# INSTRUCTION MANUAL

## Nextteq® NX-1000 Gas Sampling Pumps


Gas Sampling Pump

NEXTTEQ® INTERNATIONAL

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## Section 1: Introduction

This manual explains how to use the Nextteq NX-1000 Gas Sampling Pump and the Nextteq NX-1000 Gas Sampling Pump with Automatic Stroke Counter. The NX-1000 Gas Sampling Pump is designed specifically for use with Nextteq Gas Detector Tubes. The Nextteq Gas Detector Tube and Pump System can detect the presence of more than 300 airborne gases and vapors. This manual contains important notes for assuring proper use and safe operation of the NX-1000 Gas Sampling Pumps. **Carefully read this entire manual prior to operating.**

NX-1000 Gas Sampling Pump with Automatic Stroke Counter


NX-1000 Gas Sampling Pump

Figure 1: Nextteq Sampling Pumps

## Section 2: Safe Operation and Correct Use

- CAREFULLY READ BOTH THIS INSTRUCTION MANUAL AND THE NEXTTEQ INSTRUCTION SHEETS FOR THE INDIVIDUAL NEXTTEQ DETECTOR TUBES PRIOR TO USE OF THIS PRODUCT.
- ENSURE THAT THIS INSTRUCTION MANUAL IS STORED IN A CONVENIENT LOCATION FOR EASY REFERENCE AT ALL TIMES.
- IF YOU HAVE ANY QUESTIONS REGARDING THIS MANUAL, PLEASE CONTACT YOUR LOCAL AUTHORIZED NEXTTEQ DISTRIBUTOR, NEXTTEQ MANUFACTURER REPRESENTATIVE OR NEXTTEQ CUSTOMER SERVICE.

This manual uses symbols defined below to indicate cautions and notes that promote the safe and correct use of this product.

⚠ The Caution symbol indicates that failure to observe this instruction can result in injury to the operator or damage to the product or property.

N The Notes symbol indicates operational tips for correct use of the product to prevent problems and/or errors with the products or its interpretation.

⚠ CAUTIONS:

1. With a detector tube inserted and the handle drawn back, the pump cylinder is under a high vacuum. If the handle lock is released under vacuum conditions, it will pull back suddenly. Holding the pump by the extended shaft can lead to injury. Always hold the pump by the cylinder, never by the shaft.

2. Broken glass tube tips can fall from the tip cutter or storage area when using the pump. To prevent glass contamination in restricted areas (e.g., food processing plants) use the optional Nextteq Tip Cutter with Container NX90153.

3. Normal use of detector tubes requires the handling of broken glass tubes. Safety glasses and protective gloves are recommended.

4. Detector tubes contain small amounts of chemical reagents, which may be toxic. Avoid skin and eye contact with the internal chemical reagents.

5. If the reagent is completely discolored (i.e., the detector tube is over – ranged) after measuring a high concentration toxic gas (e.g., a process measurement), the possibility exists for harmful gas residue to remain inside the pump cylinder. This gas will exhaust from the back of the pump cylinder when the handle is pulled out for the next pump stroke. Whenever the tube has fully discolored, purge the air inside the cylinder by pulling and pushing the handle several times in a well-ventilated area.

6. Keep detector tubes out of the reach of children. If they are used in schools, teachers or parents should be responsible for safe operation.

7. The NX-1000 Sampling Pump with Automatic Stoke Counter is NOT intrinsically safe and is NOT to be used in hazardous areas where there is an explosion potential.

N NOTES:

1. All Nextteq Gas Detector Tubes are wrapped in a thin transparent film that protects against the shattering of the glass tube. However, since they are made of glass and may break, we recommend wearing protective goggles and protective gloves to prevent injuries.

2. Do not direct the tip of a detector tube toward a person when it is attached to a sampling pump (when inspecting for air-tightness or during measurement). Otherwise you may injure the person with the tube end.

3. When using a sampling tube, be sure to hold the cylinder and the handle, not just the shaft. If the handle lock is released when inspecting air-tightness or when sampling gas, the handle may suddenly snap to its original position, pinching or injuring your fingers.

4. When breaking off the tip of a detector tube, never grasp the tube strongly. Otherwise the detector tube may break and you may injure yourself.

5. If you break the detector tube, do not pick up the broken pieces of the detector tube or touch the detecting reagents with your bare hands. Otherwise you may injure yourself. If detecting reagents come in contact with the skin, immediately rinse the area with water. Sweep away any broken pieces of glass or detecting reagent(s), then wipe the swept area with a damp cloth.

6. To prevent broken pieces of glass or detecting reagents from injuring your eyes, be sure to keep the detector tube away from your eyes when breaking off its tip. If you do get a piece of glass or detecting reagent in your eyes, do not rub your eyes with your hands. Immediately rinse your eyes with plenty of water and see a doctor.

7. The ends of the detector tubes with their tips snapped off may cause injuries. We strongly recommend covering the ends with rubber caps.

8. When removing the detector tube from the sampling pump, hold the tube firmly at a point close to the attachment and pull it straight out. Never bend the tube or strongly grasp it. Otherwise you may break the tube and injure yourself.

9. Choose detector tubes carefully using the tube selection guide and pay strict attention to chemical names and measuring ranges. If the proper detector tube for a particular application is not chosen, a correct reading cannot be obtained.

10. When gases other than the target gas are also suspected, refer to the tube instructions for information on interfering compounds and to the handbook for information on other relevant detector tubes.

11. A detector tube is designed for a single use; do not re-use detector tubes.

12. A detector tube should be used immediately after breaking the ends. Detector tubes exposed to the air for a long time after breaking the ends will give erroneous readings, and may not respond to the target gas at all.

13. Read the concentration immediately after completion of measurement. If not read immediately, the stain may lengthen or fade, which can lead to erroneous readings. It may be useful to photograph the detector tube immediately after sample completion to document the result.

14. A leaking pump will produce low readings. Always check the pump for leakage before use in accordance with the section "Operating Procedures – Leak Test."

15. The temperature range for use of detector tubes generally is 0 to 40˚C. Use detector tubes only in the temperature ranges specified on the Nextteq Detector Tube Box or the Instruction Sheet inside the Nextteq Detector Tube Box. Temperature ranges are also listed in the Nextteq Gas Detector Tube and Pump System Handbook. When using detector tubes at temperatures outside of the above range, refer to the section "Reading the Nextteq Detector Tube – Conditions that affect results and how to correct." Use sampling pumps only in temperatures ranging from 0˚C to 40˚C (32˚F to 104˚F). Using the sampling pumps and detector tubes outside their respective operating temperature ranges may cause the pumps to leak or result in erroneous measurements.

16. Do not drop or strike the pump. If the cylinder is dented, it will impede the handle operation and possibly cause leakage.

17. Should the pump be disassembled, only hand tighten on re-assembly. Over-tightening can damage threads.

18. Clean the pump only with a dry paper towel. Do not use water or solvents.

19. Do not store the pump in areas of high temperature or high humidity. Do not store with the handle extended, as the pump shaft is susceptible to bending under stress.

20. It is recommended that service repair be done only by authorized service centers. Any service or repair must be followed by a leak check prior to field use.

21. Note that the NX-1000 pump is a vacuum pump only, and it cannot be used for specialized detector tubes that require sample entry by pressure or injection (Oxygen, Hydrogen, Propane, etc.).

22. If using the following detector tubes, it is necessary to purchase and use the flow control orifice option.

Acetylene and Ethylene – Tube Number NX105
(two tube measurement)
Phosphine in Acetylene – Tube Number NX204SH
Phosphine in Acetylene – Tube Number NX204SM
Carbon Monoxide in Blood – Tube Number NX711
Ethyl Alcohol in Blood – Tube Number NX712
Hydrogen Cyanide Blood – Tube Number NX713
Hydrogen Sulfide Blood – Tube Number NX714

23. The following conditions apply to special Nextteq Detector Tubes:

- Nextteq TWA detector tubes and some specialty detector tubes require a continuous flow sampling pump. Nextteq's NX-300, NX-1200 or NX-5000 meet the required flow rates for these applications.
- Airteq tubes for compressed breathing air analysis do not require sampling pumps but require the use of a regulator. Nextteq's Deluxe Airteq Kit comes complete with a regulator and the required Nextteq Airteq detector tubes.
- Solution tubes do not require sampling pumps.

Please see the Nextteq Gas Detector Tube System Handbook or the Nextteq Gas Detector Tube Guide for complete tube listing with the required equipment to be used for sampling.

## Section 3: What is the Nextteq Gas Detector Tube and Pump System?

Nextteq International LLC, an innovative leader in the gas detection industry, provides industrial professionals with products and expert technical support that encompasses detecting and measuring vapors and gases in the workplace serving the Industrial Hygiene, Safety, and Environmental markets worldwide. By utilizing decades of technical experience in design, manufacturing, marketing, distribution and support, Nextteq has a proven reputation of supplying and fully supporting superior products in the field that continuously meet the industry's highest quality standards and technology requirements. Nextteq has over 20 technical patents and patents pending in gas or substance detection technology.

The Nextteq Detector Tube and Pump System offers:

- **better technology** with future expansion in gas and vapor detection,
- **better quality** for reliable, safe use day after day, and
- **better value** in price, high-level support, and product longevity.

The Nextteq Detector Tube and Pump System focuses on ease of use, speed, and accuracy and is manufactured by one of the largest professional industrial organizations in the gas detection industry.

The Nextteq Gas Detector Tube and Pump System reflects the technical and market feedback provided by numerous long-term relationships with customers and leading industrial professionals from around the world. Nextteq continuously sets the bar for product expertise, quality, customer service, and no-charge technical support. Nextteq's in-house staff incorporates a Certified Industrial Hygienist, a Board Certified Toxicologist, and a Certified Safety Professional to assist you with your technical questions.

The Nextteq Gas Detector Tube and Pump System product line represents well over 500 unique applications utilizing over 300 different kinds of detector tubes as part of a complete sampling and analysis system to detect and measure toxic and combustible gases or vapors and materials in support of multiple industries including: Industrial, Manufacturing, Chemical, Energy, Construction, Transportation, Medical, HAZMAT, Uniformed Services and Government Agencies. Simply put, Nextteq's Gas Detector Tube and Pump System is designed, built and supported by industry professionals for industry professionals.

**The Nextteq Detector Tubes:** Nextteq's pre-calibrated detector tubes are the direct-read type with a single calibration scale printed on each tube; measurement is as simple as reading a thermometer. Each detector tube is wrapped in a thin transparent film that protects against the glass tube shattering and the release of the chemical reagent in the event of accidental tube breakage. The unique absorbing media provides stable, long-term shelf life, and high resolution. The tubes' distinct lines of demarcation make quantitative results easy to see and reduce measuring errors. Each production lot of tubes undergoes strict quality control and testing to ensure the highest level of performance and quality.

**The Nextteq Gas Sampling Pump:** The Nextteq NX-1000 Gas Sampling Pump can precisely collect the required sample volume for a detector tube inserted in the pump. The sample concentration of the gas or vapor being detected can be read right on location – a grab sample. The red lines on the pump shaft mark exactly when the handle is at the full-stroke (100 mL) and the half stroke (50 mL) positions. When sampling, the handle will click and will be precisely locked at those positions. If you pull the pump handle back fully "n" times (allowing for a sampling time interval between each pump stroke), a total volume of (100 mL) x "n" can be sampled. For example:

| Pump Stroke completed | Volume of Air Sampled |
|---|---|
| 1 | 100 mL x 1 = 100 mL of air sampled |
| 2 | 100 mL x 2 = 200 mL of air sampled |
| 1.5 | 100 mL x 1.5 = 150 mL of air sampled |

Each detector tube is calibrated based upon a prescribed (standard) volume of sample. You can obtain accurate gas or vapor measurements in minutes.

Each pump piston has been designed with a smaller diameter contoured grip so that the handle can be pulled back with even less effort. There is no power supply or batteries required. The Nextteq NX-1000 Gas Sampling Pump's lightweight non-sparking design provides you with advanced superior features including an antibacterial nonskid grip, intrinsically safe design, a hand strap, and a convenient compact size easily carried for field use.

N NOTE: The NX-1000 Gas Sampling Pump with Automatic Stroke Counter is non-intrinsically safe.

# Section 4: Nextteq NX-1000 Sampling Pump Configurations and Kits

Nextteq International LLC offers two different pump configurations:

- NX-1000 Sampling Pump
- NX-1000 Sampling Pump with Automatic Stroke Counter


Figure 2:
Nextteq NX-1000 Pump Deluxe Kit

Part Numbers and Components of NX-1000 Pump and Pump Kits:

| | Intrinsically Safe | | |
|---|---|---|---|
| | NX-1000 Pump Only | NX-1000 Pump Kit | NX-1000 Pump - Deluxe Kit |
| Part Number | NX-1000-100 | NX-1000-130 | NX-1000-150 |
| Nextteq Gas Sampling Pump | X | X | X |
| Hand Strap | X | X | X |
| Thermal Ring | X | X | X |
| 1 Lubricant / Grease | X | X | X |
| 2 Rubber Tube Inlets | X | X | X |
| Manual | X | X | X |
| Carrying Case | | X | X |
| Nextteq Handbook | | | X |


Figure 3:
Nextteq NX-1000 Pump with Automatic Stroke Counter Deluxe Kit

Part Numbers and Components of NX-1000 Pump with Automatic Stroke Counter and Pump Kits:

| | Not Intrinsically Safe ⚠ | | |
|---|---|---|---|
| | NX-1000 Pump with Stroke Counter Only | NX-1000 Pump with Stroke Counter Kit | NX-1000 Pump with Stroke Counter Deluxe Kit |
| Part Number | NX-1000-200 | NX-1000-230 | NX-1000-250 |
| Nextteq Gas Sampling Pump with removable Automatic Stroke Counter/ Tip Cutter | X | X | X |
| Hand Strap | X | X | X |
| Thermal Ring | X | X | X |
| 1 Lubricant / Grease | X | X | X |
| 2 Rubber Tube Inlets | X | X | X |
| Manual | X | X | X |
| Carrying Case | | X | X |
| Nextteq Handbook | | | X |

⚠ Caution: The NX-1000 Sampling Pump with Automatic Stroke Counter is NOT intrinsically safe and is NOT to be used in hazardous areas where there is an explosion potential.

# Section 5: Nextteq NX-1000 Pump Diagram and Features

**Rubber Tube Inlet:**
a rubber flange into which the detector tube is inserted

**Inlet Clamping Nut:**
holds the rubber inlet in place

**Lifetime Warranty:**
Covers normal wear and tear for the life of your NX-1000 Sampling Pump.


**Head Case:**
removable for aid in maintenance

**Thermal Ring:**
accurately displays ambient temperature

**Pump Body:**
pump body is covered with an antibacterial soft elastomer, with the middle portion narrower than the ends to ensure a firm safe grip on the pump cylinder

**Pump Cylinder:**
made of metal to ensure smooth flow

**Pump Piston:**
sealing assures excellent air tightness and durability

**Tube Tip Breaker:**
built-in tip breaker makes the tip breaking much easier, safer and convenient. Remove cap for easy disposal

**Bottom Case:**
removable for aid in maintenance

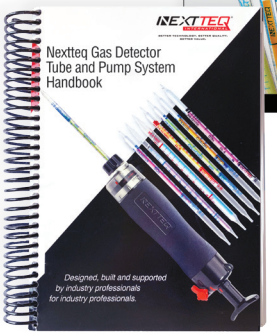
**Pump Stop Marks:**
locks the shaft into the position of
a. 50 mL half stroke
or
b. 100 mL full stroke

**Guide Marks:**
bright red marks on the handle shaft are aligned with the red guideline on the pump to place the handle at the initial position

**Bottom Red Line:**
used to identify the pump handle is fully inserted when the red line is no longer visible

**Handle:**
two-finger design for easy, consistent pull-back sampling. Clicking noise ensures complete sample pull of 50 mL or 100 mL

Nextteq Gas Detection System Detector Tube Guide P/N NX90156


Nextteq Gas Detector Tube and Pump System Handbook P/N NX90118-001

**Removeable LED Automatic Stroke Counter:**
easily slides off and can be replaced with tube tip cutter

**NX-1000 with Automatic Stroke Counter:**
includes replaceable tube tip cutter unit


**Tube Tip Cutter:**
replaces display for intrinsically safe operation

**Flow Finish Indicator:**
enclosed indicator in front of pump (protects against dust/dirt buildup) confirms the completion of the sampling of 100 mL or 50 mL

# Section 6: Nextteq Detector Tubes Diagram and Features

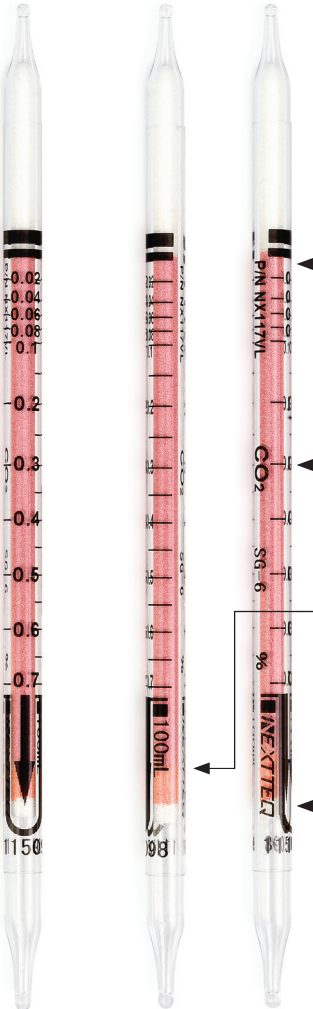
**High quality glass tube** – Each detector tube is wrapped in a thin transparent film that protects against the shattering of the glass tube and the release of the chemical reagent in the event of accidental tube breakage.

**Calibration scale –** (in ppm, mg/m3, mg/l, lb/mmcf or % depending on the substance and its concentration to be measured) - Printed label in contrasting ink color that permits high legibility against the color change layer.

**Reliable detecting reagents** that comply with Nextteq's stringent quality standards (regulating the length of color change layer, the clear distinction of the line of demarcation, and the tone and brightness of the color change).

**Arrow** – Indicates the direction of the flow of air through the tube when a sample is taken.

**Quality control number (Lot No.)** – Nextteq's quality assurance number is printed on every Nextteq detector tube. Detector tubes of the same production lot have the same Lot No. When a Lot No. is registered, sample tubes with that Lot No. will be retained and monitored periodically to verify the quality. Each scale is determined for each production that has passed Nextteq's rigorous qualification testing protocol.




**Detector tube number** – A unique part number that defines the substance and range to be detected. See the Nextteq Gas Detector System Detector Tube Guide for complete descriptions of all Nextteq detector tube part numbers.

Example: **NX117VL**
**NX** – represents the Nextteq brand.
**117** – a unique Nextteq number that represents the kind of substance the tube can measure (Carbon Dioxide).
**VL** – unique lettering that represents the concentration the tube can determine (Very Low range).

**Chemical formula** of the substance to be measured.

**Pump stroke volume** – "100 mL" indicates that one complete pump stroke is required to collect the standard volume of sample air for this tube. "200 mL" indicates two complete pump strokes of 100 mL per stroke.

NEXTTEQ
A brand name that indicates the highest quality tube available in the market exclusively sold by Nextteq International LLC.

# Section 7: Nextteq Detector Tubes - Reading the Box Label

**Expiration Date of Shelf Life:**
Nextteq Detector Tubes have a shelf life of 1-3 years depending upon the application.

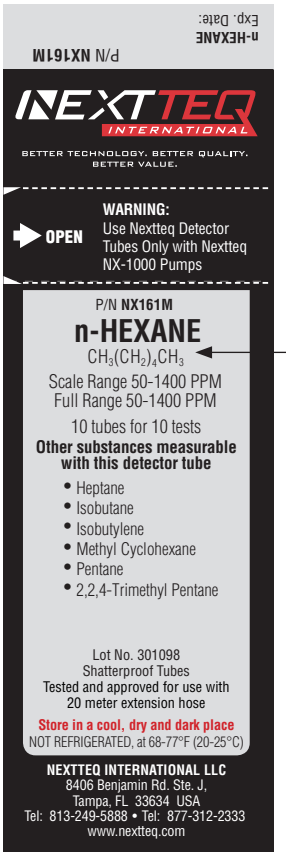
**Unique Nextteq Detector Tube Number**
See the Nextteq Gas Detector System Detector Tube Guide for complete descriptions of all Nextteq detector tube part numbers.

**Scale Range:**
printed on the tube.

**List of Other Gases**
or vapors that can be detected and measured using this tube. This section may be left off if no other applications available.

**Shatterproof Tube:**
Each Nextteq Detector Tube is wrapped in a thin transparent film that protects against the glass tube shattering and the release of the chemical reagent in the event of accidental tube breakage.

**Nextteq Contact Information:**
Toll free phone number for quality one-on-one customer service, and no-charge technical support. Nextteq's in-house staff incorporates a Certified Industrial Hygienist, a Board Certified Toxicologist, and a Certified Safety Professional to assist you with your technical questions.




**Gas or Vapor to be Detected:**
Nextteq Detector tubes can detect over 500 gases or vapors.

**Chemical Formula of Gas or Vapor**
to be detected: now printed on label for ease of use.

**Full Range:**
full detection range of tube which can exceed the scale range.

**Quantity of Nextteq Detector Tubes**
inside box and number of tests per box. Ex. 10 tubes for 10 tests, 5 tubes and 5 pre-treat tubes for 5 tests, etc.

**Manufacturing Lot Number**
of Nextteq Detector Tube – Quality Control number maintained by Nextteq.

**Maximum Length of Nextteq Extension Hose** that has been tested and approved to be used with the Nextteq NX-1000 pump and this tube. Nextteq offers an optional 5, 10, and 20 meter extension hose for remote sampling.

**Storage Instructions:**
There are three different storage conditions for tubes:

**1)** "Store in a cool, dry, and dark place at 32-77°F (0-25°C)" for tubes that do not need to be refrigerated but can be refrigerated.

**2)** "Store in a refrigerated place at 32-50°F (0-10°C)" for tubes that need to be refrigerated.

**3)** "Store in a cool, dry and dark place, NOT REFRIGERATED, at 68-77°F (20-25°C)."

# Section 8: Nextteq Detector Tubes - Configurations

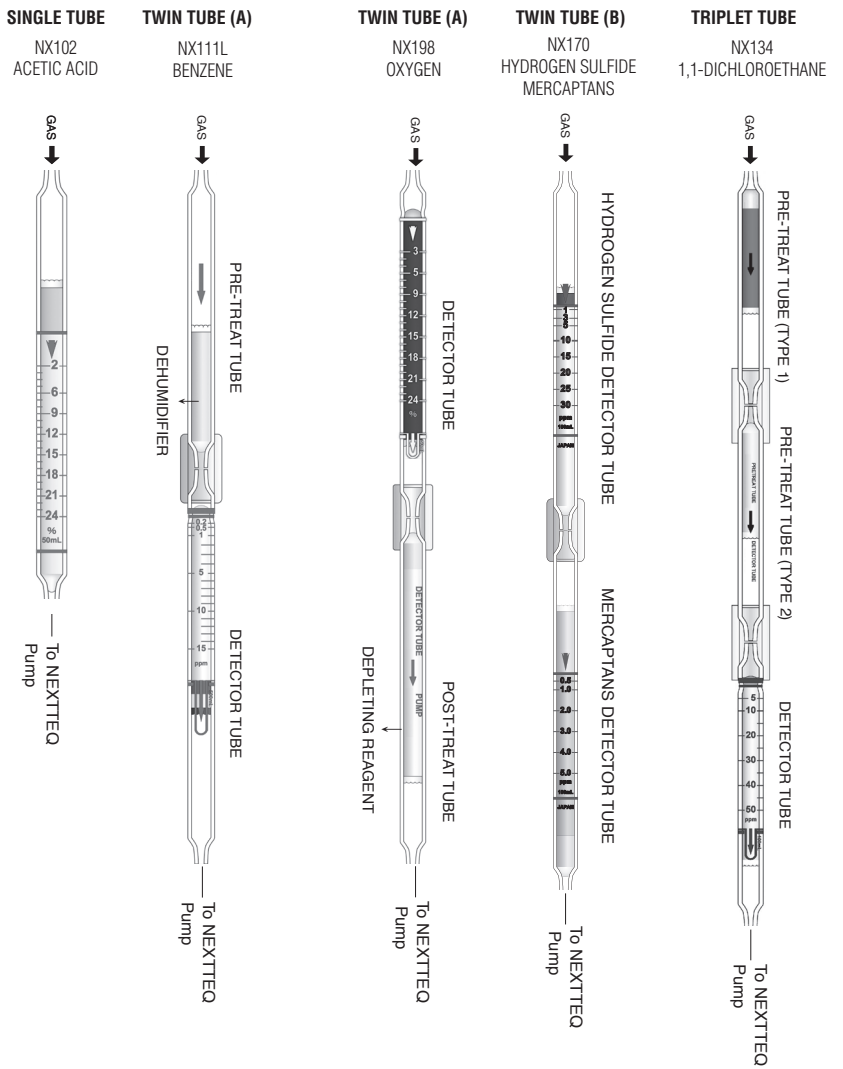
Nextteq Detector Tubes consist of one of the 5 following configurations:

**SINGLE TUBE:** 1 tube for a single measurement

**TWIN TUBE (A) :** 2 tubes for a single measurement
- 2 tubes that connect a pre-treat tube and a measurement tube using a connecting rubber tube
- 2 tubes that connect a measurement tube and a post-treat tube using a connecting rubber tube

**TWIN TUBE (B) :** 2 tubes for a dual measurement
- 2 tubes that connect 2 measurement tubes using a connecting rubber tube that detects two different chemicals separately

**TRIPLET TUBE:** 3 tubes that connect a measurement tube and two pre-treat tubes with connecting rubber tubes



# Section 9: Operating Procedures

NOTE: If there is a leak in the sampling pump you cannot obtain the correct measurement values, e.g. measured values may be lower than the actual values or there may be no response at all. Be sure to check the sampling pump for air-tightness before doing any measurements and check the operation of the flow finish indicator at this time.

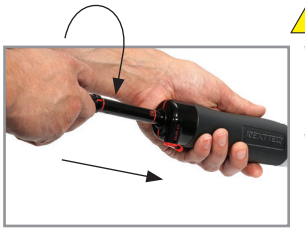
### A. Leak Test - Inspecting the air-tightness of the sampling pump PRIOR TO USE:

1. Confirm the inlet clamping nut is firmly tightened.

2. Confirm the pump handle is fully in, then insert a sealed, unbroken detector tube into the rubber tube inlet. At this time, make sure the flow finish indicator is popped out.

3. Align the red line on the bottom case and that of shaft. Securely hold the cylinder of the sampling pump. Then pull out the handle fully along the red guideline on the pump shaft to full stroke locked position. Wait one minute.

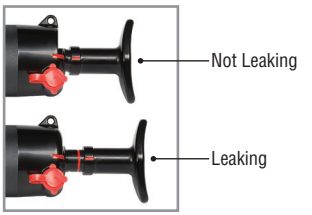
4. Unlock the handle by turning it ¼ turn (90 degrees), and check to see if the handle returns to the initial position. Also confirm the flow finish indicator has been popped out again. When the lock is released under full vacuum, the handle tends to snap back quickly. To prevent possible damage to the locking device allow the handle to return slowly by holding the cylinder and handle securely. If the handle returns completely to the original position and the flow finish indicator has popped out, then the performance is satisfactory.



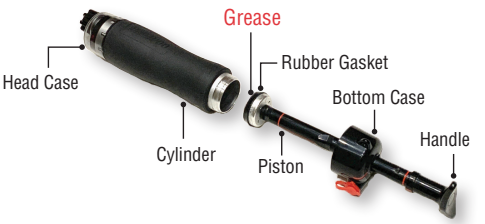
CAUTION: HANDLE WILL TEND TO SNAP BACK INTO THE PUMP QUICKLY.
When the handle is unlocked, be sure to guide it back gradually by applying a little resistance. Otherwise the handle will spring back due to the vacuum in the pump cylinder and possibly damage internal parts or cause injury.

If the pump fails the leak test, the following are possible causes:

- A loose connecting inlet clamping nut.
- A loose rubber tube inlet.
- Cracks and deterioration of the rubber tube inlet.
- Deterioration of the grease.




To correct a leaking pump, consult "Section 12: Maintenance" to ensure pump is greased properly.




A functional failure in the finish indicator may lead to a leak. If a failure is found in the indicator, immediately contact your local authorized Nextteq Distributor to repair it or call Nextteq to obtain an RMA for repair.

## B. Selecting the Nextteq Detector Tube

Nextteq precision gas detector tubes vary in type according to the gas or vapor to be detected and the required detection range. They are used for measuring gases or vapors in different concentration ranges. As gas or vapor concentrations can vary from high to low, and Nextteq gas detector tubes vary in detectable concentrations from high to low, please refer to Nextteq Gas Detector Tube and Pump System Handbook for the complete offering and in-depth description of all Nextteq Detector Tubes.

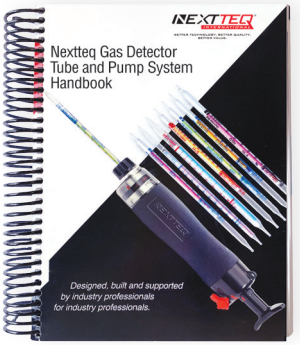



Figure 4: Nextteq Gas Detector Tube and Pump System Handbook
P/N NX90118-001

Nextteq gas detector tubes are of two basic types:

1) Length of stain detector tubes
   A) Direct Reading tubes:
      - Single tube and
      - Twin and Triplet tubes that utilize a pre-treat tube(s) or post-treat tube
   B) Concentration Chart tubes
2) Color Chart tubes

It is important to take time to select the Nextteq detector tube most appropriate for your target substance and presumed concentrations. If you need assistance, please call your Authorized Nextteq Distributor or Nextteq customer service.

Confirm the standard number of pump strokes (n) and the sampling time for the tube, and the connection sequence if a twin tube or triplet tube is selected.

Check if the detector tube requires correction for temperature, humidity, atmospheric pressure, or interfering gases to the tube reading. Consult “Section 10: Reading the Nextteq Detector Tube – Conditions that affect results and how to correct.”

N NOTES:

1. Be sure to use only Nextteq Gas Detector Tubes with the Nextteq NX-1000 Gas Sampling Pump. If you mix manufacturer Tubes and Pumps you may end up with erroneous measurements.

2. Use a Nextteq Detector Tube that has been stored under its specified storage conditions indicated on each Nextteq Detector Tube Box. If your detector tubes are not stored in their specified storage conditions, you may end up with erroneous measurements.

3. When the temperature of the detector tube itself differs from that of the measurement environment, first assimilate the detector tube temperature to the ambient temperature; otherwise you may end up with erroneous measurements. For a tube that has been stored in a refrigerated environment, leave tube for about 15 minutes in the measurement environment to assimilate its temperature to the ambient temperature.

4. Do not use a detector tube in which its “expiration date” has expired. Otherwise, you may end up with erroneous measurements.

5. Break off both ends of the detector tube immediately before the measurement. Using a detector tube that has been left with its tips broken off may result in an erroneous measurement.

6. Read the concentration immediately after completion of measurement. If not read immediately, the stain may lengthen or fade, which can lead to erroneous readings. It may be useful to photograph the detector tube immediately after sample completion to document the result.

⚠ CAUTION: Never re-use a detector tube.

### C. Thermal Ring

The Nextteq Thermal Ring comes with every Nextteq NX-1000 Sampling Pump. The Nextteq Thermal Ring displays ambient temperature allowing you to accurately correct detector tube readings for temperature on the spot.

### D. Taking a Sample

N NOTES: prior to sampling:

1. The operating procedure varies from one Nextteq detector tube to another. Before proceeding, carefully read the individual instruction sheets provided in each box.

2. Some Nextteq detector tubes require temperature correction using tables provided in the instruction sheets. Be sure that the tube temperature has reached equilibrium with the sample area before drawing the sample. Note the temperature on the Thermal Ring prior to sampling.

3. When using Nextteq detector tubes at a pressure other than normal atmospheric pressure, correction of the reading is necessary. Refer to the Section 10 B – "Reading the Nextteq Detector Tube – Conditions that affect results and how to correct." To read the tube scale directly, it is necessary that the pressure of the sample gas is equal to that of the aspirating pump.

4. When sampling high-pressure systems, or areas where the NX-1000 cannot be used, first collect the sample in a Nextteq VeriAir Flex Self-Inflating Sample Bag. Bags are available in foil or Tedlar depending upon your application. Then, you can use the NX-1000 pump to draw the sample from the bag. Nextteq offers a complete line of VeriAir Flex Sampling Bags. Consult Nextteq in selecting the correct VeriAir Sampling Bag for your application.


STEP 1:
Rapidly collect a whole air or gas sample for analysis or storage.

STEP 2:
Take an immediate reading with the Nextteq Gas Detector Tube and Pump System Handbook or ship to a lab for analysis.

### D. Taking a Sample (continued)

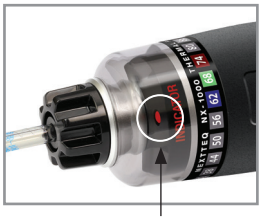
1. Prepare NX-1000 Sampling pump.
Check the pump for leaks in accordance with "Section 9A: Operating Procedures – Leak Test"

2. Break off both ends (tips) of the gas detector tube.
Insert the tip of the Nextteq gas detector tube into the tip cutter on the NX-1000 Sampling Pump and scratch the tip of tube by rotating it for one revolution, then pull it toward you. (The glass tips can be thrown away by removing the tip cutter cap.) An optional accessory, the Nextteq Tube Tip Cutter with container P/N NX90153 is available. It is a transparent container to let you see the amount of fragments. It holds 200 broken tips and is reusable.

3. Connect the gas detector tube to the aspirating pump.
Confirm the pump handle on the NX-1000 is fully pushed in and the bottom red line on the pump shaft cannot be seen. The sample gas must be drawn through the Nextteq gas detector tube in the correct direction. Insert the Nextteq gas detector tube into the rubber tube inlet with the tube's directional arrow pointing toward the pump.

4. Pull the handle.
Align either red line on the shaft to either red line on the bottom case and pull the pump handle to its full 100 mL locking position. If the sample calls for a half stroke, pull out the pump handle until 50 mL line appears, and shaft will be locked at 50 mL. All Nextteq tubes will indicate the volume of air (e.g. 100 mL) directly on the tube for the standard measuring range printed on the tube. Check the Nextteq Tube Guide, Nextteq Handbook, Nextteq Detector Tube Box or the tube Instruction Sheet for alternate extended ranges and pump strokes.

5. Draw the sample gas.
Direct the detector tube end to the point of measurement. Draw the sample gas for the specified time at the desired sampling point. For 100 mL sample pull out the handle fully and for the 50 mL sample pull out the handle halfway along the guide. Confirm with the flow indicator that the sample is completed. The estimated sample time required for each detector tube is stated clearly in the instruction sheet.




Flow Finish Indicator-
Still Sampling


Flow Finish Indicator-
Sampling Complete

6. Return the handle.
When the sample is completed, turn the handle ¼ turn (90 degrees) clockwise or counterclockwise to unlock the handle. Confirm that the handle remains extended. (If the handle returns part way, the sample is incomplete, and this will cause a low reading). Some detector tubes require extra pump strokes (i.e., more than 100 mL of air). In this case, push the handle back and repeat the operation.

7. Read the concentration.
Remove the gas detector tube from the Nextteq Sampling Pump after the prescribed sample volume has been drawn. Read the concentration of gas at the maximum end of the stain against the printed scale on the detector tube. It may be useful to photograph the detector tube immediately after sample completion to document the result. Some detector tubes require a temperature correction using a table or correction coefficient provided in the instructions.

N NOTE: Remember to remove broken glass tips in the pump head block before it becomes full. Remove the entire red tip cutter cap and shake out the broken glass tips and carefully dispose of them. After disposing of the broken glass tips, securely re-insert the red cap.

# Section 10: Reading the Nextteq Detector Tube

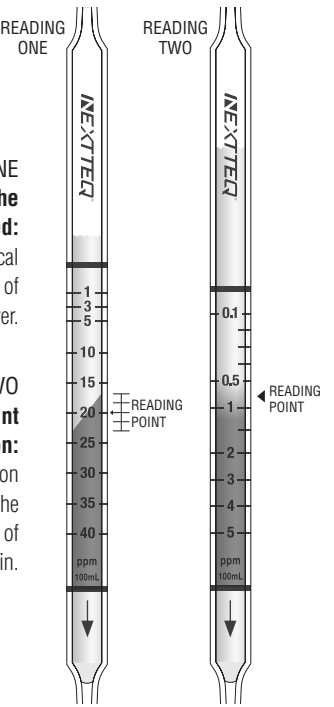
## A. How to Read the Scale:

All Nextteq Detector Tubes are of the following types when determining the gas concentration:

1) Length of Stain detector tubes
   A) Direct Reading tubes:
      - Single tube and
      - Twin and Triplet tubes that utilize a pre-treat tube(s) or post-treat tube
   B) Concentration Chart tubes

2) Color Chart tubes

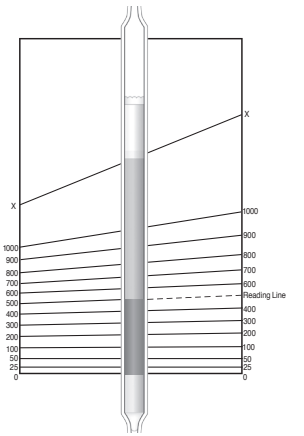
**For Length of Stain - Direct Reading Tubes:**
Read the concentration of gas at the maximum end of the stain against the printed scale on the detector tube.




READING ONE
**In case the end of the stain is slanted:**
Read out the numerical value at the middle of the oblique layer.

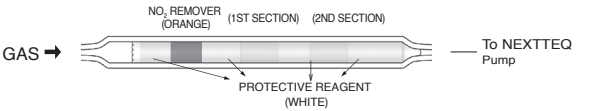
READING TWO
**In case of faint discoloration:**
Read the concentration of the gas at the maximum end of the stain.

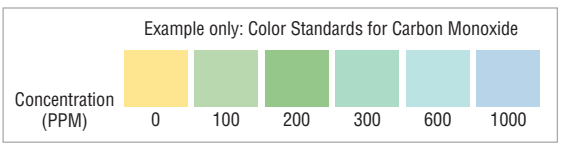
**For Length of Stain - Concentration Chart Tubes:**
Nextteq Concentration Chart Tubes utilize a printed chart used to determine the concentration of the gas or vapor preset. After completing the sample, align the zero end of the detecting reagent (inlet side of the tube) with the **0 – 0** line on the concentration chart. Align the other end of the same layer (exit side or pump side of the tube) with the **X – X** line respectively. Read the gas concentration at the maximum end of the stain against the scale on the card. If the end is slanted, read at the middle point of the oblique stain.




**For Color Chart Tubes:**
There are two types of Color Chart Tubes:
1) Tubes that have several sections of specific reagent that will change color to identify the type of gas present. For example, Inorganic (NX301) and Organic (NX302) qualitative detector tubes have a special color chart to identify 60 chemicals in a couple of minutes.


2) Tubes whose reagent sections will show a change in color intensity proportional to the concentration of the target gas which can be measured by comparing the tube's color stain to a color intensity chart. For example, with Carbon Monoxide (NX119SA and NX119SB), the color goes from pale yellow to green to blue depending on the concentration of CO and other gases present.



## B. Conditions that Affect Results and How to Correct:

### Sample Volume:

Graduations on the detector tube showing the concentration of gas are generally calibrated to 100 mL (100 cc), the quantity of gas passed through the detector tube in one complete pump stroke of the Nextteq NX-1000 Gas Sampling Pump. Some detector tube graduations are calibrated to 200 mL or 300 mL (two or three complete pump strokes). The term pump "stroke" simply means the number of times the sample pump is operated (pump handle pulled back all the way and allowed to automatically lock). The discolored layer generally lengthens in proportion to the quantity of gas passed through the detector tube. When a gas or vapor is present in concentrations lower than the lowest graduation on the detector tube, the approximate concentration value can be found by increasing the sample volume to several hundred milliliters (several pump strokes) and dividing the concentration value read on the detector tube by the number of pump strokes. It should be noted, however, that the quantity of gas or vapor detected may not be exactly proportional to the length of the discolored layer obtained due to the effects of moisture and a depleted oxidizer.

### Temperature:

The temperature of the gas detector tube (normally the same temperature as the sampling environment) can also affect the measured concentration of gas or vapor for the following reasons:

- An increase or decrease in the sample density caused by a temperature change.
- A change in the quantity of gas or vapor reacting with the detecting reagent.
- A change in the rate in which the detecting reagent reacts with the gas or vapor.

These effects can overlap one another, causing the length of the stain in the detector tube to increase or decrease. Or they can offset one another, having no effect on the measured value. Those Nextteq gas detector tubes that can be affected by temperature changes are provided with a temperature correction table as part of the instruction sheet packed with each box of detector tubes.

Temperature Correction Procedure:

1. In Case of Use of Correction Table

[EX.1] When the tube reading is 550 ppm at 25˚C, the true concentration is found by interpolating between the concentrations listed for 20 and 30˚C. in this example, the corrected value is 560 ppm.

| Temperature Correction (at 20˚C) | | | | | |
|---|---|---|---|---|---|
| Scale Reading (ppm) | True Concentration of Carbon Monoxide (ppm) | | | | |
| | 0˚C | 10˚C | 20˚C | 30˚C | 40˚C |
| 1000 | 870 | 930 | 1000 | 1030 | 1060 |
| 900 | 780 | 840 | 900 | 930 | 960 |
| 800 | 690 | 750 | 800 | 830 | 850 |
| 700 | 610 | 660 | 700 | 720 | 740 |
| 600 | 520 | 560 | 600 | 620 | 640 |
| 500 | 430 | 470 | 500 | 520 | 540 |
| 400 | 350 | 370 | 400 | 410 | 430 |
| 300 | 260 | 280 | 300 | 310 | 320 |
| 200 | 180 | 190 | 200 | 210 | 220 |
| 100 | 90 | 100 | 100 | 100 | 110 |

| Scale Readings ˚C | 20˚C | (25˚C) | 30˚C |
|---|---|---|---|
| 600 | 600 | (610) | 620 |
| (550) | (560) | (560) | (570) |
| 500 | 500 | (510) | 520 |
| (450) | (450) | (457.5) | (465) |
| 400 | 400 | (405) | 410 |

2. In Case of Use of Correction Coefficient

[EX.2] When the detector tube is reading 0.4mg/l at 23˚C, the true concentration of water vapor is 0.36 mg/l by the following calculation.
0.4 mg/l X 0.90 = 0.36 mg/l

| Temp (˚C) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1.85 | 1.81 | 1.77 | 1.72 | 1.68 | 1.63 | 1.59 | 1.54 | 1.49 | 1.45 |
| 10 | 1.40 | 1.36 | 1.31 | 1.27 | 1.23 | 1.19 | 1.15 | 1.11 | 1.07 | 1.03 |
| 20 | 1.00 | 0.96 | 0.93 | 0.90 | 0.87 | 0.84 | 0.81 | 0.78 | 0.76 | 0.73 |
| 30 | 0.71 | 0.68 | 0.66 | 0.64 | 0.62 | 0.60 | 0.58 | 0.56 | 0.55 | 0.53 |
| 40 | 0.51 | – | – | – | – | – | – | – | – | – |

**Humidity:**
While nearly all Nextteq gas detector tubes are not affected by unsaturated water vapor, some detector tubes are formulated with

- Both a dehumidifying reagent and detection reagent together in the tube, or
- A separate dehumidifying tube that is connected to the detector tube with a connector supplied in each box of tubes.

However, water droplets can enter a detector tube; water can even condense inside the detector tube due to temperature changes. Both of these situations can have a serious effect on both the gas or vapor readings obtained and the actual color change of the detector tube. For these reasons, taking readings with the Nextteq Water Vapor tubes prior to gas or vapor sampling is recommended.

**Coexisting Gases or Vapors:**
While the detecting reagents in Nextteq gas detector tubes are formulated to react uniquely with the gas or vapor to be measured, they can also show a similar reaction (color change) with another gas or gases having similar chemical properties. It is necessary to carefully consider this when taking gas or vapor readings with any gas detector tube.

A coexisting gas or vapor can have the following effects on gas detector tubes:

- It may not discolor the detecting reagent, but can give a higher or lower reading.
- It can discolor the detecting reagent in a similar way, giving a higher reading than the actual concentration.
- It can give an entirely different color change in the tube.
- It can give the discolored length with an indistinct end point.

**Atmospheric Pressure:**
Tube readings are affected by significant fluctuations in atmospheric pressure. All Nextteq detector tubes are calibrated based on a standard atmospheric pressure of 1 atmosphere (760 mmHg, 1013 hPa) and readings will not be affected at pressure fluctuations of ± 10%. If the pressure at the time of measurement is not within this range, correct the tube readings as follows:

Actual concentration =

$$\text{Tube reading} \times \frac{1\ (\text{ATM})}{\text{Atmospheric Pressure During Sampling (ATM)}}$$

Or

$$\text{Tube reading} \times \frac{1013\ (\text{hPa})}{\text{Atmospheric Pressure During Sampling (hPa)}}$$

Or

$$\text{Tube reading} \times \frac{760\ (\text{mmHg})}{\text{Atmospheric Pressure During Sampling (mmHg)}}$$

**Shelf Life:**
Gas detector tubes use chemical reagents that inevitably deteriorate over time. Because of this, if detector tubes are used after the stated shelf life expiration date (stamped on each box of tubes), they may not show an accurate gas or vapor concentration. While the highest purity reagents are used in formulating Nextteq detector tubes to ensure the longest shelf life possible, complex chemistries used to detect some gases and vapors make it important to use tubes before the stamped expiration date.

**Storage:**
All Nextteq detector tubes should be stored in a cool, dry, and dark place and out of direct sunlight to ensure adequate shelf life. All Nextteq tube boxes will indicate one of the following storage conditions:

1. "Store in a cool, dry, and dark place at 32-77˚F (0-25˚C) for tubes that do not need to be refrigerated, but can be refrigerated."

2. "Store in a refrigerated place at 32-50˚F (0-10˚C) for tubes that do need to be refrigerated."

3. "Store in a cool, dry, and dark NOT REFRIGERATED, at 68-77˚F (20-25˚C)."

Detector tubes improperly stored inconsistent with the storage condition stated on the front of each detector tube box or in direct sunlight may show a performance deterioration even if they are within the stated shelf life.

# Section 11: Disposal of Nextteq Detector Tubes

Detector tubes contain a chemical reagent which reacts with the target gas. The chemical reagents used vary among different types of detector tubes, and may include substances regulated by laws for proper disposal. When discarding used or expired detector tubes, always dispose of them properly in accordance with your local regulations. For further information contact your local distributor or the manufacturer's head office or branches.

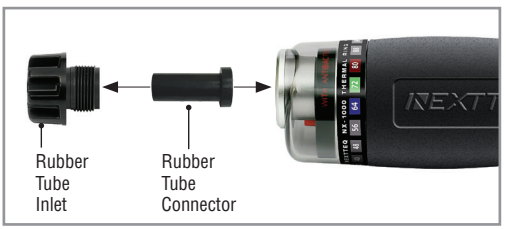
# Section 12: Maintenance

### Application of New Vacuum Grease

1. Pull the handle part way and turn the bottom case counterclockwise to remove it.
2. Pull the piston out from the cylinder.
3. Wipe off the old grease and dirt from the piston and inside the cylinder using a clean paper towel. Apply a thin coat of vacuum grease to the rubber gasket of the piston. When wiping off the old grease, be careful not to scratch the inside walls of the cylinder. Reassemble pump.

### Replacement of Rubber Tube Inlet and Rubber Tube Connector

If the rubber tube inlet or rubber tube connector appear cracked or deteriorated, remove and replace with new ones.




# Section 13: Spare Parts / Optional Accessories

### Air Flow Control Orifice

P/N NX90160

Some Nextteq detector tubes require management to the air flow in order to achieve an accurate reading. The Nextteq Air Flow Control Orifice includes an O-ring and should be used with the following tubes: NX105, NX204SH, NX204SM, NX711, NX712, NX713 and NX714.





### Extension Hoses

Remote measurement

A rubber extension hose (shown below) is used for remote detection of potentially harmful gases prior to entering a confined space such as a manhole or tank. The extension hose is placed between the detector tube and the aspirating pump to determine the concentration.

| | |
|---|---|
| 5-Meter Extension Hose: | P/N NX90154 |
| 10-Meter Extension Hose: | P/N NX90147 |
| 20-Meter Extension Hose with tube holder for single tube applications: | P/N NX90148 |
| 20-Meter Extension Hose with tube holder for dual tube applications: | P/N NX90149 |

**5 and 10 Meter Extension Hoses:**
The convenient 5 and 10-meter hose design eliminates the need for you to factor in hose line air volume when sampling. Sample results can be read directly from the detector tube; no additional calculations, charts or correction factors are required.

**20-Meter Extension Hoses:**
The 20-Meter Extension Hose comes in two configurations: One with a tube holder for single tube applications (P/N NX90148) and one with a tube holder for dual tube applications (P/N NX90149). Designed to satisfy demand for efficient and complete sampling of a ship's large cargo holds, stack sampling and other deep confined spaces. The 20-meter hose is identical in materials, construction and method of assembly as the 5 and 10-meter hoses. Due to the long length of the 20-Meter Extension Hose, there is increased flow resistance causing a reduction in the vacuum which effects the length of stain. Therefore, some tubes need a correction factor and/or longer than normal sampling time to account for the reduced vacuum.

SECTION 13

### One Hand Operation Adapter

P/N NX90146

Nextteq's One Hand Operation Adapter is ideal for sampling in hard-to-reach places, such as over vats and from a ladder. With the One Hand Operation Adapter and the tube inserted into the pump, the pump handle can be drawn back and locked while maintaining the pump vacuum without taking a sample. When you are ready, the pump can be activated and the sample taken with just the push of a button.

### Hot Air Probe and Hot Air Probe Holder

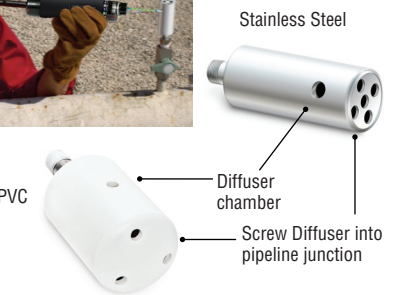
P/N NX90151 Hot Air Probe
P/N NX90152 Hot Air Probe Holder

Most Nextteq detector tubes are designed to be used at temperatures in the range of 32˚ – 104˚F (0-40˚C). However, some samples such as flue gases, stack emissions and automotive exhaust are at elevated temperatures. The Nextteq Hot Probe rapidly cools samples as hot as 1112˚F (600˚C) down to an ambient temperature before the sample enters the detector tube. The hot probe holder provides horizontal and vertical support for the tube and hot probe. No tools are required for assembly.


### Diffuser

P/N STD-910 PVC Diffuser constructed of inert material
P/N 90101 Diffuser constructed of Stainless Steel

The Diffuser, available in either PVC or Stainless Steel, provides a convenient method for sampling gas in pipelines. Designed for use with Nextteq Gas Sampling Pumps and Detector Tubes, the Diffusers are intrinsically safe, rugged, reusable and maintain the sample integrity by not reacting with most chemicals. To prepare for the sample, simply screw the diffuser into a pipeline junction. Prepare the Nextteq Pump and applicable Nextteq Detector Tube, open the pipeline valve, insert the tube in the diffuser chamber and begin sampling.




### Tube Magnifier

P/N NX90171

If you are reading tubes in a non-lit or poorly lit area; or you just need a better view when reading the concentration of the tube, the Nextteq Tube Magnifier is the solution. The Magnifier automatically lights when the tube is inserted allowing clear visibility of the tube's concentration area. The Magnifier is lightweight and easy to transport to area of sampling. Requires two AA batteries and is not intrinsically safe.

### Nextteq VeriAir Flex® Manual-Inflating Sample Bags

A completely new approach to detector tube use. Non-technical personnel can easily and inexpensively collect an atmospheric grab sample using the VeriAir Flex, and then perform detector tube measurements afterwards at a time and location that is convenient. The patented design allows an atmospheric grab sample to be collected directly without any need for a calibrated sampling pump or other equipment. Simple, intrinsically safe, and made of durable, analytical grade, multi-layer foil, VeriAir Flex sample bags are reusable and can be air shipped for analysis.

- No additional equipment needed
- Ready to sample any time, any place
- Collect a more accurate & reliable sample


STEP 1:
Rapidly collect a whole air or gas sample for analysis or storage.


Step 2:
Take an immediate reading with the Nextteq Gas Detector Tube and Pump System Handbook or ship to a lab for analysis.


1 Liter Foil
P/N 31000

5 Liter Foil
P/N 31029


4 Liter Tedlar
P/N 31047

1 Liter Tedlar
P/N 31019

### Telescoping Extension Pole

P/N NX90150

With Nextteq's adjustable and rigid telescoping extension pole, one person can easily conduct testing in any direction. Many times industrial hygienists and safety professionals are faced with testing in confined spaces that are not accessed from the top. Even with topside entry, it is advantageous at times to conduct testing at angles other than vertical. Remote testing at angles, horizontally or even vertically upward is possible at distances over 6 ft. (2 meters) away. Made of non-conductive, corrosion resistant fiberglass, the pole is lightweight and rugged.

Contracts to 18 inches (46 centimeters) for easy transport.

## Section 14: Lifetime Warranty

Nextteq International LLC offers a Lifetime Warranty which covers normal wear and tear for the life of your Nextteq NX-1000 Sampling Pump. Please contact your authorized Nextteq Manufacturers Representative for complete details.

BETTER TECHNOLOGY. BETTER QUALITY.
BETTER VALUE.



January 2020 1st Edition,
Instruction Manual Nextteq NX-1000
Gas Sampling Pumps
P/N NX90116

All information exhibited in this document including but not limited to features, detector tube specifications, appearances and usage are subject to change without notice. Please refer to the instruction sheet in the box of tubes on the use of each detector tube.



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