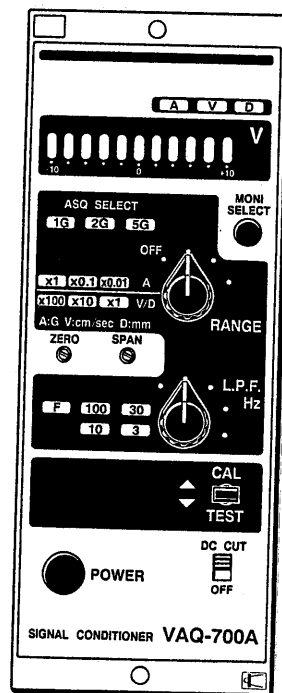


SIGNAL CONDITIONER FOR
ASQ-CA/CB
SERVO ACCELERATION TRANSDUCER

VAQ-700A
INSTRUCTION MANUAL



KYOWA ELECTRONIC INSTRUMENTS CO., LTD.

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SIGNAL CONDITIONER FOR
ASQ-CA/CB
SERVO ACCELERATION TRANSDUCER

VAQ-700A

INSTRUCTION MANUAL

Thank you for purchasing KYOWA's product.
Read this Instruction Manual carefully in order to
make full use of the high performance of the
instrument.
Do not operate this instrument in methods other
than described in this Manual.

KYOWA ELECTRONIC INSTRUMENTS CO., LTD.

SAFETY PRECAUTIONS

Read carefully this Instruction Manual before using VAQ-700A Signal Conditioner (hereinafter referred to as VAQ-700A) for ASQ-CA/CB Servo Acceleration Transducer (hereinafter referred to as ASQ-CA/CB). Take special care for securing safety and handle them with correct manner. In this Instruction Manual, safety precautions are classified into "WARNING" and "CAUTION" as described in the following.

 WARNING	Improper handling may result in death or severe injury of the operator. To avoid it, the operator must refer to the accompanying instructions in the user's Manual.
--	--

 CAUTION	Improper handling may result in injury of the operator or cause damage to or destruction of parts of the product. To avoid it, the operator must refer to the accompanying instructions in the user's Manual.
--	--

In addition, precautions stated in  "CAUTION" may cause serious damage to the operator and the instrument depending on the situation. It is essential to keep them with special care when handling the instrument.

Symbols used in this System	
	Indicates "HANDLE WITH CARE." It is used and put at a portion required to refer to the Instruction Manual in order to protect human body and the instrument.
	Indicates "PROTECTIVE GROUND TERMINAL." Do not forget to ground the terminal of the instrument having this mark before operating the instrument.



WARNING

- ① If the secondary damage is potential to generate in the System due to deterioration of the VAQ-700A, always adopt more than one technical measures for safety.
- ② Mounting and wiring should be conducted more than three seconds after the power is turned to OFF.
Or, it may cause an electric shock to the operator or damage to the product.
- ③ Special care should be taken not to use the VAQ-700A in environment with inflammable gas or vapor.
Or it may catch fire.
- ④ If the VAQ-700A is faulty, emitting smoke or offensive odor, or producing abnormal sound, immediately turn OFF the power.
Or, it may catch fire or cause an electrical shock to the operator. Contact KYOWA's service shop or a representative for repair.
- ⑤ Do not put water nor foreign matters into the VAQ-700A. In case if any foreign matters are entered, immediately turn OFF the power.
Or, it may cause fire or an electric shock to the operator. Contact KYOWA's service shop or a representative for repair.
- ⑥ Do not use worn out power cables.
Or it may cause fire or an electric shock to the operator.
- ⑦ Use the VAQ-700A only with the specified power voltage specifications indicated in this Instruction Manual.
Or, it may cause fire or an electric shock to the operator.
- ⑧ Do not use the VAQ-700A in environment with excessive moisture, dust, or oil dust.
Or, it may cause fire or an electric shock to the operator.
- ⑨ Do not disassemble the VAQ-700A.
Or, it may cause deterioration or malfunction of the instrument. Contact KYOWA's service shop or a representative for repair.
- ⑩ When it started thundering, do not touch the instrument or cables.
Or it may cause an electric shock to the operator.
- ⑪ Always ground a protective conductor terminal.
Or it may cause an electric shock to the operator.

STANDARD ACCESSORIES

The following accessories are enclosed with the VAQ-700A. On opening the package, do not forget to check the attached items are correctly prepared.

VAQ-700A Signal Conditioner.....	1
AC power cable (P-16).....	1
Conversion plug CM-33.....	1
Output cable (U-58).....	3
Short bar.....	1
Mizet type fuse (ϕ 5.2 $\times$ 20 mm, 0.5A).....	1
Mizet type fuse (ϕ 5.2 $\times$ 20 mm, 3A).....	1
Small screwdriver.....	1
Inspection Sheet.....	1
Warranty.....	1
Instruction Manual (This textbook).....	1

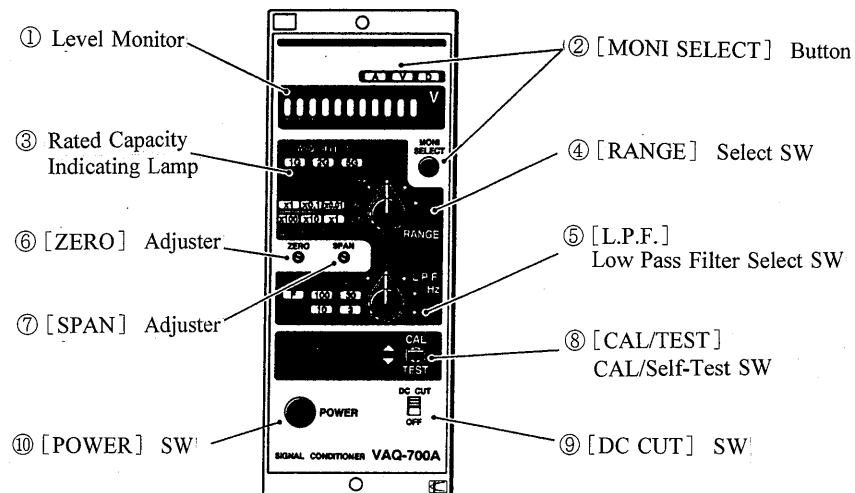
HANDLING PRECAUTIONS

Read carefully the following instructions before using the VAQ-700A.

- The ASQ-CA/CB is constituted of a highly sensitive structure. Do not apply impact on it or drop it. Or it may be damaged.
- Do not forget to power OFF the VAQ-700A before connecting as well as disconnecting it to/from the acceleration transducer.
- The VAQ-700A is a signal conditioner specified for the ASQ-CA/CB.
Special care should be taken not to connect KYOWA's ASQ-AL/BL type servo acceleration transducer. Or it may cause trouble.

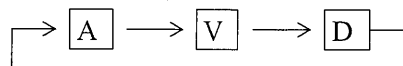
CHAPTER 1. PARTS NAMES & FUNCTIONS

1-1 Front



- ① Level Monitor..... Indicates the output signal selected by the [MONI SELECT] button on bar length. One LED segment is relevant to approx. 2V. Both LEDs on right and left ends are in red while the rest are in green.

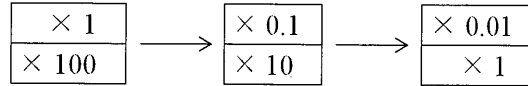
- ② [MONI SELECT] (Monitor Select)
/Monitor Select Display Button..... Selects the output signal indicated on the Level Monitor bar.
LEDs on the level monitor bar lights up every time the [MONI SELECT] button is pressed in due order as shown in the following.



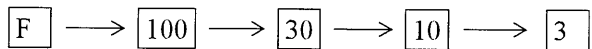
A : Acceleration
V : Velocity
D : Displacement

- ③ [ASQ SELECT]
Rated Capacity Indicating Lamp..... Lights up the LED indicating the acceleration transducer capacity set by the [ASQ SELECT] switch (rated capacity setting switch) on the rear panel.

- ④ [RANGE] Select SW..... Used for selecting the range. Turn clockwise the SW from the "OFF" position and the LEDs of the selected range lights up in the following order.

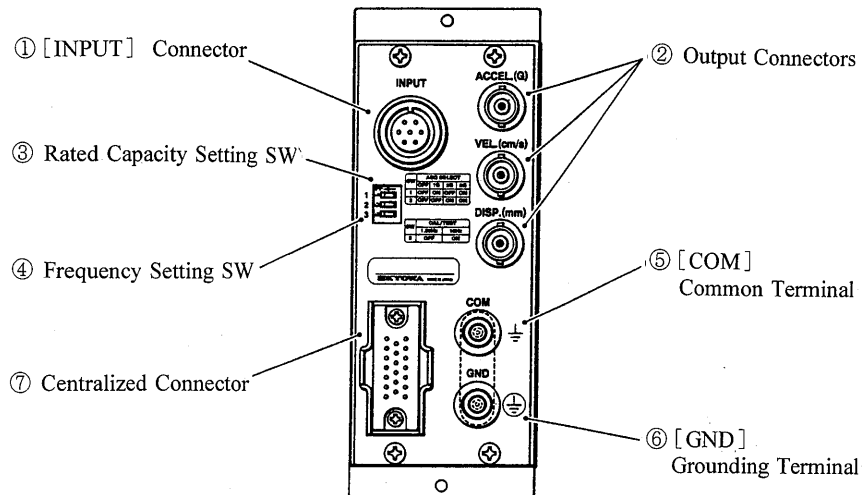


- ⑤ [L.P.F.] Low Pass Filter Select SW..... Used for selecting low pas filter cutoff frequency. Turn clockwise the switch from the "F" position. Then, the LEDs of the selected low pass filter cutoff frequency light up in the following order.



- ⑥ [ZERO] Adjuster..... Used for adjusting ZERO of the acceleration output voltage.
- ⑦ [SPAN] Adjuster..... Used for adjusting span of the output voltage.
- ⑧ [CAL/TEST] Calibration/Self Test SW... Only while the switch is pushed up to the "CAL" side, 50% range of sinusoidal wave signal is output to the respective output connectors. On the contrary, while it is pushed down to the "TEST" side, signal relevant to the acceleration transducer rated capacity is output between input connector F and G pins.
- ⑨ [DC CUT] DC Cut Slide SW..... Slide up the switch for removing DC component from acceleration output.
- ⑩ [POWER] SW..... Press the switch to power ON, and press it once again to power OFF.

1-2 Rear



- ① [INPUT] Connector..... Connects the ASQ-CA/CB.
- ② Output Connectors..... Connect a recording instrument or voltmeter. Obtains the following 3 types of output signals at a time.
- ACCEL (G) : Acceleration
VEL (cm/s) : Velocity
DISP (mm) : Displacement

- ③ [ASQ SELECT]
Rated Capacity Setting SW..... Selects rated capacity of the connected ASQ-CA/CB by combining the SWs 1 & 2.

SW	OFF	1G	2G	5G
1	OFF	ON	OFF	ON
2	OFF	OFF	ON	ON

Prior to shipment —↑

- ④ [CAL/TEST] Frequency Setting SW..... Sets frequency of the CAL/TEST signals.

SW	1.59 Hz	10 Hz
3	OFF	ON

Prior to shipment —↑

- ⑤ [COM] Common Terminal..... Internally connected to circuit common potential.
- ⑥ [GND] Grounding Terminal..... Internally connected to a case by protective grounding terminal.
- ⑦ Centralized Connector..... Connects the power cable.

CHAPTER 2. PRE-MEASUREMENT

This Chapter describes preparatory operations required before turning the power ON.

Especially, it details the essential operations for using the VAQ-700A for 1 CH.

When it is used for measuring multiple CHs by using the specified housing case, see section "5-2 Housing Case."

2-1 Setting Up Input/Output Devices

Connect the ASQ-CA/CB, output devices as well as power cable to the VAQ-700A.

(1) Input device

For connecting input device, see section "3-1 Connecting Input."

(2) Output device

Prepare a recorder or voltmeter for reading the amplified acceleration, velocity, and displacement signals.

Connect the above devices to the VAQ-700A using the attached output cable.

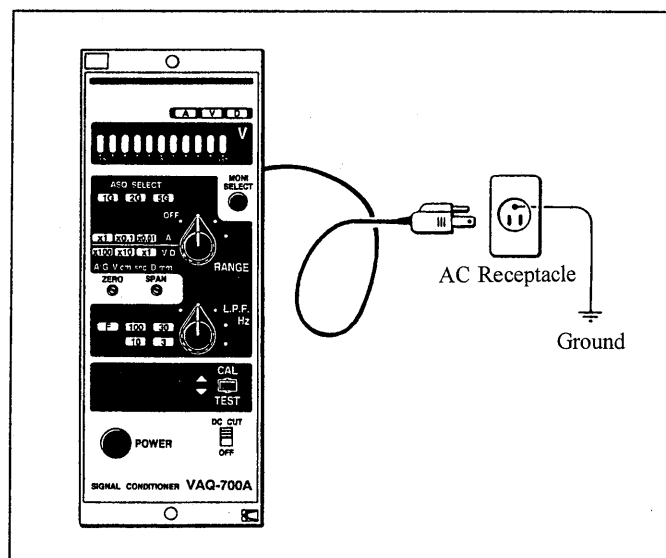
For connecting to output devices, see sections "3-2 Connecting Output" and "4-1 Output."

2-2 Connecting Power Supply

Either AC or DC power is required for operating the VAQ-700A. Do not forget to confirm the power voltage before use.

(1) AC power

Generally, the VAQ-700A is connected to 100V AC power using the attached power cable. (See the following figure.) If it is used with voltage other than 100V AC, it is an optionally specified VAQ-700A.



Note

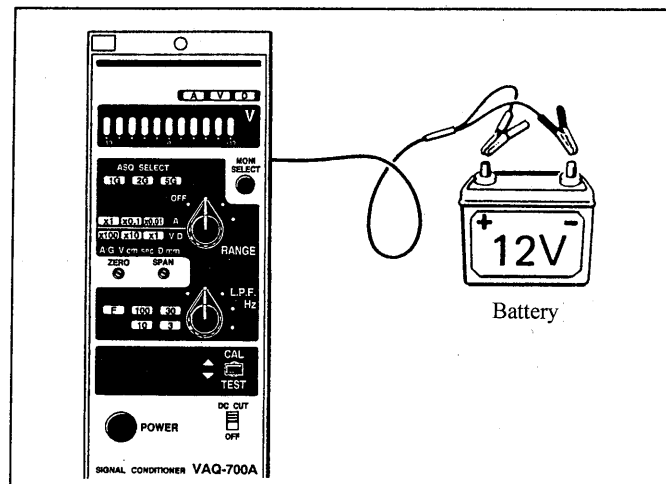
Use the attached 3-P/2-P conversion adapter (CM-33 : NEMA plug). Do not forget to ground the ground terminal (in green) before using this adapter.

Note

Do not forget to ground the mid pin of the 3-pole plug.

(2) DC Power

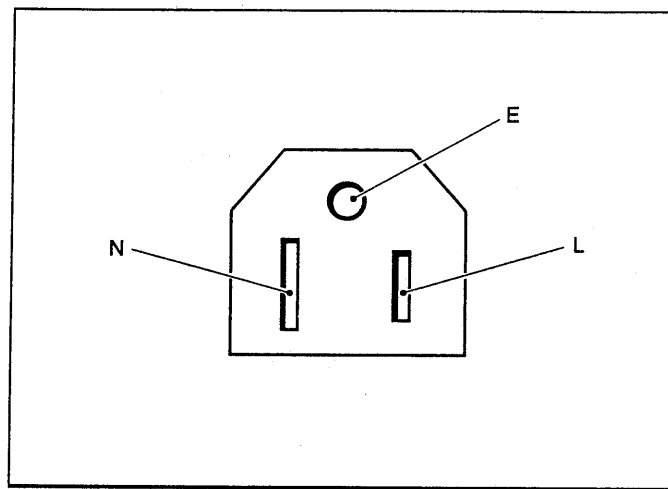
Can use DC power or a battery having voltage ranging from 10.5 to 15V DC. Since no DC power cable is attached, it is required of customers to purchase a connector plug (S-1620-C : HIROSE DENKI CO., LTD.) when using DC power, and connect it by referring to the following drawing. For connecting to DC power, see section "4-8 Application of Centralized Connector."



2-3 Grounding

Grounding should be made in order to secure safety of the operator and prevent accidents.
On using AC power, use the attached 3-pole AC power cable for connection, and it is automatically grounded.

- L = Voltage line
- N = Grounding line
- E = Earth



CHAPTER 3. STANDARD OPERATION

This Chapter describes basic method for operating the VAQ-700A.

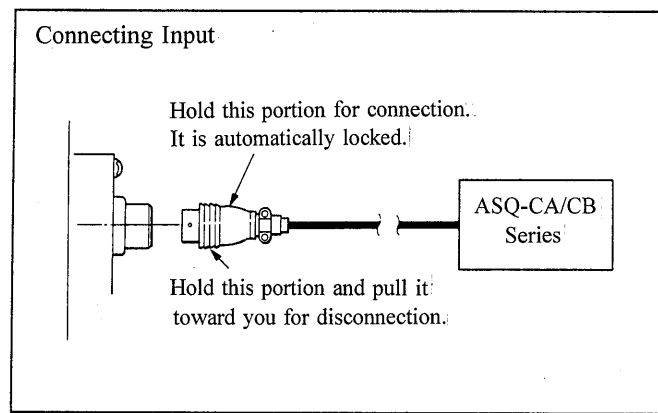
For customers using KYOWA's Signal Conditioner for the first time, operate it by referring to the following operating instructions.

This Chapter especially details method of using the VAQ-700A for 1 CH.

For using the VAQ-700A for multiple CHs with a housing case, see section "5-2 Housing Case."

3-1 Connecting Input

Connect the ASQ-CA/CB to a VAQ-700A input connector.



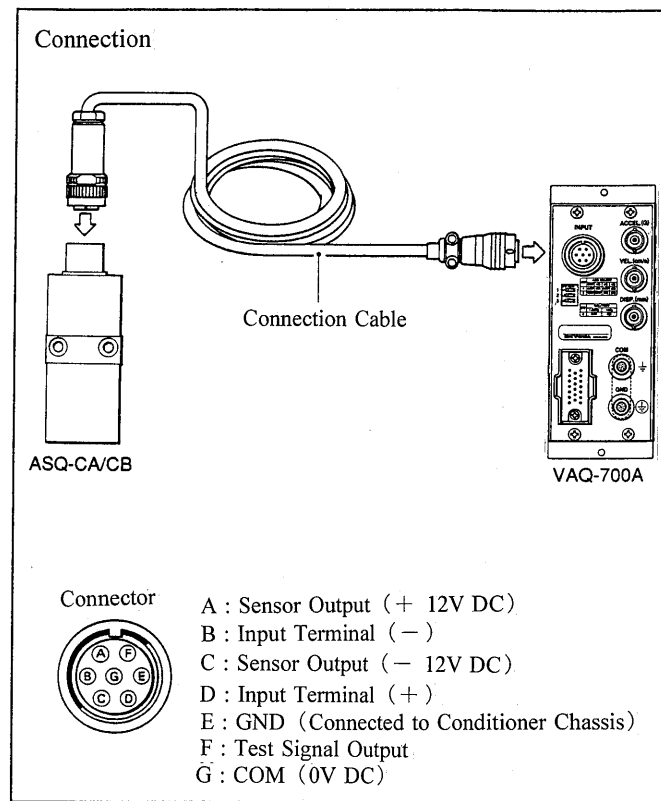
Memo

It is required to read also the ASQ-CA/CB Instruction Manual.

For connecting the ASQ-CA/CB to VAQ-700A with a 4-wire shield cable, connect connector pins other than F and G, and shunt B and G pins that are connected to the VAQ-700A..

Considering the ASQ-CA/CB rated capacity, see section "4-9 Setting Rated Capacity" and set the ASQ-CA/CB rated capacity with the [ASQ SELECT] (Rated capacity setting) switch on the rear panel.

On turning ON the power, confirm that the ASQ-CA/CB rated capacity coincide with the lighting position of the rated capacity indicating lamp.



Note

Special care should be taken not to connect KYOWA's ASQ-AL/BL Type Servo Acceleration Transducer, Or it may cause trouble.

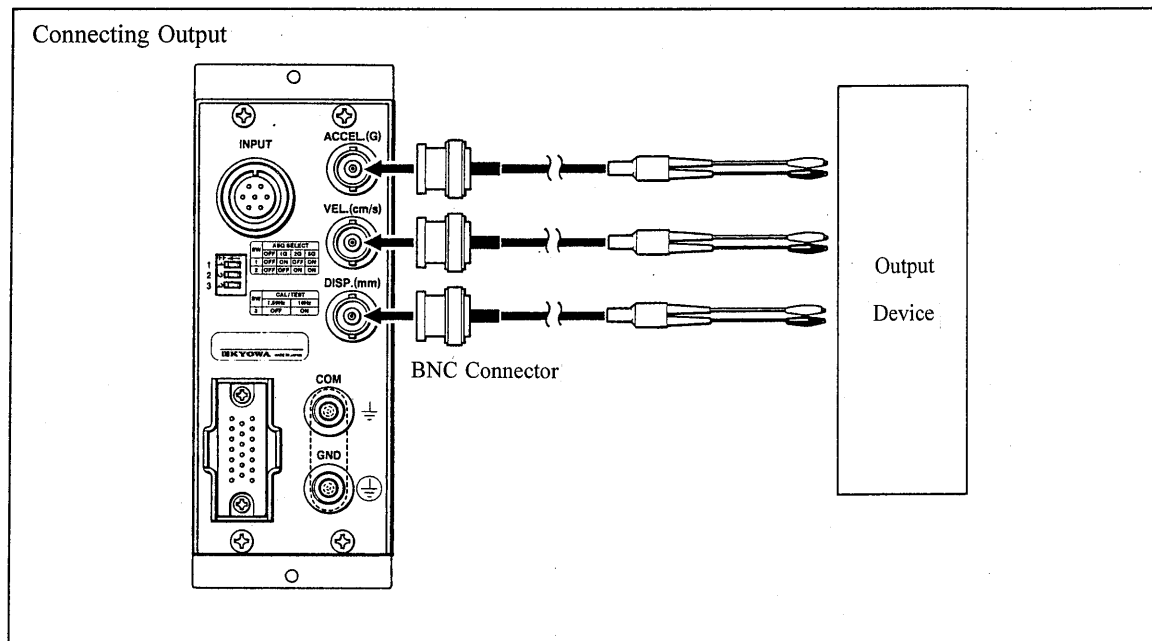
3-2 Connecting Output

The VAQ-700A has three output systems; acceleration, velocity and displacement.

The above three are output through BNC connectors.

Connect the VAQ-700A to output devices using the attached output cable. Output impedance is approx. $10\ \Omega$. See the following figure for connecting to the output devices.

Set the output devices to be in AC voltage measuring mode.



3-3 Power Supply Operation

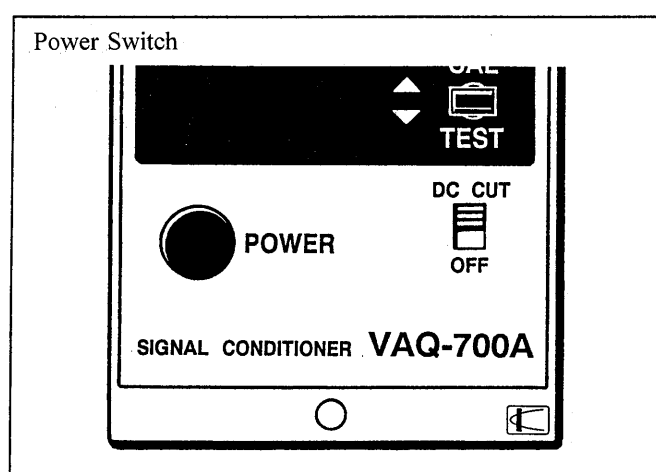
Read carefully the following descriptions on power ON/OFF operations.

3-3-1 Power ON

Before operating the power switch, confirm the input connector and the power supply are correctly connected.

For connections, see sections "2-1 Setting Up Input/Output Devices," "3-1 Connecting Input," and "3-2 Connecting Output."

Press the power switch until it hits the end.



3-3-2 Power OFF

Press the power switch. Then, all the displays turn OFF.

3-4 Setting Measuring Conditions

Range and low pass filter settings are essential conditions required for measuring acceleration.

3-4-1 Setting Range

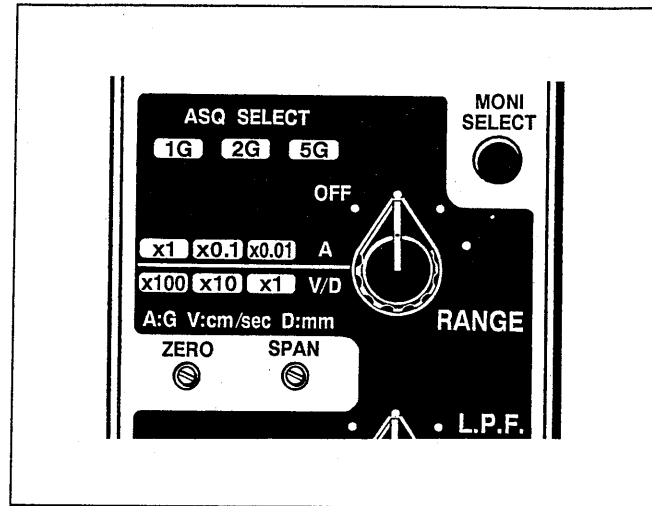
In order to correctly obtain the magnitude of the acceleration, it is required to set appropriate range. This clause describes a basic method for setting the range. For details, see section "4-5 Range."

Consider the magnitude of the measuring acceleration. Set an appropriate range that sufficiently allows measurement of the acceleration assumed by adding test conditions, etc.

Here, range

$\times 1$
$\times 100$

 is simply selected.

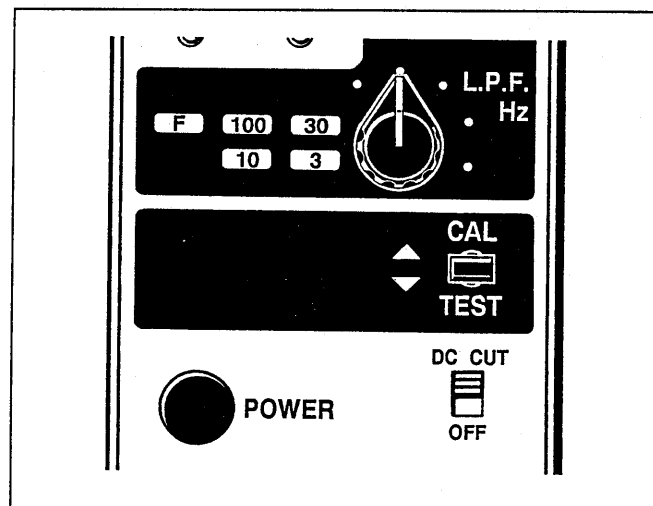


Note

Since each of the output signals are temporarily disturbed just after the range change, do not forget to confirm the output signals are stable before using the VAQ-700A (Approx. several ten seconds).

3-4-2 Setting Low Pass Filter

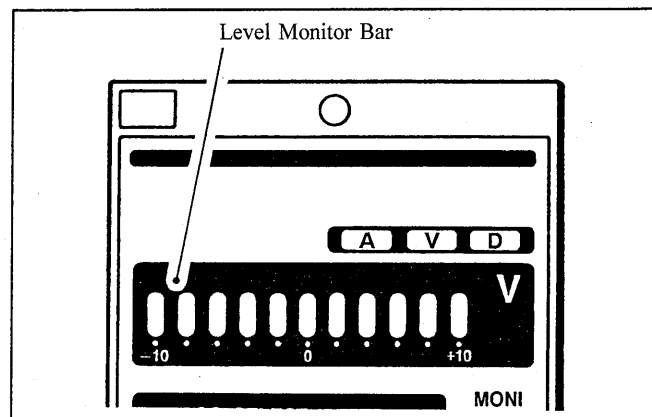
Generally, low pass filter is used for limiting the output frequency band. However, as a basic operation of the low pass filter, it is set to "F" (Flat) that has no low pass filter function. For details, see section "4-7 Low Pass Filter."



3-5 Monitoring Output Voltage

Connect the ASQ-CA/CB to the input connector and read the indication of a recorder or voltmeter (hereinafter referred to output devices) that is connected to the acceleration output (ACCEL). Indication with no [CAL/TEST] (Calibration/Self Test) switch operated shall be around 0V. Push up the [CAL/TEST] switch, and confirm the indication of the output devices connected to the acceleration output is approx. 10V_{p-p} (3.6 Vrms). In addition, output voltage can be roughly confirmed on the level monitor bar.

- If ZERO is not 0V, see section "4-3 Zero Adjustment" for adjusting ZERO.
- If no output signal is issued on pushing up the [CAL/TEST] switch, see section "4-4 SPAN Adjustment" for adjusting SPAN.



3-6 Exercise

We have gone through rough description on the various settings. Now, let's operate the VAQ-700A by changing various conditions.

- (1) Change the input.
Slightly move the ASQ-CA/CB to sensitive axis.
By changing the input, observe the output voltage on the indication of a level monitor bar or output devices.
Roughly obtain the magnitude of the output voltage when the input is changed.
- (2) Measure the magnitude of acceleration, velocity, and displacement.
Push up the [CAL/TEST] switch. Then, sinusoidal wave appears on each of the outputs (acceleration, velocity, and displacement). Compare the output value with the above output voltage obtained by changing the input.

Magnitude of the acceleration, velocity, and displacement generated can roughly be obtained by the following expression.

(If rated capacity is 1G, calibration signal is relevant to 0.5G, 50 cm/sec, 50 mm)

Acceleration [G] =

$$[V](\text{Accel output voltage on changing input}) / [V_{p-p}](\text{Accel output voltage on conducting A} \times \text{calibration}) \times \text{Range FS value (= 1G)}$$

Velocity [cm/sec] =

$$[V](\text{Velocity output voltage on changing input}) / [V_{p-p}](\text{Velocity output voltage on calibration}) \times \text{Range FS value (= 100 cm/sec)}$$

Displacement [mm] =

$$[V](\text{Displacement output voltage on changing input}) / [V_{p-p}](\text{Displacement output voltage on calibration}) \times \text{Range FS value (=100 mm)}$$

Amplitude of the acceleration calibration value is 1.0204 times value . (Conversion factor of SI unit and unit : 1000/980)

Other than the above, arbitrarily change several other predetermined conditions and operate the VAQ-700A.

CHAPTER 4. APPLICABLE OPERATIONS

This Chapter details specified functions and operations of the VAQ-700A.

4-1 Output

The VAQ-700A has output functions such as acceleration, velocity, and displacement which serves independently of others and which can provide $\pm 10V$ or more to load having more than $5k \Omega$.

Output devices connected to the VAQ-700A, for example, a voltage measuring device or recorder are equipped with the following conditions.

- Devices inputting voltage having $5k \Omega$ or more input impedance

4-2 Preheating

Immediately after the power ON, the VAQ-700A shall be in operating state.

However, electrical or semiconductor parts used inside the VAQ-700A do not become thermally stable right after the power ON.

Especially, if the electric circuit is unstable, it may change sensitivity or may drift the ZERO point.

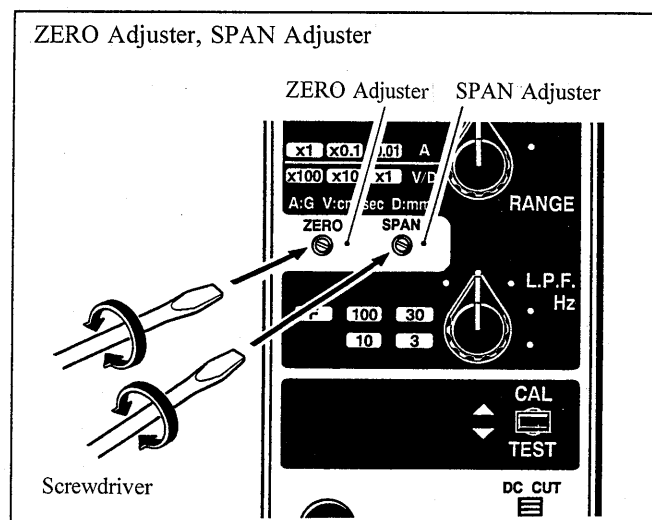
Therefore, to have the stable VAQ-700A operation, it is required to set approximately 10 to 15 minutes for preheating.

4-3 Zero Adjustment

ZERO of acceleration output can be adjusted with [DC CUT] switch set to "OFF" side.

Turn the [ZERO] adjuster on the front panel with the attached small screwdriver. Turn clockwise for adjusting ZERO to the [+] (plus) direction, and turn counterclockwise for adjusting the same to the [-] direction. (See the following drawing.)

If sensitive axis and gravity direction of the ASQ-CA/CB coincide with each other, connect the ASQ-CA/CB "IG cancel pin" to adjust its output functions.



4-4 SPAN Adjustment

Span adjustment can be conducted to acceleration output issued from the ASQ-CA/CB, if required.

(The span adjustment of velocity and displacement outputs are conducted at the same time with that of the acceleration output.)

Turn the [SPAN] (Span Adjuster) on the front panel with the attached small screwdriver. Turn clockwise for adjusting the span to the [+] (plus) direction, and turn counterclockwise for adjusting the same to the [-] (minus) direction. (See the drawing on the previous page.)

4-5 Range

Select the maximum range "× 1" to cover the whole measuring range.

However, when 0.01G acceleration is input, since maximum output voltage obtained is about 50 mV, measuring accuracy shall be deteriorated. On the contrary, if the small-value range is selected, it may be saturated with exceedingly large acceleration input.

Therefore, it is essential to select an appropriate range according to the magnitude of the acceleration input.

There are the following four steps in the range.

OFF,

× 1
× 100

,

× 0.1
× 10

, and

× 0.01
× 1

Magnitude of the noise shows the following tendency.

× 1
× 100

 <

× 0.1
× 10

 <

× 0.01
× 1

If the range is set to OFF, no calibration value nor acceleration signal output is obtained.

Use the [RANGE] (Range Select) switch for selecting the range.

The following ranges are set in accordance with the rated capacity of the connected ASQ-CA/CB.

× 1
× 100

When rated capacity is 1G

Acceleration : 1G, Velocity : 100 cm/sec, & Displacement : 100 mm

When rated capacity is 2G

Acceleration : 2G, Velocity : 200 cm/sec, & Displacement : 200 mm

When rated capacity is 5G

Acceleration : 5G, Velocity : 500 cm/sec, & Displacement : 500 mm

× 0.1
× 10

When rated capacity is 1G

Acceleration : 0.1G, Velocity : 10 cm/sec, & Displacement : 10 mm

When rated capacity is 2G

Acceleration : 0.2G, Velocity : 20 cm/sec, & Displacement : 20 mm

When rated capacity is 5G

Acceleration : 0.5G, Velocity: 50 cm/sec, & Displacement: 50 mm

× 0.01
× 1

When rated capacity is 1G

Acceleration : 0.01G, Velocity : 1 cm/sec, & Displacement : 1 mm

When rated capacity is 2G

Acceleration : 0.02G, Velocity : 2 cm/sec, & Displacement : 2 mm

When rated capacity is 5G

Acceleration : 0.05G, Velocity : 5 cm/sec, & Displacement : 5 mm

Note

Set the range having acceleration, velocity, and displacement set within the measuring range.

The VAQ-700A is designed to output signals of acceleration, velocity, and displacement at the same time. Range is basically changed when acceleration output is changed.

Therefore, in order to conduct a correct measurement, it is essential to set the above three output signals within the measuring range. .

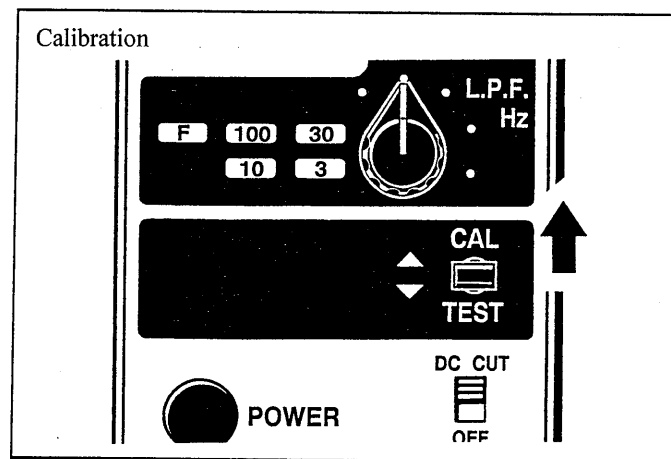
4-6 Calibration/Self Test

4-6-1 Calibration

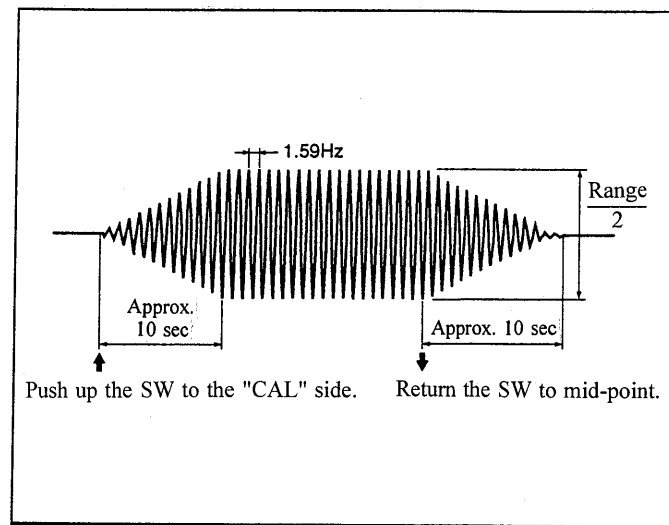
Calibration signal is used to measure the magnitude of input signals.

Leave the CAL/TEST (Calibration/Self Test) switch on the front panel pushed up for approximately 10 seconds. Then, sinusoidal wave having 50% amplitude of the range is output as shown in the following figure.

This signal is succeedingly issued until the CAL/TEST switch is released. After the switch is released, it takes approximately another 10 seconds for the amplitude to return to around ZERO. If the above signal is normally issued, the operation of the VAQ-700A is in normal state.



Following is a figure of output waveform displayed at calibration.



Set frequency with the [CAL TEST] (Frequency Setting) switch on the rear panel. It is set to 1.59 Hz prior to shipment.

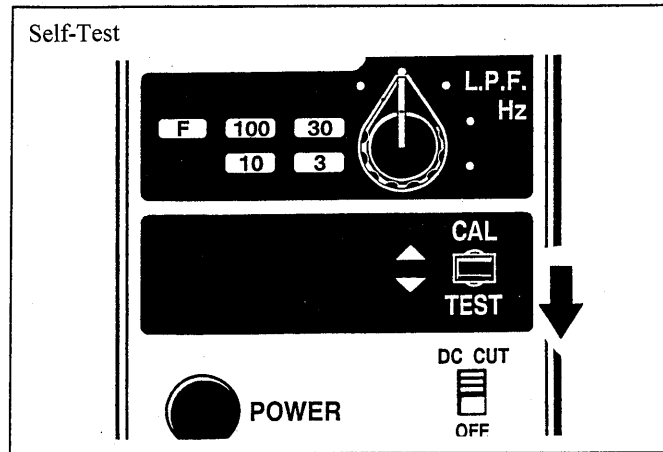
Frequency Output	1.59 Hz	10 Hz
Acceleration	Approx. 10.2 V _{pp} (Approx. 3.6 Vrms)	Approx. 10.2 V _{pp} (Approx. 3.6 Vrms)
Velocity	Approx. 10.0 V _{pp} (Approx. 3.5 Vrms)	Approx. 1.59 V _{pp} (Approx. 0.56 Vrms)
Displacement	Approx. 10.0 V _{pp} (Approx. 3.5 Vrms)	Approx. 0.25V _{pp} (Approx. 0.09 Vrms)

Note

- Amplitude of the acceleration calibration value is 1.0204 times value of the range.
(Conversion factor of SI unit and G unit : 1000/980)
- Voltage indicated on the above table is output voltage of reference sensitivity.
The reference sensitivity means a sensitivity that becomes 10 voltage when rated capacity (1, 2, and 5 Gs) is issued from the transducer.

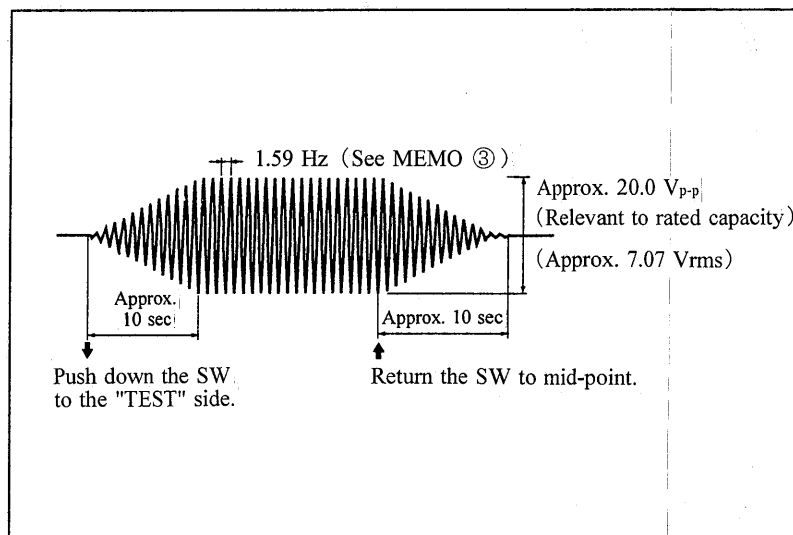
4-6-2 Self-Test

Test signals are output to the ASQ-CA/CB in order to conduct self-test of the ASQ-CA/CB. Leave the [CAL/TEST] (Calibration/Self-Test) switch on the front panel pushed down for approximately 10 seconds. Then, sinusoidal wave having the amplitude of the relevant capacity is output as shown in the following figure. This signal is successfully issued until the [CAL/TEST] switch is released. After the switch is released, it takes approximately another 10 seconds for the amplitude to return to around ZERO.



If the above signal is normally received by the ASQ-CA/CB, the signal relevant to the rated capacity is issued.

(MEMO ①) If acceleration output voltage of the rear panel at this time is approx. $20.0 V_{p-p}$ ($7.07 V_{rms}$), the operation of the ASQ-CA/CB is in normal state.



MEMO

- ① Self-test output signal relevant to each rated capacity issued to the ASQ-CA/CB shall be as follows.
 - 1G = Approx. 3.93 V_{p-p} (Approx. 1.39 V_{rms})
 - 2G = Approx. 7.86 V_{p-p} (Approx. 2.78 V_{rms})
 - 5G = Approx. 19.66 V_{p-p} (Approx. 6.95 V_{rms})
- ② Voltage value indicated in the above figure is output voltage of the reference sensitivity.
- ③ When the [CAL/TEST] (Frequency Setting) switch on the rear panel is set to 10 Hz, the self-test signal rate shall be 10 Hz.
- ④ If the self-test is conducted with 1G cancel pin of the ASQ-CA/CB is in shunt state, although the output signal may be issued by shifting approximately 0.25G, it is not faulty. In addition, on using the ASQ-CA/CB having 1G rated capacity, since the + side output signal may saturate to deform the waveform, adjust and confirm the span of the VAQ-700A for use.

4-7 Low Pass Filter

The VAQ-700A has low pass filter with second order Butterworth characteristics built-in. Cutoff frequency is in 5 steps, 3, 10, 30, 100 Hz, and F (Flat). Regarding the flat area, amplitude attenuates to approx. 70% at cutoff frequency and phase lags approx. 90 degrees. The roll off characteristics is -12 dB/oct. This means that if cutoff frequency becomes double at cutoff area with excessive cutoff frequency, the amplitude attenuates to approx. one fourth. For example, assuming that cutoff frequency at cutoff area with excessive cutoff frequency is A and amplitude at this time is BV_{p-p} . If the frequency is 2A, the amplitude shall be $1/4 BV_{p-p}$.

The roll of the low pass filter is described in the following.

- (1) Removes unnecessary high frequency component included in input signals.
- (2) Defines characteristics of the overall measuring systems including acceleration transducers.
- (3) Sets characteristics for data to pass through when multiple points are measured at the same time.

Use the [L.P.F.] (Low Pass Filter) switch for selecting the cutoff frequency.

Note

Since phase lag is not in proportion to frequency at around cutoff frequency, the low pas filter with Butterworth characteristics may generate an overshoot when passing through exceedingly rising and falling signals. At this time, set the cutoff frequency to about 10 times as much of the input signal frequency.

4-8 Application of Centralized Connector

The VAQ-700A is equipped with centralized connector at its rear.

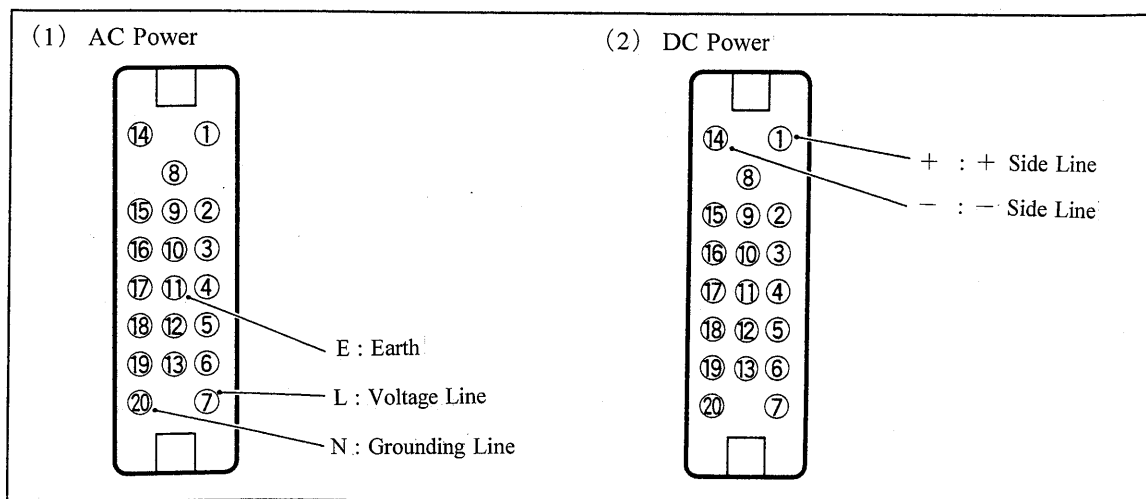
Generally, the VAQ-700A is connected to AC power supply using an AC power cable. There are plugs for connecting to DC power on the centralized connector as described in "(2) DC Power in section 2-2 Connecting Power Supply." In addition, on using the specified housing case, the Centralized Connector is connected to a connector provided inside the specified housing case. The operation of the VAQ-700A can be conducted by turning ON/OFF the power switch on the housing case. .

Pin No.	Signal Name	Input/Output	Function and Connected Destination
1	+ 12 V	Input	+ side of DC power input Note 1)
2	N.C.	Note 2)	
3	N.C.		
4	N.C.		
5	COM —	—	Common potential
6	N.C.		
7	100V AC	Input	Connected to AC power
8	N.C.		
9	N.C.		
10	N.C.		
11	GND	—	Internally connected within the case
12	N.C.		
13	N.C.		
14	0V	Input	— side of DC power input
15	N.C.		
16	N.C.		
17	REM-CAL	Input	Effective with "L" with external calibration indicating signal.
18	REM-TEST	Input	Effective with "L" with external test indicating signal
19	N.C.		
20	100V AC	Input	Connected to AC power

Connector plug : Model S-1620-C (HIROSE DENKI CO., LTD.)

Note 1 : Use heat-proof vinyl wire with diameter 0.3 mm² or more for connection.

Note 2 : N.C. means No Connection (Unused).

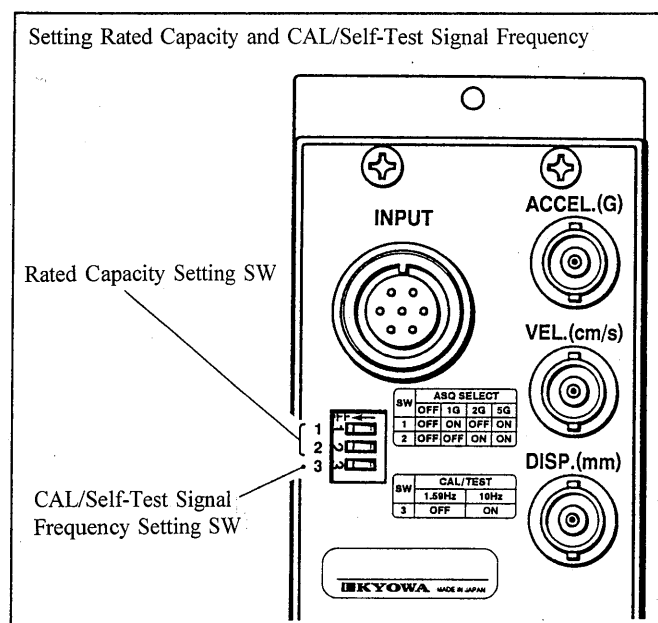


4-9 Setting Rated Capacity

The VAQ-700A can select the rated capacity of the ASQ-CA/CB to be connected.

It is set to 1G prior to shipment.

Select the rated capacity with the [ASQ SELECT] (Rated Capacity Setting) switch on the rear panel (see the following drawing).



SW	OFF	1G	2G	5G
1	OFF	ON	OFF	ON
2	OFF	OFF	ON	ON

Prior to shipment



【Note】 No output with SWs 1 and 2 turned to OFF.

4-10 Setting Frequency of CAL/Self-Test Signal

The VAQ-700A can select frequency of the Calibration/Self-Test signals.
It is set to 1.59 Hz prior to shipment (see the drawing on the previous page).

SW	1.59 Hz	10 Hz
3	OFF	ON

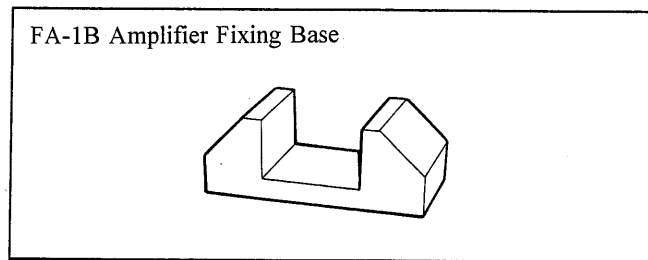
Prior to shipment —↑

CHAPTER 5. OPTIONALS

This Chapter describes optional goods that can be used together with the VAQ-700A. It should be noted that all the optional goods are separately sold. Please contact KYOWA's service shop or representative, if required.

5-1 FA-1B Amplifier Fixing Base

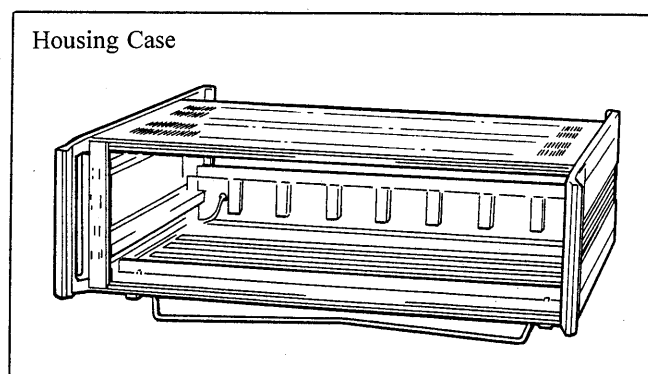
A rubber base for fixing the VAQ-700A when it is solely used.



5-2 Housing Case

Four types of housing case are provided to store the varying No. of CHs. Use them for using the VAQ-700A with multiple CHs.

YB-503A	3-CH housing case
YB-504A	4-CH housing case
YB-506A	6-CH housing case
YB-508A	8-CH housing case



In addition, the above housing cases are equipped with switches for conducting batch control from the front panel.

5-2-1 Function of Housing Case

The specified housing case is provided with the following functions.

- Equipped with batch balance adjusting key. Note 1)
- Equipped with batch calibration key. Note 2)
- Equipped with a power switch for batch control from the front panel.
- Internally connected for carrier synchronization (for DPM-700B series Dynamic Strain Amplifier).
- Equipped with batch lock key. Note 3)

Moreover, rack mounting metals (conforming to JIS and DIN Standard) are provided.

Note

Note 1. Batch balance adjusting key and batch lock key of the specified housing case are not applicable for the VAQ-700A.

Note 2. Batch calibration key corresponds to the following keys in the VAQ-700A.

+ CAL key → CAL key

– CAL key → TEST key

Note 3. Batch lock key can be installed together with DPM-700B series Dynamic Strain Amplifier or CDV/CAD-700A series Signal Conditioner.

CHAPTER 6. TROUBLESHOOTING

6-1 No Power ON

If no indicators including a level monitor bar lights up after the power ON, the power cable may be faulty or blowing of the fuse is considered. Firstly, check the power cable.

A fuse is located inside the case. Do not forget to disconnect the power cable plug from an AC receptacle or battery before replacing the fuse. It is recommended to use the fuse having the following rated capacity.

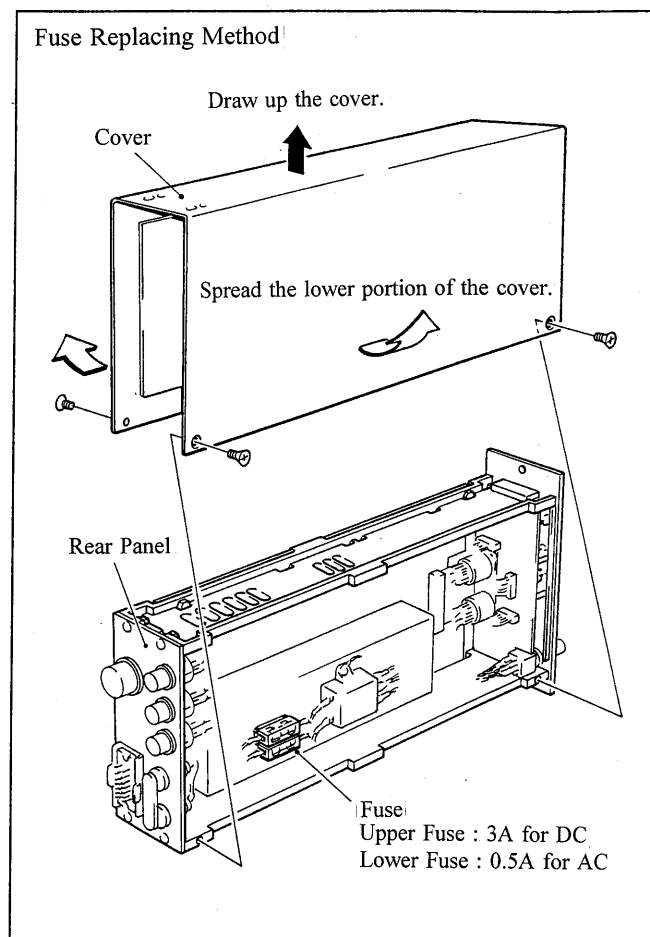
Mizet type DC power fuse 3A (ϕ 5.2 × 20 mm)

Mizet type AC power fuse 0.5A (ϕ 5.2 × 20 mm)

If the fuse still blows after it is replaced, a circuit may be faulty. Contact KYOWA's service shop or representative.

■ The Fuse is located at the side of the shield case. Replace the fuse according to the following procedures.

- ① Disconnect the power cable.
- ② Remove 4 screws fastening the VAQ-700A cover.
- ③ Draw up the cover while spreading its lower portion.
- ④ Fuse case is on the shield case. Replace the blown out fuse inside the fuse case with a new one.
- ⑤ Then, set up the VAQ-700A according to the reverse procedures of the above.
Take special care not to put vinyl wire between the shield case and fuse cover at this time.



6-2 No Output

Cause	Countermeasures
No CAL output	Operate "ON/OFF" of [CAL] or [TEST] SWs and immediately after then, turn [CAL] to "ON." Repeat the above operation after 10 seconds.
Connection cable is not correctly connected to ASQ-CA/CB.	Confirm the cable connected states on both transducer and conditioner sides.
ASQ-CA/CB is fixed with its acceleration direction not coincide with the sensing direction.	Confirm whether the acceleration direction of the ASQ-CA/CB coincide with the sensing direction.
Range is set to "OFF."	Set the range to other than "OFF" position.
Span adjuster indicates minimum value.	Turn clockwise the span adjuster to confirm it issues output signal.
Level monitor bar varies but no output.	Confirm the output cable.
Both [ASQ SELECT] (Rated Capacity setting) SWs 1 and 2 on rear panel are "OFF."	Set rated capacity of the ASQ-CA/CB connected.

If any troubles still occur after the above countermeasures, contact KYOWA's service shop or representative.

6-3 Unstable ZERO

If ZERO is not stable, it is considered that ASQ-CA/CB (including a connection cable) or VAQ-700A itself is faulty.

To confirm whichever is faulty, firstly, disconnect the cable connected to the ASQ-CA/CB.

Next, shunt pins B, D, and G of the input connector. And then, confirm whether or not the ZERO of each output is stable.

Velocity and displacement output signals require 30 to 40 seconds to become stable. At this time, if each of the output signals are stable, the ASQ-CA/CB side may be faulty. Confirm the ASQ-CA/CB.

In addition, if each of the outputs are unstable, the VAQ-700A itself may be faulty. Contact KYOWA's service shop or representative.

6-4 Noise

Regarding the excessively large noise, the following cause may be considered. Take appropriate countermeasures.

● Inductive Interference

If the VAQ-700A is located close to devices having large leakage magnetic flux including large motors, transducers, ferro-resonant constant voltage generators, it may generate noise. In addition, if the measuring point is located far apart from the VAQ-700A, inductive noise may also be generated.

To cope with the above problems, the following countermeasures are considered.

- Locate the VAQ-700A apart from the above electric devices.
- Ground the measuring object and the VAQ-700A separately on the same grounding point.

● Potential Affected Interference

If potential with AC or DC power exists between the measuring object and the ground, it may generate noise. In such case, grounding the measuring object is not always an appropriate method to cope with the problem. It may be solved by connecting the measuring object to the strain measuring instrument.

It should be noted that when inductive interference is generated or if the measuring object has potential, it is rare to solve the above problems by a simple method. Especially, in the recent years, since various electric devices are used in the same measuring environment, they may affect with each other as noise sources. The above is just one example of the countermeasures to be taken. It is required of users to fully consider the operating environment and take measures to obtain the most preferable result.

CHAPTER 7. SPECIFICATIONS

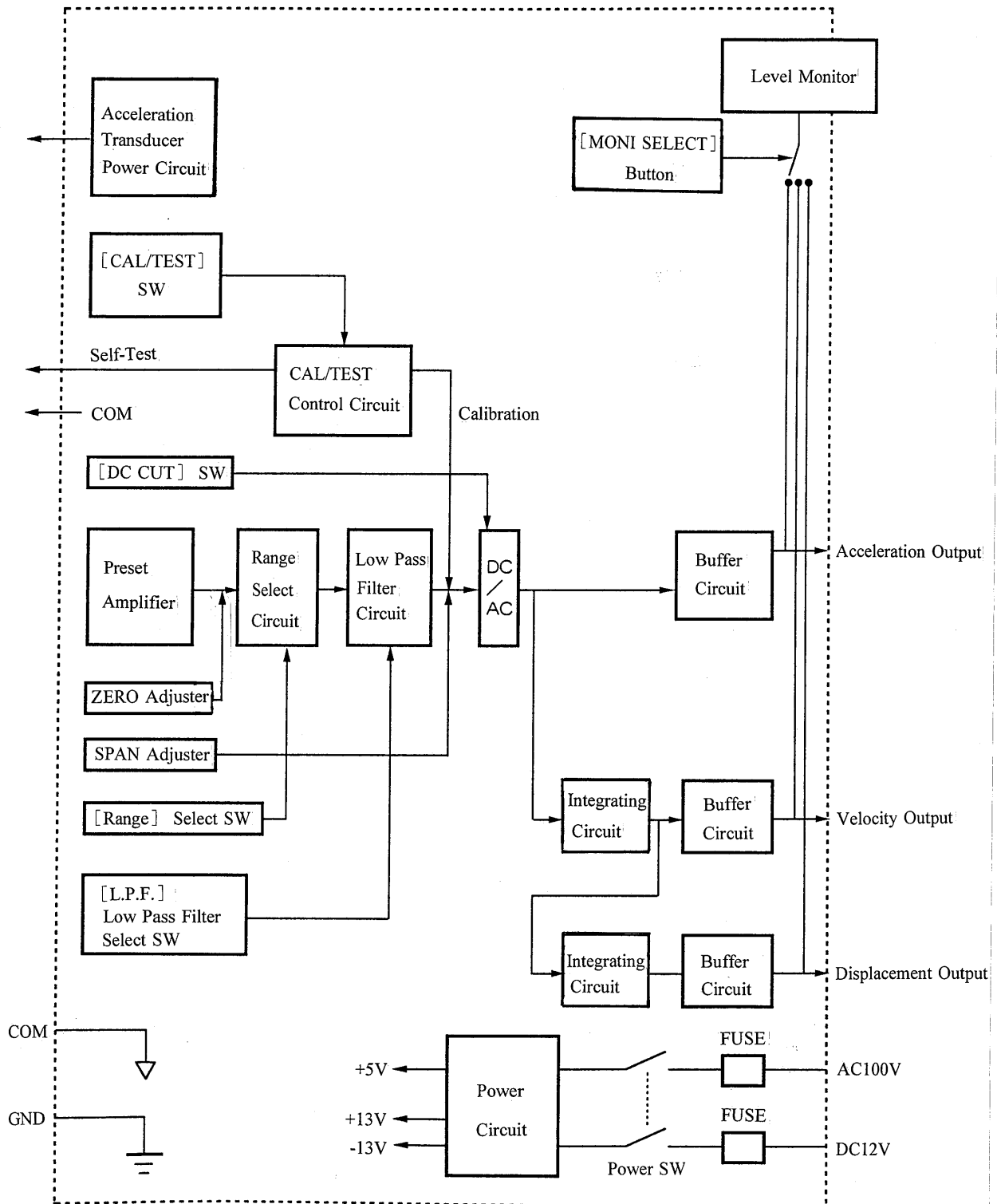
7-1 Specifications

Item	Acceleration	Velocity	Displacement
No. of Measuring Points	1. However, mounting specified housing case enables multiple CHs.		
Applicable Transducer	ASQ-CA/CB series		
Input Type	Balance difference input		
Connection	DC/AC selection	AC	AC
Measuring Range	The following range according to ASQ-CA/CB rated capacity.		
Acceleration Transducer	1G	± 0.00001 to ± 1 G	± 0.001 to ± 100 cm/sec ± 100 mm
	2G	± 0.00002 to ± 2 G	± 0.002 to ± 200 cm/sec ± 200 mm
	5G	± 0.00005 to ± 5 G	± 0.005 to ± 500 cm/sec ± 500 mm
Measuring Range	4 steps of the measuring range according to ASQ-CA/CB rated capacity.		
Acceleration Transducer	1G	0.01, 0.1, 1G, OFF	1, 10, 100 cm/sec, OFF
	2G	0.02, 0.2, 2G, OFF	2, 20, 200 cm/sec, OFF
	5G	0.05, 0.5, 5G, OFF	5, 50, 500 cm/sec, OFF
Frequency Response	DC : DC to 300 Hz ($\pm 5\%$) AC : 0.1 to 300 Hz ($\pm 5\%$)	0.1 to 100 Hz ($\pm 5\%$)	capacity of the ASQ-CA/CB. 1, 10, 100 mm, OFF 2, 20, 200 mm, OFF 5, 50, 500 mm, OFF 0.1 to 60 Hz ($\pm 5\%$) At Max sensing:
Range Accuracy	$\pm 0.5\%$ FS	$\pm 1.0\%$ FS	1 to 60 Hz ($\pm 5\%$)
Calibration	$\pm 1.0\%$ FS Relevant to 1/2 of range full scale Frequency : 1.59 Hz/10 Hz (Selected by CAL/TEST SW on rear)		
Self Test	Accuracy : Acceleration: $\pm 0.5\%$, Velocity & Displacement : $\pm 1\%$ Relevant to transducer full scale		
Low Pass Filter	Frequency : 1.59 Hz/10 Hz (Selected by CAL/TEST SW on rear)		
Transfer Characteristics	Accuracy : Acceleration $\pm 2.0\%$		
Cutoff Frequency	2-pole (Second order) Butterworth characteristics		
Cutoff Freq Accuracy	5 steps : 3, 10, 30, 100 Hz and F (Flat)		
Roll Off Characteristics			
Output	-3 dB ± 1 dB		
Output Voltage	-12 dB/oct ± 1 dB/oct		
ZERO Adjusting Range	Outputs Acceleration/Velocity/Displacement at the same time.		
Sensitivity Adjusting Rang	± 10 V or more (Load 5 k Ω or more) ± 0.25 V or more 1 to 1/10		

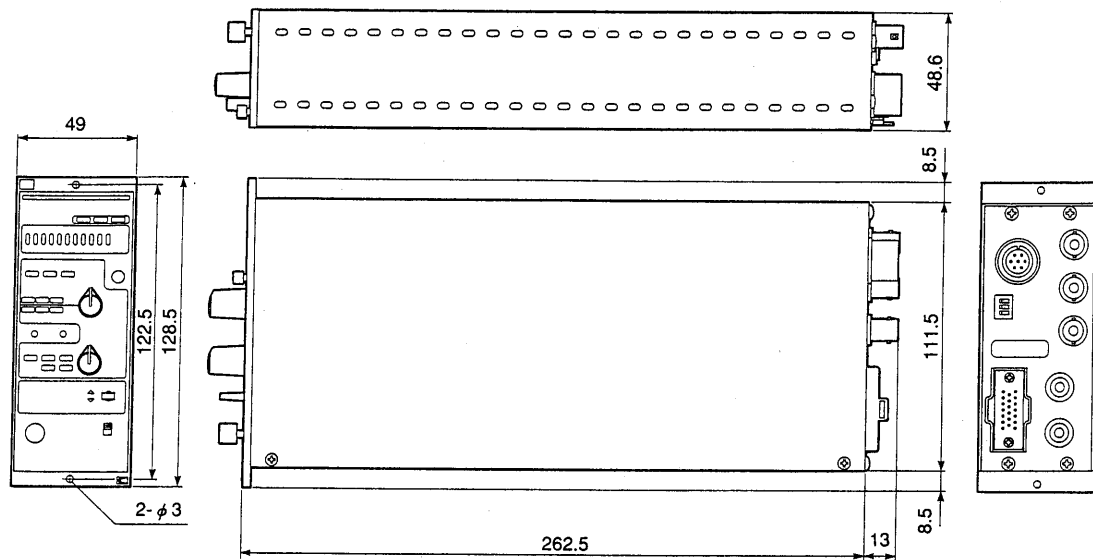
Item	Acceleration	Velocity	Displacement
Output Impedance	Approx. 10 Ω		
Output Voltage Indication	LED Bar graph meter (11 segments)		
Transducer Power Supply	$\pm 12\text{ V} \pm 10\%$ (With over-current protection)		
Operating Temp Range	- 10 to + 50 $^{\circ}\text{C}$, 85% RH or less (Non-condensing)		
Power Supply	90 to 110V AC. Approx. 15 (100V AC) 10.5 to 15V DC Approx. 0.5A (12V DC)		
Dimensions	48 (W) $\times$ 128.5 (H) $\times$ 262.5 (D) mm (protruded portion not included)		
Weight	Approx. 1.4 kg		

]

7-2 Block Diagram



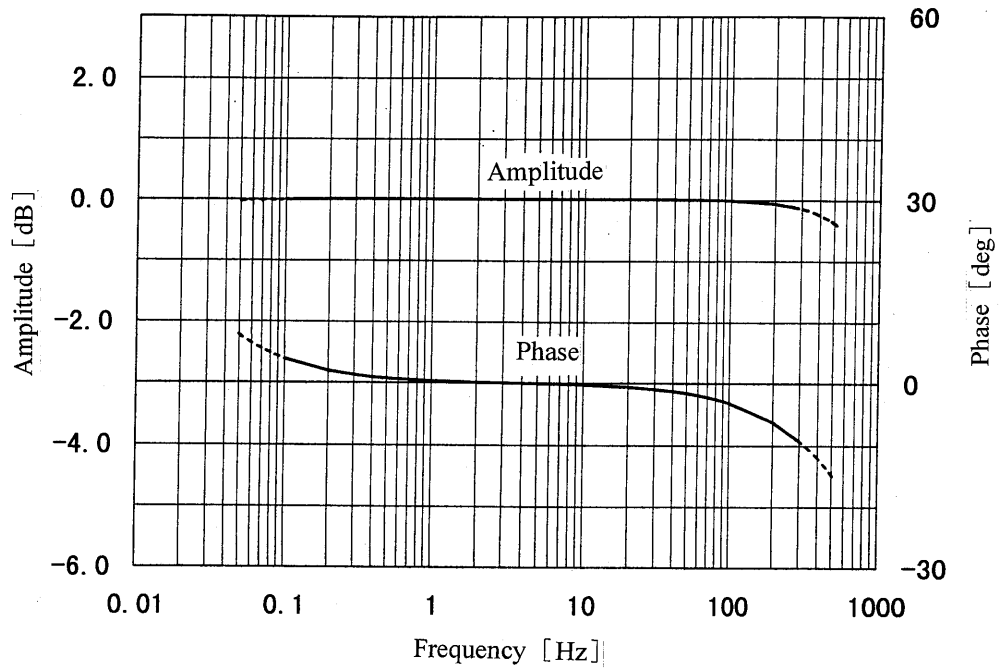
7-3 Dimensions



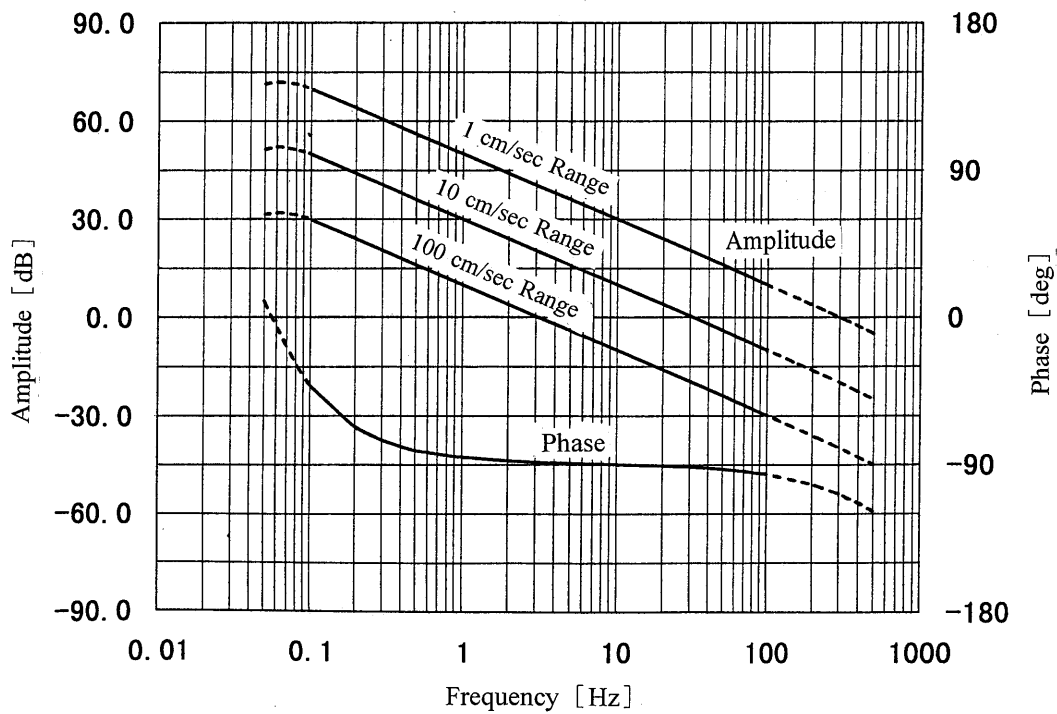
CHAPTER 8. APPENDIX

8-1 Characteristics Data

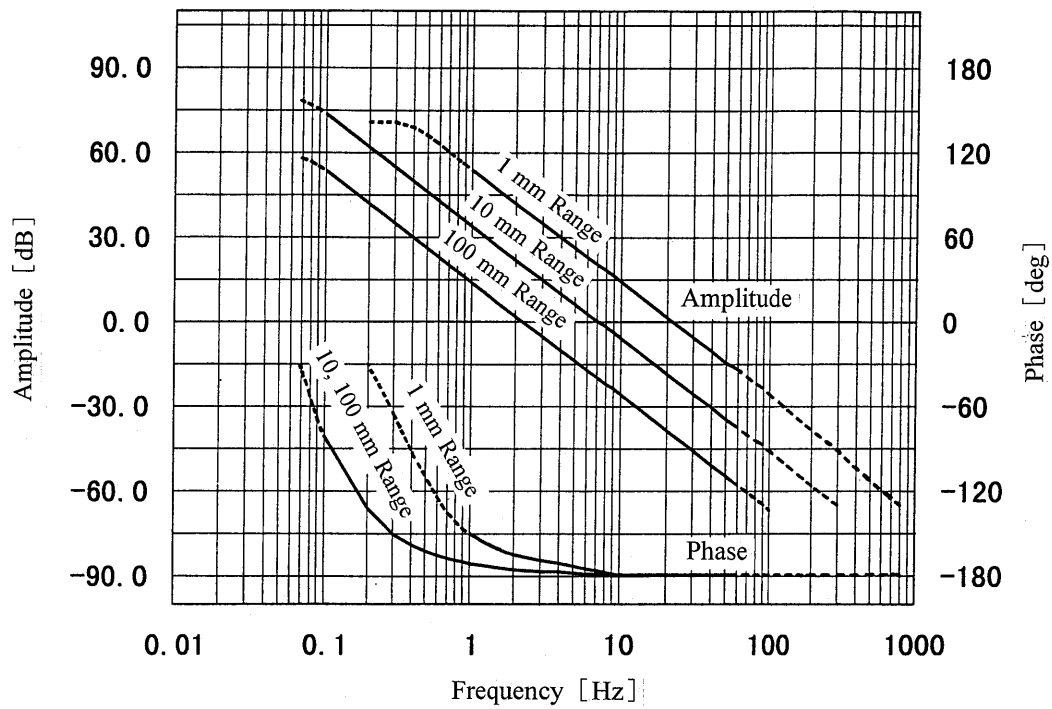
8-1-1 Acceleration AC Mode Frequency Characteristics



8-1-2 Velocity Mode Frequency Characteristics



8-1-3 Displacement Mode Frequency Characteristics



8-1-4 Low Pass Filter Characteristics

