Smart Vibration Monitoring Solution

The "Smart Vibration Monitoring Solution" provided by Microprogram is for reducing the huge losses caused by machine malfunctions and shutdowns during the manufacturing process of semiconductors and flat panel display (FPD) manufacturers. The aging of machines is monitored by vibration-sensing so that failure positions can be discovered earlier. If abnormal collisions occur during the monitoring process, they will be reported and displayed on the screen; it will also be connected to the customer's system to upload real-time data, and to detect wafer damages or glass fragments as soon as possible. The "Smart Vibration Monitoring Solution" can be applied on various machines that have reduced yield rates or shutdowns due to vibrations, providing more precise and mind-easing manufacturing operations for customers.

Mode	Feature
Vibration features monitoring	• Multiple sensors for long-term monitoring of equipment vibration • Feature value calculation • Connected to the customer's system to upload and report data
Vibration learning and monitoring	• Connects and controls equipment through DI/O • Introduced learning algorithms • Able to reduce on-site computer installations
Multi-function vibration records and expert analysis	• Supports various types of sensor recording; diverse usage methods • Provides expert analysis software and report generation

⚠ Glass Scratch →

VRS Smart Vibration Sensor

Battery Type
(Fully Wireless)

Powered Type

External Sensor
Magnet/Stud Mount

External Sensor
PCB

DI/DO Control Board
PCB

The "VRS Smart Vibration Sensor" is used to detect vibration signals of equipment to further determine whether or not the equipment is abnormal. It includes a MEMS accelerometer combined with a microcontroller unit (MCU) and can be installed at any position by freely choosing between the wireless, wired and external types according to different needs; analysis algorithm can also be written into the sensors and be outputted through DI/O to be received by equipment controllers. It can be applied on the machines in manufacturing processes for industries of semiconductors and optoelectronics, such as the equipment that may have reduced yield or shutdown due to vibrations or produce abnormal vibrations due to malfunctions, including robot arms, motors, pumps, etc.

Scenarios

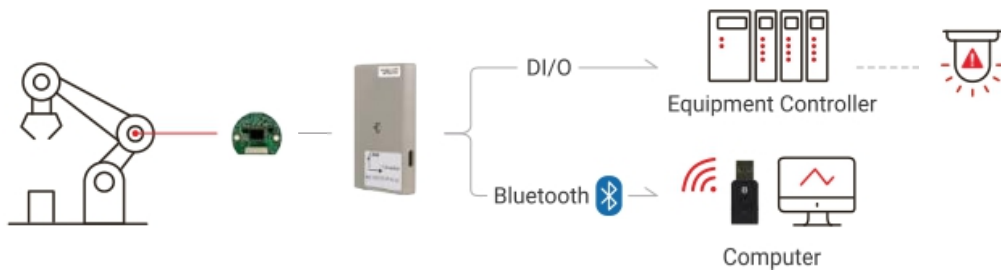| Robot arms, motors, pumps, cylinders and other components | Equipment with reduced yield or shutdown due to vibrations | Machinery with abnormal vibrations due to malfunctions |

Items	Battery Type (Main Board)	Powered Type (Main Board)	Options		
			External	External PCB	
Application	Measurement	Measurement / Monitoring	Harsh environment	Build-in	
Size	70*40*7 mm	71*42*10 mm	26*20*20 mm	Ø26*2 mm	16*12*4mm
Weight	20g	33g	80g	1g	
Data transfer	BLE	BLE / USB	Wired		
Extension Length	-	-	3M / 10M		
Data Type	Raw data	Raw data / calculated	-	-	-
Durable Surface Material	Polyetheretherketone (PEEK)		316 stainless steel	-	-
Simultaneous Connections	1~3	1~3 (raw data) 1~8 (calculated)	-	-	-
Operating Temp.	-20°C ~ + 70°C	-20°C ~ +85°C	-20°C ~ +85°C		
Power	Battery (20hr)	USB Type-C (+5V ; >0.5A) / 24 VDC (>0.1A)			
Sampling Frequency	2k Hz				
Principle of Sensing	MEMS				
Number of Axes	X,Y,Z – 3Axis G-Sensor				
Sensitivity	0.244/0.122/0.061 mg/LSB (4096/8192/16384 LSB/g)				
Sensing Range	Range. ±2 / ±4 / ±8G				
Fixed Way	Magnet / Stud Mounting / Paste				
Software	- BLE 1v1 display real-time visual feedback and can record data in a log file online system (Win10). - BLE 1v8 multi-sensor feature values monitoring. - Robot motion learning and monitoring. - Protocol for collecting raw data or features.				

Service Architecture

▍Vibration features monitoring

x1-8 — Bluetooth ⑧ → x1-8 ⑨ Computer — Ethernet → • FDC (Fault Detection Classification) • Network Drive

▍Vibration learning and monitoring

DI/O → Equipment Controller

Bluetooth ⑧ → Computer

▍Multi-function vibration records and expert analysis

❶ — Bluetooth ⑧
❷ — Bluetooth ⑧ → Computer
❸ — USB → Computer