

# FORNEY TEST MACHINES

LT-900-VFD UNIVERSAL

## UNIVERSAL TESTING MACHINE

<b>LOAD CAPACITY</b>	<b>FRAME</b>	<b>CONTROL SYSTEM</b>
400,000lb	Universal	VFD
<b>TEST TYPES</b>	<b>TESTING MATERIALS</b>	<b>DESIGNED &amp; BUILT BY FORNEY</b>
Compression, Tension, Flexural, Modulus of Elasticity/Poisson's Ratio (MP), Proppant Crush Resistance, Tensile Splitting	Cylinders, Cubes, Grout Prism, Beams, Rebar, Screws, Bolts, Wire, Bars, Coupons	Exceeds ACI Recommendations



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## GET A CONNECTED MACHINE AND SAVE \$1,500

### NATIVE TWO-WAY INTEGRATION WITH CMT SOFTWARE

Connected Testing Machines allow technicians to get more done faster with minimal human error through a two-way integration with ForneyVault. Resulting in 99.9%+ fewer manual errors, 66%+ increase in productivity, and 100% unalterable, unquestionable data.

- ▲ "One-touch" test starts and automatic controls
- ▲ Pre-test "Smart Checks" to validate test parameters
- ▲ Automatic preload calculations, notifications for individual and average low breaks and excessive variance, automatic data transfer, and more

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## HARDWARE

FRAME



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Designed and built by Forney. The LT-900 Series Universal Testing Machines are specifically designed for testing a variety of materials in tension, compression and flexure – including cementitious and metallic materials like briquettes, cubes, cylinders, rebar, rebar with joints or T-Caps, and bolts, as well as other non-cementitious and non-metallic materials. Universal Testing Machines measure Force, Displacement, Velocity and Strain.

The main frame is fabricated from solid steel with 2.50" (63.5mm) thick side members. The top crosshead or cylinder mounting plate and the bottom crosshead are both 6.00" (150mm) thick. The moveable crosshead is fabricated from 6.00" (150mm) thick solid steel, and is positioned on strain rods 3.00" (75mm) in diameter. Metallurgical samples of various lengths ranging from 15.50" (400mm) to 22.25" (565mm) can be tested, using the 12" (305mm) piston stroke. The hydraulic cylinder assembly is mounted on top of the unit frame and force is applied in the upward direction. This method of mounting positions the tension and compression work area at a convenient waist-high work level.

## SYSTEM DESIGN

The control console is separated from the load frame. The two-unit design incorporates a tensile/compression load frame and a separate control console. The Universal (Compression and Tension) Testing Machine is of the open-frame type design, incorporating two side members. The moveable platen or crosshead is suspended by 4 strain rods between these side members. Both units are floor mounted, with the load frame located approximately 24" to the left of the console thus reducing the possibility of shock transfer to the load indicating system.

## HYDRAULIC POWER PISTON ASSEMBLY

Testing pressure is applied by an 8.00" (203.2mm) diameter power piston. Stability length of the piston is 21.00" (533.4mm) and the working stroke is 12.00" (305mm). Precision ground and polished to an 8 RMS (0.20um) finish, the piston is mounted in a honed, solid steel cylinder with a non-frictional "O" ring and Teflon back-up ring for sealing.

## COMPRESSION PLATEN

A removable compression platen mounts directly on the movable compression crosshead. This special alloy steel platen is hardened to a minimum of 60Rc, chrome plated and scribed with a centerline and concentric circles for test specimen centering and alignment.

## MANUAL GRIPPING SYSTEM

Manual gripping is standard equipment on the LT-900 testing machine. The gripper control lever is mounted on the side frame of the testing unit within arm's reach. Front loading access makes positioning the grippers, inserting and removing specimens, a one-man operation. Gripper jaws are easily interchanged for testing metallurgical specimens from .25" (6mm) to 1.375" (35mm) in diameter and flat plate with up to 3.00" (75mm) wide X 1.00" (25mm) thick gripping dimensions. Rapid traverse while inserting specimens is easily obtained by momentarily depressing the jog button.

## CONTROL CONSOLE

The control console is a separate unit from the load frame and is positioned to the right of the load frame. The console houses the pumps, hydraulic control, the ForneyLink touchscreen operator interface (HMI), and electrical systems.

## CONSOLE DESIGN

The console consists of a welded frame with removable side and end covers to allow access to two areas: an electronic control chamber, housing two variable frequency drives, power supplies, and additional electrical equipment to control the load frame; and a hydraulic power chamber housing pumps, valves and other necessary equipment.

## HYDRAULIC PUMPING SYSTEM

The console houses the pumping system, consisting of two (2) submerged, vertically-mounted radial piston pumps, in-line coupled with supercharge/rapid advance pumps. Appropriate valves for safety relief and pressure discharge are mounted on top of the reservoir, which is mounted inside the bottom of the console.

The system utilizes two (2) variable frequency drives to adjust motor speed and therefore pump output to coincide with programmed demand set by the test set up. This provides the most efficient hydraulic power arrangement as only the amount of flow needed is developed. Excess oil is not generated, and does not therefore require discharge over a relief valve. This minimizes heat, and greatly extends hydraulic system longevity.



In addition, an optional precision proportional control valve provides fine control of the testing process and facilitates test protocols such as Modulus of Elasticity and Cyclic Testing which require controlled release of hydraulic pressure.

The system utilizes a maximum safe operating pressure of 8,000 psi to permit development of 400,000lbf maximum on the load frame.

Maximum free running crosshead speed is 1.3 ipm. Rapid advance speed, at low pressure is limited to approximately 6.0 ipm.

## ELECTRICAL

A PC-based system utilizes a variable frequency drive to control the hydraulic pump motor. This maximizes efficiency – only running the pump at speeds necessary to achieve the desired pressure. This energy efficient approach dramatically reduces heat build-up in the hydraulic system and greatly extends hydraulic component life.

Here are the main components of the system:

- ▲ Variable frequency drive (VFD)
- ▲ Windows-based touchscreen human machine interface (HMI)
- ▲ Pressure transducer that provides pressure feedback
- ▲ E-stop PB
- ▲ Limit switch
- ▲ Solenoid-operated dump valve

## SAFETY FEATURES

Several safety features are incorporated to protect both operator and testing machine:

- ▲ Maximum Capacity Protection: A high-pressure safety relief valve protects the hydraulic circuit and load frame from exceeding maximum capacity.
- ▲ Overextension Protection: A piston over-extension limit switch system protects against piston extension beyond maximum travel.

# SOFTWARE

## EASY AUTOMATIC TESTING

Push one button and the machine performs the complete test, including piston retract. Accurately controls the rate of load at the desired setting, thus no question about meeting ASTM (or other) specifications and ensuring repeatable results. Frees the operator to do other tasks while testing is in process.

## DIGITAL CONTROL SYSTEM

Setup of testing protocol, real-time display of test data, and post-test data transfer is accomplished through the ForneyLink touchscreen HMI. The operator can navigate options for:

- ▲ Test Run
- ▲ Test Setup
- ▲ Machine Setup
- ▲ Calibration
- ▲ Reporting and Data Transfer
- ▲ Diagnostics

Provides simultaneous display of force, stress, and rate of load and displays a real-time graph of Load vs. Time, or Stress vs. Strain. Standard functionality includes data collection by the ForneyLink HMI for printing and transfer. Data from optional extensometer and compressometer displacement transducers are also collected by the HMI. This data is captured with the same timestamp as the load data.



## CMT SOFTWARE INTEGRATION

Connected testing machines natively integrate with ForneyVault CMT software, improving important processes before and after an automatic test.

Before the test, Connected machines will:

- ▲ Enable positive specimen identification via barcode scan
- ▲ Provide pre-test “Smart Checks” based on preloaded sample and specimen data to validate sample date, ample size and type, and expected strength.
- ▲ Validate specimen geometry.
- ▲ Calculate preload settings based on actual and/or expected strength.

After the test, Connected machines will:

- ▲ Provide a detailed XY plot data for every test performed.
- ▲ Transfer data automatically to LIMS packages, QC systems, or other software.
- ▲ Alert to warn calibration expiration.
- ▲ Notify correction factor use, individual low breaks, and excessive variance.
- ▲ Enable intelligent workflows for detailed reporting and approvals.

## REMOTE SUPPORT

With a user-provided Internet connection (either Wi-Fi or Ethernet), all Forney VFD systems are capable of real-time, online support from the Forney Support Team for basic settings and test setup to advanced troubleshooting, fault finding, and software updates.

We offer unlimited Remote Technical Support for all Forney Testing Machines during the two-year warranty period.

For ForneyVault® subscribers, post-warranty remote technical support fees are waived for the life of your subscription.

Please refer any special requirements to a Forney sales representative.

**\* Specifications are subject to change without notice.**



ACCESSORIES	
Cylinder Compression (6" Dia x 12" L with Pad Caps) (150mm x 300mm)	TA-0103 Cylinder Top Platen Assembly
	TM-0095 Bottom Platen (included w/ machine)
	TM-2035 Centering Stud (included w/ machine)
Cylinder Compression (6" Dia x 12" L with Capping Compound or Ground Ends) (150mm x 300mm)	TA-0103 Cylinder Top Platen Assembly
	TM-0095 Bottom Platen (included w/ machine)
	TM-2035 Centering Stud (included w/ machine)
Cylinder Compression (4" Dia x 8" L with Pad Caps) (100mm x 200mm)	TA-0103 Cylinder Top Platen Assembly
	TM-0095 Bottom Platen (included w/ machine)
	TM-2035 Centering Stud (included w/ machine)
Cylinder Compression (4" Dia x 8" L with Capping Compound or Ground Ends) (100mm x 200mm)	TA-0103 Cylinder Top Platen Assembly
	TM-0095 Bottom Platen (included w/ machine)
	TM-2035 Centering Stud (included w/ machine)
Cylinder Tensile Splitting (6" Dia x 12" L) (150mm x 300mm)	TAG-0023 Cylinder Splitting Kit
Cylinder Tensile Splitting (4" Dia x 8" L) (100mm x 200mm)	TAG-0023 Cylinder Splitting Kit
Cube (2") (50mm)	TAG-0002 Cube (2") Accessory Kit
Cube (6") (150mm)	TAG-0025 Cube (6") Accessory Kit
Flexural Beam (6" x 6" x 18") (150mm x 150mm x 450mm)	TA-0166 Flexural Testing Accessory
Grout Prism (3" x 3" x 6") (75mm x 75mm x 150mm)	TA-0103 Cylinder Top Platen Assembly
	TM-0095 Bottom Platen (included w/ machine)
	TM-2035 Centering Stud (included w/ machine)
MOE (6" diameter) (150mm)	LA-0488-E6-SG Compressometer
	*Must have compression accessories *Must have -M or -MP machine
MOE (4" diameter) (100mm)	LA-0488-E4-SG Compressometer
	*Must have compression accessories *Must have -M or -MP machine

FACTORY INSTALLED OPTIONS	
Voltage	110/220VAC Single Phase
Displacement	Factory Installed Upgrade Included
Optional Test Protocol Capabilities	ASTM C469 MOE (M)
	ASTM C469 MOE & Poisson's Ratio (MP)
	ISO 13503-2 Proppant (SW-0010)
	*Additional accessories required *Inquire about other test types
Capacity Options	Contact Us for Special Requests
Frame Options	Contact Us for Special Requests
Travel Limit Switch	Standard Equipment

SPECIFICATIONS	
Load Capacity Range	4,000lbf - 200,000lbf tension / 400,000lbf compression
Vertical Opening	26"
Horizontal Opening	13"
Ram Diameter	8"
Piston Stroke	12"
Platen Hardness	60HRC
Lower Platen Dimension	6.5" Diameter
Upper Platen Dimension	*See Available Accessories
Oil Reservoir Capacity	10 Gallons
Overall Width	35"
Overall Depth	20"
Overall Height	94" (+12" stroke)
Unit Weight	5,500lbs Frame / 700lbs Console



MOE & Poisson's Ratio (6" Diameter) (150mm)	LA-0488-P6-SG Compressometer/Extensometer  *Must have compression accessories  *Must have -MP machine
MOE & Poisson's Ratio (4" Diameter) (100mm)	LA-0488-P4-SG Compressometer/Extensometer  *Must have compression accessories  *Must have -MP machine
MOE & Poisson's Ratio (2" Diameter) (50mm)	TA-3542-03 Axial Extensometer 2"  TA-3975-01 Diametral 0.030"  *Must have compression accessories  *Must have -MP machine
Proppant (2" diameter) (50mm)	TA-0119-11 Top Platen Assembly  TA-0151 Bottom Platen  TA-0174 Spacer, 6" H  TM-2035 Centering Stud  TA-0002 Proppant Crush Piston & Cell
Rebar/Round Tensile	(4) TA-0189 Grips - Tests #2 - #6 Rebar  (4) TA-0190 Grips - Tests #6 - #11 Rebar
Flat Tensile Specimens	(4) TA-0192 Grips  * Can fit up to 1" thickness x 3" width
Threaded Fasteners	TA-0212 Bolt Test Set  (.25" to 1.5" diameter flat and wedge)
Cold Bend Rebar	TA-0160 Cold Bend Test Set, #3 - #11  TA-0160-01 Cold Bend Test Set, #14 - #18
7 Strand Cable/Wire	TA-0191-02 - Grips for 0.5" Cable/Wire, 7-Strand, (4 Required)  TA-0191-03 - Grips for 0.6" Cable/Wire, 7-Strand, (4 Required)

Test Standard Ready	(1) set of grips  ASTM E4
Test Standard Capable	ASTM C39, C78, C293, C109, C469, C496, C1019, D7012  A370, A1061, F606, E290  AASHTO T 22, T 97, T 106  BS 1610, BS 1881, EN ISO7500-1, EN 12390-3, EN 12390-4

