

# Two-phase stepper motor MS 56



Two-phase stepper motor MS 56

Drive unit MD 24



## Features

- Stepping angle 1.8°, lower precision in micro-step operation
- Very high torque with rare-earth magnets
- Optimised for use with positioning controls
- Optimal ratio of torque and scale
- 8-wire connection
- Minor stepping angle error, not cumulative
- Protection class IP43

## General

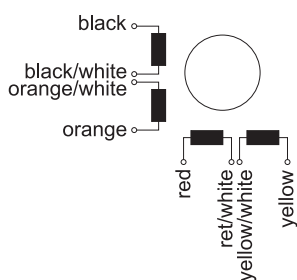
2-phase stepper motors show similar characteristics as synchronous motors. They are easy to control and are marked by excellent durability and reliability at a favourable price. This opens a broad spectrum of applications. The MS series 2 phase stepper

motors are high torque types. A particularly high torque is achieved through the use of rare-earth magnets.

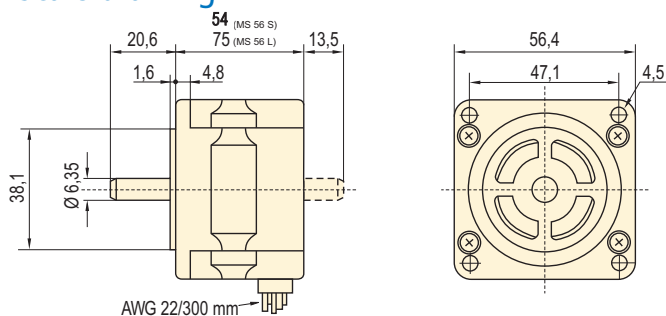
## Technical specifications

Description	Holding torque Bipolar Nm.	Winding current per phase parallel / serial A	Coil voltage per phase parallel / serial V	Winding inductance per phase mH	Weight kg	Overall length (without shaft) mm	Item no.
MS 56 S	1.35	4.2 / 2.1	1.5 / 2.9	1.8	0.7	54	470550
MS 56 L	2	4.2 / 2.1	2.1 / 4.2	3.1	1.0	75	470580

## Wiring diagram

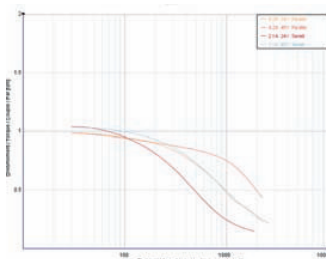


## Scale drawing

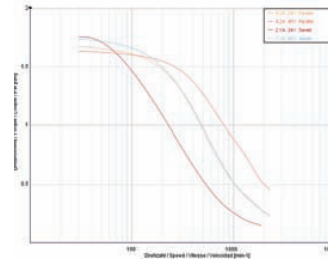


## Torque curves

MS 56 S



MS 56 L



Technical specifications subject to change.

# Two-phase stepper motor MS 86



Two-phase stepper motor MS 86



Drive unit MD 28

## Features

- Stepping angle 1.8°, lower precision in micro-step operation
- Very high torque with rare-earth magnets
- Optimised for use with positioning controls
- Optimal ratio of torque and scale
- 8-wire connection
- Minor stepping angle error, not cumulative
- Protection class IP43
- Optional: drive unit

## General

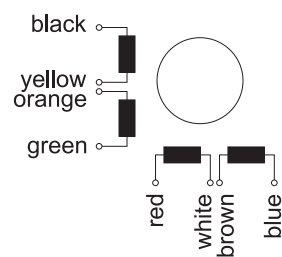
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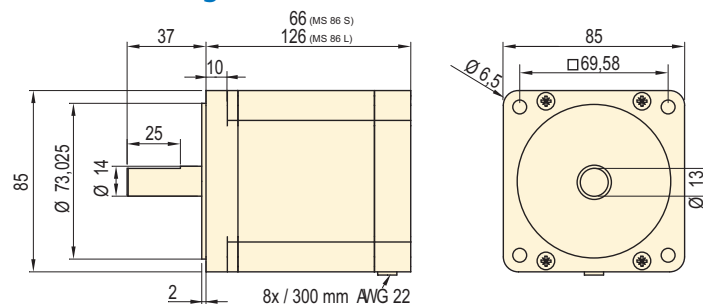
## Technical specifications

Description	Holding torque Bipolar Nm.	Winding current per phase parallel / serial A	Coil voltage per phase parallel / serial V	Winding inductance per phase mH	Weight kg	Overall length (without shaft) mm	Item no.
MS 86 S	3.01	6.3 / 3.18	1.4 / 2.8	1.5	1.7	66	470820
MS 86 L	9	5.6 / 2.8	2.6 / 5.3	4.2	3.8	126	470880

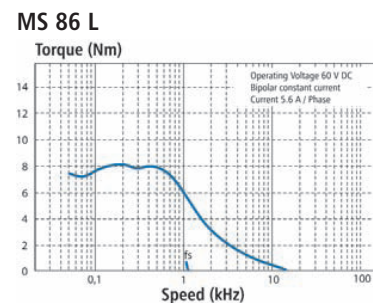
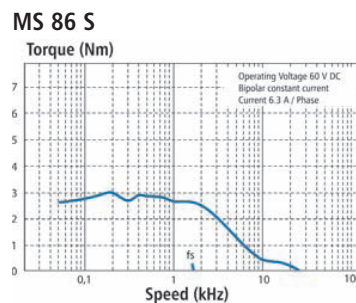
## Wiring diagram



## Scale drawing



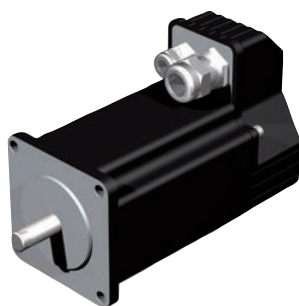
## Torque curves



Technical specifications subject to change.

# Three-phase stepper motor

## ST 56



Three-phase stepper motor ST 56



Drive unit MD 34

### Features

- Stepping angle 1.2°, higher precision in micro-step operation
- Very high torque with rare-earth magnets
- High power density, optimal ratio of torque and scale
- 6-wire connection
- Star- or delta connection
- Minor stepping angle error, not cumulative
- Protection class IP43
- Optimised for use with positioning controls

### General

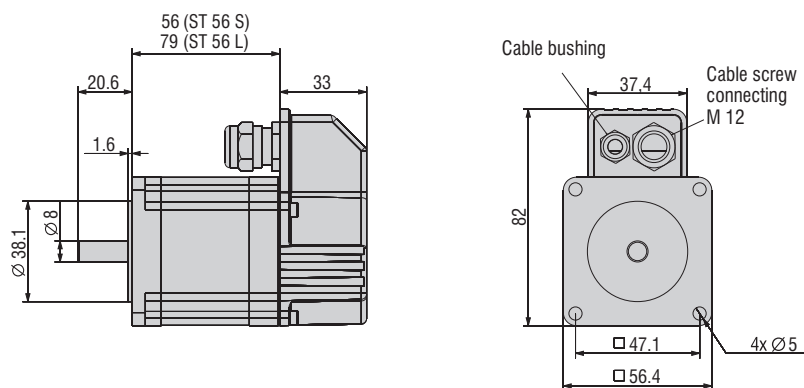
3-phase stepper motors, just as the prevalent 2-phase stepper motors, offer a high degree of reliability and durability. However, they do feature higher step precision and better resonance properties. This opens a broad spectrum of applications.

Using the matching drive module the control, too, is very easy. The ST series 3 phase stepper motors are high torque types. A particularly high torque is achieved through the use of rare-earth magnets.

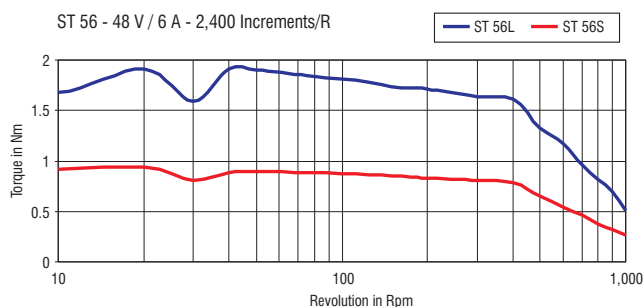
### Technical specifications

Description	Holding torque Nm	Winding current per phase A	Coil voltage per phase V	Winding inductance per phase mH	Stepping angle °	Connecting lead	Weight kg	Flange size mm	Overall length (without shaft) mm	Ø / length shaft side A mm	Resistance per phase Ohm	Item no.
ST 56 S	0.9	6.3	3.34	1.3	1.2°	6	0.79	56.4	56	8 / 20.6	0.53	396 700 5000
ST 56 L	1.5	6.3	5.04	2.1	1.2°	6	1.32	56.4	79	8 / 20.6	0.8	396 701 5000

### Scale drawings



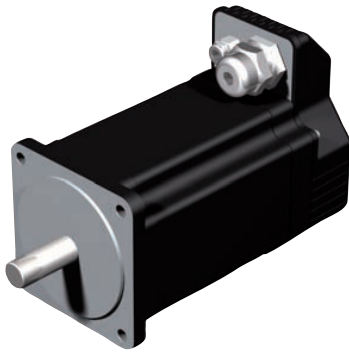
### Torque curves



Technical specifications subject to change.

# Three-phase stepper motor

## ST 86



Three-phase stepper motor ST 86



Drive unit MD 38

### Features

- Stepping angle 1.2°, higher precision in micro-step operation
- Very high torque with rare-earth magnets
- High power density, optimal ratio of torque and scale
- 6-wire connection
- Star- or delta connection
- Minor stepping angle error, not cumulative
- Protection class IP43
- Optimised for use with positioning controls

### General

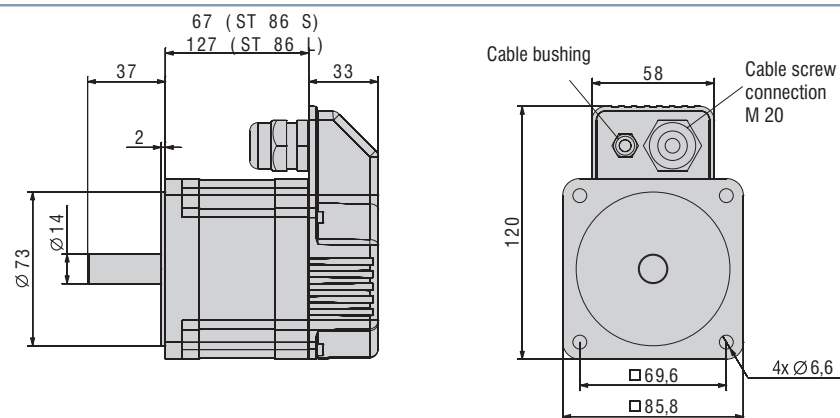
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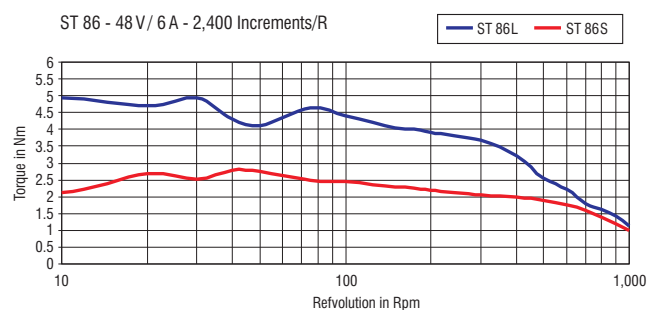
### Technical specifications

Description	Holding torque Nm	Winding current per phase A	Coil voltage per phase V	Winding inductance per phase mH	Stepping angle °	Connecting lead	Weight kg	Flange size mm	Overall length (without shaft) mm	Ø / length shaft side A mm	Resistance per phase Ohm	Item no.
ST 86 S	2.26	6.36	3.7	1.6	1.2°	6	1.65	85.8	67	14 / 37	0.58	396 702 5000
ST 86 L	6.4	9.47	5.4	2.34	1.2°	6	3.8	85.8	127	14 / 37	0.57	396 703 5000

### Scale drawings



### Torque curves



Technical specifications subject to change.

# Servo motor

# DC 100



Drive controller IMD 10



## Features

- Brush covered servo motor
- Low-impedance winding construction
- Good dynamics
- 2-finger brush (high durability)
- Incremental encoder with 512 impulses/revolution
- Protection class IP43/Encoder IP50

## General

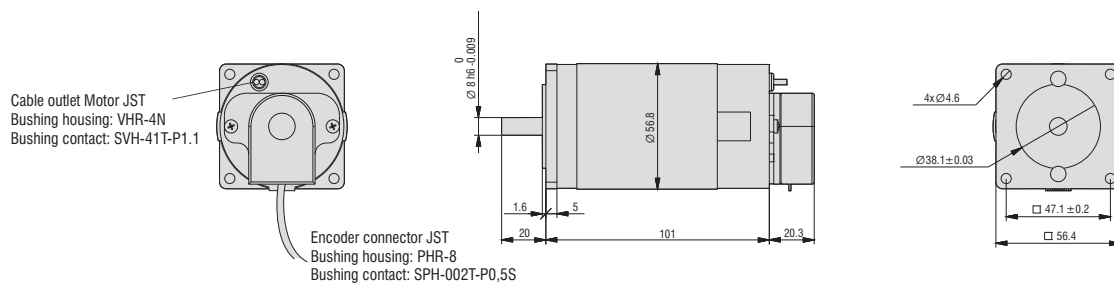
Brush-coated DC servo motors are the entry level of controlled drive technology. They feature great dynamics and are proven in drive technology. The added-on encoder allows for very precise

positioning. This predestines the use in CNC machines and in automation technology.

## Technical specifications

Description	Voltage V	Idle speed 1/min	No-load current A	Nominal speed 1/min	Nominal torque Ncm	Nominal current A	Effective output W	Peak current A	Item no.
DC 100	48	3,400	0.25	3,000	30	2.8	95	6.5	471022 0020

## Scale drawings



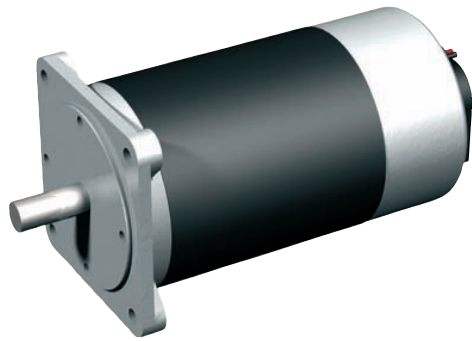
## Terminal assignment

Cable coding	1	2	3	4	5	6	7	8
Conductor colouring	Black	Red	Green	Brown	Grey	White	Yellow	Orange
Driver output	0V	Vcc	SIG A	SIG A <sup>-</sup>	SIG B <sup>-</sup>	SIG B	SIG Z	SIG Z <sup>-</sup>

Technical specifications subject to change.

# Servo motor

# DC 300



Drive controller IMD 10

## Features

- Brush covered servo motor
- Low-impedance winding construction
- Good dynamics
- 2-finger brush (high durability)
- Incremental encoder with 512 impulses/revolution optional 1000 impulses/revolution
- Protection class IP43/Encoder IP50

## General

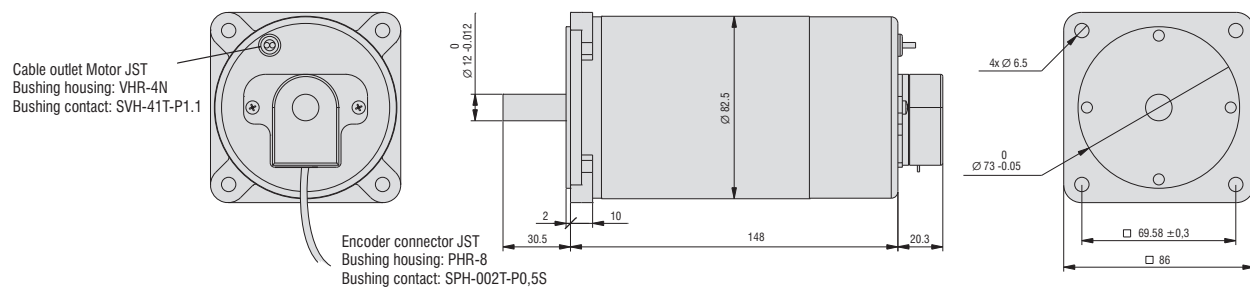
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positioning. This predestines the use in CNC machines and in automation technology.

## Technical specifications

Description	Voltage V	Idle speed 1/min	No-load current A	Nominal rotation speed 1/min	Nominal torque Ncm	Nominal current A	Effective output W	Peak current A	Item no.
DC 300	48	3,200	1	3,000	100	9	315	20	471024

## Scale drawings



## Terminal assignment

Cable coding	1	2	3	4	5	6	7	8
Conductor colouring	Black	Red	Green	Brown	Grey	White	Yellow	Orange
Driver output	0V	Vcc	SIG A	SIG A <sup>-</sup>	SIG B <sup>-</sup>	SIG B	SIG Z	SIG Z <sup>-</sup>

Technical specifications subject to change.

# Servo motor

# EC 60



Drive controller iMD 20

## Features

- Electronically commutated 3-phase servo motor
- Brushless drive
- High delivery output with a compact design
- Incremental measuring system
- Hall effect sensors
- Protective type IP 44
- Application areas: positioning controls, torque control
- Connects via round connector
- Option: brake

## General

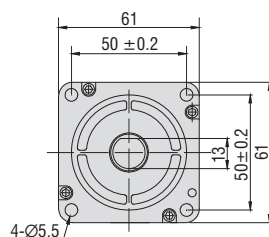
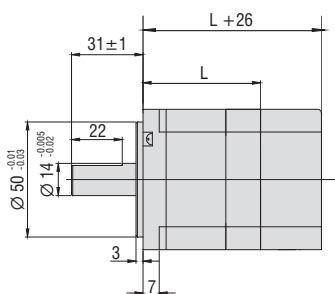
Brushless EC-motors are designed as electronically commutated 3-phase synchronous motors. Compared to brush-covered drives, these motors feature an even longer lifetime as they are subject to less wear. Further, the high power density and dyna-

mics as related to the overall size must be pointed out. These motors are used in many areas of automation technology and in CNC machines.

## Technical specifications

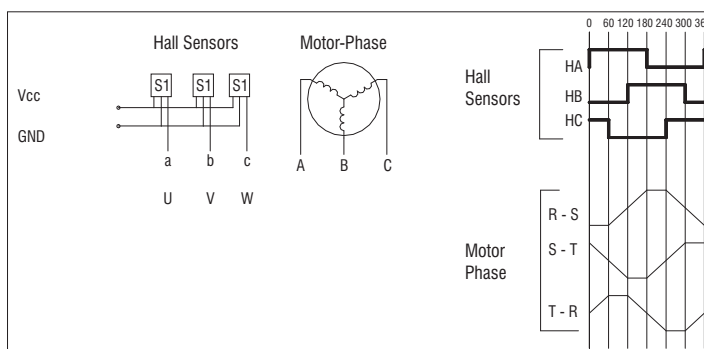
Description	Nominal output W	Nominal voltage V DC	Current A	Number of poles	Nominal speed rpm	Torque at Nominal speed Nm	Peak torque Nm	Torque constant Nm / A	Length L mm	Weight kg	Encoder P/R	Peak current A	Item no..
EC 60 S	156	48	6.9	8	3,000	0.5	1.75	0.12	71	1.25	1,000	20	<b>474156 0048</b>
EC 60 L	235	48	10.5	8	3,000	0.75	2.25	0.12	91	1.6	1,000	31.5	<b>474235 0048</b>

## Scale drawings



Model	Shaft diameter	Shaft shape
EC 60 S	Ø 14 mm	Flat 1 x 25
EC 60 L	Ø 14 mm	Flat 1 x 25

## Terminal assignment



Technical specifications subject to change.

# Servo motor

# EC 86



Drive controller IMD 40

## Features

- Electronically commutated 3-phase servo motor
- Brushless drive
- High delivery output with a compact design
- Incremental measuring system
- Hall effect sensors
- Protective type IP 44
- Application areas: positioning controls, torque control
- Connects via round connector
- Option: brake

## General

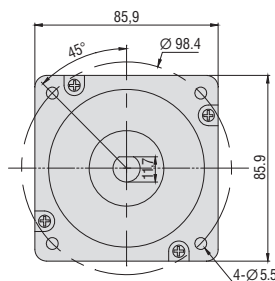
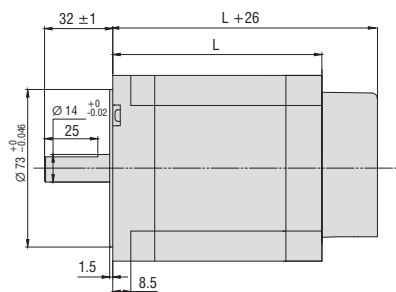
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## Technical specifications

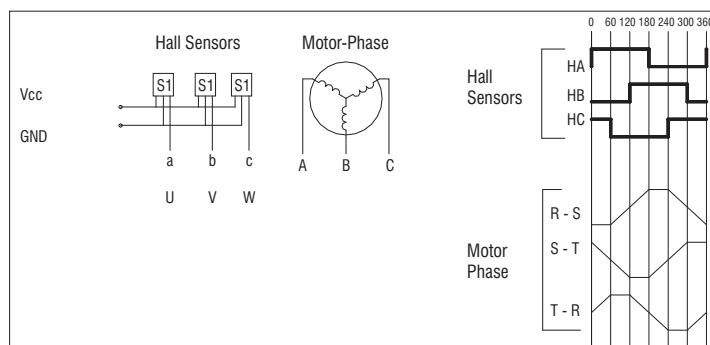
Description	Nominal output W	Nominal voltage V DC	Current A	Number of poles	Nominal speed rpm	Torque at Nominal speed Nm	Peak torque Nm	Torque constant Nm / A	Length L mm	Weight kg	Encoder P/R	Peak current A	Item no..
EC 86 S	440	310	3.4	8	3,000	1.4	5.0	0.74	100	2.6	1,000	11	474440 0310
EC 86 L	660	310	3.6	8	3,000	2.1	7.4	0.74	125	4	1,000	12.6	474660 0310

## Scale drawings



Model	Shaft diameter	Shaft shape
EC 86 S	Ø 14 mm	Flat 1 x 25
EC 86 L	Ø 14 mm	Flat 1 x 25

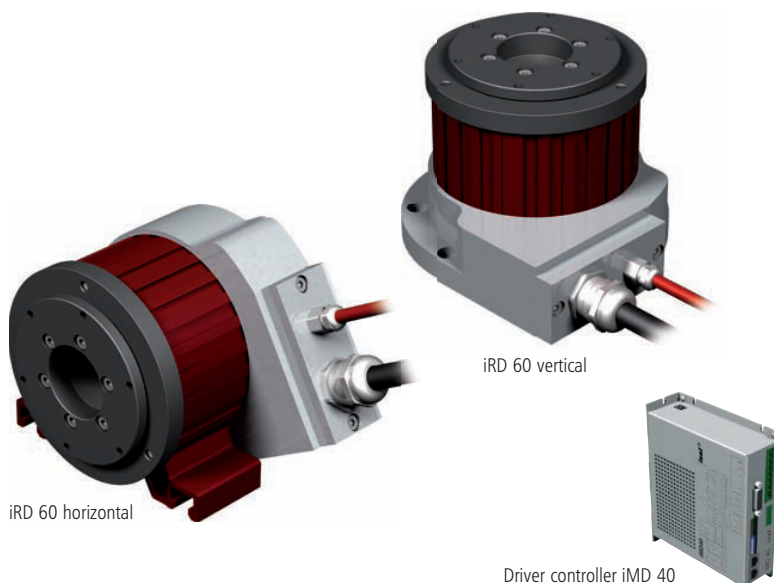
## Terminal assignment



Technical specifications subject to change.

## Torque motors

## iRD 60



## Features

- compact design with hollow shaft
- horizontal and vertical design
- PG gland
- high dynamics and torsional strength
- high acceleration left/right  
no signal dead range
- backlash-free 4-point bearings with great rotation and axial run-out accuracy
- high torques up to 10 Nm and speeds up to 1,200 rpm
- magnetic measuring system
- temperature monitor
- magnetic measuring system with index track (incremental or sin/cos)

## Optional:

- Drive controller
- larger scale and output
- round connector
- Brake

## General

The iRD series torque motors are multi-pole, permanent-exciter three-phase current synchronous motors with hollow shaft rotors with an optimal price/performance ratio. The respective unit consists of rotor, housing, bearing and sensor system. With the iRD compact torque motors high torques are produced right on the rotor. This eliminates unnecessary elasticity and gear backlash. Add to his minimised frictional losses, high torsional rigidity and a high level of efficiency.

The seal between rotor and stator ensures trouble-free operation, even under complex conditions. The precise 4-point bearing is designed for high stress, with excellent rotation and axial run-out accuracy. The integration of the measuring system on the rotor shaft achieves high repeat and positioning accuracy. The iRD torque motors are virtually maintenance-free with a long lifetime.

## Technical specifications

	iRD 60/50	iRD 60/100
Intermediate circuit voltage [V]	330	330
Nominal current [A]	3	3
Peak current [A]	7.5	7.5
Nominal torque [Nm]	2.7	5
Peak torque [Nm]	5	10
Max. speed [rpm]	1,200	1,000
Diameter [mm]	130*	130*
Height [mm]	123	173
Rotor inertia [kg/cm <sup>2</sup> ]	8.8	12.2

	iRD 60/50	iRD 60/100
Concentricity ± [mm]	2/100	2/100
Axial run-out ± [mm]	2/100	2/100
Permissible stat. load [N]	1,570	1,570
Permissible dyn. load [N]	1,225	1,225
Encoder option 1 [Inc/r] incremental	18,000	18,000
Encoder option 2 [sin/r] analogue	90	90
Pull-out torque for bearing [Nm]	140	140
Dimensions (LxWxH)* [mm]	140x130x123	140x130x173

\* only applicable for the upright version

## Order data

Torque Motor iRD 60/50,  
Ø/L = 130\*/123 mm

**Horizontal** Item no.: **267011 0000**  
**Vertical** Item no.: **267010 0000**

Torque Motor iRD 60/100,  
Ø/L = 130\*/173 mm

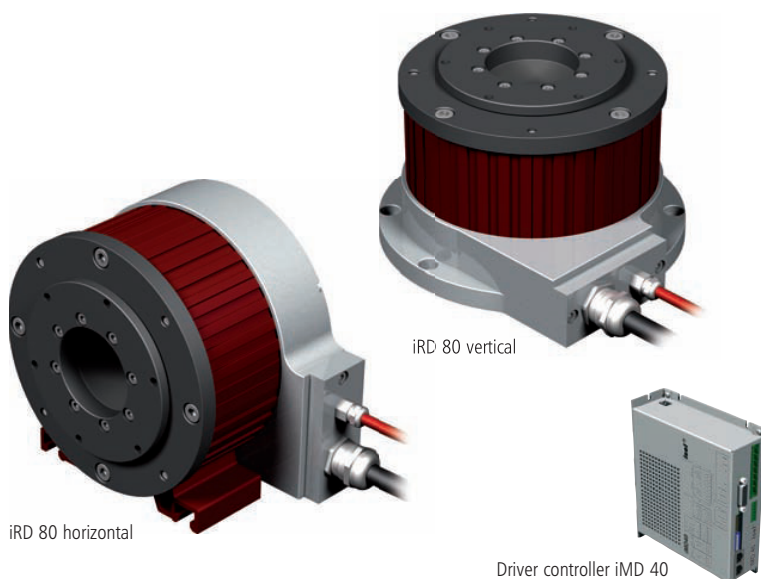
**Horizontal** Item no.: **267031 0000**  
**Vertical** Item no.: **267030 0000**

\* only applicable for the upright version

Technical specifications subject to change.

## Torque motors

## iRD 80



## Features

- compact design with hollow shaft
- horizontal and vertical design
- PG gland
- high dynamics and torsional strength
- high acceleration left/right  
no signal dead range
- backlash-free 4-point bearings with  
great rotation and axial run-out accuracy
- high torques up to 50 Nm  
and speeds up to 1,200 rpm
- magnetic measuring system
- temperature monitor
- magnetic measuring system with  
index track (incremental or sin/cos)

## Optional:

- drive controller
- larger scale and output
- round connector
- brake

## General

The iRD series torque motors are multi-pole, permanent-exciter three-phase current synchronous motors with hollow shaft rotors with an optimal price/performance ratio. The respective unit consists of rotor, housing, bearing and sensor system. With the iRD compact torque motors high torques are produced right on the rotor. This eliminates unnecessary elasticity and gear backlash. Add to his minimised frictional losses, high torsional rigidity and a high level of efficiency.

The seal between rotor and stator ensures trouble-free operation, even under complex conditions. The precise 4-point bearing is designed for high stress, with excellent rotation and axial run-out accuracy. The integration of the measuring system on the rotor shaft achieves high repeat and positioning accuracy. The iRD torque motors are virtually maintenance-free with a long lifetime.

## Technical specifications

	iRD 80/50	iRD 80/100
Intermediate circuit voltage [V]	330	330
Nominal current [A]	6	6
Peak current [A]	15	15
Nominal torque [Nm]	8	14
Peak torque [Nm]	15	25
Max. speed [rpm]	1,200	1,000
Diameter [mm]	170*	170*
Height [mm]	130	180
Rotor inertia [kg/cm <sup>2</sup> ]	28	39.9

	iRD 80/50	iRD 80/100
Concentricity ± [mm]	2/100	2/100
Axial run-out ± [mm]	2/100	2/100
Permissible stat. load [N]	1,495	1,495
Permissible dyn. load [N]	1,360	1,360
Encoder option 1 [Inc/r] incremental	22,800	22,800
Encoder option 2 [sin/r] analogue	114	114
Pull-out torque for bearing [Nm]	230	230
Dimensions (LxWxH)* [mm]	179x170x130	179x170x180

\* only applicable for the upright version

## Order data

Torque Motor iRD 80/50,

Ø/L = 170\*/130 mm

**Horizontal** Item no.: **267111 0000**

**Vertical** Item no.: **267110 0000**

Torque Motor iRD 80/100,

Ø/L = 170\*/180 mm

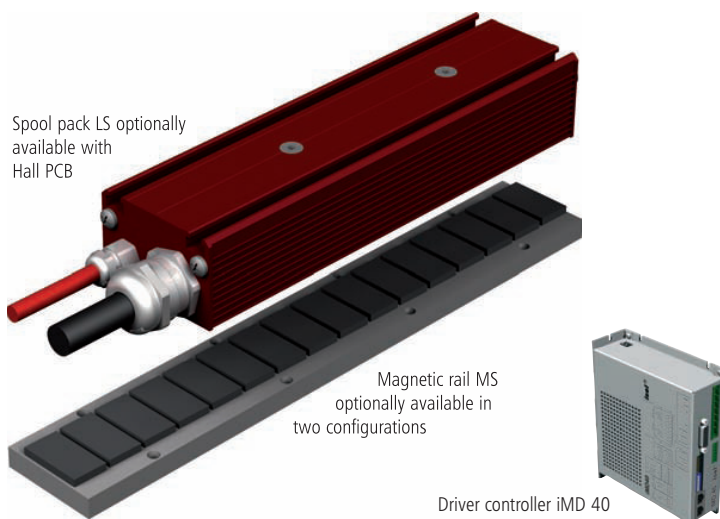
**Horizontal** Item no.: **267131 0000**

**Vertical** Item no.: **267130 0000**

Technical specifications subject to change.

# Linear motors

# iLM 25



## Features

- Ready-to-install systems consist of Primary part (spool pack LS) and Secondary part (magnetic rail MS)
- compact design
- high acceleration
- high speed
- high dynamics
- high degree of efficiency
- Motor length made to order
- Secondary part (magnetic rail MS) can be combined from various elements
- Control with single-phase or three-phase servo inverters
- **Optional:**
  - Drive controller
  - String potentiometer and linear guides

## General

The iLM series linear motors are linear 3-phase servo motors in various sizes and any length at an optimal price/performance ratio.

The integrated Hall sensors provide the position information for commutating the motors. The primary part features a temperature sensor to protect the motor. Permanently electrical connection (Hall, spools and temperature sensor) is made via permanently attached cables.

The direct power transmission eliminates all mechanical transmis-

sion elements such as spindles and tooth belts, completely eliminating any friction and backlash. This allows higher speeds and dynamics to be realised.

The therefore reduced cycle times lower production costs and increase productivity. Since the drive itself does not contain any mechanical elements, noise, wear and maintenance costs incurred are minimised. Drive mechanisms with linear motors compared to other linear drives are more accurate, quicker, free of backlash (no dead signal range) and more robust.

## Technical specifications

\* Applies to a working air gap of 1 mm.

	Intermediate circuit voltage [V]	Number of spools	Nominal current (A)	Peak current [A]	Feed force [N]	max. feed force [N]	max. initial power [N]*	nominal speed [m/s] at nominal current	max. speed [m/s] at peak current
iLM 25 with LS 25/6	330	6	2.6	6.5	70	170	500	6.6	4.7
iLM 25 with LS 25/12	330	12	2.6	6.5	140	340	1000	4.0	3.0

## Order information

Spool pack LS 25 with 6 spools, without Hall PCB (L/W/H approx.180/50/33mm )  
Weight: 2.00kg  
Item no.: **486000 0002**

Spool pack LS 25 with 12 spools, without Hall PCB (L/W/H 335/50/33mm)  
Weight: 3.50 kg  
Item no.: **486000 0004**

Magnetic rail MS 25 with 8 magnets (L/W/H approx.124/50/11mm )  
Item no.: **486100 0124**

Spool pack LS 25 with 6 spools, with Hall PCB (L/W/H 220/50/33mm)  
Weight: 2.20kg  
Item no.: **486001 0002**

Spool pack LS 25 with 12 spools, with Hall PCB (L/W/H 375/50/33mm)  
Weight: 3.70kg  
Item no.: **486001 0004**

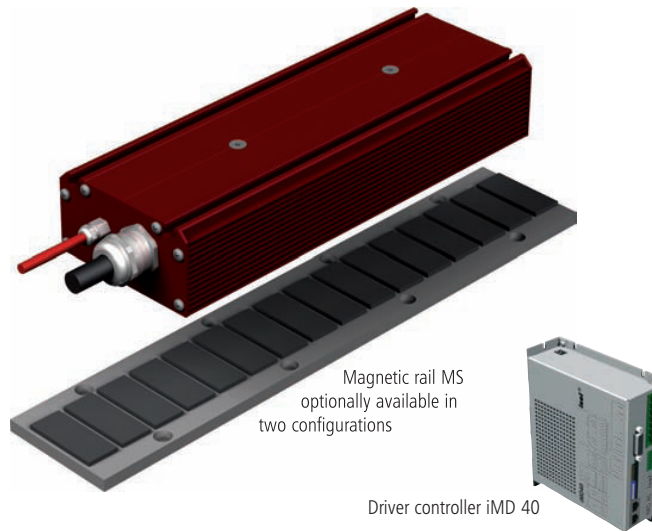
Magnetic rail MS 25 with 32 magnets (L/W/H approx.496/50/11mm )  
Item no.: **486100 0496**

The magnetic rails can be strung together in any quantity.

Technical specifications subject to change.

# Linear motors

# iLM 50



## Characteristics

- Ready-to-install systems consist of active part (spool pack LS) and passive part (magnetic rail MS)
- compact design
- high acceleration
- high speed
- high dynamics
- high degree of efficiency
- Motor length made to order
- Secondary part (magnetic rail MS) can be combined from various elements
- Control with single-phase or three-phase servo inverters
- **Optional:**
  - Drive controller
  - String potentiometer and linear guides

## General

The iLM series linear motors are linear 3-phase servo motors in various sizes and any length at an optimal price/performance ratio.

The integrated Hall sensors provide the position information for commutating the motors. The primary part features a temperature sensor to protect the motor. Permanently electrical connection (Hall, spools and temperature sensor) is made via permanently attached cables.

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## Technical specifications

\* Applies to a working air gap of 1 mm.

	Intermediate circuit voltage [V]	Number of spools	Nominal current (A)	Peak current [A]	Feed force [N]	max. feed force [N]	max. initial power [N]*	nominal speed [m/s] at nominal current	max. speed [m/s] at peak current
iLM 50 with LS 50/6	330	6	6.0	15.0	285	675	1995	5.1	3.6
iLM 50 with LS 50/12	330	12	6.0	15.0	570	1350	3990	3.5	2.4

## Order information

Spool pack LS 50 with 6 spools, without Hall PCB (L/W/H 280/100/52.5 mm)  
Weight: 7.50 kg  
Item no.: **486010 0002**

Spool pack LS 50 with 12 spools, without Hall PCB (L/W/H 532/100/52.5 mm)  
Weight: 13.00 kg  
Item no.: **486010 0004**

Magnetic rail MS 50 with 8 magnets (L/W/H approx. 200/80/11mm )  
Item no.: **486110 0200**

Spool pack LS 50 with 6 spools, without Hall PCB (L/W/H 343/100/52.5 mm)  
Weight: 8.00 kg  
Item no.: **486011 0002**

Spool pack LS 50 with 12 spools, without Hall PCB (L/W/H 595/100/52.5 mm)  
Weight: 13.50 kg  
Item no.: **486011 0004**

Magnetic rail MS 50 with 32 magnets (L/W/H approx. 800/80/11mm )  
Item no.: **486110 0800**

The magnetic rails can be strung together in any quantity.

Subject to technical alterations.