27-WF2180

- **Fully automatic management of the complete test (from consolidation to failure).**
- **Automatic pneumatic application of vertical loading.**
- **Different and independent data recording mode for consolidation and failure.**
- **Different protocols of data downloading via RS232 serial port.**
- **Easy software interface option for data processing with template 30-WF6016/T2 AND 30-WF6016/T9.**

Reference Standard: ASTM D3080, CEN ISO TS 17892-10, BS 1377:7, AASHTO T236, NF P094 0711/2

MAIN FEATURES

- **Compact design, easily transportable and assembled on a standard laboratory bench.**
- **Sets of heavy and bulky dead weights are not required.**
- **A balanced lever arm maintained horizontal is not required.**
- **Loading yoke and pneumatic piston factory preassembled and balanced.**
- **The vertical force is positively applied to the shear box without any friction.**
- **Automatic application of pre-set consolidation steps (up to 50).**
- **Possibility to set different speeds and travel (forward and reverse) in the residual shear tests.**
- **Each single step of axial force can be applied:**
  - **instantaneously**
  - **by means of a linear ramp in a preset time interval.**
- **Automatic management of the test with the possibility to directly continue from consolidation to failure (the operator only needs to remove the clamping screws of the shear box).**
- **Driven by high resolution stepper motor.**
- **Possibility to set different speeds and travel (forward and reverse) in the residual shear tests.**
- **Easy and immediate set up of the test parameters via the large digital graphic display.**
- **Straight connection between shear box, drive unit and load cell for the axial transmission of the horizontal force along the shearing plane.**
- **Instead of the classic "swan neck", a straight-rigid loading yoke between shear box and load cell assembly is used, to increase the stiffness of transmission of the horizontal force along the shearing plane.**
- **Shear carriage and box assembly constructed of brass, chemically nickel-plated protection.**
- **The normal loading acting on the specimen is also maintained after the end of the test, until unloaded by the operator.**
- **New technopolimeric carriage with high resistance.**

SHEARMATIC

This new and microprocessor based advanced model, is a stand-alone machine, driven by a high resolution stepper motor with epicyclical reduction gear with a reduced backlash.
Incorporates a pneumatic closed loop system for the automatic application of the axial pressure by a high performance pressure regulator, with the main advantage of eliminating the manual loading of the dead weights.This system can also be upgraded to perform different types of automatic shear tests, since it is possible to control the different parameters measured during the test: for example the constant volume shear test, where the height of the specimen is maintained constant along the failure stage.
Excellent quality and high resistance techno-polimeric material has been adopted for the carriage of the shaearbox. It garantees very good stand to wear and tear, stiffness and stability to water, contaminated substances, acid and base contained in soil samples.
No more encrustings on the internal surface of the carriage! Good handiness because of light weight.

SPECIFICATION

Display:	Mono-chromatic large digital display (240 x 128 pixels)
Motor:	High accuracy stepper motor with 1/10.000 resolution
Test velocity:	Infinitely variable from 0.00001 to 11.00000 mm/min (within ±1%)
Maximum horizontal force:	5 kN
Maximum vertical force:	8 kN (more than 800 kPa for a specimen 100 x 100 mm)
Max. shear cycles:	9 (forward and reverse)
Maximum travel:	20 mm
Height of the specimen:	20 mm
Max. air pressure supply:	10 bar
Max. working air pressure:	8 bar
Automatic stop of the test	· after a pre-set horizontal load or displacement · after a pre-set time of the shear stage (from 1 min to about 7 days)
Safety micro switch:	· optical for zero and end of travel · mechanical for maximum horizontal displacement
Application of vertical loading	· pneumatic piston with an high resolution regulator motor-driven via "Automax" electronic board in a closed loop with a 10 bar pressure transducer
3 calibration modes of transducers:	· 1 step linear · 2nd degree polynomial · up to 10 steps linear
Data recording:	· consolidation stage: vertical pressure and displacement · shear stage: horiz. force and displacement; axial press. and displacement
Recording mode:	· linear, exponential, polynomial versus time · For pre-set intervals of the recorded data
Maximum recorded data:	· 2000 lines of data
Blocks of memory:	up to 25
Communication protocol:	selectable via RS232 Serial Port: · ASCII for use with Windows Hyper Terminal and template 30-WF6016/T1 and 30-WF6016/T9 · CONTROLS for use with 82-Q0800/TRM · GEOLAB2000 for use with 30-T0601/IMP

ELECTRONIC

The electronic parts of the Shearmatic is based on our "Automax" unit, this is a micro-processor system that reads and processes the force, axial pressure and displacement readings, manages the motor, the pressure valve and the safety systems and the test steps through closed loop systems. It features a front panel in scratch proof poly carbon with a ten key keyboard and a large mono-chromatic graphic display.

Main characteristics:

- Multi-layered printed board using the latest technology and SMD components.
- Hitachi H8S 16 bit processor
- RAM memory with battery back-up with clock/ calendar which operate also when the unit is switched off.
- Analogical channel for strain gauge load cell with 130,000 points resolution.
- Two analogical channels for displacement transducers with 130,000 point resolution for each channel.
- Serial output port 38,400 baud rate for connection of PC.
- Digital port with very high resolution for management of the stepper motor of the machine.
- Relay outputs for motor control
- Digital input ports for the full-travel safety switches.

SHEARMATIC

Ordering information

Shear machine

Code	Description
27-WF2180	**SHEARMATIC** Automatic digital direct/residual shear machine (multi-reversal type) with programmable pneumatic vertical loading system 110-230V, 50-60 Hz, 1ph, complete with load cell (5kN cap.) and linear transducers for vertical (10mm travel) an horizontal displacement (25mm travel)

Transducers (included in the machine)

Code	Description
27-WF0377/ST	Load cell 5 kN capacity for Shearmatic with cable 6 pins connector
30-WF6207	Linear potentiometric transducer 10 mm travel with cable 6 pins connector
30-WF6208	Linear potentiometric transducer 25 mm travel with cable 6 pins connector

Shear box (not included with the machine)

Code	Description
27-WF0215/B	Shear box for square specimens 60 x 60 mm
27-WF0216/B	Shear box for square specimens 100 x 100 mm
27-WF0218/B	Shear box for round specimens 60 mm diameter
27-WF0219/B	Shear box for round specimens 63.5 mm diameter
27-WF0222/B	Shear box for round specimens 100 mm diameter

Spare parts

Description/Code	**27-WF0215/B 60 x 60 mm**	**27-WF0216/B 100 x 100 mm**	**27-WF0218/B 60 mm dia**	**27-WF0219/B 63.5 mm dia**	**27-WF0222/B 100 mm dia**
Loading pad	27-WF0215/B2	27-WF0216/B2	27-WF0218/B2	27-WF0219/B2	27-WF0222/B2
Retaining plate	27-WF0215/B3	27-WF0216/B3	27-WF0218/B3	27-WF0219/B3	27-WF0222/B3
Porous plate	27-WF0215/4	27-WF0216/4	27-WF0218/4	27-WF0219/4	27-WF0222/4
Plane grids (two)	27-WF0215/B5	27-WF0216/B5	27-WF0218/B5	27-WF0219/B5	27-WF0222/B5
Perforated grids (two)	27-WF0215/B6	27-WF0216/B6	27-WF0218/B6	27-WF0219/B6	27-WF0222/B6
Sample cutter (°)	27-WF0215/B7	27-WF0216/B7	27-WF0218/B7	27-WF0219/B7	27-WF0222/B7
Extrusion dolly (°)	27-WF0215/8	27-WF0216/8	27-WF0218/8	27-WF0219/8	27-WF0222/8

(°) Not supplied with the shear box. It must be ordered separately

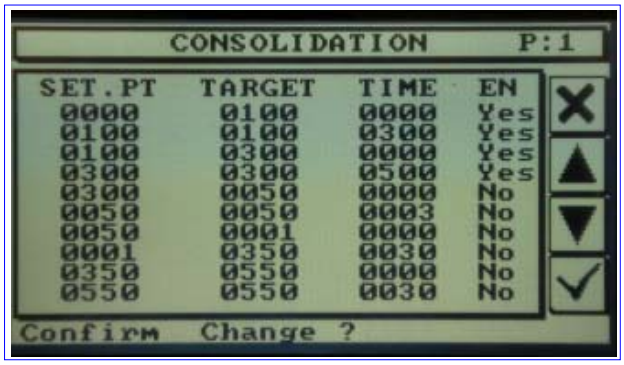
Accessories for air supply

Code	Description
28-WF2016/A	Laboratory air compressor, 10 bar max. pressure, 50 l cap.230 V,50 Hz,1 ph.

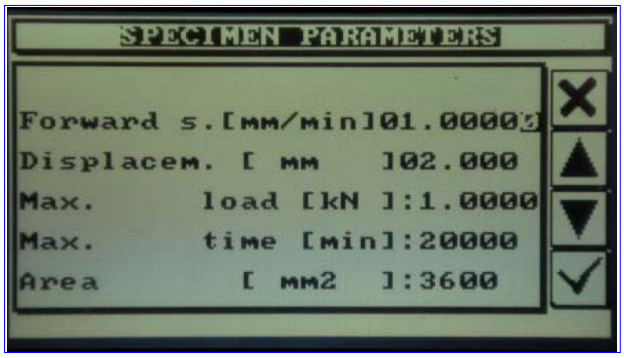
Accessories for software (PC and printer not included)

Code	Description
30-WF6016/T2	Direct and residual shear geo-analysis template conforming to BS 1377:7
30-WF6016/T9	Direct and residual shear geo-analysis template conforming to ASTM D3080
27-WF2180/LINK	4 Channels multiconnection box for up to 4 shear testing machine

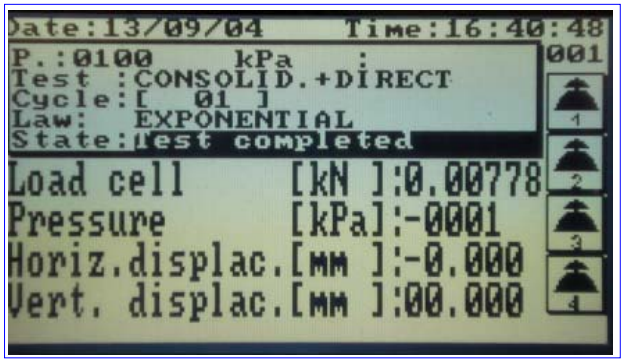
First page of the main menu
Selection of main options:
- Start of the test (direct or residual)
- Delete of recorded data & tests
- Options of language clock and data format
- Calibration procedure
- Manual mode for digital display of the transducers (e.g. for calibration control) out of the tests



Set up of the consolidation steps
Each line of this table step is defined by:
- initial pressure (set point) that is equal to the pressure of the previous step
- final pressure (target) that will be reached automatically at constant rate
- pre-set time to pass from initial to final pressure
  For example lines n. 3 and 4 of the table on the left means:
- to apply istantaneously (time = 0) the consolidation step from 100 to 300 kPa
- to maintain the pressure of 300 kPa for the time of consolidation (e.g. 500 min.)



Direct shear test
Input of test parameters:
- Velocity of shear
- Maximum horiz. displacement
- Maximum horiz. force
- Maximum time of the shear stage
- Cross section of the specimen



Direct shear test
Digital display of measurements in real time:
- Horizontal force
- Axial pressure (maintained constant)
- Horizontal displacement
- Vertical displacement