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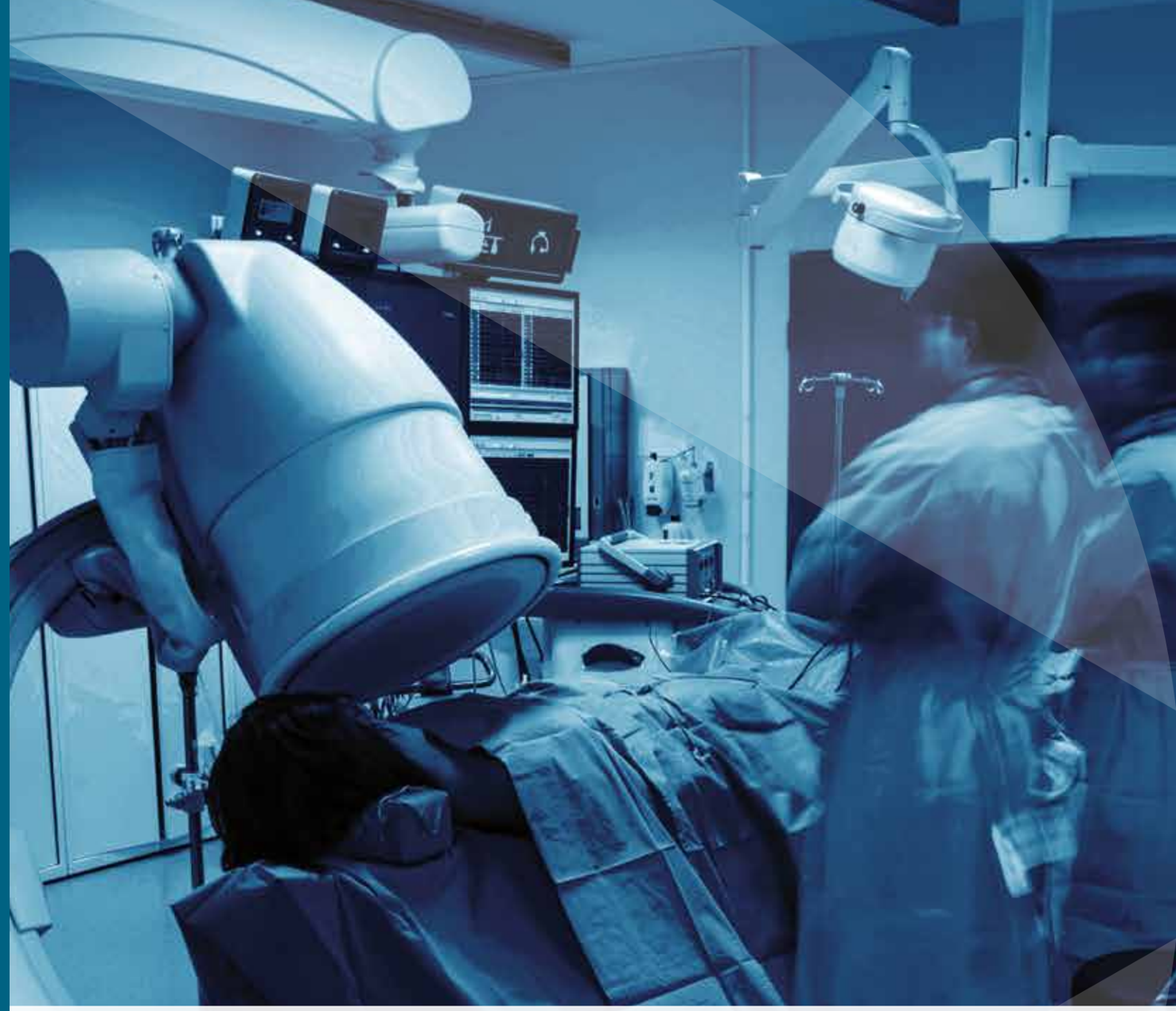

INFRANOR
MAVILOR

ADVANCED MOTORS FOR
HEALTHCARE APPLICATIONS

INFRANOR
MAVILOR

Infranor Group is a Swiss based Company, we are specialists in motion control technology. With a global presence we can provide complete solutions for servo systems in robotics, automated machines and other applications which include CNC, servodrives and servomotors.

Within the Infranor Group, Mavilor Motors supplies advanced servomotors to be used in any motion control servo system and incorporates the design and manufacturing expertise to become your ideal technological partner.

Short after its foundation in 1973 we gained a reputation for our ironless flat motor design, with extraordinary dynamic response. Since then, Mavilor offers innovative design solutions for both brushless and brushed servomotors, always focused in efficiency and performance.

Our motors have attractive characteristics, we produce a range that has extremely low inertia, another range having zero cogging, high efficiency and very high torque to weight ratio to name just a few examples. The complete portfolio includes flat pancake permanent magnet motors and conventional radial flux motors, both with slot or slot-less (zero-cogging) technology.

We are devote to our customer's projects. We can offer a complete servomotor solution backed by a team of highly skilled and competent engineers, benefiting from more than forty years of cumulated experience in design, manufacturing and implementation stages. This deep product knowledge makes Mavilor a real partner with the capacity to provide smart actuator solutions. We are delighted to work with our customers' engineering services to provide the best available motion solution and to support a seamless integration into their equipment.

Mavilor Motors product engineering and manufacturing is located in the area of Barcelona, in Spain, where we can attract skilled personnel and maintain a competent supply chain as well, to preserve and further develop our servomotors know-how.

Since our integration into the Infranor Group back in 1979, we can offer our customers a comprehensive range of services worldwide.

Infranor Sales and Engineering offices can provide appropriate application advice. Their teams have gathered years of experience in many automation domains and are able to propose most adequate solutions. Their knowledge covers not only the motors, but the entire servo-system including control and drives.

Further to application support, Infranor Group offices provide also project management service. Our engineers follow the project from initial design to start of production. Eventually they can locally support logistics and after-sales services too.

In addition to own Infranor Group Sales and engineering offices, a list of distributors in other countries can provide same level of service, ensuring worldwide support to our global customers.

Infranor Group

FRANCE - GERMANY - ITALY - REP. OF CHINA - SPAIN - SWITZERLAND - UNITED KINGDOM - UNITED STATES

Distributors

ARGENTINE - AUSTRALIA - AUSTRIA - BRASIL - BULGARIA - COLOMBIA - CROATIA CZECH - REPUBLIC - DENMARK - EGYPT - FINLAND - GREECE - HUNGARY - INDIA IRAN - ISRAEL - JAPAN - KOREA - MALAYSIA - MEXICO - MOROCCO - POLAND RUSSIA - SLOVAKIA - SLOVENIA - SOUTH AFRICA - SWEDEN - TAIWAN - THAILAND TURKEY - VIETNAM

INFRANOR
MAVILOR

INTERNATIONAL
SERVICE FOR WORLDWIDE
MOTORS

MAVILOR THE COMPANY

MANUFACTURING
MOTORS WITH CARE

CHARACTERISTICS (1)					
DESCRIPTION	SYMBOL	UNIT	BR -2	BR -3	BR -4
MAX. SPEED (48VDC)	Nmax	rpm	4000	3100	1500
SUPPLIED VOLTAGE	V	VDC	48	48	48
MAX. SPEED AT 48VDC ±10% (2)	N_n	rpm	4000	2700	1500
STALL TORQUE (3) ±10%	M_S	Nm	0,83	2,6	3,85
STALL CURRENT	I_S	A	,8	18,57	14,81
PEAK TORQUE (3) ±10%	M_S	Nm	1,8	6,75	9,625
TORQUE-WEIGHT RATIO	Tw	Nm/kg	1,77	2,17	1,77
EMF CONSTANT ±10%	K_E	Vs/rad	0,06	0,08	0,15
TORQUE CONSTANT ±10%	K_T	Nm/A	0,1	0,14	0,26
RELUCTANCE TORQUE	T_R	mNm	10	30	60
WINDING RESISTANCE ±10%	R	Ω	0,71	0,21	0,25
WINDING INDUCTANCE ±10%	L	mH	0,41	0,20	0,44
ROTOR INERTIA	J	$kg{\cdot}m^2{\cdot}10^{-3}$	0,016	0,105	0,385
MECHANICAL TIME CONSTANT	ζ_M	ms	1,86	1,97	2,47
ELECTRICAL TIME CONSTANT	ζ_E	ms	0,58	0,95	1,76
THERMAL TIME CONSTANT	ζ_{TH}	s	192	1352	2520
THERMAL RESISTANCE	R_{TH}	ºC/W	1,17	0,79	1,05
MASS	M	kg	0,47	1,2	2,18
RADIAL LOAD (4)	F_R	N	71	178	295
AXIAL LOAD	F_A	N	10	89	134
POLE PAIR	p	-	10	10	10
INSULATION	-	-	CLASS-F	CLASS-F	CLASS-F
PROTECTION	-	-	IP-54	IP-54	IP-54
HEAT SINK PLATE	-	mm	300x300x10	300x300x10	300x300x10

(1) All characteristics measured at 25ºC ambient temperature / (2) With load / (3) With the aluminum heat sink plate specified / (4) At midlength of the output shaft

INFRANOR
MAVILOR

FC SERIES

FC range derives from our patented FP series, which are zero-cogging motors with high torque and high peak performance. No-cogging motors allow for vibration free drivers and complex torque control loops using haptic sensors.

- Infranor XtraforsPrime motors in cylindrical housings (FC).
- Slotless design.
- Absolute no cogging.
- High efficiency allows significant speeds at low voltages

BR SERIES

Multi-pole brushless motor, originally developed for direct drive use in exoskeleton and rehabilitation devices, targeting a high torque-to-weight ratio.

- Reduced weight brushless motors
- Small volume
- High torque/weight ratio
- Pancake size. Low center of gravity.

SPECIAL PRODUCTS FOR
HEALTH CARE
INDUSTRY

CHARACTERISTICS (1)					
DESCRIPTION	S YMBOL	UNIT	FC -12	FC -13	FC -34
SUPPLIED VOLTAGE	V	VDC	48	48	48
MAX. SPEED AT 48VDC ±10% (2)	Nn	rpm	4000	20000	20000
STALL TORQUE (3) ±10%	M_S	Nm	0,16	0,2	0,35
STALL CURRENT	I_S	A	1,2	9,09	14
PEAK TORQUE	Mj	Nm	0,96	1,2	2,1
TORQUE -WEIGHT RATIO	T_W	Nm/kg	0,5 8	0,77	0,63
EMF CONSTANT ±10 %	K_E	Vs/rad	0,08	0,013	0,014
TORQUE CONSTANT ±10 %	K_T	Nm/A	0,13	0,022	0,025
COGGING TORQUE	T_R	mNm	0	0	0
WINDING RESISTANCE ±10 %	R	Ω	14,2	0,17	0,126
WINDING INDUCTANCE ±10 %	L	mH	1,9	0,03	0,037
ROTOR INERTIA	J	$kg{\cdot}m^2{\cdot}10^{-3}$	0,00 1	0,003	0,01
MECHANICAL TIME CONSTANT	ζ_M	ms	1,48	1,78	3,6
ELECTRICAL TIME CONSTANT	ζ_E	ms	0,13	0,18	0,29
THERMAL RESISTANCE	R_{TH}	°C/W	2,81	4,08	2,32
MASS	M	kg	0,275	0,26	0,56
RADIAL LOAD (4)	F_R	N	144	60	110
AXIAL LOAD	F_A	N	54	10	34
POLE PAIR	p	-	2	2	2
INSULATION	-	-	CLASS -F	CLASS -F	CLASS -F
PROTECTION	-	-	IP -54	IP -54	IP -54
HEAT SINK PLATE	-	mm	150x150x10	300x300x10	300x300x10

((1) All characteristics measured at 25°C ambient temperature / (2) With load / (3) With the aluminum heat sink plate specified / (4) At mid-length of the output shaft

INFRANOR
MAVILOR

With our cumulated experience in industrial automation and know-how in the domain of permanent magnet synchronous motors, we can offer the healthcare industry fully customized solutions for servomotors.

Our motors characterize for extreme low inertia, low cogging, high efficiency and very high torque to weight ratio. Typical applications are in general robotics, testing equipment, MRI motion, packaging /filling, rehab devices and exoskeletons. Among these we can highlight:

BF Wash-down series. Made of stainless steel grades, they are rated IP 69k with stall torque up to 30 Nm. Primarily used for packaging and filling but also in MRI scanning devices and other clean or wet applications.

BR multi-pole range, originally developed for direct drive usage in exoskeleton and rehabilitation devices. Targeting a high torque-to-weight ratio, they offer high torque at reasonable rotation speed.

LM Linear motors. Our patented coil lay-out system allow for windings with low resistance that offer low working temperature and great direct drive control, reaching nanometer precision. They are used in high accuracy devices with extremely smooth motion control (no backlash, no cogging).

FC slot-less motors. FC range derives from our patented FP series, which are zero-cogging motors with high torque and high peak performance. FC are the small version and were developed for hand portable devices, where efficiency, zero vibration at high speeds and low temperature are essential. No-cogging motors allow for sophisticated force or torque control loops using haptic sensors.

In addition to the outlined products, already used in the health care domain, we can provide customized and eventually frameless solutions derived from our wide range of industrial servo-motors. We will be delighted to team up with your engineering services to provide the best available motion solution to be integrated into your equipment.

“We offer customized solutions based in our extensive product portfolio and wide application experience”

BF SERIES

Wash-down brushless motors for food, medical and pharmaceutical industries.

- Stall torque up to 30 Nm
- Stainless steel housing, covers and shaft
- High IP protection until IP69K
- No deep corners to improve cleaning.

CHARACTERISTICS (1)						
DESCRIPTION	SYMBOL	UNIT	BFS -82	B FS-83	B FS-122	BFS -124
SUPPLIED VOLTAGE	V	VAC	230	230	230	230
MAX. SPEED AT 230VDC ±10% (2)	Nn	rpm	6400	4400	3700	3800
STALL TORQUE (3) ±10%	M_S	Nm	1,5	2	4,5	8,6
STALL CURRENT	I_S	A	3,1	2,9	5,4	10,36
PEAK TORQUE	Mj	Nm	7,6	10,8	20	42,4
TORQUE-WEIGHT RATIO	T_W	Nm/kg	0,27	0,31	0,26	0,41
EMF CONSTANT ±10%	K_E	Vs/rad	0,28	0,4	0,48	0,48
TORQUE CONSTANT ±10%	K_T	Nm/A	0,48	0,69	0,83	0,83
RELUCTANCE TORQUE	T_R	mNm	52	70	135	258
WINDING RESISTANCE ±10%	R	Ω	5,3	6,4	2,4	0,8
WINDING INDUCTANCE ±10%	L	mH	5,4	6,4	4,8	1,9
ROTOR INERTI A	J	$kg{\cdot}m^2{\cdot}10^{-3}$	0,05	0,07	0,38	0,74
MECHANICAL TIME CONSTANT	ζ_M	ms	1,99	1,71	2,29	1,49
ELECTRICAL TIME CONSTANT	ζ_E	ms	1,02	1	2	2,38
THERMAL RESISTANCE	R_{TH}	°C/W	1,13	1,07	0,82	0,67
MASS	M	kg	5,6	6,4	17	21
19.5 RADIAL LOAD (4)	F_R	N	245	274	515	515
AXIAL LOAD	F_A	N	98	98	255	255
POLE PAIR	p	-	4	4	4	4
INSULATION	-	-	CLASS -F	CLASS -F	CLASS -F	CLASS -F
PROTECTION	-	-	IP -67	IP -67	IP -67	IP -67
HEAT SINK PLATE	-	mm	300x300x10	300x300x10	500x500x10	500x500x10

(1) All characteristics measured at 25°C ambient temperature / (2) With load / (3) With the aluminum heat sink plate specified / (4) At mid-length of the output shaft

SPECIAL PRODUCTS FOR
HEALTH CARE
INDUSTRY

INFRANOR
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CHARACTERISTICS (1)					
DESCRIPTION	SYMBOL	UNIT	L25 -150	L50 -25	L100 -220
SUPPLIED VOLTAGE	V	VAC	230	230	230
MAX. SPEED AT 230VAC ±10% (2)	V	m/s	2,5	5	4
STALL FORCE ±10%	F_S	N	25	50	100
STALL CURRENT	I_S	A	0,76	1	2,14
PEAK FORCE	Fj	N	150	300	600
FORCE -WEIGHT RATIO	F_W	N/kg	11,5	20	18,5
EMF CONSTANT ±10 %	K_E	Vs/m	19	29	27
TORQUE CONSTANT ±10 %	K_T	N/A	32,9	50,23	46,8
COGGING FORCE	T_R	N	0	0	0
WINDING RESISTANCE ±10 %	R	Ω	93,5	29	22,3
WINDING INDUCTANCE ±10 %	L	mH	18,4	14,5	10,8
SLIDER MASS	Ws	kg	0,94	1,81	3,5
MECHANICAL TIME CONSTANT	ζ_M	ms	140,56	36,03	61,81
ELECTRICAL TIME CONSTANT	ζ_E	Ms	0,2	0,5	0,48
THERMAL RESISTANCE	R_{TH}	°C/W	1,06	2	0,56
TOTAL MASS	Wt	kg	2,17	2,5	5,4
EFFECTIVE TRAVEL	L	mm	155	28	221
MAGNETIC POLE PITCH	Lp	mm	18	24	24
POLE PAIR	p	-	1	1	2
INSULATION	-	-	CLASS -F	CLASS -F	CLASS -F
PROTECTION	-	-	IP -54	IP -54	IP -54
TOTAL LENGTH	Lt	mm	236	121	362

(1) All characteristics measured at 25°C ambient temperature / (2) With load

LM SERIES

Linear motors for high precision positioning and smooth motion. Patented coil lay-out system allow for windings with low working temperature and great direct drive control.

- Magnets placed in the slider.
- Ironless winding produces smooth movement.
- High precision. Minimal mechanical compliances.
- Frameless option available.