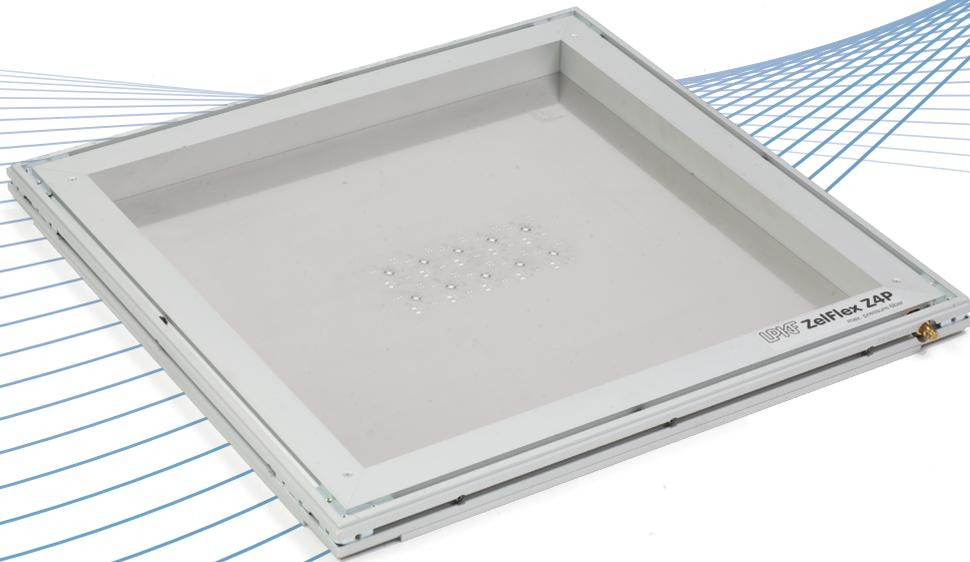


# USER MANUAL

Pneumatic 4-side quick release  
stretching frame

LPKF ZeFlex® Z4P





## 1 INTRODUCTION

Company name:	LPKF Laser & Electronics d.o.o.
Abbreviated name:	LPKF d.o.o.
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Telephone:	+386 (0) 592 08 800
Fax	+386 (0) 592 08 820
Internet:	www.lpkf.com; www.lpkf.si; www.zelflex.com
E-mail:	support@lpkf.si, sales@lpkf.si
Trade-mark:	

### 1.1 LPKF ZelFlex Z4P

ZelFlex frames are designed for holding SMT metal stencils tensioned during the SMT printing process.

The ZelFlex frame size should be selected according to printer data, either for direct inserting, or using adapters.

When the printer supports various sizes of frames, frame holders must be adjusted to the ZelFlex frame size.

The ZelFlex patented stretching system uses compressed air for perfect and uniform tensioning all over the working area. Two major ZelFlex Z4P types are available - standard and slim. Standard frame has thickness of 33 mm, whereas Slim of 25 mm. This type was designed especially to fit into smaller printers with height limit of 25 mm. Thinner frame accumulates less air inside and for this reason it needs fill up time at least every 24 h.

Compressed air is kept inside the frame and provides optimum tensioning for the next 24/48 h depending on the frame type.

Different supplied air pressure levels allow optimum tensioning of stencils from 100 microns (4 mil) to 250 microns (10 mil). Details can be found inside the manual.

When stencil is mounted, air supply is disconnected. A frame can be inserted into the printer, and used for at least 24 hours without the need for air connection.

LPKF ZelFlex Z4P is available in many different sizes and with different adapters suitable for almost all printing machines.

## 1.2 Warnings

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Copying and distributing these instructions in their entirety or in part is only permitted by LPKF approval in writing.

Note: Data can be altered without prior notice.

Original Instructions

LPKF is not liable for damage occurring due to improper use of these instructions.

The owner of the LPKF system is obligated to:

- Ensure that the system is used only for its intended purpose.
- Ensure that the system is used only under the specified operating conditions.
- Regularly check for safety, and control systems.
- Ensure that only authorized and qualified personnel operate the system.
- Ensure that all operators of the system have ready access to these instructions.
- Ensure that the system always has safety labels in place.

Remove the packaging and check the general state of the equipment, and check the contents against the enclosed packing list.

In the event of any damage immediately inform the transport agent!

Before starting-up the system, remove all packaging, which served as protection of the system during transport, otherwise severe damage could be caused to the system!

Please note: unauthorized repairs or modifications to the equipment will void the warranty!

In case of problems with the system, please immediately contact us, giving the serial number of the system!

Telephone: +386 (0) 592 08 800

Fax: +386 (0) 592 08 820

E-mail: [support@lpkf.si](mailto:support@lpkf.si)  
[sales@lpkf.si](mailto:sales@lpkf.si)

## 2 CONTENTS

1	INTRODUCTION	3
1.1	LPKF ZelFlex Z4P	3
1.2	Warnings	4
2	CONTENTS	5
2.1	Symbols, etc. used in this manual	6
2.1.1	Registered trademarks	
3	BASIC DATA	7
3.1	Name and address of the manufacturer	7
3.2	Relevant model	7
3.3	Intended use	7
3.4	Technical data	7
3.4.1.	LPKF ZelFlex - standard	
3.4.2.	LPKF ZelFlex - slim	
3.5	Noise level/vibration/emission of hazardous chemicals	9
4	SAFETY NOTES	10
4.1	General	10
4.2	Hazards	10
4.3	Safety measures	11
4.4	Procedures in the event of injury or other emergencies.	11
5	DEVICE DESCRIPTION	12
5.1	Basic parts	12
5.1.1	Air connector	
5.1.2	Pins	
5.1.4	Return springs	
5.2	Compressed Air	13
5.3	Optional equipment	14
5.3.1	Adapters	
5.3.2	Air pressure measuring gauge	
5.3.3	Air supply unit	
6	DEVICE INSTALLATION	15
6.1	Opening the packaging	15
6.2	Inspection of the frame	15
7	USE OF ZELFLEX Z4P	16
7.1	Process of inserting the stencil	16
7.1.1	Compressed Air	
7.2	Process of removing the stencil	19
8	MAINTENANCE	20
8.1	General	20
8.2	Cleaning the frame	20
8.3	Cleaning the stencil – Washing Frame (optional)	20
8.4	Stencil care	21
9	TROUBLESHOOTING	22
10	APPENDICES	23

## 2.1 Symbols, etc. used in this manual

**Bolded text** emphasises the importance of the information.

Symbols that you will notice in some chapters have the following meaning:



### **Danger!**

The symbol is used to highlight danger to life or health.



### **Caution!**

The symbol warns of circumstances that could threaten the safety and health of the device operator or cause a serious device defect.



### **Good advice and instruction**

“Rapido” warns the user about possible faults, and recommends simple and effective solutions.

### 2.1.1 Registered trademarks

The LPKF logo and all LPKF product brand names are registered trademarks of LPKF Laser & Electronics AG and LPKF Laser & Electronics d.o.o.

All other trademarks are property of their respective owners.

### 3 BASIC DATA

#### 3.1 Name and address of the manufacturer

Company name: LPKF Laser & Electronics d.o.o.  
 Abbreviated name: LPKF d.o.o.  
 Address: Polica 33  
 SI-4202 Naklo  
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E-mail: [support@lpkf.si](mailto:support@lpkf.si), [sales@lpkf.si](mailto:sales@lpkf.si)

Trade-mark: 

#### 3.2 Relevant model

ZelFlex Z4P

#### 3.3 Intended use

Professional quick-release SMT stencil frame.

#### 3.4 Technical data

##### 3.4.1. LPKF ZelFlex - standard

Compressed air supply:	Clean and dry air only! Pressure depends on the thickness of the stencil:		
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	4,5 bar	5,0 bar	6,0 bar
Fill-up time:	Every 48 hours		
Size:	Width & length (outer dimension) are defined in the frame name LPKF ZelFlex Z4P 584 x 584= width 584 mm x length 584 mm		
Thickness:	33 mm		
Weight:	4,3 – 8 kg (depends on the model & size, without adapters)		
Ambient conditions:	temperature: 5 – 35°C humidity: 30 - 95 %		

### 3.4.2. LPKF ZelFlex - Slim

Compressed air supply:	Clean and dry air only! Pressure depends on the thickness of the stencil:		
Stencil Thickness	80 µm	100 µm	120 µm
Recommended air supply	5,0 bar	5,5 bar	6,0 bar
Fill-up time:	Every 24 hours		
Size:	Width & length (outer dimension) are defined in the frame name LPKF ZelFlex Z4P 584x584= width 584 mm x length 584 mm		
Thickness:	25 mm		
Weight:	3,4 – 5 kg (depends on the model & size, without adapters)		
Ambient conditions:	temperature: 5 – 35°C humidity: 30 - 95 %		

When the frame is equipped with adapters, its outside dimensions are part of the name:

ZelFlex Z4P 636x636 / 736x736 (dimensions with adapters).

#### ZelFlex Z4P, most common product range:

ZelFlex Z4P 406x508	ZelFlex Z4P 381x381x25 Slim
ZelFlex Z4P 457x584	ZelFlex Z4P 508x508x25 Slim
ZelFlex Z4P 508x508	ZelFlex Z4P 540x540x25 Slim
ZelFlex Z4P 508x584/584x584	ZelFlex Z4P 559x559x25 Slim
ZelFlex Z4P 540x540	ZelFlex Z4P 584x584x25 Slim
ZelFlex Z4P 558x558	ZelFlex Z4P 584x584x25 Slim manometer
ZelFlex Z4P 558x558/584x558	ZelFlex Z4P 600x550x25 Slim manometer
ZelFlex Z4P 558x558/736x736	ZelFlex Z4P 650x550x25 Slim manometer
ZelFlex Z4P 584x508	ZelFlex Z4P 650x680x25 Slim
ZelFlex Z4P 584x584	
ZelFlex Z4P 584x584 manometer	
ZelFlex Z4P 584x584/736x736	
ZelFlex Z4P 584x584/736x736 manometer	
ZelFlex Z4P 636x636	
ZelFlex Z4P 636x636 manometer	
ZelFlex Z4P 636x636/650x680	
ZelFlex Z4P 636x636/736x736	
ZelFlex Z4P 636x636/736x736 manometer	
ZelFlex Z4P 636x736/736x736	
ZelFlex Z4P 650x550	
ZelFlex Z4P 736x636/736x736	
ZelFlex Z4P 736x736	

### 3.5 Noise level/vibration/emission of hazardous chemicals

The device does not cause any noise or vibration.

Contact with chemicals (soldering pastes) is possible during the process of printing.



Soldering pastes may contain lead and hazardous chemicals!  
Please take into account the prescribed safety measures, and the prescribed personal protective equipment stated in the paste manufacturer's instruction



Check product data, both on the packaging and on any safety data sheets, for any harmful characteristics.



Please find further information about LPKF ZelFlex stretching frames on our web site:  
[www.zelflex.com](http://www.zelflex.com)

## 4 SAFETY NOTES



Before using the device, carefully read this chapter on health and safety. Familiarise yourself with potential risks and prescribed safety precautions.

### 4.1 General

1. The device must be installed in accordance with the installation instructions.
2. The device should only be used for its designated purpose.
3. A suitable working environment must be ensured.
4. The device may only be operated by qualified personnel.
5. Servicing can only be performed by authorised and qualified personnel.
6. Ready access to the “User Manual” must be provided to all device operators.

### 4.2 Hazards

	<b>CHEMICAL HAZARDS</b>	Soldering pastes may contain substances hazardous to health.
	<b>MECHANICAL HAZARDS</b>	A risk of cuts is present during the process of clamping the stencil (use protective gloves).
	<b>MECHANICAL HAZARDS</b>	Inflating the frame without holding bars mounted could cause serious injury (uncontrolled moving parts).

### 4.3 Safety measures

Before operating the device a full visual inspection should be carried out. In the event of any defects or malfunctions, work may not begin before removing all faults!

It is of vital importance that the area around the device is maintained clean and tidy. A disorganised workplace can cause occupational injuries (e.g. a person can fall, slip or incur an injury).

Holding bars must always be mounted on the frame during printing.

Do not push sharp edges of the stencil through the notches on the profile.

Do not use air pressure over 6 bars (87 PSI). It can damage the frame permanently. Make sure to use clean and dry air only. Exceeded air pressure may damage the stencil permanently.

Consider recommended compressed air supply according to the frame type and stencil thickness.

Please ensure, that the environment in which the equipment is going to be used, conforms to that specified in this document.

While working with the device, complete attention of the operator is required. A person who is feeling unwell or is having difficulties concentrating should not operate the device!

Only equipment, which has been approved by LPKF, can be used in conjunction with the device. The use of unsuitable equipment could endanger the operator!

Repairs can only be carried out by authorised service personnel. The service personnel should ensure that the safety of the equipment is not compromised by the repair.

The storing or consuming of food and beverages in the work area is forbidden!

Smoking in the work area and while working is forbidden!

When using hazardous substances, safety data sheet instructions and advice should be followed!



Recommended personal protective equipment: protective gloves!

### 4.4 Procedures in the event of injury or other emergencies.

In the event of a work-related injury, stop working immediately, and if necessary, seek professional medical assistance.

## 5 DEVICE DESCRIPTION

### 5.1 Basic parts

#### 5.1.1 Air connector



Fast connector enables a fast and effective air connection with your air supply unit.

**⚠** Make sure to use clean and dry air only.



Under moderate stress ZelFlex Z4P requires refilling every 48 h, whereas ZelFlex Z4P Slim requires refilling every 24 h.

#### 5.1.2 Pins



Stencil supporting pins on the stretching bar enable a fast and easy placement of stencils onto the ZelFlex frame.

#### 5.1.3 Protective holding bars



Protective bars have multiple functions:

- holding the stencil down while air is supplied
- providing good contact between pins and perforation
- providing an adequate stencil level
- protecting the stencil and operator from mechanical hazards

#### 5.1.4 Return springs



Return springs are factory adjusted for optimum operation.

**⚠** Do not adjust or change return springs position. Wrong settings may damage the frame and the stencil.

## 5.2 Compressed Air



ZelFlex frames must be refilled with compressed air for 5 – 10 s to provide the necessary stretching force.

Stretching force is related to compressed air pressure.



Exceeding the pressure of 6 bar (87 PSI) may damage the stencil and the frame.

LPKF recommends:

ZelFlex Z4P			
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	4,5 bar	5,0 bar	6,0 bar

ZelFlex Z4P Slim			
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	5,0 bar	5,5 bar	6,0 bar



Always use dry and clean air only! Particles and humidity can damage the frame or the air connector.



For easy and reliable air distribution use an air supply unit with a water separator and 5 µm air filter (option).



The connection hose is equipped with a fast connector for fast and effective air connection with the air supply unit.



Always use original air connectors to protect the valve (fast connector) on the frame side!

### 5.3 Optional equipment

#### 5.3.1 Adapters



Many different adapters have been designed to fit most of the customer's demands for different printer requirements.

Please find additional information on: [www.zelflex.com](http://www.zelflex.com)

#### 5.3.2 Air pressure measuring gauge



The optional manometer can be integrated into the frame for a fast check of the pressure – stencil tension.

#### 5.3.3 Air supply unit



- water separation
- 5 µm air filter for particles removal
- pressure regulation
- fast clamping to the working table



Use of Air supply unit with water separator and 5 µm air filter is strongly recommended, as it prevents damage caused by particles or humidity in the air or by exceeded air pressure. It is particularly important to use it with the thinnest stencils.

## 6 DEVICE INSTALLATION

### 6.1 Opening the packaging

Carefully open the packaging by cutting the belts.

### 6.2 Inspection of the frame

Inspect the ZeiFlex frame for transport damage.



If any transport damage is discovered, immediately notify the forwarding agent!

Please inspect the ZeiFlex frame immediately after unpacking it:

- check the enclosed packaging list
- check the general state of the device



In an event of damage immediately contact your ZeiFlex representative, providing the SN and type of the frame.

ZeiFlex frames may be repaired by an authorized ZeiFlex partner only.

## 7 USE OF ZELFLEX Z4P



Before tensioning the stencil, always CHECK your system's air supply characteristics!

Use of Air supply unit (available as an option) with 5 µm air filter and water separator is advised.

LPKF recommends:

ZelFlex Z4P			
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	4,5 bar	5,0 bar	6,0 bar

ZelFlex Z4P Slim			
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	5,0 bar	5,5 bar	6,0 bar



Always use dry and clean air only! Particles and humidity can damage the frame or the air connector.

### 7.1 Process of inserting the stencil



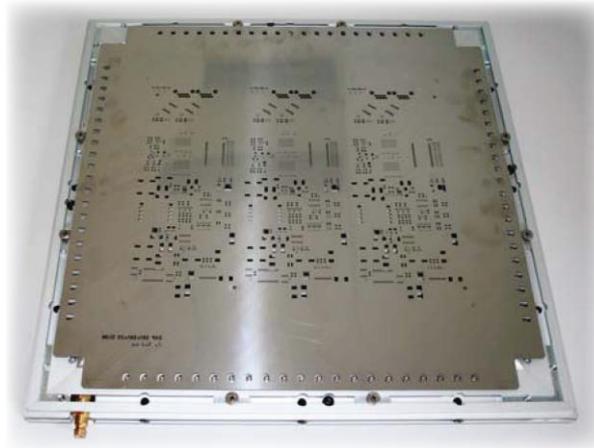
Make sure there is no pressure in the frame.

1.

Remove the protective holding bars side by side: press down, slide to the left and lift them.



2. Carefully put the stencil onto the pins.  
Pay special attention to the orientation of the stencil.  
Mind the upper and lower sides of the stencil!



3. Put the protective holding bars back onto the frame side by side:



Press down and slide to the right:





Connect the frame with your air supply.



Always use dry and clean air only! Particles and humidity can damage the frame or air connector.

Remove the air connection tube from the frame. Insert the frame into the printer according to printer instructions.

The ZelFlex size should be selected according to printer data, either for direct inserting or using adapters. When the printer supports various sizes of the frame, frame holders must be adjusted to the ZelFlex frame size.



Under moderate stress ZelFlex Z4P requires refilling every 48 h, whereas ZelFlex Z4P Slim requires refilling every 24 h.



Fill-up time is every 24/48 hours to guarantee the tensioning of the stencil > 35 N/cm. When using a stencil with sharp edges, use of protective gloves is recommended.

### 7.1.1 Compressed Air

ZelFlex frames must be supplied with compressed air for 5 – 10 s to provide the necessary stretching force. Stretching force is related to compressed air pressure; the recommended pressure is 4,5 – 6 bar (65 – 87 PSI) for 100 – 200 µm stencils.



Exceeding the pressure of 6 bars (87 PSI) may damage the stencil and frame.

LPKF recommends:

ZelFlex Z4P			
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	4,5 bar	5,0 bar	6,0 bar

ZelFlex Z4P Slim			
Stencil thickness	80 µm	100 µm	120 µm or thicker
Recommended air supply	5,0 bar	5,5 bar	6,0 bar



Always use dry and clean air only! Particles and humidity can damage the frame or air connector.



An air supply unit with a pressure regulator, water separation and 5 µm air filter is available as an option.

## 7.2 Process of removing the stencil



- Release air from the Zelflex frame:  
use the air connector (connection hose) → push the female thread towards the male thread just enough to release the clamp (do not connect)

- Remove the protective holding bars (for details see chapter 7.1).
- Remove the stencil.
- Place the protective holding bars back onto the frame (for details see chapter 7.1).



When using a stencil with sharp edges, use of protective gloves is recommended.

## 8 MAINTENANCE

### 8.1 General

ZelFlex frames are designed to be operated maintenance free, except for cleaning.

Always use clean and dry compressed air to avoid particles and humidity entering into the ZelFlex frame.

### 8.2 Cleaning the frame



Never clean ZelFlex frames using cleaning devices or dipping them into cleaning solvents!

No cleaning solvent should enter the ZelFlex frame!

Pastes, solders or adhesives must be cleaned in accordance with the manufacturer's instructions regarding each individual substance.



Most soldering pastes and glues can be cleaned using isopropyl alcohol.



Take care to follow manufacturer's instructions for each individual substance!

### 8.3 Cleaning the stencil – Washing Frame (optional)

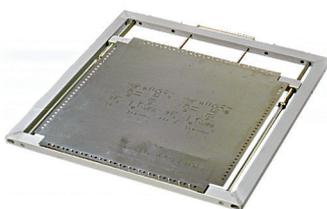
Matching the respective to sizes of the ZelFlex frames/stencils, two special washing frames for stencils with ZelFlex perforation are available:

- LPKF ZelFlex Washing frame 584x584:

For stencils with Z4P perforation with frame width of up to 584 mm (23") and frame length of 508 - 584 mm (20" - 23")

- LPKF ZelFlex Washing frame 736x736:

For stencils with Z4P perforation with frame width of up to 610 mm (24") and frame length of 610 - 736 mm (24" - 29")



The stencil is easily clamped onto the washing frame, which provides support and protection of the stencil during washing.

The washing frame is designed to be inserted into a cleaning agent solution or/and ultrasonic cleaning system.

## 8.4 Stencil care

Care should be taken when inserting the stencil onto the frame and when inserting the frame into the printer (please observe printer manufacturer's instructions, if available).

Use a metal or plastic spatula to remove the majority of solder paste from the stencil.

Care should be taken when removing the stencil from the frame.

Final hand cleaning should be done with care using cleaning agents recommended by manufacturers of the solder pastes and adhesives.

If a screen washing machine is used, please observe the manufacturer's instructions.

Damage could occur if stencils are exposed to mechanical friction.

If a brush is used to clean the stencil, damage can occur, especially in fine pitch areas.



When using a stencil with sharp edges, use of protective gloves is recommended. Do not wash the ZelfFlex frame in a cleaning machine.



It is recommended to store unused stencils in an appropriate storage system. Several storage systems are available on the market.

## 9 TROUBLESHOOTING

Some faults can be corrected with the help of this chart.

When this is not possible contact an authorised serviceman/distributor of ZelFlex devices.

Fault/Defect	Procedure
Tension is lost after a short time – air leaking.	Test the air connector for locking using a drop of soap solution and water. Contact the ZelFlex distributor for spares and tools for exchange.
Air is leaking, air connector is OK.	Contact the ZelFlex representative, provide the SN and type of frame.

**Frames can only be repaired by an authorised ZelFlex partner.**



Never disassemble the frame – no serviceable parts inside!  
Special tools are required!  
Improper dismantling can permanently damage the frame!

## 10 APPENDICES



### Shipped with all units:

- User Manual
- Spiral tube with fast connector for air supply

### Options:

- Air supply unit
- Washing frame
- Adapters
- Air pressure measuring gauge



Please find further information about LPKF ZelFlex stretching frames on our web site:

[www.zelflex.com](http://www.zelflex.com)

**ZelFlex** Pneumatic Stretching Frames

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*The only pneumatic stretching frame with no need of constant air connection*

PRODUCT RANGE | SUPPORTED PRINTERS | HOW TO BUY | FAQ | NEWS

<p><b>ZelFlex Z4P &amp; Slim</b></p> <p>The LPKF ZelFlex Z4P is a unique patented pneumatic four-sided stretching frame for quick and uniform clamping of SMT metal stencils.</p> <p><a href="#">See product details &gt;&gt;</a></p>	<p><b>ZelFlex Protect</b></p> <p>The LPKF ZelFlex Protect is an innovative system based on the ZelFlex frame concept, combined with the patented protective sub-frame. It offers improved operator safety and stencil protection.</p> <p><a href="#">See product details &gt;&gt;</a></p>	<p><b>ZelFlex QR &amp; ZR</b></p> <p>The LPKF ZelFlex QR is an advanced version of ZelFlex ZR double-sided mechanical stretching frame. It allows direct and simple clamping of polymer and metal stencils by single movement clamping mechanism.</p> <p><a href="#">See product details &gt;&gt;</a></p>	<p><b>How to buy</b></p> <p>We provide you any kind of stencil frames in an easy, fast and reliable way. The only thing you should do is to fill in the inquiry.</p> <p><a href="#">More information &gt;&gt;</a></p>
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**NOTES:**