

---

**Brushless DC motor driven and custom designed intelligent seamless pumps with integrated magnetic drive**

Moog Aspen Motion Technologies integrated pump technology (patent pending) in which the motor itself functions as the magnetic coupling offers the most compact pumps for fitting into very tight spaces. Aspen's integrated technology results in pumps which are often less than a third the size and more flow when compared to other magnetic drive pumps available in the market today<sup>1</sup>. The other elements of the technology (high efficiency brushless DC motor and DSP based drive electronics) add other powerful advantages to the trim size.



**Moog Aspen Motion Technologies**

1120 West Rock Road  
Radford, Virginia 24141-3362  
Phone: +1-540-639-4440  
Fax: 540-630-5013

**[www.aspenmotiontech.com](http://www.aspenmotiontech.com)**

---

<sup>1</sup> In comparison with magnetic drive pumps from March Pumps (<http://marchpumpcompany.com/magneticdrive-pumps/TTE-7-5P-MD.php>) and Ametek 26 GPM pump([http://www.ametektip.com/index.php?option=com\\_rokdownloads&view=file&id=681](http://www.ametektip.com/index.php?option=com_rokdownloads&view=file&id=681))

## ADVANTAGES OF ASPEN'S INTEGRATED PUMP TECHNOLOGY

- **Compact size:** integrated motor, pump and magnetic coupling (the motor is itself the magnetic coupling!) result in extremely compact size. Aspen's pumps are often less than a third the size of other magnetic drive pumps with similar discharge and pressure characteristics.
- **Reliability:** Long life brushless DC motor and custom engineered shaft and bearing systems offer unmatched sealless reliability.
- **Wet stator design:** enables continuous cooling of the stator for optimum size, life and efficiency
- **DSP based drive electronics:** adds a whole new dimension to precision pumping. Intelligent features (CAN bus, sensor based interface) are customized to suit specific applications.
- **Optional Stainless steel or other material construction:** can be custom designed for use with a wide variety of pumping media.
- **Self Priming:** the underlying centrifugal pump technology is self priming.

## FURTHER ADVANTAGES FROM THE USE OF BRUSHLESS DC MOTOR

- ***Higher electrical efficiency*** when compared to other motor technologies.
- ***Adjustable speed***. The output can be throttled to the specific requirement.
- ***Compact size***. Significantly smaller and lighter weight when compared to other motor technologies.
- ***Special sensors*** can be installed for further customization to the applications:
  - Dry pump sensing to confirm that the pump is operating, without the need for an external sensor.
  - accelerometer to sense vibration or undesired movement
  - pressure sensor to measure cavity pressure
  - Current and temperature feedback can be provided to the drive system electronics.
  - CAN bus or other such interface can be provided.

## APPLICATIONS:

- **Intelligent thermal cooling of electronics equipment.** Cooling of computer systems has conventionally been accomplished through forced-air cooling systems, such as fans. However, liquid cooling systems provide better heat transfer compared to forced-air systems. In liquid cooling systems, a liquid coolant circulates through tubing around the computer system. As the liquid coolant circulates, heat is transferred from the computer system to the liquid coolant, thus cooling the computer system. The liquid coolant then circulates back to a cooling component where it is again cooled, and then recirculated around the computer system. Circulation of the liquid coolant can be accomplished using a pump. Conventional pumps for liquid cooling systems utilize magnetic couplings. Conventional magnetic drive pumps require a separate motor and are bulky, making them a poor choice for use in small spaces near computer systems. In contrast, in Aspen's integrated pump technology, the motor itself functions as the magnetic coupling and this results in a neat and compact motor-coupling-pump-electronics package which is less than a third of the size of conventional magnetic drive pumps with separate motors. Where the pump is required to fit in very tight spots and yet deliver superior performance with respect to pressure and flow characteristics, Aspen's integrated pump technology offers a viable and attractive solution.
- **Cryogenics.** In cryogenics, processes and test setups often require the movement of extremely low temperature fluids from one point to another. Aspen's high reliability and design with optional stainless steel materials in critical surfaces, make Aspen's integrated pump technology an attracting choice, especially in places where the pump that delivers the required performance is also required to fit in very tight spaces. Since Aspen is a custom manufacturer, materials and pump geometries can be designed to meet the OEM's requirement very precisely.
- **Petrochemicals.** Petrochemical processes often require the movement of liquid which is harsh and corrosive. Magnetic coupled pumps devoid of vulnerable seals are usually the only viable choice. If the pump is required to fit in tight spaces, Aspen's integrated pump technology becomes a clearly superior choice.
- **Pharmaceuticals & biotech.** Movement of harsh and often corrosive fluids is often required in the pharmaceutical and biotech industries. Aspen's integrated motor-pump-coupling design along with its integrated computer interface offers advantages when compared to alternate magnetically coupled pumps without intelligence. Aspen's integrated pumps can be designed to offer customized digital interfaces such as RS232 serial interface and CAN bus.

- **Semiconductor manufacturing.** Machines used in this industry often use strong chemicals in the manufacturing processes. These chemicals which are often corrosive are required to be moved precisely and safely. Machines are high ticket items and space is always at a premium. When the pumps are required to fit in tight spots, Aspen's integrated pump technology and its extremely compact size offers an attractive choice.
- **Medical.** Irrigation and other types of pumps used in surgery are required to be highly reliable, compact and precise. In addition, the fluids need to be isolated from the rest of the machine. In these situations, Aspen's integrated pump technology is an attractive choice since it meets all of these exacting requirements.

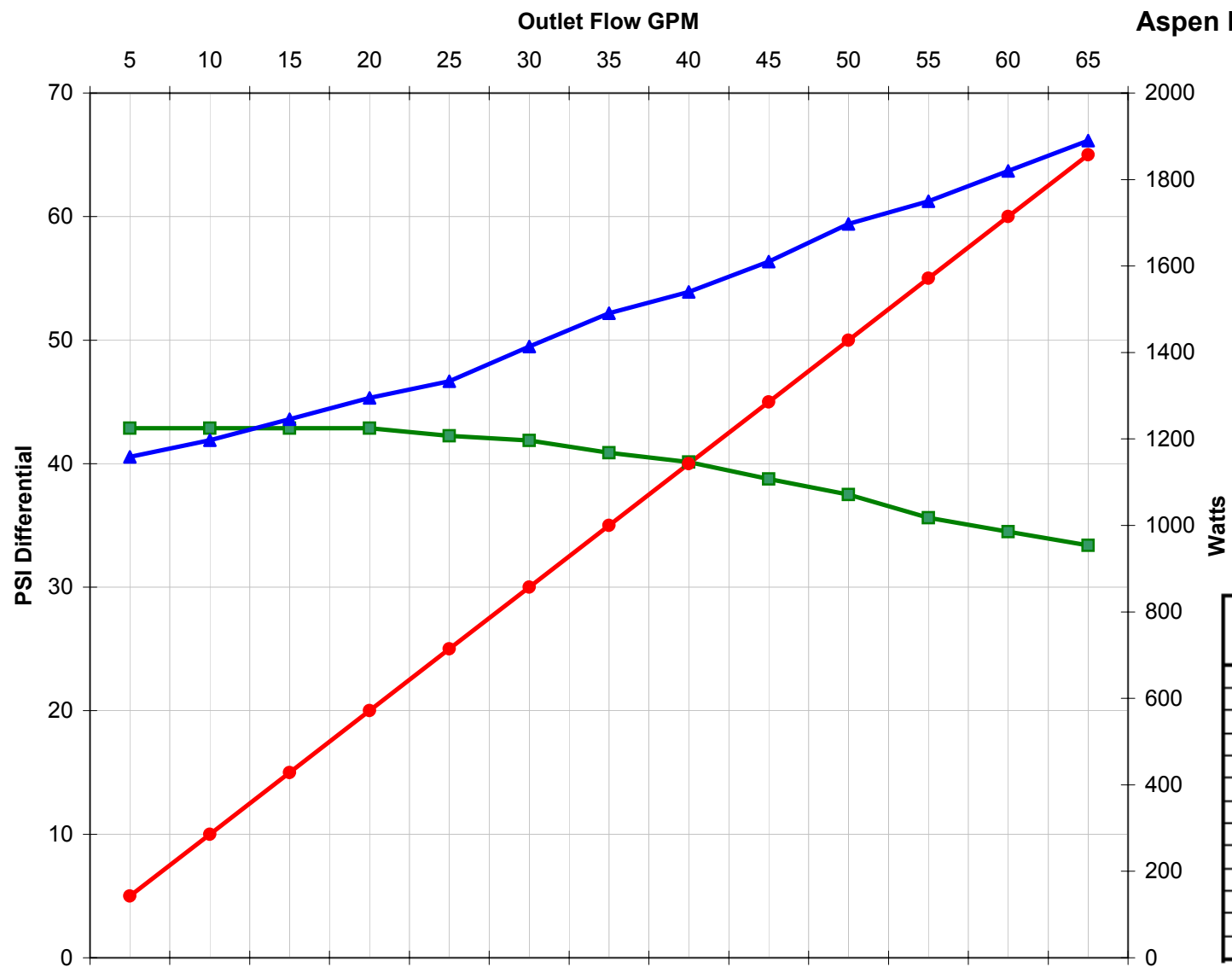
## **PERFORMANCE CURVES**

The attached performance curves are for a particular OEM application and representative of the levels of performance which can be achieved with this ultra compact integrated pump technology. Aspen is a custom manufacturer and as such we can scale the design upwards or downwards to suit particular requirements.

## **OUTLINE DRAWING**

The attached outline drawings are for a particular OEM application and again are representative of the possible reduction in size. Since Aspen is a custom manufacturer, we can modify the design to fit a particular set of specifications.

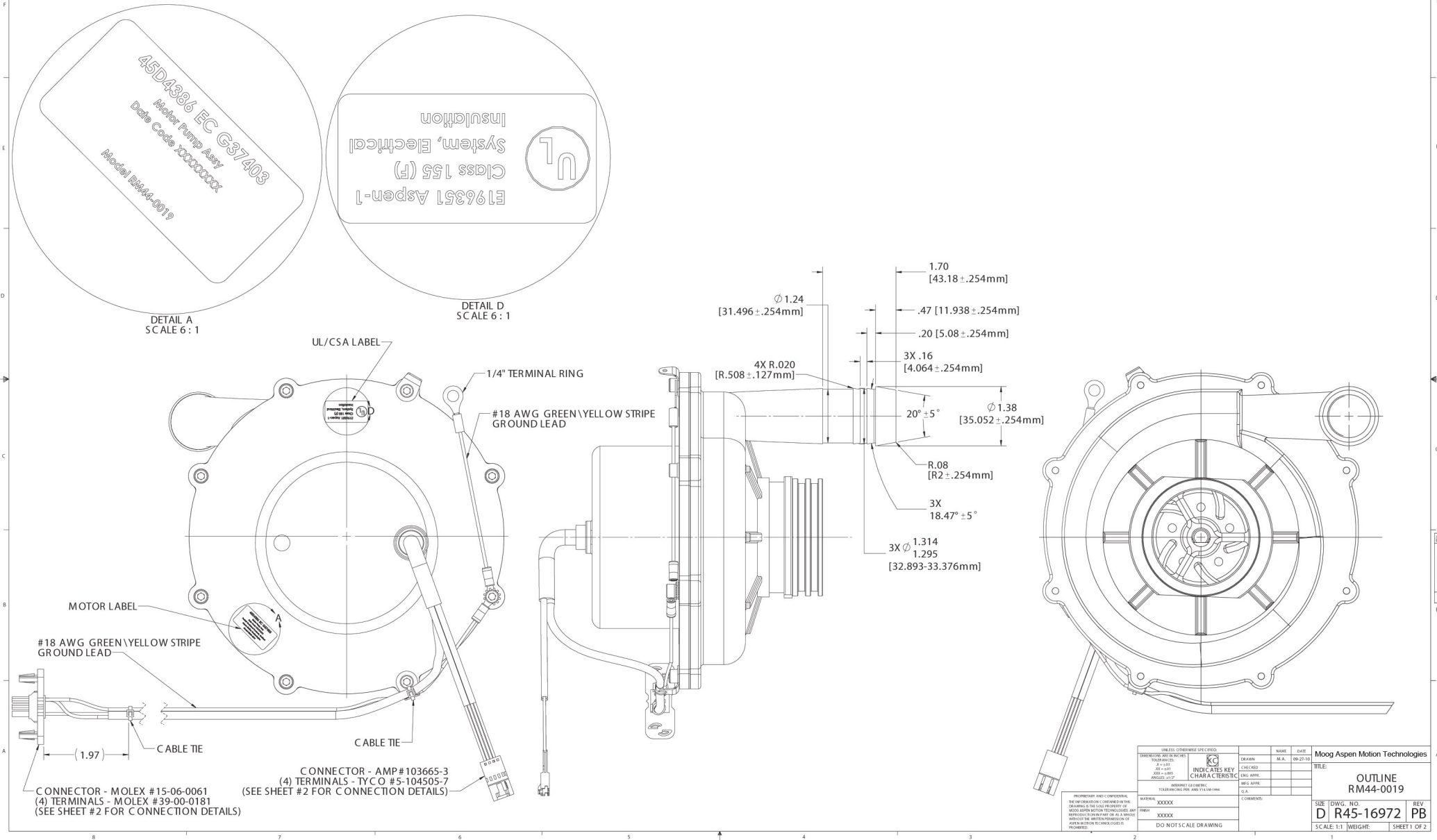
# Aspen Pump Test 14Jan09



Pressure PSID	Flow GPM	Input Power Watts
42.88	5	1159
42.88	10	1197
42.88	15	1246
42.88	20	1295
42.25	25	1334
41.88	30	1414
40.88	35	1491
40.13	40	1540
38.75	45	1610
37.50	50	1698
35.63	55	1750
34.50	60	1820
33.38	65	1890

NOTES:  
1 - SEE SHEET #2 FOR CABLE LENGTH DETAILS.  
2 - ASSEMBLY MUST COMPLY WITH EUROPEAN DIRECTIVE 2002/95/EC (RoHS).

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	PB	Added dimensions and sheet #2.	10-01-10	M.A.





THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MOOG ASPEN MOTION TECHNOLOGIES, INC. REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MOOG ASPEN MOTION TECHNOLOGIES IS PROHIBITED.	MATERIAL	XXXXXX	COMMENTS:	SIZE	DWG. NO.	REV
	FINISH	XXXXXX		D	R45-16972	PB
	DO NOT SCALE DRAWING			SCALE: 1:1		WEIGHT:



THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MOOG ASPEN MOTION TECHNOLOGIES, INC. REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MOOG ASPEN MOTION TECHNOLOGIES IS PROHIBITED.	MATERIAL	XXXXXX	COMMENTS:	SIZE	DWG. NO.	REV
	FINISH	XXXXXX		D	R45-16972	PB
	DO NOT SCALE DRAWING			SCALE: 1:1		WEIGHT:

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MOOG ASPEN MOTION TECHNOLOGIES, INC. REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MOOG ASPEN MOTION TECHNOLOGIES IS PROHIBITED.	MATERIAL	XXXXXX	COMMENTS:	SIZE	DWG. NO.	REV
	FINISH	XXXXXX		D	R45-16972	PB
	DO NOT SCALE DRAWING			SCALE: 1:1		WEIGHT: