SYNTAX 12 – UNIVERSAL TESTING MACHINE

Tensile & Compression Testing Frame

OVERVIEW

The SYNTAX 12 is a compact and high-performance 12 kN universal testing machine, offering an excellent balance between rigidity, versatility, and cost efficiency. It combines the proven mechanical stiffness of the SYNTAX frame architecture with a compact motorization, making it suitable for advanced laboratory, R&D, and industrial applications.

Model	SYNTAX 12
Capacity (kN)	12 (10 nominal)
Frame stiffness (kN/mm)	20
Screw type	Preloaded ball screws
Number of guidance column	2
Number of ball screws	2
Transmission type	Gearbox with reinforced belt
Bearing type	Precharged and waterproff, full life greased
Accuracy (Class) Load Cell Mesurement	Class 1 (≥0.1% FS) / Class 0.5 (≥0.2% FS) – ISO 7500-1
Crosshead position resolution (µm)	0,08
Maximum speed, max load (mm/min)	1200
Minimum speed (µm/min)	3,3
Crosshead travel (mm) Without load cell and interface	1130
Test width (mm)	450
Working area height (mm)	160
Dimensions (W × D × H) mm	900 x 515 x 1480
Weight (kg)	145
Power supply	230 V Single Phase
Power consumption (W)	320

KEY FEATURES

Nominal load: 10 kN
Maximum load: 12 kN
High frame stiffness: 20 kN/mm
Compact lateral-frame design
Wide test area for tooling, furnaces, and thermal chambers
High-speed, closed-loop digital control
New-generation controller
Modular, expandable measurement architecture

MECHANICAL FRAME

Frame structure:

- Lateral metallic structure
- Oversized preloaded ball screws for high stiffness
- 2 precision guiding columns

Transmission:

- Gearbox reinforced belt transmission
- High-capacity, machine-tool-grade bearings

Lower table: Granite table (optional / configurable)
Total vertical daylight : 1130 mm
Working area width: 160 mm

MOTORIZATION & MOTION CONTROL

Motor: DC servomotor with resolver
Speed range : From 3.3 µm/min up to 1200 mm/min
Crosshead position resolution: ±0.08 µm
Speed regulation: High-precision closed-loop digital control
Power supply:

- 230 V + Earth
- Power consumption: 320 W

PROTECTION & DESIGN

Side casing: Aluminum and transparent polycarbonate
Housing : 2 mm thick sheet metal structure
Ball screw protection : Polyurethane-coated protective covers (standard)
Front access : Easy handling even when mounted on dedicated pedestal

ERGONOMICS & WORKING AREA

Large working space:

- Compatible with all tooling types
- Suitable for thermal chambers and furnaces

Remote control pad:

- LCD display
- Analog digital potentiometer for fast speed adjustment in manual mode

Emergency stop : Magnetic emergency button mounted on machine side
Tooling compatibility : More than 1300 tooling references available

CONTROLLER & ELECTRONICS

GENERAL ARCHITECTURE

Remote BlackBox control unit

- Power electronics and signal conditioning integrated
- Compact footprint, installed next to the machine

Cooling system : Fan with dust filter

CONTROL PERFORMANCE

2.5 kHz control loop

Closed-Loop Control Modes :

- Force rate (kN/s)
- Stress rate (MPa/s)
- Crosshead displacement (mm/s)
- Extensometer displacement (mm/s – multi-extensometer support)
- Strain rate (%Lc / %Le per second)
- Dynamic switching between control modes possible during the same test

MEASUREMENT CHANNELS

Standard channels :

- Force
- Crosshead position

Additional channels : 3 or 7 measurement channels depending on controller version
Supported sensor types:

- Load cells
- Analog extensometers (±10 V, 4–20 mA)
- LVDT
- Encoders / incremental signals
- Magnetostrictive rulers
- Optical sensors

RESOLUTION & ACCURACY

Channel resolution:

- 10,000,000 digits
- Equivalent to 0.00001% of full scale

Force channel accuracy (ISO 7500-1) :

- Class 1 from 0.1% FS
- Class 0.5 from 0.2% FS

Crosshead position:

- Resolution: 0.08 µm

INTELLIGENT SENSOR PLUG (ISP)

Automatic sensor recognition
Plug & play configuration
Calibration data stored in sensor EEPROM
No operator manipulation required

ADDITIONAL INTERFACES & EXTENSIONS

Hydraulic unit control for jaw actuation
Automatic arm extensometer control
Mono- or bi-camera video extensometer
External DAQ systems (HBM or equivalent)
Non-contact sensors (laser, optical)
Multi-zone furnaces and thermal enclosures
Video camera and screen/workspace recording

SAFETY DOORS / SHIELDS (OPTIONAL)

The machine may be operated without safety doors, subject to formal customer justification and compliance with Machinery Directive 2006/42/EC, including :

- Documented risk analysis
- Assessment of operator and environmental impact
- Written liability waiver toward 3R
- Commitment to re-evaluate risks in case of any change in machine use or test type

PEDESTAL / BASE (OPTIONAL)

Ergonomic working height (laboratory bench level)
Integrated storage shelves for tools and accessories
Welded steel construction
Pedestal weight: 120 kg
Pallet truck handling compatible
Dimensions:

- Height: 430 mm or 730 mm
- Width: 895 mm
- Depth: 600 mm

LOAD CELLS

Available designs:

- S-type
- High-stiffness massive design

High-definition technology with:

- Mechanical decoupling
- Internal electronic compensation

Insensitive to transverse forces and bending moments
High axial stiffness → reduced shock at specimen break
Automatic identification via EEPROM
Electronic overload protection
Accuracy up to Class 0.5, linearity error < 0.1%
Compliant with ISO 7500-1 and ASTM E4