



FIELD DEPLOYABLE MODULAR INDUSTRIAL MONITORING DEVICE



PROPERTIES

- Low noise, high resolution 8-Channel 24-bit ADC
- Range of uniform or combined type of inputs front-end modules
- Range of communication modules
- Low power, fan less operation
- Compact and rugged design for use in harsh environments
- -40°C to +75°C operating temperature range

STANDALONE USE

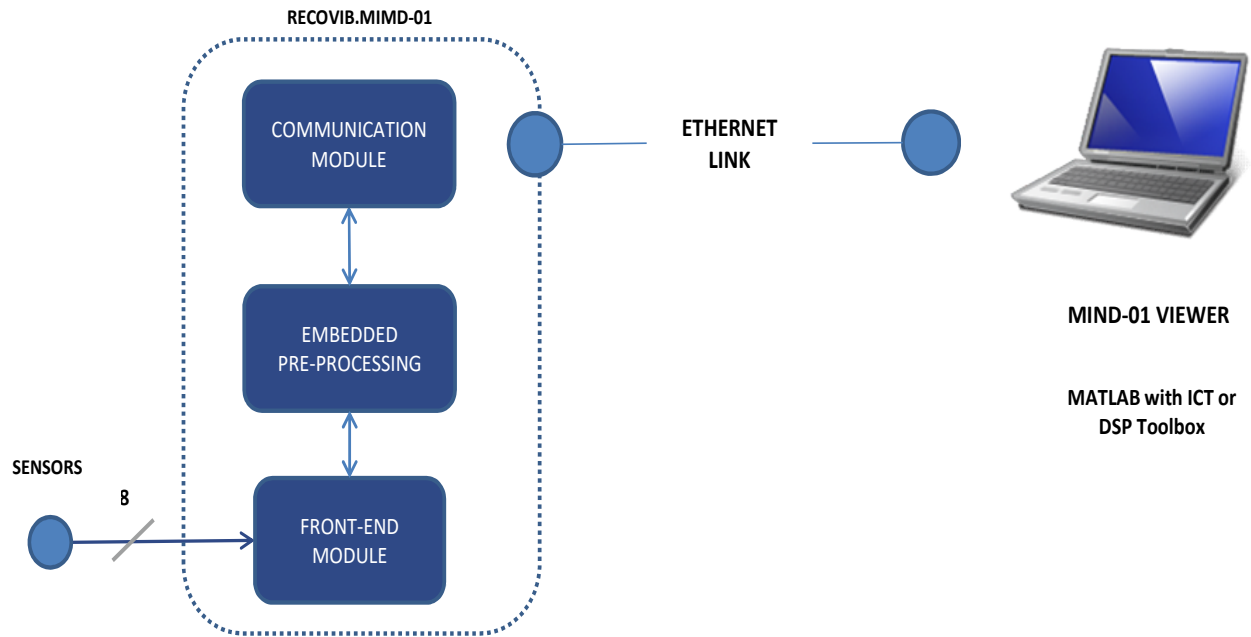
- Field Measurement Campaigns
- Structural Health Monitoring (SHM)
- Vibration diagnostic
- Connector into MATLAB using ICT or DSP toolboxes
- Connector into RECOVIB.MIMD-01 Viewer

DEPLOYED FIELD MONITORING

Thanks to an embedded cloud client many MIMD-01 can be deployed in the field for structures or machines monitoring, addressing the following challenges :

- High number of devices in the field
- No human operator
- Can be in remote locations, where physical access is expensive
- Overcome intermittent, slow, or expensive network connectivity
- Deliver scaling, security and reliability.

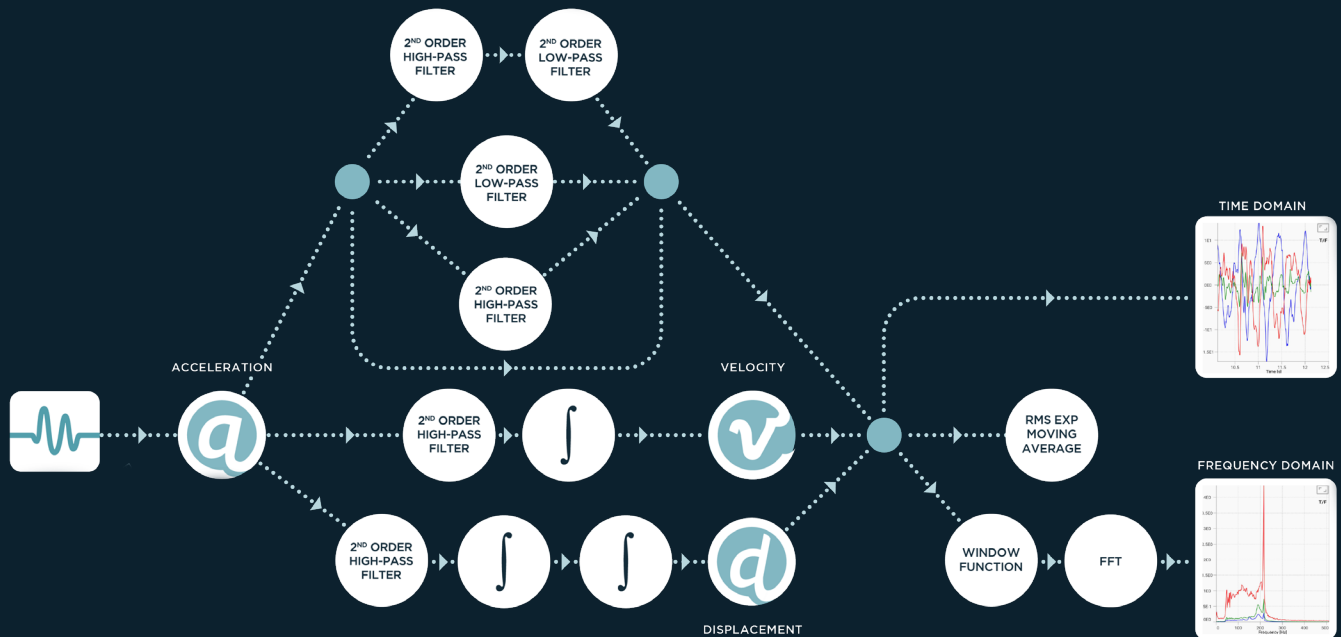
STANDALONE USE (STREAMING)



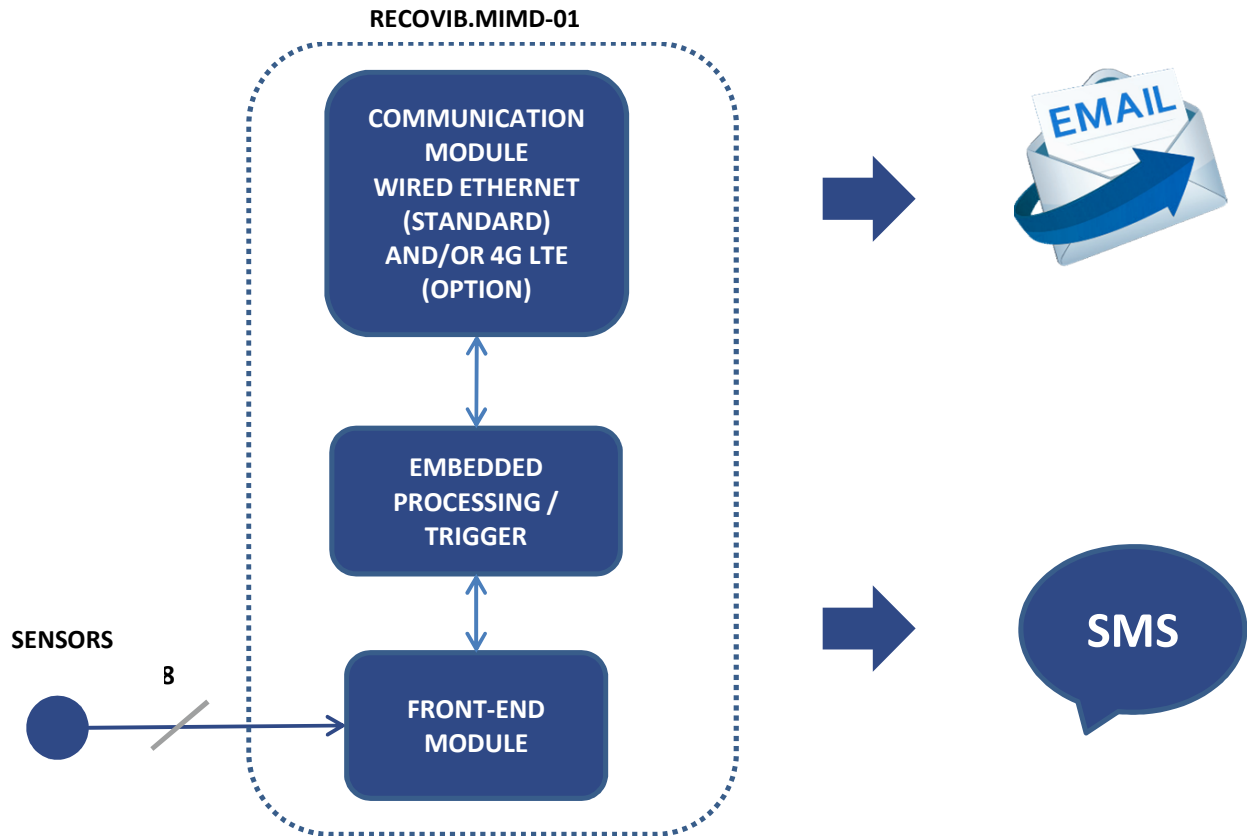
MIMD-01 VIEWER

The MIMD-01 Viewer is a vibration-oriented visualization and analysis software that allows for:

- Online acquisitions visualization in both time and frequency domains
- Acquisition pre-processing, filtering, integration (velocity), and double integration (displacement).
- Acquisition logging and replay



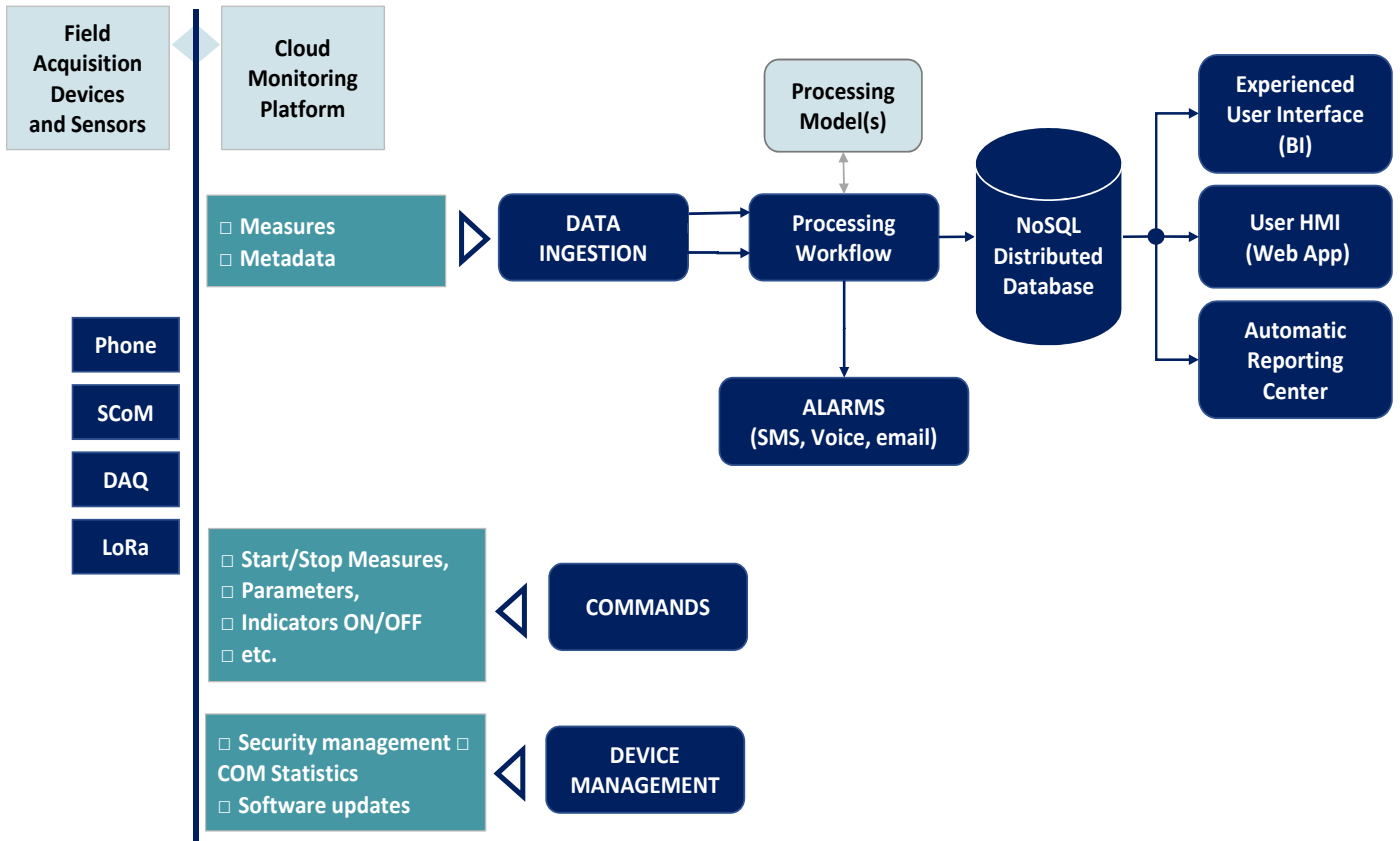
STANDALONE USE (EVENT DETECTION)



The MIMD-01 can be used to send warning and alarm upon event detection. The process is as follows:

- Sensors signals are processed according to standard or custom algorithms.
- Warning and alarms are generated upon defined trigger conditions or anomaly detection.
- Related SMS and emails are sent to pre-defined recipients

DEPLOYED USE - TOGETHER WITH OUR CLOUD PLATFORM



Online Data Analysis and Anomaly Detection

Automatic data analysis and/or anomaly detection triggering upon field device telemetry reception
Data analysis can range from simple signal processing to machine learning models

Alarms and Reporting

Alarms can be automatically generated following online data analysis, anomaly detection, predicted failure, etc.

Reports can be automatically built and sent to registered users on a periodic basis.

Business Intelligence interface

Interactive data visualization interface for experienced analyst for in-depth data analysis and reporting

User interface

More classical end-user web access to results.

Devices Management

Fully featured provisioning, configuring, monitoring, updating, and retiring of many devices in the field

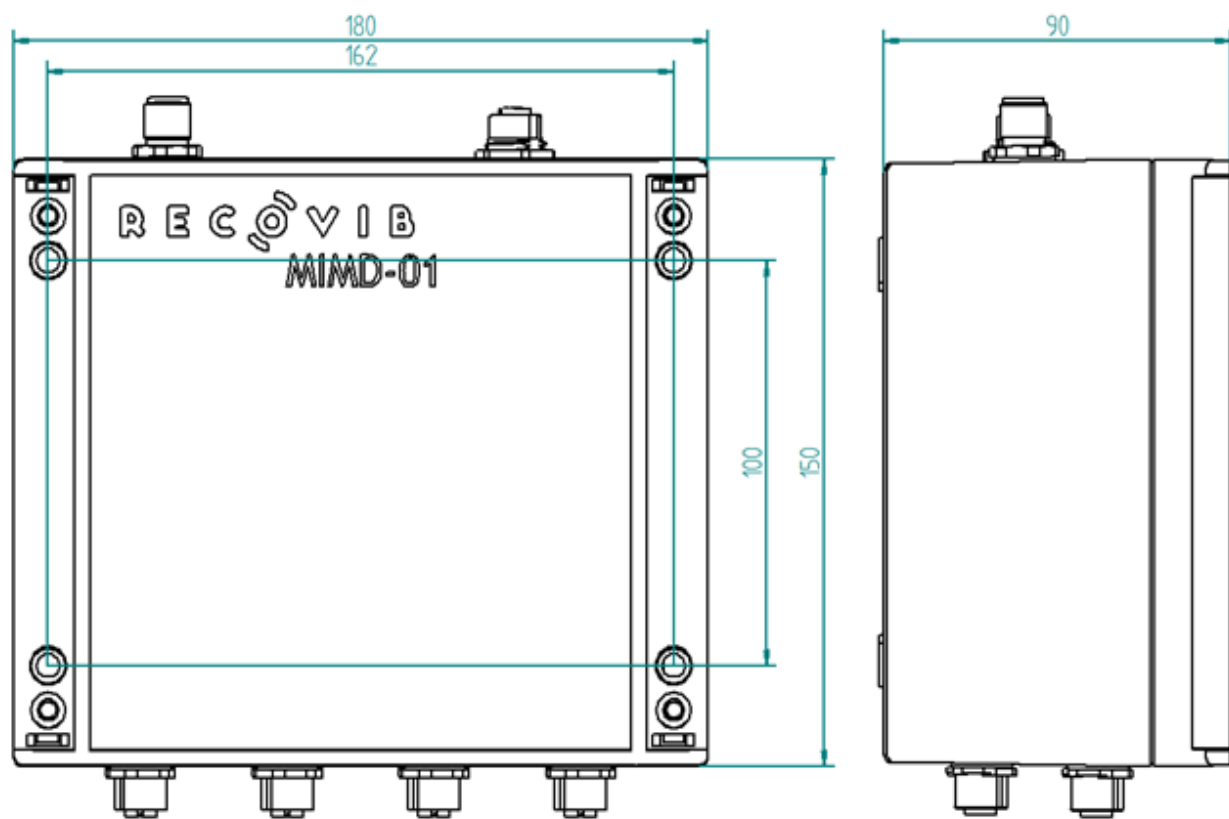
AVAILABLE FRONT-END MODULES

- 8 channels of 4-20mA current inputs
- 6 channels of 4-20 mA current inputs and 2 channels of ICP/IEPE

AVAILABLE COMMUNICATION MODULES

- Wired Ethernet Link (standard)
- 4G LTE Cat. 1 (option)
- LoRa (option – under development)

DIMENSIONS



PERFORMANCES

ANALOG INPUTS CHARACTERISTICS	Number of channels	8	
	Sampling rate	Up to 16000 samples per second (all channels active)	
	Resolution	24-bit	
	Dynamic	> 110 dB	
	Synchronization across channels	All channel sampled synchronously	
POWER SUPPLY DC OPTION	Voltage	24 ± 2 VDC	
	Current	300mA (typical) – 500mA (max) ⁽¹⁾	
POWER SUPPLY AC OPTION	Voltage	100 - 240 VAC	
	Current	50mA (typical) – 80mA (max) ⁽¹⁾	
ENVIRONMENTAL CHARACTERISTICS		Operating	Non-Operating
	Temperature range	- 40 - 60°C ⁽¹⁾	- 40 - 85 °C
	Relative humidity	5...95 % without condensation	
	Protection grade	IP65	
MECHANICAL DATA	Weight	2 kg	
	Case Material	Aluminum	

(1) Depends on the front-end module installed

RELATED ENGINEERING SERVICES

- Custom Front-End Module with specific signal conditioning
- Custom local pre-processing
- Custom Cloud analysis / Anomaly Detection
- Custom User Web Interface

POSSIBLE CUSTOMISATIONS

- Enclosure adapted to a specific environment (e.g. marine)

USE CASES

Pump Monitoring

The MIMD-01 is used in the “standalone use / event detection” configuration and equipped with a 4G LTE communication module. Accelerometer signals are converted to velocity and processed such that they can be compared to ISO 10816-3 levels (see table below). SMS and/or emails are sent upon exceeding warning and alarm levels.

ISO 10816-3		Medium-sized machines	Large machines
Advisor		Group 2	Group 1
Velocity		Rated Power	
in/sec eq. Peak	mm/sec RMS	15 kW – 300 kW	300 kW – up
0.61	11.0	DAMAGE OCCURS	
0.39	7.1		
0.25	4.5	RESTRICTED OPERATION	
0.19	3.5	UNRESTRICTED OPERATION	
0.16	2.8		
0.13	2.3		
0.08	1.4		
0.04	0.7	NEWLY COMMISSIONED MACHINERY	
0.00	0.0		
Foundation		Rigid	Flexible

Quarry Blasting Vibration Monitoring

Several MIMD-01 are in the surrounding area of a quarry (usually by houses of people living close to the quarry). They all receive a “start measurements” prior to the quarry blasting and a “stop measurements” when this event has occurred. The measured data is automatically sent to our cloud platform where it is automatically processed and compared to allowed levels according to standards (e.g. DIN 4150-3 Vibrations in buildings - Effects on structures). Measurements are stored for latter retrieval or further analysis in a NoSQL database. A web interface allows registered users accessing blasting vibration level history and/or receiving periodic summary reports.

Human Exposure to Vibration in Buildings

Vibration can be generated by road traffic, rail traffic, and construction work. Consequently, people leaving or working in surrounding areas close to those vibration sources might experience discomfort. Regulations exist regarding allowed levels based on standards such as DIN 4150-2 (Vibrations in buildings - Effects on persons in buildings) and DIN 45669-1 (Measurement of vibration immission).

MIMD-01 and HiRes accelerometers can be used to collect vibration data, pre-process it, and send it to our cloud platform for further evaluation. Measurements are stored for latter retrieval or further analysis in a NoSQL database. A web interface allows registered users accessing vibration level history and/or receiving periodic summary reports.