

## CONSOLIDATION

(IS 2720 - Pt IV)

The unit consists of an aluminum cast body, and a lever with the loading ratio of 1:10. Loading yoke has self aligned bearing for proper transfer of load on the specimen. Beam is fitted with counter balance weight while the body has a screw jack , for jerk less loading on the specimen through the beam. Horizontal clearance have been so maintained that the unit accommodates cells with specimen up to 100mm diameter.

### ●● HS18.30

#### Bench type Consolidometer (Front Loading)Single Unit

Test is performed as per IS:2720 (Part-XV).

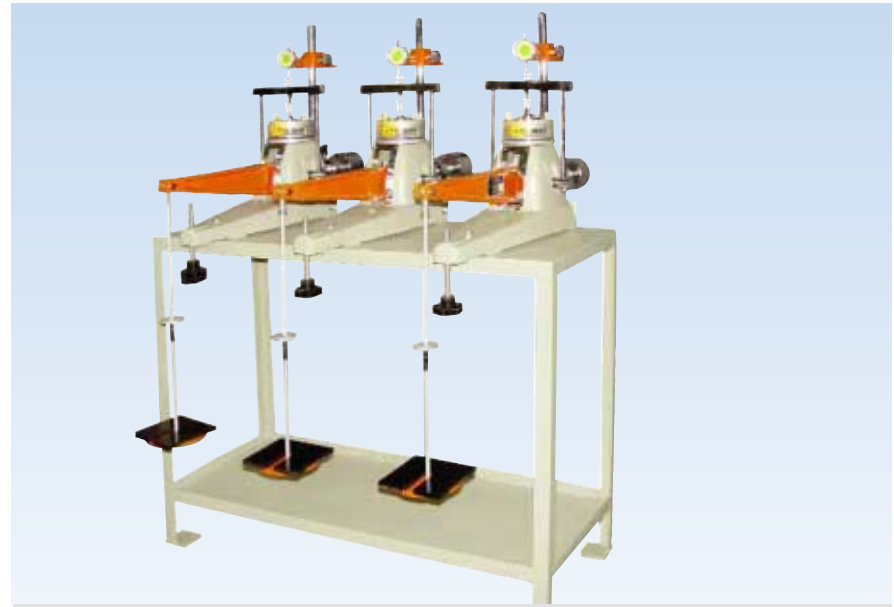
It comprises:

Loading Unit	
20 kg/cm <sup>2</sup> capacity	- 1 No.
Consolidation cell	
60mm x 20mm height	- 1 No.
Dial gauge 10x0.002mm	-1 No.
Set of Weights	- 1 Set
(Stress - up to 10kg/cm <sup>2</sup> )	

### ●● HS18.35

#### Three Gang Bench Type Consolidometer (Front loading)

It is same as HS18.30 except that the unit have 3 loading machines instead of one .The unit comprises:



HS18.35

Loading Unit	
20 kg/cm <sup>2</sup> capacity	- 3 No.
Consolidation cell	
60mm x 20mm height	- 3 No.
Dial gauge 10x0.002mm	- 3 No.
Set of Weights	- 3 Sets
(Stress - up to 10kg/cm <sup>2</sup> )	

engineering units are displayed as programmed through keyboard. Time recording is on  $\epsilon$  basis where as consolidation is measured directly in mm.

#### Signal Conditioning Unit

The Three-channel micro controller based signal conditional unit is the three-function system attached to the Single/Three-Gang Bench Type Consolidation Test Equipment. The functions are displacements directly indicated in its respective engineering unit. The system receives the output signal from the displacement sensors attached to the single/three-gang bench type consolidation

#### Electronic Consolidation Apparatus

Electronics units have a micro processor controlled digital display. In case of single channel only one channel is displayed and for multiple channels readings in direct



HS18.30



HS18.530



test equipment. It consists of the power supply, signal conditioning cards and processing card. The signal-conditioning card amplifies the signal of each sensor and transfers it to processing card. The processing card consists of a Micro controller that stores the reading of each sensor and finally transfers it to computer. The data of all three channels of three-gauge bench type consolidation test equipment can be transferred to computer and can be online monitored.

The Unit also provides the facility of online monitoring of data through LCD display. Each channel is scanned simultaneously and can be observed.

Broadly the following facilities are incorporated in the system:-

1. Independent Displacement channel for each consolidation equipment.
2. Independent digital display for each channel.
3. Data storing on  $\mu$  basis.
4. Automatic data saving on stop button.
5. There are 25 set results that can be stored in the electronic unit. The sample number can be programmed.
6. Online date and time of test will be stored along with the data.
7. On line (while the test is in progress) data transfer to the computer which will be stored in the computer with a particular file name.
8. Data can be down loaded to the computer after the test, which will be stored even after the power is off.
9. Without computer, test data can be printed through printer port provided in the electronic unit.

#### Signal Conditioning and Processing Unit

1. 8 bit micro-controller with multitasking facility having multiprocessing Processor unit in it.
2. Flash memory of 512KB required to save data while testing.
3. Flash memory that can store the data, even if power turns off.
4. A direct PC connection using one serial RS232 port for data receiving and transmission of data.
5. 16 extended I/O pins.
6. Printing facility with any parallel port printer directly from the Electronic Unit.

7. Keyboard with 12 functional keys, can be extended to 64 keys or Dip Switches.
8. Memory is nonvolatile. Data retention is there even case of power failure.
9. 10 onboard 12 bit analog channels.
10. Reference voltage for AD converter.

#### ●● HS18.530

##### Electronic Bench Type Consolidometer (Front Loading)

Same as HS18.30 except that the data is displayed and acquired on electronic unit. Test is performed as per IS:2720 (Part-XV). The unit comprises:

Loading Unit capacity 20kg/cm <sup>2</sup>	- 1 No.
Consolidation cell 60mm x 20mm height	- 1 No.
Displacement sensors 10 x 0.001 mm	- 1 No.
Set of Weights upto 10kg/cm <sup>2</sup>	- 1 Set
Digital display with RS232 and one L.V.D.T. of $\pm 10$ mm	- 1 No.

#### ●● HS18.535

##### Electronic, Three Gang Bench Type Consolidometer (Front Loading)

Same as HS18.35 except that the data is displayed and acquired in the digital electronic system. Unit conforms to IS:2720 (Part-XV). It comprises of :

Loading Unit capacity 20kg/cm <sup>2</sup>	- 3 No.
Consolidation cell 60mm x 20mm height	- 3 No.
Displacement sensors 10 mm x 0.001mm	- 3 No.
Digital display unit	- 1 No.

#### Optional Accessories for HS18.30, HS18.35, HS18.530, HS18.535 and HS18.630:

##### Consolidation Cells

**HS18.05.3** - Fixed Ring consolidation Cell for 70mm x 20mm thick specimen.

**HS18.05.3** - Fixed Ring consolidation Cell for 100mm x 25mm thick specimen.



HS18.535



**Floating Ring Consolidation Cell**

**HS18.05.7** - Floating ring consolidation Cell for 60mm x 20mm thick specimen.

**HS18.05.9** - Floating ring consolidation Cell for 70mm x 20mm thick specimen

**HS18.05.10** - Floating ring consolidation Cell for 100mm x 25mm thick specimen.

**Software** - Since the digital display system has RS232 port, readings can be transferred to the computer on a basis for off line analysis, window based software is used.

**HS 18.630**

**Digital Consolidation Test Apparatus**

Digital consolidation test apparatus conforms to essential requirements of IS 2720 PT (XV) and BS1377. It is totally automatic, loading and unloading is controlled through very strong window based software. Stress is maintained by controlling the rotation of micro stepper motor.

Consolidation on most of the samples can be completed within 24-48 hrs. Stress is maintained on feed back basis by signals received from the load cell.

Unit comprises of :  
Loading Frame - 20kN capacity - 1 No.

Consolidation cell

60mm x 20mm ht - 1 No.

Dedicated Computer - 1 No.

Displacement Sensor

10x0.001mm - 1 No.

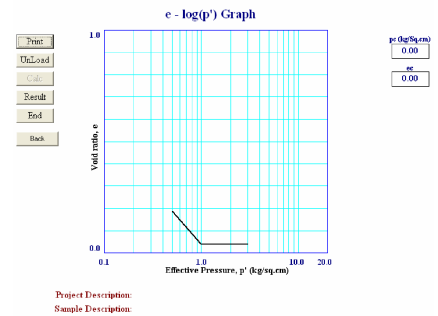
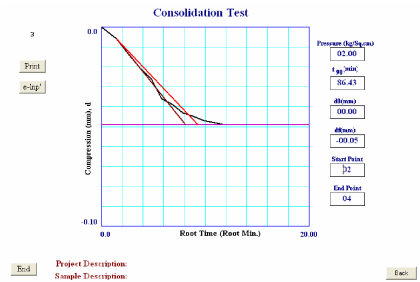
Load cell capacity 20kN - 1 No.

**Salient Features of the software for HS18.30, HS18.35, HS18.530, HS18.535 and HS18.630:-**

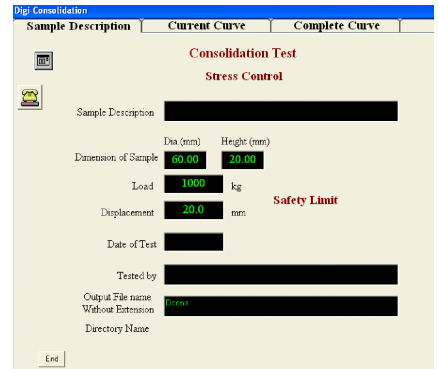
Software for consolidation manual/automatic (with Heico electronic units no manual recording is required).

- i) Calculates dry density, initial void ratio and moisture content of specimen.
- ii) Plots  $\epsilon$  vs deformation.
- iii) Plots void ratio vs effective stress and also gives value in tabular form.
- iv) Calculates  $c_c$ ,  $a_v$ ,  $m_v$  and  $c_v$  values for all stress increments.

- v) Desired load and unloading cycles can be performed.
- vi) Gives past consolidation pressure for the soil.
- vii) It has the option for manual as well as automatic recording.



**HS18.630**



**Dedicated Computer with Controlling and Data Acquisition Card.**

It consists of:  
Pentium (IV) 3.0 GHz. or higher, 512MB RAM, 52x CD ROM, 80 GB HDD, Keyboard, Mouse, 15" Color Monitor with Color Inkjet Printer.  
(Note - Computer with latest configuration will be supplied)



## ●● HS 18.730

### Hydraulic consolidometer (Rowe Type Consolidation Cells)

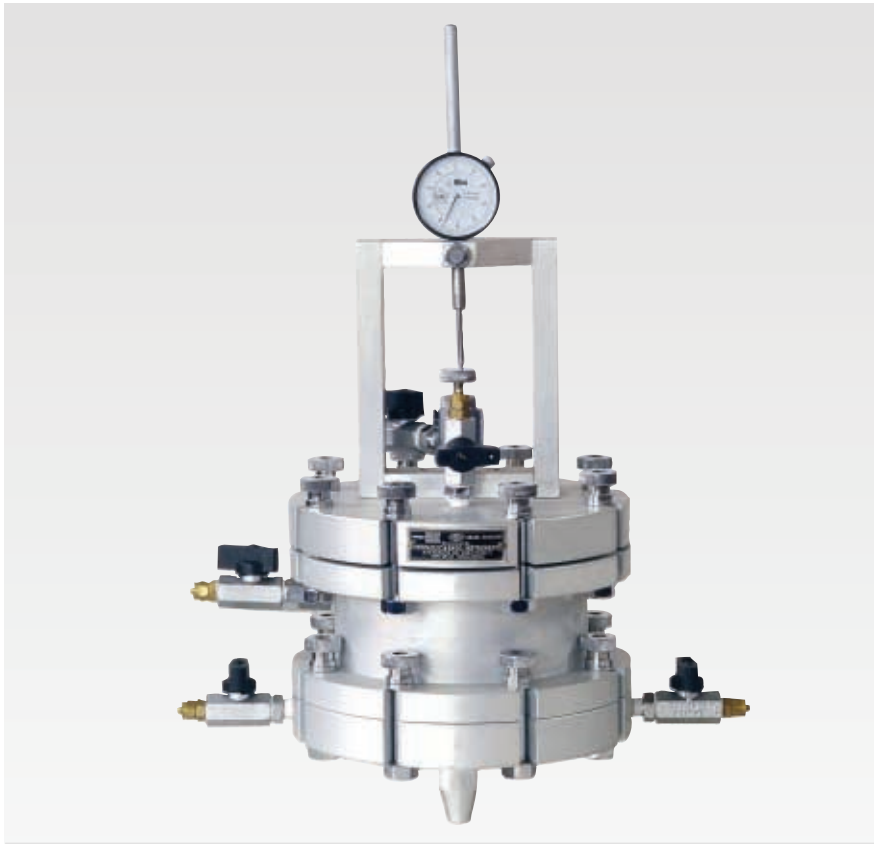
Heico's Hydraulic Consolidometers are available for conducting consolidation tests on smaller to larger sized soil specimens under saturated condition with the application of back pressure. A check on the

applied through a flexible diaphragm to simulate field consolidation under uniform pressure or under uniform deformation. Deformations volume changes and pressures are measured with a great degree of precision. The hydraulic Consolidometer opens up a vast research potential of theoretical and applied nature on offshore and onshore soft to stiffer clays.

Various methods of drainage and loading conditions can be applied to the specimen. Basically cells of three different sizes are available. Each type can withstand a pressure of 10 bars. No-volume change valves are fixed at top plate, bottom plate and in the middle for different combination of test requirements.

#### ACCESSORIES

- i) Loading diaphragm
- ii) Porus stones
- iii) No volume change valves
- iv) Dial gauge 10x0.002mm or
- v) Displacement sensor 20x0.001mm with digital display unit.



HS 18.730

degree of saturation can be performed. The pore pressure dissipation during consolidation can be measured under various simulated drainage conditions namely, one-way, two-way, radial in-wards or radial outwards. The consolidation pressure can be

#### Consolidation Cell

Heico hydraulic consolidation cells come in different models for small to large diameters of samples. Since the loading is through pneumatics, drainage can be precisely controlled.

Model No.	18.730.1	18.730.2	18.730.3
Size of the specimen diameter (mm)	75.5	151.5	252.5
Height (mm)	30	50	90
Points in the base	2	2	4