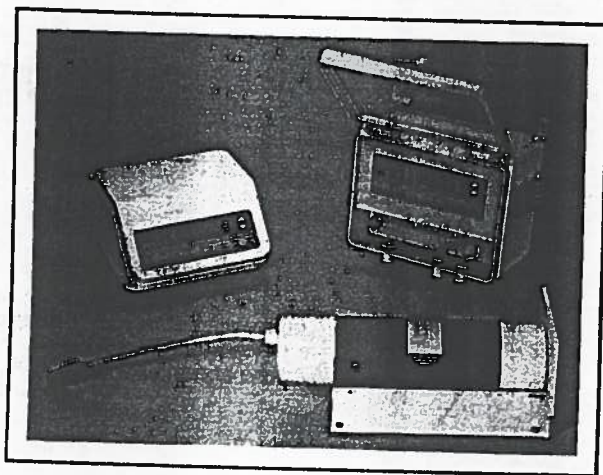


OPERATOR'S MANUAL

**MASTERFLEX<sup>®</sup>**  
MICROPROCESSOR  
CONTROLLED  
PUMP DRIVE/DISPENSER

Type	MODELS		
	System	Pump Drive	Controller
Benchtop (115V)	7592-00	7592-50	7592-60
Benchtop (230V)	7592-05	7592-55	7592-65
NEMA (115V)	7592-10	7592-50	7592-70
NEMA (230V)	7592-15	7592-55	7592-75



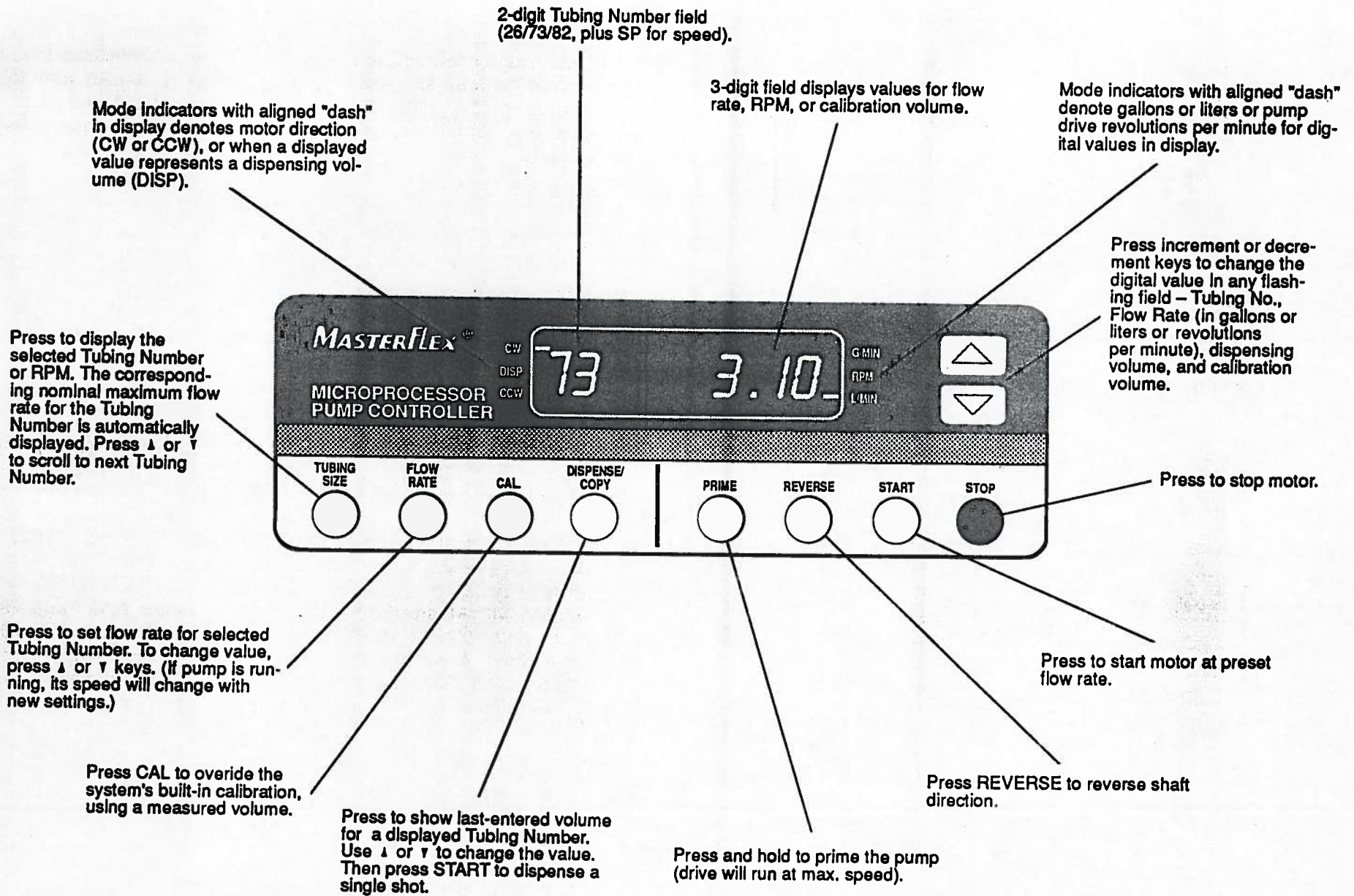
**Cole-Parmer Instrument Co.**  
7425 N. Oak Park Avenue  
Chicago, Illinois 60648

(708) 647-7600  
(800) 323-4340

A-1299-330  
Edition 1290

# CONTROL/DISPLAY FUNCTIONS

(For all Series 7592 Controllers)



## INTRODUCTION

The liquid delivered through a peristaltic pump is in contact only with the inside of the tubing, which can be readily replaced or cleaned. The outstanding characteristics of the Series 7592 MICROPROCESSOR CONTROLLED PUMP DRIVE/DISPENSER systems are accuracy and versatility. The Series 7592 provides convenient digital display of flow rate, speed, dispensed volume and number of samples dispensed. Small to large volumes and repetitive duplicated volumes of a wide range of liquids 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 7592 systems are built to quickly deliver large, precise volumes of liquid at flow rates up to 3.5 gallons or 13.2 liters per minute, including multiple duplicate volumes. These systems are particularly well suited for use in both industrial laboratories and plant environments. The NEMA systems (7592-10 and 7592-15) can be washed down.

For use with Masterflex® Short Shaft I/P Series 7019 Pump Heads or Models 7529-00 or 7529-10 Easy Load Pump Heads (order separately). A second pump head can be tandemed, depending upon tubing size, material, backpressure, fluid density, viscosity and temperature conditions. Flow rates can be displayed based on either built-in nominal tubing calibration factors, or more precisely, via a quick and easy measured volume calibration method.

An accessory FOOTSWITCH for start/stop operation is available for use with the bench-top systems. Also, the NEMA system is available with a hand-held REMOTE CONTROL device. (Ordered separately—see ACCESSORIES section.)

Masterflex-Reg. TM Cole-Parmer Instrument Co.

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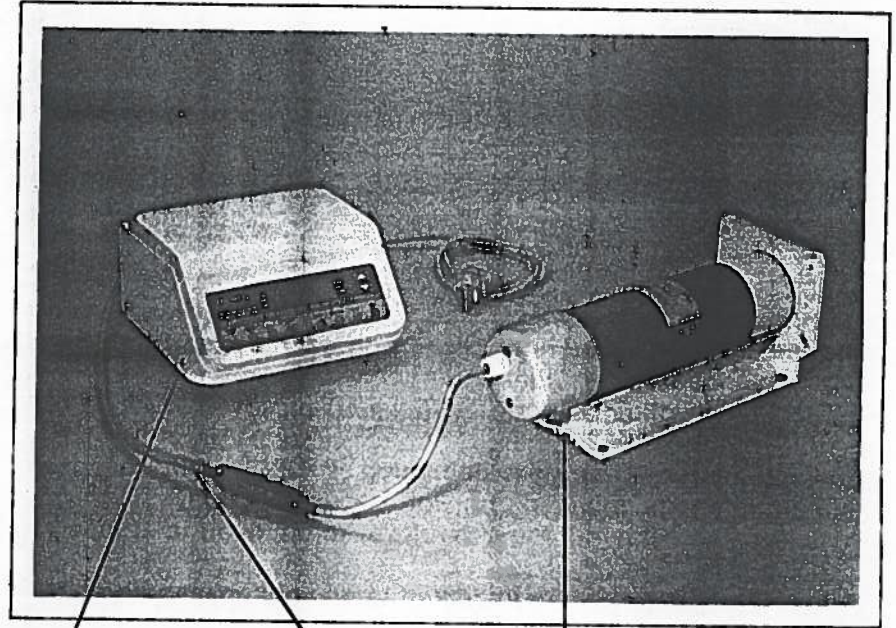
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## DESCRIPTION

The Series 7592 Industrial/Process (I/P) MICROPROCESSOR PUMP/CONTROLLER systems are modularized to allow easier 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 washdown model).

### Benchtop System



**BENCHTOP  
CONTROLLER**  
7592-60 (115V)  
7592-65 (230V)

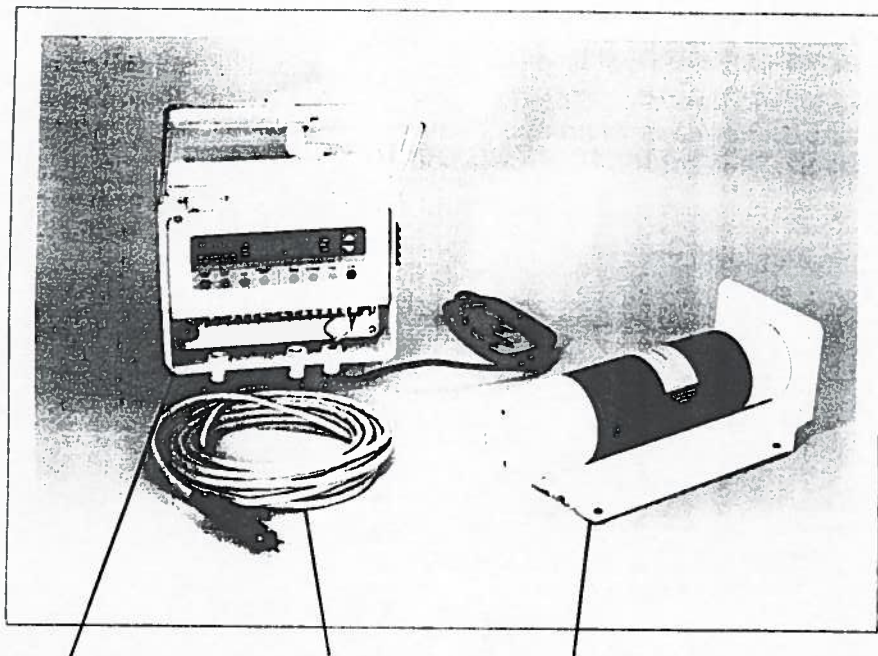
**CONTROLLER  
CABLE**  
(6-ft.)

**PUMP DRIVE**  
7592-50 (115V)  
7592-55 (230V)

**PUMP HEAD**  
(Order  
separately)

Benchtop systems (7592-00 and 7592-05).

## Nema System



**NEMA  
CONTROLLER**  
7592-70 (115V)  
7592-75 (230V)

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

**PUMP DRIVE**  
7592-50  
7592-55

**PUMP HEAD**  
(Order  
Separately)

NEMA (washdown Systems (7592-10 and 7592-15) Controllers are housed in a durable plastic case suitable for wall mounting. Hinged, door with latch provides easy access to Controller 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 these digital values on demand: *volume* (in gallons or liters)...*flow rate* (in gallons per minute, liters per minute, or RPM)...*tubing number*...*copy number*.

### NOTE:

Tubing numbers used throughout the manual and displayed in the Controller refer to the last two digits of the high-capacity Masterflex tubing catalog number. For example, the 3/8" ID silicone tubing catalog number is 06411-73 so "73" should be selected under tubing size.

The display always tells you what's happening during a pumping operation. Adjacent to the display window on either side are "mode" indicators. One or more "dash" segments automatically align opposite the appropriate mode indicator in response to your settings. Thus, you can instantly verify the following functions: motor rotation (clockwise or counter-clockwise)...a precise dispense volume (DISP) is being delivered...and whether the digital value displayed represents a flow rate in gallons per minute, liters per minute or drive motor revolutions per minute.

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/tubing combination 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 tubing selection, flow rate setpoint, motor direction, dispense volume, copy amount, mode and custom calibration.

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

### Pump Drive (All Systems)

The drive furnished with all Series 7592 systems has a 1/5 H.P. 650 RPM precision permanent magnet DC motor with a husky planetary gearhead capable of delivering 300 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 washdowns.

### Pump Heads (All Systems)

One or two Pump Heads can be controlled, depending upon the selected Tubing Number and material, plus backpressure conditions (see SETUP section).

The following short shaft I/P pump heads can be used with this unit:

TABLE 1

Easy load, PS/CRS (Tubing sizes 26, 73, 81 and 82)	7529-00
Easy load, PS/SS (Tubing sizes 26, 73, 81 and 82)	7529-10
High capacity Masterflex, PC/CRS (Tubing size 73)	7019-20
High capacity Masterflex, PC/SS, (Tubing size 73)	7019-21
High capacity Masterflex, PPS/CRS, (Tubing size 73)	7019-42
High capacity Masterflex, PPS/SS, (Tubing size 73)	7019-43
High capacity Masterflex, PC/CRS, (Tubing sizes 81 and 82)	7019-32
High capacity Masterflex, PC/SS, (Tubing sizes 81 and 82)	7019-31
High capacity Masterflex, PPS/CRS, (Tubing sizes 81 and 82)	7019-36
High capacity Masterflex, PPS/SS, (Tubing sizes 81 and 82)	7019-53

PS = polysulfone

CRS = cold rolled steel

SS = stainless steel

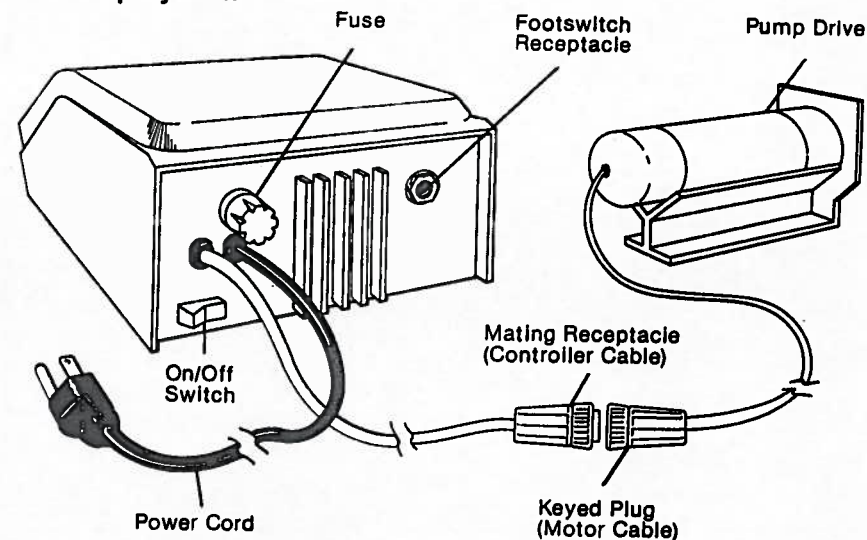
PC = polycarbonate

PPS = polyphenylene sulfide

## 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.

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.

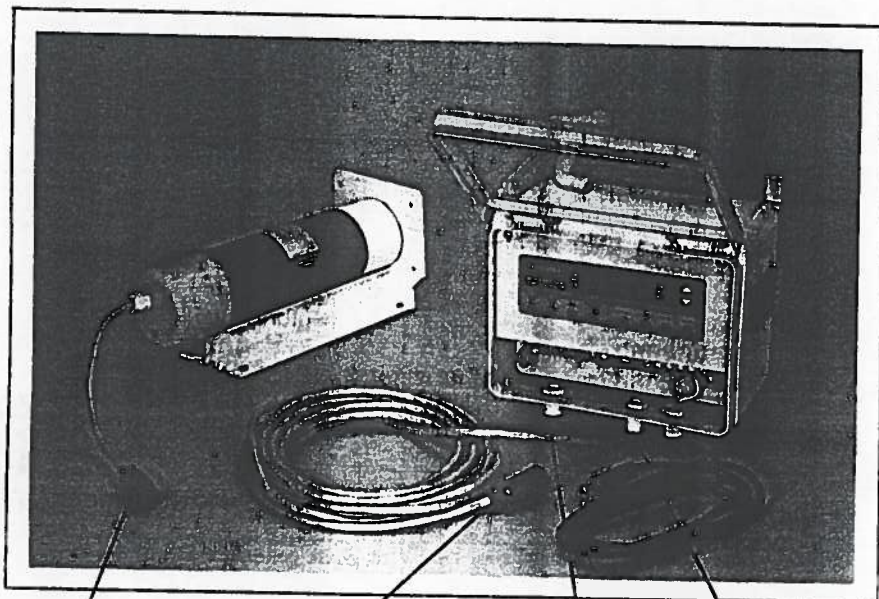
(2) Air vents are provided at the bottom of the cabinet; don't place Controller on a surface that will obstruct air flow when the system is operating.

## (2) Optional: Connect FOOTSWITCH

Instead of using the START/STOP keys on the front control panel, the rear panel of the Benchtop systems 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 (Washdown) System



KEYED PLUG  
(Motor Cable)

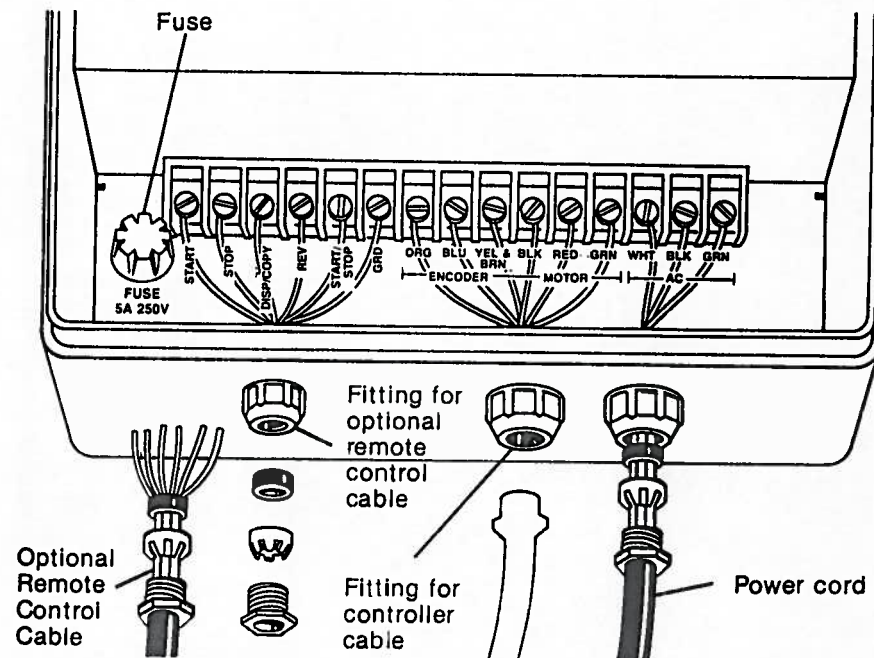
MATING RECEPTACLE  
(Controller Cable)

\*FITTING  
with plastic  
cap for  
optional  
REMOTE  
CONTROL  
CABLE

\*FITTING  
with plastic  
cap for  
CONTROLLER  
CABLE

**\*NOTE:** In order to make enclosure washdown 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 washdown and having a longer CONTROLLER CABLE (24 ft.), it has more remote functions.



Terminal arrangements in NEMA Controller.

**NOTE:** The WHT, BLK, GRN AC Input wires are labeled BLU, BRN, YEL/GRN for the 7592-75, 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 water-proof 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**

If supervision away from the Controller is desired, the preceding illustration denotes how cable connection can be made to a remote control device. The following remote functions are available: start, stop, dispense/copy, reverse, and momentary start/stop. Each function can be activated by a customer supplied switch closure against ground. The customer must furnish the necessary cable (.196" to .315" dia.).

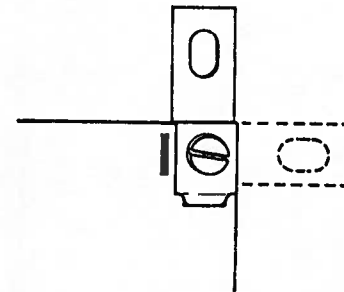
- Remove the plastic cap from the first fitting and feed the accessory or user supplied cable leads through to the terminal strip.
- Connect the leads to the appropriate designated terminals.
- Be sure to tighten the plastic fitting to maintain a wash-down seal.

**NOTE:** An optional hand held remote control unit (7592-80) is available which is connected via a 10 ft. cable. (Refer to instructions furnished with unit.)

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

**(4) Optional: Wall-Mount The NEMA Controller**

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



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

- 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.

The system should now be ready to adjust for an actual application.

**(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 Tubing Numbers. 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(s) & Tubing**

See Table 1 for pump heads that can be used with the Microprocessor Controlled Pump Drives.

The number of pump heads that can be used in tandem depends on the application requirements such as fluid density, viscosity, temperature, backpressure and tubing size and material. Silicone and C-Flex® tubing materials create a smaller load than do Tygon®, Norprene®, PharMed® and Viton®.

In addition, pump temperature and voltage have an effect on loading capability (See Specifications section). Loading affects flow rate and the number of pump heads driveable.

As a rule of thumb, the Pump Drives can pump water in one size 73 Masterflex tube at pressures up to 30 psi and two size 73 Masterflex tubes at 0 psi.

The following table can be used as a guide in selecting the proper tubing size for your desired flow rate.

**TABLE 2**

MIN. FLOW	MAX. FLOW	TUBING NO.
123 mL/min	4.0 L/min	26
250 mL/min	8.11L/min	73
406 mL/min	13.2 L/min	81 & 82

PharMed, Norprene, Tygon - Reg. TM Norton Co.  
 Viton - Reg. TM E.I. duPont DeNemours & Co.  
 C-Flex - Reg. TM Concept. Inc.

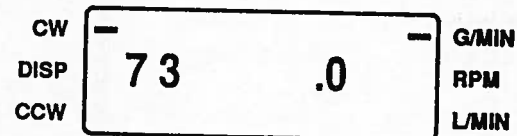
**(2) Install Pump Head(s)**

Refer to Instructions furnished with the Masterflex series 7019, 7529-00 and 7529-10 pump heads.

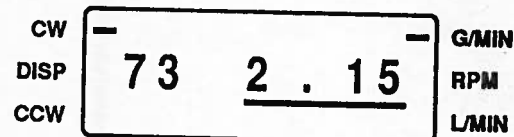
**(3) Apply Power**

- 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 after a shut-down condition. When power is applied, the last setting will appear.



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



Note that the "dash" segment is aligned with the G/MIN mode indicator. Thus, the Flow Rate shown (2.15) represents gallons per minute (not liters or RPM). Incidentally, 2.15 is the maximum flow rate for Tubing Size 73 — it could be any smaller value you previously set.

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.

To set up for a new operation, follow these additional steps:

**(4) Select CW or CCW operations**

**(5) How To Change G/MIN, L/MIN, RPM Flow Rate Display**  
 With the previous display still shown:

- Press the TUBING SIZE key.
- Press the ▲ key once to change the display from G/MIN to L/MIN:



Note that the dash segment is now aligned opposite the L/MIN indicator, and the maximum flow rate value has changed to 8.11 liters per minute.

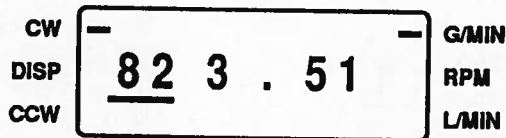
To operate in RPM:

- Press the ▲ or ▼ key until "SP" (for speed in RPM) appears in the display.

#### (6) How To Select A New Tubing Number

If you install different tubing, the corresponding Tubing Number must be displayed. For example, with the preceding display still shown, follow these simple steps:

- Press the ▼ key and scroll to a desired Tubing Number. For example, 82:



Note that the dash segment for Tubing Number 82 is again aligned opposite the G/MIN indicator, and a new maximum Flow Rate (3.51) is automatically displayed. (In general, select a tubing size where the maximum flow rate is at least 10 to 20% higher than the required flow rate.)

Also, note that the Tubing Number field will flash, prompting you to either change it (via the ▲ or ▼ keys). Or, you can change from G/MIN to L/MIN or RPM (see Step 5).

**NOTE:** When Tubing No. 81 is installed, always set the display to read 82.

#### (7) Prime The Pump

- Press and hold the PRIME key. The motor will run at full speed (650 RPM).

### OPERATION

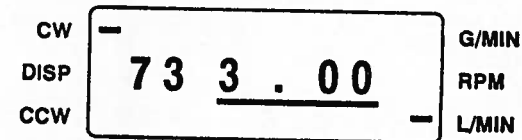
This section describes how to put the system to work. There are several ways of doing it:

#### (1) Start/Stop Operation

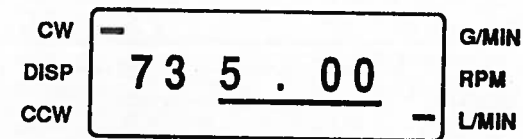
- Select the direction of motor rotation. A dash segment will align opposite the CW or CCW mode indicator to indicate the existing flow direction. To change the direction, press the Reverse key.

If the motor is running when the reverse function is activated, it will stop for about one second, then operate in the opposite direction.

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



- To change the displayed set Flow Rate Value, press the ▲ or ▼ keys. For example, increase the flow to 5.00. Use the ▲ key:



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 TUBING SIZE key and then ▲ or ▼ until the Tubing Number and units in the display agree with the installed tubing.
- Press the DISPENSE/COPY key. The last-entered volume value will be displayed. The dash aligned with L/MIN indicates volume in liters. For example, 2 liters:

CW	-	G/MIN
DISP	-73 2 . 00	RPM
CCW	-	L/MIN

Note that a dash segment is automatically aligned opposite the DISP indicator.

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

CW	-	G/MIN
DISP	-73 1 . 00	RPM
CCW	-	L/MIN

**NOTE:** A controlled Pump Drive coast minimizes potential errors due to motor over-shoot.

- Press the START button. The preset volume will be delivered, and the pump will stop automatically. The dash segment opposite the DISP indicator will flash to indicate the dispense is complete.
- 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:

CW	-	G/MIN
DISP	- <u>C O P Y</u>	RPM
CCW	-	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 change or refine the copy volume, use the START and STOP keys until you are satisfied.

- 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 dash segment opposite the DISP indicator will flash to indicate the dispense is complete. The display will show:

CW	-	G/MIN
DISP	- C O P Y 1	RPM
CCW	-	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.
- 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

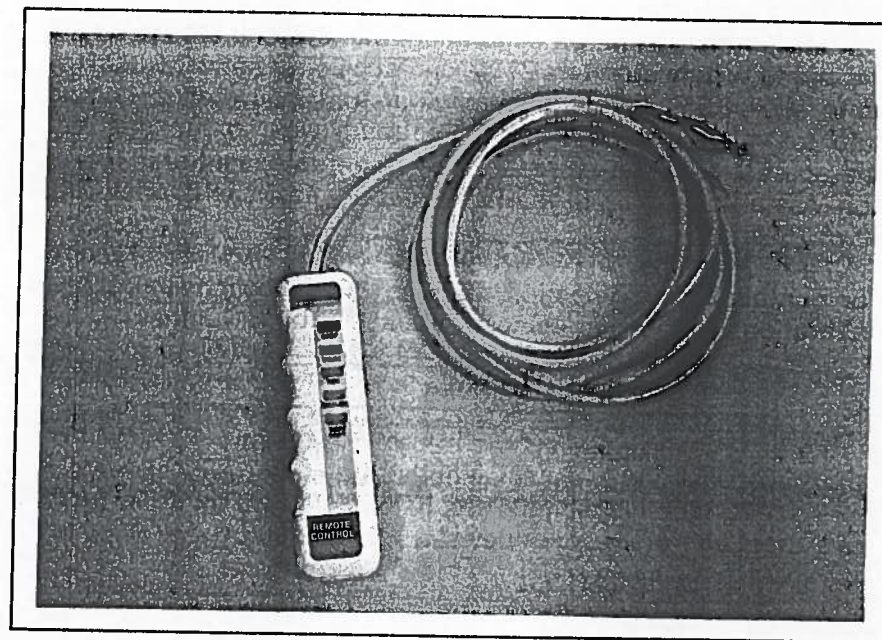
Two optional remote control devices (see **ACCESSORIES** section) are available to pump precise calibrated volumes. Instead of using the front panel controls, a **FOOTSWITCH**, can be plugged into the rear panel of the Benchtop Controller or easily wired to the **NEMA** Controller. (See **INSTALLATION**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

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

#### Accessories

The **FOOTSWITCH** is ideal for applications where frequent start/stop operations are required. Furnished with 6-ft. plug-in cable for Benchtop Controllers. Can be wired to **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.)

#### Mounting Hardware

Mounting Hardware, Single Pump Head 07019-95

Mounting Hardware, Two Pump Heads 07019-96

### CALIBRATION

#### Automatic Calibration

Calibration factors for all standard tubing sizes 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 (in liters only), and achieving flow accuracies of up to  $\pm 0.5\%$ . This capability is useful if you wish to compensate for minor deviations due to tubing wear or unusual fluid characteristics. Also, empirical calibration is essential if you use non-Masterflex tubing in the Easy Load Pump Head (Models 7529-00 or 7529-10).

For container size selection, refer to the following approximate calibration volumes established for each Tubing Number:

Tubing No.	CAL Fill Volume (Liters)
26	.700
73	1.50
81/82	2.50

**NOTE:** For ease in measuring, refer to Cole-Parmer Catalog number 06008-70 graduated beaker with handle. Capacity 3000 ml.

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 Tubing Number automatically cancels 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.

Keep in mind that empirical calibration can be done in liters only. Here's the calibration procedure using a Tubing Number 73 example:

CW — G/MIN  
 DISP 73 8 . 11 RPM  
 CCW — L/MIN

The maximum Flow Rate for Tubing No. 73 is 8.11 liters 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  $\nabla$  key to display a lower Flow Rate value, for example, 6.50.

CW — G/MIN  
 DISP 73 6 . 50 RPM  
 CCW — L/MIN

- Press the CAL key.

The display will show a calibration message (CAL). Also, the stored volume value for the selected Tubing Number will replace the Flow Rate value. For Tubing No. 73, this volume value is 1.50 liters (from Table 3):

CW — G/MIN  
 DISP CAL 1 . 50 RPM  
 CCW — 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 any key except 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 (1.50 L), plus a small overshoot.
- Press the START key to deliver the liquid. The drive will stop automatically, and the volume field will flash:

CW — G/MIN  
 DISP 73 1 . 50 RPM  
 CCW — L/MIN

Note that a second "dash" segment is aligned opposite the CW motor direction indicator. You can also calibrate with the pump running counter-clockwise (explained in the OPERATION section).

**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, 1.40:

CW	—	G/MIN
DISP	73 CAL 1.40	RPM
CCW	—	L/MIN

- Press any key (except ▲ 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 (1.40 liters) and the selected Tubing Number (73), replacing the built-in calibration factor. The drive's motor shaft speed will produce the set Flow Rate using the new CAL factor.

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

CW	—	G/MIN
DISP	73 c 8.11	RPM
CCW	—	L/MIN

The original, unmodified Flow Rate is still available for selection. You now have the option of proceeding with the displayed setpoints (with built-in calibration factors), or, you can change any of the setpoints:

- Use the ▲ or ▼ keys to scroll to your previously calibrated flow rate.

## MAINTENANCE

### Service

The Series 7592 systems are not customer serviceable, except for replacement of FUSES (Part No. B-1115-41 for 115V; Part No. B-1115-43 for 230V) and MOTOR BRUSHES (Part No. A-2543-CR). 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. (See RETURN OF ITEMS at the end of this manual.)

- |           |   |
|-----------|---|
| "Error 1" | No encoder pulses from motor/<br>Corrective action: Check all motor connections.  |
| "Error 2" | Motor over-speed/<br>Corrective action: Check all motor connections.  |
| "Error 3" | TRIAC firing angle too large/<br>Corrective action: Check all motor connections.<br>Unit must be turned off to clear error. |
| "Error 4" | Bad EEPROM, operator parameters reset to default values/<br>Corrective action: Return controller for repair.                |
| "Error 5" | Software failure/<br>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 7592 Controllers are chemically resistant. Use a mild detergent to clean surfaces.

## SPECIFICATIONS

- Voltage range:** 90 Volts AC to 130 Volts AC, 50/60 Hz or 190 Volts AC to 265 Volts AC, 50/60 Hz.
- Current:** 115 Volt Units: 3.0 amps, nominal  
230 Volt Units: 1.5 amps, 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
- Speed Range:** 20 to 650 RPM
- Flow Rates:** From 123 mL/MIN to 13.2 liters per minute
- Torque:** 300 oz.-in. @ 650 RPM continuous
- Speed Regulation:**  $\pm 1$  RPM
- Resolution:** 1 RPM
- Repeatability:**  $\pm 1$  RPM
- Motor Cable**  
**Benchtop:** 6-ft. multi-conductor  
**NEMA:** 24-ft. multi-conductor
- Washdown-proof:** Controllers 7592-70 & 7592-75, meet NEMA 13 requirements (IP55). Controllers 7592-60 & 7592-65 meet IP22. Pump Drives 7592-50 and 7592-55 meet NEMA 4 & IP56.

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

**Fuses:** For 115V - 5A #3AG (Slo-Blo)  
For 230V - 2-1/2A 5 x 20 mm (Slo-Blo)

**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" W x 9-1/4" L x 5" H  
NEMA: 8" W x 10" L x 6" H

## WARRANTY

We warrant the product to be free from defects in material and workmanship as noted in the Warranty Card. If repair or adjustment is necessary, which has not been the result of abuse or misuse within the warranty period, please return, freight prepaid. Correction of the defect will be made without charge. (See Note on Return of Items).

For your protection, items being returned must be **carefully** packed to prevent damage in shipment and **insured** against possible damage or loss. We will not be responsible for damage resulting from careless or insufficient packing.

Out-of-Warranty products will be repaired for a nominal charge.

## RETURN OF ITEMS

Authorization must be obtained from your Dealer before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned.

## TECHNICAL ASSISTANCE

Technical information and advice on the use of the products in specific applications may be obtained. Modifications can often be made to adapt the unit to special customer applications. Contact your Dealer for information.

We reserve the right to make improvements in design, construction and appearance of our products without notice.