

# Hydrogen Generators for Fuel Gas

- Ideal for fuel gas, up to 14 FID's
- Eliminates dangerous and expensive hydrogen gas cylinders from the laboratory
- Exclusive water management system and control circuitry maximize uptime
- Unique display lighting changes color for easy status checks and water level indication
- Remote control and remote monitoring capable by adding USB options bay controller
- Compact and reliable - only one square foot of bench space required
- Includes 2 year cell warranty
- No liquid caustics



H2PEM Hydrogen Generator with Agilent 7890 GC-FID

**Parker Balston's Proton Exchange Membrane (PEM) Cell** eliminates the use of liquid electrolytes with hydrogen generators.

Proven in over 40,000 GC installations worldwide. Parker Balston's generators are the most reliable hydrogen generators on the market. Maintenance requires only a few moments per year - no inconvenient, extended downtime.

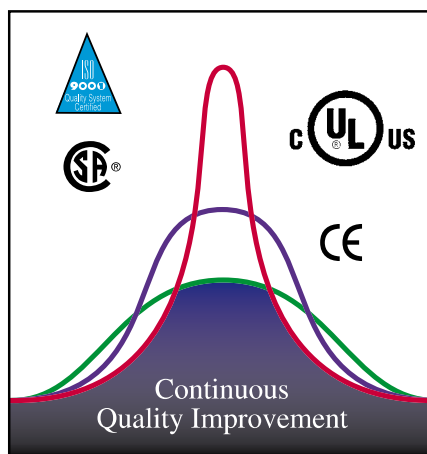
Simply change the filters every six months and the desiccant cartridge whenever it turns dark brown.

Deionized water is all that is required to generate hydrogen for weeks of continuous operation.

With an output capacity of up to 510 cc/minute, one generator can supply 99.9995% pure hydrogen for up to several FID's. Based on cylinder gas savings alone, a Parker Balston® hydrogen generator pays for itself in less than a year.

All Parker Balston hydrogen generators meet NFPA requirements and OSHA 1910.103 regulations governing the storage of hydrogen.

Produced and supported by an ISO 9001 registered organization, Parker Balston's hydrogen generators are the first built to meet the toughest laboratory standards in the world: CSA, UL, CE and IEC 1010.



# Hydrogen Generators for Fuel Gas

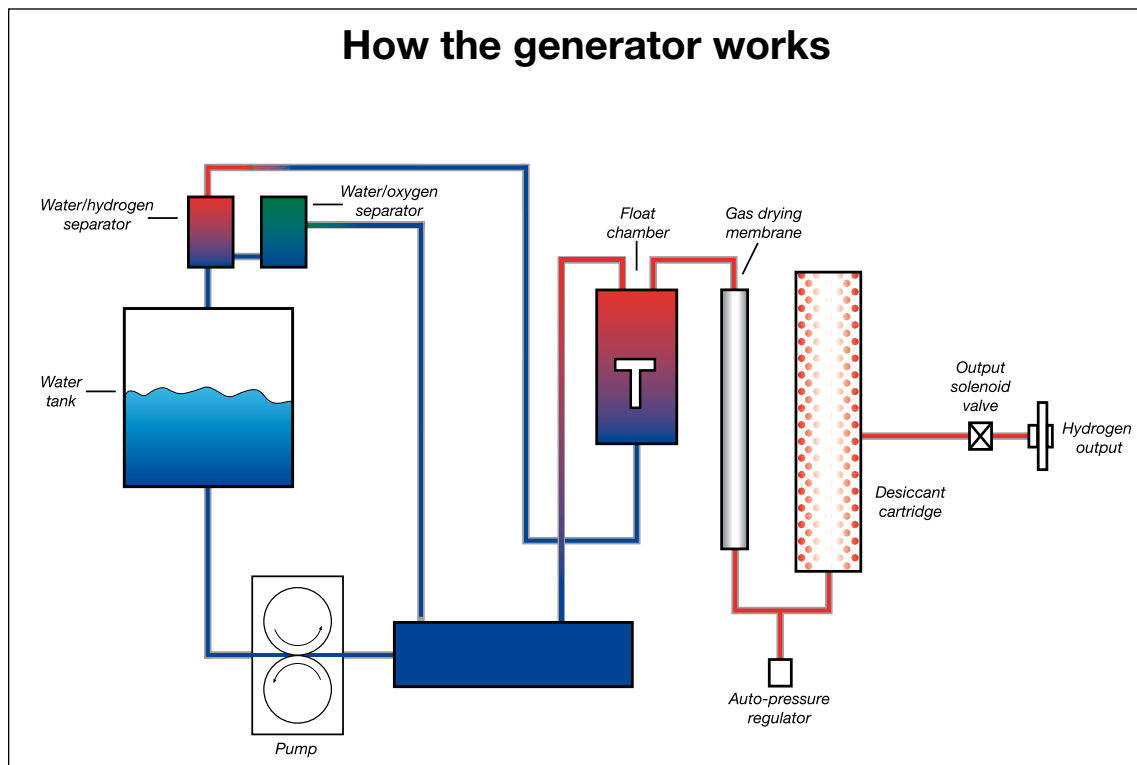
## Principal Specifications

Model Number	H2PEM-100	H2PEM-165	H2PEM-260	H2PEM-510
Purity	99.9995%	99.9995%	99.9995%	99.9995%
Flow Rates	100 cc/min	165 cc/min	260 cc/min	510 cc/min
Outlet Port	1/8" compression	1/8" compression	1/8" compression	1/8" compression
Electrical	100 Vac/230 Vac	100 Vac/230 Vac	100 Vac/230 Vac	100 Vac/230 Vac
Delivery Pressure	5-100 psig ± 0.5 psig	5-100 psig ± 0.5 psig	5-100 psig ± 0.5 psig	5-100 psig ± 0.5 psig
Shipping Weight	59 lb (27 kg) dry	59 lb (27 kg) dry	59 lb (27 kg) dry	59 lb (27 kg) dry
Dimensions	17.12"H x 13.46"W x 17.95"D (43.48cm x 34.19cm x 45.6cm)	17.12"H x 13.46"W x 17.95"D (43.48cm x 34.19cm x 45.6cm)	17.12"H x 13.46"W x 17.95"D (43.48cm x 34.19cm x 45.6cm)	17.12"H x 13.46"W x 17.95"D (43.48cm x 34.19cm x 45.6cm)

## Ordering Information for assistance, call 800-343-4048, 8 to 5 Eastern Time

Model	Description
MKH2PEM-D	Dessicant Cartridge (1 each)
MKH2PEM-6M	6 Month Service Kit
MKH2PEM-24M	24 Month Service Kit
H2PEM-100-PM, H2PEM-165-PM, H2PEM-510-PM	Preventive Maintenance Plan
H2PEM-100-INST, H2PEM-165-INST, H2PEM-260-INST, H2PEM-510-INST	Installation Service
604970894	USB Remote Control Accessory

## How the generator works



Hydrogen Technology

# Hydrogen Generators for Fuel and Carrier Gas

- Eliminates dangerous and expensive hydrogen gas cylinders from the laboratory
- Exceeds OSHA 1910.103 and NFPA 50A safety guidelines
- Safe - produces only as much gas as you need
- Produces a continuous supply of 99.99999+% pure hydrogen gas without snap on downstream purifiers
- Compact and reliable - only one square foot of bench space required and designed to run continuously 24 hours/day - includes automatic water fill
- Unique (NM) no maintenance palladium membrane prevents baseline drift unlike auto-drying technologies
- Certified for laboratory use by CSA, UL, IEC 1010, and CE Mark



Model H2PD-300 Hydrogen Generator

**Parker Balston® Hydrogen Generators** eliminate the need for expensive, dangerous, high pressure cylinders of hydrogen in the laboratory. It is no longer necessary to interrupt important analysis to change cylinders.

Generator flow capacities of up to 300 cc/min. of ultra high purity hydrogen are available.

Parker Balston Hydrogen Generators are compact benchtop units designed for use in the laboratory or in the field.

Hydrogen gas is produced by electrolytic dissociation of water. The resultant hydrogen stream then passes through a palladium membrane to assure carrier grade purity.

Only hydrogen and its isotopes can penetrate the palladium membrane; therefore, the purity of the output gas is guaranteed to be 99.99999+% consistently. This technology produces hydrogen at a guaranteed purity two orders of magnitude greater than desiccant or silica gel technologies.

Parker Balston Hydrogen Generators offer many special features to ensure safe and convenient operation. These features include smart-display technology system status at a glance and automatic water fill for endless operation.

## Applications

Gas Chromatographs  
 Emissions Test Equipment  
 Hydrogenation Reactors  
 ICP-MS Collision Gas  
 Fuel Cells

*“Our H2 generator has saved us time, space, and money over a traditional tank configuration. We realized a return on our investment in less than one year and no longer have to manage bulky and unsightly tanks in the lab.”*

John Ross  
 Director Corporate Quality  
 Ungerer & Company

# Hydrogen Generators for Fuel and Carrier Gas

## Principal Specifications

Hydrogen Generators	Models	Specifications
Hydrogen Purity		99.99999+%
Oxygen Content		<.01 ppm
Moisture Content		<1.0 ppm
Max Hydrogen Flow Rate	H2PD-150 H2PD-300	150 cc/min 300 cc/min
Electrical Requirements		120 VAC/60 Hz, 3.15 Amps (1)
Hydrogen Outlet Pressure		Adjustable, 0 to 60 psig
Certifications		IEC 1010-1; CSA UL 3101; CE Mark
Dimensions		12" w x 12" d x 22" h (30cm x 33cm x 58cm)
Outlet Port		1/8" Compression
Shipping Weight		58 lbs (26 kg)

The Parker Balston® Hydrogen Generator is an excellent source of ultra pure, dry hydrogen for a wide range of laboratory uses. The generator is used extensively with Gas Chromatographs, as a fuel gas for Flame Ionization Detectors (FID), as a reaction gas for Hall Detectors, and as a carrier gas to ensure absolute repeatability of retention times. In high sensitivity Trace Hydrocarbon Analyzers and air pollution monitors, the hydrogen produced ensures the lowest possible background noise.

Other applications include using hydrogen for hydrogenation reactions and for FID's used in the analysis of engine gas emissions in the automobile industry.

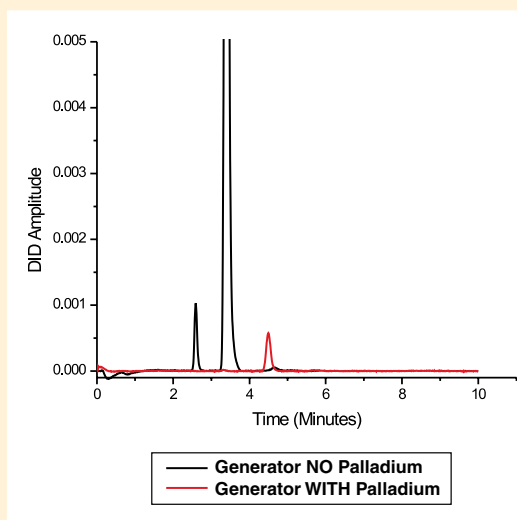
In all applications the Parker Balston Hydrogen Generator sets the standard for safety, operational performance, and dependability.

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Description	Model Number
Hydrogen Gas Generator	H2PD-150, H2PD-300
Electrolyte Solution	920071
Pressure Regulator	W-425-4032-000
Installation Kit	IK7532
Preventive Maintenance plan	H2PD-150-PM, H2PD-300-PM
Extended Support with 24 Month Warranty	H2PD-150-DN2, H2PD-300-DN2

**Simple Experimental:** The two merged baselines in the right chromatogram were created using a Gow-Mac Gas Chromatograph Series 590 equipped with a (DID) discharge ionization detector with hydrogen separator. In creating both baselines (black and red) the gas sample is hydrogen from a hydrogen generator. Both generators are the same - as hydrogen gas is produced from water via electrolytic disassociation, but differ slightly as one generator incorporates a desiccant drying tube as a final purifier while the second generator has a palladium membrane as the final purifier.

The large black peak represents a combined 12 ppm concentration of oxygen and nitrogen, suitable for hydrogen fuel gas while the corresponding point in the red baseline represents a combined 12 ppb concentration of oxygen and nitrogen, suitable for either fuel or carrier gas.



(1) Refer to voltage appendix to select correct part number and plug for Japan and 220vac/50hz configurations.

# Hydrogen Generators for Fuel and Carrier Gas

- Flow capacity to 1,200 cc/min
- Ideal for high speed and fast GC applications
- Eliminates dangerous and expensive helium and hydrogen gas cylinders from the laboratory
- Safe - produces only as much gas as you need
- Produces a continuous supply of 99.99999% pure hydrogen gas at 100 psig, palladium membrane prevents baseline drift unlike auto-drying technologies
- Compact and reliable - only one square foot of bench space required and designed to run continuously 24 hours/day
- Automatic water feed for continuous operation
- Simple maintenance, without Snap-on downstream purifiers
- Certified for laboratory use by CSA, IEC 1010, and CE Mark



Model H2-1200NA Hydrogen Generator

**The Parker Balston® Hydrogen Generator** is designed as a hazard-free alternative to high pressure gas cylinders. The generator can be used with any instrumentation requiring high purity hydrogen - anywhere a standard electrical supply is available. Deionized water is all that is required to generate hydrogen for weeks of continuous operation.

With an output capacity of up to 1,200 cc/minute, one generator can supply 99.99999% pure carrier gas, at 100 psig, to multiple GCs, and fuel gas up to 40 FIDs. Based on cylinder gas savings alone, a Parker Balston hydrogen generator pays for itself in less than one year.

The Parker Balston H2-500NA, H2-800NA and H2-1200NA Hydrogen generators use a

Proton Exchange Membrane (PEM) to produce hydrogen on demand. Each generator incorporates a palladium purifier module to remove oxygen down to less than 0.01 ppm and moisture down to <1.0 ppm. Only 100 mL of hydrogen gas is stored in the system at any time and at a maximum of 140 psig. That's why the Parker Balston hydrogen generator meets the strict, safety guidelines of the National Fire Protection Agency (NFPA) and the regulations of the Occupational Safety and Health Association (OSHA). Most importantly, the Parker Balston hydrogen generator is certified for laboratory use by CSA, IEC 1010, and CE. Proven in over 40,000 GC installations worldwide, Parker Balston's generators are the most reliable hydrogen generators on the market. Maintenance requires only a few moments per

year - no inconvenient, extended downtime. Simply change the deionizer bag every six months. If contaminated water or low water level is detected, the system activates a warning light and shuts off the generator - avoiding harm to the system.

*"Our H2 generator has saved us time, space, and money over a traditional tank configuration. We realized a return on our investment in less than one year and no longer have to manage bulky and unsightly tanks in the lab."*

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Director Corporate Quality  
Ungerer & Company

# Hydrogen Generators for Fuel and Carrier Gas

## Principal Specifications

Hydrogen Generators	Specifications
Purity	99.99999+% pure H2 Oxygen < .01 ppm Moisture < 1 ppm
Max Hydrogen Flow Rate	H2-500NA 500 cc/min* H2-800NA 800 cc/min H2-1200NA 1200 cc/min
Delivery Pressure	0 to 100 psig
Electrical Requirement	60Hz, 100 - 130 VAC (1)
Power Consumption	5.3 Amp @ 120 VAC
Certifications	IEC 1010-1; CSA; UL 3101, CE Mark
Dimensions, H2-800NA and H2-1200NA	13"w x 17"d x 15.5"h
Dimensions, H2-500NA	15"w x 18"d x 13"h
Outlet Port	1/4" Compression
Shipping Weight	45 lbs (20.4 kg)

The Parker Balston® Hydrogen Generator is an excellent source of ultra pure, dry hydrogen for a wide range of laboratory uses. The generator is used extensively with Gas Chromatographs, as a fuel gas for Flame Ionization Detectors (FID), as a reaction gas for Hall Detectors, and as a carrier gas to ensure absolute repeatability of retention times. In high sensitivity Trace Hydrocarbon Analyzers and air pollution monitors, the hydrogen produced ensures the lowest possible background noise.

Other applications include using hydrogen for hydrogenation reactions and for FID's used in the analysis of engine gas emissions in the automobile industry.

In all applications the Parker Balston Hydrogen Generator sets the standard for safety, operational performance and dependability.

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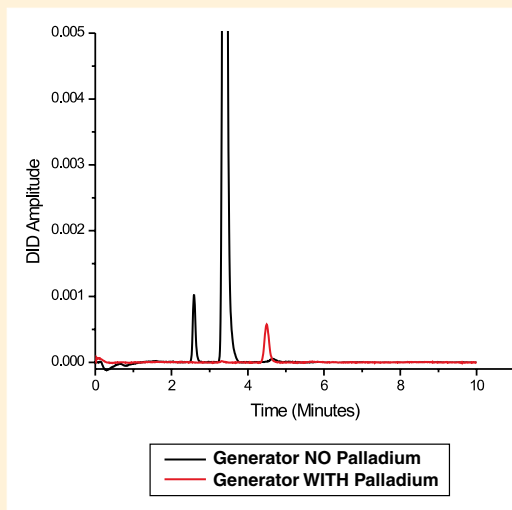
Description	Model Number
UHP Hydrogen Gas Generator	H2-500NA*
UHP Hydrogen Gas Generator	H2-800NA
UHP Hydrogen Gas Generator	H2-1200NA
Deionizer Bags (2 each)	7601132
Preventative Maintenance Plan	H2-500-PM, H2-800-PM
Extended Support with 24 Month Warranty	H2-500-DN2, H2-800-DN2, H2-1200-DN2

\*Does not include automatic waterfeed feature and has maximum pressure output of 90 psig. Outlet port is 1/8" compression.

(1) Refer to voltage appendix for electrical and plug configurations for outside North America.

**Simple Experimental:** The two merged baselines in the right chromatogram were created using a Gow-Mac Gas Chromatograph Series 590 equipped with a (DID) discharge ionization detector with hydrogen separator. In creating both baselines (black and red) the gas sample is hydrogen from a hydrogen generator. Both generators are the same - as hydrogen gas is produced from water via electrolytic disassociation, but differ slightly as one generator incorporates a desiccant drying tube as a final purifier while the second generator has a palladium membrane as the final purifier.

The large black peak represents a combined 12 ppm concentration of oxygen and nitrogen, suitable for hydrogen fuel gas while the corresponding point in the red baseline represents a combined 12 ppb concentration of oxygen and nitrogen, suitable for either fuel or carrier gas.



# Offer of Sale

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**1. Terms and Conditions of Sale:** All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance or an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

**2. Payment:** Payment shall be made by Buyer within 30 days from the date of shipment. Amounts not timely paid shall bear interest at the Maximum rate permitted by law for each month or portion thereof that the Buyer is late making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

**3. Delivery:** Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

**4. Warranty:** Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 12 months from date of shipment to Buyer. THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.

**5. Limitation of Remedy:** SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEMS SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

**6. Changes, Reschedules and Cancellations:** Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

**7. Special Tooling:** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**8. Buyer's Property:** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

**9. Taxes:** Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

**10. Indemnity For Infringement of Intellectual Property Rights:** Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

**11. Force Majeure:** Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's Control.

**12. Entire Agreement/Governing Law:** The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.