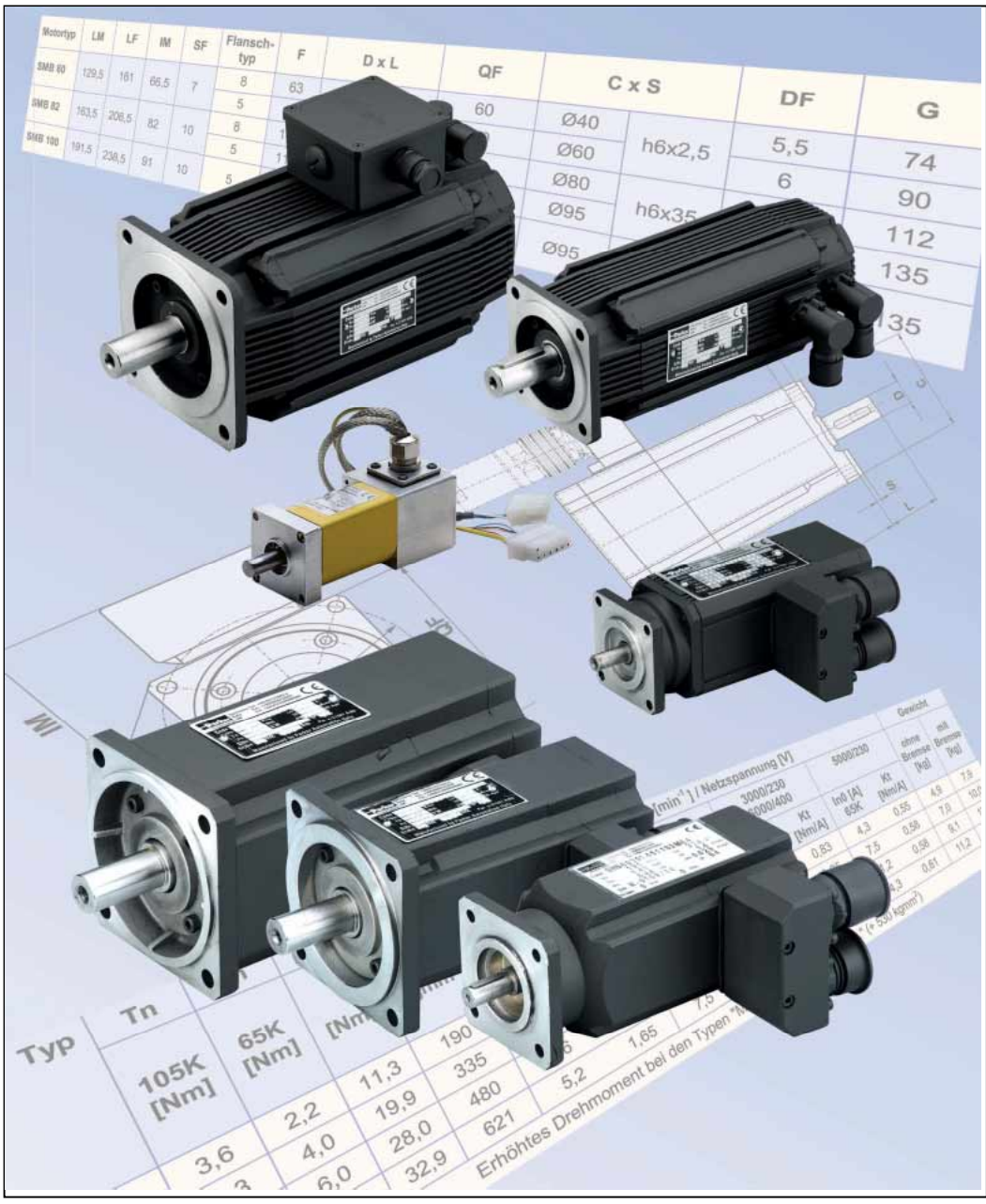
Synchronous Servo Motors

SMH and MH series

Manual: 192-061020 N4
Version 4 , May 2004



Contents

Synchronous Servo Motors made by Parker Hannifin

Modern electric drive technology requires synchronous servomotors meeting the requirements of individual applications. Parker servo motors were designed to meet the requirements for variable speed drives.

SMH synchronous servo motors

An outstanding characteristic of SMH synchronous servomotors is their low rotor moment of inertia. Typical areas of usage for these motors are for packing machines or automatic pressing and assembly machines for which rapid accelerations and delays are required.
SMH servo motors have smooth surfaces as well as depressions in the mounting areas that make it very easy to mount them on the gearbox.
The 6 design sizes are available in different flange dimensions with edge lengths of 40, 60, 70, 82, 100, 115, 130, 145 and 142 mm and with different shaft diameters in a power range of 0.2 to 15 Nm (Over-temperature 65K).
The motors can be equipped with different moments of inertia, which facilitates the adaptation to different applications.

MH synchronous servo motors

MH series servo motors stand out due to their wide output range as well as a multitude of available options. Stall torques of the MH motor series cover a range of 0.2 to 90 Nm (Over-temperature 65K). 5 design sizes are available in 7 flange sizes with 56, 70, 96, 105, 116, 145 and 205 mm. The motors can be equipped with different moments of inertia, which facilitates the adaptation to different applications. Active and passive ventilator fans complement a variety of options.
Typical areas of application for these motors are therefore tool and printing machines as well as handling robots.

Both series SMH / MH can be equipped with a holding brake if desired. As an alternative to the resolver feedback we can supply SinCos©[1] - Singleturn or a SinCos© - Multiturn absolute encoder. Together with the compact COMPAX servo control system and the intelligent Compax3 servo drive, these motors form a drive concept for use on power networks from 230 V to 400 V (480 V) AC.
A wide range of gearboxes is available for all types of motors. The gearboxes can be mounted if necessary.

[1] © The term SinCos© appearing in this catalogue is a registered trademark of Stegmann.

Overview tables

SMH motors 230V AC			Speed [rpm]													
			1600 / 1800		3000		3300		4300		4500		5400 / 6000		7500	
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
40-0.2	8	12	---	---	---	---	---	---	---	---	---	---	-/0.05	-/0.031	---	---
40-0.35		12	---	---	---	---	---	---	---	---	---	---	-/0.21	-/0.132	---	---
60-1.4		12	1.33/-	0.211/-	---	---	1.18	0.484	---	---	---	---	-/1.12	-/0.703	---	---
82-03		12	2.91/-	0.50/-	---	---	2.40	0.829	2.60	1.171	---	---	-/1.70	-/1.07	---	---
100-06		12	---	---	4.7	1.477	---	---	---	---	3.45	1.625	---	---	2.60	2.042
115-10		12	9/-	1.508/-	8	2.513	---	---	---	---	---	---	7.1/-	4.015/-	---	---
142-15		12	-/13.3	-/2.507	12.5	3.927	---	---	---	---	---	---	---	---	---	---

SMH motors 400V AC			Speed [rpm]													
			3000		5600		6000		7500		10000		10500		---	
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
60-1.4	8	12	1.20	0.44	---	---	1.12	0.88	---	---	---	---	0.4	0.44		
82-03		12	2.30	0.72	---	---	1.36	0.85	1.94	1.52	---	---	---	---		
100-06		12	---	---	1.64	0.96	---	---	2.80	2.20	---	---	---	---		
115-10		12	8	2.513	6	3.519	---	---	---	---	--	---	---	---		
142-15		12	---	---	9.2	5.395	---	---	---	---	----	---	---	---		

MH56 motors 230V AC			Speed [rpm]													
			2500		5000		10000									
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
56-0.2	4	32	0.21	0.05	0.19	0.10	0.145	0.15								
56-0.4		32	0.40	0.10	0.35	0.18	0.21	0.22								
56-0.6		32	0.60	0.15	0.51	0.26	---	---								

MH56 motors 400V AC			Speed [rpm]													
			5000		9500											
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
56-0.2	4	32	0.18	0.09	0.16	0.16										
56-0.4		32	0.33	0.17	0.23	0.23										
56-0.6		32	0.50	0.26	0.24	0.24										

MH70 motors			Speed [rpm]													
230V AC			2000		3800		7500									
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
70-0.5	4	33	0.50	0.10	0.40	0.17	0.35	0.27								
70-1.0		33	1.00	0.20	0.80	0.33	0.51	0.40								
70-1.5		33	1.50	0.31	1.40	0.54	0.66	0.51								
70-2.0		33	1.90	0.40	1.70	0.68	---	---								

MH70 motors			Speed [rpm]													
400V AC			3700		7000											
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
70-0.5	4	33	0.46	0.18	0.36	0.26										
70-1.0		33	0.88	0.34	0.56	0.41										
70-1.5		33	1.31	0.51	0.85	0.62										
70-2.0		33	1.71	0.66	1.06	0.77										

MH105 motors			Speed [rpm]													
230V AC			1600		2500		3000		5000							
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
105-02	8	34	2.20	0.36	2.10	0.54	2.10	0.65	1.84	0.96						
105-04		34	4.00	0.66	3.70	0.97	3.60	1.11	2.65	1.39						
105-06		34	5.90	0.98	5.50	1.43	5.20	1.63	3.51	1.84						
105-08		34	7.80	1.30	7.20	1.88	6.8	2.14	4.42	2.13						

MH105 motors			Speed [rpm]													
400V AC			3000		4500		6000									
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
105-02	8	34	2.05	0.64	1.92	0.91	1.76	1.10								
105-04		34	3.50	1.10	2.96	1.40	2.40	1.51								
105-06		34	5.29	1.66	4.06	1.91	3.09	1.94								
105-08		34	6.80	2.13	5.24	2.47	3.57	2.24								

MH145 motors			Speed [rpm]													
230V AC			550		1100		1600		2500		3000					
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
145-04	8	36	4.50	0.27	4.50	0.52	4.50	0.76	4.50	0.92	4.29	1.34				
145-08		36	8.70	0.50	8.70	0.98	8.60	1.43	8.10	2.11	7.97	2.50				
145-15		36	15.00	0.88	14.70	1.66	14.30	2.40	13.60	3.55	12.96	4.07				
145-22		36	21.90	1.27	21.30	2.40	20.80	3.46	19.10	5.00	17.89	5.61				
145-28		36	27.80	1.61	26.90	3.03	26.20	4.38	23.20	6.09	21.51	5.91				

MH145 motors			Speed [rpm]													
400V AC			1000		2000		3000		4500		5600					
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
145-04	8	36	4.54	0.47	4.45	0.93	4.29	1.34	3.87	1.82	3.56	2.09				
145-08		36	8.70	0.91	8.35	1.74	7.84	2.46	7.18	3.38	6.80	4.00				
145-15		36	14.15	1.48	14.19	2.96	12.52	3.93	10.47	4.93	10.82	6.34				
145-22		36	20.56	2.16	20.13	4.20	17.76	5.57	12.07	5.68	15.74	9.22				
145-28		36	25.97	2.72	25.21	5.17	21.25	6.67	12.86	6.05	18.13	10.62				

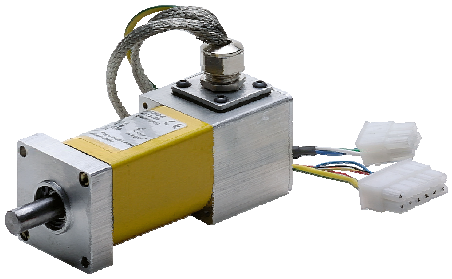
MH205 motors			Speed [rpm]													
230V AC			550		1150		1700									
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
205-28	8	37	28.60	1.65	27.30	3.38	27.60	4.97								
205-50		37	51.30	2.97	50.00	6.00	48.00	8.65								
205-70		37	68.64	4.12	68.60	8.23	65.00	11.71								
205-90		37	87.11	5.27	87.00	10.45	81.70	14.70								

MH205 motors			Speed [rpm]													
400V AC			1000		2000		3000									
Type/M_0	Number of poles	Page	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]	M_n [Nm]	P_n [kW]
205-28	8	37	28.15	2.94	27.25	5.70	25.65	8.05								
205-50		37	50.40	5.27	46.95	9.82	41.65	13.07								
205-70		37	69.36	7.28	62.87	13.16	52.31	16.42								
205-90		37	88.21	9.23	78.33	16.37	61.58	19.33								

SMH series servo motors

SMH40

Connection type :0V (cable length 200mm)
1IA = Motor connection at the top, Feedback on the right side (front view to shaft).
1IC = Motor connection at the top, Feedback on the left side (front view to shaft).



SMH60

Connection type :2ID
(straight fixed connector socket, rotatable by 180°)

SMH82

Connection type: 2ID

SMH100
Connection type: 2ID

SMH115
Connection type :2I
(single rotatable connector sockets)

SMH142
Connection type :2I

General ratings of the SMH motors :

- High power density.
- Compact design.
- Smooth surface.
- Any fitting position possible.
- Integrated feedback system.
- Holding brake available (not for SMH 40).
- IP65 design as a standard.
- Radial eccentricity tolerance R in accordance with DIN 42955.
- Sinusoidal back-EMF.
- Neodymium magnets.
- 8-pin design.
- Triple torque possible for up to 3 seconds.
- Output range from 0.2 to 15.0 Nm (Overtemperature 65K).
- Low inertia for dynamic applications.
- Increased inertia available as an option (not for SMH 40).
- Different coils for different speeds
- Nitrile shaft seal.
- Insulation class F.
- Motor temperature monitoring via integrated PTC – KTY84-130 (not for SMH 40).
- Standardized flanges: Standard according to DIN 42955; IEC72.
- Main casting: extruded aluminium (steel for SMH 40).
- Flange: aluminium (steel for SMH 40).
- Flange sizes (40, 60, 70, 82, 100, 115, 130, 145 and 142 mm).
- Straight fixed connector socket, for: SMH 60, 82, 100. single rotatable connector sockets for: SMH 115 und 142. SMH 40 optionally the connection type: 0V = cable with „open“ ends (Molex connector) or 1IA = Motor plug vertically upwards, Feedback straight to the right resp. 1IC = Motor plug vertically upwards, Feedback straight to the left.

Design:

- With feather key
- Spur thread

SMH40:	--
SMH 60:	M4x10
SMH 82:	M5x12.5
	M6x16
SMH 100:	M6x16
	M8x19
SMH 115:	M6x16
	M8x19
	M10x22
SMH 142:	M6x16
	M8x19
	M10x22

- Integrated resolver.
- UL version upon request (not for SMH 40).

Mechanical load:

- Shock load max. 2g radial and 2g axial.
- Vibration load max. 2g radial and 2g axial.

Field of application:

Applications requiring rapid accelerations and delays, such as:

- Packing machines.
- Presses.
- Assembly machines.

Options

Holding brake

On request the motors can be equipped with a holding brake.
The brake is mounted in the motor housing, the mechanical dimensions of the motor are then changed. See the dimensions table.
The power supply infeed is through the motor cable. Please see to the poling being correct.

Technical Data of the holding brakes:

Motor type	SMHA60	SMHA82	SMHA100	SMHA115	SMHA142	
Supply voltage ±10%	24	24	24	24	24	V DC
Current at 20°C	0.34	0.5	0.67	0.67	0.75	A DC
Resistance at 20°C	71	48	35.8	35.8	32	Ohm
min. static braking torque	2.2	5	11	11	22	Nm
max. brake closing delay time	14	19	20	20	12.5	ms
min. brake opening delay time	28	29	29	29	62	ms
Moment of Inertia	13	43	104	104	200	$kgmm^2$
Backlash	0	0	0	0	0	
Weight	0.3	0.7	0.6	2	3	kg
Type	PM	PM	PM	PM	PM	

Attention: The holding brake does not allow active braking.

Feedback system

A resolver is built into the motors in their standard configuration.

The motors are optionally available with the following encoders:

Encoder SinCos© Singleturn		
Option – A6 (not for SMH 40)	*SRS50*	*1024* Number of the Sine-/Cosine periods per revolution
		32768 total number of steps
Option – C6 (only SMH 40 and SMH 60)	*SKS36*	*128* Number of the Sine-/Cosine periods per revolution
		4096 total number of steps
Absolute encoder SinCos© Multiturn		
Option – A7 (not for SMH 40)	*SRM50*	*1024* Number of the Sine-/Cosine periods per revolution
		32768 x 4096 total number of steps
Option – C7 (only SMH 40 and SMH 60)	*SKM36*	*128* Number of the Sine-/Cosine periods per revolution
		4096 x 4096 total number of steps

When using the SinCos©, the nominal torque must be reduced by 10% for proper dimensioning.

Motor overview SMH motors

- Tolerance +/-10%;
- Over-temperature 65K with 20°C ambient temperature.
- The double nominal torque is possible at 90% and the triple nominal torque is possible at 80% of the nominal speed.
- Data apply for: Motor freely mounted and with flange plate:(Size: up to 2Nm: 200*230*20; up to 35Nm:200*270*20; >35Nm:310*320*25 in mm)
- The nominal data are still valid for a power supply undervoltage of 10%

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of inertia*	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Characteristics
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	
SMH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No.
40 60 0.2 ... xx...2**	0.2	0.63	1.5	8.8	84	0.13	3.5	11.17	0.6	230	6000	0.05	0.4	0.031	**1**
40 60 0.35 ... xx...2**	0.35	1.27	1.3	8.8	35	0.26	3.5	22.34	0.6	230	6000	0.21	0.8	0.132	**2**
60 30 1.4 ... 2ID...4	1.4	4.4	0.9	47	107	1.48	30.2	126.81	1.5	230	1600	1.33	0.90	0.211	
										400	3000	1.20	0.80	0.440	**3**
60 60 1.4 ... 2ID...4	1.4	4.4	1.7	11.4	32.3	0.81	30.2	69.49	1.5	230	3300	1.18	1.46	0.484	**4**
										400	6000	1.12	1.40	0.880	**5**
60 105 1.4 ... 2ID...4	1.4	4.4	3.0	5.1	10	0.47	30.2	40.23	1.5	230	6000	1.12	2.40	0.703	**6**
										400	10500	0.4	0.85	0.44	**7**
82 30 03 ... 2ID...4	3.0	9.0	1.8	4.4	18.1	1.66	140	142.55	3.5	230	1600	2.91	1.75	0.500	
										400	3000	2.30	1.4	0.723	**8**
82 60 03 ... 2ID...4	3.0	9.0	3.5	3.38	18.2	0.85	140	73.20	3.5	230	3300	2.40	2.8	0.829	**9**
										400	6000	1.36	1.6	0.855	**10**
82 75 03 ... 2ID...4	3.0	9.0	4.4	2.17	8.81	0.68	140	58.25	3.5	230	4300	2.60	3.8	1.171	
										400	7500	1.94	1.6	1.524	**11**
82 60 03 ... 2ID...2	3.0	9.0	6.1	1.1	6.1	0.49	140	41.87	3.5	230	6000	1.70	3.5	1.068	**12**
100 56 06 ... 2ID...4	6.0	18.0	5.9	1.12	11.2	1.02	336	87.61	4.7	230	3000	4.70	4.6	1.477	**13**
										400	5600	1.64	1.61	0.96	**14**
100 75 06 ... 2ID...4	6.0	18.0	9.4	0.54	4.13	0.64	336	59.10	4.7	230	4500	3.45	5.4	1.625	**15**
										400	7500	2.80	4.1	2.199	**16**
100 75 06 ... 2ID...2	6.0	18.0	14.7	0.188	1.43	0.41	336	34.89	4.7	230	7500	2.60	6.4	2.042	**17**
115 30 10 ... 2I...4	10	32	6.0	2.4	19	1.66	900	142.255	7.7	230	1600	9	5.4	1.508	**18**
										400	3000	8	4.8	2.513	**19**
115 56 10 ...2I ... 4	10	32	10.5	0.8	5.8	0.95	900	81.67	7.7	230	3000	8	8.4	2.513	**20**
										400	5600	6	6.3	3.519	**21**
115 54 10 ... 2I...2	10	32	18.2	0.25	1.8	0.55	900	47.07	7.7	230	5400	7.1	12.9	4.015	**22**
① 142 30 15 ... 2I...4	15	47	9.7	1.12	10.7	1.54	1400	132.16	13	230	1800	13.3	8.6	2.507	**23**
										400	3000	12.5	8.1	3.927	**24**
① 142 56 15 ... 2I...4		47	16	0.44	4.5	0.94	1400	80.18	13	230	3000	12.5	13.4	3.927	**25**
										400	5600	9.2	9.8	5.395	**26**

standard motors

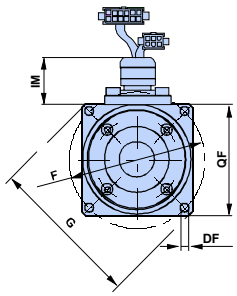
*Increased mass moment of inertia (Option - M) available with the following motors: SMH60 +29$kgmm^2$, SMH82 +270$kgmm^2$, SMH100 +284$kgmm^2$, SMH115 +900$kgmm^2$, SMH142 +690$kgmm^2$.

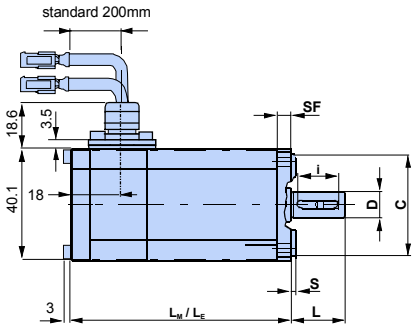
① Preliminary data for SMH142, we reserve the right to make technical changes.
**xx for SMH40: 0V = cable with „open“ ends (plug).
1IA = Motor connection at the top, Feedback on the right side (front view to shaft).
1IC = Motor connection at the top, Feedback on the left side (front view to shaft).

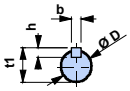
Dimensional drawings SMH series

Dimensional drawing: SMH40

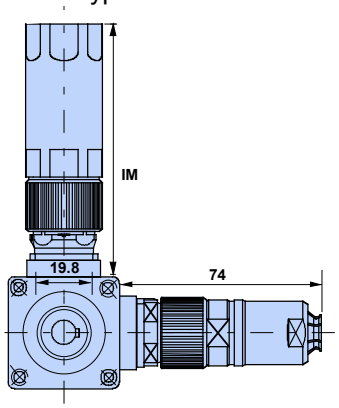
Connection type 0V





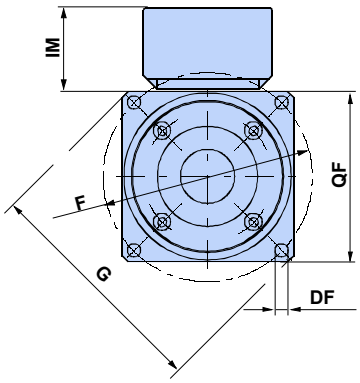


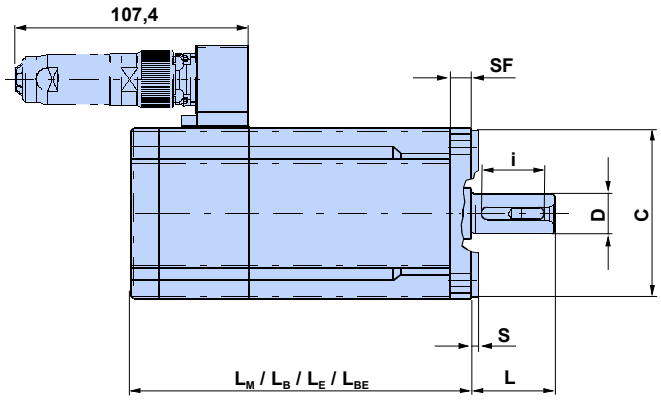
Connection type 1IA

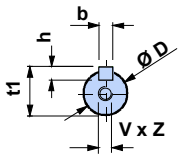


Dimensional drawing: SMH

Connection type 2ID







Motor	Type	L_M / L_B / L_E / L_{BE}	SF	IM	Flange - type	DF	F	D x L	bxhxi	t1	V x Z	QF	C x S		G
SMH 40 0V	0.2 0.35	101/--/ 142.5 [1] / --	10.3	18.6	5	4.2	46	6x20 9x20	2x2x- 3x3x-	6.8 10.2	--	40	Ø30	h6x2	55
SMH 40 1IA				92.5											
SMH 40 1IC				92.5											
SMH 60	1.4	129.5 / 161.0 / 163.0 / 209 / 142.5 [1] / 187.5 [1]	7	40	8	5.5	63	9x20 11x23	3x3x16 4x4x18	10.2 12.5	----- M4x10	60 70	Ø40 Ø60	h6x2.5	74 90
					5	6	75								
SMH 82	03	163.5 / 206.5 / 183.5 / 226.5	10	40	8	6.5	100	14x30 19x40	5x5x25 6x6x30	16 21.5	M5x12.5 M6x16	82 100	Ø80 Ø95	h6x3.5	112 135
					5	9	115								
SMH 100	06	191.5 / 238.5 / 211.5 / 258.5	10	40	5	9	115	19x40 24x50	6x6x30 8x7x40	21.5 27	M6x16 M8x19	100	Ø95	h6x3.5	135
SMH 115	10	220/265/ 220 / 265	10	41.5	8	9	130	19x40 24x50 28x60	6x6x30 8x7x40 8x7x50	21.5 27 31	M6x16 M8x19 M10x22	115 130 145	Ø95 Ø110 Ø130	h6x3.5	156 156 196.5
					7	11	130								
					5	11	165								
SMH 142	15	243 / 293 / 243 / 293	12	41.5	5	11	165	19x40 24x50 28x60	6x6x30 8x7x40 8x7x50	21.5 27 31	M6x16 M8x19 M10x22	142	Ø130	h6x11	192.5

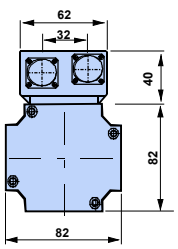
[1] SMH40 with Option C6, C7 on request

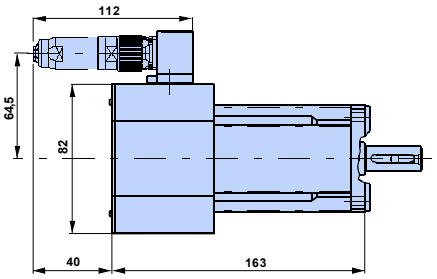
Stated in mm

Motor length	Brake	Encoder A6/A7 / C6/C7 [1]
L_M	---	---
L_B	●	---
L_E	---	●
L_{BE}	●	●

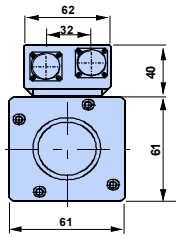
Dimensional drawing: SMH 60 with Encoder

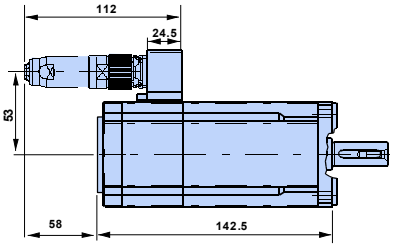
Option - A6 / A7





Option - C6 / C7





Maximum shaft loads

The data apply for a load applied at the middle of the shaft.
The data apply for 20.000 hours of operation.
The maximum axial load is 20% smaller than the maximum radial load.

Maximum radial shaft load of the SMH motors

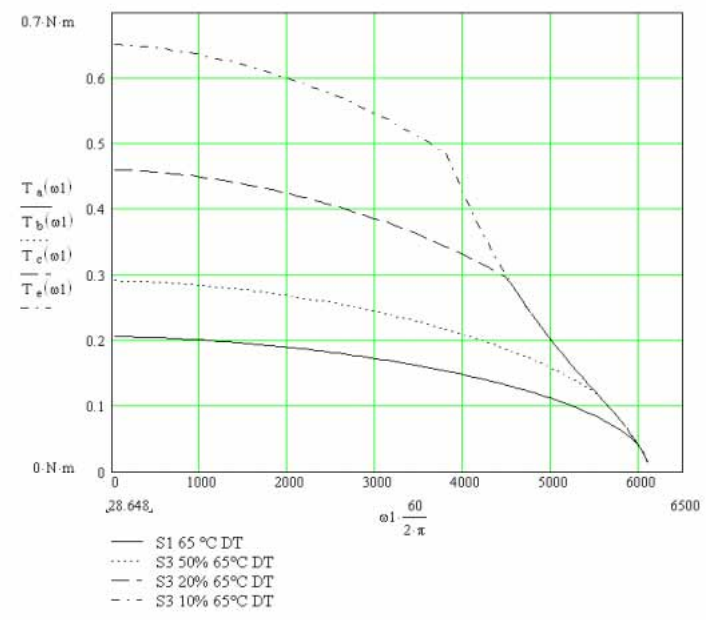
Motor type	1000rpm	3000rpm	5000rpm	6000rpm	8000rpm	Shaft
SMH40 [N]	120	58	50	48	-	9x20
SMH60 [N]	466	323	272	257	233	11x23mm
SMH82 [N]	880	610	515	485	440	19x40mm
SMH100 [N]	896	621	524	493	448	24x50mm
SMH115 [N]	1250	950	880	750	-	28x60
SMH142 [N]	1300	1000	900	800	-	28x60

Motor characteristics of the SMH series

Operating modes S1/S3 in accordance with DIN 60034-1

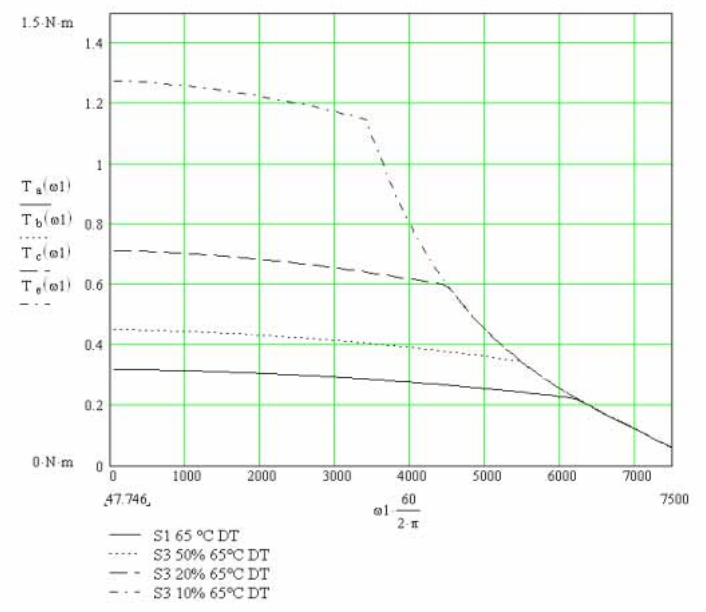
SMH 40 (without temperature sensor)

SMH 40 60 0.2 ...xx...2: 6000rpm at 230VAC



Characteristic 1

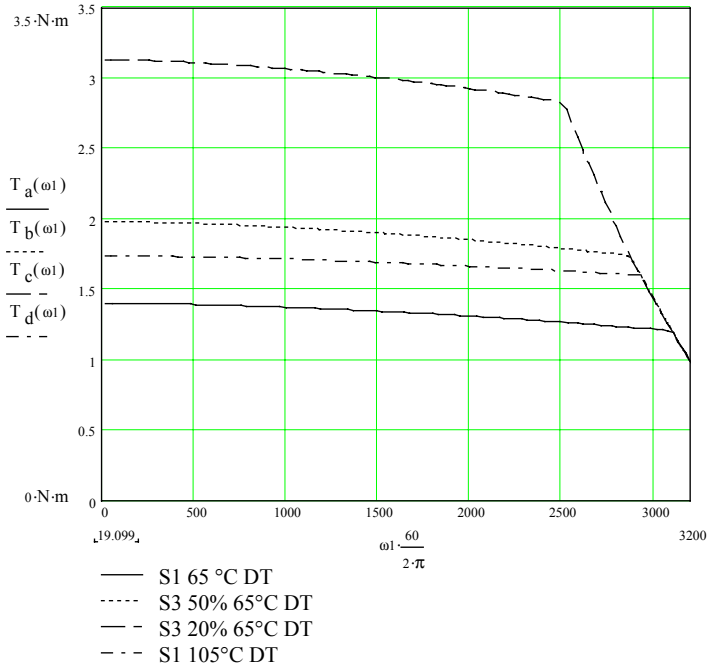
SMH 40 60 0.35 ...xx...2: 6000rpm at 230VAC



Characteristic 2

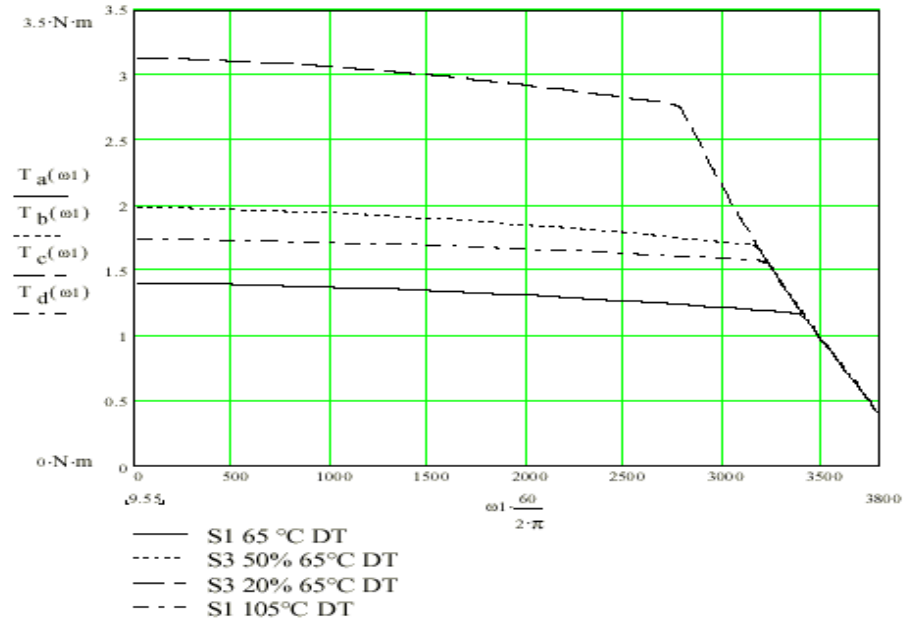
SMH 60

SMH 60 30 1.4 ...2ID...4: 3000rpm at 400VAC



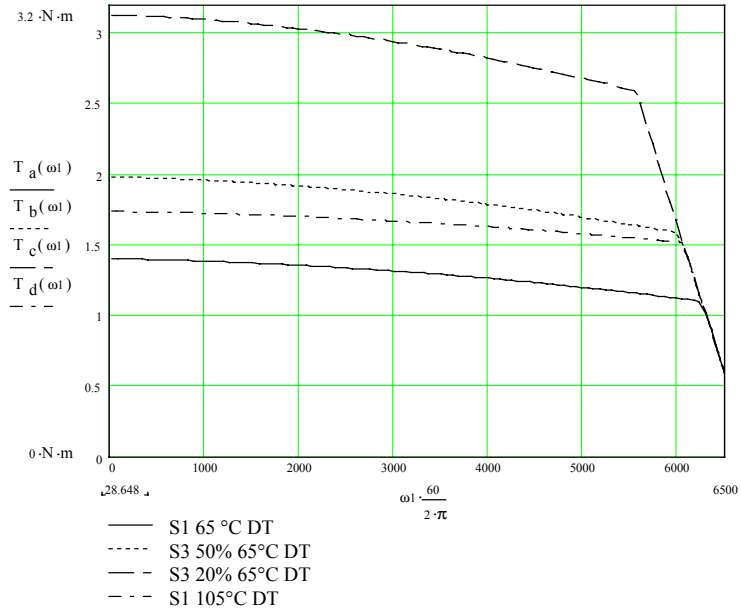
Characteristic 3

SMH 60 60 1.4 ...2ID...4: 3300rpm at 230VAC



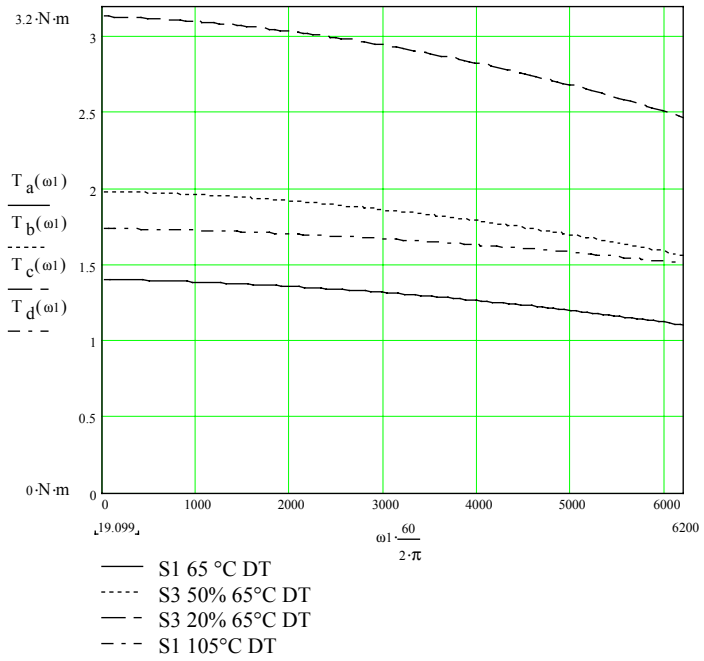
Characteristic 4

SMH 60 60 1.4 ...2ID...4: 6000rpm at 400VAC



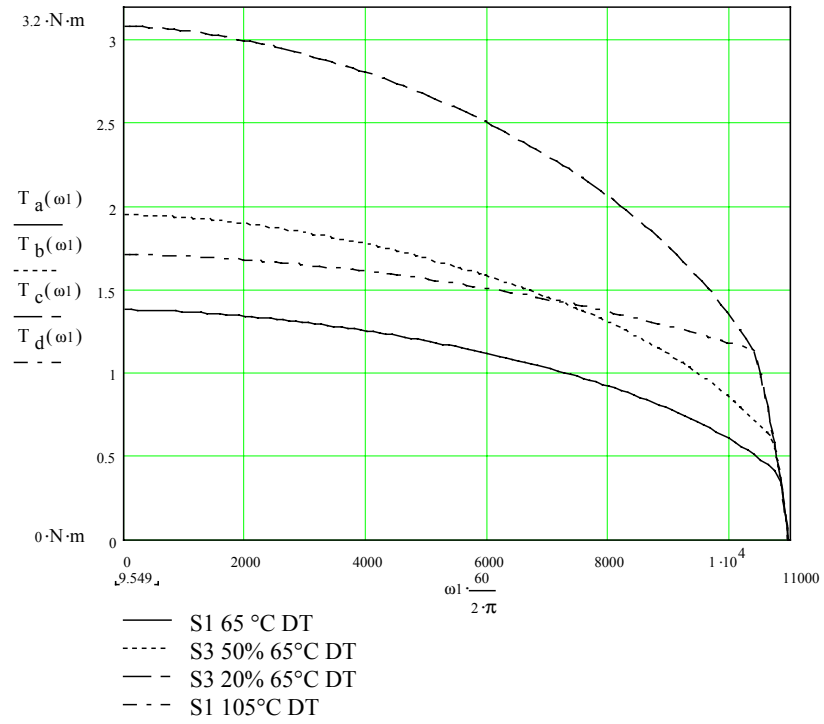
Characteristic 5

SMH 60 105 1.4 ... 2ID...4: 6000rpm at 230VAC



Characteristic 6

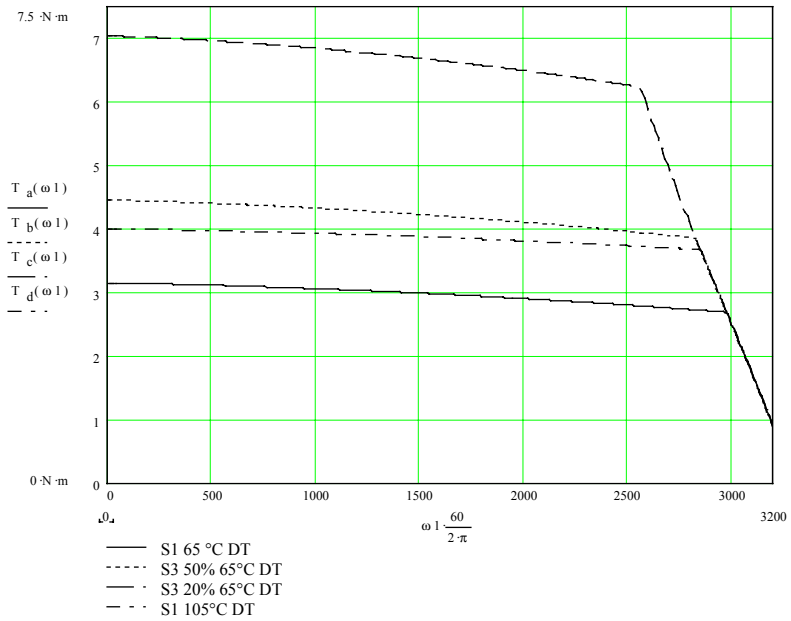
SMH 60 105 1.4 ... 2ID...4: 10500rpm at 400VAC



Characteristic 7

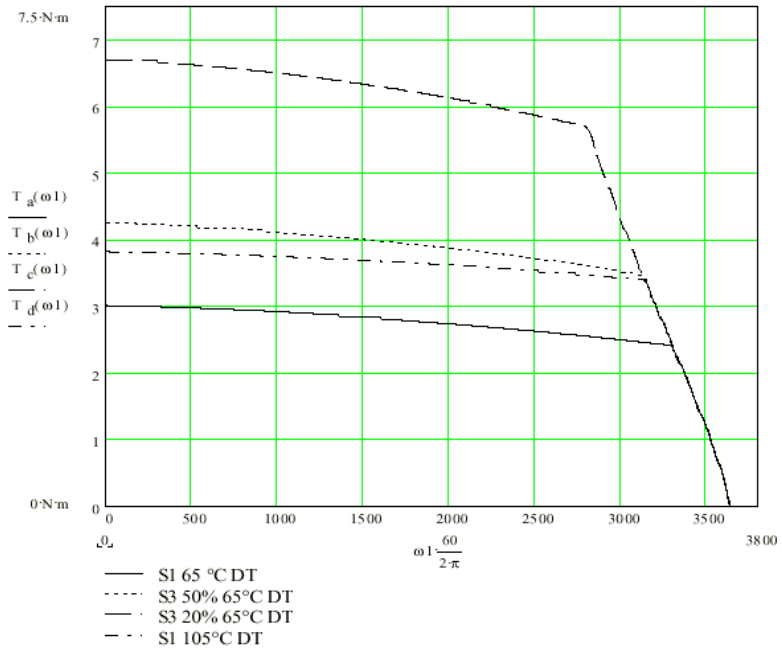
SMH 82

SMH 82 30 03 ...2ID...4: 3000rpm at 400VAC



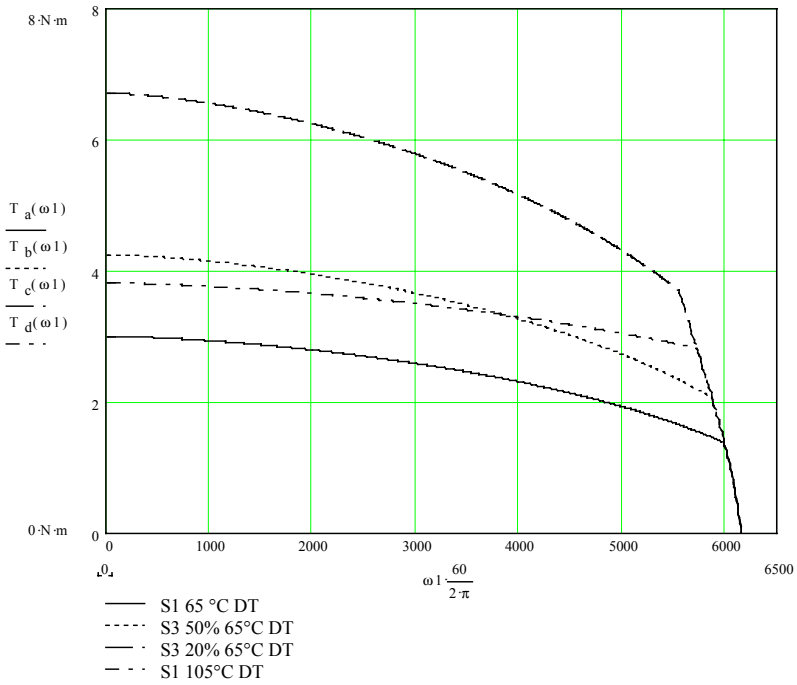
Characteristic 8

SMH 82 60 03 ... 2ID...4: 3300rpm at 230VAC



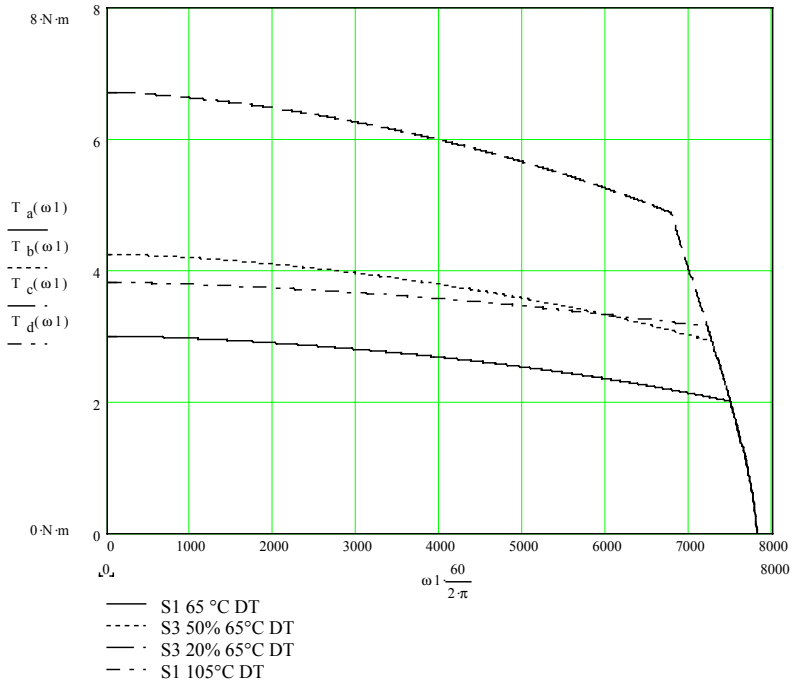
Characteristic 9

SMH 82 60 03 ... 2ID...4: 6000rpm at 400VAC



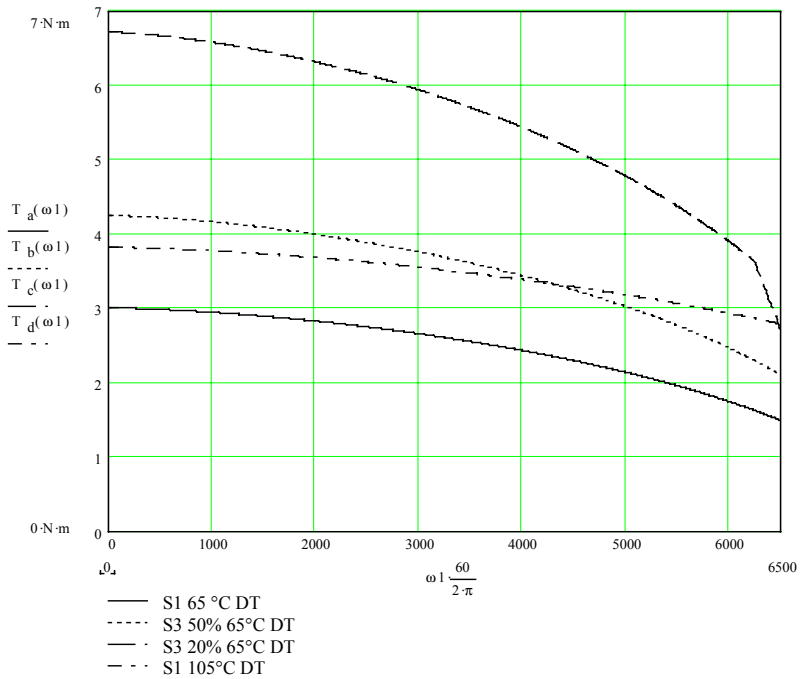
Characteristic 10

SMH 82 75 03 ... 2ID...4: 7500rpm at 400VAC



Characteristic 11

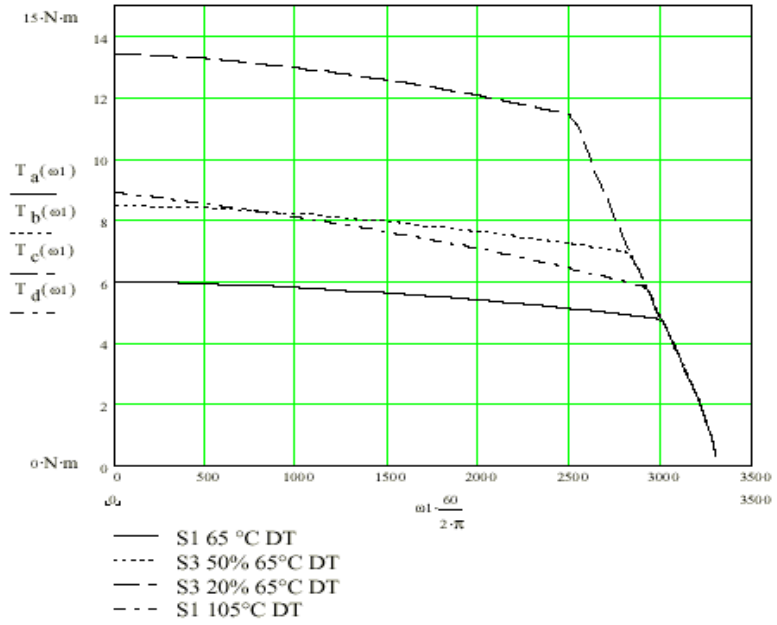
SMH 82 60 03 ... 2ID...2: 6000rpm at 230VAC



Characteristic 12

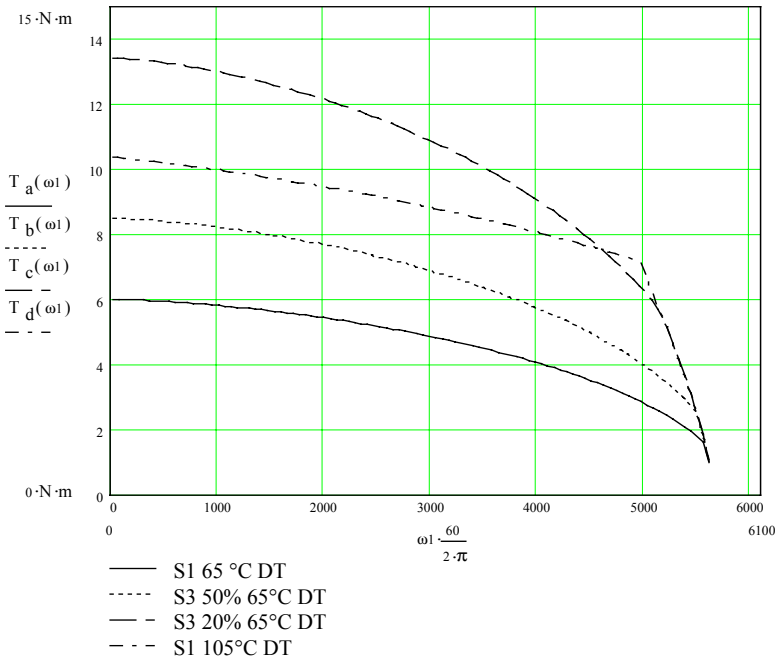
SMH 100

SMH 100 56 06 ...2ID...4: 3000rpm at 230VAC



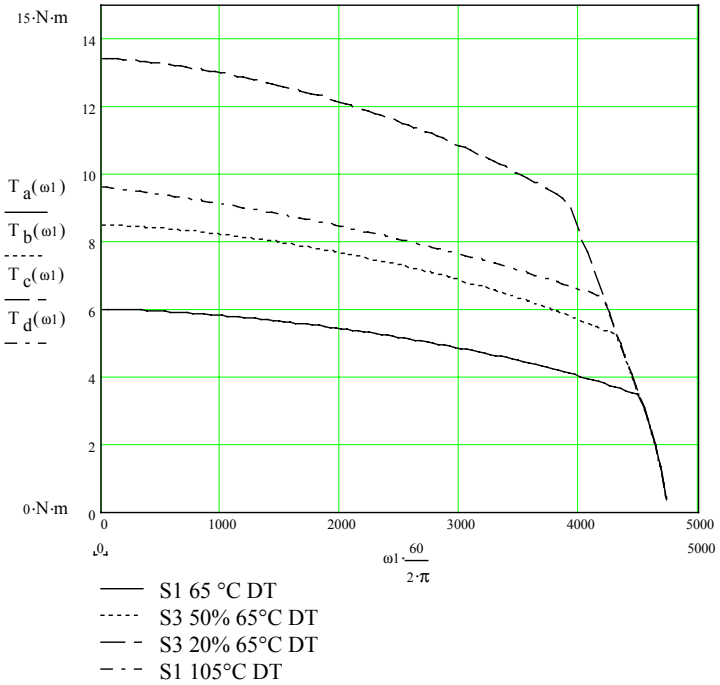
Characteristic 13

SMH 100 56 06 ...2ID...4: 5600rpm at 400 VAC



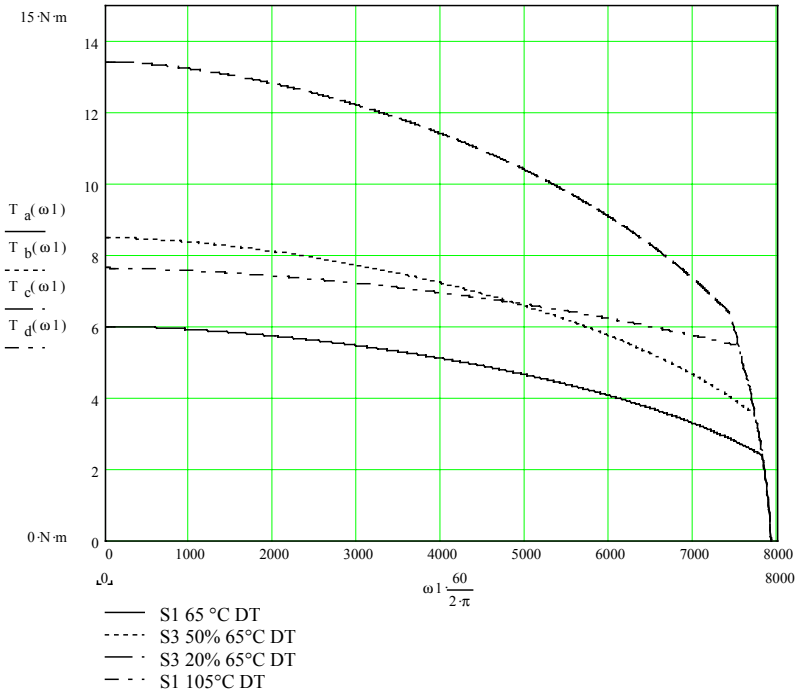
Characteristic 14

SMH 100 75 06 ... 2ID...4: 4500rpm at 230VAC



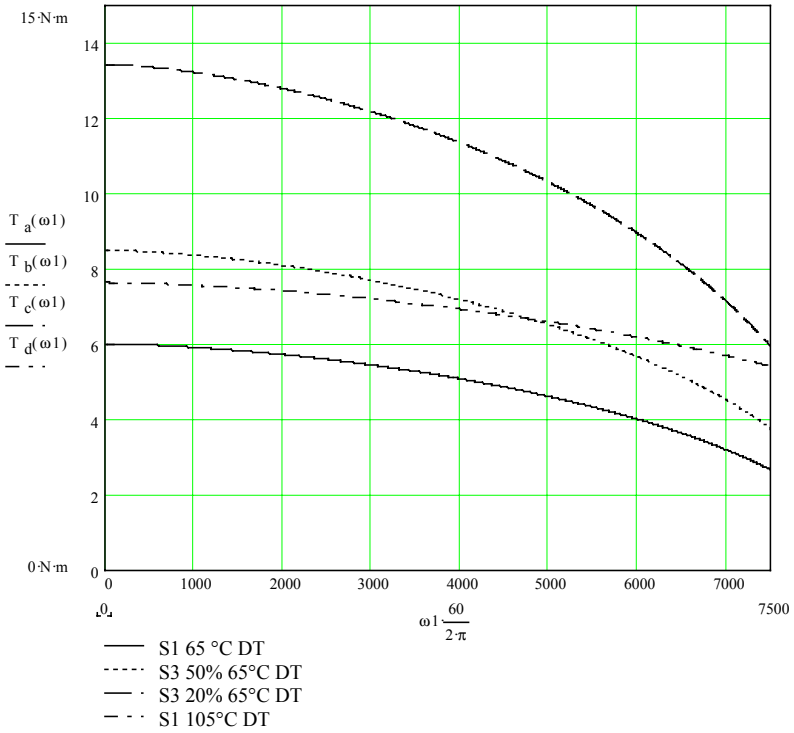
Characteristic 15

SMH 100 75 06 ... 2ID...4: 7500rpm at 400VAC



Characteristic 16

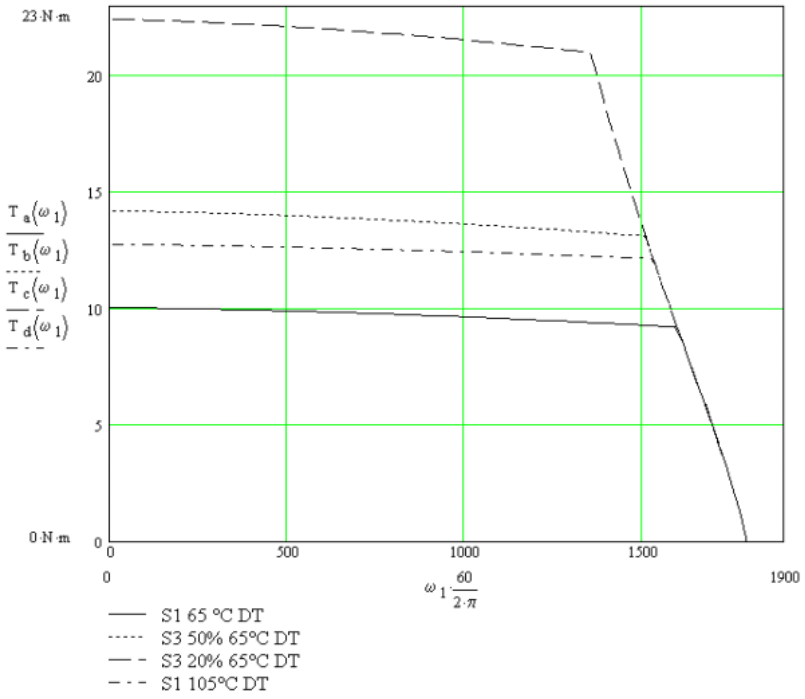
SMH 100 75 06 ...2ID...2: 7500rpm at 230VAC



Characteristic 17

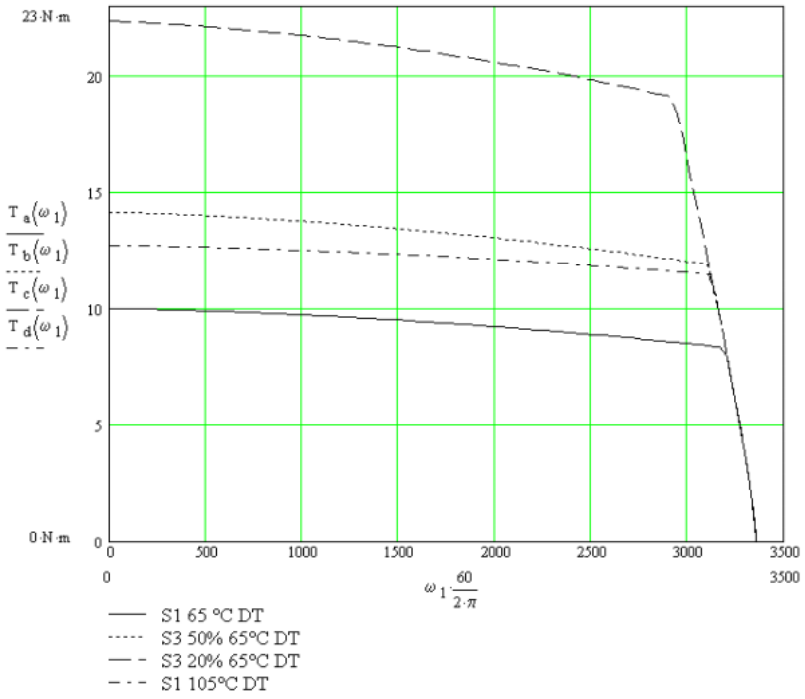
SMH 115

SMH 115 30 10 ...2ID... 4: 1600rpm at 230VAC



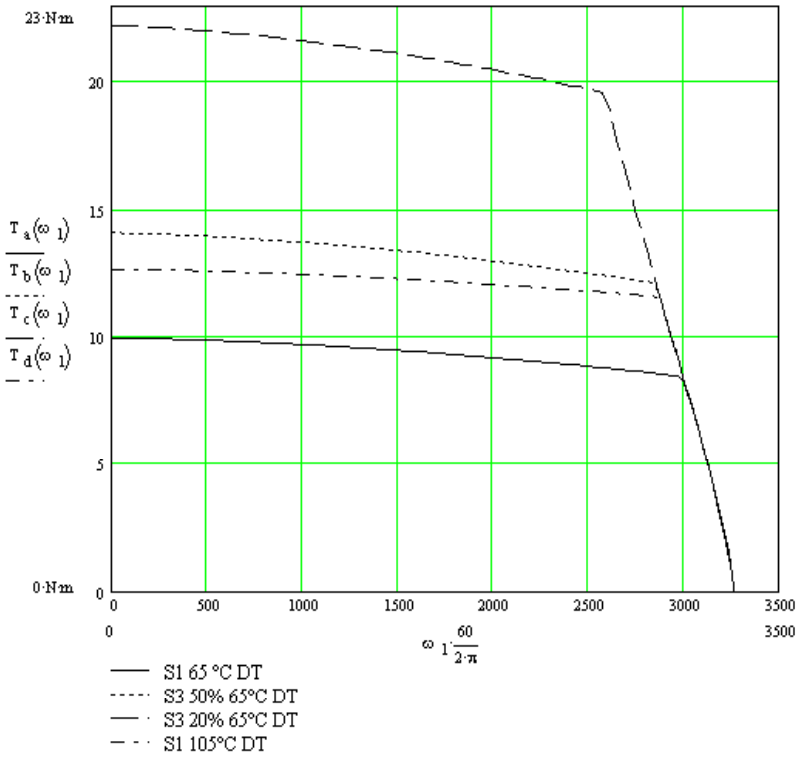
Characteristic 18

SMH 115 30 10 ...2ID... 4: 3000rpm at 400VAC



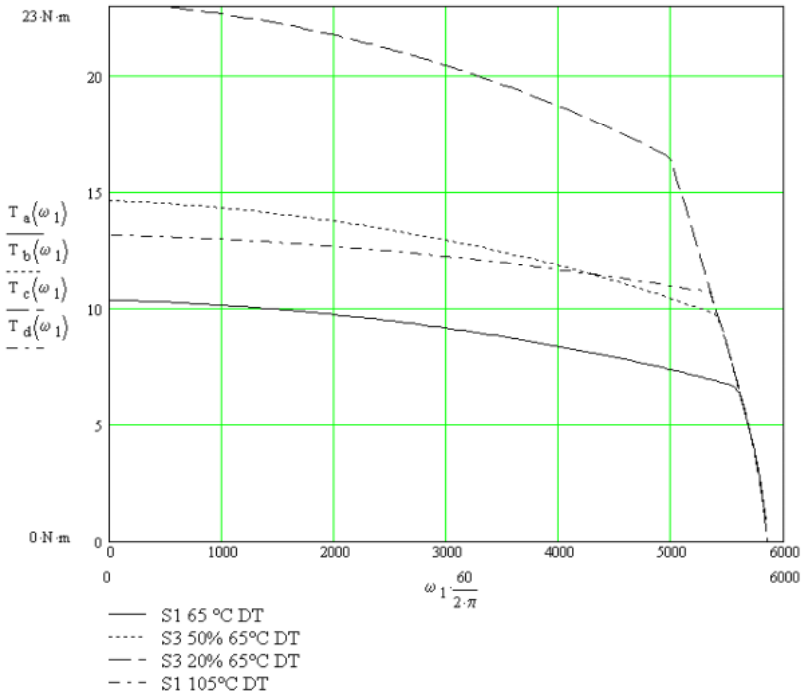
Characteristic 19

SMH 115 56 10 ...2ID... 4: 3000rpm at 230VAC



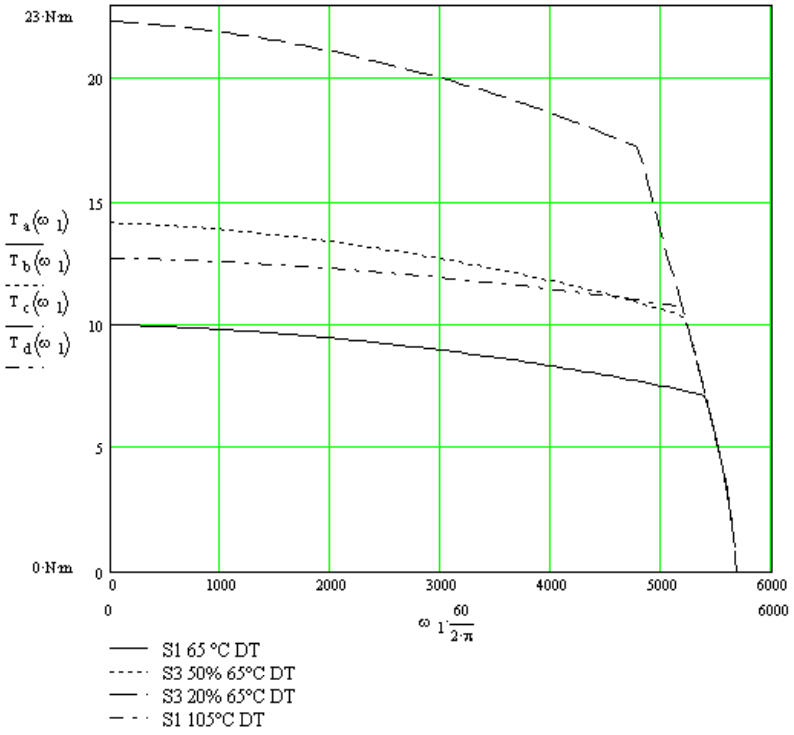
Characteristic 20

SMH 115 56 10 ...2ID... 4: 5600rpm at 400VAC



Characteristic 21

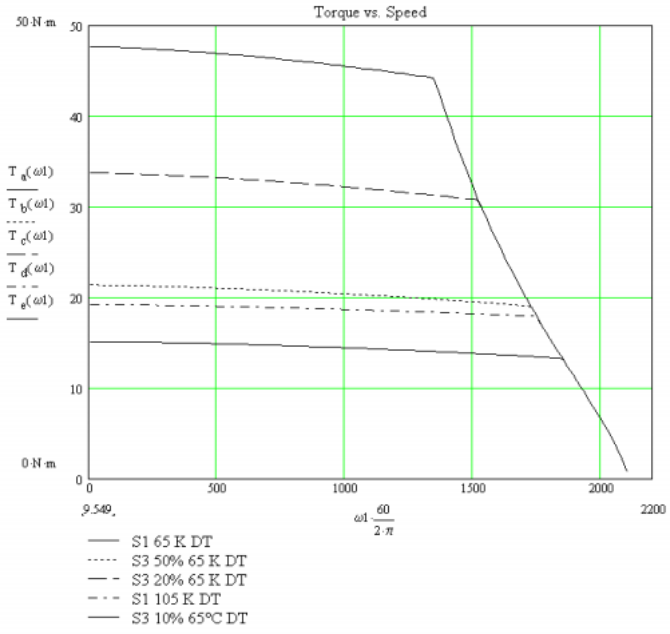
SMH 115 54 10 ...2ID... 2: 5400rpm at 230VAC



Characteristic 22

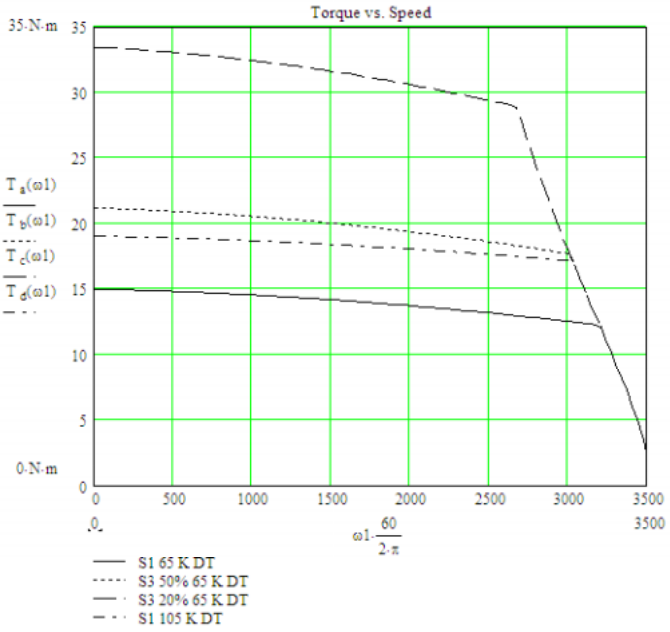
SMH 142

SMH 142 30 15 ...2ID... 4: 1800 rpm at 230VAC



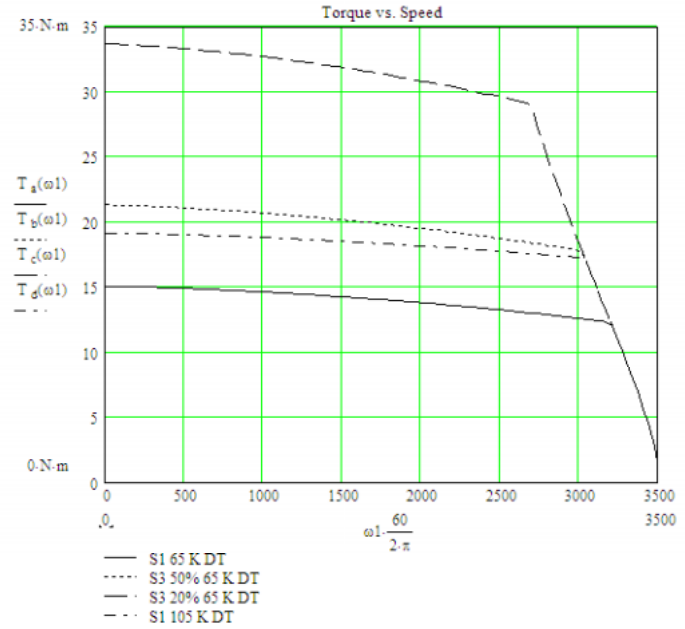
Characteristic 23

SMH 142 30 15 ...2ID... 4: 3000 rpm at 400VAC



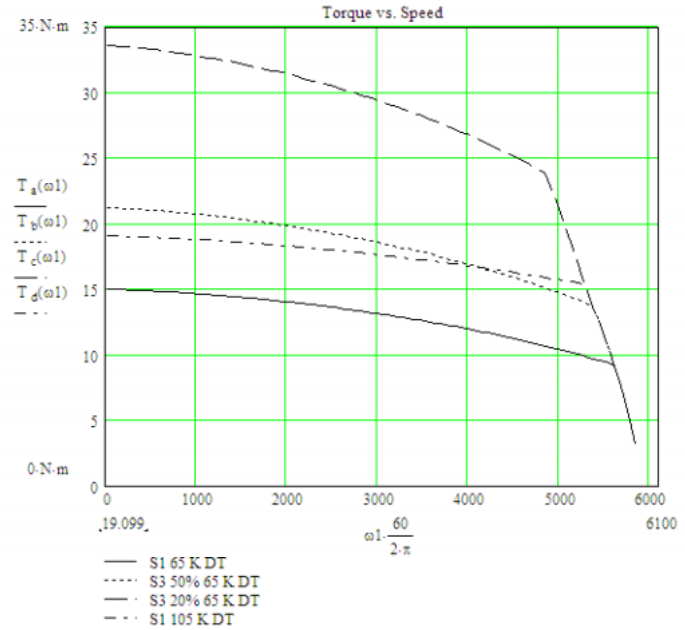
Characteristic 24

SMH 142 56 15 ...2ID... 4: 3000 rpm at 230VAC



Characteristic 25

SMH 142 56 15 ...2ID... 4: 5600 rpm at 400VAC



Characteristic26

MH series servo motors

MH56

Connection type :2ID
(straight fixed
connector socket,
rotatable by 180°)

MH70

Connection type :2I
(single rotatable
connector sockets)

MH105

Connection type :2I

MH145

Connection type: 3I
(terminal box)

MH205

Connection type: 3I

General ratings of the MH motors:

- Smooth surface at MH56, rippled surface at MH70, 105, 145 and 205.
- Integrated feedback system.
- Holding brake available.
- IP65 design as a standard.
- Radial eccentricity tolerance R in accordance with DIN 42955.
- mat black coating RAL9005.
- Any fitting position possible.
- Sinusoidal back-EMF.
- Neodymium magnets.
- 4-pin design at MH56, 70
  8-pin design at MH105, 145 and 205.
- Triple torque possible for up to 3 seconds.
- Output range from 0.2 to 90 Nm
  (65K overtemperature)
- Variable mass moments of inertia per motor type for the sizes 105, 145 and 205.
- Different coils for different speeds.
- Nitrile shaft seal.
- Insulation class F.
- Motor temperature monitoring via integrated PTC (KTY84-130).
- Standardized flanges:
  Standard according to DIN 42955; IEC72.
- Main casting: extruded aluminium.
- Flange: aluminium.
- 7 flange sizes:
  (56, 70, 96, 105, 116, 145 and 205 mm)
- Straight common connector socket for:
  MH56,
  single rotatable connector sockets for:
  MH 70 and MH 105,
  terminal box for:
  MH145 and 205.
- Passive cooling available as an option for MH105/MH145/MH205.
- Active cooling avaliable as an option for MH105/MH145/MH205; resulting in a 30% increased torque.

Design:

- With feather key.
- With spur thread

MH 70:	M4x10, M5x12.5
MH 105:	M6x12, M8x19
MH 145:	M6x16, M8x19, M10x22
MH 205:	M12x32, M16x40.

- Integrated resolver.

Mechanical load

- Shock load max. 2g radial and 2g axial.
- Vibration load max. 2g radial and 2g axial.

Field of application

Highly dynamic applications in:

- Packing machines.
- Handling systems.
- Shelf transport technology
- Wood machining, etc.

Options

Holding brake

On request the motors can be equipped with a holding brake.
The brake is mounted in the motor housing, the mechanical dimensions of the motor are then changed. See the dimensions table.
The power supply infeed is through the motor cable. Please see to the poling being correct.

Technical data of the holding brakes:

Motor type	MHA56	MHA70	MHA105	MHA145	MHA205	
Supply voltage ±10%	24	24	24	24	24	V DC
Current at 20°C	0.32	0.53	1.1	1.8	1.65	A DC
Resistance at 20°C	76	45	22	13.2	14.5	Ohm
min. static braking torque	0.6	2.0	10	28	120	Nm
max. brake closing delay time	250	250	250	250	150	ms
min. brake opening delay time	100	100	100	100	80	ms
Moment of Inertia	17	29	62.5	195	1000	$kgmm^2$
Backlash	0	0	0	0	0	
Weight	0.8	1.1	3.0	5.0	14.0	kg
Type	Spring	Spring	Spring	Spring	PM	

Attention: The holding brake does not allow active braking.

Feedback system

A resolver is built into the motors in their standard configuration.

The motors are optionally available with the following encoders:

Encoder SinCos© Singleturn		
Option – A6 (not for MH 56, MH70)	*SRS50*	*1024* Number of the Sine-/Cosine periods per revolution
		32768 total number of steps
Absolute encoder SinCos© Multiturn		
Option – A7 (not for MH 56, MH70)	*SRM50*	*1024* Number of the Sine-/Cosine periods per revolution
		32768 x 4096 total number of steps

When using the SinCos©, the nominal torque must be reduced by 10% for proper dimensioning.

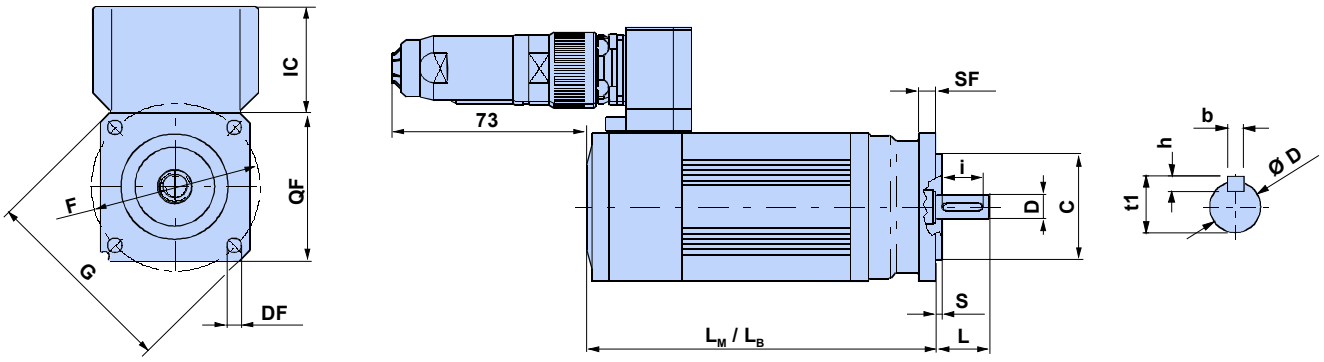
Motor overview MH motors

- Tolerance +/-10%;
- Over-temperature 65K with 20°C ambient temperature.
- The double nominal torque is possible at 90% and the triple nominal torque is possible at 80% of the nominal speed.
- Data apply for: Motor freely mounted and with flange plate:(Size: up to 2Nm: 200*230*20; up to 35Nm:200*270*20; >35Nm:310*320*25 in mm)

MH 56

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of Inertia	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Charact eristic
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	
MH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No.
56 50 0.2	0.2	1.3	0.27	198.4	338.2	0.828	11	70.82	0.65	230	2500	0.21	0.26	0.055	
										400	5000	0.185	0.24	0.097	**27**
56 95 0.2	0.2	1.3	0.46	66.8	114.9	0.483	11	41.28	0.65	230	5000	0.190	0.42	0.102	
										400	9500	0.163	0.364	0.163	**28**
56 100 0.2	0.2	1.3	0.83	17.85	33.36	0.260	11	22.24	0.65	230	10000	0.145	0.604	0.152	**29**
56 50 0.4	0.4	2.5	0.48	71.17	202.3	0.906	16	77.47	0.98	230	2500	0.4	0.46	0.105	
										400	5000	0.338	0.399	0.177	**30**
56 95 0.4	0.4	2.5	0.83	23.0	68.26	0.526	16	44.99	0.98	230	5000	0.350	0.710	0.185	
										400	9500	0.229	0.478	0.229	**31**
56 100 0.4	0.4	2.5	1.52	7.1	11.5	0.290	16	24.80	0.98	230	10000	0.211	0.807	0.222	**32**
56 50 0.6	0.6	3.6	0.66	44.48	120.0	0.987	21	84.37	1.3	230	2500	0.600	0.630	0.157	
										400	5000	0.504	0.542	0.264	**33**
56 95 0.6	0.6	3.6	1.20	13.71	37.5	0.551	21	47.17	1.3	230	5000	0.510	0.980	0.266	
										400	9500	0.248	0.507	0.248	**34**

Dimensional drawing: MH 56



Motor	Type	L_M / L_B	SF	IC	Flange type	DF	F	D x L	bxhxi	t1	QF	C x S		G
MH 56	0.2	130.5 / 181.5 / ---.- / ---.-	6.5	40	5	5.5	63	9x20 11x23	3 x 3 x 16 4 x 4 x 18	10.2 12.5	56	Ø40	h6x2.5	74
	0.4	150.5 / 201.5 / ---.- / ---.-												
	0.6	170.5 / 221.5 / ---.- / ---.-												

Stated in mm

Motor length	Brake	Encoder A6/A7
L_M	---	---
L_B	●	---
L_E	---	---
L_{BE}	---	---

MH 70

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of Inertia	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Charact eristics
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	
MH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No.
70 37 0.5	0.52	2.9	0.422	108.1	184.33	1.25	26.25	106.87	2.0	230	2000	0.5	0.43	0.100	
										400	3700	0.468	0.39	0.181	**35**
70 70 0.5	0.50	2.9	0.715	37.7	58.8	0.70	26.25	60.36	2.0	230	3800	0.440	0.66	0.178	
										400	7000	0.360	0.54	0.264	**36**
70 75 0.5	0.51	2.9	1.366	10.3	15.53	0.38	26.25	32.39	2.0	230	7500	0.351	0.99	0.275	**37**
70 37 01	1.03	5.2	0.83	36.5	91.7	1.24	40	106.61	2.75	230	2000	1.0	0.8	0.202	
										400	3700	0.883	0.741	0.342	**38**
70 70 01	0.99	5.2	1.393	13.1	30.68	0.72	40	61.66	2.75	230	3800	0.800	1.23	0.338	
										400	7000	0.563	0.846	0.412	**39**
70 75 01	1.02	5.2	2.64	3.64	8.27	0.39	40	33.44	2.75	230	7500	0.510	1.42	0.401	**40**
70 37 1.5	1.50	6.7	1.25	21.9	62.95	1.26	53	108.18	3.5	230	2000	1.50	1.18	0.311	
										400	3700	1.31	1.09	0.511	**41**
70 70 1.5	1.54	6.7	2.24	7.0	20.63	0.72	53	61.36	3.5	230	3800	1.40	1.96	0.542	
										400	7000	0.85	1.27	0.622	**42**
70 75 1.5	1.52	6.7	4.06	2.07	5.60	0.394	53	33.70	3.5	230	7500	0.660	1.85	0.518	**43**
70 37 02	1.99	8.4	1.54	16.94	54.3	1.35	67	120.26	4.25	230	2000	1.9	1.47	0.403	
										400	3700	1.71	1.32	0.664	**44**
70 70 02	2.00	8.4	2.82	5.23	16.4	0.74	67	63.75	4.25	230	3800	1.70	2.40	0.684	**45**
										400	7000	1.06	1.54	0.778	**46**

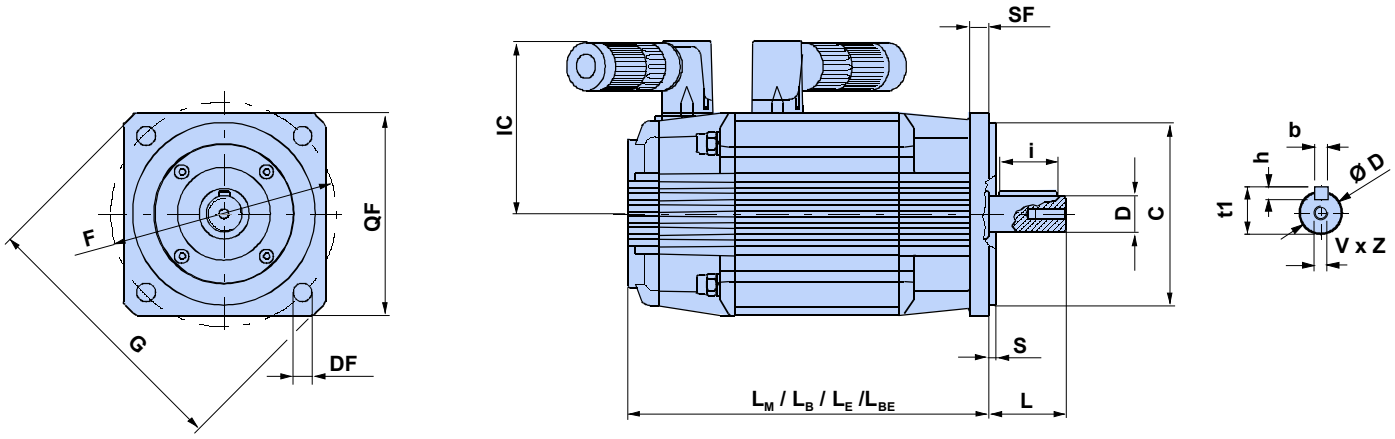
MH 105

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of inertia*	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Characteristics
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	
MH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No.
105 30 02	2.17	11.3	1.43	19.05	47.94	1.63	190	138.95	4.9	230	1600	2.20	1.40	0.367	
										400	3000	2.05	1.33	0.645	**47**
105 45 02	2.20	11.3	2.13	8.63	22.32	1.10	190	94.82	4.9	230	2500	2.10	2.0	0.548	
										400	4500	1.92	1.84	0.910	**48**
105 60 02	2.19	11.3	2.84	4.85	12.42	0.82	190	70.72	4.9	230	3000	2.1	2.60	0.649	
										400	6000	1.76	2.26	1.106	**49**
105 50 02	2.22	11.3	4.33	2.09	5.50	0.55	190	47.10	4.9	230	5000	1.84	3.55	0.965	**50**
105 30 04	3.95	19.9	2.57	6.69	24.79	1.65	335	141.31	7.0	230	1600	4.00	2.50	0.660	**51**
										400	3000	3.49	2.23	1.097	**52**
105 45 04	3.97	19.9	3.79	3.07	11.53	1.12	335	96.36	7.0	230	2500	3.70	3.50	0.969	
										400	4500	2.96	2.80	1.399	**53**
105 60 04	3.98	19.9	5.01	1.80	6.61	0.85	335	73.00	7.0	230	3000	3.60	4.40	1.115	**54**
										400	6000	2.40	3.02	1.510	**55**
105 50 04	4.01	19.9	7.46	0.81	3.03	0.57	335	49.46	7.0	230	5000	2.65	4.92	1.390	**56**
105 30 06	5.98	28.0	3.61	3.68	16.52	1.77	480	152.07	9.1	230	1600	5.90	3.70	0.983	
										400	3000	5.29	3.14	1.662	**57**
105 45 06	5.96	28.0	5.60	1.83	7.93	1.14	480	97.91	9.1	230	2500	5.50	5.00	1.434	**58**
										400	4500	4.06	3.79	1.918	**59**
105 60 06	5.98	28.0	7.41	1.08	4.55	0.86	480	74.19	9.1	230	3000	5.20	6.40	1.635	
										400	6000	3.09	3.84	1.941	**60**
105 50 06	6.00	28.0	11.15	0.47	2.02	0.57	480	49.44	9.1	230	5000	3.51	6.54	1.840	**61**
105 30 08	8.01	32.9	5.21	2.63	12.39	1.65	620	141.31	11.2	230	1600	7.8	5.00	1.306	**62**
										400	3000	6.80	4.35	2.137	**63**
105 45 08	7.97	32.9	7.47	1.29	5.95	1.14	620	97.91	11.2	230	2500	7.20	6.60	1.887	
										400	4500	5.24	4.89	2.473	**64**
105 60 08	7.98	32.9	9.73	0.76	3.52	0.88	620	75.38	11.2	230	3000	6.80	8.20	2.149	
										400	6000	3.57	4.39	2.242	**65**
105 50 08	8.04	32.9	14.27	0.36	1.66	0.60	620	51.80	11.2	230	5000	4.42	7.87	2.317	**66**

standard motors

*** Increased mass moment of inertia with type "M" (+ 140 $kgmm^2$) and "ML" (+530 $kgmm^2$) not for MH 105...08)**

Dimensional drawing: MH 70 and MH 105



Motor	Type	L_M / L_B / L_E / L_{BE}	SF	IC	Flange - type	DF	F	D x L	bxhxi	t1	V x Z	QF	C x S		G
MH 70	0.5	158 / 214 / --- / ---	8.5	85	5	6	75	11x23 14x30	4x4x18 5x5x25	12.5 16	M4x10 M5x12.5	70	Ø60	h6x2.5	90
	01	188 / 244 / --- / ---													
	1.5	218 / 274 / --- / ---													
	02	248 / 304 / --- / ---													
MH 105 flange 5/14	02	186 / 250 / 206 / 260	10	90	5 14	9.5 M8	115	19x40 24x50	6x6x30 8x7x40	21.5 27	M6x16 M8x19	105	Ø95	h6x3.5	140
	04 (02 ML)	229 / 293 / 250 / 304													
	06 (04 ML)	273 / 337 / 294 / 348													
	08 (06 ML)	317 / 381 / 338 / 392													
MH 105 flange 6/9	02	186 / 250 / 206 / 260			6 9	9 7	130 100					116 96	Ø110 Ø80	h6x3.5 h6x3.5	155 128
	04 (02 ML)	229 / 293 / 250 / 304													
	06 (04 ML)	273 / 337 / 294 / 348													
	08 (06 ML)	317 / 381 / 338 / 392													

Stated in mm

MH105 with passive / active cooling	
Motor length with Option-V	L_M + 34mm
Motor length with Option-SV	L_M + 64mm
Supply voltage	24V_{DC}

Motor length	Brake	Encoder A6/A7
L_M	---	---
L_B	●	---
L_E	---	●
L_{BE}	●	●

Option – M / ML
MH ... M – Motor: same length as MH Motor
MH ... ML – Motor longer than MH Motor
The length of the MH... ML – Motor equals the length of the next larger MH motor

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MH 145

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of inertia*	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Charact eristics
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	
MH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No.
145 10 04	4.46	28.1	1.07	41.84	34.71	4.45	775	381.13	8	230	550	4.50	1.06	0.270	
										400	1000	4.54	1.06	0.476	**67**
145 20 04	4.49	28.1	2.38	8.50	42.45	2.02	775	173.24	8	230	1100	4.50	2.40	0.520	
										400	2000	4.45	2.30	0.931	**68**
145 30 04	4.51	28.1	3.42	4.14	45.88	1.41	775	121.27	8	230	1600	4.50	3.30	0.760	
										400	3000	4.29	3.17	1.347	**69**
145 45 04	4.45	28.1	4.73	2.16	23.40	1.01	775	86.62	8	230	2500	4.50	4.60	0.920	
										400	4500	3.87	4.03	1.825	**70**
145 56 04	4.53	28.1	5.48	1.56	17.96	0.887	775	69.27	8	230	3000	4.29	5.08	1.349	
										400	5600	3.56	4.65	2.090	**71**
145 10 08	8.70	48.9	2.00	14.98	146.00	4.69	1050	400.22	8	230	550	8.70	2.00	0.505	
										400	1000	8.70	1.90	0.914	**72**
145 20 08	8.67	48.9	3.69	4.04	41.60	2.50	1050	213.04	12	230	1100	8.70	3.60	0.983	
										400	2000	8.35	3.51	1.745	**73**
145 30 08	8.72	48.9	5.51	1.93	19.27	1.70	1050	145.48	12	230	1600	8.60	5.20	1.430	**74**
										400	3000	7.84	4.84	2.464	**75**
145 45 08	8.65	48.9	8.16	0.87	8.64	1.13	1050	97.42	12	230	2500	8.10	7.40	2.118	
										400	4500	7.18	6.62	3.382	**76**
145 56 08	8.85	48.9	10.72	0.51	5.23	0.92	1050	78.63	12	230	3000	7.97	9.44	2.503	
										400	5600	6.80	7.78	3.990	**77**
145 10 15	15.04	85.5	3.27	5.77	52.26	4.94	1600	422.63	17.5	230	550	15.00	3.20	0.880	
										400	1000	14.15	3.19	1.486	**78**
145 20 15	15.01	85.5	6.22	1.64	14.38	2.59	1600	221.70	17.5	230	1100	14.70	5.90	1.665	**79**
										400	2000	14.19	5.73	2.966	**80**
145 30 15	14.99	85.5	9.03	0.80	6.79	1.78	1600	152.41	17.5	230	1600	14.30	8.50	2.396	
										400	3000	12.52	7.38	3.931	**81**
145 45 15	15.01	85.5	14.17	0.316	2.77	1.13	1600	97.33	17.5	230	2500	13.60	12.50	3.555	
										400	4500	10.47	9.69	4.934	**82**
145 56 15	15.17	85.5	17.13	0.21	1.93	0.95	1600	81.40	17.5	230	3000	12.96	14.28	4.070	
										400	5600	10.82	11.94	6.344	**83**
145 10 22	22.02	115.9	4.71	3.49	29.32	5.02	2150	429.55	22.7	230	550	21.90	4.60	1.272	
										400	1000	20.56	4.56	2.159	**84**
145 20 22	21.95	115.9	8.89	0.973	8.18	2.65	2150	226.90	22.7	230	1100	21.30	8.40	2.407	
										400	2000	20.13	7.94	4.208	**85**
145 30 22	22.01	115.9	13.12	0.474	3.77	1.80	2150	154.15	22.7	230	1600	20.80	12.10	3.468	
										400	3000	17.76	10.35	5.577	**86**
145 45 22	21.98	115.9	20.83	0.185	1.49	1.13	2150	96.98	22.7	230	2500	19.10	17.60	4.995	
										400	4500	12.07	11.26	5.688	**87**
145 56 22	22.43	115.9	25.32	0.122	1.05	0.952	2150	81.40	22.7	230	3000	17.89	19.74	5.618	
										400	5600	15.74	17.34	9.227	**88**
145 10 28	27.99	144.1	5.94	2.47	19.81	5.06	2700	433.02	28	230	550	27.80	5.80	1.613	
										400	1000	25.97	5.71	2.727	**89**

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of inertia*	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Charact eristics
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	
MH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No.
145 20 28	27.99	144.1	11.33	0.678	5.44	2.65	2700	226.90	28	230	1100	26.90	10.60	3.035	
										400	2000	25.21	9.95	5.169	**90**
145 30 28	27.98	144.1	16.87	0.323	2.45	1.78	2700	153.41	28	230	1600	26.20	15.50	4.382	
										400	3000	21.25	12.54	6.675	**91**
145 45 28	27.99	144.1	26.52	0.130	0.99	1.13	2700	96.98	28	230	2500	23.20	21.40	6.090	
										400	4500	12.86	12.04	6.058	
145 56 28	28.63	144.1	29.80	0.097	0.79	1.01	2700	86.59	28	230	3000	21.51	19.65	5.911	
										400	5600	18.13	18.79	10.626	**92**

standard motors

***Increased mass moment of inertia with type „M“ (+790 $kgmm^2$) and „ML“ (+1770 $kgmm^2$ not for MH 145 .. 28)**

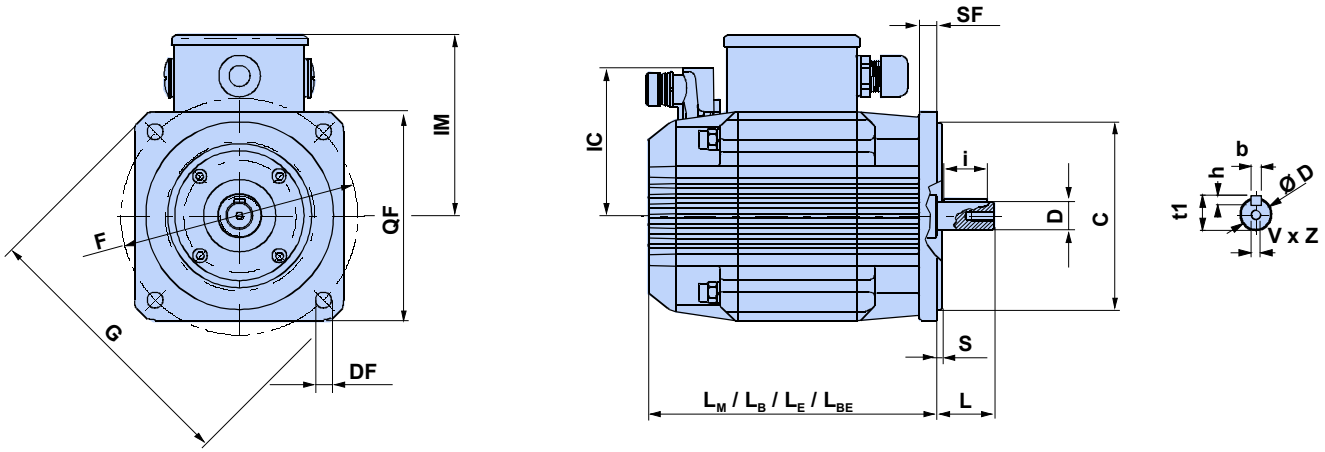
MH 205

Motor type	Static torque	Peak moment	Continual stall current	Resistance	Inductivity	Torque constant	Moment of inertia*	EMF	Weight	Mains voltage	Nominal speed	Nominal torque	Nominal current	Nominal output	Charact eristics
	M_0	M_S	I_0	R	L	K_T	J		m	U	n_n	M_n	I_n	P_n	.
MH ...	Nm	Nm	A_{eff}	Ohm	mH	Nm/A	$kgmm^2$	V/1000rpm	kg	V AC	rpms	Nm	A_{eff}	kW	No
205 10 28	28	122.6	6.90	3.30	36.69	4.35	5000	372.22	29.2	230	550	28.60	6.90	1.657	
										400	1000	28.15	6.75	2.946	**93**
205 20 28	28	122.6	12.99	0.932	8.87	2.31	5000	197.73	29.2	230	1150	27.30	12.70	3.385	
										400	2000	27.25	12.32	5.704	**94**
205 30 28	28	122.6	20.08	0.390	3.47	1.49	5000	127.95	29.2	230	1700	27.60	19.30	4.970	
										400	3000	25.65	17.96	8.054	**95**
205 10 50	50	211.9	12.42	1.17	18.82	4.35	8000	372.22	44	230	550	51.30	12.30	2.977	
										400	1000	50.40	12.08	5.272	**96**
205 20 50	50	211.9	22.08	0.372	4.95	2.45	8000	209.37	44	230	1150	50.00	21.30	5.998	
										400	2000	46.95	20.07	9.829	**97**
205 30 50	50	211.9	33.13	0.165	1.91	1.63	8000	139.57	44	230	1700	48.00	30.80	8.657	
										400	3000	41.65	26.77	13.078	**98**
205 10 70	70	309.8	16.75	0.722	12.65	4.49	11000	383.85	58.8	230	550	68.64	16.50	4.126	
										400	1000	69.36	16.14	7.282	**99**
205 20 70	70	309.8	30.72	0.215	3.30	2.44	11000	209.37	58.8	230	1150	68.60	29.30	8.237	
										400	2000	62.87	26.89	13.161	**100**
205 30 70	70	309.8	46.08	0.095	1.59	1.63	11000	139.57	58.8	230	1700	65.00	41.70	11.711	
										400	3000	52.31	33.68	16.428	**101**
205 10 90	90	398.2	22.13	0.470	9.01	4.35	14000	372.22	73.6	230	550	87.11	21.80	5.271	
										400	1000	88.21	21.17	9.233	**102**
205 20 90	90	398.2	44.26	0.117	2.25	2.17	14000	186.11	73.6	230	1150	87.00	41.80	10.453	
										400	2000	78.33	37.71	16.372	**103**
205 30 90	90	398.2	59.01	0.066	1.26	1.63	14000	139.57	73.6	230	1700	81.70	52.40	14.698	
										400	3000	61.58	39.70	19.337	**104**

standard motors

*** Increased mass moment of inertia with type „M“ (+4400 $kgmm^2$) and „ML“ (+12100 $kgmm^2$ not for MH 205 .. 90)**

Dimensional drawing: MH 145 and MH 205



Motor	Type	L_M / L_B / L_E / L_{BE}	SF	IM	IC	Flange - type	DF	F	D x L	bxhxi	t1	V x Z	QF	C x S		G
MH 145	04	200 / 274 / 220 / 294	12	125	103	5 14	11.5 M10	165	24x50 28x60	8x7x40 8x7x50	27 31	M8x19 M10x22	145	Ø130	h6x3.5	200
	08 (04 ML)	231 / 305 / 251 / 325														
	15 (08 ML)	292 / 366 / 312 / 396														
	22 (15 ML)	354 / 428 / 374 / 448														
	28 (22 ML)	416 / 490 / 436 / 510														
MH 205	28	273 / 372 / 293* / 392*	18	172	132	5	14	215	38x80 42x110	10x8x70 12x8x100	41 45	M12x32 M16x40	205	Ø180	h6x4	250
	50 (28 ML)	342 / 441 / 362* / 461*														
	70 (50 ML)	411 / 510 / 431* / 530*														
	90 (70 ML)	480 / 579 / 500* / 599*														

* applies only to SinCos Multiturn (Option A7)Option A6 (SinCos Singleturn) has for MH205 no effect on the motor length (then L_M and L_B apply). Stated in mm

MH145/MH205 with passive / active cooling

	MH145	MH205
Motor length with Option-V	L_M + 44mm	L_M + 54mm
Motor length with Option-SV	L_M + 97mm	L_M + 109mm
Supply voltage	230V_{AC}	230V_{AC}

Motor length	Brake	Encoder A6 / A7*
L_M	---	---
L_B	●	---
L_E	---	●
L_{BE}	●	●

Option – M / ML
MH ... M – Motor: same length as MH Motor
MH ... ML – Motor longer than MH Motor
The length of the MH... ML – Motor equals the length of the next larger MH motor.

Maximum shaft loads

The data apply for a load applied at the middle of the shaft.
The data apply for 20,000 hours of operation.
The maximum axial load is 20% smaller than the maximum radial load.

Maximum radial shaft load of the MH motors

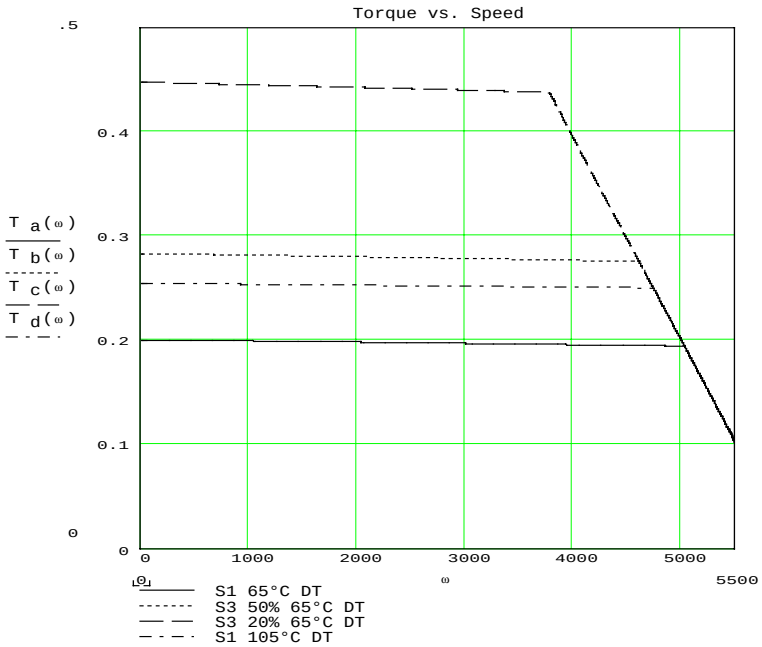
Motor	Type [Nm]	1000rpm	2000rpm	3000rpm	4000rpm	6000rpm	8000rpm
MH56 [N]	0.2	-	-	-	226	197	179
	0.4	-	-	-	239	209	189
	0.6	-	-	-	248	217	197
MH70 [N]	0.5	372	337	294	-	-	-
	1.0	398	360	306	-	-	-
	1.5	416	376	330	-	-	-
	2.0	428	388	340	-	-	-
MH105 [N]	2	-	-	927	775	652	-
	4	-	-	1000	820	710	-
	6	-	-	1016	866	750	-
	8	-	-	1100	896	775	-
MH145 [N]	8	1335	1095	940	-	-	-
	15	1445	1185	1020	-	-	-
	22	1515	1240	1070	-	-	-
	28	1560	1280	1100	-	-	-
MH205 [N]	28	3435	2810	2430	-	-	-
	50	3750	3070	2650	-	-	-
	70	3950	3235	2790	-	-	-
	90	4100	3350	2890	-	-	-

Motor characteristics MH series

Operating modes S1/S3 in accordance with DIN 60034-1

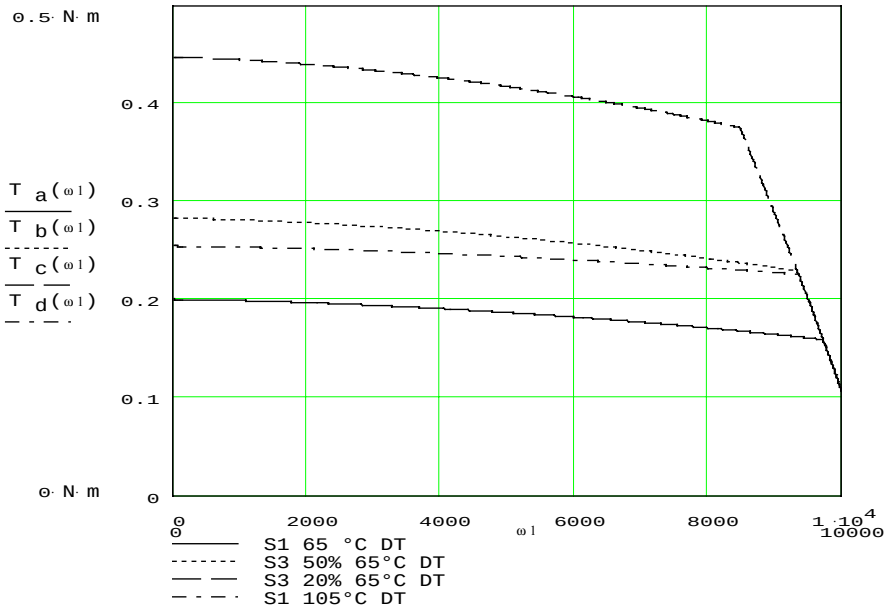
MH 56

MH 56 50 0.2: 5000rpm at 400V$_{AC}$



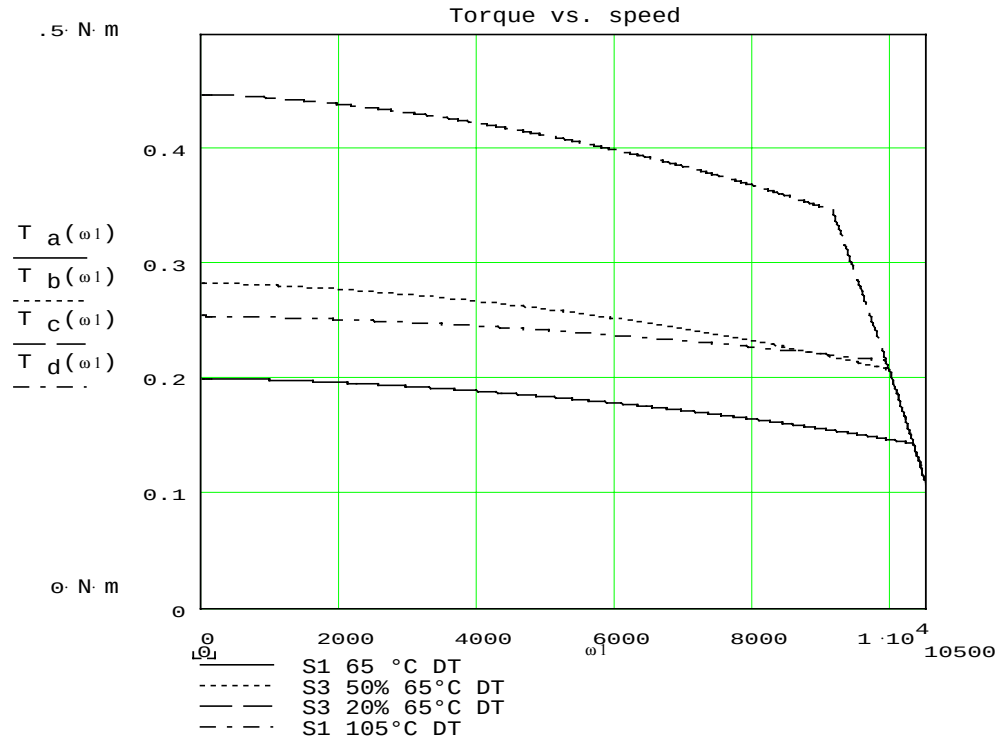
Characteristic 27

MH 56 95 0.2: 9500rpm at 400V$_{AC}$



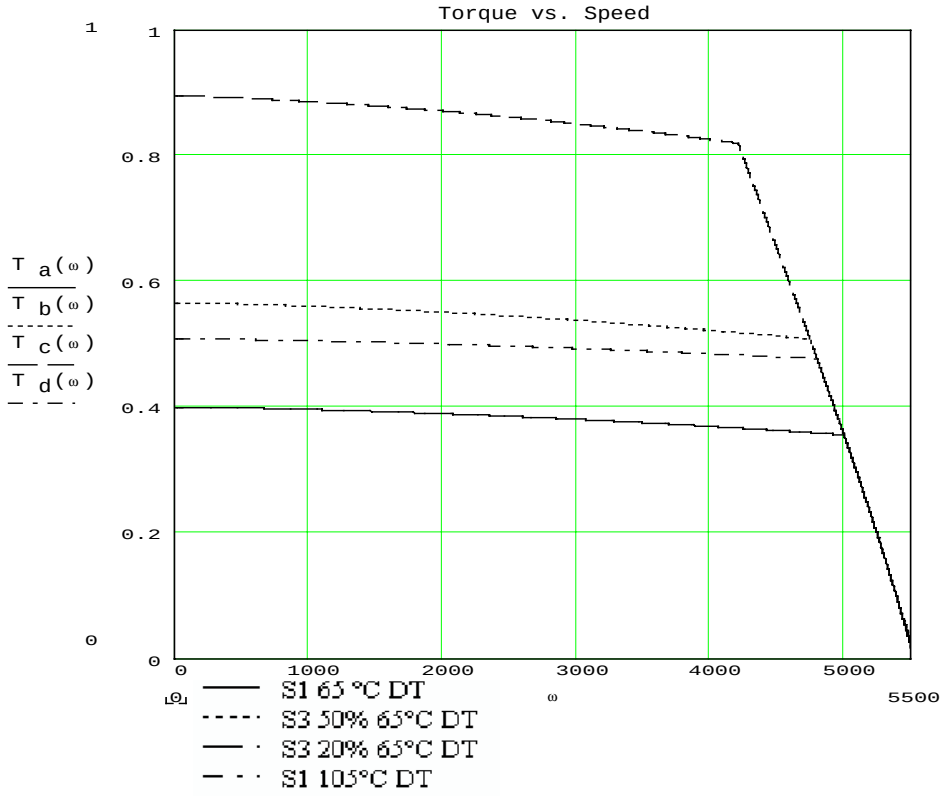
Characteristic 28

MH 56 100 0.2: 10 000rpm at 230V$_{AC}$



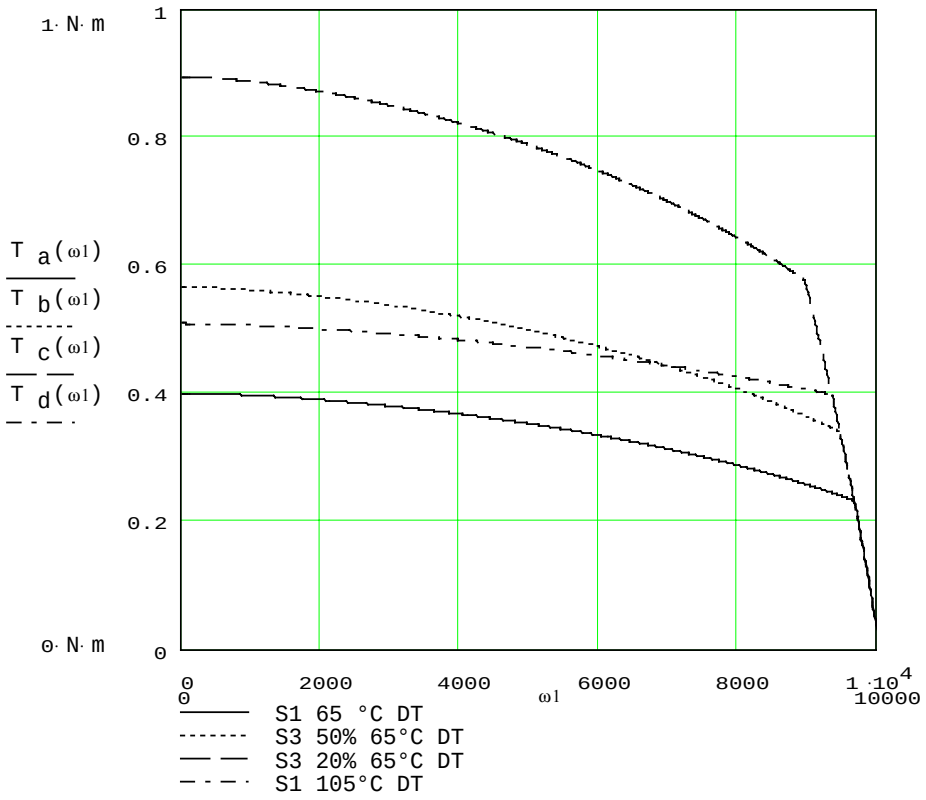
Characteristic 29

MH 56 50 0.4: 5000rpm at 400V$_{AC}$



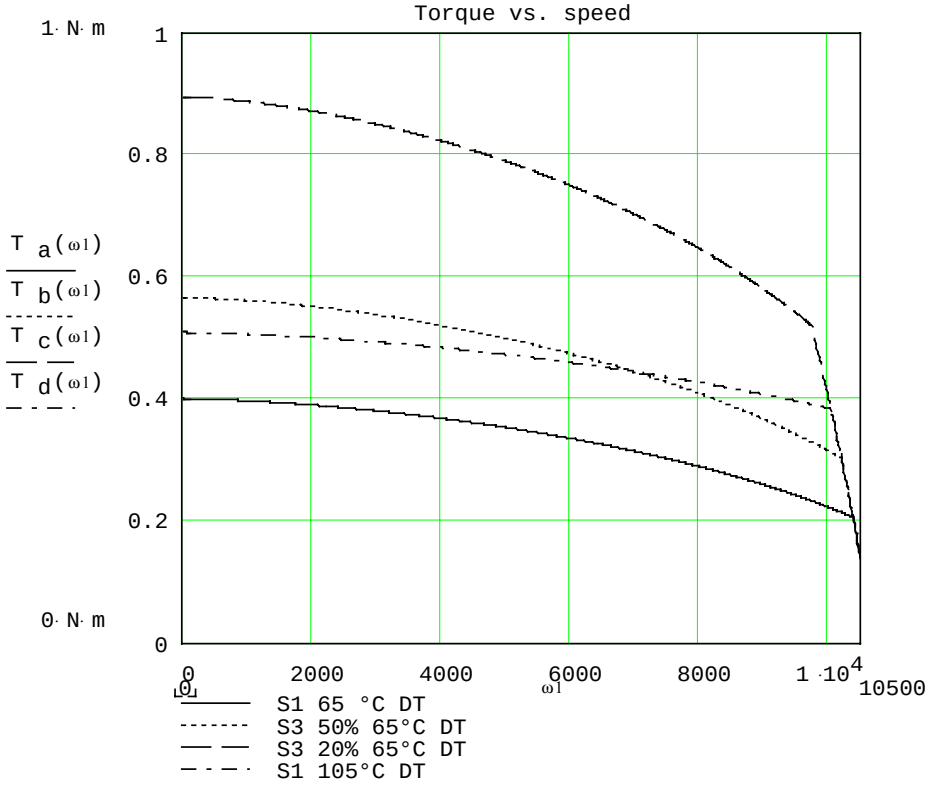
Characteristic 30

MH 56 95 0.4: 9500rpm at 400V$_{AC}$



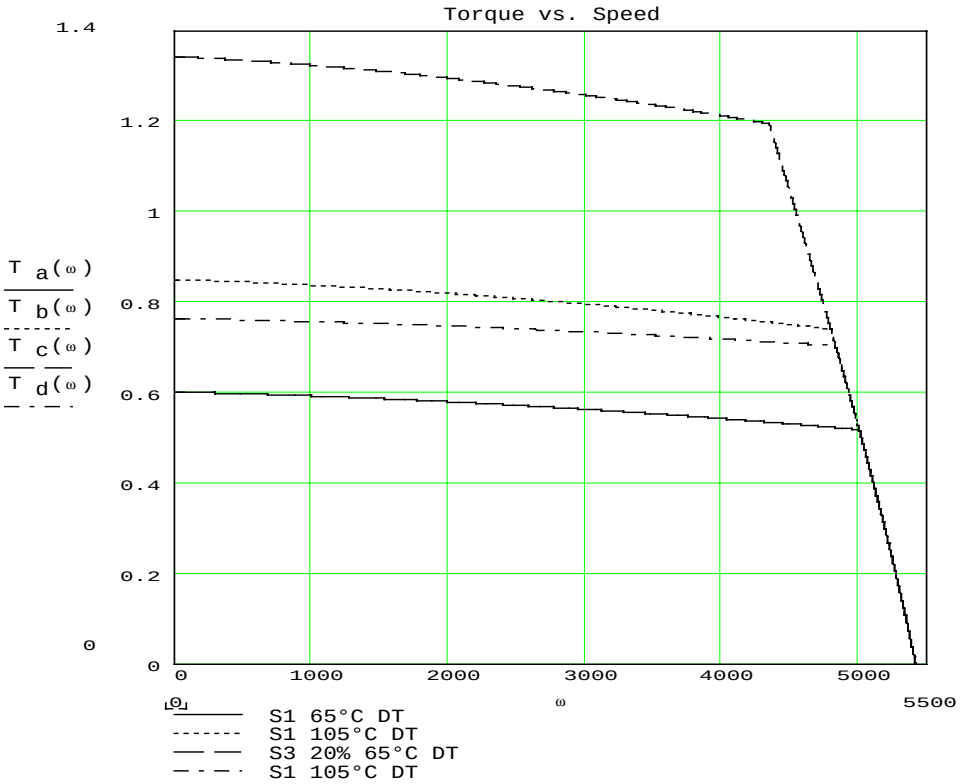
Characteristic 31

MH 56 100 0.4: 10 000rpm at 230V$_{AC}$



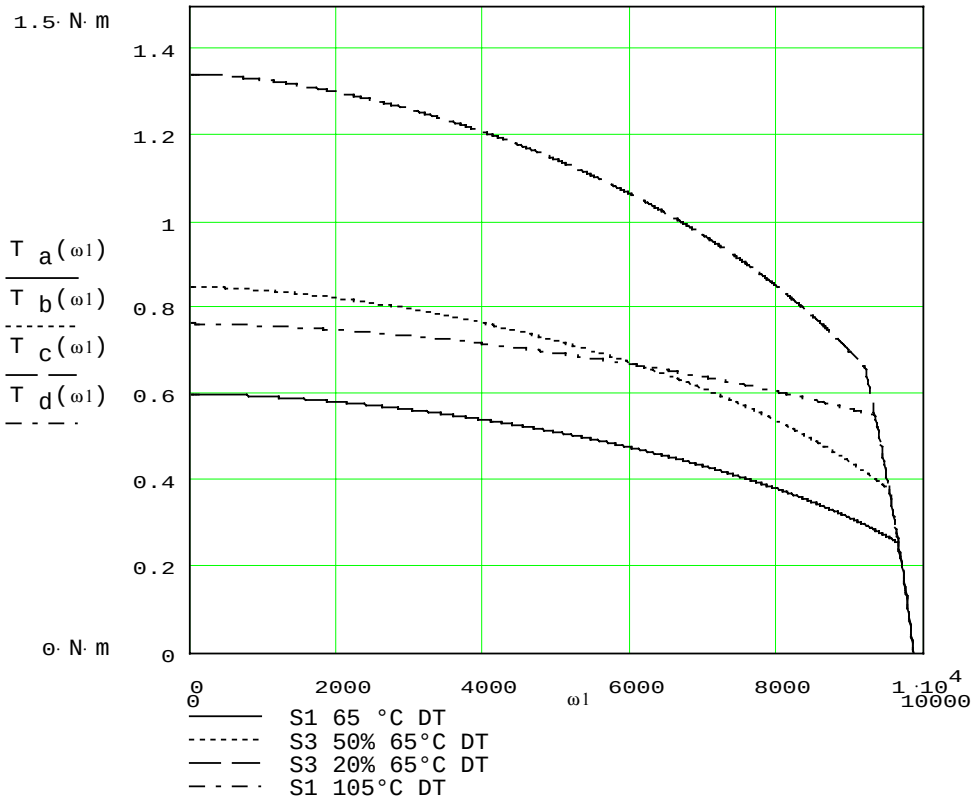
Characteristic 32

MH 56 50 0.6: 5000rpm at 400V$_{AC}$



Characteristic 33

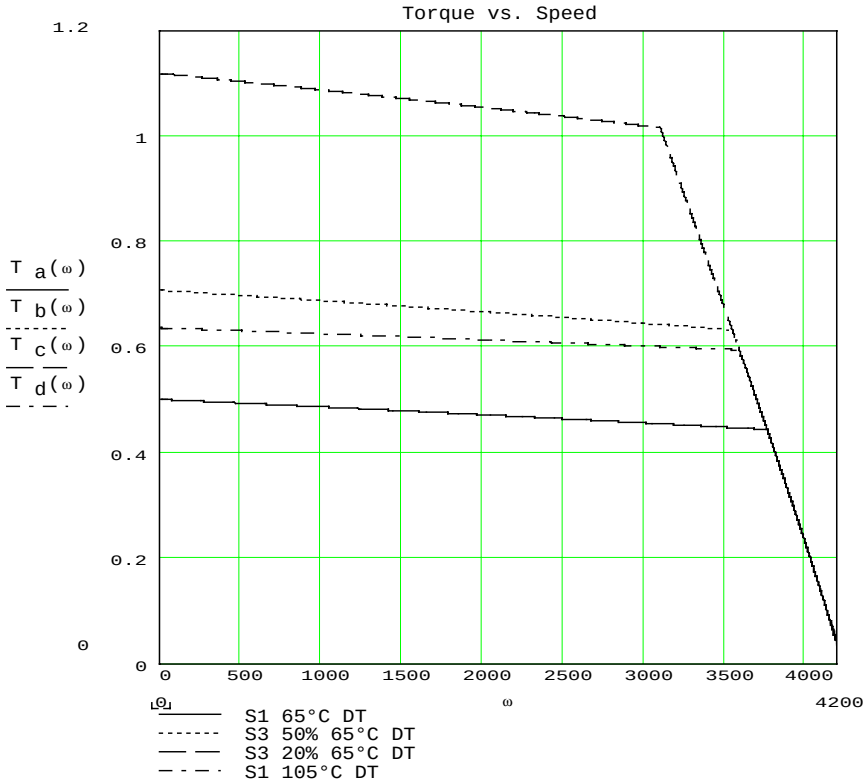
MH 56 95 0.6: 9500rpm at 400V$_{AC}$



Characteristic 34

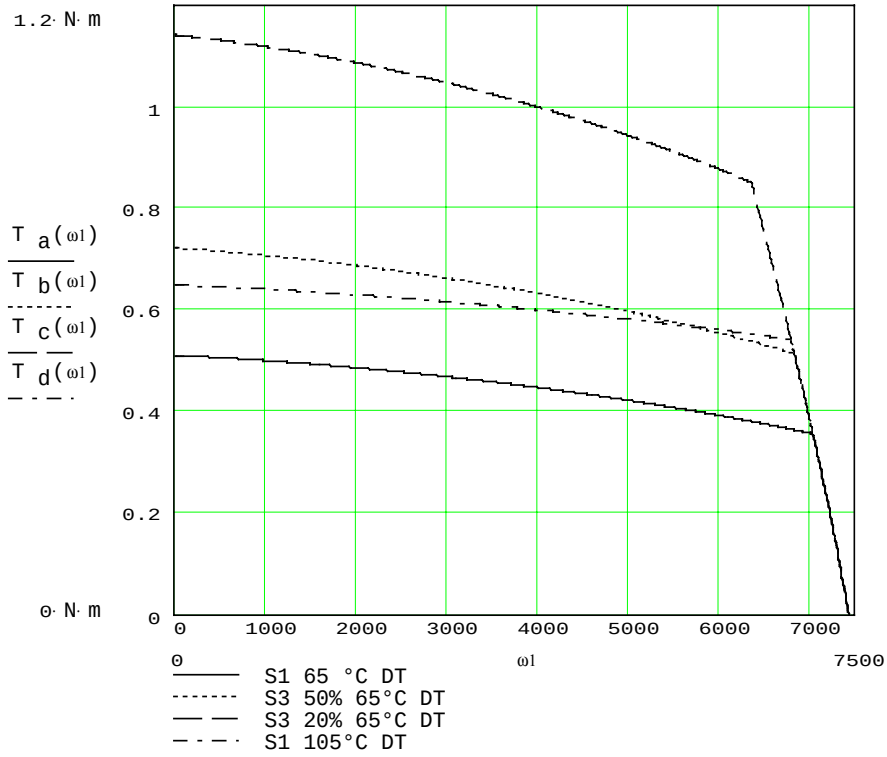
MH 70

MH 70 37 0.5: 3700rpm at 400VAC



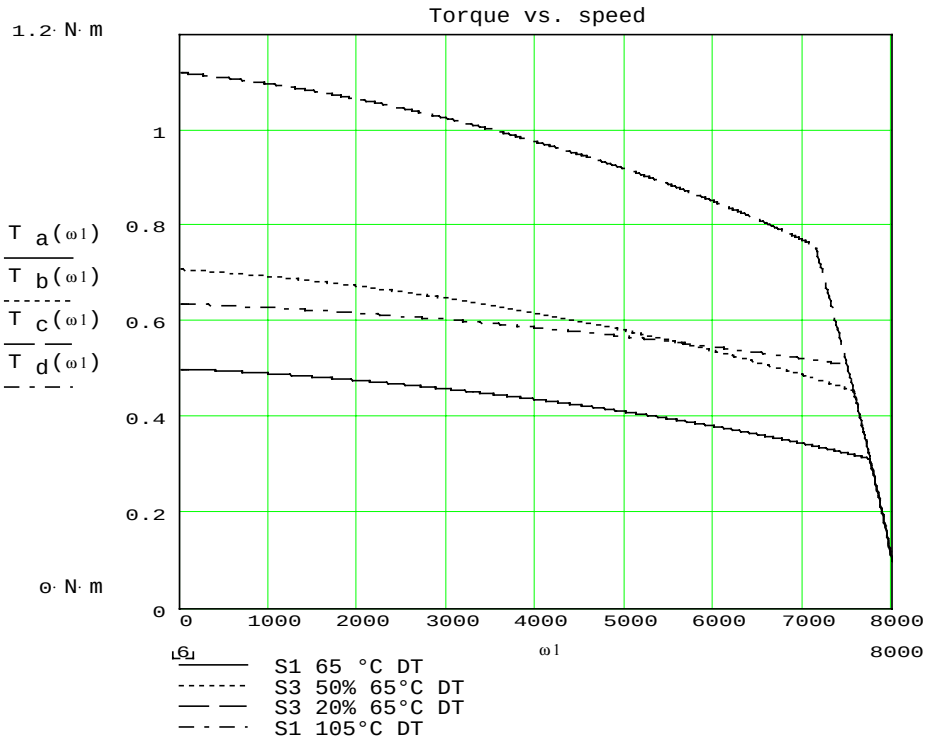
Characteristic 35

MH 70 70 0.5: 7000rpm at 400VAC



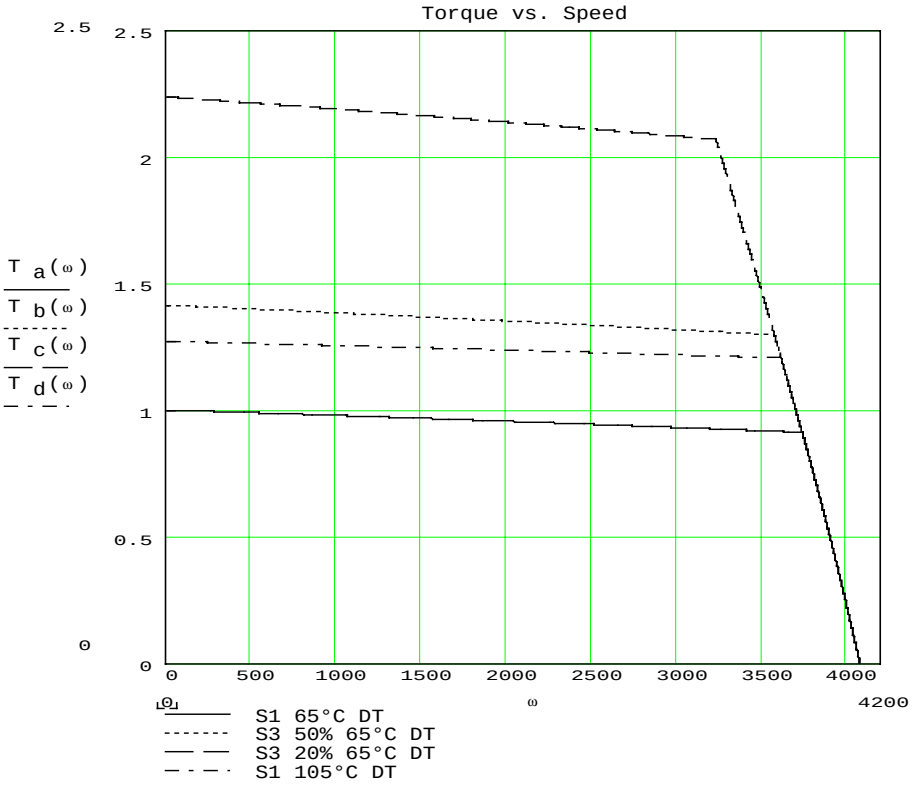
Characteristic 36

MH 70 75 0.5: 7500rpm at 230VAC



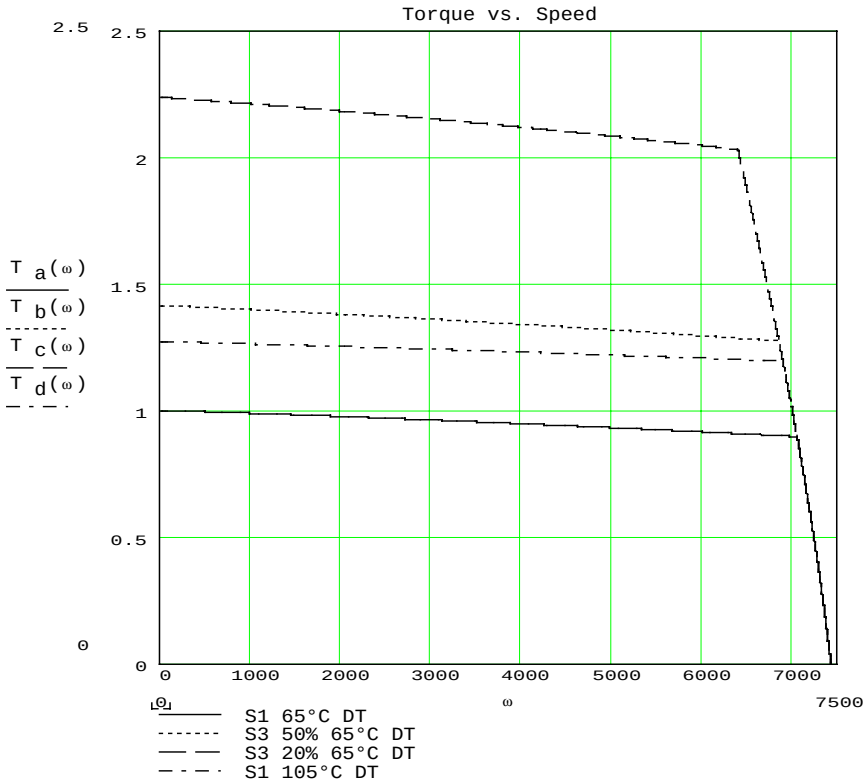
Characteristic 37

MH 70 37 01: 3700rpm at 400VAC



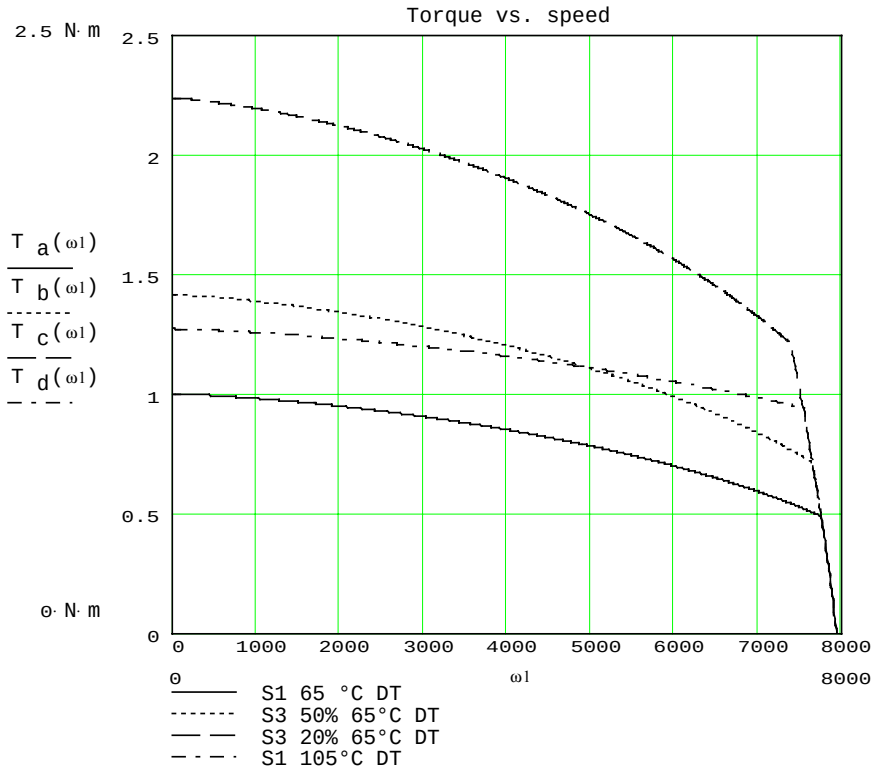
Characteristic 38

MH 70 70 01: 7000rpm at 400VAC



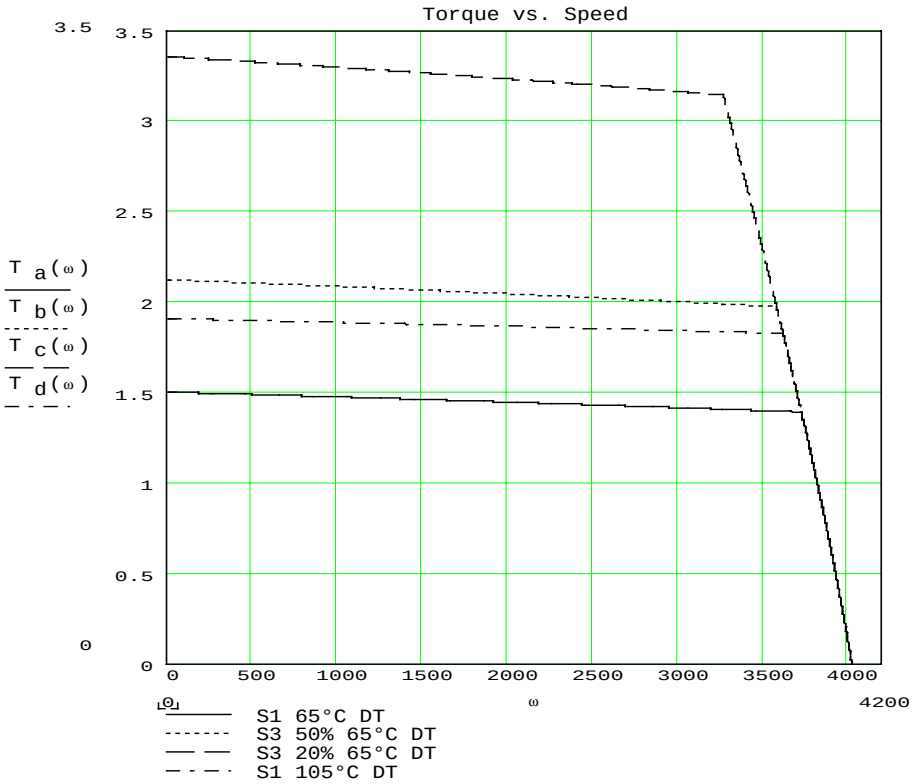
Characteristic 39

MH 70 75 01: 7500rpm at 230VAC



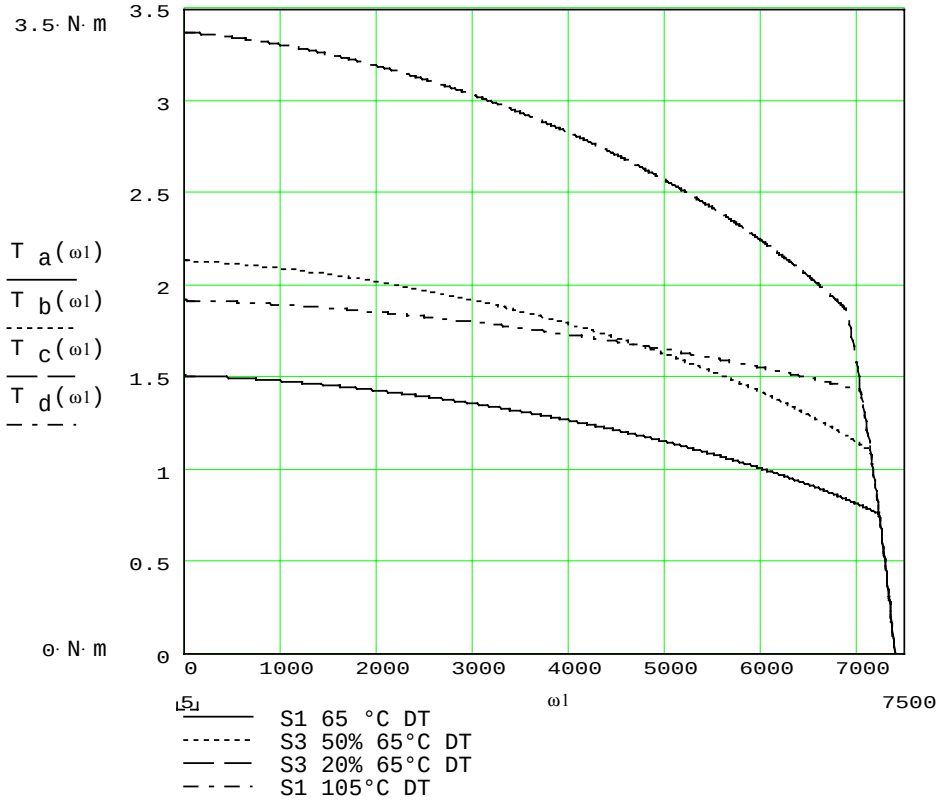
Characteristic 40

MH 70 37 1.5: 3700rpm at 400V$_{AC}$



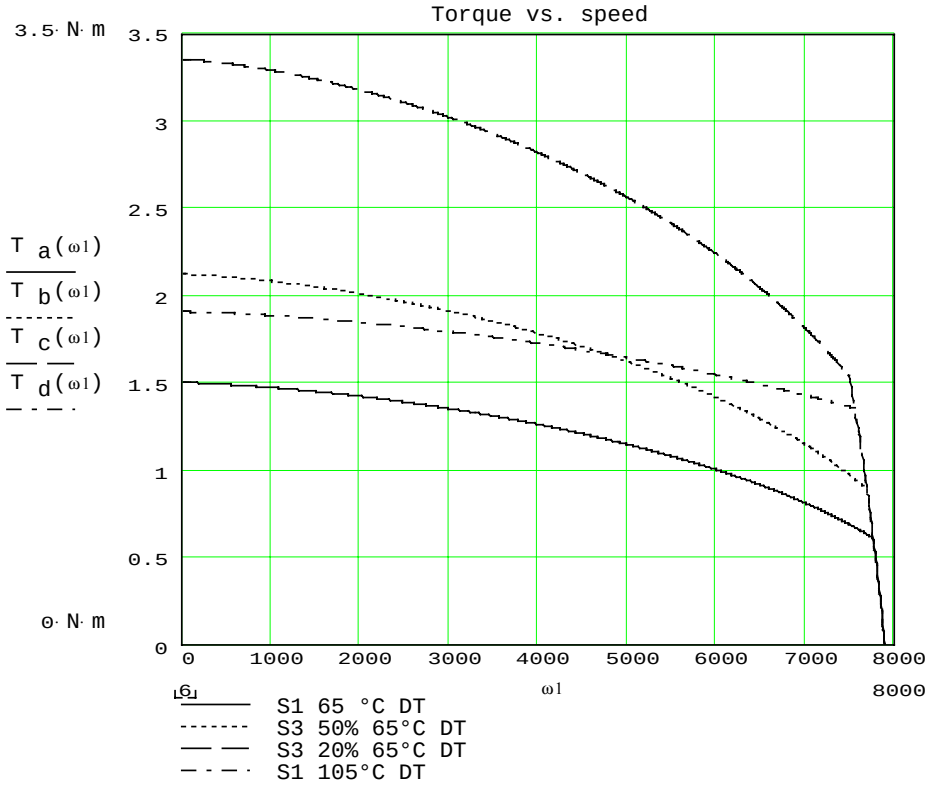
Characteristic 41

MH 70 70 1.5: 7000rpm at 400V$_{AC}$



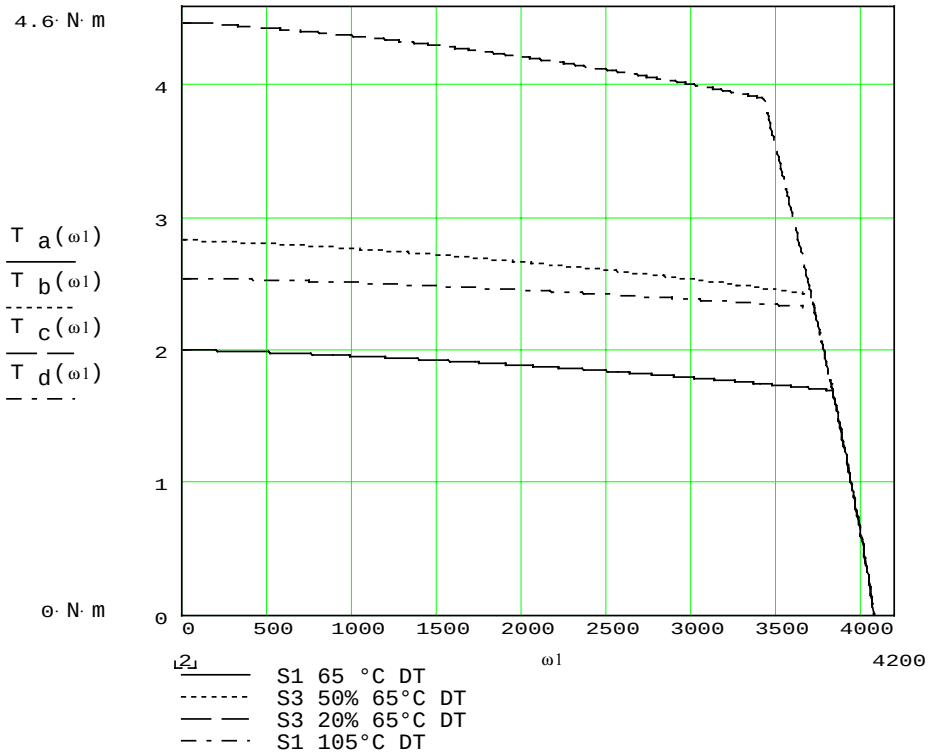
Characteristic 42

MH 70 75 1.5: 7500rpm at 230VAC



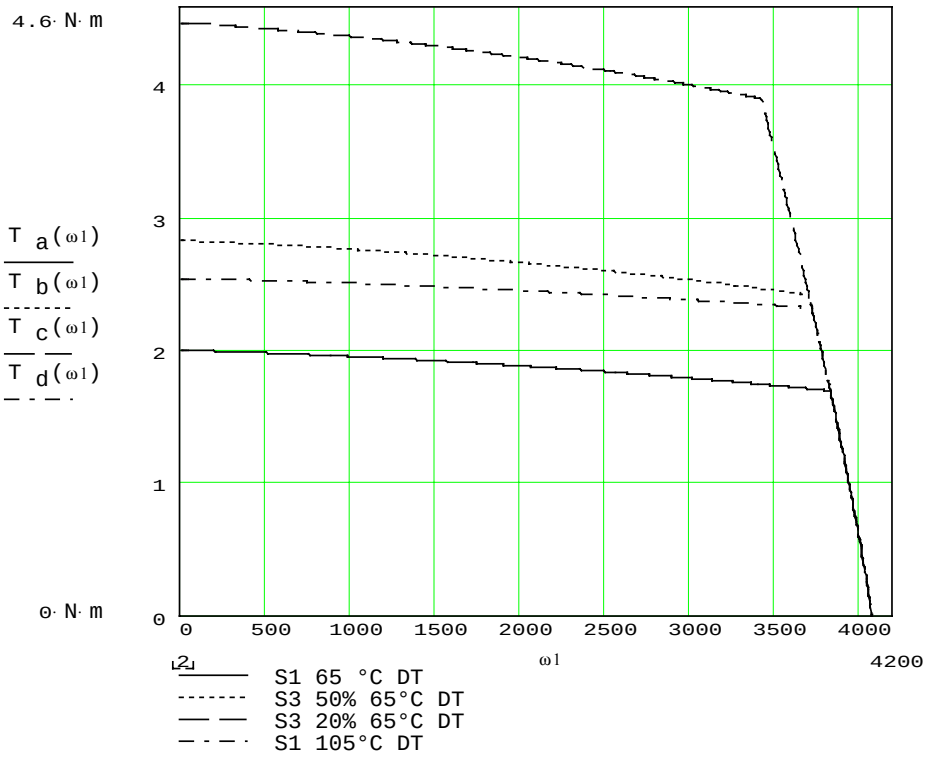
Characteristic 43

MH 70 37 02: 3700rpm at 400VAC



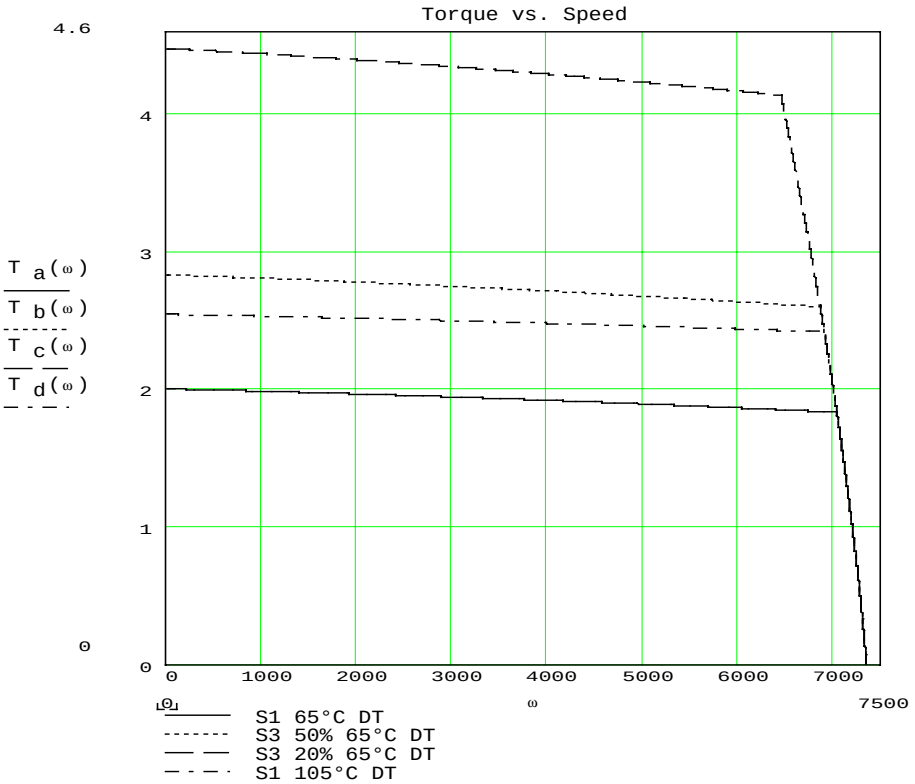
Characteristic 44

MH 70 70 02: 3800rpm at 230VAC



Characteristic 45

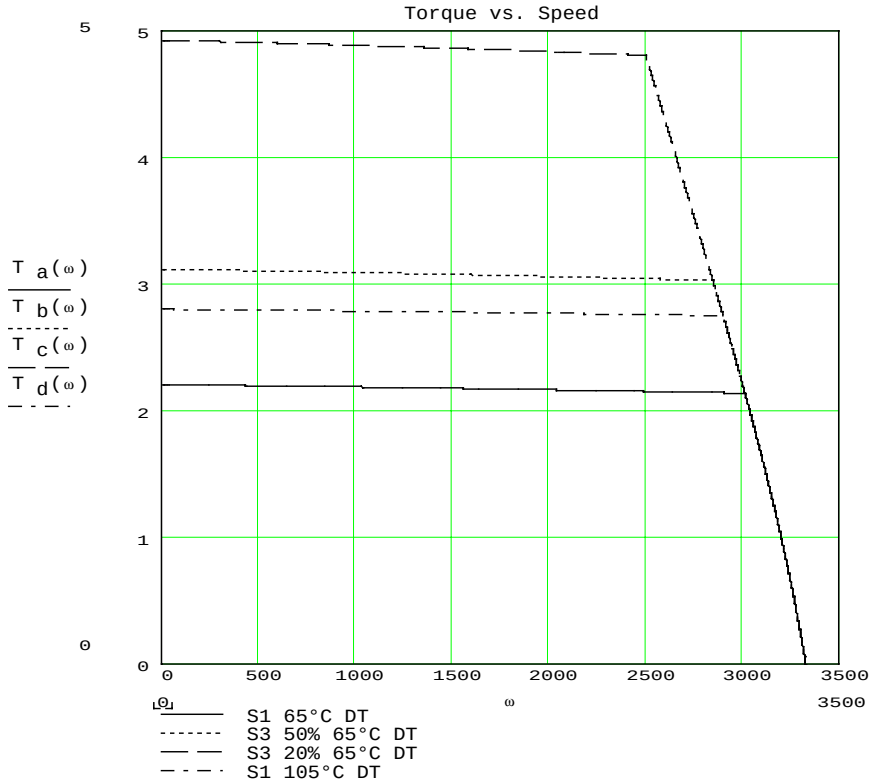
MH 70 70 02: 7000rpm at 400VAC



Characteristic 46

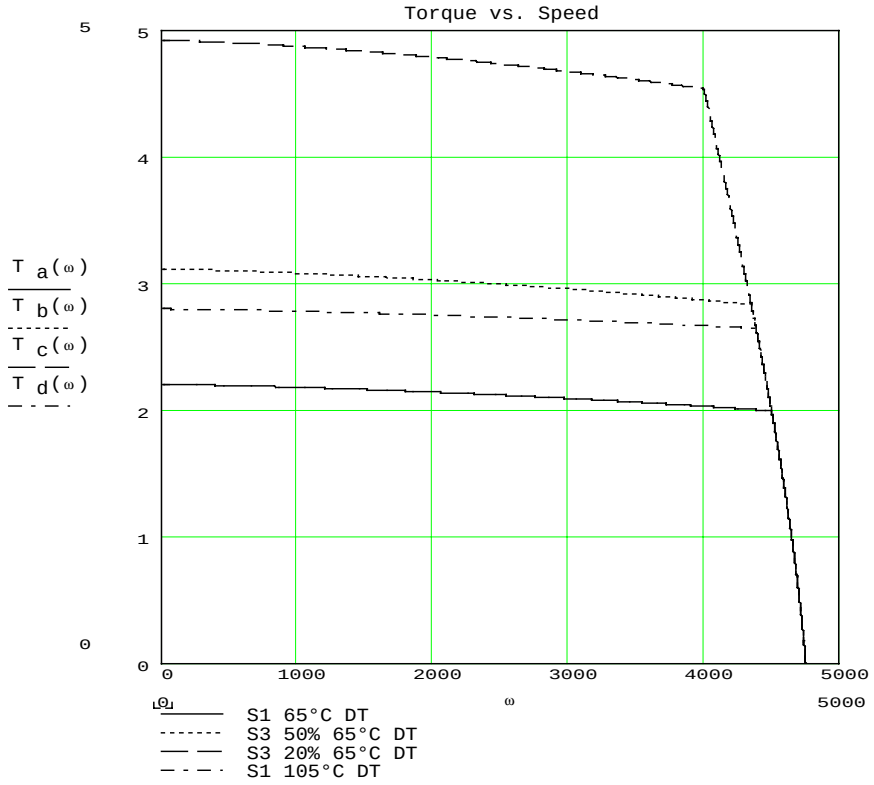
MH 105

MH 105 30 02: 3000rpm at 400V$_{AC}$



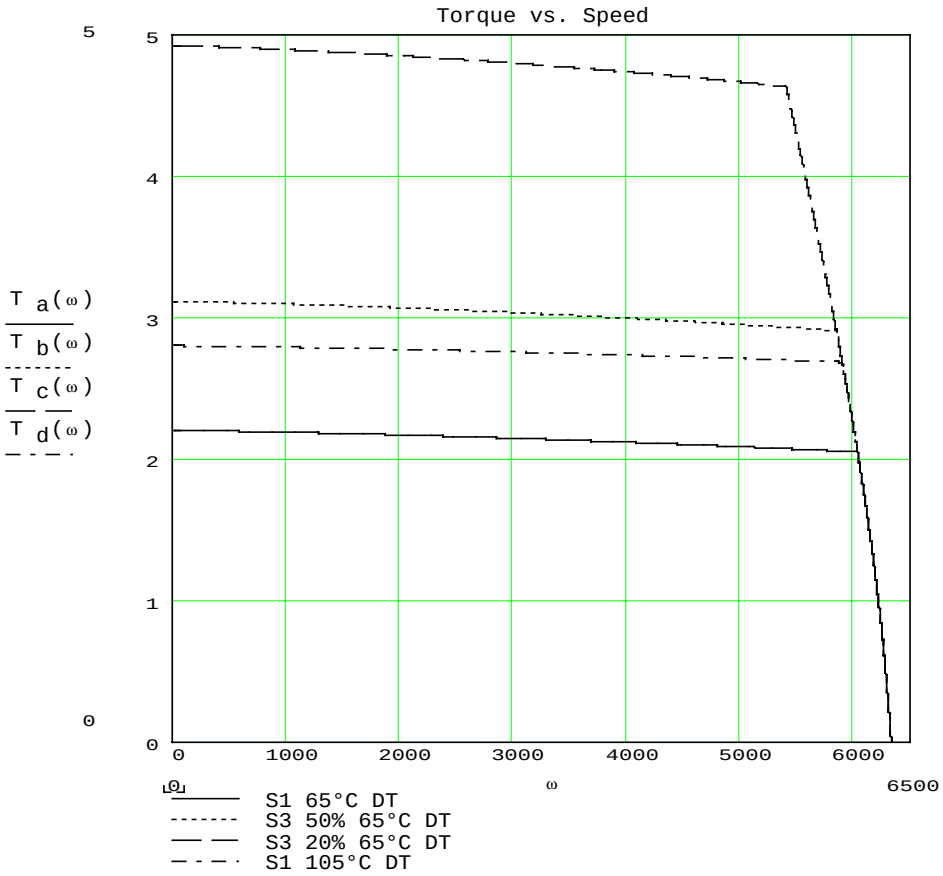
Characteristic 47

MH 105 45 02: 4500rpm at 400V$_{AC}$



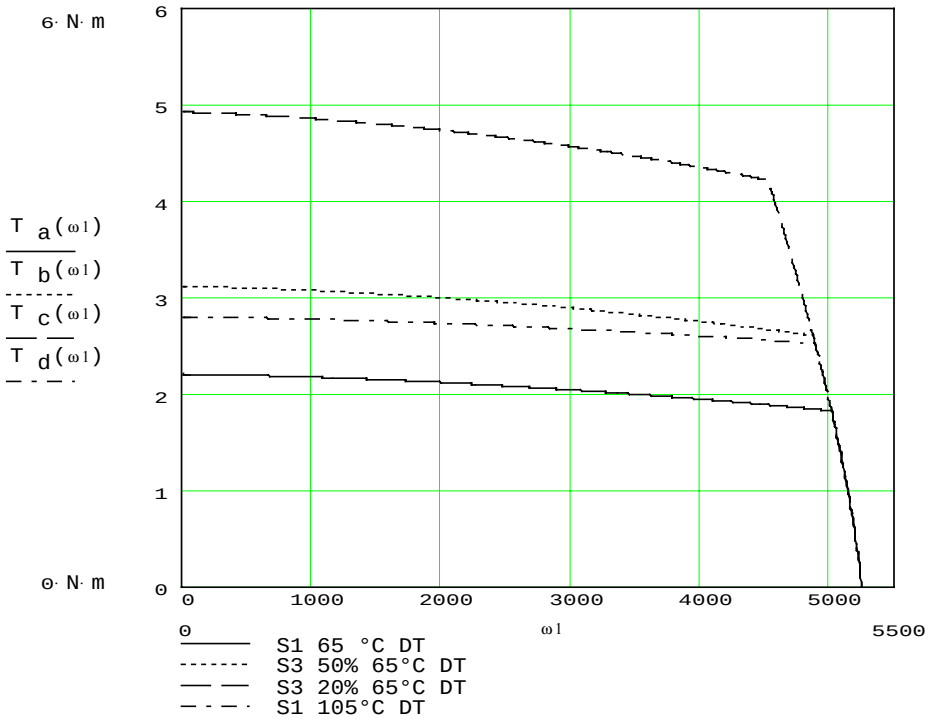
Characteristic 48

MH 105 60 02: 6000rpm at 400V$_{AC}$



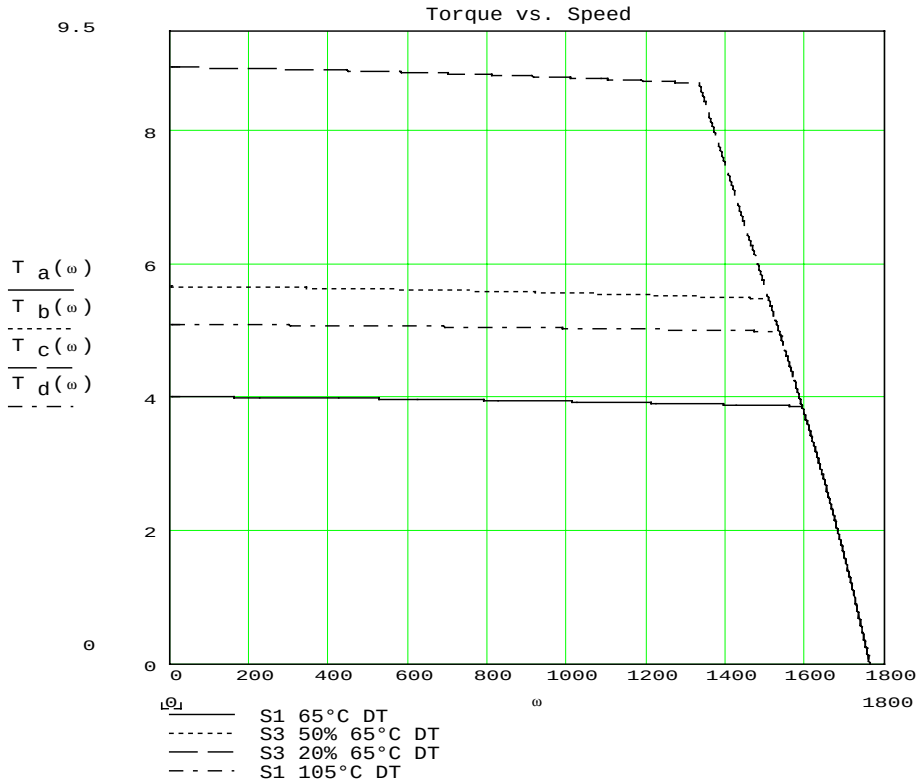
Characteristic 49

MH 105 50 02: 5000rpm at 230V$_{AC}$



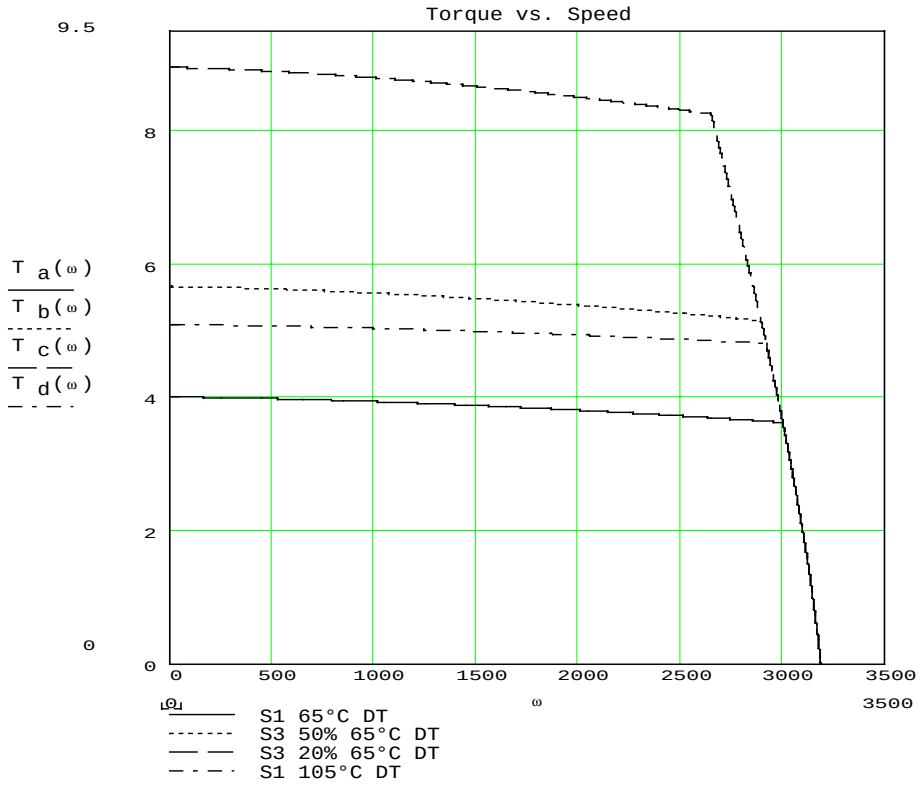
Characteristic 50

MH 105 30 04: 1600rpm at 230V$_{AC}$



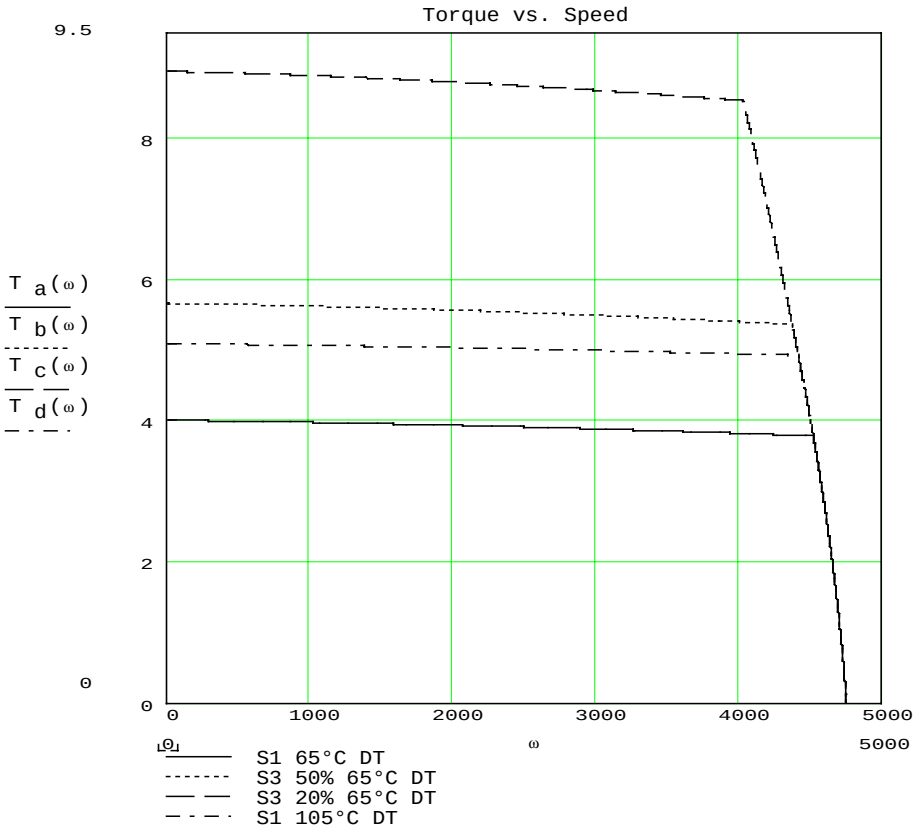
Characteristic 51

MH 105 30 04: 3000rpm at 400V$_{AC}$



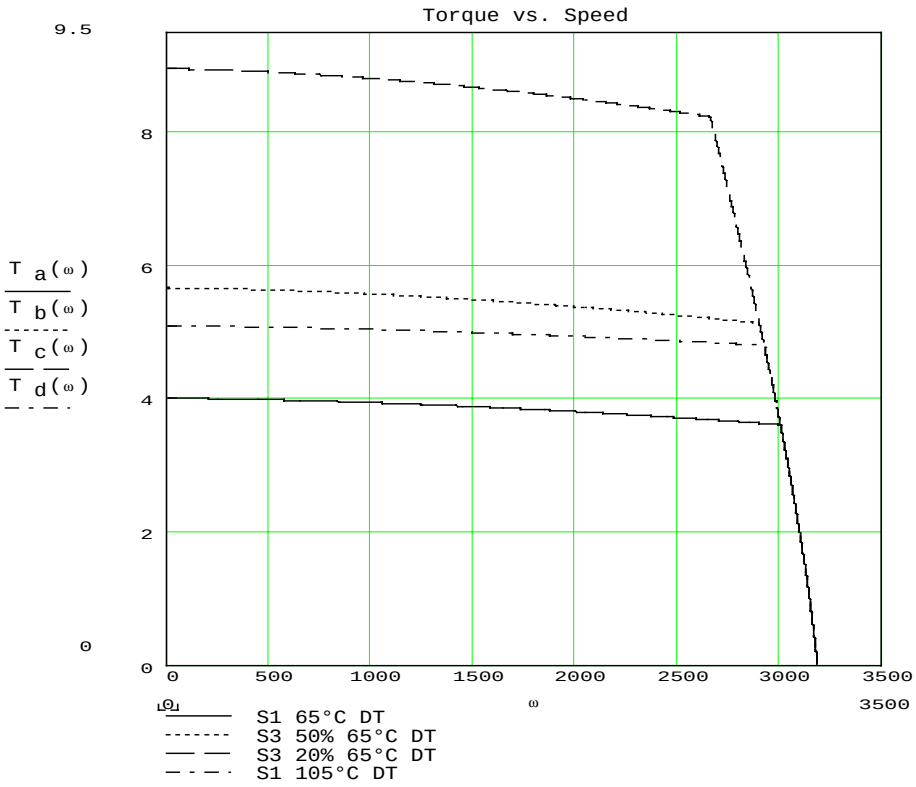
Characteristic 52

MH 105 45 04: 4500rpm at 400VAC



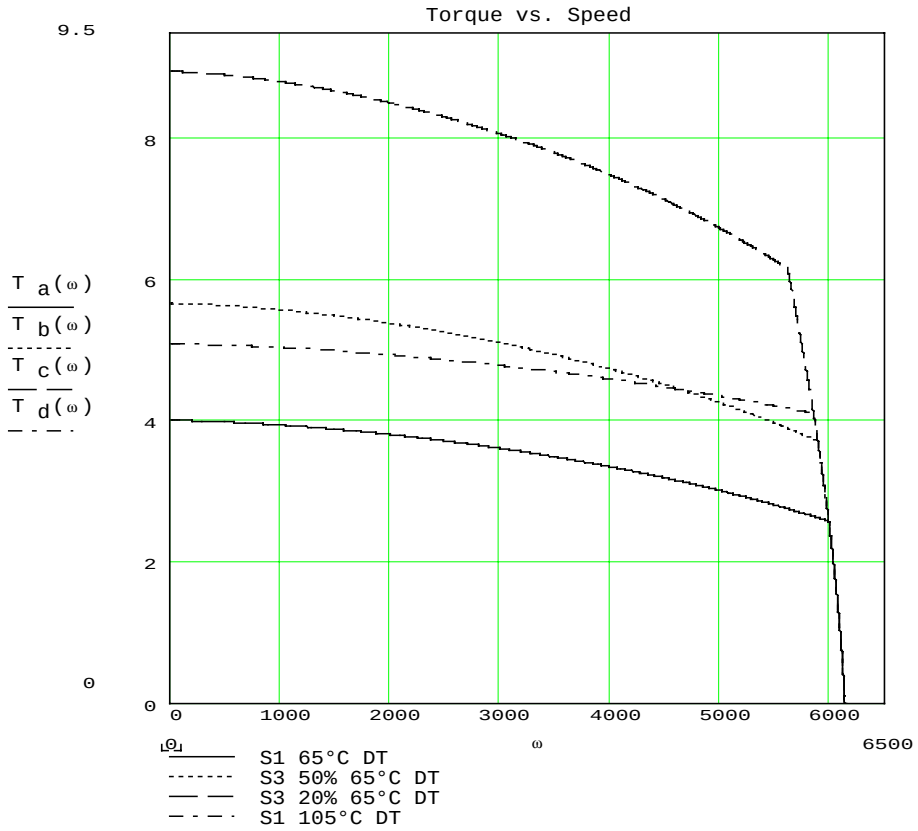
Characteristic 53

MH 105 60 04: 3000rpm at 230VAC



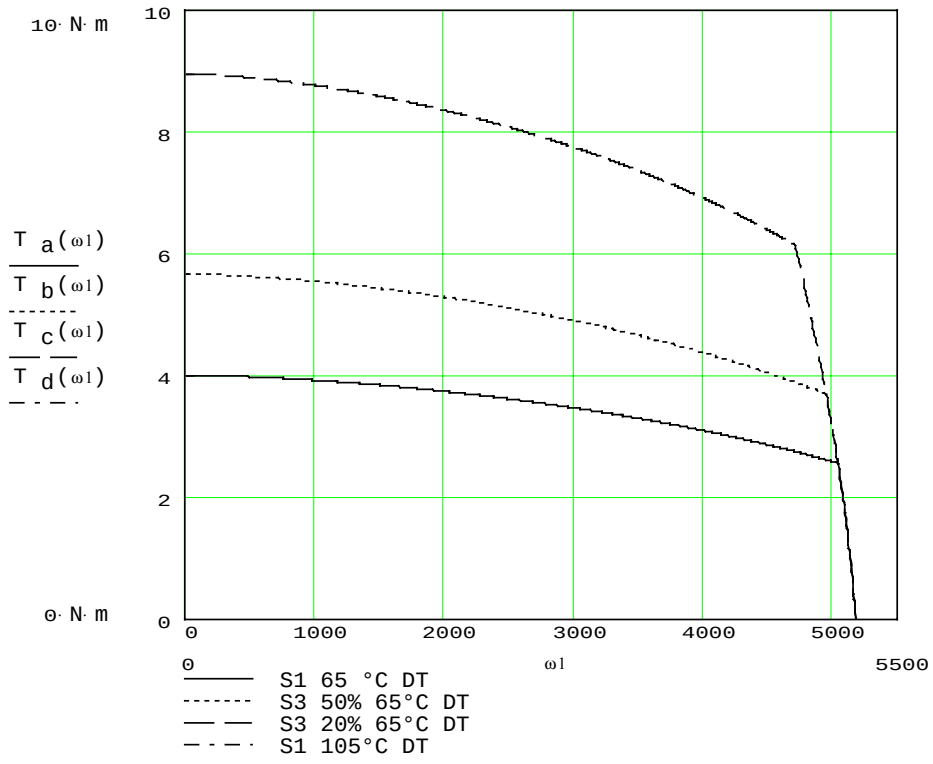
Characteristic 54

MH 105 60 04: 6000rpm at 400V$_{AC}$



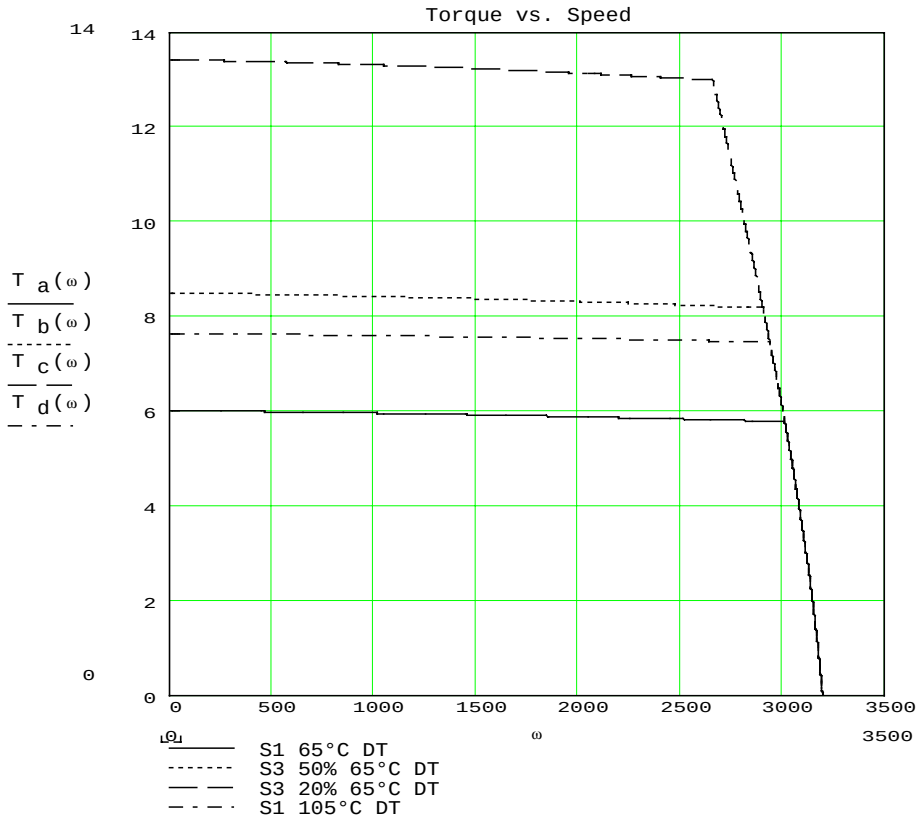
Characteristic 55

MH 105 50 04: 5000rpm at 230V$_{AC}$



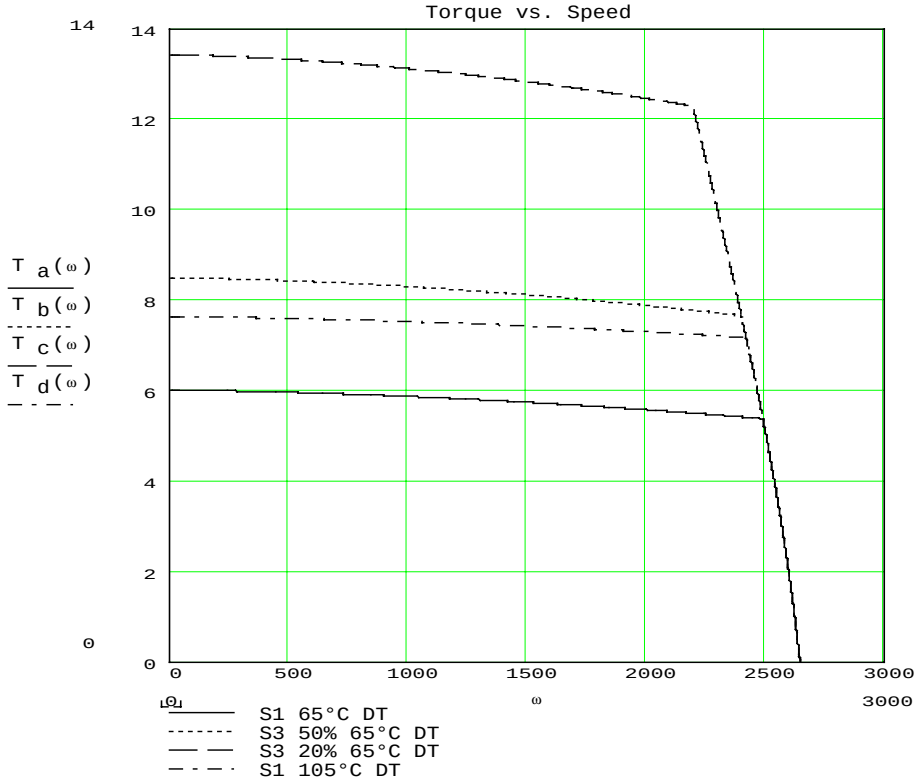
Characteristic 56

MH 105 30 06: 3000rpm at 400V$_{AC}$



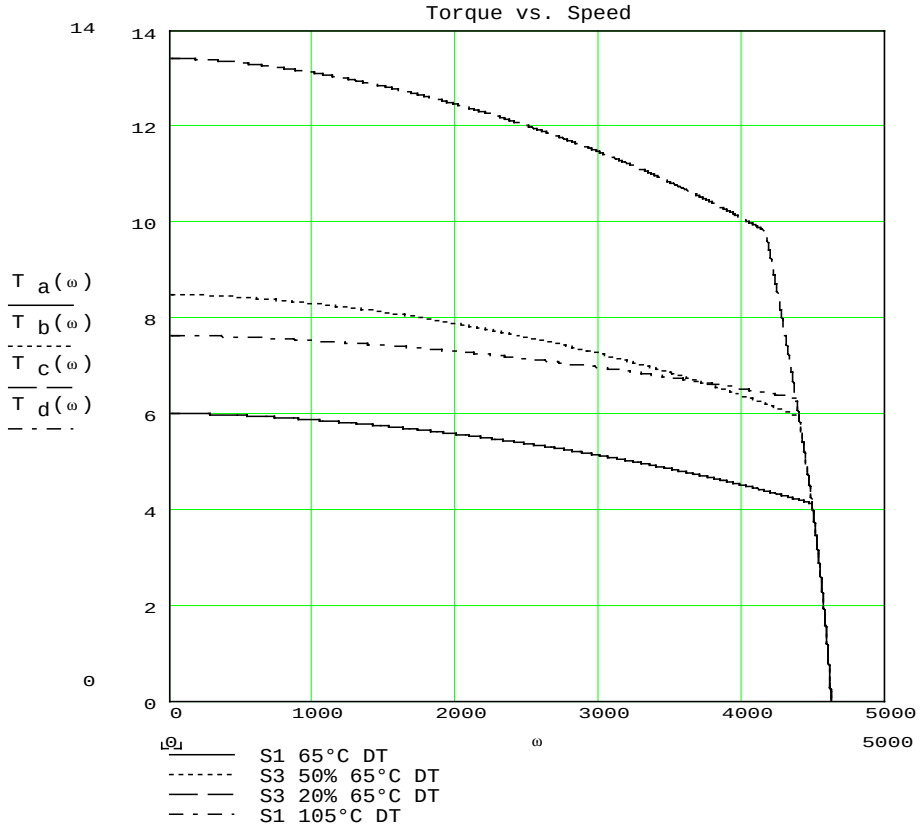
Characteristic 57

MH 105 45 06: 2500rpm at 230V$_{AC}$



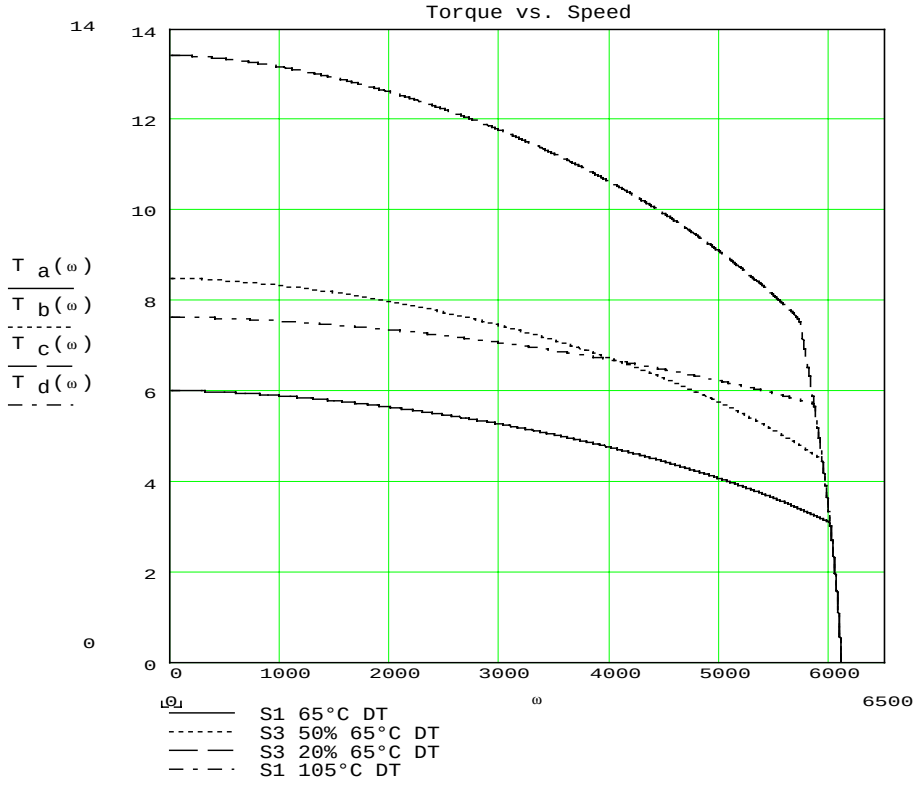
Characteristic 58

MH 105 45 06: 4500rpm at 400V$_{AC}$



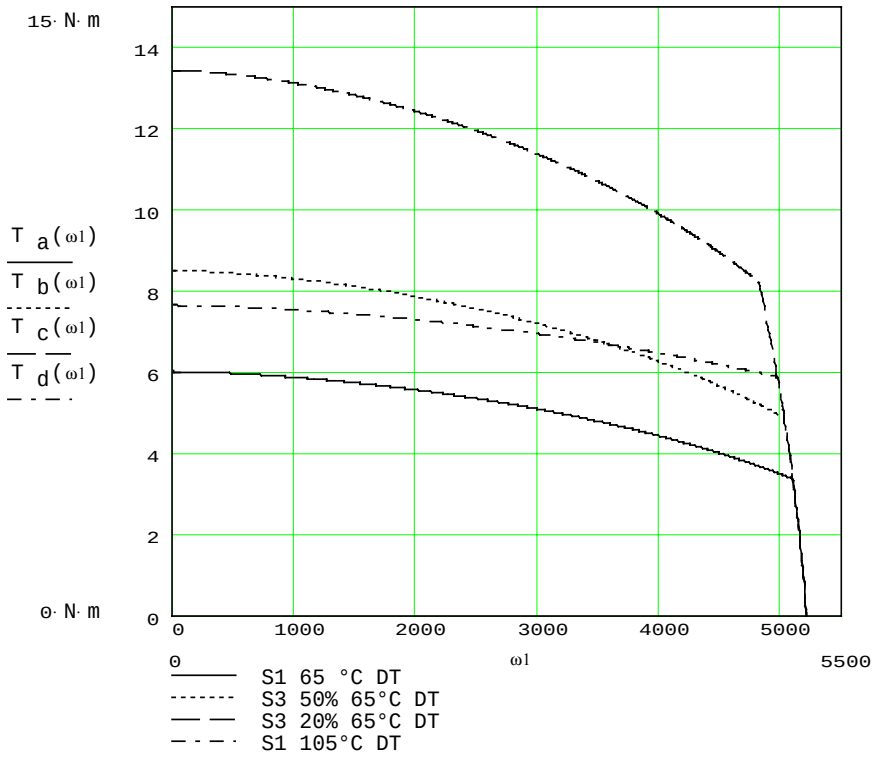
Characteristic 59

MH 105 60 06: 6000rpm at 400V$_{AC}$



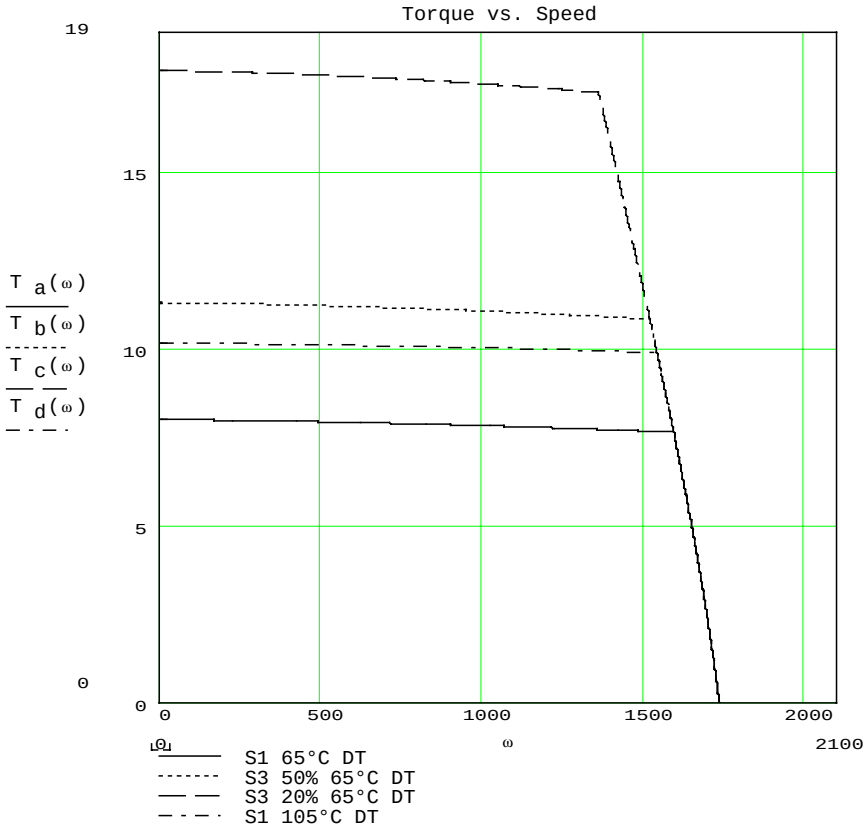
Characteristic 60

MH 105 50 06: 5000rpm at 230V$_{AC}$



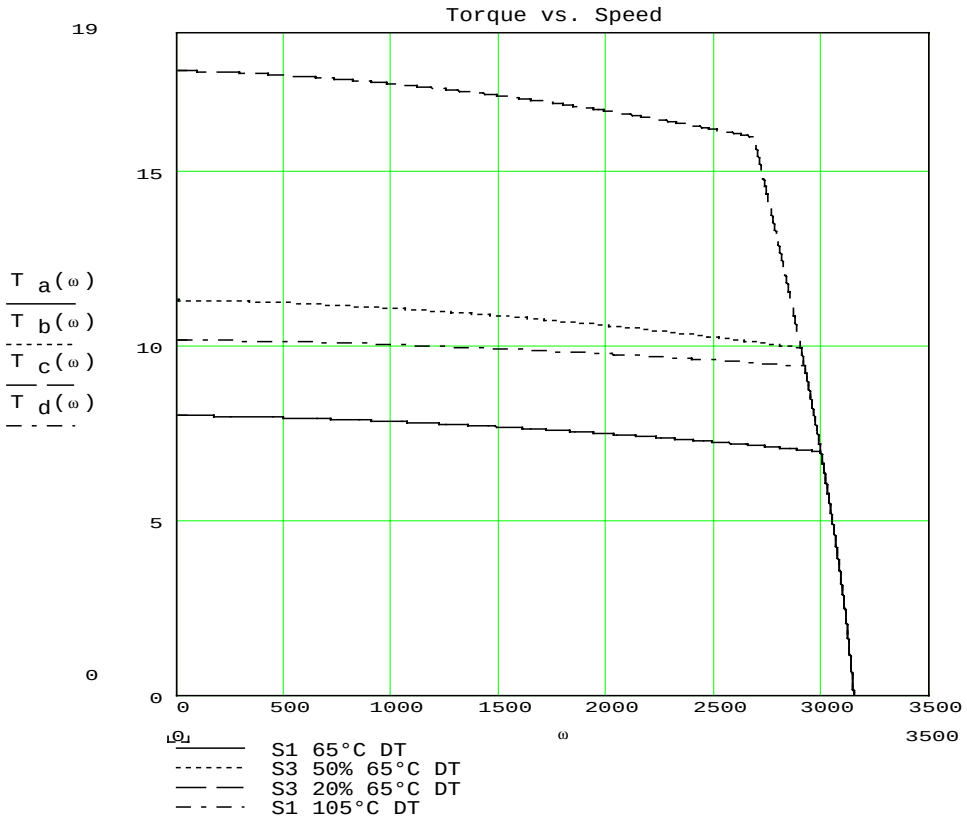
Characteristic 61

MH 105 30 08: 1600rpm at 230V$_{AC}$



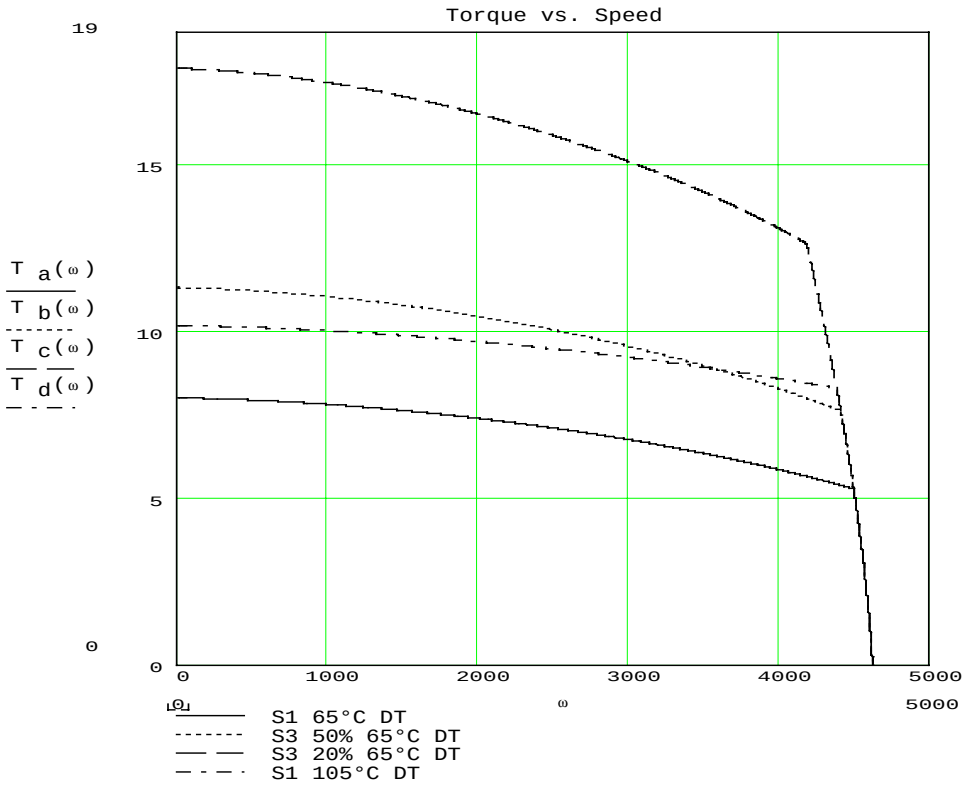
Characteristic 62

MH 105 30 08: 3000rpm at 400V$_{AC}$



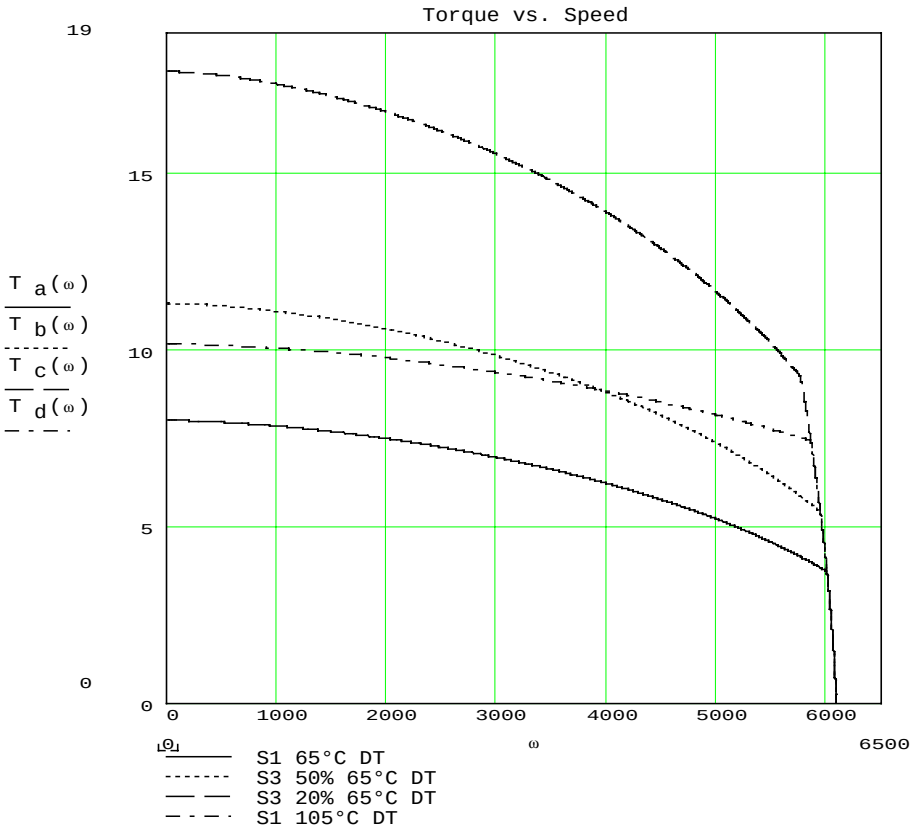
Characteristic 63

MH 105 45 08: 4500rpm at 400V$_{AC}$



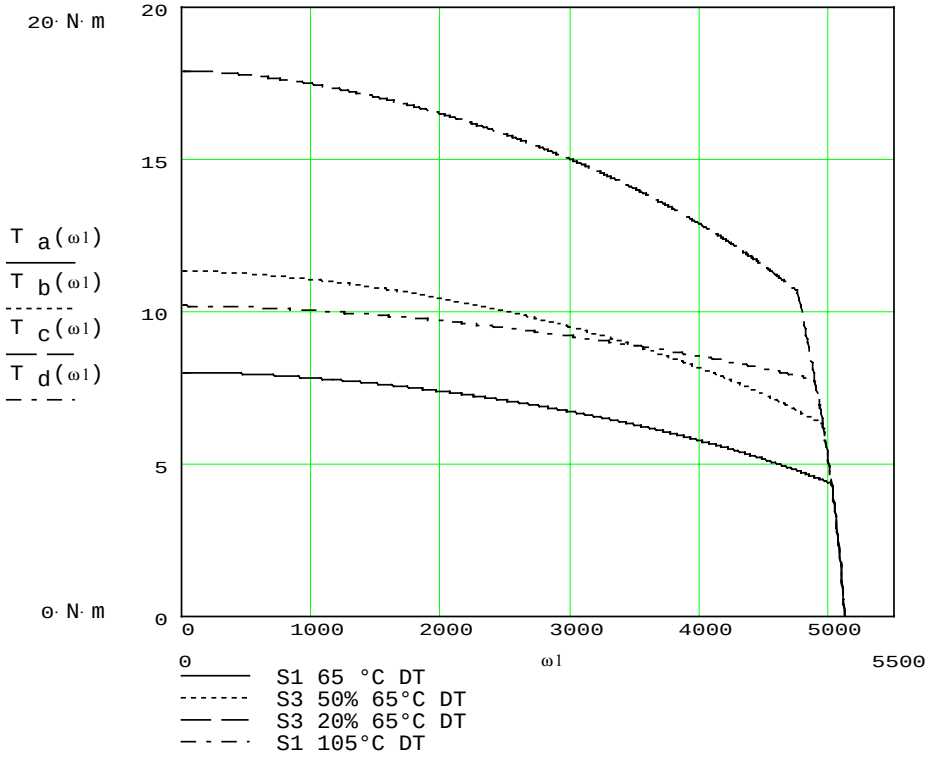
Characteristic 64

MH 105 60 08: 6000rpm at 400V$_{AC}$



Characteristic 65

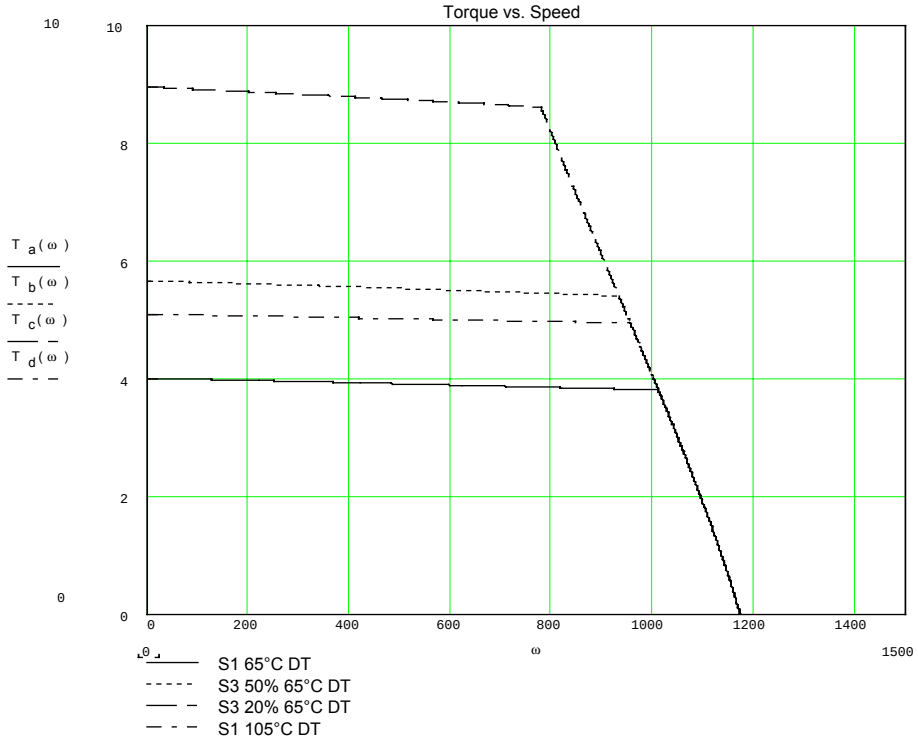
MH 105 50 08: 5000rpm at 230V$_{AC}$



Characteristic 66

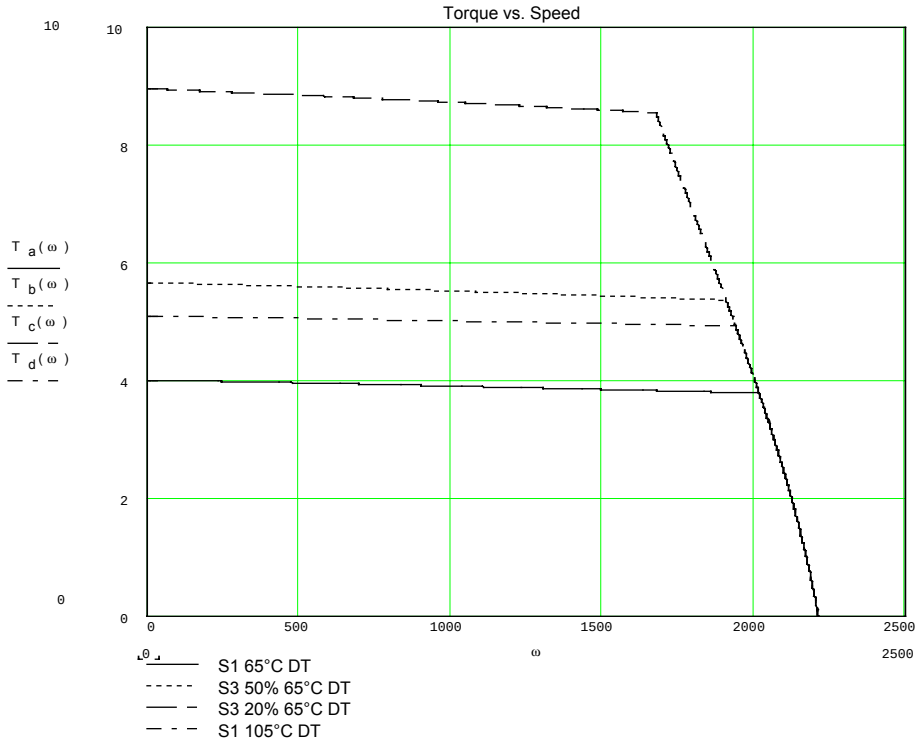
MH 145

MH 145 10 04: 1000rpm at 400V$_{AC}$



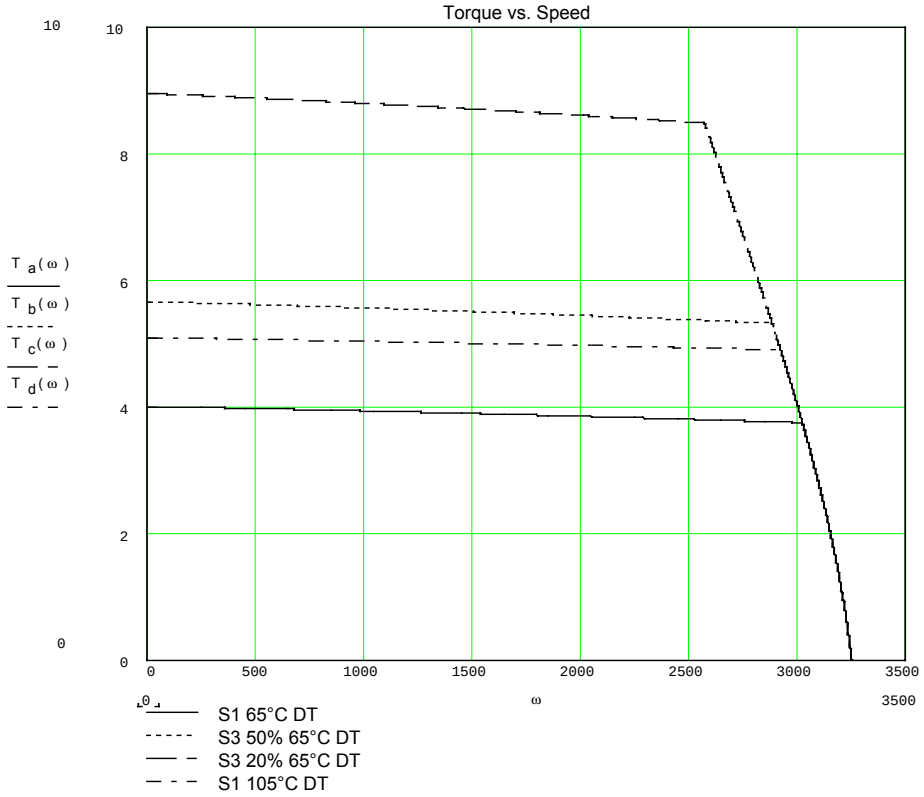
Characteristic 67

MH 145 20 04: 2000rpm at 400V$_{AC}$



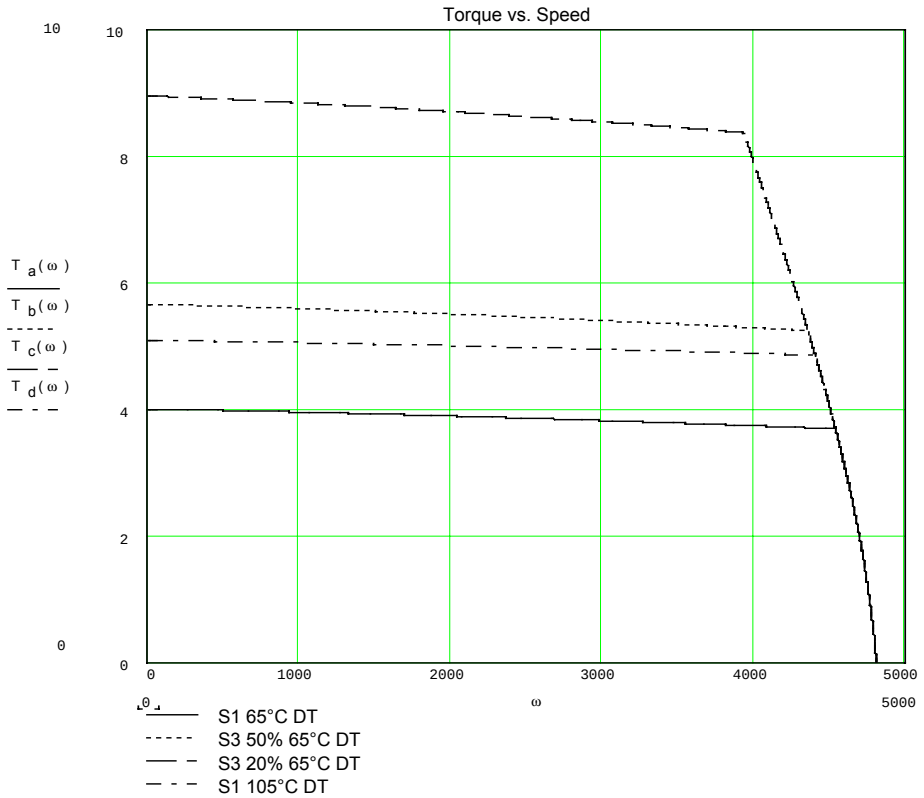
Characteristic 68

MH 145 30 04: 3000rpm at 400V$_{AC}$



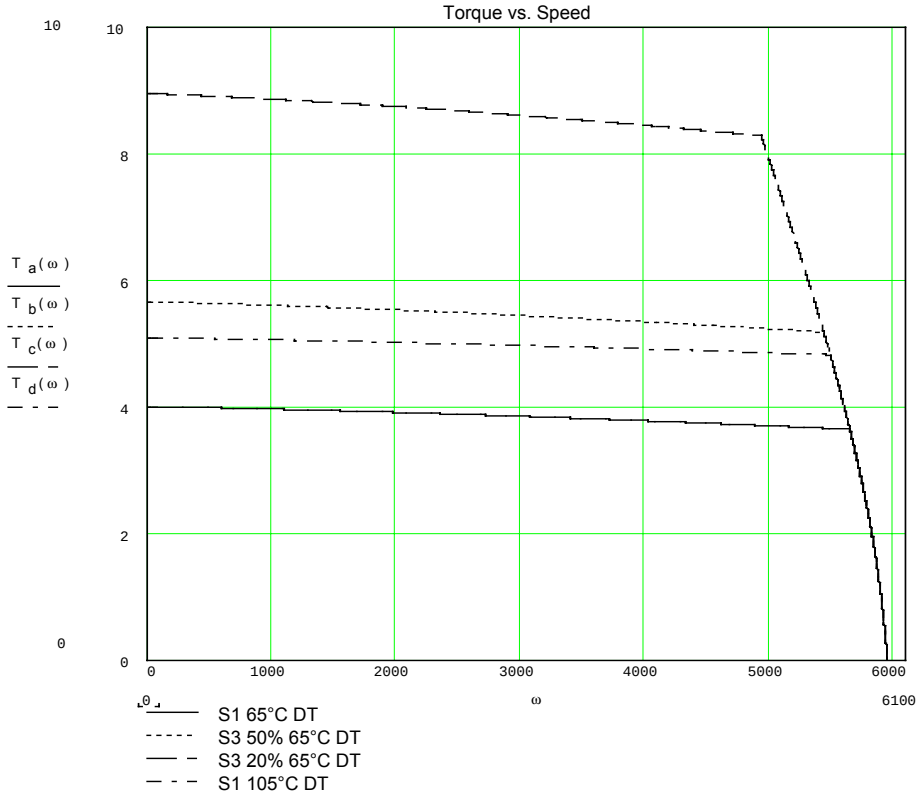
Characteristic 69

MH 145 45 04: 4500rpm at 400V$_{AC}$



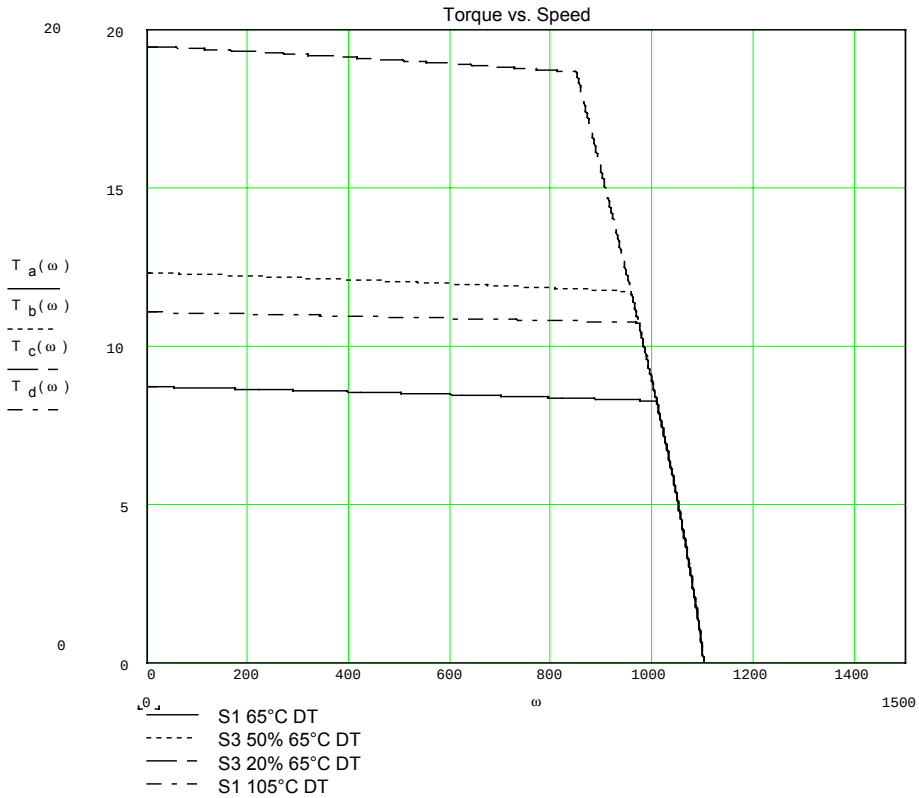
Characteristic 70

MH 145 56 04: 5600rpm at 400V$_{AC}$



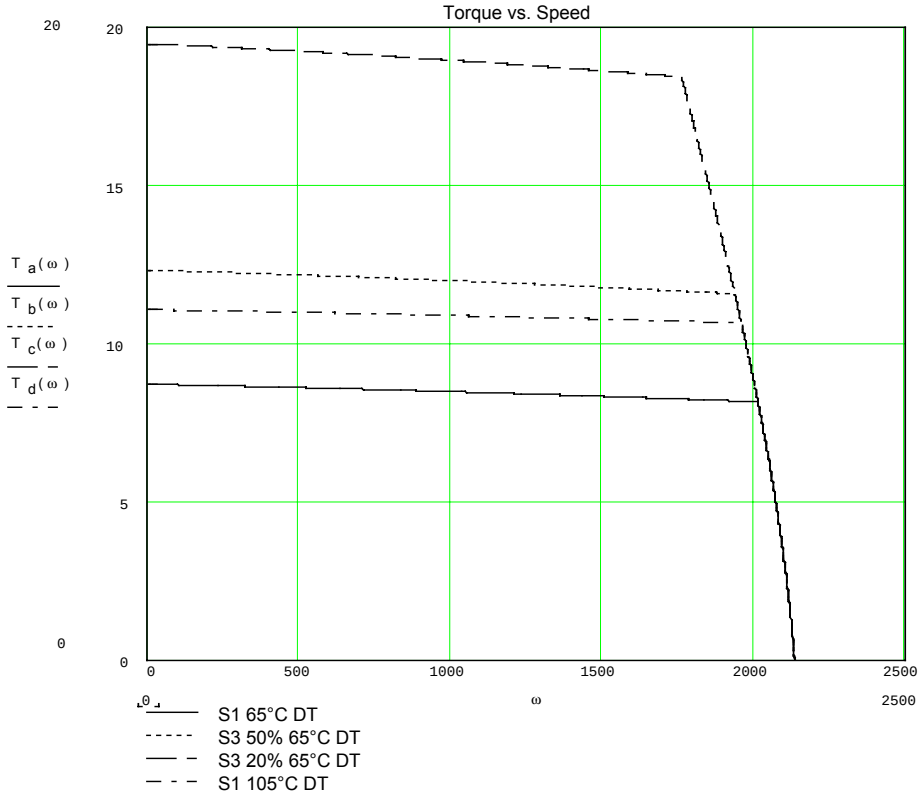
Characteristic 71

MH 145 10 08: 1000rpm at 400V$_{AC}$



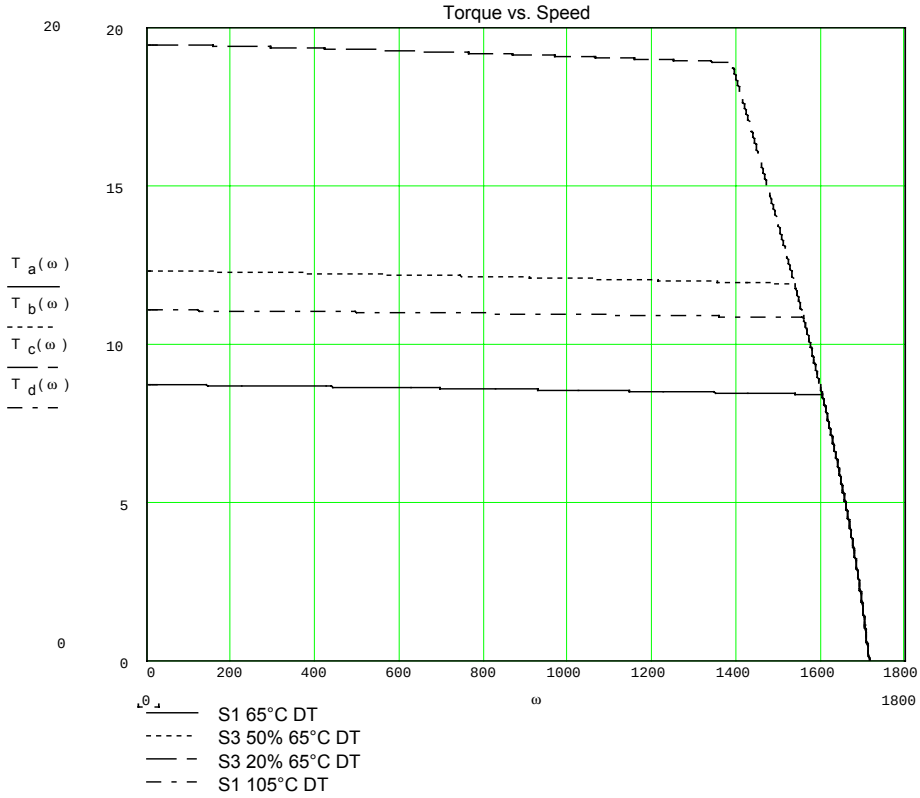
Characteristic 72

MH 145 20 08: 2000rpm at400V$_{AC}$



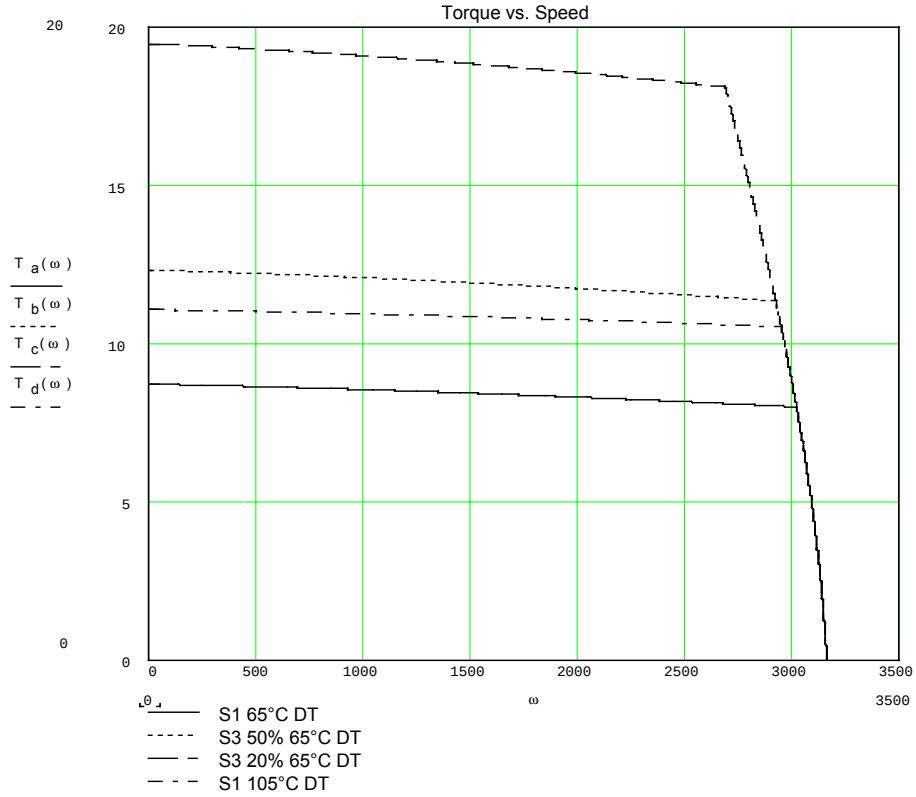
Characteristic 73

MH 145 30 08: 1600rpm at 230V$_{AC}$



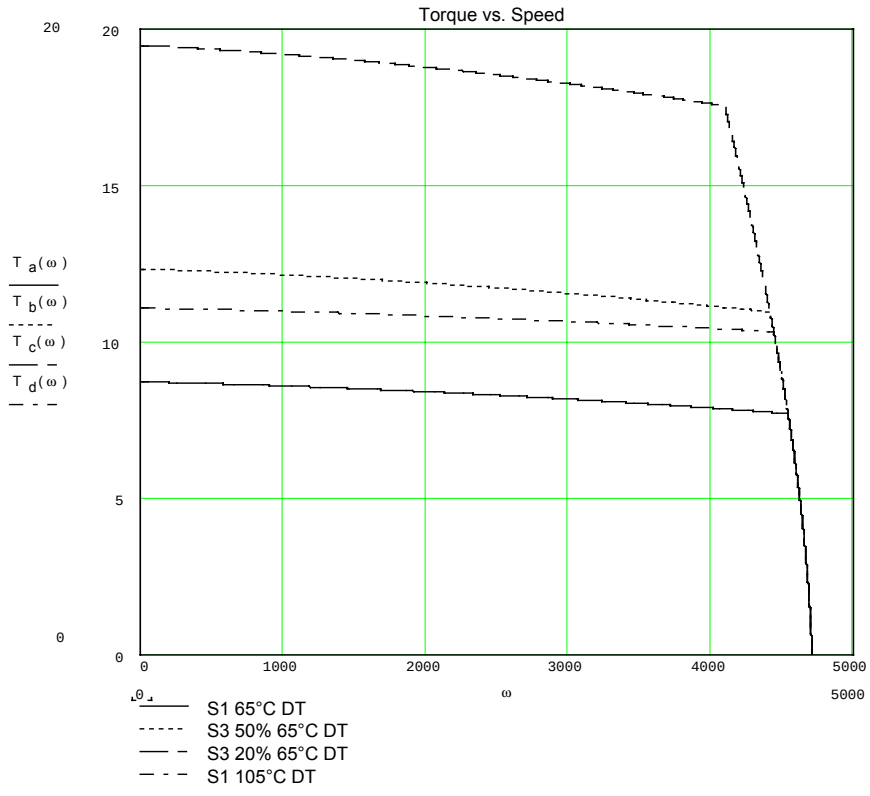
Characteristic 74

MH 145 30 08: 3000rpm at 400V$_{AC}$



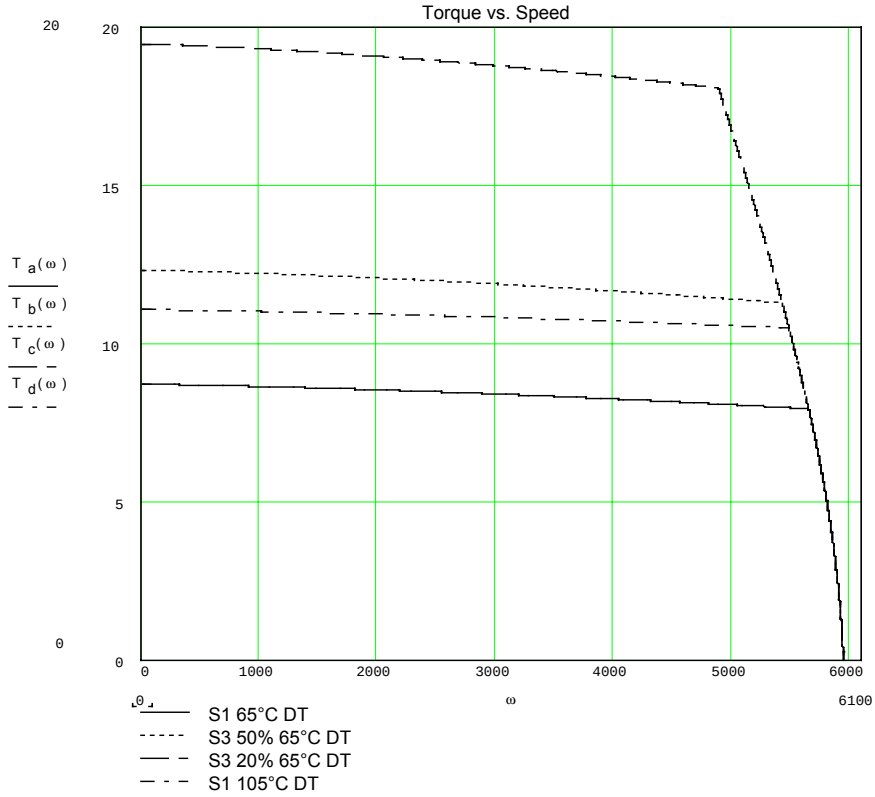
Characteristic 75

MH 145 45 08: 4500rpm at 400V$_{AC}$



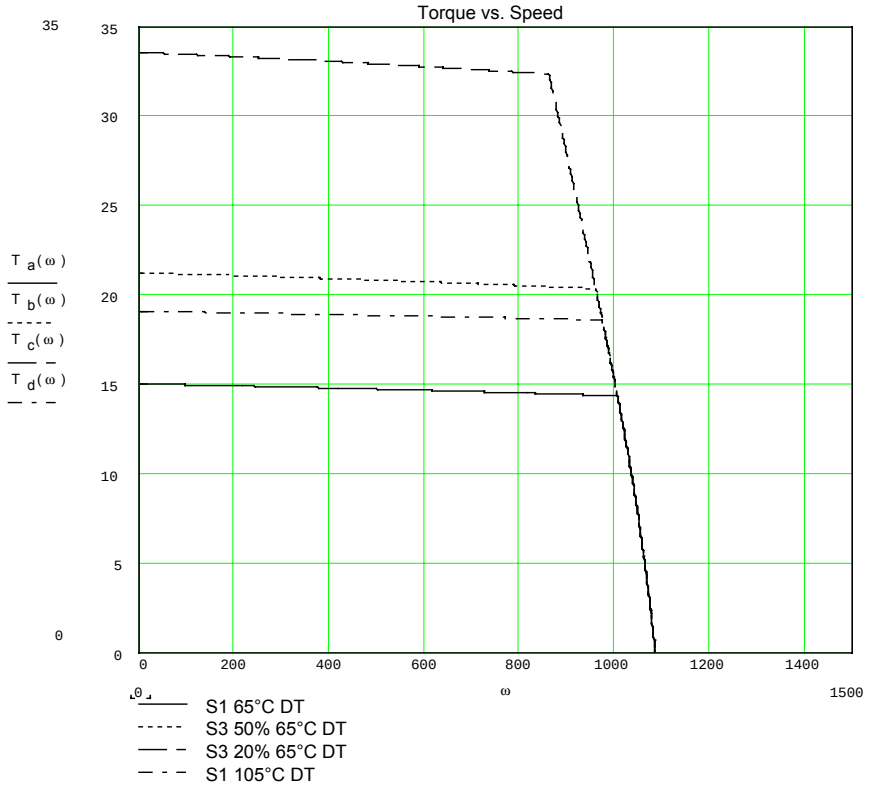
Characteristic 76

MH 145 56 08: 5600rpm at 400V$_{AC}$



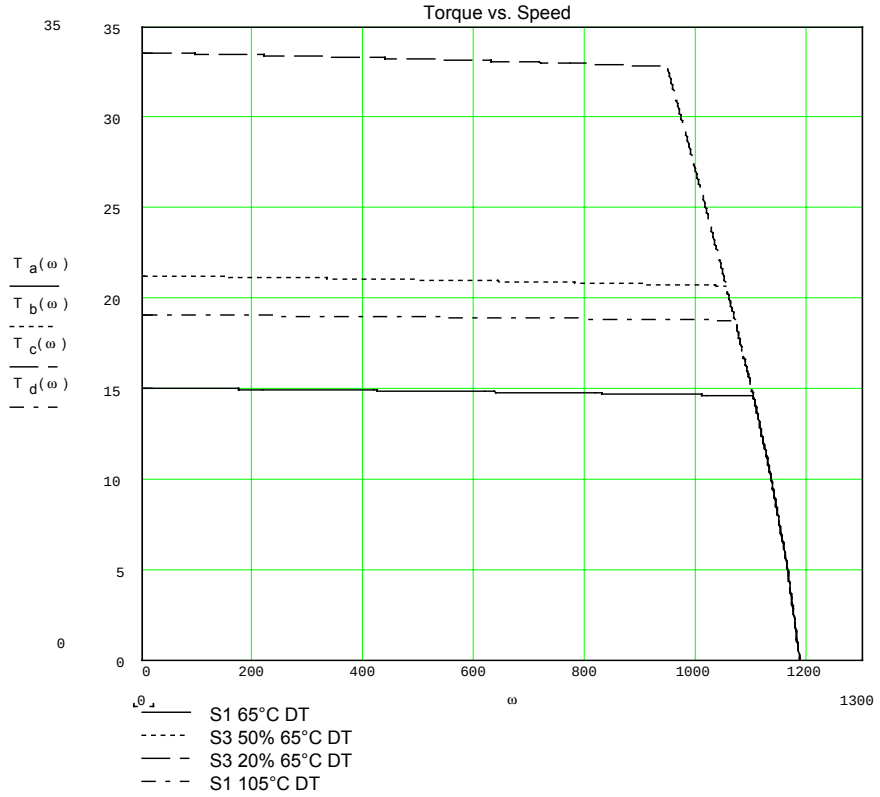
Characteristic 77

MH 145 10 15: 1000rpm at 400V$_{AC}$



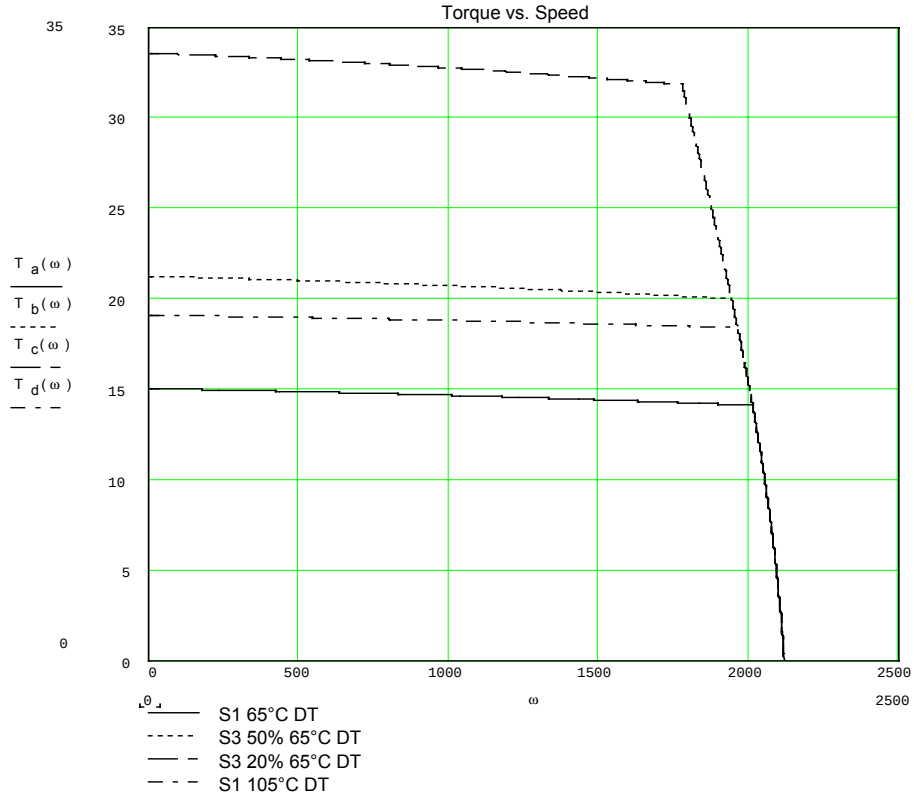
Characteristic 78

MH 145 20 15: 1100rpm at 230V$_{AC}$



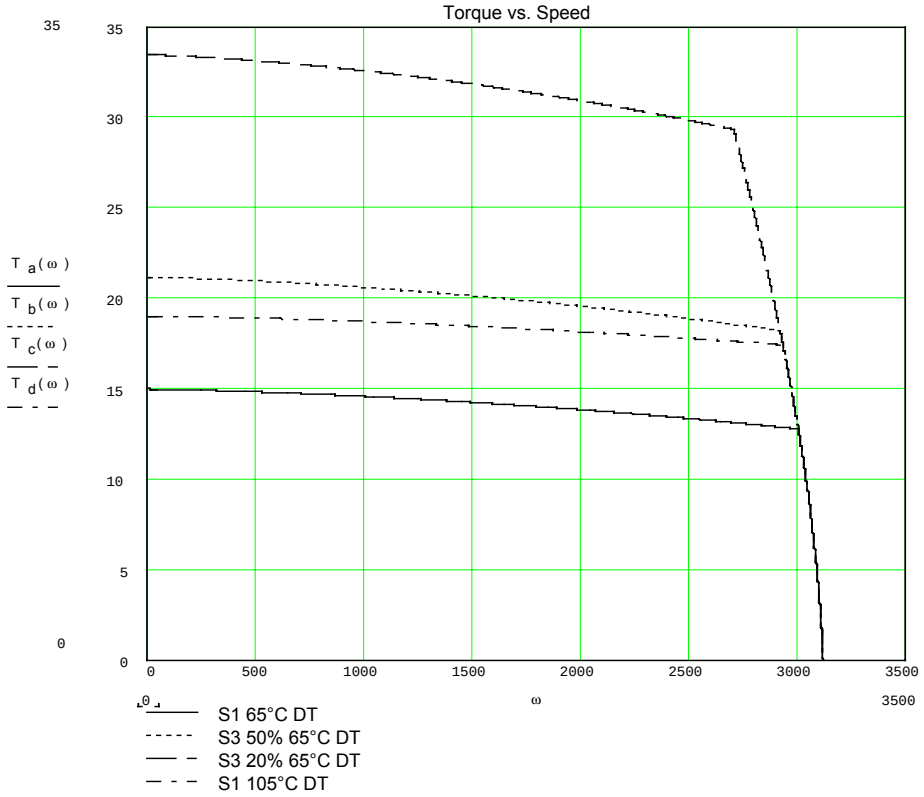
Characteristic 79

MH 145 20 15: 2000rpm at 400V$_{AC}$



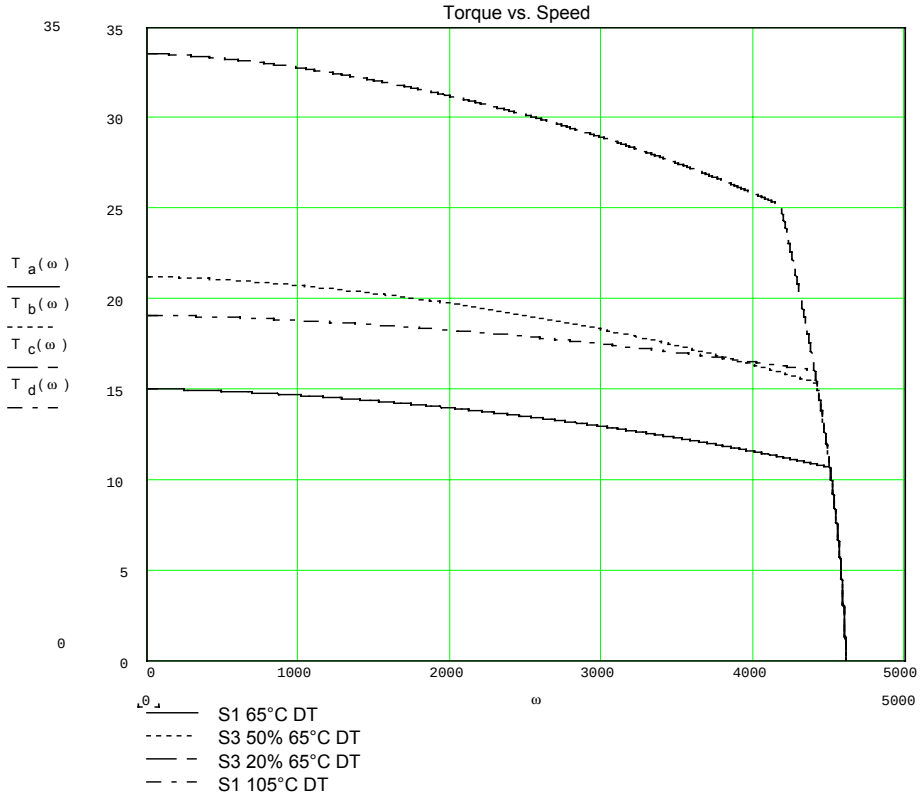
Characteristic 80

MH 145 30 15: 3000rpm at 400V$_{AC}$



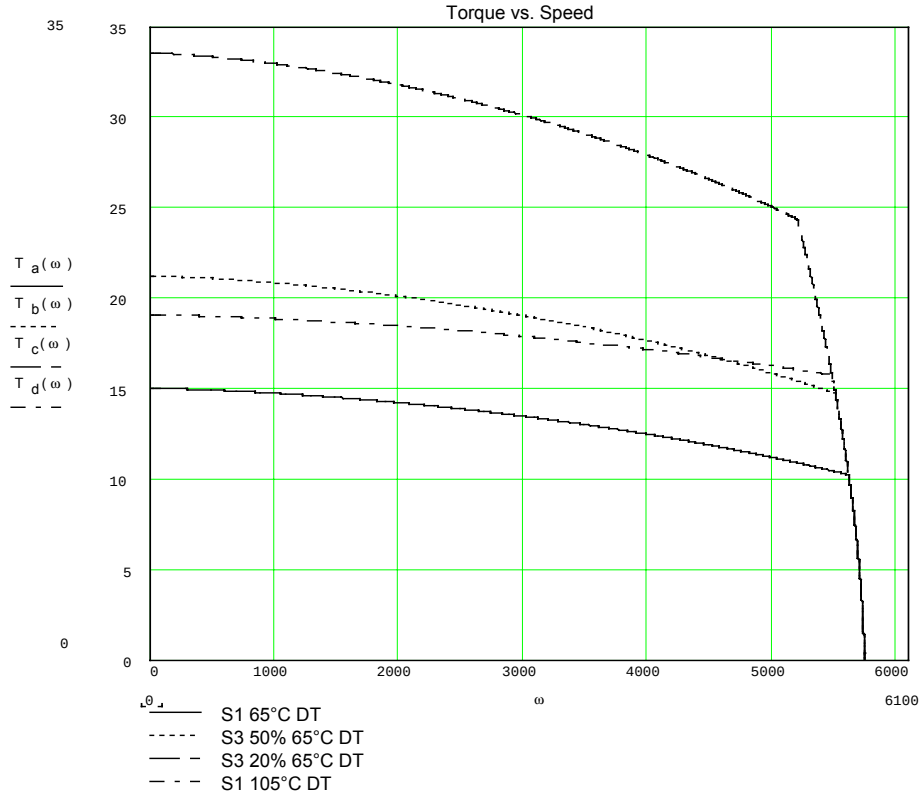
Characteristic 81

MH 145 45 15: 4500rpm at 400V$_{AC}$



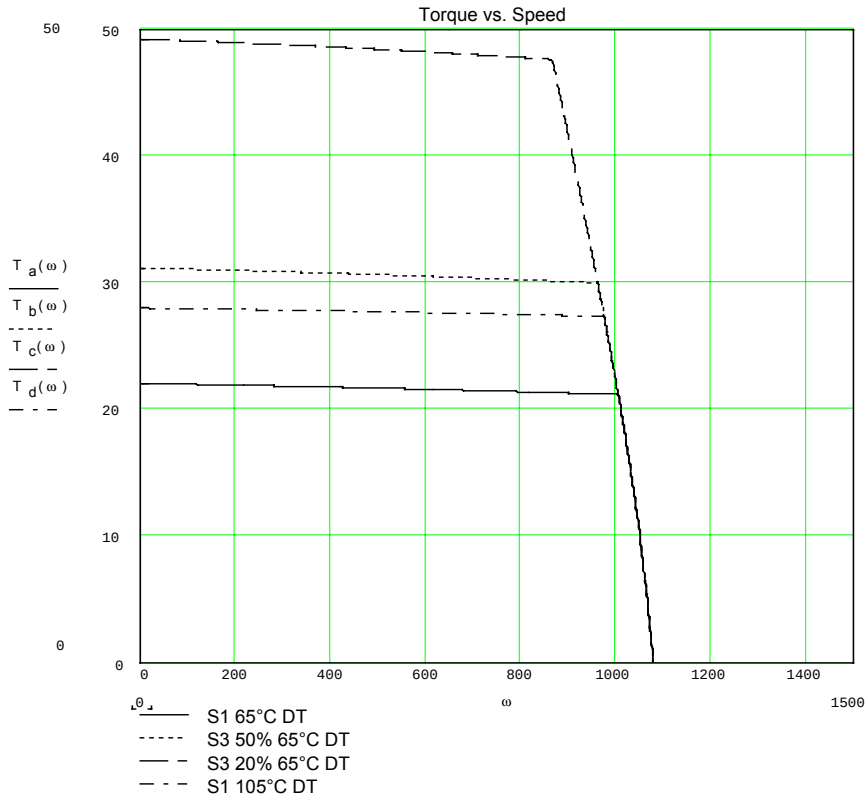
Characteristic 82

MH 145 56 15: 5600rpm at 400V$_{AC}$



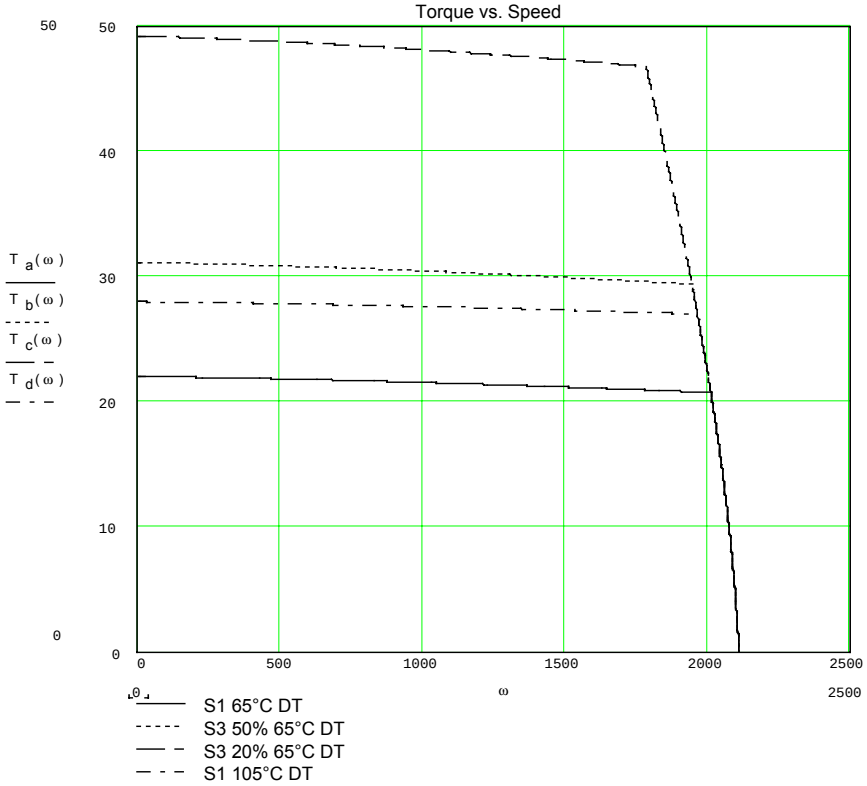
Characteristic 83

MH 145 10 22: 1000rpm at 400V$_{AC}$



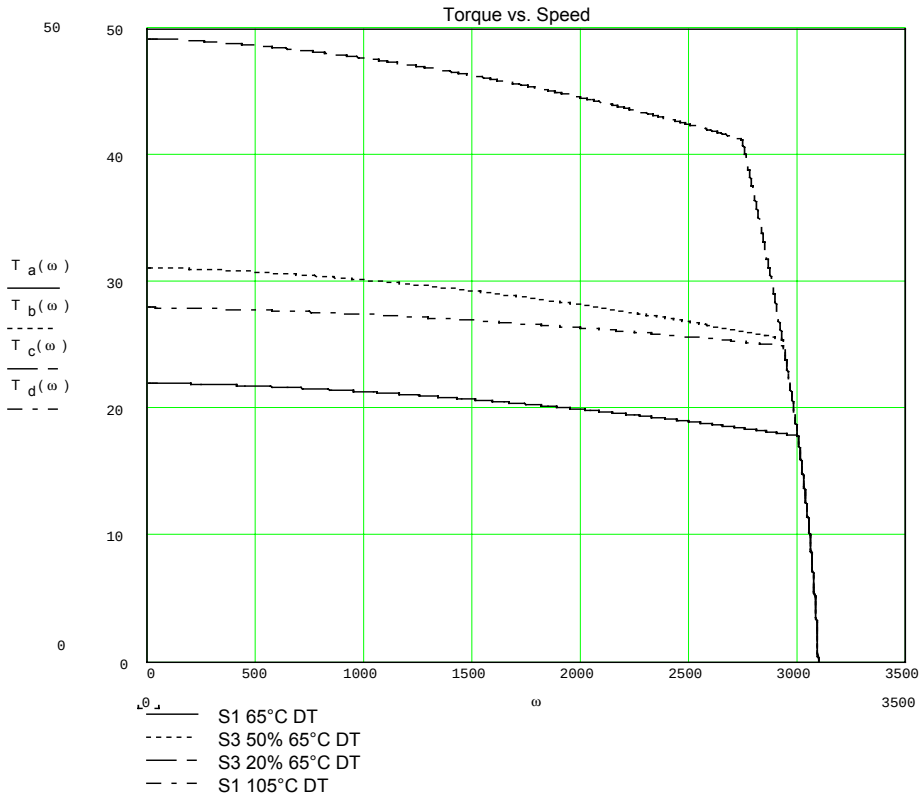
Characteristic 84

MH 145 20 22: 2000rpm at 400V$_{AC}$



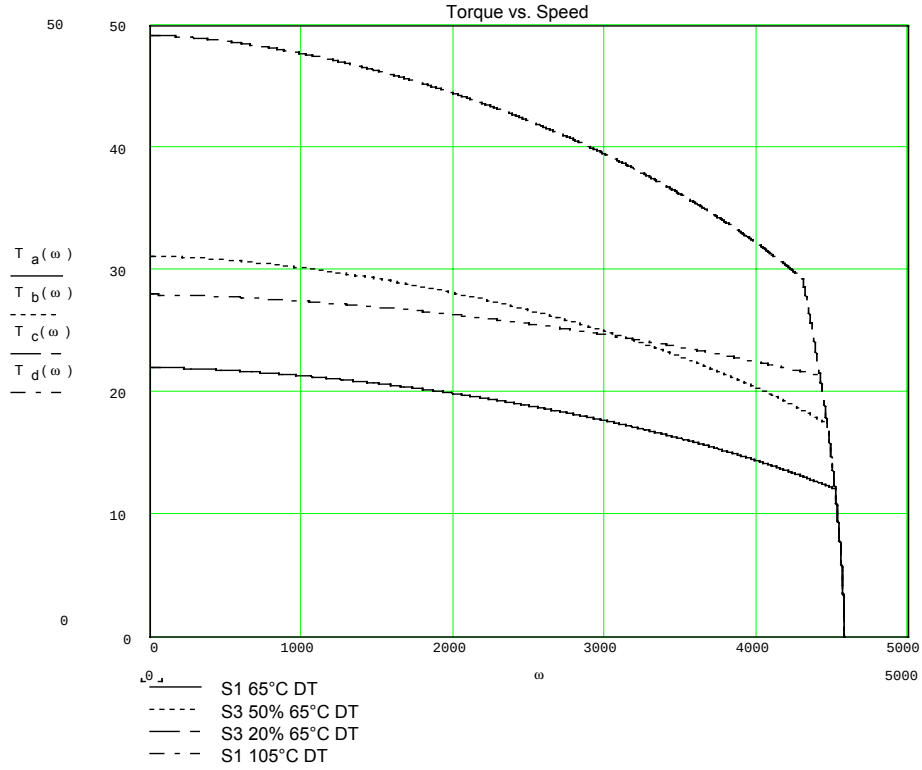
Characteristic 85

MH 145 30 22: 3000rpm at 400V$_{AC}$



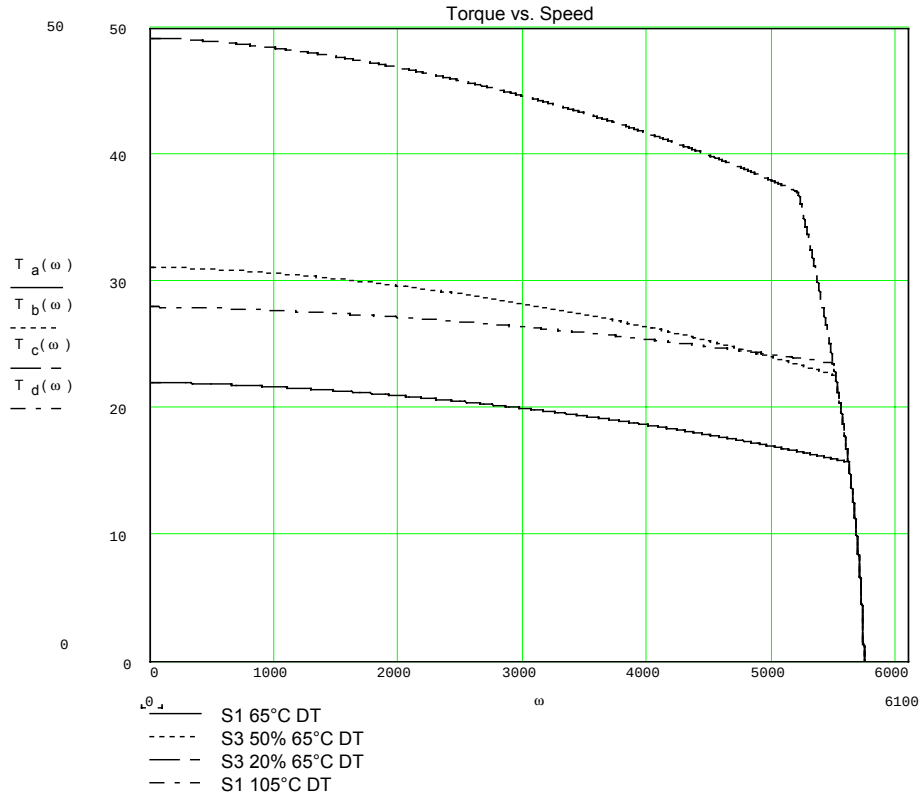
Characteristic 86

MH 145 45 22: 4500rpm at 400V$_{AC}$



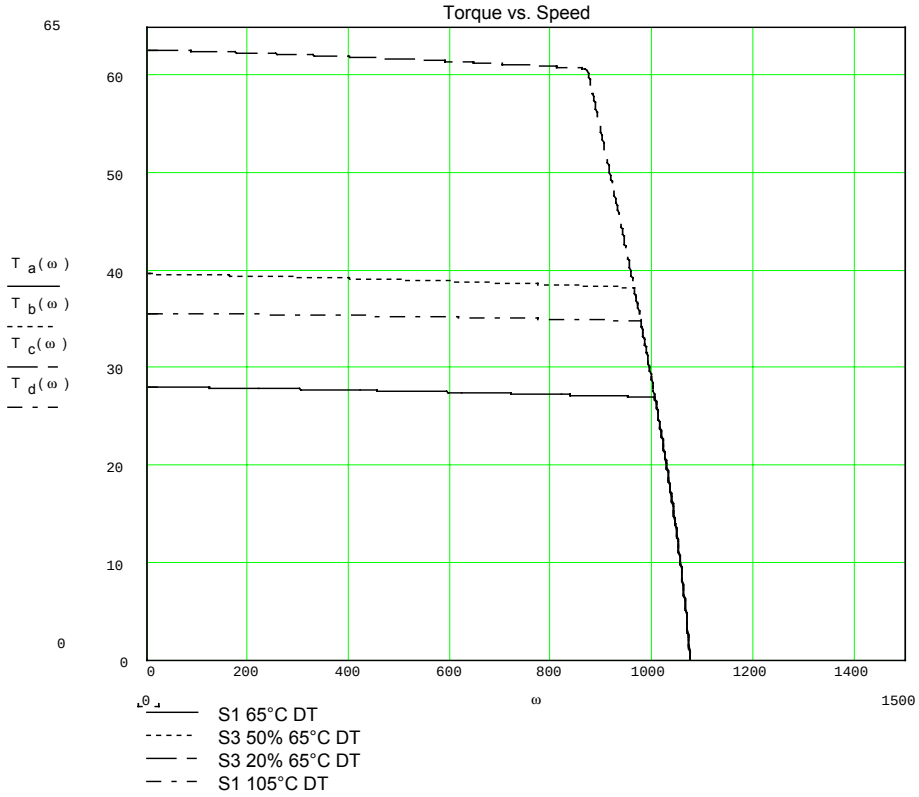
Characteristic 87

MH 145 56 22: 5600rpm at 400V$_{AC}$



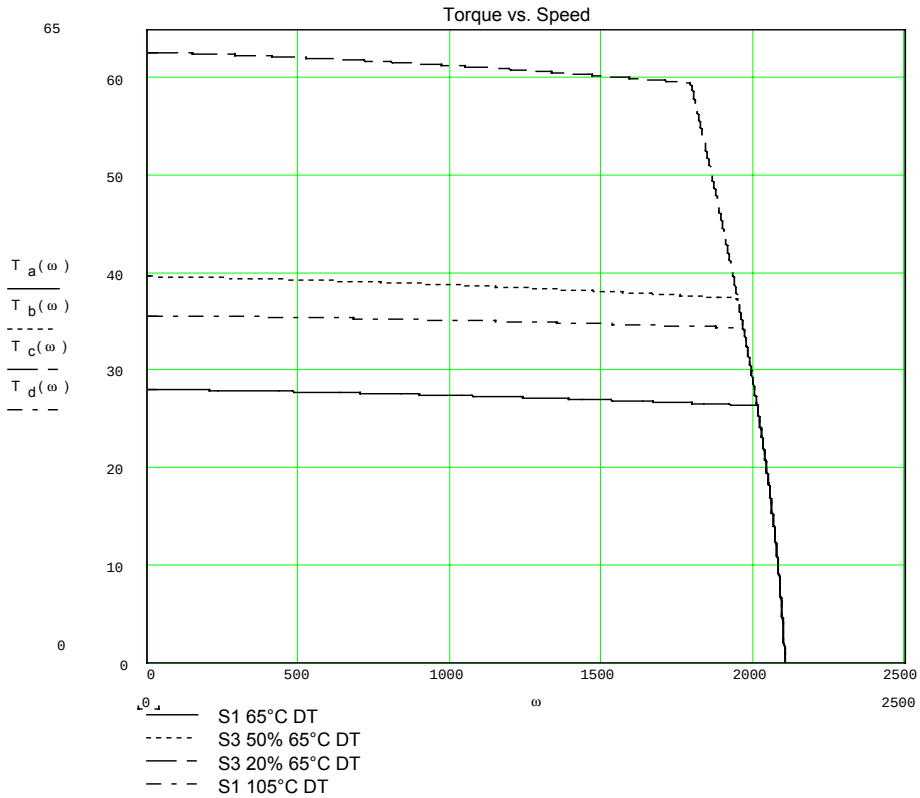
Characteristic 88

MH 145 10 28: 1000rpm at 400V$_{AC}$



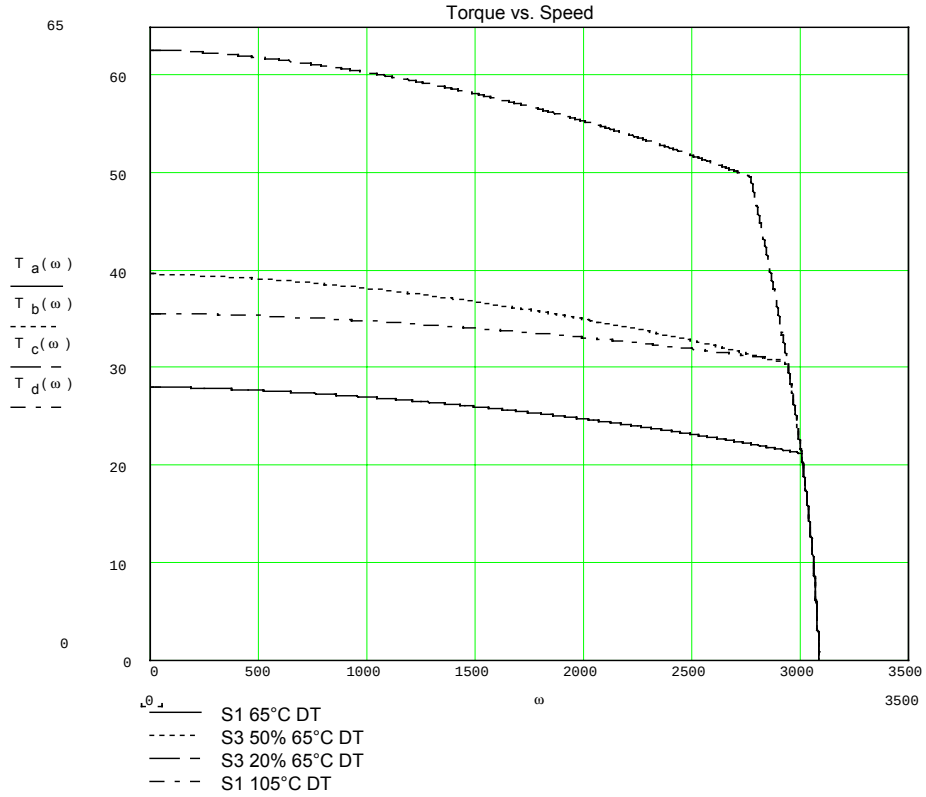
Characteristic 89

MH 145 20 28: 2000rpm at 400V$_{AC}$



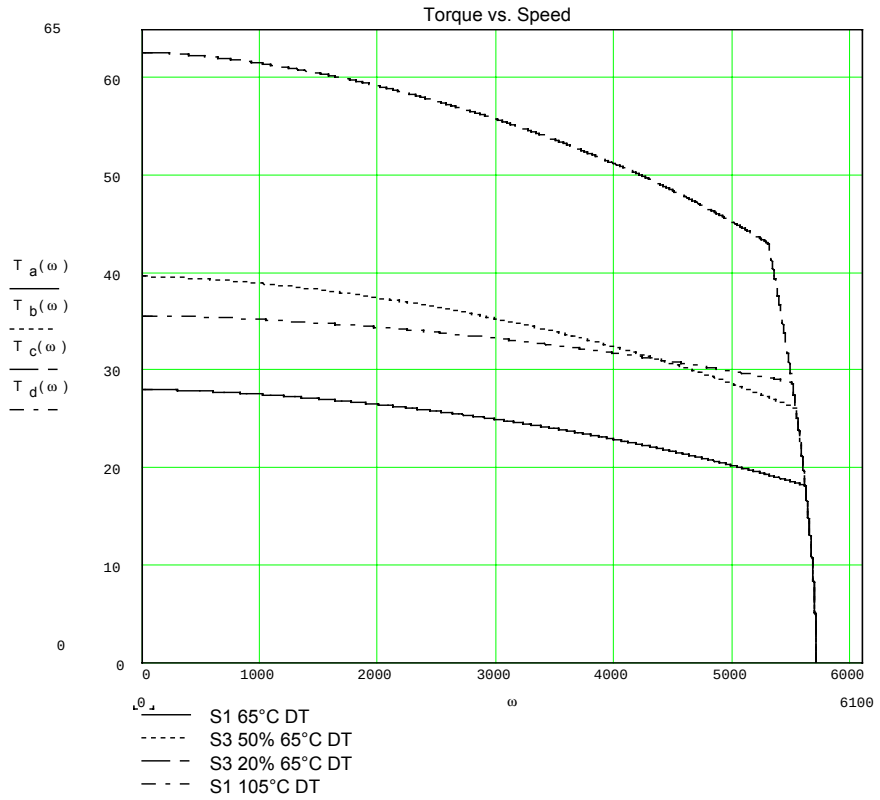
Characteristic 90

MH 145 30 28: 3000rpm at 400V$_{AC}$



Characteristic 91

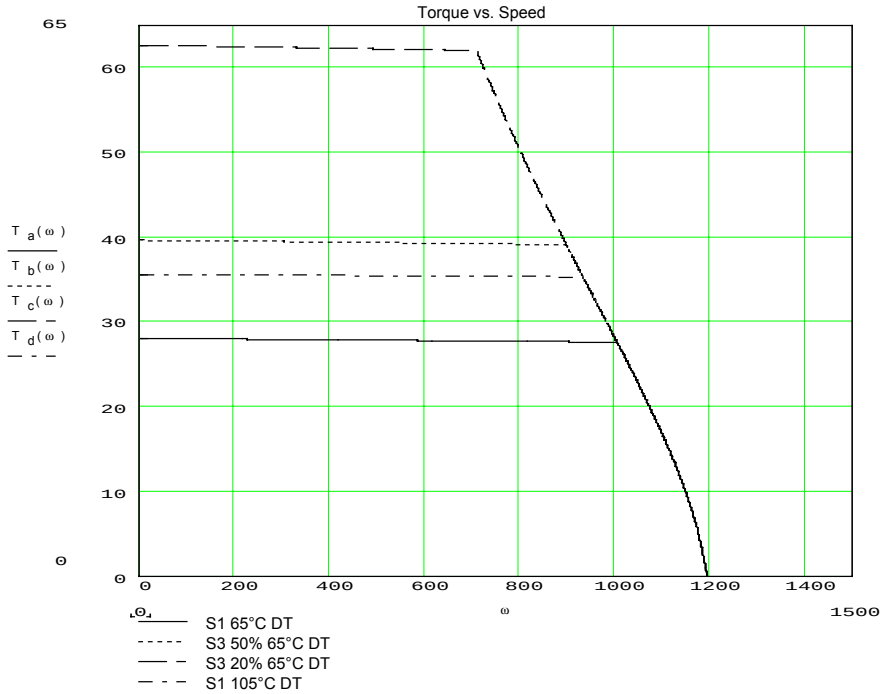
MH 145 56 28: 5600rpm at 400V$_{AC}$



Characteristic 92

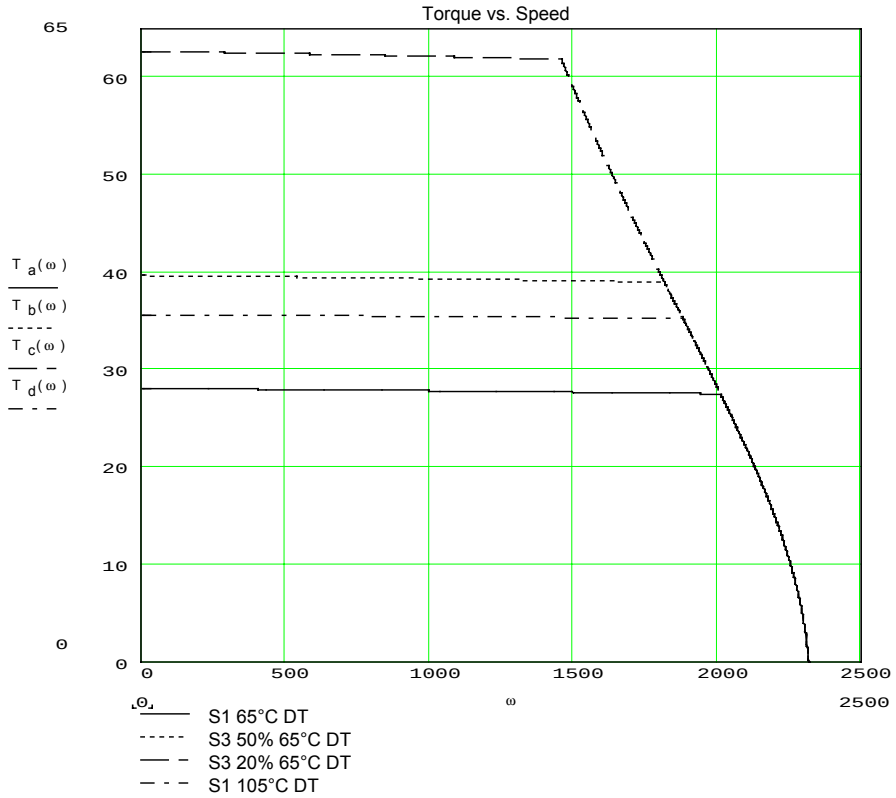
MH 205

MH 205 10 28: 1000rpm at 400V$_{AC}$



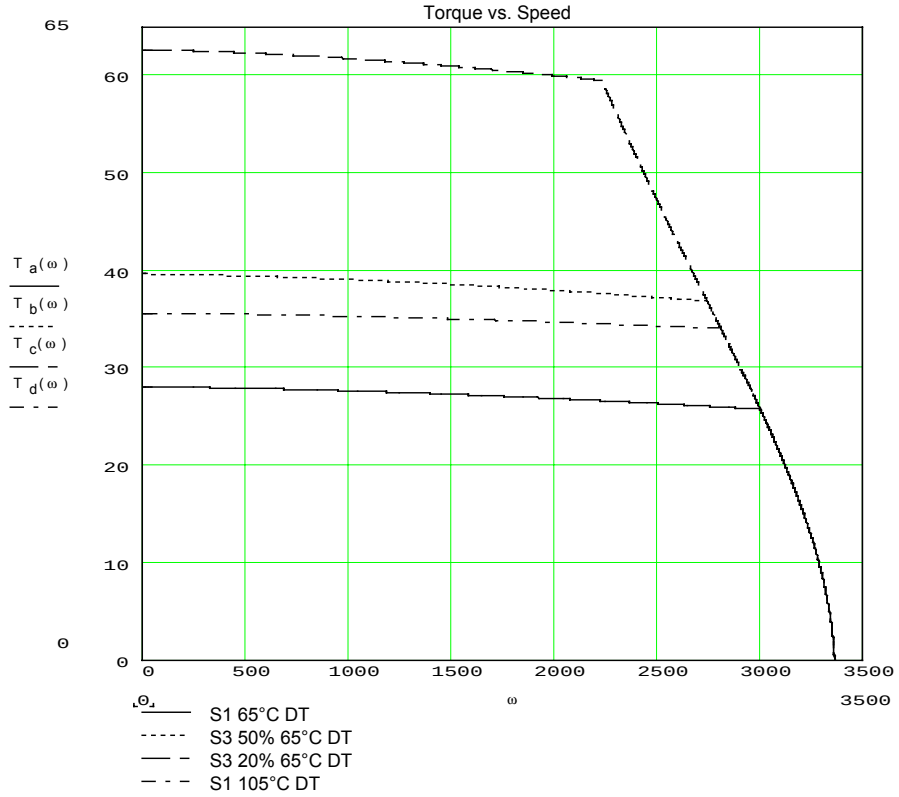
Characteristic 93

MH 205 20 28: 2000rpm at 400V$_{AC}$



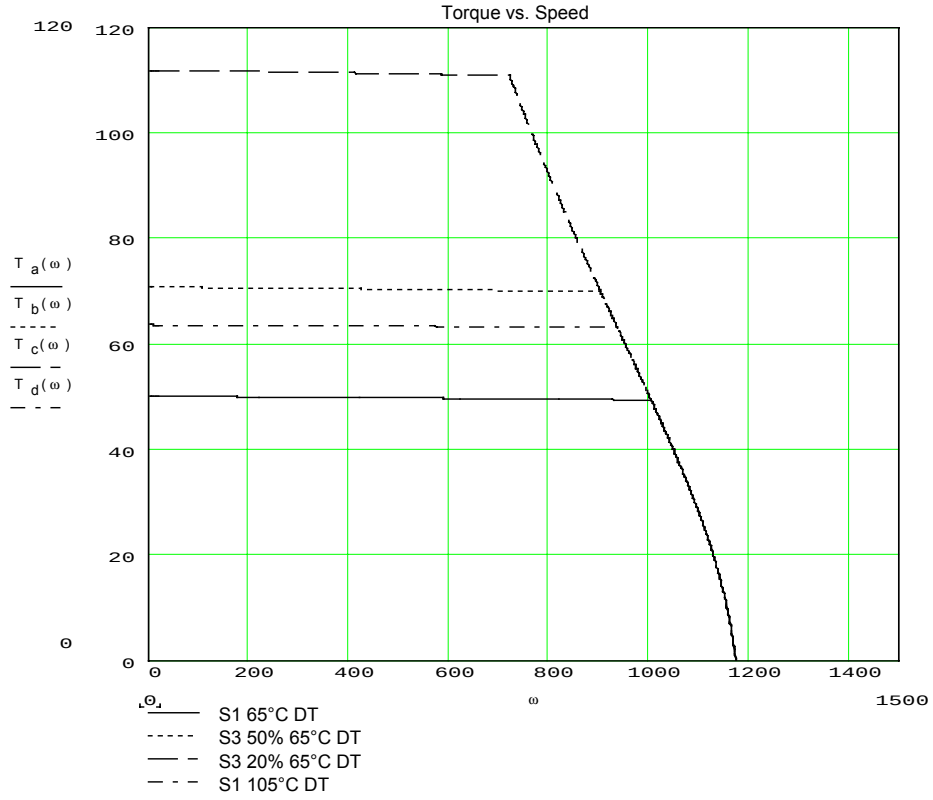
Characteristic 94

MH 205 30 28: 3000rpm at 400V$_{AC}$



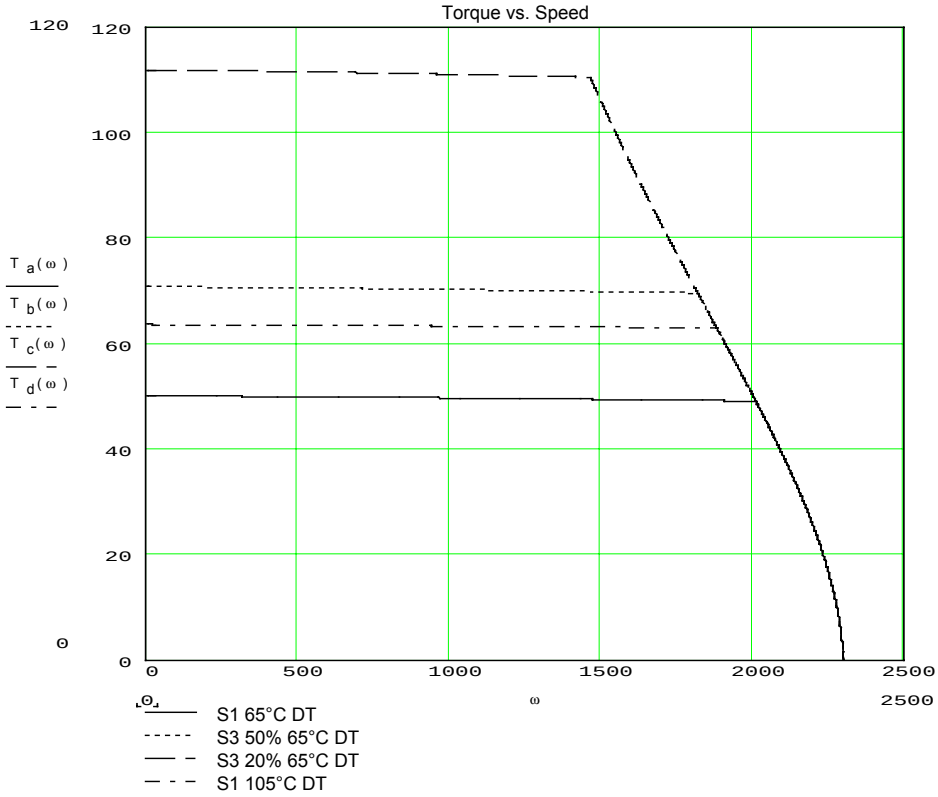
Characteristic 95

MH 205 10 50: 1000rpm at 400V$_{AC}$



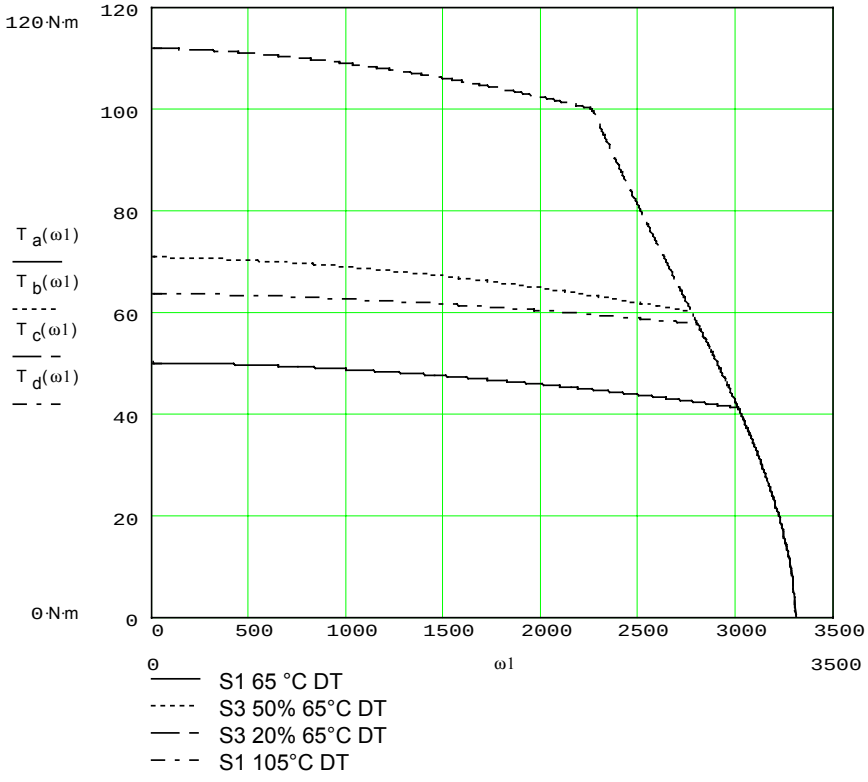
Characteristic 96

MH 205 20 50: 2000rpm at 400V$_{AC}$



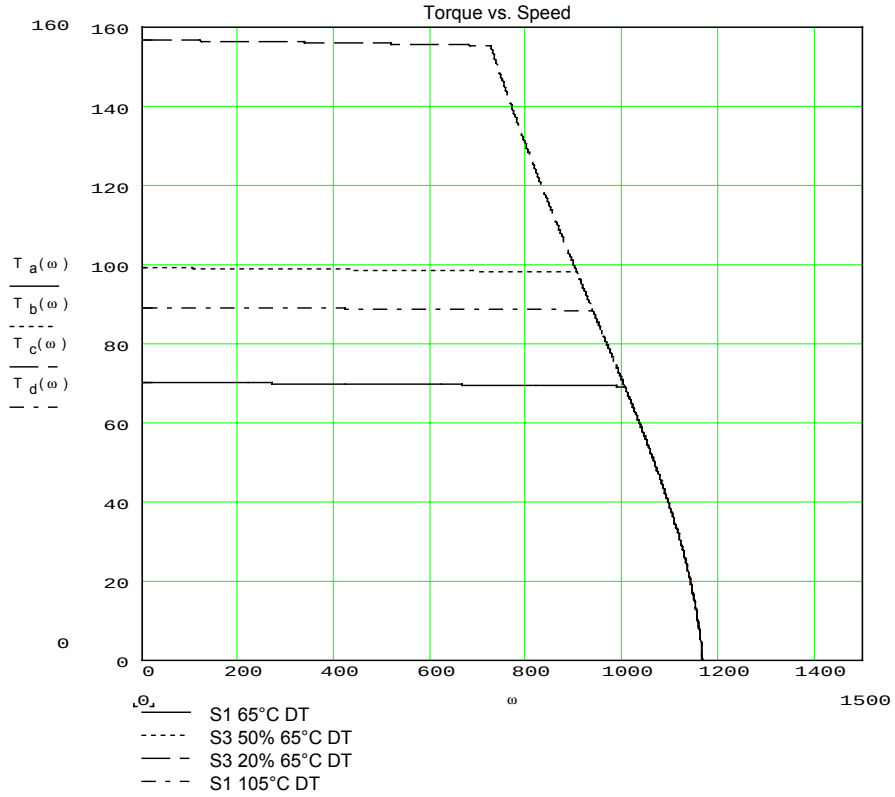
Characteristic 97

MH 205 30 50: 3000rpm at 400V$_{AC}$



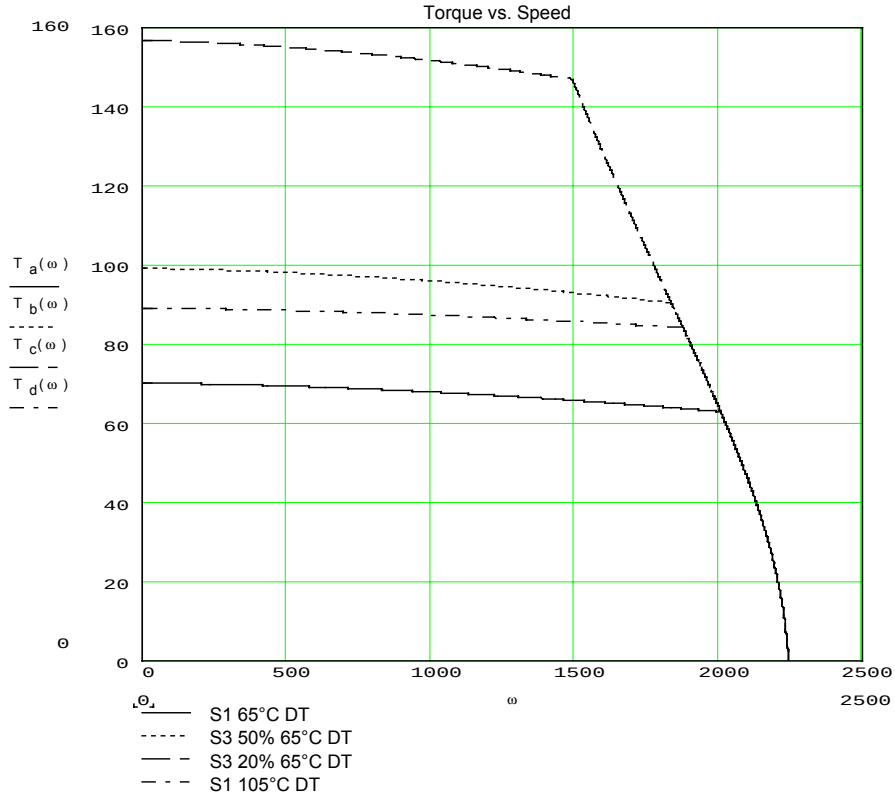
Characteristic 98

MH 205 10 70: 1000rpm at 400V$_{AC}$



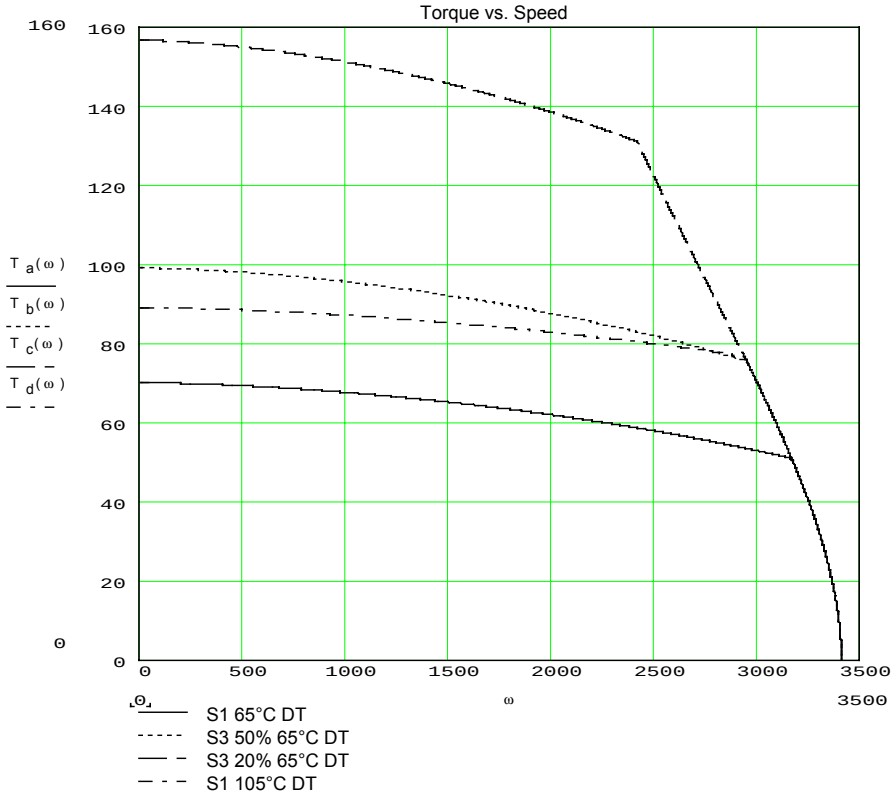
Characteristic 99

MH 205 20 70: 2000rpm at 400V$_{AC}$



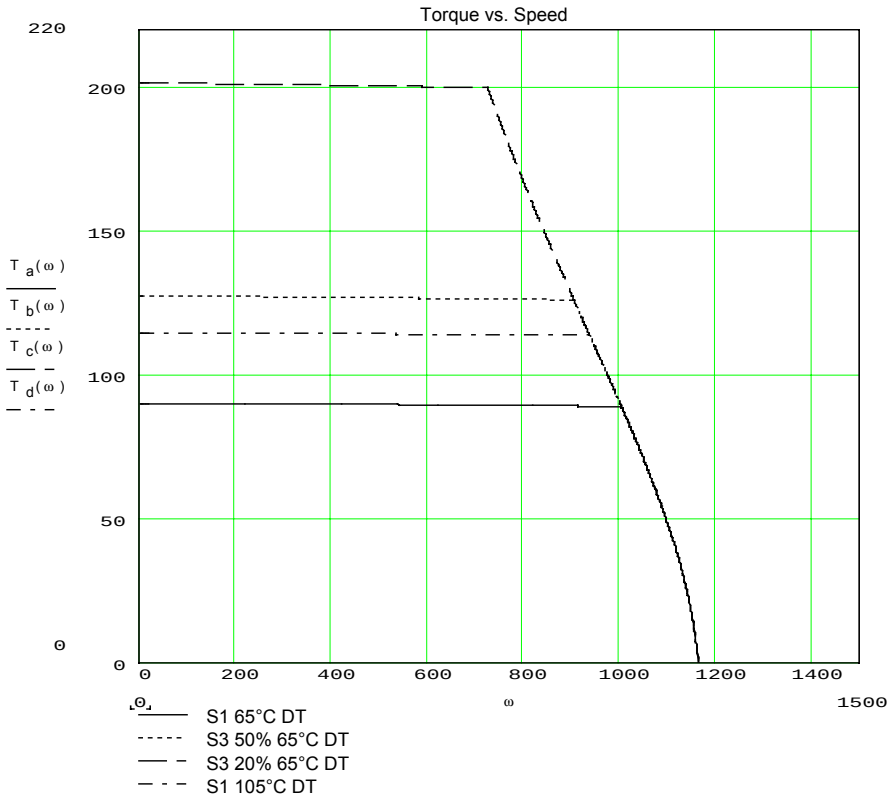
Characteristic 100

MH 205 30 70: 3000rpm at 400V$_{AC}$



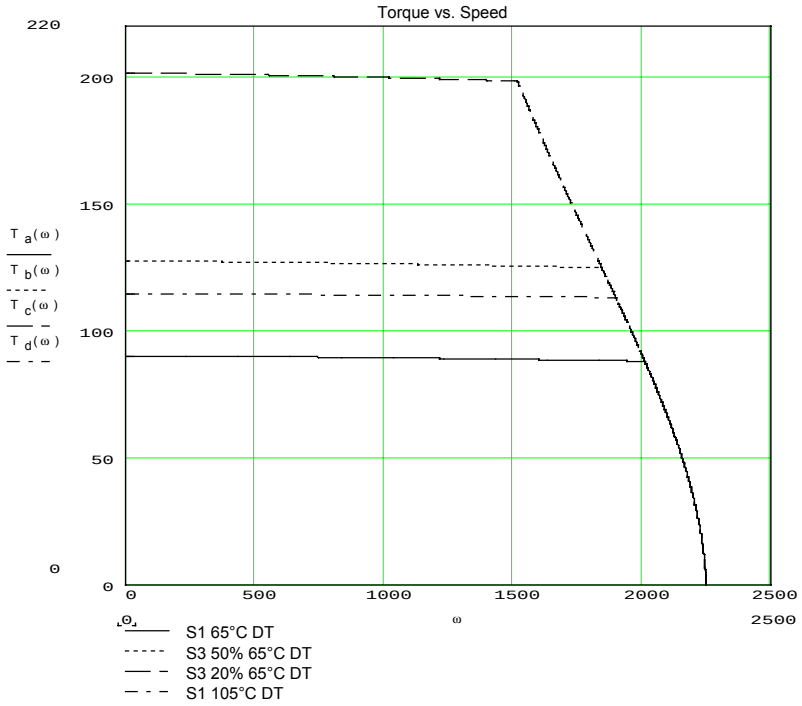
Characteristic 101

MH 205 10 90: 1000rpm at 400V$_{AC}$



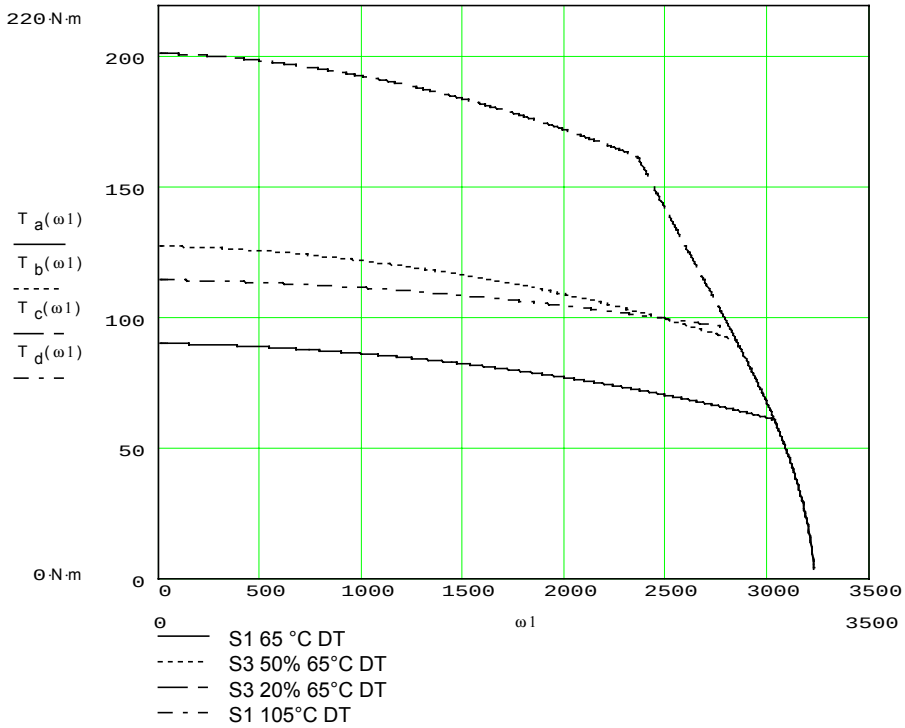
Characteristic 102

MH 205 20 90: 2000rpm at 400V$_{AC}$



Characteristic 103

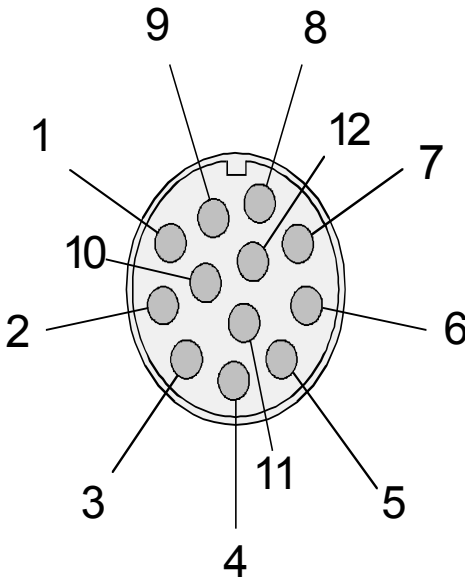
MH 205 30 90: 3000rpm at 400V$_{AC}$



Characteristic 104

Connector assignments

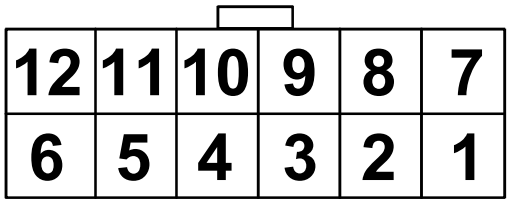
Resolver connection



PIN	Assignment
1	Sin -
2	Sin +
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Ref. -
8	+Temp
9	-Temp
10	Ref. +
11	Cos +
12	Cos -

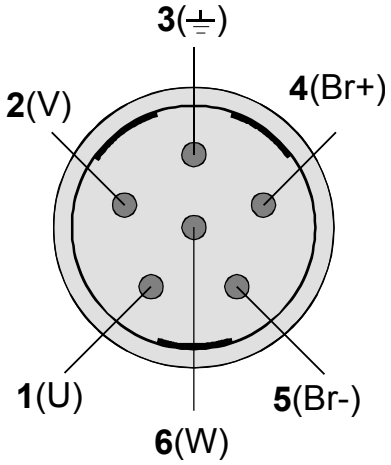
Mating plug connector available: Order no: 085-301312

Resolver connection (connection type 0V)



PIN	Assignment
1	n.c.
2	n.c.
3	n.c.
4	+Temp
5	-Temp
6	PE
7	Sin +
8	Sin -
9	Cos +
10	Cos -
11	REF -
12	REF +

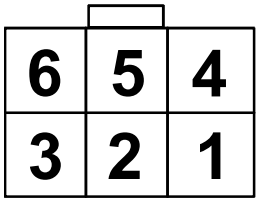
Motor connection



PIN	Assignment
1	Phase U
2	Phase V
3	PE
4	Brake +
5	Brake -
6	Phase W

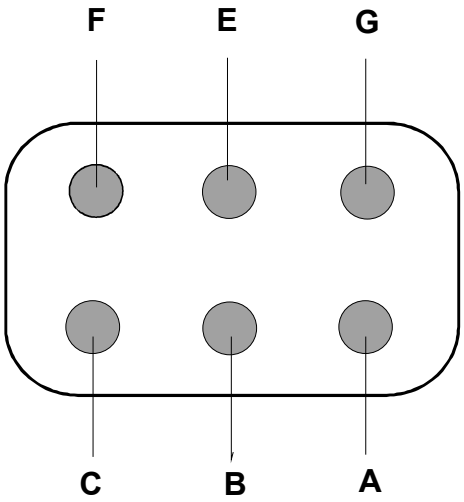
Mating plug connector available: Order no: 085-301306

Motor connection (connection type 0V)



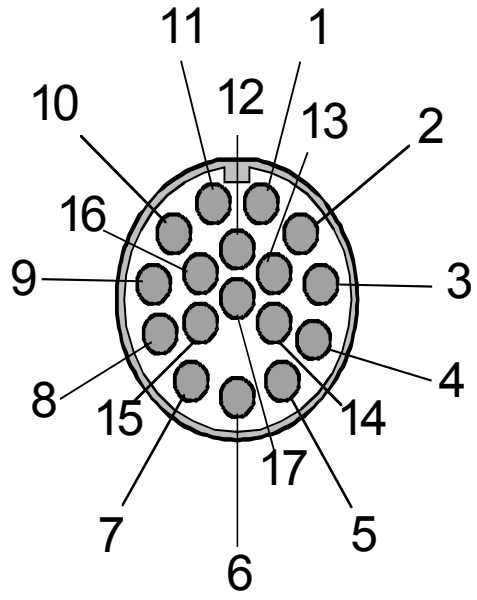
PIN	Assignment
1	PE
2	Brake -
3	Brake +
4	W
5	V
6	U

Motor clamps



Terminal	Assignment
A	Phase U
B	Phase V
C	Phase W
E	PE
F	Brake (+ red for 205)
G	Brake (- blue for 205)

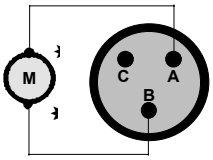
SinCos©-connection



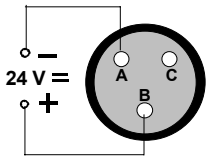
PIN	Assignment
1	Sin +
2	Sin –
3	+ 485
4	Reserved
5	Reserved
6	Reserved
7	GND
8	K 1
9	K 2
10	+ V
11	Cos +
12	Cos –
13	– 485

Mating plug connector available: Order no: 085-301317

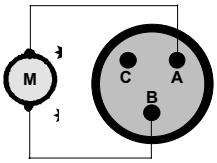
Separate cooling



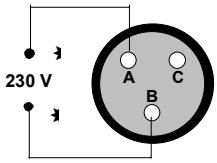
MH105 (Pin)



MH105 24VDC (Bush)



MH145/205 (Pin)



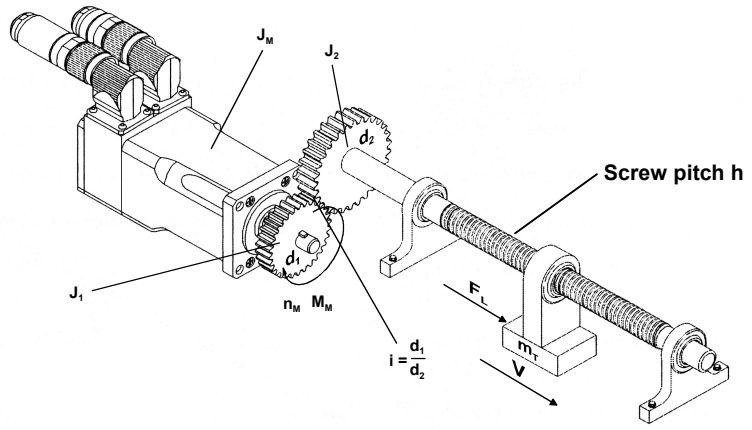
MH145/205 (Bush)

Ventilator Characteristic

Motor	Current	Voltage
MH105	0.17 A	24 VDC
MH145	0.35 A	230 VAC
MH205	0.22 A	230 VAC

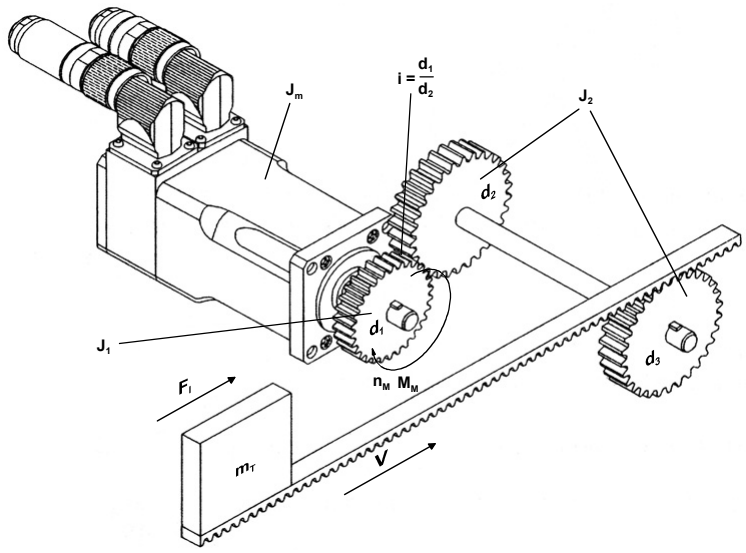
Motor dimensioning

Formula for calculating the spindle drive



Motor speed	$n_m = \frac{v \times 6 \times 10^4}{h \times i}$	[rpm]
Load torque	$M_L = h \times i \times \frac{F_L}{2000 \times \pi}$	[Nm]
Translational mass moment of inertia	$J_T = m_T \times \left(\frac{h}{2 \times \pi}\right)^2 \times 10^{-6}$	[kg m^2]
Rotational mass moment of inertia	$J_R = \frac{\pi}{32} \times 10^{-15} \times d^4 \times l \times \rho$	[kg m^2]
For steel:	$J_R = 7{,}7 \times d^4 \times l \times 10^{-13}$	[kg m^2]
For aluminium:	$J_R = 2{,}7 \times d^4 \times l \times 10^{-13}$	[kg m^2]
Sum of the reflected mass moments of inertia	$J = J_M + J_1 + i^2 \times (J_R + J_T)$	[kg m^2]
Acceleration or deceleration torque M_B=f(n_M)	$M_B = \frac{2 \times \pi \times n_M \times J}{60 \times t_B} = \frac{n_M \times J}{9{,}55 \times t_B}$	[Nm]
Acceleration or deceleration torque M_B=f(s_B)	$M_B = \frac{4 \times \pi \times s_B \times J}{h \times i \times t_B^{\,2}}$	[Nm]
Acceleration or deceleration time t_B=f(n_M)	$t_B = \frac{2 \times \pi \times n_M \times J}{60 \times M_B} = \frac{n_M \times J}{9{,}55 \times M_B}$	[s]
Acceleration or deceleration time t_B=f(s_B)	$t_B = \sqrt{\frac{4 \times \pi \times s_B \times J}{h \times i \times M_B}}$	[s]
Speed reached after acceleration	$n_M = \frac{120 \times s_B}{h \times i \times t_B}$	[rpm]
Acceleration or deceleration path	$s_B = \frac{n_M \times t_B \times h \times i}{120}$	[mm]
Power output	$P_A = \frac{M_M \times n_M}{9{,}55}$	[W]

Formula for calculating a leadscrew drive



Motor speed	$n_m = \frac{v \times 6 \times 10^4}{\pi \times d_3 \times i}$	[rpm]
Load torque	$M_L = d_3 \times i \times \frac{F_L}{2000}$	[Nm]
Translational mass moment of inertia	$J_T = m_T \times \left(\frac{d_3}{2}\right)^2 \times 10^{-6}$	[kg m^2]
Rotational mass moment of inertia	$J_R = \frac{\pi}{32} \times 10^{-15} \times d^4 \times l \times \rho$	[kg m^2]
For steel:	$J_R = 7{,}7 \times d^4 \times l \times 10^{-13}$	[kg m^2]
For aluminium:	$J_R = 2{,}7 \times d^4 \times l \times 10^{-13}$	[kg m^2]
Sum of the reflected mass moments of inertia	$J = J_M + J_1 + i^2 \times (J_R + J_T)$	[kg m^2]
Acceleration or deceleration torque M_B=f(n_M)	$M_B = \frac{2 \times \pi \times n_M \times J}{60 \times t_B} = \frac{n_M \times J}{9{,}55 \times t_B}$	[Nm]
Acceleration or deceleration torque M_B=f(s_B)	$M_B = \frac{4 \times s_B \times J}{d_3 \times i \times t_B^2}$	[Nm]
Acceleration or deceleration time t_B=f(n_M)	$t_B = \frac{2 \times \pi \times n_M \times J}{60 \times M_B} = \frac{n_M \times J}{9{,}55 \times M_B}$	[s]
Acceleration or deceleration time t_B=f(s_B)	$t_B = \sqrt{\frac{4 \times s_B \times J}{d_3 \times i \times M_B}}$	[s]
Speed reached after acceleration	$n_M = \frac{120 \times s_B}{d_3 \times \pi \times i \times t_B}$	[rpm]
Acceleration or deceleration path	$s_B = \frac{n_M \times t_B \times d_3 \times \pi \times i}{120}$	[mm]
Power output	$P_A = \frac{M_M \times n_M}{9{,}55}$	[W]

Key:

d	=diameter of the cylinder [mm]	**M_M**	= motor torque [Nm]
d_1	= diameter of the driving wheel [mm]	**M_R**	= Friction torque [Nm]
d_2	= diameter of the driven wheel [mm]	**n_M**	=motor speed [rpm]
d_3	=diamenter of the pinion or wheel [mm]	**P_A**	=output power [W]
F_L	=Feed force [N]	**J**	=Mass moment of inertia [kg m^2]
h	=Screw pitch [mm]	**J_M**	=Mass moment of inertia of the motor [kg m^2]
i	=Reduction ratio	**J_R**	=Rotational mass moment of inertia [kg m^2]
l	=Length of the cylinder [mm]	**J_T**	=Translational mass moment of inertia [kg m^2]
m	=Mass of the cylinder [kg]	**s_B**	=Acceleration or deceleration dist.[mm]
m_T	=Mass of the linearly moved parts [kg]	**t_B**	=Acceleration or deceleration time [s]
M_B	=Acceleration or deceleration torque [Nm]	**v**	=Feed rate [m/s]
M_D	Continuous torque [Nm]	**h**	=Mechanical Efficiency relative to the motor shaft
M_I	= Peak torque [Nm]	**ρ**	=Density [kg/m^3]
M_L	=Load torque [Nm]		

All calculations for dimensioning the motor must be based on the most disadvantageous conditions of operation possible.

Order code for the motors

SMH / MH motors

Motor type

MH: MH-Motor (Resolver)
SMH: SMH-Motor (Resolver)

A: with brake (not for SMH40)

Cooling (available for MH105/145/205)

V: passive cooling [1)]
SV: active cooling [2)]

Size of motor

SMH: **40/60/82/100/115/142**
MH: **56/70/105/145/205**

Speed

in 100's of rpm at 400 VAC [3)]

Motor-Type (as specified in the tables)

Flange type B...

5,. 6, 7, 8, 9 or 4 for flange 14 [4)]

Shaft diameter

9/11/14/19/24/28/38/42

Shaft

S: without feather key

Type of connections

0V [8)], 1IA, 1IC: SMH40
2ID: SMH60/82/100/MH56
2I: SMH115/SMH142/MH70/MH105
3I: MH145/205

Protection class

64: IP64 (SMH40 only available with IP64)
65: IP65 (Standard)

SinCos© type

A6: Singleturn (SRS50) (not available with SMH40, MH56, MH70)
A7: Multiturn (SRM50) (not available with SMH40, MH56, MH70, MH205 with SV)
C6: Singleturn (SKS36) (only available with SMH60; SMH40 on request)
C7: Multiturn (SKM36) (only available with SMH60; SMH40 on request)

Increased moment of inertia

M: (available with MH105/145/205, SMH60/82/100/115/142) [5)]
ML: (available with MH105/145/205) [6) 7)]

Mains power supply (drive)

4: 400VAC [3)]

1) Resulting in longer motor: MH105 +34mm; MH145 +44mm; MH205 +54mm.
2) Resulting in longer motor: MH105 +64mm; MH145 +97mm; MH205 +109mm
Supply voltage: MH105: 24VDC; MH145: 230VAC; MH205: 230VAC.
3) Except for motors which are designed for 230V, then the following applies: Speed = 230V speed; mains power supply "2" for 230VAC.
4) For availability see the dimension tables.
5) Resulting in longer motor : SMH60 +31,5mm, SMH82 +43mm, SMH100 +47mm, SMH115 +45mm, SMH142 +50mm.
6) Not available with MH105 08, MH145 28 and MH205 90.
7) Thus longer motor: see the dimensions table
8) Connection type 0V with SMH40: Cable with Molex plugs, cable length: 200mm.

Additional options on request (Encoder, Explosion protection).

Index

reprint 2006/08/02

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