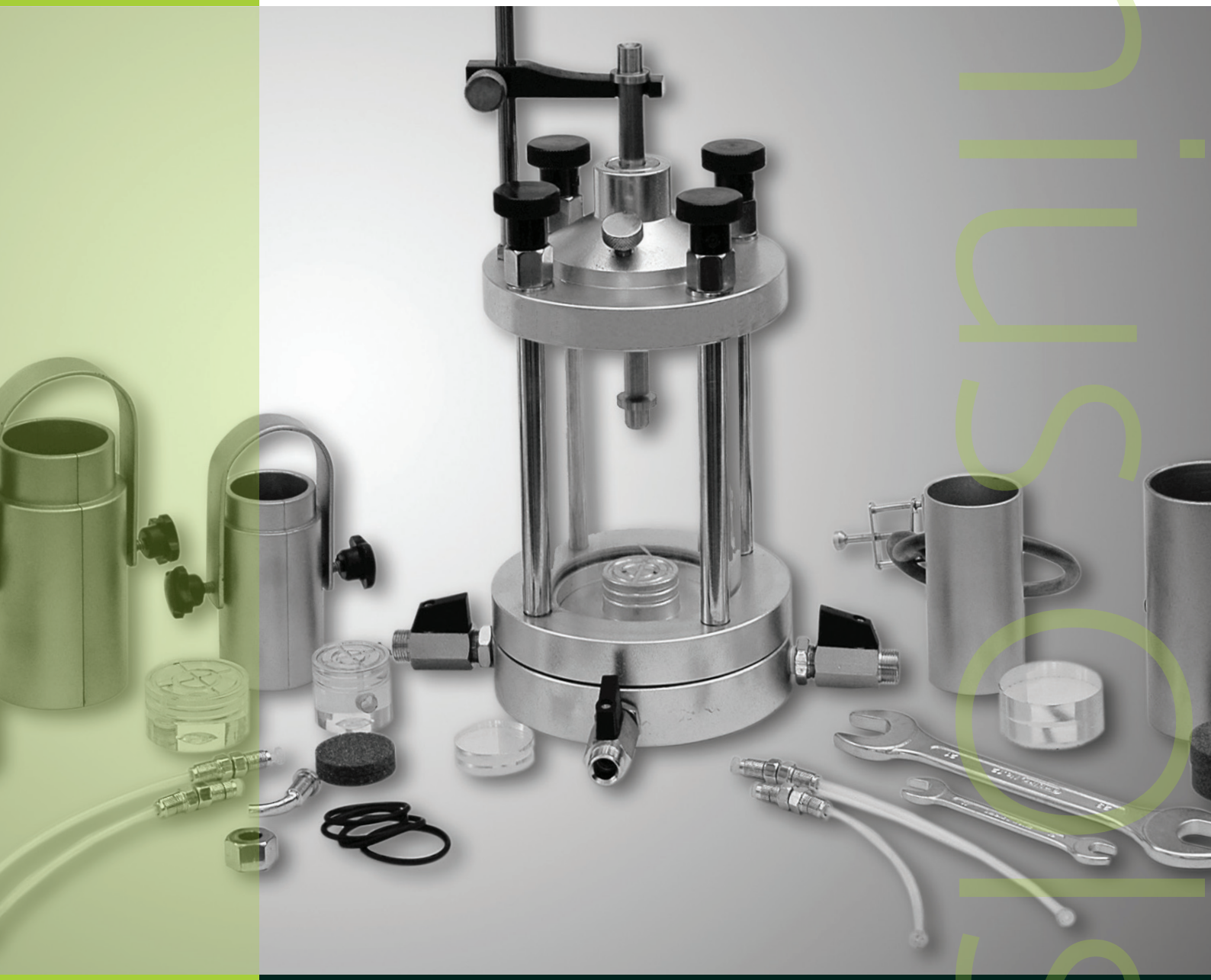
Tinius Olsen



# Triaxial Tests

## System components

TO5064EN02

# Triaxial Test Load Frame **MODEL TO-064**

## Triaxial tests

Tinius Olsen's triaxial test system is modular in design and can be tailored to suit a wide range of customer requirements.

The system is made up of various components, with the major items being:

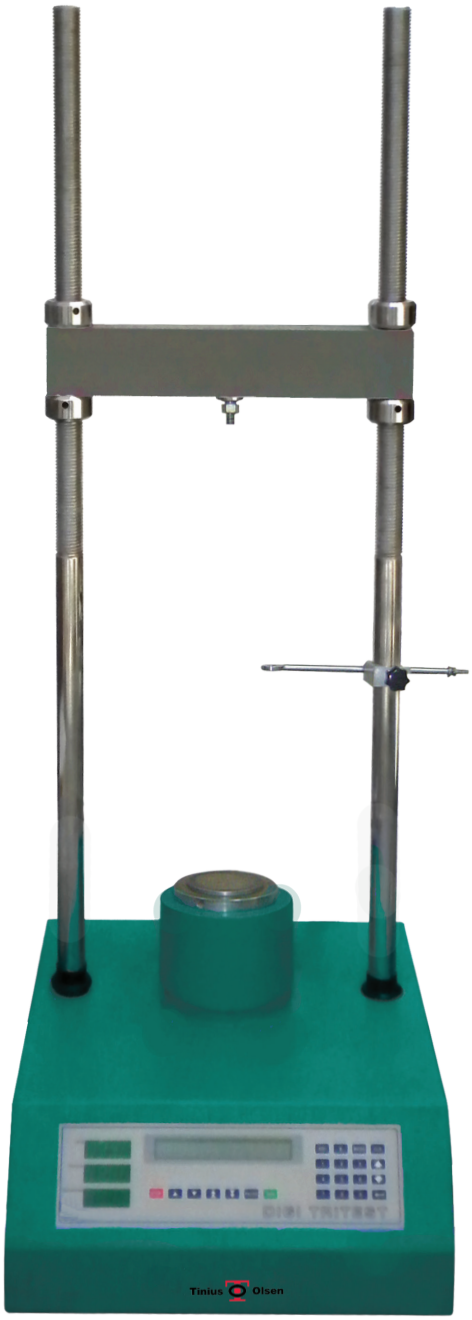
- A 50kN (11,200lbf) capacity Load Frame.
- Triaxial Cell complete with accessories for drained and undrained testing of 2.8in or 70mm diameter specimens to confining pressures of up to 145psi (1,000kPa).
- Data Acquisition system.
- Set of Electronic Measurement Transducers for load, displacement, pressure and volume change.
- Data System Triaxial Software for recording, analysis and report generation in English or Metric units.
- De-aired Water Tank System for precise applications of confining, back and saturation pressures.

This 50kN capacity machine is supplied complete with integral electronic kit for triaxial testing of soil specimens up to 100mm diameter x 200mm long.

It consists of a rigid twin-column construction with an integral, fully variable microprocessor controlled drive unit and LCD display with a touch sensitive keyboard. It is bench-mounted for ease of installation and operation.

The use of a microprocessor controlled drive system and keyboard entry provides the load frame with a wide variety of features, including pause and speed reset during test, RS232 interface for computer control, operator programming of speed and control functions, and self-test diagnostics.

A robustly constructed steel case houses the motor drive system and protects against water and dirt. All operating controls are mounted on the front panel of the machine, which is angled and recessed to prevent physical and environmental damage.




## RELEVANT STANDARDS

- BS598, 1377, 1924; EN 12697-23, 24, 13286-47; ASTM D1883; AASHTO

## ORDERING INFORMATION

- **TO-064E-01** Triaxial Test Load Frame, 110VAC, 60Hz
- **TO-064E-02** Triaxial Test Load Frame, 220VAC, 60Hz
- **TO-064E-03** Triaxial Test Load Frame, 220VAC, 50Hz

| MODEL TO-064 SPECIFICATIONS | |
|---|---|
| Capacity | 50kN |
| Type | Microprocessor-controlled stepper motor drive |
| Platen speed range | Up to 9.99mm/min |
| Rapid approach speed | 25mm/min |
| Horizontal clearance | 364mm |
| Maximum vertical clearance | 910mm |
| Maximum platen travel | 100mm |
| Specimen diameter | 38mm (50, 75 and 100mm can also be used) |

## Key features

- Microprocessor control.
- Large on-board LED screen display.
- Direct entry via a touch sensitive keyboard.
- Rapid approach and return to datum of platen.
- Fully variable speed to 9.99mm/min.
- Samples up to 100mm diameter.

# Triaxial Cells **MODEL TO-075**

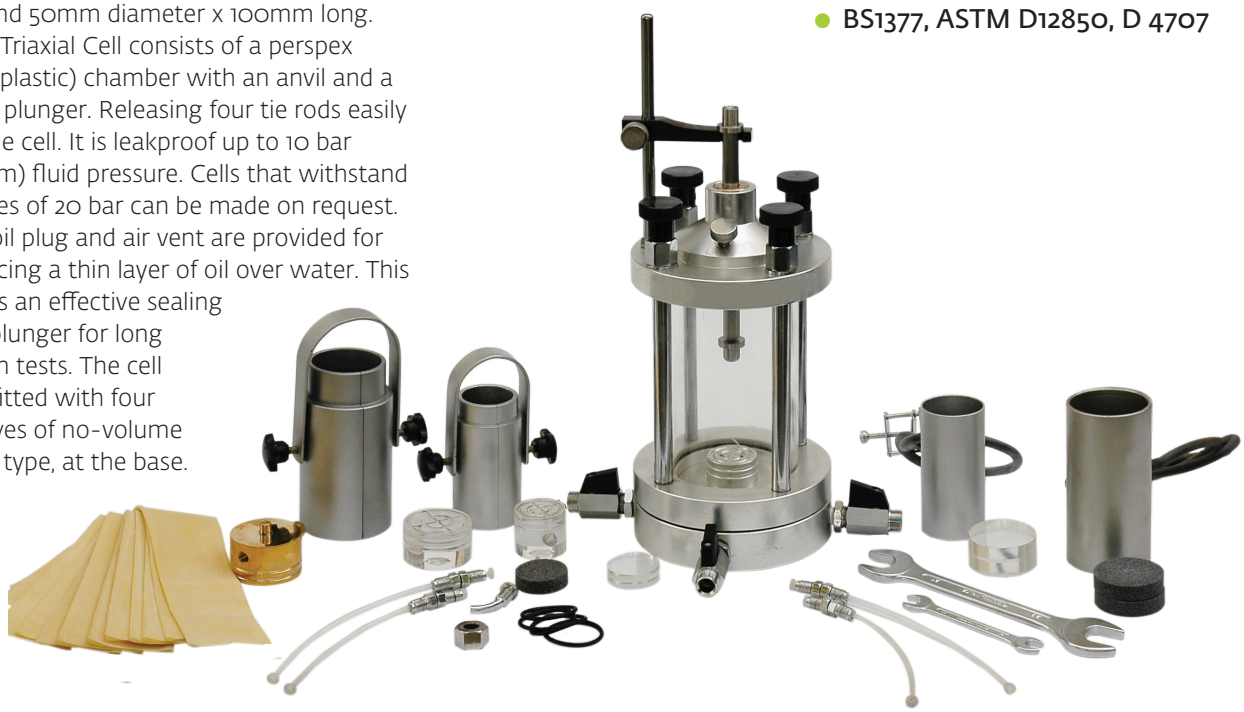
The cells are for testing specimens measuring 38mm diameter x 76mm long and 50mm diameter x 100mm long.

The Triaxial Cell consists of a perspex (acrylic plastic) chamber with an anvil and a loading plunger. Releasing four tie rods easily splits the cell. It is leakproof up to 10 bar (10kg/cm) fluid pressure. Cells that withstand pressures of 20 bar can be made on request.

An oil plug and air vent are provided for introducing a thin layer of oil over water. This provides an effective sealing at the plunger for long duration tests. The cell is also fitted with four ball valves of no-volume change type, at the base.

## RELEVANT STANDARDS

- BS1377, ASTM D12850, D 4707



## SUPPLIED AS STANDARD

**38mm Triaxial Cells**

- **TO-07501** Top loading pad, perspex, 38mm diameter
- **TO-07502** Plain perspex disc 38mm diameter x 6mm thick
- **TO-07503** Porous stone 38mm diameter x 6mm thick
- **TO-07504** Sheath stretcher for 38mm diameter specimen
- **TO-07505** Sand former for 38mm diameter (1 qty)
- **TO-07506** Rubber sheath for 38mm diameter specimen (set of 12)
- **TO-07507** 4 x drainage tube (short), 38mm diameter
- **TO-07508** 4 x drainage tube (long), 38mm diameter
- **TO-07509** 'O' rings for 38mm diameter specimen (set of 4)
- **TO-03105** Split mold, 38mm diameter

## SUPPLIED AS STANDARD

**50mm Triaxial Cells**

- **TO-07501** Top loading pad, perspex, 38mm diameter
- **TO-07502** Plain perspex disc, 38mm diameter x 6mm thick
- **TO-07503** Porous stone 38mm diameter x 6mm thick
- **TO-07504** Sheath stretcher for 38mm diameter specimen
- **TO-07505** Sand former for 38mm diameter (1 qty)
- **TO-07506** Rubber sheath for 38mm diameter specimen (set of 12)
- **TO-07507** 4 x drainage tube (short), 38mm diameter
- **TO-07508** 4 x drainage tube (long), 38mm diameter
- **TO-07509** 'O' rings for 38mm diameter specimen (set of 4)
- **TO-07510** Brass pedestal 38mm diameter
- **TO-07521** Top loading pad, perspex, 50mm diameter

Continued

# Triaxial Cells **MODEL TO-075**

## SUPPLIED AS STANDARD

**50mm Triaxial Cells**

Continued

- **TO-07522** Plain perspex disc 50mm diameter x 6mm thick
- **TO-07523** Porous stone 50mm diameter x 6mm thick
- **TO-07524** Sheath stretcher for 50mm diameter specimen
- **TO-07525** Sand former for 50mm diameter
- **TO-07526** Rubber sheath for 50mm diameter specimen (set of 12)
- **TO-07527** 4 x drainage tube (short), 50mm diameter
- **TO-07528** 4 x drainage tube (long), 50mm diameter
- **TO-07529** 'O' rings for 50mm diameter specimen (set of 4)
- **TO-07530** Brass pedestal, 50mm diameter
- **TO-03105** Split mold, 38mm diameter
- **TO-03301** Split mold, 50mm diameter
- **TO-07540** Top loading pad, 38mm diameter (plain)
- **TO-07541** Top loading pad, 50mm diameter (plain)

## ORDERING INFORMATION

- **TO-075** Triaxial cell suitable for 38mm and 50mm diameter specimens
- **TO-075-38** Triaxial cell suitable for 38mm diameter specimens

## OPTIONAL ACCESSORIES

- **TO-07501** Top loading pad, perspex, 38mm diameter
- **TO-07502** Plain perspex disc, 38mm diameter x 6mm thick
- **TO-07503** Porous stone, 38mm diameter x 6mm thick
- **TO-07504** Sheath stretcher for 38mm diameter specimen
- **TO-07505** Sand former for 38mm diameter (1 qty)
- **TO-07506** Rubber sheath for 38mm diameter specimen (set of 12)
- **TO-07507** 4 x drainage tube (short), 38mm diameter
- **TO-07508** 4 x drainage tube (long), 38mm diameter
- **TO-07509** 'O' rings for 38mm diameter specimen (set of 4)
- **TO-07510** Brass pedestal, 38mm diameter
- **TO-07521** Top loading pad, perspex, 50mm diameter
- **TO-07522** Plain perspex disc, 50mm diameter x 6mm thick
- **TO-07523** Porous stone 50mm diameter x 6mm thick
- **TO-07524** Sheath stretcher for 50mm diameter specimen
- **TO-07525** Sand former for 50mm diameter
- **TO-07526** Rubber sheath for 50mm diameter specimen (set of 12)
- **TO-07527** 4 x drainage tube (short), 50mm diameter
- **TO-07528** 4 x drainage tube (long), 50mm diameter
- **TO-07529** 'O' rings for 50mm diameter specimen (set of 4)
- **TO-07530** Brass pedestal, 50mm diameter
- **TO-03105** Split mold, 38mm diameter
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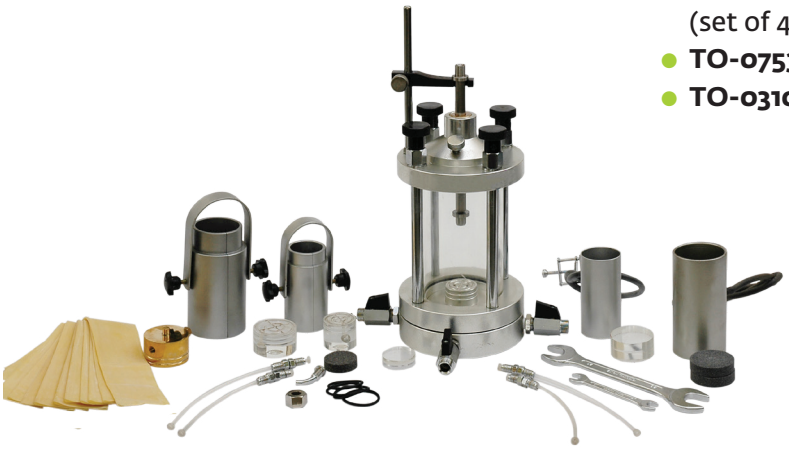
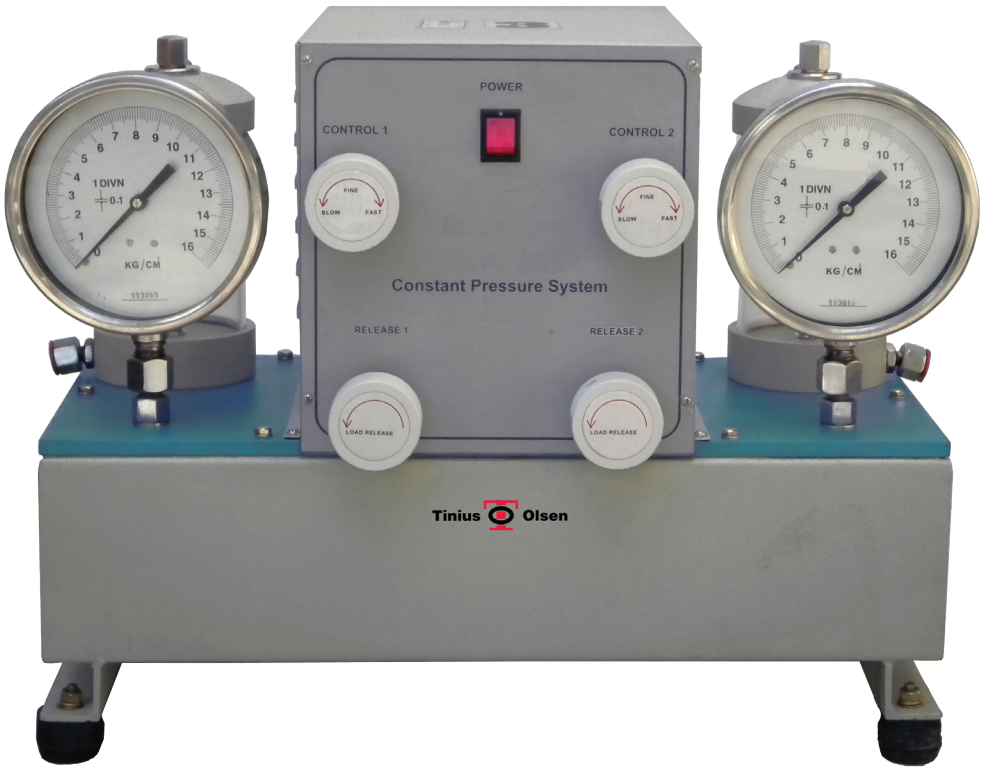
- **TO-07540** Top loading pad, 38mm diameter (plain)
- TO-07541 Top loading pad, 50mm diameter (plain)



# Oil Water Constant Pressure System




## MODEL TO-081

The Oil Water Constant Pressure System is an extremely versatile apparatus that can be used for a wide range of applications.

This system provides an effective alternative to a Mercury and Water Constant Pressure system, especially where space is at a minimum. The apparatus is designed to provide confining pressure up to 16 bar to Triaxial Cells.

The system consists of an oil pump, driven by an electric motor during the entire period of operation to maintain the desired pressure. The unit provides variable pressure up to 16 bar, which can be increased or decreased simply by turning a control knob. A transparent oil water interchange vessel is provided to transmit water pressure to the test apparatus.

*"An effective alternative to a Mercury and Water Constant Pressure system"*

| MODEL TO-081 SPECIFICATIONS | |
|---|---|
| Range | 10 bar (10kg/cm²) |
| Resolution | 0.05 bar (0.05kg/cm²) |
| Accuracy pressure | ± 1% of the indicated |
| **Note:** Supplied complete with pressure gages, flow valves and connecting pressure hose. | |

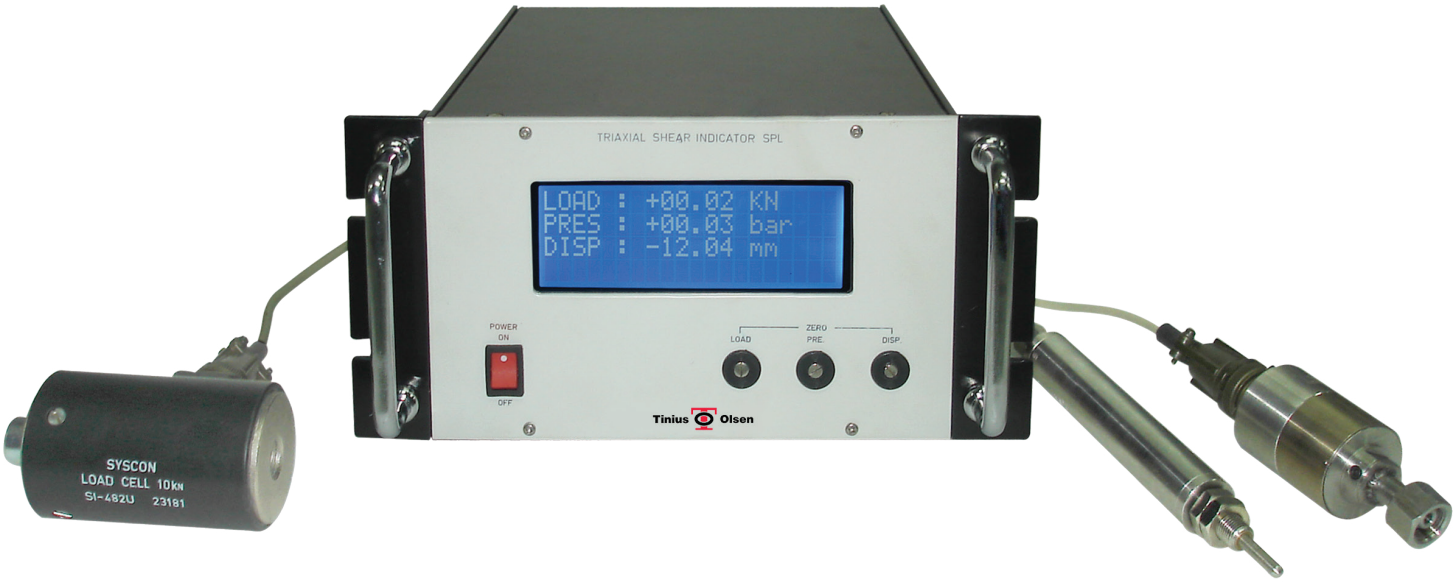
### Key features

- Use of mercury is eliminated.
- Maintains constant pressure continuously.
- Pressure capacity, 10 bar (10kg/cm).
- Also suitable for mobile laboratories.

## ORDERING INFORMATION

- **TO-081-1-01** Constant Pressure System, oil/water type, 110VAC, 60Hz
- **TO-081-1-02** Constant Pressure System, oil/water type, 220VAC, 60Hz
- **TO-081-1-03** Constant Pressure System, oil/water type, 220VAC, 50Hz
- **TO-081-2-01** Oil Water Constant Pressure System with two cells, oil/water type, 110VAC, 60Hz
- **TO-081-2-02** Oil Water Constant Pressure System with two cells, oil/water type, 220VAC, 60Hz
- **TO-081-2-03** Oil Water Constant Pressure System with two cells, oil/water type, 220VAC, 50Hz

# Data Acquisition System **MODEL TO-085**




The Triaxial Data Acquisition System comprises a 10kN (1000kgf) capacity external load cell, a 20 bar (20kg/cm) capacity pore pressure transducer, an LVDT displacement sensor with a range of ±10mm, and a 3-channel digital indicator that has been specially designed to meet the requirements of triaxial testing.

## MODEL TO-085 SPECIFICATIONS

| | |
|---|---|
| **TO-08501** | **3-channel digital indicator** |
| Mode of display | Micro-controller multi-line alpha numeric VFD display for all simultaneous channels – no need for channel selection |
| | |
| **TO-08502** | **External load cell** |
| Capacity | 10kN (1000kgf) |
| Load cell excitation | 5V, DC |
| Resolution | 0.01kN (1kgf) |
| Sensing element | Strain gages in full bridge configuration |
| | |
| **TO-08503** | **Pore pressure transducer** |
| Capacity | 20 bar (20kg/cm$^2$) |
| Pressure cell excitation | 5V, DC |
| Resolution | 0.01 bar (0.01kg/cm$^2$) |
| Sensing element | Strain gages in full bridge configuration |
| | |
| **TO-08504** | **LVDT displacement transducer** |
| Range | ±10mm |
| Sensing element | LVDT |

## ORDERING INFORMATION

- **TO-085-01** Triaxial Data Acquisition System, 110VAC, 60Hz
- **TO-085-02** Triaxial Data Acquisition System, 220VAC, 60Hz
- **TO-085-03** Triaxial Data Acquisition System, 220VAC, 50Hz

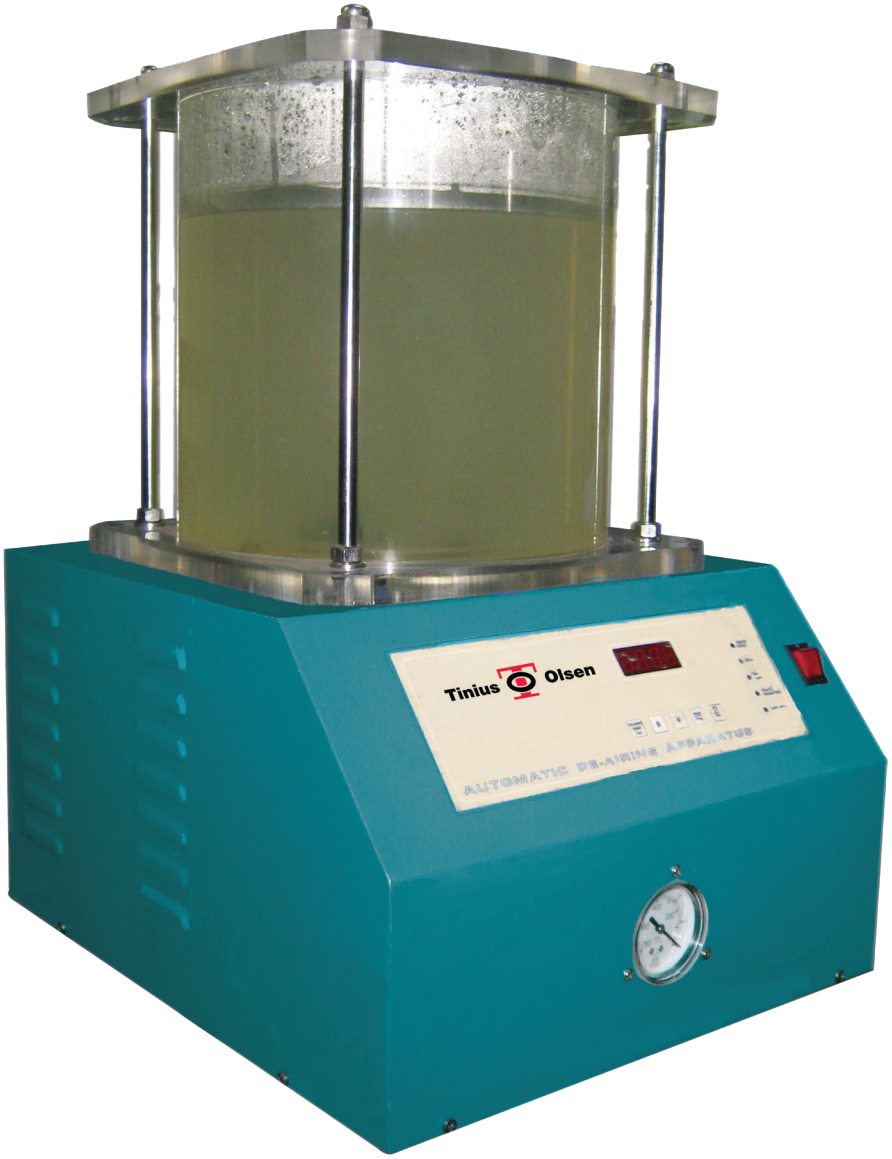
# De-aired Water Apparatus **MODEL TO-097**

The De-aired Water Apparatus works on the principle of removal of dissolved air from the water present in the soil in order to measure the pore pressure. It is used to study the levels of dissolved oxygen acceptable for geotechnical test methods for soil.

Benefits include:

- Time to consolidate soil samples is reduced
- For simultaneous flushing of many hydraulic piezometer lines in dams and earth works to considerably reduce labor and disturbance at the top ends.

**Note** Any dissolved air in the water will lead to errors in the measurement of pore pressure, particularly at low pressure, and also gives slow or incorrect saturation results.




## Key features

- Fully microprocessor controlled.
- Real time clock function included.
- Oil free-vacuum pump.
- The unit is fully automatic and shuts off when the de-airing program is complete.

## RELEVANT STANDARDS

- BS1377

## OPTIONAL ACCESSORIES

- Pressurized storage tank, capacity 20 liters
- Valves and pressure gage (for storing de-aired water to be used in the field)
- Water pump

## ORDERING INFORMATION

- **TO-097-1-01** De-aired Water Apparatus, 110VAC, 60Hz
- **TO-097-1-02** De-aired Water Apparatus, 220VAC, 60Hz
- **TO-097-1-03** De-aired Water Apparatus, 220VAC, 50Hz

Tinius Olsen

# Triaxial Tests

## System components

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Tinius Olsen