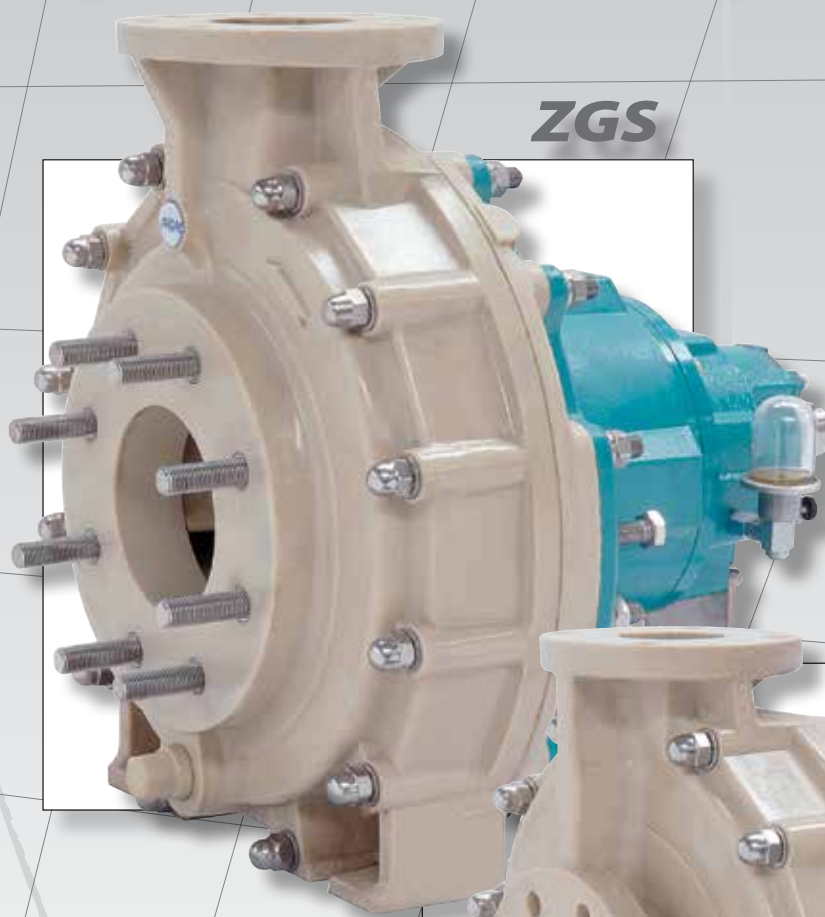


ARGAL

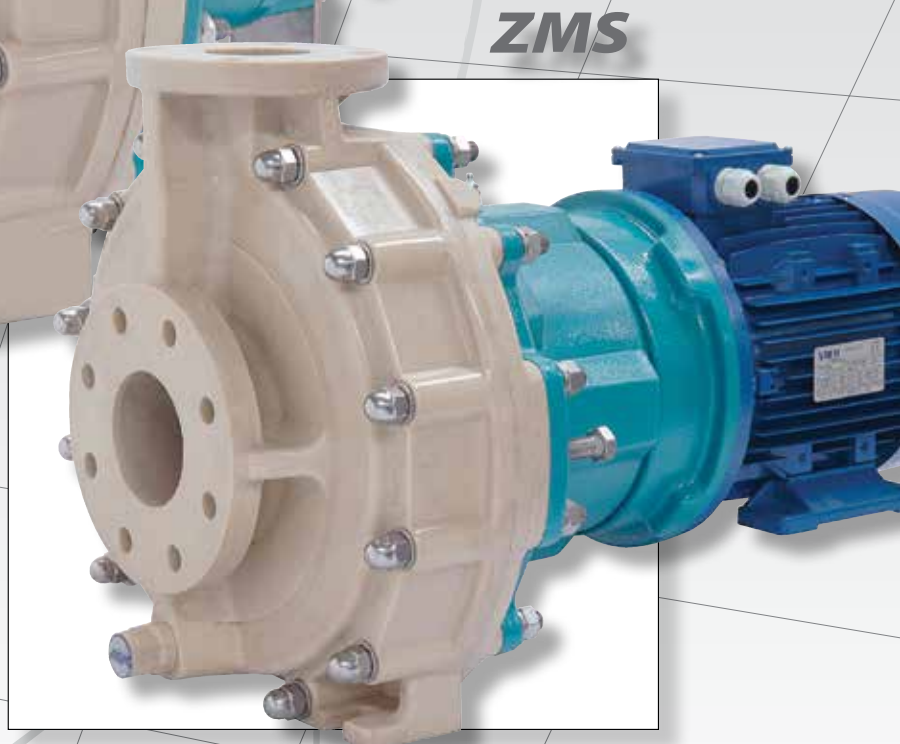
CHEMICAL PUMPS

SATURN

Fiberglass Reinforced Polyester Pumps



ZGS



ZMS

SATURN - Fiberglass Reinforced Polyester Pumps

The Argal pumps of the new range Saturn are centrifugal, single stage and compliant to ANSI/ASME B73.1. Regulation. These pump are manufactured in FRP (fibre reinforced polyester) and do not need a protecting carcass or external frames to reinforce the structure.

Peculiar design and the intrinsic resistance of the material of construction confer to these pumps mechanical resistance comparable to that of the major metallic alloys. Use of different formulations of epoxy vinyl ester resins, extend the spectrum of chemical resistance of these pumps that are adequate and resistant to a large number of corrosive and moderately abrasive medias.

The Saturn pumps are a technical and economical alternative to metallic pumps made of special alloys and can be effectively applied in water treatment applications, water games, depuration of civil and industrial waste waters, and in general in productive processes deploying chemicals.

THE MANUFACTURING PROCESS

The Saturn pumps are produced completely by Argal in its plant located in Italy by RTM injection moulding technology.

By this process parts are manufactured in moulds where reinforcing layers of glass fibre matt are arranged prior to the injection of the resin.

The use of glass fibers in form of layer of tissue of different weight allows to reinforce the structure in the areas of most mechanical stress and at the same time offers an excellent chemical resistance of the surfaces wetted by the liquid pumped.

The thermoset resins, differently from thermoplastics materials, can not be re processed once catalyzed and this is a warrantee for better mechanical properties, thermal and dimensional stability and longer life.



APPLICATIONS

table 1

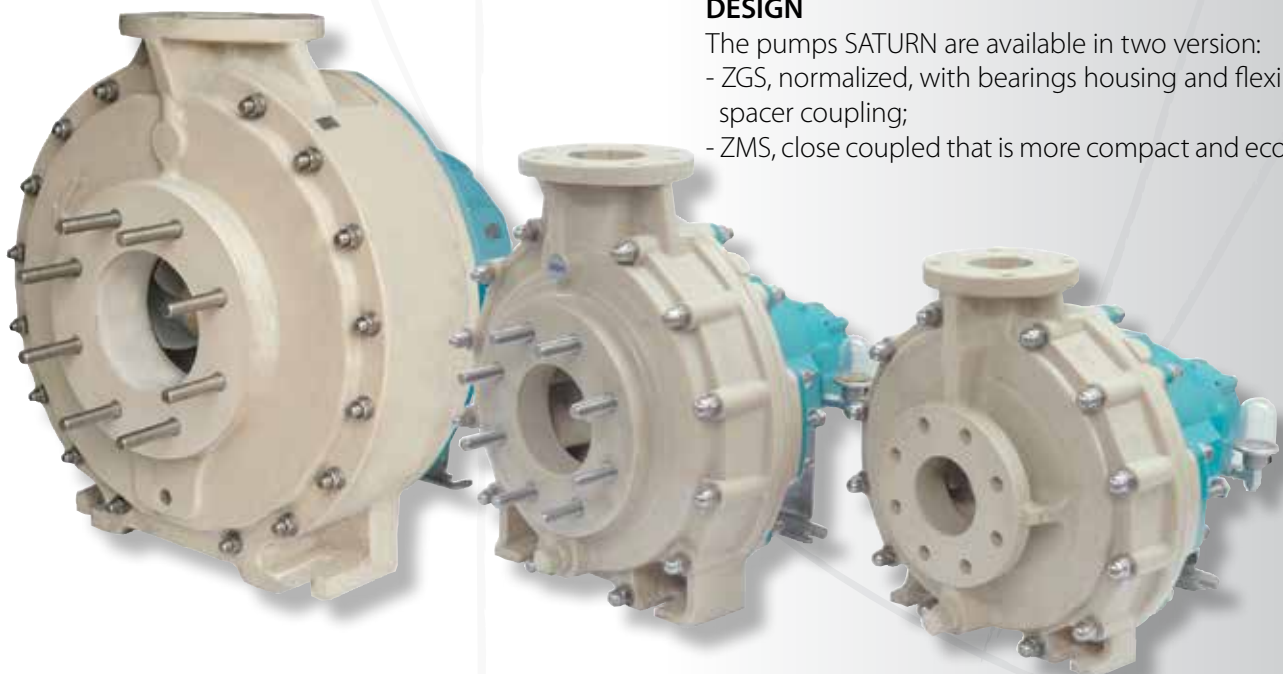
FIBERGLASS RESIN	APPLICATIONS
V1G standard vinyl ester resin compound	General purpose
V1A vinyl ester resin compound	Abrasive liquids
V1C vinyl ester resin compound	Bleaches applications
V1F vinyl ester resin compound	Fluoridric applications

MARKET	APPLICATIONS
Aquariums/Zoos	Salt water
Chemical Process	Acids
	Chemical waste
	Waste water
Desalination	Filtration
	Seawater In-take
	Chemical Transfer
	Concentrated Brine
Electric Utilities	Coal pile run-off
Electronics	Acids
	Chemical waste
	Chromic acids
Metal Finishing	Pickling acids
	Plating solutions
	Acids
Petrochemical	Chemical waste
Pharmaceutical	Organic Solvents
Pulp and Paper	Bleach
Mining	Abrasives and Corrosives
Scrubbers/Odor Control	Acids and Caustics

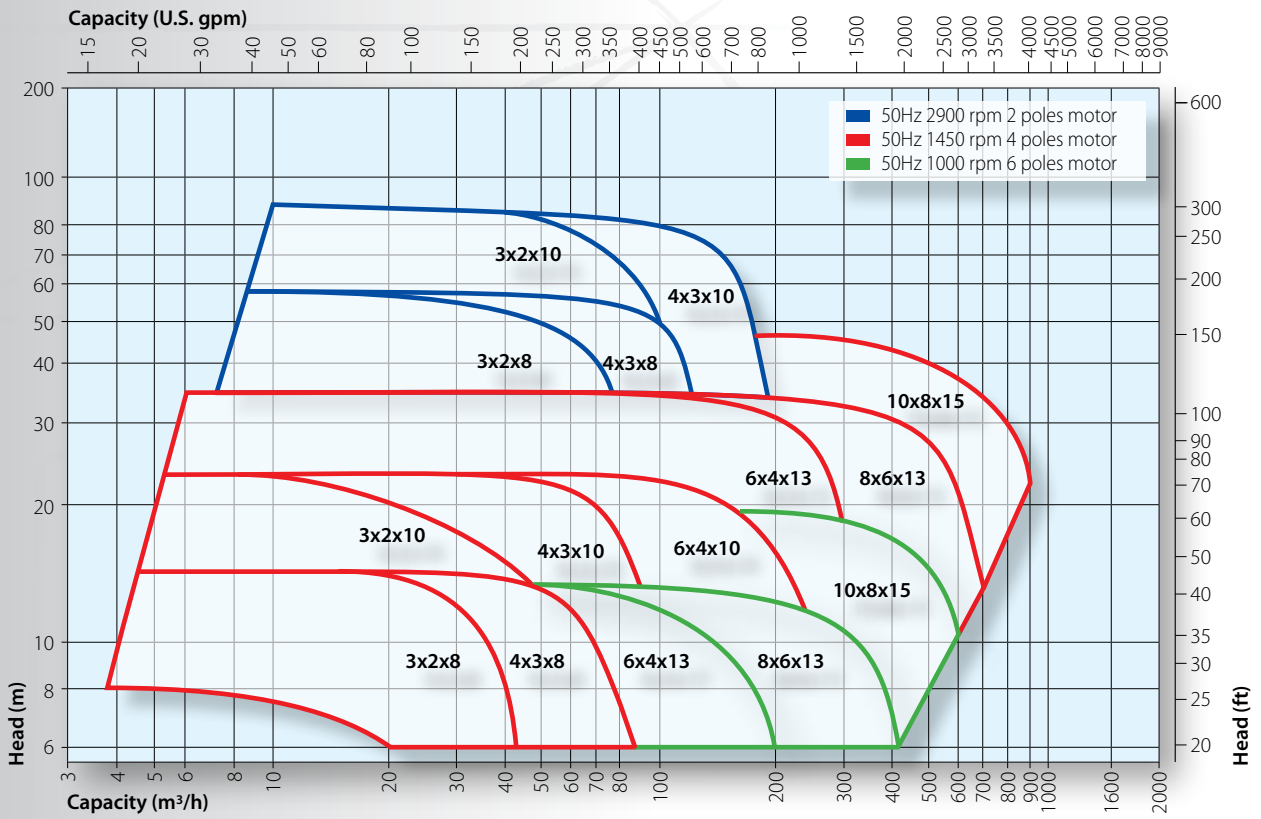
DESIGN

The pumps SATURN are available in two version:

- ZGS, normalized, with bearings housing and flexible spacer coupling;
- ZMS, close coupled that is more compact and economical.



General Performance Curves 50 Hz



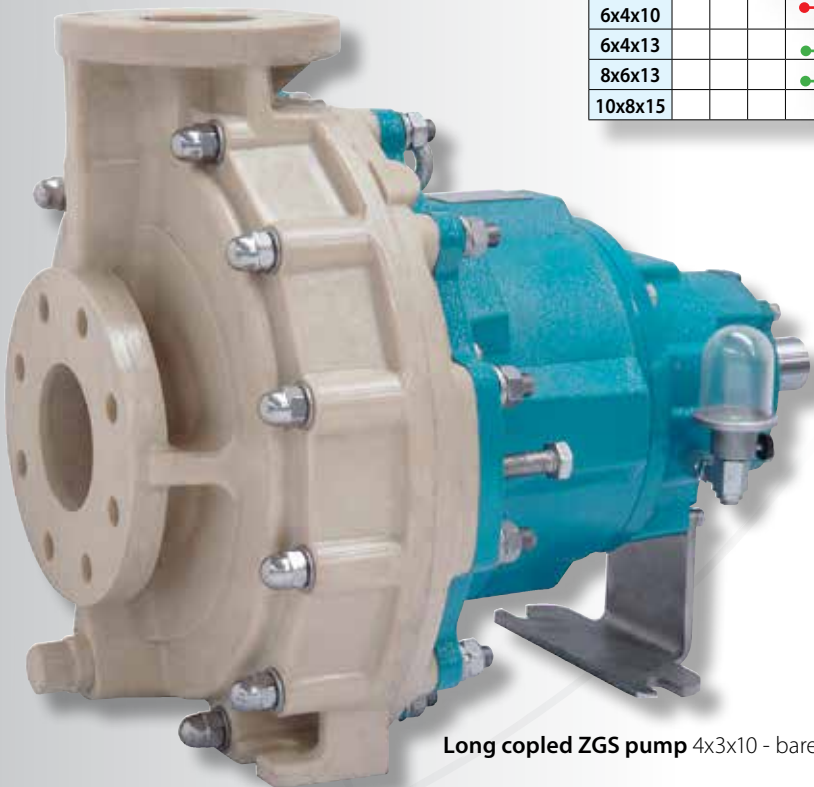
NOTE: All curves are referred to water at 20°C - viscosity 1^eE - specific gravity 1 kg/dm³

MOTOR POWER INSTALLED (50 Hz)

table 2

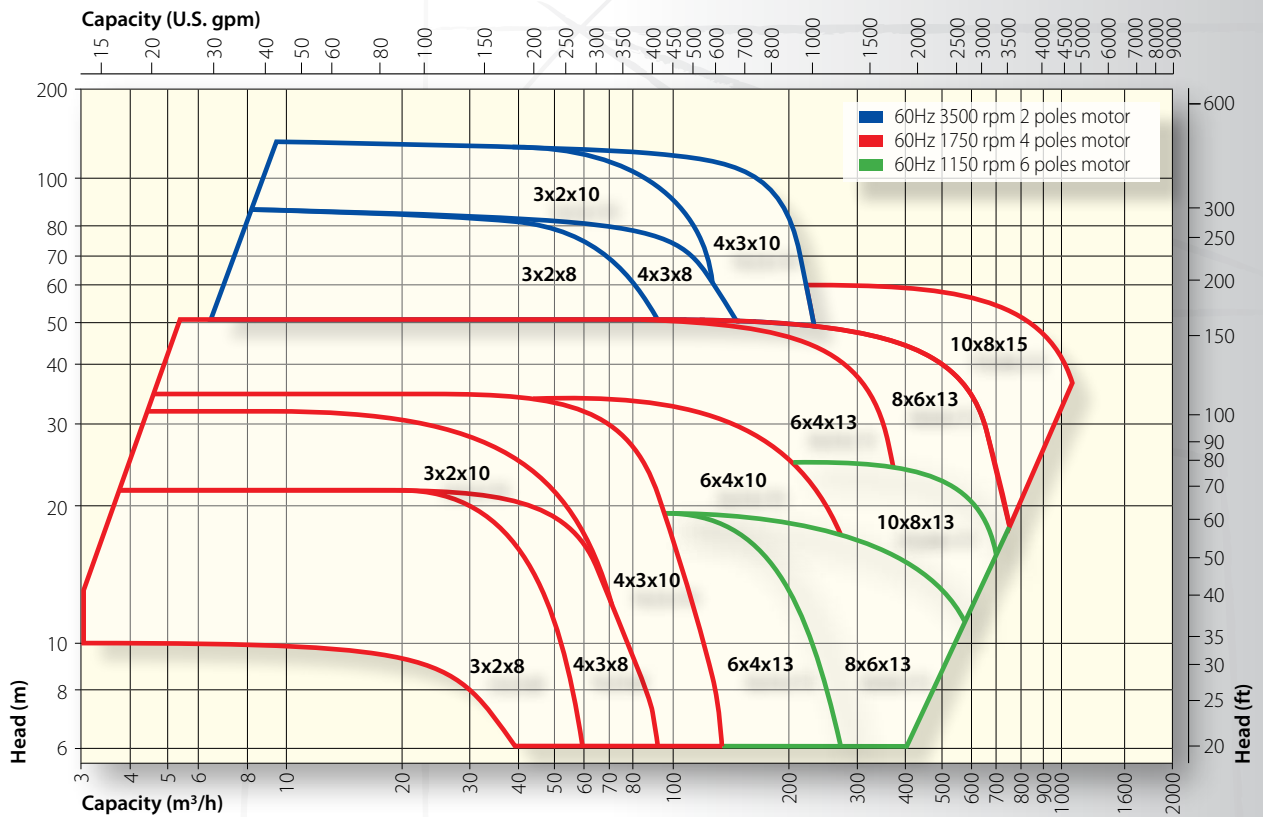
Model	kW																		
	1,5	2,2	3	4	5,5	7,5	11	15	18,5	22	30	37	45	55	75	90	110	132	
3x2x8																			
3x2x10																			
4x3x8																			
4x3x10																			
6x4x10																			
6x4x13																			
8x6x13																			
10x8x15																			

2 poles IEC motors ●●●●
 4 poles IEC motors ●●●●
 6 poles IEC motors ●●●●



Long coupled ZGS pump 4x3x10 - bare shaft

General Performance Curves 60 Hz



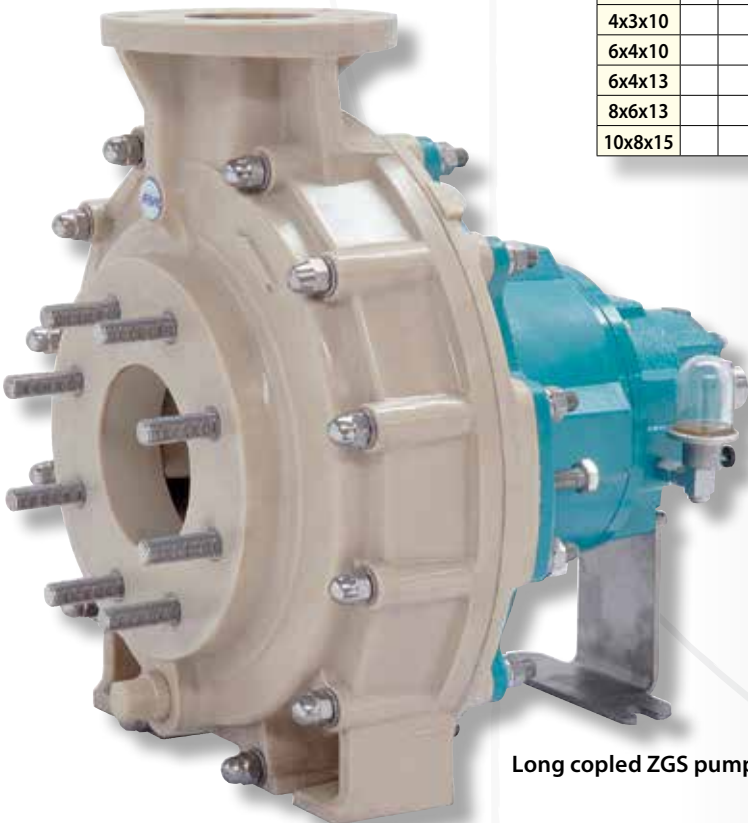
NOTE: All curves are referred to water at 20°C - viscosity 1°E - specific gravity 1 kg/dm³

MOTOR POWER INSTALLED (60 Hz)

table 3

Model	kW																			
	1,5	2,2	3	4	5,5	7,5	11	15	18,5	22	30	37	45	55	75	90	110	132	160	
3x2x8																				
3x2x10																				
4x3x8																				
4x3x10																				
6x4x10																				
6x4x13																				
8x6x13																				
10x8x15																				

2 poles IEC motors (blue dot)
 4 poles IEC motors (red dot)
 6 poles IEC motors (green dot)

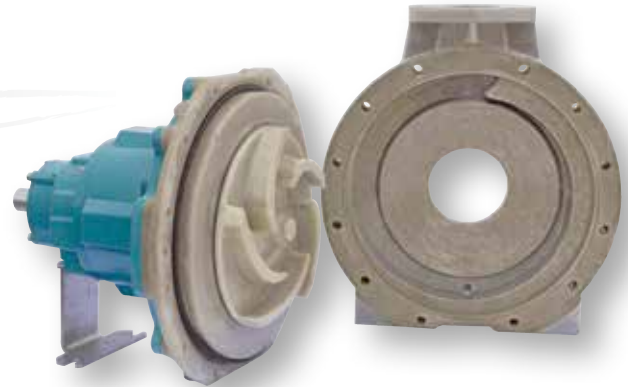
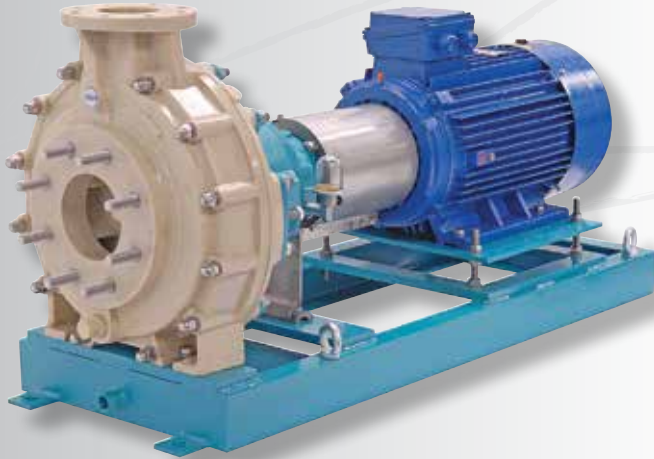


Long coupled ZGS pump 6x4x13 - bare shaft

Saturn ZGS

ZGS. The coupling of the pump to the motor by a flexible joint deliver a longer operative life to the mechanical part of the pump and is the preferred solution for heavy duty application and continuous use.

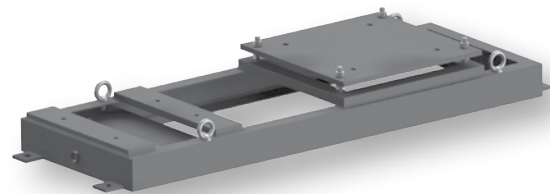
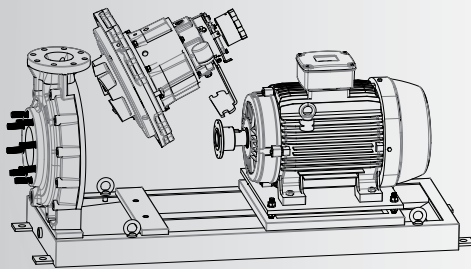
The flexible joint coupling allows maintaining the pump or the motor mounted on a mutual base plate, independently. The back pull-out construction allows to dismantle the support of the pump and some hydraulic parts subjected to periodic inspection without disconnecting the casing from the piping of the plant or removing the electric motor from the base plate.



Long coupled pump ZGS - Pump and electric motor are assembled on a common FRP base plate (optional) and coupled by flexible joint. Guard plate is made of Stainless steel and directly assembled on to the pumps (doesn't need to be anchored to the base plate.)

Detail of the volute casing

Depending from the model the volute casing can be manufactured with a simple volute or with a double volute. In the latter case the final section of the volute is partly divided in two independent section that reduce the radial loads on to the bearings and the transmission shaft.



Back pull-out execution - All the SATURN pumps with elastic coupling are equipped with the back pull out system that allows the dismantling of the internal and mechanic parts of the pump without disconnecting the casing from the fittings and without moving the motor.

Base plate

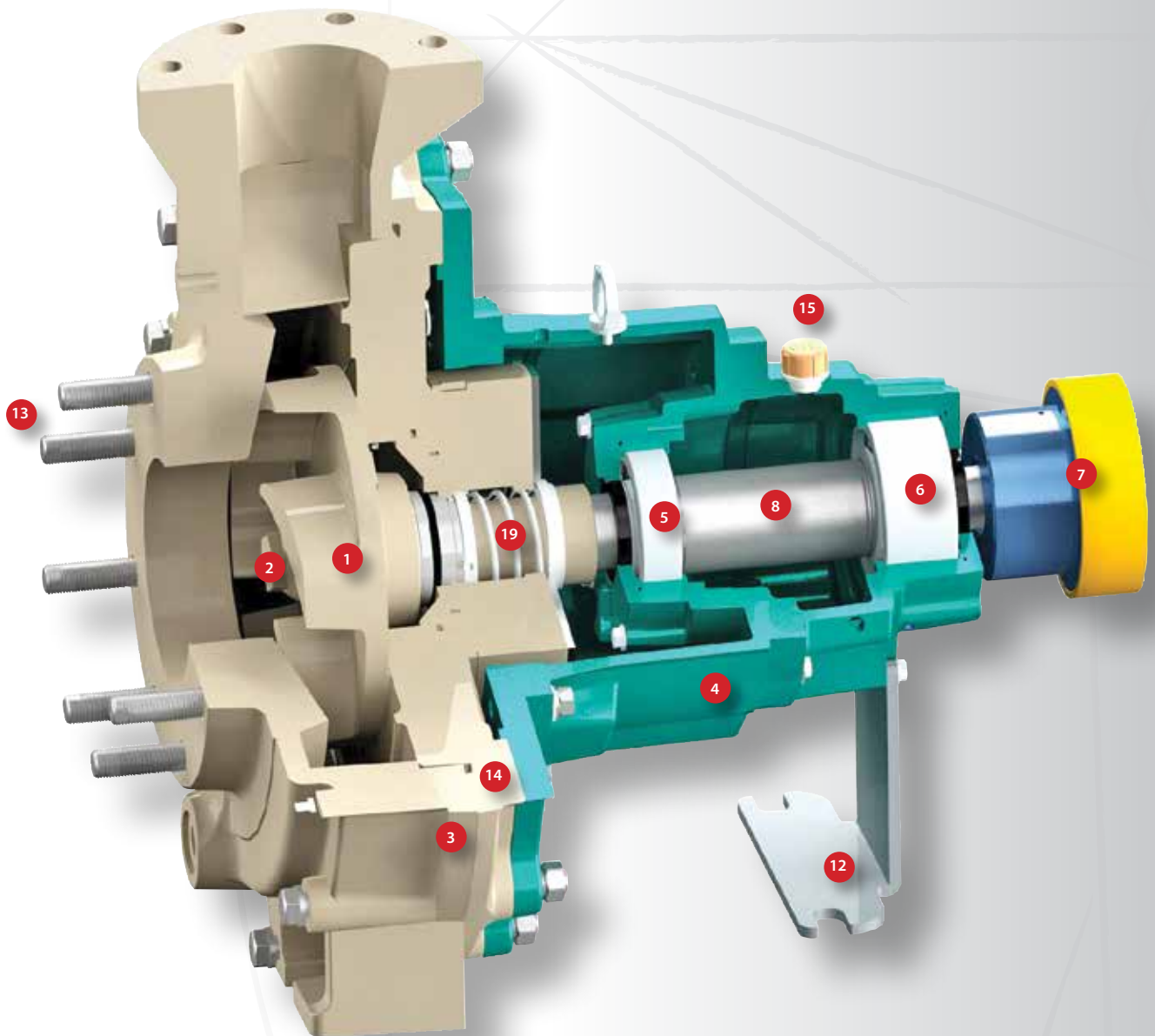
Made of carbon steel profiles, painted with anti corrosion enamel and provided with a system to adjust the position of the motor and ease its alignment with the pump.

PUMP IDENTIFICATION LABEL

table 4

ZGS	4x3x8	V1G	V	TC8	R	E	O	A
SATURN	4" Inlet 3" Outlet 8" impeller ø	Vinyl ester resin for general purpose	V = FKM E = EPDM F = FEP K = FFKM	TC8 ext. single SiC-SiC	Integral	E = IEC U = NEMA	0 = without joint 1 = with joint	ANSI Flange
SERIE	MODEL	VERSION	GASKET MATERIAL	MECHANICAL SEAL	EXTERNAL STRUCTURE	STANDARD MOTOR	COUPLING	CONNECTIONS
ZGS	3x2x8 3x2x10 4x3x8 4x3x10 6x4x10 6x4x13 8x6x13 10x8x15	V1G V1A V1C V1F	V E F K	TR5_ TR8_ TC8_ BF8_ MTR5_ MTR8_ MTC8_	R	E 132 38 ... E 355 95	0 1	A

Saturn ZGS long-coupled pump



1 - Impeller

Centrifugal. Semi open type, with high efficiency vanes is manufactured by RTM injection as single piece with metallic core embedded.

2 - Ogive

It is polyester made part with a stainless steel core embedded in the part when it is injected designed to lock the impeller permanently in its home position. It has a hexagonal shape compatible with a standard wrench.

3 - Volute casing and rear casing

RTM Injection moulded in single piece without joints are extremely resistant.

The areas of the rear casing subjected to localise mechanical stress as flanges and supports are manufactured with peculiar design attentions.

4 - Bearings housing and rear flange

Cast iron parts produced by a mechanised process. The support hosts the bearings' housing and the lubricant oil. The lantern located in intermediate position connects the support to the rear-casing flange.

5 - Bearing pump side

Taper roller bearing to counter axial and radial loads.

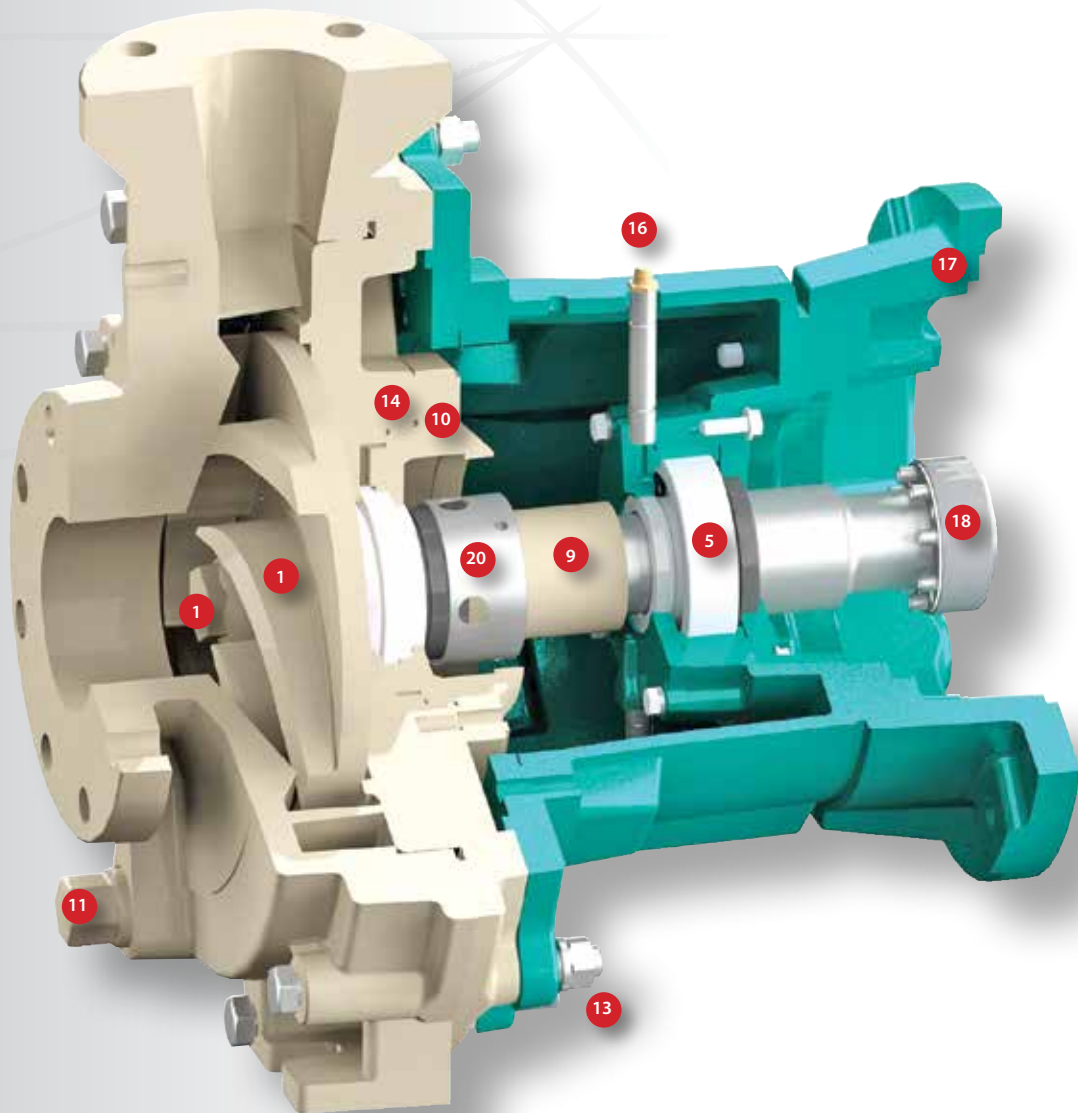
6 - Bearing motor side

Double row ball bearing.

7 - Flexible spacer coupling

Made of cast steel and single piece with crown in plastic polymer: It's complete with removable spacer to allow pulling out the pump for dis assembly purposes.

Saturn ZMS close-coupled pump



8 - Shaft

Is machined from a steel made bar and designed to resist to hydraulic loads and corresponding vibrations. Is totally protected by the shaft sleeve made of FRP.

9 - Shaft Sleeve

Single piece without additional metallic parts.

10 - Diaphragm

Manufactured in FRP, is designed to support the stationary part of the mechanical seal and it is easily replaceable if it fails.

11 - Drain port

Optional.

12 - Support foot

Made of stainless steel plate.

13 - Locking bolts and tie rods

Made of stainless steel.

14 - O-ring gaskets

FKM Standard.

15 - Oil fill plug.

16 - Grease nipple.

17 - Flanged adaptor.

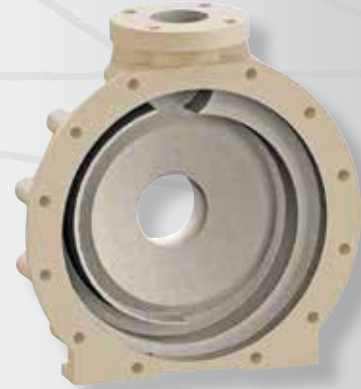
18 - Shrink disc.

19 - BF8 mechanical seal.

20 - TR5 mechanical seal.

Saturn ZMS

ZMS. The close coupled construction, proposed for installed power up to 37 kW has also important functional advantages. The shaft of the pump is supported by a bearing located in the lantern: This bearing counters all the radial load of the shaft and by reducing its overhung section reduces the loads on the bearings of the electric motor contributing to extend their life. This solution is characterized by reduced overall dimensions and allows installing these pumps also in plants dimensioned for different devices.



Detail of the volute casing

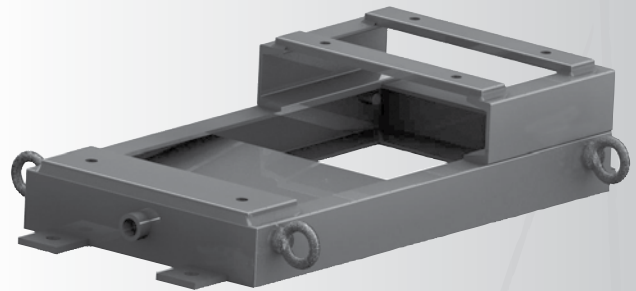
Depending from the model the volute casing can be manufactured with a simple volute or with a double volute. In the latter case the final section of the volute is partly divided in two independent section that reduce the radial loads on to the bearings and the transmission shaft.

Close coupled pump ZMS

Pump and electric motor are assembled directly.

Base plate (optional)

Made of carbon steel profiles, painted with anti corrosion enamel.



PUMP IDENTIFICATION LABEL

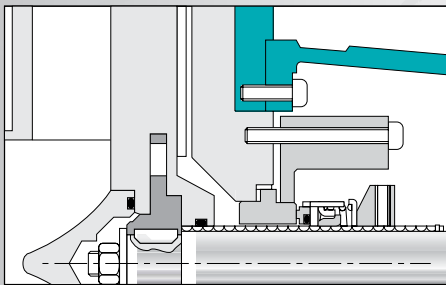
table 5

ZMS	4x3x8	V1G	V	TC8	R	E	T	A	
SATURN	4" Inlet 3" Outlet 8" impeller ø	Vinyl ester resin for general purpose	V = FKM E = EPDM F = FEP K = FFKM	TC8 ext. single SiC-SiC	Integral	E = IEC U = NEMA	T=Shrink disc	ANSI Flange	
SERIE	MODEL	VERSION	GASKET MATERIAL	MECHANICAL SEAL	EXTERNAL STRUCTURE	STANDARD MOTOR	STANDARD MOTOR	COUPLING	CONNECTIONS
ZMS	3x2x8 3x2x10 4x3x8 4x3x10 6x4x10 6x4x13	V1G V1A V1C V1F	V E F K	TR5_ TR8_ TC8_ BF8_ MTR5_ MTR8_ MTC8_	R	E 132 38 ... E 200 55	U 182T 29 ... U 326 TS 48	T	A

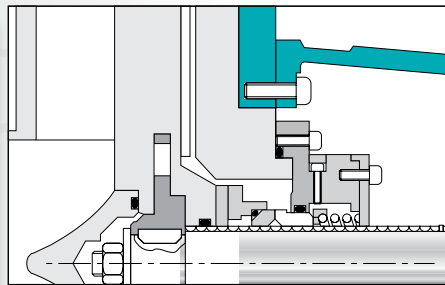
Mechanical Seals

SATURN pumps can be installed with various types of mechanical seals, both those produced by ARGAL and those produced by other leading Manufacturers. These can be classified by type of installation (single internal or external, double flushing) and by the materials used for the sliding parts and the packing. The metal parts are never in contact with the pumped fluid.

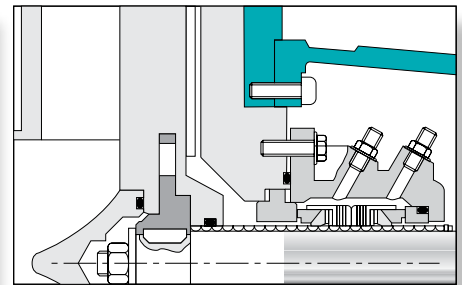
TR5 - TR8 - TC8



BF8



MTR5 - MTR8 - MTC8



APPLICATIONS

table 6

MODEL	TR5 (1)	TR8 (2)	TC8 (3)	BF8 (4)	MTR5 (5)	MTR8 (6)	MTC8 (7)
concentrated fluorine compounds			X	X			
clear chemical	X	X					
volatile liquids					X	X	X
abrasive liquids		X	X	X		X	X
precipitation risk solutions				*	X	X	X
liquids with solids				X		X	X
max. %	1-3	1-3	1-3	1-5	1-3	1-3	1-3
max. dimension (mm)	0,1-0,6	0,1-0,6	0,1-0,6	1-2	0,1-0,6	0,1-0,6	0,1-0,6
max. hardness (Mohs)	1-3	3-6	3-6	3-6	1-2	3-6	3-6
WORKING CONDITIONS	standard	extreme			critical	heavy	

* Only with external flushing

Note 1:

- TR5-1 Argal
- TR5-2 Crane 8-1T
- TR5-3 Flowserve RA-C

Nota 2:

- TR8-1 Argal
- TR8-2 Crane 8-1T
- TR8-3 Flowserve RA-C

Note 3:

- TC8-1 Argal
- TC8-2 Crane 8-1T

Note 4:

- BF8-1 Argal
- BF8-2 Flowserve Allpac 481

Note 5:

- MTR5-1 Argal
- MTR5-2 Crane 8-1T/8-1T

Note 6:

- MTR8-1 Argal
- MTR8-2 Crane 8-1T/8-1T
- MTR8-3 Flowserve CRO

Note 7:

- MTC8-1 Argal
- MTC8-2 Crane 8-1T/8-1T

MATERIALS

table 7

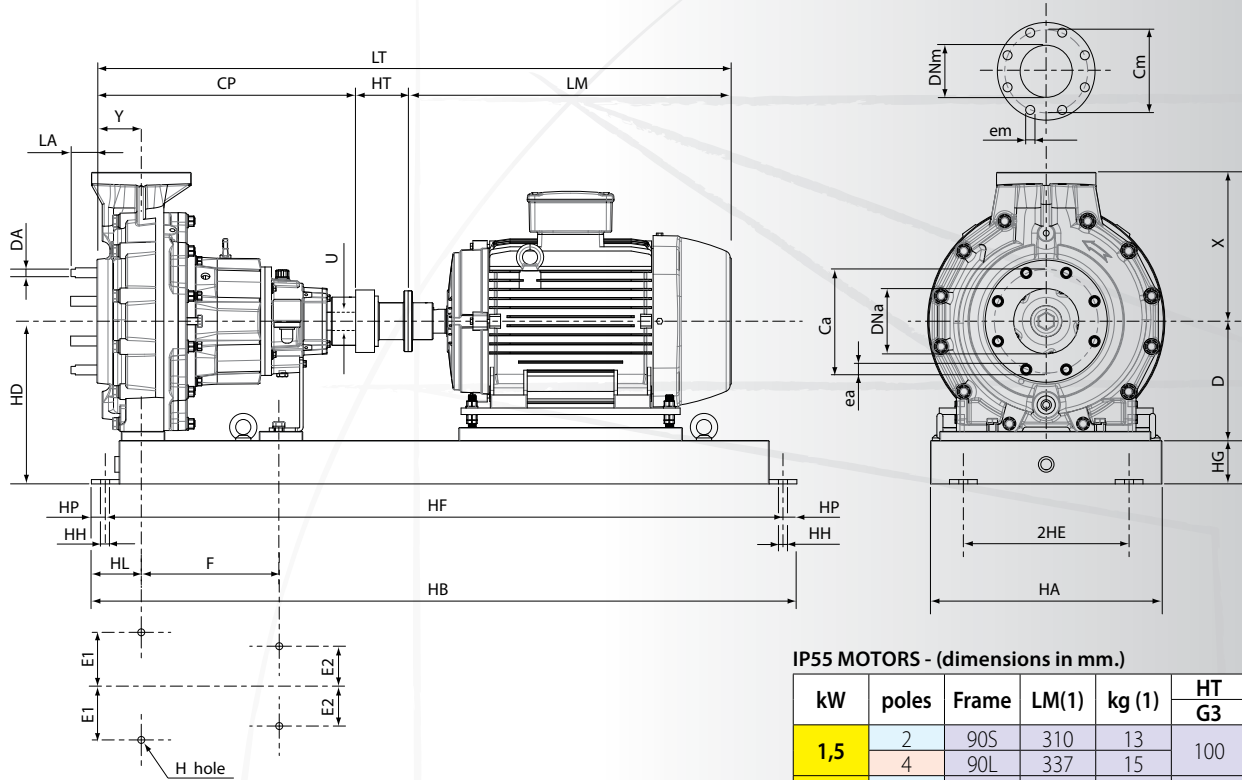
MODEL	TR5 (1)	TR8 (2)	TC8 (3)	BF8 (4)	MTR5 (5)	MTR8 (6)	MTC8 (7)	
Construction	external single			internal single	double flushed			
Part	rotating	Car	SiC	SiC	SiC	Car	SiC	SiC
	fixed	Al ₂ O ₃	SiC	SiC	SiC	Al ₂ O ₃	SiC	SiC
Gasket		FKM*	FKM*	FFKM	FKM*	FKM*	FFKM	
Part	2° rotating	-	-	-	Car	Car	Car	
	2° fixed	-	-	-	Al ₂ O ₃	Al ₂ O ₃	Al ₂ O ₃	

* Available also in EPDM

SEAL FLUSHING ARRANGEMENTS

All mechanical seals require flushing to lubricate the seal faces and maintain normal operating temperatures. Seals are normally flushed with either a clean external fluid or by the liquid being pumped.

Saturn ZGS long-coupled pumps



ANSI/ASME B73.1 PUMPS - (dimensions in mm.)

table 8

MODEL	CP	Y	D	X	F	E1	E2	H	U	LA	DA	(kg)
3 x 2 x 8	597	102	210	242	318	124	92	16	41,3	n.a.	n.a.	95
3 x 2 x 10	597	102	210	242	318	124	92	16	41,3	n.a.	n.a.	95
4 x 3 x 8	597	102	210	280	318	124	92	16	41,3	n.a.	n.a.	100
4 x 3 x 10	597	102	210	280	318	124	92	16	41,3	n.a.	n.a.	100
6 x 4 x 10	597	102	254	343	318	124	92	16	41,3	60	20	120
6 x 4 x 13	597	102	254	343	318	124	92	16	41,3	60	20	120
8 x 6 x 13	860	152	368	406	476	203	114,5	22	60,3	60	20	240
10 x 8 x 15	860	152	368	483	476	203	114,5	22	60,3	60	20	280

CONNECTIONS - ANSI/ASME B16.5 class 150 - (dimensions in mm.)

table 9

MODEL	INLET					OUTLET				
	DNa	Ca	ea	n°	type	DNm	Cm	em	n°	type
3 x 2 x 8	80	152	19	4	hole	50	121	19	4	hole
3 x 2 x 10	80	152	19	4	hole	50	121	19	4	hole
4 x 3 x 8	100	191	19	8	hole	80	152	19	4	hole
4 x 3 x 10	100	191	19	8	hole	80	152	19	4	hole
6 x 4 x 10	150	241	20	8	tie rod	100	191	19	8	hole
6 x 4 x 13	150	241	20	8	tie rod	100	191	19	8	hole
8 x 6 x 13	200	298	20	8	tie rod	150	241	22	8	hole
10 x 8 x 15	250	362	20	12	tie rod	200	298	22	8	hole

ISO flanged on request

BASE PLATE - (dimensions in mm.)

table 10

N°	HA	HB	HE	HF	HG	HH	HL	HP	(kg)
245	381	1143	114	1080	95	19	114	32	50
252	457	1321	152	1257	105	19	114	32	65
258	533	1473	191	1410	121	25	114	32	85
264	533	1626	191	1562	121	25	114	32	95
268	660	1727	241	1664	121	25	114	32	110
280	660	2032	241	1969	121	25	114	32	125
368	660	1727	241	1664	121	25	165	32	140
380	660	2032	241	1969	121	25	165	32	150
398	660	2489	241	2426	121	25	165	32	190

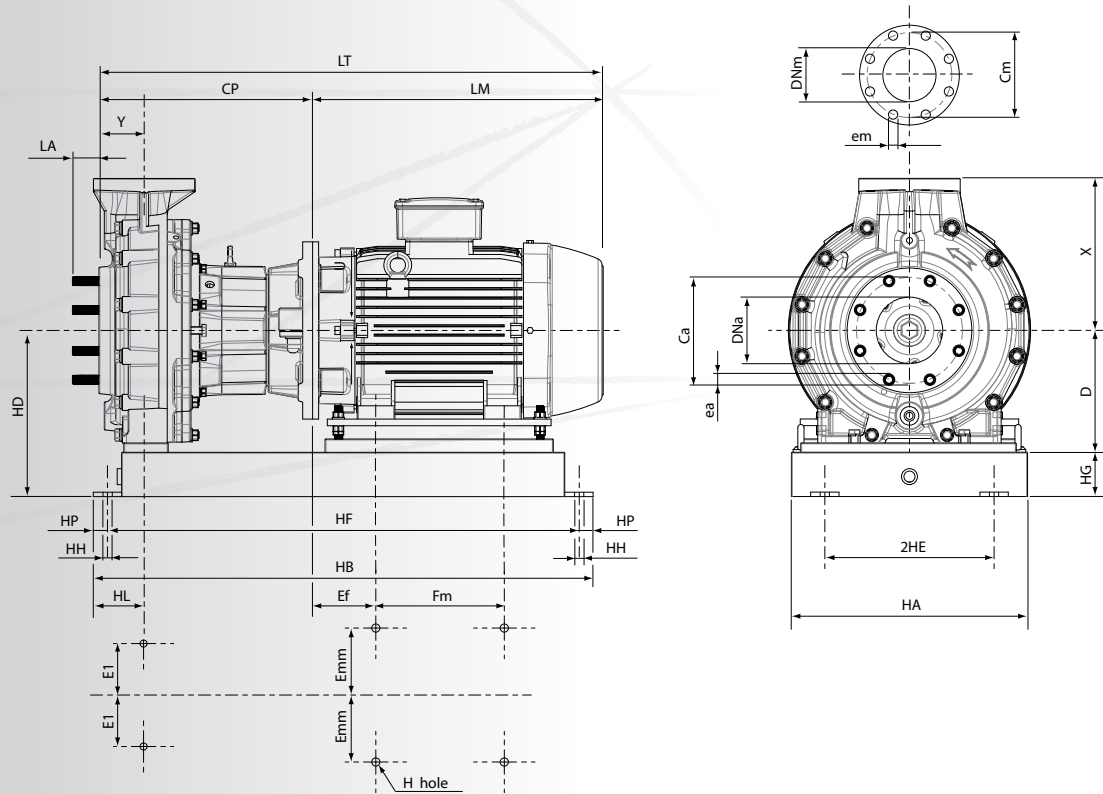
IP55 MOTORS - (dimensions in mm.)

table 11

kW	poles	Frame	LM(1)	kg (1)	HT	HT
					G3	G4
1,5	2	90S	310	13	100	
	4	90L	337	15		
2,2	2	90L	337	16	100	
	4			22		
3	2	100L	368	23	100	
	4			27		
4	2	112	395	27	100	
	4			32		
5,5	2	132S	437	42	100	
	4			43		
7,5	2	132S	437	46	100	
	4	132M	475	53		
11	2	160M	655	122	100	120
	4			134		
15	2	160L	675	121	100	120
	4			133		
18,5	2	160L	675	169	100	120
	4	180L	768	173		
22	2	160L	675	163	100	120
	4	180M	720	196		
30	2	200LA	760	221	120	140
	4	180M	720	190		
37	2	180L	768	242	100	120
	4	200LB	760	236		
45	2	200L	760	252	120	140
	4			275		
55	2	225M	850	301	100	140
	4			275		
75	2	200L	760	275	120	140
	4			301		
90	2	225S	825	328	120	140
	4			370		
110	2	250M	925	315	120	140
	4			355		
132	2	280S	975	478	120	140
	4			417		
160	2	250M	925	402	120	140
	4			615		
180	2	280M	1015	615	120	140
	4			512		
200	2	280S	975	540	140	180
	4			790		
225	2	315S	1190	790	140	180
	4			615		
250	2	280M	1015	615	120	140
	4			880		
280	2	315M	1300	880	140	180
	4			870		
315	2	315LA	1300	997	140	180
	4			990		
350	2	315M	1300	990	140	180
	4			1103		
390	2	315LA	1270	1053	140	180
	4			1400		

(1) It can change for various manufacturers

Saturn ZMS close-coupled pumps



ANSI/ASME B73.1 PUMPS - (dimensions in mm.)

table 12

MODEL	CP	Y	D	X	E1	H	U	LA	Weight (kg)
3 x 2 x 8	597	102	210	242	124	16	41,3	n.a.	95
3 x 2 x 10	597	102	210	242	124	16	41,3	n.a.	95
4 x 3 x 8	597	102	210	280	124	16	41,3	n.a.	100
4 x 3 x 10	597	102	210	280	124	16	41,3	n.a.	100
6 x 4 x 10	597	102	254	343	124	16	41,3	60	120
6 x 4 x 13	597	102	254	343	124	16	41,3	60	120

CONNECTIONS - ANSI/ASME B16.5 class 150 - (dimensions in mm.)

table 13

MODEL	INLET					OUTLET					
	DNa	Ca	ea	n°	type	DNm	Cm	em	n°	type	
3 x 2 x 8	80	152	19	4	hole	50	121	19	4	hole	
3 x 2 x 10	80	152	19	4	hole	50	121	19	4	hole	
4 x 3 x 8	100	191	19	8	hole	80	152	19	4	hole	
4 x 3 x 10	100	191	19	8	hole	80	152	19	4	hole	
6 x 4 x 10	150	241	20	8	tie rod	100	191	19	8	hole	
6 x 4 x 13	150	241	20	8	tie rod	100	191	19	8	hole	

BASE PLATE - (dimensions in mm.)

table 14

N°	HA	HB	HE	HF	HG	HH	HL	HP	Weight (kg)
233	381	838	114	774	95	19	114	32	30
244	381	1143	114	1080	95	19	114	32	40

IP55 MOTORS - (dimensions in mm.)

table 15

kW	1,5		2,2		3		4		5,5		7,5		11		15		18,5		22		30		37					
Poles	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2	4	2					
FRAME	90S	90L	90L	100L	112	132S	132S	132M	160M	160M	160L	160M	160L	180L	160L	180M	200LA	180M	180L	220LA	200LB	200L	200LB					
LM (°)	260	285	285	326	335	356	356	396	500	500	545	500	545	610	545	570	650	570	610	650	650	650	650					
Weight kg(!)	12	15	16	22	23	27	27	32	42	43	46	53	103	122	134	121	133	169	173	163	196	221	190	242	236	226	240	245

(1) It can change for various manufacturers



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