INSTRUCTION MANUAL

Vibration Monitor

UG-50

RION CO., LTD.

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http://www.rion.co.jp/english/

Organization of this manual

This manual describes the features, operation, and other aspects of the Vibration Monitor UG-50. If the unit is used together with other equipment to configure a measurement system, consult the documentation of all other components as well. The following pages contain important information about safety. Be sure to read and observe these in full.

This manual contains the following sections.

Outline

Gives basic information about the unit.

Parts and Functions

Briefly identifies and explains the indicators, connectors, and other parts on the front panel and rear panel of the unit.

Reading the Display

Explains items that appear on the display of the unit.

Preparations

Describes how to make various settings and how to connect the accelerometer and other parts of the system.

Check Function

Describes how to check the DIP switch settings and the version of the unit.

Operation

Describes the basic operation procedures of the unit.

Unit Characteristics

Gives information about frequency response characteristics of the unit, including filter response.

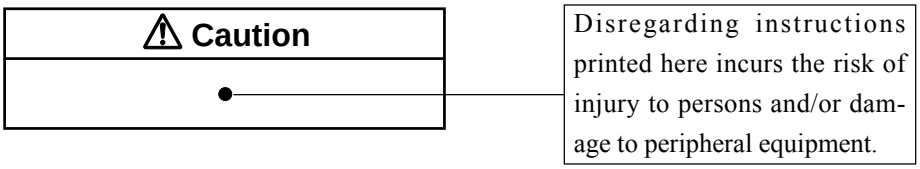
Specifications

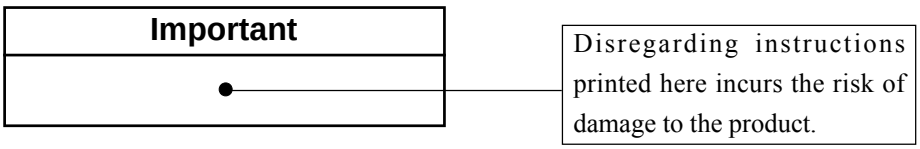
Lists the technical specifications of the unit.

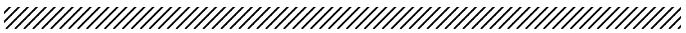
* Company names and product names mentioned in this manual are usually trademarks or registered trademarks of their respective owners.

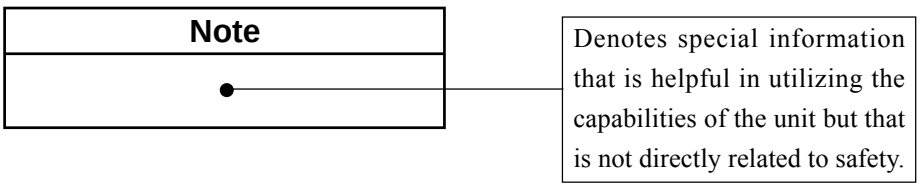
FOR SAFETY

In this manual, important safety instructions are specially marked as shown below. To prevent the risk of death or injury to persons and severe damage to the unit or peripheral equipment, make sure that all instructions are fully understood and observed.









Precautions

- Operate the unit only as described in this manual.
- Take care not to drop the unit and protect it from shocks and vibration.
- The permissible ambient temperature range for operation and storage of the unit is -10 to +50ºC. Relative humidity must be below 90%.
- Do not use or store the unit in locations which
  - · may be subject to splashes of water or to high levels of dust, or
  - · may be subject to high temperature, high humidity, or direct sunlight, or
  - · may be exposed to air with high salt or sulphur content, gases, or are in the vicinity of stored chemicals, or
  - · may be directly subject to shocks or vibrations, or
  - · may be subject to strong magnetic fields or radiation.
- Do not forget to turn the unit off after use.
  When disconnecting cables, always hold the plug or connector and do not pull the cable.
- To clean the unit, use only a dry cloth or a cloth lightly moistened with lukewarm water. Do not use solvents or alcohol-based cleaners.
- Do not disassemble the unit or attempt internal alterations.
  In case of malfunction, do not attempt any repairs. Note the condition of the unit clearly and contact the supplier.
- Do not insert any objects such as wire, pieces of metal, conductive plastic or similar into any openings of the unit. Otherwise the unit may be damaged.
- The packing box and padding in which the unit is shipped are made from recycled paper. When disposing of these, follow national and local regulations regarding waste disposal.
- The bag in which the unit is shipped is made of polyethylene. When disposing of the bag, follow national and local regulations regarding waste disposal.

- Before changing any switch settings or performing maintenance tasks, set the ALARM switch to OFF.
- When disposing of the unit, be sure to observe all applicable legal regulations and guidelines in your country and community.

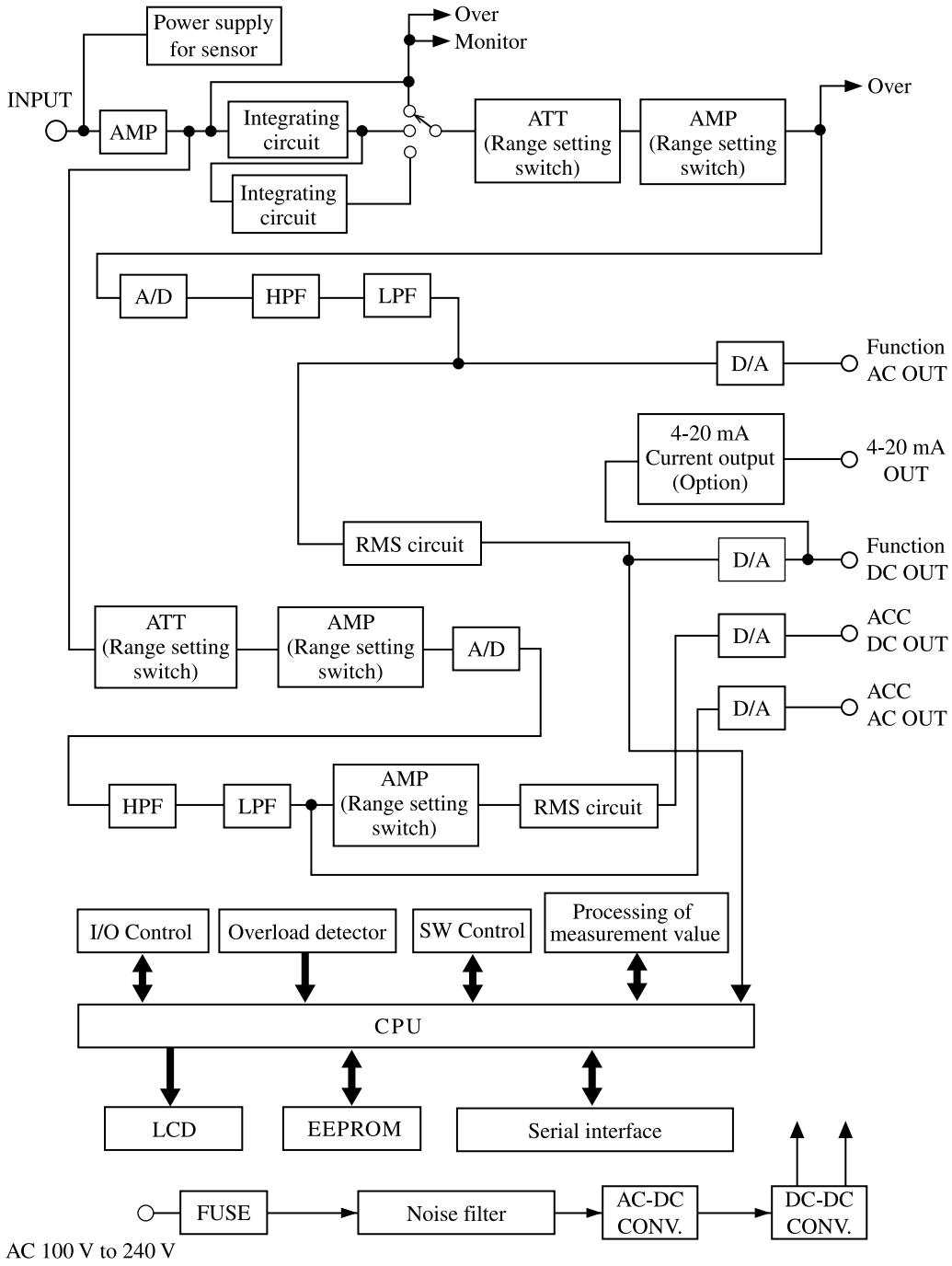
- Disclaimer of liability
  - RION Co., LTD. accepts no liability for any damage or injury caused by having the unit checked, serviced, or repaired by any party other than RION Co., LTD.
  - RION Co., LTD. accepts no liability for any consequences that arise out of the use of the unit under conditions or for purposes other than specified in this manual.
  - RION Co., LTD. accepts no liability for any damage or injury caused by using replacement parts other than specified by RION Co., LTD.
  - RION Co., LTD. accepts no liability for any damage or injury caused by seismic activity, fire, water damage, lightning strike, or other natural disaster.

Contents

Outline

The UG-50 is designed for constant monitoring of vibrations in power plants, factories, workshops and similar, using a piezoelectric accelerometer. The unit incorporates both a main circuit and a dedicated acceleration circuit. The measurement mode of the main circuit can be switched to allow measurement/ monitoring of acceleration, velocity, or displacement. The dedicated acceleration circuit always measures acceleration, separately from the main circuit. For the main circuit, an alarm threshold (warning) and trip threshold (danger) can be set separately, to trigger a warning or danger alert when the measured vibration level exceeds the respective threshold (with indicators and relay contacts). An alarm function for indicating input signal interruption is also built in (with indicators and relay contacts).

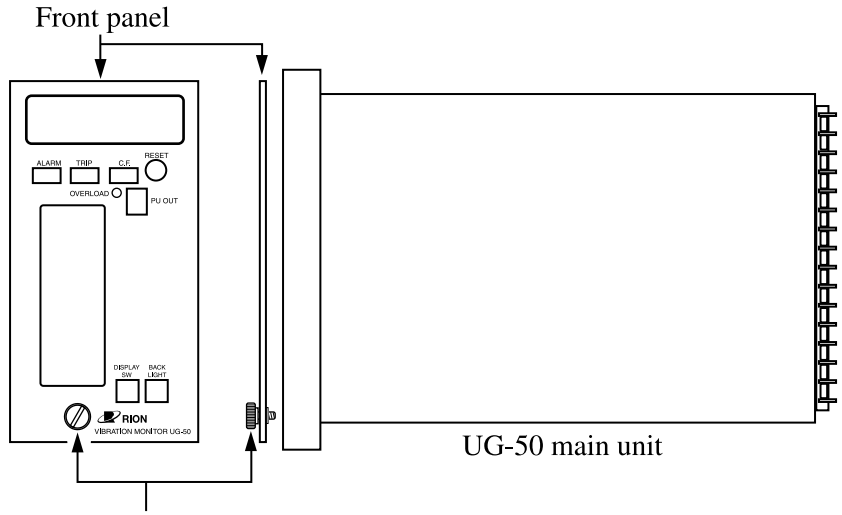
Flexible measurement range settings and a backlit LCD panel showing vibration levels or setting parameters enhance operation convenience. Both the main circuit and the dedicated acceleration circuit incorporate separate high-pass and low-pass filters with selectable cutoff frequencies. This makes it possible to optimize monitoring efficiency of the unit for the respective measurement target. Separate AC and DC outputs are provided, and an option for providing a current output (4-20 mA) is also available.

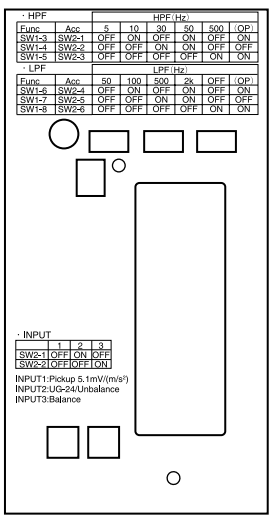


UG-50 Block diagram

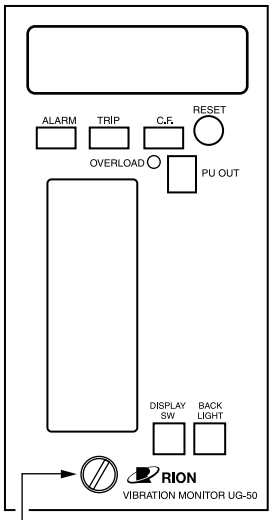
Parts and Functions

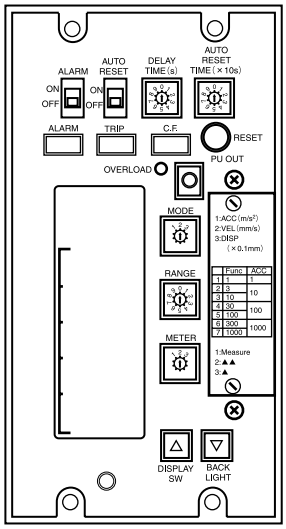
Remove the front panel fastening screw and remove the front panel to gain access to the setup panel.





Rear of front panel shows a setting table for input parameter DIP switches (see page 7).



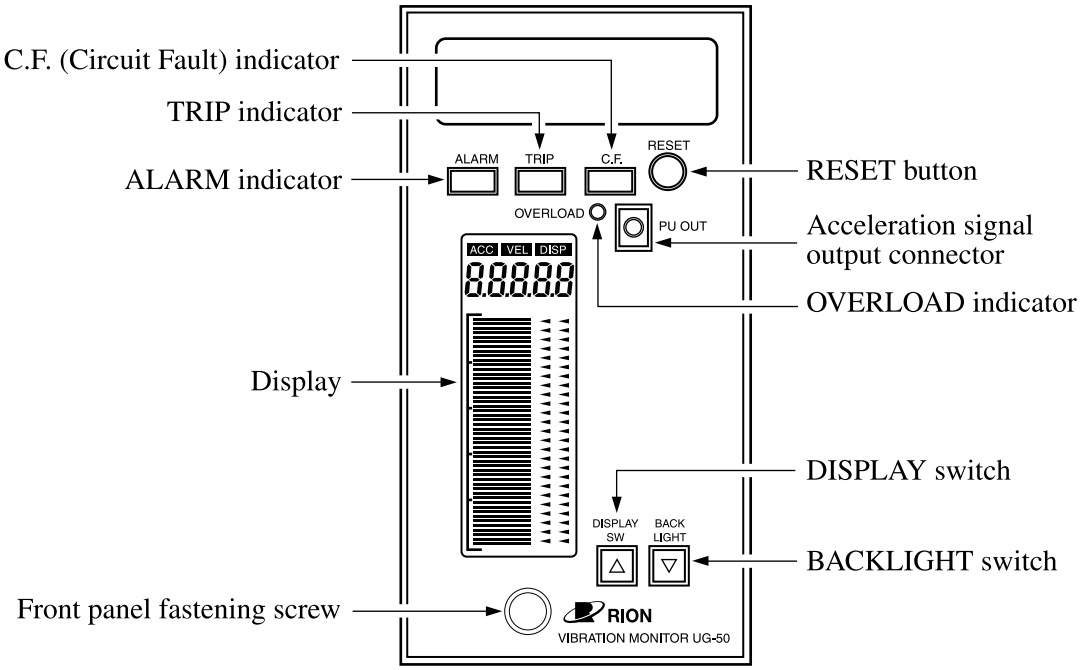


Front Panel

All parts necessary for monitoring, such as the alarm indicators and meter, are visible when the front panel is attached. For normal operation, the front panel can therefore remain in place.

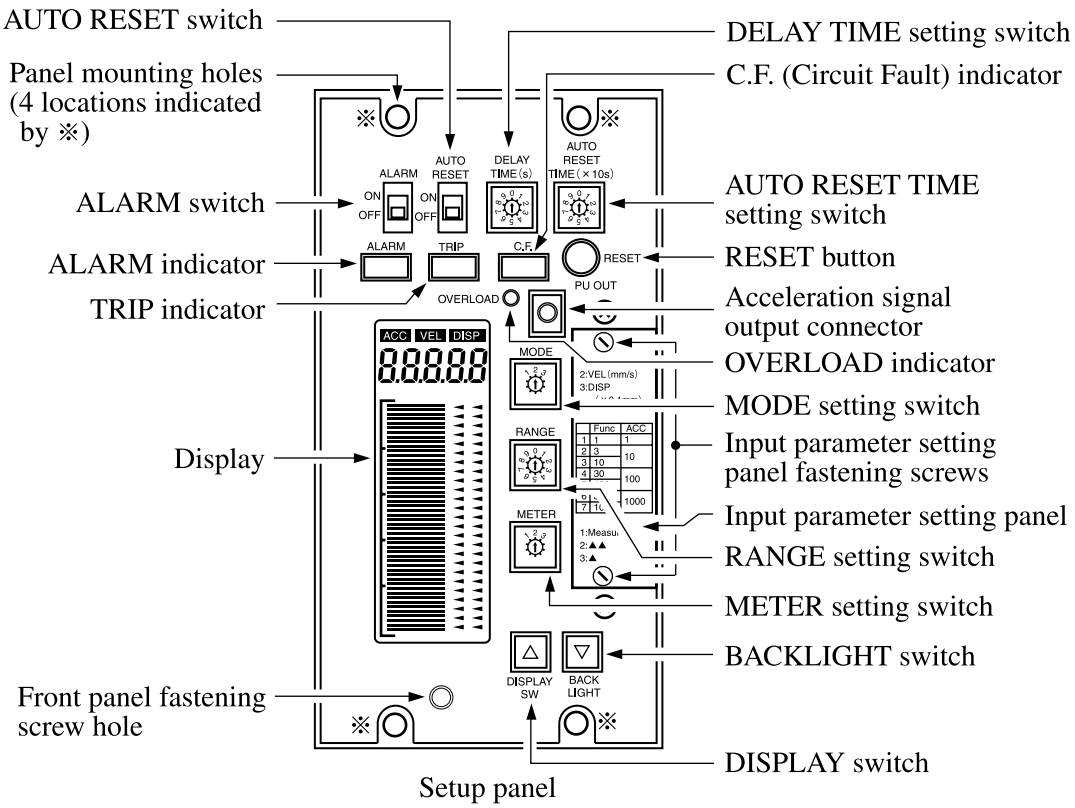
After making the required settings on the setup panel, reattach the front panel and tighten the fastening screw. This will prevent inadvertently changing any settings.

The names and functions of the parts on the front panel are described in the section about the setup panel starting on the next page.



Front panel

Setup Panel



Setup panel

DELAY TIME (s) setting switch

This switch serves to set the delay between the point where the vibration level has exceeded the preset alarm or trip threshold level and the point where the alarm or trip condition is triggered.

Similarly, when a circuit fault (input connection interruption) is detected, the circuit fault warning condition will be triggered after the same delay.

The delay time can be set from 0 to 9 seconds in 1-second steps.

C.F. (Circuit Fault) indicator

Lights up when the circuit fault condition has been activated (by an input connection interruption).

AUTO RESET TIME setting switch (× 10 s)

This switch serves to set the delay until the alarm or trip condition is canceled after the vibration level has fallen below the preset alarm or trip threshold level.

Similarly, when a circuit fault (input connection interruption) is removed, the circuit fault warning condition will be canceled after the same delay.

The reset time can be set from 10 to 90 seconds in 10-second steps.

RESET button

Serves to manually reset the alarm condition, trip condition, or circuit fault condition.

Acceleration signal output connector (PU OUT)

The input signal to the UG-50 (from the accelerometer or preamplifier) is supplied as is at this connector.

OVERLOAD indicator

Normally, this indicator is lit in green. When excessive vibration levels have overloaded the main circuit of the unit, the indicator color changes to red.

MODE setting switch

Selects the monitoring mode from the following settings.

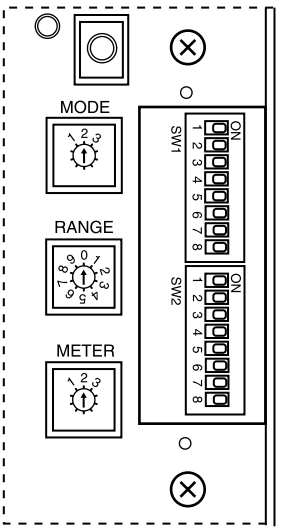
1: ACC (Acceleration)
2: VEL (Velocity)
3: DISP (Displacement)

Input parameter setting panel fastening screws

These screws secure the input parameter setting panel.

Input parameter setting panel

Opening this panel gives access to an array of DIP switches which control the settings for input, high-pass filter (HPF), low-pass filter (LPF), and range selection.



Removing the input parameter setting panel reveals two banks of DIP switches. For information on respective settings, refer to the following pages.
Input selection: page 29
Range selection: page 31
High-pass filter: page 32
Low-pass filter: page 32

RANGE setting switch position

Serves to select the measurement range for the main circuit and dedicated acceleration circuit.

The available range settings for the main circuit and dedicated acceleration circuit are shown in the table below.

RANGE setting switch position	Main circuit monitoring mode and range setting			Dedicated acceleration circuit range setting (m/s^2)
	ACC (m/s^2)	VEL (mm/s)	DISP (mm)	
1	1	1	0.1	1
2	3	3	0.3	
3	10	10	1	10
4	30	30	3	
5	100	100	10	100
6	300	300	30	
7	1000	1000	100	1000
8, 9, 0	1000	1000	100	1000

* When the range setting is a value in the 3 series (3, 30, 300), the range full-scale value is 3.16, 31.6, and 316 respectively.

METER setting switch

Selects the type of level to be displayed on the meter.

1: Measure Unit monitors vibration level
2: ▲▲ Use this setting to set the trip level.
3: ▲ Use this setting to set the alarm level.

BACKLIGHT switch

This switch turns the display backlight on and off when the unit is in monitoring mode. The backlight automatically goes out after 10 minutes.
When the METER setting switch is set to ▲▲ or ▲, the BACKLIGHT switch serves as a DOWN switch for setting the trip level or alarm level.

DISPLAY switch

When the unit is in monitoring mode, this switch selects either measurement value display or range display.
When the METER setting switch is set to ▲▲ or ▲, the DISPLAY switch serves as an UP switch for setting the trip level or alarm level.

Front panel fastening screw hole

Used for securing the front panel.

Display

This LCD panel comprises indicators for the monitoring mode, a numeric segment for showing the measurement value, indicators for trip level and alarm level, and a bar graph representation of the measurement value.

TRIP indicator

Lights up when the trip condition has been activated.

ALARM indicator

Lights up when the alarm condition has been activated.

ALARM switch

The alarm function is activated by setting this switch to ON. When activated, the alarm or trip condition will be triggered after the preset delay when the vibration level exceeds the preset alarm or trip threshold level.
Similarly, when a circuit fault (input connection interruption) is detected, the circuit fault warning condition is triggered after the preset delay.
When the switch is set to OFF, all alarm functions are disabled.

Panel mounting holes

Two holes each at the top and bottom allow installing the unit in a panel or similar, using the four supplied M4 screws (see pages 15 to 16).

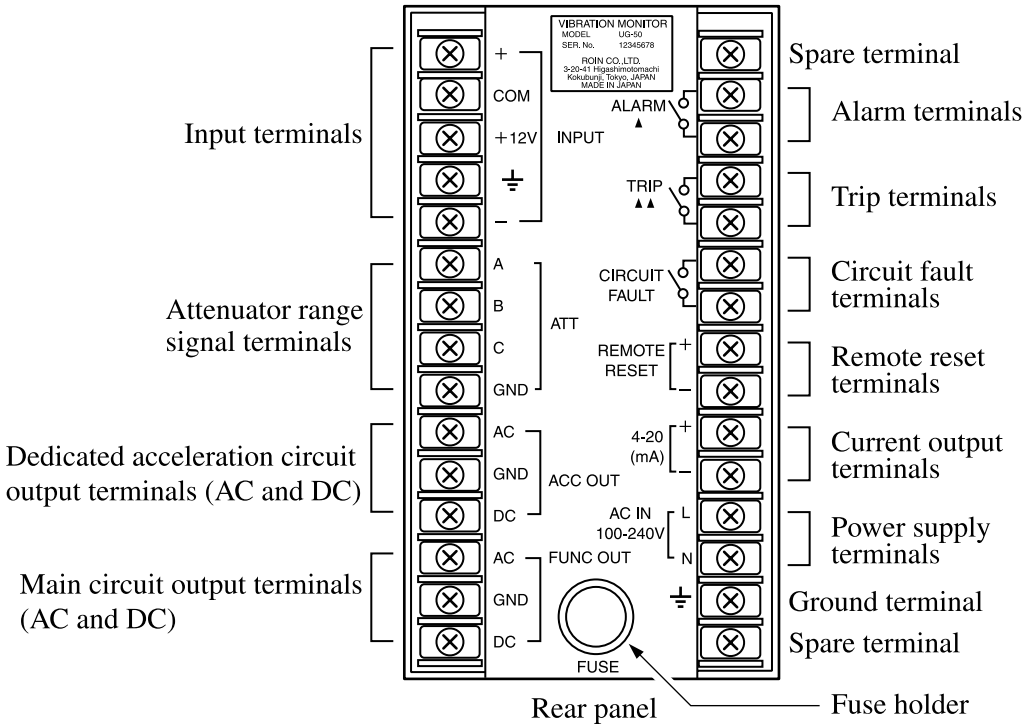
AUTO RESET switch

The auto reset function is activated by setting this switch to ON. When activated, the alarm or trip condition will be canceled automatically after the auto reset time when the vibration level falls below the alarm or trip threshold level.

Similarly, when the circuit fault (input connection interruption) is removed, the circuit fault warning condition will be canceled automatically after the reset time.

Rear Panel

The rear panel of the unit contains terminal strips for input, signal output, alarm, trip, and other connections.



Alarm terminals (ALARM ▲)

When the vibration level exceeds the preset alarm threshold and the preset delay time has elapsed, the relay contacts between these terminals close. When the alarm condition is canceled, the contacts open again.

Trip terminals (TRIP ▲▲)

When the vibration level exceeds the preset trip threshold and the preset delay time has elapsed, the relay contacts between these terminals close. When the trip condition is canceled, the contacts open again.

Circuit fault terminals (CIRCUIT FAULT)

When the input to the unit has been interrupted (circuit fault) and the preset delay time has elapsed, the relay contacts between these terminals close. When the circuit fault condition is terminated, the contacts open again.

Note
The alarm terminals (ALARM ▲), trip terminals (TRIP ▲▲), and circuit fault terminals (CIRCUIT FAULT) are relay contacts rated for 250 V AC, 3 A, or 30 V DC, 5 A. The minimum load is 100 mV DC, 100 μA. When using these terminals for configuring an alarm circuit or similar, make sure that these ratings are not exceeded.

Remote reset terminals (REMOTE RESET)

When these two terminals are shorted, the alarm, trip, and circuit fault conditions are reset.

Current output terminals (4-20 (mA))

When the 4-20 mA isolation unit UG-33 (option) is installed, a DC current corresponding to the vibration level of the currently selected monitoring mode is output here.

Power supply terminals (AC IN 100-240 V)

Connect a 100 to 240 V AC power supply here.

Ground terminal

Be sure to connect this terminal to a good ground.

⚠ Caution
For the 100 to 240 V AC power supply connection, you must use cables that are rated for at least twice the voltage and five times the current that will be drawn by the unit. The rated power consumption of the UG-50 is approx. 22 VA.
To prevent the risk of electric shock, the ground terminal must be connected.

Fuse holder (FUSE)

Contains a 2-ampere fuse for the AC power supply.

Main circuit output terminals (FUNC OUT)

These terminals provide an AC and DC output from the main circuit, corresponding to the currently selected mode.

Note
Depending on the measurement mode, the AC output voltage (sine wave) at the bar graph full-scale point is as follows. Acceleration (ACC): 2 V PEAK Velocity (VEL): 2 V RMS Displacement (DISP): 2 V P-P

Dedicated acceleration circuit output terminals (ACC OUT)

These terminals provide an AC and DC output from the dedicated acceleration circuit.

Attenuator range signal terminals (ATT)

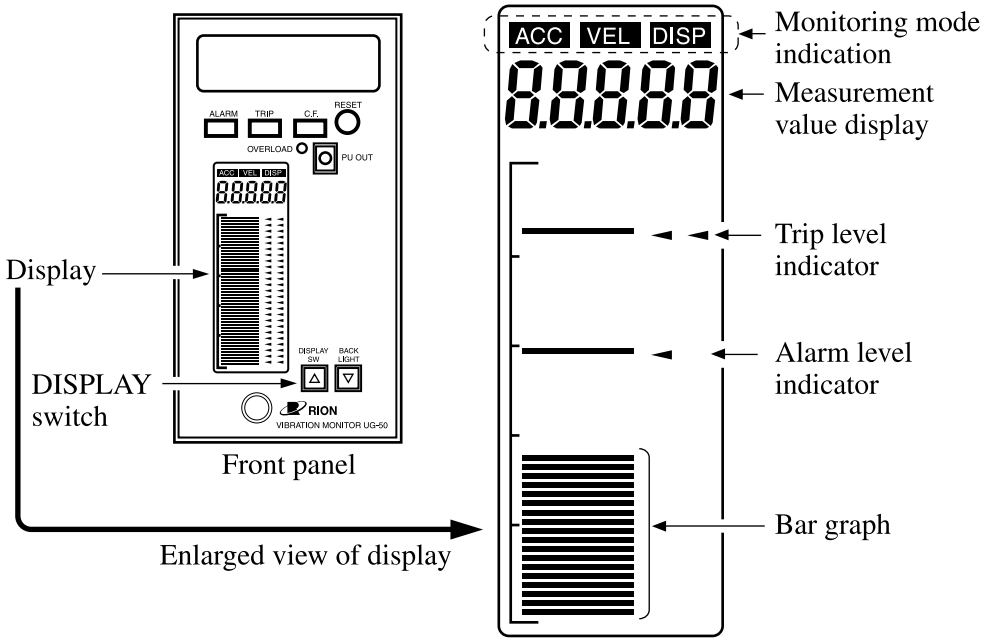
The setting status of the RANGE setting switch on the setup panel is indicated by a signal output from terminals A, B, and C (see page 22).

Input terminals (INPUT)

These terminals serve for connection of a piezoelectric accelerometer with built-in preamplifier or of the signal from a preamplifier (UG-20/UG-21) or junction box (UG-23).

Important
Be sure to protect the terminal strips by attaching the terminal strip cover.

Reading the Display



Monitoring mode indication

The monitoring mode as set by the MODE setting switch is shown here.

ACC: Acceleration VEL: Velocity DISP: Displacement

Measurement value display

This display segment either shows a numeric readout of the measurement value or the range, trip level, or alarm level selected with the METER setting switch.

METER setting switch position	Measurement value display
1. Measure	Measurement value or range is displayed. The indication can be changed with the DISPLAY switch. The indication is updated every second.*
2. ▲▲	The selected trip level is shown.
3. ▲	The selected alarm level is shown.

* When measurement value display is selected, the range will be shown for a few seconds after changing the range setting.

Trip level indication

Shows the vibration level value that will trigger the trip condition.

Note
The trip level should be set to a higher point than the alarm level.

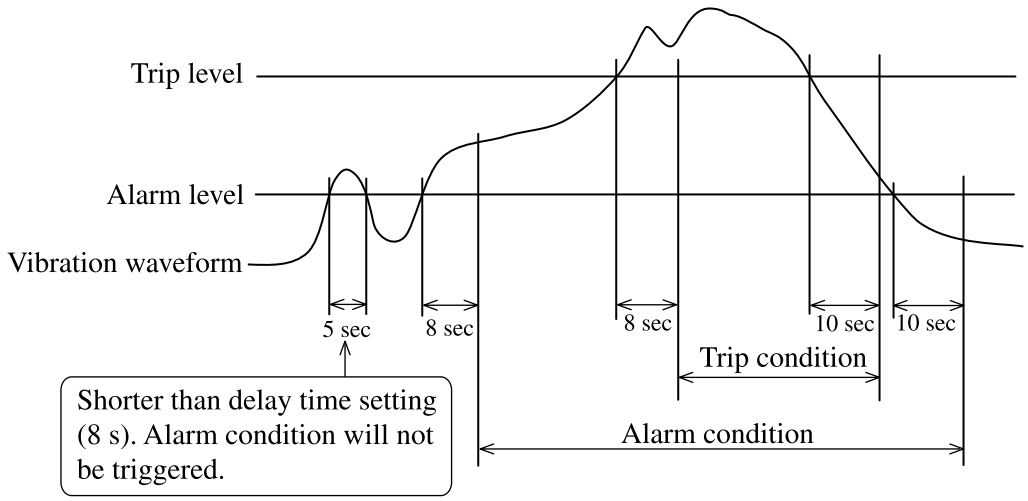
Alarm level indication

Shows the vibration level value that will trigger the alarm condition.

Note
The alarm level should be set to a lower point than the trip level.

An example for trip level and alarm level operation (triggering and canceling) is shown below.

ALARM switch: ON
AUTO RESET switch: ON
DELAY TIME setting switch: 8 s
AUTO RESET TIME setting switch: 10 s



Bar graph

Shows the vibration level at the input as a bar graph.

Preparations

Important
Perform the preparation steps described below before connecting the AC power supply.

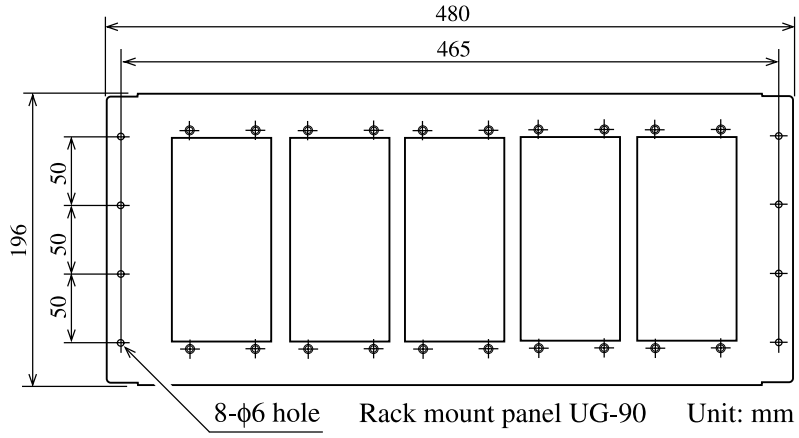
Note
The UG-50 does not have a power switch.

Panel Installation

Remove the front panel fastening screw and remove the front panel, so that the setup panel becomes accessible. Use the panel mounting holes (2 each at top and bottom) to mount the unit to a panel or similar.

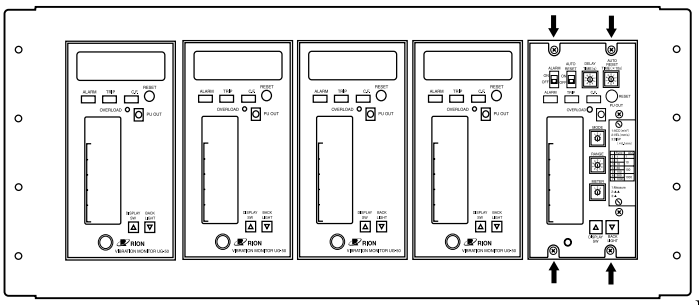
Using the dedicated panel

The optional panel UG-90 is designed to accommodate up to five UG-50 units for five channels. The panel can then be mounted for example to a JIS rack. Use four M4 screws to mount the UG-50 to the panel.



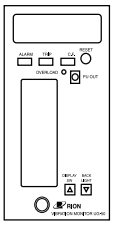
8-ϕ6 hole Rack mount panel UG-90 Unit: mm

Fasten with four supplied M4 screws



UG-50 mounted on UG-90

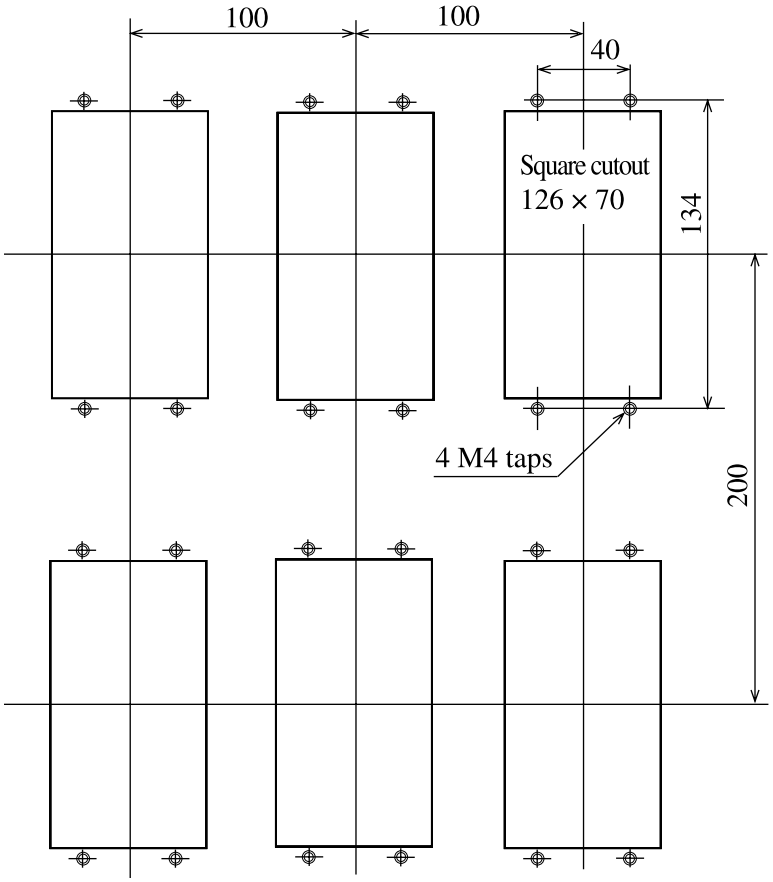
Remove front panel and fasten with four M4 screws



Front panel

Direct mounting to an operation panel

Use a steel plate of at least 2 mm thickness for the operation panel, and provide cutouts on the panel as shown below. The example shown below is for mounting six UG-50 units.



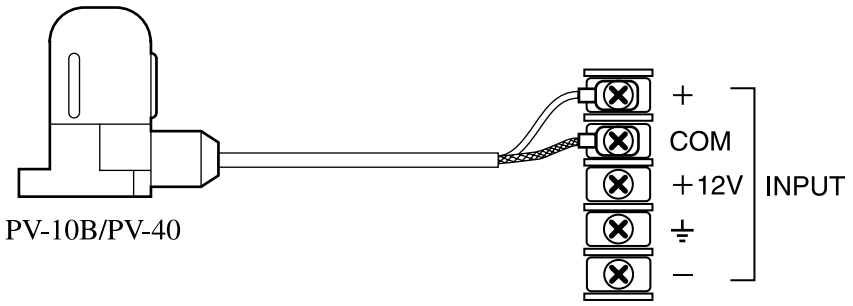
Terminal Strip Wiring

The terminal strips on the rear panel of the unit serve for making the required connections. Use only cables with crimp-on lugs and fasten the lugs to the terminals by securely tightening the screws.

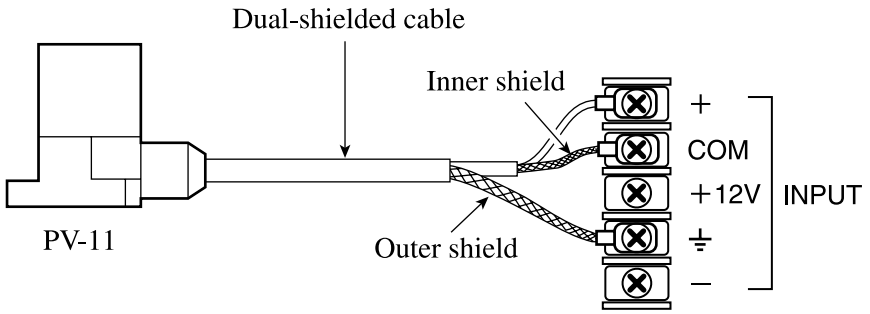
Input terminals (INPUT)

These terminals serve for connection of a piezoelectric accelerometer with built-in preamplifier or of the signal from a preamplifier (UG-20/UG-21) or junction box (UG-23). Set the DIP switches on the input parameter setting panel to the appropriate position, depending on which type of equipment is connected here.

· Connection of piezoelectric accelerometer with built-in preamplifier



Input terminal strip of UG-50



Input terminal strip of UG-50

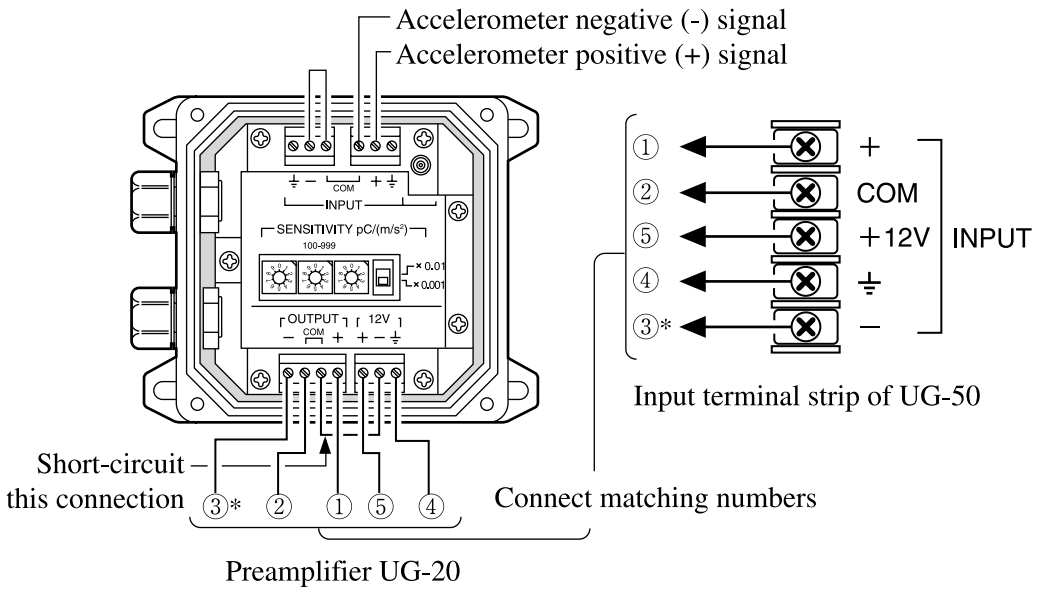
Important
The accelerometer is a highly delicate precision instrument. Never drop an accelerometer and always protect it from shocks. Do not suspend, carry, or pull the accelerometer by its cable, because this can lead to wire break.

· Connection of preamplifier UG-20

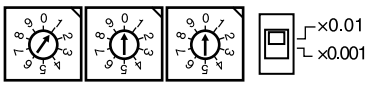
The preamplifier UG-20 is designed for applications where the acceleration signal from a piezoelectric accelerometer is to be transmitted for a distance of up to 300 m.

The principle for making a balanced connection of the UG-20 is shown below. For an unbalanced connection, leave (3) * open.

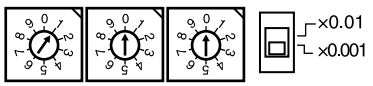
Set the DIP switches according to the input selection setting as described on page 29.



SENSITIVITY pC/(m/s²)



When set to ×0.01
1.00 to 9.99 pC/(m/s²)



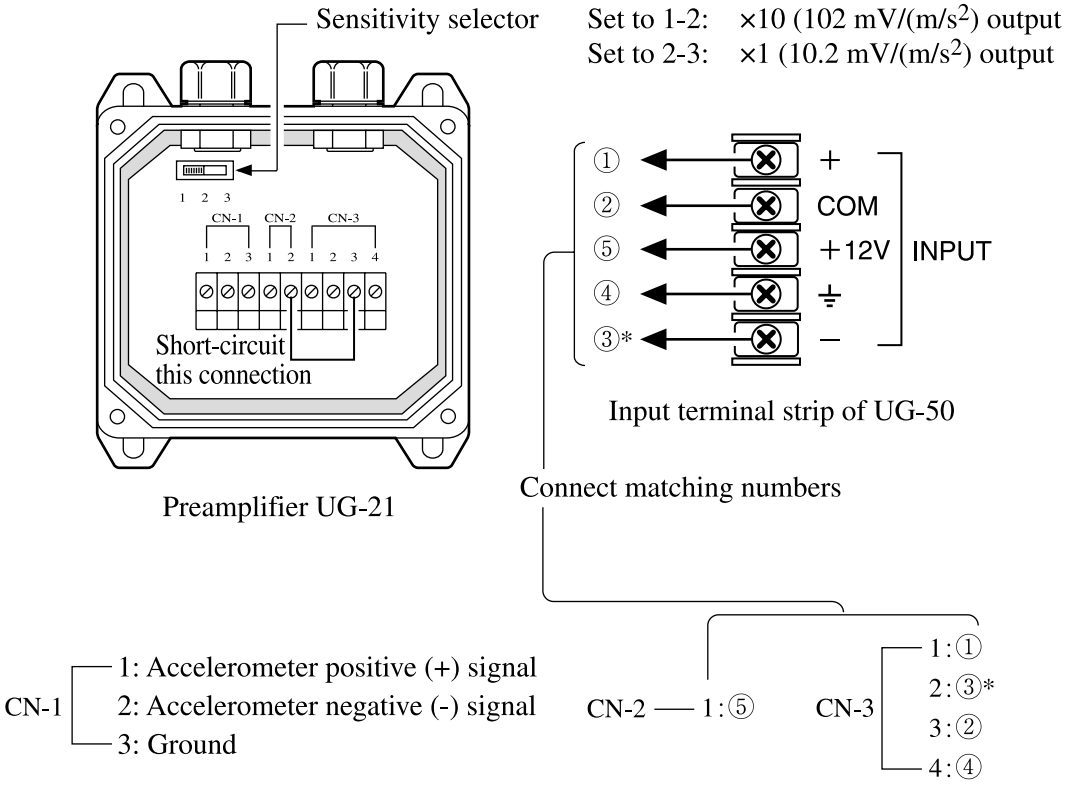
When set to ×0.001
0.100 to 0.999 pC/(m/s²)

· Connection of preamplifier UG-21

The preamplifier UG-21 is designed for applications where the acceleration signal from a piezoelectric accelerometer with built-in preamplifier is to be transmitted for a distance of up to 400 m.

The principle for making a balanced connection of the UG-21 is shown below. For an unbalanced connection, leave (3) * open.

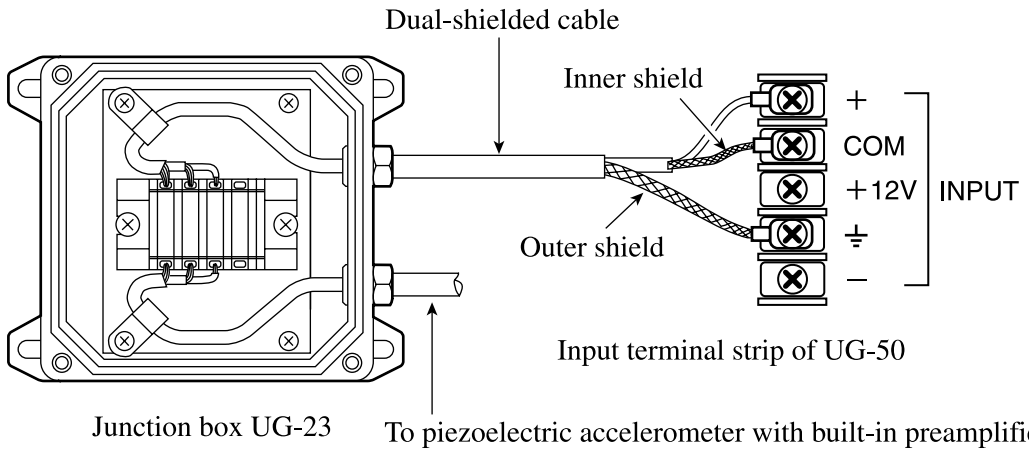
Set the DIP switches according to the input selection setting as described on page 29.



· Connection of junction box UG-23

The junction box UG-23 is designed for applications where the acceleration signal from a piezoelectric accelerometer with built-in preamplifier is to be transmitted for a distance of up to 100 m.

The principle for connecting the junction box UG-23 is shown below.



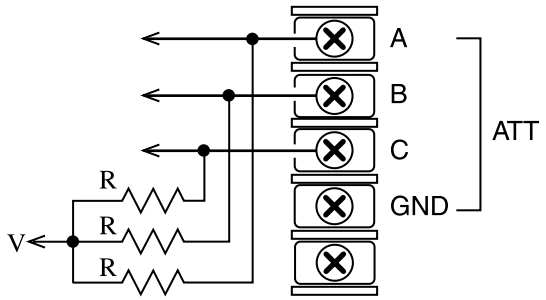
Attenuator range signal terminals (ATT)

The setting status of the RANGE setting switch on the setup panel is indicated by a signal output from terminals A, B, and C.

The terminals A, B, and C are an open collector output. You should connect external pull-up resistors (R) to these lines.

The output can be used for data recording and processing.

The output as determined by the position of the RANGE setting switch is shown in the table below.



ATT terminal strip of UG-50

RANGE setting switch position	ATT terminals on rear panel		
	Terminal A	Terminal B	Terminal C
1	0	0	1
2	0	1	0
3	0	1	1
4	1	0	0
5	1	0	1
6	1	1	0
7	1	1	1

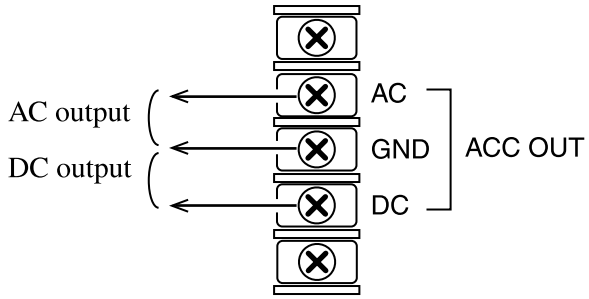
Dedicated acceleration circuit output terminals (ACC OUT)

These terminals provide an AC and DC output from the dedicated acceleration circuit.

AC - GND: 2 V PEAK AC output corresponding to range full-scale point

DC - GND: +10 V DC output corresponding to range full-scale point

The output can be used for data recording and processing.



ACC OUT terminal strip of UG-50

Main circuit output terminals (FUNC OUT)

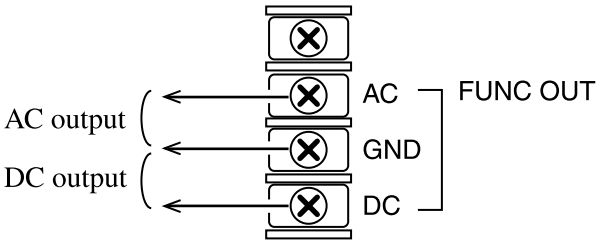
These terminals provide an AC and DC output from the main circuit, corresponding to the currently selected mode.

AC - GND: 2 V AC output corresponding to bar graph full-scale point

DC - GND: 10 V DC output corresponding to bar graph full-scale point

The output can be used for data recording and processing.

Note
Depending on the measurement mode, the AC output voltage (sine wave) at the bar graph full-scale point is as follows. Acceleration (ACC): 2 V PEAK Velocity (VEL): 2 V RMS Displacement (DISP): 2 V P-P



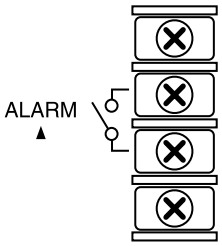
FUNC OUT terminal strip of UG-50

Alarm terminals (ALARM ▲)

When the vibration level exceeds the preset alarm level threshold and the preset delay time has elapsed, the relay contacts between these terminals close. When the alarm condition is canceled, the contacts open again.

The relay contacts are rated for 250 V AC, 3 A, or 30 V DC, 5 A. The minimum load is 100 mV DC, 100 μA.

The output can be used for alarm indication, to control external equipment, etc.



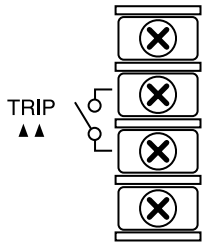
ALARM terminal strip of UG-50

Trip terminals (TRIP ▲▲)

When the vibration level exceeds the preset trip level threshold and the preset delay time has elapsed, the relay contacts between these terminals close. When the trip condition is canceled, the contacts open again.

The relay contacts are rated for 250 V AC, 3 A, or 30 V DC, 5 A. The minimum load is 100 mV DC, 100 μA.

The output can be used for alarm indication, to control external equipment, etc.



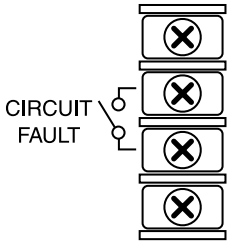
TRIP terminal strip of UG-50

Circuit fault terminals (CIRCUIT FAULT)

When the input to the unit has been interrupted (circuit fault) and the preset delay time has elapsed, the relay contacts between these terminals close. When the circuit fault condition is terminated, the contacts open again.

The relay contacts are rated for 250 V AC, 3 A, or 30 V DC, 5 A. The minimum load is 100 mV DC, 100 μA.

The output can be used for alarm indication, to control external equipment, etc.



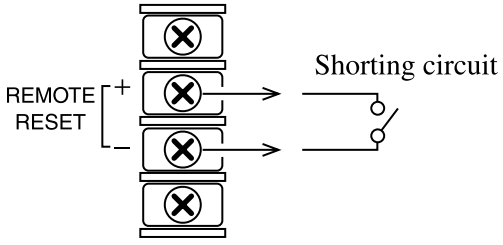
CIRCUIT FAULT terminal strip of UG-50

Remote reset terminals (REMOTE RESET)

When these two terminals are shorted, the alarm, trip, and circuit fault conditions are reset. This has the same effect as pressing the RESET button on the setup panel.

The terminals can be used for an external reset control circuit.

Note
The circuit used to short these terminals must be able to fully withstand a continuous current of 60 μA.



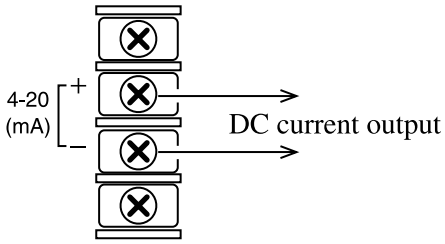
REMOTE RESET terminal strip of UG-50

Current output terminals (4-20 (mA))

When the 4-20 mA isolation unit UG-33 (option) is installed, a DC current corresponding to the vibration level of the currently selected monitoring mode is output here.

For this output, the 0 to 10 V DC voltage is converted into a 4 to 20 mA DC current.

The output can be used for connection to equipment designed for current input.

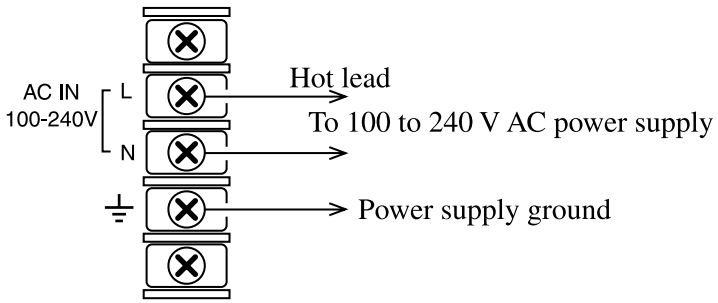


4-20 (mA) terminal strip of UG-50

Power supply terminals (AC IN 100-240 V)

Connect a 100 to 240 V AC power supply here. Be sure to connect the ground terminal to a good ground.

⚠ Caution
For the 100 to 240 V AC power supply connection, you must use cables that are rated for at least twice the voltage and five times the current that will be drawn by the unit. The rated power consumption of the UG-50 is approx. 22 VA.
To prevent the risk of electric shock, the ground terminal must be connected.



AC IN 100-240 V terminal strip of UG-50

Important
Be sure to attach the terminal strip cover.

Fuse replacement

The fuse holder on the rear panel contains a fuse for the unit.

Important
Before replacing the fuse, be sure to cut the power. Fuse rating: 250 V AC, 2 A, fast-acting, ϕ5 × 20 mm

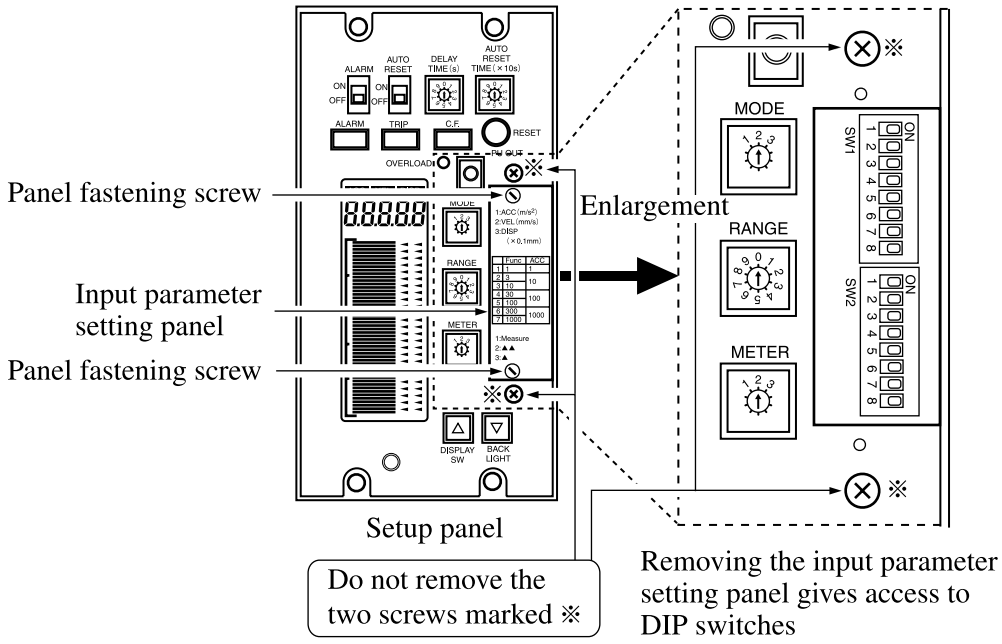
Input selection setting

After making connections to the terminals on the rear panel, make the required settings for the input configuration. To make these settings, remove the input parameter setting panel on the setup panel.

1. Turn the power supply off.
2. Remove the front panel.
3. Remove the two input parameter setting panel fastening screws with the supplied flatblade screwdriver and remove the input parameter setting panel.
4. Set the DIP switches as shown below. (The DIP switches also serve to make settings for high-pass filter and low-pass filter).

Connection method	DIP switch setting	
	SW1-1	SW1-2
Direct connection of piezoelectric accelerometer with built-in preamplifier (unbalanced input 1: INPUT1)	OFF	OFF
Unbalanced connection using UG-20 or UG-21 (unbalanced input 2: INPUT2)	ON	OFF
Balanced connection using UG-20 or UG-21 (balanced input: INPUT3)	OFF	ON
Connection via UG-23	OFF	OFF
Connection via UG-24 (unbalanced input 2: INPUT2)	ON	OFF

5. Replace the input parameter setting panel in the original position.



Range selection setting

Make the appropriate range setting for the input connection configuration (accelerometer with built-in preamplifier, separate preamplifier, or junction box).

1. Turn the power supply off.
2. Remove the front panel.
3. Remove the input parameter setting panel fastening screws and remove the input parameter setting panel.
4. Set the DIP switches as shown below.
   For the UG-50, the normal setting is always OFF.

Connection method	DIP switch setting SW2-7
Direct connection of piezoelectric accelerometer with built-in preamplifier (unbalanced input 1: INPUT1)	OFF
Unbalanced connection using UG-20 or UG-21 (unbalanced input 2: INPUT2)	OFF
Balanced connection using UG-20 or UG-21 (balanced input: INPUT3)	OFF

5. Replace the input parameter setting panel in the original position.

The range settings for the main circuit and the dedicated acceleration circuit are shown in the table below.

RANGE setting switch position	Main circuit monitoring mode and range setting			Dedicated acceleration circuit range setting (m/s^2)
	ACC (m/s^2)	VEL (mm/s)	DISP (mm)	
1	1	1	0.1	1
2	3	3	0.3	
3	10	10	1	10
4	30	30	3	
5	100	100	10	100
6	300	300	30	
7	1000	1000	100	1000
8, 9, 0	1000	1000	100	1000

* When the range setting is a value in the 3 series (3, 30, 300), the range full-scale value is 3.16, 31.6, and 316 respectively.

High-pass filter (HPF) and low-pass filter (LPF) setting

High-pass filter (HPF) and low-pass filter (LPF) settings can be made for the main circuit and the dedicated acceleration circuit separately, as shown below. To make these settings, remove the input parameter setting panel on the setup panel.

1. Turn the power supply off.
2. Remove the front panel.
3. Remove the two input parameter setting panel fastening screws and remove the input parameter setting panel.
4. Set the DIP switches as shown below.
5. Replace the input parameter setting panel in the original position.

* The optional custom filter NX-50 allows customer-specified cutoff frequencies.

Main circuit high-pass filter settings

DIP switch	5 Hz (OFF)	10 Hz	30 Hz	50 Hz	500 Hz	Option *
SW1-3	OFF	ON	OFF	ON	OFF	ON
SW1-4	OFF	OFF	ON	ON	OFF	OFF
SW1-5	OFF	OFF	OFF	OFF	ON	ON

Main circuit low-pass filter settings

DIP switch	50 Hz	100 Hz	500 Hz	2 kHz	30 kHz (OFF)	Option *
SW1-6	OFF	ON	OFF	ON	OFF	ON
SW1-7	OFF	OFF	ON	ON	OFF	OFF
SW1-8	OFF	OFF	OFF	OFF	ON	ON

Dedicated acceleration circuit high-pass filter settings

DIP switch	5 Hz (OFF)	10 Hz	30 Hz	50 Hz	500 Hz
SW2-1	OFF	ON	OFF	ON	OFF
SW2-2	OFF	OFF	ON	ON	OFF
SW2-3	OFF	OFF	OFF	OFF	ON

Dedicated acceleration circuit low-pass filter settings

DIP switch	50 Hz	100 Hz	500 Hz	2 kHz	30 kHz (OFF)
SW2-4	OFF	ON	OFF	ON	OFF
SW2-5	OFF	OFF	ON	ON	OFF
SW2-6	OFF	OFF	OFF	OFF	ON

DIP switch setting examples for high-pass filter (HPF) and low-pass filter (LPF) in the main circuit and dedicated acceleration circuit are shown below.

Main circuit high-pass filter (HPF) settings

DIP switch	5 Hz (OFF)	10 Hz	30 Hz	50 Hz	500 Hz	Option *
SW1-3	OFF	ON	OFF	ON	OFF	ON
SW1-4	OFF	OFF	ON	ON	OFF	OFF
SW1-5	OFF	OFF	OFF	OFF	ON	ON

Main circuit low-pass filter (LPF) settings

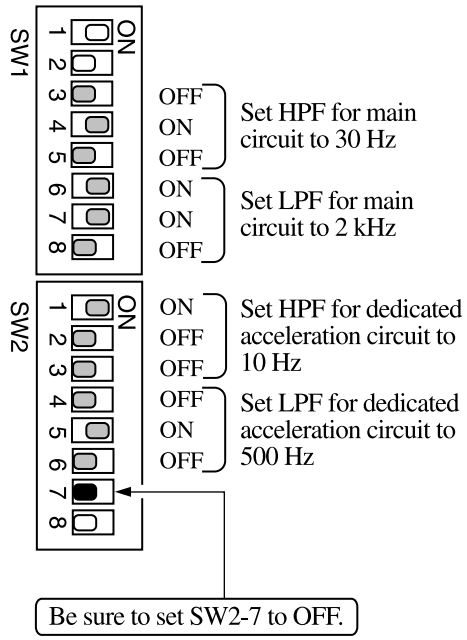
DIP switch	50 Hz	100 Hz	500 Hz	2 kHz	30 kHz (OFF)	Option *
SW1-6	OFF	ON	OFF	ON	OFF	ON
SW1-7	OFF	OFF	ON	ON	OFF	OFF
SW1-8	OFF	OFF	OFF	OFF	ON	ON

Dedicated acceleration circuit high-pass filter (HPF) settings

DIP switch	5 Hz (OFF)	10 Hz	30 Hz	50 Hz	500 Hz
SW2-1	OFF	ON	OFF	ON	OFF
SW2-2	OFF	OFF	ON	ON	OFF
SW2-3	OFF	OFF	OFF	OFF	ON

Dedicated acceleration circuit low-pass filter (LPF) settings

DIP switch	50 Hz	100 Hz	500 Hz	2 kHz	30 kHz (OFF)
SW2-4	OFF	ON	OFF	ON	OFF
SW2-5	OFF	OFF	ON	ON	OFF
SW2-6	OFF	OFF	OFF	OFF	ON



Note

When the custom filter NX-50 is not installed, do not choose the "Option" position of the DIP switches

Check Function

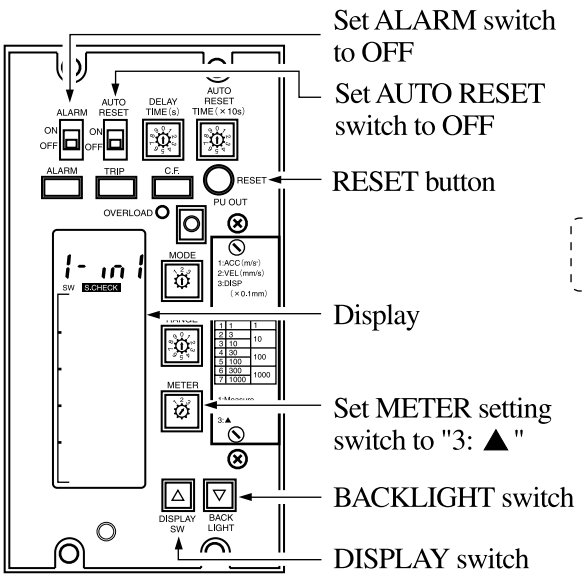
This function allows you to check the DIP switch settings and the software version of the unit.

Checking items

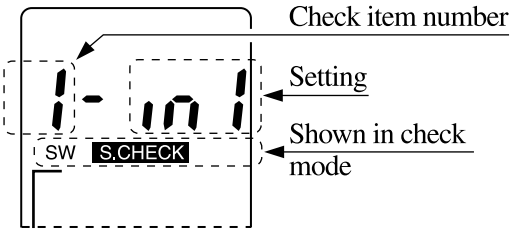
- Input selection setting
- High-pass filter (HPF) and low-pass filter (LPF) setting
- RANGE setting switch position
- UG-50 software version

Checking procedure

1. Set the ALARM switch to OFF.
2. Set the AUTO RESET switch to OFF.
3. Set the METER setting switch to "3: ▲".
4. Hold down the RESET button for 2 seconds or more to activate the check mode.

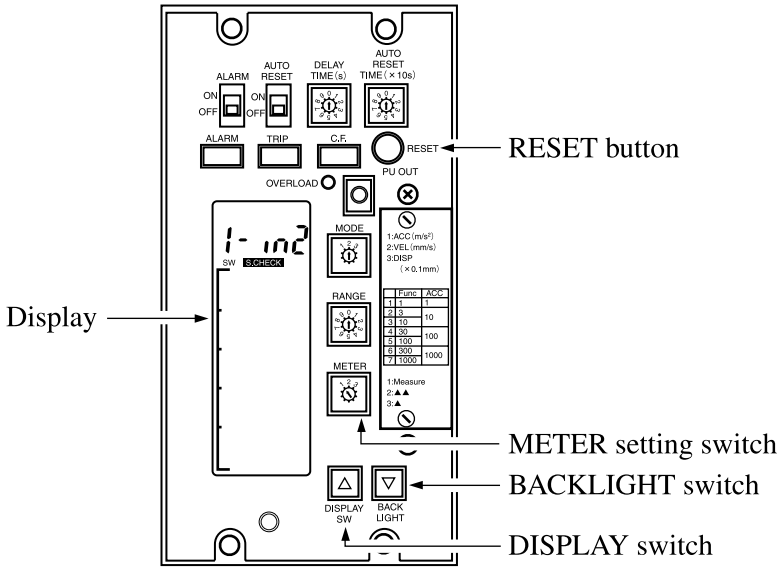


Setup panel



Enlarged partial view of display

5. Use the BACKLIGHT switch and DISPLAY switch to select the item, and check the setting shown on the display.
   To return to monitoring mode, press the RESET button and set the METER setting switch to "1: MEASURE".



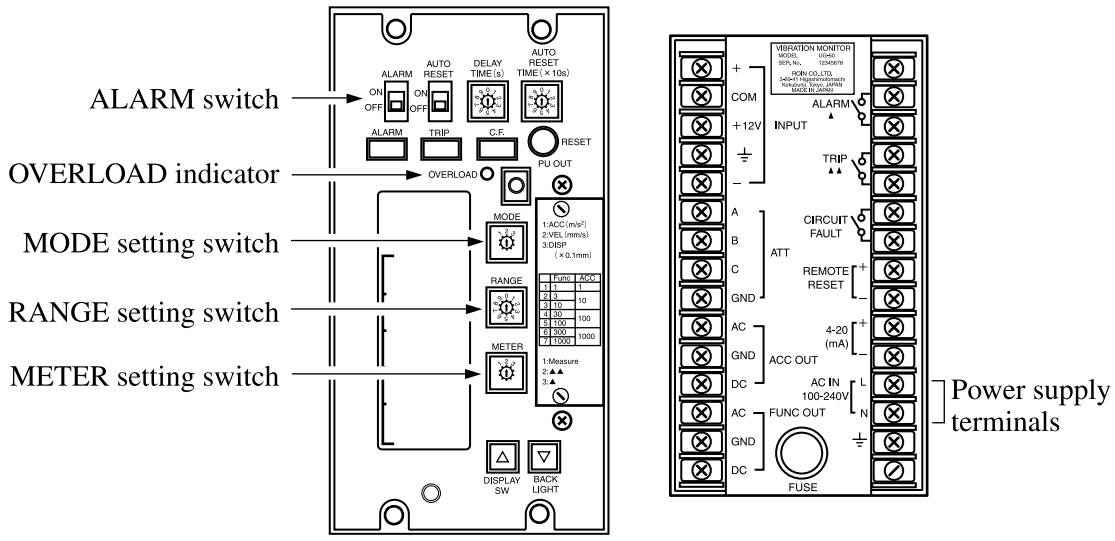
Check item	Setting	Remarks
1	Input selection	in1: Unbalanced input 1 (INPUT1) in2: Unbalanced input 2 (INPUT2) in3: Balanced input (INPUT3)
2	Main circuit high-pass filter (HPF)	Selected frequency is shown
3	Main circuit low-pass filter (LPF)	Selected frequency is shown
4	Dedicated acceleration circuit high-pass filter (HPF)	Selected frequency is shown
5	Dedicated acceleration circuit low-pass filter (LPF)	Selected frequency is shown
6	Range selection	When UG-24 is used and input charge setting is 10000 pC, 10 is shown. Otherwise 1 is shown.
7	UG-50 version	Example: 1.0

Operation

AC power supply connection

When an AC power supply is connected, the unit becomes operative, and the OVERLOAD indicator lights up in green.

Note
Before connecting the AC power supply, set the ALARM switch to OFF.



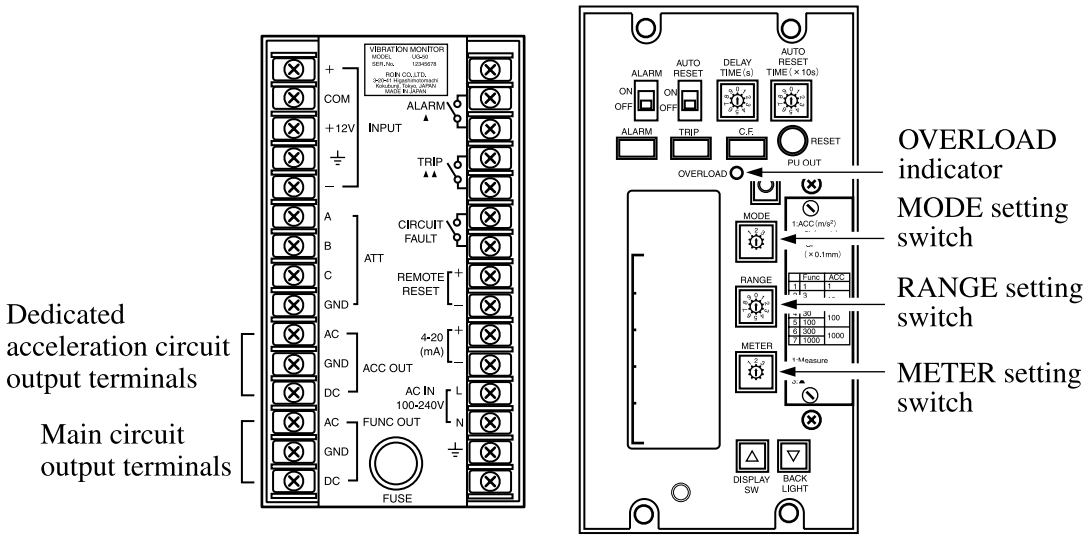
Setup panel

Monitor mode setting

Using the METER setting switch on the setup panel, select the monitor mode that best fits the application: acceleration (ACC), velocity (VEL), or displacement (DISP).

Note
Before making the setting, set the ALARM switch to OFF.

Note
The dedicated acceleration circuit operates independently of the selected mode setting. It always measures acceleration, according to the cutoff frequencies set for the high-pass and low-pass filters of the dedicated acceleration circuit. The result is output as an acceleration signal from the ACC OUT terminals. If the mode for the main circuit is set to ACC, an acceleration signal will be output both from the main circuit output terminals (FUNC OUT) and the dedicated acceleration circuit output terminals (ACC OUT), but this signal may not be identical, depending on the type of vibration being monitored and the filter settings for the two circuits. The bar graph only shows the acceleration level as measured by the main circuit.



Rear panel Setup panel

Note
Use only the supplied screwdriver to change the setting of the switches. If the blade width is incorrect, the slot of the switch may be damaged.

Measurement range setting

Note
Before making the setting, set the ALARM switch to OFF.

1. Set the METER setting switch to "1: Measure".
2. Check the magnitude of the vibration level as shown on the bar graph display and select a suitable position of the RANGE setting switch so that the OVERLOAD indicator does not turn red. The range setting is shown on the numeric section of the display.

Note
When measurement value display is selected, the range will be shown for a few seconds after changing the range setting.

RANGE setting switch position	Main circuit monitoring mode and range setting			Dedicated acceleration circuit range setting (m/s^2)
	ACC (m/s^2)	VEL (mm/s)	DISP (mm)	
1	1	1	0.1	1
2	3	3	0.3	
3	10	10	1	10
4	30	30	3	
5	100	100	10	100
6	300	300	30	
7	1000	1000	100	1000
8, 9, 0	1000	1000	100	1000

- The dedicated acceleration circuit range corresponds to the range setting selected for the main circuit, as shown in the table above.
- When the range setting is a value in the 3 series (3, 30, 300), the range full-scale value is 3.16, 31.6, and 316 respectively.

Alarm functions

This unit incorporates two types of alarms for the vibration level as measured by the main circuit, as well as an alarm that indicates when the connection to the input terminals has been interrupted. When one of the alarms is triggered, the corresponding indicator on the setup panel lights up, and the relay contacts for the corresponding terminals on the terminal strip at the rear of the unit close, so that the terminals are shorted.

(1) Alarm indication (Caution)
This function is triggered when the vibration level exceeds the preset alarm level and the preset delay time has elapsed.

(2) Trip indication (Danger)
This function is triggered when the vibration level exceeds the preset trip level and the preset delay time has elapsed.

(3) Circuit fault indication
This function is triggered when an interruption in the signal input to the unit has been detected and the preset delay time has elapsed.

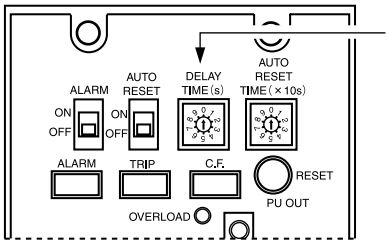
The settings for the alarm functions should be made according to the sequence as described on page 42.

Note
Set the ALARM switch to OFF while you are making the alarm settings.

Delay time setting

This setting determines the delay time that elapses after the vibration level exceeds the alarm or trip threshold until the actual alarm or trip condition is triggered. Use the DELAY TIME setting switch to set the delay time to a value between 0 and 9 seconds, in 1-second steps.

The selected delay time is also applied to the circuit fault function, determining the delay between the point when a signal interruption is detected and the triggering of the circuit fault condition (see page 48).



DELAY TIME setting switch

Set to 0: No delay
Set to 1: 1-second delay
Etc.

Setup panel

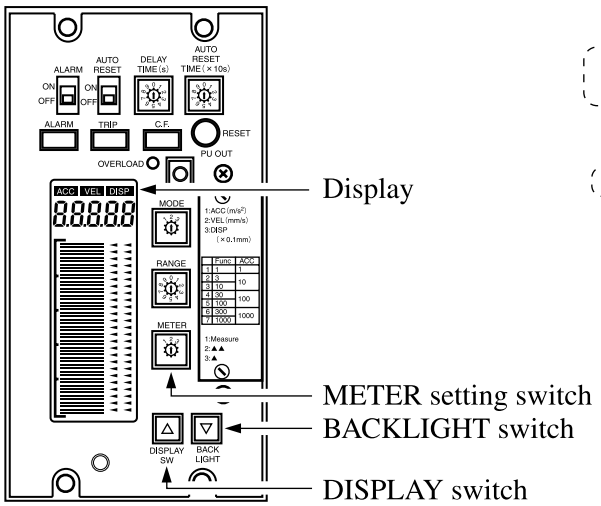
Alarm and trip level setting

This setting determines the vibration level values which will trigger the alarm or trip condition.

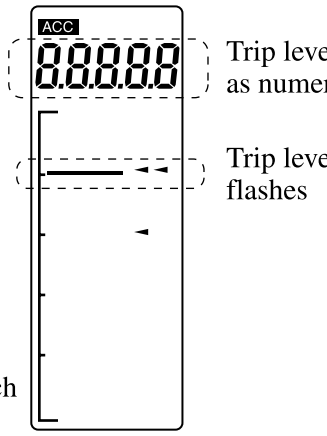
Setting the trip level

Note
The trip level should be set to a higher point than the alarm level.

1. Set the METER setting switch to "2: ▲▲". (The display backlight comes on automatically.)
2. While watching the display indication, use the BACKLIGHT and DISPLAY switches to set the trip level.
   BACKLIGHT switch: Reduce trip level value
   DISPLAY switch: Increase trip level value
   The trip level setting is shown on the numeric section of the display. On the bar graph, the trip level is shown as a line and ◄ ◄.



Setup panel



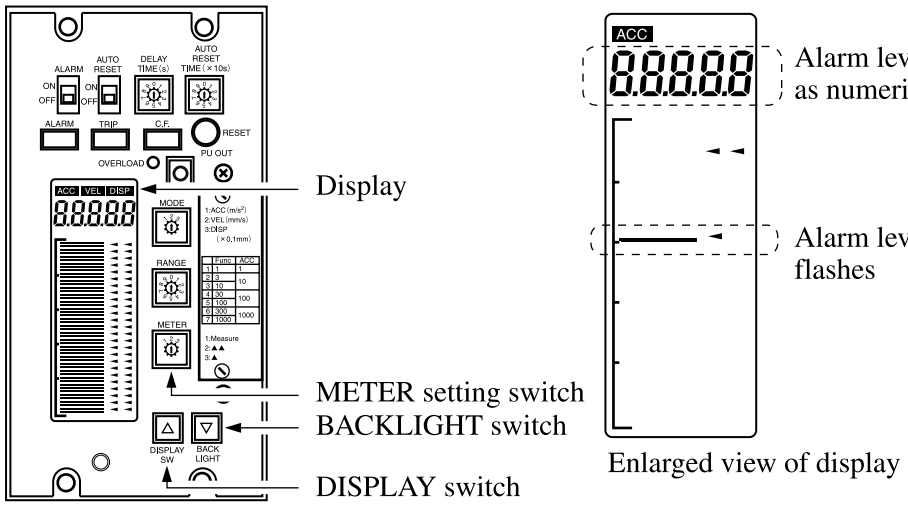
Enlarged view of display

3. When you set the METER switch to "1: Measure", the trip level setting becomes active. The display backlight will go out automatically after about 10 minutes.

Setting the alarm level

Note
The alarm level should be set to a lower point than the trip level.

1. Set the METER setting switch to "3: ▲". (The display backlight comes on automatically.)
2. While watching the display indication, use the BACKLIGHT and DISPLAY switches to set the alarm level.
   BACKLIGHT switch: Reduce alarm level value
   DISPLAY switch: Increase alarm level value



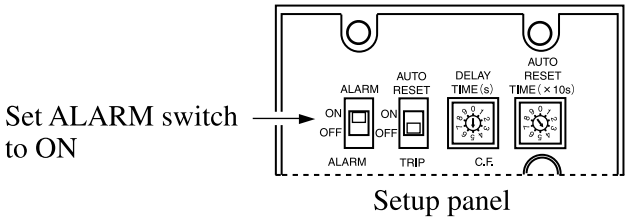
The alarm level setting is shown on the numeric section of the display. On the bar graph, the alarm level is shown as a line and ◄.

3. When you set the METER setting switch to "1: Measure", the alarm level setting becomes active. The display backlight will go out automatically after about 10 minutes.

Note
The settings for alarm level and trip level are maintained also when the power supply is turned off.

Activating the alarm functions

After making the settings as described above, set the ALARM switch to ON. The various alarm functions are now operative.



Setup panel

Canceling the alarm functions

The three alarms described in the previous section (alarm, trip, circuit fault) can be canceled according to two methods, as follows.

(1) Using auto reset

When the vibration level in the main circuit falls below the alarm or trip threshold or the circuit fault is terminated (the signal is restored), the alarm condition will automatically be canceled after a preset delay.

(2) Using manual reset

The alarm condition is manually canceled by the operator.

When the alarm condition is canceled, the respective indicator on the setup panel goes out, and the relay contacts for the corresponding terminals on the terminal strip at the rear of the unit open.

Using the auto reset function

To use the auto reset function, perform the following steps.

Note
Set the ALARM switch to OFF while you are making the alarm settings.

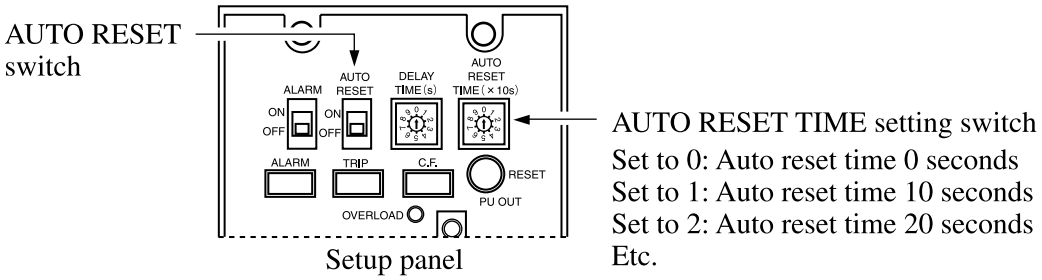
Setting the auto reset time

Use the AUTO RESET TIME setting switch to set the number of seconds that will elapse after the vibration level has fallen below the alarm level or trip level until the respective condition is canceled. The setting can be made in the range from 0 to 90 seconds, in 10-second steps.

The selected auto reset time is also applied to the circuit fault function, determining the delay between the point when the interruption is restored and the canceling of the circuit fault condition.

Activating the auto reset function

After making the settings as described above, set the AUTO RESET switch to ON. The auto reset function is now operative.



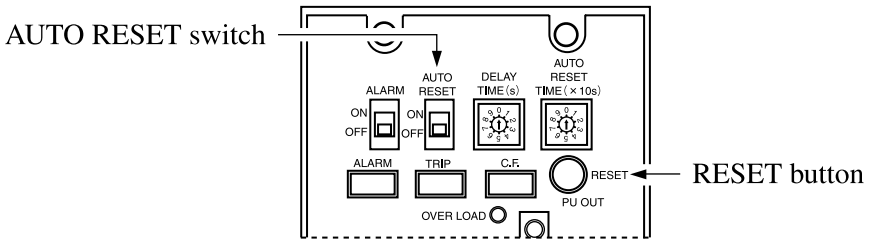
Using the manual reset function

Manual reset setting

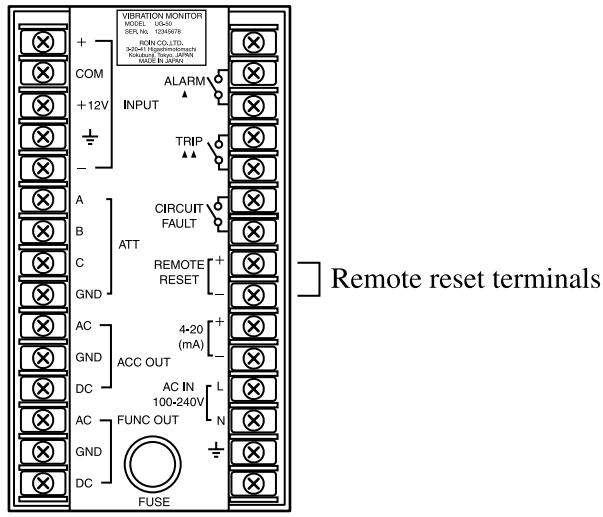
Set the AUTO RESET switch to OFF.

Manual reset operation

A reset is performed by pressing the RESET button on the front panel or by short-circuiting the REMOTE RESET terminals on the terminal strip at the rear of the unit.



Setup panel

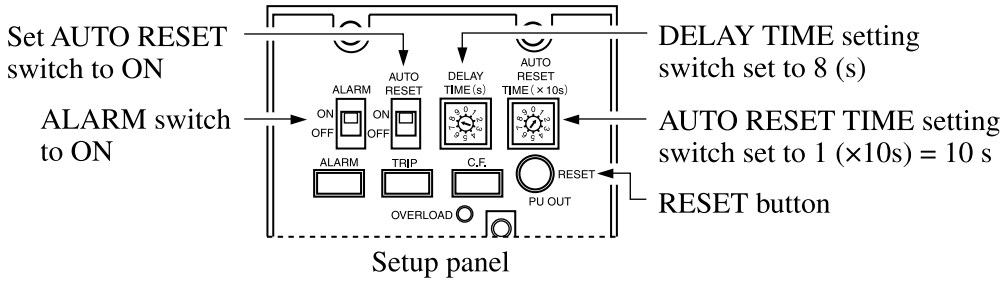


Rear panel

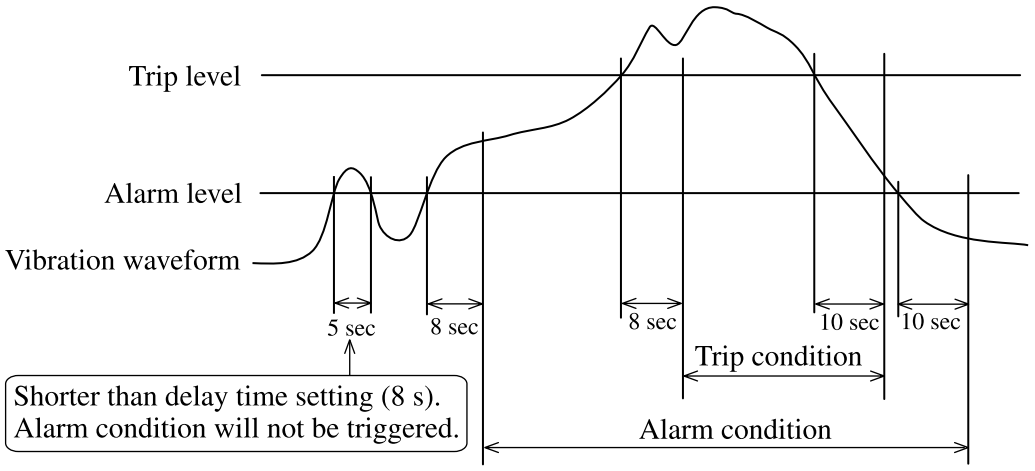
Alarm function example

An example for the action of the alarm and trip function using the sample settings listed below is shown in the illustration.

ALARM switch:	ON
AUTO RESET switch:	ON
Delay time setting switch:	8 s
Auto reset time setting switch:	10 s



Setup panel



Operation of alarm and trip function including resetting

When the alarm or trip condition is triggered, the corresponding indicator on the setup panel lights up, and the relay contacts for the corresponding terminals on the rear of the unit close, so that the terminals are shorted. When the condition is canceled, the respective indicator goes out and the relay contacts for the corresponding terminals open.

Monitor operation

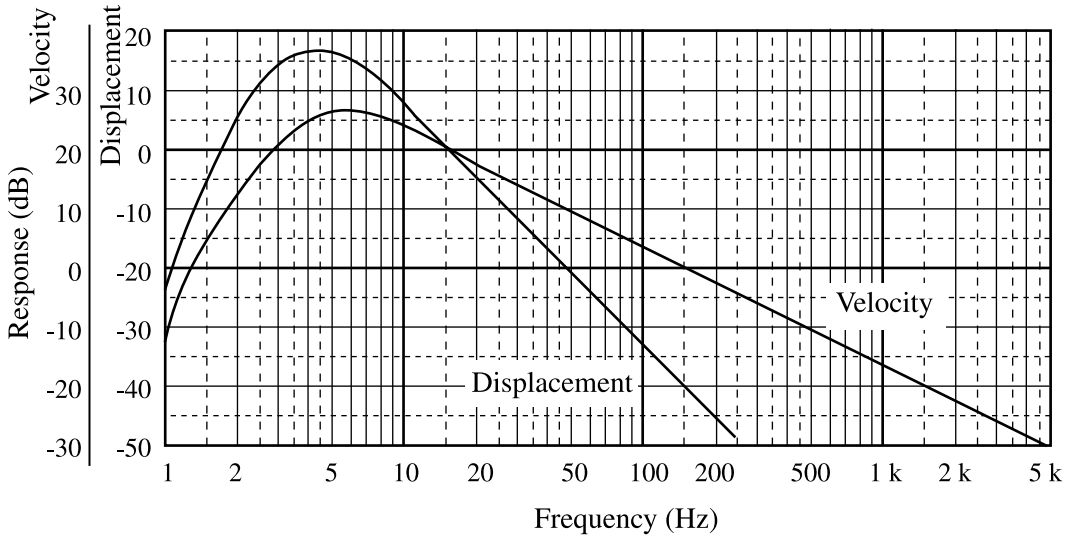
After all necessary settings for alarm and trip level, delay time etc. as well as for auto reset (if required) have been made, prepare the unit for monitoring as follows.

1. Set the METER setting switch to "1: Measure".
2. Attach the front panel to the setup panel and secure it with the front panel fastening screw.
   Use the display and indicators visible on the front panel for monitoring.

Unit Characteristics

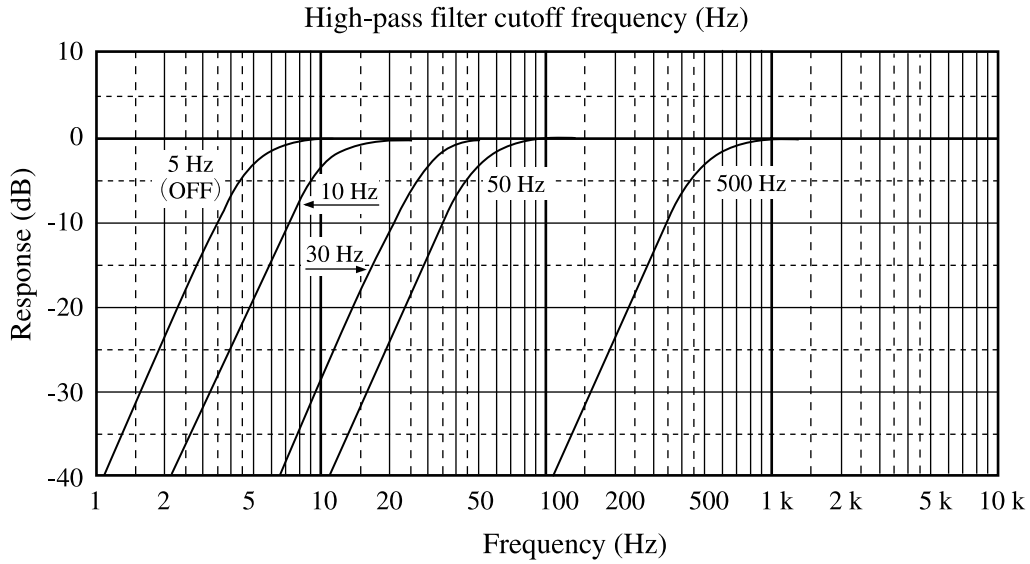
The frequency response characteristics for various measurement modes as well as the high-pass filter and low-pass filter characteristics for the main circuit and dedicated acceleration circuit are shown in this section.

Frequency characteristics of main circuit in various modes

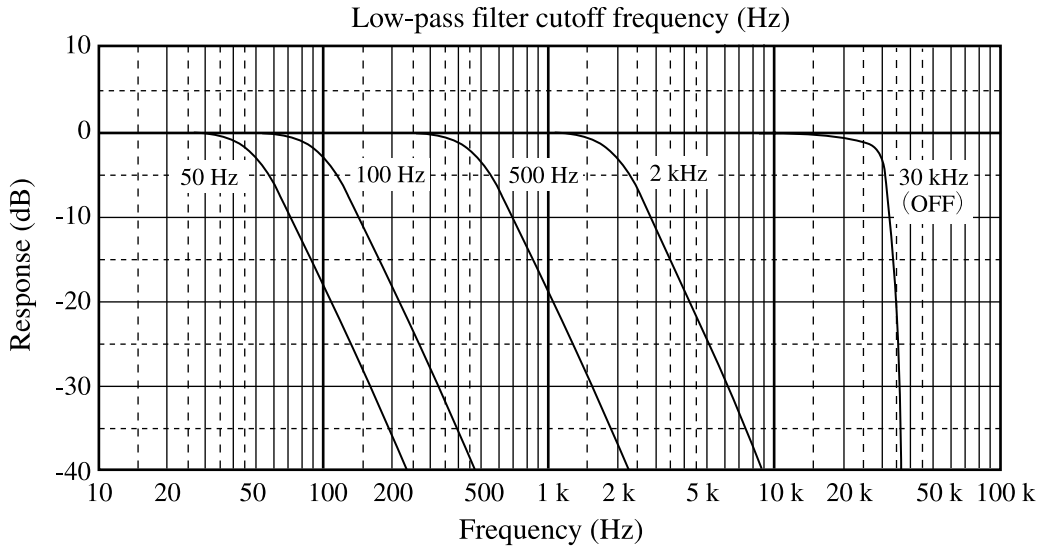


Velocity and displacement characteristics

High-pass filter characteristics for main circuit and dedicated acceleration circuit



Low-pass filter characteristics for main circuit and dedicated acceleration circuit



Specifications

Inputs

Input configuration

Terminal strip

Input selection	Unbalanced input 1:	For piezoelectric accelerometer with built-in preamplifier
		Input voltage 5.1 mV/(m/s^2)
		Power supply 18 V, 4 mA
	Unbalanced input 2:	For unbalanced connection via UG-20, UG-21, or UG-23
		Input voltage 10.2 mV/(m/s^2)
	Balanced input 3:	For balanced connection via UG-20 or UG-21
		Input voltage 20.4 mV/(m/s^2)

Monitoring mode

Acceleration	EQ PEAK	(EQ PEAK = $\sqrt{2}$ × RMS)
Velocity	RMS	
Displacement	EQ P-P	(EQ P-P = $2\sqrt{2}$ × RMS)

Vibration frequency range

Acceleration:	5 Hz to 30 kHz
Velocity:	5 Hz to 2 kHz
Displacement:	5 Hz to 100 Hz

Filters (main circuit)

High-pass filter

OFF (5 Hz), 10 Hz, 30 Hz, 50 Hz, 500 Hz (-3 dB)

Cutoff slope: -18 dB/oct

Use of optional custom filter supported

(-18 dB/oct) (-3 dB)

Custom filter cutoff frequency

Filter constant can be set to center frequency (R10 series for -3 dB) in range from 3.15 Hz to 500 Hz in 1/3-octave steps

Cutoff slope: -18 dB/oct

Low-pass filter OFF (30 kHz), 50 Hz, 100 Hz, 500 Hz, 2 kHz (-3 dB)
Cutoff slope: -18 dB/oct (except OFF setting)
Use of optional custom filter supported (-18 dB/oct) (-3 dB)
Custom filter cutoff frequency
Filter constant can be set to center frequency (R10 series for -3 dB) in range from 50 Hz to 10 kHz in1/3-octave steps
Cutoff slope: -18 dB/oct
For custom filter, high-pass filter setting must be lower than low-pass filter setting.

Filters (dedicated acceleration circuit)

High-pass filter OFF (5 Hz), 10 Hz, 30 Hz, 50 Hz, 500 Hz (-3 dB)
Cutoff slope: -18 dB/oct

Low-pass filter OFF (30 kHz), 50 Hz, 100 Hz, 500 Hz, 2 kHz (-3 dB)
Cutoff slope: -18 dB/oct (except OFF setting)

Display
Segment-type LCD panel (with backlight)
50-segment bar graph (display update cycle 100 ms, linear scale)
Trip level/alarm level position indication
Level range or measurement value indication, monitoring mode setting indication
Backlight activated by key operation, max. continuous ON period 10 minutes
Backlight automatically activated when setting alarm or trip level

DC output

Configuration Terminal strip
Output voltage +10 V
Output impedance 50 Ω
Load impedance 10 kΩ or higher
Maximum output +12 V

Output voltage accuracy

Acceleration range full-scale ±2% (at 80 Hz)
Velocity range full-scale ±3% (at 159.1 Hz)
Displacement range full-scale ±5% (15.91 Hz)

AC output

Configuration	Terminal strip
Output voltage	Acceleration 2 Vpeak ±2% (measurement value at range full-scale Velocity 2 Vrms ±2% (measurement value at range full-scale Displacement 2 Vp-p ±2% (measurement value at range full-scale
Output impedance	50 Ω
Load impedance	10 kΩ or higher
Maximum output	±12 V

Output voltage accuracy

Acceleration range full-scale ±2% (at 80 Hz)
Velocity range full-scale ±3% (at 159.1 Hz)
Displacement range full-scale ±5% (15.91 Hz)

Alarm settings

Alarm function: Alarm level can be set to any value up to range full-scale point, in 1% steps.
When activated, rear-panel terminals linked to relay contacts close, and alarm indicator LED on front panel lights.
Setting accuracy: ±5% of range full-scale
Delay time setting range:
0 to 9 seconds in 1-second steps

Trip function

Trip level can be set to any value up to range full-scale point, in 1% steps.

When activated, rear-panel terminals linked to relay contacts close, and trip indicator LED on front panel lights.

Setting accuracy: ±5% of range full-scale

Delay time: Same as set for alarm function

Circuit fault function

When vibration input signal connected to UG-50 is interrupted due to cable break, rear-panel terminals linked to relay contacts close, and circuit fault indicator LED on front panel lights up.

Delay time: Same as set for alarm function

Alarm output

When triggered, relay contacts close and indicator LED lights.

Relay specifications

Rated voltage and current: 250 V AC, 3 A, or 30 V DC, 5 A

Relay contacts: rear panel terminal strips

Delay time setting range:

0 to 9 seconds in 1-second steps

Alarm auto reset

After alarm activation, when vibration level falls below threshold, relay contacts and LED are automatically reset. Auto reset delay time can be set from 0 to 90 seconds, in 10-second steps.

Level range (main circuit)

Acceleration

1, 3, 10, 30, 100, 300, 1000 m/s^2

Velocity

1, 3, 10, 30, 100, 300, 1000 mm/s

Displacement

0.1, 0.3, 1, 3, 10, 30, 100 mm

Level range (dedicated acceleration circuit)

1, 10, 100, 1000 m/s^2

Relation between dedicated acceleration circuit range and main circuit range

Dedicated acceleration circuit range (determined by main circuit range setting)	Main circuit		
	Acceleration	Velocity	Displacement
1000	1000	1000	100
	300	300	30
100	100	100	10
	30	30	3
10	10	10	1
	3	3	0.3
1	1	1	0.1

When range setting is a value in 3 series (3, 30, 300), range full-scale value is 3.16, 31.6, and 316 respectively.

Measurement value detection circuit

Digital processing type circuit

Sampling frequency

Approx. 76.8 kHz

Resume function — Alarm level, trip level, custom filter cutoff frequency settings are stored by unit

Power requirements

Input power supply voltage range

85 to 265 V AC

Frequency range — 47 to 440 Hz

Power consumption

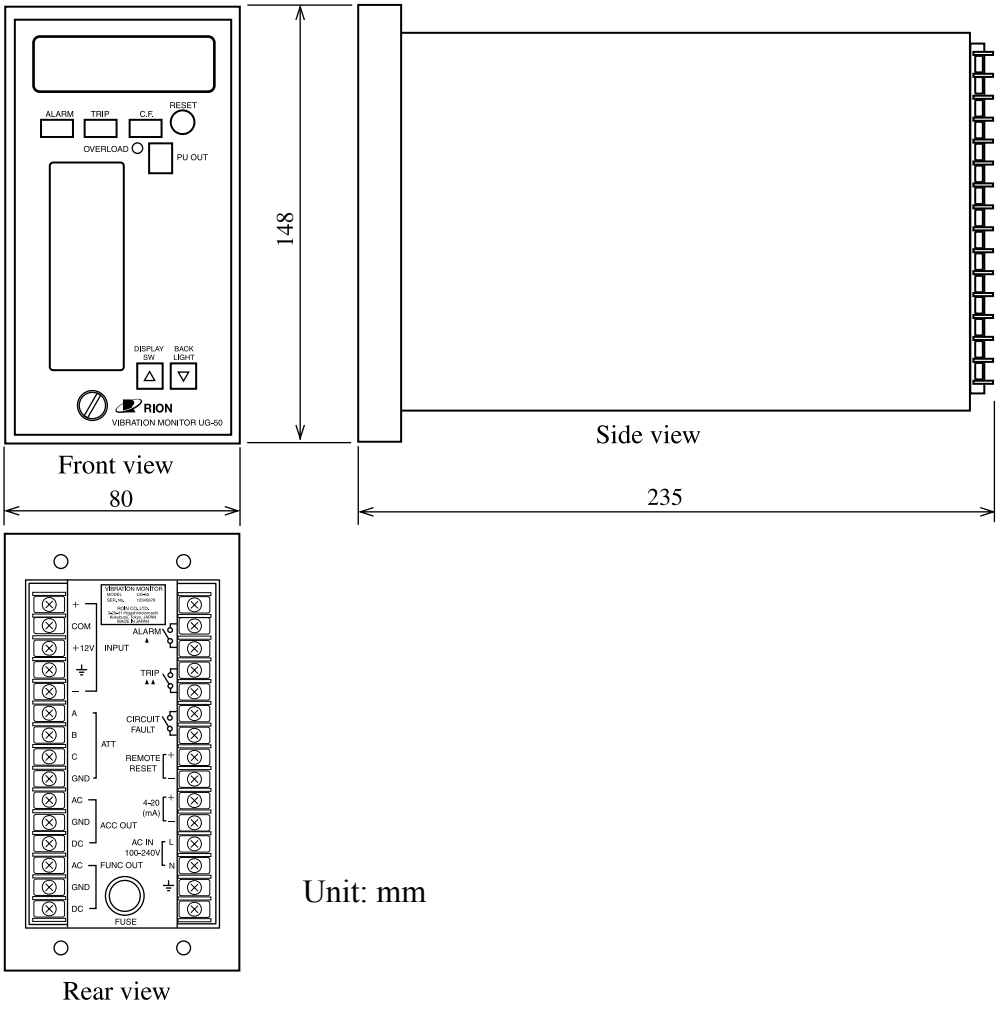
Approx. 15 VA (100 V AC, ALARM/TRIP warning active, UG-33 not installed)

Approx. 16 VA (100 V AC, ALARM/TRIP warning active, UG-33 installed)

Approx. 24 VA (240 V AC, ALARM/TRIP warning active, UG-33 not installed)

Approx. 25 VA (240 V AC, ALARM/TRIP warning active, UG-33 installed)

Operating temperature and humidity range	-10 to +50ºC, max. 90% RH (no condensation)	
Storage temperature and humidity range	-10 to +50ºC, max. 90% RH (no condensation)	
Dimensions	148 (H) × 80 (W) × 235 (D) mm	
Weight	Approx. 1.5 kg	
Supplied accessories	Screwdriver	1
	Cross-recess panhead M4 × 20 screw	4
	Label	1
	Instruction manual	1
	Inspection certificate	1
Optional accessories	4-20 mA isolation unit	UG-33 (factory option)
	Custom filter	NX-50 (factory option)
	Piezoelectric accelerometer	PV-11, PV-10B, PV-40
	Preamplifier	UG-20, UG-21
	Junction box	UG-23



Unit: mm

Dimensional drawing of Vibration Monitor UG-50

No. 50020 05-10