med associates inc

Instrumentation and Software for Research

SYRINGE PUMPS

SCAN FOR WEBSITE

A

B

C

SINGLE SPEED SYRINGE PUMP

PHM-200

The next generation of our time-tested PHM-100 series syringe pump has significant improvements, including a complete redesign of the enclosure, anti-siphoning hardware, and a purge/flush feature.

- Can be operated standalone, or activated and de-activated by a Med-PC® 28 volt output (3-pin micro-fit molex)
- Time "on" determines the dose
- A built-in limit switch disconnects power when the plunger reaches the end of the syringe
- The motor is single fixed speed, the speed of the motor determines the infusion rate for the syringe.
  - Speeds available: 0.1, 0.5, 1, 1.5, 2, 3.33*, 5, 10, 15, 20, 30 RPM *(NOTE: 3.33 RPM is standard)*
- Replaces the PHM-100 and PHM-108 pumps
- To compare all three pumps, see the chart on p.8

NOTE: A calibration sheet is included with every pump, which supplies a formula for calculating flow rate using any syringe.

IMAGES

A) Right side (MED control and power connections)

B) 1mL syringe with R-ACC micro syringe adapter (sold separately)

C) Left side (drive screw adjustment knob)

A

B

C

VARIABLE SPEED SYRINGE PUMP

PHM-210

The next generation of our time-tested PHM-100 series syringe pump has significant improvements, including a complete redesign of the enclosure, anti-siphoning hardware, and a purge/flush feature.

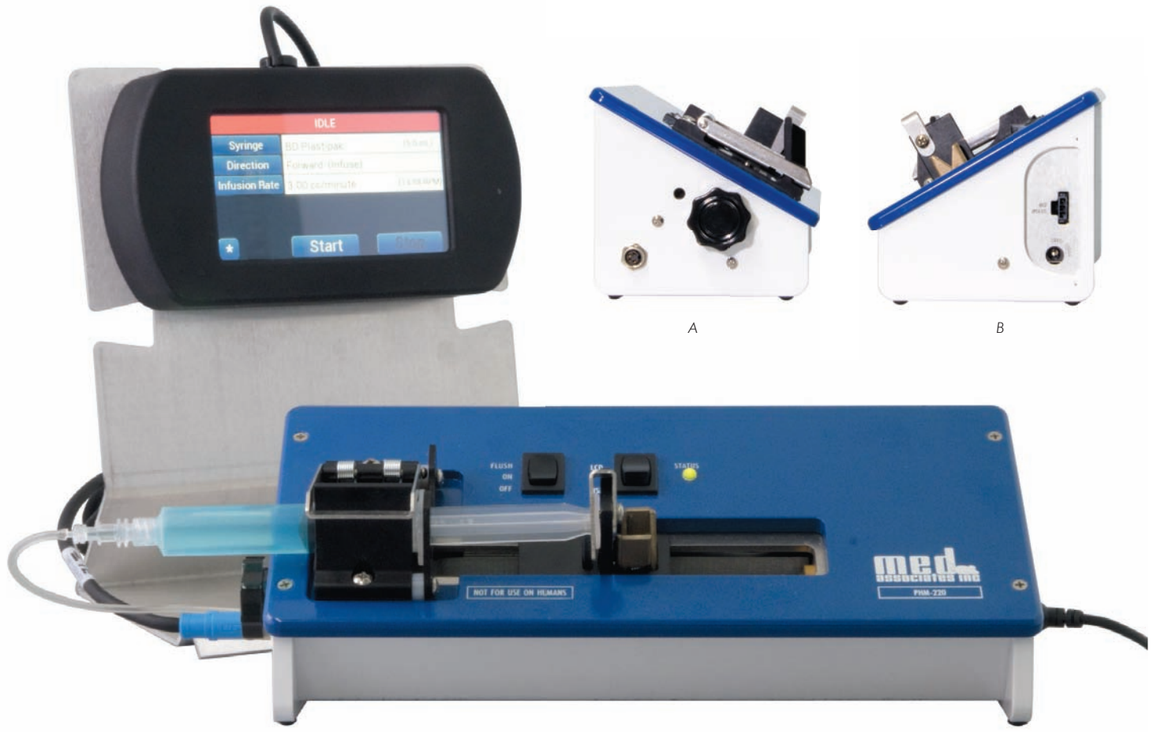
- Can be operated standalone, or activated and de-activated by a Med-PC® 28 volt output (3-pin micro-fit molex)
- Time "on" determines the dose
- A built-in limit switch disconnects power when the plunger reaches the end of the syringe
- The motor speed is adjustable, the speed of the motor determines the infusion rate for the syringe.
  - Adjustable from 0.1 – 30 RPM in 0.1 increments
- Replaces the PHM-100VS-2 and PHM-107 pumps
- To compare all three pumps, see the chart on p.8

IMAGES

A) Right side (MED control and power connections)

B) 1mL syringe with R-ACC micro syringe adapter (sold separately)

C) Left side (drive screw adjustment knob)



A

B

ADVANCED USB TOUCHSCREEN SYRINGE PUMP

PHM-220

The Advanced USB Touchscreen Syringe Pump offers the ability to control the operation of the pump either locally using the intuitive touchscreen interface, or remotely via a serial USB port, or a 28V Med-Connect port.

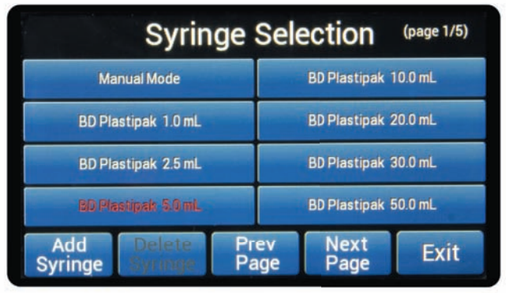
- Specify a syringe from a list of makes and capacities, as well as set the desired infusion rate
- Our recommended pump for variable speed and remote operated infusion or siphoning applications
- The pump can be controlled via computer using:
  - SOF-736 Med-PC software *(w/SOF-111)*
  - RAZEL-IPC Infusion Pump Control software *(w/SOF-111)*
  - SOF-111 USB Syringe Pump Test Program *(included)*
  - 3rd party/custom software
- Safety features:
  - Automatic shut-off switch
  - Alarm
  - Safety Timer
- Replaces the PHM-111-EC pump
- To compare all three pumps, see the chart on p.8

IMAGES

A) Right side (MED control and power connections)

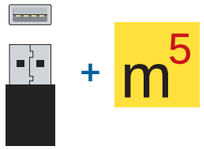
B) Left side (drive screw adjustment knob)

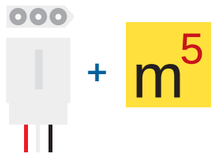
- The PHM-220 pump is pre-loaded with syringe settings for common commercially available syringe makes and sizes. The device can operate in both direction modes with most commercially made syringes. The inner barrel diameter (ID) and subsequent flow rate ranges of many commercial makes are available in the manual.
- Common glass syringes are integrated into the pump interface and can be selected to reference a calculated flow rate estimate.
- Syringes are organized by make and then by fluid capacity.

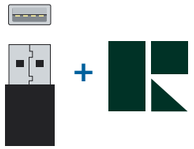


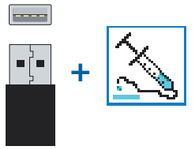
- From the Set Infusion Rate view, the user can choose to change the Rate within the Valid Infusion Rate range listed at the bottom of this view in units set in the Select Infusion Units view.

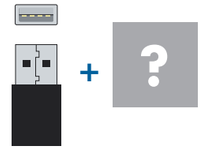
- For user convenience, conversions are pre-programmed into the pump to convert the rate units using either the manually entered or pre-programmed syringes on the Syringe Selection view.



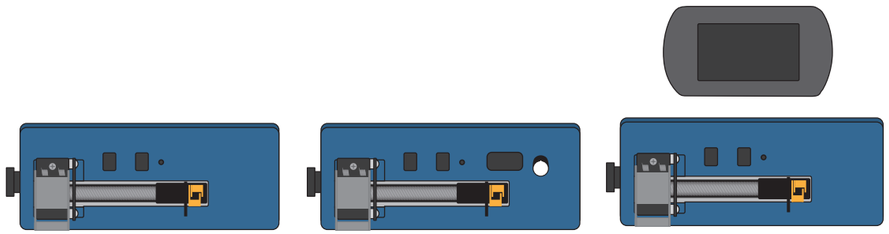








	USB + MED-PC	28V + MED-PC	USB + RAZEL IPC		N/A + DOSE CONTROL INTERFACE	USB + USB SYRINGE PUMP TEST PROGRAM (included w/pump)	USB + 3RD PARTY SOFTWARE
APPLICABLE PUMPS	PHM-220	PHM-200, PHM-210, PHM-220	PHM-220		PHM-220	PHM-220	PHM-220
COMMANDS AVAILABLE	OFF, ON, DOSE, RESET, REVERSE, INPUTOFF, INPUTON, RAMP, RAMPDOSE	OFF, ON	OFF, ON, DOSE, RESET, REVERSE, INPUTOFF, INPUTON, RAMP, RAMPDOSE		OFF, ON, RESET, REVERSE, INPUT-OFF, INPUTON	OFF, ON, DOSE, RESET, REVERSE, INPUTOFF, INPUTON, RAMP, RAMPDOSE	OFF, ON, DOSE, RESET, REVERSE, INPUTOFF, INPUTON, RAMP, RAMPDOSE
MAXIMUM # OF PUMPS	16	16	24		1	16	?
CAPABILITIES	• Best for incorporating the syringe pump into a behavioral experiment. • Trigger various commands dependent upon actions taken by the subject. • Set and save fixed parameters using MedState Notation as part of a protocol, or at the start of a run. • Using the included USB Syringe Pump Test Program provides a GUI for ease of use, and also enables the syringe pump to operate with all of its features.	• Incorporate the syringe pump into a behavioral experiment, but in its most basic form as a standard output device. Only able to control when to run it, and turn it off.	• Best for controlling infusions and planning sophisticated infusion control protocols that track dispensed volume and syringe progress. This is the only control mode/software combination to achieve these capabilities. • Save the entire protocol, both fixed and variable parameters. • Multiple variable parameters can be changed via convenient drop-down menus.		• Specify a syringe from either a list of pre-loaded makes and capacities, or input custom ones, with the ability to save them. • Set the infusion rate in the desired units of volume and time.	• On its own, it can do everything that the dose control interface does, with the addition of ramp doses and dispensation of a dosed volume. • Used in conjunction with Med-PC as a graphic user interface to control the pump.	• To interface with the pump with 3rd party or custom software, the included USB Syringe Pump Test Program will facilitate connection.
DRAWBACKS	• All of these functions are dependent on the complexity of the protocol and thus, the coder's skill level. • Unable to save variable parameters from run to run. • Not pre-programmed to track dispensed volume or syringe progress (coding required).	• Unable to use the USB Syringe Pump Test Program and all of its capabilities, or operate the PHM-220 pump in an advanced way.	• Unable to interface with Med-PC.		• Unable to ramp doses or set a dose to dispense as the USB Syringe Pump Test Program can. • Unable to interface with Med-PC. • Unable to track dispensed volume or syringe progress.	• On its own, it is unable to save either fixed or variable parameters. • Unable to track dispensed volume or syringe progress.	• Requires ability to link a 3rd party program to the pump via DLL file.

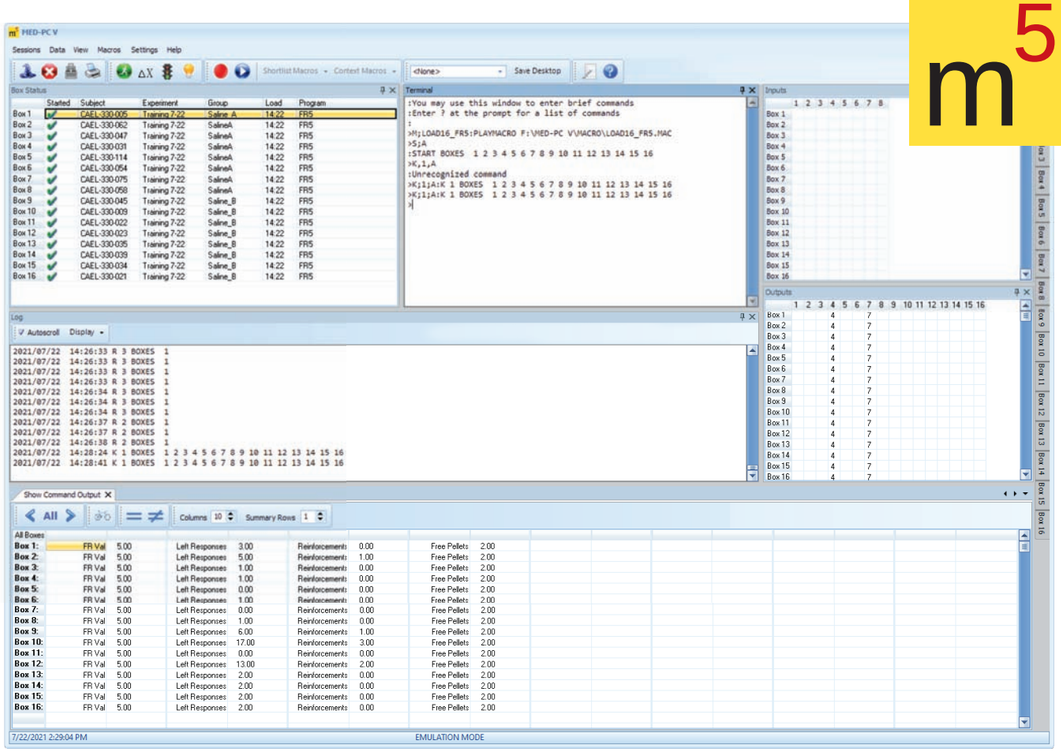


	PHM-200	PHM-210	PHM-220
COMPARABLE MODELS	PHM-100, PHM-108	PHM-100VS-2, PHM-107	PHM-111-EC
OPERATION	◦Standalone ◦Remote via Med-PC *using 28 V Output, a 3-pin micro-fit Molex*	◦Standalone ◦Remote via Med-PC *using 28 V Output, a 3-pin micro-fit Molex*	◦Standalone ◦Remote via Med-PC or Razel IPC *using 28 V Output, a 3-pin micro-fit Molex or USB serial port*
TYPE	Single Speed	Variable Speed	Variable Speed
MOTOR SPEED RANGE	3.33 RPM standard *(available: 0.1, 0.5, 1, 1.5, 2, 3.33, 5, 10, 15, 20, 30 RPM)*	0.1 - 30 RPM *(adjustable in 0.1 RPM increments)*	0.1 - 30 RPM *(adjustable in 0.01 RPM increments)*
SPEED SELECTOR	N/A (factory set)	1.7" display w/rotary encoder	Dose Control Interface w/4.25" Touchscreen
INFUSION RATE RANGE [1]	From 0.2 mL/hr *(0.1 RPM + 1mL syringe)* to 32.1 mL/min *(30 RPM + 50mL syringe)*	From 0.2 mL/hr *(0.1 RPM + 1mL syringe)* to 32.1 mL/min *(30 RPM + 50mL syringe)*	From 0.2 mL/hr *(0.1 RPM + 1mL syringe)* to 32.1 mL/min *(30 RPM + 50mL syringe)*
SYRINGE SIZES [2]	1 - 60 mL *(small syringes require R-ACC adapter)*	1 - 60 mL *(small syringes require R-ACC adapter)*	1 - 60 mL *(small syringes require R-ACC adapter)*
SYRINGE TYPE	Plastic or Glass	Plastic or Glass	Plastic or Glass
ELECTRICAL	28V DC, 700 mA 100V-240V AC, 50-60 Hz, 25W	28V DC, 700 mA 100V-240V AC, 50-60 Hz, 25W	28V DC, 700 mA 100V-240V AC, 50-60 Hz, 25W
ACCURACY	+/- 1.0% CV	+/- 1.0% CV	+/- 1.0% CV
LIMIT SWITCH?	YES	YES	YES
REVERSE?	NO	YES	YES
PURGE/FLUSH SPEED	20 RPM	20 RPM	20 RPM
CONSTRUCTION	Aluminum, Stainless Steel	Aluminum, Stainless Steel	Aluminum, Stainless Steel
OVERALL SIZE	10.5" L x 4.3" W x 3.5" H *(26.7 x 10.9 x 8.9 cm)*	10.5" L x 4.3" W x 3.5" H *(26.7 x 10.9 x 8.9 cm)*	10.5" L x 4.3" W x 3.5" H *(26.7 x 10.9 x 8.9 cm)*
ACCESSORIES	R-ACC *(for microsyringes)*	R-ACC *(for microsyringes)*	R-ACC *(for microsyringes)*

$$\text{Flow Rate (mL/min)} = 0.19538 \times \text{Motor RPM} \times \text{Syringe Cross Sectional Area (cm}^2\text{)}$$

1) Infusion range is approximate, calculated using example syringes (1mL = 0.174cm² / 50mL = 5.477cm²), different syringes may yield greater or lesser infusion rates.

2) Using syringes with plunger flanges greater than 1" OD requires removal of the plunger lock, which disables the syringe reversal feature. 30 mm diameter barrel max.



MED-PC V BEHAVIORAL CONTROL SOFTWARE SUITE

SOF-736

Med-PC uses MedState Notation (MSN) coding language. Determine exactly what is desired for experimental flow and data collection, and encode it in simple text commands. MSN uses commands whose functions are inherently recognizable and easy to learn (e.g. ON, OFF, SHOW, ADD, IF, SET, etc.).

Placing these commands into logically ordered text gives you total flexibility in the control of chamber components, stimuli, reinforcement mechanisms, data storage, and display. MSN is a state-based programming language with blocks of states called state sets. If it can be drawn as a state diagram or a flow chart, it can be coded in MSN.

Incorporate any syringe pump into your procedure by connecting it with a 28V 3-pin molex connection as a standard output device (on/off). Or, with the PHM-220, connect it via USB for sophisticated control (see comparison chart on pp. 6-7).

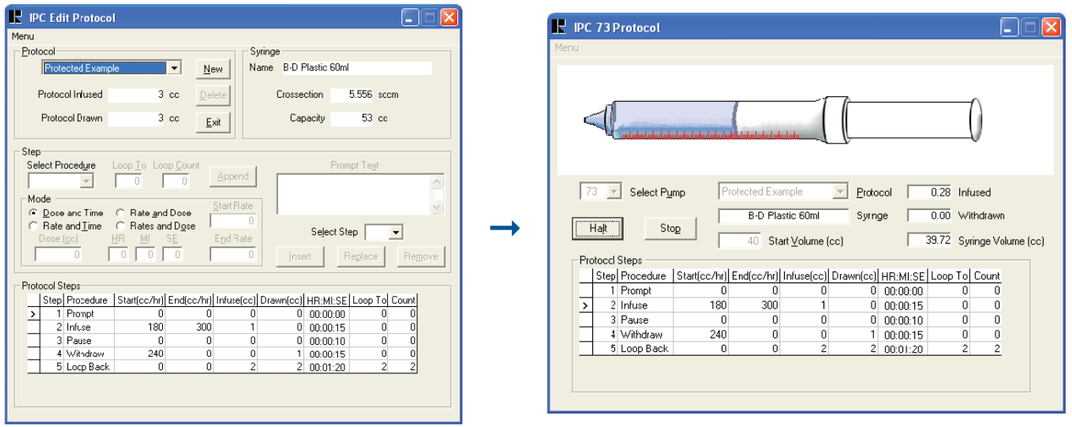
- Best for incorporating the syringe pump into a behavioral experiment.
- Trigger various commands dependent upon actions taken by the subject.
- Set and save fixed parameters using MSN as part of a protocol, or at the start of a run.
- Using the included USB Syringe Pump Test Program provides a GUI for ease of use, and also enables the syringe pump to operate in its fullest capacity.

NOTE: For more info about Med-PC, refer to the Software brochure

COMPUTER REQUIREMENTS:

- Windows 7 or newer *(64-bit)*

RAZEL®
SCIENTIFIC INSTRUMENTS



INFUSION PUMP CONTROL

RAZEL-IPC

A Windows® based program used to control the PHM-220 pump remotely via USB, without the use of Med-PC®. The program allows the user to design an infusion protocol and then send the commands to the pump.

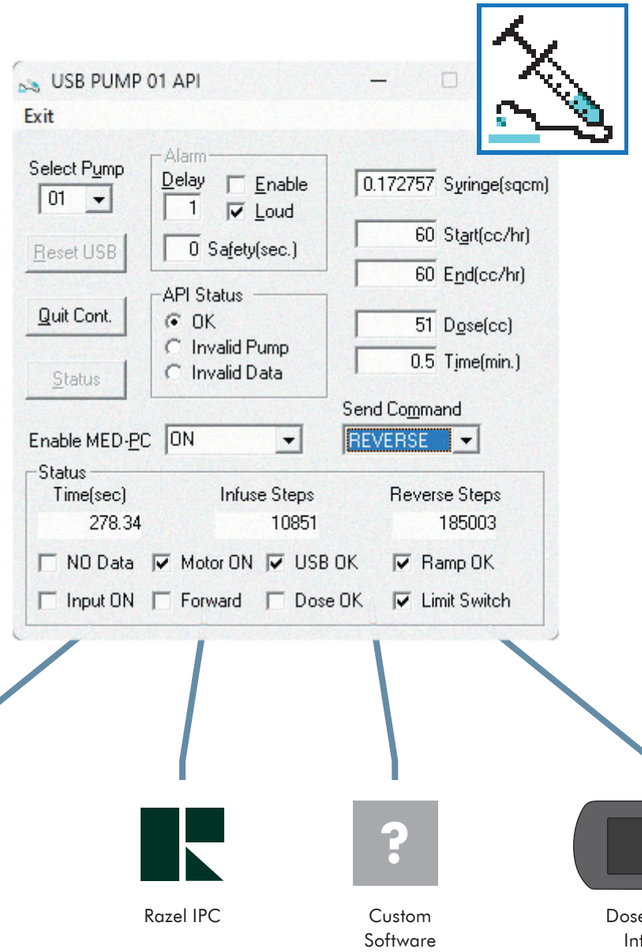
- Control for up to 24 infusion pumps simultaneously
- Infusion protocol steps easily added or removed.
- Contains profiles of commonly used syringes organized by manufacturer, type and size
  - *NOTE: If a syringe is not on the list, its cross-sectional area can easily be entered to calculate flow rate*
- User-defined infusion protocols specify:
  - Infusion specification
  - Withdrawal & pauses
  - Initial flow rates
  - Final flow rates
  - Volume infused
  - Duration of infusion
- Save the entire protocol, both fixed and variable parameters.
- Multiple variable parameters can be changed via convenient drop-down menus.

"Run" screen displays:

- Real-time graphic of the syringe
- Protocol being used
- Syringe size
- Total volume infused & withdrawn
- Current protocol step indicator

COMPUTER REQUIREMENTS:

- Windows 7 or newer *(64-bit)*
- USB port (for pump)



INCLUDED WITH PHM-220

USB SYRINGE PUMP TEST PROGRAM

SOF-111

Included with the PHM-220 pump, this program provides a graphic user interface (GUI) to control the PHM-220 syringe pump.

- On its own, it can do everything that the dose control interface does, with the addition of ramp doses and dispensation of a dosed volume.
- Used in conjunction with Med-PC as a graphic user interface to control the pump.

COMPUTER REQUIREMENTS:

- Windows 7 or newer *(64-bit)*
- USB port (for pump)

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