

# Alaris<sup>®</sup> Syringe module FAQs

## 1. Is this the first syringe pump from CareFusion?

No, Alaris<sup>®</sup> products from CareFusion have a longstanding tradition of building syringe infusion pumps, going back almost 20 years. In fact, the Alaris Syringe module represents a fourth-generation syringe pump technology.

## 2. Where are syringe pumps used most often?

Syringe pumps are most commonly used in NICU, PICU and with anesthesia. These environments often require the precise delivery of very concentrated drugs.

## 3. What type of infusions are syringe pumps used for?

Syringe pumps are routinely used for the precise delivery of very concentrated drugs or antibiotics. In NICUs, they are also used for enteral feedings.

## 4. What makes the Alaris Syringe module unique?

The Alaris Syringe module is the only syringe pump that is part of a comprehensive IV medication safety system with a common user interface shared across multiple infusion modalities. The Alaris Syringe module further distinguishes itself through Guardrails<sup>®</sup> software, accuracy and ease of use.

In addition, a unique pressure sensing disc on dedicated administration sets provides accurate readings in real-time, can help reduce startup delays due to mechanical slack, shortens the time to an occlusion alarm and helps prevent an inadvertent bolus after an occlusion.

## 5. What does the pressure sensing disc do?

The pressure sensing disc is a key component to the Alaris Syringe module that enables several important features.

These include:

- Occlusion back off
- Real-time numeric pressure display
- Dynamic pressure display
- Auto-pressure
- Configurable alarm limits between 25mmHg and 1000mmHg in increments of 1mmHg
- Fast start

Together, these features offer the following benefits:

- Shortens time to an occlusion alarm
- Helps prevent inadvertent bolus after occlusion
- Monitors line pressure accurately
- Can help reduce delays upon startup

## 6. What criteria were used in the design of the Alaris Syringe module?

The Alaris Syringe module was carefully designed to meet the following criteria:

- Lightweight—only 4.5 lbs.
- Common user interface—same front panel keys as other modules
- Front loading of syringes—syringe in full open unobstructed view vs. side loading
- Easy to transport—handle strong enough to carry an entire Alaris System with 4 modules attached  
Plunger drive head protected—extended handle to protect plunger

**7. What is the accuracy of the Alaris Syringe module?**

*The instrument accuracy of the Alaris Syringe module is +/- 2% of full scale plunger travel (not including syringe variation).*

**8. How much does the Alaris Syringe module weigh?**

*The Alaris Syringe module weighs approximately 4.5 lbs.*

**9. What are the dimensions of the Alaris Syringe module?**

*The dimensions of the Alaris Syringe module are: 4.5" W x 15.0" H x 7.5" D.*

**10. How many Alaris Syringe modules can be attached to one Alaris PC Unit?**

*Anywhere from one to four modules in any configuration (i.e. all on one side of the Alaris PC Unit or two on each side, etc.).*

**11. Does the Alaris Syringe module have a battery?**

*No. The Alaris Syringe module requires an Alaris PC Unit for power and operation. The Alaris PC Unit has its own battery that can power up to four infusion and/or monitoring modules when not connected to AC power.*

**12. What is the critical volume of the Alaris Syringe module?**

*The maximum over-infusion that can occur in the event of a single fault condition will not exceed 1.2mL during syringe loading and 0.6mL after syringe loading.*

**13. What display resolution does the Alaris Syringe module offer?**

*The display resolution for the Alaris Syringe module is to the hundredth of a milliliter or two decimal points (e.g., 2.22mL/hr.)*

**14. What type of motor does the Alaris Syringe module use?**

*A stepper motor.*

**15. What syringe sizes and brands will the Alaris Syringe module accept?**

*(See Fig. 1)*

**Fig. 1**

Syringe size	Brand and model numbers			
	BD	Monoject <sup>®</sup>	Terumo <sup>®</sup>	IVAC <sup>®</sup>
1mL	309628	n/a	n/a	n/a
3mL	309657	Soft pack only: 1180300777	SS-03L	n/a
5mL	309646	n/a	SS-05L (6mL total)	n/a
6mL	n/a	Soft pack: 1180600777 Rigid pack: 8881516937	SS-05L (6mL total)	n/a
10mL	300912	n/a	SS-10L (12mL total)	n/a
12mL	n/a	Soft pack: 1181200777 Soft pack: 1181200777T Rigid pack: 8881512878	SS-10L (12mL total)	n/a
20mL	302830	Soft pack: 1182000777 Rigid pack: 8881520657	SS-20L SS-20L2	n/a
30mL	302832	n/a	SS-30L (35mL total)	n/a
35mL	n/a	Soft pack: 1183500777 Rigid pack: 8881535762	SS-30L (35mL total)	n/a
50mL	n/a	n/a	n/a	30602N
60mL	309653	Soft pack: 1186000777 Soft pack: 1186000777T Rigid pack: 8881560125	SS-60L	n/a

**16. Can the Alaris Syringe module automatically identify the syringe when it is loaded?**

The Alaris Syringe module can automatically identify the size of an approved syringe (see list of approved syringe sizes and brands in fig.1). The user, however, needs to specify the brand of syringe being used.

**17. How does the Alaris Syringe module recognize a syringe size?**

The syringe clamp or “hugger” assesses the syringe’s outer diameter and compares it to syringe profiles/ configurations stored in memory.

**18. Why can’t the Alaris Syringe module recognize the syringe brand?**

The variance in outer diameters between syringes of the same size but different manufacturers is often too slight to accurately and reliably identify the syringe brand.

**19. Can the Alaris Syringe module detect the volume in a syringe?**

Yes. The Alaris Syringe module is designed to detect the amount of fluid in a syringe once it is loaded. The system will not accept a VTBI that is greater than the volume of fluid detected in the syringe.

**20. What are the differences between the BD 1mL and BD 3mL syringes?**

The BD 1mL luer lock syringe has an almost identical external barrel diameter to the BD 3mL syringe. However, the size and content of the internal barrel chamber is smaller with the 1mL syringe. The Alaris Syringe module will not be able to differentiate between these two syringe types. The clinician must carefully identify the correct syringe size and brand when starting an infusion.

**21. Can the hospital enable and disable specific syringe sizes and brands?**

Yes. Syringe Favorites can be identified in Guardrails® Editor to limit the syringe size and brand options that appear on the screen when a new syringe is loaded.

If necessary, the clinician can push the All Syringes soft key to select from a list of all compatible syringes.

**22. Can the Alaris Syringe module be used during MRI?**

No. The Alaris System is not MRI compatible. CareFusion carries extra-long extension sets that can be added to the tubing to have the Alaris System outside the MRI door with the infusions running.

**23. Can the Alaris Syringe module be turned upside down?**

Yes. Although not recommended, orientation of the pump will not affect performance.

**24. What is the maximum/minimum flow rate for the Alaris Syringe module?**

- Maximum flow rate for the pump is 999mL/hr, but it will be syringe dependent
- Minimum flow rate for the pump is 0.01mL/hr, but it will be syringe dependent

Syringe size	Flow rate ranges
50/60mL	0.1-999mL/hr
30mL	0.1-650mL/hr
20mL	0.1-500mL/hr
10mL	0.1-250mL/hr
5mL	0.1-150mL/hr
3mL	0.01-100mL/hr
1mL	0.01-30mL/hr

**25. Why does the Alaris Syringe module only allow 1mL and 3mL syringes to infuse at rates below 0.1mL/hr?**

Generally speaking, at lower flow rates, larger syringes deliver with poorer flow uniformity than smaller syringes. We therefore recommend that clinicians use the smallest syringe size available for any particular VTBI. We also advise against using anything larger than a 3mL syringe to deliver flow rates below 0.1mL/hr.

The physics and practicalities of syringe infusions do not allow a clinically-responsible company to claim accurate sub-0.1mL/hr rates for 5mL and 10mL syringes. Such infusions will be slow to startup and will deliver with poor flow continuity and uniformity.

The fact is, any syringe 5mL or larger cannot accurately deliver fluid rates below 0.1mL/hr, no matter how good the pump is. Simply being able to type two decimal places into an entry field does not bestow that accuracy to the infusion device

**26. What are the flow rate programming increments of the Alaris Syringe module?**

Rate range (mL/hr)	Increments (mL/hr) user input rates
0.01-9.99	0.01
10-99.9	0.1
100-999	1

**27. What is the flow continuity for the Alaris Syringe module?**

Flow continuity is driven by the mechanism step size of the syringe pump. In other words, every time a signal is sent to the motor to move, the head moves by a set distance. For the Alaris Syringe module, this average set distance is 2.5 millionths of an inch (0.0000025 inches). Thinking of it in terms of fluid delivered from an actual syringe gives us an idea of how great the flow continuity is:

BD 1mL luer lock syringe at 0.01mL/hr

- At this very low rate, our mechanism is making 2.5 steps (of 0.0000025 inches) every second
- For this syringe we have 908,000 steps/mL

BD 60mL luer lock syringe at 0.1mL/hr

- At this very low rate, our mechanism is making 1 step (of 0.0000025 inches) every 1.25 seconds
- For this syringe we have 28,333 steps/mL

For a given flow rate, the greater the number of steps per mL, the closer together in time each step will occur. No formal industry standards exist specifying a particular time interval. However, the ECRI Institute recently asserted that “no more than a 20 second interval” between steps was deemed “excellent” in flow continuity.

**28. What is the flow uniformity for the Alaris Syringe module?**

Flow uniformity is mainly driven by the mechanical accuracy of the entire mechanism. In other words, the average set distance is not a perfect 0.0000025 inches every time. A good tool to visualize or quantify flow uniformity is the trumpet curve and the associated startup curve. For the trumpet curve, the tighter the trumpet shape is, the better. For the startup curve, the more steady the line is or the smaller the fluctuations are, the better. Please review the trumpet and startup curves located in the back of the Directions for Use Manual.

**29. Can I use non-dedicated extension sets?**

Yes. The Alaris Syringe module accepts non-dedicated extension sets, but we recommend using the pressure sensing disc whenever advanced pressure monitoring is deemed important.

**30. What extension sets does CareFusion offer?**

CareFusion offers dedicated and non-dedicated sets for the Alaris Syringe module. The available options can be found in the IV sets and accessories catalog available on the website.

**31. Do the dedicated disposables for the Alaris Syringe module contain DEHP?**

All the Alaris Syringe module dedicated and non-dedicated sets are made without DHP or have DEHP-free fluid paths.

**32. How much priming volume does the pressure sensing disc account for?**

*The pressure sensing disc accounts for approximately 0.2mL of fluid.*

**33. What Alaris Syringe module configurable settings are shared with the Alaris Pump module?**

*Configurable settings that will be shared with the Alaris Pump module include:*

- Delay options
- Drug calculation
- Drug calculation bolus mode
- Multidose
- Priming
- Volume/duration

**34. What are the configurable settings for the Alaris Syringe module?**

*Configurable settings for the Alaris Syringe module include:*

- ALL mode
- Auto-pressure
- Back off after occlusion
- Current pressure display
- Fast start
- KVO
- KVO rate adjust
- KVO volume adjust
- NEOI
- NEOI alert time
- Occlusion pressure set point—no disc
- Occlusion pressure set point—with disc
- Priming

**35. What is Fast Start?**

*It is not uncommon for ordinary syringe devices to experience delays before delivering IV fluid at the desired rate (based on programmed rate). Fast Start is a pressure sensing disc enabled feature that helps minimize the delay in medication delivery following syringe setup and the start of an infusion. If enabled,*

*this feature will automatically take up some of the mechanical slack in the system and returns to the programmed flow rate.*

**36. What is occlusion back off?**

*When an occlusion in an infusion line occurs (e.g., kink in the line or stopcock is left closed), fluid accumulates in the line, raising the pressure. Depending on the pressure alarm setting (typically low, med or high for an ordinary syringe pump) and the type of extension set used, a significant amount of fluid can get stored in the line. Removing the source of the occlusion (e.g., opening the stopcock) can rapidly release stored volume, creating an unintentional bolus to the patient. Occlusion back off is a pressure sensing disc enabled feature that greatly reduces the potential for unintentional boluses by reversing the movement of the plunger. When a pressure alarm limit is reached, the system will automatically back up the plunger movement until the pressure in the line returns to normal. This feature is especially valuable in a NICU and PICU setting, where small amounts of powerful drugs are routinely administered via syringe pumps.*

**37. How quickly will the occlusion alarm sound when using a 50mL syringe at 1mL/hr?**

*With regard to the time to occlusion alarm for a 50/60mL syringe running at 1mL/hr with a pressure sensing disc installed, the system can alarm in as little as three to five minutes. (Pressure setting dependent and syringe type dependent.)*

**38. What is auto-pressure?**

*Auto-pressure is a shortcut that automatically sets the pressure alarm limit at the current line pressure plus 30mmHg when the line pressure is below 100mmHg (e.g., 57mmHg current line pressure + 30mmHg=87mmHg new alarm limit). Above 100mmHg, auto-pressure adds 30% to the current line pressure to create the new pressure limit.*

**39. Can in-line pressure monitoring prevent or detect infiltrations?**

*No. There is no empirical evidence to suggest that in-line pressure monitoring can prevent or detect infiltrations. However, closely monitoring in-line pressure and observing pressure trends may help facilitate and accelerate the identification of line issues*

**40. What is NEOI?**

*“Near End of Infusion”. When enabled, the Near End of Infusion can occur anywhere from 1 to 60 minutes before the infusion completes. An alert occurs at configured time or when 25% of VTBI remains, whichever comes later. To silence alarm, press SILENCE key.*

**41. Does the Alaris Syringe module offer a KVO option?**

*Yes. When enabled, as a setting, chosen by the hospital, continuous infusions will automatically switch into KVO mode upon completion. The KVO rate is configurable between 0.01 and 2.5mL/h. The KVO volume is an established amount from 0.5–5% of the total size of the syringe.*

**Note:** *0.01–0.09 rate only available with 1 and 3cc syringes. For syringes larger than 3cc, the lower rate limit adjusts to 0.1mL/hr.*

**42. Will the Alaris Syringe module allow for different drugs and concentrations in the same dataset?**

*Yes. The drugs and concentrations entered into the dataset are customized by each customer.*

**43. What are the occlusion alarm thresholds for the Alaris Syringe module?**

*With the pressure sensing disc, the alarm thresholds for the Alaris Syringe module can be set anywhere between 25mmHg and 1,000mmHg, in increments of 1mmHg.*

**44. What is the maximum infusion pressure with the pressure sensing disc?**

*The maximum infusion pressure with the disc is 1,000mmHg.*

**45. What is the maximum infusion pressure without the pressure sensing disc?**

*The maximum infusion pressure without the disc is approx. 800mmHg (pressure alarm setting high)*

**46. What are the pressure alarm settings without the pressure sensing disc?**

*The settings low, medium and high range from approximately 200mmHg (low), 500mmHg (medium) and 800 mmHg (high). Actual pressure thresholds may vary for smaller syringes (1mL, 3mL and 5mL) in order to reduce nuisance alarms.*

**47. How is the dynamic pressure display different between the Alaris Syringe module and the Alaris Pump module?**

*Although the dynamic pressure display bars for the Alaris Pump module and Alaris Syringe module both use the full width of the screen for display, they each represent different ranges. The range of the Alaris Syringe module is 25mmHg to 1,000mmHg. The range of the Alaris Pump module is 50mmHg to 525mmHg.*

**48. Does the Alaris Syringe module offer a priming feature?**

*Yes. The Prime Set with Syringe priming option allows a limited volume of fluid to be delivered in order to prime the administration set prior to being connected to a patient. To decrease potential start-up delays, each time a new syringe is loaded, the Prime Set with Syringe channel option should be used to speed up the engagement of the device’s mechanical components and decrease the syringe’s internal friction. When priming, a single continuous press of the prime soft key delivers up to 2mL of priming fluid. The prime volume is not added to VTBI or VI. The prime feature can be utilized with or without the Pressure Sensing Disc.*

**49. Why shouldn't one prime with the pressure sensing disc installed?**

*The pressure sensing disc, if left installed, can trap air that may not be totally expelled. To ensure entrapped air is eliminated, it is recommended that the pressure sensing disc be removed prior to priming and the membrane be gently massaged during priming.*

**50. What is ALL mode?**

*When ALL is enabled, the VTBI field will be pre-populated with ALL. When an infusion is started with a VTBI of ALL, the entire contents of the syringe will be delivered. This field is editable by the clinician at the bedside.*

**51. Does the Alaris Syringe module work with anesthesia mode?**

*Yes. Anesthesia mode is available with the Alaris Syringe module.*

**52. What anesthesia drugs are delivered via syringe?**

*Anesthesia drugs are generally broken into three major categories: hypnotics (e.g. propofol), analgesics (e.g. Fentanyl) and muscle relaxants (e.g. rocuronium). While almost all of these drugs are delivered via syringe, propofol is most commonly used with a syringe pump.*

**53. Does the Alaris Syringe module offer multidose capabilities?**

*Yes. When enabled, the multidose mode allows 1-24 doses to be programmed at equally spaced intervals on the same Alaris Syringe module over a 24 hour period.*

**54. Does the Alaris Syringe module offer any safety features around enteral feeding?**

*Yes. Enteral feedings can be loaded into the Guardrails® fluid library. This provides safety around delivery rates. Additionally, custom clinical advisories can be created to remind clinicians to use enteral-only tubing if required in their unit.*

**55. Will the Alaris Syringe module offer delay options?**

*The Alaris Syringe module can be programmed to:*

- *Delay start until a set time*
- *Delay start until a specific amount of time has lapsed*

**56. How can the Alaris Syringe module help prevent free-flow or siphoning?**

*If the syringe plunger head is not captured by the pump's plunger grippers within 30 seconds of loading, the system will indicate a potential siphoning condition and a bitmap message will come up guiding the user to load the syringe properly.*

**57. Will a fast bolus trigger a pressure alarm limit?**

*This is most unlikely since the pressure alarm limits are automatically and temporarily raised to the maximum limit during a bolus delivery. (Note: triggering a pressure alarm during a bolus infusion will depend on several factors including viscosity of the fluid, bolus flow rate and internal diameter of the extension set.)*

**58. Does the Alaris Syringe module offer air-in-line detection capabilities like the Alaris Pump module?**

*No. Syringe pumps in the US and abroad do not include air-in-line detection capabilities. If the syringe is purged of air and the disposable primed properly, there is no need for air-in-line detection.*

**59. How will the Alaris Syringe module respond when downward force is applied to the plunger during operation?**

*We measure two different characteristics of how mechanically solid the syringe pump is. The two characteristics are compliance and slack.*

*Compliance is the small amount the head moves when the split nut is engaged, as a load is applied (by a hand on the head or by backpressure from a syringe). Our unit moves about 0.05 inches when 20 lbs is applied to the head (this is about 0.9mL with a 60mL syringe when 20 lbs is applied).*

*Slack is the small amount the head wiggles, when the split nut is engaged, with a very small amount of load applied. The Alaris Syringe module has about 0.014 inches of slack at the head. This is equivalent to about 0.25mL with a 60mL syringe.*

**60. What is the best way to eliminate start-up delays when delivering infusions with a syringe pump?**

*To decrease potential start-up delays, each time a new syringe is loaded:*

- *Use the smallest syringe size possible (e.g., if infusing 2.3 mL of fluid, use a 3 mL syringe).*
- *Ensure the device is as close to level of patient as possible. Patient should be in line with the Channel Select key. The device should be level with or slightly lower than the patient.*
- *Use the Prime Set with Syringe channel option on the Alaris Syringe module to speed up the engagement of the device's mechanical components and decrease the syringe's internal friction.*
- *Avoid use of manifolds with ports containing high pressure valves. These valves require at least 50-200 mmHg pressure to open and create flow. The time it takes for this pressure to build contributes to potential delay.*

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