AUTOMATIC TRIAXIAL MACHINES
50 AND 100 KN CAPACITY

STANDARD
ASTM D2850-95 /
BS 1377: Part 7, Part 8: 1990
NF P94 070, NF P94 074

■ **28-T0401/AC**

Automatic digital triaxial frame 50 kN cap. 110-230 V, 50-60 Hz, 1 ph.

■ **28-T0403/AC**

Automatic digital triaxial frame 100 kN cap. 110-230 V, 50-60 Hz, 1 ph.

Intoduction

This new series of automatic machine has been designed to perform compression triaxial tests both in consolidation and failure stage.
The consolidation stage can also be performed in anisotropic conditions, with $k_0 < 1$ (i.e. vertical stress higher than horizontal stress).
All the tests are carried out automatically either in controlled rate of displacement (as the traditional compression machines) or in controlled rate of load (particularly suitable for consolidation stage) and terminated automatically at pre-set test conditions.
The 28-T0403/AC machine can be upgraded to perform also extension tests (extension-unload). See upgrading options.

General description

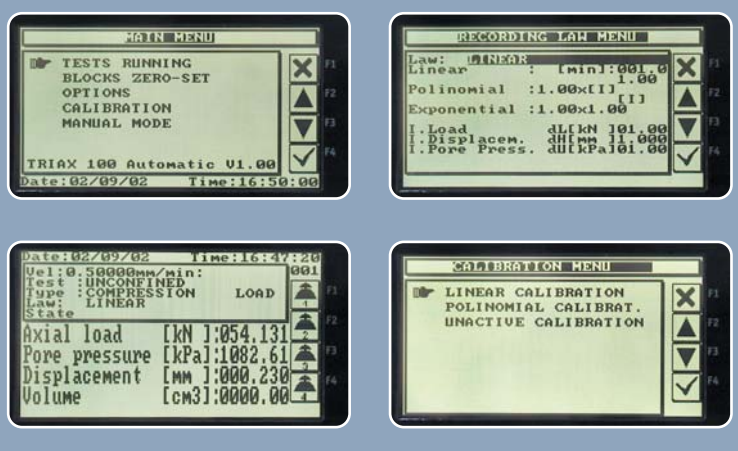
Two threaded column highly stable frame with upper crosshead beam, adjustable in height by means of a simple locking-nut system, that assures correct application of the axial stress within the triaxial chamber.
The lower box of the compression machine contains the stepper motor with servo control drive, the control panel with large graphic displays, for input of servo control parameters, test data and calibration factors, the display of recorded data in real time, the battery backed data storage and the serial output to PC. Stand alone model for automatic triaxial tests control (Unconfined UU, CU, and CD) with store of test data and possibility to download via serial port in real time or deferred time for data analysis, processing and printing.
The following triaxial tests can be automatically performed:
- Pre-axial load before the failure stage, to recreate or carry out the consolidation stage in anisotropic conditions (with $K_0 < 1$)
- Failure stage in conditions of compression (increasing axial pressure)
- Triaxial (UU, CU, CD) and unconfined tests are carried out either in controlled stress or in controlled strain conditions and terminated automatically at pre-set conditions.

28-T0403/AC with triaxial cell and accessories

Main features
- Servo controlled drive through stepper motor
- Application for compression tests
- Test velocity adjustment from 0.00001 to 9.99999 mm/min

Main advantages compared to the standard models 28-T0401 and 28-T0403
- Stand alone machine (servocontrolled with built in data acquisition unit)
- Automatically controlled rate of load
- Automatic anisotropic consolidation and failure
- Large graphic display 240x128 pixel
- Data recording and display in phisical units in real time
- Temporary connection to PC via RS 232 port to download recorded data in phisical units
- Special software available to download and convert recorded data, to be compatible with our GEOLAB 2000 package
- Upgradable for extension tests (see 28-T0403/UP1)

Detail of some screens play on the large display of 248x124 pixel



TECHNICAL DATA

Same as model 28-T-T0401 and 28-T0403 shown on page 72

Characteristics common to both models 28-T0401/AC and 28-T0403/AC

Configuration	-	servo controlled drive through stepper motor
Servo-control parameters	-	Axial load (load controlled tests)
	-	Axial displacement (displacement controlled tests)
Control Unit	-	4 channel built-in stand alone digital unit for data acquisition and control of stepper motor
	-	Microprocessored based design with 16 bit A/D converter
Control panel	-	Incorporates a large graphic display (240x128 pixel), a touch sensitive 10 keys membrane keypad
	-	Use of programmed keys F1, F2, F3, F4 allows different menu to be activated and linked together at different levels for immediate access to the required functions
Digital display	-	display in real time of test data in physical units: axial load (N), axial displacement (mm compression/extension), pore pressure (kPa), volume change (cm^3)
Resolution	-	1/65.000 full range
Connection of transducers for data acquisition(1)	a)	To the compression machine - Strain gauge load cell for axial load measurement - Potentiometric transducer for axial displacement
	b)	To the triaxial cell - Strain gauge transducer for pore pressure
	c)	To volume change control panel - Potentiometric transducer for volume change measurement
Excitation supply of the transducers	-	built-in within the compression machine
Data storage	-	battery backed with real time clock
Scanning time of data	-	Data recording can pre-set by the operator:
	-	at intervals of time linear polynomial, exponential
	-	at intervals of recorded stress
	-	at interval of recorded displacement
Data maximum capacity	-	2000 readings per channel for each test
Transducers calibration	-	Automatic linear calibration (5 points)
	-	Input of parameters of polynomial equation for non linear calibration
	-	Non-volatile storage of channels calibration data
RS 232 C Serial port	-	For temporarily connection to PC to download recorded data in physical units:
	-	with serial data communication program (e.g. Hyperterminal D Terminal code 82-P0800/TRM)
	-	with our Geolab 2000 dedicated software

(1) See accessories

Software application

The machine is fully automatic, controlled via the front panel with digital display of test measurements (axial pressure, axial displacement, pore pressure and volume change) in real time.
The computer is only temporarily connected for data transmission of stored data for monitoring of the test in progress, processing and printing of results.
For complete processing according to the International standards (BS 1377, ASTM, ISSMGE) and customised printout of test reports a special software, Windows compatible, is available for triaxial tests (see Geolab 2000, code 30-T0601/P3).
The following diagrams and printouts are available for a single or for a group of tests:
- Mohr's circle plots and Mohr-Coulomb linear failure envelope
- Stress path plots and failure envelope (according to MIT analysis)
- Axial stress vs. axial strain
- Pore pressure vs. axial strain (for CU triaxial tests)
- Volume change vs. axial strain (for CD triaxial tests)
- Stress ratio vs. strain
- Skempton's A parameter vs. axial strain (for CU triaxial tests).

A special section of the software is devoted to the customised printout, 30-T0601/R0. The user can introduce all the information and general data to printout each test certificate (logo of the laboratory, name of the technicians involved in the tests, file of the test, number of the certificate, reference standards, etc.).

UPGRADING OPTIONS

COMPRESSION AND EXTENSION TESTS (EXTENSION-UNLOAD)

Introduction

The 28-T0403/AC machine can be upgraded to perform extension tests (extension-unloaded), where the axial stress can be reduced below the horinzontal stress.
This condition (where the factor K_0 is >1) can be automatically carried out either in the consolidation or in the failure stage, at constant rate of stress. The maximum tensile capacity is 8 kN. Data recording, downloading to PC, processing and printing are carried on in the same way described above.

n o t e

To perform extension tests it is necessary to substitute the porous caps model T0420/A3, T0422/A3, T0425/A3, T0428/A3, T0432/A3 respectively with the following appropriate models: T0420/A3T, T0422/A3T, T0425/A3T, T0428/A3T, T0432/A3T, for dia. 35-38-50-70-100 mm. Furthermore the modification of the upper flange of the triaxial cell is also required. This modification can be factory made on your existing triaxial cells or programmed in case of a complete laboratory supply. For new modified triaxial cells ask for the following codes:
28-T0410/AT Triaxial cell up to 50 mm dia.
28-T0411/AT Triaxial cell up to 70 mm dia.
28-T0416/AT Triaxial cell up to 100 mm dia.

■ **28-T0403/UP1**

Upgrading system for the 28-T0403/AC machine to perform extension test (extension-unload)

Including firmware and the following mechanical accessories:

Extension testing kit comprising:
- Bidirectional spherical seat for upper crosshead
- Fast clamping device load cell/triaxial cell piston
- Clamping device triaxial cell/lower platen to triaxial frame (suitable for models: 28-T0410/A, 28-T0411/A, 28-T0416/A).

The extension testing kit is also proposed when using the 28-T0403 machine for stress path triaxial tests with the code 28-T0403/A1. See page 84.

Accessory

◤ **28-T0403/A2** Triaxial cell piston for extension tests. It is interchangeable with the standard piston part of 28-T0410/A, 28-T0411/A, 28-T0416/A cells

Detail of the locking system of the triaxial cell to the lower platen for extension tests

Detail of the triaxial cell and rigid connection to the piston for extension tests

Measurement accessories

Electronic transducer

Same as those shown on page 76.