

2712-051 50N Pneumatic Side-Action Grips



Electromagnetic Compatibility

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

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

Proprietary Rights Notice

This document and the information that it contains are the property of Illinois Tool Works Inc. (ITW). Rights to duplicate or otherwise copy this document and rights to disclose the document and the information that it contains to others and the right to use the information contained therein may be acquired only by written permission signed by a duly authorized officer of ITW.

Trademarks

Instron[®] is a registered trademark of Illinois Tool Works Inc. (ITW). Other names, logos, icons and marks identifying Instron products and services referenced herein are trademarks of ITW and may not be used without the prior written permission of ITW.

Other product and company names listed are trademarks or trade names of their respective companies.

Original instructions

Copyright © 2014 Illinois Tool Works Inc. All rights reserved. All of the specifications shown in this document are subject to change without notice.

Worldwide Headquarters

Instron
825 University Avenue
Norwood, MA 02062-2643
United States of America

European Headquarters

Instron
Coronation Road
High Wycombe, Bucks HP12 3SY
United Kingdom

Industrial Products Group

Instron
900 Liberty Street
Grove City, PA 16127
United States of America

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



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.



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.

Warnings



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



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



Crush hazard - disconnect the pneumatic supply to the grips before installing or removing jaw faces.

Installing and removing jaw faces involves working very close to the hazard area between the grips. Disconnect the pneumatic supply to the grips to remove the risk of accidental operation of the toggle switch or foot switch.

Table of Contents

Chapter 1	Introduction	1-1
	Description	1-1
	Grip Components	1-2
	Accessories	1-2
Chapter 2	Specifications	2-1
	Specifications	2-1
	Grips	2-1
	Air Supply	2-2
	Grip Dimensions	2-3
	Compatible Jaw Faces	2-4
Chapter 3	Installation	3-1
	Installing onto a Load Frame	3-1
	Checklist	3-1
	Procedure	3-1
	Installing and Removing Jaw Faces	3-2
	Install Jaw Faces	3-2
	Remove Jaw Faces	3-3
	Connecting Pneumatics	3-3
	Grip Air Inlets	3-3
	Manual Foot Switch	3-4
	Automatic Grip Control Unit	3-6
Chapter 4	Operation	4-1
	Preparing for Use	4-1
	Opening and Closing the Grips	4-2
	Foot Switch	4-2
	Automatic Grip Controller	4-2
	Installing a Specimen	4-2

Checklist	4-2
Procedure	4-3
Removing a Specimen	4-5
Checklist	4-5
Procedure	4-5
Chapter 5 Maintenance	5-1
Checklist	5-1
Servicing	5-1
Troubleshooting	5-1

Chapter 1

Introduction

- Description 1-1
- Grip Components 1-2
- Accessories 1-2

Description

Instron 2712-051 50N capacity pneumatic action grips are designed for materials testing applications where specimens are difficult to hold in conventional screw-action grips. Pneumatic action grips allow rapid, easy loading of specimens from delicate films to polymers and woven fabrics.

Both jaw faces automatically adjust to different specimen thicknesses to ensure that the line of tensile force remains concentric with the grip body. The grips can be equipped with a variety of interchangeable jaw faces in various sizes and surface types. Refer to [Table 2-3](#) on page 2-8 to find compatible jaw faces. Contact your Instron sales representative for assistance with selecting jaw faces that are suitable for your testing requirements.

These pneumatic action grips clamp the specimen through a dual lever arm, actuated by air cylinders built into the grip body. The gripping force can be increased with air pressure to accommodate materials that are often difficult to hold. This constant gripping force is maintained on the specimen, and provides follow-up action to compensate for any decay in the gripping force. You can operate the grips using a separate pneumatic foot switch.

Grip Components

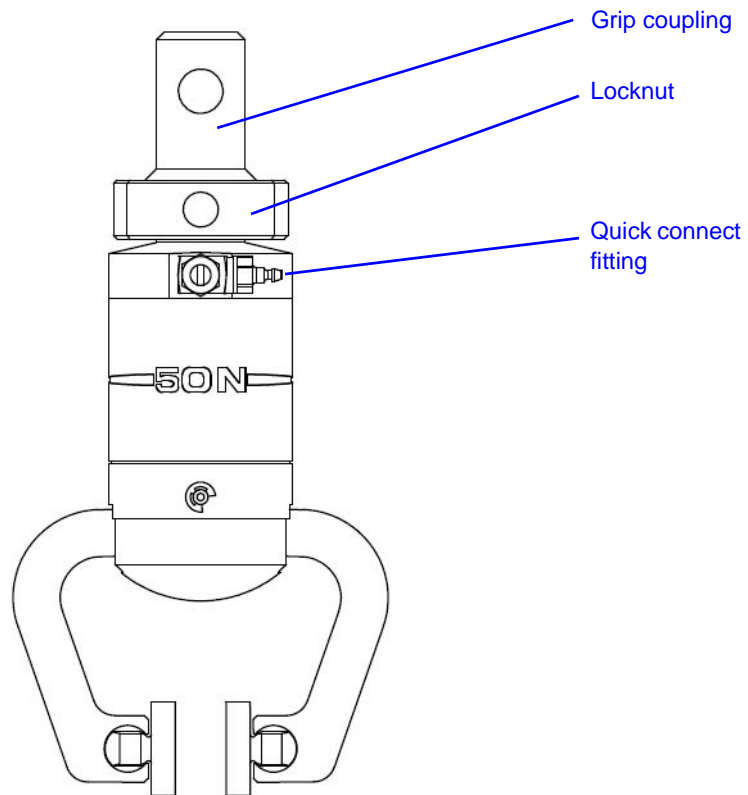


Figure 1-1. Grip Components

Accessories

The following accessories are available. Refer to [Chapter 3 “Installation”](#) for more details.

- Pneumatic foot switch
- Automatic grip controller

Chapter 2 Specifications

-
- Specifications 2-1
 - Grip Dimensions 2-3
 - Compatible Jaw Faces 2-4
-

Specifications

Grips

Table 2-1. Grip Specifications

	2712-051
Load capacity (N)	50
Test Application	Tensile
Mechanical connection (upper and lower)	Type Om 6 mm (0.25 in) clevis pin
Maximum specimen thickness	Varies according to jaw face, refer to Table 2-3 on page 2-4
Nominal specimen thickness (mm) ^a	7.4
Gripping force at 90 psi (6 bar) air pressure (mid-stroke)	90 N (20 lbf)
Temperature range	-20°C to +100°C
Weight (each grip) (kg)	0.1 kg (0.23 lb)
Air supply pressure range	2.8 bar (40 psi) to 6.2 bar (90 psi)
Air supply - consumption ^b (SCFM)	0.001

- a. This value assumes 51mm x 51 mm serrated jaw faces. Refer to [Table 2-3](#) on page [2-4](#) for different faces.
- b. SCFM is Standard Cubic Feet per Minute, assuming 1 gripping cycle per minute for the entire grip set. This measurement assumes air pressure of 5.5 bar (80 psi).

Air Supply

To ensure long term operation of the grips the air supply must be dry and filtered. To ensure dry air you can install an in-line desiccant air dryer (not available from Instron) at the compressor. Use of a local regulator and 5 µm filter assembly near the testing system is also recommended.

Grip operating pressure range is 2.8 bar (40 psi) to 6.2 bar (90 psi). If the air pressure is below the minimum recommended 2.8 bar (40 psi), gripping force will be diminished. [Figure 2-1](#) on page 2-2 illustrates this effect.

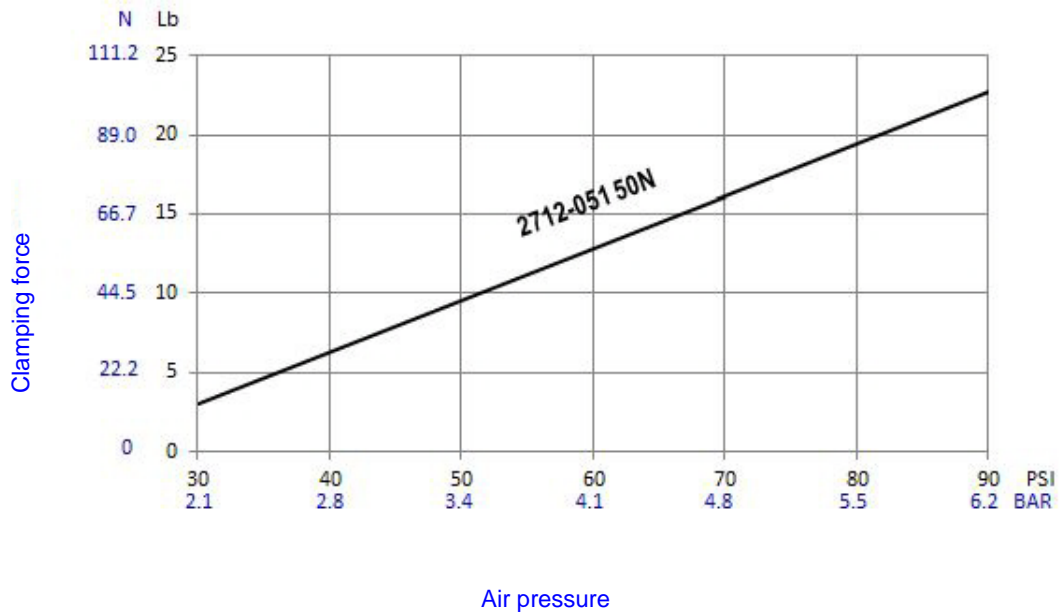


Figure 2-1. Clamping force vs Air pressure

Grip Dimensions

Table 2-2. Grip Dimensions - mm (in)

Dimension - mm (in)	Label on Figure 2-2	2712-051
Overall width	A	50.7 (1.996)
Overall height	B	101.61 (4.0)
Piston outside diameter	C	24.51 (0.965)
Depth including fittings	D	40.66 (1.601)
Body thickness	E	6.00 (0.236)
Effective length	F	93.61 (3.685)
Jaw center to grip edge	G	4.51 (0.178)

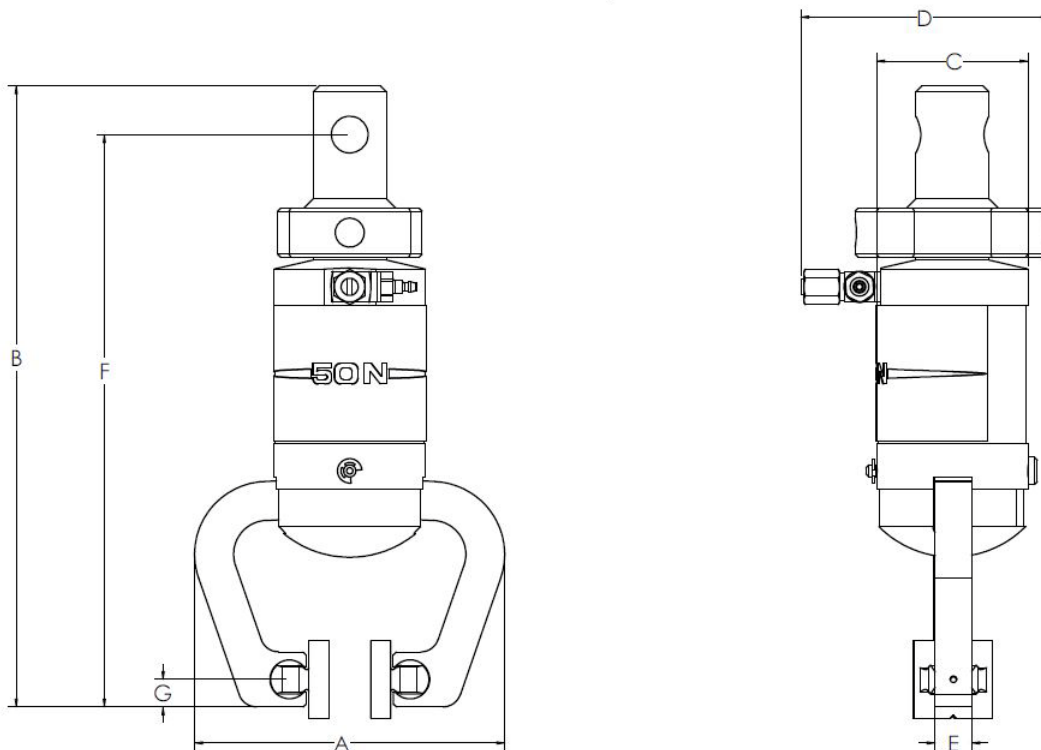


Figure 2-2. Grip Dimensions

Compatible Jaw Faces

Table 2-3. Compatible Jaw Faces

Catalog No.	Surface	Width - mm (in)	Height - mm (in)	Maximum Specimen Thickness
2702-360	Rubber	10 (0.4)	10 (0.4)	4.6 (0.18)
2702-361	Rubber	12 (0.5)	25 (1.0)	4.6 (0.18)
2702-362	Rubber	25 (1.0)	25 (1.0)	4.6 (0.18)
2702-363	Rubber	50 (2.0)	25 (1.0)	4.6 (0.18)
2702-364	Rubber	100 (4.0)	25 (1.0)	4.6 (0.18)
2702-365	Serrated	10 (0.4)	10 (0.4)	6.5 (0.25)
2702-366	Serrated	12 (0.5)	25 (1.0)	6.5 (0.25)
2702-367	Serrated	25 (1.0)	25 (1.0)	6.5 (0.25)
2702-368	Serrated	50 (2.0)	25 (1.0)	6.5 (0.25)
2702-369	Serrated	100 (4.0)	25 (1.0)	6.5 (0.25)
2702-370	Smooth	10 (0.4)	10 (0.4)	6.5 (0.25)
2702-371	Smooth	12 (0.5)	25 (1.0)	6.5 (0.25)
2702-372	Smooth	25 (1.0)	25 (1.0)	6.5 (0.25)
2702-373	Smooth	50 (2.0)	25 (1.0)	6.5 (0.25)
2702-374	Smooth	100 (4.0)	25 (1.0)	6.5 (0.25)
2702-375	Brake Lining (HFC)	25 (1.0)	25 (1.0)	4.6 (0.13)
2702-376	Brake Lining (HFC)	50 (2.0)	25 (1.0)	4.6 (0.18)
2702-377	Line Contact	25 (1.0)	n/a	5 (0.2)



The jaw faces listed in [Table 2-3](#) are also compatible with the 2712-052 250N pneumatic grips.

Chapter 3

Installation

This chapter contains procedures for installing the grips. It includes the following sections:

- Installing onto a Load Frame 3-1
 - Installing and Removing Jaw Faces 3-2
 - Connecting Pneumatics 3-3
-

Installing onto a Load Frame

Checklist

Before you begin, check the following:

- There is sufficient space between the load cell and the load frame base to install the grips.
- The testing system is in standby mode and other personnel cannot operate any of the system controls.
- The limit stops on the load frame are set to prevent the upper and lower grips from colliding with each other.
- The mating surfaces of the grips, load cell and load frame base are free of dirt and debris.

Procedure

Use the following procedure to install both the upper and lower grip onto the load frame.

1. Insert the adapter on the grip into the female clevis socket on the load frame base or load cell as shown in [Figure 3-1](#) on page 3-2.
2. Align the clevis holes and insert the clevis pin through the holes.
3. Secure the clevis pin in position with the clevis pin clip.
4. Tighten the lock nut by hand. This is sufficient for 50N grips, you should not need to preload the loadstring.

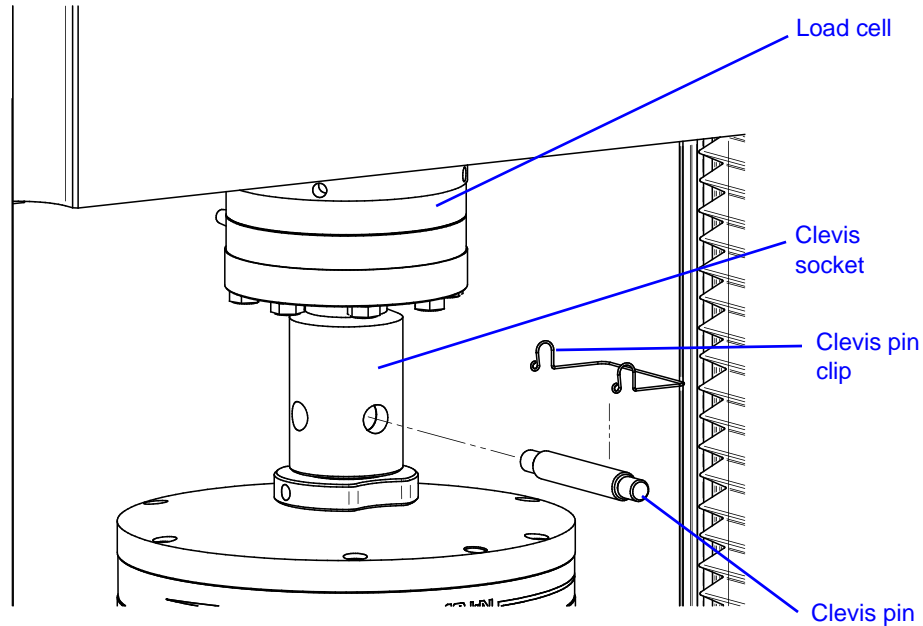


Figure 3-1. Installing Grip onto Load Frame

Installing and Removing Jaw Faces

Warning



Crush hazard - disconnect the pneumatic supply to the grips before installing or removing jaw faces.

Installing and removing jaw faces involves working very close to the hazard area between the grips. Disconnect the pneumatic supply to the grips to remove the risk of accidental operation of the foot switch.

Install Jaw Faces

1. Verify that the pneumatic supply to the grip is disconnected.
2. Push the jaw face into the grip body as shown in [Figure 3-2](#) on page [3-3](#) until you feel it locate in the socket.
3. Grasp the top and bottom edges of the jaw face between finger and thumb and rock it up and down to ensure that it is fully located in the socket.

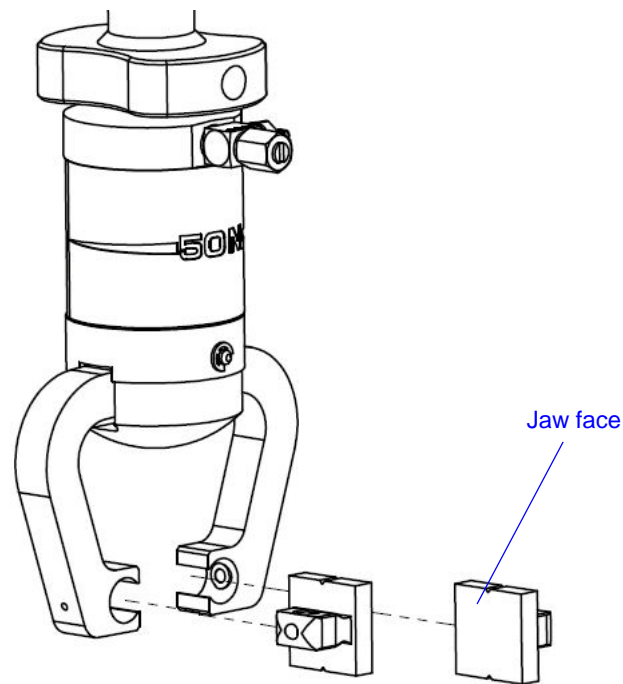


Figure 3-2. Installing Jaw Faces

Remove Jaw Faces

1. Verify that the pneumatic supply to the grip is disconnected.
2. Push the jaw face out of the grip body.

Connecting Pneumatics

When connected to the air supply you can operate the grips in one of the following ways:

- using the manual foot switch
- using the optional grip controller unit

Grip Air Inlets

All Instron pneumatic grips have a quick release type connector. [Figure 3-3](#) on page 3-4 illustrates the grip nozzle and hose coupling.

The air inlets on the grips can swivel to let you keep the air hoses tidy and out of the way of testing.

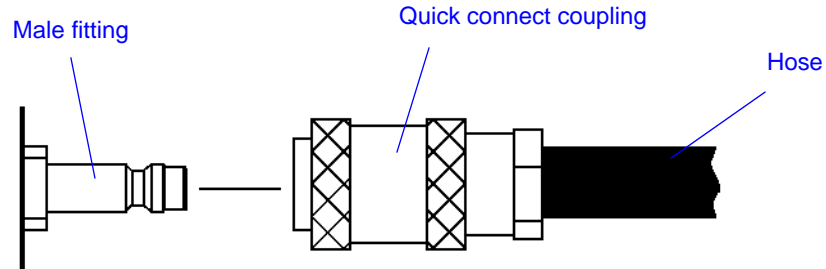


Figure 3-3. Grip Air Inlet Connection

Warning



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.

Connecting

Grasp the coupling behind the sleeve and firmly push it inward on the nozzle. Make sure the coupling slides into the nozzle groove and makes complete engagement.

Disconnecting

Grasp the coupling sleeve and push it towards the nozzle until it disengages. If air pressure is flowing to the grip when you disconnect the nozzle, there will be a pressure discharge.

Manual Foot Switch

The pneumatic foot switch allows you to close or open the grips while keeping your hands free for aligning the test specimen. This mechanically actuated switch is independent of the test system. The foot switch system consists of the switch assembly and three air lines. Two

air lines, marked upper and lower grip, are attached to the switch assembly at the factory. The other end of the hoses have quick disconnect fittings for connecting to the grips. The third air line has a female threaded fitting on both ends for connecting to the air supply. [Figure 3-4](#) on [page 3-5](#) illustrates the foot switch.

Caution

Be sure to attach the hose for the upper grip to the clip on the crosshead as shown. If you do not, your test results will be affected by the weight of the hose, especially at low loads.

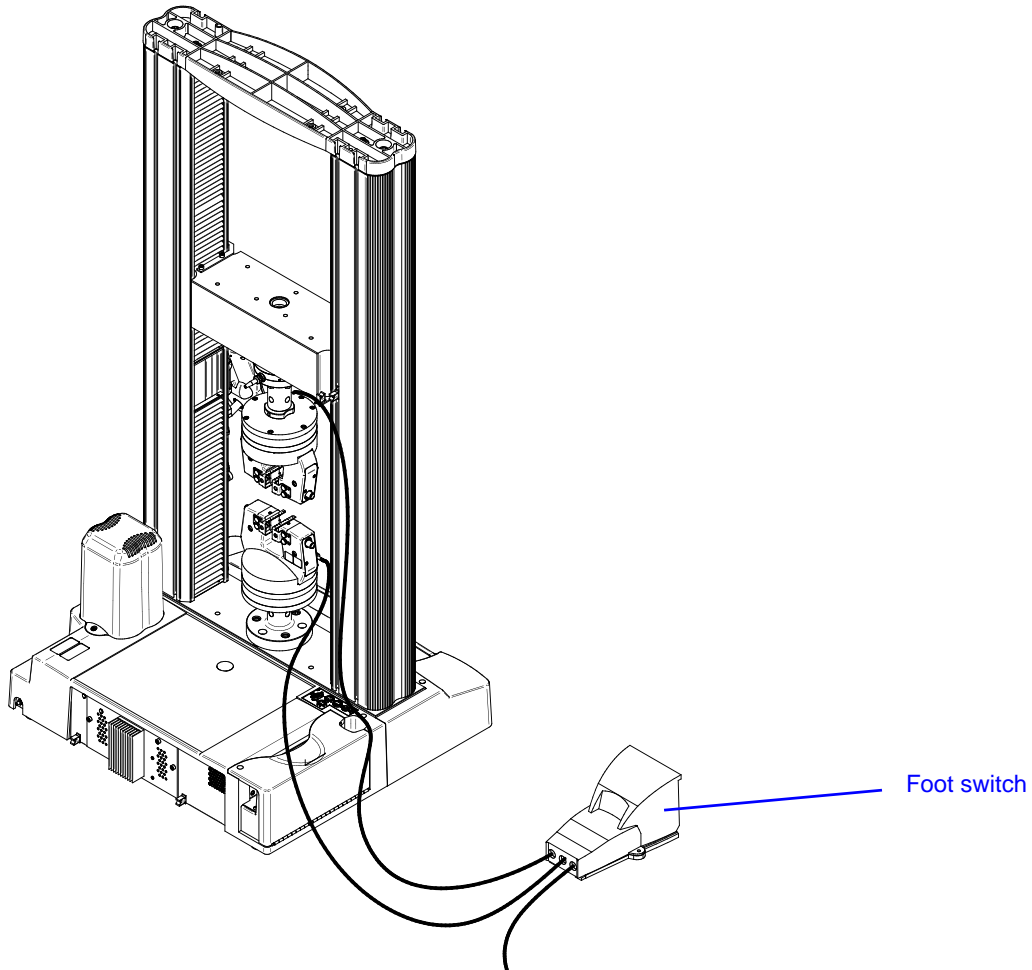


Figure 3-4. Manual Foot Switch

Automatic Grip Control Unit

An automatic grip control integrates the grips with the load frame's control system. [Figure 3-5](#) on page 3-6 illustrates the grip controller. There are various configurations for each type. Refer to the automatic grip control unit manual for specific installation details.

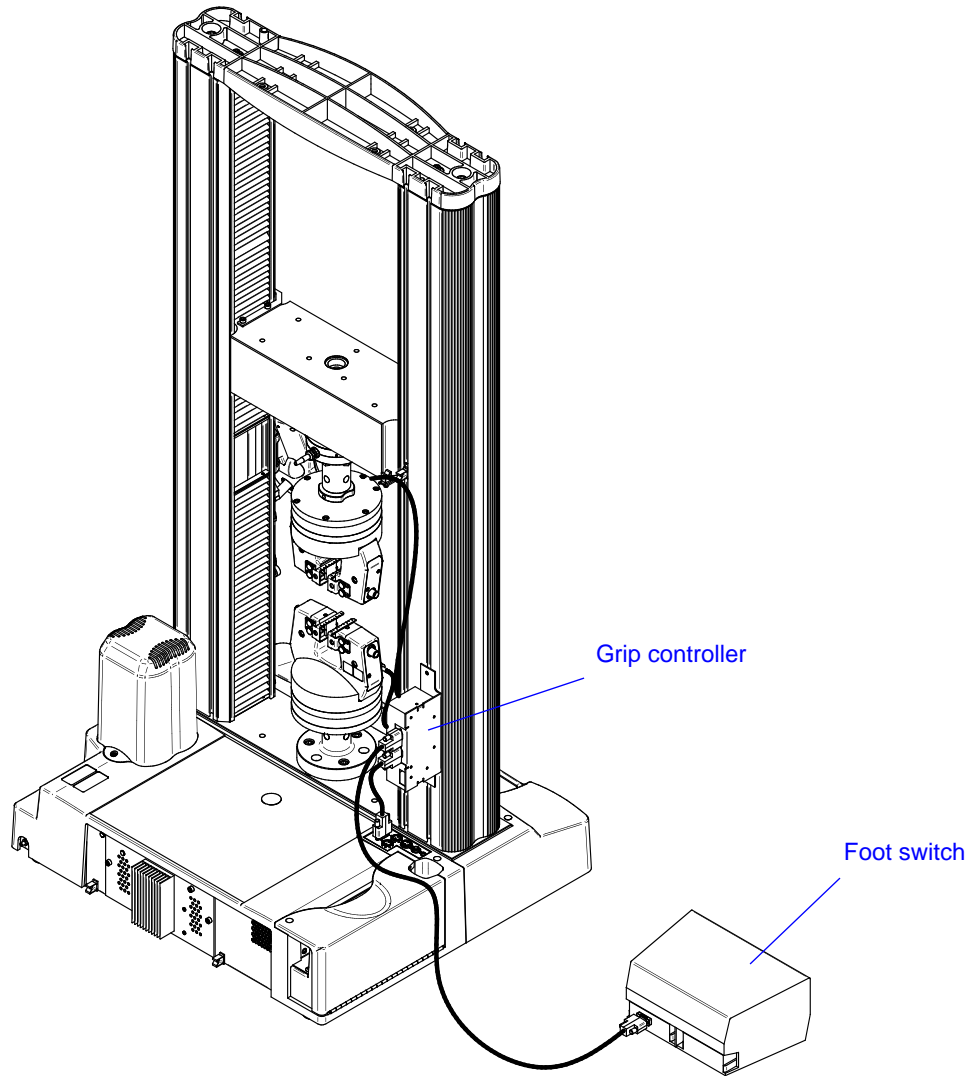


Figure 3-5. Grip Controller

Chapter 4 Operation

-
- Preparing for Use 4-1
 - Opening and Closing the Grips 4-2
 - Installing a Specimen 4-2
 - Removing a Specimen 4-5
-

Materials testing systems are inherently hazardous. The following two statements warn of behavior that offers the highest probability of personal injury from using the system.

Warnings



Hazard - do not allow more than one person to operate a testing machine.

Operator injury may result if more than one person operates the testing machine. For example, injury can occur if one person moves the crosshead or actuator while the other is working inside the hazard area between the grips or fixtures.



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.

Preparing for Use

Before using the grips for testing, make sure that:

- The grips are installed and the coupling pins are secure.
- The jaw faces are the appropriate size for the test specimen.
- The air supply is on, and the air hoses are connected and free of kinks.

- There is adequate slack in the air hoses to accommodate the crosshead travel that you anticipate during the test.
- The gauge length your test requires is set between the ends of the upper and lower jaw faces.

Opening and Closing the Grips

The method you use to close the grips depends on the configuration of your pneumatic system.

Foot Switch

- To close the upper grip, press the pedal about half-way to engage the first position.
- To close the lower grip, press the pedal completely until it locks. This position also maintains pressure to both grips.
- To open the grips, kick the toe plate at the front of the switch.

Automatic Grip Controller

Refer to the Automatic Grip Controller manual for complete operational details.

Installing a Specimen

Checklist

Check for the following conditions before you install a specimen:

- The grip coupling pins are secure.
- The air pressure supply is on and the pressure setting provides the optimum gripping force on the specimen, without exceeding the grip's maximum air pressure rating. You may have to experiment to determine the optimum air pressure.
- The crosshead is set to the test gauge length.
- The load frame's limit stops are set to prevent the grips from colliding with each other or other fixtures.



If your testing system has a *Specimen Protect* function, use it when installing a specimen. Refer to the testing system documentation for operating details.

Warnings



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.



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.

Procedure

1. Center the specimen in the grips. Make sure the specimen is perpendicular and contacts the entire length of the jaw faces as shown in [Figure 4-1](#) on page 4-4.
2. Close the upper grip.
3. Close the lower grip.
4. Adjust the air pressure to the minimum required to hold the specimen during the test, without exceeding the grip's maximum air pressure rating.

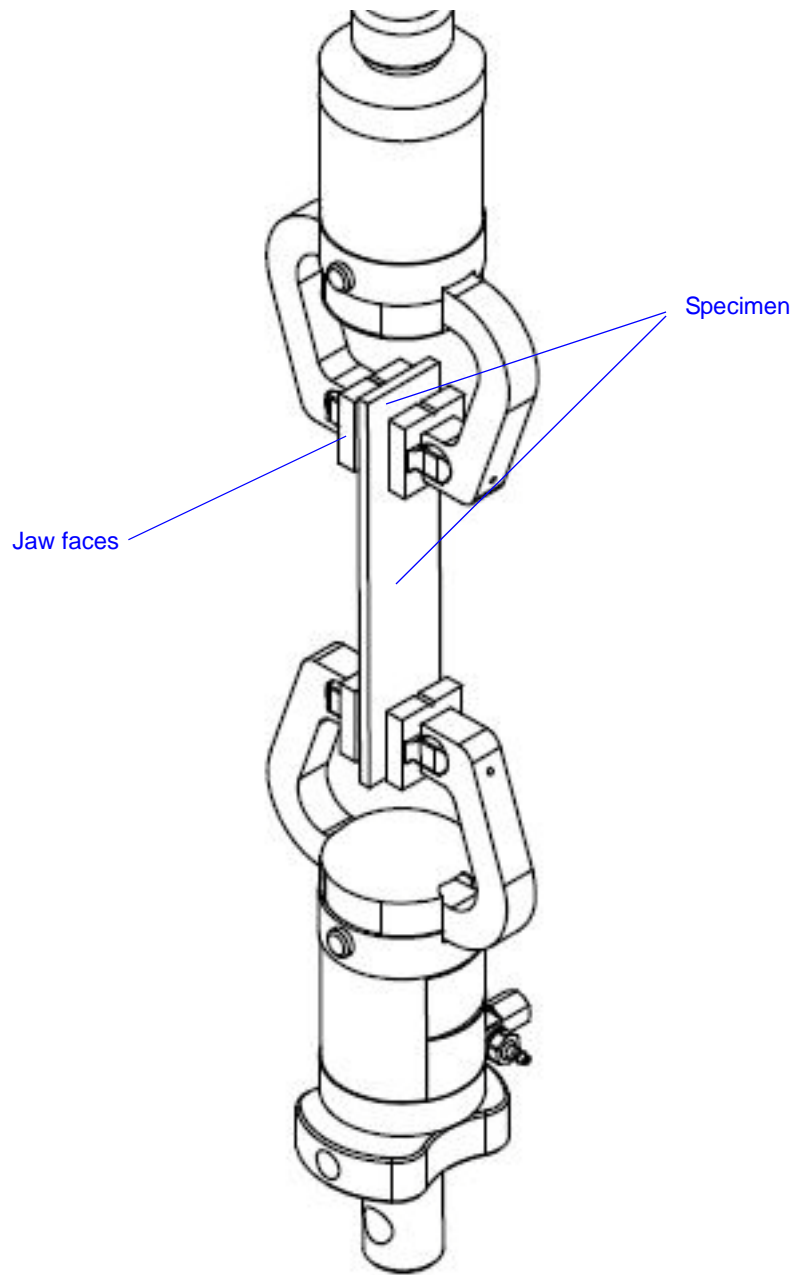


Figure 4-1. Specimen Installation



Recommended specimen insertion depth is 100%. The specimen should fully contact the entire length of the jaw faces.

Removing a Specimen

Checklist

Check for the following conditions before you remove a specimen:

- The test is complete and there is no significant load on the specimen.
- There is no measuring device, such as an extensometer or LVDT, on the specimen.

Warning



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.

Procedure

1. Open the upper grip. The jaw faces should retract away from the specimen.

Caution

Secure fragile specimens before opening the lower grip.

2. Open the lower grip. The jaw faces should retract away from the specimen.
3. Remove the specimen.

Chapter 5

Maintenance

This chapter contains instructions for maintaining and troubleshooting your grips. It includes the following sections:

- Checklist 5-1
 - Servicing 5-1
 - Troubleshooting 5-1
-

Checklist

- Check the air supply for correct pressure.
- Check the air hoses for damage or excessive wear. Replace if necessary.
- Check the jaw faces for excessive wear. Replace if necessary.
- Periodically check the air supply filter and lubricant.

Servicing

- Contact Instron Service regarding warranty and repair services.
- The grip seals are designed to last approximately 250,000 cycles and then must be replaced by a qualified Instron Service Engineer.

Troubleshooting

Improper adjustments or the lack of maintenance cause most grip operating problems. When a problem develops, [Table 5-1](#) suggests a probable cause and recommends a remedy. If you are unable to solve a problem, contact Instron Service.



Before you contact Instron Service, note the model and serial numbers of the test system and make sure there is a telephone at the test site.

Table 5-1. Troubleshooting

Problem	Cause	Remedy
Jaw faces do not close on specimen. Jaw faces do not operate smoothly.	No air pressure to grips.	Ensure that the air pressure supply is on.
	Foot switch is closed.	Toggle the foot switch.
	Air flow is restricted.	Check that the air hoses to the grips are not damaged. Check that all fittings and valves are clean and unobstructed.
	Faulty grip seal.	Replace the grip seal. Contact Instron's Service department for assistance.
Jaw faces do not retract from the specimen.	Grips are pressurized.	Toggle the foot switch to remove air pressure on the grips.
	Jaw face bound to the specimen.	Lightly tap the jaw face to release the bond.
Specimen slips while under load.	Wrong size or type of jaw face.	Install appropriate jaw faces for specimen size and type.
	Not enough gripping area.	Install specimen for complete engagement with jaw faces.
	Not enough gripping force.	Verify the air supply pressure, and adjust if necessary.
	Worn jaw faces.	Replace with new jaw faces.
	For 5kN and 10kN grips only - jaw faces not adjusted correctly.	Adjust the jaw faces closer to the specimen width.
Specimen breaks at jaw face	Initial gripping force is too great for specimen.	Reduce the air pressure to the grip. Use taller jaw faces to distribute the clamping force over more of the specimen area.
	Wrong size or type of jaw face.	Install appropriate jaw face for specimen size and type.
	Load string component is out of alignment.	Verify the alignment of the load string and specimen.

The background of the page is a light gray color with abstract, flowing, curved lines in a slightly darker shade of gray. There are also sections with a fine, repeating dot pattern, similar to a halftone or perforated metal texture, located on the left and bottom right sides. At the bottom of the page, there is a solid red horizontal bar.

Product Support: www.instron.com