



# ALS- Electromechanical Screw Rams

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## ALS – Electromechanical Screw Rams



The "ALS" Electromechanical Screw Ram is a universal drive system for a wide range of applications within the machine building industry. With a choice of 4 sizes, a modular design in

- "ALS" compact version and
- "ALSR" cylinder version

it is possible to obtain the optimal design features to suit your specific requirements. The system is particularly ideal for single drive applications on linear motion projects.

### Description of the product

The "ALS" consists of a fully enclosed housing unit with a rugged axial and radial bearing arrangement and long-term lubrication (low-maintenance). The housing is surface-treated and can be converted into a swivelling version by means of 2 pins. The standard version has a self-locking trapezoidal screw with a travelling nut and a drive shaft for mounting a suitable gear motor. The "ALSR" version consists of the base version "ALS" and a shaft and thrust tube design in a completely closed version, whereby the thrust tube is hard chrome-plated and the shaft tube is painted black as standard. Countless motor options are possible using a choice of mounting flanges or bell housings and couplings. A ball screw with various nut assemblies can also be used instead of the trapezoidal screw.

To complete the product, there is a wide range of accessories such as stroke limiting devices, anti-turn devices and a choice of head types.

### Design features

- Maximum dynamic axial force of size
  - 10** = 12,5 kN
  - 25** = 25 kN
  - 50** = 50 kN
  - 100** = 100 kN
- Lifting speeds from 0.5 m/min to 10 m/min depending on the load and cyclic duration factor
- Self-locking trapezoidal screw
- Mounting possibility of every flange-fitting gear motor of solid or hollow shaft design
- Long-term lubrication by high-quality grease and enclosed design
- Standard or stroke lengths to customer's specification based on buckling and speed diagrams
- Special screw diameters and pitches possible
- Wide range of accessories
- Standard stroke lengths "ALSR" for size
  - 10** : 100/200/300/400 mm
  - 25**: 100/200/300/400/500 mm
  - 50**: 200/400/600/800/1000 mm
  - 100**: 300/600/900/1200/1500 mm
- or lengths to order
- Electronic synchronization of several individual drives



Can be used in accordance with EC Directive 94/9/EC (ATEX)

### Applications for low cost solution "ALS" drive units

- Feed drives for horizontal or vertical movements in machine building industry and plant construction
- Linear adjustment movements for automation of handling and automobile industry and in building management systems
- Drive units in lock gates and sewage farms with the fully enclosed "ALSR" version providing special protection for the drive unit against contamination
- These benefits can also be used for applications in the food industry and for all outdoor applications
- Applications in aerospace, crane manufacture, paper industry etc.

And soon for your applications as well!



### Trapezoidal and ball screw threads

#### Trapezoidal thread suitable for:

- Lift speeds up to approx. 3 m/min
- Low duty cycle (approx. 20% per hour).

#### Ball screw threads suitable for:

- Frequent adjustment s
- Lift speeds > 3 m/min
- Exceptional operating conditions



### Anti-turn device

An integrated anti-turn device can be fitted to the shaft tube in the "ALSR" version, if no on-site anti-turn device is on the spindle.



### Various head designs

The thrust tube of the "ALSR" version can be fitted with a range of head designs. The picture shows a rod-type head (head version IV). Other versions such as heads I and II and a coupling rod that complies with DIN are available as standard (see dimension tables).



### Stroke limitation

The "ALSR" version can be fitted with a stroke limitation to order. The picture shows an inductive version using an inductive proximity switch in a programmable D.C. version (10–55V – IP 67) with a simple connection (cable with plug).



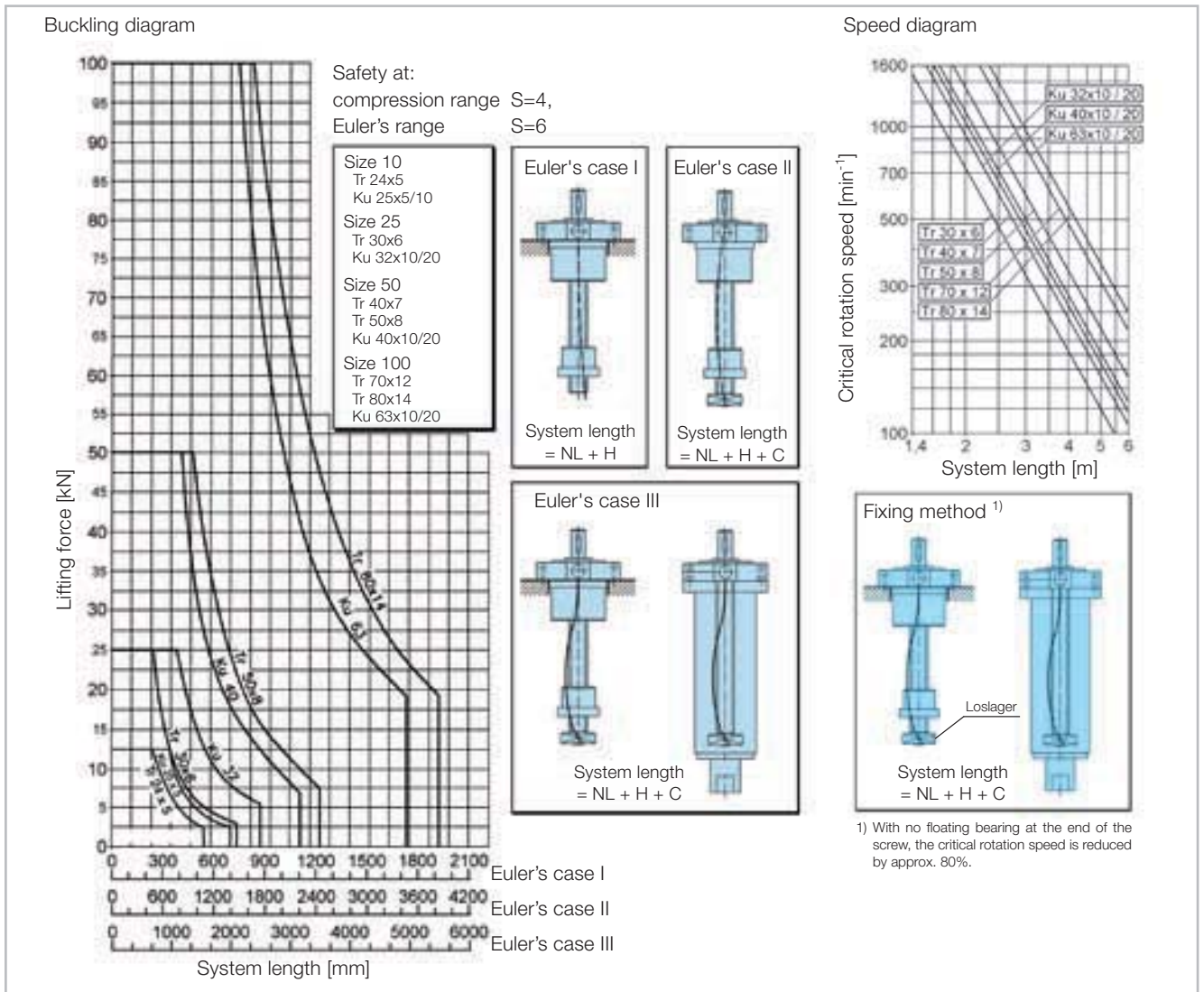
### "ALS" version

The basic "ALS" version with the standard housing and integral axial and radial bearings can be fitted with a series of gear motors from various manufacturers using different mounting flanges.

Selection table	Trapezoidal screw (Tr)							Ball screw (Ku)				
		10	25	50	100	10	25	50	100			
Size ALS – ALSR		10	25	50	100	10	25	50	100			
Max. tensile / compressive force	[kN]	12,5	25	50	100	12,5	25	50	100			
Screw		Tr 24x5	Tr 30x6	Tr 40x7	Tr 50x8	Tr 70x12	Tr 80x14	Ku 25x5 / 10	Ku 32x10 / 20	Ku 40x10 / 20	Ku 63x10 / 20	
Static load rating	[kN]	50*	98*	173*	300*	33,8**	99 / 50**	170 / 85**	300 / 219**			
Dynamic load rating	[kN]	28*	46,5*	88*	137*	16,9**	44 / 27,5**	79 / 48**	163 / 75**			
Lift per revolution	[mm/U]	5	6	7	8	12	14	5 / 10	10 / 20	10 / 20	10 / 20	
Max. drive power at 20 °C ambient temp. and 20 % c.d.f.***hour	[kW]	0,75	1,1	1,5	2,2	4,0	5,5	see service life calculation [A restriction does not exist based on duty cycle (% duty cycle/hour)]				
Max. drive power at 20 °C ambient temp. and 10 % c.d.f.***hour	[kW]	1,1	1,5	2,0	3,0	5,5	7,5					
Overall efficiency	[%]	34,4	35	32,5	30,5	31,5	32,5	78,0	75,0	75,0	75,0	
Torque-power-speed at 20 % c.d.f.***hour and 20 °C		see performance data tables							see service life calculation			
Torque at the drive shaft	[Nm]	see performance data tables							see performances data tables			
Max. perm. screw length under compr. load	[mm]	see buckling diagram							see buckling diagram			
Max. perm. screw length	[mm]	see speed diagram							see speed diagram			
Housing material		"steel burnished"							"steel burnished"			
Basic weight	[kg]	4,5	10	25	35	4,5	10	25	35			
Extra weight of ALS per 100 mm stroke	[kg]	0,35	0,5	0,8	1,2	2,5	3	0,4	0,5	1	2,5	
Extra weight of ALSR per 100 mm stroke	[kg]	1,3	2,2	4	4,5	9	9,5	1,3	2,2	4,2	9	

\* Axial bearing \*\*Ball screw/nut \*\*\*Cyclic duration factor

The standard screw sizes are as follows: Tr 24x5 / Tr 30x6 / Tr 40x7 / Tr 70x12



### Selection and Sizing

- Look into the selection table for the maximum permissible tensile/compressive forces to narrow down the choice of size
- For compressive force: Check the screw size in the buckling diagram (consider the Euler's case)
- Screw lengths from > 1400 mm: Check the screw size in the speed diagram (consider the fixing method)
- Determine the size by looking into the performance data tables (consider the lifting load, speed and cyclic duty factor)
- Check the service life of the bearing and ball screw (use the calculation formula)

### Calculation formula:

- Drive power:

$$P_{\text{dr}} = \frac{F_{\text{dyn}} \cdot v}{60 \cdot \eta} \quad [\text{kW}]$$

- Service life:

$$L_{\text{h}} = \frac{1 \cdot 10^6}{60 \cdot n} \cdot \left( \frac{C_{\text{dyn}}}{F_{\text{dyn}}} \right)^3 \quad [\text{Hours}]$$

- $F_{\text{dyn}}$  = Lifting load [kN]
- $v$  = Lifting speed [m/min]
- $\eta$  = overall efficiency
- $n$  = Input speed [ $\text{min}^{-1}$ ]
- $C_{\text{dyn}}$  = Dynamic load rating [kN]

**Performance data tables:**

All performance figures related to the dynamic lifting force and a duty cycle of 20 % per hour or 30 % per 10 minutes in an ambient temperature of 20 °C.

**ALS – ALSR with Tr:** The screw/nut system is overheated in fields highlighted in grey.

**ALS – ALSR with Ku:** The service life falls below 500 hours in the fields highlighted in grey.

**Performance data table ALS 10 – ALSR 10 with Tr 24x5\***

Speed n [min <sup>-1</sup> ]	Lifting Speed Tr 24x5 [m/min]	12,5 kN Tr 24x5		10 kN Tr 24x5		7,5 kN Tr 24x5		5 kN Tr 24x5		2,5 kN Tr 24x5	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
750	3,75	28,80	2,50	23,07	1,90	17,30	1,40	11,53	0,90	5,77	0,45
500	2,50	28,80	1,50	23,07	1,20	17,30	0,90	11,53	0,60	5,77	0,30
250	1,25	28,80	0,75	23,07	0,60	17,30	0,45	11,53	0,30	5,77	0,15
100	0,50	28,80	0,30	23,07	0,30	17,30	0,20	11,53	0,15	5,77	0,10
50	0,25	28,80	0,15	23,07	0,15	17,30	0,15	11,53	0,10	5,77	0,10

**Performance data table ALS 10 with Ku 25x5 / Ku 25x10**

Speed n [min <sup>-1</sup> ]	Lifting Speed [m/min]	12,5 kN Ku 25 x 5 / Ku 25 x 10		10 kN Ku 25 x 5 / Ku 25 x 10		7,5 kN Ku 25 x 5 / Ku 25 x 10		5 kN Ku 25 x 5 / Ku 25 x 10		2,5 kN Ku 25 x 5 / Ku 25 x 10	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
750	3,75	13,0	1,10	26,0	2,10	10,4	0,90	21,0	1,70	7,8	0,70
500	2,50	13,0	0,70	26,0	1,40	10,4	0,60	21,0	1,10	7,8	0,40
250	1,25	13,0	0,40	26,0	0,70	10,4	0,30	21,0	0,60	7,8	0,20
100	0,50	13,0	0,15	26,0	0,30	10,4	0,15	21,0	0,25	7,8	0,12
50	0,25	13,0	0,15	26,0	0,15	10,4	0,15	21,0	0,15	7,8	0,12

**Performance data table ALS 25 – ALSR 25 with Tr 30x6\***

Speed n [min <sup>-1</sup> ]	Lifting Speed Tr 30x6 [m/min]	25 kN Tr 30x6		20 kN Tr 30x6		15 kN Tr 30x6		10 kN Tr 30x6		5 kN Tr 30x6	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
700	4,20	70	5,2	56	4,1	42	3,1	28	2,1	14	1,0
500	3,00	70	3,7	56	2,9	42	2,2	28	1,5	14	0,7
300	1,80	70	2,2	56	1,8	42	1,3	28	0,9	14	0,4
100	0,60	70	0,7	56	0,6	42	0,4	28	0,3	14	0,1
50	0,30	70	0,4	56	0,3	42	0,2	28	0,1	14	0,1

**Performance data table ALS 25 – ALSR 25 with Ku 32x10 / Ku 32x20**

Speed n [min <sup>-1</sup> ]	Lifting Speed Ku 32x10 / Ku 32x20 [m/min]	25 kN Ku 32x10 / Ku 32x20		20 kN Ku 32x10 / Ku 32x20		15 kN Ku 32x10 / Ku 32x20		10 kN Ku 32x10 / Ku 32x20		5 kN Ku 32x10 / Ku 32x20	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
700	7,00	53	3,9	106	7,8	42	3,1	85	6,2	32	2,3
500	5,00	53	2,8	106	5,6	42	2,2	85	4,4	32	1,7
300	3,00	53	1,7	106	3,3	42	1,3	85	2,7	32	1,0
100	1,00	53	0,6	106	1,1	42	0,4	85	0,9	32	0,3
50	0,50	53	0,3	106	0,6	42	0,2	85	0,4	32	0,2

**Performance data table ALS 50 – ALSR 50 with Tr 40x7\* / Tr 50x8**

Speed n [min <sup>-1</sup> ]	Lifting Speed Tr 40x7 / Tr 50x8 [m/min]	50 kN Tr 40x7 / Tr 50x8		40 kN Tr 40x7 / Tr 50x8		30 kN Tr 40x7 / Tr 50x8		25 kN Tr 40x7 / Tr 50x8		20 kN Tr 40x7 / Tr 50x8		10 kN Tr 40x7 / Tr 50x8	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
500	3,50	180	9,4	218	11,4	144	7,5	174	9,1	108	5,6	131	6,8
400	2,80	180	7,5	218	9,1	144	6,0	174	7,3	108	4,5	131	5,5
300	2,10	180	5,6	218	6,8	144	4,5	174	5,5	108	3,4	131	4,1
100	0,70	180	1,9	218	2,3	144	1,5	174	1,8	108	1,1	131	1,4
50	0,35	180	0,9	218	1,1	144	0,8	174	0,9	108	0,6	131	0,7

**Performance data table ALS 50 – ALSR 50 with Ku 40x10 / Ku 40x20**

Speed n [min <sup>-1</sup> ]	Lifting Speed Ku 40x10 / Ku 40x20 [m/min]	50 kN Ku 40x10 / Ku 40x20		40 kN Ku 40x10 / Ku 40x20		30 kN Ku 40x10 / Ku 40x20		25 kN Ku 40x10 / Ku 40x20		20 kN Ku 40x10 / Ku 40x20		10 kN Ku 40x10 / Ku 40x20	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
450	4,50	106	5,0	212	10,0	85	4,0	170	8,0	64	3,0	127	6,0
350	3,50	106	3,9	212	7,8	85	3,1	170	6,2	64	2,3	127	4,7
200	2,00	106	2,2	212	4,4	85	1,8	170	3,6	64	1,3	127	2,7
100	1,00	106	1,1	212	2,2	85	0,9	170	1,8	64	0,7	127	1,3
50	0,50	106	0,6	212	1,1	85	0,4	170	0,9	64	0,3	127	0,7

**Performance data table ALS 100 – ALSR 100 with Tr 70x12\* / Tr 80x14**

Speed n [min <sup>-1</sup> ]	Lifting Speed Tr 70x12 / Tr 80x14 [m/min]	100 kN Tr 70x12 / Tr 80x14		80 kN Tr 70x12 / Tr 80x14		60 kN Tr 70x12 / Tr 80x14		50 kN Tr 70x12 / Tr 80x14		40 kN Tr 70x12 / Tr 80x14		20 kN Tr 70x12 / Tr 80x14		10 kN Tr 70x12 / Tr 80x14	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
225	2,70	624	14,7	719	16,9	499	11,8	575	13,5	375	8,8	431	10,2	312	7,4
200	2,40	624	13,1	719	15,1	499	10,5	575	12,0	375	7,8	431	9,0	312	6,5
160	1,92	624	10,5	719	12,0	499	8,4	575	9,6	375	6,3	431	7,2	312	5,2
80	0,96	624	5,2	719	6,0	499	4,2	575	4,8	375	3,1	431	3,6	312	2,6
40	0,48	624	2,6	719	3,0	499	2,1	575	2,4	375	1,6	431	1,8	312	1,3

**Performance data table ALS 100 – ALSR 100 with Ku 63x10 / Ku 63x20**

Speed n [min <sup>-1</sup> ]	Lifting Speed Ku 63x10 / Ku 63x20 [m/min]	100 kN Ku 63x10 / Ku 63x20		80 kN Ku 63x10 / Ku 63x20		60 kN Ku 63x10 / Ku 63x20		50 kN Ku 63x10 / Ku 63x20		40 kN Ku 63x10 / Ku 63x20		20 kN Ku 63x10 / Ku 63x20		10 kN Ku 63x10 / Ku 63x20	
		Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW	Nm	kW
225	2,25	212	5,0	424	10,0	170	4,0	340	8,0	106	2,5	212	5,0	42	1,0
200	2,00	212	4,4	424	8,9	170	3,6	340	7,1	106	2,2	212	4,4	42	0,9
160	1,60	212	3,6	424	7,1	170	2,8	340	5,7	106	1,8	212	3,6	42	0,7
80	0,80	212	1,8	424	3,6	170	1,4	340	2,8	106	0,9	212	1,8	42	0,4
40	0,40	212	0,9	424	1,8	170	0,7	340	1,4	106	0,4	212	0,9	42	0,2

\*The standard screw sizes are as follows: Tr 24x5 / Tr 30x6 / Tr 40x7 / Tr 70x12



Dimension	ALS 10 - ALSR 10			ALS 25 - ALSR 25			ALS 50 - ALSR 50				ALS 100 - ALSR 100			
	Tr screw		Ball screw	Tr screw		Ball screw	Tr screw		Ball screw		Tr screw		Ball screw	
	Tr 24x5	Ku 25x5	Ku 25x10	Tr 30x6	Ku 32x10	Ku 32x20	Tr 40x7	Tr 50x8	Ku 40x10	Ku 40x20	Tr 70x12	Tr 80x14	Ku 63x10	Ku 63x20
Ø A	100			145			175				250			
Ø B j6	60			95			110				180			
C	24			34			38				52			
C 1	12			17			19				26			
C 3	30			40			47				61			
Ø D j6	16			25			30				40			
E ± 0,2	82			125			155				215			
F	2			3			4				5			
G	16			13			15				25			
H	56			63			85				111			
h	20			40			63				54			
i	M 33x2			M 42x2			M 60x2				M 95x3			
K 1	8 x 45 °			8 x 45 °			6 x 60 °				8 x 45 °			
K 2	4 x 90 °			4 x 90 °			6 x 60 °				4 x 90 °			
L	40			50			60				90			
Ø M f7	60			90			115				150			
Ø M 1	70			100			130				170			
N	68			88			106				150			
N 1	6,6			8			6				8			
N 2	4			4			6				6			
NL / Stroke	+85	+91	+96	+85	+130	+170	+120	+176	+191	+205	+198	+238		
Ø P	59,5			89,5			114				149			
Ø P 1	40			50			70				110			
Q	5 x 5 x 20			8 x 7 x 40			8 x 7 x 50				12 x 8 x 80			
R 1	22,5 °			22,5 °			30 °				22,5 °			
R 2	45 °			45 °			15 °				45 °			
S	205	211	216	236	281	321	311	342	407	466	459	499		
S 1 - DIN 912/8.8	M6			M8			M8				M12			
S 2 - DIN 912/8.8	M6			M8			M8				M12			
S 5	225			276			336				486			
S 6	245			298			374				514			
S 7	282			343			439				569			
S 8	285			343			439				601			
S 9	45			55			73				170			
S 10	90			100			124				171			
T	10			23			25				42			
U	90 -0,3			140 -0,3			170 -0,3				240 -0,4			
V	M6			M8			M10				M12x1			
Ø W H7	16			20			25				35			
X	20			20	40	60	30	50	70	40	50	70		

Travelling Nut												
a	45	51	56	45	50	60	76	51	125	116	110	
b	10			15	12	18	14	30	20			
Ø c	35 h9	40 g6	50 h9	50 g6	70 h9	63 g6	120 h9	95 g6				
Ø d	50	62	-	80	87	93	155	135				
Ø tk	-	51	-	65	-	78	-	115				
Ø s	-	6,6	-	9	-	9	-	13,5				

Head Type I														
Ø a	15 j6			20 j6			30 j6				50 k6			
b	24			30			50				60			

Head Type II														
Ø d	72			98			122				182			
Ø e	50			75			85				135			
Ø f	9			14			17				26			
r	10			12			18				25			

Head Type IV														
I -0,2	25			30			40				75			
n	40			50			70				120			
Ø o H7	20			25			35				60			
u	40			50			65				110			
v	20			25			35				60			

Trunnion Pins														
Z	136			200			250				330			
Z1	96			146			176				250			

Pillow Blocks														
a	60			80			100				140			
b	9			12			20				25			
c	75			100			125				170			
d	45			60			75				100			
f	45			60			95				130			
g	15			20			25				30			
h	75			100			140				200			
Ø j	13			17			21				25			
k	150			230			270				370			
m	180			260			320				440			

IEC Flange														
Ø A 2	120			150			175				250			
Ø B 2 H7	80			110			110				180			
Ø C 2	20			12			17				25			
Ø E ±0,2	100			130			130				215			
S 3-DIN 6912/8.8	M6			M8			M8				M8			

The standard sizes are as follows: Tr 24x5 / Tr 30x6 / Tr 40x7 / Tr 70x12



**CMS**  
COLUMBUS MCKINNON



Reg.-Nr. 054396 QM08



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