OPERATING MANUAL

MICROPUMP® GEAR PUMP DRIVES

PART NOS.
83721 (115V AC)
83722 (230V AC)

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**NOTE:** A copy of this manual can be found at www.micropump.com.

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SAFETY SYMBOLS

The following safety definitions are used throughout this manual to indicate procedures which, if not followed correctly, may result in injury to personnel or damage to equipment.

⚠️ **DANGER**—This word and symbol are used in safety measures for hazards that are immediately accessible and capable of causing severe personal injury or death.

⚠️ **WARNINGS** are used to alert the reader to a procedure or practice which, if not followed correctly, could result in personal injury.

⚠️ **CAUTIONS** are used to alert the reader to a procedure or practice which, if not followed correctly, could result in damage to the gear pump or ancillary equipment.

☞ **NOTES** are used to highlight important information that may assist the reader in carrying out a procedure or in understanding the text.

SAFETY INSTRUCTIONS

LIMITS OF USE

To achieve optimum performance and safe operation, Micropump Gear Pump Drives and their associated gear pumps must be operated within the limits given in the SPECIFICATIONS Section. Operation outside these limits may result in personal injury, system failure, or damage to the gear pump and/or ancillary equipment.

**WARNING:** High-pressure Fluid Ejection. To prevent any risk of high-pressure fluid, it is essential that the pump never be operated outside the limits specified in its Technical Specification Table. Providing the pump is operated within the safety limits, the sealing system will prevent high-pressure fluid ejection.

**WARNING:** High Temperature. Avoid direct skin contact with the pump head when operating at high temperatures. Blistering of exposed skin may result.

**WARNING:** Explosion. Gear Pump Drives are not designed for use in potentially explosive atmospheres. Consult your Micropump distributor or applications engineer when pumping flammable or combustible fluids.

**CAUTION:** Dust and Airborne Contamination. Pump performance is not affected by dust and airborne contamination providing the installation instructions are followed.

**CAUTION:** Corrosive Liquids. The materials of construction for the pump head are specified by the pump product code (refer to the Manual provided with the Gear Pump) and must be evaluated for compatibility with the fluid to be pumped. Any incompatibility may produce leak paths around the sealing surfaces of the pump. The pump should be inspected for leaks on a regular basis and corrective action taken immediately if a leak is suspected. Consult your Micropump distributor or applications engineer for advice when pumping corrosive liquids.

**CAUTION:** Flooding and Water Immersion. The Gear Pump Drive is rated to Protection Class IP55 and is not designed to operate immersed in water. Permanent damage to the pump drive and its associated pump may result.

**CAUTION:** Condensation. When pumping liquids that are colder than the air surrounding the pump, ensure that any condensation produced on the external surface of the magnet cup is not allowed to accumulate or freeze on the pump and/or pump drive. Accumulated condensation can restrict the pump rotation or enter the drive motor, resulting in motor seizure.
IMPORTANT SAFETY INFORMATION
To ensure safe operation of the pump drive and its associated gear pump, the following safety procedures must be observed.

DANGERS: High voltages exist and are accessible in the Modular Drive. Use extreme caution when servicing internal components.

Modular Drive Systems are not customer serviceable, except for replacement of FUSES and MOTOR BRUSHES.

High voltages exist and are accessible in the Modular Drive. Refer servicing to qualified personnel.

WARNINGS: Always observe the statutory safety and accident prevention regulations when operating the pump.

In the case of hazardous materials, it is imperative to observe all the regulations set out in the material safety data sheets. Keep all safety data sheets where they are readily accessible to anyone operating the pump.

When operating the pump, always wear appropriate personal protective equipment such as safety goggles.

Extreme care is called for when pumping flammable material. Observe the material safety data sheets.

Unplug Controller prior to checking or replacing FUSES and/or MOTOR BRUSHES.

CAUTIONS: Before connecting the pump drive to the mains, make sure the power supply matches the requirements specified on the data plate.

Always set the pump drive “ON/OFF” switch to the “OFF” position when the appliance is not in use, and before connecting or disconnecting it from the mains power supply.

Always make sure the pump drive is set up on a firm base that is capable of supporting the combined weight of the drive and the pump head.

Power must be turned off before connecting the external remote control cable to prevent damage to the drive.

NOTES: Always read the operating instructions carefully and ensure that everyone who operates the appliance has read the instructions before use.

Keep the operating instructions in a place that is accessible to everyone.
INTRODUCTION

Your Gear Pump Drive
Represents years of fluid-handling experience, and we feel it is the finest product available of its type. The Modular Drive controls the speed of MICROPUMP Gear Pump Heads to provide flow rates from 1 to 4210 mL/min.

The Pump you have purchased with the Drive was designed and constructed to handle compatible, clean fluids within designated limits and conditions. Staying within performance limits as identified in the Technical Specification Table, and following the guidelines given in this manual and the applicable pump manual will result in excellent performance and maximum pump life.

Should you have a question or a problem, technical assistance is available through a global network of distributors, factory engineers and field sales personnel. Micropump products are designed for easy field servicing with service kits and technical support available for all products.

The Purpose of This Manual
Is to provide information to enable suitably qualified technicians and fitters to install, operate and maintain Micropump Gear Pump Drives.

How to Use This Manual
You have purchased either a Pump and the Gear Pump Drive as a complete unit, or the Pump and Gear Pump Drive as two separate units. This manual contains specific information for Gear Pump Drives. When installing or operating gear pump/motor combinations, the instructions given in this manual must be read in conjunction with the instructions provided with the gear pump.

List of Abbreviations
The following abbreviations are used in this guide:

CAL  Calibration
LED  Light Emitting Diode
MAX  Maximum
MIN  Minimum
RPM  Revolutions per Minute
VOL  Volume
CONTROL/DISPLAY FUNCTIONS

Press buttons to activate function.

Use up/down (▲, ▼) arrows to correct/change a flashing display.

Press STOP/START to enter new values.

A. DOWN ARROW (DECREMENT)—Decrease value of a flashing display.
B. UP ARROW (INCREMENT)—Increase value of a flashing display.
C. DISPENSE/COPY—Select dispensed volume, number of copies of a dispensed volume, or the dispense interval.
D. FLOW CONTROL—Set flow rate for selected gear set. To change flow rate, press ▲ or ▼ arrows. (If pump is running, its speed will change with new settings.)
E. CAL CONTROL—Refine built-in calibration using a measured volume.
F. STOP/START—Stop/Start motor.
G. PRIME—Run pump at full speed to fill or clear lines.
H. MODE SELECT—INT for internal control; mA for remote current control; V for remote voltage control.
I. GEAR SET—Select gear set.
MOUNTING DIMENSIONS

MOUNTING DIMENSIONS FOR PART NUMBERS 83721, -22

SETUP AND DRIVE OPERATION

1. Connect Motor Cable plug to mating receptacle on the Controller.
2. Connect power cord from Controller to grounded power line outlet.
3. Mount Pump Head. (See instructions furnished with pump head.)
4. Turn pump on and select GEAR SET. (See chart.)

**NOTE:** If CAL LED is lit, that gear set has been previously field calibrated. If LED is not lit, the drive is operating with the built-in factory calibration. To clear a field calibration, press and hold the CAL switch until the CAL light goes out. This will take about 3 seconds. To recalibrate for better accuracy, see Calibration section.

5. MODE selection (INT, mA, V).
6. PRIME and CALibrate the pump (if required).
7. Press FLOW button and watch display to set the flow rate with UP/DOWN (▲, ▼) keys.
8. Press STOP/START button to begin pumping.

**NOTE:** Pump will restart automatically after a brownout or powerout condition.

Calibration

1. Select correct gear set and flow rate.
2. Press CAL: Calibration volume appears.
3. Press STOP/START: The pump will use its stored memory to dispense the specified calibration sample quantity. The pump will stop automatically.
4. Weigh/measure the sample.
5. Use UP/DOWN arrow keys to correct the flashing display.
NOTE: If the adjusted calibration is too great, “Err” will appear in the display. If this occurs, press the CAL control and repeat the calibration procedure. The microprocessor will retain one special calibration value per gear set, even when power is turned off. The next calibration will replace the existing value.

6. Press GEAR SET to exit the calibration cycle.

Maximum Flow Rate (Other Gear Set)
1. To set the maximum flow rate for other gear set, OTHER, press CAL, then FLOW. The maximum flow rate will then flash on the display.
2. Use UP/DOWN arrow keys to set the desired flow rate.
3. Press GEAR SET to exit.

<table>
<thead>
<tr>
<th>Gear Set</th>
<th>Pump Model</th>
<th>Displacement (mL/rev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X21</td>
<td>GA-X21</td>
<td>0.017</td>
</tr>
<tr>
<td>V21</td>
<td>GA-V21</td>
<td>0.042</td>
</tr>
<tr>
<td>V23</td>
<td>GA-V23</td>
<td>0.084</td>
</tr>
<tr>
<td>T23</td>
<td>GA-T23</td>
<td>0.092</td>
</tr>
<tr>
<td>P23</td>
<td>GB-P23</td>
<td>0.261</td>
</tr>
<tr>
<td>P25</td>
<td>GB-P25</td>
<td>0.58</td>
</tr>
<tr>
<td>N21</td>
<td>GJ-N21, GF-N21</td>
<td>0.316</td>
</tr>
<tr>
<td>N23</td>
<td>GJ-N23, GF-N23</td>
<td>0.64</td>
</tr>
<tr>
<td>N25</td>
<td>GJ-N25, GF-N25</td>
<td>0.91</td>
</tr>
<tr>
<td>N27</td>
<td>GF-N27</td>
<td>1.17</td>
</tr>
</tbody>
</table>

DISPense/copy
A first press of the DISP key results in the last entered dispense volume being displayed. The “mL” annunciator will illuminate and flash. The INC/DEC keys are used to change the dispense volume, if desired. The STOP/START key then initiates delivery of the set volume. The amount remaining to be dispensed will be displayed during countdown. The dispense function is exited by pressing any key except Increment, Decrement, DISP, or STOP/START.

A second press of the DISP key causes the COPY annunciator to illuminate and flash. The STOP/START key is then used to deliver the desired volume without the need to know the volume in specific units. A third press of the DISP key enters the volume dispensed. The COPY annunciator stops flashing. The STOP/START key is then used to initiate delivery of the copied volume. The number of copies dispensed will be displayed after each dispense. The maximum number of copies is 9999. The STOP/START key is used to pause the copy dispense during dispensing; copy dispense can then be continued using the STOP/START key.

A fourth press of the DISP key results in the last entered dispense interval being displayed. The SEC annunciator will illuminate and flash. The INC/DEC keys are used to change the dispense time, if desired, from 1 to 9999 seconds. The STOP/START key then initiates delivery for the set time interval. The remaining time will be displayed during countdown. Pressing the DISP key a fifth time exits this mode.

Keypad Lockout Enable/Disable
Press and hold FLOW. After five (5) seconds, display will change to all dashes. Then, while holding FLOW, press PRIME five (5) times.
REMOTE CONTROL

Selectable input (0–20 mA, 4–20 mA, 0–10V DC)
±0.5% linearity control
2300V isolation potential
START/STOP; PRIME via contact closure

Remote Control Setup

1. Place the power switch in the off position.
   
   **CAUTION:** Power must be turned off before connecting the external remote control cable to prevent damage to the drive.

2. Connect the cable from the external remote control to the mating receptacle on the bottom panel.

3. Select type of remote control input and output required as follows:
   
   a. Press and hold the MODE control while turning the power switch to the on position. After two seconds, release the MODE control. The initial display will show: “inP”. After two seconds, the display will show either 0–20 or 4–20.
      
      **NOTE:** Press the up (increment) or down (decrement) arrows to select between 4–20 and 0–20 for current loop control.

   b. Press the MODE control again. The initial display will show: “out”. After two seconds the display will show either 0–20 or 4–20.
      
      **NOTE:** Press the up (increment) or down (decrement) arrows to select between 4–20 and 0–20 for current loop output.

4. Press the MODE control to select mode of operation. The LEDs indicate the selected mode. Select either mA or V.

   **NOTE:** If only remote STOP/START and/or PRIME is to be used, the MODE control can be set to any of the three positions.
A) START/STOP
B) NOT USED
C) OUTPUT 0–20mA; 4–20mA
D) INPUT 0–20mA; 4–20mA
E) INPUT 0–10V
F) OUTPUT 0–10V
G) TACH OUTPUT
H) PRIME
I) MOTOR RUNNING N.O. CONTACT
J) MOTOR RUNNING N.C. CONTACT

NOTE: Colors are those of Remote Cable, part number 83739.
TROUBLESHOOTING AND MAINTENANCE

**DANGER:** Modular Drive Systems are not customer serviceable, except for replacement of FUSES and MOTOR BRUSHES.

**DANGER:** High voltages exist and are accessible in the Modular Drive. Refer servicing to qualified personnel.

**WARNING:** Unplug Controller prior to checking or replacing FUSES and/or MOTOR BRUSHES.

Motor Brush Check/Replacement (part no. 83738)
Brushes should be checked every 6 months or 2000 operating hours or if erratic operation occurs.

Erratic operation may occur immediately after brush replacement. Allow motor to run up to an hour to allow brushes to seat.

To replace the brushes remove the 2 rubber caps and unscrew the brush caps.

Inspect for cracks and excessive wear.

Replace both brushes if either brush is less than 7.6 mm (0.300 in) long from base to point.

Contact your dealer if you have service needs.

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A) EXTERNAL RECEPTACLE
B) MOTOR RECEPTACLE
C) LINE CORD
D) T3.15A Fuse (115V AC); T1.6A FUSE (230V AC)
   ⚠️ CAUTION: Do not substitute.
E) POWER SWITCH — ALL SETTINGS ARE RETAINED IN MEMORY.
## Troubleshooting

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
</table>
2. Check that unit is plugged into an AC receptacle.  
3. Check connection of power cord.  
4. Check the line cord for continuity and replace if defective.  
5. Return for servicing. |
| A2. Defective remote control. | | 1. Place power switch in OFF position.  
2. Check that remote cable connector is inserted fully into the receptacle.  
3. If motor still does not rotate, select INT with the MODE control and press the STOP/START control.  
4. If the motor rotates, replace the remote control with similar unit. If motor will not rotate, return drive for servicing. |
| B. Motor does not rotate. Display lights. | MODE control not properly set. | 1. Check that the MODE control is set to INT for operation with front panel control or to mA or V for operation with remote control.  
2. If motor still does not rotate, return for servicing. |

If an error message is displayed, refer to the following list for possible corrective action you can take. If these do not correct the problem, contact your dealer.

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
</table>
2. No encoder pulses from motor. | 1. Clear by pressing stop/start.  
2. Check all motor/encoder connections. |
2. Check all motor/encoder connections. |
| “Error 3” | TRIAC firing angle too large or motor overload. | Check all motor connections. Check pump for obstructions. Unit must be turned off to clear error. |
| “Error 4” | Bad PROM. | Return unit for repair. |
| “Error 5” | Motor overload. | Check pump for obstructions. Unit must be turned off to clear error. |
Troubleshooting (continued)

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Error 6”</td>
<td>Bad zero crossing detector or crystal.</td>
<td>Return unit for repair.</td>
</tr>
<tr>
<td>“Error 7”</td>
<td>Bad EEPROM data, operator parameters set to default values.</td>
<td>Avoid fast switching of power to the unit.</td>
</tr>
<tr>
<td>“Error 8”</td>
<td>Bad EEPROM data, A/D span cal, span cal set to default.</td>
<td>Return unit for repair.</td>
</tr>
</tbody>
</table>

Replacement Parts and Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
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<td>Brush caps (set of 2)</td>
<td>Consult Factory</td>
</tr>
<tr>
<td>Brushes (set of 2)</td>
<td>83738</td>
</tr>
<tr>
<td>Fuse—T3.15A (115 V units)</td>
<td>Consult Factory</td>
</tr>
<tr>
<td>Replacement Gear Head Mounting Kit</td>
<td>Consult Factory</td>
</tr>
<tr>
<td>Fuse—T1.6A (230 V units)</td>
<td>Consult Factory</td>
</tr>
<tr>
<td>Hand-held remote control</td>
<td>Consult Factory</td>
</tr>
<tr>
<td>Remote control cable, 25 ft. (7.62 m)</td>
<td>83739</td>
</tr>
</tbody>
</table>

Cleaning

Keep the drive enclosure clean with mild detergents. Never immerse nor use excessive fluid.

SPECIFICATIONS

Output:

- Speed: 60 to 3600 r/min
- Torque output, Maximum: 30 oz-in (2 kg-cm)
- Speed Regulation:
  - Line: ±0.25% F.S.
  - Load: ±0.25% F.S.
  - Drift: ±0.25% F.S.
- Display: Four-digit, seven segment LED
- Remote outputs:
  - Voltage speed output (0–10V DC)
  - Current speed output (0–20 mA or 4–20 mA)
  - Tach output (TTL, 128 to 7680 Hz)
  - Motor running output (N.O. & N.C. contact closure)
Specifications (continued):

Input:

Supply voltage limits:
- 83721 90 to 130 Vrms @ 50/60 Hz
- 83722 200 to 260 Vrms @ 50 Hz

Current, max.:
- 83721 2.3A
- 83722 1.2A

Installation Category: Installation Category II per IEC 664 (Local level — appliances, portable equipment, etc.)

Remote Inputs: Start/Stop, PRIME (contact closure)
Voltage input (0–10V DC)
Current input (0–20 mA or 4–20 mA)

Construction:

Dimensions (L × W × H):
- 83724, 83726 9 in × 11 in × 4 1/2 in (229 × 279 × 114 mm)
- 83723, 83725 10 in × 4 in × 3 3/4 in (254 × 102 × 95 mm)

Weight:
- 83724, 83726 9.4 lbs (4.3 kg)
- 83723, 83725 8.7 lbs (3.9 kg)

Enclosure Rating:
- 83724, 83726 IP 56 (NEMA 4) Per IEC 529
- 83723, 83725 IP 34 (NEMA 4) Per IEC 529

Environment:

Temperature, Operating: 0°C to 40°C (32°F to 104°F)
Temperature, Storage: -45°C to 65°C (-49°F to 149°F)
Humidity (non-condensing): 10% to 90%
Altitude: Less than 2000 m
Pollution Degree: Pollution Degree 3 per IEC 664
(Sheltered locations)
Chemical Resistance: Exposed material is painted aluminum, plastic and vinyl

Compliance: 115V: UL508, CSA C22.2, No. 14-M91
230V (For CE Mark):
EN61010-1/A2: 1995 (EU Low Voltage Directive) and
STANDARD LIMITED WARRANTY

The products manufactured by Micropump Incorporated are warranted to be free from defects in workmanship and material at the time of shipment from the place of manufacture. Micropump will repair or replace, at its option, any part or component which fails to conform to this warranty for a period of one year from date of original invoice, but not exceeding 18 months from the date of shipment. Micropump’s obligation under this warranty is limited to the repairs or replacement of defective equipment returned to Micropump on a F.O.B. destination and freight pre-paid basis. All normal wear and tear is excepted, and product is subject to examination at Micropump to verify that the parts or components were defective at the time of sale.

For the purposes of the limited warranties, the Stator/Controller Assembly means only the stator and the printed circuit board and electronic components contained in the controller housing, plus the connecting control and power cables. The Power Supply Assembly means only the printed circuit board and the electronic or mechanical components located inside or on the power supply enclosure, and the Pump Head Assembly means all other parts of the product, including but not limited to, the rotor.

No warranty of any kind is made or shall be imposed with respect to any pump or parts (1) which have not been properly installed and tested in operation, (2) that have been subject to misuse, negligence, acts of God or the elements, or any other form of casualty, or (3) which have been repaired or altered outside of Micropump’s facility in a way, so as, in our judgment, to affect performance or reliability.

The parties agree that the buyer’s sole and exclusive remedy against Micropump shall be for the repair or replacement of defective parts under the conditions stated above. The buyer agrees that no other remedy (including but not limited to incidental or consequential damages for lost profits, lost sales, loss of use, injury to person or property, or any other incidental or consequential loss) shall be available to it.

This warranty shall not apply to prototype pumps, experimental pumps, or brush-type electric motors. Warranty of equipment or accessories from outside sources, purchased by Micropump and incorporated into Micropump’s product is subject to the manufacturer’s standard warranty, unless specifically agreed otherwise between Micropump and the buyer. A copy of the warranty on the aforementioned equipment is available on request.

The adjustment or replacement of defective parts made under this warranty will not extend the original warranty period.

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