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Single-Axis Linear Motor Stage Technical Information

Publication Date • March 2019, first edition

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1. Features

- Short delivery
- User friendly
- Best price-performance ratio
- Efficient drive included
- High acceleration/velocity, which ball screw system cannot achieve
- Long stroke supported
- Multiple forcers supported

Application
Automation, Electronics Industry, Semi-conductor Industry, Packaging Industry

SSA Highlights
5000 mm/s Max. Velocity
0.1 µm High Encoder Resolution
±1 µm Optimal Repeatability

2. Model Description

LMSSA-18S100-800-GS-S-D-A0

Width code
18, 20

Motor type
S: Ironcore LMSA
C: Ironless LMC(U Type)

Rated force level (NI)
100, 200, 300, 500

Stroke (mm)
200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950, 1000, 1050, 1100, 1150, 1200

Encoder type
G: TTL digital 1µm resolution optical encoder
K: TTL digital 0.1µm resolution optical encoder
E: TTL digital 1µm resolution magnetic scale

Option
A: Standard
Ax: Customized request
(cable chain, multiple forcers, hall sensor...etc. Please contact HIWIN MIKROSYSTEM)

Drive
D: Drive with connector

Cover
S: Standard top/side cover
N: None

Cables length & connector
G*: Standard
C: For other lengths and connector types, please contact HIWIN MIKROSYSTEM

1) Strouki: 5000 mm/Motor 3m open-end, limit switch: 3m open-end, encoder: 3m D-sub-15pins.
With Hallsensor, encoder: 3m D-sub-15pins.
Stroke: 2000 mm/Motor 3m open-end, limit switch: 3m open-end, encoder: 3m D-sub-15pins.
With Hallsensor, encoder: 3m D-sub-15pins.

3. Sizing Diagram (Acceleration/velocity-payload curve)

Acceleration – Mass

Velocity – Stroke

Payload (kg)

Stroke (mm)

Velocity (m/s)

Acceleration (m/s²)

*For other payload please calculate with interpolation method.
*With digital 0.1µm resolution optical scale, the max. velocity is 1.5m/s
*Voltage: 220V
4. Product Dimension

<table>
<thead>
<tr>
<th>Model</th>
<th>SSA-18S100</th>
<th>SSA-18S200</th>
<th>SSA-18C100</th>
<th>SSA-18C200</th>
<th>SSA-20S100</th>
<th>SSA-20S200</th>
<th>SSA-20C100</th>
<th>SSA-20C200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Motor Type</td>
<td>Ironcore LMSA</td>
<td>Ironless LMC</td>
<td>Ironcore LMSA</td>
<td>Ironless LMC</td>
<td>Ironcore LMSA</td>
<td>Ironless LMC</td>
<td>Ironcore LMSA</td>
<td>Ironless LMC</td>
</tr>
<tr>
<td>Length (mm)</td>
<td>1800</td>
<td>2400</td>
<td>1800</td>
<td>3700</td>
<td>2400</td>
<td>3700</td>
<td>2400</td>
<td>3700</td>
</tr>
<tr>
<td>Down Width (mm)</td>
<td>203</td>
<td>229</td>
<td>33</td>
<td>50</td>
<td>236</td>
<td>50</td>
<td>236</td>
<td>50</td>
</tr>
<tr>
<td>Up Width (mm)</td>
<td>175</td>
<td>236</td>
<td>50</td>
<td>106</td>
<td>236</td>
<td>50</td>
<td>236</td>
<td>50</td>
</tr>
<tr>
<td>Total Height (mm)</td>
<td>88.7</td>
<td>91.7</td>
<td>91.7</td>
<td>91.7</td>
<td>91.7</td>
<td>91.7</td>
<td>91.7</td>
<td>91.7</td>
</tr>
<tr>
<td>Total Length (mm)</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>450</td>
<td>500</td>
<td>550</td>
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<tr>
<td>Continuous Force (N)</td>
<td>103</td>
<td>205</td>
<td>75</td>
<td>150</td>
<td>362</td>
<td>544</td>
<td>91</td>
<td>145</td>
</tr>
<tr>
<td>Peak Force (N)</td>
<td>289</td>
<td>579</td>
<td>300</td>
<td>400</td>
<td>1023</td>
<td>1535</td>
<td>364</td>
<td>580</td>
</tr>
<tr>
<td>Stroke (mm)</td>
<td>200, 250, 300, 350, 400, 500, 600, 700, 750, 800, 850, 900, 950, 1000, 1050, 1100, 1150, 1200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encoder Resolution</td>
<td>1µm magnetic scale / Digital 1µm optical encoder / Digital 0.1µm optical encoder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>±3µm / ±3µm / ±1µm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Straightness</td>
<td>±8µm / 300 mm (Stroke=1200mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Straightness</td>
<td>±8µm / 300 mm (Stroke=1200mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Velocity (m/s)</td>
<td>3.1</td>
<td>3.1</td>
<td>5.0</td>
<td>4.2</td>
<td>1.6</td>
<td>1.6</td>
<td>4.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Max. Acceleration (m/s²)</td>
<td>10</td>
<td>10</td>
<td>13</td>
<td>14</td>
<td>13</td>
<td>14</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

* Measurement is performed on granite platform according to HIWIN standard.
* Max. velocity varies with stroke, payload, encoder resolution and motor type.
* Please refer to each curve in the sizing diagram.
* With digital 0.1µm resolution encoder scale, the max. velocity is 1.5m/s
* Limit NFN NC, C102-25V: Wiring[Blue: +, Black: -] 400mm
5. Drive: D2T-LM

- Excellent high speed response
- High acceleration responses
- Built-in accuracy improvement feature
- Vibration Suppression Feature
- Electronic gear ratio and Encoder Emulator
- Process Description Language

Application
- Automation, Electronics Industry, Semi-conductor Industry, Packaging Industry

D2T-LM series including standard & EtherCAT(mega-ulink) drive.

5.1 Dimensions Of Drive

**400W**

- **Standard**

**1KW**

- **Standard**

---

5.2 D2T-LM Model Description

**D 2 T - 0 4 2 3 - S - B 5 - 0 L**

- **Rated output**
  - D4 = 400W
  - 10 = 1.0kW

- **Voltage range**
  - 1/3 phase 110/220VAC

- **Interface**
  - Standard  S = Pulse/Analog command
  - EtherCAT[CoE] E = EtherCAT[CoE]
  - EtherCAT[mega-ulink] F = mega-ulink

- **Frame size**
  - B = B frame (suggestion: 400W rated output)
  - C = C frame (suggestion: 1000W rated output)

---

5.3 D2T-LM Interface Directions

- **Circuit Breaker (MCCB)**
- **Noise Filter (optional)**
- **LED Status**
  - Ready/Error quick guide (4-pin type to BFA1)
  - Connection to PC
- **Connection to host controller (6-pin SBSM connector (Standard accessory))**

---

**S U R V I E V E**

- **Connection to Tracer**
- **Lightening Protection FREE**

---

**S U R V I E V E**

- **USB 2.0**

---

**S U R V I E V E**

- **Connection to Host Controller (6-pin SBSM Connector (Standard Accessory))**

---

**S U R V I E V E**

- **Connection to Encoder Encoder Installation**
- **Use the encoder with a motor and filter**
5.4 D2T-LM Specification

### Power output

| Main power | Single/three-phase, 200 to 240V 50/60Hz |
| Control power | Single phase, 200 to 240V 50/60Hz |
| Watt | 440W, C:1.0kW |
| Continuous current B | 2.5A rms, C:1.5A rms |
| Peak current B | 7.5A rms, C:15.3A rms |
| Peak current time No more 1 second |
| Temperature Operation Temperature: 0°C ~ 45°C; 19 °F temperature in higher than 25 °C, ventilation is needed |
| Storage Temperature: -20°C ~ 65°C |
| Humidity | 8% to 95% RH (no frost) |
| Altitude | Under 1000 Meters |
| Vibration | 1G (10 to 500Hz) |
| Environment |

### Encoder

- **Control method**: IGBT PWM space vector control
- **Frequency**: 6M脉冲/sec, 20M count/sec (quadruple)
- **Note**: Encoder must be digital A/A formate

### I/O signal connector

| Control signal | Input General purpose 10 inputs |
| Analog signal | Input 2 outputs (Analog monitor-under construction) |
| Pulse signal | Input 2 outputs (Low speed channel, High speed channel) |
| Output 4 outputs (Line drive; 3output; open collector: 1 output) |

### Brake connector

- **Control signal**: Direct brake connection. (No need of extra relay for brake)
- **Output**: Also programmable for general purpose output
- **Dynamic brake**: Need external brake resistor

### Communication function

- **Connector**: Dot matrix 27*27 characters LCD with 4 buttons LED (green, red)
- **Unit**: count
- **Frequency**: Maximum 5,000 point
- **Method**: Established compensation table to compensate encoder error by linear interpolation
- **Variables**: (1) floating: 32bits, (2)integer: 16 & 32bits, (3)support matrix and pointer

### Control mode

- **Activation**: Activated internally by home complete, or activated externally by input signal

### Position control

- **Max command pulse frequency**: Dedicated interface for Photo-coupler (single end input); 500Kpps
- **Input pulse signal format**: 4Mpps (1M cnt/s) with A/B
- **Electron gear**: Gear ratio: Pctures/counts
- **Input Pulse and Direction**: Pulse Up/Pulse Down (1 Quadrature A/B)
- **Input pulse frequency**: 13Pulse and Direction (2)/Pulse Up/Pulse Down (3)/Quadrature (A/B)

### Protective function

- **Error log**: Errors and warnings are saved in non-volatile memory.

### Vibration suppression filter (VSF)

- **Vibrations**: can be set with analog voltage method, parameters can set ratio and direction +/-10V
- **PWM input**: Speed command input can be provided by means of duty cycle of PWM input. Parameter are used for scale setting and command polarity.

### Velocity control

- **PWM input**: Torque command input can be provided by means of duty cycle of PWM input. Parameter are used for scale setting and command polarity.

### Emulated encoder feedback output

- **Set up**: Speed limit value with parameter is possible.

### Common

- **Max:32KBytes**
- **Max. Variables**: 800 Bytes
- **PDL (Process Description Language)**:
  - Running cycle 66.67us
  - 4 tasks in parallel processing
  - Including if, else, while, for, goto & till flow control
  - Including number, logic & comparing processing
  - Including Lock & Unlock to run parallel processing
  - Max. words length: 11/16(17); 13(dword) 24; (3) processor 24
  - Method: Established compensation table to compensate encoder error by linear interpolation
  - Samples: Maximum 5,000 point
  - Storage: Flash ROM, Disc file
  - Unit: count
  - Activation: Activated internally by home complete, or activated externally by input signal

### Regenerative Resistor

- **Need external install**

### Functional specification

- **Position control**: Dedicated interface for Photo-coupler (single end input); 500Kpps
- **Pulse input**: Dedicated interface for line (up/down); horizontal input; 4Mpps (1M cnt/s) with A/B
- **Electronic gear**: Gear ratio: pulses/counts
- **Input Pulse and Direction**: Pulse Up/Pulse Down (1/2)/Quadrature (A/B)
- **Smoothing filter**: Smooth factor 1.1-500 [bit: no smoothing filter]
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Single-Axis Linear Motor Stage SSA

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