

**NEW RUDOLPH NASAL & MOUTH BREATHING  
FACE MASK TWO-WAY NON-REBREATHING  
Stress/Exercise/Pulmonary Function Testing  
& Metabolic Measurements  
Pediatric Small 8960 Size #2, Large 8950 Size #3**

The NEW Rudolph Nasal & Mouth Breathing Two-Way Non-Rebreathing Face Mask is primarily designed for Stress/Exercise Testing, Pulmonary Function Studies, & Metabolic Measurements. It is similar in function as our previous blue 7910 Series Face Mask. The primary improvements include a lower rebreathing volume dead space, one inhalation valve port instead of two (as with the 7910 series), a new translucent silicone rubber material, and improved facial sealing. All design changes result in enhanced subject comfort and improved quality of test results.

**Two-Way Non-Rebreathing Masks** are especially useful with subjects who have difficulty in using a mouthpiece and noseclip with a Two Way Non-Rebreathing Valve. Subject comfort and the secure fit afforded with this **Nasal & Mouth Breathing Face Mask** will result in more accurate test results. As compared to a mouthpiece / noseclip technique, this mask design has the advantage of eliminating jaw fatigue, saliva build up, dry mouth, throat irritation and leakage of air around the lips that would be otherwise holding a mouth piece.

This **Pediatric Size Series** has Large and Small Mask Face Pieces available adapted with Hans Rudolph **Y-Shape™** and **T-Shape™** Two Way Non-Rebreathing Valves. The user can select from these valve sizes to meet the optimum test parameters such as dead space and flow characteristics. Other mask sizes, Infant, Neonatal & Premature, for adapting with Hans Rudolph Low Volume Dead Space Two-Way Non-Rebreathing Valves will be available.

**SPECIAL FEATURES**

- The face mask allows vocal communication between the subject and the technician.
- Our **new head cap** is designed of **polyester net material** which is light in weight and allows for greater heat loss during exercise testing.
- There are two Pediatric Head Cap sizes, Small & Large.

- **Sampling Ports, Couplers & Tubing** - (Gas and Pressure)  
Two plastic nylon **Female Luer Lock Type Sampling Ports** are located 180° apart from one another on the circumference of the **valve adapter to face piece**. Two have been installed, however, only one is usually needed. This is to allow users to rotate the valve and adapter 90° from the **standard location** as shown in the above illustration. One of the two sampling ports will remain above a horizontal plane parallel to the ground and will not collect moisture which would cause the port to become occluded. The **standard location** is 2 o'clock and 8 o'clock. (0200 hours and 0800 hours) as viewed by subject wearing the nasal and mouth breathing mask.

Each Female Luer Lock Sampling Port is sealed with a Male Luer Plug P/N 171180.

A set of three **couplers** is supplied with each mask. One end connects to the sampling port Female Luer Lock, the other end is a hose barb which fits in to the bore of flexible plastic tubing. These three hose barb sizes provide the user flexibility in tube size usage.

**Tygon® Tubing for Sampling Ports** (Gas & Pressure) is available in the following bore sizes to fit over the Coupler Hose Barb: .062" (1.6mm) P/N 666060, .093" (2.4mm) P/N 666061 and .125" (3.2mm) P/N 666062. The maximum working pressure of this Tygon® Tubing is 40 psi (275kPa).

**GENERAL INFORMATION**

- **Face Mask sizes #00, #0, #1, #2, #3, #4, #5, #6 represent a commonly designated size configuration with anesthesia face masks.** To help the end user relate to these different sizes, this series of numbers will be shown on all of the Rudolph Human Face Mask product line.
- **Valving** - Utilizes one inhalation port and one exhalation port, using Hans Rudolph, inc. time proven, low resistance to flow **Spiral-Type™** Diaphragms. Diaphragm sizes used in the inhalation/exhalation ports are shown in the tabulation.

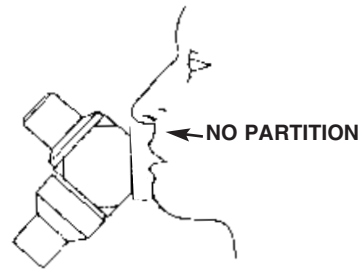
**Nasal & Mouth Breathing Pediatric Face Mask with T-Shape™ and Y-Shape™ Configuration of Two-Way Non-Rebreathing Valves attached.**



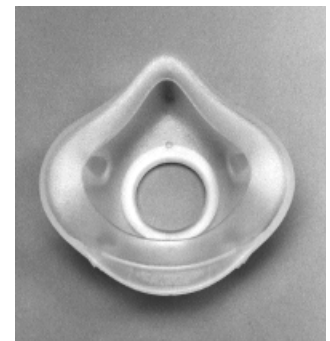
**T-Shape™ Valve**



**Y-Shape™ Valve**



Side view of **Nasal & Mouth Breathing Face Mask** mated to a Two-Way Non-Rebreathing Valve on a subjects face. This illustrates the common air flow passageway between the nose & mouth as compared to our mouth breathing face mask, which has a **partition separating & sealing** the nose chamber from the mouth chamber.



Interior photograph of **Mask Face Piece**. This **Nasal & Mouth Breathing Face Mask** does not have a **partition separating & sealing** the nose chamber from the mouth chamber as is with our mouth breathing face mask.

**GENERAL INFORMATION (continued)**

- **Breathing Tube** - All inhalation / exhalation port tube adapters on the Two-Way Non-Rebreathing Valves have outside diameters for fitting into Large Bore 1.375" (35mm) and Infant .875"(22mm) Bore Tubing as follows:
- **Tubing Bore (Diameter) - Two-Way Non-Rebreathing Valve Series**  
.1375" (35mm) - Series 2630, 2600  
.875" (22mm) - Series 1420, 1410
- **Rebreathing Volume Dead Space:**  
Includes the volume of mask face piece chamber, which has some variance because of users facial differences, plus the Two-Way Non-Rebreathing valve chamber and adapter, which is the passageway volume between the inhalation and exhalation One-Way Valve **Spiral-Type™** Diaphragms. Refer to Physical Characteristics.
- **Beards** are a factor which can possibly cause leakage.
- Designed and Manufactured for **Multiple Patient Use**.
- **Packaged:** This product is individually polyethylene bagged and shipped clean, **non-sterile**.
- **Caution:** Federal law restricts this device to be sold by or on the order of a physician.
- User specials & OEM applications invited.

**RESISTANCE TO FLOW DATA**

Pediatric Small Series 8960												
*	8961		8962		8963		8964		8965		8966	
	Y-Shape™		T-Shape™		Y-Shape™		T-Shape™		Y-Shape™		T-Shape™	
Flow L/min	Differential Pressure (dp) - cm Water											
	I	E	I	E	I	E	I	E	I	E	I	E
25	—	—	—	—	.6	.5	.6	.6	.6	.6	.6	.6
50	—	—	1.2	1.0	.8	.8	1.2	1.2	.9	.8	1.1	1.2
100	1.7	1.6	2.0	1.7	2.0	2.0	2.1	2.4	2.0	1.8	1.9	2.1
150	2.6	2.9	2.9	2.7	3.5	3.7	4.1	5.8	3.5	3.3	3.8	5.1
200	3.8	4.9	3.8	4.5	6.8	7.8	5.8	9.4	6.8	6.9	5.5	8.2
300	6.7	9.9	5.9	9.4	—	—	—	—	—	—	—	—
400	10.8	15.7	8.2	15.9	—	—	—	—	—	—	—	—

**RESISTANCE TO FLOW DATA**

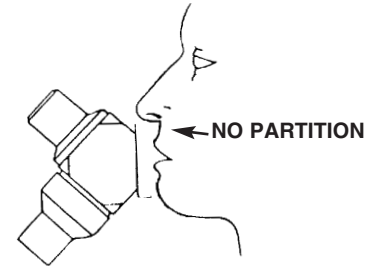
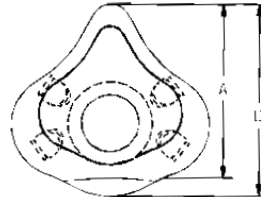
Pediatric Large Series 8950												
*	8951		8952		8953		8954		8955		8956	
	Y-Shape™		T-Shape™		Y-Shape™		T-Shape™		Y-Shape™		T-Shape™	
Flow L/min	Differential Pressure (dp) - cm Water											
	I	E	I	E	I	E	I	E	I	E	I	E
25	—	—	—	—	.6	.5	.6	.6	.6	.6	.6	.6
50	—	—	1.2	1.0	.8	.8	1.2	1.2	.9	.8	1.1	1.2
100	1.7	1.6	2.0	1.7	2.0	2.0	2.1	2.4	2.0	1.8	1.9	2.1
150	2.6	2.9	2.9	2.7	3.5	3.7	4.1	5.8	3.5	3.3	3.8	5.1
200	3.8	4.9	3.8	4.5	6.8	7.8	5.8	9.4	6.8	6.9	5.5	8.2
300	6.7	9.9	5.9	9.4	—	—	—	—	—	—	—	—
400	10.8	15.7	8.2	15.9	—	—	—	—	—	—	—	—

\* The Two-Way Non-Rebreathing Valve Model is part of the mouth breathing face mask assembly & shown as an aid in your selection process. (E) is Expired and (I) is Inspired.

**GUIDELINES FOR MASK FIT SELECTION**

Mask Size	Age Fit	Series Model No. (Nasal & Mouth Breathing-Type)
#00 Premature	Less than 38 week Gestation	8990
#0 Neonatal	Birth to 1 Month	8980
#1 Infant	1-12 Months	8970
#2 Pediatric Small	1-5 Years	8960
#3 Pediatric Large	4-9 Years	8950
#4 Adult Small	9 Years to Small Adult	8940
#5 Adult Medium	Large Adolescent to Medium Adult	8930
#6 Adult Large	Large Adult	8920

**RUDOLPH NASAL & MOUTH BREATHING PEDIATRIC MASK FACE PIECE DIMENSIONS**



**COUPLERS For Sampling Ports to Tubing**

- Couplers adapt the Female Luer Lock Sampling Port to different bore sizes of Flexible Plastic Tubing.

**Couplers - Left End Male Luer Lock**

Right End Hose Barb for use with flexible Plastic Tubing

Female Luer Lock Sampling Port on mask.	P/N	171210-Barb for .062" (1.6mm) Bore Tubing.
	P/N	171211-Barb for .093" (2.4mm) Bore Tubing.
P/N 171179	P/N	171212-Barb for .125" (3.2mm) Bore Tubing.

- Refer to items 7,8, and 9 of the Exploded Assembly Drawing & Tabulation for additional information.
- This set of three couplers is supplied with each Rudolph Mouth Breathing Face Mask.
- For ordering **Replacement Parts & mating Tubing** to Hose Barb, refer to the Detailed Price List Section "Sampling Ports, Couplers & Tubing (Gas & Pressure)".

**ORDERING INFORMATION** - Rudolph Pediatric size Nasal & Mouth Breathing Face Mask with your choice of the appropriate size **T-Shape™** or **Y-Shape™** Two-Way Non-Rebreathing Valve (2WNRBV).

For **ordering information** and part number of **replacement components**, refer to Exploded Drawings & Tabulation of part numbers (P/N).

P/N-Model No.	Pediatric Small Series 8960 Size #2
113071-8961	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Small with 2630 Medium <b>Y-Shape™</b> Valve (2WNRBV).
113072-8962	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Small with 2600 Medium <b>T-Shape™</b> Valve (2WNRBV).
113073-8963	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Small with 1420A Small <b>Y-Shape™</b> Valve (2WNRBV).
113074-8964	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Small with 1410A Small <b>T-Shape™</b> Valve (2WNRBV).
113075-8965	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Small with 1420B Small <b>Y-Shape™</b> Valve (2WNRBV).
113076-8966	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Small with 1410B Small <b>T-Shape™</b> Valve (2WNRBV).
	<b>Pediatric Large Series 8950 Size #3</b>
113033-8951	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Large with 2630 Medium <b>Y-Shape™</b> Valve (2WNRBV).
113034-8952	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Large with 2600 Medium <b>T-Shape™</b> Valve (2WNRBV).
113035-8953	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Large with 1420A Small <b>Y-Shape™</b> Valve (2WNRBV).
113036-8954	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Large with 1410A Small <b>T-Shape™</b> Valve (2WNRBV).
113037-8955	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Large with 1420B Small <b>Y-Shape™</b> Valve (2WNRBV).
113038-8956	Rudolph Nasal & Mouth Breathing Face Mask, Pediatric Large with 1410B Small <b>T-Shape™</b> Valve (2WNRBV).

Size	Series	Face Piece P/N	A Inch (mm)	B Inch (mm)	C Inch (mm)
Pediatric #2 Small	8960	669072	3.5 (88.9)	3.0 (76.2)	1.2 (30.5)
#3 Large	8950	669053	4.0 (101.6)	3.6 (91.4)	1.7 (43.2)

**REFERENCES**

For a validation study of the **large Adult Rudolph Mouth Breathing Face Mask** compared to the historic **mouthpiece/noseclip technique** refer to abstract titled "Comparison of the Rudolph Face Mask with the standard Mouthpiece/Noseclip Apparatus in measuring Respiratory Variables." G.W. Danhoff & T.E. Dohmeier, W.L. Laskie Human Performance Lab, Western Illinois University, Macomb, IL & Condell Medical Center, Medical Center Health Institute, Libertyville, IL. Medicine and Science in Sports and Exercise. Volume 24, Number 5, Supplement.

For additional information on the advantages of using the **Hans Rudolph Mouth Breathing Face Mask** for exercise testing refer to "Manual on Exercise Testing: A Training Handbook" by Donald C. Zavala, M.D., Third Edition, Chapter 3, pages 21,27,28,29 & Chapter 10 page 120.

For additional information on the advantages of using the **Rudolph Mouth Breathing Face Mask** to collect expired air in spontaneously breathing patients refer to "Nutritional Assessment in Critical Care: A Training Handbook" by Donald C. Zavala, M.D., First Edition, Chapter 3, pages 51 & 55.

For information on the effects of breathing patterns comparing the face mask with mouthpiece technique, refer to "Human breathing patterns on mouthpiece of face mask during air, CO<sub>2</sub> or Low O<sub>2</sub>" by Judith Ann Hirsch and Beverly Bishop, Journal of Applied Physiology, Nov. 1982 - Vol. 53, No. 5, pages 1281-1290. The mask discussed in the article is not this **Rudolph Nasal & Mouth Breathing Face Mask** Series 8900 or the **Rudolph Mouth Breathing Face Mask** Series 7900.