



# USTER® *TENSORAPID 5-C*

The strength measurement system

Technical Data

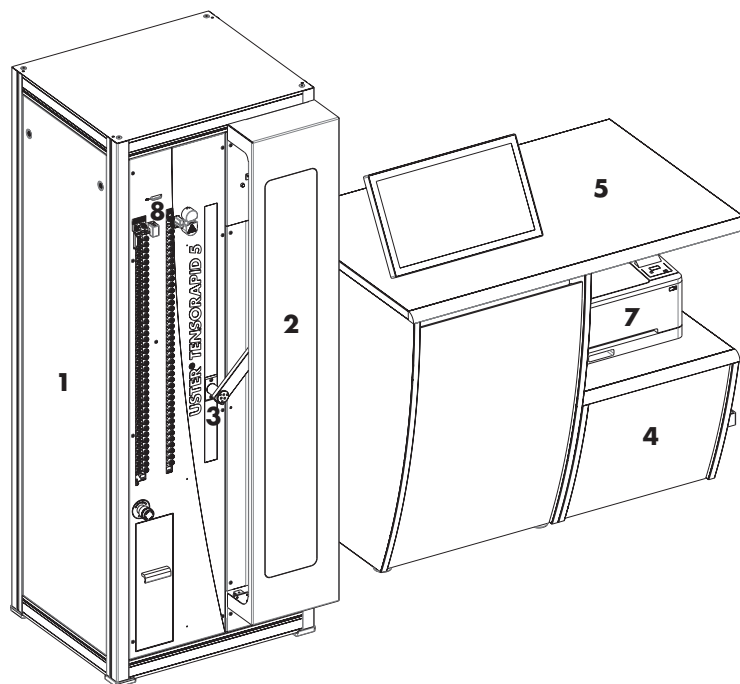
November 2021

# USTER® TENSORAPID 5-C

## The strength measurement system

Tensile testing and analyzing instrument for the yarn quality assurance of a wide variety of yarns and fabrics.

**Elements** of the Uster Tensorapid 5-C installation



### Basic installation

- 1** Test unit
  - Sensor for force and elongation
  - Sensor for temperature and humidity
- 2** Clamping device
- 3** Finger tensioner
- 4** Control units
- 5** Table with touchscreen
- 6** Calibration device ISO Inspect (no illustration)
- 7** Printer provided by the customer

### Options

- 8** Unwinding device
- 9** Special clamps 180° with booster (no illustration)
- 10** Reductions clamps (no illustration)
- 11** Vibration suppressor (no illustration)

### Accessories

- 12** Support with 40 thread tensioner (no illustration)
- 13** Support with 40 yarn guides (no illustration)

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### Basic installation

<b>Overall Installation</b>	<b>Functions</b>	<ul style="list-style-type: none"> <li>– Measurement of tensile strength and elongation of an extensive range of yarns and fabrics</li> <li>– Measurement of the force and the elongation at the first filament break, various modulus values, yield point, natural draw ratio</li> <li>– Analysis, evaluation and storage of measurement values</li> <li>– Automatic check of all measured values</li> <li>– Editor for customizing reports and setting of mill limits</li> <li>– Smart view focusing on exception and outliers</li> <li>– Filter functions for quick data selection and for the preparation of long-term reports</li> </ul>
	<b>Included in the delivery</b>	<ul style="list-style-type: none"> <li>– Test unit</li> <li>– Control unit</li> <li>– Touchscreen</li> <li>– Application software</li> <li>– Table</li> <li>– Calibration device ISO Inspect</li> </ul>

### Subsystem of the Uster Tensorapid 5-C basic version:

<b>Test unit (1)</b>	<b>Instrument type 500 N</b>	<ul style="list-style-type: none"> <li>– 0.01 to 500 N</li> <li>– Recommended for filament yarns</li> <li>– Configuration: <ul style="list-style-type: none"> <li>– Clamping device 500 N with finger tensioner or</li> <li>– Clamping device 500 N with unwinding device for the transportation of the yarn between the individual tests</li> </ul> </li> </ul>
	<b>Instrument type 1,500 N</b>	<ul style="list-style-type: none"> <li>– 0.05 to 1,500 N</li> <li>– Recommended for high tenacity filaments yarns like tire cord or bulletproof yarns</li> <li>– Configuration: <ul style="list-style-type: none"> <li>– Clamping device 1,500 N with finger tensioner or</li> <li>– Clamping device 1,500 N with unwinding device for the transportation of the yarn between the individual tests</li> </ul> </li> </ul>
	<b>Measuring principle</b>	Constant rate of extension CRE
	<b>Testing method</b>	Simple tensile test, single yarn testing
	<b>Force measuring arrangement</b>	Practically inertialess electronic force measurement

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<b>Test unit (1)</b>	<b>Elongation measuring arrangement</b>	<ul style="list-style-type: none"> <li>- Electronic elongation measurement</li> <li>- Measuring accuracy for force and elongation measurement: for force <math>\pm 1\%</math> (above 100 cN) or <math>\pm 1</math> cN (below 100 cN), and for elongation <math>\pm 1\%</math></li> </ul>
	<b>Clamp speed</b>	Continuously adjustable between 50 and 5,000 mm/min
	<b>Pre-tension</b>	Adjustable between 0.5 and 6,000 cN
	<b>Test lengths</b>	<ul style="list-style-type: none"> <li>- With horizontal position of clamps: continuously adjustable between 200 and 1,000 mm</li> <li>- With vertical position of clamps: continuously adjustable between 100 and 1,000 mm</li> </ul>
	<b>Elongation measuring range</b>	<ul style="list-style-type: none"> <li>- For 100 mm test length: 0 to 1,000%</li> <li>- For 200 mm test length: 0 to 500%</li> <li>- For 500 mm test length: 0 to 140%</li> </ul>
	<b>Yarn changer</b>	<ul style="list-style-type: none"> <li>- Automatic changing of the yarn preparation unit into the clamps</li> <li>- Setup of 40 samples, run automatically even when a within fail</li> <li>- Later continuation of the incomplete test</li> </ul>
	<b>Yarn clamps</b>	Pneumatically actuated yarn clamps with exchangeable clamp inserts of various materials, and exchangeable reduction curves (see options); the clamp pressure is programmable in stages.
<b>Control unit (2)</b>	<b>Computer software</b>	<ul style="list-style-type: none"> <li>- Uster Tensorapid 5-C intuitive touch application software</li> <li>- Windows Embedded 8.1 operating system</li> <li>- System pre-configured and locked down</li> <li>- Simple full system update process</li> </ul>
	<b>Computer hardware</b>	<ul style="list-style-type: none"> <li>- Industrial computer with Intel processor</li> <li>- 3 internal hard drives for data security and system redundancy</li> <li>- 1 TB test data storage</li> </ul>
	<b>Computer accessories</b>	<ul style="list-style-type: none"> <li>- Large easy to read touchscreen monitor</li> </ul>

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### Options

Reduction clamps (10)

#### Application range

- High strength filament yarns and ply yarns
- Undrawn, partially drawn or very fine filament yarns
- Test materials with a tendency to stick to polished surfaces
- Filament yarns with abrasive additives for obtaining matt surfaces (e.g. titanium dioxide)

180° clamps with booster (9)

#### Application range

- Automatic testing of high strength yarns (e.g. aramides), technical yarns and oiled, high strength ply yarns
- Testing of difficult materials which in spite of extensive trials with different clamp inserts and a force reduction over 90° reduction curve have so far produced incorrect measurements as a result of slippage or clamp breaks

#### Included in the delivery

- Special clamps with a force reduction over 180°
- Pressure doubler

Unwinding device (8)

#### Application range

Allows quick sample control of whole bobbins due to unwinding of long yarn pieces between the measurements with winding speeds up to 400 m/min

Support with 40 thread brakes

#### Application range

Arrangement with yarn tensioner to guide the preparation device

Support with 40 yarn guides

#### Application range

Arrangement to guide the yarn to the preparation device

Vibration suppressor (13)

#### Application range

For measurements of material with a breaking force less than 200 cN, or if vibrations of the floor are to be expected

Accessories (5)

#### Tools

- For the exchange of the clamps (e.g. from clamps for fabric strips to clamps for skein test to clamps for high resistance yarns with 180° force reduction curve)
- For the exchange of the clamp inserts
- For the exchange of the reduction curve

#### Clamp inserts

To enable the appropriate testing of various types of materials, different clamp inserts are included in the delivered parts

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### Application software

<b>Reports</b>	<b>Type of report</b>	<ul style="list-style-type: none"> <li>– Standard test report of the measurement series</li> <li>– Uster Quality Report (summary of the key data and the test results on one page; quality certificate)</li> <li>– Pre-defined table reports and graphical reports for different application</li> <li>– Long-term reports</li> <li>– Customized reports</li> </ul>
	<b>Display and printout of the reports</b>	<ul style="list-style-type: none"> <li>– Live view report during the measurement</li> <li>– Analysis tool with all measured data and graphical output</li> <li>– Smart view report for exceptions and outliers</li> <li>– Automatic printout possibility after the measurement</li> </ul>
	<b>Limit values</b>	<ul style="list-style-type: none"> <li>– Setting of customized limits according to the Uster Statistics, standard deviation, relative and absolute values</li> <li>– Automatic verification of the measured value</li> <li>– Measured values which exceed the limit will be marked with red or purple color in the report</li> </ul>
<b>Numerical results</b>	<b>Time to break</b>	Time from the start of measurement to the break of the sample
	<b>Breaking force</b>	Maximum force value measured during the tensile test
	<b>Breaking elongation</b>	Elongation at maximum breaking force value
	<b>Tenacity</b>	Breaking force in relation to the yarn count of the sample
	<b>Breaking work</b>	Work done to break (enclosed area below the force/elongation characteristic curve up to the point of breaking force)
	<b>Part work done</b>	Partial work done to break (enclosed area below the force/elongation characteristic curve and two freely-selected elongation values)
	<b>Reference values</b>	A maximum of any 10 points on the force/elongation characteristic curve (choice of force or elongation)
	<b>Modulus values</b>	A maximum of 10 modulus values at any point on the force/elongation characteristic curve
<b>Reference elongation E(F-)</b>	Elongation at a defined decrease in force from the breaking force up to 90%	

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Numerical results	<b>Force F (1st break)</b>	Force value at a defined decrease in force
	<b>Elongation E (1st break)</b>	Elongation value at a defined decrease in elongation
Statistics	<b>Statistical values</b>	<ul style="list-style-type: none"> <li>– Mean value</li> <li>– Standard deviation s</li> <li>– Coefficient of variation (CV)</li> <li>– Q95% confidence interval</li> <li>– Minimum value</li> <li>– Maximum value</li> </ul>
	<b>Stroke diagram</b>	Available for breaking force or tenacity and elongation or tenacity and elongation
Graphic output of results	<b>Diagram</b>	Available for force and elongation or for other results configurable
	<b>Force/elongation diagram</b>	<ul style="list-style-type: none"> <li>– Show all single measurements in curves</li> <li>– Easier detection of the sample due to different colors</li> </ul>
	<b>Modulus/elongation diagram</b>	Modulus curves of all single measurements
	<b>Spectrogram</b>	<ul style="list-style-type: none"> <li>– Available for force and elongation</li> <li>– Pre-condition: needs 200 within tests per sample</li> </ul>
	<b>Backup</b>	Automatic backup to dedicated internal hard drive every 15 minutes
Data protection	<b>Dialog and report languages</b>	English, German, French, Italian, Spanish, Portuguese, Turkish, Russian, Chinese or Japanese can be selected (other languages on request)
	<b>Possible units</b>	<ul style="list-style-type: none"> <li>– Force values: N, cN, kgf, gf, lbf, ozf</li> <li>– Yarn count: ktex, tex, dtex, denier, Nm, Nec, Nel, New, grn/yd, Y.S.W.</li> <li>– Tenacity: mN/tex, cN/tex, gf/denier, Rkm, CSP, MPA</li> </ul>
Input of data, output of results, languages, units	<b>Protection function</b>	<ul style="list-style-type: none"> <li>– System protected from viruses, network and other security threads</li> <li>– Remote support capabilities built in</li> <li>– Diagnostic tools with extensive event logging</li> <li>– Automated system recovery</li> </ul>
	<b>System security</b>	

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### General

<b>General ambient conditions</b>	<b>Room climate</b>	The ambient conditions must be maintained in order to avoid any influencing of the test material according to ISO 139 (2015) <ul style="list-style-type: none"><li>– Humidity: <math>65\pm 4\%</math></li><li>– Temperature: <math>20\pm 2^\circ</math> standard atmosphere</li></ul>
<b>Installation data</b>	<b>Electrical connection</b>	Single-phase mains with protective conductor
	<b>Nominal voltages</b>	100 to 240 VAC
	<b>Mains frequency</b>	50/60 Hz
	<b>Power consumption</b>	Approx. 1,000 VA
	<b>Compressed air connection</b>	<ul style="list-style-type: none"><li>– Air quality: according to ISO 8573.1, class 3</li><li>– Min. pressure at inlet of air filter regulator: 6 bar</li><li>– Max. pressure at inlet of air filter regulator: 7 bar</li></ul>
<b>Weight of the installation</b>	<b>Compressed air consumption</b>	<ul style="list-style-type: none"><li>– <math>9\text{ m}^3/\text{h}</math> with normal pressure</li><li>– Noise level at the suctioning-off jet: approx. 65 to 70 dB(A) at 1 m distance and according to the type of yarn</li></ul>
	<b>Tester</b>	260 kg
	<b>Table</b>	83 kg



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### Uninterrupted power supply (UPS)

UPS must be provided by the customer

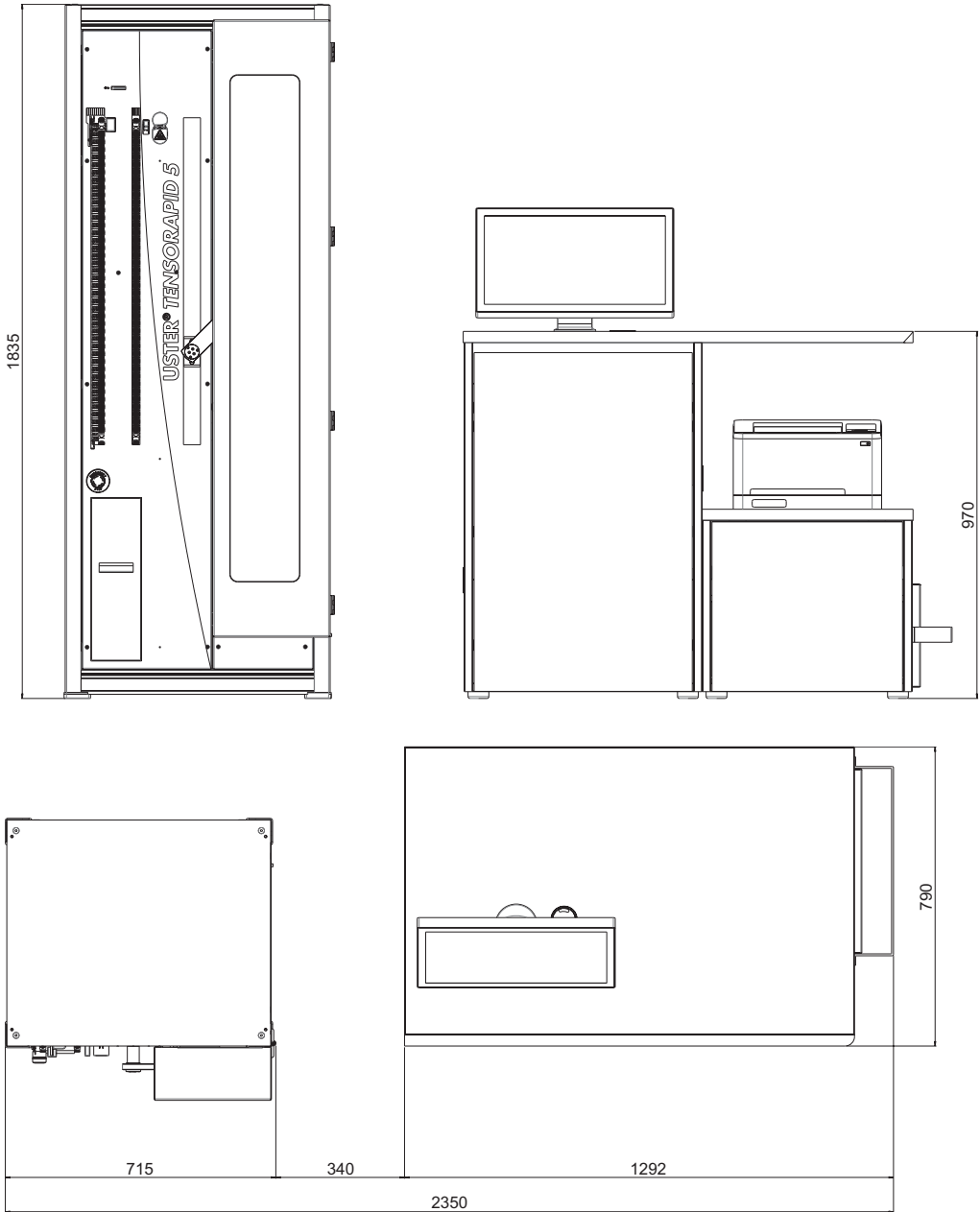
	<b>UPS Model</b>	Tower
	<b>UPS Bypass Type</b>	ON-Line
<b>Electrical Input</b>	<b>Nominal Voltage</b>	120 VAC, 220–240 VAC
	<b>Voltage range 120 VAC</b>	90–138 VAC
	<b>Voltage range 230 VAC</b>	160–276 VAC
	<b>Frequency</b>	50/60 Hz
<b>Output</b>	<b>Nominal Output Voltage</b>	120 VAC, 230 VAC
	<b>Power Capacity</b>	1,000 VA (1 kVA)/900 W
	<b>Voltage regulation</b>	+/-3%
<b>Environment</b>	<b>Safety markings 120/208 V</b>	UL, CUL, VCCI
	<b>Safety markings 230 V</b>	CE, GS
	<b>Ambient operating temp.</b>	Laboratory condition are acceptable
	<b>Relative humidity</b>	Laboratory condition are acceptable

Note: It is not permitted to connect a Laser Printer.

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Space required  
for the Uster  
Tensorapid 5-C



Uster Technologies has made all possible efforts to ensure that all information is accurate at the time of publication. Hereby it is declared that alterations to the product may be possible at any time. In these cases the information contained in this technical datasheet is subject to change without notice.

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