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HIOKI

8938

FFT ANALOG UNIT

INSTRUCTION MANUAL

September 2006 Revised edition 6 Printed in Japan
8938A980-06 06-09H

HIOKI E. E. CORPORATION

HEAD OFFICE
81 Koizumi, Ueda, Nagano 386-1192, Japan
TEL +81-268-28-0562 / FAX +81-268-28-0568
E-mail: os-com@hioki.co.jp URL http://www.hioki.co.jp/

HIOKI USA CORPORATION
6 Corporate Drive, Cranbury, NJ 08512, USA
TEL +1-609-409-9109 / FAX +1-609-409-9108

Introduction

Thank you for purchasing the HIOKI "Model 8938 FFT ANALOG UNIT". To obtain maximum performance from the device, please read this manual first, and keep it handy for future reference.

Overview

The 8938 is the FFT analog unit for the Memory HiCorders. For the detailed installation procedure, refer to the instruction manual for the main unit.

HIOKI device supported: 8720, 8826 (ROM Ver.2.00 or later), 8835 (ROM Ver.5.00 or later), 8835-01, 8841, 8842, 8860, 8861

Inspection and Maintenance

Initial Inspection

When you receive the device, inspect it carefully to ensure that no damage occurred during shipping. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

Preliminary Checks

- Before using the device the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer or Hioki representative.
- Before using the device, make sure that the insulation on the connection cords is undamaged and that no bare conductors are improperly exposed. Using the device in such conditions could cause an electric shock, so contact your dealer or Hioki representative for replacements. (Model 9197, 9198)

Maintenance and Service

- To clean the device, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- If the device seems to be malfunctioning, contact your dealer or Hioki representative.
- Pack the device so that it will not sustain damage during shipping, and include a description of existing damage. We cannot accept responsibility for damage incurred during shipping.

Safety

This manual contains information and warnings essential for safe operation of the device and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

⚠DANGER
This device is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the device. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from device defects.

Safety Symbol

⚠	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the device. The ⚠ symbol printed on the device indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
⏚	Indicates a grounding terminal.
~	Indicates both DC (Direct Current) and AC (Alternating Current).
⎓	Indicates DC (Direct Current).

The following symbols in this manual indicate the relative importance of cautions and warnings.

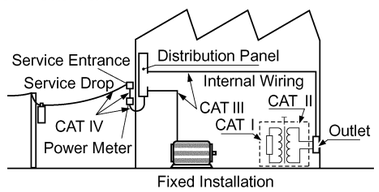
⚠DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
⚠WARNING	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
⚠CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the device.

Measurement categories (Overvoltage categories)

This device complies with CAT II safety requirements.
To ensure safe operation of measurement devices, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT I to CAT IV, and called measurement categories. These are defined as follows.

CAT I: Secondary electrical circuits connected to an AC electrical outlet through a transformer or similar device.
CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
CAT III: Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.
CAT IV: The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).

Higher-numbered categories correspond to electrical environments with greater momentary energy. So a measurement device designed for CAT III environments can endure greater momentary energy than a device designed for CAT II.
Using a measurement device in an environment designated with a higher-numbered category than that for which the device is rated could result in a severe accident, and must be carefully avoided.
Never use a CAT I measuring device in CAT II, III, or IV environments.
The measurement categories comply with the Overvoltage Categories of the IEC60664 Standards.

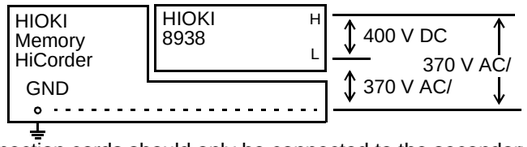


Fixed Installation

Usage Notes

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

⚠DANGER
- The maximum input voltage is 400 V DC. Attempting to measure voltage in excess of the maximum input could destroy the device and result in personal injury or death.
- The maximum rated voltage between input terminals and ground (voltage between 8938 input terminal and main unit frame, and between input terminals of other input modules) is 370 V DC. Attempting to measure voltages exceeding this level could damage the device and result in personal injury. The maximum rated voltage to earth rating applies also if an input attenuator or similar is used.

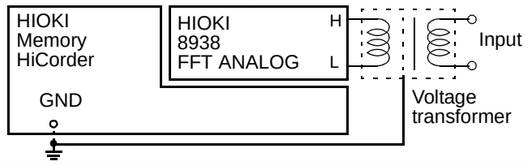


- Connection cords should only be connected to the secondary side of a breaker, so the breaker can prevent an accident if a short circuit occurs. Connections should never be made to the primary side of a breaker, because unrestricted current flow could cause a serious accident if a short circuit occurs.

⚠WARNING
- Do not allow the device to get wet, and do not take measurements with wet hands. This may cause an electric shock.
- Do not use the device where it may be exposed to corrosive or combustible gases. The device may be damaged or cause an explosion.
- For safety reasons, when taking measurements, only use the specified HIOKI 9197/9198 CONNECTION CORD (options).

⚠CAUTION
- Do not store or use the device where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the device may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This device is not designed to be entirely water- or dust-proof. Do not use it in an especially dusty environment, nor where it might be splashed with liquid. This may cause damage.
- To avoid damage to the device, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.

When making measurements on an AC power line for example, using a voltage transformer, be sure to connect the voltage transformer ground terminal to ground.



Specifications

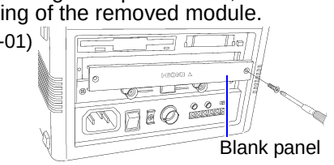
Accuracy guaranteed for one year at 23±5°C (73±9°F), 35 to 80%RH, after auto-balancing, after 30-minutes warming-up time.

Number of input channels	2
Measurement ranges	f.s. = 10 DIV: 10 m, 20 m, 50 m, 100 m, 200 m, 500 m, 1, 2, 5, 10, 20, 50 V/DIV f.s. = 20 DIV: 5 m, 10 m, 20 m, 50 m, 100 m, 200 m, 500 m, 1, 2, 5, 10, 20 V/DIV
DC amplitude accuracy	±0.4%f.s.
Zero position accuracy	±0.1%f.s. (after zero adjustment)
Temperature characteristic	Gain: ±0.025%f.s./°C Zero position: ±0.02%f.s./°C (after zero adjustment)
Frequency characteristic	DC to 400 kHz ±3 dB (DC coupling) 7 Hz to 400 kHz ±3 dB (AC coupling, low cut-off frequency: 7 Hz±20%)
Noise	500 µV p-p typ., 750 µV p-p max. (sensitivity range, with input shorted) (when installed in the 8860/8861, Serial No. 2004-041132533 or later)
Common mode rejection ratio	80 dB minimum (at 50/60 Hz and with signal source resistance 100 Ω maximum)
Low-pass filter	OFF, 5, 500, 5 k, 100 kHz ±50% (-3 dB)
Anti-aliasing filter	Cutoff frequency (fc): 20, 40, 80, 200, 400, 800, 2 k, 4 k, 8 k, 20 k, 40 kHz (These frequencies are automatically set when the anti-aliasing filter is set to ON) Attenuation characteristic: -66 dB min. at 1.5 fc
Input type	Unbalanced (input isolated from output)
Input coupling	DC/ AC/ GND
Input resistance	1 MΩ±1%
Input capacitance	30 pF±10 pF (at 100 kHz)
A/D resolution	12 bits
Voltage axis resolution	f.s. = 10 DIV:160 points/DIV f.s. = 20 DIV: 80 points/DIV
Maximum sampling rate	1 MS/s (sampling period: 1 µs)
Input terminals	Insulated BNC terminal
Maximum input voltage	400 VDC
Maximum rated voltage to earth	370 VDC (between each input channel and main unit, and between input channels)
Operating temperature and humidity ranges	Same as the Memory HiCorder in which the 8938 is installed
Storage temperature and humidity ranges	-10 to 50°C (14 to 122°F), 80% RH or less (no condensation)
Operating environment	Same as the Memory HiCorder in which the 8938 is installed
Effect of radiated radio-frequency electromagnetic field	±2%f.s. at 3 V/m
Effect of conducted radio-frequency electromagnetic field	±28%f.s. at 3 V (100 mV/DIV range at 1 VDC input)
Dimensions and mass	Approx.170W x 20H x 148.5D mm (6.69"W x 0.79"H x 5.85"D)(excluding projections), approx.290g (10.2 oz.)
Accessory	Instruction Manual
Applicable Standards	Safety EN 61010 Pollution degree 2, Measurement category II (anticipated transient overvoltage 4000 V) EMC EN 61326 Class A

Replacement Procedure

⚠WARNING
- To avoid electric shock accident, before removing or replacing an input module, confirm that the instrument is turned off and that the power cord and connection cords are disconnected.
  The mounting screws must be firmly tightened or the input module may not perform to specifications, or may even fail.
- To avoid the danger of electric shock, never operate the instrument with an input module removed. To use the instrument after removing an input module, install a blank panel over the opening of the removed module.

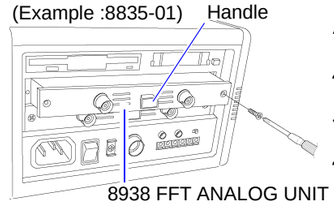
(Example:8835-01)


Blank panel

⚠CAUTION
Do not measure with a blank panel removed. Otherwise, the main unit internal temperature becomes unstable and consequently the specifications are not met.

This section describes how to replace the 8938 FFT ANALOG UNIT. The following procedure describes how to remove the 8938.
Install the modules by reversing the procedure for removal.

(Example :8835-01) Handle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1. Remove the connection cords from all input modules.
2. Power off the main unit, and disconnect the power cord.
3. Remove the two fixing screws with a Phillips screwdriver.
4. Grasp the handle and pull the module out.