

## Model VSR Stationary Vacuum Samplers (Refrigerated)



### ◆ **Low Cost of Ownership.**

Over their useful life, vacuum samplers are the least expensive suction lift samplers to own. With minimal moving parts, critical components rated for thousands of operations, and no regular scheduled replacement of consumable parts such as peristaltic pump tubing, labor and spare parts costs are minimized. It is possible to save hundreds, if not thousands of dollars over the useful life of a Model VSR sampler.

### ◆ **Accurate, Repeatable Sample Volumes.**

Absolute accuracy and repeatability of sample volumes for the VSR sampler is within 2 ft./sec. for transport velocity 0.5% of pre-set volume versus the  $\pm 10$  ml typical of a peristaltic sampler. Changes in vertical or horizontal head height will not affect sample volume taken, since the sample is volumetrically measured. The collected sample will be exact, ensuring the validity of your sampling data.

### ◆ **High Transport Velocity.**

Experts and other sampler manufacturers agree a critical factor (if not the most critical) in obtaining a representative sample is the sampler's transport velocity. Unlike most peristaltic samplers, the VSR easily meets the EPA recommended minimum of 2 ft./second for transport velocity over a wide range of

horizontal and vertical heights, ensuring the most representative samples possible. (based on USGS sampler test 7/11/95)

### ◆ **Industrial-grade Refrigerator.**

The optional refrigerator is durable and corrosion resistant. Capable of maintaining samples at the EPA recommended 4° even in high ambient temperatures, this industrial-grade refrigerator is built to handle the toughest environments. Features such as a corrosion-resistant frame and exterior, refrigerant lines wrapped with asphalt cork tape to resist damaging environments, non-ferrous evaporation coils with corrosion resistant finish, and a heavy-duty compressor ensure reliable operation under the harshest conditions.

### ◆ **Versatile Controller.**

The sampler's microprocessor based controller is housed in a NEMA 4X/NEMA 6 enclosure for environmental protection. The controller offers advanced functionality and features such as data logging, review of settings and operating status, and a variety of flow and time modes. With its step-by-step menu format, dedicated-button keypad, and large backlit LCD, the controller is simple to setup, even in the dark! Easy to understand

prompts and "shortcut" keys save manpower and time by avoiding frustrating navigation through long, complicated menu structures.

### ◆ **Single or Multiple Bottle Sampling.**

The VSR has various bottle options for single or 24-bottle sampling of non-toxic liquids. It is convertible between single and multiple bottle sampling without tools.

### ◆ **Comprehensive, Flexible Programming.**

The exceptional sampling software is designed to be highly flexible and easy to use. The menu-driven system provides many programming features. (See partial listing in specifications on page 2.)

### ◆ **Durable Design.**

Manning samplers over twenty years old are still in regular service. No other sampler company can claim a longevity record like that! The VSR is no exception. Its ABS enclosure protects the electromechanical parts and the stainless steel hardware can withstand corrosive environments. These features, along with watertight connectors, ensure that over time no other sampler will last as long as a Manning VSR sampler

# Specifications

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Size ..... Controller: 16.25 in. (41.28 cm) high x 17.5 in. (44.45 cm) diameter  
Refrigerator: W 23.875 in. (60.65 cm) x H 34.5 in. (87.63 cm) x D 24 in. (60.96 cm)  
Complete Unit (Controller & Refrigerator): W 23.875 in. (60.65 cm) x H 50.75 in. (128.9 cm) x D 24 in. (60.96 cm)  
Optional Hinged Hood for Controller: W 24.75 in. (62.87 cm) x H 52.50 in. (133.35 cm) x D 24.50 in. (62.23 cm)  
Optional NEMA 3R Sampler House: W 32 in. (81.3 cm) x H 74 in. (187.9 cm) x D 30 in. (76.2 cm)

Weight (dry)..... 120 lbs. (54.48 kg) with optional refrigerator and empty sample bottle(s)

Environmental Protection ..... NEMA 4X/NEMA 6 ABS housing around electromechanical components with all stainless steel hardware

Sample Cooling..... Optional refrigerator capable of maintaining samples at 39°F (4°C)

Temperature Limits ..... Standard unit: 32° to 122°F (0° to 50°C); unit with optional heaters and/or hood: -40° to 122°F (-40° to 50°C)

Sample Pump..... Diaphragm vacuum compressor pump, 12 VDC

Maximum Lift..... 28 ft. (8.2 m)

Intake Hose ..... Size: 3/8-inch ID (5/8 inch OD) hose or 5/8 inch ID (7/8 inch OD) hose  
..... Type: PVC or Teflon in 10 ft (3 m), 25 ft. (7.6 m), 50 ft. (15.2 m), or 100 ft. (30.4 m) lengths

Transport Velocity ..... With 3/8 inch ID hose: 5 ft./sec. @ 3 ft. of lift (1.52 m/sec. @ 1 m of lift)  
..... With 5/8 inch ID hose: 2.5 ft./sec. @ 20 ft. of lift (0.76 m/sec. @ 6.1 m of lift)

Sample Volume..... Infinitely adjustable; chamber holds 500 ml per cycle; maximum of 2000 ml using multiple chamber fills (max. 4)

Accuracy..... 0.5 ml or ±0.5% of set volume (whichever is greater)

Repeatability..... 0.5 ml or ±0.5% of the average largest and smallest sample volume in a sample set (whichever is greater)

Membrane Keypad ..... Hermetically sealed 24-key, multiple function keypad with 2-line by 20-character alphanumeric backlit LCD

Sample Programming ..... Programming features include but are not limited to:

- Data logging (512 event capacity)
- Flow proportional pacing (contact closure)
- Flow pacing with time override capability
- Flow pacing with delay sampling feature
- Flow pacing with maintained event sampling
- Totalized flow pacing (analog input)
- Uniform and non-uniform time intervals
- Multiple bottles per sample
- Multiple samples per bottle
- Multiple bottle compositing
- Bottle grouping
- Program delay (time or flow)
- Sampling based on external device input
- Hydrologic level event mode (storm water sampling)
- Real-time clock (time and date)
- Password protection
- Manual test cycle feature
- Activity review log (current and past)
- Intake fault alert
- Intake line purge
- Automatic shut-off
- Power fail/auto restart

Internal Clock ..... Indicates real time with 1 minute per month accuracy

Internal Battery Backup ..... 5-year internal lithium battery to maintain program logic, RAM memory, real-time clock

Power Requirement..... 110 VAC, 220 VAC, 110 VAC with battery backup, or 220 VAC with battery backup

Alarm Contacts (optional)..... Three SPST contacts rated 5A 110/220 VAC

Input/Output (optional)..... Contact closure with or without 4-20mA input and/or RS-232 output in various combinations

# Ordering Information

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## Model VSR Sampler Spare Parts/Accessories

### • Replacement Pinch Tubing:

3/8-inch tubing\* MS566905

5/8-inch tubing\* MS566919

\*Specify required length in inches.

### • Pressure Switch MS638540

### • Contact/Analog Input Cables:

3 ft. (1 m) long, 4-pin plug cable MS818016

10 ft. (3 m) long, 4-pin plug cable MS818018

### • RS-232 Output 6-inch Patch Cable MS810059

### • Multiple-to-Single Bottle Conversion Kit MS889774

For non-toxic use only; includes bottle-full sensor, bottle full sensor harness, and chamber base, but not a bottle which must be ordered separately.

### • Replacement Bottles:

One 2.5-gallon polyethylene bottle w/cap MS687547

One 4-gallon polyethylene bottle w/cap MS687551

One 5-gallon polyethylene bottle w/cap MS687535

One 2.5-gallon glass bottle w/Teflon lid liner MS889715

Set of 24 1000 ml polyethylene bottles w/caps MS889117

Set of 24 500 ml polyethylene bottles w/caps MS889041

Set of 24 350 ml glass bottles w/Teflon-lined caps MS889141

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# Ordering Information

<b>MODEL NUMBER</b> <b>VSR3</b> 3/8-inch ID vacuum pump stationary sampler system (requires 3/8-inch sampling hose) <b>VSR5</b> 5/8-inch ID vacuum pump stationary sampler system (requires 5/8-inch sampling hose)						
<b>POWER REQUIREMENT</b> (for sampler only -- not refrigerator) <b>A</b> 110 VAC <b>B</b> 220 VAC <b>C</b> Battery backup -- 110 VAC <b>D</b> Battery backup -- 220 VAC						
<b>REFRIGERATOR</b> <b>1</b> None <b>2</b> Standard -- 110 VAC, 60 Hz. <b>3</b> Standard -- 220 VAC, 50 Hz. <b>4</b> Stainless steel -- 110 VAC, 60 Hz. <b>5</b> Stainless steel -- 220 VAC, 50 Hz. <b>6</b> Standard -- 110 VAC, 50 Hz. <b>7</b> Stainless steel -- 110 VAC, 50 Hz.						
<b>INPUT/OUTPUT OPTION</b> (includes 3' cable for contact closure, pulsed, and analog inputs, and patch cable for RS-232 output when applicable) <b>A</b> Contact closure input <b>B</b> Option A plus 4-20mA input <b>C</b> Option A plus RS-232 output <b>D</b> Option B plus RS-232 output						
<b>BOTTLE CONFIGURATION</b> <b>A</b> 1 bottle for non-toxic liquids with bottle full sensor <b>C</b> 24 bottles for non-toxic liquids						
<table style="width: 100%; border: none;"> <tr> <td style="width: 60%; border: none;"> <b>BOTTLE TYPE</b>  <b>1</b> None  <b>2</b> 2.5-gallon polyethylene  <b>3</b> 5-gallon polyethylene  <b>4</b> 4-gallon polyethylene  <b>5</b> 2.5-gallon glass w/Teflon cap           </td> <td style="width: 10%; border: none; text-align: center; vertical-align: middle;">           }            }            }            }            }         </td> <td style="width: 20%; border: none; vertical-align: middle;">           Only for            1 bottle            sampler         </td> <td style="width: 10%; border: none; vertical-align: middle;">           }            }            }         </td> <td style="width: 10%; border: none; vertical-align: middle;">           Only for            24 bottle            sampler         </td> </tr> </table>		<b>BOTTLE TYPE</b> <b>1</b> None <b>2</b> 2.5-gallon polyethylene <b>3</b> 5-gallon polyethylene <b>4</b> 4-gallon polyethylene <b>5</b> 2.5-gallon glass w/Teflon cap	} } } } }	Only for 1 bottle sampler	} } }	Only for 24 bottle sampler
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<b>SAMPLING STRAINER TYPE</b> <b>1</b> None <b>2</b> PVC strainer <b>3</b> 100% stainless steel strainer (3/8-in. only)						
<b>ENVIRONMENTAL PROTECTION</b> <b>A</b> None <b>B</b> Heater for refrigerator <b>C</b> Fiberglass hood for controller <b>D</b> Fiberglass hood with heater <b>E</b> Fiberglass hood and heater for refrigerator <b>F</b> Fiberglass hood with heater and heater for refrigerator <b>G</b> NEMA 3R fiberglass insulated sampler house <b>H</b> NEMA 3R sampler house with heater <b>J</b> NEMA 3R sampler house with light <b>K</b> NEMA 3R sampler house with fan <b>L</b> NEMA 3R sampler house with heater, light, and fan <b>M</b> NEMA 3R sampler house with heater and light <b>N</b> NEMA 3R sampler house with heater and fan <b>P</b> NEMA 3R sampler house with light and fan						
<b>ALARMS</b> <b>1</b> None <b>2</b> Three alarm contacts (sample in progress, missed sample, and bottle-full condition for a single bottle sampler or end-of-sample sequence for a multiple bottle sampler)						
<div style="border: 1px solid black; height: 20px; width: 100%;"></div> <p style="text-align: right; margin-top: 5px;"><b>Configuration Number</b></p>						

Choose one from each category.

# Engineering Specification

1. The sampler shall be suitable for automatic collection and preservation of composite or discrete non-toxic liquid samples.
2. The sampler enclosure shall be thick walled ABS with NEMA 4X/NEMA 6 ratings.
3. Minimum ID of all wetted parts is 3/8-inch. Non-toxic samples shall be collected using a clear PVC measuring chamber adjustable 10 to 500 ml sample volume and  $\pm 0.5\%$  repeatability of preset value. All wetted parts are stainless steel, PVC, or silicone rubber.
4. The sampler incorporates vacuum compressor technology. The sampling mechanism consists of a heavy-duty vacuum compressor with an aluminum body coated with corrosion-resistant paint. The sample does not pass through a pump. Samplers using technologies requiring regularly scheduled parts replacement will not be acceptable. A 500 ml precision measuring chamber with  $\pm 0.5\%$  repeatability of preset volume is used. Determining sample volume using contacting electrical probes or by inferentially deriving volume through measuring flow based on pump rotations or time is not permissible. There is no need to compensate for changes in draw height or intake line length.
5. The sampler enables field conversion from multiple to single bottle sampling to collect non-toxic liquids by using a parts kit which does not require special tools.
6. Composite and/or discrete samples are collected by the sampler. For composite sampling, an overflow protection mechanism shall automatically terminate any further sampling. Discrete sampling can be multiple bottles of the same sample or multiple samples in multiple bottles. Systems relying upon sensing bottle weight to determine sample volume is unacceptable due to the variance in sample densities and the need to calibrate the weight sensing mechanism.
7. Bottle-full condition is detected using a stainless steel sensor located in the bottle neck. It is easily removable for cleaning or replacement without using special tools.
8. The sampler is capable of collecting 10 to 2000 ml samples through a 3/8-inch ID sample line at a minimum transport velocity of 2.5 ft./sec. at 20 feet of lift using a 25 ft. long sampling hose, and a 7 ft./sec. At 3 ft. of lift using a 15 ft. long hose.
9. An optional weighted sampling strainer of PVC or stainless steel is used.
10. A hermetically sealed 24-button keypad and a 2-line by 20-character alphanumeric backlit LCD is linked to a programmable CPU.
11. Sample bottle(s) are located below the controller in a carbon steel refrigerator (with iron phosphate pretreatment covered by baked acrylic enamel or a stainless steel refrigerator. The refrigerator condenser is made of carbon steel with baked enamel finish. For protection from hydrogen sulfide gas attack, copper refrigerant lines are coated with asphalt cork tape. A thermostat is included within the refrigerator to ensure that a temperature of  $4^{\circ}\text{C}$  is maintained. The evaporator coils are rolled aluminum with baked acrylic enamel finish. The fan motor is unit bearing. The 475 BTU compressor has a high efficiency fan and condenser arrangement permitting reliable operation in high ambient temperatures. Insulation is foam formed CFC-free polyethylene with an interior of food grade ABS.
12. No unique symbols or codes for programming or to indicate operating conditions are used. The software, menu driven, prompts input of requested information by using the keypad. The display indicates each programming step. After entering date, the systems automatically advance to the next programming step.
13. A password feature is used to restrict access to authorized persons only.
14. A sampling program can be delayed by entering the time in hours and minutes for the sampler to count down, or the number of contact closures to occur. The delay is independent of the sampling interval.
15. Immediately prior to and following each sample, the sampler purges the sample hose. Purge duration is selectable.
16. If a sample is not obtained on the first attempt, the sampler immediately retries to collect the sample. If a sample still cannot be collected, the sampler will omit that sample and continue the sampling sequence.
17. Manual sampling, independent of a programmed sequence, is initiated by a keystroke. The sampler logs manual collections is selectable to allow taking test samples:
  - a) Only when sampler is not running a program.
  - b) During a program but the test sample is not counted as a sample.
  - c) During a program and the test sample is counted as a sample.
18. In the time mode, the interval between samples is adjustable (1-9999 min. in 1 min. increments). In the flow mode, the sampler accepts and totalizes contact closures (1-9999) or a 4-20mA DC analog signal input for sampling at a user set point.
19. A hydrologic event algorithm is used to enable sample programming based on a combination of parameters including water level, differential (rising and falling) water levels, and time defaults as established by the U.S. Geological Survey for hydrologic events.
20. Operating status is reviewed with minimal effort and includes:
  - Program status
  - Time and date program started
  - Minutes or flow signals remaining to the next sample
  - Bottle number
  - Number of samples collected
  - Number of samples remaining
  - Volume collected, and,
  - Volume remaining.All program settings are also reviewed in addition to seeing the review of the completed program. The sampler has diagnostics for RAM, ROM, pump, and distributor.
21. The entire refrigerated sampler is enclosed in an optional weather-resistant, NEMA 3R outdoor enclosure made of fiberglass-reinforced polyester and insulated with 0.75 in. (19.05 mm) thick polyurethane. It is equipped with a full-size gasket-sealed door with lockable latch, duplex outlet, air vents, and access holes for the sampling hose. It also includes any or all of the following: an optional heater with thermostat suitable for sampler operation to  $-4^{\circ}\text{F}$  outside temperature, an optional light and/or optional fan.

Data Sheet VSR

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