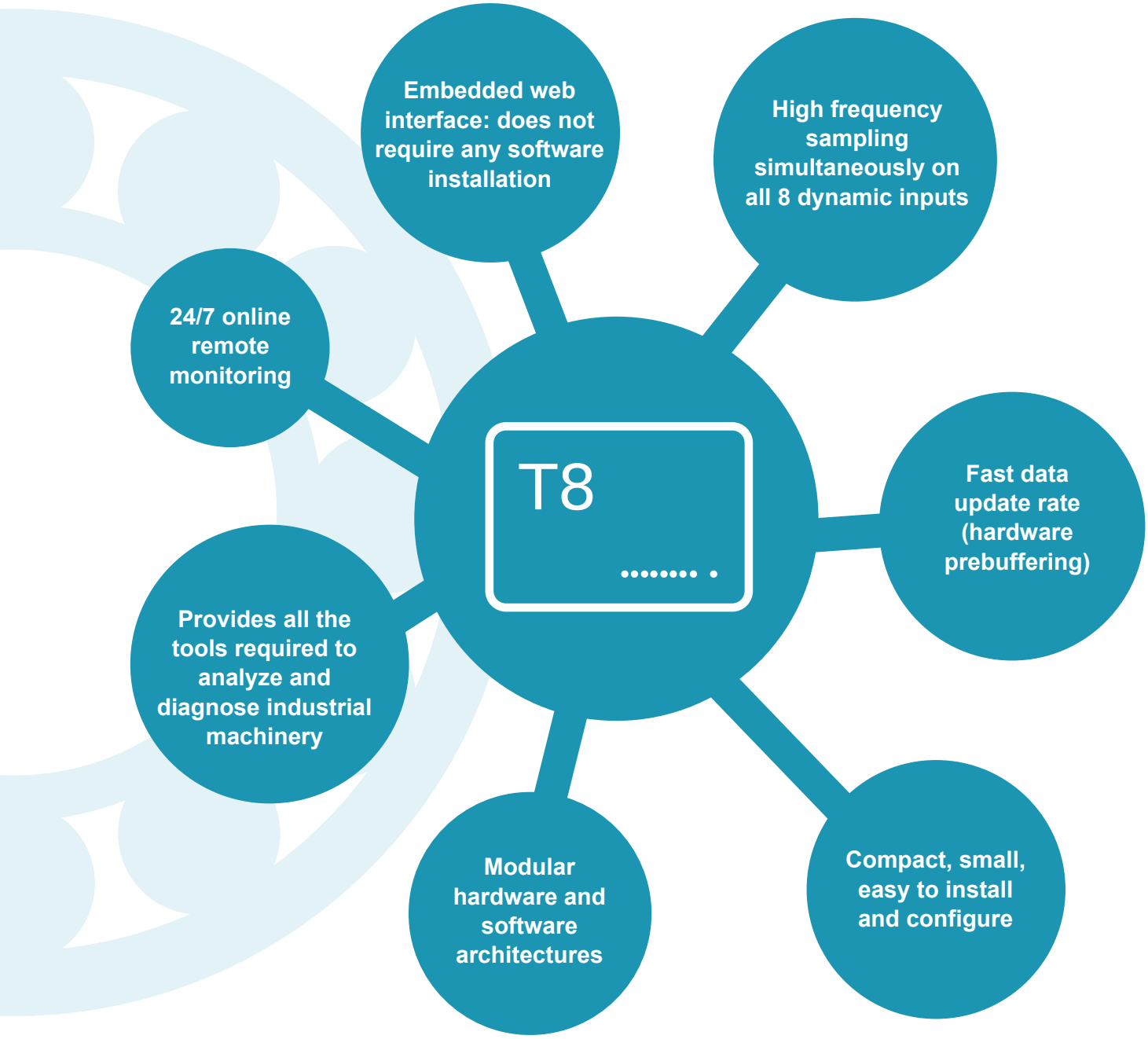
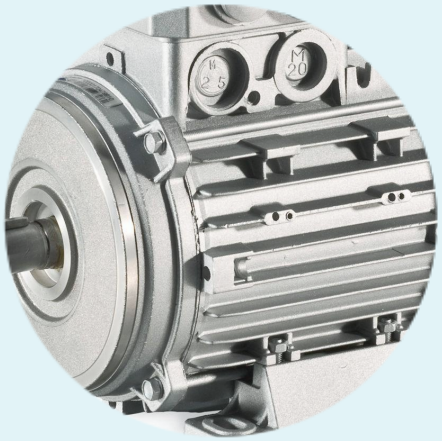
TWave

T8 Online Monitoring System

New Times. New Tools.





Applications

- Pumps
- Fans
- Gear boxes
- Cranes
- Compressors
- Wind Turbines
- Gas and Steam Turbines
- Electric Motors

TWave T8 - Online Machinery Supervisor

TWave T8 is the ultimate monitoring solution. It is a very advanced tool for vibration analysis, and it is also suitable for any predictive maintenance technique and any type of industry

It provides information about the machine condition, its failure modes, and its evolution over time, with a user friendly, intuitive and flexible interface.

TWave T8 automatically detects the machine states (running, stopped, start-up, high load, low load, etc.) and establishes different alarms for each of them. It is also able to monitor calculated parameters, based on formulas.

Its powerful interface provides advanced tools for vibration analysis, using a simple web browser

TWaveT8 is a simple and compact solution for supervising machinery.

Its small size, low consumption, high processing power, storage capabilities, and embedded configuration and visualization interfaces, make the system very easy to install, operate and maintain, while keeping all the functionalities required by expert analysts or plant operators.

T8 protects, supervises and diagnoses the health state of your machinery

Main Benefits

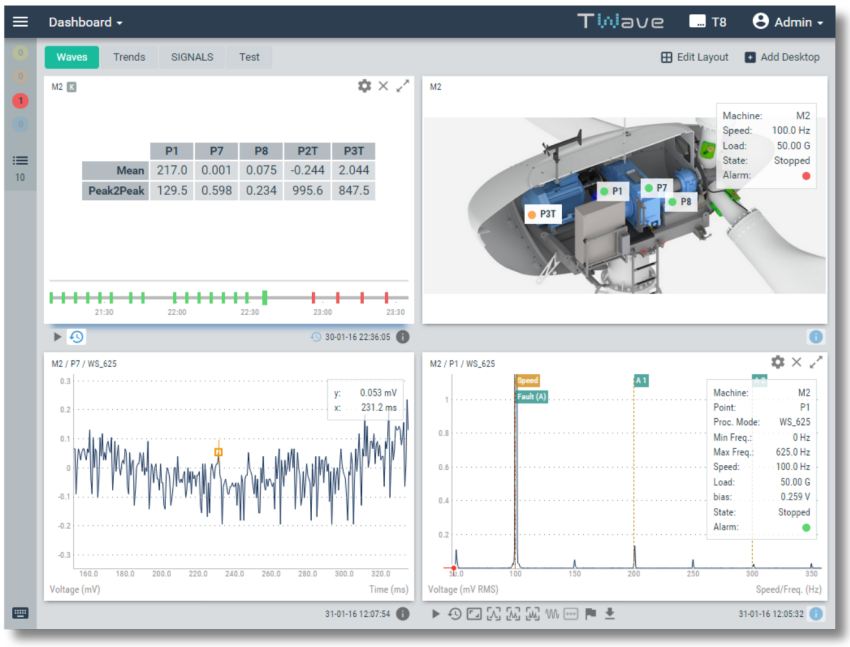
TWave T8 alerts of any failure modes being developed on the machinery, decreasing production downtime and maintenance costs.

- Increases productivity.
- Extends machinery lifespan.
- Optimises the periodic maintenance program.
- Reduces machinery maintenance expenditures.
- Reduces the cost of spare parts in stock.
- Keeps machinery health condition under control.

The Dashboard

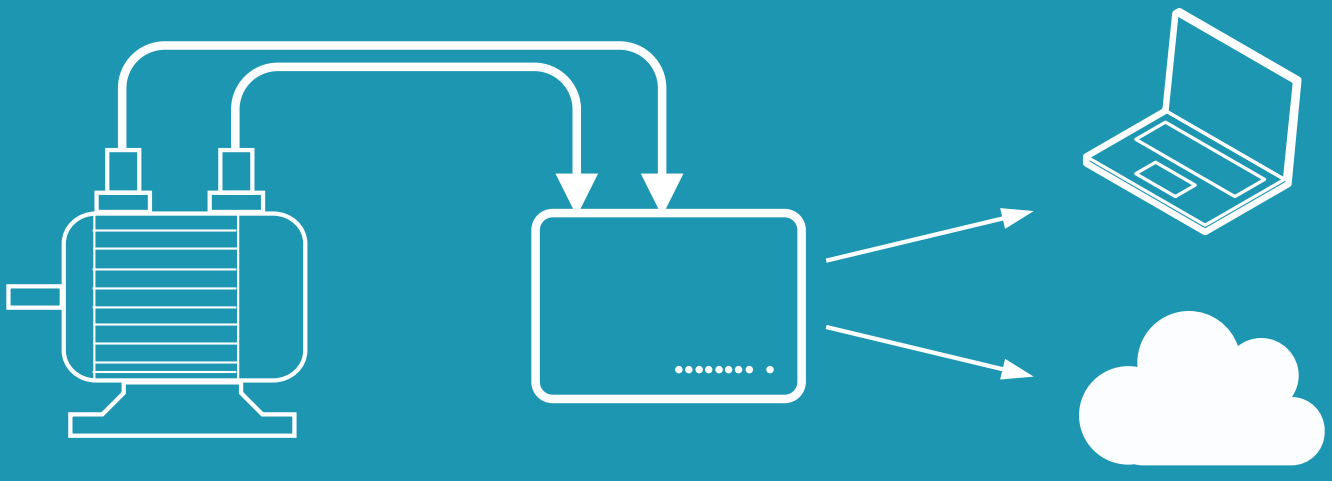
The visualization of the data acquired by TWave T8 is very flexible and intuitive.

The interface is composed of multiple desktops. On each of them the data is shown in independent windows called widgets, whose size and position can be easily defined by the user. The widgets provide all the graphic tools required for the plant operators and analysts.



All the data measured and stored on TWave T8 can be accessed directly from any web browser, and it is optimized to be used from remote locations using an internet connection. This gives several advantages:

- Eliminates the need for a local server, thus reducing installation and maintenance costs.
- No software licenses are required. The interface is embedded within the hardware, and can be accessed from any computer or mobile device using a web browser.
- Allows automatic upgrades of the system using a remote connection to the updating server.
- User friendly, flexible and intuitive interface, which accelerates the learning process. It allows the user to access all features from the beginning.
- Reduces the initial investment due to the simplicity of the monitoring system and its installation.



Smart Monitoring

TWave T8 has been designed to accomodate the real conditions of the industrial equipment.

- Evaluates the machine condition depending on its different states, avoiding false alarms.
- Measures all parameters continuously due to its internal buffering capabilities.
- Provides a flexible configuration of data storage based on time, alarm or machine status changes, and conditions defined by the user.
- Measures into a single value the energy contained in several spectral bands, and can combine different parameters using a predefined formula.
- Captures long waveforms based on user defined events and pretriggering options.
- Includes the most advanced demodulation techniques.

Advanced tools for turbomachinery

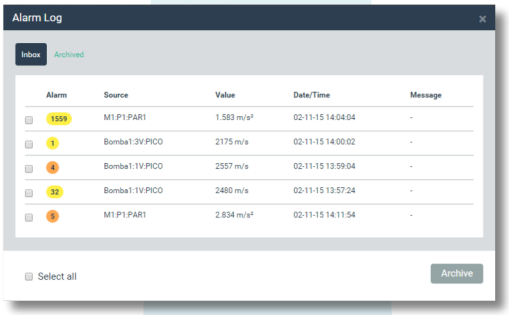
TWave T8 includes highly sophisticated tools that allow the diagnostic of the most complex machines.

- Phase analysis (Bode and Nyquist plots).
- Orbits display, including 1x and 2x filtering.
- Order tracking and synchronous averaging.
- Spectrum waterfall, including 3D cursors.
- Allows discarding measures based on system instability (RPM or load changes).

Alarm Register

TWave T8 registers any alarm and machine condition change into an alarm log.

The alarm log can show both the currently active and historical alarms. They can be sorted, acknowledged or deleted by the user.

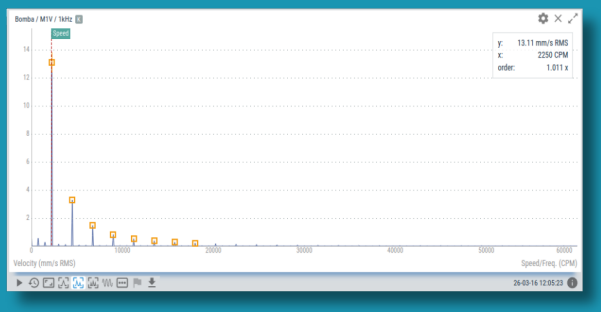


Graphs and Tools

TWave T8 includes all types of graphs required for the analysis of the machine condition (spectrum, waveforms, orbits, trends, waterfalls, etc.).

Advanced functions are also included within each type of graph (single, harmonic and side-band cursors, zooms, peak detection, fault frequencies, etc.).

Stored data is represented using timelines, allowing a quick and easy access to historical data.



Parameter Monitoring

TWave T8 is constantly monitoring the machine condition by measuring different type of parameters (RMS overall values, spectral bands, Peak-Phase values, Peak and Peak-to-Peak values, Peak Extraction, Crest Factor, Kurtosis, Mean, DC), which provide early symptoms of machine faults.

These measurements can be easily supervised using the Widget called Parameter Matrix, which presents all parameters and its alarm condition into a single view.

Parameters can also be displayed individually by using the Online Value widget.

TWave T8 stands out from any other CMS on the market

- **Low installation and maintenance costs** due to its simple architecture and reduced size.
- **Simultaneous data acquisition** at high frequencies on all its 8 dynamic inputs.
- **Real time measurements** on all channels, regardless of the sampling time required by any particular parameter, due to its buffering capabilties.
- **Does not require any software installation**, only a web browser is needed.
- **User friendly and intuitive interface** that facilitates the access to the information through multiple desktops, configurable layouts and Widgets.
- **Easy access** to historical data based on timelines interface.
- **Advanced diagnostic tools** optimized to facilitate the analyst's work even through a remote access to the unit.
- **Accessible** from any operating system and device connected to the network (computer, tablet, mobile phone, etc.).
- **Flexible storage capabilities,** allows users to define what data to store and when, by configuring conditions and events based on time, alarm change, machine state change, etc.

About us

TWave is a company specialized in the design and manufacture of supervising and monitoring systems for industrial machinery.

We develop **innovative solutions** that integrate the most advanced technologies, helping our clients to protect their critical assets through online diagnosis. In this sense, our products are designed for **Industry 4.0**, applying the Internet of Things to the industrial sphere.

Our technical team has been developing vibration monitoring systems for ten years. Hundreds of our units have been successfully installed in industrial sectors such as **wind, chemical, food & beverage, petrochemical or solar-thermal.**

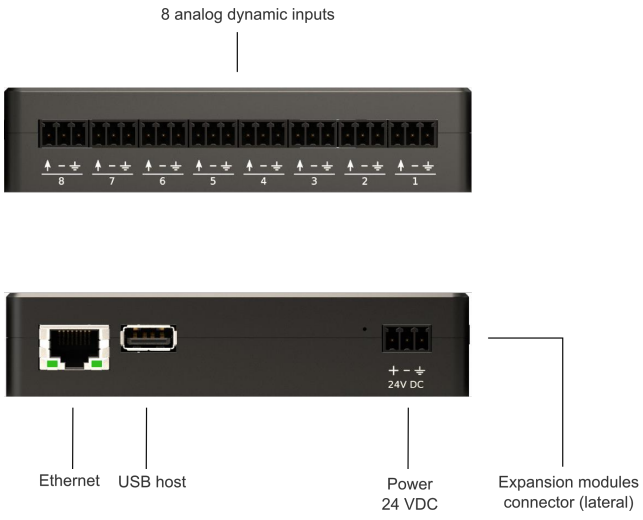
TWave T8 hardware versions

We offer two different T8 hardware variants: the compact T8-M and the T8-L which includes four additional static inputs (two of them can be set as tachometer inputs).

T8 Compact [M]

Compact version of the T8 system offers the most compact size while keeping a high count of dynamic high-speed inputs:

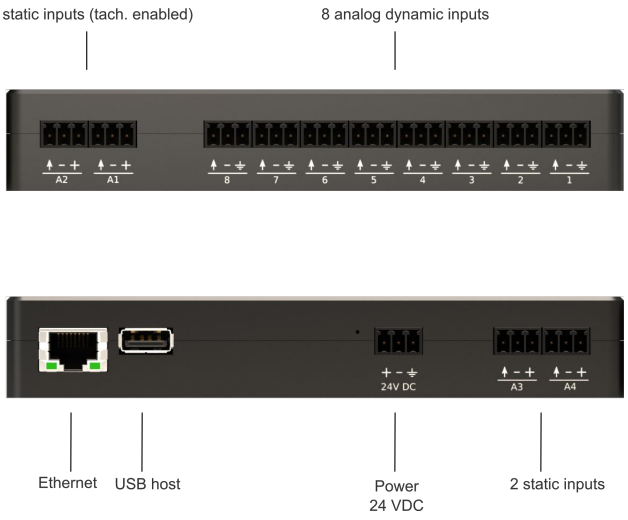
- 8 high-speed (dynamic) multipurpose analog inputs.
- ICP power source available on all dynamic inputs.
- Ethernet TCP/IP communications.
- Powered at +24 Vdc.
- Auxiliary connector for Expansion Modules



T8 Large [L]

This version is just 4 cm longer than the T8-M, offers the same 8 high-speed dynamic inputs and includes four additional static inputs:

- 8 high-speed (dynamic) multipurpose analog inputs.
- ICP power source available on dynamic inputs.
- Ethernet TCP/IP communications.
- Powered at +24 Vdc.
- 4 auxiliary inputs for tachometers and slow signals.



Two different sizes allow hardware to be adapted to the needs of the application

A compact hardware design with a huge processing power in a tiny instrument

Expansion Modules

Add auxiliary inputs and outputs to the compact T8-M variant by using external hardware connected through the expansion port.

Default Expansion Module adds 4 auxiliary analog inputs and 4 relay outputs. Customized Expansion Module configurations are available upon request:

- Analog inputs: voltage inputs, up to 100 SPS, 16 bits, ±24V
- Tachometer inputs
- Relay outputs: 250 Vac, 60W, SPDT
- Customized designs on demand (RTD, TC, 4/20mA outputs)

Variants and optional software features

TWave T8 has a wide variety of optional software modules and utilities that allow the customization of the system to meet any particular requirements.
There are available three predefined configurations: Supervisor, Diagnostic, Turbomachinery. The system may also be adapted to any specific needs, upon request, so customers only pay for the functions to be used.

FUNCTION		SUPERVISOR	DIAGNOSTIC	TURBOMACHINERY
Simultaneous Capture	SM	✓	✓	✓
Prebuffering	PB	✓	✓	✓
Online Value Widget	OV	✓	✓	✓
Parameter Matrix Widget	PM	✓	✓	✓
Mimic Widget	MM	✓	✓	✓
Waveform Widget	WV		✓	✓
Spectrum Widget	SP		✓	✓
Data Storage	DS		✓	✓
Trends Widget	TR		✓	✓
Demodulation	DM		✓	✓
Extended Processing Blocks	ET		✓	✓
Order Tracking	OT			✓
Spectrum Waterfall	SW			✓
Orbit Widget	OB			✓
Advanced Capture	AC			✓
Long Waveforms	LW			✓
Phase Tools	PH			✓
Modbus	MB	O	O	O

MB Modbus

This feature enables master mode for Modbus-TCP communications, which allows the system to read registers or values from external devices such as sensors or control PLCs. The feature is available for all three predefined configurations.

T8 SUPERVISOR

This version includes the essential features for the basic supervision of most industrial machines.

SM Simultaneous Capture

Simultaneous sampling on all 8 dynamic channels.
A high-end feature available in all TWave T8 versions.

PB Prebuffering

The pre-buffering capability makes real-time monitoring possible in all channels, regardless of the sampling time

OV Online Value Widget

It shows the online value of a parameter. Four different display modes are available: Simple, Horizontal bar, Vertical bar, and Meter.

PM Parameter Matrix Widget

Displays in a matrix format all the measured parameters, allowing the user to see in a single view the current condition of a machine.

MM Mimic Widget

This Widget displays the image associated to the machine and its measuring points.

T8 TURBOMACHINERY

Includes advanced graphs and tools required for a deeper and sophisticated analysis of the most complex industrial machinery.

OT Order Tracking

Allows extracting useful spectral information from machines that vary their speed during measurements.

OB Orbit Widget

Displays the orbit graph in an X-Y plot calculated from two waveforms measurements, providing a visual picture of the motion of a rotating shaft.

AC Advanced Capture

Allows avanced data storage strategies based on state transitions, alarm changes or monitoring cycles.

LW Long Waveforms

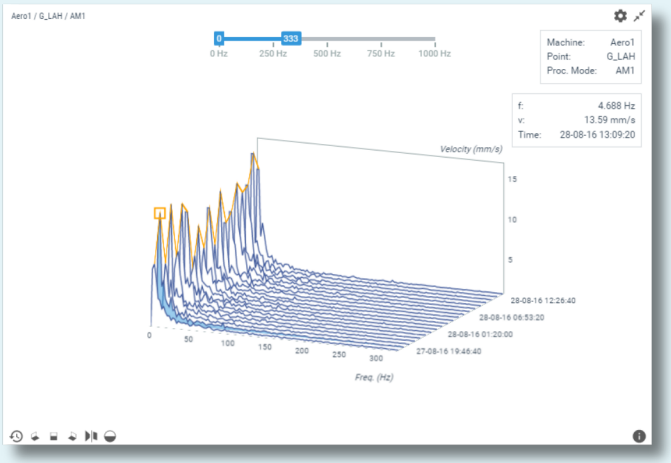
Displays a long waveform (up to 30 minutes) while showing its envelope. Useful to analyse start-ups and shut-downs of big machines.

PH Phase Tools

This module includes the Phase Diagram Widget and other advanced tools such as the Peak/Phase parameter.

SW Spectrum Waterfall

Multiple spectra in a three-dimensional plot. This widget shows how spectra changes over time, facilitating a quick analysis.



T8 DIAGNOSTIC

Includes the typical graphs and functions required for a complete analysis of most usual industrial machinery.

ET Extend Processing Blocks

This module extends the processing capability of the system.

WV Waveform Widget

Displays the original vibration signal collected in each snapshot. Measurements can be made using different available cursors.

SP Spectrum Widget

Spectra give a lot of information about the machine state. Several cursors (sidebands, harmonics, fixed point) are available.

DS Data Storage

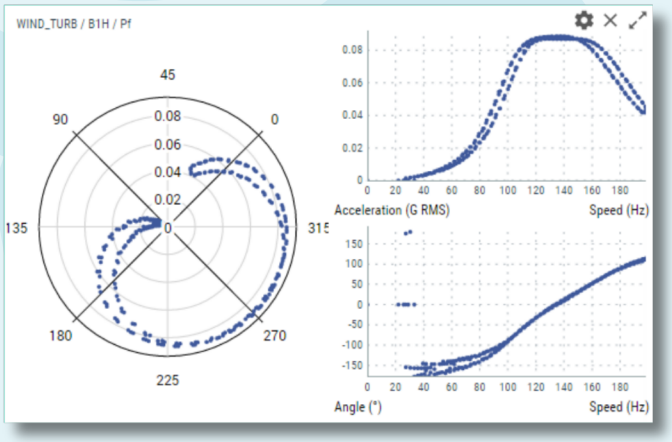
With this module data can be stored (paremeters, waveforms, spectra) depending on time events defined by user.

TR Trends Widget

Trends show continuous indication for each parameter, helping the user to detect time variations in machine state.

DM Demodulation

This Processing Mode is useful to detect ball-bearing failures at high frequencies.



Accesories

Mobility Case

Small and robust industrial case with external BNC connectors for IEPE accelerometers. Indicated to use the T8 as a portable instrument.

- BNC connectors for 8 IEPE accelerometers.
- M12 connector with +24 Vdc output for connecting tachometers or other sensors.
- Includes 24 Vdc power supply. Can be connected directly to AC power mains.
- Option: Include modem for direct wireless communications (Wifi/4G).

IP65 Box

Robust metal enclosure with high IP rating (IP65), designed to meet the conditions of the industrial environment.

- Includes cable glands for sensor connection.
- Includes 24 Vdc power supply. Can be connected directly to AC power mains.
- Option: include modem for direct wireless communications (Wifi/4G)

T250US Airborne Ultrasonic Sensor

This sensor can detect any source of airborne ultrasounds: gas leakages, rubbing, electrical noise, etc. The sensor is capable of detecting very low levels of ultrasonic noise (up to -90dB).

- Dual dynamic (10Vpp AC) and static outputs (0-20mA).
- Gain range adjustable using external resistors.
- Requires +24 Vdc external power supply.
- Optional cable (custom lengths) and mounting grip.

IEPE Accelerometers

Standard IEPE vibration sensors for being used with monitoring devices.

- Sensitivity: 100mV/G (nominal).
- 80G dynamics.
- 2-pin MS or M12 connectors. Multiple lengths and options for cable assemblies.

	T8-M (Compact)	*T8-L (Large)*
High Speed Inputs		
Number of high speed inputs	8	8
High speed inputs sampling rate	512 to 51200 Hz	
DC range	±24 V	
AC range	24 Vpp	
IEPE sensors drive current	5.5 mA @20 V	
Resolution	16 bits	
Input configuration modes	Dynamic, Static, Digital, Pulse Train	
Harmonic distortion	-70 dB	
Accuracy	1%	
Dynamic range	110 dB	
Point types	Dynamic, Static, Tachometer	
Auxiliary Inputs		
Number of auxiliary inputs	0	4
Auxiliary inputs sampling rate	Up to 100 Hz (1 sample for each capture)	
DC range	±24 V	
Resolution	16 bit	
Power output	+24 V	
Input configuration modes	Static, Digital, Pulse Train (A1 and A2 only)	
Accuracy	0.5%	
Point types	Static, Tachometer	
Signal Processing		
Spectral lines (bins)	100, 200, 400, 800, 1600, 3200, 6400, 12800	
Time waveform samples	128 up to 262016	
Window types	Hann, Hamming, Blackman, Rectangular	
Processing modes	Waveform, Spectrum & Waveform, Order Tracking, Demodulation, Long-Waveform	
Filter types	Butterworth, Bessel, Chevyshev	
Number of averages	1 up to 32	
Overlap	0% up to 99%	
System General Features		
Internal Storage (OS)	4 GB	
Main CPU	ARM Cortex™-A9 Quad Core (NVIDIA® Tegra™ 3)	
CPU clock	1.4 GHz	
RAM	1 GB	
Storage Capacity (Database)	4 GB	
USB ports	1 Host	
Status indicator	RGB LED	
Analog channels indicator	8x Red/Green LEDs	12x Red/Green LEDs
Network communication	IEEE1588 Ethernet 10/100	
Power Supply	20-26 Vdc, 24 Vdc nominal	
Power consumption	<12 W	
Mechanical Characteristics		
Mounting	Standard 35 mm DIN rail	
Size	119x95x27 mm	162.2x95x27
Weight	0.42 Kg	0.55 Kg
Temperature range	-30 to +50 ºC	
EMI/EMC	EN 61000-6-1:2007, EN 61000-6-3:2007/A1:2012	
Electrical security	UNE-EN 60950:2007	

TWave

TME SOLUTIONS APS
Myhlenbergvej 62
9510 Arden
DK

Tel: +45 81 61 11 16

Email: info@tmesolutions.dk

www.tmesolutions.dk

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
A WAY TO MAKE EUROPE