

5960 Series Dual Column Table Frames



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.

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Original Instructions

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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 in the testing system that are potentially hazardous, particularly force actuators or a moving crosshead.

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. 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 safety risk assessment on the use of the test system, test methods employed, specimen loading and specimen behavior at failure.

Warnings



Crush Hazard - Allow only one person to handle or operate the system at all times.

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



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. 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 - 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.



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.



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.

Warnings



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.



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.

Table of Contents

Chapter 1	Introduction	1-1
	System Description and Terminology	1-2
	Components	1-2
	Principle of Operation	1-4
	Hardware Controls	1-4
	Software	1-4
	System Components and Interconnections	1-5
	System Safety and Information Labeling	1-6
	Product Support	1-8
	Product Documentation	1-8
Chapter 2	Requirements and Specifications	2-1
	Responsibilities	2-1
	Customer's Responsibilities	2-1
	Instron's Responsibilities	2-2
	Site Requirements	2-3
	Frame Location	2-4
	Floor Loading	2-4
	Table Loading	2-4
	Power Supply	2-4
	Telephone and Network Access	2-5
	Ceiling Clearance	2-5
	Environmental Conditions	2-5
	Accessibility	2-5
	Site Requirements for System Accessories	2-5
	Environmental Specifications	2-6
	General	2-6
	Conformity with EU directives	2-6
	Environmental Impact	2-7
	Noise Levels	2-7
	Power Requirements	2-8

Power Cord Selections	2-8
Series 5960 Optional Configurations	2-10
Series 5960 Dimensions	2-11
Standard Frame Dimensions	2-11
Extra Height Configuration	2-12
Extra Wide Configuration	2-14
Extra Wide and Extra Height Configuration	2-14
Second Test Space Configuration	2-15
Extra Height with Second Test Space Configuration	2-17
Load Frame Weights	2-17
Accessory Mounting Dimensions	2-19
Base Beam	2-19
Crosshead	2-20
Top Plate	2-22
Checklist for Site Preparation	2-23
Site Location	2-23
Transporting	2-23
Scheduling Installation	2-24
Chapter 3 Lifting and Handling	3-1
General Handling Precautions	3-1
Packaging Dimensions	3-2
Unpacking Dual Column Frames	3-3
Transporting Dual Column Frames	3-4
Before You Begin	3-4
Equipment	3-5
Transporting Procedures	3-5
Chapter 4 Installation	4-1
Level the Load Frame	4-1
Equipment	4-1
Procedure	4-1
Set the Input Voltage	4-2
Power Supply Compatibility	4-2

Connect the System Components	4-5
Connect Optional Accessories	4-10
First Time Startup	4-11
Chapter 5 Maintenance	5-1
Preventive Maintenance	5-1
Daily Maintenance Checks	5-2
Periodic Inspections	5-2
Cleaning	5-3
Lubrication	5-3
General Maintenance Procedures	5-6
Test Limit Stops	5-6
Replace a Fuse	5-7
Troubleshooting for Load Cells	5-8
Ancillary Parts	5-8
Models 5965 and 5966	5-9
Models 5967 and 5969	5-11

Chapter 1

Introduction

- System Description and Terminology 1-2
- System Components and Interconnections. 1-5
- System Safety and Information Labeling. 1-6
- Product Support 1-8
- Product Documentation 1-8

These instructions include the following information:

- system specifications that are required for installation of your testing system, for example required environmental conditions, system weights and dimensions
- transporting your system to its final location, including instructions for lifting and handling
- installing and connecting all the system components together (carried out by an Instron Service Engineer for first-time installation)
- configuring the system before you start testing (carried out by an Instron Service Engineer for first-time installation)
- routine maintenance of the system
- spare parts

Refer to the Operator's Guide for instructions on running tests.

System Description and Terminology

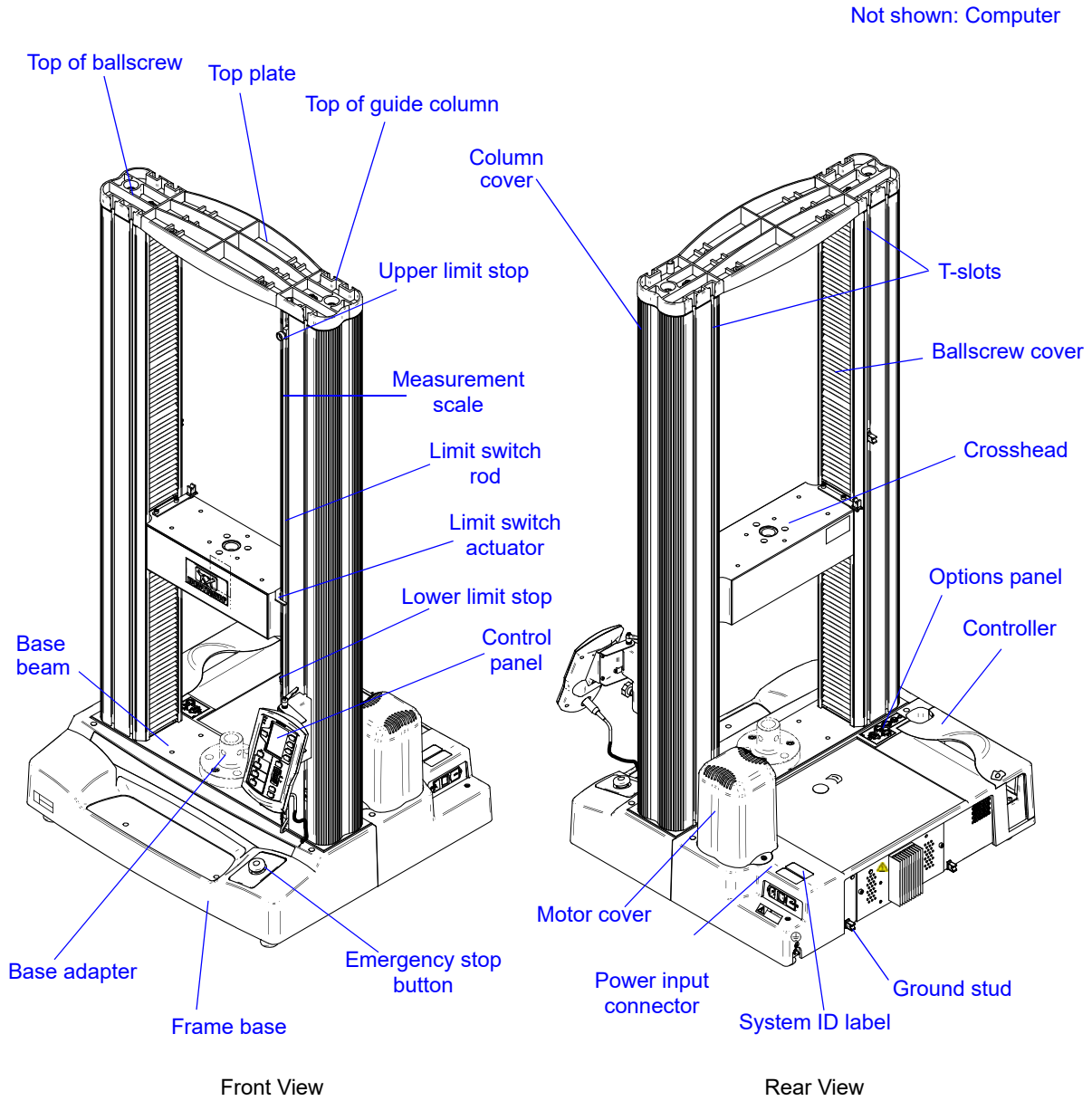


Figure 1-1. 5960 Dual Column Table Frame

Components

The major components of an Instron electromechanical testing system include:

- Load frame with integral controller

- Load cell mounted to the crosshead
- Grips for tension testing or table-mounted anvils on a platen for compression testing.
- Instron approved computer system with Instron Bluehill® software.

Special fixtures are available for applications such as flexure and peel testing. For strain measurement, an optional strain gauge extensometer attaches to the specimen. You can use non-contacting extensometers with specimens that are unable to support a contacting extensometer. Contact your regional Instron office or check our web site at www.instron.com for assistance with Instron’s grips and fixtures.

The following table defines the components of the testing system:

Table 1-1. Testing System Components

Component	Description
Load Frame	The load frame comprises a base, one or two columns, a moving crosshead, and a top plate. It is a high stiffness support structure against which the test forces react. 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.
Controller	The hardware that controls the frame and any ancillary equipment connected to the testing system. The controller panel contains all the connectors for load cells, extensometers and any other sensors that are required for testing.
Control Panel	The hardware panel, mounted on the side of the load frame, that lets you perform some of the software functions directly at the frame.
Load String	Comprises all of the components that you install between the moving crosshead and the load frame base (or fixed crosshead). Typically this involves a load cell, a set of grips, any adapters that are required to connect the components, and the specimen to be tested. Typically, you mount a load cell on the crosshead, then a pair of grips or fixtures on the load cell and frame base. The grips or fixtures secure the specimen and when you start a test the crosshead moves up or down applying a tensile or compressive load to the specimen. The load cell converts this load into an electrical signal that the software measures and displays.
Bluehill Software	Instron testing software that controls the testing system, running tests and analyzing test data to produce test results.
Specimen	A single piece of material to be tested.

Principle of Operation

The system communicates primarily through the controller. The controller contains sensor conditioning cards for the system transducers 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.

Hardware Controls

The hardware controls consist of:

- Emergency stop button - to be used whenever you need to stop the crosshead immediately because an unsafe condition exists.
- Limit stops - these must be set before each test session to protect the operator against unexpected crosshead movement.
- Control panel - lets you perform certain functions at the frame instead of at the computer. These include starting and stopping a test and using the jog controls to position the crosshead prior to installing a specimen.

Software

Control of the testing system is carried out via Instron Bluehill software. Setting test parameters, operating the system, and collecting test data is done through the software program.

Table 1-2. Software Terminology

Term	Description
Test Method	In Bluehill software, a test method is a file that contains a set of defined parameters that the system uses to run tests, analyze the test data, and produce calculated results.
Sample	A group of material specimens, whose properties are studied and compared to gain statistical or quality assurance information. For example, you could take a specimen from different parts of a single manufacturing run of a material to form a sample of the material. The sample is then representative of the complete run and you can test it to ensure that the material quality has remained stable over the complete run. You perform the same test on each specimen in a sample.

System Components and Interconnections

Figure 1-1 on page 1-2 shows you how each hardware component is connected to make up the complete testing system.

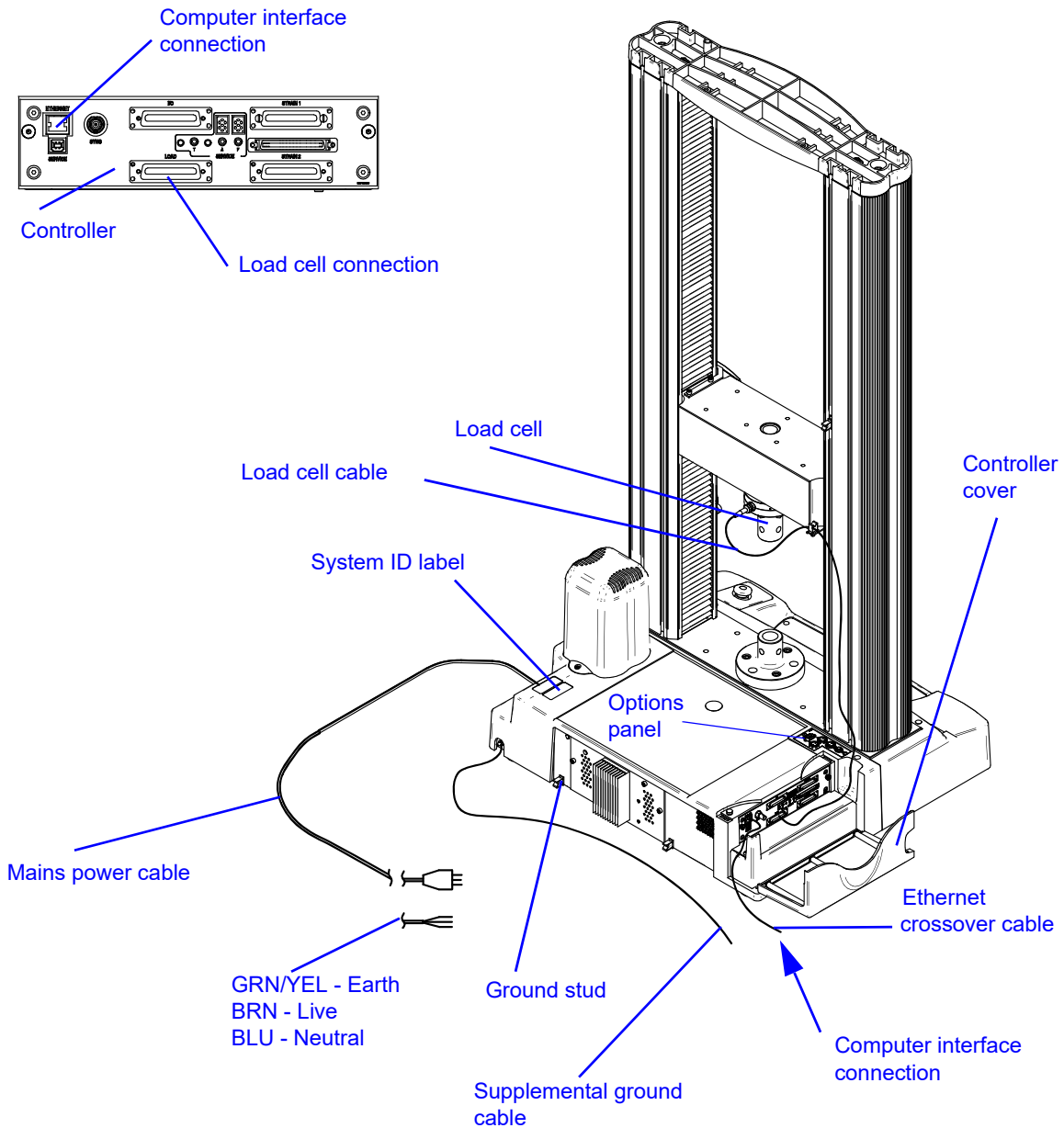


Figure 1-2. 5960 System Connections

System Safety and Information Labeling

Table 1-3 on page 1-6 explains the meanings of any safety and information labels that may be attached to any part of the testing system.

Table 1-3. Safety and Information Labeling Descriptions



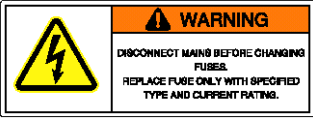








Label	Meaning	Purpose
	Electrical hazard	Indicates that an electrical hazard exists from high voltage or electrical current.
	Disconnect power supply	Disconnect the power supply before servicing machine.
	Electrical - fuse warning	Indicates an electrical hazard exists. Advises about disconnecting power mains before changing fuses and using only specified fuses.
	Belt entanglement hazard	Indicates that a hazard exists from the drive belt and pulley system.
	High temperature hazard	Indicates that a heat hazard exists. Stay clear of area when operating the machine.
	Rotating machinery hazard	Indicates that a rotating hazard exists. Keep clear of these areas (and tie back long hair).

Table 1-3. Safety and Information Labeling Descriptions (Continued)

Label	Meaning	Purpose
	Ground stud	Indicates a ground stud.
	Read the manual	Read and understand the operator's manual before using the machine.
	Crosshead direction	Indicates the direction to turn the pulley to manually move the crosshead upward. Pulleys can be turned by hand when power is disabled.
	Crush hazard	Indicates the crush hazard of the moving crosshead and instructs the user to read and understand the operator's manual before using the machine.
	Waste Electrical and Electronic Equipment (WEEE)	In accordance with the European Union's WEEE directive, the crossed out wheeled bin symbol indicates that the equipment must be disposed of separately from other waste at the end of its usable life. For advice on the disposal of electrical and electronic equipment in your country, contact your local Instron representative.

Product 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.

If you cannot find answers in these sources, contact Instron's Service department directly. A list of Instron offices is available on our website at www.instron.com. In the US and Canada, you can call directly at 1-800-473-7838.

Product Documentation

Instron offers a comprehensive range of documentation to help you get the most out of your Instron products. Depending on what you have purchased, your documentation may include some or all of the following:

Operator's Guide	How to use your system components and controls, procedures for setting limits, calibration and other frequently performed operating tasks.
System Support	Information about system installation, set up and configuration, transducer connection and calibration.
Online Help	Software products come complete with context sensitive help, which provides detailed information on how to use all software features.
Accessory Equipment Reference	How to set up and use any accessories you have purchased, for example grips, fixtures, extensometers, transducers, and environmental chambers.

We welcome your feedback on any aspect of the product documentation. Please email info_dev@instron.com with your comments.

Chapter 2

Requirements and Specifications

- Responsibilities 2-1
- Site Requirements 2-3
- Environmental Specifications 2-6
- Power Requirements 2-8
- Power Cord Selections 2-8
- Series 5960 Optional Configurations 2-10
- Series 5960 Dimensions 2-11
- Load Frame Weights 2-17
- Accessory Mounting Dimensions 2-19
- Checklist for Site Preparation 2-23

Responsibilities

Customer's Responsibilities

It is the customer's responsibility to ensure that all required support services are available, and that all necessary checks are made prior to installing the testing system. These services and checks are described below.

Site Preparation

Proper site preparation is imperative so that the testing system operates in accordance with its specifications and provides accurate test results. The customer must ensure that the site requirements are satisfied prior to scheduling the installation appointment (refer to "[Site Requirements](#)" on page 2-3).

Handling and Transporting

Unless specifically arranged otherwise, it is the customer's responsibility to arrange the off-loading, unpacking and moving of the testing system to the final site location (refer to [Chapter 3 "Lifting and Handling"](#)).

Upon special arrangements, an Instron service engineer can supervise the off-loading and transportation of the load frame to its final site. Contact Instron's Professional Services department or your local Instron office for additional information on this service (refer to "Product Support" on page 1-8).

Insurance and Safety

Under Instron's standard contract, the shipping terms are Ex-Works (or FOB Factory), meaning ownership and liability for the testing system transfers to the customer at Instron's loading dock. Unless other shipping terms are specified in a purchase order, which Instron does not dispute, the Ex-Works shipping terms apply. Under these terms, the customer is responsible for securing the applicable transit insurance on the shipment and arranging safe transport to the final destination. Arrangements can be made through Instron to secure insurance cover and shipping, at the customer's expense.

When transporting a load frame within your own premises, you are responsible for its safe transport. Upon special arrangements, an Instron service engineer can supervise the transportation to the load frame's final site. Contact Instron's Professional Services department or your local Instron office for additional information on this service (refer to "Product Support" on page 1-8).

Materials Disposal

It is the customer's responsibility to 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. These services are described below.

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.

Insurance

Under Instron's standard contract, the shipping terms are Ex-Works (or FOB Factory), meaning ownership and liability for the testing system transfers to the customer at Instron's loading dock. Unless other shipping terms are specified in a purchase order, which Instron does not dispute, the Ex-Works shipping terms apply. Under these terms, Instron is

responsible for insurance cover while the testing system is in the factory up until it reaches the loading dock for shipping.

Installation

When the site location is prepared and the frame and its components have been moved to the final operating location (refer to [Chapter 3 “Lifting and Handling”](#)), Instron is responsible for the complete installation of the load frame, its components and any additional accessories that may have been purchased.

The customer must not make any attempt to install the load frame without an Instron service representative present.

Initial Operation

Once the installation is complete, Instron performs an initial operation of the load frame and a calibration check to ensure that it is working properly.

The service representative also performs a required on-site training program. The required on-site training takes approximately one day to complete, and is designed to accommodate up to three individuals.

Contact Instron’s Professional Services department for more information on this training (refer to [“Product Support”](#) on page 1-8). Additional training is available through Instron’s training center.

Documentation

Instron provides all the documentation required to operate the system, including manuals for the load frame and any required online help systems for software applications.

Additional copies of manuals are available and can be ordered through Instron’s Sales department.

Site Requirements

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

Frame Location

The load frame must not be located against a wall or other object that interferes with air ventilation around the frame. Proper air ventilation is required to dissipate the heat generated from the frame base.

Floor Loading

The supporting floor must be checked for its weight loading and be able to support the weight of the load frame and any other accessory parts that may have been purchased. The floor must be free of vibrations from other activities taking place in or near the building.

For larger load frames, it is recommended that you consult your facility engineer, foundation specialist, or a 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 load capacity is necessary because large dynamic loads may occur when a specimen breaks and this additional load may be absorbed into the floor.

Table Loading

The supporting table must be checked for its weight loading and must be able to support the weight of the load frame with all its components and accessories, if the computer and accessories are placed on the same table. There must be a sufficient margin of safety in the table's weight loading to ensure the stability of the system.

The table must be free of vibrations from other activities taking place in or near the building. A table with leveling feet is recommended.

Power Supply

Ensure that the required power supply is available and complies with the requirements detailed under “[Power Requirements](#)” on page 2-8.

Caution

Power fluctuations and surges can cause performance problems ranging from intermittent electrical problems to severe damage.

Instron systems require “clean” and stable electrical power. Unless other arrangements are made with Instron, you are responsible for providing clean electrical power. An in-line power surge protector is recommended for all installations.

If you purchased an environmental chamber with your system, it requires a dedicated electrical power supply that is separate from the power supply for the rest of the system.

Telephone and Network Access

Ensure that a telephone line is located within the general testing area. This enables the user to contact Instron's service department directly from the testing area so the user can perform the instructions provided and resolve the situation while on the telephone with the service representative. This facilitates resolving issues in a timely manner and reduces the number of repeated phone calls on the same problem.

It is also suggested that network drops, or digital phone lines, be within the general testing area. A network connection near the system facilitates distributing test data via the network. Instron's goal is to provide remote diagnostics in order to resolve system issues. Having a network drop or digital phone line available will enable an Instron service representative to dial into the testing system's computer to diagnose and resolve problems more efficiently. Including the network or digital lines in your initial site preparation will facilitate adding this function if it becomes necessary in the future.

Ceiling Clearance

Ensure that there is adequate ceiling clearance so that the load frame can be easily placed in its testing location. Take into consideration how you will be transporting the frame (by forklift or crane, for instance) and ensure that the ceiling height can accommodate your mode of transportation.

Environmental Conditions

Ensure that the testing site meets the standards described under "[Environmental Specifications](#)" on page 2-6.

Accessibility

The testing system must be accessible for routine maintenance without having to move the load frame. If the frame is moved, it may need to be re-verified.

Site Requirements for System Accessories

Some of Instron's accessories require additional site requirements. If you are not sure if the accessories you purchased require any of the following site preparations, contact Instron's Professional Services department or your local Instron office for advice.

Dry Compressed Air

Dry, compressed air is required for pneumatic grips. Typically, 90 psi air is required with a water trap/filter.

Water Supply

A water supply may be required for some specimen grips and some temperature control systems.

Liquid Nitrogen and Carbon Dioxide

A Liquid Nitrogen (LN2) or Carbon Dioxide (CO2) supply may be required for environmental chambers with cooling options.

For carbon dioxide, tank pressure must be approximately 725 psi. It must be in a liquid state when it reaches the valve of the environmental chamber.

For liquid nitrogen, tank pressure must be approximately 22 psi.

Environmental Specifications

General

Table 2-1. Environmental Specifications

Parameter	Specifications
Operating Temperature	+5°C to +40°C (+41°F to +104°F)
Storage Temperature	-25°C to +55°C (-13°F to +131°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.

Conformity with EU directives

Instron declares under our sole responsibility that 5940 and 5960 testing systems are in conformity with all relevant provisions of the following regulations:

- Machinery Directive 2006/42/EC
- EMC Directive 2014/30/EU
- ROHS Directive 2011/65/EU including substances added by amendment 2015/863/EU

Instron testing systems are CE marked. A signed CE declaration of conformity is supplied with each system.

Environmental Impact

Instron materials testing systems and their accessories are designed to produce no adverse environmental impact during normal use as long as they are operated and serviced in accordance with their operating instructions.

Normal care must be taken with service items such as greases and oils needed to operate and maintain the equipment as indicated in their packaging and operating instructions.

These systems comprise mechanical and electronic components that contain potentially environmentally harmful chemicals, such as chromium, chromates, lead and brominated fire retardants. Care must be taken at the end of the equipment's life to ensure its disposal in accordance with local environmental regulations.

Because of the wide range of applications where our instruments are used, Instron has no knowledge of the environmental impact of the customer's test pieces or specimens.

Noise Levels

The noise output for table model load frames does not exceed 70dB(A). Noise levels do not include noise from specimen breaks.



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.

Power Requirements

Table 2-2. Series 5960 System Power Requirements

Parameter	Specification
Maximum Power (VA)	900
Single Phase Voltage (Vac) (±10%)	100, 120, 220 ^a , 240
Frequency	47 to 63 Hz
Length of Power Cable	2.44 m (8 ft)

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

Warning



You must use GFCI (Ground Fault Circuit Interruption) protection on all power sources if your testing system includes water or any other fluid.

If your system includes any fluids (e.g. water-cooled grips, BioPuls baths, food testing fixtures), you must use GFCI protection on all power sources to protect the operator from fluids that might leak into the load frame electronics.

Power Cord Selections

When you place an order for a table model load frame, you can choose the following:

- voltage
- power cord type

Refer to [Table 2-2](#) on page [2-8](#) for a list of the available voltages and to [Table 2-3](#) on page [2-9](#) for a list of available power cords and their matching receptacles.

If you do not make a choice, Instron chooses the customary voltage and power cord combination that matches the shipping destination for the system.

Table 2-3. Power cords for Table Models

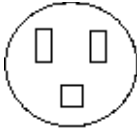


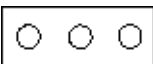



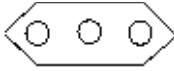
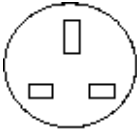
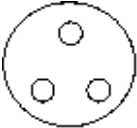
Power cord designation	Matching receptacle	Locale
P1		USA and Canada
P2		Denmark
P3		Europe
P4	 and 	Italy
P5		China
P6		Australia and New Zealand

Table 2-3. Power cords for Table Models

Power cord designation	Matching receptacle	Locale
P7		Switzerland
P8 (includes 10A fuse)		United Kingdom
P9	Two receptacles: P1 (USA) and P3 (Europe).	
PA		India and South Africa

Series 5960 Optional Configurations

In addition to the standard height, standard width model with a single test space below the moving crosshead, dual column table model load frames are available in several frame options for specialized testing, as follows:

- Extra wide - for large assemblies
- Extra height - for unusually long specimens
- Second test space - lets you test above the moving crosshead

Table 2-4 on page 2-11 summarizes the options and combination of options that are available.

Table 2-4. 5960 Optional Frame Combinations

Optional Configuration	Load Frame Model			
	5965	5966	5967	5969
Extra Wide	No	No	Yes	No
Extra Height	Yes	Yes	Yes	Yes
Extra Wide + Extra Height	No	No	Yes	No
Second Test Space	Yes	Yes	Yes	Yes
Extra Height with Second Test Space	Yes	Yes	Yes	No
Extra Wide with Second Test Space	No	No	No	No

Series 5960 Dimensions

Standard Frame Dimensions

Load frame dimensions for all standard configuration dual column table model load frames are listed in Table 2-5 on page 2-11. See Figure 2-1 on page 2-13 to match the letter designations in the table.

Table 2-5. Series 5960 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	418 (16.5)
D	Top plate thickness	52 (2.0)
E	Crosshead thickness 5965/5966 5967/5969	76 (3.0) 120 (4.7)
F	Space required to open controller door	148 (5.8)

Table 2-5. Series 5960 Standard Configuration Dimensions

Letter Designation	Description	Dimension - mm (inch)
G	Base beam height from table	190 (7.5)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position 5965/5966 Minimum 5965/5966 Maximum 5967/5969 Minimum 5967/5969 Maximum	116 (4.6) 1256 (49.5) 72 (2.8) 1212 (47.7)
J2	Not applicable	
K	Overall depth	725 (28.5)
L	Front of base to test center	265 (10.4)
M	Motor cover height	403 (15.9)
N	Overall height (maximum)	1634 (64.3)
P	Overall width	779 (30.7)
Q	Coupling pin to base	59 (2.3)
R	Load cell pin to crosshead with 2580 Series load cells 500N, 1kN, 2kN with 2580 Series load cell 5kN with 2580 Series load cells 10kN, 30kN, 50kN	91 (3.58) 101 (3.98) 122 (4.80)
S	Top plate width	180 (7.1)

Extra Height Configuration

The dimensions of the extra height models are the same as for standard models, except for the overall height dimension N, which is 2159 mm (85.0 in).

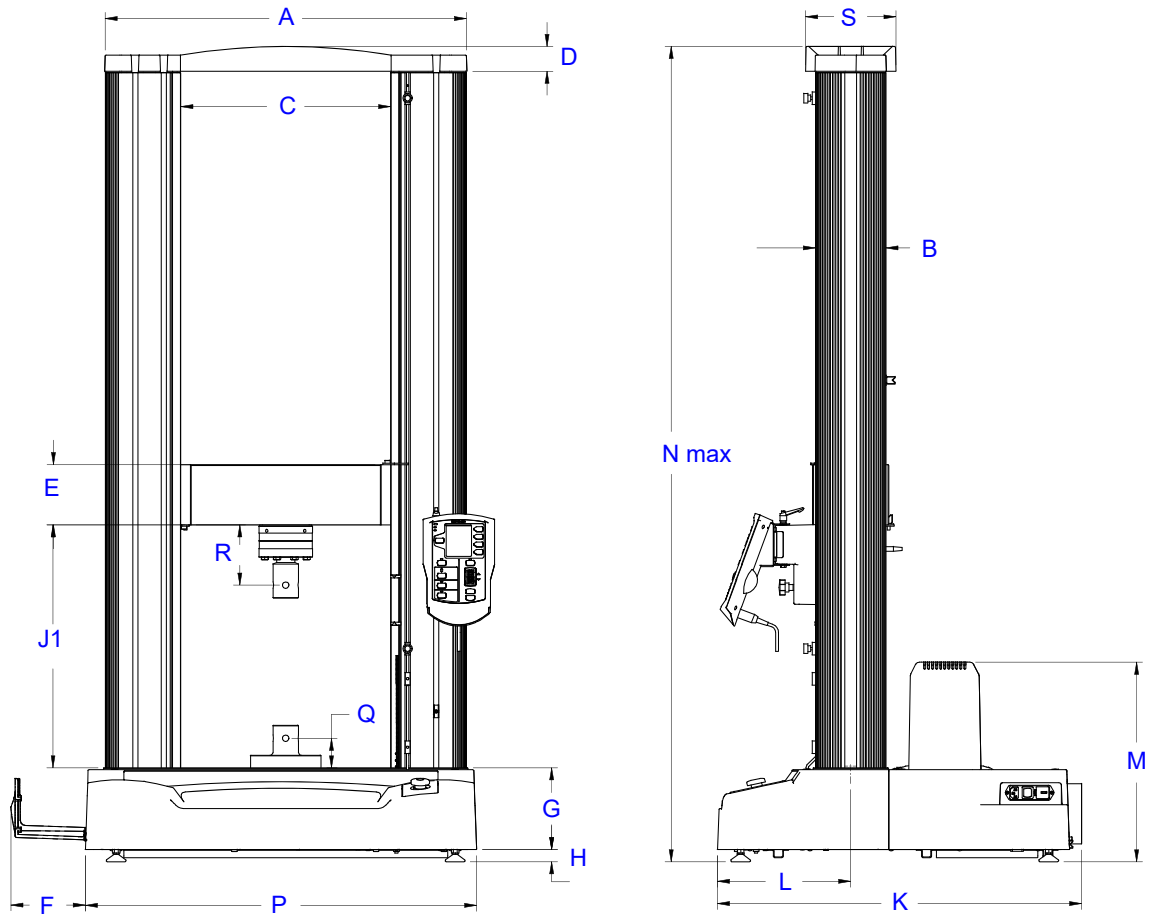


Figure 2-1. Series 5960 Standard Configuration Load Frame Dimensions

Extra Wide Configuration

Table 2-6 on page 2-14 lists the dimensions for the extra wide configuration that differ from the standard configuration. Figure 2-2 on page 2-14 shows the top plate of the extra wide frame. Refer to Table 2-5 on page 2-11 and Figure 2-1 on page 2-13 for the remaining dimensions.

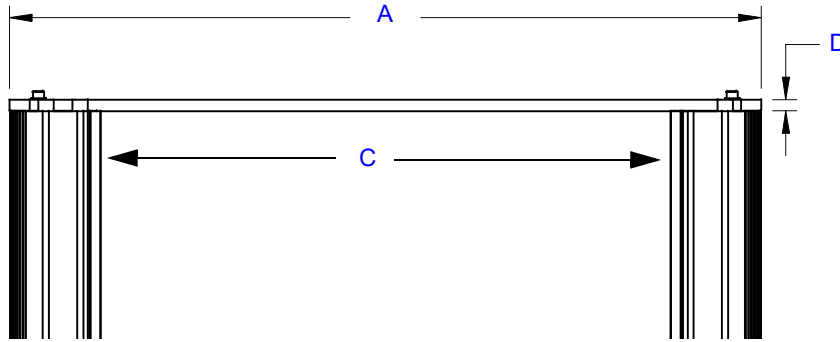


Figure 2-2. Extra Wide Dimensions

Table 2-6. 5967 Extra Wide Frame Dimensions

Designation	Description	Dimension - mm (inch)
A	Across columns	1247 (49.1)
C	Horizontal test daylight	946 (37.2)
D	Top plate thickness	13 (0.5)
E	Crosshead thickness	125 (4.9)
J1	Crosshead position Minimum Maximum	67 (2.63) 1197 (47.1)
N	Overall height	1595 (62.8)
P	Overall width	1278 (50.3)

Extra Wide and Extra Height Configuration

The dimensions of the extra height and extra wide configuration are the same as for the extra wide model, except for those listed in Table 2-7 on page 2-15.

Table 2-7. 5967 Extra Wide & Extra Height Frame Dimensions

Designation	Description	Dimension - mm (inch)
G	Base beam height from table	230 (9.1)
J1	Crosshead position Minimum Maximum	67 (2.63) 1656 (65.2)
N	Overall height	2120 (8352)
P	Overall width	1278 (50.3)

Second Test Space Configuration

The second test space option lets you test in the space above the moving crosshead, as shown in [Figure 2-3](#) on page 2-15.

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.

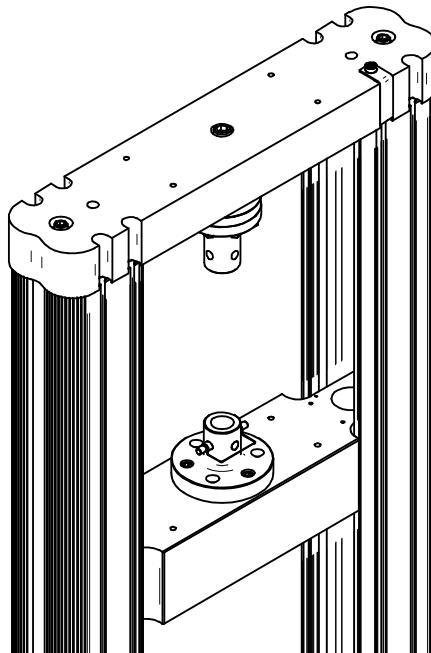


Figure 2-3. Second Test Space Configuration

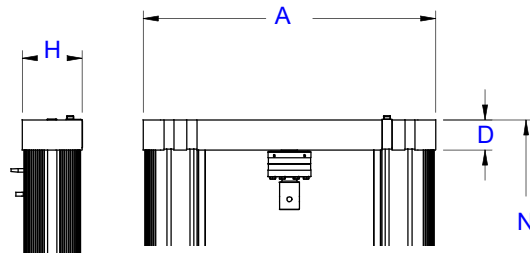


Figure 2-4. Second Test Space Dimensions

Table 2-8. 5960 Second Test Space Configuration Dimensions

Letter Designation	Description	Dimension mm (inch)
A	Across columns	729 (28.7)
B	Column depth	140 (5.5)
C	Horizontal test daylight	418 (16.5)
D	Fixed crosshead thickness	75 (2.9)
E	Moving crosshead thickness 5965/5966 5967/5969	76 (3.0) 120 (4.7)
F	Space required to open controller door	148 (5.8)
G	Base beam height from table	190 (7.5)
H	Gap for feet - nominal setting	25 (1.0)
J1	Crosshead position (First test space) Minimum Maximum	192 (7.5) 1332 (52.4)
J2	Crosshead position (Second test space) Minimum Maximum	128 (5.0) 1256 (44.5)
K	Overall depth	725 (28.5)
L	Front of base to test center	265 (10.4)
M	Motor cover height	403 (15.9)
N	Overall height - standard height Overall height - extra height	1657 (65.2) 2182 (85.9)

Table 2-8. 5960 Second Test Space Configuration Dimensions (Continued)

Letter Designation	Description	Dimension mm (inch)
P	Overall width	779 (30.7)
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 Height with Second Test Space Configuration

The dimensions of the extra height with second test space model are the same as for the standard model, except for those listed in [Table 2-9](#) on page 2-17.

Table 2-9. 5960 Extra Height with Second Test Space Dimensions

Designation	Description	Dimension mm (inch)
J1	Crosshead position Minimum Maximum	192 (7.5) 1832 (72.1)
J2	Crosshead position with second test space Minimum Maximum	128 (5.0) 1756 (69.1)
N	Overall height	2182 (85.9)

Load Frame Weights

Table 2-10. Weight - Standard Configurations

Model Number	Weight of Load Frame
5965	146 kg (322 lb)
5966	146 kg (322 lb)

Table 2-10. Weight - Standard Configurations (Continued)

Model Number	Weight of Load Frame
5967	192 kg (423 lb)
5969	250 kg (551lb)

Table 2-11. Weight - Optional Configurations

Model Number	Optional Configuration	Weight of Load Frame
5965	Extra height	161 kg (355 lb)
	Second test space	164 kg (361 lb)
	Extra height with second test space	179 kg (395 lb)
5966	Extra height	161 kg (355 lb)
	Second test space	164 kg (361 lb)
	Extra height with second test space	179 kg (395 lb)
5967	Extra height	210 kg (463 lb)
	Extra wide	435 kg (959 lb)
	Second test space	258 kg (569 lb)
	Extra height with second test space	276 kg (609 lb)
	Extra height and extra wide	453 kg (999 lb)
5969	Extra height	273 kg (602 lb)
	Second test space	316 kg (602 lb)

Accessory Mounting Dimensions

You can attach numerous testing accessories and fixtures to the load frame for specialized tests. Use the standard mounting holes shown in the following diagrams to mount your accessories. Avoid tapping new holes that may weaken or otherwise compromise the integrity of the load frame.



All measurements in the following figures are shown in mm.

Base Beam

Figure 2-5 on page 2-19 and Table 2-12 on page 2-19 show the accessory mounting dimensions on the base beam for both standard and extra wide models.

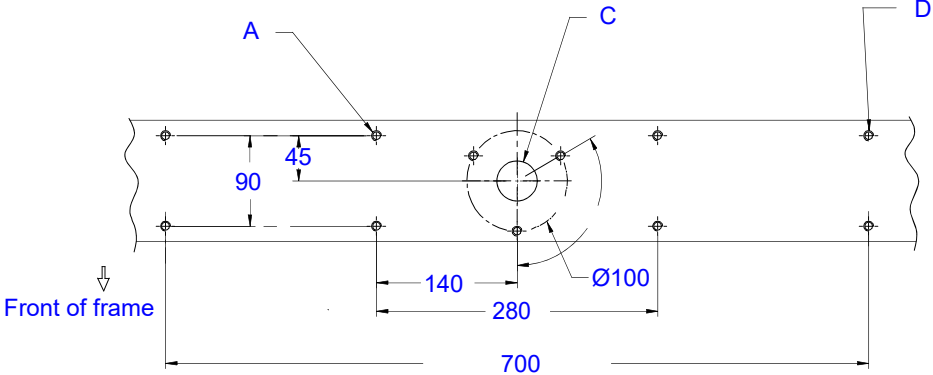


Figure 2-5. Base Beam Mounting Dimensions

Table 2-12. Base Beam Mounting Dimensions

Label	Dimension		
	5965 and 5966	5967	5969
A (7 holes)	M10 x 25 deep		
C (1 hole)	Ø40 x 3 deep		
D (4 holes - extra wide only)	n/a	M10 x 25 deep	n/a

Crosshead

Figure 2-6 on page 2-20 and Table 2-13 on page 2-20 show the accessory mounting dimensions on the moving crosshead for both standard and extra wide models. If your machine has the second test space option, refer to Figure 2-7 on page 2-21 for the accessory mounting dimensions on the fixed crosshead.

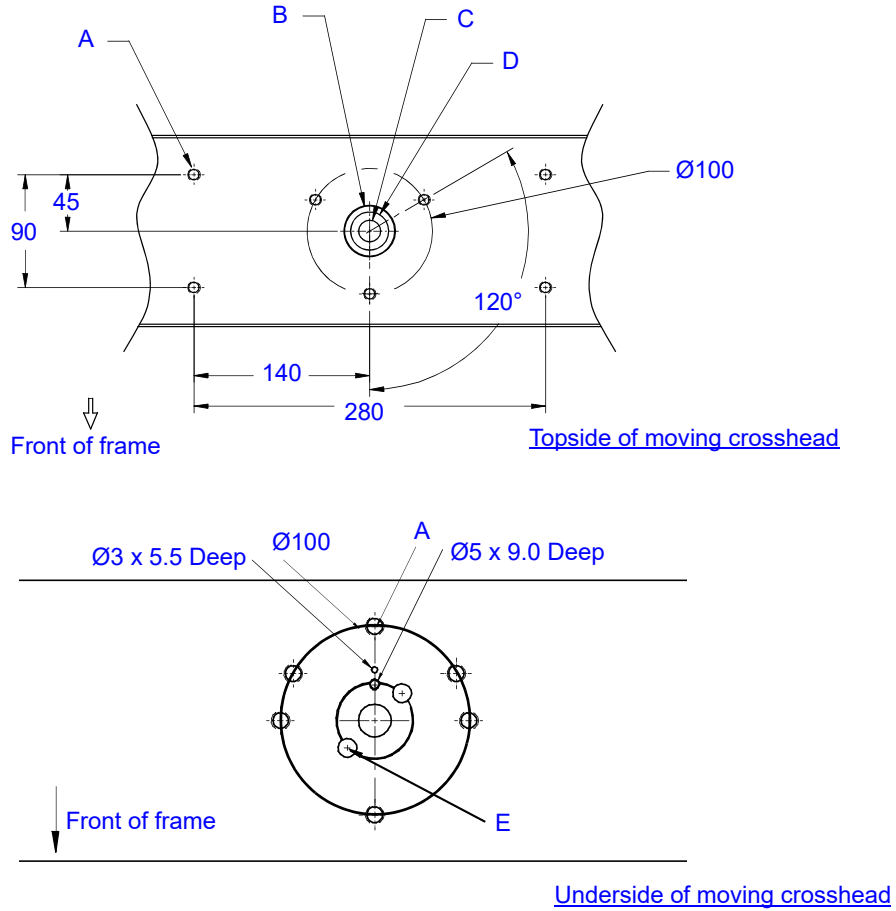


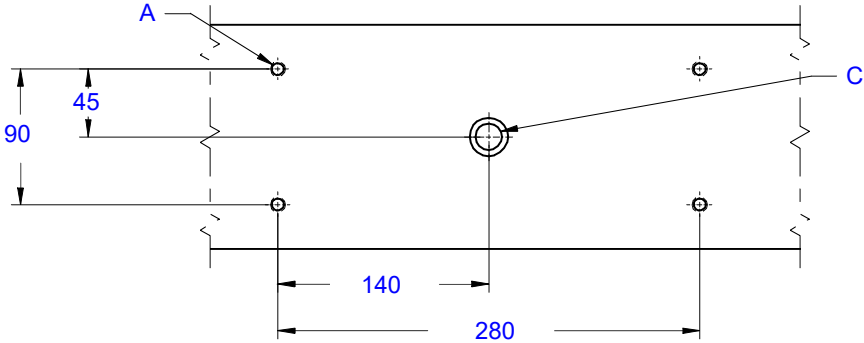
Figure 2-6. Moving Crosshead Mounting Dimensions

Table 2-13. Moving Crosshead Mounting Dimensions

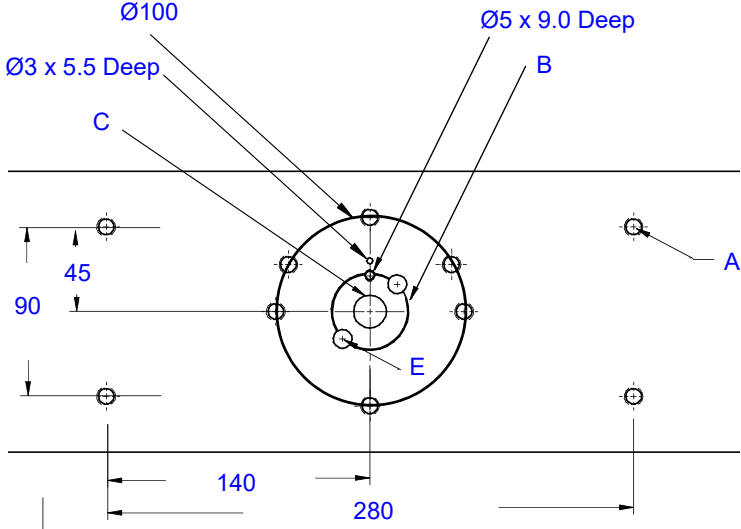
Label	Dimension
A (13 holes)	M10 x 25 deep
B (1 hole)	Ø40 x 3 deep
C (1 hole)	Ø17.5 thru

Table 2-13. Moving Crosshead Mounting Dimensions

Label	Dimension
D (1 hole)	Ø30.5 x 21 deep
E (2 holes)	Ø10 x 6 deep



Topside of fixed crosshead



Underside of fixed crosshead

Figure 2-7. Fixed Crosshead Mounting Dimensions

Table 2-14. Fixed Crosshead Mounting Dimensions

Label	Dimension
A (10 holes)	M10 x 25 deep
B (1 hole)	Ø40 x 3 deep
C (1 hole)	Ø17.5 thru
E (2 holes)	Ø10 x 6 deep

Top Plate

Figure 2-8 on page 2-22 shows the top plate dimensions for both standard and extra wide models.



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

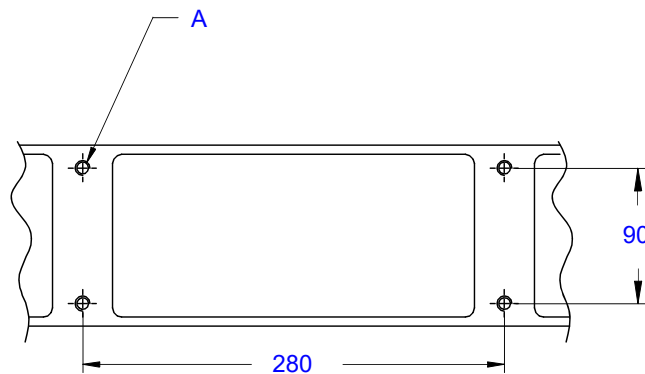


Figure 2-8. Top Plate Mounting Dimensions

Checklist for Site Preparation

The following checklist provides a quick summary of items that should be considered when planning and preparing the site location of your testing system. Additional information regarding each item below is provided within this manual. If you need more specific information, contact Instron's Professional Services department or your local Instron office for assistance (refer to "Product Support" on page 1-8).



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.

Site Location

- Floor and table is able to support the weight of the frame, and its computer components.
- Environment complies with the specifications for your specific model:
 - Operating temperature
 - Storage temperature
 - Humidity
 - Atmosphere
- The required power supply is available and is compatible with the electrical requirements for your specific model.
- Electrical outlets are within the maximum distance requirement to the load frame's location.
- Phone lines are located within the general testing area so that users can call Instron's service department directly from the testing area. It is also suggested that network drops, or digital phone lines, be within the general testing area.
- Ceiling clearance is adequate for the load frame, including the additional space necessary to lift and move the frame by either a forklift or crane.
- Location provides sufficient accessibility for routine maintenance (915 mm or 36 in).
- Employees are adequately trained to operate the load frame and its computer system.

Transporting

- You have the correct number of packing boxes as stated on the packing list.
- Insurance coverage is secured or verified.

- ❑ You have the required equipment for the chosen transporting method.
- ❑ You have the appropriate packaging to protect the load frame when moving or relocating it.
- ❑ Pathway from the loading dock to the final site location has sufficient width and height to fit the frame and forklift (or crane). Measure all doors and hallways. If you transfer the load frame while it is still in its packaging, refer to “Packaging Dimensions” on page 3-2. If you move or relocate the load frame without its packaging, refer to the dimensions for your specific model number, “Series 5960 Dimensions” on page 2-11.
- ❑ Floor area along the pathway to the final site location is able to support the weight of the frame and forklift (or crane). Refer to “Packaging Dimensions” on page 3-2 for the total package weight of your frame or to the weight specification for your specific model number, “Load Frame Weights” on page 2-17.
- ❑ There are no loose accessories on the shipping skid or frame.
- ❑ Your equipment operators have the appropriate licenses and have complied with your local safety standards (i.e. the appropriate training required by OSHA in the U.S.).

Scheduling Installation

When the testing site is ready, and the frame has been moved to its final operating location, contact Instron Professional Services to schedule an installation appointment:

Worldwide	Contact your local Instron Sales and Service office. A list of Instron offices is available on our website at www.instron.com .
In the United States & Canada:	1-800-473-7838

Chapter 3

Lifting and Handling

- General Handling Precautions 3-1
 - Packaging Dimensions 3-2
 - Unpacking Dual Column Frames 3-3
 - Transporting Dual Column Frames 3-4
-

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 or if any part of the shipment is damaged (refer to “[Product Support](#)” on page 1-8).

Warnings



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. Refer to the “System Description and Terminology” on page 1-2 to identify the top plate.



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 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.

Packaging Dimensions

Instron recommends leaving the load frame in its packaging while moving it to its final site location within your building.

Use the information in this section to verify that:

- the packaged frame fits through all doorways and hallways leading to the final location
- all floors leading to the final location can support the weight of the packaged frame

Table 3-1. Packaging Dimensions for 5960 Standard Frame Models

Model #	Length	Width	Height	Packaged Weight
5965	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	187 kg 412lb
5966	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	187 kg 412lb
5967	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	246 kg 542 lb
5969	965 mm 38 in	1169 mm 46 in	1880 mm 74 in	323 kg 712lb

Table 3-2. Packaging Dimensions for 5960 Optional Frame Configurations

Frame Configuration	Model #	Length	Width	Height	Packaged Weight	
Table models with second test space	5965	965 mm	1169 mm	1880 mm	5965	210 kg
	5966	38 in	46 in	74 in	5966	462 lb
	5967				5967	333 kg 734 lb
Table models with extra height	5965	965 mm	1169 mm	2286 mm	5965	206 kg
	5966	38 in	46 in	90 in	5966	453 lb
	5967				5967	270 kg 594 lb
	5969				5969	352 kg 776 lb
Table models with extra height and second test space	5965	965 mm	1169 mm	2312 mm	5965	230 kg
	5966	38 in	46 in	91 in	5966	507lb
	5967				5967	356 kg 784 lb
Table models with extra width	5967	965 mm 38 in	1575 mm 62 in	1880 mm 74 in	5967	562 kg 1238 lb
Table models with extra width and extra height	5967	965 mm 38 in	1575 mm 62 in	2261 mm 89 in	5967	585 kg 1288 lb

Unpacking Dual Column Frames

Before moving the load frame, review the following sections:

- “Site Requirements” on page 2-3.
- “Transporting Procedures” on page 3-5.

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.



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](#)” on page 3-5 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 boxed 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.
 - Do not disassemble or remove any components or parts from any Instron frame or accessory.
5. Retain all packing materials until the system is satisfactorily installed and all parts, assemblies and accessories are located.
6. Move the load frame into its operating location using the selected transportation method. Refer to “[Transporting Procedures](#)” on page 3-5 for additional information.

Transporting Dual Column Frames

Before You Begin

Before moving the load frame ensure that:

- You have reviewed “[Site Requirements](#)” on page 2-3. 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 3-2. If you move or relocate the load frame without its packaging, refer to the dimensions for your specific model ([Chapter 2 “Requirements and Specifications”](#)).

- 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’s Service Department to determine the appropriate packaging requirements for your model type.

Equipment

- 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”](#) on page 3-7 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 3-1](#) on page 3-6.
- Crosshead method - Using a forklift with padded forks to lift the load frame from under the crosshead as shown in [Figure 3-2](#) on page 3-7.
- 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.

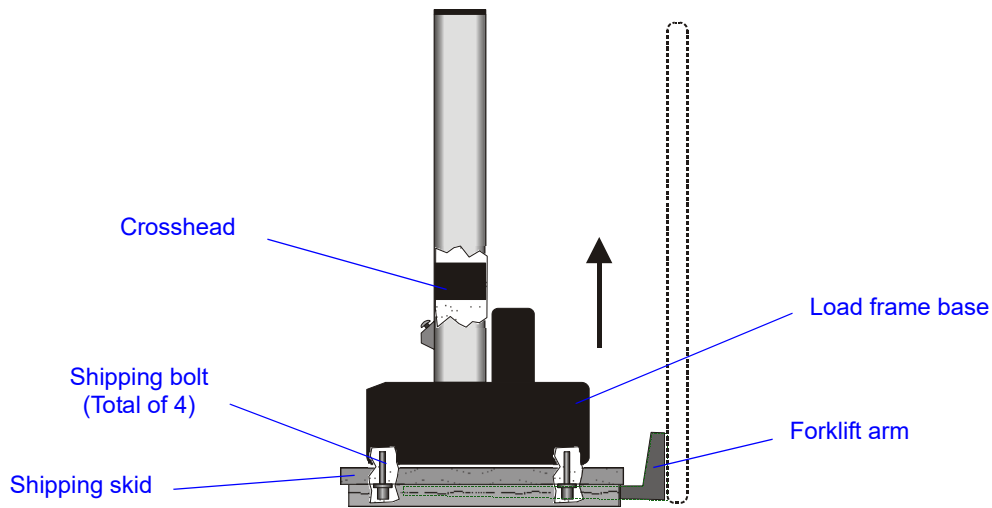


Figure 3-1. Lifting the Frame from the Base

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 3-1](#) on page 3-6.
3. The crosshead should be in its lowest position so that the frame is not top heavy.

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” on page 3-7 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.

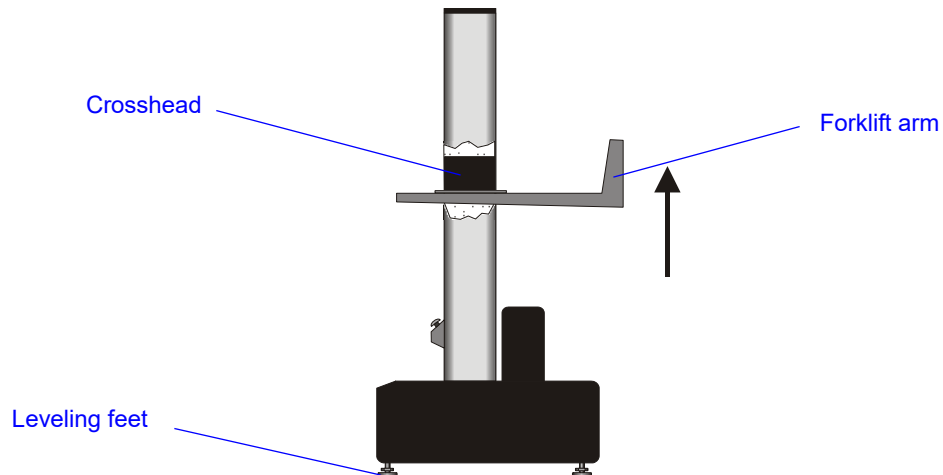


Figure 3-2. Lifting the Frame from the Crosshead

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 3-2](#) on page 3-7.

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 3-3](#) on page 3-9. 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 - 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.

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.

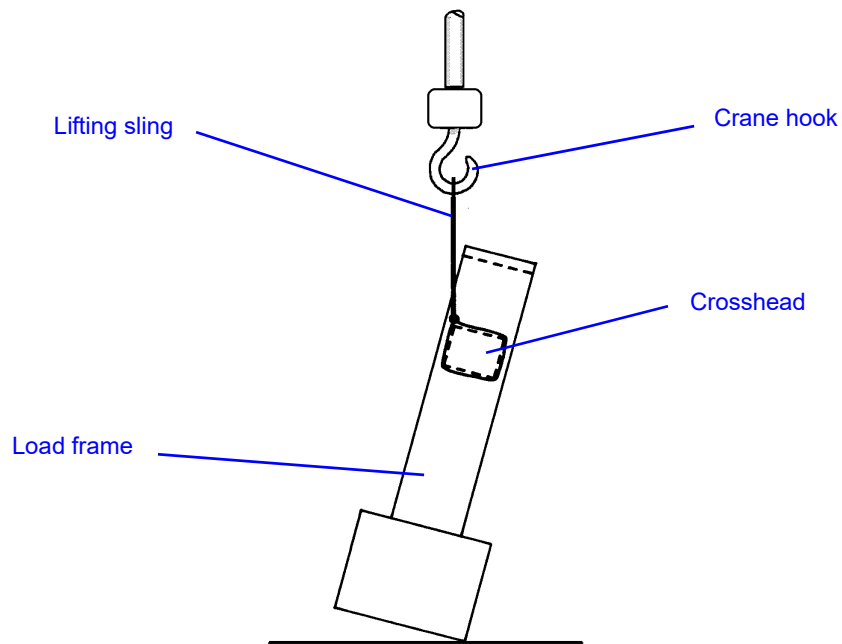


Figure 3-3. Lifting Load Frame with a Crane

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.

Chapter 4 Installation

-
- Level the Load Frame. 4-1
 - Set the Input Voltage 4-2
 - Connect the System Components. 4-5
 - Connect Optional Accessories 4-10
 - First Time Startup. 4-11
-

Level 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

- Spirit level.
- Open-end wrench.

Procedure

1. Place a spirit level on the center of the base beam.
2. Loosen the lock nut (1) on each leveling foot.
3. Using the wrench, turn the level adjuster nut (2) on each foot while you monitor the spirit level reading.

Warning



As you make adjustments, make sure no more than 12mm (0.5in) of thread is exposed. If you expose more thread, there is a risk that the threaded adapter can separate from the foot.

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 lock nut on each leveling foot.

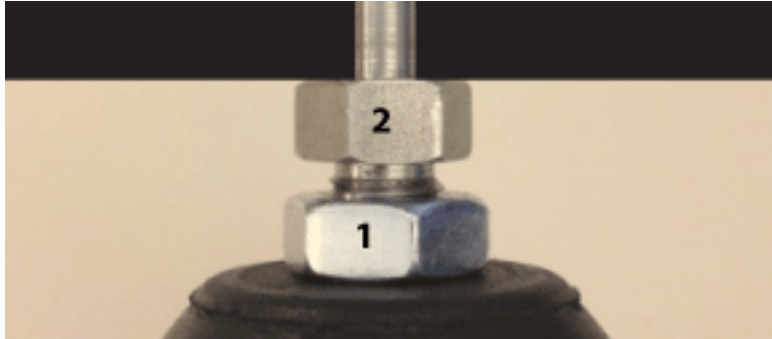


Figure 4-1. Adjusting a Leveling Foot

Set 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.

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.

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.



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. Observe the CEE wire color code as follows:

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

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.

Set the Voltage

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](#)” on page 2-8 for the available voltages for each model type.



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 “[Determine the Voltage Setting](#)” on page 4-4 to determine the current voltage setting on your machine. If the voltage indicated does not match your power source, follow the instructions in section “[Change the Voltage Setting](#)” on page 4-4 to change the frame’s voltage.

Determine the Voltage Setting

1. Locate the power input connector on your machine. Refer to “[System Description and Terminology](#)” on page 1-2 for assistance, if necessary.
2. Inspect the power input connector. The current voltage setting is visible through a small window in the fuse holder, as shown in [Figure 4-2](#).

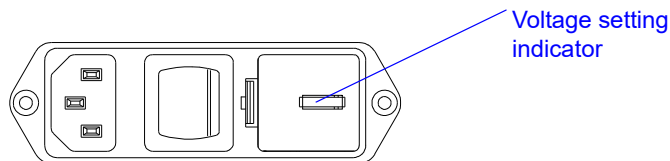


Figure 4-2. Power Input Connector with Voltage Setting

Change the Voltage Setting

Equipment:

- 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 slot indicated in [Figure 4-2](#) on page 4-4 and pry out the fuse holder.
3. Remove the fuse holder from the power input connector.
4. Remove the voltage selector unit (see [Figure 4-4](#) on page 4-5) from the power input connector using long nose pliers or a screwdriver.

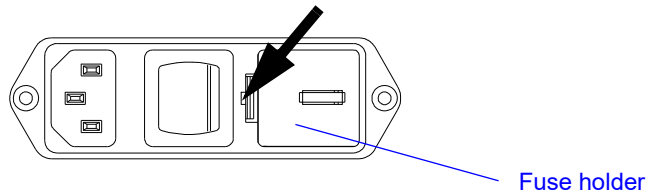


Figure 4-3. Prying out the fuse holder

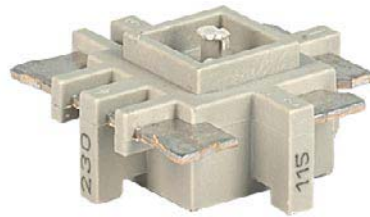


Figure 4-4. Voltage Selector Unit

5. Re-insert the voltage selector unit in the power input connector so that the required voltage faces the front.
6. If necessary, change the fuse in the holder. Refer to “[Replace a Fuse](#)” on page 5-7 for replacing a fuse.
7. Re-install the fuse holder into the connector. Ensure that the indicator now indicates the correct input voltage.
8. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light illuminates.
9. Before you do any testing, perform the procedure “[First Time Startup](#)” on page 4-11.

Connect 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.

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.

Refer to [Figure 4-5](#) on page 4-8, [Figure 4-6](#) on page 4-9.

1. Ensure that the power switch is set to Off (○) and the mains power cable to the machine is disconnected.
2. Ensure that the Ethernet card in the computer that you intend to use for communication with the frame is not connected to a network. You can connect the computer to a network, but you must use a separate Ethernet card.
3. Connect the Ethernet crossover cable to the **ETHERNET** connector on the controller. Connect the other end of the cable to the appropriate Ethernet card on the back of the computer. Ensure that the connectors are fully engaged in their sockets.
4. Connect the load cell cable from the load cell to the **LOAD** connector on 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 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.



*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.*

5. Verify that the voltage setting for the machine is compatible with the facility's voltage. Refer to [“Power Supply Compatibility”](#) on page 4-2. If it is not the appropriate voltage, refer to [“Set the Input Voltage”](#) on page 4-2 to reset the machine's voltage. Verify that the electrical plug is compatible with the new voltage setting.
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.



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

7. Connect the mains power cable for the machine to the IEC connector on the rear of the machine and to the electrical power supply, which must be a grounded supply.



If the electrical supply is not grounded, you can use the supplemental ground cable to connect the machine to a suitable ground in the building.

8. Refer to the documentation for the computer to connect the computer and monitor to the electrical power supply.
9. Change the Windows Network TCP/IP settings for the dedicated Ethernet card to use a fixed IP address. The following values are compatible with the system:

IP address	169.254.1.2
Subnet mask	255.255.255.0

Contact your IT department if you are not sure how to do this.

10. The system is now ready to be turned on. Refer to “[First Time Startup](#)” on page 4-11 for instructions.

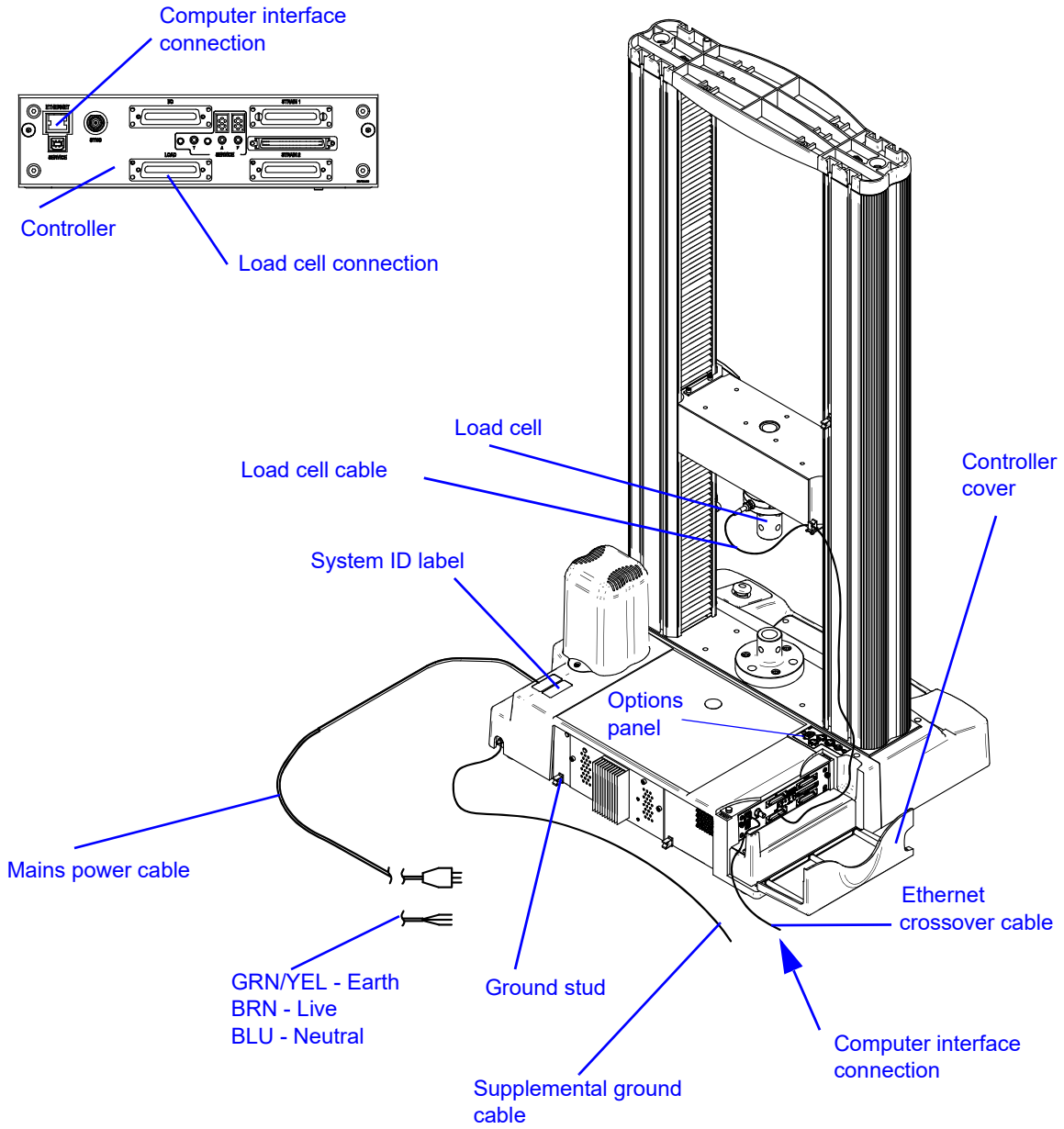


Figure 4-5. 5960 System Connections

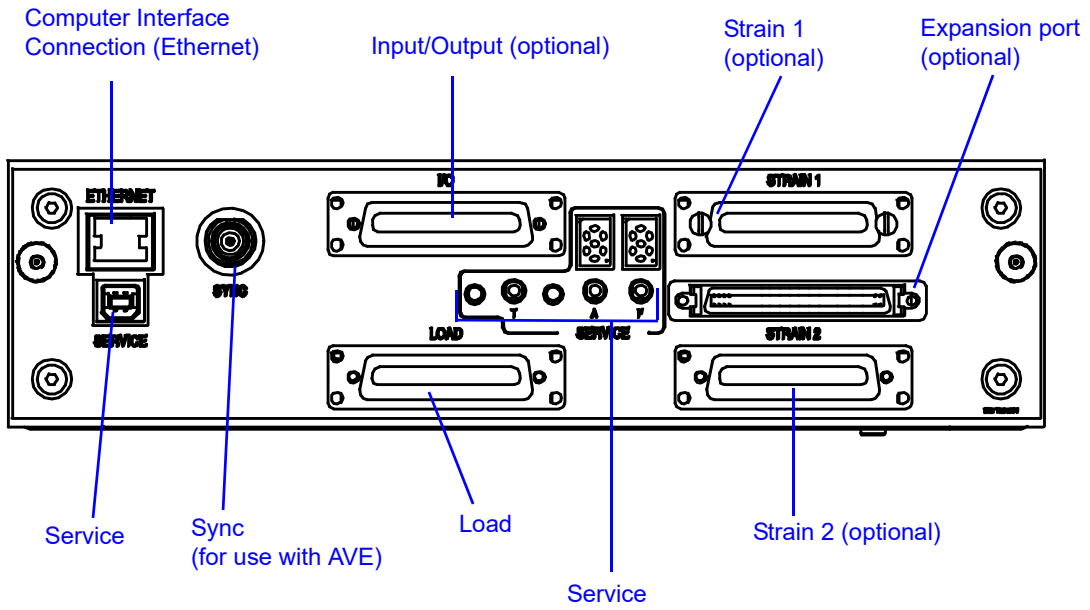


Figure 4-6. 5960 Controller Connections

Connect 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 the following accessories:

- 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.



The following graphic displays 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.

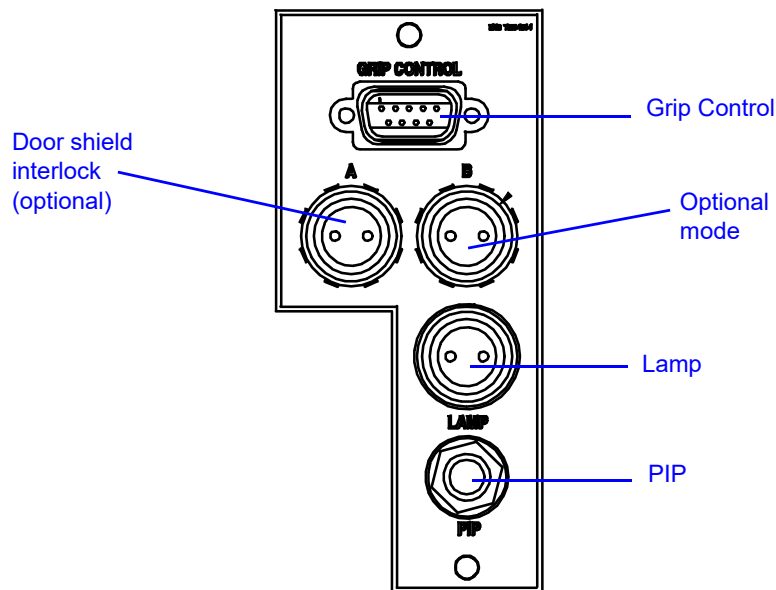


Figure 4-7. 5960 Options Panel

First Time Startup

When the testing system is installed, you need to configure the Bluehill software so that it can communicate with the hardware. When the entire system is assembled and the software is started for the first time, a configuration wizard displays to let you make the choices that are needed to configure the system.

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 illuminates.
3. Power on all other system components (e.g. computer and any other accessories).
4. Start the Instron Bluehill software. The first time the software runs, the configuration wizard displays.
5. Follow the instructions in the wizard screens to:
 - select the controller type and frame model
 - enter the System ID (located on a label on the frame)
 - enter the MAC address (located on a label adjacent to the Ethernet connector on the controller)
 - enter any additional information (e.g. service contract number)
 - select any accessories that are installed



If you need to change any of these settings at a later time, when you purchase an additional accessory for example, go to the Admin tab in Bluehill software.

Chapter 5

Maintenance

• Preventive Maintenance	5-1
• General Maintenance Procedures	5-6
• Troubleshooting for Load Cells	5-8
• Ancillary Parts	5-8

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.

Preventive Maintenance

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

To ensure that the frame 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.

Daily Maintenance Checks

Before operating the system each day, ensure:

- All cable connections are tight and secure.
- All grips, fixtures and accessories are free of dirt, damage and deformation.
- The load frame is level. If an adjustment is necessary, refer to “[Level the Load Frame](#)” on page 4-1.
- 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. If it does not, refer to [Table 5-1](#) on page 5-3 for lubrication recommendations.
- Test the limit stops to ensure they are in working order. Refer to “[Test Limit Stops](#)” on page 5-6.
- 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

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.

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

To clean the load frame, wipe exterior surfaces of the load frame with a moist cloth.

If your machine has a maximum capacity of 50 kN or greater (all floor models and some table models) and 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. If you regularly use a base adapter, then you do not need to lubricate this area (refer to “[Lubrication](#)” on page 5-3).

Lubrication

Table 5-1. Lubrication Requirements for Ballnuts

Recommended Lubricant	Interval	Instron Part Number
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	1000 ^a hours or 36 months of operating time ^b	105-1-1057 (small can of lubricant)

- a. If the system is used more than 100 hours per month, inspect the lubricated area periodically and increase lubrication frequency as required.
- b. Operating time is defined as time of crosshead movement, not the length of time the system has been powered on.

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 5-1](#) on page [5-3](#).

Inspect the ballscrew and lubricate more frequently 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.
- **Guide columns** - The guide columns require only a thin film of lubrication. It is recommended that the machine be re-lubricated every two years.

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.

The top and bottom ballscrew bearings are sealed and should never need lubrication.

Ballscrew Ballnuts

Warnings

**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. Refit covers as soon as possible.

**Entanglement Hazard - Keep hair and loose clothing clear of the ballscrews during this procedure.**

This procedure requires that you remove the bottom ballscrew cover, exposing a section of the ballscrew. Ensure that the power supply is disconnected during the procedure and reinstall the ballscrew covers immediately after the procedure is completed.

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 is not illuminating.
2. Detach the bottom ballscrew cover from the crosshead and slide it to the frame base. Refer to [Figure 5-1](#) on page 5-6 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 5-1](#). 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 the power switch to the On (**I**) position. Verify that the **POWER** indicator light 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. The **TEST IN PROGRESS** indicator light illuminates when the crosshead is moving.

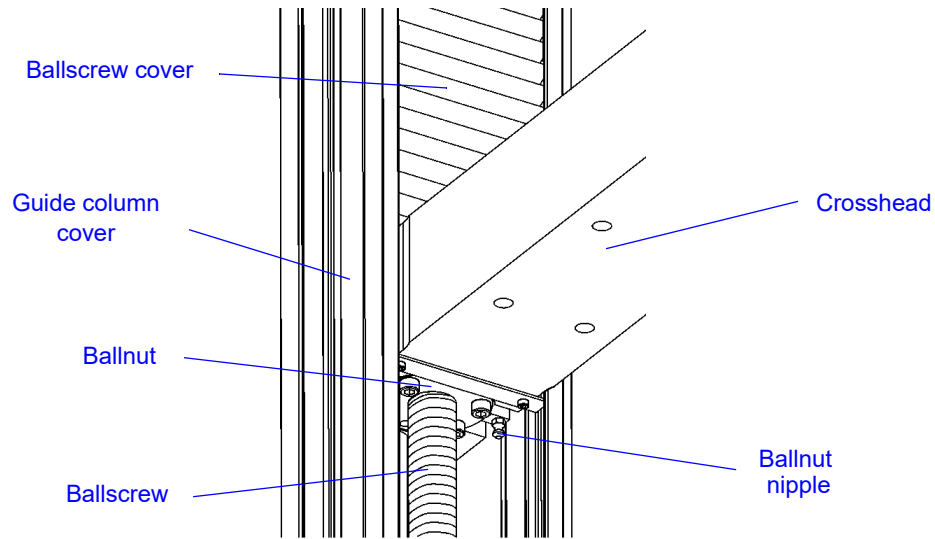


Figure 5-1. Ballscrew Lubrication Points

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 regional Instron office or check our web site at www.instron.com for assistance.

Test Limit Stops

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

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.

After testing the limit stops, you need to re-enable the load frame.

1. In Bluehill software, click in the console area to open the Load Frame Settings dialog.
2. Click the **Frame** tab.
3. Click **Enable frame**.
4. Click **Done** to close the dialog box. The **FRAME READY** light on the control panel illuminates when the frame is enabled.

Replace a Fuse

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.

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 does not illuminate.
2. Verify that the voltage setting is correct on the power input connector. Refer to “Set the Input Voltage” on page 4-2 if you need to change the line voltage.
3. Insert a small flat-head screwdriver into the slot indicated in Figure 5-2 on page 5-7 and pry out the fuse holder.

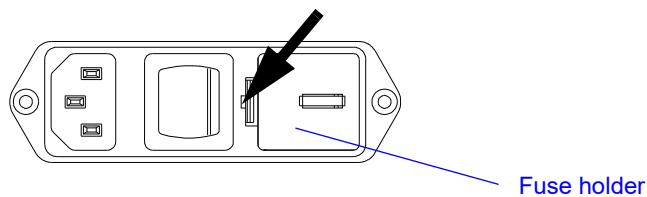


Figure 5-2. Prying out the fuse holder

4. Remove the fuse holder from the power input connector.
5. Install a new fuse in the holder. Spare fuses are supplied with the system. The fuse is a 10A, 250V, 5 x 20mm time lag fuse, Instron part number 27-2-233.
6. Re-insert the fuse holder into the power input connector.
7. Verify that the voltage selection is correct (refer to “[Set the Input Voltage](#)” on page 4-2).
8. Re-connect the power cable to the main power source and turn the power switch to the On (I) position. Verify that the **POWER** indicator light illuminates.

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.

Ancillary Parts

The following tables list the ancillary parts that are included with the system upon delivery. These components are either required to complete the installation, or facilitate setting up load cells and accessories on the load frame. Keep these components in a safe place.

Models 5965 and 5966

Table 5-2. 5965 and 5966 Ancillary Parts

Description	Part Number	Quantity	Purpose
Cable tie hook and loop	11-10-1027	5	Cable management
Cable clip, 6-12 mm	11-6-60	3	Secures cables to the frame
Screw, M10 x 70	201R239	1	Attaches 2580 Series load cells (500N, 1kN, 2kN and 5kN) to 5965 and 5966 frames
Screw, M16 x 80	201R312	1	Attaches 2580 Series load cell (10kN) to 5966 frame
Screw, M10 x 30	201V55	3	Attaches 2525 Series load cells
Screw, M10 x 40	201V57	3	Attaches 2525 Series load cells
Pin 3mm diameter, 10mm long	705K84	1	Load cell anti-rotation pin
Pin 3mm diameter, 12mm long	705K85	1	Load cell anti-rotation pin
Locating disc	T1335-1048	1	Load cell locating ring - 40mm - used for 2580 Series load cells (500N, 1kN, 2kN, 5kN)
Locating ring adapter	T604-101	1	Adapter for load cell locating ring - 40mm/20mm - used for 2580 Series load cells (10kN, 30kN, 50kN)
M10 spacer	T604-90	1	Use with M10 screws for load cell attachment
M16 washer	610J12	3	Use with M16 screws for load cell attachment
Fuse, 10A Time lag, 5 x 20mm glass high surge	27-2-233	2	Protection from electrical surges
Compression spring	66-5-6	1	Removes slack on lower grips with no checknut
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
8 mm bit - 1/2 drive	80-3-13	1	Torquing M10 bolts on various load string components

Table 5-2. 5965 and 5966 Ancillary Parts

Description	Part Number	Quantity	Purpose
Tool spanner, open 12/13 mm	80-4-25	1	Leveling the load frame
Tool socket driver	80-3-50	1	Used to attach 2580 Series load cell (10kN) to 5966 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
Ground cable	A712-213	1	Used to connect the frame to a suitable ground where the mains power supply is not grounded
Cable Ethernet Cat5E 10ft Crossover	144-1-1052	1	Connects the frame controller to the computer
Converter Type D to Type O	2501-346	1	Allows use of accessories with Type O interface.
Additional parts for frames with second test space only:			
Screw, M10 x 70	201R239	1	Attaches 2580 Series load cells (500N, 1kN, 2kN and 5kN) to 5965 and 5966 frames
Screw, M16 x 75	201R311	1	Attaches 2580 Series load cell (10kN) to 5966 frame
Screw, M10 x 30	201V55	3	Load cell attachment
M10 spacer	T604-90	1	Use with M10 screws for load cell attachment
M16 washer	610J12	1	Use with M16 screws for load cell attachment
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Pin 3mm diameter, 10mm long	705K84	1	Load cell anti-rotation pin
Pin 3mm diameter, 12mm long	705K85	1	Load cell anti-rotation pin
Retainer clip for 1/2 diameter pin	T1223-1053	1	Prevents the grip coupling pin from sliding out during testing

Table 5-2. 5965 and 5966 Ancillary Parts

Description	Part Number	Quantity	Purpose
Locating disc	T1335-1048	2	Load cell locating ring - 40mm - used for 2580 Series load cells (500N, 1kN, 2kN, 5kN)
Locating ring adapter	T604-101	1	Adapter for load cell locating ring - 40mm/20mm - used for 2580 Series load cells (10kN, 30kN, 50kN)
Crosshead Clevis - Type D	T1209-1138	1	Connects grips and fixtures to top of crosshead
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling
Converter Type D to Type O	2501-346	1	Allows use of accessories with Type O interface.

Models 5967 and 5969

Table 5-3. 5967 and 5969 Ancillary Parts

Description	Part Number	Quantity	Purpose
Cable tie hook and loop	11-10-1027	5	Cable management
Cable clip, 6-12 mm	11-6-60	3	Secures cables to the frame
Screw, M10 x 120	201R246	1	Attaches 2580 Series load cells (500N, 1kN, 2kN and 5kN) to 5967 and 5969 frames
Screw, M16 x 120	201R317	1	Attaches 2580 Series load cells (10kN, 30kN and 50kN) to 5987 and 5989 frames.
Screw, M10 x 30	201V55	3	Attaches 2525 Series load cells
Screw, M10 x 40	201V57	3	Attaches 2525 Series load cells
Pin 3mm diameter, 10mm long	705K84	1	Load cell anti-rotation pin
Pin 3mm diameter, 12mm long	705K85	1	Load cell anti-rotation pin
Locating disc	T1335-1048	1	Load cell locating ring - 40mm - used for 2580 Series load cells (500N, 1kN, 2kN, 5kN)

Table 5-3. 5967 and 5969 Ancillary Parts

Description	Part Number	Quantity	Purpose
Locating ring adapter	T604-101	1	Adapter for load cell locating ring - 40mm/20mm - used for 2580 Series load cells (10kN, 30kN, 50kN)
M10 spacer	T604-90	1	Use with M10 screws for load cell attachment
M16 washer	610J12	3	Use with M16 screws for load cell attachment
Fuse, 10A Time lag, 5 x 20mm glass high surge	27-2-233	2	Protection from electrical surges
Compression spring	66-5-6	1	Removes slack on lower grips with no checknut
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
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
Tool socket driver	80-3-50	1	Used to attach 2580 Series load cell (10kN) to 5966 frame
Torque wrench	80-9-9	1	Provides correct installation torque for load cell attachment screw
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
Ground cable	A712-213	1	Used to connect the frame to a suitable ground where the mains power supply is not grounded
Cable Ethernet Cat5E 10ft Crossover	144-1-1052	1	Connects the frame controller to the computer
Converter Type D to Type O	2501-346	1	Allows use of accessories with Type O interface.

Table 5-3. 5967 and 5969 Ancillary Parts

Description	Part Number	Quantity	Purpose
Additional parts for frames with second test space only:			
Screw, M10 x 70	201R239	1	Attaches 2580 Series load cells (500N, 1kN, 2kN and 5kN) to 5965 and 5966 frames
Screw, M16 x 75	201R311	1	Attaches 2580 Series load cell (10kN) to 5966 frame
Screw, M10 x 30	201V55	3	Load cell attachment
M10 spacer	T604-90	1	Use with M10 screws for load cell attachment
M16 washer	610J12	1	Use with M16 screws for load cell attachment
Compression spring 3/4 OD x 2 in length	66-4-5	1	Removes slack on lower grips with no checknut
Pin 3mm diameter, 10mm long	705K84	1	Load cell anti-rotation pin
Pin 3mm diameter, 12mm long	705K85	1	Load cell anti-rotation pin
Retainer clip for 1/2 diameter pin	T1223-1053	1	Prevents the grip coupling pin from sliding out during testing
Locating disc	T1335-1048	2	Load cell locating ring - 40mm - used for 2580 Series load cells (500N, 1kN, 2kN, 5kN)
Locating ring adapter	T604-101	1	Adapter for load cell locating ring - 40mm/20mm - used for 2580 Series load cells (10kN, 30kN, 50kN)
Crosshead Clevis - Type D	T1209-1138	1	Connects grips and fixtures to top of crosshead
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling
Converter Type D to Type O	2501-346	1	Allows use of accessories with Type O interface.

Index

A	
accessibility	2-5
accreditations	2-6
B	
ballscrew ballnuts	
lubricating	5-5 to 5-6
C	
CE accreditation	2-6
ceiling clearance	2-5
changing a fuse	5-7
checklist	2-23
checks	
daily maintenance	5-2
chromium	2-7
cleaning	5-3
connecting optional accessories	4-10
connecting system components	4-5 to 4-9
contact information	1-8, 2-24
crosshead	
travel limits, testing	5-6
customer responsibilities	2-1
D	
daily maintenance checks	5-2
digital phone lines	2-5
dimensions	
optional configurations	2-11
packaging	3-2 to 3-3
dimensions, standard configuration	2-11
documentation	2-3
E	
environmental conditions	2-5
environmental impact	2-7
environmental specifications	2-6
F	
floor loading	2-4
frame	
dimensions, standard configuration	2-11
optional combinations	2-11
optional specifications	2-11
fuse replacement	5-7
G	
general maintenance	
fuse replacement	5-7
I	
impact, environmental	2-7
initial operation of the system	2-3
installation	
changing a fuse	5-7
connecting optional accessories	4-10
connecting system components	4-5 to 4-9
Instron's responsibilities	2-3
leveling	4-1
setting input voltage	4-3 to 4-5
Instron	
contact information	1-8, 2-24
product support	1-8
Instron responsibilities	2-2
insurance	
customer's responsibilities	2-2
Instron's responsibilities	2-2
L	
labeling	
safety and information	1-6 to 1-7
lead, brominated fire retardants	2-7
leveling the load frame	4-1

M

limit stops	
testing	5-6
load cells	
troubleshooting	5-8
load frame	
dimensions, standard configuration	2-11
leveling	4-1
optional combinations	2-11
optional specifications	2-11
lubricating	
ballscrew ballnuts	5-5 to 5-6
lubrication	5-5 to 5-6

M

maintenance	
cleaning	5-2 to 5-3
daily checks	5-2
fuse replacement	5-7
inspection	5-2
lubricating the ballscrew ballnuts	5-5 to 5-6
lubrication	5-5 to 5-6
testing limit stops	5-6
maintenance schedule	5-1
materials disposal	2-2
moving, dual column frames	
frame base method	3-6 to 3-7
moving, frames	
crane method	3-8 to 3-9
crosshead method	3-7 to 3-8

N

network access	2-5
network drops	2-5
noise levels	2-7

O

optional accessories	
connecting	4-10
optional frame combinations	2-11
optional frames	

specifications	2-11
--------------------------	------

P

packaging dimensions	3-2 to 3-3
power requirements	2-8
power supply	2-4
preparation checklist	2-23
preventive maintenance	
cleaning	5-3
daily checks	5-2
inspection	5-2
lubrication	5-5 to 5-6
product support	1-8

R

remote system access	2-5
replacing a fuse	5-7
responsibilities	
customer	2-1
Instron	2-2
routine maintenance	2-5

S

safety and information labeling	1-6 to 1-7
safety limits	
testing	5-6
setting input voltage	4-3 to 4-5
site preparation checklist	2-23
site requirements	2-3
specifications	
dimensions	2-11
environmental	2-6
noise levels	2-7
power requirements	2-8
weight, optional configuration models	2-18
weight, standard configuration models	2-17
support	1-8
system components	
connecting	4-5 to 4-9

system power requirements 2-8

T

table loading 2-4

technical support 1-8

telephone access 2-5

testing safety limits 5-6

transporting procedures, frames

 crane method 3-8 to 3-9

 crosshead method 3-7 to 3-8

 frame base method 3-6 to 3-7

travel limits

 testing 5-6

troubleshooting load cells 5-8

U

unpacking

 frames 3-3 to 3-4

V

voltage

 setting 4-3 to 4-5

voltage requirements 2-8

W

weight specifications

 optional configuration models 2-18

 standard configuration models 2-17

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