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Asynchronous Linear Motors
LAF

Selection Data DIAX03 / DIAX04

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The purpose of this documentation

This document assists ....

- when selecting the LAF asynchronous linear motor and drive controller combinations.

Supplementary or complementary documentation

- Asynchronous Linear Motors LAF
  Project Planning Manual
  INDRAMAT stock number: (presently in preparation)
- Asynchronous Linear Motors LAF
  Application manual
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Contents

1 Explanatory Notes about the Selection Data

1.1 General Information

By combining LAF asynchronous linear motors of various sizes with one of numerous drive controllers from INDRAMAT, the user has at his disposal a broad spectrum of forces of up to 4,000 N and speeds of up to 200 m/min.

Selecting a motor/controller combination necessitates a planning of the drive in terms of force and speed requirements.

The data resulting from various combinations of LAF asynchronous linear motors and drive controllers from INDRAMAT are listed in this document.

A breakdown of the selection data

The selection data of asynchronous linear motors is primarily broken down in terms of individual motor sizes and the type of windings.

The data are hereby sorted in terms of peak force and the therewith achievable speeds.

Parallel motor arrangement

Selection data is also listed for parallel motor arrangements.

Note: The data for parallel motor arrangement is specified in terms of arrangement on **one** drive controller.
Gantry axes necessitate that layouts comprise only single motors. Please note the information in the document „Asynchronous Linear Motor LAF - Project Planning Manual“.

Winding version of the motor

The nominal speed of the motor v_{nom} and the maximum motor speed v_{fmax} at peak force (see Fig. 1-3) can be adapted to the respective demands via the motor winding and the DC bus voltage (determined by supply module and drive controller).

The winding is identified by the type code of the motor.

Speed limits caused by the linear measuring system

The speeds specified in this document relate to the data which can be achieved with motor and corresponding controller. The maximum speed could possibly be reduced by the implemented measuring system.

Note: Maximum speed is additonally limited by the linear measuring system implemented. Please note the manufacturer’s guidelines or the information in the document „Asynchronous linear motor LAF - Project Planning Manual“.

Type code - primary part

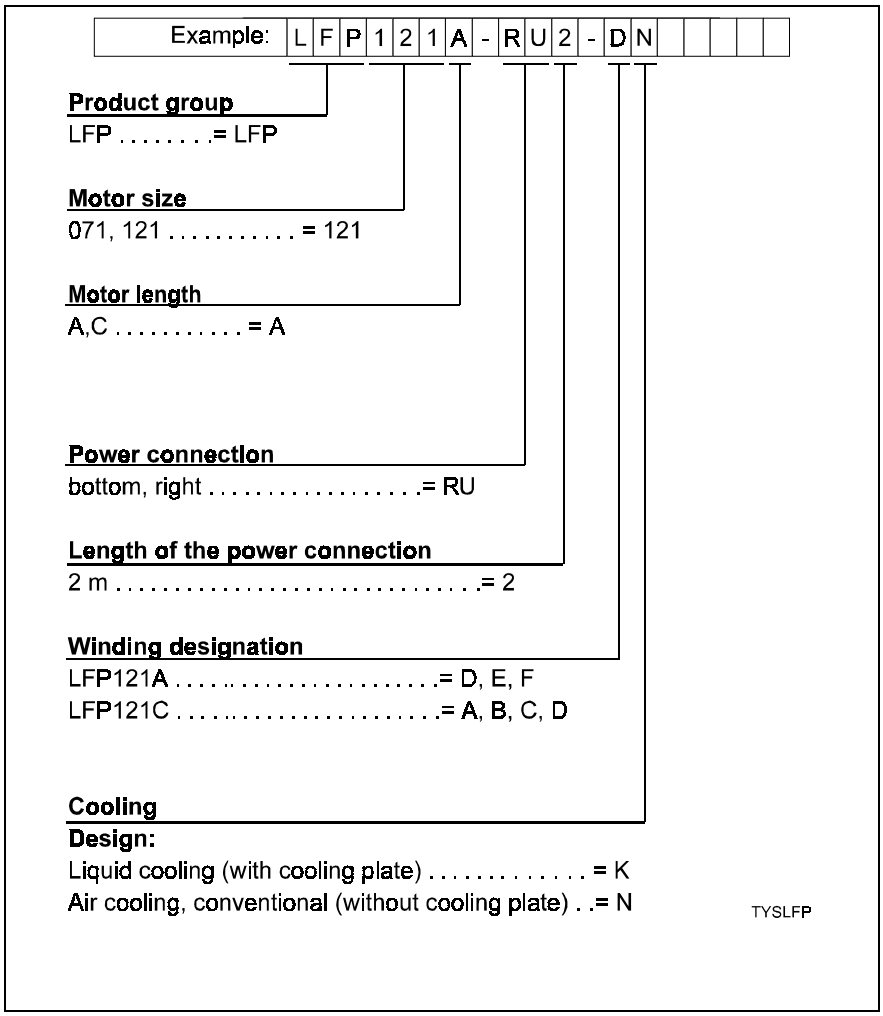

Fig. 1-1: Type code of the primary part (example)

Note: The designation RU2 for the cable connection as well as the designation of the cooling mode are not used in the following selection data

Example

Complete type code: **LFP121A-RU2-DN**
(see Fig. 1-1)

Type code in the selection data: **LFP121A - D**

Size and length of primary part

winding designation

DC bus voltage

The following table shows possible DC bus voltages in conjunction with INDRAMAT drive controllers.

Drive controllers	Possible DC bus voltages	Supply module
DDS	320V	TVD, KVR
HDS	540V 750V	HVE HVR
DKR	540V	-

Fig. 1-2: Possible DC bus voltages and relevant drive controllers and supply modules

1.2 Explanatory Notes on the Variables

F_{max} Maximum force

Peak or maximum force of the motor

F_{dN} Continuous nominal force

Force which the motor can generate continuously at standstill

F_{KB} Short-term force

The short-term force results from the relationship between motor continuous nominal current and continuous nominal current of the drive controller and can be used during intermittent operations. Maximum duty cycle time equals ten (10) minutes.

V_{nom} Nominal velocity

The velocity that is available up to the continous force F_{dN} of the motor.

v_{fmax} Maximum velocity at maximum force F_{max}

Velocity available up to maximum force F_{max} of the motor.

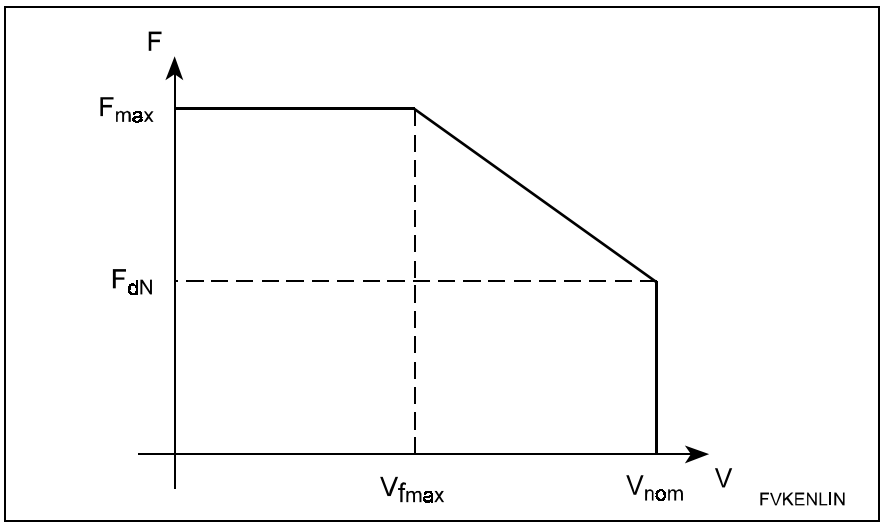

Fig. 1-3: Force / velocity characteristic curves

i_{dN} Continuous current of the motor.

i_{max} Peak or maximum current of the motor.

Note: Currents are always specified in peak values.

P_{vmax} Electrical peak power loss of motor in terms of specified peak current at maximum motor temperature.

P_{vN} Electrical nominal power loss of motor in terms of the continuous nominal current at maximum motor temperature.

ED Relative duty cycle duration in terms of peak force

Duty cycle are specified in terms of the peak force resulting from the combination of motor and drive controller.

Note: Layouts for higher duty cycles require that a motor/controller combination be selected in terms of the needed continuous nominal force and the therefore higher peak force.

1.3 Determining Drive Power when Dimensioning the Supply Module

The supply module is dimensioned in terms of continuous and peak power. This means that the continuous and peak output of the linear drive must be determined.

Note: When determining total output of all drives connected to a supply module, the coincidence factor must be taken into consideration.

1.3.1 Continuous Power

Continuous power corresponds to the average motor power.

Continuous power of the linear drive

$$P_d = P_{d\,mech} + P_{vN} \quad (1.1)$$

$P_{d\,mech}$ continuous mechanical power of the motor

P_{vN} electrical nominal power loss of the primary part

Continuous mechanical power

$$P_{d\,mech} = F_{eff} \cdot v_{AVG} \quad (1.2)$$

F_{eff} effective force of the motor

v_{AVG} average velocity

Continuous electrical power loss

The nominal power loss of the motor P_{vN} is specified in this document in terms of its dependency on the relevant continuous current of the motor (with continuous nominal force).

Note: A reduction of the continuous nominal force means a reduction in continuous electrical power loss P_{vN}.

With a reduction of the continuous nominal force, the following reduced continuous electrical power loss P_{vN1} applies:

$$P_{vN1} = \left(\frac{F}{F_{dN}} \right)^2 \cdot P_{vN} \quad (1.3)$$

1.3.2 Peak Power

Peak power must be available to the drive during accel and decel phases.

Peak power of the linear drive

$$P_{max} = P_{mech\,max} + P_{vmax} \quad (1.4)$$

$P_{mech\,max}$ peak mechanical power of the motor

P_{vmax} peak electrical power loss of the motor

Peak mechanical power

$$P_{mech\,max} = F_{max\,req} \cdot v_{fmax\,req} \qquad 1.5$$

$F_{max\,req}$ peak force required

$v_{fmax\,req}$ velocity for required peak force $F_{max\,req}$

Note: To avoid overdimensioning the power supply module, when determining peak mechanical power base it on the actually required maximum force and the velocity which this requires.

The peak forces and velocities listed in the selection data are the maximum achievable data.

Peak electrical power loss

The peak electrical power loss of the motor P_{vmax} is specified here in terms of its dependency on the relevant peak motor current (with peak motor force).

Note: When reducing the peak force from the maximum achievable peak force of the motor, there is a reduction in the peak electrical power loss P_{vmax}.

When reducing peak force, the following applies to the reduced peak electrical power loss P_{vmax1}:

$$P_{vmax1} = \left(\frac{F}{F_{max}} \right)^2 \cdot P_{vmax} \qquad 1.6$$

Supplementary information

Supplementary information on dimensioning the power supply modules can be found in the document „Power supply modules for AC drives“ or the documentation on the power supply module used.

2 Selection Data

2.1 LAF071

2.1.1 Single arrangement LAF071

F_{max} N	v_{fmax} m/min	P_{vmax} kW	F_{dN} N	v_{nenn} m/min	P_{vN} kW	ED %	F_{KB} N	i_{dN} A	i_{max} A	Motor	Regelgerät	Versorgungs modul
800	165	6,97	350	200	0,71	19%	400	27,0	90	LFP071A-A	HDS03.1-W100N	HVE
800	200	6,97	350	200	0,71	19%	400	27,0	90	LFP071A-A	HDS03.1-W100N	HVR
800	120	6,97	350	200	0,71	19%	400	27,0	90	LFP071A-A	DDS2.2-W100	TVD,KVR
800	80	6,89	200	200	1,04	6%	200	15,0	40	LFP071A-B	HDS02.1-W040N	HVE
800	100	6,89	200	200	1,04	6%	200	15,0	40	LFP071A-B	HDS02.1-W040N	HVR
800	60	6,89	350	150	1,46	19%	350	18,0	40	LFP071A-B	DDS2.2-W050	TVD,KVR
1600	125	13,78	700	200	1,39	19%	800	27,0	90	LFP071C-A	HDS03.1-W100N	HVE
1600	150	13,78	700	200	1,39	19%	800	27,0	90	LFP071C-A	HDS03.1-W100N	HVR
1600	90	13,78	700	180	1,39	19%	900	27,0	90	LFP071C-A	DDS2.2-W100	TVD,KVR
1600	55	13,45	500	165	2,04	10%	500	15,0	40	LFP071C-B	HDS02.1-W040N	HVE
1600	70	13,45	500	200	2,04	10%	500	15,0	40	LFP071C-B	HDS02.1-W040N	HVR
1600	40	13,45	700	120	2,86	19%	700	18,0	40	LFP071C-B	DDS2.2-W050	TVD,KVR

Fig. 2-4: Selection data LAF071, single arrangement

2.1.2 Parallel arrangement LAF071

F_{max} N	v_{fmax} m/min	P_{vmax} kW	F_{dN} N	v_{nenn} m/min	P_{vN} kW	ED %	F_{KB} N	i_{dN} A	i_{max} A	Motor	Regelgerät	Versorgungs modul
1600	165	2 x 6,97	600	200	2 x 0,66	14%	600	52,0	180	2 x LFP071A-A	HDS04.1-W200N	HVE
1600	200	2 x 6,97	600	200	2 x 0,66	14%	600	52,0	180	2 x LFP071A-A	HDS04.1-W200N	HVR
1600	120	2 x 6,97	700	200	2 x 0,71	19%	900	54,0	180	2 x LFP071A-A	DDS2.2-W200	TVD,KVR
1400	80	2 x 6,07	400	200	2 x 0,75	8%	400	25,0	75	2 x LFP071A-B	HDS03.1-W075N	HVE
1400	100	2 x 6,07	400	200	2 x 0,75	8%	400	25,0	75	2 x LFP071A-B	HDS03.1-W075N	HVR
1600	80	2 x 6,89	600	200	2 x 1,42	14%	600	35,5	80	2 x LFP071A-B	HDS03.1-W100N	HVE
1600	100	2 x 6,89	600	200	2 x 1,42	14%	600	35,5	80	2 x LFP071A-B	HDS03.1-W100N	HVR
1600	60	2 x 6,89	700	150	2 x 1,46	19%	700	36,0	80	2 x LFP071A-B	DDS2.2-W100	TVD,KVR
3200	125	2 x 13,78	1300	200	2 x 1,30	17%	1300	52,0	180	2 x LFP071C-A	HDS04.1-W200N	HVE
3200	150	2 x 13,78	1300	200	2 x 1,30	17%	1300	52,0	180	2 x LFP071C-A	HDS04.1-W200N	HVR
3200	90	2 x 13,78	1400	180	2 x 1,39	19%	1800	54,0	180	2 x LFP071C-A	DDS2.2-W200	TVD,KVR
2900	50	2 x 11,84	900	165	2 x 1,47	10%	900	25,0	75	2 x LFP071C-B	HDS03.1-W075N	HVE
2900	70	2 x 11,84	900	200	2 x 1,47	10%	900	25,0	75	2 x LFP071C-B	HDS03.1-W075N	HVR
3200	55	2 x 13,45	1300	165	2 x 2,78	17%	1300	35,5	80	2 x LFP071C-B	HDS03.1-W100N	HVE
3200	70	2 x 13,45	1300	200	2 x 2,78	17%	1300	35,5	80	2 x LFP071C-B	HDS03.1-W100N	HVR
3200	40	2 x 13,45	1400	120	2 x 2,86	19%	1400	36,0	80	2 x LFP071C-B	DDS2.2-W100	TVD,KVR

Fig. 2-5: Selection data LAF071, parallele Anordnung

Note: Maximum velocity is limited by the linear measuring system. Please note the manufacturer's information or the data listed in the document „Aynchronous Linear Motor LAF - Project Planning Manual".

2.2 LAF121

2.2.1 Single arrangement LAF121

F_{max} N	v_{fmax} m/min	P_{vmax} kW	F_{dN} N	v_{nenn} m/min	P_{vN} kW	ED %	F_{KB} N	i_{dN} A	i_{max} A	Motor	Regelgerät	Versorgungs modul
2000	120	7,49	900	180	1,68	20%	900	27,0	60	LFP121A-D	HDS03.1-W075N	HVE
2000	130	7,49	900	180	1,68	20%	900	27,0	60	LFP121A-D	HDS03.1-W075N	HVR
2000	80	7,49	900	140	1,68	20%	1300	27,0	60	LFP121A-D	DDS2.2-W100	TVD,KVR
2000	110	5,68	800	160	0,94	16%	800	15,0	40	LFP121A-E	HDS02.1-W040N	HVE
2000	115	5,68	800	180	0,94	16%	800	15,0	40	LFP121A-E	HDS02.1-W040N	HVR
2000	65	5,68	900	110	1,05	20%	1000	16,0	40	LFP121A-E	DDS2.2-W050	TVD,KVR
2000	90	5,21	900	160	1,29	20%	1100	14,0	30	LFP121A-F	HDS02.1-W040N	HVE
2000	110	5,21	900	160	1,29	20%	1100	14,0	30	LFP121A-F	HDS02.1-W040N	HVR
4000	120	17,62	1800	200	2,81	20%	1900	57,0	150	LFP121C-A	HDS04.1-W200N	HVE
4000	110	17,62	1800	200	2,81	20%	1900	57,0	150	LFP121C-A	HDS04.1-W200N	HVR
4000	45	17,62	1800	105	2,81	20%	2400	57,0	150	LFP121C-A	DDS2.2-W200	TVD,KVR
4000	120	12,32	1500	160	1,69	14%	1500	25,0	75	LFP121C-B	HDS03.1-W075N	HVE
4000	140	12,32	1500	160	1,69	14%	1500	25,0	75	LFP121C-B	HDS03.1-W075N	HVR
4000	120	13,97	1800	160	2,27	20%	2100	30,0	80	LFP121C-B	HDS03.1-W100N	HVE
4000	140	13,97	1800	160	2,27	20%	2100	30,0	80	LFP121C-B	HDS03.1-W100N	HVR
4000	120	13,97	1800	150	2,27	20%	2200	30,0	80	LFP121C-B	DDS2.2-W100	TVD,KVR
4000	150	11,22	1500	200	1,68	14%	1500	32,7	90	LFP121C-C	HDS03.1-W100N	HVE
4000	180	11,22	1500	200	1,68	14%	1500	32,7	90	LFP121C-C	HDS03.1-W100N	HVR
4000	80	11,22	1600	140	1,87	16%	1600	34,8	90	LFP121C-C	DDS2.2-W100	TVD,KVR

Fig. 2-6: Selection data LAF121, single arrangement

Note: Maximum velocity is limited by the linear measuring system. Please note the manufacturer's information or the data listed in the document „Aynchronous Linear Motor LAF - Project Planning Manual".

2.2.2 Parallel arrangement LAF121

F_{max}	v_{fmax}	P_{max}	F_{dN}	v_{nenn}	P_{vN}	ED	F_{KB}	i_{dN}	i_{max}	Motor	Regelgerät	Versorgungs
N	m/min	kW	N	m/min	kW	%	N	A	A			modul
3300	120	2 x 5,27	1000	180	2 x 0,66	9%	1000	30,0	100	2 x LFP121A-D	HDS03.1-W100N	HVE
3300	130	2 x 5,27	1000	180	2 x 0,66	9%	1000	30,0	100	2 x LFP121A-D	HDS03.1-W100N	HVR
4000	120	2 x 7,49	1800	180	2 x 1,68	20%	2400	54,0	120	2 x LFP121A-D	HDS04.1-W200N	HVE
4000	130	2 x 7,49	1800	180	2 x 1,68	20%	2400	54,0	120	2 x LFP121A-D	HDS04.1-W200N	HVR
3300	80	2 x 5,27	1000	140	2 x 0,74	9%	1000	32,5	100	2 x LFP121A-D	DDS2.2-W100	TVD,KVR
4000	80	2 x 7,49	1800	140	2 x 1,68	20%	2700	54,0	120	2 x LFP121A-D	DDS2.2-W200	TVD,KVR
3300	120	2 x 5,27	1800	180	2 x 1,68	30%	2300	54,0	100	2 x LFP121A-D	DKR3.1-W100	DKR
4000	120	2 x 7,49	1800	180	2 x 1,68	20%	3500	54,0	120	2 x LFP121A-D	DKR3.1-W200	DKR
4000	110	2 x 5,01	1400	160	2 x 0,71	12%	1400	25,0	75	2 x LFP121A-E	HDS03.1-W075N	HVE
4000	110	2 x 5,01	1400	180	2 x 0,71	12%	1400	25,0	75	2 x LFP121A-E	HDS03.1-W075N	HVR
4000	110	2 x 5,68	1800	160	2 x 1,05	20%	1900	32,0	80	2 x LFP121A-E	HDS03.1-W100N	HVE
4000	115	2 x 5,68	1800	180	2 x 1,05	20%	1900	32,0	80	2 x LFP121A-E	HDS03.1-W100N	HVR
4000	65	2 x 5,68	1800	110	2 x 1,05	20%	2000	32,0	80	2 x LFP121A-E	DDS2.2-W100	TVD,KVR
4000	110	2 x 5,68	1800	160	2 x 1,05	20%	4000	32,0	80	2 x LFP121A-E	DKR3.1-W100	DKR
4000	90	2 x 5,21	1800	160	2 x 1,29	20%	1800	28,0	60	2 x LFP121A-F	HDS03.1-W075N	HVE
4000	110	2 x 5,21	1800	160	2 x 1,29	20%	1800	28,0	60	2 x LFP121A-F	HDS03.1-W075N	HVR
4000	90	2 x 5,21	1800	160	2 x 1,29	20%	4000	28,0	60	2 x LFP121A-F	DKR3.1-W100	DKR
6300	120	2 x 8,00	1400	200	2 x 0,70	5%	1400	45,0	200	2 x LFP121C-A	HDS04.1-W200N	HVE
6300	110	2 x 8,00	1400	200	2 x 0,70	5%	1400	45,0	200	2 x LFP121C-A	HDS04.1-W200N	HVR
6300	40	2 x 8,00	2000	105	2 x 1,12	10%	2000	65,0	200	2 x LFP121C-A	DDS2.2-W200	TVD,KVR
6300	120	2 x 8,00	2500	200	2 x 1,54	16%	2500	80,0	200	2 x LFP121C-A	DKR3.1-W200	DKR
8000	120	2 x 17,62	3600	200	2 x 2,81	20%	3900	114,0	300	2 x LFP121C-A	DKR3.1-W300	DKR
8000	120	2 x 13,97	3500	160	2 x 2,20	19%	3500	58,9	160	2 x LFP121C-B	HDS04.1-W200N	HVE
8000	140	2 x 13,97	3500	160	2 x 2,20	19%	3500	58,9	160	2 x LFP121C-B	HDS04.1-W200N	HVR
8000	120	2 x 13,97	3600	150	2 x 2,27	20%	4400	60,0	160	2 x LFP121C-B	DDS2.2-W200	TVD,KVR
8000	120	2 x 13,97	3600	160	2 x 2,27	20%	5600	60,0	160	2 x LFP121C-B	DKR3.1-W200	DKR
8000	150	2 x 11,22	2400	200	2 x 1,14	9%	2400	52,0	180	2 x LFP121C-C	HDS04.1-W200N	HVE
8000	180	2 x 11,22	2400	200	2 x 1,14	9%	2400	52,0	180	2 x LFP121C-C	HDS04.1-W200N	HVR
8000	80	2 x 11,22	3200	140	2 x 1,87	16%	3200	69,5	180	2 x LFP121C-C	DDS2.2-W200	TVD,KVR
8000	150	2 x 11,22	3600	200	2 x 2,19	20%	4100	76,0	180	2 x LFP121C-C	DKR3.1-W200	DKR

Fig. 2-7: Selection data LAF121, parallel arrangement

Note: Maximum velocity is limited by the linear measuring system. Please note the manufacturer's information or the data listed in the document „Aynchronous Linear Motor LAF - Project Planning Manual".

Directory of Customer Service Locations

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Switzerland Rexroth AG Geeschäftsbereich INDRAMAT Gewerbestraße 3 CH-8500 Frauenfeld Telefon: 052/720 21 00 Telefax: 052/720 21 11	Russia Tschudnenko E.B. Arsenia 22 153000 Ivanovo Rußland Telefon: 093/22 39 633		

European customer service locations without Germany

Outside of Europe

Argentina Mannesmann Rexroth S.A.I.C. Division INDRAMAT Acassusso 48 41/7 1605 Munro (Buenos Aires) Argentina Telefon: 01/756 01 40 01/756 02 40 Telex: 262 66 rexro ar Telefax: 01/756 01 36	Argentina Nakase Asesoramiento Tecnico Diaz Velez 2929 1636 Olivos (Provincia EN Buenos Aires) Argentina Argentina Telefon 01/790 52 30	Australia Australian Industrial Machenery Services Pty. Ltd. Unit 3/45 Horne ST Campbellfield VIC 2061 Australia Telefon: 03/93 59 0228 Telefax: 03/93 59 02886	Brazil Mannesmann Rexroth Automação Ltda. Divisão INDRAMAT Rua Georg Rexroth, 609 Vila Padre Anchieta BR-09.951-250 Diadema-SP Caixa Postal 377 BR-09.901-970 Diadema-SP Telefon: 011/745 90 65 011/745 90 70 Telefax: 011/745 90 50
Canada Basic Technologies Corporation Burlington Division 3426 Mainway Drive Burlington, Ontario Canada L7M 1A8 Telefon: 905/335-55 11 Telefax: 905/335-41 84	China Rexroth (China) Ldt. Shanghai Office Room 206 Shanghai Intern. Trade Centre 2200 Yanan Xi Lu Shanghai 200335 P.R. China Telefon: 021/627 55 333 Telefax: 021/627 55 666	China Rexroth (China) Ldt. Shanghai Parts & Service Centre 199 Wu Cao Road, Hua Cao Minhang District Shanghai 201 103 P.R. China Telefon: 021/622 00 058 Telefax: 021/622 00 068	China Rexroth (China) Ldt. 1430 China World Trade Centre 1, Jianguomenwai Avenue Beijing 100004 P.R. China Telefon: 010/50 50 380 Telefax: 010/50 50 379
China Rexroth (China) Ldt. A-5F., 123 Lian Shan Street Sha He Kou District Dalian 116 023 P.R. China Telefon: 0411/46 78 930 Telefax: 0411/46 78 932	Honkong Rexroth (China) Ldt. 19 Cheung Shun Street 1st Floor, Cheung Sha Wan, Kowloon, Honkong Telefon: 741 13 51/-54 und 741 14 30 Telex: 3346 17 GL REX HX Telefax: 786 40 19 786 07 33	India Mannesmann Rexroth (India) Ltd. INDRAMAT Division Plot. 96, Phase III Peenya Industrial Area Bangalore - 560058 Telefon: 80/839 21 01 80/839 73 74 Telex: 845 5028 RexB Telefax: 80/839 43 45	Japan Rexroth Co., Ltd. INDRAMAT Division I.R. Building Nakamachidai 4-26-44 Tsuzuki-ku, Yokohama 226 Japan Telefon: 045/942-72 10 Telefax: 045/942-03 41
Korea Rexroth-Seki Co Ltd. 1500-12 Da-Dae-Dong Saha-Gu, Pusan, 604-050 Telefon: 051/264 90 01 Telefax: 051/264 90 10	Korea Seo Chang Corporation Ltd. Room 903, Jeail Building 44-35 Yoido-Dong Youngdeungpo-Ku Seoul, Korea Telefon: 02/780-82 07 ~9 Telefax: 02/784-54 08	Mexico Motorización y Diseño EN Controles, S.A. EN C.V. Av. Dr. Gustavo Baz No. 288 Col. Parque Industrial la Ioma Apartado Postal No. 318 54060 Tlalnepantla Estado EN Mexico Telefon: 5/397 86 44 Telefax: 5/398 98 88	
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Customer service locations outside of Europe

Notes