



Instruction Manual
MINI CALIBRATOR
MC-20

Introduction

Thank you for purchasing the “MINI CALIBRATOR MC-20”.

This manual contains operating, specifications and cautions, etc. Please ensure that you fully understand the contents of this manual before using “MINI CALIBRATOR MC-20”.

Checking Accessories

First, check the accessories.

Contact your retailer or the manufacturer if any are missing or defective.

Name	No.	Remarks
MC-20	1	—
Cable	1	Low-Noise Cable LN-030 0.5m Miniature-BNC
Mounting Stud	1 each	M6 Trd.-M3 Trd. (Approx. 4.9g) M6 Trd.-No.10-32UNF Hole (Approx. 1.2g) M6 Trd.-Flat Base (Approx. 5.0g) M6 Trd (Approx. 1.3g)
Hard case	1	—
Dedicated AC adapter	1	Type: DCP01
USB cable	1	Type: USB01
Data Transfer Software	1	Installation CD-ROM
BNC Cap	1	BNC connector protector
Instruction Manual	1	This manual
Data Transfer Application Manual	1	—

Safety Precautions

Please read these “Safety Precautions” and this manual thoroughly to ensure that you are able to use the “MINI CALIBRATOR MC-20” safely and correctly.

Please also note that Fuji Ceramics Corporation bears no responsibility and offers no warranties in relation to any damage or injury arising from usage that does not comply with this manual and the cautions and warnings in this section.

● Warnings and Cautions

This section, “Safety Precautions”, employs the warning labels shown below in order to assist in the safe use of the “MINI CALIBRATOR MC-20”.



Warning: This label is used when the user can be exposed to the risk of death or serious injury as a result of erroneous handling.



Caution: This label is used when the user can be exposed to the risk of injury or when the incidence of physical damage can be envisaged as a result of erroneous handling.



Warning

- Avoid use in areas of significantly high temperature.
 - » The operating temperature range for this product is 10°C to 40°C. There is a risk of ignition when the product is used in places with temperatures beyond this operating temperature range.

- Avoid storage or use in gas.
 - » Do not store or use this device in places where combustible or explosive gases or steam is present.
Use of this device in such environments is dangerous.

- Avoid storage or use in places where water is present.
 - » Water penetration into the device or getting the device wet can cause heat generation or electrocution. In the event that the device does get wet, cut off the power supply (unplug AC adapter/remove batteries) immediately and consult your retailer or the manufacturer.

- Do not disassemble or modify this device.
 - » Usage in a disassembled or modified state can cause fire, electrocution or malfunction, etc.

- Should any foreign matter get into the device, cut off the power supply (unplug AC adapter/ remove batteries) immediately.
 - » Usage with foreign matter inside can cause fire, electrocution or malfunction, etc.
If any foreign matter does get into the device, consult your retailer or the manufacturer.

- Should any abnormalities occur, such as smoke, strange smells or noises emanating from the device, cut off the power supply (unplug AC adapter/ remove batteries) immediately.
 - » Continued use in this state can cause fire, electrocution or malfunction, etc.
If any abnormalities do occur, consult your retailer or the manufacturer.

- Do not use this device if has been dropped or damaged.
 - » Using the device regardless can cause fire, electrocution or malfunction, etc.
If the device is dropped or damaged, consult your retailer or the manufacturer.

- Do not use the device in sites where it will be exposed to oil smoke or steam, or in dusty places.

» Oil and dust can cause heat generation, fire and electrocution.

- Do not place the device in sites exposed to direct sunlight.

» This can cause fire.



Caution

- Do not place the device on unstable sites or place other items on the device.

» Falling from unstable sites or falling over can cause injury or damage.

- When lightning is occurring, do not touch the power plug (power outlet end) of the AC adapter.

» This can cause electrocution.

- Use only the dedicated AC adapter provided with the device.

» Use of AC adapters other than the one provided can cause the device to malfunction.

- When the device will not be used for long periods, cut off the power supply (unplug AC adapter/remove batteries).

» Perpetual power connection during long periods of non-usage can cause electrocution or fire.

- In the event of malfunction

In the unlikely event of a malfunction, please contact your retailer or the manufacturer.

Manufacturer contact details:

Fuji Ceramics Corporation

Yamamiya 2320-11, Fujinomiya-shi, Shizuoka pref. 418-0111

TEL 0544-58-4651

FAX 0544-58-1413

URL: <http://www.fujicera.co.jp>

E-mail: sales_dept@fujicera.co.jp

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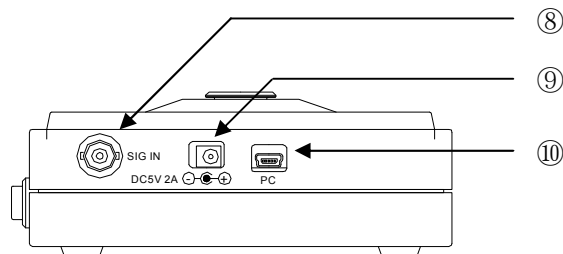
1. Overview

MC-20 Mini calibrator is a simple, portable calibrator for charge and IEPE, ICP® type accelerometers.

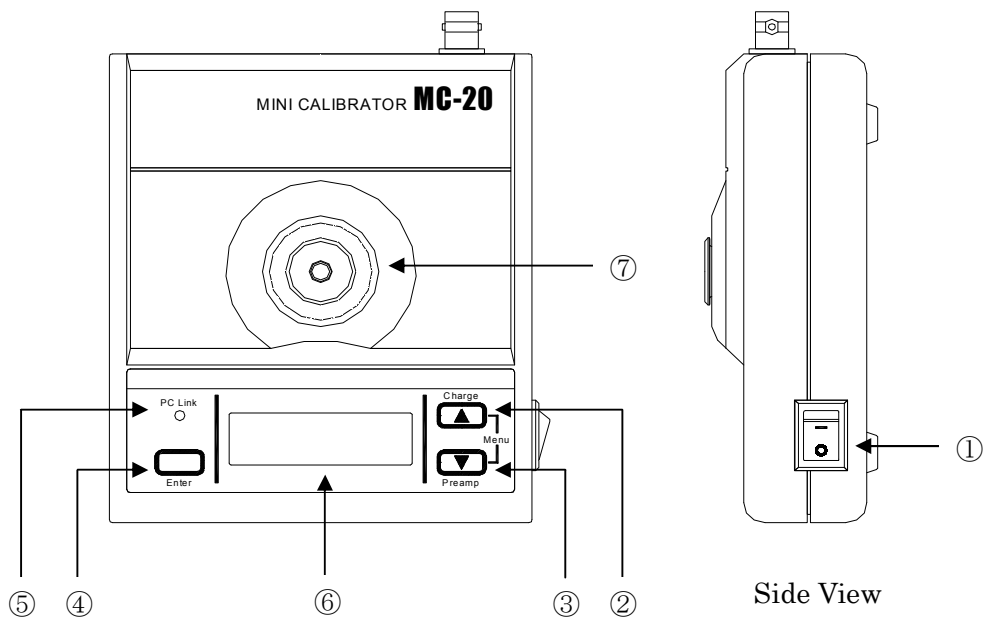
The unit shakes the accelerometer, measures output signal from accelerometer, and calculates sensitivity.

- * MC-20 shakes accelerometer at 159.2 Hz to get sensitivity easily and simply in the field.
- It is not recommended for high-precision calibration for laboratory or institute use.

2. Names and Parts




Rear View



Top View

① Power switch


Switches the power ON or OFF.

② Select switch 

Change to charge mode. On menu mode, this works as UP key.

When measurement is complete (Single mode), hold button down for about 1 second to restart measurement.

※ For further details regarding Single mode function, see page 13.

③ Select switch 

Change to IEPE, ICP® mode. On menu mode, this works as DOWN key.

When measurement is complete (Single mode), hold button down for about 1 second to restart measurement.

To get into menu mode, press both UP and DOWN key at once.

④ Enter key

Store sensitivity data to PC or MC-20. On menu mode, this works as ENTER key.

When you wish to store data to MC-20, set “PC Link” to “Cut” via menu.

⑤ PC Link

Red : Communication mode is set to “Link”

Blue : Communicating with PC

Off : Communication mode is set to “Cut”

⑥ LCD Display

Sensitivity, bias voltage, mode, etc. are displayed.

For further details regarding the display, see page 11.

⑦ Shaker

Base which accelerometer is connected to

The screw section is M6 with a depth of 6.5mm.

For sensor attachment method, see page 10.

⑧ Signal input connector (BNC)

Output signal from accelerometer has to be connected to

In the amplifier internal sensor measurement mode, this also acts as the amplifier's drive power supply terminal.

⑨ Dedicated AC adapter input terminal
 Connection point for the dedicated AC adapter.

⑩ Mini USB connector
 Connect USB cable from PC.

3. Menu items and settings

To get into menu mode, press both UP and DOWN key at once.

In addition, you can keep these buttons pressed down to initiate continuous scrolling while in the menu screen.

No.	Item	Parameter (*3)	Note
1	Source Current	4mA/ <u>2mA</u> /0.5mA	Select constant current of ICP supply
2	Source Voltage	24V/ <u>15V</u>	Select bias voltage of ICP supply
3	PC Link	Link/ <u>Cut</u>	Communication mode with PC
4	Data List	Data list view	—
5	Clear Data List	Clear/Cancel	Clear all data
6	Measure Mode	Single/ <u>Repeat</u>	Select measure mode (*1)
7	Auto Power off	ON(3min)/ <u>OFF</u>	Set auto power off (*2)
8	LCD illumination	ON/ <u>OFF</u>	Select LCD backlight setting
9	Date Time	Set Time Date	Set Time Date Month Year
10	Data Transmit	Transmit/Cancel	Transfer data to PC
	Return	—	Rerurn

___: Factory settings

(*1) Use the Repeat mode when seeking precise measurement accuracy as it may take a while for the sensitivity of low-sensitivity sensors to stabilize.

(*2) If the power supply is cut off when the power switch status is “ON” in Auto Power off, switch the power switch of “OFF” and then back to “ON” to return MC-20 to its drive state.

(*3) All settings are kept, even if MC-20 is turned off.

4. Operations

● Power supply preparation

The MC-20 can be driven either by the dedicated AC adapter or four LR6 (recommended).

Select the drive method.

Note:

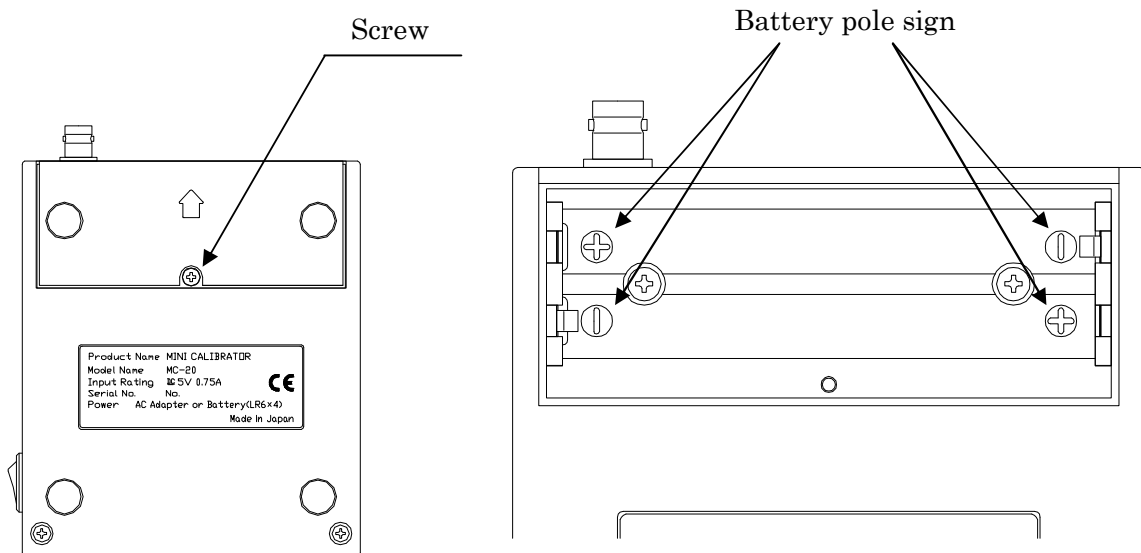
- It works about one hour using alkaline batteries.
- Operating time depends battery type
- Use AC/DC adapter when it's used for a long time.

When using the dedicated AC adapter, connect the AC power source to the MC-20's AC power input terminal via the dedicated AC adapter.

When drive is battery powered, the cover of the battery housing at the back is fixed in place with an M3 screw. Use an appropriate screw driver for an M3 screw to remove the screw and the battery housing cover.

Set the batteries in accordance with the \oplus and \ominus polar direction signs shown in the housing.

(See diagram below)



Bottom View

Note:

- Remove batteries, if it's not used for a while.

Please be careful as this can cause battery rupture or leakage.

● Attach accelerometer



- Clean the base and remove dust
- If an accelerometer has a female screw, attach accelerometer using screw which supplied with accelerometer.
If an accelerometer has M6 male screw, it can be attached using male screw (Apply a thin coat of silicone grease between the sensor and the MC-20 base.)
If a screw which accelerometer has is not M6, use conversion screw or conversion stud
- Attach the cable to the sensor, and connect the BNC connector at the end of the cable to the BNC connector on the main MC-20 unit.

Note:

- Attach accelerometer less than 0.5 N·m (4.43 inch-lbf) torque.

Please be careful as excessive tightening can damage the exciter section.

● Driving

- MC-20 starts to shake the base and measure the sensitivity immediately, when turned ON.
- In case of charge type accelerometer, push select switch  to change charge mode.
In case of IEPE , ICP® type accelerometer, push select switch  to change ICP® mode.
And select power supply such as voltage and current for accelerometer.

(Example)

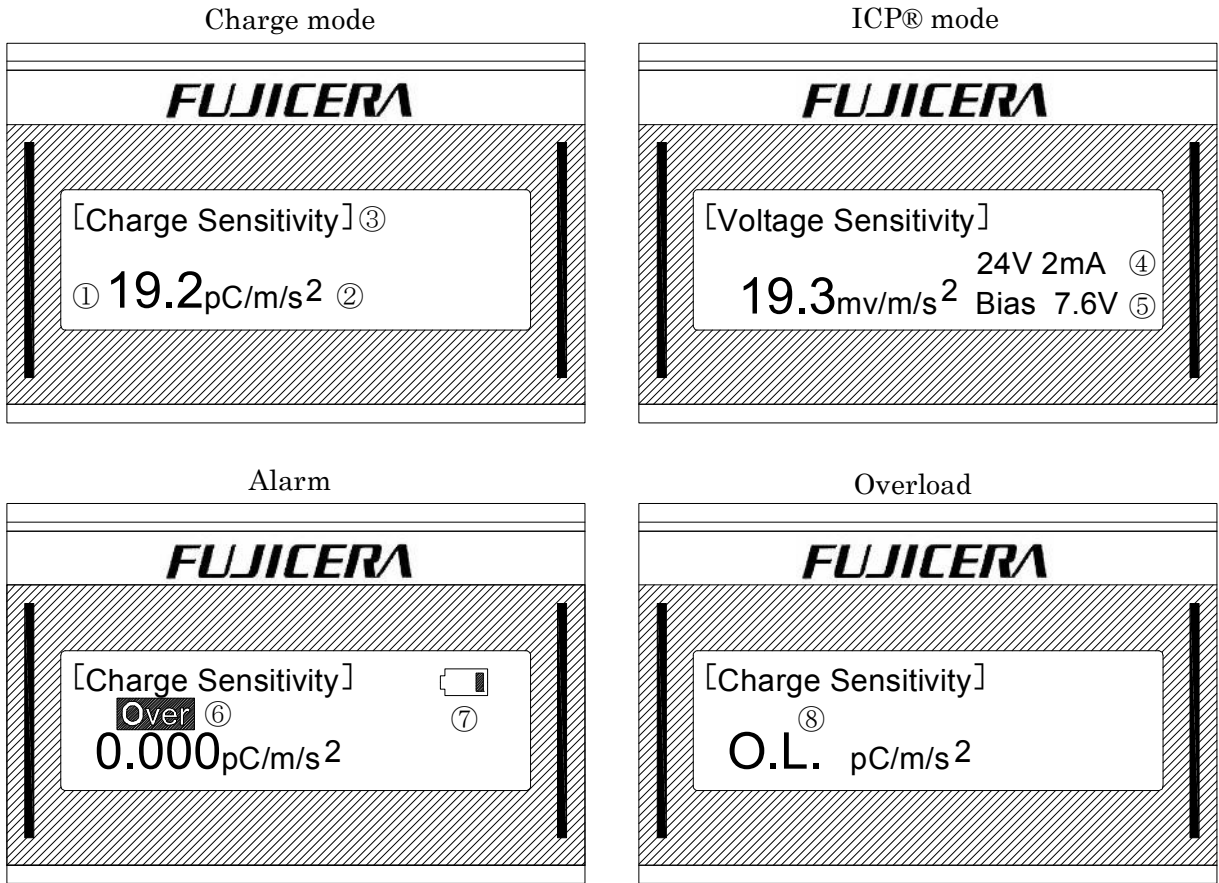
In the case of Fujicera's 3-Axis Acceleration Sensor (SA11ZSC-TI), as the amp operates at a drive voltage between 21V-24V and a current of 0.5mA – 10mA, set the MC-20 to 24V.

With this sensor, any one of the 0.5mA, 2.0mA or 4.0mA settings can be used.

Note:

- Make sure power supply such as voltage and current for accelerometer. If these are too high, accelerometer might get damaged.
Check that the MC-20 settings and the sensor specifications match, and then connect to the MC-20.

- Measure
- Display screen



① Sensitivity

Calculated sensitivity is displayed.

The minimum number of digits is displayed as three significant digits, down to the third decimal place.

② Unit

pC/m/s² (Charge mode), mV/m/s² (IEPE, ICP® mode)

③ Accelerometer type (Charge / Voltage (ICP®))

Charge Sensitivity (Charge mode), Voltage Sensitivity (IEPE, ICP® mode)

(Note)

When the measurement mode is set to "Charge Sensitivity", sensitivity will be displayed when the amplifier's internal sensor is measured. However, you should bear in mind that normal measurement has not taken place.

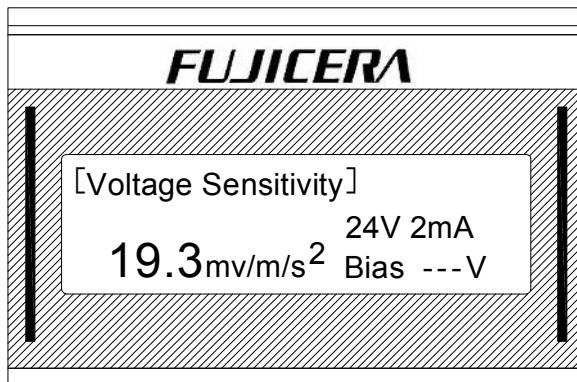
④ Supply voltage,current

ICP supply voltage, current

⑤ DC bias voltage

DC bias voltage on IEPE, ICP® mode

A dashed line will be displayed when there is no input (See diagram below).



⑥ Overload alarm

Overload or overweight (accelerometer is too heavy to calibrate)

If this alarm appears, calibrator stops to shake.

If the overload alarm is displayed, remove the load (sensor) from the exciter section immediately.

Should vibrations cease, they can be restarted by holding down the Select switch.

⑦ Low battery alarm

Installed batteries voltage are low, change batteries or connect AC/DC adapter.

⑧ Over range

Sensitivity is too high (maximum sensitivity which MC-20 can calibrate is 19.9 pC/m/s² or 19.9 mV/m/s²)

“O.L” will be displayed for sensitivity greater than 20.0pC(mV)/m/s², indicating that measurements cannot be taken.

Note:

- Minimum sensitivity which MC-20 can calibrate is 0.026 pC/ m/s² or 0.026 mV/ m/s²

Sensitivity lower than 0.025pC(mV)/m/s² will be displayed as “0”.

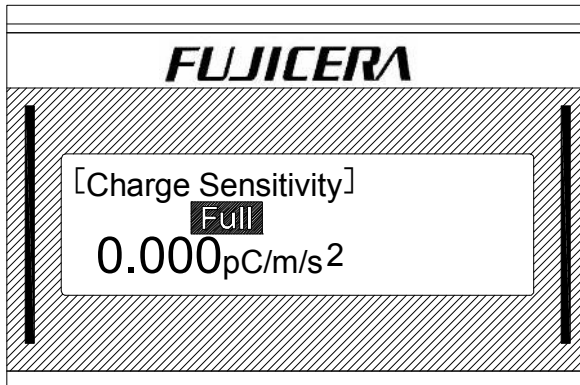
5. Function

○ Storing Data to MC-20

Set to “Cut” on PC Link menu and measure the sensitivity.

Push Enter key to store the measured sensitivity. Up to 100 data can be stored to MC-20 unit.

When the number of stored data entries reaches 100, the word “Full” will be displayed on the measurement screen. (See diagram below)



During “Full” is displayed, storing data is not available. In this case, delete stored data on MC-20.

Possible to delete stored data on “Clear Data List” menu.

○ Data List

Display stored data on MC-20.

“Number, Sensitivity, DC bias voltage” are displayed. In case of transferring data to PC, Date and Time information also transferred with above information.

○ Measurement Mode

Two measurement mode “Single” and “Repeat” are available.

“Single” means single shot measurement.

After measured sensitivity being stable, MC-20 stops to shake base.

Push select switch bit longer to measure sensitivity again and switching the power switch OFF and then ON will restart measurement.

“Repeat” means continuous measurement. MC-20 doesn't stop to measure sensitivity.

(Use the Repeat mode when seeking precise measurement accuracy as it will take a while for the sensitivity of low-sensitivity sensors to stabilize.)

○ Auto Power off

In case of “Auto Power Off” is set, MC-20 power turns off after three(3) minutes from last operation.

Turn off and turn on to start again.

○ Time Setting

Possible to set date and time on “Date Time” menu.

Date time format is “YYYY.MM.DD HH:MM”. Up Down key allow to change each parameter and push Enter key to determine parameter.

Pressing the Enter switch will finish time setting and the screen will revert to the menu screen.

○ Storing Data to PC

MC-20 can store measured sensitivity data to pc using data transfer application supplied with MC-20.

※ Please refer to application manual for the details.

6. Specification

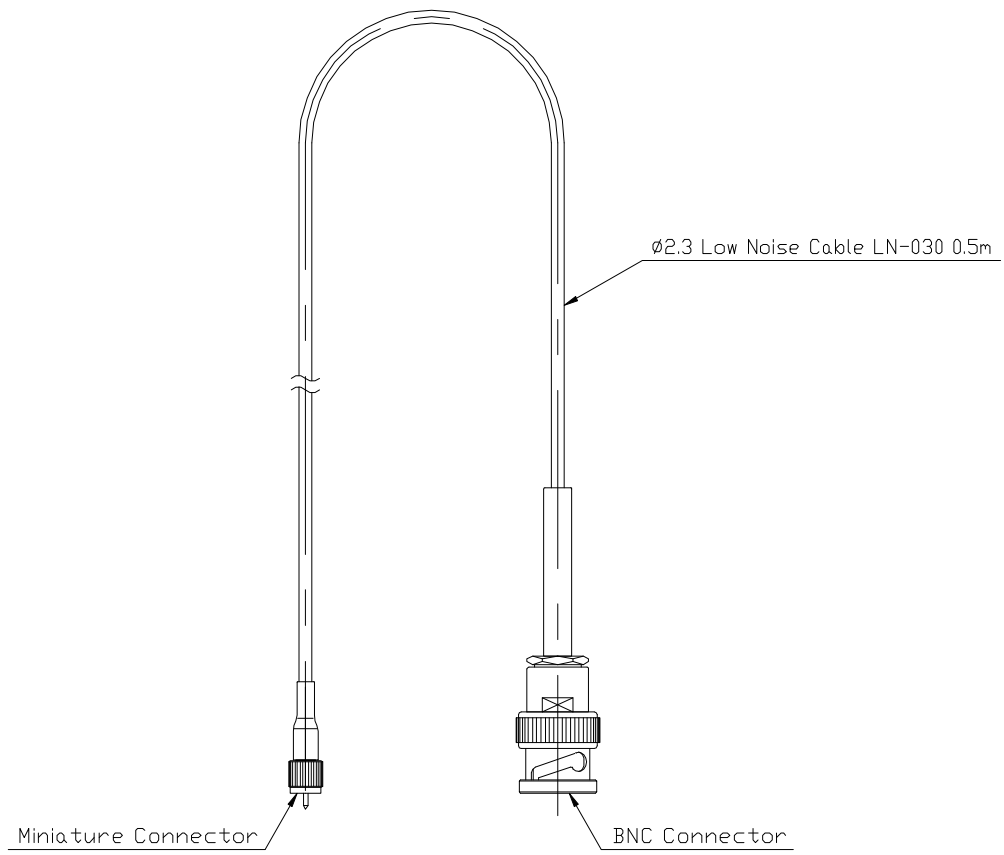
Exciter vibration frequency	: 159.2Hz±1%
Exciter vibration acceleration	: 10m/s ² (rms)±3%
Harmonic Distortions ratio	: Less than 3%
Calibration accuracy	: 0.101~19.9pC(mV)/m/s ² ±(3%+1digit) 0.026~0.100pC(mV)/m/s ² ±(10%+1digit)
DC bias voltage measurement accuracy	: Within ±1V
Calibratable sensor weight	: Approx. 100g or less
Input power	: DC 5V 0.75A
In case of using Battery	: LR6×4(6V)
In case of using AC Adapter	: AC100-240V 50/60Hz 0.3A
	※ To be used attached AC Adapter with CE Marking
Battery voltage loss alarm	: 4.25V±0.1V
Indoor use	
Atitude	: Max.2000 meters
Temperature Operation	: 10°C - 40°C
Storage	: -10°C - 50°C
Humidity	: Less than 90%RH(non-condensing)
Excessive sensor mass alarm	: “OVER” is displayed, vibrations stopped
Measurement mode	: Select either Single mode or Repeat mode
Auto Power off	: Power switches OFF about 3 minutes after set time
Number of data entries stored in MC-20	: 100 entries
Backlight	: Can be switched ON and OFF
Sensor attachment	: φ 20mm、 M6 female, depth of 6.5 mm
Dimensions(W×H×D)	: 120(W)× 50(H)× 140(D)mm
Weight	: Approx. 1 kg (Including batteries)

CE Marking

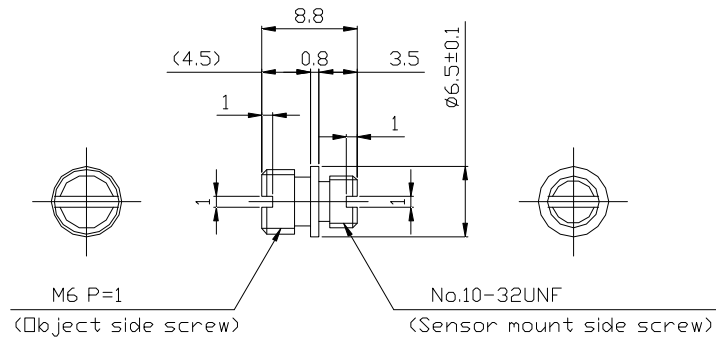
This device complies with the requirements of directive 2004/108/EC concerning electromagnetic compatibility and directive 2006/95/EC concerning low voltage.

The CE Marking indicates compliance with the above directives.

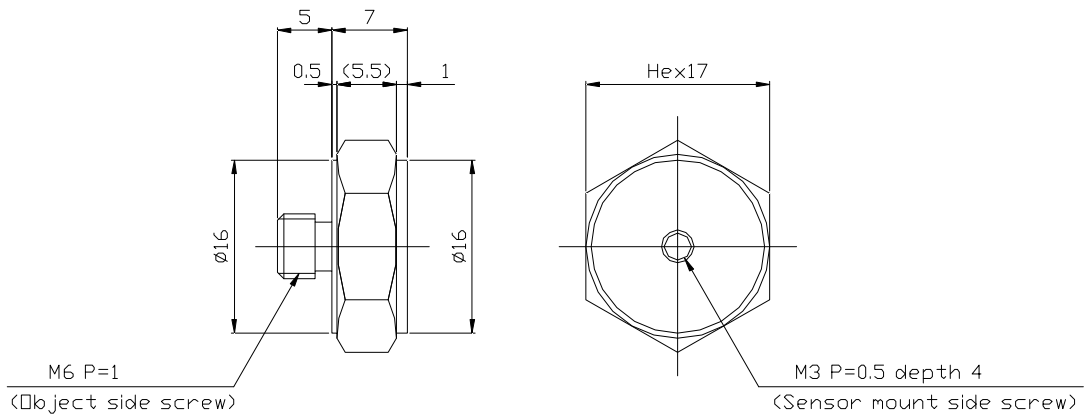
Low Noise Cable LN-030 0.5m Miniature-BNC



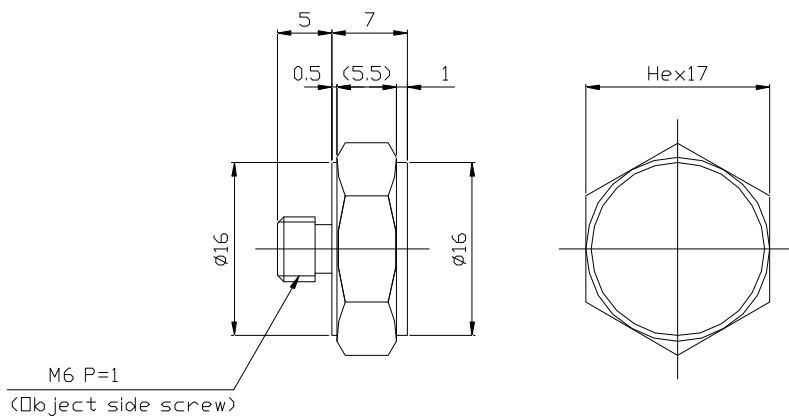
Mounting Stud



M6 Trd. - No.10-32UNF Trd. Stud



M6 Trd. - M3 Hole Stud



M6 Trd. - Flat Base Stud

