Instron
Series 5500 Load Frames
Including Series 5540, 5560, 5580

Reference Manual - Equipment

M10-14190-EN Revision A

www.instron.com

Electromagnetic Compatibility

Where applicable, this equipment is designed to comply with International Electromagnetic Compatibility (EMC) standards.

To ensure reproduction of this EMC performance, connect this equipment to a low impedance ground connection. Typical suitable connections are a ground spike or the steel frame of a building.

Proprietary Rights Notice

Trademarks

General Safety Precautions

Materials testing systems are potentially hazardous.

Materials testing involves inherent hazards from high forces, rapid motions, and stored energy. You must be aware of all moving and operating components that are potentially hazardous, particularly the actuator in a servohydraulic testing system or the moving crosshead in an electromechanical testing system.

Carefully read all relevant manuals and observe all Warnings and Cautions. The term Warning is used where a hazard may lead to injury or death. The term Caution is used where a hazard may lead to damage to equipment or to loss of data.

Instron products, to the best of its knowledge, comply with various national and international safety standards, in as much as they apply to materials and structural testing. Our products are designed to the Instron Safety Standard (ICP-CS503), which is available on request. This standard is derived from various national and international standards including IEC61010-1. We certify that our products comply with all relevant EU directives (CE mark).

Because of the wide range of applications with which our instruments are used, and over which we have no control, additional protection devices and operating procedures may be necessary due to specific accident prevention regulations, safety regulations, further EEA directives or locally valid regulations. The extent of our delivery regarding protective devices is defined in your initial sales quotation. We are thus free of liability in this respect.

At your request, we will gladly provide advice and quotations for additional safety devices such as protective shielding, warning signs or methods of restricting access to the equipment.

The following pages detail various general warnings that you must heed at all times while using materials testing equipment. You will find more specific Warnings and Cautions in the text whenever a potential hazard exists.

Your best safety precautions are to gain a thorough understanding of the equipment by reading your instruction manuals and to always use good judgement.

It is our strong recommendation that you should carry out your own product safety risk assessment.

Warnings

Hazard - Press the Emergency Stop button whenever you consider that an unsafe condition exists.

The Emergency Stop button removes hydraulic 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. Whenever you consider 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.

Flying Debris Hazard - Make sure that test specimens are installed correctly in grips or fixtures in order to eliminate stresses that can cause breakage of grip jaws or fixture components.

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 projected forcefully some 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.

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.

Warnings

High/Low Temperature Hazard - Wear protective clothing when handling equipment at extremes of temperature.

Materials testing is often carried out at non-ambient temperatures using ovens, furnaces or cryogenic chambers. Extreme temperature means an operating temperature exceeding 60 °C (140 °F) or below 0 °C (32 °F). You must 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. You should note that the hazard from extreme temperature can extend beyond the immediate area of the test.

Crush Hazard - Take care when installing or removing a specimen, assembly, structure, or load string component.

Installation or removal of a specimen, assembly, structure, or load string component involves working inside the hazard area between the grips or fixtures. When working in this area, ensure that other personnel cannot operate any of the system controls. 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.

Hazard - Do not place a testing system off-line from computer control without first ensuring that no actuator or crosshead movement will occur upon transfer to manual control.

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.

Robotic Motion Hazard - Keep clear of the operating envelope of a robotic device unless the device is de-activated.

The robot in an automated testing system presents a hazard because its movements are hard to predict. The robot can go instantly from a waiting state to high speed operation in several axes of motion. During system operation, keep away from the operating envelope of the robot. De-activate the robot before entering the envelope for any purpose, such as reloading the specimen magazine.

Warnings

Hazard - Set the appropriate limits before performing loop tuning or running waveforms or tests.

Operational limits are included within your 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.

Electrical Hazard - Disconnect the electrical power supply before removing the covers to electrical equipment.

Disconnect equipment from the electrical power supply 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.

Rotating Machinery Hazard - Disconnect power supplies before removing the covers to rotating machinery.

Disconnect equipment from all power supplies before removing any cover which gives access to rotating machinery. Do not reconnect any power supply while the covers are removed unless you are specifically instructed to do so in the manual. If the equipment needs to be operated to perform maintenance tasks with the covers removed, ensure that all loose clothing, long hair, etc. is tied back. Refit covers as soon as possible.

Hazard - Shut down the hydraulic power supply and discharge hydraulic pressure before disconnection of any hydraulic fluid coupling.

Do not disconnect any hydraulic coupling without first shutting down the hydraulic power supply and discharging stored pressure to zero. Tie down or otherwise secure all pressurized hoses to prevent movement during system operation and to prevent the hose from whipping about in the event of a rupture.

Hazard - Shut off the supply of compressed gas and discharge residual gas pressure before you disconnect any compressed gas coupling.

Do not release gas connections without first disconnecting the gas supply and discharging any residual pressure to zero.

Warnings

Explosion Hazard - Wear eye protection and use protective shields or screens whenever any possibility exists of a hazard from the failure of a specimen, assembly or structure under test.

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 the user of the equipment.

Hazard - Ensure components of the load string are correctly pre-loaded to minimize the risk of fatigue failure.

Dynamic systems, especially where load reversals through zero are occurring, are at risk of fatigue cracks developing if components of the load string are not correctly pre-loaded to one another. Apply the specified torque to all load string fasteners and the correct setting to wedge washers or spiral washers. Visually inspect highly stressed components such as grips and threaded adapters prior to every fatigue test for signs of wear or fatigue damage.

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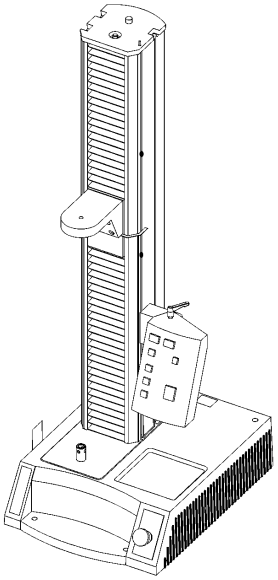
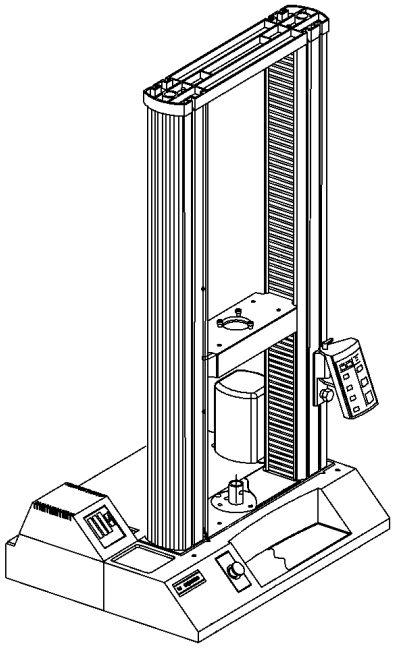
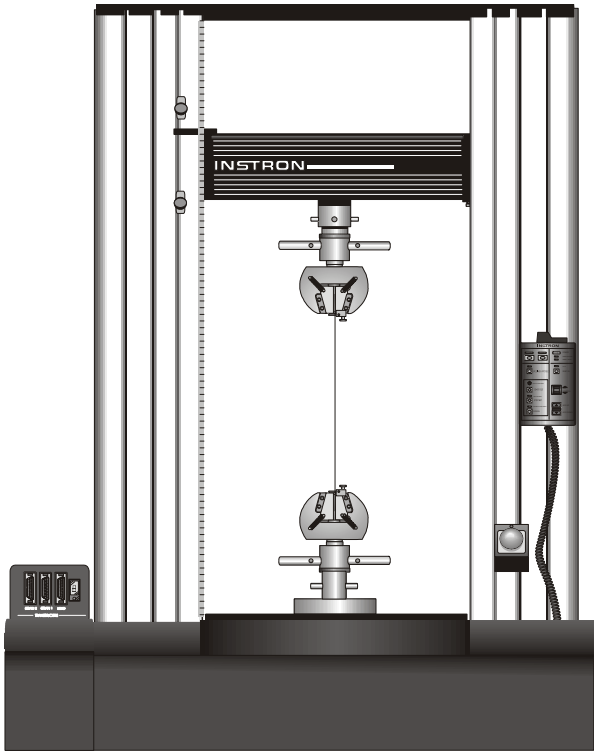


Series 5540 Single Column Table Top Models



Series 5560 Dual Column Table Top Models



Series 5580 Floor Models

Series 5500 Load Frames

Chapter 1
Introduction

Outline

This chapter provides a brief overview of the entire electromechanical testing system. It includes the following sections:

Purpose

Instron's electromechanical testing systems are used to test a wide range of materials in tension or compression. There are three general categories, or series, of testing systems within the Series 5500 product line, which are summarized in Table 1-1.

Table 1-1. Summary of Series 5500 Load Frames

Series	Description	Model Numbers	Load Capacity
Series 5540	Single column table top models	5542	500 N (112 lbf)
		5543	1 kN (225 lbf)
		5544	2 kN (450 lbf)
Series 5560	Dual column table top models	5564	2 kN (450 lbf)
		5565	5 kN (1125 lbf)
		5566	10 kN (2250 lbf)
		5567	30 kN (6700 lbf)
		5569	50 kN (11250 lbf)
Series 5580	Dual column floor models	5581	50 kN (11250 lbf)
		5582	100 kN (22500 lbf)
		5584	150 kN (33750 lbf)
		5585H	250 kN (56200 lbf)

Instron electromechanical load frames are designed to apply a load to a test specimen via the moving crosshead. The drive system moves the crosshead up to apply a tensile load on the specimen, or down to apply a compressive load on the specimen.

A load transducer (load cell), mounted in series with the specimen, measures the applied load. The load cell converts the load into an electrical signal that the control system measures and displays. Load cells are interchangeable with others of different capacities, providing a range of load measuring capabilities limited only by the maximum capacity of the load frame. Strain transducers (extensometers) can also be used on these systems to measure strain.

Control of the testing system is via an Instron proprietary software program designed specifically for materials testing. Setting test parameters, operating the

system, collecting and analyzing test data is done through the software program. Detailed information on operating the system from the software is provided in the software online help.

A control panel is located on the load frame. The control panel, combined with the software program, provides a flexible user interface that enables you to perform functions from either the computer or the control panel.

System Description

Major Components

The major components of an Instron electromechanical testing system include:

- Load frame
- Instron approved computer system with Instron console software and either Instron application software or user programs.
- Controller
- Load cell

The specimen is secured by grips for tension testing, or table-mounted anvils on a platen for compression testing. Special fixtures are available for applications such as flexure and peel testing. If you require strain measurement, an optional strain gauge extensometer attaches to the specimen. Specialized, non-contacting extensometers can also be used with specimens that are unable to support a contacting extensometer. Contact your local Instron office or visit our web site at **www.instron.com** for assistance with Instron's grips and fixtures.

Structural Design

Dual-Column Load Frames

Dual-column load frames comprise a base, two columns, a crosshead, and a top plate. This structure forms a rigid closed frame with high stiffness to reduce the deflection of the load frame when under load.

Each column comprises a guide column and a ballscrew. The crosshead is mounted on both the guide column and the ballscrew. Rotation of the ballscrew drives the crosshead up or down while the guide column provides stability.

Single-Column Load Frames

Single-column load frames comprise a base, a column and a crosshead. This structure forms a rigid c-shaped frame with high stiffness to reduce the deflection of the load frame when under load.

The column comprises a guide column and a ballscrew. The crosshead is mounted on both the guide column and the ballscrew. Rotation of the ballscrew drives the crosshead up or down while the guide column provides stability.

Frame Drive System

The load frame drive is located in the frame base. The drive motor is connected to the lower end of the ballscrews by a series of belts and drive pulleys. On the dual column machines, motor rotation causes synchronous rotation of the ballscrews, which in turn causes the crosshead to move up or down. On the single column machines, motor rotation causes the rotation of the single ballscrew, which in turn causes the crosshead to move up or down.

Load String

A load cell is mounted on the crosshead. A pair of grips or fixtures is then mounted on the load cell and the frame base. The grips or fixtures secure a specimen of material in place. When you start a test, the crosshead moves up or down applying a tensile or compressive load on the specimen. The load cell converts this load into an electrical signal that the controlling software can measure and display.

System Communication

The system communicates primarily through the controller. The computer running the test control and analysis software contains a Digilink communications board, which enables the computer to communicate with the controller. The controller contains sensor conditioning cards for the system transducers that communicate with the computer and transfers data between the transducers and the computer. The controller also communicates with the load frame via a frame interface board (FIB) inside the load frame. The FIB links all the electrical components of the frame together.

Principle of Operation

The testing system operates on the principle of closed-loop servo control. The control may be based on crosshead position, load, or strain.

Using crosshead position as an example, when a test begins, the computer passes a start command to the controller which in turn sends a command signal to a servo-amplifier requesting a particular crosshead position. The servo-amplifier also receives a feedback signal of the current crosshead position from an encoder that is driven by the frame drive system. The servo-amplifier compares the command signal and the feedback signal and, if there is a difference between the two, an error signal is generated that causes the drive motor to move the crosshead at a speed and direction that will reduce the error.

Load Frame Components

The graphics shown in this section display the various components for the single column and dual column load frames. Refer to the graphic displaying your specific model type in order to familiarize yourself with the various components of your frame. The following sections briefly describe the various components.

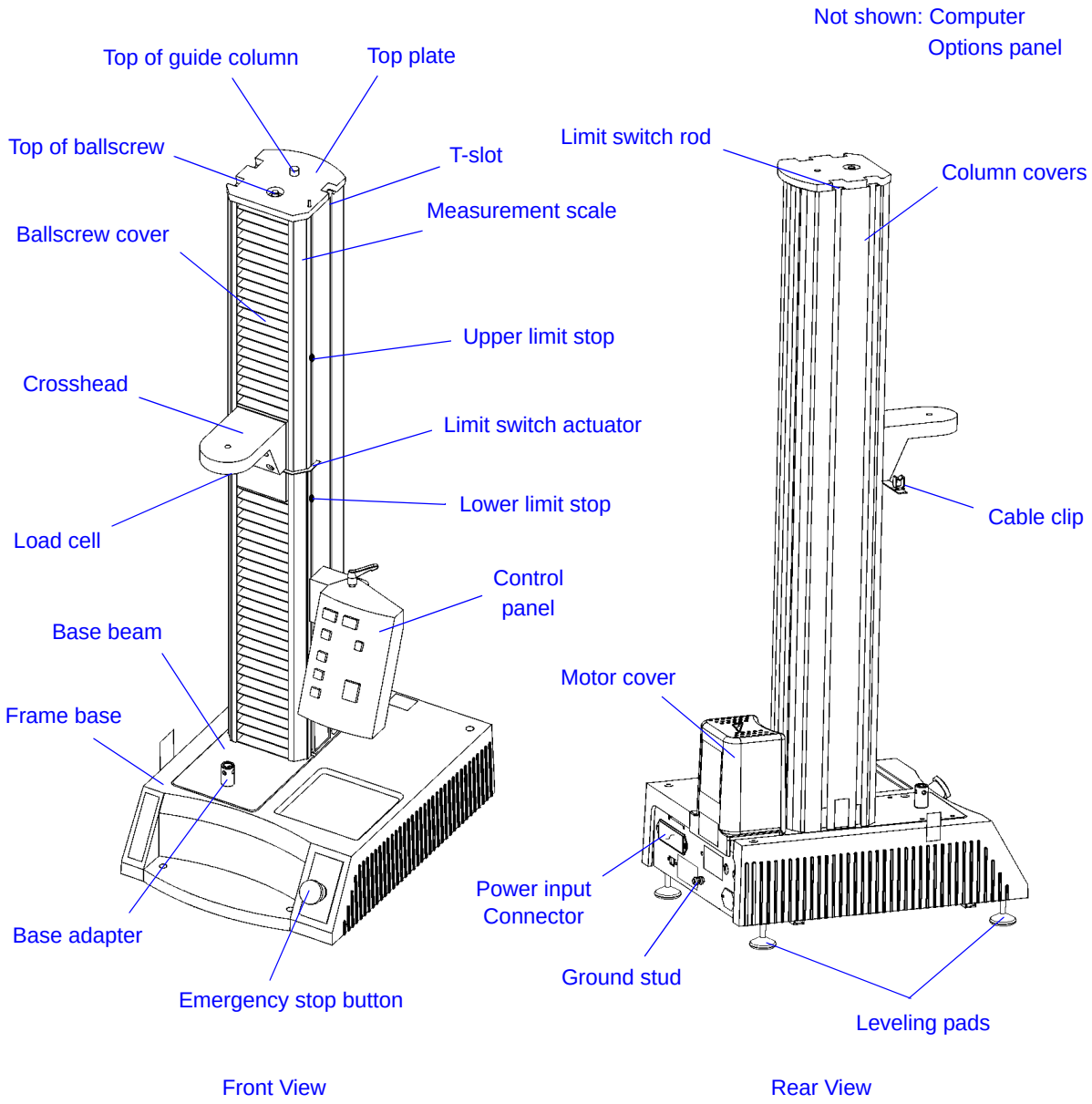


Figure 1-1. 5540 Series Load Frame

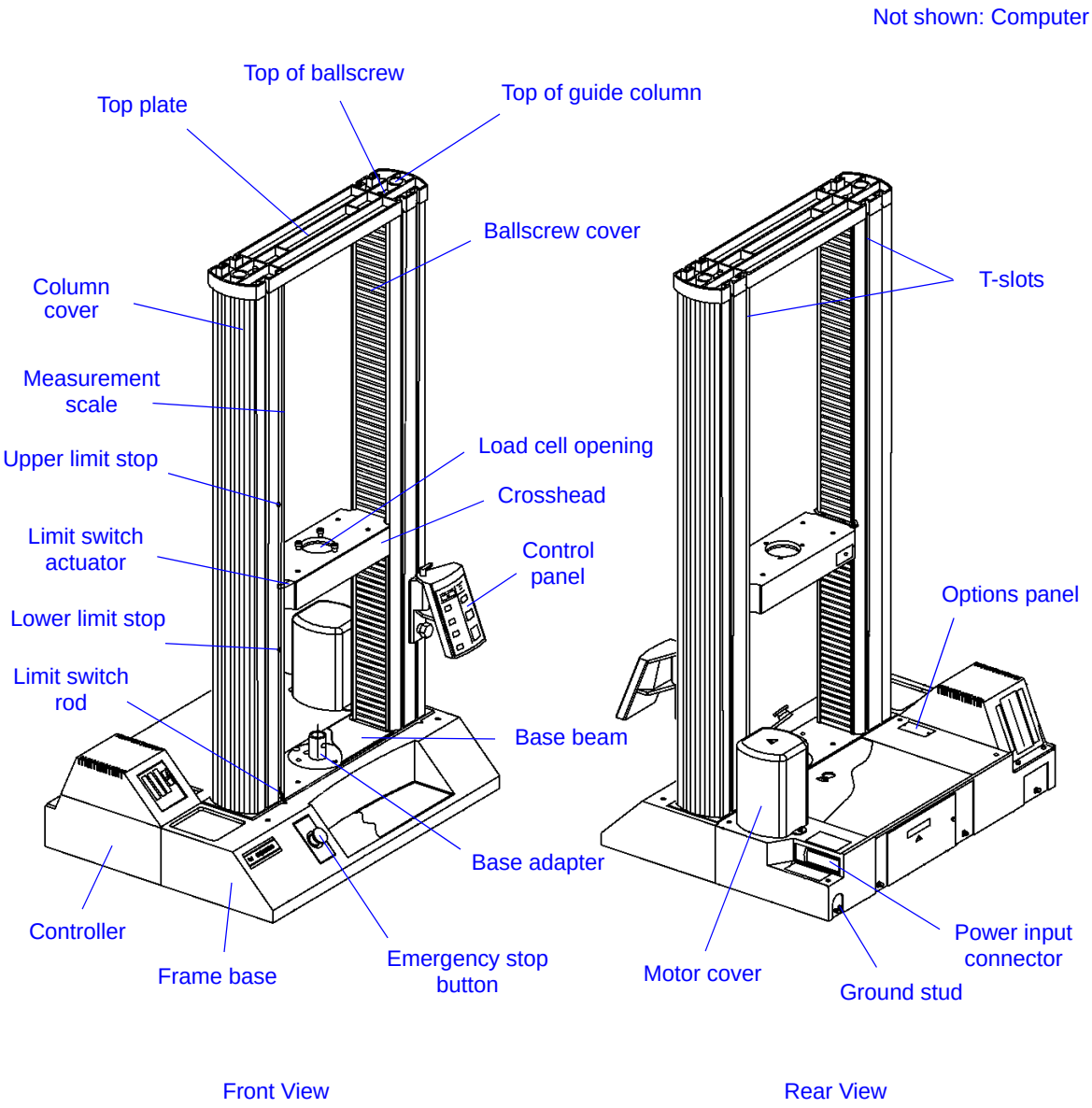


Figure 1-2. 5560 Series Load Frame

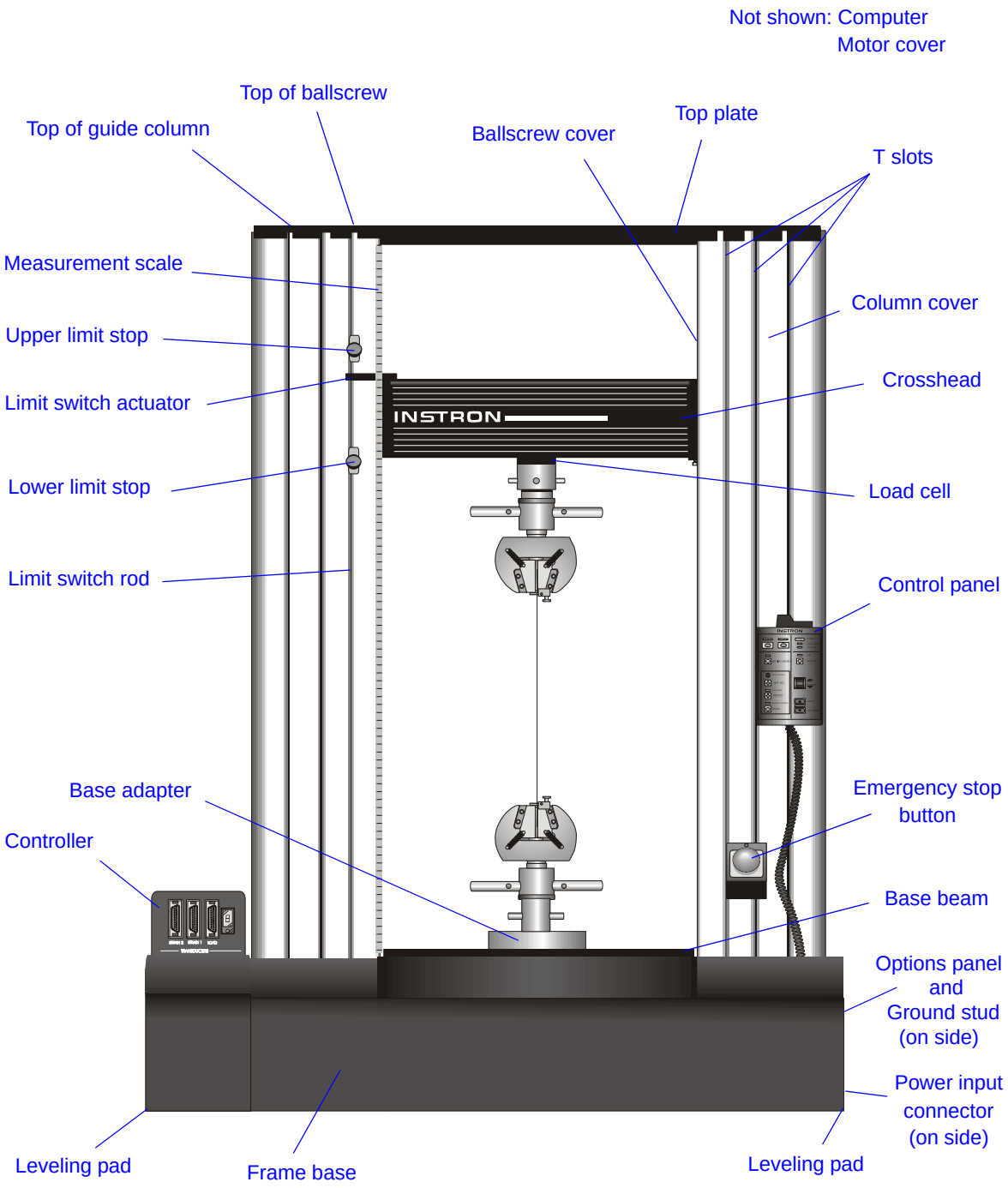


Figure 1-3. 5580 Series Load Frame

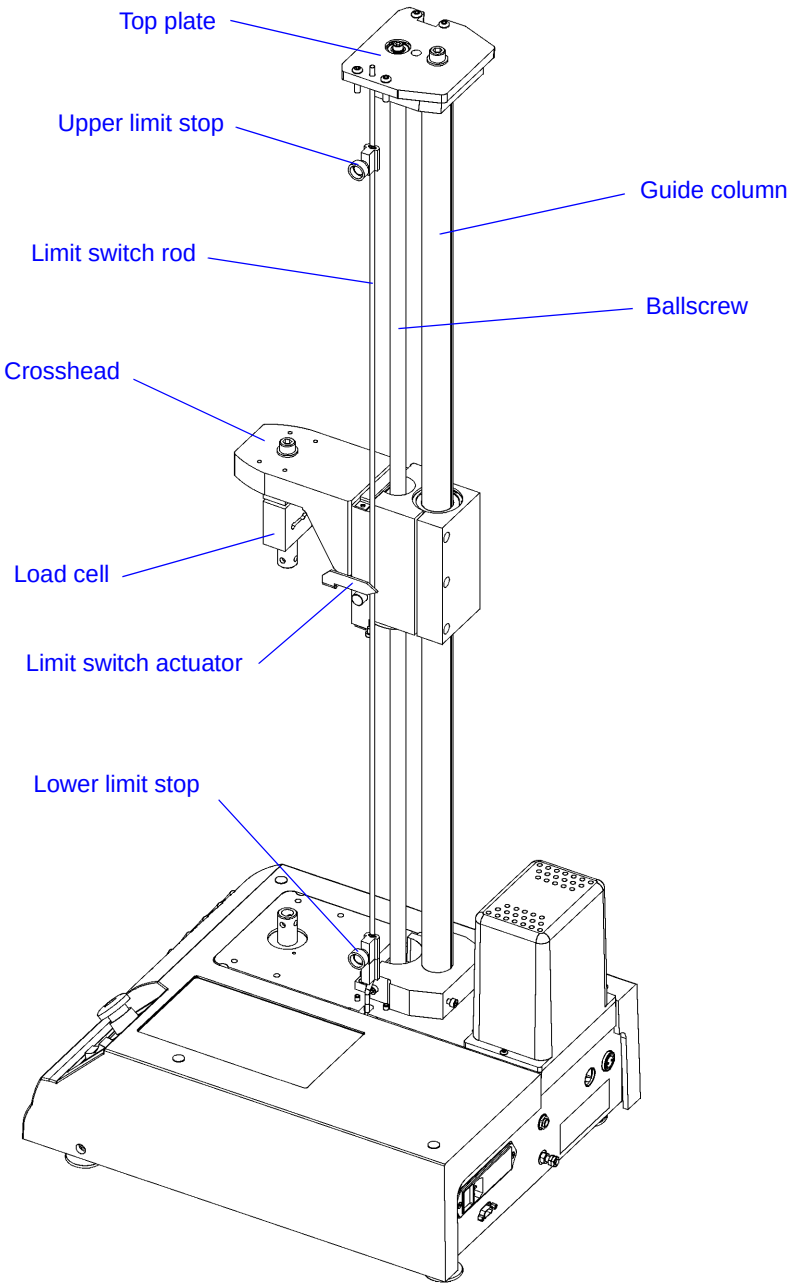


Figure 1-4. Column Components - Single Column Frames

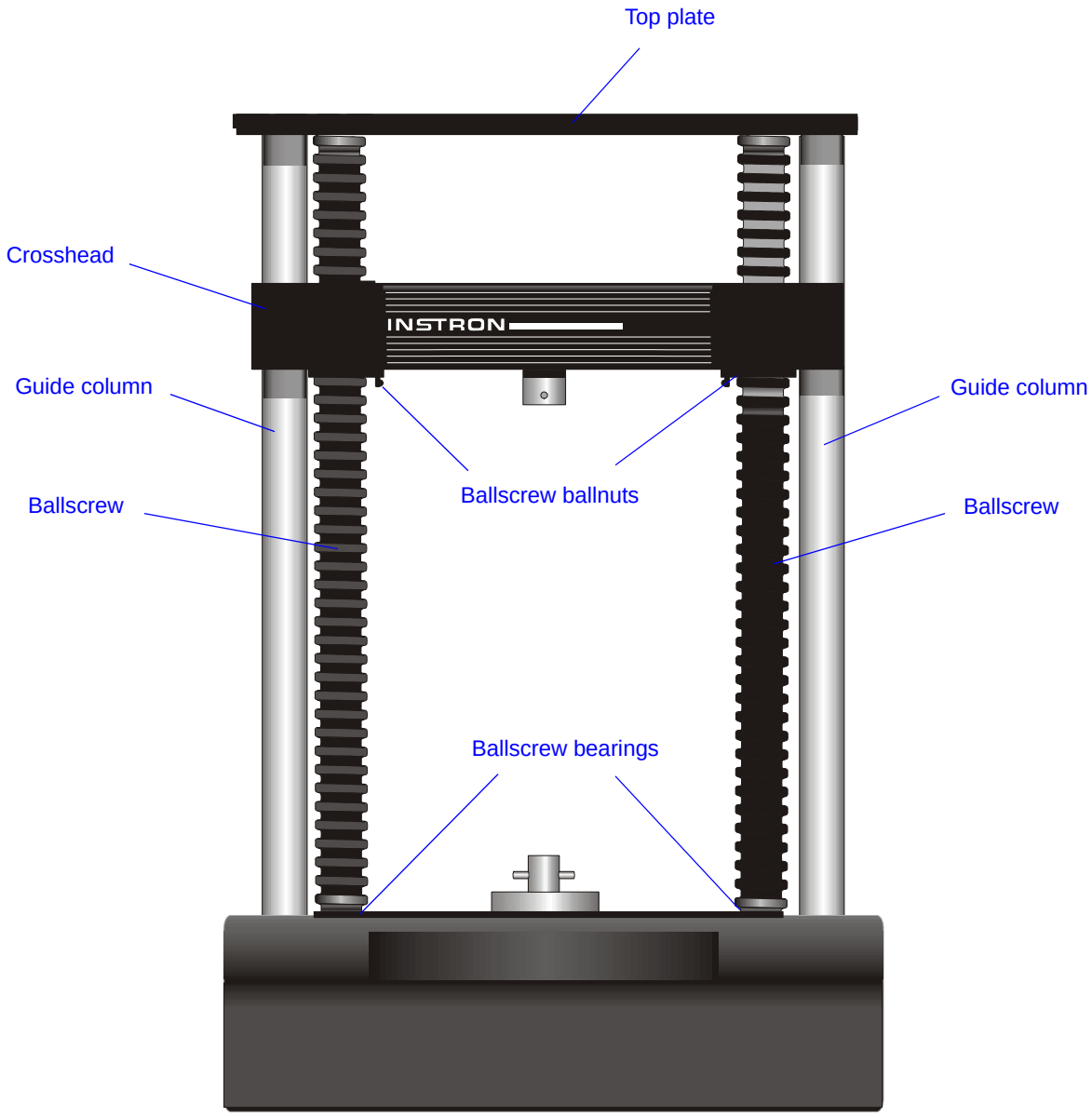


Figure 1-5. Column Components - Dual Column Frames

Main Components

The main components of the Instron load frames are briefly described in this section and are shown in one of the graphics included in this section. Refer to the graphic pertaining to your specific model to familiarize yourself with its various components.

Frame Base	The base of the frame contains the mechanical and electrical components that power the frame, the drive system, and the controller panel that controls communications.
Base Beam	A rigid, rectangular, load bearing beam from which the ballscrew and guide column extend up to the top plate. The base adapter attaches to the center of the base beam.
Base Adapter	Enables a specimen, grip, or fixture to be connected to the base beam.
Emergency Stop Button	The emergency stop button is a round, red button located on the frame. When you press this button, the system shuts off immediately. Refer to "Emergency Stop Button" on page 5-5 for additional details on this safety feature.
Control Panel	The frame's control panel attaches to one of the column covers and works in conjunction with the 5500 Console software to operate the frame. The control panel facilitates performing many of the Console functions directly at the frame, so you do not need to return to the computer during testing or between tests. Refer to "Control Panel" on page 5-7 for more information about this component.
Controller	The controller is connected to the frame base and contains the control electronics and system communications. It provides connectors that receive cables from the transducer (load cell or extensometer) and the computer. On the front of the controller is a load channel connector and two optional strain channel connectors. The channel output connectors are on the back of the controller.
Power Input Connector (Table top models only)	Connects the load frame to the electrical power supply, contains the power On/Off switch, holds the power fuse, and controls the voltage setting. The voltage setting can be changed if necessary. Refer to "Setting the Input Voltage" on page 4-7.
Power Switch/ Circuit Breaker (Floor models only)	The power switch provides electrical current to the machine. It is also the system circuit breaker. Refer to "Power Switch - Floor Models" on page 5-3.

Options Panel — The options panel provides connections for compatible accessories. Refer to "Connecting Optional Accessories" on page 4-21 for additional information.

Motor Cover — Covers the motor that powers the ballscrews and moves the crosshead.

Leveling Pads — Four adjustable pads are used to level the load frame. They are located at each corner of the frame base.

Ground Stud — Use the ground stud to ground the frame if the electrical power plug is not a grounded plug.

Computer (Not Shown) — The computer runs the system software. A cable connects the computer to an IEEE interface on the rear of the controller.

Note: Not all computers are compatible with Instron testing systems. If you intend to purchase a computer from an outside vendor, contact Instron Service to verify its compatibility. Additional charges may result from service that is required to evaluate or reconfigure non-approved computers.

Column and Crosshead Components

The column and crosshead components of Instron load frames are briefly described in this section and are shown in one of the graphics included in this section. Refer to the graphic pertaining to your specific model to familiarize yourself with its various components.

Column Covers — Extruded aluminum covers that enclose both the ballscrews and the guide columns on the load frame. These protect the guide column and ballscrews, and provide additional support to the frame.

T-slots — Vertical grooves in the column covers are used to mount testing accessories. In all frames, one T-slot is reserved for the limit switch rod and is therefore not available for general use.

These T-slots are used to mount standard Instron accessories and to hold adjustable clips for convenient routing of cables. The T-nuts can be used with a snap-in clip to create a general purpose cable holder. The T-nuts accept the head of a standard M6 hex head screw to produce a stud or an M6 nut can be inserted to provide an internal thread. T-nuts are inserted from the top of the column.

Cable Clips	Secure various cables to the load frame so they do not interfere with testing.
Ballscrew Covers	Protective multi-fold curtains that mount inside the column covers and shield the ballscrews from dust and debris, without limiting crosshead movement. These covers also provide protection and should always be in place when testing.
Crosshead	The moving structure on the load frame that applies a load to the test specimen.
Limit Switch Actuator	A plate on the moving crosshead that contacts either the upper or lower limit stop and activates the stopping mechanism that prevents crosshead over-travel. Refer to "Setting Crosshead Travel Limits" on page 7-4 for more information on the system limits.
Upper and Lower Limit Stops	Limit stops are located on the column cover and connect to the limit switch rod. These stops are adjustable to restrict crosshead travel to within safe boundaries, and should be positioned just beyond the test parameters to prevent crosshead over-travel. When the limit switch actuator contacts a limit stop, the stop moves the limit switch rod, which then activates the limit switch located within the frame base. When a limit switch is activated, the crosshead stops immediately. To set the limit stops, refer to "Setting the Limit Stops" on page 7-5.
Limit Switch Rod	The limit switch rod runs through a T-slot inside the column cover into the frame base. The limit switch rod connects the upper and lower limit stops to the limit switch inside the frame base, which stops the crosshead when activated.
Travel Limit Switches	Located inside the frame base. There are first and second level limit switches that stop the moving crosshead. When a first-level limit switch is activated, the crosshead stops. A status message appears on the computer. To restore operation, use the jog buttons on the front panel to move the crosshead away from the limit stop. Refer to "Moving Off a Crosshead Limit Stop" on page 7-6 for details. The second-level switch is a backup in case the first-level switch malfunctions. When a second-level switch is activated, it disables the drive motor relay and the crosshead stops. Operation of a secondary overtravel limit indicates that the primary overtravel limit has failed to stop the crosshead. This is a serious condition. Identify and resolve the condition that caused the secondary overtravel limit to trip before you use the testing system again. Contact your local Instron Professional Services department for assistance.

Measurement Scale	A graduated marker strip is located on the column cover. Use this strip to determine the approximate position of the moving crosshead. The limit switch actuator arm acts as a pointer.
Top Plate	A non-load bearing plate that provides support for the ballscrews and rigidity to the frame structure. Tapped holes in the plate let you mount optional, non-load bearing accessories to the frame. The standard top plate is not designed to accommodate testing above the crosshead.
Guide Columns	A cylindrical bar extending from the base beam to the fixed top plate. A guide column is located inside each column and intersects the crosshead. The guide column provides a rigid contact surface for maintaining crosshead guidance and a close alignment tolerance during heavy loading.
Ballscrews	Threaded rods that are located inside each column cover and extend from the base beam to the top plate. They also intersect the crosshead and are supported by pre-loaded angular contact bearings that turn at set speeds to move the crosshead.
Ballscrew Ballnuts	Ballscrew ballnuts are mounted in the crosshead where the ballscrew intersects the crosshead. The ballnuts contain the recirculating balls that let the ballscrews impart vertical motion to the crosshead.
Ballscrew Bearings	The lower bearing carrier for the ballscrews. They are located inside the base beam at the base of each ballscrew.
Load Cell	Load cells are precision force measurement transducers. They are typically mounted to the crosshead. For information on installation of load cells, refer to “Installing a Load Cell” on page 6-11.

System Safety and Information Labeling

Instron incorporates both the ISO and ANSI safety and information labels. Individual machines have either the ISO or ANSI warnings, not both. ISO labels display pictogram labels with no text, whereas ANSI labels include text and are used primarily in the United States. Table 1-2 on page 1-18 explains the meanings of these labels.

ISO and ANSI safety labels are attached to Instron load frames and are shown in one of the graphics included in this section. Refer to the graphic pertaining to your specific model to familiarize yourself with the various safety warnings.

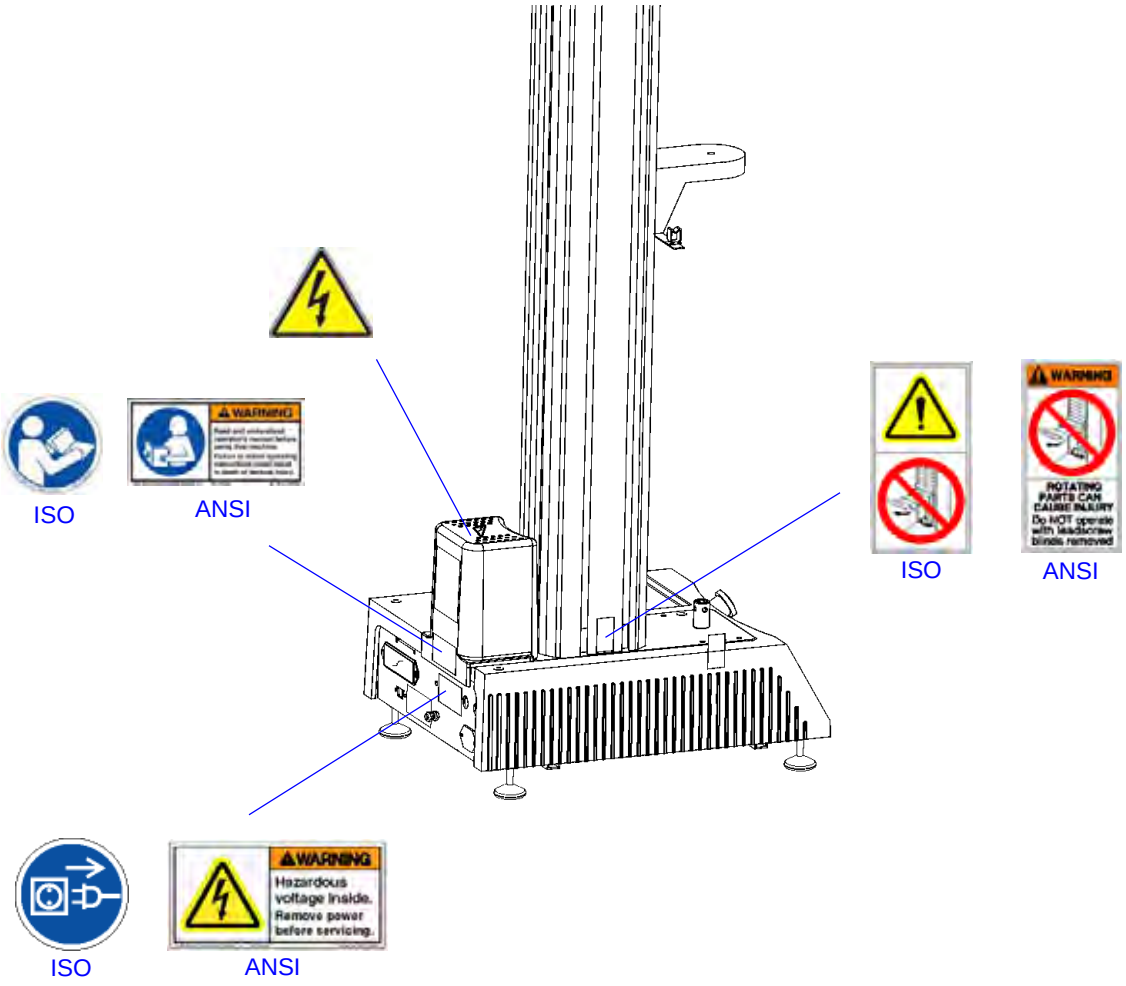


Figure 1-6. Series 5540 Single Column Table Top Safety Labeling

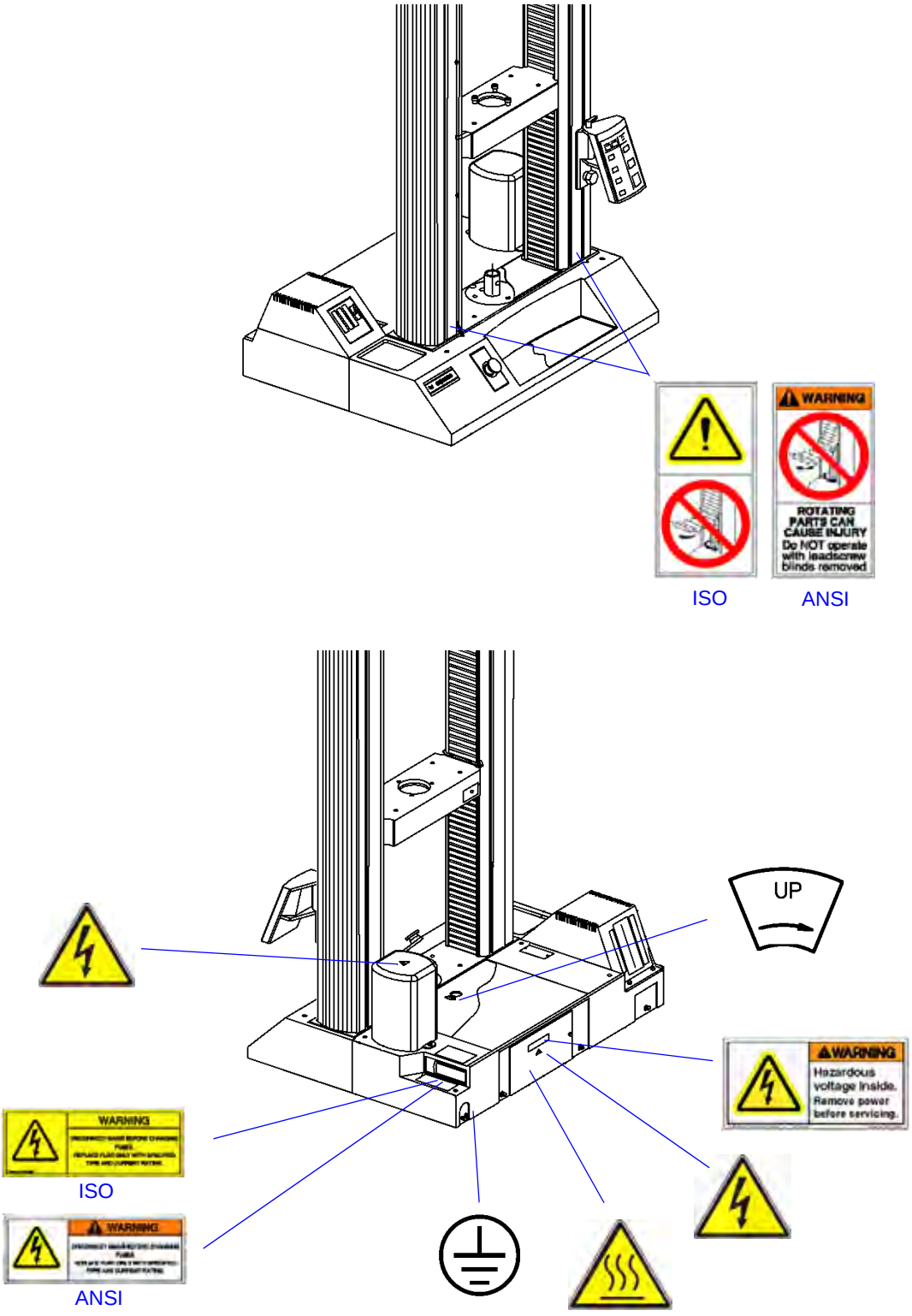


Figure 1-7. Series 5560 Dual Column Table Top Safety Labeling

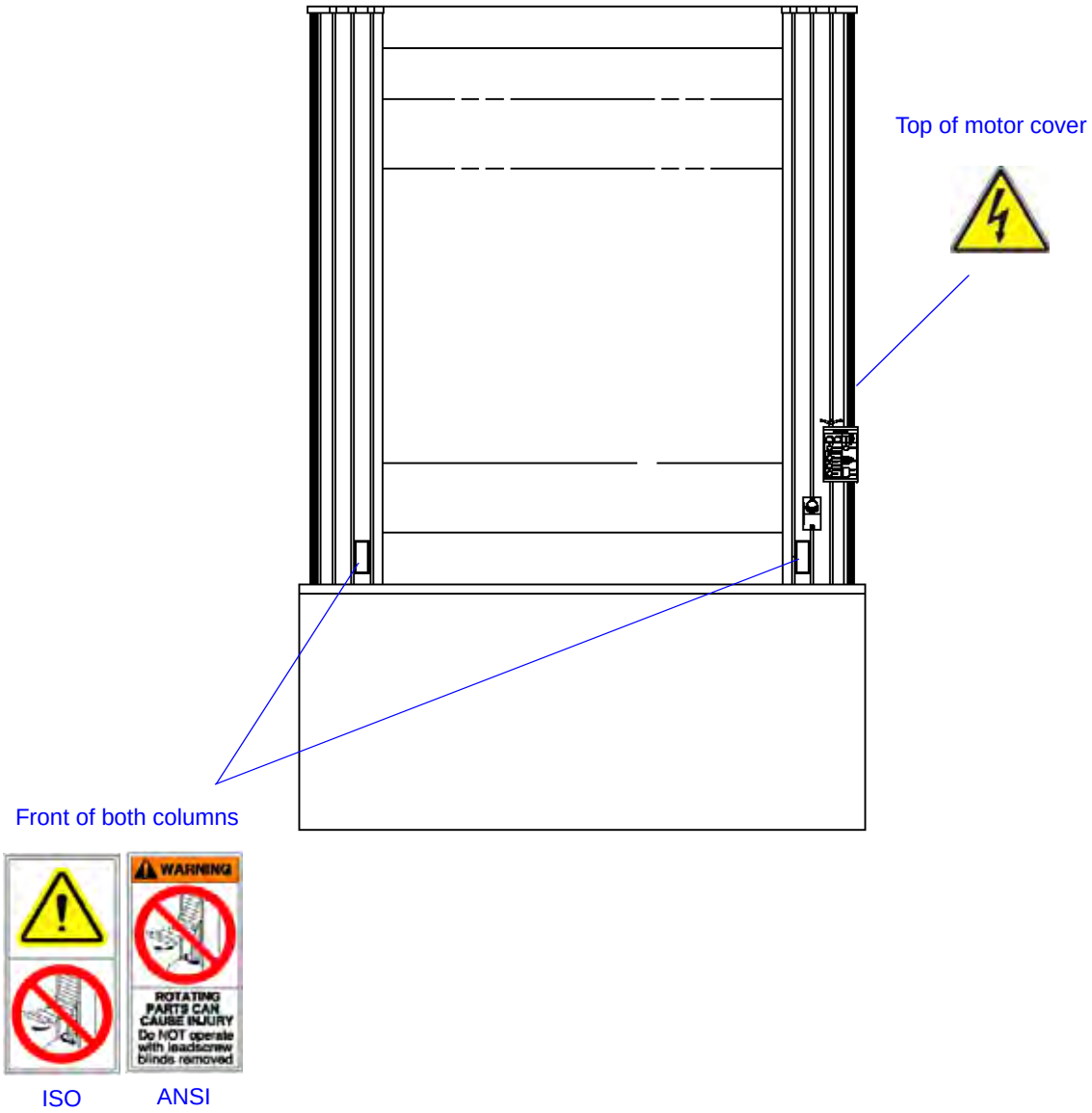


Figure 1-8. Series 5580 Floor Model Safety Labeling

Table 1-2. Safety and Information Labeling Descriptions

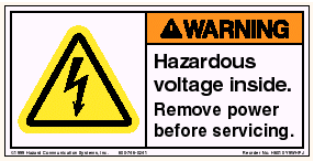
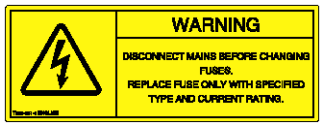
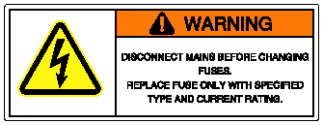
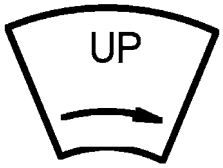
Label	Meaning	Type	Purpose
	Electrical hazard	ISO	Indicates that an electrical hazard exists from high voltage or electrical current.
	Electrical hazard	ANSI	Indicates that an electrical hazard exists from high voltage or electrical current.
	Disconnect power supply	ISO	Disconnect the power supply before servicing machine.
	Electrical - fuse warning	ISO	Indicates an electrical hazard exists. Advises about disconnecting power mains before changing fuses and using only specified fuses.
	Electrical - fuse warning	ANSI	Indicates an electrical hazard exists. Advises about disconnecting power mains before changing fuses and using only specified fuses.
	Belt entanglement hazard	ISO	Indicates that a hazard exists from the drive belt and pulley system.
	High temperature hazard	ISO	Indicates that a heat hazard exists. Stay clear of area when operating the machine.

Table 1-2. Safety and Information Labeling Descriptions (Continued)

Label	Meaning	Type	Purpose
	Rotating machinery hazard	ISO	Indicates that a rotating hazard exists. Do not operate with leadscrew (ballscrew) blinds removed. Keep clear of these areas (and tie back long hair).
	Rotating machinery hazard	ANSI	Indicates that a rotating hazard exists. Do not operate with leadscrew (ballscrew) blinds removed. Keep clear of these areas (and tie back long hair).
	Rotating machinery hazard	ISO	Indicates that a rotating hazard exists. Keep clear of these areas (and tie back long hair).
	Ground stud	ISO	Indicates a ground stud.
	Read the manual	ISO	Read and understand the operator's manual before using the machine.
	Read the manual	ANSI	Read and understand the operator's manual before using the machine.

Table 1-2. Safety and Information Labeling Descriptions (Continued)

Label	Meaning	Type	Purpose
	Crosshead direction	ISO	Indicates the direction to turn the pulley to manually move the crosshead upward. Pulleys can be turned by hand when power is disabled.
	Electrical hazard	Instron	Indicates that an electrical hazard exists from high voltage or electrical current.
	Rotating machinery hazard	Instron	Indicates that a rotating hazard exists. Keep clear of these areas (and tie back long hair).

Product Support

Documentation

About This Manual

This manual provides a basic understanding of the Series 5500 load frames and their principles of operation. The manual contains information on:

- System overview
- Component and control descriptions
- Load frame specifications
- Installation procedures and setup procedures
- Functional and operational details
- Maintenance procedures
- Ancillary parts information

This manual is intended for the system operator.

Other Documentation

Series 5500 systems use an Instron proprietary software program that is designed specifically for materials testing. Operating instructions for the system are contained in the online help files that are part of the software program.

Accessories such as printers, grips and extensometers are supplied with separate reference manuals.

Technical Support

Instron provides documentation, including manuals and online help, that can answer many of the questions you may have. It is recommended that you review the documentation sent with the system you purchased for possible solutions to your questions.

You can also check the Frequently Asked Questions (FAQs) page on Instron's website for additional information. If you need more information, you can submit your question by completing a Service Support form on the website.

If you cannot find answers in these sources, contact Instron's Professional Services department directly:

Worldwide	**www.instron.com**
In the United States & Canada:	1-800-473-7838
Outside the U.S./Canada:	Contact your local Instron Sales and Service office.

A list of Instron offices is available on our website at **www.instron.com**.

Calibration and Verification

Before shipment from the factory, your machine is calibrated and tested to ensure that it meets its performance specifications. The factory calibration is traceable to national standards, but is not a full calibration meeting all the requirements of the relevant ISO and ASTM standards. ISO 7500-1 and ASTM E4 both state that a calibration must be performed after installation for it to meet their standard. This helps ensure that any changes in calibration during shipment are corrected before any test data is taken. These standards also recommend that verifications are performed annually or whenever the system is moved.

Note: *The calibration performed by an Instron service engineer compares the actual load values measured by a load cell against a known value, which is traceable to national standards and ensures that the load cell complies with the relevant ASTM and ISO standards.*

The calibration you perform via the software program is an electrical calibration that enables the system to determine the type of load cell and its maximum capacity. It is not a complete calibration and does not meet the requirements of the ASTM and ISO standards.

Service Agreements/Contracts

In many countries and territories Instron Service offers a variety of service agreements and contracts to cover such things as annual verification, maintenance, repair coverage, and hotline support for your system. Contact your local Instron office for details on a service agreement or contract that best matches your needs. A listing of Instron offices can be found on the Instron web site at **www.instron.com**.

Calibration Upon Installation

ASTM and ISO force standards require the system be calibrated when it is installed or whenever it is moved or relocated. Instron recommends that all your transducers receive an on-site verification after installation is complete or when your system is moved or relocated. Instron can calibrate all your transducers as an additional service to the basic installation of your system, which does not include this service. Refer to “Verification Services” below for more information about Instron’s calibration services.

Verification Services

In addition to the initial calibration service available at installation, Instron recommends verifying your transducers on a regular schedule (at least annually) to ensure that your system operates properly and meets ISO and ASTM standards.

Instron's Professional Services Department provides a wide range of verification services including:

- Force
- Strain
- Torsion
- Temperature
- Crosshead displacement
- Crosshead speed

Contact your local Instron office for more information about our on-site verification services. Refer to "Product Support" on page 1-21 for Instron's contact information.

Chapter 2
Specifications

Outline

This chapter describes the specifications for Instron's electromechanical load frames, both standard configuration models and optional configuration models. Standard configuration models are defined as frames with standard height, standard width and one test space. This chapter also displays the standard mounting holes on each configuration of load frames intended for mounting accessories and fixtures. It includes the following sections:

Common Specifications

The specifications described in this section are common among the Series 5540, 5560, and 5580 load frames. More detailed specifications are provided later in this chapter for each Series.

Environmental Specifications

Table 2-1. Environmental Specifications

Parameter	Specifications
Operating Temperature	+10°C to +38°C (+50°F to +100°F)
Storage Temperature	-40°C to +66°C (-40°F to +150°F)
Humidity	10% to 90% (non-condensing)
Environmental Conditions	Designed for use under normal laboratory conditions. Protective measures may be required if excessive dust, corrosive fumes, electromagnetic fields or hazardous conditions are encountered.

Table 2-2. Accreditation - CE Approval

Meets the requirements of EN61236-1 (1998) Equipment for Measurement Control and Laboratory Use using CISPR 11 (1990) per the following class codes:											
5542	**5543**	**5544**	**5564**	**5565**	**5566**	**5567**	**5569**	**5581**	**5582**	**5584**	**5585H**
Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class B	Class A	Class B

Power Requirements

Table 2-3. Series 5500 System Power Requirements

Parameter	Specifications							
	5542/ 5543	**5544**	**5564/ 5565/ 5566**	**5567**	**5569**	**5581/ 5582** [a]	**5584** [a]	**5585H** [a]
Maximum Power (VA)	225	360	300	600	700	1400	2800	2950
Single Phase Voltage (Vac) (±10%)[b]	100 120 -- 220 -- [c] 240	100 120 -- 220 -- [c] 240	100 120 -- 220 -- [c] 240	100 120 -- 220 -- [c] 240	100 120 -- 220 -- [c] 240	100 120 -- 220 -- [c] 240	100 120 -- 220 -- [c] 240	-- -- 200/208 220 230 240
Frequency	47 to 63 Hz							
Maximum Distance from Power Source	2.44 m (8 ft) [d] Measured from the right side on the rear of the load frame		2.44 m (8 ft) [d] Measured from the right side of the load frame					

a. Although these frames can operate at the indicated voltages, high speed turn-around times will be affected if voltage is near extreme of tolerance.

b. Model 5564 tolerance is +10/-5% to guarantee 100 in/min.

c. For 230 Vac operation, the frame is normally set to 220 Vac.

d. If the power source is located to the left of the load frame, then the distance must also include the width of the load frame.

Noise Levels

Series 5540 and 5560 Models

The noise output for the Series 5540 and 5560 load frames does not exceed 70dB(A). Noise levels do not include noise from specimen breaks.

Notes: *The noise level of the entire system depends on your particular system configuration. Refer to the documentation supplied with other system components for information about that component's noise level.*

The noise output from equipment used for materials or structures testing is also dependent upon the items under test. Instron recommends that users carry out their own noise level measurements to ensure the continuous safety and comfort of personnel.

Series 5580 Models

Table 2-4. Series 5580 Noise Levels

	Maximum Noise Level dB(A)			
Test Speed	**5581**	**5582**	**5584**	**5585H**
Standby or low speed	55	55	55	55
Maximum rated speed	77	77	79	74

Noise levels do not include noise from specimen breaks.

Notes: *The noise level of the entire system depends on your particular system configuration. Refer to the documentation supplied with other system components for information about that component's noise level.*

The noise output from equipment used for materials or structures testing is also dependent upon the items under test. Instron recommends that users carry out their own noise level measurements to ensure the continuous safety and comfort of personnel.

Weight Specifications

The weights for standard configuration load frames are provided in Table 2-5. The weights for optional configuration load frames are provided in Table 2-6.

Table 2-5. Weight - Standard Configuration Specifications

Model Number	Weight of Load Frame
5542	36 kg (79 lb)[a]
5543	41 kg (90 lb)[a]
5544	42 kg (92 lb)[a]
5564	136 kg (300 lb)
5565	136 kg (300 lb)
5566	136 kg (300 lb)
5567	182 kg (400 lb)
5569	240 kg (530 lb)
5581	862 kg (1900 lb)
5582	862 kg (1900 lb)
5584	952 kg (2100 lb)
5585H	952 kg (2100 lb)

a. Weights exclude the weight of the controller - 9 kg (18 lb)

Note: Base extensions on the standard configuration floor models add 91 kg (200 lb)

Table 2-6. Weight - Optional Configuration Specifications

Model Number	Optional Configuration	Weight of Load Frame
5564	Extra height	151 kg (333 lb)
	Second test space	154 kg (340 lb)
	Extra height with second test space	169 kg (373 lb)
5565	Extra height	151 kg (333 lb)
	Extra wide	330 kg (725 lb)
	Second test space	154 kg (340 lb)
	Extra height with second test space	169 kg (373 lb)
	Extra height and extra wide	347 kg (765 lb)

Table 2-6. Weight - Optional Configuration Specifications

Model Number	Optional Configuration	Weight of Load Frame
5566	Extra height	151 kg (333 lb)
	Extra wide	330 kg (725 lb)
	Second test space	154 kg (340 lb)
	Extra height with second test space	169 kg (373 lb)
	Extra height and extra wide	347 kg (765 lb)
5567	Extra height	200 kg (440 lb)
	Extra wide	425 kg (935 lb)
	Second test space	248 kg (547 lb)
	Extra height with second test space	266 kg (586 lb)
	Extra height and extra wide	443 kg (975 lb)
5569	Extra height	263 kg (580 lb)
	Second test space	306 kg (674 lb)
5581/5582	Extra height	930 kg (2050 lb)
	Extra wide	1090 kg (2400 lb)
	Second test space	1047 kg (2310 lb)
	Double extra height	998 kg (2200 lb)
	Extra height and extra wide	1158 kg (2550 lb)
	Extra height with second test space	1116 kg (2460 lb)
	Double extra height with second test space	1188 kg (2620 lb)
	Double extra height and extra wide	1230 kg (2712 lb)

Table 2-6. Weight - Optional Configuration Specifications

Model Number	Optional Configuration	Weight of Load Frame
5584/5585H	Extra height	1025 kg (2260 lb)
	Extra wide	1180 kg (2600 lb)
	Second test space	1192 kg (2630 lb)
	Double extra height	1098 kg (2420 lb)
	Extra height and extra wide	1253 kg (2760 lb)
	Extra height with second test space	1265 kg (2790 lb)
	Double extra height with second test space	1338 kg (2950 lb)
	Double extra height and extra wide	1330 kg (2930 lb)

Operating Envelope

The operating envelope is the boundary within which tests must be performed. Refer to the System Performance table for your specific model (later in this chapter) for the operating limits of your machine. In the System Performance table, look at the Maximum Force at Full Speed and Maximum Speed at Full Force parameters.

Within the operating envelope can be two zones:

- Continuous operation zone - When the maximum load and speed parameters of your test fall within this zone, the machine may run continuously (including long term low speed or zero speed tests), and it does not require a waiting period between tests. You may start the next test as soon as the current test finishes. However, cyclic tests, in which the frame constantly reverses direction, is limited as outlined in section “Cyclic Testing” in this chapter.
- Intermittent operation zone (50% duty zone) - When the maximum load and speed parameters of your test fall within this zone, then the idle time between tests must be equal to or more than the test duration time. This allows time between tests for the motor and power amplifier to cool. For example, if a test runs into the 50% duty zone and lasts for 5 minutes, then you must wait 5 minutes or more before starting another test.

Refer to the following figures to determine the operating envelope zones for your specific model.

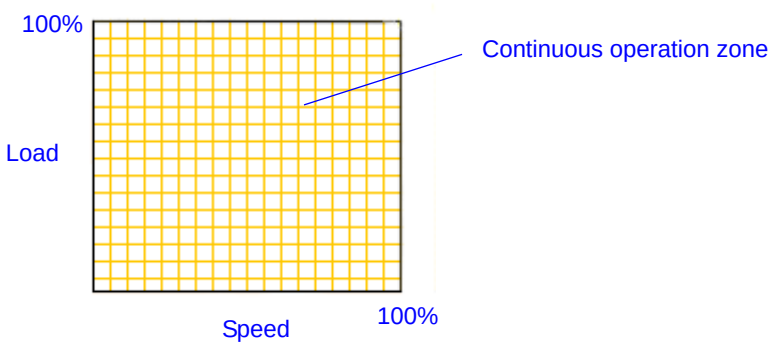
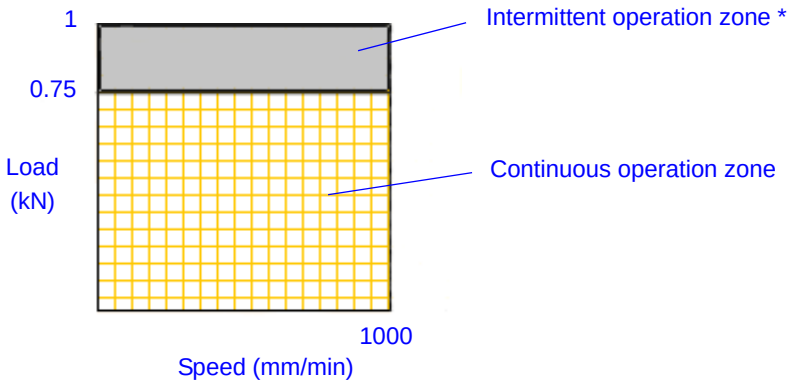


Figure 2-1. Operating Envelope for Series 5542 and 5544 Models



* In addition to the 50% duty cycle requirement, the time at load is restricted to 30 minutes

Figure 2-2. Operating Envelope for Series 5543 Model

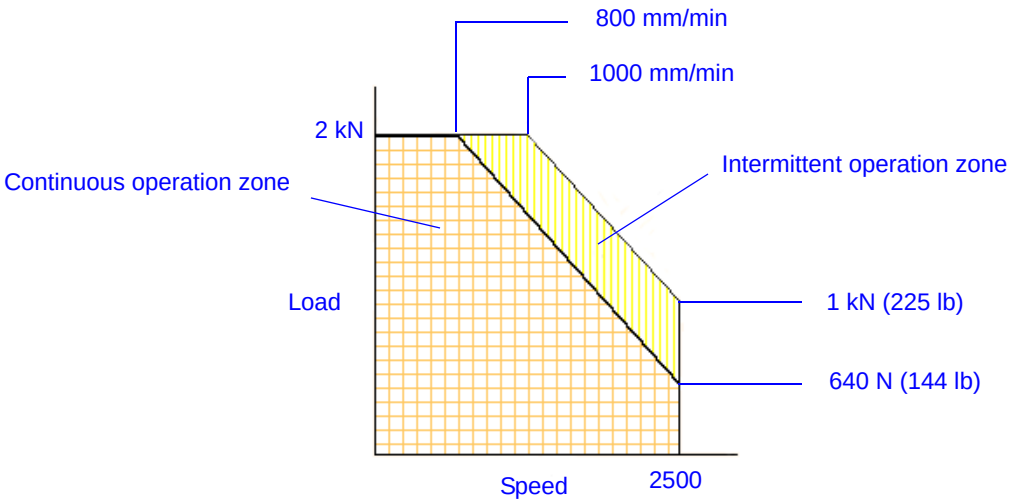


Figure 2-3. Operating Envelope for Series 5564 Model

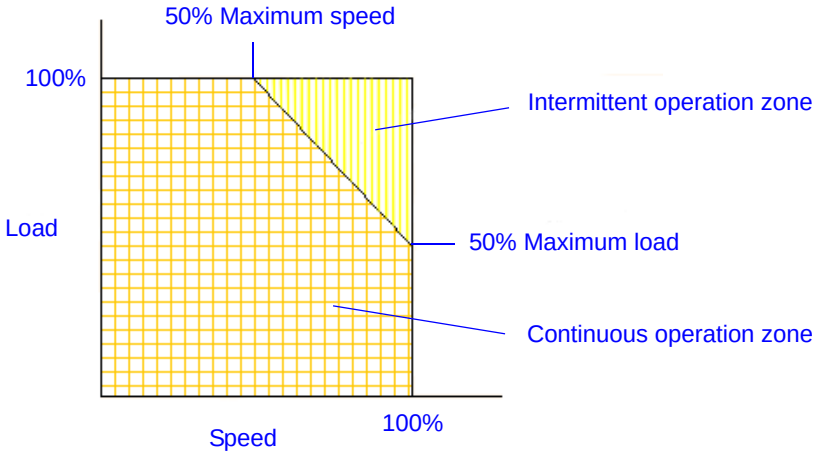


Figure 2-4. Operating Envelope for Series 5565, 5566 and 5567 Models

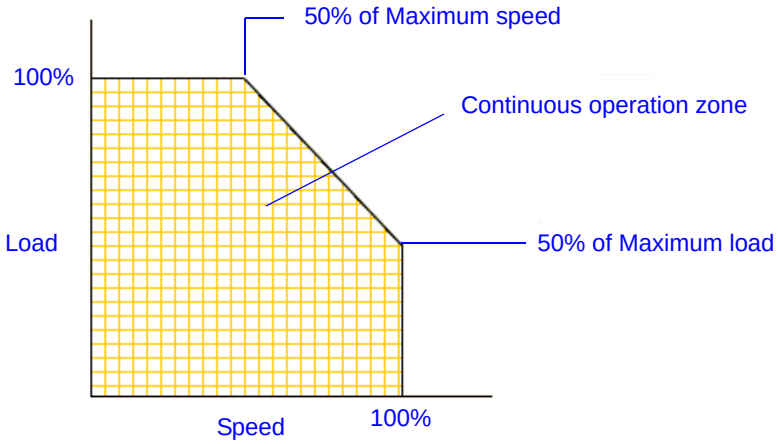


Figure 2-5. Operating Envelope for Series 5569 Model

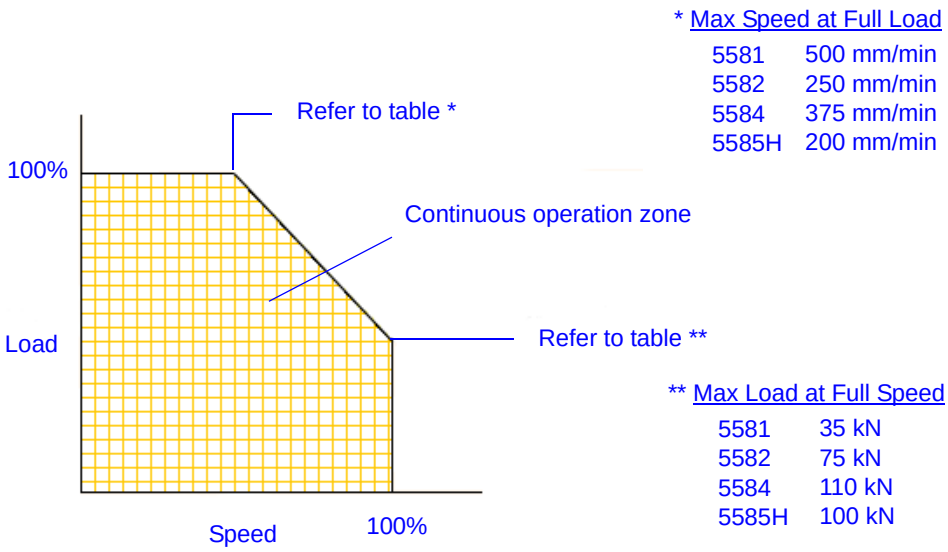


Figure 2-6. Operating Envelope for Series 5580 Models

Cyclic Testing

Cyclic testing is defined as tests where the cycling limits are enabled and testing requires that the frame constantly reverses direction. Cyclic testing on electromechanical load frames is limited by the heating of the power amplifier. If the power amplifier is close to overheating, a thermal protection switch activates and automatically shuts down the amplifier.

To ensure that the power amplifier stays within its heating limits, cyclic testing must stay within the limits summarized in the following table. The cyclic frequency limits shown in this table are dependent upon the speed and time parameters of your test.

For example, using a Series 5567 machine, you can perform a continuous cycling test if the speed is less than 50% of the system's maximum speed and the cyclic frequency is 1.0 Hz or less. If the speed of your test is above 50% of the maximum speed, you can perform a continuous cycling test, but the cyclic frequency limit drops to 0.05 Hz. If your test requires a greater cyclic frequency, then you can perform intermittent cycling. When performing intermittent cycling, the cyclic frequency limit increases to 0.5 Hz. When performing intermittent cycling, there are two requirements:

- The test must be less than 20 minutes.
- A 50% duty cycle applies between tests. The idle time between cyclic tests must be equal to or more than the test duration time. For example, if a test lasts for 5 minutes, you must wait 5 minutes or more before starting another test.

In addition to the speed and cyclic frequency limits shown in this table, you must also consider the operating envelope for your system. Refer to section "Operating Envelope" in this chapter to determine the boundary limits of your system and if a 50% duty cycle requirement applies to your testing parameters.

Caution

Electromechanical load frames are not suitable for fatigue testing. The values shown in the following table are for guidance only and assume an

elastic specimen and an ambient temperature of 25° C (77° F). Higher ambient temperatures may further limit the performance.

Table 2-7. Series 5500 Cyclic Frequency Limits

% Of Maximum Speed	Maximum Frequency (Hz)				
	5542 5543 5544	**5564 5565 5566**	**5567 5569**	**5581 5582**	**5584 5585H**
Below 50% speed - Continuous cycling	1.0	1.0	1.0	1.0	0.5
Above 50% speed - Continuous cycling	N/A	0.05	0.05	0.1	0.05
Above 50% speed - Intermittent cycling*	0.5	1.0	0.5	0.5	0.20
* Intermittent cycling is defined as tests in which the cycling limits are enabled and the duration of the test is less than 20 minutes.					

Extension Accuracy

When measuring strain on a specimen, it can be measured using either the frame's extension readout or an extensometer directly on the specimen. Deciding which method to use depends on the required accuracy and careful evaluation of the errors introduced from system compliance (deflection under load) as compared to the compliance of the gauge section on the specimen. Note that the position (i.e. extension) accuracy given in the system performance tables assumes a no-load condition, so the error from system compliance must be added to this value. Since extension is measured by an encoder installed on the motor shaft, it cannot compensate for the compliance of the crosshead, load cell, grips and other system components that are in the load path between the motor and the specimen.

Over short travels and higher loads, the error resulting from system compliance can be over 100%. Conversely, over longer travels and lower loads, the error may be insignificant. The frame compliance and deflection at full load values shown in table 2-8 may be used to assess this effect, and determine whether extension can accurately measure strain for your test scenario. If extension cannot measure strain under your test scenario, it is recommended that you use an extensometer. In general, the extension readout should not be used as the primary strain measuring device in situations where your testing requirements warrant using an extensometer on the specimen.

Table 2-8. Frame Compliance

Model	Frame Compliance	Deflection at Full Load (Frame only)	Mean Stiffness[a]
5542	0.50 mm/kN 88 µin/lb	0.25 mm 0.010 in	2 kN/mm 11400 lb/in
5543	0.50 mm/kN 88 µin/lb	0.50 mm 0.020 in	2 kN/mm 11400 lb/in
5544	0.50 mm/kN 88 µin/lb	1.00 mm 0.039 in	2 kN/mm 11400 lb/in
5564	0.025 mm/kN 4.4 µin/lb	0.05 mm 0.002 in	40 kN/mm 225000 lb/in
5565	0.025 mm/kN 4.4 µin/lb	0.13 mm 0.005 in	40 kN/mm 225000 lb/in
5565 Extra wide option	0.030 mm/kN 5.4 µin/lb	0.15 mm 0.006 in	33 kN/mm 185600 lb/in
5566	0.025 mm/kN 4.4 µin/lb	0.25 mm 0.010 in	40 kN/mm 225000 lb/in
5566 Extra wide option	0.030 mm/kN 5.4 µin/lb	0.30 mm 0.012 in	33 kN/mm 185600 lb/in
5567	0.010 mm/kN 1.8 µin/lb	0.30 mm 0.012 in	100 kN/mm 562500 lb/in
5567 Extra wide option	0.015 mm/kN 2.6 µin/lb	0.45 mm 0.018 in	67 kN/mm 382600 lb/in
5569	0.0061 mm/kN 1.1 µin/lb	0.31 mm 0.012 in	163 kN/mm 930800 lb/in
5581	0.0039 mm/kN 0.7 µin/lb	0.20 mm 0.008 in	255 kN/mm (1.46×10^6 lb/in)
5581 Extra wide option	0.0051 mm/kN 0.9 µin/lb	0.26 mm 0.010 in	195 kN/mm (1.11×10^6 lb/in)
5581 Second test space	0.0083 mm/kN 1.5 µin/lb	0.42 mm 0.016 in	120 kN/mm 685000 lb/in
5582	0.0039 mm/kN 0.7 µin/lb	0.39 mm 0.015 in	255 kN/mm (1.46×10^6 lb/in)
5582 Extra wide option	0.0051 mm/kN 0.9 µin/lb	0.51 mm 0.020 in	195 kN/mm (1.11×10^6 lb/in)
5582 Second test space	0.0083 mm/kN 1.5 µin/lb	0.83 mm 0.033 in	120 kN/mm 685000 lb/in

Table 2-8. Frame Compliance

Model	Frame Compliance	Deflection at Full Load (Frame only)	Mean Stiffness[a]
5584	0.0029 mm/kN 0.5 µin/lb	0.43 mm 0.017 in	350 kN/mm (2.00 x 10^6 lb/in)
5584 Extra wide option	0.0045 mm/kN 0.8 µin/lb	0.68 mm 0.027 in	220 kN/mm (1.26 x 10^6 lb/in)
5584 Second test space	0.0056 mm/kN 1.0 µin/lb	0.83 mm 0.033 in	180 kN/mm (1.03 x 10^6 lb/in)
5585H	0.0029 mm/kN 0.5 µin/lb	0.71 mm 0.028 in	350 kN/mm (2.00 x 10^6 lb/in)
5585H Extra wide option	0.0045 mm/kN 0.8 µin/lb	1.14 mm 0.045 in	220 kN/mm (1.26 x 10^6 lb/in)
5585H Second test space	0.0056 mm/kN 1.0 µin/lb	1.11 mm 0.044 in	180 kN/mm (1.03 x 10^6 lb/in)

a. The frame and drive (excluding load cell or grip string) is measured with the top of the crosshead at the travel midpoint. Values represent the extension that would be indicated on the display if the frame was loaded with an “infinitely stiff” load string and specimen. The stiffness values can vary ±10% from the mean.

Series 5540 Standard Model Specifications

The specifications in this section describe the 5540 standard configuration load frames. These are all single column, table-top load frames, designed for relatively low-force laboratory and quality control testing applications. Standard configuration models are defined as frames with standard height, standard width and one test space.

System Performance

Table 2-9. Series 5540 System Performance

Parameter	Specifications		
	5542	**5543**	**5544**
Testing type	Tension, compression, and reverse stress. Frames are also capable of limited cyclic testing as outlined in "Cyclic Testing" on page 2-11. Standard configuration is below the moving crosshead.		
Basic control mode	Closed loop position control.		
Load capacity kN kgf lbf	0.5 50 112	1 100 225	2 200 450
Maximum speed mm/min in/min	1000 40	1000 40	1000 40
Minimum speed mm/min in/min	0.05 0.002	0.05 0.002	0.05 0.002
Maximum force at Full speed kN kgf lbf	0.5 50 112	1 [a] 100 225	2 200 450
	a - The 5543 system can operate continuously up to 0.75 kN (335 lbf). Above 0.75 kN, the time at load is restricted to 30 minutes and the system must operate at 50% duty cycle. Refer to "Operating Envelope" on page 2-7.		

Table 2-9. Series 5540 System Performance (Continued)

Parameter	Specifications		
	5542	**5543**	**5544**
Maximum speed at Full load mm/min in/min	 1000 40	 1000 40	 1000 40
Return speed mm/min in/min	 1500 60	 1500 60	 1500 60
Crosshead speed accuracy	± 0.1% at steady state and no load measured over 100 mm or 30 seconds, whichever is greater.		
Position accuracy (Extension)	Under no load conditions, equal or less than ± 0.02 mm (0.0008 in) or ± 0.05% of displayed reading, whichever is greater.		
Position repeatability	± 0.015 mm (0.0006 in)		
Load measurement accuracy	± 0.4% of reading down to 1/100 of load cell capacity. ± 0.5% of reading down to 1/250 of load cell capacity.		
Strain measurement accuracy	± 0.5% of reading down to 1/50 of full scale with ASTM E83 class B or ISO 9513 class 0.5 extensometer.		
Crosshead position control resolution	0.156 µm	0.156 µm	0.208 µm
Acceleration time, 0 to top speed	120 ms		
Emergency stop time	100 ms	100 ms	100 ms

Dimensions

Table 2-10 on page 2-17 shows the load frame dimensions for all 5540 single column table top models. See Figure 2-7 to match the letter designation from Table 2-10.

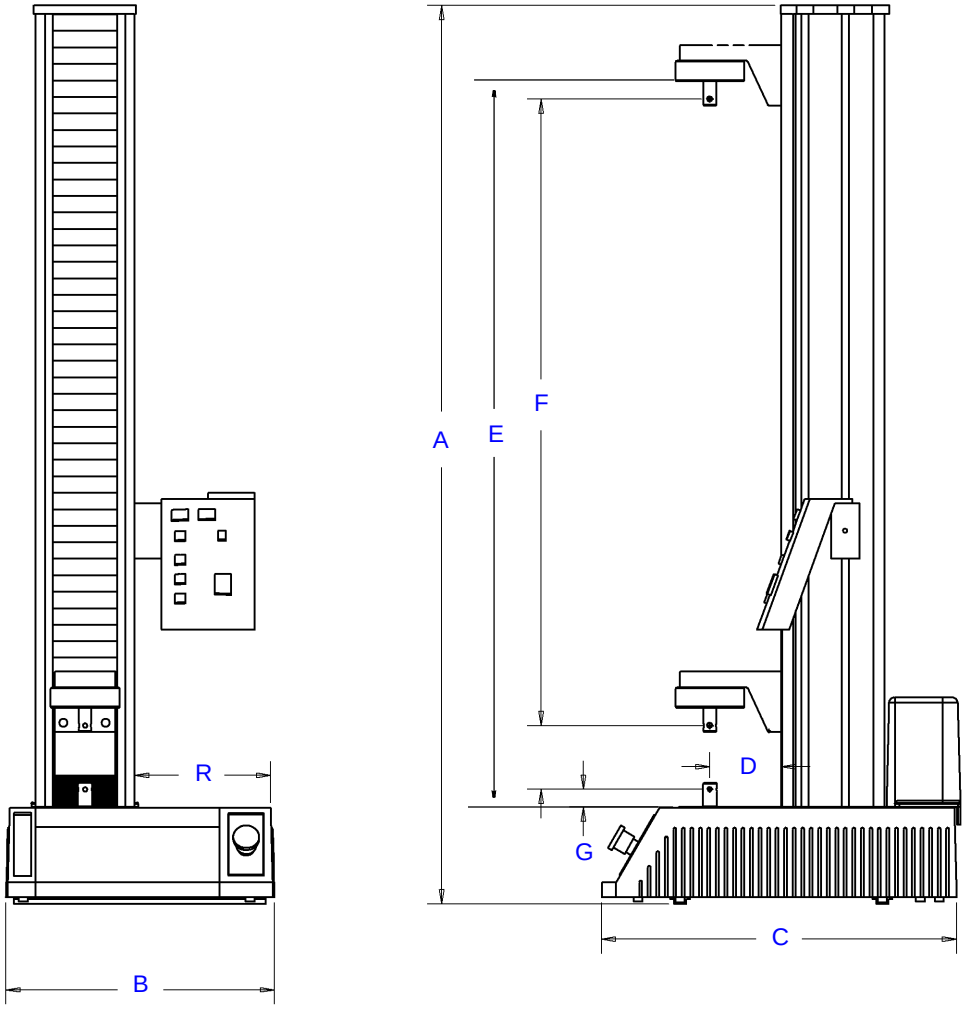


Figure 2-7. Series 5540 Standard Load Frame Dimensions

Table 2-10. Series 5540 Standard Load Frame Dimensions

Letter Designation	Description	Dimension - mm (inch)		
		5542	**5543**	**5544**
A	Overall height	900 (35.4)	1300 (51.2)	1300 (51.2)
B	Overall width	382 (15.0)		
C	Overall depth	500 (20.0)		
D	Throat depth daylight	100 (4.0)		

Table 2-10. Series 5540 Standard Load Frame Dimensions (Continued)

Letter Designation	Description	Dimension - mm (inch)		
		5542	**5543**	**5544**
E	Vertical test daylight * Maximum Minimum *From the base to the underside of the crosshead	 651 (25.6) 159 (6.7)	 1067 (42.0) 159 (6.7)	 1067 (42.0) 159 (6.7)
F	Total crosshead travel	490 (19.29)	910 (35.83)	910 (35.83)
G	Base beam to coupling pin Type O adapter Type D adapter	 22 (.87) 35 (1.38)	 22 (.87) 35 (1.38)	 22 (.87) 35 (1.38)
R	Column to the right side of the base	191 (7.5)		

Series 5560 Standard Model Specifications

The specifications in this section describe the 5560 standard configuration load frames. These are all dual column, table-top load frames, designed for relatively low-force laboratory and quality control testing applications. Standard configuration models are defined as frames with standard height, standard width and one test space.

System Performance

Table 2-11. Series 5560 System Performance

Parameter	Specifications				
	5564	**5565**	**5566**	**5567**	**5569**
Testing type	Tension, compression, and through zero operation. Frames are also capable of limited cyclic testing as outlined in "Cyclic Testing" on page 2-11. Standard configuration is below the moving crosshead.				
Basic control mode	Closed loop position control.				
Load capacity kN kgf lbf	2 200 450	5 500 1125	10 1000 2250	30 3000 6750	50 [a] 5000 11240
Maximum speed mm/min in/min	2500 100	1000 40	500 20	500 20	500 20
Minimum speed mm/min in/min	0.05 0.002	0.01 0.0004	0.005 0.0002	0.005 0.0002	0.005 0.0002
Maximum force at Full speed kN kgf lbf	1 100 225	5 500 1125	10 1000 2250	30 3000 6750	25 2500 5620
Maximum speed @ Full load mm/min in/min	1000 40	1000 40	500 20	500 20	250 10

Table 2-11. Series 5560 System Performance (Continued)

Parameter	Specifications				
	5564	**5565**	**5566**	**5567**	**5569**
Return speed - Standard configuration mm/min in/min	2500 100	1200 48	600 24	600 24	500 20
Return speed - Extra wide configuration mm/min in/min	NA	1000 40	500 20	500 20	NA
Crosshead speed accuracy	± 0.1% at steady state and no load measured over 100 mm or 30 seconds, whichever is greater.				
Position accuracy (Extension)	Under no load conditions, equal to or less than ± 0.02 mm (0.0008 in) or ± 0.05% of displayed reading, whichever is greater.				
Position repeatability	± 0.015 mm (0.0006 in)				
Load measurement accuracy	± 0.4% of reading down to 1/100 of load cell capacity. ± 0.5% of reading down to 1/250 of load cell capacity.				
Strain measurement accuracy	± 0.5% of reading down to 1/50 of full scale with ASTM E83 class B or ISO 9513 class 0.5 extensometer.				
Crosshead position control resolution	0.236 µm	0.118 µm	0.057 µm	0.054 µm	0.0625 µm
Acceleration time, 0 to top speed	276 ms	250 ms	200 ms	460 ms	350 ms
Emergency stop time	100 ms	100 ms	100 ms	300 ms	320 ms

a. The second test space is rated to 30 kN maximum, while the first test space is rated to 50 kN maximum, as per the standard specifications.

Dimensions

Table 2-12 on page 2-21 shows the load frame dimensions for all 5560 dual column table top models. See Figure 2-8 to match the letter designation from Table 2-12.

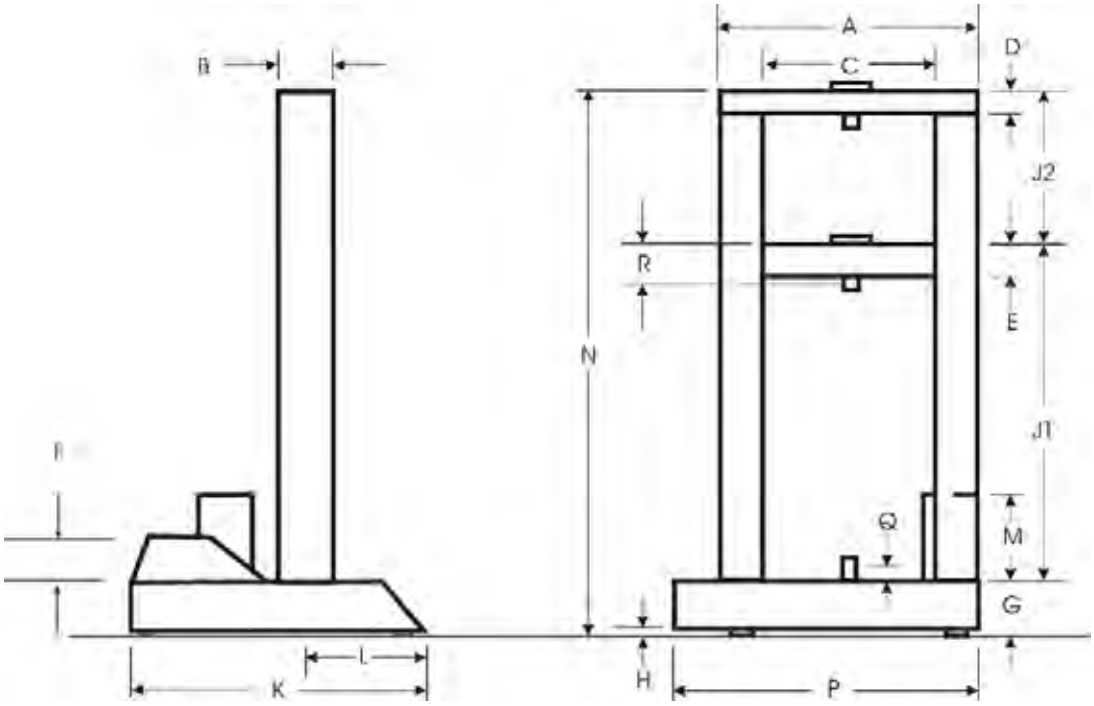


Figure 2-8. Series 5560 Standard Configuration Dimensions

Table 2-12. Series 5560 Standard Configuration Dimensions

Letter Designation	Description	Dimension - mm (inch)
A	Across columns	720 (28.3)
B	Column depth	140 (5.5)
C	Horizontal test daylight	420 (16.5)
D	Top plate thickness	36 (1.4)
E	Crosshead thickness 5564/5565/5566 5567/5569	 76 (3.0) 120 (4.7)
F	Controller height	120 (4.7)
G	Base beam height from table	180 (7.1)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position Minimum Maximum	 190 (7.5) 1325 (52.1)

Table 2-12. Series 5560 Standard Configuration Dimensions

Letter Designation	Description	Dimension - mm (inch)
J2	Not applicable	
K	Overall depth	700 (27.5)
L	Front of base to test center	245 (9.6)
M	Motor cover height	215 (8.5)
N	Overall height	1597 (62.9)
P	Overall width	909 (35.8)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2525-800 Series load cells up to 10 kN with 2525-800 Series 30 kN or 50 kN load cell	 133 (5.2) 142 (5.6)

Series 5560 Optional Configuration Specifications

Instron table top load frames are available in several frame options for specialized testing. Extra wide configurations can accommodate large assemblies. Extra-high configurations can accommodate unusually long specimens. Load frames with a second test space option let you test above the moving crosshead.

Certain combinations of these options are available, but others are not. Table 2-13 summarizes the options and combination of options that are available for the table top model load frames. If none of these configurations meet your testing requirements, contact your local Instron sales representative to discuss creating a custom product.

Table 2-13. 5560 Optional Frame Combinations

Optional Configuration	Load Frame Model				
	5564	**5565**	**5566**	**5567**	**5569**
Extra Wide	No	Yes	Yes	Yes	No
Extra Height	Yes	Yes	Yes	Yes	Yes
Extra Wide + Extra Height	No	Yes	Yes	Yes	No
Second Test Space	Yes	Yes	Yes	Yes	Yes
Extra Height with Second Test Space	Yes	Yes	Yes	Yes	No
Extra Wide with Second Test Space	No	No	No	No	No

The following sections summarize the dimensions for each configuration. Refer to the following graphic to identify the letter designation in the appropriate table for your load frame.

Most of the standard specifications also apply to the optional configuration load frames. The only specifications that may differ from the standard specifications are the weight of the frames and the axial stiffness. If these specifications differ, they will be noted in the appropriate sections under Common Specifications. If there is no specific entry for an optional configuration frame, then the standard specification for that model applies.

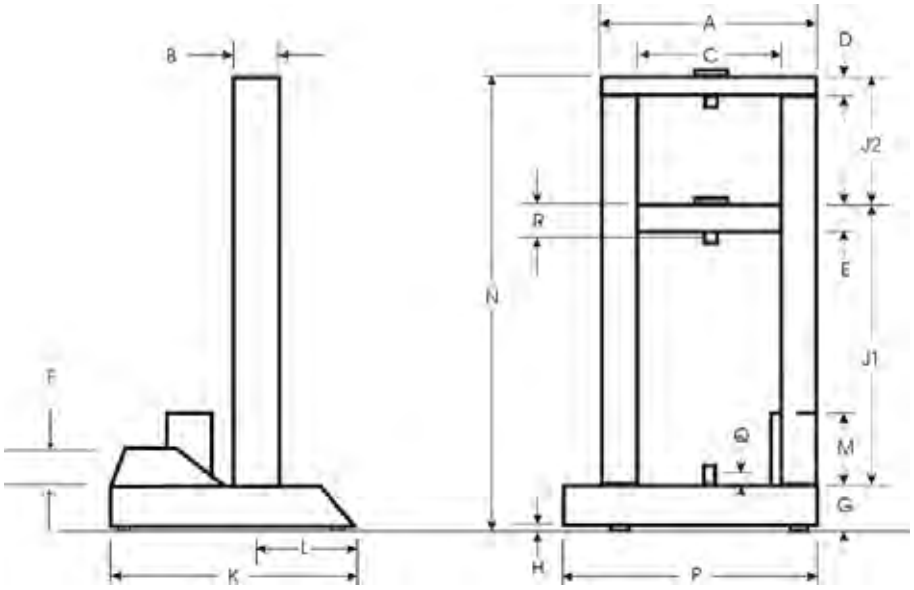


Figure 2-9. Series 5560 Optional Configuration Load Frame Dimensions

Extra Wide Configuration

Table 2-14. 5560 Extra Wide Frame Dimensions

Designation	Description	Dimension - mm (inch)
A	Across columns	1247 (49.1)
B	Column depth	140 (5.5)
C	Horizontal test daylight	946 (37.2)
D	Top plate thickness	19 (0.75)
E	Crosshead thickness	125 (4.9)
F	Controller height	120 (4.7)
G	Base beam height from table	230 (9.1)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position Minimum Maximum	 140 (5.5) 1275 (50.2)
J2	Not applicable	

Table 2-14. 5560 Extra Wide Frame Dimensions (Continued)

Designation	Description	Dimension - mm (inch)
K	Overall depth	700 (27.5)
L	Front of base to test center	245 (9.6)
M	Motor cover height	215 (8.5)
N	Overall height	1580 (62.2)
P	Overall width	1427 (56.2)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2525-800 Series load cells up to 10 kN with 2525-800 Series 30 kN load cell	 133 (5.2) 142 (5.6)

Extra Height Configuration

Table 2-15. 5560 Extra Height Frame Dimensions

Designation	Description	Dimension - mm (inch)
A	Across columns	720 (28.3)
B	Column depth	140 (5.5)
C	Horizontal test daylight	420 (16.5)
D	Top plate thickness	36 (1.4)
E	Crosshead thickness 5564/5565/5566 5567/5569	 76 (3.0) 120 (4.7)
F	Controller height	120 (4.7)
G	Base beam height from table	180 (7.1)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position Minimum Maximum	 190 (7.5) 1825 (71.8)
J2	Not applicable	
K	Overall depth	700 (27.5)

Table 2-15. 5560 Extra Height Frame Dimensions (Continued)

Designation	Description	Dimension - mm (inch)
L	Front of base to test center	245 (9.6)
M	Motor cover height	215 (8.5)
N	Overall height	2122 (83.5)
P	Overall width	909 (35.8)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2525-800 Series load cells up to 10 kN with 2525-800 Series 30 kN or 50 kN load cell	 133 (5.2) 142 (5.6)

Extra Wide and Extra Height Configuration

Table 2-16. 5560 Extra Wide & Extra Height Frame Dimensions

Designation	Description	Dimension - mm (inch)
A	Across columns	1247 (49.1)
B	Column depth	140 (5.5)
C	Horizontal test daylight	946 (37.2)
D	Top plate thickness	19 (0.75)
E	Crosshead thickness	125 (4.9)
F	Controller height	120 (4.7)
G	Base beam height from table	230 (9.1)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position Minimum Maximum	 140 (5.5) 1775 (69.9)
J2	Not applicable	
K	Overall depth	700 (27.5)
L	Front of base to test center	245 (9.6)
M	Motor cover height	215 (8.5)
N	Overall height	2105 (82.9)

Table 2-16. 5560 Extra Wide & Extra Height Frame Dimensions (Continued)

Designation	Description	Dimension - mm (inch)
P	Overall width	1427 (56.2)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2525-800 Series load cells up to 10 kN with 2525-800 Series 30 kN load cell	 133 (5.2) 142 (5.6)

Second Test Space Configuration

The second test space option lets you test in the space above the moving crosshead, as shown below. In this configuration, the top plate is replaced with a fixed crosshead. Holes are drilled in the fixed crosshead to mount the load cell or grip adapter. The specimen is gripped between the fixed crosshead and the top of the moving crosshead.

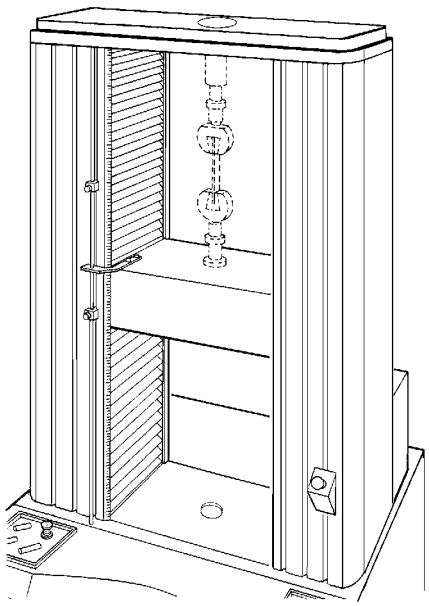


Figure 2-10. Second Test Space Configuration

Table 2-17. 5560 Second Test Space Configuration Dimensions

Letter Designation	Description	Dimension mm (inch)
A	Across columns	720 (28.3)
B	Column depth	140 (5.5)
C	Horizontal test daylight	420 (16.5)
D	Fixed crosshead thickness	75 (2.95)
E	Moving crosshead thickness 5564/5565/5566 5567/5569	 76 (3.0) 120 (4.7)
F	Controller height	120 (4.7)
G	Base beam height from table	180 (7.1)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position (First test space) Minimum Maximum	 190 (7.5) 1325 (52.1)
J2	Crosshead position (Second test space) Minimum Maximum	 131 (5.2) 1266 (49.8)
K	Overall depth	700 (27.5)
L	Front of base to test center	245 (9.6)
M	Motor cover height	215 (8.5)
N	Overall height	1636 (64.4) [a]
P	Overall width	909 (35.8)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2525-800 Series load cells up to 10 kN with 2525-800 Series 30 kN or 50 kN load cell	 133 (5.2) 142 (5.6)

a. Add 30 (1.2) with load cell fitted. Allow an additional 200 (8.0) space above the fixed crosshead for load cell removal and access.

Extra Height with Second Test Space Configuration

Table 2-18. 5560 Extra Height with Second Test Space Dimensions

Designation	Description	Dimension mm (inch)
A	Across columns	720 (28.3)
B	Column depth	140 (5.5)
C	Horizontal test daylight	420 (16.5)
D	Fixed crosshead thickness	75 (2.95)
E	Moving crosshead thickness 5564/5565/5566 5567	 76 (3.0) 120 (4.7)
F	Controller height	120 (4.7)
G	Base beam height from table	180 (7.1)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position Minimum Maximum	 190 (7.5) 1825 (71.8)
J2	Crosshead position with second test space Minimum Maximum	 156 (6.1) 1791 (70.5)
K	Overall depth	700 (27.5)
L	Front of base to test center	245 (9.6)
M	Motor cover height	215 (8.5)
N	Overall height	2161 (85.1) [a]
P	Overall width	909 (35.8)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2525-800 Series load cells up to 10 kN with 2525-800 Series 30 kN load cell	 133 (5.2) 142 (5.6)

a. Add 30 (1.2) with load cell fitted. Allow an additional 200 (8.0) space above the fixed crosshead for load cell removal and access.

Series 5580 Standard Model Specifications

The specifications in this section describe the 5580 standard configuration floor models. Standard configuration models are defined as frames with standard height, standard width and one test space.

System Performance

Table 2-19. Series 5580 System Performance

Parameter	Specifications			
	5581	**5582**	**5584**	**5585H**
Testing types	Tension, Compression and through zero operation. Standard configuration is below the moving crosshead. Not suitable for fatigue testing, but limited cyclic testing is available. Refer to "Cyclic Testing" on page 2-11. High frequency waveforms are subject to mechanical limitations of the load frame and may cause excessive wear on the load frame.			
Basic control mode	Closed loop position control.			
Load capacity kN kgf lbf	50 5100 11240	100 10000 22500	150 15000 33750	250 [a] 25000 56200
Maximum speed mm/min in/min	1000 40	500 20	750 30	500 20
Minimum speed mm/min in/min	0.001 0.00004	0.001 0.00004	0.001 0.00004	0.001 0.00004
Maximum force at Full speed kN kgf lbf	35 3570 7870	75 7650 16860	110 * 11215 24730	100 10200 22480
	* 5584 - If operating at 100 V ±10% service, these values may need to be reduced to 50% of load capacity due to electrical current limits.			
Maximum speed at Full load mm/min in/min	500 20	250 10	375 15	200 8

Table 2-19. Series 5580 System Performance (Continued)

Parameter	Specifications			
	5581	**5582**	**5584**	**5585H**
Return speed mm/min in/min	1000 40	600 24	800 32	500 20
Crosshead speed accuracy	± 0.1% at steady state and no load measured over 100 mm or 30 seconds, whichever is greater.			
Position accuracy (Extension)	Under no load conditions, equal to or less than ± 0.02 mm (0.0008 in) or ± 0.05% of displayed reading, whichever is greater.			
Position repeatability	±0.015 mm (0.0006 in)			
Load measurement accuracy (at 25° C)	± 0.4% of reading down to 1/10 of load cell capacity. ± 0.5% of reading down to 1/100 of load cell capacity. ± 1.0% of reading down to 1/250 of load cell capacity.			
Strain measurement accuracy	± 0.05% of full scale or ± 0.5% of reading, whichever is greater. (Using Series 2630-100 extensometers)			
Crosshead position control resolution	0.0996 µm	0.0598 µm	0.0747 µm	0.0598 µm
Acceleration time, 0 to top speed	550 ms	660 ms	690 ms	685 ms
Emergency stop time	400 ms	400 ms	650 ms	650 ms

a. The second test space is rated to 200 kN maximum, while the first test space is rated to 250 kN maximum, as per the standard specifications.

Dimensions

Table 2-20 on page 2-32 shows the load frame dimensions for all 5580 floor models. See Figure 2-11 to match the letter designation from Table 2-20.

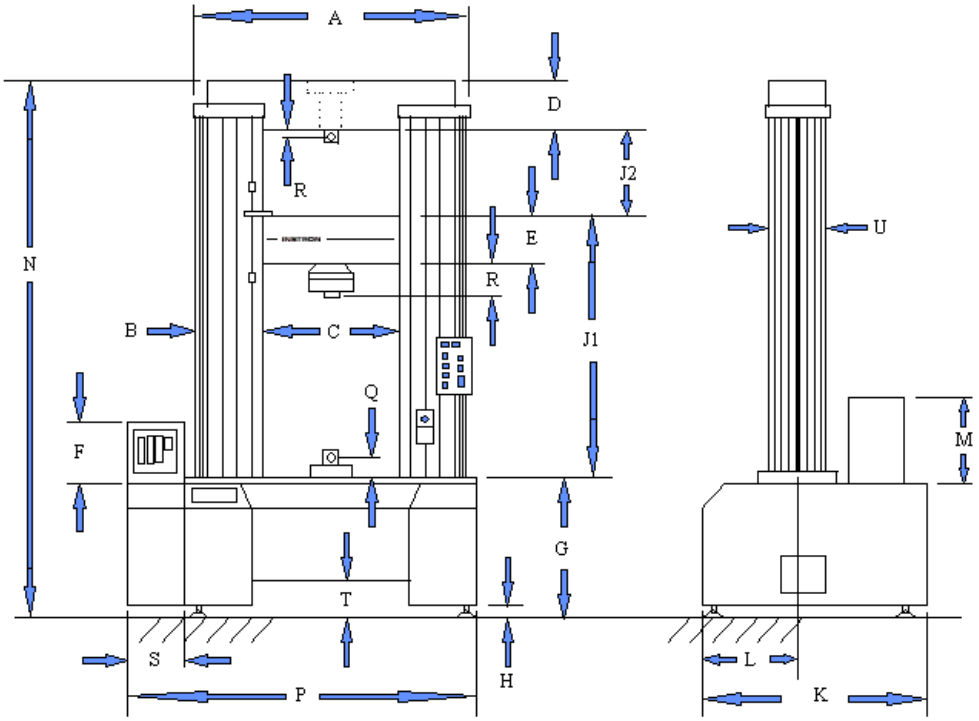


Figure 2-11. Series 5580 Standard Configuration Dimensions

Table 2-20. Series 5580 Standard Configuration Dimensions

Designation	Description	Dimension mm (inch)
	Total crosshead travel 5581/5582 5584/5585H	 1235 (48.6) 1182 (46.5)
	Vertical test daylight * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 1310 (51.6) 1260 (49.6)
A	Across columns	1120 (44.1)
B	Column width	263 (10.4)
C	Horizontal test daylight	575 (22.6)
D	Top plate thickness	55 (2.2)

Table 2-20. Series 5580 Standard Configuration Dimensions (Continued)

Designation	Description	Dimension mm (inch)
E	Crosshead thickness 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
F	Controller height	120 (4.7)
G	Base beam height from floor With base extension 2910-061	480 (18.9) 780 (30.7)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 225 (8.9) 1460 (57.5) 278 (11.0) 1460 (57.5)
J2	Not applicable	
K	Overall depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height With base extension 2910-061	2092 (82.4) 2392 (94.2)
P	Overall width	1307 (51.5)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 load cells (50/100kN) 5584/5585H - with Low Profile 2525-171/174 load cells	 16 (0.7) 111 (4.4)
S	Width of controller	183 (7.2)
T	Clearance under base	112 (4.4)
U	Column depth	200 (7.8)

Series 5580 Optional Configuration Specifications

Instron floor model load frames are available in several frame options for specialized testing. Extra wide configurations can accommodate large assemblies. Extra-high configurations can accommodate unusually long specimens. Load frames with a second test space option let you test above the moving crosshead.

Certain combinations of these options are available, but others are not. Table 2-21 summarizes the options that are available for the floor model load frames. If none of these configurations meet your testing requirements, contact your local Instron sales representative to discuss creating a custom product.

Table 2-21. Series 5580 Optional Frame Combinations

Optional Configurations	Load Frame Model			
	5581	**5582**	**5584**	**5585H**
Extra Wide	Yes	Yes	Yes	Yes
Extra Height	Yes	Yes	Yes	Yes
Double Extra Height	Yes	Yes	Yes	Yes
Extra Wide + Extra Height	Yes	Yes	Yes	Yes
Extra Wide + Double Extra Height	Yes	Yes	Yes	Yes
Second Test Space	Yes	Yes	Yes	Yes
Extra Height with Second Test Space	Yes	Yes	Yes	Yes
Extra Wide with Second Test Space	No	No	No	No
Double Extra Height with Second Test Space	Yes	Yes	Yes	Yes

The following sections summarize the dimensions for each configuration. Refer to the following graphic to identify the letter designation in the appropriate table for your load frame.

Most of the standard specifications also apply to the optional configuration load frames. The only specifications that may differ from the standard specifications are the weight of the frames and the axial stiffness. If these specifications differ, they will be noted in the appropriate sections under Common Specifications. If there is no specific entry for an optional configuration frame, then the standard specification for that model applies.

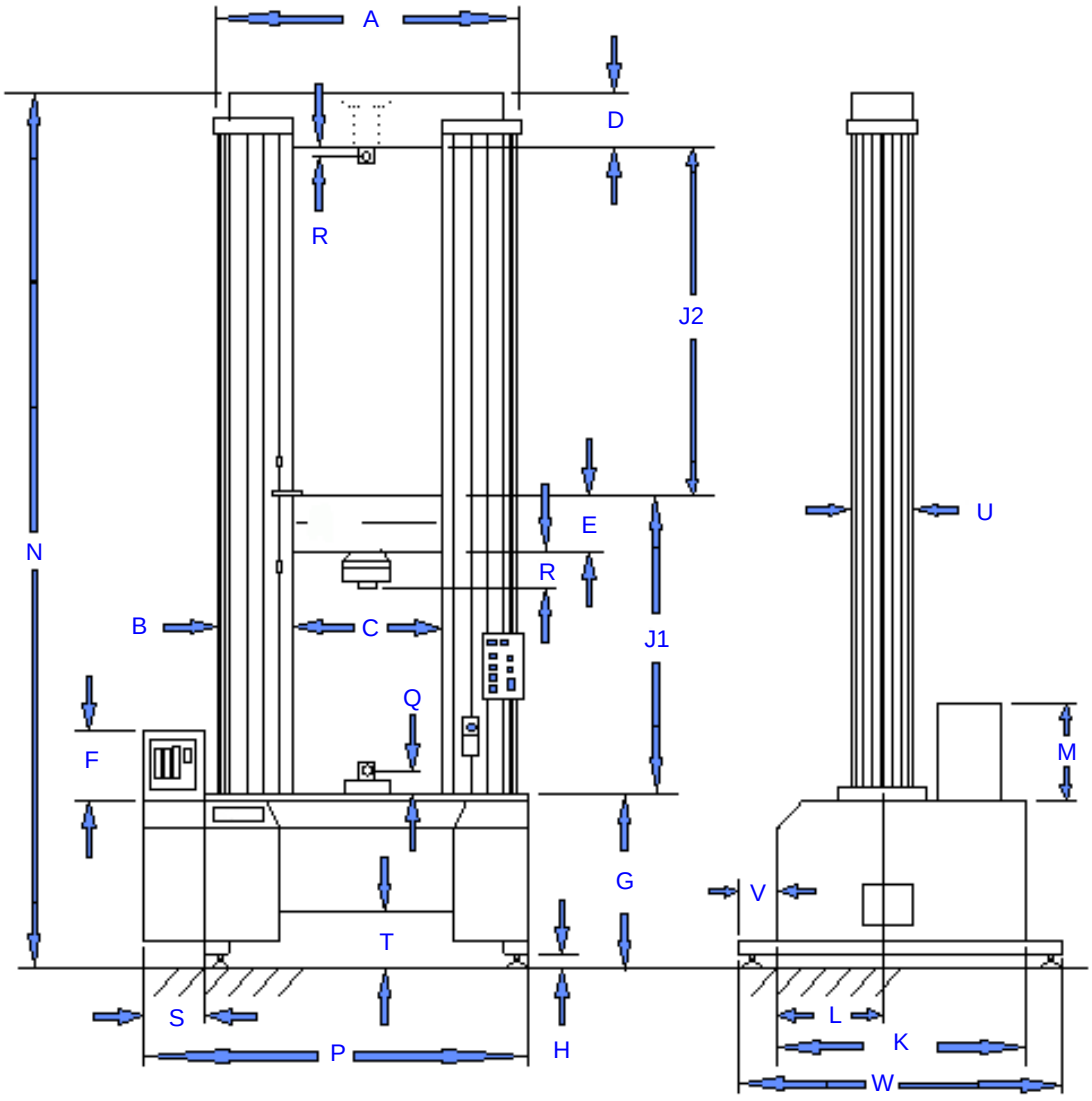


Figure 2-12. Series 5580 Optional Configuration Load Frame Dimensions

Extra Wide Configuration

Table 2-22. Series 5580 Extra Wide Frame Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel 5581/5582 5584/5585H	 1180 (46.5) 1155 (45.5)
	Vertical test daylight * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 1235 (48.6) 1210 (47.6)
A	Across columns	1479 (58.2)
B	Column width	263 (10.4)
C	Horizontal test daylight	934 (36.8)
D	Top plate thickness	55 (2.2)
E	Crosshead thickness 5581/5582 5584/5585H	 200 (7.9) 225 (8.9)
F	Controller height	120 (4.7)
G	Base beam height from floor	505 (19.9)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 255 (10.0) 1435 (56.5) 280 (11.0) 1435 (56.5)
J2	Not applicable	
K	Overall depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height	2092 (82.4)
P	Overall width	1666 (65.6)
Q	Coupling pin to base	59 (2.3)

Table 2-22. Series 5580 Extra Wide Frame Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) * 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN) * Mounts to underside of crosshead. No drop-through feature on Extra Wide option.	 172 (6.8) 111 (4.4)
S	Controller width	183 (7.2)
T	Clearance under base	112 (4.4)
U	Column depth	200 (7.8)
V	Not applicable	
W	Not applicable	

Extra Height Configuration

Table 2-23. Series 5580 Extra Height Frame Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel 5581/5582 5584/5585H	 1735 (68.3) 1682 (66.2)
	Vertical test daylight * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 1810 (71.2) 1760 (69.2)
A	Across columns	1120 (44.1)
B	Column width	263 (10.4)
C	Horizontal test daylight	575 (22.6)
D	Top plate thickness	55 (2.2)
E	Crosshead thickness 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
F	Controller height	120 (4.7)
G	Base beam height from floor	480 (18.9)

Table 2-23. Series 5580 Extra Height Frame Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 225 (8.9) 1960 (77.2) 278 (11.0) 1960 (77.2)
J2	Not applicable	
K	Overall depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height	2592 (102.0)
P	Overall width	1307 (51.5)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN)	 16 (0.7) 111 (4.4)
S	Controller width	183 (7.2)
T	Clearance under base	112 (4.4)
U	Column depth	200 (7.8)
V	Not applicable	
W	Not applicable	

Double Extra Height Configuration

Table 2-24. Series 5580 Double Extra Height Frame Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel 5581/5582 5584/5585H	 2235 (88.0) 2183 (85.9)
	Vertical test daylight * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 2328 (91.6) 2276 (89.6)
A	Across columns	1120 (44.1)
B	Column width	263 (10.4)
C	Horizontal test daylight	575 (22.6)
D	Top plate thickness	55 (2.2)
E	Crosshead thickness 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
F	Controller height	120 (4.7)
G	Base beam height from floor	544 (21.4)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 241 (9.5) 2476 (97.5) 293 (11.5) 2476 (97.5)
J2	Not applicable	
K	Base depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height	3181 (125.2)
P	Overall width	1307 (51.5)
Q	Coupling pin to base	59 (2.3)

Table 2-24. Series 5580 Double Extra Height Frame Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN)	 16 (0.7) 111 (4.4)
S	Controller width	183 (7.2)
T	Clearance under base	163 (6.4)
U	Column depth	200 (7.8)
V	Front of base to front of stabilizer	111 (4.4)
W	Overall depth	976 (38.4)

Extra Wide and Extra Height Configuration

Table 2-25. Series 5580 Extra Wide and Extra Height Frame Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel 5581/5582 5584/5585H	 1680 (66.1) 1655 (65.2)
	Vertical test daylight * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 1735 (68.3) 1710 (67.3)
A	Across columns	1479 (58.2)
B	Column width	263 (10.4)
C	Horizontal test daylight	934 (36.8)
D	Top plate thickness	55 (2.2)
E	Crosshead thickness 5581/5582 5584/5585H	 200 (7.9) 225 (8.9)
F	Controller height	120 (4.7)
G	Base beam height from floor	505 (19.9)
H	Gap for feet - nominal setting	45 (1.8)

Table 2-25. Series 5580 Extra Wide and Extra Height Frame Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
J1	Crosshead position 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 255 (10.0) 1935 (76.2) 280 (11.0) 1935 (76.2)
J2	Not applicable	
K	Overall depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height	2592 (102.0)
P	Overall width	1666 (65.6)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) * 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN) * Mounts to underside of crosshead. No drop-through feature on Extra Wide option.	 172 (6.8) 111 (4.4)
S	Controller width	183 (7.2)
T	Clearance under base	112 (4.4)
U	Column depth	200 (7.8)
V	Not applicable	
W	Not applicable	

Extra Wide and Double Extra Height Configuration

Table 2-26. Series 5580 Extra Wide and Double Extra Height Frame Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel 5581/5582 5584/5585H	 2221 (87.4) 2183 (86.0)
	Vertical test daylight * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 2276 (89.6) 2251 (88.6)
A	Across columns	1479 (58.2)
B	Column width	263 (10.4)
C	Horizontal test daylight	934 (36.8)
D	Top plate thickness	55 (2.2)
E	Crosshead thickness 5581/5582 5584/5585H	 200 (7.9) 225 (8.9)
F	Controller height	120 (4.7)
G	Base beam height from floor	505 (19.9)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 255 (10.0) 2476 (97.5) 293 (11.5) 2476 (97.5)
J2	Not applicable	
K	Base depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height	3181 (125.2)
P	Overall width	1666 (65.6)
Q	Coupling pin to base	59 (2.3)

Table 2-26. Series 5580 Extra Wide and Double Extra Height Frame Dimensions

Letter Designation	Description	Dimension mm (inch)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) * 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN) * Mounts to underside of crosshead. No drop-through feature on Extra Wide option.	 172 (6.8) 111 (4.4)
S	Controller width	183 (7.2)
T	Clearance under base	163 (6.4)
U	Column depth	200 (7.8)
V	Front of base to front of stabilizer	111 (4.4)
W	Overall depth	976 (38.4)

Second Test Space Configuration

The second test space option lets you test in the space above the moving crosshead, as shown below. In this configuration, the top plate is replaced with a fixed crosshead. Holes are drilled in the fixed crosshead to mount the load cell or grip adapter. The specimen is gripped between the fixed crosshead and the top of the moving crosshead.

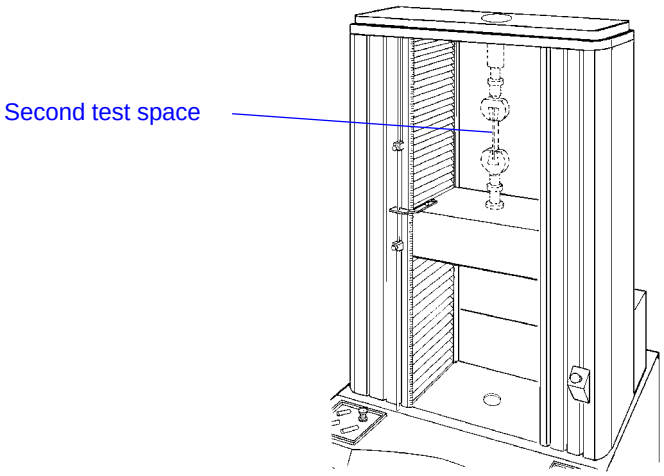


Figure 2-13. Second Test Space Configuration

Table 2-27. Series 5580 Second Test Space Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel (First test space) 5581/5582 5584/5585H	 1235 (48.6) 1182 (46.5)
	Vertical test daylight (First test space) * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 1310 (51.6) 1260 (49.6)
A	Across columns	1120 (44.1)
B	Column width	263 (10.4)
C	Horizontal test daylight	575 (22.6)
D	Fixed crosshead thickness - Second test space 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
E	Moving crosshead thickness 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
F	Controller height	120 (4.7)
G	Base beam height from floor With base extension 2910-061	480 (18.9) 780 (30.7)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position (First test space) 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 225 (8.9) 1460 (57.5) 278 (11.0) 1460 (57.5)
J2	Crosshead position (Second test space) 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 77 (3.0) 1312 (51.7) 77 (3.0) 1259 (49.6)
K	Overall depth	757 (29.8)

Table 2-27. Series 5580 Second Test Space Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height [a] 5581/5582 5584/5585H With base extension 2910-061 5581/5582 5584/5585H	 2173 (85.6) 2223 (87.5) 2473 (97.4) 2523 (99.3)
P	Overall width	1307 (51.5)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN)	 16 (0.7) 111 (4.4)
S	Width of controller	183 (7.2)
T	Clearance under base	112 (4.4)
U	Column depth	200 (7.8)
V	Not applicable	
W	Not applicable	

a. Allow an additional 200 (8.0) space above the fixed crosshead for load cell removal and access.

Extra Height with Second Test Space Configuration

Table 2-28. Series 5580 Extra Height with Second Test Space Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel (First test space) 5581/5582 5584/5585H	 1735 (68.3) 1682 (66.2)
	Vertical test daylight (First test space) * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 1810 (71.2) 1760 (69.2)
A	Across columns	1120 (44.1)
B	Column width	263 (10.4)
C	Horizontal test daylight	575 (22.6)
D	Fixed crosshead thickness - Second test space 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
E	Moving crosshead thickness 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
F	Controller height	120 (4.7)
G	Base beam height from floor	480 (18.9)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position (First test space) 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 225 (8.9) 1960 (77.2) 278 (11.0) 1960 (77.2)
J2	Crosshead position (Second test space) 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 77 (3.0) 1812 (71.3) 77 (3.0) 1759 (69.3)
K	Overall depth	757 (29.8)

Table 2-28. Series 5580 Extra Height with Second Test Space Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height [a] 5581/5582 5584/5585H	2673 (105.2) 2723 (107.2)
P	Overall width	1307 (51.5)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN)	 16 (0.7) 111 (4.4)
S	Width of controller	183 (7.2)
T	Clearance under base	112 (4.4)
U	Column depth	200 (7.8)
V	Not applicable	
W	Not applicable	

a. Allow an additional 200 (8.0) space above the fixed crosshead for load cell removal and access.

Double Extra Height with Second Test Space Configuration

Table 2-29. Series 5580 Double Extra Height with Second Test Space Dimensions

Letter Designation	Description	Dimension mm (inch)
	Total crosshead travel (First test space) 5581/5582 5584/5585H	 2235 (88.0) 2183 (85.9)
	Vertical test daylight (First test space) * 5581/5582 5584/5585H * Measured from the base beam to the underside of the crosshead.	 2328 (91.6) 2276 (89.6)
A	Across columns	1120 (44.1)

Table 2-29. Series 5580 Double Extra Height with Second Test Space Dimensions

Letter Designation	Description	Dimension mm (inch)
B	Column width	263 (10.4)
C	Horizontal test daylight	575 (22.6)
D	Fixed crosshead thickness - Second test space 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
E	Moving crosshead thickness 5581/5582 5584/5585H	 150 (6.0) 200 (8.0)
F	Controller height	120 (4.7)
G	Base beam height from floor	544 (21.4)
H	Gap for feet - nominal setting	45 (1.8)
J1	Crosshead position (First test space) 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 241 (9.5) 2476 (97.5) 293 (11.5) 2476 (97.5)
J2	Crosshead position (Second test space) 5581/5582 Minimum Maximum 5584/5585H Minimum Maximum	 90 (3.5) 2325 (91.5) 90 (3.5) 2273 (89.5)
K	Base depth	757 (29.8)
L	Front of base to test center	369 (14.5)
M	Motor cover height	362 (14.3)
N	Overall height [a] 5581/5582 5584/5585H	3258 (128.3) 3310 (130.3)
P	Overall width	1307 (51.5)
Q	Coupling pin to base	59 (2.3)

Table 2-29. Series 5580 Double Extra Height with Second Test Space Dimensions

Letter Designation	Description	Dimension mm (inch)
R	Load cell pin or thread face to underside of crosshead 5581/5582 - with 2525-800 Series load cells (50/100 kN) 5584/5585H - with Low Profile 2525-171/174 Series load cells (150/250 kN)	 16 (0.7) 111 (4.4)
S	Width of controller	183 (7.2)
T	Clearance under base	163 (6.4)
U	Column depth	200 (7.8)
V	Front of base to front of stabilizer	111 (4.4)
W	Overall depth	976 (38.4)

a. Allow an additional 200 (8.0) space above the fixed crosshead for load cell removal and access.

Accessory Mounting Dimensions

You can attach numerous testing accessories and fixtures to the load frame for specialized tests. Instron manufactures many of these accessories. The following diagrams show the standard mounting holes in each style of load frame (single column, dual column table top, and floor styles). Use these standard mounting holes to mount your accessories. Avoid tapping new holes that may weaken or otherwise compromise the integrity of the load frame.

This section describes each style of load frame separately. Look for the section pertaining to your specific model for the dimensions that apply to your model. This section includes mounting dimensions for optional configuration frames.

Series 5540 Accessory Mounting Dimensions

Base Beam

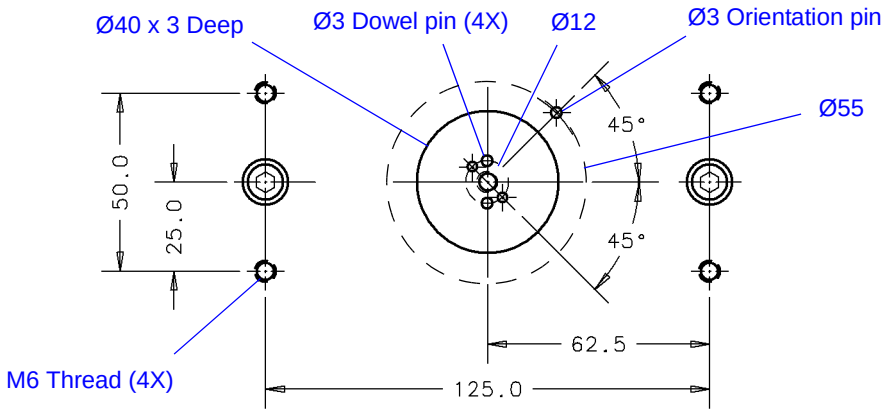


Figure 2-14. Series 5540 - Base Beam Accessory Mounting Dimensions

Crosshead

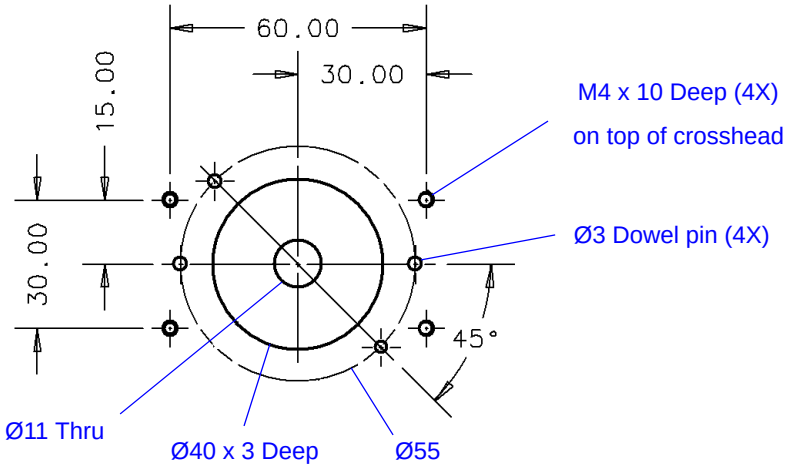


Figure 2-15. Series 5540 - Crosshead Mounting Dimensions

Series 5560 Accessory Mounting Dimensions

Base Beam

Refer to Figure 2-16 for the Series 5564/5565/5566 accessory mounting dimensions on the base beam. Refer to Figure 2-17 on page 2-52 for the Series 5567/5569 base beam accessory mounting dimensions. If you have the extra wide configuration floor model, refer to Figure 2-18 on page 2-52 for the base beam accessory mounting dimensions on the extra wide models.

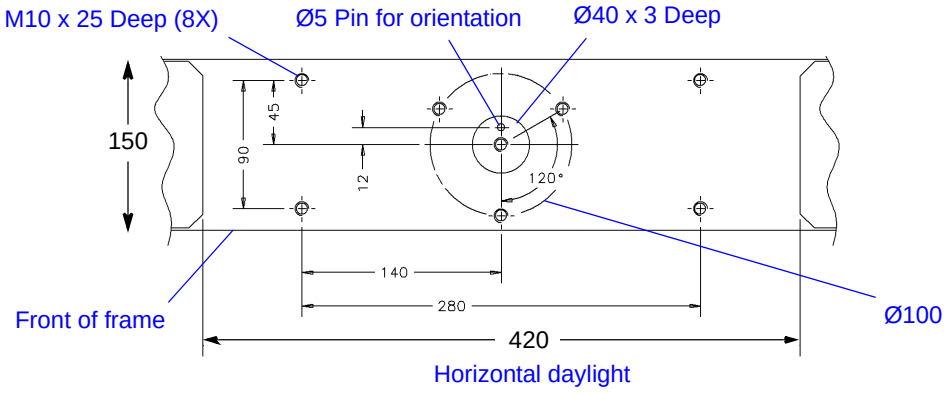


Figure 2-16. Series 5564, 5565, 5566 Standard Configuration - Base Beam Mounting Dimensions

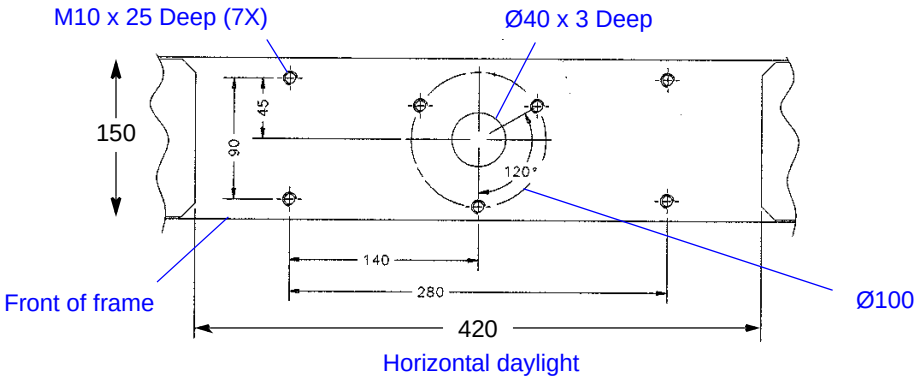


Figure 2-17. Series 5567 and 5569 Standard Configuration - Base Beam Mounting Dimensions

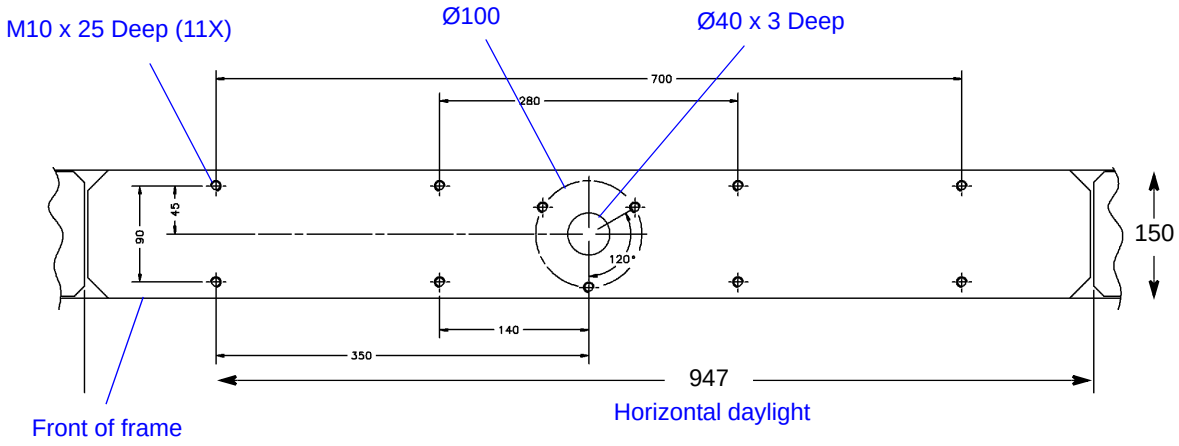


Figure 2-18. Series 5565, 5566, 5567 Extra Wide Configuration - Base Beam Mounting Dimensions

Crosshead

Refer to Figure 2-19 on page 2-53 for the mounting dimensions on the moving crosshead. If your machine has a second test space, then the top plate is replaced by a fixed crosshead. Refer to Figure 2-20 on page 2-53 for the mounting dimensions on the fixed crosshead. Note that Figure 2-19 on page 2-53 also pertains to the extra wide configuration models.

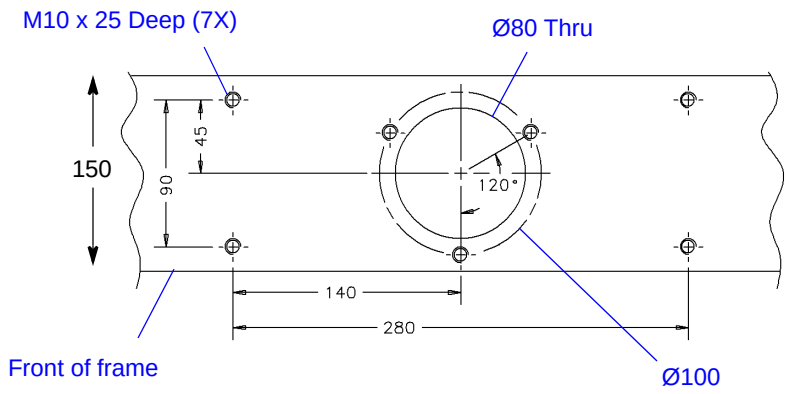
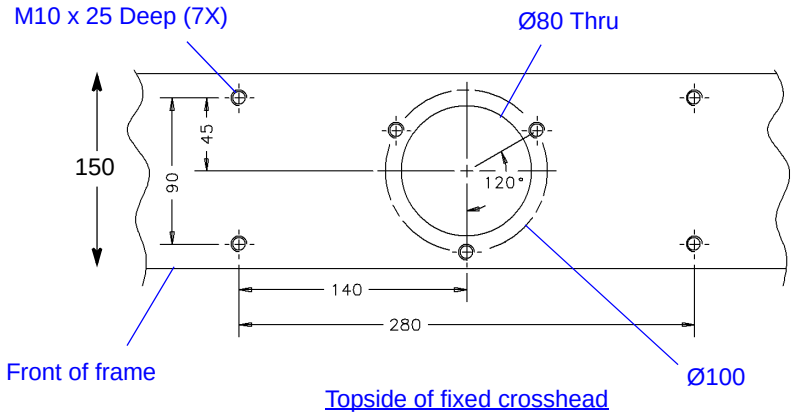


Figure 2-19. Series 5560 - Moving Crosshead Mounting Dimensions



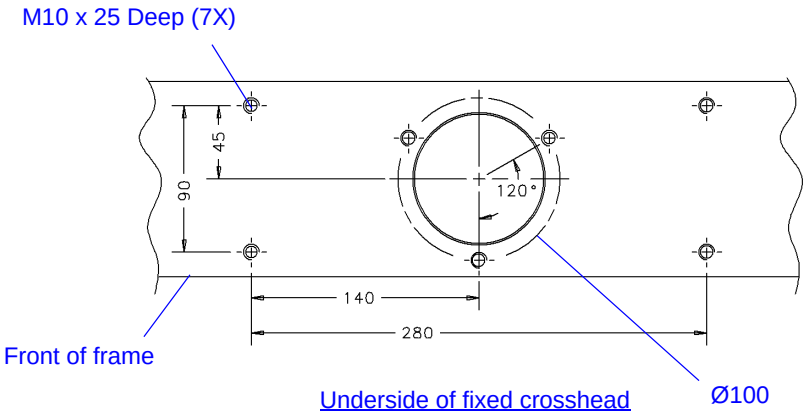


Figure 2-20. Series 5560 - Fixed Crosshead Mounting Dimensions

Top Plate

Refer to Figure 2-21 on page 2-54 for the top plate dimensions of the model 5560 model frames. The top plate dimensions apply to frames with one test space. Figure 2-22 on page 2-54 shows the top plate dimensions for the 5560 extra wide configuration models.

Note: *The top plate is not a load bearing component of the machine.*

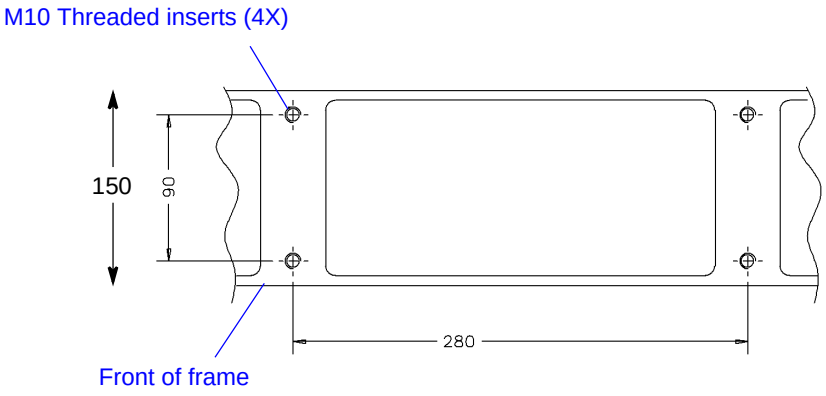


Figure 2-21. Series 5560 Standard Configuration - Top Plate Mounting Dimensions

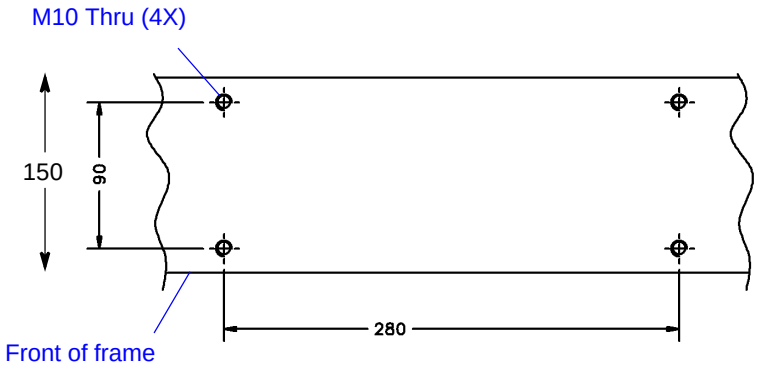


Figure 2-22. Series 5565, 5566, 5567 Extra Wide Configuration - Top Plate Mounting Dimensions

Series 5580 Accessory Mounting Dimensions

Base Beam

Refer to Figure 2-23 for the Series 5581/5582 accessory mounting dimensions on the base beam. Refer to Figure 2-24 on page 2-56 for the Series 5584/5585H base beam accessory mounting dimensions. If you have the extra wide configuration floor model, refer to Figure 2-25 on page 2-56 for the base beam accessory mounting dimensions.

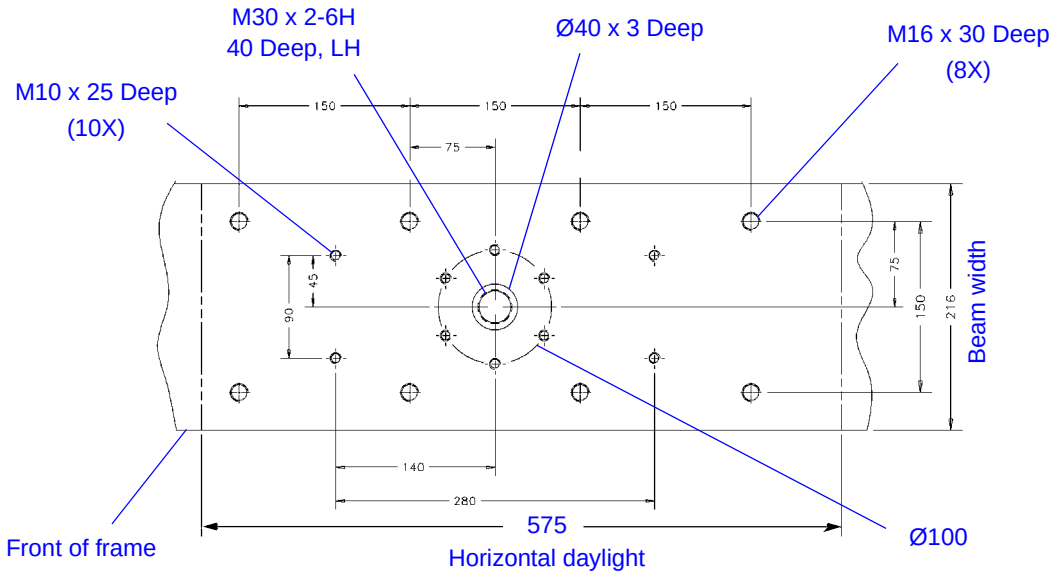


Figure 2-23. Series 5581 and 5582 Standard Configuration - Base Beam Mounting Dimensions

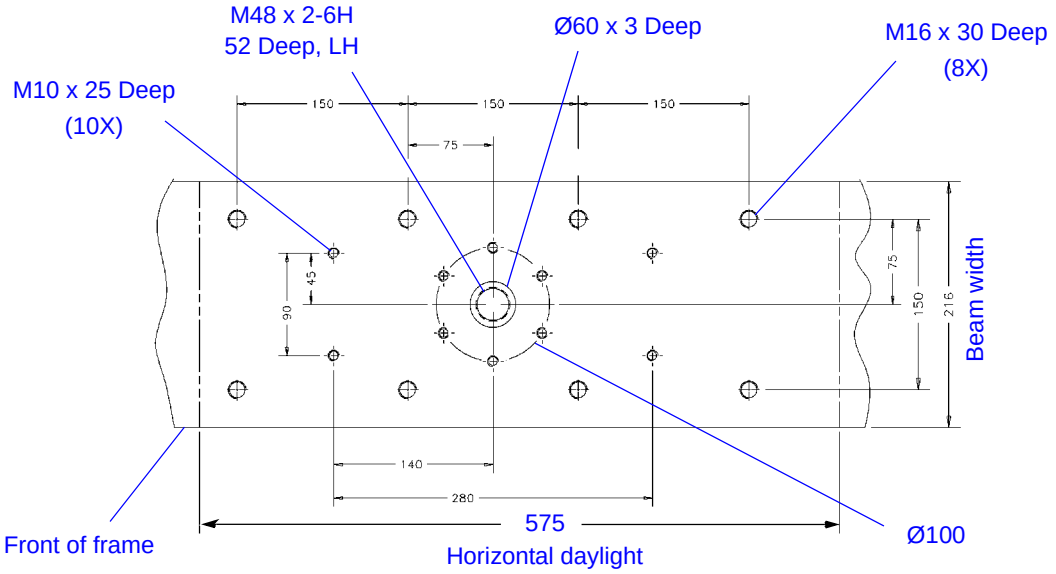
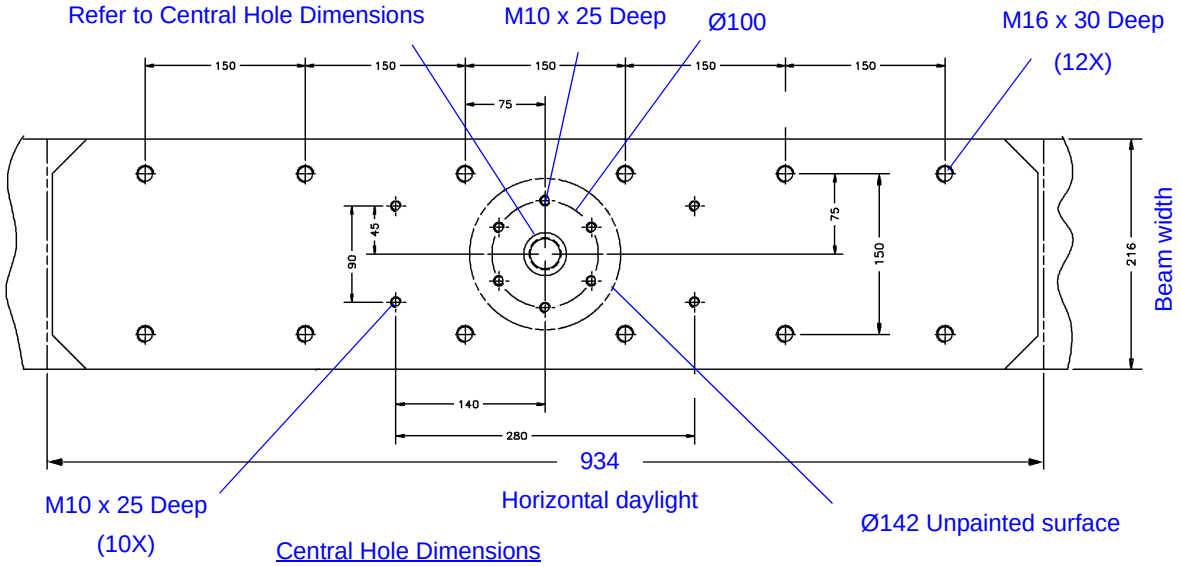


Figure 2-24. Series 5584 and 5585H Standard Configuration - Base Beam Mounting Dimensions



Central Hole Dimensions

5581/5582	M30 x 2-6H Left hand x 40 Deep Ø40H8 x 3 Deep locating spotface (Interface Type I)
5584/5585H	M48 x 2-6H Left hand x 50 Deep Ø60H8 x 3 Deep locating spotface (Interface Type II)

Figure 2-25. Series 5580 Extra Wide Configuration - Base Beam Mounting Dimensions

Crosshead

The crosshead configuration is different between the 5581 and 5582 and the 5584 and 5585H. Refer to Figure 2-26 on page 2-57 for the Series 5581/5582 crosshead mounting dimensions. Refer to Figure 2-27 on page 2-58 for the Series 5584/5585H crosshead mounting dimensions.

If your machine has an extra wide configuration, then refer to Figure 2-28 on page 2-58 for the Series 5581/5582 extra wide crosshead mounting dimensions, or Figure 2-29 on page 2-59 for the Series 5584/5585H extra wide crosshead mounting dimensions.

If your machine has a second test space configuration, then the top plate is replaced by a fixed crosshead. Refer to Figure 2-30 on page 2-60 for the Series 5581/5582 fixed crosshead mounting dimensions, or Figure 2-31 on page 2-60 for the Series 5584/5585H fixed crosshead mounting dimensions.

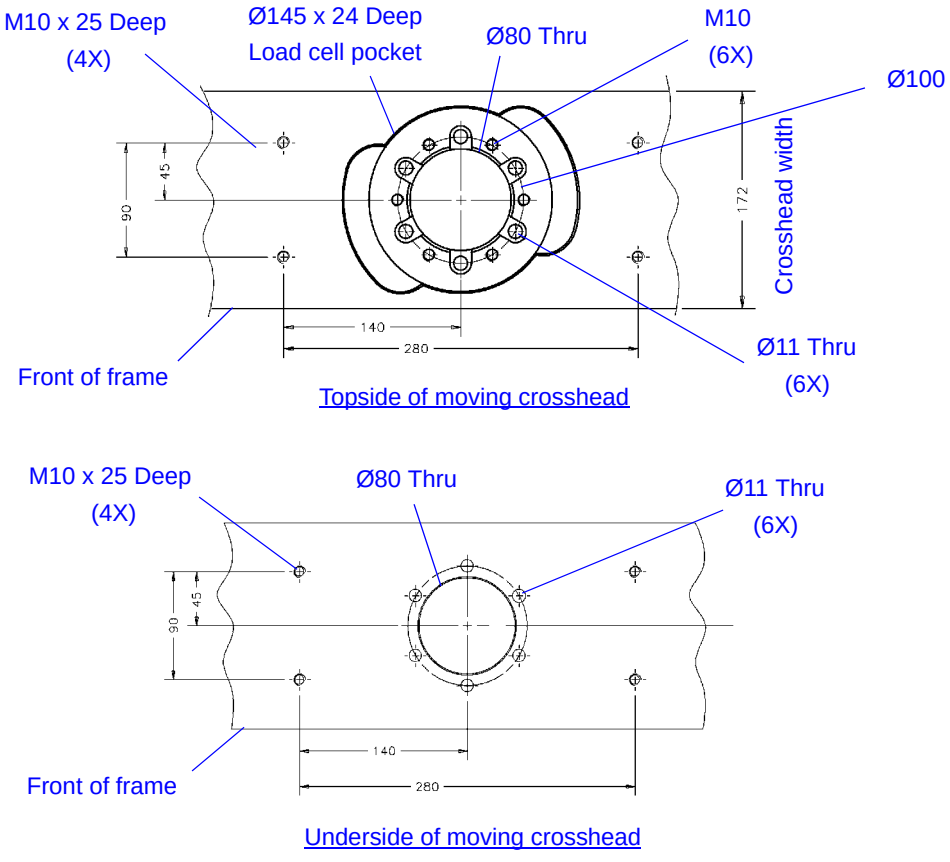


Figure 2-26. Series 5581 and 5582 Moving Crosshead Mounting Dimensions

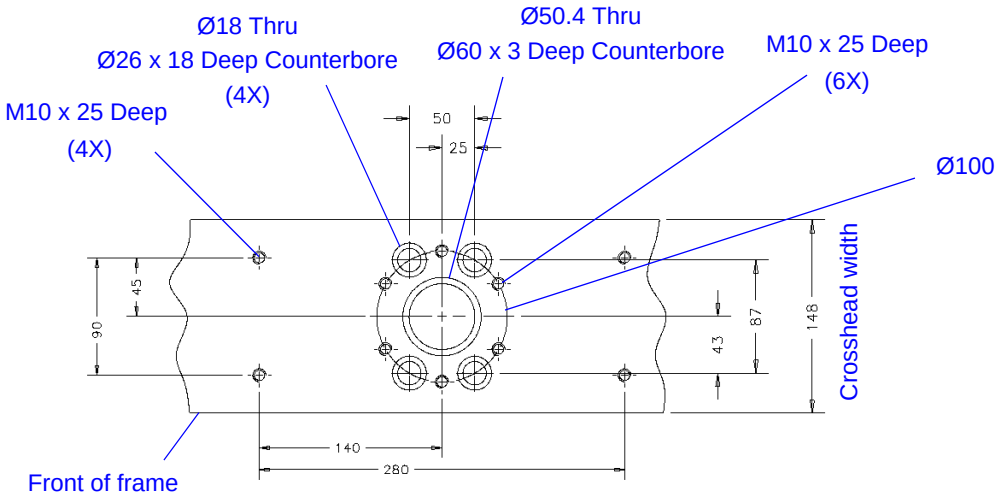
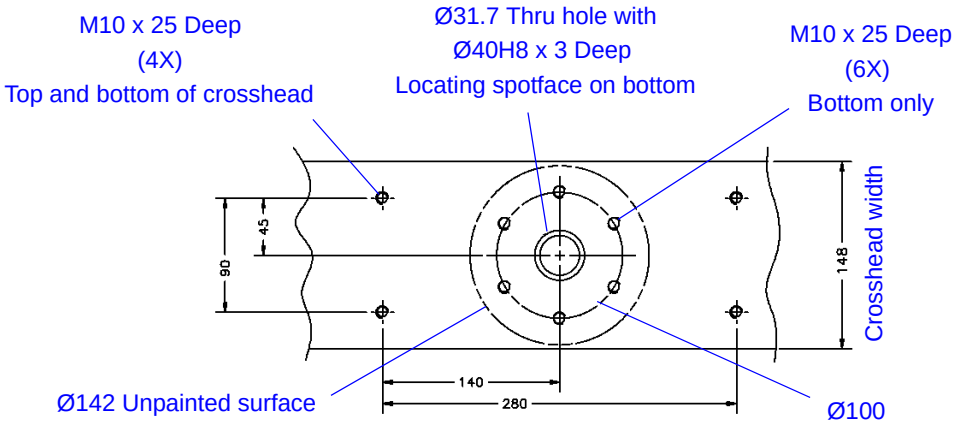
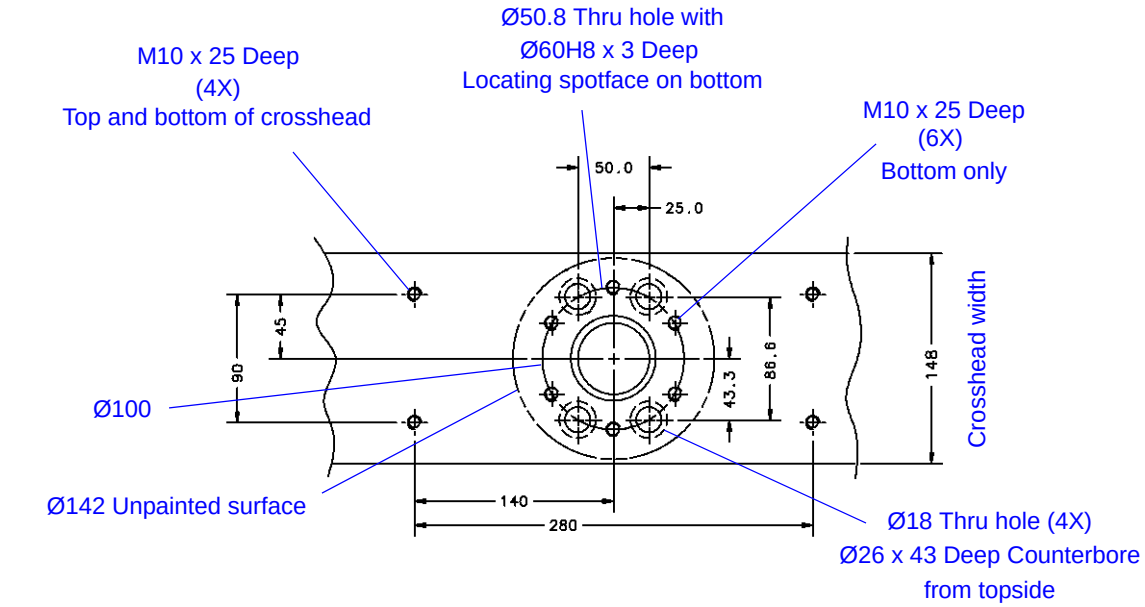


Figure 2-27. Series 5584 and 5585H Moving Crosshead Mounting Dimensions



Crosshead thickness: 200 mm

Figure 2-28. Series 5581 and 5582 Extra Wide Configuration - Moving Crosshead Mounting Dimensions



Crosshead thickness: 225 mm

Figure 2-29. Series 5584 and 5585H Extra Wide Configuration - Moving Crosshead Mounting Dimensions

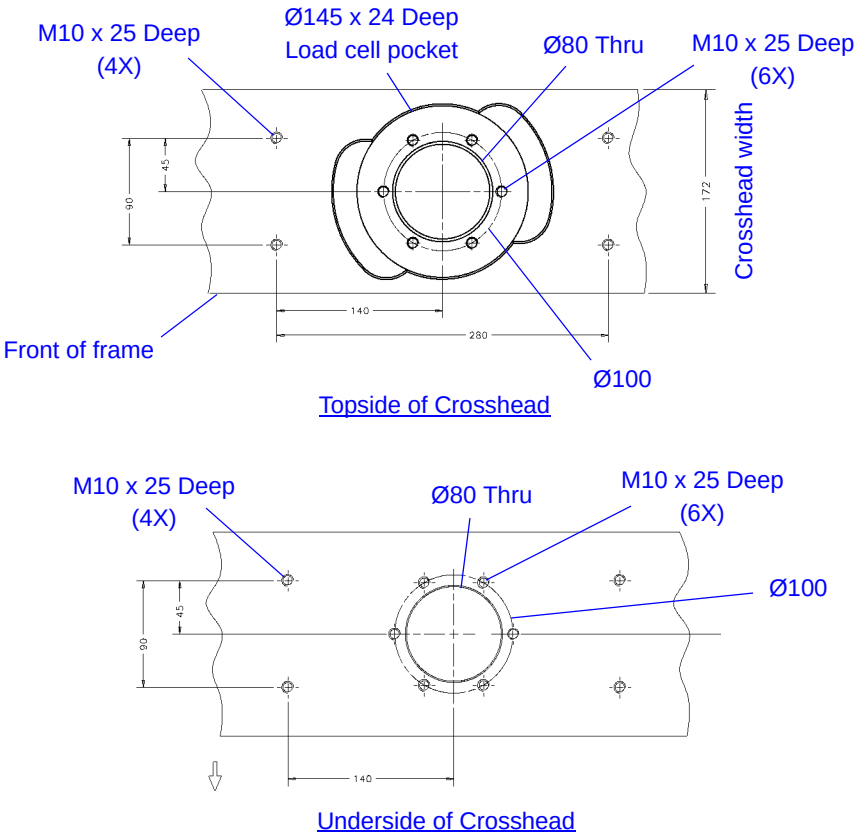


Figure 2-30. Series 5581 and 5582 Second Test Space Configuration - Fixed Crosshead Mounting Dimensions

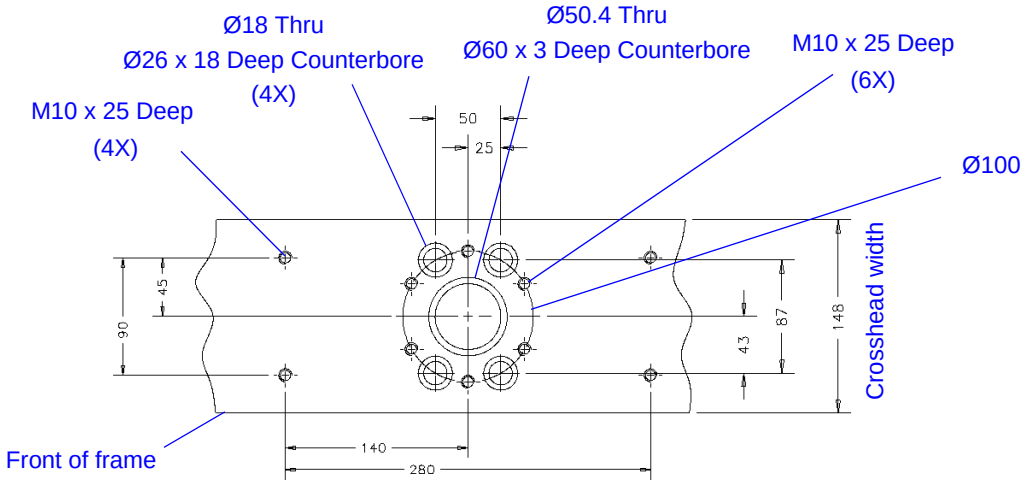


Figure 2-31. Series 5584 and 5585H Second Test Space Configuration - Fixed Crosshead Mounting Dimensions

Top Plate

Refer to Figure 2-32 on page 2-61 for the top plate dimensions of the model 5580 floor model frames. The top plate dimensions apply to frames with one test space.

Note: *The top plate is not a load bearing component of the machine.*

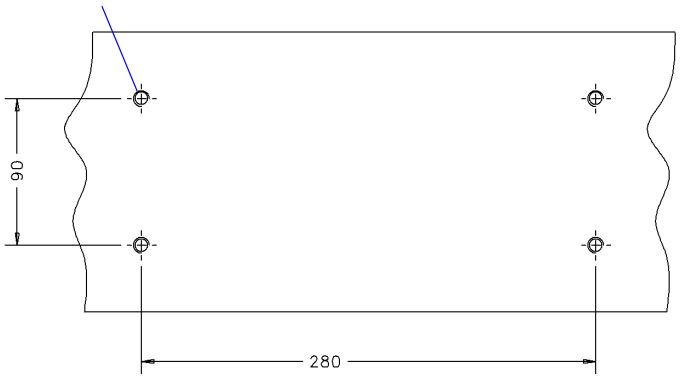


Figure 2-32. Series 5580 - Top Plate Mounting Dimensions

Chapter 3
Lifting and Handling

Outline

This chapter provides general guidelines for moving electromechanical frames. Since our electromechanical frames vary in size and configuration (floor models vs. tabletop models, single column vs. dual column), the instructions within this chapter are not specific to any one load frame. Rather, the instructions describe how to unpack and transport your system in general terms. Detailed instructions are included with your system when it is shipped.

General Handling Precautions

Only individuals experienced with the operation of lifting equipment and rigging techniques should attempt to lift or move an Instron system. Equipment operators must have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).

Always follow the instructions provided with the shipping package. Contact Instron if you require any additional information. Refer to "Technical Support" in chapter 1 for Instron's contact information.

Warnings

Hazard - Do not use a lifting device or straps rated for less than twice the weight of the load frame. All lifting devices and straps must be rated for a capacity at least twice the weight of the load frame.

Hazard - Do not lift the frame by the top plate. This plate does not support the weight of the frame. The plate could break and cause personal injury and equipment damage. See Figure 3-1 to identify the top plate.

Hazard - Do not tilt an unsupported load frame more than 10° when it is in the upright position. Doing so may topple the load frame and cause personal injury and damage.

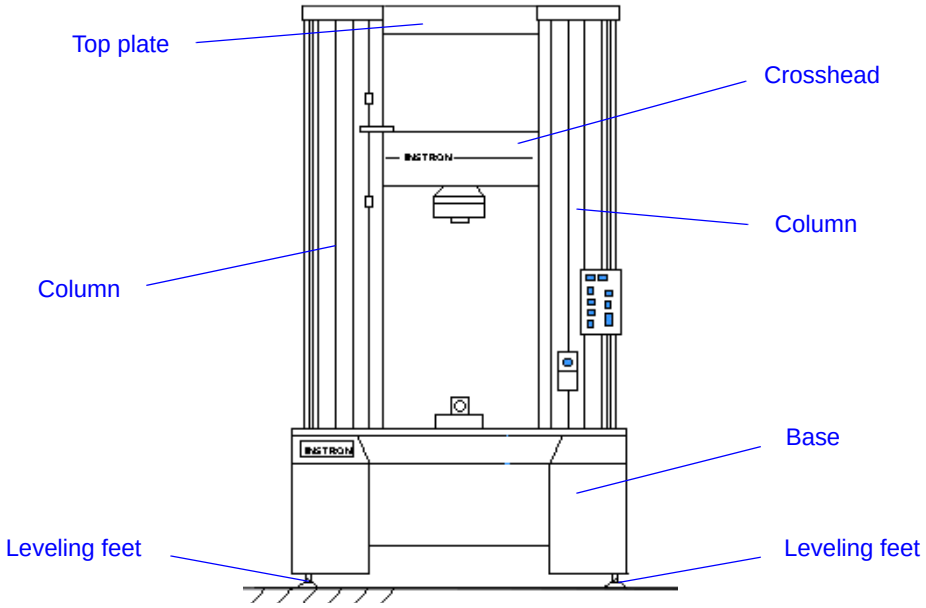


Figure 3-1. Load Frame Components

Packaging Dimensions

The tables in this section provide the dimensions and weights of Instron's load frames when packaged for shipping. Instron recommends leaving the load frame in its packaging while moving it to its final site location within your building. Refer to the following tables to verify that the packaged frame fits through all doorways and hallways leading to the final location. Also verify that all floors in this path can support the weight of the packaged frame.

Table 3-1. Packaging Dimensions for 5500 Standard Frame Models

	Model #	Length	Width	Height	Packaged Weight
Single Column Table Top Models	5542	660 mm 26 in	1118 mm 44 in	1778 mm 70 in	118 kg 260 lb
	5543	660 mm 26 in	1118 mm 44 in	1778 mm 70 in	118 kg 260 lb
	5544	660 mm 26 in	1118 mm 44 in	1778 mm 70 in	118 kg 260 lb
Dual Column Table Top Models	5564	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	177 kg 390 lb
	5565	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	177 kg 390 lb
	5566	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	177 kg 390 lb
	5567	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	236 kg 520 lb
	5569	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	313 kg 689 lb

Table 3-1. Packaging Dimensions for 5500 Standard Frame Models (Continued)

	Model #	Length	Width	Height	Packaged Weight
Floor Models	**Standard Floor Models without a base (Shipped upright)**				
	5581	1524 mm 60 in	1524 mm 60 in	2388 mm 94 in	1121 kg 2470 lb
	5582	1524 mm 60 in	1524 mm 60 in	2388 mm 94 in	1121 kg 2470 lb
	5584	1524 mm 60 in	1524 mm 60 in	2388 mm 94 in	1239 kg 2730 lb
	5585H	1524 mm 60 in	1524 mm 60 in	2388 mm 94 in	1239 kg 2730 lb
	Standard Floor Models with a base (Shipped horizontally)				
	5581	2743 mm 108 in	1524 mm 60 in	1524 mm 60 in	1239 kg 2730 lb
	5582	2743 mm 108 in	1524 mm 60 in	1524 mm 60 in	1239 kg 2730 lb
	5584	2743 mm 108 in	1524 mm 60 in	1524 mm 60 in	1357 kg 2990 lb
	5585H	2743 mm 108 in	1524 mm 60 in	1524 mm 60 in	1357 kg 2990 lb

Table 3-2. Packaging Dimensions for 5500 Optional Frame Configurations

Frame Configuration	Model #	Length	Width	Height	Packaged Weight
Optional Table Models					
Table models with second test space	5564 5565 5566 5567	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	5564 200 kg 5565 442 lb 5566 5567 323 kg 711 lb

Table 3-2. Packaging Dimensions for 5500 Optional Frame Configurations (Continued)

Frame Configuration	Model #	Length	Width	Height	Packaged Weight
Table models with extra height	5564 5565 5566 5567 5569	965 mm 38 in	1169 mm 46 in	2286 mm 90 in	5564 5565 5566 5567 5569	196 kg 433 lb 260 kg 572 lb 342 kg 754 lb
Table models with extra height and second test space	5564 5565 5566 5567	965 mm 38 in	1169 mm 46 in	2312 mm 91 in	5564 5565 5566 5567	220 kg 485 lb 346 kg 762 lb
Table models with extra width	5564 5565 5566 5567	965 mm 38 in	1575 mm 62 in	1880 mm 74 in	5564 5565 5566 5567	428 kg 943 lb 552 kg 1216 lb
Table models with extra width and extra height	5564 5565 5566 5567	965 mm 38 in	1575 mm 62 in	2261 mm 89 in	5564 5565 5566 5567	452 kg 995 lb 575 kg 1268 lb
Optional Floor Models					
Floor models with second test space	5581/ 5582 5584/ 5585H	2337 mm 92 in 2388 mm 94 in	1524 mm 60 in 1524 mm 60 in	915 mm 36 in 915 mm 36 in	1363 kg 3003 lb 1480 kg 3263 lb
Floor models with extra height	5581/ 5582 5584/ 5585H	2743 mm 108 in 2743 mm 108 in	1524 mm 60 in 1524 mm 60 in	915 mm 36 in 915 mm 36 in	1209 kg 2665 lb 1333 kg 2938 lb
Floor models with extra height and second test space	5581/ 5582 5584/ 5585H	2845 mm 112 in 2896 mm 114 in	1524 mm 60 in 1524 mm 60 in	915 mm 36 in 915 mm 36 in	1452 kg 3200 lb 1575 kg 3471 lb

Table 3-2. Packaging Dimensions for 5500 Optional Frame Configurations (Continued)

Frame Configuration	Model #	Length	Width	Height	Packaged Weight
Floor models with extra width	5581/ 5582	2261 mm 89 in	1829 mm 72 in	915 mm 36 in	1416 kg 3120 lb
	5584/ 5585H	2261 mm 89 in	1829 mm 72 in	915 mm 36 in	1534 kg 3380 lb
Floor models with extra width and extra height	5581/ 5582	2743 mm 108 in	1829 mm 72 in	915 mm 36 in	1504 kg 3315 lb
	5584/ 5585H	2743 mm 108 in	1829 mm 72 in	915 mm 36 in	1628 kg 3588 lb
Floor models with double extra height	5581/ 5582	3353 mm 132 in	1524 mm 60 in	1143 mm 45 in	1298 kg 2860 lb
	5584/ 5585H	3353 mm 132 in	1524 mm 60 in	1143 mm 45 in	1427 kg 3146 lb
Floor models with double extra height and second test space	5581/ 5582	3429 mm 135 in	1524 mm 60 in	1143 mm 45 in	1545 kg 3406 lb
	5584/ 5585H	3480 mm 137 in	1524 mm 60 in	1143 mm 45 in	1740 kg 3835 lb
Floor models with double extra height and extra width	5581/ 5582	3353 mm 132 in	1829 mm 72 in	915 mm 36 in	1600 kg 3526 lb
	5584/ 5585H	3353 mm 132 in	1829 mm 72 in	915 mm 36 in	1729 kg 3810 lb

Unpacking Dual Column Frames

For unpacking instructions for single column frames, refer to “Handling Single Column Frames” in this chapter.

Unpacking Procedures

Note: *It is recommended that you do not unpack the load frame until the Instron service engineer arrives for installation. Unpacking the frame prior to installation may result in lost parts that are critical to assembly and may delay the installation.*

Before moving the load frame, review the following sections:

- The Site Requirements section in Chapter 4.
- The Transporting or Handling section for your model type, found later in this chapter.

Unpack the load frame in the following sequence:

1. Move the load frame, still in the shipping material, to its final location within your building. Use a forklift (or crane) to transport the frame from the shipping dock to the final location. Unpack the load frame after it has been moved to its final location.

Note: *After unpacking the load frame, it may be necessary to position the frame into its operating location. Do not remove the wooden skid until you decide which method will be used to move the frame to its operating location. The skid is required if you choose to lift the frame from under the base. Refer to “Transporting Procedures” for the possible transporting methods.*

2. Remove the shipping material, leaving the load frame fastened to the shipping skid.
3. Remove the shrink wrap vapor barrier encasing the load frame.
4. Use the packing list to inventory all the items. Some accessories may be in the container with the load frame or may be packaged separately.

   Do not open any of the packing boxes until the Instron service engineer arrives to install your testing system. The packing list indicates the total number of boxes that are included in the shipment. Count the number of boxes you received to make sure you have the correct number of boxes. This ensures that no parts are lost prior to installation.
5. Retain all packing materials until the system is satisfactorily installed and all parts, assemblies and accessories are located.

6. If the load frame is in a horizontal position, refer to “Righting the Frame from a Prone Position” for instructions.
7. Move the load frame into its operating location using the selected transportation method. Refer to “Transporting Procedures” for additional information.

Righting the Frame from a Prone Position

This section provides the recommended procedure for righting a load frame from a prone position. Your new frame may have been shipped in a horizontal position, so it must be moved into an upright, standing position before placing it in its operating location.

Using a Crane

If you elect to use a crane to move the load frame, Instron recommends using professional riggers experienced in moving heavy equipment.

Before You Begin

Before moving the load frame ensure that:

- The load frame is not bolted to the shipping skid.
- There are no loose accessories on the shipping skid.
- There is adequate ceiling clearance to allow the load frame to be lifted into a vertical position, including clearance for the crane.
- Your equipment operators have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).

Equipment

The following items are required:

- A crane with a load rating that is double the load frame's gross weight.
- Two lifting slings, each with a load rating that is double the load frame's gross weight.

Procedure

To lift the load frame into a vertical position:

1. Remove all packaging material from the frame and ensure that the frame is not attached to the shipping skid. This includes the L brackets securing the base to the shipping skid, and the 4x4 brace and rods protecting the crosshead.
2. Attach the two lifting slings to the crosshead and secure them to the crane hook as shown in Figure 3-2 on page 3-11. If you use chains in lieu of lifting

slings, wrap protective material around the crosshead to protect the crosshead from scratching and marring.

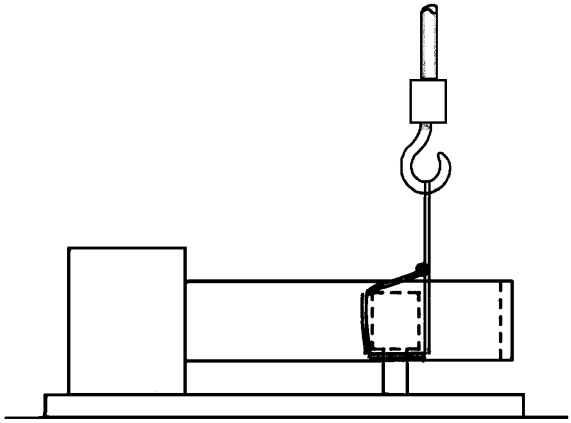


Figure 3-2. Righting a Load Frame Using a Crane

Warning

Crush hazard - Ensure that all persons in the immediate area are standing away from the frame during lifting.

Do not lift the frame more than 8 cm (3 in) off the floor.

3. Slowly lift the frame until it is in an upright position and is lifted off the floor.
4. Slowly move the load frame away from the shipping skid and remaining packaging materials.
5. When the frame is clear of the packaging material, slowly lower the load frame to the floor so that it is standing on its base in an upright position.
6. Remove the slings from the crosshead.

The frame can now be positioned into its operating location and then installed by an Instron service representative. To position the frame into its operating location, use the crosshead method to lift the frame. Refer to “Crosshead Method” for details.

Using a Forklift

Before You Begin

Before moving the load frame ensure that:

- The load frame is not bolted to the shipping skid.
- There are no loose accessories on the shipping skid.
- There is adequate ceiling clearance to allow the load frame to be lifted into a vertical position, including clearance for the forklift's arms, which will be above the load frame.
- Your equipment operators have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).

Equipment

The following items are required:

- A forklift with a load rating that is double the load frame's gross weight.
- Forklift extenders to extend the forklift arms.
- Two lifting slings, each with a load rating that is double the load frame's gross weight.
- Come-along to stabilize the base of the frame while moving the frame into an upright position.

Procedure

Prior to moving the frame, it is recommended that you contact Instron service for additional guidance when righting the frame.

To lift the load frame into a vertical position:

1. Remove all packaging material from the frame and ensure that the frame is not attached to the shipping skid. This includes the L brackets securing the base to the shipping skid, and the 4x4 brace and rods protecting the crosshead.
2. Attach the forklift extenders to the forklift arms.
3. Raise the forklift's arms high enough so that they can pass over the base of the load frame. Angle the arms back toward the mast so that the lifting slings cannot slip off the ends.

4. Using the forklift, approach the frame from the base end of the load frame. Position the forklift so that the arms are directly over the load frame's base. Leave at least 36 inches of space between the forklift and the base of the frame.
5. Tie each lifting sling around the crosshead and then around each forklift arm extender. Ensure that both are taut and secure.
6. Attach the come-along to the base of the frame. The come-along provides stability to the frame while it is moving into the upright position.

Warning

Crush hazard - Ensure that all persons in the immediate area are standing away from the frame during lifting.

Do not lift the frame more than 8 cm (3 in) off the floor.

7. Slowly and carefully raise the forklift arms upward to lift the crosshead and the top of the frame. The forklift arms should be high enough to allow enough clearance for the load frame to rotate into an upright position. Continue lifting the forklift arms until the load frame is in an upright position and is lifted off the floor.
8. Slowly reverse the forklift to back away from the shipping skid and remaining packaging materials.
9. Once the frame is clear of the packaging material, slowly lower the load frame to the floor so that it is standing on its base in an upright position.
10. Remove the slings from the crosshead.

The frame can now be positioned into its operating location and then installed by an Instron service representative. To position the frame into its operating location, use the crosshead method to lift the frame. Refer to "Crosshead Method" for details.

Transporting Dual Column Frames

Before You Begin

Before moving the load frame ensure that:

- You have reviewed the section “Site Requirements” for the load frame series applicable to your testing system. Verify that all conditions are met prior to transporting the test system.
- Your equipment operators have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).
- At the final site location, there is adequate clearance between the ceiling and the top of the load frame, including clearance for lifting the frame via a forklift or crane.
- There are no loose accessories on the shipping skid.
- The frame and forklift (or crane) can fit through all doorways, halls, elevators or stairs from the shipping dock to its final site location. When transferring the load frame while it is still in its packaging, refer to the dimensions for your frame type in “Packaging Dimensions” on page 3-4. If you move or relocate the load frame without its packaging, refer to the dimensions for your specific model in the applicable Specifications section of this manual.
- The floors from the shipping dock to the final site location have sufficient support for the weight of the load frame and forklift (or crane) combined.
- You have adequate packaging materials to protect the load frame when moving or relocating it to another site. Contact Instron Professional Services to determine the appropriate packaging requirements for your model type.

Equipment

The following items are required:

- A forklift or crane with a load rating that is double the load frame’s gross weight.
- Protective padding for the crosshead.
- 8 mm wrench for securing bolts for the table top machines.

Caution

If the shipping skid has been removed, do not lift the frame with a forklift underneath the base. Lifting the frame in this manner will damage the underside of the frame.

Similarly, do not lift the load frame by the top plate. This plate is not designed to support the weight of the frame, and it might break.

If the shipping skid has been removed, then lift the frame using a forklift with padded forks inserted under the crosshead. Refer to “Crosshead Method” for details.

Transporting Procedures

There are three methods for transporting the load frame to the test site:

- **Frame Base method** - Using a forklift to lift the upright load frame from underneath the base with the shipping skid still attached. Refer to Figure 3-3 on page 3-16.
- **Crosshead method** - Using a forklift with padded forks to lift the load frame from under the crosshead as shown in Figure 3-4 on page 3-17.
- **Crane method** - Using a crane to lift the upright load frame from the crosshead. If this method is used, Instron recommends using professional riggers experienced in moving heavy equipment.

Frame Base Method

This method requires that the base be firmly attached to a shipping skid. The center of the base, where the forklift arms would be placed if no shipping skid was used, cannot support the weight of the load frame.

To transport the load frame using the frame base method:

1. Ensure that the frame is bolted to the shipping skid.
2. Carefully insert the forks under the shipping skid as shown in Figure 3-3 on page 3-16.
3. The crosshead should be in its lowest position so that the frame is not top heavy.

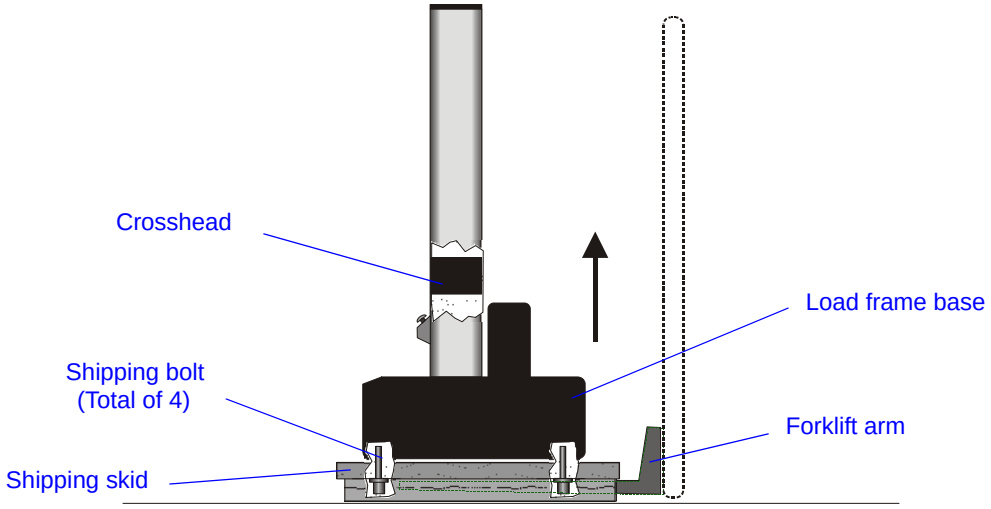


Figure 3-3. Lifting the Frame from the Base

Warning

Crush hazard - Ensure that all persons in the immediate area are standing away from the frame during lifting.

Do not lift the frame more than 8 cm (3 in) off the floor.

4. Slowly and carefully lift the frame off the floor.
5. Move the frame to its operating location.
6. Slowly lower the frame to the floor.
7. Before placing the frame in its operating location, you must insert the leveling feet into each corner of the base. The shipping skid must be removed to insert the feet and before placing the frame in its operating location. Follow the instructions described under “Crosshead Method” to remove the shipping skid, insert the leveling feet and position the frame.

When the frame is in its operating location, you can proceed with the installation process.

Crosshead Method

This method requires protective padding on either the crosshead or forklift arms to protect the crosshead from scratching or marring.

This method can be used to:

- Transport the load frame to the site location.
- Lift a tabletop load frame onto a table or workbench.
- Lift the frame to remove the transport skid from the frame's base and to insert the leveling feet.

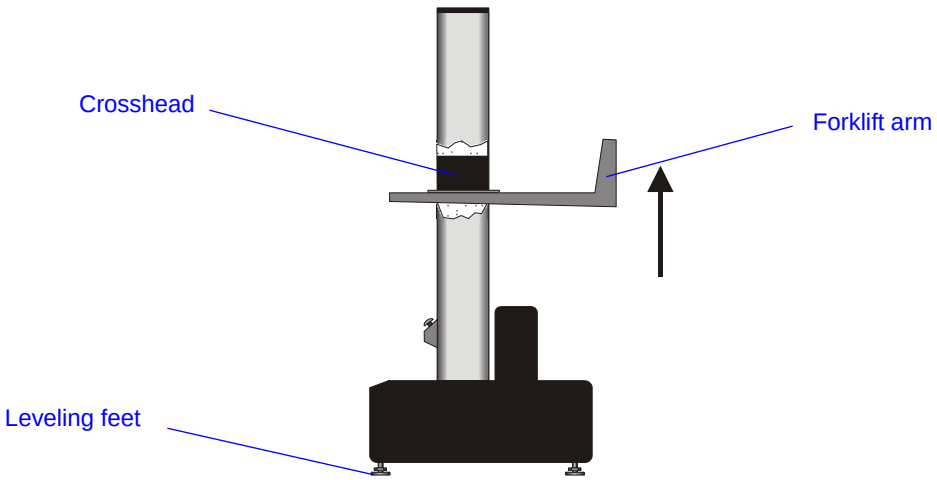


Figure 3-4. Lifting the Frame from the Crosshead

To transport the load frame using the crosshead method:

1. Ensure that there are no shipping bolts attached to the skid.
2. Using a forklift with padded forks or protective material around the crosshead, carefully insert the forks under the crosshead between the columns. Refer to Figure 3-4 on page 3-17.

Warning

Crush hazard - Ensure that all persons in the immediate area are standing away from the frame during lifting.

Do not lift the frame more than 8 cm (3 in) off the floor.

3. Slowly and carefully lift the frame off the floor.
4. Remove the shipping skid, if it has not already been removed.
5. Move the frame to its operating location.
6. Four leveling feet are supplied for the load frame. Thread one leveling foot into each corner of the base before placing the frame in its testing location.

7. Place the load frame carefully into position.
8. Remove the padded forks from under the frame's crosshead.

When the frame is in the testing location, you can proceed with the installation process.

Crane Method

Instron recommends using professional riggers experienced in moving heavy equipment.

To transport the load frame using the crane method:

1. Attach the two lifting slings to the crosshead and secure them to the crane hook as shown in Figure 3-5 on page 3-19. If you use chains in lieu of lifting slings, wrap protective material around the crosshead to protect the crosshead from scratching and marring.

Warning

Crush hazard - Do not allow anyone in the immediate area of the load frame when lifting it off the ground.

Do not lift the frame more than 8 cm (3 in) off the floor.

2. Slowly and carefully lift the frame off the floor.
3. Remove the shipping skid, if it has not already been removed.
4. Move the frame to the operating location.
5. Four leveling feet are supplied for the load frame. Thread one leveling foot into each corner of the base before placing the frame into its testing location.
6. Place the load frame carefully into position.
7. Remove the lifting straps from the crosshead, and any protective padding, if used.

When the frame is in its testing location, you can proceed with the installation process.

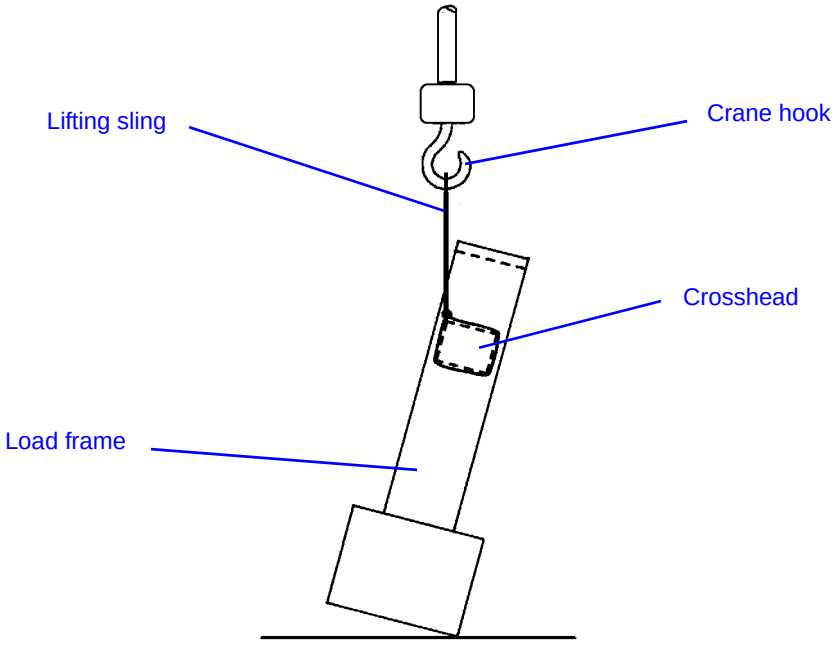


Figure 3-5. Lifting Load Frame with a Crane

Handling Single Column Frames

The single column load frames are packed in a strong cardboard carton strapped to a wooden pallet. Accompanying components are also packed in cardboard cartons. These testing systems must be set up on a strong table or work bench at a convenient operating height and within easy reach of electrical power outlets.

Before You Begin

Before moving the load frame ensure that:

- You have reviewed the section “Site Requirements” for the load frame series applicable to your testing system. Verify that all conditions are met prior to transporting the test system.
- Your equipment operators have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).
- At the final site location, there is adequate clearance between the ceiling and the top of the load frame.
- There are no loose accessories on the shipping skid.
- The frame and forklift can fit through all doorways, halls, elevators or stairs from the shipping dock to its final site location. If you transfer the load frame while it is still in its packaging, refer to the dimensions for your frame type in section “Packaging Dimensions”. If you move or relocate the load frame without its packaging, refer to the dimensions for your specific model in the applicable Specifications section of this manual.
- You have adequate packaging materials to protect the load frame when moving or relocating it to another site. Contact Instron Service Department to determine the appropriate packaging requirements for your model type.

Equipment

You need the following items:

- A forklift with a load rating that is double the load frame's gross weight.
- Sharp knife.
- Cutter for the steel strapping.
- Two individuals to lift the frame onto the table.

Procedure

To unpack and position the load frame:

1. Use a forklift to carry the container to the testing area. Refer to “General Handling Precautions” for guidelines and warnings.
2. Place the load frame carton near its final operating location.
3. Cut the strapping that secures the load frame carton to the wooden pallet.
4. Open the top of the load frame carton and remove the packing material.
5. Using a sharp knife, carefully cut down one corner of the carton and along the base, then fold the cut portion of the carton to one side.

Warning

Hazard - The load frame is heavy. Use two adults to lift the frame.

Caution

Do not put any strain on the Emergency Stop button, the limit stops, or the load frame grip adapters while lifting the load frame.

6. Using two individuals, firmly grasp the load frame base, lift the frame out of the carton, and place it in its operating position.
7. Use the packing list to inventory all the items. Some accessories may be in the container with the load frame or may be packaged separately.

   Do not open any of the packing boxes. The packing list will indicate the total number of boxes that are included in the shipment. Count the number of boxes you received to make sure you have the correct number of boxes. Do not open these boxes until the Instron service representative arrives to install your testing system. This ensures that no parts are lost prior to installation.
8. Retain all packing materials until the system is satisfactorily installed and all parts, assemblies and accessories have been located.

Chapter 4
Installation

Outline

This chapter describes the setup and installation of the testing system. The Installation Guidelines and Site Requirements sections provide information for you to prepare your site for the installation. The remaining sections assume the testing system has already been transported to its final location. Refer to Chapter 3 for information about transporting your system to its final location.

Installation Guidelines

In addition to this installation chapter, Instron includes installation drawings for your system at delivery. Refer to these installation drawings for further details regarding installation.

Customer's Responsibilities

Unless otherwise specified at the time of purchase, you must:

- Assume insurance and safety responsibilities.
- Arrange to off-load and unpack the equipment using qualified personnel.
- Transport the equipment to the test site. This includes special handling and rigging considerations.
- Prepare the test site. This includes the physical, electrical and environmental considerations.
- Properly dispose of any waste materials generated from the installation of the system and its accessories, or from the general operation of the system. This includes packing materials, hydraulic fluid, and waste materials contaminated with hydraulic fluid. Hydraulic fluid is generally considered a hazardous material so proper disposal of this substance, or anything contaminated with it, must comply with local, state, and federal regulations.

Instron's Responsibilities

Instron's standard contract requires Instron to provide the necessary services to ensure that your testing system operates accurately. Additional services and equipment may be negotiated with Instron, but these additional services must be mutually agreed upon and specifically described in your purchase order.

Upon arrival of the system at your site, Instron is responsible for the following:

- Complete installation of the machine, its components and any additional accessories that were purchased. The customer must not make any attempt to install the machine without an Instron service representative present.
- Perform an initial operation of the system and a verification check to ensure that it is working properly and measuring accurately.
- Perform a customer demonstration that briefly describes how to operate the system.

- Provide all the documentation required to operate the system, including manuals for the machine and any required online help systems for software applications.

Site Requirements

Proper site preparation is imperative to ensure that the testing system operates in accordance with the system specifications and provides accurate test results.

For floor models, consult your facility engineer, foundation specialist or civil engineer to ensure that the load capacity of the floor can support at least three times the weight of the load frame and its component parts. The higher weight capacity rating is necessary to withstand large dynamic loads that may be released when a test specimen breaks.

Ensure that the following site requirements are completed before you transport and unpack the system:

- The site floor and table can support the weight of the load frame, and the system components. A table with leveling feet is preferred.
- The frame is not located against a wall or other object that interferes with air ventilation around the frame base. Proper air ventilation is required to dissipate the heat generated from the frame base.
- The site is free of vibration from other machinery.
- There is adequate clearance between the load frame and the site ceiling.
- The system is accessible for routine service. Allow approximately 1 meter (3 feet) of space on all sides of the frame.
- The electrical power source rating is within the voltage rating specified on the rear of the load frame. If it is not within the range, contact Instron Professional Services Department or refer to the section, “Setting the Input Voltage” in this chapter.
- The electrical power source is within 2.43 m (8 ft.) of the system.
- The test site meets the system’s environmental specification. Refer to “Environmental Specifications” in chapter 2.

Refer to chapter 2 for specific system specifications.

Preliminary Considerations

Install the test instrument in a semi-permanent location that can support the weight of the load frame. Refer to “Weight Specifications” in chapter 2 and the above section regarding floor support.

Place system components such as the computer, the controller and printer on a table beside the load frame or on a roll-around cart. Be sure the table or cart

provides a comfortable working height for the user and can support the weight of all the computer components.

Leveling the Load Frame

Level the load frame immediately after you position it for installation. This prevents the base from rocking and provides a level test surface for more accurate test results. Refer to Figure 4-1.

Equipment

You need the following items:

- Spirit level.
- Open-end wrench.

Procedure

To level the frame base:

1. Place a spirit level on the center of the base beam.
2. Loosen the top nut on each leveling foot.
3. Using an open end wrench, alternately adjust the height of each leveling foot while you monitor the spirit level reading.
4. Rotate the spirit level 90° to verify that the load frame is level side to side and front to back.
5. When the machine is level, tighten the top nut on each leveling foot.

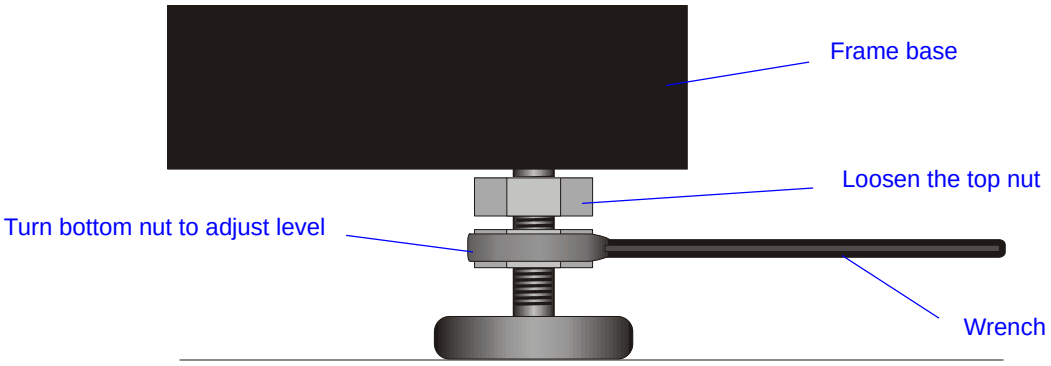


Figure 4-1. Adjusting a Leveling Foot

Setting the Input Voltage

The first step in the installation is to verify that the voltage and electrical plug are compatible with the location's power supply. The system voltage and electrical power plug are set at the factory according to the power input voltage that was specified on your purchase order. Use the following procedure only if the facility power source does not match the frame voltage setting. This situation may arise if the system is moved to another location with a different voltage rating from the factory setting on the frame.

Power Supply Compatibility

Verify the following before proceeding with installation:

- The machine's voltage is compatible with the main power supply to your facility.
- The machine's power cable can reach the electrical power supply with some slack in the cable.
- The plug is compatible with the electrical power outlet. Refer to Table 4-1 on page 4-8.
- For floor models only - To accommodate high in-rush currents, connect a time delay circuit breaker between the facility power source and the load frame.

If your power source is not the voltage originally specified on your purchase order, follow the instructions described in the following sections to change the machine's voltage. Ensure that you use the appropriate electrical plug when changing voltages. Refer to Table 4-1 on page 4-8.

Warning

Hazard - Do not remove covers to any component of your system, unless it is specified in a procedure.

There are dangerous voltages and rotating machinery inside the machine that may cause bodily injury or damage to equipment.

Caution

Use a 3-wire, grounded main power cable for the load frame. The load frame operates from a single phase, two-wire grounded power source that applies

240 volts rms or less between the supply conductors or between the ungrounded supply conductor and earth ground.

Note: *The connector on the power cable must be compatible with the power source. If the power cable supplied with your system does not fit your power source outlet, add a male plug to the cable that is compatible with the voltage (refer to Table 4-1). Observe the CEE wire color code as follows:*

- *Brown - high (live)*
- *Light blue - low (neutral)*
- *Green and yellow - earth (ground)*

Table 4-1. Power Connector Plugs

Model	Voltage	Power Connector Plug	Plug Rating
Table top models (single and dual column)	The power cord set and plug is based on the country to which the frame is shipped and is compatible with the electrical requirements for that country.		
Floor models	100 V	Flying leads (No plug)	Not Applicable
	120 V	NEMA L5-30P Twist lock	30A/125V
	200/208 V	NEMA L6-20P Twist lock	20A/250V
	220, 230, 240 V	IEC309 (UK only) [a]	16A/250V

a. If 220 or 240 voltage is selected in either US or ALA, recommended plugs are NEMA L6-15R or NEMA L6-20R. These plugs are not supplied by Instron.

Setting the Voltage for Series 5540 and 5560

The load frame voltage is factory set, according to the voltage that was specified at the time of purchase. However, you can alter the power input connector to accept line voltages from 100 Vac to 240 Vac (47 to 63 Hz). Refer to “Power Requirements” in chapter 2 for the available voltages for each model type.

Note: *Some line voltage selector units may read 230 V (instead of 220 V) on the external face and on the internal card. These units are interchangeable and can be used as the 220 V selection.*

Refer to “Determining the Voltage Setting” on page 4-9 to determine the current voltage setting on your machine. If the voltage indicated does not match

your power source, follow the instructions in section "Changing the Voltage Setting" on page 4-9 to change the frame's voltage.

Determining the Voltage Setting

To determine the machine's voltage setting:

1. Locate the power input connector on your machine. Refer to "Load Frame Components" on page 1-6 for assistance, if necessary.
2. Inspect the power input connector. There are four holes in a vertical line at the right side of the connector, each corresponding to a different line voltage. The current voltage setting is indicated by a white plastic pin visible in one of the holes, as shown in Figure 4-2.

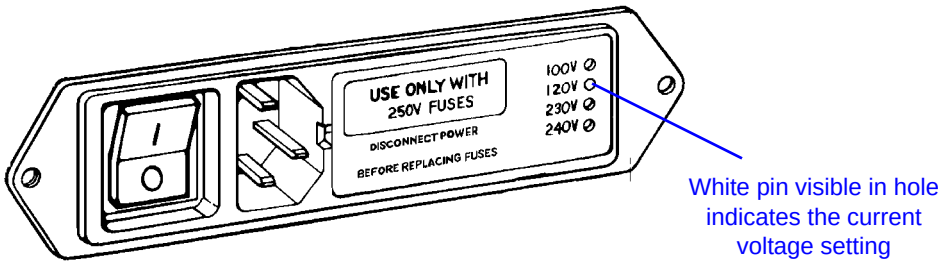


Figure 4-2. Power Input Connector with Voltage Setting

Changing the Voltage Setting

Tools you need for this procedure:

- Small flat-head screwdriver or probe.
- Long nose pliers.

Warnings

Electrical Hazard - Shut off the main power switch and disconnect the power cable to the frame before changing the power setting. There are dangerous voltage levels inside the fuse holder.

Hazard - Do not remove covers to any component of your system, unless it is specified in a procedure.

There are dangerous voltages and rotating machinery inside the machine that may cause bodily injury or damage to equipment.

To change the input power line voltage:

1. Ensure that the power switch is in the Off (**O**) position and disconnect the power cable from the power source. Verify that the **POWER** indicator light on the control panel is not illuminating.
2. Insert a small flat-head screwdriver into the middle of the connector and pry out the fuse holder, as shown in Figure 4-3.

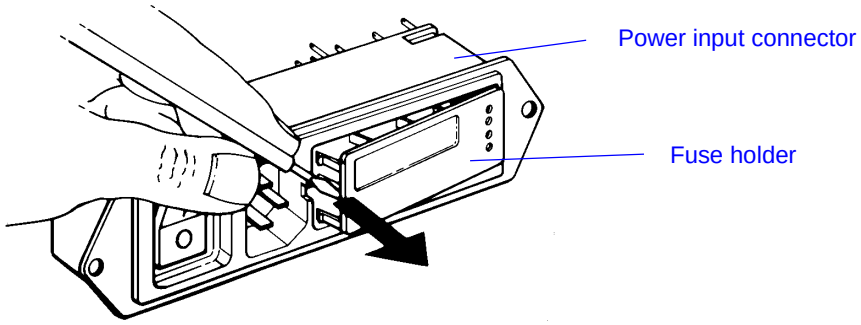


Figure 4-3. Prying Out the Fuse Holder

3. Remove the fuse holder from the power input connector, as shown in Figure 4-4.
4. Remove the voltage selector card using long nose pliers as shown in Figure 4-5.
5. Position the voltage selector card so that the indicator pin points up, as shown in Figure 4-6.
6. Holding the pin in this position, rotate the card until the required voltage setting shows at the bottom of the card, as shown in Figure 4-6.

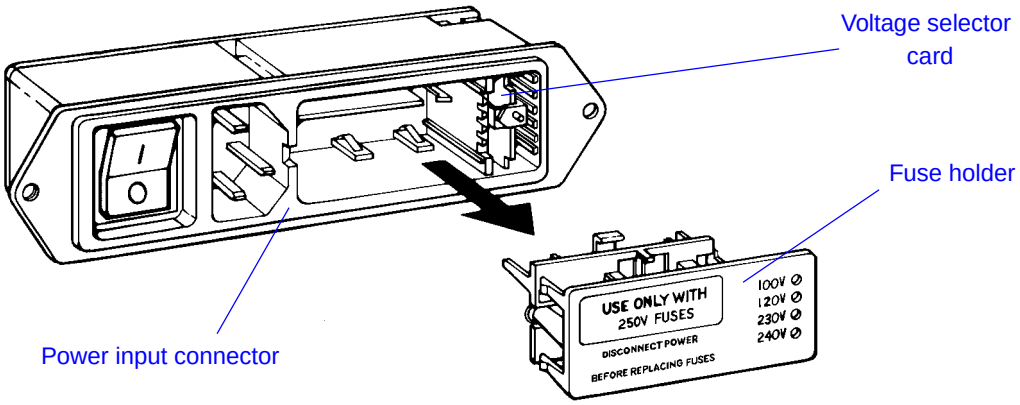


Figure 4-4. Removing the Fuse Holder

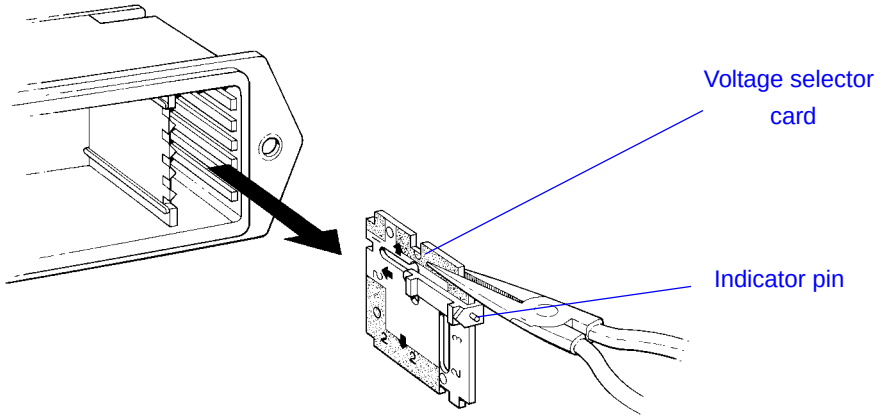


Figure 4-5. Removing the Voltage Selector Card

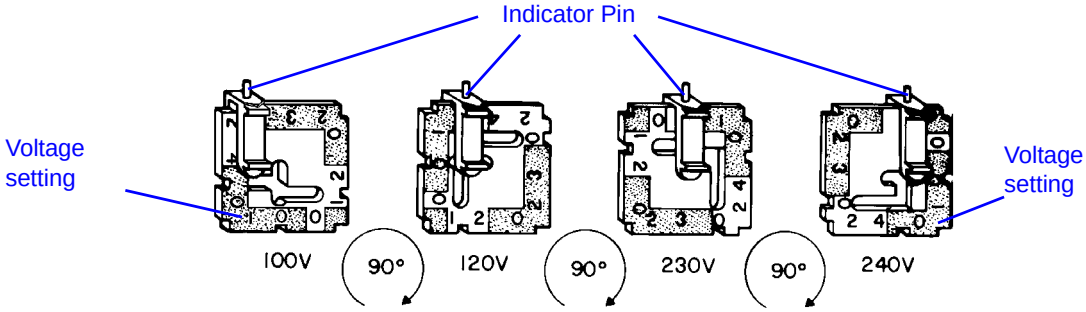


Figure 4-6. Selecting the Line Voltage Setting

7. Re-insert the card into the connector with the indicator pin pointing away from the connector. Ensure the card is fully seated.

8. If necessary, change the fuse in the holder. Refer to “Fuse Replacement” on page 8-10 for replacing a fuse.
9. Re-install the fuse holder into the connector. Ensure that the indicator pin now indicates the correct input voltage. See Figure 4-2 on page 4-9 for reference.
10. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the control panel illuminates.
11. Before you do any testing, perform the procedure “System Startup” on page 7-3.

Setting the Voltage for 5580

On the floor models, the voltage settings are inside the machine. Due to the electrical dangers inherent with working inside an electromechanical machine, an Instron service technician must make any changes to the voltage settings on the floor models. If you have a floor model and need to change the voltage setting, contact your local Instron Professional Services office for assistance. The current voltage setting is labeled on the back of the machine directly above where the power cable connects with the machine.

Connecting the System Components

Connect the cables as instructed in the following sections. These connections provide electrical power to the load frame and establish communications between the computer and controller.

5500 System Connections

Warnings

Electrical Hazard - Do not connect power cables when the power is on. Turn the power off to avoid hazardous voltages and component damage.

Hazard - Do not remove covers to any component of your system, unless it is specified in a procedure.

There are dangerous voltages and rotating machinery inside the machine that may cause bodily injury or damage to equipment.

The following graphics show the system connections for the single column table top models, the dual column table top models and the floor models. Use these graphics as a reference for your specific model when connecting the system components.

The following procedure describes the connections for the basic components of an Instron electromechanical system. If you purchased additional accessories for your system, you need to refer to the documentation for those accessories for proper installation.

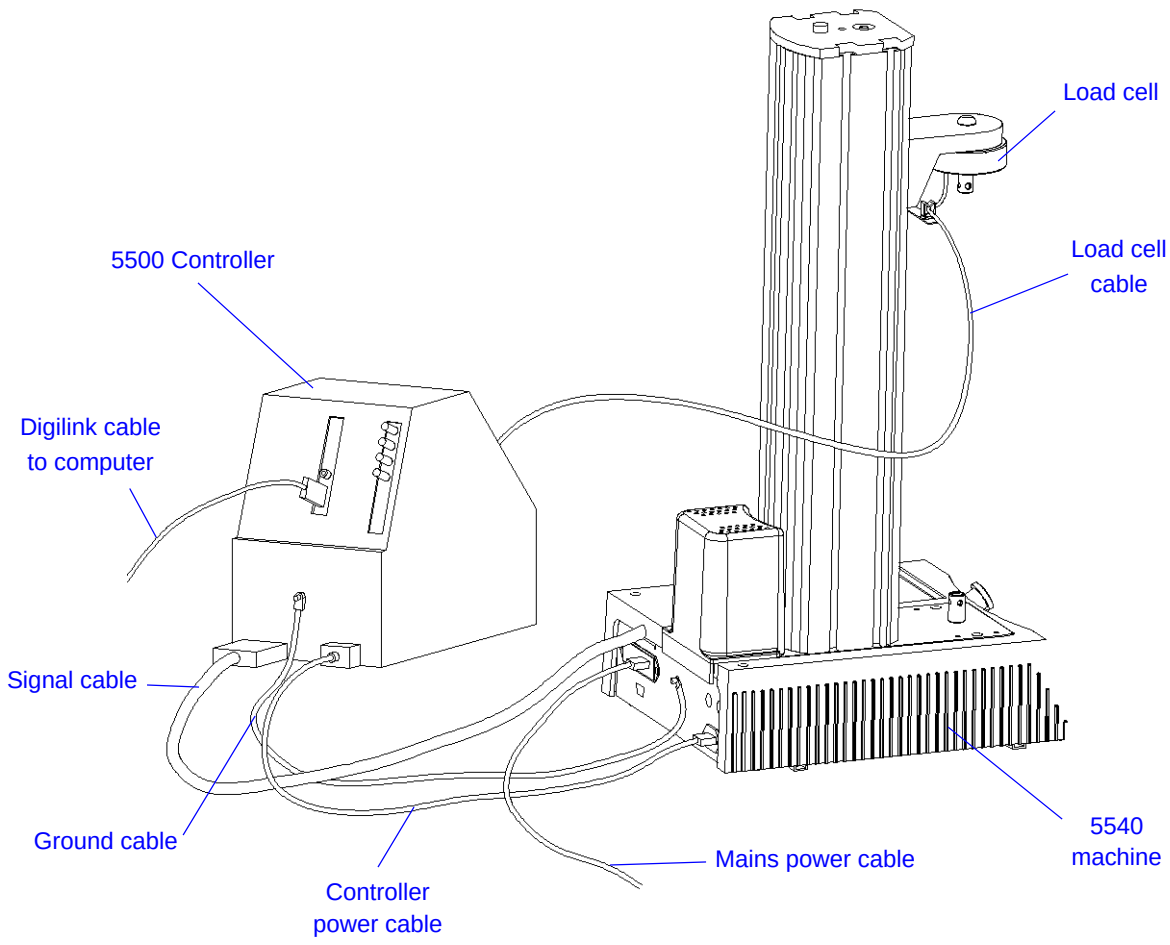


Figure 4-7. 5540 System Connections

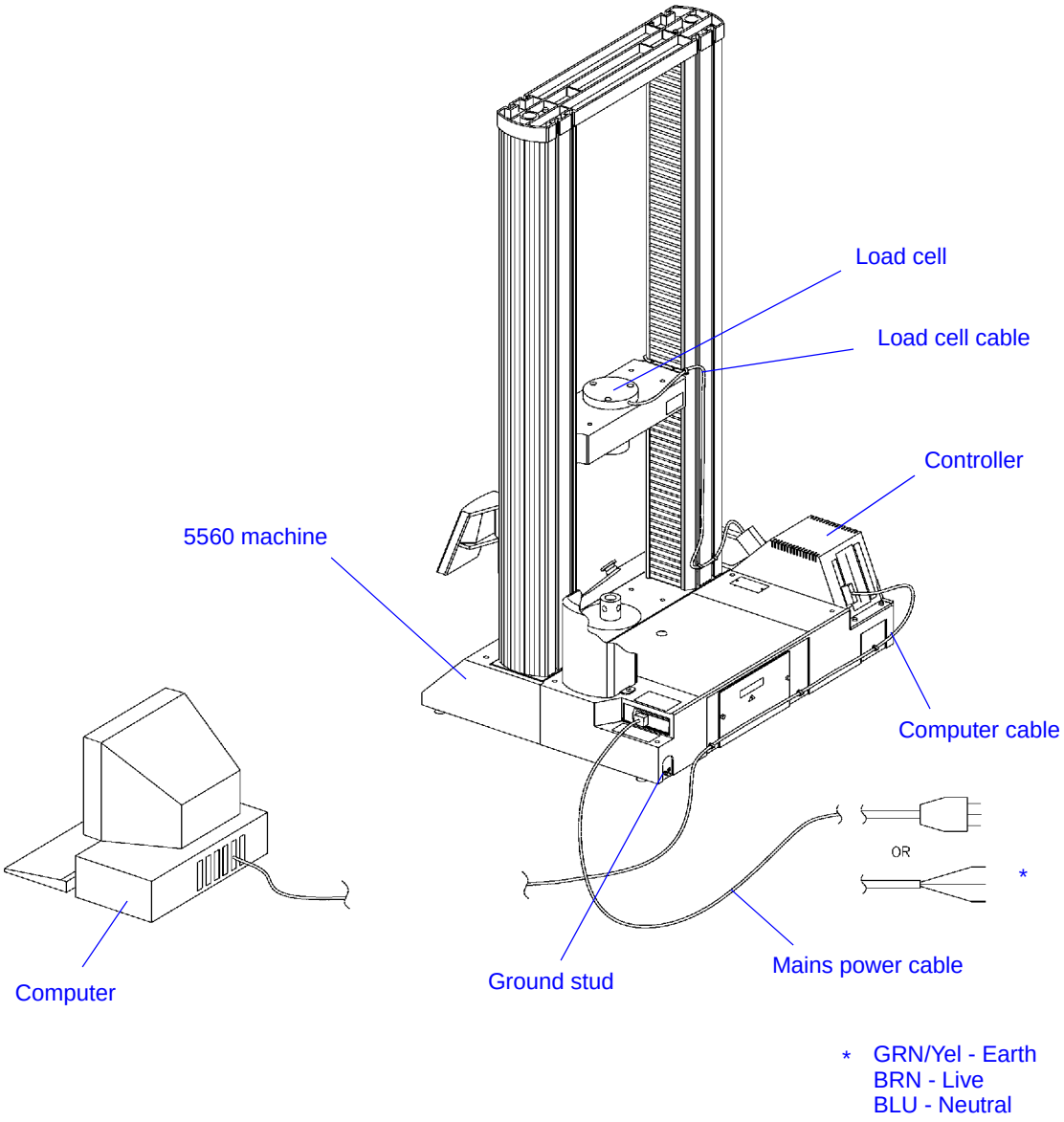


Figure 4-8. 5560 System Connections

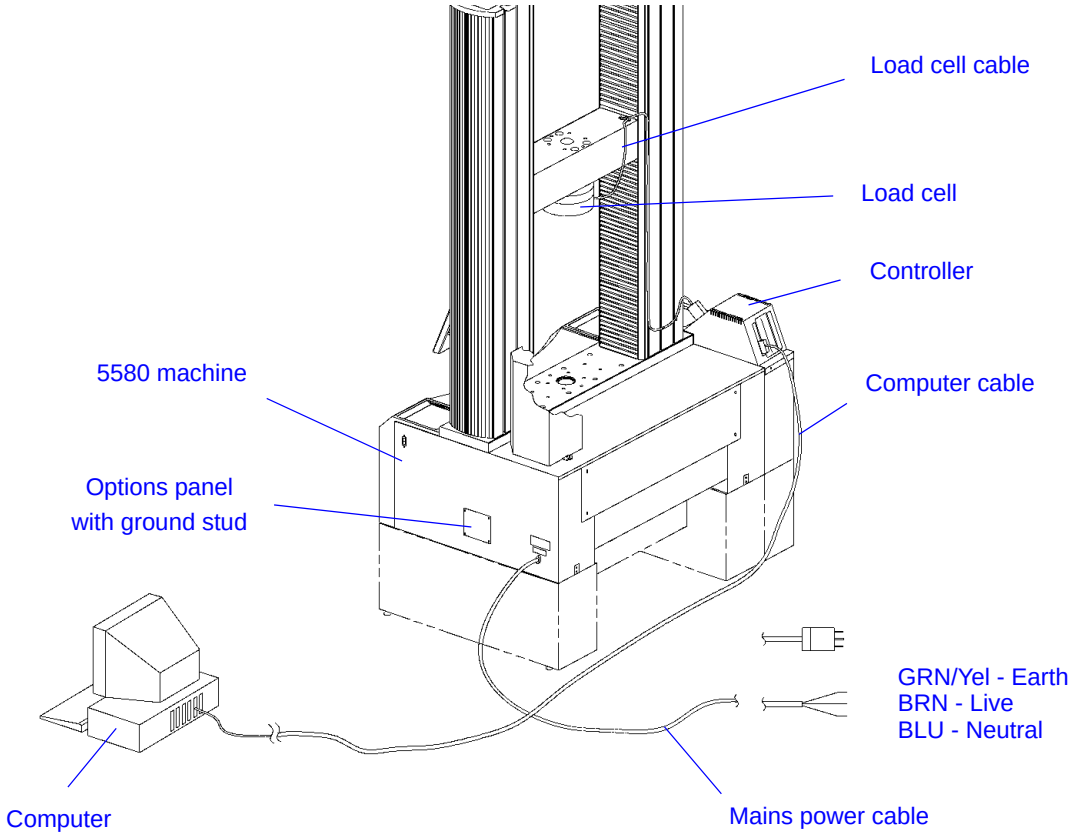
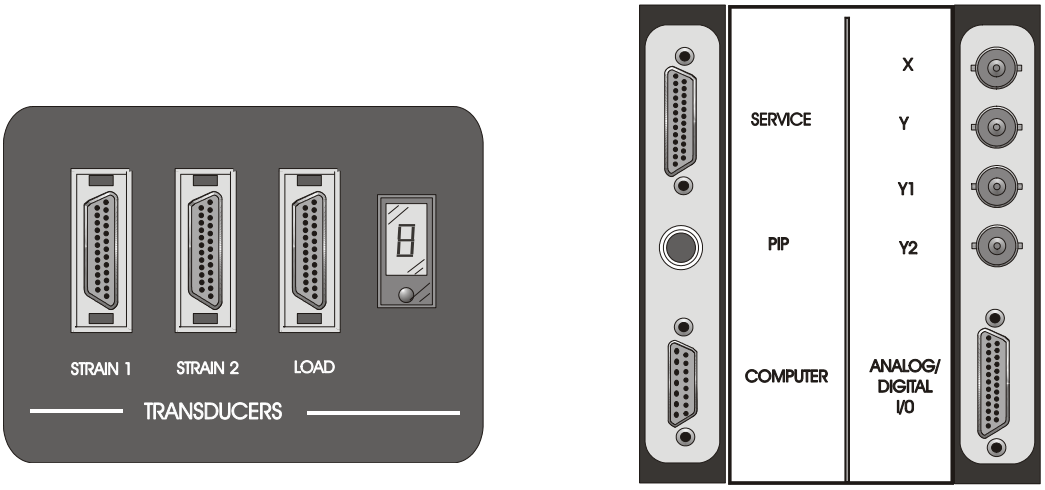


Figure 4-9. 5580 System Connections



Front of controller

Back of controller

Figure 4-10. 5500 Controller Connections

5540 System Connections

Refer to Figure 4-7 on page 4-14 and Figure 4-11 shown below for reference.

To set up a 5540 testing system:

1. Ensure that the power switch is set to Off (**O**) and the mains power cable to the machine is disconnected.

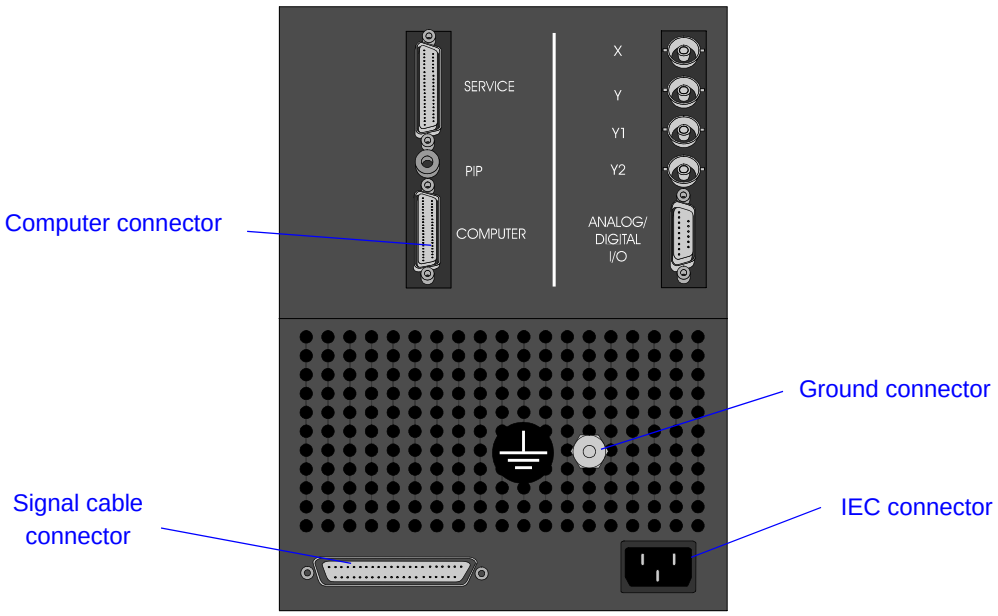


Figure 4-11. Series 5540 Controller Connections (Rear)

2. Connect the signal cable (50-way cable) from the rear of the machine to the 50-way connector on the rear of the controller.
3. Connect the controller power cable between the **5500 POWER** connector on the rear of the machine and the IEC connector on the rear of the controller.
4. Connect the ground cable between the ground connection on the rear of the machine and the ground connection on the rear of the controller.
5. Connect the load cell cable from the load cell to the **LOAD** connector on the front of the controller.

   Instron systems provide an option to measure strain. If your machine is enabled to measure strain, then connect the extensometer to the **STRAIN 1** connector on the front of the controller. Always use **STRAIN 1** as the primary connection for strain. **STRAIN 2** is another available option you can use to connect a second extensometer or other strain device to the system.

6. Connect the digilink cable between the **COMPUTER** connector on the rear of the controller and the digilink board connector on the computer.

Note: *The connector labeled* **SERVICE** *on the controller is used only by Instron's field service engineers. No equipment should ever be connected via the* **SERVICE** *connector.*

7. Verify that the voltage setting for the machine is compatible with the facility's voltage. Refer to "Power Supply Compatibility" on page 4-7. If it is not the appropriate voltage, refer to "Setting the Input Voltage" on page 4-7 to reset the machine's voltage. Verify that the electrical plug is compatible with the new voltage setting.
8. Ensure that the computer and monitor are set to the appropriate line voltage. Check the switch on the back of the computer to verify the line voltage setting. If necessary, set the switch to the proper line voltage. Check the back of the monitor for a line voltage switch and ensure that it is properly set. If there is no switch on the monitor, then the monitor automatically sets itself.
9. Connect the mains power cable for the machine to the IEC connector on the rear of the machine and to the electrical power supply.
10. Refer to the documentation for the computer to connect the computer and monitor to the electrical power supply.

    The system is now ready to be turned on. Refer to "System Startup" on page 7-3 for instructions.

Note: *If installation of a system accessory requires additional cabling, refer to the documentation for these devices for proper installation.*

5560 and 5580 System Connections

To set up a 5560 or 5580 testing system:

1. Ensure that the main power switch is set to Off (**O**) and the mains power cable to the machine is disconnected.
2. Connect the computer interface cable to the **COMPUTER** connector on the back of the controller. Connect the other end of the cable to the system interface card on the back of the computer. Ensure that the connectors are fully engaged in their sockets and are clamped with the connector screws. On the dual column table models, there are cable clips on the back of the machine to secure the computer cable in place.

Note: *The connector labeled* **SERVICE** *on the controller is used only by Instron's field service engineers. No equipment should ever be connected via the* **SERVICE** *connector.*

3. Connect the load cell cable to the **LOAD** connector on the front of the controller. Press the load cell cable into the cable clips on the crosshead and the column cover. Refer to "Installing a Load Cell" in chapter 6 for additional information.

   Instron systems provide an option to measure strain. If your machine is enabled to measure strain, then connect the extensometer to the **STRAIN 1** connector on the front of the controller. Always use **STRAIN 1** as the primary connection for strain. **STRAIN 2** is another available option you can use to connect a second extensometer or other strain device to the system.
4. Verify that the voltage setting for the machine is compatible with the facility's voltage. Refer to "Power Supply Compatibility" in this chapter. If it is not the appropriate voltage, refer to "Setting the Input Voltage" to reset the machine's voltage. Verify that the electrical plug is compatible with the new voltage setting.

   For the floor models, the voltage setting is labeled above the power cable on the machine. If the voltage must be reset, ensure that the existing voltage setting label on the machine is replaced with an updated label indicating the new voltage setting.
5. If the mains power cable is not a grounded cable, you must manually ground the machine using a separate ground cable. Attach the ground cable to the ground stud on the rear of the machine (for floor models, the ground stud is on the options panel on the right side of the machine). Attach the other end of this cable to an earth ground connection.
6. Ensure that the computer and monitor are set to the appropriate line voltage. Check the switch on the back of the computer to verify the line voltage setting. If necessary, set the switch to the proper line voltage. Check the back

of the monitor for a line voltage switch and ensure that it is properly set. If there is no switch on the monitor, then the monitor automatically sets itself.

7. Connect the mains power cable for the machine to the electrical power supply. For the table models, use the IEC connector on the power input connector.

8. Refer to the documentation for the computer to connect the computer and monitor to the electrical power supply.

   The system is now ready to be turned on. Refer to "System Startup" on page 7-3 for instructions.

Note: *If installation of a system accessory requires additional cabling, refer to the documentation for these devices for proper installation.*

Connecting Optional Accessories

Instron electromechanical systems provide access for adding optional accessories that may be necessary for your testing requirements. An options panel is located on the machine that enables you to use accessories such as grip control, light accessories and an interlock safety mechanism.

The following graphics shows the options panel for the 5540, 5560 and 5580 models, and displays the connections that are available on this panel. They include:

- Lamp - 12 Vac 2A rated outlet for optional light accessory.
- Pip jack - Connects a remote recorder pen pipping device, such as an event marker or an incremental extensometer, to the system.
- Interlock capability (optional) - The interlock capability is provided with certain custom protective shields. The interlock prevents the system from working when the door is open. The standard protective shield does not include this functionality.
- Grip control - 9 pin D connector for the optional pneumatic grip control function. This function enables you to apply a specified pre-tension to the specimen when using cord and yarn grips.

Note: *The following graphics display all options on the Options panel. If any of these options are not purchased with the system, then these connectors are not enabled and have black coverings.*

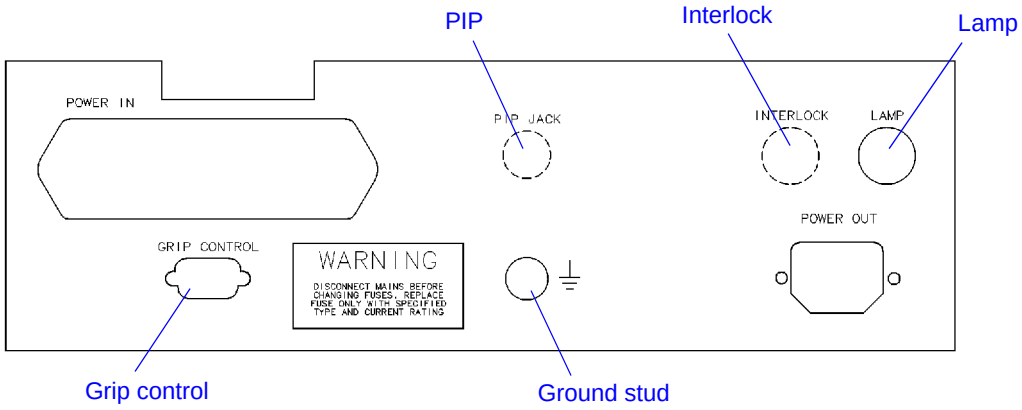
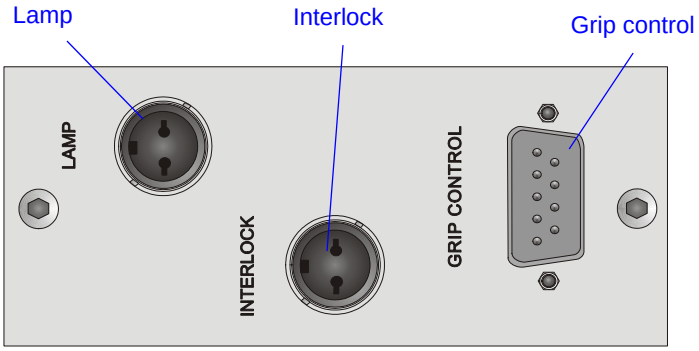
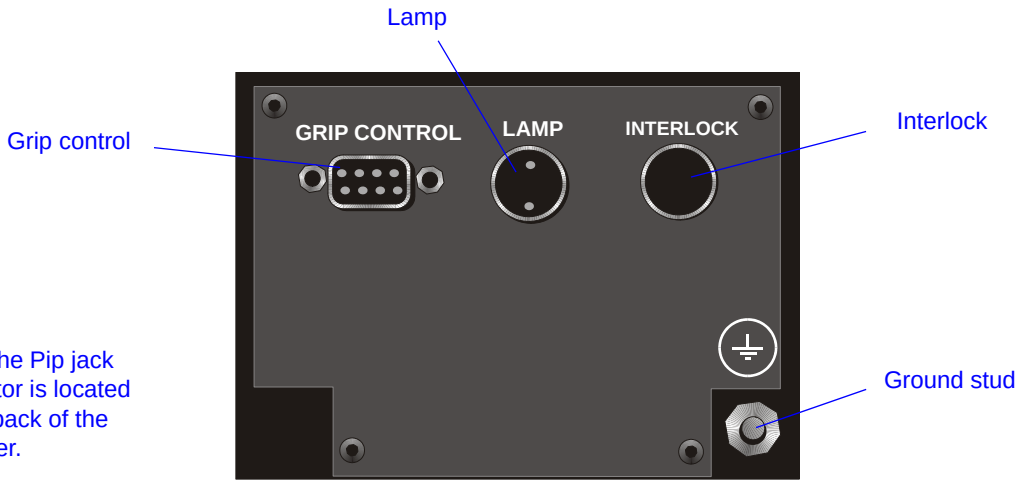


Figure 4-12. 5540 Options Panel



Note: The Pip jack connector is located on the back of the controller

Figure 4-13. 5560 Options Panel



Note: The Pip jack connector is located on the back of the controller.

Figure 4-14. 5580 Options Panel

Chapter 5
Function of Controls

Outline

This chapter describes the various load frame controls and their functions. It includes the following sections:

Power Input Connector

Power Input Connector - Table Models

The power input connector, shown in Figure 5-1, performs the following functions:

- Connects the load frame to the electrical power supply.
- Contains the power On/Off switch.
- Holds the power fuse.
- Controls the voltage setting. The voltage setting can be changed if necessary. Refer to "Setting the Input Voltage" on page 4-7.

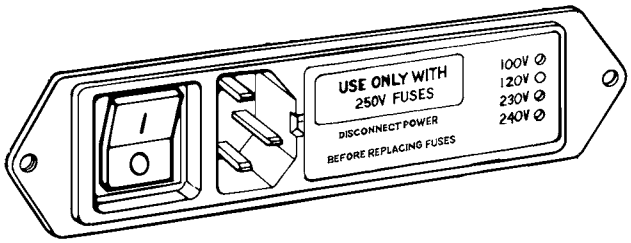


Figure 5-1. Power Input Connector

Refer to chapter 1 to locate the power input connector on your specific model.

If the frame shuts down suddenly, do the following:

1. To verify that power has been disabled, ensure that the **POWER** indicator light on the control panel is not illuminating.
2. Save your existing data.
3. Exit the software program.
4. Replace the power fuse. Refer to "Fuse Replacement" on page 8-10.
5. Turn on the frame and start the software program again. The system should reset itself. Verify that the **POWER** indicator light on the control panel illuminates.
6. Before you resume testing, determine why the system shut down and take the necessary steps to avoid repeating the action.

To avoid blowing a fuse:

- Set the test parameters within the normal operating envelope of the frame.
- Improve the site voltage supply, if possible.

Specific instructions for turning your system on are provided under section "System Startup" on page 7-3.

Power Switch - Floor Models

On the floor models, the main power switch is located on the right side of the frame base, as shown in Figure 5-2. Select position **I** to turn the power on to the load frame and the controller. When the power is on, the displays on the frame control panel illuminate. Select position **O** to turn off power to the load frame and the controller.

The power switch is also a system circuit breaker. Wiring from the switch connects the transformer and the power amplifier. The switch opens if the demand for current exceeds the system rating, and the load frame electronics automatically shut off and the frame shuts down. The displays on the frame control panel stop illuminating. This situation may occur during a test with high loads or speeds that are outside the normal operating envelope of the frame, or when there are large variances in the input voltage.

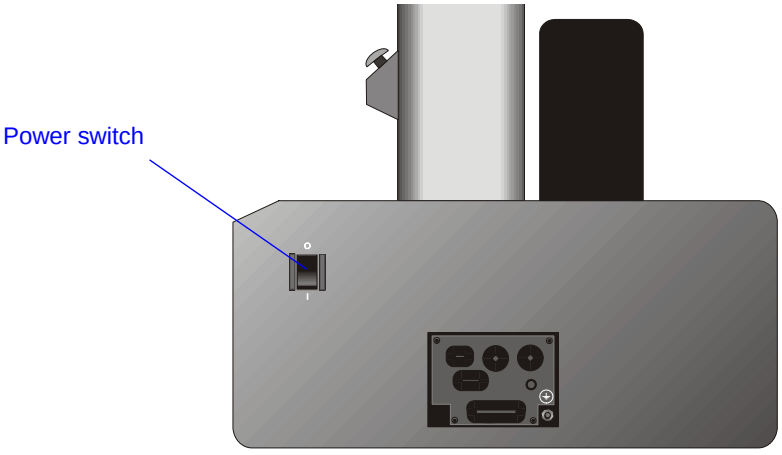


Figure 5-2. Power Switch - Floor Models

Note: *The circuit breaker only affects the frame electronics. The system's software will still operate. If this occurs during a test, a message displays on the screen advising that the frame is disabled.*

If the frame shuts down suddenly, do the following:

1. To verify that power has been disabled, ensure that the **POWER** indicator light on the control panel is not illuminating.
2. Save your existing data.
3. Exit the software program.
4. Turn on the frame and start the software program again. The system should reset itself. Verify that the **POWER** indicator light on the control panel illuminates.
5. Before you resume testing, determine why the circuit breaker activated and take the necessary steps to avoid repeating the action.

To avoid activating the circuit breaker:

- Set the test parameters within the normal operating envelope of the frame.
- Improve the site voltage supply, if possible.

Specific instructions for turning your system on are provided under section "System Startup" on page 7-3.

Emergency Stop Button

The Emergency Stop button is a large, round, red button on the testing system. The Emergency Stop button interrupts power to the electrical drive system and brings the system to a stop as quickly as possible.

Hazard - Press the Emergency Stop button whenever you consider that an unsafe condition exists.

Whenever you consider that safety may be compromised, stop the test using the Emergency Stop button. Press this button to stop the test as soon as possible when a condition develops that:

- Could affect the safety of persons operating the system.
- Could damage the specimen, load frame, or the test fixtures.

Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it.

When operated, the Emergency Stop button locks into the closed position and the system is disabled until you reset the button and re-enable the load frame. To reset the Emergency Stop button, turn it a quarter-turn clockwise to release the button. Refer to the following section for instructions on enabling the load frame.

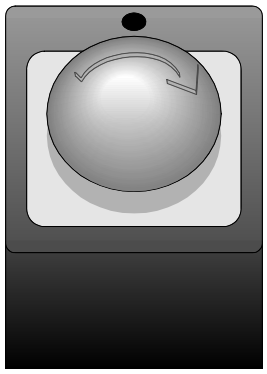


Figure 5-3. Emergency Stop Button

Enabling the Load Frame

The load frame is disabled after the Emergency Stop button is pressed or when the load frame trips a secondary overtravel limit.

Warnings

Hazard - Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it.

If the Emergency Stop button is operated due to a safety concern, ensure that concern is resolved before you use the system again.

Hazard - Identify and resolve the condition that caused the operation of the secondary overtravel limit before you use the testing system.

Operation of a secondary overtravel limit indicates that the primary overtravel limit has failed to stop the crosshead. This is a serious condition. Identify and resolve the condition that caused the secondary overtravel limit to trip before you use the testing system again. Contact your local Instron Professional Services department for assistance.

To enable the load frame:

1. Remove the condition that caused the load frame to become disabled; that is, reset the Emergency Stop button or drive the load frame away from the limit. Make sure that any issues that caused the Emergency Stop button to be pressed or the secondary overtravel limit to operate are resolved before you use the system again.
2. Using the Console software from the computer, click the **ENABLE FRAME** button to re-enable the motor. If necessary, refer to the online help for further assistance with the Console software.

Control Panel

The control panel attaches to one of the column covers on the load frame and works in conjunction with the Console software to operate the frame. The control panel facilitates performing many of the Console functions directly at the frame, so you can perform these functions either at the computer or at the load frame. Figure 5-4 illustrates the control panel. Table 5-1 on page 5-8 describes the control panel's functions.

Warning

Crush Hazard - Do not place your hands between the moving grips or fixtures while operating any controls on the control panel.

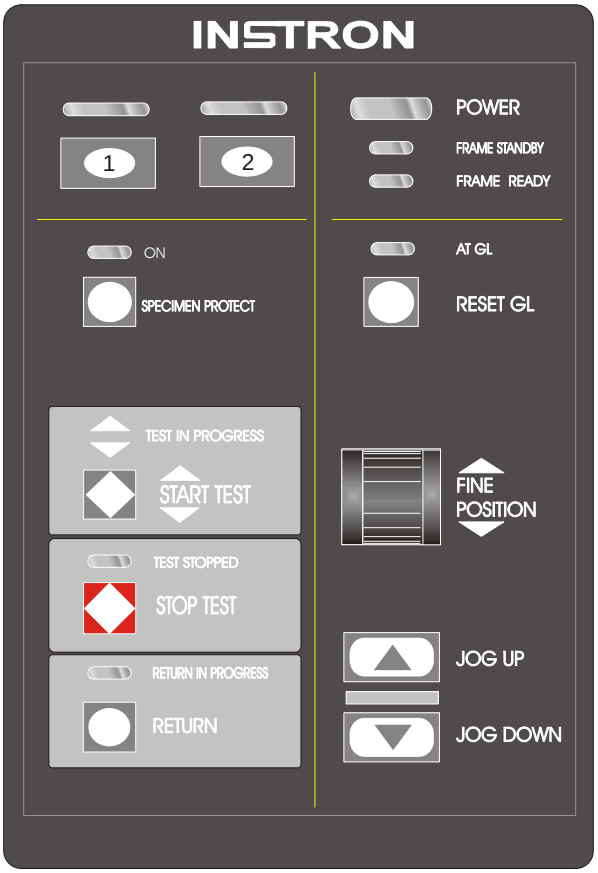


Figure 5-4. Control Panel

Table 5-1. Control Panel Functions

Control	Function
JOG UP	Press the **JOG UP** arrow button to move the crosshead in tension (away from the base beam). Pressing the button increases the speed linearly, up to a maximum speed, until you release the button.
JOG DOWN	Press the **JOG DOWN** arrow button to move the crosshead in compression (toward the base beam). Pressing the button increases the speed linearly, up to a maximum speed, until you release the button.
FINE POSITION	Turn this thumbwheel to slowly position the crosshead. Fine Position lets you set an accurate gauge length, or set a precise grip position for loading specimens.
RESET GL	Press this button to set the current position of the crosshead as the gauge length (or extension = zero) position. After setting the gauge length, the crosshead returns to this position when: • You press the **RETURN** button • The crosshead encounters a pre-set limit or event that instructs the crosshead to return to gauge length.
AT GL	This indicator illuminates when the crosshead is at the gauge length position.
POWER	This indicator illuminates when the system power is in either **STANDBY** or **FRAME READY** mode. In **STANDBY** mode, the system supplies power to the load cell and its conditioner board but not to the frame. In **FRAME READY** mode, the system supplies power to all load frame and transducer components. This indicates that the test system is ready for operation.
SPECIMEN PROTECT	Press this button to toggle on or off the **SPECIMEN PROTECT** function. This function protects the test specimen and load string components from overloads. The **ON** indicator illuminates when **SPECIMEN PROTECT** is functioning.
START TEST	After you set the test parameters, press this button to begin the test. The indicators on either side of the **START TEST** label indicate the direction that the crosshead will move once a test starts. This function is only available with Merlin and Bluehill software.
STOP TEST	Press this button to stop crosshead motion during or at the end of a test. The **TEST STOPPED** indicator illuminates to show that the test has stopped, but that the crosshead has not returned to the gauge length position.
RETURN	Press this button to move the crosshead back to the gauge length position after a test. The **RETURN IN PROGRESS** indicator illuminates to show that the crosshead is returning to the gauge length position.
Soft Keys **1** & **2**	Press either of these buttons to carry out a function that you have previously assigned to these keys from your testing software. The soft keys on your computer screen display the function of each button.

Software Controls

Control of the testing system is via an Instron proprietary software program designed specifically for materials testing. Setting test parameters, operating the system, and collecting test data is done through the software program. The software program runs in conjunction with the Console software, which appears at the top of the computer screen as a series of buttons that provide live displays and access to transducer setup, system calibration, loop tuning and other features.

Detailed information on operating the system from the software is provided in the software online help.

Chapter 6
Preparation for Use

Outline

This chapter provides basic information required to create an appropriate load string for your test requirements and provides installation instructions for the primary load string components. It includes the following sections:

Load Cells

Note: *Load cells are precision instruments that are environmentally sensitive and require an extensive warm up period prior to use. Let your load cell warm up for a minimum of 15 minutes or longer before calibrating. This warm up period is necessary to let the load weighing components stabilize.*

General Characteristics

Load cells are precision force measurement transducers. They are typically mounted to the crosshead, but you can also mount them to the base plate by using specific fixtures.

Each load cell contains a special resistor with a resistance value unique to each type. This resistor enables a load cell to be automatically identified by the testing system.

Instron load cells are ruggedly made, but, as with any transducer, should be handled with care. Each cell is labeled with its rated capacity, and should only be used when testing within this rated capacity.

For additional information on selecting an appropriate load cell for your testing needs, refer to “Selecting a Load Cell” on page 6-3.

Load Cell Stability

There are two primary factors controlling the stability of load cells:

- change of balance point with temperature.
- change of balance resulting from an application or change of load (creep).

Careful temperature compensation is made during manufacture so that all Instron load cells have a coefficient of less than 0.002% of full rated output per degree F. The balance shift due to temperature change becomes proportionately less at the higher end. Therefore, if you are running a very long test requiring maximum stability, it is recommended that you use a load cell where the loading is at the higher end of its range.

The creep of a cell is a gradual, very small shift in a recorder reading after a high load has been quickly applied, or as a small shift in the balance point after a load has been quickly removed. For most cells, the creep coefficient is less than 0.05%

of full rated output, although for a 500 gram cell this may be as high as 0.5% because of its more sensitive design.

The above discussion regarding stability refers only to the shift in balance point due to temperature or creep, its effect being to move the whole scale of a recorder up or down by the amount concerned. The calibration, or the scale sensitivity, of a load cell is not affected by these variations and remains constant for all normal conditions.

Electrical Calibration

Calibrating a load cell electrically eliminates handling and applying precision dead weights to the load cell for calibration purposes. This method is as accurate and stable as the dead weight method except that the mechanics of the load cell are not checked. In addition to the stability considerations discussed in section “Load Cell Stability”, two other factors influence the operation of these cells: modulus compensating resistors and electrical calibration resistors.

Modulus compensation is provided to prevent temperature-induced modulus changes from affecting the calibration or sensitivity of the load cell. While the magnitude of this effect is very small, the sensitivity of an electrically calibrated load cell must be exactly the same as that of the electrical calibration signal, and this agreement must exist under environmental conditions which may be different from those that existed in the laboratory at the time of calibration.

Each load cell contains a special calibration resistor so that when calibration is initiated, an electrical signal is produced which is equivalent to applying a precision dead weight to the load cell. The accuracy of this comparison is better than 0.1% of the actual signal.

Selecting a Load Cell

Selecting a load cell is the first step in preparing for a tension or compression test. If the approximate tensile or compressive strength of the specimen is known, use these guidelines to choose a load cell:

- The minimum test load must be greater than the smallest load cell capacity range shown in the Specifications section for your specific machine. Refer to the load measurement accuracy parameter in the System Performance table for your machine. Measurements taken below the stated minimum range cannot be held to the stated accuracy specification. Refer to the specifications section for your model in Chapter 2.

- If a choice is possible between two different load cells because of overlapping ranges:

  a. Select a higher-capacity load cell whenever a minimum of deflection is desired.

  b. Select a lower-capacity load cell whenever a maximum long term balance or stability is desired.

If the tensile strength is not known, refer to a Properties of Materials handbook to obtain an approximate strength. To calculate the tensile strength in force units for a specimen, multiply the tensile strength of the specimen by its cross-sectional area. For example:

psi x in^2 = lbf (pounds-force)

kg/m^2 x m^2 = kgf (kilograms-force)

Pascals x m^2 = newtons

Example:

Specimen:	Standard ASTM tensile geometry
Material:	Lexan
Tensile Strength:	5200 psi (from materials handbook)
Specimen area:	0.502 in. wide x 0.125 in. thick = 0.063 in^2
Tensile strength:	5200 psi x 0.063 in^2 = 328 lbf

In this example, the 5 kN (1000 lb, 500 kg) capacity load cell is recommended.

If you cannot determine an approximate value of tensile strength, use the highest capacity load cell rated for the load frame. Perform a preliminary test at a very slow speed to obtain the load range required. After performing the preliminary test, you can determine if a lower capacity load cell can provide better load resolution.

Compatible Load Cells

Instron load cells are designed for general tension and compression testing. They have a rationalized output designed for accurate load measurement and precise load control. These cells are calibrated in S.I. units. However, you can select either U.S. Customary (English), metric, or S.I. units at the computer. The load

cells are interchangeable so that a wide range of forces, up to the full capacity of the load frame, can be accurately measured and recorded.

Table 6-1 on page 6-6 shows the various load frame models and the load cells that are compatible with each model. Some load cells have a clevis pin coupling that provides a quick connection for grips and fixtures while others have a threaded coupling in various sizes. The table includes important information necessary when selecting an appropriate load cell:

- **Load capacity** - The maximum load that the load cell can measure.
- **Effective length** - The distance between the load cell mounting surface on the crosshead and the clevis pin opening. On load cells with a threaded connection, the effective length is the distance between the load cell mounting surface on the crosshead and the bottom of the load cell.
- **Mechanical fitting** - The size and type of the coupling.
- **Interface size** - The size of the interface connection required to ensure proper fit between the grips or fixtures. If the interface size on the load cell and grip are not compatible, then an adapter is required. The lower case letter following the interface size indicates the gender of the coupling.

Note: *The following table summarizes all the load cells that are compatible for each model series. Some of the load cells may exceed the maximum capacity of the smaller frames in a series, but will be appropriate for the larger frames in the series.*

When creating a load string for your tests, keep in mind the maximum capacity of all the components making up the load string. The expected test load should not exceed the maximum capacity of any load string component including, but not limited to:

- *Load frame*
- *Load cell*
- *Adapters*
- *Grips or fixtures*

Refer to "Selecting a Load Cell" on page 6-3 for additional information on selecting a load cell. Refer to the load cell installation section later in this chapter that pertains to your specific model and load cell.

Table 6-1. Compatible Load Cells

Load Frame Type	Load Cell	Capacity	Effective Length	Mechanical Fitting	Interface Size
5540 Single Column Table Top Models	2530-416	500 N 112 lbf	54 mm 2.1 in	6 mm clevis pin	Of
	2530-418	2 kN 450 lbf	54 mm 2.1 in	6 mm clevis pin	Of
	2530-426	1 kN 225 lbf	54 mm 2.1 in	6 mm clevis pin	Of
	2530-427	100 N 22 lbf	48 mm 1.9 in	2.5 mm clevis pin and 6 mm clevis pin	OOf Of
	2530-428	10 N 2.25 lbf	48 mm 1.9 in	2.5 mm clevis pin and 6 mm clevis pin	OOf Of
	2530-437	50 N 11 lbf	48 mm 1.9 in	2.5 mm clevis pin and 6 mm clevis pin	OOf Of
	2530-439	5 N 1 lbf	48 mm 1.9 in	2.5 mm clevis pin and 6 mm clevis pin	OOf Of

Table 6-1. Compatible Load Cells (Continued)

Load Frame Type	Load Cell	Capacity	Effective Length	Mechanical Fitting	Interface Size
5560 Dual Column Table Top Models and 5581/5582 Floor Models	2525-801	100 kN 22500 lbf	142 mm 5.6 in	16 mm clevis pin	1f
	2525-802	50 kN 11250 lbf	142 mm 5.6 in	16 mm clevis pin	1f
	2525-804	10 kN 2250 lbf	133 mm 5.2 in	6 mm clevis pin	Of
	2525-805	5 kN 1125 lbf	133 mm 5.2 in	6 mm clevis pin	Of
	2525-806	1 kN 225 lbf	133 mm 5.2 in	6 mm clevis pin	Of
	2525-807	100 N 22 lbf	135 mm 5.3 in	2.5 mm clevis pin	OOf
	2525-808	10 N 2.25 lbf	135 mm 5.3 in	2.5 mm clevis pin	OOf
	2525-810	30 kN 6750 lbf	142 mm 5.6 in	16 mm clevis pin	1f
	2525-815	2.5 N 0.5 lbf	135 mm 5.3 in	2.5 mm clevis pin	OOf
	2525-816	500 N 112 lbf	133 mm 5.2 in	6 mm clevis pin	Of
	2525-817	50 N 10 lbf	135 mm 5.3 in	2.5 mm clevis pin	OOf
	2525-818	2 kN 450 lbf	133 mm 5.2 in	6 mm clevis pin	Of
5584/5585H Floor Models	2525-171	150 kN 33750 lbf	111 mm 4.4 in	M48 x 2 LH	IIf
	2525-174	250 kN 56200 lbf	111 mm 4.4 in	M48 x 2 LH	IIf

Adapters

Adapters enable you to connect grips (or fixtures) to the frame when the interfaces have different connection sizes. Adapters ensure a secure fit between the two interfaces and minimize slack in the load string. There are two types of adapters: base adapters and coupling adapters.

Note: *When creating a load string for your tests, keep in mind the maximum capacity for all the components making up the load string. The expected test load should not exceed the maximum capacity of any load string component including, but not limited to:*

- *Load frame*
- *Load cell*
- *Adapters*
- *Grips or fixtures*

Base Adapters

Base adapters enable you to connect grips and fixtures to the base of the load frame. The type of base adapter included with the system varies depending on the model you purchased, as shown in Table 6-2.

Table 6-2. Base Adapters

Load Frame Type	Base Adapter (included with the system)[a]
5540	Type O and Type D
5560	Type D
5581/5582	Type D
5584/5585H	Not supplied with a base adapter. The base plate has a M48 x 2 left hand threaded interface (Type II), which can be used to attach any grip or fixture using a compatible adapter.

a. Refer to the Ancillary Parts list in Chapter 9 for part numbers.

Coupling Adapters

Coupling adapters enable you to attach grips and fixtures of different sizes to the load cell and base adapter, thus providing more options for testing. These adapters are available in many types and sizes. The two primary types of adapters are:

1. Tension couplings, or self-aligning coupling adapters. This type provides a swivel connection and join clevis pin type interfaces. The swivel action allows the grip, or fixture, to self-align in the direction of the test load, thus minimizing any bending load on the specimen. Use self aligning adapters for tension testing only.
2. Rigid coupling adapters. This type also joins clevis pin type interfaces, but uses checknuts to provide fixed connections. This type can also have a threaded interface. There is no swivel action with these adapters so they are not self aligning. The load string alignment is dependent on the accuracy of the load cell alignment during installation. Use rigid couplings for either tension or compression testing.

Within these two types of adapters there are different connection sizes available. Interface size is defined as the diameter of the shank, or male type interface, through which the clevis pin hole is drilled. When the load cell interface, or base adapter interface, differs from your grip interface, a coupling adapter creates a secure connection between the two different interfaces.

Coupling types are listed from load cell, or base, towards the accessory. The lower case letter following “Type” indicates the gender of the coupling at that end. Since coupling adapters connect two different interface sizes, between the load cell and the grip, they are identified by the two different sizes on each end. For example, if you have a type D load cell and a type O grip, the coupling you need must be a D to O coupling adapter. An example of such a coupling is Type Dm to Of.

Note: *If your grip (or fixture) is the same size as your load cell, then an adapter is not required since the grip can connect securely with the load cell. However, if you need the self-aligning feature that optimizes the load string alignment, you need to use appropriate tension couplings.*

Table 6-3 shows the different interface sizes that Instron uses for its load cells, adapters, grips and fixtures.

Table 6-3. Connection Sizes

Interface Size	Dimensions
Type O	12 mm connection with 6 mm clevis pin
Type OO	6 mm connection with 2.6 mm clevis pin
Type A	Hook
Type B	0.5 inch connection with 3/16 inch clevis pin
Type C	5/8 inch connection with 0.25 inch clevis pin

Table 6-3. Connection Sizes (Continued)

Interface Size	Dimensions
Type D	1.25 inch connection with 0.5 inch clevis pin
Type 1	34 mm connection with 16 mm clevis pin
Type I	M30 x 2 LH thread
Type II	M48 x 2 LH thread
Type IIA	M72 x 3 LH thread

Contact your local Instron office or visit our web site at **www.instron.com** for assistance to determine the appropriate adapters required for your testing.

Installing a Load Cell

Testing on an electromechanical load frame is typically conducted below the moving crosshead. Refer to the following section pertaining to your model type and load cell for detailed load cell installation instructions.

Checklist

Check for the following conditions before installing a load cell:

- ❑ The load cell installation drawings are available and you have all the parts that are required for the installation.
- ❑ Mounting screws are lubricated. Lubricating the mounting screws ensures that required pre-load factors can be obtained when testing. Refer to Table 8-1 on page 8-6 in the Maintenance chapter for recommended lubricants.
- ❑ A torque wrench is available. Floor models also require a hex key wrench.
- ❑ All threads, bores and mating surfaces are clean and free of damage.
- ❑ The crosshead is positioned below its travel midpoint so that you can easily and safely access the crosshead.
- ❑ The crosshead is stationary. The **TEST IN PROGRESS** indicator light on the control panel should not illuminate.

Series 5540 - Installation of the 2530 Load Cells

To install a Series 2530 low profile load cell into the crosshead:

1. Review the "Checklist" on page 6-11 and make sure all tasks are completed.
2. Connect the mounting screw and washer as shown in Figure 6-1 on page 6-12.
3. Place the mounting screw assembly (from Step 2) into the top of the central bore of the crosshead.
4. Insert the anti-rotation pin into one of the pin holes on the bottom of the crosshead.

Note: *There are four pin holes on the bottom of the crosshead that enable you to position the load cell either straight on or at a 45° angle. Refer to "Accessory Mounting Dimensions" on page 2-50 for pin locations.*

5. Place the locating ring into the top of the load cell that connects to the crosshead. See Figure 6-1 on page 6-12.

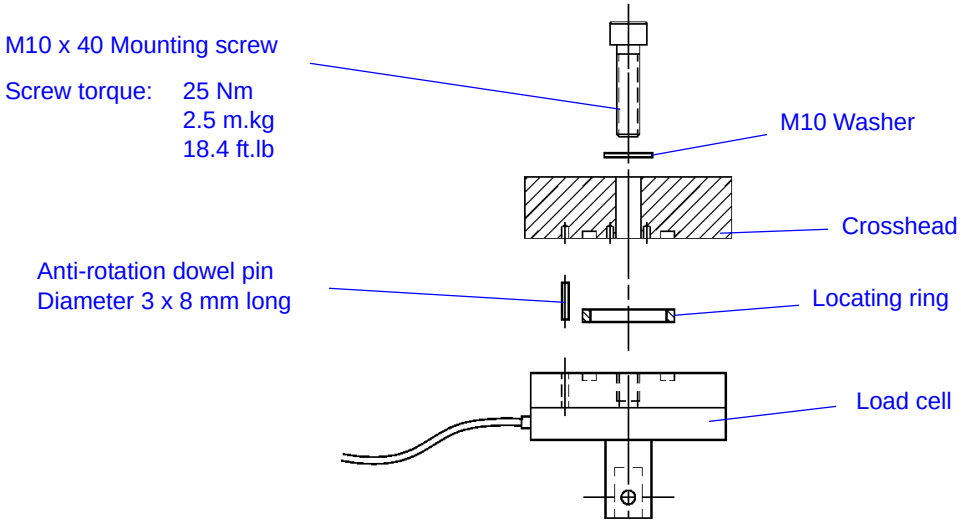


Figure 6-1. Series 5540 - Installing 2530 Load Cells

6. Place the load cell against the bottom of the crosshead, ensuring that the anti-rotation pin and locating ring fit securely in place against both the crosshead and load cell. Place the cable to the left side of the column.

7. Tighten the mounting screw, by hand, so that it secures to the load cell underneath the crosshead.

Caution

Prevent the load frame from sliding by holding the crosshead with one hand while applying torque to the mounting screw.

8. Set the torque wrench to 25 Nm and tighten the mounting screw.

9. Connect the load cell cable into the **LOAD** connector on the controller.

10. Press the load cell cable into the adjustable clip on the rear of the guide column to prevent it from interfering with your test.

11. Calibrate the load cell.

12. Leave the system on for at least 15 minutes to allow the load cell circuitry to stabilize. After this warm-up period, calibrate the load cell again.

The load cell is now ready for testing.

Series 5560 - Installing a Series 2525 Load Cell

To install a Series 2525-800 load cell in the crosshead:

1. Review the "Checklist" on page 6-11 and make sure all tasks are completed.
2. Position the crosshead below the travel midpoint so that you can easily reach the top of the crosshead.
3. Carefully lower the load cell into the center hole of the crosshead with its cable facing the rear of the machine. See Figure 6-2 on page 6-14. Align the holes in the flange of the load cell with the tapped holes in the crosshead.
4. Using an 8 mm hex key wrench, tighten the three M10 screws to secure the load cell to the crosshead. Torque the screws to 50 Nm (37 ft-lb).

Note: *For tension testing, you don't have to bolt down the load cell. For convenience, you can place the load cell into the crosshead without bolts. However, for some applications where the load cell must be held rigid, you must use the bolts. For example, if you are testing at very low loads, bolts are needed to remove any non-linearities of the loading rates as the load cell "beds down" on the mounting surface.*

5. Connect the load cell cable into the **LOAD** connector on the controller.
6. Press the load cell cable into the clips on the rear of the column cover to prevent it from interfering with your test.
7. Calibrate the load cell.
8. Leave the system on for at least 15 minutes to allow the load cell circuitry to stabilize. After this warm-up period, calibrate the load cell again.

The load cell is now ready for testing.

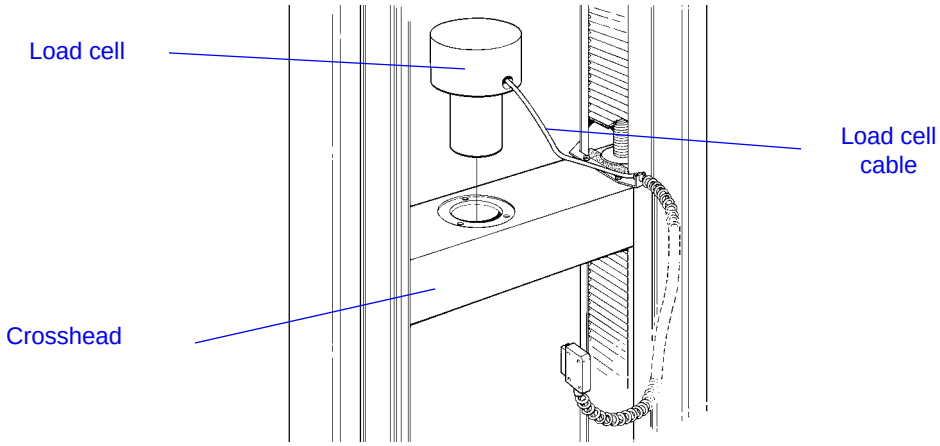


Figure 6-2. Series 5560 - Installing a Load Cell

Series 5581/5582 - Installing a Series 2525-800 Load Cell

The 5581 and 5582 load frames use Series 2525-800 load cells.

Equipment

You need the following items:

- Torque wrench
- Hex key wrench, 8 mm
- Two wooden blocks at least 50 mm (2 in) high

Installation Procedure

To install a 2525-800 load cell:

1. Review the “Checklist” on page 6-11 and make sure all tasks are completed.
2. Position the crosshead below its travel midpoint so that you can easily reach the top of the crosshead.
3. Rotate the load cell so the cable is facing towards the rear of the machine and align the load cell bolt pattern to the crosshead bolt pattern, as shown in Figure 6-3 on page 6-15.
4. Insert the load cell into the crosshead central bore.
5. Secure the load cell to the crosshead by tightening the six M10 bolts using the hex key wrench.

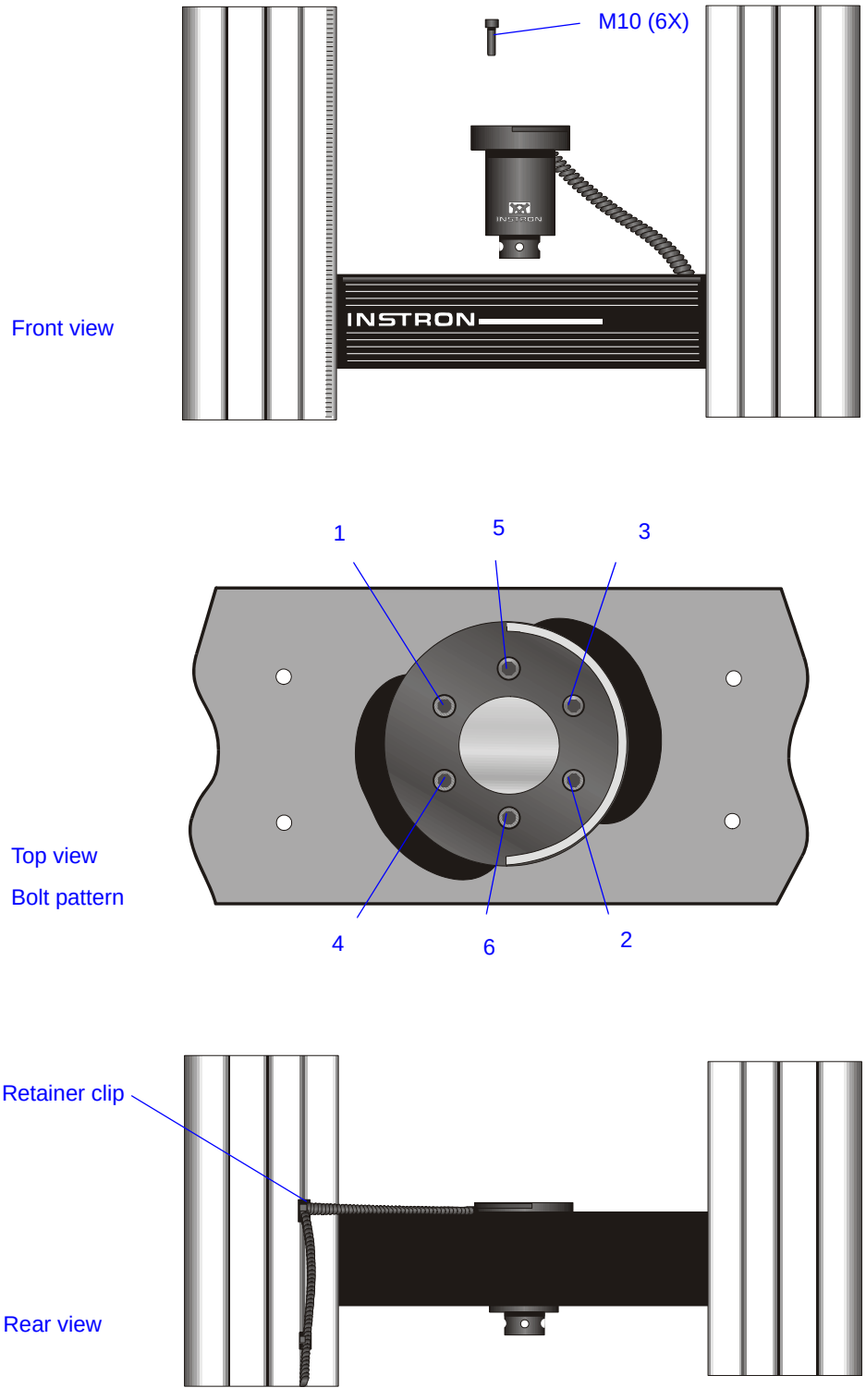


Figure 6-3. Series 5581 and 5582 - Load Cell Installation

6. Set the torque wrench to 50 Nm (37 lb-ft.), and tighten the bolts according to the numbered sequence in the Top view in Figure 6-3 on page 6-15.
7. Connect the load cell cable into the **LOAD** connector on the controller.
8. Press the load cell cable into the clips on the rear of the column cover to prevent it from interfering with your test.
9. Calibrate the load cell.
10. Leave the system on for at least 15 minutes to allow the load cell circuitry to stabilize. After this warm-up period, calibrate the load cell again.

The load cell is now ready for testing.

Series 5584/5585H - Installing a Series 2525-170 Load Cell

The 5584 and 5585H load frames use Series 2525-170 high capacity load cells.

Equipment

You need the following items:

- Torque wrench
- Hex key wrench, 14 mm
- Two wooden blocks at least 50 mm (2 in) high

Installation Procedure

1. Review the "Checklist" on page 6-11 and make sure all tasks are completed.
2. Place two wooden blocks on the base beam. Refer to Figure 6-4 on page 6-18.
3. Position the load cell on the blocks so that the Instron label is upright and faces the front of the machine.
4. Place the locating ring into the load cell pilot recess.
5. Position the crosshead until there is a gap of 10 mm (0.5 in.) between the top of the load cell and the bottom of the crosshead.
6. Set the crosshead limit stop to prevent the crosshead from traveling further down. Refer to "Setting Crosshead Travel Limits" on page 7-4 for details on setting travel limits.
7. Insert the four M16 bolts through the bores in the crosshead.

8. Use a hex key wrench to thread the bolts evenly into the load cell. Continue to thread the bolts until the load cell lifts off the wooden blocks.
9. Align the load cell so the locating ring sits in the crosshead pilot recess when you tighten the bolts.

Caution

Do not drive the crosshead down using the Jog or computer controls when the bolts are loose. This can damage the crosshead bores and locating ring.

10. Set the torque wrench to the appropriate torque for your model and tighten the bolts according to the numbered sequence shown in Figure 6-4 on page 6-18. The appropriate torque values for each model are:
    - Model 5584 - 200 Nm (150 lb-ft)
    - Model 5585H - 250 Nm (185 lb-ft)
11. Connect the load cell cable into the **LOAD** connector on the controller.
12. Press the load cell cable into the clips on the rear of the column cover to prevent it from interfering with your test.
13. Calibrate the load cell.
14. Leave the system on for at least 15 minutes to allow the load cell circuitry to stabilize. After this warm-up period, calibrate the load cell again.

The load cell is now ready for testing.

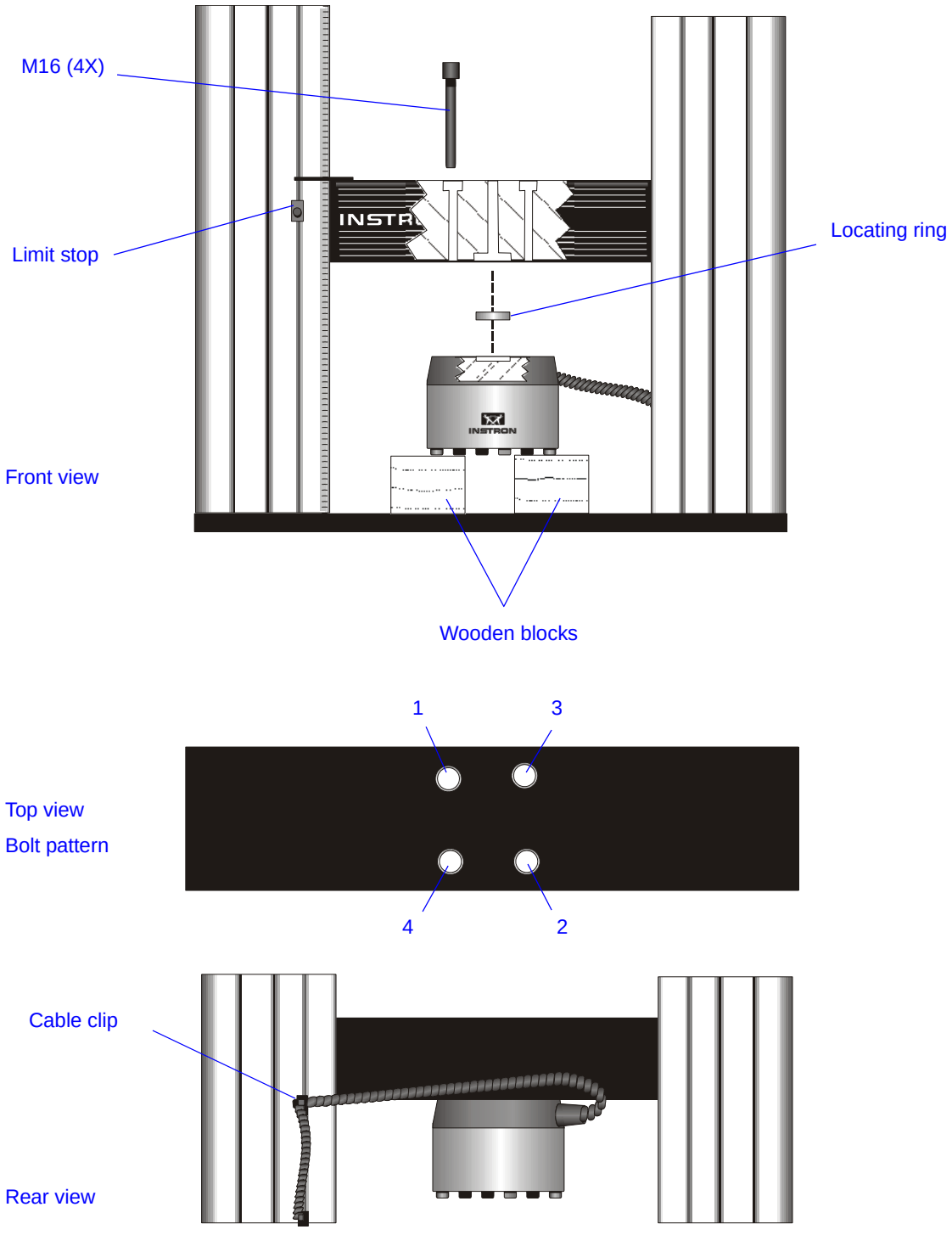


Figure 6-4. Series 5584 and 5585H - Load Cell Installation

Installing the Base Adapter

The type of base adapter included with the system varies depending on the model you purchased, as shown in Table 6-2 on page 6-8. Refer to the following section that pertains to your specific model for installation instructions.

Refer to the Parts chapter for the Instron part numbers, if necessary.

Series 5540

The base adapter can be removed, or re-oriented on an angle to match the position of the load cell. To change the orientation of the base adapter, you must remove the adapter and re-install it in the new position.

Removing the Base Adapter

To remove the base adapter:

1. Remove the spring that is located inside the adapter.
2. Insert the 5 mm hex key into the base adapter, ensuring that it fits into the screw at the base of the adapter.
3. Using a torque wrench, turn the wrench counterclockwise to loosen and remove the screw inside the adapter.
4. Lift the base adapter away from the base beam.

Installing the Base Adapter

To install the base adapter:

1. Insert the adapter into the base beam, noting the orientation of the locating pin on the bottom of the adapter. The locating pin fits into any of the three locating pin holes on the base beam. The adapter can be placed at 90°, or 60° to either side of 90°.
2. Insert the 5 mm hex key inside the adapter, ensuring that it fits into the screw at the base of the adapter.
3. Using a torque wrench, tighten the screw to the torque value shown below:

Machine	Screw size	Torque Value
5542/5543	M6	7 Nm 5.16 ft.lb
5544	M10	25 Nm 18.4 ft.lb

4. Remove the hex key and insert the compression spring.

You can now connect a grip or fixture to the base adapter.

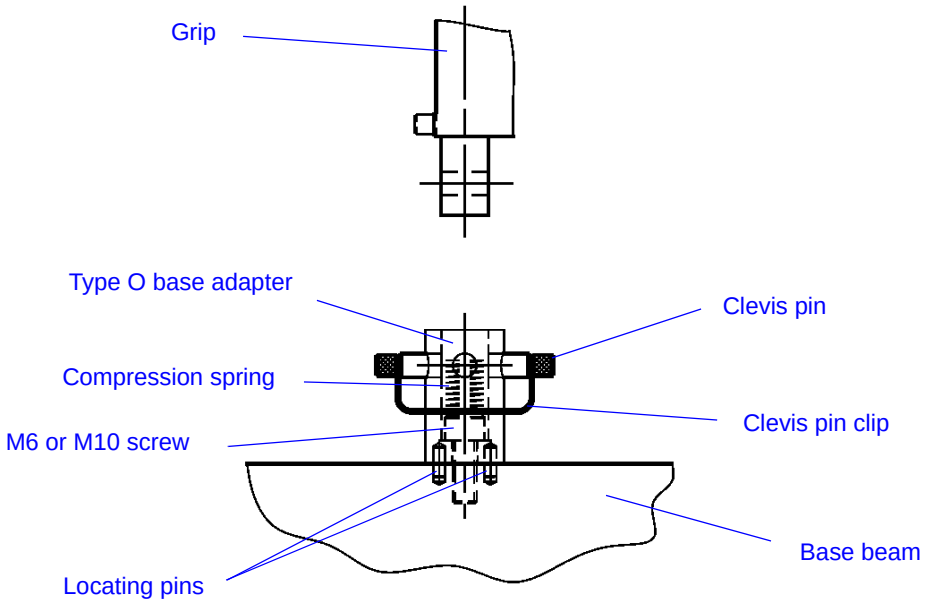


Figure 6-5. Series 5540 - Type O Base Adapter

Series 5564, 5565, 5566

The base adapter can be removed, or re-oriented on an angle to match the position of the load cell. To change the orientation of the base adapter, you must remove the adapter and re-install it in the new position.

Removing a Base Adapter

Use the following procedure to remove any of the base adapters discussed in the previous sections.

To remove the base adapter:

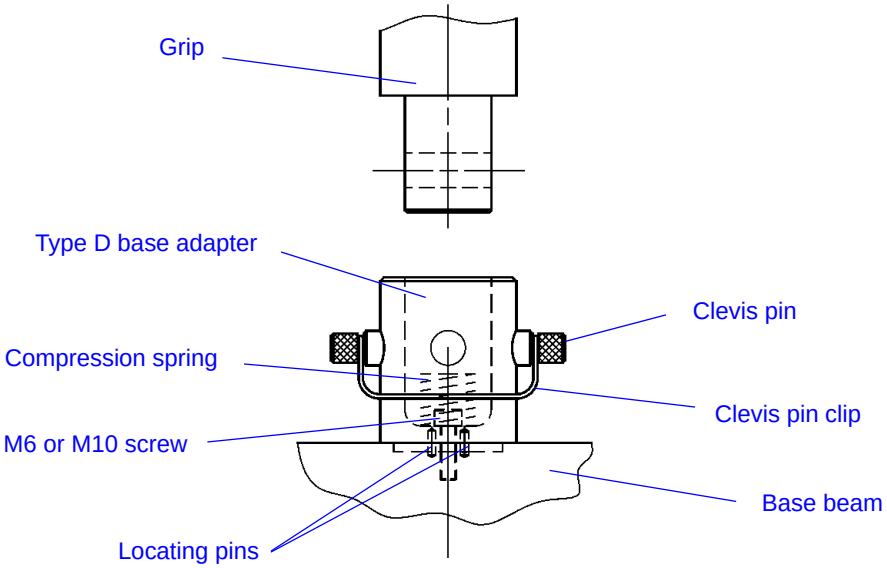


Figure 6-6. Series 5540 - Type D Base Adapter

1. Remove the spring that is located inside the adapter.
2. Insert the 5 mm hex key into the base adapter, ensuring that it fits into the screw at the base of the adapter.
3. Using a torque wrench, turn the wrench counterclockwise to loosen and remove the screw inside the adapter.
4. Lift the base adapter away from the base beam.

Installing the Base Adapter

To install the base adapter:

1. Insert the adapter into the base beam, noting the orientation of the locating pin on the bottom of the adapter. The locating pin fits into any of the three locating pin holes on the base beam where the adapter is fitted.

   The adapter can be placed at 90°, or 60° to either side of 90°.
2. Insert the 14 mm hex key inside the adapter, ensuring that it fits into the M10 screw at the base of the adapter.
3. Using a torque wrench on the hex key, tighten the screw to 62 Nm (45 ft-lb).
4. Remove the hex key and insert the compression spring.

You can now install a grip or fixture to the base adapter.

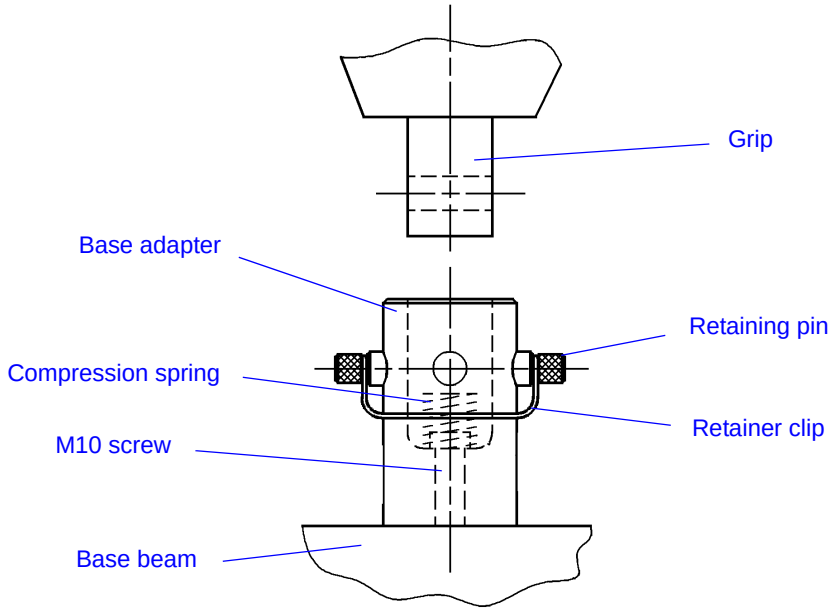


Figure 6-7. Series 5564, 5565, 5566 - Type D Base Adapter

Series 5567 and 5569

The base adapter can be removed, or re-oriented on an angle to match the position of the load cell. To change the orientation of the base adapter, you must remove the adapter and re-install it in the new position.

Installing the Base Adapter

To install the base adapter:

1. Place the locating ring in the center position on the base beam.
2. Place the adapter on the base beam, positioning it over the locating ring as shown in Figure 6-8 on page 6-23.
3. Secure the base adapter with three M10 screws.
4. Using a torque wrench, tighten the screws to 62 Nm (45 ft-lb).
5. Insert the compression spring into the center of the base adapter.

You can now install a grip or fixture to the base adapter.

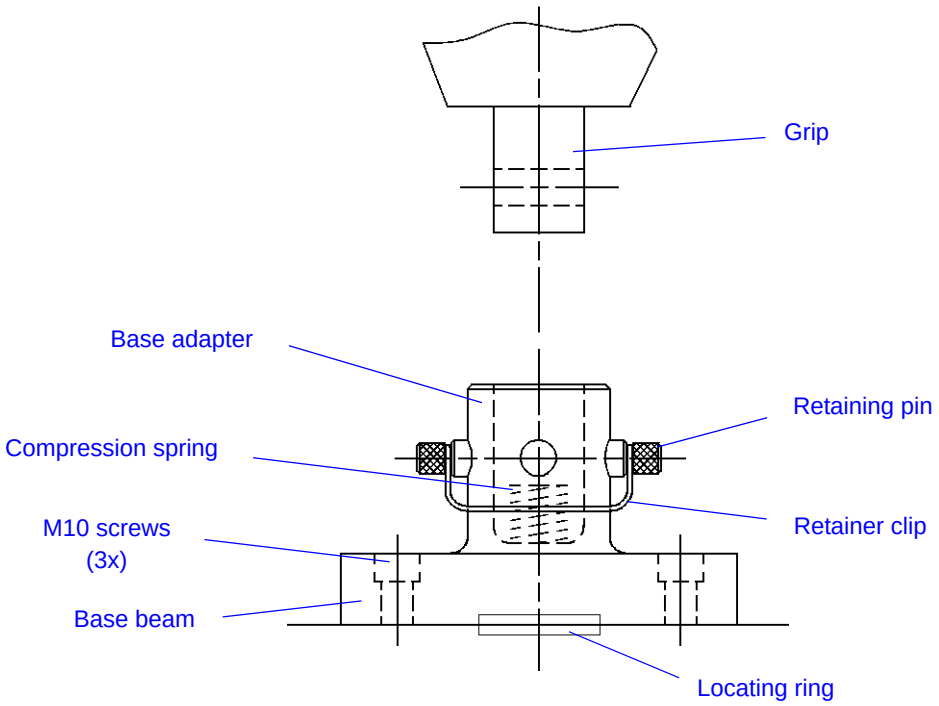


Figure 6-8. Series 5567 and 5569 - Type D Base Adapter

Series 5581 and 5582

The base adapter can be removed, or re-oriented on an angle to match the position of the load cell. To change the orientation of the base adapter, you must remove the adapter and re-install it in the new position.

Installing the Base Adapter

To install the base adapter:

1. Place the locating ring in the center position on the base beam.
2. Place the adapter on the base beam, positioning it over the locating ring as shown in Figure 6-9 on page 6-24.
3. Secure the base adapter with six M10 screws.
4. Using a torque wrench, tighten the screws to 62 Nm (45 ft-lb).
5. Insert the compression spring into the center of the base adapter.

You can now install a grip or fixture to the base adapter.

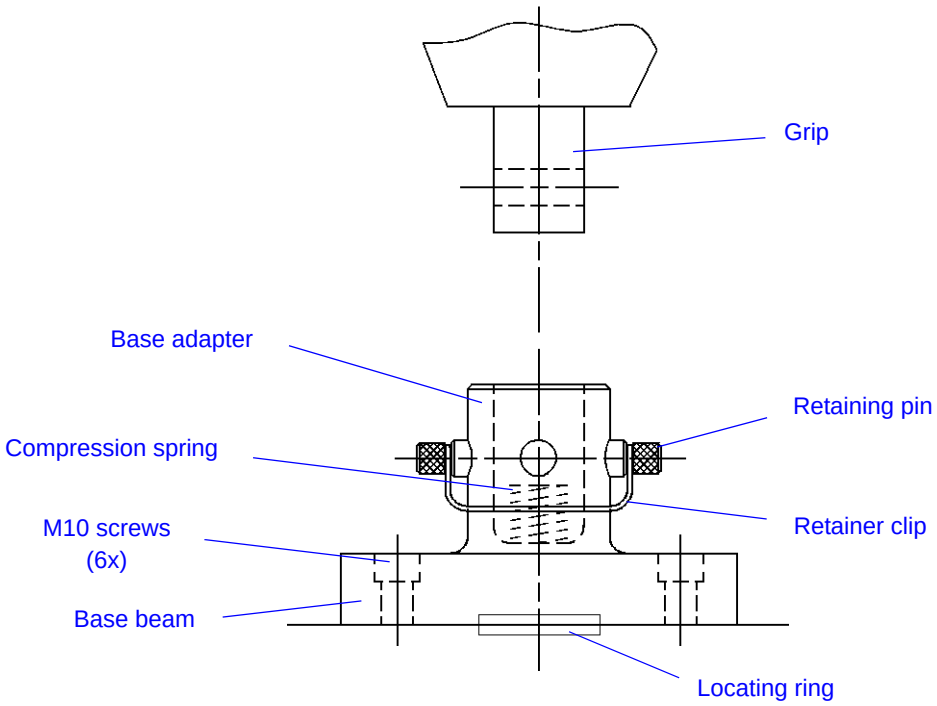


Figure 6-9. Series 5581 and 5582 - Type D Base Adapter

Selecting Grips and Fixtures

The selection of grips depends on the material, geometry, and strength of the test specimen. However, the tensile strength of the specimen is the primary consideration. If, for example, a material has a tensile strength of 500 lbf, then pneumatic grips would not be used because these grips are designed for loads less than 200 lbf. Always determine the capacity of the grips before using them in a test, and do not overload the fixtures.

In tension testing, the test specimen is held securely in the jaws of upper and lower grips. The upper grip is usually attached to the load cell (which, in turn, is attached to the moving crosshead), and the lower grip is attached to the fixed base plate of the load frame. The jaws in most types of grips are designed to tighten even more firmly on the specimen as tensile loads increase.

When compression testing, the specimen is placed on a table (called a platen), and the loading is applied by an anvil coupled to the load cell. In this case, the diameter (or area) of the anvil is important, as well as its maximum loading capacity.

Examples of gripping techniques are shown in Table 6-4 on page 6-25. In many cases, you will have to experiment with several gripping techniques to eliminate or minimize slippage of the specimen in the grips. For grips with interchangeable jaw faces, such as screw-action and pneumatic-action types, the serrated, flat, and rubber-coated faces can be tried to determine the best method.

Table 6-4. Examples of Gripping Techniques

Specimen Material	Specimen Geometry	Max. Break Load (lbf)	Types of Grips and Faces
Paper	25 mm (1 in) wide	100	Screw-action or pneumatic-action with 25 x 50 mm flat faces
Plastic Films	25 mm (1 in) wide	100	Same as above. Also, line contact faces can be used
Rigid Plastics	25 mm wide x 12.5 mm thick (1 in wide x 0.5 in thick)	1000	Wedge-action or screw-action with serrated faces

Table 6-4. Examples of Gripping Techniques (Continued)

Specimen Material	Specimen Geometry	Max. Break Load (lbf)	Types of Grips and Faces
Wire and Sheet Metal	0.5 to 1.5 mm diameter (0.002 to 0.060 in)	200	Screw-action or pneumatic-action with 25 x 50 mm flat or serrated faces
Cord and Yarn	0.5 to 4.8 mm diameter (0.002 to 0.189 in)	350	Pneumatic cord and yarn grips
Fabrics	25 mm or 100 mm wide strip (1 in or 4 in)	1000	Screw-action or pneumatic-hydraulic action with flat faces

It is important that the rated load capacity of the grips and fixtures exceeds, with a reasonable safety factor, the expected load during a test. Instron provides a wide variety of grips and compression fixtures to meet all your testing needs. Contact your local Instron office or visit our web site at **www.instron.com** for assistance.

Installing Grips and Fixtures

Instron produces many different types of grips and fixtures for the many varied testing needs of its customers. However, there are two basic types of connections for all Instron grips: clevis pin couplings and threaded couplings.

The sections that follow describe, in general terms, the basic installation process of each type of connection. For more detailed installation instructions for your specific grip or fixture, refer to the documentation provided with your grip or fixture.

Clevis Pin Couplings

Figure 6-10 illustrates a typical clevis pin coupling for load cells and adapters on an electromechanical load frame. A male shank connects to a female clevis socket, that connects to either the load cell or to the base adapter. A clevis pin couples the shank and socket together. A locknut eliminates play in the connection between the grip and the load frame. On smaller capacity grips, a compression spring may be used in place of the locknut to eliminate play in the connection.

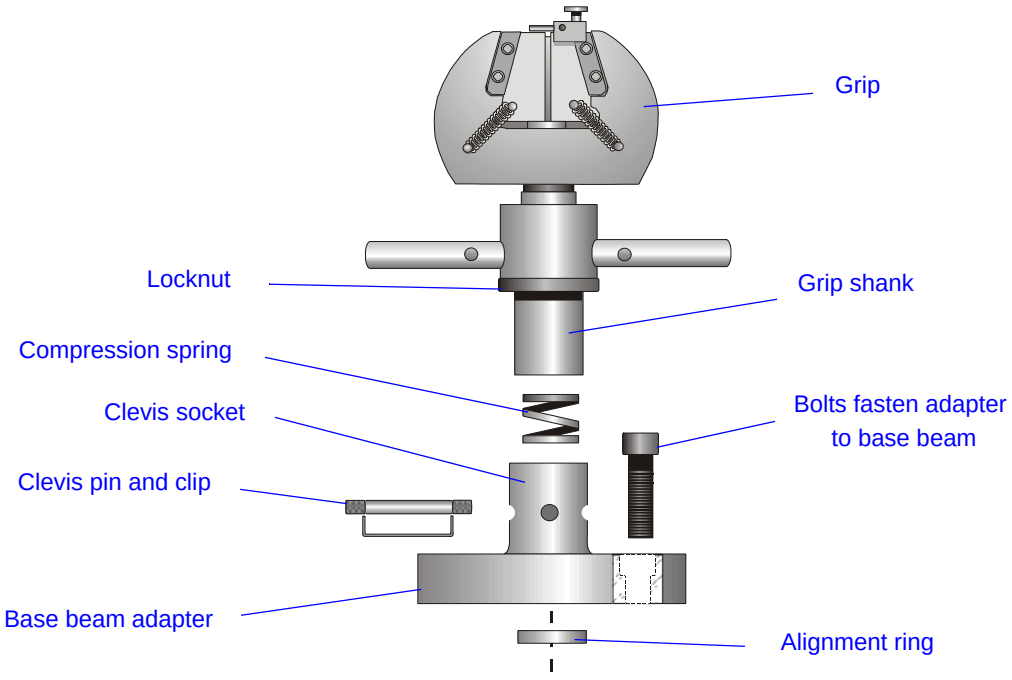


Figure 6-10. Grip with Clevis Pin Coupling

Threaded Couplings

Figure 6-11 illustrates a threaded coupling. The optional threaded attachment kit uses a female clevis socket that screws into the load cell. Eliminate end play by tightening a locknut against the base beam or load cell, and the grip locknut against the grip adapter. Typically, the adapter is loaded in tension to its full rated capacity, then the locknuts are tightened by hand. This ensures optimum preload of the adapter threads.

A = Thread engagement

B = Adapter diameter

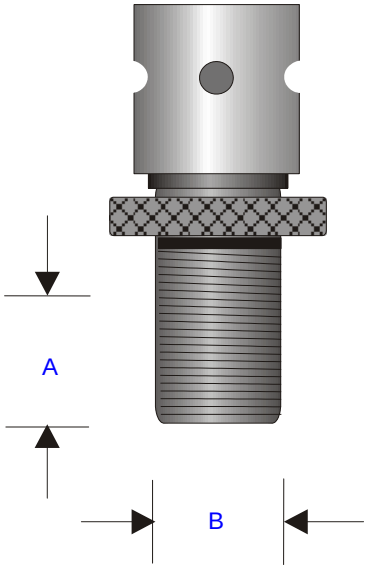


Figure 6-11. Threaded Coupling

Installing a Specimen

Warning

Flying Debris Hazard - Make sure that test specimens are installed correctly in grips or fixtures in order to eliminate stresses that can cause breakage of grip jaws or fixture components.

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 projected forcefully some 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.

A specimen is typically installed into a grip or fixture so that it is held securely in place during the test. Instron provides many varieties of grips and fixtures to accommodate the endless variety of specimens that can be tested on an electromechanical testing system. Due to the wide range of specimens and types of grips involved, it is impossible to summarize a general procedure for installing a specimen.

It is recommended that you refer to the documentation provided with your grip or fixture for detailed instructions about installing a specimen into your specific grip or fixture.

Chapter 7
Operation

Outline

This chapter provides instructions on the basic operation of your testing system. It includes the following sections:

Basic Operation

The basic operation of an Instron electromechanical testing system involves:

- Starting the system.
- Proper load cell selection.
- Mounting the load cell in the moving crosshead on the load frame.
- Attaching appropriate grips and fixtures.
- Setting the test parameters at the computer.
- Setting travel limits.
- Installing the specimen.
- Starting a test and applying a load to the specimen.
- Measuring the results of the test.

Instron’s documentation for electromechanical systems, including the software online help and the equipment reference manuals, provide instructions for performing all the above actions.

System Startup

Before starting the system, ensure that you:

- Review the operating features and controls to understand the basic operation of the machine.
- Verify that the voltage setting on the machine is compatible with your power supply.

Startup Procedure

1. Ensure that all cables are properly installed and securely connected.
2. Turn the power switch for the machine to the On (**I**) position. Ensure that the **POWER** indicator light on the control panel illuminates.
3. Power on all other system components (e.g. computer and any other accessories).

Note: *Before starting the software, wait until the numeric status display on the controller displays a 1 or 2. The controller counts through a diagnostic self test sequence for about 20 seconds and then it displays a 1 or 2. Do not open the software until this self test is complete.*

4. Open the Instron proprietary software.

   Wait for the software to fully initialize the machine before using the jog controls on the machine. The machine relay makes a clicking sound before the machine is ready.
5. Ensure that the displays on the control panel illuminate.
6. Perform a system calibration and then let the system warm-up for at least 15 minutes to stabilize the load weighing components.

Note: *A fifteen minute warm-up period is also necessary whenever a load cell is changed, or after the initial connection of a strain gauge.*

7. Re-calibrate the system.
8. Set the test parameters via the software program in accordance with your testing requirements. Refer to the software online help system for setting test parameters and operating the system.
9. Use the jog buttons on the machine to move the crosshead during test setup, or to facilitate specimen installation.

Setting Crosshead Travel Limits

There are two levels of crosshead limit stops that act to protect the crosshead from traveling too far in either direction. The first level stops are the upper and lower limit stops that you can manually set as described below. The second level limits act as a backup in case the first level limits malfunction.

Caution

Do not use limit stops to end a test.

The limit stops are not intended to be an end of test condition to end every test. Repeated use of the limit stops in this way may cause excessive wear, which can result in the limit stop failing to stop the crosshead. Refer to the Warning below for more information on unexpected crosshead motion. Proper end of test conditions can be set from the software. Refer to the online help system for further assistance.

Crosshead Limit Stops

Warning

Hazard - Always set the limit stops before starting a test. Failure to set the limit stops could cause injury from unexpected crosshead motion, and cause possible damage to test fixtures.

Note: *Set the crosshead limit stops after you establish the crosshead starting position, but before you start the test.*

The travel limit stops are two adjustable blocks mounted on the limit switch rod, which is located inside the column of the machine, as shown in Figure 7-1 on page 7-5. Limit stops have thumbscrews that you tighten and release by hand, and you can move them to any position on the limit rod. Position these stops just beyond the test parameters to prevent crosshead over-travel. When the crosshead reaches the maximum pre-set travel, the limit switch actuator contacts one of these stops. Contact between the limit actuator and the limit stop moves the limit switch rod and activates the limit switches. This stops crosshead motion.

Note: *When setting limit stops, allow for an additional 3 mm of crosshead travel after the actuator activates a limit stop. There is a small delay time from the point when the actuator hits the limit stop and when the message relays to the limit switches located in the frame base.*

Setting the Limit Stops

Note: *Use the vertical measurement strip along the column to find the approximate set point.*

To set the limit stops:

1. Ensure that the crosshead is stationary and that the test parameters are set. The **TEST IN PROGRESS** indicator light on the control panel should not illuminate.
2. Set the upper limit stop at a position just above the expected maximum crosshead travel in the upward direction when tension testing, or just above the test starting point when compression testing. Tighten the stop securely on the limit rod.
3. Set the lower limit stop at a position just below the starting position when tension testing or just below the expected maximum crosshead travel in the down direction when compression testing. Tighten the stop securely on the limit rod.

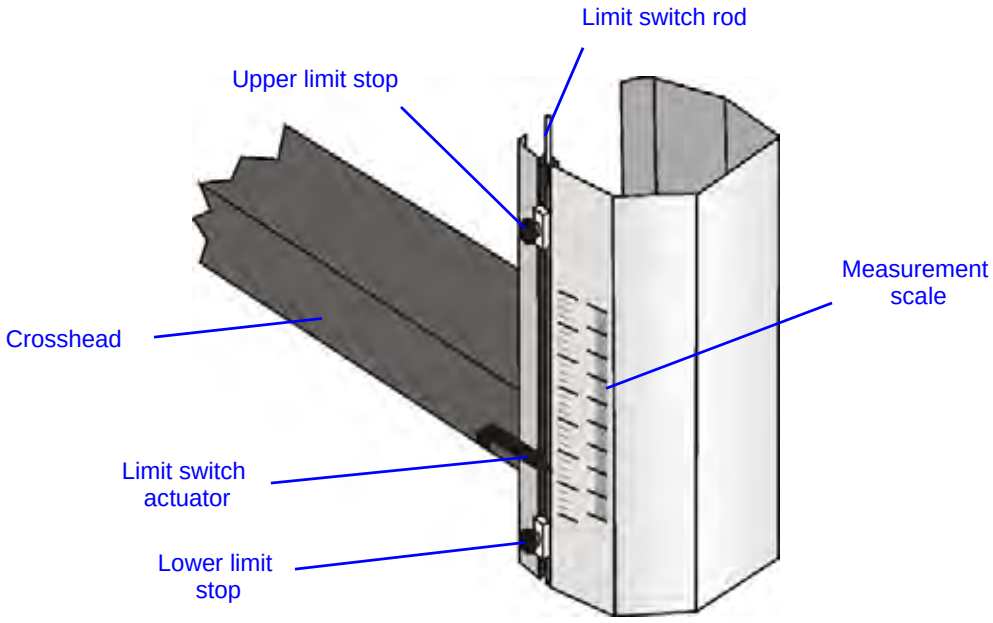


Figure 7-1. Setting Limit Stops

Moving Off a Crosshead Limit Stop

When the crosshead contacts either the upper or lower limit stop, the test stops. If this happens, use the jog buttons on the control panel to move the crosshead off the limit stop. Press the **DOWN** button on the jog control panel to move the crosshead off the upper limit stop. Press the **UP** button to move the crosshead off the lower limit stop.

Second Level Limit Stops

The second level limit switch acts as a backup if the first level switch (the limit stops) malfunctions. Activating a second-level limit switch disables the drive system so you cannot move the crosshead. The second level limits are internal to the machine and cannot be manually adjusted.

Warning

Hazard - Identify and resolve the condition that caused the operation of the secondary overtravel limit before you use the testing system.

Operation of a secondary overtravel limit indicates a serious problem with your testing system, not least that the primary overtravel limit may have failed. Identify and resolve the condition that caused the secondary overtravel limit to trip before you use the testing system again. Contact the Instron service department for assistance.

Starting a Test

Before You Begin

Ensure that the following conditions are met before starting a test:

- Verify that the system is properly installed and all preparation is complete. Refer to the Installation chapter and Preparation for Use chapter.
- The appropriate channel (load or strain) is calibrated.
- Set the crosshead travel limits.
- The test parameters are set in accordance with your test requirements.
- You have reviewed the manuals for the control system and software and are familiar with the online help system that accompanies the software.
- Know the specific procedures for setting up and running a test.
- The load cell, grips and fixtures are appropriate for your test.

Procedure

1. Verify that the setup and test parameters in the software are reasonable and correct for your test, including end of test criteria. Refer to the online help for details.
2. Ensure that travel limit stops on the frame are set.
3. Ensure that the following status indicators on the control panel illuminate:

Status Indicator	Illuminated Status
Frame Ready	Illuminates Green
Test Stopped	Illuminates Red
Start Test (Up or Down) (Available with Merlin and Bluehill only).	Arrow illuminates indicating the correct direction of the crosshead (up or down).
At GL	Illuminates Green - If you are starting the test from a zero extension.

4. Start a test from the software program.

   If you are using Merlin or Bluehill, you can also press the **START TEST** button on the control panel.

5. Ensure that the **TEST IN PROGRESS** indicator light illuminates after you start the test.

Stopping a Test

You can stop a test by using hardware controls on the machine or settings in the software. The following sections describe the different ways to stop a test.

Control Panel Buttons

Press the **STOP** button on the control panel to stop the crosshead during or after a test. The crosshead will remain in its current position.

Press the **RETURN** button on the control panel to stop a test and return the crosshead to the gauge length specified in the pre-test setup.

Emergency Stop Button

The Emergency Stop button is a large, round, red button on the machine. Press this button to stop the test as soon as possible when a condition develops that:

- Could affect the safety of persons operating the system.
- Could damage the specimen, load frame, or the test fixtures.

Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it. When you press the Emergency Stop button, the system is disabled until you reset the button. To reset the Emergency Stop button, refer to “Enabling the Load Frame” on page 5-6.

Limit Switches

The test stops if the crosshead contacts the upper or lower limit stops. If this happens, move the crosshead away from the limit by pressing the **UP** or **DOWN** jog buttons on the control panel.

Software Controls

When the system encounters a pre-set limit or event set from the software, the test stops. The Stop and Return actions are the same as the **STOP** and **RETURN** buttons on the control panel described above.

System Shutdown

Wait until the system completes all active tasks before shutting it off or disconnecting the electrical power. The system may be engaged in recalculations or printing tasks after the test has run.

Shut off the power to the system before you:

- Perform any maintenance procedure on the load frame.
- Disconnect the main power cable.
- Move the load frame.
- Connect or install optional components or accessories.

Procedure

To turn the system off:

1. Complete the test and ensure that the **TEST IN PROGRESS** indicator light on the control panel no longer illuminates.
2. Remove the specimen.
3. Exit the software and turn off the computer and printer using the normal shutdown procedure.
4. Shut off all other components or accessories to your test system.
5. Switch the power for the load frame to the Off (**O**) position. The **POWER** indicator light no longer illuminates.

Standby Mode

The system also has a Stand-by mode that enables you to shut down the computer while leaving the control electronics on. This allows the load cell to remain warm while the system is not in actual use, and eliminates having to wait for the load cell to warm up when restarting the system.

The Stand-by feature initiates automatically when the computer is turned off but the load frame remains on. To activate Standby mode:

1. Wait until the computer has finished its current tasks.
2. Exit Instron’s software program. Exiting the program before shutting off the computer ensures that the program properly closes all open files before shutting down.

3. Turn off the computer using the normal shutdown procedure.
4. Leave the load frame in the On (**I**) position to maintain power to the control electronics. Ensure that the **POWER** indicator light on the control panel illuminates.

Chapter 8
Maintenance

Outline

This chapter describes the routine maintenance procedures for Instron's electromechanical load frames, and provides a troubleshooting section for load cells. It includes the following sections:

Introduction to Maintenance

Instron electromechanical machines are precision instruments that are designed to support a variety of test applications. To ensure that your system remains in proper working order, it is recommended that you perform the procedures described in the Daily Maintenance Checks section and the Preventive Maintenance section of this chapter.

The General Maintenance section includes the procedures that you can perform should it become necessary. These procedures do not require an Instron service technician, although assistance is available. Contact your local Instron office or visit our web site at **www.instron.com** for assistance.

Warnings

Hazard - Only qualified personnel, trained to service Instron machines, should perform all internal maintenance requirements.

Instron machines must operate within stringent specifications. In order to keep the system working within the stated specifications, a professionally trained and qualified technician must perform most maintenance procedures. If unqualified personnel perform any maintenance procedures not described in this manual, the machine may not perform to its stated specifications.

Hazard - Do not remove covers to any component of your system, unless it is specified in a procedure.

There are dangerous voltages and rotating machinery inside the machine that may cause bodily injury or damage to equipment.

Maintenance Schedule

To ensure that your machine continues working at its optimal performance, it is recommended that the machine receive an annual service check. Instron's Service department can perform this annual service, and replace any damaged or worn parts to ensure that your machine operates to its stated specifications.

Instron offers many service agreements that provide a variety of services, including annual service visits. Contact your local Instron office for details on a service agreement or contract that best matches your needs.

Preventive Maintenance

Preventive maintenance is the periodic inspection, cleaning, and lubrication of the test system. The following sections provide guidelines for preventive maintenance.

Daily Maintenance Checks

Before operating the system each day, ensure:

- ❑ All cable connections are tight and secure.
- ❑ The self test indicators on the controller completes the test sequence each time you turn on the system.
- ❑ All grips, fixtures and accessories are free of dirt, damage and deformation.
- ❑ The load frame is level. If an adjustment is necessary, refer to the leveling instructions in the Installation chapter.
- ❑ Signal and power cables have adequate slack to prevent excessive strain on connectors.
- ❑ All cables are free of wear and chafing. Re-route the cables if necessary, and replace any damaged cables.
- ❑ After turning on the system, make sure that power is adequately supplied to the electronics.

Correct any problems before you operate the testing system. If you require assistance, contact your local Instron Service department.

Periodic Inspections

Every six to twelve months, perform the following inspections:

- ❑ Visually inspect the machine for any loose fittings. Check the limit stops, cable connections, and connections for any accessories that are attached to the machine. Tighten any loose connections that you may find.
- ❑ Operate the crosshead through the full range of motion. It should move smoothly with no unusual noise, or erratic motion.

- ❑ Test the limit stops to ensure they are in working order. Refer to "Testing Limit Stops" on page 8-10.
- ❑ If you have any additional safety equipment added to the machine, test the equipment to ensure it is in working order.

If you notice any problems resulting from these inspections, contact Instron's Professional Services department for immediate assistance.

Cleaning

It is recommended that the machine be cleaned weekly, or more often if it is operating in a dusty or dirty environment.

Caution

Do not clean with solvents or abrasive cleaners. Some household or commercial cleaners can react with painted surfaces or panel markings.

Do not apply excessive amounts of detergent cleaner. It may seep into electrical circuits within the base and cause equipment failure.

Do not use too much oil. It attracts abrasive particles that may accelerate wear.

Use low pressure air to blow dust. Do not direct the air stream directly at sensitive components.

To clean the load frame:

- Wipe exterior surfaces of the load frame with a moist cloth.
- For all machines with a maximum capacity of 50 kN or greater (all floor models and 5569) - If the central mounting area on the base beam is exposed (no base adapter is in place) then you must regularly lubricate the mounting area with oil to prevent corrosion. The base beam mounting area must be protected by either inserting a base adapter or regularly lubricating this area to prevent corrosion. If you regularly use a base adapter, then you do not need to lubricate this area. If you need to lubricate this area, refer to the Lubrication section of this chapter.

Lubrication

The following areas of the machine will require periodic lubrication:

- **Ballscrews** - The ballscrews are lubricated via a ballnut that is located on the crosshead where the ballscrew intersects the crosshead. As the crosshead moves up and down, the ballnut disperses a thin layer of lubricant over each ballscrew as the ballscrew passes through the ballnut. Periodically, the ballnut must be filled with lubricant to ensure that the ballscrews remain well lubricated. The ballnut must be maintained and filled in accordance with Table 8-1 on page 8-6. The following sections describe the lubrication procedures for the various machines.
- **Guide columns** - The guide columns require only a thin film of lubrication. It is recommended that the machine be re-lubricated every two years. Contact your local Instron Professional Services department for assistance.

  On the table top models, it is difficult to reach the guide column, which is behind the ballscrew. If you suspect that the guide column needs lubrication, contact your local Instron Professional Services department for assistance. However, the floor models provide enough space to reach around the ballscrew. Refer to section “Guide Columns - Floor Models Only” in this chapter for instructions on lubricating the guide columns on the floor models.
- **Mounting surfaces** - As mentioned in the Cleaning section, the mounting area in the base of the floor models and the 5569 model must also be lubricated if it is regularly exposed (no base adapter inserted). You can do so using a lint-free cloth and the same lubricants and schedule used for the ballscrews and guide columns.
- **Roller bearings** - The top and bottom ballscrew bearings are sealed and should never need lubrication.

Table 8-1. Lubrication Requirements

Location	Recommended Lubricant	Interval	Instron Part Number
Ballnuts	Lithium based water resisting grease - NLGI Class 2 (DIN51825 class K2k LS2) Equivalents: Lubriplate: Lubriplate 1200-2 Mobil: Mobilux® 2 BP: Energrease® LS2 Shell: Alvania® R2	**Table top models:** 1000 hours or 36 months of operating time * **Floor models:** 600 hours or 6 months of operating time *	105-1-1057 (small can of lubricant)

** Note:*

1. *Operating time is defined as time of crosshead movement, not the length of time the system has been powered on.*
2. *If the system is used more than 100 hours per month, inspect the lubricated area periodically and increase lubrication frequency as required.*
3. *Inspect the ballscrew and lubricate more frequently than the above recommendations if any of the following conditions exist:*
   - *There is high-load or high-speed testing.*
   - *There is long-term, continuous movement of the crosshead.*
   - *The system operates in a dirty environment.*
   - *There are high-load cycling tests.*

Ballscrew Ballnuts - Series 5540 Models

To lubricate the ballscrew ballnut on the single column models:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the control panel does not illuminate.
2. Detach the bottom ballscrew cover from the crosshead and slide it to the frame base. Refer to Figure 8-1 on page 8-7 to locate the grease nipple inside the column cover.
3. Use a grease gun to apply the grease into the grease nipple as shown in Figure 8-1. It is not necessary to remove the guide column cover.
4. Fill the ballnut until grease oozes from the bottom of the ballnut. Wipe away the excess grease.
5. Re-attach the bottom ballscrew cover to the crosshead.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the control panel illuminates.

7. Use the jog controls to move the crosshead over the full stroke of the frame to distribute the grease in the ballnut and coat the entire length of the ballscrew shaft.

8. Before you do any testing, perform the procedure "System Startup" on page 7-3.

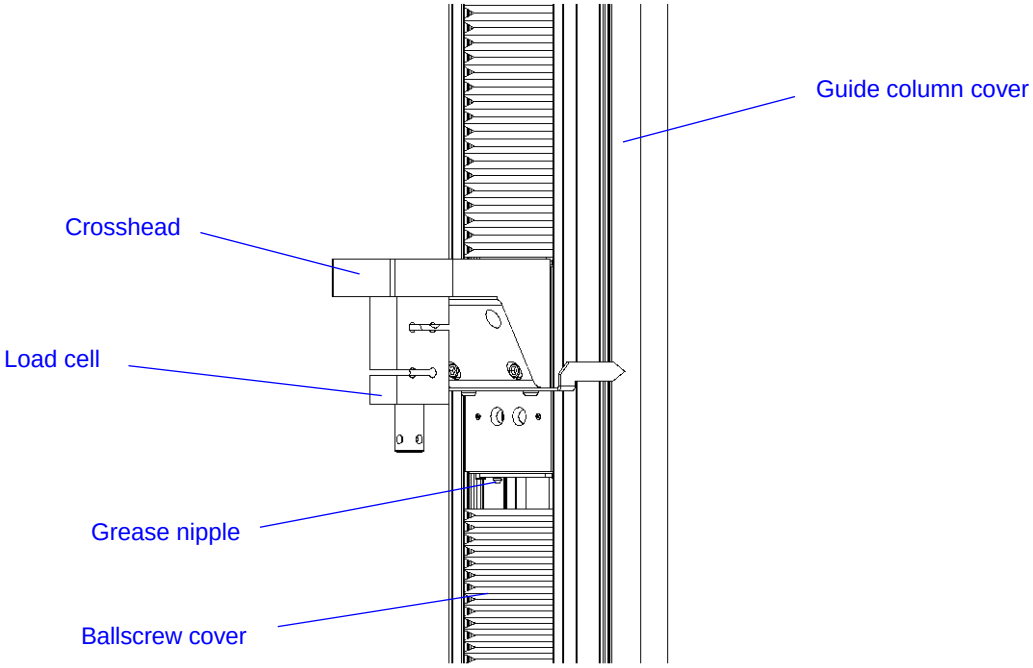


Figure 8-1. Lubricating the Ballnut on the 5540 Models

Ballscrew Ballnuts on Series 5560 and 5580 Models

The ballnuts are located on the crosshead where the ballscrews intersect with the crosshead.

To lubricate the ballscrew ballnuts:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Verify that the **POWER** indicator light on the control panel is not illuminating.

2. Detach the bottom ballscrew cover from the crosshead and slide it to the frame base. Refer to Figure 8-2 on page 8-8 to locate the ballnut nipple inside the column cover.

3. Use a grease gun to apply the grease through the ballnut nipples on both columns as shown in Figure 8-2. It is not necessary to remove the guide column covers.
4. Fill the ballnuts until grease begins to ooze from the top of the nut. Wipe away the excess grease.
5. Re-attach the bottom ballscrew cover to the crosshead.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the jog control panel illuminates.
7. Use the jog controls to move the crosshead over the full stroke of the frame to distribute the grease in the ballnut and coat the ballscrew shaft.
8. Before you do any testing, perform the procedure "System Startup" on page 7-3.

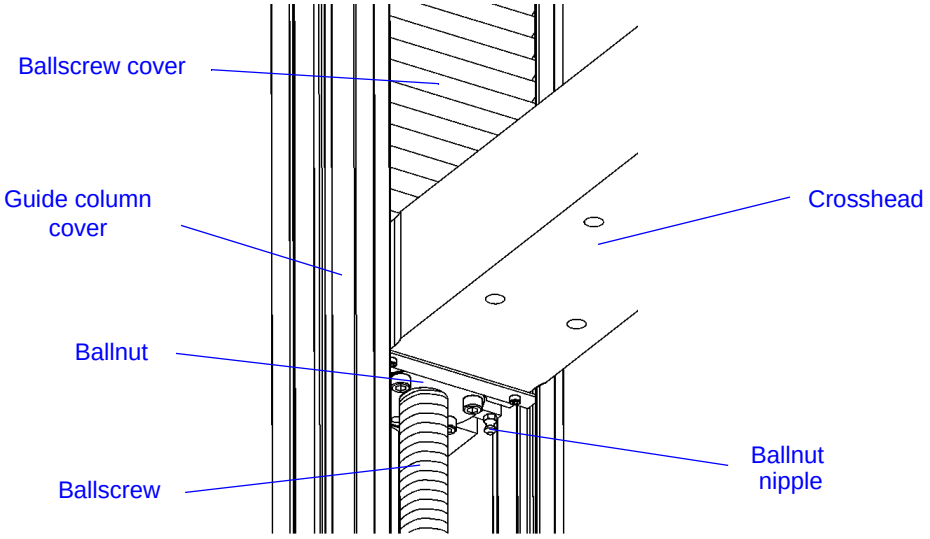


Figure 8-2. Series 5560 and 5580 Lubrication Points

Guide Columns - Floor Models Only

The guide columns should also be lubricated periodically. Lubricate the guide columns when you lubricate the ballscrews, using the same lubricant.

To lubricate the guide columns:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the control panel does not illuminate.

2. Detach the ballscrew covers from the crosshead and slide the covers away from the crosshead. Refer to Figure 8-3 on page 8-9 to locate the guide column inside the column cover.
3. Reaching behind the ballscrew, apply a thin film of lubricant with a soft, lint-free cloth over the entire length of each column.
4. Re-attach the ballscrew covers to the crosshead.
5. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the control panel illuminates.
6. Use the jog controls to move the crosshead over the full stroke of the frame to ensure that the crosshead moves smoothly.
7. Before you do any testing, perform the procedure "System Startup" on page 7-3.

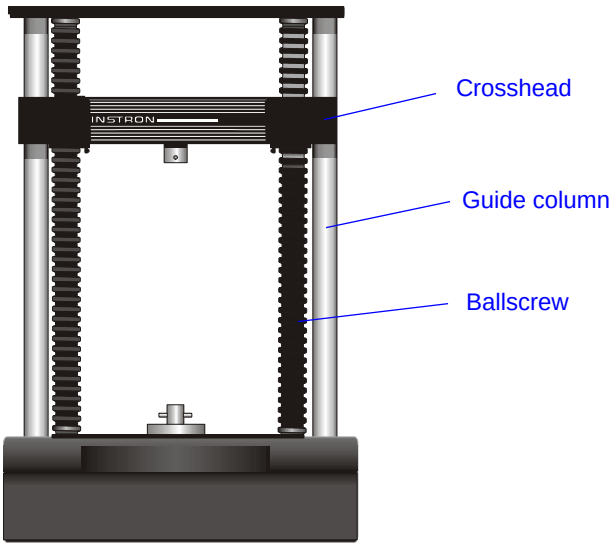


Figure 8-3. Lubricating the Guide Columns on the Floor Frames

General Maintenance Procedures

General maintenance procedures are the procedures that you can perform should it become necessary. These procedures do not require an Instron service technician, although assistance is available. Contact your local Instron office or visit our web site at **www.instron.com** for assistance.

Testing Limit Stops

It is recommended that you periodically test both the first and second level limit stops on the load frame.

To test the limit stops:

1. Ensure that the system is on and the crosshead is stationary.
2. Secure one of the limit stops (either the upper or lower limit stop) to the limit switch rod.
3. Firmly hold the yellow part of the limit stop to gently move the stop either downward (in compression) or upward (in tension) about 3 mm (1/8 in).
4. A first level limit warning displays on the computer.
5. Repeat Step 3 moving the limit stop another 3 mm (1/8 in) in the same direction.
6. A second level limit warning and frame disabled warning displays on the computer.

   The frame disabled warning indicates that the limit stops are working correctly. If the frame disabled warning does not display, contact your local Instron service office for assistance.
7. Re-enable the frame via the software program. Refer to the online help for assistance, if necessary.

Fuse Replacement

The table top models contain a power fuse in the power input connector, which can be replaced if necessary. Table 8-2 shows the proper fuse sizes for the single column and dual column table top models. The floor frames have a system circuit breaker incorporated into the power switch, which does not need replacement. Refer to section “Power Switch - Floor Models” on page 5-3 for instructions on resetting the system if the circuit breaker activates on a floor model machine.

Replacing a Fuse - Series 5540 and 5560

Warning

Electrical Hazard - Shut down the system and disconnect the power cable from the main power source before replacing a fuse. Dangerous voltages can cause personal injury.

Caution

Replace a fuse with the same type and size as the original. Installing the wrong fuse could damage the electrical circuits inside the machine.

Table 8-2. Power Line Fuses

Load Frame Models	Fuse Description	Instron Part Number
5542, 5543, 5544	3.0A, 250 V Slo Blo	27-2-40
5564, 5565, 5566, 5567,5569	6.25A, 250 V Slo Blo	27-2-46

To replace the fuse:

1. Turn the power switch to the Off (**O**) position and disconnect the power cable from the main power source. Ensure that the **POWER** indicator light on the control panel does not illuminate.
2. Verify that the voltage setting is correct on the power input connector. Refer to “Setting the Input Voltage” in chapter 4 if you need to change the line voltage.
3. Insert a small flat-head screwdriver into the middle of the connector and pry out the fuse holder. Refer to “Setting the Input Voltage” in chapter 4 for more detailed instructions on locating and removing the fuse holder.
4. Remove the fuse as shown in Figure 8-4 on page 8-12.
5. Install a new fuse in the holder. Refer to Table 8-2 on page 8-11 for the appropriate fuse type. Spare fuses are supplied with the system.
6. Re-insert the fuse holder into the power input connector.
7. Verify that the voltage selection is correct (refer to “Setting the Input Voltage” in chapter 4).

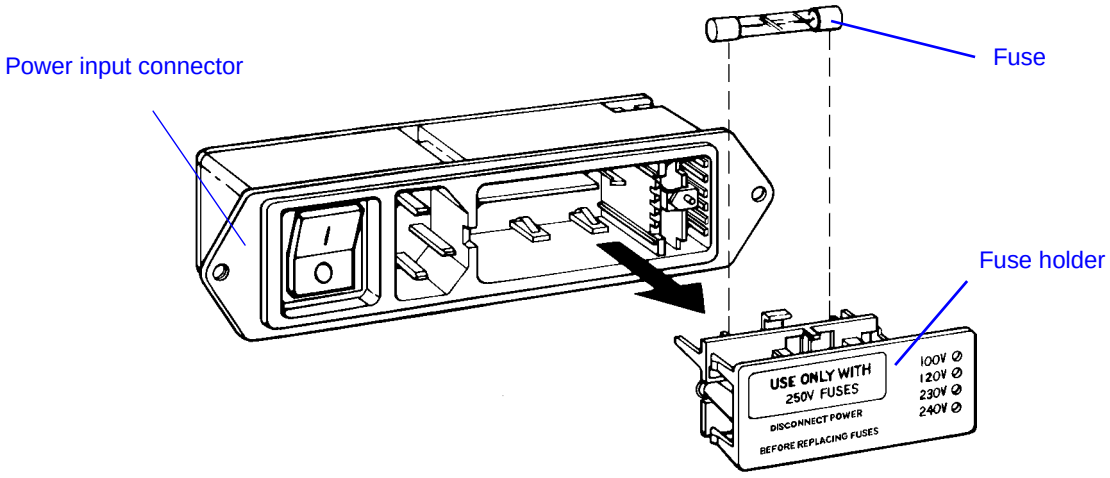


Figure 8-4. Removing the Fuse from the Fuse Holder

8. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light on the control panel illuminates.

9. Before you do any testing, perform the procedure "System Startup" on page 7-3.

Troubleshooting for Load Cells

Instron load cells, in general, are electrically calibrated, self-identifying and rationalized. Approximate resistances are given that can verify a possible broken gauge, or a faulty connector or cable.

If a strain gauge in a cell has been badly overstressed, but still maintains its electrical continuity, the cell may show a higher than normal amount of creep. If a gauge has become improperly bonded due to degradation in use, the cell may exhibit a combination of general instability in its balance point, together with a large amount of creep. Difficulties of this sort rarely appear as an instability in the calibration of the cell.

If a load cell has been overloaded, the load-sensitive member may be permanently deformed to the extent that the proper dimensional alignments inside the cell are no longer maintained. For example, if the position of the central spindle is changed, this can result in the balance point shifting abruptly as the cell is loaded or unloaded.

To check the load cell, substitute another cell to re-check the test results carefully. If your results differ significantly from the original test results, then the original load cell may be damaged. However, many of the symptoms described above can also arise from a faulty load sensor conditioner, recorder, or possibly a mechanical adjustment.

If you suspect that a cell may be damaged, contact your local Instron Service office to arrange returning the load cell for analysis and possible repair.

Chapter 9
System Parts

Outline

This chapter describes the replacement parts and ancillary parts for each Series of load frames. It includes the following sections:

Replacement Parts

Table 9-1 displays various parts of the load frame, and the part numbers that may require replacement at some point in the future. Refer to this table to identify the Instron part number when ordering a replacement part.

Table 9-1. Replacement Parts List

Description	Applicable Frames	Part Number	Quantity	Purpose
Type O base adapter	All 5540 models	T1701-1020	1	Connect grips and fixtures to the base of the frame
Type D base adapter	All 5540 models	T581-48	1	Connect grips and fixtures to the base of the frame
Type D base adapter	All 5560 models 5581/5582	T1209-1138	1	Connect grips and fixtures to the base of the frame
Locating ring	5567/5569 5581/5582	T1335-1048	1	Fitting between base beam and base adapter (T1209-1138)
Load cell	All	Various [a]	1	Force measurement transducer
Digilink cable	All 5500 models	82-10-63	1	Connects the computer to the system controller
Ground cable assembly	All 5500 models	A712-213	1	Ground cable to ground the load frame if the mains power supply is not grounded
Electrical cord set	All	Various [b]	1	Provides electrical connection from power source to the frame

a. Numerous load cells are compatible with these load frames. Refer to Chapter 6 for a list of compatible load cells for your specific system. Contact your local Instron office or visit our web site at **www.instron.com** for assistance with determining the appropriate load cell for your needs.

b. The cord set included with the frame is determined by the selection made on the purchase order, or the country specified on the purchase order. If no selection is made, or country specified, then the cord set is based on the country to which the frame is shipped and is compatible with the electrical requirements for that country.

Series 5540 Ancillary Parts

Ancillary parts for the system are shown in Table 9-2. These components are either required to complete the installation, or facilitate setting up load cells and accessories on the load frame. Ancillary parts are included with the system upon delivery. Keep these components in a safe place so they do not get misplaced. You may need them in the future.

Table 9-2. Series 5540 Ancillary Parts List

Description	Part Number	Quantity	Purpose
Screw, M6 x 16	201V33	3	Installing load cells
Screw, M10 x 40	204F215	2	Installing load cells
Screw, M6 x 20	310K146	2	Installing load cells
Washer, M10	610J9	2	Installing load cells
Compression spring, LC029E-2	66-1-1080	3	O coupling
Compression spring, 0.85OD x 3/4 L	66-5-6	1	D coupling
Clevis pin clip, type O	T1223-1031	2	Installing grips and fixtures
Clevis pin, type O	T1223-1034	2	Installing grips and fixtures
Clevis pin clip, type D	T1223-1053	1	Installing grips and fixtures
Clevis pin, type D	T29-515	1	Installing grips and fixtures
Accessories slot T-nut	T1697-1307	6	Installing accessories in the T-slot on the column cover, or installing mounting clips for cable routing
Adjustable cable clips	11-6-60	6	Secures cables to the T-slot on the column cover to ensure cables do not interfere with testing
Hex wrench key set, 1.5 to 10 mm, ball end	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Fuse, 3.0A Slo-Blo	27-2-40	2	Protection from electrical surges
Fuse, 0.5A time delay	27-2-1020	2	Fuse on a printed circuit board internal to base of the frame - For service engineer use only

Table 9-2. Series 5540 Ancillary Parts List (Continued)

Description	Part Number	Quantity	Purpose
Dowel pin, 3 x 8 mm	705K83	5	Orienting a Series 2519 load cell at different angles
Locating ring	T1335-1048	1	Fitting between load cell and crosshead

Series 5560 Ancillary Parts

Ancillary parts for the various frame options are shown in the remaining tables within this section. These components are either required to complete the installation, or facilitate setting up load cells and accessories on the load frame. Ancillary parts are included with the system upon delivery. Keep these components in a safe place so they do not get misplaced. You may need them in the future.

Refer to Table 9-3 to determine the applicable Ancillary Parts List for your specific system.

Table 9-3. 5560 Ancillary Parts Reference Table

Series System	Configuration Type	Table
5564	Standard [a]	Table 9-4
	Standard with second test space	Table 9-4 and Table 9-7
	Extra height option	Table 9-4
	Extra height with second test space	Table 9-4 and Table 9-7
5565	Standard	Table 9-4
	Standard with second test space	Table 9-4 and Table 9-7
	Extra height option	Table 9-4
	Extra height with second test space	Table 9-4 and Table 9-7
	Extra height and extra wide option	Table 9-6
	Extra wide	Table 9-6
5566	Standard	Table 9-4
	Standard with second test space	Table 9-4 and Table 9-7
	Extra height option	Table 9-4
	Extra height with second test space	Table 9-4 and Table 9-7
	Extra height and extra wide option	Table 9-6
	Extra wide	Table 9-6

Table 9-3. 5560 Ancillary Parts Reference Table (Continued)

Series System	Configuration Type	Table
5567	Standard	Table 9-5
	Standard with second test space	Table 9-5 and Table 9-7
	Extra height option	Table 9-5
	Extra height with second test space	Table 9-5 and Table 9-7
	Extra height and extra wide option	Table 9-6
	Extra wide	Table 9-6
5569	Standard	Table 9-5
	Standard with second test space	Table 9-5 and Table 9-7
	Extra height option	Table 9-5

a. Standard is defined as standard height and standard width, with no second test space.

Table 9-4. Series 5564, 5565, 5566 Ancillary Parts List

Description	Part Number	Quantity	Purpose
Cable clip, 6-12 mm	11-6-60	3	Secures cables to the frame
Screw, M10 x 30	201V55	6	Load cell attachment
Screw, M10 x 50	201V58	3	Load cell attachment
Fuse, 6.25A Slo-Blo	27-2-46	2	Protection from electrical surges
Compression spring	66-5-6	1	Removes slack on lower grips with no checknut
Hex wrench key set, 1.5 to 10 mm	80-1-1011	1	Tools for maintaining the frame and installation of accessories
8 mm bit - 1/2 drive	80-3-13	1	Torquing M10 bolts on various load string components
Tool spanner, open 12/13 mm	80-4-25	1	Leveling the load frame
Retainer clip for 1/2 diameter pin	T1223-1053	2	Prevents the grip coupling pin from sliding out during testing

Table 9-4. Series 5564, 5565, 5566 Ancillary Parts List (Continued)

Description	Part Number	Quantity	Purpose
Accessories slot T-nut	T1697-1307	3	Installing accessories onto the column cover
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling

Table 9-5. Series 5567 and 5569 Ancillary Parts List

Description	Part Number	Quantity	Purpose
Cable clip, 6-12 mm	11-6-60	3	Secures cables to the frame
Screw, M10 x 30	201V55	6	Load cell attachment
Screw, M10 x 50	201V58	3	Load cell attachment
Fuse, 6.25A Slo-Blo	27-2-46	2	Protection from electrical surges
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Hex wrench key set, 1.5 to 10 mm, ball end	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Tool spanner, open 12/13 mm	80-4-25	1	Leveling the load frame
Retainer clip for 1/2 diameter pin	T1223-1053	2	Prevents the grip coupling pin from sliding out during testing
Accessories slot T-nut	T1697-1307	3	Installing accessories onto the column cover
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling

Table 9-6. Series 5565, 5566, 5567 Extra Wide Option - Ancillary Parts List

Description	Part Number	Quantity	Purpose
Cable clip, 6-12 mm	11-6-60	3	Secures cables to the frame
Screw, M10 x 30	201V55	6	Load cell attachment

Table 9-6. Series 5565, 5566, 5567 Extra Wide Option - Ancillary Parts List

Description	Part Number	Quantity	Purpose
Screw, M10 x 50	201V58	3	Load cell attachment
Fuse, 6.25A Slo-Blo	27-2-46	4	Protection from electrical surges
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Hex wrench key set, 1.5 to 10 mm, ball end	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Tool spanner, open 12/13 mm	80-4-25	1	Leveling the load frame
Retainer clip for 1/2 diameter pin	T1223-1053	2	Prevents the grip coupling pin from sliding out during testing
Accessories slot T-nut	T1697-1307	3	Installing accessories onto the column cover
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling

Table 9-7. Series 5560 Second Test Space - Ancillary Parts List

Description	Part Number	Quantity	Purpose
Screw, M10 x 30	201V55	3	Load cell attachment
Screw, M10 x 60	201V59	3	Load cell attachment
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Crosshead Clevis - Type D	T1209-1138	1	Connects grips and fixtures to top of crosshead
Retainer clip for 1/2 diameter pin	T1223-1053	1	Prevents the grip coupling pin from sliding out during testing
Locating ring	T1335-1048	1	Fitting between crosshead and crosshead clevis
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling

Series 5580 Ancillary Parts

Ancillary parts for the various frame options are shown in the remaining tables within this section. These components are either required to complete the installation, or facilitate setting up load cells and accessories on the load frame. Ancillary parts are included with the system upon delivery. Keep these components in a safe place so they do not get misplaced. You may need them in the future.

Table 9-8. Series 5581 and 5582 Ancillary Parts List

Description	Part Number	Quantity	Purpose
Cable clip, 6-12 mm	11-6-60	4	Secures cables to the frame
Screw, M10 x 30	201V55	6	Load cell attachment
Screw, M10 x 50	201V58	3	Load cell attachment
Fuse, 0.5A time delay	27-2-1020	2	Fuse on a printed circuit board internal to base of the frame - For service engineer use only
Fuse, 3A 32 x 6.3	27-2-40	2	Fuse on a printed circuit board internal to base of the frame - For service engineer use only
Nut, M5 T-slot clip	52-59-1011	4	Installing accessories to T-slot in guide column cover
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Hex wrench key set, 1.5 to 10 mm	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Tool spanner, open 19 A/F	80-51-1003	1	Leveling the load frame
Retainer clip for 1/2 diameter pin	T1223-1053	2	Prevents the grip coupling pin from sliding out during testing
Locating ring	T1335-1048	1	Fitting between base beam and base adapter
Accessories slot T-nut	T1697-1307	4	Installing accessories onto the column cover
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling
Voltage label set	T563-539	1	Additional voltage labels

Table 9-9. Series 5584 and 5585H Ancillary Parts List

Description	Part Number	Quantity	Purpose
Cable clip, 6-12 mm	11-6-60	4	Secures cables to the frame
Screw, M16 x 200	201R325	4	Load cell attachment
Screw, M10 x 30	201V55	6	Load cell attachment
Screw, M10 x 40	201V57	6	Load cell attachment
Fuse, 0.5A time delay	27-2-1020	2	Fuse on a printed circuit board internal to base of the frame - For service engineer use only
Fuse, 3A 32 x 6.3	27-2-40	2	Fuse on a printed circuit board internal to base of the frame - For service engineer use only
Nut, M5 T-slot clip	52-59-1011	4	Installing accessories to T-slot in guide column cover
Hex wrench key set, 1.5 to 10 mm	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Tool socket driver, 14 mm key	80-3-50	1	Load cell attachment
Tool spanner, open 19 A/F	80-51-1003	1	Leveling the load frame
Torque wrench	80-9-9	1	Load cell attachment
Locating ring, Stepped Ø60-Ø40 mm	T1208-1147	2	Installing load cell, grips and fixtures on either the crosshead or base
Locating ring, type 2, Ø60 mm	T1335-1052	2	Installing load cell, grips and fixtures on either the crosshead or base
Accessories slot T-nut	T1697-1307	4	Installing accessories onto the column cover
Voltage label set	T563-539	1	Additional voltage labels

Table 9-10. Series 5580 Second Test Space - Ancillary Parts List

Description	Part Number	Quantity	Purpose
Screw, M10 x 30	201V55	6	Load cell attachment
Screw, M10 x 60	201V59	6	Load cell attachment
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Load cell cable extension	A563-435	1	Extends the load cell cable to reach the second test space area
Crosshead Clevis - Type D	T1209-1138	1	Connects grips and fixtures to top of crosshead
Retainer clip for 1/2 diameter pin	T1223-1053	1	Prevents the grip coupling pin from sliding out during testing
Locating ring	T1335-1048	1	Fitting between crosshead and crosshead clevis
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling

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