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SATEC™ Series KN Models

High Capacity Universal Hydraulic Testing Systems

INSTRON®

The difference is measurable™

KN Model Brochure

The Premier Line of High Capacity Testing Machines

Superior Design Provides the Ultimate in Versatility

Instron• introduces its new KN model of universal testing systems. By building on years of experience, Instron has kept the best of its static hydraulic technology while infusing this new SATEC™ series with design flexibility, a modern appearance, high-performance electronics and leading edge software.

▲
1500 kN capacity load frame with hydraulic wedge action grips for metals testing.

Superior Technology for Measuring Force Directly

KN model frames use strain gauge load cell technology to independently and directly measure the force being applied to the specimen. Other manufacturers use pressure transducers that measure force indirectly based on oil pressure observed in the cylinder. However, much of the pressure in a hydraulic system has nothing to do with the load being applied to the specimen: moving the cylinder requires some pressure, raising the piston off the cylinder can require a significant amount of pressure and the weight of the oil itself creates pressure in the system.

The pressure from these sources creates errors in the indication of the load that can raise the lowest calibrated reading as high as ten percent. Machines using pressure transducers require cumbersome mechanics and techniques to overcome inherent load measuring errors. For instance, systems are designed without piston seals, systems require additional plumbing and fittings to eliminate friction and systems require electrical pressure offsets to compensate for the weight of the oil in the cylinder. By eliminating these mechanics and directly measuring force, the load cell technology of the KN model offers superior accuracy (over the entire stroke of the machine), precision and repeatability with less maintenance.

Cost-Effective Technology for High-Capacity Testing

Developed for high-capacity testing, these frames use hydraulics to cost-effectively provide the forces necessary for static tension, compression, bend, flex and shear testing. Models in the series are available in 300 kN (67,500 lbf), 600 kN (135,000 lbf), 1200 kN (270,000 lbf), 1500 kN (337,500 lbf) and 2000 kN (450,000 lbf) capacities and may be available with higher or lower capacities upon request.

KN Model Design Provides the Ultimate in Versatility

KN models feature an ultra-large single test opening and long test stroke. This design offers the ultimate in adaptability by accommodating a myriad of specimen sizes, grips, fixtures and extensometry.

User Interfaces for Flexible and Productive Testing

The KN model comes with a choice of universal testing software providing the ultimate in ease-of-operation and flexibility. Testing can be further enhanced with the addition of the productivity panel (page 5) that provides convenient access to the most widely used test functions.

▲ 5500 controller

Advanced Electronics for First Class Testing

Instron® digital control electronics feature advanced designs that provide high accuracy and fast response. Single range signal conditioners provide high resolution throughout the entire measuring range, simplifying control loop tuning and eliminating range change transients. Synchronous data capture on all channels at up to 500 Hz[1] (5 kHz[2]) means no data skew and the best possible fidelity. The controller automatically recognizes and calibrates transducers, eliminating switches, pots and dials. This design avoids costly mistakes by preventing operators from running tests with the wrong transducers or setting up transducers incorrectly.

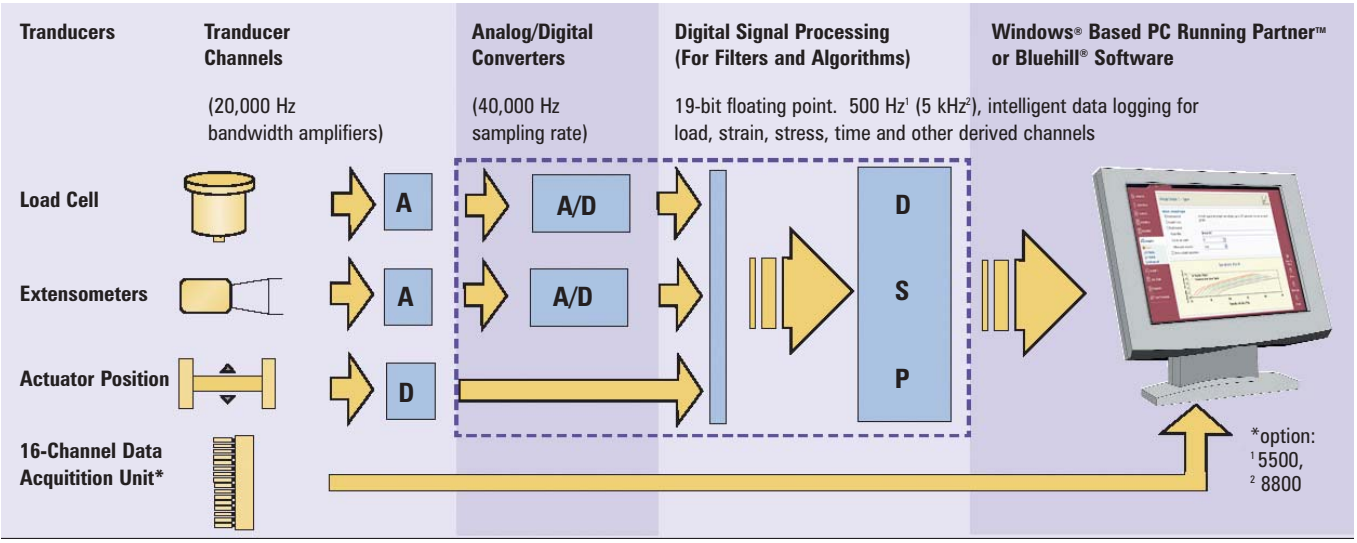
▲ 8800 controller

Principle of Operation

A hydraulic actuator is used to apply a tensile or compressive load to the test specimen. Tension force is applied in the up direction and compression in the down direction. Actuator travel is precisely controlled using a servo valve and built-in position encoder to regulate oil flow to the hydraulic actuator. Load is precisely measured using an Instron load cell. Strain can be measured using an optional Instron automatic, video or clip-on extensometer.

Servo-Controlled System for the Modern Approach to Testing

The PC and digital electronics perform closed loop control of the system's servo valve for the most precise and repeatable testing. The KN model features advanced Instron 5500 control electronics and a comprehensive software suite for a wide variety of applications. Systems may also be equipped with optional Instron 8800 control electronics for specialized static testing applications.



** Pictures shown may feature optional accessories not included in standard machine configuration.

KN Model Features

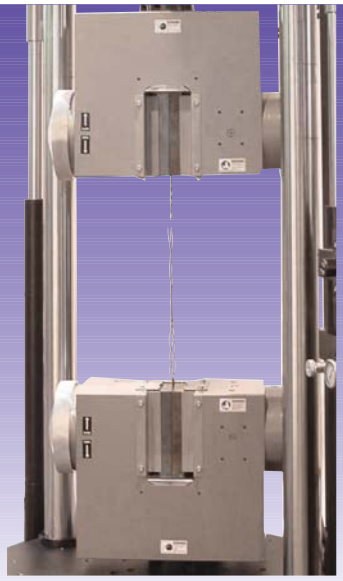
Versatile Frame Design

Typical KN designs include a rigid two-column frame, adjustable crosshead and double-acting hydraulic cylinder. The top-mounted actuator and separate hydraulic console of this series make it easy to provide different stroke lengths and extended test openings to suit unique applications without costly customization. It's the fastest machine available with the longest test stroke and largest test space.

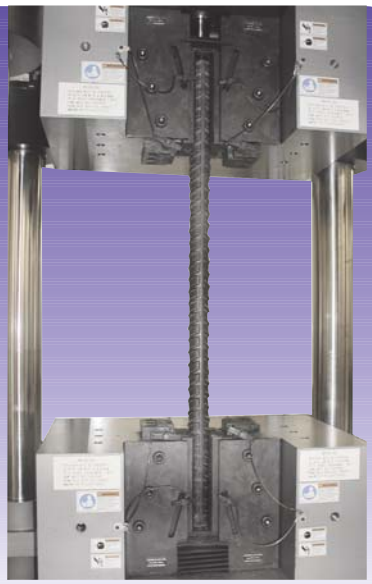
Application Range

- Metals-wire, strip, rod, tube and plate
- Fasteners-tensile, proof, single and double shear
- Construction-reinforcement bar, wire, mesh, concrete compression/flex, structural steel
- Component testing
- EN 10002, ASTM E 8, ASTM C 39, ASTM F 606, SAE J 429 and many other test standards

Tension Grip Styles



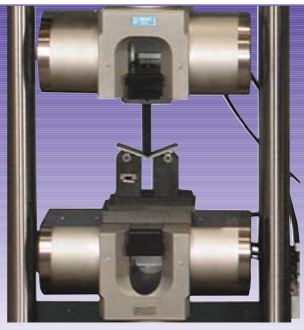
Hydraulic side acting grips



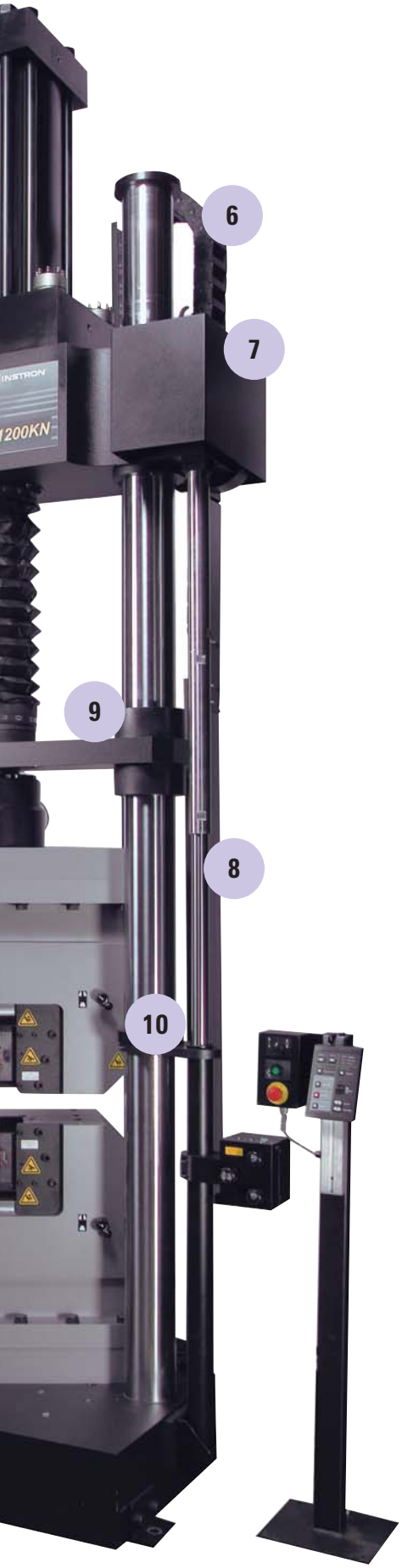
Hydraulic wedge action grips

Compression Fixtures

Spherical and plane compression plates



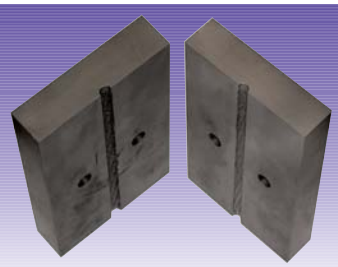
Shear and flexure



1. Long test stroke and faster speeds
2. Piston protective boot
3. Strain gauge load cell
4. Fully-open face grips
5. Advanced Video Extensometer (AVE)
6. Cable track
7. Hydraulic locks
8. Hydraulic lifts
9. Anti-rotation device
10. Large, easy-to-access test space

Accessories - Grip Jaws

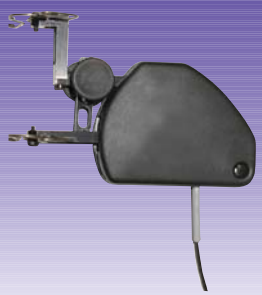
Vee wedge grip jaws for round specimens



Single side-acting grip jaws for stranded wire

Accessories - Extensometers

Automatic contacting



Clip-on

Non-contacting video

System Controls

The adjustable crosshead can be moved easily with hydraulic lifts and locked in place quickly and effectively using the hydraulically locking clamp system.

The productivity panel can be added for convenient access to commonly used testing functions including start and stop, channel zero, load/unload and reset gauge length.

PC with universal testing software (Partner™ or Bluehill® 2) provides the ultimate in ease of operation and flexibility.

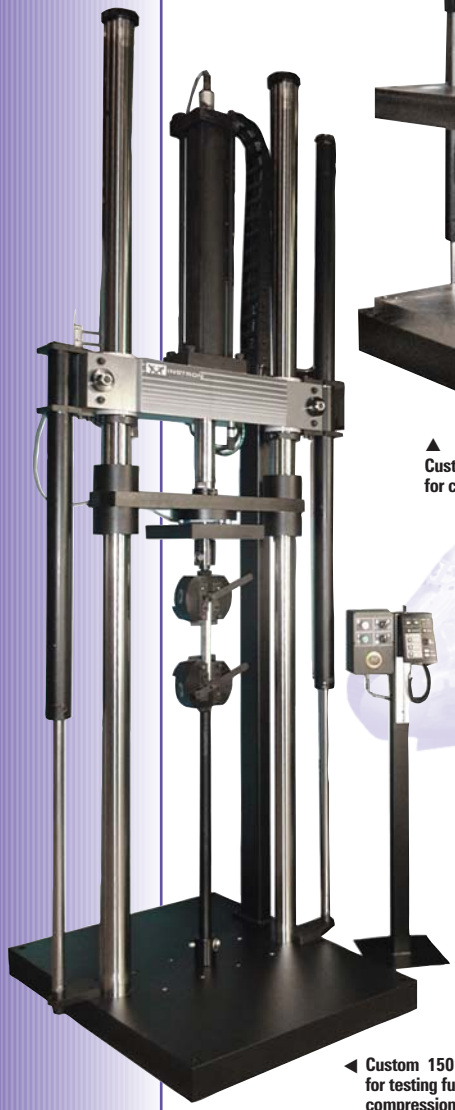
** Pictures shown may feature optional accessories not included in standard machine configuration.

KN Models

Custom Designs for Unique Application Solutions

▲ Custom 600 kN (135,000 lbf) capacity frame for compression testing of plastic crates.

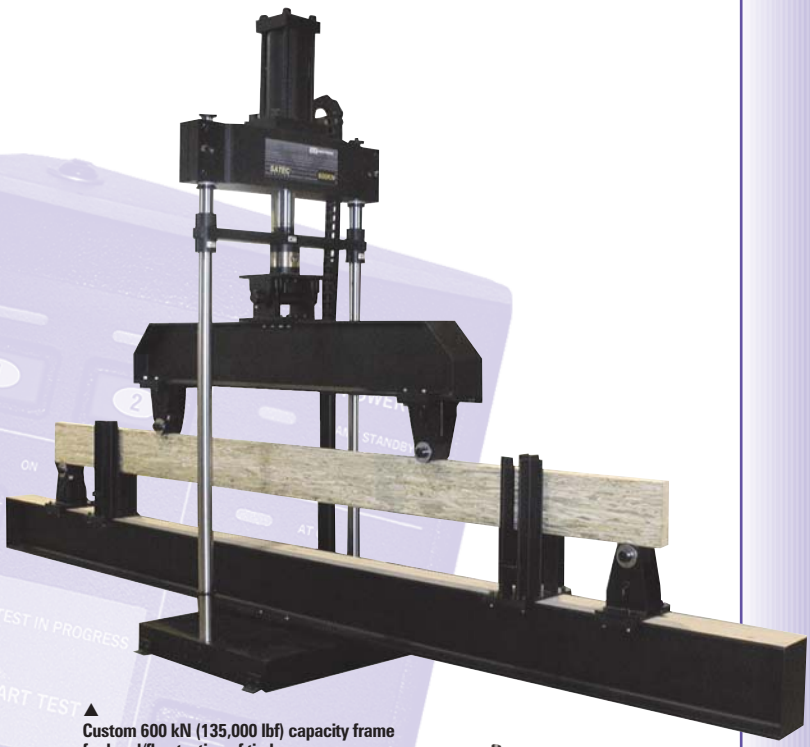
▲ 600 kN (135,000 lbf) capacity frame with hydraulic grips and guided bend test fixture.



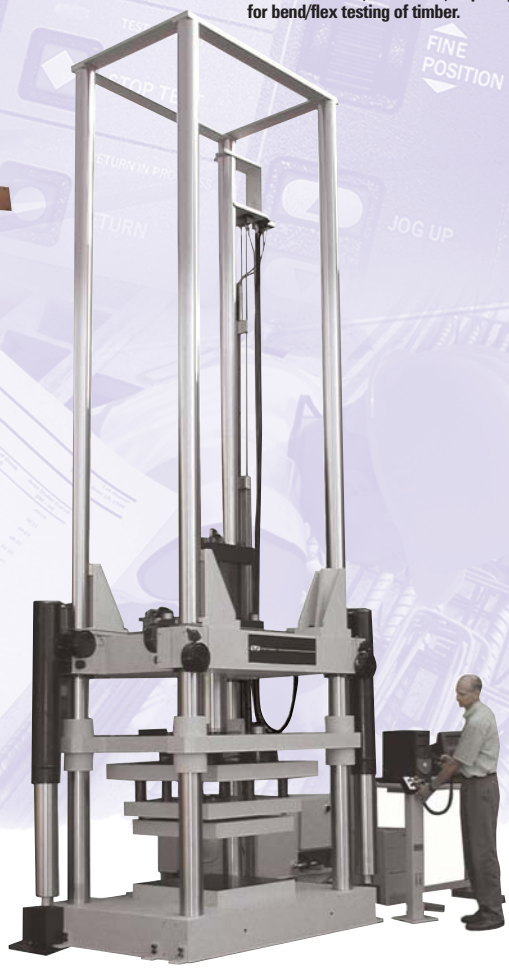
◀ Custom 150 kN (33,750 lbf) capacity frame for testing full diameter pipe sections in compression and pipe samples in tension.

▲ 600 kN (135,000 lbf) capacity frame with single, hydraulic, side-acting grips for tensile testing of stranded wire.

▲ Custom 3,500 kN (800,000 lbf) capacity frame for tensile testing of large diameter rebar.



▲ Custom 600 kN (135,000 lbf) capacity frame for bend/flex testing of timber.



▲ Custom 2,500 kN (562,000 lbf) capacity design for testing concrete beams, cylinders and cubes.

▲ 600 kN (135,000 lbf) capacity frame with pneumatic wedge action grips and automatic extensomter.

** Pictures shown may feature optional accessories not included in standard machine configuration.

Specifications

Model	300KN	600KN	1200KN	1500KN	2000KN
Frame Capacity	300 kN, 30,000 kgf (67,500 lbf)	600 kN, 60,000 kgf (135,000 lbf)	1,200 kN, 120,000 kgf (270,000 lbf)	1,500 kN, 150,000 kgf (337,500 lbf)	2,000 kN, 200,000 kgf (450,000 lbf)
Maximum Vertical Test Opening[1]	1625 mm (64 in)	1625 mm (64 in)	2311 mm (91 in)	2311 mm (91 in)	2311 mm (91 in)
Horizontal Test Opening	711 mm (28 in)	711 mm (28 in)	876 mm (34.5 in)	876 mm (34.5 in)	876 mm (34.5 in)
Actuator Stroke	508 mm (20 in)	508 mm (20 in)	610 mm (24 in)	610 mm (24 in)	610 mm (24 in)
Number of Columns[2]	2	2	2	2 or 4	4
Table Size (WxD)	711 mm x 762 mm (28 in x 30 in)	711 mm x 762 mm (28 in x 30 in)	876 mm x 940 mm (34.5 in x 37 in)	876 mm x 940 mm (34.5 in x 37 in)	876 mm x 1118 mm (34.5 in x 44 in)
Testing Speed at Full Load, Maximum	400 mm/min (15.5 in/min)	200 mm/min (7.87 in/min)	200 mm/min (7.87 in/min)	200 mm/min (7.87 in/min)	200 mm/min (7.87 in/min)
Frame Weight[3,5]	2500 kg (5510 lb)	2845 kg (6270 lb)	6645 kg (14650 lb)	6645 kg (14650 lb)	9570 kg (21090 lb)
Maximum Frame Height[4]	3404 mm (134 in)	3531 mm (139 in)	4636 mm (182.5 in)	4636 mm (182.5 in)	4712 mm (185.5 in)
Overall Frame Width[5]	1120 mm (44 in)	1120 mm (44 in)	1500 mm (59 in)	1500 mm (59 in)	1500 mm (59 in)
Overall Frame Depth[5]	762 mm (30 in)	762 mm (30 in)	940 mm (37 in)	940 mm (37 in)	1118 mm (44 in)
Ground Bearing Pressure	0.29 kg/cm^2 (4.18 psi)	0.34 kg/cm^2 (4.84 psi)	0.51 kg/cm^2 (7.25 psi)	0.51 kg/cm^2 (7.25 psi)	0.63 kg/cm^2 (8.85 psi)
Stiffness Deflection	<1.0 mm (<0.04 in)	<1.0 mm (<0.04 in)	<1.0 mm (<0.04 in)	<1.0 mm (<0.04 in)	<1.0 mm (<0.04 in)

Common Specifications

Power Requirements for PC and Controller:
Single phase, 230 V/50 Hz
Single phase, 115 V/60 Hz

Power Requirements for Load Frame and Pump:
Three phase, 380 V or 400 V/50 Hz
Three phase, 230 V or 460 V/60 Hz

Load Accuracy:
±0.5% of reading down to 1/250 of load cell capacity

Strain Accuracy:
±0.5% of reading down to 1/50 of full range to ASTM E 83 class B-1, B-2 or ISO 9513 class 0.05 extensometer

Position Accuracy:
Position accuracy is ±0.5% or 0.13 mm (0.005 in)

Noise Level:
79 dBA. Noise level recordered using an uncovered pumping unit. Options are available to enclose the pump for a quieter lab environment. Since many variables, such as room layout, affect noise levels, it can not be assumed that these readings will be equal to those in the field.

Notes:
1. Maximum vertical test opening includes actuator stroke, but does not include grips or fixtures.
2. Model 1500KN comes standard with two columns or as an option with four columns.
3. Weight does not include grips, fixtures, pumping unit or PC workstation.
4. Maximum height is listed for standard frames and does not include optional test space.
5. Overall frame dimensions and weights change with crosshead lifts/locks, test enclosures and test space extensions.

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