


kaise TRIAXIAL ELF MAGNETIC FIELD METER

INSTRUCTION MANUAL


SK-8301

KAISE CORPORATION

FOR SAFETY MEASUREMENTS!!

To prevent an electrical shock hazard to the operator and/or damage to the instruments, read this instruction manual carefully before using the instrument. **WARNINGS** with the symbol  on the instrument and this instruction manual are highly important.

Important Symbols :

 The symbol listed in IEC 61010-1 and ISO 3864 means "Caution (refer to instruction manual)".

WARNING

The symbol in this manual advises the user of an electrical shock hazard that could result in serious injury or even death.

CAUTION

The symbol in this manual advises the user of an electrical shock hazard that could cause injury or material damages.

INTRODUCTION

Thank you for purchasing KAISE "SK-8301 TRIAXIAL ELF MAGNETIC FIELD METER". To obtain the maximum performance of this instrument, read this Instruction Manual carefully, and take safe measurement.

FEATURES

SK-8301 provides accurate magnetic field measurement by its triaxial sensor and True RMS measurement method.

- Suitable for extremely low frequency magnetic field measurement from 40Hz to 1kHz.
- Two measurement units, μT or mG are selectable.
- MAX, MIN and Average measurement are possible.
- Quick measurement without connecting any external sensor. Also provides high portability.






1. UNPACKING AND INSPECTIONS

Confirm if the following items are contained in the package in good condition. If there is any damage or missing items, ask your local dealer for replacement.

- | | |
|-------------------------|--------|
| 1. Magnetic Field Meter | 1 pce. |
| 2. Carrying Case (1015) | 1 pce. |
| 3. Batteries (1.5V R6P) | 2 pcs. |
| 4. Instruction Manual | 1 pce. |

2. SPECIFICATIONS

2-1. GENERAL SPECIFICATIONS

- DISPLAY (LCD)**
 - Numerical Display** : 2000 count, Maximum reading 2000, 15mm high
 - Units and Symbols** : , , MAX, MIN, AVG, μT , mG, , AUTO, 
- OPERATING PRINCIPLE** : Triaxial True RMS (X, Y, Z)
- SAMPLING RATE** : 2 times/second
- RANGE SELECTION** : Auto-ranging
- MEASUREMENT UNIT** : μT /mG (selectable when turn the power on)
- OVERLOAD INDICATION** : "OL" indication when exceeding 2000 count
- BATTERY WARNING** :  indication at approx. $2.3\text{V} \pm 0.15\text{V}$ or less
- DISPLAY HOLD** : Hold indicating values by DH Key
- MAX/MIN/AVERAGE** : Measurable by REC Key
- AUTO POWER OFF** : Power turns off automatically after approx. 30 minutes. (in normal measurement mode / cancelable)
- OPERATING POWER SUPPLY VOLTAGE** : 2.3V to 3.6V
- OPERATING TEMPERATURE & HUMIDITY** : 0°C to 40°C , 80%RH or less in non-condensing
- STORAGE TEMPERATURE & HUMIDITY** : -20°C to 60°C , 70%RH or less in non-condensing
- TEMPERATURE COEFFICIENT** : Accuracy at $23^\circ\text{C} \pm 5^\circ\text{C} \times 0.1\%/^\circ\text{C}$
- SAFETY LEVEL** : CE marking approved (IEC-61010-1, CAT I 600V and EMC Test passed.)
- POWER SUPPLY** : 1.5V R6P or LR6 (AA) batteries x 2
- CURRENT CONSUMPTION** : Approx. 20mA (less than $100\mu\text{A}$ in auto power off and power-off conditions)
- CONTINUOUS OPERATING TIME** : Approx. 100 hours (alkaline), Approx. 50 hours (manganese)
- DIMENSIONS & WEIGHT** : 148(H) \times 83(W) \times 33(D)mm, Approx. 220g (including batteries)
- ACCESSORIES** : 1015 Carrying Case, 1.5V R6P (AA) batteries x 2, Instruction Manual

2-2. MEASUREMENT SPECIFICATION

($23^\circ\text{C} \pm 5^\circ\text{C}$, <80%RH in non-condensing)

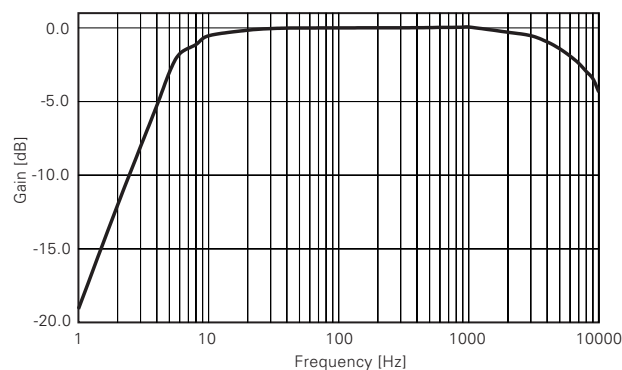
1. Magnetic Flux Density (μT)		True RMS	
Range	Accuracy	Resolution	Maximum Input
20.00 μT	$\pm 2\% \text{rdg} \pm 5 \text{dgt}$ (50/60Hz)	0.01 μT	200.0 μT
200.0 μT	$\pm 5\% \text{rdg} \pm 5 \text{dgt}$ (40Hz to 1kHz)	0.1 μT	

Range Selection : Auto-ranging
Response Speed : Within 2 seconds

2. Magnetic Flux Density (mG)		True RMS	
Range	Accuracy	Resolution	Maximum Input
200.0mG	$\pm 2\% \text{rdg} \pm 5 \text{dgt}$ (50/60Hz)	0.1mG	2000mG
2000mG	$\pm 5\% \text{rdg} \pm 5 \text{dgt}$ (40Hz to 1kHz)	1mG	

Range Selection : Auto-ranging
Response Speed : Within 2 seconds

FREQUENCY CHARACTERISTIC EXAMPLE



3. SAFETY PRECAUTIONS

Correct knowledge of electric measurements is essential to avoid unexpected danger such as operator's injury or damage to the instrument. Read the following precautions carefully for safety measurements.

3-1. WARNINGS

WARNING 1. Checks of the Instrument

Before measurement, check if there is no damage to the instrument. Dust, grease and moisture must be removed.

WARNING 2. Strong Magnetic Field

Extremely strong magnetic field could be generated depending on the electromagnetic sources.

1. Be careful not to get out of safety zone or safely marking area.
2. The person who with implant electronic devices such as pacemaker should avoid any dangerous area.
3. Be careful about displayed measurement values when approaching uncertain magnetic field sources.

WARNING 3. Electrical Shock

Do not touch the instrument on voltage generated circuit or any other parts. It might cause electrical shock hazard that could result in serious injury or even death.


WARNING 4. Measurable Frequency Range


Measurable frequency range of this instrument is 40Hz to 1kHz. Measurement out of this range should be incorrect, and may not detect the strong magnetic field which is dangerous for the person who with implant electronic devices such as pacemaker.


WARNING 5. Maximum Input Observance


Do not measure any magnetic flux density that might exceed the specified maximum input value.


3-2. GENERAL WARNINGS AND CAUTIONS

 **WARNING 1.** Children and the persons who do not have enough knowledge about electric measurements must not use this instrument.

 **WARNING 2.** Do not measure the electricity in naked of barefooted to protect yourself from electrical shock hazard.

 **CAUTION 1.** Keep away the instrument from hot and humid conditions like inside the car. Do not apply hard mechanical shock or vibration.

 **CAUTION 2.** Do not polish the case or attempt to clean it with any cleaning fluid like gasoline or benzene. If necessary, use silicon oil or antistatic fluid.

 **CAUTION 3.** Remove the batteries when the instrument is out of use for a long time. The exhausted batteries might leak electrolyte and corrode the inside.

4. NAME ILLUSTRATION

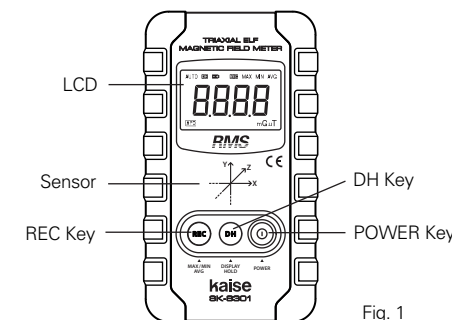


Fig. 1

4-1. LCD

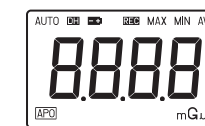






Fig. 2

- AUTO : Auto-ranging measurement
 DH : Lights up in display hold function
 : Low battery warning
 REC : Lights up in MAX/MIN/AVERAGE measurement
MAX : Lights up when maximum value is displayed
MIN : Lights up when minimum value is displayed
AVG : Lights up when average value is displayed
 APO : Lights up when auto power off is activated
mG : Lights up in mG measurement
 μT : Lights up in μT measurement

4-2. POWER Key

a. Power ON/OFF

Press this key for 0.5 seconds or less to turn on. To turn off, press it for 2 seconds or more.


b. Changing Measurement Units

Turn on the instrument holding down DH Key. Measurement unit is changed into another one, either μT or mG.

NOTE : Factory default setting is " μT ".


NOTE : The changed measurement unit is displayed from the next power-on.

4-3. DH Key : Display Hold

Holds displayed value on LCD by pressing this key for 0.5 seconds or less. ("" lights up)

To release it : Press DH Key again for 0.5 seconds or less.

4-4. REC Key : MAX/MIN/AVERAGE measurement

Press this key for 0.5 seconds or less to start MAX, MIN and Average measurements ("" lights up). To view each value, press this key for 0.5 seconds or less during MAX/MIN/AVERAGE measurement.

To return to normal measurement mode : Press REC Key for 2 seconds or more.

※For details of this function, read "5-3. MAX/MIN/AVERAGE Measurement".

4-5. Sensor

Triaxial sensor is incorporated inside of the X, Y, Z mark.

When measuring, put this mark almost under the magnetic field source.


5. MEASUREMENT PROCEDURES

5-1. PREPARATION FOR USE

1. INSTRUCTION MANUAL

Read INSTRUCTION MANUAL carefully to understand the specification and functions properly. "3. SAFETY PRECAUTIONS" is very important for safety measurement.

2. BATTERY INSTALLATION

Before starting measurement, install 2 pcs of 1.5V R6P or LR6 batteries referring to "6-1. BATTERY REPLACEMENT". Replace them in the same way when " " lights up on LCD.

3. OVERLOAD INDICATION

LCD displays "OL" if measurement value exceeds 2000 count.

4. AUTO POWER OFF

Power turns off automatically after approx. 30 minutes of the last key operation.



NOTE : Approx. 100 μ A is consumed even in the power-off condition.

NOTE : Auto power off is cancelled under MAX/MIN/AVERAGE measurement.

To cancel it : Turn on the instrument holding down **REC** Key. Auto power off is disabled and "**APD**" disappears from LCD.

5. SYMBOL MARK

The following symbol marks shown on the instrument and instruction manual are listed in IEC 61010-1 and ISO 3864.

	Caution (refer to instruction manual.)
	CE Marking Conformity

5-2. MAGNETIC FLUX DENSITY MEASUREMENT (μ T / mG)

WARNINGS

- Do not touch the instrument on voltage generated circuit or any other parts. It might cause electrical shock hazard that could result in serious injury or even death.
- Extremely strong magnetic field could be generated depending on the electromagnetic sources. Read "3. SAFETY PRECAUTIONS" carefully before starting the measurement.
- Frequency range to be measured is **40Hz to 1kHz**. Measurement out of this range should be incorrect.
- Do not measure any magnetic flux density that might exceed the specified maximum input value.

- Press **POWER** Key for 0.5 seconds or less and turn on the instrument.
- Confirm if the appropriate measurement unit, μ T or mG is displayed on the LCD.

Measurement unit can be changed by the following procedures.

How to change the measurement unit :

- Turn off the instrument by pressing **POWER** Key for 2 seconds or more.
- Hold down **DH** Key and press **POWER** Key for 0.5 seconds or less.
- The instrument turns on again and another measurement unit is displayed on LCD.

NOTE : Factory default setting is " μ T". (1 μ T = 10mG)

NOTE : The changed measurement unit is displayed from the next power-on.

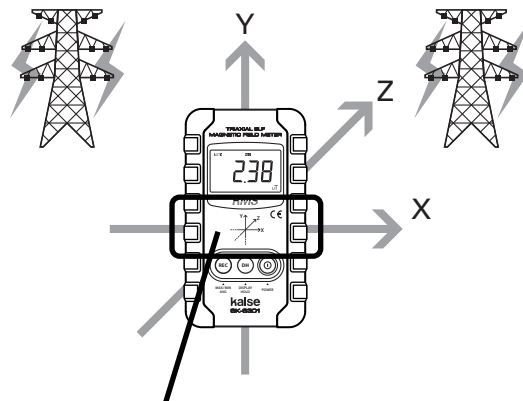
- Put sensor part, marked X, Y, Z, directly under the magnetic field source. Or, put this part close to the object to be measured.

NOTE : Triaxial sensor can take the measurement regardless of the instrument direction. Measurement from front, side, or any direction is possible.

- Read the measurement value on LCD.
- After finishing the measurement, turn off the instrument by pressing **POWER** Key for 2 seconds or more.

Available Functions :

MAX/MIN/AVERAGE Measurement (refer to 5-3), Display Hold (refer to 4-3)



Put sensor part, marked X, Y, Z, directly under the magnetic field source. Or, put this part close to the object to be measured.

Fig. 3

5-3. MAX/MIN/AVERAGE MEASUREMENT

MAX, MIN and Average measurement are possible by using **REC** Key.

- Press **REC** Key for 0.5 seconds or less during normal measurement. "**REC**" lights up on LCD and starts MAX/MIN/AVERAGE measurements. **NOTE** : Auto power off is cancelled in this function.
- Press **REC** Key for 0.5 seconds or less to view MAX, MIN, and Average values. "MAX" (maximum value) \rightarrow "MIN" (minimum value) \rightarrow "AVG" (average value) are displayed on LCD each time the key pressed.
- To return to MAX/MIN/AVERAGE measuring mode, press **REC** Key for 0.5 seconds or less in "AVG" display.
- To return to the normal measurement mode, press **REC** Key for 2 seconds or more. MAX/MIN/AVERAGE measurement is finished and "**REC**" disappears from LCD.

NOTE : Auto power off is reactivated after returning to the normal measurement mode.

NOTE : The instrument does not memorize MAX, MIN and Average values after finishing this function.

MAX/MIN/AVERAGE MEASUREMENT EXAMPLE

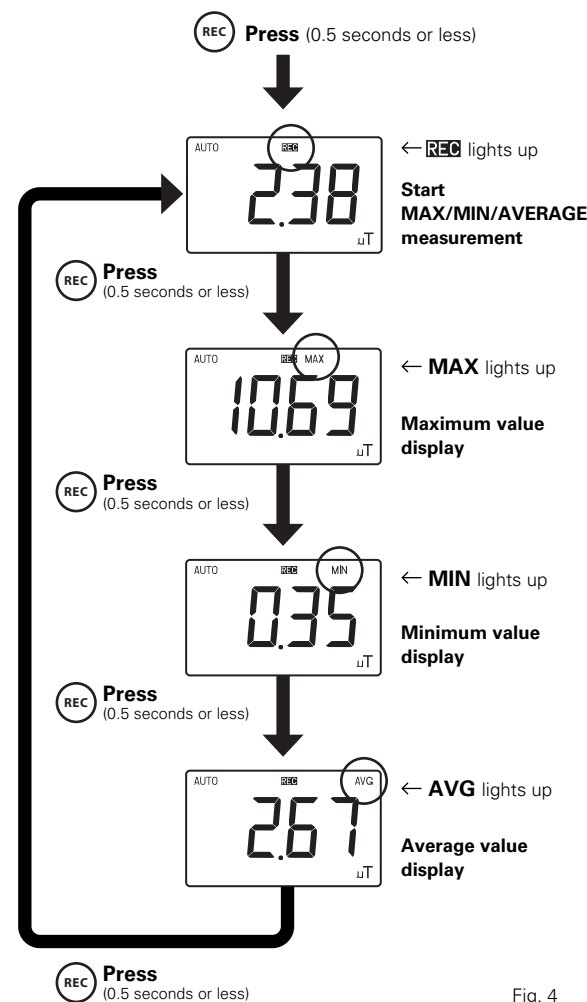



Fig. 4

5. MAINTENANCE

6-1. BATTERY REPLACEMENT

WARNING

To avoid electrical shock, stop measurement and turn off the instrument when to replace battery.

Replace the batteries when " " lights up on LCD.

- Stop measurement and turn off the instrument.
- Loosen a screw of battery cover and open it. **NOTE** : Pull the screw when the battery cover is hard to be opened.
- Remove the exhausted batteries.
- Insert 2 pcs of new 1.5V R6P or LR6 batteries in correct polarity.
- Fix battery cover and tighten the screw.

NOTE : Remove the batteries when the instrument is out of use for a long time. The exhausted batteries might leak electrolyte and corrode the inside.

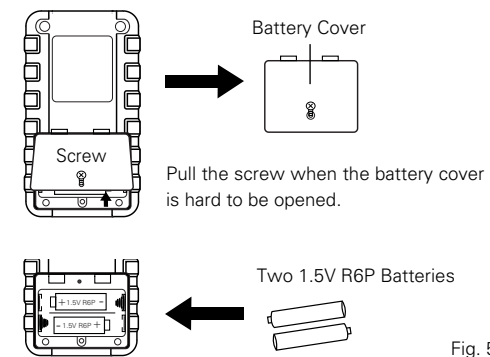


Fig. 5


6-2. PERIODICAL CHECK AND CALIBRATION

Periodical check and calibration is necessary to make safety measurements and to maintain the specified accuracy. The recommended check and calibration term is once a year and after the repair service. This service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer.

6-3. REPAIR

Repair service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer. Pack the instrument securely with your name, address, telephone number and problem details, and ship prepaid to your local dealer.

Check the following items before asking repair service.

- Check the battery connection, polarity, and capacity (" " lights up or not).
- Confirm that the keys are set correctly.
- Confirm that measured accuracy is adopted in the operating environment.
- Confirm that the body of this instrument has no cracks or any other damages.

WARRANTY

SK-8301 is warranted in its entirety against any defects of material or workmanship under normal use and service within a period of one year from the date of purchase of the original purchaser. Warranty service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer. Their obligation under this warranty is limited to repairing or replacing SK-8301 returned intact or in warrantable defect with proof of purchase and transport charges prepaid. KAISE AUTHORIZED DEALER and the manufacturer, KAISE CORPORATION, shall not be liable for any consequential damages, loss or otherwise. The foregoing warranty is exclusive and in lieu of all other warranties including any warranty of merchantability, whether expressed or implied.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside of KAISE AUTHORIZED SERVICE AGENCY, nor which have been subject to misuse, negligence, accident, incorrect repair by users, or any installation or use not in accordance with instructions provided by the manufacturer.

KAISE AUTHORIZED DEALER



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Product specifications and appearance are subject to change without notice due to continual improvements.