

# INSTRUCTION MANUAL

HI300N - HI310N

HI301N - HI311N

HI302N - HI312N

HI303N - HI304N

HI322N - HI324N

Magnetic Stirrers



Dear  
Customer,

Thank you for choosing a Hanna Instruments product. Please read this instruction manual carefully before using this instrument.

This manual will provide you with the necessary information for correct use of this instrument, as well as a precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at [tech@hannainst.com](mailto:tech@hannainst.com) or view our worldwide contact list at [www.hannainst.com](http://www.hannainst.com).

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Remove the instrument and accessories from the packaging and verify damage has not occurred during shipping. Remove protective film from stirrer. Please contact your local Hanna Instruments Office. Each stirrer is supplied with a magnetic stir bar.

*Note: Save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.*

The Hanna Instruments series of magnetic stirrers are designed with simplicity of use for stirring and mixing solutions in a wide range of laboratory applications. Several models are available in an extensive range covering:

- general purpose stirrers
- dual-speed range
- auto-reverse cycle stirring
- rpm indication
- timer control

All models employ a motorized magnet to rotate a stirring bar to create a forced vortex rotational flow in the solution with a constant angular speed which is adjustable with an external speed knob.

Unlike conventional stirrers, all Hanna Instruments stirrers use the concept of pulse-driven drive to give the full power required to effectively stir the fluid regardless of the speed. This eliminates the need to start the motor at high speed and the user is now able to control the speed precisely.

Each stirrer is equipped with an opto-sensor for speed monitoring, and a speed limiter circuit that prevents hazardous operation when the load is suddenly removed.

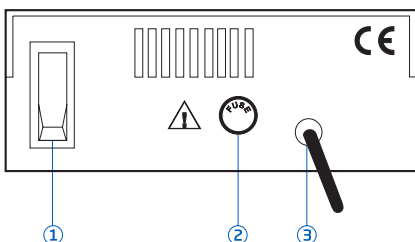
The power required to effectively stir a fluid is affected by the torque load on the stirrer which is dependent on the capacity, type and viscosity of the fluid. The speed of the stirrer decreases as the torque load increases and vice versa, unless the power delivered changes accordingly.

For Newtonian fluids like water, the viscosity remains constant during stirring. General purpose, normal stirrers are ideal for this kind of fluids. For some fluids like oil and clay, the viscosity changes during the stirring process, making it necessary to adjust the power to maintain a constant speed during the stirring.

Hanna Instruments Auto-Speed stirrers (HI31X series) are designed with automatic feedback control to maintain constant speed when the torque load changes and are therefore ideal for stirring non-Newtonian fluids where the viscosity changes during stirring.

They are also ideal for mixing applications where one solution is added to another which changes the capacity and thereby the torque load on the stirrer. The Auto-Speed stirrers maintain a constant stirring speed during the mixing up to the full capacity of 5 liters. They can also be used with Newtonian fluids up to a capacity of 5 liters.

APPLICATION	MODEL
Newtonian fluids up to 2.5 liters	HI300N
	HI301N
	HI302N
	HI304N
Non-Newtonian fluids up to 5 liters whose viscosity changes during stirring or Newtonian fluids up to 5 liters or mixing operation where load changes during stirring	HI310N
	HI311N
	HI312N
Repetitive stirring in Newtonian fluids up to 2.5 liters	HI303N
Repetitive stirring in multiple samples with the same stirring speed	HI304N
Routine stirring application with a predetermined stirring time	HI322N
Repetitive stirring in multiple samples with the same stirring speed and predetermined stirring time	HI324N



1. ON/ OFF switch for power supply
2. Fuse holder for 400 mA/ 250 V fuse
3. AC power cord.



Unplug the stirrers from the power supply before replacing the fuse.

See the following pages for specifications of each model.

The capacity is referred to stirring water with a viscosity of 0.001 N·s/ m<sup>2</sup> at 25 °C.

Specifications for all models:

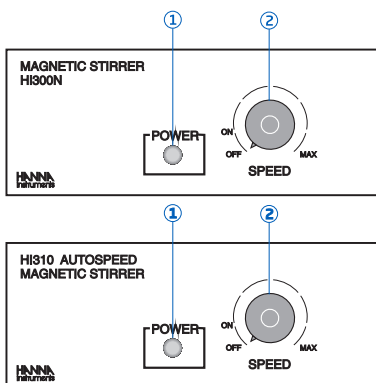
Speed Control	ON/ OFF and continuously variable with potentiometer knob
Drive	Direct drive D.C. Motor with magnet
Power Consumption	4 W
Torque Delivered	85 g·cm
Power Supply	115 or 230 Vac, 50/ 60 Hz depending on models
Fuse	400 mA/ 250 V; 20 x 5 mm
Stirring Bar	Teflon® coated, L 50 x dia 7 mm

### HI300N & HI310N

#### General Purpose Stirrers

These general purpose stirrers are suitable for daily stirring applications in the laboratory.

HI300N normal stirrer and HI310N autospeed stirrer are covered with a corrosion resistant stainless steel top.



1. Power indicator (LED lights up when the stirrer is powered)
2. ON/ OFF/ Speed knob, to turn the stirrer ON and OFF, and set the stirring speed (continuously variable up to the maximum)

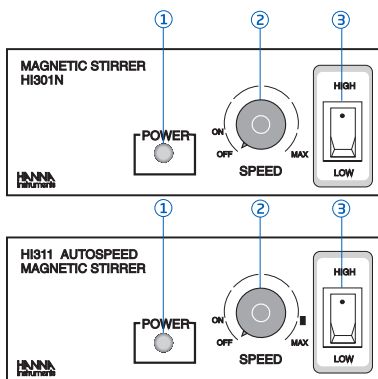
	HI300N	HI310N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)	5 liters (1.3 gallons)
Speed Range		
Min.		100 rpm
Max.		800 to 1000 rpm
Auto-Speed	not applicable	standard
Power Supply		
HI300N-1	110/ 115 Vac, 50/ 60 Hz	
HI300N-2	220/ 240 Vac, 50/ 60 Hz	
HI310N-1	110/ 115 Vac, 50/ 60 Hz	
HI310N-2	220/ 240 Vac, 50/ 60 Hz	
Installation Category	II	
Cover Material	AISI 316 stainless steel	
Environment	0 to 50 °C (32 to 122 °F); RH max 95%	
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")	
Weight	1.4 kg (3.1 lb.)	

## HI301N & HI311N

### Two-Speed Stirrers

HI301N normal stirrer and HI311N autospeed stirrer, are ideal for long duration stirring which require slow speed and accurate speed control (for example in electrolysis applications).

The selectable HIGH/ LOW range allows to set the speed precisely.



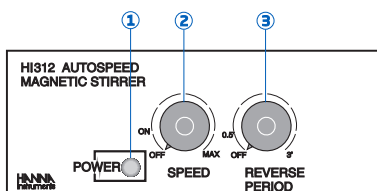
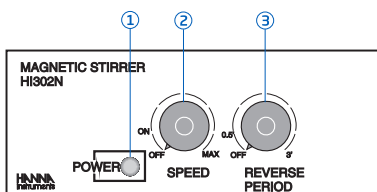
1. Power indicator (LED lights up when the stirrer is powered)
2. ON/ OFF/ Speed knob, to turn the stirrer ON and OFF, and set the stirring speed (continuously variable up to the maximum)
3. HIGH/ LOW switch (for selecting low or high speed range)

	HI301N	HI311N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)	5 liters (1.3 gallons)
Speed Range		
Low		100 to 500 rpm
High		100 to 800/ 1000 rpm
Auto-Speed	not applicable	standard
Power Supply		
HI301N-1	110/ 115 Vac, 50/ 60 Hz	
HI301N-2	220/ 240 Vac, 50/ 60 Hz	
HI311N-1	110/ 115 Vac, 50/ 60 Hz	
HI311N-2	220/ 240 Vac, 50/ 60 Hz	
Installation Category	II	
Cover Material	AISI 316 stainless steel	
Environment	0 to 50 °C (32 to 122 °F); RH max 95%	
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")	
Weight	1.4 kg (3.1 lb.)	

### HI302N & HI312N

#### Auto-Reverse Stirrers

**HI302N** normal stirrer and **HI312N** autospeed stirrer allow to stir the fluid in both directions and are ideal for powder mixing applications to ensure a homogeneous final product and complete dissolution of hard-to-wet powders. The reverse stirring period is adjustable from 30 seconds to 3 minutes. When set to 1 minute, the fluid will rotate in one direction for minute and then reverse its rotation for another minute at the desired speed in a repeated cycle until the stirrer is switched off.





1. Power indicator (LED lights up when the stirrer is powered)
2. ON/ OFF/ Speed knob, to turn the stirrer ON and OFF, and set the stirring speed (continuously variable up to the maximum)
3. REVERSE PERIOD knob with the ON/ OFF and continuously variable selection of inversion cycle time in minutes, from 0.5 to 3 minutes

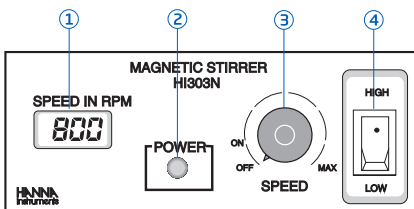
	HI302N	HI312N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)	5 liters (1.3 gallons)
Speed Range		
Min.		100 rpm
Max.		100 to 1000 rpm
Auto-Speed	not applicable	standard
Power Supply		
HI302N-1	110/ 115 Vac, 50/ 60 Hz	
HI302N-2	220/ 240 Vac, 50/ 60 Hz	
HI312N-1	110/ 115 Vac, 50/ 60 Hz	
HI312N-2	220/ 240 Vac, 50/ 60 Hz	
Installation Category	II	
Cover Material	AISI 316 stainless steel	
Environment	0 to 50 °C (32 to 122 °F); RH max 95%	
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")	
Weight	1.4 kg (3.1 lb.)	

### HI303N

#### Two-Speed Stirrer with Tachometer

HI303N stirrer incorporates an LCD tachometer.

This model allows precise stirring repeatability by using two separate ranges. In each range, the speed can be set precisely.



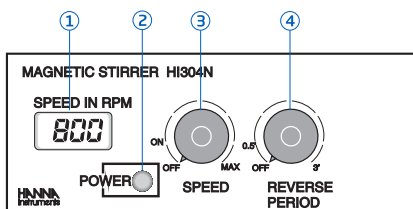
1. rpm LCD displays the rpm speed
2. Power indicator (LED lights up when the stirrer is powered)
3. ON/ OFF/ Speed knob, to turn the stirrer ON and OFF, and set the stirring speed (continuously variable up to the maximum)
4. HIGH/ LOW switch (for selecting low speed range or high speed range)

<b>HI303N</b>	
Maximum Stirring Capacity	2.5 liters (0.66 gallons)
Speed Range	
Low	100 to 500 rpm
High	100 to 800/ 1000 rpm
Tachometer	4 digit LCD
Power Supply	
HI303N-1	110/ 115 Vac, 50/ 60 Hz
HI303N-2	220/ 240 Vac, 50/ 60 Hz
Installation Category	II
Cover Material	AISI 316 stainless steel
Environment	0 to 50 °C (32 to 122 °F); RH max 95%
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")
Weight	1.4 kg (3.1 lb.)

### HI304N

#### Auto-Reverse Stirrer with Tachometer

HI304N is a heavy-duty stirrer with a built-in tachometer. An advanced circuit allows to reverse the direction of the stir at an interval that can be adjusted from 30 seconds up to 3 minutes.



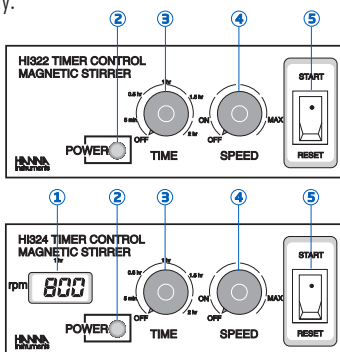
- rpm LCD displays the rpm speed
- Power indicator (LED lights up when the stirrer is powered)
- ON/ OFF/ Speed knob, to turn the stirrer ON and OFF, and set the stirring speed (continuously variable up to the maximum)
- REVERSE PERIOD knob with the ON/ OFF and continuously variable selection of inversion cycle time in minutes, from 0.5 to 3 minutes

	HI304N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)
Speed Range	
Min.	100 rpm
Max.	800 to 1000 rpm
Tachometer	4 digit LCD
Power Supply	
HI304N-1	110/ 115 Vac, 50/ 60 Hz
HI304N-2	220/ 240 Vac, 50/ 60 Hz
Installation Category	II
Cover Material	AISI 316 stainless steel
Environment	0 to 50 °C (32 to 122 °F); RH max 95%
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")
Weight	1.4 kg (3.1 lb.)

## HI322N & HI324N

### Timer-Controlled Stirrers

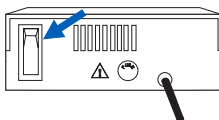
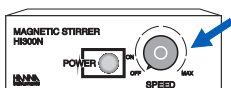
HI322N and HI324N are autospeed stirrers equipped with timer control to start and automatically stop the stirring process after a user-selectable period (from 5 minutes to 2 hours). They are the ideal stirrers for routine applications where the required stirring time is known, and for non-Newtonian fluids whose viscosities change during stirring or Newtonian fluids up to 5 liters capacity.



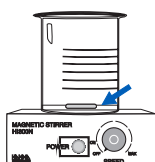
1. rpm LCD displays the rpm speed
2. Power indicator (LED lights up when the stirrer is powered)
3. TIME knob for setting the stirring time from 5 minutes to 2 hours
4. Speed knob, to turn the stirrer ON and OFF, and set the stirring speed (continuously variable up to the maximum)
5. START/ RESET switch for starting and resetting the time control

	HI322N	HI324N
Maximum Stirring Capacity	5 liters (1.3 gallons)	5 liters (1.3 gallons)
Speed Range		
Min.		100 rpm
Max.		800 to 1000 rpm
Timer Range	user selectable from 5 minutes to 2 hours	
Tachometer	not applicable	4 digit LCD
Auto-Speed	standard	standard
Power Supply		
HI322N-1	110/ 115 Vac, 50/ 60 Hz	
HI322N-2	220/ 240 Vac, 50/ 60 Hz	
HI324N-1	110/ 115 Vac, 50/ 60 Hz	
HI324N-2	220/ 240 Vac, 50/ 60 Hz	
Installation Category	II	
Cover Material	AISI 316 stainless steel	
Environment	0 to 50 °C (32 to 122 °F); RH max 95%	
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")	
Weight	1.4 kg (3.1 lb.)	

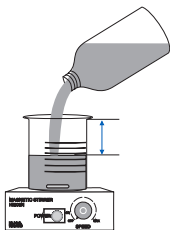
- Make sure that the SPEED knob (on the front panel) and the ON/ OFF switch (on the rear panel) are in OFF position.



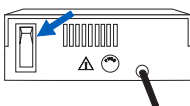
- Place a beaker or glass container at the center of the top of the stirrer, and place the stirring bar in the beaker.



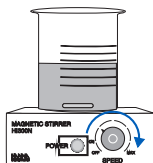
- Pour the liquids to be mixed into the beaker.  
Do not fill up to the brim and leave sufficient space to prevent spillage during stirring.



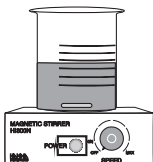
- Connect the power cord to the mains and turn the stirrer on.



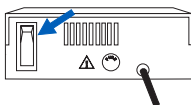
- Adjust the SPEED knob slowly until the required stirring speed is achieved.



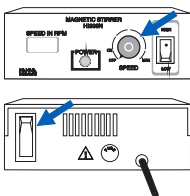
- Allow sufficient time for the mixing operation to attain uniform rotational flow.
- When stirring is complete, turn the SPEED knob to the OFF position.



- If no further stirring is required, turn the stirrer off.



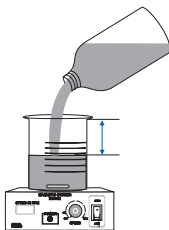
- Make sure that the SPEED knob and the ON/ OFF switch are in the OFF position.



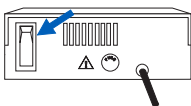
- Place a beaker or glass container at the center of the top of the stirrer and place the stirring bar in the beaker.



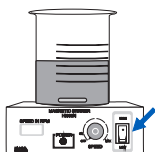
- Pour the liquids to be mixed into the beaker. Do not fill up to the brim and leave sufficient space to prevent spillage during stirring.



- Connect the power cord to the mains and turn the stirrer on with the ON/ OFF switch.



- Select the low or high range with the HIGH/ LOW switch as required.



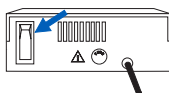
- Adjust the SPEED knob slowly until the required stirring speed is achieved. Allow sufficient time for the mixing operation to attain uniform rotational flow. The stirring speed is indicated in the rpm LCD (HI303N only).



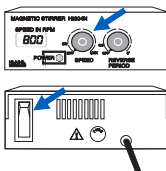
- When stirring is complete, turn the SPEED knob to the OFF position.



- If no further stirring is required, turn the stirrer off.



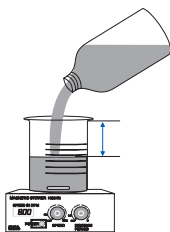
- Make sure that the SPEED knob and the ON/ OFF switch are in the OFF position.



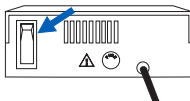
- Place a beaker or glass container at the center of the top of the stirrer and place the stirring bar in the beaker.



- Pour the liquids to be mixed into the beaker. Do not fill up to the brim and leave sufficient space to prevent spillage during stirring.



- Connect the power cord to the mains and turn the stirrer on with the ON/ OFF switch.



- Set the REVERSE PERIOD knob to the desired reverse stirring period from 30 seconds to 3 minutes. E.g. if set to one minute, the fluid will rotate in one direction for one minute and then reverse its rotation for another minute in a repeated cycle until the stirrer is turned off.



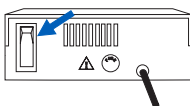
- Adjust the SPEED knob slowly until the required stirring speed is achieved. Allow sufficient time for the mixing operation to attain uniform rotational flow. The stirring speed is indicated in the rpm LCD for HI304N.



- When stirring is complete, turn the SPEED knob to the OFF position.

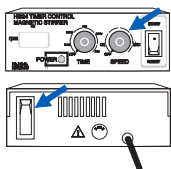


- If no further stirring is required, turn the stirrer off.

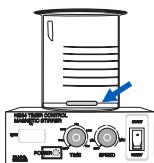




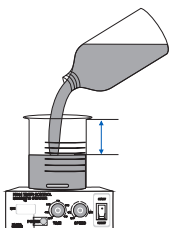
- Make sure that the SPEED knob and the ON/ OFF switch are in the OFF position and the START/ RESET switch is in RESET position.



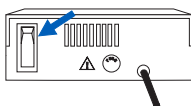
- Place a beaker or glass container at the center of the top of the stirrer and place the stirring bar in the beaker.



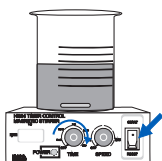
- Pour the liquids to be mixed into the beaker. Do not fill up to the brim and leave sufficient space to prevent spillage during stirring.



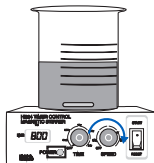
- Connect the power cord to the mains and turn the stirrer on with the ON/ OFF switch.



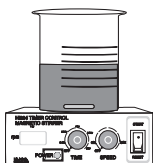
- Set the TIME knob to the desired stirring time from 5 minutes to 2 hours. Then set the START/ RESET switch to START. The stirrer will only start stirring when the START switch is in the START position and will end when the selected stirring time has passed.



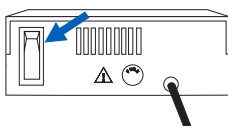
- Adjust the SPEED knob slowly until the required stirring speed is achieved.
  - Allow sufficient time for the mixing operation to attain uniform rotational flow.
- The stirring speed is indicated in the rpm LCD for HI324N.



- When stirring is complete, turn the SPEED knob to the OFF position.



- If no further stirring is required, turn the stirrer off.



Code	Description
HI731320	Magnetic stir bar (10 pcs.)

## Recommendations for Users

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used.

Any variation introduced by the user to the supplied equipment may degrade the meters' performance.

Unplug the stirrer from the power supply before replacing the fuse.

To avoid damages or burns, do not put the stirrer in microwave ovens. For your and the stirrer's safety, do not use or store the stirrer in hazardous environments.

## Warranty

The products are guaranteed for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered. If service is required, contact your local Hanna Instruments Office.

If under warranty, report the model number, date of purchase, serial number and the nature of the problem. If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization number from the Technical Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packed for complete protection.

Hanna Instruments reserves the right to modify the design, construction or appearance of its products without advance notice.

## World Headquarters

Hanna Instruments Inc.  
Highland Industrial Park  
584 Park East Drive  
Woonsocket, RI 02895 USA  
[www.hannainst.com](http://www.hannainst.com)

## Local Office

Hanna Instruments Inc.  
Highland Industrial Park  
584 Park East Drive  
Woonsocket, RI 02895 USA  
Phone: 800.426.6287  
Fax: 401.765.7575  
e-mail: [tech@hannainst.com](mailto:tech@hannainst.com)