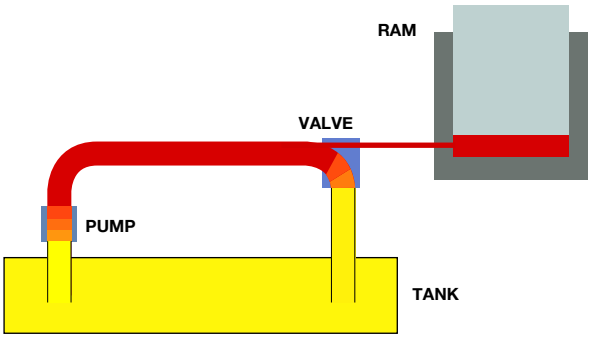
2.1 CONCRETE

NEW TECHNOLOGY

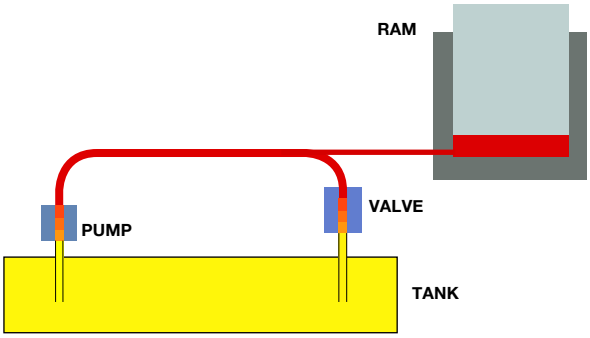
SC silent & cold power

When Tecnotest's R&D division set out to design our new hydraulic power unit, the objective was to revolutionise the way compression testing machines work, in that in models built to traditional concepts, a large part of the oil flow produced returns to the tank without being used.
This poses a serious problem for the machine which must nonetheless compress the oil flow before being separated by a special device into two branches, one for injection and one for discharge.
Usually by injecting an excessive quantity of oil at a fixed rate, the volume during discharge is decreased and rate of flow is modulated by means of a valve.
In engineering terms the rational solution would be that of using a pump that generates at any given moment just the right amount needed for use.
Varying the number of revolutions per minute of the motor would be one approach but still presents some practical problems, especially given the irreversibility of the pump which is a characteristic which generates substantially asymmetrical responses during acceleration and deceleration.
To follow a defined load ramp it is necessary to correct the errors which inevitably arise, making negative or positive adjustments as necessary; the more effective the adjustment, the more accurate the actual line traced compared to the theoretical line.

TRADITIONAL SYSTEM

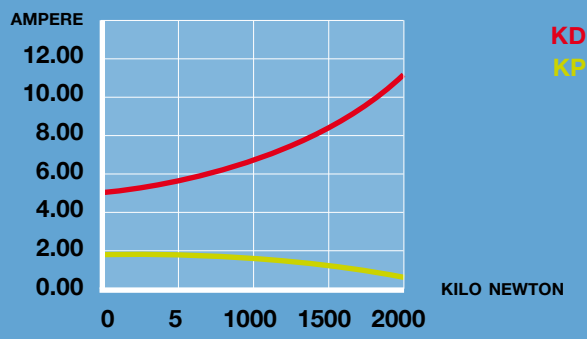


NEW SYSTEM



Our idea was to inject very small amounts of oil at a constant rate thus replacing the traditional concept based on a fixed rate of flow during input and a modulated rate during output with that based on a modulated rate of flow during input and a fixed rate during output.
In fact the end result is the same, that is to say that of obtaining ramps with negative, nil or positive pace as desired, but with lower energy consumption.
With such exciting prospects ahead of us, the next step was to design our own, original hydraulic device for use in our own range of products.

Being of rugged construction, with adjustable draining over a wide range of pressures, the device is not affected by impurities in the hydraulic fluid so its special feature is that since there is no wear, no maintenance is required.
The range of machines equipped with this device is distinguished by the logo with highlights in particular its noiseless operation and minimal heat production even during continuous usage.
Use of a variable speed motor with inverter, lamination performed by means of a multi-cylinder pump and the reduction of flow to pressurize are factors which contribute towards improving substantially energy yield/output.
In order to measure energy saving, we have compared power absorption of the traditional power units with the new, SC series units.
The objective was to reach a load of 2 MN following the pace rate prescribed by Standards for compression testing of concrete specimens.
Both machines were powered by mains electrical supply (220-240 V, 50 Hz, single phase) so the difference involved the current (A).
As can be seen in the figure, energy consumption in the new series is decidedly lower.



Obviously, the difference in terms of kilowatts and kilocalories is similar.
As for noise, measured using a phonometre in the position occupied by the operator, the difference in the automatic machines (KP/KE series) is around 10 dB (being reduced from 73 to 63 dB).
In addition to a substantial reduction in energy consumption, an important feature is the excellent response obtained during adjustments which mean that usage with this range of machines may also be extended to those materials and tests that require moderate loads.
The device we developed is now patented and installed on all our new line of automatic compression testing machines.

PATENTED VALVE FOR TECNOTEST AUTOMATIC POWER UNITS (SILENT & COLD POWER SYSTEM)

GENERAL FEATURES

ASTM C 39 BS 1610 DIN 51220 EN 12390-4 UNI 6686 UNE 83304 NF P18-411

HYDRAULIC RAM

All the compression machines in the range are hydraulic. The compressive force is generated by a hydraulic ram (50 mm travel) housed in a rigid, ring-shaped structure.
Safely dimensioned elements in special steel are used to ensure absolute reliability in all working conditions.
High-precision machine finish reduces frictional forces to a minimum thus increasing the overall accuracy of the machines.

LOAD FRAMES AND PLATENS

All of our machines are characterized by their high flexural rigidity on all three axes. This is particularly true of the four column models but is also a feature of our welded, enbloc frames thanks to the use of H or tubular section beams which, as is common knowledge, optimize the stiffness/weight ratio.
The critical point in four-column structures lies in the connections between uprights and crossbeams; the system adopted by Tecnotest overcomes the problem arising when the tradition locknuts are used by using, instead, 32 high-strength screws, each of which is tightened using a torque wrench so as to obtain overall pre-tensioning equal to the loading capacity of the machine.
In this way stability is increased and in line with that obtained by welding while maintaining optimal structural symmetry.
The test platens are made in compliance with the flatness, hardness and parallelism criteria of the latest international standards.
Minimum surface hardness: 550 HV 30 or, upon request 600 HV (EN 772/1).
A wide range of testing platens for blocks and distance pieces is available as accessories.

BALL SEATING ASSEMBLY

The ball seat is of the oil bath type, with the exception of KB series which comply with ASTM only. Ball coupling ensures initial free alignment with the specimen and subsequent locking upon specimen contact, as prescribed by BS 1881 - DIN 51220 - EN 12390-4.

HYDRAULIC POWER UNIT

Automatic and computerized compression machines are actuated by means of control consoles that use our “Silent & Cold Power” technology. The semi-automatic machines still use our traditional, on-board power unit. The latter contains two pumps: a high capacity/low pressure pump used during fast approach procedure for securing the specimen is securely fitted between the test platens and a low capacity/high pressure pump that is used during the actual testing procedure. This unit is also fitted with two devices which were specially designed by Tecnotest: a special oil flow control valve which enables accurate regulation of the load pace and a valve to allow discharge of pressure and withdrawal of the ram. The lever-operated, single-acting manual pump has two different capacities: the higher capacity enables quick clamping of the specimen between the platens, the lower capacity allows a reduction in the stress to which the lever is subjected during the test. Selection is automatically controlled according to pressure exerted.

SAFETY DEVICE

The standard device, fitted on all machines with electronic control unit consists of two transparent Lexan guards, a safety microswitch (which allows testing only when the door is closed) and a switch to prevent overrun of hydraulic ram. Machines fitted with platens for testing blocks have special guards suitably dimensioned. Microswitch is not foreseen on manual models or on KB series.

COMPRESSION TESTING MACHINES

Developments in the performance of compression testing machines, reflected in the requirements of major International Standards, have resulted in machines being produced with greater stability and alignment criteria. Tecnotest has adopted the policy of introducing these improvements on its complete range of compression testing machines.

HOW TO SELECT A TESTING MACHINE

The Tecnotest range comprises machines of 1500, 2000, 3000, 4000 and 5000 kN capacities. Choice of machine is made according to size and strength of specimens to be tested in the laboratory. It must nonetheless be underlined that there is a current tendency to produce concrete with higher performance so it is a good idea to choose a machine which has a higher capacity to that indicated by calculations.
Dual ram machines are also available which allow testing with two different capacities: 2000/300 kN and 3000/300 kN. The reading system most commonly used nowadays is the digital readout which has mostly replaced the classic analog dial gauge, which is still available if requested. Various forms of data processing become possible through the application of sensors and electronic control units. Data can be displayed in numeric form, printed or processed by a computer. In this last case the fully compiled certificate is obtained automatically.
Computerised models with feedback system and automatic load pace regulation enable the entire test to be controlled via the software. As for the structure, the four-column model is to be preferred for accredited laboratories or research purposes.

TESTING AND CALIBRATION

Each compression machine is tested and calibrated in compliance with the most advanced standards in force.
In particolar, in countries where EN 12390-4 standard is in force, control is routine.
All Tecnotest compression testing machines are individually and accurately calibrated in our laboratory which issues certification to this effect (with serial number and client’s name).
Upon request, arrangements can be made for indipendent calibration by an accredited laboratory, authorised to certify the accuracy and the class of the machines.
Stability testing using four strain gauge, bridge-type tester, to EN 12390-4 and BS 1881 Part 4, App. A, may be requested.
Tecnotest frames are generously-sized so as to ensure high rigidity for the two planes of symmetry. This feature, in conjunction with the ball seating in oil bath, is a pre-requisite which enables it to pass the stringent tests using the four strain gauge, bridge-type tester (stability tester or Footemeter).

INSURANCE

Tecnotest has stipulated a civil liability insurance covering damage to third parties and property caused by our service personnel during or after installation, verification and maintenance.This insurance safeguards our customers and their managements interests.

LOAD MEASUREMENT DEVICES

MANOMETERS

Features:

- Nominal diameter 200 mm
- Maximum error ± 1% in upper four fifths of full scale
- Strip mirror to eliminate parallex errors
- Black pointer indicates load while a slip pointer indicates peak load reached during testing

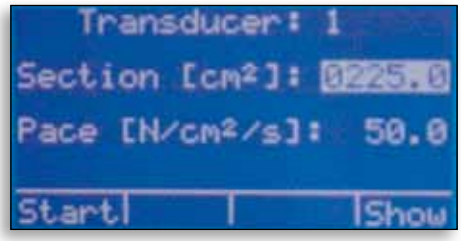
Available models:

BK 030/2	300 kN gauge, 1 kN divisions
BK 050/2	500 kN gauge, 2 kN divisions
BK 150/2	1500 kN gauge, 5 kN divisions
BK 200/2	2000 kN gauge, 10 kN divisions

MONOTRONIC READOUT/CONTROL UNIT AD 001

This microprocessor-based unit offers a series of auxiliary functions which make it both practical and easy to use: the initial settings are menu guided and the way in which pace is displayed during the loading phase is clearly indicated, while a full range of choices is presented at the end of the test. There is a graphic display measuring 60 x 32 mm lit from behind that acts as user interface.
Data is input via a practical numeric key pad and by means of a set of function keys illustrated on the display. When used with the optional printer AD 013/B02, the Monotronic allows a hard copy of the test parameters to be obtained in various languages (Italian, English, French, Spanish, German, Russian, Polish and Portuguese). Besides the socket for the transducer, the unit also has a serial port for connection to a printer or, alternatively, to a PC. The unit has two working modes:

AD 001



TEST when the unit is turned on for the following settings and functions:

- Peak value memorisation (may be activated or deactivated)
- Specimen section
- Load rate for pacing
- Calibration zeroing
- Printout of results (with optional printer AD 013/B02)
- Re-start with the same settings or reset

CALIBRATION activated by a special code for the following functions:

- Testing of output devices for malfunctions
- Testing of non-volatile memory for malfunctions
- Testing of analog-digital converter for malfunctions
- Testing of displays and keypads for malfunctions
- Machine setup
- Keypad input of calibration parameters
- Procedure for semi-automatic calibration on 11 points equally distributed over the full scale
- Printout of setup and set parameters (with optional printer AD 013/B02)

SPECIFICATIONS:

- Unit of measurement : kN
- ± 30000 divisions
- Power supply : 12 Vdc 220 V, 50 - 60 Hz, single phase
- Serial line : 4800 baud, 8 bit, no parity, 1 stop bit
- Archive for 250 tests - Clock - Calendar

The micro-printer (AD 013/B02) which uses thermal paper may be connected to the MONOTRONIC control unit, to provide a hard copy of the test (indicating input data and results), or a list of calibration parameters, or current load/time values. MONOTRONIC may also be connected to a PC while, with AD 050/001 optional software, a certificate of the test can be made using Windows applications (such as Excel, Access, etc.).

AD 013/B02

EUROTRONIC AD 200

HARDWARE FEATURES

- 24 VDC power (supplied with mains adaptor 110/220 V)
- 320 x 240 pixel backlit display complete with energy save feature
- 4 Channels which may be set at 2 mV/V, 3 mV/V, 7 mV/V or 10 VDC: each channel has a resolution of 500000 points
- 24 Button keyboard, including a numeric keypad, for quick test selection and easy data input, more practical than the minimalistic models with fewer buttons
- 8 Digital inputs
- 8 Digital outputs
- 2 Pulse width modulation output (PWM) for stepper or brushless motor control
- 2 Analog outputs (12 bits – 0/10 Volts) for closed-loop feedback control
- 1 Serial RS-232 port and 2 serial RS-485 ports for transmitting data to a PC in real time or at the end of test
- 1 Slave USB port for transmitting data to a PC or for uploading software upgrades or custom modifications to software in use
- 1 Master USB port for connecting to a USB data stick
- 1 Ethernet port or Wi-Fi port for data transmission or remote control

The Eurotronic is one of the few instruments (if not the only one) in the market to have a numeric keypad for data input.
To enter a number there is no need to call up the number required by first scrolling up or down using arrow keys, as it is sufficient to input it via the numeric keypad.

SOFTWARE FEATURES

- Selectable languages: Italian, English, Spanish, French, Portuguese, Russian (Cyrillic alphabet), Polish and Rumanian. All test pages are translated, including those sent to PC or printer
- Selectable units of measurement: kN, N, lbf, tonnes, kgf, mm, in. The instrument automatically converts values in one unit of measurement to another without any need for recalibration
- Display of test graph in real time
- Transmission to PC to test data in real time with data time scan selection (1 datum per second, 2 data per second, 5 data per second, 10 data per second, 1 datum every 10 seconds)
- Tests performed are stored in an archive
- Archive with scroll index for tests performed: it is possible to send to a PC test results only or all test data foreseen, time/load/displacement, for subsequent processing in graph format
- Clock and calendar with daylight saving hour foreseen
- Memorizes for each test: time, user ID, sample parameters and serial number, test results
- Special functions, protected by password, for verification of functioning of keyboard, A/D inputs, inputs and outputs

CALIBRATION

Tecnotest has taken special care as usual to ensure that maximum readout accuracy of its calibration function is guaranteed.
The calibration function is obviously protected by a password.
Calibration is performed over 11 programmable points from zero to full scale of the instrument under calibration.
The procedure is particularly simple and designed so that there is no need for calculation of coefficients, to enter them by hand or to repeat procedures on a trial and error basis.
In practice, the user is invited to explore the entire readout scale, then to press a key when the sample dynamometer indicates exactly 0, 10%, 20%.....90%, 100% relative to full potential of the machine.
The instruments suggests memorizing 11 points equally distributed along the readout scale, but these may be modified as desired : for example, it may be decided to memorize points 0, 1%, 5%, 10%, 20%.....80%, 100% of full scale thus guaranteeing, thanks to the 500000 divisions available, high precision even at very low loads. All these operations are extremely simple and quick to perform thanks to the unit's function keys and numeric keypad.

AD 200

ACCESSORIES

AD 200/ETH	Ethernet port
AD 200/WFI	Wi-Fi port

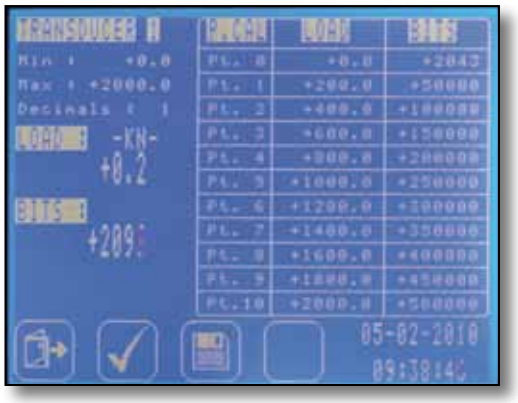
NB: Implementation of any one of the optional ports (not both) is possible only at the time the AD 200 is ordered, not once delivered, so choice of port must be specified, if required, at time of order.

TEST SCREENS

Eurotronic has the following test routines:

- Manual mode
- Compression test on cubes, cylinders, blocks
- Flexural tests with 3 or 4 point loading
- Tensile test
- Block pavers test
- Marshall test
- CBR test
- Indirect tensile test for asphalt
- Unconfined test
- Failure under controlled loading
- Failure under controlled test speed

For each test the previous considerations are valid (see software features).



Compression test:
Graph display in real time, automatic calculation of sample strength at end of test. In automatic machines test start, test speed management and test stop with calculation of results are all, obviously, completely automatic. If numerous tests are to be performed on samples of equal shapes and sizes, a simple touch of a key allows other tests to be performed again and again without having to repeat input of sample parameters.

Examples of test pages displayed during tests on 15 cm/side cubes

PRESS F4 TO SELECT "TEST RUN"

PRESS F4 TO SELECT "COMPRESSION"

PRESS F4 TO SELECT "START TEST"

If test is to be performed on cylinders rather than cubes, select "sample description" and press F4

Input sample parameters and, on re-starting Eurotronic, latest data to be input are memorised

AUTOMATIC TESTING MACHINES: THE EUROTRONIC STARTS TEST AND STOPS IT ON SAMPLE FAILURE. SEMI-AUTOMATIC TESTING MACHINES: OPERATOR STARTS TEST AND WAITS FOR THE EUROTRONIC TO SIGNAL SAMPLE FAILURE

READOUT OF TEST RESULTS: PRESS F4 TO PERFORM ANOTHER TEST

TEST PERFORMED USING F4 KEY ONLY

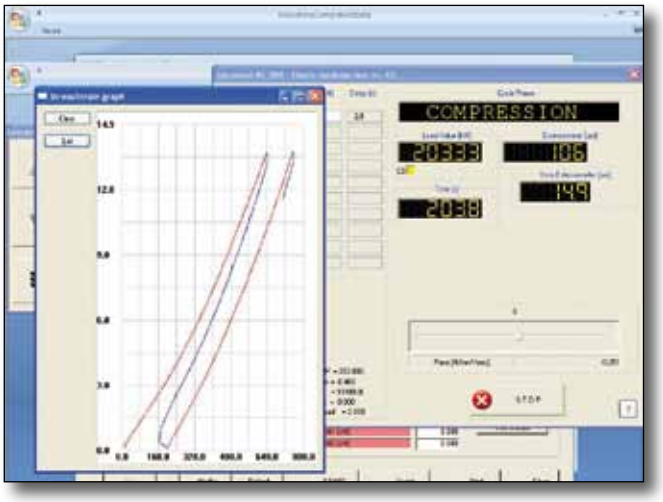
Flexural test:
Four types of flexural tests may be selected. Centre point or two point loading by inputting parameters for base and height of specimen or also section.

Archive:
Data may also be saved in an archive for subsequent trasmission to a PC or printer. Test data do not have to be saved but may be trasmitted directly to a PC or printer at the conclusion of each test.

Paving blocks:
Test function according to EN 1338 standard for paving block testing.
Automatic calculation of correction coefficient and test results.

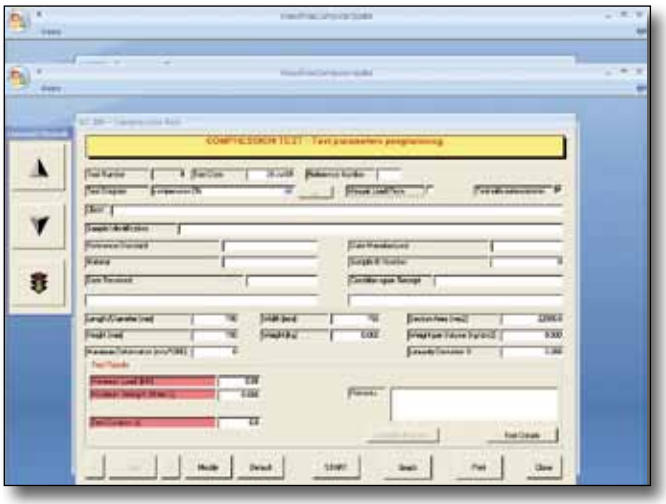
Failure under load speed control:
Test function which foresees readout of a load and deformation.
Load and deformation speeds may be managed.
It is possible to perform tests under load speed control or under deformation speed control

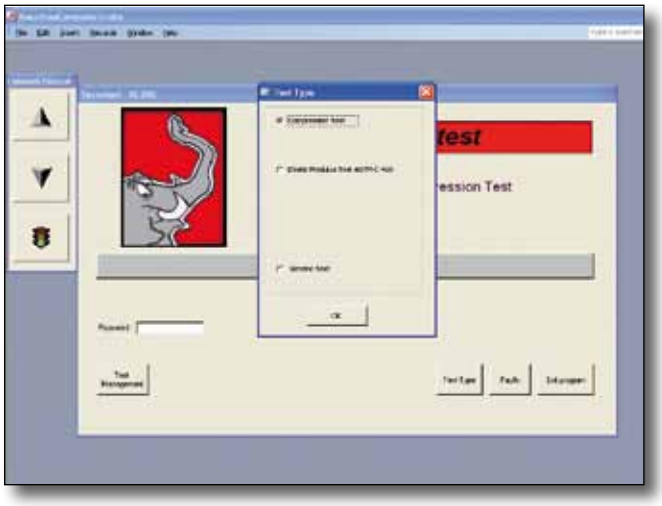
Manual mode:
Generic routine for displaying one, two, three or four channels, also allowing memorization of peak. This routine is particularly useful for checking calibration.

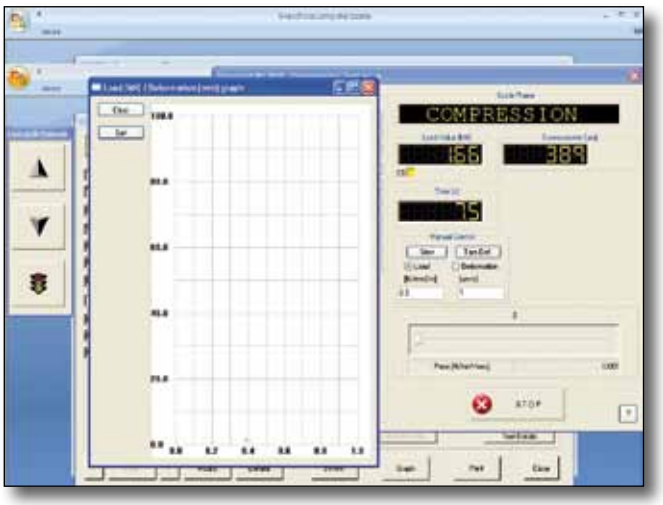


PERSONAL COMPUTER

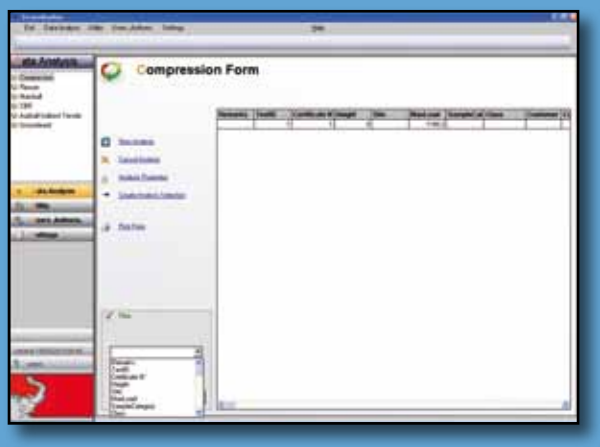
Both enbloc and four column testing frames may be connected to a computerized control unit of the “SC” series.
The PC, besides acting as user interface, manages all high level functions as well as printout of graphs and certificates.
Data bases and test screens are organized under Microsoft Access so as to consent remote access to files and also enable customization of user interface if required.
Software implementation is available to allow calculation of Modulus of Elasticity and Poisson Ratio.
Upon request, software may be anable to perform tests involving displacement control as well as load control.





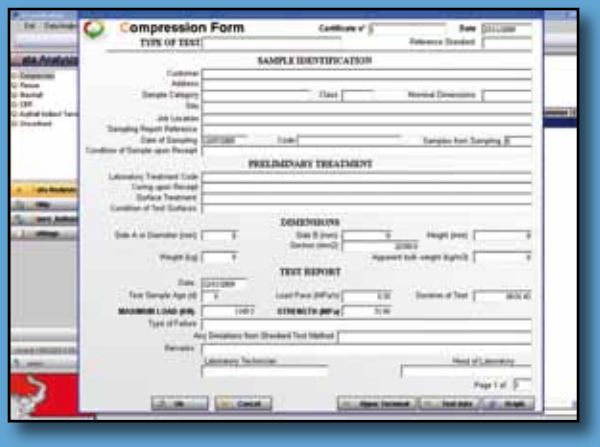


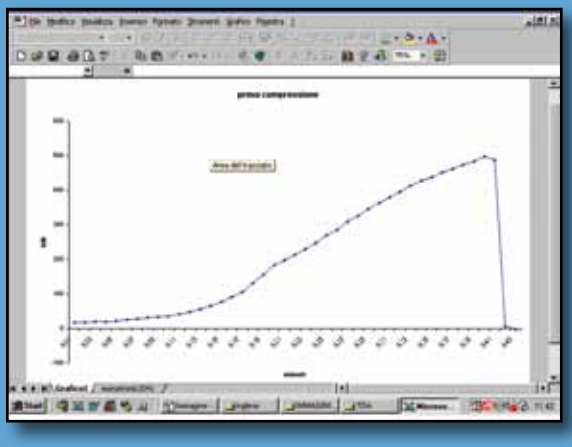
Semi-automatic testing machines equipped with MONOTRONIC or EUROTRONIC Digital Control Units, as well as the automatic machines which are equipped with the EUROTRONIC as standard, may be connected to a PC (having MS Windows operating system) via an RS 232 serial port.

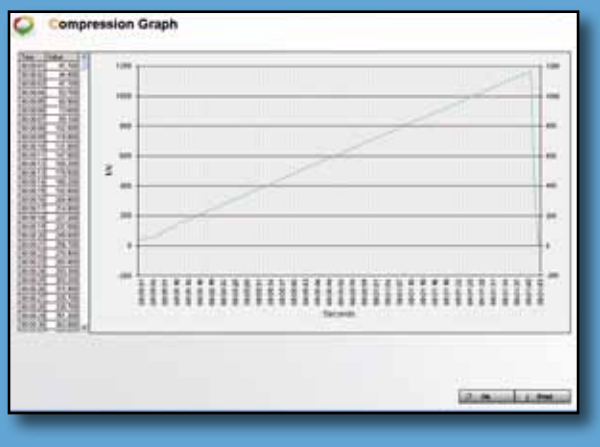


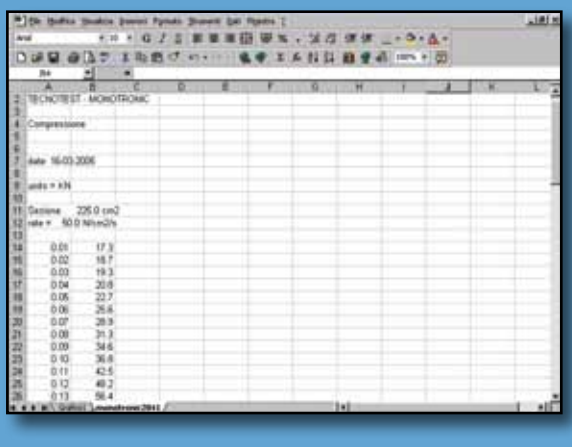
TECNOTEST SUGGESTS THE FOLLOWING OPTIONAL ACCESSORIES:

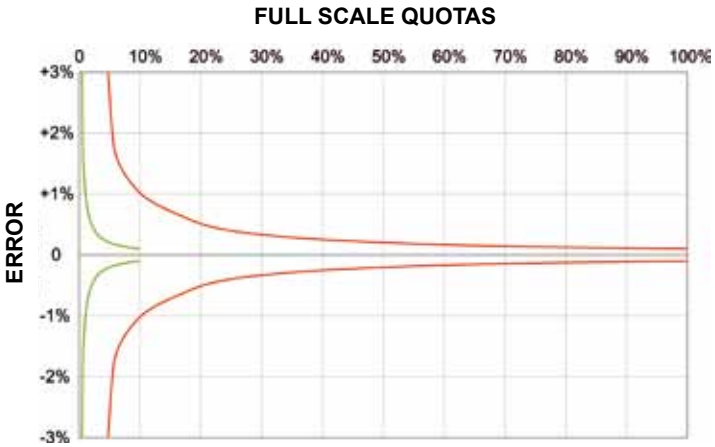
AD 050/001	Software package for data acquisition and creation of relevant test data file. It may be used with current MS applications (such as EXCEL, etc.) for creating customized certificates
AD 050/003	Software package for data acquisition, creation of relevant test data file and processing of test data together with the possibility of creating customer certificates and test graph











DUAL RAM OPTION

The dual ram testing machine for concrete offers two distinct measurement scales, with the lower scale covering 10% of the higher scale.

It is characterized by a hydraulic ram having two concentric stems, one operating from inside the other but completely autonomous so that, in practice, there are two machines available in one, the more powerful machine for specimens of standard strength and the more sensitive one for testing specimens of lower strength.

A single frame and a single power unit proved an advantageous solution cost-wise and meant no sacrifices were necessary in terms of performance when compared with the classic, two-machine solution.

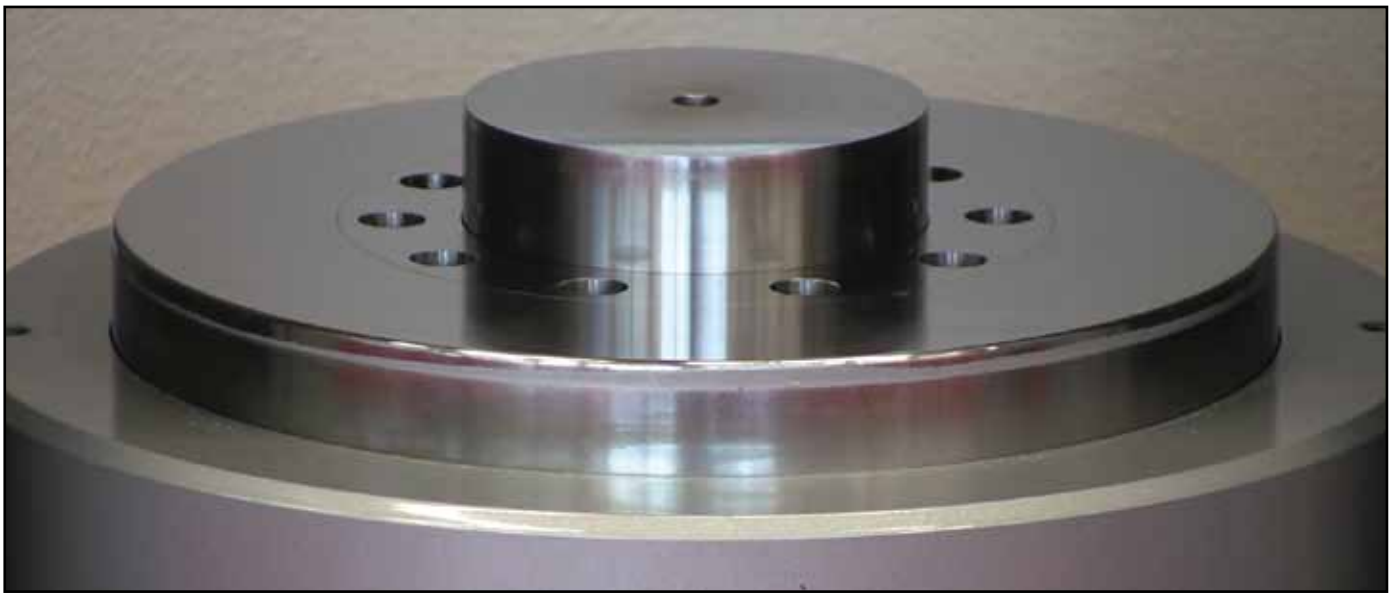
When first presented by TECNOTEST, the project was well in advance of its time, so much so that only today, after many years, the dual ram machine is largely recognized as a highly practical and technologically advanced solution.

The graph on the left shows the theoretical curves that delineate the possible errors in response made by the two generic devices with a discrimination of ± 0.1 % of respective full scales.

If a precision higher than 1% is required, the object described by the red curves, can be used from 10 to 100% of its potential.

The green curves show the effect using the second device which has the same characteristics but with a scale limited to 10% of that of the former.

Combining the two objects stretches the field of use to the lower limit of 1%, so the required precision is respected at all times.



DUAL RAM

DUAL RAM TESTING MACHINES

EN 12390-4 BS 1610 BS 1881

The special characteristic of these machines is their versatility. Specimens having different strengths can be tested. Using the larger ram, it is possible to perform tests on high strength samples, using the smaller ram, located inside the larger one, tests are performed on low strength samples (specimens that have not been completely cured, light-weight concrete specimens of lower than average size, etc..).

Dual ram testing machine are available in the following versions:

KD 200/CE	Enbloc frame, semi-automatic operation
KD 300/CE	Enbloc frame, semi-automatic operation
KE 200/CE	Enbloc frame, automatic operation
KE 300/CE	Enbloc frame, automatic operation
KE 300/ECE	Four column structure, automatic operaration
KC 200/CE	Enbloc frame, computerized operation
KC 300/CE	Enbloc frame, computerized operation
KC 300/ECE	Four column structure, computerized operaration

GENERAL FEATURES FOR ALL MACHINES ARE TO BE FOUND ON PAGE 114

KE 300/CE
AD 013/B02

Dual ram machines may be used for performing the following tests:
COMPRESSION TESTS ON CUBES, CYLINDERS AND BLOCKS
MEASUREMENT OF THE ELASTIC MODULUS OF CYLINDERS
INDIRECT TENSILE TESTS ON CYLINDERS AND PAVING BLOCKS
COMPRESSION AND FLEXURAL TESTS ON CEMENT AND MORTAR
FLEXURAL TESTS ON CONCRETE BEAMS.

For accessories and platens see pages 138-139.

ELECTRONIC TESTING DEVICE C 362/FD

This electronic device allows flexural testing of specimens measuring 4 x 4 x 16 cm.
If consists of a testing device on which a 25 kN load cell is fitted so as to extend lower measurement range of the machine up to a value of 2.5 kN (calibration from 1 kN available upon request).

C 362/FD

KD 300/CE
KR 10 x2
KR 12

ENBLOC WELDED LOAD FRAMES

SEMI-AUTOMATIC TESTING MACHINES "KD" SERIES with digital readout

EN 12390-4 BS 1610 BS 1881

General features are as indicated on page 114. Electro-hydraulic power unit with rapid approach pump as standard (low pressure) and high pressure pump for testing. Load pacer for control of loading rate.The digital readout/control unit Monotronic or Eurotronic (specifications on the following pages) converts the signal received by the extensometric pressure transducer and displays it in engineering units. The relevant displays act as user interface. A hard copy of the test may be obtained with the optional printer AD 013/B02. The test routine includes the transmission, via the RS232 port, of current values (load and time) to a PC.
The optional software AD 050/001 manages data trasmission to a PC.
The software AD 050/003 (which includes AD 050/001) allows also to printout a test certificate and a graph.
The versions with the Eurotronic having capacities of 2000 or 3000 kN and enbloc welded frames may be supplied with dual ram option.

For accessories and platens see pages 138-139.

KD 150 - KR 15 - AD 013/B02

KD 200 - KR 12 - KR 10 (x3) - AD 013/B02

KD 400/R - KR 10 (x2)

ENBLOC WELDED LOAD FRAME

SEMI-AUTOMATIC TESTING MACHINES
"KD" SERIES with digital readout

FEATURES	MODELS				
	KD 150 KD 150/R	KD 200 KD 200/R KD 200/CE	KD 300 KD 300/R KD 300/CE	KD 400 KD 400/R	KD 500 KD 500/R
CAPACITY (kN)					
MAIN RAM	1500	2000	3000	4000	5000
SECONDARY RAM[1]	NO	300	300	NO	NO
VERTICAL SPAN (mm)	370	340		410 *	510 *
HORIZONTAL SPAN (mm)	240	288	325	525	540
USABLE RAM TRAVEL (mm)	50				
TEST PLATEN (mm)	Ø 218	Ø 285		310 x 310	
STANDARD SPECIMEN SIZES AND RELEVANT DISTANCE PIECES (TO BE ORDERED SEPARATELY)					
CUBES 100 mm/side	WITH KR 15 + KR 10	WITH KR 12 + 4x KR 10		WITH 2x KR 10 WITH 2x KR 90	WITH 2x KR 10 WITH 3x KR 90
CUBES 150 mm/side	WITH KR 15	WITH KR 12 + 3x KR 10		WITH 1x KR 10 WITH 2x KR 90	WITH 1x KR 10 WITH 3x KR 90
CUBES 200 mm/side	NO	WITH KR 12 + 2x KR 10		WITH 2x KR 90	WITH 3x KR 90
CUBES 300 mm/side	NO	NO	WITH KR 39 + KR 12 [4]	WITH KR 39 + 2 KR 10	WITH 2x KR 90
CYLINDERS DIA. 100 x 200 mm	1 KR 90 + 1 KR 10	WITH KR 12 + 2x KR 10		WITH 2x KR 90	WITH 3x KR 90
CYLINDERS DIA. 100 x 200 mm with capping pads	1 KR 90	WITH KR 12 + 2x KR 10		1 KR 90 + 1 KR 10	2 KR 90 + 1 KR 10
CYLINDERS DIA. 150 x 300 mm	WITH KR 10	WITH KR 12		WITH 1x KR 90	WITH 2x KR 90
CYLINDERS DIA. 150 x 300 mm with capping pads	YES	NO		WITH KR 10	1 KR 90 + 1 KR 10
CYLINDERS DIA. 160 x 320 mm	WITH KR 12	YES		WITH KR 10 + KR 12	WITH KR 10 + KR 12 + KR 90
CYLINDERS DIA. 160 x 320 mm with capping pads	1 KR 93 (2)				
MEASUREMENT DEVICES: STRENGTH [3]	(A) MONOTRONIC DIGITAL DISPLAY - 1 CHANNEL (1 : 30.000 POINT DISCRIMINATION)				
	(B) EUROTRONIC DIGITAL DISPLAY - 4 CHANNEL (1 : 500.000 POINT DISCRIMINATION)				
LOAD SENSOR	PRESSURE TRANSDUCER - EXTENSOMETRIC TYPE				
READING RANGE (kN)	FROM 0 TO 1500	FROM 0 TO 2000	FROM 0 TO 3000	FROM 0 TO 4000	FROM 0 TO 5000
READING RANGE (kN)	FROM 150 TO 1500	FROM 200 TO 2000	FROM 300 TO 3000	FROM 400 TO 4000	FROM 500 TO 5000
READING RANGE (kN)[1]		FROM 30 TO 300	FROM 30 TO 300		
DIVISIONS (kN)	0.1				
DIVISIONS (kN)[1]	0.01				
MACHINE CLASS	1				
OPERATION	220 V, 50 Hz, SINGLE PHASE - 1130 WATTS [2]				
ASSEMBLED DIMENSIONS (cm)	88 x 40 x 134	106 x 40 x 145	106 x 43 x 155	130 x 55 x 160	145 x 55 x 220
PACKED DIMENSIONS (cm)	90 x 60 x 140	132 x 92 x 165		150 x 100 x 200	160 x 130 x 245
NET/PACKED WEIGHT (kg)	370 / 410	585 / 675	840 / 930	1550 / 1700	3700 / 3850

N.B.

(1) FORESEEN ONLY IN DUAL RAM MODELS KD 200/CE AND KD 300/CE

(2) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

(3) KD 150 - KD 200 - KD 300 - KD 400 - KD 500 WITH MONOTRONIC **(A)**
KD 150/R - KD 200/R - KD 300/R - KD 400/R - KD 500/R WITH EUROTRONIC **(B)**

(4) KR 39: VARIATION PLATENS (310 x 310 mm)

(*) KR 55: WINCH FOR LIFTING LOWER TEST PLATEN (RECOMMENDED)

ENBLOC WELDED LOAD FRAMES

AUTOMATIC TESTING MACHINES "KP" SERIES with digital readout

EN 12390-4 BS 1610 BS 1881 DIN 51220 DIN 51223

General features of frame and components are as indicated on page 114.
The electro hydraulic power unit is of the "Silent & Cold power" type, characterized by reduced noise and heat generation, so this series is suited for all day usage.
The preset pace rate is actuated by the regulating system in feedback: further automatic mechanisms ensure that test procedure is simple and safe.
Pressure is read by an extensometric-type pressure transducer which the MONOTRONIC readout unit (features on page 115) displays as a load reading. When the test has ended, the motor stops automatically and the test results are displayed. Safety guard and ram limiting device are standard features.

For accessories and platens see pages 138-139.

KP 200/A

KP 200/L - KR 12 - KR 10 (x3)

KP 300/L - KR 12 - KR 10 (x3)

ENBLOC WELDED LOAD FRAMES

AUTOMATIC TESTING MACHINES
"KP" SERIES with digital readout

FEATURES	MODELS		
	KP 200/A	KP 200/L	KP 300/L
CAPACITY (kN)	2000		3000
VERTICAL SPAN (mm)	340		
HORIZONTAL SPAN (mm)	288		325
USABLE RAM TRAVEL (mm)	50		
TEST PLATEN (mm)	Ø 285		
STANDARD SPECIMEN SIZES AND RELEVANT DISTANCE PIECES (TO BE ORDERED SEPARATELY):			
CUBES 100 mm/side	WITH KR 12 + 4x KR 10		
CUBES 150 mm/side	WITH KR 12 + 3x KR 10		
CUBES 200 mm/side	WITH KR 12 + 2x KR 10		
CUBES 300 mm/side	NO		
CYLINDER DIA. 100 x 200 mm	WITH KR 12 + 2x KR 10		
CYLINDER DIA.15 x 30 cm - 6 x 12"	WITH KR 12		
CYLINDER DIA. 160 x 320 mm	YES		
MEASUREMENT DEVICES: STRENGTH	MONOTRONIC DIGITAL DISPLAY (1 : 30.000 POINT DISCRIMINATION)		
LOAD SENSOR	PRESSURE TRANSDUCER - EXTENSOMETRIC TYPE		
READING RANGE (kN)	FROM 0 TO 2000		FROM 0 TO 3000
READING RANGE (kN)	FROM 200 TO 2000		FROM 300 TO 3000
DIVISIONS (kN)	0.1		
MACHINE CLASS	1		
OPERATION	220 V, 50 Hz, SINGLE PHASE - 700 WATTS (1)		
DIMENSIONS (cm)	106 x 40 x 145	106 x 40 x 145	106 x 43 x 155
PACKED DIMENSIONS (cm)	132 x 92 x 165		
NET/PACKED WEIGHT (kg)	560 / 650	585 / 675	840 / 930

N.B.

(1) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

ENBLOC WELDED LOAD FRAMES

AUTOMATIC TESTING MACHINES "KE" SERIES with digital readout

EN 12390-4 BS 1610 BS 1881 DIN 51220 DIN 51223

General features are as indicated on page 114. The console houses the power unit and the EUROTRONIC digital display unit (features on page 116) and serves as user interface and control unit.
The electro-hydraulic power unit is of the Silent & Cold Power type characterized by reduced heat and noise generation so this series is suited for all day usage.
The preset pace rate is actuated by the regulating system in feedback; further automatic mechanisms ensure that test procedure is simple and safe.
Pressure is read by an extensometric type pressure transducer which the EUROTRONIC displays as a load reading. Scale discrimination is over 500000 points. An auxiliary transducer may be added to obtain two distinct readout scales when testing low-strength materials.
Safety guards and ram limiting device are standard features.

For accessories and platens see pages 138-139.

KE 200/A

KE 300/A

KE 400/A

ENBLOC WELDED LOAD FRAMES

AUTOMATIC TESTING MACHINES
"KE" SERIES with digital readout

FEATURES	MODELS			
	KE 200/A KE 200/CE	KE 300/A KE 300/CE	KE 400/A	KE 500/A
CAPACITY (kN)	2000	3000	4000	5000
MAIN RAM	2000	3000	4000	5000
SECONDARY RAM(1)	300	300	NO	NO
VERTICAL SPAN (mm)	340		410 *	510 *
HORIZONTAL SPAN (mm)	288	325	525	540
USABLE RAM TRAVEL (mm)	50			
TEST PLATEN (mm)	Ø 285		310 x 310	
DISTANCE PIECES	KR 12		-	-
	3x KR 10		2x KR 90 2x KR 10	3x KR 90 2x KR 10
STANDARD SPECIMEN SIZES:				
CUBES 100 mm/side	YES (3)		YES	
CUBES 150 mm/side	YES			
CUBES 200 mm/side	YES			
CUBES 300 mm/side	NO	YES (2)	YES	
CYLINDER DIA. 100 x 200 mm	YES			
CYLINDER DIA.15 x 30 cm - 6 x 12"	YES			
CYLINDER DIA. 160 x 320 mm	YES			
MEASUREMENT DEVICES: STRENGTH	EUROTRONIC DIGITAL DISPLAY (1 : 500.000 POINT DISCRIMINATION)			
LOAD SENSOR	PRESSURE TRANSDUCER - EXTENSOMETRIC TYPE			
READING RANGE (kN)	FROM 0 TO 2000	FROM 0 TO 3000	FROM 0 TO 4000	FROM 0 TO 5000
READING RANGE (kN)	FROM 200 TO 2000	FROM 300 TO 3000	FROM 400 TO 4000	FROM 500 TO 5000
READING RANGE (kN)(1)	FROM 30 TO 300	FROM 30 TO 300	NO	NO
DIVISIONS (kN)	0.1			
DIVISIONS (kN)(1)	0.01			
MACHINE CLASS	1			
OPERATION	220 V, 50 Hz, SINGLE PHASE - 700 WATTS (4)			
ASSEMBLED DIMENSIONS (cm)	75 x 43 x 135	80 x 43 x 136	100 x 55 x 160	117 x 110 x 220
PACKED DIMENSIONS (cm)	110 x 70 x 160	132 x 92 x 160	130 x 100 x 200	140 x 130 x 245
CONSOLE DIMENSIONS NET/PACKED (cm)	40 x 60 x 120/ 60 x 90 x 140			
NET/PACKED WEIGHT (kg)	665 / 785	910 / 1030	1550 / 1700	3700 / 3850

N.B.

(1) FORESEEN ONLY IN DUAL RAM MODELS KE 200/CE AND KE 300/CE

(2) KR 39: VARIATION PLATENS (310 x 310 mm)

(3) WITH DISTANCE PIECE KR 10 (DIAMETER 200 x 50 mm)

(4) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

(*) KR 55: WINCH FOR LIFTING LOWER TEST PLATEN (RECOMMENDED)

FOUR COLUMN LOAD FRAME

AUTOMATIC TESTING MACHINES "EUR" SERIES with digital readout

EN 12390-4 BS 1610 BS 1881 DIN 51220 DIN 51223

The frame is composed of columns and mono-bloc crossbeams and uses mechanical connections pre-compressed at nominal load of machine. Every element is accurately machined to guarantee the best overall symmetry; its large dimensions guarantee enhanced rigidity on the three axes. This characteristic, together with a hydraulic ram incorporating low-friction gaskets and ball seating in oil bath, ensure that the series complies with the strictest Standards for precision and stability.
The preset pace rate is actuated by the regulating system in feedback; further automatic mechanisms ensure that test procedure is simple and safe.
The control console houses the power pack and the EUROTRONIC digital display unit (features on page 116), and serves as user interface and control unit.
The electrohydraulic power pack is of the "Silent & Cold Power" type, characterised by reduced heat and noise generation, so this series is suited for all day usage. Pressure is read by an extensometric type pressure transducer which the EUROTRONIC displays as a load reading. Scale discrimination is over 500000 points. An auxiliary transducer may be added to obtain two distinct readout scales when testing low-strength materials.
Safety guard and ram limiting device are standard features.

For accessories and platens see pages 138-139.

KE 300/EUR

FOUR COLUMN LOAD FRAMES

AUTOMATIC TESTING MACHINES

"EUR" SERIES with digital readout

FEATURES	MODELS	
	KE 300/EUR KE 300/ECE	KE 400/EUR
CAPACITY (kN)	3000	4000
MAIN RAM	3000	4000
SECONDARY RAM[1]	300	NO
VERTICAL SPAN (mm)	340	
HORIZONTAL SPAN (mm)	330	495
USABLE RAM TRAVEL (mm)	50	
TEST PLATEN (mm)	Ø 285	310 x 310*
STANDARD DISTANCE PIECES (mm)	KR 12	KR 12
	3x KR 10	3x KR 10
STANDARD SPECIMEN SIZES:		
CUBES 100 mm/side	YES [3]	
CUBES 150 mm/side	YES	
CUBES 200 mm/side	YES	
CUBES 300 mm/side	YES [2]	YES
CYLINDER DIA. 100 x 200 mm	YES	
CYLINDER DIA. 15 x 30 cm - 6 x 12"	YES	
CYLINDER DIA. 160 x 320 mm	YES	
MEASUREMENT DEVICES: STRENGTH	EUROTRONIC DIGITAL DISPLAY (1 : 500.000 POINT DISCRIMINATION)	
LOAD SENSOR	PRESSURE TRANSDUCER - EXTENSOMETRIC TYPE	
READING RANGE (kN)	FROM 0 TO 3000	FROM 0 TO 4000
READING RANGE (kN)	FROM 300 TO 3000	FROM 400 TO 4000
READING RANGE (kN)[1]	FROM 30 TO 300	NO
DIVISIONS (kN)	0.1	
DIVISIONS (kN)[1]	0.01	
MACHINE CLASS	1	
OPERATION	220 V, 50 Hz, SINGLE PHASE - 700 WATTS [4]	
ASSEMBLED DIMENSIONS (cm)	60 x 45 x 145	86 x 56 x 165
PACKED DIMENSIONS (cm)	132 x 92 x 160	130 x 100 x 200
CONSOLE DIMENSIONS NET/PACKED (cm)	40 x 60 x 120 / 60 x 90 x 140	
NET/PACKED WEIGHT (kg)	1350 / 1550	3750 / 4000

N.B.

(1) FORESEEN ONLY IN DUAL RAM MODELS KE 300/ECE

(2) KR 39: VARIATION PLATENS (310 x 310 mm)

(3) WITH DISTANCE PIECE KR 10 (DIAMETER 200 x 50 mm)

(4) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

(*) KR 55: WINCH FOR LIFTING LOWER TEST PLATEN (RECOMMENDED)

ENBLOC WELDED LOAD FRAMES

COMPUTERIZED TESTING MACHINES "KC" SERIES with feedback system

EN 12390-4 BS 1610 BS 1881

KC 300

General features of frame and components are as indicated on page 114.
The console houses the power pack, the electronic hardware and the computer. All the high-level functions are managed by the computer which also serves as user interface, stores test results and manages printout of graphs and certificates.
The organization of the database and test screens is performed with Microsoft ACCESS and allows remote access to the archive or customization of the user interface.
Pace may be set at a defined rate or at increasing, decreasing or constant rates for complex test procedures such as the measurement of the elastic modulus and, obviously, when strain measurement is also required, suitable accessories must be added.
The electro-hydraulic power pack is of the Silent & Cold Power type, characterized by reduced heat and noise generation so this series is suited for all day usage.
Pressure is read by an extensometric type transducer; optionally, an auxiliary transducer may be added to obtain two distinct readout scales.
Safety guards and ram limited device are standard features.
The computer, colour monitor and printer supplies with the machine are the most recent models of a brand that is well-known at an international level.

For accessories and platens see pages 138-139.

KC 400

KC 500 - KR 55

ENBLOC WELDED LOAD FRAMES

COMPUTERIZED TESTING MACHINES

"KC" SERIES with feedback system

FEATURES	MODELS			
	KC 200 KC 200/CE	KC 300 KC 300/CE	KC 400	KC 500
CAPACITY (kN)	2000	3000	4000	5000
MAIN RAM	2000	3000	4000	5000
SECONDARY RAM(1)	300		NO	NO
VERTICAL SPAN (mm)	340		410*	510*
HORIZONTAL SPAN (mm)	288	325	525	540
USABLE RAM TRAVEL (mm)	50			
TEST PLATEN (mm)	Ø 285		310 x 310	
DISTANCE PIECES	3x KR 10 + KR 12		2x KR 10 2x KR 90	2x KR 10 3x KR 90
STANDARD SPECIMENS SIZES:				
CUBES 100 mm/side	YES (3)		YES	
CUBES 150 mm/side	YES			
CUBES 200 mm/side	YES			
CUBES 300 mm/side	NO	YES (2)	YES	
CYLINDER DIA. 100 x 200 mm	YES			
CYLINDER DIA.15 x 30 cm - 6 x 12"	YES			
CYLINDER DIA. 160 x 320 mm	YES			
MEASUREMENT DEVICES: STRENGTH	COMPUTER AND ELECTRONIC LOGIC CARDS			
LOAD SENSOR	PRESSURE TRANSDUCER - EXTENSOMETRIC TYPE			
READING RANGE (kN)	FROM 0 TO 2000	FROM 0 TO 3000	FROM 0 TO 4000	FROM 0 TO 5000
READING RANGE (kN)	FROM 200 TO 2000	FROM 300 TO 3000	FROM 400 TO 4000	FROM 500 TO 5000
READING RANGE (kN)(1)	FROM 30 TO 300		NO	NO
DIVISIONS (kN)	0.1			
DIVISIONS (kN)(1)	0.01			
MACHINE CLASS	1			
OPERATION	220 V, 50 Hz, SINGLE PHASE - 750 WATTS (4)			
ASSEMBLED DIMENSIONS (cm)	75 x 43 x 135	80 x 43 x 136	100 x 55 x 160	117 x 110 x 220
PACKED DIMENSIONS (cm)	110 x 70 x 160	132 x 92 x 160	130 x 100 x 200	140 x 130 x 245
CONSOLE DIMENSIONS NET/PACKED (cm)	75 x 75 x 101/ 110 x 100 x 120			
NET/PACKED WEIGHT (kg)	665 / 785	910 / 1030	1550 / 1700	3700 / 3850

N.B.

(1) FORESEEN ONLY IN DUAL RAM MODELS KC 200/CE AND KC 300/CE

(2) KR 39: VARIATION PLATENS (310 x 310 mm)

(3) WITH DISTANCE PIECE KR 10 (DIAMETER 200 x 50 mm)

(4) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

(*) KR 55: WINCH FOR LIFTING LOWER TEST PLATEN (RECOMMENDED)

FOUR COLUMN LOAD FRAMES

COMPUTERIZED TESTING MACHINES "EUR" SERIES

with feedback system

EN 12390-4 BS 1610 BS 1881 DIN 51220 DIN 51223

General features of frame and components are as indicated on page 114.
The console houses the power pack, the electronic hardware and the computer. All the high-level functions are managed by the computer which also serves as user interface, stores test results and manages printout of graphs and certificates.
The organization of the database and test screens is performed with Microsoft ACCESS and allows remote access to the archive or customization of the user interface.
Pace may be set at a defined rate or at increasing, decreasing or constant rates for complex test procedures such as the measurement of the elastic modulus and, obviously, when strain measurement is also required, suitable accessories must be added.
The electro-hydraulic power pack is of the Silent & Cold Power type, characterized by reduced heat and noise generation so this series is suited for all day usage.
Pressure is read by an extensometric type transducer; optionally, an auxiliary transducer may be added to obtain two distinct readout scales.
Safety guards and ram limited device are standard features.
The computer, colour monitor and printer supplies with the machine are the most recent models of a brand that is well-known at an international level.

For accessories and platens see pages 138-139.

KS 300/EUR

FOUR COLUMN LOAD FRAMES

COMPUTERIZED TESTING MACHINES
"EUR" SERIES with feedback system

FEATURES	MODELS	
	KS 300/EUR KC 300/ECE	KS 400/EUR
CAPACITY (kN)	3000	4000
MAIN RAM	3000	NO
SECONDARY RAM[1]	300	NO
VERTICAL SPAN (mm)	340	
HORIZONTAL SPAN (mm)	330	495
USABLE RAM TRAVEL (mm)	50	
TEST PLATEN (mm)	Ø 285	310 x 310
STANDARD DISTANCE PIECES (mm)	KR 12	KR 12
	3x KR 10	3x KR 10
STANDARD SPECIMEN SIZES:		
CUBES 100 mm/side	YES [3]	
CUBES 150 mm/side	YES	
CUBES 200 mm/side	YES	
CUBES 300 mm/side	YES [2]	YES
CUBES 100 x 200 mm/side	YES	
CYLINDER DIA. 15 x 30 cm - 6 x 12"	YES	
CYLINDER DIA. 160 x 320 mm	YES	
MEASUREMENT DEVICES: STRENGTH	COMPUTER AND ELECTRONIC LOGIC CARDS	
LOAD SENSOR	PRESSURE TRANSDUCER - EXTENSOMETRIC TYPE	
READING RANGE (kN)	FROM 0 TO 3000	FROM 0 TO 4000
READING RANGE (kN)	FROM 300 TO 3000	FROM 400 TO 4000
READING RANGE (kN)[1]	FROM 30 TO 300	NO
DIVISIONS (kN)	0.1	
MACHINE CLASS	1	
OPERATION	220 V, 50 Hz, SINGLE PHASE - 750 WATTS [4]	
ASSEMBLED DIMENSIONS (cm)	60 x 45 x 145	86 x 56 x 165
PACKED DIMENSIONS (cm)	132 x 92 x 160	130 x 100 x 200
CONSOLE DIMENSIONS NET/PACKED (cm)	40 x 60 x 120 / 60 x 90 x 140	
NET/PACKED WEIGHT (kg)	1350 / 1550	3750 / 4000

N.B.

(1) FORESEEN ONLY IN DUAL RAM MODELS KC 300/ECE

(2) KR 39: VARIATION PLATENS (310 x 310 mm)

(3) WITH DISTANCE PIECE KR 10 (DIAMETER 200 x 50 mm)

(4) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

ENBLOC WELDED LOAD FRAMES

KD 200/E
KR 10 x3
KR 12

TESTING MACHINES WITH DIAL GAUGE
electrically operated

These machines are powered by an electro-hydraulic power pack with a rapid approach pump as standard (low pressure) and a high pressure pump for testing. General features of frame and componente are as indicated on page 114.
Dial Gauges (Bourdon type) are 200 mm diameter with permissible error ± 1% in upper four fifths of full scale. Parallax error is eliminated with a strip mirror and a slip pointer is used to indicate peak load.
On twin gauge machines, a safety maximum pressure valve is fitted as standard to cut out the secondary gauge once its full scale has been reached.

TESTING MACHINES WITH DIAL GAUGE
hand operated

These machines (identical to the electric models) differ only in the hydraulic pump (hand operated). They are ideal for site use where mains supply is not readily available, for periodical tests and for basic educational purposes. The manual pump is of the single-action type with two capacities; high capacity/low pressure for rapid closure of free clearance between the specimen and upper test platen, low capacity/high pressure for the application of the test force. Selection of the high or low capacity is automatically piloted by the oil pressure.

KD 150/M
KR 15

ENBLOC WELDED LOAD FRAMES

TESTING MACHINES WITH DIAL GAUGE

electrically operated

FEATURES	MODELS			
	KD 150/E	KD 150/30E	KD 200/E	KD 200/50E
CAPACITY (kN)	1500	1500	2000	2000
VERTICAL SPAN (mm)	370			
HORIZONTAL SPAN (mm)	236		288	
USABLE RAM TRAVEL (mm)	50			
TEST PLATEN (mm)	218		385	
STANDARD SPECIMEN SIZES AND RELEVANT DISTANCE PIECES (TO BE ORDERED SEPARATELY):				
CUBES 100 mm/side	WITH KR 15 + KR 10		WITH KR 12 + 4x KR 10	
CUBES 150 mm/side	WITH KR 15		WITH KR 12 + 3x KR 10	
CUBES 200 mm/side	NO		WITH KR 12 + 2x KR 10	
CYLINDER DIA. 100 x 200 mm	WITH 2 KR 10		WITH KR 12 + 2x KR 10	
CYLINDER DIA. 15 x 30 cm - 6 x 12"	YES		WITH KR 12	
CYLINDER DIA. 160 x 320 mm	YES (1)		YES	
MANOMETER DIA. 200 mm	ONE MANOMETER	TWO MANOMETER	ONE MANOMETER	TWO MANOMETER
READING RANGE (kN)	FROM 0 TO 1500	FROM 0 TO 300	FROM 0 TO 2000	FROM 0 TO 500
		FROM 0 TO 1500		FROM 0 TO 2000
READING RANGE (kN)	FROM 300 TO 1500	FROM 60 TO 300	FROM 400 TO 2000	FROM 100 TO 500
		FROM 300 TO 1500		FROM 400 TO 2000
MANOMETER DIVISIONS (kN)	5	1 AND 5	10	2 AND 10
OPERATION	220 V, 50 Hz, SINGLE PHASE - 1130 WATTS (1)			
DIMENSIONS: ASSEMBLED/PACKED (cm)	88 x 40 x 111 / 90 x 60 x 140		102 x 43 x 132 / 132 x 92 x 165	
NET/PACKED WEIGHT (kg)	395 / 435	420 / 460	605 / 665	610 / 670

ENBLOC WELDED LOAD FRAMES

TESTING MACHINE WITH DIAL GAUGE

hand operated

FEATURES	MODELS			
	KD 150/M	KD 150/30M	KD 200/M	-
CAPACITY (kN)	1500	1500	2000	-
OPERATION	MANUAL PUMP			
DIMENSIONS: ASSEMBLED/PACKED (cm)	88 x 40 x 111 / 90 x 60 x 140		102 x 43 x 132 / 110 x 70 x 160	
NET/PACKED WEIGHT (kg)	370 / 410	395 / 435	580 / 640	585 / 645

NOTE

(1) OTHER VOLTAGES ARE AVAILABLE UPON REQUEST

Variation *	Accessory	Description
SET OF TWO TESTING PLATENS FOR BLOCKS (550 HV)		
KR 39	**KR 49**	Platens 310 x 310 x 50 mm. For 3000 kN machines
KR 38	**KR 42**	Platens 445 x 205 x 50 mm. For 1500 kN machines
SET OF TWO TESTING PLATENS FOR BLOCKS (600 HV - EN 772/1)		
KR 20	**KR 40**	Platens 520 x 320 x 50 mm. For 3000 kN machines
KR 21	**KR 22**	Platens 520 x 270 x 50 mm. For 2000 kN machines

* Variation: set of two PLATENS FOR BLOCKS (instead of the standard platens)

KR 40

DETAILED VIEW OF **KR 55** WITH **KR 40**

ACCESSORY:

KR 55	Winch for lifting lower platen

KR 55

TESTING PLATENS

KR 94	TESTING PLATEN (BS 1881) FOR CUBES 10 cm/side: size 100 x 100 x 50 mm
KR 96	TESTING PLATEN (BS 1881) FOR CUBES 15 cm/side: size 150 x 150 x 50 mm
KR 93	TESTING PLATEN FOR CYLINDERS (1500 kN machines) dia.16 x 32 (h) cm Equipped with capping pads and retainers Dimensions: diameter 218 x 30 mm

DISTANCE PIECES

KR 10	DISTANCE PIECE DIAMETER 200 mm 50 mm thickness
KR 12	DISTANCE PIECE DIAMETER 200 mm 30 mm thickness
KR 90	DISTANCE PIECE DIAMETER 200 mm 100 mm thickness
KR 15	DISTANCE PIECE DIAMETER 160 mm 150 mm thickness (1500 kN machines)

AD 013/B02	Printer, 24 column, provides a printout of test report on thermal paper
AD 050/001	Software for data acquisition and transmission to a PC with MS Windows O.S.
AD 050/003	Software for data acquisition and transmission to a PC with MS Windows O.S. Also enables test data to be precessed for generating graphs and certificates

ACCESSORIES FOR TESTING MACHINES

Positioned between the platens of a suitable compression testing machine, various tests may be performed. The load measuring instrument on the compression testing machine must be sufficiently sensitive to measure the relevant strength values (which are considerably lower than compressive strength values).

UNIVERSAL FLEXURAL TESTING DEVICE FOR CONCRETE BEAMS 10 AND 15 cm/SIDE — KR 08

EN 12390-5

For concrete beams with centre-point loading method and third-point loading method. The device comprises:
- a lower element with two bearers (one fixed and one floating/rotating bearer). Adjustable span at 300 mm and at 450 mm
- an upper element with two floating/rotating bearers fixed in a floating system. Adjustable span at 100 mm and at 150 mm. One of the upper bearers can be removed to perform the centre-point test.

dimensions: 226 x 620 x 330 (h) mm.
weight: 29.5 kg.

KR 08

INDIRECT TENSILE STRESS TESTING DEVICE FOR CYLINDERS Ø 100, 150, 160 mm — KR 021

EN 12390-6 UNI 6135

For the indirect tensile testing (“Brazilian” test) of concrete cylinders with diameters 100, 150 and 160 mm. The test requires the sample to be taken to failing point by the application of compressive force to the two generating lines of the cylinder.

dimensions: 175 x 420 x 310 (h) mm.
weight: 25 kg.

KR 021

KR 021/C	Wooden strips (pack of 10): 4 x 10 x 340 mm
KR 022/C	Hard board packing strips (pack of 100): 4 x 10 x 340 mm

INDIRECT TENSILE STRESS TESTING DEVICE ON SOIL-CEMENT SAMPLES — KR 023

EN 13286-42

For samples measuring 6” x 7” - 152.4 x 177.8 (h) mm.

dimensions: 165 x 285 x 215 (h) mm.
weight: 9.2 kg.

KR 023

KR 024/C	Hard board packing strips (pack of 100): 4 x 16 x 240 mm

INDIRECT TENSILE STRESS TESTING DEVICE FOR BLOCK PAVERS AND CUBIC SPECIMENS — KR 09

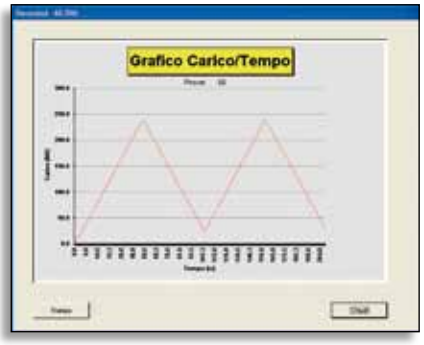
EN 1338 EN 12390-6

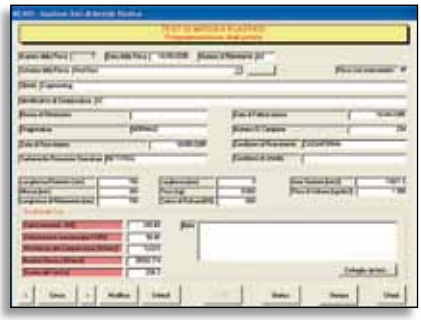
For testing of block pavers having maximum dimensions between 160 (width), 320 (length) and 150 mm (height) or cubic specimens 10-15 cm/side.

dimensions: 150 x 420 x 335 (h) mm.
weight: 30 kg.

KR 09

KR 023/C	Hard board packing strips (pack of 100): 4 x 15 x 355 mm (pavers test)
KR 021/C	Wooden strips (pack of 10): 4 x 10 x 340 mm (cubes test)





ELASTIC MODULUS

ASTM C 469 UNI 6556

In order to determine the elastic modulus of a concrete specimen, various options are available depending on which of the various Standards are used as reference and which type of control is used for the compression machine.
The simplest method is offered by the ASTM C 469 which prescribes the application of a special mechanical device (compressometer) to a cylindrical specimen. This device is equipped with a sensor which measures and amplifies vertical deformation.
An analog sensor (dial gauge) may be used or, in alternative, an electronic model (strain bridge type transducer); the former is used on compression machines that do not have the facility for automatic data acquisition; the latter requires a computerized machine equipped with dedicated hardware and software for the test.
The compressometer may also be equipped with a sensor for measuring axial deformation (Poisson ratio) and can be supplied in analog or digital versions.
Where Standards require the measurement of vertical deformation along more generatrices of the specimen, the instrumentation used is more complex and the compression machine must be computerized with feedback.
Two different types of sensors are available: strain gauges for affixing directly on the specimen, and physical transducers, supported by mechanical strain gauges which must be applied using elastic bands.
Obviously the former may be used once and then discarded; the latter may be used over and over again.
Hardware and software installed in the compression testing machine change according to which type of sensor is used, so at time of ordering the system in its entirety must be taken into examination.
There are four readout channels for deformation, but more may be added upon request.
Various Standards regulate the test procedure: UNI 6556, BS 1881:121, DIN 1048, so it is a good idea to specify which upon ordering so as to enable the relevant software modules that automate the test to be installed.

COMPRESSOMETER **KR 06**

The instrument is used to determine the stress/strain ratio (modulus of elasticity) of concrete cylinders of 10-15 cm diameter during compression testing.
Made of anodised aluminium.
Complete with 0.001 dial gauge, 5 mm travel.

dimensions: 310 x 250 x 210 (h) mm.
weight: 4 kg.

COMPRESSOMETER/EXTENSOMETER **KR 07**

The instrument is used to determine both axial and radial strain in cylindrical concrete specimens during compression testing so to obtain both the modulus of elasticity and Poisson's ratio.
Suitable for specimens of 10 and 15 cm in diameter.
Made of anodized aluminium.
Complete with two dial gauges, 0.001 divisions, 5 mm travel.

dimensions: 310 x 250 x 250 (h) mm.
weight: 5 kg.

COMPRESSOMETER KR 06/T

Similar to KR 06 model, but provided with an extensometric transducer (Wheatstone bridge type), 5 mm travel, instead of dial gauge.
Comprises a frame in anodized aluminium and an electronic, extensometric transducer (Wheatstone bridge type), 0.001 divisions, 5 mm travel. Suitable for cylindrical specimens of 10 and 15 cm diameter. This model may only be connected to a computerized compression testing machine.

DIMENSIONS: 310 x 250 x 250 (h) mm
WEIGHT: 4 kg

KR 06/T

COMPRESSOMETER-EXTENSOMETER (POISSON RATIO) KR 07/T

The instrument is used to determine both axial and radial strain on cylindrical concrete specimens during compression testing so as to obtain both the modulus of elasticity and the Poisson ratio. It is suitable for specimens of 10 and 15 cm diameter and is made of anodized aluminium.
Complete with two extensometric transducers (Wheatstone bridge type), 0.001 divisions, 5 mm travel. This model may only be connected to a computerized compression testing machine.
Also needed with the instrument is the software/hardware implementation AD 040/001.

HARDWARE-SOFTWARE IMPLEMENTATION AD 040/001

Our computerized compression testing machines with feedback system may be supplied with additional software and relevant hardware to enable direct connection to either KR 06/T or KR 07/T compressometers. In this case, data management is automatic. AD 040/001 implementation must be ordered at the same time as the compression testing machine.

AD 306

STRAIN GAUGES AD 306

Set of strain gauges for gluing directly on the specimen. These strain gauges are disposed of after use and may be used with computerized compression testing machines only.

ELECTRONIC EXTENSOMETER AD 307

Extremely high precision extensometer for measuring axial strain. Such extensometers are intended for application to the specimen, two or four at a time, using simple O-Rings made of rubber.
Resolution 0.1 µm, 2 mm travel.
Measurement base: 50 mm, 100 mm, 200 mm.
The AD 307 may be connected only to computerized compression testing machines.

AD 307

N.B.:
USING COMPRESSOMETERS KR 06, KR 07, KR 06/T, KR 07/T, THE MODULUS OF ELASTICITY ACCORDING TO ASTM C 469 IS DETERMINED.
USING EXTENSOMETER AD 303, THE MODULUS OF ELASTICITY TO UNI 655615 IS DETERMINED.

PRESSURE TRANSDUCERS

PRESSURE TRANSDUCER (0-700 bars) AD 150/700

The set consisting of AD 001 (Monotronic) + AD 150/700 transducer when calibrated together allows conversion of a dial gauge machine into a digital readout machine. The set may be placed on any brand of machine; all we need to know is the thrust section of the hydraulic cylinder.

These pressure transducers can be applied to increase the precision of load measurements on low-strength specimens. Each transducer is supplied complete with a support block and an automatic cut-out valve.

FOR 250 KN MACHINES:

AD 159	Transducer kit from 0 to 35 bar (25 kN)

POUR LES PRESSES DE 1500-2000-3000 KN:

AD 154	Transducer kit from 0 to 100 bar
AD 155	Transducer kit from 0 to 200 bar
AD 156	Transducer kit from 0 to 350 bar
AD 157	Transducer kit from 0 to 500 bar

SPARE PARTS

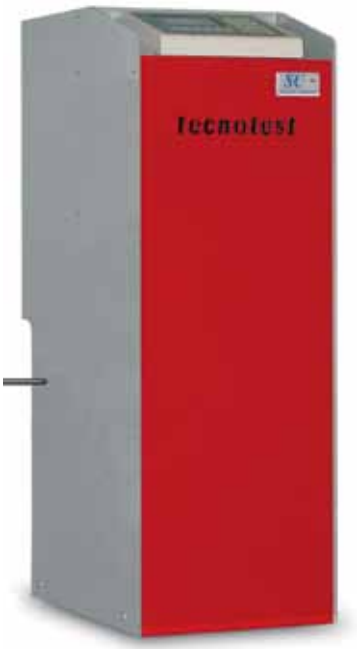
R 300/097	Complete hydraulic cylinder for 1500 kN machines
R 300/117	Complete hydraulic cylinder for 2000 kN machines
R 300117/1	Complete hydraulic cylinder for 300/2000 kN dual ram machines
R 300/125	Complete hydraulic cylinder for 3000 kN machines
R 300125/1	Complete hydraulic cylinder for 300/3000 kN dual ram machines
R 300/135	Complete hydraulic cylinder for 4000 kN machines
R 300/145	Complete hydraulic cylinder for 5000 kN machines
R 300/04	Set of gaskets for 1500 kN machines
R 300/03	Set of gaskets for 2000 kN machines
R 300/011	Set of gaskets for 300/2000 kN dual ram machines
R 300/01	Set of gaskets for 3000 kN machines
R 300/02	Set of gaskets for 300/3000 kN machines
R 300/06	Set of gaskets for 4000 kN machines
R 300/08	Set of gaskets for 5000 kN machines
R 350	Set of gaskets for hand operated machines
R 445/505	Load pace regulator
R 421/038	Dial indicator handwheel for R 445/505
R 435/501	RIV valve (max. 700 bar) with max. pressure valve incorporated
R 421/006	Handwheel for valve R 435/501
R 435/502	RIV valve -700 valve- for automatic machines
R 090	Hydraulic oil bottle (5 kg)
R 439	Oil level cap with dip-stick

ELECTRO-HYDRAULIC POWER UNITS

The forces required for destructive tests on concrete specimens are such that hydraulic actuators need to be used that are capable of operating safely with pressure of hydraulic fluid reaching around 700 bar.
To generate a flow of oil at such pressures, the power unit must be fitted with special components that only a limited number of manufacturers are able to supply. If, as in our case, a particularly accurate rate of flow is required, the range of commercial valves available is reduced practically to nil and so we had to resort to designing our own. In all our electro-hydraulic power units, highly accurate control is made possible thanks to components built specially to our design.
In our semi-automatic machines, in which load pace is regulated via a hand-wheel, the hydraulic valve maintains a constant flow of oil to the actuator independently from the pressure, so there is no need for the operator to have to make continual adjustments in order to follow the load ramp prescribed by Standards.
In our automatic and computerized machines, regulation is controlled electronically by the feedback system; the closed-loop control is based on the number of rotations of the motor, so the rate of hydraulic flow varies accordingly.
The unique feature of Tecnotest's valve is its ability to release a small amount of oil at a constant rate so as to reduce the load developed by the ram when discharge exceeds the capacity of the pump.
Differently from other systems, the motor continues its rotation even when the feedback system requires a reduction in load; in this way it is possible to optimize the course of the programmed ramp and avert the typical step-like progression.
A particularly important feature of this innovative technology is that it results in a reduction of energy consumption, a lower oil temperature and reduced noise.

KC 70	KC 70 Control unit and console for computerized compression testing machines. Power supply: 230 V, 50/60 Hz, single phase Weight: 200 kg For computerized series machines

KP 70	Control unit, on-board type for automatic compression machines with built-in Monotronic display. Power supply: 230 V, 50/60 Hz, single phase Weight: 60 kg For KP series machines



KE 70	Control unit and console for automatic compression testing machines with EUROTRONIC display. Power supply: 230 V, 50/60 hz, single phase Weight: 150 Kg For KE series machines

KR 70	Control unit for compression testing machines, Power supply: 220 V, 50 Hz, single phase Weight: 50 kg For KL series machines
KD 70	Control unit for compression testing machines, Power supply: 220 V, 50 Hz, single phase Weight: 50 kg For KD series machines
KR 74	Control unit for compression testing machines, hand operated Weight: 25 kg

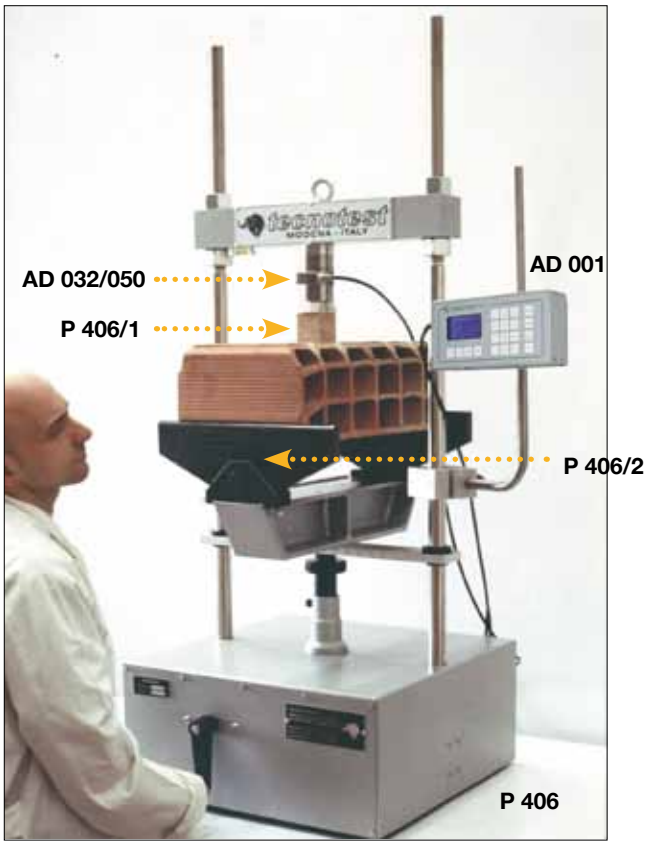
50 KN HAND-OPERATED MECHANICAL FLEXURAL TESTING MACHINE P 406

This simple, hand-operated mechanical flexure tester, provided that the necessary accessories are supplied (see COMPLETING DEVICES for details), allows flexural tests to be performed on concrete and clay tiles, hollow tiles and blocks, as well as punching tests on clay blocks for flooring. In order to measure load on failure, it is possible to choose from a proving ring or electronic load cell with Monotronic digital readout unit.
These instruments must be ordered apart according to capacity and accuracy needed for the tests required (see COMPLETING DEVICES).

Specifications:
- Maximum thrust capacity: 50 kN
- Operation: hand-operated by means of a geared-down mechanical ram
- Translation ratio: 0.02 per turn of hand wheel
- Horizontal span: 520 mm
- Maximum vertical span (without accessories): 670 mm
- Lower beam: accepts bearers for the various tests to be performed, distance between bearers being adjustable from 50 to 500 mm
- Ram travel: 100 mm

dimensions: 620 x 650 x 1500 (h) mm.
weight: 120 kg.

packed dimensions: 900 x 600 x 1650 (h) mm.
packed weight: 160 kg.



COMPLETING DEVICES

Load measuring instruments

BB 050	PROVING RING: 50 kN

Other models on page 28.

For a higher readout accuracy and to speed up test procedure, electronic load cells with relevant Monotronic microprocessor-based digital readout units (which allow load readout to be displayed immediately with no need to use conversion tables) may be used instead of the proving ring.

AP 032/050	LOAD CELL: 50 kN

Other models on page 28.

AD 001	MONOTRONIC READOUT UNIT

Features on page 115.

PUNCHING TESTS ON CLAY BRICKS

UNI 9730-3

P 406/1	Hard wooden block measuring 50 x 50 x 50 mm and corresponding metal platen for positioning between the load measuring instrument and the sample
P 406/2	Pair of lower bearers Ø 20 x 350 mm one floating and the other fixed

FLEXURAL TESTS ON CONCRETE TILES

EN 491 UNI 2107

P 406/3	Upper floating bearer Ø 20 x 350 mm to apply to load measurement instrument
P 406/2	Pair of lower bearers Ø 20 x 350 mm one floating and the other fixed

FLEXURAL TESTS ON BLOCKS/ CLAY TILES AND HOLLOW TILES

EN 538 EN 772-1

P 406/4	Lower and upper bearer assembly with bearers measuring Ø 38 x 500 mm. Upper bearer and one of the lower bearers is of the floating kind

FLEXURAL TESTING MACHINE ON CLAY BRICK SPECIMENS P 415

Used to determine tensile strength by flexure on brick specimens.
UNI 9730-3
The apparatus comprises:
- aluminium frame with 340 mm span between supports so as to be able to place a digital balance between them (see our item TL 331);
- hand operated load device;
- specimen support device with flexure bearers;

dimensions: 400 x 310 x 380 (h) mm.
weight: approx. 5 kg

P 415

TL 331

12 KG DIGITAL BALANCE TL 331

Accuracy 0.1 g, specifications as shown on page 342.
RS 232 serial port for PC connection.

Other models of scales available on page 340.

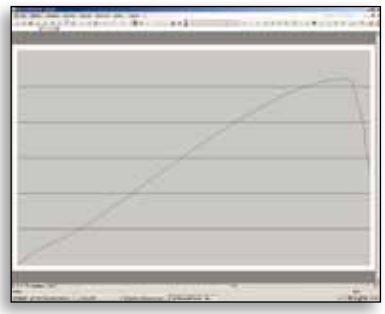
200 kN DIGITAL COMPRESSION MACHINE P 434/RC

Machine for determining the deformation energy absorption of sprayed concrete.
UNI 14488-5
The effective yielding is measured at the centre of a sprayed concrete specimen having dimensions 600 x 600 x 100 mm.

Specifications:
- 200 kN Capacity (0.01 kN sensitivity)
- Double-acting hydraulic cylinder, 70 mm stroke
- Supporting base for frame with outer dimensions 700 x 700 mm, inner span 500 x 500 mm, ground contact surfaces
- Square section loading punch measuring 100 x 100 mm, ground loading surface (50 HRC)
- Load sensor: low-form, extensometric load cell, class 1 according to EN 1002-3 and ISO 376
- Deformation sensor: 75 mm travel potentiometric transducer, 0.01 mm sensitivity
- Measurement device: Eurotronic digital unit, nominal resolution 1 in 500,000 points, RS 232 serial port (other features shown on page 403 of the general catalogue)
- Standard electro-hydraulic power pack with dual speed rapid approach and test speed (other features shown on page 401 of the general catalogue)

power: 220 V, 50Hz, single phase, 1130 Watt
dimensions: 1250 x 700 x 1350 (h) mm.
weight: 310 Kg

P 434/RC



P 433/TC

FLEXURAL TESTING MACHINE

ASTM C 78 ASTM C 293 AASHTO T 97 EN 12390-5

For testing flexural strength of concrete beams measuring 100 x 100 x 400/500 mm and 150 x 150 x 600/750 mm.
Supplied with an electric control unit, extensometric load cell and relevant digital readout unit Monotronic (see page 115 for features). The digital readout unit is supplied with specific software for flexure tests.
Standard equipment includes a pair of lower bearers (one is fixed, one is rotating/floating) with adjustable span up to 450 mm and a pair of upper (rotating/floating) bearers, placed on a rotating device. Adjustable span up to 150 mm. One of the upper bearers may also be easily removed to enable tests requiring centre-point loading to be performed.

Specifications:
Capacity: 100 kN
Maximum vertical span (between bearers): 165 mm
Horizontal span: 720 mm
Bearer dimensions: Ø 40 x 160 mm (length)
Distance between lower bearers: adjustable from 300 to 450 mm
Distance between upper bearers: adjustable from 100 to 150 mm
Piston stroke: 200 mm

power supply: 220 V, 50 Hz, single phase, 1130 Watts
dimensions: 1150 x 550 x 1250 (h) mm.
weight: 280 kg

MODELS:

P 433/C	100 kN CAPACITY MACHINE
P 433/G	150 kN CAPACITY MACHINE
P 433/L	200 kN CAPACITY MACHINE

FRAME FOR USE IN CONJUNCTION WITH DIGITAL COMPRESSION MACHINE

Basically it is the P 433/C supplied without hydraulic power pack or Monotronic. The frame is usually combined to a machine for compression testing (of concrete specimens) or for testing concrete paving blocks (series P 431) using a hydraulic connection kit. See some examples of combinations on pages 151-160. Supplied complete with hydraulic devices, quick coupling pipes, valves, one extensometric pressure transducer. The frame must be ordered together with the machine with which it is to be combined. Final calibration of the group is carried out in our testing laboratory.

dimensions: 950 x 550 x 1250 (h) mm.
weight: 220 Kg.

MODELS:

P 433/TC	100 kN FRAME
P 433/V	150 kN FRAME
P 433/Z	200 kN FRAME

ACCESSORIES:

AD 050/001	Software for transmission of data to a PC
AD 013/B02	Printer, 24 column, provides a printout of test report on thermal paper

500 kN TENSILE SPLITTING STRENGTH TESTING MACHINE FOR PAVING BLOCKS

EN 1338

For tensile splitting strength of paving blocks measuring 310 x 310 mm max. Supplied with an electric power unit and a pressure transducer. Complete with relevant digital readout unit (Monotronic or Eurotronic) (see page 115-116).
The digital displays are supplied complete with a specific software which:
- automatically calculates the correction factor k during the input phase;
- at the end of the test allows the peak value (specific strength and max. load referred to the unit length) is displayed.

A further alternative is represented by the possibility of using the frame in conjunction with an existing compression machine.
Standard equipment includes a pair of bearers: lower bearer is fixed, upper bearer is floating type (R = 75 mm, length 320 mm).
Optional distance pieces (30 mm - 50 mm) are available to reduce vertical test span (190 mm).
The distance piece must be ordered apart.

Specifications:
Capacity: 500 kN
Maximum vertical span (between bearers): 190 mm
Horizontal span: 320 mm
Bearer length: 320 mm
Bearer radius: 75 mm
Piston stroke: 50 mm
power: 220 V, 50 Hz, single phase, 1130 W
dimensions: 1000 x 410 x 1300 (h) mm
weight: 370 kg

Models:

500 kN TESTING MACHINE ELECTRIC MODEL EQUIPPED WITH EUROTRONIC	**P 431/R**
500 kN TESTING MACHINE ELECTRIC MODEL EQUIPPED WITH MONOTRONIC	**P 431**
500 kN FRAME FOR COMBINATION TO A DIGITAL TESTING MACHINE	**P 431/T**

The frame is usually conbined to a machine for compression testing or for testing concrete paving blocks (series P 431) equipped with Eurotronic readout unit, by means of a hydraulic connection kit. See pages 151-160 for combinations.
Supplied complete with quick coupling pipes and one extensometric pressure transducer.
The frame must be ordered together with the machine with which it is to be combined.
Final calibration of the group is carried out in our testing laboratory.

ACCESSORIES:

KR 023/C	Hard board packing strips (100 pcs, 4 x 15 x 355 mm)
KR 12	30 mm distance piece - 200 mm diameter
KR 10	50 mm distance piece - 200 mm diameter
AD 013/B02	Printer, 24 column, provides a printout of test report on thermal paper
AD 050/001	Software package for transmission of test data to a PC

P 431
KR 10 (x 2)
KR 12 (x 1)
AD 013/B02

P 432/C

100 kN FLEXURAL STRENGTH TESTING MACHINE FOR CONCRETE CURBS

EN 1340

Used for flexural test on concrete curbs measuring 180 x 300 x 1000 (h) mm length max. Supplied with electro-hydraulic power unit and digital readout. Strength is measured by means of an extensometric load cell, or a pressure transudcer, complete with relevant digital readout unit (Monotronic or Eurotronic), (see pages 402 and 403 for features). The digital displays are supplied complete with a specific software for flexure test. A further alternative is represented by the possibility of using the frame only in conjunction with an existing compression machine. Standard equipment includes a pair of lower bearers (one is fixed, one is floating); the distance is adjustable up to 900 mm max. Ram stroke limiting device. The upper loading plate (Ø 40 mm) containing the ball seating assembly, can easily be removed for adding any other accessories which may be needed (such as bearers for flexure tests).

Specifications

Capacity: 100 kN

Maximum vertical span (bearers/loading platen): 190 mm

Loading device: Ø 40 x 22 mm (length)

Bearer dimensions: Ø 40 x 350 mm (length)

Distance between bearers: 150 to 950 mm (adjustable)

Horizontal span: 720 mm. Piston stroke: 200 mm

power suuply: 220 V, 50 Hz, single phase, 1130 W

dimensions: 1150 x 1050 x 1250 (h) mm.

weight: 290 Kg.

Models:

100 kN TESTING MACHINE ELECTRIC MODEL WITH MONOTRONIC DIGITAL DISPLAY P 432/C

100 kN TESTING MASCHINE ELECTRIC MODEL WITH EUROTRONIC DIGITAL DISPLAY P 432/RC

100 kN FRAME FOR COMBINATION TO A DIGITAL MACHINE P 432/TC

Basically it is the P 432/C supplied without hydraulic power unit or Monotronic. The frame is usually combined to a machine for compression testing (of concrete specimens) or for testing paving blocks (series P 431), using a hydraulic connection kit (series KR 065). See some examples of combinations on pages from 151 to 160).

The frame must be ordered together with the machine with which it is to be combined. Supplied complete with quick coupling pipes and one extensometric load cell. Final calibration of the group is carried out in our testing laboratory.

dimensions: 950 x 1050 x 1250 (h) mm.

weight: 230 kg

100 kN TESTING MACHINE ELECTRIC MODEL WITH MONOTRONIC DIGITAL DISPLAY P 437/C

Identical to the P 432/C but with a vertical span of 270 mm. Bearers Ø 40 x 550 mm.

100 kN TESTING MACHINE ELECTRIC MODEL WITH EUROTRONIC DIGITAL DISPLAY P 437/RC

Identical to the P 432/RC but with a vertical span of 270 mm. Bearers Ø 40 x 550 mm.

100 kN FRAME FOR COMBINATION TO A DIGITAL MACHINE P 437/TC

Identical to the P 432/TC but with a vertical span of 270 mm. Bearers Ø 40 x 550 mm.

Particolare del distributore montato sulla P 432/C

ACCESSORIES (P 432 AND P 437):

AD 013/B02	Printer, 24 column, provides a printout of test report on thermal paper for Monotronic and Eurotronic
AD 050/001	Software package, for transmission of test data to a PC

ACCESSORIES FOR FLEXURE TEST (CENTRED LOAD) ACCORDING TO: EN 1339 (PAVING FLAGS), EN 12390-5 (BEAMS):

P 432/12C	Upper support with floating and rotating bearer 40 mm dia. - 350 mm length
P 432/55C	Upper support with floating and rotating bearer 40 mm dia. - 550 mm length
P 432/13C	Lower bearer (floating and rotating) 40 mm dia. - 320 mm length
P 432/55H	Lower bearer (floating and rotating) 40 mm dia. - 550 mm length
P 432/55G	Lower bearer (floating) 40 mm dia. - 550 mm length
P 432/55F	Lower bearer (fixed) 40 mm dia. - 550 mm length

KR 08 + P 432/SN

P 432/55F

P 432/55H

FLEXURE TESTS ON CONCRETE BEAMS 10 AND 15 CM/SIDE (EN 12390-5) USING UNIVERSAL FLEXURE TESTING DEVICE

Flexure tests on concrete beams may be performed following centre-point or third point loading methods by inserting universal flexure testing device KR 08 in the testing bay of P 432 or P 437 series machines which must also be equipped with P 432/SN or P 437/SN ball seating assembly.

The Silent & Cold Power type power units for the automatic compression machines with Eurotronic of the “KE” series and the computerized compression machines of the “KC” series, may all be connected to testing frames, thus rendering various combinations possible. A single control unit, on its own, is thus able to manage two or more kinds of tests.
Different tests are actuated by means of one or more two-way valves installed on the control console. The models described below may be supplied with from 1 to 2 two-way valves. This consideration will determine the choice of control console. Here are the available models:

KE 71

KE 72

KE 73

AUTOMATIC CONTROL CONSOLE

WITH 1 TWO-WAY VALVE **KE 71**

Allows two frames with single-acting cylinder or one frame with double-acting cylinder to be combined and may be chosen from among the codes indicated in the table below. The same electro-hydraulic control console drives the automatic version of the dual ram machines, as shown on page 123.

Frames with single-acting cylinder:

K 150/T	1500 kN frame for compression testing
K 200/T	2000 kN frame for compression testing
K 300/T	3000 kN frame for compression testing
K 400/T	4000 kN frame for compression testing
K 500/T	5000 kN frame for compression testing
C 050/T	250 kN frame for compression testing
C 030/2T	300/20 kN frame for compression testing
P 431/T	500 kN frame for indirect tensile testing

Frames with double-acting cylinder:

P 432/TC	100 kN frame for flexural testing (curbs)
P 437/TC	100 kN frame for flexural testing (curbs)
P 433/TC	100 kN frame for flexural testing (beams)
P 433/V	150 kN frame for flexural testing (beams)
P 433/Z	200 kN frame for flexural testing (beams)

AUTOMATIC CONTROL CONSOLE

WITH 2 TWO-WAY VALVES **KE 72**

Allows a combination of three frames with single-acting cylinder, or one frame with a single-acting cylinder with a frame with double-acting cylinder, or a frame with a single-acting cylinder with a dual ram frame. In addition to the frames indicated in the table above, here-below are listed the codes for the other frames that may be connected.

Frames with dual ram:

K 200/CET	2000/300 kN frame for compression testing
K 300/CET	3000/300 kN frame for compression testing

AUTOMATIC CONTROL CONSOLE

WITH 3 TWO-WAY VALVES **KE 73**

Allows combination of four frames with single-acting cylinder, or two frames with single-acting cylinder with a frame with double-acting cylinder or dual ram, or two frames with double-acting cylinder or with dual ram. The range of frames that may be used in combination is indicated in the tables above.

EXAMPLES OF THE COMBINATIONS POSSIBLE WITH AUTOMATIC CONTROL CONSOLE KE 71

K 200/T
KE 71
P 431/T

KE 71
P 432/TC
P 432/12C

K 200/T
KE 71
C 030/2T

KE 71
P 433/TC

K 200/T
KE 71
C 050/T
C 050/B01

EXAMPLES OF THE COMBINATIONS POSSIBLE WITH AUTOMATIC CONTROL CONSOLE KE 72

K 200/T

KE 72

P 432/TC
P 432/12C

K 200/T

KE 72

P 433/TC

C 050/T
C 050/B01

KE 72

P 432/TC

EXAMPLES OF THE COMBINATIONS POSSIBLE WITH AUTOMATIC CONTROL CONSOLE KE 73

Since the computerized versions of the Silent & Cold Power type power units are actuated by the same hydraulic assembly as the automatic version described previously, the same combinations already listed are possible.
Here are the available models:

KC 71

KC 72

KC 73

COMPUTERIZED CONTROL CONSOLE WITH 1 TWO-WAY VALVE KC 71

Allows two frames with single-acting cylinder or one frame with double-acting cylinder to be combined and may be chosen from among the codes indicated in the table below. The same electro-hydraulic control console drives the automatic version of the dual ram machines, as shown on page 123.

Frames with single-acting cylinder:

K 150/T	1500 kN frame for compression testing
K 200/T	2000 kN frame for compression testing
K 300/T	3000 kN frame for compression testing
K 400/T	4000 kN frame for compression testing
K 500/T	5000 kN frame for compression testing
C 050/T	250 kN frame for compression testing
C 030/2T	300/20 kN frame for compression testing
P 431/T	500 kN frame for indirect tensile testing

Frames with double-acting cylinder:

P 432/TC	100 kN frame for flexural testing (curbs)
P 437/TC	100 kN frame for flexural testing (curbs)
P 433/TC	100 kN frame for flexural testing (beams)
P 433/V	150 kN frame for flexural testing (beams)
P 433/Z	200 kN frame for flexural testing (beams)

COMPUTERIZED CONTROL CONSOLE WITH 2 TWO-WAY VALVES KC 72

Allows a combination of three frames with single-acting cylinder, or one frame with a single-acting cylinder with a frame with double-acting cylinder, or a frame with a single-acting cylinder with a dual ram frame. In addition to the frames indicated in the table above, here-below are listed the codes for the other frames that may be connected.

Frames with dual ram:

K 200/CET	2000/300 kN frame for compression testing
K 300/CET	3000/300 kN frame for compression testing

COMPUTERIZED CONTROL CONSOLE WITH 3 TWO-WAY VALVES KC 73

Allows combination of four frames with single-acting cylinder, or two frames with single-acting cylinder with a frame with double-acting cylinder or dual ram, or two frames with double-acting cylinder or with dual ram. The range of frames that may be used in combination is indicated in the tables above.

EXAMPLES OF THE COMBINATIONS POSSIBLE WITH COMPUTERIZED CONTROL CONSOLE KC 71

K 200/T KC 71 P 431/T

KC 71 P 432/TC P 432/12C

K 200/T KC 71 C 030/2T

KC 71 P 433/TC

K 200/T KC 71 C 050/T C 050/B01

EXAMPLES OF THE COMBINATIONS POSSIBLE WITH COMPUTERIZED CONTROL CONSOLE KC 72

K 200/T

KC 72

P 432/TC
P 432/12C

K 200/T

KC 72

P 433/TC

C 050/T
C 050/B01

KC 72

P 432/TC

EXAMPLES OF THE COMBINATIONS POSSIBLE WITH COMPUTERIZED CONTROL CONSOLE KC 73

K 300/CET KC 73 P 432/TC

K 300/T KC 73 C 050/T C 050/B01 P 432/TC P 432/12C

P 431/T C 050/T C 050/B01 KC 73 P 432/TC

SOME EXAMPLES OF THE COMBINATIONS POSSIBLE WITH SEMI-AUTOMATIC MACHINES

ALL THE SEMI-AUTOMATIC COMPRESSION TESTING MACHINES, EQUIPPED WITH DIGITAL UNIT EUROTRONIC, can be combined to a secondary testing frame.
The frame may be ordered together with the compression machine or, alternatively, at a later date, but the compression machine has to be initially fitted with the relevant hydraulic connection kit for the connection, series KR 065.

	Frames with single-acting cylinder		Frames with double-acting cylinder	
PRESSE / CHÂSSIS	P 431/T	C 050/T C 030/2T	P 432/TC P 437/TC	P 433/TC P 433/V P 433/Z
KD 150/R	KR 065/3		KR 065/4	
KD 200/R	KR 065/3		KR 065/4	
KD 300/R	KR 065/3		KR 065/4	
KD 400/R	KR 065/3		KR 065/4	
KD 500/R	KR 065/3		KR 065/4	
P 431/R	KR 065/3		KR 065/4	
KD 200/CE	KR 065/5		KR 065/6	
KD 300/CE	KR 065/5		KR 065/6	
F 050/TC	KR 065/7		KR 065/8	

The secondary frame is complete with quick coupling pipes, pressure transducers or load cell. The digital unit EUROTRONIC uses the first channel for performing the main test, and the second one for the combined frame.
The test performed with the second frame is also handled by the Eurotronic software.
Technical details of the various additional frames available are provided on the previous pages.
For the choice of the correct hydraulic connection kit for the machine, choose from the following:

FOR MACHINES KD 150/R – KD 200/R – KD 300/R – KD 400/R –KD 500/R – P 431/R:

KR 065/3	CONNECTION KIT FOR P 431/T – C 050/T FRAMES
KR 065/4	CONNECTION KIT FOR P 432/TC – P 433/TC FRAMES (DOUBLE-ACTING CYLINDER)

FOR MACHINES KD 200/CE – KD 300/CE:

KR 065/5	CONNECTION KIT FOR P 431/T – C 050/T FRAMES
KR 065/6	CONNECTION KIT FOR P 432/TC – P 433/TC FRAMES (DOUBLE-ACTING CYLINDER)

FOR MACHINE F 050/TC (see specifications on page 322)**:**

KR 065/7	CONNECTION KIT FOR P 431/T – C 050/T FRAMES
KR 065/8	CONNECTION KIT FOR P 432/TC – P 433/TC FRAMES (DOUBLE-ACTING CYLINDER)

KD 200/R
KR 065/3
C 050/T
C 050/B01
C 362/N

KD 300/R
KR 065/3
C 030/2T

KD 200/R
KR 065/4
P 432/TC

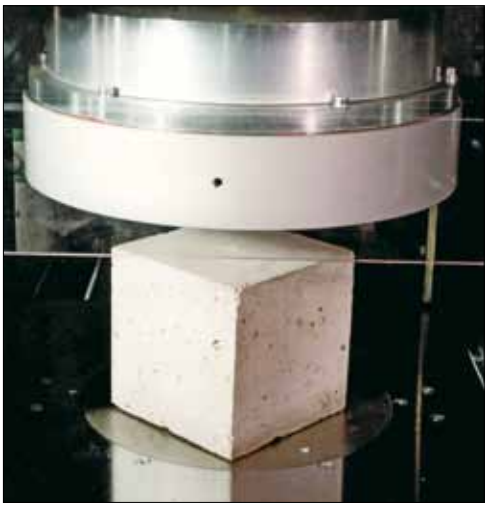
4000 KN WORK STATION: AUTOMATIC, FULLY COMPUTERIZED SYSTEM KC 400/WG

Specially designed to satisfy demands of major laboratories having large amounts of standard samples to be tested and thus requiring optimum efficiency. Equipped with high precision, state-of-the-art electronic and mechanical components, this model is undoubtedly the most advanced compression testing unit ever manufactured anywhere in the world.
Testing time is reduced to the absolute minimum necessary for compressing the sample until failure load is reached.
This model has the same features as the automatic, computerised machine with feedback system and four column frame (pag. 134 - 135), but weighing and measuring of 15 and 20 cm/side samples is also automatic.
WEIGHING is carried out by means of an electronic cell whereas MEASUREMENT of sides is carried out by a LASER BEAM and height by an OPTICAL MEASURING DEVICE: the data are stored automatically via the management software.
A CONVEYOR BELT facilitates sample movement before the test. Accurate positioning of sample on the tester is obtained by means of a specially-designed HYDRAULIC POSITIONER (15 and 20 cm/side) which also discharges previously broken sample on to the bench top and simultaneously cleans test platen; a second HYDRAULIC ARM pushes the broken samples along the bench top.
Tests on samples different from 15 and 20 cm/side are carried out automatically, even if the load cell, the laser beam and the hydraulic positioner are not activated.

Automatic load pacer and transferral of compression and strain data to PC. Obviously, a hard copy of certificates for stored tests may be obtained via the ink-jet printer.
The PC controls three different operations simultaneously:
- data input for one sample
- measuring and weighing of a second sample.
- compression and strain data acquisition and control for a third sample.

Optimal productivity, after verification, is approx. 500 samples in 8 hours for 15 x 15 cm or 20 x 20 cm samples.
- 25 N/mm^2 specific strength - with 50 N/cm^2/s load pace.

WORK STATION INSTALLED AT THE GIORDANO INSTITUTE IN BELLARIA (RIMINI, ITALY)



COMPUTERIZED COMPRESSION TESTING MACHINE, 3000 KN KC 300/S

Maximum working pressure, 295 bar. Vertical span, 1000 mm

DETAILED VIEWS OF MODEL KC 300/S

KC 300/S: Drawer system with 7 distance pieces for variation of the vertical testing span from 160 mm (min.) to 1000 mm (max.)

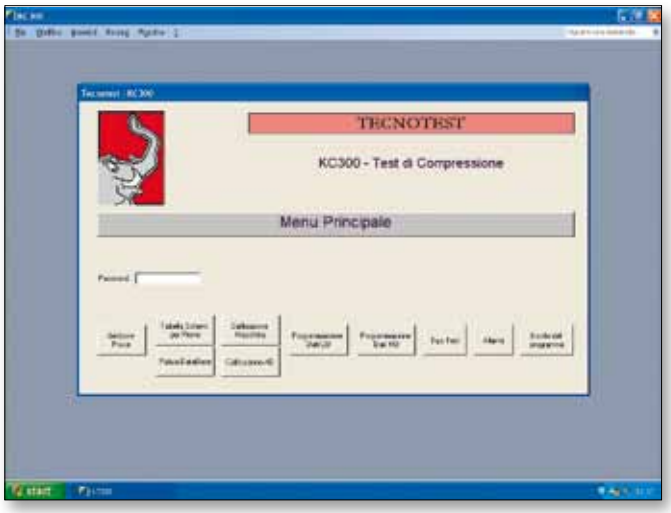
Calibration of the machine, using a load cell

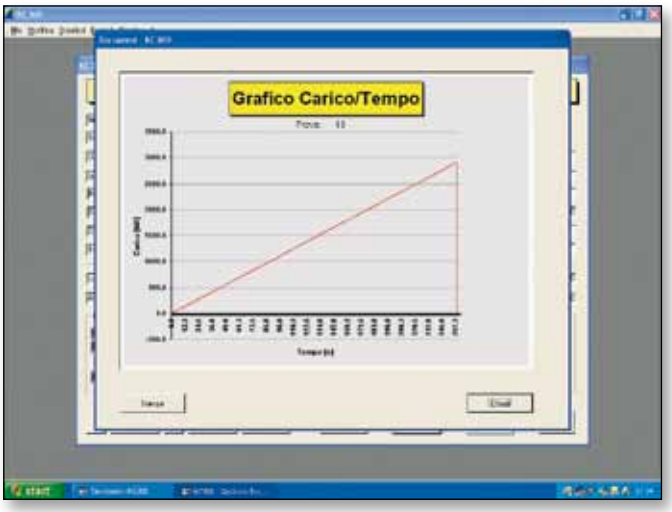
Hydraulic cylinder (295 bar max. pressure)

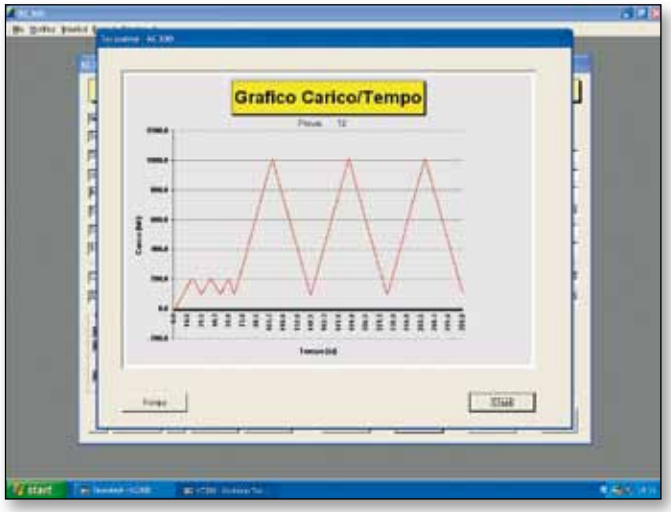
KC 300/N

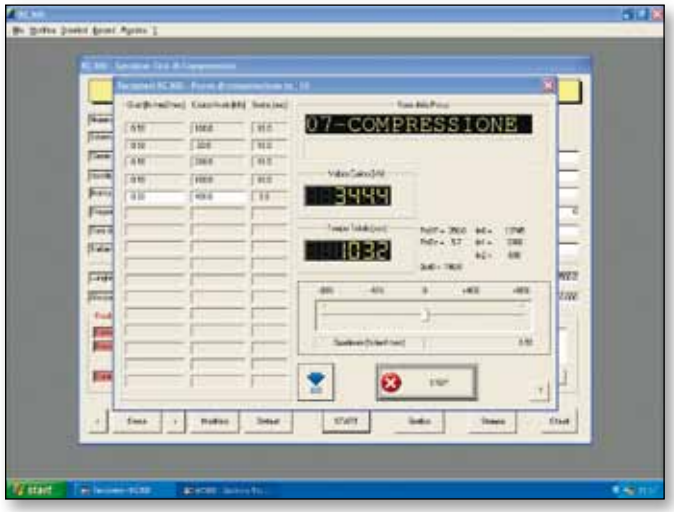
Mechanical lifting system of the lower platen (KC 300/N - KC 300/ISP)

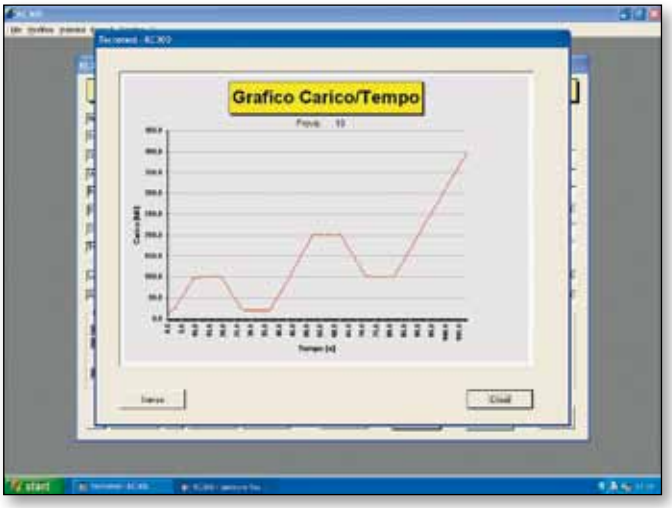
The structure has four columns connected to two monobloc crossbeams. The assembly is made by means of a special mechanism allowing connections to be pre-tensioned to 3000 kN. The result is a particularly rigid frame suitable for both routine and experimental tests. Height of the spacious compression testing bay may be modified by means of the distance pieces required for testing specimens of different dimensions to be positioned quickly and effortlessly. The loading ram works at pressure lower than 300 bar, that is to say half that of the standard 3000 kN compression machines, which is an advantage when it comes to user safety and life-span of components. The hydraulic power unit is designed for continuous use and is equipped with an air-oil heat exchanger with thermostat. Automatic regulations can be by-passed so that the user can perform particularly accurate regulations, such as those required for calibration purposes, using a hand-operated valve. The software provided with the machine comprises a program for compression testing at constant load pace as well as that for multiple cycle tests intended for providing loading/unloading ramps and programmable stops on demand. Additional software modules are available for other tests such as flexural testing and modulus of elasticity measurement.











	KC 300/S	KC 300/N
Capacity	3000 kN	3000 kN
Column diameter	140 mm	140 mm
Maximum horizontal light	460 mm	600 mm
Vertical span	1000 mm (max.) - 160 mm (min.)	410 mm (max.) - 160 mm (min.)
Vertical span variation	Using a drawer system with 7 distance pieces clamped by means of a hydraulic cylinder (one 20 mm distance piece, one 40 mm distance piece, one 80 mm distance piece, one 100 mm distance piece, three 200 mm distance pieces)	Mechanical lifting device for lower testing platen with N. 5 distance pieces, 50 mm thick
Testing light	From 160 à 1000 mm a passi di 20 mm	mm 160 - 210 - 260 - 310 - 360 - 410
Testing platens	450 x 550 x 70 mm	ø 435x 70 mm
Maximum working pressure: Load sensor: Readout range: Machine class: Operating system: Software: Safety devices: Reference Standards: Power supply:	295 bar (with proportional HAWE servo-valve) Photo-engraved extensometric grid type pressure transducer from 0 to 3000 kN 1 (from 150 to 3000 kN) Windows Uses ACTIVEX functions of MS Access Doors in transparent plastic with safety microswitches Ram stroke limit switch EN 12390 - ASTM C 469 for Modulus of Elasticity 220 V, 50 Hz, 1 ph, 1500 W	
Frame dimensions / Weight	1200 x 1160 x 3350 (h) mm / 4200 kg	970 x 695 x 1780 (h) mm / 3200 kg
Power pack dimensions / Weight	700 x 530 x 1050 (h) mm / 150 kg	
Computer table dimensions / Weight	700 x 750 x 720 (h) mm / 30 kg	

MODULUS OF ELASTICITY

As with all our compression testing machines with feedback systems, the KC 300/S and KC 300/N models may also be equipped with devices to enable the Modulus of Elasticity to be determined as prescribed in ASTM C 469. The test is performed within the working stress range traditionally applicable for concrete, that is to say from 0 to 40% of ultimate concrete strength.
The following are necessary:

COMPRESSOMETER FOR MODULUS OF ELASTICITY **KR 06/T**

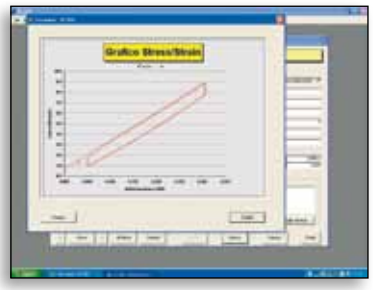
COMPRESSOMETER FOR MODULUS OF ELASTICITY AND POISSON RATIO **KR 07/T**

IMPLEMENTATION KIT (HARDWARE AND SOFTWARE) **AD 040/001**

STRAIN GAUGES **AD 306**

ELECTRONIC EXTENSOMETER **AD 307**

Details of devices are described on pages 141.



COMPUTERIZED COMPRESSION TESTING MACHINE, 3000 KN — KC 300/ISP

Load measurement using a load cell (class 1) - EN 10002-3, UNI EN ISO 376
Load regulation system using a MOOG proportional valve
Working pressure: maximum 295 bar
Vertical span: 460 mm

It was designed to assure the particularly high precision and stability necessary for performing tests with programmable loading and unloading. Nowadays the tendency is to concentrate efforts on improving the quality of concrete so the structural dimensions of compression machines must be increased with respect to indications in current standards, as must accuracy of measurement and control so as to make test results involving elastic features of material more meaningful. In order to obtain the rigidity and strength suitable for this purpose, the machine has a 4000 kN frame . For accuracy of measurement, a **1 class Load Cell**, 3000 kN capacity, ≤ 0.03% F.S. linearity and hysteresis, according to EN 10002-3, UNI EN ISO 376 standard. The load cell has been integrated into the ram, whereas for piloting controls, a **MOOG servo-valve** has been used.
The hardware/software characteristics are the same as those of the models KC 300/S and KC 300/N.

	KC 300/ISP
Capacity	3000 kN
Column diameter	140 mm
Maximum horizontal span	600 mm
Vertical span	460 mm (max.) - 160 mm (min.)
Vertical span variation	Mechanical lifting device for lower testing platen with N. 6 distance pieces, 50 mm thick
Testing span	mm 160 - 210 - 260 - 310 - 360 - 410 - 460
Testing platens	ø 435 x 70 mm
Maximum working pressure: Proportional regulation valve: Load sensor: Readout range: Machine class: Operating system: Software: Safety devices: Reference standard: Power supply: power pack: control system:	295 bar MOOG Photo-engraved extensometric grid type pressure transducer from 0 to 3000 kN 1 (from 150 to 3000 kN) Windows Uses ACTIVEX functions of MS Access Doors in transparent plastic with safety microswitches Ram stroke limit switch EN 12390 - ASTM C 469 for Modulus of Elasticity 380 V, 50 Hz, 3 ph, 4000 watt 220 V, 50 Hz, 1 ph, 1000 watt
Frame dimensions / Weight	970 x 695 x 1860 (h) mm / 3500 kg
Power pack dimensions / Weight	780 x 880 x 1250 (h) mm / 260 kg
Control console dimensions / Weight	700 x 530 x 1050 (h) mm / 75 kg
Computer table dimensions / Weight	700 x 750 x 720 (h) mm / 30 kg
DIMENSIONS OF THE MACHINE (ASSEMBLED) 2000 x 2500 x 1860 (h) mm	

PIPE TESTING MACHINES

UNI EN 1916

The complete machine may be configured according to customer's requirements and based on sizes of pipes to be tested.

STEEL FRAMES

Customers usually prefer to have the frames designed and built in steel (or a combination of steel and concrete) structural work locally, so as to avoid the high costs involved for freight and assembly.
Tecnotest supplies all the components for load application as well as control console.
We can nonetheless supply a steel frame for testing pipes having diameters from 450 to 1500 mm.
Shaped bearers for all pipe diameters, necessary for eventual flexural tests, are excluded.

700 KN STEEL FRAME P 460/70

Steel frame for compression tests (700 kN) on concrete pipes (dia. 450 to 1500 mm). To be used in conjunction with our loading systems P 445/70 and P 445/72. Complete with 2-speed electric winch for lifting intermediate cross beam, two lower (supporting) bearers 2500 mm long and one upper bearer (floating type) 2500 mm, for compression tests.
Hot galvanization of complete structure. Highly rigid base.
Dimensions: 2620 x 2500 x 5060 (h) mm. Weight: 3800 kg.
The frame is delivered disassembled.

ELECTRO-HYDRAULIC LOADING SYSTEM

Our loading systems can be used for any mechanical structure designed and built by the customer according to their specific requirements. Capacities available: 700 kN and 1000 kN.
The system comprises a digital display unit (MONOTRONIC or EUROTRONIC) for load readout and electronic load cell for load measurement. LOAD BEARERS AND STEEL FRAME ARE NOT INCLUDED.

P 445/100

HYDRAULIC LOADING SYSTEM

700 KN CAPACITY WITH LOAD CELL P 445/70

The complete system comprises:
- Hydraulic power pack housed in a cabinet.
  Load pace controlled. Contains two pumps, one high capacity/low pressure and one low capacity/high pressure. Once the specimen comes into contact with the upper platen, the first pump is automatically excluded. The hydraulic power unit is completed by a maximum pressure safety valve, a decompression valve and a special oil flow control valve which allows the accurate control of oil flow thus allowing precise operator control of load pace. These valves were specially designed by Tecnotest to assure required linearity and smooth operation.
  Power supply: 220V – 50 Hz – single phase.
  Cabinet dimensions: 700 x 530 x 1050 (h) mm.
  Weight: 150 kg.
- Digital readout unit (page 402).
  Monotronic display unit with electronic load pacer.
  Full scale of 700.0 kN (sensitivity 100 N).
  Display with load rate indicator.
- Load sensor: 700 kN capacity electronic load cell.
- Double-acting hydraulic cylinder – 700 kN (300 bar) capacity and 400 mm stroke - Upper disc attachment (310 mm) for steel frame cross-beam. Weight 200 kg.
- 2 Flexible high-pressure hoses, 10 metres long for connecting the cylinder to the hydraulic power pack.

P 445/70

Detailed view of load cell (700 kN capacity)

Monotronic

Eurotronic

If a 1000 kN structure is foreseen:

HYDRAULIC LOADING SYSTEM: 1000 KN CAPACITY WITH LOAD CELL AND MONOTRONIC P445/100

Same as the P 445/70 but with hydraulic cylinder and electronic load cell of 1000 kN capacity.
Full scale calibration 1000.0 kN (100 N sensitivity).

Variation to the electro-hydraulic system:

With two channel Eurotronic (page 116) display unit instead of Monotronic.
This variation allows greater sensitivity during readout (10 N). For performing also flexural tests which involve lower specific strengths. Calibration on the full scale of 700.00 kN or 1000.0 kN.

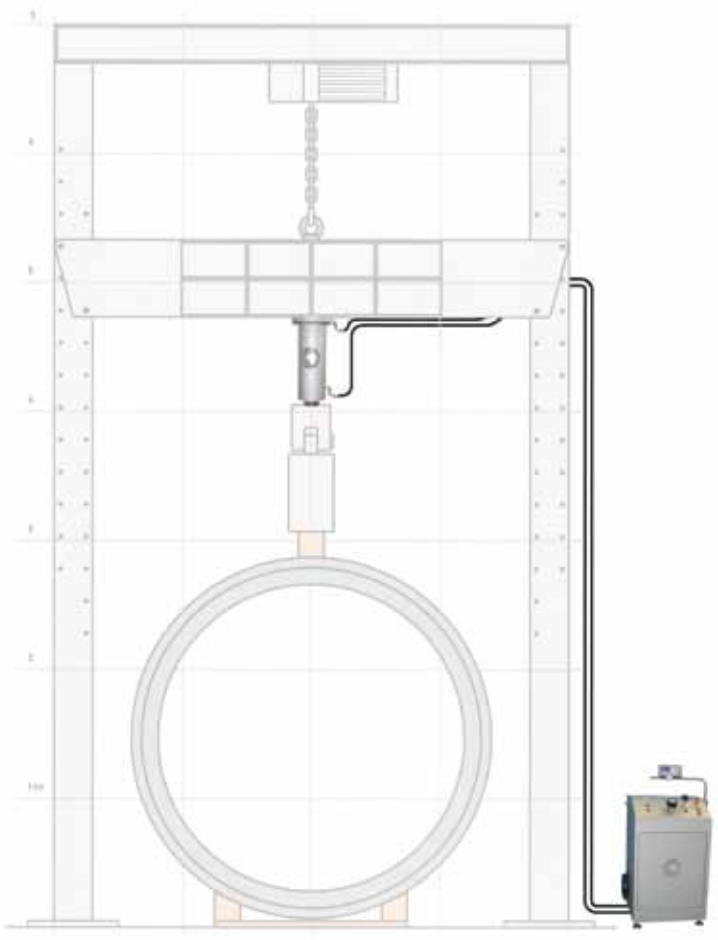
HYDRAULIC LOADING SYSTEM 700 KN CAPACITY WITH LOAD CELL AND EUROTRONIC P 445/72

HYDRAULIC LOADING SYSTEM 1000 KN CAPACITY WITH LOAD CELLAND EUROTRONIC P 445/102

ACCESSORIES:

AD 013/B02	Printer, 24-column, provides a printout of test report on thermal paper
AD 050/001	Data acquisition software for trasmission of data to a PC

Detailed view: load cell



Example of mechanical structure for pipe testing
(max. diameter 3 m) using
HYDRAULIC LOADING SYSTEM

1

2

5000/600 KN MACHINE FOR CALIBRATING LOAD CELLS (COMPRESSION) L 500

This compression machine has been designed in order to be able to apply a range of loads with minimum manual regulation thus enabling high capacity extensometric load cells to be calibrated (in compression) placing sample dynamometers on top for reference purposes.
The frame comprises 4 columns connected to the two cross-beams by means of four special, highly-resistant screws which have been tightened using a torque wrench so as to pretension to 5000 kN with the result that the frame stability remains excellent no matter what loads are applied.
The cross-beams are entirely in machine-tooled, monobloc steel while the 200 mm diameter columns are in chrome-plated high resistance special calibrated steel.
Assembly tolerance is greater than 0.05 mm and rigidity is around $2 \cdot 10^{-4}$
Based on an exclusive Tecnotest design, the machine has two hydraulic rams: a 5000 kN ram and a 600 kN ram sunk into the former so as to effectively allow two work scales.
Maximum working pressure is 400 bar.
A special device, combined with the flow valve, enables load to be regulated during both upward and downward movement along with no movement at all when load is constant.
A maximum pressure valve located on the control panel allows load limit to be pre-set at any value.
Vertical span can be easily changed from between 500 and 1000 mm (by 25 mm intervals) thanks to a distance platen loading device that runs along tracks.
In fact, a hydraulic jack controlled via the console clamps the selected platens in packs then centres them.
The hydro-electric control panel (with two speeds: rapid and test speeds), the electrical panel, the cooling system, the controls and check gauge are all housed in a separate console.
The machine is supplied with neither ball seating nor with sample dynamometer which, if needed, should be ordered separately.

Load cells, having different classes of accuracy are available, as well as universal digital control units which may be certified (official SIT certification) page 393.

5000/600 kN MACHINE FOR CALIBRATING LOAD CELLS IN COMPRESSION ACCORDING TO ISO 376 AND ASTM E 74 STANDARDS

L 500

A1
Digital control unit, combined to the reference calibrated cell

B1
Digital control unit, combined to the cell, to be calibrated

A
Officially calibrated reference load cell

B
Load cell to be calibrated

1. Detailed views of platen loader and distance platens
2. “Load cell on load cell” technique
3. Control console
4. Different stages of assembly at our factory

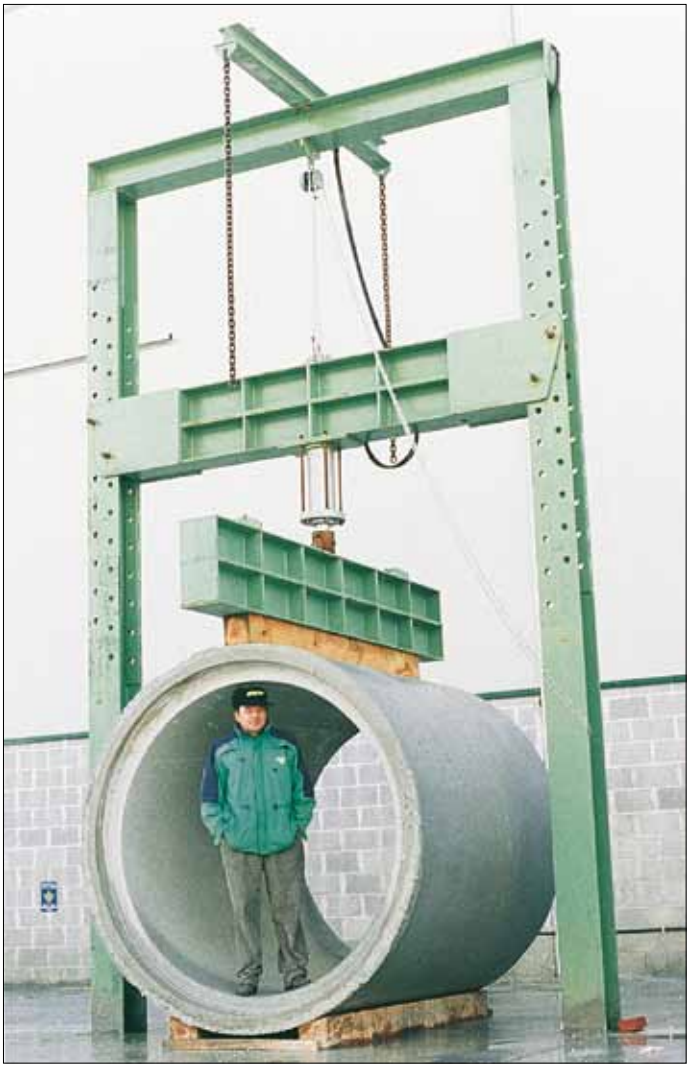
3

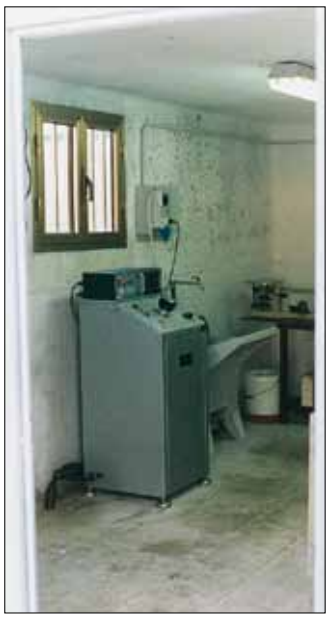
4

SPECIFICATIONS:

Capacity:	5000 kN and 600 kN (compression)
Frame:	4 columns / 2 cross-beams with pre-compressed connections
Column diameter:	200 mm each
Maximum working pressure:	398 bar for 5000 kN ram 390 bar for 600 kN ram
Maximum vertical span:	1000 mm
Minimum vertical span:	500 mm
Horizontal span:	530 mm
Load platens:	220 mm dia., depth of hardening 1.5 mm
Distance platens (drawer system):	4 measuring 100 mm, 1 measuring 50 mm and 2 measuring 25 mm
Useful ram stroke:	50 mm
Power:	220V, 50Hz, 1ph, 1200 W
Frame dimensions:	1180 x 930 x 2835 (h) mm
Frame weight:	4700 kg
Console dimensions:	850 x 660 x 1100 (h) mm
Console weight:	185 kg

EXAMPLES





EXAMPLES

MOULDS FOR CONCRETE SPECIMENS

EN 12390-1 ASTM C 31 ASTM C 192 BS 1881 DIN 51229 NF 18-400

With one or more places and for the various standard dimensions. Available in different materials:
- accurately machined **cast iron**. High precision moulds, certifiable.
- accurately machined **steel sheet**, precision made, meant to last.
- **shaped steel sheet**, light and practical. Cylindrical type only available.
- **rigid plastic**, stable and resistant, compressed air (2 bar) or water jet is sufficient for extrusion
- **foam polystyrene**, disposable

N.B.: the higher the precision of the mould, the smaller the need to grind sample surfaces for testing.

MODEL	SPECIMEN	QTY	MATERIAL	WEIGHT kg	DIMENSIONS cm
AT 212/E	CUBE 10 cm/side	1	CAST IRON	10	20 x 14 x 14
AT 221	CUBE 10 cm/side	4	STEEL	20	53 x 21 x 12
AT 213/D	CUBE 10 cm/side	2	POLYURETHANE	2	28 x 14 x 20
AT 213/E	CUBE 15 cm/side	1	CAST IRON	15	20 x 20 x 20
AT 216	CUBE 15 cm/side	2	STEEL	26	43 x 27 x 16
AT 219	CUBE 15 cm/side	4	STEEL	41	75 x 27 x 16
AT 213/P	CUBE 15 cm/side	1	POLYURETHANE* *	2	22 x 22 x 17
AT 220/3	CUBE 15 cm/side	120*	POLYSTYRENE	10	115 x 46 x 101
AT 215/P	CUBE 20 cm/side	1	POLYURETHANE	3	28 x 28 x 22.5
AT 215/1	CUBE 20 cm/side	1	STEEL	25	32 x 26 x 32
AT 218	CUBE 20 cm/side	2	STEEL	51	56 x 35 x 22
AT 222/4	CYLINDER 10 x 20 cm	1	STEEL	10	16 x 16 x 21
AT 222/5	CYLINDER 15 x 15 cm	1	STEEL	12	25 x 25 x 20
AT 222/1	CYLINDER 15 x 30 cm	1	STEEL	15	21 x 20 x 31
AT 222/R	CYLINDER 15 x 30 cm	1	POLYURETHANE	3	20 x 20 x 31
AT 222/2	CYLINDER 6” x 12”	1	STEEL	15	21 x 20 x 33
AT 222/2L	CYLINDER 6” x 12”	1	SHEET STEEL	3	20 x 20 x 31
AT 222/3	CYLINDER 16 x 32 cm	1	STEEL	15	21 x 20 x 33
AT 222/F	CYLINDER 16 x 32 cm	1	POLYURETHANE	3	20 x 20 x 31
AT 214/1	BEAM 10 x 10 x 40 cm	1	STEEL	16	21 x 50 x 12
AT 214/4	BEAM 10 x 10 x 50 cm	1	STEEL	18	21 x 60 x 12
AT 214/2	BEAM 15 x 15 x 60 cm	1	STEEL	47	27 x 72 x 16
AT 214/5	BEAM 15 x 15 x 75 cm	1	STEEL	50	27 x 87 X 16
AT 214/3	BEAM 20 x 20 x 60 cm	1	STEEL	59	80 x 30 x 23

*** AT 220/3**	N° 3 packs (40 moulds each)
**** AT 213/20**	AT 213/P in packs of 20 pcs each
AT 213/Q	Plastic cover for AT 213/P
AT 213/S	Plastic covers for AT 213/P (10 pcs)
AT 213/T	Kit of 200 bungs for AT 213/P

TONGS FOR HANDLING SPECIMENS

AT 289	For cubes with 15 - 20 cm sides
AT 287	For cylinders with 10 cm dia.
AT 288	For cylinders with 15 cm and 6” dia.

AT 288

AT 289

MEASURING INSTRUMENTS

DV 730	Straight edge 300 mm
DV 731	Engineers square 150 x 100 mm
DV 732	Feeler strips. with 13 blades, 100 mm long (from 0.02 to 0.10 mm)
DV 733	Go/No go gauges for 15 cm/side mould
DV 734	Go/No go gauges for 10 cm/side mould
DV 892	Digital vernier caliper: 15 cm
DV 894	Digital vernier caliper: 20 cm

DV 733

DV 730

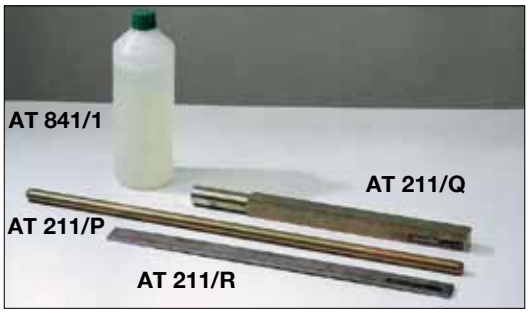
DV 732

DV 894

TAMPING RODS

BS 1881:108 EN 12390-2

AT 211/P	TAMPING ROD FOR MOULDS dia. 16 x 600 (l) mm - steel (EN - ASTM)
AT 211/Q	TAMPING ROD FOR MOULDS dia. 25 x 25 x 380 (l) mm - steel (BS 1881)
AT 211/R	CUT-OFF BAR FOR EXCESS 45 cm long - steel



DISMANTLING LIQUID for moulds

AT 841	30 Kg DRUM
AT 841/1	1 LITRE BOTTLE

ELECTRIC COMPRESSOR

50 litre tank, 110 litres of air per minute, 10 bar max pressure. Complete with pressure reduction unit, pressure switch and gauge. Exempt from ANCC test (Italy).

DIMENSIONS: 1000 x 800 x 450 (h) mm.
WEIGHT: 70 kg.

D 815	MODEL 220/380 V, 50 Hz, THREE PHASE
D 815/H	MODEL 220 V, 50 Hz, SINGLE PHASE

D 815

AT 223/HB

AT 223/H

VIBRATING TABLES

EN 12390-2

ELECTRIC VIBRATING TABLE: 80 x 40 cm **AT 223/H**

To facilitate compaction of concrete in the moulds. Vibrating surface 80 x 40 cm with rubber mat, electric vibrator 3.000 vibrations per minute. Pedal switch to start/stop vibration.

POWER SUPPLY: 220 V, 50 Hz, single phase, 100 W
DIMENSIONS: 820 x 420 x 300 (h) mm.
WEIGHT: 40 kg.

AT 223/HB	Clamping device for moulds

AT 224/HB

AT 224/HS

ELECTRIC VIBRATING TABLE 100 x 100 cm AT 224/HS

Similar to AT 223 model but provided with bigger vibrating surface and possibility to clamp the moulds.
Motor power has been increased accordingly.

POWER SUPPLY: 220 V, 50 Hz, single phase, 375 W
DIMENSIONS: 1050 x 1050 x 900 (h) mm.
WEIGHT: 290 kg.

AT 224/HB	Clamping device for moulds

POKER VIBRATORS

PORTABLE ELECTRIC POKER VIBRATOR **AT 231**

For ensuring the compaction of concrete in the moulds.
Vibrating tip diameter 25 mm.
Length 220 mm, with 2 m flexible shaft. 12,000 vibrations per minute.

AT 231

POWER SUPPLY: 220 V, 50 Hz, single phase, 2300 W.
DIMENSIONS: 300 x 200 x 400 (h) mm.
WEIGHT: 11 kg.

PORTABLE ELECTRIC POKER VIBRATOR **AT 231/A**

For ensuring the compaction of concrete in the moulds.
Vibrating tip diameter 22 mm.
Length 220 mm, with 2 m flexible shaft. 12,000 vibrations per minute.

POWER SUPPLY: 220 V, 50 Hz, single phase.
DIMENSIONS: 300 x 200 x 400 (h) mm.
WEIGHT: 11 kg.

AT 231/B

PORTABLE BATTERY-OPERATED POKER VIBRATOR **AT 231/B**

Vibrating tip diameter 22 mm, length 220 mm, with 2 m flexible shaft. Direct current motor group for connection to truck-car battery or car lighter.
Input 12 V. 14000 vibrations per minute.

DIMENSIONS: 300 x 200 x 400 (h) mm.
WEIGHT: 7 kg.

POKER VIBRATOR (PETROL ENGINE) AT 231/S

Vibrating tip diameter 22 mm, length 220 mm, 2 m flexible shaft - 18,000 vibrations per minute. Powered by a 5% petrol mixture - consumption: 0.8 l/h - 1.25 hp petrol engine.

DIMENSIONS: 300 x 300 x 400 (h) mm.
WEIGHT: 9.5 kg.

AT 231/S

SPARE PARTS FOR AT 231/A - AT 231/S - AT 231/B:

AT 231/R	Flexible shaft with Ø 22 x 220 mm tip: 2 m
AT 231/P	Flexible shaft with Ø 25 x 270 mm tip: 2 m (interchangeable)

SPARE PARTS FOR AT 231:

AT 231/T	Flexible shaft with Ø 25 x 290 mm tip: 2 m

CURING OF CONCRETE SAMPLES

ASTM C 31 ASTM C 192 AASHTO T 23 EN 12390-2

830 LITRE STEEL CURING TANK WITH DIGITAL THERMOREGULATOR AT 236/Z

The tank is made of sheet steel and is zinc coated internally and painted externally. The specimens are arranged on two easily removable, zinc coated racks, supplied as standard. The tank may contain up to 70 specimens with 15 cm sides (or 40 with 20 cm sides, or 35 cylinders 15 x 30 cm).
Control unit with digital thermoregulator (0.1°) and temperature setting for heating function only (from ambient to 100°C max).

POWER SUPPLY: 220 V, 50 Hz, single phase, 2000 W.
USEFUL INNER DIMENSIONS: 1320 x 895 x 520 (h) mm.
OUTER DIMENSIONS: 1380 x 1060 x 885 (h) mm.
WEIGHT: 140 kg

AT 236/Z

830 LITRE STEEL CURING TANK WITH ANALOG THERMOREGULATOR AT 236

Similar to AT 236/Z but with analog thermoregulator.
Complete with 2000 W electric immersion heater.
Temperature setting from ambient to 40°C.

POWER SUPPLY: 220 V, 50 Hz, single phase, 2000 W
USEFUL INNER DIMENSIONS: 1320 x 895 x 520 (h) mm.
USEFUL OUTER DIMENSIONS: 1550 x 960 x 750 (h) mm.
WEIGHT: 140 kg

ACCESSORIES:

AT 236/Z1	Plexiglass lid for the tank Two panels, divided in centre by hinge

AT 236/Z1

AT 236/D

AT 236/A

R 236/01

R 236/T

R 236/D

610 LITRE PLASTIC CURING TANK WITH DIGITAL THERMOREGULATOR — AT 236/D

The tank is built in heavy polyethylene and has a ribbed structure with reinforced base. Supplied complete with specimen supporting rack. Control unit with digital thermoregulator (0.1°C) and temperature setting for heating function only (from ambient to 100°C).

POWER SUPPLY: 220 V, 50 Hz, single phase, 2000 W.
USEFUL INNER DIMENSIONS: 1110 x 910 x 450 (h) mm.
USEFUL OUTER DIMENSIONS: 1250 x 1000 x 760 (h) mm.
WEIGHT: 85 kg

610 LITRE PLASTIC CURING TANK WITH DIGITAL THERMOREGULATOR — AT 236/A

The tank is built in heavy polyethylene and has a ribbed structure with reinforced base. Supplied complete with specimen supporting rack. Control unit with digital thermoregulator (0.1°C) and temperature setting for heating function only (from ambient to 100°C).

POWER SUPPLY: 220 V, 50 Hz, single phase, 2000 W.
USEFUL INNER DIMENSIONS: 1110 x 910 x 450 (h) mm.
USEFUL OUTER DIMENSIONS: 1250 x 1000 x 760 (h) mm.
WEIGHT: 85 kg

ACCESSORY FOR 610 LITRE TANKS:

AT 236/F	Plastic cover for tanks AT 236/A and D

200 LITRE PLASTIC CURING TANK WITH DIGITAL THERMOREGULATOR — AT 234/D

Same as AT 236/D but with 200 litre capacity.

USEFUL INNER DIMENSIONS: 920 x 570 x 280 (h) mm.
USEFUL OUTER DIMENSIONS: 1140 x 635 x 555 (h) mm.
WEIGHT: 38 kg.

200 LITRE PLASTIC CURING TANK WITH ANALOG THERMOREGULATOR — AT 234/A

Same as AT 236/A but with 200 litre capacity.

USEFUL INNER DIMENSIONS: 920 x 570 x 280 (h) mm.
USEFUL OUTER DIMENSIONS: 1140 x 635 x 555 (h) mm.
WEIGHT: 38 kg.

ACCESSORY FOR 200 LITRE TANKS:

AT 234/F	Plastic cover for tanks AT 234/A and D

ACCESSORY AND SPARE PARTS FOR ALL MODELS OF TANKS:

R 236/01	Water circulation pump To ensure a uniform temperature in the tank Power supply: 220 V, 50 Hz, single phase
R 236/T	Analog thermoregulator For temperature settings from ambient to +40°C Complete with electric heating element
R 236/D	Digital thermostatic kit for tanks up to 830 liters Complete with electric heating element

ACCELERATED STEAM CURING TANK FOR CONCRETE SPECIMENS AT 239

The accelerated curing of concrete specimens is of great importance when quantitative test results on various design mixes are required in a very short time. Internally the tank is in stainless steel, externally it is in sheet steel with a cavity wall realised in an insulating material.
It has a sealing lid with a central ventilation disk.
Electric heating elements (2000 Watts).
The control panel console is microprocessor based. A complete cycle with a maximum of 6 (curing) phases can be programmed via the keyboard to allow linear temperature increments in relation to time or periods with constant temperature.
Monitoring of temperature is via a digital thermometer.
The maximum duration of each phase is 9 hours and 59 minutes.
The temperature can be programmed from ambient temperature to 100°C. Phases can be read on the display unit via a keyboard to check the functions (time and temperature) pre-set whenever required.

AT 239

CAPACITY: 450 litres. Digital display: 0.1°C
SYSTEM PRECISION: ±1°C.
Single phase electronic equipment.

POWER SUPPLY: 220/380 V, 50 Hz, three phase, 6000 W.
USEFUL INNER DIMENSIONS: 1120 x 795 x 670 (h) mm.
OUTER DIMENSIONS: 1280 x 940 x 1030 (h) mm.
WEIGHT: 235 kg.

AD 013/B02

ALPHANUMERIC PRINTER AD 013/B02

This unit guarantees control of test execution by printing the temperature value (inside the tank) at intervals which can be preset.

POWER SUPPLY: 220 V, 50 Hz, single phase.

AT 290/P

ENVIRONMENT HUMIDIFIER AT 290

This appliance atomizes approximately 4 litres of water per hour, enough for a 500 cubic meter zone.
Fitted with a thermal switch and ball cock for automatic feeding and outlet of excess.

POWER SUPPLY: 220 V, 50 Hz, single phase, 75 Watts.
DIMENSIONS: dia. 420 x 350 (h) mm.
WEIGHT: 7 kg.

ENVIRONMENT HUMIDIFIER AT 290/P

Similar to AT 290 but 150 cubic meter capacity. 40 watts.
0.5 litres per hours.

DIMENSIONS: dia. 360 x 230 mm.
WEIGHT: 3.5 kg

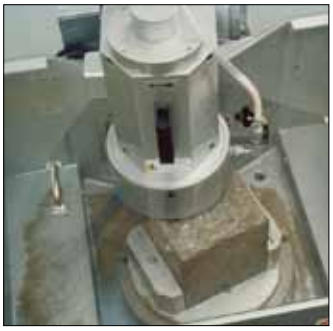
HUMIDISTAT AT 291

To make the humidifier completely automatic by inhibiting its operation at 95% humidity and re-starting it at 90% humidity.

AT 291 AT 290

AT 246/1

Brake



Specimen clamping

AT 280/2 AT 280/1 AT 280/3 AT 280/C1

AT 279

AT 288 AT 280/V AT 280/M

SINGLE-PLACE GRINDING MACHINE AT 246/1

EN 12390-3 UNI 6132

Suitable for grinding one specimen at a time.
For cubes 15-20 cm/side, or cylinders dia. 15 x 30 cm (or 16 x 32 cm).
Max. vertical span between turntable and grinding wheel: 320 mm. Turntable: 400 mm dia.
Diamond grinding wheel: 200 mm dia. (five diamond sectors).
Specimen supporting device.Manual vertical displacement of the grinding wheel.
Turntable with two turning speeds (17 and 34 rpm).
Upper panel in transparent lexan.
Manual brake for stopping grinding wheel.

POWER SUPPLY: 220/380 V, 50 Hz, three phase, 4000 W
DIMENSIONS: 900 x 1050 x 1800 (h) mm.
WEIGHT: 650 kg.

SPARE PART:

AT 246/M5	Diamond sectors (5 pieces)

SAMPLE CAPPING

EN 12390-3 ASTM C 617 ASTM C 31 ASTM C 192 AASHTO T 23 AASHTO T 126 AFNOR P 416 BS 1881 UNI 6132-72

CAPPING FRAME

Steel support frame mounted on a base plate.

DIMENSIONS: 380 x 190 x 235 (h) mm.
WEIGHT: 14 kg.

AT 280/1	MODEL FOR CYLINDERS, 15 cm/6” DIA.
AT 280/2	MODEL FOR CYLINDERS, 16 cm DIA.
AT 280/3	MODEL FOR CYLINDERS, 10 cm DIA.
AT 280/C1	MODEL FOR CUBES, 15 cm/SIDE

HEATER FOR CAPPING COMPOUND

Heating power selection. Stainless steel cup with a capacity of approximately two litres. 500 Watts.

DIMENSIONS: 400 x 280 x 200 (h) mm.
WEIGHT: 3.2 kg.

AT 279	MODEL 220 V, 50 Hz, SINGLE PHASE
AT 279/1	MODEL 110 V, 60 Hz, SINGLE PHASE

ACCESSORIES:

AT 280/M	Stainless steel ladle
AT 288	Pliers for handling 15 cm and 6” cylinders
AT 280/V	Capping compound 22.5 kg bag

CAUTION: The capping compound gives off sulphur fumes when hot and should be used in a well ventilated environment or, ideally, in a fume cupboard.

ELECTRIC MASONRY SAW

The robust design includes a blade guard for operator safety (as prescribed by safety Standards).
Sliding carriage: 570 x 430 mm (550 mm travel)
Beam for adjusting cutting height.
Centrifugal immersion electro-pump for disk coolant.
Table legs can be removed for use on work bench or floor.
Single switch control for motor and pump.
Electric motor with forced ventilation.
Cutting deepness: 115 (350 disk) 140 (400 disk) mm.
Complete with 350 mm diameter diamond disk.
Packed dimensions (legs disassembled):
1310 x 800 x 800 (h) mm.

DIMENSIONS: 1310 x 800 x 1500 (h) mm.
WEIGHT: 120 kg.

D 818	MODEL 220/380 V, 50 Hz, THREE PHASE. 3 hp electric motor, 2200 W.
D 818/M	MODEL 220 V, 50 Hz, SINGLE PHASE. 2.5 hp electric motor, 1850 W.

D 818

ELECTRIC MANSORY SAW D 819

This machine is very much the same as the model above but it has a particularly strong frame, with solid legs which cannot be removed.
Pedal control. For disk up to 450 mm.
Electric motor: 3 hp. Supplied without diamond disk.

POWER SUPPLY: 220V, 50 Hz, single phase.
DIMENSIONS: 1220 x 700 x 1360 (h) mm.
WEIGHT: 130 kg.

D 819

ACCESSORIES AND SPARE PARTS:

D 818/Z	300 mm diameter diamond disk
D 818/T	350 mm diameter diamond disk
D 818/V	400 mm diameter diamond disk
D 819/Z	450 mm diameter diamond disk (only for D 819)

CORE CLAMP D 818/A

Ideal for clamping cylindrical specimens with diameters up to 160 mm. This accessory is used to block the specimen to allow a regular cut alignment.
Applicable to the saw's carriage.

DIMENSIONS: 530 x 200 x 470 (h) mm.
WEIGHT: 6 kg.

D 818/A

AT 206

AT 205

AT 208/6

MOBILE PAN MIXERS

100 LITRE PAN MIXER — AT 206

Pan mixer which operates in upright position to produce quality mixes. Maximum aggregate size: 10 mm.
Paddles are adjustable in height. Material is discharged from below. Drawbar and 250 mm diameter wheels.
Mixing pan diameter: 550 mm. Capacity: 100 litres
Yield: 60 litres.
Thermomagnetic switch, rapid coupling.
POWER SUPPLY: 220V, 50 Hz, single phase, 1500 W
DIMENSIONS: 800 x 600 x 800 (h) mm.
WEIGHT: 100 kg.

ACCESSORY:

AT 205/A	Washing system. With ball cock, washing nozzle G 1/2", length of hose 2 metres

150 LITRE PAN MIXER — AT 205

Pan mixer which operates in upright position to produce quality mixes. Maximum aggregate size: 20 mm.
Paddles are adjustable in height. Scrapers are made in cast iron and reduction unit is in oil bath.
Gears are ground and case hardened.
The rugged frame is supported by four telescopic legs so that two discharge heights are possible (60 or 80 cm).
Drawbar and 400 mm dia. tyres.
Mixing pan diameter: 800 mm.
Capacity: 200 litres. Yield: 110 litres.
Output at 40 cycles/h: 4.4 m^3.
Thermomagnetic switch, rapid coupling 3 phases + earth.

DIMENSIONS: 1000 x 1900 x 1500 (h) mm.
WEIGHT: 181 kg.

AT 205	Model 380 V, 50Hz, three phase
AT 205/1	Model 220 V, 50 Hz, single phase

ACCESSORY:

AT 205/A	Washing system. With ball cock, washing nozzle G 1/2", length of hose 2 metres

56 LITRE PAN MIXERS — AT 208/6

Suitable for dry or moist material. Metal frame with wheels for movement and plastic pan. A safety device prevents the machine from working if paddles are raised.
Once the mixture has been prepared, the pan is extracted.
A second pan is supplied thus enabling another mixture to be prepared. The mixer is supplied with a safety device which stops rotation when motor assembly is raised.
Maximum aggregate size: 1 mm
Actual yield: 47 litres. Pan capacity: 56 litres (dia. 58 cm).

POWER SUPPLY: 220 V, 50 Hz, single phase, 550 W
DIMENSIONS: 1040 x 580 x 800 (h) mm.
WEIGHT: 30 kg.

ACCESSORY:

AT 208/V	Plastic pan

CONCRETE DRUM MIXERS FOR USE IN THE LABORATORY AND ON SITE

Only the tilting drum concrete mixers are perfectly water tight during the mixing process.
The steel drum has an integral ring gear and is mounted on a steel frame.

POWER SUPPLY: 220 V, 50 Hz, single phase.

	Yeld litres	Drum litres	Motor hp kw	Weight kg	Dimensions cm
AT 208	50-70	118	0.3	60	120 x 74 x 135
AT 208/1	80	140	0.3	65	120 x 74 x 135
AT 208/2	160	190	1	106	146 x 80 x 135
AT 208/3	190	235	1.4	120	146 x 84 x 147
AT 208/5	250	314	1.4	170	161 x 93 x 158

AT 208

TEMPERATURE RECORDER 6 INPUT CHANNELS AT 248

The measurements, which are transformed into tracks on the graph-paper, are achieved with iron-constantan thermo-coupled wires in concrete casts during the curing phases. Temperature: from 0 to 100°C (1° sub-divisions). Paper advancement 60 mm/h (upon request 20, 120, 240, mm/h), paper width 120 mm.
Supplied without accessories which should be ordered separately.

POWER SUPPLY: 220 V, 50 Hz, single phase.
DIMENSIONS: 230 x 280 x 440 (h) mm.
WEIGHT: 10 kg.

ACCESSORIES AND SPARE PARTS:

AT 248/1	5 rolls of graph paper (15m each)
AT 248/2	3 sets of 6 inked ribbons
AT 248/5	Iron constan wire, 100 m bobbin

AT 208/2

THERMOCOUPLE THERMOMETER (FOUR PROBES): -200 +1370°C DB 834

High resolution and extended temperature range. Instant printouts of date, time and temperature: the memorized information can later be displayed, downloaded and/or printed. It can take up to 4 separate probes. The sophisticated software allocates up to 15000 temperature readings to maximize available space. The LCD shows temperature with a secondary level of readout displaying logging interval, time and date. Resolution K: 0.1°C (-99.9 to 999.9°C), 1°C (1000 to 1370°C), 0.2°C (-200.0 to -100.0°C).
Accuracy: ± 0.5°C (-200.0 to 999.9°C); ± 1°C (outside).
Printing/Logging Intervals: selectable from 1, 2, 5, 10, 15, 30, 60, 120 and 180 minutes.

POWER SUPPLY: 4 x 1.5V AA batteries, 350 of continuous use.
DIMENSIONS: 220 x 82 x 66 (h) mm.
WEIGHT: 500 g.

DB 834/S	Thermocouple K type probe (50 mm bobbin)

AT 248

DB 834

AT 224/D AT 224/F

GENERAL PURPOSE CONTAINER

Made of aluminium.

AT 224/4	Nominal capacity 4.3 litres (dia. 18 x 17 cm)
AT 224/10	Nominal capacity 10 litres (dia. 24 x 23 cm)
AT 224/14	Nominal capacity 14 litres (dia. 26 x 24 cm)
AT 224/30	Nominal capacity 29 litres (dia. 34 x 32 cm)
AT 211/P	Tamping rod: diameter 16 x 600 mm
DV 739	Straight edge 300 mm long

VOLUMETRIC WEIGHT BUCKETS

For determining the weight per cubic meter of fresh concrete. Made of enamelled steel.

Code	Capacity	Reference stardards
AT 224/A	litres 2.8	ASTM C29
A 240/10	litres 10	EN 1097/3 - EN 12350/6 BS 812 - ASTM C 138
AT 224/D	litres 14	ASTM C138 - ASTM C29
AT 224/F	litres 28	ASTM C138 - ASTM C29
AT 224/9	litres 9	EN 12350-6 - UNI 7122

AT 294

CONCRETE FLOW TABLE AT 294

BS 1881 EN 12350-5 DIN 1048

For determining the consistency of concrete with flow measurements between 360 and 600 mm. Double steel table with wooden top (700 x 700 x 2 mm). Steel cone, lower diameter 200 mm, upper diameter 130 mm, height 200 mm.
Wooden tamper, with 40 x 40 mm tamping face.

DIMENSIONS: 700 x 700 x 400 (h) mm.
WEIGHT: 30 kg.

AT 235

"KELLY BALL" AT 235

ASTM C 360

For determining the consistency of fresh concrete.
Cylindrical weight with semi-spherical bottom (14 kg), rod with handle, guide and support stirrup.
The rod is graduated in 1/4" (6.4 mm) increments.

DIMENSIONS: 360 x 160 x 360 (h) mm.
WEIGHT: 16 kg.

AT 209

CONSISTOMETER AT 209

UNI 9420 EN 12350-4 DIN 1048

For determining the consistency of fresh concrete.
In galvanised sheet steel.

INNER DIMENSIONS: 200 x 200 x 400 (h) mm.
OUTER DIMENSIONS: 310 x 205 x 402 (h) mm.
WEIGHT: 7.5 kg.

AIR ENTRAINMENT METER
(water column type) **AT 225**

ASTM C 231 EN 12350-7

Used to determine the air content of fresh concrete, it comprises a sealed vessel of 5 litre capacity.
Lid with fast-closing system incorporates a pressure gauge (0-2.5 bar). Range of measurement 0-10%.
Graduated scale (0.1% divisions).
The apparatus is supplied complete with tamping rod and air pump. Each unit is supplied with an in-house, Tecnotest calibration certificate.

DIMENSIONS: 370 x 370 x 700 (h) mm.
WEIGHT: 19 kg.

ACCESSORIES AND SPARE PARTS:

AT 211/P	Tamping rod dia. 16 x 600 mm.
AT 225/C	Calibration cylinder
AT 211/Q	BS tamping rod 25 x 25 x 380 mm

AT 225

AT 225/C

AIR ENTRAINMENT METER
(pressure gauge type B) **AT 225/E**

ASTM C 231 BS 1881 EN 12350-7

For determining the percentage of air in fresh concrete.
The 8 litre pressure chamber is hermetically sealed by means of four quick- release clamps. Two ball valves, mounted on threaded supports, enable the pressure chamber to be filled with water. Air percentage is displayed on a dial gauge (from 0-100%).
Pressure is achieved by means of a mini-compressor.
Divisions from 0.1% up to 8% and from 0.5% up to 15%.
All controls are electrical (compressor, bleeding valve, pressure regulator).

POWER SUPPLY: 220 V, 50 Hz, single phase.
DIMENSIONS: 240 x 240 x 450 (h) mm.
WEIGHT: 15 kg.

AT 225/E AT 225/M

AIR ENTRAINMENT METER
(pressure gauge type) **AT 225/M**

Identical to the above but with a hand-operated pump.

AIR ENTRAINMENT METER
(pressure gauge type) **AT 225/F**

ASTM C 231 BS 1881 EN 12350-7

The percentage of air in fresh concrete is determined as per Boyle law principle.
The vessel (7 litre capacity) is provided with a cover incorporating four quick-release clampings, manual pump and dial gauge for direct reading of air percentage.
Measurement scale 0-100%.
Graduations: 0.1% up to 6% - 0.2% from 6 to 10%.

DIMENSIONS: 250 x 250 x 500 (h) mm.
WEIGHT: 10 kg.

AT 225/F

AT 210/C

AT 211/L

AT 211

AT 209/N

AT 204/H

SLUMP TEST EQUIPMENT

ASTM C 143 AASHTO T 119 EN 12350-2
BS 1881 BS 5075 NF 18-305

Used to determine the consistency of concrete mixes having medium and high workability.

AT 210/C	Cone made from galvanised sheet steel Dimensions: 200 x 100 x 300 (h) mm. 2 kg
AT 211/P	Steel tamping rod, dia. 16 x 600 (l) mm
AT 211/B	Base plate for AT 210/C: polyethylene Thickness 9 mm. 600 x 400 mm
AT 211/L	Complete set: AT 210/C, AT 211/P, galvanised steel base with graduated rod and strip for scraping and measuring. Dimensions: 450 x 350 x 300 (h) mm. 8 kg
AT 211	Complete set: same as AT 211/L but with stainless steel slump cone, plastic scoop and metal funnel to assist filling. Dimensions: 450 x 350 x 550 (h) mm. 11 kg
AT 211/T	Metal funnel

K-SLUMP — AT 209/N

ASTM C 1362

For determining the compaction degree and workability of fresh concrete; the result is directly correlated to the standard slump test.

DIMENSIONS: 70 x 70 x 300 (h) mm.
WEIGHT: 500 g.

VE-BE TIME CONSISTOMETER — AT 204/H

BS 1881 EN 12350-3

For determining the consistency and workability of concrete. It is suitable for concrete mixes of low or very low workability. The concrete is subjected to vibration after the cone has been removed.
The assembly is mounted on a vibrating table (with pre-set intensity and frequency) and a plastic disk makes contact with the surface of the concrete.
The time required to perform the operation indicates the workability, or VE-BE degree.
The equipment is supplied complete with electric vibrating table with pre-set frequency (3000 vibrations per minute) and amplitude, cylindrical container, cone, funnel and plastic disk.
Pedal switch to start/stop vibration.

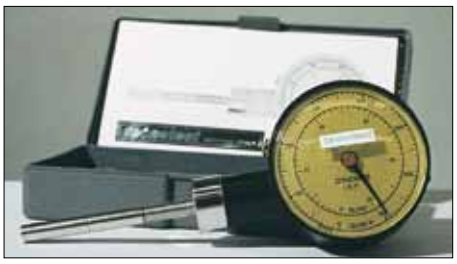
POWER SUPPLY: 220 V, 50 Hz, single phase
DIMENSIONS: 400 x 250 x 690 (h) mm.
WEIGHT: 100 kg.

N.B. The apparatus must be operated at 50 Hz to comply with the fixed test frequency prescribed in BS 1881.

POCKET PENETROMETER AT 256

For determining the initial set of concrete.
The plunger (1/20 sq. in. - 32 mm^2 area) is inserted into the concrete to a depth of 1" and the resistance is shown on the calibrated scale.
Hardening begins at 500 psi (35 kg/cm^2) therefore a few readings at regular intervals are sufficient.
The penetrometer is calibrated from 0 to 700 psi.

DIMENSIONS: 60 x 30 x 180 (h) mm.
WEIGHT: 300 g.



AT 256

CONCRETE NEEDLE PENETROMETER AT 255

ASTM C 403 AASHTO T 197 UNI 7123/72

For determining the initial setting time of concrete with slump value greater than zero.
The equipment comprises a penetrometer with calibrated spring (0 - 100 kgf, in 1 kgf divisions) six stainless steel needle points (650-325-160-65-32-16 mm^2) and an adaptor.
A flow ring on the calibrated rod of the penetrometer indicates the load reached. Plastic carrying case.

DIMENSIONS: 450 x 160 x 70 (h) mm.
WEIGHT: 5 kg.

AT 255

COMPACTING FACTOR APPARATUS AT 199

BS 1881

This test gives an accurate indication of the workability of concrete. It is particularly suitable for mixes with limited workability that have aggregates with max. 38 mm diameters.
The equipment consists of two conical hoppers with quick-opening traps that allow the concrete to fall freely.
A specimen mould, mounted on the base, receives the mix.

DIMENSIONS: 330 x 470 x 1270 (h) mm.
WEIGHT: 45 kg.

AT 199

JOISEL APPARATUS (LCPC) AT 292

Used to separate the constituents of fresh concrete mix (cement, sand, aggregates and water) and determine their proportions.
The apparatus has a capacity of 2 kg and the error margin in the results is approximately 2% for cement and water and lower than 2% for sand and aggregates.

DIMENSIONS: 140 x 140 x 200 (h) mm.
WEIGHT: 1.5 kg

AT 292

TESTS ON SCC, SELF COMPACTING CONCRETE

UNI 11041 UNI 11042 UNI 11043 UNI 11044 UNI 11045

AT 201/L

L-SHAPED BOX TEST FOR DETERMINING FLOWABILITY

UNI 11043

AT 201/L L-shaped box for determining flowability

Complete with funnel, shutter and 3 inner segregating bars of 16 mm diameter each to simulate reinforcement bars. Two reference marks are positioned horizontally on the inside bottom of the box at 200 and 400 mm. Made of galvanized steel.
DIMENSIONS: 750 x 305 x 650 (h) mm.
WEIGHT: 16 kg.

DV 739 Scraper rule in stainless steel 30 x 300 mm

U-SHAPED BOX TEST FOR DETERMINING CONFINED FLOWABILITY

UNI 11044

AT 203/U U-SHAPED BOX FOR DETERMINING CONFINED FLOWABILITY

AT 203/U

Made of galvanized steel with vertically positioned reinforcement bars (four of 10 mm diameter or three of 13 mm diameter) inside to obstruct flowability. The box is divided by a shutter.
DIMENSIONS: 440 x 310 x 830 (h) mm.
WEIGHT: 21 kg.

DV 739 Scraper rule in stainless steel 30 x 300 mm

J-RING TEST FOR DETERMINING CONFINED FLOWABILITY

UNI 11045

AT 210/JR J-RING FOR DETERMINING CONFINED FLOWABILITY

Ring made from galvanized steel, 300 mm median diameter, incorporating 20 bars 100 mm long of 10 mm diameter each positioned at equidistant intervals.
DIMENSIONS: diameter 330 x 125 (h) mm. **WEIGHT:** 7 kg.

AT 210/Z

AT 210/JR

AT 210/S

AT 210/Z SLUMP CONE

Made of galvanized steel in accordance with EN 12350-2.
DIMENSIONS: 210 x 200 x 300 (h) mm. **WEIGHT:** 2 kg.

AT 210/S SQUARE PLATE

Made of galvanized steel with engraved 200 and 500 mm diameter circles on one side (to UNI 11041) and with 200 and 310 mm diameter circles on the other (to UNI 11045).
DIMENSIONS: 800 x 800 mm. **WEIGHT:** 10 kg.

SLUMP FLOW TEST FOR DETERMINING SPREAD DIAMETER AND SPREADING TIME (SLUMP AND FLOW)

UNI 11041

AT 210/Z	SLUMP CONE

Made of galvanized steel in accordance with EN 12350-2.
Dimensions: 210 x 200 x 300 (h) mm. Weight: 2 kg.

AT 210/S	SQUARE PLATE

Made of galvanized steel with engraved 200 and 500 mm diameter circles on one side (to UNI 11041) and with 200 and 310 mm diameter circles on the other (to UNI 11045).

DIMENSIONS: 800 x 800 mm.
WEIGHT: 10 kg.

AT 210/Z

AT 210/S

V-FUNNEL TEST FOR DETERMINING FLOWING SPEED

UNI 11042

AT 202/VF	V-FUNNEL

Consisting of a galvanized steel funnel placed on a supporting stand. Rated capacity is 10 litres.
The discharge orifice has a seal valve.
DIMENSIONS: 510 x 350 x 925 (h) mm. **WEIGHT**: 11 kg.

V 972	GRADUATED PLASTIC BUCKET, 12 LITRE CAPACITY
DV 739/1	SCRAPER ROD IN STAINLESS STEEL 30 x 900 mm

AT 202/VF

DV 739/1

V 972

FLOW TABLE

Used to determine the flow and workability.
Consists of a sturdy steel frame, a 750 mm diameter table, made of steel. a bronze mould (lower dia. 250 mm, upper dia. 160 mm, height 130 mm. Steel tamper AT 211/P.
Separate control panel with mains switch, warning lights, start/stop buttons and digital selector for number of drops (15 in 15 seconds). The machine stops automatically at the end of the test cycle.

DIMENSIONS: 760 x 400 x 480 (h) mm.
WEIGHT: 100 kg.

C 376/C	Electrically operated model Power supply: 220 V, 50 Hz, single phase
C 375/C	Hand operated model

ACCESSORIES AND SPARE PARTS:

C 376/2	Spare mould (dia. 250 and 160 mm)
AT 211/P	Steel tamper dia. 16 x 600 mm

C 376/C

C 385

LENGTH COMPARATOR C 385

ASTM C 151 ASTM C 490 BS 1881:5 EN 1367-4 EN 12617-4

Precision apparatus used for measuring length changes.
Consists of aluminium alloy base with levelling feet, chrome plated columns with support for 0.001 dial gauge, as required by Standards, and two stainless steel contact points. Reference rod with negligible thermal expansion coefficient, 300 mm long (C 385/A) is supplied as standard.

DIMENSIONS: 260 x 240 x 500 mm.
WEIGHT: 8 kg.

LENGTH COMPARATOR C 385/1

Identical to previous model but with digital battery-operated, dial gauge, 0.001 divisions.

Accessories:

C 385/H	Bar 280 mm long (UNI 8147 UNI 8148)

C 385/1

C 380/A

THREE-PLACE MOULDS FOR RESTRAINED EXPANSION TEST

C 380/A	BEAMS 50 x 50 x 250 mm (UNI 8147) Dimensions: 320 x 180 x 60 mm, 15 kg
C 380/B	BEAMS 80 x 80 x 240 mm (UNI 8148) Dimensions: 320 x 280 x 90 mm, 18 kg

AT 203

WORKABILITY APPARATUS AT 203

NF P 18-452

Used in the laboratory or on site for determining the consistency and workability (or plasticity) of freshly-mixed concrete and thereby determining, also, optimal mixture.
The apparatus comprises a tank with two compartments divided by a movable panel, a vibrator and relevant electrical system.
Fresh concrete is poured into one of the compartments and then the panel is raised.
The electric vibrator is then turned on so as to evenly distribute the concrete.
The time required to obtain a uniform spread represents the grade of plasticity of the mixture.

POWER SUPPLY: 220 V, 50 Hz, single phase.
DIMENSIONS: 800 x 450 x 400 (h) mm.
WEIGHT: 70 kg.

NON- DESTRUCTIVE TESTING

CONCRETE TEST HAMMER

ASTM C 805 BS 1881:202 EN 12504-2

Used to obtain an estimate of strength and quality of hardened concrete.

CONCRETE TEST HAMMER, NORMAL TYPE AT 241/E

Supplied complete with carborundum stone and plastic carrying case.
Strength range 10 to 70 N/mm^2 (100 to 700 kgf/cm^2).

DIMENSIONS: 340 x 150 x 150 (h) mm.
WEIGHT: 1.2 kg.

AT 241/M Carborundum stone

AT 241/E

TESTING ANVIL AT 241/A

EN 12504

Made of special steel with guide for routine checks on concrete test hammers AT 241/E.

DIMENSIONS: 215 x 215 x 270 (h) mm.
WEIGHT: 17 kg.

AT 241/A

ELECTRONIC CONCRETE TEST HAMMER AT 241/D

This hammer is very easy to use and very reliable for the determination of compressive strength of concrete products.
Measurement range: 10-120 N/mm^2 (10-120 MpA).
LCD graphic display.
It consists of a key controlled test hammer with a digital expansion which enables date and hour of test session to be input (as well as impact angle and required unit of measurement) and display of values during test. Downloading of data to a PC via an RS 232 interface with special cable.
Up to 20,000 rebound values may be stored and a battery backup ensures data are not lost even when instrument is turned off.
Autonomy: 60 hours.
Contained in a carrying case and complete with carborundum stone.

DIMENSIONS: 350 x 200 x 150 (h) mm.
WEIGHT: 3.2 kg.

AT 241/D

TESTING ANVIL AT 241/B

EN 12504

Made of special steel with guide for routine checks on concrete test hammers model AT 241/D.

DIMENSIONS: 215 x 215 x 270 (h) mm.
WEIGHT: 17 kg.

AT 241/B

AT 278/1

MICRO-COVERMETER AT 278/1

BS 1881:204

Handheld digital unit with softkey that enables determination of rebar diameter, direction and depth. Supplied with probe.
Audio and visual bar location aids.
Search method: continuous read-out on screen with addition of inbuilt variable pitch audio on command.
Measurements: millimetres or inches.
Data logging with software for downloading to MS Excel.
Bar Sizing: covers from 5 mm to 185 mm (depending on bar size).
When the bar is too close to the surface, a spacer can be used. Typically a 6 mm bar can be located to 60 mm and a 40 mm bar can be located to 80 mm.
Accuracy: from ±0.5 mm to ±1.5 mm, depending on rebar diameter, coating thickness and closeness to other rebars.
Error conditions are displayed on the instrument.

DIMENSIONS: 520 x 420 x 320 (h) mm.
WEIGHT: 8 kg.

AT 274

PUNDIT - ULTRASONIC TESTER AT 274

EN 12504-4 ASTM C 597

It is packed full of new features which include a novel signal strength indicator bar on the display.
Perfect for use on site, simple and easy to use yet powerful enough for the expert user. It can be controlled directly from a PC or factory control system giving the user full remote control: ideal for extended tests in the research lab or high volume production testing applications.
For most concrete testing the pair of 54 kHz transducers supplied as standard are used.
However, other transducers are available as accessories and should be ordered separately if required.
The Pundit is also supplied complete with two 3 m transducer leads, calibration bar, ultrasound couplant, mains cable and instructions.
Time measurement: 0.1 to 999.9 ms and 1.000 to 6.553 ms.
Power supply: internal rechargeable NiMH battery pack with capacity for over 12 hours continuous use.
Operating temperature range: 0°C - 40°C.
It has an RS 232 interface as standard fitting and is supplied complete with relevant software for PC connection.

POWER SUPPLY: 220 V, 50/60 Hz, single phase.
DIMENSIONS: 105 x 220 x 230 (h) mm.
WEIGHT: 1.8 kg.

AT 274
AT 274/C

Accessory:

AT 274/C	Carrying bag

CORROSION MAPPING SYSTEM AT 410

ASTM C 114 ASTM C 876

This instrument permits the measurement of spontaneous electric potentials in structures in reinforced concrete so that areas in which the steel is prone to corrosion can be identified. The contained dimensions and battery operation enable the instrument to be used on site.
The complete system comprises:
- electronic voltmeter with digital display
- adaptor plate
- two 15" electrode extensions
- surfactant reservoir with electrode
- test wire
- copper sulphate crystals
- anti-freeze
- concentrated surfactant solutions
- carrying case

Range	Resolution
0-20 mv	0.01 mv
0-200 mv	0.1 mv
0-2 v	1 mv
0-200 v	0.1 v

CASE DIMENSIONS: 470 x 200 x 370 (h) mm.
WEIGHT: 6.5 kg.

AT 410/1	Copper sulphate crystals: 500 g

AT 410

CANIN-CORROSION ANALYSING INSTRUMENT AT 412

ASTM C 876

For the non-destructive detection of corrosion in the reinforcement bars of concrete building elements. Discovers rust before it becomes visible and has caused disastrous damage. The large display, just 9 keys for simple functions, technical menus and intelligent memory, render CANIN a unique instrument worldwide. 240 measurement values are represented on the easy-to-read display. Indicator device with non-volatile 1 M Bit memory for 120'000 measurements. A measuring surface of more than 4000 m^2 can be managed with the large memory.
Measurement with up to 8 rod or 8 wheel electrodes. Equipped for path measuring, resolution 3 mm. RS 232 interface. Integrated software for printer. 3.5" floppy disk with macro for transfer of CANIN data into MS Excel.
Battery capacity for 60 hours.

DIMENSIONS: 300 x 330 x 110 mm.
WEIGHT: 5 kg.

AT 412

ACCESSORIES:

AT 412/1	System with 4 wheel electrodes, for measurement on horizontal surface
AT 412/2	System with 4 rod electrodes (150 mm divisions)

AT 412/1

AT 412/2

AT 238/H

WINDSOR HP PROBE AT 238/H

ASTM C 803 BS 1881

Measures compressive strength concrete up to 17,000 psi. The instrument comprises a special pistol which shoots a steel probe. Depth of penetration is inversely proportional to strength of concrete.
The test provides excellent correllation with destructive tests (variation is 1-5%) and provides very fast estimation of concrete strength in-situ with little damage to concrete surface. The electronic measuring device with LCD display enables test to be menu-guided and test results to be stored for subsequent uploading to PC.
Templates are provided for guiding the probes.
Supplied complete with carrying case but without the probes which should be ordered separately.

DIMENSIONS: 500 x 400 x 200 (h) mm.
WEIGHT: 9 kg.

ACCESSORIES:

AT 238/HS	75 Silver probes and power loads for concrete up to 110 Mpa
AT 238/HG	75 Gold probes abd power loads for concrete up to 19.4 Mpa

WARNING: Class 1.45 explosive. Explosive contact is 0.0937 Class C and requires shipper's certification to IATA restricted article No. 22 under client's responsibility.

AT 238/S

WINDSOR PIN SYSTEM EQUIPMENT NON-EXPLOSIVE FOR MORTAR AND CONCRETE AT 238/S

ASTM C 803

For obtaining strength up to a maximum of 5300 PSI (36.9 MPA) from penetration value of a pin. Tests strength of blocks, mortar joints, paving slabs, pipes, etc.
The penetration pin is made of a special steel and can be used about seven times. The calibrated spring undergoes many compression cycles with no loss of energy; calibration once every year is sufficient. The needle micrometer supplied detects the penetration depth.
Supplied without pins. Transport case.

DIMENSIONS: 430 x 300 x 150 mm.
WEIGHT: kg 8

ACCESSORY:

AT 238/SP	Box of 80 hardened steel pins

DEFORMETER-EXTENSOMETER AT 390

ASTM C 426 BS 1881: 206

For measuring linear deformations on mortar, rock, concrete specimens. The instrument comprises an Invar bar which has a head with a conic point at each end.
The point at one end is fixed whilst the one at the other end can be slightly rotated around a perpendicular axis.
The rotational motion is transmitted with a 1:1 ratio to the dial gauge with 5 mm travel (-2.5 +2.5).
The structure to be checked is prepared by glueing together 2 disks with marked centres.
Position at which, to glue the disks is given by the gauge stick that has fixed points at each end.
Variation of distance between the two disks is measured with micrometric precision and shown on the instrument.
The equipment comprises the instrument, the gauge stick, 50 datum discs, 1 tube of adhesive.
Gauge length: 300 mm (standard).
Upon request other lengths (200-250-400-600-900 mm) are also available.

DIMENSIONS: 350 x 200 x 100 (h) mm.
WEIGHT: 3.2 kg.

AT 390

SPARE PARTS:

AT 390/P	Pack of 100 datum discs
AT 390/C	Special glue for discs

FIELD TEST FOR CHLORIDES AT 338

Measures the amount of chloride present in wet or dry concrete. This system produces results on-site within minutes that are accurate and comparable to expensive laboratory titration. It measures the electro-chemical reaction of a weighed sample placed in an extraction liquid. It automatically shows a temperature compensated reading of percent of chlorides on its digital display. Covers wide range from 0,002% to 2% chloride by weight.
The kit includes: the electrode with temperature sensor, the micro-processor instrument (battery operated), 12 extraction liquid bottles, 5 calibration solution bottles plus the specimen balance.
Carrying case: 500 x 400 x 200 mm.

WEIGHT: 5 kg

AT 338/A	12 Extraction bottles, 5 solution bottles
AT 338/B	100 Extraction bottles, 20 solution bottles

AT 338

PULL-OFF TESTER AT 300

EN 13963 EN 14496 EN 1015-12 EN 1348 EN 1542 BS 1881: 207

AT 300

The instrument measures the adhesive strength of plastic, mortar, bitumens and varnish coating to structural elements. It can also be used to determine the tensile resistance of concrete and is thus ideal for the evaluation of the state of an existing structure. This second function requires the use of a core drilling machine for the incision of the testing point (depth 8 to 10 mm). A disk is stuck to the surface (using a normal, fast-setting, epoxy adhesive) and then the apparatus rips the disk off and measures the required force in relation to the surface.The results are then indicated in N/mm2. Tensile force: 16 kN.
Accuracy of results: ± 2%.
A standard disk (50 mm dia.) is supplied with the apparatus. The instrument is supplied in a carrying case.

CASE DIMENSIONS: 290 x 210 x 230 (h) mm.
WEIGHT: 6 kg.

ACCESSORIES AND SPARE PARTS:

AT 300/1	Pack of 10 disks (50 mm dia.)

AT 300/1

PULL-OFF ADHESION TESTER ELCOMETER

It measures the bond strength of applied coatings (paint, mortar, concrete, laminates on wood, metal or plastic).
It employs the pull-off method to measure the lift off force required to pull a small area of coating away from the base material.
A dolly is attached by adhesive to the coating under examination. After curing, the coating can be cut through and the instrument claw engaged. The force is applied and the analog indicator retains the peak value. Supplied with 20 dollies, adhesive, base support ring, cutter.

WEIGHT: approx 4 kg

MODELS:

AT 309/1	INSTRUMENT: RANGE 0-3.5 N/mm2
AT 309/2	INSTRUMENT: RANGE 0-7 N/mm2
AT 309/3	INSTRUMENT: RANGE 0-15 N/mm2
AT 309/4	INSTRUMENT: RANGE 0-22 N/mm2
AT 309/5	INSTRUMENT: RANGE 0-0.2 N/mm2

AT 309/2

ACCESSORIES AND SPARE PARTS:

AT 309/6	Kit of 20 mm ø, dollies (100 pcs)
AT 309/7	Kit of 40 mm ø, dollies (5 pcs)
AT 309/8	Support ring for 40 mm ø dollies

PULL-OUT TEST EQUIPMENT

ASTM C 900 BS 1881 UNI 9536

Used for determining the force required to extract a special metal insert previously embedded in the hardened concrete (AT 343 and AT 343/1) or subsequently embedded (AT 341, AT 342/1 and AT 342).
Extraction in both types of test (Lok-test and Capo-test) is similar.
A quite accurate evaluation of in-situ concrete strength is possible (with appropriate correlations).

Pull-out using subsequently embedded inserts:

AT 341 CAPO TEST PULL-OUT TEST APPARATUS

With 0 - 60 kN dial gauge and tools.
Supplied in a carrying case (160 x 330 x 460 mm).
Weight: 5 kg

AT 342 KIT FOR PREPARING HOLES AND INTRODUCING INSERTS

Complete with diamond drill, bits, counter pressure for Capo test, water pump and tools for performing the test.
Supplied in a carrying case.

POWER SUPPLY: 230 V, 50 Hz, single phase.
DIMENSIONS: 160 x 330 x 460 mm.
WEIGHT: 10 kg.

AT 342/1 Kit of 10 inserts (required accessory)

AT 341

PULL-OUT TEST EQUIPMENT (PREVIOUSLY EMBEDDED INSERTS)

AT 343 LOK PULL-OUT TEST APPARATUS

Complete with 0 - 60 kN dial gauge and tools.
Supplied in carrying case (160 x 330 x 460 mm).
Weight: 5 kg

AT 343/1 Kit of 10 standard inserts

MOISTURE TESTER AT 350

BS 1881

Measuring range 6-28%
This instrument is used for testing both surface and below-surface dampness in walls and floors.
It combines the inspection method (Measure Mode) for measuring surface with the non-destructive, radio frequency technique (Search Mode) for measuring below-surface.
At the touch of a button it also enables the operator to pass from one test method to the other.
The first is the conventional, conductivity-based method which shows whether a surface is dry, damp or wet by means of coloured LEDs.
The second method employs radio wave emissions, using this instrument it is possible to obtain a reliable measurement of dampness. Complete with probe for readings at depth, calibration control device and carrying pouch.

AT 350

supplied as standard

AT 315

WATER IMPERMEABILITY APPARATUS
THREE-PLACE MODEL — AT 315

DIN 1048 EN 12390-8

Used to determine the impermeability of concrete to water.
The test is performed by placing the sample in the special chamber (measuring 250 x 250 x 220 (h) mm, height being adjustable) and securing it between the upper flange and the lower gasket delimiting the test surface.
Water under pressure is then applied to the surface (dia. 100 mm) for the duration prescribed by the Standard. A precision valve controls water pressure shown by the dial gauge, pressure being supplied by an air compressor (10 bar) to be purchased separately (page 78).
The apparatus can be used for testing three samples at a time.
All parts coming into contact with water are in stainless steel.
Inlet-outlet taps are located at the front of the apparatus while the three graduated burettes for measuring water volume are mounted on the upper panel.
Supplied complete with 6 gaskets (for 15 and 20 cm cubes).

DIMENSIONS: 1500 x 600 x 1850 (h) mm.
WEIGHT: 170 kg.

AT 315/G	RUBBER GASKETS FOR AT 315 (6 pcs)

AT 310

PORTABLE WATER PERMEABILITY
TEST KIT, FOR CONCRETE — AT 310

BS 1881

The case includes: complete pressure head, clamping pliers and anchoring tools, two bottles of distilled water.
The pressure head is clamped to the concrete surface either horizontally or vertically and is filled with water, sealed and then adequate pressure is applied.
The pressure may be chosen between 0 and 4 bar.
Readings on the gauge are effectuated at pre-established intervals.

DIMENSIONS: 410 x 360 x 100 (h) mm.
WEIGHT: 6.5 kg.

AT 214/R

AT 214/T

AT 214/M

CONCRETE SHRINKAGE

ASTM C 426 UNI 6555

The test is for determining hydraulic axial shrinkage of concrete, using max. 30 mm dia. aggregates.

AT 214/R	STEEL SHRINKAGE MOULD 100 x 100 x 500 (h) mm Supplied complete with two inserts
AT 214/T	Spare inserts for AT 214/R (50 pieces)
AT 214/M	LENGTH VARIATION GAUGE For 100 x 100 x 500 (h) mm specimens Calibration bar and precision dial gauge (0.001 mm sensitivity)

MICRO-CORING EQUIPMENT TS 713

Micro-core samples are extremely useful for verifying structures especially since their extraction does not cause any damage due to the dimensions of the holes (which, in any case, can be filled with mortar).
The test is easily performed and only requires the presence of one operator. The drilling jig, the self-blocking pincers and the bit guide device all contribute to guarantee correct and accurate sampling.
The equipment is water-cooled and the tank is pressurised via a foot pump.

The equipment comprises:
- 2 speed electric hammer-drill (220 V, single phase)
- Bit guide device
- Water tank with foot pump
- 2 impregnated diamond bits, 28 mm (inner dia.), 35 mm (outer dia.) with different lengths for 100 and 200 mm cores.
- 2 self-blocking pincers for securing the guide device
- Series of blocks, screws, bits and wrenches for use with the equipment.

If the samples obtained are to be subjected to compression tests it will be necessary to trim them for identification purposes.
The equipment we recommend for this purpose is:

TS 713

TS 714

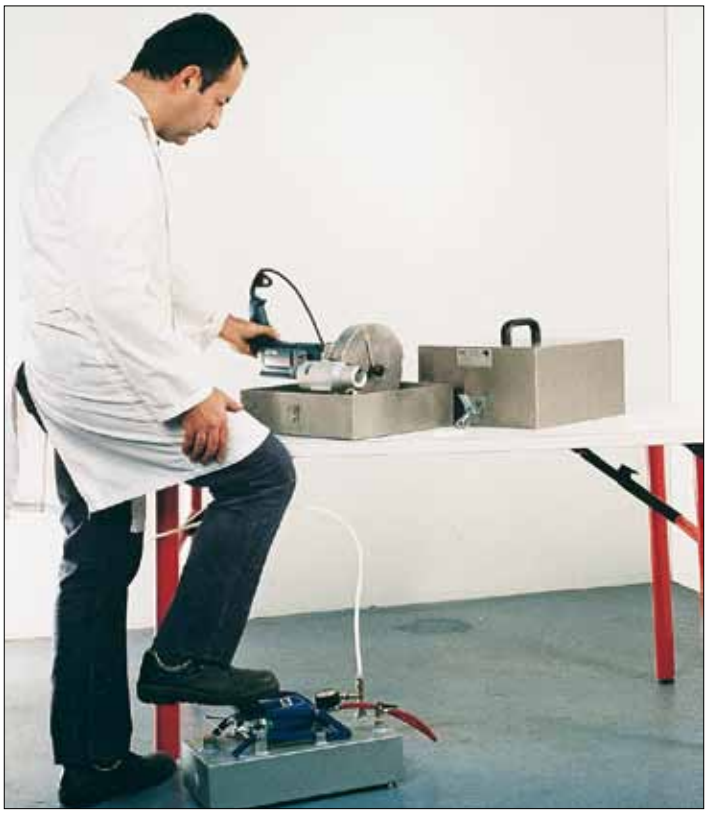
TRIMMING/CUTTING OFF MACHINE FOR SPECIMENS TS 714

Stainless steel and aluminium made.
Complete with 180 mm dia. diamond disk and safety guard. Operated with the drill and tank supplied with the afore-mentioned model (TS 713).
After trimming, the sample is ready for the determination of its resistance to failure.
For this purpose we recommend the use of TS 706 with appropriate platens (page 49).

POWER SUPPLY: 220 V, 50 Hz, single phase

ACCESSORIES AND SPARE PARTS:

TS 713/A	2 speed electric hammer-drill
TS 713/G	Water tank with foot pump
TS 714/D	180 mm dia. diamond disk
TS 713/1	Impregnated diamond bit Inner dia. 28 mm, 100 mm long Complete with built-in adapter
TS 713/2	Impregnated diamond bit Inner dia. 28 mm, 200 mm long Complete with built-in adapter



AT 450

FLEXIBLE CISTERNS FOR LOAD-BEARING TESTS

Made in polysterene covered in PVC and polyurethane. Complete with unions for loading and unloading, spherical valve and flexible tube. Ideal for tests on floor/ceiling structures, cantilever roofs etc. Available in different capacities of standard sizes:

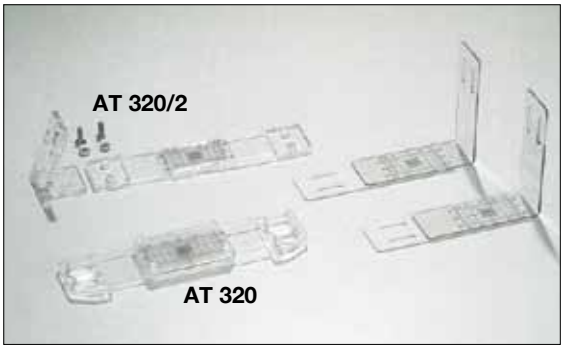
CODE	CAPACITY litres	DIMENSION cm	WEIGHT kg
AT 450/10	1,000	145 x 240	10
AT 450/25	2,500	240 x 280	16
AT 450/50	5,000	240 x 400	25
AT 451/10	10,000	340 x 490	40
AT 451/25	25,000	490 x 650	65
AT 451/50	50,000	730 x 800	120

AT 451/C

AT 451/C LITRE-COUNTER FOR CISTERNS

The system checks the quantity of water.
An intercepting counting device transmits impulses to the electronic calculator; 8 digit display.

DIMENSIONS: 300 x 150 x 150 (h) mm.
WEIGHT: 3 kg.



CRACK WIDTH GAUGES

For the constant checking, measuring and recording of all types of cracks, fissures and joints. This is an economical instrument, simple and precise, which measures displdisplacement between 40 and 0.5 mm. It is attached to the fissure to be checked and the grid indicates any displacement; forms are supplied for taking note of displacements.

DIMENSIONS: 150 x 30 x 5 (h) mm.
WEIGHT: 50 g.

AT 320	Straight crack width gauge
AT 320/2	Universal gauge (straight/corner crack)
AT 320/3	Crack width gauge for uneven surfaces
AT 320/4	Crack width gauge for floors

AT 322

CRACK DETECTION MICROSCOPE **AT 322**

The crack detection microscope is used to measure cracks in concrete and rocks. The high definition lens is provided with an adjustable light source fed by high power batteries.
- magnification: 40x, measuring range: 4 mm
- divisions: 0.02 mm, battery: 1.5 V

DIMENSIONS: 130 x 90 x 40 (h) mm.
WEIGHT: 550 g.

DIGITAL DEFLECTOMETER (25 mm travel)
FOR MEASURING DEFLECTION IN LOFTS AT 482

The equipment comprises:

Telescopic rod of adjustable height up to 3.8 m at maximum lengthening complete with support for transducer.
Linear transducer, 25 mm travel, positioned at the top end of the rod.
Digital readout unit "Monotronic" with rated resolution of 30,000 points.
Full scale reading 25 mm. Sensitivity 0.01 mm.
Tare function. RS 232 serial port.

POWER SUPPLY: 12 Vdc, 220 V, 50/60 Hz, 1 ph (using mains supply).

DIGITAL DEFLECTOMETER (50 mm travel)
FOR MEASURING DEFLECTION IN LOFTS AT 482/50

Full scale reading 50 mm - 0.01 mm sensitivity.

AT 482

SPARE PART:

AT 482/A	Telescopic rod. Up to 3.8 m lengthening Complete with mechanical tension device for transducer

HARDWARE AND SOFTWARE FOR AUTOMATIC DATA ACQUISITION

The Monotronic digital readout unit is available in another version, the Geotronic (AD 200), supplied with a "current loop" interface, instead of the usual RS 232 serial port. Even if it is easy to transfer current data to a computer via the RS 232, the number of serial ports on the PC is limited in that a PC with Windows environment may normally be connected to a maximum of 2 Monotronic units, this being the number of serial ports effectively available.
With the Geotronic version the limit is higher provided the Multiplexer AD 021/010, which enables a network of peripherals to be controlled by a single RS 232, is used.
Such a device enables:
a) quick scanning (5 readings/second) with a network comprising (maximum) 3 Geotronic units and for a maximum duration of 999 seconds;
b) slow scanning (with a minimum of 1 reading every 2 seconds) with a network comprising up to 32 Geotronic units and a maximum of 99 times.
In this last version, each Geotronic unit stores the data in its own memory. The computer therefore is activated only at the start of the test phase and when reading or transferral of peripheral files is required. In any case an ASCII data file is created with measurements referring to period of time elapsed. The file can be opened and processed with Windows software (Word, Excel...).

AT 482

Software for the PC (Windows) to be used is :

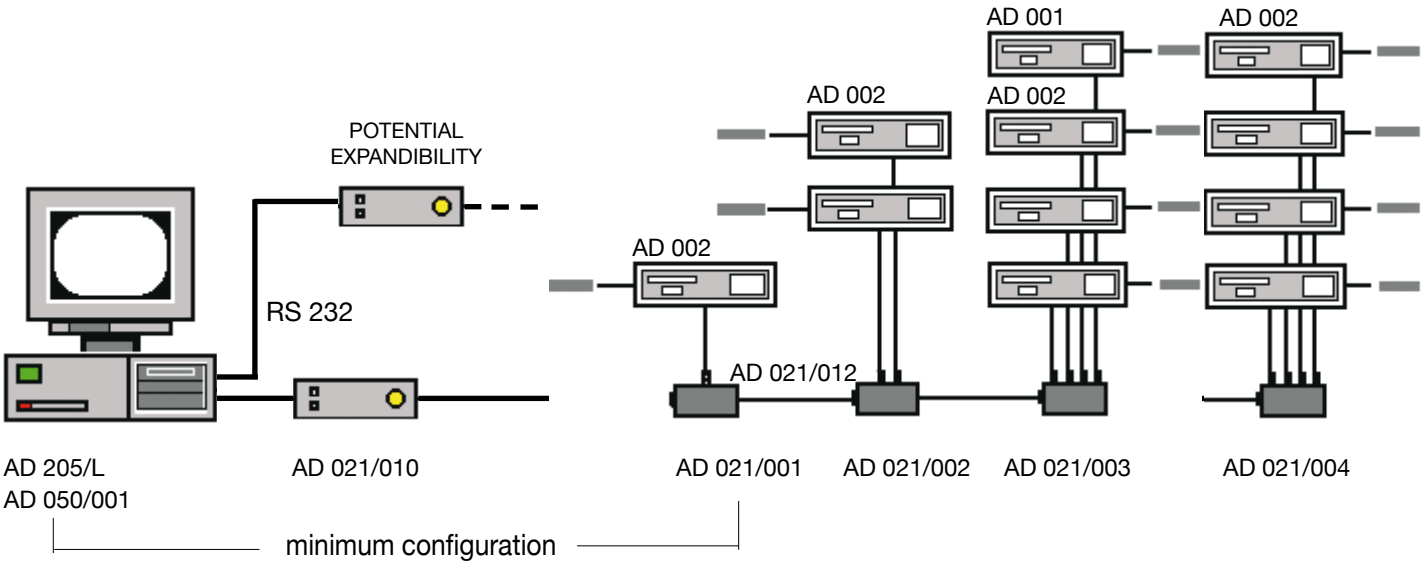
AD 050/001	Software package, for transmission of test data to a PC

To create a local area network, the following are required:

- AD 021/012 electric cable, supplied in 10 m lengths, complete with connections.
- Connector blocks, to be selected from among the following:

AD 021/001 one-way connector block
AD 021/002 two-way connector block
AD 021/003 three-way connector block
AD 021/004 four-way connector block
AD 021/010 Multiplexer

Advantages:
- **Cost is proportional to the number of channels.** The only really essential components are, in practice, the PC (unless one is already available), the MULTIPLEXER for connection to NETWORK (AD 021/010), the CABLE (AD 021/012) and DATA ACQUISITION SOFTWARE. All that need be added are the connector block or blocks as appropriate for the number of Geotronic units to be used.
- **Large expandibility.** The AD 021/010 MULTIPLEXER enables between 1 and 32 channels to be activated by simply connecting other Geotronic units and relevant connector blocks.
- **Computer is not dedicated to the system**. Although its initial function is to INPUT and load the Geotronic units, afterwards it may be either turned off or used for a different purpose. When switched on again, a chart showing data acquired so far may be called up on the video screen to check progress or to conclude test and store results on disk.
- **All data continuously displayed in real time.** Each measurement is displayed on the Geotronic unit on board the apparatus in engineering units as taken, thereby eliminating the need to interrogate the computer in order to observe progress of the test.
- **Data is transmitted in digital form.**
- **Possible faults are restricted to the local area in which they arise**: hence problems arising in any given Geotronic risk jeopardising functions of the relevant channel only while the rest of the laboratory remains unaffected.



D 950/1

SWING-ARM DEFLECTOMETERS

For deflection measurements in buildings. 0.01 gauge with 60 mm diameter dial. Compressive and tensile uses are possible with the swinging arm. Each set includes: dial gauge, swing-arm clamp, Invar coil and lead weight.

D 950/3	Model with 1 gauge, 50 mm stroke
D 950/4	Model with 3 gauges, 50 mm stroke
D 950/9	Model with 1 gauge, 30 mm stroke
D 950/1	Model with 3 gauges, 30 mm stroke
D 950/7	Model with 1 gauge, 10 mm stroke
D 950/8	Model with 3 gauges, 10 mm stroke
D 950/10	Invar coil, 20 m