

Mono[®]

A National Oilwell[®] Company

INDUSTRIAL E RANGE



Mono[®]


The Industrial E Range

Models E032 and below

1. Rotors

DURACOAT

- 1 manufactured by Mono
- 1 standard and exotic materials to suit all applications
- 1 range of coatings to improve wear resistance, including the new Duracoat 3000 coating designed for highly abrasive applications
- 1 over and undersize rotors for differing product temperatures

Duracoat Coatings

- 1 protects the surface from abrasive wear and corrosion
- 1 range of coatings to suit the application
- 1 increases the life of the rotor and reduces maintenance costs

2. Stators

- 1 manufactured by Mono
- 1 range of natural and synthetic elastomers to meet application requirements
- 1 stator tube options include mild steel and stainless steel
- 1 product temperatures up to 150°C
- 1 dry run protection option

Optimum Pump Performance - Guaranteed

- 1 pump performance is very dependent upon the fit and geometry of both rotor and stator
- 1 by controlling the manufacturing process of the components, Mono ensures that the pump performs to its published criteria

3. End Covers

- 1 screwed connections including BSP, NPT
- 1 materials include cast iron, stainless steel, and specials to suit the applications
- 1 tapings available for relief valve/pressure gauge control instrumentation as necessary
- 1 modular design, 8 pumps utilise 3 end covers
- 1 can be rotated through 90° increments

4. Flexishaft®

- 1 5 Year Warranty
- 1 manufactured by Mono since the early 1970's
- 1 manufactured in titanium and coated with Halar®
- 1 6 Flexishafts for 13 models
- 1 designed to flex during operation

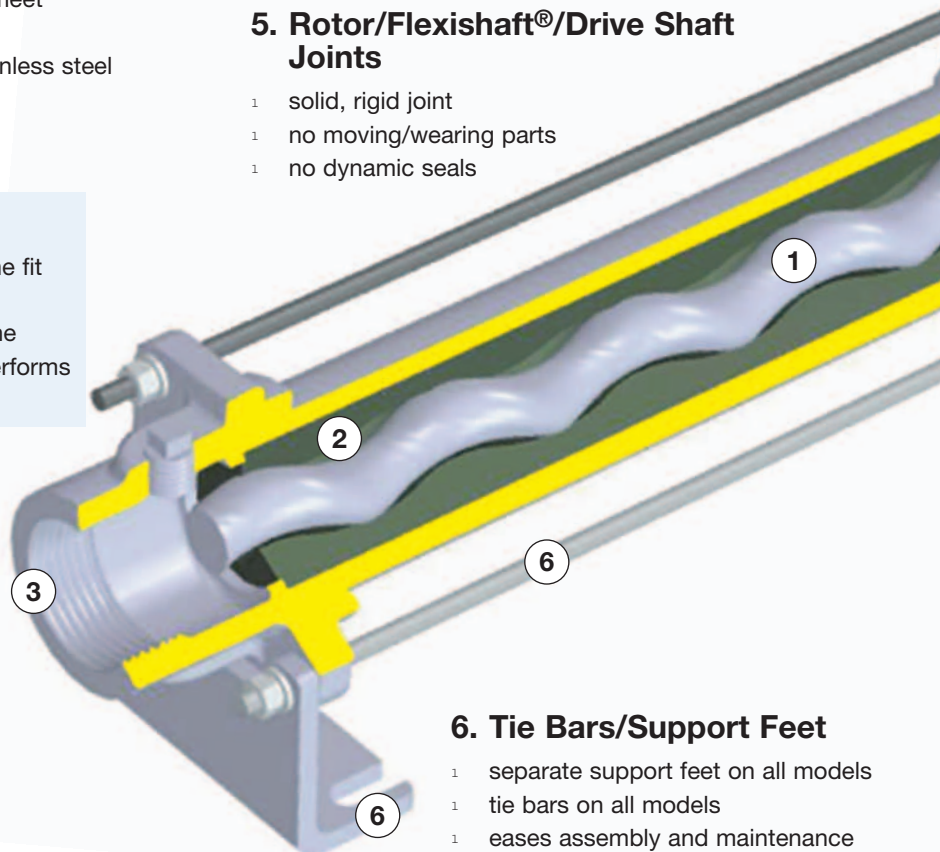


Lowest Whole Life Cost Option

- 1 this design removes the need for pin/gear/cardan shaft joints as the Flexishafts take up the eccentric motion of the rotor
- 1 eliminates need for joint lubrication so removing any likelihood of product contamination
- 1 significantly reduces operating costs associated with pin/gear and cardan shaft designs

5. Rotor/Flexishaft®/Drive Shaft Joints

- 1 solid, rigid joint
- 1 no moving/wearing parts
- 1 no dynamic seals



6. Tie Bars/Support Feet

- 1 separate support feet on all models
- 1 tie bars on all models
- 1 eases assembly and maintenance procedures



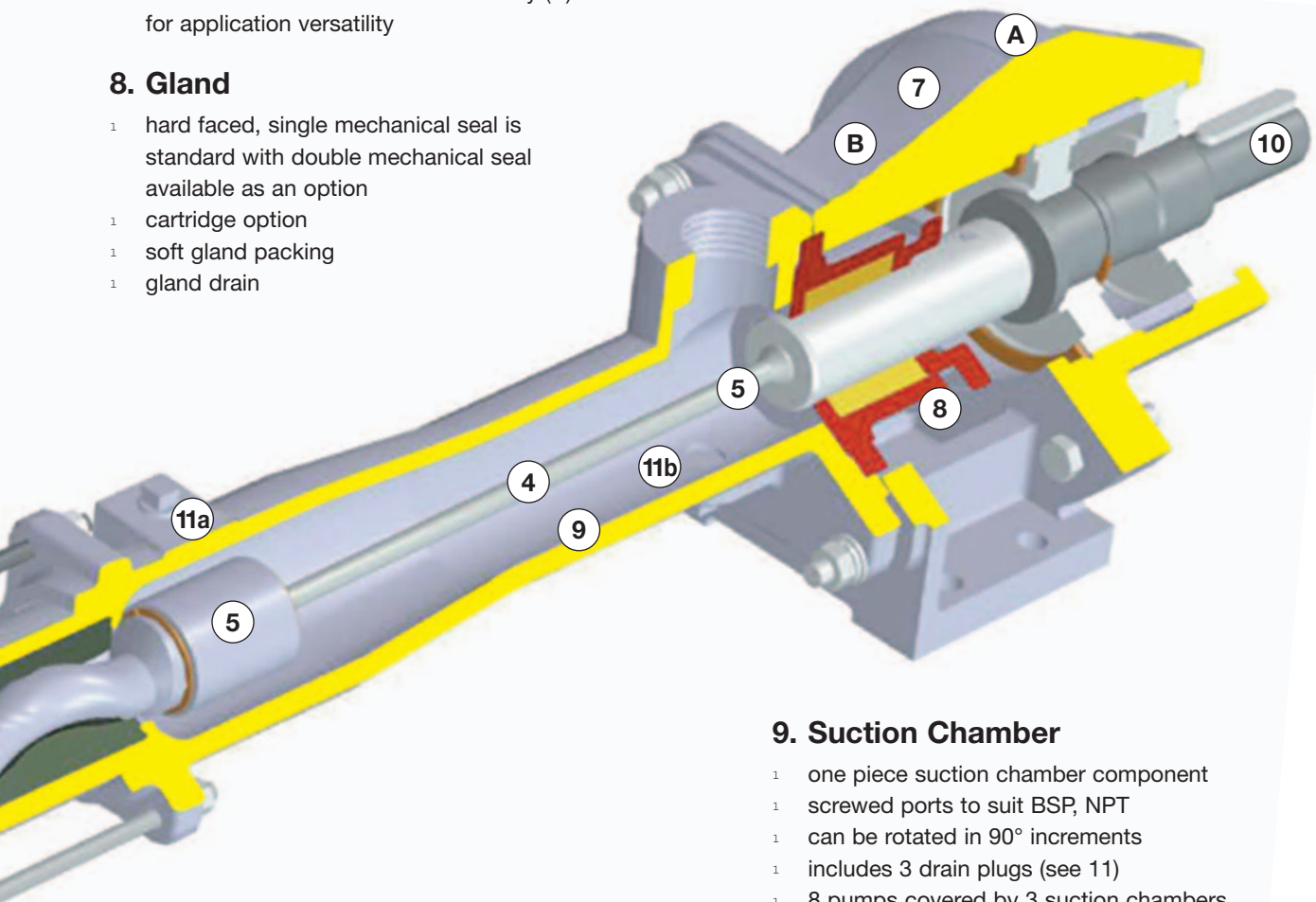
Capacities up to 10m³/h - 8 models

7. Body

- 1 for the models 012-032 (8 pumps)
- 1 there are 2 elements, a bearing housing (A)
- 1 that bolts onto the Monobloc® B body (B)
- 1 for application versatility

8. Gland

- 1 hard faced, single mechanical seal is standard with double mechanical seal available as an option
- 1 cartridge option
- 1 soft gland packing
- 1 gland drain



9. Suction Chamber

- 1 one piece suction chamber component
- 1 screwed ports to suit BSP, NPT
- 1 can be rotated in 90° increments
- 1 includes 3 drain plugs (see 11)
- 1 8 pumps covered by 3 suction chambers
- 1 materials include cast iron, stainless steel and specials to suit the application

10. Drive Shaft

- 1 2 piece shaft assembly
- 1 eases maintenance procedures
- 1 wetted shaft in stainless steel or more exotic material to suit the application
- 1 bearing shaft in mild steel
- 1 packed gland and mechanical seal options
- 1 keyways to BS4235 (1982) and ISO R773

11. Drain/Filler Plugs 3 off

- 1 with port in vertical position these 2 plugs (11a) can be used to fill the suction chamber
- 1 if port is 90° to left or right these become the drain plugs
- 1 plug 11b is normally the drain plug

Operational Versatility

- 1 these small pumps are designed to be as flexible as possible
- 1 single, two and four stage performance can be achieved by changing the rotor/stator only
- 1 this modularity has significant operating cost impact for the user as the shaft and gland section, Flexishafts and drive shafts minimise the number of spares needed to support the pumps once installed

The Industrial E Range

Models E034 and above

1. Rotors

DURACOAT

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- 1 range of coatings to improve wear resistance, including the new Duracoat 3000 coating designed for highly abrasive applications
- 1 over and undersize rotors for differing product temperatures

Duracoat Coatings

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- 1 range of coatings to suit the application
- 1 increases the life of the rotor and reduces maintenance costs

2. Stators

- 1 manufactured by Mono
- 1 range of natural and synthetic elastomers to meet application requirements
- 1 stator tube options include mild steel and stainless steel
- 1 product temperatures up to 150°C
- 1 dry run protection option

Optimum Pump Performance - Guaranteed

- 1 pump performance is very dependent upon the fit and geometry of both rotor and stator
- 1 by controlling the manufacturing process of the components, Mono ensures that the pump performs to its published criteria

3. End Covers/Suction Chamber

- 1 all standards available to cover UK/European/American/Japanese specifications DIN, BS, ANSI, JIS
- 1 materials include cast iron, stainless steel, rubber lined, duplex steel and Ni-Resist to suit the application
- 1 tapings available for relief valve, pressure gauge or control instrumentation as necessary
- 1 can be rotated through 90° increments
- 1 90° bend end covers available on sizes 04, 05, 06, single and two stage
- 1 plugged drain holes provided

4. Flexishaft®

- 1 5 Year Warranty
- 1 manufactured by Mono since the early 1970's
- 1 manufactured in stainless steel or titanium
- 1 coated with Halar®
- 1 designed to flex during operation

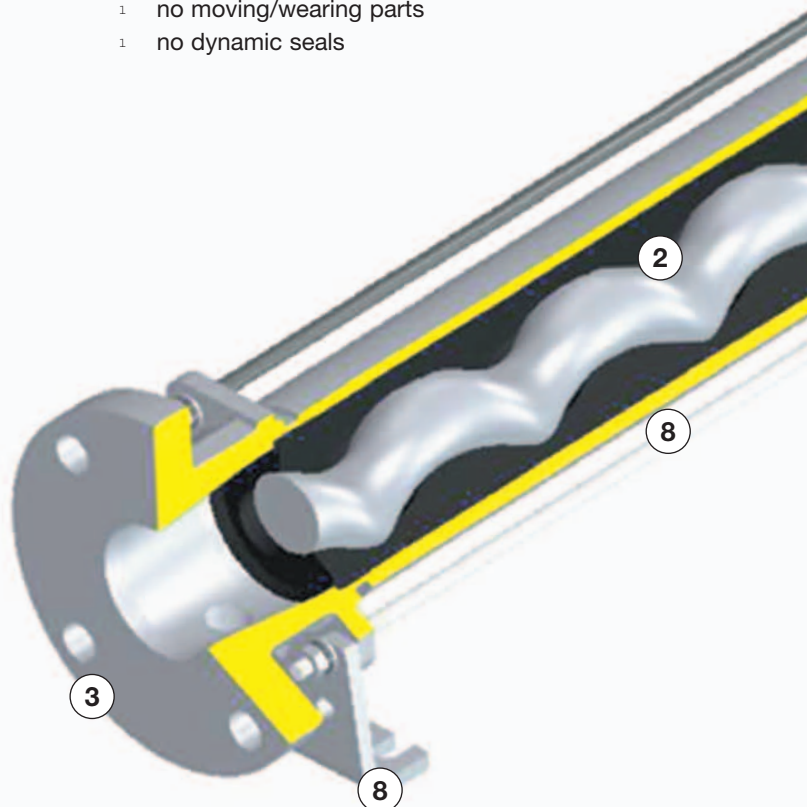


Lowest Whole Life Cost Option

- 1 this design removes the need for pin/gear/cardan shaft joints as the Flexishafts take up the eccentric motion of the rotor
- 1 eliminates need for joint lubrication so removing any likelihood of product contamination
- 1 significantly reduces operating costs associated with pin/gear and cardan shaft designs

5. Rotor/Flexishaft®/Drive Shaft Joints

- 1 solid, rigid joint
- 1 no moving/wearing parts
- 1 no dynamic seals



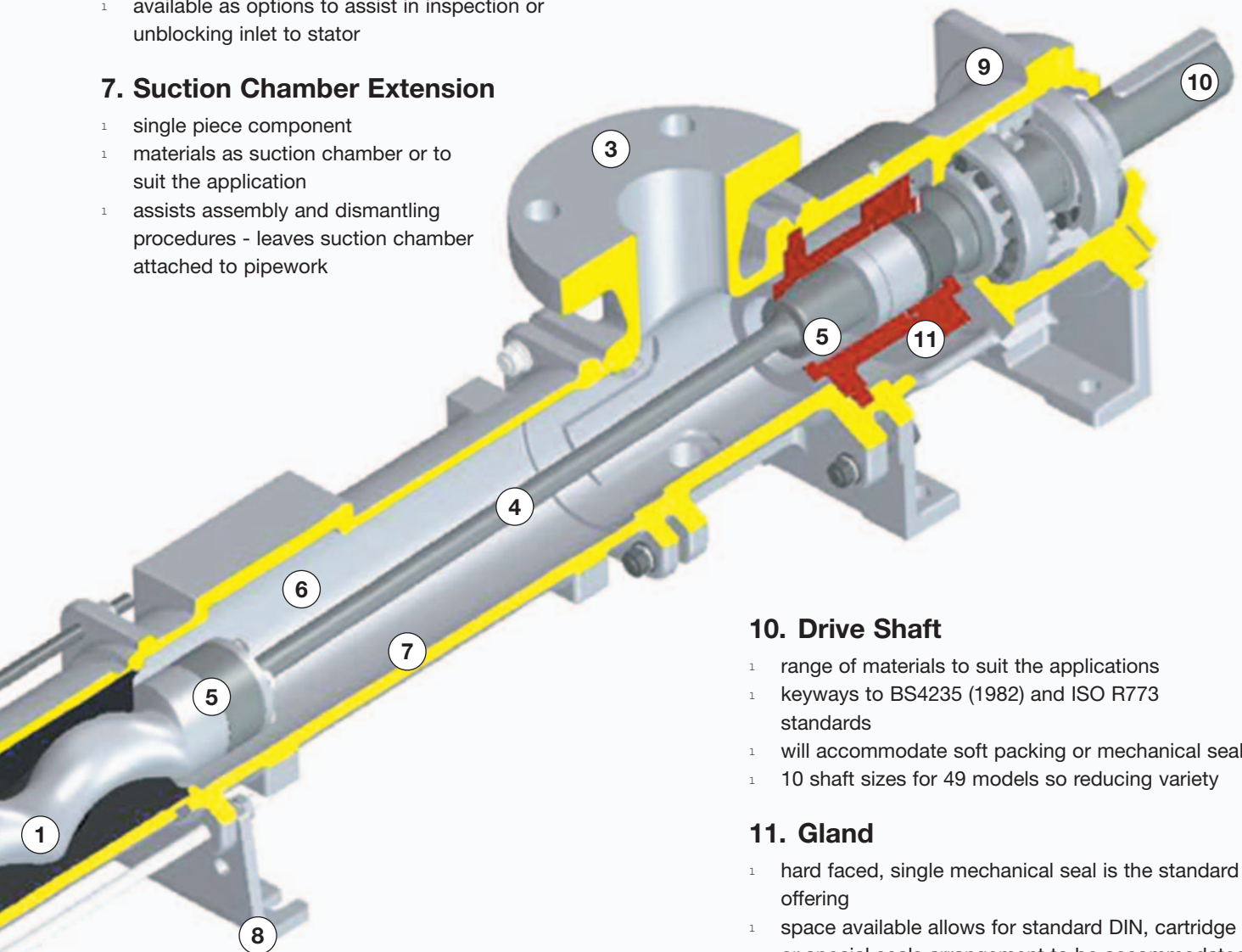
Capacities from 5m³/h up to 420m³/h - 56 models

6. Access ports

- 1 available as options to assist in inspection or unblocking inlet to stator

7. Suction Chamber Extension

- 1 single piece component
- 1 materials as suction chamber or to suit the application
- 1 assists assembly and dismantling procedures - leaves suction chamber attached to pipework



8. Tie Bars/Support Feet

- 1 on majority of pumps the use of tie bars and separate support feet assist in assembly and dismantling procedures
- 1 additional support feet for high pressure and large pumps to support the suction chamber extension

9. Body

- 1 9 bodies used across 56 pump models, so reducing variety
- 1 standard and special materials available
- 1 taper roller bearings with optional lubrication nipple
- 1 lipseal to prevent moisture ingress to bearings
- 1 heavy duty sealing option

10. Drive Shaft

- 1 range of materials to suit the applications
- 1 keyways to BS4235 (1982) and ISO R773 standards
- 1 will accommodate soft packing or mechanical seals
- 1 10 shaft sizes for 49 models so reducing variety

11. Gland

- 1 hard faced, single mechanical seal is the standard offering
- 1 space available allows for standard DIN, cartridge or special seals arrangement to be accommodated
- 1 packed gland, with optional lantern ring or grease flush
- 1 drain point included
- 1 gland material to suit the application

All E Range Models

- 1 paint finish from Mono standard to customer specific including epoxy
- 1 baseplates and units to suit the application including direct coupled, overhead vee, trolley and piggy back
- 1 fixed or variable speed gearboxes with inverter control

Halar® is a registered trademark of Ausimont. Inc, USA

Industrial E Range



Waste Water

A Sewage Treatment works in Nottingham, treating up to 360,000 megalitres/day of effluent, is using Industrial E Range pumps to transfer surplus activated sludge from various aeration systems to the dewatering unit.

The pumps operate at speeds of 180 rpm and 8 bar pressure with capacities upto 38l/s. The pumps were chosen for the adjustable stator which would allow retensioning of the rotor/stator arrangement to prolong the service life of the pumping elements.

Mining

Mono designed and constructed this complete mine de-watering system to cope with highly abrasive liquid at a uranium mine in Niger, West Africa. The £1¼ million system is built around three cast iron E088 high pressure pumps, capable of transferring water from three 5m³ capacity holding tanks at a rate of 40m³/h, at 40 bar pressure, 240m to the surface and a further 3km to a settling lagoon. Our scope of supply not only included the pumps, but also three sets of holding tanks, all interconnecting pipework and valve systems assembled onto the appropriate baseplate systems.



Chemicals

A CE102 pump installed at an Environmental Plant passed 14 months of extensive field tests. The pump is installed at the bottom outlet of a clarifier designed to concentrate solids by gravity settlement. Replacing a high capacity centrifugal pump which was unable to provide steady clarifier conditions and extracted too much slurry, the two stage pump was chosen to give variable flow control to match the changing conditions of the clarifier.

The pump handles a 2-5% wastewater slurry of metal hydroxides, clay bentonite and sand at a flow rate of between 15 and 50m³/h. The field trials showed the pump to be very reliable in operation combined with low maintenance requirements.

Pulp & Paper

Vertically mounted CE072 pumps are helping one of Europe's leading manufacturers of high quality packaging achieve a smooth latex based coating on its board packaging materials.

The pumps are used to pump the coating mix from the storage tanks to the final station tank which feeds the top layer blade coater. To constantly refill the tanks, the pumps normally operate at 5m³/h, however, the variable speed drive enables this to be automatically increased. Mono has mounted the pumps vertically to ensure that the seal and gland housing is sited above the highest possible liquid level in the tank. This prevents the possibility of seal leakage which could have costly quality and environmental implications.



Applications

Food & Drink

Three moulded to metal E Range models (together with some W Range pumps) have been installed at a refinery plant that produces a range of glucose and starch ingredients for the food and drink industries.

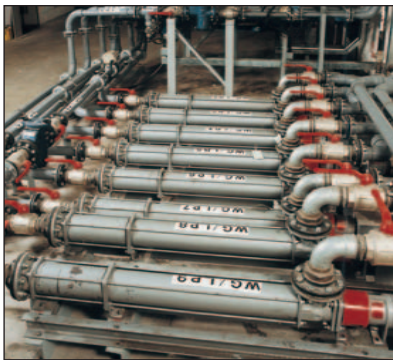
Operating at 167 rpm to deliver the gluten at 40m³/h and 8 bar pressure, the E Range models feature Mono's Flexishaft, with 5 year warranty. The reduced number of moving parts in the drive train eliminates wear and makes lubrication unnecessary, reducing the risk of product contamination.



Adhesives

After testing a total of seven competitive pumps, a flooring adhesive manufacturer chose eight SE061 pumps to deliver a variety of raw material from twelve 50 ton storage tanks, 100 metres away, to mixing machines for blending.

As the products this customer works with are quite viscous and are often shear sensitive, the progressing cavity principle of the pump is ideal to give a gentle pumping action and to achieve the steady flow rate of 200 litres per minute. Each pump handles a different product, with one on standby to enable any cleaning or maintenance work to be carried out when necessary.



Oil & Gas

This is part of a £3/4 million pump package, comprising 18 Industrial E Range pumps, installed at an oilfield in the Neuquen Province. Transferring a mixture of oil, formation water and solids to the tank separator, the pumps are installed on a first stage upstream process.

Due to the highly corrosive nature of formation water, all rotating parts within the pumps which are wetted by the formation water are manufactured in Duplex stainless steel to increase pump life and reduce maintenance requirements.



Industrial

CE082 pumps have been incorporated into a cross-flow filtration system specially designed by a company that refits and refuels the UK's nuclear submarine fleet.

The Mono pump is required to recirculate slurry for five hours in the crossflow filtration loop, comprising a feed tank and a filter module and also to recirculate a cleaning fluid around the loop once or twice a year. The filter module is designed to operate at an optimum flow rate of 28m³/h and a pressure of 4.5 bar.

As these pumps have good suction characteristics they do not rely on gravitational head to draw the waste from the storage tanks, thus eliminating the need for further pumping systems.

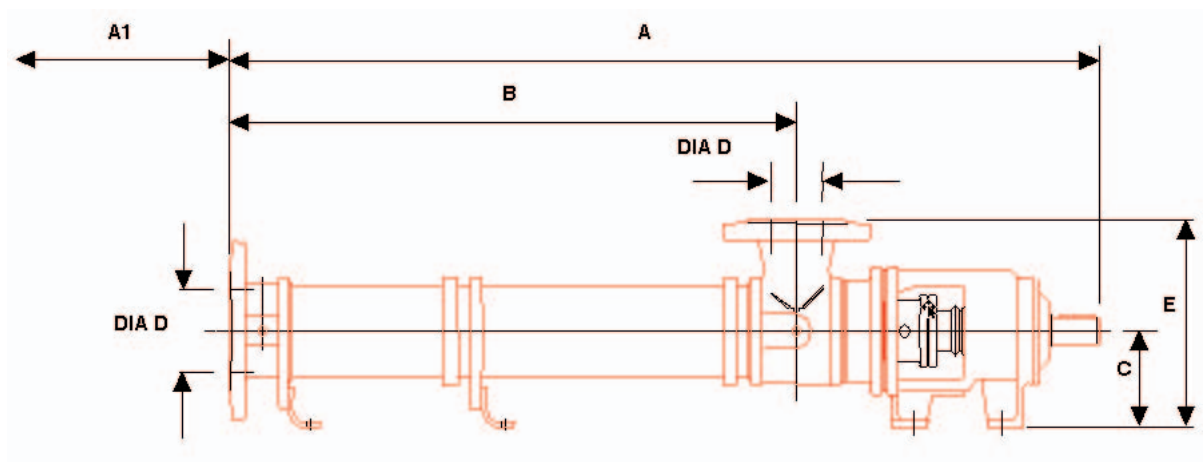


Industrial E Range

FEATURES	DESCRIPTION	BASIC PUMP CODE										STANDARD VARIATION				
		1	2	3	4	5	6	7	8	9	10	/	12	13	14	15
BODY MATERIALS	Cast Iron	C														
	Stainless Steel	S														
	Duplex	F														
	Rubber Lined	R														
PUMP DESIGN	Flexishaft - Industrial		E													
NOMINAL PUMP CAPACITY AT MAXIMUM SPEED AND ZERO PRESSURE	1.3m³/h @ 1750 rev/min			0	1											
	3.3m³/h @ 1750 rev/min			0	2											
	10m³/h @ 1500 rev/min			0	3											
	13m³/h @ 1500 rev/min			0	X											
	22m³/h @ 1000 rev/min			0	4											
	37m³/h @ 800 rev/min			0	5											
	57m³/h @ 700 rev/min			0	6											
	79m³/h @ 600 rev/min			0	7											
	97m³/h @ 500 rev/min			0	8											
	125m³/h @ 450 rev/min			0	9											
	165m³/h @ 400 rev/min			1	0											
	225m³/h @ 350 rev/min			1	2											
	210m³/h @ 270 rev/min			1	5											
	290m³/h @ 270 rev/min			1	6											
	420m³/h @ 200 rev/min			2	0											
PUMP STAGES	Low Pressure					K										
	One					1										
	Two					2										
	Three					3										
	Four					4										
	Six					6										
	Eight					8										
	Twelve					C										
END COVER AND DRIVE DESIGN	Str thro E/C, Std Flexishaft						M									
	90° E/C, Std Flexishaft						G									
	Str thro E/C, Special Flexishaft						S									
	90° E/C, Special Flexishaft						T									
MECHANICAL SEAL DUTY CONDITIONS	Light duty with Mk 1 rotor							H								
	Standard duty with Mk 1 rotor							J								
	Standard duty with Mk 0 rotor							K								
	Light duty with Mk 0 rotor							N								
PACKED GLAND DUTY CONDITIONS	Light duty with Mk 1 rotor							L								
	Standard duty with Mk 1 rotor							S								
	Standard duty with Mk 0 rotor							X								
	Light duty with Mk 0 rotor							Z								
DESIGN MARK NUMBER	1989 (1994 Sizes 01-0X) (1996 Low Pressure)								1							
	1995								2							
	1996								3							
STATOR MAT'L	RA, RR etc.									A						
ROTATING PARTS	1, 3, 4, 5, 8										3					
TYPICAL BASIC PUMP CODING	Cast Iron Flexishaft pump size 05 single stage. Mechanical seal, str thro E/C, Std F/shaft, Std duty conditions, Mk 0 rotor, Design 1, Natural rubber stator, Code 3 rotating parts	C	E	0	5	1	M	K	1	A	3					
MARKET VARIATIONS	'A' - America															
	'E' - Europe															
	'H' - Home	C	E	0	5	1	M	K	1	A	3	/	A			
	'C' - Bareshaft - Mono Australia only															
	'J' - Japan															
FULL PUMP CODING TO BE STAMPED ON PUMP NAMEPLATE																



Coding and Dimensions



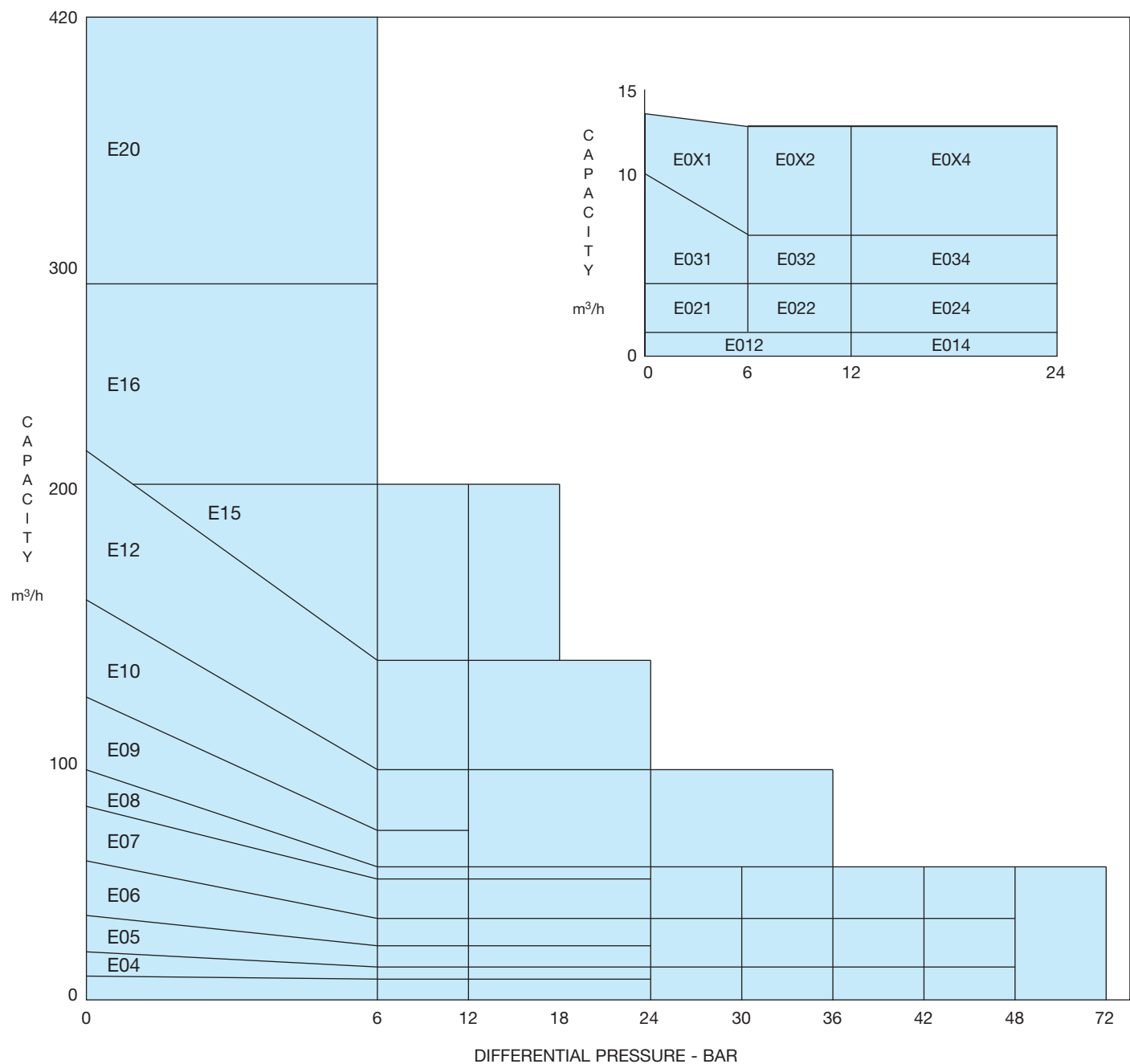
	Port Size K, Single, Two Stage Pumps	K					Single Stage *Special Flexishaft® Design							Two Stage *Special Flexishaft® Design						
	D	A	A1	B	C	E	A	A*	A1	B	B*	C	E	A	A*	A1	B	B*	C	E
E01	1 1/4"													712		105	444		85	146
E02	1 1/4"						712		105	444		85	146	856		115	588		85	146
E03	1 1/2"	922	115	650	85	150	777		105	505		85	150	922		115	650		85	150
E0X	50	1044	115	752	85	190	861		115	569		85	190	1127		230	797		100	205
E04	65	1436	170	1106	100	215	1231	1031	170	901	701	100	215	1543	1290	375	1158	905	112	227
E05	80	1762	230	1387	112	232	1502	1225	230	1127	850	112	232	1887	1568	490	1430	1111	125	245
E06	100	2070	285	1654	125	255	1758	1444	285	1342	1028	125	255	2240	1871	600	1709	1340	150	280
E07	125	2418	340	1925	150	310	2049		340	1556		150	310	2580		705	1988		160	320
E08	125	2633	385	2140	150	310	2225	1830	385	1732	1337	150	310	2806		795	2214		160	320
E09	150	2942	435	2404	160	345	2480		435	1942		160	345	3082		895	2341		225	410
E10	150	3316	515	2778	160	345	2785	2283	515	2247	1745	160	345	3424		1045	2683		225	410
E12	200	3914	595	3174	225	450	3280		595	2540		225	450	4160		1235	3392		250	475
E15	ø250/300						4011		735	3203		250	500	5485		735	4457		330	620
E16	250						4312		1036	3504		250	500							
E20	300						5777		735	4749		330	620							

	Four Stage						Six Stage						Eight Stage					
	A	A1	B	C	E	D	A	A1	B	C	E	D	A	A1	B	C	E	D
E01	856	115	588	85	146	1 1/4"												
E02	1216	115	944	85	150	1 1/2"	1666	230	1336	100	205	50	1953	230	1517	100	205	50
E03	1365	230	1035	100	205	50												
E0X	1796	255	1411	112	227	ø50/65												
E04	2090	780	1633	125	245	80							3295	1290	2764	150	280	100
E05	2596	1005	2065	150	280	100												
E06	3058	1210	2466	160	320	125	4016	1142	3288	225	385	ø125/150	4763	1142	4022	225	410	150
E07	3554	1385	2825	225	385	125												
E08	3855	1555	3114	225	410	150	5153	1555	4345	250	437	150	5970	1555	5162	250	437	150
E10	5129	1045	4360	250	465	200	6301	3100	5310	330	555	200						
E12	6156	1200	5158	330	610	200												

	Three Stage					
	A	A1	B	C	E	D
E15	5715	350	4717	330	610	200

1. All dimensions in millimetres unless otherwise stated and for guidance only.
 2. Shaft diameters are to BS 4506 (1970) and keyways to ISO R773.
 3. Flanges to BS EN 1092 or BSP.
 4. Dimension A1 is the preferred dismantling space.
 5. For full certified drawings refer to Mono Pumps Ltd, Audenshaw, Manchester.
- ◇ Suction/discharge port dimension.

Industrial E Range



NOTES:
For guidance in selecting a pump, please refer to Mono Pumps Ltd, Audenshaw, Manchester

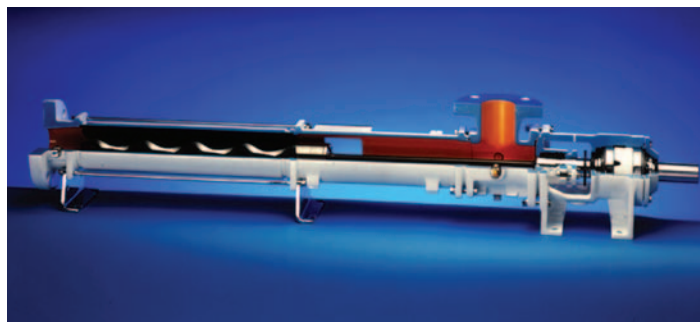
Performance Data and Benefits



The Flexishaft®

The Flexishaft is a unique solution to the problem of connecting the pump drive shaft to the eccentrically orbiting rotor, completely eliminating conventional universal joint designs. This solution has been the subject of patents by Mono Pumps over the past 30 years and has a 5 year warranty.

Because there are no wearing parts in the joints, the E Range does not incur the cost of maintenance associated with other forms of rotor/coupling rod joints. Lubrication is unnecessary, therefore product contamination caused by oil/grease is eliminated.



Further enhancements in design and the use of new materials has enabled us to reduce the Flexishaft dimensions, making the pump comparable in length to other traditional designs of progressing cavity pumps on the market. The benefit to the user is a pump which can be easily retrofitted onto existing pump foundations coupled with the significant reduction in operating costs as a result of the elimination of wearing, universal joint designs.



Service and Technology

At Mono Pumps, our philosophy is to provide full product and technical support that meets with your exact requirements, including quality, availability and price.

The latest technology is used, such as computer based flexible manufacturing systems, computerised bar stores and information systems. We are unique in having three stator manufacturing operations worldwide to ensure that we produce pumps and parts to a consistently high standard in the local area, readily available.

Attention to detail, combined with a wealth of technical advice and CAPS (Computer Aided Pump Selection) ensures you will receive a product that is quality assured. Mono is approved to ISO 9001:2000 and manufactures products within a Quality Management System which is independently measured against industry recognised standards throughout the world.

With over 700 authorised outlets located throughout the world to provide the local support you need, the Mono Pumps Group can offer you the following services:

- | | |
|-------------------------------|--|
| 1 Pre sales assistance | 1 Trouble shooting |
| 1 Quotations for applications | 1 Warranty and after sales service |
| 1 Pump availability | 1 Installation |
| 1 Spares availability | 1 Pump refurbishment and service exchange facilities |