

# micnano

Micro to Nano

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# L

# M

# Faulhaber Micro Linear DC-motors

## 微型線性馬達系列

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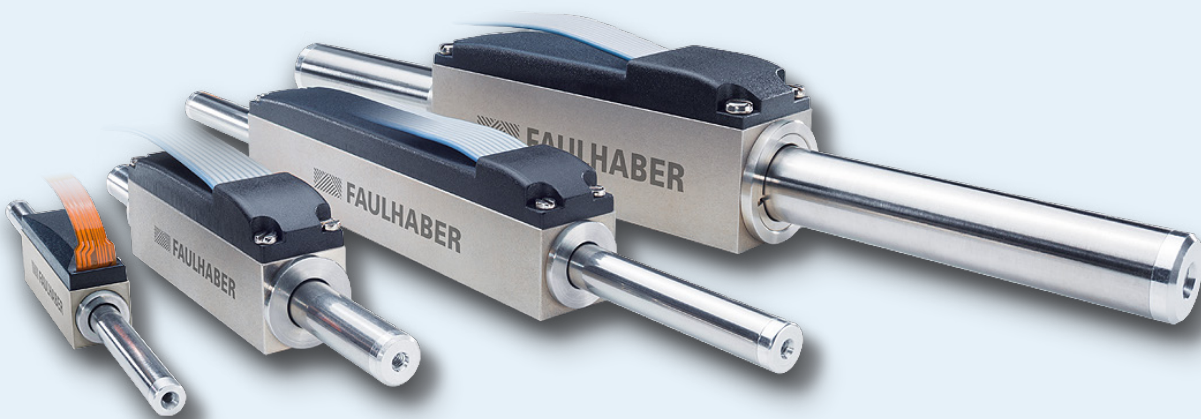
- 長度：33 ~ 85.5 mm
  - 寬度：8 ~ 20 mm
  - 推力：1.03 ~ 9.2 N
  - 速度：1.8 ~ 3.4 m/s
  - 行程長度：15 ~ 220 mm
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德國 Faulhaber LM 微型伺服線性馬達  
內建 Analog Hall Sensor 做位置回饋

搭配控制器做閉迴路力量，速度與位置控制  
同時具備多種通訊界面供選擇

建議搭配光學尺和線軌發揮更佳的定位精度與重現性

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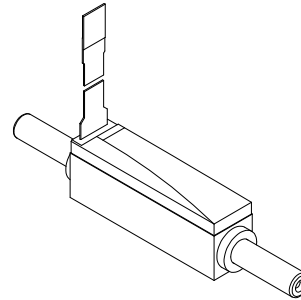
LM 0830- XXX-01  
 └── Travel  
 └── Motor type

## Linear DC-Servomotor

LM 0830 ... 01	96 - 97
LM 1247 ... 11	98 - 99
LM 1483 ... 11	100 - 101
LM 2070 ... 11	102 - 103

## LM 0830...01 with Analog Hall Sensors

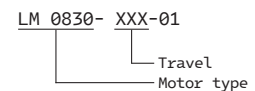
- 推力 : 1.03 N
- 瞬間推力 : 2.74 N
- 解析度 : 2.9  $\mu\text{m}$  (使用內建 Analog Hall Sensor)
- 最高連續移動速度 : 2.4 m/s (依行程不同)



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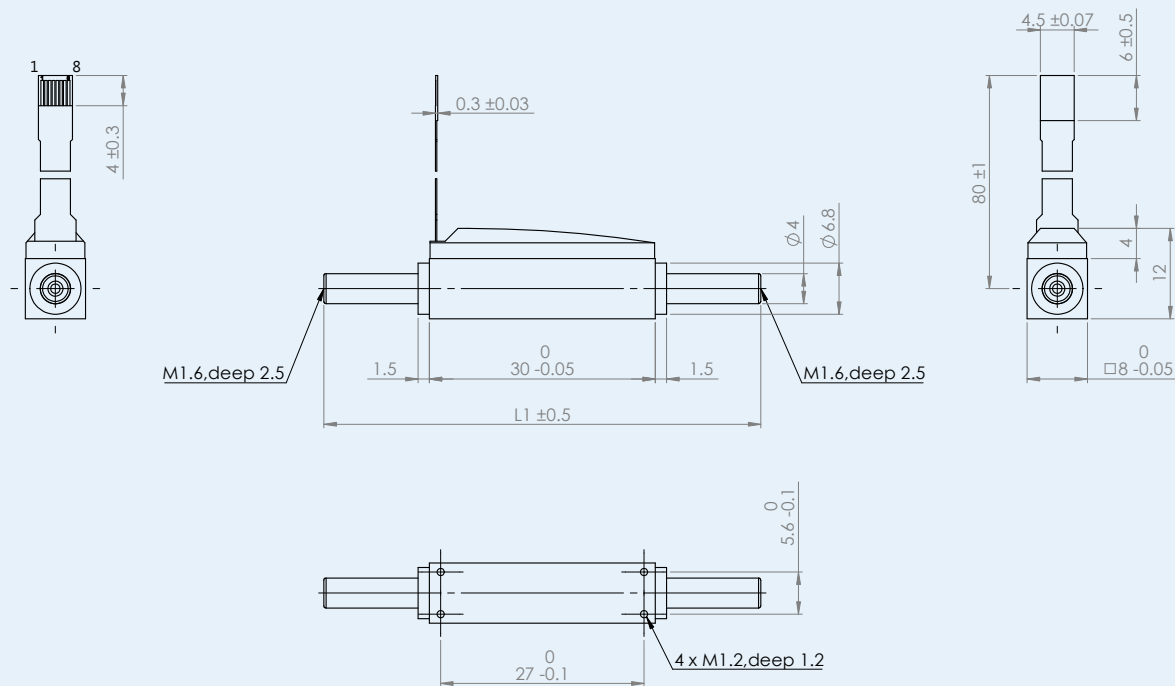
Technical Specification			Values at 22°C
Continuous force	$F_{e \max.}$	1.03	N
Peak force	$F_{p \max.}$	2.74	N
Continuous current	$I_{e \max.}$	0.53	A
Peak current	$I_{p \max.}$	1.41	A
Back-EMF constant	$k_E$	1.58	V/m/s
Force constant	$k_F$	1.94	N/A
Terminal resistance, phase-phase	R	7.37	$\Omega$
Terminal inductance, phase-phase	L	117	$\mu\text{H}$
Terminal resistance	$R_{th1}/R_{th2}$	6.6 / 37.4	K/W
Terminal time constant	$\tau_{w1} / \tau_{w2}$	4 / 291	s
Operation temperature range		-20 ... +125	°C
Magnetic pitch	$\tau_m$	12	mm
Rod bearings		polymer sleeves	
Housing material		metal, non-magnetic	
Direction of movement		electronically reversible	

		015-01	040-01	
Stroke length	$S_{\max}$	15	40	mm
Repeatability	$O_r$	40	40	$\mu\text{m}$
Accuracy	$O_a$	120	140	$\mu\text{m}$
Acceleration	$a_{e \max.}$	206.9	147.8	$\text{m/s}^2$
Speed	$v_{e \max.}$	1.8	2.4	m/s
Rod length	L1	58	82	mm
Rod mass	$m_m$	5	7	g
Total mass	$m_t$	15	17	g

Note: These motors are for operation with DC-voltage < 50 V DC. The given values are for free standing motors.

Other rod lengths available on request.

## Dimensional drawing



## Option, cable and connection information

Example product designation: LM0830-015-01

Option	Type	Description

## Connection

No	Function
Pin 1	Phase C
Pin 2	Phase B
Pin 3	Phase A
Pin 4	GND
Pin 5	Um(+5V)
Pin 6	Hall sensor C
Pin 7	Hall sensor B
Pin 8	Hall sensor A

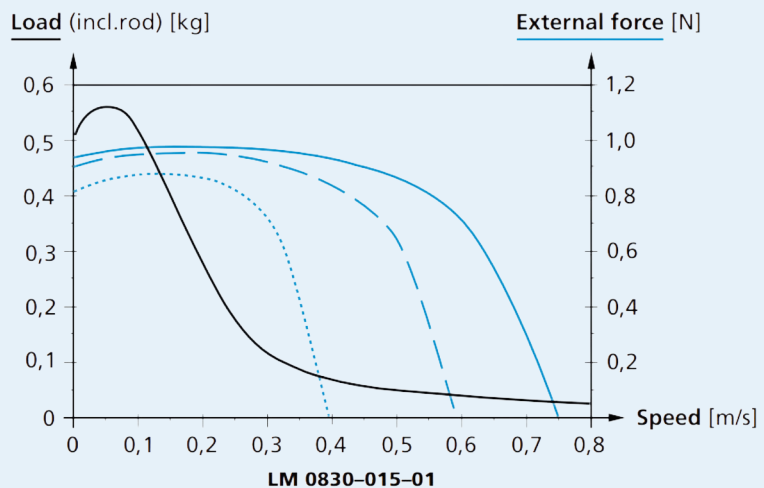
## Motor characteristic curves

Trapezoidal motion profile: ( $t1 = t2 = t3$ )  
 Displacement distance: 15 mm  
 Friction coefficient: 0,2  
 Slope angle:  $0^\circ$   
 Rest time: 0,1 s

**Load:**  
 The max. applicable load (incl. rod) at a given speed with an external force of 0 N.

**External force:**  
 The max. permissible external force at a given speed with a load (incl. rod) of:

- 0,035 kg
- 0,05 kg
- 0,1 kg



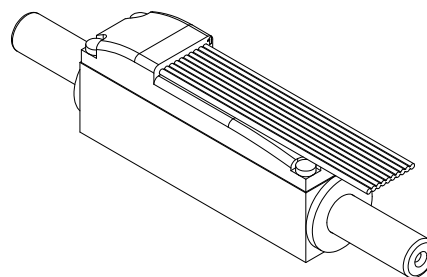
### LM 1247...11 with Analog Hall Sensors

推力 : 3.6 N

瞬間推力 : 10.5 N

解析度 : ~ 4.4  $\mu\text{m}$  (使用內建 Analog Hall Sensor)

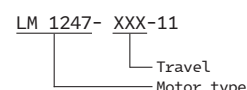
最高連續移動速度 : 3.1 m/s (依行程不同)



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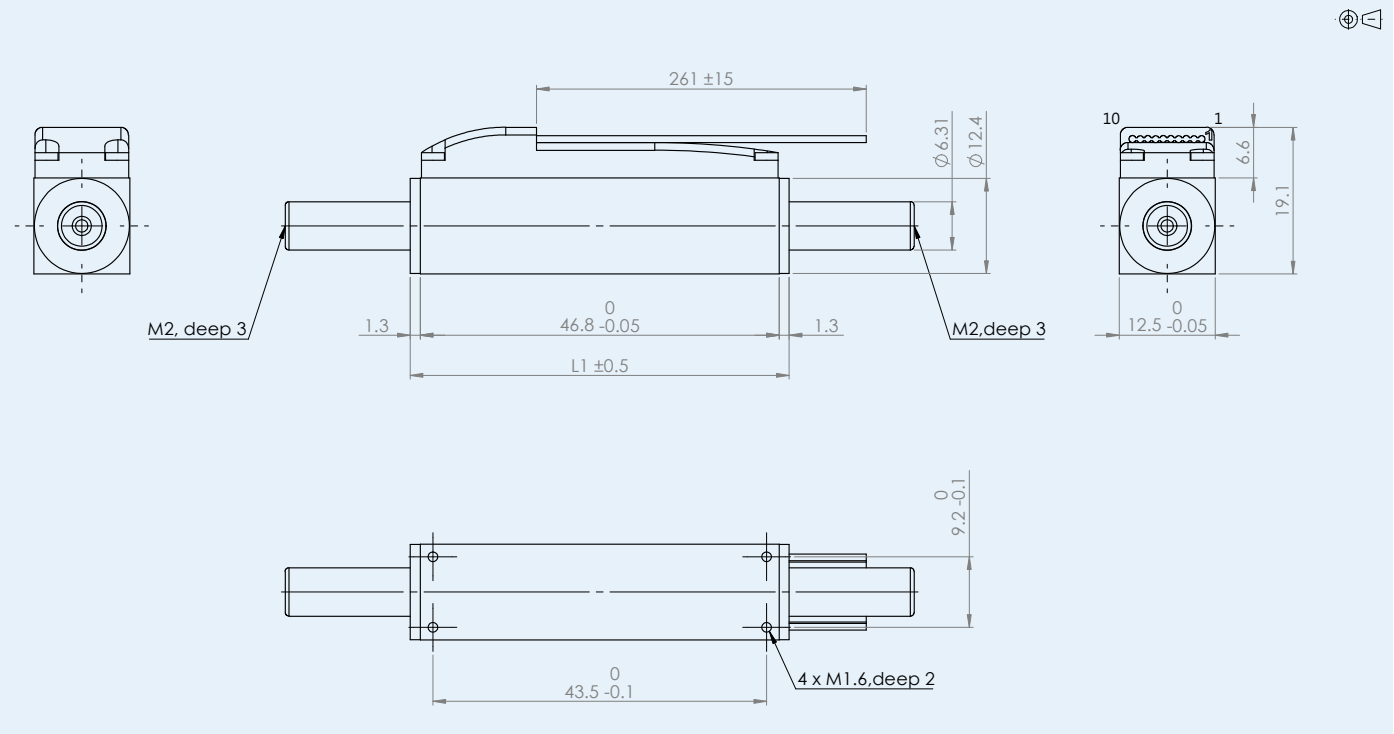
Technical Specification			Values at 22°C
Continuous force	$F_{e \text{ max.}}$	3.6	N
Peak force	$F_{p \text{ max.}}$	10.5	N
Continuous current	$I_{e \text{ max.}}$	0.55	A
Peak current	$I_{p \text{ max.}}$	1.64	A
Back-EMF constant	$k_E$	5.25	V/m/s
Force constant	$k_F$	6.43	N/A
Terminal resistance, phase-phase	R	13.17	$\Omega$
Terminal inductance, phase-phase	L	820	$\mu\text{H}$
Terminal resistance	$R_{th1}/R_{th2}$	3.2 / 20	K/W
Terminal time constant	$\tau_{w1} / \tau_{w2}$	11 / 624	s
Operation temperature range		-20 ... +125	°C
Magnetic pitch	$\tau_m$	18	mm
Rod bearings		polymer sleeves	
Housing material		metal, non-magnetic	
Direction of movement		electronically reversible	

		020-11	040-11	060-11	080-11	100-11	120-11	
Stroke length	$S_{\text{max}}$	20	40	60	80	100	120	mm
Repeatability	$O_r$	40	40	40	40	40	40	$\mu\text{m}$
Accuracy	$O_a$	120	140	160	180	200	220	$\mu\text{m}$
Acceleration	$a_{e \text{ max.}}$	187.6	142.5	122.9	101.8	91.4	81	$\text{m/s}^2$
Speed	$V_{e \text{ max.}}$	1.9	2.4	2.7	2.9	3	3.1	m/s
Rod length	L1	82	109	127	154	172	190	mm
Rod mass	$m_m$	19	25	29	35	39	44	g
Total mass	$m_t$	58	64	68	74	78	83	g

Note: These motors are for operation with DC-voltage < 75 V DC. The given values are for free standing motors.

Other rod lengths available on request.

## Dimensional drawing



## Option, cable and connection information

Example product designation: LM1247-020-11

Option	Type	Description
-11C	Connector	Material PVC, 10 conductors, AWG28 with connector A05a - TCO, pitch 2 mm

## Connection -11/-11c

No	Function
Pin 1	Phase C
Pin 2	Phase B
Pin 3	Phase A
Pin 4	GND
Pin 5	Um(+5V)
Pin 6	Hall sensor C
Pin 7	Hall sensor B
Pin 8	Hall sensor A

## Standard cable

Material PVC, 10 conductors, AWG 28, grid 1mm, wires tinned.

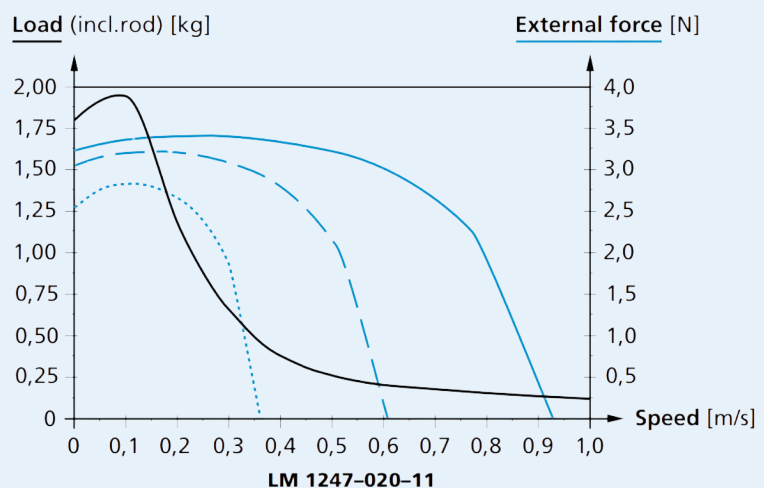
## Motor characteristic curves

Trapezoidal motion profile: ( $t_1 = t_2 = t_3$ )  
 Displacement distance: 20 mm  
 Friction coefficient: 0,2  
 Slope angle: 0°  
 Rest time: 0,1 s

**Load:**  
 The max. applicable load (incl. rod) at a given speed with an external force of 0 N.

**External force:**  
 The max. permissible external force at a given speed with a load (incl. rod) of:

- 0,1 kg ———
- 0,2 kg - - - - -
- 0,5 kg ⋯⋯⋯



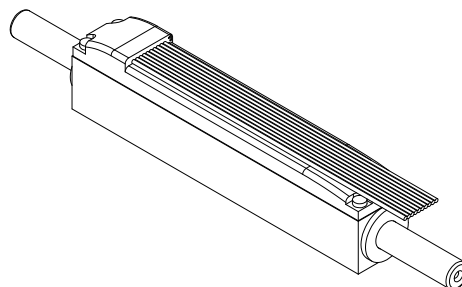
## LM 1483...11 with Analog Hall Sensors

推力 : 9.2 N

瞬間推力 : 27.6 N

解析度 : ~ 5.8 μm (使用內建 Analog Hall Sensor)

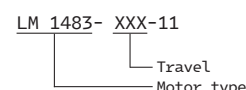
最高連續移動速度 : 2.8 m/s (依行程不同)



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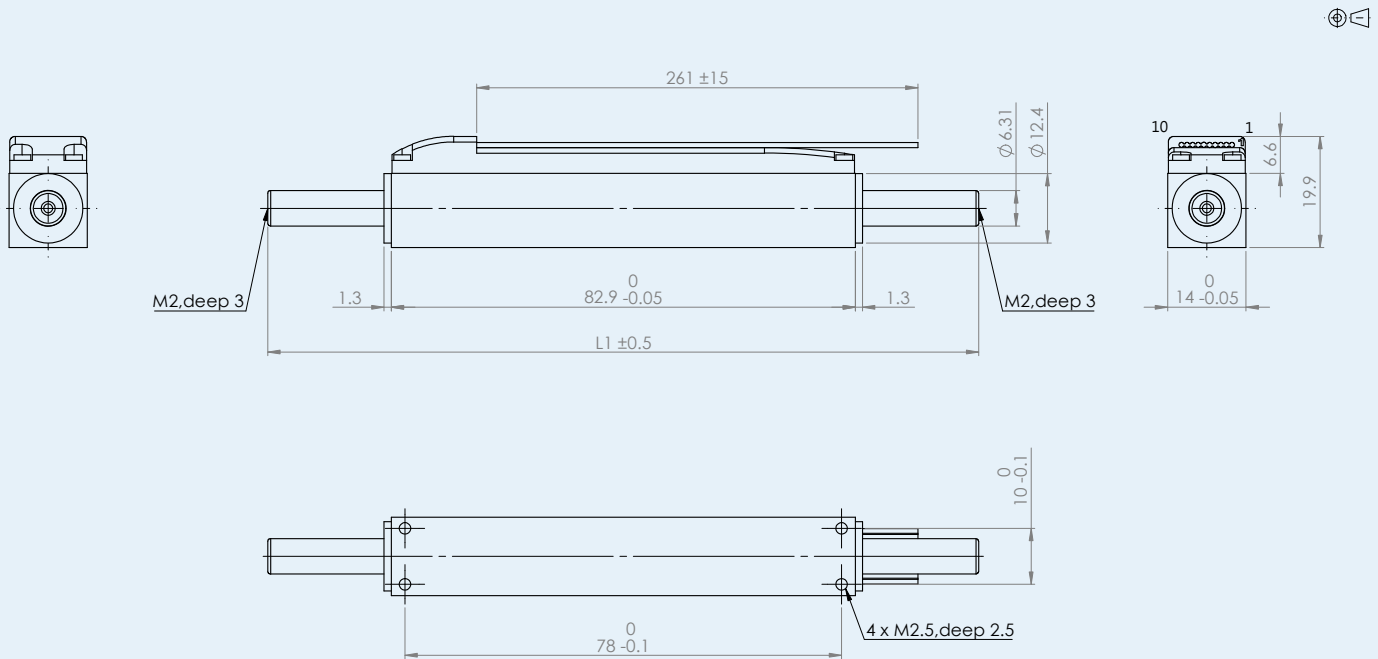
Technical Specification			Values at 22°C
Continuous force	$F_{e \max}$	6.2	N
Peak force	$F_{p \max}$	18.4	N
Continuous current	$I_{e \max}$	0.5	A
Peak current	$I_{p \max}$	1.48	A
Back-EMF constant	$k_E$	10.16	V/m/s
Force constant	$k_F$	12.44	N/A
Terminal resistance, phase-phase	R	26.3	Ω
Terminal inductance, phase-phase	L	1649	μH
Terminal resistance	$R_{th1}/R_{th2}$	1.97 / 12.5	K/W
Terminal time constant	$\tau_{w1} / \tau_{w2}$	12.2 / 789	s
Operation temperature range		-20 ... +125	°C
Magnetic pitch	$\tau_m$	18	mm
Rod bearings		polymer sleeves	
Housing material		metal, non-magnetic	
Direction of movement		electronically reversible	

		020-11	040-11	060-11	080-11	
Stroke length	$S_{\max}$	20	40	60	80	mm
Repeatability	$O_r$	40	40	40	40	μm
Accuracy	$O_a$	120	140	160	180	μm
Acceleration	$a_{e \max}$	213.1	176.6	158.5	140.5	m/s <sup>2</sup>
Speed	$v_{e \max}$	2.1	2.7	3.1	3.4	m/s
Rod length	L1	127	154	172	190	mm
Rod mass	$m_m$	29	35	39	44	g
Total mass	$m_t$	117	124	128	132	g

Note: These motors are for operation with DC-voltage < 75 V DC. The given values are for free standing motors.

Other rod lengths available on request.

## Dimensional drawing



## Option, cable and connection information

Example product designation: LM1483-020-11

Option	Type	Description
-11C	Connector	Material PVC, 10 conductors, AWG28 with connector A05a - TCO, pitch 2 mm

## Connection -11/-11c

No	Function
Pin 1	Phase C
Pin 2	Phase B
Pin 3	Phase A
Pin 4	GND
Pin 5	Um(+5V)
Pin 6	Hall sensor C
Pin 7	Hall sensor B
Pin 8	Hall sensor A

## Standard cable

Material PVC, 10 conductors, AWG 28, grid 1mm, wires tinned.

## Motor characteristic curves

Trapezoidal motion profile: ( $t_1 = t_2 = t_3$ )  
 Displacement distance: 20 mm  
 Friction coefficient: 0,2  
 Slope angle: 0°  
 Rest time: 0,1 s

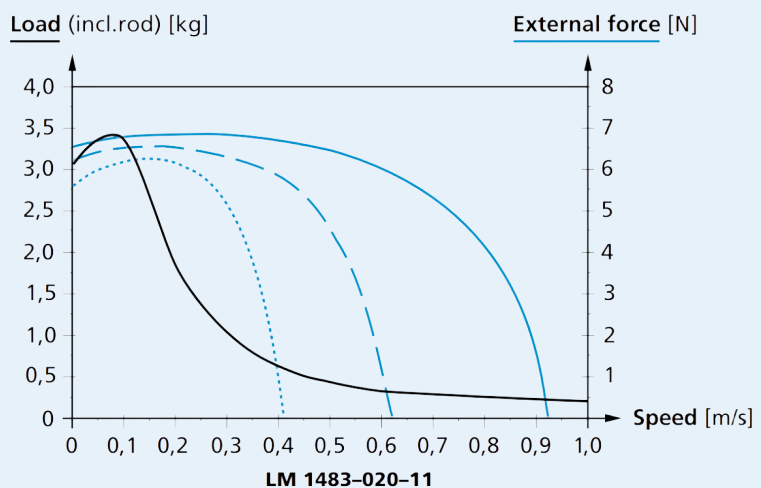
### Load:

The max. applicable load (incl. rod) at a given speed with an external force of 0 N.

### External force:

The max. permissible external force at a given speed with a load (incl. rod) of:

- 0,15 kg ———
- 0,3 kg - - - - -
- 0,6 kg ⋯⋯⋯



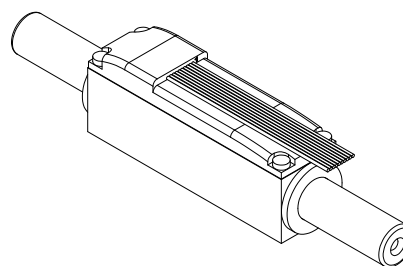
## LM 2070...11 with Analog Hall Sensors

推力 : 9.2 N

瞬間推力 : 27.6 N

解析度 : ~ 5.8  $\mu\text{m}$  (使用內建 Analog Hall Sensor)

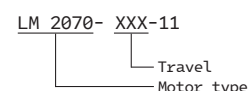
最高連續移動速度 : 2.8 m/s (依行程不同)



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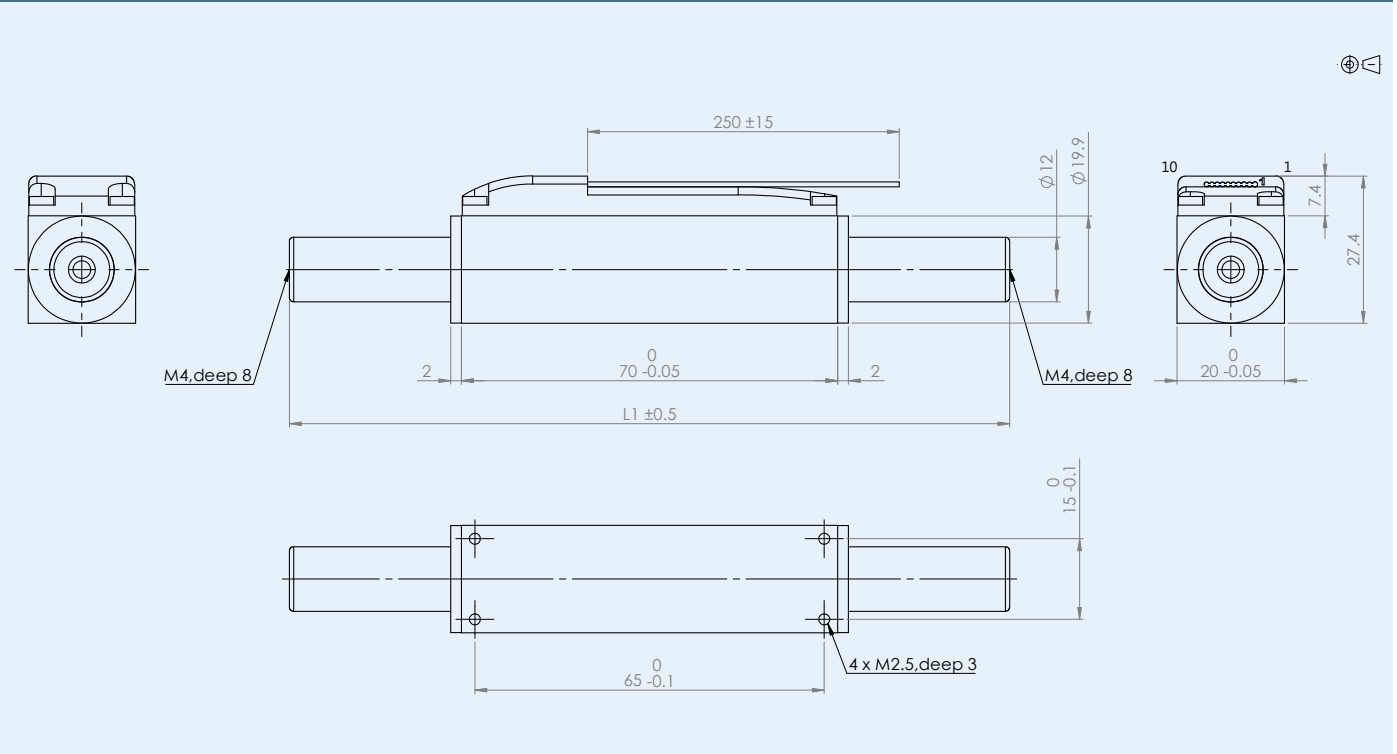
Technical Specification			Values at 22°C
Continuous force	$F_{e \max.}$	9.2	N
Peak force	$F_{p \max.}$	27.6	N
Continuous current	$I_{e \max.}$	0.79	A
Peak current	$I_{p \max.}$	2.4	A
Back-EMF constant	$k_E$	9.5	V/m/s
Force constant	$k_F$	11.64	N/A
Terminal resistance, phase-phase	R	10.83	$\Omega$
Terminal inductance, phase-phase	L	1125	$\mu\text{H}$
Terminal resistance	$R_{th1}/R_{th2}$	3.1 / 9.3	K/W
Terminal time constant	$\tau_{w1} / \tau_{w2}$	30 / 1200	s
Operation temperature range		-20 ... +125	°C
Magnetic pitch	$\tau_m$	24	mm
Rod bearings		polymer sleeves	
Housing material		metal, non-magnetic	
Direction of movement		electronically reversible	

		040-11	080-11	120-11	160-11	220-11	
Stroke length	$S_{\max}$	40	80	120	160	220	mm
Repeatability	$O_r$	60	60	60	60	80	$\mu\text{m}$
Accuracy	$O_a$	200	300	400	500	600	$\mu\text{m}$
Acceleration	$a_{e \max.}$	83.7	61.3	51.1	43.8	35.4	$\text{m/s}^2$
Speed	$v_{e \max.}$	1.8	2.2	2.6	2.6	2.8	m/s
Rod length	L1	134	182	218	254	314	mm
Rod mass	$m_m$	110	150	180	210	260	g
Total mass	$m_t$	248	288	318	348	398	g

Note: These motors are for operation with DC-voltage < 75 V DC. The given values are for free standing motors.

Other rod lengths available on request.

## Dimensional drawing



## Option, cable and connection information

Example product designation: LM2070-040-11

Option	Type	Description
-11C	Connector	Material PVC, 10 conductors, AWG28 with connector A05a - TCO, pitch 2 mm

## Connection -11/-11c

No	Function
Pin 1	Phase C
Pin 2	Phase B
Pin 3	Phase A
Pin 4	GND
Pin 5	Um(+5V)
Pin 6	Hall sensor C
Pin 7	Hall sensor B
Pin 8	Hall sensor A

## Standard cable

Material PVC, 10 conductors, AWG 28, grid 1mm, wires tinned.

## Motor characteristic curves

Trapezoidal motion profile: ( $t_1 = t_2 = t_3$ )  
 Displacement distance: 40 mm  
 Friction coefficient: 0,2  
 Slope angle: 0°  
 Rest time: 0,1 s

### Load:

The max. applicable load (incl. rod) at a given speed with an external force of 0 N.

### External force:

The max. permissible external force at a given speed with a load (incl. rod) of:

- 0,5 kg ———
- 1,0 kg - - - - -
- 2,0 kg · · · · ·

