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72-640-000 SPENCER

OPERATING MANUAL

MANOSTAT® VARISTALTIC® DISPENSERS AND PUMPS

NOTICE D'UTILISATION

DISTRIBUTEURS ET POMPES MANOSTAT® VARISTALTIC®

BEDIENUNGSANLEITUNG

MANOSTAT® VARISTALTIC® DOSIERGERÄTE UND PUMPEN

MANUAL DE OPERACIÓN

DISTRIBUIDORES Y BOMBAS MANOSTAT® VARISTALTIC®

Model Nos. ▪ Modèles n° ▪ Modellnummern
Números de modelo

KATE	**115V**	**72-620-000**
KATE	**230V**	**72-620-230**
SPENCER	**115V**	**72-640-000**
SPENCER	**230V**	**72-640-230**

ISO 9001 SUPPLIER CERTIFIED

manostat® **Division of Barnant Company**
28W092 Commercial Avenue, Barrington, IL U.S.A. 60010-2392
1-800-637-3739 (U.S. and Canada only) 847-381-7050 (Local) 11-847-381-7050 (outside U.S.)
847-381-7053 (Local Fax) 11-847-381-7053 (outside U.S.) e-mail: barnant@barnant.com www.barnant.com
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EU Declaration of Conformity

Name of Apparatus: Manostat® Variable Speed Peristaltic Pump

Model Numbers: 72-620-230 (Kate), 72-640-230 (Spencer)

Description of Apparatus: Variable speed peristaltic pump to pump fluids.

Barnant Company declares that the above models are in conformity to the following harmonized standards and directives:

Applicable Directives	Applicable Specifications	Manufacturer's Report Number
73/23/EEC 93/68/EEC	EN61010-1/A2:1995	TR9862
89/336/EEC 92/31/EEC 93/68/EEC	EN61326-1/A1:1998	TR9863

The last two digits of the year in which the current configuration of the above models were assessed per the Low Voltage Directive is: 00.

Manufacturer:

Barnant Company Division
Cole-Parmer Instrument Company
28W092 Commercial Avenue
Barrington, IL 60010-2392
USA
Tel: 847-381-7050

Manufacturer's Signature:

James W. Doll
Vice President, Engineering

15 August, 2000
Date

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SAFETY PRECAUTIONS

WARNINGS: ***Tubing breakage may result in fluid being sprayed from pump. Use appropriate measures to protect operator and equipment.***

Turn pump off before removing or installing tubing. Fingers or loose clothing could be caught in the pump mechanism.

Remove power from the pump before attempting any maintenance.

Remove power before any cleaning operation is started.

CAUTIONS: ***When changing flow direction, allow the pump to come to a complete stop before starting again. Failure to do so could cause permanent damage to the motor.***

Replace the fuse only with one of the same type and rating. The fuse rating and type are stated on the rear panel.

WARNING: PRODUCT USE LIMITATION

These products are not designed for, nor intended for use in patient connected applications; including, but not limited to medical and dental use, and accordingly have not been submitted for FDA approval.

SAFETY

1. Read instructions before operating the unit.
2. Observe safety precautions at all times, especially when pumping dangerous liquids. Always have the clear plastic cover properly mounted on the pump head and, in general, protect the pump area from accidental spillage of liquid.
3. If the pump runs unusually noisily or if bunching of the tubing in the pump can be observed, make sure the tubing is clamped down tightly and/or replace it with a new piece of tubing.
4. The Manostat Varistaltic dispensers and pumps should be well-grounded at all times.
5. The pump is equipped with a current-limiting circuit that will slow the motor down if any of the following conditions exist:
   a. Tubing that is too hard is loaded in the pump.
   b. Incorrect tubing size or wall thickness is loaded in the pump.
   c. Tubing is improperly loaded into the pump head.

Note: Use only MANOSTAT tubing.

6. The unit is fused and grounded to protect the operator in the event of short circuits that could be caused by liquid entering the case.

CAUTION: ***Replace the fuse only with one of the same type and rating. The fuse rating and type are stated on the rear panel.***

7. Pump should not be used in outdoor or hazardous locations.

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INTRODUCTION AND GENERAL DESCRIPTION

The Manostat Varistaltic dispensers and pumps provide dispensing or continuous pumping of fluids while power is supplied.

The speed range for the KATE and SPENCER pumps is 24–720 rpm. 115 V pumps are UL and cUL listed. 230 V pumps are CE certified.

Model No.	Description
72-620-000	KATE, Analog Dispenser, 115 V
72-620-230	KATE, Analog Dispenser, 230 V
72-640-000	SPENCER, Analog Dispenser, 115 V
72-640-230	SPENCER, Analog Dispenser, 230 V

CONTROLS, INDICATORS AND CONNECTORS

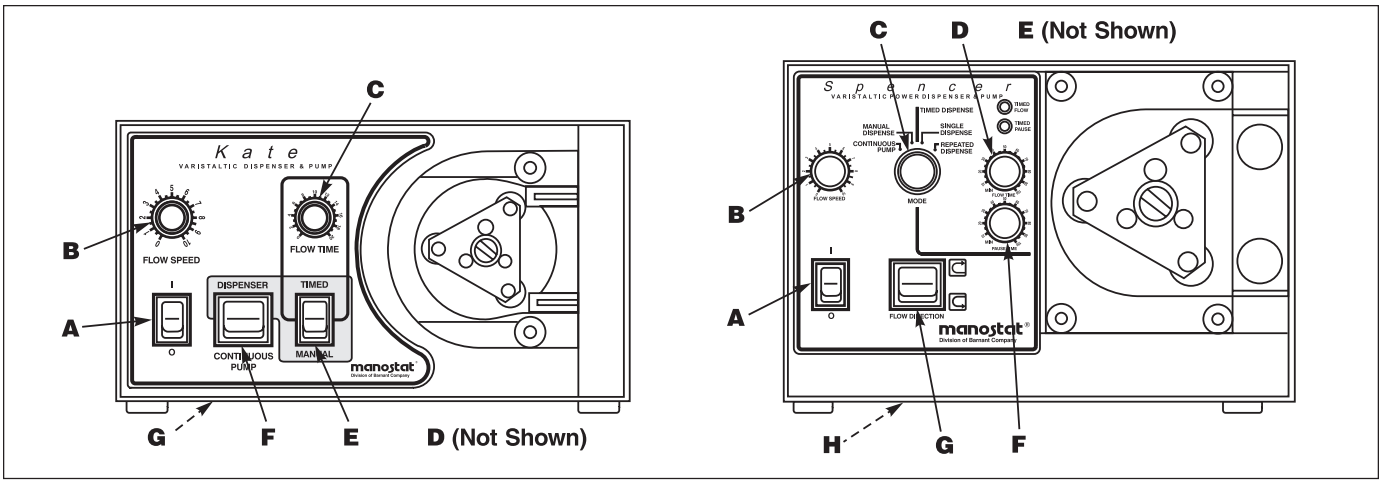


Figure 1.

KATE CONTROLS

A. POWER (ON/OFF) SWITCH: Turns the unit ON or OFF. Glows green when power is ON.

B. FLOW SPEED CONTROL KNOB: Sets the speed of the pump. The higher the number on the dial, the faster the speed of the pump.

C. FLOW TIME CONTROL KNOB: Sets the time needed to dispense aliquot from 2 to 20 seconds.

D. FRONT PANEL/REMOTE SWITCH: Sets operation from either the front panel controls or remote operation.

E. MANUAL/TIMED DISPENSE SWITCH: Sets the dispensing mode when dispenser handle or footswitch is depressed.

F. MODE SWITCH: DISPENSER/CONTINUOUS PUMP: Sets the unit for Dispensing or Pumping.

G. RUN STATUS JACK: Located on the rear panel of the units. The jack contacts are rated for 24 volts at 1 amp. These contacts can operate remote relays to start or stop other equipment being utilized in conjunction with the dispensers. Pump contacts are normally open when the pump is not running and closed when the pump is running. A 3.5 mm stereo plug (Part No. B-3968, not included with the pump) can be ordered for easy access to the pump status jack contacts.

SPENCER CONTROLS

A. POWER (ON/OFF) SWITCH: Turns the unit ON or OFF. Glows green when power is ON.

B. FLOW SPEED CONTROL KNOB: Sets the speed of the pump. The higher the number on the dial, the faster the speed of the pump.

C. MODE SET KNOB: Sets one of four modes of operation: Continuous Pump, Manual Dispense, Timed Dispense, Dispense Cycle.

D. FLOW TIME CONTROL KNOB: Sets the time needed to dispense aliquot from 2 to 20 seconds.

E. FRONT PANEL/REMOTE SWITCH: Sets operation from either the front panel controls or remote operation.

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F. PAUSE TIME KNOB: Sets the delay interval from 1 to 10 seconds between dispensing cycles.

G. FLOW DIRECTION SWITCH: Sets the direction of the rotation of the pump Clockwise/Off/Counterclockwise.

H. RUN STATUS JACK: Located on the rear panel of the units. The jack contacts are rated for 24 volts at 1 amp. These contacts can operate remote relays to start or stop other equipment being utilized in conjunction with the dispensers. Pump contacts are normally open when the pump is not running and are closed when the pump is running. A 3.5 mm stereo plug (Part No. B-3968, not included with the pump) can be ordered for easy access to the pump status jack contacts.

NOTE: The signal common for the speed control voltage and current inputs is referenced to earth ground.

SETUP

Unpack the pump and retain all packing material until proper product operation has been verified. Select the tubing according to the flow desired, while considering chemical compatibility and tubing life. Refer to the Chemical Resistance Chart provided (part number A-1299-5030) to select appropriate type of tubing for the liquid in use.

TUBING SIZE SELECTION

Flow rate and dispensing volumes are determined by the size of the tubing in the pump head. When tubing links are used, best performance will be achieved when input and output tubing connected to the link are the same ID as the link. **All tubing inside the pump head must be surface-printed Manostat tubing.**

KATE and SPENCER pumps accept tubing ID sizes of 1/32 in. to 5/16 in. For best results, select a tubing size with a mid-range at the desired flow rate to be pumped. The table below gives an average of flow rates measured with water at standard pressure and temperature. No lift or discharge pressure is represented.

TUBING SELECTION CHART

KATE Pumps (mL/min)		SPENCER Pumps (mL/min)
Silicone Tubing Size		
1–37	1/32 in ID (13)*	2–40
6–170	1/16 in ID (14)*	11–29
25–700	1/8 in ID (16)	44–1200
57–1700	3/16 in ID (25)	93–2490
91–2650	1/4 in ID (17)	170–4200
137–3475	5/16 in ID (18)	246–4950
PharMed® Tubing Size		
1–40	1/32 in ID (13)*	2–77
8–210	1/16 in ID (14)*	13–350
28–780	1/8 in ID (16)	46–1250
60–1740	3/16 in ID (25)	103–2800
96–2600	1/4 in ID (17)	168–4200
121–3400	5/16 in ID (18)	245–5500
TYGON® Tubing Size		
1–25	1/32 in ID (13)*	2–55
6–185	1/16 in ID (14)*	9–320
25–770	1/8 in ID (16)	45–1250
60–1720	3/16 in ID (25)	105–2850
96–2800	1/4 in ID (17)	174–4800
120–3500	5/16 in ID (18)	236–5400

*Requires tubing links.

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DISPENSING VOLUME TUBING REQUIREMENTS

The table below gives an average range of volumes dispensed, measured with water at standard pressure and temperature using silicone tubing.

Silicone Tubing Size	Volume Dispensed	
	KATE	SPENCER
1/32 in ID Tubing*	0.5–12 mL/cycle	0.5–25 mL/cycle
1/16 in ID Tubing*	1.0–35 mL/cycle	1.0–95 mL/cycle
1/8 in ID Tubing	3.5–190 mL/cycle	2.5–320 mL/cycle
3/16 in ID Tubing	14–420 mL/cycle	9–800 mL/cycle
1/4 in ID Tubing	18–710 mL/cycle	13–1250 mL/cycle
5/16 in ID Tubing	35–1070 mL/cycle	20–1700 mL/cycle

*Requires tubing links.

INSERTING TUBING

1. Make sure that the power switch is turned OFF.
2. Remove the clear plastic cover from the pump head.
3. **For Tubing Links:** Attach input and output ends of the transfer tubing to the connectors of the tubing link. Insert the tubing link so that the tie wraps or the flanges of the link are as close as possible to the outside of the pump head. Manually rotate the roller assembly and guide the tubing between the rollers and the pump head wall.

   For Tubing: Insert tubing between the rollers and the pump head housing in the center of the channel (i.e., midway between the clear plastic pump head cover and the pump head housing bottom). This ensures that the rollers depress the entire width of the tubing as they turn. Manually rotate the roller assembly and guide the tubing between the rollers and the pump head wall. When using tubing (not links), there should be a small but visible gap between the tubing and the pump head housing for about 1/3 to 1/2 of the contact surface at any time. Pull gently on the input and output sides of the tubing to create a gap between the tubing and the curved pump head housing wall.
4. Replace the clear plastic cover over the pump head, being sure to tighten down the thumb nuts to prevent the tubing from moving during operation.

   KATE: The pump head cover is reversible with different size tubing retainers on each face. If the tubing is smaller than 3/16 in. ID, place the cover so that the larger tubing retainers hold the tubing. If the tubing is 3/16 in. (Size 25) or larger, reverse the cover.

   SPENCER: Adjust the two screws on the retainer clamp to hold the tubing in place after attaching the clear plastic cover to the pump head. If the tubing is smaller than 3/16 in. ID (Size 25) and a tubing link is not used, cover the tubing at the clamping points with a small section of a larger tubing to increase the grip to prevent the tubing from creeping in the pump head or, use a tubing connector on the input of the pump head.

FOR OPTIMUM TUBING LIFE

Periodically move the tubing so that a different segment is in the pump head, or change the tubing link. This will avoid excessive tubing wear at any specific point. Always move the worn tubing to the suction side of the pump.

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OPERATION

USING THE DISPENSER HANDLE (OR FOOTSWITCH)

1. Insert the output end of the tubing coming from the pump head through the glass holder of the dispenser handle. Wetting the tip of the tubing will facilitate insertion.
2. Insert a dispensing tip into the end of the tubing. This step will improve accuracy by reducing dripping (See **Accessories**).
3. Plug the dispenser handle electrical cord into the socket (DB-9) on the rear of the unit. (If a footswitch is being used instead of the dispenser handle, plug the footswitch cord into the same socket.)
4. Check the rear panel label for proper position of the “Front Panel/ Remote” switch.

PRIMING TUBING AND CONTINUOUS PUMPING MODE

1. Insert appropriate size tubing into pump head and set up with dispenser handle or footswitch. (To select tubing size, see **Tubing Size Selection**.)
2. Insert both intake and output ends of tubing in reservoir to prime.
3. Adjust flow speed control knob to a setting of ‘1’.
4. Set Mode Switch or Knob to “Continuous Pump”.
5. Turn power switch to ON.
6. Turn Flow Speed Control Knob clockwise to start the pumping action. The higher the number selected, the faster the speed of the pump.

Prime new tubing for at least 5 minutes to achieve a stable flow condition.

CALIBRATION PROCEDURE AND MANUAL DISPENSING OPERATION

Refer to **Dispensing Volume Tubing Requirements** to select appropriate size tubing. Insert tubing into the pump head.

Prime tubing with liquid (See **Priming Tubing and Continuous Pumping Mode** section above).

Materials needed: Graduated cylinder (or other measuring device), timing device or watch with second hand.

1. **For KATE:** Set the Mode Switch to “DISPENSER” and the Manual/Timed Dispense Switch to “MANUAL”. **For SPENCER:** Set the Mode Switch to “MANUAL DISPENSE”.
2. Set Flow Speed control knob to ‘1’.
3. Set power switch to ON.
4. To begin pumping action, depress the button on the dispenser handle (or footswitch) and hold. Increase flow speed knob (clockwise) to adjust to a desired flow. When desired flow is achieved or desired volume is reached, release the button or footswitch to stop pumping action.
5. **For Calibrating:** Place the outlet tubing into the graduated cylinder. Depress the button on the dispenser handle (or footswitch) and time how long it takes to reach the desired volume. As soon as the volume is reached, release the button and note the time it took to dispense in seconds.

CALIBRATION CHECK AND TIMED DISPENSING OPERATION

Refer to **Dispensing Volume Tubing Requirements** to select the appropriate size tubing and insert into pump head.

Prime tubing with liquid (See **Priming Tubing and Continuous Pumping Mode**).

Material needed: Graduated cylinder (or other measuring device).

1. Set Flow Speed Control Knob to ‘1’.
2. Set Power Switch to ON.
3. Set Mode Switch to “Continuous Pump”.
4. Increase Flow Speed Knob (clockwise) to begin pumping action. Adjust to desired flow or set to the flow that was used in the **Calibration Procedure and Manual Dispensing Operation**.
5. **For KATE:** Set the Dispenser/Continuous Pump switch to “DISPENSER” and the Manual/Timed Switch to “TIMED”. **For SPENCER:** Set the Mode Switch to “SINGLE DISPENSE”.

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6. Set the Dispense Time Knob to desired time or to the time that it took to dispense in **Calibration Procedure and Manual Dispensing Operation**. At 100% maximum setting, approximately 20 seconds of pump time will result.
7. Place inlet tubing into liquid source and place output end of tubing in graduated volumetric vessel. You will be dispensing into the graduated cylinder to measure fluid output.
8. Press and release the button on the dispenser handle (or footswitch) to activate dispensing cycle (See **Using the Dispenser Handle (or Footswitch)**). The unit will dispense for the set time and stop.
9. If the volume delivered is less than the desired volume, increase the Dispense Time Knob setting or the Flow Speed Knob setting. If the volume delivered is more than the desired volume, decrease the Dispense Time Knob setting or the Flow Speed setting. Repeat steps 8 and 9 until desired volume is reached.

NOTE: If the unit does not dispense the desired volume within the desired time setting, check **Dispensing Volume Tubing Requirements** to choose a larger size tubing.

DISPENSING CYCLE—SPENCER ONLY

Unit dispenses doses on an automatic continuous cycle.

1. Follow procedure for **Timed Dispensing Operation** to set volume to be dispensed.
2. Set the Mode Set Knob to “DISPENSE CYCLE”.
3. Adjust Pause Time Knob to set the delay time between dispense cycles from 1 to 10 seconds.
4. Press the button on the dispenser handle (or depress footswitch) to initiate the dispensing cycles. The unit will dispense for the set time, pause for the preset delay time, then continue to cycle.
5. To stop the cycle, switch the Mode Set Knob to “Timed Dispense” and the unit will cycle one more time, then stop. To stop the cycle immediately, switch power to OFF.

REMOTE OPERATION

DESCRIPTION

The pumps can be controlled by external signals connected at the rear panel 9-pin “D” shell connector. The Remote inputs permit control of the pump by remote equipment or accessories. Figure 2 shows the signal locations of the connector.

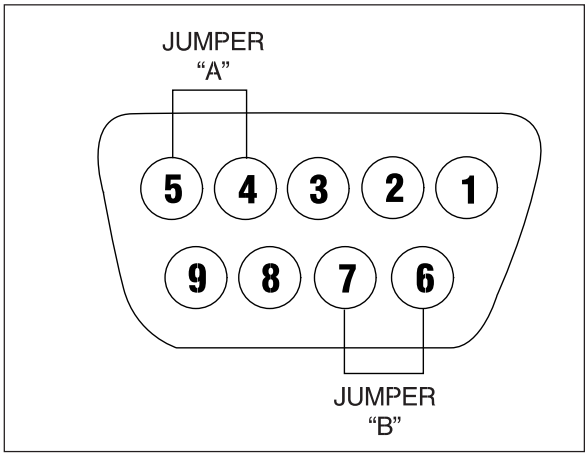


Figure 2. DB9 Pin Configuration with Wiring Scheme

Pin No.	Description
1	Speed Control Voltage Input (2–10V) (+) input
2	Speed Control Current Input (4–20 mA) (+) input
3	Speed Control Input Reference Common
4	Remote/Local Speed (+) Control
5	Remote/Local Reference Speed (–) Return
6	Start/Stop Reference (–) Return
7	Start/Stop (+) Control
8	Chassis (Earth) Ground
9	Chassis (Earth) Ground

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REMOTE INPUTS

The FRONT PANEL/REMOTE switch enables remote functions. Switching to FRONT PANEL disables the remote functions, allowing the front panel controls to operate the pump.

When the FRONT PANEL/REMOTE switch is in the REMOTE position, starting and stopping the pump is controlled by an external contact closure between pins 6 and 7 (Jumper B), and the pump speed is determined by an externally supplied 2–10V or 4–20 mA source. Connection must be made between pins 6 and 7 and a control voltage greater than 2V or a control current greater than 4 mA must be applied for the pump to run.

If setting the speed from the front panel is desired with remote Start/Stop contact operation, the FRONT PANEL/ REMOTE must again be in the REMOTE position. In addition, Jumper A should be in place. Jumper A connects pin 5 of the “D” shell connector (REMOTE/LOCAL SPEED) to pin 6 (RETURN). Start/Stop will then be controlled from the rear panel (Jumper B), and the pump speed will be controlled from the front panel. The accessory Footswitch (73-750-000) and Dispenser Wand (73-055-590) are connected internally in this way.

Figure 3 shows four typical wiring configurations: 2–10V follower, 4–20 mA follower, accessory dispenser wand (or footswitch), and full front panel control.

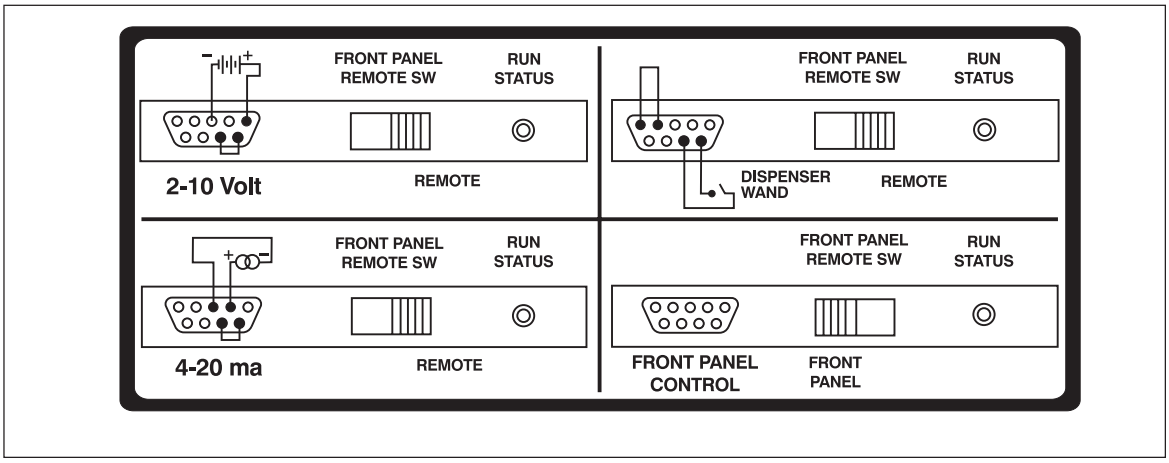


Figure 3. Back Panel Connectors

NOTE: The signal common for the speed control voltage and current inputs is referenced to earth ground.

The table **Operation Summary for the Feature Inputs** summarizes the remote input operation.

Operation Summary for the Feature Inputs					
Rear Panel Mode Select Switch		**Shorting Jumper or Contact Closure**		**Functions Activated**	
Front Panel	**Remote**	**Jumper “A” (Pins 4 to 5)**	**Jumper “B” (Pins 6 to 7)**	**Speed**	**Stop/Start**
On	Off	X	X	Front Panel Control Only	
Off	On	In	In	Front Panel	Remote Start
Off	On	In	Out	Front Panel	Remote Stop
Off	On	Out	In	Remote	Remote Start
Off	On	Out	Out	Remote	Remote Stop

KEY: X = N/A
Off = Not selected
On = Selected

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The START/STOP (pin 7) input and REMOTE/LOCAL SPEED (pin 4) input are digital inputs. They are internally pulled up to +15V with respect to logic common (RETURNS). They can alternately be driven with open collector logic. For increased noise immunity, use of contact closures is recommended.

RUN STATUS JACK

The RUN STATUS jack is located on the back panel next to the FRONT PANEL/REMOTE switch. The jack provides a normally open relay contact rated for 24V at 1 A that closes whenever the pump is running. The contacts are made between the tip and first barrel of the jack. The outermost contact of the jack is grounded. A mating 3.5 mm stereo plug (part No. B-3968, not included with the pump) can be ordered for access to the RUN STATUS contacts.

MAINTENANCE

WARNING: Remove power from the pump before attempting any maintenance.



The speed control circuit has solid-state components that do not require service. An excessive load on the system may, however, cause the fuse to blow. An indication of this would be that the switch does not light with power applied to the pump and the ON-OFF switch is in the ON position. If this condition occurs, remove power from the unit and remove the fuse from the fuse holder located on the rear of the pump. Replace the fuse with a fuse of the same type and rating. This information is printed on the rear of the unit.

CAUTION: Replace the fuse only with one of the same type and rating. The fuse rating and type are stated on the rear panel.



Motor life depends on duty cycle and operating speed. Brushes should be inspected every six months or 2000 hours, whichever occurs first. Replace when less than 7.6 mm (0.300 in) long.

These models are equipped with a toothed-belt that should be inspected for belt wear at the same interval as the brushes. The presence of some belt dust at or inside the pump is normal and has no effect on the operation of the pump. If the belt is slipping, adjust the tension by loosening the motor nuts that secure it to the motor bracket and swing the motor away from the PC board. Once adjusted, tighten the nut. Do not over-tighten the belt, as this will cause excessive drive belt wear, bearing wear and noise. Replace the belt if frayed or torn. (See **Replacement Parts**.)

CLEANING

WARNING: Remove power before any cleaning operation is started.



Keep the pump enclosure clean by using a mild detergent solution. Never immerse nor use excessive fluid when cleaning the pump.

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REPLACEMENT PARTS

Description	Part Number	Qty.
Motor brushes	A-4343-CR	2
Brush Cap	A-3190-CR	1
Motor 90 V Assembly	D-3080-0001	1
Motor 180 V Assembly	D-3080-0002	1
Pump Pulley	B-3901	1
Motor Pulley	A-3166	1
Drive Belt for KATE	A-1341-0005	1
Drive Belt for SPENCER	A-1341-0006	1
Rubber Foot	A-1390-0004	1
Knob (for speed, flow and pause time)	91-126-030	1
Fan (plastic)	B-1247-0027	1
Fan (metal)	B-1247-0032	1
Fuse (115 V) (T3.15A, 250V, 5 × 20 mm)	B-1115-0057	1
Fuse (230 V) (T1.6A, 250V, 5 × 20 mm)	B-1115-0042	1
Pump Head Cover (KATE)	91-055-075	1
Pump Head Cover (SPENCER)	91-065-110	1
Knob (pump cover)	B-1083-0063	1
Tubing Clamp (SPENCER)	91-065-130	1
Line Cord 115 V	B-3115	1
Line Cord 230 V (Euro)	B-2938	1
Stereo 1/8 in. Plug	B-3968	1

ACCESSORIES

Tubing Links	KATE	SPENCER
1/32 in. Tubing Link—NORPRENE, pk of 5	72-305-135	75-305-135
1/16 in. Tubing Link—NORPRENE, pk of 5	72-305-145	75-305-145
1/8 in. Tubing Link—NORPRENE, pk of 5	72-305-165	75-305-165
3/16 in. Tubing Link—NORPRENE, pk of 5	72-305-255	75-305-255
1/4 in. Tubing Link—NORPRENE, pk of 5	72-305-175	75-305-175
1/32 in. Tubing Link—PharMed, pk of 5	72-301-135	75-301-135
1/16 in. Tubing Link—PharMed, pk of 5	72-301-145	75-301-145
1/8 in. Tubing Link—PharMed, pk of 5	72-301-165	75-301-165
3/16 in. Tubing Link—PharMed, pk of 5	72-301-255	75-301-255
1/4 in. Tubing Link—PharMed , pk of 5	72-301-175	75-301-175
1/32 in. Tubing Link—Silicone, pk of 5	72-300-135	75-300-135
1/16 in. Tubing Link—Silicone, pk of 5	72-300-145	75-300-145
1/8 in. Tubing Link—Silicone, pk of 5	72-300-165	75-300-165
3/16 in. Tubing Link—Silicone, pk of 5	72-300-255	75-300-255
1/4 in. Tubing Link—Silicone, pk of 5	72-300-175	75-300-175

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ACCESSORIES (Continued)

Tubing Links	**KATE**	**SPENCER**
1/32 in. Tubing Link—TYGON, pk of 5	72-310-135	75-310-135
1/16 in. Tubing Link—TYGON, pk of 5	72-310-145	75-310-145
1/8 in. Tubing Link—TYGON, pk of 5	72-310-165	75-310-165
3/16 in. Tubing Link—TYGON, pk of 5	72-310-255	75-310-255
1/4 in. Tubing Link—TYGON, pk of 5	72-310-175	75-310-175

PTFE Sinkers — keep intake tube at bottom of reservoir	
Small (1/16 in. to 1/8 in. ID tubing); Large (3/16 in. to 5/16 in.)	
Sinkers set of 2 (one each size)	75-250-100
Sinkers 1/16 in.–1/8 in. ea.	75-250-102
Sinkers 3/16 in.–1/4 in. ea.	75-250-104
Pump Status Plug Assembly	B-3968
Footswitch (115 V or 230 V)	73-750-000
Dispenser Wand (115 V or 230 V)	73-055-590
Autoclavable Dispensing Tips	
Glass tip w/Luer Lock for 3/16 in. and 1/4 in. ID tubing	72-648-000
Polypropylene tip w/Luer Lock for 1/16 in. and 1/8 in. ID tubing	72-648-020
Autoclavable Stainless Steel Cannulae for use with Luer Lock Dispensing tip:	
Cannula 16 Gauge	91-015-210
Cannula 13 Gauge	91-015-220

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SPECIFICATIONS

Output:	
Speed	24–720 rpm
Torque	120 in-oz (8,6 kg•cm)
Input:	
Operating Voltage/Frequency:	
Models 72-620-000, 72-640-000	100–130 VAC, 60 Hz, 2.1 A
Models 72-620-230, 72-640-230	190–250 VAC, 50 Hz, 1.3 A
Start/Stop—Local Control:	
	Input Voltage:
Function Disable	15 VDC Typ.
Function Enable:	0.8 VDC Max.
	Input Current:
Function Disable:	100 µA Max. leakage
Function Enable:	1.5mA Max.
Installation Category:	Installation category II per IEC 664 (local level—appliances, portable equipment, etc.)
Environment:	
Operating Temperature:	32 to 104°F (0 to 40°C)
Storage Temperature:	–49 to 149°F (–45 to 65°C)
Humidity:	10% to 90% non-condensing
Altitude:	Less than 6562 ft (2000 m)
Pollution Degree:	Pollution degree 2 per IEC 664 (indoor use — lab, office)
Construction:	
Dimensions (L × W × H):	
Models 72-620-000 72-620-230	12 in × 9 in × 6 in (30.5 cm × 22.9 cm × 15.2 cm)
Models 72-640-000 72-640-230	12 in × 10 in × 7 in (30.5 cm × 25.4 cm × 17.8 cm)
Weight:	
Models 72-620-000 72-620-230	14.9 lbs (6.8 kg)
Models 72-640-000 72-640-230	17.4 lbs (7.9 kg)
Color:	Black
Material:	Painted steel housing
Enclosure Rating:	IP22 per IEC 529
Compliance:	115V: UL508, CSA C22.2, No. 14-M91 230V (For CE Mark): EN61010-1/A2: 1995 (EU Low Voltage Directive) and EN61326-1/A1: 1998 (EU EMC Directive)

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WARRANTY

Use only MANOSTAT precision tubing with MANOSTAT pumps to ensure optimum performance. Use of other tubing may void applicable warranties.

The Manufacturer warrants this product to be free from significant deviations from published specifications. If repair or adjustment is necessary within the warranty period, the problem will be corrected at no charge if it is not due to misuse or abuse on your part, as determined by the manufacturer. Repair costs outside the warranty period, or those resulting from product misuse or abuse, may be invoiced to you.

The warranty period for this product is noted on the Warranty Card.

PRODUCT RETURN

To limit charges and delays, contact the seller or Manufacturer for authorization and shipping instructions before returning the product, either within or outside of the warranty period. When returning the product, please state the reason for the return. For your protection, pack the product carefully and insure it against possible damage or loss. Any damages resulting from improper packaging are your responsibility.

TECHNICAL ASSISTANCE

If you have any questions about the use of this product, contact the Manufacturer or authorized seller.

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