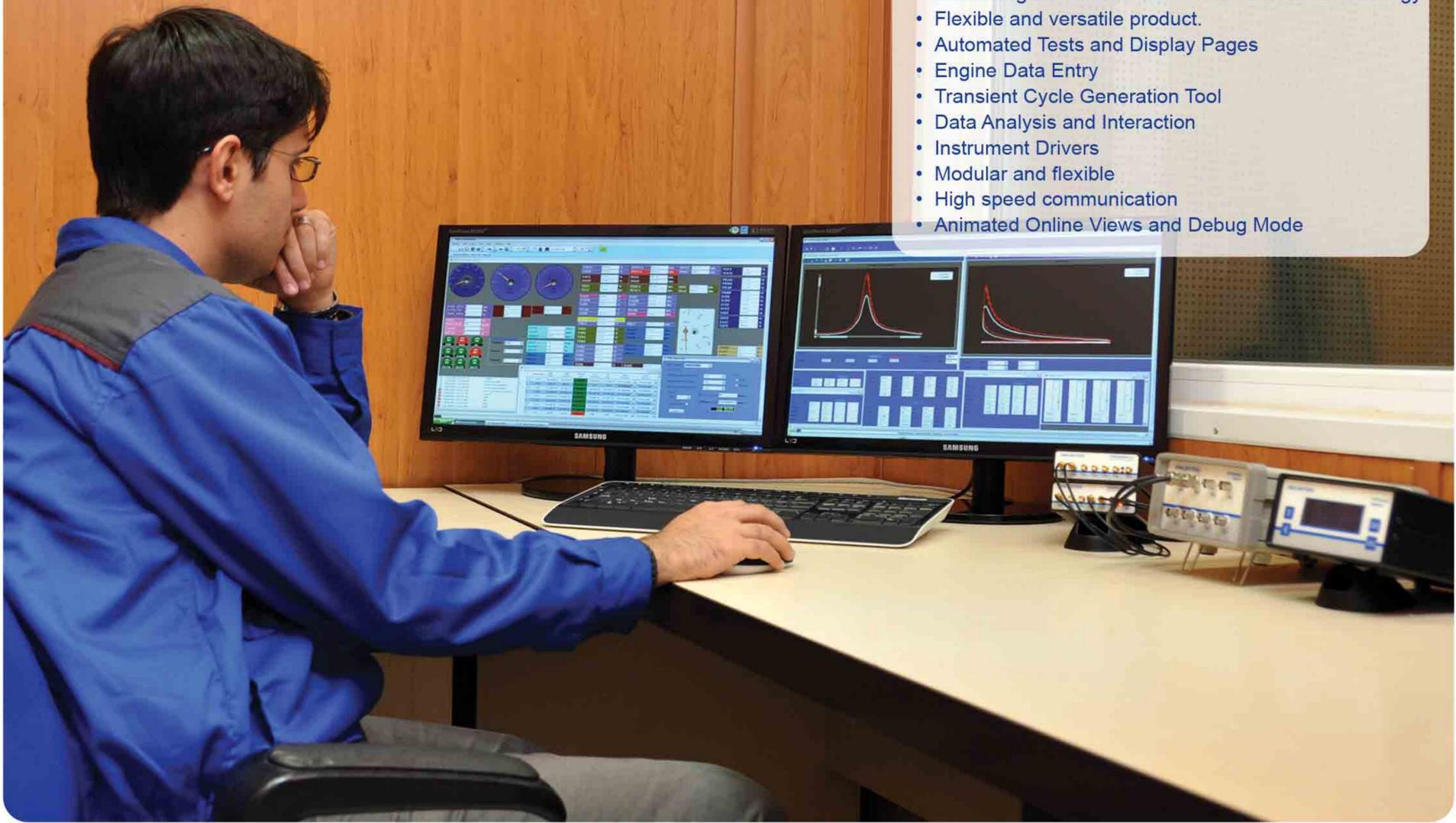




# Solutions for Engine Testing

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## Product Catalogue



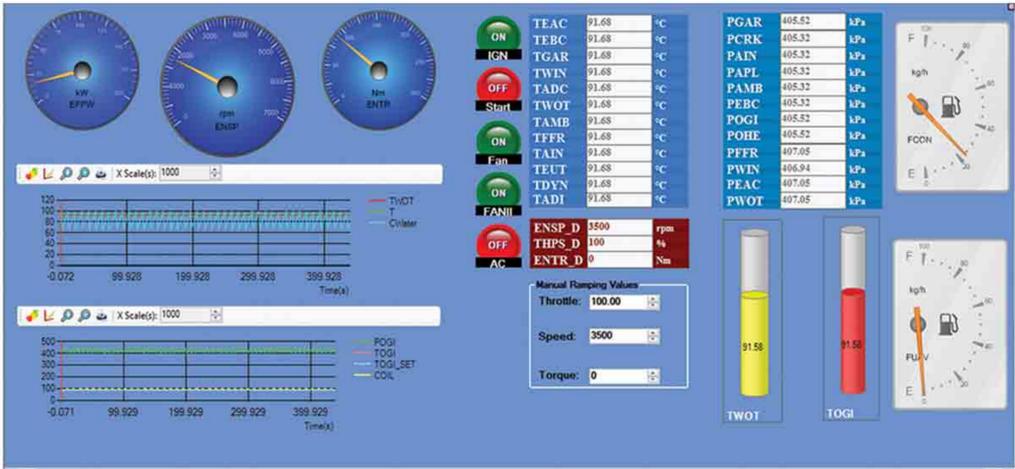
**Advantages:**

- User friendly
- Efficient by using libraries and workflow technology
- Built using Microsoft's state-of-the-art .NET technology
- Flexible and versatile product.
- Automated Tests and Display Pages
- Engine Data Entry
- Transient Cycle Generation Tool
- Data Analysis and Interaction
- Instrument Drivers
- Modular and flexible
- High speed communication
- Animated Online Views and Debug Mode

**Motor Azma Test Bed Automation Ver. 2.0.1**

Closed-loop control, control logic and safety monitoring are base Functions on every engine test bed. The quality of measurement results is directly dependent on accuracy, dynamics and stability of the Control system. The Motor Azma Test Bed Automation provides all the features you need to run a wide range of Engine Test Programmes from simple manual testing to dynamic automatic tests. The Motor Azma provides the complete software for the control and manual

operation of an engine test bed with dynamometer and combustion engine. In the configuration Motor Azma Test Bed Automation, the combustion engine can be tested without operator presence. The Motor Azma is used on quality control test beds (performance, consumption, emissions) as well as in research and development (function and endurance testing, ECU calibration).



**Technical features:**

- Powerful, real-time test schedules
- Simple-to-use, graphical Workflows
- Multi-level limit alarms
- Multiple data loggers
- Controllable user interaction and selection during a test
- Flexible display pages
- Powerful real-time system
- Test Field operation
- User definable project structure
- User friendly, graphical tools to automate the test



**Advantages:**

- System capability can be increased by the simple addition of one of the other sizes of Dina Engine Connect either for extra channels or to allow a connector panel in a different location in the cell.
- Perfect industrial designing in relevant with engine test booth's conditions.
- Fine connections and being user friendly

**Dina Engine Connect Ver. 1.0.1**

The Dina Engine Connect marshals the signals from the test system sensors. This allows transducers and sensors to be rigged onto an engine while away from the test cell and simply connected to the connector panel when the engine is brought into the cell. The connectors for the transducers and sensors are mounted on the side of the Dina Engine Connect.

Mounting of the Dina Engine Connect is via four fixing bolts this makes it both easy and versatile to attach the Dina Engine Connect to a post, on a wall or directly onto a test stand. Dina Engine Connect is designed to accept combinations of the following signals and sensors: Thermocouples, PRT's, Pressures, Voltages and Frequency's.

**Technical features\*:**

- 4 Pressure Transducers for 0 to 10 bar
- 4 Pressure Transducers for 0 to 6 bar
- 3 Pressure Transducers for 0 to 4 bar
- 2 Pressure Transducers for 0 to 2 bar
- 4 Pressure Transducers for 0 to 10 absolute bar
- 3 Pressure Transducers for -1 to 4 bar
- 2 Pressure Transducers for -0.2 to 0.2 bar
- 4 Frequency Inputs
- 6 Platinum Resistance Thermometers
- 20 K type thermocouples
- 16 digital inputs
- 16 digital outputs
- 8 analog inputs (100 Hz)
- 8 fast analog inputs (1kHz)
- 4 analog outputs
- Work in hard thermal condition from -10 to 50 Centigrade degree
- Send and receive error and error removal signals to/from central controller
- 0.5 kW input power and 50 Hz frequency

\*Adapt to customer needs



**Accessories:**

- Wall cabinet
- pressure and thermal sensors
- cable set
- user manual and technical charts



**Advantages:**

- Linear motion
- Maintenance-free, convection-cooled servo-controlled drive
- Emergency stop
- Push-and-pull operation
- Adjustment of zero and final position
- Connection via Flexible cable
- Limitation of shifting force

**KAMAND Servo Throttle Actuator Ver. 1.0.1**

The KAMAND Servo Throttle Actuator regulation unit is a versatile linear actuator for operating the throttles and injection pumps of internal combustion engines. KAMAND Throttle Actuator includes a AC servomotor and a toothed rack actuating system with attached flexible cable.

Throttle Actuator regulation unit is a positioning system for linear motion. State-of-the-art power semiconductors (IGBT) and consistent use of microprocessors allow the power and control unit to be mounted compactly in a wall cabinet. Manual adjustment and diagnosis are carried out via the KAMAND Remote control which is connected straight to the wall cabinet.



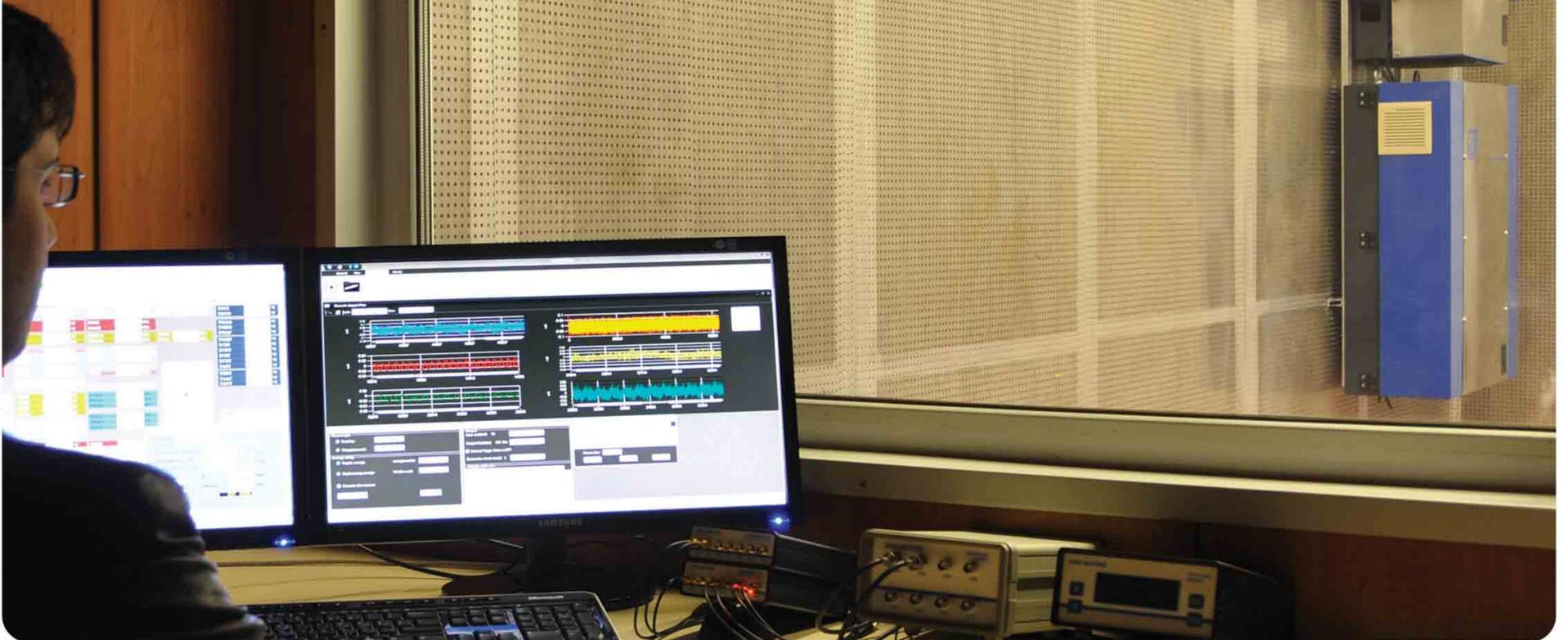
**Technical features:**

- Max. shifting travel: 110 mm
- Max. shifting force: 200 N
- Shifting speed: 0.5 m/s
- Repetitive accuracy:  $\pm 0.05$  mm
- Push-and-pull operation
- Limitation of shifting force
- Power supply: 50/60 Hz/200 to 240 V
- Remote control for Manual adjustment
- Input command (0 to 10V)
- Output Position (0 to 10V)
- Ambient temperature: -10 to 50 C°



#### Advantages:

- Measurement accuracy of 0.2% through direct mass flow measurement
- Open continuous measurement system (no additional pressure increase in the measurement circuit e.g. due to temperature changes, ...)
- Rapid measurements even at the lowest levels of consumption
- The highest level of reliability and universal suitability to the requirements of modern measurement methods and injection systems
- From a single cylinder through to a 600 kW large engine with one sensor and measuring system
- Total engine Fuel consumption measuring
- ability to measuring gasoline and diesel fuels



### Fuel Flow Meter System Ver. 2.0.1

The Dina Motors Fuel Mass Flow Meter is a high precise and continuous fuel consumption measurement system, which is used worldwide at almost all engine test beds where engines of a maximum consumption of 125 kg/h are tested.

The system stands out for a very high accuracy and because of the modular design it can be combined with existing conditioning systems.

The fuel system Dina Motors fuel Mass Flow Meter enables a high precise fuel consumption measurement also at low flow rates and short measurement times.

With a high accuracy mass flow sensor the fuel consumption is determined continuously and via direct mass flow measurement in kg/h. The density does not have to be determined in addition to the direct determination of the gravimetric or specific fuel consumption like in volumetric measurement methods.

The fuel consumption can thus be determined to an accuracy of 0.2% for the whole system under real test bed conditions.

#### Technical features:

- Ambient temperature: 0 to 50 C°
- Fuel: gasoline, diesel
- Measurement range: 0 to 125 Kg/h
- Fuel supply pressure: 0.1 to 0.8 bar
- No. of measurements (running average): 1 to 99
- Measurement accuracy: less than 0.2%
- Fuel outlet pressure: 0.05 to 1 bar adjustable
- Electrical interfaces: Ethernet
- Fuel supply temperature: -10 to +40 °C
- Power supply: 24 V DC

#### Each consisting of:

- Fuel Mass Flow Meter
- Cables
- Operating instructions
- PC Software



# Fuel Temperature Controller

## Advantages:

- Precise fuel temperature regulation
- Extremely high thermal stability of: 0.5 C°
- Gas bubble detector and separator included
- Ability to adjust the fuel temperature
- easy maintenance

## Fuel Temperature Controller Ver. 2.0.1

Applications which require the engine to be tested over a longer period at a constant preselectable fuel temperature require.

The Dina Motors Temperature Control with its high accurate and stable temperature regulation is an unchallenged market leader in the field of fuel conditioning systems.

As a controlled cooling system it allows the user to set the fuel temperature anywhere within the range of 10 to 80 °C. The achievable fuel temperature, however, depends on the cooling water temperature or the amount of heat retained in the engine return fuel.

### Technical features:

- Ambient temperature: 0 to 50 C°
- Fuel: gasoline, diesel
- Fuel circulation capacity: 240 l/h
- Temperature control range: 10 to 80 C°
- Heating power (optional): 1.6KW
- Fuel thermal stability: less than 0.5 C°
- Electrical interfaces: Ethernet
- Power supply: 220 VAC

### Each consisting of:

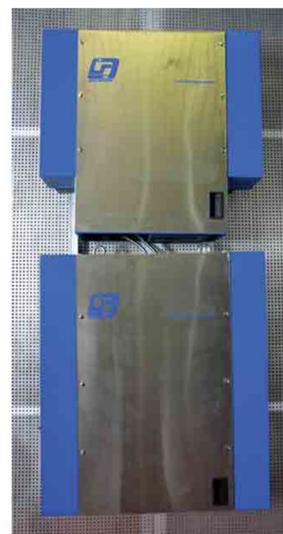
- Fuel temperature control device
- Cables
- Operating instructions
- PC Software

The high precise temperature control gives a constant pre-set fuel temperature at the engine and guarantees the high measurement accuracy of the whole test system.

Continuous fuel vapour bubble separation ensures that the fuel supply to the engine is free of bubbles.

The integrated bubble monitor outputs a warning when gas bubbles occur in the measurement system.

Any existing fuel measuring device can be retrofitted to improve the accuracy of the whole measuring system.

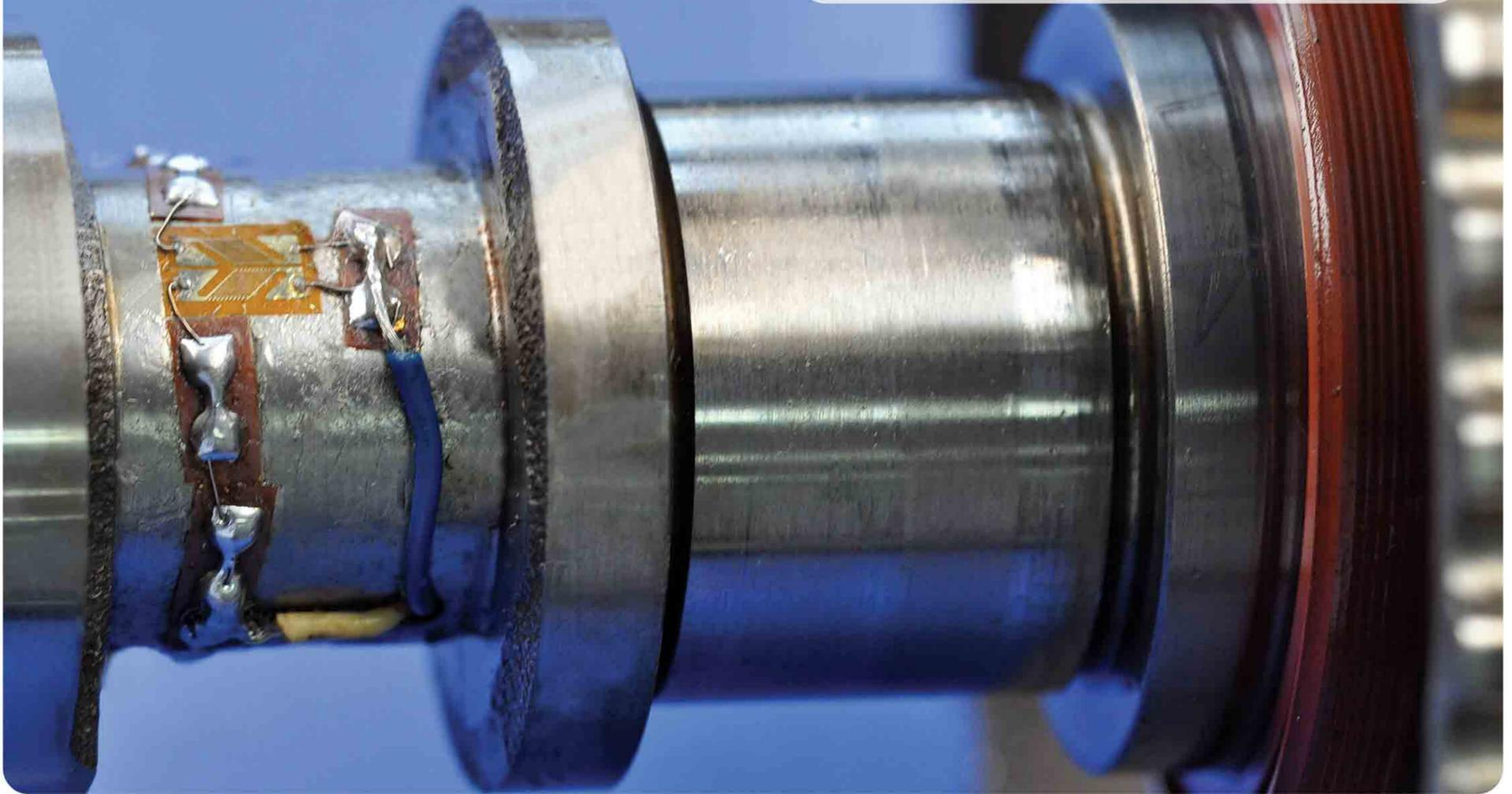


### Options:

- Special diesel fuel heater  
In specific diesel engine tests we need to increase fuel temperature and adjust it in 40 C°. In this case, using the electrical heater is necessary.

**Advantages:**

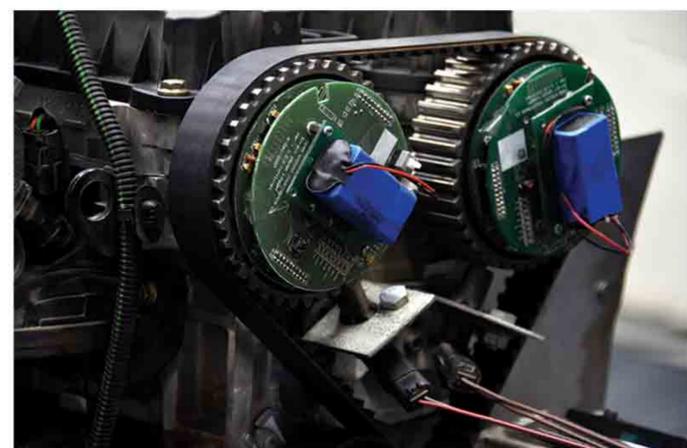
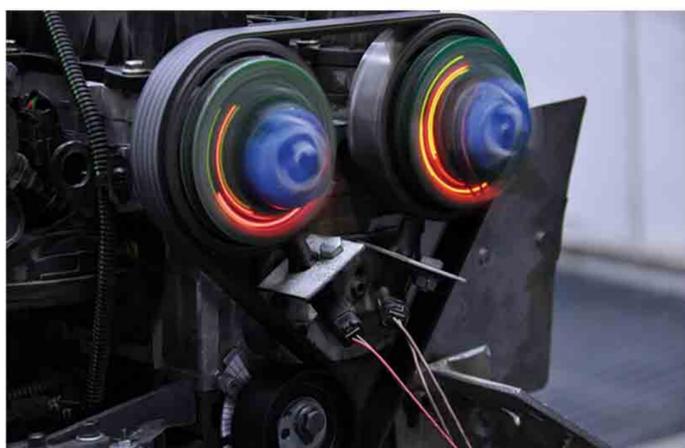
- Ability to install on moving elements
- Ability to produce in different sizes in order to customer's needs
- Saving information and data on memory card



**Rotary Strain Recorder Ver. 1.0.2**

One of the most important requirements of the timing belt test is measuring the force on rotating camshaft, so rotary strain recorder device designed to install on the camshaft and measure the force.

This is able to measure to sensors simultaneously with speed of 30000 samples per second on each device. Moreover, the device's features and dimensions are adjustable according to test requirements.

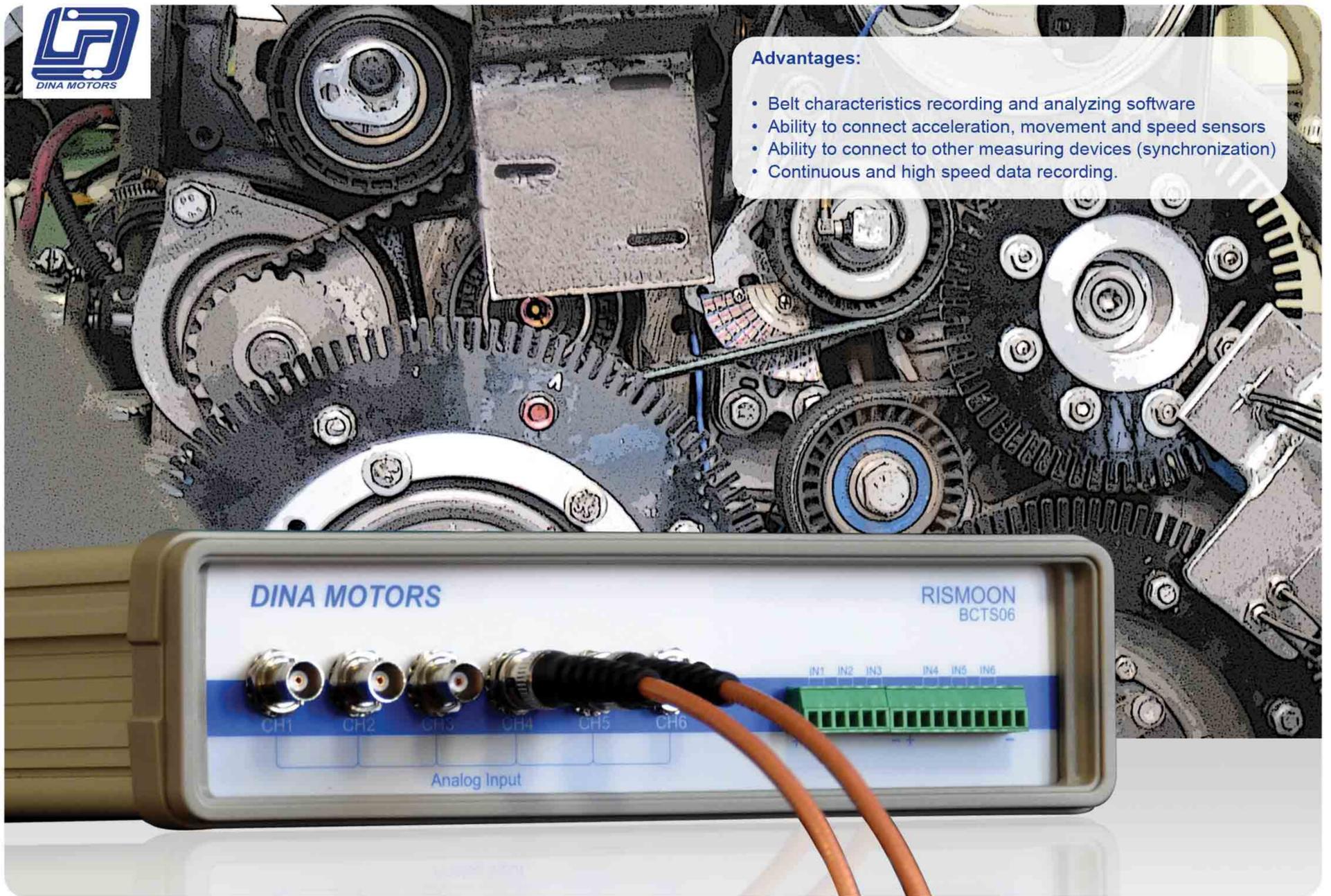


**Technical features:**

- Measuring methods: Quarter Bridge, Half bridge and full bridge
- Sampling speed: up to 30000 samples per second
- Bridge voltage: 2.5 to 5 V
- Record type: offline on memory card
- Analog resolution: 24bit
- Ambient temperature: -10 to 70 C°

**Each consisting of:**

- Strain sensor (sample)
- Rotary Strain Recorder device
- PC Software
- Battery
- Memory card
- Memory card reader
- Operating instructions



**Advantages:**

- Belt characteristics recording and analyzing software
- Ability to connect acceleration, movement and speed sensors
- Ability to connect to other measuring devices (synchronization)
- Continuous and high speed data recording.

**Rismoon (Test Belt System)**

According to test instruction sheet for the accessory & timing belt drive system, it is important to run various of engine running in order to either raise possible issues or confirm that the system drive is correctly designed.

Rismoon data acquisition, specially designed for the accessory & timing belt drive system validation.

**Characterization:**

- acyclism: angle speed deviation between crankshaft and accessory
- instantaneous sliding rate between crankshaft and accessory pulleys
- belt flapping deviation and temperature
- auto-tensioner movement
- radial load on bearing
- instantaneous dynamic tension on belt flap

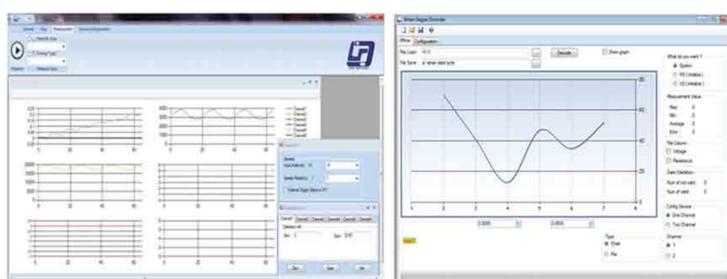
**Technical features:**

- Ambient temperature: 0 to 50 C°
- 6 Analog channels with 20000 samples per second
- 6 speed measurement channels with 20000 SPS
- Selectable Data recording speed.
- Speed measuring accuracy: less than 10 micro second
- 16 bit analog resolution
- Electrical interfaces: Ethernet
- Power supply: 24 V DC



**Each consisting of:**

- Belt characteristics measurement device
- Cables
- Operating instructions
- engineering software





#### Advantages:

- Easy handling and installation
- Ability to connect to 3600 pulse per REV encoder
- Real time data recording
- Specific software package



## Indicating Pressure Measurement Ver. 2.0.1

The EHTERAGH DH8C01 is a combustion measurement device.

Eight analog inputs for cylinder, with a signal amplification and crank angle encoder enable to record indicating pressure through pressure sensors.

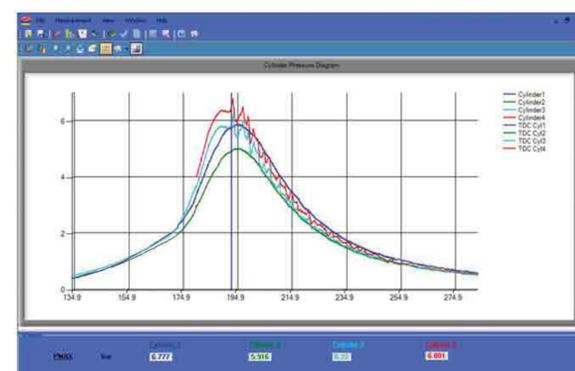
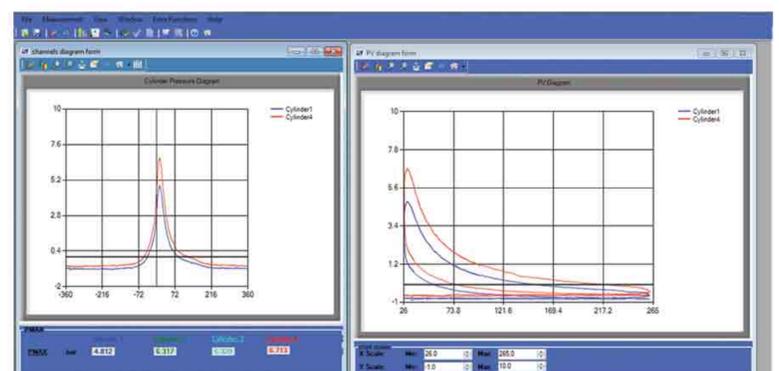
An integrated 100 Mbit/s Ethernet interface supports the real time raw data transfer to a connected laptop or PC utilizing the data acquisition software EHTERAGHNAMA.

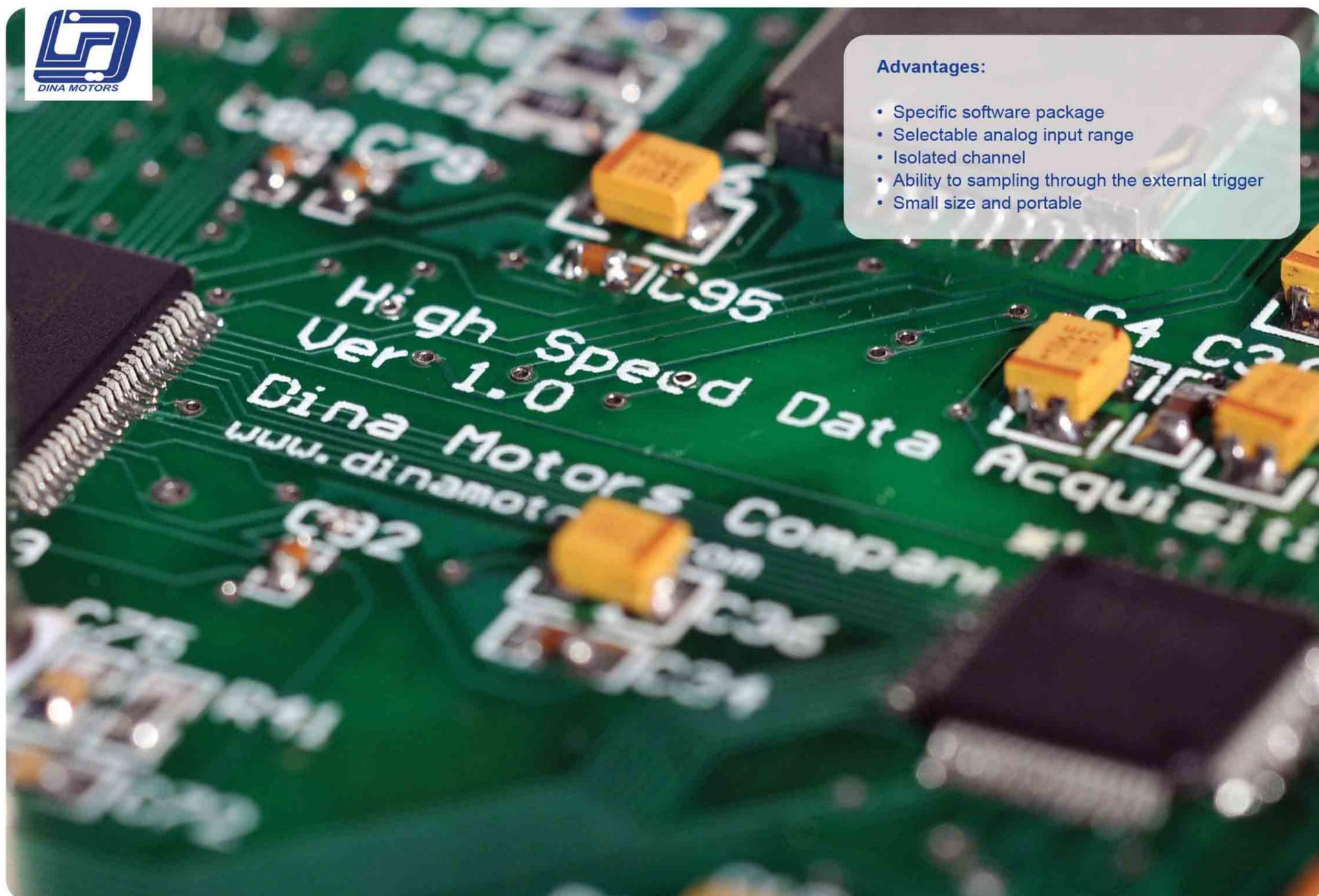
### Technical features:

- 8 input channels
- 16 bit analog input resolution
- Max. REV up to 8000 RPM
- Ability to connect to 900, 1800 and 3600 pulse per revolution encoder
- Real time data recording
- Interface to PC / Notebook via ethernet
- Supply input: DC 9-36 V
- Temperature range: -10 to 60 °C
- Dimensions (W D H): 155 200 86 mm
- Weight: 1200 gr

### Accessories:

- Full connection cable set
- Pressure indicator software
- User manual





**Advantages:**

- Specific software package
- Selectable analog input range
- Isolated channel
- Ability to sampling through the external trigger
- Small size and portable

### TONDNEGAR (high Speed Data Acquisition) AI6C

The TODNEGAR is a highly accurate 6-channel module that is ideal for vibration, sound...etc measurements. All channels are completely isolated from each other and from the computer, allowing noise-free data to be sampled in tough industrial environments.

The TCP/IP Ethernet operation allows measurements to be monitored locally or at other remote sites. This devise has a trigger input channel and can be externally triggered up to 100 Ks/s.

**Technical features:**

- 6 independent channel
- Adjustable input voltage range
  - 10 to +10      -5 to +5
  - 2 to +2        -1 to +1
- Adjustable sampling frequency up to 100kHz per channel
- 16 bit analog input resolution
- High speed interface to computer (Ethernet 100 Mbit/s)
- 4 Gbyte internal memory
- External trigger
- Power supply DC 24 volt, 500 mA
- Dimensions (W D H): 99 168 36 mm
- Weight: 600 gr

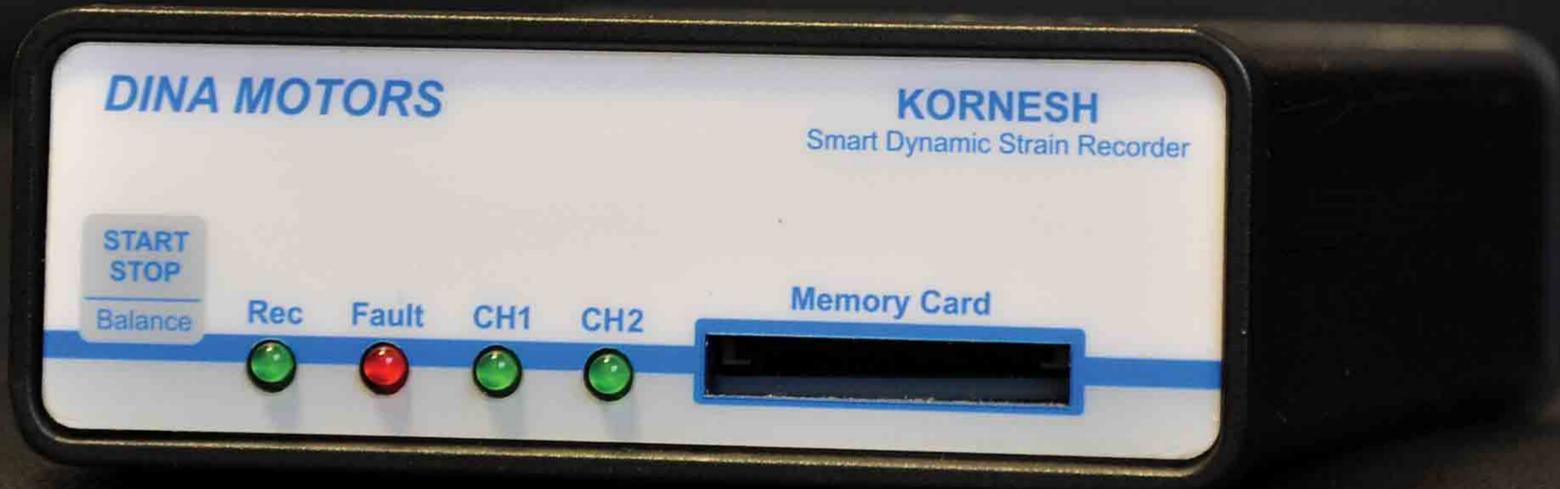
**Accessories:**

- Connection cables
- Software
- User manual



**Advantages:**

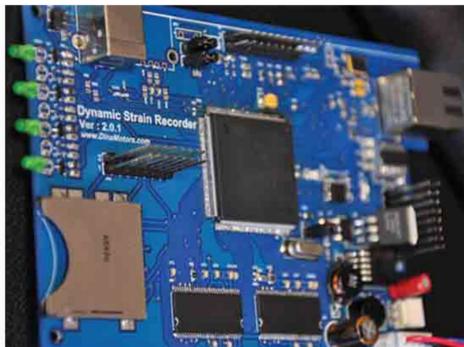
- Dynamic Strain recording
- High accuracy
- Increase Channel with synchronization (2 or 3 device)
- Synchronization with other measurement device.
- Record data on memory card (Optional)



**Smart Dynamic Strain Recorder Ver. 1.0.2**

Strain meters are connected to strain gauges and strain-gauge-type transducers in order to take measurements. A strain gauge generates changes in resistances that are proportional to the amount of strain applied to it, and it operates on the principle that the amount of strain can be determined by measuring the amount of changes. However, these changes must be electrically amplified in order to measure them

because they are so small. Strain that changes over time is called dynamic strain, and is measured using a dynamic strainmeter. Dynamic strain meters output changes in strain as analog signals that are recorded, measured and analyzed using external recording devices. As a rule, a meter and recording device is required for each measuring point channel.

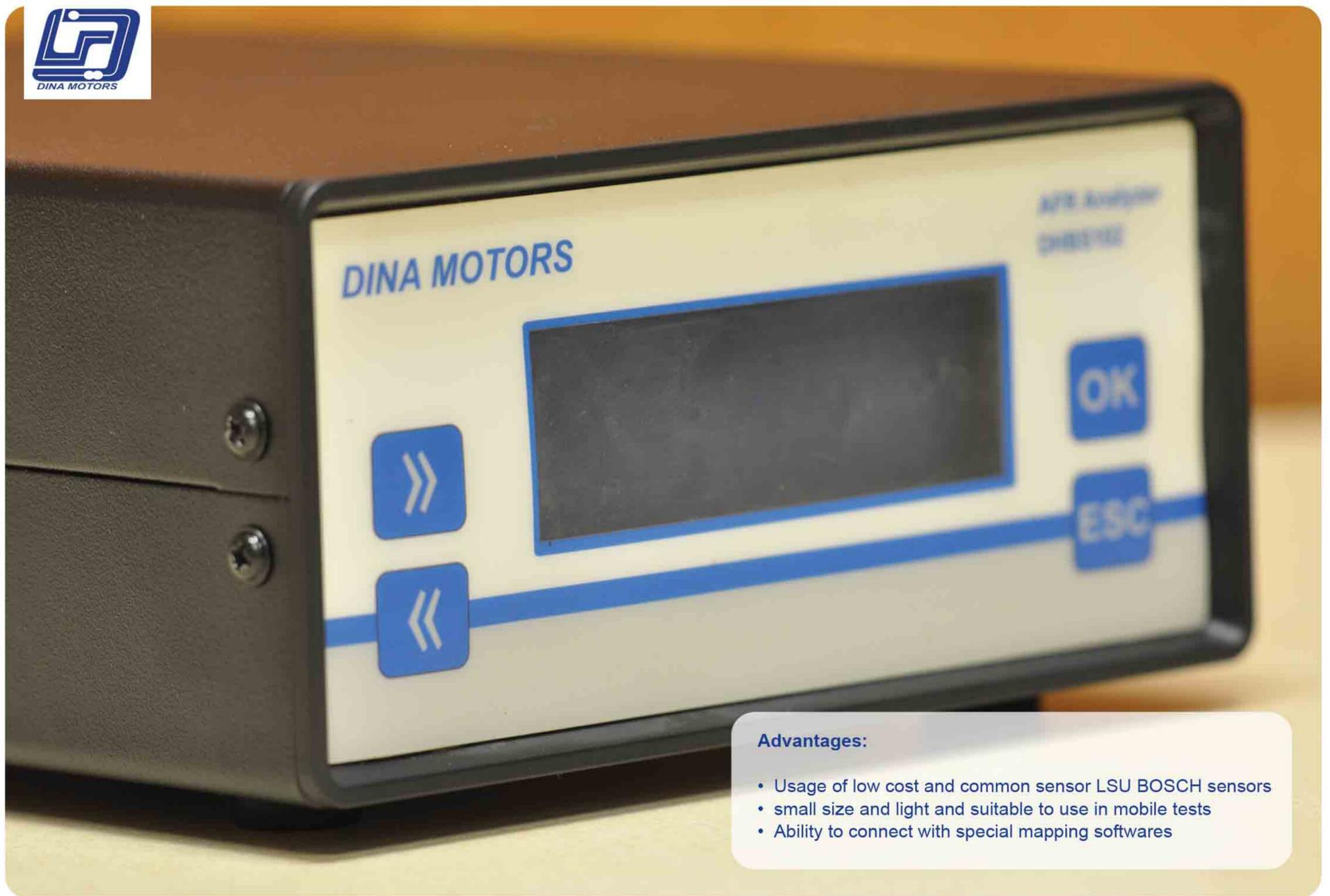


**Technical features:**

- Number of channels: 2 channels
- Measuring object: Strain, Voltage
- Sampling speed: up to 90 kHz
- Power supply: 24 V DC
- Analog convertor resolution: 24bit
- Sampling method: Simultaneous sampling
- Electrical interfaces: Ethernet
- Bridge excitation voltage: DC1.8V,0.5V,5V

**Each consisting of:**

- Smart Dynamic strain Recorder device
- Strain sensor (sample)
- Cables
- Operating instructions
- Engineering Software



#### Advantages:

- Usage of low cost and common sensor LSU BOSCH sensors
- small size and light and suitable to use in mobile tests
- Ability to connect with special mapping softwares

## Air to Fuel Ratio Analyzer DHBS102

The DHBS102 Lambda Meter is a high-precision measuring device for emission levels. It allows determining lambda values, oxygen content, and A/F ratio, as well as internal resistance, pump current of the LSU lambda sensor. This device permits exhaust gas measurements on gasoline, diesel, and gas engines.

Based on the output signals from Bosch LSU broadband lambda probes, the measurement results can be calculated either by means of an analytical method that considers fuel properties and ambient conditions or by characteristic curves. The Lambda Meter DHBS102 is suited to both engine test bed use and in-vehicle deployment.

#### Technical features:

- Ability to display data with 0.00x accuracy
- Configurable display menu to display lambda, oxygen, A/F, current and resistance of the sensor
- PID adjustment to adjust output swing and response time
- High accurate analog out
- Equipped with USB and RS232 interface
- Ability to connect to Bosh LSU 4x Series oxygen sensors
- Lambda accuracy:  $\pm 0.015$
- Response time: 0.01 second
- Dimensions (W D H): 206 150 70 mm
- Weight: 1 Kg

#### Accessories:

- Calibrated oxygen sensor
- Sensor cable (10 m)
- Analog output cable
- User manual

