

## Reciprocating/Continuous Dual Pump Infusion/Refill

Use one pump as the Master control pump, and the other as the Secondary slave pump.

### Basic Pump Setup: Select Default Program

On the Master Pump: Turn power off

Press and hold the "Program Function" button (Volume Button)

Turn power on, and then release the "Program Function" button.

The display will show [rECP]. Press any key or wait 2 seconds. The display will blink.

The default reciprocating/continuous infusion program will be loaded and the communications will be set for reciprocating control of the Secondary pump.

Change the pumping rate and dispense volume as needed.

Select Phase 2 (press and hold "Program Phase #" button until [PH:01] is displayed) and make the same changes to Phase 2.

The pumping direction for Phase 2 should be the opposite of the pumping direction for Phase 1.

On the Secondary Pump: The Secondary pump should be left in its default factory settings, with the Volume set to off [ oFF] and any rate setting.

Set the appropriate syringe diameter on both pumps.

Press the Start button and the continuous infusion program will begin to operate.

### Detailed Setup Information

Communications Mode with Secondary Pump:

Two control modes with the Secondary pump are available: Reciprocating and Dual.

When one of these is selected, the Master pump will transmit to the Secondary pump:

- Pumping rate and Pumping start or stop (including pauses).

Pumping direction control is mode dependent:

Reciprocating pump mode [ReCP]:

Secondary pump will pump in the opposite direction of the Master pump.

Dual Pump mode [dUAL]:

Secondary pump will pump in the same direction as the Master pump.

To select the Master pump control mode, enter Setup on the Master pump by pressing and holding the "Setup" button (Diameter button), until setup is entered. The pump will scroll through the setup parameters. When the pump address [Ad:00], or other current mode is displayed, press the left-most arrow button to scroll through the communications settings:

[Addr] Address mode: Default communications with PC mode.

[rECP] Reciprocating dual pumps mode: For Auto-refill.

[dUAL] Dual pumps mode: Secondary pump mimics the master pump

In Reciprocating and Dual pump modes, the baud rate defaults to 19,200.

The secondary pump should be left in Address mode [AD:00] and 19,200 baud rate [1920] setting, which are the factory defaults.

In Address mode, the next setting is the baud rate setting.

## Dual/Reciprocating Pumps Cable

### Part #

CBL-DUAL

### Description

Dual/Reciprocating pumps RS-232 control cable

The operation of two pumps is synchronized in either Dual pump mode or Reciprocating pump mode, with one pump acting as the Master control pump.

### (Quantity) Contents:

- 1) (1) Master pump adapter (Figure 2). Alternative function: PC RS-232 com port adapter
- 2) (1) Secondary pump adapter (Figure 3)
- 3) (2) Network cable, 7' (Figure 1).



Figure 1: Network Cable (7' or 25')

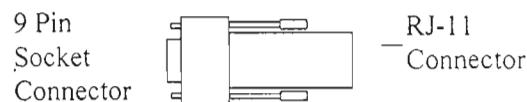


Figure 2: Master Pump Adapter

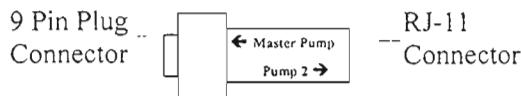
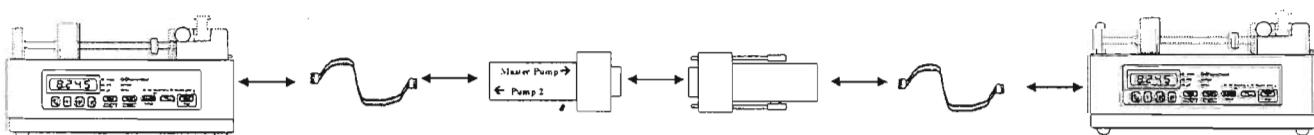


Figure 3: Secondary Pump Adapter

### Dual Pump Cable Attachment Instructions:

- 1) Turn off power to both pumps
- 2) Attach the 9 Pin Plug of the "Secondary Pump Adapter" to the 9 Pin Socket of the "Master Pump Adapter".
- 3) Attach either end of one "Network Cable" (Figure 1) to the "Master Pump Adapter" (Figure 2) RJ-11 connector.
- 4) Attach either end of the other "Network Cable" (Figure 1) to the "Secondary Pump Adapter" (Figure 3) RJ-11 connector
- 5) Attach the "Network Cable" from the "Master Pump Adapter" to the "To Computer" connector on the back of the Master Pump.
- 6) Attach the "Network Cable" from the "Secondary Pump Adapter" to the "To Computer" connector on the back of the Secondary Pump.
- 7) Refer to the pump's User's Manual to setup the baud rate and network address. The computer and pump must have the same baud rate.



Secondary Pump (connect "To Computer")

Master Pump (connect "To Computer")

## Operational Details

Syringes: Each pump can have a different size syringe, but make sure that the pumping rates on the Master pump are within range of the syringe used on the Secondary pump. If an out-of-range pumping rate is sent to the Secondary pump, the rate will just be ignored by the Secondary pump without affecting the operation of the Master pump.

Master Pump: Pumping rate and direction are only transmitted to the Secondary pump from the Master pump while the Master pump is pumping. If the Master pump starts or stops, the Secondary pump will start or stop.

Secondary Pump: Changes to the pumping rate and direction on the secondary pump will not be transmitted to the Master pump. If the Secondary pump stops, the Master pump will also stop.

Pump Stall: If either pump stalls, then the other pump will also stop.

- Synchronization between pumps: The secondary pump will lag approximately 30 milliseconds behind the Master pump due to communications delay.

## RS-232 Communications with a PC

The CBL-DUAL cable can be reconfigured to create an RS-232 pump network with a PC.

- 1) Disconnect the Master Pump Adapter from the Secondary Pump Adapter.
- 2) Attach the Master Pump Adapter to a PC's RS-232 communications port and the Network cable to the "To Computer" connector on the Master Pump.
- 3) Disconnect the Secondary Pump Adapter from the Network Cable
- 4) Attach the Secondary pump's Network Cable to the Master Pump's "To Network" connector and the "To Computer" connector on the Secondary Pump
- 5) On the Master Pump, change the communications mode to Address mode [Addr] and set the address to 0. On the Secondary pump, change the address to 1 [Ad:01].

## Reciprocating Pump Program

Below are examples of how to setup the pumps for reciprocating, continuous flow operation. The Pump 1 program is the default program that is loaded as indicated in the "Basic Pump Setup" section. Pump 1 is the Master pump which controls the Secondary pump's operation. In Reciprocating mode, Pump 2 will pump continuously in the opposite direction of Pump 1 until Pump 1 changes direction.

### **Pump 1**

| Phase | Function | Rate      | Volume  | Direction |
|-------|----------|-----------|---------|-----------|
| 1     | RATE     | 500 ml/hr | 10.0 ml | Infuse    |

| Phase | Function | Rate      | Volume  | Direction |
|-------|----------|-----------|---------|-----------|
| 2     | RATE     | 500 ml/hr | 10.0 ml | Withdraw  |

| Phase | Function |
|-------|----------|
| 3     | JP:01    |

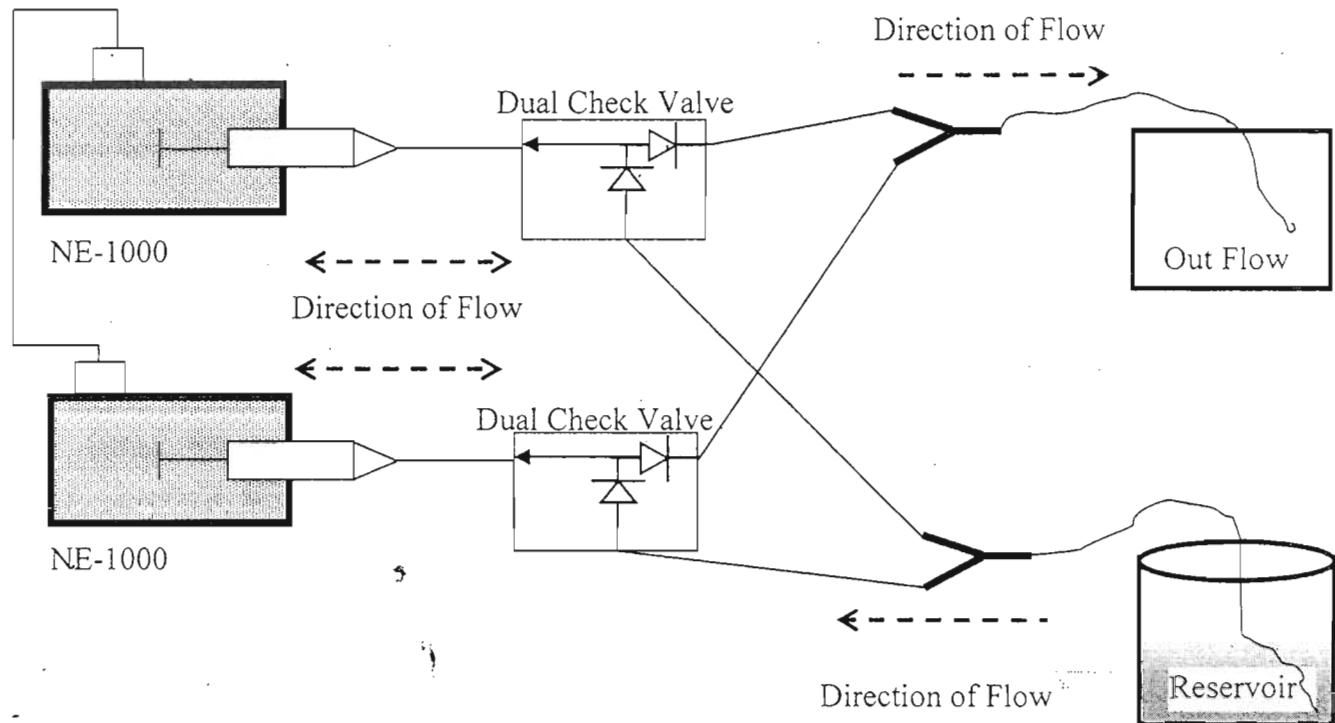
## Pump 2

| Phase | Function | Rate      | Volume          | Direction |
|-------|----------|-----------|-----------------|-----------|
| 1     | RATE     | 500 ml/hr | 0.0 ml<br>(off) | Withdraw  |

| Phase | Function |
|-------|----------|
| 2     | Stop     |

## Plumbing for a Continuous Infusion System

CBL-DUAL



### Major parts of the system:

| Quantity | Description                 |
|----------|-----------------------------|
| 2        | NE-1000 Family Syringe Pump |
| 1        | CBL-DUAL                    |
| 2        | Syringes                    |
| 2        | Dual Check Valves           |
| 2        | Y Connectors                |
| 8        | Sections of tubing          |