

alpha gear drives



TPM & TPMA High Torque

Rotary Servo actuators -
Setting new standards in dynamics,
precision and compactness

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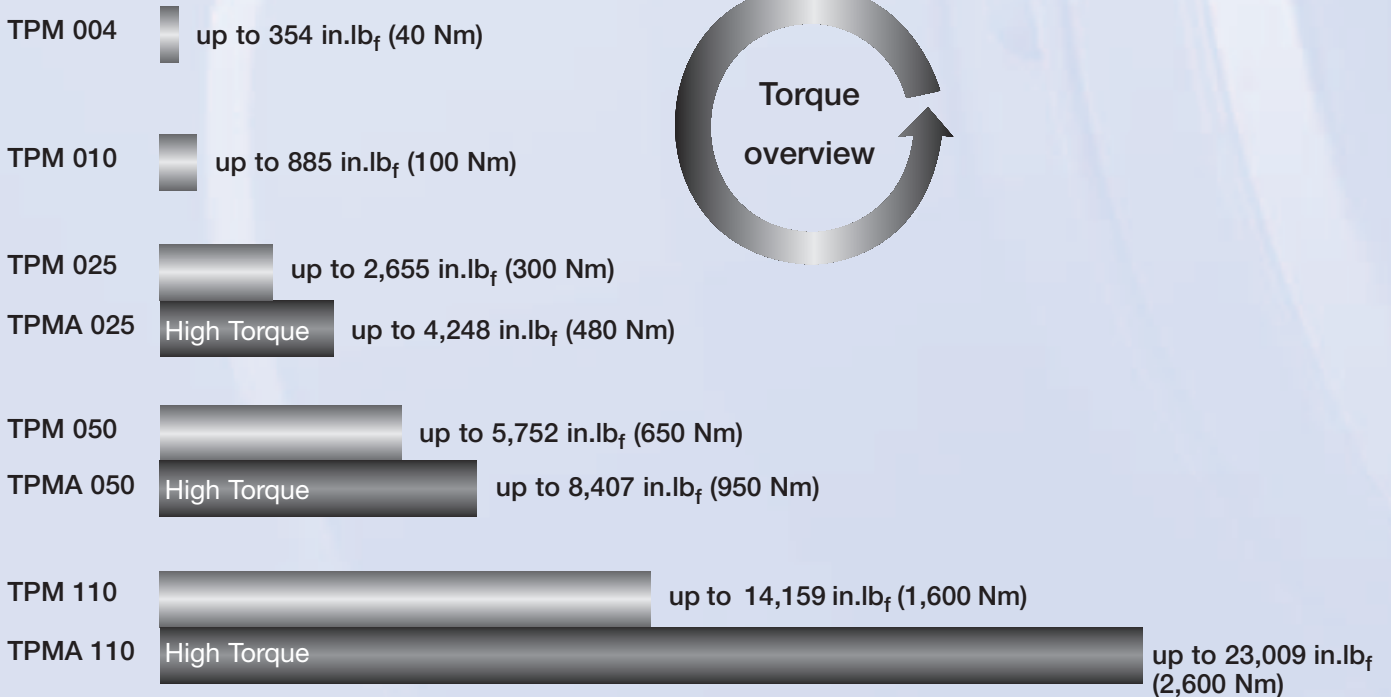
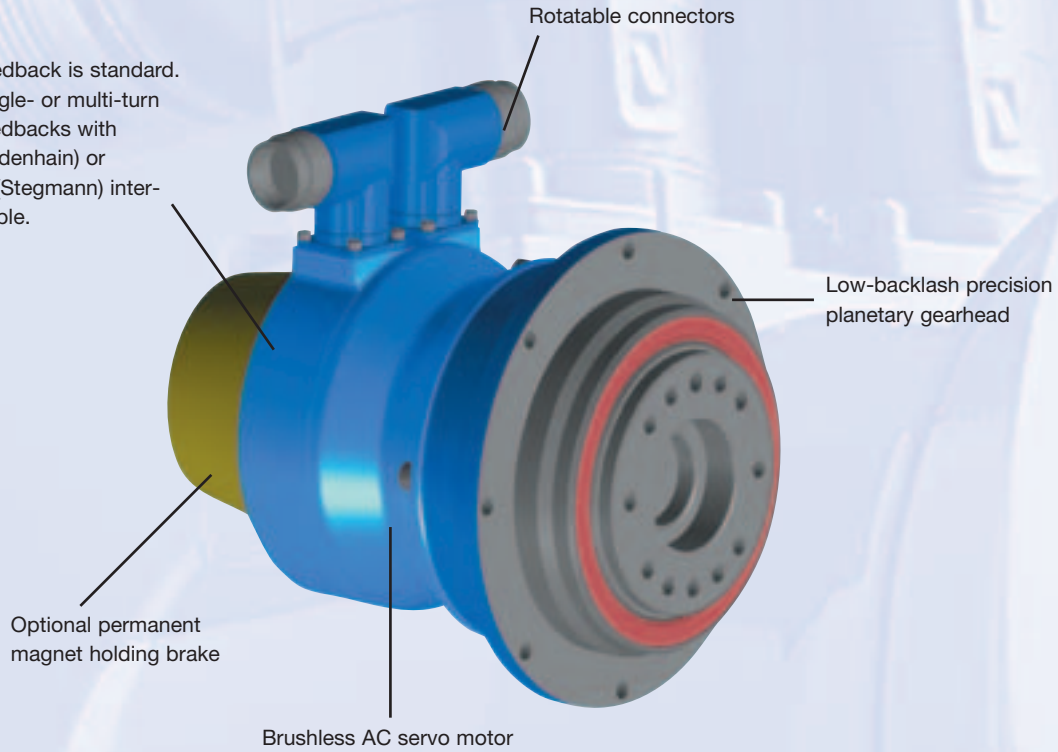
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Product features

The TPM and TPMA are rotary servo actuators with a fully integrated **alpha** TP series high precision planetary gearhead, brushless AC servomotor, resolver or absolute feedback and optional holding brake. The TPM/TPMA operate with most servo controllers on the market to provide highly dynamic performance in an extremely compact package.

The two-stage TPM and three-stage TPMA set new standards for precision, compactness and dynamic performance for the drive technology market.

Resolver feedback is standard. Optional single- or multi-turn absolute feedbacks with EnDat® (Heidenhain) or Hiperface® (Stegmann) interfaces available.



Product features



High dynamic performance

An integral brushless AC servomotor was designed to work with the **alpha** planetary gearheads to provide a high torque-to-inertia ratio, optimized for high dynamic performance. Connecting the motor to the gearhead without a coupling improves the stiffness of the unit while reducing the moment of inertia by approximately 40% compared to customary motor/gearhead units.

High power density

A high pole count motor optimizes use of the magnetic material and yields the most power in the smallest package. In the new 3-stage TPMA version, the torque range has been considerably extended while maintaining the same compact design.

Compact design/reduced weight

Integrating the servomotor and gearhead into one package sets new standards for reduced size and weight. It is approximately 62% shorter and weighs much less than a traditional motor/gearhead combination of comparable power. This is especially important for applications where mounting space is limited or where the motor itself is part of the moving load, e.g. robotics and gantries.

High positioning accuracy/efficiency

Directly mounting the drive elements to the output flange reduces overall size and provides high torsional rigidity and short settling times. The pinion is integrated directly into the motor shaft, resulting in a much shorter motor-to-pinion distance. This design results in much higher positioning accuracy - <1 arc-minute of backlash - and higher dynamics, for shorter cycle times, increased machine throughput and reduced production costs for the customer application. In addition, the TPM/TPMA feature overall efficiency >85%.

Direct mount/fewer components

The TPM/TPMA can be mounted from either the front or the rear of the mounting flange. The application load mounts directly to the driving flange, eliminating the need for a coupling. Dual tapered roller bearings in the output stage (from size 050) eliminate the need for additional support bearings in the customer application. In addition, two rotatable connectors allow for easy cable routing.

Maintenance free

High quality synthetic lubricants provide lubrication for the service life of the product.

Smooth motion and quiet operation

The TPM/TPMAs are characterized by low torque ripple for extremely smooth operation. They feature low noise levels of less than 65 dB(A).

Simple integration

The TPM/TPMAs can be operated with most of the brushless servo controllers on the market. Preassembled cables and controller-specific start-up instructions simplify installation and start-up.

Optional absolute feedback

An optional single- or multi-turn absolute encoder eliminates the necessity for homing on start-up.

Applications



Yxlon



Six TPM drives on two swivel axes and one rotating axis control an X-ray testing system for cast parts. A move to a new position and an X-ray inspection occur within one second, repeating up to 300 times per part. The rapid positioning and testing procedure requires short settling times, which are achieved because of the low weight, high torsional rigidity and low inertia of the TPM drives.



Unicor

A winding unit without dancer roll forms the terminating unit of an extrusion machine for 2-5 mm wide plastic strips. Constant tension is required for smooth winding of the strips. The high torsional rigidity and excellent dynamics of the TPM drive enables rapid torque regulation, within a torque-adjustment range of 1:40.



SIG Robotics

Three TPM drives control the movement of the three axes of this fast pick and place robot, with up to 120 pick and place cycles per minute. The TPM was chosen for this application because of its high dynamic performance, low weight, small overall length and high reliability.



Gasti

Installed in a plant for dosing liquid products, three TPM drives control the piston dosing pump, a rotary valve and the container-lifting device. Because of its compact design, three TPM drives are incorporated into a 20 in x 20 in x 30 in space.



TPM 004 - Technical data and characteristic curves

Gearhead data

Ratio		i		21, 31, 61, 91
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T_{2B}	i = 31 i = 21, 61, 91	360 (40) 280 (32)
Emergency Stop torque ²⁾	in.lbf (Nm)	T_{2Not}		890(100)
Nominal output torque	in.lbf (Nm)	T_{2N}	i = 31 i = 21, 61, 91	220 (25) 130 (15)
Maximum input speed	min ⁻¹	n_{1Max}		7,000
Nominal input speed ³⁾	min ⁻¹	n_{1N}		6,000
Torsional backlash	arcmin	i_t	Standard Reduced	≤ 5 ≤ 3
Torsional rigidity	in.lbf (Nm)/arcmin	C_{t21}		60 (6.8)
Maximum axial force ⁴⁾	lbf (N)	F_{2AMax}		370 (1,630)
Maximum tilting torque	in.lbf (Nm)	$M_{2TiltMax}$		810 (91)
Tilting rigidity	in.lbf (Nm)/arcmin	C_{2K}		750 (85)
No-load running torque ($n_1 = 3000 \text{ min}^{-1}$) ⁵⁾	in.lbf (Nm)	T_{012}	i = 31 i = 91	13 (0.15) 7 (0.08)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J_{Gear}	i = 21 i = 31 i = 61 i = 91	$0.1 \cdot 10^{-4}$ (0.01) $0.1 \cdot 10^{-4}$ (0.01) $0.01 \cdot 10^{-4}$ (0.001) $0.01 \cdot 10^{-4}$ (0.001)

Motor data

			i = 21, 31		i = 61, 91	
DC bus voltage	VDC	U_D	320	600	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M_{Max}	15 (1.70)	15 (1.70)	7 (0.79)	7 (0.79)
Continuous stall torque	in.lbf (Nm)	M_0	5 (0.58)	5 (0.51)	3 (0.31)	2 (0.27)
Nominal torque	in.lbf (Nm)	M_N	4 (0.48)	4 (0.41)	2 (0.25)	2 (0.21)
Peak current ⁶⁾	A	I_{Max}	4.20	2.50	2.90	1.70
Nominal current	A	I_N	1.30	0.70	1.00	0.50
No-load speed ⁶⁾	min ⁻¹	n_0	9,100	9,500	13,500	13,500
Nominal speed ⁶⁾	min ⁻¹	n_N	7,625	8,100	11,100	11,100
Maximum power	kW	P_{Max}	0.92	0.92	0.58	0.58
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	$1.4 \cdot 10^{-4}$ (0.16)	$1.4 \cdot 10^{-4}$ (0.16)	$0.8 \cdot 10^{-4}$ (0.09)	$0.8 \cdot 10^{-4}$ (0.09)
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	$2.0 \cdot 10^{-4}$ (0.22)	$2.0 \cdot 10^{-4}$ (0.22)	$1.3 \cdot 10^{-4}$ (0.15)	$1.3 \cdot 10^{-4}$ (0.15)

General data

Protection class		IP64
Operating temperature range	F (°C)	+14 to +194 (-10 to +90)
Mounting position		Any
Lubrication		Synthetic oil, ISO VG 220
Paint		RAL 5002 (Blue)
Noise level ($n_1 = 3000 \text{ min}^{-1}$)	dB(A)	≤ 65
Weight without/with brake	lb _m (kg)	5.7/6.6 (2.6/3.0) at i = 21/31 5.3/6.0 (2.4/2.7) at i = 61/91
Direction of rotation		motor and gearhead in same direction
Insulation class		F

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

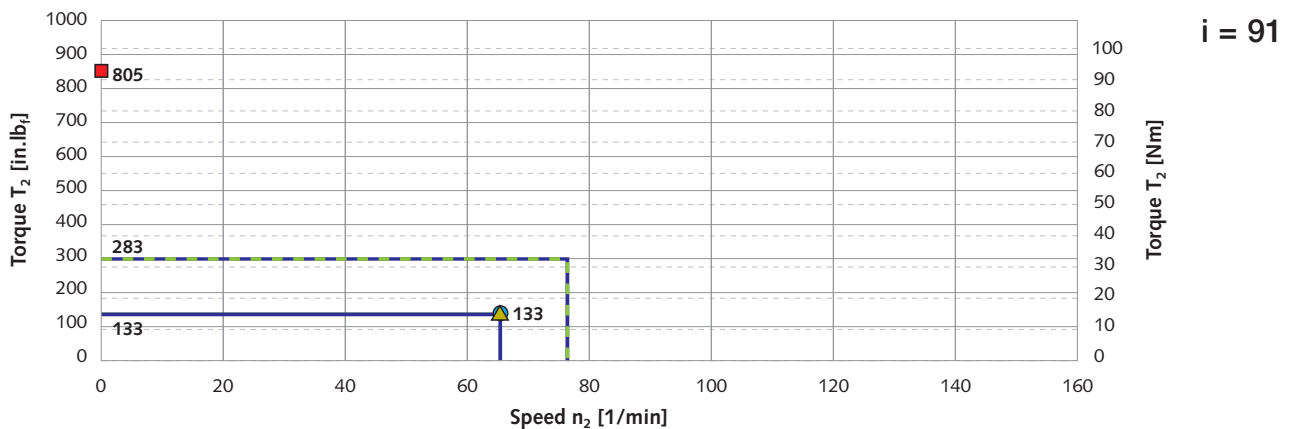
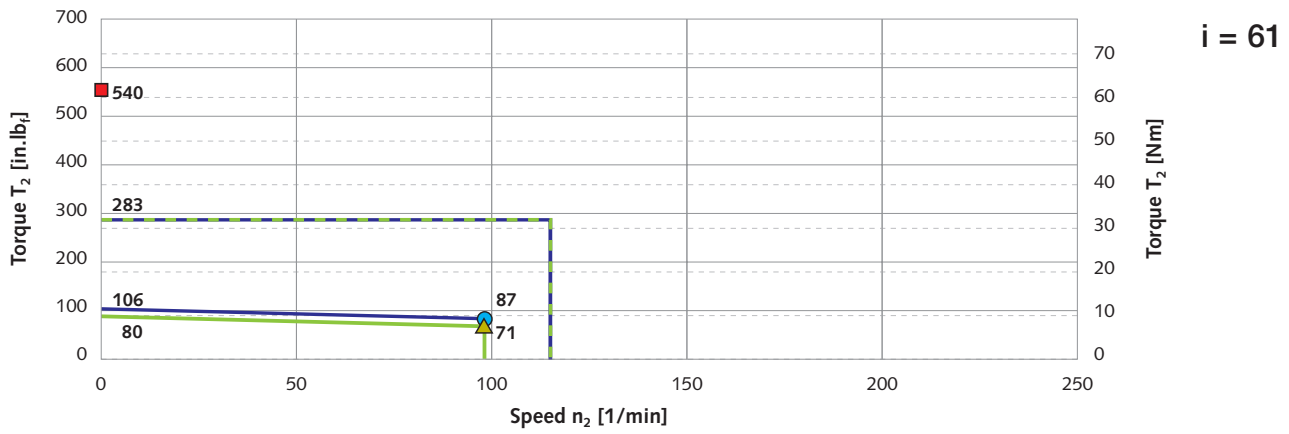
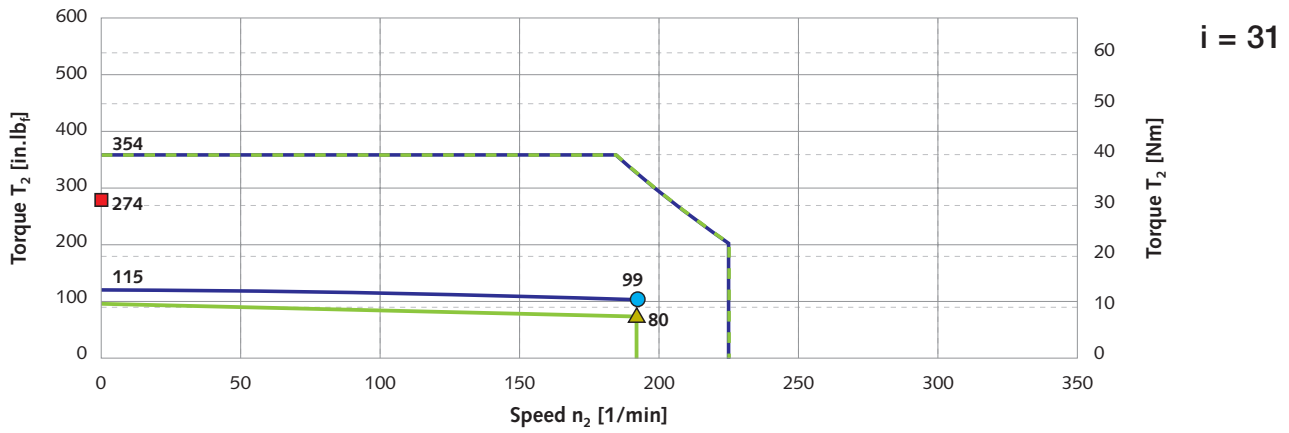
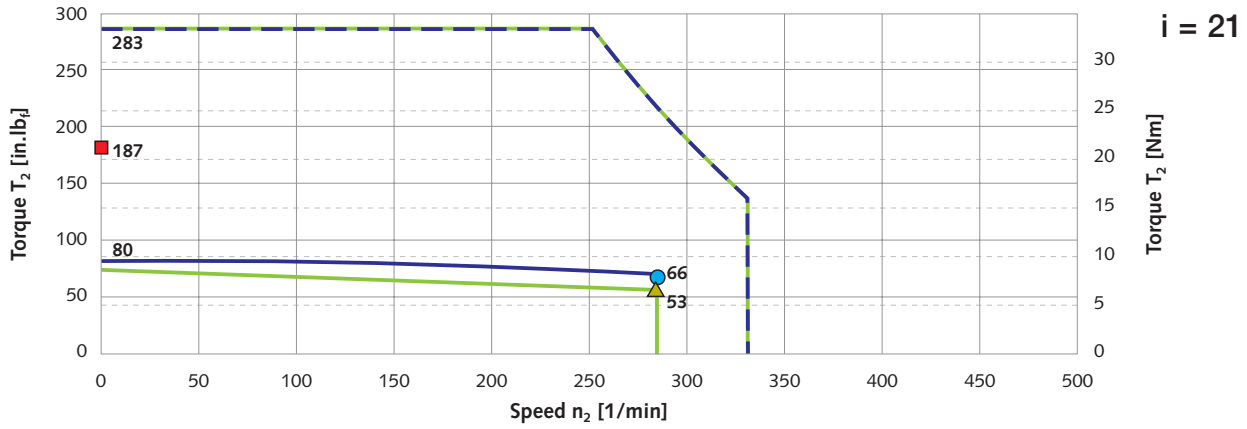
4) Based on the flange center

3) At 68 °F ambient temperature

5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be ± 10%. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



- | | | | | | | |
|----------|--|-----------------------|--|----------------|--|---------------|
| 320V DC: | | Max. output torque | | Nominal torque | | Nominal point |
| 600V DC: | | Max. output torque | | Nominal torque | | Nominal point |
| | | Holding torque: brake | | | | |



TPM 010 - Technical data and characteristic curves

Gearhead data

Ratio		i		21, 31, 61, 91
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T _{2B}	i = 31 i = 21, 61, 91	890 (100) 710 (80)
Emergency Stop torque ²⁾	in.lbf (Nm)	T _{2Not}		2,210 (250)
Nominal output torque	in.lbf (Nm)	T _{2N}	i = 31 i = 21, 61, 91	440 (50) 310 (35)
Maximum input speed	min ⁻¹	n _{1Max}		7,000
Nominal input speed ³⁾	min ⁻¹	n _{1N}		6,450
Torsional backlash	arcmin	j _t	Standard Reduced	≤ 3 ≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C _{t21}		190 (21)
Maximum axial force ⁴⁾	lbf (N)	F _{2AMax}		480 (2,150)
Maximum tilting torque	in.lbf (Nm)	M _{2TiltMax}		2,080 (235)
Tilting rigidity	in.lbf (Nm)/arcmin	C _{2K}		1,990 (225)
No-load running torque (n ₁ = 3000 min ⁻¹) ⁵⁾	in.lbf (Nm)	T ₀₁₂	i = 31 i = 91	3 (0.3) 2 (0.2)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J _{Gear}	i = 21 i = 31 i = 61 i = 91	0.35*10 ⁻⁴ (0.04) 0.27*10 ⁻⁴ (0.03) 0.09*10 ⁻⁴ (0.01) 0.09*10 ⁻⁴ (0.01)

Motor data

			i = 21, 31		i = 61, 91	
DC bus voltage	VDC	U _D	320	600	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M _{max}	32 (3.60)	29 (3.30)	15 (1.70)	15 (1.70)
Continuous stall torque	in.lbf (Nm)	M ₀	10 (1.10)	10 (1.10)	5 (0.60)	5 (0.60)
Nominal torque	in.lbf (Nm)	M _N	8 (0.94)	7 (0.84)	5 (0.52)	5 (0.51)
Peak current ⁶⁾	A	I _{Max}	7.30	5.00	4.50	3.00
Nominal current	A	I _N	1.50	1.10	1.10	0.70
No-load speed ⁶⁾	min ⁻¹	n ₀	5,800	7,800	7,000	7,700
Nominal speed ⁶⁾	min ⁻¹	n _N	4,875	6,775	5,900	6,550
Maximum power	kW	P _{Max}	1.22	1.66	0.75	0.85
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	J _{Mot.}	3.3*10 ⁻⁴ (0.37)		1.9*10 ⁻⁴ (0.21)	
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)	J _{Mot.}	3.9*10 ⁻⁴ (0.44)		2.5*10 ⁻⁴ (0.28)	

General data

Protection class		IP64
Operating temperature range	F (°C)	+14 to +194 (-10 to +90)
Mounting position		Any
Lubrication		Synthetic oil, ISO VG 220
Paint		RAL 5002 (Blue)
Noise level (n ₁ = 3000 min ⁻¹)	dB(A)	≤ 65
Weight without/with brake	lb _m (kg)	10.8/11.7 (4.9/5.3) at i = 21/31 9.7/10.8 (4.4/4.9) at i = 61/91
Direction of rotation		motor and gearhead in same direction
Insulation class		F

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

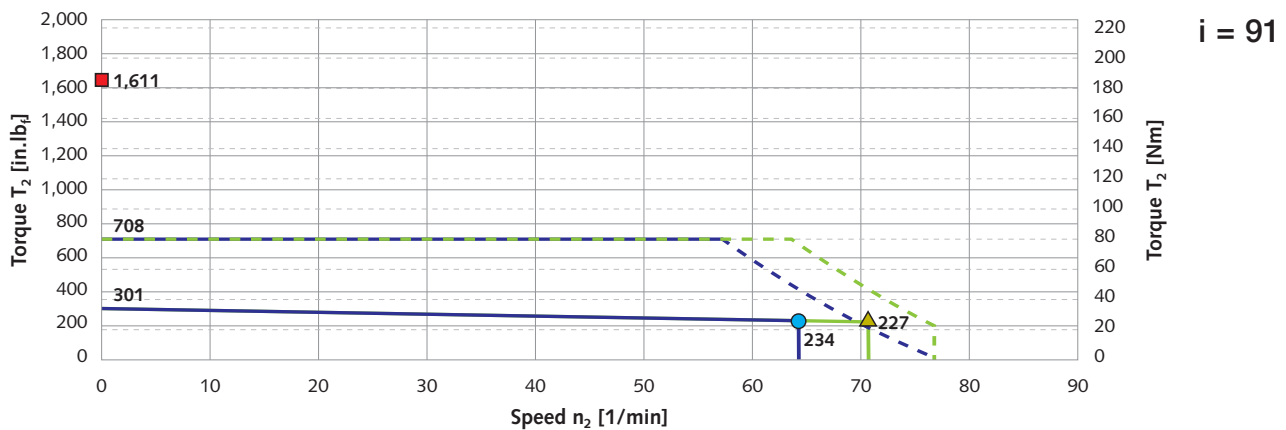
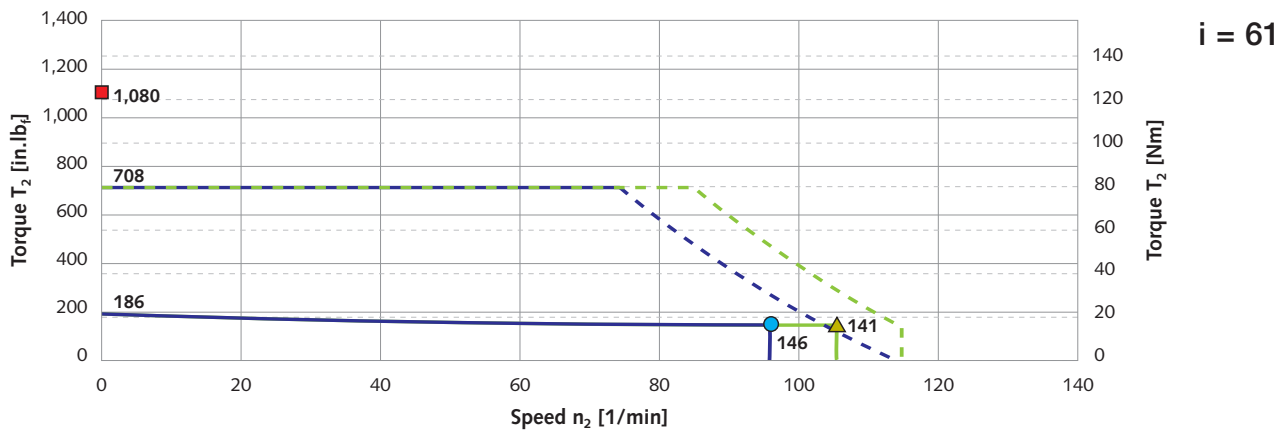
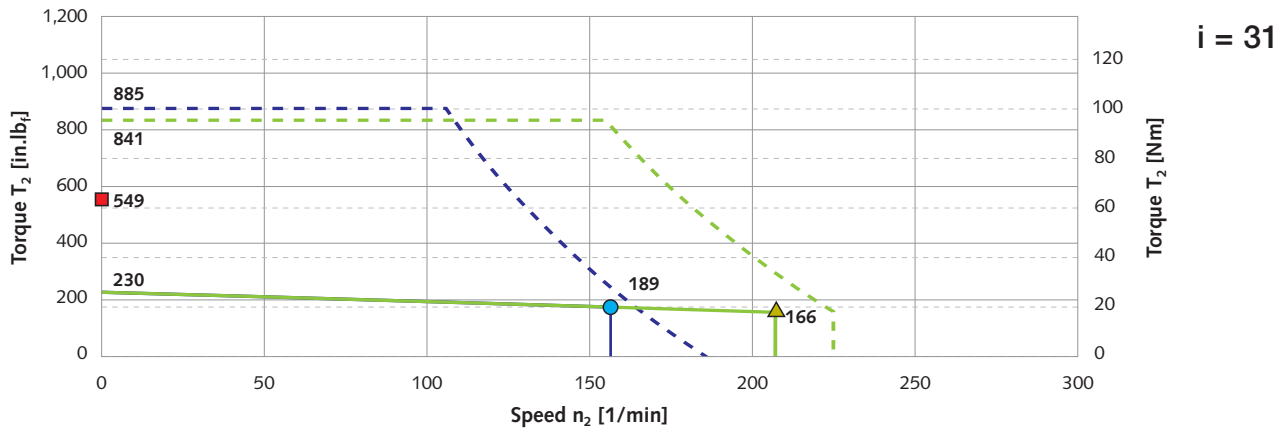
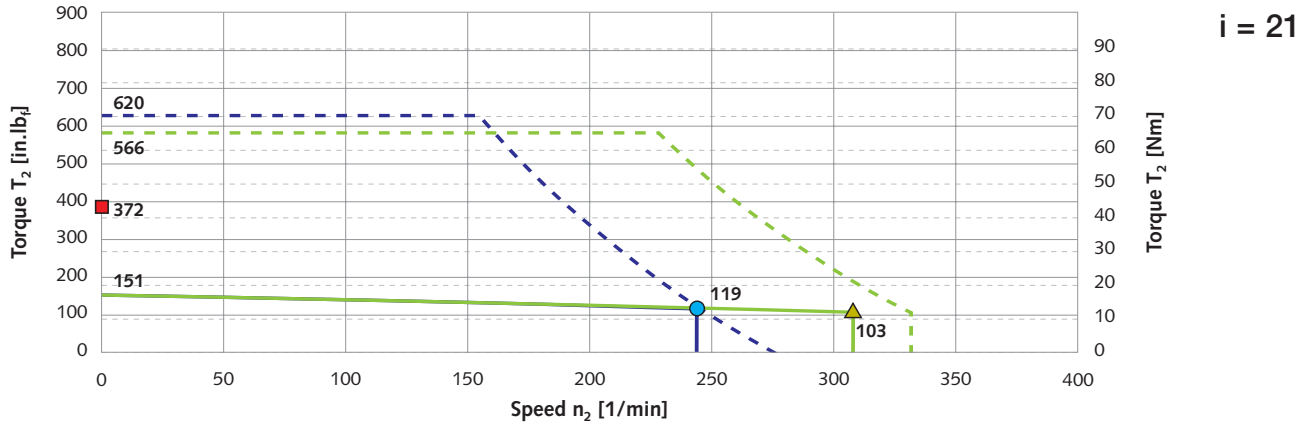
3) At 68 °F ambient temperature

4) Based on the flange center

5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be ± 10%. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



- 320V DC: - - - Max. output torque — Nominal torque ● Nominal point
- 600V DC: - - - Max. output torque — Nominal torque ▲ Nominal point
- Holding torque: brake



TPM 025 - Technical data and characteristic curves

Gearhead data

Ratio		i		21, 31, 61, 91
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T_{2B}	i = 31 i = 21, 61, 91	2,660 (300) 2,210 (250)
Emergency Stop torque ²⁾	in.lbf (Nm)	T_{2Not}		5,530 (625)
Nominal output torque	in.lbf (Nm)	T_{2N}	i = 31 i = 21, 61, 91	1,500 (170) 890 (100)
Maximum input speed	min ⁻¹	n_{1Max}		6,000
Nominal input speed ³⁾	min ⁻¹	n_{1N}		5,900
Torsional backlash	arcmin	j_t	Standard Reduced	≤ 3 ≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C_{t21}		500 (56)
Maximum axial force ⁴⁾	lb _f (N)	F_{2AMax}		930 (4,150)
Maximum tilting torque	in.lbf (Nm)	$M_{2TiltMax}$		3,660 (413)
Tilting rigidity	in.lbf (Nm)/arcmin	C_{2K}		4,870 (550)
No-load running torque ($n_1 = 3000 \text{ min}^{-1}$) ⁵⁾	in.lbf (Nm)	T_{012}	i = 31 i = 91	5.0 (0.6) 3.0 (0.3)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J_{Gear}	i = 21 i = 31 i = 61 i = 91	$0.9 \cdot 10^{-4}$ (0.10) $0.5 \cdot 10^{-4}$ (0.06) $0.1 \cdot 10^{-4}$ (0.01) $0.1 \cdot 10^{-4}$ (0.01)

Motor data

			i = 21, 31		i = 61, 91	
DC bus voltage	VDC	U_D	320	600	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M_{max}	104 (11.70)	110 (12.40)	38 (4.20)	37 (4.20)
Continuous stall torque	in.lbf (Nm)	M_0	45 (5.00)	45 (5.00)	15 (1.70)	15 (1.70)
Nominal torque	in.lbf (Nm)	M_N	30 (3.30)	30 (3.40)	12 (1.40)	12 (1.30)
Peak current ⁶⁾	A	I_{Max}	25.00	10.60	10.80	7.00
Nominal current	A	I_N	6.00	3.40	3.10	1.80
No-load speed ⁶⁾	min ⁻¹	n_0	6,380	6,000	7,300	7,800
Nominal speed ⁶⁾	min ⁻¹	n_N	5,200	4,838	5,625	6,200
Maximum power	kW	P_{Max}	4.04	4.22	1.72	1.85
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	$21.2 \cdot 10^{-4}$ (2.39)		$7.6 \cdot 10^{-4}$ (0.86)	
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	$21.8 \cdot 10^{-4}$ (2.46)		$8.3 \cdot 10^{-4}$ (0.49)	

General data

Protection class	IP64		
Operating temperature range	F (°C)	+14 to +194 (-10 to +90)	
Mounting position	Any		
Lubrication	Synthetic oil, ISO VG 220		
Paint	RAL 5002 (Blue)		
Noise level ($n_1 = 3000 \text{ min}^{-1}$)	dB(A)	≤ 65	
Weight without/with brake	lb _m (kg)	19.8/21.6 (9.0/9.8) at i = 21/31	16.8/18.5 (7.6/8.4) at i = 61/91
Direction of rotation	motor and gearhead in same direction		
Insulation class	F		

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

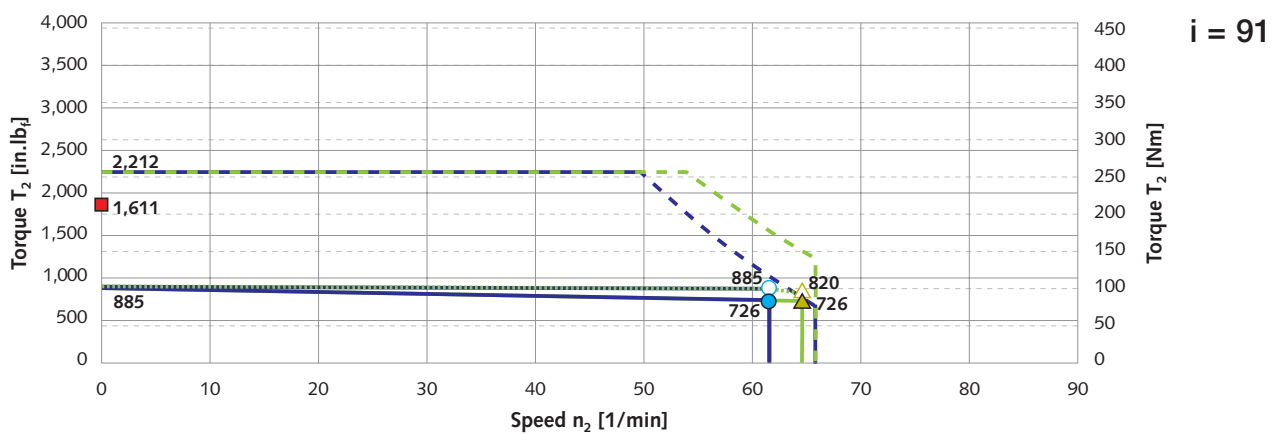
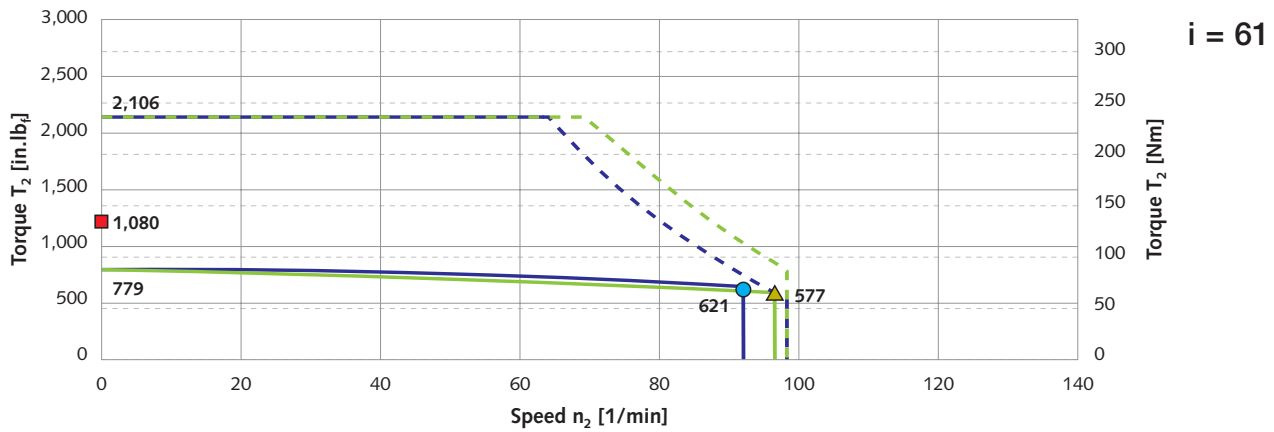
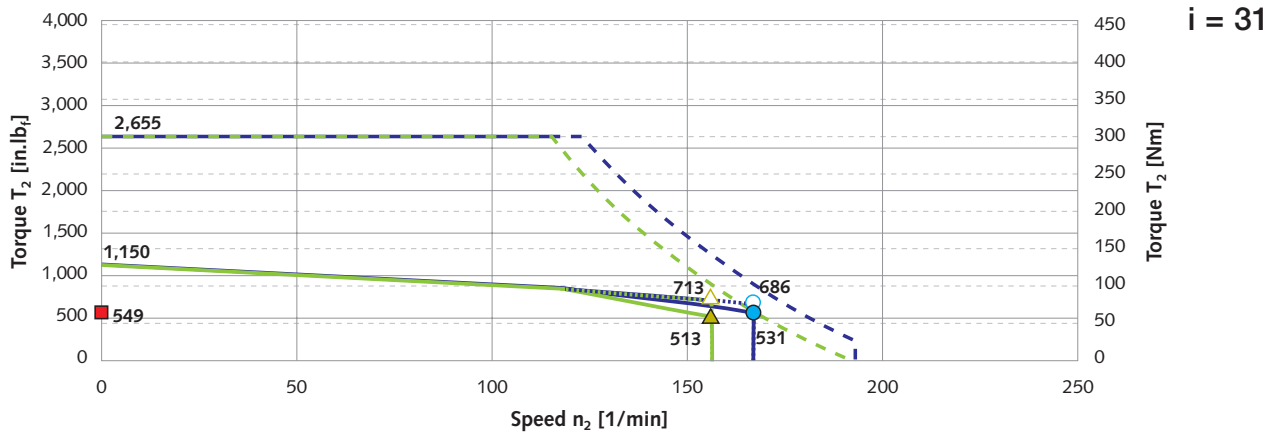
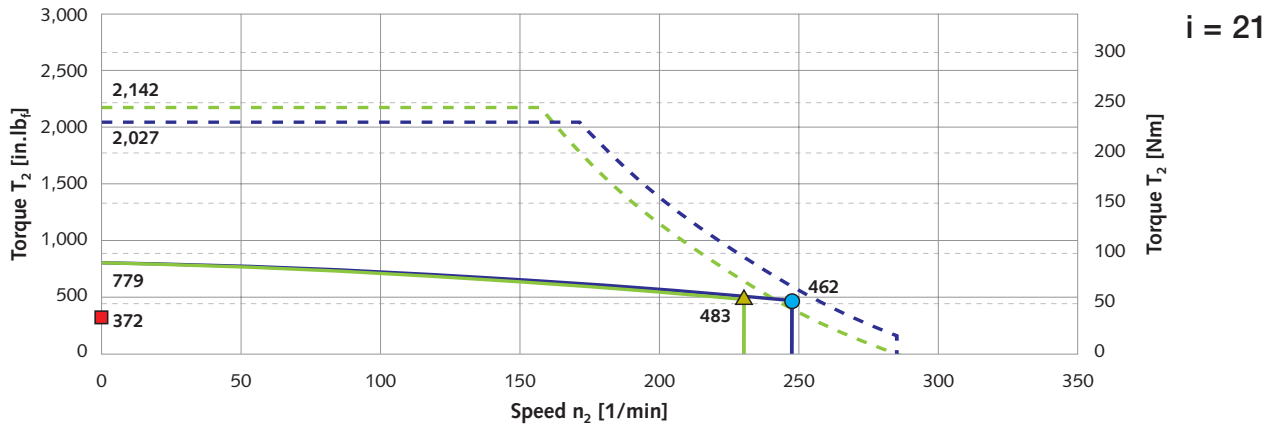
4) Based on the flange center

3) At 68 °F ambient temperature

5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be ± 10%. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



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|----------------------|------------------------|----------------------|-------------------------|
| 320V DC w/ resolver: | --- Max. output torque | Nominal torque | ○ Nominal point |
| 600V DC w/ resolver: | --- Max. output torque | Nominal torque | △ Nominal point |
| 320V DC w/ encoder: | --- Max. output torque | --- Nominal torque | ● Nominal point |
| 600V DC w/ encoder: | --- Max. output torque | --- Nominal torque | ▲ Nominal point |
| | | | ■ Holding torque: brake |

TPM 050 - Technical data and characteristic curves

Gearhead data

Ratio		i		21, 31, 61, 91
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T _{2B}	i = 31 i = 21, 61, 91	5,750 (650) 4,430 (500)
Emergency Stop torque ²⁾	in.lbf (Nm)	T _{2Not}		11,060 (1,250)
Nominal output torque	in.lbf (Nm)	T _{2N}	i = 31 i = 21, 61, 91	3,270 (370) 1,950 (220)
Maximum input speed	min ⁻¹	n _{1Max}		5,000
Nominal input speed ³⁾	min ⁻¹	n _{1N}		4,650
Torsional backlash	arcmin	j _t	Standard Reduced	≤ 3 ≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C _{l21}		1,040 (118)
Maximum axial force ⁴⁾	lbf (N)	F _{2AMax}		1,380 (6,130)
Maximum tilting torque	in.lbf (Nm)	M _{2TiltMax}		11,460 (1,295)
Tilting rigidity	in.lbf (Nm)/arcmin	C _{2K}		4,960 (560)
No-load running torque (n ₁ = 3000 min ⁻¹) ⁵⁾	in.lbf (Nm)	T ₀₁₂	i = 31 i = 91	11.5 (1.3) 9.7 (1.1)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J _{Gear}	i = 21 i = 31 i = 61 i = 91	3.3*10 ⁻⁴ (0.37) 2.3*10 ⁻⁴ (0.26) 0.5*10 ⁻⁴ (0.06) 0.4*10 ⁻⁴ (0.05)

Motor data

			i = 21, 31		i = 61, 91	
DC bus voltage	VDC	U _D	320	600	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M _{Max}	270 (30.50)	288 (32.50)	69 (7.80)	69 (7.80)
Continuous stall torque	in.lbf (Nm)	M ₀	120 (13.60)	120 (13.60)	32 (3.60)	31 (3.50)
Nominal torque	in.lbf (Nm)	M _N	59 (6.60)	43 (4.90)	25 (2.80)	22 (2.50)
Peak current ⁶⁾	A	I _{Max}	75.00	54.00	19.60	13.70
Nominal current	A	I _N	12.40	5.60	4.20	2.60
No-load speed ⁶⁾	min ⁻¹	n ₀	6,380	7,180	5,000	5,900
Nominal speed ⁶⁾	min ⁻¹	n _N	5,375	6,000	3,775	4,562
Maximum power	kW	P _{Max}	11.18	13.0	2.25	2.53
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	J _{Mot.}	80.5*10 ⁻⁴ (9.09)		20.2*10 ⁻⁴ (2.28)	
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)		82.4*10 ⁻⁴ (9.31)		22.1*10 ⁻⁴ (2.50)	

General data

Protection class		IP64
Operating temperature range F (°C)		+14 to +194 (-10 to +90)
Mounting position		Any
Lubrication		Synthetic oil, ISO VG 220
Paint		RAL 5002 (Blue)
Noise level (n ₁ = 3000 min ⁻¹) dB(A)		≤ 65
Weight without/with brake	lb _m (kg)	47.0/52.3 (21.3/23.7) at i = 21/31 33.3/35.7 (15.1/16.2) at i = 61/91
Direction of rotation		motor and gearhead in same direction
Insulation class		F

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

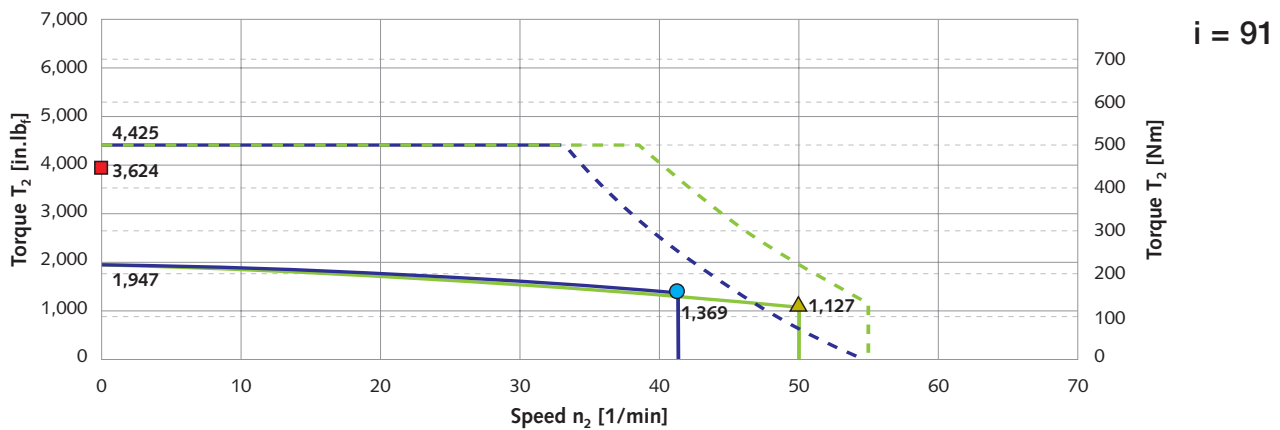
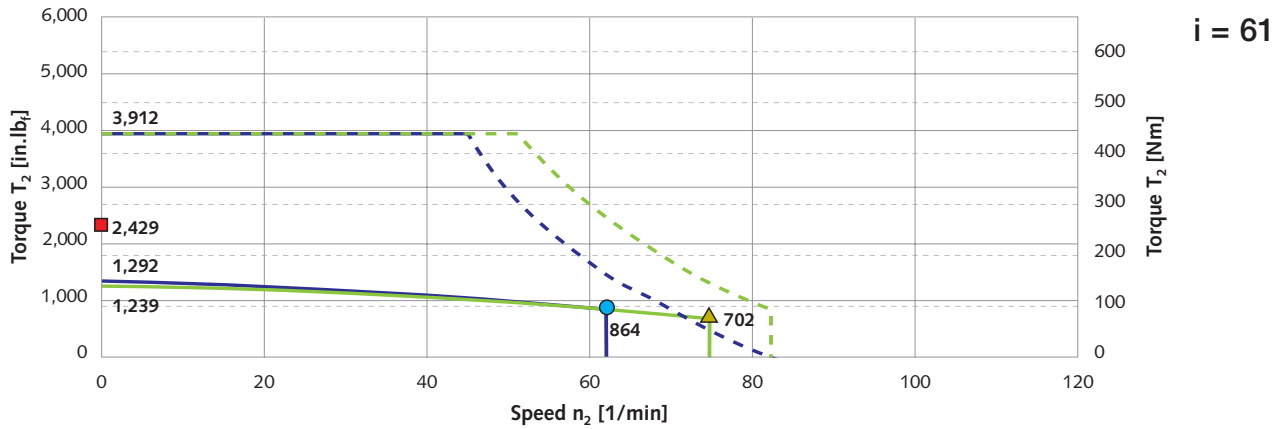
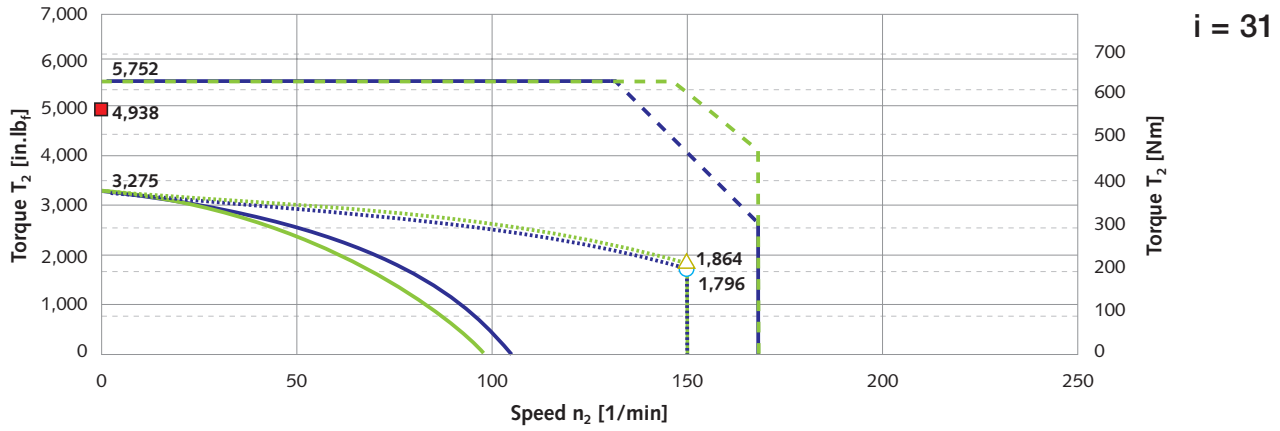
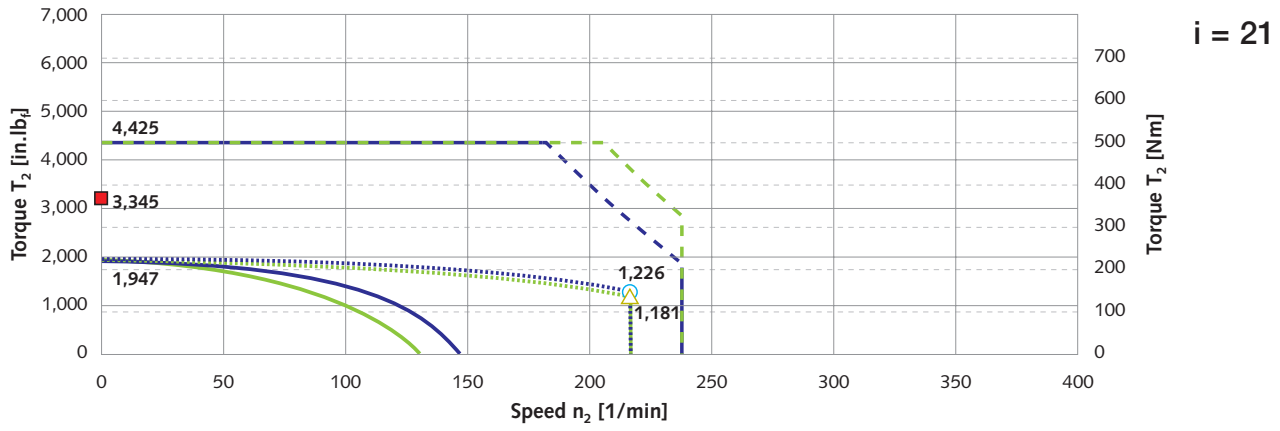
4) Based on the flange center

3) At 68 °F ambient temperature

5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be ± 10%. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



- | | | | |
|----------------------|------------------------|-------------------------|-----------------|
| 320V DC w/ resolver: | --- Max. output torque | Nominal torque | ○ Nominal point |
| 600V DC w/ resolver: | --- Max. output torque | Nominal torque | △ Nominal point |
| 320V DC w/ encoder: | --- Max. output torque | --- Nominal torque | ● Nominal point |
| 600V DC w/ encoder: | --- Max. output torque | --- Nominal torque | ▲ Nominal point |
| | | ■ Holding torque: brake | |



TPM 110 - Technical data and characteristic curves

Gearhead data

Ratio		i		21, 31, 61, 91
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T_{2B}	i = 31 i = 21/61, 91	14,160 (1,600) 9,740/11,500 (1,100/1,300)
Emergency Stop torque ²⁾	in.lbf (Nm)	T_{2Not}		24,340 (2,750)
Nominal output torque	in.lbf (Nm)	T_{2N}	i = 31 i = 61, 91 i = 21	10,890 (1,230) 6,200 (700) 5,660 (640)
Maximum input speed	min ⁻¹	n_{1Max}		4,500
Nominal input speed ³⁾	min ⁻¹	n_{1N}		3,500
Torsional backlash	arcmin	j_t	Standard Reduced	≤ 3 ≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C_{t21}		2,660 (300)
Maximum axial force ⁴⁾	lbf (N)	F_{2AMax}		2,260 (10,050)
Maximum tilting torque	in.lbf (Nm)	$M_{2TiltMax}$		27,120 (3,064)
Tilting rigidity	in.lbf (Nm)/arcmin	C_{2K}		12,850 (1,452)
No-load running torque ($n_1 = 3000 \text{ min}^{-1}$) ⁵⁾	in.lbf (Nm)	T_{012}	i = 31 i = 91	24.8 (2.8) 17.7 (2.0)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J_{Gear}	i = 21 i = 31 i = 61 i = 91	$15.2 \cdot 10^{-4}$ (1.72) $10.3 \cdot 10^{-4}$ (1.16) $2.4 \cdot 10^{-4}$ (0.27) $1.8 \cdot 10^{-4}$ (0.20)

Motor data

			i = 21, 31		i = 61, 91	
DC bus voltage	VDC	U_D	320	600	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M_{Max}	350 (39.60)	351 (39.70)	270 (30.50)	289 (32.60)
Continuous stall torque	in.lbf (Nm)	M_0	157 (17.70)	158 (17.80)	120 (13.60)	120 (13.60)
Nominal torque	in.lbf (Nm)	M_N	113 (12.80)	122 (13.80)	58 (6.60)	43 (4.90)
Peak current ⁶⁾	A	I_{Max}	58.00	26.20	75.00	54.00
Nominal current	A	I_N	13.50	9.70	12.40	5.60
No-load speed ⁶⁾	min ⁻¹	n_0	3,700	4,326	6,380	7,180
Nominal speed ⁶⁾	min ⁻¹	n_N	2,875	3,300	5,375	6,000
Maximum power	kW	P_{Max}	8.30	11.30	11.18	13.00
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	$105.8 \cdot 10^{-4}$ (11.95)		$85.7 \cdot 10^{-4}$ (9.68)	
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	$121.2 \cdot 10^{-4}$ (13.70)		$101.2 \cdot 10^{-4}$ (11.43)	

General data

Protection class	IP64		
Operating temperature range F (°C)	+14 to +194 (-10 to +90)		
Mounting position	Any		
Lubrication	Synthetic oil, ISO VG 220		
Paint	RAL 5002 (Blue)		
Noise level ($n_1 = 3000 \text{ min}^{-1}$) dB(A)	≤ 65		
Weight without/with brake	lb _m (kg)	81.8/87.3 (37.1/39.6) at i = 21/31	79.2/84.5 (35.9/38.3) at i = 61/91
Direction of rotation	motor and gearhead in same direction		
Insulation class	F		

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

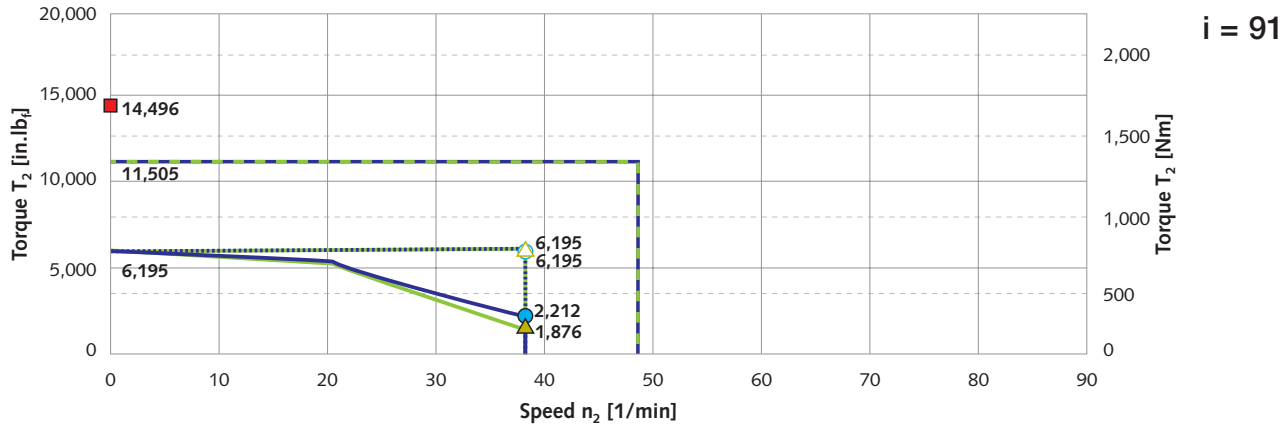
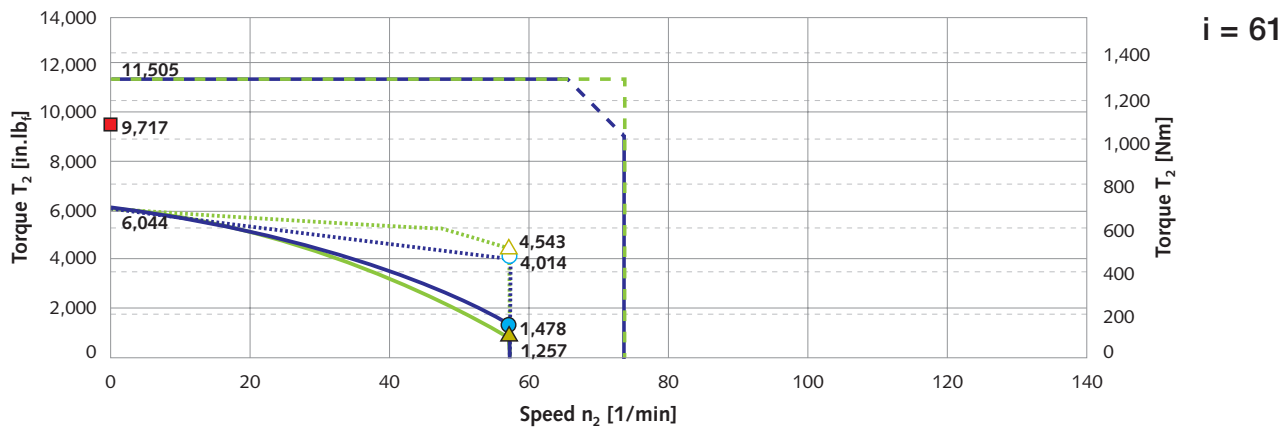
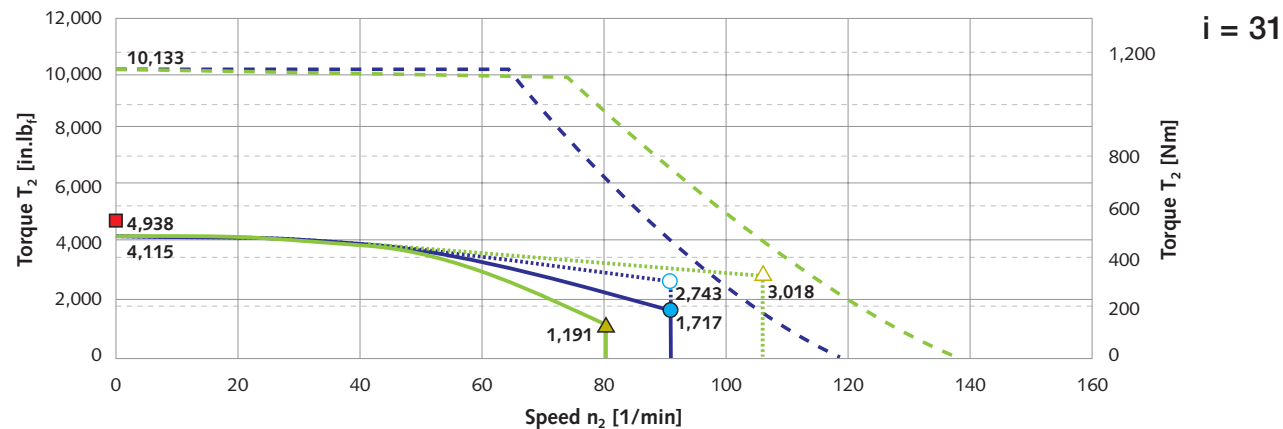
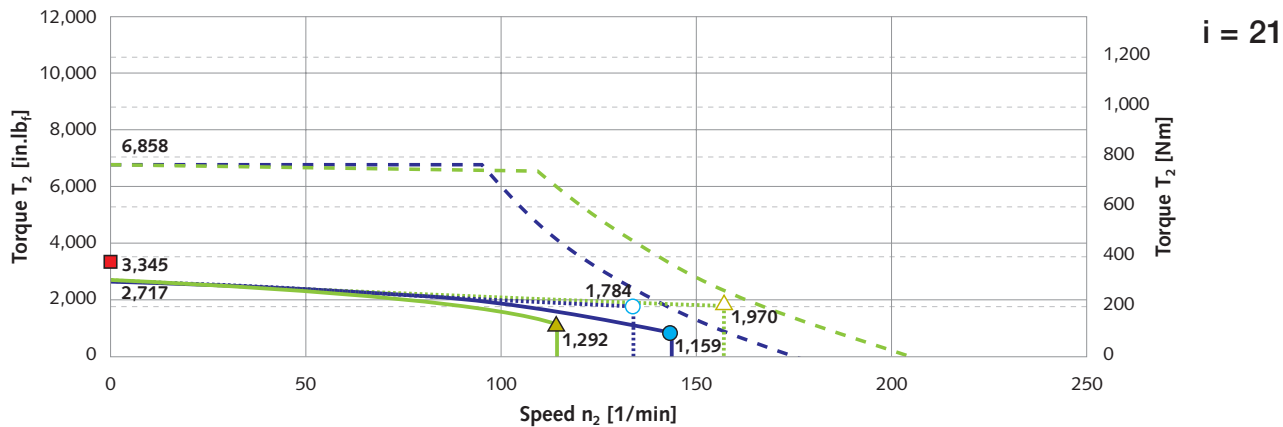
4) Based on the flange center

3) At 68 °F ambient temperature

5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be ± 10%. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



- | | | | |
|----------------------|----------------------------|----------------------|-------------------------|
| 320V DC w/ resolver: | — — — — Max. output torque | Nominal torque | ○ Nominal point |
| 600V DC w/ resolver: | — — — — Max. output torque | Nominal torque | △ Nominal point |
| 320V DC w/ encoder: | — — — — Max. output torque | ——— Nominal torque | ● Nominal point |
| 600V DC w/ encoder: | — — — — Max. output torque | ——— Nominal torque | ▲ Nominal point |
| | | | ■ Holding torque: brake |



TPMA 025 - Technical data and characteristic curves

Gearhead data

Ratio		i		110, 220
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T_{2B}		4,250 (480)
Emergency Stop torque ²⁾	in.lbf (Nm)	T_{2Not}		10,620 (1,200)
Nominal output torque	in.lbf (Nm)	T_{2N}		2,300 (260)
Maximum input speed	min ⁻¹	n_{1Max}		6,000
Nominal input speed ³⁾	min ⁻¹	n_{1N}		4,200
Torsional backlash	arcmin	j_t		≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C_{t21}		860 (97)
Maximum axial force ⁴⁾	lbf (N)	F_{2AMax}		930 (4,150)
Maximum tilting torque	in.lbf (Nm)	$M_{2TiltMax}$		3,660 (413)
Tilting rigidity	in.lbf (Nm)/arcmin	C_{2K}		4,870 (550)
No-load running torque ($n_1 = 3000 \text{ min}^{-1}$) ⁵⁾	in.lbf (Nm)	T_{012}		3.5 (0.4)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J_{Gear}	i = 110 i = 220	0.32*10 ⁻⁴ (0.036) 0.08*10 ⁻⁴ (0.009)

Motor data

		i = 110, 220		
DC bus voltage	VDC	U_D	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M_{Max}	37 (4.20)	37 (4.20)
Continuous stall torque	in.lbf (Nm)	M_0	15 (1.70)	15 (1.70)
Nominal torque	in.lbf (Nm)	M_N	12 (1.40)	12 (1.30)
Peak current ⁶⁾	A	I_{Max}	10.80	7.00
Nominal current	A	I_N	3.10	1.80
No-load speed ⁶⁾	min ⁻¹	n_0	7,300	7,800
Nominal speed ⁶⁾	min ⁻¹	n_N	5,625	6,200
Maximum power	kW	P_{Max}	1.72	1.85
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	7.6*10 ⁻⁴ (0.86)	
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	8.4*10 ⁻⁴ (0.95)	

General data

Protection class		IP64
Operating temperature range	F (°C)	+14 to +194 (-10 to +90)
Mounting position		Any
Lubrication		Synthetic oil, ISO VG 220
Paint		RAL 5002 (Blue)
Noise level ($n_1 = 3000 \text{ min}^{-1}$)	dB(A)	≤ 65
Weight without/with brake	lb _m (kg)	18.5/20.5 (8.4/9.3)
Direction of rotation		motor and gearhead in same direction
Insulation class		F

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

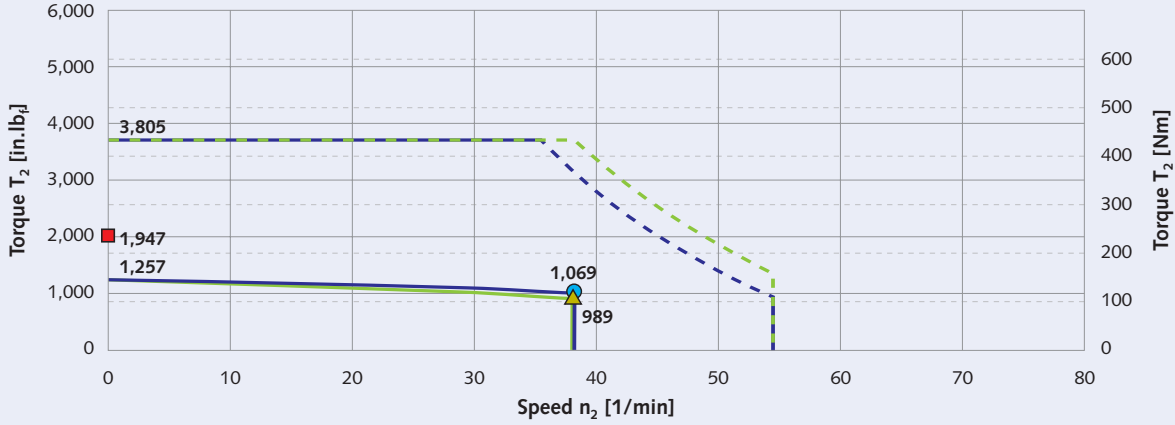
3) At 68 °F ambient temperature

4) Based on the flange center

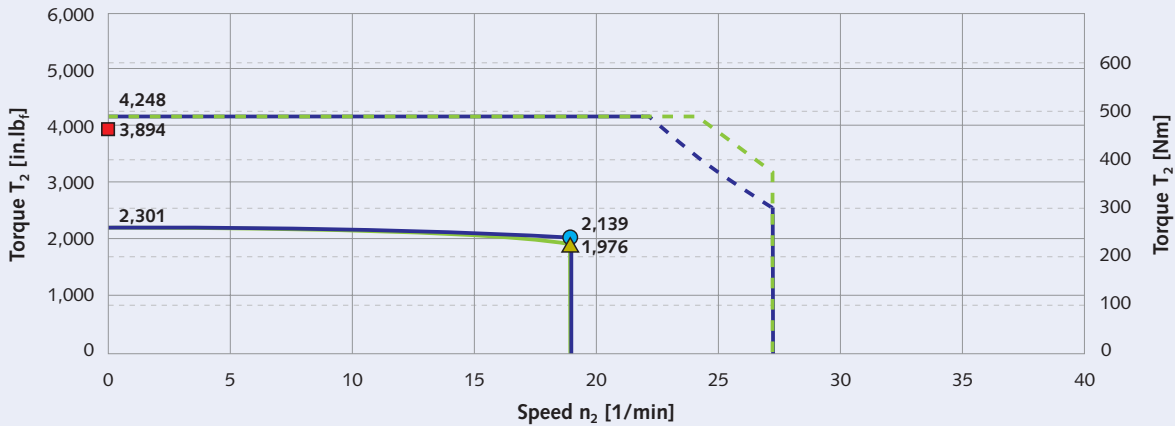
5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be $\pm 10\%$. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



$i = 110$



$i = 220$

- 320V DC: - - - Max. output torque — Nominal torque ● Nominal point
- 600V DC: - - - Max. output torque — Nominal torque ▲ Nominal point
- Holding torque: brake





TPMA 050 - Technical data and characteristic curves

Gearhead data

Ratio		i		110, 220
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T_{2B}		8,410 (950)
Emergency Stop torque ²⁾	in.lbf (Nm)	T_{2Not}		21,020 (2,375)
Nominal output torque	in.lbf (Nm)	T_{2N}		5,980 (675)
Maximum input speed	min ⁻¹	n_{1Max}		5,000
Nominal input speed ³⁾	min ⁻¹	n_{1N}		2,600
Torsional backlash	arcmin	j_t		≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C_{t21}		1,650 (186)
Maximum axial force ⁴⁾	lbf (N)	F_{2AMax}		1,380 (6,130)
Maximum tilting torque	in.lbf (Nm)	$M_{2TiltMax}$		11,460 (1,295)
Tilting rigidity	in.lbf (Nm)/arcmin	C_{2K}		4,960 (560)
No-load running torque ($n_1 = 3000 \text{ min}^{-1}$) ⁵⁾	in.lbf (Nm)	T_{012}		7.1 (0.8)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J_{Gear}	i = 110 i = 220	1.34*10 ⁻⁴ (0.151) 0.34*10 ⁻⁴ (0.038)

Motor data

		i = 110, 220		
DC bus voltage	VDC	U_D	320	600
Peak torque ⁶⁾	in.lbf (Nm)	M_{Max}	69 (7.80)	69 (7.80)
Continuous stall torque	in.lbf (Nm)	M_0	32 (3.60)	31 (3.50)
Nominal torque	in.lbf (Nm)	M_N	25 (2.80)	22 (2.50)
Peak current ⁶⁾	A	I_{Max}	19.60	13.70
Nominal current	A	I_N	4.20	2.60
No-load speed ⁶⁾	min ⁻¹	n_0	5,000	5,900
Nominal speed ⁶⁾	min ⁻¹	n_N	3,775	4,562
Maximum power	kW	P_{Max}	2.25	2.53
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	20.2*10 ⁻⁴ (2.28)	
Moment of inertia w/ resolver w/ brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	22.2*10 ⁻⁴ (2.51)	

General data

Protection class		IP64
Operating temperature range	F (°C)	+14 to +194 (-10 to +90)
Mounting position		Any
Lubrication		Synthetic oil, ISO VG 220
Paint		RAL 5002 (Blue)
Noise level ($n_1 = 3000 \text{ min}^{-1}$)	dB(A)	≤ 70
Weight without/with brake	lb _m (kg)	38.8/41.5 (17.6/18.8)
Direction of rotation		motor and gearhead in same direction
Insulation class		F

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

3) At 68 °F ambient temperature

4) Based on the flange center

5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead



TPMA 110 - Technical data and characteristic curves

Gearhead data

Ratio		i		110, 220
Maximum acceleration torque ¹⁾	in.lbf (Nm)	T_{2B}		23,010 (2,600)
Emergency Stop torque ²⁾	in.lbf (Nm)	T_{2Not}		57,520 (6,500)
Nominal output torque	in.lbf (Nm)	T_{2N}		13,890 (1,570)
Maximum input speed	min ⁻¹	n_{1Max}		4,500
Nominal input speed ³⁾	min ⁻¹	n_{1N}		3,300
Torsional backlash	arcmin	j_t		≤ 1
Torsional rigidity	in.lbf (Nm)/arcmin	C_{t21}		4,870 (550)
Maximum axial force ⁴⁾	lbf (N)	F_{2AMax}		2,260 (10,050)
Maximum tilting torque	in.lbf (Nm)	$M_{2TiltMax}$		27,120 (3,064)
Tilting rigidity	in.lbf (Nm)/arcmin	C_{2K}		12,850 (1,452)
No-load running torque ($n_1 = 3000 \text{ min}^{-1}$) ⁵⁾	in.lbf (Nm)	T_{012}		15.0 (1.70)
Moment of inertia reflected to the input	in.lbf.s ² (kgcm ²)	J_{Gear}	i = 110 i = 220	5.72*10 ⁻⁴ (0.646) 1.41*10 ⁻⁴ (0.159)

Motor data

				i = 110, 220	
DC bus voltage	VDC	U_D	320	600	
Peak torque ⁶⁾	in.lbf (Nm)	M_{Max}	270 (30.50)	289 (32.60)	
Continuous stall torque	in.lbf (Nm)	M_0	120 (13.60)	120 (13.60)	
Nominal torque	in.lbf (Nm)	M_N	58 (6.60)	43 (4.90)	
Peak current ⁶⁾	A	I_{Max}	75.00	54.00	
Nominal current	A	I_N	12.40	5.60	
No-load speed ⁶⁾	min ⁻¹	n_0	6,380	7,180	
Nominal speed ⁶⁾	min ⁻¹	n_N	5,375	6,000	
Maximum power	kW	P_{Max}	11.18	13.00	
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	85.7*10 ⁻⁴ (9.68)		
Moment of inertia w/ resolver w/o brake	in.lbf.s ² (kgcm ²)	$J_{Mot.}$	101.2*10 ⁻⁴ (11.44)		

General data

Protection class		IP64
Operating temperature range	F(°C)	+14 to +194 (-10 to +90)
Mounting position		Any
Lubrication		Synthetic oil, ISO VG 220
Paint		RAL 5002 (Blue)
Noise level ($n_1 = 3000 \text{ min}^{-1}$)	dB(A)	≤ 70
Weight without/with brake	lb _m (kg)	96.1/101.4 (43.6/46.0)
Direction of rotation		motor and gearhead in same direction
Insulation class		F

1) 1000 cycles per hour

2) Permissible 1000 times during the life span of the gearhead

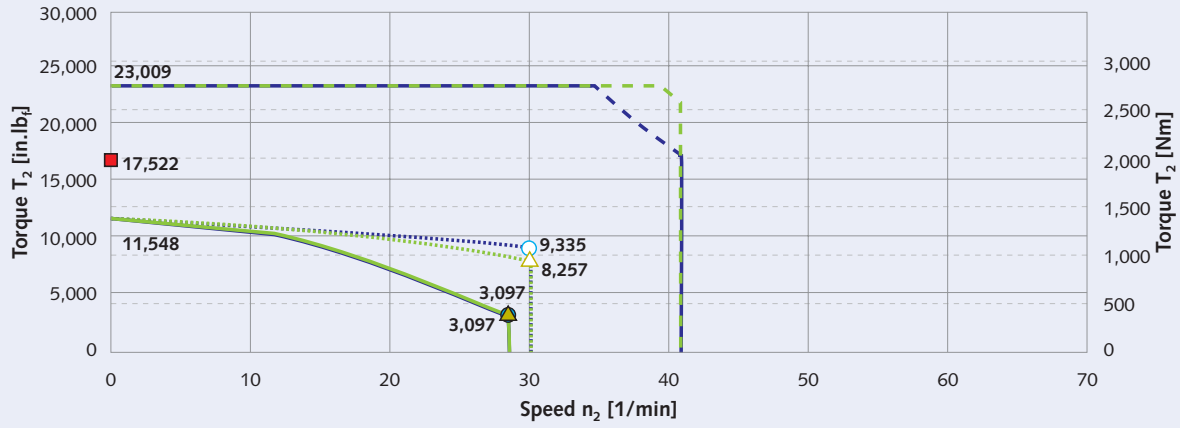
4) Based on the flange center

3) At 68 °F ambient temperature

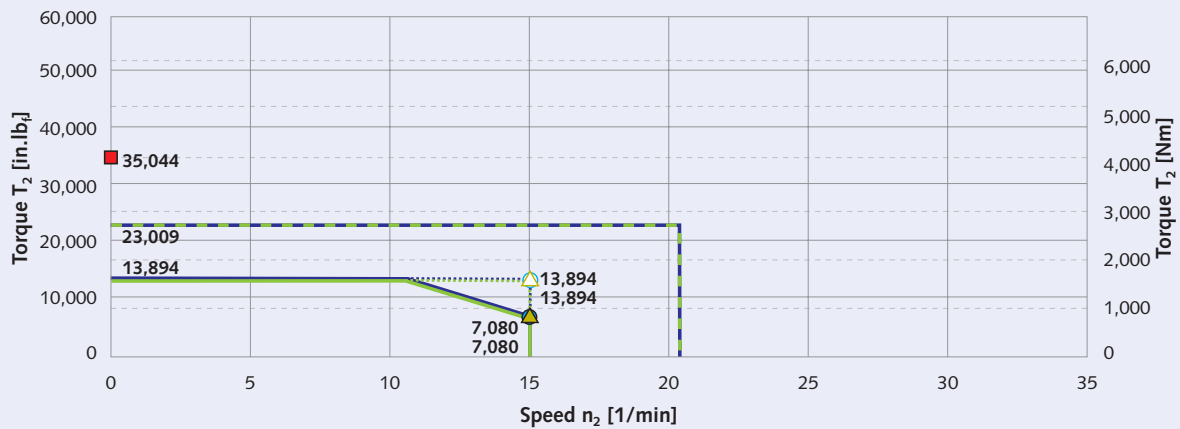
5) At 68 °F gearhead temperature

6) Limit motor values to maximum values of the gearhead

The tolerances of T, I, n may be ± 10%. In circumstances the maximum allowable current has to be limited because of the maximum allowable torque of the mounted gearbox.



i = 110

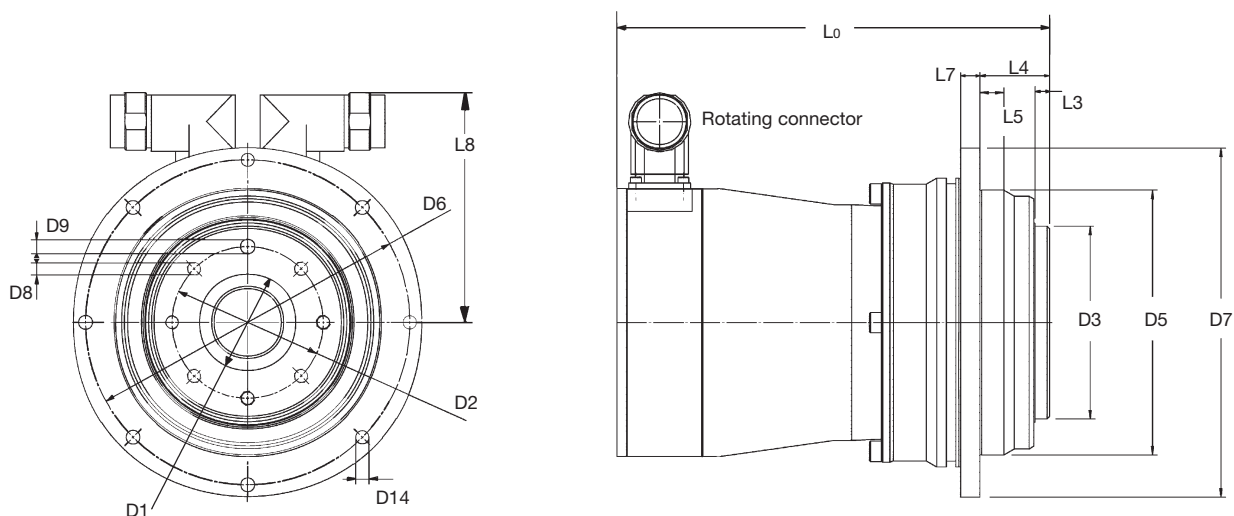


i = 220

- | | | | |
|----------------------|--------------------------|----------------------|-------------------------|
| 320V DC w/ resolver: | - - - Max. output torque | Nominal torque | ○ Nominal point |
| 600V DC w/ resolver: | - - - Max. output torque | Nominal torque | △ Nominal point |
| 320V DC w/ encoder: | - - - Max. output torque | —— Nominal torque | ● Nominal point |
| 600V DC w/ encoder: | - - - Max. output torque | —— Nominal torque | ▲ Nominal point |
| | | | ■ Holding torque: brake |



TPM 004-TPM 110 - Drawings



All dimensions in inch (mm)

TPM	004		010		025		050		110	
	21/31	61/91	21/31	61/91	21/31	61/91	21/31	61/91	21/31	61/91
Ratio										
D1 H7	0.7874 (20)		1.2402 (31.5)		1.5748 (40)		1.9685 (50)		3.1496 (80)	
D2	1.2402 (31.5)		1.9685 (50)		2.4803 (63)		3.1496 (80)		4.9213 (125)	
D3 h7	1.5748 (40)		2.4803 (63)		3.1496 (80)		3.9370 (100)		6.2992 (160)	
D5 h7	2.5197 (64)		3.5433 (90)		4.3307 (110)		5.5118 (140)		7.8740 (200)	
D6	3.1102 (79)		4.2913 (109)		5.3150 (135)		6.6142 (168)		9.1732 (233)	
D7	3.3852 (86)		4.6457 (118)		5.7087 (145)		7.0472 (179)		9.7244 (247)	
D8	7xM5		7xM6		11xM6		11xM8		11xM10	
D9	1x0.1969 (5)		1x0.2362 (6)		1x0.2362 (6)		1x0.3150 (8)		1x0.3937 (10)	
D14	8x0.1772 (4.5)		8x0.2165 (5.5)		8x0.2165 (5.5)		12x0.2598 (6.6)		12x0.3543 (9)	
L3	0.1181 (3)		0.2362 (6)		0.2362 (6)		0.2362 (6)		0.3150 (8)	
L4	0.7677 (19.5)		1.1811 (30)		1.1417 (29)		1.4961 (38)		1.9685 (50)	
L5	0.2756 (7)		0.3937 (10)		0.3937 (10)		0.5748 (14.6)		0.5906 (15)	
L7	0.1575 (4)		0.2756 (7)		0.3150 (8)		0.3937 (10)		0.4724 (12)	
L8	3.0551 (77.6)		3.2126 (81.6)		3.7598 (95.5)		4.5276 (115)/4.9410 (125.5)		4.9410 (125.5)	

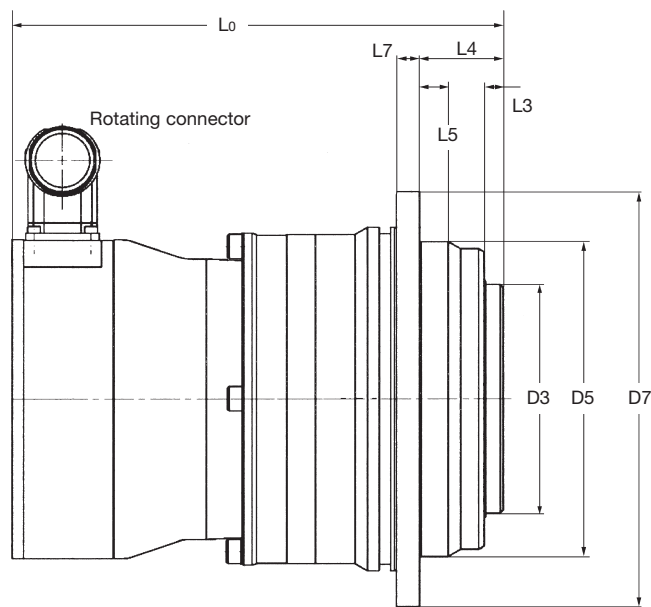
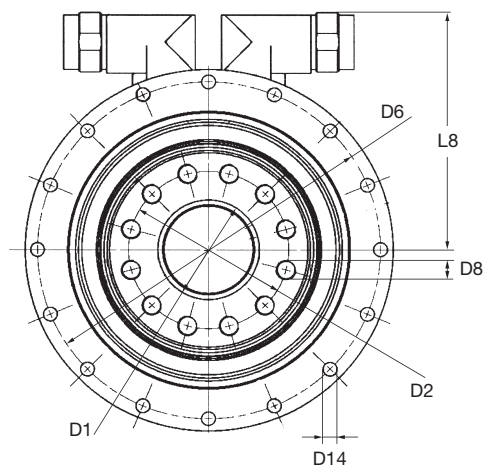
Length L₀ **without Brake**

Resolver	5.0393 (128)	4.4488 (113)	6.1024 (155)	5.5118 (140)	7.0866 (180)	5.9449 (151)	10.1968 (259)	7.3228 (186)	11.2205 (285)	10.6299 (270)
EnDat	6.1811 (157)	5.5905 (142)	8.1260 (206.4)	7.5197 (191)	8.9370 (227)	7.7165 (196)	11.8110 (300)	8.9173 (226.5)	12.8346 (326)	12.2441 (311)
Hiperface	6.1811 (157)	5.5905 (142)	7.2441 (184)	6.6929 (170)	8.7598 (222.5)	7.5590 (192)	10.7874 (274)	8.9173 (226.6)	11.8110 (300)	11.2205 (285)

Length L₀ **with Brake**

Resolver	6.5748 (167)	5.9842 (152)	7.2441 (184)	6.6732 (169.5)	7.9527 (202)	6.8110 (173)	11.8110 (300)	8.3071 (211)	12.9134 (328)	12.2441 (311)
EnDat	7.7559 (197)	7.1653 (182)	9.5433 (242.4)	9.0157 (229)	10.5512 (268)	9.3504 (237.5)	14.3307 (364)	10.7677 (273.5)	15.3543 (390)	14.7638 (375)
Hiperface	7.8740 (200)	7.2835 (185)	8.6417 (219.5)	8.0670 (204.9)	9.8819 (251)	8.7008 (221)	13.6220 (346)	10.0984 (256.5)	14.6456 (372)	14.0551 (357)

TPMA 025-TPMA 110 - Drawings



All dimensions in inch (mm)

TPM	025	050	110
Ratio	110/220	110/220	110/220
D1 H7	1.5748 (40)	1.9685 (50)	3.1496 (80)
D2	2.4803 (63)	3.1496 (80)	4.9213 (125)
D3 h7	3.1496 (80)	3.9370 (100)	6.2992 (160)
D5 h7	4.3307 (110)	5.5118 (140)	7.8740 (200)
D6	5.3150 (135)	6.6142 (168)	9.1732 (233)
D7	5.7087 (145)	7.0472 (179)	9.7244 (247)
D8	12xM8	12xM10	12xM12
D14	16x0.2165 (5.5)	24x0.2598 (6.6)	24x0.3543 (9)
L3	0.2362 (6)	0.2362 (6)	0.3150 (8)
L4	1.1417 (29)	1.4961 (38)	1.9685 (50)
L5	0.3937 (10)	0.5748 (14.6)	0.5906 (15)
L7	0.3150 (8)	0.3937 (10)	0.4724 (12)
L8	3.7598 (95.5)	4.5276 (115)	4.9409 (125.5)
Length L_0 without Brake			
Resolver	6.7323 (171)	8.7008 (221)	12.4212 (315.5)
EnDat	8.5433 (217)	10.3543 (263)	14.0354 (356.5)
Hiperface	8.3858 (213)	10.3543 (263)	13.0118 (330.5)
Length L_0 with Brake			
Resolver	7.5984 (193)	9.7244 (247)	14.0354 (356.5)
EnDat	10.1811 (258.6)	12.2047 (310)	16.5551 (420.5)
Hiperface	9.5118 (241.6)	11.4960 (292)	15.8464 (402.5)



Options

Electrically-released holding brake

A compact permanent-magnet brake is available for holding the rotor when the power is off. It is characterized by backlash-free operation, drag-free when disengaged, unlimited ON time and constant torque at high operating temperatures.

Data		TPM 004	TPM 010, TPM(A) 025	TPM(A) 050 (i=61/91/110/220)	TPM(A) 110, TPM 050 (i=21/31)
Holding torque at 68°F (20°C)	in.lbf	8.85	17.70	39.82	159.29
	(Nm)	(1)	(2)	(4.5)	(18)
Holding torque at 212°F (100°C)	in.lbf	7.1	15.93	35.40	132.74
	(Nm)	(0.8)	(1.8)	(4.0)	(15)
Dynamic torque	in.lbf	7.08	15.04	33.63	132.74
	(Nm)	(0.8)	(1.7)	(3.8)	(15)
Moment of inertia	in.lbf·s ²	0.1859*10 ⁻⁴	0.6018*10 ⁻⁴	1.5930*10 ⁻⁴	0.1469
	(kgcm ²)	(0.021)	(0.068)	(0.18)	(1.66)
Weight	lb _m	0.2426	0.3308	0.6615	1.9845
	(kg)	(0.11)	(0.15)	(0.30)	(0.9)
Release/set time	ms	12/8	25/6	35/7	50/10
Coil resistance at 68°F (20°C)	Ω	53-62	48-56	44-52	22-26
Supply voltage	VDC	24 +6% -10%			
Current	A	0.45	0.50	0.55	1.1

Temperature sensors

The following temperature sensors are available with various servo controllers. They measure temperature directly at the motor coil.

- PTC - Positive temperature coefficient thermistor
- KTY - Linear temperature coefficient thermistor
- NTC - Negative temperature coefficient thermistor

Feedback systems

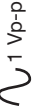
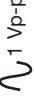


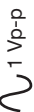
Various feedback systems are available for position encoding.

A single turn brushless resolver feedback is standard for TPM. This robust feedback device is suitable for many applications with normal demands for smooth running and precision.

For higher technical demands, optical encoders are available from Heidenhain and Stegmann. Using the EnDat® and Hiperface® interfaces, position values as well as information regarding startup and drive data can be stored to and retrieved from the TPM.

See page 30 for the respective pin assignments.

Comparison of TPM feedback devices

Parameter	Unit	HEIDENHAIN			STEGMANN		Resolver (2 Pole)
		ERN1185/ERN1387	ECN1113/ECN1313	EQN1125/EQN1325	SRS50/66K	SRM50/66K	
Feedback type		Incremental	Abs. Singleturn	Abs. Multiturn	Abs. Singleturn	Abs. Multiturn	Abs. Singleturn
Operating voltage	V	5	5	5	7 ... 12	7 ... 12	7 (10 KHz)
Data interface		-	EnDat	EnDat	Hiperface	Hiperface	-
Electronic type plate		-	✓	✓	✓	✓	-
Form of the incremental signals							-
Number of sin/cos periods per revolution		2048/2048	512/2048	512/2048	1024	1024	1
Reference track available		✓	-	-	-	-	-
Absolute position when main power is on		✓ (within 1 revolution)	✓ (within 1 revolution)	✓	✓ (within 1 revolution)	✓	✓ (within 1 revolution)
Absolute resolution	Pos./rev	1 Sin/Cos period	8192	8192	32768	32768	1 Sin/Cos period
Multiturn function		-	-	✓	-	✓	-
Multiturn measuring range		-	-	4096	-	4096	-
Maximum operating temperature	°C	120	115	115	115	115	150
Minimum operating temperature	°C	-30	-30	-30	-20	-20	-55
Moment of inertia	in.lb.s ² (kgcm ²)	0.035*10 ⁻⁴ / 0.23*10 ⁻⁴ (0.004/0.026)	0.035*10 ⁻⁴ / 0.23*10 ⁻⁴ (0.004/0.026)	0.035*10 ⁻⁴ / 0.23*10 ⁻⁴ (0.004/0.026)	0.0885*10 ⁻⁴ (0.01)	0.0885*10 ⁻⁴ (0.01)	TPM004 0.0177*10 ⁻⁴ (0.002) TPM(A) 010-050 0.2655*10 ⁻⁴ (0.03) TPM(A) 110 2.0709*10 ⁻⁴ (0.234)
Shock after EN60068-2-6		< 100g/6ms	< 100g/6ms	< 100g/10ms	< 100g/10ms	< 100g/10ms	< 100g/11ms
Vibration (55-2000Hz) after EN60068-2-27		< 10g	< 20g / 10g	< 20g / 10g	< 20g (10-2000Hz)	< 20g (10-2000Hz)	< 20g (10-500Hz)



Accessories

Cables

Matching signal and power cables for the tested servo controllers listed on page 29 are available.

Please supply the following data when you order:

- Complete TPM description
- Desired length of cable, available in lengths of 5, 10, 15, 20, 25, 30, 40 and 50 meters
- Exact type description of servo controller to be used

The cables have excellent quality:

- Suitable for cable tracks, because of highly flexible wires in accordance with DIN VDE 0295, class 6
- Oil and fire proof
- Free of halogen, silicon and CFC

Mechanical characteristics:

Maximum tensile strength	Static 7258 lb _f /sq in (50 N/mm ²) Conductor diameter Dynamic 2903 lb _f /sq in (20 N/mm ²) Conductor diameter
Maximum permissible torsion	± 1,181 °/in (30 °/m)
Permissible operating temperature	Static: -58 °F to +176 °F (-50 to +80 °C) Flexed: -4 °F to +158 °F (-20 to +70 °C)
Minimum permissible bending radius	10 x D (outer diameter of cable) *)
Number of bending cycles	5 million (at bending radius 10 x D)
Maximum permissible acceleration	197 in/sec ² (5 m/sec ²)
Maximum permissible speed	7087 in/min (180 m/min)

*)	D	Conductor diameter
Power cable TPM 004 - TPM(A) 050 (i=61, 91, 110, 220) TPM 050 (i=21, 31), TPM(A) 110	0.48 in (12.2 mm) 0.59 in (15.1 mm)	4 x 0.0023 sq in (1.5 mm ²) + 2 x 0.0012 sq in (0.75 mm ²) 4 x 0.0039 sq in (2.5 mm ²) + 2 x 0.0015 sq in (1 mm ²)
Signal cable	0.39 in (10 mm)	



Servo controllers

The TPM/TPMA AC servo actuators can be operated with a wide variety of servo controllers. The subsequent table lists all tested controllers with information on the correct option choices, feedbacks, temperature sensor and DC bus voltage.

For a number of these, a written startup manual is available. It contains all relevant parameter settings of the respective manufacturer to ensure that the startup can be performed in the shortest possible time.

Manufacturer	Series/type	Feedback device				Temperature sensor			DC bus voltage	
		Resolver	Incremental	EnDat interface	Hiperface interface	PTC	NTC	KTY 84-130	320V DC	600V DC
AMK ²⁾	AMKASYN KU ³⁾	✗	-	✗	✗	✗	-	-	✗	✗
Bosch Rexroth ²⁾	Servo Dyn D	✗	-	✗	-	-	✗	-	-	✗
Bosch Rexroth (Indramat) ¹⁾	Ecodrive 03 ⁴⁾	✗	-	✗	-	✗	-	-	✗	✗
	Ecodrive 03, 16A	✗	-	-	-	✗	-	-	✗	✗
	DIAX 04	✗	-	✗	-	✗	-	-	✗	✗
B & R ¹⁾	AcoPos	✗	-	✗	-	✗	-	✗	✗ ⁶⁾	✗
CT	UniDrive ¹⁾	✗	-	-	✗	✗	-	-	✗ ⁵⁾	✗
	UniDrive SP ²⁾	✗	-	✗	✗	✗	-	-	✗ ⁵⁾	✗
Danaher motion (Atlas Copco)	DMC 2	✗	-	-	-	✗	-	-	✗	✗
Danaher motion ¹⁾ (Seidel Kollmorgen)	Servostar 600/400	✗	-	✗	✗	✗	-	-	✗	✗
ELAU ²⁾	PACDrive MC-4	-	-	-	✗	✗	-	-	✗	✗
ESR Pollmeier	Trio-/MidiDrive A	✗	-	-	-	✗	-	-	✗	✗
	Trio-/MidiDrive C	✗	-	✗	-	✗	-	-	✗	✗
	Trio-/MidiDrive D	✗	-	✗	✗	✗	-	-	✗	✗
Jetter	Jetmove 6xx	✗	-	✗	✗	✗	-	-	✗	✗
KEB ¹⁾	Combivert S4	✗	✗	-	-	✗	-	-	✗	✗
Lenze ¹⁾	Global Drive 93xx	✗	-	-	✗	✗	-	✗	-	✗
Nord ²⁾	SK 1000 E	✗	-	-	-	-	-	✗	-	✗
Parker Hannifin ²⁾ (Hauser)	Compax	✗	-	-	✗	✗	-	✗	✗	✗
S.B.C. ²⁾	HPD	✗	-	-	-	✗	-	-	✗	✗
	LVD	✗	-	-	-	✗	-	-	✗	-
Siemens ¹⁾	SimoDrive 611U	✗	✗	✗	-	-	-	✗	-	✗
	SimoDrive 611D/840D	-	✗	✗	-	-	-	✗	-	✗
	Master Drive MC	✗	✗	✗	-	✗	-	✗	-	✗

Information on additional controllers can be supplied on request.

✗ = possible

- = not available

1) = Startup manual available

2) = Startup manual in preparation

3) = Version with EnDat interface needs Encoder with 512 SinCos

4) = Use of TPM 004, 010 please contact **alpha geardrives**

5) = Low voltage model

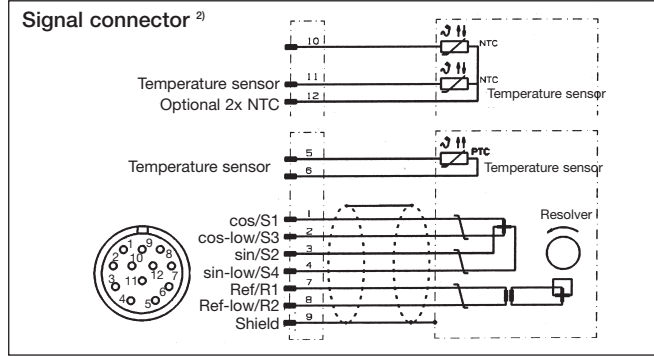
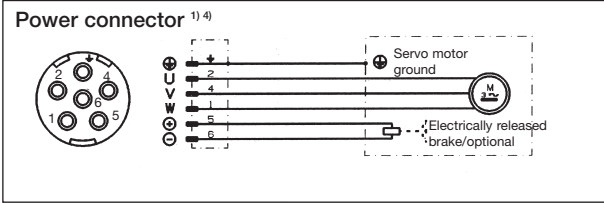
6) = Low voltage model, supported TPM type on request

Operating manuals and installation guides are available at www.alphagear.com.

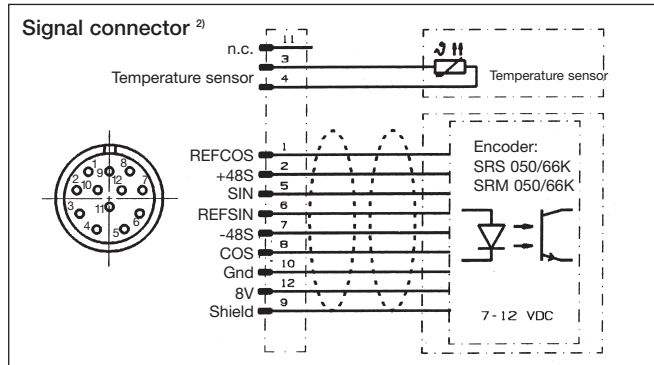
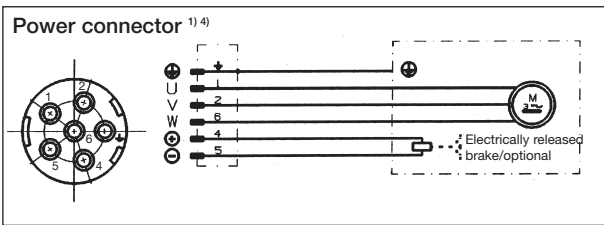


Plug connections

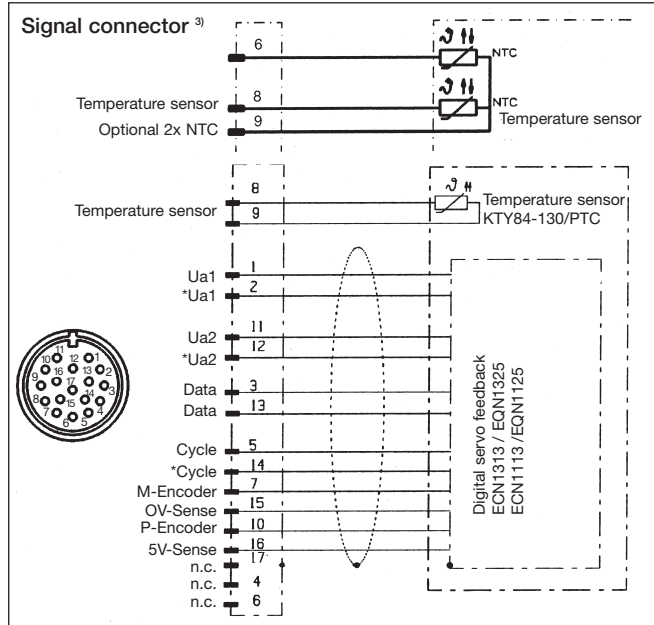
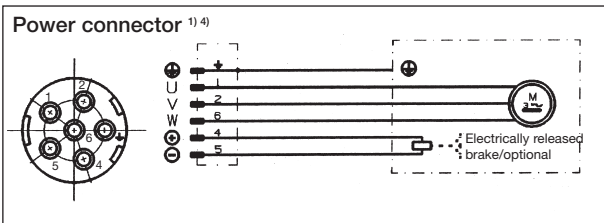
Resolver, Singleturn



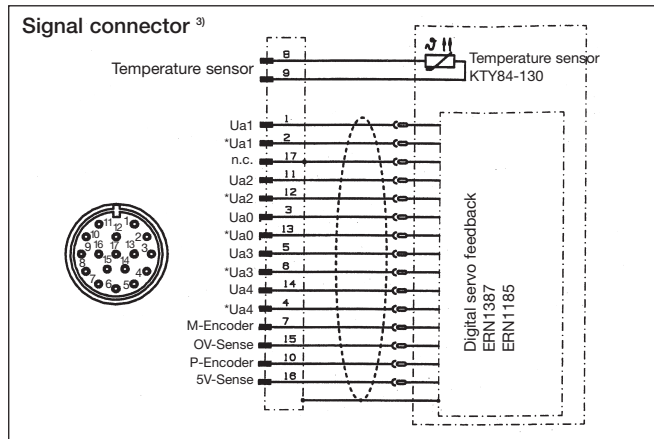
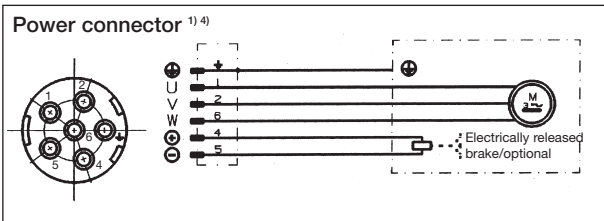
Stegmann encoder, Single- and Multiturn Hiperface®



Heidenhain encoder, Single- and Multiturn EnDat®



Heidenhain encoder, incremental



- 1) = series B, 6 poles, pin contact Ø 2mm
- 2) = series A, 12 poles, P type, pin contact Ø 1mm, housing code 0°
- 3) = series A, 17 poles, E type, pin contact Ø 1mm, housing code 0°
- 4) = connection of ground wire to housing according to VDE 0627

Ordering codes

TPM 025 - 021M - 600K - BP1

Size

TPM 004 / 010 / 025 / 050 / 110
TPMA 025 / 050 / 110

Ratio

21 / 31 / 61 / 91 (TPM)
110 / 220 (TPMA)

Motor encoder

R = Resolver
S = Singleturn absolute encoder EnDat[®]
M = Multiturn absolute encoder EnDat[®]
N = Singleturn absolute encoder Hiperface[®]
K = Multiturn absolute encoder Hiperface[®]
I = Incremental encoder

Backlash

1 = Standard < 3 (5) arcmin
0 = Reduced < 1 (3) arcmin
(values in brackets: TPM 004)

Brakes

BP = Permanent magnet brake
OH = Without brake

Temperature sensor

P = PTC
N = NTC
K = KTY 84-130

DC bus voltage

320 = 320V DC at controller input
voltage 1x230V/3x230V AC
600 = 600V DC at controller input
voltage 3x400V AC

Additional options without codes

- Straight plug connections
- Painted in RAL 9005 (black)
- Synthetic oil, ISO PG68
- Explosionproof model (on request)
- Grease Lubrication



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