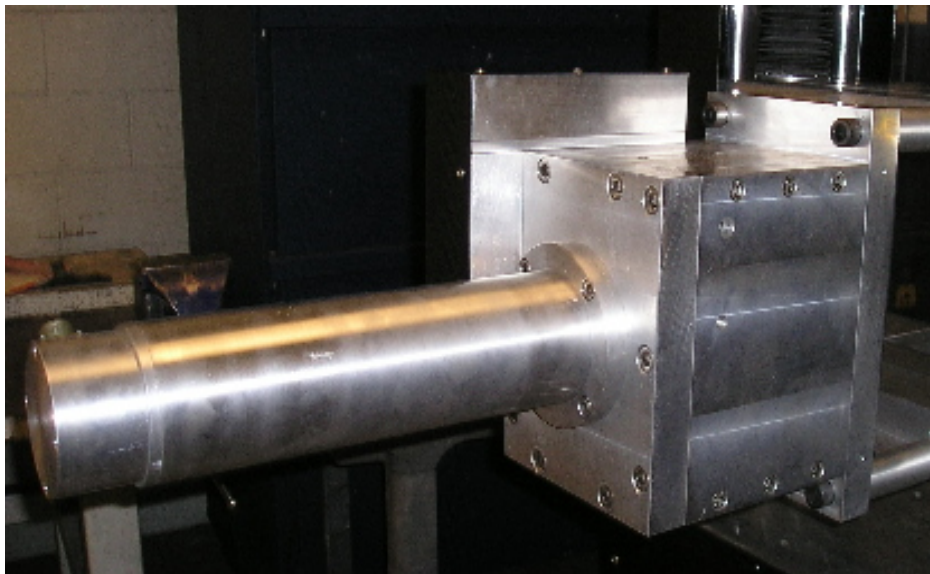




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ACT Series of  
Tension/Compression  
Mechanical Loading Actuators  
Specification Sheets

**Revised: November 2011**



## 1.0 Introduction to the ACT Series of Loading Actuators

The ACT Series of computer controlled actuators are very similar in design to hydraulic actuators except the piston rod is replaced by an internal ball screw which is driven by a DC servo motor. The actuators may be mounted in any position for performing tensile and compression testing on structures or load frames. The ACT Series actuators are available in many different load capacities and stroke lengths over the range from 5 kN (1,100 lb) up to 50 kN (11,000 lb). The actuator design consists of a single ball screw driven mechanical loading actuator which protrudes from the mounting plate end of the actuator. The screw is driven by a DC servo electric motor operating in closed loop control for accurate loading control. The easy to use Model TC-100 software is used for testing in tensile and compression loading. The rugged design features of the ACT Series makes these systems suitable for a wide variety of applications in both Quality Control and Research and Development testing of products and components. Software packages are also available for performing creep tests and low cyclic rate fatigue testing. In addition, modifications to the software packages and the standard machine designs are available for special applications.

Figure 1 shows the major part locations and dimensions of two load capacities of the ACT Series of actuators. Other sizes are available on request.

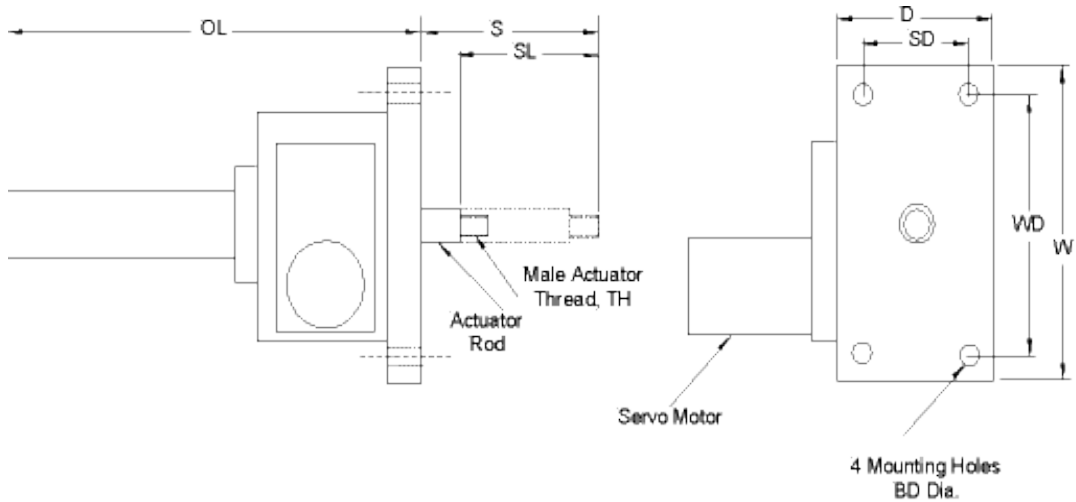
## 2.0 Mechanical Specifications

1. Test Speeds and Ranges (at rated capacity)  
Standard speeds: 0.005 - 100 mm/min (0.0002 - 4.0 in/min)  
Other speeds available on request.
2. 350 mm (14 in) stroke length. Other stroke lengths on request.
3. The loading mechanism consists of a ball screw type actuator rod which protrudes from the mounting platen end of the actuator. It is driven by a DC servo motor mechanically coupled to the drive system.
4. The DC servo motor has a shaft mounted encoder. The encoder is used for both actuator rod position calculation and speed control. Internally mounted limit switches are used to prevent overshoot of the actuator rod at both maximum and minimum stroke length positions.
5. Standard Load Cell: Full Wheatstone bridge type rated for testing system capacity in tension and compression.  
Lower capacity load cells are also available.
6. Power Requirements: 110 - 120 VAC, 60 Hz, 1 phase or  
220 - 240 VAC, 50 Hz, 1 phase

**Specifications are Subject to Change without Notice**

**MODEL NUMBER**

	<b>ACT-5KN</b>	<b>ACT-50KN</b>
<b>DESCRIPTION</b>		
Load Capacity, kN	5	50
lb	1100	11000
Overall Length, OL	64 (25)	69 (27)
Mounting Platen Width, W	20.3 (8.0)	34.80 (13.7)
Mounting Platen Depth, D	10.7 (4.2)	20.83 (8.2)
Mounting Holes Dimensions		
Width Direction, WD	17.78 (7.0)	30.73 (12.1)
Depth Direction, SD	7.62 (3.0)	16.51 (6.5)
Hole Diameter, BD	1.11 (0.44)	16.67 (0.66)
Max. Actuator Rod Stroke Position, S	40.6 (16.0)	77.7 (18.0)
Stroke Length Range, 0 - SL	----- 35.0 (14) -----	-----
Male Actuator Thread, TH	1/2"-20UNF	1.0"-14UNF
Test Speed Range		
at rated Capacity, mm / min	----- 0.005 - 100 -----	-----
in / min	----- 0.0002 - 4.0 -----	-----
Machine Mass, kg	25	55
Weight, lb	55	120



**Notes**

1. Dimensions in Table are given as cm (in) unless otherwise indicated.
2. Machine Mass / Weight does not include actuator cover or other options.
3. Dimensions shown for standard stroke length actuator. Extended stroke length versions also available.
4. Specifications and Dimensions are Subject to Change Without Notice

Figure 1  
Major Dimensions and Part Locations of the  
ACT Series of Mechanical Loading Actuators

### 3.0 Computer Requirements and Motor Control System

The ACT Series of actuators requires an IBM compatible Pentium type PC system with a color display, hard drive, R/W CD or DVD drive, and a Windows compatible printer for printing test reports. One unused PCI slot must be available on the PC for the servo controller / data acquisition card. The ATM software requires Microsoft Windows2000 or the WindowsXP operating system. The motor control and data acquisition hardware consists of the PCI card and an Electronics Control box containing the motor power supply, servo amplifier, and a combined DC and AC conditioners system. The PCI card features include a combination of 12 bits resolution A/D channels and 2 channel servo motor controller capability. A 16 bits A/D resolution is available as an Option. The PCI card uses the encoder feedback signal from the actuator motor and software commands to produce the motor control system command signal for the actuator motor. The motor control system consists of a DC power supply for powering the DC servo motors and DC servo amplifier for amplification of the servo controller card command signal. Figure 2 shows a typical setup of a computer control system with the Electronics Control box.



Figure 2  
Electronics Control Box and Computer System

**Note:** A 4 channel DC conditioner board is available as an option with the ACT Series actuator as a substitute for the standard 2 channel AC / 2 channel DC conditioner board. The 4 channel DC conditioner board is recommended in systems that may require additional load cells and extensometers for the tests to be performed with the actuator.

Two selector switches mounted on the front panel of the Electronics Control box are used for Manual Control positioning of the actuator rod. The actuator rod is moved using the left spring loaded selector switch labelled Down/Up. The right selector switch labelled Slow/Fast is used

to select the speeds of the manual positioning motion. The speeds corresponding to the Slow/Fast positions are set from within the software. Two DC and two AC conditioners are provided in the Electronics Control box on a single circuit board. All of the input connections from the rear panel and front mounted Manual Control switches are made to this board through connectors. The DC conditioners can be used for excitation and amplification of the ATM line of full Wheatstone bridge type load cells. The AC conditioners are used for excitation and amplification of LVDT type devices including certain types of extensometers and other position feedback transducers. Provision is made on the Electronics Control box rear panel for monitoring the conditioner output signals through female type BNC connectors. The 15 turn potentiometers accessible through a slot in the right side panel are used for the 2 DC conditioners for electrical adjustment of the Gain, Input Offset (In OS), and Output Offset (Out OS) adjust. The AC conditioners have potentiometers for adjustment of the + Offset (+OS), - Offset (-OS), and Gain. In addition, the DC conditioners have a push button Calibration Check (Cal Chk) switch for a quick check of correct DC conditioner calibration. In a typical setup, the DC conditioner 1 is used with the load cell signal and DC conditioner 2 is used for an optional extensometer or other Wheatstone bridge type transducer.

#### 4.0 Computer Software Description

The TC-100 Tensile/Compression software package is the standard package included with an ACT Series actuator system. The software features a user friendly environment to perform the tasks necessary to run the system. The various features are available through use of the Function keys or clicking on the associated boxes. A brief description of the software is given as follows.

The Main Screen of the TC-100 software is shown in Figure 3. When the software is started, the data set and test parameters which are displayed on the X-Y graph are those which were current at the previous software shutdown. This data set and test parameters are stored in the TESTBAK.000 file. The present Tensile/Compressive and Yield Strengths for the data set are displayed in the Present Data box in the upper left hand screen.

**Note:** The Yield Strength will only be shown if the test was performed with an extensometer or actuator position on the horizontal axis which is required to calculate the strain or the elongation in the specimen.

Below this box, the Limits Status box will show if any load, stroke, strain, or time limits are being exceeded. The Current Test box shows test setup parameters such as testing speed, data sampling rate, specimen type, specimen dimensions, etc. Additional screens for the Current Test box are accessed in the Main Screen configuration using the <UP ARROW> key or clicking in this box. The lower right portion of the screen displays the

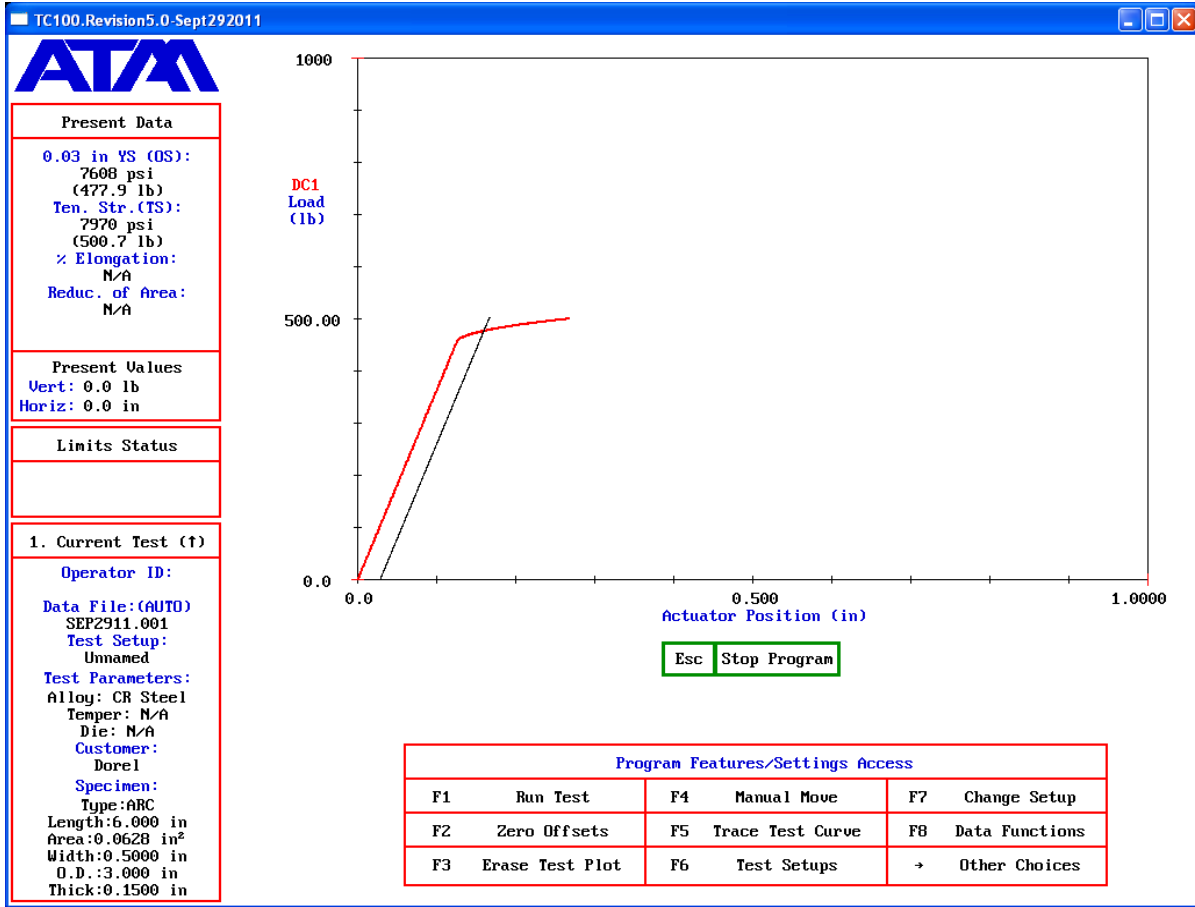


Figure 3  
Main Screen Display of the TC-100 Software

command descriptions of the keyboard function keys F1 to F8 and the Other Choices box. The Other Choices box is selected to display a second set of command descriptions for additional features.

The software design allows a high degree of Operator control of the testing configuration. The Operator can make changes to the display screen with the F7 Change Setup box with minimum disruption of the background display. Up to 1000 data sets can be stored at any given time in the directory which contains the software. The data file named TESTS.NAM contains a listing of the data sets that are available for display. The data set generated during a test can be stored to the hard drive with a filename which the Operator either enters or is automatically generated by the software. An additional archive copy can also be made of the data file to another specified folder. The resulting data files may be reloaded or erased from within the program.

Performing replicate tests is easily accomplished with a minimum number of Operator inputs. The system features the F2 Zero Offsets command for performing a software zeroing of an existing offset load resulting from changes in the test grips or test setup. An Actuator Return feature which

is activated at test completion may be chosen which automatically or after an Operator key input returns the actuator to its position at the start of the test.

During a test, the results are displayed in Real-Time to the monitor on an X-Y plot. The current value of the individual point being displayed is updated during the test in the Present Data box. The test is stopped at a preselected end point determined by such parameters as maximum time limit, load limit, after sample breakage, % load drop after maximum value, or by pressing the <Esc> key. The values of the Tensile/Compressive Strength, % Elongation, and % RA (ie. Reduction of Area) are calculated and displayed after test completion. If an extensometer or actuator position is used for the X axis, the Yield Strength (Y.S.) may also be displayed. At test completion, the individual data points may be scrolled with the F5 Trace Test Curve function using the <LEFT ARROW> and <RIGHT ARROW> keys or by inputting of the number of the data point to be displayed. Also, the data may be replotted by changing the axes scales or with different Engineering Units and the resultant data stored under a different filename. The F8 Data Functions key may be used to display multiple data sets for comparison, storing data sets, or erasing stored data sets.

For simplifying multiple test setup requirements, up to 100 test setups may be stored using the F6 Test Setups feature. These are listed in the SETUP.NAM file. When a test setup is loaded, the current data on the screen is automatically reconfigured for the new test setup X and Y axes and Engineering Units.

Other software features include the capability of printing a test report to a Windows compatible printer. Figure 4 shows an example of the one page test report format for the TC-100 Tensile/Compression software package. The Operator may change the axes scales of the graph and view the results on the monitor before printout. The test report contains information such as the Test Parameter descriptions which may be preset by the Operator to include such parameters as Order No., Alloy, etc. In addition, the Test Date/Time and the Test Operator are also included in the report.

Other software packages are available for performing creep tests and low cycle fatigue cycling tests. In addition, existing software packages can be customized for unique testing requirements which can not be handled by the standard software package. Please contact Adelaide Testing Machines if you have requirements which can not be handled by our standard software packages.

Adelaide Testing Machines Inc. Test Report

Customer Name: ABC Manufacturing Inc.      Test Date/Time: Oct. 25, 2011 at 9:50 pm      Test Number: 12  
Order No.: 1-2321      Color: Black  
Alloy Type: 6061      Temper No.: T651  
Test File Name: testbak.000      Operator: Patrick Sooley  
Testing Machine - Model No.: TCA-5KNBS      Serial No.: A100119

Transducers (Axis)	Type	Model No.	Serial No.
Vertical	DC1.CAL	LF-5KN(RSC-1K)	4587799A
Horizontal	ACTUATOR	N/A	N/A

Test Result Summary: 182 Data Points

Tensile Yield Point (0.050 in - OS): 5795.7 psi (Load: 362.23 lb)  
Ultimate Tensile Strength: 6275.3 psi (Load: 392.21 lb)  
Actuator Position at: Max. Load: 0.6170 in      Break Load: 0.6170 in  
% Elongation: 21.600% (2.0000 in Gage Length)      % Reduction of Area: N/A  
Test Speed: 1.0000 in/min (Tension)  
Points Sampling Interval: 0.20000 s      A/D Averaging Sample Size: 30 Points  
Specimen - Type: SQ      Length: 6.0000 in  
Width: 0.25000 in  
Area: 0.062500 in<sup>2</sup>

Test Comments:

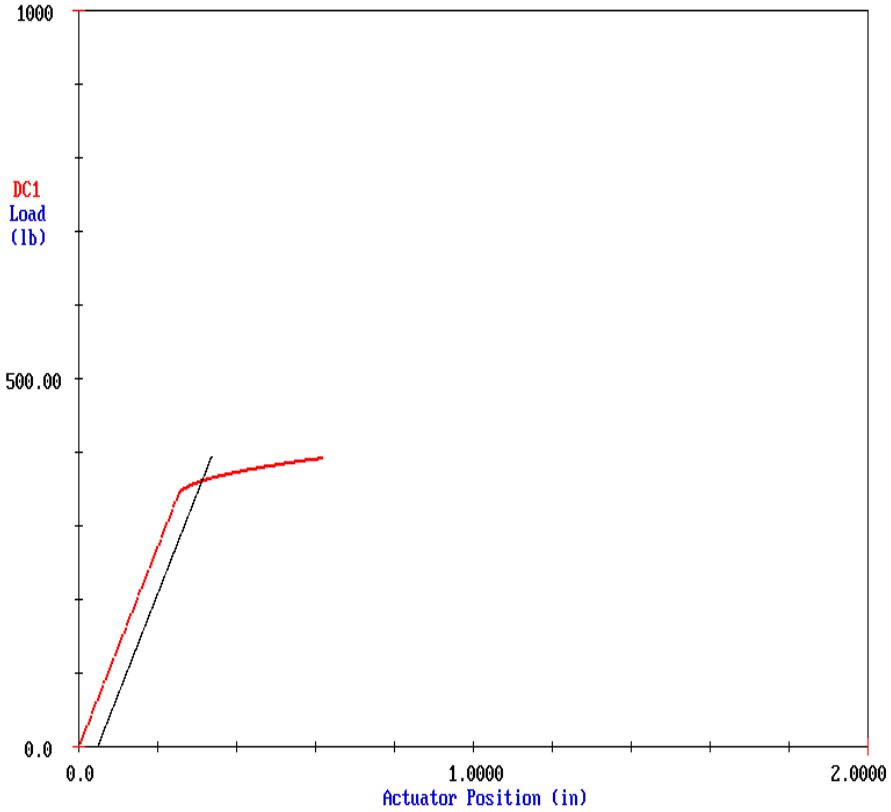


Figure 4  
Test report for the TC-100 Tension/Compression Software



## 5.0 Options and Accessories

Additional options and features may be supplied with the ACT Series of actuators to enhance their capabilities. Some of these are listed as follows:

### A. Bellows Covers on Actuator (Part No. ACTxxxxx.BSC)

For dusty environments, the ACT Series actuators can be manufactured with a bellows cover over the actuator rod to prevent dust from coating the linear bearing guiding the actuator rod through the platen. This option is a factory installed modification and should be ordered with the system.

### B. Optional 4 Channel DC Conditioner (Part No. ACT.4CHDC)

This amplifier board replaces the 2 Channel DC, 2 Channel AC Conditioner amplifier on the standard system. The additional 2 channels of DC conditioners are useful for systems utilizing multiple load cells and extensometers.

### C. Additional Modifications

In addition to the listed options, ATM can provide additional modifications to the standard actuators to accommodate specific requirements. Some of these options include longer actuator travel length, very low speed range for ultra low speed control applications, and others. Please contact us with your additional requirements.

### D. Extensometers

ATM can provide linear, diametral, biaxial, non contact laser type and elevated extensometry equipment for most applications. They are available in a wide range of deflections and temperature ranges for use with the ATM line of software and test equipment. Please contact ATM for your specific requirements for extensometry equipment.

### E. Linear Transducers

Linear transducers may be provided to allow monitoring of the precise actuator movement or deflection elsewhere in a ATM or Customer supplied test fixture. Please contact us for ranges of transducers available.

### F. Material Testing Grips

An extensive line of material testing grips such as wedge loading tensile grips, clevis grips, fixed and self-adjusting compression platens, 3 and 4 point bending fixtures, and others can be provided. Special high temperature grips for ceramics testing are also available. ATM can also custom design test grips or test fixtures to test component parts. Please contact ATM for all your test fixture requirements.

### **G. Additional Software Packages for ACT Series of Actuators**

In addition to the standard TC-100 Tensile/Compression software package supplied with the actuator system, other software packages are available to perform a wide variety of tests. Two of these software packages are as follows:

- a) Creep Testing Software - Part No.: CR-100
- b) Low Cycle Fatigue Software ( < 1 Hz. ) - Part No.: FC-100

The standard packages may also be customized to include features necessary to perform unique tests using the ACT Series actuators. Please contact ATM if you have questions regarding the features of any of our software products or if you need custom features added.

### **H. High Temperature Test Ovens**

ATM can supply split tubular or box type testing ovens in a range of temperatures up to 1,200 F and a very high temperature line for materials testing up to a maximum temperature capability of 2,800 F. These models may be supplied with mounting structures to mount them directly to customer specified equipment on which the ACT Series actuator is to be used.

### **I. Environmental Chambers**

Low temperature environmental chambers with temperature and/or humidity control are also available. These chambers are of mainly stainless steel construction and are designed with the same accessibility as the test ovens. These chambers may be supplied with mounting structures to mount them directly to customer specified equipment on which the ACT Series actuator is to be used.

### **J. Customized Electronics Packages**

The ATM line of DC and AC conditioners may also be supplied in rack mounted versions for excitation and amplification of multiple source Wheatstone bridge type device input signals. Other manufacturer's load cells and extensometers may also be adapted for use with ATM equipment. Please contact ATM for additional information.