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TCA Series of
Universal Testing Machines
Specification Sheets

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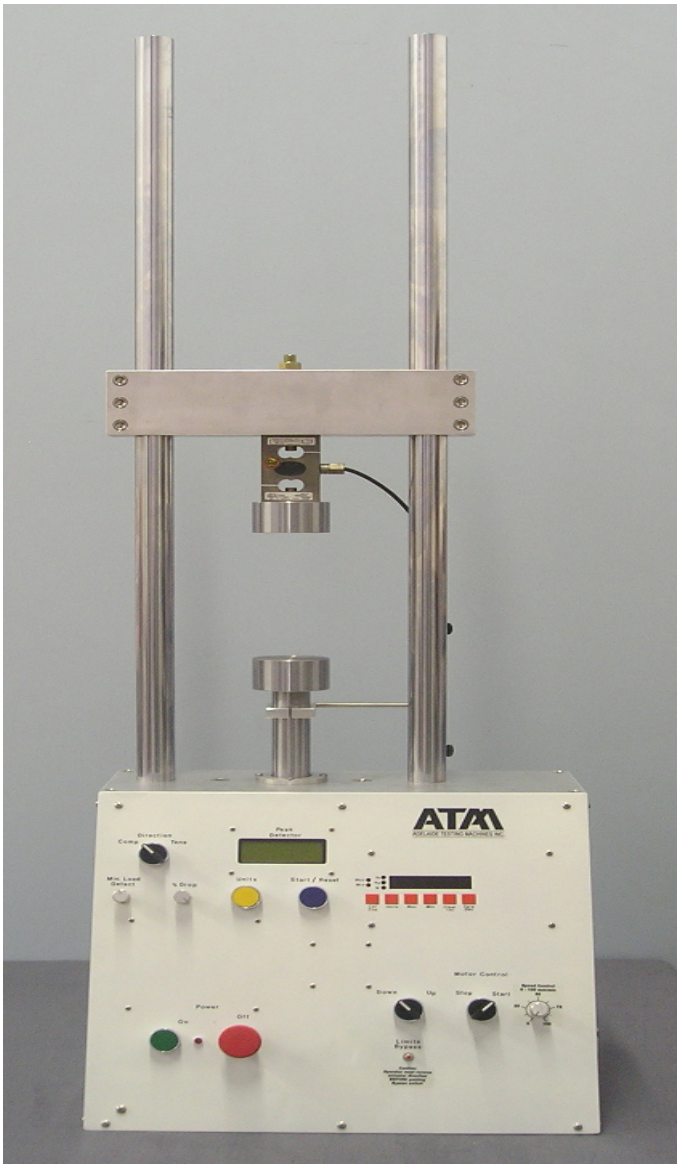


1.0 Introduction to the TCA Series

The TCA Series of testing machines consists of five bench top mounted universal testing machines which can be used for tensile and compression testing in the range from 2 kN (550 lb) up to 50 kN (11,000 lb). These low cost machines were designed for test applications requiring tensile or compression capabilities but which still demand the accuracy usually available in much higher priced testing machines. They feature a limited stroke length mechanical loading actuator for applications not requiring the long stroke length capability and larger clearances featured in our TTD and TTS Series of testing machines. The TCA Series consist of the following models and their testing capacities:

TCA-2KN (2 kN / 550 lb Capacity)
TCA-5KN (5 kN / 1,100 lb Capacity)
TCA-1OKN (10 kN / 2,200 lb Capacity)
TCA-25KN (25 kN / 5,600 lb Capacity)
TCA-50KN (50 kN / 11,000 lb Capacity)

The machines in the TCA Series feature a short stroke loading actuator and a crosshead which can be adjusted vertically on a pair of parallel chrome plated solid steel loading posts. The actuator rod is moved by a motorized drive system controlled by front panel mounted Down/Up and Stop/Start switches. The test speed is set between 0 - 100% of the maximum speed using a front panel mounted single turn potentiometer. The nominal speed range rating is between 0 - 100 mm/min (0 - 4.0 in/min). Figure 1 shows an overall view of a TCA-10KN machine. Figure 2 shows a closeup view of the load cell and the optional roller type tensile grips mounted on a TCA-2KN testing machine. Figure 3 shows the AC Power Control On/Off switches and the Motor Control selector switches on the front panel. Figure 4 shows the digital display used for load indication. Figure 5 shows the major parts locations and their dimensions.

2.0 Motor Control System

The motor control system for the TCA Series of testing machines utilizes a gearmotor which is coupled to the input of the loading actuator with a timing belt drive. The gearmotor is lubricated for life and should not require servicing in normal operation. The motor control is provided by a solid state DC motor speed controller.

The electrical control circuitry to control the loading actuator consists of the following control elements. The Down/Up selector switch setting determines the movement direction of the loading actuator when the motor is running. The Stop/Start selector switch will start the motor which drives the loading actuator at the speed set by the Speed control potentiometer. The loading actuator speed is scaled from 0 - 100% from the minimum to maximum Speed potentiometer setting. The Speed potentiometer adjusted fully clockwise will result in 100% of the maximum speed (ie. 100 mm/min or 4.0 in/min). With the potentiometer rotated fully counter clockwise the motor speed is off.

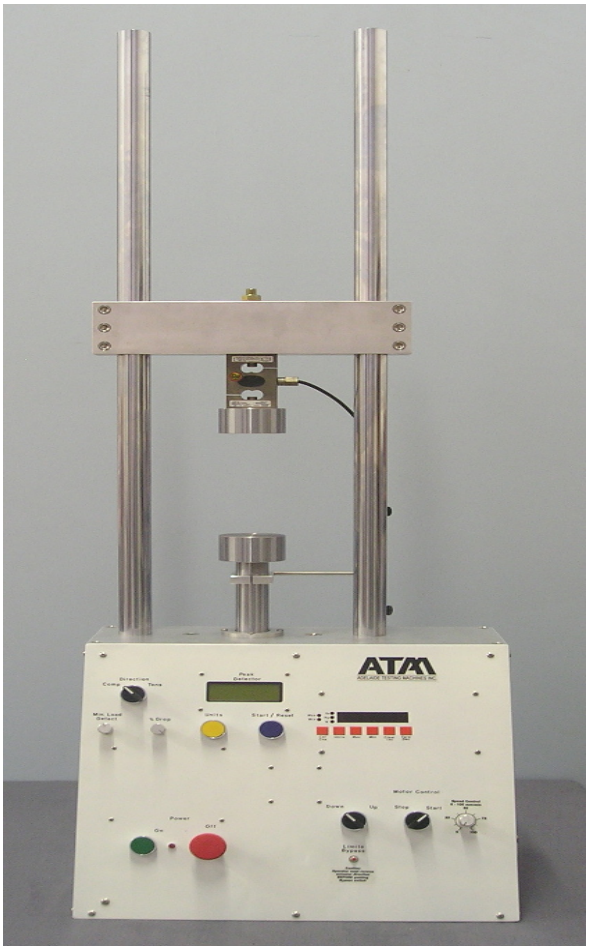


Figure 1
Overall View of Model TCA-10KN Testing Machine with Optional Break Detector and Circular Compression Platens

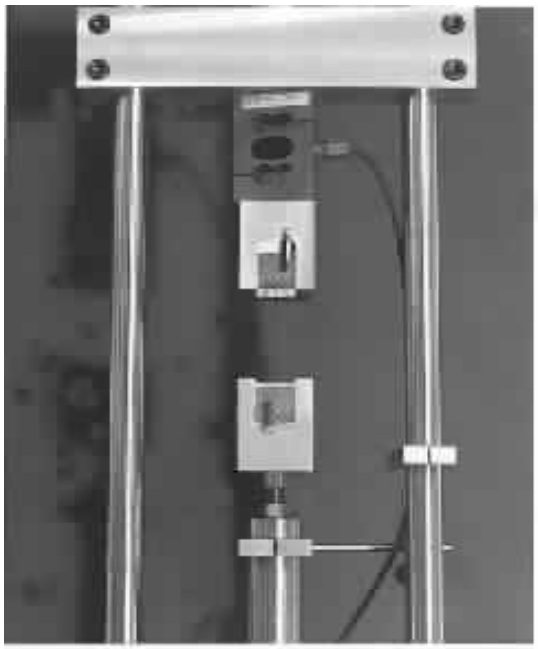


Figure 2
View of Roller Type Tensile Grips

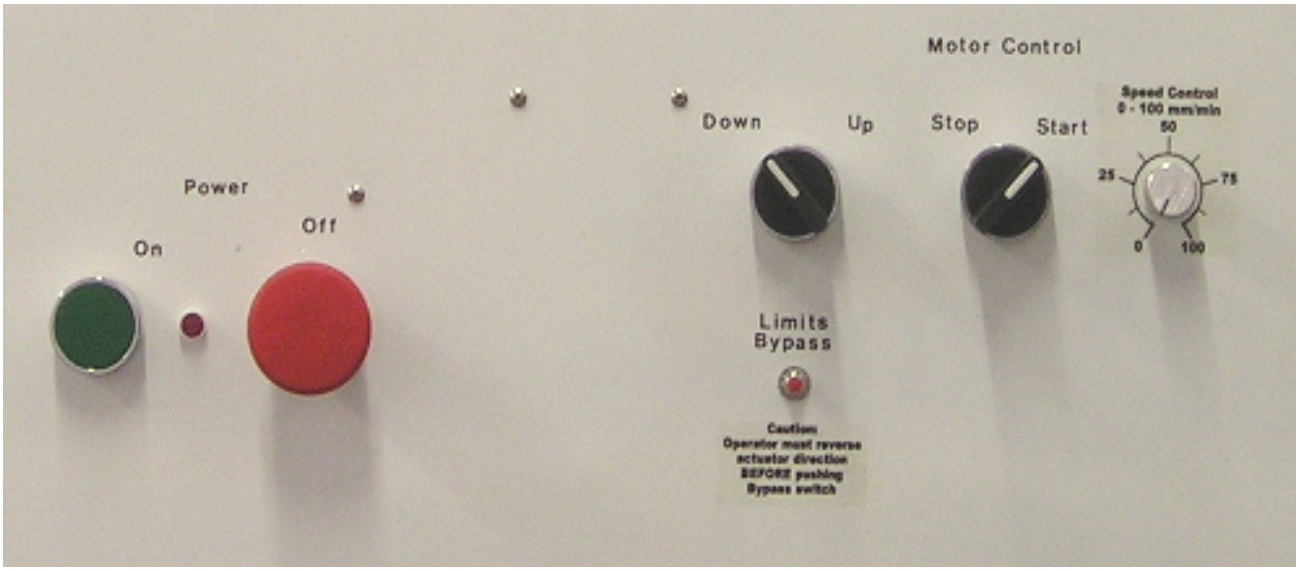
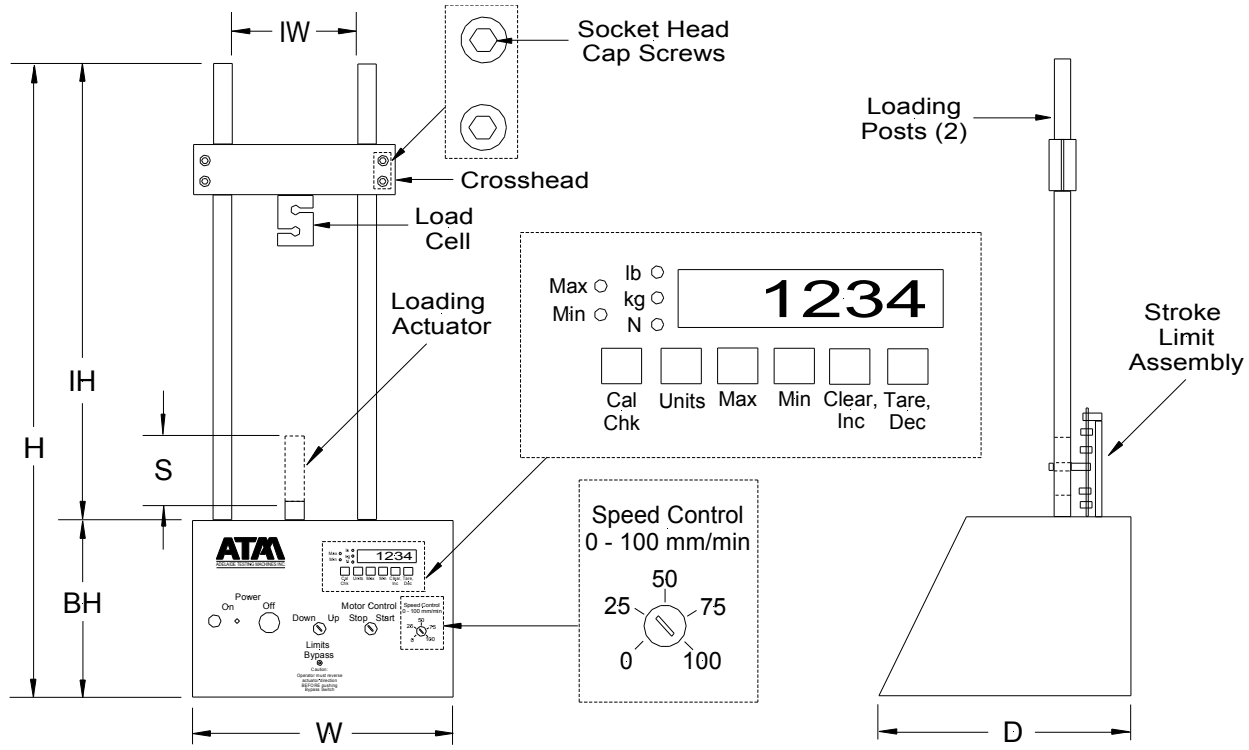


Figure 3
Control Switches on Front Panel

Figure 4
View of Microprocessor Display for Load Indication



MODEL NUMBER

DESCRIPTION	TCA-2KN	TCA-5KN	TCA-10KN	TCA-25KN	TCA-50KN
Load Capacity, kN	2	5	10	25	50
lb	550	1,100	2,200	5,600	11,000
Overall Height, H	122.2 (48.1)	127.0 (50.0)	132.1 (52.0)	130.3 (51.3)	151.1 (59.5)
Platen to Top Height, IH	91.4 (36.0)	94.0 (37.0)	97.8 (38.5)	91.4 (36.0)	91.4 (36.0)
Base Height, BH	30.7 (12.1)	33.0 (13.0)	34.3 (13.5)	38.9 (15.3)	59.7 (23.5)
Maximum Width, W	38.1 (15.0)	40.6 (16.0)	41.9 (16.5)	46.2 (18.2)	53.3 (21.0)
Inner Working Width, IW	17.8 (7.0)	20.3 (8.0)	22.9 (9.0)	27.9 (11.0)	27.9 (11.0)
Maximum Depth, D	26.7 (10.5)	27.9 (11.0)	29.2 (11.5)	30.7 (12.1)	40.6 (16.0)
Stroke Length, S	----------	----------12 (5.0) ----------		7.5 (3.0)	12 (5.0)
Test Speed Range at Rated Capacity	---------- 5 - 100 mm/min (0.2 - 4.0 in/min) ----------				
Machine Mass, kg	34	45	60	78	141
Weight, lb	75	100	130	172	310

NOTES:

1. Dimensions in Table are given as cm (in).
2. Machine Mass/Weight does not include actuator cover, safety doors, or other options.
3. Specifications and Dimensions are Subject to Change without Notice.

Figure 5
Major Parts Locations and Machine Dimensions

3.0 Detailed Description of Load Display System

This section contains information about the load display system, its operation, and how to configure it for particular test setups.

3.1 Overview of the Display Features

The load display system was designed to overcome some of the shortcomings of the various displays which are presently available in the market place for amplification and display of load cell signals. Most of these externally display to their digital display and internally calculate maximum and minimum loads at the same low speed rate of typically around 3 operations/second. The TCA Series machines display updates at 3.125 operations/second but internally at over an 800 Hz conversion rate. The high speed conversion rate is necessary in testing of certain materials or products which may undergo very fast load changes at the time of sample failure. The typical displays that are available may inaccurately calculate the failure load in situations of rapid load changes when only a 3 conversions/second sampling rate is utilized.

The TCA display board also has been designed with specific features such as Operator input of lower load limits than the load cell capacity for test situations where a test is to be stopped after a preset test load has been applied. If the preset load limit is reached the motor will stop rotating in the set test direction. The load can then be decreased by reversing the test direction. The Operator can also choose to display the load in one of three most commonly used Engineering Units (ie. lb, kg, N) which may be beneficial for test applications requiring different testing units. The Operator may also perform a fast tare of the load cell to zero out any initial load fluctuations on the display due to load grips setup or initial warmup fluctuations.

The following section details the operations which are performed using the individual keys.

3.2 Main Display Function Key Descriptions

3.2.1 Single Key Input Operations

The single key input operations are described as follows:

a) Cal Chk (Calibration Check)

An accuracy check of the load cell calibration can be quickly made by use of this key input. The ATM load cell provided is of a full strain gage bridge Wheatstone type which utilizes four strain gages for measurement of the load. Pressing the Cal Chk switch places a resistor in parallel with one of the four strain gages which results in the production of an unbalanced bridge and a load cell output reading. The Operator can then

compare this reading to that taken when the load cell was originally calibrated to determine if any significant changes have developed.

b) Set Units

The Set Units key switch allows the Operator to select between three Engineering Units for the display. The choices of Units are lb, kg, or N. Pressing this switch will cause the LED next to the indicated Unit to light and the reading on the display to be updated to the selected Unit.

Note: For the Max and Min keys, the load cell signal output corresponding to these keys have been designated in the following way.

Maximum value: Largest load cell output value closest to +10 volts which corresponds to the maximum tension load cell capacity

Minimum value: Largest load cell output value closest to -10 volts which corresponds to the maximum compression load cell capacity.

c) Max

The Max key switch is used to display the internally recorded maximum tension load or smallest compression load (ie. closest to zero load) since the Clear button was last pressed. This load was calculated by sampling the load cell signal at over 800 Hz. The load will be displayed in the Engineering Unit which has been selected.

d) Min

The Min key switch is used to display the internally recorded maximum compression load or smallest tension load (ie. closest to zero load) since the Clear button was last pressed. This load was calculated by sampling the load cell signal at over 800 Hz. The load will be displayed in the Engineering Unit which has been selected.

e) Clear

The Clear key switch is used to reset the microprocessor display to start recording the maximum and minimum load cell readings. This switch would typically be pressed before the start of a test to ensure that the new Maximum and Minimum load cell readings have been properly stored during a test.

f) Tare

The Tare key switch is pressed to zero the load cell if a change in the loading grips arrangement has been made or if the system is still warming up. This is a software tare and is not recorded by the microprocessor memory when the AC power switch is turned off.

3.2.2 Combined Key Operations

Four combined key operations are used to change the Operator settable load limits. If these limits are exceeded during a test, the motor will stop and an Error message will be displayed. If the maximum load limit is reached or the high limit switch is activated, the Error message E HI will be displayed. If the minimum load limit is reached or the lower limit switch is activated, the Error message E LO will be displayed. The combined key operations to change the load limits are described as follows.

a) Max and Clear

Pressing and holding the Max and Clear key switches simultaneously will increment the Operator settable maximum load limit from the present setting.

b) Max and Tare

Pressing and holding the Max and Tare key switches simultaneously will decrement the Operator settable maximum load limit from the present setting.

c) Min and Clear

Pressing and holding the Min and Clear key switches simultaneously will increment the Operator settable minimum load limit from the present setting.

d) Min and Tare

Pressing and holding the Min and Tare key switches simultaneously will decrement the Operator settable minimum load limit from the present setting.

4.0 Options and Accessories

Additional options, accessories, and other customized features may be added to the TCA Series of machines for special applications. Some of these are listed as follows:

A. 3 Digit Speed Control Potentiometer (Option TCA.DSC)

The TCA Series machines may be modified to include a three digit speed control potentiometer in place of the single turn potentiometer used on the standard machine. The speed may be input using the speed control from 0 - 99.9 mm/min with a direct readout of the speed.

B. Position (Displacement) Readout (Option TCA.MICPOS)

The TCA Series machines may be upgraded with a displacement readout display

to indicate the position of the actuator piston rod during a test. Price includes a digital display mounted on the front panel of the machine and an encoder mounted inside the machine for calculating the position.

C. Break Detector (Option TTD.BRKDET)

This option consists of a separate digital display and processor board to detect the peak load applied to a specimen during a test based on an Operator Input of the % Load Drop from the peak detected load of the test. This features works in both the tension and compression directions for determining peak load. When the peak load is detected the machine motor is shut off to stop the test. The Peak Load is then read off the main microprocessor display.

D. Data Acquisition Package (Option TCA-DAP)

The TCA Series may be upgraded with a data acquisition package consisting of a special version of our Model TC-100 Tensile/Compression software package which is used to control and acquire data from our different lines of computer controlled testing machines. Information on some of the features of the TC-100 software package can be obtained from our website under the TTS Series of testing machines. The data acquisition package consists of the Model TC-100 Tensile/Compression software package and our 12 bit A/D D/A I/O Data Acquisition card. The software will monitor the load cell signal and the actuator stroke position (ie. if Position Readout option is purchased for TCA Series) available at BNC connectors on the rear of the TCA Series machine and allow Real-Time display of the test as either Load vs. Time or Load vs. Actuator Position.

E. Safety Shields for Front and Rear (Option TCAxxKN.SAF)

The TCA series machines may be supplied with clear safety shields for the front and/or rear working area of the systems. The safety shield package consists of two side panels and two front hinged panels of 3/8 in (9.5 mm) thick clear polycarbonate sheet. This design ensures a large enclosed working distance for specialized setups. The side panels are approximately 4 in (10 cm) wide and do not open. The hinged doors are secured in place by two sliding bolts.

The safety shield package includes two hinged door panels, two side panels, and mounting hardware. A complete package is used to enclose each of the front and rear working areas of the system. Price of each package includes factory installation of the safety shields on the machine when ordered with the TCA series machine.

F. Optional Safety Shield Door Switches (Option TCASERIES.SAFSW)

Switches will monitor the open/close condition of the safety doors. In the TCA Series, opening a door will cause the motor to stop running if the Start/Stop selector switch is in the Start position.

G. Bellows Covers on Actuator (Option TCAxxKN.BSC)

For dusty environments, TCA Series machines can be supplied with a bellows cover over the loading actuator rod to prevent dust from coating the bushing guiding the actuator rod through the top of the base. This option is factory installed and should be ordered with the system.

H. Optional Load Cells

A large selection of optional load cells are available for use with the TCA Series for special testing situations. Please contact ATM if you need assistance selecting a proper size load cell.

I. Test Grips

A wide range of test grips are available to perform tensile, compression, bending, and tear tests and others. Custom designed fixtures can also be provided by ATM to allow testing of many different specimen types or customer products. Please contact us with your requirements for test grips and/or custom designed fixtures for your application.

J. Other Modifications

In addition to the listed options, ATM can provide other modifications to the standard machines to accommodate specific requirements. Some of these options include an increased working distance between the loading posts, longer actuator travel length, and other speed ranges. Please contact ATM with your additional requirements.