



## ROCK

Rock mechanics is an important field of geotechnical engineering as it is the theoretical and applied science concerning the physical behavior of rocks and rock masses. It also deals with the application of the principles of engineering mechanics to the design of the rock structures generated by mining, drilling, civil construction activity and other structures built in or made of rock.

Like aggregates, rocks need special cares too: a rock stratum undergoes several alterations in case of excavations and handlings. As a result, specific studies on the properties of intact rocks are required.



## CONTENTS

DIGITAL POINT LOAD TESTER (ROCK STRENGTH INDEX) .....	56
ROCK CLASSIFICATION HAMMER (LOW IMPACT ENERGY MODEL) .....	56
CALIBRATION ANVIL .....	57
SLAKE DURABILITY APPARATUS .....	57
AUTOMATIC CORE-ROCK COMPRESSION TESTING MACHINE .....	58
AUTOMATIC CORE-ROCK COMPRESSION TESTING MACHINE (TOUCH SCREEN) .....	63
COMPRESSION JIG ASSEMBLY FOR ROCK CORE SPECIMENS .....	68
TRIAxIAL TESTS ON ROCK SPECIMENS .....	69
SPECIMEN EXTRUDER FOR HOEK TRIAXIAL CELLS .....	70
BRAZILIAN TEST APPARATUS .....	70

## HİRA TESTING EQUIPMENT

### DIGITAL POINT LOAD TESTER (ROCK STRENGTH INDEX)

STANDARD: ASTM D5731

Used to determine the strength values of a rock specimen both in the field and in the laboratory.

It consist of a load frame for applying loads up to 50 kN or 100 kN, on which a manual hydraulic jack is mounted.

The instrument accepts core specimens up to 4" (101.6 mm) diameter which are loaded by two cone shaped points. A graduated scale indicates the distance between the conical points.

Complete with Manuel Hydraulic Jack, Digital Indicator, Safety Mask and Wooden Carrying Case.

#### Spare Parts & Accessories:

Product Code	Product Name
HR-R0125/1	Manuel Hydraulic Jack for HR-R0125
HR-R0130/1	Manuel Hydraulic Jack for HR-R0130
HR-R0125/2	Digital Indicator
HR-R0125/3	Safety Mask
HR-R0125/4	Wooden Carrying Case



HR-R0125

#### Technical Specifications:

Product Code	Product Name	Dimensions (cm)	Weight (kg)
HR-R0125	Digital Point Load Tester (Rock Strength Index), 50 kN	40x53x72	25
HR-R0130	Digital Point Load Tester (Rock Strength Index), 100 kN	40x53x72	40

### ROCK CLASSIFICATION HAMMER (LOW IMPACT ENERGY MODEL)

STANDARDS: ASTM D5873

This lightweight and portable impact hammer is used for rock classification tests.

Includes rubbing stone for surface preparation.

The hammer is similar to a device used for many years for strength classification tests of mass concrete.

Cylindrical cores, usually NW size, are held in a horizontal position and the hammer mechanism impacted against the core to obtain rebound readings. A series of readings is taken along the length of the core to get the average rebound number.

The core rock specimen normally NX Ø54,7 mm is held on a special cradle in horizontal position and the hammer tests the same in all its length to obtain average of the readings.

The Rock Cradle is used to hold cores (EX Ø21,46 mm and NX Ø54,74 mm) in place during rock classification test procedures. The cradle incorporates a guide for positioning the hammer to allow for a series of readings along the length of the core.

Rock cradle and Calibration Anvil should be ordered separately.



HR-R0120 with HR-R0110

#### Technical Specifications:

Product Code	Product Name	Impact energy (Nm)	Dimensions (cm)	Weight (kg)
HR-R0120	Rock Classification Hammer (Low Impact Energy Model)	0.74	10X10X36	2

#### Spare Parts & Accessories:

Product Code	Product Name	Dimensions (cm)	Weight (kg)
HR-R0110	Rock Cradle	15x11x31	20
HR-R0115	Calibration Anvil	Ø 15x23	16

## CALIBRATION ANVIL

STANDARDS: EN 12504-2, ASTM D5873, C805

Used for the verification of the calibration of the hammers.

The EN 12504:2 Specification requires obligatory the use of the anvil for the hammer tests.

The Standard specifies; before a sequence of tests on a concrete surface, take and record readings using the steel reference anvil and check to ensure that they are within the range recommended by the manufacturer. If they are not, clean and/or adjust the hammer.

After tests, take readings using the steel anvil, record them and compare them with those taken prior to the test. If the results differ, clean and/or adjust the hammer and repeat the test.

Made of hardened steel according to the standards.



HR-R0115

Product Code	Product Name	Dimensions (cm)	Weight (kg)
HR-R0115	Calibration Anvil	Ø 15x23	25

## SLAKE DURABILITY APPARATUS

STANDARDS: ASTM D4644

This equipment has been developed to assess the durability of rock to weakening and disintegration when subjected to the simulated effects of climatic slaking.

The rock samples are dried and then submitted to wear stress inside a drum which is rotated into water.

The test is performed different times and the wear is given by the loss in weight of the sample.

The system incorporates a motor drive unit mounted on a baseplate which revolves two stainless steel drums manufactured from 2 mm mesh, 140 mm dia. x 100 mm long.

The tanks are filled with water to a level 20 mm below the drum axis.

A digital timer automatically stops the motor after the preset time. The machine can turn to two or four drums with 20 rpm.

The equipment is supplied complete with two Drums with tanks, base and accessories.

### Technical Specifications:

Product Code	Product Name	Dimensions (cm)	Weight (kg)	Power Supply
HR-R0135	Slake Durability Apparatus	35x74x30	30	220 V, 50 Hz, 1 ph
HR-R0135/60Hz	Slake Durability Apparatus	35x74x30	30	220 V, 60 Hz, 1 ph

### Spare Parts & Accessories:

Product Code	Product Name	Dimensions (mm)
HR-R0135/1	Drum (2 pieces)	Ø 140 x 100



HR-R0135

## AUTOMATIC CORE-ROCK COMPRESSION TESTING MACHINE

STANDARDS: EN 12390-3, 12390-4; BS 1881, ASTM C39

The HiRA Automatic 600 kN Capacity Compression Testing Machine has been designed for reliable and consistent testing of core and rock samples. Machine confirms all EN, ASTM and BS standards written above. These also meet the requirements of CE norms for the safety and health of the operator.

A compression test determines behavior of materials under crushing loads. The specimen is compressed and deformation at various loads is recorded.

Testing machines are supplied with EN compression platens as standard. Machines also comply with the ASTM C39 standard when used together with suitable platens.

Tests can be performed by either Digital Readout Unit or on a computer with using free Software.

The Automatic Core-Rock Compression Testing Machine allow inexperienced operators to perform the tests. Once the machine has been switched on and the specimen is positioned and centered by the help of centering apparatus. The only required operations are;

- Setting test parameters, including pace rate (only required when the specimen type is changed).
- Pressing the START button on the control unit
- The machine automatically starts the rapid approach, when the specimen touches the upper platen the rapid approach is ended and starts loading at the pace rate that selected by user and stops once the specimen fails.
- Automatically saves the test parameters and test results.



**HR-R6000**

### ***The Automatic Core-Rock Compression Testing Machines consist of;***

- Load Frame,
- Automatic Hydraulic Power Pack,
- Digital data acquisition & control system,
- Distance Pieces, Ø165x30 mm, Ø165x50 mm and Ø165x80 mm,
- Upper Platen (with ball seating assembly) Ø165 mm,
- Lower Platen Ø165 mm,
- Loading Cylinder Assembly & Limit Switch for safety,
- Front and Rear Protective Doors for safety.
- Software and Ethernet Cable.



**HR-R6000/TS with HR-G0979**

### ***Core-Rock Compression Load Frame***

Load Frame is 600 kN Capacity.

The dimensions of the 600 kN Load Frame allow the testing of concrete and rock samples up to its capacity.

The load frame provides the stability needed for accurate and repeatable test results over the years of operation.

The frames are supplied with factory calibration certificate for force transfer stability and the self-alignment of the upper loading platen conforming to EN 12390-4.

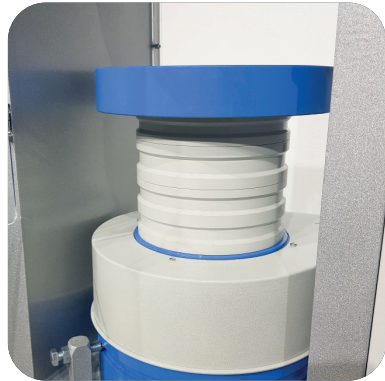
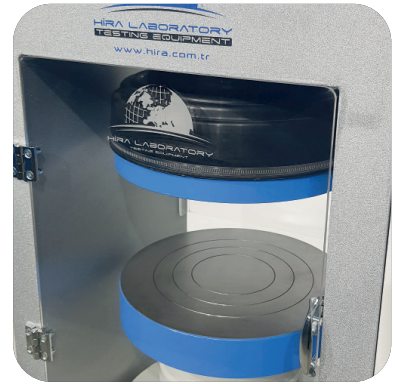


## Upper Platens/Lower Platens

Upper Platen (with ball seating assembly) Ø 165 mm and Lower Platen Ø 165 mm.

The platens enable the testing of a wide variety of cylinder or similar samples.

- Manufactured from high quality steel, which is then hardened, smoothed and finished.
- The roughness value for the surface texture of the auxiliary platens is  $\leq 3.2 \mu\text{m}$ .
- Ø 165 mm Upper Platen (with ball seating assembly) and Lower Platen have centering rings on the lower platens for proper centering of 100 mm and 150 mm cylinder samples.



## Distance Pieces

Distance pieces are used to reduce the amount of vertical clearance between the upper platen and the lower platen. Supplied with Ø165x30 mm, Ø165x50 mm and Ø165x80 mm distance pieces.

HR-C8166 & HR-C8167 & HR-C8168

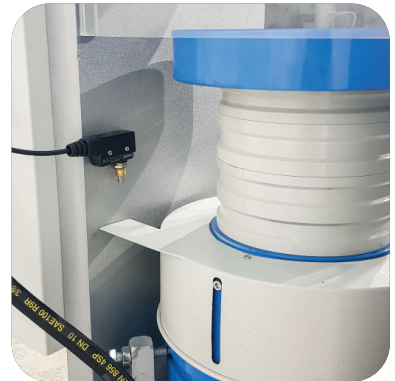
## Loading Cylinder Assembly & Limit Switch

The Load Frame has a single acting up stroking ram. The diameter of piston changes with regard to the capacity.

The maximum ram stroke is 50 mm, a limit switch is fitted to prevent over travel of the ram which cuts the power to the pump for safety.

At the end of the test process to start a new test the piston returns to default position.

There is a low friction coaxial PTFE seal between the cylinder and the piston fitted to the cylinder.



## HYDRAULIC POWER PACK AND DIGITAL DATA ACQUISITION & CONTROL SYSTEM

### Hydraulic Power Pack

Automatic Hydraulic Power Pack, dual stage, controlled by digital readout unit is designed to supply the required oil to the load frames for loading.

Controller unit has a simple and compact configuration.

Very silent power pack can load the specimen between 1 kN/sec. to 20 kN/sec, with an accuracy of  $\pm 5\%$ . A Rapid approach pump is supplied as standard. Safety valve (maximum pressure valve) is used to avoid machine overloading.

Maximum working pressure of the system is 400 bar.



HR-C8000

# HİRA TESTING EQUIPMENT

## Dual Stage Pump

The dual stage pump is formed by two groups;

1. Low pressure gear pump
2. High pressure radial piston pump

On the dual stage pump, a high delivery, low pressure gear pump is used for rapid approach, while a low delivery, high pressure radial piston pump is used for test execution. The rapid approach facility shortens the time interval from piston start until the upper platen touches to the specimen. This excellent feature helps to save a lot of time when a large number of specimens are going to be tested.



## Motor

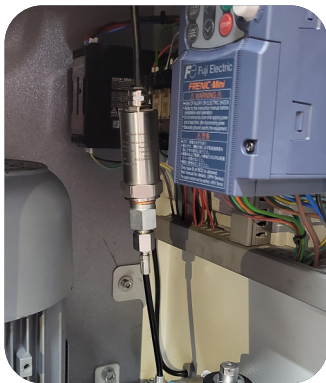
The motor which drives the dual pumps in an AC motor and it is controlled by motor inverter. The variation in the oil flow is executed with the variation of the rotation speed of the motor.

## Distribution Block

A distribution block is used to control the oil flow direction supplied by the dual stage pump, the following parts are fitted to the distribution block; Solenoid valve, Safety valve (max. pressure valve), High Precision Pressure Transducer, Low pressure gear pump and High pressure radial piston pump.



HR-C8003



HR-C8003

## High Precision Pressure Transducer

The HİRA range of Automatic Machines can be upgraded with option High Precision Pressure Transducer special calibration Class 1 starting from 1% of the full range.

This unique performance enables the machines to be used for a considerable number of applications including:

- Early age (2 or 3 days) compression strength tests
- Flexural and splitting tests by using proper accessories
- Mortar (Cement) compression tests by using proper accessories
- Core Testing

## Load Cell

600 kN Load Cell can be used for load measurements instead of High Precision Pressure Transducer.

These property allows high accuracy at very low sample failures. (Class 1 at 6 kN to 600 kN)

The user can choose Load Cell or Transducer in the order stage.

## Oil Tank

The tank includes enough oil to fill the mechanism which pushes the ram during the test. The level and oil temperature can be seen on the indicator fitted to the tank. It has 25 L capacity. Hydraulic motor oil, number 46, must be used.



## Digital Data Acquisition & Control System

The unit is designed to control the machine and processing of data from load-cells and pressure transducers which are fitted to the machine.



HR-C8002

All the operations of the unit is controlled from the front panel consisting of a LCD display and function keys.

The unit has easy to use menu options.

Digital graphic display unit loading rate of the time of Testing and load values can be monitored.

Digital graphic display is able to draw real-time "Load vs. Time".

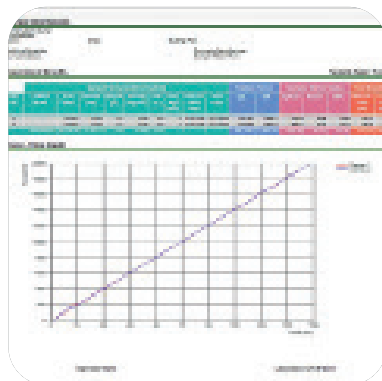
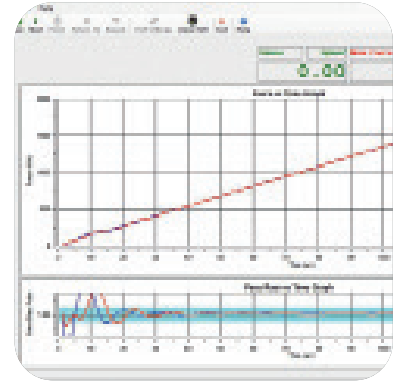
## Software

Sample, company, laboratory and test values can be entered in the programme.

Load-time graphic, test reports and sample reports can be taken.

Software provides test data, results, and the load-time graphs can be seen at LCD screen.

The Automatic Core-Rock Compression machine can be controlled (Start, Stop commands) by a computer with the software free of charge. This software provides data acquisition and management for compression, tensile and splitting tensile test throughout the test execution. The advanced functions for data base management provide an easy navigation of all saved data. The test results certificate includes all descriptive information. Therefore, test parameters can be set and details about the test carried out such as client details, test type, specimen type, user info and other information required can be entered and printed out as well as test report and graph.



Software can be performed in Turkish and English.

Test results, graphics and properties of 24 different specimens can be saved in one folder. Old test folders can be reviewed.

User can highlight all 12 different specimen curves in different colors on the graphics.

Frequently used information like name and location of the laboratory, type and dimensions of mostly used specimens are held in memory and can be written automatically by right clicking on information boxes and selecting frequently used text in menu.

User can access any data of previously completed tests and use in his/ her new report since most of the tests have same structure and properties.



### Main Features

- Pace rate control from 1 kN/sec to 20 kN/sec depending on piston size.
- Can control 2 frames (optional)
- Can make test with load control.
- Real time display of test graph.
- Analog channels for different frame load cells
- RS-232 serial port connecting for computer interface
- LCD display
- 2 different unit system selection; kN and kgf
- Multi-language support (English and Turkish)
- 2 different unit system selection; SI and Metric
- Real-time clock and date
- Free of charge PC software for the test control and printout the test report.

### Safety Features

- Maximum pressure valves to avoid machine overloading
- Piston travel limit switch
- Emergency stop button
- Software controlled maximum load value
- Front and rear transparent durable Plexiglas guards

### Technical Specifications:

Product Code	HR-R6000
Capacity (kN)	600
Roughness (µm)	≤ 3.2
Ø Lower Platen (mm)	165
Ø Upper Platen (mm)	165
Max. Vertical clearance (mm)	330
Piston diameter (mm)	150
Piston Stroke (mm)	50
Horizontal clearance (mm)	230
Oil Capacity (lt)	25
Max. Working Pressure (bar)	400
Power (W)	750

### Technical Specifications:

Product Code	Product Name	Dimensions (cm)	Weight (kg)	Power Supply
HR-R6000	600 kN Automatic Core-Rock Compression Testing Machine	71x38x91	450	220 V, 50-60 Hz, 1 ph

### Spare Parts & Accessories:

Product Code	Product Name	Dimensions (cm)	Weight (kg)	Power Supply
HR-R6000/1	600 kN Load Frame	35x30x91	350	---
HR-C8000	Hydraulic Power Pack and Digital Data Acquisition & Control System	36x38x91	100	220 V, 50-60 Hz, 1 ph
HR-C8001	Hydraulic Power Pack	36x38x91	98	220 V, 50-60 Hz, 1 ph
HR-C8002	Digital Data Acquisition & Control System	---	---	220 V, 50-60 Hz, 1 ph
HR-C8003	High Precision Pressure Transducer	---	---	---
HR-C8004	Software	---	---	---
HR-C8165	Distance Pieces	Ø 16,5 x 2,5	---	---
HR-C8166	Distance Pieces	Ø 16,5 x 3	---	---
HR-C8167	Distance Pieces	Ø 16,5 x 5	---	---
HR-C8168	Distance Pieces	Ø 16,5 x 8	---	---
HR-G0975	Computer & Printer	---	---	220 V, 50-60 Hz, 1 ph
HR-G0975/1	Usb to com port Converter	---	---	---
HR-G0979	Thermal Printer	---	---	---
HR-G0979/1	Thermal Printer roll for printer (pack of 10 rolls)	---	---	---

## AUTOMATIC CORE-ROCK COMPRESSION TESTING MACHINE WITH H-TOUCH PRO MAX CONTROL UNIT (TOUCH SCREEN)

STANDARDS: EN 12390-3, 12390-4; BS 1881, ASTM C39

The HİRA Automatic 600 kN Capacity Compression Testing Machine has been designed for reliable and consistent testing of core and rock samples. Machine confirms all EN, ASTM and BS standards written above. These also meet the requirements of CE norms for the safety and health of the operator.

Testing machines are supplied with EN compression platens as standard. Machines also comply with the ASTM C39 standard when used together with suitable platens.

Tests can be performed by controlling the machine either H-Touch Pro Max Control Unit or on a computer with using free HİRATEST Software which is provided free of charge with the machines. There are several advantages of performing tests on computer with using HİRATEST Software, such as reporting and graphical output.

The Automatic Core-Rock Compression Testing Machine allow inexperienced operators to perform the tests. Once the machine has been switched on and the specimen is positioned and centered by the help of centering apparatus. The only required operations are;

- Setting test parameters, including pace rate (only required when the specimen type is changed).
- Pressing the START button on the control unit
- The machine automatically starts the rapid approach, when the specimen touches the upper platen the rapid approach is ended and starts loading at the pace rate that selected by user and stops once the specimen fails.
- Automatically saves the test parameters and test results.



HR-R6000/TS



HR-R6000/TS with HR-G0979

### **The Automatic Core-Rock Compression Testing Machines consist of;**

- Load Frame,
- Automatic Hydraulic Power Pack,
- H-Touch Pro Max Control Unit,
- Distance Pieces, Ø165x30 mm, Ø165x50 mm and Ø165x80 mm,
- Upper Platen (with ball seating assembly) Ø165 mm,
- Lower Platen Ø165 mm,
- Loading Cylinder Assembly & Limit Switch for safety,
- Front and Rear Protective Doors for safety,
- H-GUI Software and Ethernet Cable..

### **Core-Rock Compression Load Frame**

Load Frame is 600 kN Capacity.

The dimensions of the 600 kN Load Frame allow the testing of concrete and rock samples up to its capacity.

The load frame provides the stability needed for accurate and repeatable test results over the years of operation. The machine's hydraulic power pack, control and read out units are positioned on the right hand side of the load frame for easier accessibility, increased productivity and for safer operations.

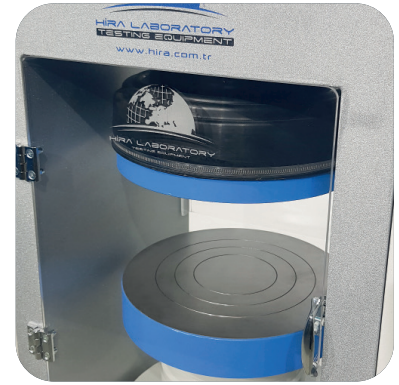
The frames are supplied with factory calibration certificate for force transfer stability and the self-alignment of the upper loading platen conforming to EN 12390-4.

### Upper Platens/Lower Platens

Upper Platen (with ball seating assembly) Ø 165 mm and Lower Platen Ø 165 mm.

The platens enable the testing of a wide variety of cylinder or similar samples.

- Manufactured from high quality steel, which is then hardened, smoothed and finished.
- The roughness value for the surface texture of the auxiliary platens is  $\leq 3.2 \mu\text{m}$ .
- Ø 165 mm Upper Platen (with ball seating assembly) and Lower Platen have centering rings on the lower platens for proper centering of 100 mm and 150 mm cylinder samples.



### Distance Pieces

Distance pieces are used to reduce the amount of vertical clearance between the upper platen and the lower platen. Supplied with Ø165x30 mm, Ø165x50 mm and Ø165x80 mm distance pieces.

HR-C8166 & HR-C8167 & HR-C8168

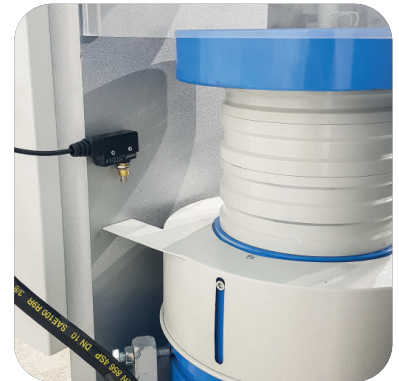
### Loading Cylinder Assembly & Limit Switch

The Load Frame has a single acting up stroking ram. The diameter of piston changes with regard to the capacity.

The maximum ram stroke is 50 mm, a limit switch is fitted to prevent over travel of the ram which cuts the power to the pump for safety.

At the end of the test process to start a new test the piston returns to default position.

There is a low friction coaxial PTFE seal between the cylinder and the piston fitted to the cylinder.



## HYDRAULIC POWER PACK AND H-TOUCH PRO MAX CONTROL UNIT

### Hydraulic Power Pack

Automatic Hydraulic Power Pack, dual stage, controlled by H-Touch Pro Max Control Unit is designed to supply the required oil to the load frames for loading.

Controller unit has a simple and compact configuration. The Hydraulic Power Pack, Control and Read out Units are positioned on the right-hand side of the load frame for easier accessibility, increased productivity and for safer operations.

Very silent power pack can load the specimen between 1 kN/sec. to 20 kN/sec, with an accuracy of  $\pm 5\%$ . A Rapid approach pump is supplied as standard. Safety valve (maximum pressure valve) is used to avoid machine overloading.

Maximum working pressure of the system is 400 bar.



HR-C8000/TS



## Dual Stage Pump

The dual stage pump is formed by two groups;

1. Low pressure gear pump
2. High pressure radial piston pump

On the dual stage pump, a high delivery, low pressure gear pump is used for rapid approach, while a low delivery, high pressure radial piston pump is used for test execution. The rapid approach facility shortens the time interval from piston start until the upper platen touches to the specimen. This excellent feature helps to save a lot of time when a large number of specimens are going to be tested.



## Motor

The motor which drives the dual pumps in an AC motor and it is controlled by motor inverter. The variation in the oil flow is executed with the variation of the rotation speed of the motor.

## Distribution Block

A distribution block is used to control the oil flow direction supplied by the dual stage pump, the following parts are fitted to the distribution block; Solenoid valve, Safety valve (max. pressure valve), High Precision Pressure Transducer, Low pressure gear pump and High pressure radial piston pump.

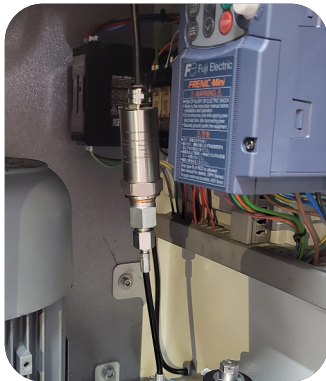


## High Precision Pressure Transducer

The HIRA range of Automatic Machines can be upgraded with option High Precision Pressure Transducer special calibration Class 1 starting from 1% of the full range.

This unique performance enables the machines to be used for a considerable number of applications including;

- Early age (2 or 3 days) compression strength tests
- Flexural and splitting tests by using proper accessories
- Mortar (Cement) compression tests by using proper accessories
- Core Testing



HR-C8003

## Load Cell

600 kN Load Cell can be used for load measurements instead of High Precision Pressure Transducer.

These property allows high accuracy at very low sample failures. (Class 1 at 6 kN to 600 kN)

The user can choose Load Cell or Transducer in the order stage.

## Oil Tank

The tank includes enough oil to fill the mechanism which pushes the ram during the test. The level and oil temperature can be seen on the indicator fitted to the tank. It has 25 L capacity. Hydraulic motor oil, number 46, must be used.





### Digital Data Acquisition & Control System

HİRATEST H-Touch Pro Max Control Unit is designed to control the automatic compressive, flexural and splitting tensile strength tests of construction materials such as concrete, cement mortar, masonry units, paving blocks, roofing tiles by processing of data from load-cells, pressure transducers or displacement transducers which are fitted to the machine.

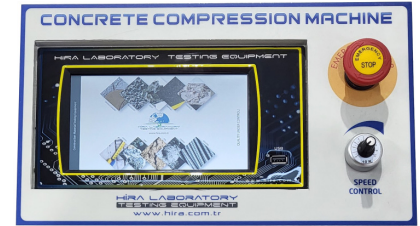
All the operations of H-Touch Pro Max Control Unit are controlled from the front panel color resistive of TFT-LCD Touchscreen display and function keys.

The unit has easy to use menu options.

It displays all menu option listings simultaneously, allowing the operator to access the required option in a seamless manner to activate the option or enter a numeric value to set the test parameters.

H-Touch PRO Max Control Unit enable simultaneously display machine status, test values, warnings during operation and test graphs such as load-time or load-displacement curves in real time.

Digital graphic display of the unit is able to draw real-time "Load vs. Time" or "Stress vs. Time" graphics.



HR-C8002/TS

### Main Features of H-Touch Pro Max Control Unit

- 2 analog channels for load cell or pressure sensors or displacement sensors.
- Can control 2 frames
- Provides load control of two separate testing frames with Closed-loop PID.
- Optionally supplied-integrated thermal printer (If requested, must be specified in the order)
- Real-time numeric display of load, loading rate and load/ time curves with automatic resolution adjustment on the touchscreen
- Up to 8-point calibration support and adjustable digital gains for every channel
- User-customizable load, position limits and test termination conditions
- Backup and recall option for device settings
- Recalling to factory default settings option.
- Easy recall of embedded test parameters for different types of tests and sample sizes
- Storage capacity up to 10.000 test result or 80 hours real time data recording with 1 sample per second recording interval (recording interval is variable).
- Graph axes on touchscreen can be configured for different tests and configurations
- The axes of the graph drawn on the device can be set to constant maximum values or axes can be automatically scaled according to the data
- Three different unit system selection; kN- Mpa -mm or lbf- psi- in or kgf- kgf/cm<sup>2</sup>- cm
- Real time and adjustable date/time.
- Multi-language support (English, French, Spanish, Turkish, Russian...)
- LAN connection for instantaneous transfer of test data to PC.
- USB port support for transfer of test data to a flash drive.
- Password Protection for machine settings, calibration and channel menus
- Record of test results in txt and MS excel format on pre-defined intervals
- 5 different visual themes
- Customizable IP

### Hardware

- 2 fully customizable analog channels with 24-bit ADC and PGA-FPGA circuit
- 800x480 pixel and 65535 color resolution TFT-LCD touchscreen
- 33 Hz control loop
- 32 Bit, 120 MHz ARM CORTEX M3 micro-PROcessor (CPU) for data acquisition
- 32 Bit, 400 MHz ARM CORTEX M3 micro-PROcessor (CPU) for data display
- Additional memory support up to 32 GB via external USB flash drive
- Support for -optionally supplied- integrated thermal printer
- Real time display of test graph
- LAN connection for instantaneous transfer of test data to PC.
- USB port support for transfer of test data to a flash drive

## Software

HİRATEST H-GUI Software has been designed for data acquisition, processing controlling, presentation and reporting compressive, flexural and splitting tensile strength tests of construction materials such as concrete, cement mortar, masonry units, paving blocks, roofing tiles with appropriate Automatic Compression/Flexure Testing Machines and also with a computer.

The Automatic Compression Machine can be controlled (Start, Stop commands) by a computer with the HİRATEST H-GUI Software free of charge.

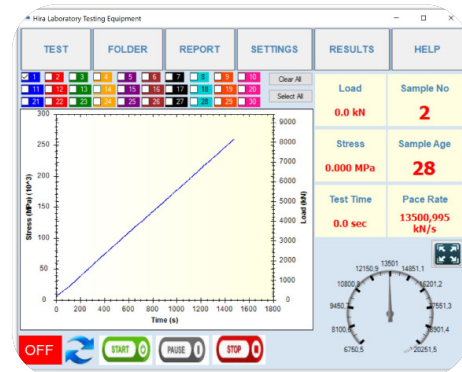
The advanced functions for database management provide an easy navigation of all saved data.

Test parameters can be set and details about the test carried out such as Test Type, Sample Type, Report details, Customer details, Sample details and other information required can be entered in the software.

This informations and "Load vs. Time" or "Stress vs. Time" graphics can be seen and printed out on the Test Report.

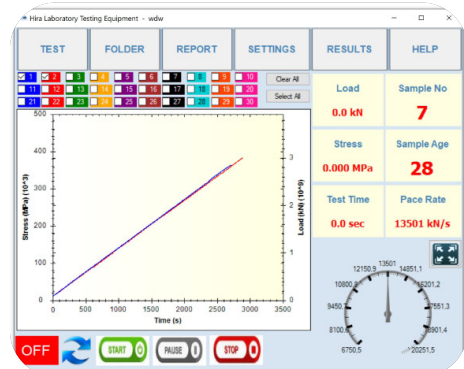
### Following tests can be done with the HİRATEST H-GUI Software;

- Compressive Strength of Concrete Cylinders / Cubes
- Flexural Strength of Concrete Beams
- Compressive Strength of Cement Mortars
- Flexural Strength of Cement Mortars
- Tensile Splitting Strength of Concrete Paving Blocks
- Tensile Splitting Strength of Concrete Cylinders / Cubes
- Flexural Strength of Roofing Tiles
- Flexural Strength of Concrete Kerbs
- Compressive Strength of Masonry Units



### Following tests can be done with the HİRATEST H-GUI Software;

- Multi-language support and customizable user interface
- 30 Tests Results, Graphics and Properties Storage Capacity in One Test File
- Exporting test results to database
- Advanced test graphical interface
- Option to store and recall test information
- Modification of test machine parameters using the software
- Able to save frequently used texts in memory and recall them when necessary
- Exporting reports and graphs
- Flexible report and graph formats
- Help and user manual display



### Main Features of the device

- Pace rate control from 1 kN/sec to 20 kN/sec depending on piston size.
- Accuracy Class 1 acc. to EN 12390-4 starting from with the 5% of the machine capacity (Special calibration option Class 1 starting from 1% of the full range with HR-C8003)
- Supplied with factory calibration certificate for force transfer stability and the self-alignment of the upper loading platen conforming to EN 12390-4
- Tests automatically with closed loop control
- Tests can be performed by controlling the machine either H-Touch Screen Digital Readout Unit or on a computer with using free HİRATEST Software which is provided free of charge with the machines.
- Load measurement with a pressure transducer
- Hydraulic pump with dual stage for rapid approach
- Welded steel walled frame with a single acting piston
- Piston return at the end of test automatically
- Multi-Point calibration function for the channels
- Optionally supplied-integrated thermal printer (If requested, must be specified in the order)
- Ethernet port connecting for computer interface
- H-Touch Screen Digital Readout Unit
- Free of charge HİRATEST Software for the test control and printout the test report.

**Technical Specifications:**

Product Code	HR-R6000/TS
Capacity (kN)	600
Roughness (µm)	≤ 3.2
Ø Lower Platen (mm)	165
Ø Upper Platen (mm)	165
Max. Vertical clearance (mm)	330
Piston diameter (mm)	150
Piston Stroke (mm)	50
Horizontal clearance (mm)	230
Oil Capacity (lt)	25
Max. Working Pressure (bar)	400
Power (W)	750

**Safety Features**

- Maximum pressure valves to avoid machine overloading
- Piston travel limit switch
- Emergency stop button
- Software controlled maximum load value
- Front and rear transparent durable Plexiglas guards

**Technical Specifications:**

Product Code	Product Name	Dimensions (cm)	Weight (kg)	Power Supply
HR-R6000/TS	600 kN Automatic Core-Rock Compression Testing Machine	71x38x91	450	220 V, 50-60 Hz, 1 ph

68

**Spare Parts & Accessories:**

Product Code	Product Name	Dimensions (cm)	Weight (kg)	Power Supply
HR-R6000/1	600 kN Load Frame	35x30x91	350	---
HR-C8000/TS	Hydraulic Power Pack and H-Touch Pro Max Control Unit	36x38x91	100	220 V, 50-60 Hz, 1 ph
HR-C8001	Hydraulic Power Pack	36x38x91	98	220 V, 50-60 Hz, 1 ph
HR-C8002/TS	H-Touch Pro Max Control Unit	---	---	220 V, 50-60 Hz, 1 ph
HR-C8003	High Precision Pressure Transducer	---	---	---
HR-C8004/TS	H-GUI Software	---	---	---
HR-C8165	Distance Pieces	Ø 16,5 x 2,5	---	---
HR-C8166	Distance Pieces	Ø 16,5 x 3	---	---
HR-C8167	Distance Pieces	Ø 16,5 x 5	---	---
HR-C8168	Distance Pieces	Ø 16,5 x 8	---	---
HR-G0975	Computer & Printer	---	---	220 V, 50-60 Hz, 1 ph
HR-G0975/1	Usb to com port Converter	---	---	---
HR-G0979	Thermal Printer	---	---	---
HR-G0979/1	Thermal Printer roll for printer (pack of 10 rolls)	---	---	---

**COMPRESSION JIG ASSEMBLY FOR ROCK CORE SPECIMENS****STANDARDS: ASTM D2938**

The jig assembly is used for uniaxial compressive strength tests of rock core specimens with Ø 50 to 55 mm and 100 to 110 mm height and consists of a two-column frame fit with an upper platen with spherical seat that moves vertically sustained by a spring. The lower platen is fit to the base. The assembly is also used for compressive strength test of natural stone core specimens. Minimum Hardness of Platens is 58 HRC.

Compression Jig Assembly is used for uniaxial compressive strength for rock core specimens.

**Technical Specifications:**

Product Code	Product Name	Dimensions (cm)	Weight (kg)
HR-R0105	Compression Jig Assembly for Rock Core Specimens	12x12x25	10

**HR-R0105**

## TRIAXIAL TESTS ON ROCK SPECIMENS

STANDARDS: EN 1926, 14580; ASTM D2664, D2938, D3148, D5407

The manual pressure system is used for maintaining the constant lateral pressure in the Hoek triaxial cells and consists of a hydraulic hand pump with oil reservoir, a precision digital readout unit, a pressure transducer and a 3 m long flexible hose with quick release coupling.

The manual pressure system is used with any Hoek triaxial cell and 2000 kN Automatic Compression Testing Machine for the triaxial tests. Other type of HİRA compression testing machine can be used instead of HR-C2000.

BX type (Ø 42,04 mm), NX type (Ø 54,74 mm) and HQ, Ø 63,5 mm Hoek Cells have been designed for triaxial testing of rock specimens.

Hoek Cells comprise a steel body complete with two quick release self-sealing couplings, two steel end caps which are screwed to the cell body, 2 pieces of upper and 2 pieces of lower loading caps with spherical coupling and a rubber sealing sleeve to separate the specimen from the cell fluid.

Triaxial Test Set complete with Hand operated pressure system for lateral pressure in Hoek Cell with 700 bar capacity.

Hoek Cells and Spare Sealing Sleeves for Hoek Cells should be ordered separately according the test.



HR-R0150 with HR-C2000

### Technical Specifications:

Product Code	Product Name	Max. Working Pressure	Dimensions (cm)	Weight (kg)
HR-R0150	Triaxial Test Set on Rock Specimens	700 bar	---	---
HR-C2000/TS	2000 kN Automatic Compression Testing Machine	400 bar	81x50x100	900

### Spare Parts & Accessories:

Product Code	Product Name	Max. Working Pressure	Dimensions (cm)	Weight (kg)
HR-R0151	Hand Operated Pressure System for Lateral Pressure in Hoek Cell	700 bar	105x50x30	20
HR-G9000	Hydraulic Hand Pump	700 bar	---	---
HR-R0153	Pressure Transducer and Digital Readout Unit	---	---	---
HR-R0154	Hoek Cell, BX, Ø 42,04 mm	---	35x15x20	15
HR-R0154/1	Spare Sealing Sleeves for HR-R0154	---	---	---
HR-R0155	Hoek Cell, NX, Ø 54,74 mm	---	35x15x20	15
HR-R0155/1	Spare Sealing Sleeves for HR-R0155	---	---	---
HR-R0156	Hoek Cell, HQ, Ø 63,5 mm	---	35x15x20	15
HR-R0156/1	Spare Sealing Sleeves for HR-R0156	---	---	---



## SPECIMEN EXTRUDER FOR HOEK TRIAXIAL CELLS

Specimen Extruder for Hoek Triaxial Cells is used to eject the rock sample from the rubber jacket, avoiding to empty the confining fluid out of the Hoek Cell.

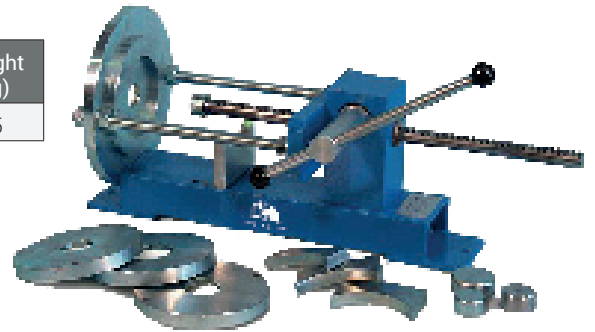
The Specimen Extruder consists of a steel frame with a rack and pinion mechanism.

Supplied without Adaptors and should be ordered separately according the sample.

Adaptor Alternatives are BX Type (Ø 42,04 mm), NX Type (Ø 54,74 mm), HQ Type (Ø 63,5 mm) Adaptors.

### Technical Specifications:

Product Code	Product Name	Dimensions (cm)	Weight (kg)
HR-R0100	Specimen Extruder for Hoek Triaxial Cells	50x25x20	15



HR-R0100

### Spare Parts & Accessories:

Product Code	Product Name
HR-R0100/1	BX (Ø 42,04 mm) Type Adaptor
HR-R0100/2	NX (Ø 54,74 mm) Type Adaptor
HR-R0100/3	HQ (Ø 63,5 mm) Type Adaptor

## BRAZILIAN TEST APPARATUS

Brazilian Test Apparatus is designed to test specimens from 50 mm dia to 100 mm dia having thickness equal to half of the diameter for determination of Indirect Tensile Strength of rocks.

The specimen is held in circular jaws, this is primarily similar to a compression Machine and consists of a small load frame having sturdy base with two vertical threaded rods and an adjustable cross head. The hydraulic jack is fitted at the centre of the base of the load frame. The jack of the load frame is self-retracting and two plain platens are supplied.

A pressure gauge capacity is 0-100 x 1 kN is fixed at the base of jack.

A maximum pointer is also provided on the gauge, a pair of semicircular platens for Ø 50mm samples also provided.

The other Pair of jaws should be ordered separately.

### Technical Specifications:

Product Code	Product Name
HR-R0250	Brazilian Test Apparatus

### Spare Parts & Accessories:

Product Code	Product Name
HR-R0250/1	Pair of jaws for Ø 50 mm samples
HR-R0250/2	Pair of jaws for Ø 60 mm samples
HR-R0250/3	Pair of jaws for Ø 70 mm samples
HR-R0250/4	Pair of jaws for Ø 80 mm samples
HR-R0250/5	Pair of jaws for Ø 90 mm samples
HR-R0250/6	Pair of jaws for Ø 100 mm samples



HR-R0250

