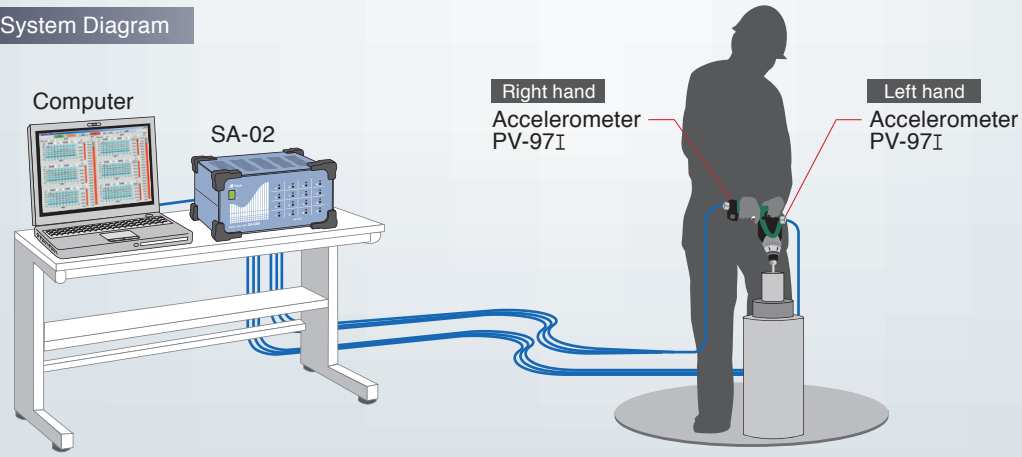
# Hand-Arm Vibration Measurement System

A machinery safety directive was enacted by the EU in 2002, whose objective and main targets are shown below

| | |
|---|---|
| **Purpose:** | **Obligate employers to reduce the risk of injury in persons using hand-held power tools.** |
| **Main requirements:** | **Require employers to establish indicative values and limit values. If indicative values are exceeded, provide information to machinery operators about risk reduction, and carry out suitable health checks.** |

In order for employers to assess the vibration exposure of operators, data regarding the vibration levels of hand-held power tools as well as about usage time etc. are required. Manufacturers of hand-held power tools must provide vibration ratings and indications that allow employers to fulfill their obligations. A measurement setup for the evaluation of human exposure to hand-transmitted vibration is described in ISO 5349-1. Measurement methods are specified in ISO 8662-1 and ISO 5349-2. The current system complies with these standards. Because frequency analysis is carried out at the same time, the results are also useful for devising vibration countermeasures.

System Diagram

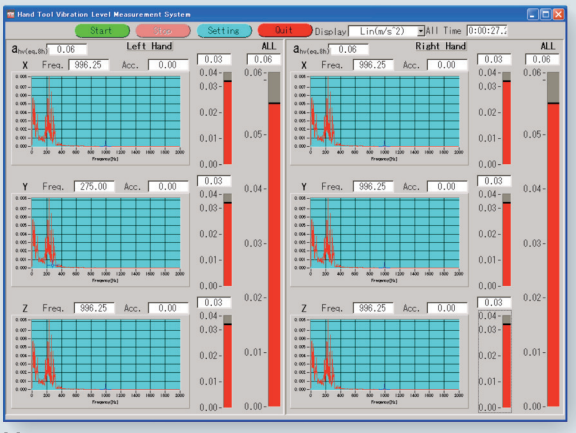



## Equipment configuration

| Product | Model | Quantity |
|---|---|---|
| Multi-Channel Signal Analyzer | SA-02M (8ch) | 1 |
| Computer for SA-02 | | 1 |
| Hand-arm Vibration Measurement Software | CAT-SA02-HT | 1 |
| Piezoelectric Accelerometer (Triaxial) | PV-97I | 2 |
| BNC adapter | VP-52C | 6 |
| BNC link connector | VP-54C | 6*1 |
| BNC-BNC coaxial cable | EC-90 series | 6*1 |

*1 The PV-97I is supplied with a 3-meter cable. These extension parts are required only if longer cable runs are necessary.

## Measurement result examples




Measurement screen

## Application examples

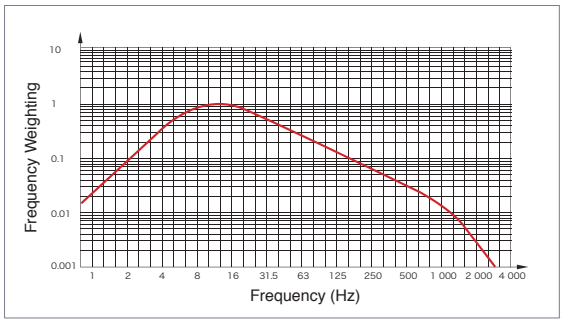
**Hand-held power tools such as chain saws, bush cutters, sanders, grinders, rock drills, pavement breakers, etc.**

## Applicable standards, reference material

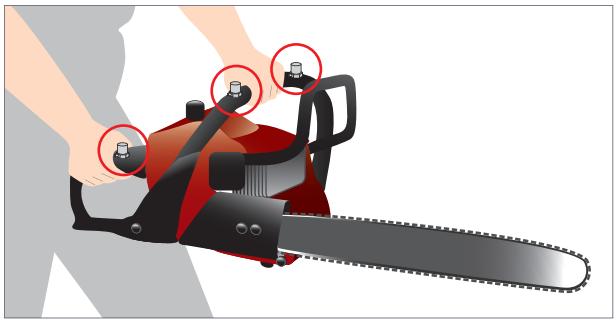
| | |
|---|---|
| ISO 8041 | Human response to vibration Measuring instrumentation |
| ISO 5349-1 | Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration - Part 1: General requirements |
| ISO 5349-2 | Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration - Part 2: Practical guidance for measurement at the workplace |
| ISO 8662-1 | Hand-held portable power tools - Measurement of vibrations at the handle - Part 1~Part14 |

## Supplementary information: Measurement method features

①Triaxial measurement
②Hand-arm frequency correction coefficient Wh is used.
③Evaluation quantity: Vibration total value $a_v$ (m/s²)
This value is determined by the vector sum of vibration values for each axis.
④Measurement time: At least 1 minute is desirable.
⑤Accelerometer attachment position: Specified separately in standards for respective product category.




Frequency-weighting curve Wh for hand-transmitted vibration Weighting factor



Example of accelerometer attachment positions (chain saw)

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ISO 9001 RION CO., LTD.

∗ Specifications subject to change without notice.

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