



# Precision Medical



*Continuous Intermittent PM3300D shown*



*Continuous PM3100 shown*

# Vacuum Regulator

CONTINUOUS & CONTINUOUS INTERMITTENT

## Model Series:

PM3000, PM3100, PM3300, PM3400, PM3500, PM3600

**CAUTION**

Federal (USA) law restricts this device to sale by or on the order of a physician.



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## RECEIVING / INSPECTION

Remove the Precision Medical, Inc. *Vacuum Regulator* from the packaging and inspect for damage. If there is any damage, DO NOT USE and contact your Provider.

## INTENDED USE

The devices are intended to control and show the amount of vacuum from a central vacuum system used in various medical suctioning procedures.

## READ ALL INSTRUCTIONS BEFORE USING

This manual instructs a Professional to install and operate the *Vacuum Regulator*. This is provided for your safety and to prevent damage to the Vacuum Regulator. If you do not understand this manual, DO NOT USE the Vacuum Regulator and contact your Provider.

## EXPLANATION OF ABBREVIATIONS

l/min	Liters Per Minute
mmHg	Millimeters of Mercury
inHg	Inches of Mercury
kPa	Kilopascal

## SAFETY INFORMATION - WARNINGS AND CAUTIONS

### WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

### CAUTION

Used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.



CONSULT ACCOMPANYING DOCUMENTS



There are no components in this product made with natural rubber latex.

### WARNING

**DO NOT** use this Vacuum Regulator for anything other than its Intended Use. Personal injury and/or damage to Regulator may result from misuse.

Only personnel instructed and trained in its use should operate this Vacuum Regulator.

# SPECIFICATIONS

## GAUGE RANGE:

<b>PM3000:</b>	0-200 mmHg - Full Vacuum	<b>*PM3300EHV:</b>	0-300 mmHg (0-40kPa)
<b>*PM3000E:</b>	0-200 mmHg (0-26 kPa)	<b>PM3300HV:</b>	0-300 mmHg - Full Vacuum
<b>PM3000HV:</b>	0-300 mmHg - Full Vacuum	<b>PM3400:</b>	0-150 mmHg
<b>PM3100:</b>	0-200 mmHg - Full Vacuum	<b>*PM3400E:</b>	0-150 mmHg (0-20kPa)
<b>*PM3100E:</b>	0-200 mmHg (0-26 kPa)	<b>PM3500:</b>	0-150 mmHg
<b>*PM3100EHV:</b>	0-300 mmHg (0-40kPa)	<b>*PM3500E:</b>	0-150 mmHg (0-20 kPa)
<b>PM3300:</b>	0-200 mmHg - Full Vacuum	<b>PM3600:</b>	0-760 mmHg
<b>*PM3300E:</b>	0-200 mmHg (0-26 kPa)	<b>*PM3600E:</b>	0-760 mmHg (0-100 kPa)

\*Counterclockwise direction

## GAUGE ACCURACY:

**Analog Gauge:**  $\pm 5\%$  of MAX

### Digital/Analog, Dual Gauge:

Digital Display:  $\pm 1\%$  of Full Scale

Analog Gauge:  $\pm 5\%$  of MAX within ref. Indicator

## VACUUM PORTS:

1/8 NPT Female

## MODES OF OPERATION:

### PM3000, PM3500 Series:

OFF - No Vacuum

REG. - (Regulated) provides an adjustable, continuous vacuum level

### PM3100, PM3600 Series:

LINE - Provides maximum, continuous vacuum from the vacuum source

OFF - No Vacuum

REG. - (Regulated) provides an adjustable, continuous vacuum level

### PM3300, PM3400 Series:

REG. - (Regulated) provides an adjustable, continuous vacuum level

OFF - No Vacuum

INT. - (Intermittent) provide an adjustable vacuum level that cycles between ON and OFF

*Specifications are subject to change without prior notice.*

## FLOW RATES:

*PM3000, PM3100, & PM3500:	REG	50 l/min
	LINE	55 l/min
**PM3600 SERIES:	REG	71 l/min
	LINE	82 l/min
*PM3300:	REG	50 l/min
	INT	10 l/min
*PM3400:	REG	50 l/min
	INT	3 l/min

\* MAXIMUM FLOW IS OBTAINED WITH A VACUUM SOURCE OF 21" Hg (71.1 kPa)

\*\* MAXIMUM FLOW IS OBTAINED WITH A VACUUM SOURCE OF 25" Hg (84.6 kPa)

## MAXIMUM VACUUM:

**PM3000, PM3100, PM3300, & PM3300HV:** REG. Mode @ Max – min. 100 mmHg above calibrated range

**PM3400 & PM3500D:** Restricted to 170 mmHg (23 kPa) ± 10 mmHg (1.3 kPa)

**PM3500E:** Restricted to 160 mmHg (21 kPa) ± 10 mmHg (1.3 kPa)

**PM3600:** REG. Mode – source vacuum

## INTERMITTENT CYCLE TIME:

Factory set at approximately sixteen (16) seconds ON and eight (8) seconds OFF (reference only)

## OPERATING ENVIRONMENTAL LIMITS:

0°F to 122°F (-18°C to 50°C)

## RECOMMENDED ENVIRONMENTAL OPERATING LIMITS:

55°F to 85°F (13°C to 29°C)

## STORAGE ENVIRONMENTAL LIMITS:

Temperature Range: -4°F to 140°F (-20°C to 60°C)

Humidity: Max 95% Non-condensing

## Battery (*Digital Vacuum Gauge Models ONLY*):

3 Volt Lithium, ½ AA

# OPERATING INSTRUCTIONS

## CAUTION

Inspect the Vacuum Regulator for visual damage before use, DO NOT USE if damaged.

Failure to implement recommended protective devices may cause product contamination, malfunction and/or failure.

Contamination of the product voids all warranty claims.

**NOTE:** The vacuum regulator does not contain any protection from the ingress or passing of fluids. It is the user's responsibility to provide a collection container with overflow protection or a fluid trap and either a hydrophobic or micro-bacterial filter. Precision Medical provides these accessories separately.

The Digital / Analog Dual Gauges operate independently; if the digital gauge fails, the analog gauge will still function and vice versa.

1. Turn the Selector Knob to the "OFF" position.
2. Connect the Vacuum Regulator to a vacuum source.

### A. REG. MODE (Regulated Mode) **ALL MODELS**

- a. Turn the Selector Knob to the "REG." position.
- b. Block the bottom port of the Vacuum Regulator.
- c. Using the regulator Knob, set the desired vacuum.

To *INCREASE* vacuum - Turn Knob *CLOCKWISE*

To *DECREASE* vacuum - Turn Knob *COUNTERCLOCKWISE*

### B. LINE MODE (Full, unregulated vacuum) **PM3100 & PM3600 Series ONLY**

- a. Turn the Selector Knob to the "LINE" position.

### C. INT. MODE (Vacuum cycles ON and OFF.) **PM3300 & PM3400 Series ONLY**

- a. Turn the Selector Knob to the "REG." position, to select desired vacuum level.
- b. Turn the Selector Knob to the "INT." position.

**NOTE:** The intermittent cycle starts in the "OFF" phase, therefore a delay occurs before the intermittent cycle begins.

3. Turn the Selector Knob to the "OFF" position to turn the Vacuum Regulator off.

## **WARNING**

When turning the Vacuum Regulator to “REG.” from “LINE” or “OFF”, the vacuum level will return to its previously regulated setting. Vacuum may be set at improper level from procedure.

**PM3300 & PM3400 ONLY:** When turning the Vacuum Regulator to “REG.” or “INT.” from any position, The vacuum level will return to its previously regulated setting.

ALWAYS confirm vacuum setting prior to performing procedure.

The vacuum CAN NOT be regulated when the Selector Knob is set to the “LINE” position.

**Full Line Vacuum is present between settings.**

### **REGULATE MODE**

Turn Selector Knob **fully** clockwise to the regulator mode and confirm vacuum setting before use.

### **LINE MODE**

Turn Selector Knob **fully** counterclockwise for line vacuum and confirm vacuum setting before use.

## **CAUTION**

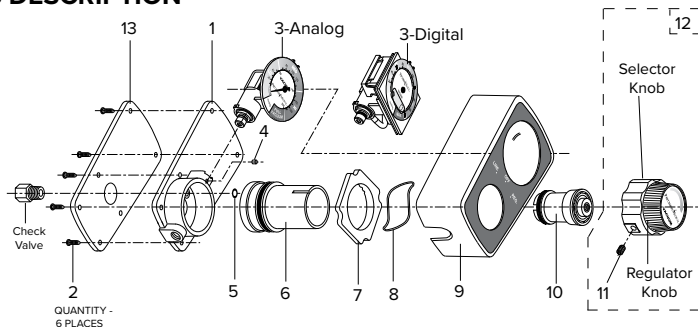
**DO NOT** operate the Vacuum Regulator when the collection canister is “full”. This may cause loss of vacuum and damage to the Vacuum Regulator. This will **void the warranty**.

# CONTINUOUS SERIES (PM3000, PM3100, PM3500 & PM3600)

## CAUTION

Missing or illegible labels must be replaced, contact Precision Medical, Inc.

### PARTS DESCRIPTION



### PARTS LIST

No.	Description	PM3000	PM3100	PM3500	PM3600
1	Housing Assembly	1561			
--	Check Valve (Export E)	NA	502230		NA
2	Screw	503956 (*505152)			503956
3	Analog Gauge Assembly)	503694 (*505163)		503826 (*505162)	505937
	Analog Gauge Assembly (Export E)	503923		504225	
	Analog Gauge Assembly (HV)	504309			
	Analog Gauge Assembly (Export E)(HV)		506384		506555
	Digital Assembly	505244 (0-200 mmHg)		505391 (0-150 mmHg)	505938
	Digital Assembly (HV)	505392 (0-300 mmHg)			
	Digital Assembly (Export E)	506036		506034	506040
	Digital Assembly (Export E) (HV)	506038 (0-300 mmHg)			
4	Snubber	1396			
5	O-ring	1016			
6	Selector Assembly	1563	1564	1563	505935
7	Selector Ring	502685			
8	Wave Spring Washer	1614 (*505154)			1614
9	Case Assembly	1565	1566	1565	1566
10	Regulator Module Assembly	1567 (*505164) (**505962)		1567 (*505164)	505962
--	Washer (metal)	NA	NA	502818	NA
--	Washer (plastic)	NA	NA	503879	NA
11	Set Screw	1391 (*505158)			1391
12	Control Knob Assembly	1568 (*505165)			1568
13	Rear Cover	507769			
--	Battery for Digital Assembly	8066			

\* MR Models ONLY (PM3000MR, PM3100MR & PM3500MR)

\*\* HV Models ONLY (PM3000HV & PM3100HV)



<b>REPAIR KITS</b>	<b>Analog Part#</b>	<b>Digital Part#</b>
PM3000 / PM3000D Vac Reg	RK6000	RK6000D
PM3000E / PM3000DE Vac Reg	RK6000E	RK6000DE
PM3000HV / PM3000DHV Vac Reg	RK6000HV	RK6000DHV
PM3000DEHV Vac Reg	N/A	RK6000DEHV
PM3100 / PM3100D Vac Reg	RK6100	RK6100D
PM3100E / PM3100DE Vac Reg	RK6100E	RK6100DE
PM3100HV / PM3100DHV Vac Reg	RK6100HV	RK6100DHV
PM3100EHV / PM3100DEHV Vac Reg	RK6100EHV	RK6100DEHV
PM3500 / PM3500D Vac Reg	RK6500	RK6500D
PM3500E / PM3500DE Vac Reg	RK6500E	RK6500DE
PM3600 / PM3600D Vac Reg	RK6600	RK6600D
PM3600E / PM3600DE Vac Reg	RK6600E	RK6600DE

*Not all Repair Kits are listed above, contact Precision Medical, Inc. for availability.*

## **DISASSEMBLY INSTRUCTIONS**

### **PM3000, PM3100, PM3500 & PM3600 Series**

(Reference "PARTS DESCRIPTION")

1. Loosen the Set Screw (Item# 11) in Selector Knob.
2. Pull the Control Knob Assembly (Item# 12) away from case. (The Regulator Module (Item# 10) is threaded onto the Control Knob Assembly.)
3. Remove the screws (Item# 2) from the back of the Regulator.
4. Separate the Case Assembly (Item# 9) by pulling it away from the Housing Assembly (Item# 1).
5. Remove the Selector Assembly (Item# 6) by pulling it away from the Housing Assembly (Item# 1).
6. Remove the Gauge Assembly (Item# 3).

## **ASSEMBLY INSTRUCTIONS**

1. To assemble, perform the "DISASSEMBLY INSTRUCTIONS" in reverse order.  
**NOTE:** Ensure the Selector Assembly is inserted into the control knob assembly with the groove in the 12 o'clock position.

Ensure tabs and slots on various components are properly aligned and engaged when reassembling.

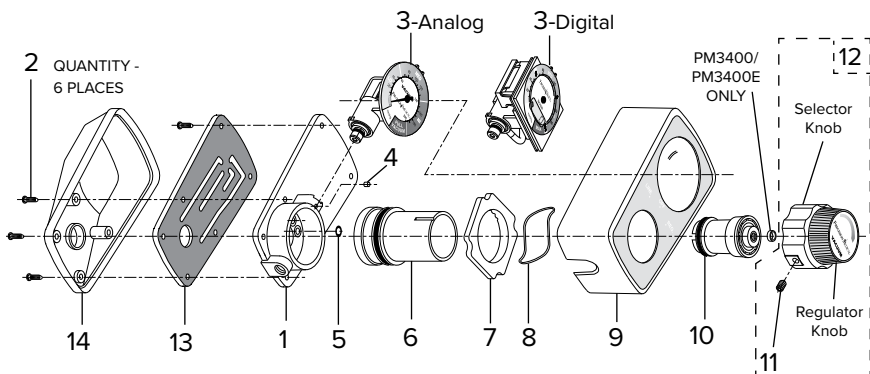
2. Lubricate all O-rings and cavities with Vacuum grease (part# 1775) supplied in the Vacuum Regulator Repair Kit.
3. Repeat steps 1 through 3 of "OPERATING INSTRUCTIONS".
4. Prior to returning Vacuum Regulator to service verify accuracy of gauge.

# CONTINUOUS INTERMITTENT SERIES (PM3300 & PM3400)

## CAUTION

Missing or illegible labels must be replaced, contact Precision Medical, Inc.

### PARTS DESCRIPTION



### PARTS LIST

No.	Description	PM3300	PM3400
1	Housing Assembly	502102	
2	Screw	503956	
3	Analog Gauge Assembly Analog Gauge Assembly (Export E) Analog Gauge Assembly (HV) Digital Assembly Digital Assembly (HV) Digital Assembly (Export E) Digital Assembly Export E (HV)	503694 503923 504309 505244 (0-200 mmHg) 505392 (0-300 mmHg) 506036 506038	503826 504225 505391 (0-150 mmHg) 506034
4	Snubber	1396	
5	O-ring	502231	
6	Selector Assembly	1805	
7	Index Ring	502685	
8	Wave Spring Washer	1614	
9	Case Assembly	1827	
10	Regulator Module Assembly	1567 (*505962)	1567
11	Set Screw	1391	
12	Control Knob Assembly	502100	
13	Timing Module	502103	
14	Rear Case	1831	

\* HV MODELS ONLY (PM3300HV)

## REPAIR KITS

	Analog Part#	Digital Part#
PM3300 / PM3300D Vac Reg	RK6300	RK6300D
PM3300HV / PM3300DHV Vac Reg	RK6300HV	RK6300DHV
PM3300E / PM3300DE Vac Reg	RK6300E	RK6300DE
PM3300EHV / PM3300DEHV Vac Reg	RK6300EHV	RK6300DEHV
PM3400 / PM3400D Vac Reg	RK6400	RK6400D
PM3400E / PM3400DE Vac Reg	RK6400E	RK6400DE

## DISASSEMBLY INSTRUCTIONS

### PM3300 & PM3400 Series

(Reference "PARTS DESCRIPTION")

1. Loosen the Set Screw (Item # 11) in Selector Knob.
2. Pull the Control Knob Assembly (Item # 12) away from case. (The Regulator Module (Item # 10) is threaded onto the Control Knob Assembly.)
3. Remove the screws (Item # 2) from the back of the product.
4. Remove the Rear Case (Item # 14) by pulling away from product.
5. Remove screws (Item# 2) from the top of the Timing Module.
6. Remove the Timing Module (Item# 13) by pulling away from the Housing Assembly (Item# 1).
7. Separate the Case Assembly (Item# 9) by pulling it away from the Housing Assembly (Item# 1).
8. Remove the Selector Assembly (Item# 6) by pulling it away from the Housing Assembly (Item# 1).
9. Remove the Gauge Assembly (Item# 3).

## ASSEMBLY INSTRUCTIONS

1. To assemble, perform the "DISASSEMBLY INSTRUCTIONS" in reverse order.

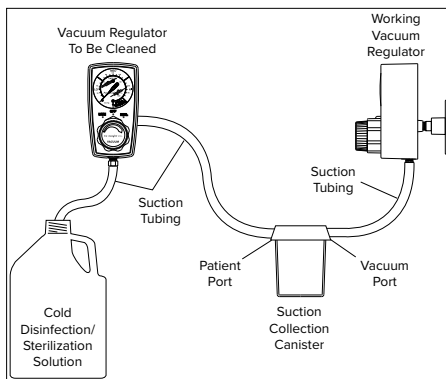
**NOTE:** Ensure the Selector Assembly is inserted with the groove in the 12 o'clock position.

Ensure tabs and slots on various components are properly aligned and engaged when reassembling.

2. Lubricate all O-rings and cavities with Vacuum grease (part# 1775) supplied in the Vacuum Regulator Repair Kit.
3. Repeat steps 1 through 3 of "OPERATING INSTRUCTIONS".
4. Prior to returning Vacuum Regulator to service verify accuracy of gauge.

# VACUUM REGULATOR CLEANING ILLUSTRATION

(See Cleaning/Decontamination Instructions)



## CAUTION

**DO NOT** autoclave or immerse in liquid. This will cause damage to the Vacuum Regulator and will **void the warranty**.

**DO NOT** set the Vacuum Regulator to the "INT"(Intermittent) mode when cleaning. Pulling cleaning fluids thru the Intermittent mode will damage the timing module and void the warranty.

If Vacuum Regulator becomes internally contaminated, warranty is voided, **DO NOT** send back to Precision Medical, Inc. for repair. Follow your facilities contaminated equipment protocol.

This Vacuum Regulator contains magnetic, ferrous material that may affect the results of an MR.

Be sure all connections are tight and leak free.

Note: MR Conditional models have a MR Conditional label.



## **CLEANING / DECONTAMINATION** (As Needed)

1. Attach a working Vacuum Regulator with a continuous regulated mode to a minimum vacuum source of 15 inHg.
2. Mix cold disinfection/sterilization solution Cidex OPA or the like according to its manufacturer's directions.
3. Connect tubing as shown in Cleaning Illustration on previous page.
4. Turn the working Vacuum Regulator on to a continuous regulated mode.
5. Adjust the vacuum to a minimum of 120 mmHg.
6. Set the Vacuum Regulator to be cleaned to the "REG." mode, and set at 100 mmHg.
7. Allow cold disinfection/sterilization solution to pass through and collect in Suction Canister. Procedure should continue for time recommended by the manufacturer of the cold disinfection/sterilization solution for the desired level of disinfection or sterilization.
8. Turn the Vacuum Regulator to be cleaned to the "LINE" mode (if applicable).
9. Allow remaining cold disinfection/sterilization solution to pass through and collect in Suction Canister.
10. Set working Vacuum Regulator to its maximum vacuum setting.
11. Thoroughly dry the internal components by drawing maximum vacuum through the Regulator to be cleaned for at least 30 seconds in both "REG." and "LINE" modes (if applicable).

**NOTE:** If it is not possible to pass cold disinfection/sterilization solution through the Regulator, then the passageways are totally blocked and **DISASSEMBLY** of the Regulator is required. Be sure to follow your facilities' Bio-hazard protocol.

## **EXTERIOR CLEANING**

1. Disconnect all gas connections and equipment before cleaning.
2. Clean exterior surfaces using Super Sani-Cloth germicidal disposable wipes. Remove all visible contamination from the external surfaces of the device and its accessories. Be sure to closely inspect and remove contamination from seams and recesses on the device that may trap contaminants. Wipe with clean paper towel to remove debris.
3. After all visible contamination is removed; use a second germicidal wipe to thoroughly wet the surfaces of the device and accessories. Allow to remain wet for 4 minutes. Use additional wipes if needed to assure surfaces are wetted continuously for 4 minutes.
4. Allow device to air dry completely.
5. Visually inspect the device for visible contamination. Repeat cleaning/disinfection process if necessary.

## **MAINTENANCE**

Before each use, visually inspect Vacuum Regulator for any sign of damage, **DO NOT USE** if damaged.

## **RETURNS**

Returned products require a Returned Goods Authorization (RGA) number, contact Precision Medical, Inc. All returns must be packaged in sealed containers to prevent damage. Precision Medical, Inc. will not be responsible for goods damaged in transit. Refer to Precision Medical, Inc. Return Policy available on the internet: [www.precisionmedical.com](http://www.precisionmedical.com).

**Note:** Federal Law prohibits shipping of bio-hazard materials via U.S. mail.

# DISPOSAL INSTRUCTIONS



Dispose of the *Vacuum Regulators* in accordance with local regulations. **Please Recycle**

## **⚠WARNING**

Bio-hazardous devices should be disposed of properly.

## TROUBLESHOOTING

If the *Preset Vacuum Regulator* fails to function, consult the Troubleshooting Table below. If problem cannot be solved, consult your Provider.

<b>Problem</b>	<b>Probable Cause</b>	<b>Remedy</b>
<b>No vacuum at bottom port (gauge at zero)</b>	<ol style="list-style-type: none"><li>1. Regulator turned "OFF"</li><li>2. Loose connection</li><li>3. No vacuum to Regulator</li><li>4. Clogged vacuum Port</li></ol>	<ol style="list-style-type: none"><li>1. Turn white Selector Knob to "REG." mode. Adjust gray Preset Knob</li><li>2. Tighten connection</li><li>3. Connect to a known working vacuum source</li><li>4. Disassemble and clean</li></ol>
<b>No vacuum at bottom port (gauge showing vacuum)</b>	Clogged Regulator	Disassemble and clean
<b>Vacuum at bottom port (No reading on gauge when port is blocked)</b>	Defective Gauge	Replace Gauge
<b>Gauge will not return to zero</b>	<ol style="list-style-type: none"><li>1. Clogged Snubber</li><li>2. Damaged Regulator Module</li><li>3. Defective Gauge</li></ol>	<ol style="list-style-type: none"><li>1. Replace Snubber</li><li>2. Replace Regulator Module</li><li>3. Replace Gauge</li></ol>
<b>Vacuum Regulation erratic</b>	<ol style="list-style-type: none"><li>1. Dirty Regulator Module</li><li>2. Defective Regulator Module</li></ol>	<ol style="list-style-type: none"><li>1. Disassemble, clean and lubricate O-ring</li><li>2. Replace Module</li></ol>
<b>Stiff movement of white Selector Knob</b>	Dirty Selector Module cavity or O-rings	Disassemble, clean casting cavity and lubricate cavity and O-rings
<b>No digital display</b>	Dead battery	Replace battery
<b><u>Intermittent Models ONLY:</u> No Intermittent (INT.) cycle</b>	<ol style="list-style-type: none"><li>1. Improper mode selected</li><li>2. Defective Timing Module</li></ol>	<ol style="list-style-type: none"><li>1. Turn Selector Knob to "INT." mode</li><li>2. Replace Timing Module</li></ol>

**Applies to MRI labeled Vacuum Regulators only!**



Indicates the device is MR Conditional and can be used in an MR Environment

**WARNING!** This product may be used near a MR Environment (e.g. in the MR System room near the scanner). It should not be utilized directly inside of the MR System (e.g. inside of the bore of the scanner). The device must be securely attached to a wall Gas Outlet.

- This information must be kept with the device.
- MR Conditional with 1.5T MR systems.
- Service must be performed by qualified personnel.
- Vacuum Regulators must be kept to manufacturing specifications.
- Fittings must be kept MR conditional if serviced or replaced.
- MRI manufactures guidelines supersedes this information
- Consult MRI Manufacture if used with an Open MRI.

### **LIMITED WARRANTY AND LIMITATION OF LIABILITY**

Precision Medical, Inc. warrants that the Medical Vacuum Regulator (the Product) will be free of defects in workmanship and/or material for the following period:

Ten (10) years from date of shipment.

Should any failure to conform to this warranty appear within the applicable period, Precision Medical, Inc. shall, upon written notification thereof and substantiation that the goods have been stored, installed, maintained and operated in accordance with Precision Medical, Inc.'s instructions and standard industry practice, and that no modifications, substitutions, or alterations have been made to the goods, correct such defect by suitable repair or replacement at its own expense.

**ORAL STATEMENTS DO NOT CONSTITUTE WARRANTIES.**

The representative of Precision Medical, Inc. or any retailers are not authorized to make oral warranties about the merchandise described in this contract, and any such statements shall not be relied upon and are not part of the contract for sale. Thus, this writing is a final, complete and exclusive statement of the terms of that contract.

**THIS WARRANTY IS EXCLUSIVE AND IS IN LIEU OF ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHER WARRANTY OF QUALITY, WHETHER EXPRESS OR IMPLIED.**

Precision Medical, Inc. shall not under any circumstances be liable for special, incidental or consequential damages including but not limited to lost profits, lost sales, or injury to person or property. Correction of nonconformities as provided above shall constitute fulfillment of all liabilities of Precision Medical, Inc. whether based on contract, negligence, strict tort or otherwise. Precision Medical, Inc. reserves the right to discontinue manufacture of any product or change product materials, designs, or specifications without notice.

Precision Medical, Inc. reserves the right to correct clerical or typographical errors without penalty.



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***ISO 13485 Certified***