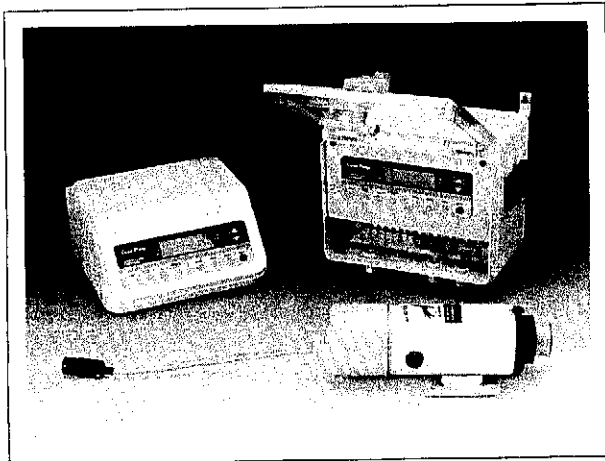


## OPERATING MANUAL

# GEAR PUMP CONTROLLER/DISPENSER

Type	MODELS		
	System	Pump Drive	Controller
Benchtop (115V)	75210-00	75210-50	75210-60
Benchtop (230V)	75210-05	75210-55	75210-65
NEMA (115V)	75210-10	75210-50	75210-70
NEMA (230V)	75210-15	75210-55	75210-75



**Cole-Parmer Instrument Company**  
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800-323-4340

A-1299-0461  
Edition 03

## DANGER/WARNINGS

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

**Warning:** Turn off the AC power before connecting the external remote control cable.

### 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.

If the Controller/Dispenser is used in any manner not specified herein, the safety protection provided may be impaired and the warranty voided.

## INTRODUCTION

The outstanding characteristics of the Series 75210 CONTROLLER/DISPENSER systems are accuracy and versatility. The Series 75210 provides convenient digital display of flow rate, dispensed volume and number of samples dispensed. Small to large volumes and repetitive duplicated volumes of a wide range of fluids can be pumped.

The instructions in this manual are presented in a step-by-step sequence, just as you would install, set up, and operate the system for the first time. Also, each step is task-oriented for easy reference. At any later time, you can go directly to a particular section and quickly find answers or guidance.

For quick reference, the control and display functions are summarized in the foldout sheet.

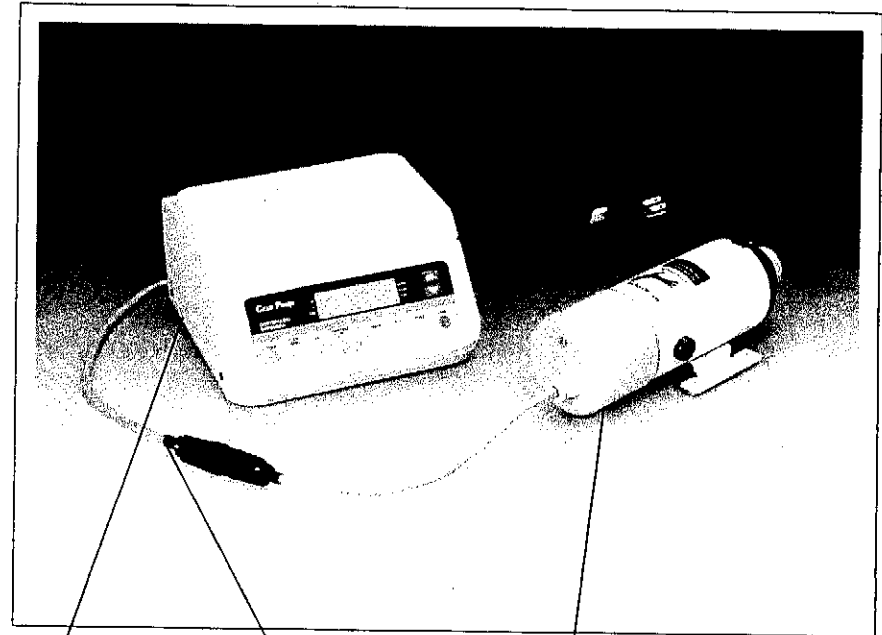
### Application Data

The Series 75210 systems are designed to deliver precise volumes of fluids at flow rates up to 3.9 liters per minute. The Controller may also be used as a repetitive dispenser using either calibrated dosing or simple repetitive copy modalities. These systems are

## DESCRIPTION

The Series 75210 Gear Pump CONTROLLER/DISPENSER systems are modularized to allow easy setups and operation. The Controller is connected to the separate Pump Drive via a multi-conductor cable (6-ft. for the Benchtop models; 24-ft. for the NEMA wash-down model).

### Benchtop System



**BENCHTOP  
CONTROLLER**  
75210-60 (115V)  
75210-65 (230V)

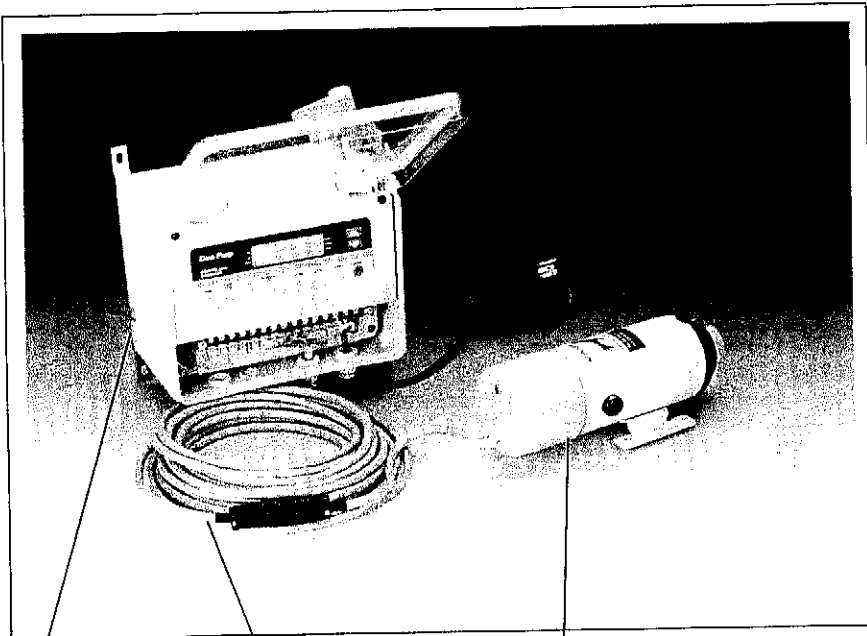
**CONTROLLER  
CABLE**  
(6-ft.)

**PUMP DRIVE**  
75210-50 (115V)  
75210-55 (230V)

**PUMP HEAD**  
(Order  
separately)

Benchtop systems (75210-00 and 75210-05).

## NEMA System



**NEMA  
CONTROLLER**  
75210-70 (115V)  
75210-75 (230V)

**CONTROLLER  
CABLE**  
(24-ft.)

**PUMP DRIVE**  
75210-50 (115V)  
75210-55 (230V)

**PUMP HEAD**  
(Order  
Separately)

NEMA wash-down systems (75210-10 and 75210-15). Controllers are housed in a durable plastic case suitable for wall mounting. Hinged door with latch provides easy access to Control panel.

## Controllers

The foldout sheet summarizes the control and display functions for all Controllers.

The control panel is composed of a membrane keypad and display. The display window has a capacity for 8 large, bright characters to show many values on demand: including *volume* (in ounces, milliliters or liters)...*flow rate* (in milliliters per minute, liters per minute, or ounces per minute)...*copy number*.

Alternate line cords are available for the 230 volt Benchtop unit, 75210-05. See the ACCESSORIES section for details.

**NOTE:** Pump model numbers used throughout the manual and displayed in the Controller/Dispenser refer to the MICROPUMP model number. For example, MICROPUMP model 120-000 is referred to as "120". This should not be confused with the MICROPUMP part number, eg 81110.

The display always indicates currently selected flow or volume units by means of "dash" segments aligned opposite the appropriate unit description. See the foldout sheet at the front of the manual.

A microprocessor adds great flexibility to the overall pump system performance. Its memory stores built-in calibration factors so you can completely bypass the normal calibration chores. For optimum precision, the microprocessor also allows you to calibrate a pump head using empirical (measured volume) values that **you** enter (described in the CALIBRATION section).

Finally, the microprocessor stores all settings for the current job. This permits instant restart when an operation is resumed after a shutdown. These stored values include flow rate setpoint, dispense volume, copy amount and custom calibration.

**Safety Features:** (1) At startup, all circuits are automatically checked. (2) Special circuitry detects selected fault conditions, and automatically shuts down the system if appropriate. (3) Software and circuitry prevents an uncontrolled high speed (runaway) condition.

#### Pump Drive (All Systems)

The drive furnished with all Series 75210 systems has a 1/10 H.P., 3600 RPM precision permanent magnet DC motor capable of delivering 30 oz.-in torque. Superb speed regulation is achieved through a digital optical encoder feedback signal. The motor is rated for continuous duty operation and is permanently lubricated. It also meets NEMA 4 requirements to withstand wash-downs.

#### Pump Heads (All Systems)

The Gear Pump Controller/Dispensers are intended for use with all MICROPUMP standard canister pump heads. See Table 1 for a listing of available pump heads and corresponding maximum flow rates at 0 psi.

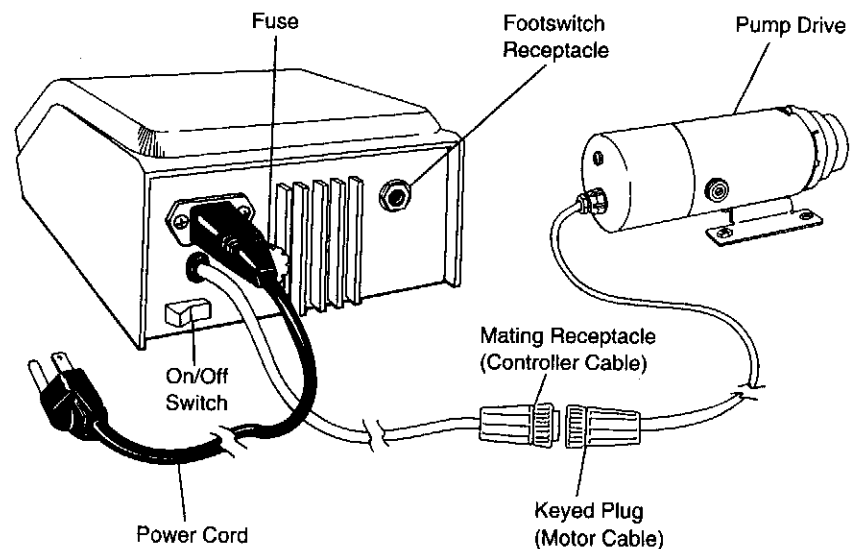
TABLE 1

MODEL NUMBER	MAXIMUM FLOW RATE (ml/min)	MODEL NUMBER	MAXIMUM FLOW RATE (ml/min)
020	1140	142	3400
040	1140	150	2300
120	2300	152	3400
121	2160	184	150
122	3400	185	300
12A	2160	187	60
130	2300	200	2030
132	3400	201	3900
140	2300	1840	330
141	2160	2120	1500

## INSTALLATION

The installation procedures for the Benchtop and NEMA systems are quite different:

#### Benchtop System



Rear Panel of Benchtop System.

#### (1) Connect Pump Drive

The CONTROLLER CABLE is factory-wired to the Benchtop Controller.

- Connect the keyed plug on the MOTOR CABLE to the mating receptacle on the CONTROLLER CABLE.
- Connect power cord to Controller.

That's it. The Benchtop system is ready for setup (unless you wish to plug in a FOOTSWITCH – see step number 2).

- Skip ahead to the SETUP section.

**NOTES:** (1) The front panel START/STOP keys will always *override* the FOOTSWITCH control.

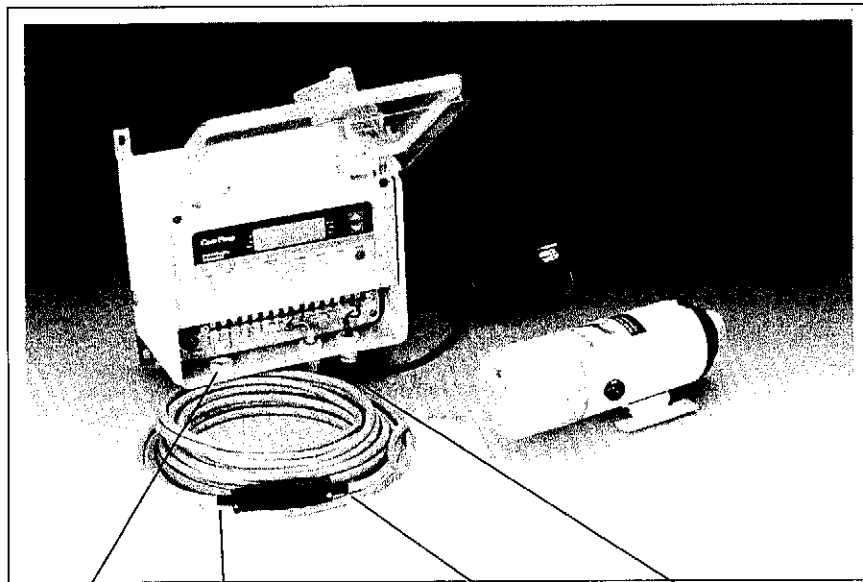
(2) Air vents are provided at the bottom of the cabinet; don't place Controller on a surface that will obstruct air flow when the system is operating.

## (2) Optional: Connect FOOTSWITCH

Instead of using the START/STOP keys on the front control panel, the rear panel of the Benchtop system has a receptacle for connecting a FOOTSWITCH (described in the ACCESSORIES section) or similar momentary contact closure.

- Plug the FOOTSWITCH cable into the receptacle shown in the preceding illustration.

## NEMA (Wash-down) System



\*FITTING with plastic cap for optional REMOTE CONTROL CABLE

MATING RECEPTACLE (Controller Cable)

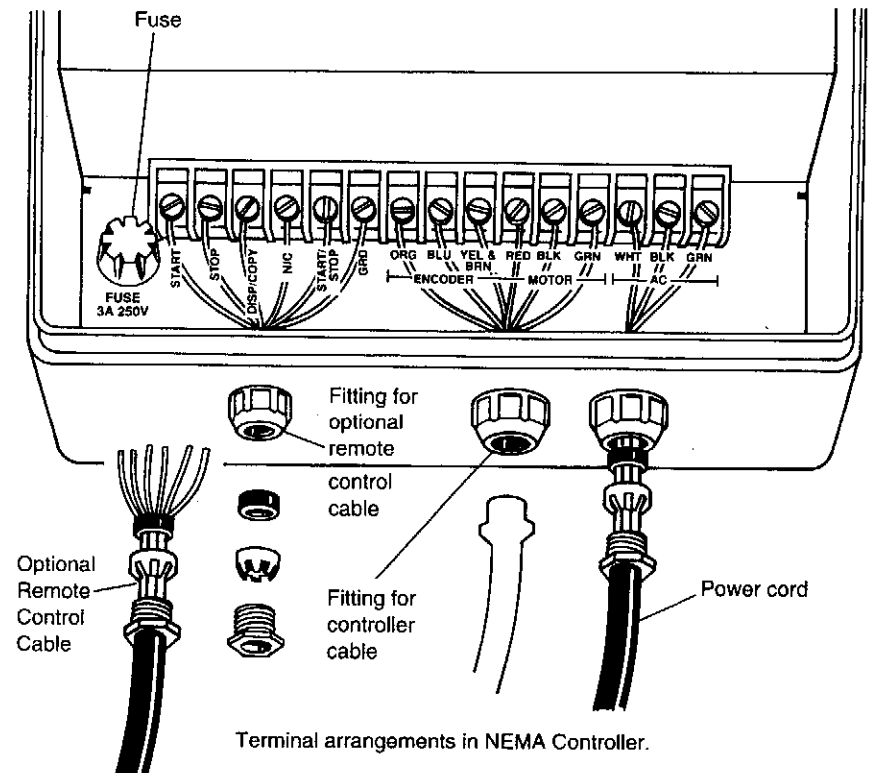
KEYED PLUG (Motor Cable)

\*FITTING with plastic cap for CONTROLLER CABLE

**\*NOTE:** In order to make enclosure wash-down proof, without installing remote control cables, remove outer part of fitting, plastic grip and rubber washer and replace with plastic cap.

The NEMA controller has the same front panel keypad functions as the Benchtop units – accessible through a hinged door. In addition to being wash-down and having a longer CONTROLLER CABLE (24 ft.), it has more remote functions.

**Warning:** Turn off the AC power before connecting the cables.



Terminal arrangements in NEMA Controller.

**NOTE:** The WHT, BLK, GRN AC Input wires are labeled BLU, BRN, YEL/GRN for the 75210-75, 230 volt unit.

### (1) Wire Controller Cable to Terminals

The cables are furnished factory wired. However, if they need to be re-connected for any reason, follow these instructions.

- Remove the plastic cap from the middle fitting and feed the leads of the CONTROLLER CABLE through to the terminal strip.
- Connect the color-coded leads to the designated terminals.
- Be sure to tighten the plastic fitting to maintain the wash-down seal.

### (2) Connect the CONTROLLER/MOTOR CABLES

- Connect the keyed connector on the CONTROLLER CABLE to the mating receptacle on the MOTOR CABLE.

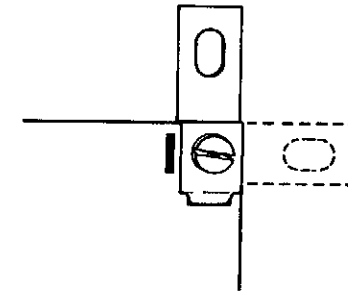
### (3) Optional: Connect REMOTE CONTROL

Four remote functions are available. The start, stop and dispense/copy remote controls operate the same as the corresponding front panel keys. Refer to the Operation section. A customer supplied momentary low level contact closure to ground will activate the function. The start/stop remote control works differently depending on operating mode. When in the dispense mode, a customer supplied momentary low level contact closure to ground initiates a dispense. When not in the dispense mode, the motor will run as long as the input is grounded. The customer must furnish the necessary cable, 0.196" to 0.315" diameter (50 mm to 80 mm).

- Remove the plastic cap from the first fitting and feed the accessory or user supplied cable leads through to the terminal strip.
- Connect the leads to the appropriate designated terminals.
- Be sure to tighten the plastic fitting to maintain a wash-down seal.

**NOTE:** An optional hand held remote control unit (7592-80) is available which is connected via a 10 ft. cable. Connect the black wire from the remote cable to the terminal marked N/C or clip off altogether. Refer to instructions furnished with unit for the remaining connections.

Caps must be installed on unused cable feed-throughs to maintain wash-down feature.



Optional wall mounting for NEMA Controller.  
(Broken lines denote horizontal bracket arrangement.)

### (4) Optional: NEMA Controller Wall-Mount

The 24-ft. long CONTROLLER CABLE furnished with the NEMA system permits convenient wall mounting away from the pumping operation:

- Select a mounting location. The 4 brackets furnished can be installed vertically or horizontally, as shown, to help overcome any obstructions or space limitations.
- Fasten the accompanying bolts to secure the brackets in each corner of the Controller enclosure.

### (5) Plug the Power Cord into a Grounded Outlet.

## SETUP

Fast, easy setups will become routine because the microprocessor stores nominal flow rates for different pump heads. Also, your last setpoints are automatically stored, even when the power is off. This enables you to eliminate repetitive setup chores when you resume the same operation after a shutdown.

Before proceeding, it will be helpful to review the control and display functions summarized in the foldout sheet at the front of this manual.

Automatic prompts are displayed to help you enter settings for each new job. Whenever you see a flashing field in the display, you can either *change* the digital values (via the ▲ and ▼ keys) or simply exit to another function by pressing some other button.

**NOTE:** *Underscores* in the following example displays represent flashing fields.

Following is the basic setup sequence:

### (1) Select Pump Head

See Table 1 for the Gear Pumps that can be used with the Controller/Dispenser.

**NOTE:** MICROPUMP standard canister Gear Pumps other than those listed can be accommodated by selecting a pump having a similar maximum flow rate and using the field calibrate feature.

Factory set calibration constants are programmed into the drive memory for all listed pumps. Maximum flow rates for each pump are also stored in the unit and are displayed for use in pump head selection.

### (2) Install Pump Head

Refer to instructions furnished with the Gear Pumps.

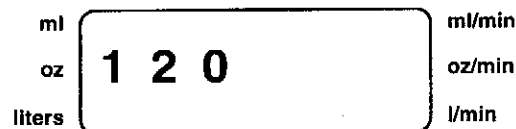
### (3) Set Units and Pump Head

- Place the power switch to the ON position (at the rear panel of the Benchtop Controller; at the side of the NEMA enclosure).

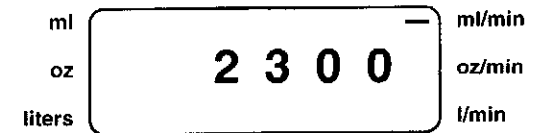
A non-volatile memory stores the last setpoints and operating conditions after a shutdown. When power is applied, the last setting will appear. (If the pump was running when power was disconnected, it will re-start when power is applied.)



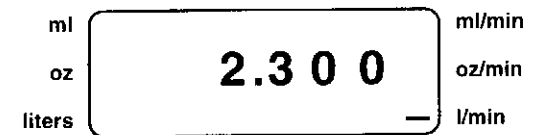
- Press PUMP key. The display shows the pump head model number. For example, if a model 120-000 is selected, the display shows:



- Press the PUMP key again. The display shows the maximum flow rate for the selected pump head. For example, 2300 ml/min is the maximum flow rate for the model 120 pump:

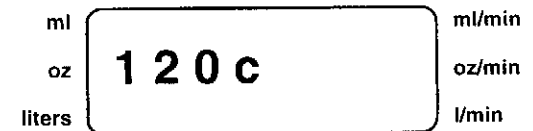


- Press the UNITS key to select desired units. For example, if liters per minute is desired:

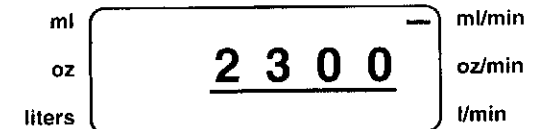


- Press the ▲ or ▼ keys if a different pump model is desired.
- Press any key other than ▲, ▼ or PUMP to exit the pump select mode.

A "c" is included in the display indicating which configuration has been **field** calibrated. See the CALIBRATION section for details on how to calibrate the system for your particular setup. For example, if the above pump was field calibrated, the field calibrated pump setup is utilized by selecting:



- To read the stored Flow Rate previously set, press the FLOW RATE button. For example:



Note that the "dash" segment is aligned with the ml/min indicator.

If you wish to resume a job with the **same** settings, no further setup steps are required. You can prime the pump and start operating the system.

#### (4) Prime The Pump

- Press and hold the PRIME key. The motor will run at full speed (3600 RPM).

### OPERATION

This section describes how to put the system to work. There are several ways of doing it.

#### (1) Start/Stop Operation

- Select the Flow Rate. Press the FLOW RATE key to display the last setpoint value. For example:

ml	<u>2 2 0 0</u>	ml/min
oz		oz/min
liters		l/min

- To change the displayed set Flow Rate Value, press the ▲ or ▼ keys. For example, increase the flow to 2250. Use the ▲ key:

ml	<u>2 2 5 0</u>	ml/min
oz		oz/min
liters		l/min

The system is now ready to operate.

- Press the START button. The system will deliver the fluid until you:
- Press the STOP button.

**NOTE:** Start/stop control can also be done **remotely** by activation of a FOOTSWITCH or other contact closure. (See INSTALLATION section.) The Pump Drive will run as long as the footswitch is pushed.

#### (2) Dispense Operation

Here's the simple procedure for delivering a precise volume of liquid:

- Press the DISPENSE/COPY key. The last-entered volume will

be displayed. The dash aligned with liters indicates **volume** in liters. For example, 2 liters:

ml	<u>2 . 0 0</u>	ml/min
oz		oz/min
liters	—	l/min

- Use the ▲ or ▼ keys to change the displayed volume (2.00) to a new value – for example, 1.00:

ml	<u>1 . 0 0</u>	ml/min
oz		oz/min
liters	—	l/min

- Press the UNITS key to select alternate units as desired.
- Press the START button. The preset volume will be delivered, and the pump will stop automatically.
- To exit from the Dispense function, press any key other than START.

#### (3) Copy Operation

Any number of precise duplicate volumes can be quickly dispensed. Here's the procedure:

- Press the DISPENSE/COPY key twice. This display will flash:

ml	<u>COPY</u>	ml/min
oz		oz/min
liters		l/min

- Press the START key.
- When the desired COPY volume has been delivered, press the STOP key. The microprocessor will store this information so that precise duplicate volumes can be delivered.



If you wish to refine the copy volume, use the START and STOP keys until you are satisfied. Additional starts and stops, however, will reduce accuracy.

- Press the DISPENSE/COPY key again. The COPY message will stop flashing, and you are ready to deliver identical volumes into a series of containers.
- Press the START key. The first copy volume will be delivered and the pump will stop automatically. The display will show:

ml	<b>COPY 1</b>	ml/min
oz		oz/min
liters		l/min

- Press the START key for as many duplicate volumes as you desire. The display will show a count of how many copies you make. After 99 copies, the count will start over at 1.
- A dispense can be interrupted using the STOP key. To continue with the same dispense, press the START key. To cancel the incomplete dispense and start over, press the DISPENSE/COPY key three times to cycle back to the start of a new dispense.
- To exit from the COPY function, press any key, except START or STOP.

#### (4) Remote Dispensing

Two optional remote control devices (see ACCESSORIES section) are available to pump precise calibrated volumes. Instead of using the front panel controls, a FOOTSWITCH can be plugged into the rear panel of the Benchtop Controller or easily wired to the NEMA Controller. (See INSTALLATION section.) The operator simply steps on the switch to start each dispense; the pump will stop automatically.

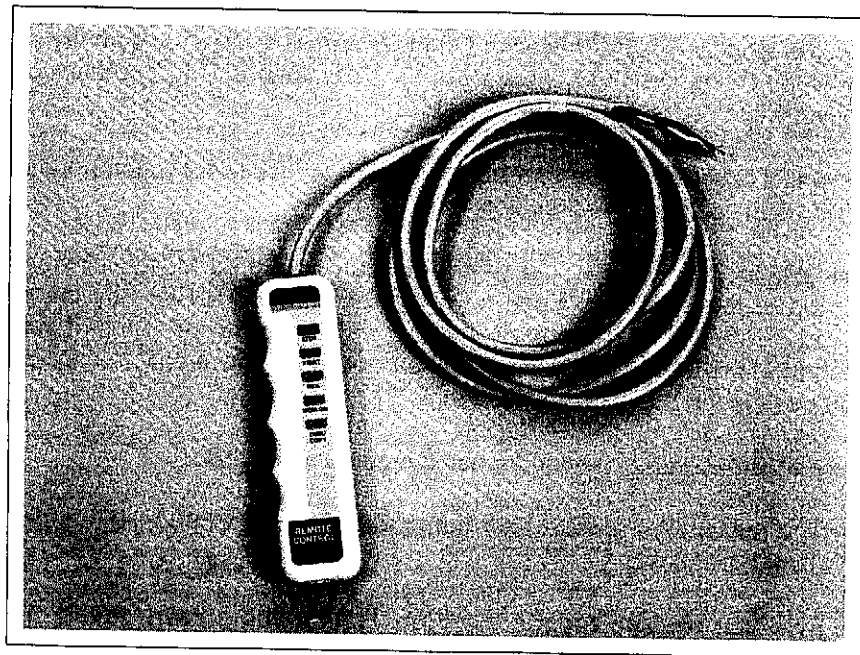
Also, a hand-held REMOTE CONTROL device or external controller can be wired to the NEMA Controller. (See INSTALLATION section.)

## ACCESSORIES

### Footswitch

The FOOTSWITCH is ideal for applications where frequent start/stop operations are required. It is furnished with a 6-ft. plug-in cable for Benchtop Controllers and it can be wired to a NEMA Controller. (Part No. 07595-35.)

### Remote Control



The REMOTE CONTROL is for the NEMA Controller only. It requires wiring to terminals (see INSTALLATION section). (Part No. 07592-80.)

### Line Cords

Alternate Line Cords for Model 75210-05:

- 50001-70 European (standard)
- 50001-72 British
- 50001-74 Swiss
- 50001-76 Italian
- 50001-78 NEMA Type 6-15P (USA)

## CALIBRATION

### Automatic Calibration

Calibration factors for most pump models are **stored** in a permanent system memory. If this is satisfactory for your applications, you can skip this calibration section. If more refined system calibration is necessary, use the following method.

### Measured Volume Calibration

You have the option of calibrating the system empirically via measured volume and achieving improved flow accuracies. This capability is essential if you wish to compensate for deviations due to pressure or unusual fluid characteristics.

Empirical calibration is performed by pumping a measured volume of the application liquid at a desired flow rate.

**IMPORTANT:** Only **one** field calibration can be stored for later instant startup of the same job. Each new calibration factor set for any pump automatically **cancel**s the previous user calibration factor. Thus, if you calibrate for a new application, it will be necessary to re-calibrate when you resume the previous application.

Here's the calibration procedure using a pump model 120.

The maximum Flow Rate for pump model 120 is 2300 milliliters per minute as shown.

- If you wish to reduce the Flow Rate value shown, press the FLOW RATE key. This field will flash.
- Press the ▼ key to display a lower Flow Rate value, for example, 2200.

ml	<div style="border: 1px solid black; padding: 5px; display: inline-block;">2 2 0 0</div>	ml/min
oz		oz/min
liters		l/min

- Press the CAL key.

The display will show a calibration message (CAL). Also, the calibration **volume** for the selected pump will replace the Flow Rate value. The calibration volume will be equal to the set flow rate, running for a time of one minute.

ml	<div style="border: 1px solid black; padding: 5px; display: inline-block;">CAL 2200</div>	ml/min
oz		oz/min
liters		l/min

The flashing CAL message prompts you to proceed.

**NOTE:** At any time, if you wish to **cancel** your entries and start over, simply press the CAL key and repeat the sequence. A "NoCAL" message will appear, indicating that no changes in calibration were made to memory.

- For delivery, select a graduate or container that will accommodate the displayed volume (2200 ml), plus a small overshoot.
- Press the START key to deliver the liquid. The drive will stop automatically, and the volume field will flash:

ml	<div style="border: 1px solid black; padding: 5px; display: inline-block;">CAL 2200</div>	ml/min
oz		oz/min
liters		l/min

**CAUTION:** You may end the calibration run early, using the STOP key. But if the volume delivered is less than 50% of the displayed volume, the drive will return to the normal Flow Rate operation and terminate the CAL run. (Restart is not allowed in the calibration mode.)

- Measure or weigh the delivered volume.
- Respond to the flashing volume field by using the ▲ or ▼ keys to make the displayed volume value agree with your measured volume. For example, 2190:

ml  
oz  
liters

**CAL 2190**

ml/min  
oz/min  
l/min

- Press any key (except CAL, ▲ or ▼) to enter this refined calibration factor into memory. When this is done, you will automatically exit the calibration mode.

The system is now calibrated for the measured volume (2190 milliliters) and the selected pump model (120), replacing the built-in calibration factor. The drive's motor shaft speed will produce the set Flow Rate using the new CAL factor.

**NOTE:** If flow rates and/or pressures are significantly different from set values, a second calibration cycle may be necessary. Be sure to start from the previously calibrated pump head selection (indicated by a small "c").

A new pump selection is now available with a small "c" to remind you:

ml  
oz  
liters

**120c**

ml/min  
oz/min  
l/min

The original, unmodified Flow Rate is still available for selection.

## MAINTENANCE

**Danger:** *High voltages exist and are accessible in the drives. Refer servicing to qualified personnel.*

### Service

The Series 75210 systems are not customer serviceable, except for replacement of FUSES and MOTOR BRUSHES (Part No. A-2543-CR). See table below for fuse part numbers.

**CAUTION:** Unplug Controller prior to servicing.

MODEL NUMBER	FUSE PART NUMBER
75210-60	B-1115-0006
75210-65	B-1115-0003
75210-70	B-1115-0006
75210-75	B-1115-0042

To replace the brushes, remove the 2 rubber caps and unscrew the brushes using a screwdriver. Inspect for cracks and excessive wear. Brushes should be replaced when less than 3/8" long.

## Trouble Shooting

If a problem occurs, turn the unit off, check the fuse, then re-check for the problem.

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

- "Error 1" No encoder pulses from motor/  
Corrective action: Check all motor connections.
- "Error 2" Motor over-speed/  
Corrective action: Check all motor connections.
- "Error 3" TRIAC firing angle too large/  
Corrective action: Check all motor connections. Unit must be turned off to clear error.
- "Error 4" Bad EEPROM, operator parameters reset to default values/  
Corrective action: Return controller for repair.
- "Error 5" Software failure/  
Corrective action: Reduce electrical noise around controller.
- "Error 6" Software failure/  
Corrective Action: Reduce electrical noise around controller.
- "Error 7" Bad PROM/  
Corrective action: Return controller for repair.
- "Error 8" Bad RAM/  
Corrective action: Return controller for repair.
- "Error 9" Relay inoperable/  
Corrective action: Return controller for repair.

## Cleaning

Series 75210 Controllers are chemically resistant. Use a mild detergent to clean surfaces.

## SPECIFICATIONS

Voltage Range:	90V AC to 130V AC, 50/60 Hz or 190V AC to 265V AC, 50/60 Hz.
Current:	115 Volt Units: 2.0 A., nominal 230 Volt Units: 1.0 A., nominal
Microprocessor:	Handles functions for keypad, display, speed monitoring, triac triggering, and relay controlled motor reversing.
Display:	8 character, 7 segment, 9.5mm high vacuum fluorescent
Pump Head:	MICROPUMP Standard canister
Speed Range:	180 to 3600 rpm
Flow Rates:	From 3 mL/min to 3.9 liters per minute
Torque:	30 oz-in @ 3600 rpm continuous
Speed Regulation:	0.3%
Resolution:	Volume: 0.1 or 1 mL/min Flow rate: 0.1, 1 or 10 mL/min
Repeatability:	± 6 rpm
Motor Cable	
Benchtop:	6-ft. multi-conductor
NEMA:	24-ft. multi-conductor
Wash-down proof:	Controllers 75210-70 & 75210-75, meet NEMA 13 requirements (IP55). Controllers 75210-60 & 75210-65 meet IP22. Pump Drives 75210-50 and 75210-55 meet NEMA 4 & IP56.

Environmental	
Operating Temperature:	0 to 40°C (max.)
Storage Temperature:	-25 to 60°C (max.)
Humidity:	20 - 95% (non-condensing)

NEMA	
Fuses:	For 115V - 3A #3AG For 230V - 1.6A 5 x 20 mm

Benchtop	
Fuses:	For 115V - 3A #3AG For 230V - 1.5A #3AG

Power Cord	
115V:	6-ft., 3-wire, 18 ga., with grounded plug
230V:	6-ft., 3-wire, 14 ga., with grounded European type plug (CEE-7-7)

Controller dimensions	
Benchtop:	9 in W x 9-1/4 in L x 5 in H
NEMA:	8 in W x 10 in L x 6 in H