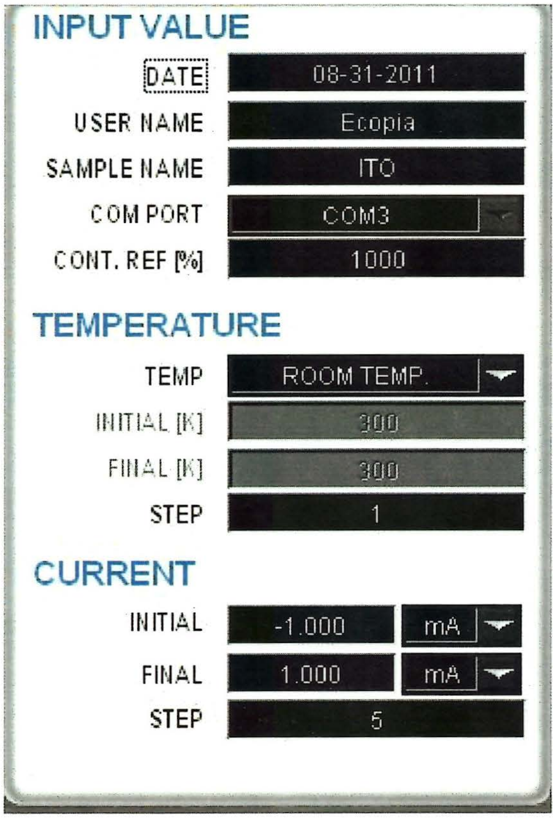

GoTo I/V Curve
GoTo TempChar

< Pic# 1. Click "Go To I/V CURVE >


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
I - V / I - R Curve Tracer
INPUT VALUE
TEMPERATURE
CURRENT
RESULT DATA
○ ab
○ bc
○ cd
○ da
5.21E-2
4.50E-2
3.75E-2
3.00E-2
2.25E-2
1.50E-2
7.50E-3
2.60E-16
-7.50E-3
-1.50E-2
-2.25E-2
-3.00E-2
-3.75E-2
-4.50E-2
-5.20E-2
VOLTAGE [V]
-1.0E-3
-800.0E-6
-600.0E-6
-400.0E-6
-200.0E-6
-54.2E-21
200.0E-6
400.0E-6
600.0E-6
800.0E-6
1.0E-3
CURRENT [A]
● I-V CURVE
○ I-R CURVE
OpenPort
Measure
Stop
Clear
Redraw
DataView
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

DATE 08-31-2011
USER NAME Ecopia
SAMPLE NAME ITO
COM PORT COM3
CONT. REF [%] 1000
TEMP ROOM TEMP.
INITIAL [K] 300
FINAL [K] 300
STEP 1
INITIAL -1.000 mA
FINAL 1.000 mA
STEP 5
Temp. ROOM
Text pos. LEFT
OPERATING DESCRIPTION Measurement END
PROGRESS [%] ntrolling Temperature

< Pic#2. I/V, I/R Curve Tracer page >



INPUT VALUE

DATE: 08-31-2011
USER NAME: Ecopia
SAMPLE NAME: ITO
COM PORT: COM3
CONT. REF [%]: 1000

TEMPERATURE

TEMP: ROOM TEMP.
INITIAL [K]: 300
FINAL [K]: 300
STEP: 1

CURRENT

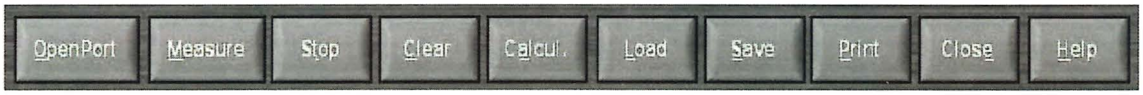
INITIAL: -1.000 mA
FINAL: 1.000 mA
STEP: 5

< Pic# 3. Input value of I/V, I/R page >

“CON.REF(%)” is percentage of the ratio between horizontal and vertical resistance values. If vertical resistance is 10ohm and horizontal resistance 20ohm, “CON.REF(%)” is 200%.

Limit is 1000%, and if actual tested percentage is higher than 1000%, the system says “contact fail” in “ OPERATING DESCRIPTION”.

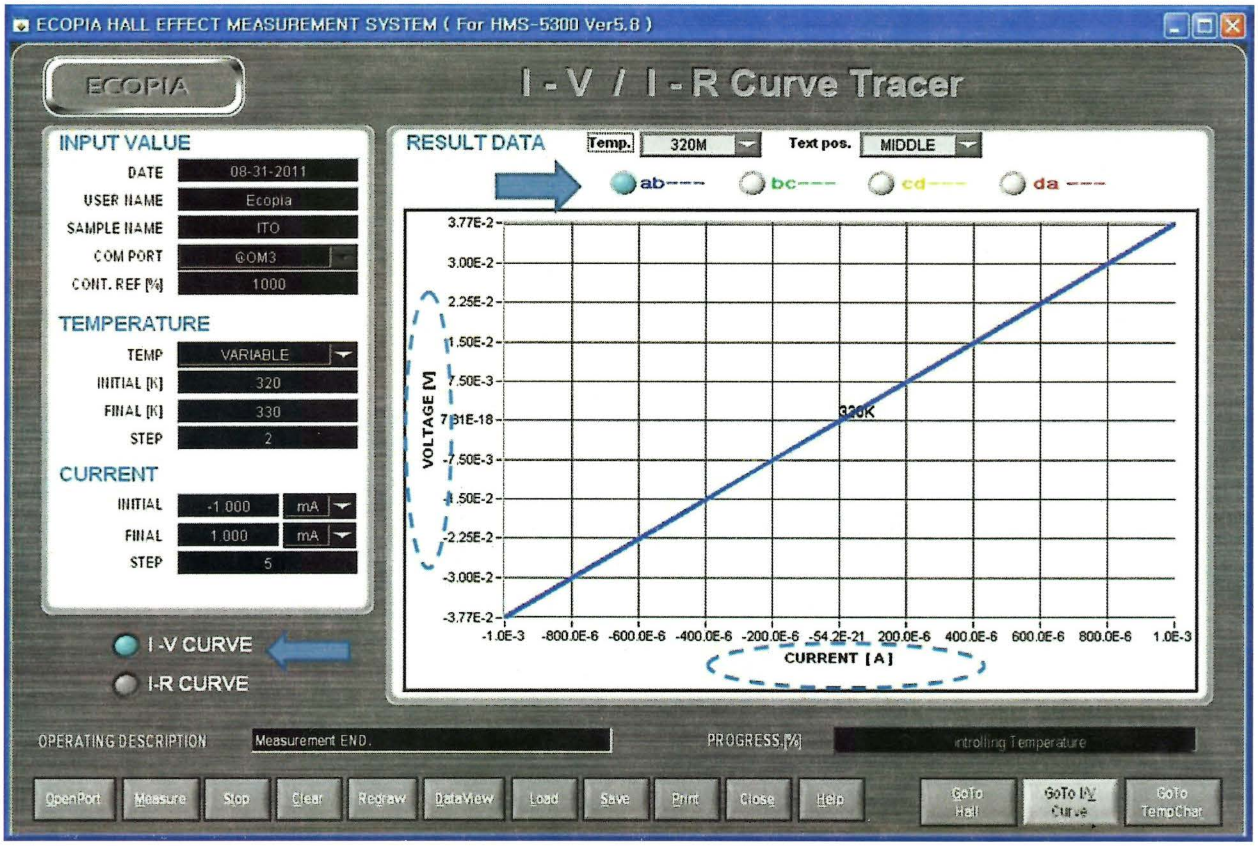
“STEP” in current above also can be set up as mentioned in “STEP” of temperature.



< Pic#4, menu button in I/V, I/R curve tracer page >

Click “MEASURE” button if you filled all in input value, temperature range and current in I/V, I/R page.

Or, if you just like to see measured data in the first main page, click “I-V curve” and click “ab ---“. You can see each a to b plotting graph in variable temp.



ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)

I - V / I - R Curve Tracer

INPUT VALUE

DATE 08-31-2011
USER NAME Ecopia
SAMPLE NAME ITO
COM PORT COM3
CONT. REF [%] 1000

TEMPERATURE

TEMP VARIABLE
INITIAL [K] 320
FINAL [K] 330
STEP 2

CURRENT

INITIAL -1.000 mA
FINAL 1.000 mA
STEP 5

● I-V CURVE
○ I-R CURVE

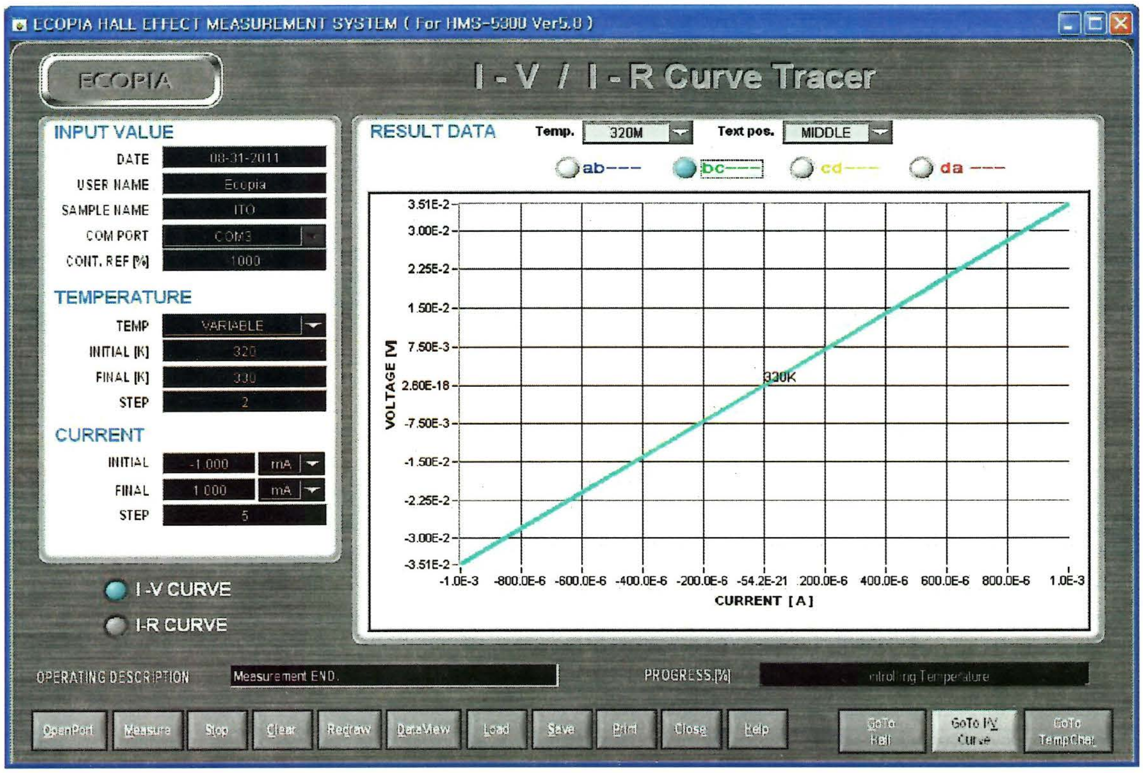
RESULT DATA
Temp. 320M
Text pos. MIDDLE
● ab--- ○ bc--- ○ cd--- ○ da ---

OPERATING DESCRIPTION Measurement END.
PROGRESS [%] ntrolling Temperature

ECOPIA
3.77E-2
3.00E-2
2.25E-2
1.50E-2
7.50E-3
7.81E-18
-7.50E-3
-1.50E-2
-2.25E-2
-3.00E-2
-3.77E-2
VOLTAGE [V]
320K
-1.0E-3
-800.0E-6
-600.0E-6
-400.0E-6
-200.0E-6
-54.2E-21
200.0E-6
400.0E-6
600.0E-6
800.0E-6
1.0E-3
CURRENT [A]
OpenPort
Measure
Stop
Clear
Redraw
DataView
Load
Save
Print
Close
Help
GoTo Hall
GoTo I-V Curve
GoTo TempChar

< Pic# 5. **a to b** plotting graph in variable temperature >

And, you also can see plotting graph of "b to c", "c to d" and "d to a" in variable temperature by just clicking "bc", "cd", "da" in above pictures.



ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)

I - V / I - R Curve Tracer

INPUT VALUE
DATE: 08-31-2011
USER NAME: Ecopia
SAMPLE NAME: ITO
COM PORT: COM3
CONT. REF [%]: 1000

TEMPERATURE
TEMP: VARIABLE
INITIAL [K]: 320
FINAL [K]: 330
STEP: 2

CURRENT
INITIAL: -1.000 mA
FINAL: 1.000 mA
STEP: 5

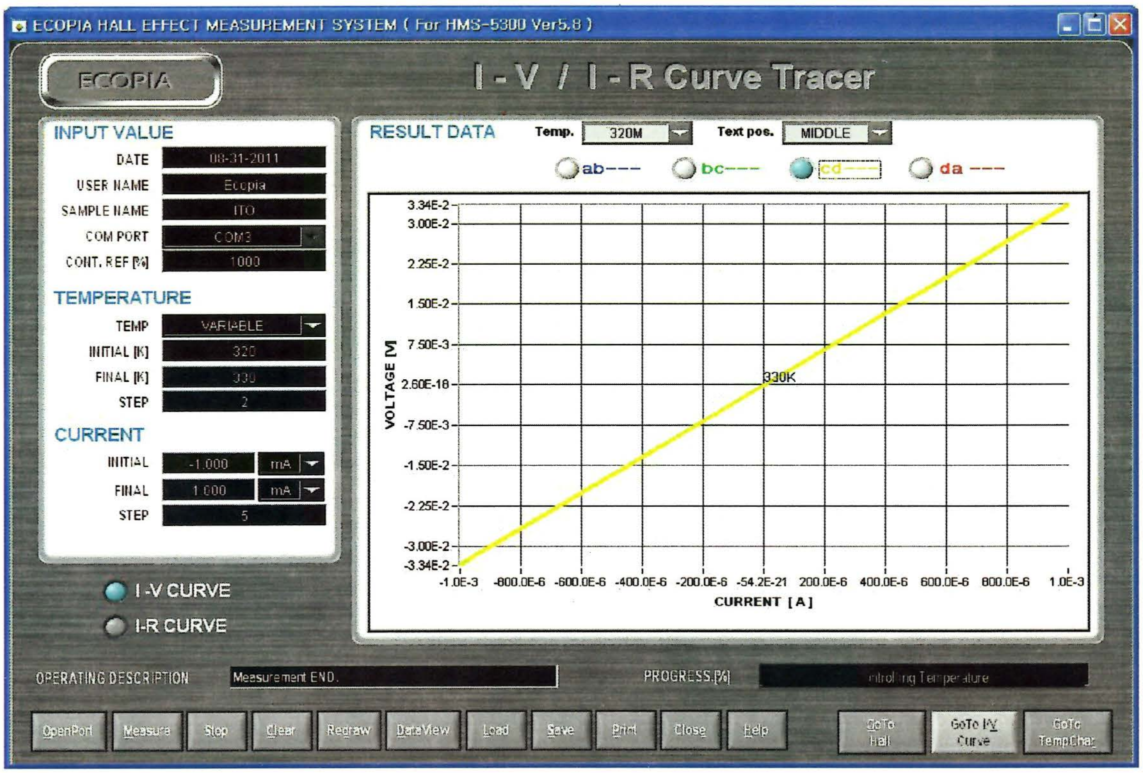
● I-V CURVE
○ I-R CURVE

RESULT DATA
Temp.: 320M
Text pos.: MIDDLE
○ ab--- ● bc--- ○ cd--- ○ da ---

OPERATING DESCRIPTION: Measurement END.
PROGRESS.[%]: ntrolling Temperature

ECOPIA
3.51E-2
3.00E-2
2.25E-2
1.50E-2
7.50E-3
2.60E-18
-7.50E-3
-1.50E-2
-2.25E-2
-3.00E-2
-3.51E-2
VOLTAGE [V]
330K
-1.0E-3
-800.0E-6
-600.0E-6
-400.0E-6
-200.0E-6
-54.2E-21
200.0E-6
400.0E-6
600.0E-6
800.0E-6
1.0E-3
CURRENT [A]
OpenPort
Measure
Stop
Clear
Redraw
DataView
Load
Save
Print
Close
Help
GoTo Hall
GoTo I-V Curve
GoTo TempChar

< Pic#6. **b to c** plotting graph in variable temperature >



ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)

I - V / I - R Curve Tracer

INPUT VALUE
DATE: 08-31-2011
USER NAME: Ecopia
SAMPLE NAME: ITO
COM PORT: COM3
CONT. REF [%]: 1000

TEMPERATURE
TEMP: VARIABLE
INITIAL [K]: 320
FINAL [K]: 330
STEP: 2

CURRENT
INITIAL: -1.000 mA
FINAL: 1.000 mA
STEP: 5

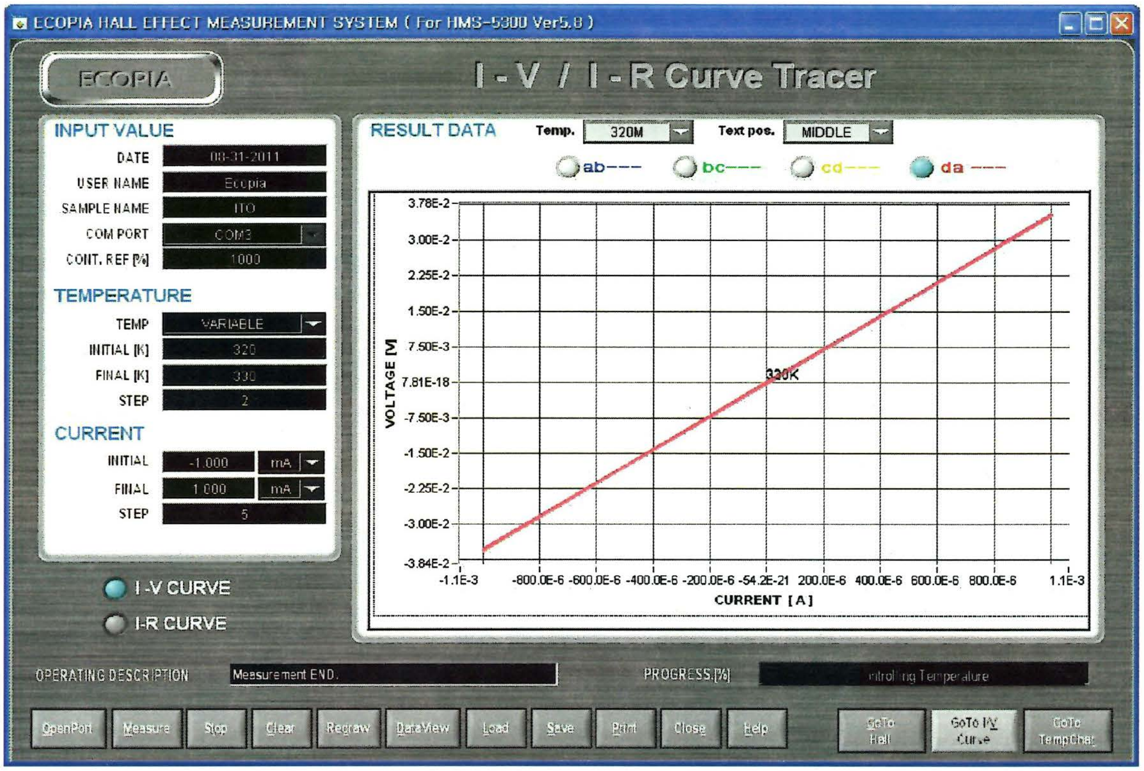
● I-V CURVE
○ I-R CURVE

RESULT DATA
Temp.: 320M
Text pos.: MIDDLE
○ ab--- ○ bc--- ● cd--- ○ da ---

OPERATING DESCRIPTION: Measurement END.
PROGRESS.[%]: ntrolling Temperature

ECOPIA
3.34E-2
3.00E-2
2.25E-2
1.50E-2
7.50E-3
2.60E-18
-7.50E-3
-1.50E-2
-2.25E-2
-3.00E-2
-3.34E-2
VOLTAGE [V]
330K
-1.0E-3
-800.0E-6
-600.0E-6
-400.0E-6
-200.0E-6
-54.2E-21
200.0E-6
400.0E-6
600.0E-6
800.0E-6
1.0E-3
CURRENT [A]
OpenPort
Measure
Stop
Clear
Redraw
DataView
Load
Save
Print
Close
Help
GoTo Hall
GoTo I-V Curve
GoTo TempChar

< Pic#7 **c to d** plotting graph in variable temperature >

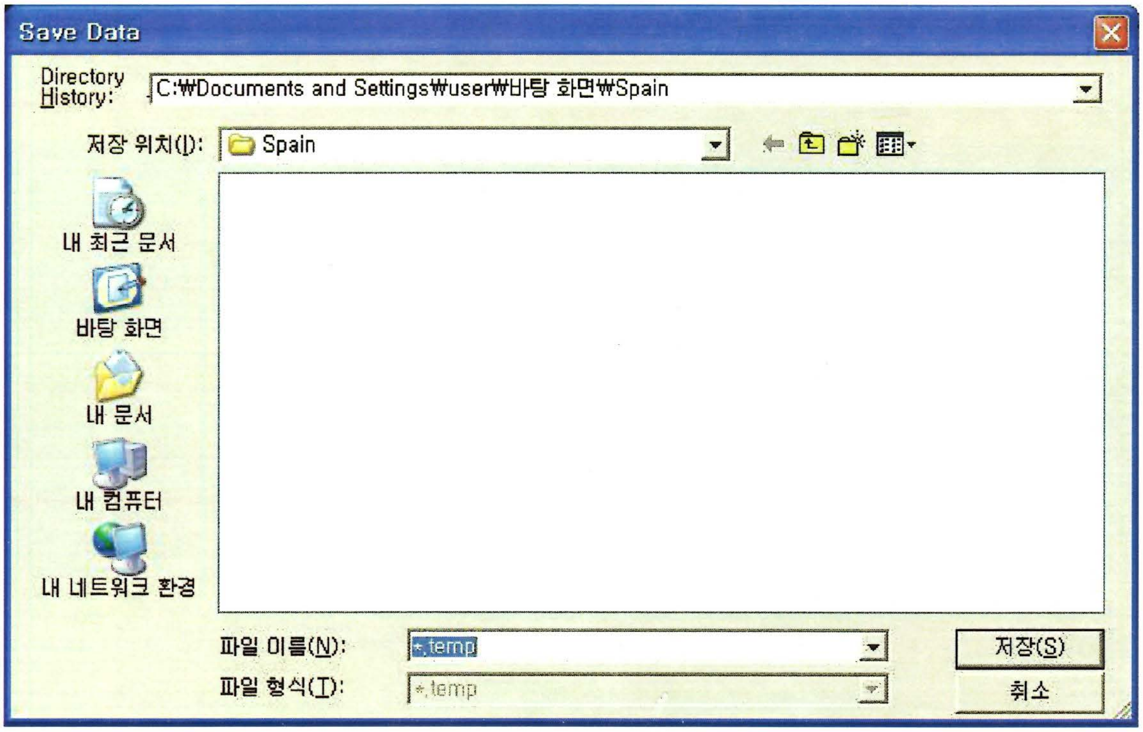

ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
I - V / I - R Curve Tracer
INPUT VALUE
TEMPERATURE
CURRENT
RESULT DATA
ab---
bc---
cd---
da ---
3.78E-2
3.00E-2
2.25E-2
1.50E-2
7.50E-3
7.81E-18
-7.50E-3
-1.50E-2
-2.25E-2
-3.00E-2
-3.84E-2
VOLTAGE [V]
330K
-1.1E-3
-800.0E-6
-600.0E-6
-400.0E-6
-200.0E-6
-54.2E-21
200.0E-6
400.0E-6
600.0E-6
800.0E-6
1.1E-3
CURRENT [A]
I-V CURVE
I-R CURVE
OpenPort
Measure
Stop
Clear
Regraw
DataView
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

DATE: 08-31-2011
USER NAME: Ecopia
SAMPLE NAME: ITO
COM PORT: COM3
CONT. REF [%]: 1000
TEMP: VARIABLE
INITIAL [K]: 320
FINAL [K]: 330
STEP: 2
INITIAL: -1.000 mA
FINAL: 1.000 mA
STEP: 5
Temp.: 320M
Text pos.: MIDDLE
OPERATING DESCRIPTION: Measurement END.
PROGRESS [%]: ntrolling Temperature

< Pic#8. **d to a** plotting graph in variable temperature >

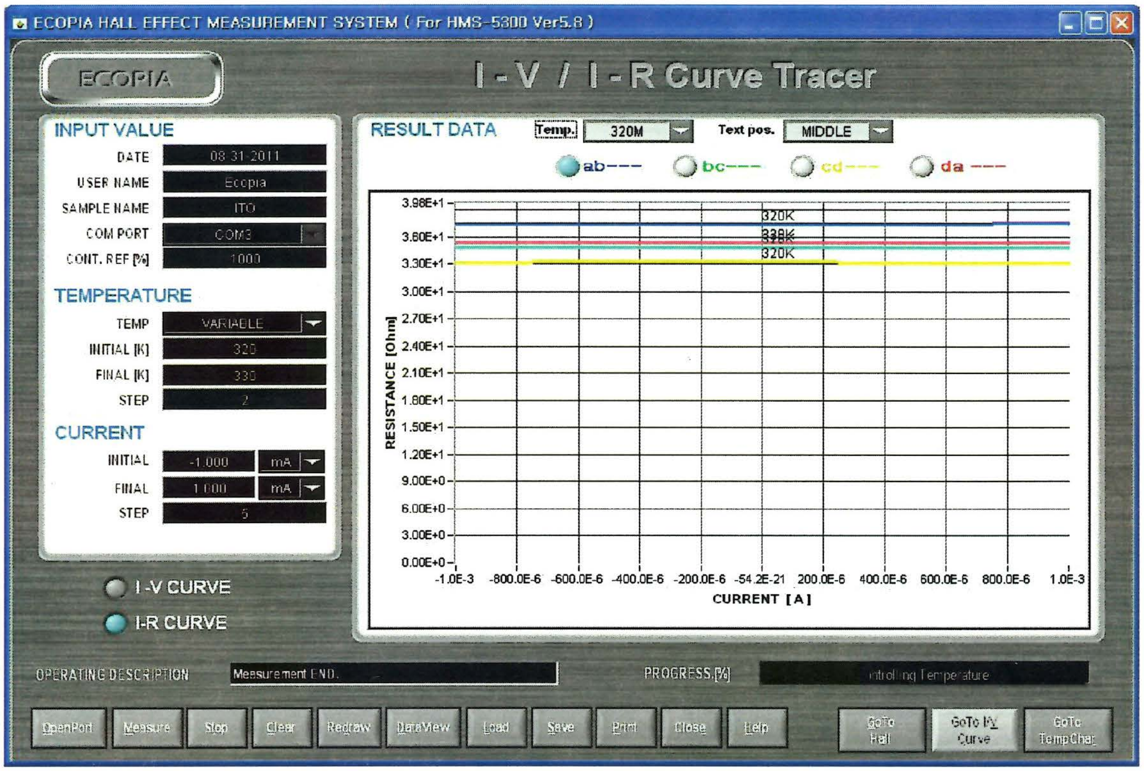
If you like to save the data, click **"SAVE"** menu button.

And, it saves in **"~ .temp"** . Extension name must be ".temp".


Save Data
내 최근 문서
바탕 화면
내 문서
내 컴퓨터
내 네트워크 환경
저장(S)
취소

Directory History: C:₩Documents and Settings₩user₩바탕 화면₩Spain
저장 위치(I): Spain
파일 이름(N): *.temp
파일 형식(T): *.temp

< Pic#9. I/V. I/R save data window >


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
I - V / I - R Curve Tracer
RESULT DATA
Temp. 320M
Text pos. MIDDLE
ab--- bc--- cd--- da ---
320K
330K
328K
320K
3.98E+1
3.60E+1
3.30E+1
3.00E+1
2.70E+1
2.40E+1
2.10E+1
1.80E+1
1.50E+1
1.20E+1
9.00E+0
6.00E+0
3.00E+0
0.00E+0
RESISTANCE [Ohm]
-1.0E-3
-800.0E-6
-600.0E-6
-400.0E-6
-200.0E-6
-54.2E-21
200.0E-6
400.0E-6
600.0E-6
800.0E-6
1.0E-3
CURRENT [A]
OpenPort
Measure
Stop
Clear
Redraw
DataView
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

INPUT VALUE

DATE 08-31-2011
USER NAME Ecopia
SAMPLE NAME ITO
COM PORT COM3
CONT. REF [%] 1000

TEMPERATURE

TEMP VARIABLE
INITIAL [K] 320
FINAL [K] 330
STEP 2

CURRENT

INITIAL -1.000 mA
FINAL 1.000 mA
STEP 5

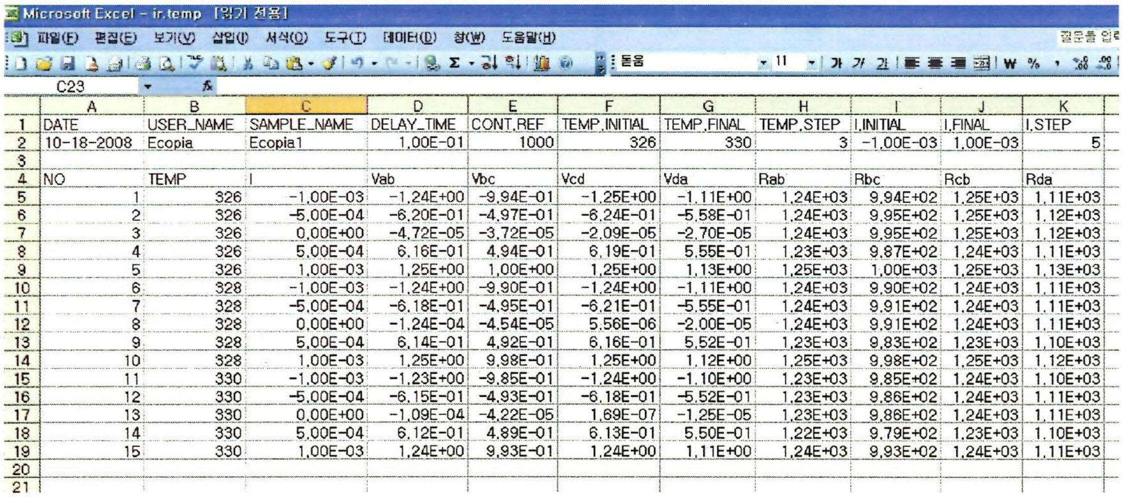
○ I-V CURVE
● I-R CURVE

OPERATING DESCRIPTION Measurement END.
PROGRESS [%] ntrolling Temperature

< Pic# 10. **I/R plotting graph** in variable temperature >

And, you also can see I/R plotting graph of **"a to b", "b to c", "c to d" and "d to a"** in variable temperature by just clicking "ab", "bc", "cd", "da" in above pictures.

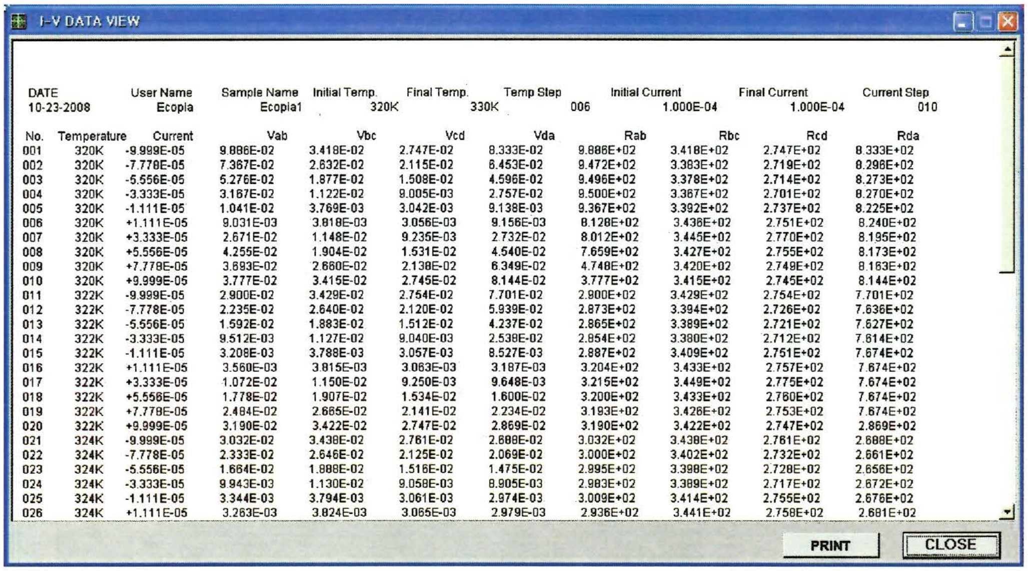
And, if you 'd like to save I/R tested data, click **"SAVE"** menu bar. It can save as below image.


Microsoft Excel - ir.temp [읽기 전용]
파일(F) 편집(E) 보기(V) 삽입(I) 서식(O) 도구(T) 데이터(D) 창(W) 도움말(H)
질문을 입력
돋움
11
C23

	A	B	C	D	E	F	G	H	I	J	K
1	DATE	USER_NAME	SAMPLE_NAME	DELAY_TIME	CONT,REF	TEMP,INITIAL	TEMP,FINAL	TEMP,STEP	I,INITIAL	I,FINAL	I,STEP
2	10-18-2008	Ecopia	Ecopia1	1,00E-01	1000	326	330	3	-1,00E-03	1,00E-03	5
3											
4	NO	TEMP	I	Vab	Vbc	Vcd	Vda	Rab	Rbc	Rcb	Rda
5	1	326	-1,00E-03	-1,24E+00	-9,94E-01	-1,25E+00	-1,11E+00	1,24E+03	9,94E+02	1,25E+03	1,11E+03
6	2	326	-5,00E-04	-6,20E-01	-4,97E-01	-6,24E-01	-5,58E-01	1,24E+03	9,95E+02	1,25E+03	1,12E+03
7	3	326	0,00E+00	-4,72E-05	-3,72E-05	-2,09E-05	-2,70E-05	1,24E+03	9,95E+02	1,25E+03	1,12E+03
8	4	326	5,00E-04	6,16E-01	4,94E-01	6,19E-01	5,55E-01	1,23E+03	9,87E+02	1,24E+03	1,11E+03
9	5	326	1,00E-03	1,25E+00	1,00E+00	1,25E+00	1,13E+00	1,25E+03	1,00E+03	1,25E+03	1,13E+03
10	6	328	-1,00E-03	-1,24E+00	-9,90E-01	-1,24E+00	-1,11E+00	1,24E+03	9,90E+02	1,24E+03	1,11E+03
11	7	328	-5,00E-04	-6,18E-01	-4,95E-01	-6,21E-01	-5,55E-01	1,24E+03	9,91E+02	1,24E+03	1,11E+03
12	8	328	0,00E+00	-1,24E-04	-4,54E-05	5,56E-06	-2,00E-05	1,24E+03	9,91E+02	1,24E+03	1,11E+03
13	9	328	5,00E-04	6,14E-01	4,92E-01	6,16E-01	5,52E-01	1,23E+03	9,83E+02	1,23E+03	1,10E+03
14	10	328	1,00E-03	1,25E+00	9,98E-01	1,25E+00	1,12E+00	1,25E+03	9,98E+02	1,25E+03	1,12E+03
15	11	330	-1,00E-03	-1,23E+00	-9,85E-01	-1,24E+00	-1,10E+00	1,23E+03	9,85E+02	1,24E+03	1,10E+03
16	12	330	-5,00E-04	-6,15E-01	-4,93E-01	-6,18E-01	-5,52E-01	1,23E+03	9,86E+02	1,24E+03	1,11E+03
17	13	330	0,00E+00	-1,09E-04	-4,22E-05	1,69E-07	-1,25E-05	1,23E+03	9,86E+02	1,24E+03	1,11E+03
18	14	330	5,00E-04	6,12E-01	4,89E-01	6,13E-01	5,50E-01	1,22E+03	9,79E+02	1,23E+03	1,10E+03
19	15	330	1,00E-03	1,24E+00	9,93E-01	1,24E+00	1,11E+00	1,24E+03	9,93E+02	1,24E+03	1,11E+03
20											
21											

< Pic# 11. **I/V, I/R** saved data in excel >

Click **"DATA VIEW"** menu. You can see all tested data in I/V, I/R page in text file.



DATE	User Name	Sample Name	Initial Temp.	Final Temp.	Temp Step	Initial Current	Final Current	Current Step
10-23-2008	Ecopia	Ecopia1	320K	330K	006	1.000E-04	1.000E-04	010

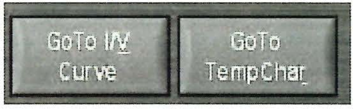
No.	Temperature	Current	Vab	Vbc	Vcd	Vda	Rab	Rbc	Rcd	Rda
001	320K	-9.999E-05	9.886E-02	3.418E-02	2.747E-02	8.333E-02	9.886E+02	3.418E+02	2.747E+02	8.333E+02
002	320K	-7.778E-05	7.367E-02	2.632E-02	2.115E-02	6.453E-02	9.472E+02	3.383E+02	2.719E+02	8.298E+02
003	320K	-5.556E-05	5.276E-02	1.877E-02	1.508E-02	4.596E-02	9.496E+02	3.378E+02	2.714E+02	8.273E+02
004	320K	-3.333E-05	3.167E-02	1.122E-02	9.005E-03	2.757E-02	9.500E+02	3.367E+02	2.701E+02	8.270E+02
005	320K	-1.111E-05	1.041E-02	3.769E-03	3.042E-03	9.138E-03	9.367E+02	3.392E+02	2.737E+02	8.225E+02
006	320K	+1.111E-05	9.031E-03	3.818E-03	3.056E-03	9.156E-03	8.128E+02	3.436E+02	2.751E+02	8.240E+02
007	320K	+3.333E-05	2.671E-02	1.148E-02	9.235E-03	2.732E-02	8.012E+02	3.445E+02	2.770E+02	8.195E+02
008	320K	+5.556E-05	4.255E-02	1.904E-02	1.531E-02	4.540E-02	7.659E+02	3.427E+02	2.755E+02	8.173E+02
009	320K	+7.778E-05	3.693E-02	2.660E-02	2.138E-02	6.349E-02	4.748E+02	3.420E+02	2.749E+02	8.163E+02
010	320K	+9.999E-05	3.777E-02	3.415E-02	2.745E-02	8.144E-02	3.777E+02	3.415E+02	2.745E+02	8.144E+02
011	322K	-9.999E-05	2.900E-02	3.429E-02	2.754E-02	7.701E-02	2.900E+02	3.429E+02	2.754E+02	7.701E+02
012	322K	-7.778E-05	2.235E-02	2.640E-02	2.120E-02	5.939E-02	2.873E+02	3.394E+02	2.726E+02	7.636E+02
013	322K	-5.556E-05	1.592E-02	1.883E-02	1.512E-02	4.237E-02	2.865E+02	3.389E+02	2.721E+02	7.627E+02
014	322K	-3.333E-05	9.512E-03	1.127E-02	9.040E-03	2.538E-02	2.854E+02	3.380E+02	2.712E+02	7.614E+02
015	322K	-1.111E-05	3.208E-03	3.788E-03	3.057E-03	8.527E-03	2.887E+02	3.409E+02	2.751E+02	7.674E+02
016	322K	+1.111E-05	3.560E-03	3.815E-03	3.063E-03	3.187E-03	3.204E+02	3.433E+02	2.757E+02	7.674E+02
017	322K	+3.333E-05	1.072E-02	1.150E-02	9.250E-03	9.648E-03	3.215E+02	3.449E+02	2.775E+02	7.674E+02
018	322K	+5.556E-05	1.778E-02	1.907E-02	1.534E-02	1.600E-02	3.200E+02	3.433E+02	2.760E+02	7.674E+02
019	322K	+7.778E-05	2.484E-02	2.665E-02	2.141E-02	2.234E-02	3.193E+02	3.426E+02	2.753E+02	7.674E+02
020	322K	+9.999E-05	3.190E-02	3.422E-02	2.747E-02	2.869E-02	3.190E+02	3.422E+02	2.747E+02	2.869E+02
021	324K	-9.999E-05	3.032E-02	3.438E-02	2.761E-02	2.688E-02	3.032E+02	3.438E+02	2.761E+02	2.688E+02
022	324K	-7.778E-05	2.333E-02	2.646E-02	2.125E-02	2.069E-02	3.000E+02	3.402E+02	2.732E+02	2.661E+02
023	324K	-5.556E-05	1.664E-02	1.888E-02	1.516E-02	1.475E-02	2.995E+02	3.398E+02	2.728E+02	2.656E+02
024	324K	-3.333E-05	9.943E-03	1.130E-02	9.058E-03	8.905E-03	2.983E+02	3.389E+02	2.717E+02	2.672E+02
025	324K	-1.111E-05	3.344E-03	3.794E-03	3.061E-03	2.974E-03	3.009E+02	3.414E+02	2.755E+02	2.676E+02
026	324K	+1.111E-05	3.263E-03	3.824E-03	3.065E-03	2.979E-03	2.936E+02	3.441E+02	2.758E+02	2.681E+02

< Pic# 12. **DATA VIEW** window >

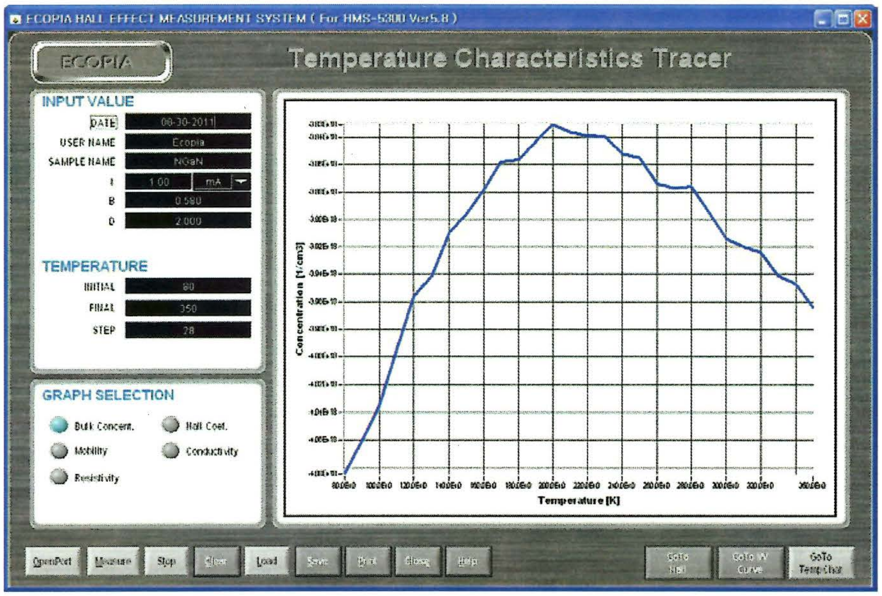
3) The third page

(Graph plotting of temp versus carrier concentration, mobility, resistivity, conductivity, hall coefficient)

If you finished test in the first main page, click **"Go To TEMP Chart"** as below.



< Pic#1. click **"Go To TEMP Chart"** menu button >


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
Temperature Characteristics Tracer
GRAPH SELECTION
Bulk Concent.
Hall Coef.
Mobility
Conductivity
Resistivity
Concentration [1/cm3]
Temperature [K]
OpenPort
Measure
Stop
Clear
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

INPUT VALUE

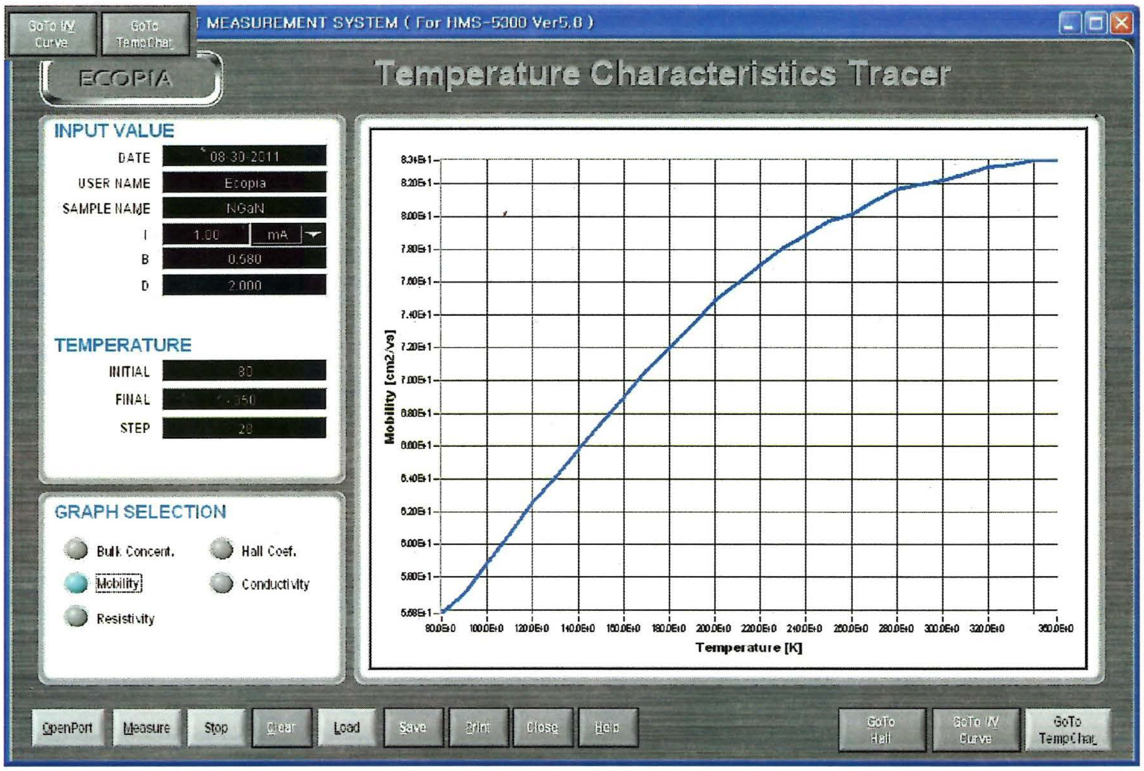
DATE 08-30-2011
USER NAME Ecopia
SAMPLE NAME NGaN
I 1.00 mA
B 0.580
D 2.000

TEMPERATURE

INITIAL 80
FINAL 350
STEP 28

< Pic# 2. **Temperature versus Bulk concentration** graph >

Click **"Concentration"** button in Pic#2 and graph plot as above.


GoTo I/V Curve
GoTo TempChar
MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
Temperature Characteristics Tracer
GRAPH SELECTION
Bulk Concent.
Hall Coef.
Mobility
Conductivity
Resistivity
Mobility [cm2/vs]
8.34E1
8.20E1
8.00E1
7.80E1
7.60E1
7.40E1
7.20E1
7.00E1
6.80E1
6.60E1
6.40E1
6.20E1
6.00E1
5.80E1
5.68E1
80.0E0
100.0E0
120.0E0
140.0E0
160.0E0
180.0E0
200.0E0
220.0E0
240.0E0
260.0E0
280.0E0
300.0E0
320.0E0
360.0E0
Temperature [K]
OpenPort
Measure
Stop
Clear
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

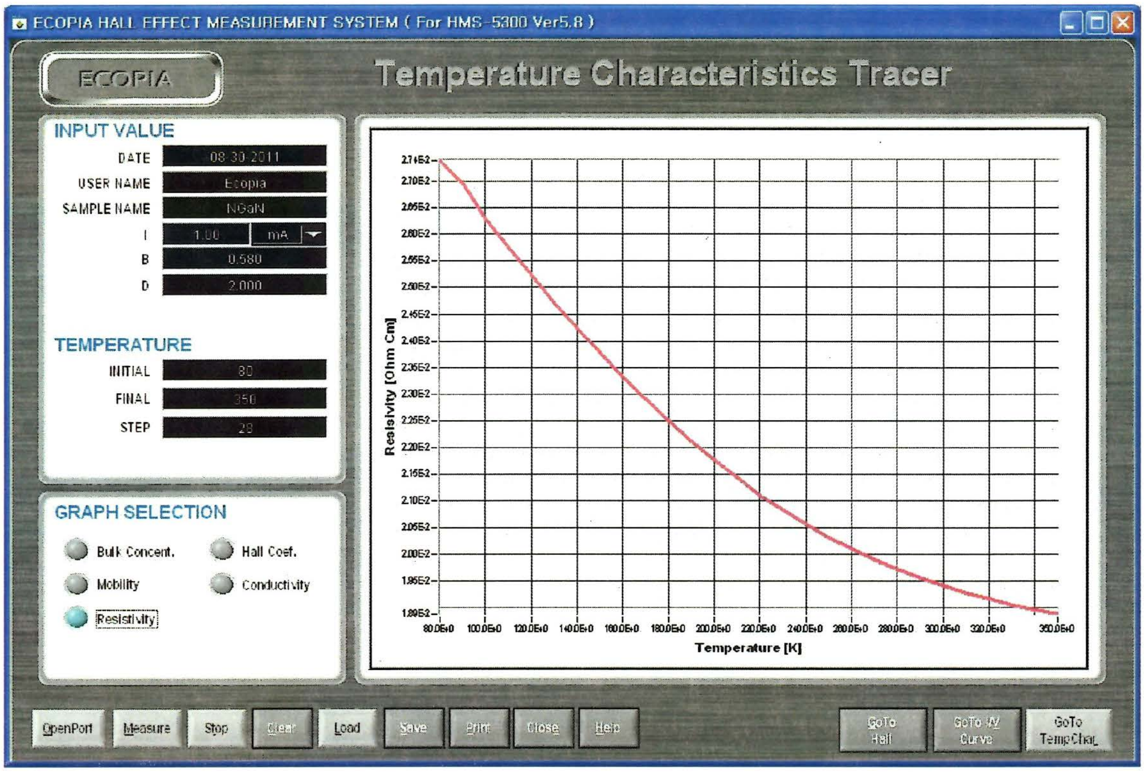
INPUT VALUE

DATE 08-30-2011
USER NAME Ecopia
SAMPLE NAME NGaN
I 1.00 mA
B 0.580
D 2.000

TEMPERATURE

INITIAL 80
FINAL 350
STEP 20

< Pic# 3. **Temperature versus mobility** graph >


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
Temperature Characteristics Tracer
Resistivity [Ohm Cm]
2.74E-2
2.70E-2
2.65E-2
2.60E-2
2.55E-2
2.50E-2
2.45E-2
2.40E-2
2.35E-2
2.30E-2
2.25E-2
2.20E-2
2.15E-2
2.10E-2
2.05E-2
2.00E-2
1.95E-2
1.89E-2
80.0E+0
100.0E+0
120.0E+0
140.0E+0
160.0E+0
180.0E+0
200.0E+0
220.0E+0
240.0E+0
260.0E+0
280.0E+0
300.0E+0
320.0E+0
350.0E+0
Temperature [K]
OpenPort
Measure
Stop
Clear
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

INPUT VALUE

DATE 08-30-2011
USER NAME Ecopia
SAMPLE NAME NGaN
I 1.00 mA
B 0.580
D 2.000

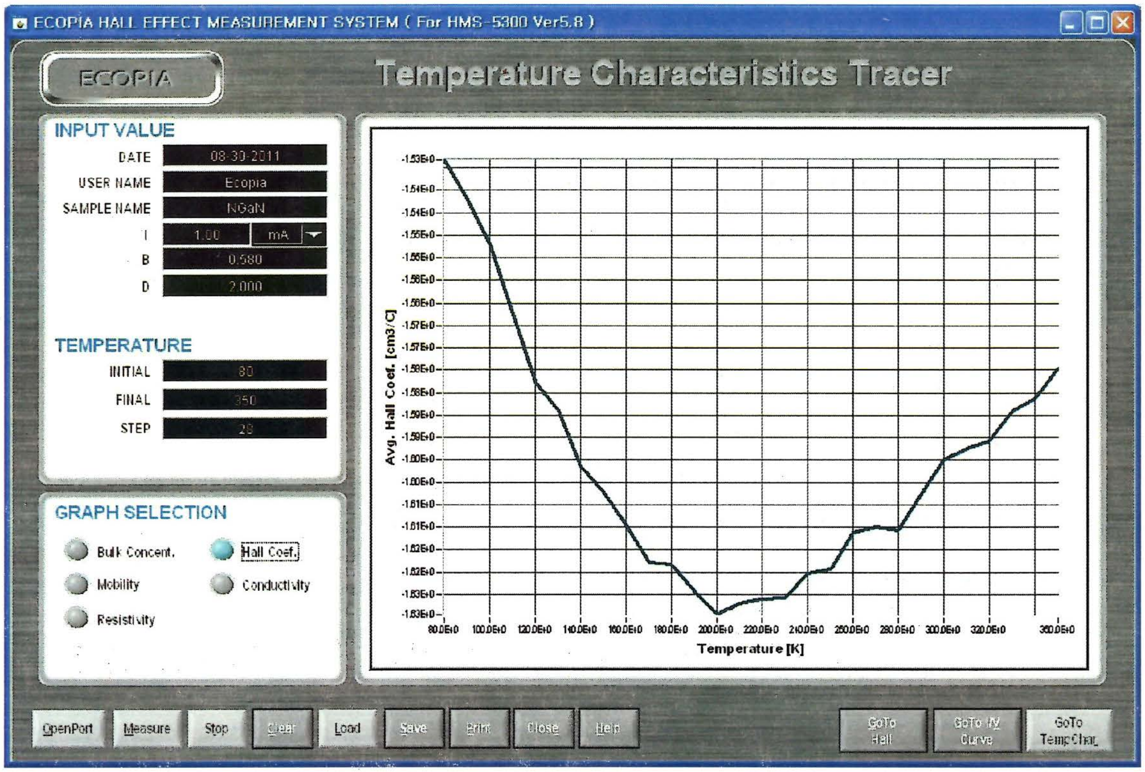
TEMPERATURE

INITIAL 80
FINAL 350
STEP 29

GRAPH SELECTION

○ Bulk Concent.
○ Hall Coef.
○ Mobility
○ Conductivity
● Resistivity

< Pic# 4. **Temperature versus Resistivity** graph >


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
Temperature Characteristics Tracer
Avg. Hall Coef. [cm3/C]
-1.53E+0
-1.54E+0
-1.54E+0
-1.55E+0
-1.56E+0
-1.56E+0
-1.56E+0
-1.57E+0
-1.57E+0
-1.58E+0
-1.58E+0
-1.59E+0
-1.59E+0
-1.60E+0
-1.60E+0
-1.61E+0
-1.61E+0
-1.62E+0
-1.62E+0
-1.63E+0
-1.63E+0
80.0E+0
100.0E+0
120.0E+0
140.0E+0
160.0E+0
180.0E+0
200.0E+0
220.0E+0
240.0E+0
260.0E+0
280.0E+0
300.0E+0
320.0E+0
350.0E+0
Temperature [K]
OpenPort
Measure
Stop
Clear
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

INPUT VALUE

DATE 08-30-2011
USER NAME Ecopia
SAMPLE NAME NGaN
I 1.00 mA
B 0.580
D 2.000

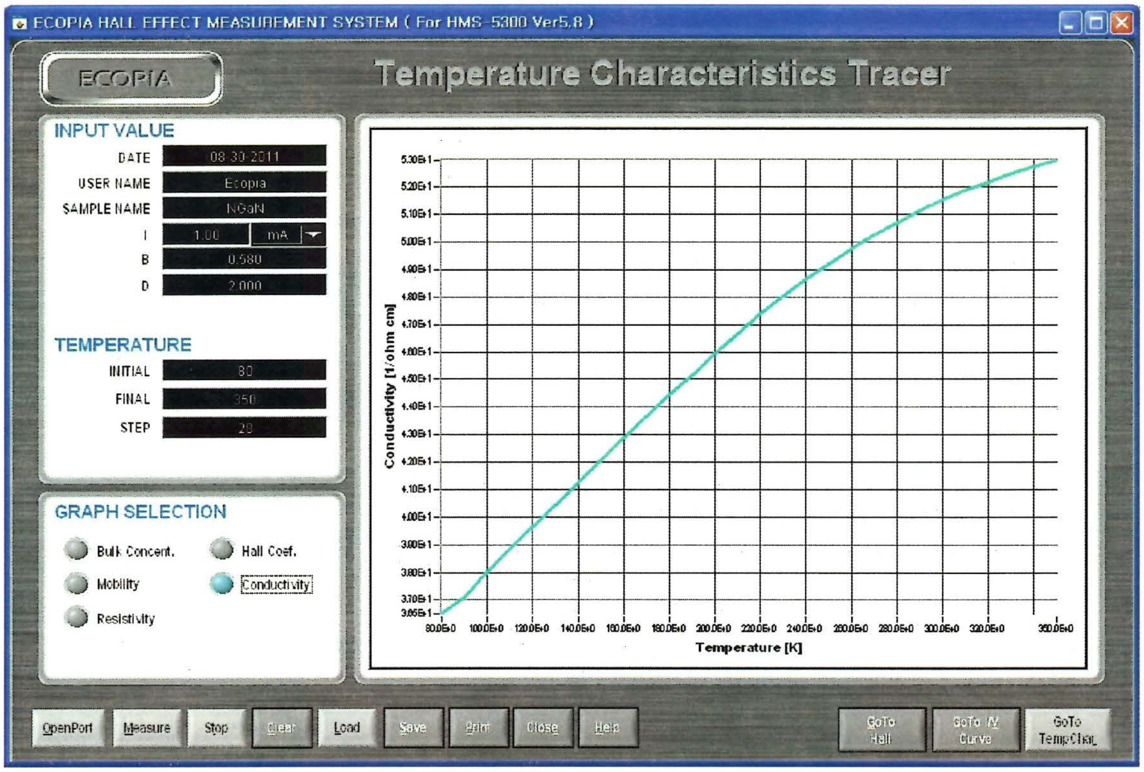
TEMPERATURE

INITIAL 80
FINAL 350
STEP 29

GRAPH SELECTION

○ Bulk Concent.
● Hall Coef.
○ Mobility
○ Conductivity
○ Resistivity

< Pic# 5. **Temperature versus Hall Coefficient** graph >


ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)
ECOPIA
Temperature Characteristics Tracer
5.30E+1
5.20E+1
5.10E+1
5.00E+1
4.90E+1
4.80E+1
4.70E+1
4.60E+1
4.50E+1
4.40E+1
4.30E+1
4.20E+1
4.10E+1
4.00E+1
3.90E+1
3.80E+1
3.70E+1
3.65E+1
Conductivity [1/ohm cm]
80.0E+0
100.0E+0
120.0E+0
140.0E+0
160.0E+0
180.0E+0
200.0E+0
220.0E+0
240.0E+0
260.0E+0
280.0E+0
300.0E+0
320.0E+0
350.0E+0
Temperature [K]
OpenPort
Measure
Stop
Clear
Load
Save
Print
Close
Help
GoTo Hall
GoTo I/V Curve
GoTo TempChar

INPUT VALUE

DATE 08-30-2011
USER NAME Ecopia
SAMPLE NAME NGaN
I 1.00 mA
B 0.580
D 2.000

TEMPERATURE

INITIAL 80
FINAL 350
STEP 20

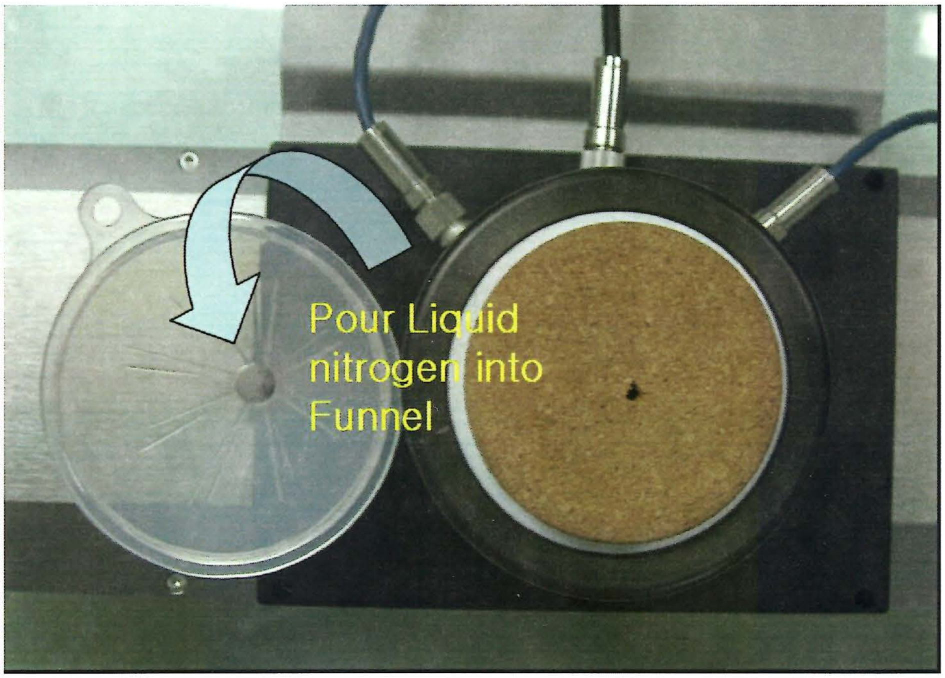
GRAPH SELECTION

○ Bulk Concent.
○ Hall Coef.
○ Mobility
● Conductivity
○ Resistivity

< Pic# 6. **Temperature versus conductivity** graph >

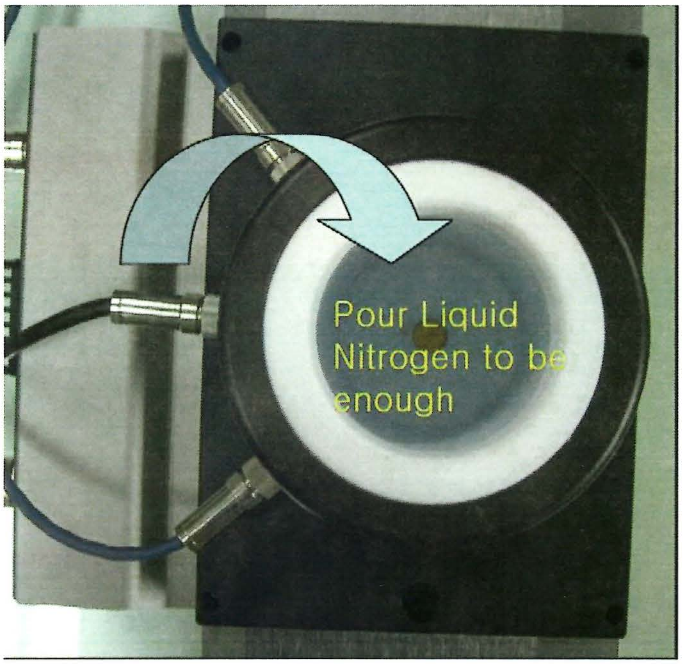
4) Test in Low temperature by using Liquid Nitrogen (important)

(1) Pour Liquid Nitrogen into Funnel.


Pour Liquid
nitrogen into
Funnel

< Pic# 1. Pour Liquid nitrogen into Funnel >

(2) Pour Liquid Nitrogen to be enough and close LN2 tank lid



< Pic#2. Pour Liquid Nitrogen into round LN2 tank >

(3) Click "COM PORT" before starting to measure.

In the first measurement page of s/w, click **"COM PORT"**. If it shows "connection success", the system is trying to read currently temperature and it indicates currently temperature in **"Progress (%)"**,
You can see temperature goes down step by step in **"Progress(%)"**.

If you like to measure at very low temperature, for example, from 80K or 90K temperature, you have to pour about 100ml Liquid Nitrogen into funnel one time.
And, you will have to repeatedly pour more than 2 to3 times at one or two minutes interval.
It flows down into square LN2 tank which is centered on both round magnet.

This process is not only to reach to low goal temperature but also to keep not-dewy status in square LN2 tank.

And, these process of pouring LN2 is always substantially needed to measure at lower temperature than room temperature.

(4) Start to measure

If temperature of sample nearly reaches to goal, by above LN2 pouring process, click **"MEASURE" button.** It starts to measure sample at variable temperature.

For example, you would like to measure on 150K and the system is reading 270, 260, 250….. 170, 160K arrived, you click the 'Measure' button, so the system will find 150 K temperatures and start the test.

**** Starting on low temperature at 80 ~90K**

If you want to start at 80K or 90K etc. which is very low temperature, it is very hard to reach and start the test at the first time.

In starting on low temperature at 80 ~90K, please wait for over 5 minutes, because the LN2 tank need a time to low itself also. The thermocouple can read the low temperature by LN2 at first, but the low temperature can be read by reaching it to the sample board in the bottom of the LN2 tank.

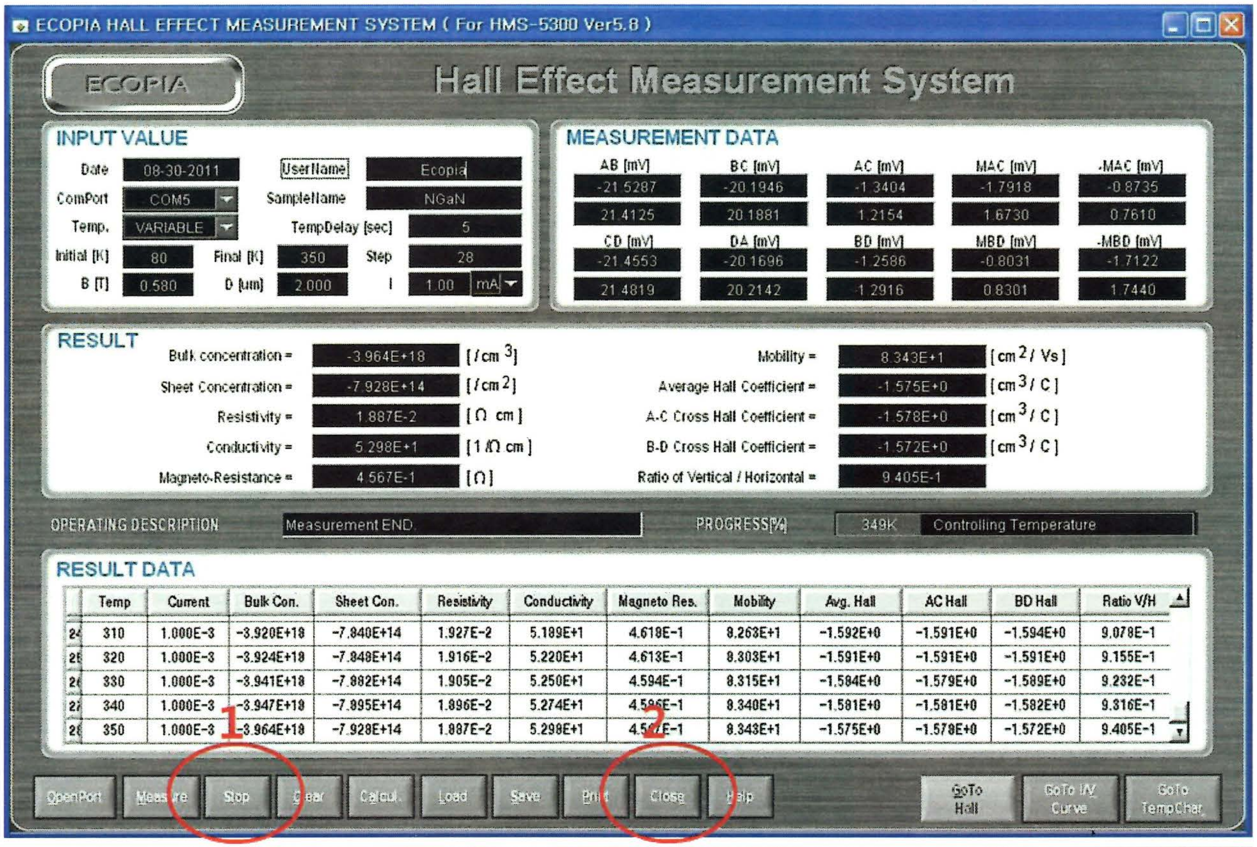
Therefore, the user who want to test to start on 80~90K, please have a time to wait for a while.(over 5 minutes.)

(5) Tip (Important and take care !)

i) Liquid Nitrogen may be dangerous if it is contacted to skin or clothes. So, please pay more attention to this during test.

ii) When you like to quit testing process, during test performance, you have to click "STOP" button, first and then click "CLOSE" button and finally close button("X") in s/w test window.

If you click directly close button ("X") in s/w test window , without clicking "STOP" button and "CLOSE" button, it may cause some system problem.



ECOPIA HALL EFFECT MEASUREMENT SYSTEM (For HMS-5300 Ver5.8)

INPUT VALUE

Date: 08-30-2011
UserName: Ecopia
ComPort: COM5
SampleName: NGaN
Temp.: VARIABLE
TempDelay [sec]: 5
Initial [K]: 80
Final [K]: 350
Step: 28
B [T]: 0.580
D [um]: 2.000
I: 1.00 mA

MEASUREMENT DATA

AB [mV]	BC [mV]	AC [mV]	MAC [mV]	-MAC [mV]
-21.5287	-20.1946	-1.3404	-1.7918	-0.8735
21.4125	20.1881	1.2154	1.6730	0.7610

CD [mV]	DA [mV]	BD [mV]	MBD [mV]	-MBD [mV]
-21.4553	-20.1696	-1.2586	-0.8031	-1.7122
21.4819	20.2142	1.2916	0.8301	1.7440

RESULT

Bulk concentration = -3.964E+18 [/cm ^{3}]
Sheet Concentration = -7.928E+14 [/cm ^{2}]
Resistivity = 1.887E-2 [Ω cm]
Conductivity = 5.298E+1 [1/Ω cm]
Magneto-Resistance = 4.567E-1 [Ω]
Mobility = 8.343E+1 [cm ^{2}/ Vs]
Average Hall Coefficient = -1.575E+0 [cm ^{3}/ C]
A-C Cross Hall Coefficient = -1.578E+0 [cm ^{3}/ C]
B-D Cross Hall Coefficient = -1.572E+0 [cm ^{3}/ C]
Ratio of Vertical / Horizontal = 9.405E-1

OPERATING DESCRIPTION: Measurement END.
PROGRESS[%]: 349K Controlling Temperature

RESULT DATA

	Temp	Current	Bulk Con.	Sheet Con.	Resistivity	Conductivity	Magneto Res.	Mobility	Avg. Hall	AC Hall	BD Hall	Ratio V/H
24	310	1.000E-3	-3.920E+18	-7.840E+14	1.927E-2	5.189E+1	4.618E-1	8.263E+1	-1.592E+0	-1.591E+0	-1.594E+0	9.078E-1
2	320	1.000E-3	-3.924E+18	-7.848E+14	1.916E-2	5.220E+1	4.613E-1	8.303E+1	-1.591E+0	-1.591E+0	-1.591E+0	9.155E-1
2	330	1.000E-3	-3.941E+18	-7.882E+14	1.905E-2	5.250E+1	4.594E-1	8.315E+1	-1.584E+0	-1.579E+0	-1.589E+0	9.232E-1
2	340	1.000E-3	-3.947E+18	-7.895E+14	1.896E-2	5.274E+1	4.5[illegible]6E-1	8.340E+1	-1.581E+0	-1.581E+0	-1.582E+0	9.316E-1
2	350	1.000E-3	-3.964E+18	-7.928E+14	1.887E-2	5.298E+1	4.5[illegible]7E-1	8.343E+1	-1.575E+0	-1.578E+0	-1.572E+0	9.405E-1

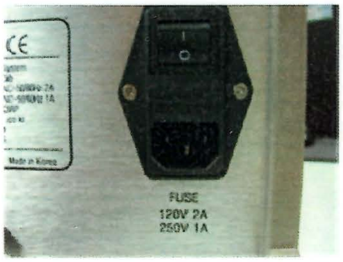
iii) When you try to change sample to measure another sample, you have to dry the sample board and sample. To do that, do not try to take out the sample board with magnet lid from square type LN2 tank.

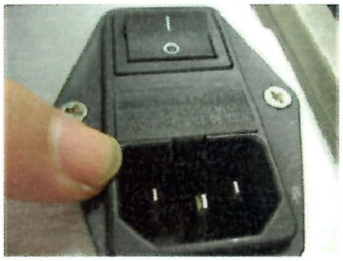
It will make the sample board with sample be dewy if taking it out of square LN2 tank. Without taking out sample board with sample, just set up **330K in initial and 330K in finial** and **set up 3 steps** and **measure it**. If so, then the system will raise the temperature and measure at 330K in three times for 1~3 minutes. After this test, you can see sample board with sample be dried.

iv) HMS5300 system can have 99number of test results at one time test and therefore, if you like to test 2K interval such as 80K,82K,84K,,,, temperature range set-up must be limited, i.e from 80K ~270K or 90K ~ 280K or 100K ~ 290K like this way. Or, if you like to test wider temperature range, you have to set up 3K or higher temperature interval.

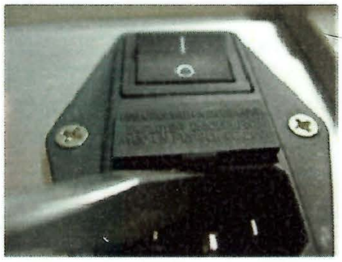
v) We strongly recommend that you should not do other work on the computer that is measuring Hall Effect by HMS-5300. Other job will possibly interfere the measurement data and especially 'Go To Temp Chart' button cause the problem with buffering, so main data cannot receive the current and shows a wrong data result.

vi) Although there is no problem in common use, we provide fail-safe fuse of 2A for purchasers who use 100-120 voltage, in case that the fuse 1A is sometimes disconnected in 100-120 volt circumstance. The disconnection problem seldom happens. This is fail-safe fuse, so you don't need to force to change if there is no problem. If you want to change the fuse, please follow the below process.

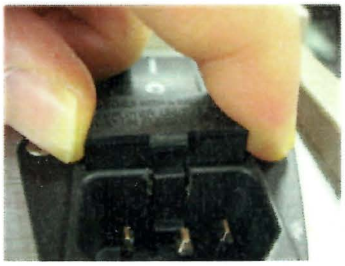




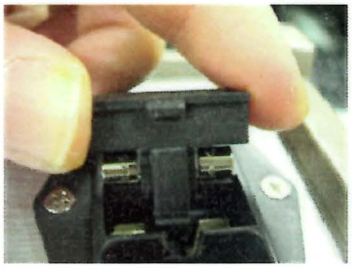
This is fuse case.

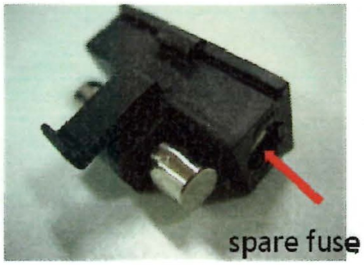


Use flat device(ex.driver)
to lift the case.



Lift the case by hand.





This is the current fuse.
(for 220-240 volt, 1A)

We provide the fail-safe fuse.
(for 100-120 volt, 2A)

- TECHNICAL SUPPORT -

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Phone) 82-505-389- 1999 / Fax) 82-505- 389- 1996
Contact person: Andy Lee (International sales manager)
MOB) 82-10-3440-4413
e-mail) andylee@ecopia21.co.kr (International) , lgt111@ecopia21.co.kr (Domestic)
web) www.ecopia21.co.kr