

TURNKEY ® iVIBE® OPERATING INSTRUCTIONS

The following associated documentation is available from www.iVIBE.uk

- ***iVIBE Outdoor Installation*** instructions
- ***iVIBE Indoor Installation***
- ***Installing the Power Portal***
- ***Connecting iVIBE to AirQWeb***
- ***Performance of the iVIBE Sound Processor***
- ***Performance of the iVIBE Vibration Processor***

PREAMBLE

iVIBE® operates automatically under the control of AirQWeb and associated programs and Apps. The instrument is supplied pre-configured so that it will start operating automatically as soon as it is connected to AirQWeb.

iVIBE is factory set to measure the following

- Peak Particle Velocity (PPV) in the X, Y, Z directions plus true vector resultant R.
- Dominant vibration frequencies in the X, Y, Z, and R directions
- dB(A) and dB(C) sound pressures and statistics, including L_{eq}, L_{max}, L_{90} and L_{10} measured over each reporting interval.
- RMS acceleration in the X, Y, Z and R directions
- RMS velocities in the X, Y, Z and R directions
- The vibration high pass filter is set to 1.0 Hz (-3dB)
- The vibration low pass filter is set to 450 Hz (-3dB)
- Sound pressures are measured with F-time weightings
- Measurements are in SI units
- Reporting interval is 5 minutes
- Viewing interval is 2 seconds

Visit www.iVIBE.uk to download performance tests for the vibration and sound processors.

The rest of this document gives deeper knowledge of the instrument to allow the operator to change its operating mode to suit their application. These changes can be made using AirQWeb or other programs and Apps. All sampling measurements must be stopped before any of the instrument's settings can be changed.

Operation of the instrument is controlled by the state of its **Feature Flags** and its **Instrument Settings**. Its operational state is indicated by the **Instrument Information** table, **Fault Flag** states and **Diagnostic & Housekeeping Readings.**

Please see Appendix of this document for full lists of the Feature Flags, Instrument Settings, Fault Flags and Diagnostic readings.

SAMPLING

Sampling is the process by which the instrument measures and stores readings from its sound and vibration and other sensors. Each **sample** consists of a series reports measured over successive time intervals, the Reporting interval. The series of reports which make up the sample is known as the time series. The reported readings will be the average (or sometimes the peak) value over the reporting interval. Average (or peak) readings are also recorded over the duration of the sample.

Sampling may be started and stopped automatically as defined by the Feature Flags. Automatic samples are generally aligned with 1 minute boundaries.

The shortest reporting interval is one second, the longest 50 minutes. The recommended reporting intervals are between 1 minute and 15 minutes, these give the best compromise between memory use and time resolution. The shortest sampling period is one report interval, the maximum many days.

For those instruments with a display output, analogue output or micro-website, the Viewing Interval specifies how often the output is updated. The output is the average (or peak) over the specified viewing interval. The viewing interval can be in the range 1 second to 30 minutes and is independent of the reporting interval.

The instrument's memory can hold up to 100 samples each consisting of many reports. A sample is identified by its Sample Number. When the memory is cleared the sample number is reset. The total number of samples measured by the instrument over its life is the Sample Total.

SAMPLE CONTROL FEATURE FLAGS

If *Automatic Start* is set, sampling will automatically start on the next 1 minute boundary after the instrument is switched on. If *Timed Sample* is set the sample will last for the *Duration* number of reports (specified in the Instrument Settings) and, if *Automatic Start* is set too, another sample of the same duration will start immediately. This process will carry on till the memory fills when a Memory Full Fault Flag will end the current sample and prevent another restarting.

If *Circular Buffer* is set, the last sample (i.e. the one just finished) will be overwritten if the Instrument Settings *Sample Stack* value equals 0, if it equals 1 the last but 1 will be overwritten and so on. Hence it is possible to create a stack of N samples that will overwrite forever.

If *New Sample Daily* is set a new sample will start at precisely midnight but only if *Automatic Start* is set. This can be combined with the *Circular Buffer* flag and the value of the *Sample Stack* to create a rotating, N-day sample block.

POWER MANAGEMENT AND SLEEPING

The instrument is fitted with a 6 Volt, 5 cell NiMH battery.

If the battery voltage drops below 5.5 Volts, measurements will stop and the current sample will be terminated and the *Dead battery* Fault Flag will be set. If the battery drops below 5.2 Volts the instrument will go into a low power sleep to conserve energy (regardless of the state of the *AllowToSleep* flag). The red activity light will go out. The *Dead Battery* flag will only be cleared when the battery voltage has recovered to > 5.8 Volt

The *Low Battery* Fault Flag is set when the battery voltage drops below 5.8 Volt. An existing sample will continue but a new sample cannot start while that flag is set.

When the instrument is awake, the red activity light is always on

The iVIBE internal battery capacity is 2000 mAH. The battery is intended to keep the instrument operating if the external +12V power disappears. Assuming a full charge, iVIBE will continue to operate without external power for about 10 hours.

If the battery is discharged, a full recharge will take about 12 to 14 hours with the instrument automatically switching on before then when the battery reaches 6.5 Volt.

The battery is not required for data storage and the instrument uses flash memory to store the results. Data retention is more than 100 years.

When you have finished using the instrument, it is good practice to clear the *Automatic Start* flag, stop the instrument sampling, and set the *Allow To Sleep* flag. This will allow the

instrument to sleep until next required without discharging its battery. You can do this by clicking *Hibernate* in AirQWeb

GETTING STARTED WITH iVIBE®

Please refer to the latest versions of the associated documentation for instructions on how to install iVIBE, the Power Portal, and connect to AirQWeb. The door key for the Power Portal will be found in the iVIBE pelicase. All the latest documentation can be found at www.iVIBE.uk

To turn the instrument on, press the instrument's black RESET push-button. The red activity light on the underside will illuminate. This indicates the instrument has started to operate. The instrument will only start if the battery voltage is greater than 5.8 Volts. If it isn't you must connect the +12V power supply from the Power Portal and wait until the battery is sufficiently charged.

If a 12V power supply is connected, the instrument will automatically turn-on if the supply voltage is > 9 Volts and the battery voltage is > 6.5Volts.

The instrument can also be turned on remotely by sending a 1 second RS485 BREAK command from the WS3 web server in the Power Portal. Please refer to your AirQWeb documentation.

If the *Allow to Sleep* Feature Flag is set and

1. there is no communications activity
2. the instrument is not measuring a sample

the instrument will automatically fall asleep after about 5 minutes and the red light go out. The instrument can be awoken again by pressing the RESET button, sending a BREAK command or simply connecting the +12 Volt supply. The instrument will not fall asleep if the +12 Volt supply is connected and the battery voltage is > 6.5 Volt.

Applying mains power to the Power Portal should automatically establish an internet connection between iVIBE and AirQWeb. Please refer to ***Connecting iVIBE to AirQWeb*** from www.iVIBE.uk for more instructions.

Please contact techsupport@tunkey-instruments.com if you experience any difficulties.

APPENDIX

FEATURE FLAGS

The operation of iVIBE is controlled by Feature Flags which may be set or cleared by the operator. They are normally set automatically by AirQWeb. The basic set of Feature Flags is as follows, preset factory defaults are shown ticked:

Feature Flag Name		Explanation/Description
iDB A-weight	√	Measure A-weighted noise readings
iDB C-weight	√	Measure C-weighted noise readings
iVIBE RMS	√	Measure root mean square vibration accelerations and velocities
iVIBE seismic	√	Use quiet seismic accelerometer, otherwise will use the MEMS accelerometer which is noisier.
US units		SI units by default
Auto Start		Auto starts sampling whenever power is on and battery condition is OK
Daily sample		New sample starts at midnight each day, the autostart feature must be on. Will terminate active sample at midnight.
Timed sample		Each sampling period terminates after a set number of reports, specified in the Settings Table (IS)
Stop if fault	√	Stops sampling if a fatal fault occurs
Filter IDB(A)	√	A-weighted readings are filtered F (0.125s) or S (1.0s(
Filter IDB(C)	√	C-weighted readings are filtered F (0.125s) or S (1.0s)
Fast (F) iDB(A)	√	Use F (0.125 sec) filter for A-weighting
Fast (F) iDB(C)	√	Use F (0.125 sec) filter for C-weighting
iVIBE 0.5 Hz		High pass filter is 0.5Hz (-3dB)
iVIBE 1.0 Hz	√	High pass filter is 1.0 Hz (-3dB)
iVIBE 2.0 Hz		High pass filter is 2.0 Hz (-3dB)
iVIBE 4.0 Hz		High pass filter is 4.0 Hz (-3dB)
Histogram iDB(A)		Record A-weighted statistical histogram
Histogram iDB(C)		Record C-weighted statistical histogram
Avg hist iDB(A)		Record averaged A-weighted histogram
Avg hist iDB(C)		Record averaged C-weighted histogram
Circular Buffer		Use circular buffers to record stacked samples, number of stacked samples saved before overwrite is specified in the Settings Table (IS)
Save iDB SPL	√	Save the iDB SPL readings in the dataset
Save iVIBE rms	√	Save the iVIBE rms readings in the dataset
Save iDB peak C		Save the peak C-weighted readings and the sound pressure overload percentages in the dataset
Save housekeep.		Save the Housekeeping Readings in the dataset
Save diagnostic		Save the Diagnostic readings in the dataset
Allow to sleep	√	Allow to fall asleep after about 5 minutes if not sampling and no communications. Press reset button or send break command from WS3 to awaken. Will automatically awaken and not fall asleep if +12V connected and battery > 6.5V

INSTRUMENT INFORMATION

The Instrument Information table provides additional information about the instrument. It is read only and cannot be modified by the user

Information Table	Explanation/Description
Serial Number	Instrument serial number
Instrument type	iVIBE Monitor
Manufacturer	Turnkey UK
Software Version	Software version programmed into instrument
Cal. Due by	Date next calibration due.
iDB(A) at 0 Volt	A-weighted offset, default = 7.00 dB
iDB(C) at 0 Volt	C-weighted offset, default = 7.00 dB
X seismic, mV/g	X calibration of SV84, default=1000.0 mV/g
Y seismic, mV/g	Y calibration of SV84, default=1000.0 mV/g
Z seismic, mV/g	Z calibration of SV84, default=1000.0 mV/g
Mic. Serial	16-byte microphone serial number, text string
Acc. Serial	16-byte accelerometer serial number, text string

INSTRUMENT SETTINGS

These settings control the instrument's reporting and sampling. They are normally controlled automatically by AirQWeb.

Instrument Setting	Explanation/Description
Sample Total	Running count of total number of samples taken by the instrument over its life. Never normally reset.
Sample Number	Next sample number, is reset to 0 when memory is cleared. Increments by 1 every time a sample is completed. Range is 0 to 99. Sample 0 is always the first sample.
Reporting interval (sec)	Time interval when new results are reported. AirQWeb normally sets this to 5 minutes
Start time.	If sampling, start timestamp of current sample. If not, start timestamp of last sample
Stop time	If sampling, timestamp of latest report. If not, stop timestamp of last sample
Sample Stack	Number of samples in the stack before loopback if ***Circular Buffer*** Feature Flag is selected
Report Number	Number of reports in the current sample, or last sample if not sampling.
Duration	Number of reports in a sample before it auto-stops, only if ***Timed Sample*** Feature Flag is selected
Company	Company name string, up to 16 bytes
Location	Location name string up to 16 bytes

FAULT FLAGS

These flags indicate the faults or errors the instrument has encountered. Many of these are managed automatically by AirQWeb.

FAULT FLAG	Explanation/Description
Directory FULL	100 samples have been stored. Sampling is stopped and canniot restart. Upload and clear memory
Memory FULL	The IvIbe memory is full. Sampling has stopped. Upload and clear memory. Depending on length of samples, may occur before 100 samples have been saved.
Dead battery	Battery voltage < 5.5Volts. Sampling will have been stopped and cannot re-start until battery voltage . 5.8 Volts.
I'm too hot!	The case temperature is >60C. Sampling is stopped
Fatal Error	One of the above faults has occurred, sampling is stopped until fault condition clears.
Memory 90% full	Memory is at 90 % capacity, stop sampling and clear memory.
Low battery	The battery voltage is < 5.8 Volts. Recharge battery. New sample cannot be started.
Cal. < 50 day	Calibration is due in less than 50 days. Have instrument recalibrated.
Cal. OVERDUE	Calibration is now overdue. Soon the instrument will be disconnected from AirQWeb server. Have instrument recalibrated as soon as possible..
dBC overload	The C-weighted sound pressure has momentarily exceeded 125 dB during the current sample

NOTES

Please visit www.iVIBE.uk to access other iVIBE and iDB documentation

If you need assistance, please contact:

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