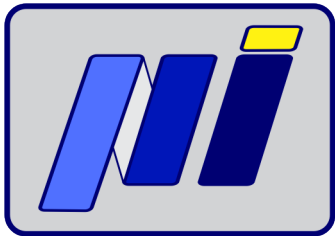# On-Line 24/7
Machinery Monitoring System

TWave T8

TWave T8: Main features

- Online monitoring system

- 8 simultaneous channels

- Advanced diagnostic tools

- Web interface - No Software installation
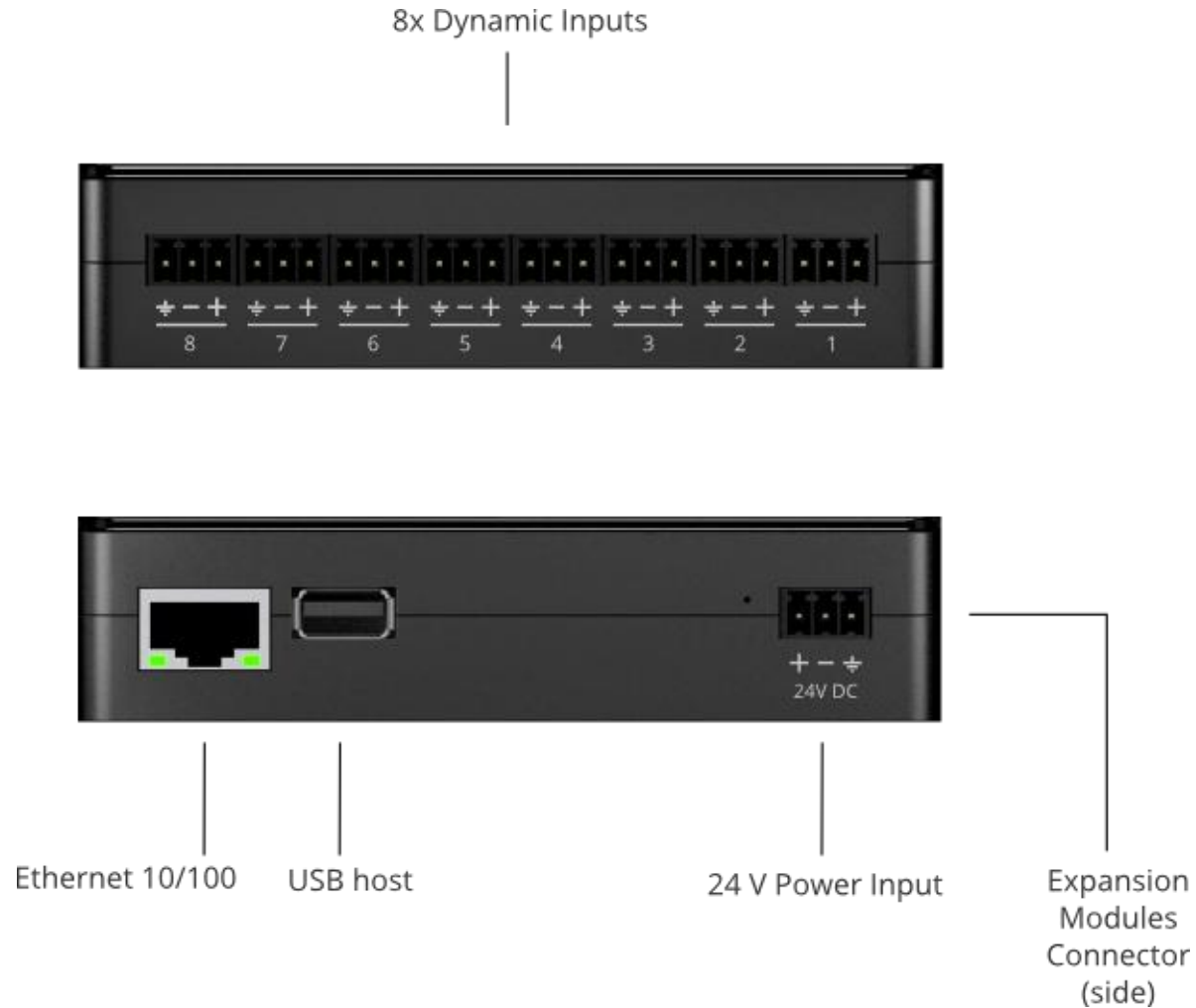
- Very compact size

- Hardware Expansion modules

Hardware specifications

- 8 High-Frequency dynamic inputs (up to 40kHz signals)

- Simultaneous sampling on all channels

- Main power supply: 24 VDC (<7W)

- IEPE power supply: 5 mA @ 20 V

- Inputs range: ± 24 VDC / 24 Vpp

- Communications: Ethernet 10/100

- 4GB internal data storage (up to several years of data)

- Large version (L) adds 4 static analog/tachometer inputs

Instrument connections

8x Dynamic Inputs

8   7   6   5   4   3   2   1

24V DC

Ethernet 10/100   USB host   24 V Power Input   Expansion Modules Connector (side)

System architecture

- **Embedded web application:** The system does not require any software or database to be installed.

- The web interface can be accessed from any computer or mobile device from the moment the TWave T8 has been powered up.
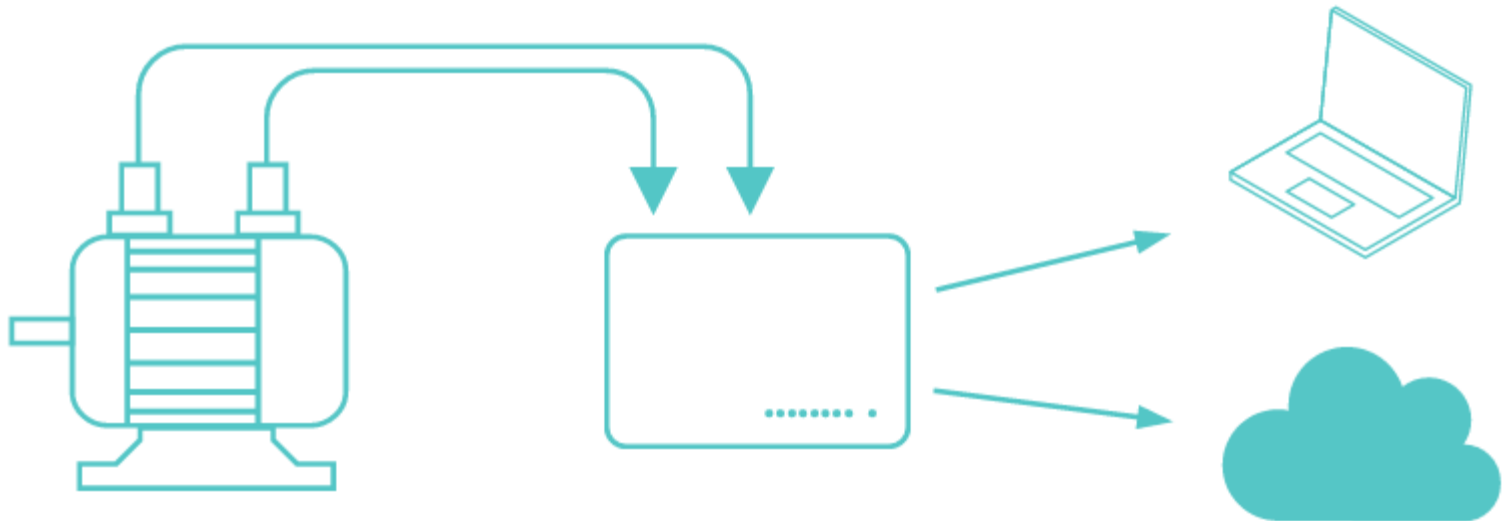
The web application

- Modular software architecture: It is possible to adapt the cost and the capacities of the system to the requirements of any application.

- Optimized interface for remote monitoring, using an Internet connection and a simple web browser.

- Light-weight fast user interface. Execution on client PC (minimum data latency).

- REST interface: Easy integration with external platforms.

- Four different applications:
  - Dashboard (User Interface)
  - Configuration Interface
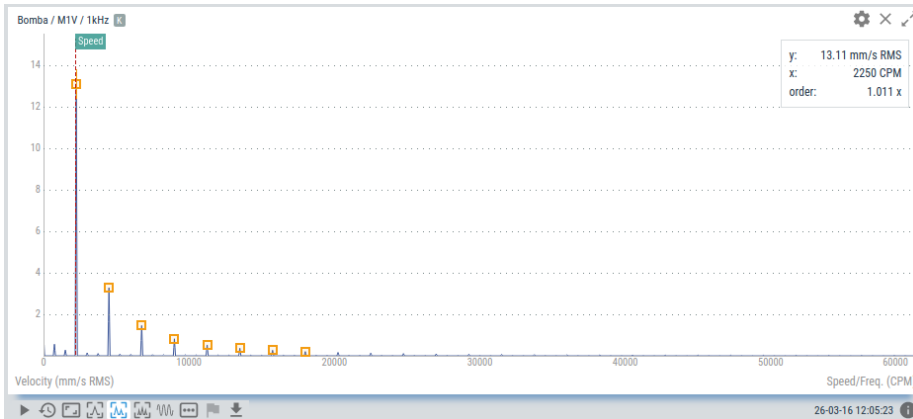 - System Interface
  - Manual

The dashboard
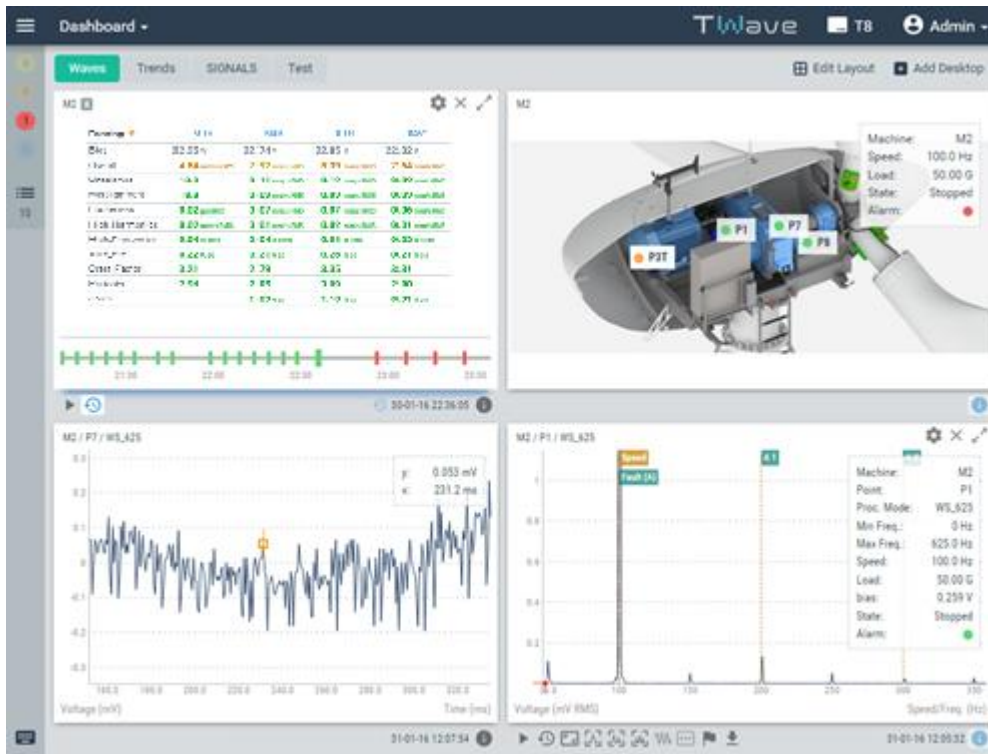
- Multiple Desktops and Widgets for data visualization

- User-friendly desktop layout configuration

- Customized desktop settings for each user

- Keyboard shortcuts for an efficient access to plots and analysis tools

- Easy access to historical data using timeline control
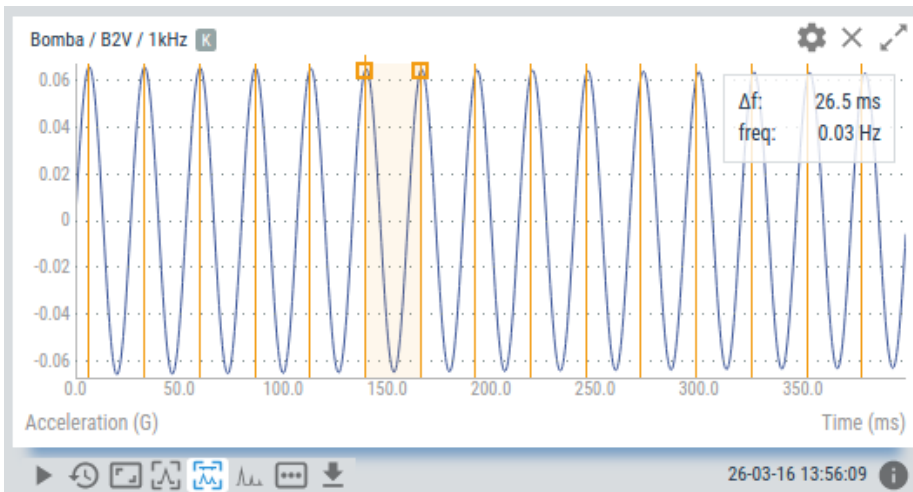
The dashboard: widgets

- **Spectrum:**
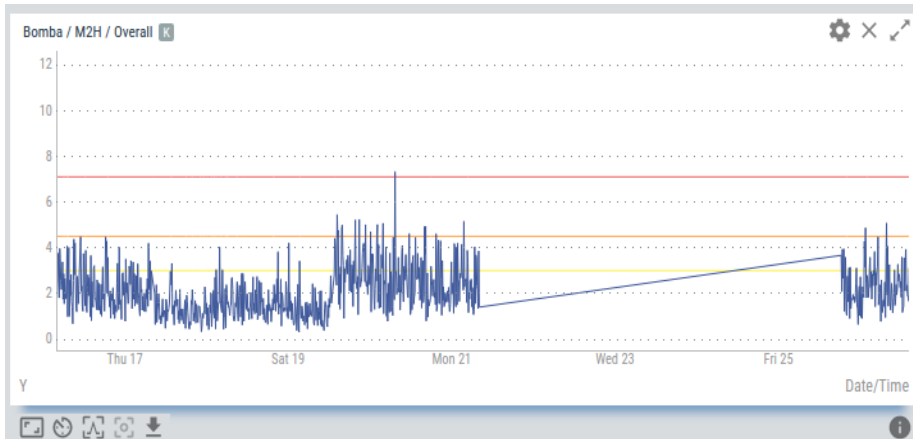
  - Single, harmonic and sideband cursors
  - Easy processing modes switching
  - Fault frequencies marks
  - Peak detection
  - Direct access to waveform

- **Waveform:**

  - Single and double cursors
  - Tachometer marks
  - Direct access to spectrum

The dashboard: widgets

- Trends:
  - Up to 4 parameters in the same plot
  - Alarm levels and machine state indications
  - Direct access to spectrum/waveform plots

- Parameter Matrix:
  - Shows all scalar measurements in a single graph for a quick machine overview
  - Direct access to trends and spectrum/waveforms

The dashboard: widgets
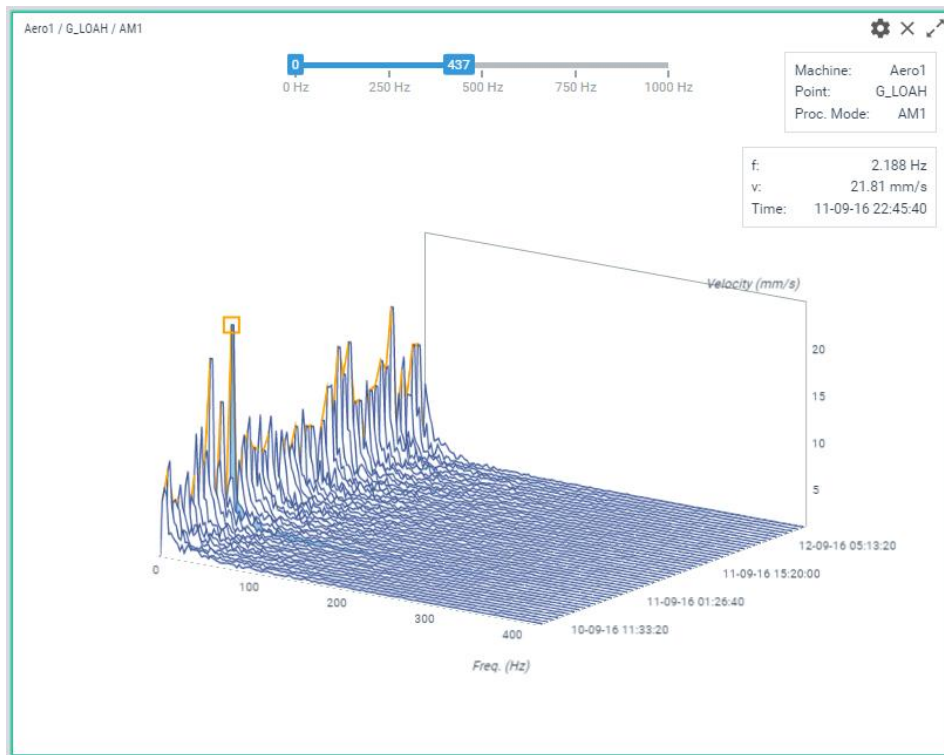
- **Other Widgets:**
  - **Spectrum Waterfall**
  - Mimic
  - Orbits
  - Online Value
  - Long Waveform
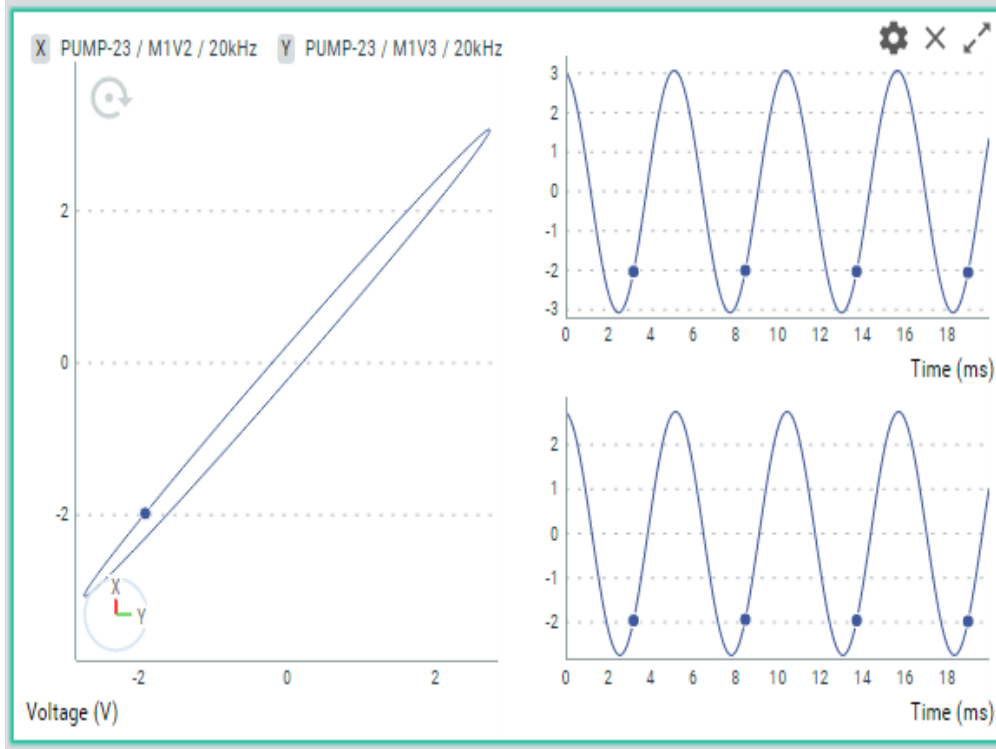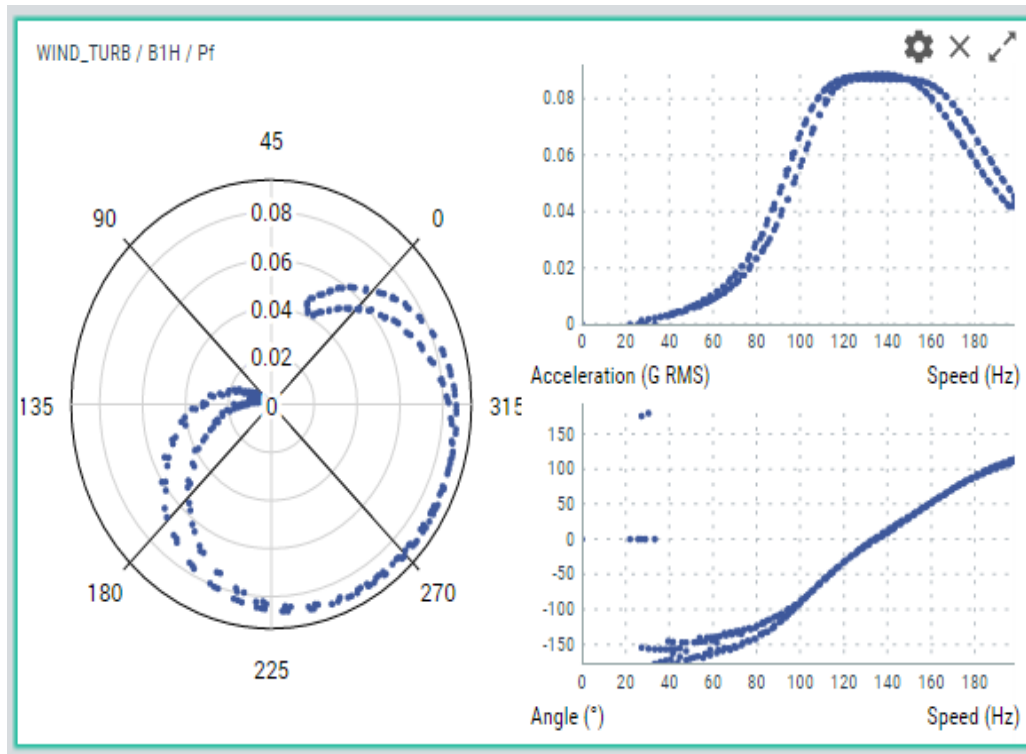 - Phase diagram
  - ...

The dashboard: widgets

- Other Widgets:
  - Spectrum Waterfall
  - Mimic
  - **Orbits**
  - Online Value
  - Long Waveform
  - Phase diagram
  - ...

The dashboard: widgets

WIND_TURB / B1H / Pf

- **Other Widgets:**
  - Spectrum Waterfall
  - Mimic
  - Orbits
  - Online Value
  - Long Waveform
  - **Phase diagram**
  - ...

Supervision parameters

- Processing Modes:

  - Waveform only
  - Spectrum and Waveform
  - Demodulation
  - Long Waveforms (up to several minutes)

- Parameters extracted from the waveform:

  - RMS, true and calculated peak or peak-to-peak values
  - Kurtosis, crest factor
  - Peak/Phase parameters (Bode plot)

- Parameters extracted from the spectrum:

  - RMS, peak or peak-to-peak, peak extraction
  - Parameters based on the quadratic sum of multiple spectral bands, with maximum and minimum frequencies defined as a function of RPM
  - Calculates real frequency and amplitude of a spectral peak applying advanced algorithms

Smart monitoring

- Define <u>machine states</u> based on logical expressions

- <u>Customized alarms</u> depending on machine states

- <u>Flexible</u> configuration for <u>data storage</u>, based on different type of events (time, alarm, state, etc.) and conditions defined using logical expressions

- Stores <u>long waveforms</u> based on events and conditions, with user defined pre-trigger, for capturing of transient events

- Rejects captures based on <u>instability</u> of particular measurements

- Includes the most advanced <u>demodulation</u> techniques

- <u>Bidirectional</u> communications via <u>Modbus-TCP</u>

SW variants and optional modules

- Customer can decide and pay only for the functions actually needed

- 3 Predefined Configurations: Supervisor, Diagnostic and Turbomachinery

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		✓	✓
Extend Processing Blocks	ET			✓
Orbit Widget	OB			✓
Advanced Capture	AC			✓
Long Waveforms	LW			✓
Phase Tools	PH			✓
Spectrum Waterfall	SW			✓
Modbus	MB	O	O	O

Hardware variants

- **T8-M:** This compact version offers 8 high-speed dynamic inputs and includes an auxiliary connector for Expansion Modules.

- **T8-L:** Just 4 cm longer than the T8-M, offers the same 8 high-speed dynamic inputs and includes 4 additional static inputs.

Expansion modules

- **EM08-S** : Standard expansion module, adding 4 static inputs (2 of them tachometer enabled) and 4 relay outputs.

- Upon request it is possible for TWave to design custom 8 channel expansion modules with :

  - Analog inputs: voltage/current inputs

  - Tachometer inputs

  - RTD (Pt100) inputs

  - Relay outputs

  - 4/20 mA analog current outputs

Mobility Case

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

- Includes 24 VDC power supply. Options: Wifi/3G link.

IP65 BOX

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

- Includes 24Vdc power supply, sensor connectors and optional Wifi/3G communications.

- Possible to include a Local Display (color touch screen with graphical interface).

T8 stands out from any other CMS

- **State-of-the-art web-based interface:** Fast, intuitive, and user friendly. Includes all the tools needed for machinery supervision and analysis.

- **Cloud monitoring (IoT) device:** Designed to work fluidly and securely while using remote Internet connections.

- **Facilitates monitoring services:** The small size and high internal storage and monitoring capabilities make system easy to carry, install and operate.

- **Versatile:** User can set flexible strategies for data storage, and define alarm levels based on machine states. Combine software options and external expansion modules to adapt the system to the needs of any specific application.

- **Cost-effective:** Easy to install and maintain. Simple architecture. Requires no external software or data-base.
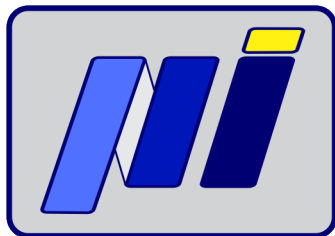
TWave T8: New Times. New Tools.

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