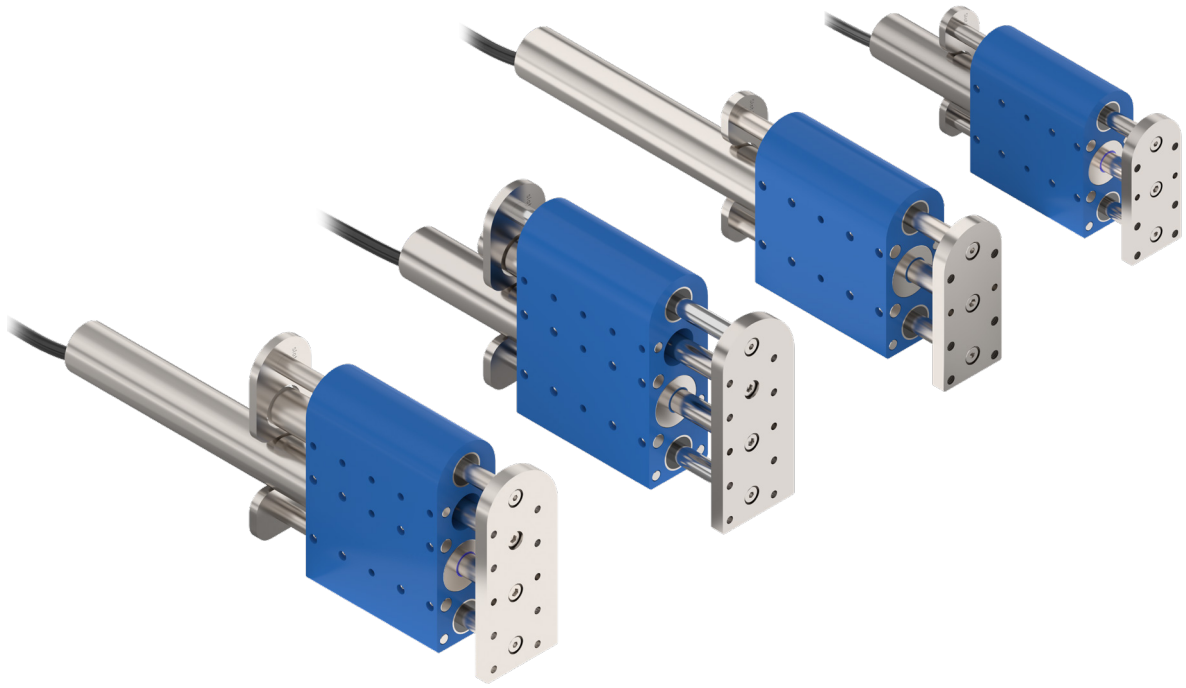
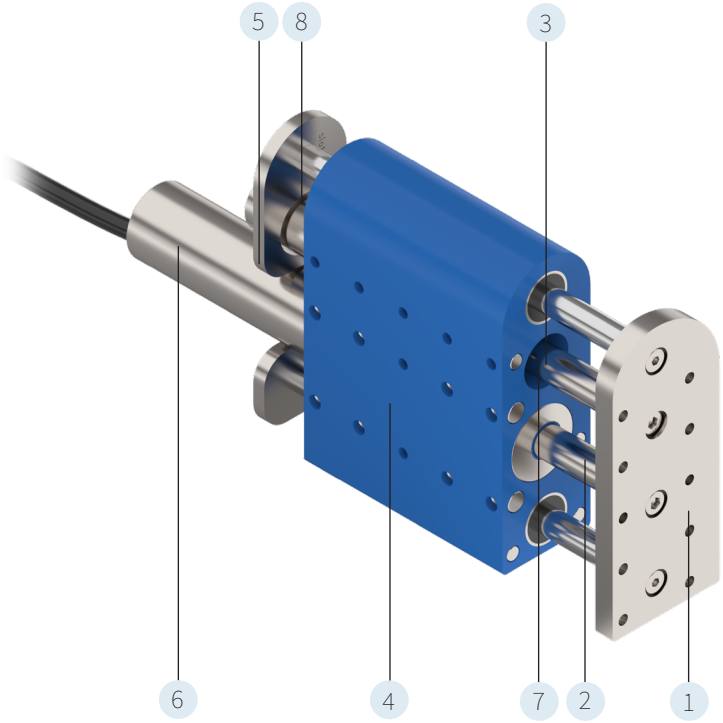
STAINLESS STEEL
LINEAR MODULES SM01-23



- Especially for pharmaceutical applications and the food sector
- Suitable for "wash-down" with protection class IP69
- High resistance to chemicals
- Motor housing made of Polyoxymethylen (POM, FDA approved)
- Guide rods in surface-hardened stainless steel 1.4112 (AISI 440B)
- Guide with stainless linear ball bearings and food-grade lubricant (NSF H1)
- Equipped with "plug and play" technology
- Simple load simulation by LinMot Designer software
- Optional with "stainless steel" MagSpring® for vertical load balancing

LINEAR MODULES SM01-23



1. Front plate with counterbore holes for precise load mounting
2. Hardened stainless steel shafts with high corrosion resistance
3. Stainless linear ball bearings with food grade lubricant (NSF H1)
4. Guide block made of polyoxymethylene (POM, FDA approved) with built-in linear ball bearings
5. Back plate for higher mechanical stiffness of the linear guide
6. Stainless steel linear motor with integrated temperature and position sensors and mounting flange
7. Magnetic slider of the linear motor (Magnets are protected in a chrome steel tube.)
8. Magnetic spring MagSpring® for vertical load compensation (Optional)

Linearmodules SM01-23

The SM01 linear modules are complete drive solutions consisting of linear guides with integrated "LinMot" linear motors and optionally attached vertical load compensation elements "MagSpring". The modules have been specially developed for applications in the pharmaceutical or food industry which require a solution made of stainless steel with a high degree of protection. The modules are guided by linear ball bearings lubricated with a food-grade lubricant (NSF H1).

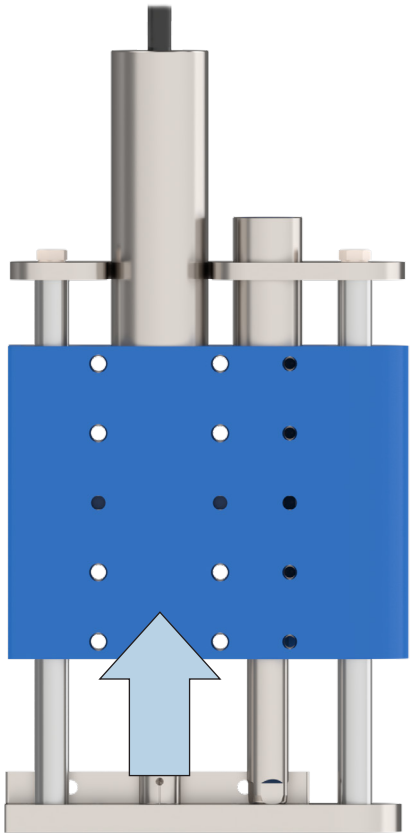
Each SM01-23 linear module are supplied to the customer fully assembled and does not have to be assembled from individual parts. Only one article number is required to order. The commissioning of the drives is very easy as all SM01 linear modules are equipped with the "Plug and Play" technology. The required type parameters do not have to be selected manually, but are read in automatically by the servo drive.

SM01-23 linear modules with vertical load compensation «MagSpring®»

In the vertical mounting position, linear modules and other direct drives must constantly apply a constant force to counteract the weight force. A magnetic spring, MagSpring®, installed parallel to the linear motor, can passively compensate for the weight load. The motor is only used for the actual positioning operation or for applying the dynamic forces and can be sized accordingly smaller. Since MagSprings are purely passive elements, a defined function or position of a device can be ensured in the de-energized state. Examples are the lifting of a gripper or print head in vertical arrangements.

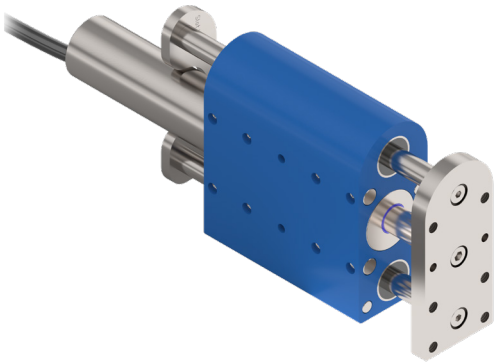
The mode of operation is based on the attractive force of permanent magnets. Accordingly, no energy source (electricity, compressed air, etc.) is needed. The special design of the flow-guiding components and the magnets translates the strongly non-linear relationship between force and displacement in magnet-iron arrangements into a constant force curve. Depending on the strength class of the MagSpring, the permanent magnets are either in the stator, in the slider, or in both components. The slider is guided by an integrated plain bearing, so that MagSprings can be used comparably to gas pressure springs in a design. The effective force is in the range of +/- 10% of the nominal force, due to material and manufacturing tolerances.

The SM01 linear modules are optionally available with permanently installed MagSpring (MSxx option). These cover a constant force of 22 N and are arranged in such a way that a pulling action is exerted on the load axis.

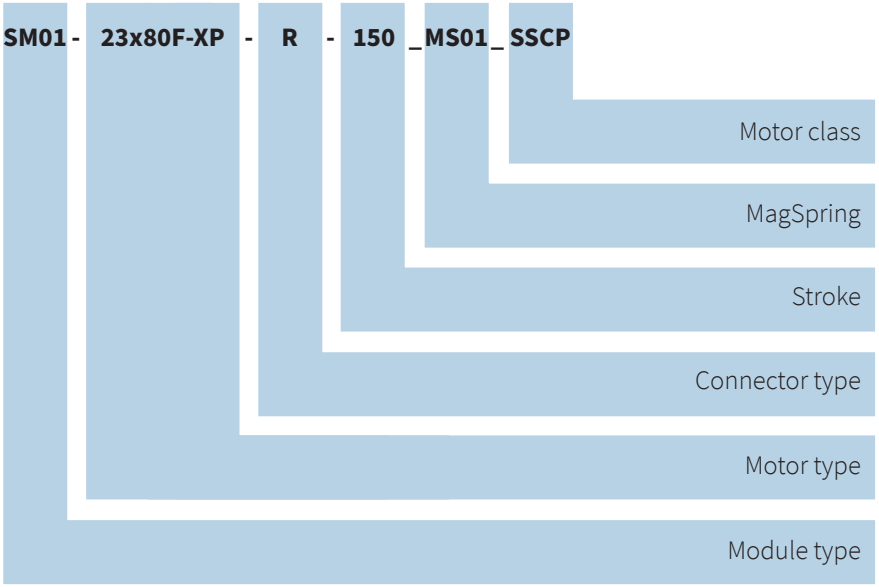


Linear ball bearings of the SM01-23 linear modules

Guide systems based on rolling elements such as linear ball bearings are superior to plain bearings in general with regard to guiding accuracy, load capacity and friction. This is also shown in the respective load diagrams. The stainless steel linear ball bearings used in the SM01 linear modules require lubrication of the balls, which is why seals are necessary in practice to achieve an appropriate degree of protection. The lubricant used is a food grade lubricant (NSF H1) based on medical white oil.

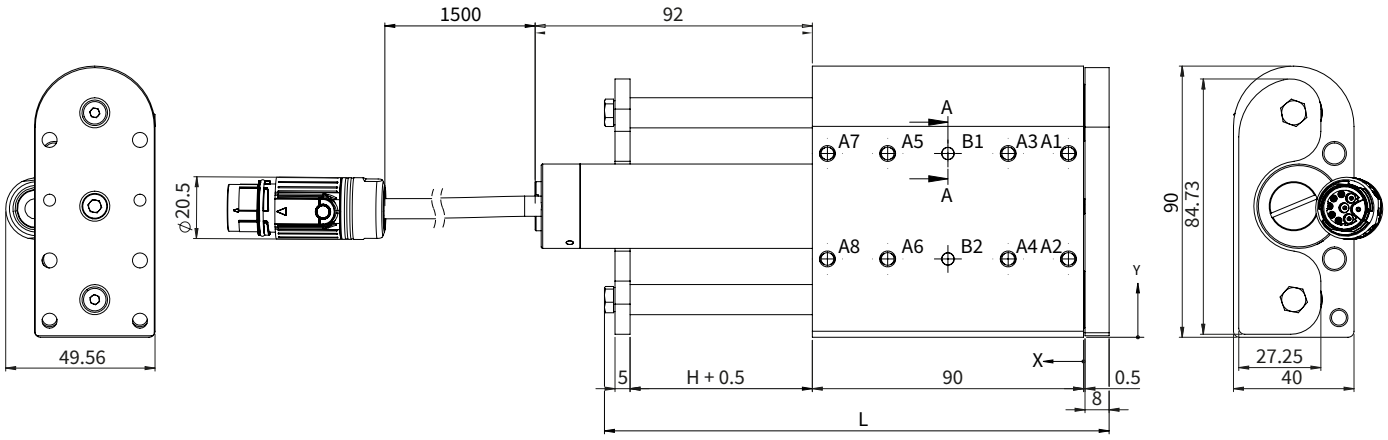


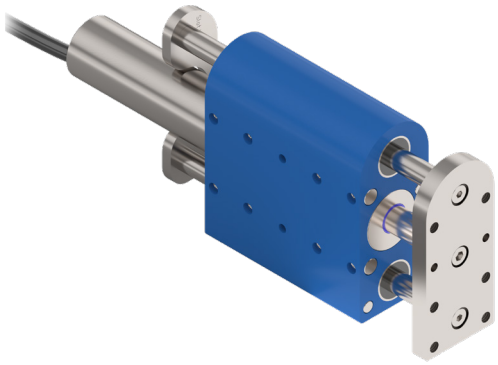
Designation Code Linear Modules SM01-23

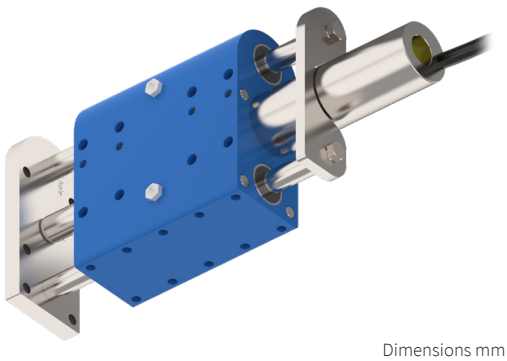


The SM01-23 linear module product family currently offers 10 product variants. Each variant has its own article number and is delivered fully assembled. The large variety of strokes, forces and features opens up a very comprehensive range of applications for the user.

SM01-23X80F_SSCP WITH LINEAR BALL BEARINGS







Dimensions mm

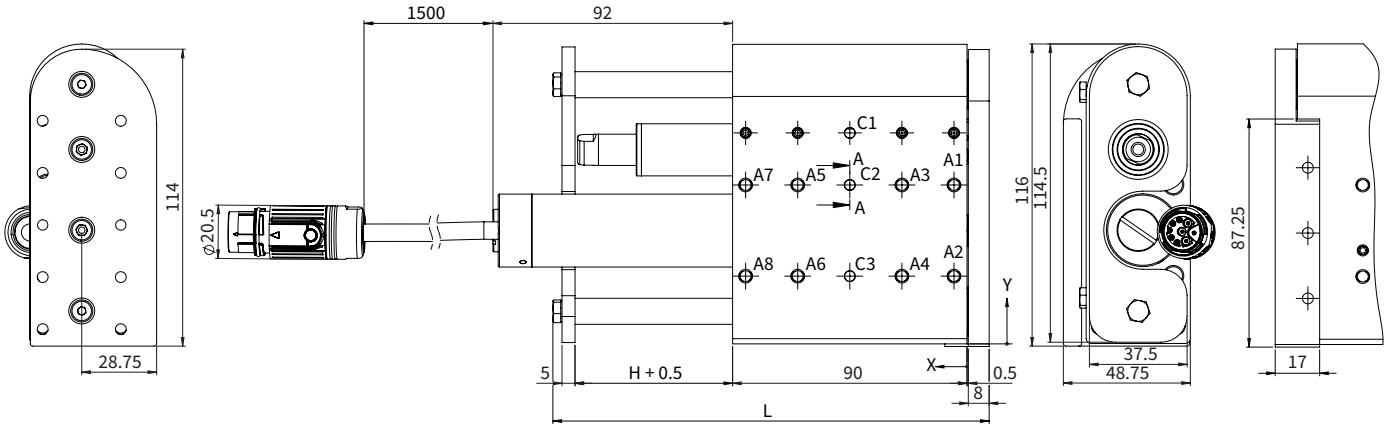
Linear Module	Stroke H [mm (inch)]		Carriage length L [mm (inch)]		Moving mass [1] [g (lb)]		Total weight [g (lb)]	
SM01-23x80F-XP-R-60_SSCP	60	(2.36)	167.5	(6.59)	590	(1.30)	1450	(3.20)
SM01-23x80F-XP-R-110_SSCP	110	(4.33)	217.5	(8.56)	690	(1.52)	1640	(3.62)
SM01-23x80F-XP-R-150_SSCP	150	(5.91)	257.5	(10.14)	780	(1.72)	1670	(3.68)
SM01-23x80F-XP-R-190_SSCP	190	(7.48)	297.5	(11.71)	860	(1.89)	1760	(3.88)

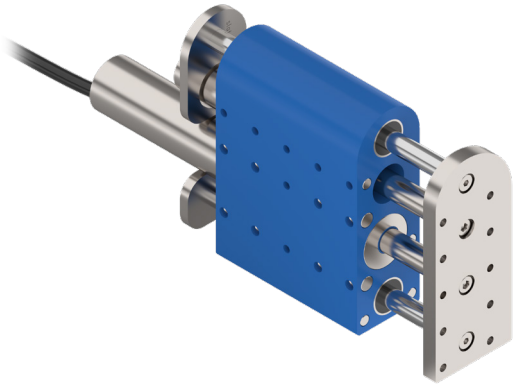
[1] Mass: Slider, Shafts, Front plate, Back plate

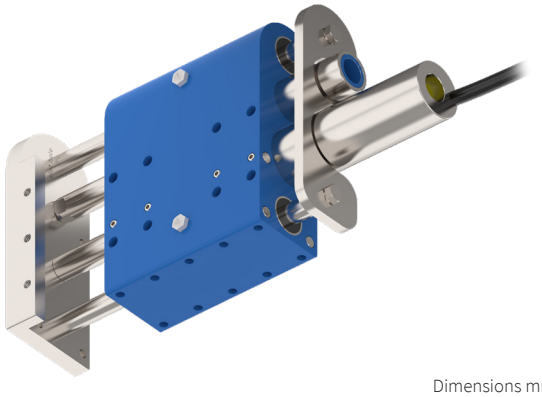
MATERIALS

Guide Block	Front Plate	Guide Shaft	Bearing	Wipers
POM (FDA conform)	Stainless Steel Mat. 1.4404 / 316 L	Stainless Steel Mat. 1.4112 / 440B	Linear ball bearing (stainless)	NBR (FDA conform)

SM01-23X80F_MS01_SSCP WITH LINEAR BALL BEARINGS AND VERTICAL LOAD COMPENSATION MAGSPRING®







Dimensions mm

Linearmodul	Stroke H [mm (inch)]		Carriage length L [mm (inch)]		Moving mass [1] [g (lb)]		Total weight [g (lb)]	
SM01-23x80F-XP-R-60-MS01_SSCP [2]	60	(2.36)	167.5	(6.59)	910	(2.00)	2010	(4.43)
SM01-23x80F-XP-R-110-MS01_SSCP [2]	110	(4.33)	217.5	(8.56)	1020	(2.25)	2260	(4.98)
SM01-23x80F-XP-R-150-MS01_SSCP [2]	150	(5.91)	257.5	(10.14)	1150	(2.54)	2380	(5.25)

[1] Mass: Slider, Shafts, Front plate, Back plate, MagSpring slider
[2] MagSpring MS01: Constant force 22N

MATERIALS

Guide Block	Front Plate	Guide Shaft	Bearing	Wipers
POM (FDA conform)	Stainless Steel Mat. 1.4404 / 316 L	Stainless Steel Mat. 1.4112 / 440B	Linear ball bearing (stainless)	NBR (FDA conform)

PERFORMANCE DATA SM01-23x80F

Performance Data Linear Module SM01-23x80F				
Stroke				
Maximum Stroke	mm	(in)	190	(7.48)
Force				
Max. Force @ 48VDC	N	(lbf)	73	(16.41)
Max. Force @ 72VDC	N	(lbf)	73	(16.41)
Max. Cont. Force [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	N	(lbf)	15.2 / 18 / 25	(3.42 / 4.04 / 5.62)
Force Constant	N/A_{pk}	(lbf/A_{pk})	8.95	(2.01)
Position Detection				
Position Resolution	mm	(in)	0.005	(0.0002)
Repeatability	mm	(in)	±0.05	(±0.002)
Position Resolution with ES	mm	(in)	-	(-)
Repeatability with ES	mm	(in)	-	(-)
Linearity with ES	mm	(in)	-	(-)
Electrical Data				
Max. Current @ 48VDC	A_{pk}		7.4	
Max. Current @ 72VDC	A_{pk}		7.4	
Max. Cont. Current [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	A_{pk}		1.5 / 1.9 / 2.4	
Magnetic Period	mm	(in)	20	(787.4)
Thermal Data				
Max. Winding Temperature (Sensor)	°C		120	
Thermal Resistance [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	K/W		6.0 / 3.7 / 2.3	
Thermal Time Constant [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	s		900 / 1500 / 400	
Mechanical Data				
Stator Diameter	mm	(in)	28	(1.1)
Slider Diameter	mm	(in)	12	(0.47)
IP Code [Plain Bearing / Linear Ball Bearing]			IP 69S	

1) Motor is mounted on a stainless steel surface of 0.02 m².
2) Motor is mounted on a 20°C cold plate.

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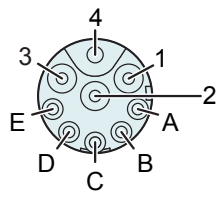
CONNECTOR

Motor Connector Wiring	R-Connector	Wire Color Motor Cable
Ph 1+	1	red
Ph 1-	2	pink
Ph 2+	3	blue
Ph 2-	4	grey
+5VDC	A	white
GND	B	inner Shield
Sinus	C	yellow
Cosinus	D	green
Temp.	E	black
Shield	Case	outer Shield

R-Connector

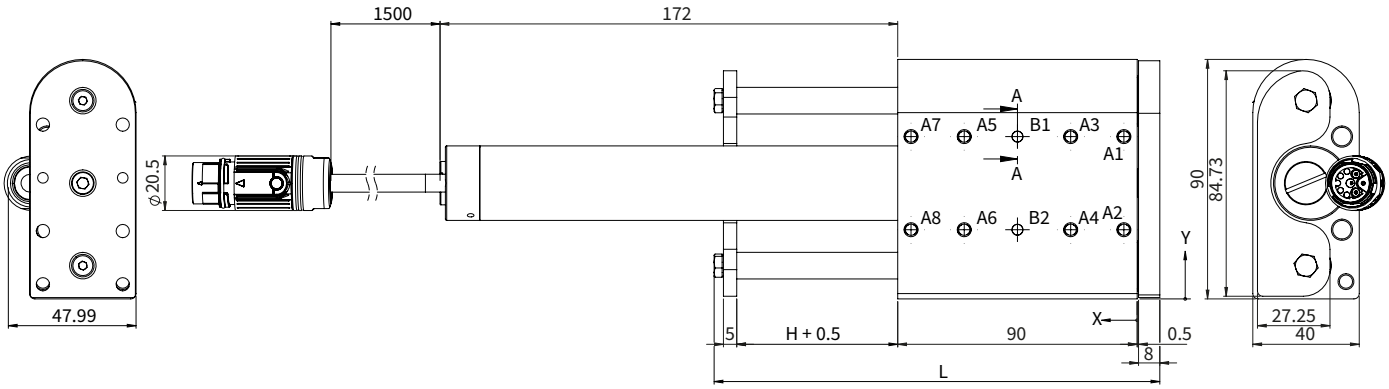


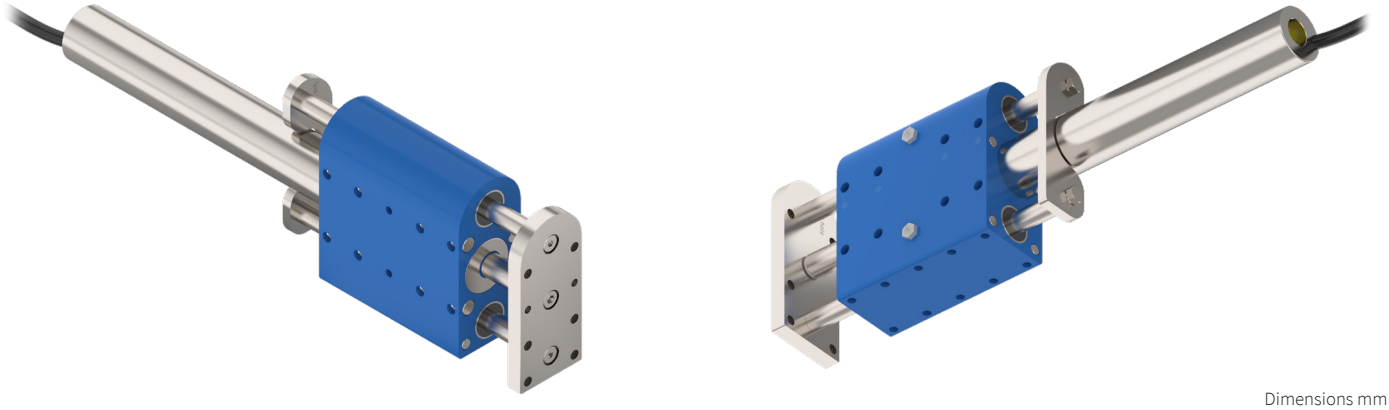
View: Motor connector, plug side

ORDERING INFORMATION

Item	Description	Item-No.
SM01-23x80F-XP-R-60_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 60 mm	0150-6717
SM01-23x80F-XP-R-60-MS01_SSCP	Linear Module SSCP, Linear Ball Bearing, MagSpring 22N, stroke max 60 mm	0150-6845
SM01-23x80F-XP-R-110_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 110 mm	0150-7188
SM01-23x80F-XP-R-110-MS01_SSCP	Linear Module SSCP, Linear Ball Bearing, MagSpring 22N, stroke max 110 mm	0150-7189
SM01-23x80F-XP-R-150_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 150 mm	0150-6768
SM01-23x80F-XP-R-150-MS01_SSCP	Linear Module SSCP, Linear Ball Bearing, MagSpring 22N, stroke max 150 mm	0150-6846
SM01-23x80F-XP-R-190_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 190 mm	0150-6805

SM01-23X160H_SSCP WITH LINEAR BALL BEARINGS





Dimensions mm

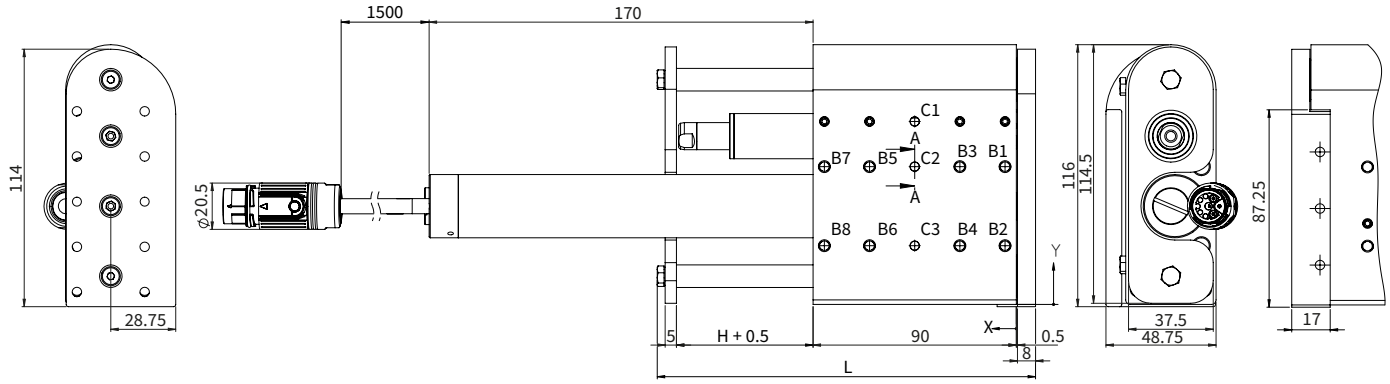
Linear Module	Stroke H [mm (inch)]		Carriage length L [mm (inch)]		Moving mass [1] [g (lb)]		Total weight [g (lb)]	
SM01-23x160H-XP-R-60_SSCP	60	(2.36)	167.5	(6.59)	590	(1.30)	1620	(3.57)
SM01-23x160H-XP-R-150_SSCP	150	(5.91)	257.5	(10.14)	780	(1.72)	1850	(4.08)
SM01-23x160H-XP-R-190_SSCP	190	(7.48)	297.5	(11.71)	860	(1.90)	1940	(4.28)

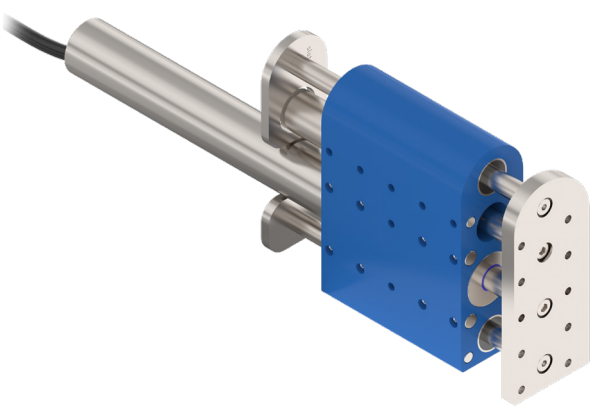
[1] Mass: Slider, Shafts, Front plate, Back plate

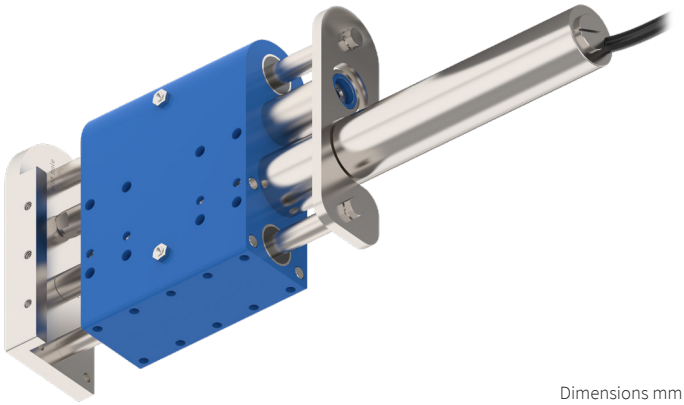
MATERIALS

Guide Block	Front Plate	Guide Shaft	Bearing	Wipers
POM (FDA conform)	Stainless Steel Mat. 1.4404 / 316 L	Stainless Steel Mat. 1.4112 / 440B	Linear ball bearing (stainless)	NBR (FDA conform)

SM01-23X160H_MS01_SSCP WITH LINEAR BALL BEARINGS AND VERTICAL LOAD COMPENSATION MAGSPRING®







Dimensions mm

Linearmodul	Stroke H [mm (inch)]		Carriage length L [mm (inch)]		Moving mass [1] [g (lb)]		Total weight [g (lb)]	
SM01-23x160H-XP-R-60-MS01_SSCP [2]	60	(2.36)	167.5	(6.59)	910	(2.00)	2200	(4.85)
SM01-23x160H-XP-R-150-MS01_SSCP [2]	150	(5.91)	257.5	(10.14)	1150	(2.54)	2560	(5.64)

[1] Mass: Slider, Shafts, Front plate, Back plate, MagSpring slider
[2] MagSpring MS01: Constant force 22N

MATERIALS

Guide Block	Front Plate	Guide Shaft	Bearing	Wipers
POM (FDA conform)	Stainless Steel Mat. 1.4404 / 316 L	Stainless Steel Mat. 1.4112 / 440B	Linear ball bearing (stainless)	NBR (FDA conform)

PERFORMANCE DATA SM01-23x160H

Performance Data Linear Module SM01-23x160H				
Stroke				
Maximum Stroke	mm	(in)	190	(7.48)
Force				
Max. Force @ 48VDC	N	(lbf)	137.5	(30.91)
Max. Force @ 72VDC	N	(lbf)	137.5	(30.91)
Max. Cont. Force [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	N	(lbf)	25.6 / 32.7 / 38.2	(5.76 / 7.35 / 8.59)
Force Constant	N/A_{pk}	(lbf/A_{pk})	12.5	(2.81)
Position Detection				
Position Resolution	mm	(in)	0.005	(0.0002)
Repeatability	mm	(in)	±0.05	(±0.002)
Position Resolution with ES	mm	(in)	-	(-)
Repeatability with ES	mm	(in)	-	(-)
Linearity with ES	mm	(in)	-	(-)
Electrical Data				
Max. Current @ 48VDC	A_{pk}		10	
Max. Current @ 72VDC	A_{pk}		10	
Max. Cont. Current [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	A_{pk}		1.9 / 2.4 / 2.9	
Magnetic Period	mm	(in)	20	(787.4)
Thermal Data				
Max. Winding Temperature (Sensor)	°C		120	
Thermal Resistance [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	K/W		4.3 / 2.7 / 2	
Thermal Time Constant [Passive cooling/ Passive mounted[1] / Cold Plate[2]]	s		800 / 1500 / 400	
Mechanical Data				
Stator Diameter	mm	(in)	28	(1.1)
Slider Diameter	mm	(in)	12	(0.47)
IP Code [Plain Bearing / Linear Ball Bearing]			IP 67S	

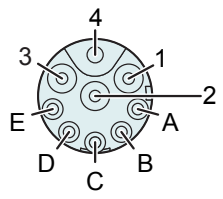
1) Motor is mounted on a stainless steel surface of 0.02 m².
2) Motor is mounted on a 20°C cold plate.

13

CONNECTOR

Motor Connector Wiring	R-Connector	Wire Color Motor Cable
Ph 1+	1	red
Ph 1-	2	pink
Ph 2+	3	blue
Ph 2-	4	grey
+5VDC	A	white
GND	B	inner Shield
Sinus	C	yellow
Cosinus	D	green
Temp.	E	black
Shield	Case	outer Shield

R-Connector



View: Motor connector, plug side

ORDERING INFORMATION

Item	Description	Item-No.
SM01-23x160H-XP-R-60_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 60 mm	0150-6853
SM01-23x160H-XP-R-60-MS01_SSCP	Linear Module SSCP, Linear Ball Bearing, MagSpring 22N, stroke max 60 mm	0150-6850
SM01-23x160H-XP-R-150_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 150 mm	0150-6854
SM01-23x160H-XP-R-150-MS01_SSCP	Linear Module SSCP, Linear Ball Bearing, MagSpring 22N, stroke max 150 mm	0150-6851
SM01-23x160H-XP-R-190_SSCP	Linear Module SSCP, Linear Ball Bearing, Stroke max 190 mm	0150-6855

ALL LINEAR MOTION
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