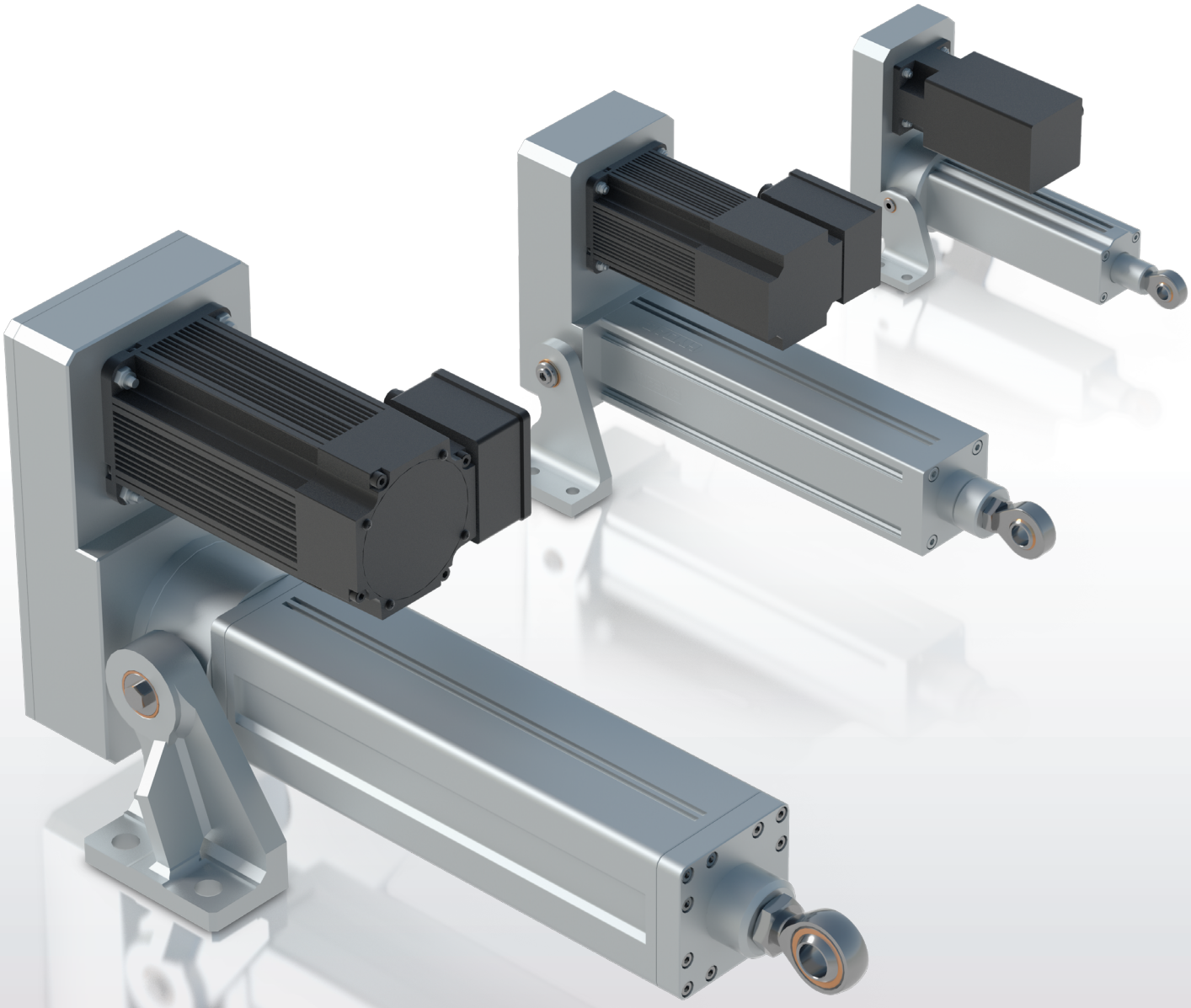
HYDAC INTERNATIONAL

KINESYS

Electric cylinders
HEZ



EN 10.146.1.5/02.25

HYDAC was founded in 1963 in Sulzbach/Neuweiler in Germany, which is still the company's head office today.

With over 9,000 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment.

With over 50 subsidiaries outside of Germany and more than 500 sales and service partners, HYDAC is within easy reach of its customers and a reliable partner worldwide.

Our wide range of products, combined with our acknowledged expertise in development, manufacturing, sales and service, is key to designing and manufacturing modern and reliable drive systems.

HYDAC KineSys stands for kinematic systems which are notable for their perfect symbiosis of hydraulic and electromechanical engineering.

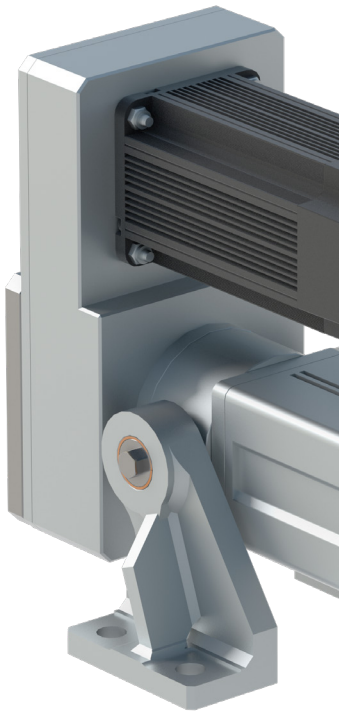
Our customers are demanding ever higher productivity as well as efficient use of resources in their modern machines and systems. Against a background of steadily rising costs for energy and raw materials, the efficient design of the drive system is an important factor when considering the overall life cycle costs. This means that modern drive technology represents a competitive advantage.

Using the experience gained from many international projects, our industry and product specialists will analyse your application. Together we can quickly and accurately work out cost-effective solutions.

Depending on the application, different strategies are chosen for the drive task concerned, ranging from simple control through to a highly dynamic control system. We're able to make use of numerous test benches and simulation systems. It makes no difference whether it is a case of developing and manufacturing custom stationary or mobile systems or implementing series production solutions.

With access to the entire range of HYDAC products we can provide you with the best solution for your requirements. This streamlines the design and ensures maximum efficiency for your machine and system operation.

Providing you with the best solution is our challenge.



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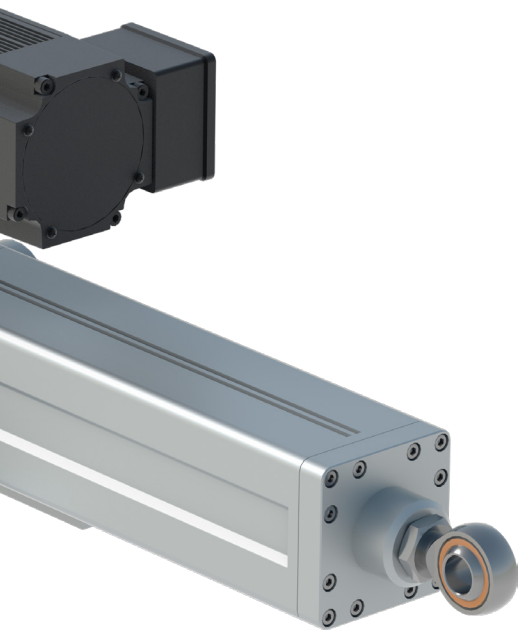


Note

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

1 Electric cylinders HEZ

Design and mode of operation

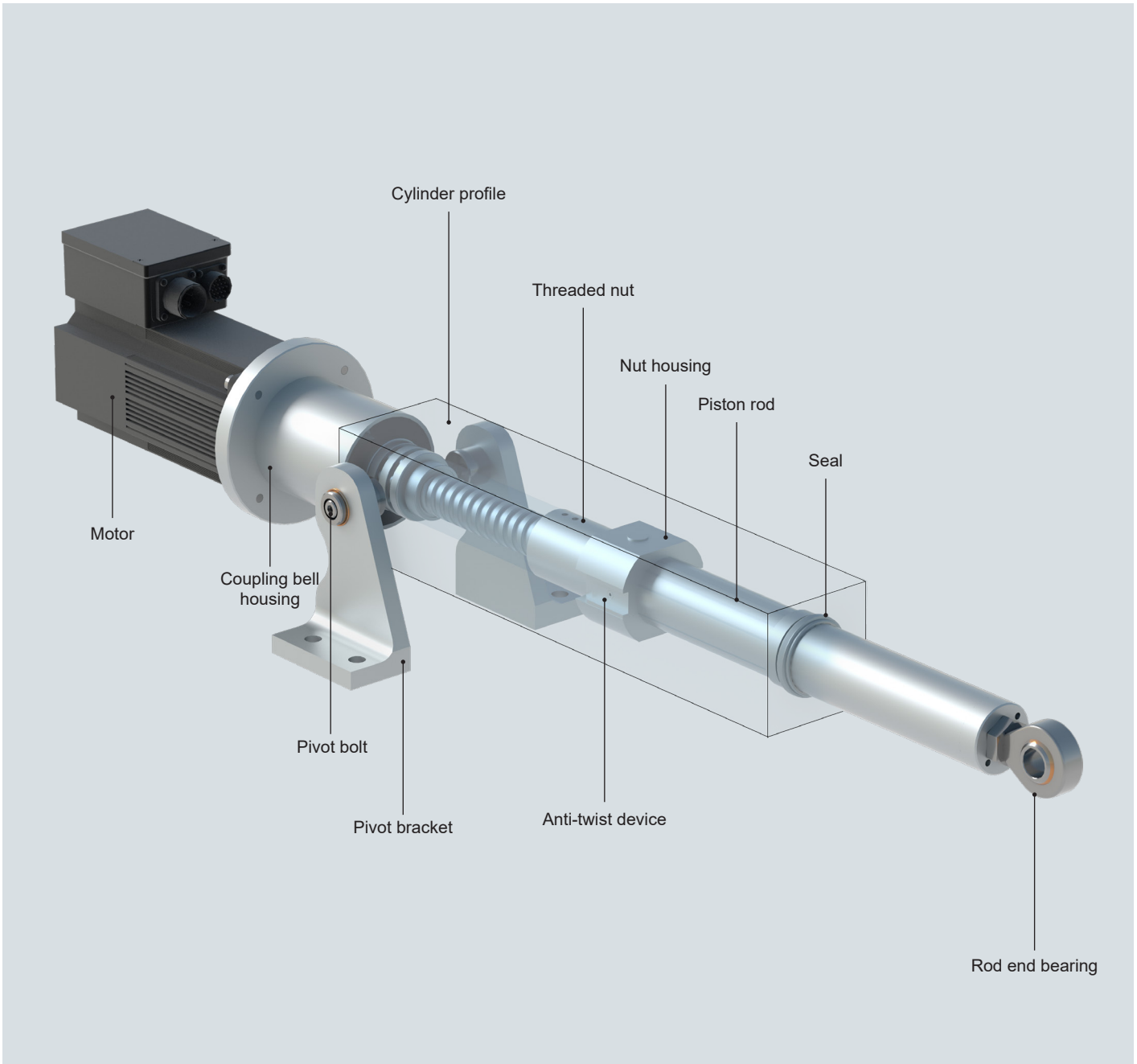
As they are easy to integrate and need no maintenance, HYDAC electric cylinders (HEZ) allow simple implementation of linear movements. The HEZ function is achieved with the following set-up:

A (gear) motor drives the spindle via a coupling that is mounted in the bearing housing via ball bearings. The threaded nut converts the rotary movement of the spindle into a linear movement, as the nut housing is secured against turning with plain bearing guides.

The piston rod is driven by the connection with the nut housing. The motor's direction of rotation therefore causes the piston rod to extend or retract. The spindle's rotational speed and the pitch of the thread determine the translational speed.

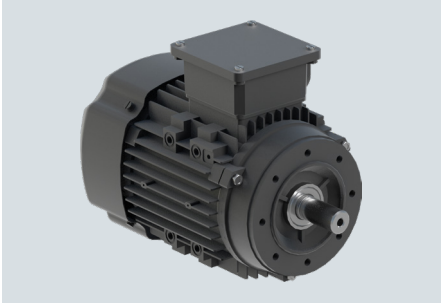
The inside of the HYDAC KineSys electric cylinder is protected from environmental influences by a sealing system.

To fasten the unit, there is a pivot bracket on the bearing housing and a rod end bearing on the piston rod, for example.



Motors

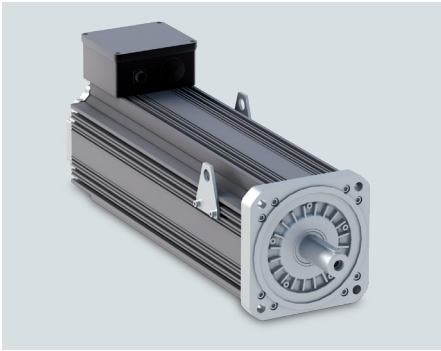
The drive can be selected to produce various positioning forces, movement speeds and duty cycles. Just as for the KineSys variable speed drive for hydraulic systems, various types of drives can be selected, from a simple drive to a high precision positioning drive.



Standard motor

For not particularly dynamic applications:

- Cost-effective
- 2, 4, 6 or 8-pole
- 1/3 phase operation
- Retraction and extension
- With proximity switches and frequency inverter



Servo motor

Suitable for applications with control and regulation processes performed via frequency inverters:

- Accurate positioning with an encoder
- Highly dynamic operation
- Short-time overload capacity (to overcome holding torque and abrupt torque changes)
- Speed/velocity control and regulation
- Speed range 0 to 4,000 min-1
- Large power range
- Torque or force control

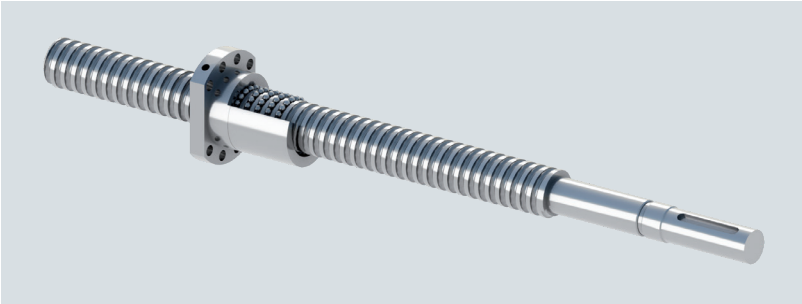
Other motors available on request.

Spindle types

Depending on the application, various spindle types are integrated into HYDAC KineSys electric cylinders to provide drive power as needed.

Trapezoidal thread drive (TTD)

- Low positioning speeds (< 35 mm/s)
- Low duty cycle (< 50 %)
- High impact load permitted
- Self-locking
- Medium positioning accuracy (≥ 0.1 mm)
- Spindle diameter Ø 16 to Ø 80 mm
- Pitches of 4 – 10 mm



Ball screw drive (BSD)

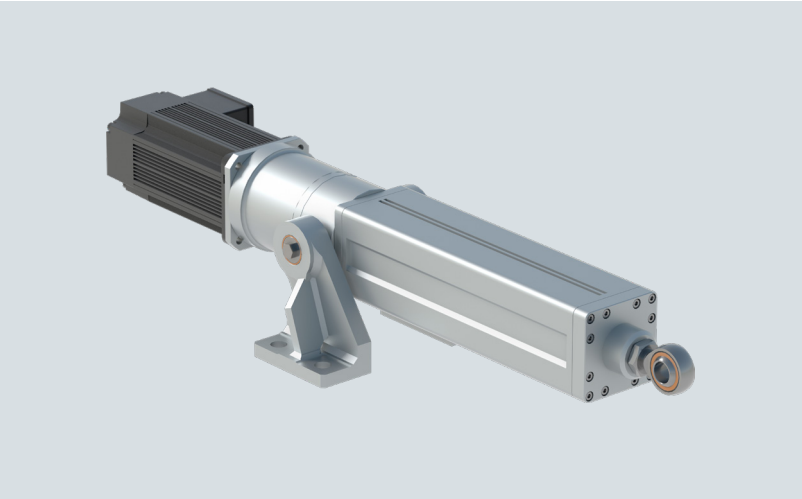
- Very good dynamic performance
- Maximum duty cycle (≤ 100 %)
- High degree of efficiency (> 85 %)
- High positioning accuracy (≥ 0.05 mm)
- Very high speed (up to 2,000 mm/s)
- Spindle diameter Ø 20 to Ø 100 mm
- Pitches of 5 – 40 mm

Planetary roller screw drive (PRSD)

- High power density
- High speed (up to 1,000 mm/s)
- High duty cycle (< 90 %)
- Good dynamic performance
- Impact load permitted
- Spindle diameter Ø 30 to Ø 99 mm
- Pitches of 10 – 20 mm

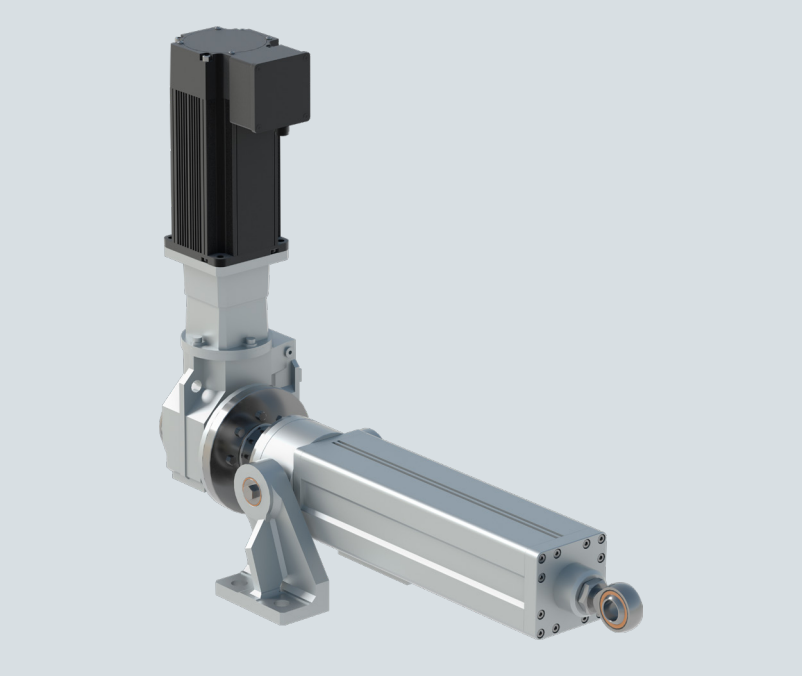
Electric cylinder designs

The electric cylinders are available in a range of designs. The different designs have different connections for the electric motor, offering diverse installation variants.



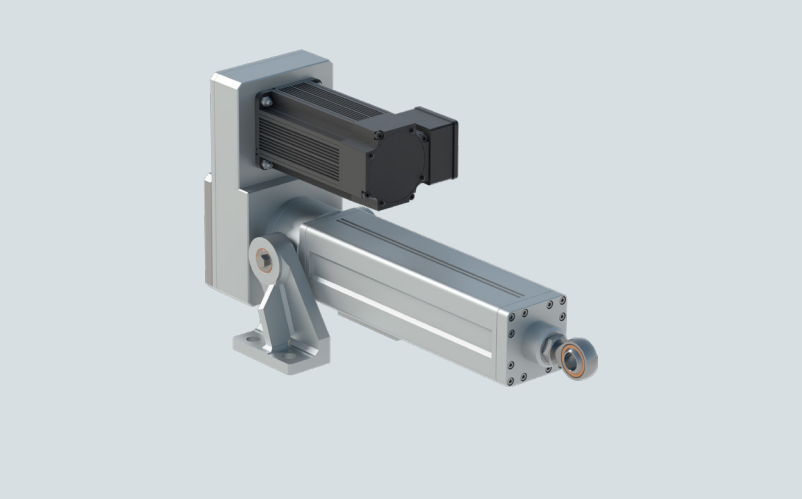
I design

- Direct connection between the spindle and (gear) motor
- Slim silhouette
- Use with spur gears or planetary gears



L design

- Short design
- Bevel gears or worm gears
- Self-locking possible with worm gears

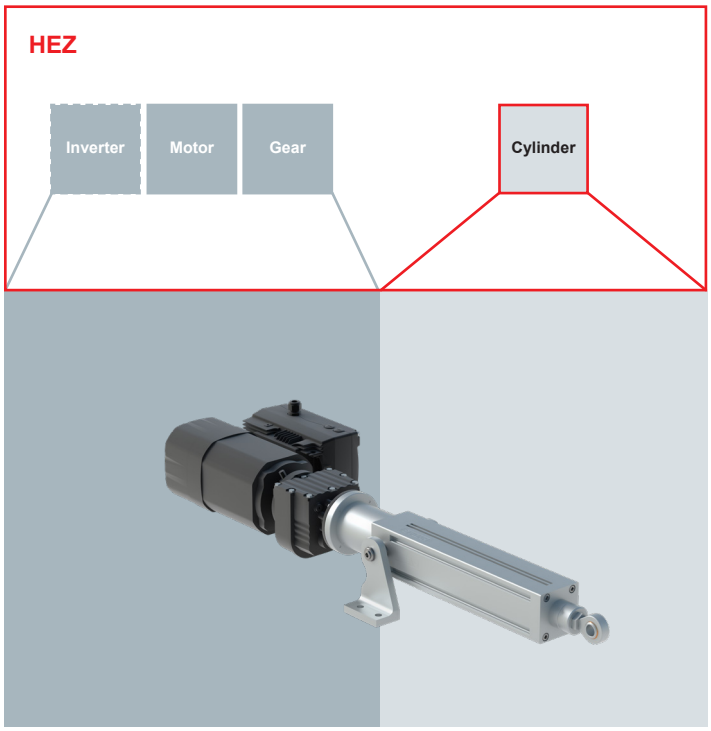


U design

- Compact design
- Connection via various deflection systems
- Use with spur gears or planetary gears

System solution setup

To control the HYDAC HEZ electric cylinders, there are several variants to choose from. From simple mains operation to complex system solutions through the use of HYDAC HFI frequency inverters, an open loop and closed loop control system can be constructed for specific applications and tailored to customer requirements.

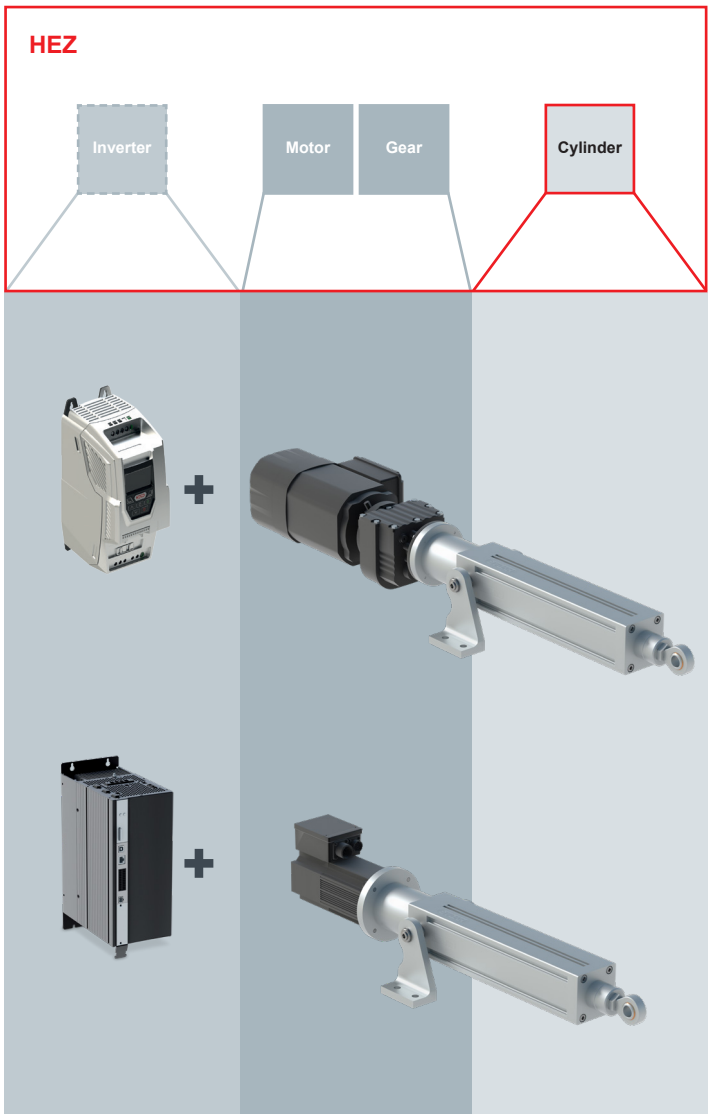


Operation with a HYDAC frequency inverter (HFI-MM) and asynchronous motor

A motor-mounted frequency inverter is supplied for drive solutions with variable speeds.

Properties:

- Smooth start-up / stopping
- Variable speed
- Simple parameterisation / adjustment
- Simple positioning tasks
- Analogue and digital inputs / outputs and optional common bus systems
- STO available as an option



Operation with a HYDAC frequency inverter (HFI-WM) and asynchronous motor

A frequency inverter for wall mounting (HFI-WM) is used for demanding applications, powers higher than 22 kW or upon request by the customer.

Properties:

- More complex motion profiles
- Advanced positioning tasks
- Various inputs / outputs, including bus systems
- STO available as an option

Control tasks such as position control and force control with HYDAC frequency inverters (HFI-CM) and servo motors

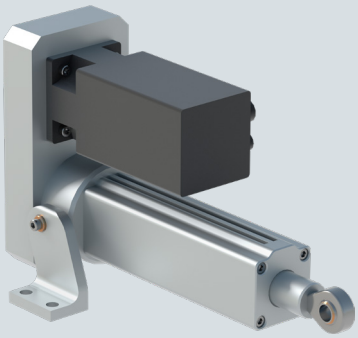
The servo motor is the ideal drive for precise control. For high powers with a wide range of speeds and loads, extremely high positioning accuracy can be achieved. The frequency inverter is mounted externally in a switch cabinet.

Properties:

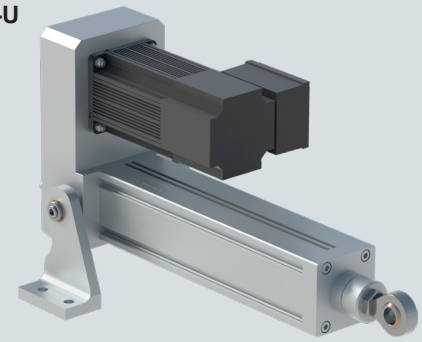
- Maximum positioning accuracy
- Maximum system dynamics
- Trajectories can be mapped
- Various inputs / outputs, including bus systems
- With STO as standard
- Also available in a safety version, e.g. SS1, SS2, SLS etc.

HEZ modular series

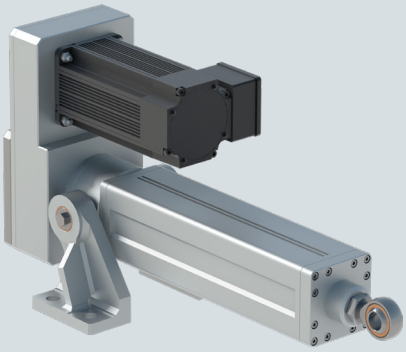
HEZ-1-U



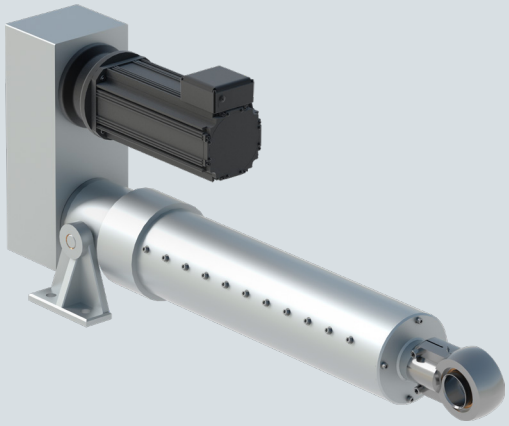
HEZ-2-U



HEZ-3-U

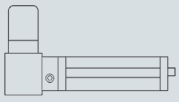


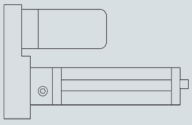
HEZ-X-U



Designs

I

L 

U 

Positioning accuracy:	up to ±10 µm		
Speed:	up to 2 m/s		
Acceleration:	up to 12 m/s²		
Stroke length:	up to 5 m		
Forces:	**HEZ–**	Dynamic	Static
	1	7.5 kN	15 kN
	2	25 kN	40 kN
	3	70 kN	120 kN
	X	500 kN	1,000 kN

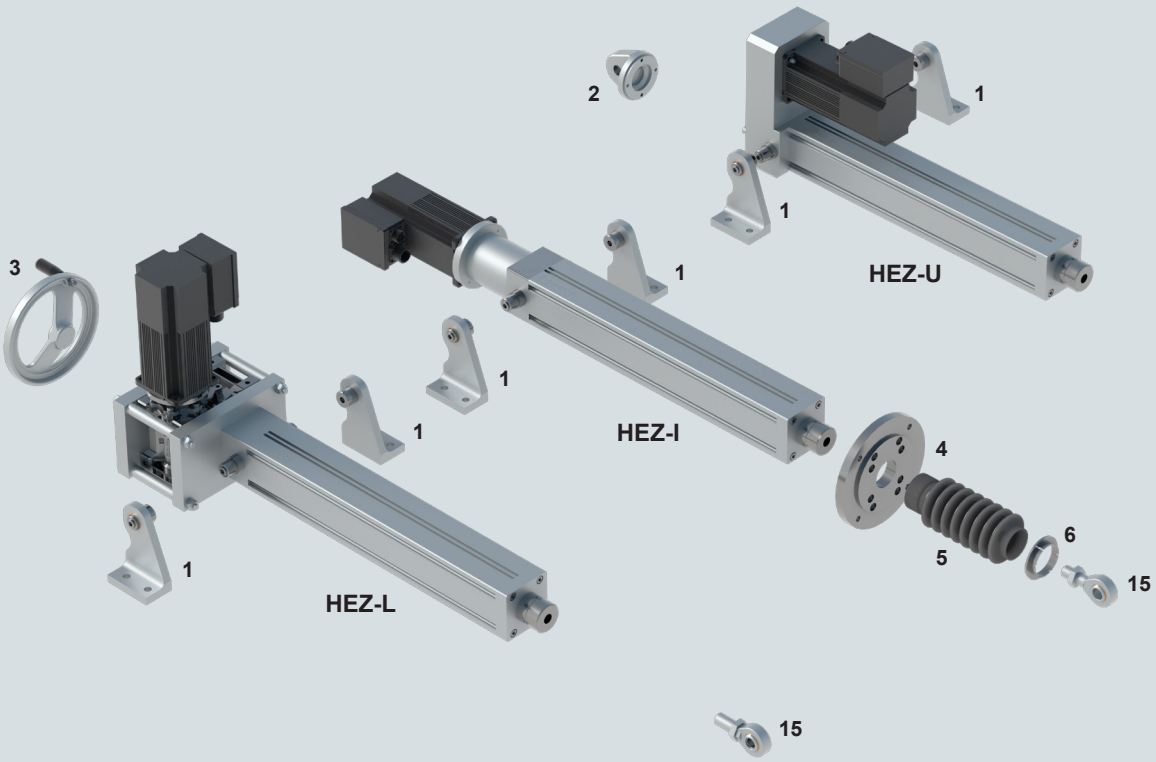
Functionalities via the drive controller:

- force control
- Position control
- Speed control
- Synchronous operation of multiple axes
- Sequential control: Motion profile (trajectory)

Safety functions:

- SLS
- STO
- ST
- Safety IO

Components



1	Brackets
2	Rod end bearing 0°
3	Handwheel
4	Flange
5	Bellows
6	Ice scraper
15	Rod end bearing

Further options:

- Hydraulic steel structure version
- Stainless steel version
- Sensors: limit switch; absolute encoder
- Dampers
- Other fastenings according to customer requirements possible
- Rod end bearing 90°
- Fork 0°, fork 90°
- Hex manual control
- Thread, internal
- Trunnions

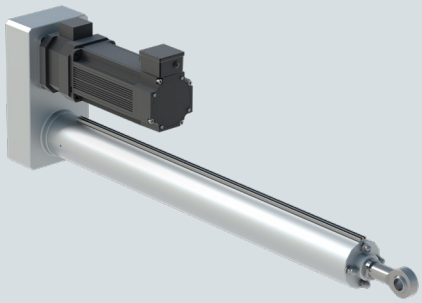
Options

- Linear position measurement system
- Explosion protection
- Additional safety functions e.g. safety nut, holding brake with high Performance Level
- Safety nut, holding brake with high Performance Level
- Increased IP protection
- Force measurement
- Extended temperature range

3 Applications

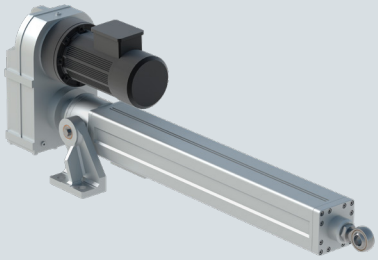
Lifting and lowering mechanisms in machining centres

- Drive power: 2.7 kW
- Force: 15 kN
- Speed: 250 mm/s
- Stroke: 800 mm
- STO
- PLd
- Safety brake



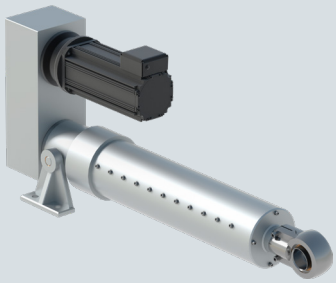
Scissor lift with safety function

- Force: 51 kN
- Speed: 40 mm/s
- Stroke: 734 mm
- Manual opening of the holding brake
- Emergency lowering function
- Safety casing
- IP65



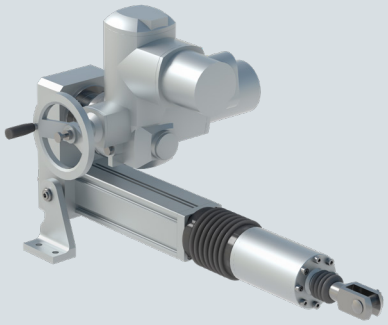
Foam press

- Drive power: 9.22 kW
- Force: 300 kN
- Speed: 45 mm/s
- Planetary roller screw drive



Support cylinder for a high water flood barrage

- Force: 10 kN dyn. / 15 kN stat.
- Speed: 12 mm/s
- Stroke: 133 mm
- Spring assembly
- Bellows



Material testing system

- Drive power: 2.3 kW
- Force: 50 kN
- Speed: 30 mm/s
- Stroke: 200 mm
- Integrated force measurement
- Record of force-distance diagram

Model code

HEZ – 2 – I – K – 32 x 10 x 250 – 1,1 A 1420 / 8,5 – XXXX

Designation
HYDAC **E**lektro **Z**ylinder (HYDAC Electric Cylinder)

Size
1 = Aluminium square profile size 1
2 = Aluminium square profile size 2
3 = Aluminium square profile size 3
X = Round steel tube

Design
I / L / U

Spindle type
K = Ball screw drive
T = Trapezoidal thread drive
P = Planetary roller screw drive

Spindle dimensions [mm]
Diameter
Pitch
Stroke

Motor power [kW]

Motor type
A = Asynchronous motor
S = Synchronous motor
X = Special version

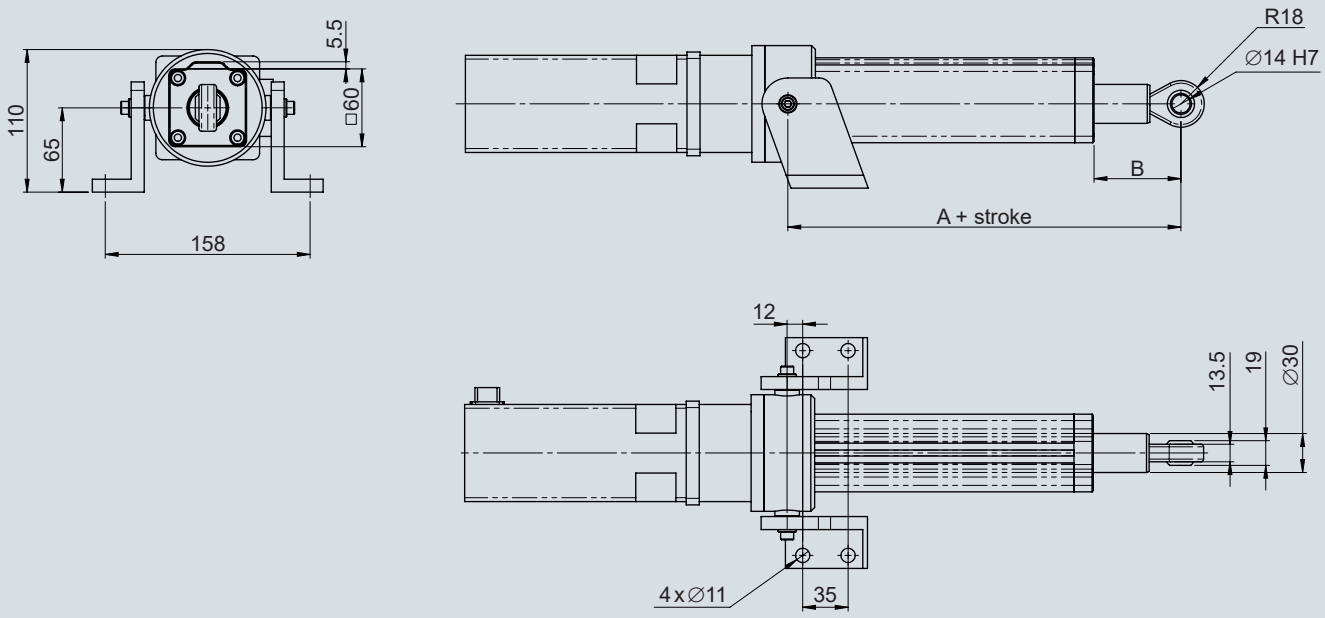
Nominal speed [min^{-1}]

Speed reduction

Model
Fastening
Measuring system
Further options

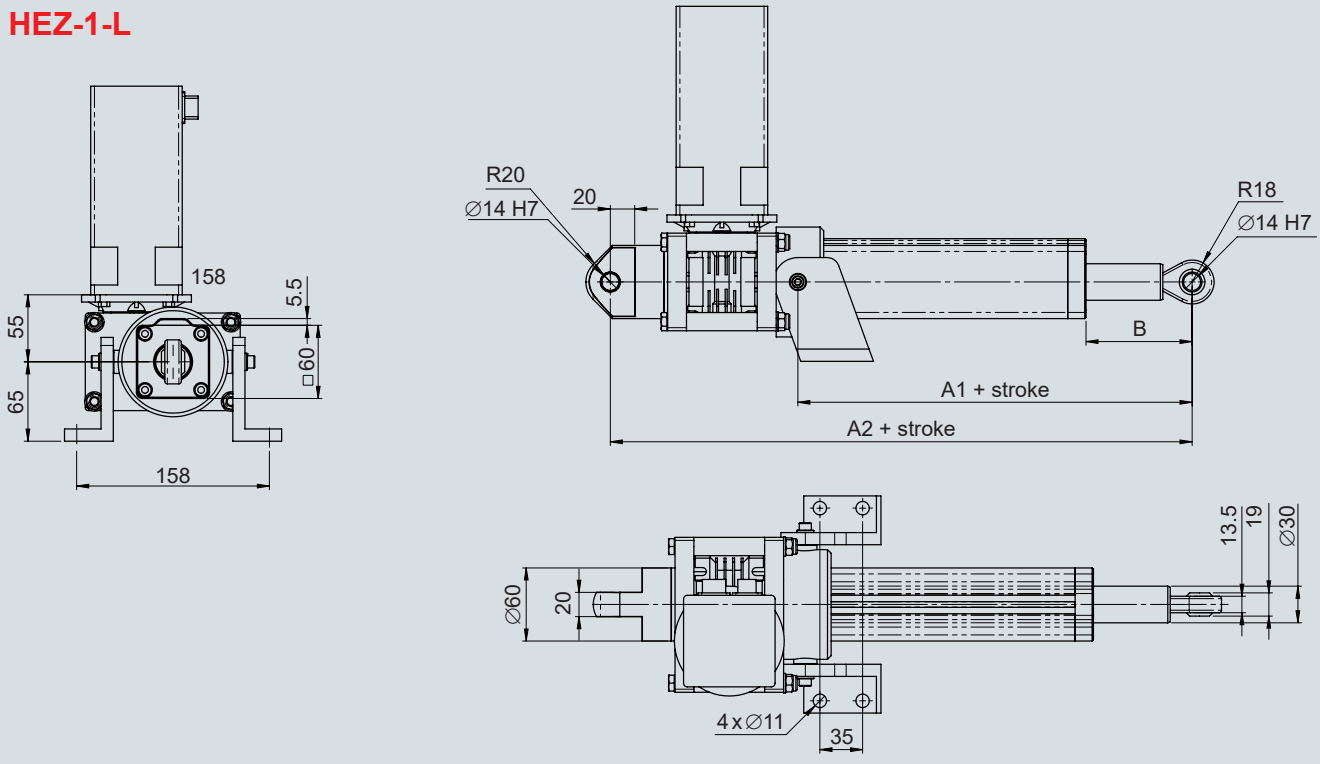
5 Dimensions HEZ-1

HEZ-1-I



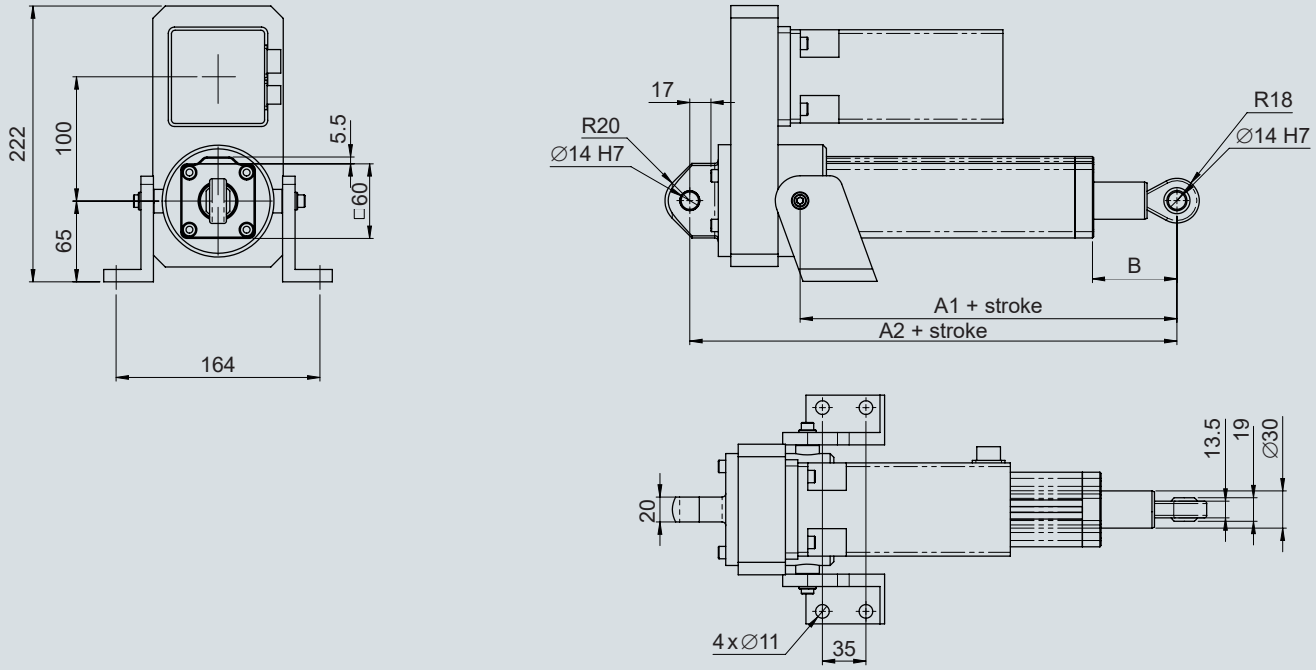
Spindle type	A	B
TTD ∅20x4	160	74
BSD ∅20x5	222	67

HEZ-1-L



Spindle type	A1 (without eye at rear)	A2 (without bracket)	B
TTD 20x4	160	314	74
BSD 20x5	222	376	67

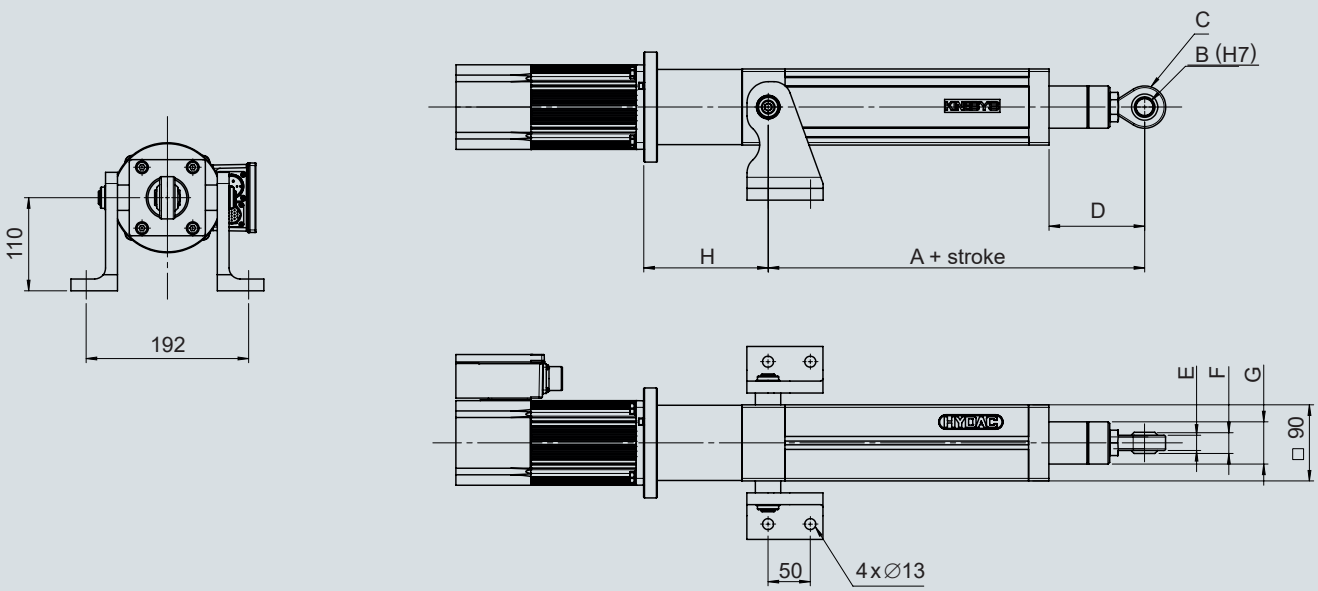
HEZ-1-U



Spindle type	A1 (without eye at rear)	A2 (without bracket)	B
TTD 20x4	160	254	74
BSD 20x5	222	316	67

5 Dimensions HEZ-2

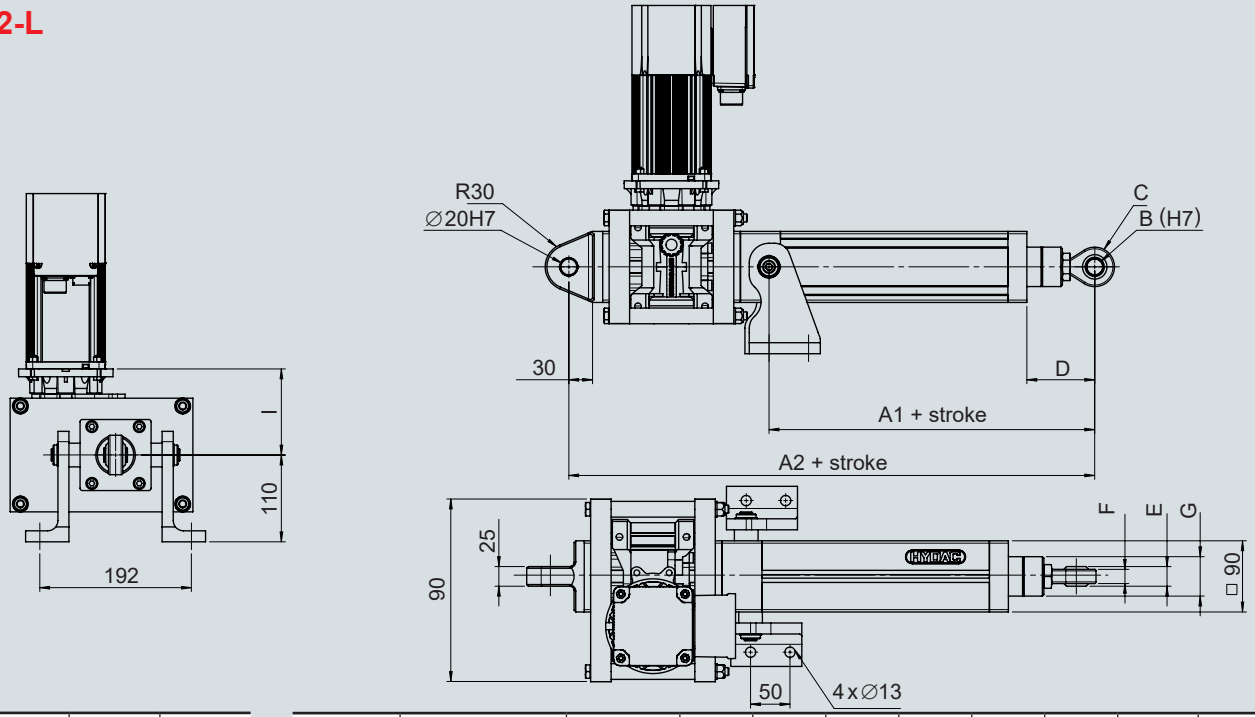
HEZ-2-I



Motor (with gear + brake)	a	b
IEC 63	372.5	110
IEC 71	393	124
IEC 80	423	140
IEC 90	455	158

Spindle type	A	B	C	D	E	F	G	H
TTD ∅ 26	215	∅ 16	∅ 42	94	15	21	∅ 40	118
BSD ∅ 25	265	∅ 16	∅ 42	78	15	21	∅ 40	118
TTD ∅ 36	245	∅ 20	∅ 50	113	18	25	∅ 50	159
BSD ∅ 32	294	∅ 20	∅ 50	86	18	25	∅ 50	140

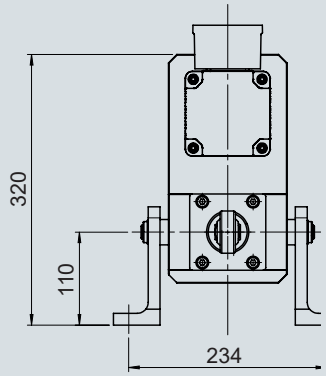
HEZ-2-L

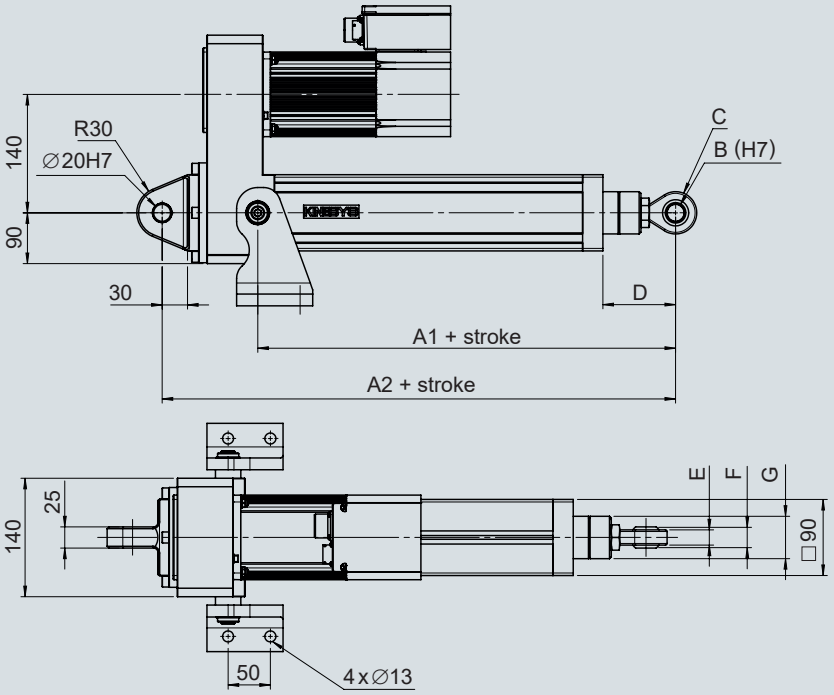


Motor (with brake)	a	b
IEC 63	246.5	110
IEC 71	265	124
IEC 80	294	140
IEC 90	341	158

Spindle type	A1 (without eye at rear)	A2 (without bracket)	B	C	D	E	F	G	H	I
TTD ∅ 26	215	430	∅ 16	∅ 42	94	15	21	∅ 40	162	70
BSD ∅ 25	265	480	∅ 16	∅ 42	78	15	21	∅ 40	162	70
TTD ∅ 36	245	493	∅ 20	∅ 50	113	18	25	∅ 50	231.5	109
BSD ∅ 32	294	542	∅ 20	∅ 50	86	18	25	∅ 50	231.5	109

HEZ-2-U



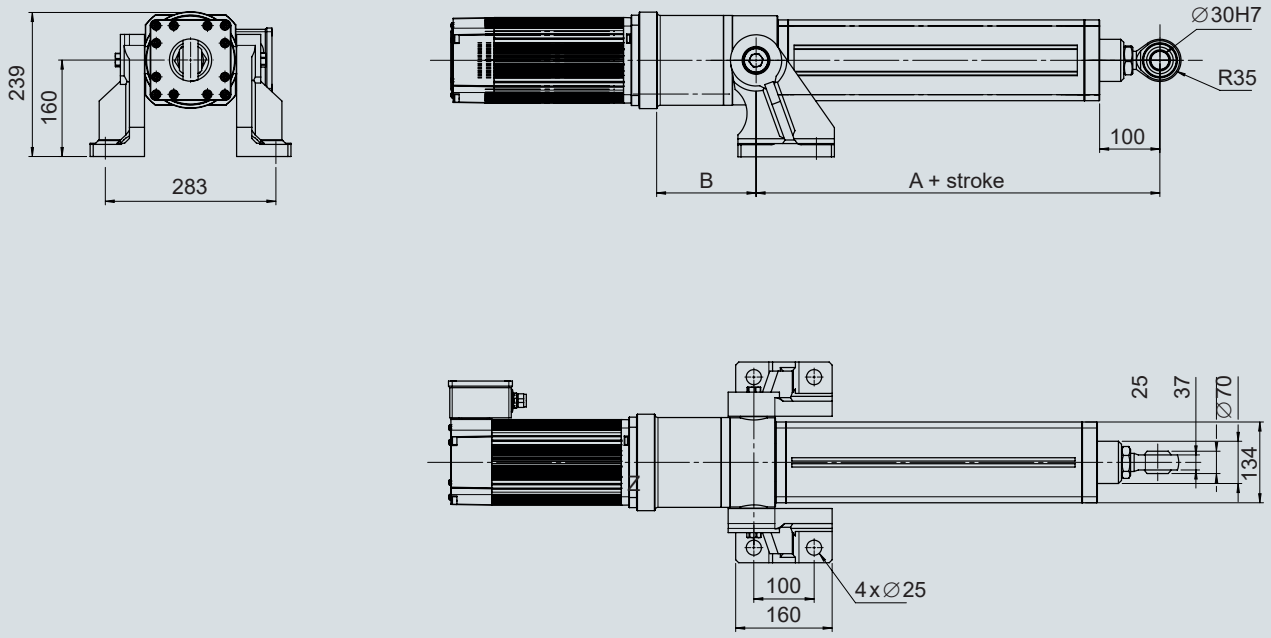


Motor (with gear + brake)	a	b
IEC 63	372.5	110
IEC 71	393	124
IEC 80	423	140
IEC 90	455	158

Spindle type	A1 (without eye at rear)	A2 (without bracket)	B	C	D	E	F	G
TTD ∅ 26	215	328	∅ 16	∅ 42	94	15	21	∅ 40
BSD ∅ 25	265	378	∅ 16	∅ 42	78	15	21	∅ 40
TTD ∅ 36	245	358	∅ 20	∅ 50	113	18	25	∅ 50
BSD ∅ 32	294	407	∅ 20	∅ 50	86	18	25	∅ 50

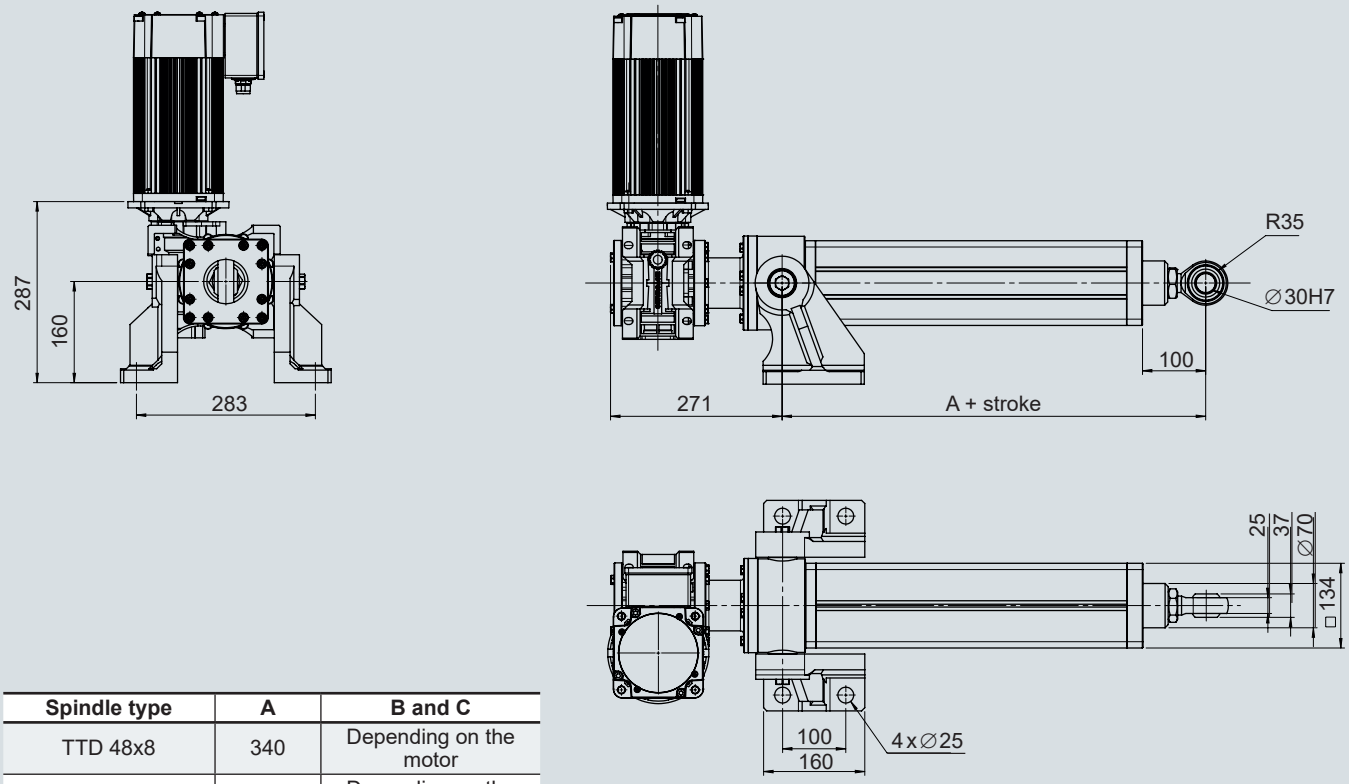
5 Dimensions HEZ-3

HEZ-3-I



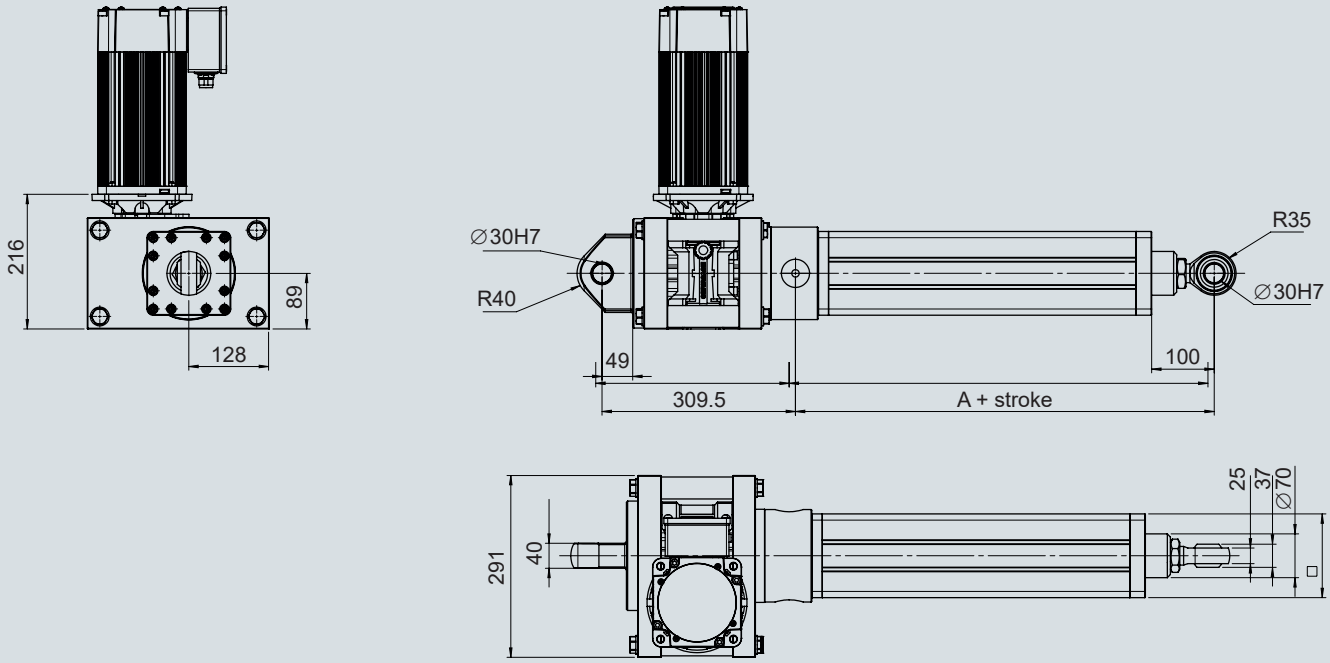
Spindle type	A	B	C and D
TTD 48x8	340	180	Depending on the motor
BSD 50x10	370	165	Depending on the motor

HEZ-3-L



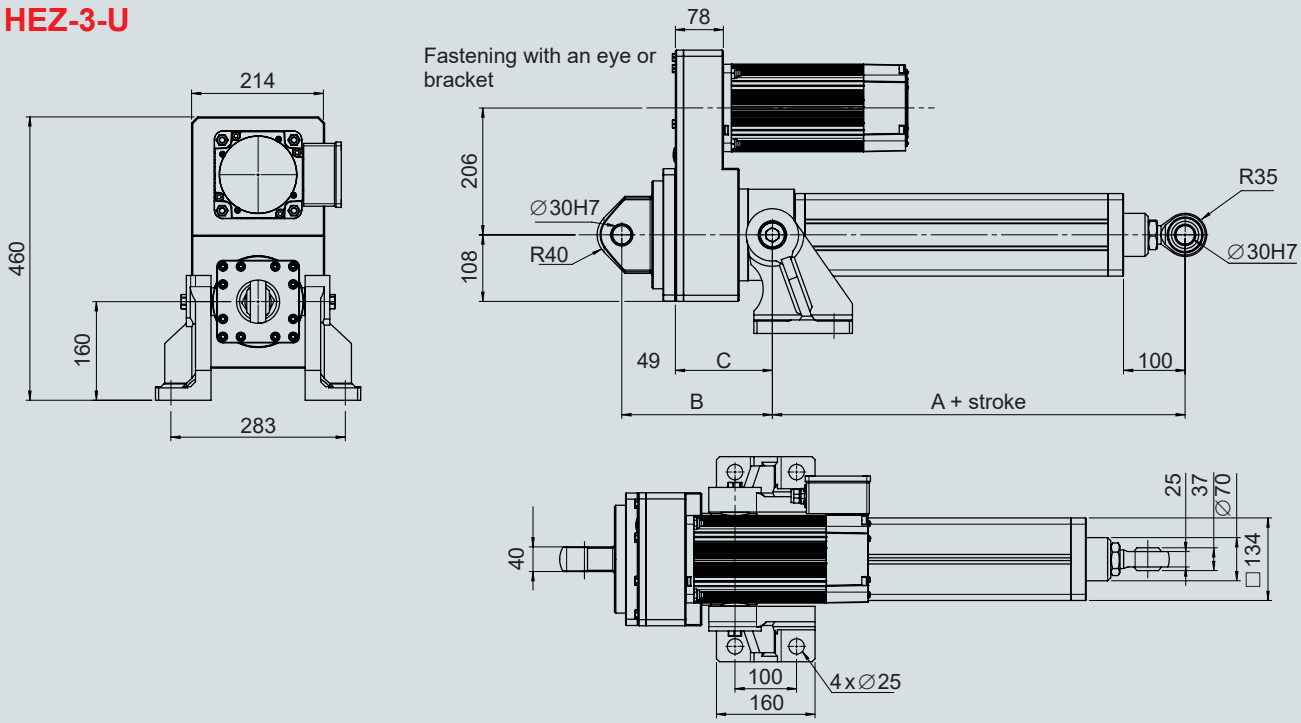
Spindle type	A	B and C
TTD 48x8	340	Depending on the motor
BSD 50x10	370	Depending on the motor

HEZ-3-L



Spindle type	A	B and C
TTD 48x8	340	Depending on the motor
BSD 50x10	370	Depending on the motor

HEZ-3-U



Spindle type	A	B (without bracket)	C (without eye)	D and E
TTD 48x8	340	245	158	Depending on the motor
BSD 50x10	370	245	158	Depending on the motor

With asynchronous standard motors: 4 pole

HEZ-1						
Design	Spindle	Nominal motor torque [Nm]	Nominal current [A]	i	v_{max} [mm/s]	F [kN]
I	BSD 20x5	1.25	0.55	3.46	34	3
I	BSD 20x5	1.25	0.55	4.52	26	4
I	BSD 20x5	1.25	0.55	8.02	15	5
I	TTD 20x4	2.50	1.00	3.95	24	5
I	TTD 20x4	1.25	0.55	9.18	10	6
I	TTD 20x4	0.83	0.47	16.97	5	7
U	BSD 20x5	1.25	0.55	3.46	34	3
U	BSD 20x5	1.25	0.55	4.52	26	4
U	BSD 20x5	1.25	0.55	8.02	15	5
U	TTD 20x4	2.50	1.00	3.95	24	5
U	TTD 20x4	1.25	0.55	9.18	10	6
U	TTD 20x4	0.83	0.47	16.97	5	7

HEZ-2						
Design	Spindle	Nominal motor torque [Nm]	Nominal current [A]	i	v_{max} [mm/s]	F [kN]
I	BSD 32x10	14.00	4.45	3.49	69	15
I	BSD 32x10	7.30	2.50	4.91	47	15
I	TTD 36x6	9.80	3.35	5.51	26	20
I	BSD 32x10	5.00	1.81	10.04	23	25
I	BSD 32x10	3.70	1.46	16.08	12	25
I	TTD 36x6	5.00	1.81	14.16	10	25
I	TTD 36x6	2.50	1.00	27.95	5	25
U	BSD 32x10	14.00	4.45	3.49	69	15
U	BSD 32x10	7.30	2.50	4.91	47	15
U	TTD 36x6	9.80	3.35	5.51	26	20
U	BSD 32x10	5.00	1.81	10.04	23	25
U	BSD 32x10	3.70	1.46	16.08	12	25
U	TTD 36x6	5.00	1.81	14.16	10	25
U	TTD 36x6	2.50	1.00	27.95	5	25

HEZ-3						
Design	Spindle	Nominal motor torque [Nm]	Nominal current [A]	i	v_{max} [mm/s]	F [kN]
I	BSD 50x10	20.00	6.2	3.49	67	22
I	BSD 50x10	14.00	4.45	5.06	45	35
I	BSD 50x10	9.80	3.35	9.65	23	50
I	BSD 50x10	7.30	2.5	15.16	15	50
I	TTD 48x8	26.00	8.7	5.06	40	30
I	TTD 48x8	20.00	6.2	9.65	20	50
I	TTD 48x8	14.00	4.45	15.16	12	50
U	BSD 50x10	20.00	6.2	3.49	67	22
U	BSD 50x10	14.00	4.45	5.06	45	35
U	BSD 50x10	9.80	3.35	9.65	23	50
U	BSD 50x10	7.30	2.5	15.16	15	50
U	TTD 48x8	26.00	8.7	5.06	40	30
U	TTD 48x8	20.00	6.2	9.65	20	50
U	TTD 48x8	14.00	4.45	15.16	12	50

HSM servo motors with nominal speed 3000 min^{-1}
HFI-CM-24 inverter

HEZ-1						
Design	Spindle – BSD	Nominal motor torque [Nm]	i	Nominal current inverter [A]	v_{max} [mm/s]	$F_{max.\ dyn}$ [kN]
I	20x5	0.64	1.00	4	250	0.70
I	20x5	0.64	3.46	4	72	2.30
I	20x5	0.64	3.95	4	63	2.60
I	20x5	0.64	4.52	4	55	3.00
I	20x5	0.64	5.21	4	48	3.50
I	20x5	0.64	6.04	4	41	4.00
I	20x5	0.64	7.02	4	36	4.70
I	20x5	0.64	8.02	4	31	5.40
I	20x5	0.64	9.18	4	27	6.10
I	20x5	0.64	10.58	4	24	7.10
I	20x5	0.64	12.26	4	20	8.20
U	20x5	0.64	1.00	4	250	0.70
U	20x5	0.64	3.46	4	72	2.30
U	20x5	0.64	3.95	4	63	2.30
U	20x5	0.64	4.52	4	55	3.00
U	20x5	0.64	5.21	4	48	3.40
U	20x5	0.64	6.04	4	41	4.00
U	20x5	0.64	7.02	4	36	4.60
U	20x5	0.64	8.02	4	31	5.30
U	20x5	0.64	9.18	4	27	6.10
U	20x5	0.64	10.58	4	24	7.00
U	20x5	0.64	12.26	4	20	8.10

HEZ-2						
Design	Spindle – BSD	Nominal motor torque [Nm]	i	Nominal current inverter [A]	v_{max} [mm/s]	$F_{max.\ dyn}$ [kN]
I	32x10	3.60	1.00	16	500	2.00
I	32x10	3.60	3.37	16	148	6.30
I	32x10	3.60	3.85	16	130	7.20
I	32x10	3.60	4.41	16	113	8.30
I	32x10	3.60	4.91	16	102	9.20
I	32x10	3.60	5.51	16	91	10.30
I	32x10	3.60	6.22	16	80	11.70
I	32x10	3.60	7.06	16	71	13.30
I	32x10	3.60	7.68	16	65	14.40
I	32x10	3.60	8.77	16	57	16.50
I	32x10	3.60	10.04	16	50	18.80
I	32x10	3.60	11.19	16	45	21.00
I	32x10	3.60	12.56	16	40	23.60
I	32x10	3.60	14.16	16	35	26.60
U	32x10	3.60	1.00	16	500	1.90
U	32x10	3.60	3.37	16	148	6.30
U	32x10	3.60	3.85	16	130	7.10
U	32x10	3.60	4.41	16	113	8.20
U	32x10	3.60	4.91	16	102	9.10
U	32x10	3.60	5.51	16	91	10.20
U	32x10	3.60	6.22	16	80	11.50
U	32x10	3.60	7.06	16	71	13.10
U	32x10	3.60	7.68	16	65	14.20
U	32x10	3.60	8.77	16	57	16.30
U	32x10	3.60	10.04	16	50	18.60
U	32x10	3.60	11.19	16	45	20.80
U	32x10	3.60	12.56	16	40	23.30
U	32x10	3.60	14.16	16	35	26.30

HSM servo motors with nominal speed 3000 min^{-1}
HFI-CM-24 inverter

HEZ-3						
Design	Spindle – BSD	Nominal motor torque [Nm]	i	Nominal current inverter [A]	v_{max} [mm/s]	$F_{max.\ dyn}$ [kN]
I	50x10	9	1.00	16	500	5.00
I	50x10	9	3.49	16	143	16.40
I	50x10	9	4.01	16	125	18.80
I	50x10	9	4.48	16	112	21.00
I	50x10	9	5.06	16	99	23.70
I	50x10	9	5.74	16	87	26.90
I	50x10	9	6.31	16	79	29.60
I	50x10	9	7.52	16	66	35.30
I	50x10	9	8.64	16	58	40.60
I	50x10	9	9.65	16	52	45.30
I	50x10	9	10.9	16	46	51.20
U	50x10	9	1.00	16	500	4.90
U	50x10	9	2.00	16	250	9.70
U	50x10	9	3.49	16	143	16.20
U	50x10	9	4.01	16	125	18.60
U	50x10	9	4.48	16	112	20.80
U	50x10	9	5.06	16	99	23.50
U	50x10	9	5.74	16	87	26.60
U	50x10	9	6.31	16	79	29.30
U	50x10	9	7.52	16	66	34.90
U	50x10	9	8.64	16	58	40.10
U	50x10	9	9.65	16	52	44.70
U	50x10	9	10.90	16	46	50.50

HEZ-3						
Design	Spindle – BSD	Nominal motor torque [Nm]	i	Nominal current inverter [A]	v_{max} [mm/s]	$F_{max.\ dyn}$ [kN]
I	63x10	9	1.00	16	500	5.00
I	63x10	9	3.49	16	143	16.40
I	63x10	9	4.01	16	125	18.80
I	63x10	9	4.48	16	112	21.00
I	63x10	9	5.06	16	99	23.70
I	63x10	9	5.74	16	87	26.90
I	63x10	9	6.31	16	79	29.60
I	63x10	9	7.52	16	66	35.30
I	63x10	9	8.64	16	58	40.60
I	63x10	9	9.65	16	52	45.30
I	63x10	9	10.9	16	46	51.20
I	63x10	9	12.36	16	40	58.00
I	63x10	9	13.60	16	37	63.80
I	63x10	9	15.16	16	33	71.20
U	63x10	9	1.00	16	500	4.90
U	63x10	9	2.00	16	250	9.70
U	63x10	9	3.49	16	143	16.20
U	63x10	9	4.01	16	125	18.60
U	63x10	9	4.48	16	112	20.80
U	63x10	9	5.06	16	99	23.50
U	63x10	9	5.74	16	87	26.60
U	63x10	9	6.31	16	79	29.30
U	63x10	9	7.52	16	66	34.90
U	63x10	9	8.64	16	58	40.10
U	63x10	9	9.65	16	52	44.70
U	63x10	9	10.90	16	46	50.50
U	63x10	9	12.36	16	40	57.30
U	63x10	9	13.60	16	37	63.10
U	63x10	9	15.16	16	33	70.30

HYDAC KINESYS
Request for electric cylinders

KINESYS

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Please feel free to use our
online configurator for HEZ:
https://www.hydac.com/en/online-tools/hez/
or scan this QR-Code

Customer: _____ Date: _____

Project: _____ Requirement: _____ pcs / year

1. Application description

_____

_____

_____

2. Performance data

Force: _____ kN
Stroke: _____ mm
Speed: _____ mm/s

3. Installation space

☐ No restrictions ☐ Maximum length of retracted cylinder: _____ mm

4. Voltage

☐ 12 V DC ☐ 24 V DC ☐ 48 V DC ☐ 230 V AC (1~,50 Hz) ☐ 400 V AC (3~, 50 Hz) ☐ Consultation

5. IP code

☐ IP54 ☐ IP _____ ☐ Consultation

6. Sensors

☐ None ☐ Limit switches ☐ Position feedback ☐ Consultation

7. Motor Controller / Frequency inverter

☐ yes ☐ no ☐ Consultation

8. Further information / Free text

_____

_____

9. Please add photos or drawings to the inquiry if possible!

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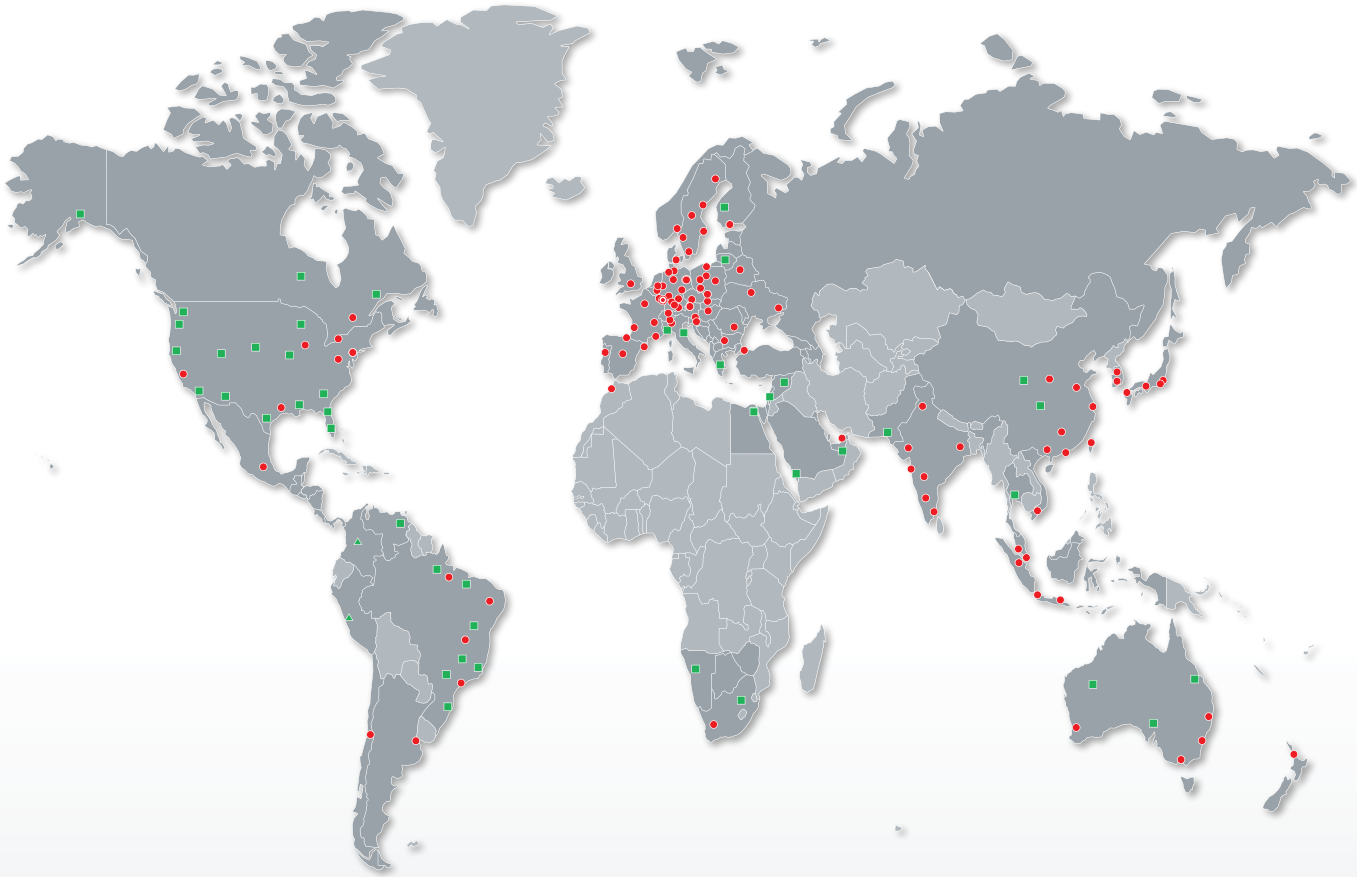

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Note

The information in this brochure relates to the operating conditions and applications described.
For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

EN 10.146.1.5/02.25