

VIBRATION COMPARATOR

VC-3100

The VC-3100 is "advanced signal processor" in a wide range of situations in which vibration-based judgements must be made, such as in go/no-go vibration testing of products, scar, abrasion, short of grease hurt, abrasion by facilities diagnosis. The VC-3100 enables not only band selection of peak value judgement, and rms, but crest factor value, so that it make more reliable for detecting aberrance of bearing. The VC-3100 provides wide usage, such as automatic judgements for instruments, and for maintain constant surveillance.



ONO SOKKI

Total support for Detection and Monitoring of bearing.

1 Simultaneous Three-Band (Frequency Bands) Judgement

Three frequency bands can be set, enabling a judgement based on rms, peak value or crest factor value on each band. It potentiates to measure and judge three phenomena simultaneously.

2 Digital Display Function

In addition to displaying the vibration values digitally, a bar graph provides a visual presentation of the vibration condition, enabling use as needle-indicating vibration meter used in the past.

9 Compact 96 x 96 (DIN) Size

The VC-3100 was packaged for easy mounting into a control panel, this representing less than 1/5 the space formerly required.

8 RS-232C Interface

The VC-3100 has RS-232C interface, which enables to connect to the Personal Computer.

7 Comparator Delay Time Setting

A comparator output is made when the vibration exceeds a comparison level for more than a set period of time. This prevents misoperation caused by human errors, such as when an operator accidentally strikes a sensor.

3 Analog Output

An AC signal and a DC signal are output for each set band, enabling use in combination with analysis equipment such as a FFT analyzer, and connection to a recorder.

4 Headphone Output

By connecting a pair of commercially sold headphones to the VC-3100, it is possible to make an auditory check of the vibration sound, enabling use of the VC-3100 as one would have used a stethoscopic probe in the past.



6 Comparator Gate Input

The VC3100 can be used for automatic go/no-go product testing on a production line. By controlling the measurement timing, it is possible to measure and diagnosis vibration phenomena of interest.

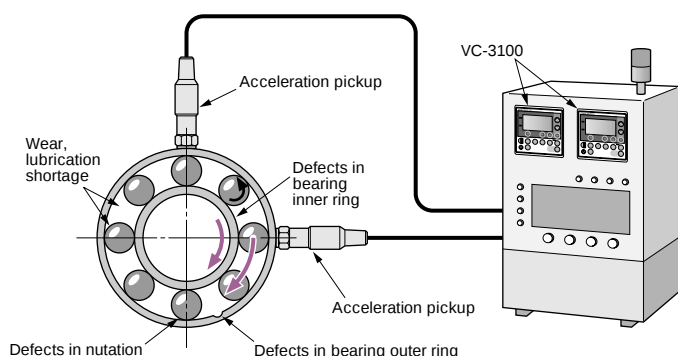
5 Memory Function

It provides condition memory and data memory. It contributes to collecting the data.

ACTUAL SIZE

Application Example

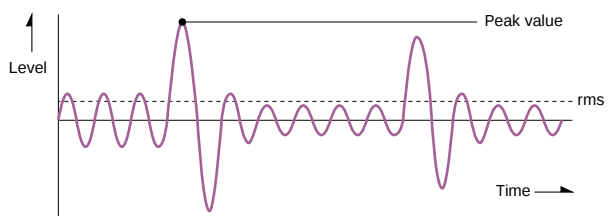
Inspection of abnormality in ball bearing



Memo

Why the Crest factor value?

In order to judge the degree of bearing's crack, the Crest factor value is effective. It is calculated with a peak value/rms, and is called the Crest factor value with an alias "peak-to-rms ratio." A vibration value also varies by the sizes of bearing in a peak value or rms. The Crest factor value has the feature which is not influenced by the size of bearing but can measure the degree of a crack.



Specifications

■ Main unit VC-3100

Input Section

- **Number of input channels** : 1
- **Signal input** : Input switched between an acceleration pickup with built-in amplifier and an external voltage signal.
 - **Acceleration pickup with built-in amplifier** : 2mA/18 VDC sensor power supply (constant current)
 - **External voltage signal** : Input voltage : $\pm 5V$
Input impedance : 100 k Ω min.
 - **Input connector** : CO2 (BNC)
- **Sensor sensitivity setting** : 1.00×10^{-2} to $9.99 \times 10^2 mV/(m/s^2)$, digital input
- **Units setting** : m/s^2 or engineering units
- **Input ranges** : 0.1 to 50,000 m/s^2 (setting range depends on the sensor sensitivity)
(Ex. 2,000 to 1,000 m/s^2 for a sensor sensitivity of 5 mV (m/s^2))
- **Frequency characteristics** : 3 Hz to 15 kHz; ± 0.5 dB
1.5 Hz to 20 kHz; ± 3 dB
- **Input-referenced noise** : 3 Hz to 20 kHz band: 30 μ Vrms max.

External Control Signal Input

- **Functions** : Key lock, reset input, gate input
- **Input voltage** : High: +4.2 to 5.0 V
Low: 0 to +0.8 V
- **Dry voltage input** : Open Voltage: 5V
Short-circuit current: 0.5 mA

Analysis Section

- **Number of settable bands** : 3 (4 when the VC-0262 option is installed)
- **Band filters** : HP filter: Thru, 50, 100, 200, 300, 500, 1k, 2k, 3k, 5k, 10kHz
LP filter: Thru, 50, 100, 200, 300, 500, 1k, 2k, 3k, 5k, 10kHz
Roll off: -48dB/oct (Butterworth, -3dB $\pm$ 1dB at fc)
- **Analog filters** : Low-cut (highpass) filter: 3Hz, 10Hz, -3 dB $\pm$ 1 dB at fc,
-18 dB/octave rolloff
High-cut (lowpass) filter: 1 kHz, 10 kHz: -3 dB $\pm$ 1 dB at fc,
-18 dB/octave rolloff
* fc: Cutoff frequency

Processing section

- Switchable between rms value, peak value, crest factor value, maximum hold, peak hold, and crest factor hold.
Calculation and display made for each band separately.
 - **Rms value** : True rms value
Time constant: Selectable 8ms, 16ms, 32ms, 63ms, 125ms, 250ms, 500 ms, 1s
 - **Peak value** : Absolute PEAK value of time-axis waveform
 - **Crest factor value** : Wave height ratio(peak value divided by rms)
 - **Maximum hold** : Held maximum of rms value
 - **Peak hold** : Held maximum of peak value
 - **Crest factor hold** : Held maximum of crest factor value

Output Section

- **Analog output** : Thru, AC and DC outputs (simultaneous)
- **Output impedance** : 100 k Ω max.
- **Thru output** : Maximum rated output: $\pm 5V$
- **Frequency range** : 2 Hz to 15 kHz ± 0.5 dB
0.8 Hz to 40 kHz ± 3 dB
- **AC output** : Switchable output for each band
Maximum rated output: $\pm 5V$
Frequency range: 3 Hz to 15 kHz ± 0.5 dB
1.5 Hz to 20 kHz ± 3 dB
- **DC output** : Switchable output for each band (rms output)
Maximum rated output: + 5V 4-20mA output (option)
* Current output is unusable when selected 4-20mA.
- **Headphone output** : AC output for each band
- **Power consumption** : 15 mW into the rated impedance of 24 k Ω
- **Connector** : $\phi 3.5$ mm diameter miniplug
- **CAL signal output** : 160 Hz, 1 V_p $\pm 3\%$ (output at AC output)
- **RS-232C output** : Provided as standard.
 - **Transmission rate** : Selectable 9,600 bps or 19,200 bps
 - **Connector** : HR12-10R-8 SD (Hirose) or equivalent
 - **Recommendable cable** : AX-5022 (9 pins Dsub connector)
- **Over output** : Output when input range or A/D range is exceeded.
Open-collector output (negative logic)
 - **Current** : 30V DC max.
 - **Sinking current** : 25 mA max.

Comparator Output

- **Functions** : Judgements made independently for each band
Selection of either rms, peak value or crest factor value judgement for each band.
- **Comparator level setting** : Settable in steps of 1% of the full-scale range
- **Output** : Outputs made when the measured value is above or below a set value.
Open-collector output (positive and negative logic outputs made simultaneously)
- **Voltage** : 30V DC max.
- **Sinking current** : 25mA max.
- **Operating time** : 100 ms max.
- **Delay time setting** : Selectable from 0, 0.5, 1, 1.5, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, and 20 seconds
* It can not be operated when the crest factor count function (VC-0293, option) is built-in.

Display

- **Display type** : Liquid Crystal Display with back light.
Measured value: 4-digit digital display
Display refresh: 0.5 second
Bar-graph display
Comparator level display
- **OVER indicator** : Lights in red at input range or A/D over
- **NG (no-go) indicator** : Lights in red at comparator Nogo output
- **Comparator on/off display** : Lights in green during comparator function operation

Accuracy

- **Total accuracy** : $\pm 3\%$ at 160 Hz

Other Specifications

- **Condition backup** : Setup conditions are backed up even after power is switched off
- **Condition memory** : Enable to store 5 conditions
- **Data memory** : Setting values are saved 500 data max. for one condition (Result of the data only)
- **Terminal strip** : M3.5 free screw terminals
2 pieces of panel mounting fixtures are provided.

General Specifications

- **Power requirements** : 22 to 26 VDC
- **Current consumption** : 160 mA max. (at 25°C)
- **Operating temperature range** : 0 to +50 °C
- **Storage temperature range** : -5 to +55 °C
- **Operating humidity range** : 85% relative humidity max. (with no condensation)
- **Outer dimensions** : 96 x 96 x 112 mm (DIN)
- **Material** : 94V2 (flame-related polycarbonate)
- **Weight** : Approx. 500 g

Optional functions

- **Integration software: VC-0261** *1 :
Measurement for the velocity and displacement
- **Single additional band: VC-0262** :
Expands the VC-3100 to 4-bands operation
- **Current Output (4 to 20 mA): VC-0263** :
Converts analog output (DC output) to current output
- **Envelope function: VC-0264**
- **Crest factor count function: VC-0293** *1 *2
- **Low frequency band filter: VC-0131** :
Adds HPF and LPF; 30, 40, 60, 70, 80, 90 Hz
Roll off: -48dB/oct (Butterworth, -3dB $\pm$ 1dB at fc)
- **Intermediate frequency band filter: VC-0132** :
Adds HPF and LPF; 400, 600, 700, 800, 900 Hz
Roll off: -48dB/oct (Butterworth, -3dB $\pm$ 1dB at fc)
- **High-frequency band filter: VC-0133** :
Adds HPF and LPF; 4k, 6k, 7k, 8k, 9k Hz
Roll off: -48dB/oct (Butterworth, -3dB $\pm$ 1dB at fc)
- **Correspond velocity sensor : VC-0136** *3 :
Adds HPF and LPF; 50, 300, 800, 1k, 1.8k, 10k Hz
Roll off: -72dB/oct (Chebyshev, -3dB $\pm$ 1dB at fc)

*1 Disapprove of simultaneous setting VC-0261 and VC-0293.

*2 For more information, please contact your nearest sales representative.

*3 Standard filter (Butterworth characteristics) is unusable .

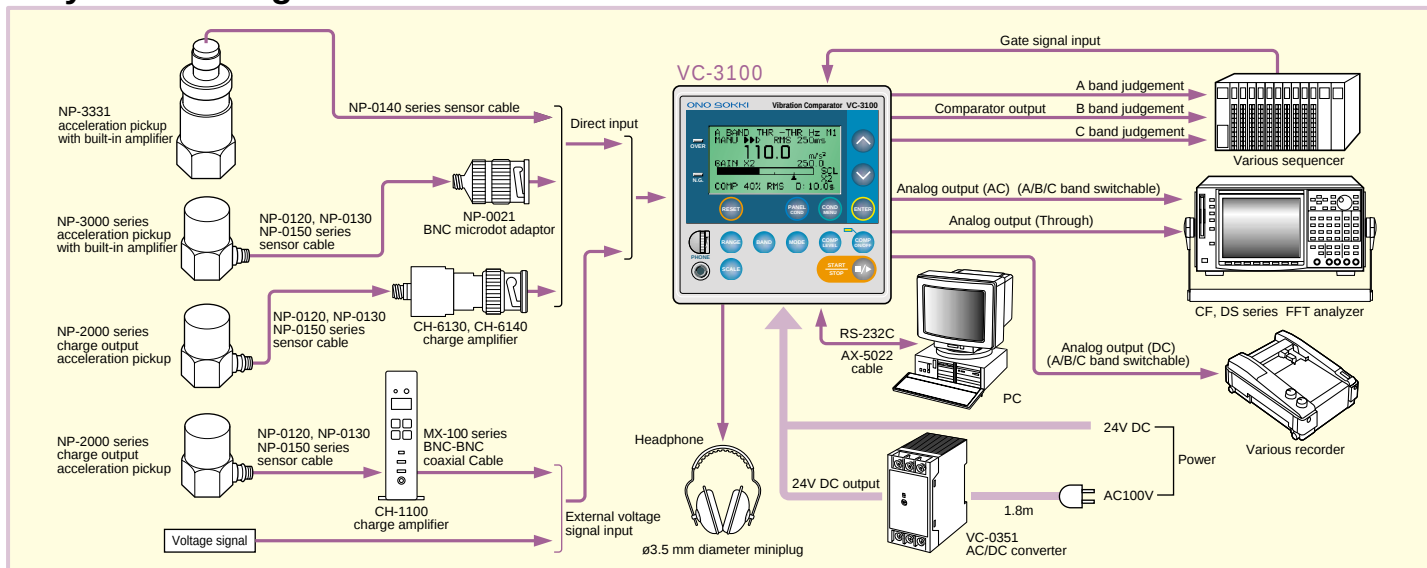
■ Acceleration Pickup with Built-In Amplifier NP-3331

- **Type** : Isolated type
- **Structure** : Share type
- **Sensitivity** : $5.0 mV/(m/s^2) \pm 1dB$
- **Resonance frequency** : 25k Hz min.
- **Frequency range** : 5 Hz to 4 kHz ± 0.5 dB
5 Hz to 8 kHz ± 3 dB
- **Lateral sensitivity** : 5% or less.
- **Max. operating acceleration** : 700 m/s^2
- **Resistance to shock** : 5,000 m/s^2
- **Operating temperature range** : -20 to + 110°C
- **Output impedance** : 100 Ω or less
- **Sensor noise** : 20 μ V or less
- **Drive power supply** : 2mA
- **Weight** : Approx. 49g
- **Case material** : Stainless steel (SUS303)
- **Dimensions** : 17 Hex x 37.5 H (mm)
- **Connector** : TNC connector (from top)
- **Detector mounting** : M5 depth 4.5 female screw

■ Sensor Cable NP-0143

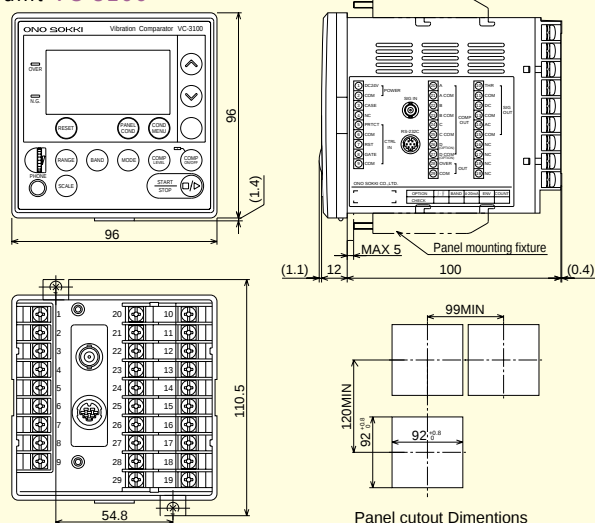
- **Capacitance** : 79pF/m
- **Isolated resistance** : 1,000 M Ω
- **Operating temperature range** : -20 to +100°C
- **Cable outer diameter** : $\phi 4.2$ mm
- **Material** : FEP/PUR (black)
- **Waterproof rubber cover** : NBR
- **Sensor connector** : TNC
- **Amplifier connector** : CO2 (BNC)
- **Cable length** : 5m

System Configuration

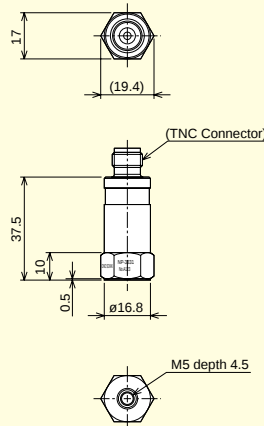


Outer Dimensions

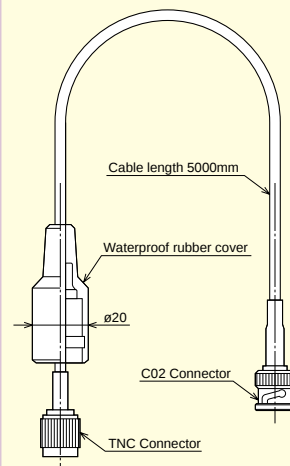
Main unit VC-3100



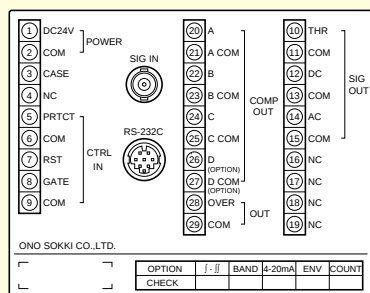
Acceleration pickup NP-3331



Sensor cable NP-0143



Connection Diagram



ONO SOKKI

U.S.A. & CANADA
 Ono Sokki Technology Inc.
 2171 Executive Drive, Suite 400
 Addison, IL. 60101 U.S.A.
 Home Page : <http://www.onosokki.net>
 E-mail : info@onosokki.net
 Phone : 630-627-9700
 Fax : 630-627-0004

EUROPE
 Ono Sokki Mess-und
 Kontrollsysteme GmbH
 Im Vogelsang 1, D-71101 Schoenaich
 Germany
 Phone: 07031-630203
 Fax : 07031-654249

P.R.CHINA
 Ono Sokki Beijing Office
 Beijing Jing Guang Center 3510
 Hu Jia Lou, Chao Yang Qu
 Beijing P.R.C. 100020
 Phone: 010-6597-3113
 Fax : 010-6597-3114

WORLDWIDE
 Ono Sokki Co., Ltd.
 1-16-1 Hakusan, Midori-ku,
 Yokohama 226-8507, Japan
 Phone: 045-935-3976
 Fax : 045-930-1906
 E-mail: overseas@onosokki.co.jp

★Outer appearance and specifications are subject to change without prior notice.

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