

MHS 40 Drive Unit

Ball Screws with hollow-shaft motor

The Drive and Control Company



Rexroth Ball Screws

MHS drive unit

The MHS drive unit is a innovative combination of a ball screw and a digital AC servo motor. Linking the electric drive directly with the mechanical components results in the highest travel speeds while at the same time achieving the highest precision of linear positioning.

In this new development the operation of a ball screw transform in a rotary movement into a linear movement has been redefined.

The conventional drive solution is to have the screw driven by an AC servo motor either directly or by side drive belt.

The driven screw rotates and the nut performs the required feed movement.

Axial rigidity values are limited by the length of the screw and by the end bearings. Positioning accuracy is also limited as the result.

Today a screw's operating speed comes close to its critical whirling speed especially in high dynamic applications. This combined with thermal influences and physical reasons makes it very difficult to implement a high dynamic machine concept.

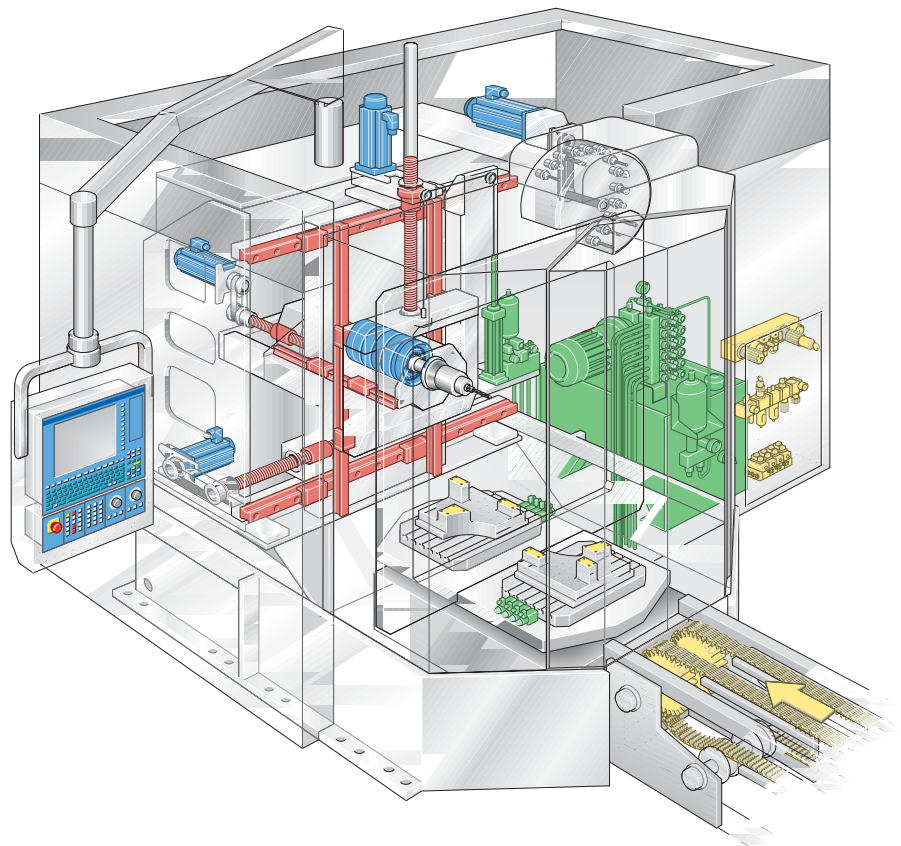
It is always a challenge for the machine manufacturer to achieve the acceleration and linear speed values possible while at the same time maintaining the required positioning accuracy.

An alternative approach is to drive the nut

The rotary movement is not performed by the screw but by the nut with an anti-friction bearing. Normally the nut is driven by way of a toothed belt so that the nut and the screw perform the feed movement relative to each other. Screw rigidity can be increased by stretching the

screw. In this arrangement there are no longer any limiting end bearings. Furthermore it is possible to use a hollow machined screw with liquid coolant to dissipate the heat.

Vertical axis of a machining center
Ball screw with a driven nut and a toothed belt



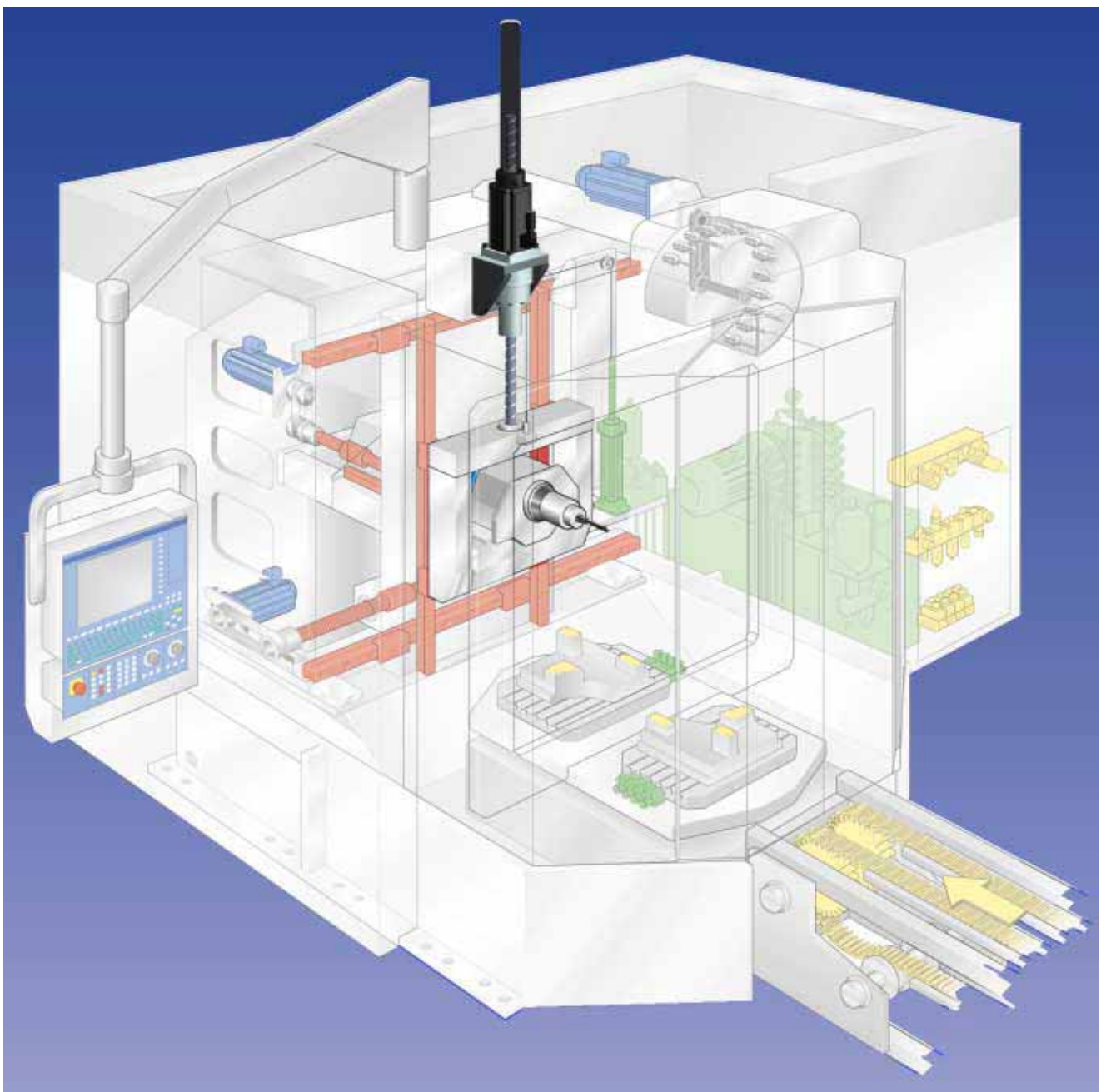
The concept of the M HS drive unit goes one decisive step further

The nut is connected to the hollow shaft motor without any additional transmission elements. This is an ideal concept for high dynamic applications and makes maximum use of the dynamic possibilities of the ball screw

The screw of the ball screw assembly is passed through the hollow rotor shaft of the servo motor "hollow shaft motor". Transmission elements such as drive belts or clutches are eliminated by either with their negative effects on precision. Arranging the servo motor and the ball screw on one axis is also helps to save space

Thus possibilities of new drive concepts are given e.g. more than one motor on one spindle for independent motions

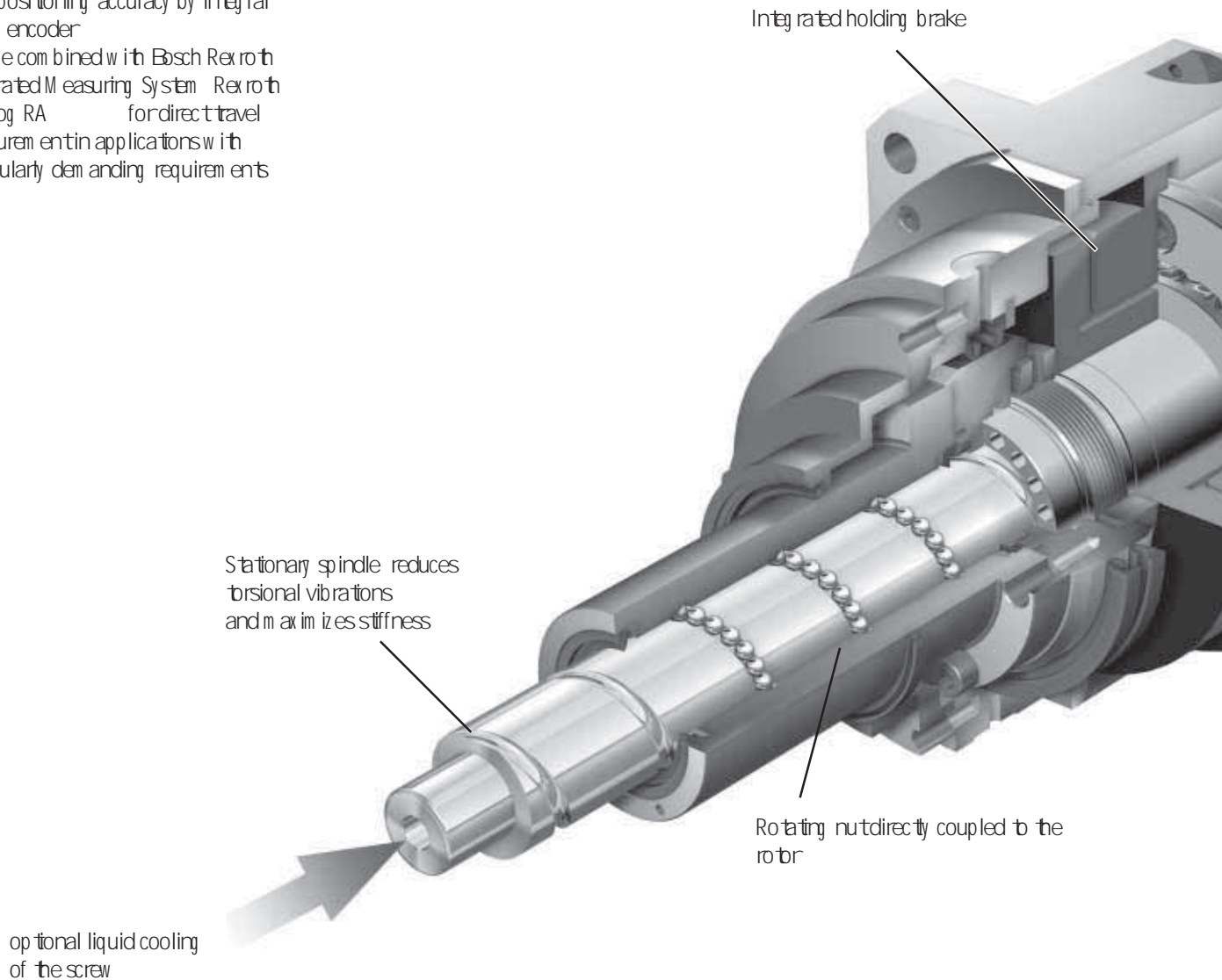
Vertical axis of a machining center driven by an M HS drive unit

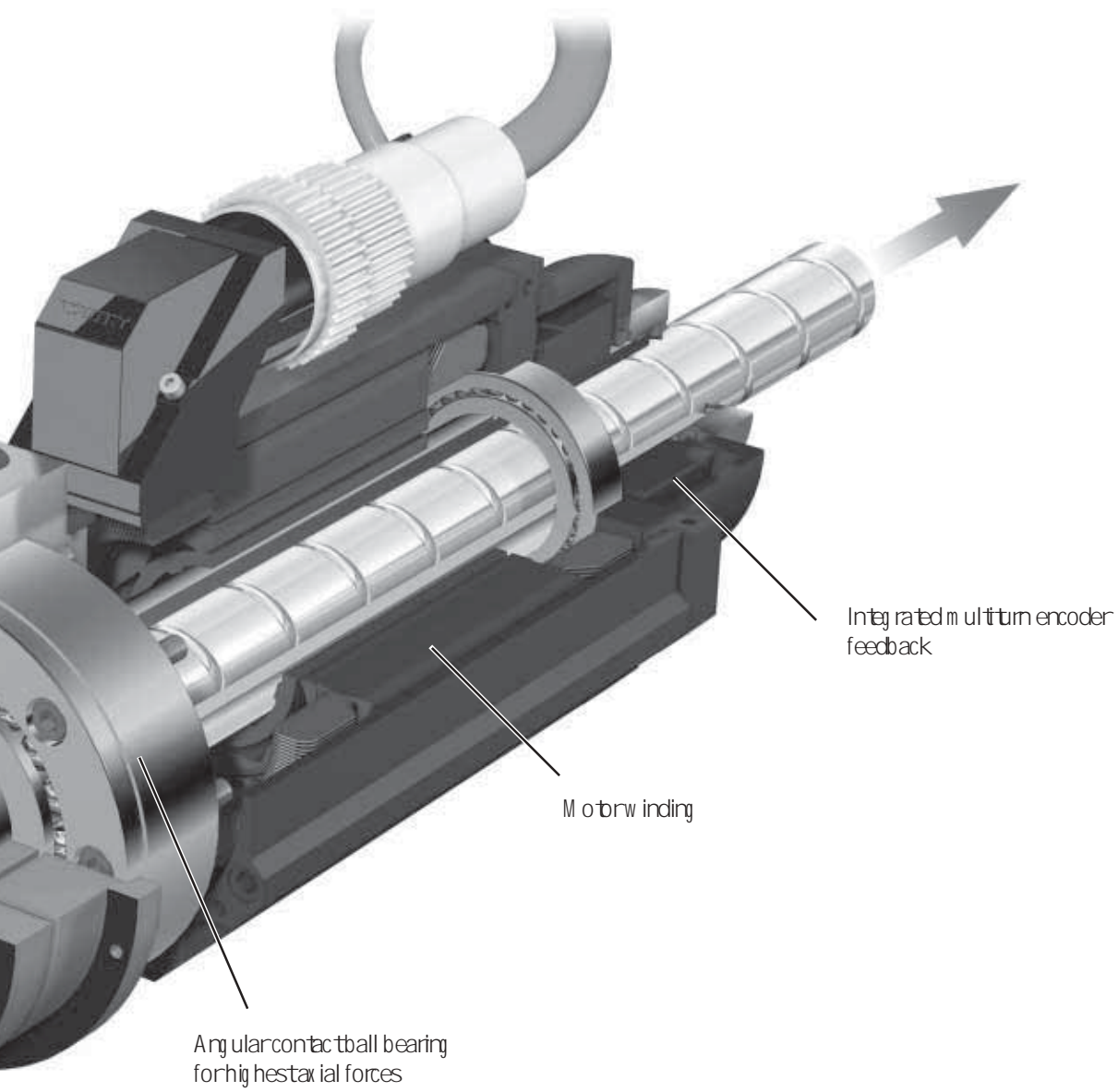


Rexroth Ball Screws M HS drive unit

User benefits

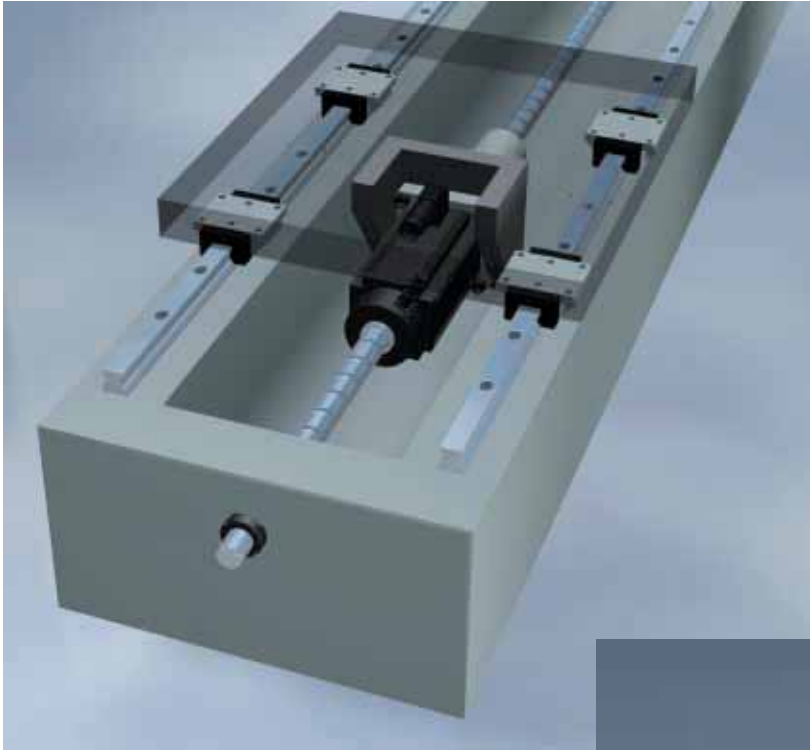
- Economy through the use of a complete unit consisting of a ball screw, an AC servo motor and a brake
- Adaptation to various speeds and loads by way of the screw lead
- Various power levels by using different motor versions
- Compact design requires little installation space
- Minimal mounting effort by the customer and integral functionality
- Low system costs
- High positioning accuracy by integral rotary encoder
- Can be combined with Bosch Rexroth Integrated Measuring System Rexroth Catalog RA for direct travel measurement in applications with particularly demanding requirements





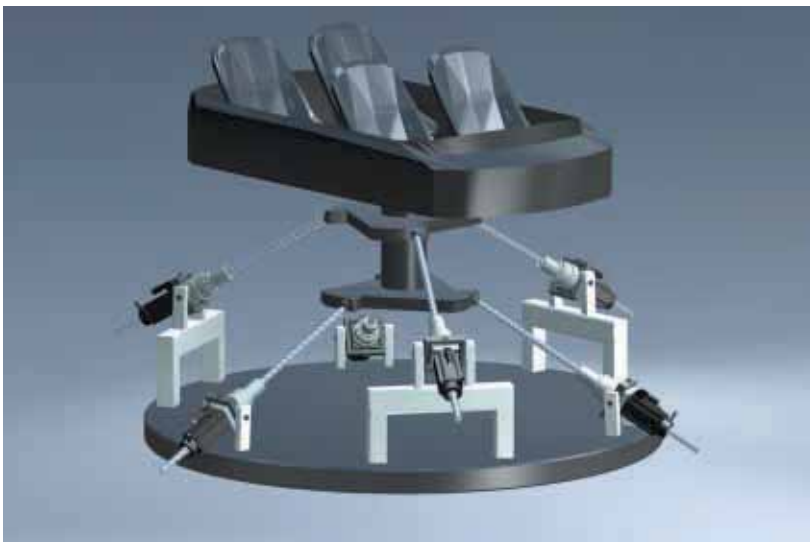
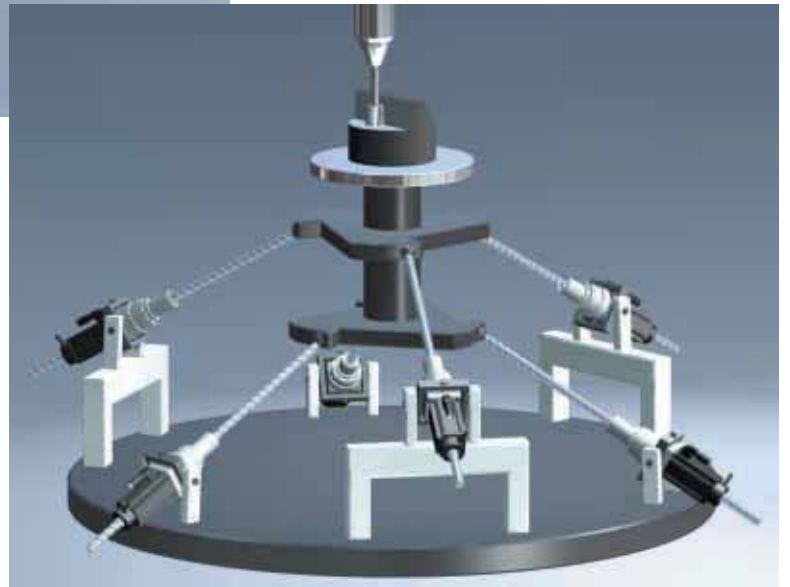
Rexroth Ball Screws

MHS drive unit applications



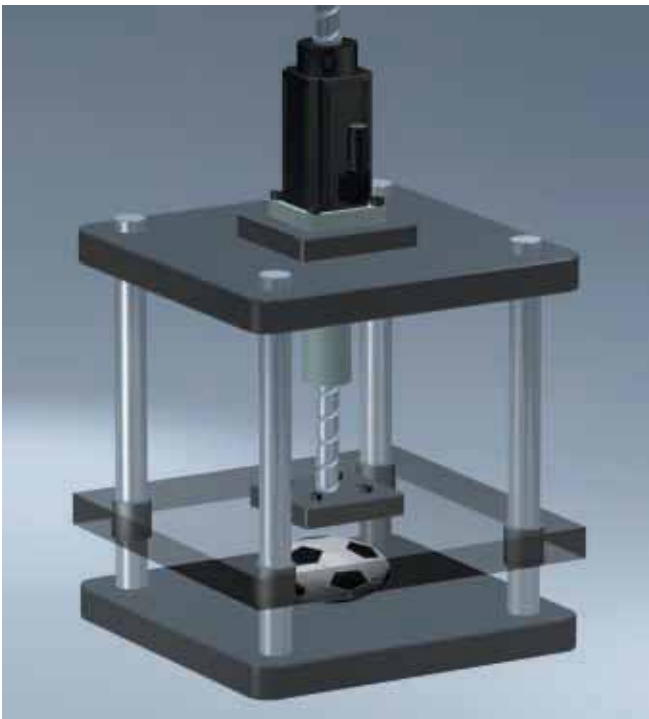
◀ Machine tool axis with MHS drive unit

▼ Hexapod with MHS actuators



◀ Simulation stage with MHS actuators

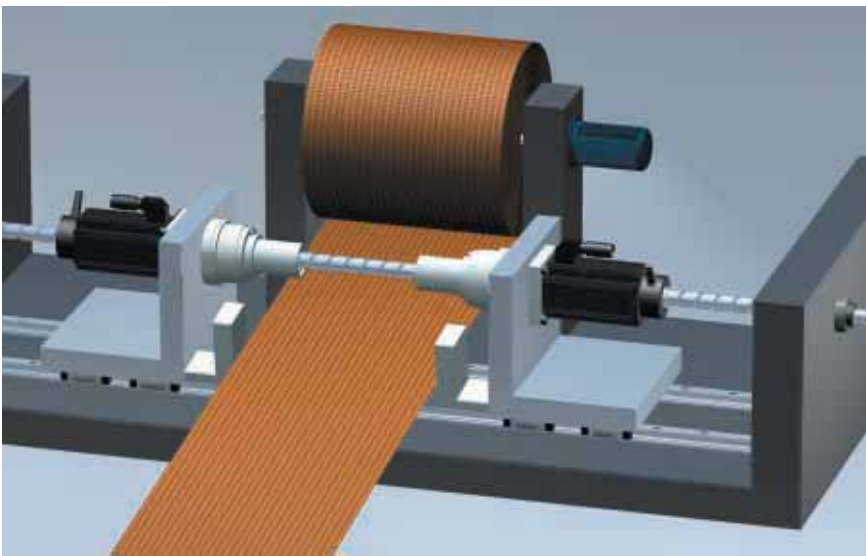
All pictures have been simplified



▲ Press with M HS drive unit

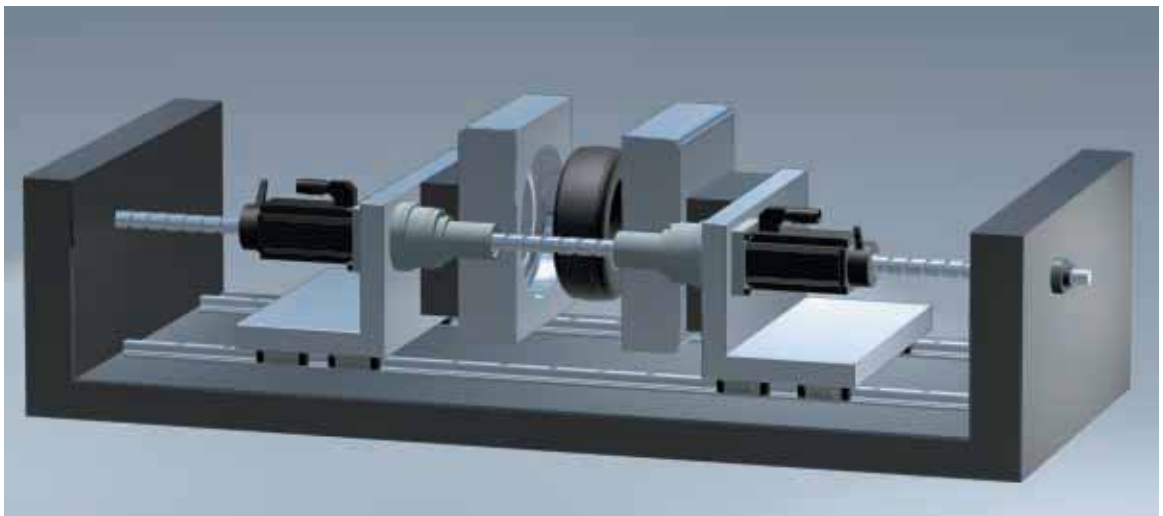


▲ Tensile testing with M HS drive unit



◀ Two M HS drive units for coil winding cutting

▼ Two M HS drive units for tire molds



Rexroth Ball Screws

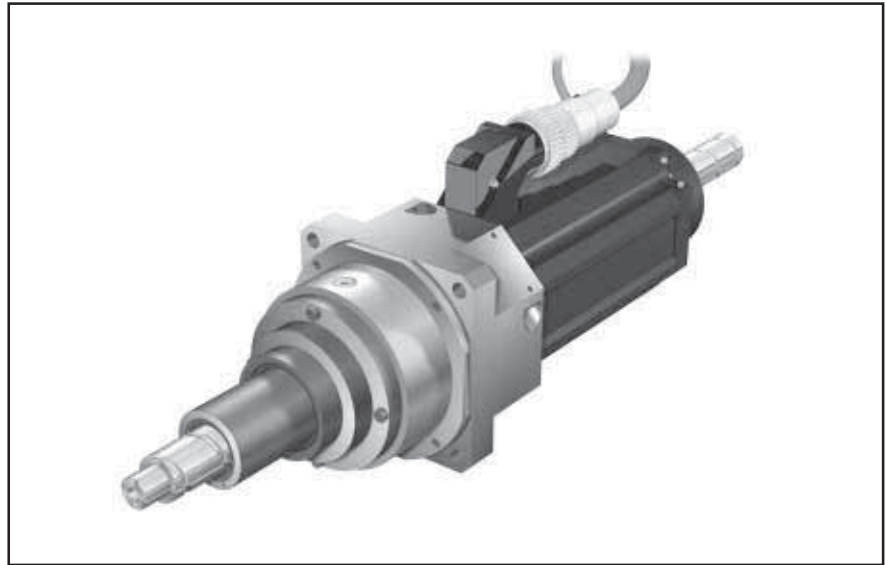
MHS drive unit

Ball screw with hollow shaft motor

with high resolution encoder

options

- liquid cooled screw
- integrated holding brake
- cooling fan



Ordercode

M	H	S	E	B	x	R	x		P	S	K	K			
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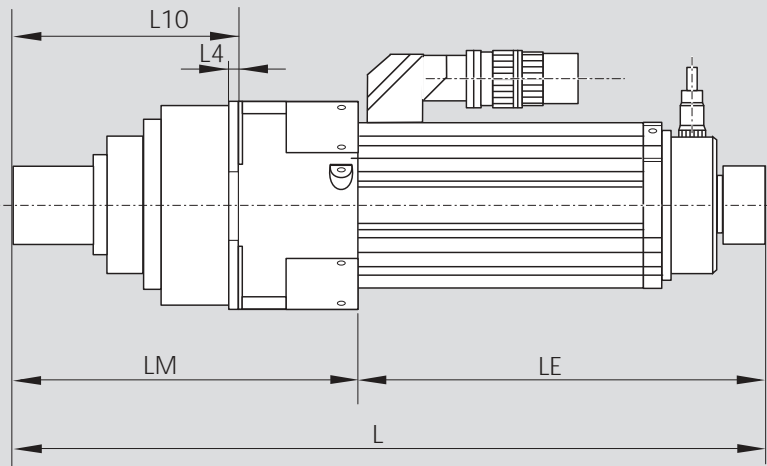
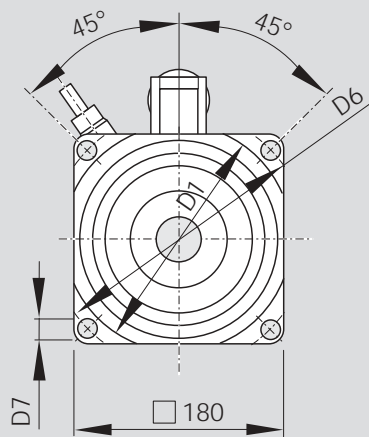
Technical details of the Rexroth ball screw are to be found in the main catalog RE

- d** = nominal diameter
- P** = lead right hand
- D_w** = ball diameter
- i** = number of ball track turns

Size d₀ x P x D_w - i	Load ratings	
	dyn. C (N)	stat. C₀ (N)
40 x 5R x 3,5 - 5	29100	64100
40 x 10R x 6 - 4	50000	86400
40 x 12R x 6 - 4	49900	86200
40 x 16R x 6 - 4	49700	85900
40 x 20R x 6 - 3	37900	62800
40 x 40R x 6 - 3	37000	62300

Motor type	Ball screw Size d x P x D_w - i	Max Nm	Drive torques Nm		Braking torque Nm	Max speed min	Mass kg	
			Duration only convection	Surface cooling			without brake	with brake
MHS 095 B	40 x 5R x 3,5 - 5	66	17,5	26,3	70	3000	30,3	33,7
	40 x 10R x 6 - 4	66	17,5	26,3	70	3000	30,4	33,8
	40 x 12R x 6 - 4	66	17,5	26,3	70	3000	30,5	33,9
	40 x 16R x 6 - 4	66	17,5	26,3	70	3000	30,6	34,0
	40 x 20R x 6 - 3	66	17,5	26,3	70	3000	30,7	34,1
	40 x 40R x 6 - 3	66	17,5	26,3	70	3000	31,6	35,0
MHS 095 C	40 x 5R x 3,5 - 5	88	23	34,5	70	3000	33,8	37,2
	40 x 10R x 6 - 4	88	23	34,5	70	3000	33,9	37,3
	40 x 12R x 6 - 4	88	23	34,5	70	3000	34,0	37,4
	40 x 16R x 6 - 4	88	23	34,5	70	3000	34,1	37,5
	40 x 20R x 6 - 3	88	23	34,5	70	3000	34,2	37,6
	40 x 40R x 6 - 3	88	23	34,5	70	3000	35,1	38,5

Duration at K over temperature at the motor windings



Mass moment of inertia		Dimensions mm							
without brake kg m	with brake kg m	L	L _M	L _E	L	L	D _j	D	D
114	170	584	214	370	4	87	190	215	M12
115	171	600	230	370	4	138	190	215	M12
115	171	605	235	370	4	138	190	215	M12
116	172	620	250	370	4	153	190	215	M12
117	173	618	248	370	4	151	190	215	M12
124	180	672	302	370	4	205	190	215	M12
127	183	624	214	410	4	87	190	215	M12
128	184	640	230	410	4	103	190	215	M12
128	184	645	235	410	4	138	190	215	M12
129	185	660	250	410	4	153	190	215	M12
130	186	658	248	410	4	151	190	215	M12
137	193	712	302	410	4	205	190	215	M12

Rexroth Ball Screws

Drive unit MHS screw end machining

Option	Dimensions of liquid cooling on request
S	
K	None

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Ordercode

M	H	S	E	B	x	R	x			P	S	K	K				
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Form Version	Ball screw size	Dimensions (mm)									Hex socket
		d ₀	P	L	D ₁	DT1	L ₁	G ₁	LG ₁	S	
51	309	40	5/ 10/12/16/20/40	117	30	h6	83	M30x1,5	34	10	

Order Code

Drive unit	M H S E B	x	R x			P	S	K	K			
Drive unit M H S Motor type B												
Size	Nominal diameter mm											
	Lead mm											
	Direction of lead R right											
	Ball diameter mm											
	Number of ball track turns in the nut											
Seal	standard seal	reinforced seal										
Preload												
Precision	P P P	g round thread screw										
	P T	precision rolled screw										
Screw	R ...	precision rolled									S ...	g round thread
Left screw end	Form											
	Option	S ... hex socket									K ... none	
	Version											
Right screw end	see left screw end											
Overall length mm												
Documentation	standard acceptance testreport lead testreport torque testreport lead and torque testreport											
Lubrication	preserved					preserved and nut with basic grease						

for the precision rolled version note higher frictional torque

N B It is also possible to process inquiries based on a customer's drawings

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