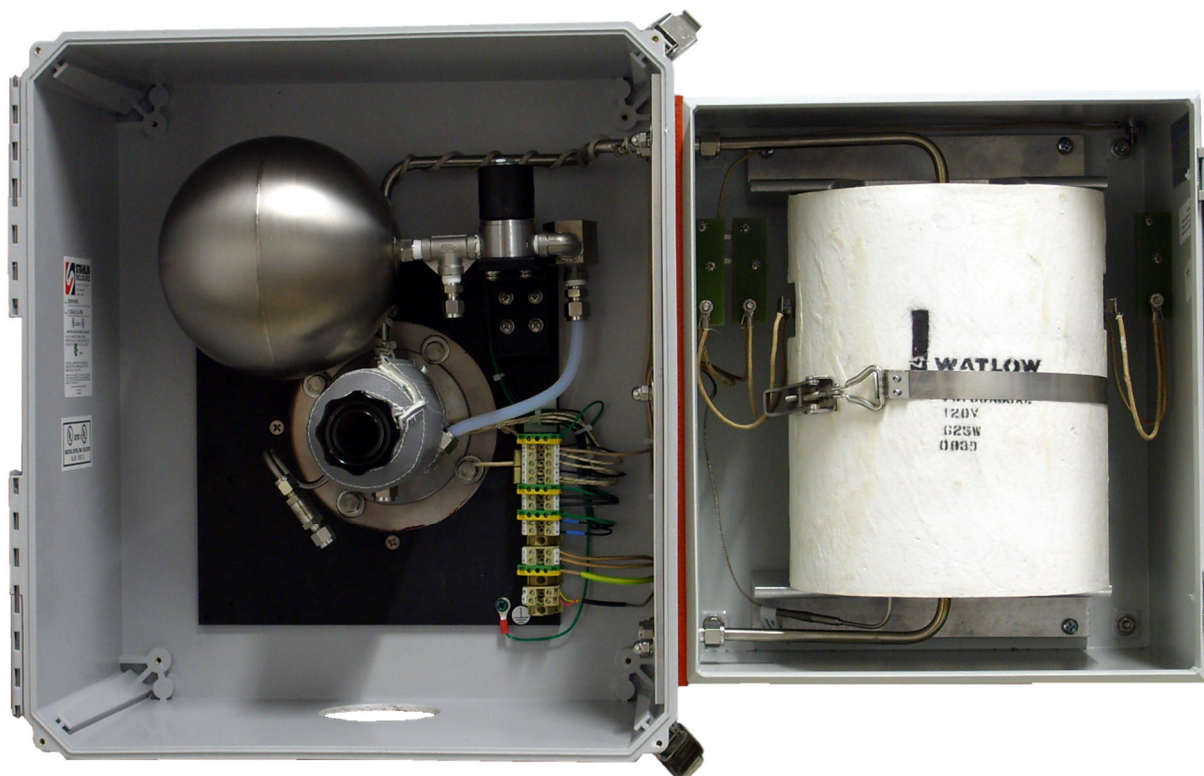




# 270SF NH<sub>3</sub> Gas Sample Probe with Ammonia Convertor

Instruction Manual



## TABLE OF CONTENTS

1.0	Receiving and Storage .....	3
2.0	Definition of Symbols.....	4
3.0	Product Identification & Configuration .....	5
4.0	Specifications .....	6
5.0	Description and Principle of Operation .....	7
6.0	Installation .....	9
7.0	Start-Up .....	10
8.0	Shutdown .....	11
9.0	Maintenance .....	12
10.0	Troubleshooting.....	13
11.0	Drawings and Spare Parts.....	14
12.0	Standard Terms & Conditions of Sale and Warranty .....	15

## **1.0 Receiving and Storage**

The Universal Analyzers Model 270SF gas sample probe with ammonia converter comes completely pre-assembled. No assembly is necessary when received on-site.

Carefully inspect the product and included accessories immediately on arrival by removing them from the packing and checking for missing articles against the packing list.

Check the items for any damage which may have occurred during transit and immediately inform the shipping insurance company of any damage found.

Storage location should be protected from the elements. Although all components provided are designed to resist corrosion, additional protection from heat (>140°F/ 60°C) and humidity is recommended.

## 2.0 Definition of Symbols



CAUTION, RISK OF DANGER SYMBOL INDICATES INJURY MAY OCCUR IF MANUFACTURER'S INSTRUCTIONS ARE NOT ADHERED TO. PLEASE READ MANUAL CAREFULLY WHEN SYMBOL IS DISPLAYED



CAUTION, HOT SURFACE SYMBOL INDICATES EXPOSED SURFACE TEMPERATURE CAN CAUSE BURNS OR PERSONAL INJURY. CARE SHOULD BE TAKEN WHEN CONTACT IS REQUIRED.



CAUTION, RISK OF ELECTRICAL SHOCK SYMBOL INDICATES ELECTRICAL SHOCK MAY OCCUR. CAUTION SHOULD BE TAKEN BEFORE DISCONNECTING OR CONTACTING ANY ELECTRICAL CONNECTIONS.



CAUTION, RISK OF EXPLOSION SYMBOL INDICATES THAT THE SYSTEM IS PRESSURIZED AND AN EXPLOSION CAN OCCUR. CAUTION SHOULD BE TAKEN WHEN OPERATING THE DEVICE.



PROTECTIVE CONDUCTOR TERMINAL SYMBOL INDICATES THE TERMINAL LOCATION FOR THE PROTECTIVE CONDUCTOR. FAILURE TO CONNECT TO THE PROTECTIVE CONDUCTOR TERMINAL MAY RESULT IN A SHOCK HAZARD.

### **3.0 Product Identification & Configuration**

For the current version of all Model 270SF with Ammonia Converter product configuration, visit the Universal Analyzers website.

<https://www.universalanalyzers.com/>

Navigate to: Products -> Gas Sample Probes -> Model 270SF w/NH3

A link to the current configuration is provided at the bottom of the page.

## 4.0 Specifications

OPERATING SPECIFICATIONS	
Sample Flow Rate	0 to 5 LPM
Calibration Gas Requirement	Sample flow rate plus 10% (includes unconverted sample)
Dimensions*	16" H x 14" W x 10" D
Weight*	36 lbs
Input Power Requirement*	1250 Watts
Input Voltage Requirement*	115 VAC at 50/60 Hz
Instrument air pressure MAX	125psi dry/clean
Maximum NH <sub>3</sub> Concentration	20 ppm by volume
Conversion Efficiency	> 95%
MATERIAL SPECIFICATIONS	
Enclosure	Painted steel (NEMA 4)
Heater Type	Ceramic fiber heater (controlled remotely, sensed with Type K Thermocouple)
Heater Temperature	1200°F to 1550°F (650°C to 1115°C)
Converter Canister and Tubing	316 Stainless Steel with 309 Stainless Steel balls for tortuous path

\* 270 Probe specifications are not included.

## 5.0 Description and Principle of Operation

### APPLICATION

The Ammonia (NH<sub>3</sub>) Converter is typically bolted to the side of, and plumbed to, a 270 series probe. The assembly is designed to sample gas in stacks where ammonia is added and must be analyzed. There is an unconverted sample output located immediately after the filter on the probe. A second sample connection is made after the converter. NO (Nitric Oxide) gas is analyzed from samples at both locations, and the difference in concentration is a measure of the amount of ammonia that has been converted.

### GENERAL DESCRIPTION

The NH<sub>3</sub> converter may be ordered as a standard option to the 270 probe series. Most standard model 270 probe options may be ordered along with the ammonia converter, including high pressure blowback functions, calibration gas injection, and all standard flange sizes. Refer to the specific model 270 manuals for more information regarding the probe specifications. The NH<sub>3</sub> converter assembly is mounted on the right side of the probe. The NH<sub>3</sub> converter option is only available with 115 VAC option.

The probe enclosure is fastened directly to a mounting flange which is sized to match the mating flange on the stack. There is a heat shrink boot on the bottom of the enclosure to accept a heated sample line. When the heated sample line is properly supported, the flange mounting of the enclosure is sufficient to support the entire assembly.

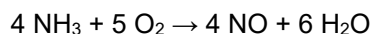
Tubing connects one of the heated probe filter outputs to the input on the NH<sub>3</sub> converter. This tubing is wrapped with a heater to ensure that no condensate forms. This heater, along with the heater inside the converter chamber, is terminated in the probe enclosure, where user power is provided.

It is recommended to provide blowback features with the probe assembly to flush particulate matter out of the filter. When the blowback accumulator sphere is discharged, small amounts of air will also travel through the converter. Blowback air does not harm the converter but will momentarily disturb both sample outputs. Clean and dry instrument quality air is essential to avoid particulate buildup in the converter chamber. Typical blowback time intervals are user controlled, from every 15 minutes to 24 hours.

Calibration (cal) gas is injected into the probe chamber, ahead of the filter. This fulfills most EPA requirements for cal gas insertion with respect to proximity of the sample source. A back-pressure check valve, set to approximately 3 psi, is provided in the cal gas injection path to ensure that the gas does not leak into the sample path during normal operation. After the filter, cal gas is drawn through both the converted and unconverted sample outputs.

The converter canister provides a torturous gas path through 309 Stainless Steel balls, with elevated surface temperatures above 1200°F. The temperature of the chamber is user controlled via monitoring of the pre-installed Type K thermocouple which is welded to the chamber core. The oven temperature may be safely controlled up to 1550°F; however, the stainless steel surfaces, along with the ammonia gases, oxidize at the high end of the range, reducing the service life of the reactor.

As the sample passes through the reactor, all NO<sub>x</sub> and NH<sub>3</sub> are thermally oxidized into Nitric Oxide. Reaction of NH<sub>3</sub> proceeds according to this exothermic reaction:



The controlled temperature, gas concentration, and flow rate through the converter should be optimized by each user through empirical means. It is recommended to first test the conversion efficiency at 1250°F. Most applications result in as high as 95% effectiveness at this temperature. Testing above 1500°F has shown to reduce effectiveness in many instances.

For maximum conversion efficiency and long reaction life (several years), observe the following:

- Ratio of O<sub>2</sub> to NH<sub>3</sub> should be greater than 1.25
- Flow through the reactor should be limited to 1 – 1.5 l/m
- Do not expose the reactor to ammonia concentrations > 20 ppm
- Minimize (NH<sub>3</sub> ppm \* hours \* flow rate) for longest reactor life



## 6.0 Installation

The Ammonia Converter is typically bolted to the side of a probe enclosure, which provides all the structural support necessary. Interfacing to the stack, connecting to sample bundles, and termination of electrical wiring is done through the probe assembly. The probe mounts to a flange face, which should be vertical or canted slightly to allow any entrained liquid in the sample to drain back into the stack. The probe tube should extend into the center third of the stack.

Heated sample line bundles should be supported externally to the probe housing, such that no weight is transferred to the enclosure wall. Connect the two sample tubes to the appropriate fittings before and after the converter. Unheated portions of these tubes should be kept to a minimum to avoid condensation. The cal gas input line connects directly to the check valve on the side of the chamber. The blowback instrument air tubing connects to the fitting close to the accumulator sphere. If an external air line is to be utilized, use a bulkhead fitting in the side of the probe enclosure for support.

Electrical terminals in the probe enclosure provide connections to the converter heater and thermocouple. Wiring may vary for different options and probe models. Always be sure that the power supplied to the probe and the NH<sub>3</sub> converter matches the voltage requirement shown on the serial number tag. Type K thermocouple extension wire should be used in the bundle to connect to the temperature controller. A solid-state relay may be necessary in the heater control process. Approximately 1250 watts of power is required. An independent ground wire should be run to the grounding terminal in the probe enclosure.

Secure the enclosure and ensure that the sample tubing is kept at a temperature above the dew point of the gas all the way to the cooler/dehydrator.

## 7.0 Start-Up

Apply power to the unit. Allow the probe filter chamber and NH<sub>3</sub> converter to come up to operation temperature. This warm-up period is extremely important to avoid condensation, which can cement particulates to the filter surface and in the converter path.

Only after the unit has come up to full temperature, start the gas sample pump(s) and determine that the proper amount of sample is being supplied to secondary instrumentation.

Run a calibration cycle to ensure that tubing is properly installed and sealed. A flow meter should be installed in the cal gas supply line to ensure that at least 10% more gas is being supplied than what is withdrawn as sample. This calculation should include the sum of the unconverted and converted sample paths. Excess cal gas is discharged through the probe into the stack.

If applicable, charge the accumulator and manually perform a blowback cycle to ensure proper wiring. A slight pulse of instrument air in the sample tubing will cause a momentary dilution of sample at the analyzers. This is normal and signifies that a blowback cycle has occurred.

### AMMONIA OXIDATION TEMPERATURES

It is suggested that the temperature of the reactor oven be first controlled to 1250°F (677°C). to determine if satisfactory ammonia conversion efficiencies can be obtained at that temperature.

## 8.0 Shutdown

1. It is recommended to introduce inert gas or instrument air through the cal gas port for 15 to 30 minutes to purge the filter chamber, NH<sub>3</sub> converter, and sample lines of potentially hazardous substances.
2. Shut down the sample pump before the end of the purge cycle to avoid drawing in new gasses.
3. Filter replacement may now be safely performed. Caution: The filter chamber is typically controlled to temperatures above 300°F and can cause serious burns.
4. For further disassembly, shut down all heaters in the probe and converter.
5. It is recommended to flow instrument air through the converter for several hours to cool down to acceptable temperatures. Caution: The NH<sub>3</sub> canister operates at temperatures above 1250°F and can cause serious burns. Depending on the installation and application parameters, the well-insulated chamber may take up to 24 hours for a sufficient cool down period.
6. Turn off instrument air for blowback and manually perform a blowback cycle to empty the accumulator chamber and reduce any stored energy in the system.

## 9.0 Maintenance



**CAUTION: DISCONNECT ALL ELECTRICAL POWER PRIOR TO SERVICE TO AVOID ELECTROCUTION.**



**CAUTION: RELEASE AIR PRESSURE PRIOR TO SERVICE.**



**CAUTION: THIS PROCEDURE CAN CAUSE SEVERE BURNS. USE PROPER PROTECTION.**

The NH<sub>3</sub> Converter requires relatively little maintenance, but over a long period of time (years), the effectiveness can drop off due to oil and oxidation coatings on the internal components. This is measurable by comparing the cal gas analysis through both sample ports. When the converter effectiveness is no longer acceptable, a replacement chamber may be installed.

Complete a full shutdown sequence and include enough time for adequate cool down. The canister starts at over 1250°F and is well insulated, so cool down may take up to 24 hours. Pumping instrument air through the canister will reduce cool down time.

1. Unbuckle the ceramic heater/insulator strap and open the front half of the unit. There should be adequate room to leave the heater wired up and still perform the swap.
2. Slide the thermocouple down and out of the canister.
3. Loosen the fittings from the canister tubes at the bulkhead wall and remove the canister.

It is not recommended to perform maintenance on any other part of the converter assembly.

## 10.0 Troubleshooting

The following table should give an overview of possible errors and an instruction to check and to repair them.

<b>Error</b>	<b>Possible reason</b>	<b>Check/Repair</b>
No sample gas flow	Probe filter element plugged  Probe filter chamber exit port plugged	Check/ replace filter element  Remove filter element and inspect exit port. Exit port will be located at 0° or 180° from the top, depending on configuration
High oxygen readings/ low pollutant readings	Leak	Leaking past the filter cap O-ring: Remove filter element using the filter change instructions. Inspect the O-ring under the filter cap by removing the 3 screws in the top of the cap and removing the aluminum section from the filter cap plug. The O-ring under the aluminum cap should be pliable, undamaged, and seated in its groove. Replace the O-ring if necessary.  Leaking blowback solenoid valve: Block or disconnect the blowback supply and look for a change in the analyzer readings.  Loose connection: Verify all fittings are tight and leak free
Low readings during calibration	Insufficient calibration gas flow	Ensure calibration flow is at least 110% of the sample gas flow

## 11.0 Drawings and Spare Parts

For the current revision of all Model 270SF and Ammonia Convertor drawings and spare parts, visit the Universal Analyzers website.

<https://www.universalanalyzers.com/>

Navigate to: Products -> Gas Sample Probes -> Model 270SF w/NH3

Links to all current drawings and spare parts for standard probe configurations are provided at the bottom of the page.

## 12.0 Standard Terms & Conditions of Sale and Warranty

THE FOLLOWING TERMS/CONDITIONS, TOGETHER WITH ANY OTHER TERMS/CONDITIONS SPECIFICALLY AGREED TO IN WRITING BY SELLER, SHALL APPLY TO ALL ORDERS ("Order(s)") FROM, AND SALES OF PRODUCTS ("Products") OR SERVICES ("Services") TO BUYER. ANY ACCEPTANCE OF ANY ORDER OF BUYER IS CONDITIONED UPON THESE TERMS/CONDITIONS. ANY ADDITIONAL OR DIFFERENT TERMS/CONDITIONS PROPOSED BY BUYER IN ANY DOCUMENT ARE OBJECTED TO AND SHALL NOT BE BINDING UPON SELLER. No salesperson is authorized to bind Seller to any promise or understanding not expressed herein.

### I. PRICES

All prices are subject to change without notice in the event of any changes in cost of materials or labor, specifications, quantities, delivery schedules, customs duties, other factors beyond Seller's control, or in the event of delays caused by instructions of the Buyer, or failure of the Buyer to give Seller adequate information. Further, prices payable by the Buyer shall be subject to immediate increase, should the Seller as a result of governmental action or regulation including, without limitation, those contemplated by an investigation under Section 232 of the Trade Expansion Act of 1962 (19 U.S.C. §1862), incur additional duties, tariffs or restrictions on products sold hereunder, or on the raw materials that are used in making such products. In no event shall prices include any amounts imposed on the Buyer in connection with Buyer's purchases from Seller, such as taxes, including but not limited to Value Added Tax (VAT) or excise taxes, duties, tariffs, or any other costs assessed against the Buyer by a governmental authority.

### II. DELIVERY

Delivery dates are approximate and are dependent on prompt receipt by Seller of all necessary information. Seller may deliver all or any part of Products/ Services as early as 30 days in advance of agreed schedule. The point of delivery shall be "Exworks" Seller's premises, unless otherwise specified by Seller. Upon delivery, title to Products and all risk of loss or damage thereto shall pass to Buyer. Where Buyer notifies Seller that it cannot take timely delivery of the Products, Seller may place such Products in storage, at the risk of Buyer, and Buyer shall reimburse Seller for all expenses incurred in connection with such storage. Buyer shall dispose of the packing materials for Products at its own expense, and shall defend, indemnify and hold harmless Seller from any legal obligations in connection with such packing waste.

### III. PAYMENT

A. The term of payment shall be net 30 days from date of Seller's invoice, unless otherwise specified. Payments shall be made by Buyer without any deduction or set-off. Unless otherwise agreed, payment shall be made in U.S. dollars. Seller may charge late payment fees at the rate of 1.5% per month, or the highest rate permitted by law, whichever is less, accruing daily.

B. If the financial condition of Buyer is unsatisfactory to Seller, Seller may require full or partial payment in advance, or satisfactory security, in the form of a letter of

credit or otherwise. In the event of bankruptcy or insolvency of Buyer, Seller may immediately cancel any Order then outstanding.

C. Buyer grants Seller a purchase money security interest in Products located in the United States, or Services, as well as any proceeds, for the purpose of securing the obligations of Buyer hereunder. Buyer authorizes Seller to execute on Buyer's behalf and file such financing statements as Seller deems appropriate to perfect and notify Buyer's creditors of Seller's security interest.

### IV. VARIATIONS IN QUANTITY; CHANGES.

Buyer shall accept delivery of quantities greater or smaller than the quantity specified in Order(s), provided that any such variation shall not exceed 5% of the quantity originally specified, or 2 units, whichever is greater. Seller shall not be required to give notice of any such variations other than in the applicable shipping notice and invoice. Seller reserves the option to make changes to Products or Services which do not affect form, fit, or function, and shall deliver Products to the latest configuration part number at the time of delivery.

### V. EXPORT CONTROLS; FCPA; ANTI-BOYCOTT

A. Buyer shall not make any disposition of the Products, by way of transshipment, re-export, diversion or otherwise, except as applicable U.S. export laws and regulations may expressly permit, and other than in and to the ultimate country of destination specified on Order(s) or declared as the country of ultimate destination on Seller's invoices or in the End Use Statement that Buyer supplies Seller. Seller shall not be named as shipper or exporter of record or U.S. principal party-in-interest (USPPI) unless specifically agreed to in writing by Seller in which case, Buyer shall provide Seller with a copy of the documents filed by Buyer for Export clearance purposes. At Seller's request, Buyer shall supply end-use and end-user information to determine export license applicability. Failure of Buyer to comply with this section shall constitute a material default allowing Seller to cancel related Order(s) without liability.

B. Buyer warrants that it shall not violate or cause the Seller to violate the U.S. Foreign Corrupt Practices act of 1977 (FCPA), as amended, the United Kingdom Bribery Act (UKBA) of 2010, as amended, or their respective implementing regulations in connection with Buyer's sale or distribution of the Products and/or Services, and that Buyer does not know or have reason to believe that any consultant, agent, representative or other person retained by Buyer in connection with the sale and/or distribution of Products/Services has violated, nor caused Seller to violate the FCPA and/or the UKBA. Where Buyer

learns of or has reason to know of any violation of FCPA and/or or UKBA in connection with the sale or distribution of Products/Services, Buyer shall immediately advise Seller.

C. Buyer further warrants that Buyer shall not violate or cause Seller to violate the U.S. Antiboycott Provisions of the U.S. Export Administration Regulations issued pursuant to the U.S. Export Administration Act of 1979, as amended, in connection with Buyer's purchase of Products/Services and that Buyer shall not request or require Seller to make statements or certifications against countries that are not subject to boycott by the U.S.

## **VI. WARRANTIES**

A. Seller warrants that Products manufactured by Seller, when delivered, shall be free from defects in material/workmanship. Seller warrants that Services shall be performed in accordance with generally accepted industry practice. Seller's obligations under this warranty shall be limited exclusively to repairing or replacing, at Seller's option, any part of Products which, if properly installed, used and maintained, proved to have been defective in material or workmanship within 1 year from the date of shipment or re-performing the Services. Seller warrants for a period of 1 year from the date of shipment that software or firmware, when used with Products, shall perform in accordance with Seller's published specifications. Seller makes no warranty, express or implied, that the operations of the software or firmware shall be uninterrupted or error-free, or that functions contained therein shall meet or satisfy the Buyer's intended use/requirements. Buyer shall notify Seller of any defect in the quality or condition of Products (including software/firmware) or Services within 7 days of the date of delivery or performance, unless the defect was not apparent on reasonable inspection, in which case, within 7 days after discovery of the defect. If Buyer does not provide such timely notification, it shall not be entitled to reject Products (including software/firmware) or Services, and Seller shall have no liability for such defect.

B. Seller's warranty obligations shall not apply to Products which (1) have been altered or repaired by someone other than Seller, or (2) have been subjected to misuse, neglect, or improper use or application, or (3) are normally consumed in operation, or (4) have a normal life inherently shorter than the warranty period stated therein.

C. No Products may be returned unless authorized in advance by Seller, and then only upon such conditions to which Seller may agree. Buyer must obtain a Return Material Authorization (RMA) number from Seller prior to any return shipment, and such RMA number must appear on the shipping label and packing slip. Buyer shall be responsible for returned Products until such time as Seller receives the same at its facility, and for all charges for packing, inspection, shipping, transportation or insurance associated with returned Products.

D. This section VI sets forth the exclusive remedies and obligations for claims based upon defects in or nonconformity of Products/Services, whether the claim is in contract, warranty, tort (including negligence of any degree or strict liability) or otherwise. THE FOREGOING WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED OR STATUTORY. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY.

## **VII. PATENTS/INDEMNITY**

If Buyer receives a claim that Products, or part thereof manufactured by Seller infringes a patent, Buyer shall notify Seller promptly in writing and give Seller information, assistance and exclusive authority to evaluate, defend and settle such claim. Where Buyer has furnished specifications/designs for the manufacture of the allegedly infringing Products, Buyer shall defend, indemnify and hold harmless Seller against third-party claims for infringement arising out of Seller's use of such specifications/designs.

## **VIII. LIMITATION OF LIABILITY**

The total liability of Seller on any claim, whether in contract, tort (including negligence of any degree and strict liability) or otherwise arising out of, connected with, or resulting from the manufacture, sale, delivery, resale, repair, replacement or use of any Products/Services, shall not exceed the price allocable to the Products/Services or part thereof which gives rise to the claim. IN NO EVENT, WHETHER AS A RESULT OF BREACH OF CONTRACT, WARRANTY, TORT, (INCLUDING NEGLIGENCE OF ANY DEGREE, STRICT LIABILITY OR PATENT INFRINGEMENT) OR OTHERWISE, SHALL SELLER, ITS AFFILIATES, SUBCONTRACTORS, OR SUPPLIERS BE LIABLE FOR ANY LOSS OF PROFIT OR REVENUES, LOSS OF USE OF THE PRODUCTS OR SERVICES, OR ANY ASSOCIATED EQUIPMENT, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES, SERVICES OR REPLACEMENT POWER, DOWNTIME COSTS OR CLAIMS OF BUYER'S CUSTOMERS FOR DAMAGES OR FOR ANY SPECIAL, PROXIMATE, CONSEQUENTIAL, INCIDENTAL, INDIRECT OR EXEMPLARY DAMAGES. If Buyer transfers title to, or leases Products sold hereunder to, or otherwise permits or suffers use by, any third party, Buyer shall obtain from such third party a provision affording Seller and its subcontractors/suppliers the protection of the preceding sentence. Any action against Seller must be brought within 18 months after cause of action accrues.

## **IX. EXCUSABLE DELAYS**

A. Seller shall not be liable for delays in delivery or failure to perform due directly or indirectly to causes beyond Seller's reasonable control including but not limited to: acts of God; war; terrorism; civil commotion; riots; embargoes; government regulations, orders, instructions or priorities; port congestion; acts of or failure to act on the part of Buyer or its agents/employees; fires; floods; sabotage; nuclear incidents; earthquakes; storms; epidemics; strikes; lockouts or other labor difficulties; shortages of or inability to timely obtain proper labor, materials, components, shipping space or transportation, fuel, supplies or power at current prices; or due to limitations imposed by the extent of availability of Seller's normal manufacturing facilities.

B. If a delay excused per the above extends for more than 90 days and the parties have not agreed upon a revised basis for continuing providing Products/Services at the end of the delay, including adjustment of the price, then either party (except where delay is caused by Buyer, in which event only Seller) upon thirty (30) days' notice may terminate the Order with respect to the unexecuted portion of the Products/Services, whereupon Buyer shall promptly pay Seller its reasonable termination charges upon submission of Seller's invoices thereof.



## **X. SOFTWARE/TECHNICAL/PROPRIETARY INFORMATION**

A. Buyer shall not acquire any rights to any software which may be delivered with Products, except as granted in Seller's standard software license. Any software license granted in connection with Products shall be an interim license, which may be withdrawn, pending payment for Products in full.

B. The purchase of Products shall not include any right to supply of technical information such as drawings or specifications.

C. Proprietary information, including drawings, documents, technical data, reports, software, designs, inventions and other technical information supplied by Seller in connection herewith (hereinafter called "Data"), shall remain Seller's sole property and shall be held in confidence by Buyer. Data shall not be reproduced, used or disclosed to others by Buyer without Seller's prior written consent. Upon completion of Order, Buyer shall promptly return all Data to Seller together with all copies or reprints thereof then in Buyer's possession or control, and Buyer shall thereafter make no future use, either directly or indirectly, of any Data or any information derived therefrom without Seller's prior written consent. The foregoing shall in no way obligate Seller to provide or supply Data.

## **XI. DIES, TOOLS, PATTERNS**

Seller's charges for dies, molds, patterns and the like represent the Buyer's proportionate cost thereof, it being expressly understood that they remain the property of Seller.

Modifications made to dies, molds, patterns and the like in order to manufacture Products shall be at the discretion of Seller.

## **XII. GENERAL**

A. The rights and obligations of the Buyer and Seller hereunder shall be governed in all respects by the law of the Commonwealth of Pennsylvania, U.S.A. The exclusive forum for adjudication of any disputes shall be the federal or state courts of the Commonwealth of Pennsylvania, and Buyer/Seller hereby consent to personal jurisdiction and venue in such courts in any proceeding. The United Nations Convention on the International Sale of Goods shall not apply.

B. These Terms and Conditions of Sale together with any other terms specifically agreed to in writing by Seller constitute the entire agreement between Buyer and Seller and supersede any prior or contemporaneous representations, agreements, proposals, warranties, or understandings, oral or written, express or implied. No waiver, modification, amendment, rescission or other change to these Terms and Conditions of Sale shall be binding unless specifically agreed to in writing by an authorized representative of Seller.

C. The invalidity, of any part hereof shall not affect the validity of the remainder. The failure of Seller to assert any right at any time hereunder shall not prevent Seller's subsequent assertion of the same or different rights.

D. Buyer may not assign this contract without the prior written approval of the Seller.

## **XIII. PROHIBITION FOR HAZARDOUS USE**

Products sold hereunder are not intended for application in, and shall not be used by Buyer in construction or application of a nuclear installation or in connection with use or handling of nuclear material or for any hazardous activity or critical application, where failure of a single component could cause substantial harm to persons or property, unless Products have been specifically approved for such activity or application. Seller disclaims all liability for loss or damage resulting from

such unauthorized use and Buyer shall defend, hold harmless and indemnify Seller against any such liability, whether arising under breach of contract, warranty, tort (regardless of the degree of fault or negligence), strict liability or otherwise.

Where Seller approves the application of the Products in a nuclear facility, the Buyer shall, before such use or provision, arrange for insurance or governmental indemnity protecting the Seller against liability and hereby releases and agrees to indemnify the Seller and its suppliers for any nuclear damage, including loss of use, in any manner arising out of a nuclear incident, whether alleged to be due, in whole or in part to the negligence or otherwise of the Seller or its suppliers.

## **XIV. STATUTORY REQUIREMENTS**

Seller reserves the right to make any changes in the general specifications of the Products which are required for the Products to conform to any statutory requirement.

## **XV. GOVERNMENT CONTRACTS**

Only Federal Acquisition Regulation ("FAR") supplement clauses expressly accepted in writing by Seller shall be included or incorporated by reference herein. Seller shall not be bound by and makes no representation of compliance with any FAR or FAR supplement clauses that Seller shall not have expressly accepted in writing.