



Precision, Quality, Innovation

# L1 FORCE MEASUREMENT

Force Testing Systems

Digital Force Testers

Load Cell Sensors

Force Gages

Manual Force Testers

Accessories



## STARRETT INNOVATION. PRECISION.

When you need an easy-to-use and reliable solution for your force measurement applications, you can rely on Starrett- a trusted leader in measurement and innovation for over 135 years.

Our L1 solutions are engineered to meet the requirements for high-volume production testing and for accuracies needed to verify product quality in the Quality Laboratory. We have combined accuracy, reliability, repeatability and precision for an economical solution. These products are easy-to-use and easy-to-maintain. Starrett L1 solutions include:

- L1 Systems for computer-controlled force measurement
- FMM Series digital force testers
- DFG and DFC Series digital force gages
- BLC Series load cell sensors
- MTL and MTH Series manually-operated force testers

Starrett is pleased to offer you solutions you can expect from a world-leader in measurement.

## FORCE TESTING SYSTEMS

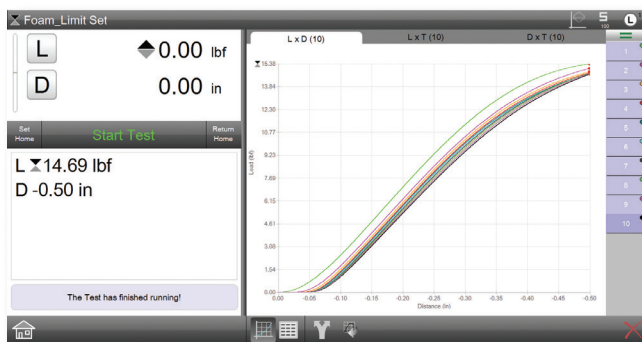
L1 Systems represent our easiest to use force testing solution. Optimized for in-situ production and quality control testing, they are designed to be easy to setup, operate and maintain.

L1 Systems can be used to perform a wide variety of testing methods including:

- Load Limit Testing
- Distance Limit Testing
- Break Limit Testing
- Cyclic Count Testing
- Cyclic Duration Testing
- Constant Load Testing
- Constant Distance Testing
- Coefficient of Friction Testing

FMM Testers are available in three capacities: 110 lbf (500N), 330 lbf (1500N) and 550 lbf (2500N). Two travel lengths are available for all capacities: standard travel at 20-inch (508mm) and extended travel at 30-inch (762mm). Crosshead speeds are controlled locally and can be configured from 0.002 to 40 inch/min (0.05 to 1016 mm/min). A high-resolution OLED display shows distance measurements with accuracy better than 20  $\mu$ m (0.0008 inch).

The FMM force tester can also be controlled using a DFC digital force gage. The DFC force gage serves as a universal interface where it can be used to setup the force tester's distance limits, crosshead direction and crosshead velocity for a test.



Multi-Graph view

| Run | Coef | Units | Actual | Limit 1 | Limit 2 | Deviation | P/F  | Comment |
|-----|------|-------|--------|---------|---------|-----------|------|---------|
| 1   | L    | lbf   | 14.57  | 14.00   | 15.50   |           | Pass |         |
| 1   | D    | in    | -0.50  |         |         |           |      |         |
| 2   | L    | lbf   | 14.47  | 14.00   | 15.50   |           | Pass |         |
| 2   | D    | in    | -0.50  |         |         |           |      |         |
| 3   | L    | lbf   | 14.38  | 14.00   | 15.50   |           | Pass |         |
| 3   | D    | in    | -0.50  |         |         |           |      |         |
| 4   | L    | lbf   | 14.31  | 14.00   | 15.50   |           | Pass |         |
| 4   | D    | in    | -0.50  |         |         |           |      |         |

Tolerance view





## DIGITAL FORCE CONTROLLER (DFC)

The DFC Digital Force Controllers offer you the latest in high-accuracy force gages. Use as handheld gages or mount them to a Starrett digital or manual force tester.

With a measurement accuracy of better than 0.1%, display resolution of 10,000:1 and data sampling at 25kHz, Bluetooth, USB and RS-232 communications, the DFC Series is the best force gage available... anywhere. And the DFC Series can be used as a controller with the FMM Digital Force Tester- you setup test methods through the gage including the operating parameters for the force tester- distance limits, test speed and more.

## DIGITAL FORCE GAGE (DFG)

When you just need a reliable, accurate and easy-to-use force gage, the DFG Digital Force Gage features a 0.2% accuracy, a display resolution of 5,000:1, and data sampling at 10kHz. Perform tests, save results to memory or export to Microsoft Excel, Word or Access.

A 3-year warranty is standard for all DFC and DFG Force Gages.



DFC-500

## MANUAL FORCE TEST STANDS

The all-new manual testers are single column, force testers with load capacities of 110lbf, 330lbf and 550lbf. Force measurement is performed using a Starrett DFC or DFG digital force gage. Options include a digital scale for measuring deflection distance.

### MTL-110 SERIES

The MTL-110 can measure force up to 110lbf (500N, 50kgf). This tester is ideal for component testing and its compact design fits small work spaces. The MTL-110 has a 6 inch (152mm) stroke. The tester's quick-action lever moves the rack & pinion crosshead 3 inches (76mm) per revolution.

### MTL-330 SERIES

The MTL-330 can measure force up to 330lbf (1500N, 150kgf). This tester can be used for tensile and compression testing applications, and is ideal for spring testing. Fit the MTL-330 with a Starrett digital force gage and optional digital scale to determine spring rates, initial tension and more.

### MTH-550 SERIES

The MTH has a load measurement capacity of 550lbf (2500N, 250kgf) and can be used for compression or tensile testing. The mechanical advantage afforded by the MTH-550's precision, high-resolution worm gear design lets you test effortlessly. One rotation of the handwheel positions the crosshead 0.03 inch (0.75mm). Total stroke for the MTH-550 is 4-inches (102mm). Force measurement is performed using a Starrett digital force gage.



Compression test performed on a L1-550 test stand with a BLC-500 load cell and compression plates

## SERVICES

### CALIBRATION, FIELD SERVICE, FACTORY SERVICE

Starrett and our global network of service providers can provide all levels of service for your material test and force measurement systems. We can supply a comprehensive range of calibration and verification services to ensure that your testing meets the requirements of international testing standards. Calibrations can be performed to ASTM E4 for load and ASTM E2658 for displacement or to equivalent standards from ISO, BS, DIN and more. Speed, stress and strain verifications can be performed on-site by technicians accredited to ISO 17025.

Preventative maintenance programs, field and factory repair services are available to ensure that your systems perform to their published specifications.

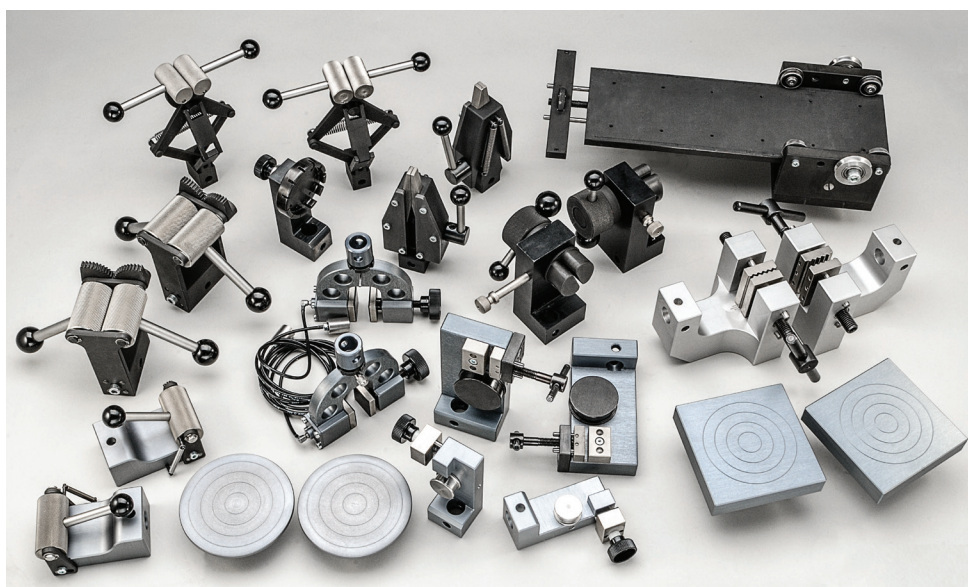


### TEST FIXTURES

Starrett offers a full range of test fixtures, grips and accessories. Test fixtures are compatible with all Starrett systems and test frames. Starrett can also engineer and supply custom test fixtures to your exact requirements.

#### TYPES

- Button Head
- Compression Cages
- Flexural
- Hydraulic
- Peel
- Platens
- Pneumatic
- Ribbon
- Roller
- Scissor
- Shear
- Vice-action
- Wedge-action



## L1 FORCE MEASUREMENT

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