



MAKERS OF RESPIRATORY VALVES SINCE 1938

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Data Sheet

RUDOLPH LINEAR PNEUMOTACHS

Series 8410, 8411 / 8300, 8311 / 3500, 4500 / 3719, 4719 / 3700, 4700 / 3830, 4830 / 3813, 4813

Product Description

The Hans Rudolph line of Pneumotachometers (PNT) are designed specifically for use as a bi-directional flow meter in a respiratory flow measurement system. A range of sizes are available that cover the flow ranges for infants through exercising adult athletes. Applications range from pulmonary function testing, exercise testing and respiratory research. The PNT design utilizes a proprietary precision screen assembly made of fine mesh stainless steel screens that generate a linear differential pressure signal that is proportional to the flow rate. A differential air pressure sensor is required to convert the PNT differential pressure to an electrical signal for flow and volume measurements. The PNT is available as heated for humid air flow measurements to eliminate moisture buildup on the screens that can affect the flow measurement process.

Product Features

- Nine PNT series covers flow ranges 0-10 thru 0-800 LPM
- Bi-Directional flow linearity
- All PNT available Heated or Non-Heated
- Convertible to Heated series in the field
- Heater Controls are switch selectable for all PNT series
- One and Two PNT adaptable Heater Controls
- Proportional Heater Control accurately regulates PNT Temperature
- Flow Calibration Certificate supplied with each PNT
- Re-Calibration and Rental services provided
- PNT Flow Instrumentation and Software available
- Reusable



Heated PNT with heater cable connected to a PNT Heater Control

Applicable Standards for medical tapered port connections: Hans Rudolph's 15mm, 22mm, & 30mm tapered port connections meet the ISO 5356-1:2015 (E) Standard for Conical Connectors, Cones and Sockets. Other non-standard tapered port connections 7.5mm & 10.5mm are also designed with same conical taper specifications.

General Information

Intended Use

Pneumotachometers (PNT) are designed for use as a component of a respiratory flow measurement system. The PNT converts the flow of air into a proportional linear differential pressure signal for input into a differential gas pressure sensor. The output from the pressure sensor is used for flow and volume measurements. The end user is required to assemble the additional instrumentation required to integrate the PNT into the flow system. PNT's are available in a wide range of sizes as specified by the physical size, port diameter connections, flow range and dead space volume. Heated PNT's are recommended when used in a humidified air flow circuit to eliminate moisture build up on the screens which can affect the flow measurement process. Heater controls are available for all PNT series. Applications range from pulmonary function testing, exercise testing and respiratory research. PNT's can be cleaned and disinfected for reuse. PNT's are NOT intended for long term continuous flow monitoring in a humidified ventilator breathing circuit. Moisture can occlude the screens. Never leave the PNT in the ventilator circuit unattended by qualified personnel.

Refer to instructions for USE 691199 and Service Manual 691038

shipped with the PNT and Heater Control for product cleaning, disinfection, operating instructions and maintenance. These products are packaged and shipped clean, non-sterile.

Cautions

1. Do not use this PNT in a humidified ventilator circuit for long term continuous flow monitoring
2. Never leave this PNT in a ventilator circuit unattended by qualified personnel
3. Do not ethylene oxide, steam sterilize or pasteurize these PNT's
4. Federal (USA) law restricts these devices to sale by or on the order of a physician

Warnings and Risks

Refer to the Instructions for Use 691199 & 691038 shipped with the product.

Ambient Conditions

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



Non Heated PNT's 4813, 8411, 4700, 4500

Specifications

PNT Series		Applications Recommendations	Volume Dead Space Range (ml)	Flow Rate Range (LPM)
Heated	Non Heated			
8410	8411	Premature ¹	1.06-1.30	0-10
8300	8311	Neonate ²	1.66-5.06	0-10
3500	4500	Infant ³	6.81-11.45	0-35
3719	4719	Pediatrics	18.15	0-100
3700	4700	Pediatrics	13.87-14.18	0-160
3830	4830	Adults	50.93-58.16	0-400
3813	4813	Adults	87.80	0-800

¹Less than 38 week Gestational ²Birth to One Month ³1-12 Months

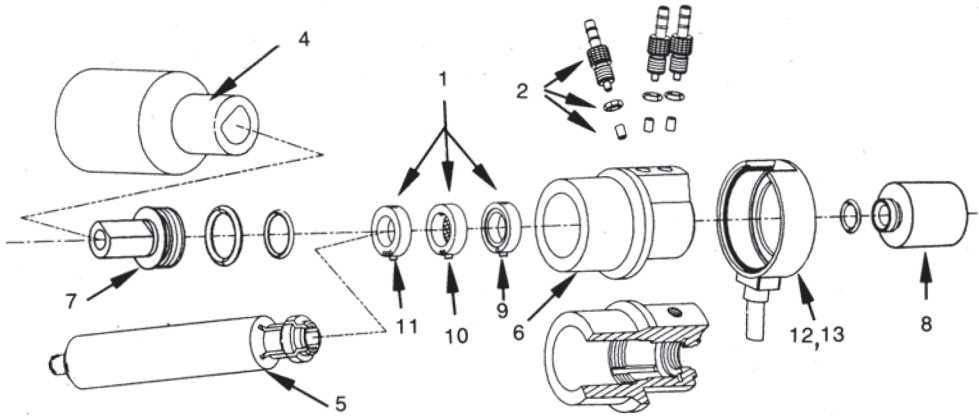
Volume Dead Space is the complete internal volume of the PNT assembly

This table lists PNT series with size selections solely as a guide to help specify the correct PNT for your application

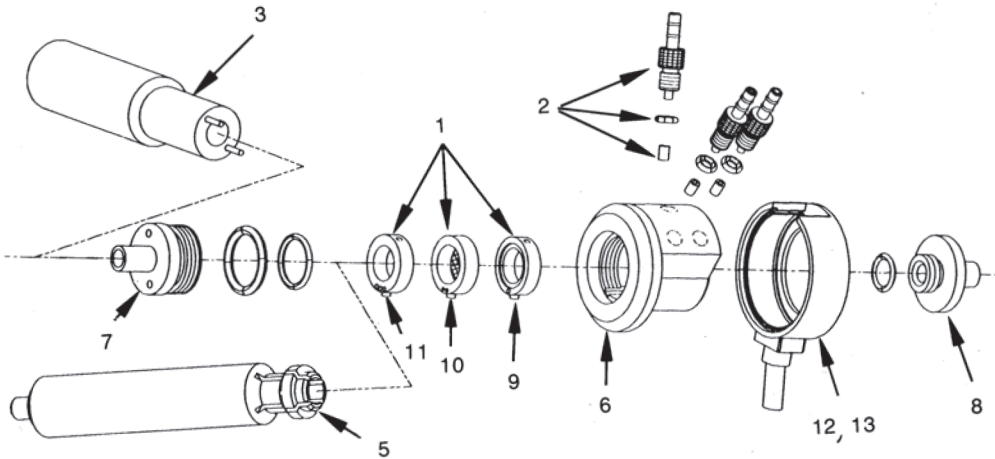
Product Features

- Drawings are illustrated with a Heated Shell. The Non-Heated Shell functions as a protective cover for the body. It is less an electrical cable & internal components for the heating circuits.
- Serial Number (SN) is required before HRI can supply these replacements.
- All Signal Pressure Tap locations are marked on the PNT body with a 1 or 2 for use in maintaining a relationship with the Pressure Transducer Taps. When flow is into the PNT at the #1 side, the #1 Tap will have a positive pressure signal & the #2 Tap will be negative. The reverse is the case if flow is into the #2 side.
- The series 8410, 8411 has a Mouth Pressure (MP) Hose Barb Type Port. This added feature allows MP sampling without adding critical dead space in these Ultra Low Dead Space Models. Adjacent to the port on the body are the letters MP for identification. The Port must be sealed or connected to a Pressure Transducer, which is a closed system, or it will make the PNT inoperable. A vinyl plastic plug is provided for sealing this port.

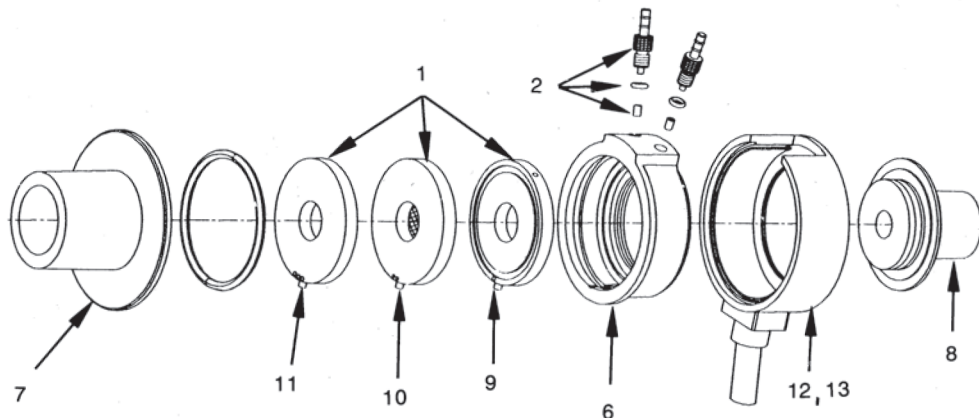
Assembly Group A Series: 8410/8411



Assembly Group B Series: 8410/8411



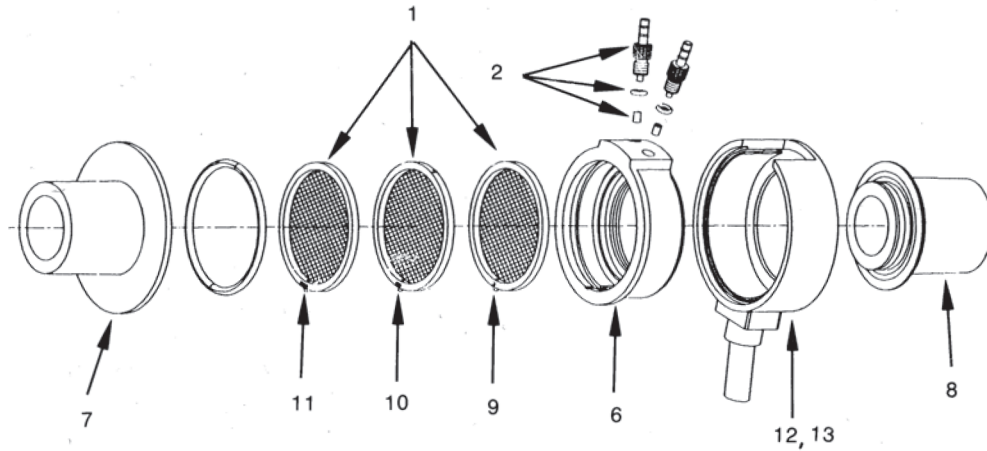
Assembly Group C Series: 8300/8311 and 3719/4719



Important - Assembly as shown, otherwise PNT will not function properly

EXPLODED ASSEMBLY DRAININGS (Continued)

Assembly Group D Series: 3700/4700 and 3500/4500



Assembly Group E Series: 3830/4830 and 3813/4813

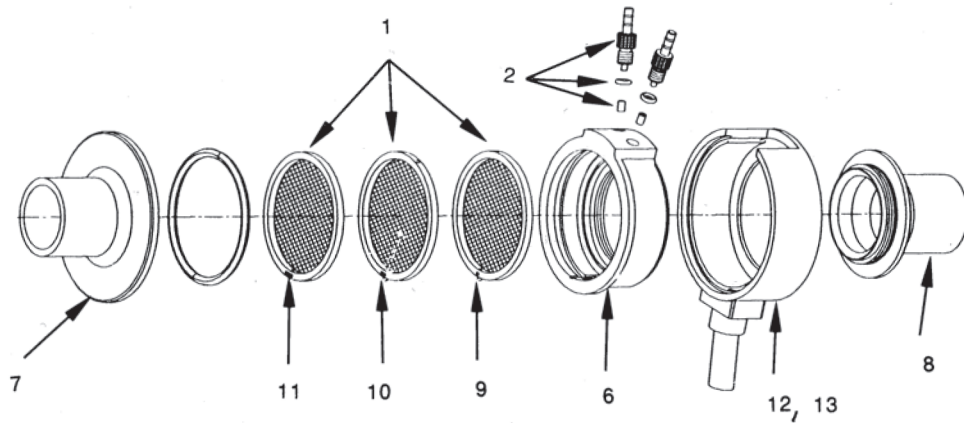
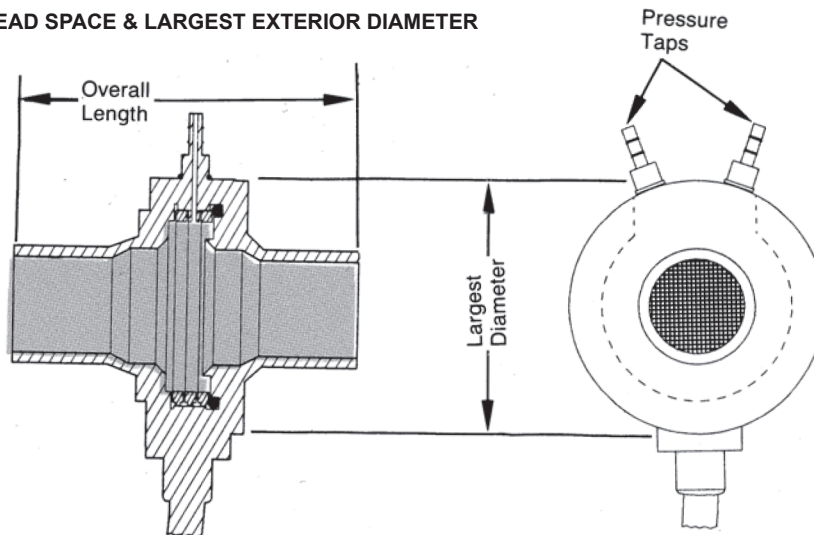


ILLUSTRATION OF VOLUME DEAD SPACE & LARGEST EXTERIOR DIAMETER



- The **Dead Space Volume**, as listed in Characteristics Tabulation, is the shaded portion measured between the extreme ends (Overall Length) of the Two Port Tubes.
- The **Largest Diameter** listed in Characteristics Tabulation is measured over the shell diameter, but it does not include the Pressure Taps which extend beyond this diameter.

Important - Assembly as shown, otherwise PNT will not function properly

TABULATION FOR EXPLODED ASSEMBLY DRAWING describes the models and components, replacement part numbers with material description, protective finish and appearance.

Materials	Item	** Req'd	Series	8410 / 8411		8300 / 8311			3500 / 4500			3700 / 4700			3830 / 4830			3813 / 4813		
				A	B	C	C	C	D	D	D	D	D	D	D	D	D	D	E	E
	N/A	N/A	Assembly Group in Exploded Drawings																	
D1, W1	††1	1	Screen Set Calibrated	200540	→	112212	→	112375	→	112213	→	112215	→	112885	→	112217				
C1, I1, V1	2	2.3	Pressure Tap Assembly (two/three required per PNT depending on series)	200527	→	200164								200165						
I1, V1	*N/A	1	O-Ring and Seal Set - Includes all O-Rings and Pressure Tap Tube Seals	200613	→	200612								200611						
Q1, W1	3	1	Spanner Wrench (Large & Small Flange Removal)	N/A	612293	200189	N/A													
Q1	4	1	Large Flange Removal Tool-D Shape Hole Design	612189	N/A															
Q1	5	1	Screen Extraction/Insertion Tool	612190	→	N/A														
C1, Q1	††6	1	PNT Body	612186	612185	611350								611346						
Q1	††7	1	Large Flange Side Port Tube	200530	200616	612172	611543	611537	611539	611515	611541	611538	530005	612259	612314	612316	530003			
Q1	††8	1	Small Flange Side Port Tube	200529	200617	612171	611540	611535	611535	611514	611540	611538	530001	612260	612313	612317	530002			
D1, Q1, W1	††9	1	#1 Position Spacer/Screen Assy.	281103	→	281074			281081	→	281098	→	281081	→	281091					
D1, W1	††10	1	#2 Position Screen Assy.	281104	→	281075			281085	→	281082	→	281081	→	281109	→	281092			
D1, Q1, W1	††11	1	#3 Position Spacer/Screen Assy.	281105	→	281076			281083	→	281099	→	281083	→	281093	→	281092			
Q1	12	1	Shell Non-Heated Heater Shell & Cable Assembly with Cable Connector for Heater Control Receptacle	612200	→	611460			611536	→	611459	→	611098	→	612261	→	611461			
Q1, V1	13	1	Recalibration at HRI. RAN required	112825	→	200550			200545	→	200548	→	200547	→	200598	→	200549			
	N/A	N/A		955028	→	955026			955025	→	955024	→	955023	→	955022	→	955021			

† Serial Number (SN) is required before Hans Rudolph, inc. can supply these replacements.

‡ Replacement available only at Hans Rudolph, inc. Return to Hans Rudolph, inc. for a quotation on replacement, repair or other services.

*O-Rings sold as set only.

**The Req'd column represents the quantity of each replacement part that is required to assemble a specific PNT. The required quantity will vary per each PNT.

NOTE: All replacement parts will be shipped with O-Rings assembled if the part requires O-Rings.

Material Description, Protective Finish and Appearance

A1 - Acetal Plastic (White & Black) B1-Acrylic Plastic (Clear) C1-Aluminum (Anodized Black), D1-Brass (Oxide Coated Brown and Electroless Nickel-Plated Silver) I1-Elastomer, Synthetic (Black, Light Blue, Gray) P1-Nylon Plastic (Transparent/ Yellow Tinted, White & Black) Q1-PET, Thermoplastic Polyester (White & Black) S1-Polycarbonate Plastic (clear & beige) V1-Silicone Rubber (Grey, Royal Blue, Medium Beige, Yellow, Red, White) W1-Stainless Steel (Passivated Natural).

ORDER INFORMATION

Pneumotach (PNT) Selection Information

Order Part Numbers (PN) as follows:

1. Non-Heated PNT
 - a. Non-Heated Flow Head Assembly [PN](#)
2. Heated PNT
 - a. Flow Head with Heater Shell Assembly [PN](#)
 - b. Heater Control [PN](#)
3. Converting Non-Heated PNT to Heated PNT
 - a. Heater Shell Assembly [PN](#)
 - b. Heater Control [PN](#)

COMPREHENSIVE LISTING

PNT Series Heated/Non-Heated	Calibrated Flow Range	Volume Dead Space
8430/8431	0-3 L/min (0-0.05 L/sec)	.39ml, .30ml
8420/8421	0-5 L/min (0-0.083 L/sec)	.71ml, .59ml
8410/8411	0-10 L/min (0-0.166 L/sec)	1.3ml, 1.06ml
8300/8311	0-10 L/min (0-0.166 L/sec)	1.66ml, 5.06ml, 2.65ml, 3.28ml
3500/4500	0-35 L/min (0-0.583 L/sec)	6.81ml, 8.74ml, 11.45ml
3719/4719	0-100 L/min (0-1.666 L/sec)	18.15ml
3700/4700	0-160 L/min (0-2.666 L/sec)	14.18ml, 13.87ml
3830/4830	0-400 L/min (0-6.666 L/sec)	50.93ml, 58.16ml
3813/4813	0-800 L/min (0-13.333 L/sec)	87.80ml

Non-Heated Pneumotach (PNT) Assemblies (15, 22 & 30 mm sizes are Medical Tapers per ISO 5356 10.5 & 7.5 mm sizes are also Tapered but not to any medical standard)		
Order Part Number	PNT Series	Port Tube Sizes (both ends)
112908	8431	.875" (22.2 mm) OD/15 mm ID 15 mm OD/.093" (2.4 mm) ID
112909		.154" (3.9 mm) OD/.093" (2.4 mm) ID (both ends)
112871	8421	.875" (22.2 mm) OD/15 mm ID 15 mm OD/.148" (3.76 mm) ID
112902		.205" (5.2 mm) OD/.148" (3.76 mm) ID (both ends)
112830	8411	.875" (22.2 mm) OD/15 mm ID 15 mm OD/.187" (4.8 mm) ID
112903		.250" (6.4 mm) OD/.187" (4.8 mm) ID (both ends)
112194	8311	.312" (7.9 mm) OD/.250" (6.4 mm) ID (both ends)
112357		22 mm OD/15 mm ID 15 mm OD
112358		15 mm OD/.250" (6.4 mm) ID (both ends)
112372		10.5 mm OD/7.5 mm ID (both ends)
112345	4500	15 mm OD/.375" (9.5 mm) ID (both ends)
112348		22 mm OD/15 mm ID 15 mm OD/.375" (9.5 mm) ID
112349		22 mm OD/15 mm ID (both ends)
112190	4719	22 mm OD/.750" (19 mm) ID (both ends)
112189	4700	22 mm OD/15 mm ID (both ends)
112805		22 mm OD/15 mm ID 15 mm OD/.520" (13.2 mm) ID
112866	4830	1.125" (28.6 mm) OD/.850" (21.6 mm) ID (both ends)
112917		30 mm OD/.850" (21.6 mm) ID 1.375" (35 mm) OD/30 mm
113058		1.375" (35 mm) OD/.850" (21.6 mm) ID (both ends)
112192	4813	1.375" (35 mm) OD/1.125" (28.6 mm) ID (both ends)

Heated Pneumatich (PNT) Assemblies
Include Flow Head & Heater Shell Assembly
(15, 22 & 30 mm sizes are Medical Tapers per ISO 5356
10.5 & 7.5 mm sizes are also Tapered but not to any medical standard)

Order Part Number	PNT Series	Port Tube Sizes (both ends)
112930	8430	.875" (22.2 mm) OD/15 mm ID 15 mm OD/.093" (2.4 mm) ID
112931		.154" (3.9 mm) OD/.093" (2.4 mm) ID (both ends)
112932	8420	.875" (22.2 mm) OD/15 mm ID 15 mm OD/.148" (3.76 mm) ID
112933		.205" (5.2 mm) OD/.148" (3.76 mm) ID (both ends)
112827	8410	.875" (22.2 mm) OD/15 mm ID 15 mm OD/.187" (4.8 mm) ID
112934		.250" (6.4 mm) OD/.187" (4.8 mm) ID (both ends)
112935	8300	.312" (7.9 mm) OD/.250" (6.4 mm) ID (both ends)
112936		22 mm OD/15 mm ID 15 mm OD
112937		15 mm OD/.250" (6.4 mm) ID (both ends)
112938		10.5 mm OD/7.5 mm ID (both ends)
112939		15 mm OD/.375" (9.5 mm) ID (both ends)
112940	3500	22 mm OD/15 mm ID 15 mm OD/.375" (9.5 mm) ID
112941		22 mm OD/15 mm ID (both ends)
112942	3719	22 mm OD/.750" (19 mm) ID (both ends)
112943	3700	22 mm OD/15 mm ID (both ends)
112944		22 mm OD/15 mm ID 15 mm OD/.520" (13.2 mm) ID
112945	3830	1.125" (28.6 mm) OD/.850" (21.6 mm) ID (both ends)
112946		30 mm OD/.850" (21.6 mm) ID 1.375" (35 mm) OD/30 mm
113120		1.375" (35 mm) OD/.850" (21.6 mm) ID (both ends)
112947	3813	1.375" (35 mm) OD/1.125" (28.6 mm) ID (both ends)

Heater Controller
Applicable for All Pneumatich (PNT) Series
One & Two PNT adaptable
USA 115V 60Hz & Foreign 230V 50Hz

Order Part Number	PNT Series	Heater Control Description
112467	3850	One PNT – USA 115V 60Hz
112587		One PNT – Foreign 230V 50Hz
112896		Two PNT – USA 115V 60Hz
112897		Two PNT – Foreign 230V 50Hz
112956		Upgrade – Convert One PNT Control to Two PNT Control USA or Foreign

Heater Shell Assembly Convert Non-Heated PNT to Heated PNT Cable end connector mates Heater Control panel connector	
Order Part Number	PNT Series
112920	8430
112874	8420
112825	8410
200550	8300
200545	3500
200548	3719
200547	3700
200598	3830
200549	3813

Replacement Parts ALL PNT Series Order Part Numbers							
Series Heated/ Non-Heated	Screen Set	Pressure Taps	O-Ring & Seals Set	Wrench "D" Hole Large Flange Removal	Spanner Wrench Small & Large Flange Removal	Screen Ex- traction Tool	Recalibration
8430/8431	112914	200527	200613	612189	612293	612251	955030
8420/8421	112875	200527	200613	612189	612293	612294	955029
8410/8411	200540	200527	200613	612189	612293	612190	955028
8300/8311	112212	200164	200612	NA	200189	NA	955026
3500/4500	112375	200164	200612	NA	NA	NA	955025
3719/4719	112213	200164	200612	NA	NA	NA	955024
3700/4700	112215	200164	200612	NA	NA	NA	955023
3830/4830	112885	200165	200611	NA	NA	NA	955022
3813/4813	112217	200165	200611	NA	NA	NA	955021

Replacement Parts Heater Controls	
Order Part Number	Description
870815	Fuse, 0.5A 250V – Two required
870303	Power Cord Set – USA – Hospital grade
870304	Power Cord – Foreign – No Power Plug
870013	Power Cord Set Australia 10A 250V
870014	Power Cord Set United Kingdom 10A 250V
870015	Power Cord Set Switzerland 10A 250V
870016	Power Cord Set Italy 10A 250V
870017	Power Cord Set European 15A 250V (Norway, Sweden, Finland, Belgium, Germany, Austria, Netherlands) & Saudi Arabia