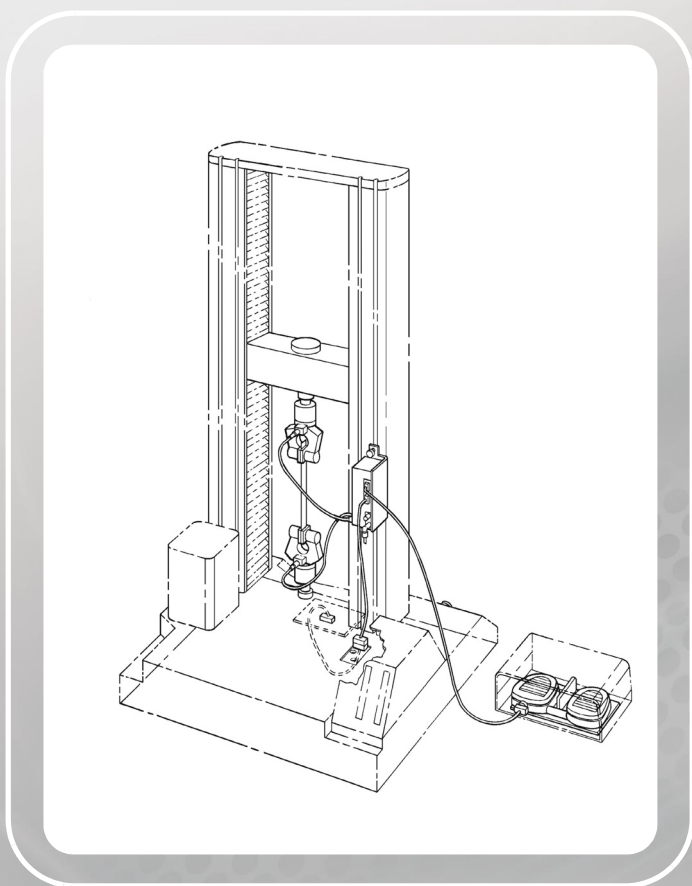


## Pneumatic Grip Control



## **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<sup>®</sup> 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 © 2017 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

---



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

The Emergency Stop button removes hydraulic power or electrical drive from the testing system and brings the hazardous elements of the system to a stop as quickly as possible. It does not isolate the system from electrical power, other means are provided to disconnect the electrical supply. Whenever you consider that safety may be compromised, stop the test using the Emergency Stop button. Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it.



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

Incorrect installation of test specimens creates stresses in grip jaws or fixture components that can result in breakage of these components. The high energies involved can cause the broken parts to be projected forcefully some distance from the test area. Install specimens in the center of the grip jaws in line with the load path. Insert specimens into the jaws by at least the amount recommended in your grip documentation. This amount can vary between 66% to 100% insertion depth; refer to supplied instructions for your specific grips. Use any centering and alignment devices provided.



**Hazard - Protect electrical cables from damage and inadvertent disconnection.**

The loss of controlling and feedback signals that can result from a disconnected or damaged cable causes an open loop condition that may drive the actuator or crosshead rapidly to its extremes of motion. Protect all electrical cables, particularly transducer cables, from damage. Never route cables across the floor without protection, nor suspend cables overhead under excessive strain. Use padding to avoid chafing where cables are routed around corners or through wall openings.

## Warnings

---



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

Materials testing is often carried out at non-ambient temperatures using ovens, furnaces or cryogenic chambers. Extreme temperature means an operating temperature exceeding 60 °C (140 °F) or below 0 °C (32 °F). You must use protective clothing, such as gloves, when handling equipment at these temperatures. Display a warning notice concerning low or high temperature operation whenever temperature control equipment is in use. You should note that the hazard from extreme temperature can extend beyond the immediate area of the test.



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

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



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

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



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

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

## Warnings

---

---



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

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



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

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



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

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



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

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



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

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

## Warnings

---



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



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



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

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





## Table of Contents

<b>Chapter 1: Introduction and Specifications</b> .....	<b>11</b>
Description .....	11
System Requirements .....	12
Specifications .....	13
<b>Chapter 2: Installation</b> .....	<b>15</b>
Mount the Control Box .....	15
Interconnections .....	16
Electrical cables .....	18
Air Hoses .....	19
<b>Chapter 3: Operation</b> .....	<b>21</b>
Adjust the Air Supply .....	21
Insert a Specimen .....	21
Remove a Specimen .....	22
<b>Chapter 4: Maintenance</b> .....	<b>25</b>
Routine Maintenance .....	25
Replaceable Parts .....	25



# Chapter 1

## Introduction and Specifications

---

• Description.....	11
• System Requirements.....	12
• Specifications .....	13

---

### Description

The 2701 Series Pneumatic Grip Control is a unit that operates pneumatic action grips. It included a pair of foot-operated switches to open and close the grips.

The system consists of (see [Figure 1](#) on page [12](#)):

- a control box that mounts on one of the load frame columns
- a foot switch assembly consisting of two foot switches
- interconnecting cabling
- interconnecting hoses and hose adapters

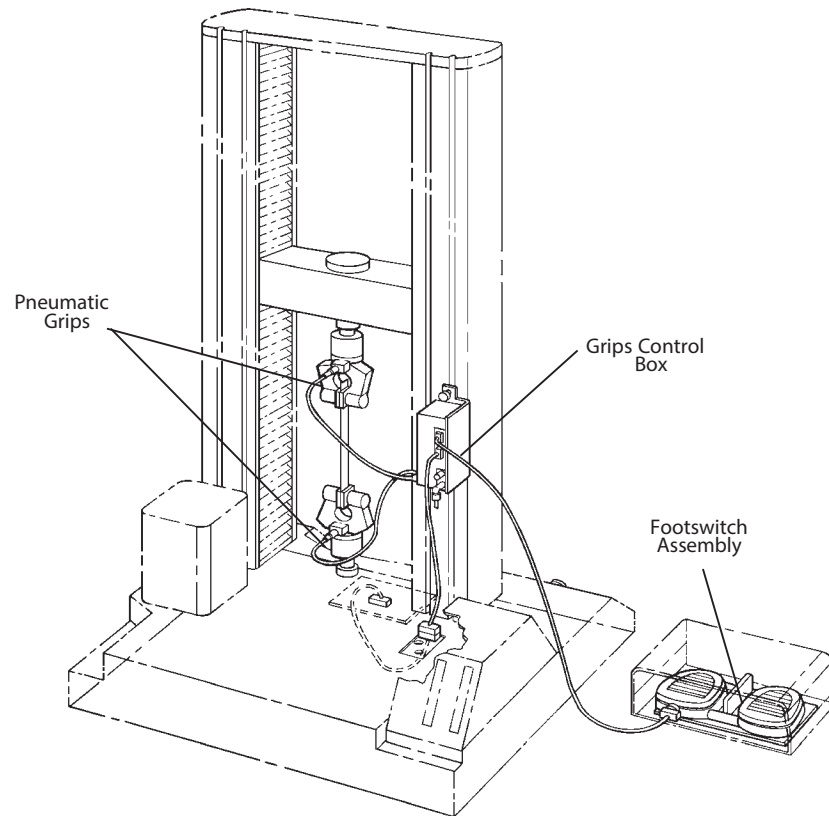


Figure 1. *Pneumatic Control System Configuration*

## System Requirements

The pressurized air source must supply reasonably dry air. In environments with high humidity, compressing ambient air can result in significant amounts of water in the pressurized air, which affects the performance of the grips. In this situation, a water separator or other drying device should be included in the air supply line.

If your testing location does not have a source of pressurized air, an optional portable air compressor is available. Contact Instron for details.

## Specifications

Table 1. *Pneumatic Grip Control Specifications*

Parameter	Value
Input voltage	24 VAC
Maximum operating pressure	90 psi (6.2 bar)
Coefficient of flow ( $C_v$ )	0.15/0.20
Input hose termination	1/8" NPT male thread or 1/4" hose barb



# Chapter 2

## Installation

The grip control unit is usually installed by Instron when you purchase a testing system. It can be purchased and installed on an existing system.

Initial installation involves adding internal cabling to the testing system. Instron Service must therefore perform the installation.

This chapter describes the external mounting and connections only.

---

• Mount the Control Box. ....	15
• Interconnections .....	16

---

### Mount the Control Box

Vertical grooves in the column covers on the load frame can accommodate various system consoles and accessories. These are held in place with friction-locking T-nuts in the grooves.

To mount the control box (see [Figure 2](#) on page [16](#)):

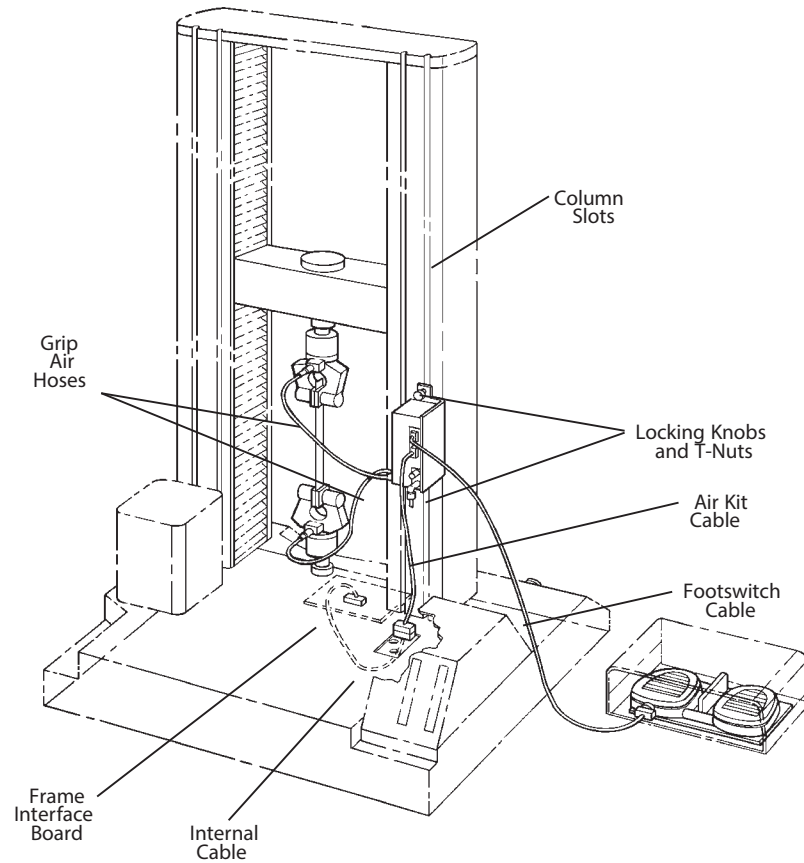


Figure 2. Pneumatic Grip Control Overview

1. Decide where on the column you want to mount the control box.
2. Place the box against the column so that the T-nuts enter the grooves in the column. Lightly tighten the T-nuts temporarily.
3. Make sure that the air hoses will reach the grips from the control box. Allow enough slack for the crosshead to move during testing without putting strain on the hoses. Adjust the position of control box up or down as necessary.
4. Tighten the T-nuts firmly. Do not over-tighten.

## Interconnections

Interconnections for the pneumatic grip control consist of electrical cables and air hoses (see [Figure 3](#) on page 17).



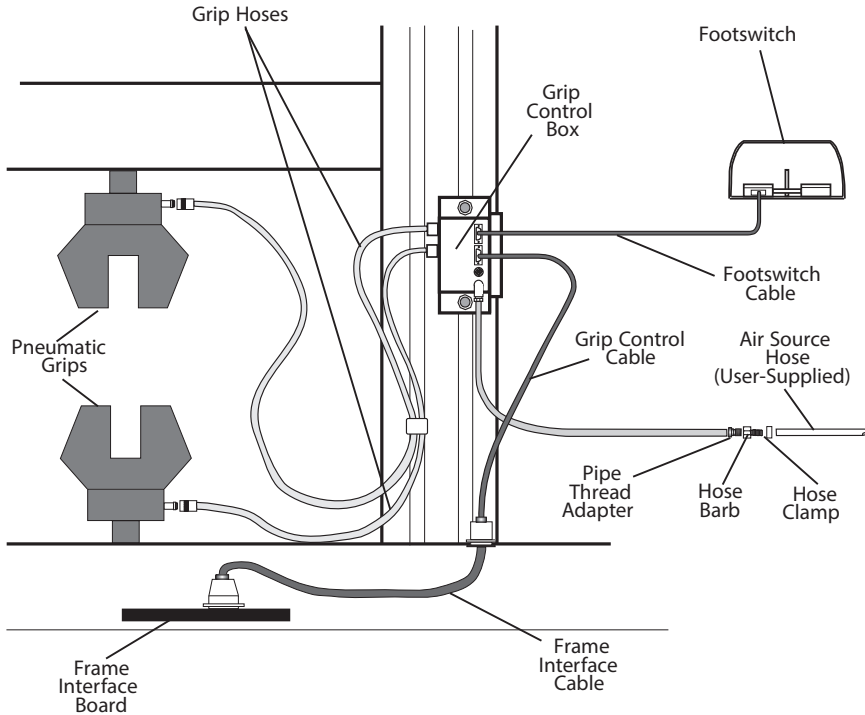


Figure 3. Interconnections



Figure 4. Air Hose Connections

## Electrical cables

See [Figure 3](#) on page [17](#).

1. Connect one end of the air kit cable to the appropriate connector on the frame.
2. Connect the other end of the air kit cable to the **FRAME** connector on the air kit control box.
3. Connect the foot switch cable to the **FOOT SWITCH** connector on the air kit control box.

## Air Hoses

Three air hoses are supplied with the system; two connect to the grips and the third connects to the pressurized air source.

The grip hoses are supplied with all necessary couplings and adapters. The supply hose is supplied with several common connector options to deal with different air supplies.

See [Figure 4](#) on page 18.

1. Connect one end of the coiled upper grip hose (A563-532) to the air outlet connector marked **A** on the control box.
2. Connect the other end of the hose to the upper grip.
3. Connect one of the lower grip hose (A563-41) to the air outlet connector marked **B** on the control box.
4. Connect the other end of the hose to the lower grip.
5. Connect one of the supply air hose to the connector marked **P** on the control box.
6. Connect the other end of the supply air hose to the source of pressurized air or to the Instron portable air compressor, if supplied.



*These connections set the system up so that the first press of the foot switch operates the upper grip and the second press operates the lower grip. If you want to reverse that order, reverse the connections to **A** and **B** the control box.*



# Chapter 3

## Operation

This chapter describes how to operate the grip control system, assuming that the grips are in place and a specimen is ready for loading.

---

• Adjust the Air Supply .....	21
• Insert a Specimen .....	21
• Remove a Specimen .....	22

---

### Adjust the Air Supply

Make sure the air hoses are connected from the control box to the grips and from the control box to the air supply (refer to “Air Hoses” on page 19).

1. Turn on the air supply.
2. If you are using an industrial air supply, make sure the air pressure does not exceed 70 psi. If possible, adjust the air pressure at the source. If this is not possible, you must use an in-line pressure regulator.
3. If you are using the Instron portable air compressor, adjust the output pressure for the appropriate clamping pressure at the grips.

### Insert a Specimen



**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.



Always use jaw face shields, if your grips support their use.

Refer to the documentation supplied with your grips for detailed instructions specific to those grips.

The following procedure assumes that you have connected the air hoses as described in [“Air Hoses”](#) on page 19.

1. Ensure both upper and lower grips are open. If not, press the foot switch marked **OPEN** (◀ | ▶).
2. Insert the upper end of the specimen into the upper grip and center it in the grip. Make sure the lower end of the specimen enters the lower grip.
3. Press the foot switch marked **CLOSE** (▶ | ◀) once only to close the upper grip.
4. If necessary, move the crosshead up or down so that the lower grip has enough gripping surface on the specimen.
5. Press the foot switch marked **CLOSE** (▶ | ◀) once only to close the lower grip.

The gripping force on the specimen is a function of the supply air pressure. To avoid damage to the specimen and the risk of premature failure, use the minimum grip pressure necessary to prevent the specimen from slipping in the grips.

## Remove a Specimen

When a test had ended, you need to remove the specimen from the grips.

1. Hold both ends of the broken specimen.

2. Press the foot switch marked **OPEN** (◀ | ▶).  
Both grips open simultaneously.
3. Remove the broken specimen pieces.





# Chapter 4

## Maintenance

---

• Routine Maintenance .....	25
• Replaceable Parts .....	25

---

### Routine Maintenance

There are no routine or periodic maintenance procedures. The design is simple and rugged.

- Keep the components clean. Use a dry cloth for dusting and use a cloth moistened with water to remove fingerprints and smudges. Do not allow fluids to seep into the unit while cleaning.

### Caution

---

**Do not use solvents or harsh detergents for cleaning.**

- Check for moisture in the pneumatic system. Disconnect the hoses at the grips and operate the foot switches while the system is pressurized. If moisture is expelled from the hoses, you must attach an air drying device to the air supply.

### Replaceable Parts

Air hoses and couplings, electrical cables and their connectors, and mounting hardware are all replaceable in the field. If the control unit or foot switch fails, you should replace the entire unit.

Description	Part no.
Control box assembly	A563-38
Foot switch assembly	A563-43

Description	Part no.
Foot switch cable assembly	A563-44
Air kit cable assembly	A563-34
Air hose assembly, lower grip	A563-41
Air hose assembly, upper grip	A563-532





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