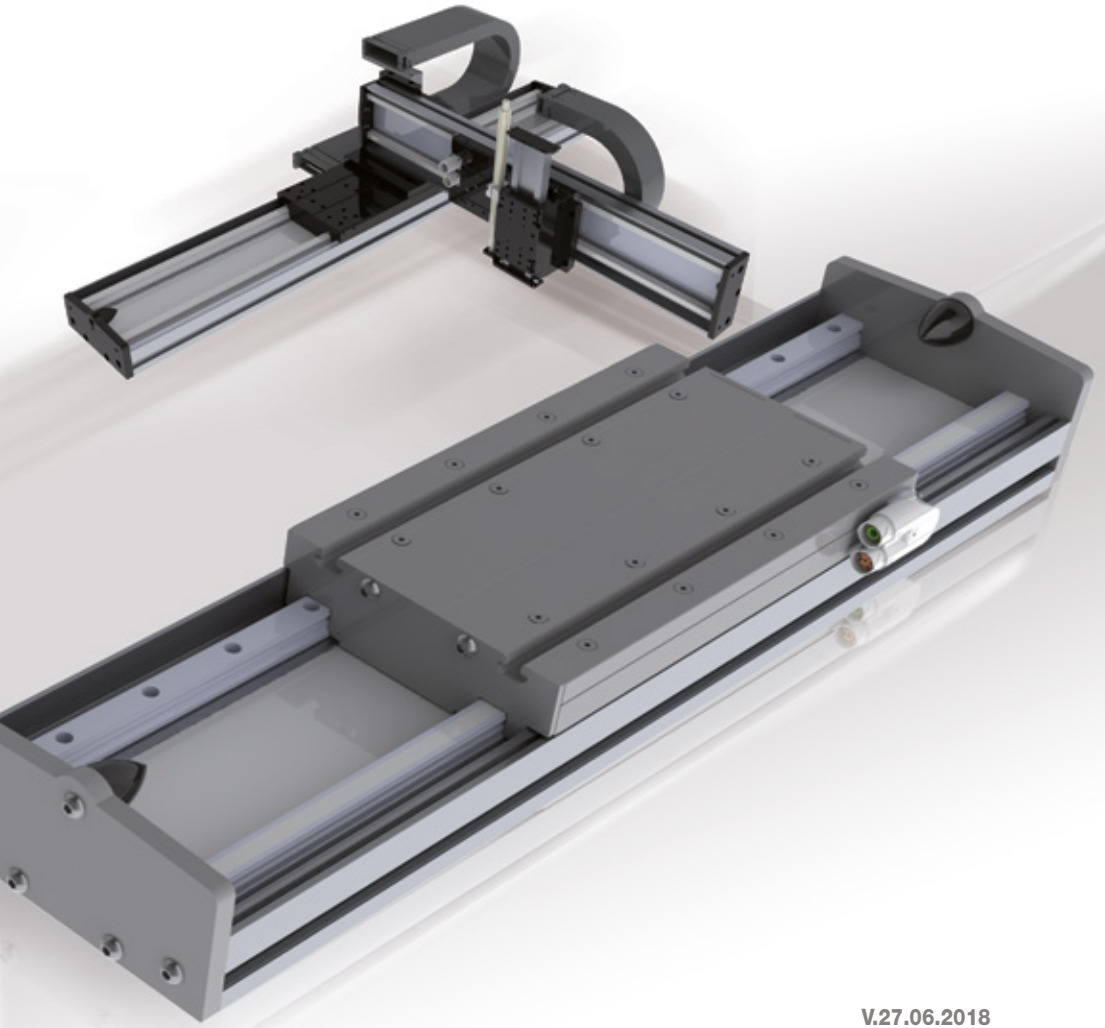
SINADRIVES®

DIRECT DRIVE EXPERTS

COMMISSIONING and MAINTENANCE MANUAL



V.27.06.2018

Serie:

MLE/ MLU/ MLZ

MLL/ MLLZ/ MCE

Imprint

Technical changes:
We reserve the right to make changes relating to technical improvements.

Dear customer, many thanks for deciding on a SINADRIVES product. You have decided on the highest quality, excellent service and the highest precision.

You will therefore increase process reliability in your production processes and achieve the best processing results to the satisfaction of your customers.

Any questions?
We are also available at any time after you have purchased your product.
Best regards

Innovation & Excellence

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1. Before you start

Please read the following instructions very carefully. They are a requirement for the safe installation and correct commissioning of the linear motor axis.

For other information and support, please contact:

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Attention: Disregarding the safety instructions during installation and commissioning can cause damage to the machine and danger to the life of operating personnel.

Attention: Strong permanent magnets can cause damage to the magnetic devices and danger to the life of operating personnel with heart pace makers.

Attention: Danger from electrical voltage! Improper conduct may endanger human life.

Attention: Danger from moving parts. The axes can start automatically.

1.1 Basic safety information

Before installing and commissioning the linear motor axis, carefully read this instruction manual.

The manufacturer accepts no responsibility or liability for non-observance of the intended purpose of the linear motor axis or operating manual and damage or accidents due to negligence.

Transport the linear motor axis with care and caution even when it is still packed or during installation.

The magnets used are very sensitive to impact. Never expose the axis to a temperature above 70°C.

Unpack the linear motor axis and visually inspect it. If you notice damage such as marks that could have been caused by a fall, please contact the manufacturer. Please always quote the serial number of the axis.

You can find the number on both of the side plates.

1.2 Safety regulations

The linear motor axis is intended for installation in a machine or system.
The requirements of the applicable guidelines must be observed and complied with. The linear motor axis may only be used and applied within the scope of its defined application parameters. Any deviating use is deemed as incorrect use and the manufacturer accepts no liability for damage that may arise from this.

Note that the magnets installed in the aluminium profile have a high force of attraction on all ferrous materials and this can have dangerous, life-threatening consequences for persons with pacemakers. Data carriers such as credit cards are also affected by this.

Before installing the linear motor axis, make sure that the machine and system are grounded.
- The correct operating voltage is applied.
- The surrounding area is clean and dry as well as free of vapour and dust.
- The outside temperature is not ≥ 70°.

This does not apply to axes that were manufactured for special ambient conditions.

1.3 CE certificate

SAIN Automation Solutions S.L. hereby declares that the following products with the linear motor axis designation comply with the applicable basic requirements of Machine Directive 2006/42/CE.

Linear motor axis
2006/42/CE

The linear motor axis may only be put into operation when it has been determined that the machine/system in which it should be installed complies with the regulations of Machine Directive 2006/42/CE.

Applied harmonised standard, particularly:
EN ISO 12100

1.4 Taric codes

Product	Taric Code	Country of Origin
Linearmodules with direct drive	84795000	Spain
T-Nuts	73181692	Spain
Cables	85444290	Spain

1.5 Magnetic field range

The recomended security distance to avoid damages produced by a magnetic field is especified at 1 meter, to assure no interference with electronic devices and heart pace makers.
However, the real magnetic force is around 1 Gauss at 15 cm above the magnets, and 0,5 Gauss at 15 cm on the side.

2. Introduction and design of the linear motor axis

Thank you for purchasing SINADRIVES linear motor axes. The linear motor axes are designed to meet demanding automation requirements.
It is the user's responsibility to ensure that the linear motor axis is installed in an assembly that has the legally required safety features.

The linear motor axis is a part of a machine, system, or plant. It was developed in compliance with technical regulations concerning safety and is safe to operate.
If the axis cannot be installed or used as described in the instruction manual or by trained persons, this can cause damage for which the manufacturer accepts no liability.

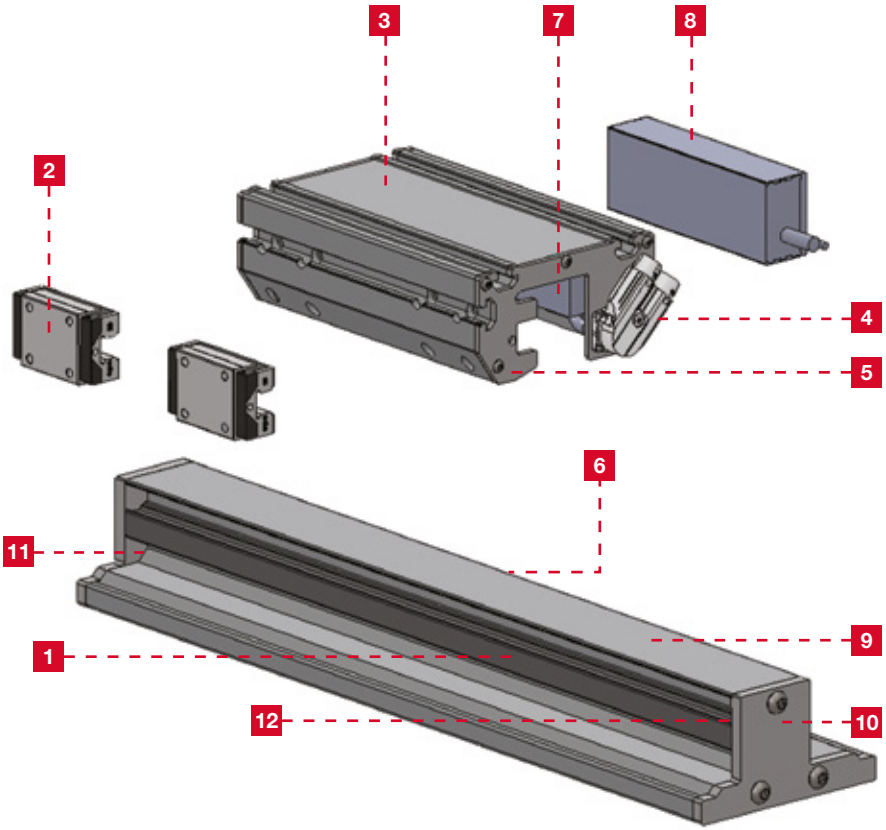
These instructions contain information about commissioning and maintenance for MLE, MLZ, MLU and MLL linear motor axes.

The SINADRIVES linear motor axes are set up on compact aluminium profiles.
This ensures the largest possible force absorption due to the light design.
The remaining components, guide rails and motors are designed so that they also comply with the selected accuracy and reproducibility for precision applications under the harshest conditions.

The linear motor axes consist of the following components: Carriage, linear motor, linear measurement system and guide rails.
Before starting installation, please check the number of delivered parts.
If you have any queries, we are available for you at any time.

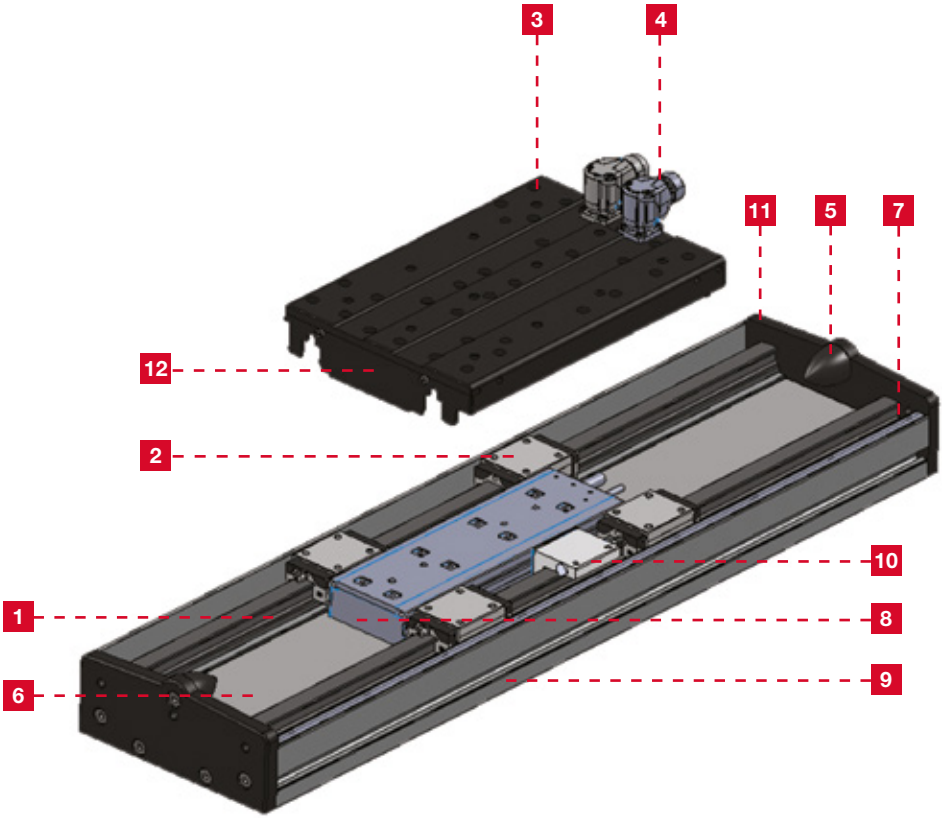
2.1 Design of the linear motor axis type MLE2

1. Guide rail
2. Block
3. Carriage
4. Connectors
5. Carriage cover
6. Permanent magnets
7. Measuring head
8. Linear motor coil
9. Aluminium profile
10. End plate
11. Bumper
12. Measuring scale (integrated in the rail)



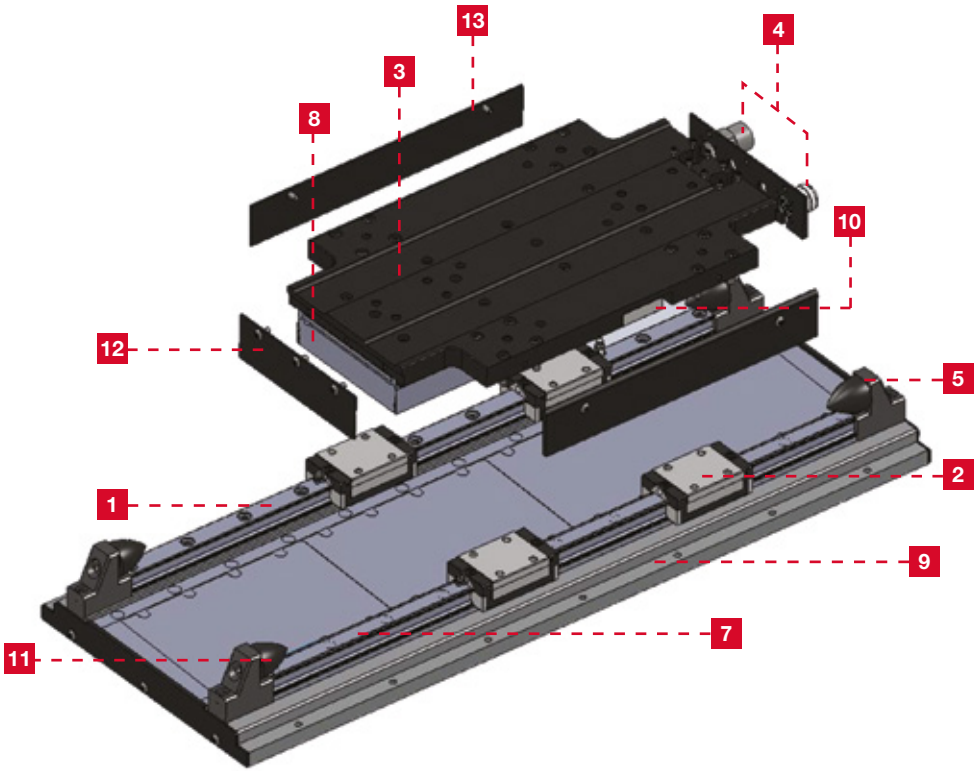
2.2 Design of the linear motor axis type MLE3 and MLE5

1. Guide rail
2. Block
3. Carriage
4. Connectors
5. Bumper
6. Permanent magnets
7. Measuring scale (integrated in the rail)
8. Linear motor coil
9. Aluminium profile
10. Measuring head
11. End plate
12. Carriage cover



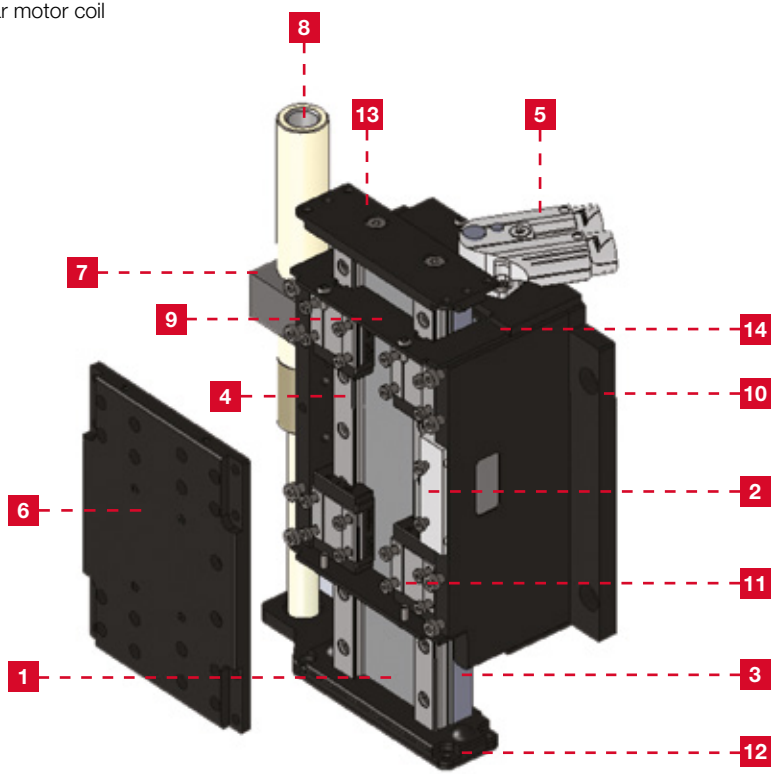
2.3 Design of the linear motor axis type MLE7

1. Guide rail
2. Block
3. Carriage
4. Connectors
5. Bumper
6. Permanent magnets
7. Measuring scale (integrated in rail)
8. Linear motor coil
9. Aluminium profile
10. Measuring head
11. Mounting stop
12. Carriage cover
13. Side carriage cover



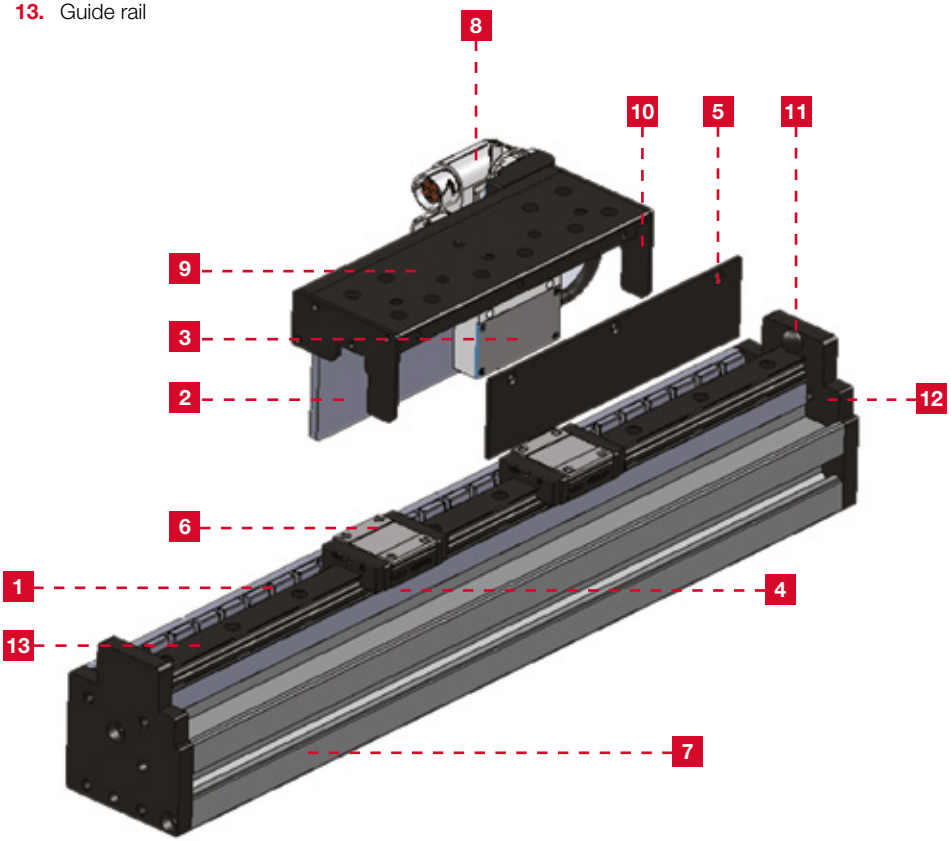
2.4 Design of the linear motor axis type MLZ

1. Permanent magnets
2. Measuring head
3. Measuring scale
4. Guide rail
5. Connectors
6. Cover plate
7. Magnetic brake holder
8. Magnet brake
9. Carriage cover
10. Housing
11. Block
12. Bumper
13. End plate
14. Linear motor coil



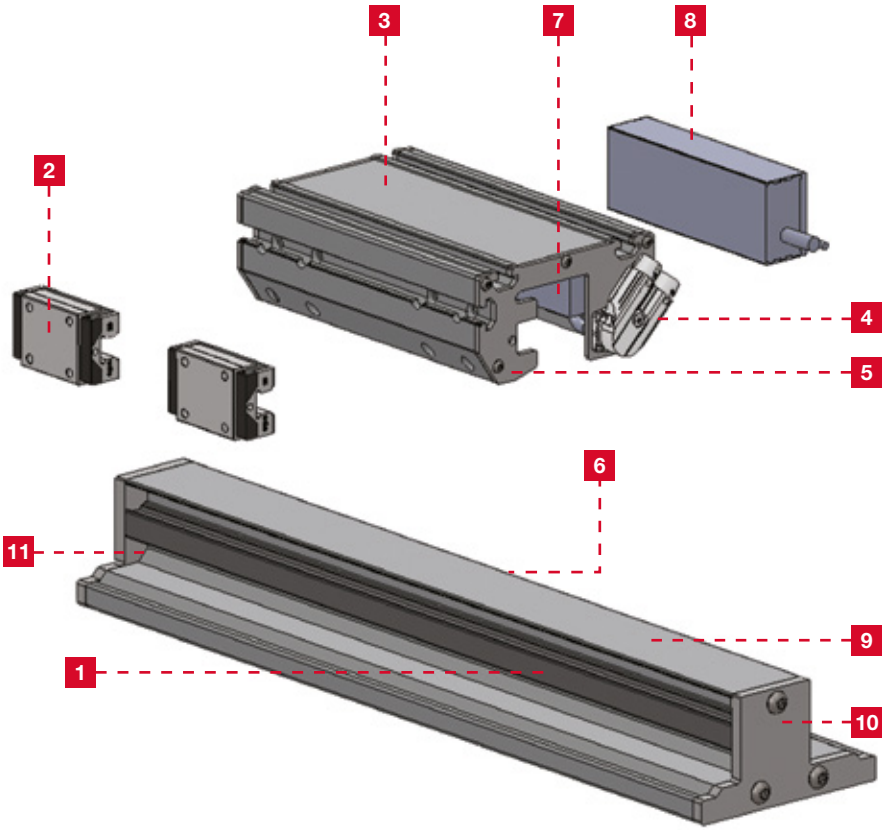
2.5 Design of the linear motor axis type MLU

1. Permanent magnets
2. Linear motor coil
3. Measuring head
4. Measuring scale
5. Side carriage cover
6. Block
7. Aluminium profile
8. Connectors
9. Carriage
10. Carriage cover
11. Bumper
12. End plate
13. Guide rail



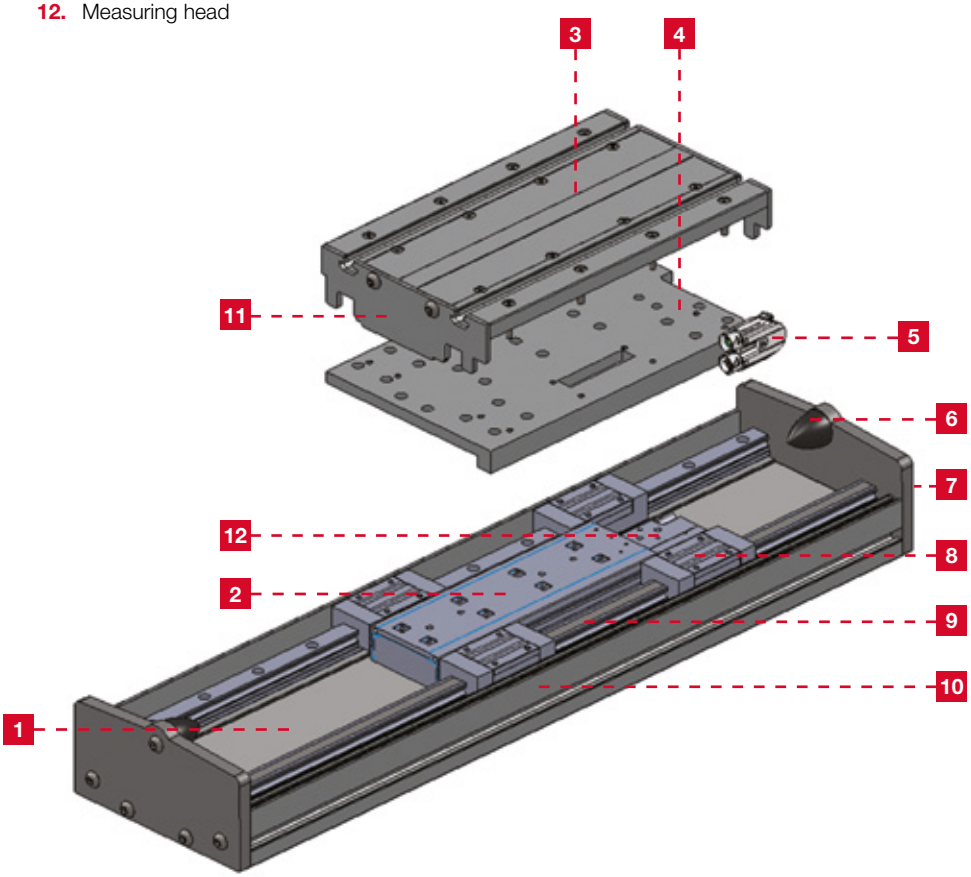
2.6 Design of the linear motor axis type MLL2

1. Guide rail
2. Block
3. Carriage
4. Connectors
5. Carriage cover
6. Permanent magnets
7. Measuring head
8. Linear motor coil
9. Aluminium profile
10. End plate
11. Bumper



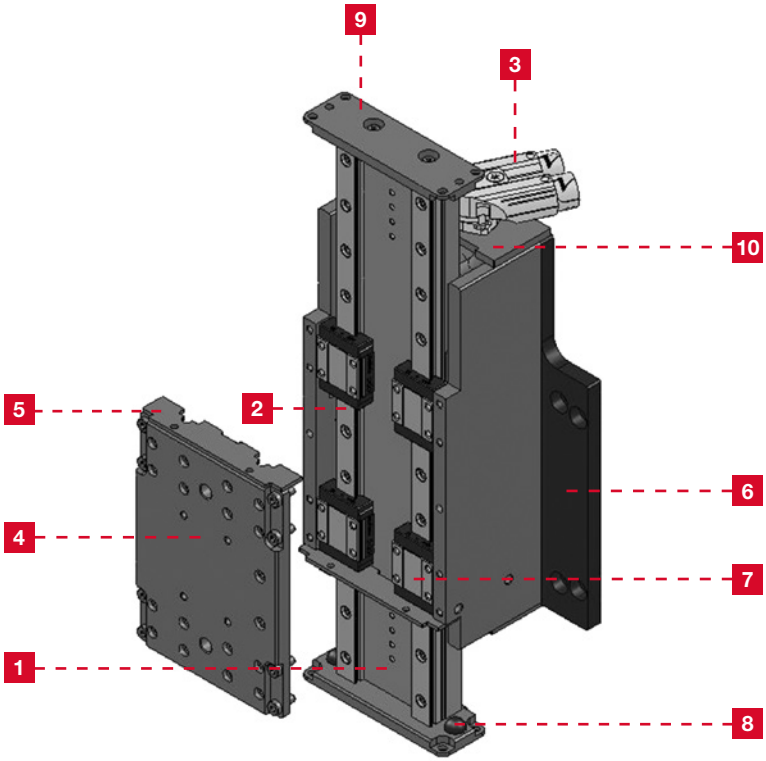
2.7 Design of the linear motor axis type MLL3 and MLL5

1. Permanent magnets
2. Linear motor coil
3. Top carriage
4. Bottom carriage
5. Connectors
6. Bumper
7. End plate
8. Block
9. Guide rail
10. Aluminium profile
11. Carriage cover
12. Measuring head



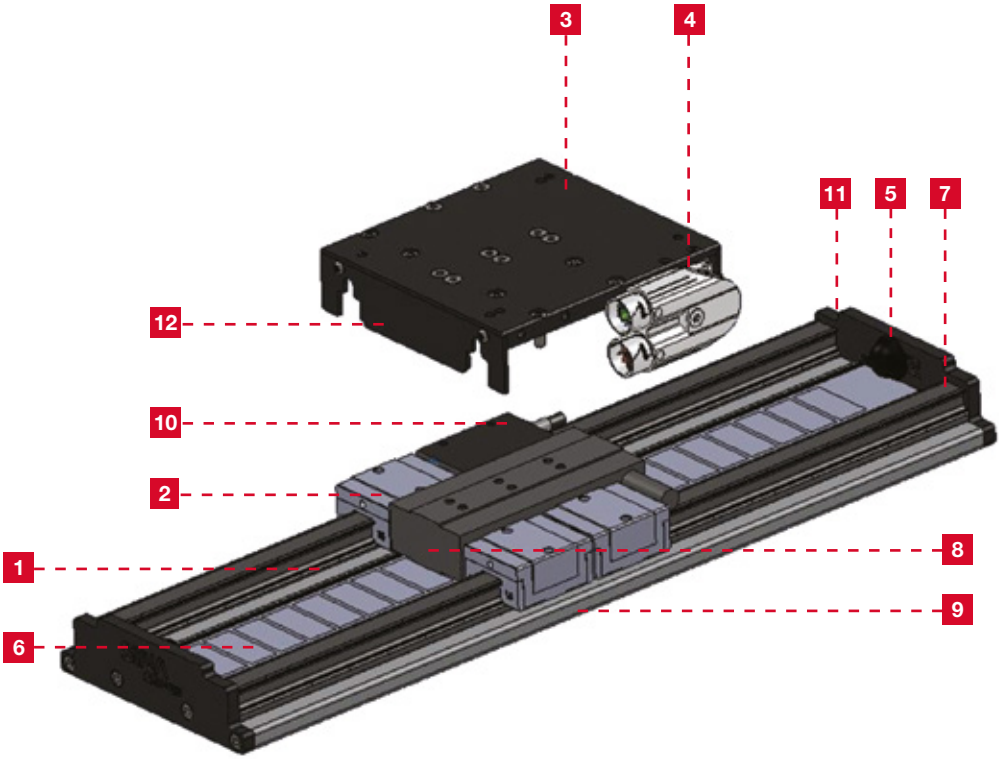
2.8 Design of the linear motor axis type MLLZ

1. Permanent magnets
2. Guide rail
3. Connectors
4. Cover plate
5. Carriage cover
6. Housing
7. Block
8. Bumper
9. End plate
10. Linear motor coil



2.9 Design of the linear motor axis type MCE

1. Guide rail
2. Block
3. Carriage
4. Connectors
5. Bumper
6. Permanent magnets
7. Measuring scale (integrated in the rail)
8. Linear motor coil
9. Aluminium profile
10. Measuring head
11. End plate
12. Carriage cover



3. Installation

The installation order must be followed as described in this instruction manual.
Non-compliance could cause dangerous situations and subsequent damage.
Correct order:

3.1 Mechanical installation

Before staring, please check that all surfaces to be used are clean and dry. We recommend using surfaces with an evenness of +/- 0.2 mm/metre. A larger tolerance could reduce the position accuracy of the linear motor axis.
The profiles are extruded and must be aligned during installation.
For correct alignment, please use a side area as the alignment reference. Use accessories offered by SINADRIVES such as T-slot nuts or mounting brackets for installation.
Information can be found in the main catalogue: Chapter Accessories.

3.2 Electrical connections

Before staring work on the cables, make sure that the power supply is disconnected. Work carefully according to the instructions for your servo amplifier. Make sure your machine/system as a whole meets the requirements of all applicable standards, such as the EN 60204 standard.

Electrical connections: There are two connectors on the carriage.
One connector is used for the operating voltage supply and the connection of the temperature sensor. The second connector is used for the measurement system. Specifications for the PIN assignment can be found on page 16 and 17.
Both cables must be shielded with a braided metal cable sheath for electromagnetic immunity.

Besides this manual you should carefully follow the installation instructions of your servo amplifier supplier. Make sure that the linear motor axis as a whole complies with the applicable electrical values. You can find all technical parameters of the linear motor axis and measurement system from page 19 of this manual.

3.3 Grounding

Check that all grounding cables are firmly connected. The linear motor axes are driven according to the principle of pulse width modulation. This gives rise to large electrical impulses and causes an increased risk for electromagnetic interference. The grounding cable (PE) must be connected to the PE connection of your servo amplifier. Attach the galvanised sheathing as close as possible to the servo amplifier.

3.4 Temperature sensor

The coil unit is equipped with two temperature sensors, one PTC-1k type and one KTY:

- KTY83-122 for MLE, MLZ, MLL and MLLZ
- KTY84-130 for MCE
- NTC for MLU

The temperature sensors are used for overheating protection of the coil units. The KTY sensor gives a proportional value to the driver while the PTC/NTC sensors act as a contact that is activated at 100ºC. For more information, contact the SINADRIVES Service Team.

3.4.1 Mode of action

The PTC sensor: operates according to the principle of a PTC resistor that has a lower conductivity at high temperatures than at low temperatures. They have positive temperature coefficients. This means that their electrical resistance also increases with increasing temperature.

The NTC sensor: operates according to the principle of a thermistor that acts responds with a drop in resistance when the coils reach a critical temperature.

The KTY Sensor: operates according to the principle of a Z-diode that changes its breakdown voltage proportional to the temperature. The proportional temperature can be seen at any time. Conversion factor in the table below:

NTC

Tº, C	20	30	40	50	60	70	80	90	100	110	120	130
R, Ohm	12490	8057	5327	3603	2488	1752	1258	918	680	511	389	301

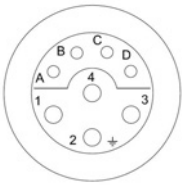
KTY83-122

Tº, C	20	30	40	50	60	70	80	90	100	110	120	130
R, Ohm	972	1049	1130	1214	1301	1392	1487	1585	1687	1792	1900	2012

KTY84-130

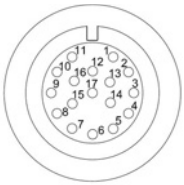
Tº, C	20	30	40	50	60	70	80	90	100	110	120	130
R, Ohm	581	626	672	722	773	826	882	940	1000	1062	1127	1194

3.5 Connection of power connector M23



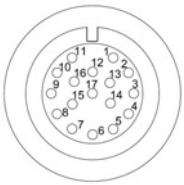
Pin	Signal description
1	U
2	PE
3	W
4	V
A	KTY
B	KTY
C	PTC+
D	PTC-

3.6 Connection for incremental measuring systems, signal connector M23



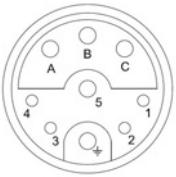
Pin	Signal description sin/cos	Signal description TTL
1	A+	A+
2	A-	A-
3	B+	B+
4	B-	B-
7	GND	GND
8	5Vdc	5Vdc
10	Z+	Z+
11	Z-	Z-
16	Vdc Sensor	Vdc Sensor
17	GND Sensor	GND Sensor

3.7 Connection for absolute measuring systems, signal connector M23



Pin	Signal description SSI	Signal description BISS/C	Signal description EnDAT
1	A+	A+	-
2	A-	A-	-
3	B+	B+	-
4	B-	B-	-
7	GND	GND	GND
8	5Vdc	5Vdc	5Vdc
10	Data+	Data+	Data+
11	Data-	Data-	Data-
12	CLK+	CLK+	CLK+
13	CLK-	CLK-	CLK-
16	Vdc sensor	Vdc sensor	Vdc sensor
17	GND sensor	GND sensor	GND sensor

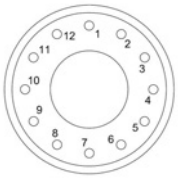
3.8 Connection of power connector YTEC



Pin	Signal description
A	U
B	V
C	W
PE	PE
1	KTY
2	KTY
3	*PTC+
4	*PTC-

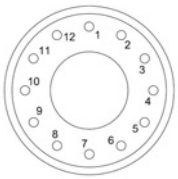
* only for Drive-Cliq protocol

3.9 Connection for incremental measuring systems, signal connector YTEC



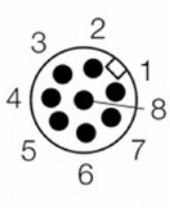
Pin	Signal description HALL	Signal description sin/cos
1	A+	A+
2	A-	A-
3	B+	B+
4	B-	B-
5	-	Z+
6	-	Z-
7	5Vdc	5Vdc
8	GND	GND
9	PTC+	PTC+
10	PTC-	PTC-

3.10 Connection for absolute measuring systems, signal connector YTEC



Pin	Signal description SSI	Signal description BISS/C	Signal description EnDAT
1	A+	A+	-
2	A-	A-	-
3	B+	B+	-
4	B-	B-	-
5	Data+	Data+	Data+
6	Data-	Data-	Data-
7	5Vdc	5Vdc	5Vdc
8	GND	GND	GND
9	PTC+	PTC+	PTC+
10	PTC-	PTC-	PTC-
11	CLK+	CLK+	CLK+
12	CLK-	CLK-	CLK-

3.11 Connection for absolute measuring systems, signal connector M12



Pin	Signal description Drive-Cliq
1	24V
3	RXP
4	RXN
5	GND
6	TXN
7	TXP

3.12 Information about the linear motors

MLE2XXXX

Properties	MLE20105	MLE20210	MLE20210	MLE20420	MLE20630
	HS	HS	IS	HS	NS
Pole pitch, mm			24		
Max. voltage, Ph-Ph, Vdc			600		
Continuous force air-cooled, N	60	120	120	200	360
Peak force, N	105	210	210	400	630
Continuous current, A	1,5	3,0	9,0	6,0	4,5
Peak current, A	3,1	6,2	18,9	12,4	9,2
Maximum speed*, m/s	12	12	24	12	4,5
Power loss, W	49	99	92	197	296
Motor force constant, N/A	39	39	13	39	79
Back EMF phase-phase peak, V/m/s	32	32	11	32	65
Motor constant, N^2/ W	95	190	190	380	570
Resistance per phase, Ω	5.4	2,7	0,3	1,35	3,6
Induction per phase, mH	35	17	2	9	23
Thermal resistance, °C / W	1,5	0,75	0,75	0,38	0,25
Thermal time constant, s			75		

MLE3XXXX

Properties	MLE30105	MLE30210	MLE30210	MLE30420	MLE30630
	HR	HS	IS	HS	NS
Pole pitch, mm			24		
Max. voltage, Ph-Ph, Vdc			600		
Continuous force air-cooled, N	60	120	120	240	360
Peak force, N	105	210	210	420	630
Continuous current, A	1,5	3,0	9,0	6,0	4,5
Peak current, A	3,1	6,2	18,9	12,4	9,2
Maximum speed*, m/s	12	12	24	12	4,5
Power loss, W	49	99	92	197	296
Motor force constant, N/A	39	39	13	39	79
Back EMF phase-phase peak, V/m/s	32	32	11	32	65
Motor constant, N^2/ W	95	190	190	380	570
Resistance per phase, Ω	5.4	2,7	0,3	1,35	3,6
Induction per phase, mH	35	17	2	9	23
Thermal resistance, °C / W	1,5	0,75	0,75	0,38	0,25
Thermal time constant, s			75		

* current values depend on the bus voltage

MLE5XXXX

Properties	MLE50400		MLE50800		MLE51000		MLE51200		MLE51600		MLE52000	
	NS	HS	NS	HS	NS	HS	NS	HS	NS	HS	NS	HS
Pole pitch, mm	24											
Max. voltage, Ph-Ph, Vdc	600											
Continuous force air-cooled, N	200		400		500		600		800		1000	
Peak force, N	400		800		1000		1200		1600		2000	
Continuous current, A	2,26	4,5	4,5	9	4,7	11,3	6,8	14	9	18,1	9,3	22,6
Peak current, A	5	10	10	20	10.4	25	15	31	20	40	20,7	50
Maximum speed*, m/s	3,5	7	3,5	7	3,5	7	3,5	7	3,5	7	3,2	8,1
Power loss, W	150		300		375		450		600		150	
Motor force constant, N/A	93	46,5	93	46,5	112	46,5	93	44,9	93	46,5	112	46,5
Back EMF phase-phase peak, V/m/s	76	38	76	38	92	38	76	38	76	38	92	38
Motor constant, N²/ W	380		760		950		1140		1520		1900	
Resistance per phase, Ω	7,2	1,8	3,6	0,9	4,3	0,72	2,41	0,59	1,81	0,46	2,2	0,37
Induction per phase, mH	54	14	27	7,0	32	5,4	18	4,4	14	3,4	16	3
Thermal resistance, °C / W	0,48		0,24		0,19		0,16		0,12		0,1	
Thermal time constant, s	77											

MLE7XXXX

Properties	MLE71600		MLE72000		MLE74000	
	NR	HR	NS	HS	NS	HS
Pole pitch, mm	24					
Max. voltage, Ph-Ph, Vdc	600					
Continuous force air-cooled, N	760		950		1900	
Peak force, N	1600		2000		4000	
Continuous current, A	4,1	8,2	4,2	10,2	8,5	20,5
Peak current, A	10	20	10	25	20	50
Maximum speed*, m/s	3	6	2,5	6	2,5	6
Power loss, W	430		530		1060	
Motor force constant, N/A	186	93	225	93	225	93
Back EMF phase-phase peak, V/m/s	152	76	183	76	183	76
Motor constant, N²/ W	1750		2150		4300	
Resistance per phase, Ω	6,3	1,6	7,6	1,3	3,8	0,65
Induction per phase, mH	51	13	60	10	30	5
Thermal resistance, °C / W	0,15		0,12		0,06	
Thermal time constant, s	90					

* current values depend on the bus voltage

MLU3XXXX

Properties	MLU30100		MLU30200		MLU30300		MLU30400	
	NS	HS	NS	HS	NS	HS	NS	HS
Pole pitch, mm	30							
Max. voltage, Ph-Ph, Vdc	300							
Continuous force air-cooled, N	29		58		87		116	
Peak force, N	100		200		300		400	
Continuous current, A	0,8	1,5	1,6	2,9	2,4	4,4	3,2	5,8
Peak current, A	2,8	5	5,5	10	8,3	15	11	20
Maximum speed*, m/s	10	18	10	18	10	17	10	16
Power loss, W	47		95		142		190	
Motor force constant, N/A	36,3	19,9	36,3	19,9	36,3	19,9	36,3	19,9
Back EMF phase-phase peak, V/m/s	30	16	30	16	30	16	30	16
Motor constant, N²/ W	24		48		71		95	
Resistance per phase, Ω	18,5	5,5	9,3	2,8	6,2	1,8	4,6	1,4
Induction per phase, mH	6	1,8	3	0,9	2	0,6	1,5	0,4
Thermal resistance, °C / W	1,8		0,9		0,6		0,45	

MLZ2XXXX

Properties	MLZ20105	MLZ20210	MLZ20210
	HR	HS	IS
Pole pitch, mm	24		
Max. voltage, Ph-Ph, Vdc	600		
Continuous force air-cooled, N	60	120	120
Peak force, N	105	210	210
Continuous current, A	1,5	3,0	9,0
Peak current, A	3,1	6,2	18,9
Maximum speed*, m/s	12	12	24
Power loss, W	49	99	92
Motor force constant, N/A	39	39	13
Back EMF phase-phase peak, V/m/s	32	32	11
Motor constant, N²/ W	95	190	190
Resistance per phase, Ω	5,4	2,7	0,3
Induction per phase, mH	35	17	2
Thermal resistance, °C / W	1,5	0,75	0,75
Thermal time constant, s	75		

* current values depend on the bus voltage

MLL2XXXX

Properties	MLL20100	MLL20200	MLL20200	MLL20400	MLL20600
	HS	HS	IS	HS	NS
Pole pitch, mm			24		
Max. voltage, Ph-Ph, Vdc			600		
Continuous force air-cooled, N	60	120	120	240	360
Peak force, N	105	210	210	420	630
Continuous current, A	1,5	3,0	9,0	6,0	4,5
Peak current, A	3,1	6,2	18,9	12,4	9,2
Maximum speed*, m/s	12	12	24	12	4,5
Power loss, W	49	99	92	197	296
Motor force constant, N/A	39	39	13	39	79
Back EMF phase-phase peak, V/m/s	32	32	11	32	65
Motor constant, N²/ W	95	190	190	380	570
Resistance per phase, Ω	5.4	2,7	0,3	1,35	3,6
Induction per phase, mH	35	17	2	9	23
Thermal resistance, °C / W	1,5	0,75	0,75	0,38	0,25
Thermal time constant, s			75		

MLL3XXXX

Properties	MLL30100	MLL30200	MLL30200	MLL30400	MLL30600
	HR	HS	IS	HS	NS
Pole pitch, mm			24		
Max. voltage, Ph-Ph, Vdc			600		
Continuous force air-cooled, N	60	100	120	240	360
Peak force, N	105	200	210	420	630
Continuous current, A	1,5	3,0	9,0	6,0	4,5
Peak current, A	3,1	6,2	18,9	12,4	9,2
Maximum speed*, m/s	12	12	24	12	4,5
Power loss, W	49	99	92	197	296
Motor force constant, N/A	39	39	13	39	79
Back EMF phase-phase peak, V/m/s	32	32	11	32	65
Motor constant, N²/ W	95	190	190	380	570
Resistance per phase, Ω	5,4	2,7	0,3	1,35	3,6
Induction per phase, mH	35	17	2	9	23
Thermal resistance, °C / W	1,5	0,75	0,75	0,38	0,25
Thermal time constant, s			75		

* current values depend on the bus voltage

MLL5XXXX

Properties	MLL50400		MLL50800		MLL51000		MLL51200	
	NS	HS	NS	HS	NS	HS	NS	HS
Pole pitch, mm	24							
Max. voltage, Ph-Ph, Vdc	600							
Continuous force air-cooled, N	200		400		500		600	
Peak force, N	400		800		1000		1200	
Continuous current, A	2.26	4.5	4.5	9.0	4.7	11.3	6.8	14
Peak current, A	5	10	10	20	10.4	25	15	31
Maximum speed*, m/s	3,5	7	3,5	7	3,5	7	3,5	7
Power loss, W	150		300		375		450	
Motor force constant, N/A	93	46,5	93	46,5	112	46,5	93	44,9
Back EMF phase-phase peak, V/m/s	76	38	76	38	92	38	76	38
Motor constant, N²/ W	380		760		950		1140	
Resistance per phase, Ω	7,2	1,8	3,6	0,9	4,3	0,72	2,41	0,59
Induction per phase, mH	54	14	27	7,0	32	5,4	18	4,4
Thermal resistance, °C / W	0,48		0,24		0,19		0,16	
Thermal time constant, s	77							

MLLZ2XXXX

Properties	MLLZ20100	MLLZ20200	MLLZ20200
	HR	HS	IS
Pole pitch, mm	24		
Max. voltage, Ph-Ph, Vdc	600		
Continuous force air-cooled, N	60	120	120
Peak force, N	105	210	210
Continuous current, A	1,5	3,0	9,0
Peak current, A	3,1	6,2	18,9
Maximum speed*, m/s	12	12	24
Power loss, W	49	99	92
Motor force constant, N/A	39	39	13
Back EMF phase-phase peak, V/m/s	32	32	11
Motor constant, N²/ W	95	190	190
Resistance per phase, Ω	5,4	2,7	0,3
Induction per phase, mH	35	17	2
Thermal resistance, °C / W	1,5	0,75	0,75
Thermal time constant, s	75		

* current values depend on the bus voltage

MCEXXXXX

Properties	MCE20100	MCE30100
	HS	HS
Pole pitch, mm	32	32
Max. voltage, Ph-Ph, Vdc	600	600
Continuous force air-cooled, N	28	28
Peak force, N	99	99
Continuous current, A	1,5	1,5
Peak current, A	5,8	5,8
Maximum speed*, m/s	21	21
Power loss, W	16	16
Motor force constant, N/A	19	19
Back EMF phase-phase peak, V/m/s	15	15
Motor constant, N^2/ W	8	8
Resistance per phase, Ω	3,5	3,5
Induction per phase, mH	7	7

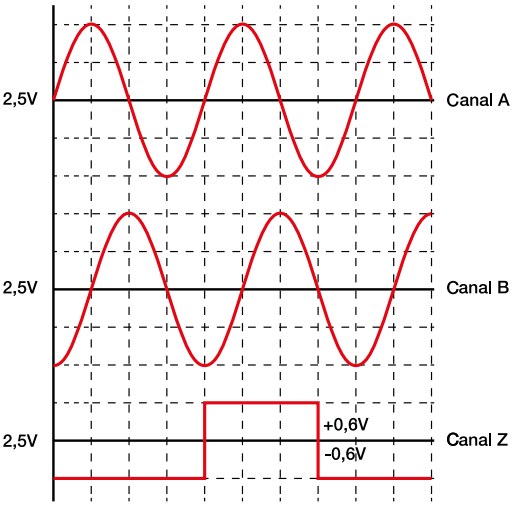
* current values depend on the bus voltage

Notes:

3.13 Information about the incremental measuring system

3.13.1 1Vpp high resolution encoder (Designation MLE-XXXXXXX-00-...). Signal description

The measurement system has a 1Vpp signal output (sin/cos). The division period is 40 µm for standard axes. The graphic representation of the signals is shown in the following table:

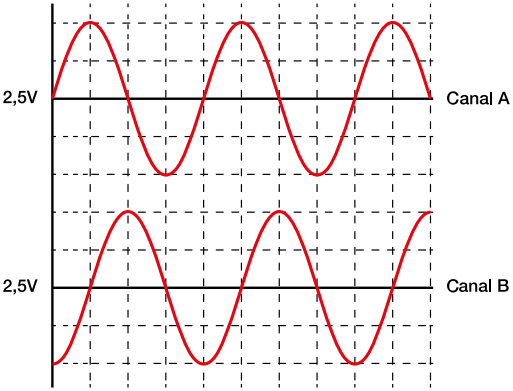


Technical data:

Operating voltage	5Vdc
Tolerance	+/- 5%
Output signal	1Vpp
Resolution	40 µm
Absolute accuracy	+/-10 µm/m
Repeat accuracy	+/-1 µm
Current consumption	250 mA

3.13.2 1Vpp analogue Hall sensor (Designation MLL-XXXXXXX-X9-...). Signal description

The measurement system has a 1Vpp signal output (sin/cos). The division period is 24000 µm for standard axes from the MLL series. The graphic representation of the signals is shown in the following table:



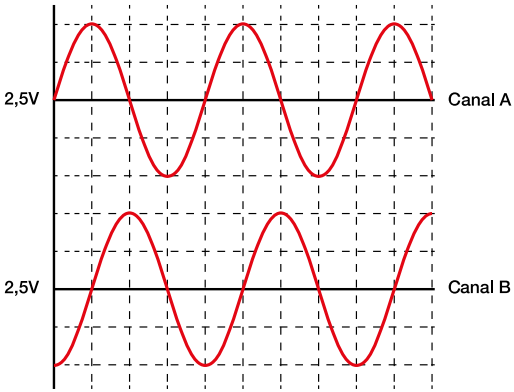
Technical data:

Operating voltage	5Vdc
Tolerance	+/- 5%
Output signal	1Vpp
Resolution	24000 µm
Absolute accuracy	+/-100 µm/m
Repeat accuracy	+/-50 µm
Current consumption	100 mA

3.13.3 1Vpp magnetic encoder (Designation MLL-XXXXXXX-22-...). Signal description

OBSOLETE - OUT OF PRODUCTION

1Vpp signal output (sin/cos). The division period is 1000 µm for standard axes from the MLL series. The graphic representation of the signals is shown in the following table:

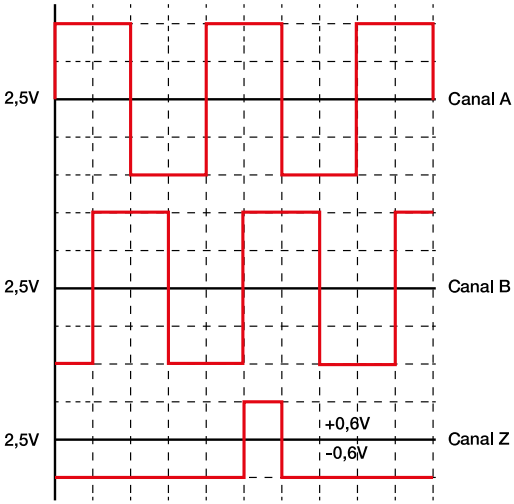


Technical data:

Operating voltage	5-28Vdc
Tolerance	+/- 5%
Output signal	1Vpp
Resolution	1000 µm
Absolute accuracy	+/-15 µm/m
Repeat accuracy	+/-10 µm
Current consumption	100 mA

3.13.4 TTL encoder (Designation MLE-XXXXXXX-04-...). Signal description

The measurement system has a 5Vdc TTL signal output. The division period is 4 µm for standard axes. The graphic representation of the signals is shown in the following table:



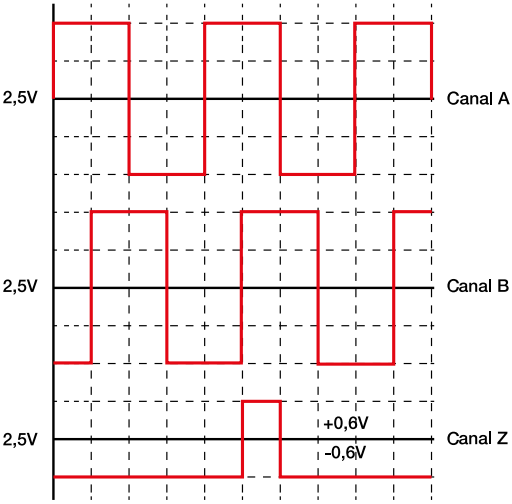
Technical data:

Operating voltage	5Vdc
Tolerance	+/- 5%
Output signal	TTL (RS 422)
Resolution	4 µm / 1 µm
Absolute accuracy	+/-10 µm/m
Repeat accuracy	+/-1 µm
Current consumption	250 mA

3.13.5 TTL magnetic encoder (Designation MLL-XXXXXXX-24-...). Signal description

OBSOLETE - OUT OF PRODUCTION

The measurement system has a 5Vdc TTL signal output. The division period is 1000 µm for standard axes. The graphic representation of the signals is shown in the following table:



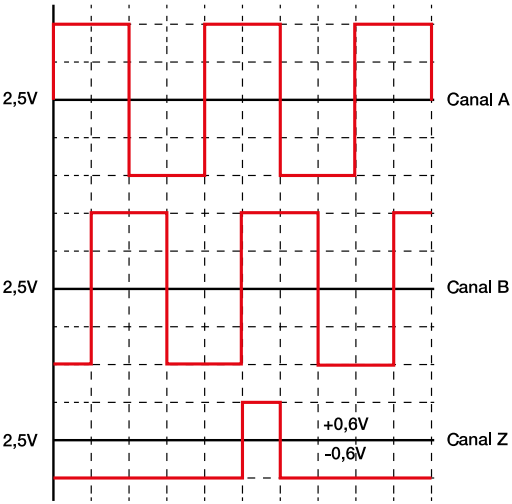
Technical data:

Operating voltage	5-28Vdc
Tolerance	+/- 5%
Output signal	TTL (RS 422)
Resolution	4 µm / 1 µm
Absolute accuracy	+/-15 µm/m
Repeat accuracy	+/-10 µm
Current consumption	100 mA

3.13.6 TTL magnetic encoder (Designation MLL-XXXXXXX-25-...). Signal description

OBSOLETE - OUT OF PRODUCTION

The measurement system has a 5Vdc TTL signal output. The division period is 1000 µm for standard axes. The graphic representation of the signals is shown in the following table:



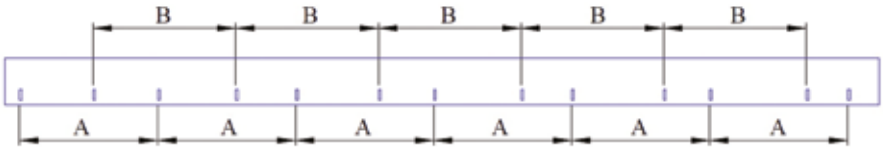
Technical data:

Operating voltage	5-28Vdc
Tolerance	+/- 5%
Output signal	TTL (RS 422)
Resolution	10 µm / 2,5 µm
Absolute accuracy	+/-15 µm/m
Repeat accuracy	+/-10 µm
Current consumption	100 mA

3.13.7 Distance-coded marks

The linear scale with integrated distance marks offers the possibility of displaying the absolute position for a very small carriage movement. This displacement is between approx. 120-240 mm for standard axes. Important parameters are the distance A (distance between fixed marks) and B (distance between moving marks). This means that there is never the same distance between 2 marks over the entire length. For the programmer: the parameters A and B should be entered in the configuration of the servo amplifier. Please contact your supplier of the servo amplifier if you have any queries. It is possible that the configuration parameters of the distance marks may be a little different for some manufacturers of servo amplifiers.

A=6000 impulses or 240 mm travel distance
B=6025 impulses or 241 mm travel distance



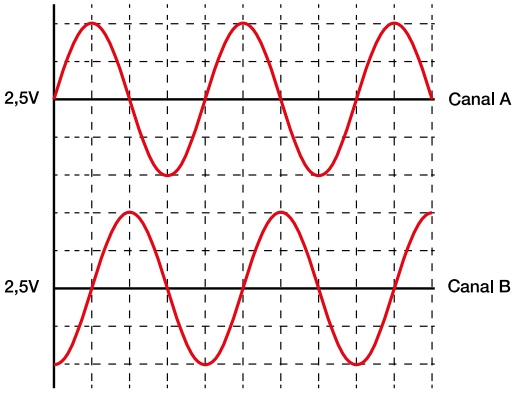
For the application where the reading of distance marks is not possible or not necessary, the user can read the first mark after the stop or limit switch.

3.14 Information about the absolute measuring system

3.14.1 Absolute measuring system. SSI protocol information

SSI Interface is an unidirectional Interface which can output position values.
The Data DATA gets transferred synchronously to the from the subsequent electronics given Clock frequency CLOCK.

Additionally three special Bits (Error, Warning and Parity) will be transferred.



Technical data:

Operating voltage	3.6Vdc-14Vdc
Tolerance	+/- 5%
Nominal current	300 mA

Incremental output:

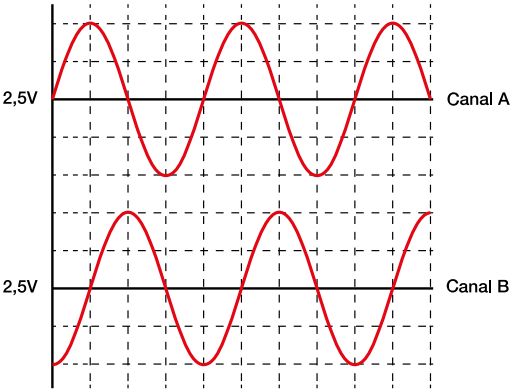
Output signal	1Vpp
Resolution	40 µm

Absolute output:

Protocol	SSI
Clock frequency	200kHz - 1MHz
Number of bits	28+3

3.14.2 Absolute measuring system. BISS/C protocol information

BiSS is an open system - digital interface for sensors and actuators. With real-time data transfer in both directions to have fast and secure communication.



Technical data:

Operating voltage	3.6Vdc-14Vdc
Tolerance	+/- 5%
Nominal current	300 mA

Incremental output:

Output signal	1Vpp
Resolution	40 µm

Absolute output:

Protocol	BISS/C
Clock frequency	2,5MHz
Number of bits	32+2

3.14.3 Absolute measuring system. Drive-Cliq protocol information

Drive-Cliq is an open communication protocol from Siemens AG, based on 100Mbit/ Ethernet. To meet with the standard of Siemens AG, only linear motor axes with the cable output version be used (code: MLExxxxxx-3D-4 -...).
The Sinadrives cable output version is fitted with a M12 plug authorized by Siemens; which can be plugged to the Siemens servo amplifier with standard Siemens cable (Reference: 6FX80022DC30-xx).

Technical data:

Operating voltage	24Vdc
Tolerance	+/- 5%
Nominal current	300 mA

Absolute output:

Protocol	Drive-Cliq

3.14.4 Absolute measuring system. EnDat 2.2 protocol information

The EnDat-Interface is a digital, bi-directional Interface for measuring systems. With this interface you can read out Position values and in the measuring system saved informations. This values can also be updated or new values can be saved. Due to the serial Data transfer four signal wires are enough. The Data gets transferred synchronously to the from the subsequent electronics given Clock frequency. The selection from the mode of transmission (position values, parameter, diagnostics,...) is done with mode-commands which are sent from the subsequent electronics to the measuring system.

Technical data:

Operating voltage	3.6Vdc-14Vdc
Tolerance	+/- 5%
Nominal current	300 mA

Absolute output:

Protocol	EnDAT 2.2
Clock frequency	16MHz

3.14.5 Absolute measuring system. Fanuc - α protocol information

Normal and high speed, two-pair transmission interface, for Fanuc devices.

Technical data:

Operating voltage	3.6Vdc-14Vdc
Tolerance	+/- 5%
Nominal current	300 mA

Absolute output:

Protocol	Fanuc - α

3.15 Troubleshooting

PROCEDURE FOR COMMISSIONING.
Please make sure that the following 6 steps were observed.

1. The motor parameters and encoder parameters are entered in the servo amplifier. Please see Chapter 1
2. Move the carriage by hand and check whether the position is determined on the servo controller/ control unit. Please see Chapter 2
3. Move the motor with an open control circuit (V/f) and check whether the direction of movement is the same as the position displayed on the servo amplifier. Please see Chapter 3
4. Commutation finding/ phasing/wake and shake. It is possible that your servo amplifier has another term for this procedure. It involves the synchronisation of the encoder signals with the motor phases. Please see Chapter 4
5. Move the carriage with the servo amplifier with the control circuit closed. (JOG+/JOG-) Please see Chapter 5
6. Set the circuit control parameters and filter according to your requirement. Please see Chapter 6

Chapter 1

The motor type and measurement system is stated on the identification plate for every axis. You can then find the motor parameters and measurement system parameters in our manual. Important: Please make sure the parameters are correctly adopted.

Chapter 2

Measurement system test
Move the carriage by hand and check the current position in the servo amplifier.
In addition, if the servo amplifier allows it, check the representations of the signals A and B on the oscilloscope.

ERRORS	POSSIBLE CAUSES	SOLUTION
The servo amplifier does not detect the measurement system.	Incorrect parameters entered in the servo amplifier.	Check the parameters in the servo amplifier.
	Error in cable connection	Check the pin assignment
	Power supply of the measurement system is incorrect	Check the power supply in the servo amplifier. Check the voltage losses especially for extended cables (>10m)
	Error in the measurement system	Contact the manufacturer SINADRIVES
The servo amplifier reads the position but the measurement is incorrect	Incorrect resolution parameters were entered when configuring the servo amplifier.	Check the parameters of the servo amplifier.
A channel (A or B) does not give any signal	Error in the connection cable.	Check the cable pinout
	Error in the measurement system	Contact the manufacturer SINADRIVES

Chapter 3

Motor test
Move the motor with an open control circuit (V/f) and check whether the direction of movement is the same as the position displayed on the servo amplifier.

ERRORS	POSSIBLE CAUSES	SOLUTION
Power supply of the motor does not work	Error in cable connection	Check the cable pinout.
The motor is supplied with current but does not move	Error when configuring the motor with the servo amplifier	Check the configuration with the servo amplifier.
	Error in the motor	Contact the manufacturer SINADRIVES
	Axis blocked	Check whether the carriage can move.
The motor moves in the opposite direction of the measurement system	Motor phases reversed	Reverse the phases of the motor orreverse the counting direction of the measurement system (parameter) in the servo control system.

Chapter 4

Commutation test
Commutation finding/ phasing/wake and shake. It is possible that your servo amplifier has another term for this procedure. It involves the synchronisation of the encoder signals with the motor phases.

ERRORS	POSSIBLE CAUSES	SOLUTION
Excessive current consumption	Incorrect parameters entered in the servo amplifier.	Check the parameters in the servo amplifier.
	Error in measurement system	Check Chapter 1 and Chapter 2
	Error in the motor	Check Chapter 1 and Chapter 2
	Axis blocked	Check whether the carriage can move.
	Axis blocked	Check whether the carriage can move.

Chapter 5

Movement test
Move the carriage with the servo amplifier with the control circuit closed (JOG+/ JOG-). This movement must be performed over the entire stroke length.

ERRORS	POSSIBLE CAUSES	SOLUTION
Excessive noise development during the entire process sequence	Poor signal of the measurement system	Check Chapter 2
		Set the control circuit and the filter of the measurement system
Too high in places Noise development	Poor signal of the measurement system	Check unevenness as well as mechanical twisting of the axis at points with increased usage
	Axis blocked	Check unevenness as well as mechanical twisting of the axis at points with increased usage. Check any structures.
	Tape measure damaged	Visual inspection of the complete tape measure
Excessive current consumption for complete cycle run	Overloaded	Check whether the payload complies with the calculation.
	Commutation faulty	Check Chapter 4
Too high at times Current consumption	Axis jams	Check unevenness as well as mechanical twisting of the axis at points with increased usage

Chapter 6

Setting of the control parameters
Set the circuit control parameters and filter according to your requirement.

ERRORS	POSSIBLE CAUSES	SOLUTION
Excessive noise development during the entire process sequence	Poor signal of the measurement system	Set the control parameters and the filter of the measurement system
	Poor shielding of the cable	Check the cabling at unshielded locations
	Poor signal of the measurement system	Check the power supply in the servo amplifier. Check the voltage losses especially for extended cables (>10m)
Excessive current consumption for complete cycle run	Overloaded	Check whether the payload complies with the calculation.
Large contouring errors	Incorrectly configured	Set control parameters
	Poor signal of the measurement system	Set control parameters
	Resolution of the measurement system	Check technical specifications

4. Maintenance & Lubrication

SINADRIVES linear motor axes are maintenance-free, except for the guide rails and the blocks. Parts like linear motors and measuring sensors should be changed/adjusted only by a qualified specialist. To carry out this work, special equipment is needed to avoid damage, demagnetization or incorrect wiring. In case of faulty function, please contact the SINADRIVES team or the official sales partner in your area.

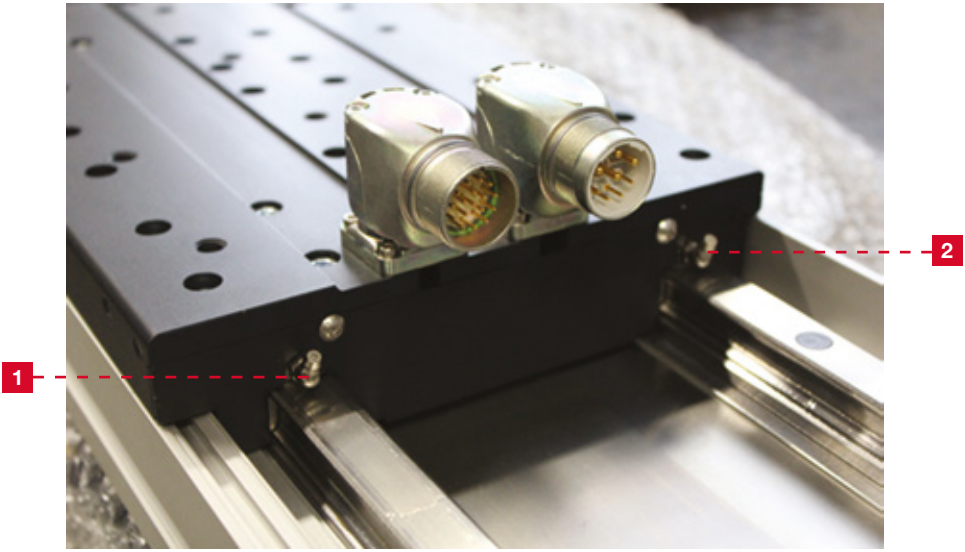
The only periodic maintenance required is the lubrication of the bearings. As the frequency of lubrication varies depending on the specific application, parameters, and environmental conditions, please read section 4.6. Grease frequency*. It is expected that a three to six month lubrication frequency will be adequate to ensure a reliable service life of the bearings.

4.1 Lubrication for MLE, MLL and MCE - Modules

Bearing grease that complies with the standards DIN 51824, DIN 51825 or DIN 51517 is to be used.

4.2 Lubrication procedure

1. Grease the nipples 1-4 with a grease gun.
2. Slowly move the carriage by hand, so that the grease can be spreaded.
3. Repeat steps 1 and 2.
4. Remove all excess residues from the rails using a clean cloth.

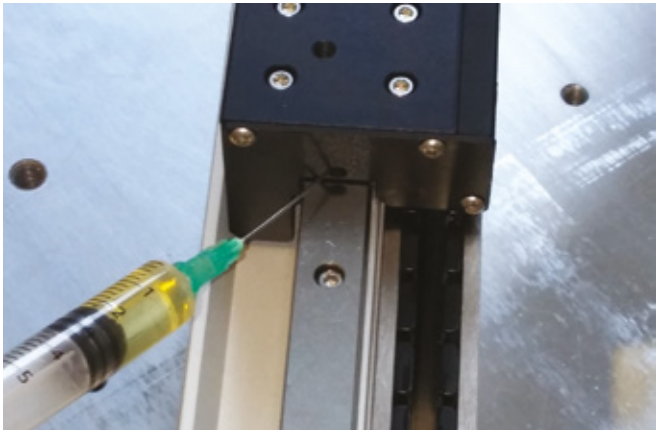


Grease nipples 3 and 4 are attached on the other side of the carriage.

4.3 Lubrication for MLU and MLZ - Modules

The MLU and the MLZ - Modules do not have a grease nipple. Here the lubrication is done by introducing oil into the hole of the carriage using a syringe.

Bearing grease that complies with the ISO VG 35 - SAE 10W norm is to be used.

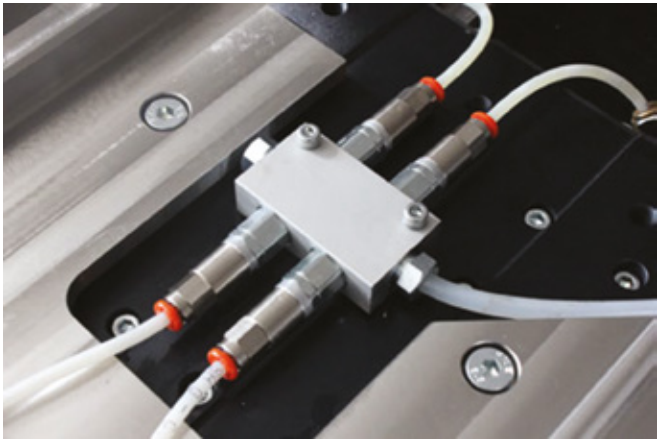


4.4 Central oil lubrication

As an option, SINADRIVES provides a central oil lubrication system. All locations to be lubricated are connected by a 6mm hose.

This system allows all the locations to be lubricated to be reached pneumatically or manually. The electrical and pneumatic pump is not included in the delivery. We recommend using a pump with a minimum pressure of 25 bar. The best way to control the system is via PLC. The dose time should be between 20-30 seconds.

For the supply, we recommend a line with an outer diameter of 6mm and a wall thickness of 1.5mm that can withstand a minimum pressure of 25 bar.



4.5 Grease volume for standard axes (per each carriage)*

Type	Volume mm³
MLE2/MLL2	1750
MLE3/MLL3	1750
MLE5/MLL5	1750
MLE7	1800
MLU	1000
MLZ/MLLZ	1000
MCE2	1750
MCE3	1750

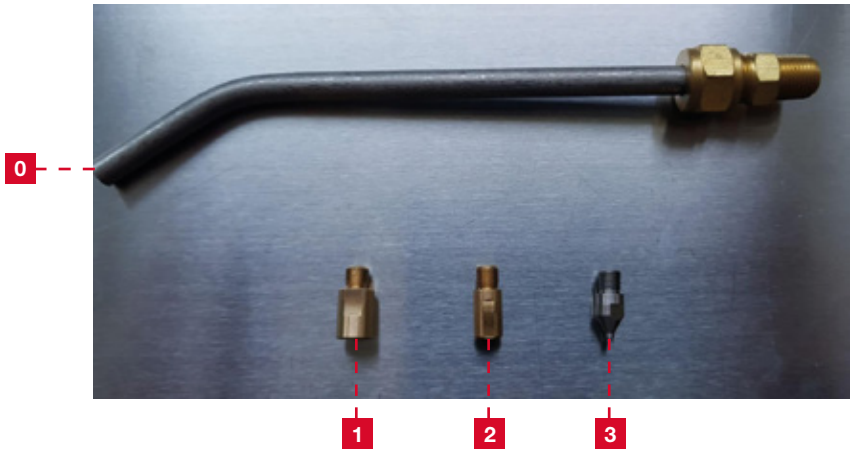
4.6 Grease frequency*

All Types	Cycle between 70% – 100% each 3 months or after 300 km Cycle between 20% – 70% each 6 months or after 600 km

* depending on application, ambient temperature and dirtiness

4.7 Lubrication kit

SINADRIVES offers you the following lubrication kit:



This kit contains a connection pipe (0) and three different adapters (1, 2, 3) for the respective grease nipples.

Code: S-SOIL010

5. CE Certification

5.1 Assembly guidelines pursuant to Annex VI of Directive 2006/42/EC

This Directive applies to the manufacturer of the machine in which the SINADRIVES product is installed.
The product from SINADRIVES is a part of a complete machine or system. It is constructed pursuant to Directive 2006/42/EC ans primarily consists of a guide element and a linear motor.

Assembly, installation, maintenance, repair and disassembly or dismantling may only be carried out by qualified persons from the field of electrical engineering or mechanical engineering. Only SINADRIVES authorized spare parts many be used for repairs.
Mounting in the machine to be completed and assembly may only be carried out by specialist personnel with the associated documents (drawings, manual).

Under certain circumstances, risks according to DIN EN 14121-1 may arise due to out product.

The manufacturer of the end product is obliged to prevent these risks. The observance of these risks does not only relate to the phases of installation, commissioning and maintenance, but also repairs to the product. You can find a risk assessment created by SINADRIVES in the following Annex.

The respective national provisions, regulations and directives for disposal of parts that are no longer used must be complied with.

5.2 Annex for the assembly guidelines

General risks that are to observed during assembly:

SINADRIVES®
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Risk	
The customer dispenses with the machine standard IEC, EN, VDE	The relevant standards such as IEC, EN or VDE must be applied.
Power connection and operating voltage	The product was developed and manufactured according to VDE 0100, EN 60034 and EN 60335. The assembly of the product is only allowed in machines that comply with these standards.
Heat, temperature, fire	If the product is faulty, a risk of fire can arise. The product heats up during operation and so it must be ensured that it does not come into contact with combustible materials.
Mechanical forces, moving parts	The product must be protected from a fall, impact, collisions or other forces acting externally. The risk is higher for vertically operating axes.
Unintentional movements	The product must protected from damage that can arise from unintentional and uncontrolled movement.
Improper use	It must always be ensured that the product is only applied in the field for which it was manufactured.
Commissioning	Commissioning must be carried out with special care and with the support of the manual. If there are any problems or uncertainties, please contact the manufacturer.
Surrounding area	The surrounding area must be specified when ordering the product.
Magnetic field	The product generates a constant magnetic field even when the mains voltage is not connected. Measures must be taken to be able to prevent any dangers that can arise due to this magnetic field.

5.3 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES®
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Document:	**DI-MLE2-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLE2**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 01 January 2016
Signature:	

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Technical Head

5.4 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES
DIRECT DRIVE EXPERTS

Document:	**DI-MLE3-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLE3**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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5.5 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES®
DIRECT DRIVE EXPERTS

Document:	**DI-MLE5-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLE5**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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5.6 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES
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Document:	**DI-MLE7-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLE7**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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Technical Head

5.7 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES®
DIRECT DRIVE EXPERTS

Document:	**DI-MLU3-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLU3**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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Technical Head

5.8 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES
DIRECT DRIVE EXPERTS

Document:	**DI-MLZ2-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLZ2**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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Technical Head

5.9 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES®
DIRECT DRIVE EXPERTS

Document:	**DI-MLL2-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLL2**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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Technical Head

5.10 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES
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Document:	**DI-MLL3-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLL3**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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Technical Head

5.11 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES®
DIRECT DRIVE EXPERTS

Document:	**DI-MLL5-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLL5**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 25 March 2015
Signature:	

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Technical Head

5.12 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES
DIRECT DRIVE EXPERTS

Document:	**DI-MLLZ2-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MLLZ2**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 01 January 2016
Signature:	

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Technical Head

5.13 EC Declaration of Incorporation pursuant to EC Machine Directive 2006 / 42 / EC Annex II Part B

SINADRIVES®
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Document:	**DI-MCE3-01-EN.pdf**
Manufacturer/distributor:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L. Ctra. Girona - Anglés, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Product designation:	Linear motor axis with integrated linear motor

We hereby declare that the following product

Type designation: **MCE3**

meets the basic requirements of Machine Directive (2006/42/EC).

The incomplete machine may only be put into operation when it has been determined that the machine in which the incomplete machine should be installed complies with the regulations of Machine Directive (2006/42/EC).
Applicable harmonised standards, in particular:

EN ISO 12100-1	Safety of Machinery - General Principles for Design. Part 1: Terminology, Methodology
EN ISO 12100-2	Safety of Machinery - General Principles for Design. Part 2: Technical Principles and Specifications

The manufacturer declares that the special technical documentation for the incomplete machine will be forwarded to the national authority on request.

The special technical documents belonging to the incomplete machine were issued according to Annex VII Part B.

Name and address:	SINADRIVES SAIN AUTOMATION SOLUTIONS S.L.
Responsible person:	Sr. Carles Burch Suñer Ctra. Girona - Angles, km. 106 17162 Vilanna - Bescanó, (Girona) - Spain
Place, Date:	Bescanó, 23 October 2017
Signature:	

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Technical Head

6. Certificate Clean Room

6.1 Colandis GmbH ISO3

clean air for your workflow

clean air for products · tools for clean air · clean air for rooms · service for clean air · clean air to go · materials for clean air · clean air for transfer

Partikelmessungen an einem Betriebsmittel

Protokoll Nr.:	**203545**
Ort der Messung:	COLANDIS GmbH Im Camisch 34 07768 Kahla; Deutschland
Artikelbezeichnung:	**Linearmotorachse mit integriertem Linear Motor** **TYP: MLL**
Artikelnummer:	**MLL2XXXXXS-XX-X-C-ST-XX-00804-000**
Zeichnungsnummer:	-
Seriennummer:	-
Baujahr:	-
Hersteller:	**SINADRIVES** SAIN AUTOMATION SOLUTIONS Unsöldstrasse 2 80538 München; Deutschland
Art der Messdurchführung:	**gemäß der DIN 14644 und VDI 2083 Blatt 9.1**
Messpersonal:	Aurelio Spannhof / Ralf Döhner COLANDIS GmbH
Datum der Messung:	21.06.2017 - 23.06.2017

Zusammenfassung des Messergebnisses

Test	Bemerkung	Wertung
Visuelle Inspektion	Design. Material. Sauberkeit	i.O.
Partikelmessung Reinraum (Leerlauf)	ISO Klasse 1	erfüllt
Klassifizierung Linearmotorachse – MLL bei v=1000 mm/s ; a=1000 mm/s²	ISO Klasse 3	erfüllt
Klassifizierung Linearmotorachse – MLL bei v=1500 mm/s ; a=1000 mm/s²	ISO Klasse 5	erfüllt
Zusammenfassung		i.O.

A. Spannhof

Unterschrift Messdurchführung
COLANDIS GmbH

COLANDIS
the clean air company
Im Camisch 34 - D-07768 Kahla

Cleanroom tested COLANDIS ISO 14644 VDI 2083

COLANDIS GmbH · Im Camisch 34 · D-07768 Kahla
Telefon +49 36424 7694-0 · E-Mail: info@colandis.com · www.colandis.com

COLANDIS
the clean air company

7. Component Assembly

7.1. Assembly of the measuring tape

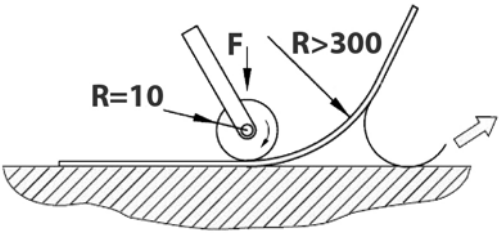
The rail must be mounted and aligned. Make sure that it is also fat-free (cleaning with alcohol, acetone, etc.).

7.1.1. Assembly instructions of the measuring tape

The tape must not be bent with a radius <300 mm. Take particular care that no bends or kinks occur during the entire mounting process. Make sure that the position of the measuring tape is aligned in accordance with the following pictures:

- Unpack the measuring tape and lay flat on the entire length.
- Pull off max. 300mm of the cover foil from the backside of the measuring tape.
- Press the measuring tape onto the mounting surface.
- Repeat this process until the entire tape is mounted.

Using a mounting roll, the measuring tape is pressed on the surface with a force of ~ 250 N / cm².



ATTENTION!
The adhesive strength is created by pressure. The final strength is reached at ~ 20 °C after 48h.

Notes:

Notes:

Notes:

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Innovation & Excellence

Linear Units based on Direct Drives technology