Chatillon materials testing / AMETEK®

Chatillon CS2Plus Series

CS2Plus-225 and CS2Plus-1100 User Manual

AMETEK®

SENSORS, TEST & CALIBRATION

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Warnings

IMPORTANT: When the machine has been installed and before it is ready for use, the final user must conduct the final Risk Assessment on the machine, including all such safety measures (shields, guards, etc.) to satisfy the requirements of the Machinery Directive and EHSR (Essential Health and Safety Requirements). The final user must take the necessary steps to ensure the safety of the operator, other people, machines and property by providing guards, shields, screen, adequate lighting, adequate ventilation. Factors affecting required safety measures include industry, application, material under test, and location of use.

! WARNING: Pinch/Crush Hazard — Allow only one person to operate the system at a time.

Operator injury may result if more than one person operates the system. Before working inside the hazard area between grips or fixtures, ensure that no other personnel can operate the computer or any of the system controls.

! WARNING: Pinch/Crush Hazard — Take care when installing or removing a specimen, assembly, structure, or load spring component.

Installation or removal of a specimen, assembly, structure, or load spring component involves working inside the hazard area between the grips and fixtures. Keep clear of the jaws of a grip or fixture at all times. Keep clear of the hazard area between the grips or fixtures during actuator or crosshead movement. Ensure that all actuator or crosshead movements necessary for installation or removal are slow and, where possible, at a low force setting.

! WARNING: Hazard — Press the Emergency Stop Button whenever an unsafe condition exists.

The Emergency Stop button removes power or electrical drive from the testing system and brings the hazardous elements of the system to a stop as quickly as possible. It does not isolate the system from electrical power—other means are provided to disconnect the electrical supply. If you are concerned that safety may be compromised, stop the test using the Emergency Stop button. Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it.

! WARNING: Flying Debris Hazard — Make sure that test specimens are installed correctly in grips or fixtures to ensure material cannot move, slip, slide or be ejected at high velocity.

Incorrect installation of test specimens creates stresses in grip jaws or fixture components that can result in breakage of these components. The high energies involved can cause the broken parts to be forcefully ejected at high velocity and a long distance from the test area. Install specimens in the center of the grip jaws in line with the load path. Insert specimens into the jaws by at least the amount recommended in your grip documentation. This amount can vary between 66% to 100% insertion depth. Refer to supplied instructions for your specific grips. Use any centering and alignment devices provided.

! WARNING: Hazard — Protect electrical cables from damage and inadvertent disconnection.

The loss of controlling and feedback signals that can result from a disconnected or damaged cable causes an open loop condition that may drive the actuator or crosshead rapidly to its extremes of motion. Protect all electrical cables, particularly transducer cables, from damage. Never route cables across the floor without protection, nor suspend cables overhead under excessive strain. Use padding to avoid chafing where cables are routed around corners or through wall openings.

! WARNING: Electrical Hazard — Disconnect the electrical power mains before removing the covers to electrical equipment.

Disconnect equipment from the electrical power mains before removing any electrical safety covers or replacing fuses. Do not reconnect the power source while the covers are removed. Refit covers as soon as possible.

! WARNING: High/Low Temperature Hazard — Wear protective clothing when handling equipment at temperature extremes.

Materials testing is often carried out at extreme temperatures using ovens, furnaces, or cryogenic chambers. Extreme temperature means an operating temperature exceeding 60° C (140° F) or below 0° C (32° F). Use protective clothing such as gloves when handling equipment at these temperatures. Display a warning notice concerning low or high temperature operation whenever temperature control equipment is in use. Be aware that the hazard from extreme temperature can extend beyond the test's immediate area.

! WARNING: Hazard — Do not switch the test machine off-line from computer control without first ensuring that the manual control will not cause actuator or crosshead movement.

The actuator or crosshead will immediately respond to manual control settings when the system is placed off-line from computer control. Before transferring to manual control, make sure that the control settings are such that unexpected actuator or crosshead movement cannot occur.

! WARNING: Motion Hazard — Keep clear of the operating area of the machine unless deactivated.

This machine is an automated testing system which can be preprogrammed for specific motion sequences. This presents a hazard because its movements are not always predictable. The machine can be programmed to hold position for a time period, and then move at high speed without warning. During operation of the machine, it is important for users to keep fingers and hands outside Pinch and Crush areas. Be sure to deactivate the machine before touching material samples or entering the critical safety areas.

! WARNING: Hazard — Set the appropriate limits before performing tests.

Operational limits are included within the testing system to suspend motion or shut off the system when upper and/or lower bounds of actuator or crosshead travel, or force or strain are reached during testing. Correct setting of operational limits by the operator, prior to testing, will reduce the risk of damage to test article and system, and associated hazard to the operator.

! WARNING: Rotating Machinery Hazard — Never operate the machine with the covers removed.

If a cover must be removed, first disconnect equipment from mains power. Do not connect power while the covers are removed. Refit covers as soon as possible.

! WARNING: Explosion Hazard — Wear eye protection and/or use protective shields or screens.

Wear eye protection and use protective shields or screens whenever a risk of injury to operators and observers exists from the failure of a test specimen, assembly, or structure, particularly where explosive disintegration may occur. Due to the wide range of specimen materials, assemblies, or structures that may be tested, any hazard resulting from the failure of a test specimen, assembly, or structure is entirely the responsibility of the owner and user of the equipment.

! **WARNING: Hazard — Ensure components of the load string are correctly pre-loaded to minimize the risk of fatigue failure.**

Visually inspect highly stressed components such as grips and threaded adapters prior to every test for signs of wear or fatigue damage.

! **WARNING: Always maintain a clean work area free of debris or obstructions.**

Remove load from any samples and ensure machine is not moving before cleaning or removing debris from the machine.

! **WARNING: Hazard — From Stored Potential Energy.**

If power is lost while a sample such as a spring is under load, the crosshead may NOT remain in its current position. In this case, it can only be moved by restoring power. Until such time, a stored potential energy in the sample may present a safety hazard.

! **WARNING: Ensure Adequate lighting of work area**

! **WARNING: Install machine in an area that will not allow the user to become distracted**

! **WARNING: Hazard—Risk of electric shock. Never operate machine with covers removed.**

! **WARNING: Shock Hazard — Risk of electric shock. Do not replace the mains power cord with an inadequately rated cord.**

! **CAUTION: User-performed maintenance is not required, and should not be performed on the CS2Plus Series force tester. If maintenance is required, please contact AMETEK for service.**

Overview

Introduction

Welcome to your new CS2Plus Series force tester. The equipment is easy to use and has been designed to meet a broad range of applications. It is an accurate measurement system for various types of physical testing and incorporates an extensive range of features that make it ideal for performing complex testing applications.
The control console is a 2 in 1 laptop that folds into a touch screen enabling control of the tester and test management without a mouse.-Using a laptop enables test data to exported via WiFi, wired network, or USB flash drive,
The high stiffness frame incorporates a crosshead guidance system to prevent side loading of the sample under test. The crosshead is driven by single leadscrew, motor and DC PWM system to achieve a wide speed range over the full load range. The machine is capable of running full load at full speed. A range of highly accurate, interchangeable Loadcells are available for tension, compression and cycling through zero force measurements. The system is ideal for use in production, quality control, educational and research environments.

Note

We are constantly improving and evolving our equipment, and releasing updates of our firmware and software. Release notes which detail the latest changes can be found at https://www.ametektest.com/products/material-testers/single-column-test-stands/cs-series.

Safety Features

Emergency Stop

The Emergency Stop Button is provided to immediately remove power from the motor drive and stop the machine. To re-enable the start-up sequence, release the button by turning it clockwise one quarter turn.

Safe Line Button

The safe line button is mounted on the left-hand side of the frame and is initially illuminated to indicate the crosshead motor circuit is ready but has not yet energized. The safe line circuit must be activated before the material tester can be used. Pressing the safe line button will turn the light off to indicate that the material tester is now ready for use. Use the main power switch to turn power off when the material tester is not in use.

The Safe Line button

The Main Power switch

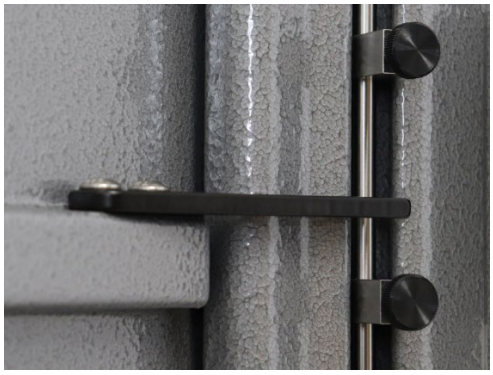
! **WARNING: Pinch/ Crushing Hazard—Always ensure the safe line button is illuminated and the machine is not moving before reaching into cross head area. Always ensure the Emergency Stop button is visible and easily accessible to the user.**

Crosshead Movement Limits

The CS2Plus Series is fitted with two mechanically activated limit stops. These can be used as extra protection to stop load cells, grips or fixtures coming into contact, or to back up the tests upper and lower limits. Activating a limit stop will automatically stop the machine.

To Adjust a Limit Stop

1. Loosen the limit stop screw, move it to the top or bottom of its travel, and tighten the screw temporarily.
2. Drive the moving crosshead to the highest or lowest position it may go to safely, without damaging any fitted grips or fixtures.
3. Move the crosshead slightly away from the position established in step 2.
4. Loosen the screw and move it to the cross-head actuator and tighten in this position.



Optional Splinter Shield

A transparent splinter shield is available as an option to enclose the test sample. A shield should be used if any danger of samples shattering during the test exists.

Safety Jog

The CS2Plus Series has a built-in safety feature to provide protection while jogging the machine.If the machine measures an unexpected load or friction while jogging, it will automatically stop.

Installation

Unpacking

All packing material should be carefully removed from the testing machine, and a careful visual inspection should be made to ensure that there is no obvious transit damage.

> **Note**
>
> Please check that you have received all the parts that were ordered. If there are any parts damaged, or any parts missing, please report this to your authorized Chatillon representative.

Setting Up the CS2Plus Force Tester

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. The CS2Plus Series should be installed in an area where adequate lighting is present in order to ensure safe use. Ensure the air flow around the base of the machine is not restricted.

! **CAUTION: Do not position the CS2Plus Series so that it is difficult to operate. The mains supply machine socket should be easily accessible so that the mains power can be disconnected in case of an emergency.**

The CS2Plus Series is a heavy machine so be careful choosing the location where it is installed. If it is to be bench mounted, ensure that the bench is capable of remaining firm and stable, and able to withstand the combined weight of the machine and any mounted accessories. The CS2Plus Series force tester must be installed with the column oriented vertically; otherwise very low load measurements could be affected.

! **CAUTION: The CS2PLus Series must be positioned so that the front of the machine can be easily accessed. The Emergency Stop Button MUST NOT BE OBSTRUCTED in any way.**

Lifting

As the CS2Plus Series is heavy, use care when lifting. Lifting equipment should be used as necessary.

Lifting With a Pallet

The CS2Plus Series can have a pallet fitted under it so that it may be lifted to the desired position with a forklift hoist or suitable lifting trolley.

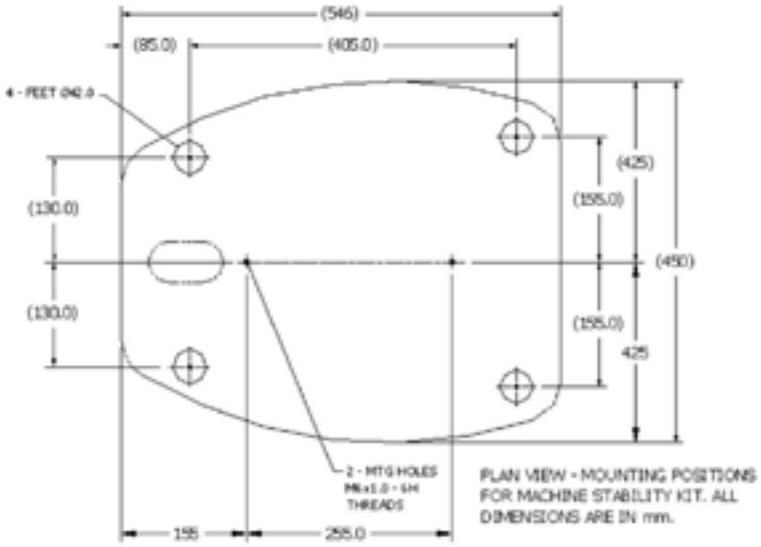
Lifting by Hand

The force tester can be lifted manually using least 2 people as the machine weighs more than 50kg (110lb). Do not lift using the plastic base cover. Instead, lift at the aluminum bottom plate.

Securing The CS2Plus Series to a Bench

The force tester is heavy and cannot normally tip over. However, if there is the possibility that users can pull against the vertical column, there is a risk that the machine may be pulled over. The template below shows the location of holes to secure the test machine to a bench top. Only two diagonal holes are necessary to secure the machine.

! **WARNING: The CS2Plus Series must be secured to a rigid and stable supporting surface. Ignoring this requirement disregards the safety standards established for the machine.**



Note

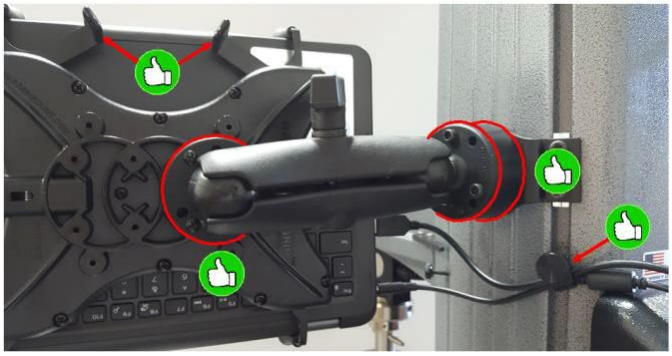
This attachment must be performed by authorized AMETEK service personnel.

Mounting the Touch Console

The touch console is fitted with a rear mounted ball joint adapter. The force tester is supplied with another ball joint adapter fitted on the right-hand side of the vertical column. The touch console is attached to the force tester using the supplied spring-loaded clamp.
Squeeze the "spring" end of the clamp and position the other end over the ball joint adapter on the rear of the touch console. Ensure that the clamp is pointing towards the left-hand side of the touch console and that the hand screw mechanism is towards the top of the touch console. Attach the opposite end of the arm to the ball joint.
As shown below, with the touch folded, and the touch Screen facing forward, position the touch Console bottom first onto the clamp. Squeeze the spring-loaded tabs on top of the clamp and gently tilt backwards the touch into rubber holding fingers and release.

Once fitted, position the touch console where it can be easily viewed and operated by the user. Once you have positioned the touch console, tighten the hand screw so that the touch console is secured in the intended position. Ensure that the control console does not move when pressing on the touch screen.

! **CAUTION: Always support the touch console whenever adjusting the spring-loaded clamp. If the touch console falls from the mounting location, serious injury or damage to the equipment can result.**



Connecting the Touch Console USB Cable

The touch console is connected to the force tester frame using the supplied USB A to B cable. Connect the cable into the USB A sockets on the left-hand side of the touch console and connect the other end into the USB B connector on the rear of the force tester frame.

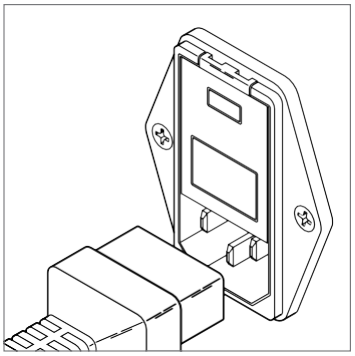
Mains Input Voltage Selection

The CS2Plus Series can be used with mains power of either 230VAC ±10% or 115VAC ±10% with frequency from 50Hz to 60Hz.

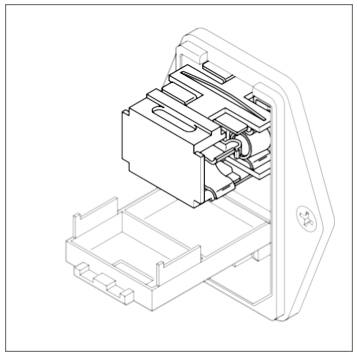
! **CAUTION: Check to ensure the correct voltage of your mains power supply has been selected on the input connector BEFORE connecting power to the machine.**

Fuse Replacement

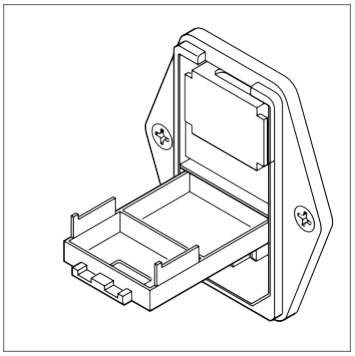
1. Remove any power to the machine, then use a small, flat-blade screwdriver to open the voltage selector access panel.
2. With the same flat-blade screwdriver, remove the voltage selector/fuse-holder and replace the fuse.
3. Rotate the voltage selector to show the required voltage at the top of the holder
4. Reinstall the voltage selector, push to close and ensure the required voltage is visible in the small window.



Remove power to the unit



Open the voltage selecto panel



Remove the voltage selector/fuse-holder

> **Note**
>
> The fuses must be installed with one end touching the pin end of the fuse holder.

! **WARNING: Replace with the factory supplied fuses as shown on the rear label of the test machine.**

! **WARNING: To avoid the risk of electrical shock, equipment must be connected to an outlet with a protective earth ground, using the power cord provided.**

Load Cells and Grips

To Install a Load Cell

1. Place the load cell adapter through the hole in the moving crosshead with the thread side down.
2. Screw the load cell adapter into the load cell. Be careful not to overtighten low-capacity load cells.

> **Note**
>
> Take care to ensure that the locating pin on the load cell fits in one of the holes on the underside of the moving crosshead.

3. Check that the connecting cable is on the same side as the connecting socket, then tighten the load cell adapter with the C spanner provided.
4. Insert the load cell plug in the socket on the rear of the machine (see Figure 1), and finger-tighten the two retaining screws.
5. Fit the eye end to the load cell and tighten with the C spanner.

Grips and Adapters

We offer a complete line of grips and adapters to meet your specific needs. Each can be found on our website at ametektest.com with individual catalogs and specifications included.

Installing the Grips

- When installing the heavy upper grips on the load cell, avoid bumping the eye end. If the grip is a close fit, DO NOT FORCE IT. Set, or re-set, the bottom limit stops so the grips will not meet when the crosshead is lowered.
- In both tension and compression tests, center the specimen in line with the axis of the load cell and the bottom fixed anchor pin to avoid side thrust.

> **Note**
>
> In compression tests, care must be taken to avoid bringing the platens together or against solid specimens at high speed. Ensure that the lower crosshead limit is set correctly. If a special lower fixture is used, ensure that it is fixed in position so that it does not block the normal downward movement of the upper fixture.

- Avoid overloading beyond the rated capacity of the load cell. Prior to testing, ensure that the maximum force anticipated will not exceed the capacity of the cell installed.

Chatillon load cells are built to exceed the standards as set out by ASTM, BS, DIN etc. Load cells on all models of CS2Plus Series machines are user changeable. Various capacities are available from 5N up to the capacity of the frame. While cells may be used below 10% of capacity, it is recommended to use a lower force cell such that the test force will fall in the upper 90% of its range. This will give the best signal to noise performance of the load measuring system.

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Warranty

This instrument is warranted against defects in workmanship, material and design for one (1) year from the date of delivery to the extent that AMETEK will, at its sole option, repair or replace the instrument or any part thereof which is defective, provided, however, that this warranty shall not apply to instruments subjected to tampering or, abuse, or exposed to highly corrosive conditions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED AND AMETEK HEREBY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITA- TION, ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. AMETEK SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, ANY ANTICIPATED OR LOST PROFITS.

This warranty is null and void if the purchaser fails to follow any and all instructions, warnings or cautions in the instrument's Instruction Manual.

If a manufacturing defect is found, AMETEK will replace or repair the instrument or replace any defective part thereof without charge; however, AMETEK's obligation hereunder does not include the cost of transportation, which must be borne by the customer. AMETEK assumes no responsibility for damage in transit, and the purchaser should present any claims for such damage to the carrier.

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