

TB motor properties
DS01046
Issue C
1. Description

This datasheet details the electrical, thermal and mechanical properties of the TB series of tubular linear motors. For a more detailed explanation of these properties please see datasheet DS01051.

2. Electrical properties

MOTOR TYPE	3810	3808	3806	3804	2510	2508	2506	2504	units
Peak force @ 25°C ambient for 1 sec	1522	1521	1521	1521	959	958	936	624	N
Peak current @ 25°C ambient for 1 sec	17.3	21.6	28.8	43.2	24.6	30.7	40	40	A _{pk}
With 25x25x2.5cm heatsink plate									
Continuous stall force @ 25°C ambient	248.8	210.2	167.3	121.5	104.3	87.3	70.5	51.1	N
Continuous stall current @ 25°C ambient	2.00	2.11	2.24	2.44	1.89	1.98	2.13	2.31	A _{rms}
	2.83	2.98	3.17	3.45	2.67	2.80	3.01	3.27	A _{pk}
Without heatsink plate									
Continuous stall force @ 25°C ambient	216.5	180.3	141.9	101.1	92.7	77.2	60.6	43.3	N
Continuous stall current @ 25°C ambient	1.74	1.81	1.90	2.03	1.68	1.75	1.83	1.96	A _{rms}
	2.46	2.56	2.69	2.87	2.38	2.48	2.59	2.77	A _{pk}
Force constant (sine commutation)	124.4	99.6	74.7	49.8	55.2	44.1	33.1	22.1	N/A _{rms}
	88.0	70.4	52.8	35.2	39.0	31.2	23.4	15.6	N/A _{pk}
Back EMF constant (phase to phase)	101.6	81.3	61.0	40.0	45.0	36.0	27.0	18.0	V _{pk} /m/s
Fundamental motor constant	19.36	17.29	15.02	12.24	10.21	9.14	7.92	6.48	N/√W
Eddy current loss	74.00	59.20	44.40	29.60	16.70	13.36	10.02	6.68	N/m/s
Resistance @ 25°C (phase to phase)	21.41	17.13	12.85	8.56	15.04	12.03	9.02	6.02	Ohm
Resistance @ 100°C (phase to phase)	27.60	22.08	16.56	11.04	19.39	15.51	11.63	7.75	Ohm
Inductance @ 1kHz (phase to phase)	20.50	16.40	12.30	8.20	9.75	7.80	5.85	3.90	mH
Electrical time constant	0.96	0.96	0.96	0.96	0.63	0.63	0.63	0.63	ms
Continuous working voltage	320	320	320	320	320	320	320	320	V d.c.
Pole pitch (one electrical cycle)	71.2	71.2	71.2	71.2	51.2	51.2	51.2	51.2	mm

3. Thermal properties

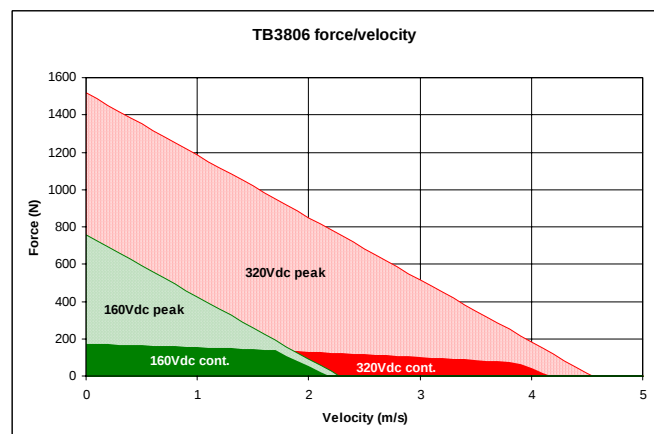
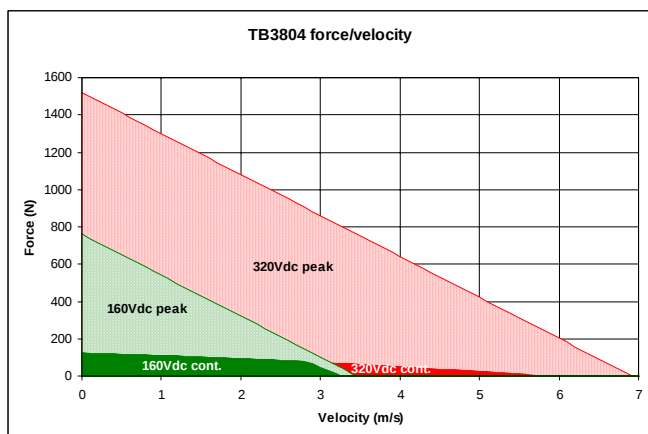
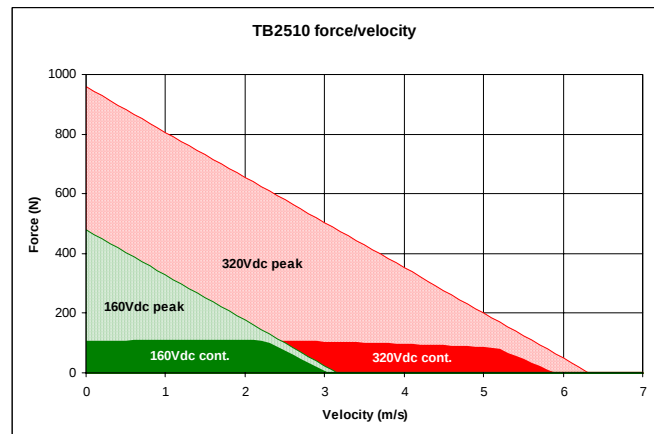
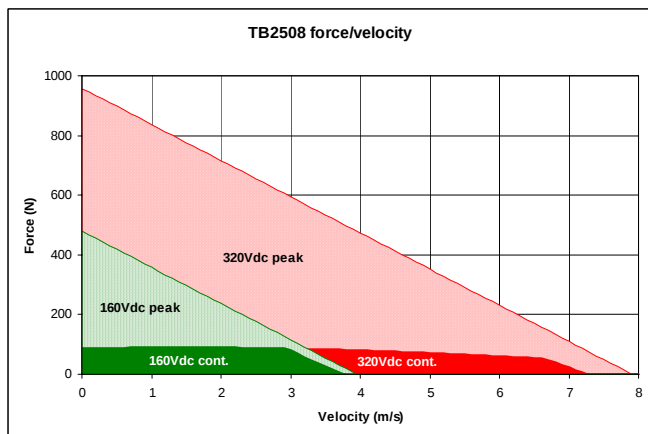
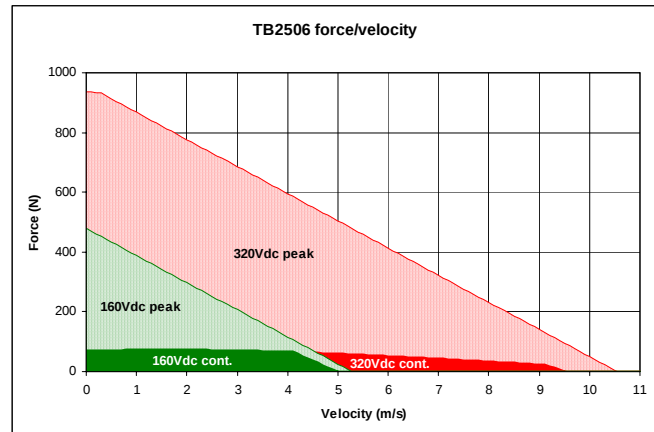
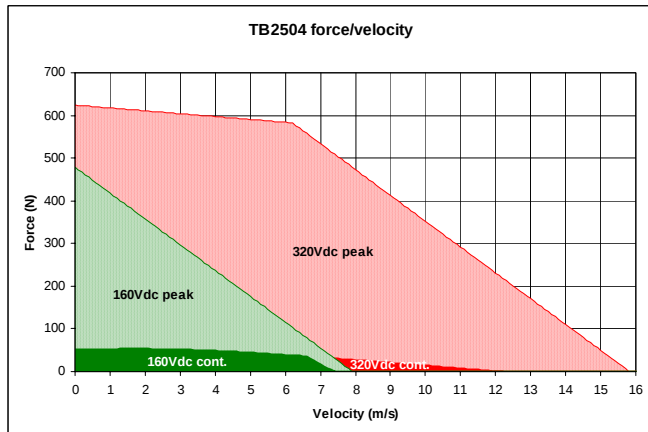
MOTOR TYPE	3810	3808	3806	3804	2510	2508	2506	2504	units
Maximum phase temperature	100	100	100	100	100	100	100	100	°C
Thermal resistance R _{th} _{phase-housing}	0.10	0.12	0.17	0.27	0.14	0.17	0.21	0.30	°C/W
With 25x25x2.5cm heatsink plate									
Power dissipation @ 25°C ambient	166.7	147.1	125.0	98.7	104.2	91.5	78.9	62.0	Watt
Thermal resistance R _{th} _{housing-ambient}	0.35	0.39	0.43	0.49	0.58	0.65	0.74	0.91	°C/W
Without heatsink plate									
Power dissipation @ 25°C ambient	125.0	108.7	89.3	68.2	82.4	71.4	58.6	44.6	Watt
Thermal resistance R _{th} _{housing-ambient}	0.50	0.57	0.67	0.83	0.77	0.88	1.07	1.38	°C/W
Thermal time constant	1815	1678	1541	1360	1306	1202	1105	986	s

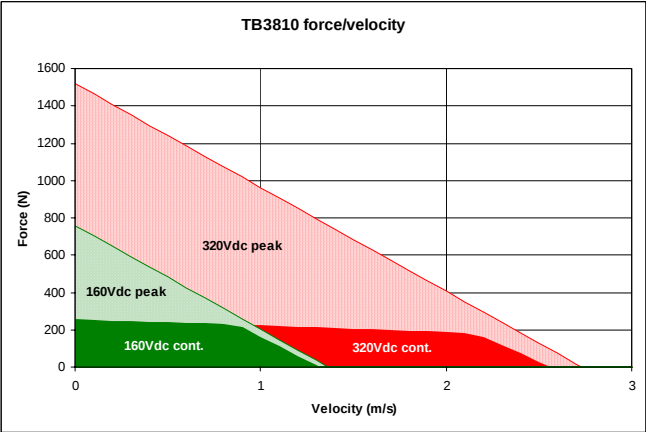
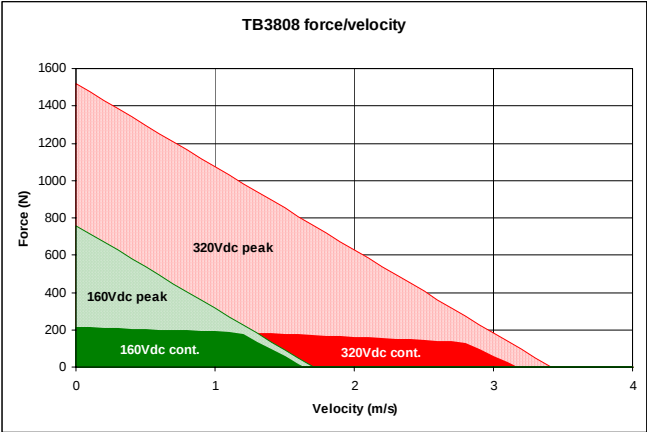
4. Mechanical properties

MOTOR TYPE	3810	3808	3806	3804	2510	2508	2506	2504	units
Forcer mass (excluding bearings)	5.15	4.15	3.15	2.15	2.45	2.00	1.50	1.05	Kg
Thrust rod mass/metre	8.3	8.3	8.3	8.3	3.5	3.5	3.5	3.5	Kg/m
Forcer mass (including bearings)	5.90	4.90	3.90	2.90	3.25	2.75	2.25	1.45	Kg
Motor module mass (excluding forcer)/m	15.2	15.2	15.2	15.2	10.4	10.4	10.4	10.4	Kg/m
Forcer length (including buffers)	380	309	238	167	276	225	174	121	mm

5. Force / velocity profiles

These profiles assume the continuous working voltage is available across the motor (there are no amplifier limitations) and that there is an additional heatsink plate. The continuous ratings are for a maximum motor phase temperature of 100°C and include cooling effects from motor movement while peak ratings are for an initial motor phase temperature of 25°C rising to 100°C.





6. Overload characteristics

This graph shows the time required to heat the motor phases from 25°C to 100°C for a given peak current and a typical motor from the range.

