

# ORION

## The Ultimate Vibration Monitoring Station

### ORION - The Ultimate Vibration Monitoring Station

#### Designed For Monitoring

The 01dB ORION Smart Vibration Monitoring Terminal offers an unparalleled solution for monitoring man-made vibrations. Developed and created by 01dB, a global leader in sustainable environmental monitoring, the unit showcases 01dB's 15 years of extensive acoustic and vibration monitoring expertise.

The latest in a suite of superior monitoring products, ORION fits seamlessly into the 01dB ecosystem, alongside the DUO, FUSION and CUBE acoustic monitoring systems. It shares a number of their best features including: fully integrated 3G modem, web interface for measurement configuration, push mode, alarm management, use of 01dB post processing software...

In addition, ORION introduces several new and exclusive characteristics in vibration measurement: a robust weatherproof casing, implementation of standards and regulations for rapid configuration of measurements, measurement display via the web interface and Wi-Fi Access point mode

Intended for use in all vibration monitoring applications (structural damage to buildings, impact on occupants, impact on sensitive equipment), ORION has been designed to be the most comprehensive device on the market.

With ORION, 01dB is the only brand to offer a comprehensive and consistent acoustic and vibration monitoring range.



#### Main Specifications

ORION presents unique technical specifications:

- Robust, weatherproof casing
- All-in-one: Wi-Fi, 3G modem, GPS
- Integrated triaxial accelerometer
- Additional second external IEPE sensor (accelerometer or velocimeter)
- Dynamic range of internal acceleration sensor from 0.5 mm/s<sup>2</sup> to 100 mm/s<sup>2</sup>
- Dynamic range of internal velocity sensor from 0.02 mm/s to 140 mm/s
- Remote control by web interface
- Mobile application
- Implementation of standards and regulations for rapid configuration
- Customisable triggers compliant with standards and regulations
- 1/3 octave real time analysis 1 Hz - 315 Hz (with ISO 2631 - 1989 embedded standard)
- HTTP commands for integrators
- Periodic and on event Push Data mode
- Metrological recording
- Up to 30-hour battery lifetime
- dBTrait Expert post-processing software
- Compatible with 01dB WebMonitoring services

## Main Applications

ORION is the world's most advanced vibration monitoring station. All functionality is designed to maximise customer productivity. It can be used for assessment, evaluation, analysis and monitoring vibration in the following fields of activity:

- Protection of buildings
- Demolition sites
- Construction sites
- Tunnels and underground railways
- Pile driving
- Compacting
- Rail traffic
- Road traffic
- Occupants
- Sensitive equipment
- Monitoring of structures
- Industrial vibrations
- Blasting monitoring

## PERFORMANCE AND SIMPLICITY

### The 01dB Ecosystem



ORION is a new member of the 01dB product range (which includes the DUO, CUBE and FUSION). The same ecosystem focuses on improving customer productivity. Familiarity with one instrument will ensure you can master them all. Each instrument shares a similar web interface and same software tools, all designed to optimise the time needed to use them. If ORION is your first purchase from the 01dB range, you will appreciate its simplicity of use, degree of remote controllability and the power of its post-processing software.

## All Weather Use

ORION is designed for external use in all weather conditions, so additional protection is not required. ORION is resistant to dust and water with all connection points intended for use on worksites and other harsh environments.

ORION's aluminium casing is used in military applications, designed to withstand mechanical stresses, like being walked on or kicked.

## Simplified Ergonomics

To increase resistance to external constraints, ORION deliberately has no screen. A simplified two-button keypad serves to start up the device and turn on the Wi-Fi mode. ORION has several LED status indicators: measurements in progress, Wi-Fi operational, 3G communication and battery life status.

All instrument settings are accessible via a web interface.

## Remote Communication

Using a web-enabled device (smartphone, tablet, laptop, etc.) you can access ORION via your internet browser. Thanks to the embedded web server, ORION offers direct access to any of the available functions (configuration, coding, real time display of instant values) without the need for specific applications. Remote connection is possible from wherever you are, using Ethernet, Wi-Fi or 3G integrated modem (optional).

## Smartphone Application

Communicating with ORION is simple using 01dB's mobile application. The app is available for iOS (Apple), Android, Windows Mobile and Windows 10 operating systems.

The application enables quick connection to each ORION device. It also offers access to 01dB social network pages (Facebook, Twitter, LinkedIn, YouTube, etc.) and the 01dB support website, allowing you to contact us at any time.



## Making On-Site Operations As Simple As Possible

ORION is easy to install on site, using the supplied or optional accessories. Once installed, you simply press a single start key to launch data acquisition, storage and communication.

### GPS Location

The built-in GPS (optional) with external antenna allows ORION to store measurement data including GPS location for easy visualisation of the measurement position in dBTrait post-processing software. In case of an unexpected displacement of ORION, a user-defined movement detection function will warn the operator by sending an SMS with the new geographical coordinates and the distance from the previous location (only available with the 3G option).

### Multi Position Synchronous Analysis

ORION opens up new possibilities for diagnosis – analysing vibratory nuisance and disturbing sources in multiple positions precisely and simultaneously. Accurate time synchronisation via NTP (Net Time Protocol) or GPS (optional) allows simultaneous use of several ORIONs in different positions. By leveraging ORION's unique remote control functions, a single operator can control several devices located in different locations on the same site.

### Smart And Powerful

ORION measures noise and vibrations perfectly. Its powerful functions contribute to operational efficiency through integration of various vibration standards, recording of metrological signals, innovative trip thresholds and remote configuration.

### Wireless In Your Office

Direct access to ORION is available through your office Wi-Fi network without additional software. This allows multiple team members to be able to access several ORION instruments at once with measured data visible at a glance.

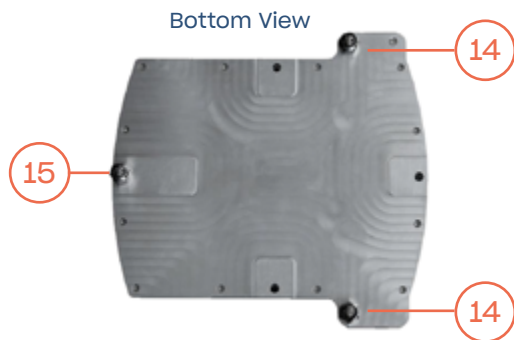
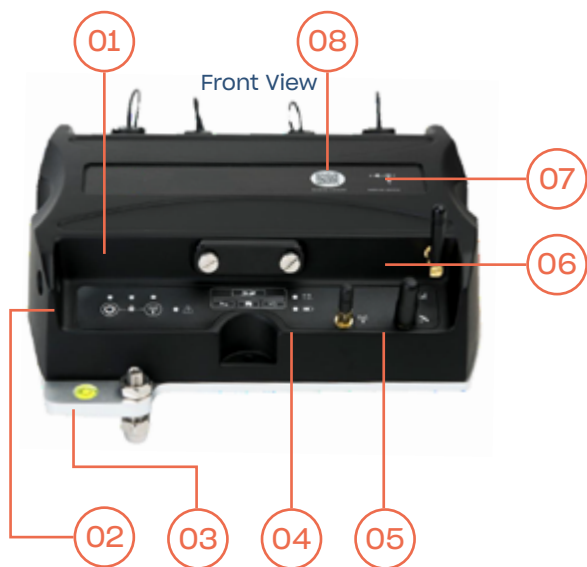
## 01dB Software: Power & Functionality

The data measured using ORION is processed using the dBTrait acoustic and vibration data processing software program. dBTrait has seen several significant enhancements since its original development in the 1990s.

Considering user feedback and technological advancements, the program now includes processing functions such as:

- multiple indicators calculations
- analysis results according to regulations
- advanced coding capabilities
- dBTrait is the most commonly used software program for the 01dB product range.
- For ORION, several functions specific to vibration data processing have been added, including:
  - calculation according to vibration standards
  - amplitude/ dominant frequency graph
  - FFT analysis
  - sonograms
- The 01dB software programs can be installed on as many terminals as needed. A dongle is not required, making it easier to organise collaborative projects.

## Main Applications



- 01 - Access hatch to SD memory card, USB port, SIM card and service port
- 02 - Keyboard
- 03 - Bubble level for horizontal adjustment
- 04 - Wi-Fi antenna
- 05 - GPS antenna (optional)
- 06 - 3G antenna
- 07 - Internal sensor orientation
- 08 - QR code
- 09 - External sensors input
- 10 - TTL Output
- 11 - Breathing valve
- 12 - External Power
- 13 - LAN/External Power over Ethernet (PoE)
- 14 - Adjustable screws
- 15 - Fixed screw

## NO COMPROMISE ON METROLOGY

### Internal Accelerometer And Velocity

Newton's second law of motion is the fundamental principle of dynamics - The acceleration of an object as produced by a net force is directly proportional to the magnitude of the net force, in the same direction as the net force, and inversely proportional to the mass of the object.

The measurement of acceleration is therefore helpful in estimating the forces applied to a building to avoid structural damage. To this end, ORION is equipped with a sensitive triaxial internal accelerometer with low inherent noise.

The key standards applicable today are based on vibration velocity threshold levels that must not be exceeded because, historically, the only sensors with high sensitivity for relevant measurements on sensitive

buildings were geophones (vibration velocity sensors). Today, new accelerometer technologies and high quality, built-in electronics enable a wide, dynamic range to be covered, suitable for all building types. Such devices also make it possible to integrate an acceleration time signal in real time to obtain a linear frequency and phase velocity signal, from a few tenths of a Hz up to more than 1 kHz.



## Integration Of Standardised Limit Curves Applied To Building Vibration

The vibration measurements applied to buildings require the dominant frequency of the vibration velocity signal to be assessed so that the peak level can be precisely compared with the limit curves set out in standards. ORION determines the dominant frequency observed at the maximum peak velocity, for each assessment period (5, 10 or 30 seconds). The two values obtained (maximum vibration velocity and dominant frequency) are compared directly with the corresponding limit for the user case of the applied standard. Vibration velocity limits, as a function of the dominant frequency, set out in the DIN 4150-3, BS 5228-4 and BS 5228-2 (BS 7385-2) standards and French circular of July 23, 1986 and Ministerial decree of 22 September 1994, are implemented directly in ORION, making it possible to monitor and process any threshold in real time.

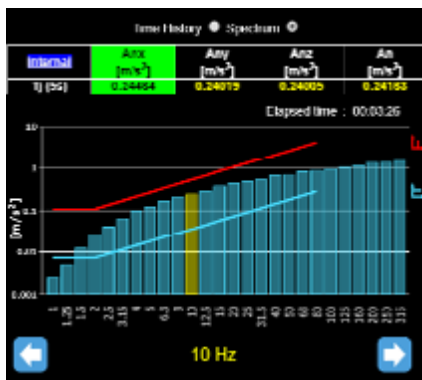


## Evaluation Vibration Severity KbftR

With the DIN 4150-2 standard activated, ORION allows the acquisition and storage of KBFT (maximum weighted vibration severity), KBFTm (RMS weighted vibration severity) and KBFT<sub>r</sub> (evaluation vibration severity), with or without consideration of rest periods during the day periods. The measured data is then aggregated in a report per periods directly in dBTrait.

## 1/3 Octave Real Time Analysis

With the implementation of ISO 2631 standard, ORION is capable of real time signal analysis from 1 Hz to 315 Hz (user defined base curves mode). Reference base curves allow for real time threshold detection of any 1/3 octave exceeding the tolerance curve. Moreover, the user can create his/her own curves to adapt to specific user cases.



## Vdv Measurement

When assessing intermittent vibration for occupants it is necessary to use VDV (Vibration Dose Value), a cumulative measurement of the vibration level received over a predefined period (typically 8 hours for day and 16 hours for night).

## Structure Borne Noise Estimation

The increasing importance of noise induced by vibration has inspired O1dB for the implementation of a method for the estimation of re-radiated (ground borne) noise based on vibration measured on a radiating surface. ORION applies a method inspired by an approach originally developed in Canada and popular in UK based on RMS particle velocity measurement to estimate L<sub>p</sub> (A-weighted re-radiated noise from 2 to 250 Hz).

## Real-Time Information Sent When A Predefined Criterion Is Exceeded

If a standardised threshold is exceeded or if an event created by a user occurs, ORION sends specific information (PPV/DF pairs, velocity signals) in data push mode so it can be viewed in real time.

## Customisation And Combinations Of Triggers

The standardised limits implemented in ORION can be adjusted, in terms of level and frequency, to create specific criteria to suit a particular usage. Furthermore, ORION is able to logically combine a standardised trigger with a trigger created by a user.

## Embedded Intelligence

Structures react differently depending on whether the excitation is continuous or transient. In order to reflect this, several standards, including the French circular of 1986 and the British BS standards, define the thresholds to be monitored as a function of the type of signal. The thresholds for transient excitation are higher than for continuous excitation. ORION is able to automatically detect, in real time, the type of vibration measured (continuous or transient) to apply the appropriate limit.

## Seven Channels In Parallel

ORION can also measure, in parallel, the three axes of the internal sensor and the three channels of the external sensor, and one measurement channel for blast pressure (under development).

## State Of Health Of The Terminal Available At All Times

ORION sends its SoH (State of Health) data at one minute intervals, providing users with information about the terminal's operating status, battery life, power supply, GPS position, remaining memory, status of each sensor and more.

## MULTI-COMMUNICATION

### Communication Modules

The integration of communication modules in ORION allows communicating with the instrument in different ways:

- Ethernet network
- Wi-Fi access point
- Wi-Fi connection to an access point
- 3G communication with modem option (SIM card and subscription not included)
- USB mass storage for SD card reader

All connection parameters are accessible from the web interface.



### Remote Data Transfer

Access to stored data and data transfer can be obtained in a variety of ways using:

- an FTP client such as FileZilla®
- dBFileManager software (included with ORION) for manual downloads on demand
- dBDataCollector software for automatic downloads, to collect data from several ORION devices in parallel and at regular intervals
- USB mass storage (SD card access)
- an external memory card reader if SD card is removed

### Structure Of Stored Data

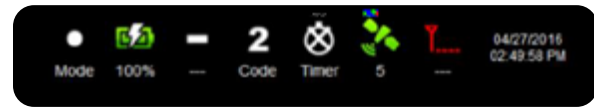
The structure of the measurement files allows the user to select the types and dates of data to transfer. This flexibility is particularly useful for 3G communication, where the cost of data transfer depends on the quantity of data to upload.

The corresponding file format (\*.cmg) is compatible with all O1dB software.

The data transferred with dBDataCollector can also be automatically converted into plain text files.

## DETAILS OF THE WEB INTERFACE

### Status Bar



The status bar is permanently displayed on the web interface and can be used to check how the main functions of ORION are operating, including:

- current acquisition mode
- battery status
- error detection (overload, underload)
- thresholds currently exceeded
- activation or non-activation of a timer
- number of GPS satellites picked up
- type of connection
- 3G signal strength
- time information.

### Measurement Configuration

A measurement configuration for ORION can be set using ergonomic sub-menus, allowing the user to remotely configure the standard/regulation used, store the parameters, and set automatic trigger thresholds, logging periods and delayed starts, etc.

Configuration management enables a predefined configuration to be loaded quickly or to be deployed on other terminals.

### Data Access

Data stored in the instrument's memory can be viewed using the web interface. The user can visualise a summary of the different measurement campaigns stored in the instrument, without disturbing the measurement in progress. Additionally, an automatic function can be activated to remove data older than a predefined number of days.

## AND EVEN MORE

### Import And Export Of Configuration Files

Measurement configurations can be stored, exported and imported. Benefits include being able to load measurement configurations from one ORION instrument to others, and therefore run measurement campaigns relying on the same parameter settings for all instruments. This feature can also be used temporarily to replace an ORION while performing a periodic laboratory.



## Storage Memory Automatic Management

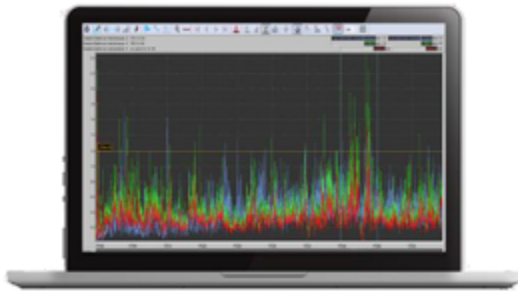
A rule can be established to automatically delete the oldest data, depending on the percentage of memory still available.

## ADVANCED DATA POST-PROCESSING

### Display Of Measurements And Events

Using the optimised display functions of the dBTrait software, ORION measurement data can be displayed with ease, whether measurements are taken over a short time period or spread over several months. Users can display various combinations of information:

- Measured vibration magnitudes time history
- Events: sources of disruption identified using ORION's automatic or manual coding with a colour code applied to events, so they can be distinguished with ease
- Graph of time signals from triaxial sensors for recorded events



Pairs of dominant frequency / vibration magnitude points featuring a cloud of dots interacting with the time history cursor, with display of the standardised limits or limits selected by the user

Data is plotted for the duration of the measurement, or for sections defined by the user. Various possibilities enable specialist or non-specialist users to produce a representation of a vibration environment situation (construction or demolition site, vibrations caused by rail infrastructure, etc.), selecting the level of detail required.

For example, specialist users can easily validate or invalidate events obtained using ORION's automatic coding, by viewing the shape of the corresponding data time history.

Comments can be entered and stored. They are time-stamped and visible directly under the graphs to provide clear additional information.

The different types of vibration (transient or continuous) are distinguished using graphic symbols. Triaxial data graphs are drawn using an automatic colour code. Finally, graphs can be drawn using a log-scale, which is very useful for measurements over a wide, dynamic range.

## Coding

The coding functions serve to identify and quantify sources of disruption (vibrations, noise, etc.). dBTrait offers several post-processing coding options:

- Validation or invalidation of automatic coding performed by ORION
- Coding modifications and additions
- Automatic (on thresholds and/or time) or manual coding
- Coding based on time signals

## Statistical Processing

Analyses can be conducted on the basis of coding performed:

- List of occurrences of sources of disruption
- Assessment of sources (levels, statistical indices, etc.) overall or by selected period

Results are presented in table or graphical format and can be printed directly or exported to Microsoft Office or other software programs. dBTrait can be used to perform automatic data analysis to optimise this task.

## Post-Processing

The dBTrait software program incorporates an operations server, enabling various post-processing operations based on time signal recordings:

- Calculations of mean spectra or multiple spectra
- In Nths of an octave or in narrow bands (FFT)
- Calculations of time histories, with various possible time-weighting factors (short Leq, slow, fast, impulse, etc.) and frequency weighting factors (acoustic and vibration weighting factors)

The dBFA software program offers even more post-processing functions, including the potential integration/derivation of time signals and spectra, signal surgery, etc.

## Statutory Analysis And Reporting

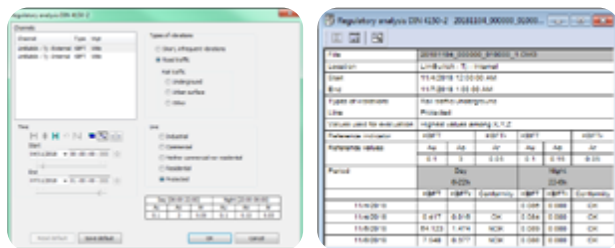
A dedicated standardised analysis module enables detailed and illustrated compliance reports to be drawn up quickly for the standards implemented in ORION. Report components include:

- lists of occurrences of sources of nuisance (based on automatic coding)
- summaries: number of occurrences, total duration, highest event
- Dominant frequencies graphs, providing visual representation of exceeded thresholds based on standardised limits
- For the highest event, or for the occurrence of a source selected by the user: time signals graphs and graphs of associated FFT spectra

The user can select the level of detail for the report components, and send these components to a Word file.

## Specific Report For Din 4150-2

The import into dBTrait allows direct access to the regulatory analysis of possible exceedance per period depending on the selected user case.



Selection of the use case  
(type of vibration and line)

Edition of the result by  
period (here 4th to 6th  
November 2018)

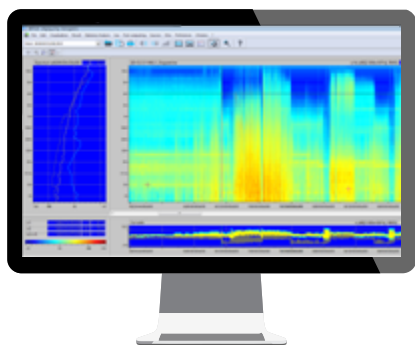
## Merging Measurements

The dBTrait software makes it possible to merge several campaigns originating from the same terminal (e.g. analysis of measurements from several days) or from different terminals (e.g. simultaneous analysis of several measurement points). This option also enables ORION measurements to be mixed with measurements taken using other O1dB instruments (e.g. DUO or CUBE) to achieve a synchronised analysis of acoustics and vibrations.

## Flexible Acoustic & Vibration Analysis

The dBTrait software package, developed over a period nearly 30 years, is an ultra-flexible acoustic and vibration data processing tool that is compatible with the full range of O1dB measurement devices. It fulfils all functions necessary for data processing and analysis for the following applications:

- Noise in the environment
- Vibrations in the environment
- Exposure of the human body to vibrations



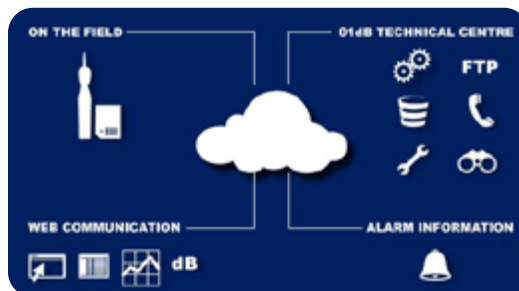
## THE O1DB WEBMONITORING OFFER

ORION is designed for monitoring. Users can integrate ORION into their own system, significantly reducing the time required by operators to deploy and set up a noise monitoring project (network deployment, computer

management, on-site maintenance), lowering overall operating expenses.

O1dB's web services are tailored to suit all types of noise and vibration monitoring activities.

O1dB WebMonitoring provides unrivalled service and quality, guaranteed to give customers reliable data without compromising on metrology. The data provides a sound basis for automatic calculations and/or expert analysis by acoustic consultants.



With WebMonitoring, O1dB offers a simple, high performance web interface that is easily accessed by everyone involved in a monitoring project. All information is visible from any web-enabled device (computer, tablet, smartphone, etc.), and can be viewed in real-time and offline.

Available in eight languages, the O1dB WebMonitoring interface can be used in private mode (which requires a user ID and a password) or in public mode.

In standard mode, a first level of customisation allows for the insertion of a corporate logo and specific information related to an individual project (description, pictures of measurement points, hardware used, etc.). Note: Please see the O1dB WebMonitoring data sheet for more information.

## ACCESSORIES: NOT ONLY SIMPLE ADD-ONS

### Carrying Case

A carrying case is provided as standard with ORION. It accommodates the ORION terminal and all accessories required for implementation on site.



### Rounded Feet



ORION comes with three rounded feet used to stand the terminal on hard ground.

### Sharp Feet (Optional)

ORION can be supplied with sharp feet to stand the terminal on loose ground.





## Weatherproof Power Supply (Optional)

The standard power supply unit can be replaced with a weatherproof unit, if the ORION terminal is to be used in very wet and/or dusty environments.

## Mounting Plate (Optional)

The ORION terminal can be mounted on a plate to be anchored to the ground to ensure better transmission of vibrations from the ground to the terminal.

## Three-Sensor Assembly Kit (Optional)

ORION can be used with single-channel external sensors. These can be mounted on a block in the X, Y and Z directions. This block comprises a spirit level to ensure that it is anchored to the ground or wall in a horizontal position.

## Gps Kit (Optional)

Two GPS antennas can be added:

- GPS patch antenna (ACE1094), to improve a signal by positioning the antenna at a distance from the terminal
- Small active antenna (ACE1095) mounted directly on the terminal (usually when the terminal is outdoors)

## AVAILABLE OPTIONS

### VMT2001000 - STRUCTURE OPTION

Activation of all standards and regulations relating to the impact of vibrations on structures:

Available standards:

- DIN 4150-3
- BS 5228-2 (BS 7385-2)
- BS 5228-4
- French circular of July 23, 1986
- Ministerial decree of 22 September, 1994

### VMT2002000 - OCCUPANT REGULATIONS OPTIONS

Activation of all available standards and regulations relating to the impact of vibrations on the occupants of buildings:

Available standards:

- ISO 2631-2 1989
- ISO 2631-2 2003
- BS 6472-1
- DIN 4150-2

### VMT2003000 - SENSITIVE EQUIPMENT REGULATIONS OPTION (UNDER DEVELOPMENT)

Activation of all available standards and regulations relating to the impact of vibrations on sensitive equipment (e.g. computer and telephone installations):

Available standards:

- ETSI EN 300-19
- ISO/TS10811-1 & 2
- IEST (Vc curves)

### VMT 2005000 - LOGGER OPTION (STANDARD WITH ALL KITS)

Global values, configuration, acquisition and storage

### VMT 2006000 - TRIGGER OPTION (STANDARD WITH ALL KITS)

Configuration and use of manual and automatic triggers

### VMT2007000 - SIGNAL RECORDING OPTION

Configuration, acquisition and storage of signal files of metrological quality

### VMT 2008000 - FTP OPTION

FTP mode activates the transfer of data via an FTP server

### VMT 2009000 - PUSH DATA OPTION (INCLUDED IN ALL ORION KITS)

Activates automatic data transfer in push mode (from the instrument to one or two servers)

The following parameters allow for selecting the types of data or upload:

- Instant values
- Events
- Signal(s)
- Configuration

### VMT2010000 - 3G MODEM ACTIVATION OPTION

Activates 3G modem for internet connection using 3G/ GPRS/EDGE and UMTS/HSDPA networks:

- Full remote control and access with a smartphone, tablet or standard computer (Windows, iOS, MAC)
- FTP server for data transfer
- Support of DTDNS/DynDNS dynamic IP address server
- SMS alarm on low battery (alert level can be adjusted by the user)
- SMS alarm on movement detected from initial location

### VMT 2011000 - HTTP COMMANDS OPTION

Activates integrators HTTP commands mode

The «integrators commands» allow retrieval of information in real time. The operator can query ORION with a simple HTTP request, and ORION responds with the corresponding real-time values.

### VMT20XX000 - GPS OPTION

Activates GPS mode. Allow the localisation of the station and improve the time accuracy

### VMT2013000 - EXTERNAL SENSOR OPTION

Activation of external channels to connect a second sensor and transform the ORION terminal into a six-channel measurement system (three internal axes and three external axes)

## PACKAGES

### Orion Overall Specifications

All ORION packages contain the minimum following specifications:

- Wi-Fi connection
- Ethernet connection
- Wi-Fi data transfer
- Ethernet data transfer
- NTP time synchronisation

- USB connection (mass storage)
- SD card reader
- Web interface for remote control
- dBFileManager software for manual data transfer
- LOG mode (time history)
- Timer functions: immediate, delayed, daily, periodic

### Available Packages

Options can be ordered individually or as a package (at time of purchase or when required)

	VMT3001000 Logger Wi-Fi	VMT3002000 Expert Wi-Fi	VMT3003000 Advanced Wi-Fi/3G
VMT2001000 Construction	●	●	●
VMT2002000 Occupants	○	○	○
VMT2003000 Sensitives Equipment	○	○	○
VMT2005000 Logger	●	●	●
VMT2006000 Triggers	●	●	●
VMT2007000 Signal Recording	●	●	○
VMT2008000 FTP	●	●	○
VMT2009000 Push Data	●	○	○
VMT2010000 3G Modem	●	○	○
VMT2011000 HTTP Commands	○	○	○
VMT2011000 GPS	○	○	○
VMT20XX000 external sensor	○	○	○

● Included ○ Option

## TECHNICAL SPECIFICATIONS

### Standards

#### Metrologic reference standard

DIN 45669-1 class 1

#### Embedded standards

DIN 4150-3, French circular of 23/07/1986, Ministerial decree of 22 September 1994, BS 5228-4, BS 7385-2, BS 6472-1, DIN 4150-2, ISO 2631-2 2003 et ISO 2631-2 1989

### Input

#### Internal sensor

Type: triaxle piezoelectric

Typical sensitivity: 500 mV/g

Transverse sensitivity: < 5%

Frequency response: 0.4 - 1600 Hz ± 10%

Typical resonant frequency: 16 kHz

Residual noise: 35 µg RMS

Spectral noise

- 3 µg/vHz @10 Hz
- 0.7µg/vHz @100 Hz
- 0.5µg/vHz @1000 Hz

#### External Sensors

Type: IEPE sensors

Vibration channels: 3 axes available for Accelerometer or velocimeter

Noise channel: 1 axis available for pressure microphone (blast applications)

Note: Selecting an accelerometer leads to the integration of the time signal for analysis of vibration velocity

### Dynamic Range Internal Input

#### Under range

Acceleration RMS: 0.5 mm/s<sup>2</sup>

Acceleration peak: 2 mm/s<sup>2</sup>

Velocity RMS: 0.04 mm/s

Velocity peak: 0.35 mm/s

Re-radiated noise Lp: 13 + (27-X) where X is the correction factor

#### Overload

Acceleration: 100m/s<sup>2</sup>

## Dynamic Range External Input

### For accelerometer 500 mV/g:

#### Under range

Acceleration RMS: 0.5 mm/s<sup>2</sup>

Acceleration peak: 2 mm/s<sup>2</sup>

Velocity RMS: 0.04 mm/s

Velocity peak: 0.35 mm/s

#### Overload

Acceleration: 100 m/s<sup>2</sup>

### For Velocimeter 30 V/m/s:

#### Under range

Acceleration RMS: 0.02 mm/s<sup>2</sup>

Acceleration peak: 0.04 mm/s<sup>2</sup>

Velocity RMS: 0.002 mm/s

Velocity peak: 0.004 mm/s

Re-radiated noise  $L_p$ : 13 + (27-X) where X is the correction factor

#### Overload

Displacement: 4 mm peak to peak

Velocity: 100 mm/s

## Frequency Response

Conforms to DIN45669-1

## Acquisition And Post-Processing

7 measurement channels

3 channels X, Y and Z axes for internal accelerometer

3 channels X, Y and Z axes for external sensor

(accelerometer or geophone IEPE)

1 channel acoustic pressure for blast

#### Sampling frequency

3200 Hz for each channel, up to 7 channels

simultaneously

#### High pass filter

Butterworth 2nd order @ 1.2 Hz

#### Low pass filter

Butterworth 8th order @ 156.25 Hz

#### Velocity signal

Obtained by numerical integration of signals if the input sensor is an accelerometer

#### Automatic detection of signal type

Kurtosis method applied to automatically determine the tolerance curves to apply (French circular of July 23, 1986, BS 5228-4 et BS 7385-2)

#### Logging period $T_j$ for Dominant Frequency calculation

5, 10 or 30 sec

#### Fast logging period $T_i$

1, 2 or 5 sec

#### Dominant frequency calculation

Maximum frequency of the FFT centred on  $PPV_{jkmax}$  sample at each  $T_j$ ; resolution 0.2 or 0.4 Hz

#### Signals recording

For each channel  $F_e = 3200$  Hz

Duration:  $nT_j + 6$  sec, n corresponding to the consecutive numbers of  $T_j$  with event detection

Velocity signal: 5 seconds within  $T_j$  if an event is occurring;  $F_e = 400$  or 800 Hz centred on  $PPV_{jkMax}$

## Triggers on signal recording

Simultaneous with codes and / or manual via the web interface

### Standardised events detection

On values or couple of values exceeding the tolerance curves:

- $PPV_{jk}/FD_{jk}$  (DIN 4150-3 and "Circulaire")
- $PCPV_j/FD_j$  (BS5228-4 and BS 7385-2)
- $VpMax_{jk}$  (arrêté)
- $VDV_{jk}$
- $Lp_{jk}$

*i* : value for a logging period  $T_i$

*j* : value for a logging period  $T_j$

*k* : value for an axis *k*

### User defined events detection

By logical combination «and» or «or» triggers on  $PPV_{jk}$ ,  $PCPV_j$  and  $PVS$ . Minimum value for trigger: 0.1 mm/s

### Manual coding

On the web interface from the real-time menu:

5 codes: codes from 1 to 5

### Timers

Immediate, Delayed, Periodic daily

## Interfaces And Communication

### 2 Buttons keyboard

Power on/off

Start/stop Measurement

Wi-Fi management

Keyboard Lock/Unlock

### 7 LED's

Power (green): flashes if logging measurement in progress

Wi-Fi (Blue), Lock (yellow), Ethernet (yellow)

Warnings (red): overload, open circuit

Battery (green and red)

GSM (green and yellow)

### Memory

SD, SDHC or SDXC card, 2 GB or higher (2GB standard delivery) for measured data and signals. Minimum recommended requirement:  $\geq$  class 10. Please note only SD cards provided by 01dB should be used.

01dB cannot be held responsible for data loss if the SD card used is not delivered by 01dB.

Measured data stored on the SD card every 10 seconds.

Non-volatile memory for configurations, system log (500), calibration data (500) and electrical checks (500).

For continuous use (fixed point), it is strongly recommended to change the SD card considered a consumable, every 6 months during the site visit, as it can be highly stressed and has a limited life.

### USB connection

Type 2.0; mass storage

Charge voltage 5V ( $\pm 5\%$ ) @ 0.5 A.

### Ethernet connection:

Connector RJ45 (shielded cable maximum length 3m)

Speed: 100 Mbits/s

## Wi-Fi Connection:

IEEE 801.11b, g

Wireless Access point and infrastructure modes

Cellular network connection

Embedded modem 3.5G compatible with

- 4-band GSM/GPRS/EDGE
- 3-band UMTS/HSDPA

## Data connectivity

Integrated Network protected http server for web interface

Integrated FTP server for data access

Integrated FTP client for automatic data upload to server

## SMS alarms

On event message content: instrument serial #, location, date and time, user defined text, IP address: http port

On low battery (user defined %) message content: instrument serial #, location, date and time, % remaining battery

On movement: message content: instrument serial #, location, date and time, GPS coordinates, distance from previous location, IP address: http port (the alarm trigs if the instrument has moved more than the user defined distance)

## Automatic SMS actions

Sending "IP" by SMS to instrument makes it reply by sending an SMS with instrument serial #, location, date and time, IP:port address and automatically sends a new SMS at every new IP address in case of floating IP

## Actions on SMS sent to the instrument

On SMS sent "IP", the instrument replies by sending an SMS with the instrument serial #, location, date and time, IP:port address

On SMS sent "stop", the instrument stops sending new SMS every time IP has changed

On SMS "reboot", the instrument reboots to establish a new connection and replies with an SMS with instrument serial #, location, date and time, IP:port address

## Web interface refresh rate webpages

once per second

## TTL output

R = 100 Ohms / 0 / 3.7V

**Clock** GPS PPS, error < Ti

Internal clock, error < 0.5 s/24 hours

## Localisation

Automatic with GPS

Information stored in measurement session

## Power

### Battery

Type lithium Ion, Voltage: 3.7V, Capacity 20 Ah

Non-removable,

charging time (@ 20 °C):

- Instrument off: < 8 h with standard charger, < 18 h

with PoE

- Instrument on in logging mode: < 11 h with standard charger; <35 h with PoE

For higher T°, charging time will increase

For internal T° > 50 °C, for safety reasons battery charge process will be stopped; nevertheless, the instrument power supply remains active

## Typical Power consumption

Without communication: < 3 W

With Wi-Fi: < 4 W

With 3G Modem: < 3.7 mW

## Operating battery lifetime

@ 20 °C, logging active and signals recording on threshold during 10% of the measurement time. > 28 h hours without Wi-Fi and 3G connection

@ -20 °C, logging active and signals recording on threshold during 10% of the measurement time: > 12 h

## External power supply

12V DC ± 3V on charger input PoE

**Warmup time** Duration < 30 sec

## Environment And Conformance To Standards

### Operating range T°

-10°C +55 °C without charging

-10°C +36°C while charging

**Humidity** 95% no condensation

**Altitude** Up to 2000 m

**Pollution degree 4** Outdoor and indoor use

**Protection** IP65

**Directive low voltage 2014/35/UE** NF EN 61010-1

**Directive CEM 2014/30/UE**

EN55011 classe B

NF EN 61000-3-2

61000-3-3

61000-4-2

61000-4-2

61000-4-3

61000-4-4

61000-4-5

61000-4-6

61000-4-8

61000-4-11

**Directive RED 2014/53/UE**

Radio 3G : ETSI EN 301 908-2 V5.2.1

Wi-Fi : ETSI EN 301 908-2 v 5.2.1

**Vibration endurance**

EI 60068-2-6 - 50m/s<sup>2</sup> - 10 cycles - 10Hz à 500Hz

**Resistance to jerking**

CEI 60068-2-29 - severity 10g

**Resistance to shocks**

CEI 60068-2-27 - severity 30g

**Weight and dimensions**

5300 g

H x L x P: 82.5\*281\*240 mm (without feet)



## DELIVERABLE AND ACCESSORIES



### Included in the standard package

- 01 - ORION
- 02 -Wi-Fi antenna
- 03 -GSM antenna
- 04 - Power supply
- 05 - Open end wrench
- 06 -Allen wrench
- 07 -USB cable
- 08 -Quick start guide / installation & safety instructions
- 09 - Metrological documents and software licenses available in the pouch lid

### For optional accessories

- 10 - Mounting cube 3 sensors with spirit level
- 11 - IEPE monoaxial sensor (x3)
- 12 -GPS antenna
- 13 -GPS patch
- 14 - Tapered steel feet (x3)