

Iron core motors

T	L	06	S
U	M	12	N

T = Iron core

U = Ironless

LM = Series type

06 12 = Number of coils

SN = Winding type



See
P.14

TBW series

Fu 2700-6750N Fc 1140-2850N

The TBW series is the water cooled variant of the TB series. It features a fully integrated, highly efficient cooling system which enables the TBW to reach even higher continuous forces than the standard version and sustain extreme accelerations while maintaining its sub micron position accuracy. Since heat is not dissipated into the machine's construction, it is especially suited for applications where thermal management is an issue.

See
P.12

TB series

Fu 1800-4500N Fc 760-1900N

The high-end TB motors are heavy duty workhorses that combine high acceleration and speed, sub micron positioning accuracy and low power consumption with a superb force density. They excel in applications where high loads and long duty cycles are the order of the day. When you require a motor that takes your application to new levels, the TB more than delivers.

See
P.10

TL series

Fu 450-3600N Fc 200-1600N

The mid-range TL is our most popular iron core motor. It features an extremely low attraction force between the coils and the magnets and stands out for its small size, high acceleration, high speed and accuracy. The TL is also available in long versions, which makes this all-rounder suited for nearly any application, including those with long travel lengths, like printers for large digital formats.

See
P. 8

TM series

Fu 120-720N Fc 60-360N

For applications that do not require high forces, it is often more effective to use a smaller and less costly motor. Over the years, the TM series has proven to be a very versatile, reliable and efficient motor for a wide range of applications. To enhance its effectiveness, the TM linear motor is equipped with a long flexible servo cable which makes the use of additional connectors superfluous and reduces total cost of ownership even further.

Ironless motors



T	L	06	S
U	M	12	N

T = Iron core

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L M = Series type

06 12 = Number of coils

S N = Winding type

See
P.24

UXX / UXA series

Fp 615-4200N Fc 120-846N

The UXX is the most powerful standard ironless motor we have to offer. It is ideal for heavy duty industrial applications that demand ultra precision and maximum force output. The UXA is the economical alternative to the UXX. It's slightly less powerful, but makes up for this with a smaller footprint and an attractive price tag.

See
P.22

UL series

Fp 240-1200N Fc 70-350N

The high-end UL ironless motors are available in various configurations that can easily be adapted to application specific requirements. Because of their high speed, positioning accuracy, zero cogging and attraction force, many UL motors are successfully applied throughout the semiconductor industry.

See
P.20

UM series

Fp 100-400N Fc 29-116N

The mid-range UM ironless motors stand out for their extremely high speed and exceptional thermal characteristics which are the result of our unique production techniques. This makes the compact UM motors especially suited for applications in which highly accurate measuring is required.

See
P.18

UF series

Fp 42.5-85N Fc 19.5-39N

The UF series is built specifically to sustain very high continuous forces for its footprint, which is only marginally larger than that of the UC. It is exceptionally suited for applications with high duty cycles, for instance in the medical and semiconductor markets or for pick & place systems.

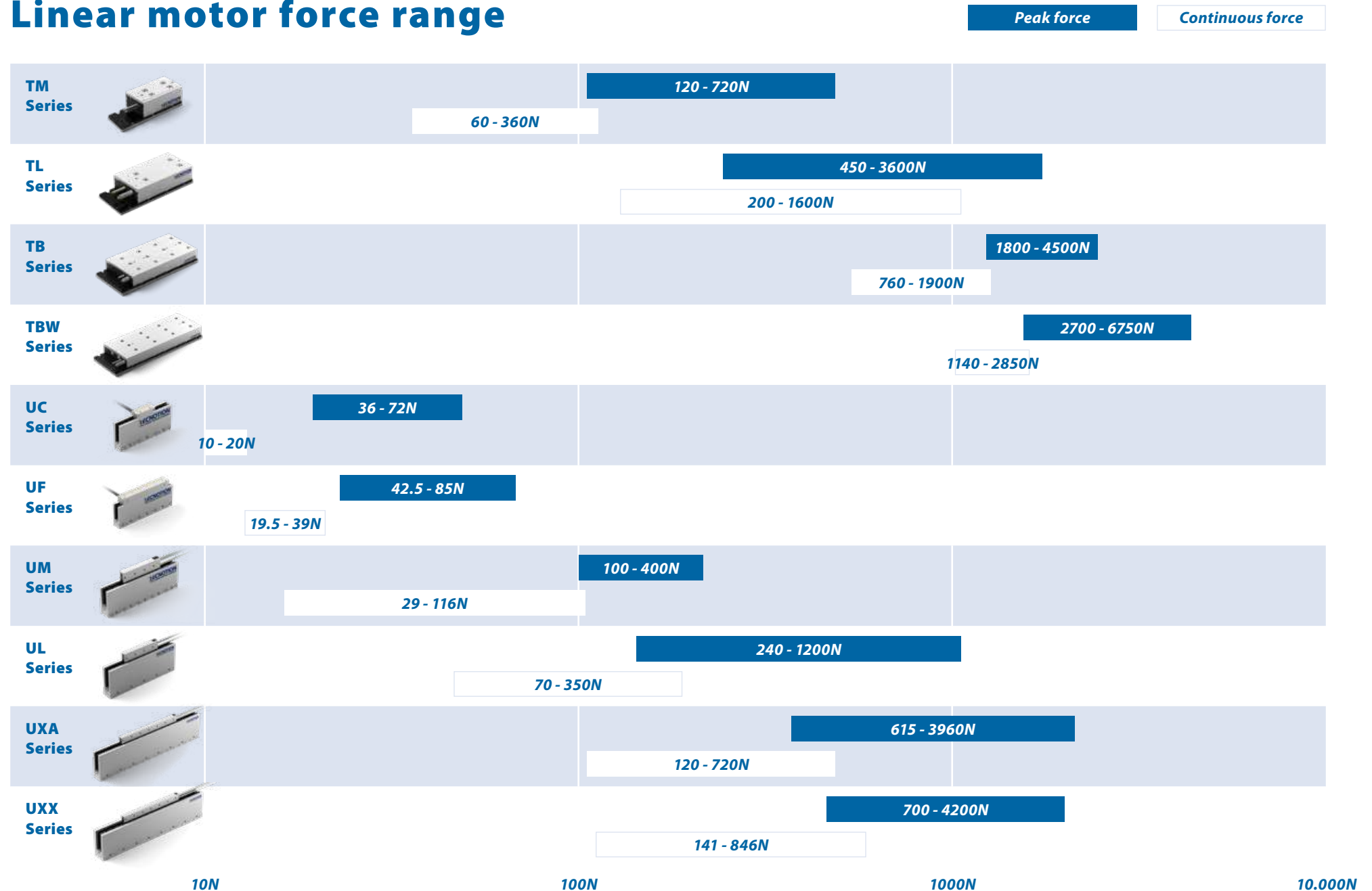
See
P.16

UC series

Fp 36-72N Fc 10-20N

The UC is our smallest "off the shelf" motor. Weighing in at just a few grams, this versatile, compact and affordable motor is still able to sustain a continuous force of 10 or 20N. Due to its low weight it is also suited to operate in a vertical application environment.

Linear motor force range



Features

Tecnotion's linear motor performance advantages

Modular system. All motors can be used in various configurations:



1. Single moving coil 2. Moving magnet 3. Parallel coupled coil 4. In-line on a single track 5. Crosstable or gantry

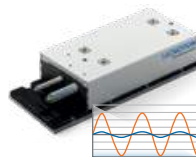
The direct drive technology of linear motors is a perfect way to enhance productivity, accuracy, and dynamic performance. Linear motors eliminate the need for mechanical transmissions like rack and pinion, belts and speed reducers. Between coil unit and magnets there is no contact, this means no mechanical wear. The technology makes designs slimmer, modular and reduces costs.



High force density

More force in a smaller packing means lowering footprint and fits better in small(er) spaces.

F/cm^3



Low cogging

Optimized iron core motor design, for smooth motion and position accuracy in your application.



Approved for CSA and CE, RoHS

Iron core motors are approved for CE, CSA and ROHS.



Aluminium housed design

Housed design with integrated water cooling for TBW- and TL series.



High acceleration and dynamics

The outstanding force to mass ratio of the ironless coils enables unmatched system dynamics.



No cogging, extremely low force ripple

Ironless motors have no cogging effects. Offering smooth motion and position accuracy in your application.



Approved for CE and RoHS

Ironless motors are CE and RoHS approved.



Low thermal resistance

Allowing good heat transfer, achieving an extremely high continuous force for all motors when using a decent size heatsink or active cooling.



TM3 on 144mm magnet plate shown

TM Series Iron Core

Parameter		Remarks	Symbol	Unit	TM3		TM6		TM12	TM18	
Performance	Winding type				S	Z	S	Z	S	N	S
	Motortype, max voltage ph-ph				3-phase synchronous Iron core, 400V _{ac rms} (565 V _{dc})						
	Ultimate force @ 10°C/s increase	magnet @ 25°C	F _u	N	120		240		480		720
	Peak force @ 6°C/s increase	magnet @ 25°C	F _p	N	105		210		420		630
	Continuous force*	coils @ 100°C	F _c	N	60		120		240		360
	Maximum speed**	@ 600 V	V _{max}	m/s	12	36.6	12	36.5	12	4.5	10.0
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	39	12.9	39	12.9	39	79	39
	Motor constant	coils @ 25°C	S	N ² /W	95		190		380		570
Electrical	Ultimate current	magnet @ 25°C	I _u	A _{rms}	4.1	12.6	8.2	25.1	16.4	12.3	25.1
	Peak current	magnet @ 25°C	I _p	A _{rms}	3.1	9.5	6.2	18.9	12.4	9.2	18.9
	Maximum continuous current*	coils @ 100°C	I _c	A _{rms}	1.5	4.7	3	9.3	6	4.5	9.3
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	32	11	32	11	32	65	32
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	5.4	0.56	2.7	0.28	1.35	3.6	0.85
	Induction per phase	I < 0.6 Ip	L _{ph}	mH	35	3.65	17	1.83	9	23	5.5
	Electrical time constant*	coils @ 25°C	τ _e	ms	6.5						
Thermal	Maximum continuous power loss	all coils	P _c	W	49		99		197		296
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	1.5	1.5	0.75		0.38		0.25
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	75						
Mechanical	Temperature cut-off / sensor				PTC 1kΩ / KTY 83-122						
	Coil unit weight	ex. cables	W	kg	0.6		0.9		1.6		2.3
	Coil unit length	ex. cables	L	mm	93		143	143	241		336
	Motor attraction force	rms @ 0 A	F _a	N	300		500		900		1300
	Magnet pitch NN		τ	mm	24						
	Cable mass		m	kg/m	0.18						
	Cable Type (power FLEX)	length 3 m	d	mm (AWG)	8.3 (≥18)						
	Cable type (sensor)	length 3 m	d	mm (AWG)	4.3 (26)						
	Cable Life (power FLEX)***	minimum			5,000,000 cycles						
	Bending Radius Static	minimum			4x cable diameter						
	Bending Radius Dynamic (power FLEX)	minimum			10x cable diameter						

All specifications ±10%

FLEX Cable

The TM series comes standard with a 3m long FLEX power cable.

Magnet plate dimensions

Le (mm)	96	144	384
M5 bolts	4	6	16
Mass (kg/m)	2.1		

Magnet plates can be butted together.

Approvals



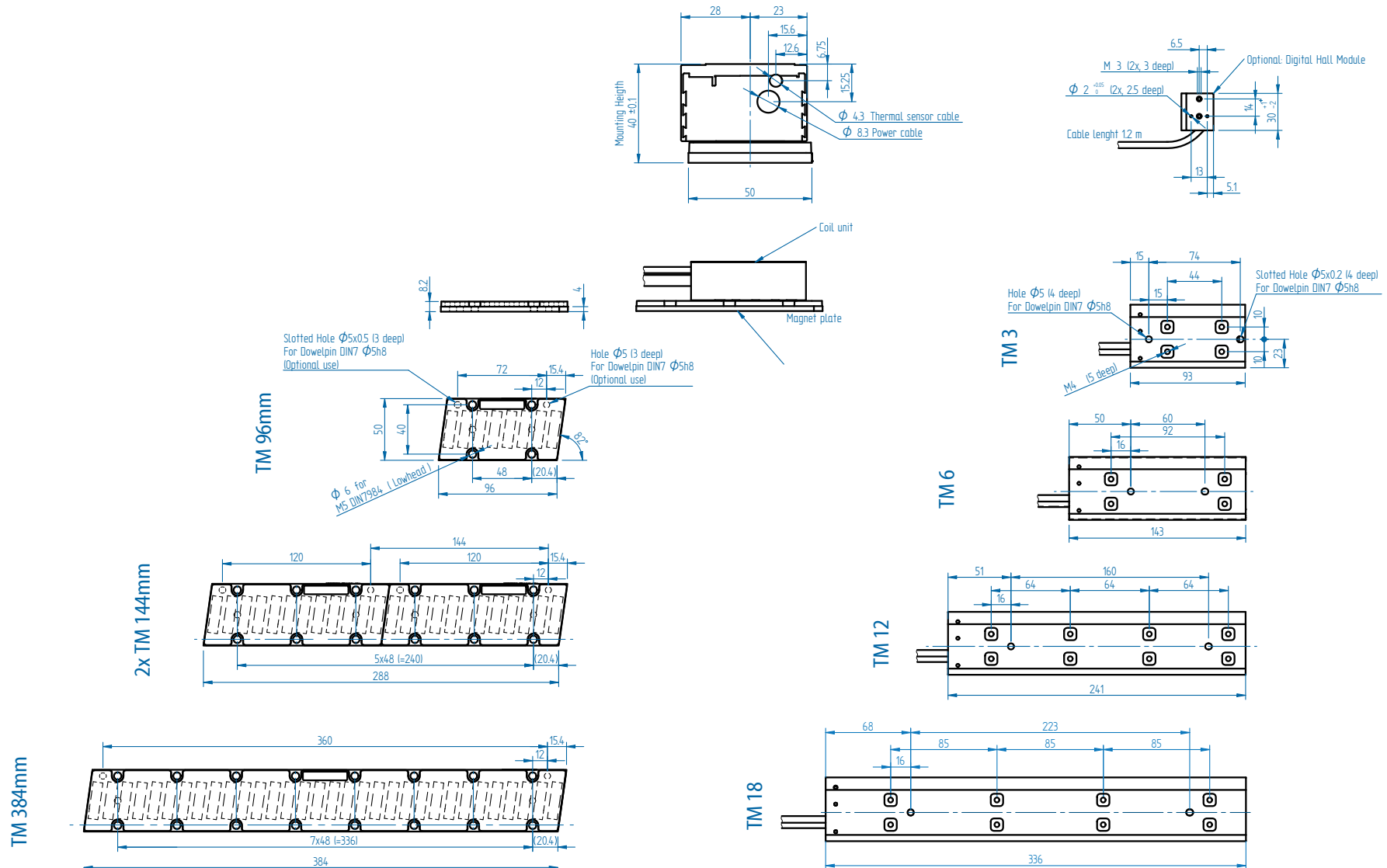
* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

*** Depending on bending radius, velocity and acceleration.

Magnet plates

Coil units



Mounting instructions and flatness or parallelism requirements can be found in the iron core installation manual. CAD files, 3D models and the manual can be downloaded from our website.

* All sizes are in mm

TL Series Iron Core



TL6 on 192mm magnet plate shown

Water cooling

All TL motors feature integrated cooling channels that allow for the easy setup of a liquid cooled system, at no additional cost.

Magnet plate dimensions

Le (mm)	192	288
M5 bolts	8	12
Mass (kg/m)	3.8	

Magnet plates can be butted together.

Approvals



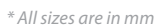
	Parameter	Remarks	Sym	Unit	TL6	TL9	TL12	TL15	TL18	TL24	TL48						
Performance	Winding type				N	S	N	S	N	S	N	S	N	S	N	S	Q
	Motortype, max voltage ph-ph				3-phase synchronous Iron core, 400V _{ac rms} (565 V _{dc})												
	Ultimate force @ 10°C/s increase	magnet @ 25°C	F _u	N	450		675		900		1125		1350		1800		3600
	Peak force @ 6°C/s increase	magnet @ 25°C	F _p	N	400		600		800		1000		1200		1600		3200
	Continuous force watercooled*	coils @ 100°C	F _{cw}	N	210		315		420		525		630		840		1680
	Continuous force	coils @ 100°C	F _c	N	200		300		400		500		600		800		1600
	Maximum speed**	@ 560 V	V _{max}	m/s	3.5	7	2.5	7	3.5	7	3.5	7	3.5	7	3.5	7	1.7
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	93	46.5	140	46.5	93	46.5	112	46.5	93	44.9	93	46.5	180
Electrical	Motor constant	coils @ 25°C	S	N ² /W	380		570		760		950		1140		1520		3040
	Ultimate current	magnet @ 25°C	I _u	A _{rms}	6.5	13.1	6.5	19.6	13.1	26.2	13.5	32.7	19.6	41	26.2	52	27.1
	Peak current	magnet @ 25°C	I _p	A _{rms}	5.0	10.0	5.0	15.0	10.0	20.0	10.4	25.0	15.0	31.0	20.0	40.0	20.7
	Continuous current watercooled*	coils @ 100°C	I _{cw}	A _{rms}	2.26	4.5	2.26	6.8	4.5	9.0	4.7	11.3	6.8	14.0	9.0	18.1	9.4
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	76	38	114	38	76	38	92	38	76	38	76	38	147
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	7.2	1.80	10.8	1.21	3.6	0.90	4.3	0.72	2.41	0.59	1.81	0.46	3.45
	Induction per phase	I < 0.6 Ip	L _{ph}	mH	54	14	81	9.0	27	7.0	32	5.4	18	4.4	14	3.4	25.9
	Electrical time constant*	coils @ 25°C	τ _e	ms	7.5		7.5		7.5		7.5		7.5		7.5		7.5
Thermal	Maximum continuous power loss	all coils	P _c	W	150		225		300		375		450		600		1200
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	0.48		0.32		0.24		0.19		0.16		0.12		0.06
	Thermal Time constant*	up to 63% max. coiltemp.	τ _{th}	s	77		77		77		77		77		77		77
	Watercooling flow	for ΔT=3K	Φ _w	l/min	0.7		1.1		1.4		1.8		2.2		2.9		5.7
	Watercooling pressure-drop	order of magnitude	ΔP _w	bar	1		1		2		2		2		3		7
	Temperature cut-off / sensor				PTC 1kΩ / KTY 83-122												
Mechanical	Coil unit weight	ex. cables	W	kg	1.5		2.0		2.6		3.2		3.8		5.2		9.75
	Coil unit length	ex. cables	L	mm	146		194		244		290		336		468		855
	Motor attraction force	rms @ 0 A	F _a	N	950		1325		1700		2075		2450		3400		6400
	Magnet pitch NN		τ	mm	24		24		24		24		24		24		24
	Cable mass		m	kg/m	0.18		0.18		0.18		0.18		0.18		0.30		0.18
	Cable type (power)	length 1 m	d	mm (AWG)					9.6 (18)						11.9 (14)		11.4 (14)
	Cable type (sensor)	length 1 m	d	mm (AWG)					4.3 (26)						4.3 (26)		4.3 (26)

All specifications ±10%

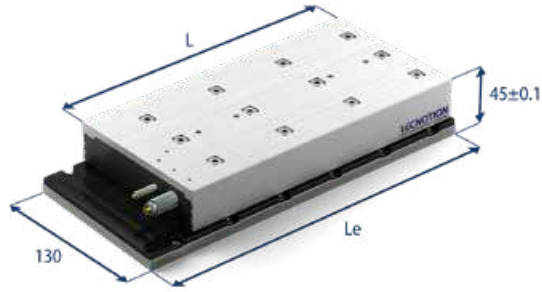
* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

Coil units



TB Series Iron Core



TB12 on 288mm magnet plate shown

Magnet plate dimensions

Le (mm)	192	288
M5 bolts	8	12
Mass (kg/m)	10.5	
Magnet plates can be butted together.		

Approvals



Parameter	Remarks	Symbol	Unit	TB12		TB15		TB18	TB24		TB30	
Winding type				N	S	N	S	N	N		N	S
Motor type, max voltage ph-ph				3-phase synchronous Iron core, 400V _{ac rms} (565 V _{dc})								
Ultimate force @ 10°C/s increase	magnet @ 25°C	F _u	N	1800		2250		2700		3600		4500
Peak force @ 6°C/s increase	magnet @ 25°C	F _p	N	1600		2000		2400		3200		4000
Continuous force*	coils @ 100°C	F _c	N	760		950		1140		1520		1900
Maximum speed**	@ 560 V	V _{max}	m/s	3	6	2.5	6	3		2.5		2.5 6
Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	186	93	225	93	186		232		225 93
Motor constant	coils @ 25°C	S	N ² /W	1750		2150		2640		3520		4300
Ultimate current	magnet @ 25°C	I _u	A _{rms}	13.0	26	13.5	33	20		21		27 66
Peak current	magnet @ 25°C	I _p	A _{rms}	10.0	20	10.0	25	15.0		16.0		20 50
Maximum continuous current	coils @ 100°C	I _c	A _{rms}	4.1	8.2	4.2	10.2	6.1		6.6		8.5 20.5
Back EMF phase-phase _{peak}		B _{emf}	V/m/s	152	76	183	76	152		189		183 76
Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	6.3	1.6	7.6	1.3	4.2		5.0		3.8 0.65
Induction per phase	I < 0.6 I _p	L _{ph}	mH	51	13	60	10	34		40		30 5
Electrical time constant*	coils @ 25°C	τ _e	ms	8		8		8		8		8
Maximum continuous power loss	all coils	P _c	W	430		530		640		853		1060
Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	0.15		0.12		0.11		0.08		0.06
Thermal Time constant*	up to 63% max. coiltemp.	τ _{th}	s	90		90		90		90		90
Temperature cut-off / sensor				PTC 1kΩ / KTY 83-122								
Coil unit weight	ex. cables	W	kg	4.9		5.9		6.9		9.4		11.6
Coil unit length	ex. cables	L	mm	244		290		336		434		562
Motor attraction force	rms @ 0 A	F _a	N	3400		4150		4900		6800		8300
Magnet pitch NN		τ	mm	24		24		24		24		24
Cable mass		m	kg/m	0.3		0.3		0.3		0.3		0.3
Cable type (power)	length 1 m	d	mm (AWG)	11.9 (14)								
Cable type (sensor)	length 1 m	d	mm (AWG)	4.3 (26)								

All specifications ±10%

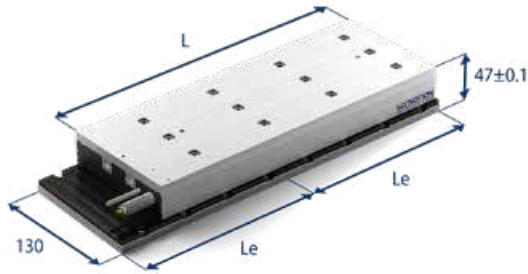
* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

	Magnet plates	Coil units
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	Magnet plates	Coil units
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TBW Series Iron Core



TBW18 on 2x192mm magnet plate shown

Water cooling

All TBW motors feature integrated cooling channels that allow for the easy setup of a liquid cooled system, at no additional cost.

Magnet plate dimensions

Le (mm) 192 288

M5 bolts 8 12

Mass (kg/m) 10.5

Magnet plates can be butted together.

Approvals



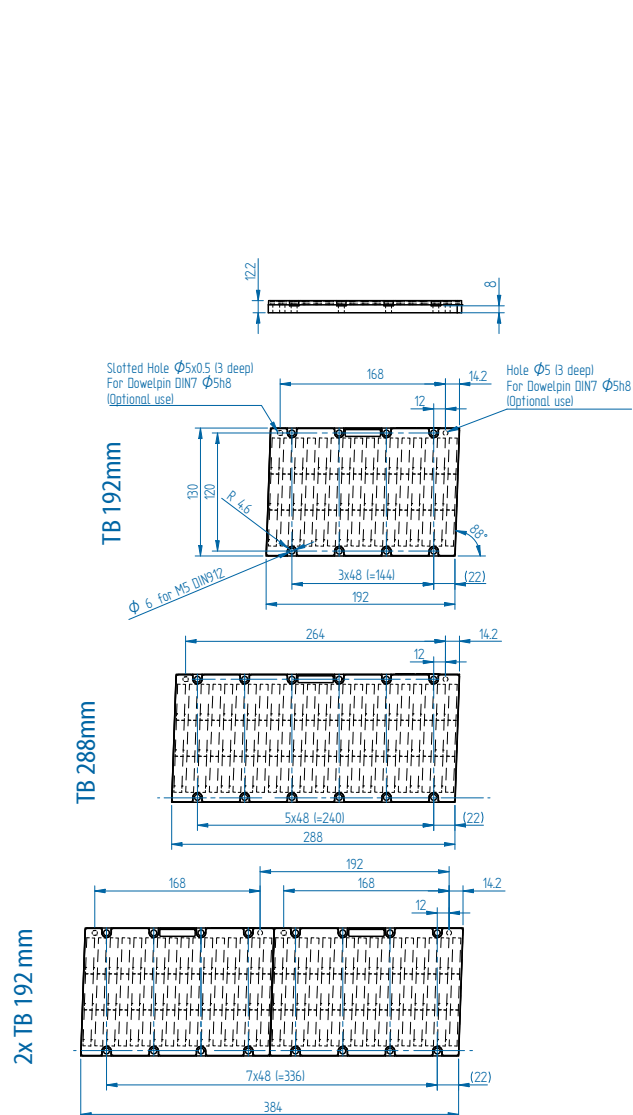
Parameter		Remarks	Symbol	Unit	TBW18		TBW30		TBW45	
Performance	Winding type				N	S	N	S	N	S
	Motortype, max voltage ph-ph				3-phase synchronous Iron core, 400V _{ac rms} (565 V _{dc})					
	Ultimate force @ 10°C/s increase	magnet @ 25°C	F _u	N	2700		4500		6750	
	Peak force @ 6°C/s increase	magnet @ 25°C	F _p	N	2400		4000		6000	
	Continuous force watercooled*	coils @ 100°C	F _{cw}	N	1200		2000		3000	
	Continuous force aircooled*	coils @ 100°C	F _c	N	1140		1900		2850	
	Maximum speed**	@ 560 V	V _{max}	m/s	3	6	2.5	6	2.5	6
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	186	90	225	93	225	93
	Motor constant	coils @ 25°C	S	N ² /W	2580		4300		6450	
Electrical	Ultimate current	magnet @ 25°C	I _u	A _{rms}	19.6	41	27	65	41	98
	Peak current	magnet @ 25°C	I _p	A _{rms}	15.0	31.1	20.7	50	31	75
	Continuous current watercooled*	coils @ 100°C	I _{cw}	A _{rms}	6.5	13.4	8.9	21.5	13.4	32.3
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	152	76	183	76	183	76
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	4.4	1.0	3.9	0.66	2.6	0.44
	Induction per phase	I < 0.6 I _p	L _{ph}	mH	35	8	31	5	21	3
	Electrical time constant*	coils @ 25°C	τ _e	ms	8		8		8	
Thermal	Maximum continuous power loss	all coils	P _c	W	726		1209		1804	
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	0.10		0.06		0.04	
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	87		87		87	
	Watercooling flow	for ΔT=3K	Φ _w	l/min	3.1		5.2		7.8	
	Watercooling pressure-drop	order of magnitude	ΔP _w	bar	1.0		1.5		2.5	
	Temperature cut-off / sensor				PTC 1kΩ / KTY 83-122					
Mechanical	Coil unit weight	ex. cables	W	kg	7.3		12.3		18.2	
	Coil unit length	ex. cables	L	mm	344		580		852	
	Motor attraction force	rms @ 0 A	F _a	N	4900		8300		12450	
	Magnet pitch NN		τ	mm	24		24		24	
	Cable mass		m	kg/m	0.3				0.6	
	Cable type (power)	length 1 m	d	mm (AWG)	11.9 (14)			16.9 (10)		
	Cable type (sensor)	length 1 m	d	mm (AWG)				4.3 (26)		

All specifications ±10%

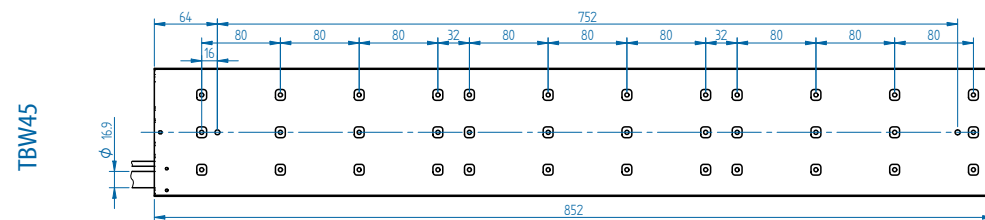
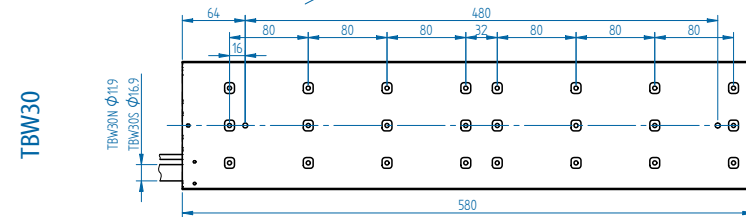
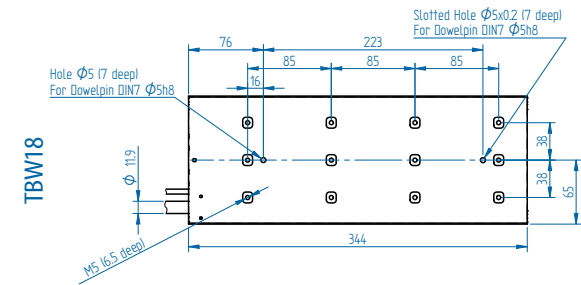
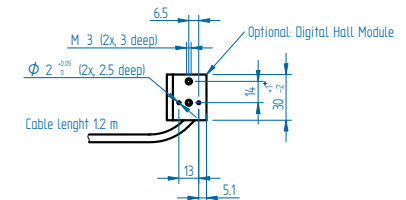
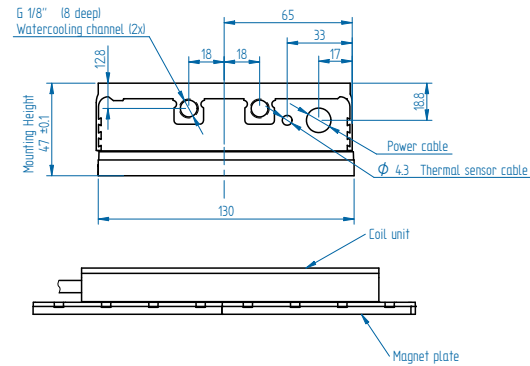
* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

Magnet plates

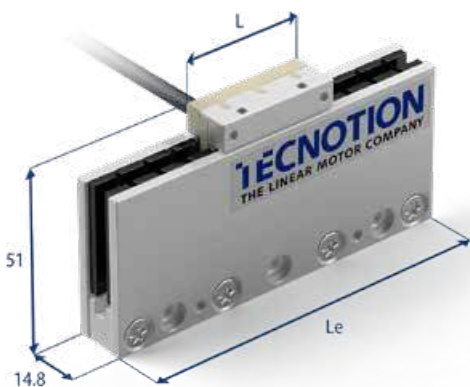


Coil units



Mounting instructions and flatness or parallelism requirements can be found in the iron core installation manual. CAD files, 3D models and the manual can be downloaded from our website.

* All sizes are in mm



UC3 in 99mm magnet yoke shown

Magnet yoke dimensions

Le (mm)	66	99	264
M4 bolts	2	3	8
Mass (kg/m)	3.2		

Magnet yokes can be butted together.

Approvals



UC Series Ironless

	Parameter	Remarks	Symbol	Unit	UC3 + UC3 inline	UC6
Performance	Motortype, max voltage ph-ph				3-phase synchronous Ironless, 45V _{ac rms} (60V _{dc})	
	Peak force @ 20°C/s increase	magnet @ 25°C	F _p	N	36	72
	Continuous force*	coils @ 80°C	F _c	N	10	20
	Maximum speed**	@ 60 V	V _{max}	m/s	5	5
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	11.4	11.4
	Motor constant	coils @ 25°C	S	N ² /W	9.2	18.3
Electrical	Peak current	magnet @ 25°C	I _p	A _{rms}	3.1	6.2
	Maximum continuous current	coils @ 80°C	I _c	A _{rms}	0.87	1.75
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	9.3	9.3
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	4.7	2.4
	Induction per phase		L _{ph}	mH	0.75	0.38
	Electrical time constant*	coils @ 25°C	τ _e	ms	0.16	0.16
Thermal	Maximum continuous power loss	all coils	P _c	W	13	26
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	3.6	1.8
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	25	25
	Temperature sensors				none	none
Mechanical	Coil unit weight	ex. cables	W	kg	0.031	0.062
	Coil unit length	ex. cables	L	mm	34	67
	Motor attraction force		F _a	N	0	0
	Magnet pitch NN		τ	mm	16.5	16.5
	Cable mass		m	kg/m	0.07	0.07
	Cable type (power)	length 1 m	d	mm (AWG)	4.3 (24)	
	Cable type (sensor)				N/A	
	Cable life (Power FLEX)***	minimum			15,000,000 cycles	
	Bending radius static				5x cable diameter	
	Bending radius dynamic				8x cable diameter	

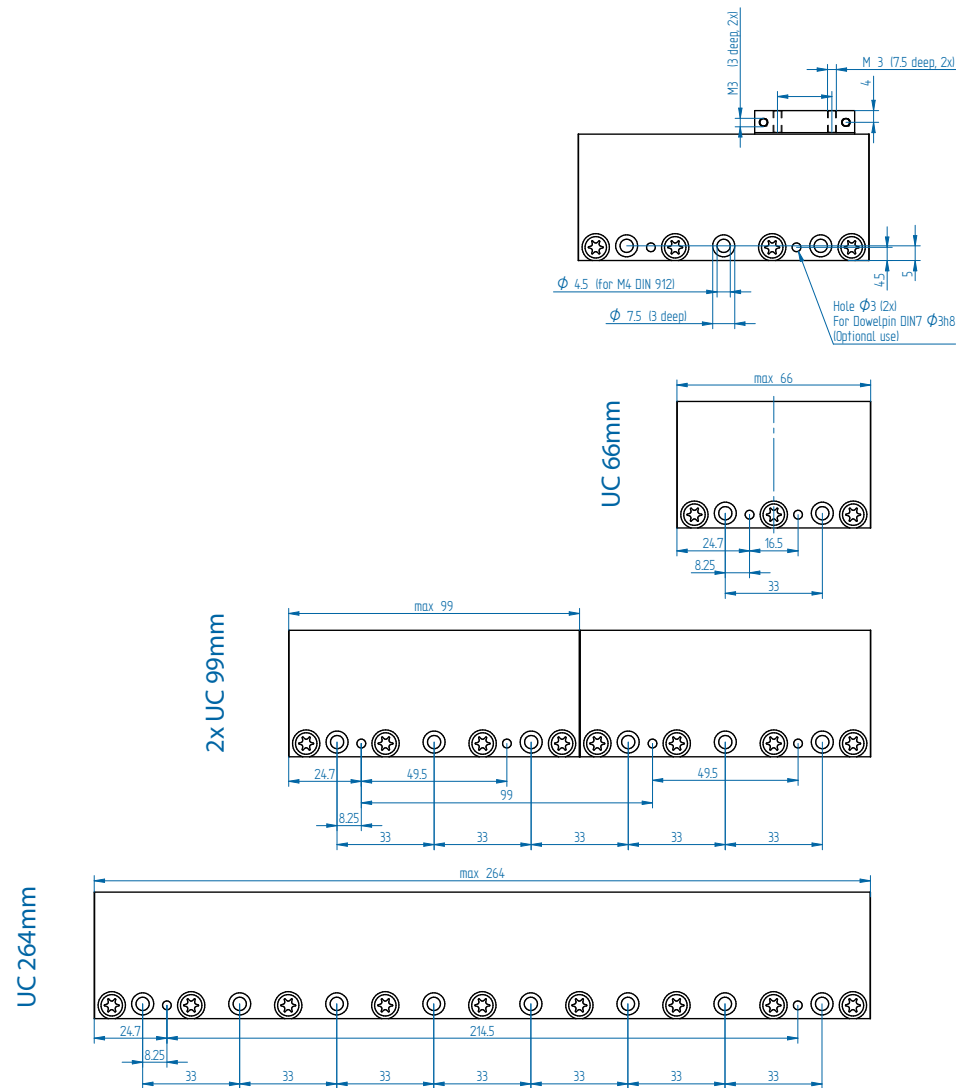
All specifications ±10%

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

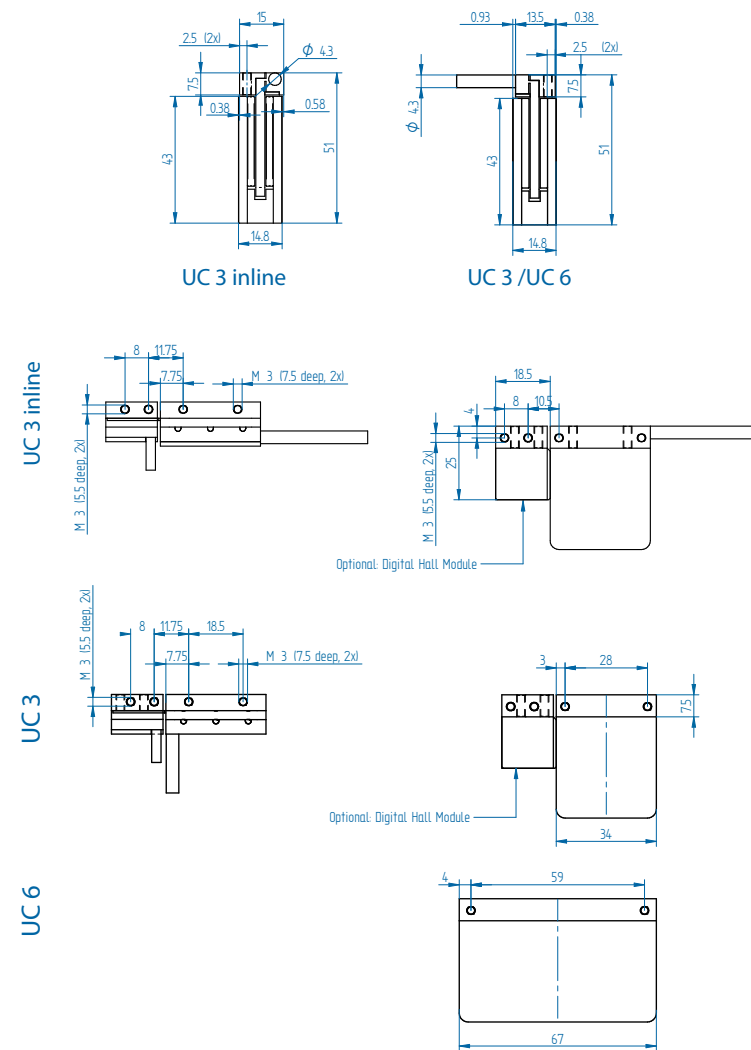
** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

*** Depending on bending Radius, velocity and acceleration.

Magnet yokes

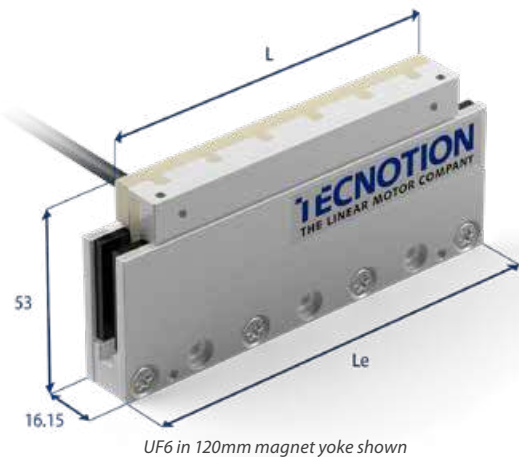


Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm



UF6 in 120mm magnet yoke shown

Magnet yoke dimensions

Le (mm)	72	120
M4 bolts	2	3
Mass (kg/m)	3.2	

Magnet yokes can be butted together.

Approvals



UF Series Ironless

	Parameter	Remarks	Symbol	Unit	UF3	UF6
Performance	Motortype, max voltage ph-ph				3-phase synchronous Ironless, 45V _{ac rms} (60V _{dc})	
	Peak force @ 20°C/s increase	magnet @ 25°C	F _p	N	42.5	85
	Continuous force*	coils @ 110°C	F _c	N	19.5	39
	Maximum speed**	@ 60 V	V _{max}	m/s	5.1	5.1
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	12.3	12.3
	Motor constant	coils @ 25°C	S	N ² /W	14.6	29.2
Electrical	Peak current	magnet @ 25°C	I _p	A _{rms}	3.5	6.9
	Maximum continuous current	coils @ 110°C	I _c	A _{rms}	1.58	3.17
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	10.1	10.1
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	3.5	1.8
	Induction per phase		L _{ph}	mH	1.24	0.62
	Electrical time constant*	coils @ 25°C	τ _e	ms	0.36	0.36
Thermal	Maximum continuous power loss	all coils	P _c	W	35	70
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	2.4	1.2
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	34	34
	Temperature sensor				NTC	NTC
Mechanical	Coil unit weight	ex. cables	W	kg	0.045	0.087
	Coil unit length	ex. cables	L	mm	49	97
	Motor attraction force		F _a	N	0	0
	Magnet pitch NN		τ	mm	24	24
	Cable mass		m	kg/m	0.07	0.07
	Cable type (power and sensor)	length 1 m	d	mm (AWG)	4.3 (24)	
	Cable life (FLEX)***	minimum			15,000,000 cycles	
	Bending radius static	minimum			5x cable diameter	
	Bending radius dynamic	minimum			8x cable diameter	

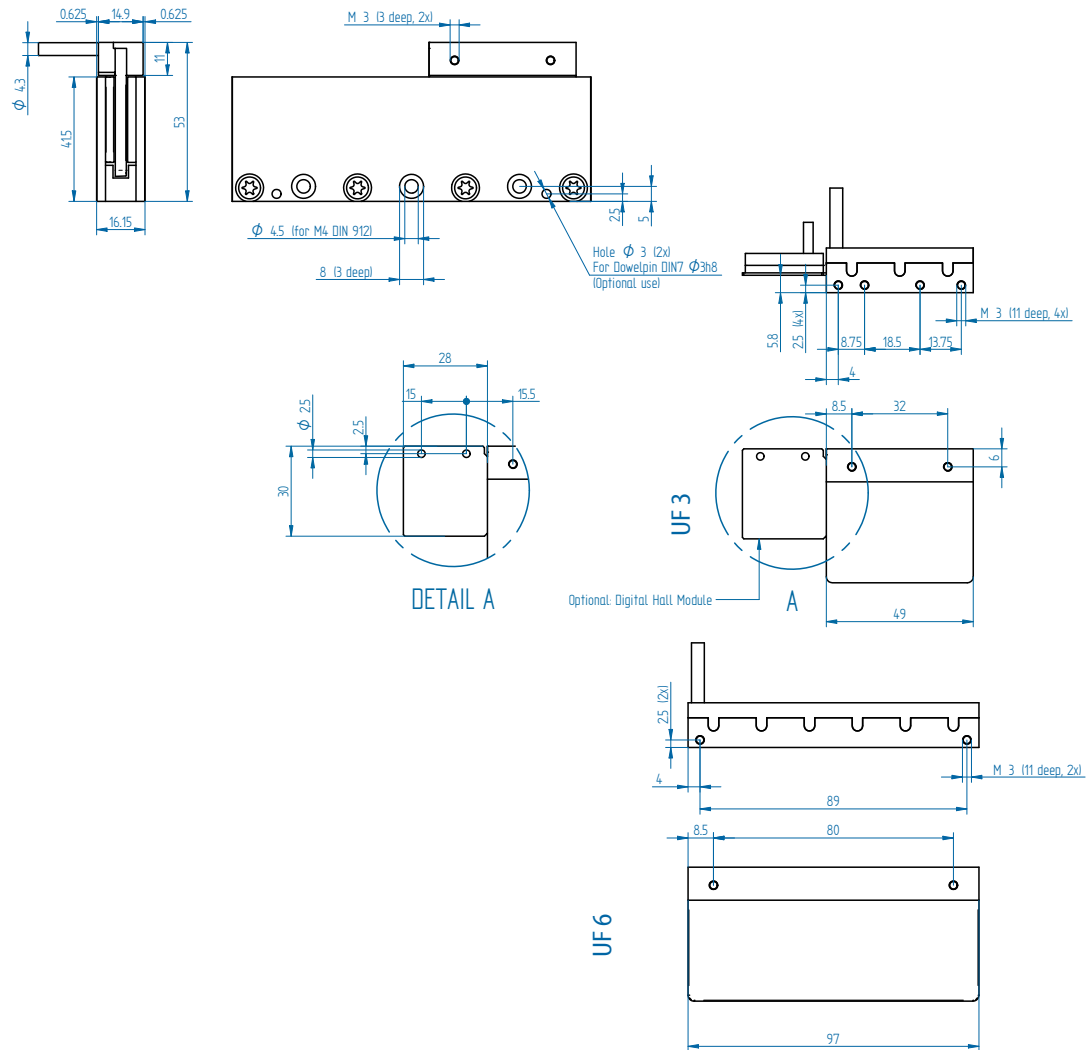
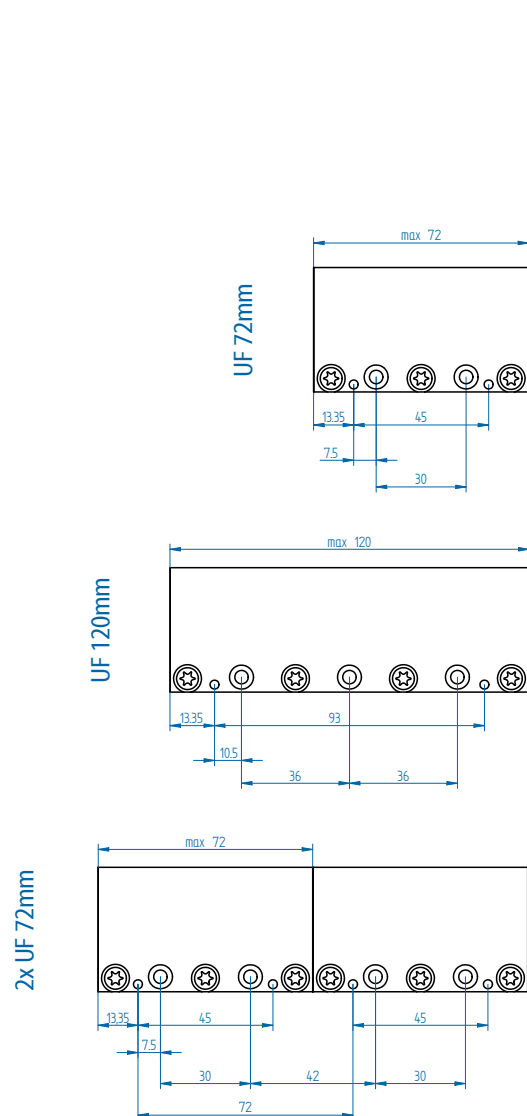
All specifications ±10%

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

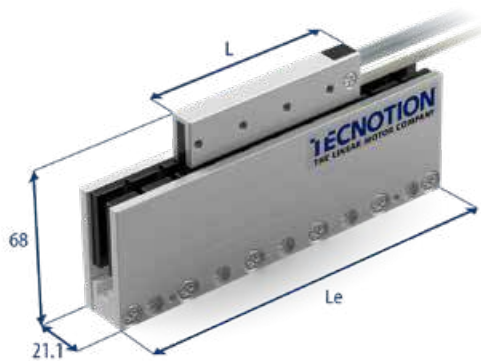
*** Depending on bending radius, velocity and acceleration.

Magnet yokes



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm



UM3 in 150mm magnet yoke shown

UM Series Ironless

Magnet yoke dimensions

Le (mm)	90	120	150	390
M4 bolts	3	4	6	13
Mass (kg/m)	4.8			

Magnet yokes can be butted together.

Approvals



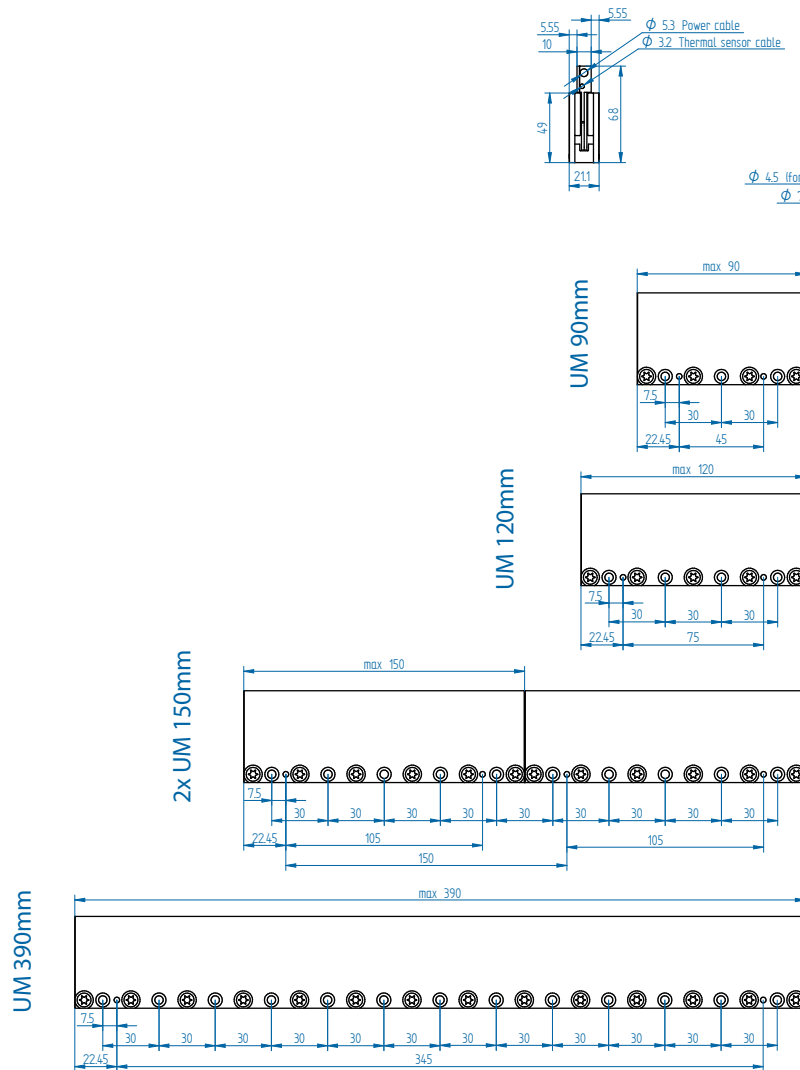
	Parameter	Remarks	Symbol	Unit	UM3		UM6		UM9		UM12	
Performance	Winding type				N	S	N	S	N	S	N	S
	Motortype, max voltage ph-ph				3-phase synchronous Ironless, 230V _{ac,rms} (325V _{dc})							
	Peak force @ 20°C/s increase	magnet @ 25°C	F _p	N	100		200		300		400	
	Continuous force*	coils @ 110°C	F _c	N	29		58		87		116	
	Maximum speed**	@ 300 V	V _{max}	m/s	10	18	10	18	10	17	10	16
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	36.3	19.9	36.3	19.9	36.3	19.9	36.3	19.9
	Motor constant	coils @ 25°C	S	N ² /W	24		48		71		95	
Electrical	Peak current	magnet @ 25°C	I _p	A _{rms}	2.8	5.0	5.5	10.0	8.3	15.0	11.0	20.0
	Maximum continuous current	coils @ 110°C	I _c	A _{rms}	0.8	1.5	1.6	2.9	2.4	4.4	3.2	5.8
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	30	16	30	16	30	16	30	16
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	18.5	5.5	9.3	2.8	6.2	1.8	4.6	1.4
	Induction per phase		L _{ph}	mH	6	1.8	3	0.9	2	0.6	1.5	0.4
	Electrical time constant*	coils @ 25°C	τ _e	ms	0.35		0.35		0.35		0.35	
Thermal	Maximum continuous power loss	all coils	P _c	W	47		95		142		190	
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	1.8		0.9		0.6		0.45	
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	36		36		36		36	
	Temperature cut-off / sensor				PTC 1kΩ / NTC							
Mechanical	Coil unit weight	ex. cables	W	kg	0.084		0.162		0.240		0.318	
	Coil unit length	ex. cables	L	mm	78		138		198		258	
	Motor attraction force		F _a	N	0		0		0		0	
	Magnet pitch NN		τ	mm	30		30		30		30	
	Cable mass		m	kg/m	0.08		0.08		0.08		0.08	
	Cable type (power)	length 1 m	d	mm (AWG)	5.3 (22)							
	Cable type (sensor)	length 1 m	d	mm (AWG)	3.2 (26)							

All specifications ±10%

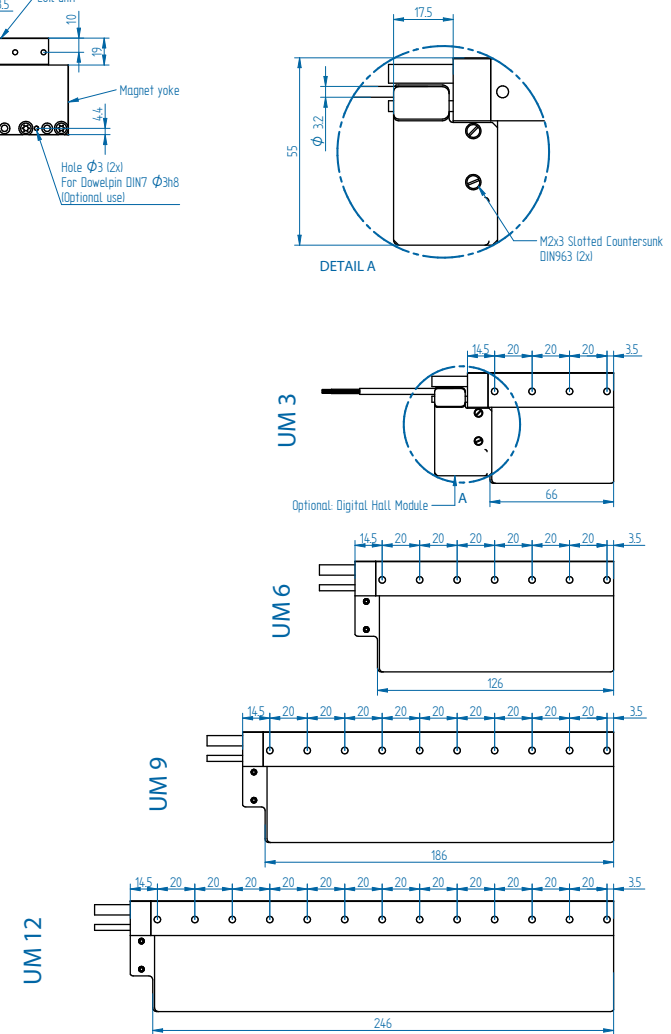
* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

Magnet yokes

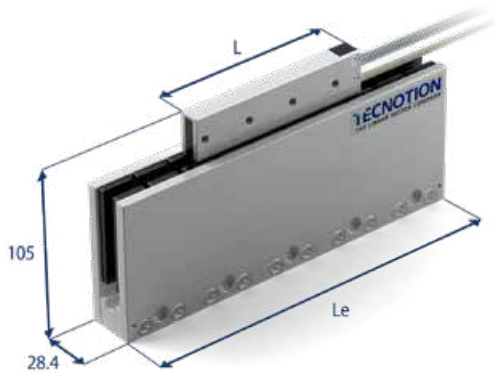


Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm



UL3 in 210mm magnet yoke shown

UL Series Ironless

Magnet yoke dimensions

Le (mm)	126	168	210	546
M5 bolts	3	4	5	13
Mass (kg/m)	11.2			

Magnet yokes can be butted together.

Approvals



	Parameter	Remarks	Symbol	Unit	UL3		UL6		UL9		UL12		UL15	
Performance	Winding type				N	S	N	S	N	S	N	S	N	S
	Motortype, max voltage ph-ph				3-phase synchronous Ironless, 230V _{ac rms} (325V _{dc})									
	Peak force @ 20°C/s increase	magnet @ 25°C	F _p	N	240		480		720		960		1200	
	Continuous force*	coils @ 110°C	F _c	N	70		140		210		280		350	
	Maximum speed**	@ 300 V	v _{max}	m/s	5	12	5	12	5	12	5	12	5	12
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	68	27.5	68	27.5	68	27.5	68	27.5	67.5	27.5
	Motor constant	coils @ 25°C	S	N ² /W	97		195		290		390		485	
Electrical	Peak current	magnet @ 25°C	I _p	A _{rms}	3.5	8.7	7	17.5	10.5	26.2	14.1	35	17.8	44
	Maximum continuous current	coils @ 110°C	I _c	A _{rms}	1.03	2.6	2.1	5.1	3.1	7.6	4.2	10.2	5.2	12.9
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	55.5	22.5	55.5	22.5	55.5	22.5	55.5	22.5	55.5	22.5
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	15.9	2.6	8.0	1.28	5.3	0.85	4.0	0.64	3.3	0.53
	Induction per phase		L _{ph}	mH	13	2.0	6.5	1.0	4.2	0.7	3.2	0.5	3	0.4
	Electrical time constant*	coils @ 25°C	τ _e	ms	0.8		0.8		0.8		0.8		0.8	
Thermal	Maximum continuous power loss	all coils	P _c	W	67		134		200		270		335	
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	1.3		0.65		0.43		0.32		0.26	
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	72		72		72		72		72	
	Temperature cut-off / sensor								PTC 1kΩ / NTC					
Mechanical	Coil unit weight	ex. cables	W	kg	0.25		0.47		0.69		0.91		1.13	
	Coil unit length	ex. cables	L	mm	106		190		274		358		442	
	Motor attraction force		F _a	N	0		0		0		0		0	
	Magnet pitch NN		τ	mm	42		42		42		42		42	
	Cable mass		m	kg/m	0.09		0.09		0.09		0.105		0.105	
	Cable type (power)	length 1 m	d	mm (AWG)			5.8 (20)				6.4 (18)			
	Cable type (sensor)	length 1 m	d	mm (AWG)			4.3 (26)				4.3 (26)			

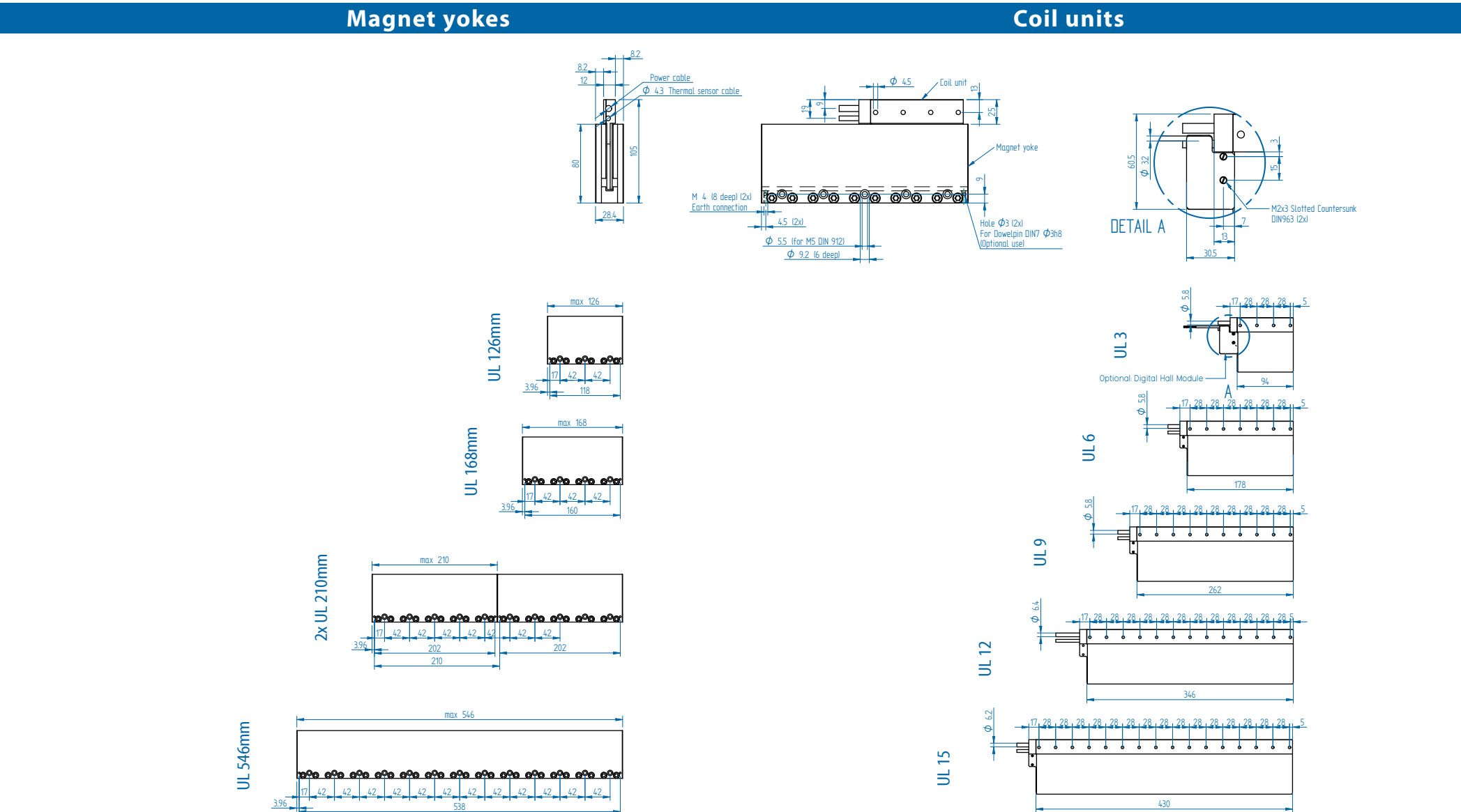
All specifications ±10%

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

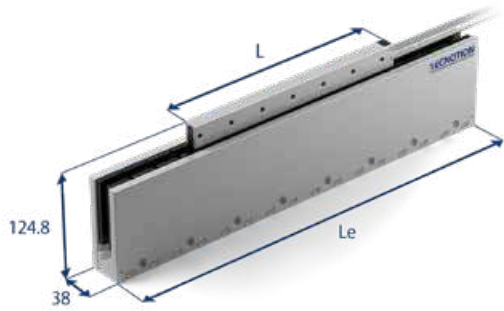
Magnet yokes		Coil units	
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

Magnet yokes		Coil units	
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.



UXA6 in 456mm magnet yoke shown

UXA3S Power Cable (FLEX cable of 3m)

Cable Type	9.0 (21) mm (AWG)
Cable Life****	5,000,000 cycles
Bending Radius Static	4x cable diameter
Bending Radius Dynamic	10x cable diameter

**** Depending on Bending Radius, Velocity and Acceleration.

Magnet yoke dimensions

Le (mm)	114	171	456
M6 bolts	2	3	8
Mass (kg/m)	19		
Magnet yokes can be butted together.			

Approvals



UXA Series Ironless

	Parameter	Remarks	Symbol	Unit	UXA3		UXA6		UXA9		UXA12		UXA18
Performance	Winding type				N	S	N	S	N	S	N	S	N
	Motortype, max voltage ph-ph				3-phase synchronous Ironless, 230V _{ac rms} (325V _{dc})								
	Peak force @ 20°C/s increase	magnet @ 25°C	F _p	N	615		1230		1845		2460		3690
	Continuous force*	coils @ 110°C	F _c	N	120		240		360		480		720
	Maximum speed**	@ 300 V	v _{max}	m/s	2.9	7.2	2.9	7.2	2.9	7.2	2.9	7.2	2.9
	Motor force constant	mount. sfc. @ 20°C	K	N/A _{rms}	107	43.4	107	43.4	107	43.4	107	43.4	107
	Motor constant	coils @ 25°C	S	N ² /W	244		488		732		976		1464
Electrical	Peak current	magnet @ 25°C	I _p	A _{rms}	5.6	13.9	11.3	28	16.9	42	22.6	56	34
	Maximum continuous current	coils @ 110°C	I _c	A _{rms}	1.14	2.80	2.27	5.6	3.4	8.4	4.5	11.2	6.8
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	87	35	87	35	87	35	87	35	87
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	15.8	2.6	7.9	1.29	5.3	0.86	4.0	0.65	2.6
	Induction per phase		L _{ph}	mH	28	4.6	14	2.3	9	1.5	7	1.2	4.7
	Electrical time constant*	coils @ 25°C	τ _e	ms	1.8		1.8		1.8		1.8		1.8
Thermal	Maximum continuous power loss	all coils	P _c	W	82		165		247		330		494
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	1.04		0.52		0.35		0.26		0.17
	Thermal time constant	up to 63% max. coiltemp.	τ _{th}	s	156		156		156		156		156
	Temperature cut-off / sensor*				PTC 1kΩ / NTC								
Mechanical	Coil unit weight	ex. cables	W	kg	0.55		0.95		1.35		1.75		2.55
	Coil unit length	ex. cables	L	mm	134		248		362		476		701
	Motor attraction force		F _a	N	0		0		0		0		0
	Magnet pitch NN		τ	mm	57		57		57		57		57
	Cable mass		m	kg/m	0.18		0.18		0.18		0.18		0.18
	Cable type (power)	length 1 m	d	mm (AWG)	6.4 (18) except UXA3S***								
	Cable type (sensor)	length 1 m	d	mm (AWG)	4.3 (26)								

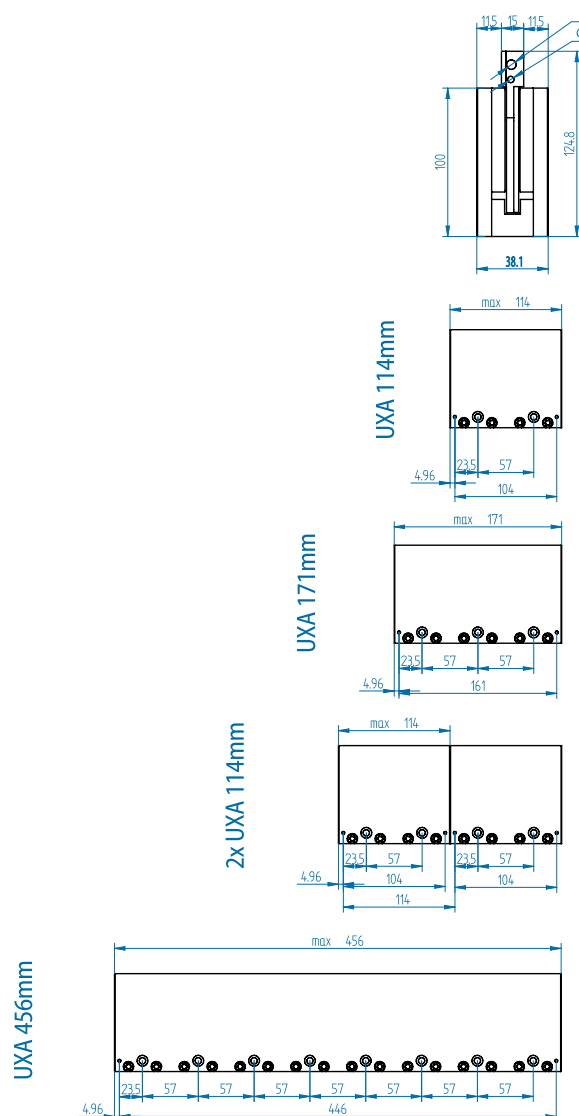
All specifications ±10%

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

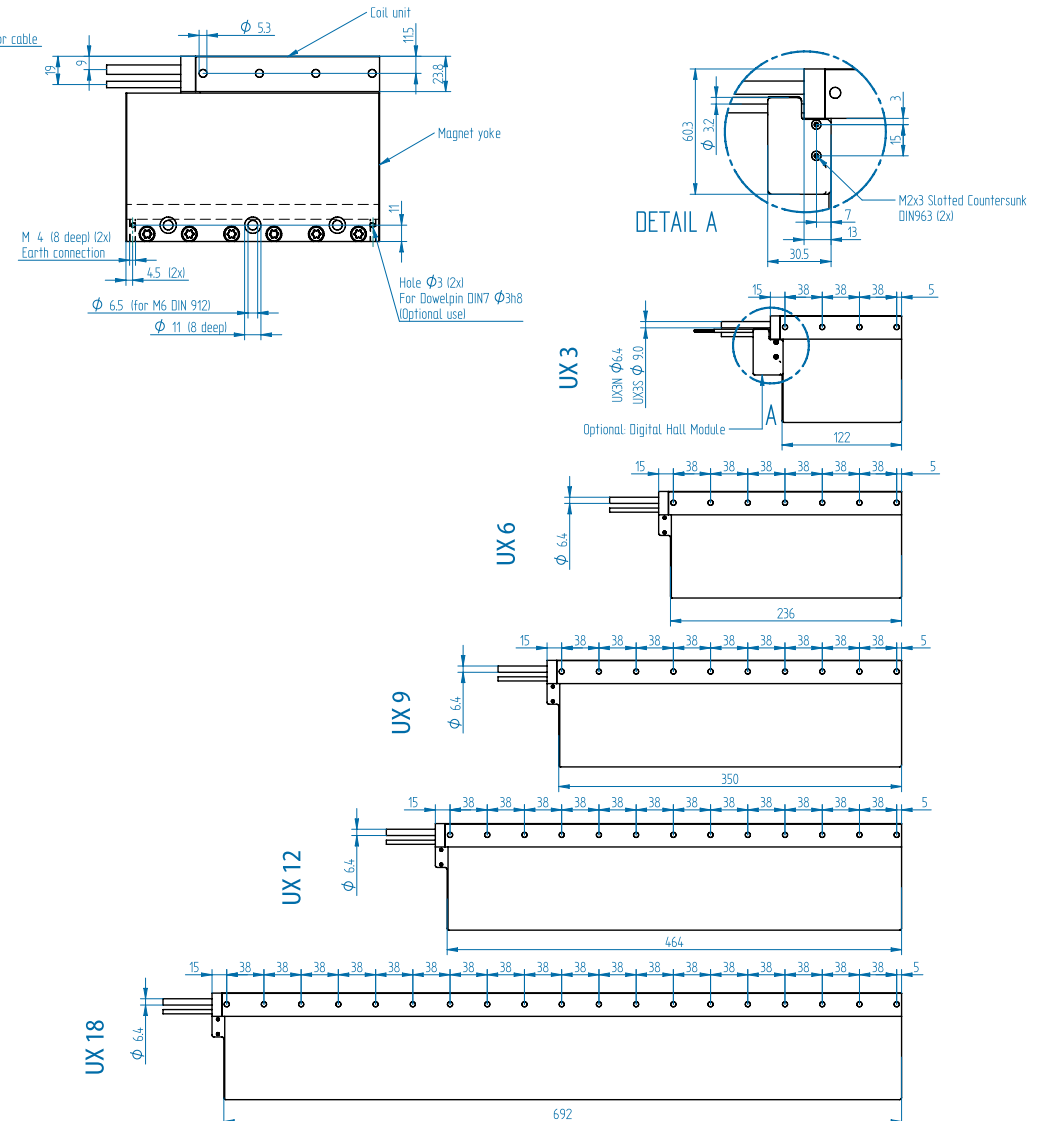
** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

*** The UXA3S is only available with a FLEX power cable. The specifications for this cable can be found in the table on the left side of this page.

Magnet yokes

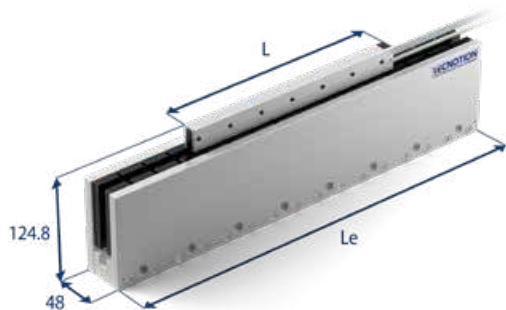


Coil units



Mounting instructions and flatness or parallelism requirements can be found in the ironless installation manual. CAD files and 3D models can be downloaded from our website.

* All sizes are in mm



UXX6 in 456mm magnet yoke shown

UXX3S Power Cable (FLEX cable of 3m)

Cable Type	9.0 (21) mm (AWG)
Cable Life****	5,000,000 cycles
Bending Radius Static	4x cable diameter
Bending Radius Dynamic	10x cable diameter

**** Depending on Bending Radius, Velocity and Acceleration.

Magnet yoke dimensions

Le (mm)	114	171	456
M6 bolts	2	3	8
Mass (kg/m)	25		
Magnet yokes can be butted together.			

Approvals



UXX Series Ironless

	Parameter	Remarks	Symbol	Unit	UXX3		UXX6		UXX9		UXX12		UXX18
Performance	Winding type				N	S	N	S	N	S	N	S	N
	Motortype, max voltage ph-ph				3-phase synchronous Ironless, 230V _{ac rms} (325V _{dc})								
	Peak force @ 20°C/s increase	magnet @ 25°C	F _p	N	700		1400		2100		2800		4200
	Continuous force*	coils @ 110°C	F _c	N	141		282		423		564		846
	Maximum speed**	@ 300 V	V _{max}	m/s	2.7	6.6	2.7	6.6	2.7	6.6	2.7	6.6	2.7
	Motor force Constant	mount. sfc. @ 20°C	K	N/A _{rms}	124	50.3	124	50.3	124	50.3	124	50.3	124
	Motor constant	coils @ 25°C	S	N ² /W	323		647		970		1293		1940
Electrical	Peak current	magnet @ 25°C	I _p	A _{rms}	5.6	13.9	11.3	28	16.9	42	22.6	56	34
	Maximum continuous current	coils @ 110°C	I _c	A _{rms}	1.14	2.80	2.27	5.6	3.4	8.4	4.5	11.2	6.8
	Back EMF phase-phase _{peak}		B _{emf}	V/m/s	101	41	101	41	101	41	101	41	101
	Resistance per phase*	coils @ 25°C ex. cable	R _{ph}	Ω	15.8	2.6	7.9	1.29	5.3	0.86	4.0	0.65	2.6
	Induction per phase		L _{ph}	mH	28	4.6	14	2.3	9	1.5	7	1.2	4.7
	Electrical time constant*	coils @ 25°C	τ _e	ms	1.8		1.8		1.8		1.8		1.8
Thermal	Maximum continuous power loss	all coils	P _c	W	82		165		247		330		494
	Thermal resistance	coils to mount. sfc.	R _{th}	°C/W	1.04		0.52		0.35		0.26		0.17
	Thermal time constant*	up to 63% max. coiltemp.	τ _{th}	s	156		156		156		156		156
	Temperature cut-off / sensor				PTC 1kΩ / NTC								
Mechanical	Coil unit weight	ex. cables	W	kg	0.55		0.95		1.35		1.75		2.55
	Coil unit length	ex. cables	L	mm	134		248		362		476		701
	Motor attraction force		F _a	N	0		0		0		0		0
	Magnet pitch NN		τ	mm	57		57		57		57		57
	Cable mass		m	kg/m	0.18		0.18		0.18		0.18		0.18
	Cable type (power)	length 1 m	d	mm (AWG)	6.4 (18) except UXX3S***								
	Cable type (sensor)	length 1 m	d	mm (AWG)	4.3 (26)								

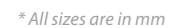
All specifications ±10%

* These values are only applicable when the mounting surface is at 20°C and the motor is driven at maximum continuous current. If these values differ in your application, please check our simulation tool.

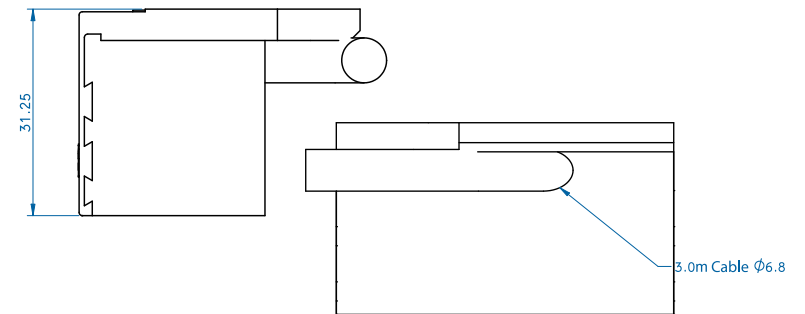
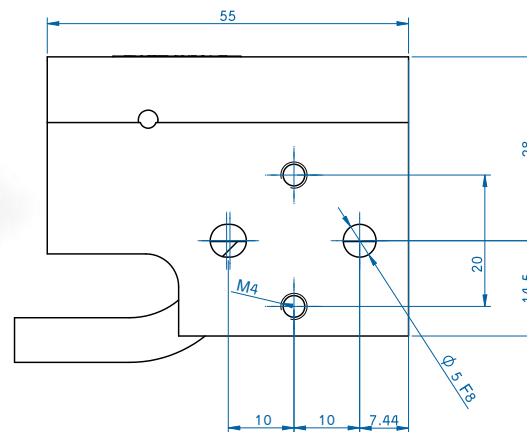
** Actual values depend on bus voltage. Please check the F/v diagram in our simulation tool.

*** The UXX3S is only available with a FLEX power cable. The specifications for this cable can be found in the table on the left side of this page.

Coil units



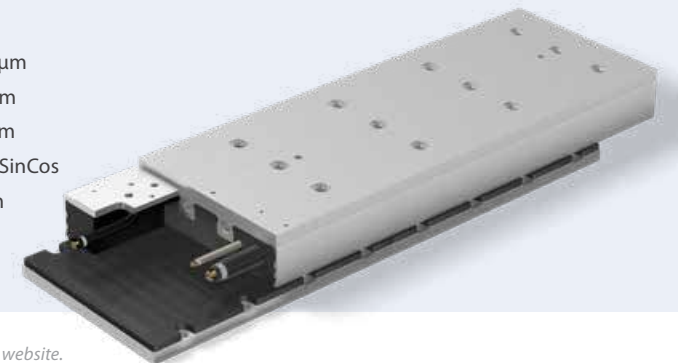
Analog Hall Module for T-series



Cost efficient positioning

Linear motors can be positioned extremely accurately by using optical encoders and rulers. If this is not required, this expensive setup can be replaced by an analog Hall module. This module uses the magnet track, as opposed to the ruler, as the linear scale. It can be easily mounted on our iron core motors and communicates with practically all standard servo controllers. The analog Hall module requires a standard 5V_{dc} power supply.

Absolute accuracy	± 100 µm
Repeatable accuracy	± 30 µm
Resolution	± 10 µm
Signal	1 Vpp SinCos
Signal period	24 mm



Mounting instructions and flatness or parallelism requirements can be found in the iron core installation manual. CAD files and 3D models can be downloaded from our website.

Additions

To use our motor simulation tool, download 3D & CAD files, installation manuals, product specifications and more, visit our website at:

www.tecnotion.com

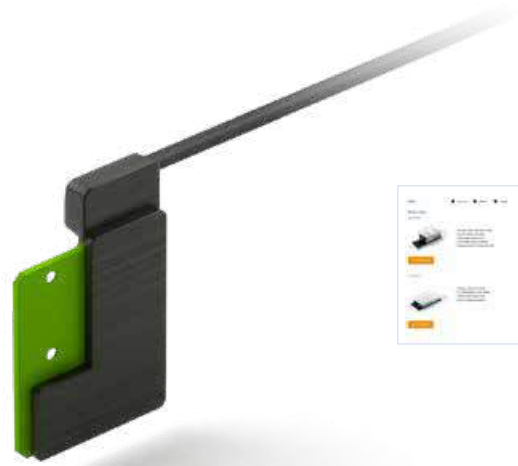


Torque motors

Tu 0.64-2202 Nm Tc 0.27-907 Nm

Due to the extensive motor design knowledge within Tecnotion, we have developed a torque motor series that is characterized, among others, by an superior force density, low thermal resistance, low cogging and housed design.

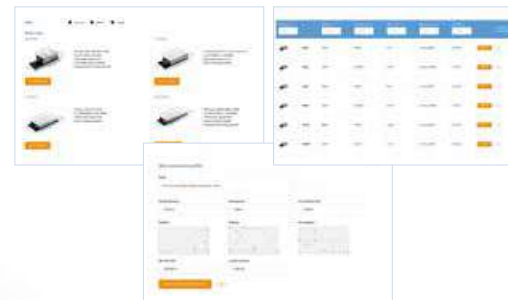
The torque series consists of different outer diameters ranging from 65mm to 485mm for the largest motor and various building heights ranging from 17mm up to 105mm.



Digital Hall module

For commutation

For commutation, we have an optional digital hall module that can be used with our entire range of linear motors. Its sensors provide 3 digital outputs, each phase shifted 120 degrees, to determine the electrical angle between coils and magnets. If you do not use a controller that allows you to commutate within the servo drive, this module can be a cost-effective alternative. The digital Hall module requires a 4.5 to 28V_{dc} power supply.



Simulation tool

Analyze your application

Save precious time by using our FREE online motor simulation tool. Our specialized software helps you find the best motor for the application and generate reports within seconds, without having to make time consuming calculations by hand.

The tool will provide you with diagrams for position, velocity, acceleration, jerk, torque, power, voltage, current, temperature and torque vs. velocity. Find the simulation tool at www.tecnotion.com/simtool.



Custom motors

Motor solutions

Besides the standard catalogue items we offer custom linear motor solutions. Some examples: custom windings, cable confection and vacuum motors for transport and positioning in vacuum.

Besides this Tecnotion offers moving magnet motors and linear solutions, completely designed toward your needs. For more information please contact Tecnotion.

Article numbers

Series	Article	Article code	Series	Article	Article code	Series	Article	Article code	Series	Article	Article code
TM Series			TB Series			UF Series			UL	Magnet yoke UL 168 mm	4022 368 5022
TM	Coil unit TM 3S FLEX	4022 368 5075	TB	Coil unit TB 12N	4022 368 5155	UF	Coil unit UF 3	4022 368 5298	UL	Magnet yoke UL 210 mm	4022 368 5023
TM	Coil unit TM 3Z FLEX	4022 368 5533	TB	Coil unit TB 12S	4022 368 5157	UF	Coil unit UF 6	4022 368 5372	UL	Magnet yoke UL 546 mm	4022 368 5024
TM	Coil unit TM 6S FLEX	4022 368 5076	TB	Coil unit TB 15N	4022 368 5122	UF	Magnet yoke UF 72 mm	4022 368 5382	UL	Digital Hall Module UL	4022 368 5145
TM	Coil unit TM 6Z FLEX	4022 368 5300	TB	Coil unit TB 15S	4022 368 5120	UF	Magnet yoke UF 120 mm	4022 368 5383	UXA Series		
TM	Coil unit TM 12S FLEX	4022 368 5078	TB	Coil unit TB 18N	111026	UF	Digital Hall Module UF	4022 368 5391	UXA	Coil unit UX 3N	4022 368 5105
TM	Coil unit TM 18N FLEX	4022 368 5500	TB	Coil unit TB 24N	111027	UM Series			UXA	Coil unit UX 3S FLEX	4022 368 5235
TM	Coil unit TM 18S FLEX	4022 368 5519	TB	Coil unit TB 30N	4022 368 5123	UM	Coil unit UM 3N	4022 368 5055	UXA	Coil unit UX 6N	4022 368 5106
TM	Magnet plate TM 96 mm	4022 368 5225	TB	Coil unit TB 30S	4022 368 5121	UM	Coil unit UM 3S	4022 368 5051	UXA	Coil unit UX 6S	4022 368 5101
TM	Magnet plate TM 144 mm	4022 368 5226	TB	Magnet plate TB 192 mm	4022 368 5221	UM	Coil unit UM 6N	4022 368 5056	UXA	Coil unit UX 9N	4022 368 5107
TM	Magnet plate TM 384 mm	4022 368 5227	TB	Magnet plate TB 288 mm	4022 368 5222	UM	Coil unit UM 6S	4022 368 5052	UXA	Coil unit UX 9S	4022 368 5102
TM	Analog Hall Module	4022 368 5139	TB	Analog Hall Module	4022 368 5139	UM	Coil unit UM 9N	4022 368 5057	UXA	Coil unit UX 12N	4022 368 5108
TM	Digital Hall Module T-Serie	4022 368 5418	TB	Digital Hall Module T-Serie	4022 368 5418	UM	Coil unit UM 9S	4022 368 5053	UXA	Coil unit UX 12S	4022 368 5103
TL Series			TBW Series			UM	Coil unit UM 12N	4022 368 5058	UXA	Coil unit UX 18N	4022 368 5111
TL	Coil unit TL 6N	4022 369 7458	TBW	Coil unit TBW 18N	4022 368 5263	UM	Coil unit UM 12S	4022 368 5054	UXA	Magnet yoke UX-A 114 mm	4022 368 5098
TL	Coil unit TL 6S	4022 368 5032	TBW	Coil unit TBW 18S	4022 368 5264	UM	Magnet yoke UM 90 mm	4022 368 5040	UXA	Magnet yoke UX-A 171 mm	4022 368 5093
TL	Coil unit TL 9N	4022 368 5311	TBW	Coil unit TBW 30N	4022 368 5242	UM	Magnet yoke UM 120 mm	4022 368 5041	UXA	Magnet yoke UX-A 456 mm	4022 368 5099
TL	Coil unit TL 9S	4022 368 5312	TBW	Coil unit TBW 30S	4022 368 5243	UM	Magnet yoke UM 150 mm	4022 368 5042	UXA	Digital Hall Module UX	4022 368 5154
TL	Coil unit TL 12N	4022 369 7459	TBW	Coil unit TBW 45N	4022 368 5244	UM	Magnet yoke UM 390 mm	4022 368 5043	UXX Series		
TL	Coil unit TL 12S	4022 368 5033	TBW	Coil unit TBW 45S	4022 368 5245	UM	Digital Hall Module UM	4022 368 5144	UXX	Coil unit UX 3N	4022 368 5105
TL	Coil unit TL 15N	4022 369 7460	TBW	Magnet plate TB 192 mm	4022 368 5221	UL Series			UXX	Coil unit UX 3S FLEX	4022 368 5235
TL	Coil unit TL 15S	4022 368 5034	TBW	Magnet plate TB 288 mm	4022 368 5222	UL	Coil unit UL 3N	4022 368 5025	UXX	Coil unit UX 6N	4022 368 5106
TL	Coil unit TL 18N	4022 368 5223	TBW	Analog Hall Module	4022 368 5139	UL	Coil unit UL 3S	4022 368 5045	UXX	Coil unit UX 6S	4022 368 5101
TL	Coil unit TL 18S	4022 368 5224	TBW	Digital Hall Module T-Serie	4022 368 5418	UL	Coil unit UL 6N	4022 368 5026	UXX	Coil unit UX 9N	4022 368 5107
TL	Coil unit TL 24N	4022 368 5014	UC Series			UL	Coil unit UL 6S	4022 368 5046	UXX	Coil unit UX 9S	4022 368 5102
TL	Coil unit TL 24S	4022 368 5035	UC	Coil unit UC 3	4022 368 5067	UL	Coil unit UL 9N	4022 368 5027	UXX	Coil unit UX 12N	4022 368 5108
TL	Coil unit TL 48Q	112547	UC	Coil unit UC 3 inline	4022 368 5516	UL	Coil unit UL 9S	4022 368 5047	UXX	Coil unit UX 12S	4022 368 5103
TL	Magnet plate TL 192 mm	4022 368 5193	UC	Coil unit UC 6	4022 368 5068	UL	Coil unit UL 12N	4022 368 5028	UXX	Coil unit UX 18N	4022 368 5111
TL	Magnet plate TL 288 mm	4022 368 5194	UC	Magnet yoke UC 66 mm	4022 368 5064	UL	Coil unit UL 12S	4022 368 5048	UXX	Magnet yoke UXX 114 mm	4022 368 5215
TL	Analog Hall Module	4022 368 5139	UC	Magnet yoke UC 99 mm	4022 368 5065	UL	Coil unit UL 15N	4022 368 5029	UXX	Magnet yoke UXX 171 mm	4022 368 5216
TL	Digital Hall Module T-Serie	4022 368 5418	UC	Magnet yoke UC 264 mm	4022 368 5066	UL	Coil unit UL 15S	4022 368 5049	UXX	Magnet yoke UXX 456 mm	4022 368 5217
			UC	Digital Hall Module UC	4022 368 5130	UL	Magnet yoke UL 126 mm	4022 368 5021	UXX	Digital Hall Module UX	4022 368 5154