PRODRIVE TECHNOLOGIES MOTION & MECHATRONICS

LINEAR MOTOR CATALOGUE

IRIS

Short stroke motors

January 2022

Linear motors
integrated in a custom mechatronic system

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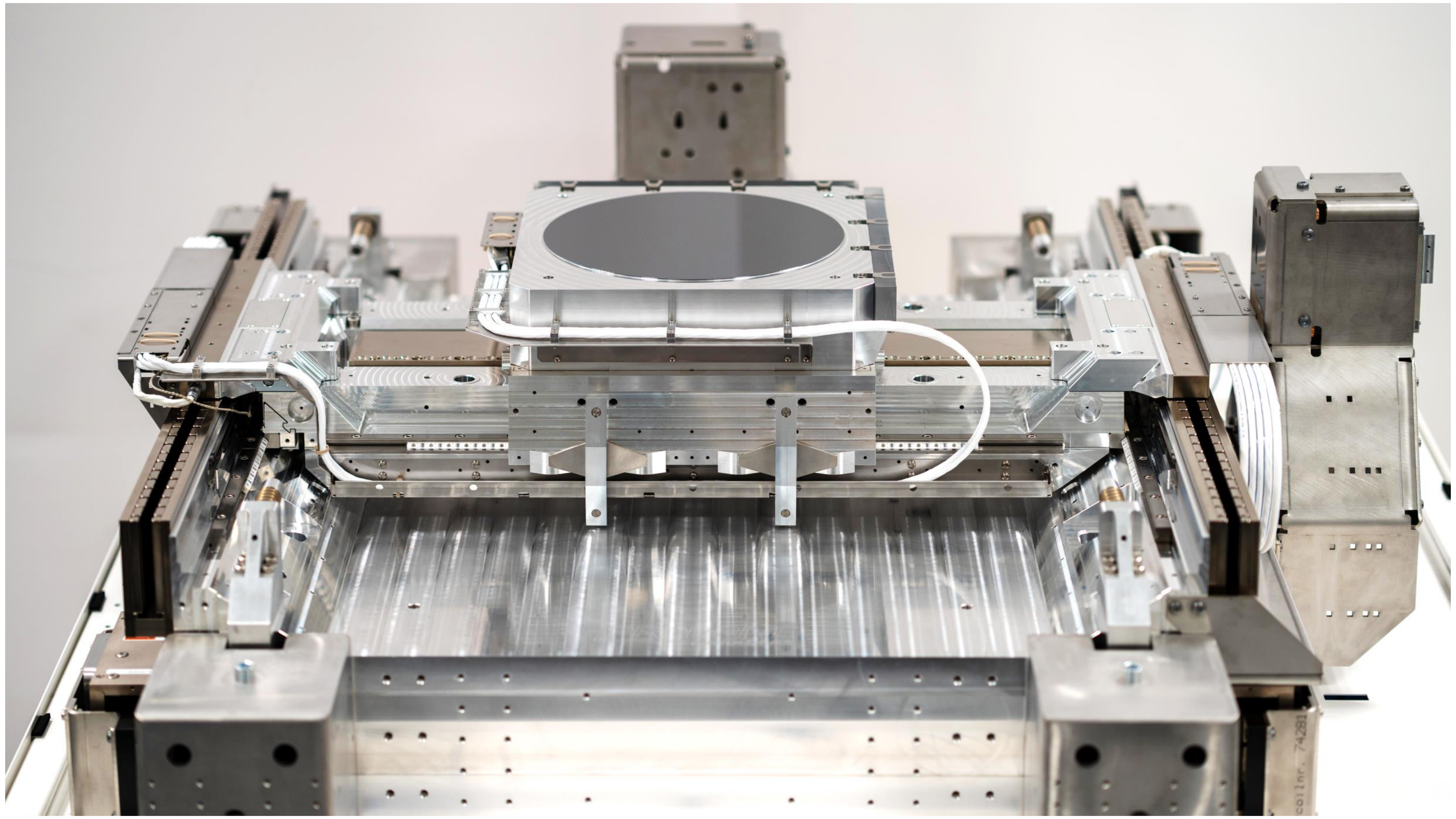


Linear motors integrated in a motion stage

A PASSION FOR TECHNOLOGY

Knowledge

Engineering excellence is the driving force behind linear motor innovation in both design and manufacturing. Prodrive has a highly skilled group of (electro-)mechanical engineers capable of customizing linear motor technology towards your needs.

Quality

Quality is in the DNA of Prodrive Technologies. With a long history in electronics manufacturing, Prodrive continues in the area of linear motor manufacturing with the same philosophy and processes, setting a new standard within the linear motor market.

Automation

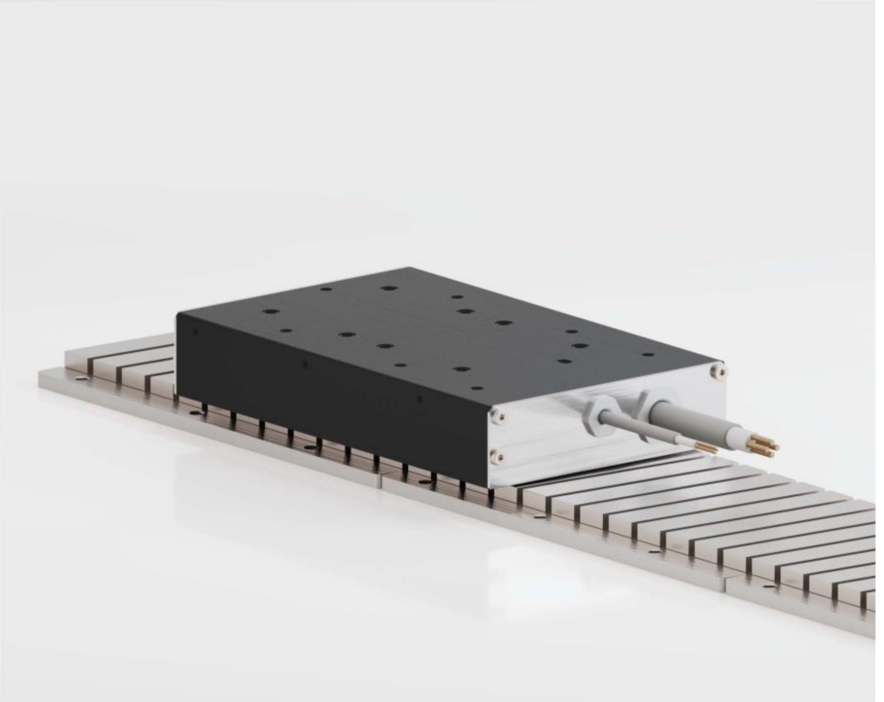
Design for manufacturing is key to reduce cost and guarantee quality. Winding, assembly, vacuum potting and magnet gluing are highly automated processes which guarantees a constant quality at minimum cost.

Time to market

Due to the agility of Prodrive Technologies' large development department, customization can be performed in a very short time, providing a short time to market for challenging mechatronic applications.

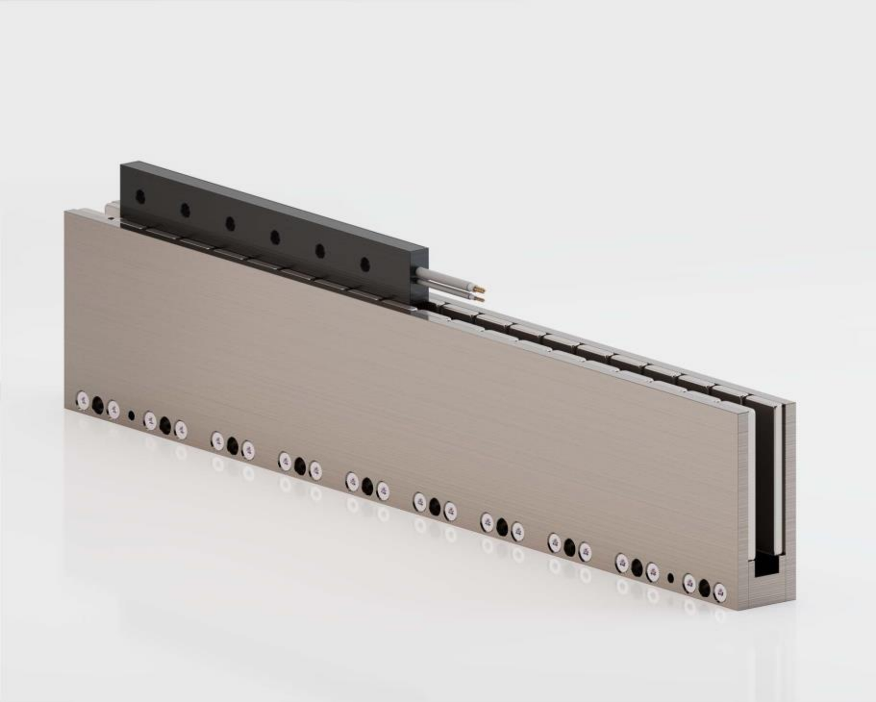
Prodrive Technologies HQ Campus, The Netherlands

OVERVIEW



Chiron

The Chiron line offers iron core linear motors which are optimized for high force and high efficiency. Find the optimal fit for your application due to the many different available form factors.

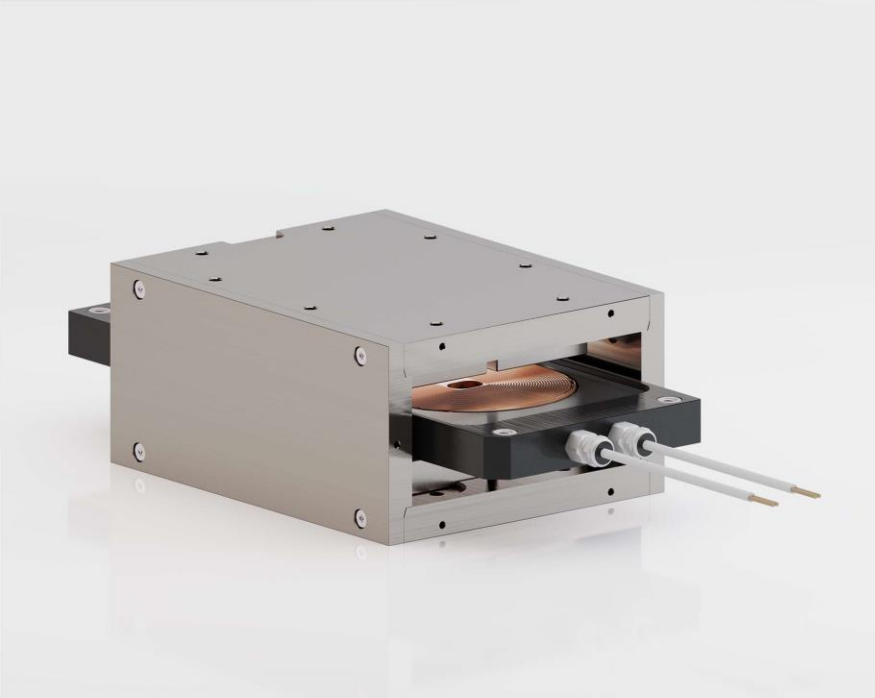


Phoenix

The Phoenix line offers ironless linear motors, for applications requiring an extremely low force ripple for excellent servo performance without attraction forces. Available in a large range of sizes.

Gryphon

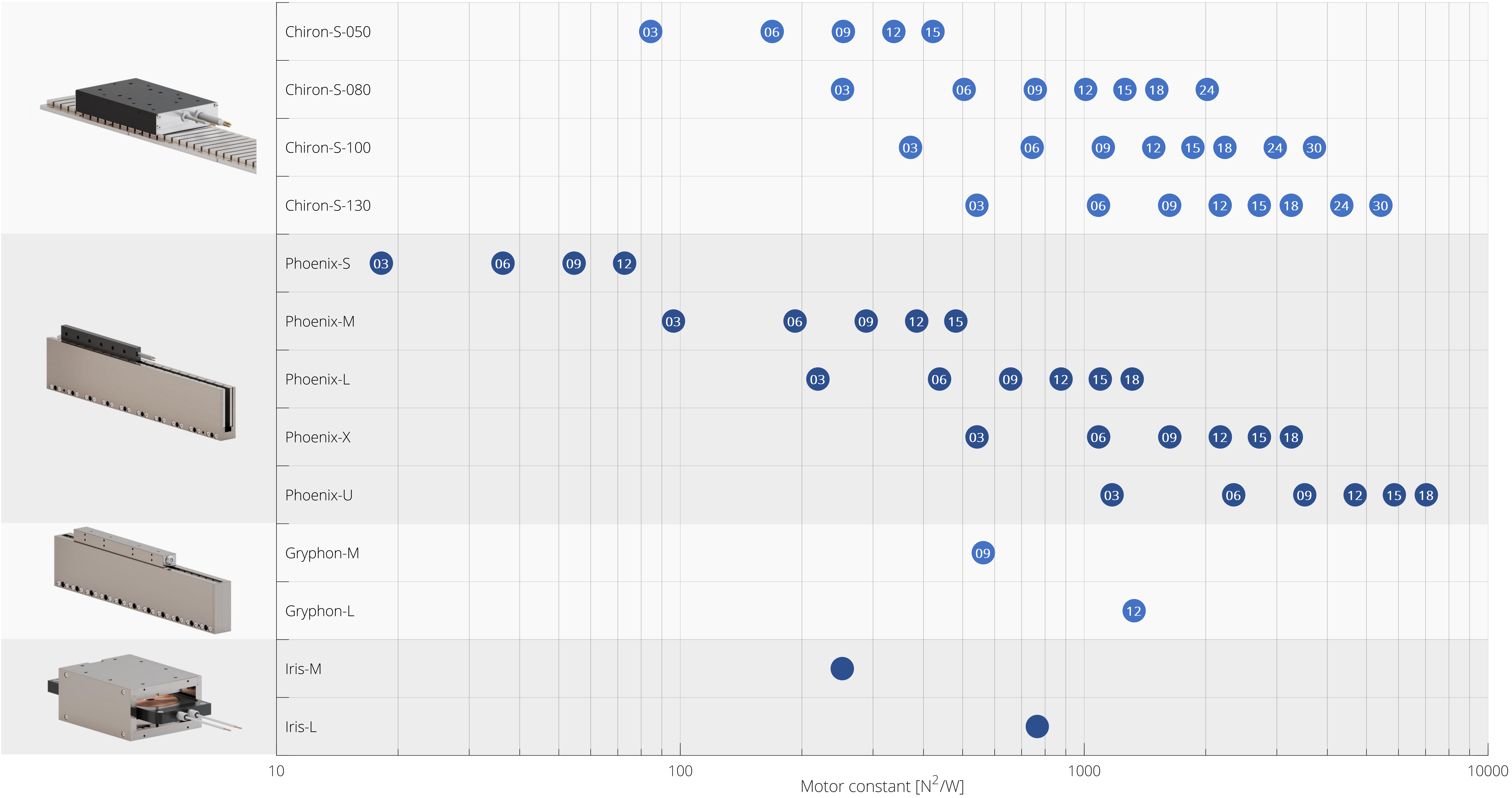
The Gryphon line offers a cost-effective solution for vacuum-compatible ironless linear motors. These motors also contain features providing magnetic shielding.



Iris

For short stroke applications requiring a relatively large displacement in three directions, the Iris line provides a high force density with zero attraction forces in a rectangular form factor.

OVERVIEW

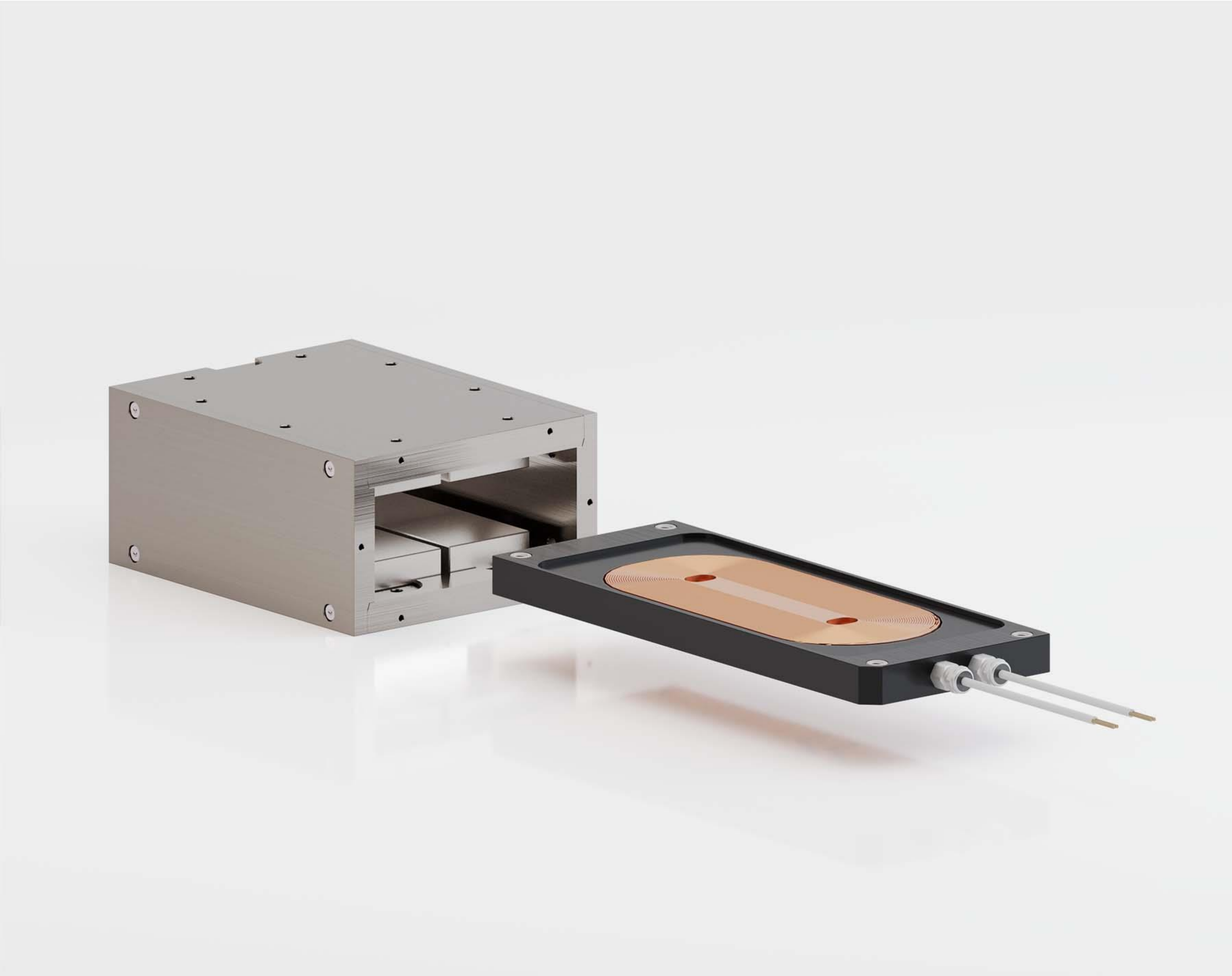

Chiron-S-050 03 06 09 12 15
Chiron-S-080 03 06 09 12 15 18 24
Chiron-S-100 03 06 09 12 15 18 24 30
Chiron-S-130 03 06 09 12 15 18 24 30
Phoenix-S 03 06 09 12
Phoenix-M 03 06 09 12 15
Phoenix-L 03 06 09 12 15 18
Phoenix-X 03 06 09 12 15 18
Phoenix-U 03 06 09 12 15 18
Gryphon-M 09
Gryphon-L 12
Iris-M
Iris-L
10
100
1000
10000
Motor constant [N2/W]

IRIS LINE

The Iris line offers short stroke linear motors with a rectangular form factor. These motors also contain features providing magnetic shielding.

Iris line in medium and large configuration

IRIS LINE - FEATURES



Iris in exploded view

Iris-CU-M-J-S

- Thermal interface (S = PT1000)
- Connector type (J = JST connector)
- Size (M / L)
- Coil unit

Iris-MY-M-R

- Mechanical interface (R = regular pattern / H = oval pattern)
- Size (M / L)
- Magnet yoke

- Different sizes for optimal mechanical integration
- Magnets are shorter than the back iron which improves magnetic shielding
- Mounting interface for additional cover plates
- Coil units have a temperature sensor (PT1000)
- Coil unit housing optimized for heat transfer and force bandwidth

IRIS-M/L PERFORMANCE SPECIFICATIONS

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	Parameter	Symbol	Unit	T_{coil} (°C)	CU-M	CU-L
Electromech.	Peak force (α_T = 5°C/s increase)	F_p	N	20	458	1178
	Continuous force	F_c	N	100	82	173
	Attraction force (I = 0)	F_{att}	N	-	0	0
	Motor constant	S	N^2/W	20	252	765
	Force constant	K_f	N/A	-	19	48
Electrical	Maximum dc bus voltage	V_{dc}	V	-	100	100
	Phase resistance	$R_{ph,20}$	Ohm	20	1.5	3.0
	Phase inductance	L_{ph}	mH	-	3.4	13.2
	EMF constant	K_e	Vs/m	-	19	48
	Maximum rms current	I_p	A	20	24.0	24.6
	Continuous rms current	I_c	A	100	4.3	3.6
Thermal	Continuous dissipation	$P_{d,c}$	W	100	35	52
	Thermal resistance	R_{th}	K/W	-	2.30	1.55
	Coil unit heat capacity	C_{th}	J/K	-	167	363
	Thermal time constant	τ_{th}	s	-	384	563

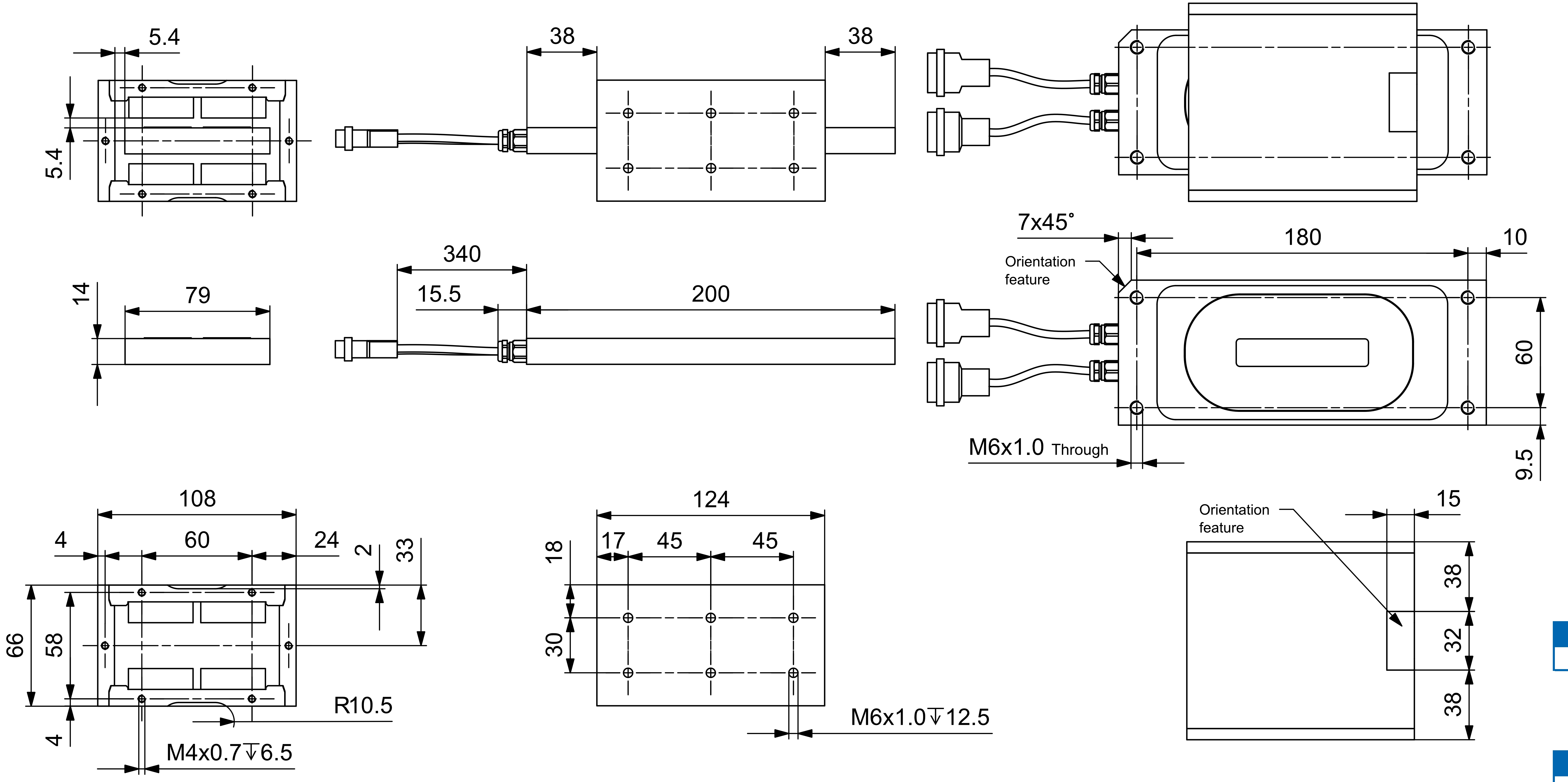
Notes

- Specifications are based upon a magnet temperature of 20°C
- Thermal resistance is measured with a convection of $10W/m^2K$

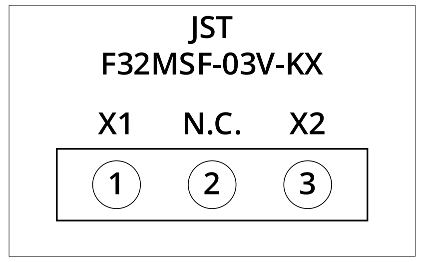
Product marking / approvals

IRIS-M MECHANICAL SPECIFICATIONS

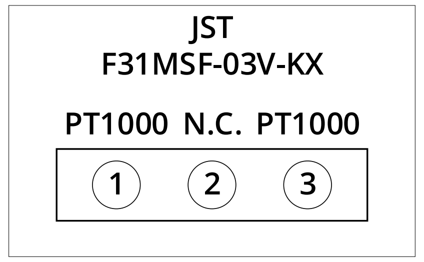
Coil unit: Iris-CU-M-J-S
Magnet yoke: Iris-MY-M-R
Drawings of remaining models on request



Power



Sensor

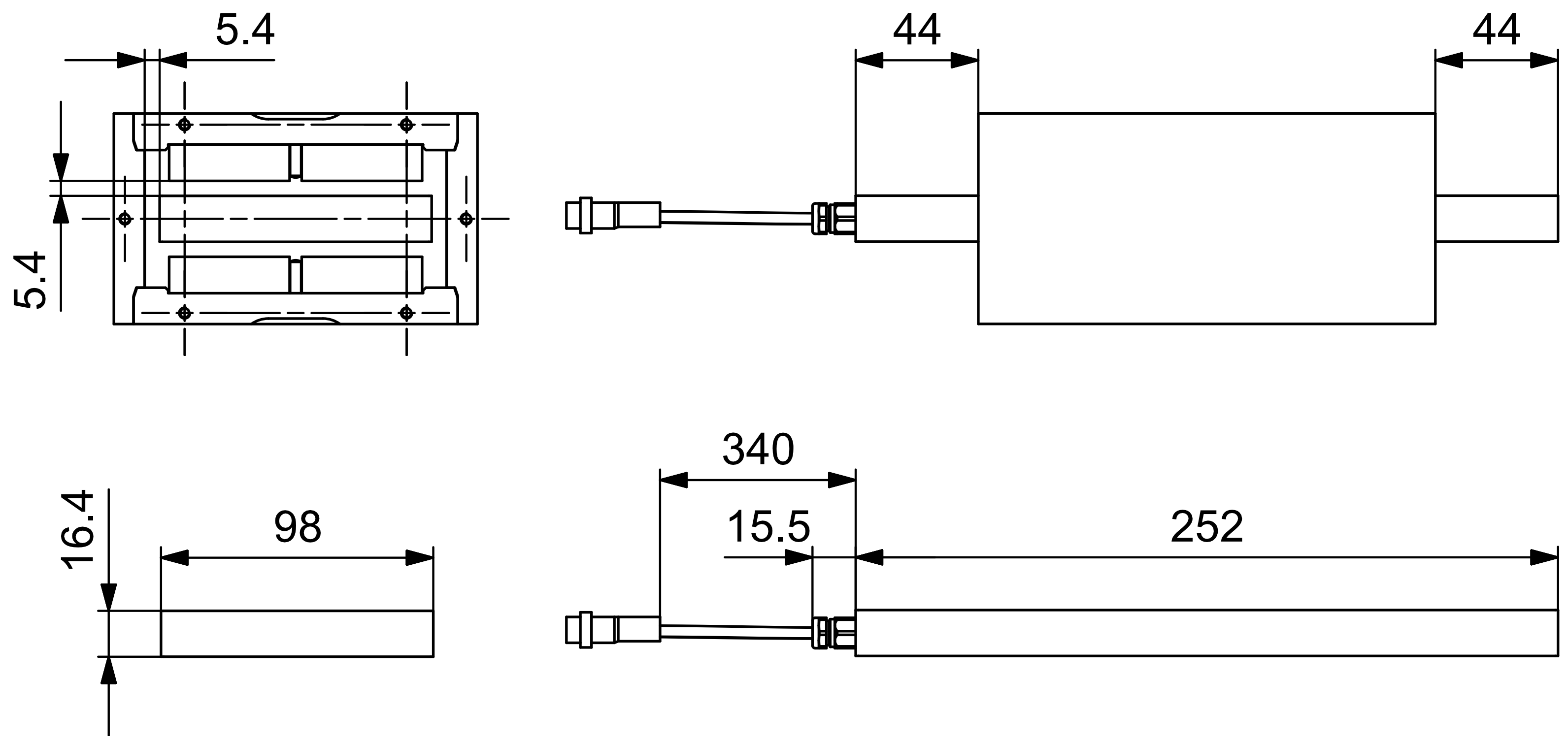


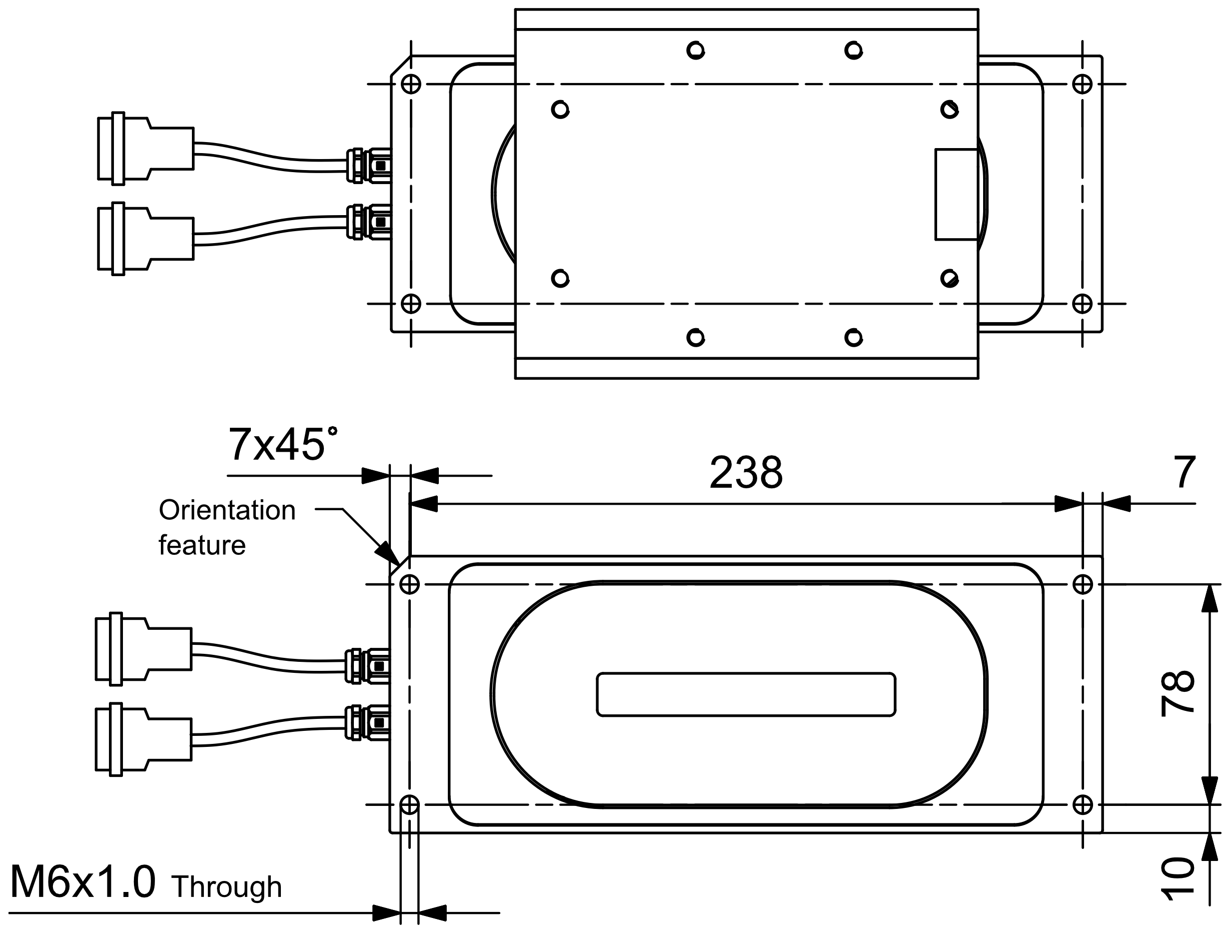
Parameter	Symbol	Unit	Iris-CU-M
Coil unit mass	M_{cu}	kg	0.8

Parameter	Symbol	Unit	Iris-MY-M
Magnet yoke mass	M_{my}	kg	3.8

IRIS-L MECHANICAL SPECIFICATIONS

Coil unit: Iris-CU-L-J-S
Magnet yoke: Iris-MY-L-H
Drawings of remaining models on request





Power

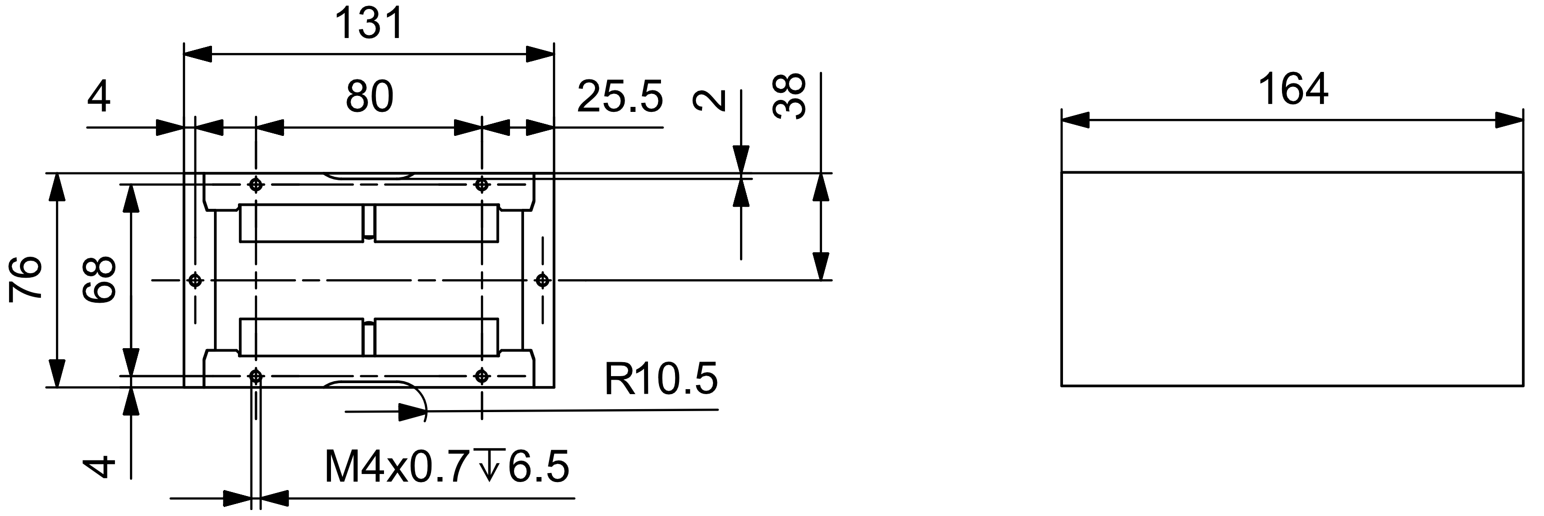
JST
F32MSF-03V-KX

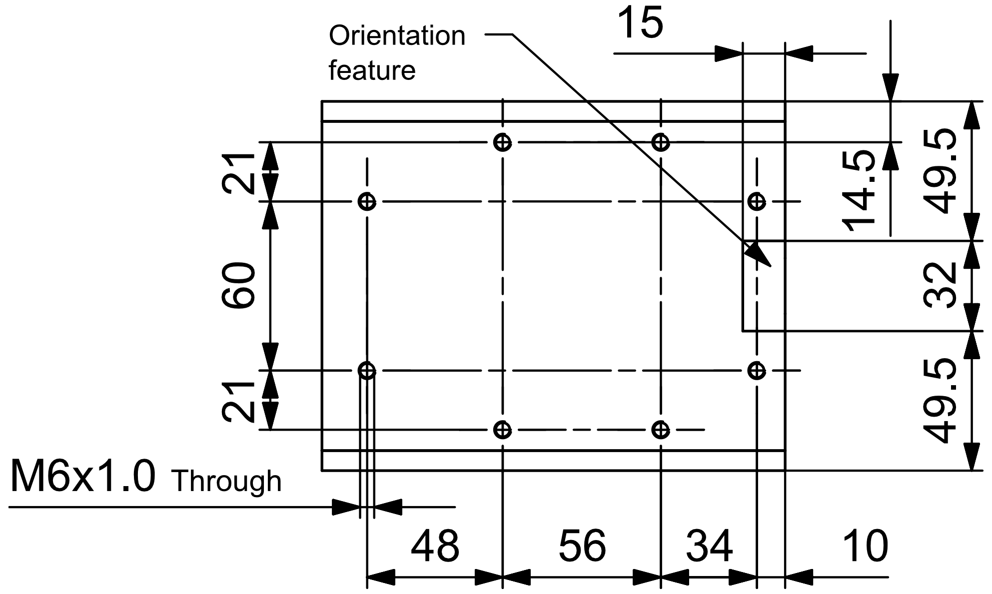
X1	N.C.	X2
1	2	3

Sensor

JST
F31MSF-03V-KX

PT1000	N.C.	PT1000
1	2	3





Parameter	Symbol	Unit	Iris-CU-L
Coil unit mass	M_{cu}	kg	1.5

Parameter	Symbol	Unit	Iris-MY-L
Magnet yoke mass	M_{my}	kg	7.6

DEFINITIONS

Description	Equation	Unit	Remarks
Phase resistance at T_{coil}	$R_{ph} = R_{ph,20}(1+0.0039(T_{coil}-20))$	Ohm	
Force constant at no load	$K_f = K_e$	N/A	
Continuous dissipation	$P_{d,c} = (T_{coil} - T_{amb})/R_{th}$	W	Only copper losses are considered. This catalogue considers T_{amb} = 20ºC.
Peak dissipation	$P_{d,p} = C_{th}\alpha_T$	W	α_T is mentioned at the peak force specification.
Continuous rms current	$I_c = \min\left(\sqrt{\frac{P_{d,c}}{R_{ph}}}, \frac{V_{dc}}{R_{ph}}\right)$	A	Limited either by continuous dissipation or dc voltage and resistance or cable/connector ratings (if applicable).
Peak rms current	$I_p = \min\left(\sqrt{\frac{P_{d,p}}{R_{ph,20}}}, \frac{V_{dc}}{R_{ph,20}}\right)$	A	Limited either by peak dissipation or dc voltage and resistance or cable/connector ratings (if applicable).
Thermal time constant	$\tau_{th} = C_{th}R_{th}$	s	
Continuous force	$F_c = K_f I_c$	N	
Peak force	$F_p = K_f I_p$	N	
Motor constant	$S = \frac{K_f^2}{R_{ph,20}}$	N^2/W	
Maximum velocity (F = 0)	$v_m = \frac{V_{dc}}{K_e}$	m/s	Iron losses are not considered.

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