

FALCON 450 SERIES

Vickers / Knoop / Brinell
hardness tester



-Dead weight machines are museum technology-

FALCON 450, technology of today
Multi Load Cell, closed loop, force feed-back system.



FALCON 450 series

Micro/Macro Vickers & low force Brinell hardness tester

The FALCON 450 series, Micro Vickers, Vickers and Micro Brinell hardness testing machines are a new generation of instruments, improving conventional hardness testing methods and focused on eliminating user influence on the test results.

The unique force actuator system utilizes an electronically controlled closed loop system and advanced force sensor technology, with force feedback to achieve absolute accuracy, reliability and repeatability, on each of the forces used for a test.

Besides this advanced electromechanical force application system, the FALCON offers superior quality mechanical and optical components, used to complete the instrument.

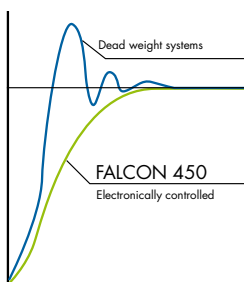
The innovative software functions of **I-Touch™** workflow control, allow file storing, test program setting and storing, limit settings, conversions to other hardness scales, system setup but also convex and concave test settings that contribute to the high reproducibility of test results.

Digital / optical image evaluation combined with intuitive operator software avoid operator influence on the test results.

A rock solid frame structure, that can withstand the harshest environment, is covered by shock and damage proof ABS covers. The covers avoid damage to the machines high tech interior and stay in a good condition over the years to come. No dents or paint damage from fallen work pieces. Replacement of the covers, if required at all, is easy and economic.

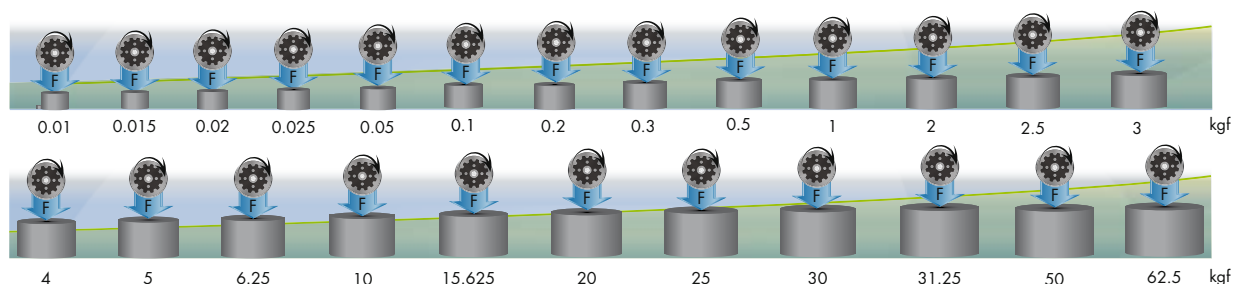
The FALCON series beating heart is a powerful embedded micro system controller with no moving or running parts. The system is easy to service and can be exchanged in just minutes if ever required.

Stunning force range



Stunning force range:
0.01Kgf (10gf) up to 62.5kgf over load cell, closed loop system.

Electronically controlled loads secure a quick and precise load application as well as a quick method change. A touch on the screen makes the correct setting for any of the objectives or indenters chosen.



FALCON 450

Advanced technology for leading industries

The precision mechanics of the motorized turret, allow for a super-fast and quiet positioning. Switching between indenter and objective is part of the automated test cycle. The turret offers up to 6 positions, with maximum 2 indenters, and 4 objective positions allowing you to fit all the magnification power for your application.

Collision Protection System (CPS):

The long working distance objectives (LWD) of the 450 series minimize the risks of a collision with the specimen. If a collision happens anyway, there will be a warning screen to indicate the collision is happening, the machine will stop all its movements while the electronic and mechanical security system allows the turret to leave its position and unpressured the collision, avoiding damage or injuries. A unique system, only available on the Innovatest Falcon machines.



Overview of test force configurations (automatic load selection)

Test force versus model number

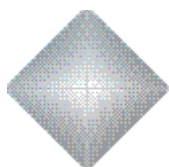
Note: See page 16 for order details

10gf 200gf 455 31.25gf 62.5kgf

10gf 200gf 459 62.5kgf

Scales and testing methods, depending on force configuration

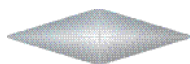
Vickers - DIN EN ISO 6507, ASTM E-384 & E-92



HV0.010	HV0.015	HV0.020	HV0.025	HV0.050	HV0.1
HV0.2	HV0.3	HV0.5	HV1	HV2	HV2.5
HV3	HV4	HV5	HV10	HV20	HV25
HV30	HV50				

* Green parameters are optional

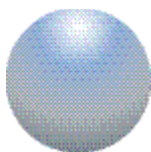
Knoop - DIN EN ISO 4545, ASTM E-384 & E-92



HK0.01	HK0.015	HK0.02	HK0.025	HK0.05
HK0.1	HK0.2	HK0.3	HK0.5	
HK1	HK2	HK5		

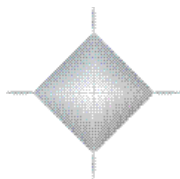
* Green parameters are optional

Brinell - DIN EN ISO 6506, ASTM E-10



HB1/1kgf, HB1/1.25kgf, HB1/2.5kgf, HB1/5kgf, HB1/10kgf, HB1/30kgf; HB2.5/6.25kgf, HB2.5/7.8125kgf, HB2.5/15.625kgf, HB2.5/31.25kgf, HB2.5/62.5kgf, HB5/25kgf, HB5/31.25kgf, HB5/62.5kgf

KiC Fracture toughness (Optional)



KC/0.010, KC/0.015, KC/0.020, KC/0.025, KC/0.050, KC/0.1, KC/0.2, KC/0.3, KC/0.5, KC/1, KC/2, KC/2.5, KC/3, KC/4, KC/5, KC/10, KC/20, KC/25, KC/30, KC/50

* Green parameters are optional

Built-in Camera (Optional)

Camera for On SCREEN measurements, in combinations with a IMP Impressions™ software system. The camera is protected against dirt and accidental damage or misalignment, by accommodating it inside the head cover.

Analogue or digital eyepiece

The Falcon 450 can be standard equipped with a digital eyepiece which can be replaced easily by an analogue eyepiece for educational purposes both can also be combined.

Stunning test force range

Test forces from 10gf up to 62.5kgf, covering Micro Vickers, Vickers and Brinell.

Super fast 6 positions turret

Vickers, Knoop or Brinell indenter installed. 2 indenters, 4 objectives.

Best in class work space

Working height 210mm
Throat depth 170mm

Manual and motorized X-Y stages

Adjustable manual stage that can carry up to 80kg load

ABS machine covers

Developed to withstand the harshest environment. Used for car bumpers, the ABS shells of the Falcon will show no trace of use due to falling objects.



Standard: Sensibility & Simplicity

Graphical User Interface (GUI) I-Touch™

The I-Touch™ software version with its clever multi-function keys for testing, set-up, storing and uploading of test programs, statistic control and more, make tester operation as easy as it can be.

The large 7,5" full-color industrial touch screen creates even more comfort and ease of use.

Mounted on a table stand, the display with smart GUI, flexible in use, can be located either on the right or left of the machine for right or left handed operators. Due to its tilt function the display can be set up in such a way that either in a standing or sitting position, the viewing and operating angle is always ideal.

Data export, single or batch readings, with a single press on a button, or just fully automatic after measurement can be stored on a USB stick or transfer by cable to a PC and used in applications like Word or Excel. Further advanced features include extended statistics, shape correction for convex, concave or ball shaped specimens, hardness conversion to Rockwell, Brinell or Tensile strength according to ASTM E140 and ISO 18625 with different material tables.

For the researchers amongst us, there is the additional option of measuring KiC fracture toughness.



- **Large 7,5" full colour HD Touch screen**
- **Selecting a scale automatically leads to correct force control. No dead weights, no motors, no obsolete mechanics that eventually fail.**
- **Graphic animated image of the turret shows unmistakable turret position.**
- **Can be used with analogue or digital microscope eyepiece**

- **"Out of set limits", indicated in red colours**
- **I-Touch™, only shows functions that are of daily need, advanced functions available in menu structure.**



Optional: Sensibility for Complexity

IMPRESSIONS XT™ Advanced Tester Control

Indent evaluation Software, also referred to as “tester automation”, often comes with a high level of complexity, both in setup and in operation.

Breaking these rules, IMPRESSIONS XT™ focuses on fast and simple operation, for a less experienced operator. A very easy to learn, work flow process but with functionality expected by expert users. IMPRESSIONS is optimized for evaluating Macro-Vickers, Micro-Vickers Knoop & Brinell indents according to ISO, ASTM and JIS standards.

The premium version of Impressions XT, suitable for the Falcon 450 also includes a high precision, large, motorized CNC X-Y stage.

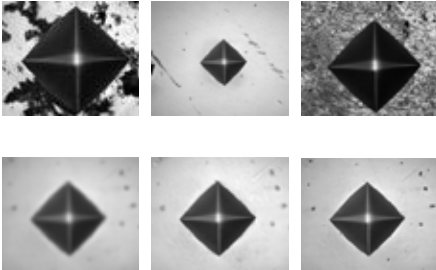


IMPRESSIONS XT™ (screenshots)



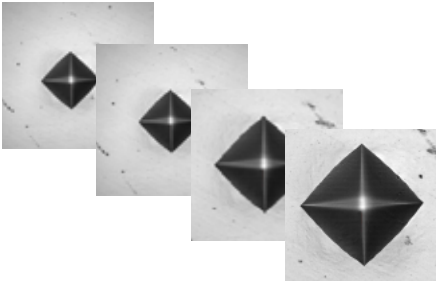
Standard functionality of IMPRESSIONS XT

Fully automatic image evaluation



IMPRESSIONS™ tester control evaluates sharpness and brightness of all camera images and measures the indentation independent of the operator. The automatic adjustment of the picture parameters ensures reproducible test results, even for different materials and difficult, scratched or damaged test surfaces.

Indent zoom magnification



Calibrated stepless zoom of the indent image provided by the objective, while maintaining the same high standard of image quality. This unique zoom system is a standard feature on the entire FALCON series.

Combined with the 4 objectives installed on the 6 position turret, the zoom system allows a further magnification of the indentation, even up to 1800X.

User defined programs



Save/load/delete work piece tester settings.

Set up your tester as required for your work piece, save the settings with a specific name or number. This function reduces the tester setup efforts for the operator and significantly increases safety and efficiency.

All user-specific settings for the particular work piece such as; test method, objective, pattern settings etc., are stored on the testers internal memory dual SSD drives, RAID system.

Variable configurations...

Advanced measuring methodes



Single measurement

This function allows you to set individual test points wherever you like.

The test procedure can be started using the objective view or the overview position.



Serial measurement

One or more test rows with positioning coordinates can be recorded.

The test procedure can be started using the objective view or the overview position.



CHD/NHD/SHD measurement

For the performance of test series for CHD/NHD/SHD data of specimen according to standard. The test can be started directly from the surface view or from the overview. Additional core points of hardness can be defined separately for NHD measurements.

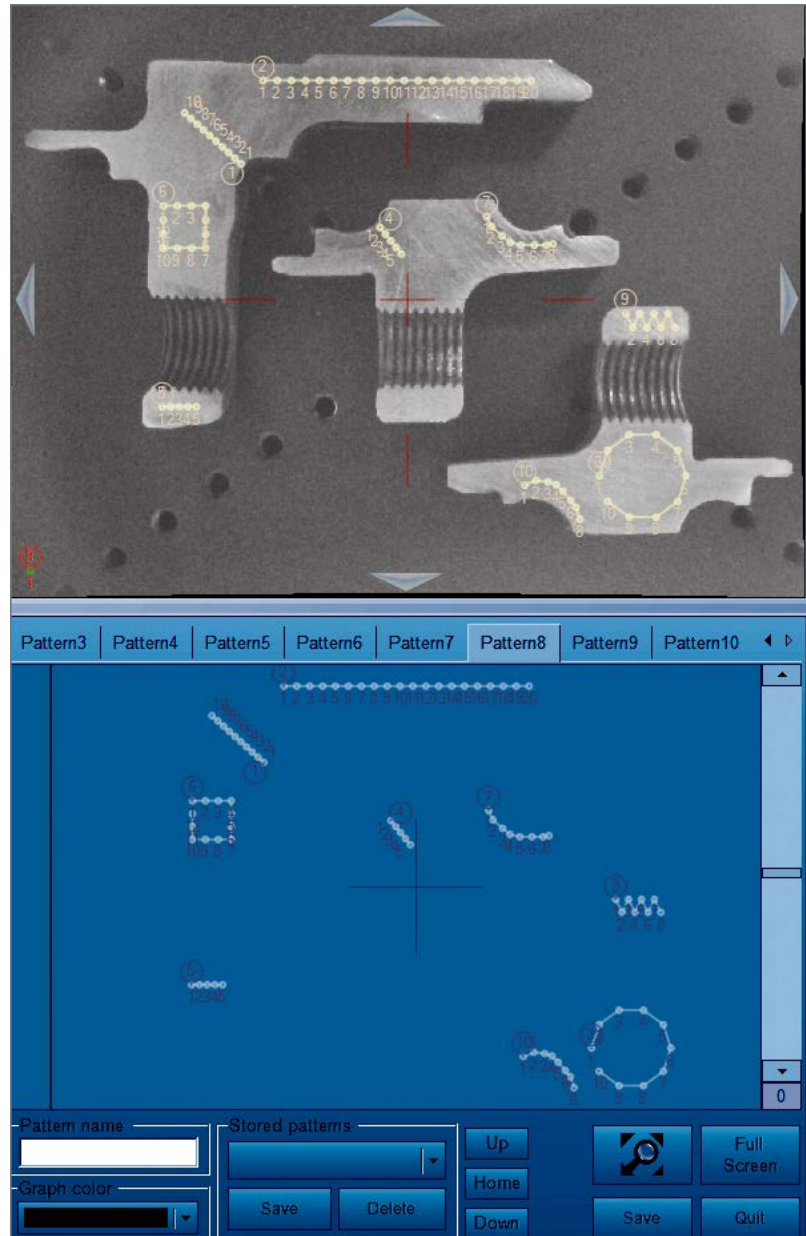


Sample testing can be defined graphically to scale. Quick and precise positioning by one mouse click, offers rapid pattern testing set up.

Perfect overview thanks to live vision technology.

Make any fixed pattern or design custom patterns. Multi pattern testing on multi samples based on live overview and macro viewing technology. Copy test patterns, modify or "drag & drop" patterns from one test sample to the other test sample. Live vision technique over zoom and macro camera's, no image stitching required.

Edge recognition (Optional) allows to make a test pattern following the test sample surface line.



More functionality...

Edge & Contour scanning



As an option, selectively, the total or partial segment of a contour is recognized by image scanning. After that the test points can be programmed in a certain number or distance corresponding to the edge. Fully automatic testing and measuring of each of the indent positions, regardless of the dimensions of the object. An excellent tool to combine with the option WELD TESTING and CHD. All results can be collected in a test report edited to your requirements. Features saving you time and money and avoid user error.

Weld testing ISO 9015



A special application for testing and reporting on the hardness tracking of welds according to ISO 9015 standards. Combined with automatic edge detection this software tool improves measuring welds according to standards efficiently.

Report generator



The IMPRESSIONS™ system incorporates a very advanced report generator. The report generator allows you to publish all testing results and graphics, including pictures of the indentations in an easy to edit and easy to customize file size. You can add your company details and change the reporting lay-out to your requirements.

All reports can be printed on a connected (optional) standard printer without the need of a personal computer or any interface.

Values can be exported to Excel or simply store the report as PDF on the systems hard disks.

Automation packages



STANDARD PACKAGE (IMP-2)

High resolution integrated camera system, industrial touch screen, mouse and keyboard. Includes powerfull system controller, there is no additional PC required.. The standard automatic indent measurement system reduces overall testing time and improves operator repeatability. The system communicates with tester and controls the entire testing procedure.

ADVANCED PACKAGE (IMP-3 & 4)

High resolution integrated camera system, industrial touch screen, mouse and keyboard. Includes power full system controller, there is no additional PC required.. no PC required.. The standard automatic indent measurement system reduces overall testing time and improves operator repeatability. The system communicates with tester and controls the entire testing procedure. IMP-3 has one digital micrometer X-axis that transfers the position of the stage to Impressions. IMP-4 has two digital micrometers for X and Y-axis that transfers the position of the stage to Impressions.



PREMIUM PACKAGE (IMP-5)

High resolution integrated camera system, industrial touch screen, mouse and keyboard. Includes power full system controller, no PC required.. The standard automatic indent measurement system reduces overall testing time and improves operator repeatability. The system communicates with tester and controls the entire testing procedure.

Includes:

- Advanced software modules for CHD, SHD, NHD, pattern testing, and automatic edge detection.
- High speed CNC motorized X-Y stage, 120x100mm displacement, 0,002mm repeatability, can carry 450kg load*.

Unique machine structure

Advanced turret / precision Z-axis

UNIQUE: Hi Tech “collision protected” turret & load application system

Multi load cell technology with the highest possible force repeatability, high speed digital electronic circuits and advanced, complex algorithms provide an ultra-fast positioning turret, free to configure as per your requirements.

Protected against damage due to collision with a work piece or stage. The anti-collision system protects not only the tester and the work piece but also indenters and objectives against operator failure under all circumstances.



High speed 6 positions precision turret.

The standard high speed modular 6 positions turret swivels motorized into the correct required position. The positions are automatically selected while the system checks which indenter and objective are most suitable for the selected test, to be performed.

The turret can be configured to request, with either 1 indenter actuator or 2 indenter actuators combined with maximum 4 objectives at choice.

The second indenter position can also be retrofitted at any moment after installation.



Accurate Z-axis movement

The Z-axis height adjustment of the motorized or manual work table is provided by a precision mechanism that allows micrometer movement.

The spindle can accommodate manual and motorized X-Y stages of different kind and has a mounting position for V-anvils and other workpiece fixtures.

Technical specifications

FALCON 450

Hardness scale	(Micro-) Vickers, Knoop & Brinell
Load application	Multi Load cell, force feedback, closed loop system
Load range	10gf up to 62.5kgf
Motorized turret	Max. 6 positions; 2 indenter positions, 4 objectives positions
Optical system	Electronic micrometer eyepiece or Analogue eyepiece
Objectives	5x, 10x, 20x, 40x, 60x
Overview camera Cam 2	(Optional) 5Mpx optical ZOOM camera, field of view 50 x 37mm / 200 x 160mm
Electronic system	High performance embedded electronics system running ITouch firmware.
Test loads (depending model)	10gf, 15gf, 20gf, 25gf, 50gf, 100gf, 200gf, 300gf, 400gf, 1kgf, 2kgf, 2.5kgf, 3kgf, 4kgf, 5kgf, 6.25kgf, 10kgf, 15.625kgf, 20kgf, 25kgf, 30kgf, 31.25kgf, 50kgf, 62.5kgf
Vickers test range	HV0.010, HV0.015, HV0.020, HV0.025, HV0.050, HV0.1, HV0.2, HV0.3, HV0.5, HV1, HV2, HV2.5, HV3, HV4, HV5, HV10, HV20, HV25, HV30, HV50
Brinell test range	HB1/1kgf, HB1/1.25kgf, HB1/2.5kgf, HB1/5kgf, HB1/10kgf, HB1/30kgf; HB2.5/6.25kgf, HB2.5/7.8125kgf, HB2.5/15.625kgf, HB2.5/31.25kgf, HB2.5/62.5kgf HB5/25kgf, HB5/31.25kgf, HB5/62.5kgf
Knoop	HK0.01, HK0.015, HK0.02, HK0.025, HK0.05, HK0.1, HK0.2, HK0.3, HK0.5, HK1, HK2, HK5
KiC Fracture	KC/1, KC/3, KC/5, KC/10, KC/15, KC/20, KC/25, KC/50, KC/100, KC/200, KC/300, KC/450
Indenters	1 factory certified Vickers indenter included
Test cycles	Motorized, automatic procedure
Standards	Complies to or exceeds, ISO, ASTM, JIS (Nadcap) standards
Test force tolerance	<0.5% for all forces
Display resolution	0.1 HV, HK, 0.5 HB
Hardness conversion	Rockwell, Rockwell Superficial, Vickers, Brinell, Knoop, Leeb & Tensile
Statistics	Total test, max, min, average, range, standard deviation, all in real time after each test
Data storage capacity	Integrated memory system
Connectivity	USB, converter to RS-232, 1 USB for optional integrated CCD camera
Dwell time setting	Default 10 seconds, user defined 1 to 99 seconds (1 sec increments)
Printer	Optional
Manual stage dimensions	Stage 100mm x 100mm, Travel 25mm x 25mm, Reading 0.01mm
Motorized stage dimensions	See optional CNC X-Y stage dimensions in this catalogue
Operating temperature	10°C to 35°C, non-condensing
Humidity	10% to 90% non-condensing
Machine dimensions	525mm x 323mm x 773mm
Machine weight	80kg
Power consumption	75W
Power supply	100VAC to 240VAC, 50/60Hz, single phase

CNC stages, connectivity & order details

Anvils, X-Y stage or CNC motorized X-Y stage



The basic version provides a manual X-Y stage and a plane anvil with all the requirements for quick and easy single tests.

The FALCON allows to expanded to a wide choice of motorized X-Y stages while the IMPRESSIONS™ tester control and workflow software has many advanced positioning functions, from single indent to advanced pattern testing. The onboard controller allows up to 5 axis CNC work piece positioning.



Super fast, high accurate motorized CNC X-Y stages:

Article code	Surface	Travels	Models
UN-XY571210	250 x 205mm	120 x 100mm	450
UN-XY571712	300 x 225mm	170 x 120mm	450

IMPRESSIONS XT Advanced connectivity



The powerful micro controller running MS Windows® provides an almost unlimited connectivity to the outside world, wired, or not.

Multiple USB ports, RJ45 LAN, W-LAN, BlueTooth, RS-232, HDMI & VGA are available on all FALCON models.

Order details

FALCON 450 series

FALCON 455	200gf – 31.25kgf	Vickers, Knoop & Brinell, large frame	31.25kgf
	Optional: 10gf – 200gf		

FALCON 459	200gf – 62.5kgf	Vickers, Knoop & Brinell, large frame	62.5kgf
	Optional: 10gf – 200gf		

STANDARD configuration, features & accessories

Standard features on all models

- Load cell, closed loop force control
- I-Touch™ work flow control
- Auto Brightness (standard with IMP system)
- Auto Contrast (standard with IMP system)
- Auto Sharpness (standard with IMP system)
- Automatic indent measurement (standard with IMP system)
- Anti-collision system for objectives and indenters
- Calibrated step less Indent ZOOM system (standard with IMP system)
- Auto save, program setup, data storage,
- 1 indenter positions, 2 objective positions
- Quality optical system
- Integrated Camera mount
- High power LED vertical illuminator with filter position
- 7,5" portrait mode, HD industrial touch screen on adjustable table stand
- Connectivity; USB, RS-232, 1 camera USB port



Standard configuration & accessories

- 1 Indenter position/actuator installed
- 1 factory certified Micro Vickers indenter
- 1 Objective 10X, 1 objective 20x
- Flat anvil 60mm
- 4 Vibration dampers
- Installation & Operator manual
- Power cable
- Spare fuse
- Certificate of calibration



OPTIONAL configuration, features & accessories

Optional features (software)

- Click & Go software for random point testing (requires motorized X-Y stage & Overview camera)
- Pattern testing (requires motorized X-Y stage)
- CHD, SHD, NHD (requires Pattern testing and motorized X-Y stage)
- Hardness scanning, color mapping 3D

Optional configuration & accessories

- Testforces 10gf up to 200gf
- Certified indenters (ASTM, DIN, ISO)
- Certified reference hardness blocks (ASTM, DIN, ISO)
- Motorized CNC precision, ultra-fast positioning X-Y stage (select model for required travel distances)
- CAM 2 (Zoom Overview), Full stage view camera, ideal for testing multiple objects of the same or different dimensions by just clicking on the required test positions. Field of view 50mm x 37mm to 200 x 160mm
- 2nd indenter position/actuator factory installed
- Large round measuring table 150mm
- Objective 5X
- Objective 10X
- Objective 20X
- Objective 40X
- Objective 60X
- V-anvil for 1-6mm
- V-anvil for 4-20mm
- Precision vice 50mm
- Precision vice 75mm
- Precision vice 100mm
- 1 Sample holder 30mm
- 1 Sample holder 40mm
- 1 Sample holder 50mm
- 6 Sample holder 30mm
- 6 Sample holder 40mm
- 6 Sample holder 50mm
- Round 3-jaw chuck 80mm
- Vibration free table for low force testing
- Vibration free table top, for low force testing
- 15" Industrial LCD touch screen
- Full colour laser printer (A4, A3)

Manual stage options

- Manual X-Y stage 100mm x 100mm, travel 25mm x 25mm
- Optional digital stage micrometer(s), for standard manual stage, travels 25mm

Motorized CNC X-Y stages

Article code	Surface	Travels	Models
• UN-XY571210	250 x 205mm	120 x 100mm	450
• UN-XY571712	300 x 225mm	170 x 120mm	450

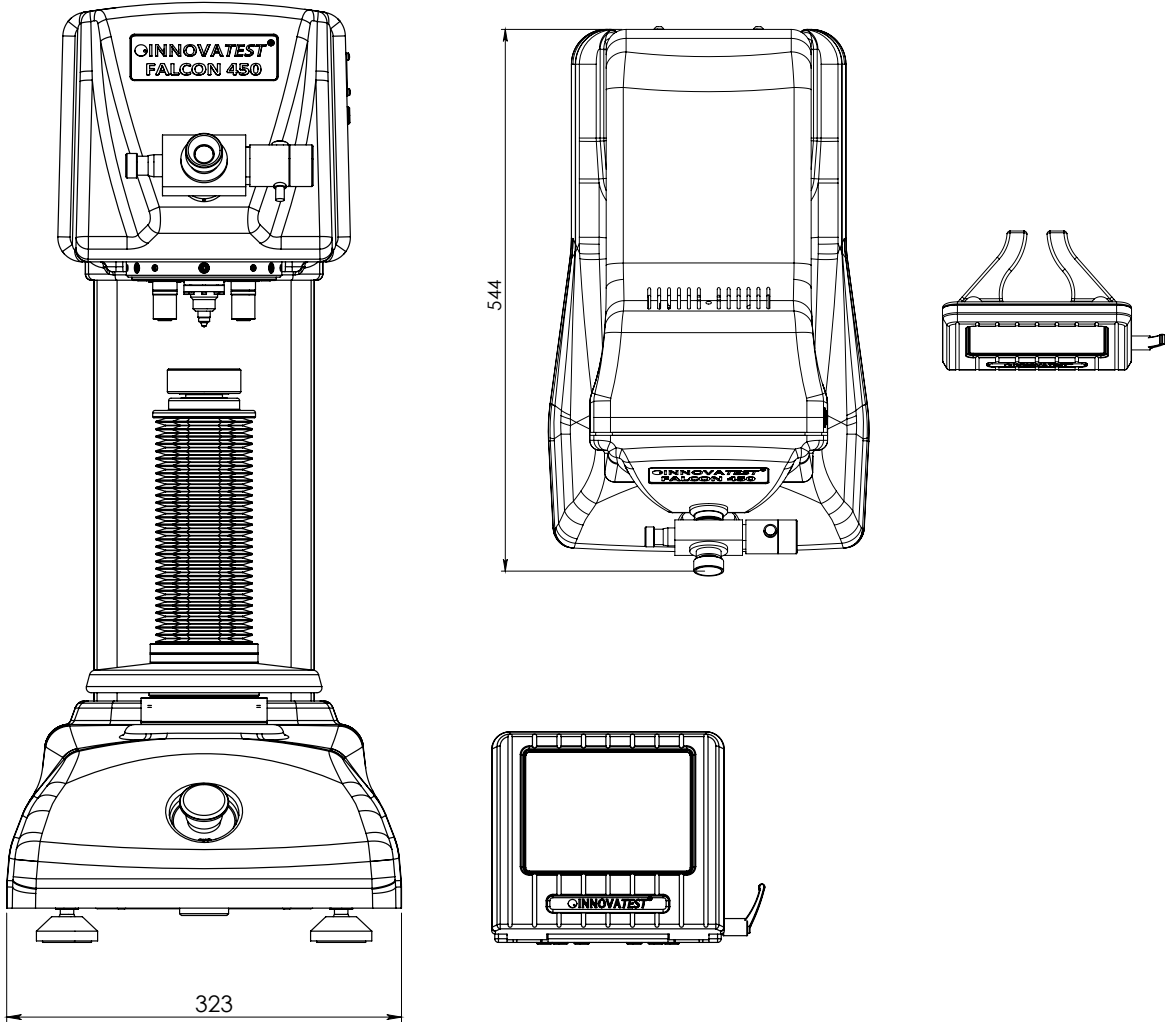


FALCON 450



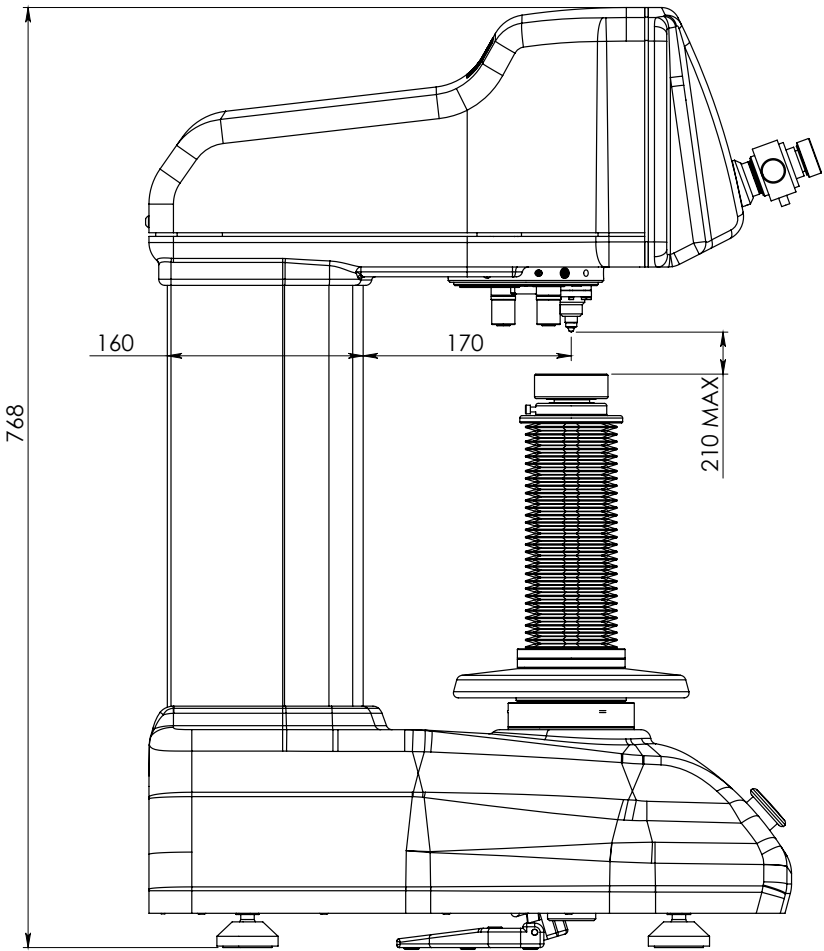
Technical Drawing FALCON 450

All dimensions are in mm



Technical Drawing FALCON 450

All dimensions are in mm



FALCON 450 working table

Features

- Large stand: 1450mm x 750mm x 825mm (UN-STAND/965), suitable for Vickers, Micro-Vickers and automated systems (PC and video systems)
- 100% retractable drawer, bearing guidance, max 100kg load. Rubber anti slip bottom
- Lockable cabinet, 300mm high
- Adjustable feet, (+/- 50mm height adjustable to reach ergonomic working position)
- Made of corrosion resistant zinc plated steel with RAL powder coating
- Carrying capacity of 450kg
- Top surface made of 50mm Plywood with 1.5mm chemical resistant plastic plating, edges made of shock resistant 3mm ABS side liner
- Industrial quality, for workshop or laboratory
- Designed for hardness testing instruments, painted in INNOVATEST® RAL colors that match with the testers.

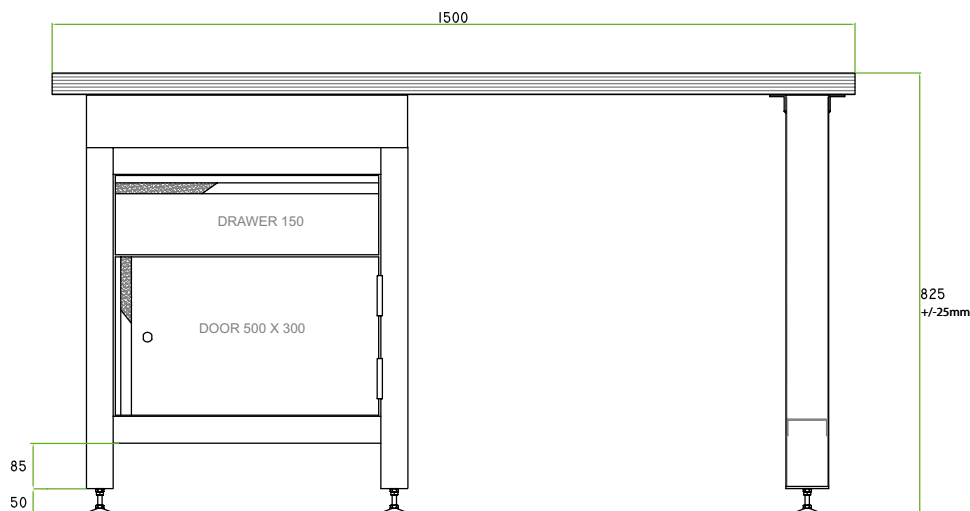
Technical Specifications

Dimensions :	1450mm x 750mm x 825mm, large high bench tester stand (UN-STAND/965)
Drawer :	150mm
Cabinet :	300mm high (lockable)

- Steel frame with table top
- 100% retractable drawer with anti-slip
- Lockable cabinet
- Adjustable feet



All dimensions are in mm



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