

# TABLE OF CONTENTS

PRODUCTS COMING SOON! .....	4	SEISMIC SENSORS .....	70
QUICKVIEW ACCELEROMETER CHART .....	6	731A Ultra Quiet, Ultra Low Frequency, Seismic Accelerometer .....	71
SENSOR SELECTION .....	8	731A / P31 Seismic Accelerometer / Power Amplifier System .....	72
<b>FREQUENTLY ASKED QUESTIONS (FAQs) .....</b>	<b>12</b>	731-207 Low Frequency, Seismic Accelerometer .....	73
INDUSTRIAL WIRELESS PRODUCTS .....	14	SHAKERS & ACCESSORIES .....	74
The Wireless Series .....	15	F3 / Z602WA Electromagnetic Shaker System .....	75
Wireless Module Specifications .....	16	F4 / Z820WA & F4/F7 Electromagnetic Shaker System .....	77
Wireless Accessories .....	18	F5B / Z11 Electromagnetic Shaker System .....	79
GENERAL PURPOSE ACCELEROMETERS .....	19	F10 / Z820WA Electromagnetic Shaker System .....	81
793 Premium Accelerometer .....	20	F7 Piezoelectric Vibration Generator .....	83
797 Premium, Center Mount Accelerometer .....	21	F7-1 Piezoelectric Shaker System .....	85
786A General Purpose Accelerometer .....	22	F4 / F7 Electromagnetic & Piezoelectric Shaker System .....	86
777 / 777B Light Duty Accelerometers .....	23	PA7F Power Amplifier .....	88
787A Low Profile, General Purpose Accelerometer .....	24	PA8F Power Amplifier .....	89
784A Low Cost, General Purpose Accelerometer .....	25	N7 & N8 Matching Networks .....	90
785A Low Cost, Center Mount Accelerometer .....	26	UNDERWATER ACCELEROMETERS .....	91
775A Low Cost, Pivoting Accelerometer .....	27	746 Underwater Accelerometer .....	92
S100C SNAP™ Low Cost, Epoxy Mount Accelerometer .....	28	754 Miniature Underwater Accelerometer .....	93
S100CS SNAP™ Low Cost, Stud Mount Accelerometer .....	29	757 Biaxial, Low Profile, Underwater Accelerometer .....	94
LOW FREQUENCY ACCELEROMETERS .....	30	HYDROPHONES .....	95
793L Low Frequency Accelerometer .....	31	H505L General Purpose, Self-Amplified Hydrophone .....	96
797L Low Profile, Low Frequency Accelerometer .....	32	H507A Ultra Low Noise, Wide Band Hydrophone .....	97
799LF Low Frequency Filtered Accelerometer .....	33	HELICOPTER .....	98
799M Low Frequency, High Sensitivity, Filtered Accelerometer .....	34	991D Internally Amplified, Helicopter Accelerometer .....	99
HIGH FREQUENCY ACCELEROMETERS .....	35	991V Internally Amplified, Helicopter Velocity Sensor .....	100
712F High Frequency, Integral Cable Accelerometer .....	36	992-1 Single Axis Accelerometer with Connector .....	101
732A and 732AT High Frequency Accelerometers .....	37	SWITCH / TERMINATION BOXES .....	102
736 and 736T High Sensitivity, High Frequency Accelerometers .....	38	CB2 & CB4 Series Cable Termination Boxes: 2 and 4 Channels .....	103
PIEZOVELOCITY TRANSDUCERS — PVT® VELOCITY OUTPUT .....	39	JB06-1H Junction Box: 6 Channels .....	104
793V / 793V-5 General Purpose, Velocity Output PVT® .....	40	JBS Series Switchable / Multichannel Junction Boxes .....	105
797V Low Profile, Velocity Output PVT® .....	41	VibraLINK® II Series Switchable Junction Boxes: 6 or 12 Channels .....	106
HIGH TEMPERATURE ACCELEROMETERS .....	42	VibraLINK® II Series Expandable Switchable Junction Boxes .....	107
376 High Temperature, Charge Mode Accelerometer .....	43	POWER / SIGNAL CONDITIONING .....	108
376/CC701HT Accelerometer / Charge Amplifier System .....	44	CC701 Charge Converter .....	109
793-6 FireFET® 150°C Amplified Accelerometer .....	45	CC701HT Charge Converter .....	109
797-6 FireFET® Low Profile, 150°C Amplified Accelerometer .....	46	CC726E Charge Converter .....	109
TRIAxIAL TRANSDUCERS .....	47	P31 Ultra Low Noise Power Unit / Amplifier .....	109
993A General Purpose, Triaxial 100 mV/g Accelerometer .....	48	P702B General Purpose Power Unit / Amplifier .....	109
993A-5 General Purpose, Triaxial Accelerometer with Integral Cable .....	49	P703B Three Channel Power Unit .....	109
993B Series Premium, Triaxial Accelerometers .....	50	P703BT Triaxial Power Unit .....	110
4-20 mA OUTPUT VIBRATION LOOP POWERED SENSORS LPS™ .....	51	P704B General Purpose Power Unit .....	110
PC420 IS / EX Intrinsically Safe / Explosion Proof Loop Powered Sensors (LPS™) ...	52	LA704B Line Adapter Power Supply .....	110
PC420A Series LPS™ Acceleration Vibration Transmitters .....	53	NC3 Battery Kit and Line Adapter Power Supply .....	110
PC420V Series LPS™ Velocity Vibration Transmitters .....	54	PR710A & PR710B Signal Conditioners .....	110
PC420V2 LPS™ Dual Output Vibration Transmitter: 4-20 mA & Velocity .....	55	HMM-101 Hand Held Meter: "Sensor Doctor" .....	110
DUAL VIBRATION & TEMPERATURE SENSORS .....	56	CABLES AND CONNECTORS .....	111
793T-3 Accelerometer with Internal Temperature Sensor .....	57	Cables .....	113
797T-1 Dual Output Sensor: Acceleration & Temperature .....	58	Connectors / Terminations .....	116
797LT Low Frequency Accelerometer with Temperature Sensor .....	59	MOUNTING & ACCESSORIES .....	121
SPECIALTY SENSORS .....	60	INTRINSIC SAFETY .....	128
221A Accelerometer with Grease Mounting .....	61	CALIBRATION .....	130
221B Accelerometer with Grease Mounting .....	62	WARRANTY .....	131
222A Accelerometer with Grease Mounting .....	63	CONVERSION CHARTS .....	132
996LD High Sensitivity, Leak Detection Accelerometer .....	64	TROUBLE SHOOTING CHART .....	133
H571LD-1A Leak Detection Accelerometer .....	65	CUSTOMER SERVICE .....	134
H571LD-2 Leak Detection Accelerometer .....	66	GLOSSARY .....	135
TEST & MEASUREMENT SENSORS .....	67	INDEX .....	139
726 / 726T Small Size, Piezoelectric Accelerometer .....	68		
728A / 728T High Sensitivity, Low Noise Accelerometer .....	69		

## INTRINSIC SAFETY PROTECTION

Many applications require Intrinsic Safety (IS) protection. In some industries, machinery operates in the presence of hazardous and flammable gases. Any electrical equipment used or installed in these areas require protection to insure that they do not pose any potential of causing ignition of the gases. Commonly known as IS protection, the requirements vary depending on certifying agency and environment ratings. A list of Wilcoxon IS certified sensors and the certifying agencies can be found on pages 128 and 129. On specification sheets, products with IS certification will display the certifying agencies logo under "Options".

Often a barrier strip is required to be used for sensors permanently mounted in hazardous areas. These zener devices act as a fuse to limit the amount of energy that can be sent to the sensor. Wilcoxon offers two barrier strips, refer to the Mounting & Accessories section on page 121. For more information on Intrinsic Safety, consult Wilcoxon Customer Service .

## 2 WILL A WIDE SENSITIVITY TOLERANCE ( $\pm 15\%$ VS. $\pm 5\%$ ) MEAN A NARROWER FREQUENCY RESPONSE?

No. Sensor frequency response is based on sensitivity variation relative to the sensitivity at the 100 Hz reference point. Whether the reference sensitivity is 105 mV/g or 85mV/g, the frequency at which the sensor sensitivity increases/decreases by a specified amount (ie. 10% or 3dB) remains constant.

## 3 HOW OFTEN SHOULD AN INDUSTRIAL SENSOR BE RE-CALIBRATED?

With proper handling and usage, Wilcoxon industrial accelerometers do not need frequent re-calibration. Wilcoxon's proprietary crystal preparation stabilizes the ceramic crystals used within the sensors to minimize output drift due to aging. Maximum sensitivity drift is less than 1% over the life of the sensor. If exact accuracy of vibration levels is necessary, the sensors should be re-calibrated annually. Otherwise, Wilcoxon sensors need to be re-calibrated only if exposed to mistreatment (overshock, extremely high temperatures) or if required by regulations (ISO 9000, Nuclear Regulatory Commission). Wilcoxon offers calibration and testing services for any make sensor.

## 4 HOW LONG DO PIEZOELECTRIC SENSORS LAST?

Piezoelectric sensors are solid state sensors with no internal moving parts to wear or fatigue. Mean Time Between Failure (MTBF) analysis for typical industrial sensors predicts a life of 12 years. However, many sensors returned to Wilcoxon for re-calibration are more than 30 years old and still operating. While many sensors do indeed last beyond a decade, empirical data suggests an average life of approximately 7 years. If a sensor is continuously operated to the full limits of their environmental specifications, then their life span can be decreased. Sensors exposed to high temperatures (> 200°F) and rough handling are candidates for earlier failures than those permanently mounted in benign environments.

## 5 IS A SHEAR MODE SENSOR SUPERIOR TO COMPRESSION MODE?

What about flexure mode sensors? In recent years, shear mode sensors have gained popularity, while compression mode are often considered to be "old technology." Meanwhile, flexure mode sensors, once considered too fragile for industrial applications, are now making a comeback by incorporating special design techniques. Each construction method has inherent advantages and disadvantages. The construction method of a sensor is less important than its performance.

For each model, characteristics such as base strain and shock limits are quantified on the specification sheet and can be compared. For example, a well-designed compression mode sensor may have a lower base strain rating than a shear mode sensor. While this may be contrary to intuition, it can be verified by comparing the values of the 793 (compression) versus the 787A (shear). In today's advanced designs, the right sensor for an application is determined by the performance yielded by different design techniques.



## 1 IS A WIDER SENSITIVITY TOLERANCE BAD, SUCH AS $\pm 15\%$ ?

Not necessarily, if trending on vibration levels then wider tolerances, such as  $\pm 15\%$ , provides adequate, cost effective information for a successful monitoring program. Also, nearly all data collection boxes, analyzers and acquisition systems have the ability to enter the exact sensitivity of a sensor. In these cases, purchasing a sensor with a wide tolerance is acceptable as long as its sensitivity is appropriately noted. However, if the user is unable to enter the exact sensitivity and the acquisition equipment assumes a nominal sensitivity, then a precise measure of the vibration level may not be possible. For example, if the acquisition equipment assumes the vibration signal is obtained from a 100mV/g sensor and the actual sensor being used is 85 mV/g, the vibration readings will be 15% low. In this case, a tighter tolerance ( $\pm 5\%$ ) may be more appropriate. If possible, enter the exact sensitivity of the sensor into the acquisition system to obtain the most precise measurements.

## 6 WHY DON'T ALL VIBRATION SENSORS HAVE LOW FREQUENCY RESPONSE?

A high pass filter is inherent to electronics of all piezoelectric accelerometers. The filter has a resistor and capacitor in series and the value of these components, RC, determines the low-end cut-off. Also known as the discharge time constant (DTC), the larger the RC value, the lower the frequency response. The DTC also defines the sensor response to abrupt changes in sensor powering such as turn-on and signal overload. When the sensor is turned on or begins to recover from an overload, the time it takes to become usable is directly related to the DTC value. Therefore, the low end cut-off is inversely proportional to the turn-on time (and shock recovery time). In other words, the lower in frequency the sensor measures, the longer it takes to turn-on or recover from an overload. For general-purpose sensors, the low-end frequency performance is sacrificed in favor of better turn on and shock recovery response.

## 7 DO 500 mV/G SENSORS JUST HAVE MORE INTERNAL ELECTRONIC GAIN THAN A GENERAL PURPOSE (100 mV/G) SENSOR?

No. A sensor with additional electronic gain will produce the desired effect of increasing the amplitude of vibration output of the low level signal. However, this technique will also produce the undesired effect of increasing the level of the noise within the sensor. The only technique to increase the sensitivity without increasing the noise is to mechanically gain the signals. Mechanical gain is accomplished by increasing the sensor mass (low frequency sensors are generally heavier than other sensors) and/or using a higher output sensing crystal. All Wilcoxon low frequency, high output sensors use mechanical gain.

## 8 WITH THE HIGHER OUTPUT SENSITIVITY, WON'T A LOW FREQUENCY SENSOR OVERLOAD EASILY?

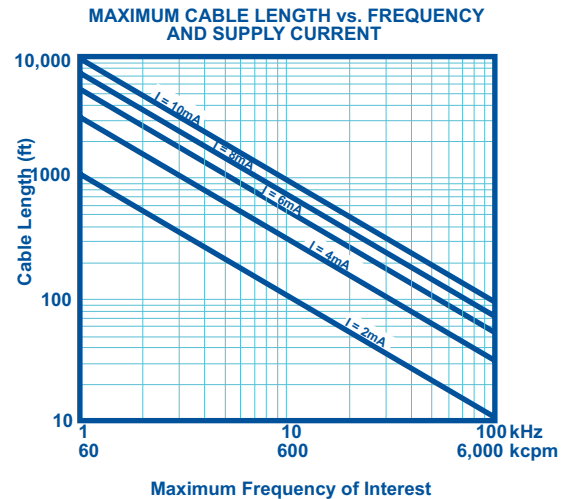
With their high sensitivity output and consequently lower amplitude range, low frequency/ high output sensors are vulnerable to overload especially in the presence of significant high frequency vibration. For this reason, Wilcoxon includes a low-pass filter within the electronics of these sensors. This filter controls the high-end frequency cut-off and attenuates the high frequency signals. By not processing the high frequency (and often high vibration level) data, there is less chance of sensor overload.

## 9 AN INCREASE IN THE 4-20mA VIBRATION TRANSMITTER MAY INDICATE A MECHANICAL PROBLEM. BUT HOW CAN THE SPECIFIC FAULT BE IDENTIFIED, SUCH AS WHETHER IT IS THE INNER RACE OR OUTER RACE?

The job of the 4-20mA Vibration Transmitter is to indicate a machinery problem, like an early warning alarm. Specific details require a higher level of vibration data collection and analysis. If needed, a good extension to the 4-20mA vibration monitoring is the use of sophisticated condition monitoring systems such as, vibration data collectors and analysis software.

## 10 HOW FAR CAN I RUN AN ACCELEROMETER CABLE WITHOUT LOSING SIGNAL?

Generally, at least a couple of hundred feet. The exact length can be determined knowing the cable capacitance (30 picoFarads per foot is common) and the available voltage swing (typically at least 5V peak to peak). Given these values, the length is a function of supply current and highest frequency of interest. Figure 1 shows a chart that helps determine maximum cable lengths.



NOTE: Values assume cable capacitance of 30pF/ft and an available voltage swing of 5Vp-p. (I) represents current available to power the sensor.

## 11 CAN I INSTALL INDUSTRIAL VIBRATION SENSORS IN A HIGH RADIATION ENVIRONMENT?

Yes. However, it is important to use those sensors that have been designed for high radiation environments. Wilcoxon manufactures many accelerometers that are designed to survive high radiation environments and give long service life. Special provisions are made in the manufacture of these accelerometers to allow them to perform well in high radiation environments. Radiation rated accelerometers have been tested to radiation levels as high as 10,000,000 rads and found to continue performing within specified tolerances.

**SUNSTAR 商斯达实业集团**是集研发、生产、工程、销售、代理经销、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一，是一家专业代理和分销世界各大品牌 IC 芯片和电子元器件的连锁经营综合性国际公司，专业经营进口、国产名厂名牌电子元件，型号、种类齐全。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM 电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA 软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。商斯达实业公司拥有庞大的资料库，有数位毕业于著名高校——有中国电子工业摇篮之称的西安电子科技大学（西军电）并长期从事国防尖端科技研究的高级工程师为您精挑细选、量身订做各种高科技电子元器件，并解决各种技术问题。

更多产品请看本公司产品专用销售网站：

商斯达中国传感器科技信息网：<http://www.sensor-ic.com/>

商斯达工控安防网：<http://www.pc-ps.net/>

商斯达电子元器件网：<http://www.sunstare.com/>

商斯达微波光电产品网：[HTTP://www.rfoe.net/](http://www.rfoe.net/)

商斯达消费电子产品网：<http://www.icasic.com/>

商斯达实业科技产品网：<http://www.sunstars.cn/>

传感器销售热线：

地址：深圳市福田区福华路福庆街鸿图大厦 1602 室

电话：0755-83370250 83376489 83376549 83607652 83370251 82500323

传真：0755-83376182 (0) 13902971329 MSN: [SUNS8888@hotmail.com](mailto:SUNS8888@hotmail.com)

邮编：518033 E-mail:[szss20@163.com](mailto:szss20@163.com) QQ: 195847376

深圳赛格展销部：深圳华强北路赛格电子市场 2583 号 电话：0755-83665529 25059422

技术支持：0755-83394033 13501568376

欢迎索取免费详细资料、设计指南和光盘；产品凡多，未能尽录，欢迎来电查询。

北京分公司：北京海淀区知春路 132 号中发电子大厦 3097 号

TEL: 010-81159046 82615020 13501189838 FAX: 010-62543996

上海分公司：上海市北京东路 668 号上海赛格电子市场 2B35 号

TEL: 021-28311762 56703037 13701955389 FAX: 021-56703037

西安分公司：西安高新开发区 20 所(中国电子科技集团导航技术研究所)

西安劳动南路 88 号电子商城二楼 D23 号

TEL: 029-81022619 13072977981 FAX:029-88789382