

APOL



IT CAN
RUN DRY
("R" vers.)

ROUTE

PUMPS FOR CHEMICALS

"TMR" sealless - "ZMR" sealed

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ARGAL, adjusting itself to the mutable and continuous demands of the market, has prepared the new series of pumps called **ROUTE**; **“TMR”** for magnetic driven pumps, where new solutions have been introduced and **“ZMR”** for traditional version with mechanical seal.

In the new innovations for the magnetic driven pumps we have reduced the friction in the highest degree controlling the impeller movements through magnetic fields. This solution has been named: “two axial directions self-alignment system”.

The traditional method to put axially the impeller through mouth rings, which is present also in our actual AM range, was already improved by some of our competitors, with the reduction of the contact, in the back side, to only one point (like in the pivots of the first clocks mechanisms in the XVII century).

This solution reduces the back attrition and consequently the heat development, which is mainly present in case of dry running conditions. The result is a better reliability.

The purpose of ARGAL has been to extend this new safety to the top, eliminating the frontal frictions (both front and back) keeping only the radial attrition of rotation. This has been possible thanks to an innovative use of the magnetic fields, sprung from researches of our R&D department and now object of **patent**. The new system moves the impeller in a central neutral position, without axial contacts, in presence of anomalies in the principal hydraulic flow. The tolerance of the dry running of the pump is therefore guaranteed!

In the structure of **ROUTE“TMR”** the rotating parts have been designed to be lighter as much as possible, assuring always mechanical resistance and required value of the maximum torque of the magnetic coupling.

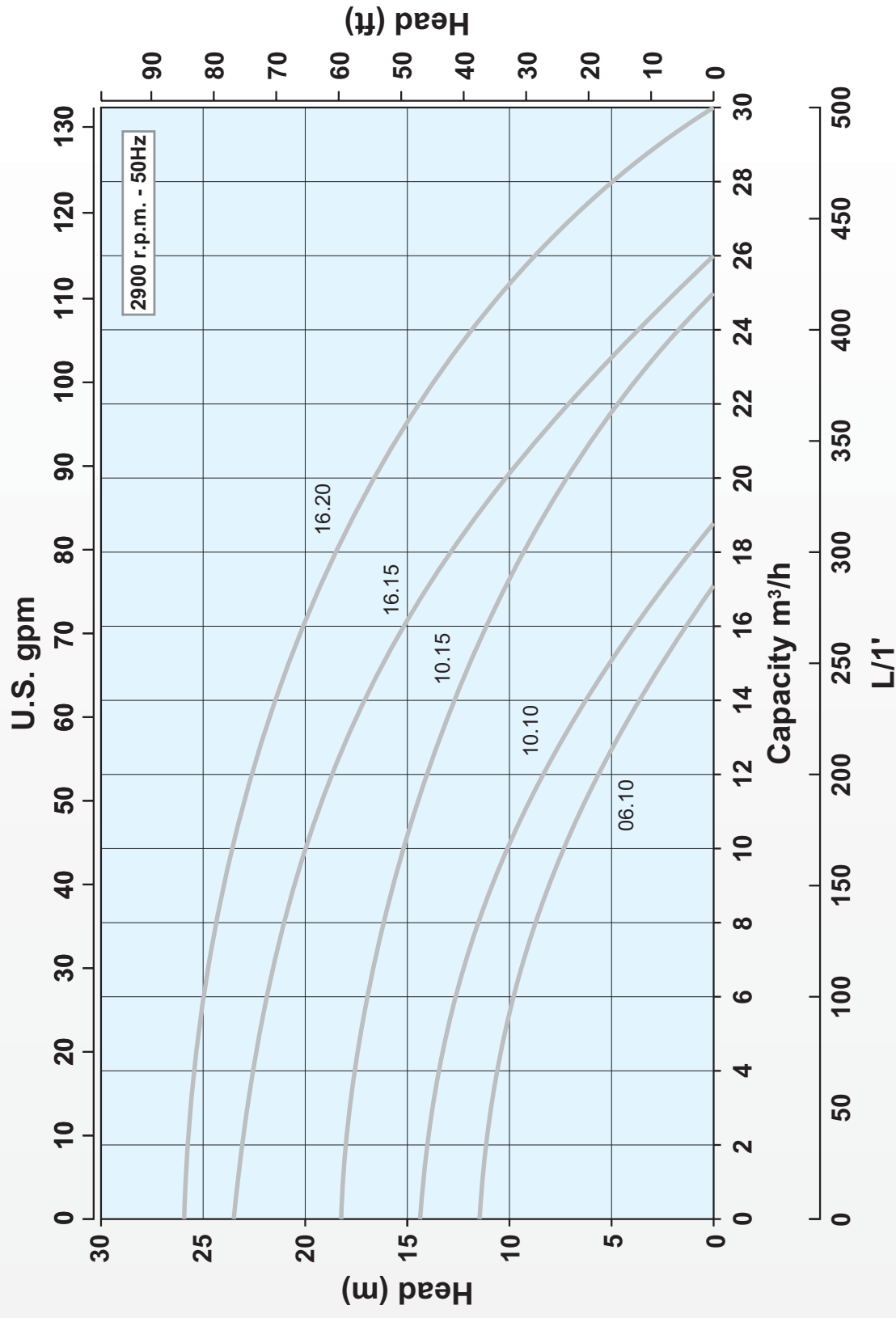
THE PRINCIPLE OF TWO AXIAL DIRECTIONS SELF-ALIGNMENT

In order to define a neutral position, without frictions, we have introduced an extra magnetic field and two work-areas (one anterior and the other one posterior) where the impeller can liberally choose to work referring to hydrodynamic loads which are determined by duty point (flow/head) on the performance curve. Two rings which are limiting device of axial excursion fix the work-space engaged by the impeller during the standard operation. In case of anomalies due to pressure loss in the dry running, the extra magnetic field (always active) contrasting the axial pushes, call back the impeller in the neutral position. This distinctive automatism precisely prevents the contact with the rings (limiting devices) and consequently avoids frictions and heat increase.

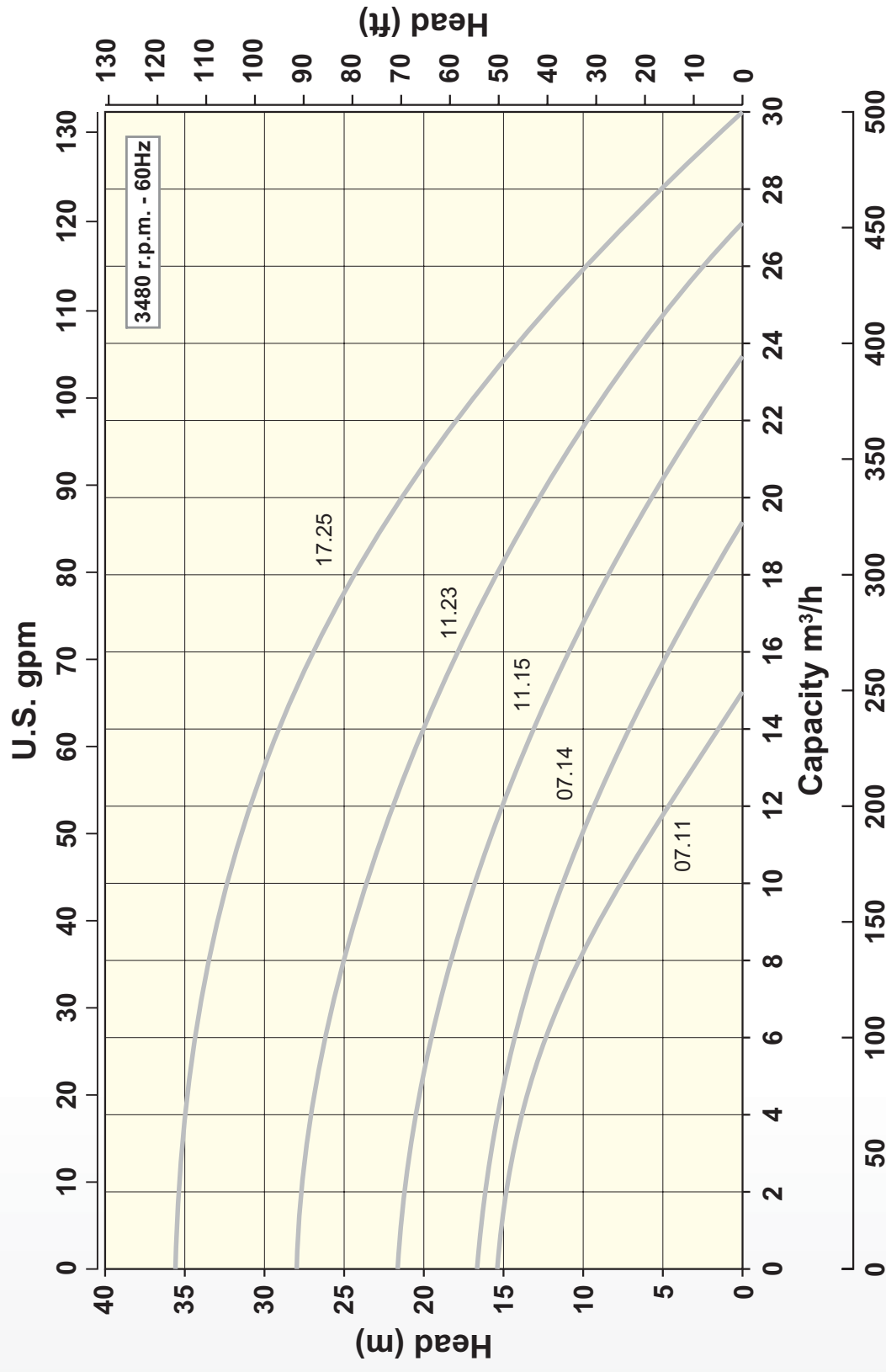
The shape of the magnets and the orientation of the fields are the key that shows the desired action.



GENERAL PERFORMANCE CURVES 50HZ

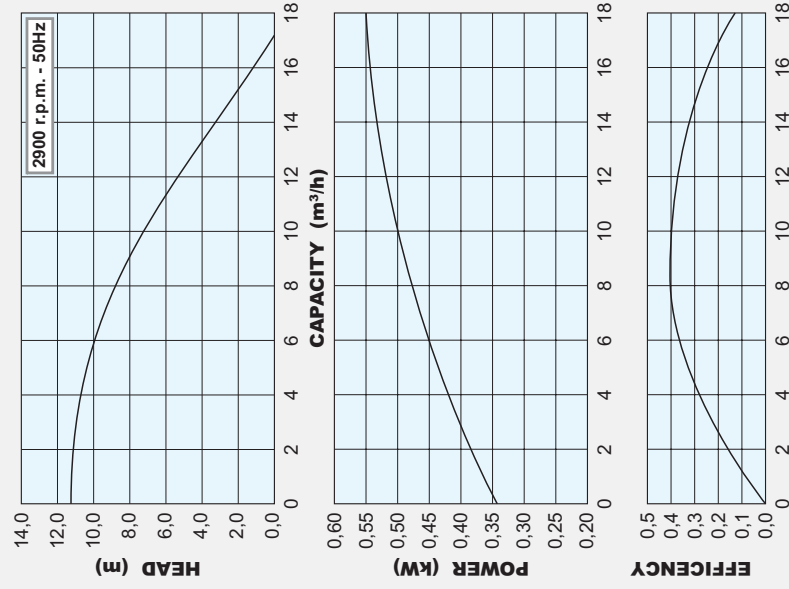


GENERAL PERFORMANCE CURVES 60HZ

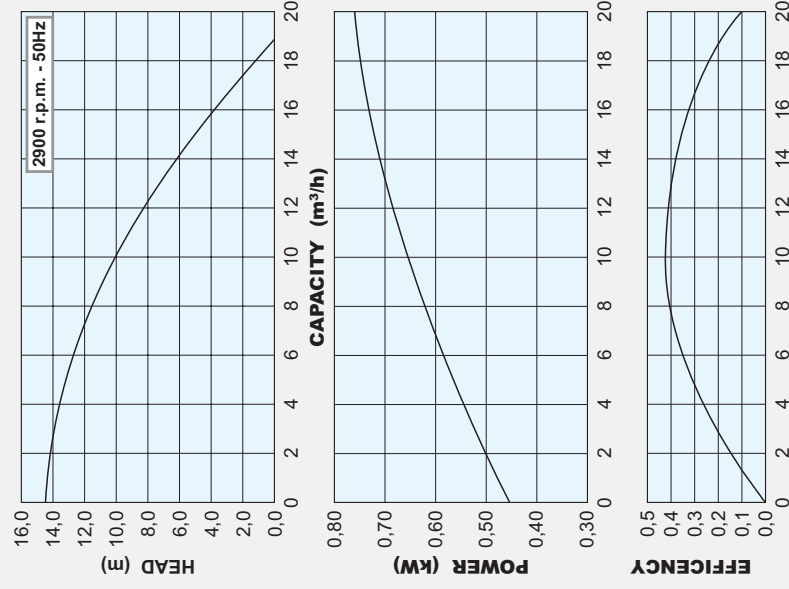


PERFORMANCE CURVES 50HZ

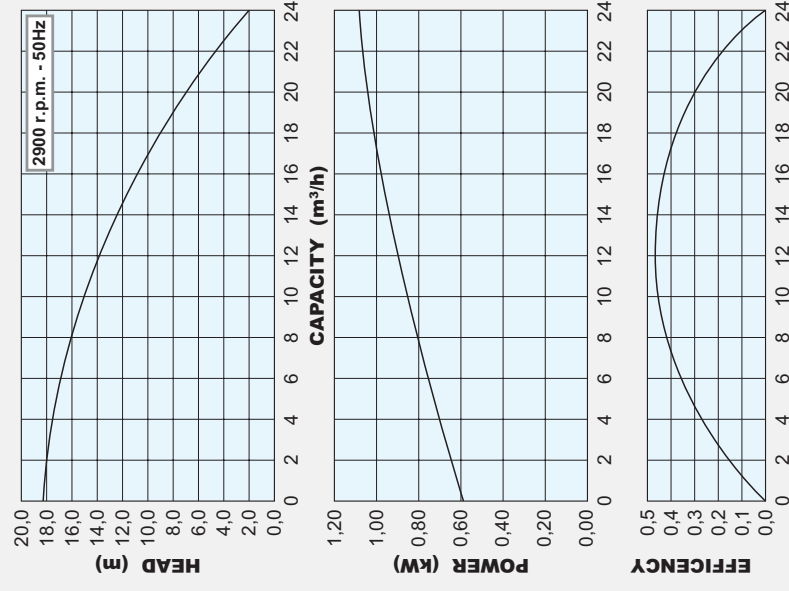
06.10



10.10

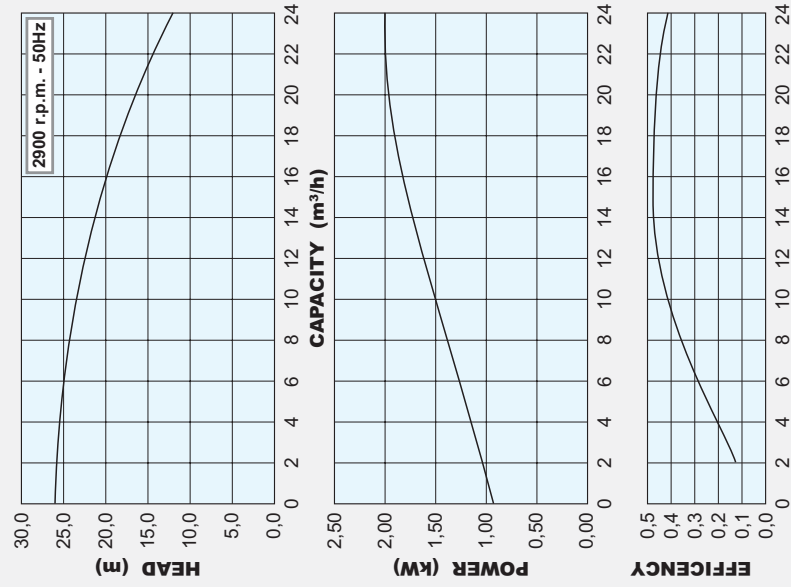


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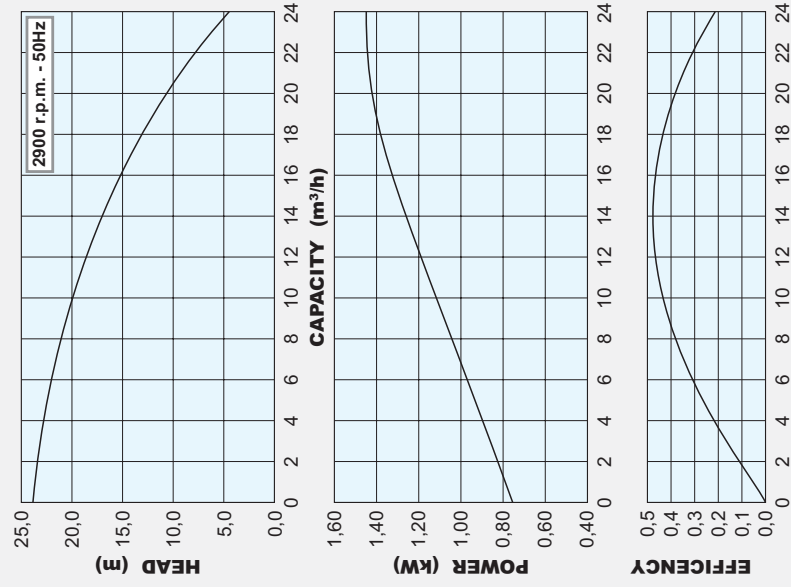


PERFORMANCE CURVES 50HZ

16.20

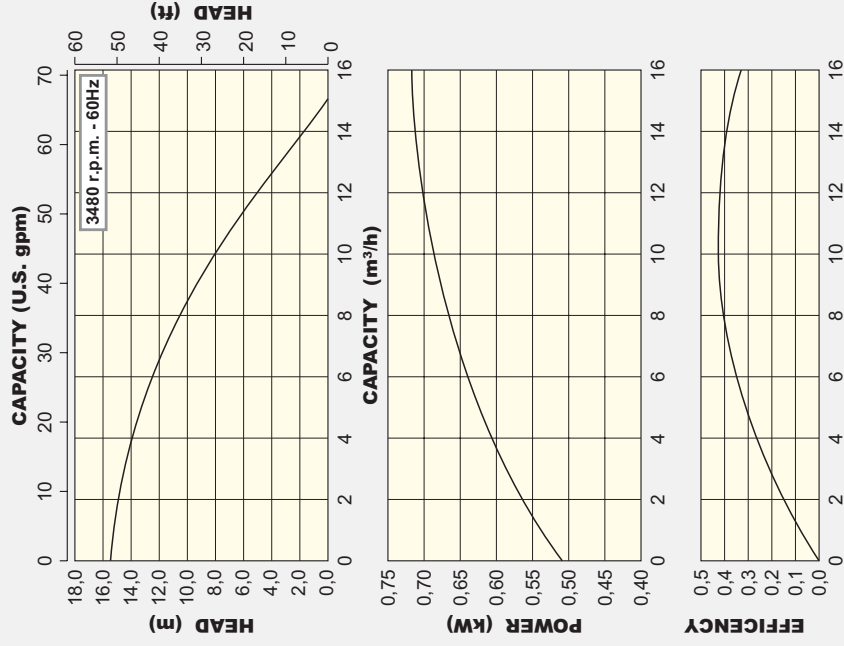


16.15

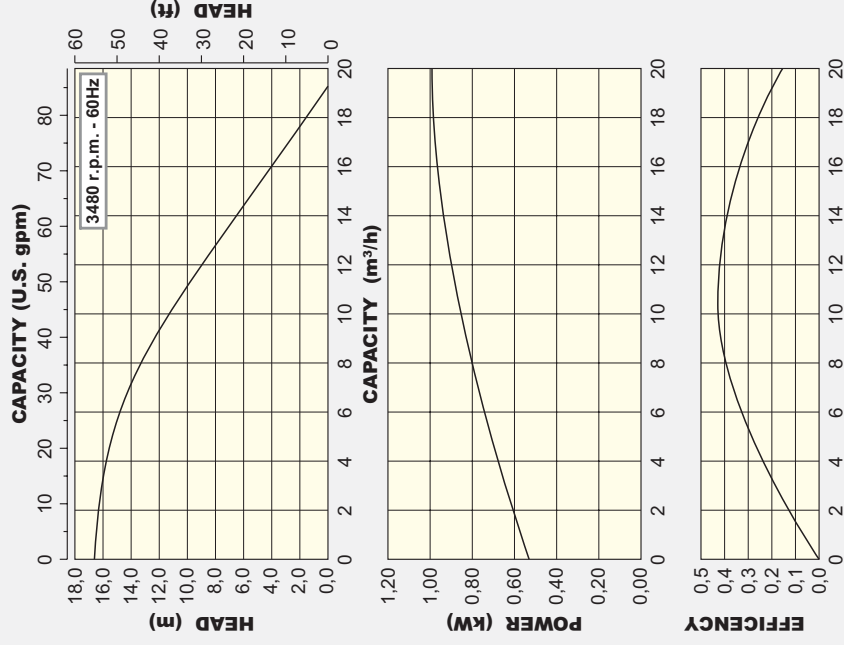


PERFORMANCE CURVES 60HZ

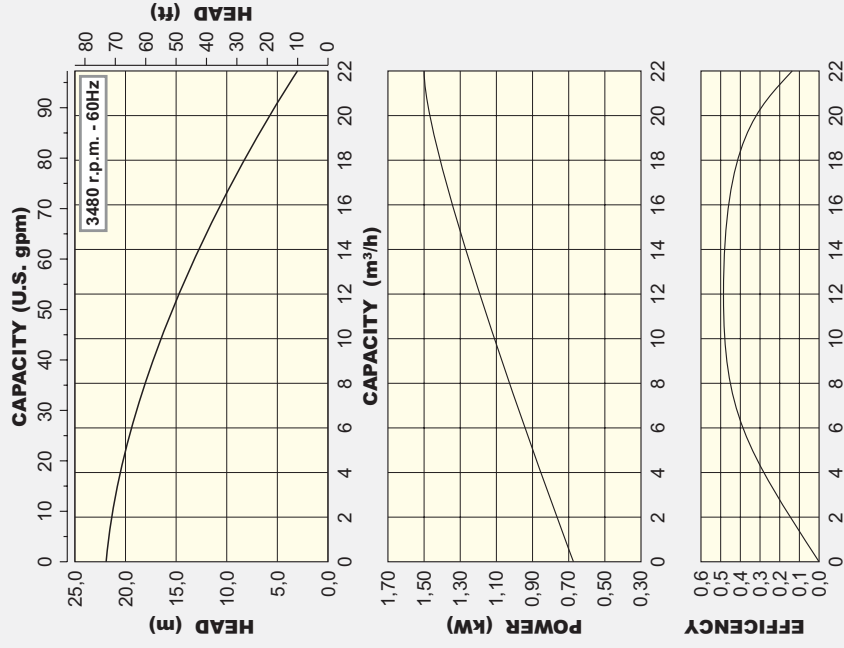
07.11



07.14

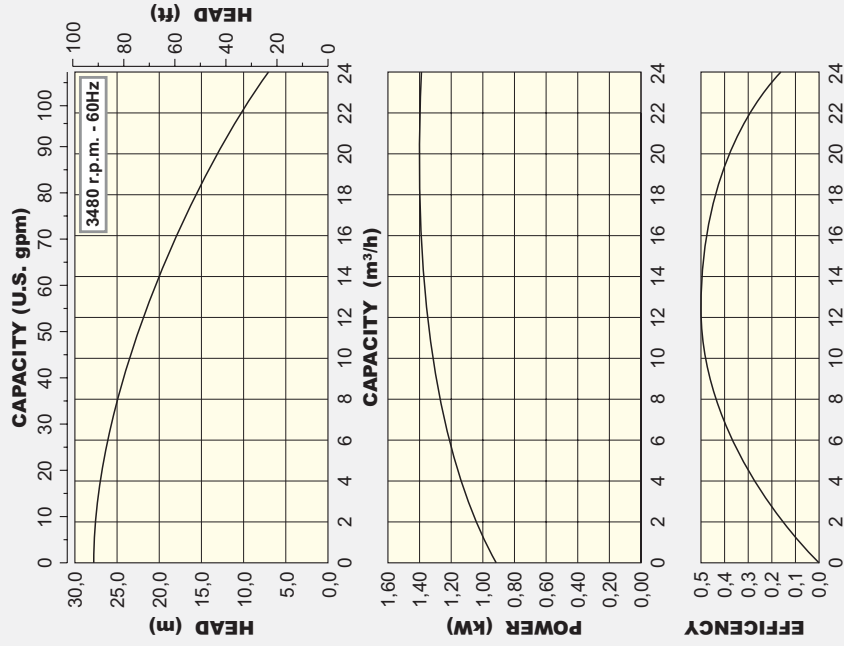


11.15

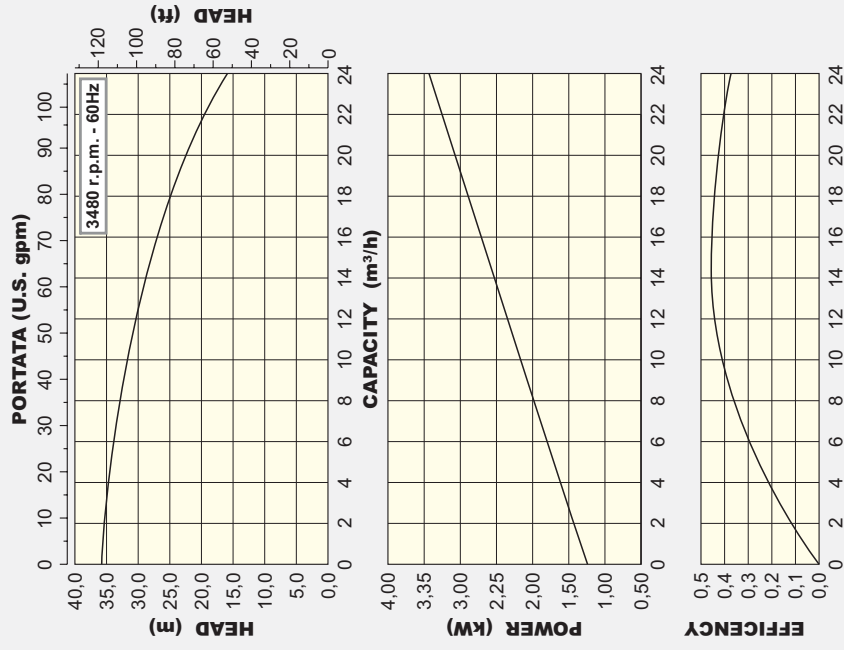


PERFORMANCE CURVES 60HZ

11.23



17.25



MAIN FEATURES OF SEALLESS EXECUTION “TMR”

• HERMETIC PUMPS

The magnetic driven pumps are defined “hermetic” because of the exclusion of any rotating component of seal. The only necessity of seal between the volute casing and the back casing is guaranteed from a static gasket: O-ring type.

• FOR ALL THE CHEMICALS

You can practically pump all the chemicals at low and medium temperatures with all the bodies in GFR-PP (glass fibre reinforced polypropylene) or CFF-E-CTFE (Ethylene- Chloro TrifluoroEthylene carbon fibres filled).

• WITH SOLIDS, LIGHTLY ABRASIVE

The different internal configurations of the materials allow to pump both clean fluids and mediums with solids in suspensions or moderately abrasive

• OR HEAVY

Strong magnetic coupling made up of rare-earth materials (Neodimium Iron Boron) and standard, powered or strong-powered versions allow to pump, also at maximum flow, liquids with 1.05 -1.35 - 1.8 specific gravity respectively.

• DRY RUNNING OPERATION

The dry running for all the models with guide bushings in Carbon HD is guaranteed without damages thanks to the “two axial directions self-alignment” system.

• CENTRIFUGAL IMPELLER PROPERLY BALANCED

Thanks to particular hydraulic and structural changes, the impeller is effectively balanced in order to reduce the assistance for maintenance.

• APPLICATION OF INDEPENDENT MOTOR

The motor can be installed and removed easily without dismantling or opening the volute casing. Standard motors are IEC or NEMA.

• POSSIBLE ROTATION OF VOLUTE CASING

Various shifts of the volute casing can be obtained thanks to rotation. These make easier the joint of the outlet connection of the pump with the tube of the plant.

• VARIOUS TYPOLOGIES OF CONNECTIONS

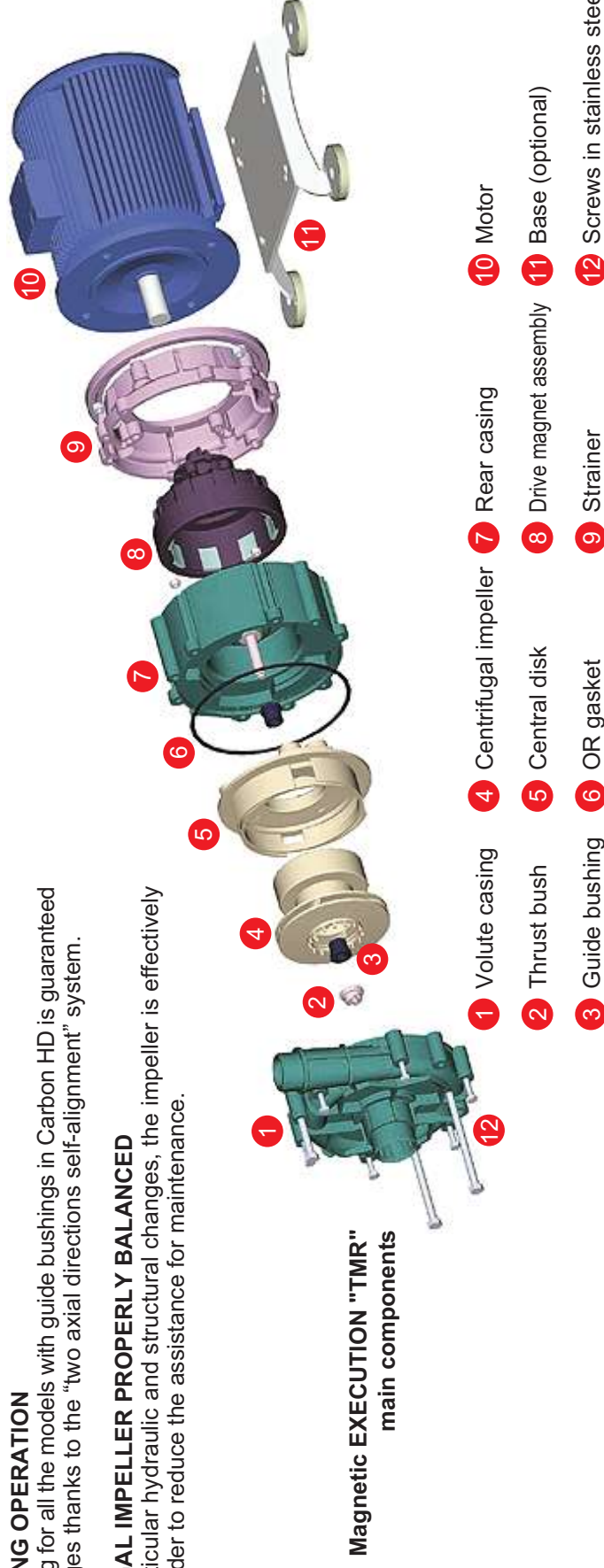
Connections with BSP cylindrical thread or NPT; flanges ISO, ANSI, JIS.

• DRAIN OF THE VOLUTE CASING

There is connection for emptying volute casing from the liquid.

• AVAILABILITY OF THE BASE

The base for anchorage of the pump is in stainless steel with ground terminals in chemical-resistant thermoplastic materials. It is supplied on request.



PRODUCTION PROGRAM

MAIN FEATURES OF SEALED EXECUTION “ZMR”

• VARIOUS TYPES OF MECHANICAL SEALS

Different types of mechanical seals are available, single lubricated by pumped liquid or with flushing systems with liquid from outside;

• FOR ALL CHEMICALS

Thanks to bodies in GFR-PP (glass fibre reinforced polypropylene) or in CFF-E-CTFE (Ethylene- Chloro TrifluoroEthylene carbon fibres filled) all chemicals at low and medium temperatures can be pumped:

• WITH SOLIDS, LIGHTLY ABRASIVE

The different combinations of materials of the sliding counter-face of the mechanical seal allow to pump liquids with solids in suspensions or abrasive;

• OR HEAVY

Various electrical powers are available in the Standard (N), Powered (P) or strong-powered (S) versions. They allow to pump , also at maximum flow, liquids with 1,05 - 1,35 - 1,8 specific gravity respectively.

• ELECTRICAL MOTORS

IEC or NEMA standard motors can be installed.

• POSSIBLE ROTATION OF VOLUTE CASING

Various shifts of the volute casing can be obtained thanks to rotation. These make easier the joint of the outlet connection of the pump with the tube of the plant.

• VARIOUS TYPOLOGIES OF CONNECTIONS

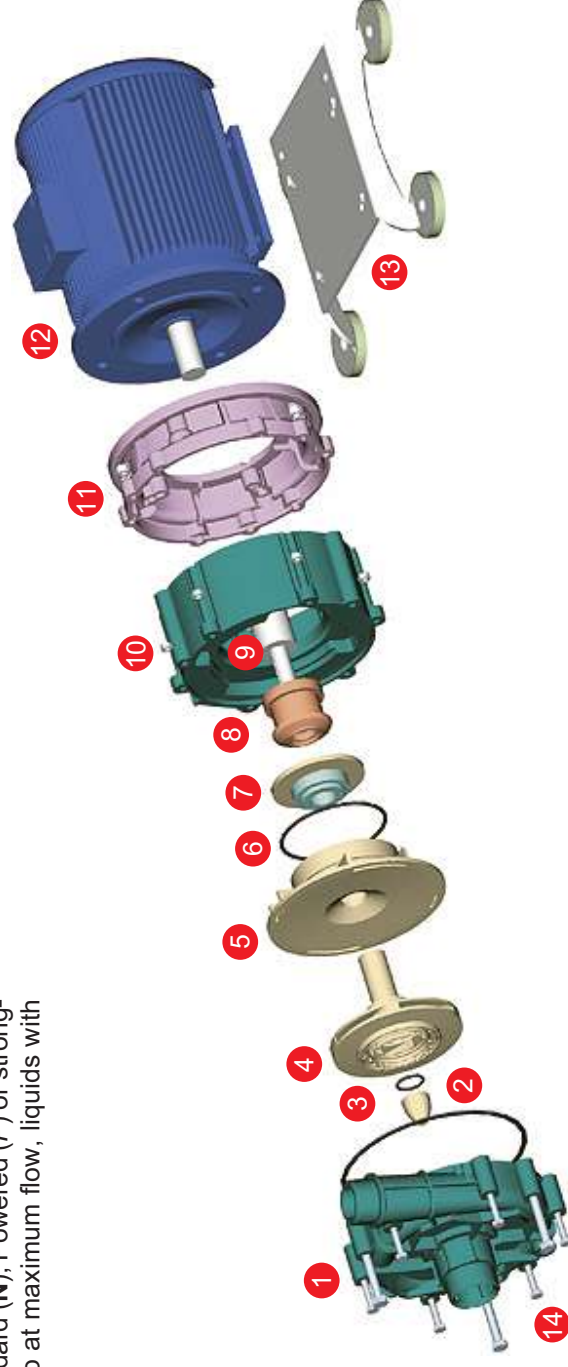
Connections with BSP cylindrical thread or NPT; flanges ISO, ANSI, JIS.

• DRAIN OF THE VOLUTE CASING

There is connection for emptying volute casing from the liquid.

• AVAILABILITY OF THE BASE

The base for anchorage of the pump is in stainless steel with ground terminals in chemical-resistant thermoplastic materials. It is supplied on request.



Mechanical execution "ZMR"
main components

- | | | | | |
|-----------------|------------------------|-------------------|----------------|------------------------------|
| 1 Volute casing | 4 Centrifugal impeller | 7 Fixed seal ring | 10 Rear casing | 13 Base (optional) |
| 2 Thrust bush | 5 Central disk | 8 Mechanical seal | 11 Strainer | 14 Screws in stainless steel |
| 3 OR gasket | 6 OR gasket | 9 Shaft | 12 Motor | |

The materials

table 4

WR	GFR/PP	Glass fibre reinforced polypropylene (U.V. stabilized).
GF	CFF/E-CTFE	Carbon fibre filled Ethylene - Cloro Trifluoro Ethylene.

Guarnizioni statiche

table 5

V	FKM	Fluorinated elastomer (e.g.: Viton®).
E	EPDM	Ethylene Propylene rubber.
K	FFKM	Perfluore elastomer (e.g.: Karlrez®).

Mechanical, thermal and chemical characteristics of the materials

table 6

Materials characteristics	GFR/PP	CFF/E-CTFE
Mechanical:		
Structural (traction) (flection)		
Thermal:		
Low temperatures		
High temperatures		
Chemical:		
Inorganic compounds		
Organic compounds		

Chemical resistance of materials

table 7

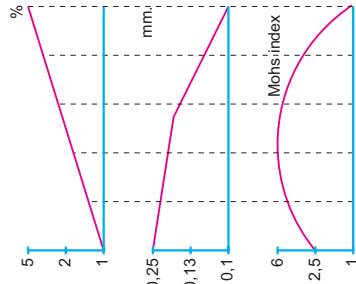
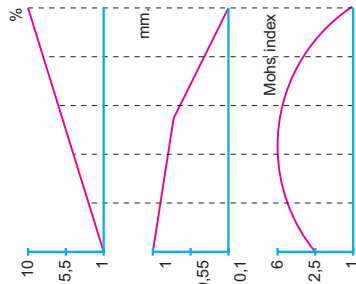
Mediums chemical:	WR	GF	V	K
Cold mineral acids	++	++	+	+
Hot mineral acids	0	++	-	+
Cold oxidizing acids	-	++	+	+
Hot oxidizing acids	-	++	0/-	+
Cold inorganic salts	++	++	+	+
Hot inorganic salts	+	++	+	+
Cold inorganic bases	++	++	-(*)	+
Hot inorganic bases	++	++	-(*)	+
Cold alogens	-	+	+	+
Hot alogens	-	+	-	+
Cold aliphatic solvents	+	+	+	+
Hot aliphatic solvents	-	0	0/-	+
Cold aromatic solvents	-	+	0/-	+
Hot aromatic solvents	-	0	-	+
Cold functional aromatic solvents	-	+	-	+
Hot functional aromatic solvents	-	0	-	+
Cold chlorinated solvents	-	+	-	+
Hot chlorinated solvents	-	0	-	+
Cold alcohols	++	++	-(*)	+
Hot alcohols	+	+	-(*)	+
Cold ethers	-	+	-	+
Hot ethers	-	+	-	+
Cold ketones	+	+	+	+
Hot ketones	0	0	-(*)	+
Cold amines	+	++	-(*)	+
Cold polymer solvents	++	0	+	+

Legend:

- Excellent ++ • Good +
- Moderate 0 • Not resistant -
- (*) Use E=EPDM

The rotation transmission model

table 8

FEATURES OF EVALUATION	Sealless pumps TMR	Sealed pumps ZMR
Hermetic structure	Total	By mechanical seal
EXAMINATION OF SOLIDS IN SUSPENSION General characteristics (to correlate) - Quantity in weight % - Dimensions in mm. - Hardness in Mohs - Inclination to precipitate (crystallization, polymerization) - Sensitivity to the magnetic field	 Applicable if the general characteristics are close to the Minimum values	 Applicable
Wear parts numbers	4+5	2
Maintenance	Simple	Normal
Viscosity (over 30cSt it is necessary to adjust the impeller dimension and the driving torque)	<150 cSt	<250 cSt

THE MATERIALS

table 1

VERSION	REINFORCED POLYMERS	MIN TEMP.	MAX TEMP.	ENVIRONMENT TEMP.
WR	GFR/PP	-5°C (23°F)	80°C (176°F)	0÷40°C (14÷104°F)
GF	CFF/E-CTFE	-30°C (-22°F)	110°C (230°F)	-20÷40°C (-4÷104°F)

The employment of Polypropylene reinforced with glass fibres allows to use AM centrifugal pumps for all the liquids, also chemicals, compatible with execution in manifold applications where you do not want to contaminate external environment with liquid losses or also evaporations of the same reinforcement with glass fibres gives stability to the material as well as 1 maximum temperatures of application.

The Etylene-ChloroTrifluoroEthylen carbon fiber filled, furthermore, thanks to great chemical inactivity of the basic material and the reinforcement, allows the use of the highly aggressive liquids. The mechanical characteristics of the reinforcement material allow the employment also with fluids containing solids with medium abrasion (for example: with the X execution: up to the index of hardness M_h maximum quantity in weight 5%, maximum dimension 0,25 mm).

Note: Maximum inlet pressure: 1,5 atm



THE CONSTRUCTIONS

table 2

TMR - ZMR VERSIONS		WR		GF	
Volute casing		GFR/PP		CFF/E-CTFE	
Rear casing					
Centrifugal impeller					
OR gasket		FKM (1)		FKM (1); (2)	
GUIDE SYSTEMS (TMR)		R1	X1	R2	X2
Guide bushing		CARB. HD	SiC	CARB. HD	SiC
Thrust bush			CER		SiC
Shaft			CER		SiC
MECHANICAL SEAL (ZMR)		EXTERNAL - SINGLE			
		SF1	SF2	TS5	TS6
Rotating part		GFR/PTFE	SiC	CARB.	SiC
Fixed part		CER	SiC	CER	SiC

Upon request: (1) EPDM or (2) FFKM

... Magnetical execution "TMR"

Internal structure

table 9

FEATURES OF EVALUATION	TYPE OF INTERNAL STRUCTURE			
	R1	X1	R2	X2
Concentrated acid compounds of flourine; strong concentrated hot alkali	Adequate	Not Applicable	Adequate	Adequate
Clean chemical mediums; hot/cold; concentrated/in solution	Adequate	Applicable	Adequate	Applicable
Exam of suspended solids (to correlate): • Max. Quantity in weight % • Max. Dimensions mm • Max. Hardness index Mohs	5 0,5 2	5 0,5 6	5 0,5 2	5 0,5 6
Mediums which are inclined to produce gas when used	Adequate	Unadvised	Adequate	Unadvised
Mediums with air in dispersion	Adequate	Applicable	Adequate	Applicable

GUIDE SYSTEMS "TMR"

table 10

COMPONENTS	R1	X1	R2	X2
Guide bushing	CARB. HD	SiC	CARB. HD	SiC
Thrust bush	CER			SiC
Shaft	CER			SiC

Sequence of the values in the applicability scale

-	~	+	++
Not applicable	Unadvised	Applicable	Adequate



Guide system "R1" version

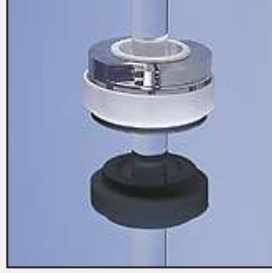


Guide system "X2" version

SF 1



SF 2



TS 5



TS 6

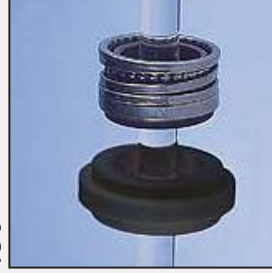
**Mechanical seal**

table 11

EVALUATION FEATURES	SF1 - TS5	SF2 - TS6
Concentrated acid compounds of flourine; strong concentrated hot alkali	Not Applicable	Applicable
Clean chemicals; hot/cold; concentrated/in solution	Adequate	Applicable
Mediums which are inclined to produce gas when used	Adequate the SF1	Applicable the SF2
Exam of suspended solids (to correlate):		
• Max. Quantity in weight %	1÷3	1÷3 (a) -1÷5 (b)
• Max. Dimensions mm	0,1÷0,6	0,1÷0,6 (a) - 1÷2 (b)
• Max. Hardness index Mohs	1÷2	
Mediums which are inclined to precipitate	Not Applicable	Applicable *

* With external flushing
IMPORTANT: See our chemical resistance tables and mechanical seal applications.

table 12

EXECUTIONS	SF1	SF2	TS5	TS6
Rotating part	GFR/PTFE	SiC	CARB.	SiC
Fixed ring	CER	SiC	CER	SiC
Bellows	PTFE	PTFE	FKM	FKM

table 13

CONDITION OF WORK	MODEL	TIPOLOGY	CODE
Standard	SF 1	Single external, PTFE bellows	10
Extreme	SF 2	Single external, PTFE bellows	20
Standard	TS5	Single external, elastomer bellows	50
Critical	TS6	Single external, elastomer bellows	60

Sequence of the values in the applicability scale

-	~	+	++
Not applicable	Unadvised	Applicable	Adequate

SPECIFICATIONS

table 3

Pumps	TMR ZMR	06.10		10.10		10.15		16.15		16.20		-	
		07.11		07.14		11.15		11.23		17.25		-	
		N	P	S	N	P	S	N	P	S	N	P	S
Ø Inlet	BSP	WR	GF	WR	GF	WR	GF	WR	GF	WR	GF	WR	GF
Ø Outlet	BSP	1 1/2"		1 1/2"		1 1/2"		1 1/2"		1 1/2"		1 1/2"	
Ø Inlet	NPT	1 1/4"		1 1/4"		1 1/2"		1 1/4"		1 1/2"		1 1/2"	
Ø Outlet	NPT	1 1/4"		1 1/4"		1 1/4"		1 1/4"		1 1/4"		1 1/4"	
ISO Flange	DNA (mm)	40		40		40		40		40		40	
	DNM (mm)	32		32		32		32		32		32	
ANSI Flange	DNA (Inch)	1 1/2"		1 1/2"		1 1/2"		1 1/2"		1 1/2"		1 1/2"	
	DNM (Inch)	1 1/4"		1 1/4"		1 1/4"		1 1/4"		1 1/4"		1 1/4"	
Power (IEC) 50 Hz	kW	0.55	0.75	1.1	0.75	1.1	1.5	1.1	1.5	2.2	1.5	2.2	3
Motor size	IEC	71	80A	80B	80A	80B	90S	90S	80B	90S	90L	100	100
Power (IEC) 60 Hz	kW	0.75	1.1	1.5	1.1	1.5	2.2	1.5	2.2	3	2.2	3	4
Motor size	IEC	80A	80B	90S	80B	90S	90L	90S	90L	100	90L	100	112
Power (NEMA) 60 Hz	HP	1	12	2	12	2	3	2	3	5	3	5	5
Motor size	NEMA	56	145	143	145	145	145	145	184	145	184	184	184
Phases	N.	3phase (all models) - 1phase (< 3 kW)											
Std. voltage (IEC)	V	400 ± 5% 50Hz											
Std. voltage (NEMA)	V	460 ± 5% 60Hz											
Motor protection	IP	55											
Pump weight (kg)	without motor	3	4	3	4	3	4	3	4	3	4	3	4
	3phase-2poles	10	11	12	13	14	11	12	13	14	16	17	20
	E-exd-2poles	18	19	23	24	23	24	23	24	33	34	34	35
1phase		12	13	14	15	17	18	14	15	17	18	20	21
		12	13	14	15	17	18	14	15	17	18	20	21

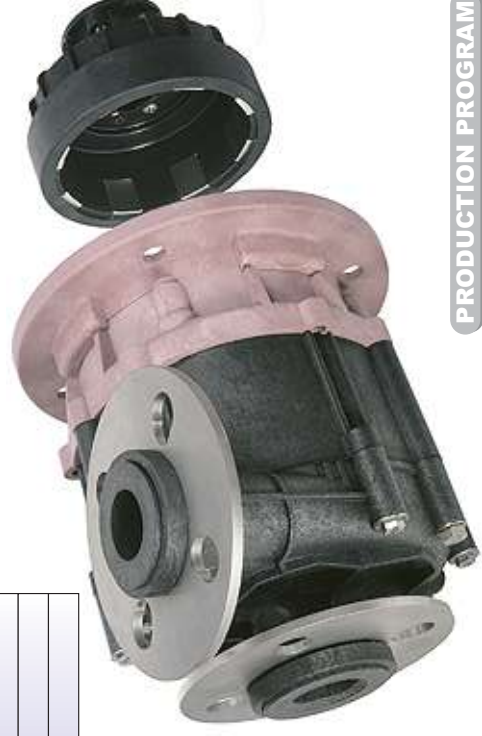
Volute casing with flanges in stainless steel according to ISO-ANSI-JIS.
In the magetical execution the motor is easily installed without disassembling the wet-end.



Detail of "BSP" outlet connection (cylindrical threaded).



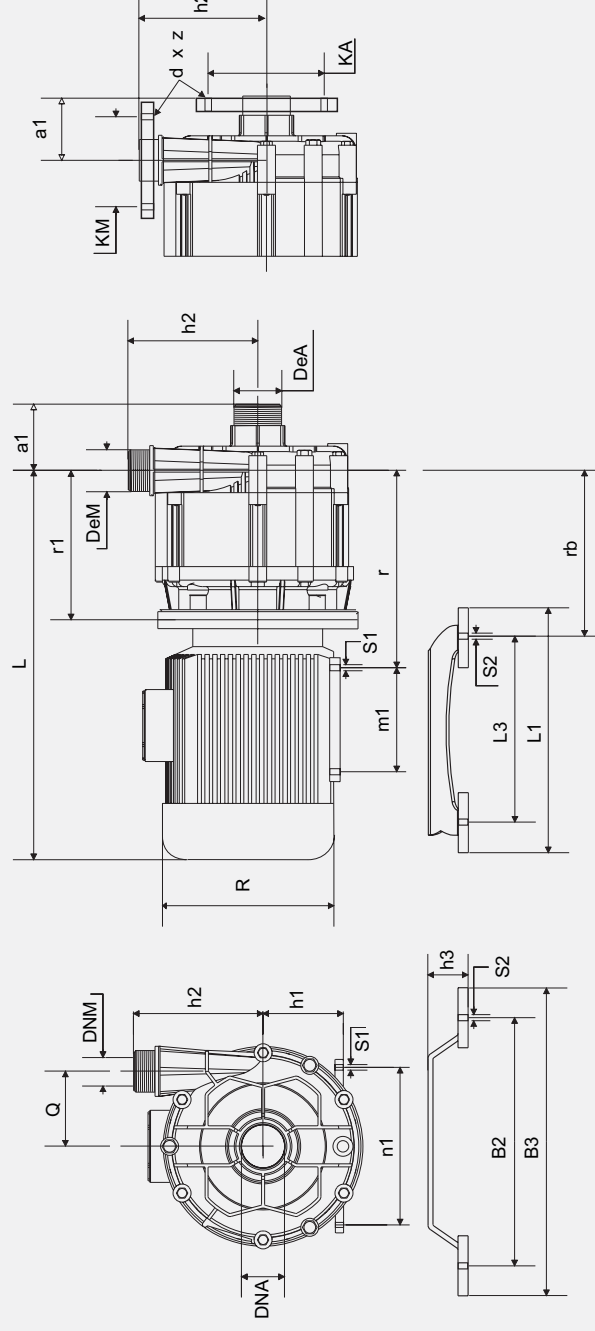
Detail of outlet connection for ISO-ANSI-JIS flanges (direct connection to the plant flange).



IEC MOTORS - 50 Hz

table 14

TMR model	06.10			10.10			10.15			16.15			16.20		
	71	80A	80B	80A	80B	90S	80B	90S	90L	90S	90L	100	90L	100	100
Flanged motors															
a1		67			67			67			67			67	
L	356	385		356	385	405	385	450	430	405	430	478	430	478	
Q		75			75			75			75			75	
h1	71	80		80	90	90	80	90		90	100		90	100	
h2		130		130	130			130			130			130	
r	194	199		199	205	205	199	205		205	227		205	227	
r1		149		149	149			149		149	164		149	164	
rb		161		161	161			161		161	176		161	176	
m1	90	100		100	100			125	125	100	125		140	125	140
n1	112	125		125	140	140	125	140		140	160		140	160	160
s1	7	8		8	8			8		8	10		8	10	10
L3		185		185	185			185		185	205		185	205	205
B2		248		248	248			248		248	305		248	305	305
S2		14		14	14			14		14	14		14	14	14
L1		245		245	245			245		245	265		245	265	265
B3		308		308	308			308		308	365		308	365	365
h3		40		40	40			40		40	40		40	40	40
KM (ISO)		100		100	100			100		100	100		100	100	100
KA (ISO)		110		110	110			110		110	110		110	110	110
KM (ANSI)		89		89	89			89		89	89		89	89	89
KA (ANSI)		98		98	98			98		98	98		98	98	98
d x z (ISO)		18 x 4		18 x 4	18 x 4			18 x 4		18 x 4	18 x 4		18 x 4	18 x 4	18 x 4
d x z (ANSI)		16 x 4		16 x 4	16 x 4			16 x 4		16 x 4	16 x 4		16 x 4	16 x 4	16 x 4

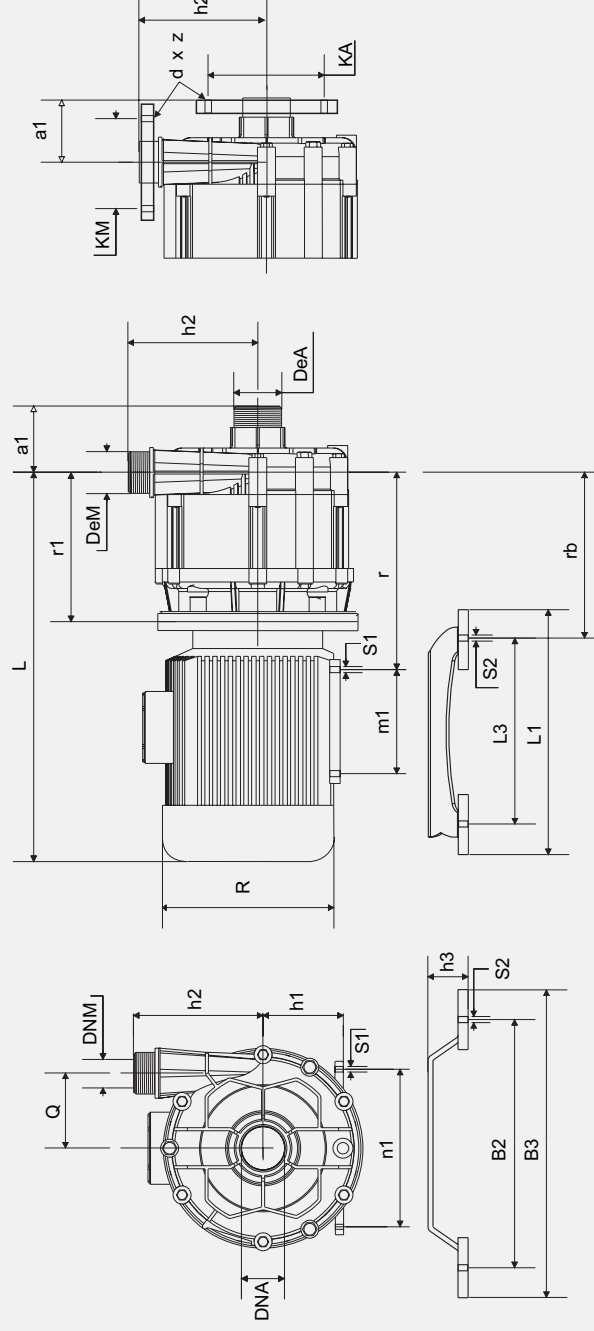


IEC MOTORS - 60 Hz

table 15

TMR model	07.11		07.14		11.15		11.23		17.25	
Flanged motors	80A	80B	90S	80B	90S	90L	90L	100	90L	100
a1	67			67			67		67	
L	385	405	430	385	405	430	405	430	430	478
Q	75			75			75		75	
h1	80	90		80	90	90	90	100	90	100
h2	130			130			130		130	
r	199	205		199	205	205	205	227	205	227
r1	149			149			149		149	
rb	161			161			161		161	
m1	100			100			100		125	
n1	125	140		125	140	140	140	160	140	160
s1	8			8			8		8	
L3	185			185			185		185	
B2	248			248			248		248	
S2	14			14			14		14	
L1	245			245			245		245	
B3	308			308			308		308	
h3	40			40			40		40	
KM (ISO)	100			100			100		100	
KA (ISO)	110			110			110		110	
KM (ANSI)	89			89			89		89	
KA (ANSI)	98			98			98		98	
d x z (ISO)	18 x 4			18 x 4			18 x 4		18 x 4	
d x z (ANSI)	16 x 4			16 x 4			16 x 4		16 x 4	

(Dimensions in mm)

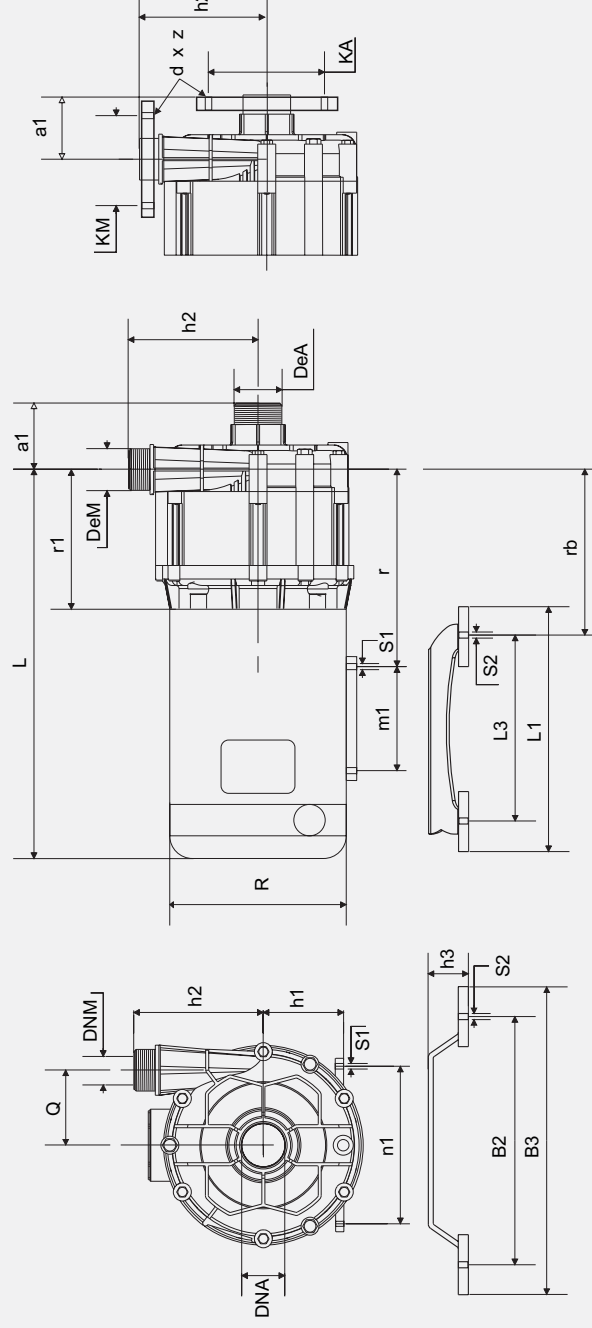


NEMA MOTORS - 60 Hz

table 16

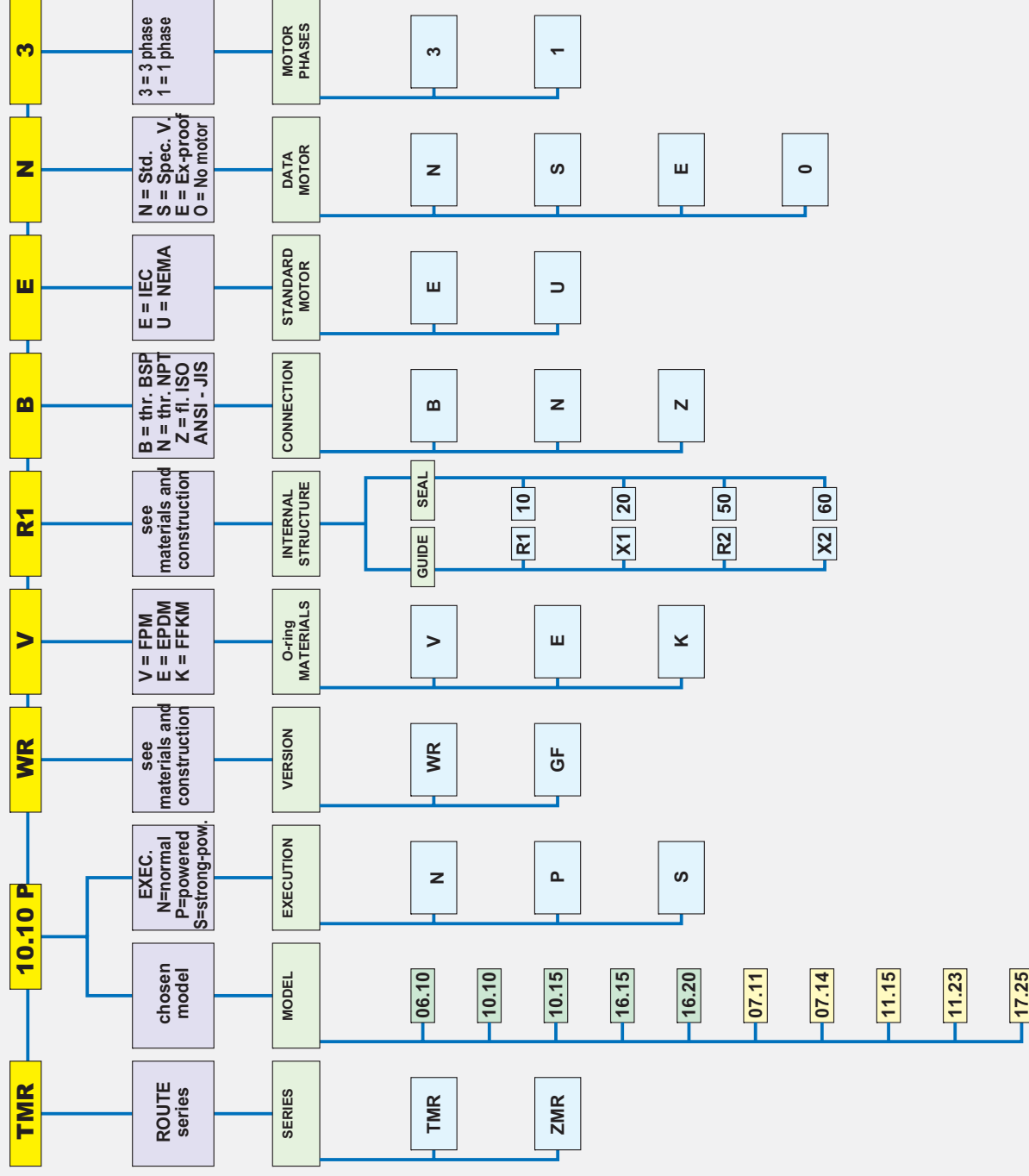
TMR model	07.11	07.14	11.15	11.23	17.15
Flanged motors	56	143	145	184	184
a1	2 21/32	2 21/32	2 21/32	2 21/32	2 21/32
L	14 15/16	15 15/16	16 15/16	16 15/16	19 3/8
Q	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16
h1	3 1/2	3 1/2	3 1/2	3 1/2	4 1/2
h2	5 1/8	5 1/8	5 1/8	5 1/8	5 1/8
r	8 7/16	8 1/8	8 1/8	8 1/8	9 5/8
r1	5 7/8	5 7/8	5 7/8	5 7/8	6 5/8
rb	6 11/32	6 11/32	6 11/32	6 11/32	7 1/8
m1	3	4	5	5 1/2	5 1/2
n1	4 7/8	5 1/2	5 1/2	5 1/2	7 1/2
s1	3/8	3/8	3/8	3/8	13/32
L3	7 9/32	7 9/32	7 9/32	7 9/32	8 1/16
B2	9 3/4	9 3/4	9 3/4	9 3/4	12
S2	9/16	9/16	9/16	9/16	9/16
L1	9 21/32	9 21/32	9 21/32	9 21/32	10 3/16
B3	12 1/8	12 1/8	12 1/8	12 1/8	14 1/8
h3	19/16	19/16	19/16	19/16	1 9/16
KM (ISO)	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16
KA (ISO)	4 11/32	4 11/32	4 11/32	4 11/32	4 11/32
KM (ANSI)	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2
KA (ANSI)	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8
d x z (ISO)	3/4 x 4	3/4 x 4	3/4 x 4	3/4 x 4	3/4 x 4
d x z (ANSI)	5/8 x 4	5/8 x 4	5/8 x 4	5/8 x 4	5/8 x 4

(Dimensions in mm)



PUMP IDENTIFICATION LABEL

table 17



Production program

K range (KG and KGS)
Installed powers:
kW 0,75÷37
Bodies materials:
GFR/PP - PVDF - PVC
Lengths 400÷3000 mm



K range (KM and KMS)
Installed powers:
kW 0,75÷22
Bodies materials:
GFR/PP - PVDF - PVC
Lengths 250÷2000 mm



FRONTIERA range
Potenze installabili: kW 0,55÷15
Materiali dei corpi: PP - E-CTFE
• Magnetic drive
• Sealed

ZGE range (ISO 2858)
Installed powers: kW 0,55÷300
Bodies materials: PP - PVDF - PVC - PE HMW
• Sealed



ZME range
Installed powers: kW 5,5÷15
Bodies materials: PP - E-CTFE
• Sealed



AM range
Installed powers: kW 0,04÷0,55
Bodies materials: GFR/PP - CFF/E-CTFE
• Magnetic drive



ZMA and ZGA range
Installed powers: kW 0,75÷11
Bodies materials: PP - PVDF - PVC
• Self priming
• Sealed

LINE range
Installed powers:
kW 0,35 - 7,5
Bodies materials:
PP - PVDF
Lengths 275÷2000



Prototype

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PRODUCTION PROGRAM

