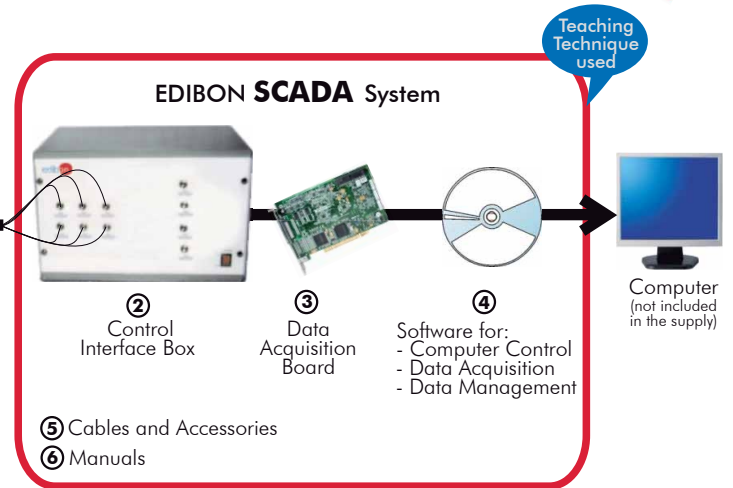


# Computer Controlled Test Bench for Four-Cylinders Engines, 75 kW, with SCADA

**TBMC75**

**EDIBON PATENT**



\* Minimum supply always includes: 1 + 2 + 3 + 4 + 5 + 6  
(Computer not included in the supply)

① Unit: TBMC75. Test Bench for Four-Cylinders Engines, 75 kW

Key features:

- ▶ **Advanced Real-Time SCADA.**
- ▶ **Open Control + Multicontrol + Real-Time Control.**
- ▶ **Specialized EDIBON Control Software based on Labview.**
- ▶ **National Instruments Data Acquisition board (250 KS/s , kilo samples per second).**
- ▶ **Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**
- ▶ **Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**
- ▶ **Capable of doing applied research, real industrial simulation, training courses, etc.**
- ▶ **Remote operation and control by the user and remote control for EDIBON technical support, are always included.**
- ▶ **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**
- ▶ **Designed and manufactured under several quality standards.**
- ▶ **Optional CAL software helps the user perform calculations and comprehend the results.**
- ▶ **This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

**OPEN CONTROL  
+  
MULTICONTROL  
+  
REAL TIME CONTROL**

[www.edibon.com](http://www.edibon.com)

- ↳ Products
- ↳ Products range
- ↳ Units
- ↳ 9.-Thermodynamics & Thermotechnics

For more information about Key Features, click here:



**ISO 9000: Quality Management**  
(for Design, Manufacturing, Commercialization and After-sales service)



**European Union Certificate**  
(total safety)



**Certificates ISO 14000 and ECO-Management and Audit Scheme**  
(environmental management)



**Worlddidac Quality Charter Certificate**  
(Worlddidac Member)

**Items supplied as standard****① TBMC75. Unit:**

Test Bench with wheels for its mobility. Control and load unit for four-stroke petrol or diesel internal combustion engines. Maximum power output of: **75 kW**.

Metallic structure and panels in painted steel. Main metallic elements in stainless steel.

Diagram in the front panel with similar distribution to the elements in the real unit.

Air-cooled eddy current brake for applying load to the engines.

Force transmission from the engine to the brake via rotationally elastic coupling and jointed shaft.

Adjustment of the braking torque and the braking speed.

Adjustment for "accelerate" engine.

Quietesting vessel for intake air, with air filter and air hose.

Vibration insulation.

Exhaust gas connection.

Fuel tanks with pump.

Speed sensor. Temperature sensors for air temperature, cooling water, fuel temperature, oil temperature and exhaust gas temperature, etc.

Force sensor (torque). Flow sensors. Level sensor. Pressure sensors.

By the previous sensors we can make measurement of the most representative parameters:

Speed. Torque. Air intake quantity. Intake pressure. Fuel consumption. Air temperature. Oil pressure. Fuel temperature.

Exhaust gas temperature. Volumetric flow (intake air and cooling water). Etc.

Adjustable speed. Pump control. Adjustable torque. Engine control. Consumption control.

The complete test bench requires for working a choice (optional) test engines :

**Test engines available:** (not included in the standard supply)

-TM75-1. Water-cooled four-cylinders four-stroke petrol engine.

-TM75-2. Water-cooled four-cylinders four-stroke diesel engine.

**Other accessories available:** (not included in the standard supply)

-TBMC-AGE. Exhaust Gas Analyzer.

**② TBMC75/CIB. Control Interface Box :**

Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student.

All sensors, with their respective signals, are properly manipulated from -10V. to +10V computer output. Sensors connectors in the interface have different pines numbers (from 2 to 16), to avoid connection errors. Single cable between the control interface box and computer.

The unit control elements are permanently computer controlled, without necessity of changes or connections during the whole process test procedure.

Simultaneous visualization in the computer of all parameters involved in the process.

Calibration of all sensors involved in the process.

Real time curves representation about system responses. Storage of all the process data and results in a file. Graphic representation, in real time, of all the process/system responses.

All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process. All the actuators and sensors values and their responses are displayed on only one screen in the computer.

Shield and filtered signals to avoid external interferences.

Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process. Real time computer control for pumps, compressors, resistances, control valves, etc.

Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously.

Three safety levels, one mechanical in the unit, other electronic in the control interface and the third one in the control software.

**③ DAB. Data Acquisition Board:**

PCI Data acquisition board (National Instruments) to be placed in a computer slot. Bus PCI.

Analog input: Channels= 16 single-ended or 8 differential. Resolution= 16 bits, 1 in 65536. Sampling rate up to: 250 KS/s (Kilo samples per second). Input range (V) =  $\pm 10V$ . Data transfers=DMA, interrupts, programmed I/O. DMA channels=6.

Analog output: Channels=2. Resolution= 16 bits, 1 in 65536. Maximum output rate up to: 833 KS/s.

Output range(V)= $\pm 10V$ . Data transfers=DMA, interrupts, programmed I/O.

Digital Input/Output: Channels=24 inputs/outputs. D0 or DI Sample Clock frequency: 0 to 1 MHz.

**④ TBMC75/CCSOF. Computer Control + Data Acquisition + Data Management Software:**

Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen.

Compatible with the industry standards.

Registration and visualization of all process variables in an automatic and simultaneous way.

Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters. Management, processing, comparison and storage of data. Sampling velocity up to 250,000 data per second.

Calibration system for the sensors involved in the process.

It allows the registration of the alarms state and the graphic representation in real time.

Comparative analysis of the obtained data, after the process and modification of the conditions during the process.

Open software, allowing to the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels.

This unit allows the 30 students of the classroom to visualize simultaneously all results and manipulation of the unit, during the process, by using a projector or an electronic whiteboard.

**⑤ Cables and Accessories**, for normal operation.**⑥ Manuals:** This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

**\* References 1 to 6: TBMC75 + TBMC75/CIB + DAB + TBMC75/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.**

## EXERCISES AND PRACTICAL POSSIBILITIES

### Some Practical Possibilities of the Unit (in conjunction with a test engine)

- 1.- Familiarisation with four-cylinders petrol and diesel engines.
- 2.- Determination of specific fuel consumption.
- 3.- Torque curves.
- 4.- Power curves.
- 5.- Determination of volumetric efficiency.
- 6.- Determination of excess air factor.
- 7.- Measurement of the most important parameters involved in the process: temperature, torque, speed, pressure, flow, etc.
- 8.- Determination of engine friction loss (in passive mode).
- 9.- Determination of fuel-air ratio.
- 10.- Energy balances.
- 11.- Sensors calibration.

## ORDER INFORMATION

### Items supplied as standard

Minimum configuration for normal operation includes:

- ① Unit: **TBMC75. Test Bench for Four-Cylinders Engines, 75 kW.**
- ② **TBMC75/CIB. Control Interface Box.**
- ③ **DAB. Data Acquisition Board.**
- ④ **TBMC75/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
- ⑤ **Cables and Accessories**, for normal operation.
- ⑥ **Manuals.**

\* **IMPORTANT:** Under **TBMC75** we always supply all the elements for immediate running as **1, 2, 3, 4, 5 and 6.**

## REQUIRED SERVICES

- Electrical supply: three-phase, 400V/50Hz. or 230V/60Hz.
- Water supply.
- Computer (PC).

## DIMENSIONS & WEIGHTS

- TBMC75. Unit:                    -Dimensions: 1900 x 1200 x 1600 mm. approx.  
    -Weight: 300 Kg. approx.
- Control Interface Box: -Dimensions: 490 x 330 x 310 mm. approx.  
    -Weight: 10 Kg. approx.

## AVAILABLE TEST ENGINES AND ACCESSORIES

### Test engines:

- TM75-1. Water-cooled four-cylinders four-stroke petrol engine.
- TM75-2. Water-cooled four-cylinders four-stroke diesel engine.

### Other accessories:

- TBMC-AGE. Exhaust Gas Analyzer.

## AVAILABLE VERSIONS

### Offered in this catalogue:

-TBMC75. **Computer Controlled Test Bench for Four-Cylinders Engines, 75 kW.**

### Offered in other catalogues:

-TBMC3. **Computer Controlled Test Bench for Single-Cylinder Engines, 2.2 kW.**

-TBMC8. **Computer Controlled Test Bench for Single-Cylinder Engines, 7.5 kW.**

-TBMC12. **Computer Controlled Test Bench for Single-Cylinder and Two-Cylinders Engines, 11 kW.**

\* Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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Issue: ED01/13  
Date: May/2013

REPRESENTATIVE: