



**Bonfiglioli**  
Tecnoingranaggi

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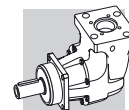
## TQK series

Precision right-angle gearboxes



**Bonfiglioli**  
power, control and green solutions





## SUMMARY

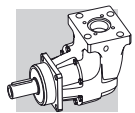


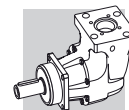
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### Revisions

Refer to page 20 for the catalogue revision index.

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## 1 GENERAL INFORMATION

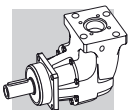
### 1.1 SYMBOLS, UNITS AND DEFINITIONS

#### Values depending on the APPLICATION

term	u.m.	definition
<b>A<sub>2</sub></b>	[N]	Axial force on output shaft
<b>A<sub>2</sub> EQU</b>	[N]	Equivalent axial force applying on output shaft
<b>A<sub>2</sub> MAX</b>	[N]	Maximum axial force applying on output shaft
<b>R<sub>2</sub></b>	[N]	Radial force on output shaft
<b>R<sub>2</sub> EQU</b>	[N]	Equivalent radial force applying on output shaft
<b>R<sub>2</sub> MAX</b>	[N]	Maximum radial force applying on output shaft
<b>ED</b>	[min]	Duration of the duty
<b>ED%</b>	[%]	Cyclic duration factor
<b>L<sub>10h</sub> TARGET</b>	[h]	Output shaft bearings' desired basic rating life
<b>M<sub>1</sub> PEAK</b>	[Nm]	Maximum input torque (limited by motor control)
<b>M<sub>2(1) ... M<sub>2(n)</sub></sub></b>	[Nm]	Output torque at the times t <sub>1</sub> ... t <sub>n</sub>
<b>M<sub>2</sub> EQU</b>	[Nm]	Equivalent output torque
<b>M<sub>2</sub> MAX</b>	[Nm]	Maximum output torque in case of emergency
<b>M<sub>T2</sub> EQU</b>	[Nm]	Equivalent tilting moment applying on output shaft
<b>M<sub>T2</sub> MAX</b>	[Nm]	Maximum tilting moment applying on output shaft
<b>n<sub>2</sub></b>	[min <sup>-1</sup> ]	Output speed
<b>n<sub>2(1) ... n<sub>2(n)</sub></sub></b>	[min <sup>-1</sup> ]	Output speed based on the times t <sub>1</sub> ... t <sub>n</sub>
<b>n<sub>2</sub> EQU</b>	[min <sup>-1</sup> ]	Equivalent output speed
<b>n<sub>2</sub> MAX</b>	[min <sup>-1</sup> ]	Maximum output speed
<b>T</b>	[C°]	Ambient temperature
<b>t<sub>1</sub> ... t<sub>n</sub></b>	[s]	Operating time
<b>t<sub>Σ</sub></b>	[s]	Cycle duration including pause
<b>Z</b>	[1/h]	Number of cycles per hour

#### Values depending on the GEAR DRIVE SELECTION

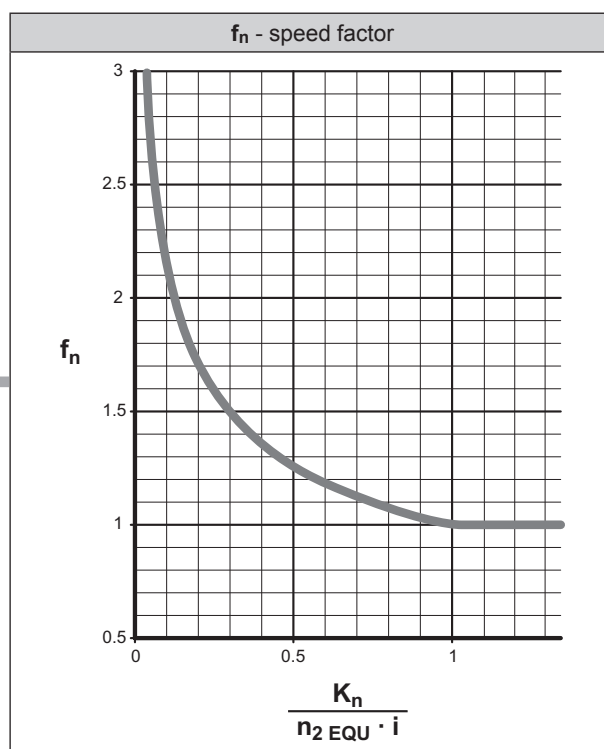
term	u.m.	definition
<b>A<sub>2 3 max</sub></b>	[N]	Admissible axial force on output shaft
<b>A<sub>2'</sub> max</b>	[N]	Axial force acting simultaneously with radial force
<b>R<sub>1</sub> max</b>	[N]	Admissible radial force at midpoint of input shaft
<b>R<sub>2 3 max</sub></b>	[N]	Admissible radial force at midpoint of output shaft
<b>C<sub>B</sub></b>	[Nm]	Constant for bearing's lifetime calculation
<b>C<sub>t</sub></b>	$\left[ \frac{\text{Nm}}{\text{arcmin}} \right]$	Torsional stiffness
<b>f<sub>n</sub></b>	—	Speed factor
<b>f<sub>z</sub></b>	—	Cycle factor
<b>f<sub>T</sub></b>	—	Temperature adjusting factor
<b>i</b>	—	Gearbox ratio
<b>J<sub>G</sub></b>	[kgcm <sup>2</sup> ]	Mass moment of inertia of the gearhead
<b>K<sub>n</sub></b>	—	Speed constant
<b>L<sub>10h</sub></b>	[h]	Bearings basic rating life
<b>L<sub>z</sub></b>	[mm]	Factor for bearing lifetime calculation
<b>M<sub>a 2</sub></b>	[Nm]	Maximum acceleration output torque
<b>M<sub>n 2</sub></b>	[Nm]	Rated output torque
<b>M<sub>p 2</sub></b>	[Nm]	Emergency stop output torque
<b>M<sub>T2</sub> max</b>	[Nm]	Maximum tilting moment applying on output shaft
<b>n<sub>1</sub> max</b>	[min <sup>-1</sup> ]	Maximum momentary input speed. The speed the unit can be driven at occasionally and in non-repetitive conditions For duty type S5, it cannot be applied continuously for more than 30 seconds
<b>p</b>	—	Bearing lifetime exponent
<b>η</b>	[%]	Gear efficiency
<b>φ<sub>R</sub></b>	[arcmin]	Reduced backlash is calculated in static conditions and with the application of a torque equal to 2% of the gear unit rated torque
<b>φ<sub>S</sub></b>	[arcmin]	Standard backlash is calculated in static conditions and with the application of a torque equal to 2% of the gear unit rated torque

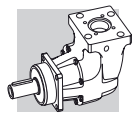


## 1.2 SELECTING THE GEAR UNIT

(a)	Ratio	i	—	$i = \frac{n_1}{n_2}$														
(b)	Equivalent output torque	M <sub>2</sub> EQU	[Nm]	$M_{2\text{EQU}} = \sqrt[3]{\frac{n_{2(1)} \cdot t_1 \cdot  M_{2(1)} ^3 + \dots + n_{2(n)} \cdot t_n \cdot  M_{2(n)} ^3}{n_{2(1)} \cdot t_1 + \dots + n_{2(n)} \cdot t_n}}$														
(c)	Equivalent output speed	n <sub>2</sub> EQU	[min <sup>-1</sup> ]	$n_{2\text{EQU}} = \frac{n_{2(1)} \cdot t_1 + n_{2(2)} \cdot t_2 + \dots + n_{2(n)} \cdot t_n}{t_\Sigma}$														
(d)	Speed factor	f <sub>n</sub>	—	<div>If <math>\frac{K_n}{n_{2\text{EQU}} \cdot i} \geq 1 \Rightarrow f_n = 1</math> If <math>\frac{K_n}{n_{2\text{EQU}} \cdot i} &lt; 1 \Rightarrow f_n = \text{Obtain from diagram}</math></div>														
(e)	Cyclic duration factor	ED%	[%]	$ED\% = \frac{t_1 + t_2 + \dots + t_n}{t_\Sigma} \cdot 100$														
	Duration of the duty	ED	[min]	$ED = t_1 + t_2 + \dots + t_n$														
(f)	Number of cycles per hour	Z	[1/h]	$Z = \frac{3600}{t_\Sigma}$														
(g)	Cycle factor	f <sub>z</sub>	—	<table><tr><th>Z</th><th>f<sub>z</sub></th></tr><tr><td>Z ≤ 1000</td><td>1.00</td></tr><tr><td>1000 &lt; Z ≤ 1500</td><td>1.25</td></tr><tr><td>1500 &lt; Z ≤ 2500</td><td>1.50</td></tr><tr><td>2500 &lt; Z ≤ 4000</td><td>1.75</td></tr><tr><td>4000 &lt; Z ≤ 6000</td><td>2.00</td></tr><tr><td>Z &gt; 6000</td><td>contact us</td></tr></table>	Z	f <sub>z</sub>	Z ≤ 1000	1.00	1000 < Z ≤ 1500	1.25	1500 < Z ≤ 2500	1.50	2500 < Z ≤ 4000	1.75	4000 < Z ≤ 6000	2.00	Z > 6000	contact us
Z	f <sub>z</sub>																	
Z ≤ 1000	1.00																	
1000 < Z ≤ 1500	1.25																	
1500 < Z ≤ 2500	1.50																	
2500 < Z ≤ 4000	1.75																	
4000 < Z ≤ 6000	2.00																	
Z > 6000	contact us																	
(h)	Temperature adjusting factor	f <sub>T</sub>	—	<div>If T ≤ 30°C ⇒ f<sub>T</sub> = 1 If T &gt; 30°C ⇒ <math>f_T = 1 + \frac{T - 30}{100} \cdot \frac{C}{C}</math></div>														
(i)	Maximum input torque	M <sub>1</sub> PEAK	[Nm]	<div>a) maximum possible application torque b) limited motor torque by inverter c) maximum motor torque</div>														

$K_n$ - speed constant					
$i$	TQK 060	TQK 070	TQK 090	TQK 130	TQK 160
6	2400	2400	2000	1600	1600
8	2400	2400	2000	1600	1600
10	2400	2400	2000	1600	1600
14	2400	2400	2000	1600	1600
18	2400	2400	2400	2000	1600
20	2400	2400	2000	1600	1600
24	2400	2400	2400	2000	1600
30	2400	2400	2400	2000	1600
40	2400	2400	2400	2000	1600
50	2400	2400	2400	2000	1600
70	2400	2400	2400	2000	1600
80	2400	2400	2400	2000	1600
100	2400	2400	2400	2000	1600
140	2400	2400	2400	2000	1600
200	2400	2400	2400	2000	1600



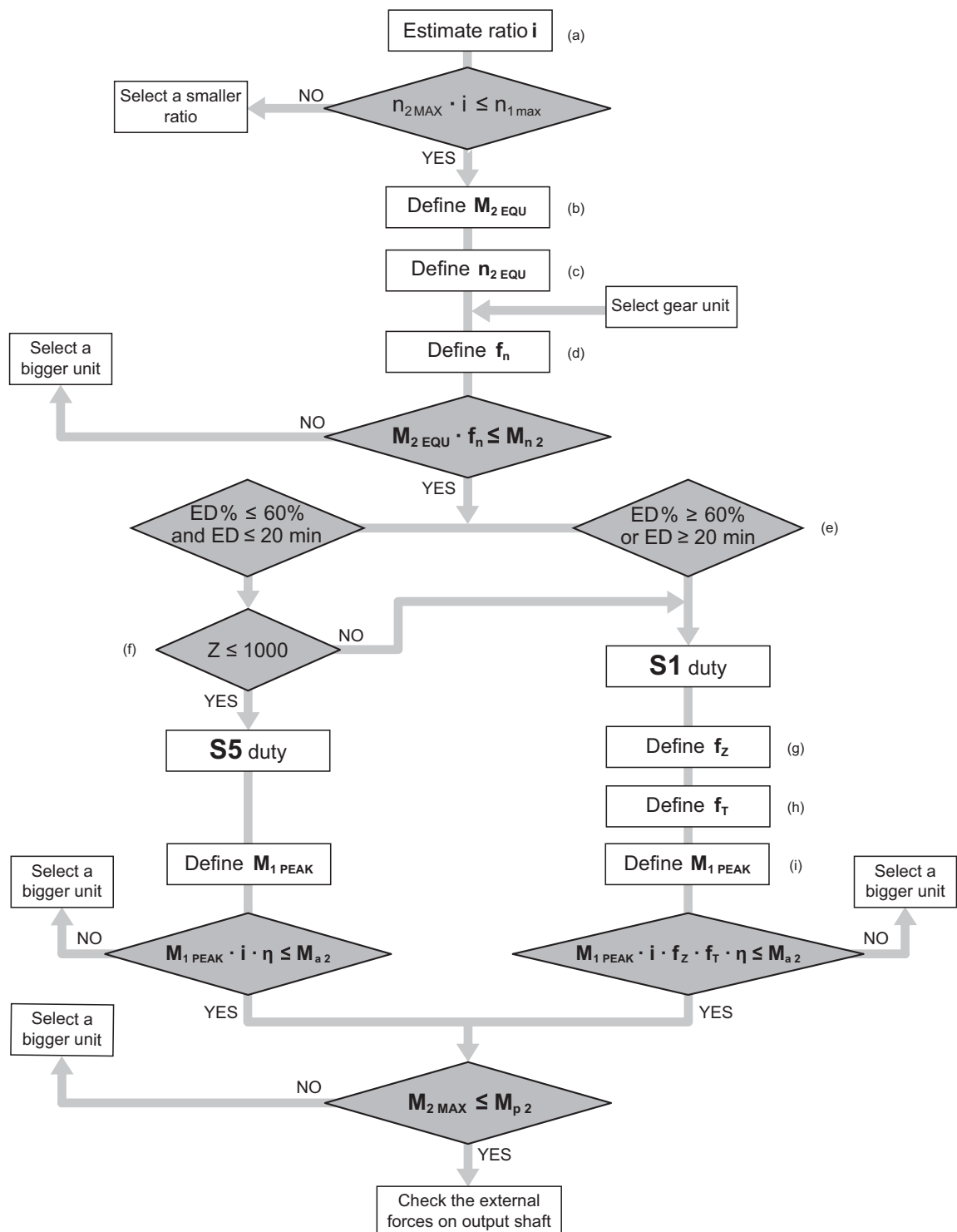
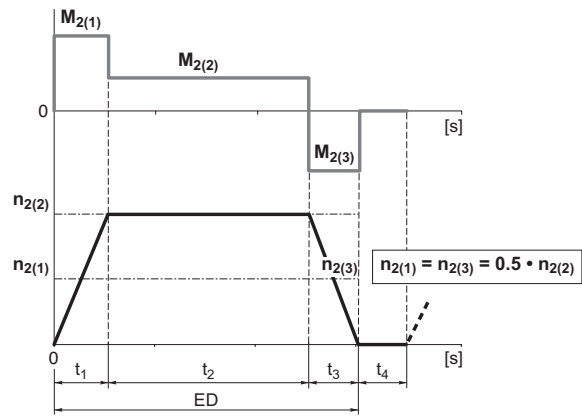


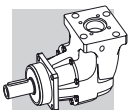
### Load diagram

—  $M_2$ : Output torque

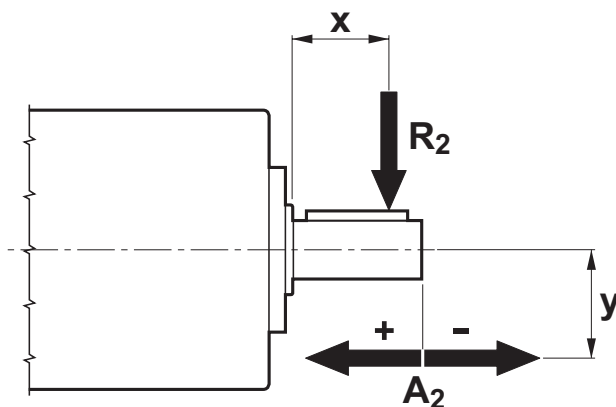
### Speed diagram

—  $n_2$ : Output speed





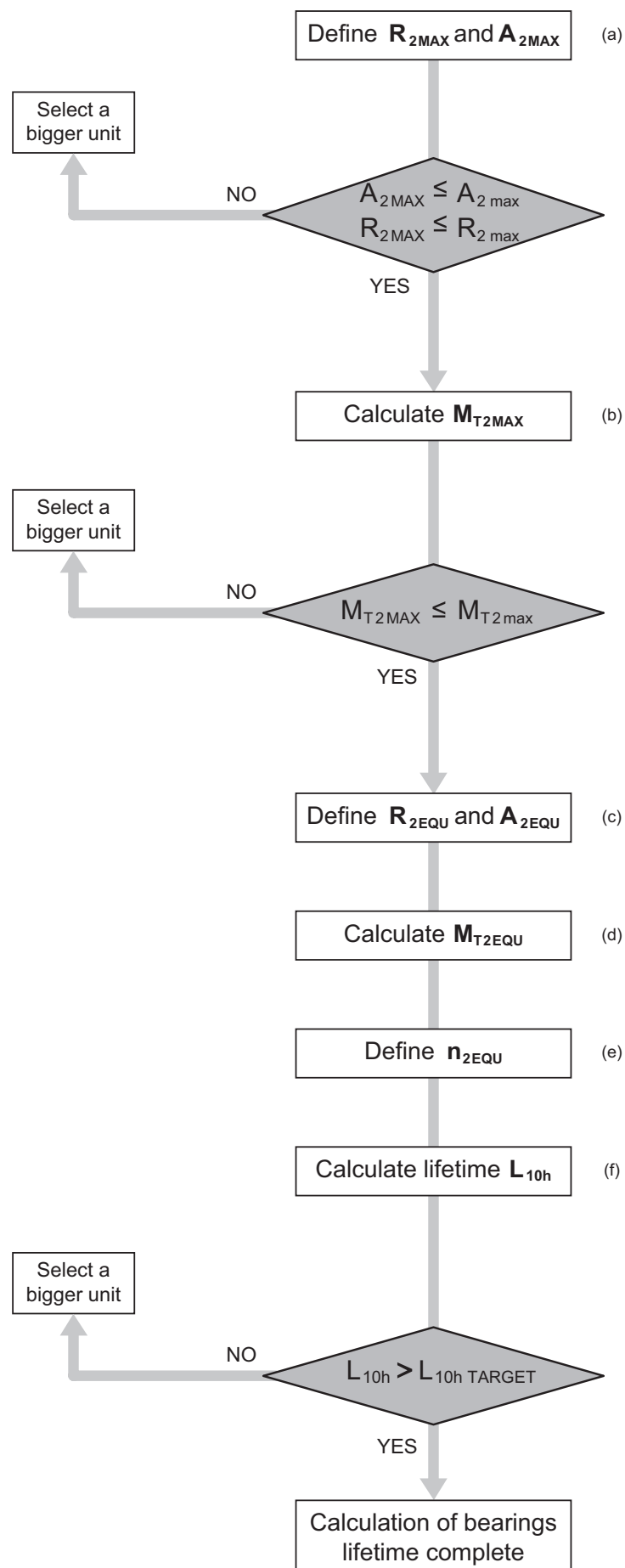
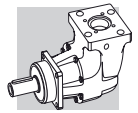
### 1.3 SERVICE LIFE OF BEARINGS

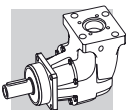


(a)	Maximum radial force applying on output shaft	$R_{2 \text{ MAX}}$	[N]	Please consider the specific conditions (e.g. belt drives under acceleration torque)
	Maximum axial force applying on output shaft	$A_{2 \text{ MAX}}$	[N]	
(b)	Maximum tilting moment applying on output shaft	$M_{T2 \text{ MAX}}$	[Nm]	$M_{T2 \text{ MAX}} = \frac{R_{2 \text{ MAX}} \cdot (x + L_z) \pm A_{2 \text{ MAX}} \cdot y}{1000}$
(c)	Equivalent forces applying on output shaft	$R_{2 \text{ EQU}}$	[N]	$R_{2 \text{ EQU}} = \sqrt[3]{\frac{n_{2(1)} \cdot t_1 \cdot  R_{2(1)} ^3 + \dots + n_{2(n)} \cdot t_n \cdot  R_{2(n)} ^3}{n_{2(1)} \cdot t_1 + \dots + n_{2(n)} \cdot t_n}}$
		$A_{2 \text{ EQU}}$	[N]	$A_{2 \text{ EQU}} = \sqrt[3]{\frac{n_{2(1)} \cdot t_1 \cdot  A_{2(1)} ^3 + \dots + n_{2(n)} \cdot t_n \cdot  A_{2(n)} ^3}{n_{2(1)} \cdot t_1 + \dots + n_{2(n)} \cdot t_n}}$
(d)	Equivalent tilting moment applying on output shaft	$M_{T2 \text{ EQU}}$	[Nm]	$M_{T2 \text{ EQU}} = \frac{R_{2 \text{ EQU}} \cdot (x + L_z) + A_{2 \text{ EQU}} \cdot y}{1000}$
(e)	Equivalent output speed	$n_{2 \text{ EQU}}$	[min <sup>-1</sup> ]	$n_{2 \text{ EQU}} = \frac{n_{2(1)} \cdot t_1 + n_{2(2)} \cdot t_2 + \dots + n_{2(n)} \cdot t_n}{t_1 + t_2 + \dots + t_n}$
(f)	Bearings' basic rating life	$L_{10h}$	[h]	$L_{10h} = \frac{16666}{n_{2 \text{ EQU}}} \cdot \left( \frac{C_B}{M_{T2 \text{ EQU}}} \right)^p$

		TQK 060	TQK 070	TQK 090	TQK 130	TQK 160
<b>Lz</b>	[mm]	56	67	93.5	96	114.8
<b>M<sub>T2 max</sub></b>	[Nm]	175.0	340.0	796.3	1233.0	2337.0
<b>C<sub>B</sub></b>	[Nm]	631.9	1064.7	2902.3	6440.0	9852.8
<b>p</b>	—	3	3	3	3.33	3.33







## 2 FEATURES OF TQK SERIES

Low backlash bevel-planetary drives of the TQK series are the solution to space problems often posed by increasingly compact machines. TQK drives combine high levels of dynamic operation with top precision, which results in great accuracy and repeatability for any positioning mechanism in which they are installed.

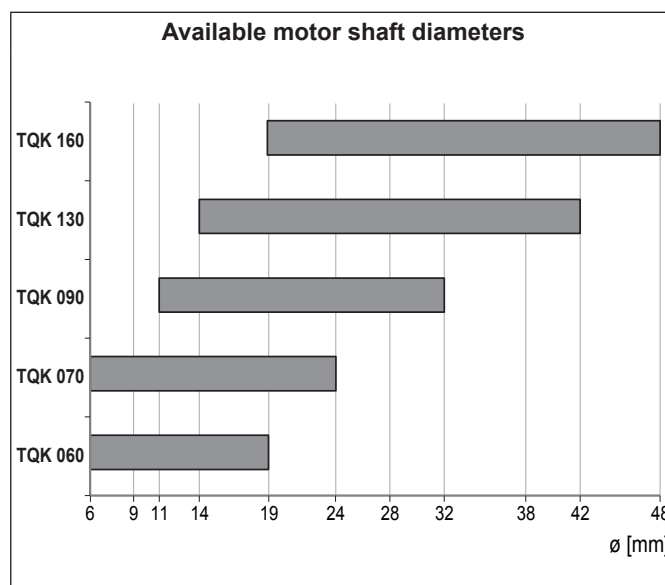
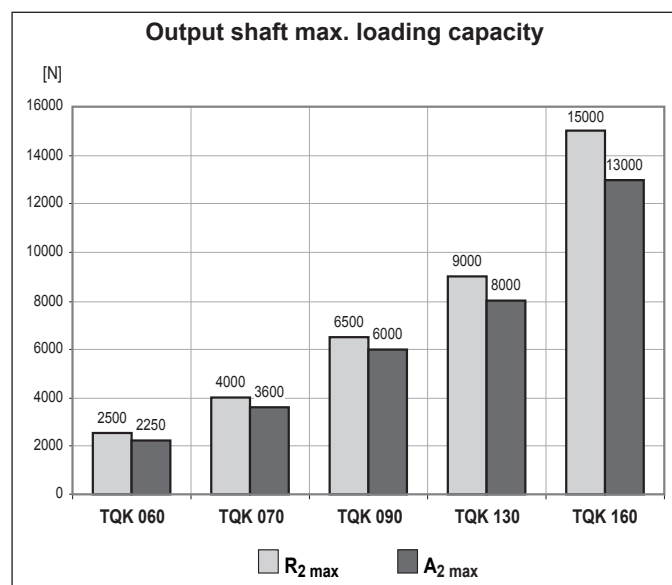
On top of their robustness and dependability TQK drives also feature a distinctive Italian style that makes them clearly recognizable amongst like products within the reference industry.

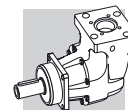
- TQK drives feature a single class of precision, corresponding to the following backlash values  
2-stage units: standard  $\varphi_S = 5'$  ( $\varphi_S = 6'$  for TQK 060 and TQK 070)  
3-stage units: standard  $\varphi_S = 7'$  ( $\varphi_S = 8'$  for TQK 060 and TQK 070)
- A high IP rating (IP64) provides inner parts with protection against the ingress of dust and liquids.
- Input section oil seals made from a Fluoro elastomer compound are supplied as standard.
- Max noise level  $L_P \leq 70$  dB(A) @  $n_1 = 3000$  min<sup>-1</sup>.
- Numerous adapters allow matching the most popular brands of servomotors.
- Lubrication optimised for the type of duty and mounting position specified at the ordering stage.  
In the absence of contamination the lubricant requires no periodical changes.

duty	TQK 060 ... TQK 160	other seals
<b>S1</b> (continuous)	synthetic oil viscosity ISO VG 220	Fluoro elastomer
<b>S5</b> (intermittent)	NLGI grease consistency 00	NBR

Distribution of nominal torque $M_{n2}$ [Nm]															
[i]	6	8	10	14	18	20	24	30	40	50	70	80	100	140	200
<b>TQK 060</b>	21	28	30	25	21	20	30	30	30	30	30	30	30	25	20
<b>TQK 070</b>	45	60	70	60	45	40	70	70	70	70	70	70	70	60	40
<b>TQK 090</b>	110	150	180	160	130	110	200	180	180	180	180	200	180	160	110
<b>TQK 130</b>	255	340	400	360	260	280	400	400	400	400	400	400	400	360	280
<b>TQK 160</b>	420	560	700	750	530	550	800	800	800	800	800	800	800	750	550

■ 3-stage gearheads





### 3 ORDERING CODE

<b>TQK</b>	<b>130</b>	<b>2</b>	<b>25</b>	<b>STD</b>	<b>80A</b>	<b>CD</b>	<b>19</b>	<b>S5</b>	<b>OR</b>	<b>KL</b>
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— SERIES  
**TQK**

— FRAME SIZE  
**060 070 090 130 160**

— REDUCTIONS  
**2 3**

— GEAR RATIO

— BACKLASH

	<b>STD (φs)</b>	
	<b>2-stage units</b>	<b>3-stage units</b>
<b>TQK 060</b>	6'	8'
<b>TQK 070</b>	6'	8'
<b>TQK 090</b>	5'	7'
<b>TQK 130</b>	5'	7'
<b>TQK 160</b>	5'	7'

— INPUT SECTION  
**30 ... 230** motor adapter

— MOTOR COUPLING  
**CD** clamping device

— INPUT SHAFT BORE

— DUTY  
**S1** continuous duty  
**S5** intermittent duty

— MOUNTING POSITION

**OR**

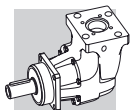
**VA**

**VB**

— OUTPUT SHAFT CONFIGURATION  
**KL** smooth keyless shaft  
**KE** keyed shaft

**Bonfiglioli**  
Tecnogranaggi

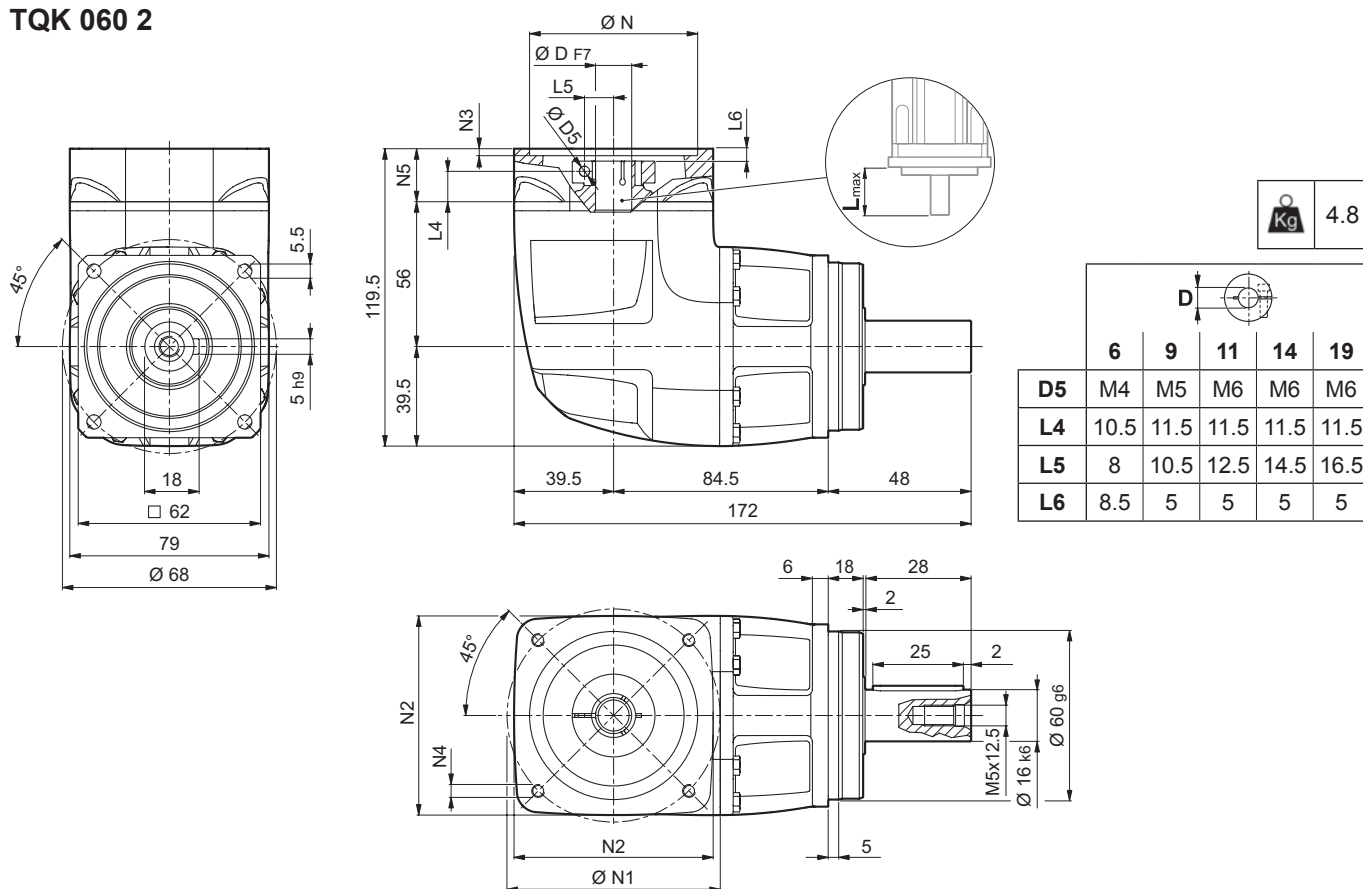
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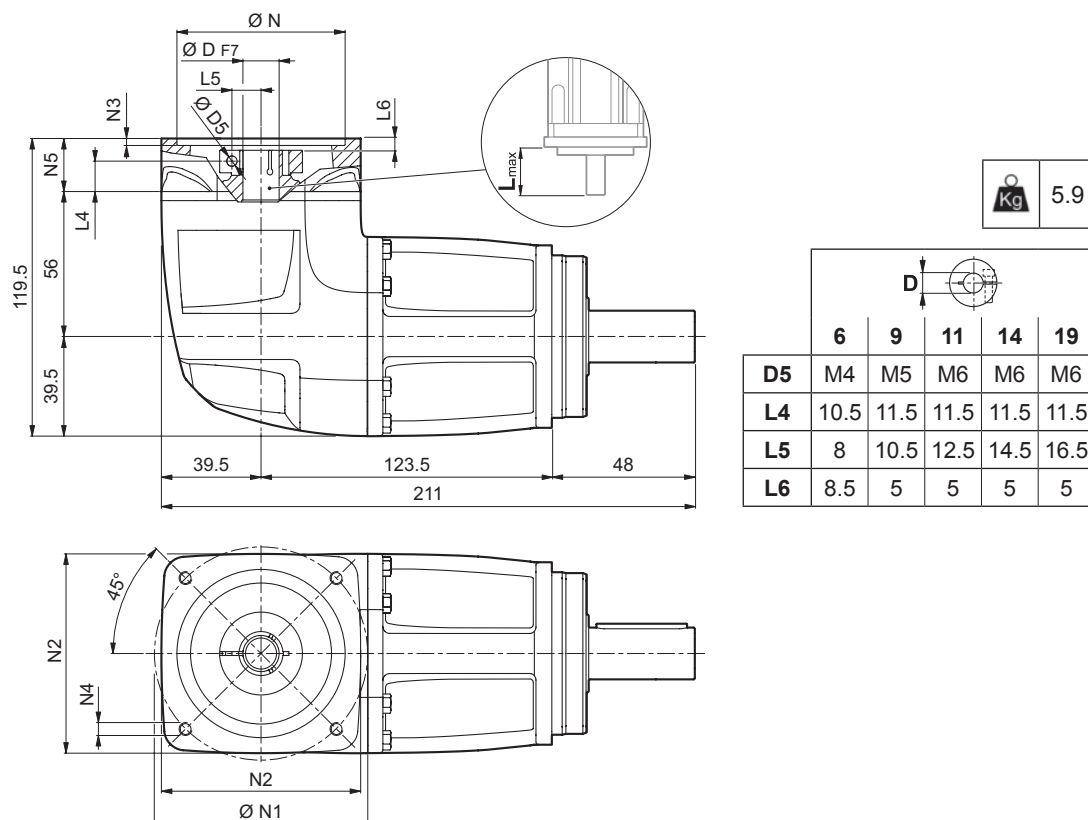
# TQK 060

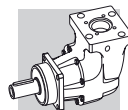
## 4 DIMENSIONS AND TECHNICAL SPECIFICATIONS

### TQK 060 2


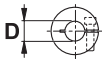


### TQK 060 3


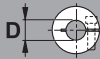


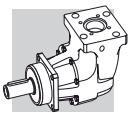


## TQK 060 2 – TQK 060 3

						N	N1	N2	N3	N4	N5	L <sub>max</sub>
<b>30A</b>	6	–	–	–	–	30	46	60	3.5	M4x10	24	40
<b>40B</b>	–	9	11	14	–	40	63	60	3.5	M4x10	24	40
<b>50A</b>	–	–	11	–	–	50	60	60	4.0	M4x10	24	40
<b>50C</b>	–	–	11	14	–	50	70	60	4.0	M4x10	24	40
<b>60A</b>	–	–	11	14	19	60	75	80	4.0	M5x12	24	40
<b>70B</b>	–	–	–	14	19	70	90	80	4.0	M5x12	24	40
<b>80A</b>	–	–	–	14	19	80	100	100	4.0	M6x14	24	40
<b>95A</b>	–	–	–	–	19	95	115	100	4.0	M8x24*	24	40
<b>110B</b>	–	–	–	–	19	110	145	120	4.0	M8x24*	24	40

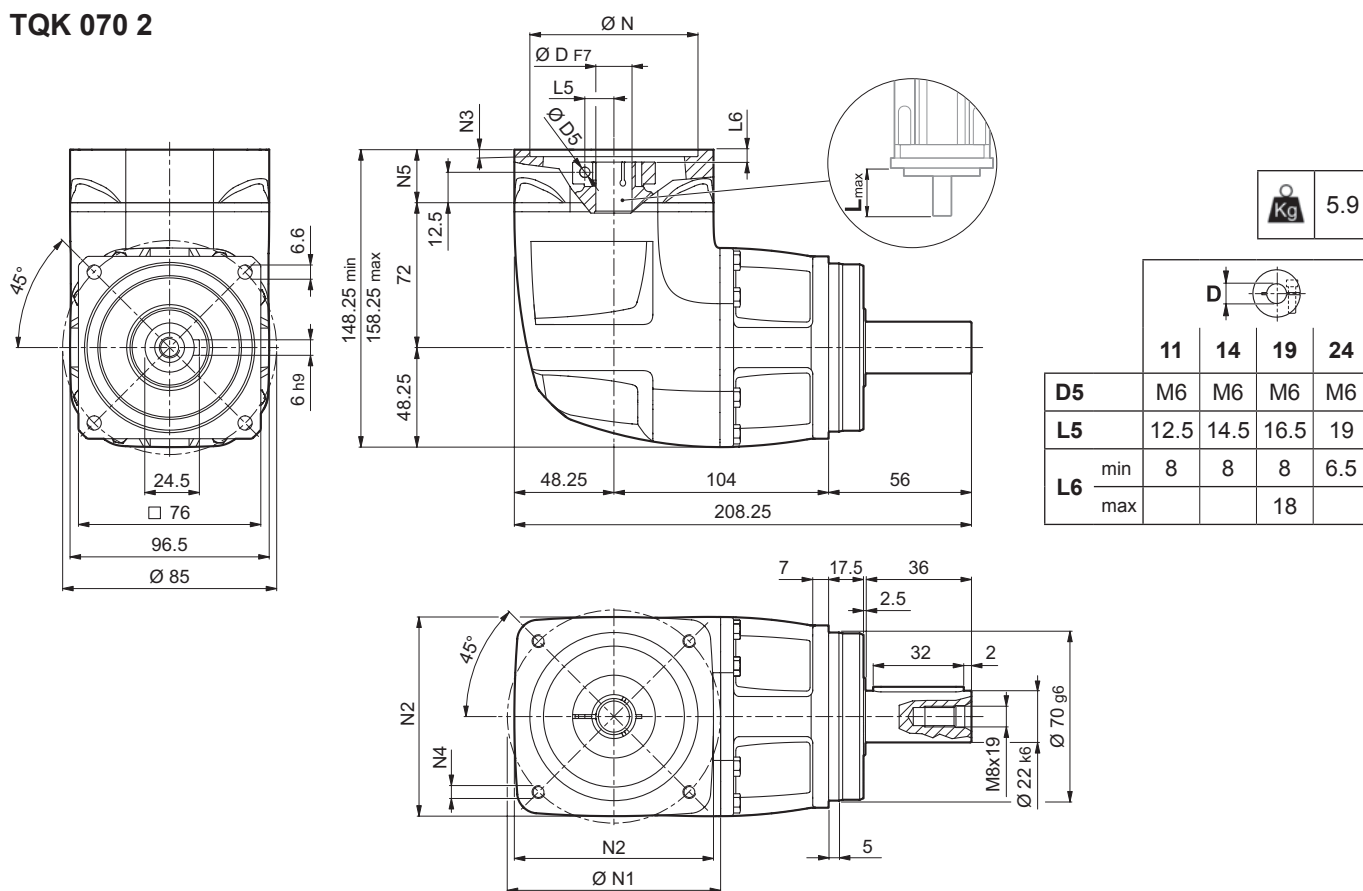
\* through hole

		M <sub>n 2</sub>	M <sub>a 2</sub>	M <sub>p 2</sub>	n <sub>1 max</sub>	φ <sub>S</sub>	C <sub>t</sub>	R <sub>2 max</sub>	A <sub>2 max</sub>	η	J <sub>G</sub> [kgcm <sup>2</sup> ]				
i		[Nm]	[Nm]	[Nm]	[min <sup>-1</sup> ]	[arcmin]	$\left[ \frac{Nm}{arcmin} \right]$	[N]	[N]	%					
											6	9	11	14	19
TQK 060 2_6		21	30	45	6000	5'	4.3	2500	2250	94	0.71	0.76	0.75	0.78	0.78
TQK 060 2_8		28	40	60	6000	5'	4.3	2500	2250	94	0.70	0.75	0.74	0.76	0.77
TQK 060 2_10		30	45	70	6000	5'	4.3	2500	2250	94	0.68	0.73	0.72	0.75	0.75
TQK 060 2_14		25	38	70	6000	5'	4.3	2500	2250	94	0.67	0.72	0.71	0.73	0.74
TQK 060 2_20		20	30	55	6000	5'	4.3	2500	2250	94	0.65	0.71	0.70	0.72	0.73
TQK 060 3_18		21	32	60	6000	7'	4.3	2500	2250	91	0.56	0.61	0.60	0.62	0.63
TQK 060 3_24		30	45	80	6000	7'	4.3	2500	2250	91	0.55	0.61	0.60	0.62	0.63
TQK 060 3_30		30	45	80	6000	7'	4.3	2500	2250	91	0.55	0.60	0.59	0.62	0.62
TQK 060 3_40		30	45	80	6000	7'	4.3	2500	2250	91	0.55	0.60	0.59	0.61	0.62
TQK 060 3_50		30	45	80	6000	7'	4.3	2500	2250	91	0.55	0.60	0.59	0.61	0.62
TQK 060 3_70		30	45	80	6000	7'	4.3	2500	2250	91	0.54	0.60	0.59	0.61	0.62
TQK 060 3_80		30	45	80	6000	7'	4.3	2500	2250	91	0.54	0.60	0.59	0.61	0.62
TQK 060 3_100		30	45	80	6000	7'	4.3	2500	2250	91	0.54	0.59	0.59	0.61	0.61
TQK 060 3_140		25	38	70	6000	7'	4.3	2500	2250	91	0.54	0.59	0.58	0.61	0.61
TQK 060 3_200		20	30	55	6000	7'	4.3	2500	2250	91	0.54	0.59	0.58	0.61	0.61

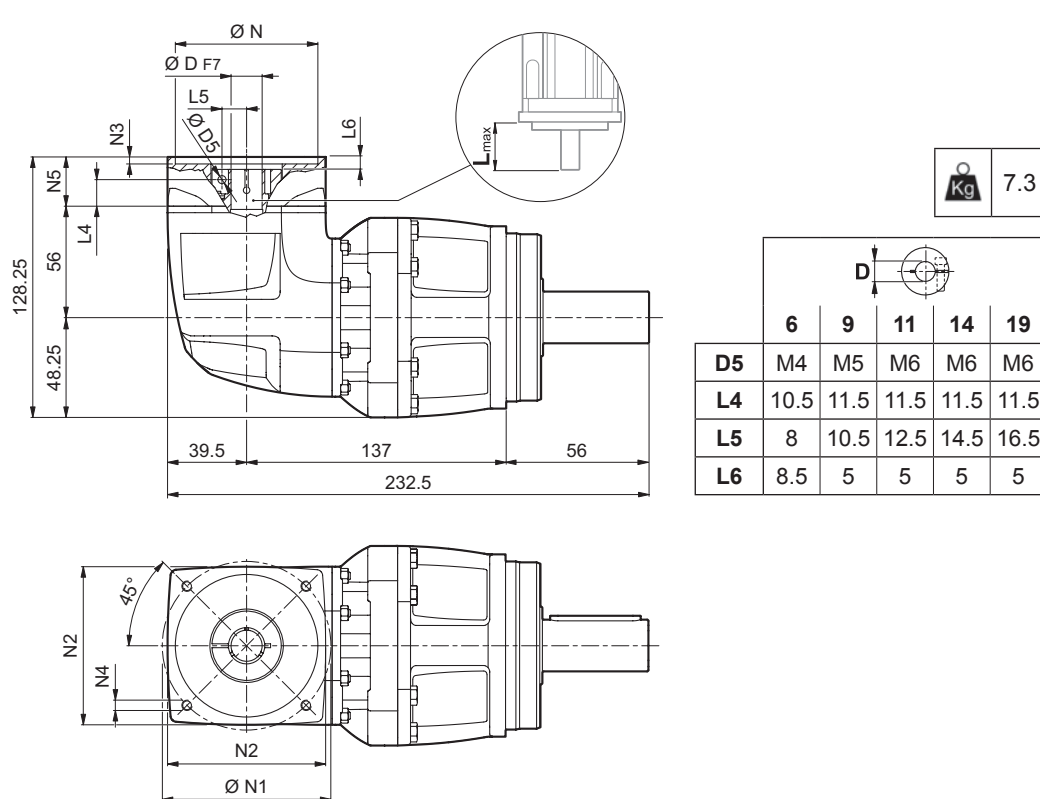


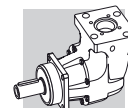
# TQK 070

## TQK 070 2


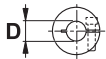


## TQK 070 3







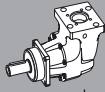

## TQK 070 2

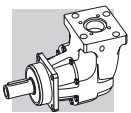
							N	N1	N2	N3	N4	N5	L <sub>max</sub>
50C	—	—	11	14	—	—	50	70	80	6.5	M4x12	28	50
60A	—	—	11	14	19	—	60	75	80	6.5	M5x14	28	50
70B	—	—	—	14	19	—	70	90	80	6.5	M5x14	28	50
80A	—	—	—	14	19	—	80	100	100	6.5	M6x14	28	50
95A	—	—	—	—	19	24	95	115	100	6.5	M8x18	28	50
110A	—	—	—	—	—	24	110	130	120	6.5	M8x18	28	50
110B	—	—	—	—	19	—	110	145	120	6.5	M8x20	38	60
130A	—	—	—	—	—	24	130	165	140	6.5	M10x19	28	50

## TQK 070 3

							N	N1	N2	N3	N4	N5	L <sub>max</sub>
30A	6	—	—	—	—	—	30	46	60	3.5	M4x10	24	40
40B	—	9	11	14	—	—	40	63	60	3.5	M4x10	24	40
50A	—	—	11	—	—	—	50	60	60	4.0	M4x10	24	40
50C	—	—	11	14	—	—	50	70	60	4.0	M4x10	24	40
60A	—	—	11	14	19	—	60	75	80	4.0	M5x12	24	40
70B	—	—	—	14	19	—	70	90	80	4.0	M5x12	24	40
80A	—	—	—	14	19	—	80	100	100	4.0	M6x14	24	40
95A	—	—	—	—	19	—	95	115	100	4.0	M8x24*	24	40
110B	—	—	—	—	19	—	110	145	120	4.0	M8x24*	24	40

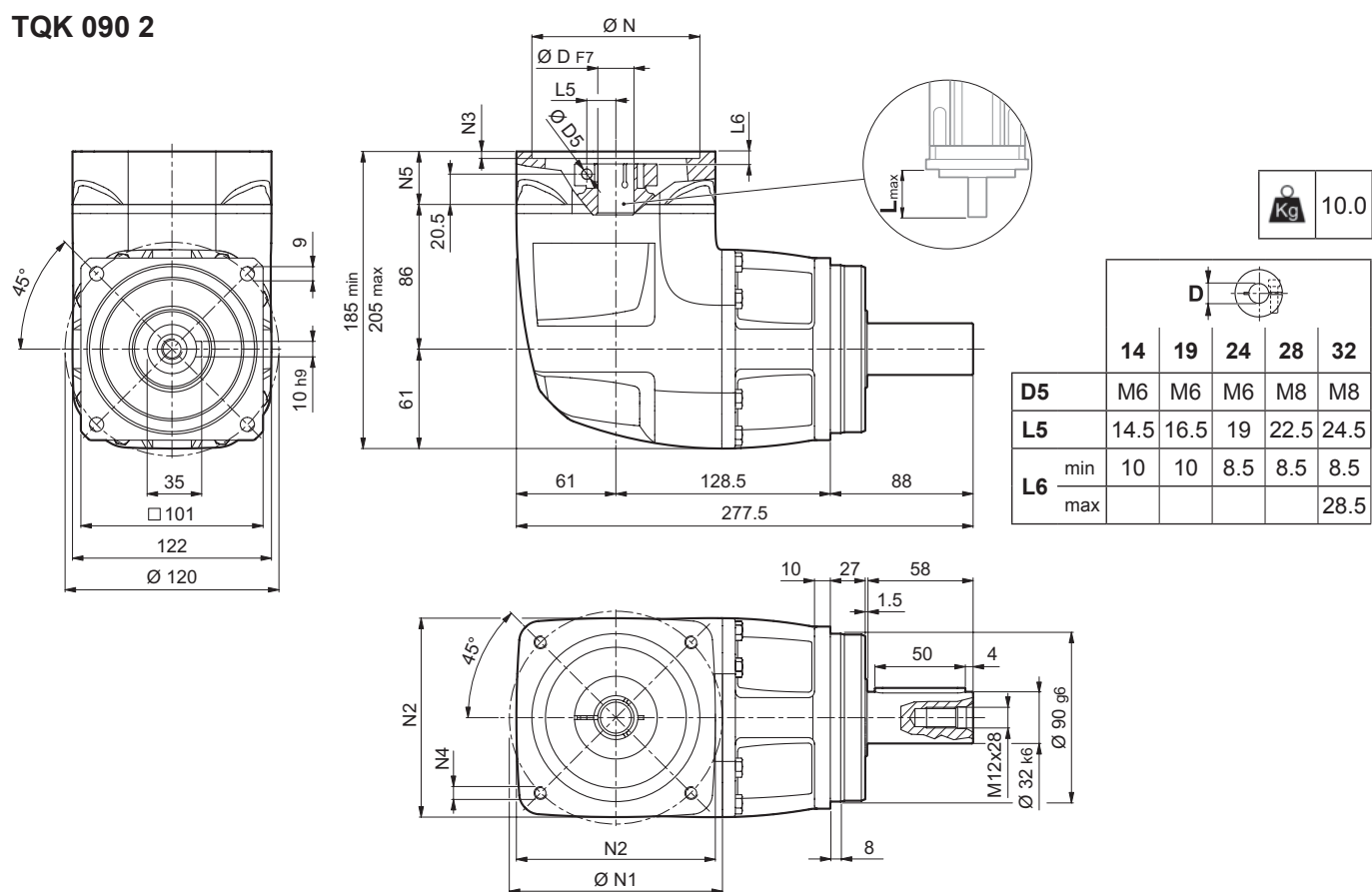
\* through hole

	i	M <sub>n 2</sub> [Nm]	M <sub>a 2</sub> [Nm]	M <sub>p 2</sub> [Nm]	n <sub>1 max</sub> [min <sup>-1</sup> ]	φ <sub>s</sub> [arcmin]	C <sub>t</sub> [ $\frac{Nm}{arcmin}$ ]	R <sub>2 max</sub> [N]	A <sub>2 max</sub> [N]	η %	J <sub>G</sub> [kgcm <sup>2</sup> ]					
																
TQK 070 2_6		45	65	90	6000	5'	11	4000	3600	94	—	—	1.45	1.52	1.55	1.63
TQK 070 2_8		60	85	120	6000	5'	11	4000	3600	94	—	—	1.37	1.44	1.47	1.55
TQK 070 2_10		70	100	150	6000	5'	11	4000	3600	94	—	—	1.34	1.41	1.43	1.52
TQK 070 2_14		60	90	160	6000	5'	11	4000	3600	94	—	—	1.31	1.38	1.41	1.49
TQK 070 2_20		40	60	110	6000	5'	11	4000	3600	94	—	—	1.29	1.36	1.39	1.48
TQK 070 3_18		45	65	120	6000	7'	11	4000	3600	91	1.26	1.28	1.32	1.39	1.42	—
TQK 070 3_24		70	100	180	6000	7'	11	4000	3600	91	1.24	1.26	1.30	1.37	1.40	—
TQK 070 3_30		70	100	180	6000	7'	11	4000	3600	91	1.23	1.25	1.29	1.36	1.39	—
TQK 070 3_40		70	100	180	6000	7'	11	4000	3600	91	1.18	1.20	1.24	1.31	1.34	—
TQK 070 3_50		70	100	180	6000	7'	11	4000	3600	91	1.18	1.19	1.24	1.31	1.33	—
TQK 070 3_70		70	100	180	6000	7'	11	4000	3600	91	1.16	1.18	1.22	1.29	1.32	—
TQK 070 3_80		70	100	180	6000	7'	11	4000	3600	91	1.16	1.17	1.22	1.29	1.31	—
TQK 070 3_100		70	100	180	6000	7'	11	4000	3600	91	1.15	1.17	1.21	1.28	1.31	—
TQK 070 3_140		60	90	160	6000	7'	11	4000	3600	91	1.14	1.16	1.20	1.27	1.30	—
TQK 070 3_200		40	60	110	6000	7'	11	4000	3600	91	1.14	1.15	1.20	1.27	1.29	—

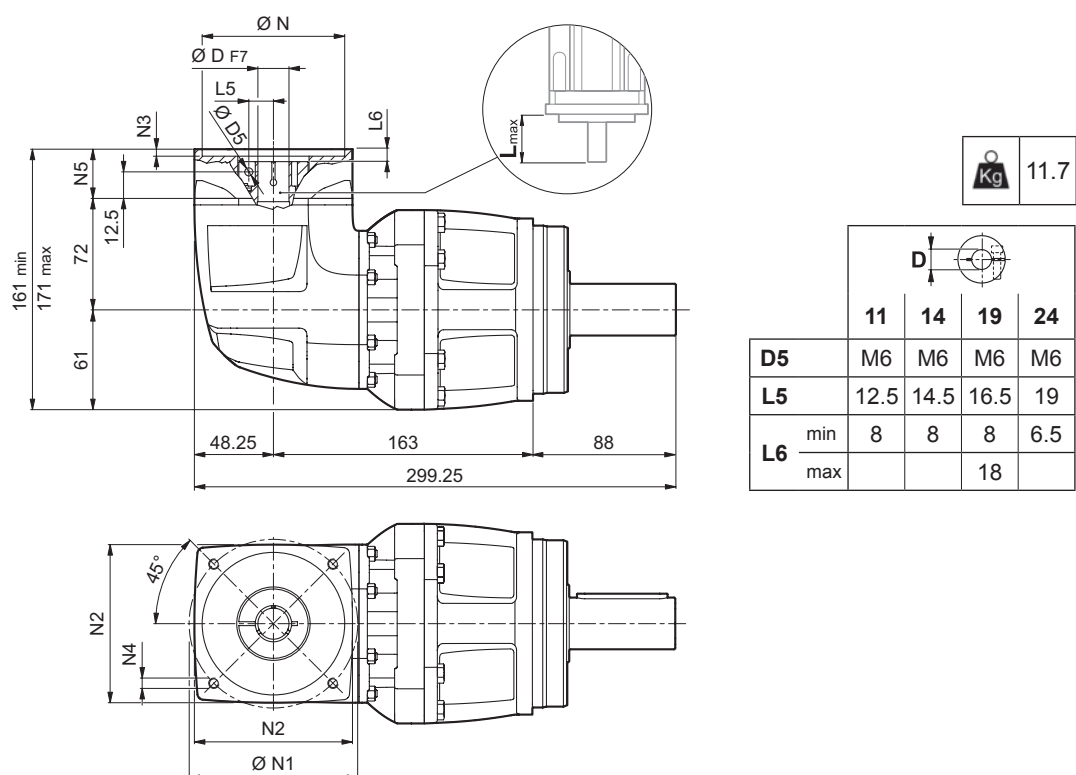


# TQK 090

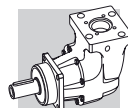
**TQK 090 2**




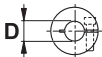
**TQK 090 3**









## TQK 090 2

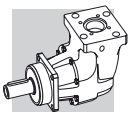
							N	N1	N2	N3	N4	N5	L <sub>max</sub>
<b>60A</b>	–	14	19	–	–	–	60	75	100	6.5	M5x14	38	60
<b>80A</b>	–	14	19	–	–	–	80	100	100	6.5	M6x14	38	60
<b>95A</b>	–	–	19	24	28	–	95	115	100	6.5	M8x18	38	60
<b>110A</b>	–	–	–	24	–	–	110	130	122	6.5	M8x20	38	60
<b>110B</b>	–	–	19	–	28	–	110	145	122	6.5	M8x20	38	60
<b>130A</b>	–	–	–	24	28	32	130	165	140	6.5	M10x20	38	60
<b>180A</b>	–	–	–	24	28	–	180	215	190	6.5	M12x38*	38	60
<b>180A1</b>	–	–	–	–	–	32	180	215	190	6.5	M12x27	58	80

\* through hole

## TQK 090 3

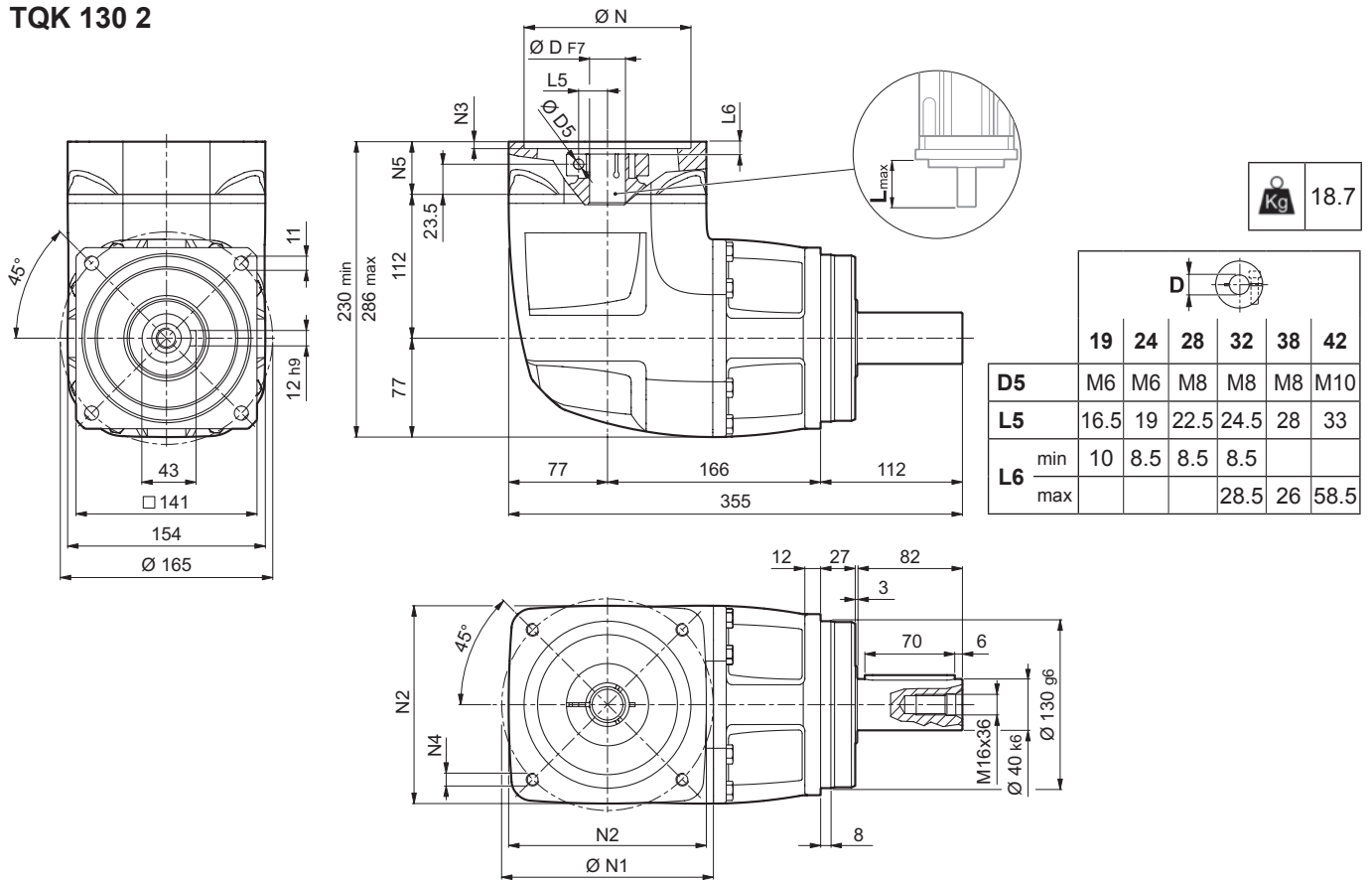
							N	N1	N2	N3	N4	N5	L <sub>max</sub>
<b>50C</b>	11	14	–	–	–	–	50	70	80	6.5	M4x12	28	50
<b>60A</b>	11	14	19	–	–	–	60	75	80	6.5	M5x14	28	50
<b>70B</b>	–	14	19	–	–	–	70	90	80	6.5	M5x14	28	50
<b>80A</b>	–	14	19	–	–	–	80	100	100	6.5	M6x14	28	50
<b>95A</b>	–	–	19	24	–	–	95	115	100	6.5	M8x18	28	50
<b>110A</b>	–	–	–	24	–	–	110	130	120	6.5	M8x18	28	50
<b>110B</b>	–	–	19	–	–	–	110	145	120	6.5	M8x20	38	60
<b>130A</b>	–	–	–	24	–	–	130	165	140	6.5	M10x19	28	50

	i	M <sub>n 2</sub>	M <sub>a 2</sub>	M <sub>p 2</sub>	n <sub>1 max</sub>	ψ <sub>S</sub>	C <sub>t</sub>	R <sub>2 max</sub>	A <sub>2 max</sub>	η	J <sub>G</sub> [kgcm <sup>2</sup> ]					
		[Nm]	[Nm]	[Nm]	[min <sup>-1</sup> ]	[arcmin]	$\left[ \frac{\text{Nm}}{\text{arcmin}} \right]$	[N]	[N]	%						
TQK 090 2_6		110	150	225	4500	4'	28	6500	6000	94	–	4.82	4.86	4.89	5.31	5.42
TQK 090 2_8		150	208	300	4500	4'	28	6500	6000	94	–	4.56	4.60	4.63	5.06	5.16
TQK 090 2_10		180	260	360	4500	4'	28	6500	6000	94	–	4.45	4.48	4.51	4.94	5.04
TQK 090 2_14		160	250	500	4500	4'	28	6500	6000	94	–	4.34	4.38	4.41	4.84	4.94
TQK 090 2_20		110	170	350	4500	4'	28	6500	6000	94	–	4.29	4.33	4.36	4.78	4.88
TQK 090 3_18		130	200	400	4500	6'	28	6500	6000	91	3.56	3.63	3.67	3.70	–	–
TQK 090 3_24		200	300	500	4500	6'	28	6500	6000	91	3.53	3.60	3.64	3.67	–	–
TQK 090 3_30		180	280	500	4500	6'	28	6500	6000	91	3.52	3.59	3.63	3.66	–	–
TQK 090 3_40		180	280	500	4500	6'	28	6500	6000	91	3.45	3.52	3.55	3.58	–	–
TQK 090 3_50		180	280	500	4500	6'	28	6500	6000	91	3.42	3.49	3.53	3.56	–	–
TQK 090 3_70		180	280	500	4500	6'	28	6500	6000	91	3.40	3.46	3.50	3.53	–	–
TQK 090 3_80		200	300	500	4500	6'	28	6500	6000	91	3.38	3.45	3.49	3.52	–	–
TQK 090 3_100		180	280	500	4500	6'	28	6500	6000	91	3.38	3.45	3.49	3.52	–	–
TQK 090 3_140		160	250	500	4500	6'	28	6500	6000	91	3.38	3.45	3.49	3.52	–	–
TQK 090 3_200		110	170	350	4500	6'	28	6500	6000	91	3.38	3.45	3.49	3.52	–	–

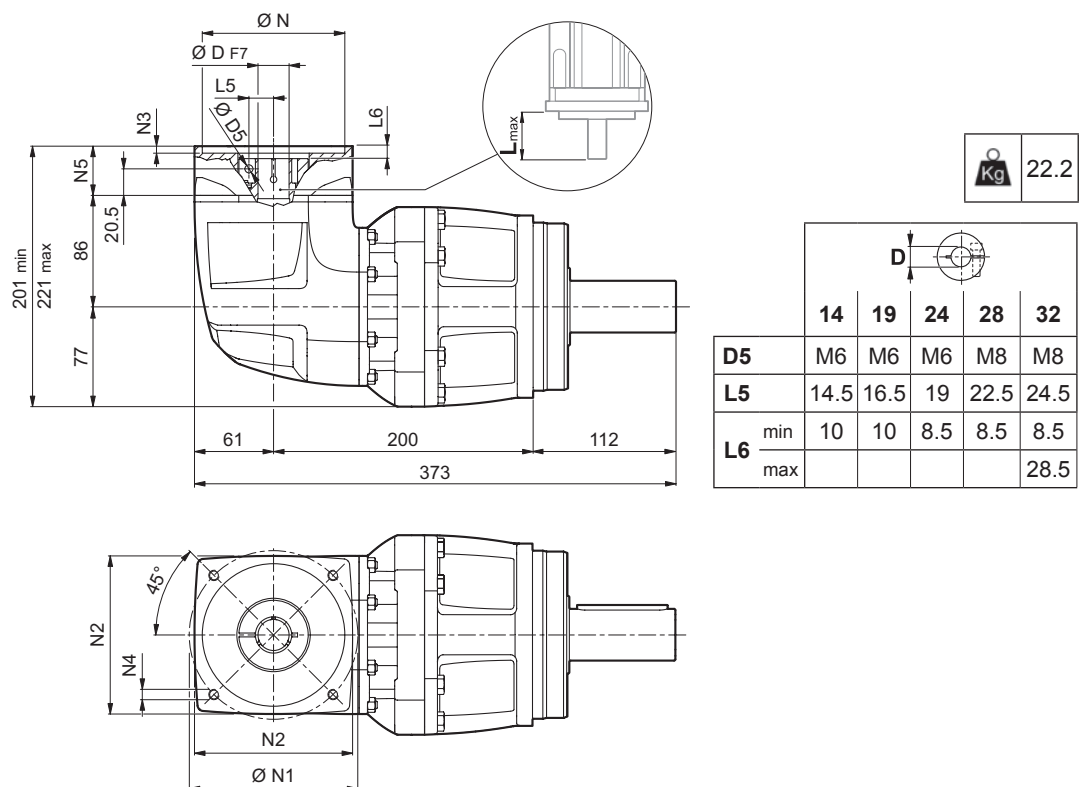


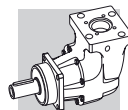
# TQK 130


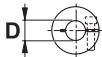
## TQK 130 2





## TQK 130 3

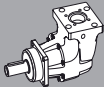
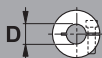


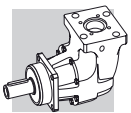


TQK 130 2														
								N	N1	N2	N3	N4	N5	L <sub>max</sub>
80A	—	19	—	—	—	—	—	80	100	130	6.5	M6x14	41	60
95A	—	19	24	28	—	—	—	95	115	130	6.5	M8x18	41	60
110A	—	—	24	—	—	—	—	110	130	130	6.5	M8x20	41	60
110B	—	19	—	28	—	—	—	110	145	130	6.5	M8x20	41	60
130A	—	—	24	28	32	—	—	130	165	154	6.5	M10x20	41	60
180A	—	—	24	28	—	—	—	180	215	190	6.5	M12x27	41	60
180A1	—	—	—	—	32	38	—	180	215	190	6.5	M12x27	61	80
200A	—	—	—	—	—	—	42	200	235	210	6.5	M12x27	97	116

TQK 130 3														
								N	N1	N2	N3	N4	N5	L <sub>max</sub>
60A	14	19	—	—	—	—	—	60	75	100	6.5	M5x14	38	60
80A	14	19	—	—	—	—	—	80	100	100	6.5	M6x14	38	60
95A	—	19	24	28	—	—	—	95	115	100	6.5	M8x18	38	60
110A	—	—	24	—	—	—	—	110	130	122	6.5	M8x20	38	60
110B	—	19	—	28	—	—	—	110	145	122	6.5	M8x20	38	60
130A	—	—	24	28	32	—	—	130	165	140	6.5	M10x20	38	60
180A	—	—	24	28	—	—	—	180	215	190	6.5	M12x38*	38	60
180A1	—	—	—	—	32	—	—	180	215	190	6.5	M12x27	58	80

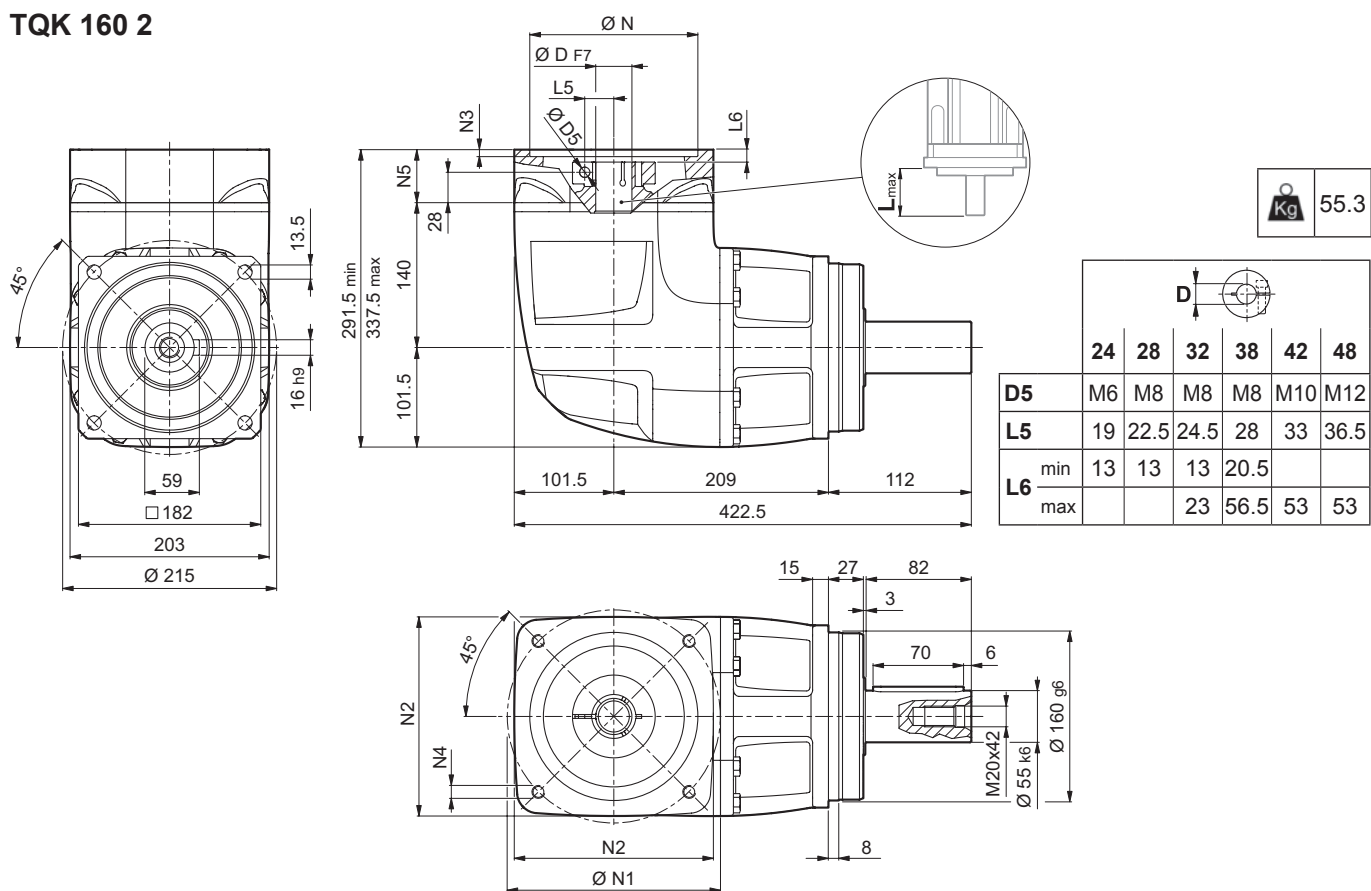
\* through hole

	i	M <sub>n 2</sub>	M <sub>a 2</sub>	M <sub>p 2</sub>	n <sub>1 max</sub>	φ <sub>s</sub>	C <sub>t</sub>	R <sub>2 max</sub>	A <sub>2 max</sub>	η	J <sub>G</sub> [kgcm <sup>2</sup> ]						
		[Nm]	[Nm]	[Nm]	[min <sup>-1</sup> ]	[arcmin]	$\left[ \frac{\text{Nm}}{\text{arcmin}} \right]$	[N]	[N]	%							
TQK 130 2_6		255	360	510	4500	4'	56	9000	8000	94	—	17.32	17.44	17.96	18.02	18.55	24.47
TQK 130 2_8		340	480	680	4500	4'	56	9000	8000	94	—	16.19	16.31	16.83	16.89	17.41	23.33
TQK 130 2_10		400	600	850	4500	4'	56	9000	8000	94	—	15.66	15.77	16.30	16.35	16.88	22.80
TQK 130 2_14		360	550	950	4500	4'	56	9000	8000	94	—	15.24	15.35	15.88	15.93	16.46	22.38
TQK 130 2_20		280	420	900	4500	4'	56	9000	8000	94	—	15.01	15.13	15.65	15.71	16.23	22.15
TQK 130 3_18		260	400	900	4500	6'	56	9000	8000	91	15.18	15.22	15.34	15.86	15.92	16.44	—
TQK 130 3_24		400	600	1000	4500	6'	56	9000	8000	91	15.05	15.10	15.21	15.74	15.79	16.32	—
TQK 130 3_30		400	600	1000	4500	6'	56	9000	8000	91	14.99	15.04	15.15	15.68	15.73	16.26	—
TQK 130 3_40		400	600	1000	4500	6'	56	9000	8000	91	14.72	14.76	14.88	15.40	15.46	15.99	—
TQK 130 3_50		400	600	1000	4500	6'	56	9000	8000	91	14.61	14.66	14.77	15.30	15.35	15.88	—
TQK 130 3_70		400	600	1000	4500	6'	56	9000	8000	91	14.52	14.56	14.68	15.20	15.25	15.78	—
TQK 130 3_80		400	600	1000	4500	6'	56	9000	8000	91	14.47	14.52	14.63	15.16	15.21	15.74	—
TQK 130 3_100		400	600	1000	4500	6'	56	9000	8000	91	14.46	14.51	14.62	15.15	15.20	15.73	—
TQK 130 3_140		360	550	950	4500	6'	56	9000	8000	91	14.46	14.51	14.62	15.15	15.20	15.73	—
TQK 130 3_200		280	420	900	4500	6'	56	9000	8000	91	14.46	14.50	14.62	15.14	15.20	15.73	—

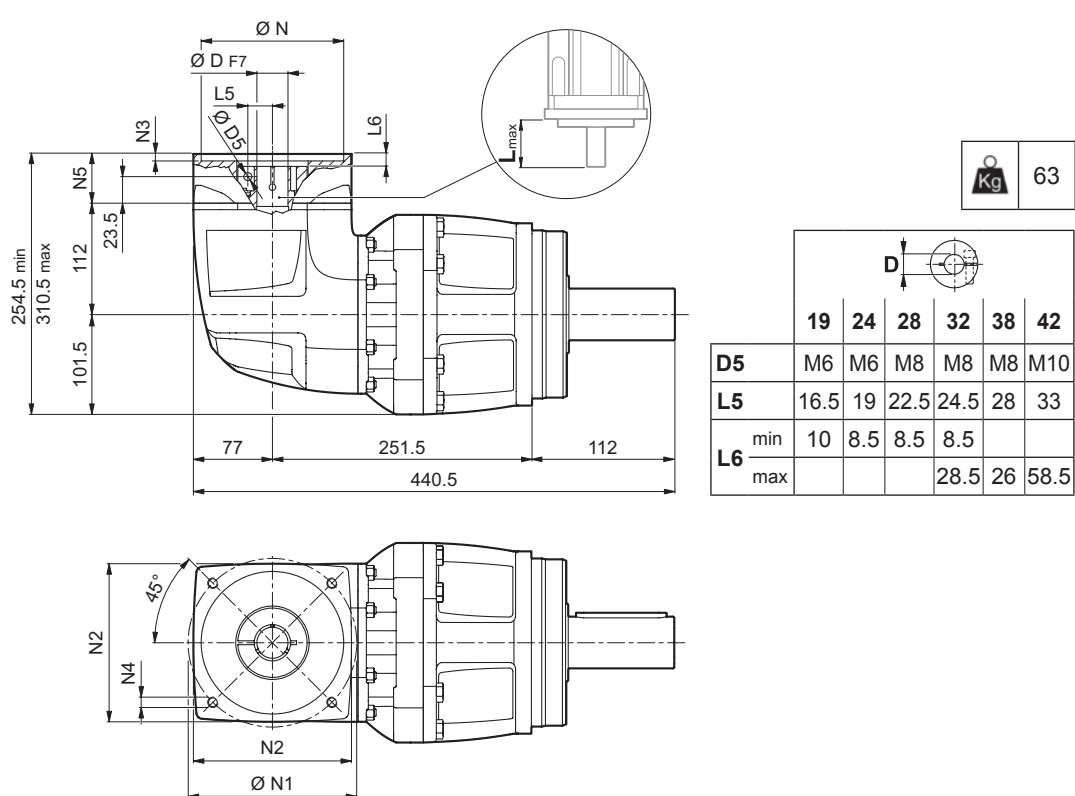


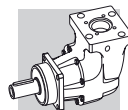
# TQK 160


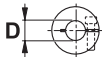
## TQK 160 2


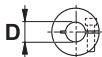


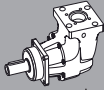
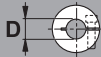
## TQK 160 3

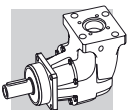





TQK 160 2														
								N	N1	N2	N3	N4	N5	L <sub>max</sub>
95A	—	24	28	—	—	—	—	95	115	158	6.5	M8x20	50	72
110A	—	24	—	—	—	—	—	110	130	158	6.5	M8x20	50	72
130A	—	24	28	32	—	—	—	130	165	158	6.5	M10x20	50	72
180A	—	24	28	—	—	—	—	180	215	203	6.5	M12x27	50	72
180A1	—	—	—	32	38	—	—	180	215	205	6.5	M12x27	60	82
200A	—	—	—	—	—	42	—	200	235	220	6.5	M12x27	96	118
230A	—	—	—	—	38	42	48	230	265	240	6.5	M12x27	96	118

TQK 160 3														
								N	N1	N2	N3	N4	N5	L <sub>max</sub>
80A	19	—	—	—	—	—	—	80	100	130	6.5	M6x14	41	60
95A	19	24	28	—	—	—	—	95	115	130	6.5	M8x18	41	60
110A	—	24	—	—	—	—	—	110	130	130	6.5	M8x20	41	60
110B	19	—	28	—	—	—	—	110	145	130	6.5	M8x20	41	60
130A	—	24	28	32	—	—	—	130	165	154	6.5	M10x20	41	60
180A	—	24	28	—	—	—	—	180	215	190	6.5	M12x27	41	60
180A1	—	—	—	32	38	—	—	180	215	190	6.5	M12x27	61	80
200A	—	—	—	—	—	42	—	200	235	210	6.5	M12x27	97	116

	i	M <sub>n 2</sub>	M <sub>a 2</sub>	M <sub>p 2</sub>	n <sub>1 max</sub>	ψ <sub>s</sub>	C <sub>t</sub>	R <sub>2 max</sub>	A <sub>2 max</sub>	η	J <sub>G</sub> [kgcm <sup>2</sup> ]						
		[Nm]	[Nm]	[Nm]	[min <sup>-1</sup> ]	[arcmin]	$\left[ \frac{\text{Nm}}{\text{arcmin}} \right]$	[N]	[N]	%							
TQK 160 2_6		420	630	840	4000	4'	167	15000	13000	94	—	73.12	73.33	73.80	73.51	75.57	79.19
TQK 160 2_8		560	840	1120	4000	4'	167	15000	13000	94	—	69.28	69.49	69.95	69.66	71.73	75.34
TQK 160 2_10		700	1050	1400	4000	4'	167	15000	13000	94	—	67.77	67.98	68.44	68.16	70.22	73.83
TQK 160 2_14		750	1150	2000	4000	4'	167	15000	13000	94	—	66.46	66.68	67.14	66.85	68.92	72.53
TQK 160 2_20		550	850	1600	4000	4'	167	15000	13000	94	—	65.73	65.94	66.41	66.12	68.18	71.80
TQK 160 3_18		530	800	1500	4000	6'	167	15000	13000	91	66.84	66.95	67.17	67.63	67.34	69.41	—
TQK 160 3_24		800	1200	2000	4000	6'	167	15000	13000	91	66.47	66.58	66.79	67.26	66.97	69.03	—
TQK 160 3_30		800	1200	2000	4000	6'	167	15000	13000	91	66.30	66.42	66.63	67.09	66.80	68.87	—
TQK 160 3_40		800	1200	2000	4000	6'	167	15000	13000	91	65.41	65.52	65.73	66.20	65.91	67.97	—
TQK 160 3_50		800	1200	2000	4000	6'	167	15000	13000	91	64.99	65.10	65.32	65.78	65.49	67.56	—
TQK 160 3_70		800	1200	2000	4000	6'	167	15000	13000	91	64.67	64.78	65.00	65.46	65.17	67.24	—
TQK 160 3_80		800	1200	2000	4000	6'	167	15000	13000	91	64.51	64.62	64.84	65.30	65.01	67.08	—
TQK 160 3_100		800	1200	2000	4000	6'	167	15000	13000	91	64.49	64.61	64.82	65.28	65.00	67.06	—
TQK 160 3_140		750	1150	2000	4000	6'	167	15000	13000	91	64.48	64.60	64.81	65.27	64.99	67.05	—
TQK 160 3_200		550	850	1600	4000	6'	167	15000	13000	91	64.47	64.59	64.80	65.26	64.98	67.04	—



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8	Sect 2 "Features of TQK series": - updated information about oil seals
10 ... 19	Sect. 4 "Dimensions and technical specifications": - updated dimensions

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