



FLOW RESISTANCE STANDARDS LINEAR TYPE Series 7100

Product Description & Intended Use

Linear Resistors are passive, non-electric, pneumatic devices intended to provide a known, constant resistance to air flow within a specified tolerance and bidirectional flow range. These resistors are designed to simulate the flow resistance of a patient's pulmonary system, and are intended for use as an aid in designing, testing, demonstrating, and maintaining the quality assurance of ventilators. Resistor series comply with ANZI Z79.7-1976 (superseded by ASTM F1100-90), ISO 80601-2-12, ISO 80601-2-72, and the ISO 10651 series of standards.

Product Features

- Bi-Directional linearity
- Resistance elements are stainless steel for durability
- Certificate of Calibration provided with each Serialized unit
- Recalibration services provided (incoming & outgoing)
- Port adapters are 22mm OD tapered per ISO 5356-1:2015
- Custom Resistors per customer specifications on request
- MRI compatible custom Resistors available on request

Specifications Materials & Dimensions

Description	Materials & Dimensions
Port Adapters (Inlet & Outlet)	PET Thermoplastic, White – 22mm OD Tapered
Resistance elements (internal)	Stainless Steel
Spacer(s) (internal)	PET Thermoplastic, White
Oring (internal)	Nitrile Rubber, Black
Diameter (Assembly, maximum)	1.50" (3.8 cm)
Length (Assembly, typical)	2.92" (7.4 cm)
Weight (Assembly, typical)	43 gm

Applicable Standards

1. ISO 5356-1:2015 Anesthetic and Respiratory equipment - Conical Connectors
2. ISO 80601-2-12:2011 Basic Safety and Essential performance of Critical Care Ventilators
3. ISO 80601-2-72:2015 Basic Safety and Essential performance of Home Healthcare Ventilators
4. ISO 10651 Series Lung Ventilators for Medical Use
5. ASTM F1100-90:1997 Ventilators intended for Use in Critical Care
6. ANSI Z79.7-1976 Breathing Machines for Medical Use



TYPICAL RESISTORS

Custom Resistors

- Custom resistors are available per customer specifications following consultation with Hans Rudolph inc. technical support as there are limitations on the flow range for each R Value (cmH₂O/L/S, hPa/L/S) specified.
- Custom resistors made completely of nonferrous materials for use in MRI environments are available on request.

Cautions

1. Do not attempt to clean, disinfect or sterilize. This will void the warranty and calibration.
2. Do not attempt to disassemble. This will void the warranty and calibration.
3. These Resistors are not intended for use in a ventilator or other life support system.
4. These Resistors are not for use in any humidified air flow circuit as the collection of moisture in the resistance elements can affect the calibration performance.

Warnings

- These Resistors are not for use in a breathing circuit of any type as there is no validated methods for cleaning, disinfection or sterilization the results of which could lead to a biohazard for patients, clinicians and researchers.
- These Resistors are not for use in any humidified patient or other air flow circuit as the collection of moisture buildup in the resistance element can affect the calibration performance.
- Linear Resistors are not intended for use on humans or as a calibration standard for medical devices.

Risks

- The only risks applicable are to the integrity of the ventilator test or demonstration setup.

References

1. Chatmongkolchart S, Williams P. Evaluation of Inspiratory Rise Time and Inspiration Termination Criteria in New Generation Mechanical Ventilators: A Lung Model Study. Respiratory Care 2001; 46(7): 666-77.
2. Mathewson HS, Gish GB, Linn CR. Pediatric Mechanical Ventilators: an evaluation of performance characteristics. J. Kansas Medical Society 1983; 84:255 p82.
3. Mathewson HS, Gish GB, Linn CR. The Search for Predicted Volumes. Pulmonary Medicine & Technology Feb. 1984, Vol. 1 No. 2: 39-46.
4. Simbruner G, Gregory GA. Performance of Neonatal Ventilators: the effects of changes in resistance and compliance. Critical Care Med. 1981; 9:509-514

Replacement Components and Recalibration

Replacement components and recalibration must be completed at Hans Rudolph inc.. Contact Hans Rudolph inc. for a Return Authorization Number (RAN) before shipping the Resistor in for any service. A quote will be provided after receipt and evaluation of your Linear Resistor.

Ambient Conditions

- Temperature: 5°C to 40°C
- Relative Humidity: 0% to 95% (non-condensing)

General Information

- Packaging: Individually poly bagged, shipped clean, non-sterile
- All instrumentation used in Resistor Calibration are NIST traceable
- Custom Resistors and OEM/OEL inquires invited

Specifications & Ordering Part Number Information

Per Standards ANSI Z79.7-1976 and ASTM F1100-90:1997					
Series No.	Part No.	Designation	Nominal Resistor Value cmH ₂ O/L/S	Flow Range (± 20% R Accuracy)	
				L/sec ±	L/min ±
7100 R5	112274	R5	5	2.0	120
7100 R20	112275	R20	20	1.0	60
7100 R50	112276	R50	50	0.5	30
7100 R200	112277	R200	200	0.1	6
7100 R500	112278	R500	500	0.075	4.5
7100 R1000	112279	R1000	1000	0.05	3

Order Part Number **955002** for Recalibration of your Linear Resistor, Contact HRI for Return Authorization Number (RAN)

Per Standards ISO 80601-2-12:2011, ISO 80601-2-72:2015 and ISO 10651 series					
Series No.	Part No.	Designation	Nominal Resistor Value hPa/L/S	Flow Range (± 10% R Accuracy)	
				L/sec ±	L/min ±
7100 R5	CR1789	R5	5	1.0	60
7100 R10	CR1971	R10	10	0.83	50
7100 R20	CR1790	R20	20	0.83	50
7100 R50	CR1791	R50	50	0.58	35
7100 R200	CR1792	R200	200	0.20	12
7100 R400	CR1972	R400	400	0.10	6

Order Part Number **955002** for Recalibration of your Linear Resistor, Contact HRI for Return Authorization Number (RAN)



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