LAB EQUIPMENTS

for Research and Manufacture

INTRODUCTION

Welcome to our 2020 - 2021 edition of Product Catalog. We would like to thank you for your continue support and encouragement. Throughout this challenging time, we have grown and transform our business to be more efficient and effective. This will enable us to offer better service and more competitive pricing to our customers.

Our new edition of catalog comes with a easy reference features where we categorized the products into different usage categories, i.e. Advanced Material, Renewable Energy, Bio-Process, Gauge Calibration, Membrane Technology, 3D scanner and others. This will facilitate the users to quickly access to the equipment specification required, and options available to them in term of measuring range or equipment complexity.

In our new catalog, we have also added the equipment to do research in renewable energy like solar cell, fuel cell, flow cell, lithium ion batteries, and membrane technologies. In synergy with our advanced material equipment, we have also added the equipment for material characterization especially in the area of rare earth research and magnetic properties. In line with the manufacturing industry footsteps, the equipment on 3D scanning and 3D printing also have been added in to expand the tools in the research and development for industry 4.0.

To our current customers, we believed our partnership will be strengthen for the years to come. The new catalog will also create new opportunities to build new relationship with new customers.

Lastly, I would like to thanks our staffs for their dedication and sacrifice in supporting the management for a brighter future.

Patrick Tan
Director
KGC (Group of Companies)

Contents

Nano Fiber Electrospinning Unit

Model : HO-NFES-040

We can provide client designed instruments on special order. For more details, please contact us

Holmarc's HO-NFES-040 model electrospinning equipment is a complete unit for Nanofiber electrospinning.

It is used to make nano and micro fibers ranging from 50nm to 5 microns in diameter. Many kinds of polymers like Protein nanofibers, carbon nanotubes, inorganic nanofibers etc. can be synthesized using our nano fiber electrospinning unit. Our equipment uses horizontal spinning when compared to other equipments available in the market. This technology assures the quality of the spun fibers with no dip and uneven diameter.

It's user friendly software, task oriented design, ease of operation and competitive pricing are certain features that place our equipment ahead of other products available in the market. Holmarc's HO-SPLF4 model syringe pump render a smooth and uninterrupted flow enabling uniform spinning. HMPSKV30 model high voltage power supply delivers 0-30 KV output voltage range with a maximum current capacity of 0.5 mA. A stationary target, a vertically moving target and Rotating mandrels of six different diameters are supplied along with the unit.

HO-FH-01 model fume hood provides an enclosed atmosphere with transparent side walls to monitor the electro spinning process. The inbuilt heater can raise the process temperature up to 45°C. A common electronic control unit is integrated within the hood. The hood also has features like exhaust fan, granite work surface and optional features like high bright halogen lighting and duct of custom dimension which can be connected to an exhaust duct (available onsite).

KEY FEATURES

- Cabin heating : Upto 45°C using 1000 watt coil heater
- The chamber is provided with residual charge discharge stick which is used for static removal.
- Safety switch provided to switch off H.V. Power supply when door is opened.
- LED cabin lighting and back light to view needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment when ever required.
- Coaxial spinneret: Our Nano fiber electrospinning unit equips Coaxial spinneret which helps to produce hollow nanofibers and core / sheath nanofibers. This technology can also be used to combine different characteristics of each polymer into one fiber.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marking the positions of syringe pump and target.
- User friendly software enables PC interfacing that helps the regulation and control of various features like rotating mandrel speed, spin duration, syringe pump flow rate, XY target movement etc.
- Rotating mandrel targets of varying diameters, stationary target and reciprocating XY target provided with the system.
- System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection.

SPECIFICATION

I High Voltage Power Supply

HOLMARC'S HO-NFES-040 comes with HMPSKV30 model high voltage power supply. It has 0 - 30kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and readout from the digital panel meters.

Specifications :

- 0 - 30kV single output, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection.

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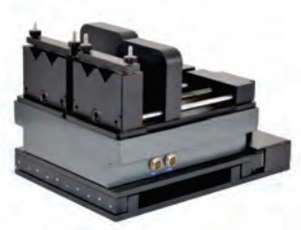
II Independently Controlled Dual Channel Syringe Pump

The speed and flow rate can be changed on both syringes to achieve custom fabrications of fibers. The Syringe pump can also be moved to and fro in X axis. The maximum travel distance is 200mm. The movement is controlled through PC.

- To dispense from standard disposable or glass syringes of volume ranging from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions.
- Motor control through micro controller to control and indicate flow rate
- Four syringe dispensing system
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.



III Rotating Mandrel

Rotating mandrels which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact.

- Stainless steel drums of different sizes
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/-1%

IV Y Plate Collector & Stationary Target

This collector can be used as stationary target or as Y plate collector. The stationary target which acts as a collector of electro spun nanofibers, is made of stainless steel plate that can be held vertically on a table top. It also has a connector for grounding. By using a stationary target alone, one cannot attain a uniform density of fibers, as most of the fiber is collected around the point orthogonal to the syringe needle.

- Plate Dimension 250 x 175 x 3mm
- Plate Material : Stainless Steel
- Grounding Facility : Available
- Programmable Y motion profile to control the nano fiber deposition characteristics
- PC based motion control with documentation of parameters like speed, traverse, motion profile and duration

Needle Spinneret

Co axial Spinneret

V Spinneret

a. Needle spinneret : The Flat tipped metal needles are provided for the easy flow of nano fibers. The high voltage is connected to the tip of the needle using metal clips.

b. Co axial Spinneret : The Coaxial spinneret provides simultaneous flow of two different solutions. This helps to produce hollow nanofibers and core / sheath nanofibers.

VI Fume Hood

HOLMARC's HO-FH-01 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from polluted air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension which can be connected to an exhaust duct available onsite. HOLMARC's Fume Hood also has an option for in-built heater capable of providing a temperature up to 45°C.

- Standalone unit with in-built power supply and wiring for the heater, lighting and exhaust
- Transparent glass windows on three sides for monitoring the electrospinning process
- Foot print: 1200mm x 850mm x 1750 mm
- Construction material: stainless steel, aluminium & glass
- Epoxy coated for electrical insulation
- Ambient to 40°C temperature control
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust outlet available at the customer's facility.

VII Accessories

- Normal glass syringe
- Glass syringe with tube connector
- Spare needle
- Teflon tube

VIII UV Curing Lamp (Optional)

- A special 10W 254nm UV light can be added on top of the rotating collector drum which helps to cure the spun fibers.
- It can be switched on during the operation or when fiber spun is completed on the collector drum.
- As the UV light is harmful to our skin and eye, the glass surfaces of the chamber is protected with special coatings to reflect maximum UV.
- The controller is also provided with an ON/OFF switch for the UV lamp.

Compact Nano fiber Electrospinning Unit with Support

Model : HO-NFES-040B

 # We can provide client designed instruments on special order. For more details, please contact us

Holmarc's (HO-NFES-040B model) Electro-spinning equipment is a compact version for Nano fiber Electro spinning. A unique support structure made of steel pipes is provided along with the equipment which when screwed and fixed together can be used as a sturdy support for the Nano fiber electrospinning unit.

It is used to make nano and micro fibers ranging from 50nm to 5 microns in diameter. Many kinds of polymers like Protein nanofibers, carbon nanotubes, inorganic nanofibers etc. can be synthesized using our nano fiber electrospinning unit. Our equipment uses horizontal spinning, which is the most commonly used method in lab scale nanofiber production. This technology assures the quality of the spun fibers with no dip and uneven diameter. It features user friendly and task oriented design. The ease of operation and competitive pricing places our equipment ahead of other products available in the market. Holmarc's HO-SPLF4 model syringe pump render a smooth and uninterrupted flow enabling uniform spinning. HMPSKV30 model high voltage power supply delivers 0-30 KV output voltage range with a maximum current capacity of 0.5 mA. A stationary target and Rotating mandrels of six different diameters are supplied along with the unit.

HO-FH-02 model fume hood is a compact unit which provides an enclosed atmosphere with 3 transparent side walls to monitor the electro spinning process. The hood also has features like exhaust fan, granite work surface and optional features like high bright halogen lighting, duct of custom dimension which can be connected to an exhaust duct available onsite. This model uses a microprocessor based control unit that interfaces the operations of the syringe pump and Mandrel.

KEY FEATURES

- Cabin Heating : Upto 45°C using 1000 watt coil heater
- The chamber is provided with residual charge discharge stick which is used for static removal.
- Safety switch provided to switch off H.V. power supply when door is opened.
- LED cabin lighting and back light to view needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment when ever required.
- Coaxial spinneret: Our Nano fiber electrospinning unit equips coaxial spinneret which helps to produce hollow nanofibers and core / sheath nanofibers. This technology can also be used to combine different characteristics of each polymer into one fiber.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marking the positions of syringe pump and target.
- User friendly software enables PC interfacing that helps the regulation and control of various features like rotating mandrel speed, spin duration, syringe pump flow rate, XY target movement etc.
- Rotating mandrel targets of varying diameters, stationary target and reciprocating XY target provided with the system.
- System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection.

SPECIFICATION

I High Voltage Power Supply

HOLMARC's HO-NFES-040B comes with HMPSKV30 model high voltage power supply. It has 0 - 30kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and readout from the digital panel meters.

Specifications :

- 0 - 30kV single output, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection.

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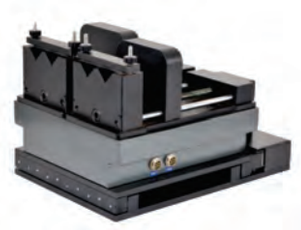
II Independently Controlled Dual Channel Syringe Pump

The speed and flow rate can be changed on both syringes to achieve custom fabrications of fibers. The Syringe pump can also be moved to and fro in X axis. The maximum travel distance is 200mm. The movement is controlled through PC.

- To dispense from standard disposable or glass syringes of volume ranging from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions.
- Motor control through micro controller to control and indicate flow rate
- Four syringe dispensing system
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.



III Rotating Mandrel

Rotating mandrels which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact.

- Stainless steel drums of different sizes
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/-1%

IV Y Plate Collector & Stationary Target

This collector can be used as stationary target or as Y plate collector. The stationary target which acts as a collector of electro spun nanofibers, is made of stainless steel plate that can be held vertically on a table top. It also has a connector for grounding. By using a stationary target alone, one cannot attain a uniform density of fibers, as most of the fiber is collected around the point orthogonal to the syringe needle.

- Plate Dimension 250 x 175 x 3mm
- Plate Material : Stainless Steel
- Grounding Facility : Available
- Programmable Y motion profile to control the nano fiber deposition characteristics
- PC based motion control with documentation of parameters like speed, traverse, motion profile and duration

Needle Spinneret

Co axial Spinneret

V Spinneret

a. Needle spinneret : The Flat tipped metal needles are provided for the easy flow of nano fibers. The high voltage is connected to the tip of the needle using metal clips.

b. Co axial Spinneret : The Coaxial spinneret provides simultaneous flow of two different solutions. This helps to produce hollow nanofibers and core / sheath nanofibers.

VI Fume Hood

HOLMARC's HO-FH-02 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from polluted air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension which can be connected to an exhaust duct available onsite. HOLMARC's Fume Hood also has an option for in-built heater capable of providing a temperature up to 45°C.

- Standalone unit with in-built power supply and wiring for the heater, lighting and exhaust
- Transparent glass windows on three sides for monitoring the electrospinning process
- Foot print: 1000mm x 800mm x 1950 mm
- Construction material: stainless steel, aluminium & glass
- Epoxy coated for electrical insulation
- Ambient to 40°C temperature control
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust outlet available at the customer's facility.

VII Accessories

- Normal glass syringe
- Glass syringe with tube connector
- Spare needle
- Teflon tube

VIII UV Curing Lamp (Optional)

- A special 10W 254nm UV light can be added on top of the rotating collector drum which helps to cure the spun fibers.
- It can be switched on during the operation or when fiber spun is completed on the collector drum.
- As the UV light is harmful to our skin and eye, the glass surfaces of the chamber is protected with special coatings to reflect maximum UV.
- The controller is also provided with an ON/OFF switch for the UV lamp.

Dual Pump Nano Fiber Electrospinning Unit

Model : HO-NFES-043C

Holmarc's (HO-NFES-043C model) Electro-spinning equipment features two syringe pumps on both sides of the rotating collector drum.

The distance between the syringe and drum can be adjusted. The speed, direction, travel and dispensing rate can be changed on both syringe pumps.This technique helps the end user to increase the production rate of nano fibers. Two different materials can be spun simultaneously if required, using dual pump spinning unit.

It is used to make nano and micro fibers ranging from 50nm to 5 microns in diameter. Many kinds of polymers like Protein nanofibers, carbon nanotubes, inorganic nanofibers etc. can be synthesized using our nano fiber electro spinning unit. Our equipment uses horizontal spinning which is the most commonly used method in lab scale nanofiber production. This technology assures the quality of the spun fibers with no dip and uneven diameter. Its user friendly software, task oriented design, ease of operation and competitive pricing are certain features that place our equipment ahead of other products available in the market.

Holmarc's HO-SPLF4 model syringe pump render a smooth and uninterrupted flow enabling uniform spinning. HMPSKV30 model high voltage power supply delivers 0-30 KV output voltage range with a maximum current capacity of 0.5 mA. A stationary target, an XY moving target and Rotating mandrels of six different diameters are supplied along with the unit.

HO-FH-03 model fume hood is a compact unit provides an enclosed atmosphere with 3 transparent side walls to monitor the electro spinning process. The hood also has features like exhaust fan, granite work surface and optional features like high bright halogen lighting, duct of custom dimension which be connected to an exhaust duct available onsite. This model uses a microprocessor based control unit that interfaces the operations of the syringe pump and Mandrel.

KEY FEATURES

- Cabin heating : Up to 45°C using 1000 watt coil heater
- The chamber is provided with residual charge discharge stick which is used for static removal.
- Safety switch provided to switch off H.V. power supply when door is opened.
- LED cabin lighting and back light to view needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment when ever required.
- Coaxial spinneret: Our Nano fiber electrospinning unit equips Coaxial spinneret which helps to produce Hollow nanofibers and Core / Sheath nanofibers. This technology can also be used to combine different characteristics of each polymer into one fiber.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marking the positions of syringe pump and target.
- User friendly software enables PC interfacing that helps the regulation and control of various features like rotating mandrel speed, spin duration, syringe pump flow rate, XY target movement etc.
- Rotating mandrel targets of varying diameters, stationary target and reciprocating X Y target provided with the system.
- System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection.

Dual Pump Nano Fiber Electrospinning Unit Product Video

Nano Fiber Double Spinning & Yarning System

SPECIFICATION

I High Voltage Power Supply

HOLMARC's HO-NFES-043C comes with HMPSKV30 model high voltage power supply. It has 0 - 30kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and readout from the digital panel meters.

Specifications :

- 0 - 30kV single output, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection.

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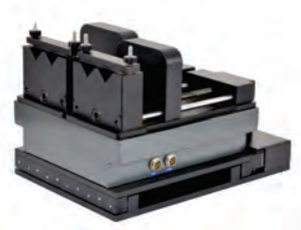
II Independently Controlled Dual Channel Syringe Pump

The speed and flow rate can be changed on both syringes to achieve custom fabrications of fibers. The Syringe pump can also be moved to and fro in X axis. The maximum travel distance is 200mm. The movement is controlled through PC.

- To dispense from standard disposable or glass syringes of volume ranging from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions.
- Motor control through micro controller to control and indicate flow rate
- Four syringe dispensing system
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.



III Rotating Mandrel

Rotating mandrels which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact.

- Stainless steel drums of different sizes
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/-1%

IV Y Plate Collector & Stationary Target

This collector can be used as stationary target or as Y plate collector. The stationary target which acts as a collector of electro spun nanofibers, is made of stainless steel plate that can be held vertically on a table top. It also has a connector for grounding. By using a stationary target alone, one cannot attain a uniform density of fibers, as most of the fiber is collected around the point orthogonal to the syringe needle.

- Plate Dimension 250 x 175 x 3mm
- Plate Material : Stainless Steel
- Grounding Facility : Available
- Programmable Y motion profile to control the nano fiber deposition characteristics
- PC based motion control with documentation of parameters like speed, traverse, motion profile and duration

Needle Spinneret

Co axial Spinneret

V Spinneret

a. Needle spinneret : The Flat tipped metal needles are provided for the easy flow of nano fibers. The high voltage is connected to the tip of the needle using metal clips.

b. Co axial Spinneret : The Coaxial spinneret provides simultaneous flow of two different solutions. This helps to produce hollow nanofibers and core / sheath nanofibers.

VI Fume Hood

HOLMARC's HO-FH-03 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from polluted air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension which can be connected to an exhaust duct available onsite. HOLMARC's Fume Hood also has an option for in-built heater capable of providing a temperature up to 45°C.

- Standalone unit with in-built power supply and wiring for the heater, lighting and exhaust
- Transparent glass windows on three sides for monitoring the electrospinning process
- Foot print: 1700mm x 800mm x 1950 mm
- Construction material: stainless steel, aluminium & glass
- Epoxy coated for electrical insulation
- Ambient to 40°C temperature control
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust outlet available at the customer's facility.

VII Accessories

- Normal glass syringe
- Glass syringe with tube connector
- Spare needle
- Teflon tube

VIII UV Curing Lamp (Optional)

- A special 10W 254nm UV light can be added on top of the rotating collector drum which helps to cure the spun fibers.
- It can be switched on during the operation or when fiber spun is completed on the collector drum.
- As the UV light is harmful to our skin and eye, the glass surfaces of the chamber is protected with special coatings to reflect maximum UV.
- The controller is also provided with an ON/OFF switch for the UV lamp.

Nano Fiber Electrospinning Unit with Horizontal & Vertical Spinning

Model : HO-NFES-043

Holmarc's (HO-NFES-043 model) Electro-spinning equipment is a compact version for Nano fiber Electro spinning.

In this model, motorized XY movement is provided for needle tip. The needle tip can be arranged in horizontal or vertical fashion for spinning. Collector bowl for liquid targets is also provided along with the system.

It is used to make nano and micro fibers ranging from 50nm to 5 microns in diameter. Many kinds of polymers like Protein nanofibers, carbon nanotubes, inorganic nanofibers etc. can be synthesized using our nano fiber electrospinning unit. Our equipment uses horizontal spinning when compared to other equipments available in the market. This technology assures the quality of the spun fibers with no dip and uneven diameter. It's user friendly software, task oriented design, ease of operation and competitive pricing are certain features that place our equipment ahead of other products available in the market.

Holmarc's HO-SPLF4 model syringe pump render a smooth and uninterrupted flow enabling uniform spinning. HMPSKV30 model high voltage power supply delivers 0-30 KV output voltage range with a maximum current capacity of 0.5 mA. A stationary target, an XY moving target and Rotating mandrels of six different diameters are supplied along with the unit.

HO-FH-04 model fume hood provides the compact unit an enclosed atmosphere with 3 transparent side walls to monitor the electro spinning process. The hood also has features like exhaust fan, granite work surface and optional features like high bright halogen lighting, exhaust port of custom dimension to be connected to an exhaust duct available onsite etc as with the other model. This model uses a microprocessor based control unit that interfaces the operations of the syringe pump and Mandrel.

KEY FEATURES

- Cabin Heating : Upto 45°C using 1000 watt coil heater
- The chamber is provided with Residual Charge Discharge Stick which is used for static removal.
- Safety switch provided to switch off H.V. Power supply when door is opened.
- LED cabin lighting and back light to view Needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment whenever required.
- Coaxial spinneret: Our Nano fiber electrospinning unit equips coaxial spinneret which helps to produce hollow nanofibers and core / sheath nanofibers. This technology can also be used to combine different characteristics of each polymer into one fiber.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marking the positions of syringe pump and target.
- User friendly software enables PC interfacing that helps the regulation and control of various features like Rotating mandrel speed, Spin Duration, Syringe pump flow rate, XY target movement etc.
- Rotating Mandrel targets of varying diameters, Stationary target and Reciprocating XY target provided with the system.
- System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection.

SPECIFICATION

I High Voltage Power Supply

HOLMARC's HO-NFES-043 comes with HMPSKV30 model high voltage power supply. It has 0 - 30kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and readout from the digital panel meters.

Specifications :

- 0 - 30kV single output, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection.

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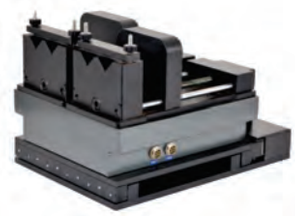
II Independently Controlled Dual Channel Syringe Pump

The speed and flow rate can be changed on both syringes to achieve custom fabrications of fibers. The Syringe pump can also be moved to and fro in X axis. The maximum travel distance is 200mm. The movement is controlled through PC.

- To dispense from standard disposable or glass syringes of volume ranging from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions.
- Motor control through micro controller to control and indicate flow rate
- Four syringe dispensing system
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.



III Rotating Mandrel

Rotating mandrels which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact.

- Stainless steel drums of different sizes
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/-1%

IV Y Plate Collector & Stationary Target

This collector can be used as stationary target or as Y plate collector. The stationary target which acts as a collector of electro spun nanofibers, is made of stainless steel plate that can be held vertically on a table top. It also has a connector for grounding. By using a stationary target alone, one cannot attain a uniform density of fibers, as most of the fiber is collected around the point orthogonal to the syringe needle.

- Plate Dimension 250 x 175 x 3mm
- Plate Material : Stainless Steel
- Grounding Facility : Available
- Programmable Y motion profile to control the nano fiber deposition characteristics
- PC based motion control with documentation of parameters like speed, traverse, motion profile and duration

Needle Spinneret

Co axial Spinneret

V Spinneret

a. Needle spinneret : The Flat tipped metal needles are provided for the easy flow of nano fibers. The high voltage is connected to the tip of the needle using metal clips.

b. Co axial Spinneret : The Coaxial spinneret provides simultaneous flow of two different solutions. This helps to produce hollow nanofibers and core / sheath nanofibers.

VI Fume Hood

HOLMARC's HO-FH-04 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from polluted air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension which can be connected to an exhaust duct available onsite. HOLMARC's Fume Hood also has an option for in-built heater capable of providing a temperature up to 45°C.

- Standalone unit with in-built power supply and wiring for the heater, lighting and exhaust
- Transparent glass windows on three sides for monitoring the electrospinning process
- Foot print: 1000mm x 800mm x 1950 mm
- Construction material: stainless steel, aluminium & glass
- Epoxy coated for electrical insulation
- Ambient to 40°C temperature control
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust outlet available at the customer's facility.

VII Accessories

- Normal glass syringe
- Glass syringe with tube connector
- Spare needle
- Teflon tube

VIII UV Curing Lamp (Optional)

- A special 10W 254nm UV light can be added on top of the rotating collector drum which helps to cure the spun fibers.
- It can be switched on during the operation or when fiber spun is completed on the collector drum.
- As the UV light is harmful to our skin and eye, the glass surfaces of the chamber is protected with special coatings to reflect maximum UV.
- The controller is also provided with an ON/OFF switch for the UV lamp.

Nano Fiber Double Spinning & Yarning System

Model : HO-NFES-SYS

Nano Fiber Double Spinning & Yarning System is one of the most efficient, convenient methods to produce fibers of a nanometric scale. These nanometric fibers reveal several remarkable characteristics such as a large surface area to the volume ratio, high porosity, flexibility in surface functionality, and superior mechanical performance. Nanofibers are utilized in a wide variety of applications such as filtration and multifunctional membranes, medical usages, and military systems due to their outstanding properties.

Holmarc's Nano Fiber Double Spinning & Yarning System comprises of a bipolar high voltage supply and a set of collectors for different applications. The instrument also equips with a unique rotary collector through which user will be able to spin the fiber into threads and collect it in spools. The diameter of the fiber depends on various parameters but mainly flow rate. In order to make fiber into yarn, two syringe pumps, one with positively charged spinneret and the other with negatively charged spinneret, are targeted to a funnel shaped collector from where fiber yarns are formed and rolled into spool.

The equipment is controlled by a software compatible with Windows OS. The parameters like solution flow rate, rotating speed of the funnel or mandrel collector, duration of electrospinning, horizontal and vertical speeds of the spool etc can be controller using this software.

KEY FEATURES

- Cabin Heating : Upto 45°C using 1000 watt coil heater
- The chamber is provided with Residual Charge Discharge Stick which is used for static removal.
- Safety switch provided to switch off H.V. Power supply when door is opened.
- LED cabin lighting and back light to view Needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment where there is any emergency.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marketing the positions of syringe pumps, target and yarn spool.
- User friendly software enables PC interfacing that helps the regulation and control of various features like Rotating speed of the funnel or mandrel collector, Spin Duration, horizontal and vertical speeds of the spool, Syringe pump flow rate, etc.
- Rotating Mandrel targets of varying diameters, Stationary target, Reciprocating XY target, metal funnel collector and yarn spool provided with the system.
- Coaxial spinneret : Our Nano fiber electrospinning unit equips Coaxial spinneret which helps to produce Hollow nanofibers and Core / Sheath nanofibers. This technology can also be used to combine different characteristics of each polymer into one fiber.
- System hood has features like Exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection.

Nano Fiber Weaving Station

The equipment also includes a Nano Fiber Weaving Station as a standard accessory.

The fiber which is already made into thread can be woven to cloth / bandage automatically using this equipment. Initially the fiber needs to be loaded manually. The weaving is similar to fabric weaving that is popular in textile industry. The pitch (Distance between adjacent threads) can be controlled using an independent controller. Once weaving is complete, the woven portion can be cut out from the station and can be used as is. The equipment can also be used for electrospinning of regular nanofiber as the standard models available with us.

SPECIFICATION

I Bipolar High Voltage Switched Mode Power Supply

HOLMARC's HO-NFES-SYS comes with HMPSKV30 model high voltage power supply. It has -15kV to +15kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and read out from the digital panel meters.

Specifications :

- -15kV to +15kV Output Voltage, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection

II Independently Controlled Dual Channel Syringe Pump

HOLMARC'S HO-SPLF4 model syringe pump provides independent control of two dual channel syringe pumps. The speed and flow rate can be changed on both to achieve custom fabrications of fibers.

The Syringe pump also can be moved to and fro in X axis. The maximum travel distance is 200mm. The movement is controlled via PC.

- To dispense from standard disposable or glass syringes from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions
- Motor control through microcontroller to control and indicate flow rate
- Four syringe dispensing system
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.
- Manual height adjustment platform to vary the pump height according to the target height.

III Metal Funnel Collector

Metal funnel collector is a funnel shaped rotating mandrel where fiber yarns are formed and rolled into spool. A thin film web of nanofiber is first formed on a metal funnel collector and is drawn initially to a 3D cone shape. With the rotation of funnel collector, a twisted nanofiber yarn is drawn from the vertex of the cone.

- Rotating speed : 300 to 4000 rpm
- Material : Aluminium
- Diameter : 100mm

IV Yarn Spool

Yarn Spool is compact and modular motorized positioner for rolling the nanofiber yarn into spool. Stepper motor is used as electrical actuator. Yarn spool is XY axis configurable.

- Material : Acetal resin
- Rotating speed : 1 to 100 rpm
- Linear reciprocating movement : 50 mm

V Rotating Mandrel

Rotating mandrels which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact. The rotating mandrel has a speed stability of +/- 1%. Holmarc's HO-RM-01 is a high speed rotating mandrel assembly which works with Holmarc HO-MN series mandrels of 2mm to 100mm diameter and is of 200mm length. No. of mandrels supplied are 100mm, 75mm, 50mm, 25mm, 15mm, 12mm, 6mm, 4mm, 2mm.

- Stainless steel drums of different sizes
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/- 1%
- PC based control with documentation of speed and duration

VI Y Plate Collector & Stationary Target

This collector can be used as Stationary target or as Y plate collector. The stationary target which acts as a collector of electro spun nanofibers, is made of stainless steel plate such that it can be held vertically on a tabletop. It also has connector for grounding.

- Plate Dimension 250 x 175 x 3mm
- Plate Material : Stainless Steel
- Grounding Facility : Available
- Programmable Y motion profile to control the nano fiber deposition characteristics
- PC based motion control with documentation of parameters like speed, traverse, motion profile and duration

Using a stationary target alone cannot attain a uniform density of fibers, as most of the fiber is collected around the point orthogonal to the syringe needle. Combined with X movement provided on the syringe pump, the Y translation stage on the target keeps the target move through a commanded motion profile. Depending on the motion profile, fibers get collected uniformly on the target. The motion profile can be created using a series of commands available in the software.

VII Spinneret

a. Needle spinneret : The Flat tipped metal needles are provided for the easy flow of nano fibers. The high voltage is connected to the tip of the needle using metal clips.

VIII Fume Hood

HOLMARC's HO-FH-06 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from pollutant air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension so that it can be connected to an exhaust duct available onsite.

HOLMARC's Fume Hood also has an option for in-built heater capable to provide a temperature up to 45°C. An independent PID controller ensures precise control of temperature. A common electronic control unit for all the devices in the electrospinning system is integrated within the hood. The fume Hood has transparent side walls and front door shield made of float glass. This ensures good visibility of the process. High intensity light from the optional halogen lamp illuminates the nanofibers being spun on its way to the target. The table top is made of granite which makes the cleaning process easy.

- Standalone unit with in-built power supply and wiring for the heater, lighting and exhaust
- Transparent glass windows on three sides for easily monitoring the electrospinning process
- Foot print: 1700mm x 800mm x 1950 mm
- Construction Material: Stainless Steel, Aluminium & Glass
- Epoxy coated for electrical insulation
- Ambient to 40°C temperature control
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust outlet available at the customer facility.

Normal glass syringe

Spare needle

Teflon tube

IX Accessories

- Normal glass syringe
- Spare needle
- Teflon tube

X UV Curing Lamp (Optional)

A special 10W 254nm UV light can be added on top of the rotating collector drum which helps to cure the spun fibers.

It can be switched on during the operation or when fiber spun is completed on the collector drum.

As the UV light is harmful for our skin and eye, the glass surfaces of the chamber is protected with special coatings to reflect maximum UV.

The controller is also provided with an ON / OFF Switch for the UV Lamp.

Nano fiber Electrospinning Unit

Base Model

Model : HO-NFES-040D

We can provide client designed instruments on special order. For more details, please contact us

Holmarc's (HO-NFES-040D model) Electro-spinning equipment is an entry level system for producing nanofibers in laboratories. It is used to make nano and micro fibers ranging from 50nm to 5 microns in diameter. Many kinds of polymers like Protein nanofibers, carbon nano tubes, inorganic nanofibers etc. can be synthesized using our nano fiber electrospinning unit. Our equipment uses horizontal spinning which is the most commonly used method in lab scale nanofiber production. This technology assures the quality of the spun fibers with no dip and uneven diameter. It features user friendly and task oriented design. The ease of operation and competitive pricing places our equipment ahead of other products available in the market.

Holmarc's HO-SPLF-ES1 model single syringe pump render a smooth and uninterrupted flow enabling uniform spinning. HMPSKV30 model high voltage power supply delivers 0-30 KV output voltage range with a maximum current capacity of 0.5 mA.

HO-FH-05 model fume hood is a compact unit provides the compact unit which provides an enclosed atmosphere with 3 transparent side walls to monitor the electro spinning process. The hood also has features like exhaust fan, granite work surface and optional features like high bright halogen lighting, duct of custom dimension which can be connected to an exhaust duct available onsite. This model uses a microprocessor based control unit that interfaces the operations of the syringe pump and mandrel.

KEY FEATURES

- The chamber is provided with residual charge discharge stick which is used for static removal.
- Safety switch provided to switch off H.V. power supply when door is opened.
- LED cabin lighting and back light to view needle tip and electro spin process.
- Exhaust fan is provided for solvent vaporization. It is also used for cooling down the equipment after spin process.
- Emergency stop is provided on the control panel to stop the equipment when ever required.
- Graduation scale provided on the granite surface in X & Y direction which helps the end-user to achieve repetitive results by marking the positions of syringe pump and target.
- User friendly software enables PC interfacing that helps the regulation and control of various features like rotating mandrel speed, spin duration and syringe pump flow rate.
- Rotating mandrel targets of 75mm diameter provided with the system.
- System hood has features like exhaust fan, halogen lighting and transparent door for monitoring electrospinning process.
- Built-in short circuit protection circuit.

SPECIFICATION

I High Voltage Power Supply

HOLMARC's HO-NFES-040D comes with HMPSKV30 model high voltage power supply. It has 0 - 30kV output voltage range with maximum current capacity of 0.5mA. Output voltage and current can be set using front panel knobs and readout from the digital panel meters.

Specifications :

- 0 - 30kV single output, 0.5mA max current
- Digital voltmeter and current meter
- Static removal device - shorting stick
- Constant current / constant voltage mode of operation
- Built-in short circuit protection

II Single Syringe Pump

Volume can be set by the user through the ElectroSpinner software interface.

In HOLMARC'S HO-SPLF-ES1 model single syringe pump, the speed and flow rate can be changed to achieve custom fabrications of fibers. It can operate with standard off-the-shelf syringes made of plastic, glass or stainless steel. The microprocessor based control circuit can render a flow rate of 0.4 μl/hr to 650 ml/hr (with 5ml Syringe).

- To dispense from standard disposable or glass syringes of volume ranging from 5 to 20ml
- Syringe holder made of insulating material to work under high voltage conditions
- Motor control through microcontroller to control and indicate flow rate
- PC based control with documentation of parameters like syringe diameter, flow rate, spray duration etc.
- Manual height adjustment platform to vary the pump height according to the target height.

III Rotating Mandrel

Rotating mandrels of 75mm dia. which comes with the electrospinning unit can be used as a target to get an aligned continuous mesh of nanofiber. It has a speed range of 300rpm to 4000rpm suitable for electrospinning. Grounding of the mandrel to the HV power supply is attained through a carbon brush contact. The rotating mandrel has a speed stability of +/- 1%.

- Stainless steel drum.
- Rotational Speed : 300 - 4000 rpm
- Grounding facility : Available
- Actuator : Microprocessor controlled BLDCmotor with hall sensor feedback
- Speed stability : +/-1%
- PC based control with documentation of speed and duration

IV Fume Hood

HOLMARC's HO-FH-05 model fume hood provides an enclosed atmosphere for electrospinning. An enclosed chamber is necessary to protect the user from polluted air caused by solvent evaporation during the process. It comes with an exhaust fan attached or optionally with a duct of custom dimension which can be connected to an exhaust duct available onsite.

A common electronic control unit for all the devices in the electrospinning system is integrated within the hood. The fume Hood has transparent side walls and front door shield made of float glass. This ensures good visibility of the process. High intensity light from the halogen lamp (optional) illuminates the nanofibers being spun on its way to the target. The table top is made of granite which makes the cleaning process easy.

- Standalone unit with in-built power supply, lighting and exhaust
- Transparent glass windows on three sides for conveniently monitoring the electrospinning process
- Foot print: 1000mm x 800mm x 1900 mm
- Construction material: Stainless steel, aluminium & glass
- Epoxy coated for electrical insulation
- Exhaust fan ventilation at the top of the hood which can be connected to an exhaust outlet available at the customer's facility.

VII Accessories

- Normal glass syringe
- Spare needle

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Flame Assisted Spray Pyrolysis Equipment

Model : HO-TH-04FA

Holmarc's Flame Assisted Spray Pyrolysis Equipment Model : HO-TH-04FA has been developed for research in surface quality improvement of metallic alloys and ceramics. In this technique, solution is sprayed on to a heated substrate through an oxygen-acetylene flame. The equipment is fitted with accessories required for controlling the flame during the process. The solution is spayed using a positive displacement pump and compressed air through a mixing chamber and nozzle. The substrate is placed on a hot plate, temperature of which can be set at the desired level through a dedicated controller. The hot plate is mounted on a motorized XY platform to move the substrates during the coating process in the required sequence so that uniform coating is achieved.

Flow rate of the solution and motion sequence of the substrate are controlled through a personal computer. The flame is initiated and set at the required intensity level manually using the control accessories fitted with the equipment. As the solution is sprayed with the help of compressed air, the equipment can be used for spray pyrolysis without flame as well. Combination of pyrolysis thin films with and without flame can also be produced on the same substrates in successive operations.

Spray pyrolysis is a process in which a thin film is deposited by atomizing and spraying a solution on a heated surface, where the constituent reacts to form a chemical compound. In flame assisted spray pyrolysis, this spray is heated by a flame produced by an oxy-acetylene gas mixture, before being deposited on to the substrate.

The chemical reactants are selected such that products other than the desired compound are volatile at the temperature of deposition. The process is generally useful for the deposition of oxides on to metal and ceramic substrates and particularly suitable for the deposition of Al_2O_3, ZnO and metastable solid solutions of ZnO-MgO and ZrO_2-$Y2O_3$ on amorphous silica & Nickel based super alloys such as Nimonic-90.

Factors affecting bonding & subsequent build up of the coating:

- Cleanliness
- Surface area
- Surface topography or profile
- Temperature (thermal energy)
- Speed
- Time (reaction rates, cooling rates etc.)
- Physical & chemical properties
- Physical & chemical reactions

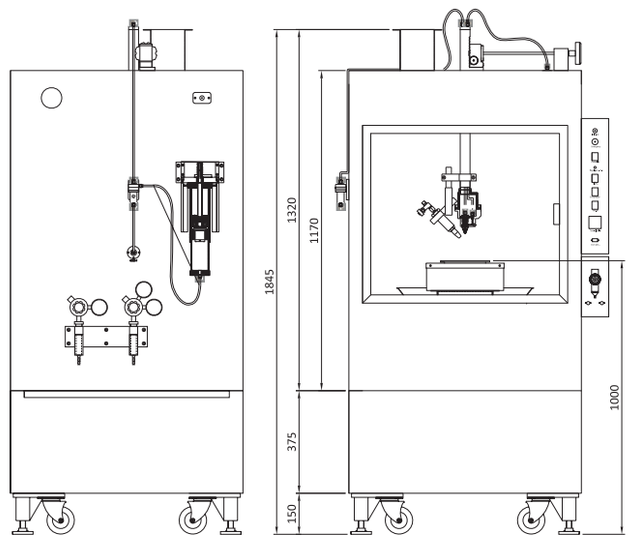
Specifications

Actuator	Stepper motor
Dispensing unit capacity	50ml & 250ml
Dispensing rate	1 - 10ml/min.
Sprayer	
Drive speed X axis (min-max)	5 - 20mm/sec
Drive speed Y axis (min-max)	2 - 12mm/sec
Sprayer traverse	X - Y 100mm max.
Substrate base plate	
Dimension	150 x 150mm
Max. temperature	500°C
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)

Accessories

Glass Container : Glass container holds the solution to be sprayed during the coating process. Containers of two volumes (250ml & 50ml) are available as standard accessories.

Nylon Tube : This tube carries the solution from the glass dispenser to the spray head. Nylon is resistant to most of the chemicals which has applications in spray pyrolysis.



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Spray Pyrolysis Equipment

Table Top Model

Model : HO-TH-04BT

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HOLMARC's Spary Pyrolisis Equipment (Table Top) Model: HO-TH-04 BT is more compact and sleek model that does not take too much space in your laboratory.It can be placed in any available platform. Even though Smaller in size, it performs all the functions and operations of the standard model.

Holmarc's Spray Pyrolysis System has been designed for research laboratories in thin films, especially for solar cell development. The system automates various fatigue and error creating processes involved in the technique when performed manually. Moreover, ergonomically designed chamber provides clean and healthy atmosphere suitable for modern lab conditions.

Factors affecting bonding & subsequent build up of the coating:

- Cleanliness
- Surface area
- Surface topography or profile
- Temperature (thermal energy)
- Speed
- Time (reaction rates, cooling rates etc.)
- Physical & chemical properties
- Physical & chemical reactions

Parameters like dispensing rate of the solution and speed of spray head movement which are difficult to control manually are controlled precisely by PC based automation. A positive displacement pump controlled by stepper motor and microprocessor is used to dispense solution as per requirement. The spray head movement is also controlled by stepper motor driven linear stages in X and Y direction. The temperature of the substrate heater plate is controlled independently through a dedicated controller.

Spray pyrolysis is a process in which a thin film is deposited by spraying a solution on a heated surface, where the constituent react to form a chemical compound. The chemical reactants are selected such that the products other than the desired compound are volatile at the temperature of deposition. The process is particularly useful for the deposition of oxides and has long been a production method for applying a transparent electrical conductor of Tin oxide (SnO_2) or Stannic oxide to glass.

Specifications

Actuator	Stepper motor
Dispensing unit capacity	50ml & 250ml
Dispensing rate	1 - 10ml / sec.
Sprayer	
Drive speed X axis (min-max)	10 - 800mm / sec
Drive speed Y axis (min-max)	1 - 12mm / sec
Sprayer traverse	X - Y 200mm max.
Substrate base plate	
Dimension	150 x 150mm
Max. temperature	500° C
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)

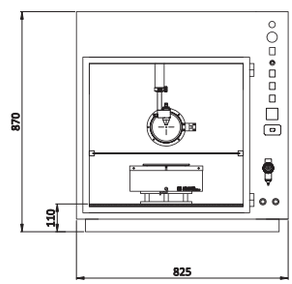
Accessories

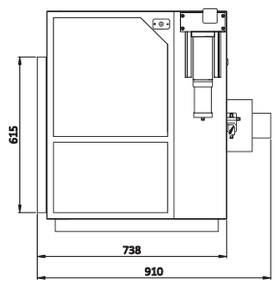
Syringe Pump : Syringe pump is preferable to the glass dispenser for solutions which should be sprayed at lower flow rates (<1ml / min). It works with very low volume of solution as the syringe is directly connected to the spray nozzle, avoiding the use of lengthy tubes which should be filled first before the solution can reach the nozzle.

Ultrasonic Spray Head : The standard spray head which uses a compressed air atomization nozzle can be replaced with the ultrasonic spray head which uses an ultrasonic atomizer nozzle. It breaks the solution by vibrating its nozzle at an ultrasonic frequency (Typically 40 kHz), producing a fine spray of droplets of 50 micron average size.

Glass Container : Glass container holds the solution to be sprayed during the coating process. Containers of two volumes (250ml & 50ml) are available as standard accessories.

Nylon Tube : This tube carries the solution from the glass dispenser to the spray head. Nylon is resistant to most of the chemicals which has applications in spray pyrolysis.





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Spray Pyrolysis Equipment

Model : HO-TH-04

Holmarc's Spray Pyrolysis system has been designed for research laboratories in thin films, especially for solar cell development. The system automates various fatigue and error creating processes involved in the technique when performed manually. Moreover, ergonomically designed chamber provides clean and healthy atmosphere suitable for modern lab conditions.

Parameters like dispensing rate of the solution and speed of spray head movement which are difficult to control manually are controlled precisely by PC based automation. A positive displacement pump controlled by stepper motor and microprocessor is used to dispense solution as per requirement. The spray head movement is also controlled by stepper motor driven linear stages in X and Y direction. The temperature of the substrate heater plate is controlled independently through a dedicated controller.

Factors affecting bonding & subsequent build up of the coating:

- Cleanliness
- Surface area
- Surface topography or profile
- Temperature (thermal energy)
- Speed
- Time (reaction rates, cooling rates etc.)
- Physical & chemical properties
- Physical & chemical reactions

A desktop computer with windows OS is used to control the operations through serial port. Our dedicated software for spray pyrolysis system can as well be used for documenting the relevant parameters used for sample preparation like temperature, air pressure, duration, etc.

Spray pyrolysis is a process in which a thin film is deposited by spraying a solution on a heated surface, where the constituent react to form a chemical compound. The chemical reactants are selected such that the products other than the desired compound are volatile at the temperature of deposition. The process is particularly useful for the deposition of oxides and has long been a production method for applying a transparent electrical conductor of Tin oxide (SnO2) or Stannic oxide to glass.

Specifications

Actuator	Stepper motor
Dispensing unit capacity	50ml & 250ml
Dispensing rate	1 - 10ml / min.
Sprayer	
Drive speed X axis (min-max)	10 - 800mm / sec
Drive speed Y axis (min-max)	1 - 12mm / sec
Sprayer traverse	X - Y 200mm max.
Substrate base plate	
Dimension	150 x 150mm
Max. temperature	500° C
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)

Accessories

Syringe Pump : Syringe pump is preferable to the glass dispenser for solutions which should be sprayed at lower flow rates (<1ml / min). It works with very low volume of solution as the syringe is directly connected to the spray nozzle, avoiding the use of lengthy tubes which should be filled first before the solution can reach the nozzle.

Ultrasonic Spray Head : The standard spray head which uses a compressed air atomization nozzle can be replaced with the ultrasonic spray head which uses an ultrasonic atomizer nozzle. It breaks the solution by vibrating its nozzle at an ultrasonic frequency (Typically 40 kHz), producing a fine spray of droplets of 50 micron average size.

Glass Container : Glass container holds the solution to be sprayed during the coating process. Containers of two volumes (250ml & 50ml) are available as standard accessories.

Nylon Tube : This tube carries the solution from the glass dispenser to the spray head. Nylon is resistant to most of the chemicals which has applications in spray pyrolysis.

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Spray Pyrolysis Equipment
Larger version
Model : HO-TH-04A

This is the latest model in Holmarc's line of Spray Pyrolysis Units. This model is the larger version of the standard model that provides expanded capacity and increased travel area for the spray head. This also provides a larger heating platform to spray coat substrates that are larger than standard application. This model uses a fresh new design that enables the user to carry out the spray coating process in a more convenient and efficient manner. This model can also be separated from the bottom shelf section for use as a table top unit. This unit also provides for Nitrogen purging of the enclosure.

Holmarc's Spray Pyrolysis system has been designed for research laboratories in thin films, especially for solar cell development. The system automates various fatigue and error creating processes involved in the technique when performed manually. Moreover, ergonomically designed chamber provides clean and healthy atmosphere suitable for modern lab conditions.

Parameters like dispensing rate of the solution and speed of spray head movement which are difficult to control manually are controlled precisely by PC based automation. A positive displacement pump controlled by stepper motor and microprocessor is used to dispense solution as per requirement. The spray head movement is also controlled by stepper motor driven linear stages in X and Y direction. The temperature of the substrate heater plate is controlled independently through a dedicated controller.

A desktop computer with windows OS is used to control the operations through serial port. Our dedicated software for spray pyrolysis system can as well be used for documenting the relevant parameters used for sample preparation like temperature, air pressure, duration, etc.

Spray pyrolysis is a process in which a thin film is deposited by spraying a solution on a heated surface, where the constituent react to form a chemical compound. The chemical reactants are selected such that the products other than the desired compound are volatile at the temperature of deposition. The process is particularly useful for the deposition of oxides and has long been a production method for applying a transparent electrical conductor of Tin oxide (SnO_2) or Stannic oxide to glass.

Factors affecting bonding & subsequent build up of the coating:

- Cleanliness
- Larger Surface area
- Surface topography or profile
- Temperature (thermal energy)
- Speed
- Time (reaction rates, cooling rates etc.)
- Physical & chemical properties
- Physical & chemical reactions

Specifications

Actuator	Stepper motor
Dispensing unit capacity	50ml & 250ml
Dispensing rate	1 - 10ml / min.
Sprayer	
Drive speed X axis (min-max)	10 - 800mm / sec
Drive speed Y axis (min-max)	1 - 12mm / sec
Sprayer traverse	X - Y 250mm max.
Substrate base plate	
Dimension	250 x 250mm
Max. temperature	500° C
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)

Accessories

Syringe Pump : Syringe pump is preferable to the glass dispenser for solutions which should be sprayed at lower flow rates (<1ml / min). It works with very low volume of solution as the syringe is directly connected to the spray nozzle, avoiding the use of lengthy tubes which should be filled first before the solution can reach the nozzle.

Ultrasonic Spray Head : The standard spray head which uses a compressed air atomization nozzle can be replaced with the ultrasonic spray head which uses an ultrasonic atomizer nozzle. It breaks the solution by vibrating its nozzle at an ultrasonic frequency (Typically 40 kHz), producing a fine spray of droplets of 50 micron average size.

Glass Container : Glass container holds the solution to be sprayed during the coating process. Containers of two volumes (250ml & 50ml) are available as standard accessories.

Nylon Tube : This tube carries the solution from the glass dispenser to the spray head. Nylon is resistant to most of the chemicals which has applications in spray pyrolysis.

We can provide client designed instruments on special order. For more details, please contact us

Vacuum Spray Pyrolysis Automated Equipment

Model : HO-TH-VSP-500T

Holmarc's Vacuum Spray Pyrolysis (VSP) system has been designed for advanced research in thin films, especially for solar cell development. This model facilitates the spray pyrolysis to take place in an inert atmosphere using Nitrogen purging. This model comes with a metal (Tin) bath heater instead of regular stainless steel hot plate. This provides uniform and stable heating to the substrate during the coating process. The system automates various fatigue and error creating processes involved in the technique when performed manually. Moreover, ergonomically designed chamber provides clean and healthy atmosphere suitable for modern lab conditions.

Factors affecting bonding & subsequent build up of the coating:

- Cleanliness
- Surface area
- Surface topography or profile
- Temperature (thermal energy)
- Speed
- Time (reaction rates, cooling rates etc.)
- Physical & chemical properties
- Physical & chemical reactions

Features

- Masking for multi layer coating
- Molten tin heater for uniform surface temperature

In vacuum spray pyrolysis, material is heated in a vacuum in order to decrease its boiling point and avoid adverse chemical reactions. The energy required to bring the material to its boiling point is reduced and the process becomes more efficient. Use of materials with high melting point becomes possible. This opens up possibilities for the use of materials which could not have been used with the traditional spray pyrolysis process.

The software interface is simple yet flexible enough to create programs for different types of processes like point spray, raster spray, intermittent spray with programmable time delay etc. The flow rate is precisely controlled through the software while the process temperature, which is independently controlled using a PID temperature controller, can be documented for future reference. The control parameters of a process can be saved and recalled for later use.

The default PC interface is RS232C (Serial port). Optionally, USB to Serial converter is supplied to connect the equipment to the USB port of a PC or laptop. The equipment can be customized to have multiple dispensers which facilitates easy switching between different solutions.

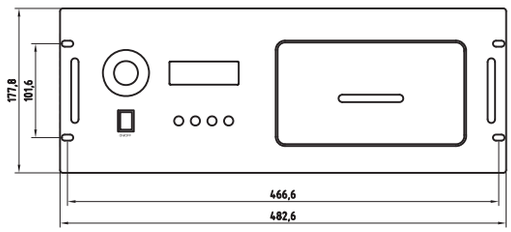
Specifications

Coating Chamber - Chamber Size	700 x 700 x 800mm
Chamber Consists of, water cooling lines, nitrogen inlet port , overhead feed through, Illumination unit with a vacuum vew port etc.	
Material construction	SS304
Vacuum Pump	Oil vacuum pump
Substrate Size	100 x 100mm
Operation	500 - 600 millibar
Inert Gas Operation	Nitrogen purging
Heater Size	150 x 150mm, with Tin bath, heat range 500°C
Dispensing System	Stepper motor controlled syringe pump
Dispensing unit capacity	50ml & 250ml
Dispensing rate	1 - 10ml / min.
Drive speed X axis (min-max)	10 - 800mm / sec
Drive speed Y axis (min-max)	1 - 12mm / sec
Sprayer traverse	X - Y 200mm max.

UV Ozone cleaner

Model : HO-TH-UVR150 & HO-TH-UVT150
HO-TH-UVR250 & HO-TH-UVT250

Holmarc offers two models of UV Ozone cleaner, Tabletop (Model: HO-TH-UVT) and Rack mount (Model: HO-TH-UVR) configurations. Rack mount UV Ozone cleaner has a front panel that is 19 inches wide. The 19-inch dimension includes the mounting holes with pull handle that protrude on each side which can be fastened to the rack frame with screws. Tabletop UV Ozone cleaner is more compact and can be placed in any available platform.



Model: HO-TH-UVR

Specifications

UV lamp type	High Ozone UV Lamp
UV lamp supply	4000 V, 30 mA
Power input	230V, 50Hz
Max substrate size	
For UVR150 &UVT150 Model	150 mm x 150 mm
For UVR250 &UVT250 Model	250 mm x 250 mm
Duration	1 – 99 sec/min/hr

Features :

- Oxygen inlet port
- Ozone removal pump
- LCD display unit
- Sample temperature measurement feature
- Buzzer for indication completion of cleaning
- Locking feature for locking sample feeding tray to avoid opening during operation

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SILAR Coating System

Single, common heater

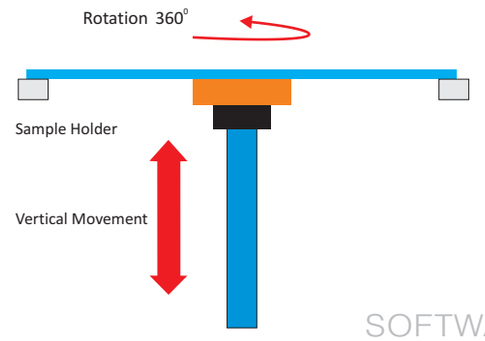
Model : HO-TH-03

Holmarc's SILAR Coating System has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. It is very difficult to control dip duration and number of dips in a manual process which can last hours.

In this system, thin film is deposited on glass substrate following a chemical technique called Successive Ion Layer Adsorption and Reaction (SILAR). The process involves multiple dipping of the substrate in a given solution and deionized water, temperature of both can vary from case to case.

In the automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles and duration.

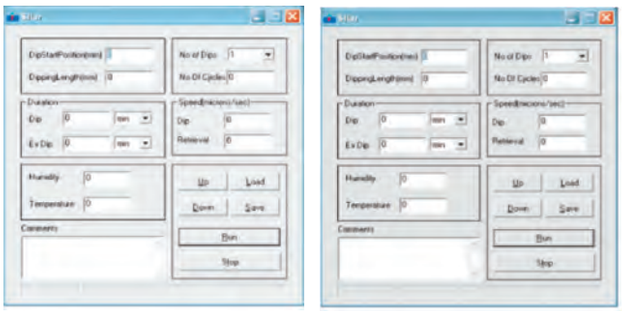
This device can be customized as per requirement. Holmarc has developed models where a controlled heater is used for keeping each beaker at specified temperature independently.

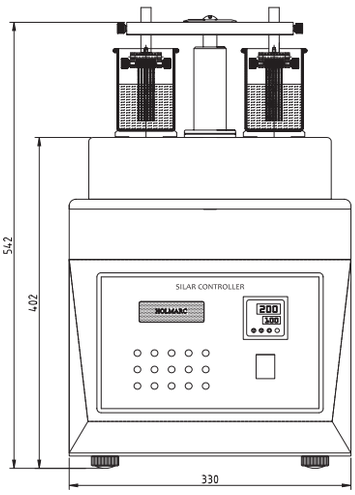


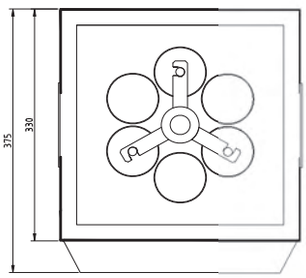
Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of dips	1 - 999
Operating temperature	Ambient to 80°C
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length	75mm
No. of position for beakers	6
No. of samples could be loaded	5
No. of programs	5

SOFTWARE







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SILAR Coating System with Stirrer

Independent heater for all the 6 Beakers

Model : HO-TH-03A

Holmarc's SILAR Coating System has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. It is very difficult to control dip duration and number of dips in a manual process which can last hours. In the automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles and duration.

This model: HO-TH-03A has a motorized substrate holder which can be used to stir the solution. By rotating the substrate along with the holder at desired speed, the solution can be kept stirred during the dipping process. The rotation speed is programmable from 1 - 200 rpm. The dipping speed, dip duration, retrieval speed and dry duration can be set for each beaker. Each hot plate can be set at different temperatures. The temperature can be set up to 350°C from ambient.

This device can be customized as per requirement. Holmarc has developed models where a controlled heater is used for keeping the solution at specified temperature.

Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of dips	1 - 999
Hot plate temperature	Ambient to 350°C
Stirrer speed	1 - 200 rpm
PC connectivity	Serial port (RS 232)
Stroke length	75mm
Power input	230V, 50Hz
No. of position for beakers	6
No. of samples could be loaded	5
No. of programs	5

In this technique thin film is deposited on glass substrate following a chemical technique called successive ion layer adsorption and reaction (SILAR). The technique involves multiple dipping of the substrate in a given solution and deionized water, temperature of both can vary from case to case.

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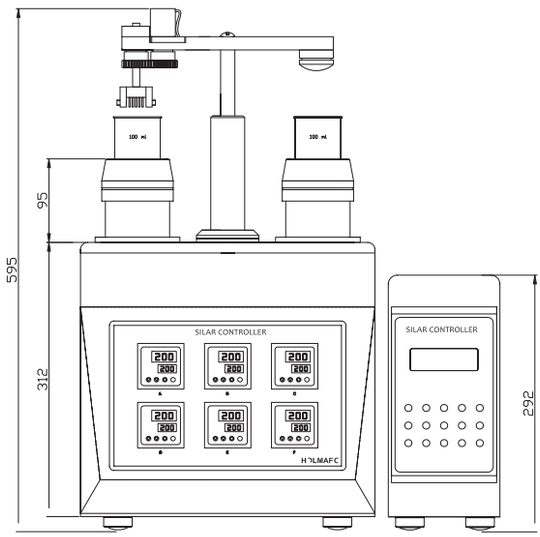

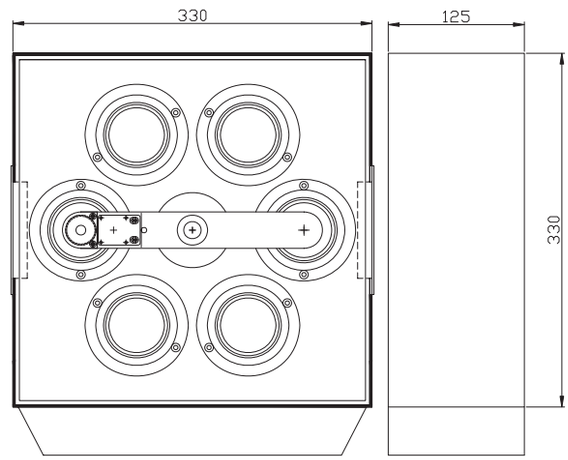

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SILAR Coating System with Stirrer

Independent heater for all the 8 Beakers

Model : HO-TH-03A8

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One of the contemporary method for the deposition of thin film is Successive Ionic Layer Adsorption and Reaction (SILAR) method, which is also known as modified version of chemical bath deposition. As it is a chemical method, a large number of varieties of substrates can be coated.

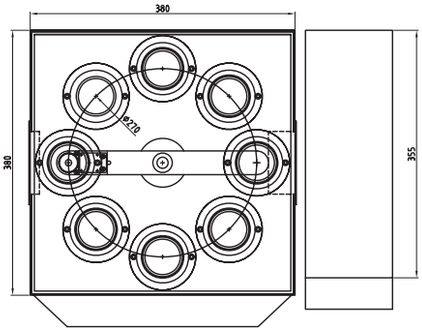
Holmarc's SILAR Coating System has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. It is very difficult to control dip duration and number of dips in a manual process which can last hours. In the automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles and duration.

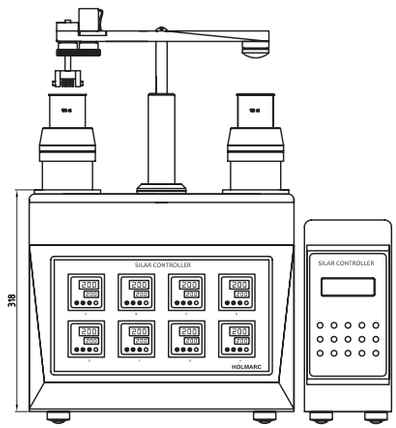
This model: HO-TH-03A8 has a motorized substrate holder which can be used to stir the solution. In this model eight beakers are placed in a circular arrangement about the rotation axis of sample dipping arm. There will be heating plate for each of the beaker. Maximum diameter of hot plate surface on each of these 8 positions will be three inches. By rotating the substrate along with the holder at desired speed, the solution can be kept stirred during the dipping process. The rotation speed is programmable from 1 - 200 rpm. The dipping speed, dip duration, retrieval speed and dry duration can be set for each beaker. Each hot plate can be set at different temperatures. The temperature can be set up to 350°C from ambient.

This device can be customized as per requirement. Holmarc has developed models where a controlled heater is used for keeping each beaker at specified temperature independently.

Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of dips	1 - 999
	(Increment by 1 cycle should be possible)
Hot plate temperature	Ambient to 350°C
Stirrer speed	Adjustable 1 rpm - 200 rpm
PC connectivity	Serial port (RS 232)
Stroke length	75mm
Power input	230V, 50Hz
No. of position for beakers	8
No. of samples could be loaded	5
No. of programs	5





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SILAR Coating System with Stirrer - Uni Heater

Single, common heater for all the 6 Beakers

Model : HO-TH-03S

Holmarc's SILAR Controller with Stirrer, Model: HO-TH-03S has a motorized substrate holder which can be used to stir the solution. By rotating the substrate along with the holder at desired speed, the solution can be kept stirred during the dipping process. The rotation speed is programmable from 2 - 200 rpm. The dipping speed, dip duration, retrieval speed and dry duration can be set for each beaker. There is a controlled heater, which is common for 6 beakers and the temperature can be set up to 80°C from ambient. The device is compact and complete with a footprint of 376 x 330 mm.

Holmarc's SILAR coating unit is an instrument with which a thin film is deposited on a glass substrate due to a chemical process called successive ion layer adsorption and reaction (SILAR). The technique involves multiple dipping of the substrate in a given solution and de-ionized water, temperature of both can vary from case to case. SILAR coating system has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water.

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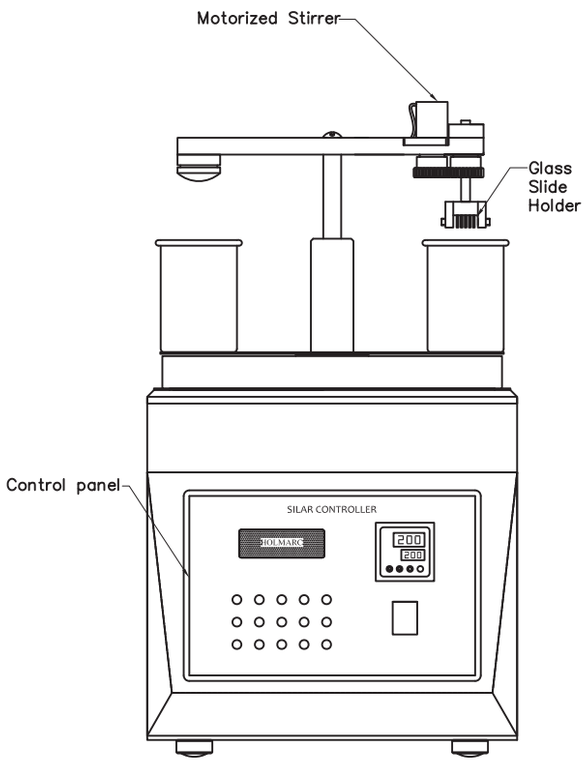

It is very difficult to control dip duration and number of dips in a manual process which may last for hours. In our automated unit, all that an operator needs to do is just clamp the substrate on to the holder and program the controller with required parameters.

Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of dips	1 - 999
Operating temperature	Ambient to 80°C
PC connectivity	Serial port (RS 232)
Stroke length	75 mm
Rotary speed	0 - 60 deg / sec
Drawing speed :	200 micron/sec - 16mm/sec (Manual mode)
	2 - 16000 micron / sec (PC mode)
Stirrer speed	2 - 200 rpm
No. of position for beakers	6
No. of samples could be loaded	5
No. of programs	5

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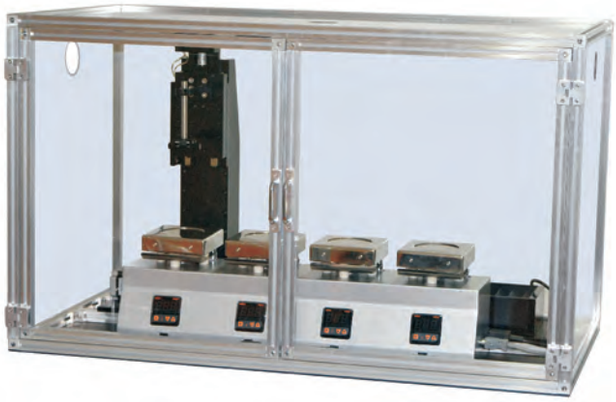


SILAR Coating System with Magnetic Stirrer

Model : HO-TH-03B

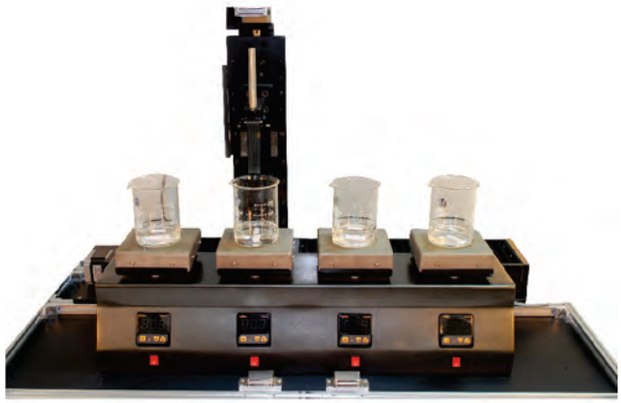
Holmarc's SILAR Coating System has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. It is very difficult to control dip duration and number of dips in a manual process which can last hours. In the automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles and duration.

In this technique thin film is deposited on glass substrate following a chemical technique called successive ion layer adsorption and reaction (SILAR). The technique involves multiple dipping of the substrate in a given solution and deionized water, temperature of both can vary from case to case.

Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of cycles	1 - 999
Hot plate temperature	Ambient to 200° C
Stirrer speed	1 - 1000 rpm
PC connectivity	Serial port (RS 232)
Stroke length	100 mm
Power input	230V, 50Hz

This device can be customized as per requirement. Holmarc has developed models where a controlled heater is used for keeping each beaker at specified temperature independently.



In the Model HO-TH-03B the solution containing beakers are kept on hot plates with magnetic stirrers. The rotation speed of the stirrers can be controlled from 1 - 1000 rpm. The dipping speed, dip duration, retrieval speed and dry duration can be set for each beaker. Each hot plate can be set at different temperatures. The temperature can be set up to 200°C from ambient.

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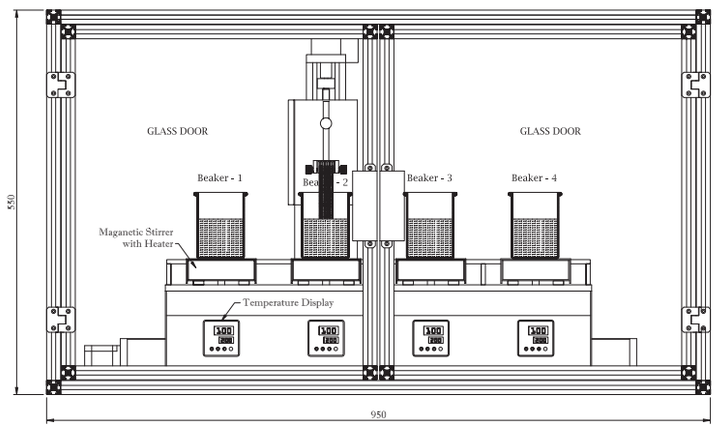

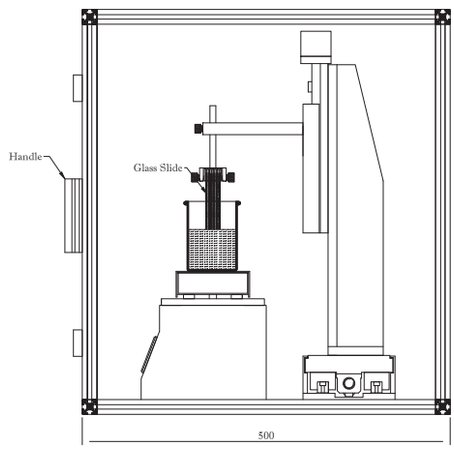

Silar Coating System with Magnetic Stirrer & Ultrasonic Bath Stand

Model : HO-TH-03C

Holmarc's SILAR Coating System has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. It is very difficult to control dip duration and number of dips in a manual process which can last hours. In the automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles and duration.

In this technique thin film is deposited on glass substrate following a chemical technique called successive ion layer adsorption and reaction (SILAR). The technique involves multiple dipping of the substrate in a given solution and deionized water, temperature of both can vary from case to case.

This model has magnetic stirrers which can be used to stir the solution. The rotation speed can be controlled from 1 - 1000 rpm. The dipping speed, dip duration, retrieval speed and dry duration can be set for each beaker. Each hot plate can be set at different temperatures. The temperature can be set up to 200°C from ambient. There is a fifth stand in this model for keeping an ultrasonic bath.

Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of cycles	1 - 999
Hot plate temperature	Ambient to 200° C
Stirrer speed	1 - 1000 rpm
PC connectivity	Serial port (RS 232)
Stroke length	75mm
Power input	230V, 50Hz

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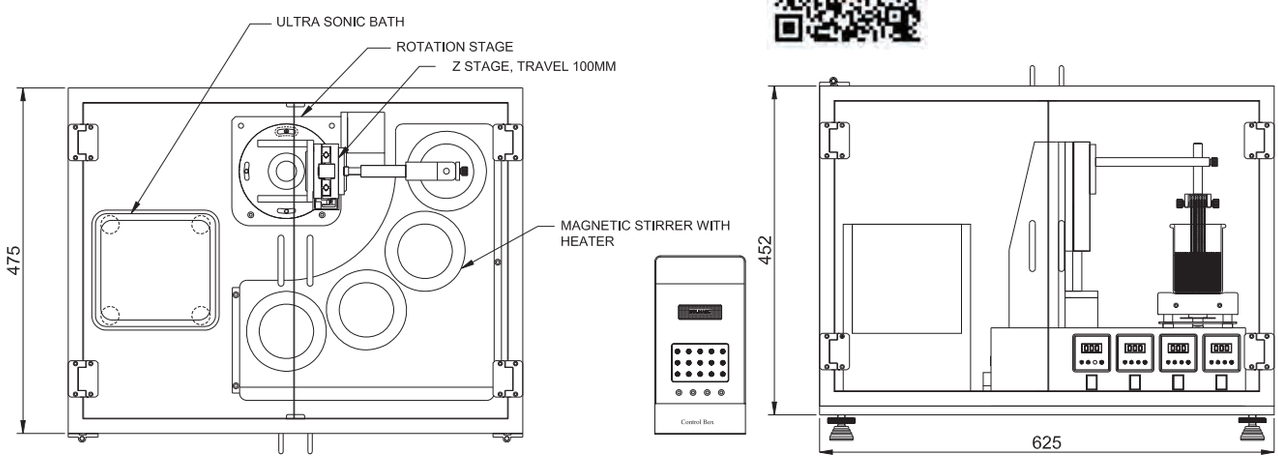

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Silar Coating System with Magnetic Stirrer & Air-tight Chamber

Model : HO-TH-03BV

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Holmarc's SILAR coating system with Magnetic stirrer and Air-tight Chamber (Model No: HO-TH-03BV) features an air-tight chamber with a service window and an operating window. The unit provides inlet and outlet valves for inert gas purging. This helps to protect samples from moisture or oxygen exposure at the end of the coating process. It provides four separate platforms to place coating solutions, each with magnetic stirrer. User can also control the speed of the magnetic stirrer for each beaker independently by using the knobs on the front panel of the controller.

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The system has a user friendly front panel with keyboard and LCD display to enter all the process parameters such as dip Length, dip speed, dip duration, retrieval speed, dry duration, no. of cycles etc. The desired parameters can be entered independently for each selected beaker positions. It can be controlled through a PC as well.

The SILAR technique involves multiple dipping of the substrate in a given solution and de-ionized water. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. In this automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles, speed and duration.

Specifications

Actuator	Stepper motor
Drive mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
Number of cycles	1 - 999
Stirrer speed	1 - 1000 rpm
PC connectivity	Serial port (RS 232)
Stroke length	75 mm
Power input	230V, 50Hz
Air tight chamber	Available

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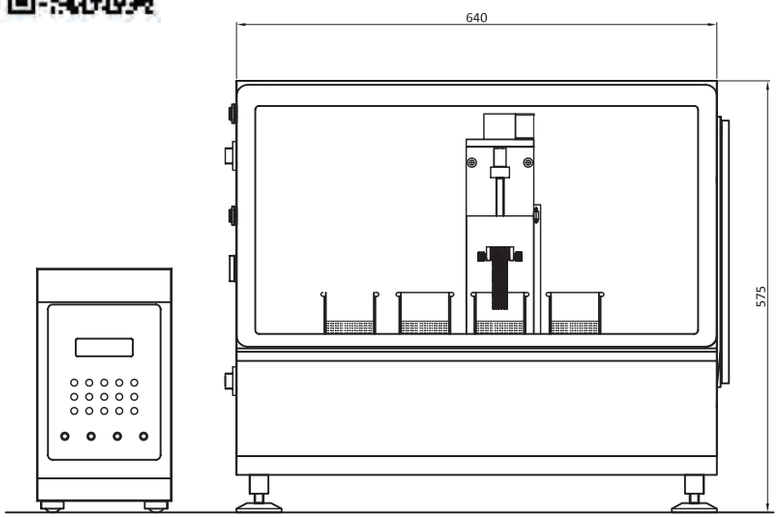

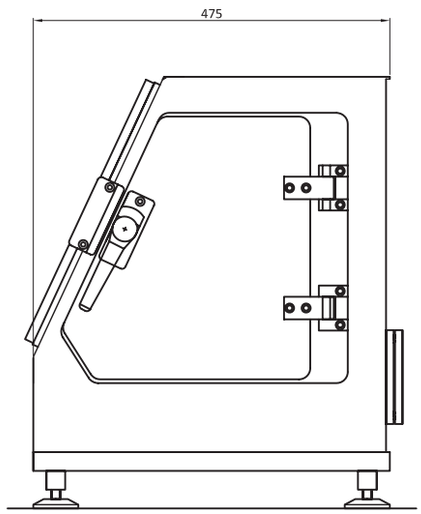

SILAR system without heater and stirrer

Model : HO-TH-03D

One of the newest solution method for the deposition of thin film is Successive Ionic Layer Adsorption and Reaction (SILAR) method, which is also known as modified version of chemical bath deposition. As it is a chemical method, a large number of varieties of substrates can be coated.

Holmarc's SILAR Coating System has been designed to automate the entire process to avoid operator fatigue and errors associated with it. In manual SILAR process, the operator has to perform hundreds of repetitive dipping into the solution and water. It is very difficult to control dip duration and number of dips in a manual process which can last hours. In the automated unit, the operator need just to clamp the substrate into the holder and program the controller with required dip cycles and duration.

http://www.holmarc.com/silar_without_heater_n_stirrer.php

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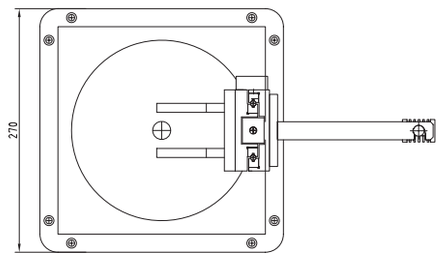
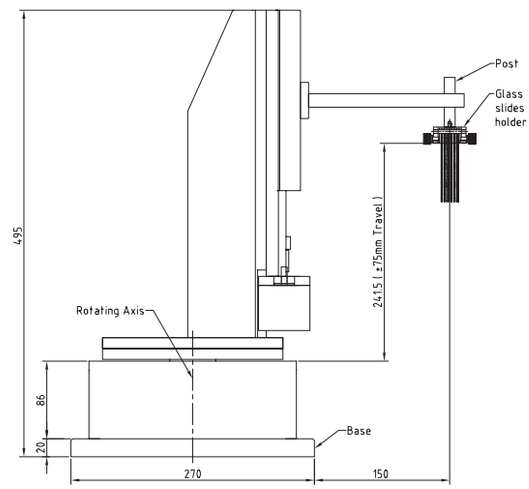
Specifications	
Mode of operation	Manual (LCD)
Actuator	Stepper Motor
Drive Mechanism	Lead screw
Dip duration	0 - 99 sec / min / hr
No. of dips	1 - 999
(Increment by 1 cycle should be possible)	
PC Connectivity	RS 232
Stroke length	75 mm
Power input	230V, 50Hz
No. of position for beakers	4
No. of samples could be loaded	5
Platform to keep beakers	Not required.
Dip min / max speed	2 microns / sec - 9000 microns / sec
Retrieval min / max speed : 2 microns / sec - 9000 microns / sec	

In this model 4 beakers can be used. The dipping speed, dip duration, retrieval speed and dry duration can be set for each beaker. The rotation speed is programmable from 1 - 10 degree/sec. In this model there is no heater and stirrer. This is work at room temperature.

In this technique thin film is deposited on glass substrate following a chemical technique called successive ion layer adsorption and reaction (SILAR). The technique involves multiple dipping of the substrate in a given solution and deionized water. The technique involves multiple dipping of the substrate in a given solution and deionized water, temperature of both can vary from case to case.





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Dip Coating Unit

Model : HO-TH-01

Holmarc's Dip Coating Unit has been designed in such a manner which minimizes the operator's effort. The variables like speed, duration, etc. are maintained accurately by computer control. Dip-coating process, includes five stages: immersion, start-up, deposition, evaporation and drainage. The coating thickness depends on various parameters like viscosity of the coating solution, immersion time, withdrawal speed, evaporation rate etc.

Movements are achieved by a precision servo motor controlled linear stage. Adjustable stroke length and accurate speed control are the exceptional features of this model along with its capability of achieving a uniform coating. This is a compact, bench-top coating unit having structural rigidity and is free from vibrations.

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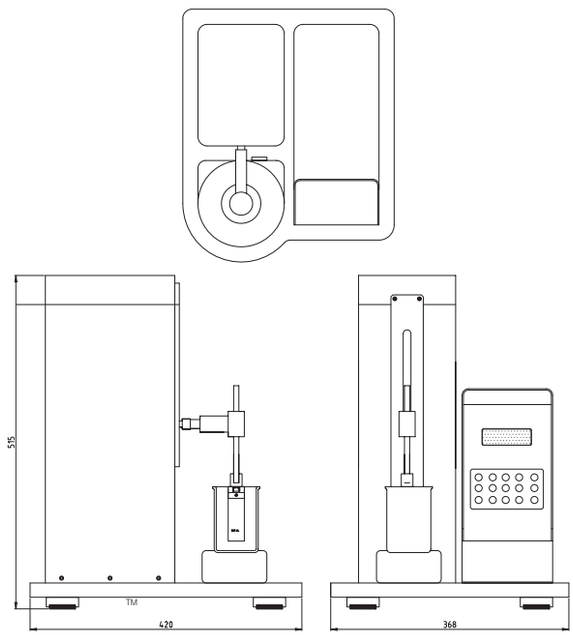
A microprocessor based system along with user friendly software takes care of accurate control throughout the process. Speed, traverse and idling duration can be programmed. Both manual mode and PC mode are possible in this equipment. In manual mode a user friendly front panel with keyboard and LCD display is provided to enter all the dipping and drying parameters where as in PC mode entire unit can be controlled by user friendly software. It can store up to 5 programs in manual mode, which are editable during the operation. The system is complete with its mechanics, electronics and software. Customization can be done in order to suit the developing needs of the user.

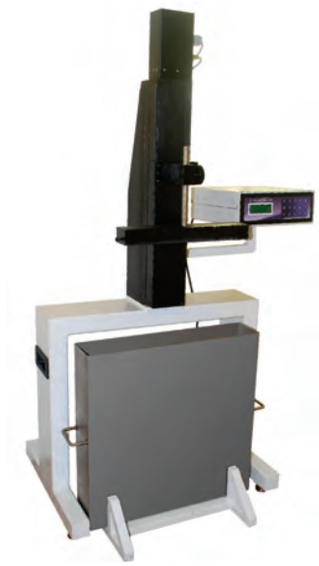
Specifications

Actuator	Servo motor
Drive mechanism	Lead screw
Speed control	Available
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length max.	100 mm
Drawing speed min.	2 micron / sec
Drawing speed max.	9000 micron / sec
Dimensions (appx.)	200 x 150 x 380 mm
Weight (appx.)	54 kg



Custom Model

Model: HO-TH-01B



Film formation in dipping is dependent on the viscosity of the fluid. The process is messy and can be highly hazardous. The viscosity of the fluid in a dip tank must remain practically constant if the deposited film quality is to remain uniform. Dip coating is well suited for high production coating of relatively simple shapes. In dip coating process transfer efficiency is very high, all contact areas are coated, equipment requirements are low, and the process can be conveyorized and automated.

The product shown (HO-TH-01B) here has been developed for specific research applications. It can be customized to suit related research activities in thin film formation. We welcome customization queries. Dip coating is done by immersing a substrate into a tank containing the coating material, removing from the tank, and allowing it to drain. The coated piece can then be dried by force-drying or baking.

A microprocessor based system along with user friendly software takes care of accurate control throughout the process. Speed, traverse and idling duration can be programmed. The system is complete with mechanics, substrate holder, electronics and software.

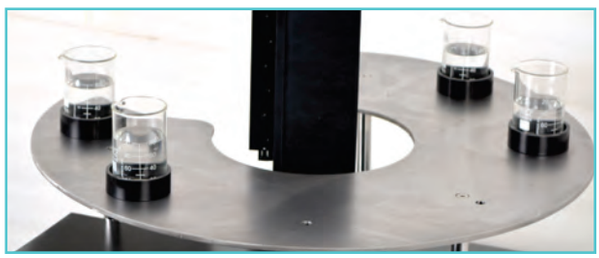
Multiple Dip Coater

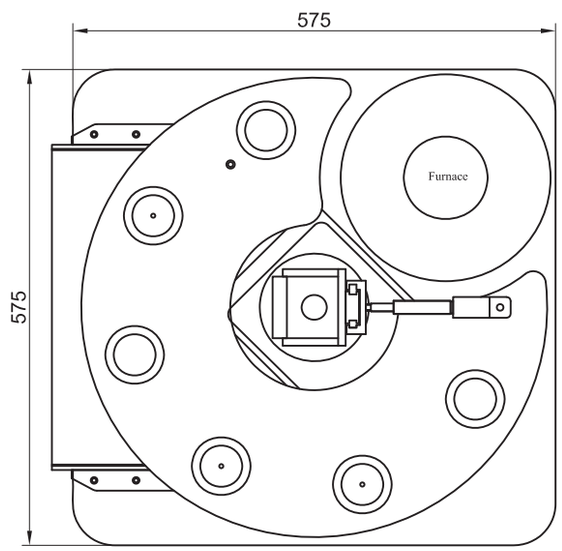
Model : HO-TH-02MD

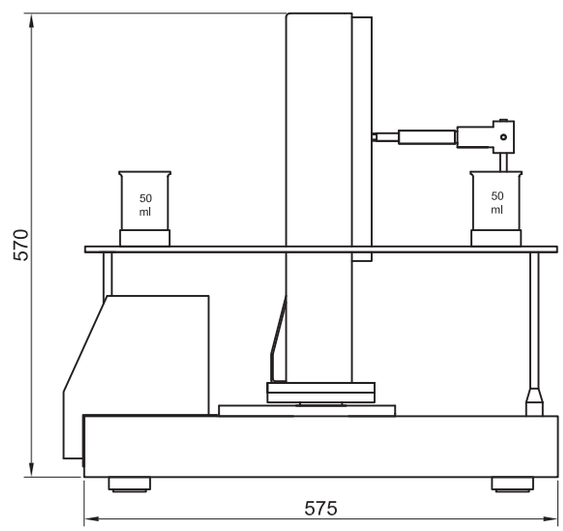
Holmarc's Multiple Dip Coater (Model No: HO-TH-02MD) comes with six beaker holders and provision to mount a high temperature furnace. A quartz tube furnace can be mounted vertically and its temperature can be set up to 1200°C. The substrate holder is made of Molybdenum to withstand the high temperature. The dip-coating solution and the furnace are positioned in a circle about a rotating arm of the dip coater. Hence, it is possible to coat different solutions alternatively, with heating in furnace in between them.

It has been designed to keep operator involvement as minimum as possible so that variables like speed, duration, etc. are maintained accurately by computer or microprocessor controller. Movements are achieved by a precision servo motor controlled stage.

Specifications	
Actuator	Servo motor
Drive mechanism	Lead screw
Speed control	Available
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length max.	200mm (in furnace)
	75mm (in solution)
Drawing speed	2 micron / sec - 9mm / sec
Dip duration	0 - 99 sec / min / hr
Max. no.of repetitive dips	1 - 999
Dimension of Furnace	250 mm Dia x 300 H
Dimensions (appx.)	580 x 600 x 580 mm H







http://www.holmarc.com/multiple_dip_coater.php

We can provide client designed instruments on special order. For more details, please contact us

Dip-coating process includes five stages: immersion, start-up, deposition, evaporation and drainage. In the dip coating method, the substrate is slowly dipped into and withdrawn from a tank containing the solution, with a uniform velocity, in order to obtain a uniform coating. This device allows multiple dipping of the substrate in different solutions, followed by heating in furnace after each dip.

A microprocessor based system along with user friendly software takes care of accurate control throughout the process. Speed, traverse and idling duration can be programmed. The system is complete with mechanics, substrate holder, electronics and software.

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Angle Dependent Dip Coating Unit

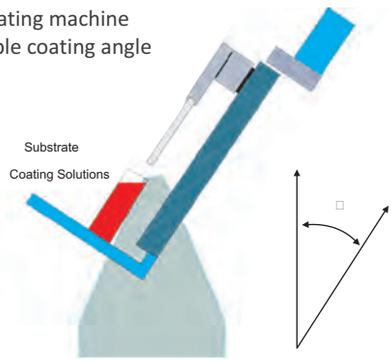
Model : HO-TH-ADDC1

Holmarc's Angle Dependant Dip Coating unit enables nano layer coating of substrates by dipping them in beakers containing coating solution. The dipping angle can be varied from 0 to 45 degree depending upon the requirement. There are 4 beaker holder provided for coating 4 different substrates. The dipping speed, dip duration, withdrawal speed and dry duration can be varied for each beaker independently.

Basic principle of ADDC: The substrate is drawn out of the coating solution under a well defined angle of inclination. Both surfaces are coated simultaneously resulting in different film thickness on front and back side.

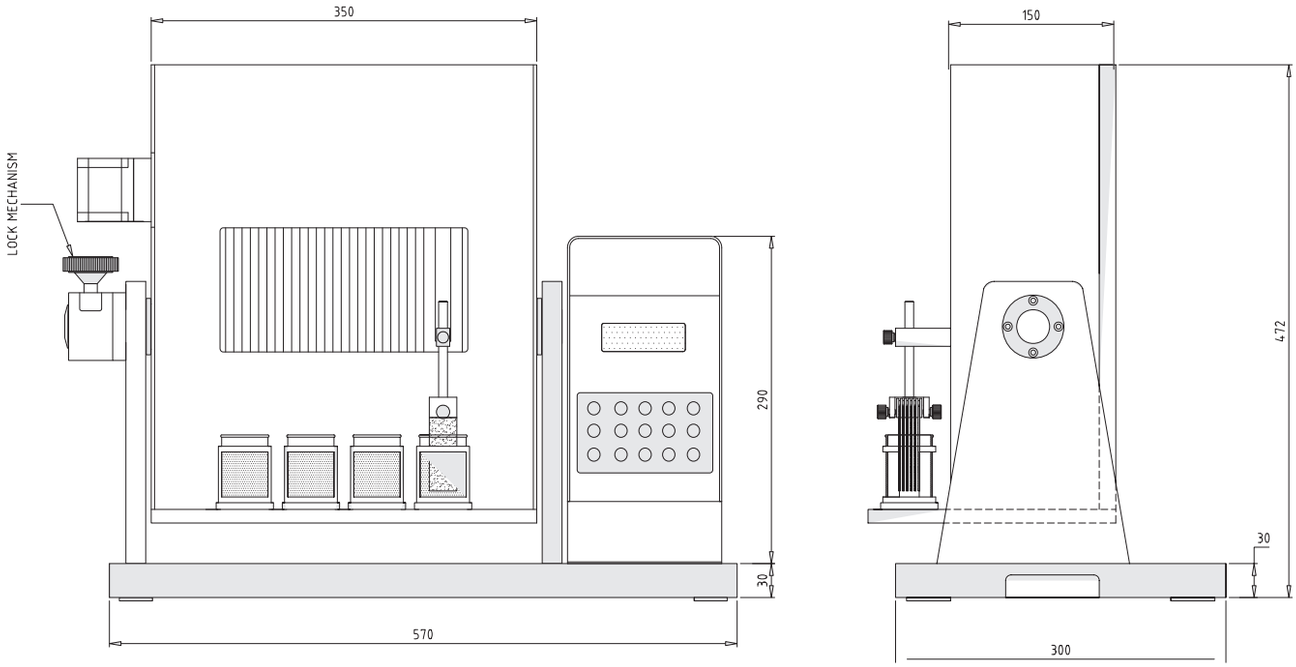
One of the advantage of ADDC is the reduced number of layers or coating steps to obtain the desired thin film properties.

Fig. Dip coating machine with variable coating angle



Specifications

Actuator	Servo motor
Drive mechanism	Lead screw
Speed control	Available
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length max.	75 mm
Drawing speed min.	2 micron / sec
Drawing speed max.	9000 micron / sec
Dimensions (appx.)	570 x 300 x 475 mm
Program memory	8 Programs
Max. power consumption	800 Watts



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Dip Coating Unit with Hot Chamber

Model : HO-TH-02

In Holmarc's Dip Coating Unit Model:HO-TH-02, the substrate is dipped in the solution and then withdrawn into a heating chamber. Temperature of the chamber can be controlled and fixed up to 75°C from ambient. All other features are same as that of Model : HO-TH-01.

The system has a user friendly front panel with key board and LCD display. It can as well be controlled through a computer. Dip duration, dip speed, baking duration, withdrawal speed etc. are programable features. Servo motor is used as actuator for vibration free dipping and withdrawal.

The device is designed and manufactured as table top device with entire electronics and servo motor housed in a compact unit. A number of substrates can be held to the holder at the same time. Height of the substrate holder can be adjusted with respect to the level of the solution during the experiment.

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Specifications

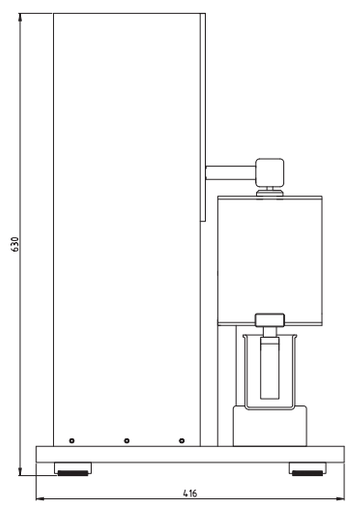
Actuator	Servo motor
Drive mechanism	Lead screw
Speed control	6 step variable speed
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length max.	150 mm
Drawing speed min.	2 micron / sec
Drawing speed max.	9000 micron / sec
Program memory	5 programs
Dimension	630 x 348 x 416 mm
Max. power consumption	460 Watts.

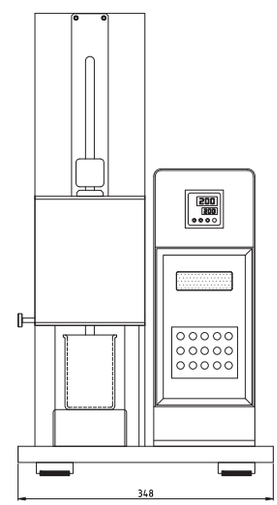
Annual Service Pack

All Holmarc Instruments and their accessories are warranted by HOLMARC for a period of ONE YEAR from the date of original purchase. Holmarc will repair or replace a product, or part there of, found by Holmarc to be defective, provided the defective part is returned to Holmarc, with proof of purchase. We guarantee effective services delivered in a timely manner.

This device can be customized as per requirement. For more assistance, please contact us at **mail@holmarc.com**

Model: HO-TH-01-F
Custom Model





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Dip Coating Unit with Infrared Dryer

Model : HO-TH-02B

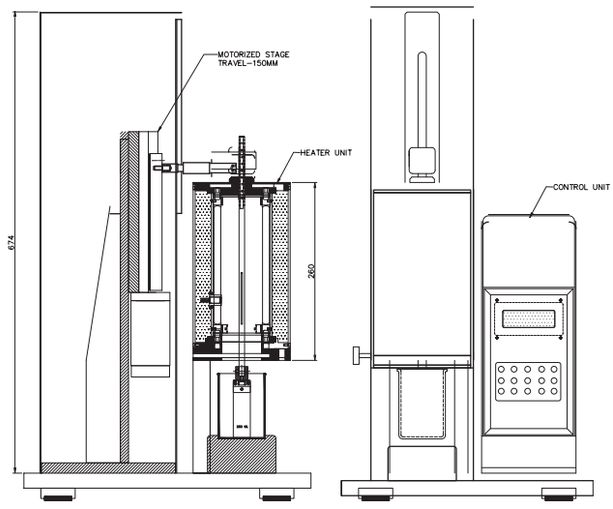
The outstanding feature of this model is the presence of an Infra-Red dryer in it. Inside the unit there is an infrared heater, which offers a maximum temperature of 200°C from ambient. After each dip, the Infrared heater helps in drying the substrate. It provides uniform heating to the substrate.The temperature is swiftly attained so that the time taken for the dipping process is greatly reduced. The coating thickness can be easily controlled by adjusting the withdrawal rate and the viscosity of the coating solution.

Another advantage of this model is that it minimizes the energy consumption as the heater will be activated only after detecting the substrate and hence it can provide the substrate with accurate temperature. Dip coating unit with infrared dryer has both manual as well as PC mode. In manual mode a user friendly front panel with keyboard and LCD display is provided to enter all dipping and withdrawal parameters where as in PC mode entire unit can be controlled by user friendly software. It is also possible to save programs for future use.

HOLMARC's Dip Coating Unit with Infrared Dryer (HO-TH-02B) has been designed to keep operator involvement as minimum as possible so that variables like speed, duration, etc. are maintained accurately by microprocessor controller. Movements are achieved by a precision servo motor controlled linear stage that offers vibration and noise free operation Moreover this model dip coaters are specially designed for lower volume applications. Our Dip coating unit can provide controlled immersion and withdrawal speeds for the substrates at user defined temperature (max.200°c) which helps to have a uniform coating. The compact size and sophisticated design of the system make it ideal for research activities and in physics, chemistry and biotechnology labs. We hold expertise in designing and manufacturing custom models depending on the varying needs of the customer.

Specifications

Actuator	Servo motor
Drive mechanism	Lead screw
Speed control	Available
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length max.	150 mm
Drawing speed min.	2 micron / sec
Drawing speed max.	9000 micron / sec
Program memory	8 programs
Dimension	630 x 368 x 420 mm
Max. power consumption	600 Watts.
Max. Temperature	200° Celsius
Max. Substrate size	75 mm



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Key Features:

- Compact and attractive design
- User friendly keyboard & LCD monitor
- PC controllable
- User friendly software
- Infrared dryer for precise substrate heating

PID Controller is used for optimum heating of the substrate. Apart from other sensors that sense the temperature of the heating chamber as a whole, the infrared sensor gives feedback of the temperature attained by the substrate by monitoring its emissivity.

Dip coating unit with infrared dryer is mainly used in physics, chemistry and biotechnology labs and corresponding research activities. Our device is designed and manufactured as a table top unit with electronics and servo motor aptly positioned making it compact and best suited for laboratory and research activities.

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For more details, please contact us

Dip Coating Unit with Touch Screen Interface

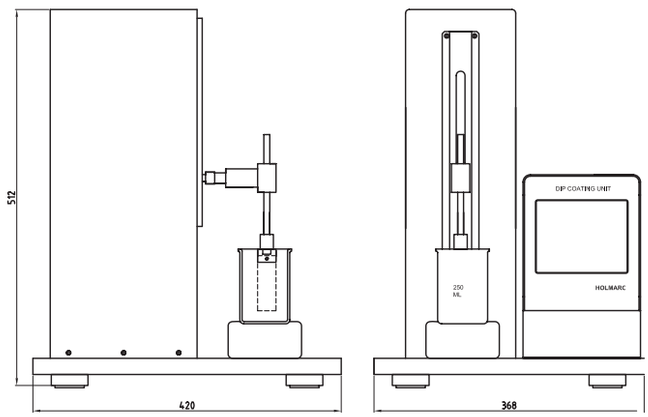
Model : HO-TH-01T

Holmarc's Dip Coating Unit with Touch screen Interface delivers an optimized performance and smart technology. Model: HO-TH-01T, features 4.5 inch LED touch screen display . A user can easily input or control all the process parameters through simple or multi-touch gestures by touching the screen. The touch screen enables the user to interact directly with what is displayed, rather than using a keypad. Moreover it can be controlled through a computer. All other features are same as that of Model: HO-TH-01.

Servo motor is used as the actuator for vibration free dipping and withdrawal. The device is designed and manufactured as table top device with entire electronics and servo motor housed in a compact unit. A number of substrates can be held to the holder at the same time. Height of the substrate holder can be adjusted with respect to the level of the solution during the experiment.

Specifications

Actuator	Servo motor
Drive mechanism	Lead screw
Speed control	Available
Power input	230V, 50Hz
PC connectivity	USB Interface
Stroke length max.	100 mm
Drawing speed	2 micron/sec - 9mm/sec
Dip duration	0-99 sec / min / hrs
Max. no.of repetitive dips	1 - 999
Interface	4.5 inch LED Touch screen
Dimensions (appx.)	368 x 420 x 512 mm



Mounted Variable Beam splitter/ Variable ND Filters

Our Circular Variable Beam splitters (Mounted) find applications in splitting an incident beam into a transmitted and a reflected beam. The intensity ratio of transmitted and reflected beams can be controlled over a wide range. The front surface of the variable beamsplitter has protected aluminium coating and the back surface has anti-reflection coating to reduce secondary images.

- 360° Rotation
- Post Mountable
- Base Mountable
- Detachable Base
- Lockable

Refer Page : 139

Spin Coating Unit

Model : HO-TH-05

Holmarc's Spin Coater, Model no: HO-TH-05 is a dedicated tabletop system to spin coat small substrates in research laboratories with well controlled spin process parameters. The high speed and duration range allows the user to achieve the desired thickness or thinness of the film. The spin head actuator is a precision DC servo motor, which requires less maintenance, with accurate speed and acceleration control. A vacuum chuck powered by oil-less vacuum pump holds the substrate at the spinning head.

The device has user friendly front panel having keyboard and LCD for programming the spin process. Spin duration, spin speed, acceleration, etc. are all programmable parameters through the front panel. As the program memories non-volatile, the recorded parameters are not lost in case of any power failure. This model is equipped with a memory of 9 pre-set, editable programs, each having 9 steps.

The device is compact and complete with electronics built into the unit within a footprint of 275 x 400 mm. All components in the device are corrosion protected to make it clean room compatible. The spin chamber is constructed in nylon with a diameter of 200mm. A transparent protective covering on top of the chamber makes spin coating a hassle free experience. Three sets of nylon anti-corrosive vacuum chucks are provided along with the equipment for holding substrate from 15 x 15 mm square to 100 x 100 mm square. Solvent drainage and vacuum release facilities are also provided in this device. Holmarc can provide customized models as per requirement.

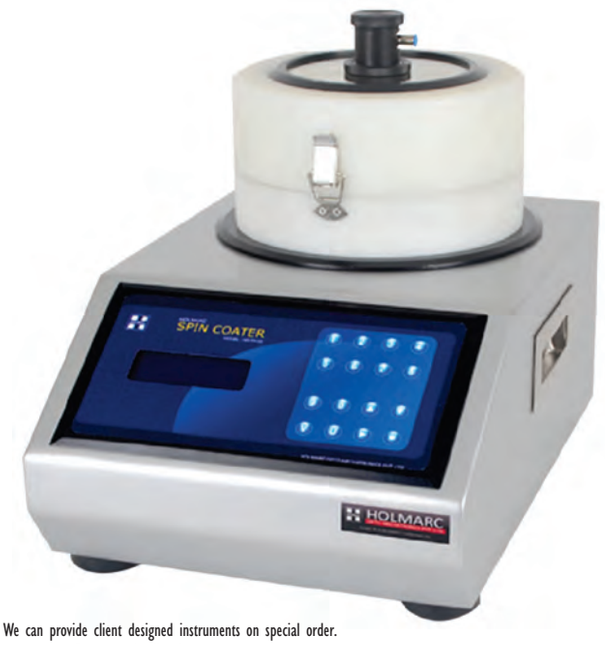
Features :

- **Chuck diameters : 10mm, 22 mm, 35 mm**
- **Transparent Safety Lid over the Working Chamber**
- **Non-volatile Program Memory**
- **User friendly design**
- **Back Panel Power On/Off Switch**
- **Stand holder to hold pipette to dispense solution.**
- **Inlet and outlet for Inert Gas Purging, 6mm tubing ***
- **Digital Pipette for dispensing of liquid into the substrate ***
- **Stand which is used for holding manual pipette ***
- **Vacuum adaptor to fix Petri dishes of sizes ranging from 30 mm - 100 mm diameter ***
- **Mechanical clips or locks to hold samples without vacuum ***

* optional

Specifications

Actuator	Brushless DC motor
Spinning speed	60 - 9999 rpm
Substrate diameter	30 mm to 70 mm
Power input	230V, 50Hz
Read out	20 x 4 line LCD
Spin chamber	Nylon
Acceleration	5 - 2000 rpm / sec
Spinning Speed Accuracy	< 5%
Programmable parameters	Speed , acceleration, dwell time and no. of steps
Maximum no of steps	9
Program memory	9 programs (non - volatile)
Dimension	400mm Depth x 275mm W x 500mm H



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For more details, please contact us

Spin coating is one of the most common techniques used to deposit uniform thin films to flat substrates. It is used in a wide variety of industries and technology sectors. The advantage of spin coating is its ability to quickly and easily produce very uniform films, ranging from a few nanometers to a few microns in thickness.

In this technique, a small amount of coating material is applied on the center of the substrate, which is either spinning at low speed or not spinning at all. The substrate is then rotated at high speed in order to spread the coating material by centrifugal force. Rotation is continued while the fluid spins off the edges of the substrate, until the desired thickness of the film is achieved. The applied solvent is usually volatile, and simultaneously evaporates. So, the higher the angular speed of spinning, the thinner the film. The thickness of the film also depends on the viscosity and concentration of the solution and the solvent.

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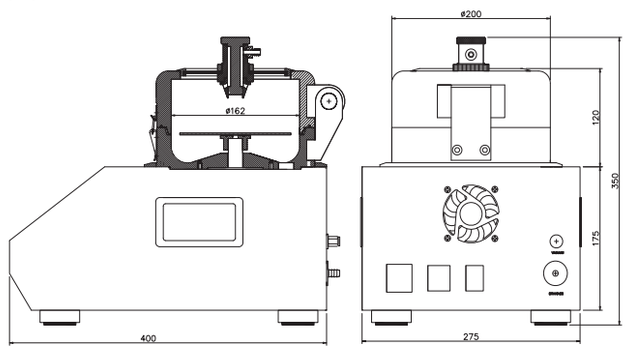
Applications:

Spincoating is ubiquitous in organic electronics, nanotechnology, semiconductor industries and other Industrial sectors.

Spin coating is widely used in microfabrication of functional oxide layers on glass or single crystal substrates using sol-gel precursors, where it can be used to create uniform thin films with Nano scale thicknesses. It is used intensively in photolithography, to deposit layers of photoresist about 1 micrometer thick.



Spin Coating Unit with UV curing system

Model : HO-TH-05C

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Holmarc's Spin Coating unit, Model : HO-TH-05C has been designed with many additional features than that of Model: HO-TH-05.

In this model of spin coater, UV LED curing system is used whenever there is a need for curing and drying of coatings. It also provides gases purge facility for additional supply of gases inside the chamber. Vacuum chucks provide flat, rigid surface for mounting substrates of different sizes and shapes. There is an adaptor to fix petri dishes of sizes ranging from 30 mm to 100 mm diameter. A vacuum chuck powered by oil-less vacuum pump holds the substrate at the spinning head. Also there are mechanical clips to hold samples without vacuum. In-built sample dispensing system helps to supply volatile solution in milli liter volume. The syringe holder height can be adjusted and rotated freely along the support rod. All required safety measures are provided for high speed rotation and spillage. It also provides facility for drainage.

The system has a user friendly front panel with key board and LCD display. The programs are easy to set up with up to 9 steps per program. All other features are same as that of Model : HO-TH-05.

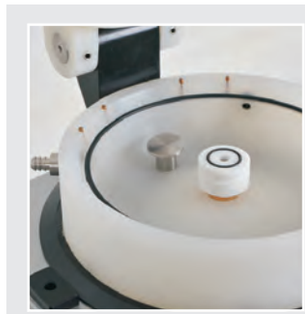
Features :

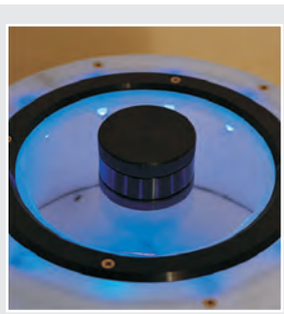
- **UV Curing Option by LED - Wavelength : 405nm**
- **Chuck diameter : 38mm**
- **Mechanical clips or locks to hold samples without vacuum.**
- **Inlet and outlet for Inert Gas Purging, 6mm tubing.**
- **Digital Pipette for dispensing liquid into the substrate *.**
- **Stand is provided for holding manual pipette *.**

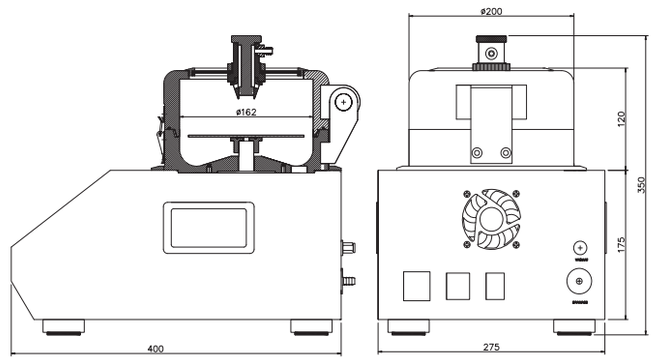
* optional

Specifications

Actuator	Brushless DC motor
Spinning speed	60 - 9999 rpm
Substrate diameter	30 mm to 70 mm
Power input	230V, 50Hz
Read out	20 x 4 line LCD
Spin chamber	Nylon
Acceleration	5 - 2000 rpm / sec
Spinning Speed Accuracy	< 5%
Programmable parameters	Speed , acceleration, dwell time and no. of steps
Maximum no of steps	9
Program memory	9 programs (non - volatile)
Gas inlet port	6mm diameter
Dimension	400mm Depth x 275mm W x 500mm H







Oil free diaphragm vacuum pump

Capacity: 75 LPM

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Spin Coating Unit with Glove Box Compatible

Model : HO-TH-05G

Holmarc's Spin Coater with glove box compatible, Model no: HO-TH-05G is a dedicated system suitable for use inside glove box to spin coat small substrates in research laboratories with well controlled spin process parameters. This model offers separate controller which has user friendly front panel having keyboard and LCD for programming the spin process. The user can, hence operate the spin coater in the remote location. A two way Start and Stop switches enables spin coater to be turned on or off within glove box or using controller.

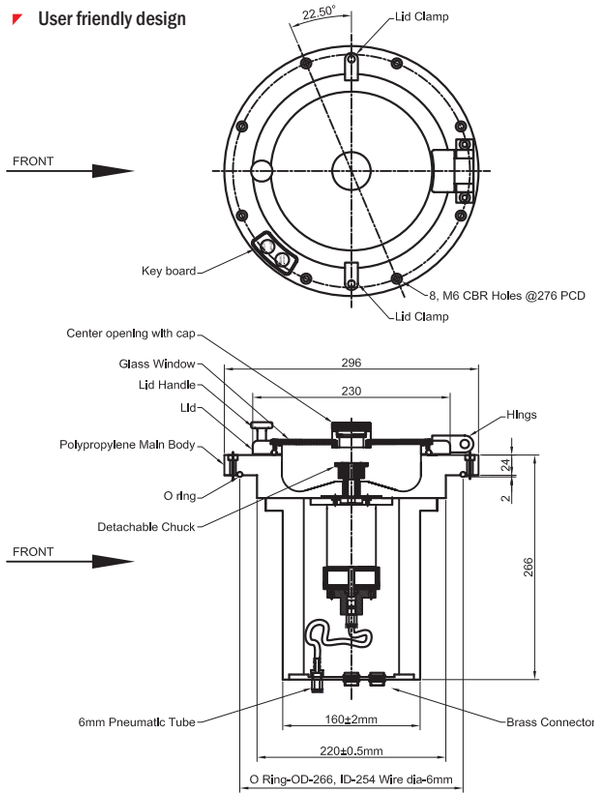
We can provide client designed instruments on special order.
For more details, please contact us

Spin duration, spin speed, acceleration, etc. are all programmable parameters through the front panel of the controller. The spin head actuator is a precision DC servo motor with accurate speed and acceleration control. A vacuum chuck powered by oil-less vacuum pump holds the substrate at the spinning head. Three sets of nylon anti-corrosive vacuum chucks are provided along with the equipment for holding substrate from 15 x 15 mm square to 100 x 100 mm square.

The nylon made spin chamber is compact within a footprint of 296 x 266 mm and easy to install into the glove box. A transparent cover on top of the chamber protects the surroundings by keeping the spin off solution inside. All components in the device are corrosion protected to make it clean glove box compatible.

Features :

- **Chuck diameters : 10mm, 22 mm, 35 mm**
- **Transparent Safety Lid over the Working Chamber**
- **Non-volatile Program Memory**
- **User friendly design**



Specifications

Actuator	Brushless DC motor
Spinning speed	60 - 9999 rpm
Power input	230V, 50Hz
Read out	20 x 4 line LCD
Spin chamber	Nylon
Acceleration	5 - 2000 rpm / sec
Spinning Speed Accuracy	< 5%
Programmable parameters	Speed , acceleration,
	dwell time and no. of steps
Maximum no of steps	9
Program memory	9 programs (non - volatile)
Gas inlet port	6mm diameter
Dimension	400mm Depth x 275mm W x 500mm H
Weight (appx.)	34 Kg

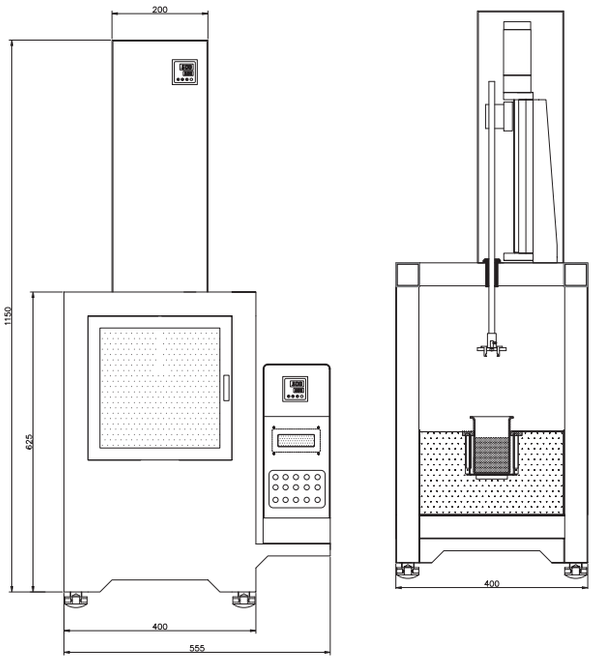
Ion Exchanger

Model : HO-TH-06

Holmarc's Ion exchanger, is a dedicated device for forming thin films by dipping the substrate in melt kept in hot chamber. Temperature of the heater can be controlled and fixed up to 400°C from ambient. Speed, duration, etc. are maintained accurately by computer control. Movements are achieved by a precision servo / stepper motor controlled linear stage.

The system has a user friendly front panel with key board and LCD display. It can as well be controlled through a computer. Dip duration, dip speed, withdrawal speed etc. are programmable features.

Servo motor (Optional) is used as actuator for vibration free dipping and withdrawal. The device is designed and manufactured as table top device with entire electronics and servo motor housed in a compact unit. Height of the substrate holder can be adjusted with respect to the level of the solution during the experiment.



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Specifications

Actuator	Stepper motor (Servo - Optional)
Drive mechanism	Precision rolled ball screw
Speed control	Available
Power input	230V, 50Hz
PC connectivity	Serial port (RS 232)
Stroke length max.	150mm
Drawing speed min.	2 micron / sec
Drawing speed max.	9000 micron / sec

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Bench Top Rubbing Machine

Model : HO-IAD-BTR-01 & HO-IAD-BTR-02

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For more details, please contact us

Rubbing Machine has been developed for LCD R & D Labs. The system is intended for tracing grooves on the substrate to orient the liquid crystal molecules. The grooves are made using a special rubbing cloth having depth of a few Angstrom. The substrate is held by a vacuum chuck for which a vacuum pump is included and integrated with the system. Maximum size of glass substrate which can be loaded is 100mm x 100mm and Model: HO-IAD-BTR-02 is 200mm diameter. The substrate along with vacuum chuck is held on a rotation stage so that it can be rotated and positioned at any required angle from +/-45 degrees for various rubbing orientations. The system has been developed as a standalone unit in which speed of the roller and speed of the substrate can be varied.

Programmable Features :

- Movement range for the substrate
- Speed of movement (substrate stage)
- No. of repetitions / Duration of operation

We can provide client designed instruments on special order.
For more details, please contact us

HO-IAD-BTR-02

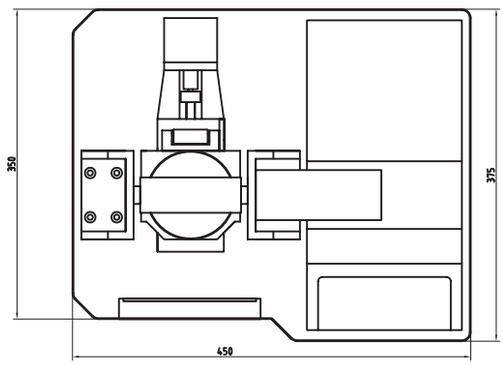
Specifications

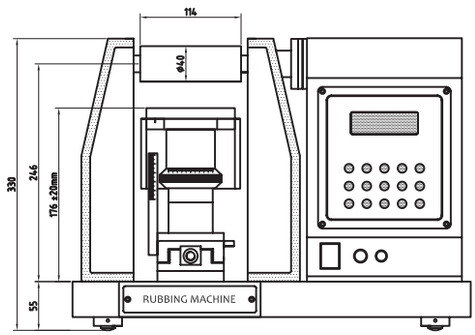
- Substrate holder :
  - a) Motorized linear stage for substrate movement.
  - b) Actuated by stepper motor.
  - c) Travel : 300mm
  - d) Minimum speed : 0.5mm / sec
    Maximum speed : 6mm / sec
  - e) Maximum size of movable substrate plate : 100mm x 100mm
  - f) Substrate fixed on a rotation stage which can be rotated from +/-45 degree.
- Rubbing wheel actuator : Brushless DC motor with speed control
  Maximum speed : 3000rpm
  Minimum speed : 0 rpm
- Display of speed on LCD screen
- Speed control of the spindle by input voltage variation by a knob
- Input : 230 VAC
- The System can be used in standalone mode

HO-IAD-BTR-01

Specifications

- Substrate holder :
  - a) Motorized linear stage for substrate movement.
  - b) Actuated by stepper motor.
  - c) Travel : 80mm
  - d) Minimum speed : 0.05mm / sec
    Maximum speed : 9mm / sec
  - e) Maximum size of movable substrate plate : 100x100mm
  - f) Substrate fixed on a rotation stage which can be rotated from +/-45 degree.
- Rubbing wheel actuator : Brushless DC motor with speed control
  Maximum speed : 3000rpm
  Minimum speed : 0 rpm
- Display of speed on LCD screen
- Speed control of the spindle by input voltage variation by a knob
- Input : 230 VAC
- The System can be used in standalone mode





Bench Top Rubbing Machine

Model : HO-IAD-BTR-03

RHolmarc Bench top rubbing machine is a compact dedicated machine specially designed for LCD and LCoS R&D Labs. The system is intended for tracing grooves on polyimide surface to orient the liquid crystal molecules. Rubbing Machine, HO-IAD-BTR-03 has been developed with additional features than that of models HO-IAD-BTR-01 & HO-IAD-BTR-02. In this model, the height of the substrate can be varied using a motorized vertical stage. A precise vertical height adjustment in the order of micrometers is possible. It is customized in such a way that, the horizontal stage will be motorized in up and down direction. It will move down when one roll is over and the stage comes back to its initial position for next roll. Hence, rubbing in single direction can be achieved. The substrate movement in linear or vertical is possible at a time.

The substrate along with vacuum chuck is held on a rotation stage so that it can be rotated and positioned at any required angle from ±45 degrees for various rubbing orientations. The substrate can be held either by vacuum or can be mounted on to the additional plate provided with the machine using M4 screws. Maximum size of substrate which can be loaded is 100 mm x 100mm. The system has been developed as a standalone unit in which speed and direction of the spindle can be varied. The spindle speed can be controlled from 0 to 3000 rpm.

Programmable Features :

- Movement range for the substrate
- Motorized linear or vertical movement
- Speed of movement (substrate stage)
- No. of repetitions / Duration of operation

We can provide client designed instruments on special order.
For more details, please contact us

Specifications

- Power input : 230 V AC (110 V AC - optional)
- Linear Stage
  - a) Actuator : Stepper motor
  - b) Travel : 100 mm
  - c) Speed control : 0.05 - 10 mm / sec
- Vertical Stage
  - a) Blank (+) dist : 99 steps [1 step = 10 µm]
  - b) Blank (-) dist : 99 mm
- Spindle
  - a) Actuator : Brushless DC motor
  - b) Speed control : 0 - 3000 rpm

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Syringe Pump / Infusion Pump

SPLF Series

Holmarc's SPLF series syringe pumps are versatile products ideal for precise dispensing of fluids in laboratory experiments, available at an economical price. Our bench-top Syringe Pump has been designed for safe and ultra-smooth fluid flow for lab applications and can be easily set up inside a standard fume cupboard. Holmarc manufactures syringe pumps in various models for single syringes, two syringes, four syringes and ten syringes.

These pumps can operate with standard off the shelf syringes in plastic, glass and stainless steel. The dispensing rates / flow rates possible with this device are very wide in range and can vary from 15.63ul/hr to 36.2ml/min, depending on the size of syringe used. The unit has built in electronics with keyboard and display for programming the operational attributes to work in standalone mode. This series of pump shows all the pertinent, real-time information on the LCD display. The Information displayed includes flow rate and total time remaining.

Computer interfacing is also possible whenever required with RS 232C serial integrated into the control electronics of the system. This model supports dispensing as well as withdrawal. Powerful drive motors and innovative design have been combined with software control to deliver ultra-smooth and steady flow rates. Apart from all these, this device can be customized as per requirement.

Features :

- **Smooth and Continuous mode of operation**
- **Automatic dispensing of small volumes**
- **Better flow performance**
- **Easy to configure**
- **Vibration and noise free working**
- **Choice of unit selection for flow rate & Duration/Target volume**
- **RS-232 interface for computerizing**
- **Constant delivery of fluids**
- **Can accomadate Multi-size syringes**
- **Compatible with glass, plastic and SS syringes**
- **Front panel with keyboard and display for programming**
- **Non-volatile memory of all parameters and programming**
- **Dispensing accuracy of +/- 1%**

Syringe	Diameter*	Flowrate	Pressure
5 ml	10.3mm	15.63 µl/hr -10.6 ml/min	24Kg/cm^2
10 ml	14.57mm	31.27 µl/hr - 21.2 ml/min	12Kg/cm^2
20 ml	19.05mm	53.45 µl/hr - 36.2 ml/min	7Kg/cm^2
30 ml*	21.59mm	68.65 µl/hr - 46.5 ml/min	5.5Kg/cm^2
50 ml*	28.9mm	123.0 µl/hr - 83.3 ml/min	Kg/cm^2
60 ml*	26.6mm	104.2 µl/hr - 70.7 ml/min	3.6Kg/cm^2

* Available on special request

We can provide client designed instruments on special order. For more details, please contact us

SPLF 2D series

This model can accept two different size syringes which varies from 5 mL to 20 mL. Any type of syringes can be used in the unit including glass, plastic or stainless steel. This pump is ideal for more complex multi-step reactions and has multi-mode operation including infusion only or withdrawal only. A piston holder is provided in order to bring the piston back to home position. In our dual syringe model no: SPLF 2D, two syringes can operate independently with different flow parameters. This device can store up to 5 programs which can be reviewed or changed during operation. The front panel display allows the user to see all of the pump's operating parameters to ensure proper operation during the experiments. Syringe size and flow rate are easily displayed, as well as the time remaining.

SPLF-H series

In SPLF-H series pumps, temperature control of the syringe is possible. A glass syringe equipped with heating coil is provided along with this device. The temperature of the solution in the syringe is controllable up to 60°C from ambient. This heating option is available in various models with single syringe, two syringes, four syringes and ten syringes.

*Actual diameter may vary depends on the syringe manufacturer.

Model	Item	Temp. control	No: of Syringes
HO-SPLF 1	Single Syringe Pump		One
HO-SPLF 1H	Single Syringe Pump with temperature control	RT - 60° C	One
HO-SPLF 2	Dual Syringe Pump		Two
HO-SPLF 2H	Dual Syringe Pump with temperature control	RT - 60° C	Two
HO-SPLF 4	Four Syringe Pump		Four
HO-SPLF 4H	Four Syringe Pump with temperature control	RT - 60° C	Four
HO-SPLF 10	Ten Syringe Pump		Ten
HO-SPLF 10H	Ten Syringe Pump with temperature control	RT - 60° C	Ten
HO-SPLF 2D	Independently controlled Dual Syringe Pump		Two
HO-SPLF 2DH	Independently controlled Dual Syringe Pump with Temperature control	RT - 60° C	Two

Syringe
Standard off the shelf syringes, 5mL to 20 ml, any manufacturer

Flow rate range
*15.63ul/hr to 36.2ml/min
*actual volume may vary depends on syringe size & manufacturer

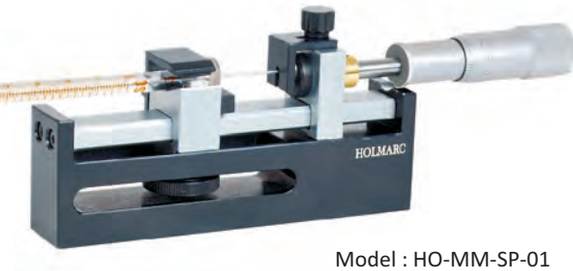
Temperature control
RT to 60°C(in selected models)

Flow rate will vary depending on the syringe size:

Manual Micro Syringe Pump

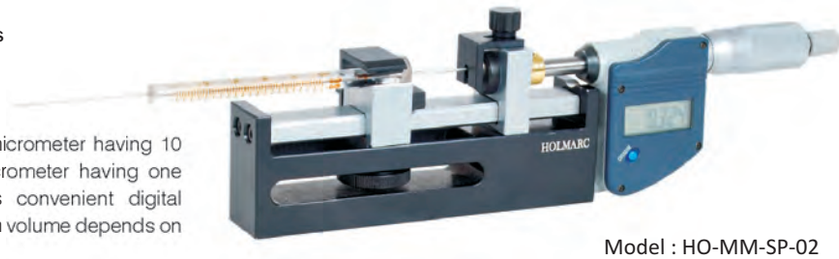
Model No: HO-MM-SP-01 | HO-MM-SP-02

Manual micro syringe pump is a convenient instrument for controlled dispensing or withdrawal of fluids. It is an economical method for any application requiring injecting / withdrawing a calibrated volume under manual control. It can be employed in applications like chromatography, micro injections etc. . .



Model : HO-MM-SP-01

- For injecting and withdrawing precise fluid volumes
- Compatible with glass, plastic or stainless steel syringes
- Micrometer driven mechanism
- Delivers precise fluid volumes



Model : HO-MM-SP-02

Two models are available. One with graduated micrometer having 10 micron resolution and the other with digital micrometer having one micron resolution. Digital micrometer provides convenient digital readings in microns. The resolution of the injection volume depends on the syringe used and resolution of micrometer.

Model No. HO-MMSP-01		
Micrometer drive range	:	25mm
Linear resolution	:	10µ
Volume Resolution		
10 µl syringe	:	0.0018 µl / div
25 µl syringe	:	0.00416 µl / div
50 µl syringe	:	0.012 µl / div
100 µl syringe	:	0.0167 µl / div
250 µl syringe	:	0.0417 µl / div
500 µl syringe	:	0.0833 µl / div

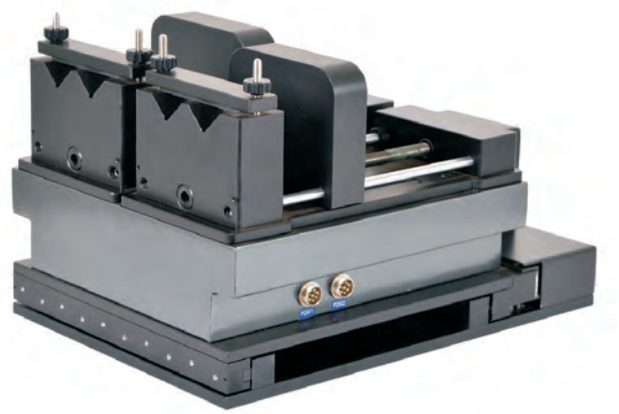
Model No. HO-MMSP-02		
Micrometer drive range	:	25mm
Linear resolution	:	01µ
Volume Resolution		
10 µl syringe	:	0.0018 µl / div
25 µl syringe	:	0.00416 µl / div
50 µl syringe	:	0.012 µl / div
100 µl syringe	:	0.0167 µl / div
250 µl syringe	:	0.0417 µl / div
500 µl syringe	:	0.0833 µl / div

Electrospinning Syringe Pump

Model No: HO-SPLF-ES2 | HO-SPLF-ES4

Syringe pump provided for Nano fiber electrospinning unit can withstand high voltages. This is possible due to the non conducting material used for its construction. They isolate the syringe pump's inner electronic circuits from the high voltage external environ- ment. Nano fiber electrospinning Syringe pump can withstand voltages as high as 30KV.

Holmarc's SPLF-ES series syringe pumps are versatile and cost effective products for precise dispensing of fluids in laboratory experiments. The pump can operate with standard off the shelf syringes in plastic, glass and stainless steel. The dispensing rates / flow rates possible with the device are very wide in range and can vary from 2.8 micro-l / hr to 19ml / min.



Model	Item	No: of Syringes
HO-SPLF-ES 1	Single Syringe Pump	One
HO-SPLF-ES 2	Dual Syringe Pump	Two
HO-SPLF-ES 4	Four Syringe Pump	Four
HO-SPLF-ES 10	Ten Syringe Pump	Ten
HO-SPLF-ES 2	Independently controlled Dual Syringe Pump	Two

The unit has built in electronics with keyboard and display for programming the operational attributes to work in standalone mode. Computer interfacing is also possible, whenever required with RS 232C serial, integrated into the control electronics of the system.

Holmarc manufactures syringe pumps in various models for single syringe, two syringes, four syringes and ten syringes as described in the chart below. In our dual syringe model no: SPLF-ES 2D, two syringes can operate independently with different flow parameters.

Peristaltic Pump

Model : HO-LS-PP-01, 02, 04, 06

Holmarc offers wide range of peristaltic pumps for dispensing, filling, dosing, sampling and transferring applications. The advantage of using peristaltic pump is that no contamination will occur to the fluid or to the pump. To use a different fluid, all you need to do is to change the tubing used to pump the fluid. The flow rate will be accurate and there will not be any reverse flow or back flow. Our equipment is ideal to use with corrosive or viscous liquids. Instant start or stop and reverse facility are available in our standard model.

Peristaltic pump from Holmarc are driven by heavy duty stepper motors along with the micro stepping drives. Drive and control electronics are assembled in compact housing along with the pump mechanism.

Front panel of the device is provided with the LCD and keyboard for programming the flow parameters. Replacement mechanism for flow tube is made as user friendly as possible. The device is handy compact and portable and work silently.

Specifications : Model : HO-LS-PP-01	
Flow rates	0.01 to 9.99 ml/min
Accuracy	+/- 1.5
Speed	0.2 to 5 rpm
Motor	Stepper Motor
Remote	Stop / Start
Power supply	220 - 240v 50/60 Hz supply
User Interface	20 x 4 Line LCD & 15 Keys Keyboard

Peristaltic pump employs a contamination - free pumping mechanism. The pumps can be effectively used for many biological research activities. It can pump abrasive, highly corrosive, viscous, high density liquids. We can customize the design as per required flow rate, number of channels, tube diameters etc.

Model	Item
HO-LS-PP-01	Single channel
HO-LS-PP-02	Two channel
HO-LS-PP-04	Four channel
HO-LS-PP-06	Six channel

We can provide client designed instruments on special order. for more details, please contact us

Peristaltic pumps do not contaminate fluids as none of the pump components comes in contact with the fluids other than the tube. Holmarc's peristaltic pumps are inexpensive to maintain and are easy to install and operate.

Features :

- Variable speed drive
- Contamination free pumping
- No reverse flow or back flow
- Accurate and repeatable flow rate
- Instant start or stop facility
- Complete isolation of pumped fluid
- Ergonomic design, Ease to use
- Almost maintenance free
- Clear, easily read LCD illuminated display
- Stepper Motor used for driving the system

Multi channel peristaltic pump

The peristaltic pump is characterized by a special combination of fluid handling mechanism and design flexibility for multi channel applications. It is sometimes important in research laboratories and production plants to move several fluid channels simultaneously. Controlling multiple channels together can be a must for many applications. Varying the speed of the motor will at once vary the flow in all channels.

Annual Service Pack

All Holmarc Instruments and their accessories are warranted by HOLMARC for a period of ONE YEAR from the date of original purchase. Holmarc will repair or replace a product, or part there of, found by Holmarc to be defective, provided the defective part is returned to Holmarc, with proof of purchase. We guarantee effective services delivered in a timely manner.

Digital Magnetic Stirrer

Model : HO-MS-01

Holmarc's Digital Magnetic Stirrer is a state of the art device that provides an extra degree of precision for your applications in research and other activities. A magnetic stirrer is a laboratory device that employs a rotating magnetic field to cause a teflon coated steel bar immersed in a liquid to spin very quickly, thus stirring it. It is an essential tool for research labs.

Holmarc' Digital Magnetic Stirrer combines stylish design and functionality in a compact device. Its user friendly keyboard and LCD display can be used to input required programs and parameters. The unit has inbuilt software with capabilities of storing multiple programs. The microprocessor controlled unit makes sure smooth and silent operation. We can input the required speeds on the digital consol and view instantaneous changes on the display. Maximum speed possible is1500 rpm.

Specifications

- Capacity (Water) : 1 Litre
- Speed range : 200 - 1500 rpm
- Speed stability : +/- 2 rpm
- 3 stirring bars of different sizes
- User interface : 20 x 4 line alphanumeric LCD & 4 button keyboard
- Real time display of speed
- 9 program non-volatile memory
- 9 steps for each program
- Different values for speed & duration for each step
- Operating ambient temperature : 5 - 40°C
- Input voltage : 230V 50Hz

We can provide client designed instruments on special order. For more details, please contact us

Features :

- Compact and User friendly device
- Fully digital console with LCD and keyboard
- Microprocessor controlled operation
- Maximum rpm of 1500
- Multiple programs with multiple steps and independent durations

Multiple Point Stirrers

Multiple Point Stirrers are available, designed for chemical, biotechnology and medical applications of all kinds. All of our stirrers are developed for continuous operation in laboratories.

Customized Stirring Systems

On request we can provide temperature control unit and multiple point stirrers having different stirring positions, individual dimensions and stirring point distances. All of our products can be customized for your special needs. Customization is our business, competence and passion.

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Digital Magnetic Stirrer with Hot Plate

Model : HO-MS-02

Holmarc Digital Magnetic Stirrer with hot plate combines stylish design and functionality in a compact device. Its user friendly keyboard and LCD display can be used to input required programs and parameters. The unit has inbuilt software with capabilities of storing multiple programs. The microprocessor controlled unit makes sure smooth and silent operation. We can input the required speeds on the digital consol and view instantaneous changes on the display. Speeds up to 1500 rpm are possible in this manner. This model also incorporates heating platform for placing the beaker. It comes with accurate heating control and temperatures upto 200°C.

Holmarc's Digital Magnetic Stirrer is a state of the art device that provides an extra degree of precision for your applications in research activities.

A magnetic stirrer is a laboratory device that employs a rotating magnetic field to cause a stir bar immersed in a liquid to spin very quickly, thus stirring it. It is an essential tool for research labs.

We can provide client designed instruments on special order. For more details, please contact us

Specifications

- Capacity (Water) : 1 Litre
- Speed range : 200 - 1500 rpm
- Speed stability : +/-2 rpm
- Temperature range : Ambient temperature to 200°C
- Heating rate (1 liter Water) : 12°C / min
- Temperature sensor : PT100
- Temperature control : Microprocessor based PID control
- Temperature control accuracy : +/-1°C
- Connection for external temperature sensor (Optional) : K type thermocouple
- Hot plate material : Stainless steel
- 3 stirring bars of different sizes
- User interface : 20 x 4 line alphanumeric LCD & 4 button keyboard
- Real time display of speed & temperature
- 9 program non-volatile memory
- 9 steps for each program
- Different values for speed, temperature & duration for each step
- Operating ambient temperature : 5 - 40°C
- Input voltage : 230V 50Hz

Features :

- **Compact and User friendly device**
- **Fully digital console with LCD and keyboard**
- **Microprocessor controlled operation**
- **Maximum rpm of 1500**
- **Multiple programs with multiple steps and independent durations**
- **Heating platform - 200°C (different models are available)**

Multiple Point Stirrers

Multiple Point Stirrers are available, designed for chemical, biotechnology and medical applications of all kinds. All of our stirrers are developed for continuous operation in laboratories.

Customized Stirring Systems

On request we can provide temperature control unit and multiple point stirrers having different stirring positions, individual dimensions and stirring point distances. All of our products can be customized for your special needs. Customization is our business, competence and passion.

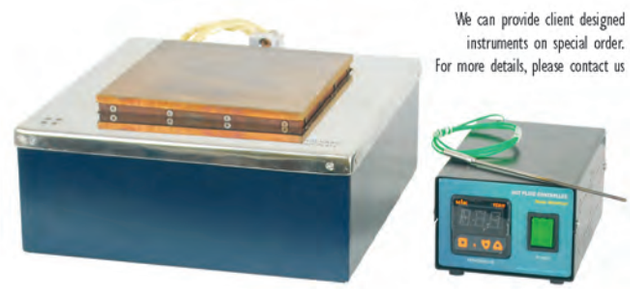
Hot Plate

Model : HO-HPC-01 & HO-HPC-02

Holmarc's HO-HPC-01, 02series hotplate is a versatile instrument equipped with high uniformity heaters controlled with an accurate digital thermostat to assure even heating across the entire surface of the hot plate. The controller, which is placed remotely facilitates microprocessor-controlled feedback which maintains consistent, repeatable temperature settings which is ideal for repetitive procedures.

The heating surface is made of high quality Stainless steel (316 L grade)which is machined smooth and flat and it contains Nichrome heating coil. The hot plate surface is resistant to spillage and corrosion. Our hot plate features an operating temperature up to 500°c from ambient with good uniformity across the plate surface. K type thermocouple temperature sensor is included in the Hot plate for accurate temperature measurements.

Specifications	
Model : HO-HPC-01	**150 x 150mm hot plate**
Temperature range	: Ambient to 500°C
Controller	: PID temperature controller with solid state relay
Sensor	: K type thermocouple (Built-in, with the controller)
Hot plate material	: Stainless Steel
Hot plate dimensions	: 150 x 150mm
Overall dimensions	: 325 x 285 x 164mm (without the controller)



Holmarc's HO-HPC-01, 02 series hot plates are portable, tabletop models and are available in two plate dimensions: 250 x 250 mm & 150 x 150 mm. Depending on the region of use, two power options are also available for the Hotplate;110 V & 220V AC.

Hot plate find application in the field of spraypyrolysis, in electronics industry, probing, characterization inspection and failure analysis of semiconductor wafers and chips, surface annealing, metal disposition, baking and in chemical laboratories.

Specifications	
Model : HO-HPC-02	**250 x 250mm hot plate**
Temperature range	: Ambient to 500°C
Controller	: PID temperature controller with solid state relay
Sensor	: K type thermocouple (Built-in, with the controller)
Hot plate material	: Stainless Steel
Hot plate dimensions	: 250 x 250mm
Overall dimensions	: 425 x 385 x 115mm (without the controller)

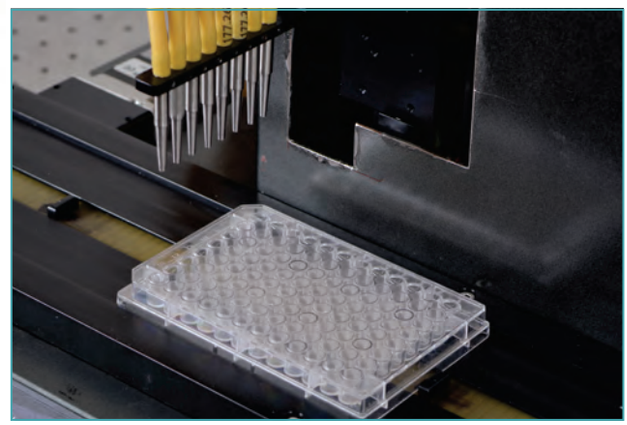
Single Channel Dispensing Station

Model : HO-BL-SCDS-214P

Holmarc's single channel dispensing station (Model : HO-BL- SCDS-214P) automates repetitive dispensing of liquids in to bottles or container in the pre determined quantities. The system consist of a peristaltic pump, conveyor belt for positioning of bottler in x axis, two axis positioning (Y & Z) for dispensing nozzle and standalone controllers with user interface integrated in the system.

Use of peristaltic pump with easily replaceable tubes, prevent contamination as the pump liquid do not touch any of the pump parts except the tubing.

Features		
Type	.....	Single Channel Dispensing
Feeding	.....	Motorized Conveyer System
Feeding Tray Size	.....	Standard, 96 Well Plate
Dispensing	.....	Peristaltic Pump
Flow rates	.....	0-1 to 5 ml / min
Motor	.....	Stepper Motor
Power supply	.....	220 - 240v 50/60 Hz supply
User Interface	.....	20 x 4 Line LCD & 15 Keys Keyboard



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MICRO Plate 8 Channel Precision Dispensing Station (96 Well Plate Standard)

Model : HO-BL-MPPD-214S

HOLMARC'S Bio LABS MICRO Plate Dispensing Station is a specially designed tool suitable for fast, repetitive dispensing of microliter to milliliter volumes into 8 channel well container. It ensures precise dispensing and offers an economical, compact, and reliable alternative to existing microplate dispensers.

Features :

- 8 Nozzle Dispensing
- Accurate dispense channels
- Low dead volume
- Fast dispenses
- Adjustable dispensing range
- Configurable for different well plates
- Microprocessor-controlled syringe pump
- Removable tubings
- Small footprint
- No recalibration required
- Minimum dispense volume of 1 µL
- Dispense precision : ≤ 5% CV

Accurate and precise dispensing are guaranteed without time consuming re-calibration, cassette replacement and maintenance. Model HO-BLMPLD-214S is a 8 channel dispenser designed for 96 well plates. It incorporates a microprocessor controlled syringe pump for optimal performance and guarantees optimal precision and accuracy.

The user controlled dispense flow rates allow low to high speed dispensing. For any application. Holmarc's Bio LAB DI software provides a high degree of control over process parameters. Column selection offers the choice of dispensing a few columns, or a complete plate. For optimal dispensing accuracy, the software allows fine tuning the dispense volume. It can be used for any dispensing task with microliter plates in molecular biology, immunology, genomics both in clinical as well as pre-clinical activities.

Holmarc can also under take custom modifications in the system like individual dispense heads (different fluids can be dispensed into a single microplate), optical reader, fluorescence detection unit etc.

Multi-channel Precision Line Dispenser

Model : HO-BL-MCPLD-214L

Holmarc's multi channel line dispensing system can be used for production as well as research in life science and bio-technology for dispensing reagent liquid in line or dot format on sheet substrate. Up to four lines can be printed at the same time with different dispensing rate for each line.

Independent syringe pumps are used for each line. All parameters are programable from the front panel of stand alone controller of the system.

Features :

- Precision Line dispensing Facility.
- Can dispense reagent from 1 line to multi-lines or dot simultaneously.
- Reversible pump allows easy cleaning and maintenance.
- Height adjuster for tip to control space between dispensing lines.
- Separate pumping system for each channel ensures accurate dispensing
- Programmable parameters for adjusting dispensing volume and feeding table speed.

Features	
Applicable sheet size	Max. 320 x 320 mm
Dispenser	Syringe pump
Dispensing volume : Line :	Minimum 0.5 µℓ / cm
Dot	Minimum 0.5 µℓ / dot
Accuracy	... < 1.0% deviation from expected result at full stroke
Precision	≤ 0.05% CV at full stroke
Feeding speed	Adjustable
Power	110 Volt or 230 Volt, 50 Hz or 60 Hz

HOLMARC FlowLine F100 can be used for printing lines and dots in various substrates. The standard machine has 3 pumps for line printing and one optional pump for conjugate spraying. Additional pump options are available. The short length tubing of this machine reduces the reagent wastage. The average out put is 120 sheets per Hour.

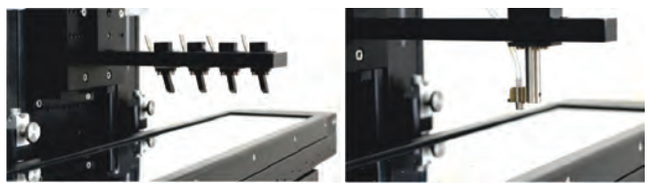


Fig : 4 Channel Nozzle Printing Head and spray holding unit

Technical Data

- Standalone mode of operation with easy to use User Interface
- Small machine footprint
- Automated Adjustable line positions
- Pumps: Precision Syringe Pumps
  Standard Configuration: 3 for reagent line printing
  All syringe pumps are independently controllable.

- Nozzles:
  Stainless steel solenoid valve controlled nozzles for non contact printing.
  PEEK nozzles for contact Printing
- Adjustable nozzle height and nozzle width.
- Operating Range : 550mm
- Dispense area: 100mmX550mm sheet, can accommodate card size from 50mm to 10mm width, and upto550mm length
- Syringe 250µl(standard)
- Tubing: Standard Teflon Tubing with Standard Connectors
- Adjustments:
  Nozzle contact
  Line distance adjustable from 4 mm to 10mm
  Conjugate spray nozzle height
  Nozzle contact angle
  Easy switch from contact to non contact Printing

Standard Models

F100-01: Contact Printer with 2 Line Printing Pumps and 1 Conjugate Spray Pump

F100-02: 3 pumps with 2 Non Contact printing nozzles, 2 Contact Printing Nozzles and 1 Spray Nozzle.

Options

Contact or non-contact printing mach
Optional Systems for dot printing.
Ungradable upto 10 Pumps
Conjugate Spraying Nozzles
Optional Sheet Feeding Trays

Fig : Nozzle and spray holding units

TDU7000S

HOLMARC 3x6 channel Precision Automated **Filling & Sealing** station

TDU7000S is a 3x6 channel Precision Automated Filling & Sealing station. Designed for filling and sealing of cartridges and tubes used in pharmaceuticals, biotech and biopharmaceutical industry. Machine is compact and provides higher production output. it also fulfils the desires of many manufacturers to have a truly customized solution to fit their needs.

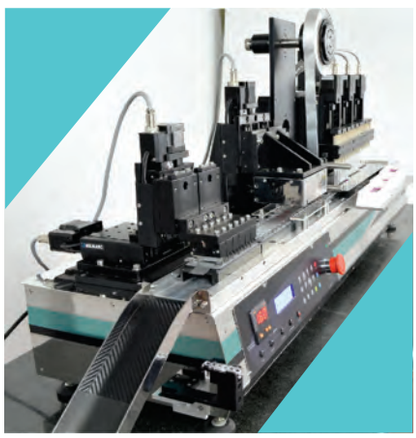
Salient Features

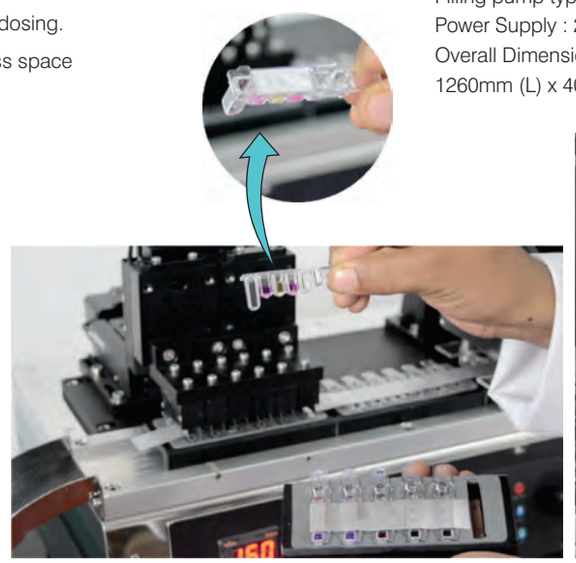
- Compact & versatile
- All contact parts made from high quality Stainless Steel 316.
- Machine body is elegantly finished from Stainless Steel 304.
- Cartridge sensing system to avoid wastage of costly liquid.
- High filling accuracy of ± 0.5% in single dosing.
- All operations on one platform, hence less space requirement.

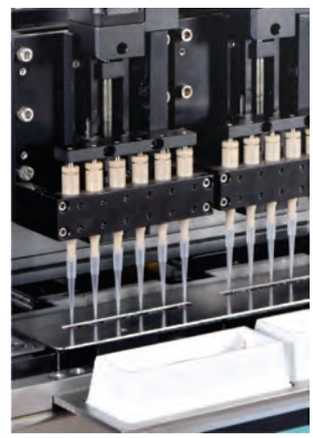
https://www.youtube.com/watch?v=a_TiwJFIVjo

Technical Specifications

Model : TDU7000S
Filling Range : 1ul to 300ul
No. of filling head : 18
No. of liquid channels : 3
No. of filling per channel : 6
Output : 500 cartridges/hr
Cartridge Type : Plastic
Contact Parts : Stainless Steel 316
Material construction : Stainless Steel 304
Filling pump type : Syringe Pump - Micro pipettes
Power Supply : 230V AC
Overall Dimension
1260mm (L) x 400mm (W) x 600mm (H)







Desktop Dispensing Unit

Model : HO-LSDDU-A3 | HO-LSDDU-A4

Holmarc manufactures desktop dispensers for automated dispensing of fluids to well plates / test tube arrays. Our standard model HO-LS-DDU-A3 is a three axes system which has a dispensing area of 300 mm x 300 mm. The system operates through a personal computer. Various dispensing attributes are programmable through the computer.

We can provide client designed instruments on special order. For more details, please contact us

Features :

- **Operating Range : X & Y axes : 300 mm, Z axis : 100 mm.**
- **Dispense area - 300 x 320mm.**
- **Repeatability : 20 microns.**
- **Resolution : 20 microns.**
- **Drive system : Stepper motors.**
- **Computer interface : Rs 232 C.**

Specifications

Model No. HO-LSDDU-A3	
Operating Range	X Axis/300mm, Y Axis/320mm, Z Axis/100mm
Repeatability	± 0.01mm per axis
Resolution	X Y & Z axis 0.01 mm
Drive system	Stepping motor
External interface	RS 232 C-one channel for PC

Model No. HO-LSDDU-A4	
Operating Range	X Axis / 300mm, Y Axis / 320mm, Z Axis / 100mm, R axis / ± 360°
Repeatability	±0 .01mm per axis R axis 0.02°
Resolution	X Y & Z axis 0.01 mm
Drive system	Stepping motor
External interface	RS 232 C-one channel for PC

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