B-H Analyzer Made in Japan

# SY-8200 series

Automatic coreless measurement at high frequency Precise magnetic property tests with various options

## B-H analyzer SY-8218 / 8219

## Comformed to IEC62044-3 with CROSS-POWER method

### B-H Analyzer (mainframe)

**SY-8218**

10Hz ～ 10MHz

**SY-8219**

10Hz ～ 1MHz

SY-8218

**[Test example]**
Measurement POD
(without POD cover)

| | | |
|---|---|---|
| Measurment method | | CROSS-POWER method (Compatible to IEC62044-3 standard) |
| Measurement items (symbols) | | Max. Magnetic flux density(Bm), Residual magnetic flux density(Br), Max.Magnetic field strength(Hm), Coersive force(Hc), Rectangular ratio(Br/Bm), Relative amplitude permeability(μa), Core loss(Pc,Pcv,Pcm), Primary excitation current(I1m), Secondary induced voltage(V2m), Phase( $\theta$ ), Total magnetic flux linkage(2 $\phi$ m), Apparent power(VA), Impedance permeability(μz), Complex permeability(μ',μ"), Loss coefficient(tan $\delta$ ), Inductance(L), Resistance(R), Impedance(\|Z\|), Quality factor(Q), Total harmonic distortion(THD) |
| Waveform display | | B-H curve, Primary current, Secondary voltage, Magnetic field, Flux density |
| Test Frequency | SINE | 10Hz～10MHz (SY-8218)、10Hz～1MHz (SY-8219) |
| | PULSE | 10Hz～1MHz (Duty50%,fixed) |
| Magnetic field detection | | Voltage detection on non-inductive shunt, max. current at ±6A |
| Fulx density detection | | Voltage at detection coil, max voltage at ±200V |
| Desitizer | | Resolution : 16bits (8192points/cycle) |
| Coil method | | Two winding method or single winding method selectable |
| Accuracy | Phase | ±0.15 deg (typical、f=100kHz、50mA、50mV ranges or above、80% or more amplitude) |
| | Amplitude | ±2%(typical,f=100kHz,50mA,50mV ranges or above) |
| | Core loss | ±5.6%(typical,calculated at $\theta$ =80°,f=100kHz,50mA,50mV ranges or above) |
| Display | | |

- **Test Freq.** 10Hz to 10MHz(SY-8218),10Hz to 1MHz(SY-8219)
- **Signal waveform** SINE or PULSE(10Hz to 1MHz)
- **Max. Input current** ±6A
- **Max. Input voltage** ±200V
- **Excitation method** Automatic excitation (Target : Hm, Bm, I1m or V2m)

## Power amplifiers

## High power high frequency quadrant amplifiers

### Power amplifier for B-H Analyzer

| | Max. Frequency | Max. output current | Max. output voltage |
|---|---|---|---|
| **SY-5001** | 3MHz | ± 5Apeak | ± 150Vpeak |
| **SY-5002** | 3MHz | ± 6Apeak | ± 75Vpeak |
| **HSA4101-IW** | 10MHz | ± 1.0Apeak | ± 71Vpeak |

SY-5001 (PMK GmbH)

SY-5002 [for BH analyzer]
(PMK GmbH)

HSA4101-IW

| Model | | SY-5001 |
|---|---|---|
| Frequency | | DC～3MHz |
| Output voltage | HIGH | ±150Vpeak (f<750kHz) |
| | LOW | ±75Vpeak (f<1.4MHz) |
| Output Current | HIGH | ±5Apeak(f>10Hz) |
| | LOW | ±6Apeak (f>10Hz) |
| Output impedance | | 30mΩ+0.33μH |
| Interface | | USB, GPIB |
| Size (mm) ,weight | | Approx. 449W×178H×435.5D,14kg |

| Model | | SY-5002 |
|---|---|---|
| Frequency | | DC～3MHz |
| Output voltage | HIGH | ±75Vpeak (f<800kHz) |
| | LOW | ±37.5Vpeak (f<1MHz) |
| Output current | HIGH | ±2.5Apeak |
| | LOW | ±5.0Apeak |
| Output impedance | | 50mΩ+0.30μH |
| Interface | | USB |
| Size (mm) ,weight | | Approx. 449W×133H×436D,19kg |

| Model | HSA4101-IW |
|---|---|
| Frequency | DC～10MHz |
| output voltage | ±71Vpeak |
| output current | ±1Apeak |
| Output impedance | 1.5Ω+0.50μH |
| Interface | - |
| Size (mm) ,weight | Approx. 220W×177H×450D,7.8kg |

**Temp. range from -55ºC to +180ºC**
**Large size samples : max. 4pcs.**

# Wide range temp. scanner

## SY-330 4pcs.

Autovehicle std. AEC-Q200 Grade0 compatible


| Model | | SY-330 |
|---|---|---|
| Chamber | Power supply | AC200V 3φ 3W 50/60Hz |
| | Max. current | 14A,max. |
| | Temp. range | −55ºC～+180ºC |
| Scanner Unit | Power supply | AC 100V ～240V 50/60Hz |
| | Max. power | 21VA,max. |
| | Frequny range | 10Hz～3MHz (SY-8218) / 10Hz～1MHz (SY-8219) |
| | Sample | 4pcs.,max. |
| | Max. current | ±6A |
| | Max. voltage | ±200V |
| Dimension (mm)、weigh | | Approx. 1,023W×607L×1,200H, 190kg |
| Accessories | | RS-232 cable, Chamber cable (SY-912)<br>Sample pushing JIG (SY-516)、Power cable, Instruction manual |

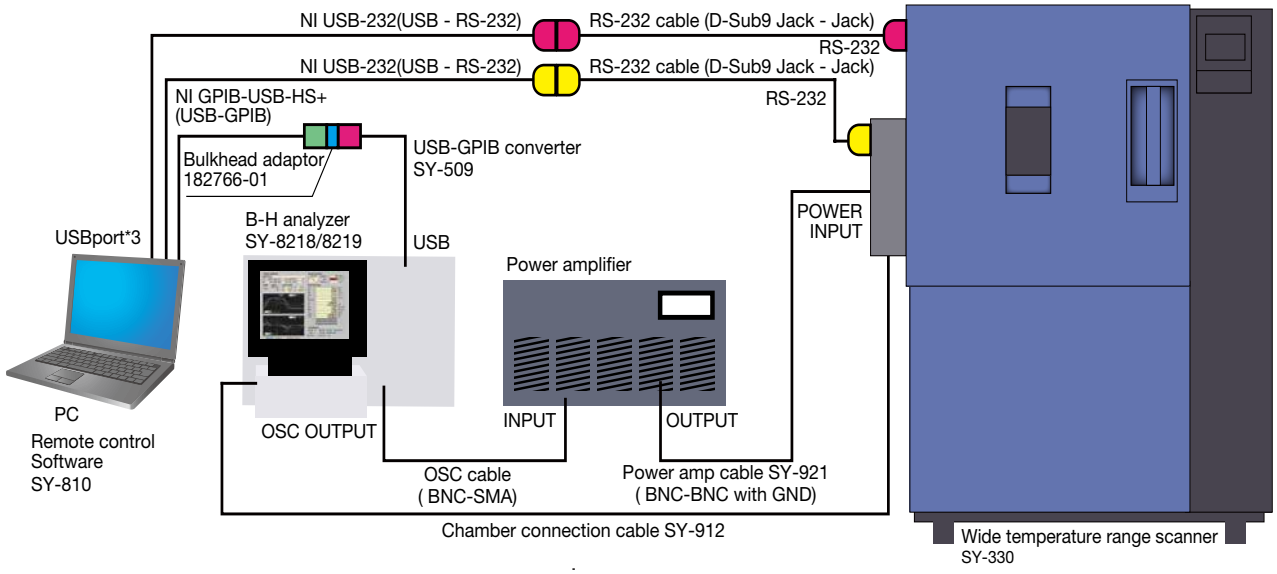
**Temp. range from -30ºC to +150ºC**
**Automatc test for max. 41pcs. samples**

# Temp. scanner system

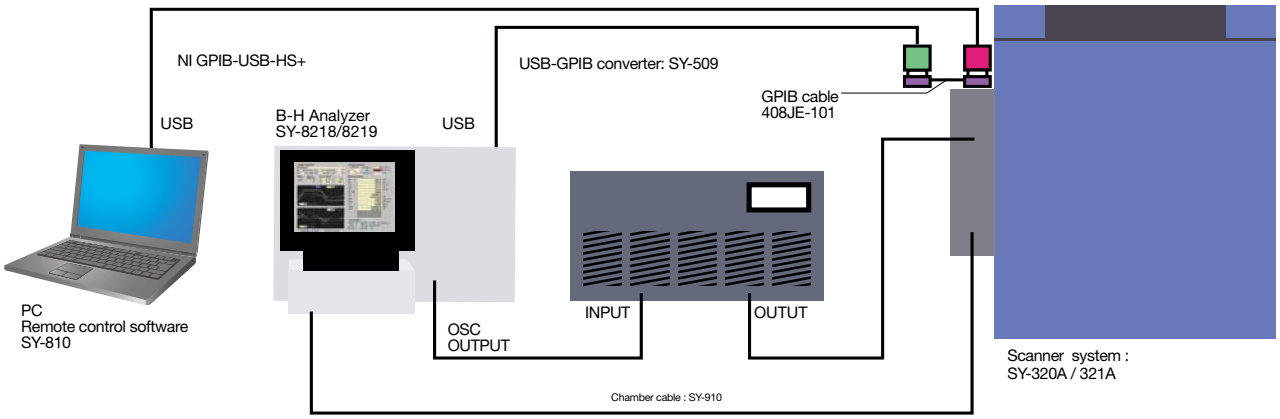
## SY-320A 20pcs. / SY-321A 41pcs.


| Model | | SY-320A | SY-321A |
|---|---|---|---|
| Chamber | Power supply | AC100V 50/60Hz | |
| | Max. current | 12.5A,max. | 21.0A,max. |
| | Temp. range | −30ºC～+150ºC | |
| Scanner Unit | Power supply | AC 100V ～120V 50/60Hz | |
| | Max. power | 28VA,max. | |
| | Frequny range | 10Hz～5MHz (SY-8218) / 10Hz～1MHz (SY-8219) | |
| | Sample | 20pcs.,max. | 41pcs.,max. |
| | Max. current | ±6A | |
| | Max. voltage | ±200V | |
| Dimension (mm)、weigh | | Approx.543W×695L×620H, 85kg | Approx.640W×920L×660H, 135kg |
| Accessories | | Chamber cable (SY-910)、GPIB cable 1m、Power cable、Manual | |
| | | Turntable SY-510 | Turntable SY-511 |

## Remote control system configuration

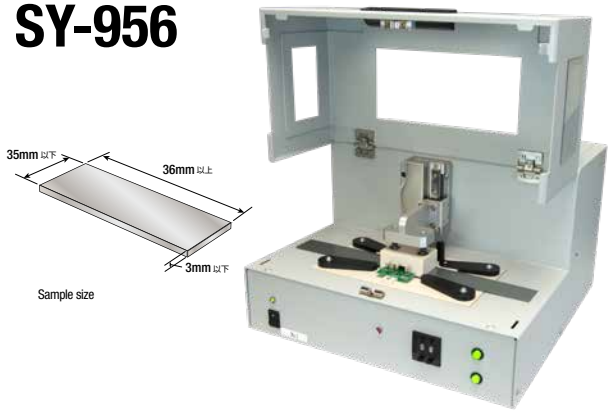



## ■Remote control system with scanner system : SY-320A / SY-321A



# AC BH analysis on single sheet / ribbon

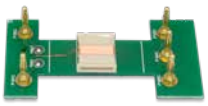
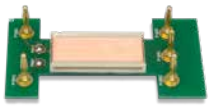
## Single sheet test system
## SY-956




■Test freqency : 10Hz to 20kHz
■Max. Magnetic field strength : 10,000A/m
■Sample size : 36mm(L) or longer, 35mm(W)max., 3mm(Thickness)max.
■Vertical single yoke test method
■Core loss in yoke cancelling compensation
(Patent pending : No. 5885646)
■Controlable pressing pressure on specimen for test reproductivity

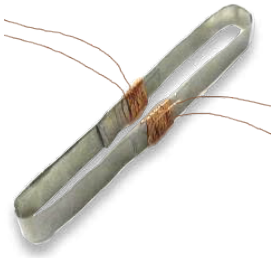
| | |
|---|---|
| Conformed test method | Vertical single yoke single sheet test method (IEC 60404-3 with yoke core loss compensation) |
| Max. Magnetic field | Approx. 10,000A/m(with excitation current at 5A) |
| Test frequency | SINE : 10Hz to 20kHz |
| Max. sample size | 36mm(L) or <, 35mm(W)max., 3mm(Thickness)max. |
| Max. current | ±6A |
| Max. voltage | ±200V |
| Power supply | AC100V～AC240V、50Hz/60Hz、27VA,max. |
| Temp. range | +18℃～+28℃ |
| Dimension(mm)、weight | Approx.330W×200H×320D、8.5kg |

### B coil for voltage detection

| Model | B coil 01 | B coil 02 |
|---|---|---|
| Outer look |  |  |
| Sample size | t:1mm or less、W:10mm or less、35turns | t:1mm or less、W:30mm or less、100turns |

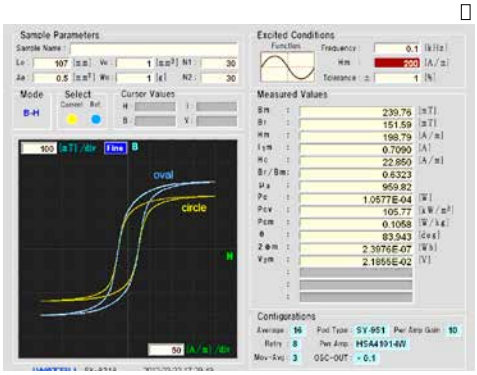
※ B coil can be wound for preferable turns.

Magnetic sheet can be varied of it's magnetic characteristics according to it's shape and before/after shaping process.



### Example of Permalloy

| | |
|---|---|
| Hc | Circle = Oval |
| Br | Circle > Oval |
| bs | Circle < Oval |
| Core loss | Circle < Oval |




## Accessories

### LF AC coupler SY-514

Best to eliminate offset voltage of power amplifier

SY-514 enables measurement with cut-off frequency at 300Hz while SY-504 (std. accessory) offers cut-off frequency at 10kHz.

BNC cable(0.6m)

Cut-off freq. : Approx. 300Hz, Max. input voltage : ±200V
Max. input current : ±6A, BNC cable (0.6m/std. accessory)

### 10kHz AC coupler SY-504

※ Standard accessory for BH analyzer


### GPIB interface NI GPIB-USB-HS+

※NATIONAL INSTRUMENTS Corp.

### RS232-USB Serial Interface NI USB-232

※NATIONAL INSTRUMENTS Corp.

### Bulkhead adaptor 182766-01

※come with SY-810
※NATIONAL INSTRUMENTS Corp.

### GPIB adaptor SY-509

※come with SY-810

### Turntable SY-510 / 511

Table for mouning specimen for auto test
SY-510 (SY-320A, std. 1pc.)
SY-511 (SY-321A, std. 1pc.)

### Spare contact pin SY-512

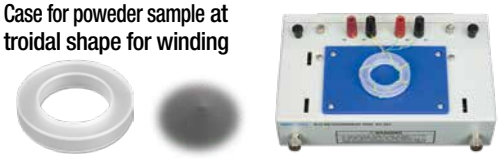
Spare contact pin (for SY-320A/321A, std. 1set)

### DC bias power supply SY-931

Max. DC bias current: 10A
Max. Test frequency: 1MHz

### Empty toroidal case SY-513

Case for poweder sample at troidal shape for winding



# AC BH Analysis with DC biasing

## DC bias tester
## SY-960/961/962

AC blocker : SY-962

DC bias source : SY-961

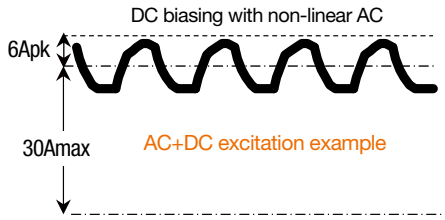
DC test fixture : SY-960

BH Analyzer and DC+AC test system configuration

■Max. DC biasing 30A
■Max. AC ripple ±6A
■Test freq.(SINE) 10kHz～3MHz

(Lowest frequency can be 10kHz or higher according to inductance value of specimen)

■Test freq. (PULSE) -10kHz～1MHz (Duty10%-90%)




DC bias test system : SY-960

| Item | | Specification |
|---|---|---|
| Test frequency | SINE | SY-8218 :10kHz ～ 3MHz、SY-8219 : 10kHz ～ 1MHz |
| | PULSE | 10kHz ～ 1MHz (Duty 10～90%) |
| Test temperature | | 0ºC～＋250ºC |
| Max. test current | | ±6A |
| Max. test voltage | | ±200V |
| Specification gurantee temp. range | | ＋18ºC～＋28ºC |
| Operation humidity | | 85%RH or less (at +35℃、no dued) |
| Warm-up time | | Current accuracy guranteed at power on 30min or later |
| Dimension (mm) | | Approx. 330 (W) ×320 (D) ×200 (H) |
| Weight | | Approx. 6.7kg |
| Accessories | | DCT cable (SY-963) x1pc.、PCB1528-030 x1pc.、PCB5650-079 x1pc. Terminal tightning screw x2pcs.、Blower blush x1pc.、Accessory case x1pc. Instruction manual x1(CD-ROM)、Users guide(paper version) x1pc. |

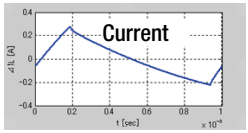
DC bias power source : SY-961

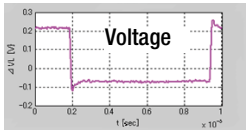
| Item | Specfication |
|---|---|
| Input voltage | AC100V～240V |
| Power consumption | 640VA,max. (with SY-962) |
| Current : $I_{dc}$ | DC 0.00A～DC30.0A |
| Current setting | 0.01A resolution |
| Compliance voltage | 10V,max. (between High-Low) |
| Specification gurantee temp. | ＋18ºC～＋28ºC |
| Operation humidity | 85%RH or less (at +35℃、no dued) |
| Dimension (mm) | Approx. 420 (W) ×480 (D) ×221 (H) |
| Weight | Approx. 15.3kg |

AC Blocker : SY-962

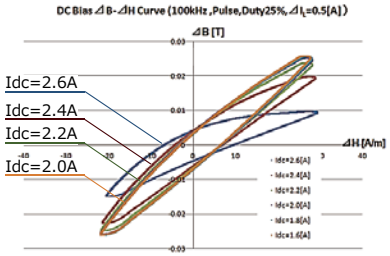
| Item | Specfication |
|---|---|
| Input voltage | DC24V (supplied from SY-961) |
| Inductance | Approx. 1.68[mH]±15% (H-L) |
| Max. input DC | 30[A] |
| Specification gurantee temp. | ＋18ºC～＋28ºC |
| Dimension (mm) | Approx.420 (W) x480 (D) x110 (H) |
| Weight | Approx. 14.0kg |

Example of chip inductor test (Chopper excitation)

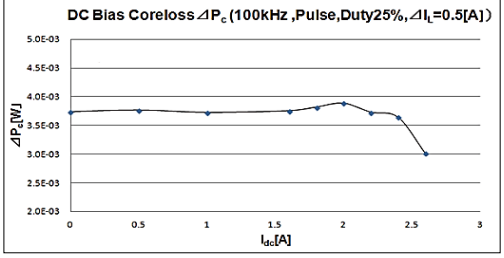


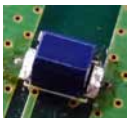

Magnetic characteristics by incerasing DC bias at fixed ⊿H




DC bias vs ⊿Pc



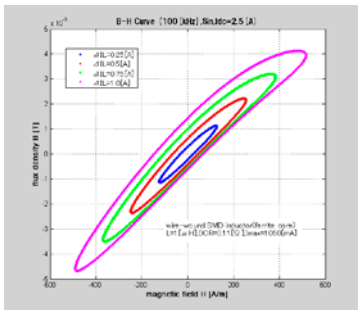

Examples of hysteresis curves of DC baising. AC+DC excitation shows changes of hysteresis curve following DC bias level.

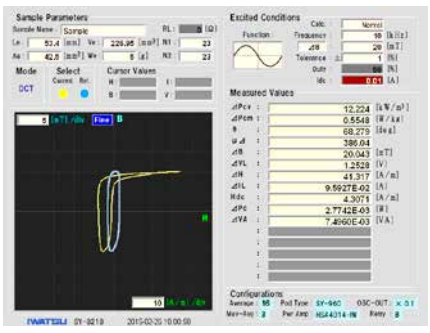


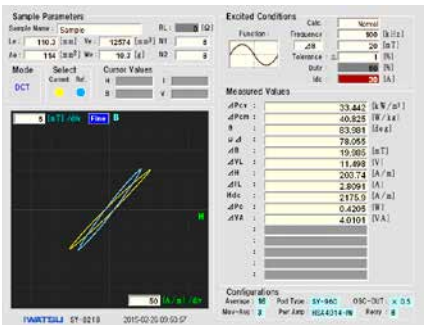
**Ferrite, Inductor**
L=1.0 μ H

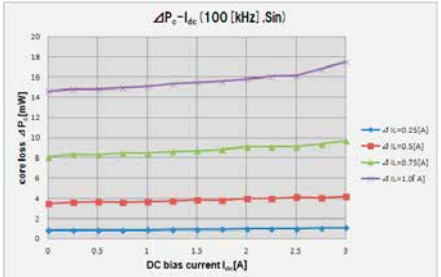
**Amorphous**
L=311 μ H

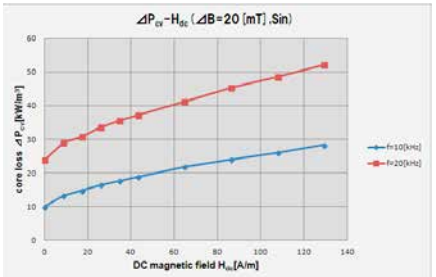
**Iron Powder**
L=8.4 μ H

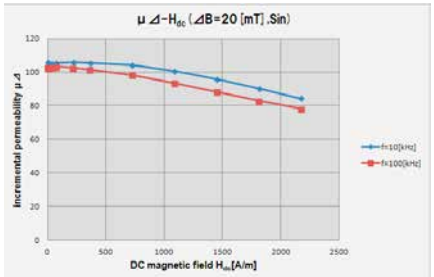






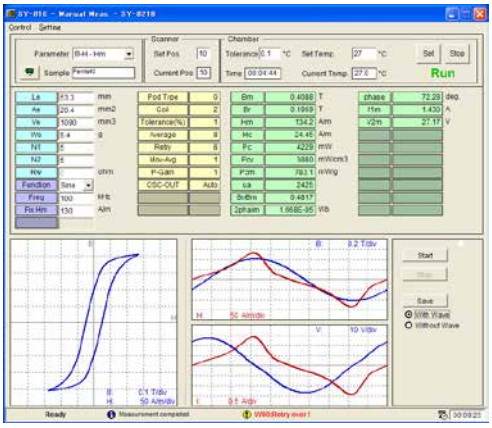



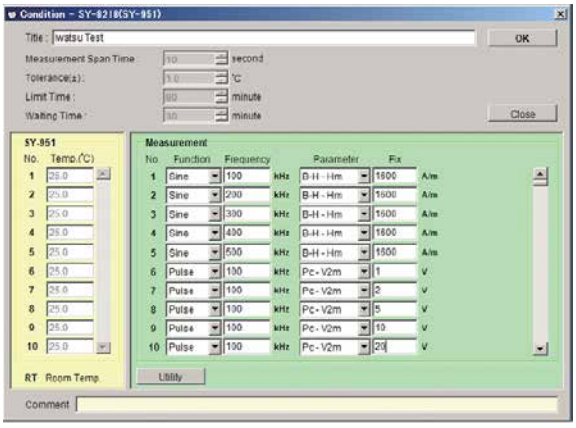



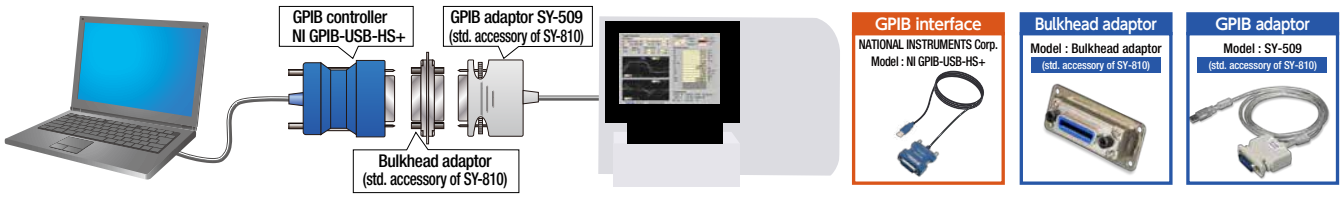
## Automatic control changing test frequency and excitation condition

# Remote control software SY-810 (for SY-8218 / SY-8219)

■Max. 800kinds (Temp. 20kinds x excitation condition x 40kinds) of test conditions are available for each sample.
■Test data (waveform at CSV basis) and display hardcopy (JPEG, PNG) are avaialble.
■SY-810 can control wide temp. range scanner(SY-330), scanner system(SY-320A/SY-321A), DC bias tester and single sheet test system for automatic tests.






SY-810 contains CD (software & operation manual at PDF), GPIB converter SY-509, Bulkhead adaptor 182766-01 and software license agreement
OS: Windows Vista SP2, Windows7 32bit/64bit, Windows8 32bit/64bit, Windows10 32bit/64bit
.NET Framework(packed), CPU Pentium133M or above, Memory at 64Mbyte or more, Display resolution at 1024x768 or above, USB port x3
※ Contact our sales for the most recommended system configurations.
※ NI GPIB-USB-HS+ (NATIONAL INSTRUMENTS) is required for PC interface with SY-8218/SY-8219. PC is not included with this system and supplied by customer.



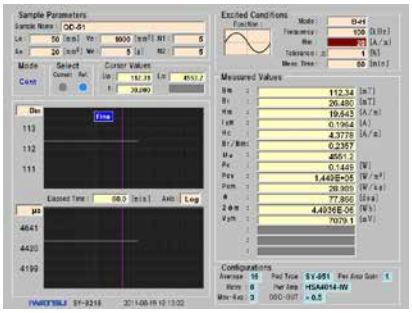
## Built-in software function for BH Analyzer (Optional)

# Continous test function SY-811

**Time-tendency property test can be performed with continuous excitation.**

■Test timeframe at 99,999minutes(Approx. 70days), max. 60second/test
■ 2 kinds of properties can be monitored on display and extracted to memory.
■Measurement item can be changed during test.
■Comparison between Reference and test result on the same display.
■Test data at CSV and display hardcopy at JPG/PNG are available.

※Implementation of SY-811 on SY-8218/SY-8219 after purchase must be done in our factory in Japan for the installation and inspection.



## Various types of soft magnetic material property test

| Soft materials | Shape |
|---|---|
| Ferrite | Troidal |
| Parmalloy | EE core |
| Amorphous | EI core |
| Si steel sheet | Sheet |
| Powder core | Powder |