



# Model 68FM-100 Dual Column Floor Model



## Preinstallation Manual

M10-17543-EN Revision E

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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 product safety risk assessment.

## Warnings

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**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.



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

Installation or removal of a specimen, assembly, structure, or load string component involves working inside the hazard area between the grips or fixtures. When working in this area, ensure that other personnel cannot operate any of the system controls. Keep clear of the jaws of a grip or fixture at all times. Keep clear of the hazard area between the grips or fixtures during actuator or crosshead movement. Ensure that all actuator or crosshead movements necessary for installation or removal are slow and, where possible, at a low force setting.



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

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



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

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

## Warnings

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

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



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

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



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

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



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

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



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

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

## Warnings

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**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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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
- system performance specifications for this frame model

Refer to the Operator's Guide for instructions on connecting system components, system configuration, running tests, and performing routine maintenance of the system.

## System Description and Terminology

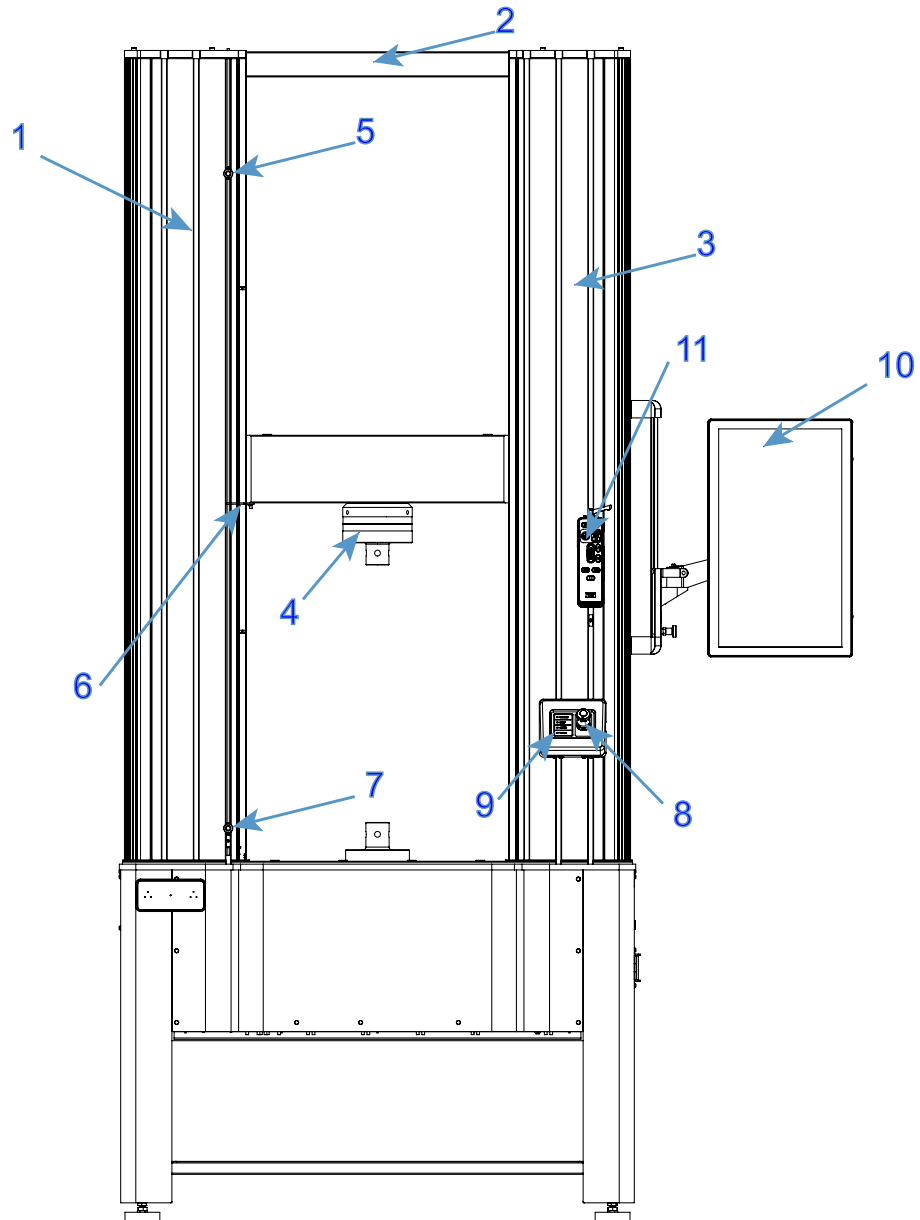


Figure 1. 68FM-100 Floor Model with Bluehill® Operator Dashboard - Front View

Legend for Figure 1

Label	Component
1	T-slots
2	Top plate
3	Column cover
4	Load cell
5	Upper limit switch
6	Limit switch actuator
7	Lower limit switch
8	Emergency stop button
9	Indicator panel
10	Bluehill® Operator Dashboard (optional)
11	Handset

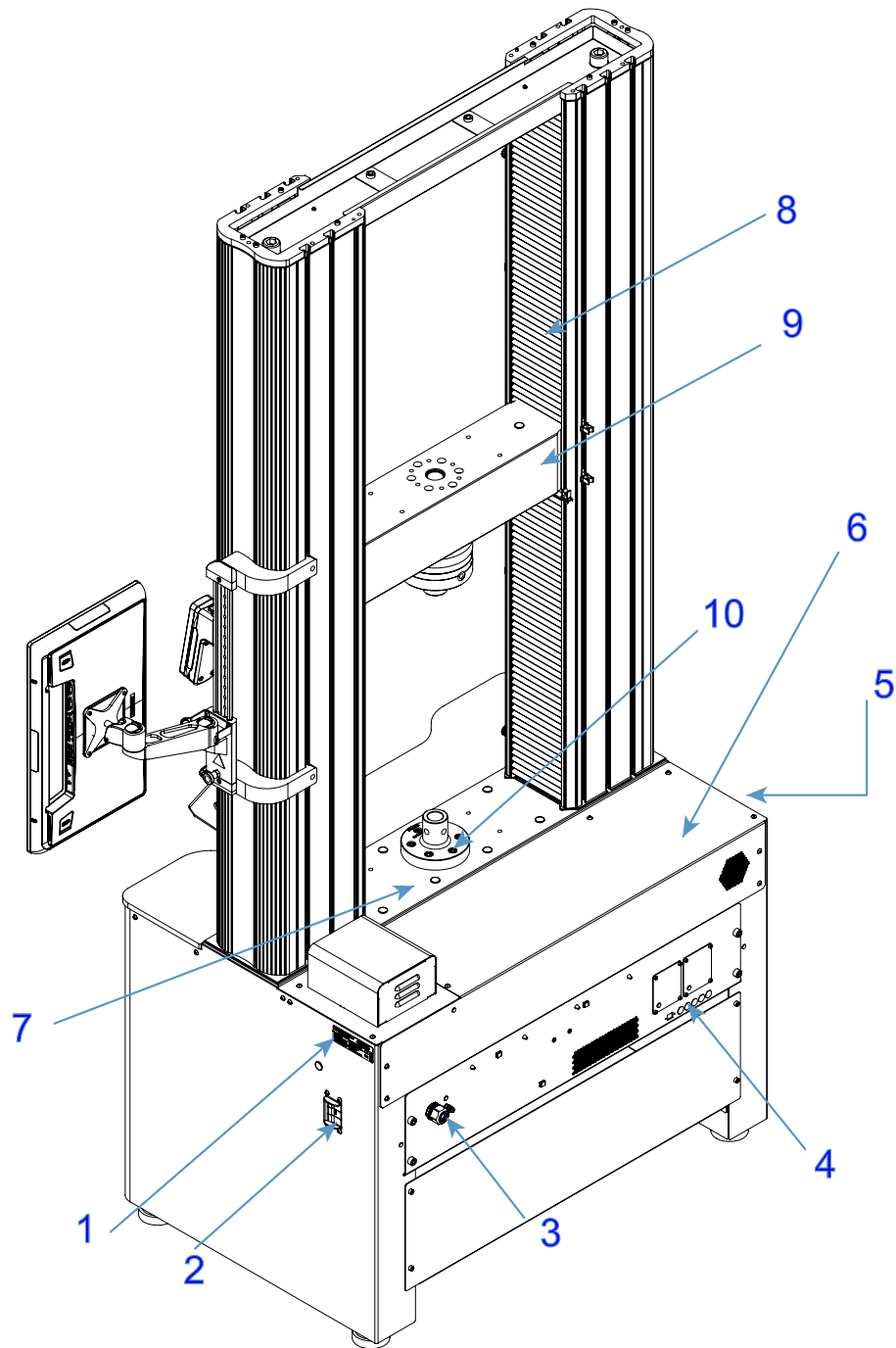


Figure 2. 68FM-100 Floor Model with Bluehill® Operator Dashboard - Rear View



Legend for Figure 2

Label	Component
1	System ID label
2	Power switch/circuit breaker
3	Power inlet
4	Rear panel
5	Controller panel
6	Frame base
7	Base beam
8	Ballscrew cover
9	Crosshead
10	Base adapter

## Components

The major components of an Instron<sup>®</sup> 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<sup>®</sup> approved computer system with Instron Bluehill<sup>®</sup> 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<sup>®</sup> 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. 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.
Indicator Panel	Indicators showing the status of the testing system.
Handset	Holds all of the controls for the testing system.
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 <sup>®</sup> Software	Instron <sup>®</sup> 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 Safety Monitoring Board (SMB) via a Break Out Board (BOB) inside the load frame. The Break Out Board 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 and load string components against unexpected crosshead movement.
- Indicator panel - indicators showing the status of the testing system.
- Handset - holds all the controls for the testing system.

## 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 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 Safety and Information Labeling

[Table 3](#) on page [20](#) explains the meanings of any safety and information labels that may be attached to any part of the testing system.

Table 3. Safety and Information Labeling Descriptions



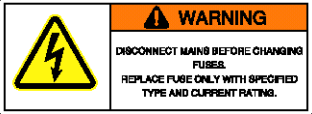








Label	Meaning	Purpose
	Electrical hazard	Indicates that an electrical hazard exists from high voltage and/or electrical current.
	Disconnect power supply	Disconnect the power supply before servicing machine.
	Electrical - fuse warning	Indicates an electrical hazard exists. Advises disconnecting power 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 and loose clothing).
	Ground stud	Indicates a ground stud.
	Read the manual	Read and understand the operator's manual before using the machine.

Table 3. Safety and Information Labeling Descriptions (Continued)

Label	Meaning	Purpose
	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<sup>®</sup> 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® Service 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. Information about system installation, set up and configuration, transducer connection and calibration. Routine maintenance and spare parts.
Preinstallation Manual	System requirements and specifications, instructions for lifting and handling to transport the system to its final location before installation.
Reference Help	Software products come complete with context sensitive help, which provides detailed information on how to use all software features.
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

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• Environmental specifications . . . . .	29
• 68FM-100 Power Requirements and Cords . . . . .	31
• Checklist for site preparation . . . . .	35

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### Responsibilities

The responsibilities outlined in this document are general. Refer to your specific purchase contract for full details of your responsibilities and those of Instron®.

### 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 26).

### 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 "[Lifting and handling](#)" on page 65).

Floor model load frames are shipped horizontally. The customer's responsibility includes righting the frame from the prone position prior to moving it to the testing location.

Upon special arrangements, an Instron® service engineer can supervise the off-loading and transportation of the load frame to its final site. Contact Instron® Service or your local Instron office for additional information on this service.

## 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 and transportation of the load frame to its final site. Contact Instron® Service or your local Instron office for additional information on this service.

## 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, battery, 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.

## Supplier's responsibilities

The standard contract requires Instron® to provide the necessary services to ensure that your testing system operates properly. These services are described below.

Additional services and equipment may be negotiated, 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 following steps have been completed:

- site location is prepared
- electrical service is correctly configured
- frame and its components have been moved to the final operating location (refer to “[Lifting and handling](#)” on page 65)

Instron<sup>®</sup> is responsible for the remaining 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<sup>®</sup> service representative present.

## Initial operation

Once the installation is complete, Instron<sup>®</sup> 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<sup>®</sup> Service for more information on this training. Additional training is available through Instron's training center.

## Documentation

Instron<sup>®</sup> 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 the Instron<sup>®</sup> Sales department.

## Site requirements

Proper site preparation is imperative so that the testing system operates in accordance with its specifications.

### 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.

Figure 3 on page 26 shows the minimum clearance necessary on each side and to the rear of the frame to allow for adequate ventilation and periodic access for service.

The clearance to the rear is necessary to allow service without removing any installed large accessories.

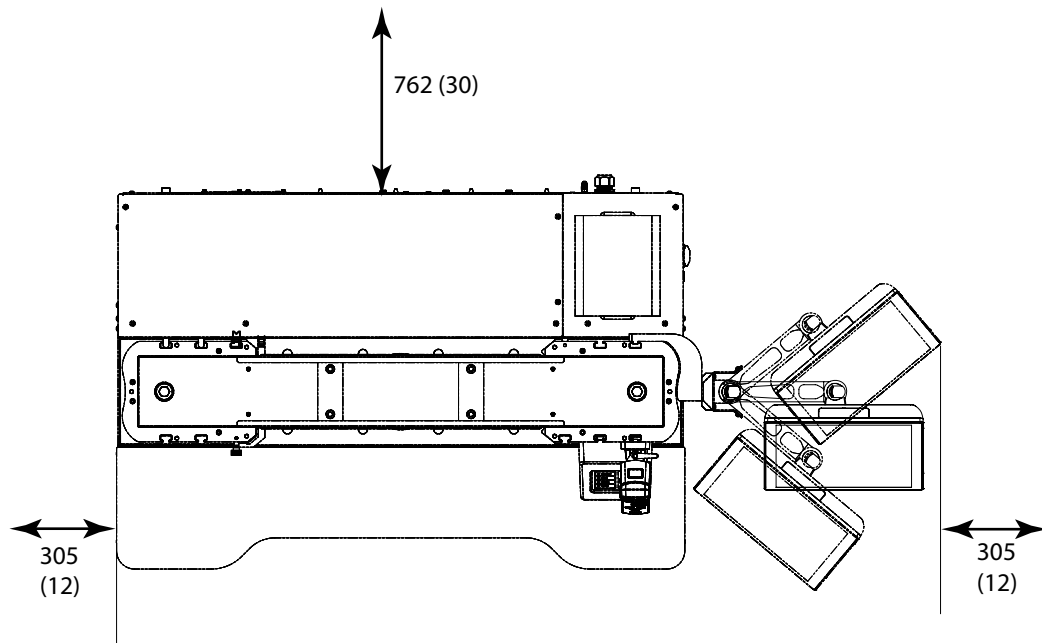


Figure 3. Minimum clearances in mm (in)

### 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 the weight of the load frame and its component parts. A load capacity higher than the weight of the testing system may be necessary because large dynamic loads may occur when a specimen breaks and this additional load may be absorbed into the floor.

## Power supply

Ensure that the required power supply is available and complies with all requirements (“[68FM-100 Power Requirements and Cords](#)” on page 31).

## Caution

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

Instron<sup>®</sup> systems require “clean” and stable electrical power. Unless other arrangements are made with Instron<sup>®</sup>, 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<sup>®</sup> 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. Our 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<sup>®</sup> service representative to connect to the testing system to diagnose and resolve problems more efficiently.

## 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.

Floor model frames are packed and shipped in a horizontal position. Make sure the ceiling height is sufficient to allow righting the frame from the horizontal to a vertical position (refer to [Table 19](#) on page [68](#)).

## Environmental conditions

Ensure that the testing site meets the specifications detailed in “[Environmental specifications](#)” on page [29](#).

## 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 (refer to “[Frame location](#)” on page [26](#)).

## Site requirements for system accessories

Some accessories require additional site requirements. If you are not sure if the accessories you purchased require any of the following site preparations, contact Instron<sup>®</sup> Service or your local Instron<sup>®</sup> office for advice.

## Compressed air supply requirements

A compressed air supply regulated to a maximum pressure of 8.3 bar (120 psi) is required for the integrated air kit. The regulated supply pressure must be greater than the test pressure value set in Bluehill<sup>®</sup> software.

To maximize the operational life of the integrated air kit and grips, the air supply must be dry and filtered of any particles larger than 20 µm.

- Dry air can be achieved by installing an air dryer (not supplied) such as an in-line desiccant air dryer.
- Filtered air can be achieved by use of a regulator with an integrated filter assembly (not supplied). This should be located as close to the testing system as is practical. A 20 µm filter is required, but the additional filtration of a 5 µm filter is preferred.

The customer is responsible for adapting the pneumatic connection of the integrated air kit to their supply. Instron® provides a 0.25 inch (6.3 mm) outer diameter, 0.125 inch (3.2 mm) inner diameter tube, which can be connected using the included 0.25 inch (6.3 mm) NPT male to push-to-connect fitting or an appropriately sized compression or hose barb fitting.

## 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 between 5 and 10 psi, depending upon the regulator and relief valves that are fitted to the dewar flask. Do not exceed 20 psi.

# Environmental specifications

## General

*Table 4. 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)
Ingress Protection (IP) Rating	IP 2X. 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 68FM 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

Noise levels do not include noise from specimen breaks.

The noise values are measured at ear level at a distance of one meter at various locations all around the machine.

When idle or operating at low speed, the noise output for these load frames is 50 dB(A). When operating at maximum speed, e.g. jogging or returning the crosshead, the noise output does not exceed 80 dB(A).



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.

## 68FM-100 Power Requirements and Cords

### Power Requirements

Table 5 on page 31 lists the power requirements for the preferred 3-phase frame configuration.

Table 6 on page 31 lists the power requirements for the optional single phase frame configuration.

Table 5. 68FM-100 power requirements - 3-phase option

Parameter	Specification		
Maximum Power (VA)	4200	4200	4200
3-Phase Voltage Wye or Delta (Vac) ( $\pm 10\%$ ) <sup>1</sup>	208	240	400
A circuit breaker is required between the facility power source and the load frame. To accommodate high in-rush currents at switch on, a (Type D) circuit breaker is recommended.	3 pole, 15 A to 20 A	3 pole, 13 A to 20 A	3 pole, 8 A to 20 A
Frequency - Hz	47 to 63	47 to 63	47 to 63
Length of power cable - m (ft)	4.5 (14.75)	4.5 (14.75)	4.5 (14.75)

1. Voltages are measured phase-to-phase. They are NOT measured between phase and ground or neutral.

Table 6. 68FM-100 power requirements - single phase option

Parameter	Specification
Maximum Power (VA)	3000
Single Phase Voltage (Vac) (-5% / +10%)	208 to 240

Table 6. 68FM-100 power requirements - single phase option (Continued)

Parameter	Specification
A circuit breaker is required between the facility power source and the load frame. To accommodate high in-rush currents at switch on, a (Type D) circuit breaker is recommended.	1 or 2 pole, 16 A to 20 A
Frequency - Hz	47 to 63
Length of power cable - m (ft)	4.5 (14.75)

Figure 4 on page 32 shows the Wye 3-phase configuration and Figure 5 on page 33 shows the Delta 3-phase configuration.

The 3-phase configuration uses a 4-wire connection as follows:

- (L1) Line 1/Phase A
- (L2) Line 2/Phase B
- (L3) Line 3/Phase C
- (G) Ground

## Caution

If the available configuration is a 5-wire configuration, including Neutral, the configuration can still be used but the Neutral line must NOT be connected.

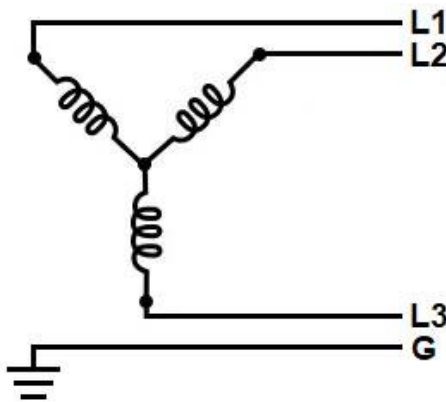


Figure 4. Wye configuration



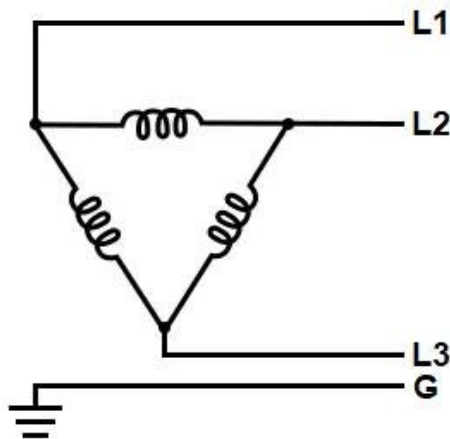


Figure 5. Delta configuration

If the Bluehill<sup>®</sup> Operator Dashboard is part of the testing system, it requires a separate power source with the following specifications:

- single phase, 100-240 Vac ( $\pm 10\%$ )
- frequency, 47-63 Hz

## Warning



You must use RCD (residual-current device), also known as 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 RCD 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 your order you can choose the voltage required. If you do not make a choice, Instron chooses the cord according to the customary voltage that matches the shipping destination for the system.

Instron provides the appropriate male plug, as shown in the following tables. It is the customer's responsibility to provide the appropriate female receptacle for the plug.

If desired, the plug may be removed for a direct wire installation.

*Table 7. Shipping destination in North America*

Voltage and Phase	Plug supplied
208/240 3-phase	NEMA L15-20P (250V, 20A, 4-wire) 
208/240 single phase	NEMA L6-20P (250V, 20A, 3-wire) 

*Table 8. Shipping destination outside North America*




Voltage and Phase	Plug supplied
208/240 3-phase	IEC 60309 (blue, 250V, 16A, 4-wire, 3P+E) 

Table 8. Shipping destination outside North America (Continued)

Voltage and Phase	Plug supplied
208/240 single phase	IEC 60309 (blue, 250V, 16A, 3-wire, 2P+E) 
400 3-phase	IEC 60309 (red, 415V, 16A, 4-wire, 3P+E) 

## 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<sup>®</sup> Service or your local Instron<sup>®</sup> office for assistance.



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

### Site location

- Floor 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<sup>®</sup> 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 (refer to [“Frame location”](#) on page 26).
- 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.  
Refer to [“68FM-100 Dimensions and Weight”](#) on page 39 for dimensions and weights of the testing system without its packaging. Refer to [“68FM-100 Packaging dimensions and weight”](#) on page 66 for dimensions and weights of the packaged system.
- 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 [“68FM-100 Dimensions and Weight”](#) on page 39 for dimensions and weights of the testing system with and without its packaging. Refer to [“68FM-100](#)

[Packaging dimensions and weight](#)” on page 66 for dimensions and weights of the packaged system.

- 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® to schedule an installation appointment.

A list of Instron® offices is available on our website at [www.instron.com](http://www.instron.com).

In the United States and Canada, you can call 1-800-473-7838.



# Chapter 3

## Specifications

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- 68FM-100 Dimensions and Weight ..... 39
- Accessory Mounting Dimensions ..... 48
- System Performance ..... 52

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### 68FM-100 Dimensions and Weight

#### Frame Dimensions

*Table 9. Meaning of abbreviations in dimension drawings*

Abbreviation	Meaning
SB	Short frame base
TB	Tall frame base
PWR	Power cable exit point

Load frame dimensions for 68FM-100 frames are shown in [Figure 6](#) on page 42, [Figure 7](#) on page 43, and [Figure 8](#) on page 44.

For those dimensions shown as labels in the figures, [Table 10](#) on page 40 lists them for standard height frames and [Table 11](#) on page 40 lists them for extra height frames.



*Except where indicated, overall height dimensions DO NOT include the height of frame stabilizers. If these are added as an option, the height dimension increases by 51 mm (2 in).*

Dimension “C” in [Figure 6](#) on page 42 is defined in [Table 12](#) on page 41.

[Figure 9](#) on page 45 shows the overall dimensions of the system including the Bluehill<sup>®</sup> Operator Dashboard.

Table 10. 68FM-100 dimensions - standard height

Letter Designation	Description	Dimension - mm (inch)
A	Overall height - Standard base	2287 (90)
	Overall height - Tall base	2587 (102)
E1	Maximum vertical test space (test daylight - from base to underside of crosshead)	1494 (58.8)
E2	Minimum vertical test space (test daylight - from base to underside of crosshead)	87 (3.43)
F	Standard base - Height to center of mass (assumes crosshead is at maximum E1 position)	955 (37.6)
	Tall base - height to center of mass (assumes crosshead is at maximum E1 position)	1212 (47.7)
FH	Foot height	57 (2.24) max 36 (1.4) min

Table 11. 68FM-100 dimensions - extra height

Letter Designation	Description	Dimension - mm (inch)
A	Overall height - Standard base	2787 (109.7)
	Overall height - Tall base (includes height of required frame stabilizers)	3138 (123.5)
E1	Maximum vertical test space (test daylight - from base to underside of crosshead)	1993 (78.5)
E2	Minimum vertical test space (test daylight - from base to underside of crosshead)	87 (3.43)
F	Standard base - Height to center of mass (assumes crosshead is at maximum E1 position)	1169 (46)
	Tall base - height to center of mass (assumes crosshead is at maximum E1 position)	1467 (57.8)
FH	Foot height	57 (2.24) max 36 (1.4) min



*Table 12. Dimension "C" - crosshead to load cell clevis pin hole*

<b>Load cell capacity</b>	<b>Connection type</b>	<b>Distance - mm (inch)</b>
100 kN	D	110 (4.33)

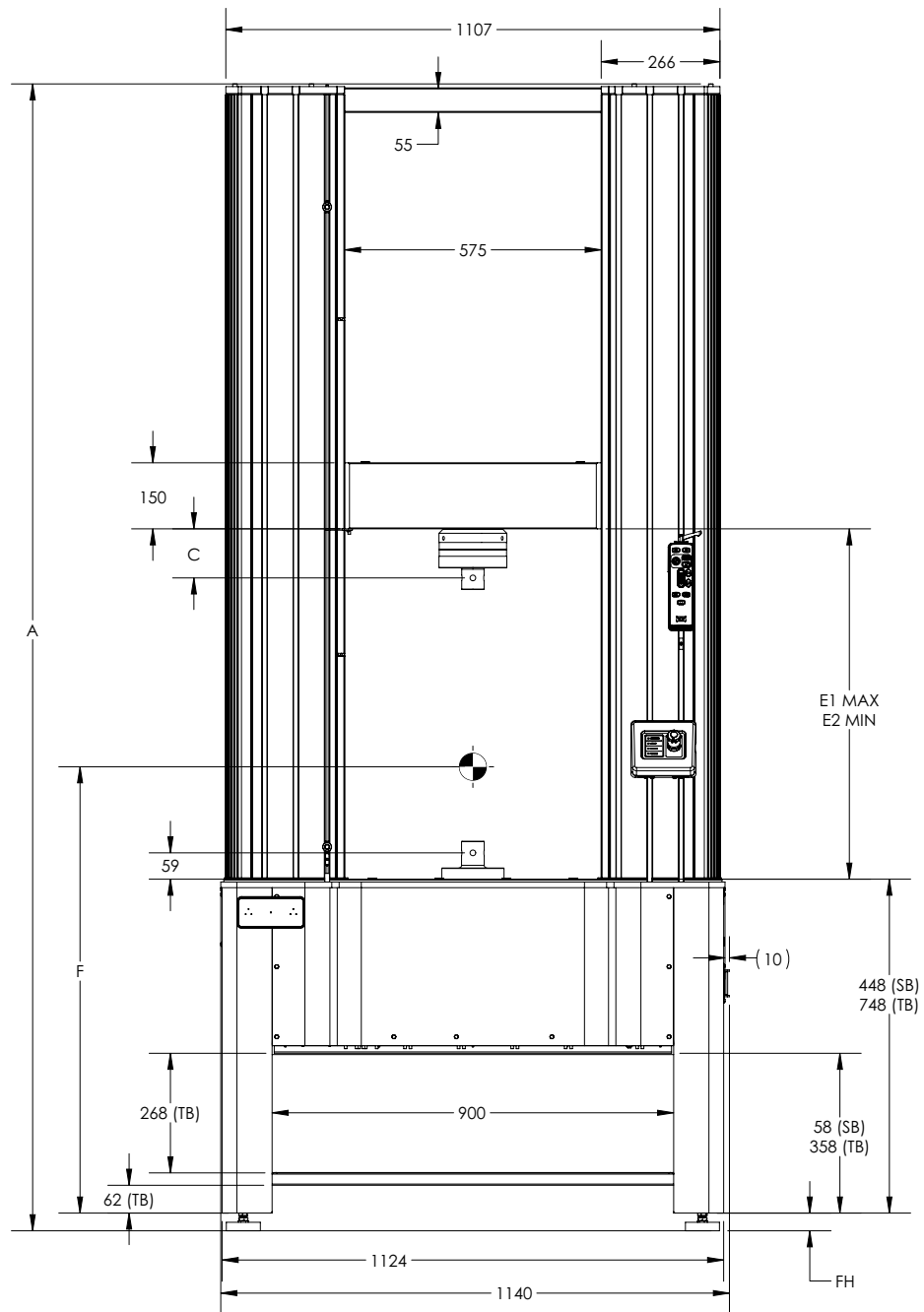


Figure 6. 68FM-100 frame dimensions - front view

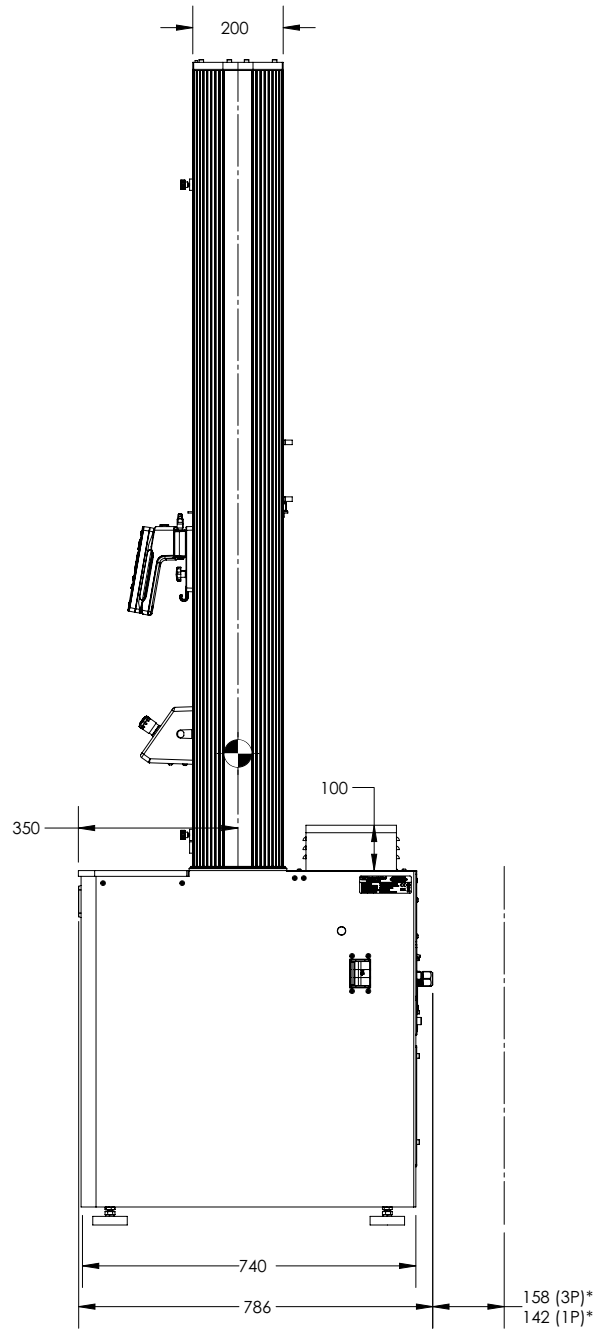


Figure 7. 68FM-100 frame dimensions - side view



\* 3-phase power (3P) requires 158 mm (6.2 in) and single phase power (1P) requires 142 mm (5.6 in) space behind the frame to accommodate the power cable bend radius.

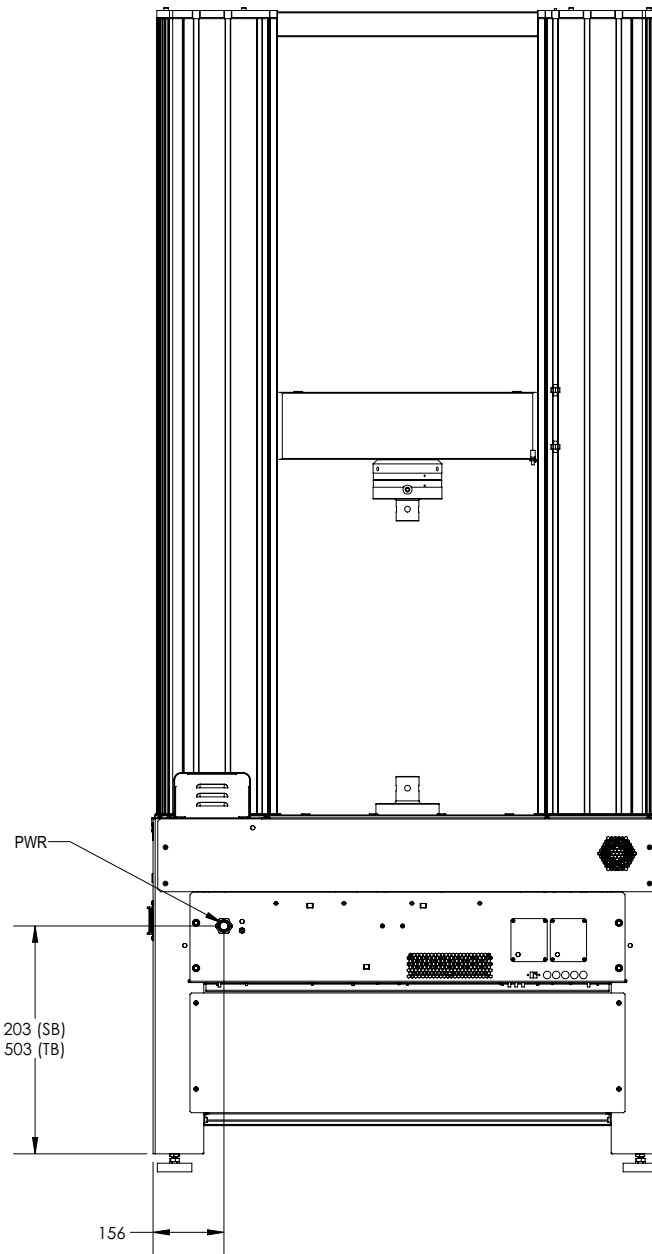


Figure 8. 68FM-100 frame dimensions - rear view

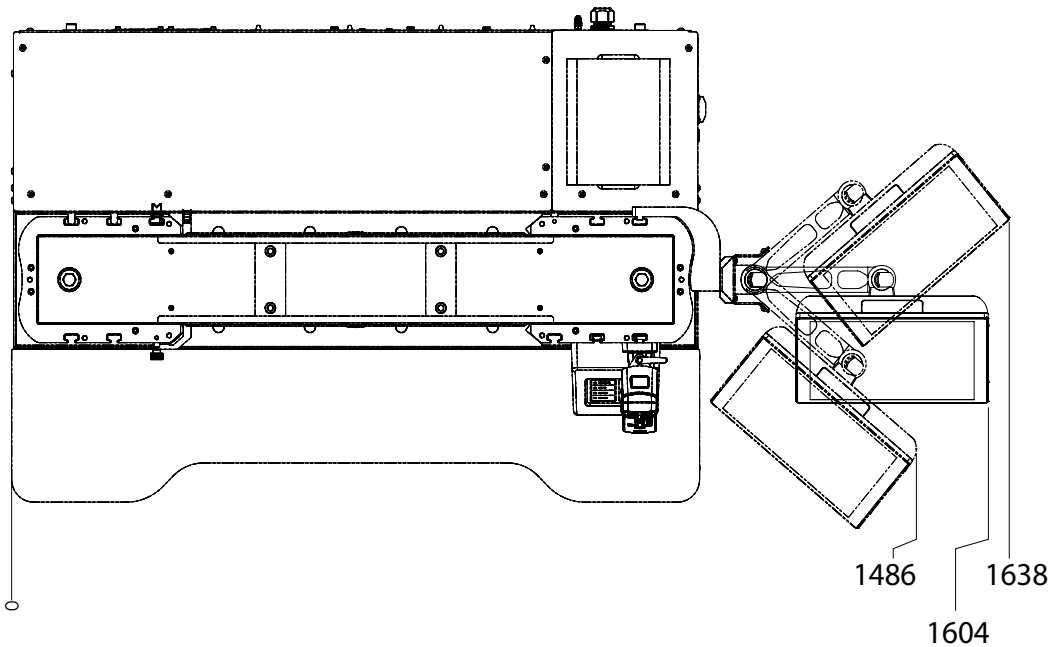


Figure 9. 68FM-100 frame dimensions - including dashboard

## Frame stabilizers

Frame stabilizers are available as an option on all frames. They are always provided on extra height frames with the tall base option.

### Warning



Do not remove the stabilizer bars at any time during the unpacking, lifting and handling of the frame.

The stabilizers are an essential component to improve stability and prevent the frame from toppling over.

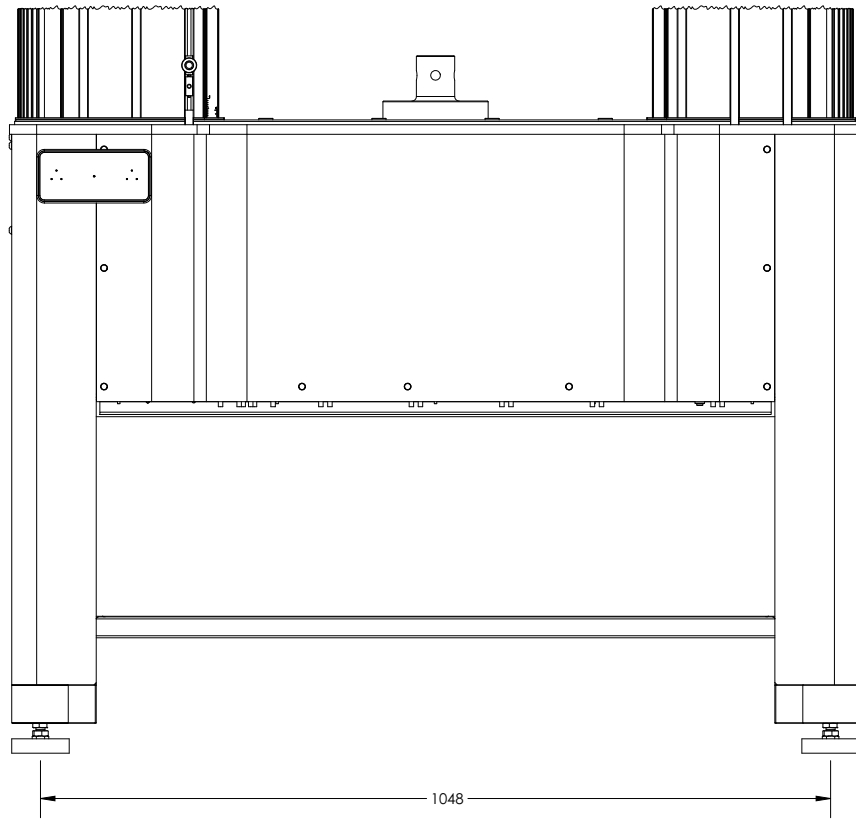


Figure 10. Dimensions with frame stabilizers - front view

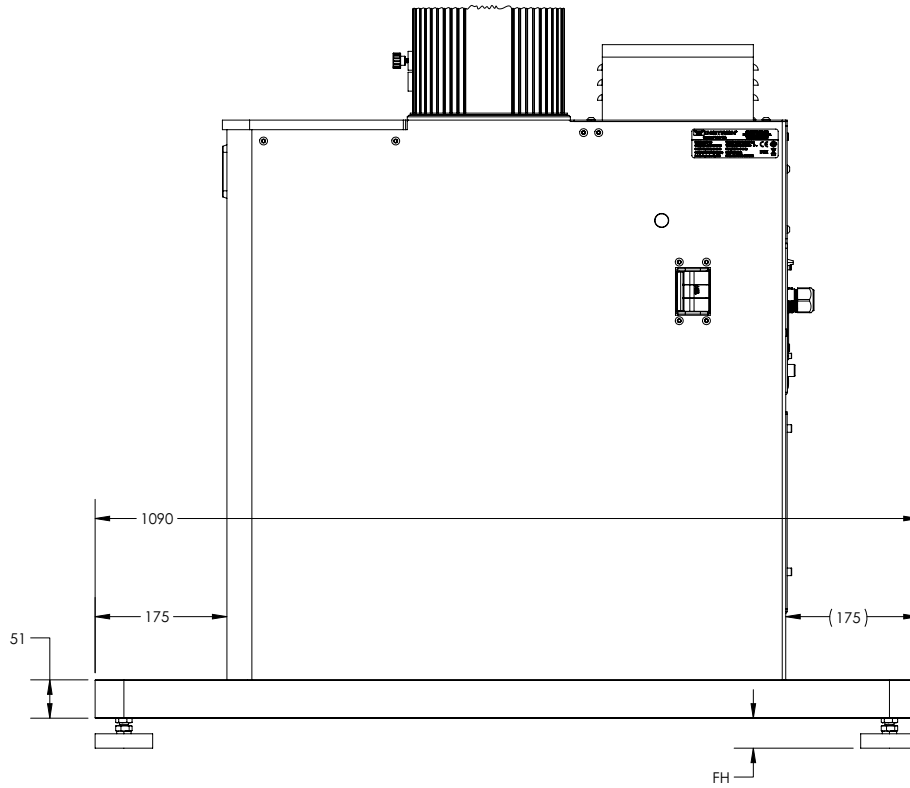


Figure 11. Dimensions with frame stabilizers - side view

## System weight

The following tables list the weight of each frame configuration and the corresponding maximum allowable weight of accessories (e.g. grips and testing fixtures) for that configuration.



Stabilizers are required on extra height frames with the tall base. The values for these frames, marked with \*, include the weight of the stabilizers. For any other configuration, where stabilizers are an option, add 90.5 kg (200 lb) to the values in these tables.

Table 13. System weight - standard height

Base height	Frame weight kg (lb)	Maximum allowable weight of accessories kg (lb)
Standard	799.2 (1762)	885.2 (1952)
Tall	861.3 (1899)	823.1 (1815)

Table 14. System weight - extra height

Base height	Frame weight kg (lb)	Maximum allowable weight of accessories kg (lb)
Standard	860.9 (1898)	823.5 (1815)
Tall	1013.6 (2235)*	719.9 (1587)

The frame weight value does not include additional accessories such as the Bluehill® Operator Dashboard or any load cell.

The weight of the Bluehill® Operator Dashboard and its mounting kit is 2.4 kg (5.2 lb).



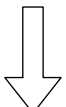
## Accessory Mounting Dimensions

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.

Table 15. Meaning of symbols on dimension drawings

Symbol on drawing	Meaning
	diameter
	depth
THRU	through-hole
LH	left hand thread
RH	right hand thread
PCD	pitch circle diameter
	arrow pointing to the front of the load frame



## Base beam dimensions

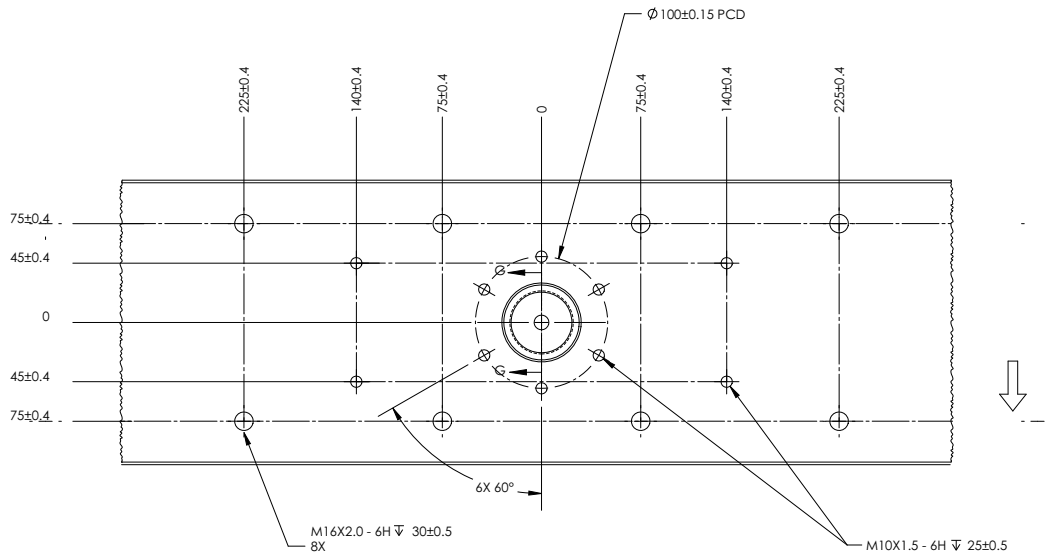


Figure 12. View of base beam from above

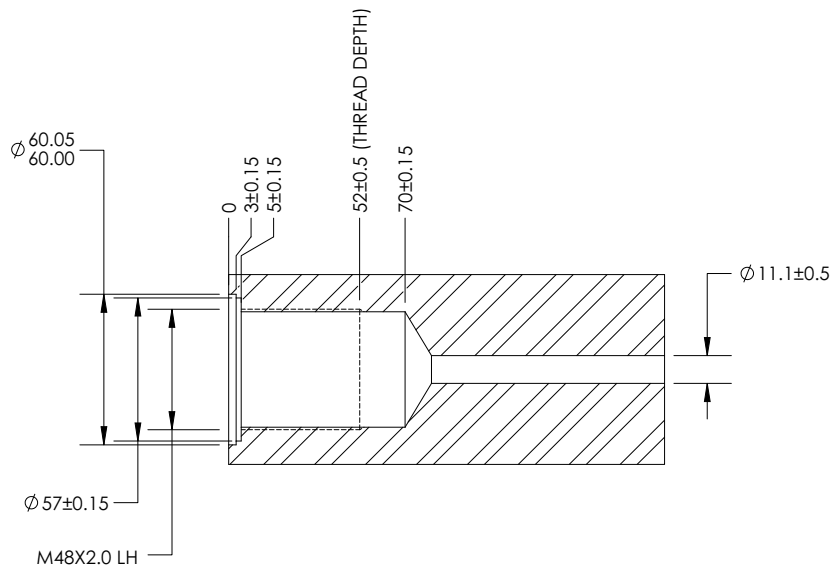


Figure 13. View of cross section G-G of frame base

## Crosshead dimensions

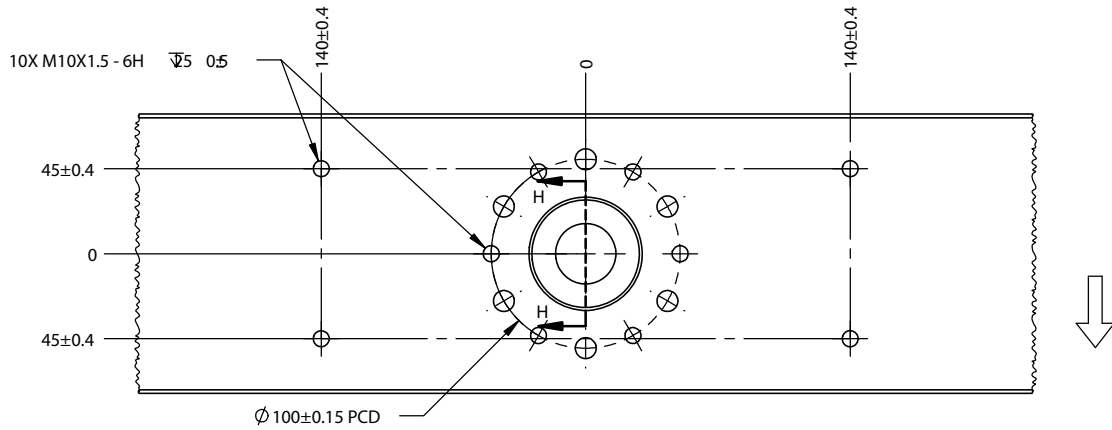


Figure 14. View of underside of crosshead

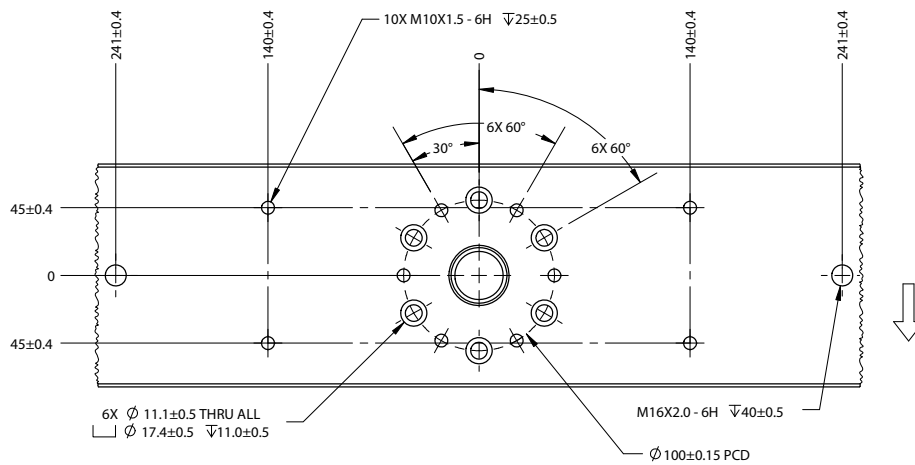


Figure 15. View of top of crosshead

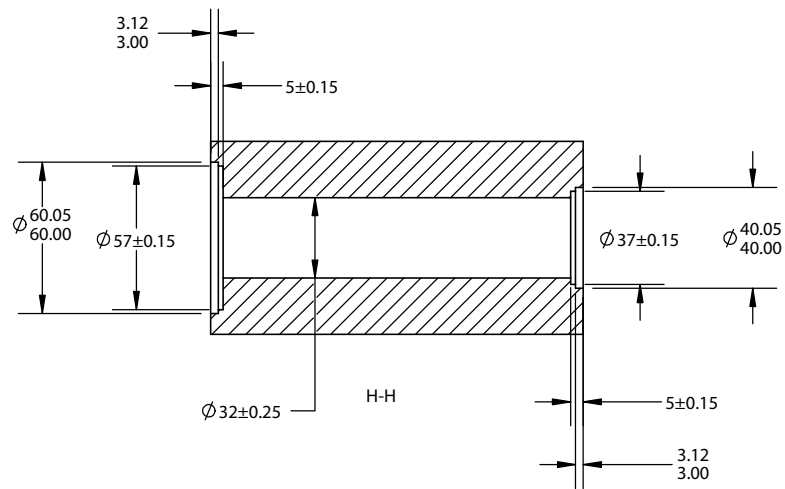


Figure 16. View of cross section H-H of crosshead

## Top plate dimensions

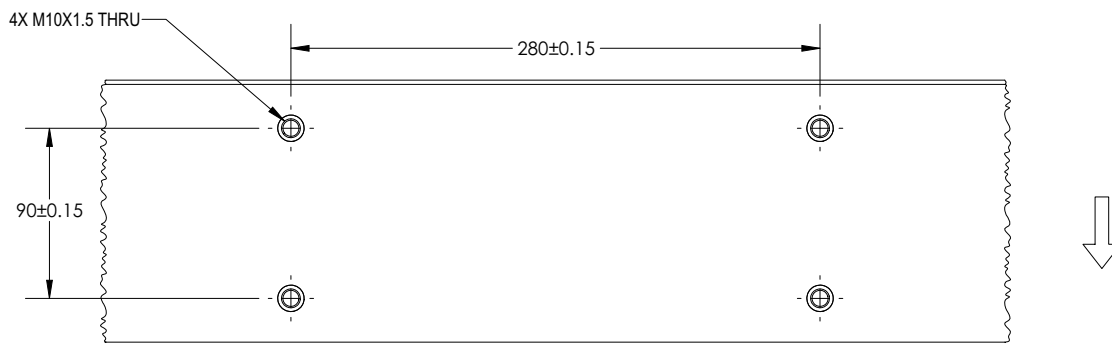


Figure 17. View of underside of top plate

## System Performance

Table 16 on page 52 lists the performance parameters for the preferred 3-phase electrical configuration.

Table 17 on page 53 lists those performance parameters that differ for the single-phase electrical configuration.

Table 16. 68FM-100 system performance

Parameter	Specifications
Testing type	Tension, compression, and through zero operation.
Basic control mode	Closed loop position control
Load capacity - kN (lbf)	100 (22480)
Maximum speed - mm/min (in/min)	1080 (42)
Minimum speed - mm/min (in/min)	0.00005 (0.000002)
Maximum force at full speed - kN (lbf)	75 (16860)
Maximum speed at full force - mm/min (in/min)	762 (30)
Return speed - mm/min (in/min)	1160 (45.6)
Crosshead speed accuracy	± 0.1% of set speed at steady state and no load
Displacement (crosshead position) display accuracy	Under no load conditions, equal or less than ± 0.01 mm (0.0004 in) or ± 0.05% of displayed reading, whichever is greater.
Displacement (crosshead position) repeatability - mm (in)	± 0.005 (0.0002)
Load measurement accuracy	± 0.5% of reading down to 1/1000 of load cell capacity.
Strain measurement accuracy	± 0.5% of reading down to 1/50 of full scale with ASTM E83 class B or ISO 9513 class 0.5 extensometer
Crosshead position control resolution - μm	0.00222

*Table 17. Reduced performance of single-phase configuration*

<b>Parameter</b>	<b>Specifications</b>
Maximum speed - mm/min (in/min)	1016 (40)
Minimum speed - mm/min (in/min)	0.00005 (0.000002)
Maximum force at full speed - kN (lbf)	50 (11240)
Maximum speed at full force - mm/min (in/min)	508 (20)
Return speed - mm/min (in/min)	1016 (40)



# Chapter 4

## Risk reduction and safe use

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• Residual risks . . . . .	55
• Collision Mitigation . . . . .	60
• Ingress Protection . . . . .	61
• Operator Protection Overview . . . . .	62

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This chapter is a copy of a chapter taken from the Operator's Guide that will be supplied with your system. It describes:

- risks associated with use of your testing system
- how to use the features of the testing system to minimize those risks
- accessories that you can purchase to minimize risks if your risk assessment indicates that they are necessary, for example:
  - interlocked shield
  - specimen insertion tool

### Residual risks

The equipment described in this documentation is designed with features to reduce the risk of injury to an operator. There are, however, always residual risks in the use of this equipment, influenced by:

- the test application
- the design of the test method or procedure
- the jog, return and test speeds used
- the type of specimen being tested
- the size of the specimen being tested
- the design of grips and test fixtures

- the experience of the operator using the equipment

It is our strong recommendation, therefore, that you carry out your own risk assessment for your particular equipment setup and testing application.

Each of the following sections describes a specific hazard zone of the testing system and lists the most common risks for testing using this equipment. Use the information in the following sections, together with the instructions in the remainder of this manual, to conduct your own risk assessment.

## Rapid crosshead motion

### Warning

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**Crush hazard to fingers or hands.**

This hazard relates to grips and fixtures coming together as a result of rapid crosshead motion, crushing hands or fingers.

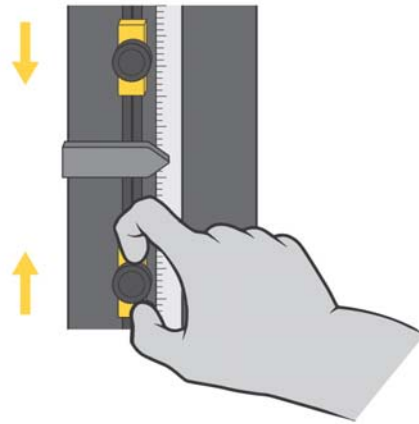
For example, an operator inadvertently commands the system to jog or return while their hands are in test area. This may also happen if the operator, in an attempt to be more efficient, reaches in to remove broken specimen pieces while simultaneously returning the crosshead to zero displacement.

### Recommendations

In all situations:

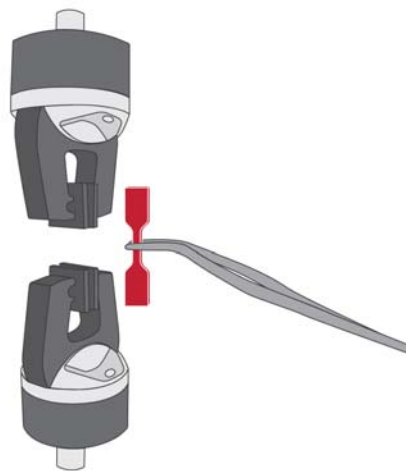
- Set up test methods so that operators do not need to have their hands in the space between fixtures while the crosshead is moving.
- Use the Operator Protection feature in Bluehill® software. This uses a reduced jog speed (default  $\leq 600$  mm/min) during set up and you can set a lower jog speed if your risk assessment requires it.
- Set appropriate travel limits every time you change the grips and adjust the crosshead.





In addition, if the gap between grips and fixtures is less than 50 mm:

- Use a specimen insertion tool and other appropriate equipment and practices to keep fingers out of the space between the fixtures.



In addition, if the gap between grips and fixtures is less than 25 mm:

- Use a specimen insertion tool to keep fingers out of the space between the fixtures.
- Use an interlocked shield to limit or disallow motion when the shield door is open. When the space is less than 25mm, the crush hazard is very significant, so this is the best option.



## Pinching fingers between grip jaw faces

### Warning

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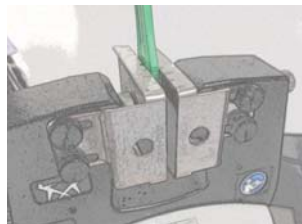
Pinch hazard to fingers.

This hazard relates to grip jaws closing quickly, pinching fingers.

### Recommendations

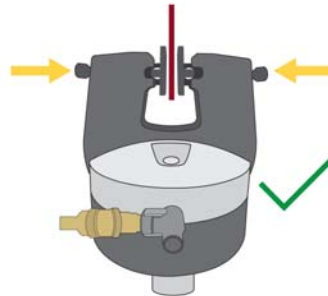
For 2712 Series pneumatic grips:

- In the documentation supplied with the grips, read and follow the safety recommendations for installing a specimen.
- Use the Operator Protection feature in Bluehill<sup>®</sup> software. This uses a reduced initial grip pressure (default 15 psi) during set up and you can set a lower initial grip pressure if your risk assessment requires it.
- Use jaw face shields.

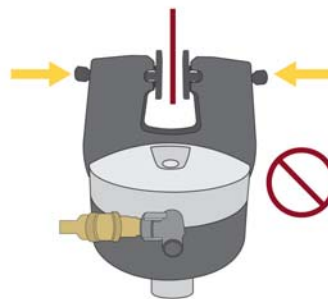


- Use the thumb screw knobs on the sides of the grip (2712-04x grips only) to reduce the jaw face gap to the smallest practical gap for your specimens.

Correct:



Incorrect:



## Impact of debris from breaking specimens

### Warning



Hazard from flying debris.

This hazard relates to brittle or composite specimens that can explode when they break.

### Recommendations

For less dangerous debris (specimen dust or fibers, for example):

- Use personal protection equipment (for example safety glasses).



For more dangerous projectile debris (brittle composite specimens, for example):

- Use an interlocked shield.



## Collision Mitigation

The 3400 and 6800 Series systems are equipped with the Collision Mitigation feature to help reduce accidental equipment and specimen damage. Collision Mitigation enables the system to continually monitor force during jog and return operations, and will automatically stop the crosshead movement if an unexpected force is detected.

- When paired with the system's matching capacity load cell, Collision Mitigation can protect the system from colliding with rigid surfaces at speeds up to 600 mm/min.
- Collision Mitigation is intended to mitigate damage to the equipment.
- Collision Mitigation is not safety rated, nor safety intended.

# Ingress Protection

To comply with relevant safety and machinery design standards, all aspects of the testing system have been designed to meet an ingress protection rating of at least IP 2X. The testing system is designed for indoor use only, away from wet areas.

The first digit of the ingress protection rating (IP 2\_) signifies protection against ingress by solid objects. The number “2” indicates that the design prevents any solid object larger than 12.0 mm from contacting any hazardous internal components (e.g. moving parts, electrical hazards) when all covers and guards are in place.

The second digit of the ingress protection rating (IP \_X) signifies protection against ingress by liquids. The letter “X” indicates that ingress protection against liquid is not required to be specified for this application. The testing system is protected only against hazards caused by the incidental spillage of liquids.

Note that in many cases, pragmatic improvements against solid and liquid ingress have been implemented in the design to improve durability and longevity of the testing system.

## Solid particle ingress

Solid particles and other debris, particularly conductive or abrasive dust (e.g. metal scale, carbon-based composite fibers) may cause damage to the testing system if allowed to accumulate. If your testing application generates debris, follow these special precautions:

- Clean the testing system and adjacent areas frequently with a vacuum or soft brush to prevent any accumulation of debris.
- As part of periodic maintenance, contact Instron<sup>®</sup> Service to inspect the inside of the testing system for accumulation of debris, and clean it if necessary.
- Clean all outer surfaces thoroughly before performing any service. This prevents debris from falling onto the internal components of the testing system.

## Liquid ingress

Any liquid spill onto the testing system may cause equipment damage. Incidental liquid spills will not pose a hazard to the operator if properly addressed.

Take particular care when using any accessory that could spill liquid onto the testing system (e.g. condensation from an environmental chamber, BioBath, or hydraulic accessories).

Instron<sup>®</sup> sells a variety of accessories, such as drip trays, that can be used to reduce the impact of spilled liquids on your testing system.

If a liquid spill occurs:

1. Discontinue testing immediately and turn off the power to the equipment. Unplug the power cord (if applicable).
2. Clean up as much spilled liquid as possible on the outside of the equipment. Be sure to check underneath rubber mats (if present) and any installed accessories.
3. If you have reason to believe that liquid entered the testing system, contact Instron<sup>®</sup> Service.
  - a The service engineer will remove the covers of the equipment and clean up all traces of spilled liquid.
  - b Any components damaged by liquid may need to be replaced.
  - c The service engineer will perform an operational check to verify proper function of safety systems.

## Warning

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Continuing to operate a testing system after liquid has entered the testing system may pose a hazard to the operator and lead to additional equipment damage.

4. Resume testing only after the liquid spill has been properly cleaned up. If the testing system exhibits any faults or unexpected behavior, discontinue testing immediately and contact Instron<sup>®</sup> Service.

## Operator Protection Overview

The majority of hazards for operating materials testing systems are associated with:

- rapid movement of the crosshead causing crush injuries
- rapid closing of pneumatic grips causing pinch injuries

Operator Protection in Bluehill<sup>®</sup> provides a mechanism that lets you limit crosshead jog speed and reduce grip closing pressure while you are setting up a test.

The default conditions during test set up are:

- crosshead jog speed reduced to a maximum of 600 mm/min, and can be set lower if your risk assessment requires it

- grip closing pressure reduced to a default of 15 psi, and can be set lower if your risk assessment requires it.

Operator Protection lets an Administrator configure the testing system to be consistent with the risk assessment for that system.

Access to the controls for Operator Protection is password protected. If you have Administrator rights you can modify Operator Protection in the Admin tab in Bluehill®.





# Chapter 5

## Lifting and handling

- 
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  - 68FM-100 Packaging dimensions and weight ..... 66
  - Unpack floor model frames ..... 66
  - Right the frame from a prone position..... 67
  - Transport floor model frames ..... 72
- 

### Warning

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While following any lifting, moving or installation procedure, NEVER REMOVE any bolt or fastener that has this label adjacent to it:



### Warning

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If your frame includes stabilizers, do not remove the stabilizer bars at any time during the unpacking, lifting and handling of the frame.

The stabilizers are an essential component to improve stability and prevent the frame from toppling over.

## General handling precautions

Only individuals experienced with the operation of lifting equipment and rigging techniques should attempt to lift or move an Instron<sup>®</sup> 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.

## 68FM-100 Packaging dimensions and weight

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

Use the information in [Table 18](#) on page 66 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 18. Packaged dimensions and weights*

Configuration	Length mm (in)	Width mm (in)	Height <sup>1</sup> mm (in)	Minimum <sup>2</sup> packaged weight kg (lb)
Standard height, standard base	2692 (106)	1524 (60)	1143 (45)	1061.4 (2340)
Standard height, tall base	2692 (106)	1524 (60)	1143 (45)	1167.5 (2574)
Extra height, standard base	2921 (115)	1524 (60)	1143 (45)	1139.4 (2512)
Extra height, tall base	3404 (134)	1524 (60)	1372 (54)	1336.3 (2946)

1. This dimension is the maximum height possible. Depending on the contents, the packaging height may be reduced.

2. This is the weight of the frame and packaging. It does not include the weight of any accessories that may be included.

## Unpack floor model frames

Before moving the load frame, review the following sections:

- “[Site requirements](#)” on page 26.
- “[Right the frame from a prone position](#)” on page 67
- “[Transport floor model frames](#)” on page 72

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.
2. Remove the shipping material, leaving the load frame fastened to the shipping skid.

## Warning

---



**Do not remove any of the bolts and brackets that attach the frame to the shipping skid before the crane has been attached and taken the weight of the frame.**

A bracket connected to the crosshead serves to support the weight of the frame during shipping. If this is removed while the frame is horizontal, the top of the frame can drop onto the skid, causing damage.

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.
  - a 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.
  - b 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 “[Transport floor model frames](#)” on page 72 for additional information.

## Right the frame from a prone position

Your frame will have been shipped in a horizontal position, so it must be moved into an upright, standing position before placing it in its operating location.

Prior to righting the frame, it is recommended that you contact Instron<sup>®</sup> Service for additional guidance.

## Equipment

Refer to [Figure 18](#) on page 70.

The recommended procedure is to lift from both the crosshead and from hoist bolts in the base beam. For this procedure you will need:

- Two cranes with a combined load rating that is appropriate for the load frame's gross weight, including the weight of any installed accessories.
- Four lifting slings, each with a load rating that is appropriate for the load frame's gross weight, including the weight of any installed accessories.
- Two M16 hoist bolts, screwed into threaded holes in the base beam.

It is possible to lift only from the crosshead, using one crane and two lifting slings, but it is not recommended.

Refer to the Appendix [“Single Crane Lifting Procedure”](#) on page 77 for guidance if this is your only option.

## Before you begin

### Warning

---



**Do not remove any of the bolts and brackets that attach the frame to the shipping skid before the crane has been attached and taken the weight of the frame.**

A bracket connected to the crosshead serves to support the weight of the frame during shipping. If this is removed while the frame is horizontal, the top of the frame can drop onto the skid, causing damage.

The ceiling height required to bring the frame to an upright position is greater than the height of the frame. Refer to [Table 19](#) on page 68 for the minimum ceiling height required for each frame configuration. These values assume that the frame is not attached to the shipping skid.

*Table 19. Minimum required ceiling height in mm (in)*

Base configuration	Frame height	Without stabilizers	With stabilizers
Short base	Standard	2345 (92.3)	2475 (97.4)
Short base	Extra height	2833 (111.6)	2950 (116.1)
Tall base	Standard	2638 (103.8)	2759 (108.6)
Tall base	Extra height	N/A	3238 (127.5)

## Warning



While following any lifting, moving or installation procedure, **NEVER REMOVE** any bolt or fastener that has this label adjacent to it:



Before lifting the load frame ensure that:

- The load frame is bolted to the shipping skid.
- There are no loose accessories on the shipping skid.
- Ensure that there is adequate ceiling clearance to allow the load frame to be lifted into a vertical position, including clearance for the crane (refer to [Table 19](#) on page [68](#)).
- Operators of any lifting equipment have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).

## Procedure

1. Remove all packaging material from the frame but **DO NOT** remove any of the bolts and brackets that attach the frame to the shipping skid.
2. Attach the two lifting slings to the crosshead and secure them to the crane hook as shown in [Figure 18](#) on page [70](#). If you use chains in lieu of lifting slings, wrap protective material around the crosshead to protect the crosshead from scratching and marring. Chains can also cause damage to other parts of the frame, the top plate for example; be sure to wrap protective material around all vulnerable components.
3. Install two M16 hoist bolts into the frame base and attach two additional slings to the bolts, as shown in [Figure 18](#) on page [70](#).

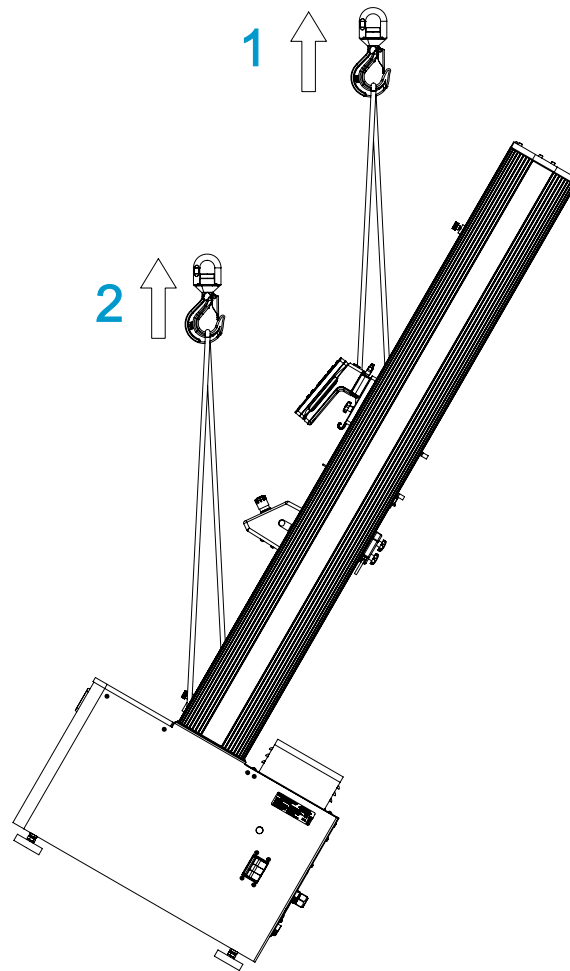


Figure 18. Righting a Load Frame Using a Crane

Legend for [Figure 18](#)

Label	Description
1	Two slings around the crosshead.
2	Two slings attached to two M16 hoist rings screwed into frame base beam.

4. Slowly lift the frame until the weight of the frame is fully supported by the slings.
5. Remove all bolts and brackets that attach the frame to the shipping skid.
6. Locate any frame feet that may have been removed in order to bolt the frame to the skid and reinstall them in the locations shown in [Figure 19](#) on page 71.

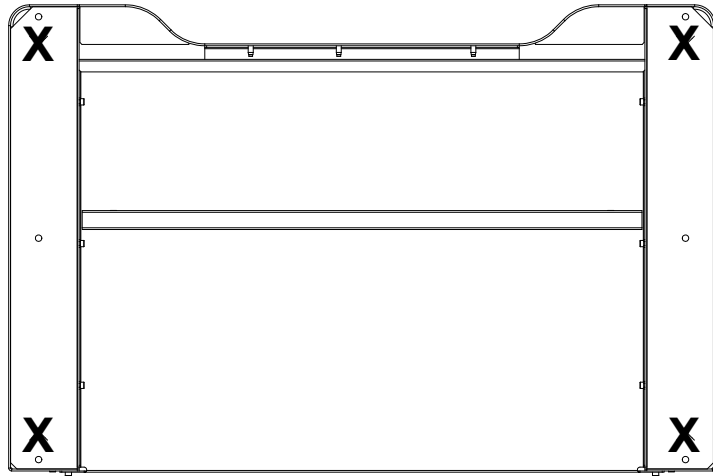


Figure 19. Underside of frame showing location of frame feet



It may be necessary to lift the frame a short distance to gain access to install the frame feet. Lift the frame the minimum distance required to achieve this.

## Warning



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

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

7. Slowly lift the frame until it is in an upright position and is lifted off the floor.
8. Slowly move the load frame away from the shipping skid and remaining packaging materials.
9. When the frame is clear of the packaging material, slowly lower the load frame to the floor so that it is standing on its base in an upright position.
10. Remove the slings from the crosshead.
11. Remove the slings and M16 hoist bolts from the frame base.

The frame can now be positioned into its operating location and then installed by an Instron service representative.

## Transport floor model frames

Instron® strongly recommends using professional riggers experienced in moving heavy equipment.

The only approved method for lifting the frame is to use a forklift with padded forks to lift the load frame from under the crosshead. Do not attempt to lift the frame at any other point (see [Figure 20](#) on page 72).

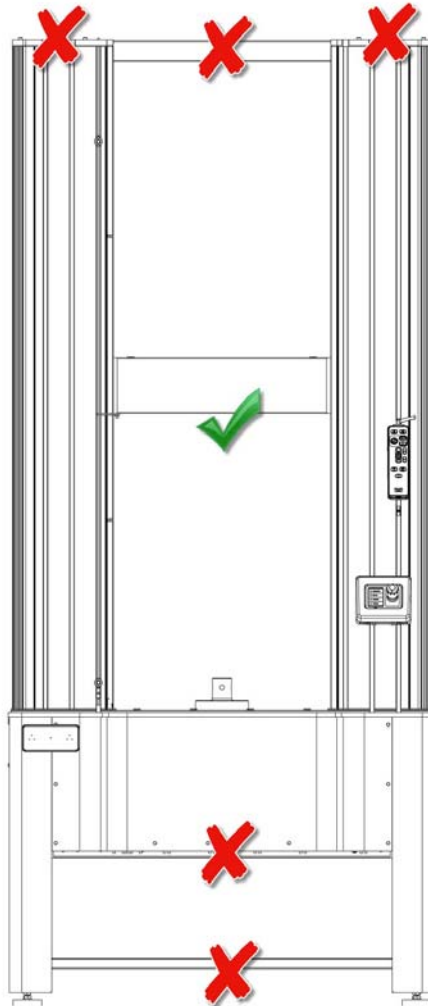


Figure 20. Lift under crosshead only



## Warnings



**Hazard - do not lift the frame by the base.**

The base covers cannot support the weight of the frame. If you try to lift the frame with a forklift under the base, the base covers could break and cause personal injury and equipment damage.



**Hazard - do not lift the frame by the top plate.**

The top plate cannot support the weight of the frame. If you try to lift the frame with a forklift under the top plate, the top plate could break and cause personal injury and equipment damage.



**Hazard - always use a lifting device or straps with sufficient capacity to lift the load frame.**

You must use a lifting device or straps 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.**

Tilting by more than 10° may topple the load frame and cause personal injury and equipment damage.

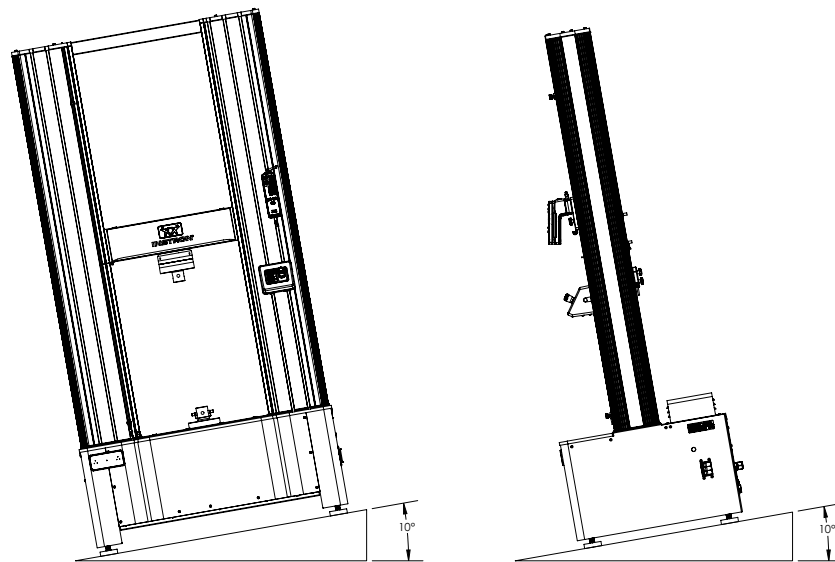


Figure 21. Maximum tilt angle

## Before you begin

Before moving the load frame ensure that:

- All site requirements are met (“[Site requirements](#)” on page 26).
- Operators of any lifting equipment 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.
- The frame and forklift can fit through all doorways, halls, elevators or stairs from the shipping dock to its final site location.

Check the dimensions for your frame model (“[68FM-100 Dimensions and Weight](#)” on page 39).

- The floors from the shipping dock to the final site location have sufficient support for the weight of the load frame and forklift combined.
- You have adequate padding materials to protect the load frame when moving it to another site. Contact Instron<sup>®</sup> Service to determine the appropriate requirements for your frame model.

## Equipment

- A forklift with a load rating that is appropriate for the load frame’s gross weight.
- Protective padding for the crosshead.

## Warnings

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**Hazard - do not lift the frame by the base.**

The base covers cannot support the weight of the frame. If you try to lift the frame with a forklift under the base, the base covers could break and cause personal injury and equipment damage.



**Hazard - do not lift the frame by the top plate.**

The top plate cannot support the weight of the frame. If you try to lift the frame with a forklift under the top plate, the top plate could break and cause personal injury and equipment damage.

## Lift the frame by the crosshead

Use this procedure to move the frame to its final location, after it has been righted from the prone position.

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

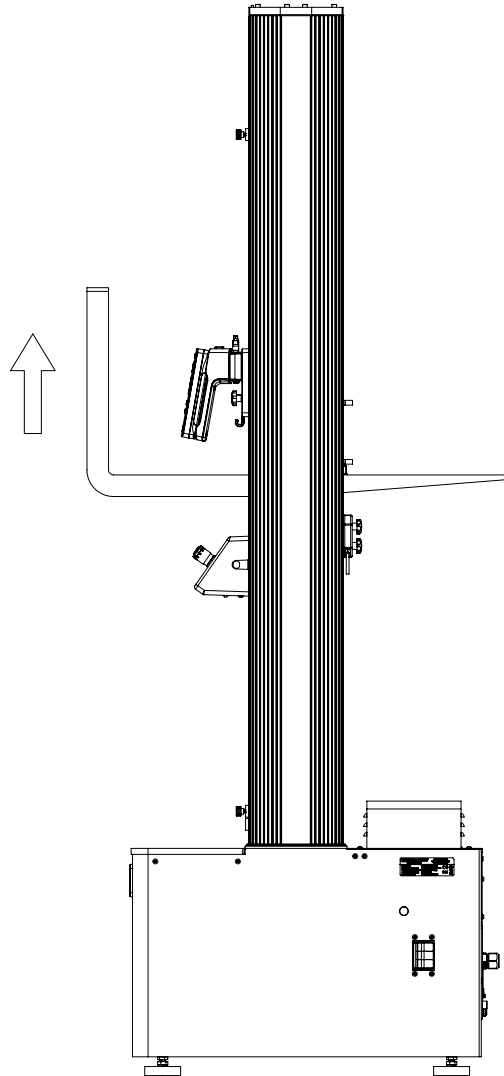


Figure 22. *Lifting the Frame from the Crosshead*

1. Using a forklift with padded forks or protective material around the crosshead, carefully insert the forks under the crosshead between the columns. See [Figure 22](#) on page [75](#).

## 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. Move the frame to its operating location.
4. Place the load frame carefully into position.
5. Remove the padded forks from under the frame's crosshead.

When the frame is in its operating location, Instron<sup>®</sup> Service can proceed to install your new testing system.

# Appendix A

## Single Crane Lifting Procedure

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• Equipment .....	77
• Before you begin .....	78
• Procedure.....	79

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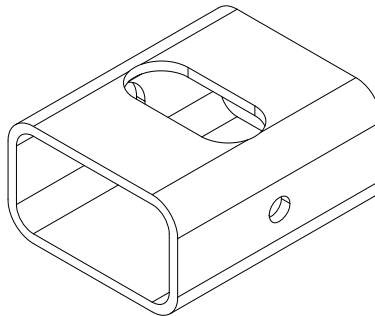
The recommended procedure for righting the frame from a prone position utilizes two cranes (“[Right the frame from a prone position](#)” on page 67).

Although not the recommended procedure, this appendix describes a lifting method that utilizes only one crane, if that is all that is available.

### Caution

---

This method should only be used when the brackets that replace the rear feet of the frame and attach it to the shipping skid are tubular steel brackets (shown below) and NOT angle brackets. Angle brackets are likely to buckle during the procedure and may damage the frame base.



## Equipment

The following equipment is required:

- A crane with a load rating of double the frame’s gross weight.
- Two lifting slings, each with a load rating of double the frame’s gross weight.

## Before you begin

### Warning



Do not remove any of the bolts and brackets that attach the frame to the shipping skid before the crane has been attached and taken the weight of the frame.

A bracket connected to the crosshead serves to support the weight of the frame during shipping. If this is removed while the frame is horizontal, the top of the frame can drop onto the skid, causing damage.

The ceiling height required to bring the frame to an upright position is greater than the height of the frame. Refer to [Table 20](#) on page 78 for the minimum ceiling height required for each frame configuration. These values assume that the frame is not attached to the shipping skid.

Table 20. Minimum required ceiling height in mm (in)

Base configuration	Frame height	Without stabilizers	With stabilizers
Short base	Standard	2345 (92.3)	2475 (97.4)
Short base	Extra height	2833 (111.6)	2950 (116.1)
Tall base	Standard	2638 (103.8)	2759 (108.6)
Tall base	Extra height	N/A	3238 (127.5)

### Warning



While following any lifting, moving or installation procedure, NEVER REMOVE any bolt or fastener that has this label adjacent to it:



Before lifting the load frame ensure that:

- The load frame is bolted to the shipping skid.
- There are no loose accessories on the shipping skid.
- Ensure that there is adequate ceiling clearance to allow the load frame to be lifted into a vertical position, including clearance for the crane (refer to [Table 20](#) on page 78).

- Operators of any lifting equipment have the appropriate licenses and have complied with your local safety standards (e.g. the appropriate training required by OSHA in the U.S.).

## Procedure

1. Remove all packaging material from the frame but DO NOT remove any of the bolts and the tubular brackets that attach the frame base to the shipping skid.
2. Attach the two lifting slings to the crosshead and attach them to the crane hook as shown in [Figure 23](#) on page 79. If you use chains in lieu of slings, wrap the crosshead and top plate with protective material to protect from scratching and marring.

### Caution

The length of the sling (A in [Figure 23](#) on page 79) must be longer than the distance required to clear the top plate (B in [Figure 23](#) on page 79). This ensures that the hook will not damage the frame during lifting.

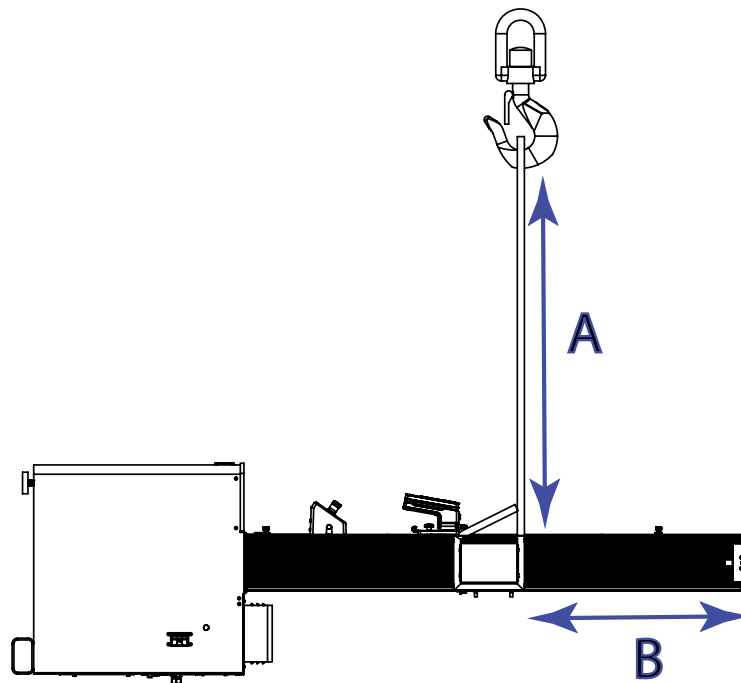


Figure 23. Attach the lifting slings

## Warning

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

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

3. Slowly lift the frame until the weight of the frame is fully supported by the slings.
4. Remove the bolts that attach the tubular brackets on the frame base to the shipping skid. DO NOT remove the brackets from the frame base.

## Caution

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The tubular brackets will act as temporary feet during the lifting process to take some of the weight of the frame and prevent damage to the frame base.

5. Slowly lift the frame into a vertical position (see [Figure 24](#) on page [81](#)).

## Warning

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**Make sure that you lift the frame very slowly and if possible brace the back of the tubular feet to prevent the frame base from sliding backwards suddenly.**

Be aware that the base of the frame is heavy and can slide backwards suddenly. Also, the frame has a tendency to “flip” upright once it has reached a certain point in the lift.

## Caution

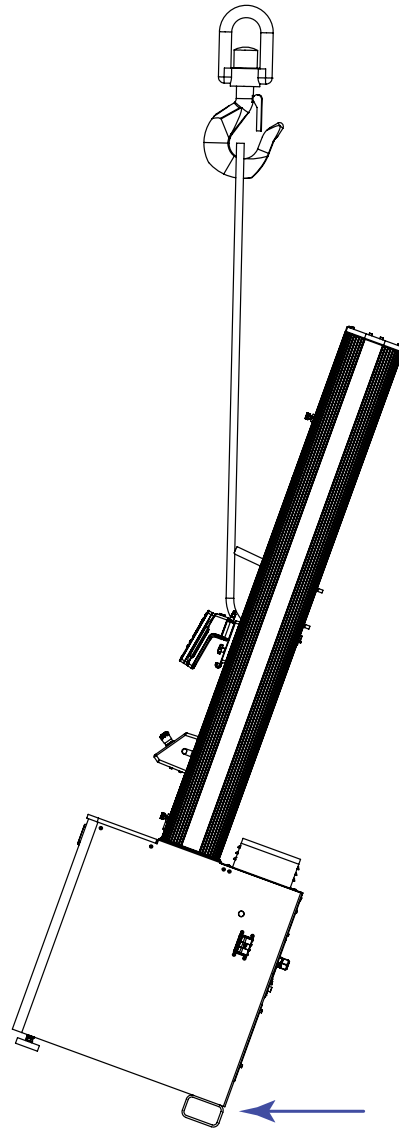
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During the lift, ensure that the only parts in contact with the shipping skid or the floor are the tubular brackets at the rear of the frame base (indicated by the arrow in [Figure 24](#) on page [81](#)).

Only these brackets are strong enough to take the weight of the frame during the lifting process.





*Figure 24. Righting the load frame*

6. When the frame is vertical, lift it clear of the shipping skid.
7. Locate the frame feet that have been removed in order to bolt the frame to the shipping skid. Remove the tubular brackets at the rear of the frame base and install the frame feet at the locations indicated in [Figure 25](#) on page [82](#).

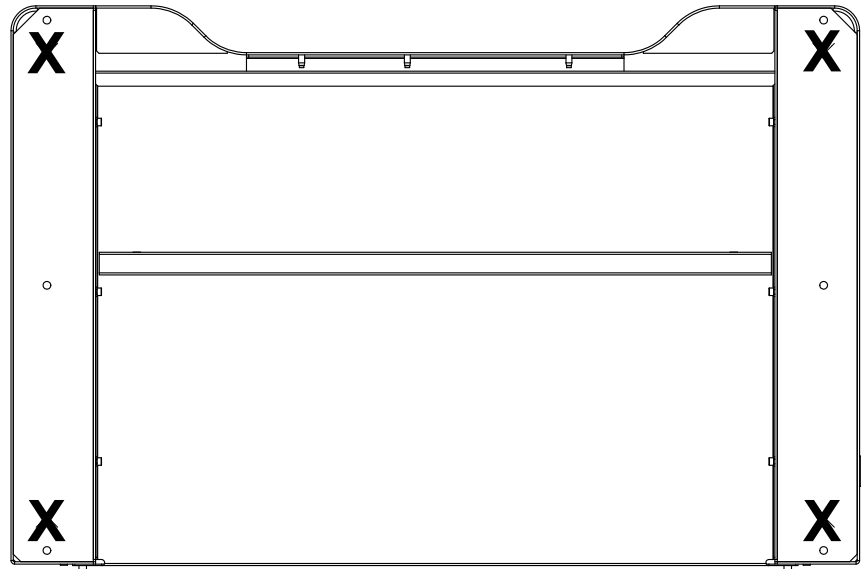


Figure 25. Underside of frame showing location of frame feet



It may be necessary to lift the frame a short distance to gain access to install the frame feet. Lift the frame the minimum distance required to achieve this.

## Warning

---



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

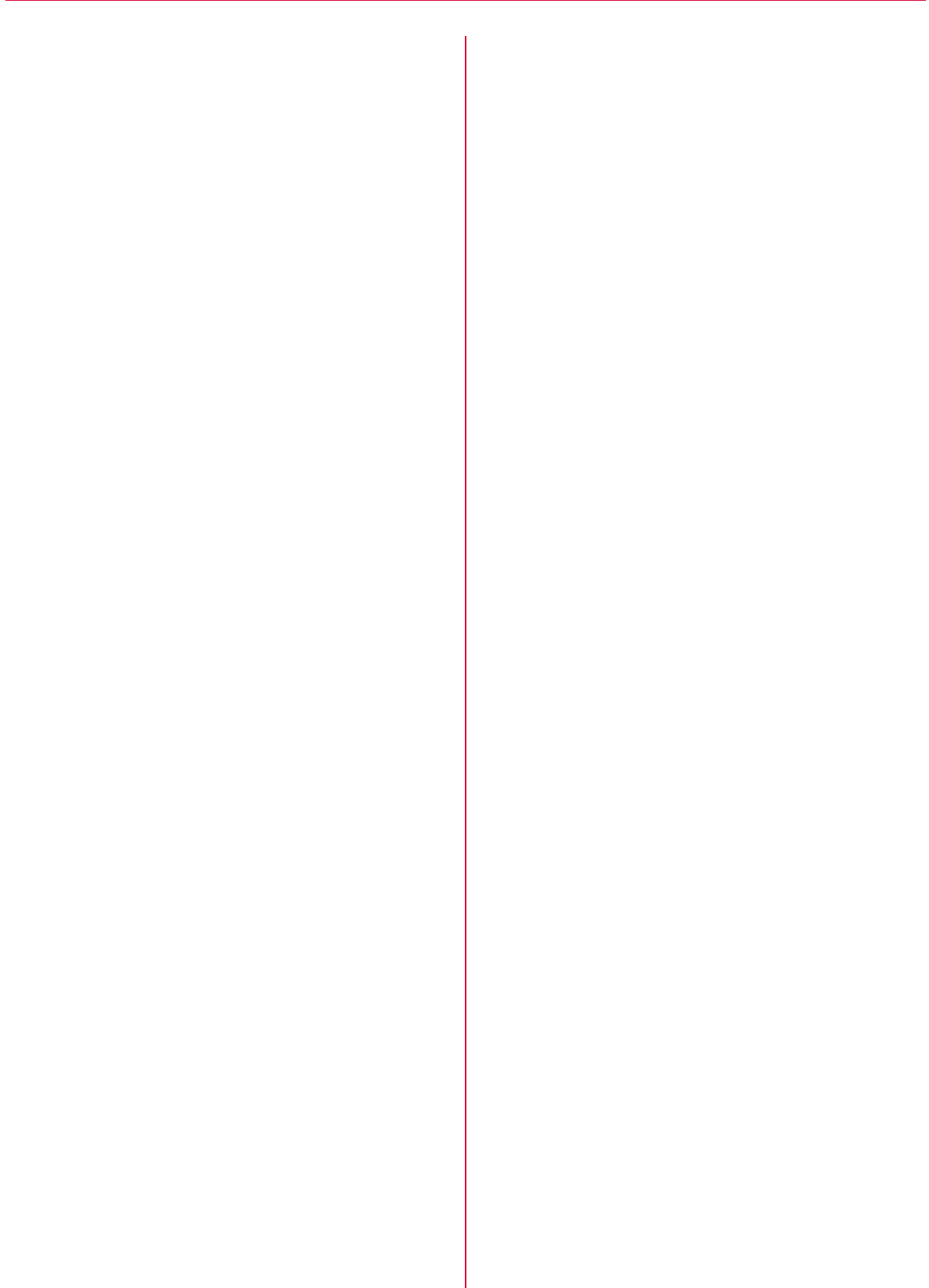
Do not lift the frame more than 8 cm (3 in) off the floor.

8. Slowly move the frame away from the shipping skid and any remaining packaging materials.
9. When the frame is clear of the packaging material, slowly lower the load frame to the floor so that it is standing on its base in an upright position.
10. Remove the slings from the crosshead.

The frame can now be positioned into its operating location and then installed by an Instron service representative. Refer to [“Transport floor model frames”](#) on page 72 for transporting instructions.

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