

## 5940 Series Single 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

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**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

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### **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

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**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.

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# Chapter 1

## Introduction

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- System Components and Interconnections. . . . . 1-5
- System Safety and Information Labeling. . . . . 1-6
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These instructions include information about:

- 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

## System Description and Terminology

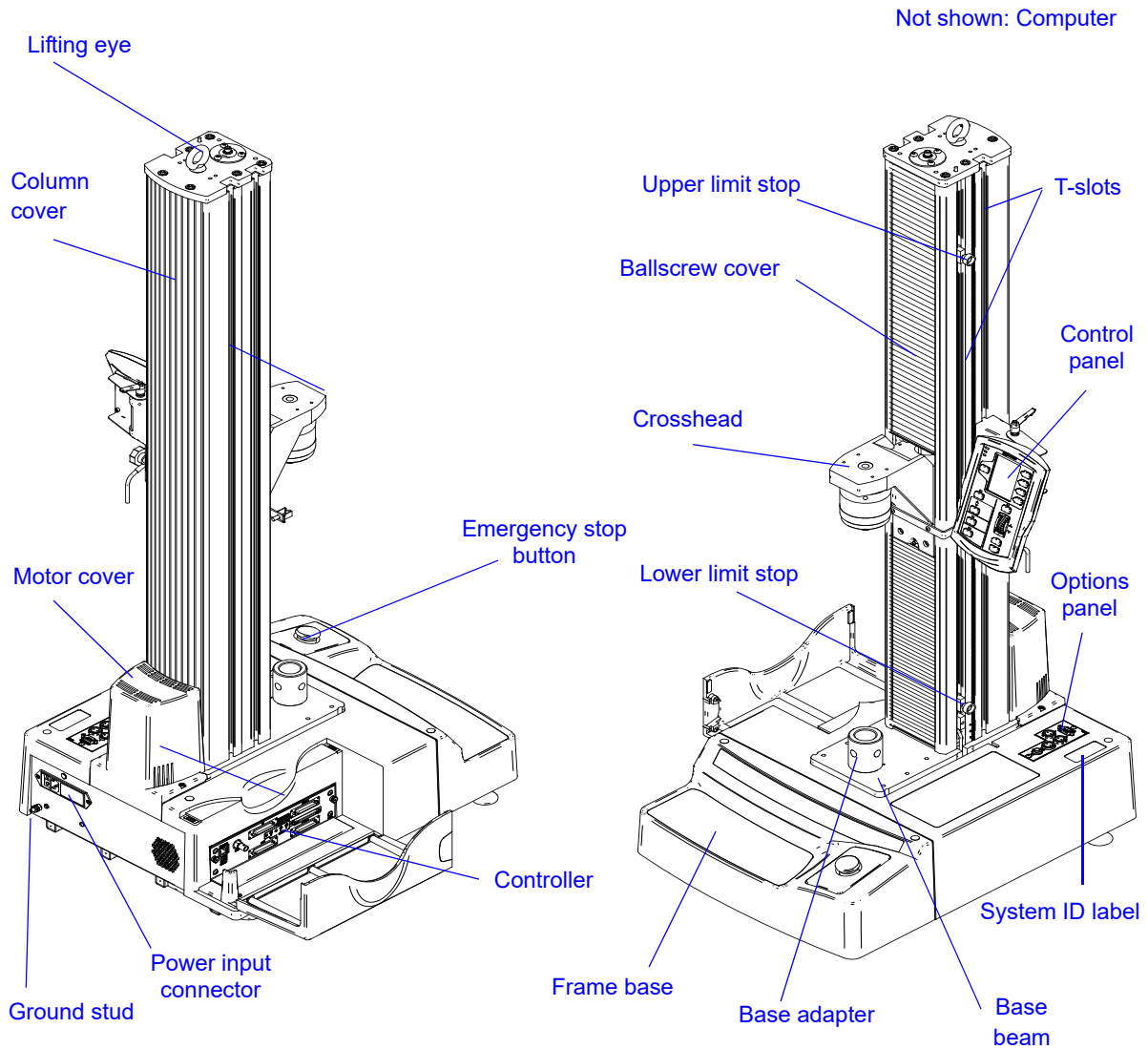


Figure 1-1. 5940 Single Column Table Frame

### 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](http://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	<p>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.</p> <p>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.</p>
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	<p>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.</p> <p>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.</p>
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*

<b>Term</b>	<b>Description</b>
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 1-2 on page 1-5 shows you how each hardware component is connected to make up the complete testing system.

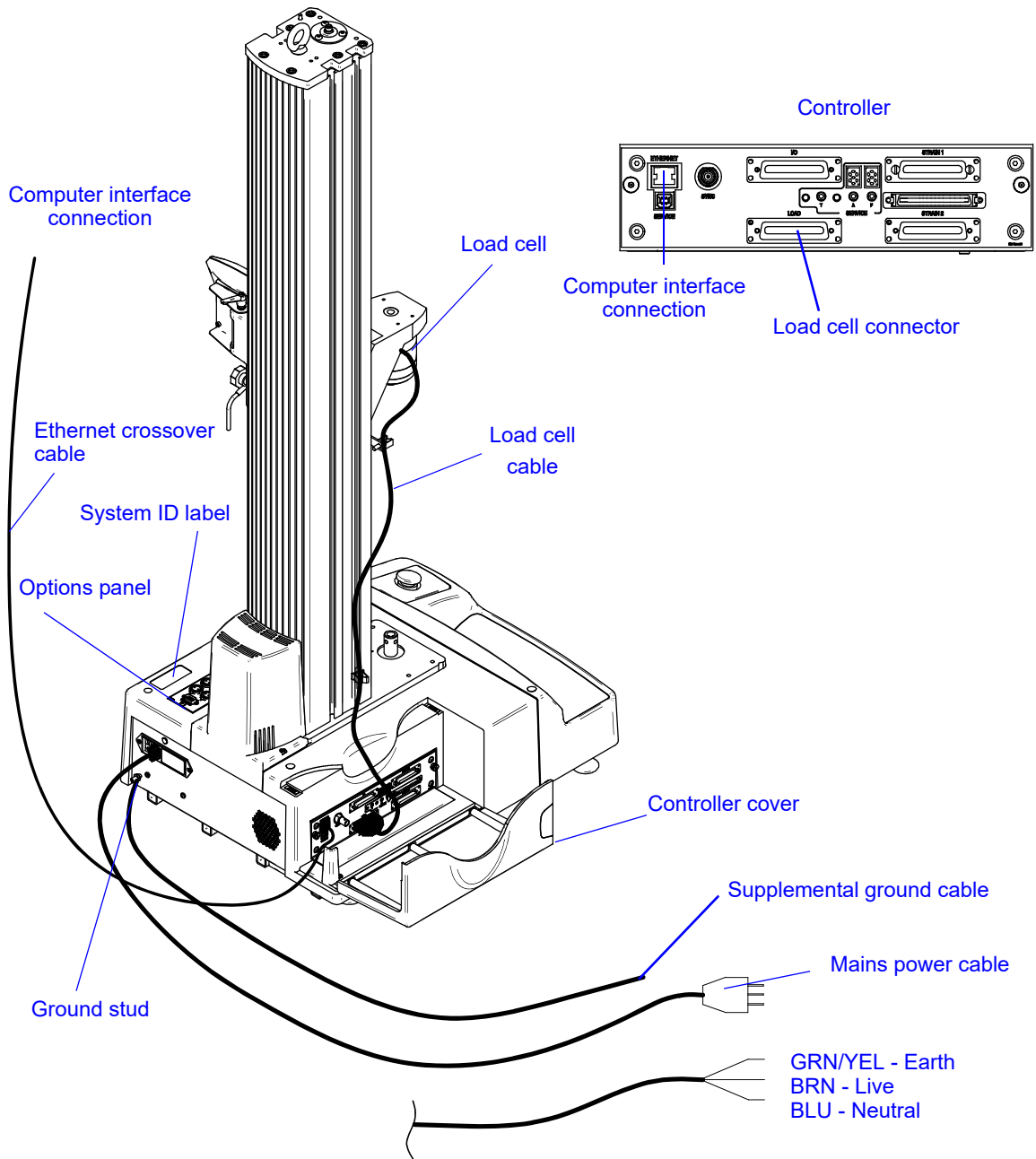


Figure 1-2. 5940 System Connections

## 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*



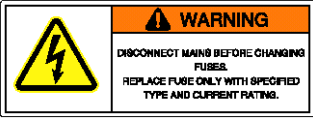








Label	Meaning	Purpose
	Electrical hazard	Indicates that an electrical hazard exists from high voltage or electrical current.
	Disconnect power supply	Disconnect the power supply before servicing machine.
	Electrical - fuse warning	Indicates an electrical hazard exists. Advises about disconnecting power 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](http://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](mailto:info_dev@instron.com) with your comments.

# Chapter 2

## Requirements and Specifications

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## 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

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**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*

<b>Parameter</b>	<b>Specifications</b>
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 5940 System Power Requirements

Parameter	Specification	
	5942/5943	5944
Maximum Power (VA)	250	300
Single Phase Voltage (Vac) ( $\pm 10\%$ )	100, 120, 220 <sup>a</sup> , 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

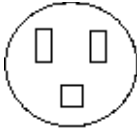


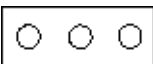



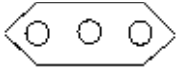
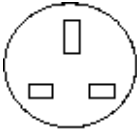
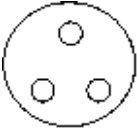
Power cord designation	Matching receptacle	Locale
P1		USA and Canada
P2		Denmark
P3		Europe
P4	 and 	Italy
P5		China
P6		Australia and New Zealand

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

## Load Frame Weights

Table 2-4. Load Frame Weights

Model Number	Weight of Load Frame
5942	43.1 kg (95 lb)
5943	54.4 kg (120 lb)
5944	54.4 kg (120 lb)

## Series 5940 Dimensions

Load frame dimensions for single column table model load frames are listed in [Table 2-5](#) on page 2-11. See [Figure 2-1](#) on page 2-12 to match the letter designations in the table.

*Table 2-5. Series 5940 Load Frame Dimensions*

Letter Designation	Description	Dimension - mm (inch)		
		5942	5943	5944
A	Overall height	986 (38.8)	1383 (54.5)	1383 (54.5)
B	Overall width	459 (18.1)		
C	Overall depth	614 (24.2)		
D	Throat depth daylight	100 (4.0)		
E	Vertical test daylight * Maximum Minimum	726 (28.6) 238 (9.4)	1123 (44.2) 238 (9.4)	1123 (44.2) 238 (9.4)
	*From the base to the underside of the crosshead			
F	Total crosshead travel	490 (19.29)	890 (35)	890 (35)
G	Base beam to coupling pin Type O adapter Type D adapter	22 (.87) 35 (1.38)	22 (.87) 35 (1.38)	22 (.87) 35 (1.38)
J	Space required to open controller door	148 (5.8)		
R	Column to the right side of the base	150 (6.2)		

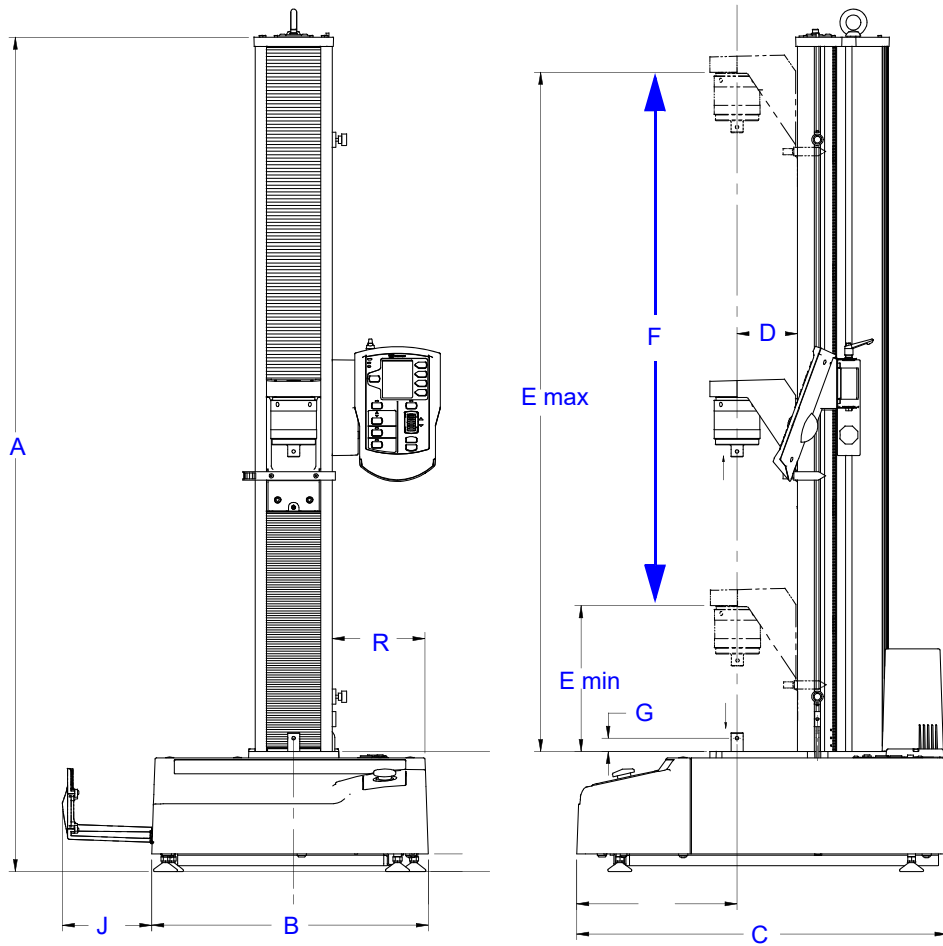


Figure 2-1. Series 5940 Load Frame Dimensions

# 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.

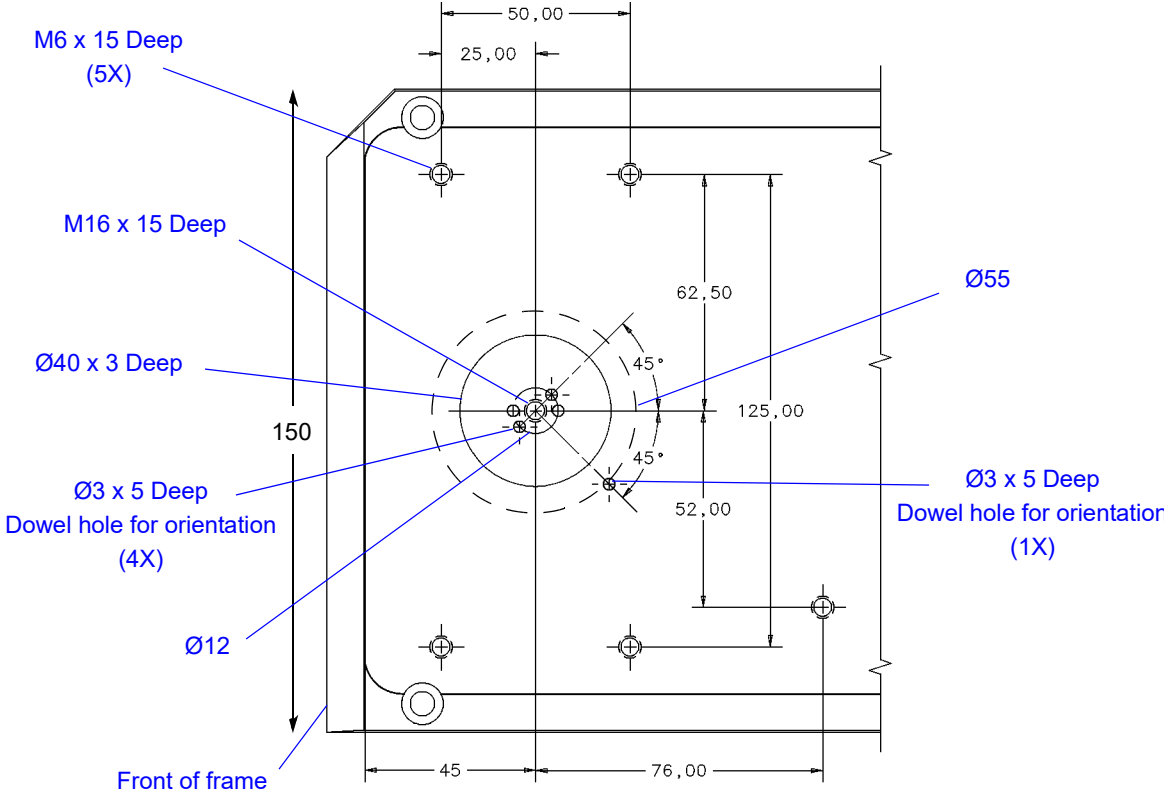


Figure 2-2. Base Beam Mounting Dimensions

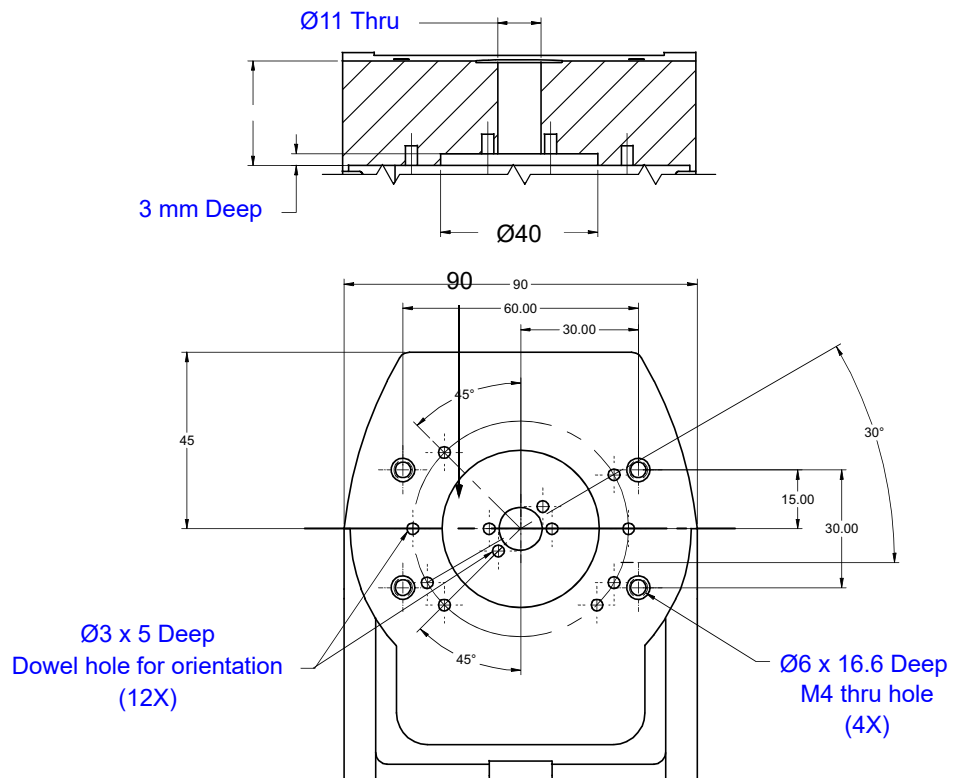


Figure 2-3. Crosshead Mounting Dimensions



## 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 5940 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 2-10.
- ❑ 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 <a href="http://www.instron.com">www.instron.com</a> .
In the United States & Canada:	1-800-473-7838

# Chapter 3

## Lifting and Handling

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- General Handling Precautions . . . . . 3-1
- Packaging Dimensions . . . . . 3-2
- Transporting Single Column Frames . . . . . 3-3

---

### 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

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**Hazard - do not lift the frame using anything other than the eyebolt on the top of the frame. In particular, the base covers cannot support the weight of the frame. The base covers could break and cause personal injury and equipment damage if you try to lift the frame by pulling upwards on the covers**



**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 5940 Frame Models*

<b>Length</b>	<b>Width</b>	<b>Height</b>	<b>Packaged Weight</b>
660 mm 26 in	1118 mm 44 in	1778 mm 70 in	125 kg 276 lb

# Transporting Single 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 crane.
- There are no loose accessories on the shipping skid.
- The frame and forklift can fit through all doorways, halls, elevators or stairs from the shipping dock to its final site location. If you transfer the load frame while it is still in its packaging, refer to the dimensions for your frame 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 in the applicable Specifications section of this manual.
- You have adequate packaging materials to protect the load frame when moving or relocating it to another site. Contact Instron’s Service Department to determine the appropriate packaging requirements for your model type.

## Equipment

- A forklift with a load rating that is double the load frame's gross weight.
- Sharp knife.
- Cutter for the steel strapping.
- A crane with a load rating that is double the load frame’s gross weight to lift the frame into its final operating location.

## Procedure

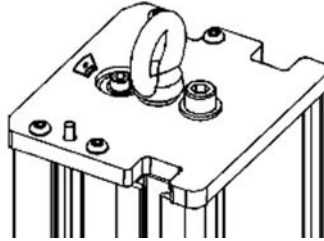
To unpack and position the load frame:

1. Use a forklift to carry the container to the testing area. Refer to “General Handling Precautions” for guidelines and warnings.
2. Place the load frame carton near its final operating location.
3. Cut the strapping that secures the load frame carton to the wooden pallet.

4. Open the top of the load frame carton and remove the packing material.
5. Use the packing list to inventory all the items. Some accessories may be in the container with the load frame or may be packaged separately.

Do not open any of the packing boxes. The packing list will indicate the total number of boxes that are included in the shipment. Count the number of boxes you received to make sure you have the correct number of boxes. Do not open these boxes until the Instron service representative arrives to install your testing system. This ensures that no parts are lost prior to installation.

6. Insert the crane hook into the eyebolt on top of the frame column (see [Figure 3-1](#) on page 3-4).



*Figure 3-1. Eyebolt for lifting the frame*



*For some systems, the eyebolt is removed prior to shipping. If the eyebolt is missing from your machine, it will be packed in an envelope inside one of the unsealed boxes, usually in the box that contains the system documentation. Screw the eyebolt into the top of the frame column as shown in [Figure 3-1](#) on page 3-4.*

7. Slowly and carefully lift the frame clear of the wooden pallet.
8. Move the frame to its operating location.
9. Place the load frame carefully into position.
10. Retain all packing materials until the system is satisfactorily installed and all parts, assemblies and accessories have been located.

# Chapter 4 Installation

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- Level the Load Frame. . . . . 4-1
  - Set the Input Voltage . . . . . 4-2
  - Connect the System Components. . . . . 4-6
  - Connect Optional Accessories . . . . . 4-11
  - First Time Startup. . . . . 4-12
- 

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

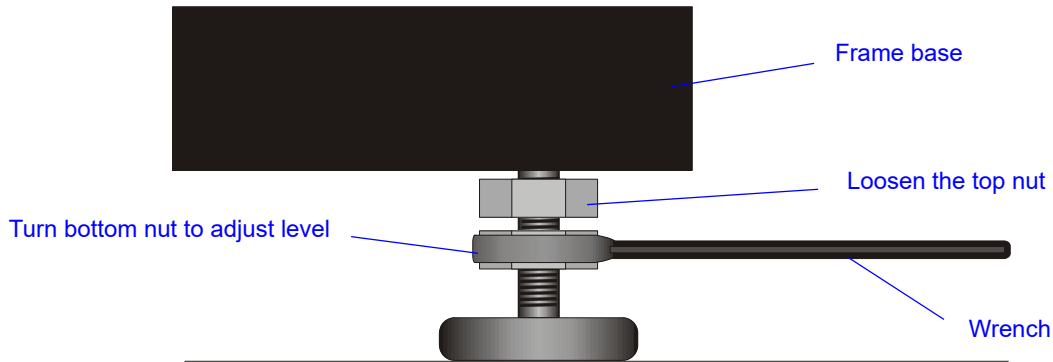


Figure 4-1. Adjusting a Leveling Foot

## 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.



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## Warning

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**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.

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## Caution

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**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.

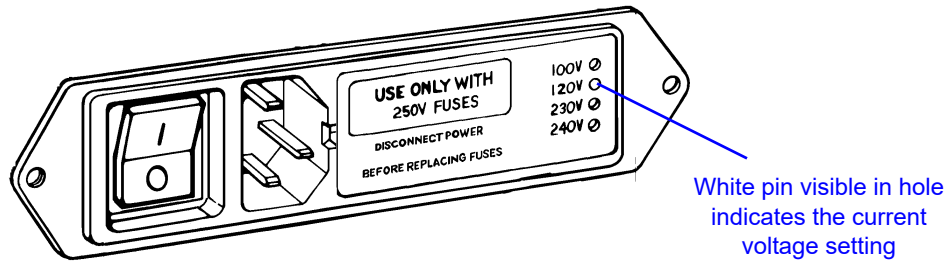


*Some line voltage selector units may read 230 V (instead of 220 V) on the external face and on the internal card. These units are interchangeable and can be used as the 220 V selection.*

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. There are four holes in a vertical line at the right side of the connector, each corresponding to a different line voltage. The current voltage setting is indicated by a white plastic pin visible in one of the holes, as shown in [Figure 4-2](#).



*Figure 4-2. Power Input Connector with Voltage Setting*

### Change the Voltage Setting

Tools you need for this procedure:

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

## Warnings

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**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 is not illuminating.
2. Insert a small flat-head screwdriver into the middle of the connector and pry out the fuse holder, as shown in [Figure 4-3](#).
3. Remove the fuse holder from the power input connector, as shown in [Figure 4-4](#).

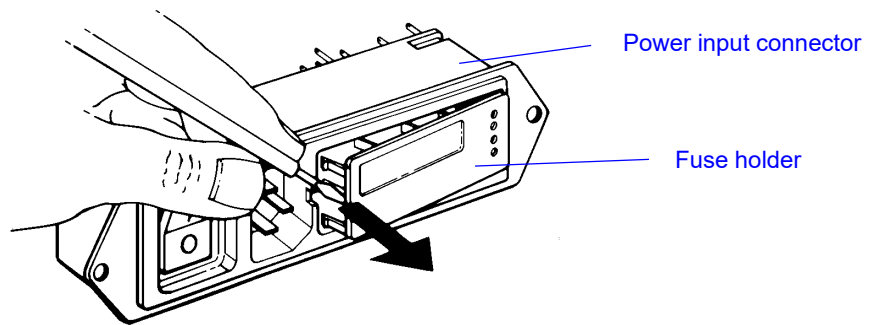


Figure 4-3. Prying Out the Fuse Holder

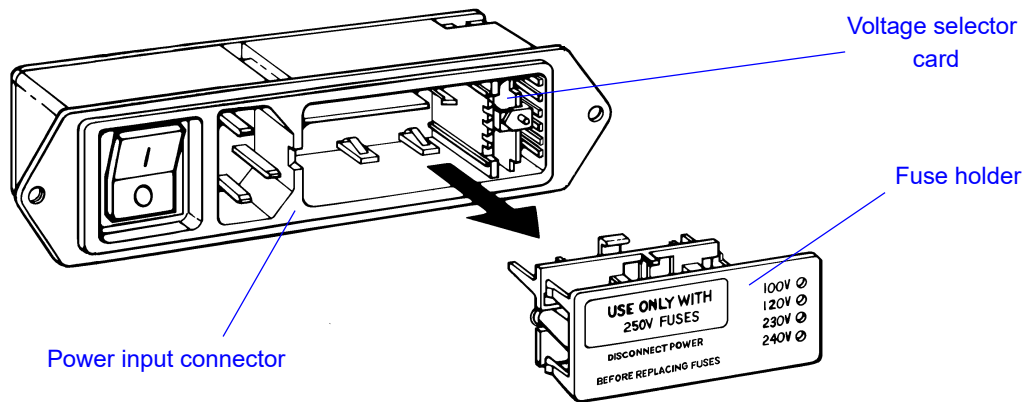


Figure 4-4. Removing the Fuse Holder

4. Remove the voltage selector card using long nose pliers as shown in Figure 4-5.

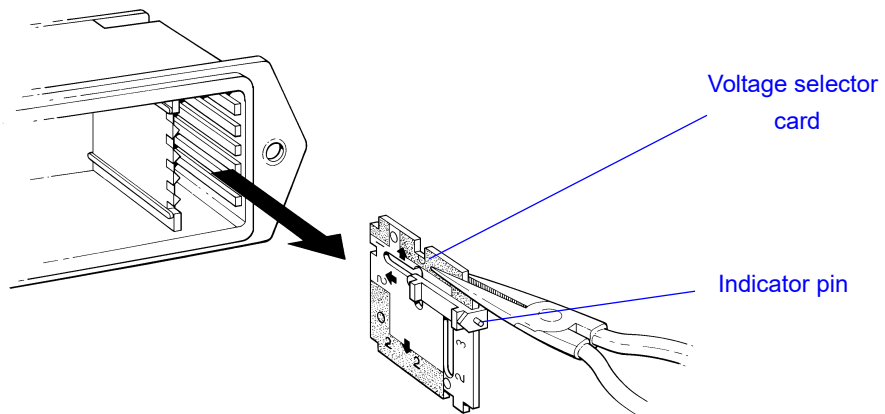
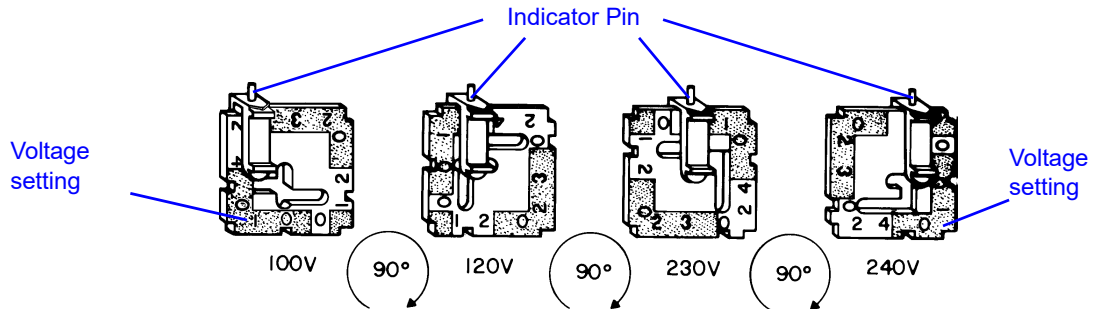


Figure 4-5. Removing the Voltage Selector Card

5. Position the voltage selector card so that the indicator pin points up, as shown in [Figure 4-5](#).
6. Holding the pin in this position, rotate the card until the required voltage setting shows at the bottom of the card, as shown in [Figure 4-6](#).



*Figure 4-6. Selecting the Line Voltage Setting*

7. Re-insert the card into the connector with the indicator pin pointing away from the connector. Ensure the card is fully seated.
8. If necessary, change the fuse in the holder. Refer to [“Replace a Fuse”](#) on page 5-9 for replacing a fuse.
9. Re-install the fuse holder into the connector. Ensure that the indicator pin now indicates the correct input voltage. See [Figure 4-2](#) on page 4-4 for reference.
10. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light illuminates.
11. Before you do any testing, perform the procedure [“First Time Startup”](#) on page 4-12.

## 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.

1. Ensure that the power switch is set to Off (O) 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.
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 4-12 for instructions.

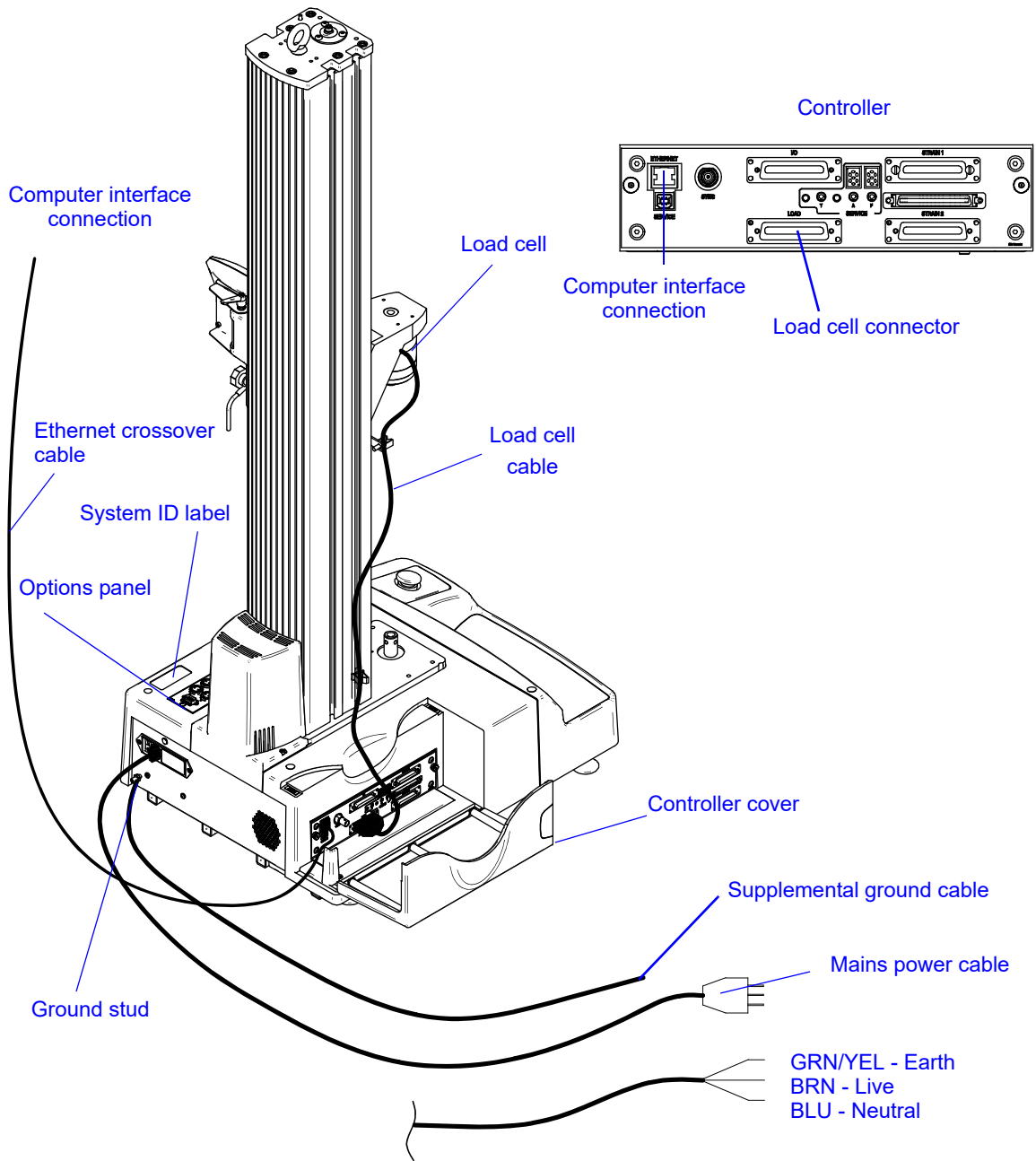


Figure 4-7. 5940 System Connections

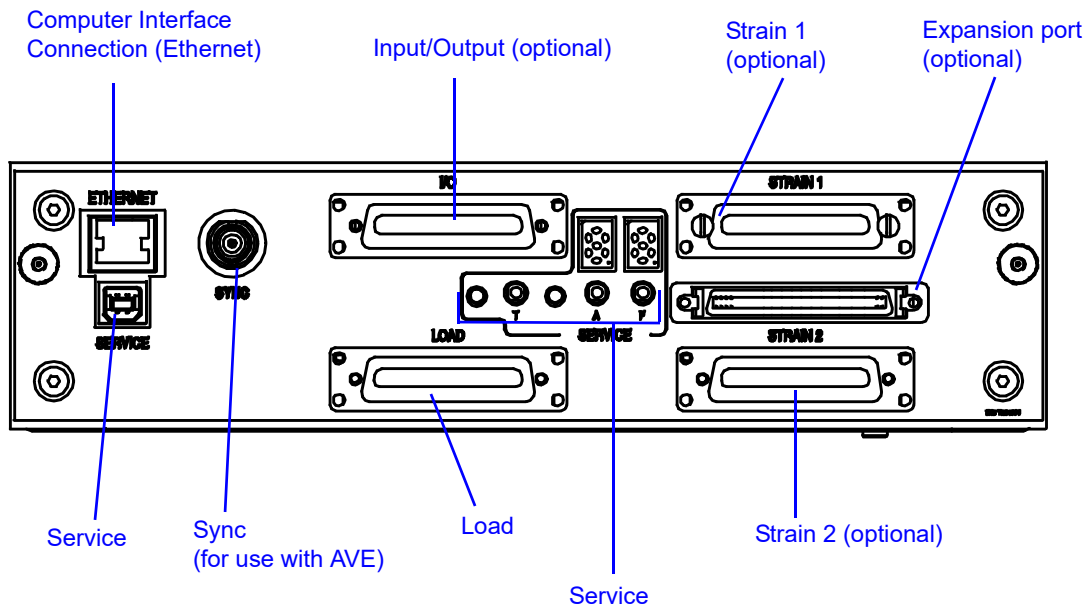


Figure 4-8. 5940 Controller Connections



## 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.*

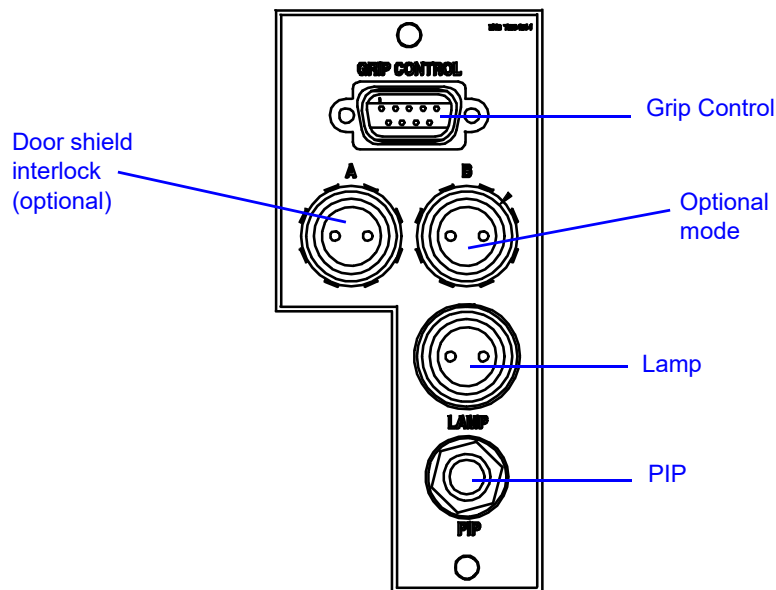


Figure 4-9. 5940 Options Panel

## 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 . . . . . 5-8
  - Troubleshooting for Load Cells . . . . . 5-10
  - Ancillary Parts . . . . . 5-10
- 

### Warnings

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**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 5-8.
- 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 <sup>a</sup> hours or 36 months of operating time <sup>b</sup>	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.
- **Linear Guide Carriages** - These should be lubricated at the same time as the ballnuts.
  - **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

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**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.

To lubricate the ballscrew ballnut:

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. Remove the black cover on the front of the crosshead to expose the grease nipple. Refer to [Figure 5-1](#) on page 5-6 to locate the grease nipple on the crosshead.
3. Use a grease gun to apply the grease into the grease nipple as shown in [Figure 5-1](#) on page 5-6.
4. Fill the ballnut until grease oozes from the bottom of the ballnut. Wipe away the excess grease.
5. Re-attach the black cover onto the grease nipple.
6. Re-connect the power cable to the main power source and turn on the system. 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 entire length of the ballscrew shaft.
8. Before you do any testing, perform the procedure “[First Time Startup](#)” on page 4-12.

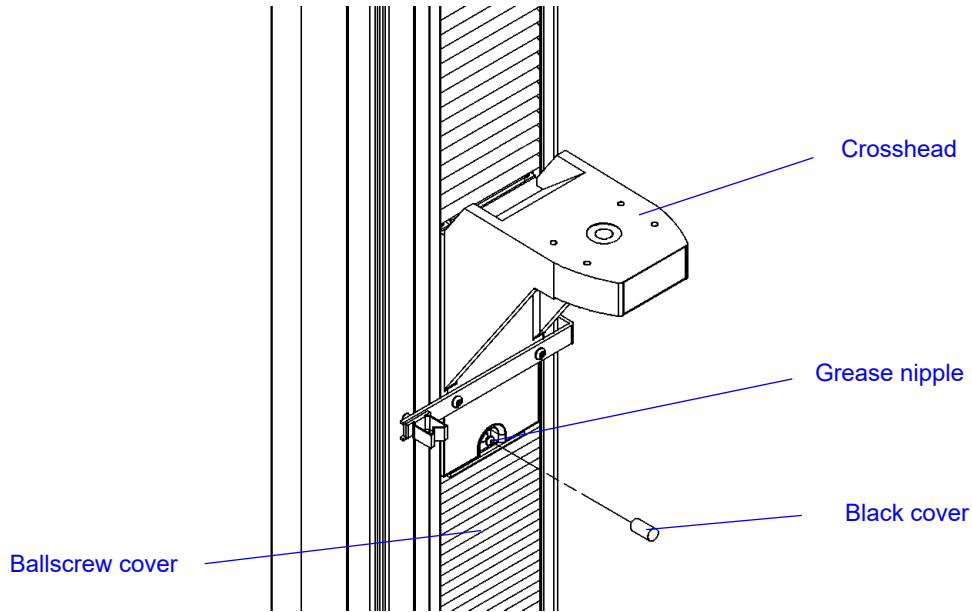


Figure 5-1. Lubricating the Ballnut

## Linear Guide Carriages

### Warnings

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**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.



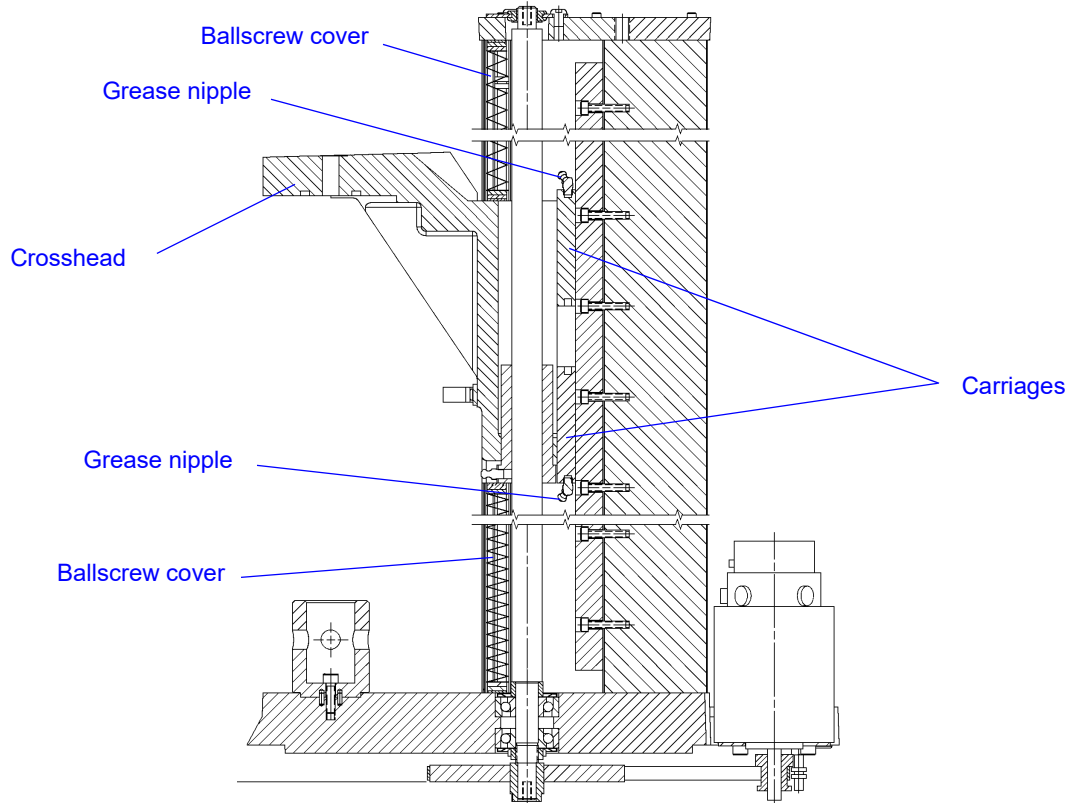
**Entanglement Hazard - Keep hair and loose clothing clear of the ballscrews during this procedure.**

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.

On some single column table models, the linear guide column must also be lubricated periodically, based on the same schedule as the ballscrew ballnut. There are two carriages that carry the crosshead along the linear guide column. These two carriages contain grease that lubricates the guide column as they travel along the guide column. Each carriage has its



own grease nipple. One is located above the crosshead (behind the ballscrew cover) and the other is located below the crosshead.



*Figure 5-2. Lubricating the Linear Guide Carriages*

To lubricate the linear guide column:

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. Detach the ballscrew covers from the crosshead and slide them away from the crosshead. Refer to [Figure 5-2](#) on page 5-7 to locate the grease nipple on each carriage.
3. Use a grease gun to apply the grease into the grease nipple. It is not necessary to remove the guide column cover.
4. Fill each carriage until grease oozes from them. Wipe away the excess grease.
5. Re-attach the ballscrew covers to the crosshead.
6. Re-connect the power cable to the main power source and turn on the system. Verify that the **POWER** indicator light illuminates.

7. Use the jog controls to move the crosshead over the full stroke of the frame to distribute the grease and coat the entire length of the linear guide column.
8. Before you do any testing, perform the procedure “[First Time Startup](#)” on page 4-12.

## 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](http://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

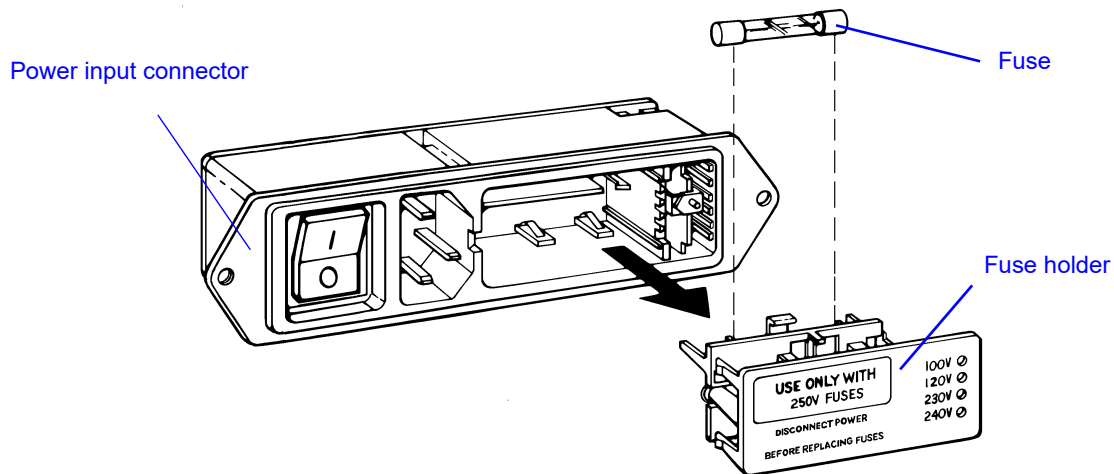


**Electrical Hazard - Shut down the system and disconnect the power cable from the main power source before replacing a fuse. Dangerous voltages can cause personal injury.**

### 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 middle of the connector and pry out the fuse holder. Refer to “[Setting the Input Voltage](#)” in chapter 4 for more detailed instructions on locating and removing the fuse holder.
4. Remove the fuse as shown in [Figure 5-3](#) on page 5-9.



*Figure 5-3. Removing the Fuse from the Fuse Holder*

5. Install a new fuse in the holder. Spare fuses are supplied with the system. The fuse is a 3.0A, 250V slo blow fuse, Instron part number 27-2-40.

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 on the system. Verify that the **POWER** indicator light illuminates.
9. Before you do any testing, perform the procedure “First Time Startup” on page 4-12.

## 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

Table 5-2 on page 5-11 lists 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.

Table 5-2. 5940 Series Ancillary Parts

Description	Part Number	Quantity	Purpose
Cable tie hook and loop	11-10-1027	1	Cable management
Cable clip, 6-12 mm	11-6-60	6	Secures cables to the frame
Screw, M6 x 25	201V35	1	Attaches base adapter to frame
Screw, M10 x 40	201S233	2	Attaches 2580 Series and 2530 Series load cells 5940 Series frames
Pin 3mm diameter, 10mm long	705K84	5	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)
M6 load washer	T604-235	1	Adapter for M6 screws
Fuse, 3A Time lag, 6.3 x 32mm	27-2-40	2	Protection from electrical surges
M10 washer	610J9	2	Use with M10 screws for load cell attachment
Compression spring	66-5-6	2	Removes slack on lower grips with no checknut
Compression spring	66-1-1080	2	
Hex wrench key set, 1.5 to 10 mm	80-1-1011	1	Tools for maintaining the frame and installation of accessories
Retainer clip for 1/2 diameter pin	T1223-1053	1	Prevents the grip coupling pin from sliding out during testing
Accessories slot T-nut	T1697-1307	6	Installing accessories onto the column cover
Retaining pin, grip coupling	T29-515	1	Secures the grip coupling
Clevis pin clip	T1223-1031	2	Secures the clevis pin
Clevis pin	T1223-1034	2	Attaches grips or other accessories to clevis
Base adapter Type D	T581-48	1	Use with accessories featuring a D clevis

*Table 5-2. 5940 Series Ancillary Parts*

<b>Description</b>	<b>Part Number</b>	<b>Quantity</b>	<b>Purpose</b>
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

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Product Support: [www.instron.com](http://www.instron.com)