



USTER® *TENSORAPID 5-C*

The strength measurement system

Technical Data

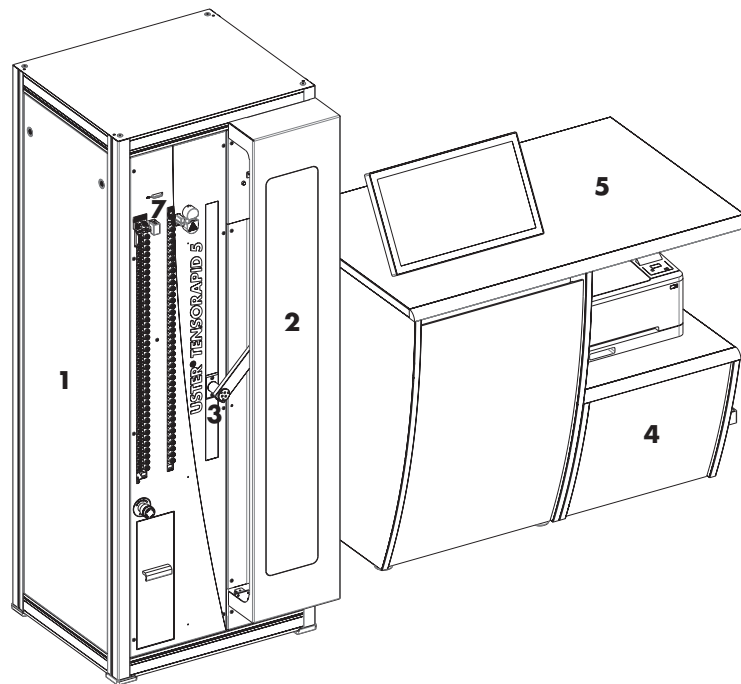
February 2020

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 ISOINSPECT (no illustration)

Options

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

Accessories

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

USTER® TENSORAPID 5-C

The strength measurement system

Basic installation

Overall Installation

Functions

- Measurement of tensile strength and elongation of an extensive range of yarns and fabrics
- Measurement of the force and the elongation at the first filament break, various modulus values, yield point, natural draw ratio
- Analysis, evaluation and storage of measurement values
- Automatic check of all measured values
- Editor for customizing reports and setting of mill limits
- Smart view focusing on exception and outliers
- Filter functions for quick data selection and for the preparation of long-term reports

Included in the delivery

- Test unit
- Control unit
- Touchscreen
- Printer
- Application software
- Table
- Calibration device ISOINSPECT

Subsystem of the USTER® TENSORAPID 5-C basic version:

Test unit (1)

Instrument type 500 N

- 0.01 to 500 N
- Recommended for filament yarns
- Configuration:
 - Clamping device 500 N with finger tensioner or
 - Clamping device 500 N with unwinding device for the transportation of the yarn between the individual tests

Instrument type 1 500 N

- 0.05 to 1 500 N
- Recommended for high tenacity filaments yarns like tire cord or bulletproof yarns
- Configuration:
 - Clamping device 1 500 N with finger tensioner or
 - Clamping device 1 500 N with unwinding device for the transportation of the yarn between the individual tests

Measuring principle

Constant rate of extension CRE

Testing method

Simple tensile test, single yarn testing

Force measuring arrangement

Practically inertialess electronic force measurement

USTER® TENSORAPID 5-C

The strength measurement system

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

USTER® TENSORAPID 5-C

The strength measurement system

Options

Reduction clamps (9)	Application range	<ul style="list-style-type: none"> – 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 (8)	Application range	<ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> – Special clamps with a force reduction over 180° – Pressure doubler
Unwinding device (7)	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 (12)	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	<ul style="list-style-type: none"> – 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

USTER® TENSORAPID 5-C

The strength measurement system

Application software

Reports

Type of report

- Standard test report of the measurement series
- USTER® Quality Report (summary of the key data and the test results on one page; quality certificate)
- Pre-defined table reports and graphical reports for different application
- Long-term reports
- Customized reports

Display and printout of the reports

- Live view report during the measurement
- Analysis tool with all measured data and graphical output
- Smart view report for exceptions and outliers
- Automatic printout possibility after the measurement

Limit values

- Setting of customized limits according to the USTER® STATISTICS, standard deviation, relative and absolute values
- Automatic verification of the measured value
- Measured values which exceed the limit will be marked with red or purple color in the report

Numerical results

Time to break

Time from the start of measurement to the break of the sample

Breaking force

Maximum force value measured during the tensile test

Breaking elongation

Elongation at maximum breaking force value

Tenacity

Breaking force in relation to the yarn count of the sample

Breaking work

Work done to break (enclosed area below the force/elongation characteristic curve up to the point of breaking force)

Part work done

Partial work done to break (enclosed area below the force/elongation characteristic curve and two freely-selected elongation values)

Reference values

A maximum of any 10 points on the force/elongation characteristic curve (choice of force or elongation)

Modulus values

A maximum of 10 modulus values at any point on the force/elongation characteristic curve

Reference elongation E(F-)

Elongation at a defined decrease in force from the breaking force up to 90 %

USTER® TENSORAPID 5-C

The strength measurement system

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

USTER® TENSORAPID 5-C

The strength measurement system

General

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

USTER® TENSORAPID 5-C

The strength measurement system

Uninterrupted power supply (UPS)

UPS must be provided by the customer

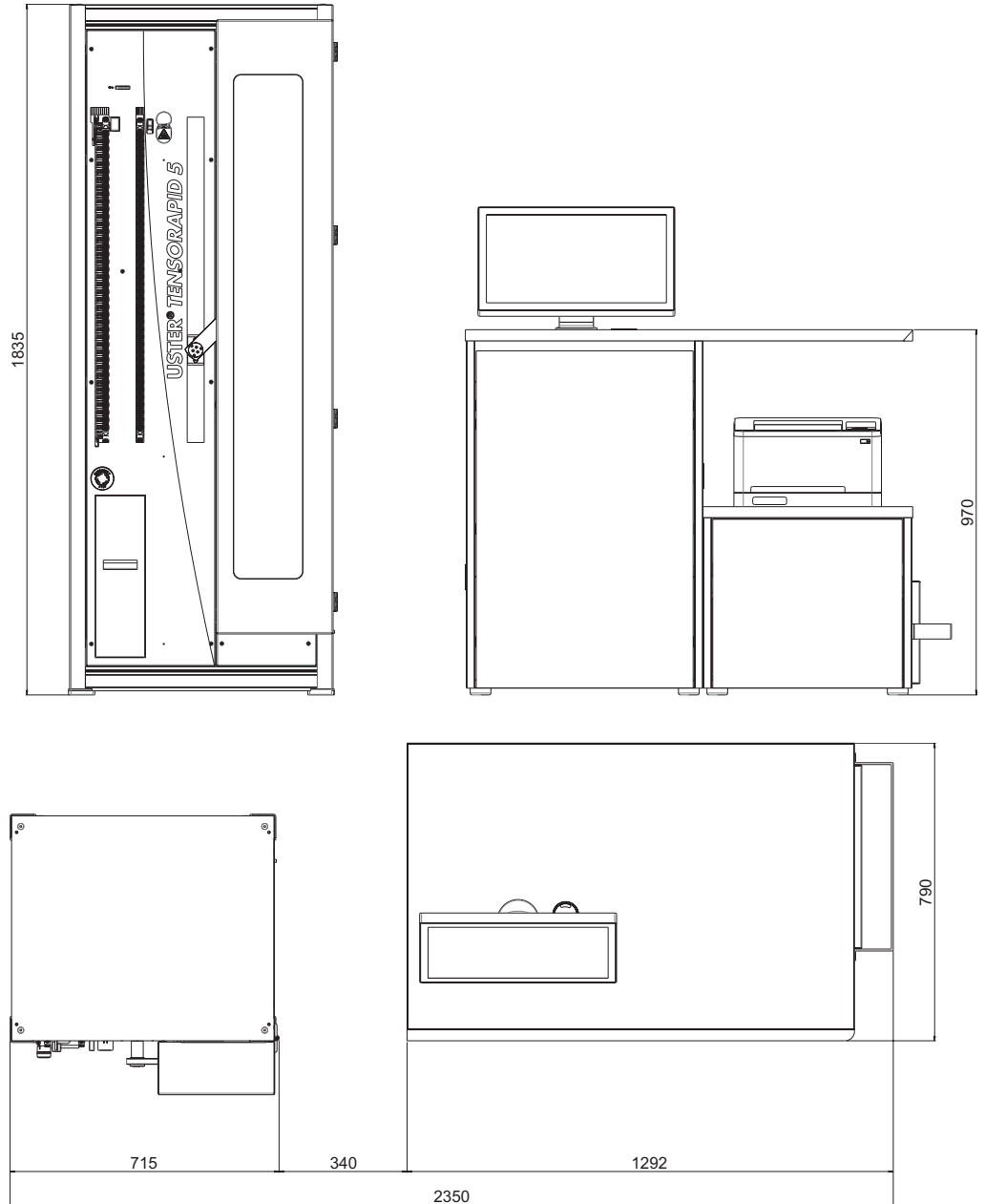
	UPS Model	Tower
	UPS Bypass Type	ON-Line
Electrical Input	Nominal Voltage	120 VAC, 220–240 VAC
	Voltage range 120 VAC	90–138 VAC
	Voltage range 230 VAC	160–276 VAC
	Frequency	50/60 Hz
Output	Nominal Output Voltage	120 VAC, 230 VAC
	Power Capacity	1000 VA (1 kVA)/900 W
	Voltage regulation	+/-3 %
Environment	Safety markings 120/208 V	UL, CUL, VCCI
	Safety markings 230 V	CE, GS
	Ambient operating temp.	Laboratory condition are acceptable
	Relative humidity	Laboratory condition are acceptable

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

USTER® TENSORAPID 5-C

The strength measurement system

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.

February 2020



Uster Technologies AG

Sonnenbergstrasse 10

8610 Uster

Switzerland

T. +41 43 366 36 36

F. +41 43 366 36 37

sales@uster.com

www.uster.com