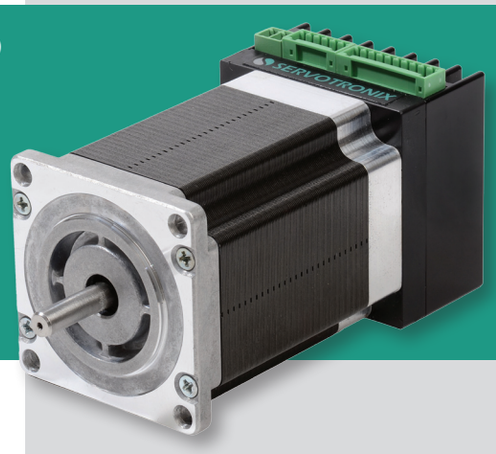
SERVOTRONIX
always in motion™

# stepIM

## Integrated Closed-Loop Stepper Motors

With a superior closed loop control and a cost-effective design, the integrated stepper motors provide an efficient and economical solution for applications that require the performance of a servo at the price level of a stepper.



### Closed loop commutation enabling highly dynamic performance

The stepIM significantly enhances the performance of the stepper motors, when compared to conventional open loop control. The integrated electronics control the stepper motor as a two phase BLDC motor, implementing position loop, velocity loop, DQ current control, as well as additional algorithms. Closed loop commutation, by means of an absolute single-turn encoder, ensures optimal torque utilization at any speed.

### Optimal cost-performance ratio for applications that require servo-like performance

- High torque/ low speed – eliminating the need for a gear
- High speed in low torque ranges
- The stepIM can function as distributed I/O points - reducing machine complexity

### Benefits of closed loop vs. open loop operation

| | Closed loop | Open loop |
|---|---|---|
| **No step loss** | Encoder feedback with closed loop control guarantees accurate motion | Abrupt changes in load may cause lost steps, creating a position error |
| **High dynamics** | Load dependent current control<br>Optimal torque utilization for any speed and any load<br>Eliminating the effect of mid-band resonance | Constant current control at all speed ranges without considering load variations |
| **Torque & force control modes of operation** | Supported | Not supported |
| **Maximum torque utilization** | Utilizing 100% of the full range of rated motor torque | Practical limitation of about 50% of rated motor torque due to risk of synchronization loss |
| **Low noise & vibration** | Silent operation due to reduced stepping vibration and low speed resonance | Stepping vibration and high speed resonance cause noisy operation |
| **Energy efficiency** | Provides current based on actual load. This reduces heating of the motor and saves energy | Maximum current is applied irrespective of required torque, leading to high losses and respective heating of the motor and drive |

### Key benefits

- Sophisticated closed loop control enhances motor performance with no step loss
- Operates in torque, velocity, and position modes
- Efficient torque utilization optimizes motor sizing
- Integrated design minimizes component and wiring requirements
- Reduced space, installation efforts and system cost
- Fieldbus: CANopen DS402
- Synchronized control of coordinated motion profiles
- Reduced machine complexity, as stepIM can function as distributed I/O points

### Optimally matched to Servotronix softMC multi axis motion controller

## Integrated components reduce cost, space and machine complexity

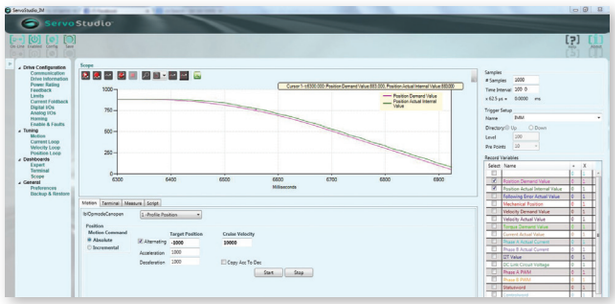
In decentralized architectures, wiring and assembly time can be reduced thus enabling significant cost savings for machine builders. Decentralized drives that integrate motor, control and power electronics also free up space and reduce heating in the cabinet. Machine complexity is reduced as fewer components and a smaller cabinet are used.

## High resolution magnetic encoder increases system efficiency

With a 12 bit absolute encoder and an update rate of 16 kHz, the stepIM precisely controls the magnetic flux generated based on actual load, ensuring accurate positioning and maximum machine efficiency.

## ServoStudio™ for simple commissioning

- Step-by-step guidance through the setup and tuning process
- Real-time data recording and plotting
- Easy integration of servo axes
- Plug-and-play motor and feedback wiring




## Rating and dimensions

| Model | Input Voltage (VDC) | Torque (Nm) | Inertia ($g \cdot cm^2$) | Weight (Kg) | Frame Size (mm) | Length (mm) |
|---|---|---|---|---|---|---|
| **Nema 23 Short** | 14 to 48 | 1.2 | 260 | 0.6 | 57 | 86 |
| **Nema 23 Medium** | 14 to 48 | 1.8 | 460 | 1.0 | 57 | 108 |
| **Nema 23 Large** | 14 to 48 | 2.6 | 750 | 1.5 | 57 | 145 |
| **Nema 34 Medium*** | 14 to 48 | 3.4 | 1850 | 2.7 | 86 | 134 |
| **Nema 34 Large*** | 14 to 48 | 5.4** | 2750 | 3.8 | 86 | 163 |

* Supports limited time peak of 50% more torque at 7 amps
** Under evaluation

## Communication:

CANopen®
EtherCAT® – future development
RS485 – upon special request

## Motor feedback:

12 bit absolute encoder

## I/Os:

Digital: 4 x Input, 2 x Output
Analog: 1 x Differential Input
I/Os are software configurable for different functions (e.g. limit switch, remote enable etc.)

## Application examples

- Tool positioning in wood, textile, and packaging machines
- Knitting axes in textile machines
- Blending machines for food and lab automation
- Coordinated control of a Gantry Robot
- Actuators on a robot gripper
- Desktop milling machines
- Belt and pulley systems with low stiffness loads

## Ordering information

IS T – 23 M 1 2 CO 1 0 – 0

**Integrated Stepper**

| Type | |
|---|---|
| T | High torque |

| Frame Size | |
|---|---|
| 23 | NEMA 23 stepper motor |
| 34 | NEMA 34 stepper motor |

| Length | |
|---|---|
| S * | Short |
| M | Medium |
| L | Large |
| * Frame Size 23 only | |

| Shaft | |
|---|---|
| 1 * | Single flat |
| 2 ** | Double flat |
| 3 * | Key |
| * Frame Size 23 only<br>** Frame Size 34 only | |
| Customized shafts available. | |

| Degree of Protection | |
|---|---|
| 2 | IP 23 |
| 6 | IP 67 |

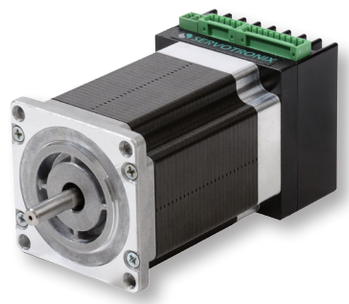
| Communication | |
|---|---|
| CO | CANopen |
| EC | EtherCAT - *upcoming* |

| Feedback | |
|---|---|
| 1 | Standard - 12-bit absolute single turn |

| Brake | |
|---|---|
| 0 | Without brake |

| Option | |
|---|---|
| 0 | Standard NEMA 23 only |
| 1 | Size 34, 14-48V |

| Examples |
|---|
| IST-23M12CO10-0 |
| IST-34M12CO10-1 |



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For specifications and manuals
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