

**NoiseKen**

**INSTRUCTION MANUAL**  
**AC LINE CDN**  
for Impulse Noise Simulator  
**MODEL IJ-4050**

**NOISE LABORATORY CO., LTD.**

Edition 1.09  
AEB00105-00E-0



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# 1 IMPORTANT SAFETY PRECAUTIONS

The following is very important matters in order to safely handle this product (called unit hereafter). Read carefully them and strictly observe them.

1. **Use of this unit in an explosive area such as "No fire" area etc. is prohibited. If used in such an area, it is liable to cause combustion or ignition due to discharge.**
2. **Any person who has an implanted pacemaker in the body should not operate this unit. Furthermore, such a person should not enter the test area while this unit is operating.**
3. **When connecting cables and carrying out settings, place the unit in the STOP conditions beforehand, otherwise, an electric shock due to high voltage may be caused. Even in the STOP conditions, keep a 5 seconds lapse as residual voltages may exist.**
4. **Before connecting the equipment under test (called EUT hereafter), check to see that the EUT LINE breaker is off, otherwise an electric shock due to supply power voltage may be caused.**
5. **An isolation transformer is indispensable for power supply input to the EUT. Power supply connection to the EUT LINE INPUT shall be always done through an isolation transformer.**
6. **Fully put in each coaxial connector and make sure connection by rotating it clockwise until a "click" is heard.**
7. **Be extremely careful of an electric shock due to the generated pulses and power supply to EUT.**
8. **Be sure to go through Section 3 Basic Safety Precautions before use listing safety precautions for test set-up, connection and execution of test.**

## Preface

Thank you very much for your purchasing our AC LINE CDN unit for Impulse Noise Simulator Model: IJ-4050. In order to obtain the highest performance from this unit, it is recommended that the contents of this manual be thoroughly understood and used as ready reference for operation and maintenance.

## 2 APPLICATION FORM FOR INSTRUCTION MANUAL

We place an order for an instruction manual.

**Model:** IJ-4050

**Serial No.:** \_\_\_\_\_

**Applicant:**

Company name: \_\_\_\_\_

Address: \_\_\_\_\_

Department: \_\_\_\_\_

Person in charge: \_\_\_\_\_

Tel No.: \_\_\_\_\_

Fax No.: \_\_\_\_\_

Cut  
line

Cut off this page "application form for instruction manual" from this volume and keep it for future use with care.

When an INSTRUCTION MANUAL is required, fill in the above Application Form and mail or fax it to your nearest sales agent of Noise Laboratory or Noise Laboratory.

Your sales agent:

Memo

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## 3 BASIC SAFETY PRECAUTIONS

### 3.1 WARNING SIGNS AND THEIR MEANINGS



#### Means a warning.

If such a danger is not avoided, a potential danger which may result in a death or serious injury will be caused.



#### Means a caution.

If such a danger is not avoided, a potential danger which may result in a minor or medium degree of injury will be caused.

### 3.2 BASIC SAFETY PRECAUTIONS



1. Use of this unit in an explosive area such as "No fire" area etc. is prohibited. If used in such an area, it is liable to cause combustion or ignition due to discharge. [Precautions for human body and environments]
2. Mishandling and careless operation of this unit will result in a deadly injury. [Precautions for human body, operation, environment and connection]
3. Any person who has an implanted pacemaker in the body should not operate this unit. Furthermore, such a person should not enter the test area while this unit is operating. [Precautions for human body and operation]
4. Before connecting the EUT, check to see that the EUT LINE breaker is off, otherwise an electric shock due to supply power voltage may be caused. [Precautions for human body and connections]
5. When connecting cables and carrying out settings, place the unit in the STOP conditions beforehand, otherwise, an electric shock due to high voltage may be caused. Even in the STOP conditions, keep a 5 seconds lapse as residual voltages may exist. [Precautions for human body and connection]
6. Fully put in each coaxial connector and make sure connection by rotating it clockwise until a "click" is heard. Insufficient connection leads to unwanted discharges inside the coaxial connectors. [Precautions for human body and connection]
7. Be extremely careful of an electric shock due to the generated pulses and power supply to EUT. [Precautions for human body and connection]

8. **When conducting coupling tests to the EUT LINE, the signal ground of the HV pulse generator circuit and one line (phase) of the EUT LINE may be connected, causing a shock hazard if the users touch the outer conductor of the HV coaxial connectors.**

**In addition, if the outer conductor of the HV coaxial connectors is connected to any grounded subject, leak current will flow, tripping the ground fault interrupter embedded in the facilities.**

**To avoid these two types of events, use of an isolation transformer is indispensable. Be sure to connect the EUT LINE INPUT to the isolation transformer secondary. [Precautions for human body and connection]**

9. **Any other connection than the supplied SG short plug shall not be connected to the SG connector of this unit. Wrong connections may apply HV pulses to the ground plane, causing a shock hazard. [Precautions for human body and connection]**
10. **The AC INPUT (AC inlet) terminal on the rear panel has a conductor for safety grounding connection. This unit shall be connected to a properly grounded service outlet through the AC INPUT. When this unit is not grounded through the AC INPUT, PE terminal positioned next to it shall be used. [Precautions for connection]**
11. **High voltages exist inside the unit. Never open the covers. [Precautions for human body]**
12. **NOISE LABORATORY and its sales agents shall have no liability against any accident resulting in injury or death, any damage to equipment or any resultant damage thereof which is caused by abuse or careless handling of this unit. [Precautions for human body, operation, environments and connection]**

**⚠ CAUTION 注意**

13. The SG terminal provided on the front panel of this unit functions as the signal reference ground for testing. The PE terminal (EUT) is for the protective earth conductor for the EUT. The protective earth terminals for this unit itself are the AC inlet earth pin (AC INPUT) and PE positioned in close proximity. These SG, EUT PE, simulator PE are independent each other. When conducting tests, make connections according to Section 9 test Set-up. [Precautions for operation and connection]
14. The test rig used in conjunction with this unit should be insulated against a minimum voltage of 8kV (when the built-in 50Ω terminator disconnected from the test circuit). [Precautions for environments]
15. During test, high level of electromagnetic radiation may be generated depending on the type or nature of the EUT and thus causing interference with nearby electronic equipment and radio communication equipment. In such case, the user may have to take measures such as a faraday case, shielded room, shielded cable and so on. [Precaution for environments]
16. The supplied SG short plug shall not be connected to any other terminal than L1, L2, L3, N, PE and SG HV coaxial connectors. Connection to wrong terminals may damage the unit. [Precautions for operation and connection]
17. Be sure to connect the ground plane to the safety ground. [Precautions for operation and safety]
18. To ensure safety in operation, use the accessories and optional equipment supplied by our company. Use of others may degrade the safety and performance of this unit. [Precaution for handling and safety]
19. Do not use nor keep the unit in a hot or cold environment (Operating temperature: 15°C~35°C/Operating humidity range: 25~75%) otherwise, the unit may be damaged or only exhibit limited performance. [Precaution for environments]
20. If condensation is found, fully dry the unit before operating it, otherwise, the unit may be damaged or only exhibit limited performance. [Precautions for environments]
21. Do not drop the unit or do not give strong shock to the unit. [Precaution for handling]
22. When installing the unit, do not block the vent. [Precaution for environments]
23. Do not apply voltage exceeding the rated voltage range. [Precautions for installation and connection]

- 24. Only a service engineer authorized by our company should perform repair, maintenance work and internal adjustment. [Precaution for handling and safety]**
- 25. Do not wipe off the body and peripheral equipment with thinner, alcohol or other solvent. When the unit is dirty, soak a cloth in a detergent, wring it and wipe the unit with this cloth. Using solvents may spoil the appearance. [Precautions for handling]**
- 26. The coaxial connectors used for this unit is of NoiseKen original design. Use of other type of connectors may cause electric shock hazards or malfunctions of the unit. [Precautions for handling and safety]**
- 27. When conducting powered EUT testing, be sure to turn ON this unit and check to see that the power lamp is on. Testing in OFF status may cause damage or deteriorate some components in this unit due to the temperature rise since the cooling fan does not work. [Precautions for handling and safety]**
- 28. Read carefully and strictly observe the instruction manuals of this unit and of the impulse noise simulator. [Precautions for handling and safety]**

### **3.3 WHEN WARNING LABEL IS MISSING**

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1. When warning label is lost, or peeled off or dirty, put up a new one for extra safety.
2. When warning label is lost, contact our company's sales dept. or maintenance dept. for issuance.

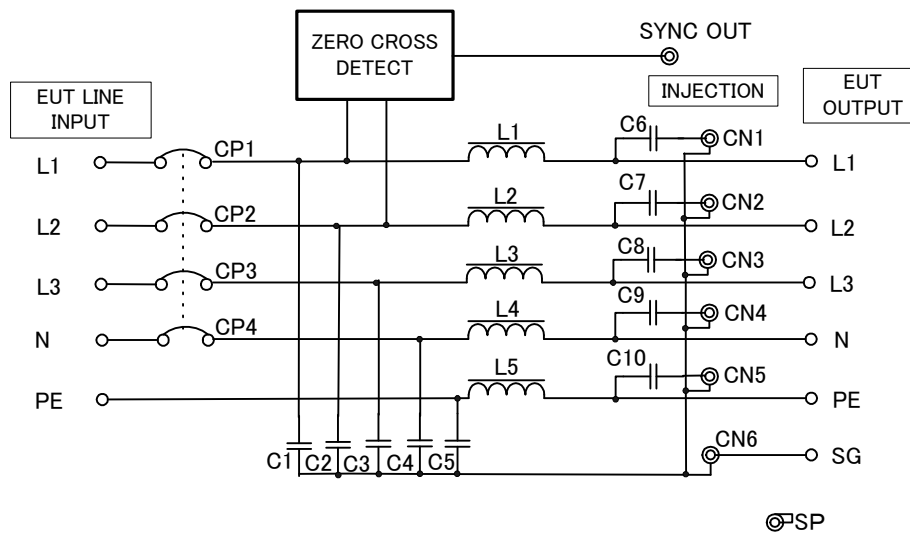
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## 5 GENERAL DESCRIPTION

- This unit can be used for AC LINE INJECTION TEST up to AC415V 50A 3-phase 5-wire (L1, L2, L3, N, PE).
- Easily selectable coupling modes (Normal mode, Common mode) by supplied SG short plug.
- Operation in synchronization with the relevant supply available in case of use with INS-4001, INS-4020/4040.

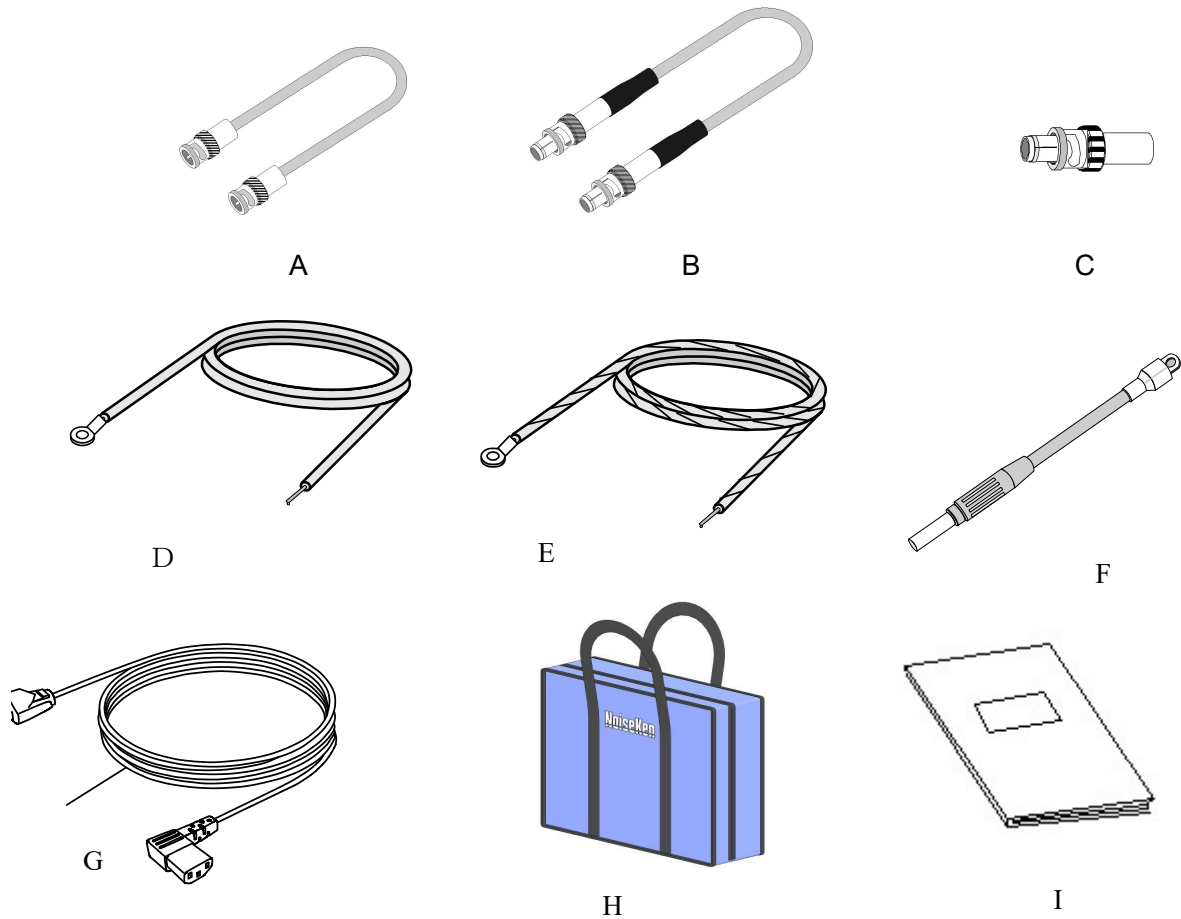
NOTE: A recommended impulse noise simulator model is INS-4001 and INS-4020/4040.  
The performance may be restricted depending on models of simulators being used with.



CP1-4	Circuit protector
L1-L5	Choke coil
C1-C5	Decoupling capacitor
C6-C10	Coupling capacitor
CN1-CN5	Impulse injection terminal
CN6	SG setting terminal
SP	Short plug
SYNC OUT	Zero cross synchronization output

## 6 INCLUDED ACCESSORIES

This product includes the following accessories.

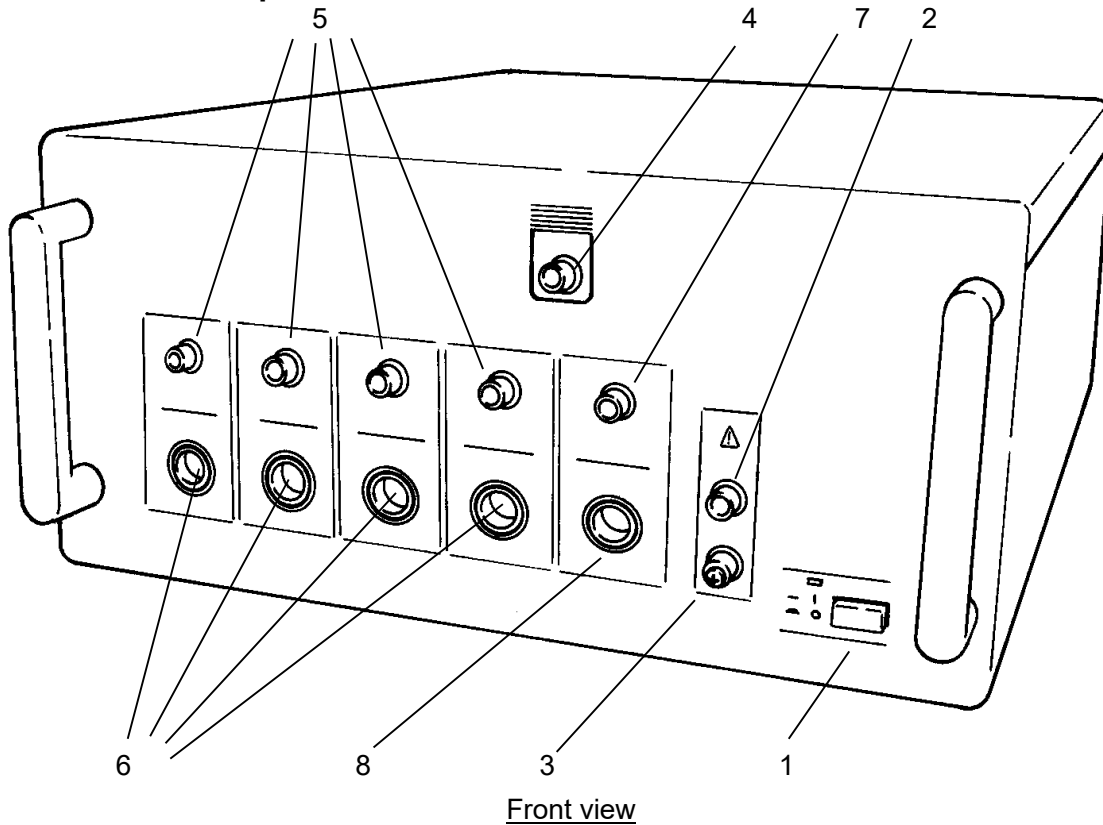


### ACCESSORIES

	ITEM		QTY	NOTE
A	Line Sync BNC cable		1pc	40cm length
B	Injection coaxial cable		1pc	40cm length
C	SG short plug	(02-00106A)	1pc	
D	Line input cable		4pcs	2m length $\phi$ 6 terminal
E	PE cable		1pc	2m length $\phi$ 6 terminal
F	Line output cable		5pcs	0.2m length $\phi$ 6 terminal
G	AC cable		1pc	AC100-115V 3P 2.4m
H	Accessory bag		1pc	
I	Instruction manual		1pc	

## 7 APPEARANCE AND FUNCTIONS

### 7.1 Front panel



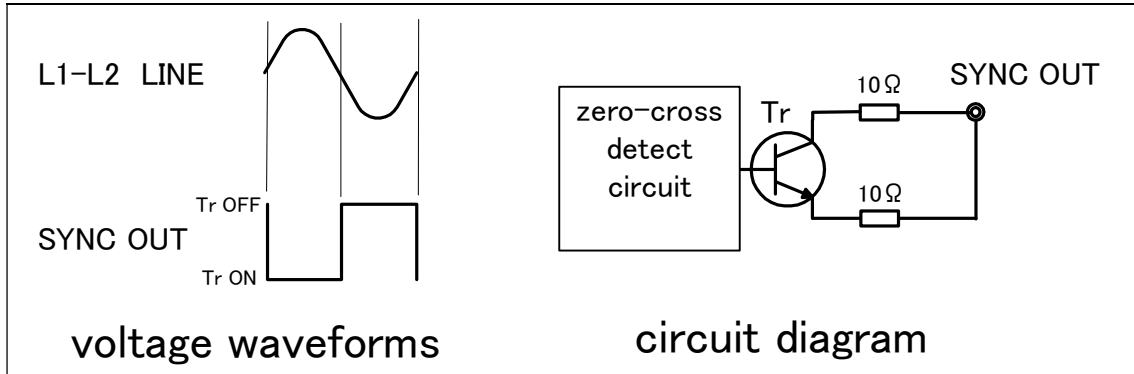
1. POWER switch  
controls mains POWER on and off. When pressed, the button is locked in the down position with turning on the LED.
  2. SG connector  
HV pulse signal ground connector  
When conducting common mode coupling test with reference to a ground plane, this connector shall be plugged with the supplied short plug. For details, please refer to Test set-up.
- Warning: any other connector than the supplied SG short plug shall not be connected to the SG connector of this unit. Wrong connectors may cause a shock hazard.** (Please refer to Basic safety precautions.)
3. SG terminal  
HV pulse signal ground terminal. When conducting common mode coupling test with reference to a ground plane, this terminal shall be connected to it.



4. SYNC OUT terminal

Outputs zero cross signals of L1-L2 for EUT AC LINE synchronization test. Connect the supplied Line Sync BNC cable to the EXT TRIG terminal of the INS-4001, and press the LINE PHASE mode button.

This output circuit is an open-collector and can drive up to 24V/5mA signal.



5. Injection terminal L1/L2/L3/N

When injecting pulses to L1 line, connect the Injection coaxial cable from  $50\Omega$  TERM OUT of the impulse noise simulator to this L1 terminal.

When selecting the L1 line as the signal ground (Normal mode coupling to L2, L3 or N), connect the SG short plug to this terminal. L2, L3 and N can be set by the same manner.

6. EUT Line output terminal L1/L2/L3/N

EUT Line output terminal with injected pulses. Connect to the EUT with the supplied EUT Line output cable.

7. Injection terminal PE

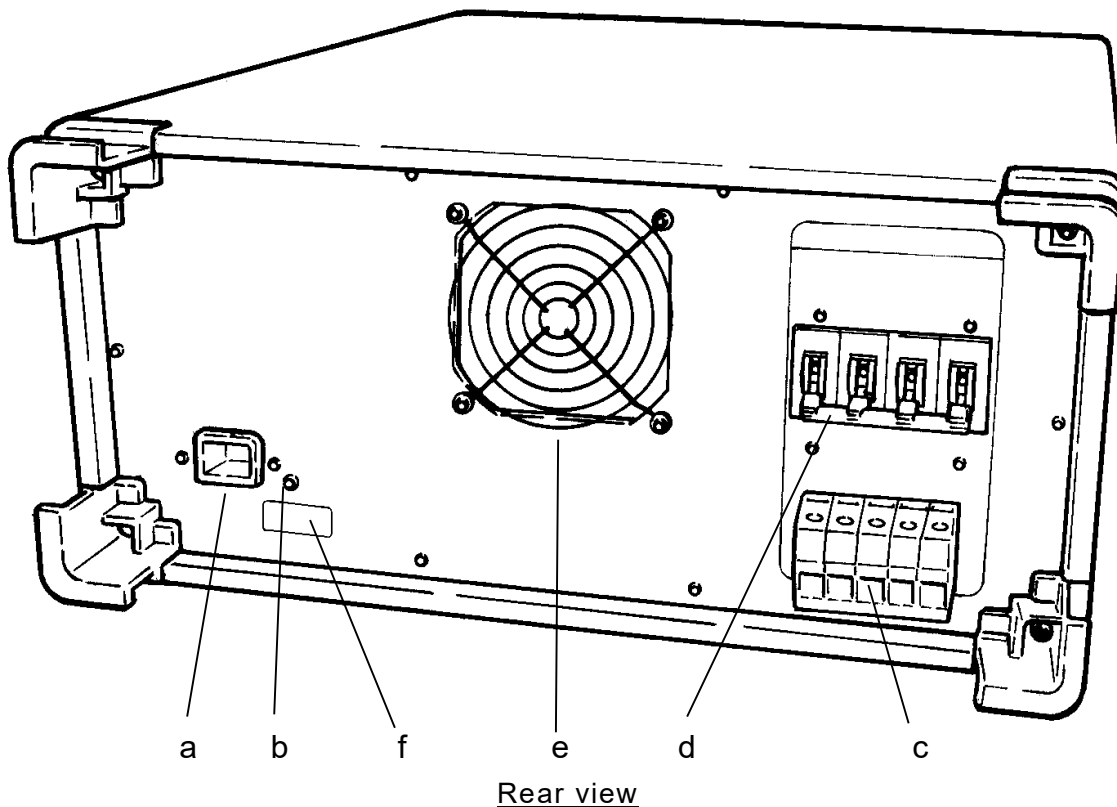
When injecting pulses to PE line, connect the Injection coaxial cable from  $50\Omega$  TERM OUT of the impulse noise simulator to this PE terminal.

When selecting the PE line as the signal ground, connect the SG short plug to this terminal.

8. EUT Line output terminal PE

EUT Line PE output terminal with injected pulses. Connect to the EUT with the supplied EUT Line output cable.

## 7.2 Rear panel



a. AC INPUT

AC mains input to operate this unit. On 100V to 115V operation, the supplied AC cord can be used for connection to an appropriately grounded AC supply. (The unit operates on a range of 100V to 240V AC. In case of 200-240V operation, user shall use an appropriate AC cord that conforms to the power capacity and the relevant safety standard.)

b. PE terminal

Terminal for connection to safety earth. This terminal shall be used when the unit is not grounded through AC INPUT earth conductor.

c. EUT LINE INPUT

Power supply input to the EUT. The supplied LINE INPUT cables or appropriate ones shall be used. The maximum rating of EUT LINE is AC415V 50Amax.

d. EUT LINE Circuit protector

When the lever is pulled to the upper position, the EUT LINE turns on. In case of over current, this breaker will trip, turning off the EUT LINE. Check the cause of the over current event. After removing it, pull up the lever again.

- e. Fan  
cools the internal circuits. Ventilation shall be kept.
- f. Serial number sticker  
shows a product serial number.

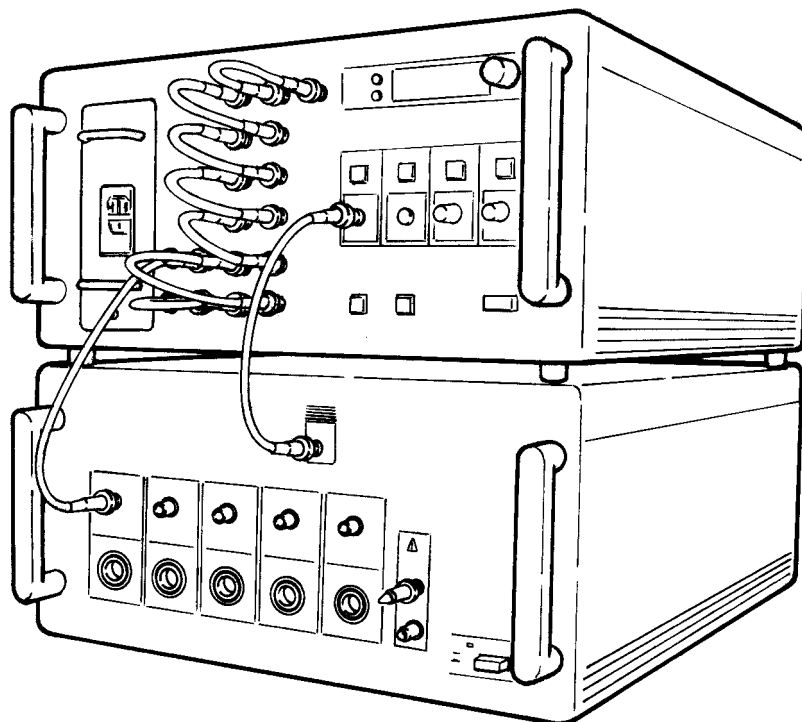
## 8 CONNECTION AND OPERATION

Observe operating precautions when conducting a test by using this simulator.

The following figure shows the set up of this unit with INS-4001.  
The set up with INS-4020 / 4040 is similar to the figure as below.

### 8.1 Set up

Place this unit under the impulse noise simulator.



\*\*\*In case of connecting this unit to INS-4020 / 4040, set them up similarly as the above.

### 8.2 Precaution

Read carefully and strictly observe the important safety precautions on page 1 and basic safety precautions on page 5-8.

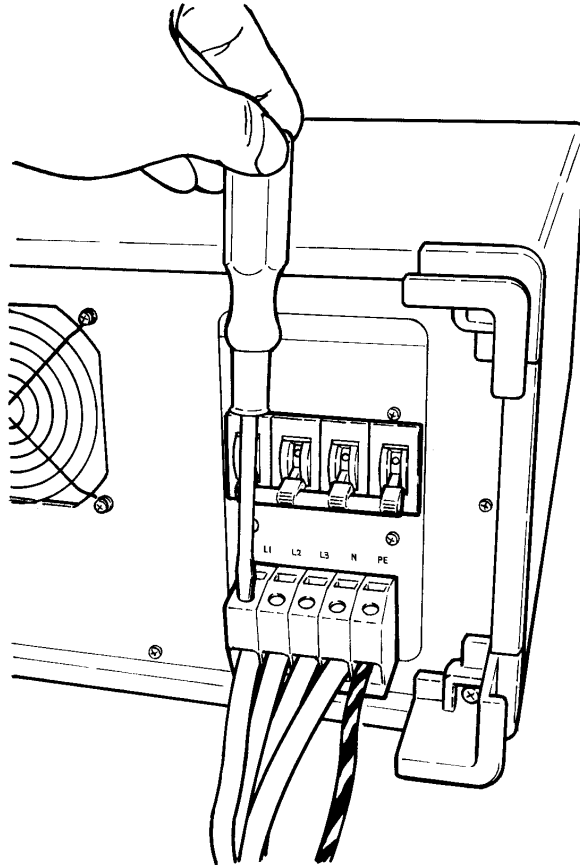
### 8.3 Turning ON and OFF the power

Connect an appropriate AC cord (the supplied one or other meeting the local supply voltage) to AC INPUT on the rear panel. When pressed, the button is locked in the down position with turning on the LED. To turn OFF, press the Power switch again after confirming that the EUT line is OFF.

### 8.4 EUT line input and circuit protector ON

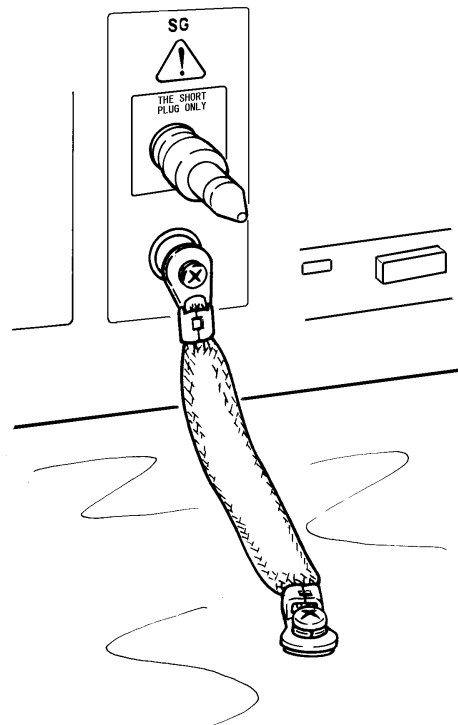
Connect to EUT LINE INPUT terminal on the rear panel the supplied LINE INPUT cables or a 0.5~16mm<sup>2</sup> single or stranded wire the sheath of which peeled off by 16mm without soldering.

- a. Loosen screws sufficiently (L1, L2, L3, N, PE) on the EUT LINE INPUT terminal by rotating them counterclockwise.
- b. Insert the cable into the holes on the front of the terminal.
- c. Tighten the screws to fix the cable with bigger torque (about 2.0-2.3 Nm) than usual.



### 8.5 Connection of SG

When conducting tests in coupling mode with reference to the ground plane, connect SG terminal to the ground plane by using a low RF impedance cable (3.5mm<sup>2</sup> or more braided wire recommended) of the shortest possible length. For connection, use M4 screws of 8mm or shorter length. Refer to Section 9 Test set-up for the details.



## 8.6 Connection of SYNC OUT

When testing the EUT in AC line synchronization mode, connect this terminal to EXT TRIG terminal of the INS-4001 unit with the supplied Line Sync BNC cable. Set the INS-4001 in the LINE PHASE mode to test the EUT for its AC line synchronized pulses. Refer to the instruction manual of the main unit for INS-4020/4040.

## 8.7 EUT LINE OUTPUT L1, L2, L3, N, PE

Connect these terminals to EUT with the supplied EUT Line output cable.

Insert the EUT Line output cables to these terminals till clicks. To remove the cables, push them furthermore to the depth. Connect the EUT to the solderless terminals at the tip of the EUT Line output cables by using M6 screws, and cover the terminals for safety. Care should be taken to avoid short-circuits.

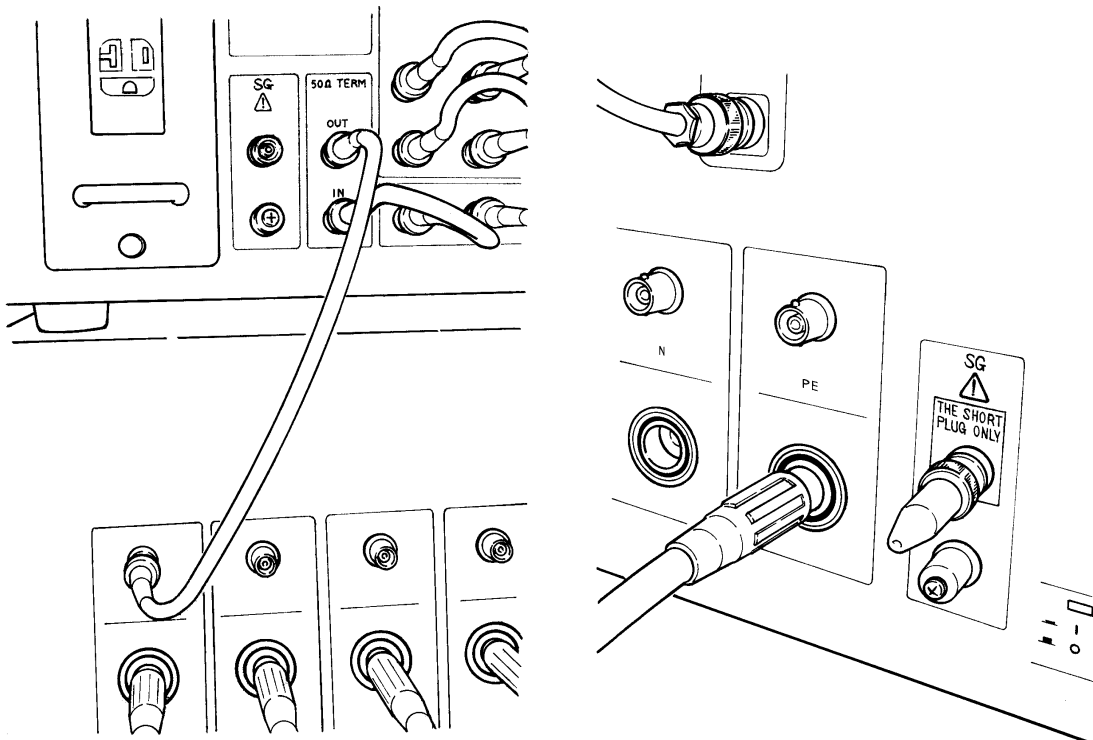
## 8.8 Selecting pulse injection line

Connect from the 50 $\Omega$  TERM OUT of the INS-4001, INS-4020/4040 unit to a injection terminal with the supplied Injection coaxial cable. Then select the signal ground line with the supplied SG short plug.

For common mode tests, set the SG short plug to the SG connector.

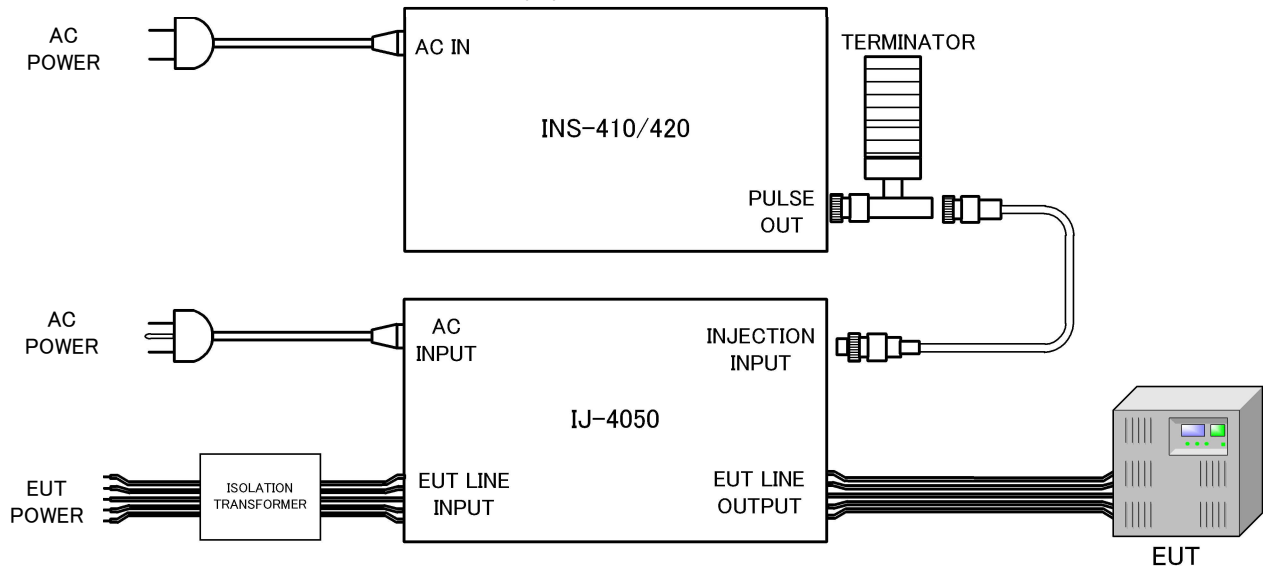
For normal mode tests, set the SG short plug to an injection terminal L1, L2, L3, or N which functions as the reference of the normal mode interference signals.

Please refer to Section 9 Test set up for more detail.



## 8.9 Connection with INS-410/420 series

The following is a diagram showing connections with INS-410/420/410R/420R/420(A).



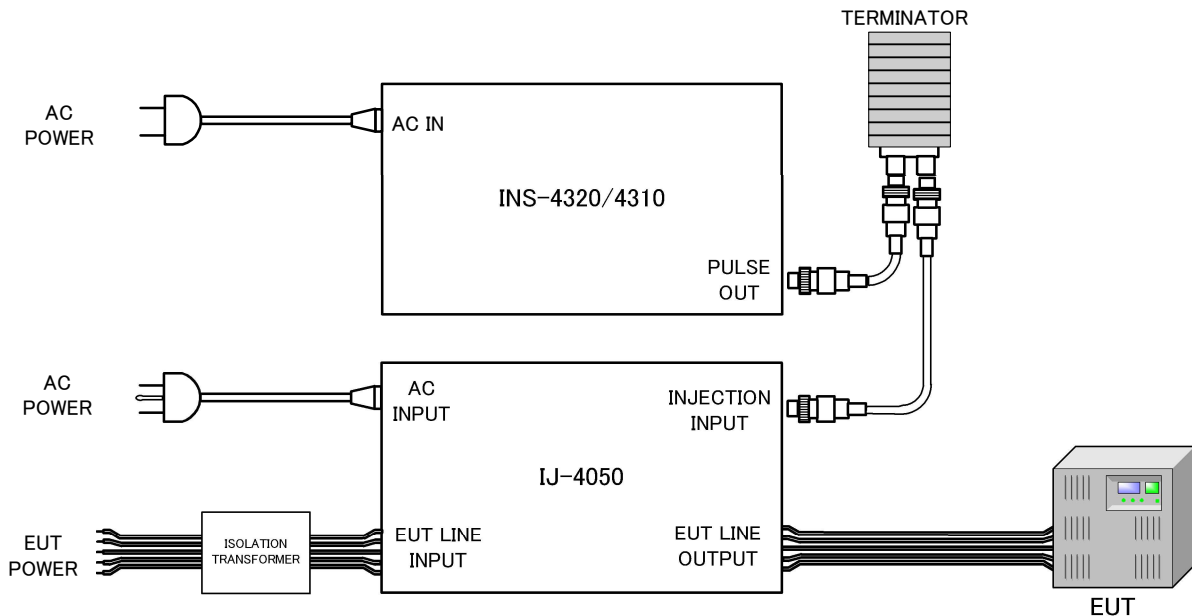
- ① Supply power to INS-410/420 with the supplied AC cable (2-pin).
- ② Connect the 50  $\Omega$  terminator to PULSE OUT of INS-410/420 series with the supplied T-type branch connector.
- ③ Connect from the output of 50  $\Omega$  terminator to a injection terminal of IJ-4050 with a conversion cable Model: 02-00003A (Option).
- ④ EUT LINE INPUT shall be power-fed from an isolation transformer. Please refer to Section 9 Test set up.
- ⑤ For EUT line synchronization test, follow the procedures mentioned below after selecting LINE PHASE mode for INS-410/420 series simulator.

Once selecting LINE PHASE mode for INS-410/420 series, the INS-410/420 outputs impulses synchronizing with the frequency of AC power supply for itself. Supplying power to the simulator synchronizing with the EUT power supply makes possible to synchronize the output impulses with the EUT power supply. If the supply voltage of the simulator is different from the EUT's, insert a voltage transformer. Observe the waveform by an oscilloscope since the line phase may turn over due to connections and AC plug's direction.

**Warning: When conducting normal mode test, the simulator frame and one line of the EUT line are connected. Although the isolation transformer eliminates the risk of a shock hazard, be careful not to have short circuit events caused by touching the simulator frame to other lead, wire or housing.**

## 8.10 Connection with INS-4310/4320 series

The following is a diagram showing connections with INS-4310/4320/4320(A) series.



- ① Supply power to the INS-4310/4320 with the supplied AC cable (2-pin).
- ② Connect the 50  $\Omega$  terminator to PULSE OUT of INS-4310/4320 series with the supplied T-type branch connector.
- ③ Connect from the output of 50  $\Omega$  terminator to a injection terminal of IJ-4050 with the supplied Injection coaxial cable.
- ④ EUT LINE INPUT shall be power-fed from an isolation transformer. Please refer to Section 9 Test set up.
- ⑤ For EUT line synchronization test, follow the below procedures mentioned below after selecting LINE PHASE mode for INS-4310/4320 simulator.

Once selecting LINE PHASE mode for INS-4310/4320 series, the simulator outputs impulses synchronizing with the frequency of AC power supply for itself. Supplying power to the simulator synchronizing with the EUT power supply makes possible to synchronize the output impulses with the EUT power supply. If the supply voltage of the simulator is different from the EUT's, insert a voltage transformer. Observe the waveform by an oscilloscope since the line phase may turn over due to connections and AC plug's direction.

**Warning: When conducting normal mode test, the simulator frame**



and one line of the EUT line are connected. Although the isolation transformer eliminates the risk of a shock hazard, be careful not to have short circuit events caused by touching the simulator frame to other lead, wire or housing.

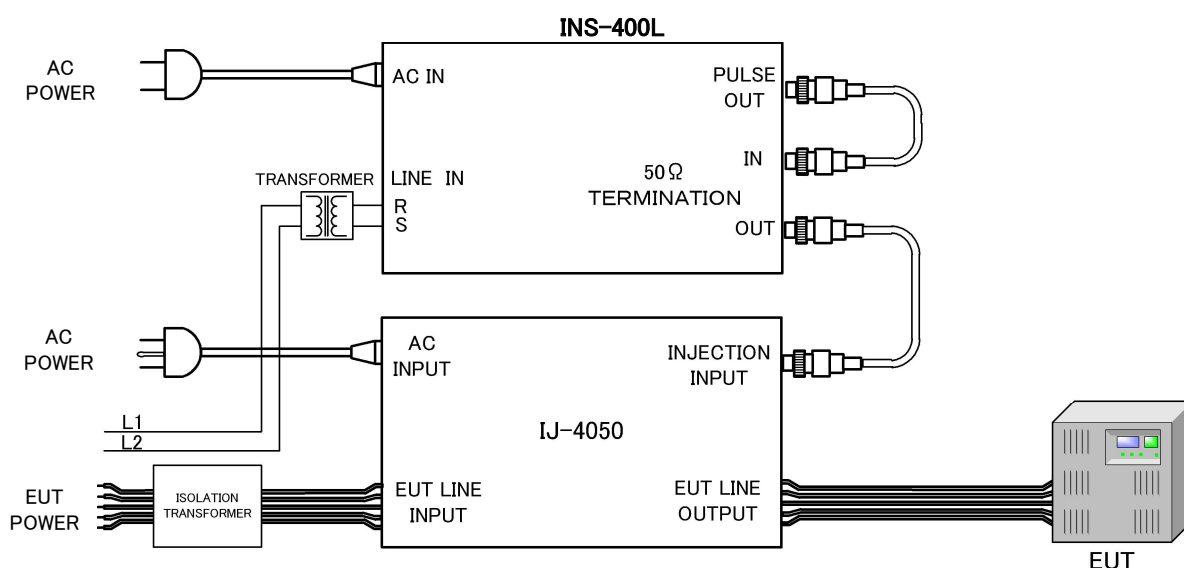
### 8.11 Connection with INS-4410/4420 series

When connecting with INS-4410/4420 series, connect from the R termination out of the simulator to an injection terminal of IJ-4050, in the same manner as INS-410/420/4310/4320, with a conversion cable Model: 02-00002A (option).

**Warning:** When conducting normal mode test, the simulator frame and one line of the EUT line are connected. Although the isolation transformer eliminates the risk of a shock hazard, be careful not to have short circuit events caused by touching the simulator frame to other lead, wire or housing.

### 8.12 Connection with INS-400L

The following is a diagram showing connections with INS-400L.



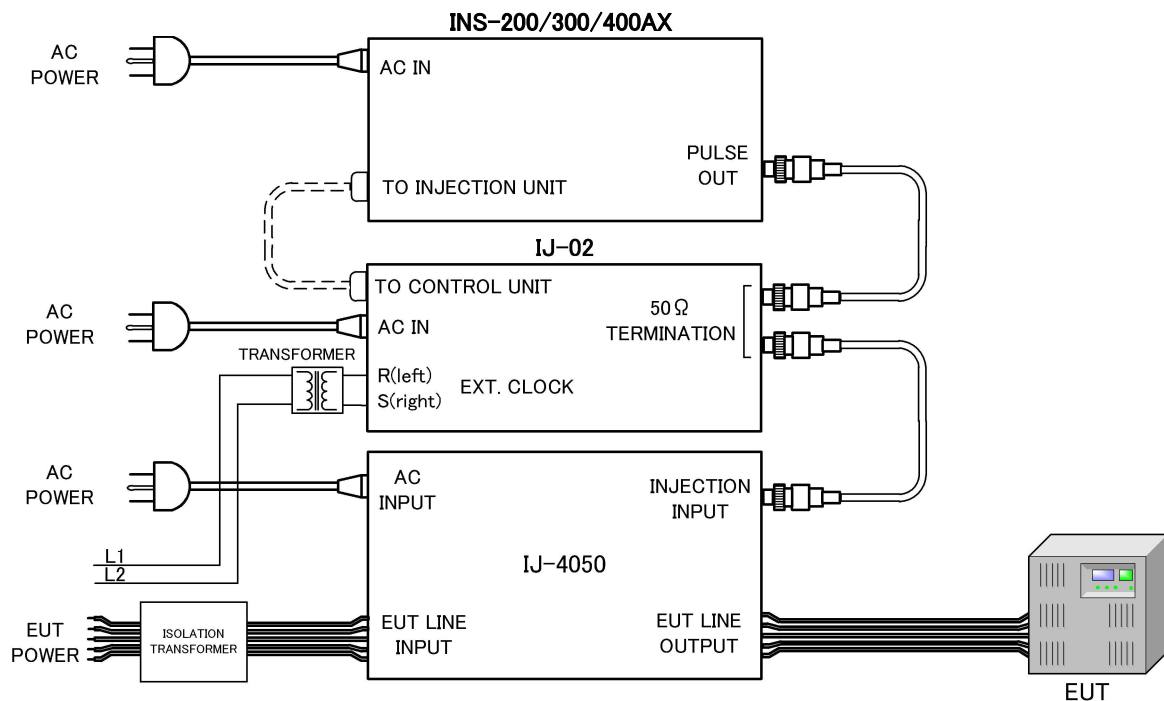
- ① Connect the PULSE OUT of the INS-400L to the built-in 50 Ω terminator.
- ② Connect from the 50 Ω termination out to a injection terminal of IJ-4050 with the supplied Injection coaxial cable.
- ③ EUT LINE INPUT shall be power-fed from an isolation transformer. Please refer to Section 9 Test set up.
- ④ For EUT line synchronization test, follow the procedures mentioned

below after selecting LINE PHASE mode of INS-400L simulator.  
 Once selecting LINE PHASE mode for INS-400L, the simulator outputs impulses synchronizing with the frequency of the EUT LINE IN. Connect the L1 and L2 from the EUT power supply to the EUT LINE IN terminal of INS-400L, select LINE PHASE mode and then turn the LINE ON. The maximum allowable input is 240VAC (Standard model). If a higher voltage is input, insert a voltage transformer. Even with 240V or lower, an isolation transformer is a must to avoid ground leak currents. Observe the waveform by an oscilloscope since the line phase may turn over due to connections to the isolation transformer.

**Warning: When conducting normal mode test, the simulator frame and one line of the EUT line are connected. Although the isolation transformer eliminates the risk of a shock hazard, be careful not to have short circuit events caused by touching the simulator frame to other lead, wire or housing.**

### 8.13 Connection with INS-AX series

The following is a diagram showing connections with INS-200AX/300AX/400AX/200AXT/300AXT.



- ① Connect the PULSE OUT of the INS-AX to the built-in 50 Ω terminator of the IJ-02/IJ-03.
- ② Connect from the 50 Ω termination out to a injection terminal of

IJ-4050 with the supplied Injection coaxial cable.

- ③ EUT LINE INPUT shall be power-fed from an isolation transformer. Please refer to Section 9 Test set up.
- ④ For EUT line synchronization test, follow the procedures mentioned below after selecting LINE SYNCHRONIZED mode for INS-AX simulator.\*

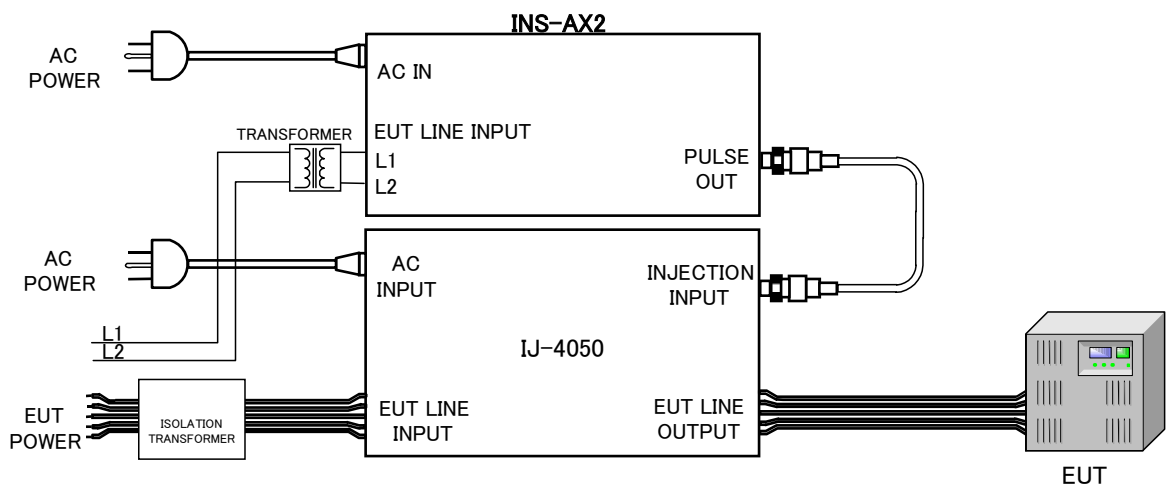
Once selecting LINE PHSE mode for INS-AX, the simulator outputs impulses synchronizing with the frequency of the EXT. CLOCK IN terminal. Connect the L1 and L2 from the EUT power supply to the EXT. CLOCK terminal of IJ-02/IJ-03, and select EXT trigger ON. The EXT. CLOCK terminal allowable input is up to AC240V. If the EUT supply voltage is larger than the power capacity of this terminal, insert a voltage transformer. Observe the waveform by an oscilloscope since the line phase may turn over due to connections to the isolation transformer.\*\*

\* When not synchronizing test, IJ-02/IJ-03 is used for 50 Ω termination purpose only. IJ-02/IJ-03 can be omitted by using 50 Ω terminator Model: 06-00006A up to 3kV testing.

\*\* Connect L1 to R (right) and L2 to S (left) of the EXT. CLOCK IN terminal.

### 8.14 Connection with INS-AX2 series

The following is a diagram showing connections with INS-AX2 series.



- ① Connect the PULSE OUT of the INS-AX2 to INJECTION INPUT of IJ-4050 of the line to be injected with the attached coaxial cable.
- ② EUT LINE INPUT shall be power-fed from an isolation transformer. Please refer to Section 9 Test set up.

- ③ For EUT line synchronization test, select PHASE (LINE SYNCHRONIZED) mode for INS-AX2 simulator.

INS-AX2 series simulators have function to generate impulses synchronized with input signal to EUT LINE INPUT on rear panel of the unit. With L1, L2 of EUT POWER connecting to EUT LINE INPUT of INS-AX2, turn on LINE ON switch, select PHASE injection mode, and conduct test. Inputtable voltage to LINE INPUT of the simulator is depending on the model. Refer to specifications of each model. In case of supplying more voltage than the allowed on the specification, supply power via a potential transformer. Even if the supplying voltage is within the specification, as leakage current of EUT LINE INPUT is big, supply power via an isolation transformer. Observe the waveform by an oscilloscope since the line phase may turn over due to connections to the isolation transformer. If it turns over, change the wiring of the transformer.

## 9 TEST SET UP

### 9.1 Test parameters

Refer to the instruction manual of the impulse noise simulator.

### 9.2 Coupling mode

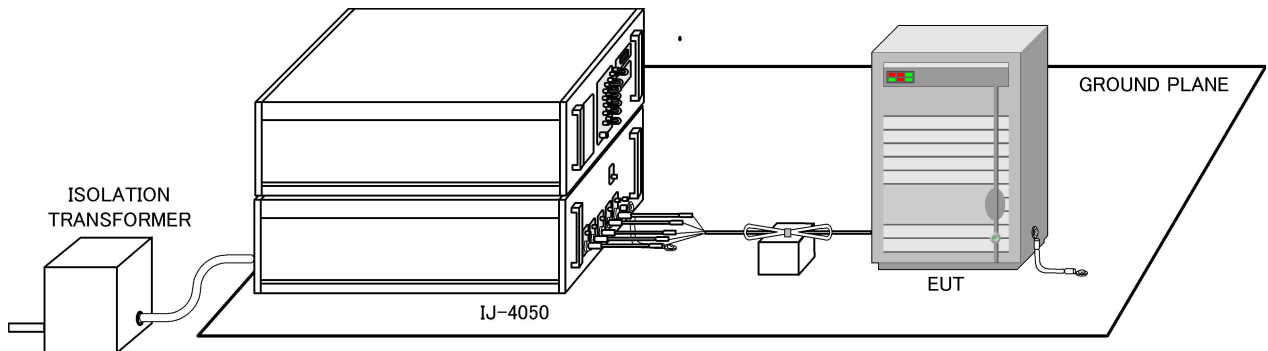
This unit can couple INS series simulator output impulses to AC415V 50A 3-phase 5-wire power line. 2 coupling modes are available.

- Line to ground mode for AC operated equipment (Common mode)
- Line to line mode for AC operated equipment (Normal mode)

### 9.3 Test environments

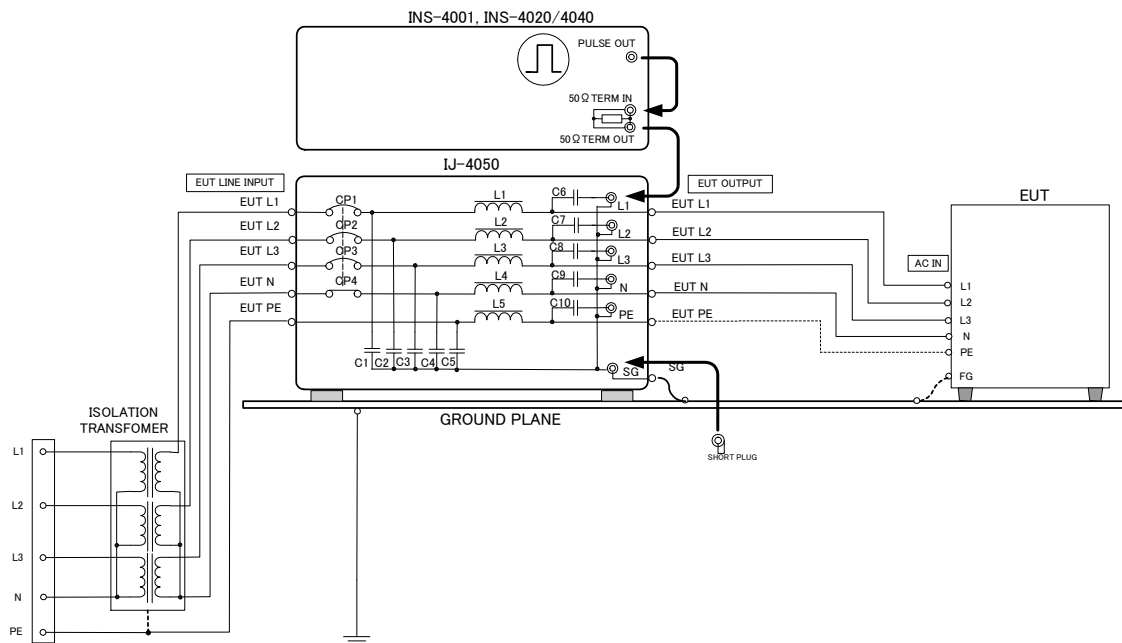
A recommended test set-up example is shown here. It consists of the following:

- Wooden test table (for table-top equipment)
- Ground plane and ground cable
- Power supply for the simulator
- Power supply for the EUT and an isolation transformer (AC powered testing)



## 9.4 Test set up

### 9.4.1 Line to ground mode (common mode) for AC operated equipment



[Points]

- 1) EUT LINE INPUT shall be power-fed from an isolation transformer.
- 2) Place a ground plane beneath the simulator and EUT. The plane shall be grounded for safety.
- 3) Connect the cables for the EUT. In case the cable is too long, fold it so that it might not cross with signal or other cables, and it might keep away from ground plane.
- 4) Plug the SG connector with the SG short plug.
- 5) Connect the SG terminal of this unit and FG terminal of the EUT to the ground plane by using low impedance wires, for example, braided wire of 3.5mm<sup>2</sup> of the shortest possible length.

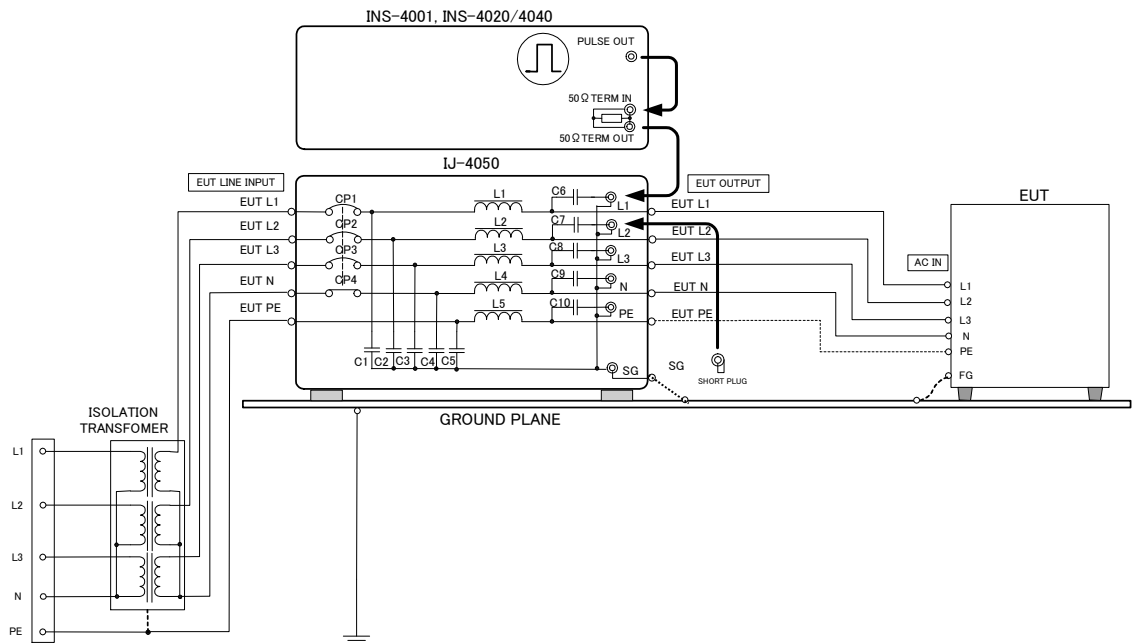
In case the EUT consists of plural units, each unit shall be connected to the ground plane.

- 6) When the EUT does not have FG terminal, testing shall be done with the EUT ungrounded to the ground plane.
- 7) Select the line to which the pulses are injected by making a connection from 50Ω TERM OUT terminal of the impulse noise simulator to the EUT LINE L1 (L2, L3, N or PE) by using the supplied Injection coaxial cable.

(Note) FG is an abbreviation for “frame ground”. SG is an abbreviation for “signal ground”

**Note: Do not use the INS-4001, INS-4020/4040’s SG short plug.**

## 9.4.2 Line to line mode (normal mode) for AC operated equipment



[Points]

- 1) EUT LINE INPUT shall be power-fed from an isolation transformer.
- 2) Place a ground plane beneath the simulator and EUT. The plane shall be grounded for safety.
- 3) Connect the cables for the EUT. In case the cable is too long, fold it so that it might not cross with signal or other cables, and it might keep away from ground plane.
- 4) Testing shall be done with the SG terminal not being connected to the ground plane. In case the EUT have an FG terminal, test it both with the FG connected to the ground plane and with the FG disconnected from the plane.
- 5) Select the line to which the pulses are injected by making a connection from 50Ω TERM OUT terminal of the impulse noise simulator to the EUT LINE L1 (or L2, L3) by using the supplied Injection coaxial cable.
- 6) Plug the L2 (or L3, N, PE) terminal with the SG short plug, while the SG connector shall remain open circuit.

(Note) FG is an abbreviation for “frame ground”. SG is an abbreviation for “signal ground”

**Warning: When conducting normal mode test, the outer conductor of the HV coaxial connectors and one line of the EUT LINE are connected. Although the isolation transformer eliminates the risk of a shock hazard, be careful not to have short circuit events caused by touching the HV connector outer conductor to other lead, wire or housing.**

**Note: Do not use the INS-4001, INS-4020/4040’s SG short plug.**

## 10 SPECIFICATIONS

### ■ SPECIFICATIONS

Parameters	Specifications	Notes
Maximum input voltage	8kV max without 50Ω termination	4kV with 50Ω termination
EUT power capacity	3-phase 5-wire (L1, L2, L3, N, PE) AC415V 50A	Do not use for DC power. L1-L2,L2-L3,L3-L1:AC415V L1,L2,L3-N:AC240V
Coupling mode selection	By short plug connection L1, L2, L3, N, PE	
Coupling mode	Normal/Common	By short plug connection
Zero cross detection	Detects L1-L2 voltage and outputs synchronization signal from SYNC OUT terminal	Open collector output. 24V/5mA max (Negative logic)
EUT Line protection	By Circuit protector	Detects L1,L2,L3 lines' current, and cut off L1,L2,L3,N lines
EUT Line input terminal	Horizontal conductor connection	Flexible stranded 0.5-16mm <sup>2</sup>
EUT Line output terminal	Φ6 dedicated contact	Connects the supplied Line output cable
Coupling attenuation characteristic	< -10dB	10kHz~1GHz No load
Residual impulse voltage at input terminal	< 450V	When injecting 4000V impulse with 50Ω termination. No load
Termination resistor	No additional resistor needed	Using the impulse noise simulator's terminator
Power supply	AC100~240V±10% 50/60Hz 20VA max	For AC200V, use a suitable AC cable to the power capacity.
Operating Temperature & Humidity	15~35℃ 25~75%	
Storage Temperature & Humidity	0~60℃ 10~90%	
Dimensions (mm)	(W)430×(H)199×(D)535	Projection excluded
Weight	About 25kg	

#### About the connection coaxial cable

Insulation failure may sometimes occur in the pulse width setting cables and/or injection coaxial cable depending on the operating condition and environment of this unit. So, check the cable for insulation using an insulation resistance meter once per 6 months or at intervals of 200 operating hours. When insulation lowers below 100MΩ/DC1000V, it is recommended that the pulse width setting cable be replaced with a new one.



## 11 WARRANTY

The following terms are applicable to servicing by Noise Laboratory Co., Ltd., (hereafter referred to as the Company) provided to maintain the intended performance of its products.

1. Scope

The following terms shall apply only to products made by the Company.

2. Technical servicing fee

In the event of a failure of a product within the warranty period (see warranty section), the Company will repair a product without charge. After the warranty expires, repairs will be billed at a nominal cost.

3. Ownership of defective parts

Any defective part exchanged under the Company's servicing belongs to it.

4. Limited liability

In the event that damages resulting from servicing by the Company are intentional or caused by negligence, the Company will pay the cost but at the purchase value of the relevant product maximum. But, notwithstanding the foregoing, the Company shall not be responsible for any incidental or consequential damages of any nature, including without limitation thereof loss of would-be profit or compensation demanded from a third party

5. Refusal to offer servicing

The company may not accept a repair order in the following cases:

- More than 5 years have passed since the product discontinued
- More than 8 years have passed after delivery
- Required component for servicing already discontinued and no alternative is available.
- Product changed, repaired or remodeled without obtaining a prior permission from the Company.
- Product severely damaged to the extent it has lost its original form

## Limited warranty

Noise Laboratory Co., Ltd. (hereafter referred to as the Company) warrants its products to be free from defects in materials and workmanship under normal use and service for a period of one year from date of delivery. In the event of failure of a product covered by this warranty, the Company will repair the product or may, at its option, replace it in lieu of repair without charge.

Notwithstanding the foregoing, the Company shall not be responsible for any incidental or consequential damages of any nature, including without limitation thereof loss of would-be profit or compensation demanded from a third party. This warranty is valid only in Japan.

### 1. Scope

This warranty shall only apply to products made by the Company.

### 2. Period

One year from date of delivery. The warranty may be valid in 6 months after servicing if the same failure on the same component has repeated.

### 3. Exclusions

The followings are exclusions from this warranty:

- Consumable parts (including HV relay)
- Failure caused by misuse, neglect, accident or abnormal conditions of operation
- Failure caused by remodeling on the user side without prior permission from the Company
- Failure caused by servicing by unauthorized personnel by the Company
- Failure due to force majeure including but not limited to, acts of God, fire, war, riot, rebellion and others
- Failure due to shock or drop in or after transit
- Failure due to operation in environment being out of ambient specifications.
- A unit shipped to overseas.

## 12 MAINTENANCE

1. The mercury relay is an expendable supplies. If a symptom such as output pulse unstable, etc happens, the mercury relay shall be replaced.
2. When repair, maintenance or internal adjustment of the unit is required, a qualified service engineer takes charge of such work.
3. Maintenance on the user side is restricted to the outside cleaning and functional check of the unit.
4. When cleaning the unit, turn off the switch of this unit and the connected equipment and disconnect the plug socket beforehand.
5. Avoid using chemicals for cleaning. Otherwise, the coating of the unit may peel off or the sight glass may be broken.
6. Do not over the cover of this unit.

## 13 NOISEKEN SUPPORT NETWORK

- If a symptom that seems a trouble is found, check the symptom against the following check sheet and inform the model name and serial Number of the product together with the symptom to Noise Laboratory or our nearest sales agent in your area.
- When the product is returned to Noise Laboratory, write the state of the trouble, contents of your request, model name and serial number in a repair order, pack the product and repair order sheet in the former package or equivalent suitable for transit, and send them back.



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