

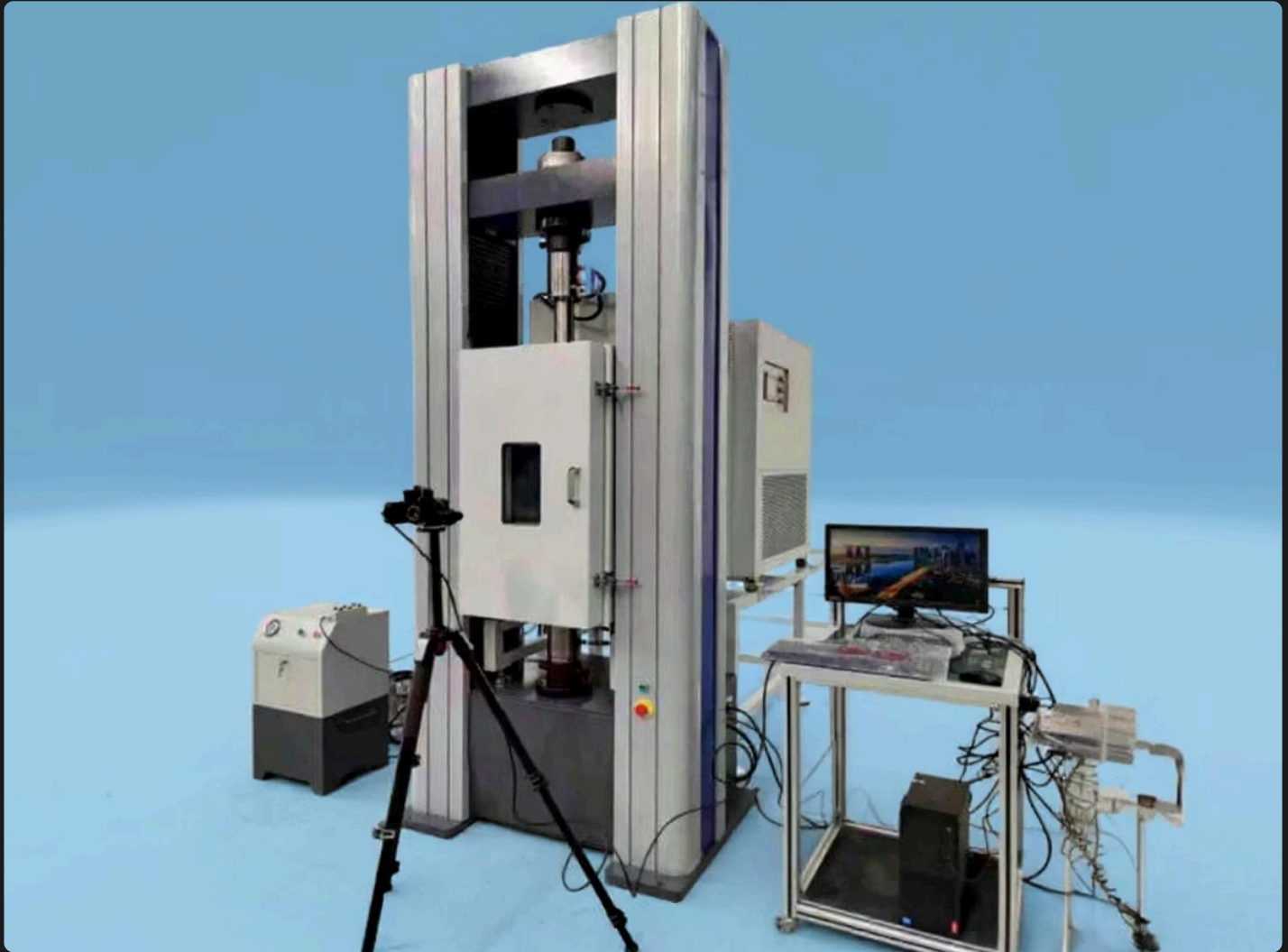
 **QUAKELOGIC**

QL-FORTiS 100 Universal Testing Machine (100 kN)

**Microcomputer-Controlled
Electromechanical Universal Testing
System**



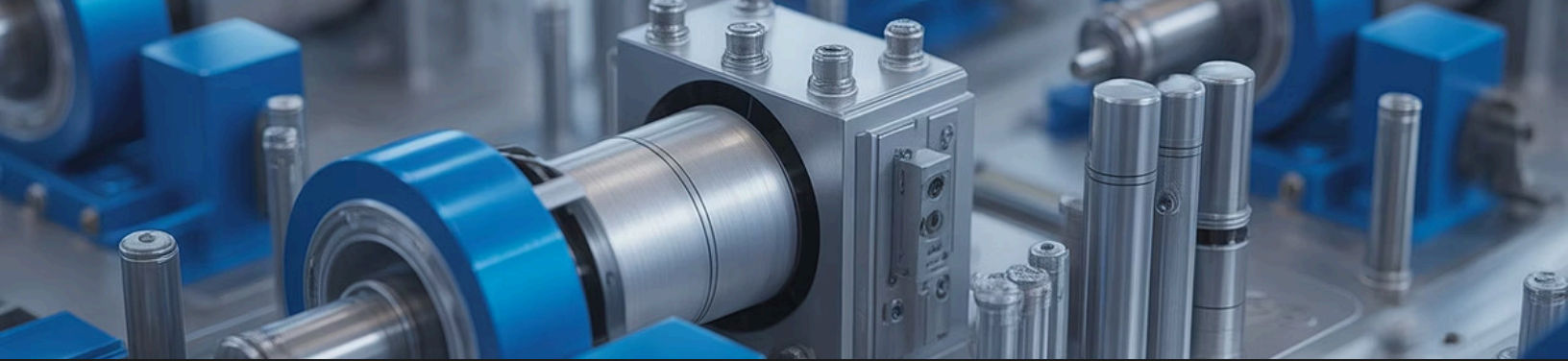
1. Introduction



The **QL-FORTiS 100** is a **microcomputer-controlled electronic universal testing machine** engineered for **high-precision mechanical property testing** of metals, composites, polymers, and other materials. Driven by an **AC servo motor** with a **fully digital data acquisition and closed-loop control system**, the QL-FORTiS 100 ensures **stable, low-noise, and highly repeatable operation**.

It automatically calculates critical material parameters such as:

- Maximum and breaking force
- Yield strength (upper/lower)
- Tensile and compressive strength
- Fracture elongation
- Elastic and flexural modulus
- All results conform to international standards including **ASTM, ISO, DIN, and GB/T**.



2. System Overview

2.1 Main Frame

- Dual-column electromechanical design with high rigidity and precise alignment
- Comprises **base, upper/middle/lower beams, and columns** forming a portal structure for superior stability
- Dual testing spaces for **tension and compression** without fixture change
- Middle crosshead provides **stepless vertical positioning**
- Constructed with **extruded aluminum alloy covers** — lightweight, corrosion-resistant, and deformation-proof with matte finish

2.2 Drive & Transmission

AC Servo Motor

2 kHz response frequency with rapid feedback for smooth and vibration-free motion

Synchronous Belt Drive

CNC-hobbed precision pulleys ensures low noise, stable operation, and minimal backlash

Precision Ball Screw

Double-nut pre-tightened and ground through **72 processes**, eliminates transmission gaps and ensures long-term maintenance-free performance

2.3 Load Cell / Force Sensor

High-accuracy Transcell™ stainless-steel load cells (100 kN / 10 kN / 1 kN, interchangeable)

IP67 protection rating for dustproof and waterproof performance

Ensures reliable long-term calibration and consistent accuracy



3. Control System

Built-in digital controller for closed-loop control of:

Constant-rate
force

Constant-rate
displacement

Constant-rate
deformation

- **Automatic range switching** for optimal accuracy
- **True digital zero/gain calibration** – no analog adjustments required
- **Overcurrent, overvoltage, overspeed, and overload protection**
- **Speed regulation ratio: 1 : 10 000**
- **Automatic data saving, calibration, and batch testing**
- **High EMI/EMC immunity** for measurement stability
- **Fully compliant electrical design** per international safety standards

4. Software — QL-TestSuite



Windows-based English interface

Real-time force, displacement, and strain curves



Dynamic graphical display

Stress-strain, Force-displacement, Force-time, Displacement-time



Automatic curve traversal

Post-test re-analysis capabilities



User-defined templates

Custom test templates and report layouts



Network-ready

LAN and Internet data transfer and storage

Built-in protections:

- Dual-level (software + mechanical) limit
- Automatic stop on specimen break
- Auto-shutdown on overload (103–105 % FS)

5. Main Technical Specifications

Parameter	Specification
Load Capacity	100 kN (22,480 lbf)
Accuracy Class	± 0.5 % (Class 0.5 per ASTM E4 / ISO 7500-1)
Force Measurement Range	0.4 % – 100 % F_n
Deformation Measurement Range	0.2 % – 100 % F_n
Displacement Resolution	0.001 mm
Speed Range	0.005 – 500 mm/min (stepless)
Speed Accuracy	± 0.5 % of set value
Force Control Rate Range	0.005 – 5 % F_n / s
Force Control Accuracy	± 1 % (< 0.05 % F_n/s) / ± 0.5 % (\geq 0.05 % F_n/s)
Deformation Control Range	0.005 – 5 % F_n / s
Deformation Control Accuracy	± 1 % (< 0.05 % F_n/s) / ± 0.5 % (\geq 0.05 % F_n/s)
Constant Force / Displacement / Deformation Range	0.5 % – 100 % F_n ± 0.1 % (\geq 10 % F_n), ± 1 % (< 10 % F_n)
Control Accuracy	700 mm
Test Width	1200 mm (+200 mm for high-temp)
Tensile Space	1200 mm (+200 mm for high-temp)
Compression Space	1150 × 700 × 3000 mm (W×D×H)
Overall Dimensions	~ 1100 kg
Machine Weight	3-phase 220 V ± 10 %, 50/60 Hz (1.5 kW)
Power Supply	10 – 35 °C, RH 20 – 80 %
Ambient Conditions	

6. Standard Accessories

01

Mainframe with Servo Drive & Controller

02

Precision Ball Screw Assemblies (2 Sets)

03

Transcell Load Cells (100 kN / 10 kN / 1 kN)

04

QL-TestSuite Software & PCI Control System

05

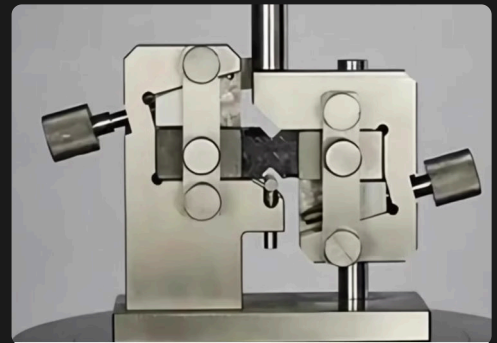
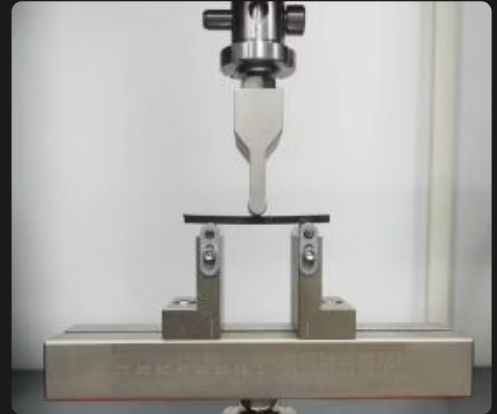
Four-Channel Resistance Strain Measurement Module

06

Computer (Lenovo®, latest configuration)

07

User Manual & Installation Tools Kit



7. Standard Fixtures

Hydraulic Wedge Tensile Grips

(usable in high/low-temp chambers):

Flat jaws: 0–7 mm, 7–14 mm, 14–21 mm

Round jaws: Ø 4–9 mm, Ø 9–14 mm, Ø 14–21 mm, Ø 21–26 mm

Compression Platens

Ø 150 mm

3-Point Bend Fixture

R5 support roller, adjustable 20–300 mm span

Open-Hole Compression Fixture

ASTM D5379

V-Notch Shear Fixture

ASTM D7078



8. Optional Components

8.1 High- & Low-Temperature Test Chamber



- **Temperature Range:** $-150\text{ }^{\circ}\text{C}$ to $+350\text{ }^{\circ}\text{C}$
- **PID intelligent control** with $\pm 1\text{ }^{\circ}\text{C}$ fluctuation, $\pm 2\text{ }^{\circ}\text{C}$ uniformity
- **Heating rate:** $\geq 5\text{ }^{\circ}\text{C}/\text{min}$
- **Inner chamber size:** $400 \times 400 \times 600\text{ mm}$
- **Observation window:** $200 \times 400\text{ mm}$ (defogging glass + illumination)
- **Cooling:** Liquid nitrogen (50 L tank included)
- **Material:** Mirror SUS inner wall + brushed stainless steel outer wall
- **Safety Protection:** Overload, leakage, over-temperature, grounding
- **Mobility:** Mounted on guide rails for easy removal/installation
- **Applicable Standards:** GB/T 4338-2006, GB/T 10592-2008, HB5195-1996

8.2 Video Extensometer System (Red Box Series)

Two-Dimensional DIC-Based Non-Contact Strain Measurement



Visual Expander Software:

- 2-D deformation & strain measurement (0–1000 % range)
- Axial & lateral elongation tracking
- Real-time connection to QL-FORTiS system for stress-strain synchronization
- Full-field strain mapping with color contour visualization
- Point & section analysis, Excel data export, PDF report generation
- Supports C++, C#, VB integration and UDP protocols

Monochrome CMOS Camera

4024 × 3036 px, 32 Hz sampling

Industrial Lens

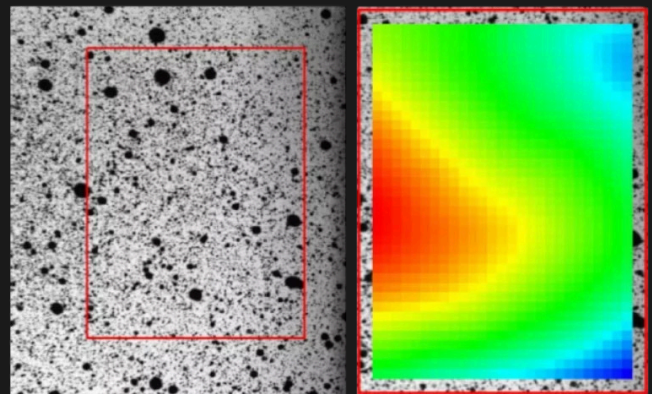
MV190 mm range

Dedicated Blue Light Source

Precision illumination

Mobile Aluminum Tripod

Adjustable height (850–1850 mm), front–rear travel (0–450 mm)



Calibration Board & Full-Field Module included, **Compliant with:** JJG762-2007 Class 0.5 accuracy

8.3 Additional Optional Accessories

1

High-Temperature Pull Rods

Grip extensions for elevated temperature testing

2

Non-contact Infrared Thermal Sensor

Chamber monitoring and temperature verification

3

Advanced DAQ Expansion Modules

8 + channels for multi-point data acquisition

4

Safety Enclosure

Interlocks and emergency stop protection

5

Custom Fixturing

For special standards (ASTM C273, D2344, D3167, C297, D1781, etc.)

9. Compliance & Standards

Standard	Scope
ASTM E4	Force Verification of Testing Machines
ASTM E83	Extensometer Classification
ASTM E1012	Alignment Verification
ISO 7500-1	Calibration and Verification of Testing Machines
NADCAP AC7122	Alignment Verification for Composite Testing
GB/T 16491	Electronic Universal Testing Machines
GB/T 2611	General Technical Requirements for Testing Machines

10. Environmental & Power Requirements



Ambient Temperature

10 °C – 35 °C



Relative Humidity

20 – 80 % (non-condensing)



Power

3-Phase 220 V \pm 10 %, 50/60 Hz (1.5 kW rated)



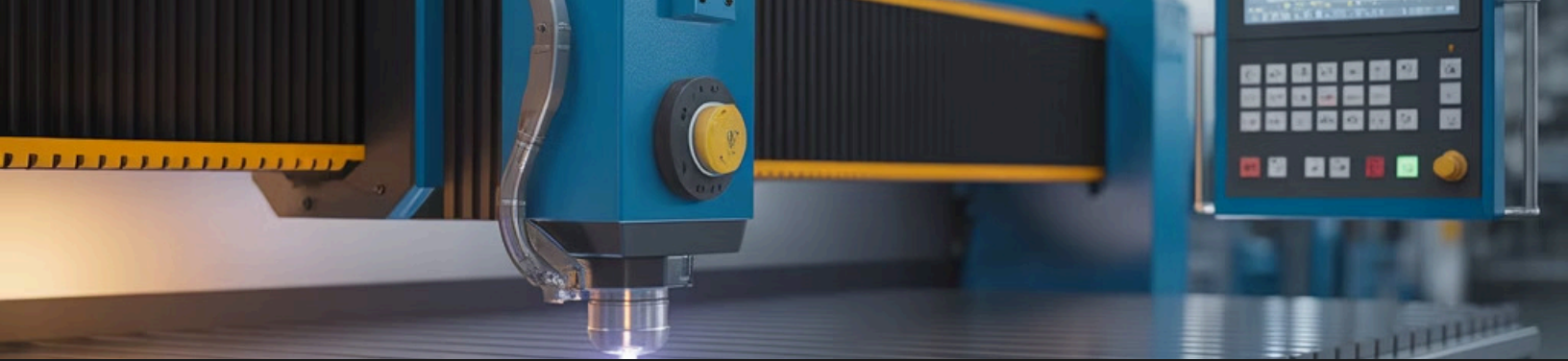
Noise Level

< 60 dB during operation

12. Compliance & Safety



- Dual-level hardware + software limits
- Automatic stop on specimen break or overload
- Emergency stop and mechanical interlock enclosure (option)
- Meets international electrical safety and EMI/EMC standards



Warranty & Support

1

Standard Warranty

12 months covering all parts and labor under normal operation

2

Remote Technical Assistance

Software and troubleshooting support

3

On-Site Installation & Training

Setup, calibration, and operator instruction by QuakeLogic technicians

4

Spare Parts Availability

Full supply of consumables and replacement components

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 **QUAKELOGIC**



Live Datasheet