GENESYS® PUMPS

INNOVATION THROUGH SYNECTIC ENGINEERING

B73lean™

Genesys® 3x2-6 Long Coupled

Genesys® Close-Coupled 3x2-6

Why GENESYS® Today

Our vision of making products that capture integrity — integrity that makes them precious to the customer — is a costly and difficult endeavor. After years of rigorous research and development, the proven B73lean® design of the Genesys® is lowering total cost of ownership from basic applications to more technologically advanced facilities around the globe. The Genesys® non-metallic, end-suction centrifugal pump line is designed and engineered to provide highly efficient pumping solutions. The Genesys® composite construction with no wetted metal parts gives it compatibility with many aggressive chemistries.

The unique closed-impeller and time-tested volute design results in high performance and efficiency.

Genesys® pumps are among the first to demonstrate a strong yet simple economic reason to start switching to BMC thermosets: Compared to metallic materials of construction, thermosets are about half the cost. BMC offers low shrink and low warp; it molds to net dimensions and holds tight tolerances. BMC also adds a "marketing-oriented" advantage in the ability to color the material for a wide variety of end-user functionality.

What is B73lean® and why is it better?

B73*lean*® THE PUMP PAYS FOR ITSELF!

For many applications, full compliance with the B73.1 standard can be a burden simply because you must pay for features you don't need. But, there is a more efficient alternative!

The B73lean® philosophy considers it far more important to emphasize process performance and energy efficiency then compliance with some of the dimension specifications in the full B73.1 spec.

B73*lean*® IS EASIER TO MAINTAIN

Its interchangeable design fits the old B73 inlet/discharge envelope but with a smaller footprint. Standard mounting, close coupled, direct back pull-out design eliminates alignment and calibration issues.

B73*lean*® IS LESS EXPENSIVE TO OPERATE

Smooth, resin-rich thermoset surfaces, elegantly simple design and fewer components make it far more efficient than the old pumps specified by your predecessors.

GENESYS® Wet End Cutaway

B73lean®

Ensures inlet and discharge ports to be interchangeable with existing metal and plastic ANSI pumps conforming to the ANSI/ASME B73.1 specification.

B73lean® provides the ability to close-couple to five different NEMA JM motor frames (143JM through 215JM NEMA frame motors). This benefit provides lower acquisition costs and reduces the overall footprint when comparing to long coupled / bearing frame pump and motor configurations.

SEAL FLUSH PORT

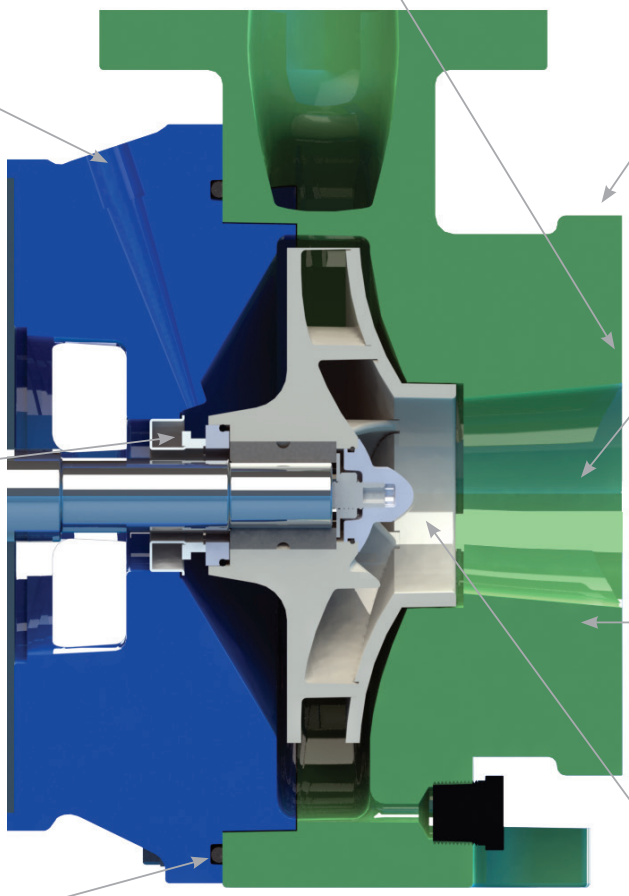
- Lubricates the mechanical seal
- Removes heat generated by the seal and motor shaft
- Extends the life of the seal
- Reduces maintenance cost
- Features two seal flush port configurations including plan 11, plan 13

IMPENATRA® II

- Non metallic design
- No metal in contact with process fluid
- Manufactured for sea water and chemical applications
- Seal faces and elastomers are available in a wide range of materials
- Ensures compatibility for corrosion resistance.

SIMPLICITY OF DESIGN

- One casing o-ring for quick and easy assembly.



GENESYS® 3x2-6 Cross Section

THROUGH BOLT DESIGN

- True back-end pullout
- Ease of maintenance

PROPRIETARY BULK MOLDED VINYL ESTER COMPOUND

- Compression molded parts
- Superior resin rich surfaces
- Smooth hydraulic passages
- Promotes high pump efficiency
- Withstands the intensity of the toughest piping loads
- The thermoset formulation provides high temperature and chemical resistance in a wide array of applications

ENCLOSED IMPELLER

- Peak efficiency of 76%
- Internal hydraulic passages provide high efficiency performance

Mechanical Seal

Impenatra® II Seal

The Impenatra® II Seal is an innovative new approach to solve many shaft sealing problems. When used with Genesys®, it isolates all metallic parts from contact with the fluid. Alternately, corrosive chemicals require seals made of exotic alloys.

You can expect unprecedented corrosion resistance and protection from attack by contained fluid and surrounding environment. Easy to install and field adjustment not required. Offers great versatility at an excellent price. Reliability due to simplicity of design and quality components.

TECHNICAL DATA

Seal Type – stationary wave spring, reverse mount
Maximum temperature 194 °F

MATERIALS OF CONSTRUCTION

O-rings and elastomers available in Buna, Viton®, EPDM, Kalrez® and Alfas®
Seal case – injection molded polypropylene
Seal face – carbon graphite resin, binderless graphite or silicon carbide
Seal seat – silicon carbide

Seal Flushing Arrangements

Genesys® provides a seal flush port, also known as a water-wash, to keep the mechanical seal surfaces cool and clean. Seal flushing helps provide an optimal environment around the Impenatra® II seal faces. They are highly recommended for longevity of the seal and reducing maintenance costs. The Genesys® internal seal flush port is offered in two common piping configurations:

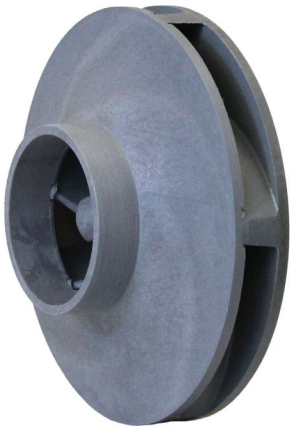
PLAN 11

Seal flush from pump discharge port to internal flush port on pump bracket.
- Seal chamber heat removal.
- Increase seal chamber pressure and fluid vapor margin.
- Keeps seal surfaces clean in applications with fluids that crystallize

PLAN 13

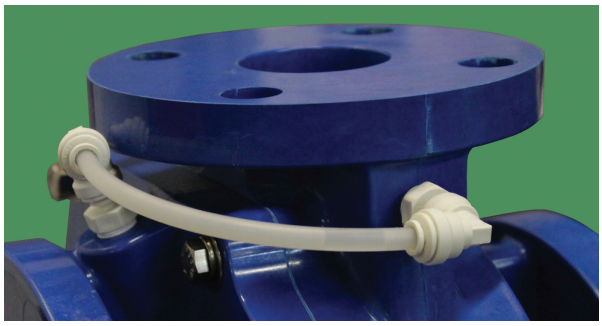
Recirculation from seal chamber to pump suction through port.
- Seal chamber heat removal.
- Keeps seal surfaces clean in applications with fluids that crystallize

Enclosed impeller



Enclosed impeller design provides high efficiency performance.

- Ultrasonically welded impeller shroud and vane
- Motor shaft o-rings not required
- No balancing and shaft alignment required for impeller assembly



Genesys® PLAN 11 Seal Flush Arrangement

Genesys® PLAN 13 Seal Flush Arrangement

BMC vs. RTM for making pump parts

Making industrial parts from a non metallic material has had a very interesting history. One of the very first manufacturing processes to do that was called "compression molding." This process was developed in the early 1900s . It is a high-pressure molding technique used originally to mold phenolic compounds. RTM is relatively newer process that is done under lower pressures but uses newer thermoset materials, fillers and matrices to make more versatile products. BMC is the latest hybrid of both that takes the best of both worlds. BMC can produce even stronger, more cost-effective complex parts previously made only in high-end metallic foundries. There have been many reasons behind the innovations in non-metallic part manufacturing, but several are:

- The need to replace complex metal parts with a composite material to lower cost.
- The need to consider the environmental impact that metal foundries were contributing in their waste stream disposal, scrap.
- The need to find ways of making a higher quality product for better performance.

The table below basically shows how the RTM process compares to the BMC process using two criteria categories: Scalar and Qualitative. The scalar rankings show the part feature relative to the manufacturing process in very objective terms. The Qualitative rankings show part features that are more subjective in nature but still give a relative value comparison. BMC materials and processes are being improved all the time. What makes this most exciting is that it will allow manufacturers to consider replacing even more metallic components in their products with composite equivalents. Of course, in any fluid flow equipment, like pumps, this will invariably contribute to higher overall efficiencies of a complete assembly or system.

Criteria	Feature	BMC	RTM
Scalar	Capital Production Tooling costs	10X	1X
	Production part cycle time	1X	10X
	Fully loaded cost of molding materials	1X	5X
Qualitative	Smooth surfaces for higher operational efficiencies	HIGH	MED
	Post molding machining operations required	LOW	MED
	Wall thicknesses required	HIGH	LOW

BMC MATERIALS HAVE OTHER PROPERTIES OF PARTICULAR VALUE TO THE PUMP INDUSTRY

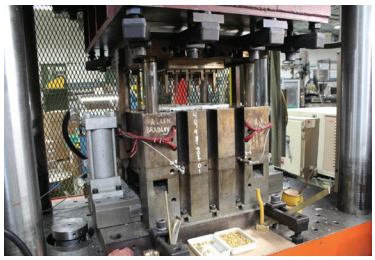
- A smooth surface finish provides for better sealing and reduces friction losses resulting in higher efficiencies than competitors. Higher efficiencies result in lower total costs of ownership and maintenance.
- The complex geometries designed into the internal fluid passages, i.e. smooth curving surfaces, are essential for optimum hydraulic performance and are required to keep fluid turbulence to a minimum, resulting in even more efficiency gains.
- Because the design incorporates complex geometries, the pumps have a smaller footprint than "Armored" pumps requiring an external support structure for their internal non-metallic "lining." Thermoset materials of construction have an inherent advantage over thermoplastics for applications with higher temperature fluids and with more aggressive chemical formulations. Thermoset materials can match the quality of parts made in the investment cast process using high-end alloys.

GENESYS® THERMOSETTING POLYMER

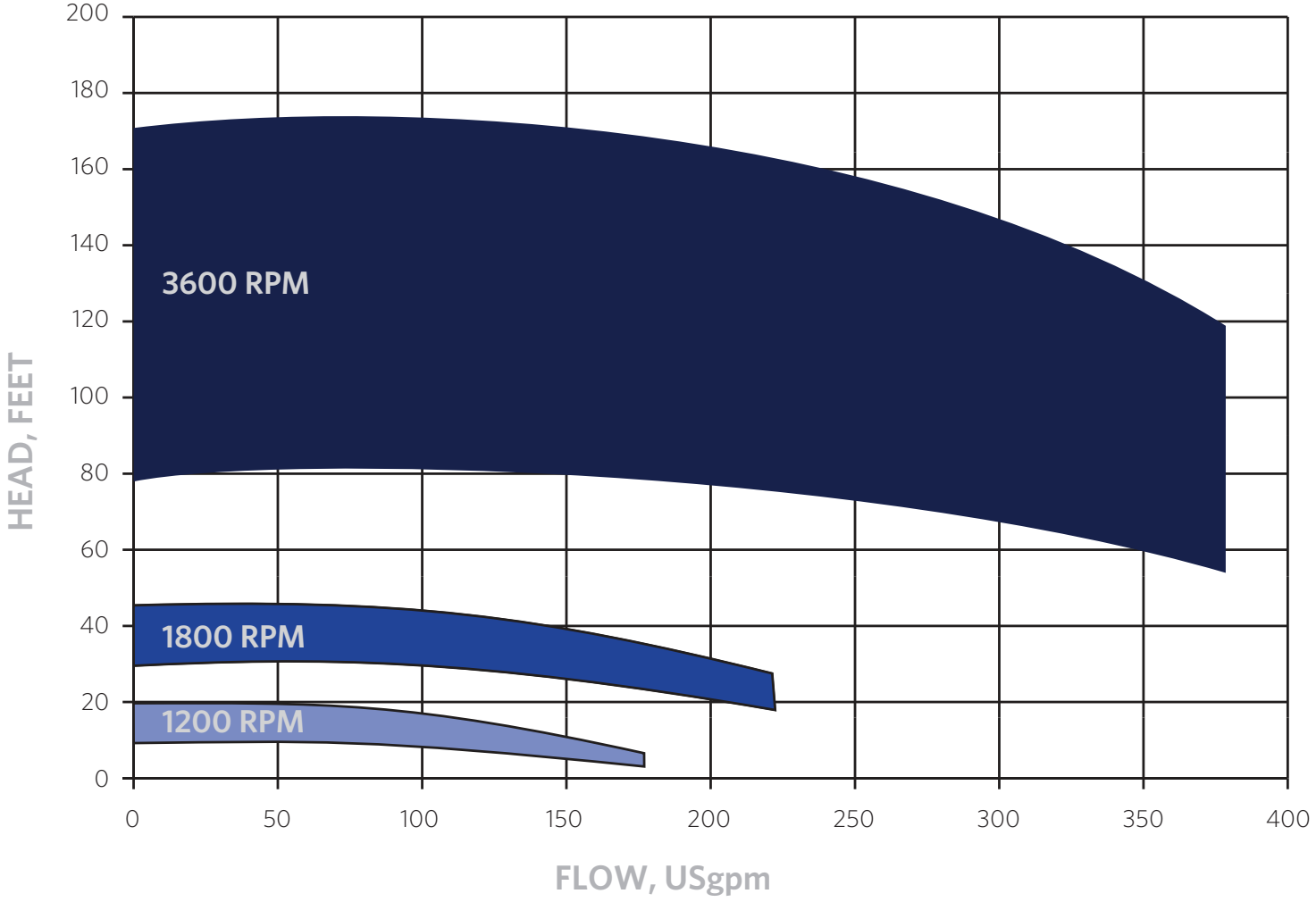
The thermoset transformation or curing process involves change from a liquid to a solid by a cross-linking process. This means that the molecular chains of the polymers are induced to link into a rigid product using chemical catalysts that make this linking go faster than it would over time. Thermoset materials are generally stronger than thermoplastic materials due to the number of three dimensional bonds that are created through cross-linking. This also makes them better suited to high-temperature applications. However, this "hardness" tends to make them more brittle and difficult to recycle.

SOME EXAMPLES OF THERMOSETS ARE:

- Polyester fiberglass systems
- Vulcanized rubber
- Bakelite, an electrical insulators and plastic ware
- Duroplast, similar to Bakelite used for making car parts
- Urea-formaldehyde foam used in plywood
- Melamine resin used on work top surfaces
- Epoxy resin polyimides used in printed circuit boards and in body parts of modern airplanes
- Cyanate esters or polycyanurates for electronics application



Family Performance Curve



IMPENATRA® II

WHAT'S DIFFERENT ABOUT THE IMPENATRA® II?

• A proven, balanced design approach which eliminates hang up.

• Seal case is Injection molded polypropylene.

• All metal surfaces, springs and shafts are isolated from fluid contact.

• Easily handles a wide range of chemical solutions including most acids, bases and inorganics.

• Every seal is individually inspected to ensure consistent quality and is readily available.

The Impenatra® II Seal is an innovative new approach to solve many shaft sealing problems. When used with GENESYS®, it isolates all metallic parts from contact with the fluid. Alternately, corrosive chemicals require seals made of exotic alloys.

You can expect excellent corrosion resistance and protection from attack by contained fluid and surrounding environment. Easy to install and field adjustment not required. Offers great versatility at an excellent price. Reliability due to simplicity of design and quality components.

WHAT THIS MEANS TO YOU

- Outstanding corrosion resistance protects from attack by contained fluid and from surrounding environment.
- Easy to install, field adjustment not required.
- Offers good versatility at an excellent price.
- Reliability, due to simplicity of design and quality components.

TECHNICAL DATA

Seal Type: Stationary wave spring, reverse mount
Maximum temperature 194 °F

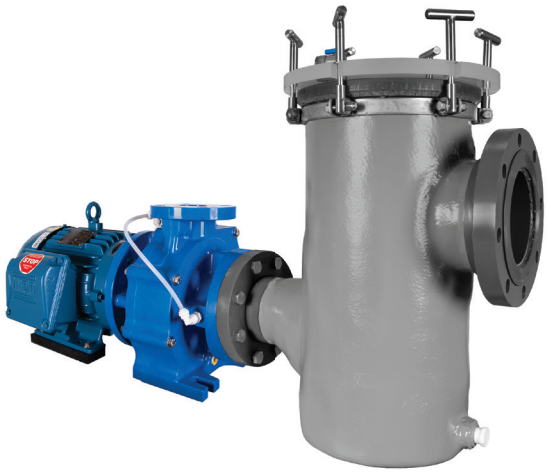
MATERIALS OF CONSTRUCTION

- O-rings and elastomers available in Buna, Viton®, EPDM, Kalrez® and Alfas®.
- Seal case – injection molded polypropylene
- Seal face – carbon graphite resin, binderless graphite or silicon carbide
- Seal seat – silicon carbide

EXAMPLE CORROSION RESISTANCE

- Deionized Water
- Ferrous Chloride 100%
- Hydrochloric Acid 37%
- Hypo Acid Fixing Baths
- Nitric Acid 10%
- Phosphoric Acid
- Photographic Developers
- Plating Solutions
- Sodium Hydroxide
- Sodium Hypochlorite
- Sulfuric Acid (aerated)
- And much more...

IMPENATRA® II

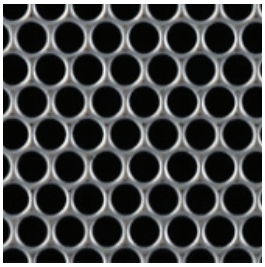


Genesys® 3x2-6 Unit with Fluidtrol Strainer and Basket

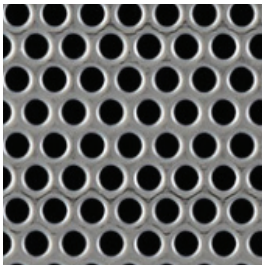
Genesys® Fluidtrol Strainer

MDM offers a non-metallic basket strainer for marine aquatic and industrial applications. These strainers are customized so the effluent port lines up with the pump inlet port. In additional to efficient solids removal, basket strainers will protect the pump impeller and can be used as priming pots for suction lift applications.

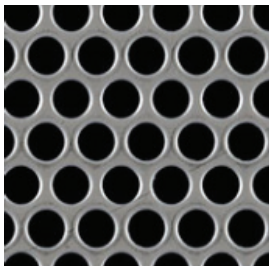
Fluidtrol Basket Strainers are constructed of FRP, PVC, and 316SS. These materials results in a product that is extremely corrosion resistant and built to last the life of any project. The standard basket is 18 Gauge 316SS, constructed with 1/8" holes perforated on 3/16" staggered centers. As depicted above, baskets can be fabricated with a variety of hole sizes and open areas to meet varying design requirements. Baskets are laser cut for maximum strength and service life.



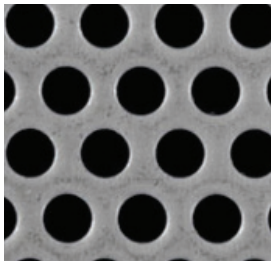
5/32" Perf @ 3/16" centers. 33 holes per sq. in. 63% open area



1/8" Perf @ 3/16" centers. 33 holes per sq. in. 40% open area



3/16" Perf @ 1/4" centers. 18.5 holes per sq. in. 51% open area



1/4" Perf @ 3/8" centers. 8.1 holes per sq. in. 40% open area

SIZE	BASKET MODEL	EFFLUENT CENTERLINE	MATERIAL
4x3	24169627	5.25"	FRP Body PVC Flanges & Drain 316 SS Basket & T-Handles

Genesys® 3x2-6 Unit with VFD

Variable Frequency Drive (VFD)

Genesys® pumps in combination with a variable frequency drive (VFD) result in a versatile pumping system with the lowest total cost of ownership. This is accomplished by slower operating speeds with a larger more efficient impeller, reducing energy consumption and increasing service life. Pump purchases should be seen as power and labor contracts, since operating cost will far exceed acquisition cost.

The design experts at MDM will size the pump to meet maximum system flow and validate whether a VFD is appropriate for your pumping application. Below is a list of potential operating benefits.

Aegis ground rings and insulated bearings can be provided for additional protection with VFD applications.

Benefits

- Reducing rotational speed will draw less electrical power compared to valve throttling.
- Increased service life by lowering rotational speed (seals, bearings and motor).
- Ability to integrate with system automation and monitoring. Rotational speed can be controlled to maintain a desired flowrate as system pressure demands fluctuate.
- Inherent soft starting reduces wear on motor and other system components such as piping and valves.
- Voltage being supplied to the motor is optimized based on the operating load, thus maintaining the right amount of motor slip.
- Some utilities offer rebates for installing VFDs in new or retrofit work.

Pump & Motor Numbering

To determine a part number, select the appropriate number from the categories listed below and insert them into the corresponding digits. For example: When G1T-01N-23 is changed the Seal will be: Carbon Graphite/Viton/Silicon Carbide.

G_ _ -_ _ _ - _ _ - _ _

Other	9,10
Seal	7,8
Motor Enclosure - One Digit Identifier	6
Motor - Two Digit Identifier	4,5
Y = Full OD Impeller	3
T = Trimmed Impeller	3
Model	2
G = GENESYS®	1

1ST DIGIT - PUMP FAMILY

G = GENESYS®

2ND DIGIT - PUMP SIZE AND MATERIAL

1 = 2" discharge x 3" suction x 6" nominal impeller diameter, glass-fiber reinforced Vinyl Ester, Noryl® impeller.

3RD DIGIT - IMPELLER TRIM

X = full diameter impeller
T = Trimmed impeller (specify trim on order)

4TH AND 5TH DIGITS - MOTOR IDENTIFIER

Motor ID	Hp	RPM	Phase	Voltage
01	¾	1200	1	115/230
02	1	1200	1	115/230
03	1	1800	1	115/230
04	1 ½	1800	1	115/230
05	2	1800	1	115/230
06	3	1800	1	115/230
07	5	1800	1	230
08	5	3600	1	230
09	7 ½	1800	1	230
10	7 ½	3600	1	230
11	10	1800	1	230
12	10	3600	1	230
30	¾	1200	3	230/460
31	1	1200	3	230/460
32	1	1800	3	230/460
33	1 ½	1800	3	230/460
34	2	1800	3	230/460
35	3	1800	3	230/460
36	5	1800	3	230/460
37	5	3600	3	230/460
38	7 ½	1800	3	230/460
39	7 ½	3600	3	230/460
40	10	1800	3	230/460
41	10	3600	3	230/460
42	15	3600	3	230/460

AO	Pump End Only, No Installed Seal
AI	Pump End Only, Installed Seal
AP	Pedestal Mount, Installed Seal

6TH DIGIT - MOTOR ENCLOSURE

N = TEFC
O = ODP
E = Exp Proof
W = Wash Down
A = EISA
S = Stainless
GR = Grounding Rings

7TH AND 8TH DIGIT - NON-METALLIC IMPENATRA® SEALS

Seal ID	Seal Head Asm
23	Resin impregnated Carbon Graphite
43	Graphite
51	Silicon Carbide

Seal Seat	Trim
Silicon Carbide	Viton®

9TH AND 10TH DIGITS - OTHER

P = Shaft Protection	F = Seal Flush
I = 50 HZ Rated Motor	S = Custom Motor

**Consult factory for pricing on all pump/motor assemblies and bearing frame mounted pump assemblies.*

2019 PUMP OPTIONS AND PRICING (60HZ)

MDM PUMP	GENESYS 3X2-6 (PHENOLIC)	GENESYS 3X2-6 (VINYL ESTER RESIN)
ALLOWABLE FLOWRATE RANGE (GPM) [1]	55-340	55-340
ALLOWABLE PRESSURE RANGE (FT) [1]	5-170	5-170
MAXIMUM EFFICIENCY	76%	76%
MOTOR POWER (HP) [2]	3/4-20	3/4-20
POWER OPTIONS (VOLTAGE / PHASE)	110-220V / 1ø *or* 230-460V / 3ø	110-220V / 1ø *or* 230-460V / 3ø
NEMA MOTOR FRAME [2]	143JM-215JM	143JM-215JM
PUMP WET END MATERIAL	Compression Molded Thermoset Polymer / Phenolic	Compression Molded Thermoset Polymer / Vinyl Ester Resin
MECHANICAL SEAL	Impenatra II (Non Metallic)	Impenatra II (Non Metallic)
IMPELLER TYPE	Enlosed	Enlosed
IMPELLER MATERIAL	Noryl®	Noryl®
LIST PRICE FOR PUMP (USD) [3]	$7,090	$8,300
LIST PRICE FOR VFD (USD) [3]	$1,650	$1,650

2019 BASKET STRAINER PRICING

MDM PUMP	GENESYS 3X2-6 (PHENOLIC)	GENESYS 3X2-6 (VINYL ESTER RESIN)
BASKET STRAINER	4" x 3" Fluidtrol (SW)	4" x 3" Fluidtrol (SW)
LIST PRICE FOR BASKET STRAINER (USD) [3]	$3,070	$3,070

1. Allowable Operating Range (AOR) is between 60% & 130% of Best Efficiency Point (BEP).
2. Close Coupled or Frame Mounted.
3. List pricing in this table is an average. Final pricing will depend on specifications and date of purchase.