

**Best solution for casing vibration measurements  
on the bearing housing!**

# CA•CV Series



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Shinkawa acceleration and velocity sensors are compact and robust. Ideal for measurement, monitoring, and analysis of casing or bearing vibration, as specified in ISO 20816 and API 670, these transducers measure a broad band of frequencies.



## Overview of Shinkawa Connected Monitors



### VM-7 Series

Fully digital and API 670 compliant, the VM-7 Series monitors are configurable from a computer and can be connected directly to vibration analysis and diagnostic systems. Ideal for monitoring turbines, compressors, and other rotating machinery at petrochemical and power plants.



### VM-5 Series

VM-5 series monitors are also designed to meet API 670, and are flexible and configurable to meet different scales of machinery. Choose a single or redundant power supply, in a rack mounted 19-inch configuration, or a standalone monitor.



### VM-25 Series

VM-25 is equipped with a digital communication (Modbus/TCP) module as a standard, so it can be applied for IoT of machine condition monitoring. The new design of VM-25 allows you to select suitable functions required for the condition monitoring of rotating machines, contributing to cost reduction. In addition, it can be easily installed in newly equipped or existing systems regardless of the installation location, because it is a compact monitor.



### VM-21 Series

These signal conditioners convert input signals from transducers into isolated 4-20 mA DC or 1-5 VDC signals.

- API 670 compliant
- External data acquisition unit not required, connects directly to analysis and diagnostic systems
- VM-7B has acquired Achilles certification Level 2, which is an international certification for the robustness of control device communications.
- High reliability, excellent maintainability, hot swappable, redundant power supplies, and redundant communications for host systems and analysis systems
- High density — accommodates up to 44ch for vibration
- Flexible system design configurable from a PC

- API 670 compliant
- Backlight LCD display on the front panel of the monitor
- Measured values displayed by both of bar graph and numerical value, and dot displays of gap voltage and alarm set values
- Monitor settings are field changeable when the monitor is in operation.
- High reliability with redundant power supplies (applicable for VM-5W1 rack only)
- Modbus communication to host systems such as DCS (rack-mounted configuration only) is available.
- Available as an independent 2ch monitor with a single-unit enclosure with power supply and relays (Model VM-5G)

- 113 (D) x 160 (W) X 100 (H) mm Small size monitor
- Standard equipped function of digital communication (Modbus/TCP)
- Monitor functions are user selectable. Optimized monitor configurations for cost reduction.
- Monitor specifications are field changeable.

- Available for displacement/velocity/acceleration vibration, thrust position, rotating speed, and LVDT
- 30 mm width for side by side installation
- DIN rail or wall-mount options
- Detects input errors
- Buffered output of vibration waveform also available for precise diagnostics.

## Features

- Connects directly to vibration signal conditioners / monitors.
- Built-in amp, 2-wire transducer (no external charge amp needed).
- Intrinsically safe (TIIS, ATEX, KTL)
- Type approval certificate for marine use (NK, LR).
- Dust / water resistance (IP67).
- Can be mounted on the machine with single M6 stud bolt.

## Applications

- Fans
- Motors
- Pumps
- Compressors
- Centrifuges
- Gearboxes
- Machine Tools
- and more



\* Contact your nearest Shinkawa dealer for information on other vibration analysis/diagnostics and remote monitoring system.  
\* Achilles is a registered trademark of GE Digital.

# CA·CVSeries

CA-302

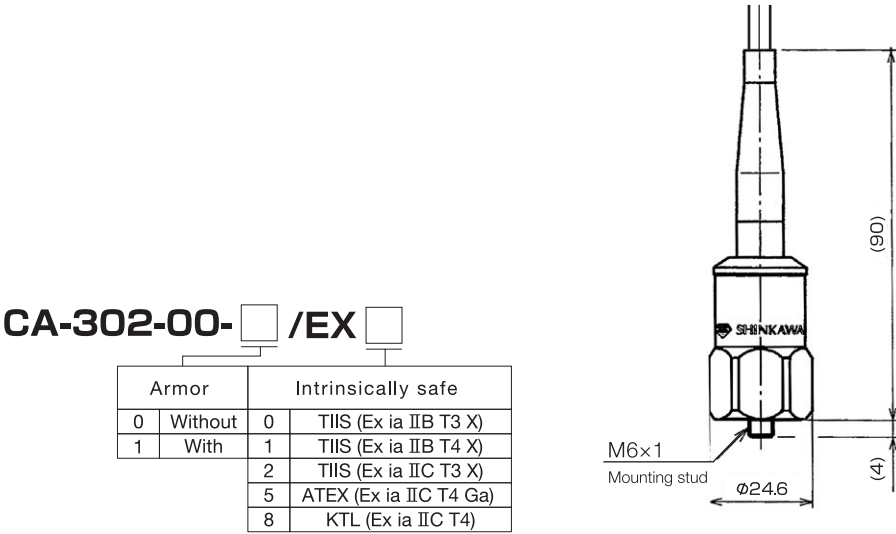
ACCELERATION TRANSDUCER

Overview

CA-302 piezoelectric acceleration transducers are designed for constant monitoring of: pumps, fans, gearboxes, and other rotating machinery.

These sensors are internally amplified and have an integral cable type.

Ordering Information



Specifications

Sensitivity	100 mV/9.8 m/s <sup>2</sup> (100 mV/g REF.) ±5 % at 100 Hz, and 25 °C	Power Supply	20 to 30 VDC, 2 to 10 mA (non-intrinsically safe) 20 to 25.5 VDC, 2 to 10 mA (intrinsically safe)
Acceleration Range	490 m/s <sup>2</sup> (50 g REF.) pk	Temperature Response	Within ±10 % (Around the operating temperature range)
Vibration Limit	4,900 m/s <sup>2</sup> (500 g REF.) pk	Operating Temperature Range	-50 to +120 °C (non-intrinsically safe) -20 to +60 °C (intrinsically safe: EX0, EX2) -20 to +40 °C (intrinsically safe: EX1) -50 to +120 °C (intrinsically safe: EX5, EX8)
Shock Limit	9,800 m/s <sup>2</sup> (1,000 g REF.) pk	Relative Humidity	100 % RH
Linearity	±1 % of F.S.	Protection Rating	IP67
Natural Frequency	30 kHz	Weight	Approx. 90 g
Frequency Response	2 to 5,000 Hz ±10 %, 1 to 10,000 Hz ±3 dB	Case Material	Stainless Steel
Transverse Sensitivity	Max. 5 %	Cabling	2-conductor shielded, Cable length: Approx. 5 m
Output Impedance	100 Ω (typical)	Accessories Supplied	M6 Mounting stud (1 piece)
Grounding	Case isolated, internally shielded		

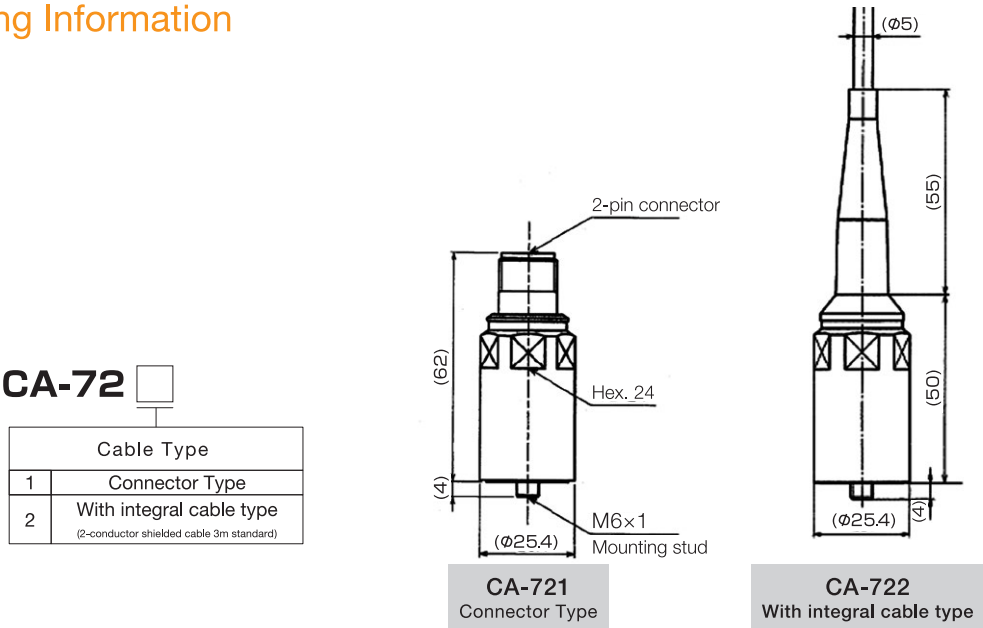
CA-72

ACCELERATION TRANSDUCER

Overview

CA-72 series piezoelectric acceleration transducers are designed for constant monitoring of: pumps, fans, gearboxes, and other rotating machinery. These heavy-duty acceleration transducers are internally amplified, highly noise resistant, and measure a broad frequency range.

Ordering Information



Specifications

Sensitivity	100 mV/9.8 m/s <sup>2</sup> (100 mV/g REF.) ±5 % at 100 Hz, and 25 °C	Power Supply	18 to 30 VDC, 2 to 10 mADC (constant current)
Acceleration Range	490 m/s <sup>2</sup> (50 g REF.) pk	Temperature Response	Within ±10 % (Around the operating temperature range)
Vibration Limit	4,900 m/s <sup>2</sup> (500 g REF.) pk	Operating Temperature Range	-50 to +120 °C
Shock Limit	49,000 m/s <sup>2</sup> (5,000 g REF.) pk	Relative Humidity	100 % RH
Linearity	±1 % of F.S.	Protection Rating	IP67 (CA-721 & CW-□□□F-FF, CA-722)
Natural Frequency	26 kHz	Weight	Approx. 120 g (CA-721) Approx. 230 g (CA-722 (including cable))
Frequency Response	3 to 5,000 Hz ±5 %, 2 to 7,000 Hz ±10 %, 1 to 15,000 Hz ±3 dB	Case Material	Stainless Steel
Transverse Sensitivity	Max. 5 %	Cabling	CA-721: Twisted pair shielded cable CA-722: 2-conductor shielded cable (integral cabling type)
Output Impedance	100 Ω (typical)		
Grounding	Case isolated, internally shielded	Accessories Supplied	M6 Mounting stud (1 piece)



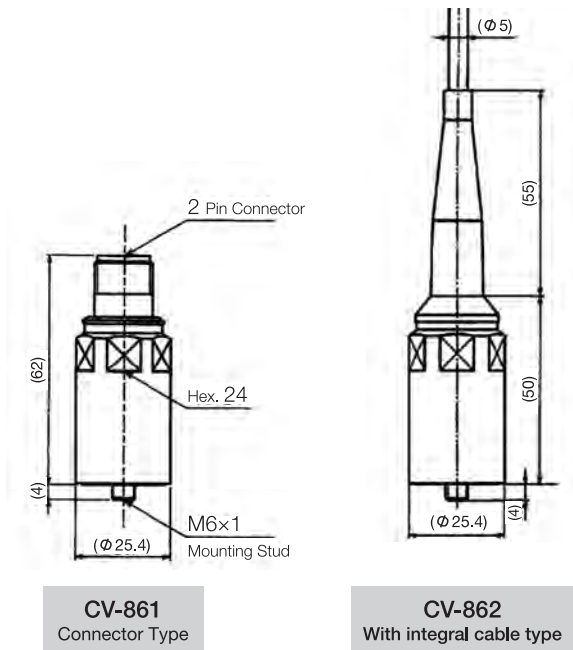
# CV-86 VELOCITY TRANSDUCER

## Overview

As with piezoelectric acceleration transducers, the CV-86 series of piezoelectric velocity transducers employ a piezoelectric element to detect acceleration, which is then converted to a velocity signal by the built-in integrator.

CV-86 /EX

Cable Type		Intrinsically Safety	
1	Connector Type	1	TIIS (Ex ia IIA T4 X)
2	With integral cable type (Coax, cable 3m standard)	5	ATEX (Ex ia IIA T4 Ga) ※CV-861 only
		8	KTL (Ex ia IIA T4) ※CV-861 only



## Specifications

Sensitivity	3.94 mV/mm/s (100 mV/in/s REF.) ±5 % at 100 Hz, 25 °C	Power Supply	18 to 30 VDC, 2 to 10 mADC (constant current)
		Temperature Response	Within ±10 % (around the operating temperature range)
Max. Velocity	1,270 mm/s (50 in/s REF.) pk	Operating Temperature Range	-50 to +120 °C (non-intrinsically safe) -20 to +60 °C (intrinsically safe: EX1) -50 to +120 °C (intrinsically safe: EX5, EX8)
Vibration Limit	2,450 m/s² (250 g REF.) pk		
Shock Limit	24,500 m/s² (2,500 g REF.) pk (non-intrinsically safe) 23,520 m/s² (2,400 g REF.) pk (intrinsically safe)	Relative Humidity	100 % RH
		Protection Rating	IP67 (CV-861 & CW-□□□F-FF, CV-862)
Natural Frequency	15 kHz	Weight	Approx. 145 g (CV-861) Approx. 250 g (CV-862 (including cable))
Frequency Response	2.5 to 3,500 Hz ±10 %, 2 to 7,000 Hz ±3 dB	Case Material	Stainless Steel
Transverse Sensitivity	Max. 5 %	Cabling	CV-861: Twisted pair shielded cable CV-862: Coax. cable (Integral cabling type)
Output Impedance	200 Ω (typical)		
Grounding	Case isolated, internally shielded	Accessories Supplied	M6 Mounting stud (1 piece)

# Appendix 1 Selection Guide of an Optimal Vibration Transducer

Measuring the health of your rotating machinery begins at the transducer. Before choosing a transducer, a thorough understanding of the machine type, application and transducer's specifications must be taken into account. The following chart is an overview of applications for displacement, velocity and acceleration measurements. Please consult a vibration expert to find out what is right for your plant.

Type	Eddy-Current Displacement Transducer	Piezoelectric Velocity Transducer	Piezoelectric Acceleration Transducer
Relevant Machinery	<ul style="list-style-type: none"><li>• Steam turbines</li><li>• Large or medium pumps</li><li>• Compressors (plain journal bearings)</li><li>• Gas turbines</li><li>• Generators</li><li>• Motors (plain journal bearings)</li><li>• Fans (plain journal bearings)</li><li>• Gearboxes (plain journal bearings)</li></ul>	<ul style="list-style-type: none"><li>• Gas turbines</li><li>• Medium-sized pumps</li><li>• Generators</li><li>• Motors</li><li>• Fans</li></ul>	<ul style="list-style-type: none"><li>• Motors (rolling bearing)</li><li>• Pumps (rolling bearing)</li><li>• Gearboxes (rolling bearing)</li></ul>
Applications	<ul style="list-style-type: none"><li>• Detects relative radial displacement vibrations from low to high speed</li><li>• Detects axial position and rotation speed</li></ul>	<ul style="list-style-type: none"><li>• Detects bearing or casing velocity vibrations for machinery rotating at low to medium speeds</li><li>• Detects absolute displacement vibrations by applying first-order integration.</li></ul>	<ul style="list-style-type: none"><li>• Detects bearing, casing, or gearbox acceleration vibrations for machinery rotating at high speeds</li><li>• Detects absolute velocity vibrations by applying first-order integration.</li></ul>
Specifications	<ul style="list-style-type: none"><li>• Linear range 2,000 μm</li><li>• Sensitivity 7.87 V/mm</li><li>• Frequency response DC – 10 kHz (-3 dB)</li><li>• Sensor operating temperatures -40 to +177 °C</li><li>• Power -24 VDC ±10 % (Shinkawa model FK-202F)</li></ul>	<ul style="list-style-type: none"><li>• Max. velocity vibration 1,270 mm/s pk</li><li>• Sensitivity 3.94 mV/mm/s</li><li>• Frequency response 2 Hz – 7 kHz (±3 dB)</li><li>• Sensor operating temperatures -50 to +120 °C</li><li>• Power 18 – 30 VDC, 2 – 10 mA (Shinkawa model CV-861)</li></ul>	<ul style="list-style-type: none"><li>• Measurement range 490 m/s² pk</li><li>• Sensitivity 100 mV/9.8 m/s²</li><li>• Frequency response 1 Hz – 10 kHz (±3 dB)</li><li>• Sensor operating temperatures -50 to +120 °C</li><li>• Power 20 – 30 VDC, 2 – 10 mA (Shinkawa model CA-302)</li></ul>
Notes	<ul style="list-style-type: none"><li>• Run-out (noise) will occur in output when measuring points subject to residual magnetic fields or non-uniform materials.</li><li>• Sensitivity varies depending on the electrical properties of the target material.</li><li>• Beat noise from interference may arise if multiple sensors are placed close to each other.</li></ul>	<ul style="list-style-type: none"><li>• Due to unwanted low-frequency phase characteristics, care must be taken when measuring phase analysis.</li><li>• Secured with stud bolt to avoid unwanted high-frequency characteristics due to installation with magnets or adhesive.</li></ul>	<ul style="list-style-type: none"><li>• May be unreliable in low-frequency ranges, particularly if displacement is obtained by second-order integration.</li><li>• Secured with stud bolt to avoid unwanted high-frequency characteristics due to installation with magnets or adhesive.</li></ul>

# Appendix 2 Mounting techniques and frequency response

The accuracy of high frequency response is directly affected by the mounting technique of the acceleration sensor. In general, the greater the mounted surface area contact between the sensor and the machine surface, the more accurate high frequency response will be.

