Brushless DC-Flat Motors

External rotor technology, with housing

9,7 mNm

6 W

Series 2214 ... BXT H

Values at 22°C and nominal voltage		2214 S		006 BXT H	012 BXT H	024 BXT H	
1	Nominal voltage	U_N		6	12	24	V
2	Terminal resistance, phase-phase	R		2,42	6,95	25,9	Ω
3	Efficiency, max.	$\eta_{max.}$		72	74	69	%
4	No-load speed	n_0		5 760	6 500	6 970	min^{-1}
5	No-load current, typ. (with shaft ø 3 mm)	I_0		0,061	0,04	0,016	A
6	Starting torque	M_A		23,5	29,1	29,6	mNm
7	Speed constant	k_n		997	561	296	min^{-1}/V
8	Back-EMF constant	k_E		1	1,78	3,37	mV/min^{-1}
9	Torque constant	k_M		9,58	17	32,2	mNm/A
10	Current constant	k_I		0,104	0,0588	0,031	A/mNm
11	Slope of n-M curve	$\Delta n/\Delta M$		252	229	238	min^{-1}/mNm
12	Terminal inductance, phase-phase	L		271	884	3 150	µH
13	Mechanical time constant	τ_m		8,7	7,92	8,22	ms
14	Rotor inertia	J		3,3	3,3	3,3	gcm²
15	Angular acceleration	$\alpha_{max.}$		71,1	88,2	89,7	·10³rad/s²
16	Operating temperature range:						
	– motor		-40 ... +100				°C
	– winding, max. permissible		+125				°C
17	Shaft bearings		ball bearings, preloaded				
18	Shaft load max.:						
	– with shaft diameter		3				mm
	– radial at 3 000 min^{-1} (5 mm from mounting flange)		6				N
	– axial at 3 000 min^{-1} (push / pull)		2				N
	– axial at standstill (push / pull)		50				N
19	Shaft play:						
	– radial	≤	0,015				mm
	– axial	=	0				mm
20	Mass		28,9				g
21	Direction of rotation		electronically reversible				
22	Speed up to	$n_{max.}$	10 000				min^{-1}
23	Number of pole pairs		7				
24	Hall sensors		digital				
25	Magnet material		NdFeB				
Rated values for continuous operation							
26	Rated torque	M_N		9,4	9,7	9,7	mNm
27	Rated current (thermal limit)	I_N		1,16	0,653	0,36	A
28	Rated speed	n_N		1 260	2 630	2 710	min^{-1}
29	Rated slope of n-M curve	$\Delta n/\Delta M$		479	399	439	min^{-1}/mNm

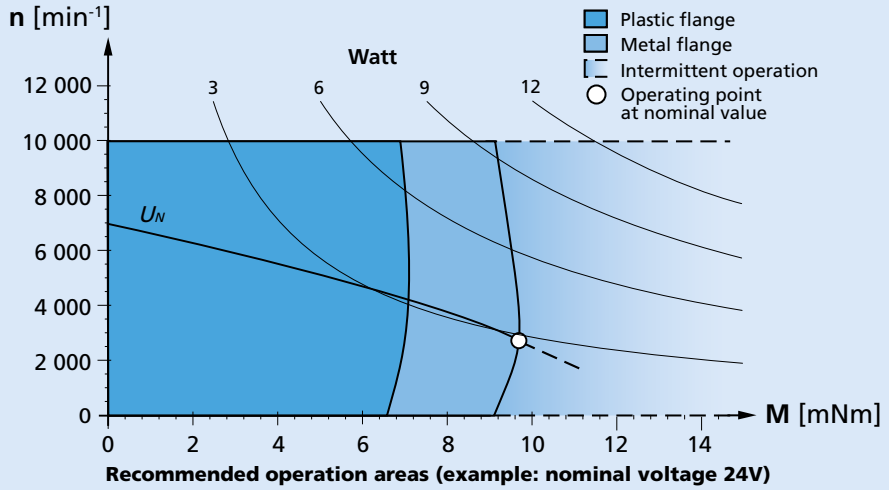
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

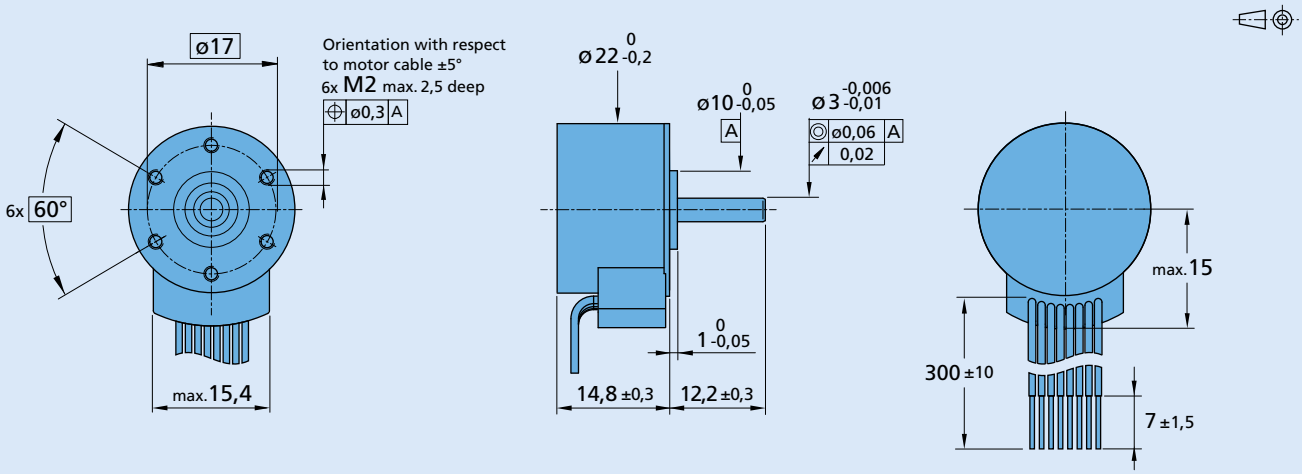
The nominal voltage linear slope describes the maximal achievable operating points at nominal voltage.
Any points of operation above this linear slope will require a supply voltage $U_{mot} > U_N$.



Recommended operation areas (example: nominal voltage 24V)

For notes on technical data and lifetime performance refer to "Technical Information".

Dimensional drawing



2214 S ... BXT H

Option, cable and connection information

Example product designation: **2214S012BXTH-3830**

Option	Type	Description
3830	Connector 	Standard cable with connector MOLEX Microfit 3.0, 43025-0800, recommended mating connector 43020-0800
4337	Gearhead combination	For combination with gearhead 20/1R

Connection

No.	Function	Colour
1	Phase C	yellow
2	Phase B	orange
3	Phase A	brown
4	GND	black
5	U_{DD} (+5V)	red
6	Hall sensor C	grey
7	Hall sensor B	blue
8	Hall sensor A	green

Standard cable

Single wires, material PVC,
AWG 26, Phase A/B/C
AWG 26, Hall A/B/C, U_{DD}, GND

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
20/1R 22GPT 22GPT LN 22GPT HT 26/1R 22L ... ML 22L ... SB 22L ... PB	IE3-1024 IE3-1024 L IEF3-4096 IEF3-4096 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L IERF3-16384 L	SC 1801 P SC 1801 S SC 2402 P SC 2804 S MC 3001 B MC 3001 P MC 3602 B MC 3603 S MC 5004 P MC 5005 S	To view our large range of accessory parts, please refer to the “Accessories” chapter.

For notes on technical data and lifetime performance refer to “Technical Information”.

Brushless DC-Flat Motors

External rotor technology, without housing

134 mNm

100 W

Series 4221 ... BXT R

Values at 22°C and nominal voltage		4221 G	018 BXT R	024 BXT R	048 BXT R	
1	Nominal voltage	U_N	18	24	48	V
2	Terminal resistance, phase-phase	R	0,46	0,74	2,6	Ω
3	Efficiency, max.	$\eta_{max.}$	88	87	88	%
4	No-load speed	n_0	5 670	5 960	6 070	min^{-1}
5	No-load current, typ. (with shaft ø 5 mm)	I_0	0,181	0,186	0,074	A
6	Starting torque	M_A	1 170	1 220	1 390	mNm
7	Speed constant	k_n	320	253	127	min^{-1}/V
8	Back-EMF constant	k_E	3,13	3,95	7,87	mV/min^{-1}
9	Torque constant	k_M	29,8	37,7	75,2	mNm/A
10	Current constant	k_I	0,0335	0,0265	0,0133	A/mNm
11	Slope of n-M curve	$\Delta n/\Delta M$	4,93	4,97	4,4	min^{-1}/mNm
12	Terminal inductance, phase-phase	L	396	664	2 550	µH
13	Mechanical time constant	τ_m	3,56	3,59	3,18	ms
14	Rotor inertia	J	69	69	69	gcm²
15	Angular acceleration	$\alpha_{max.}$	169	177	201	·10³rad/s²
16	Operating temperature range:					
	– motor		-40 ... +100			°C
	– winding, max. permissible		+125			°C
17	Shaft bearings		ball bearings, preloaded			
18	Shaft load max.:					
	– with shaft diameter		5			mm
	– radial at 3 000 min^{-1} (5 mm from mounting flange)		25			N
	– axial at 3 000 min^{-1} (push / pull)		4			N
	– axial at standstill (push / pull)		50			N
19	Shaft play:					
	– radial	≤	0,015			mm
	– axial	=	0			mm
20	Mass		127			g
21	Direction of rotation		electronically reversible			
22	Speed up to	$n_{max.}$	10 000			min^{-1}
23	Number of pole pairs		7			
24	Hall sensors		digital			
25	Magnet material		NdFeB			
Rated values for continuous operation						
26	Rated torque	M_N	122	127	134	mNm
27	Rated current (thermal limit)	I_N	3,6	3,17	1,66	A
28	Rated speed	n_N	3 690	4 180	4 390	min^{-1}
29	Rated slope of n-M curve	$\Delta n/\Delta M$	16,3	14	12,5	min^{-1}/mNm

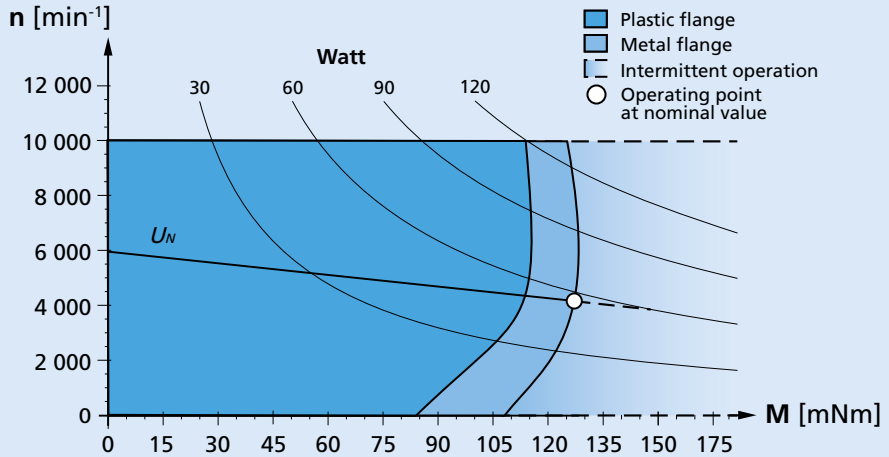
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

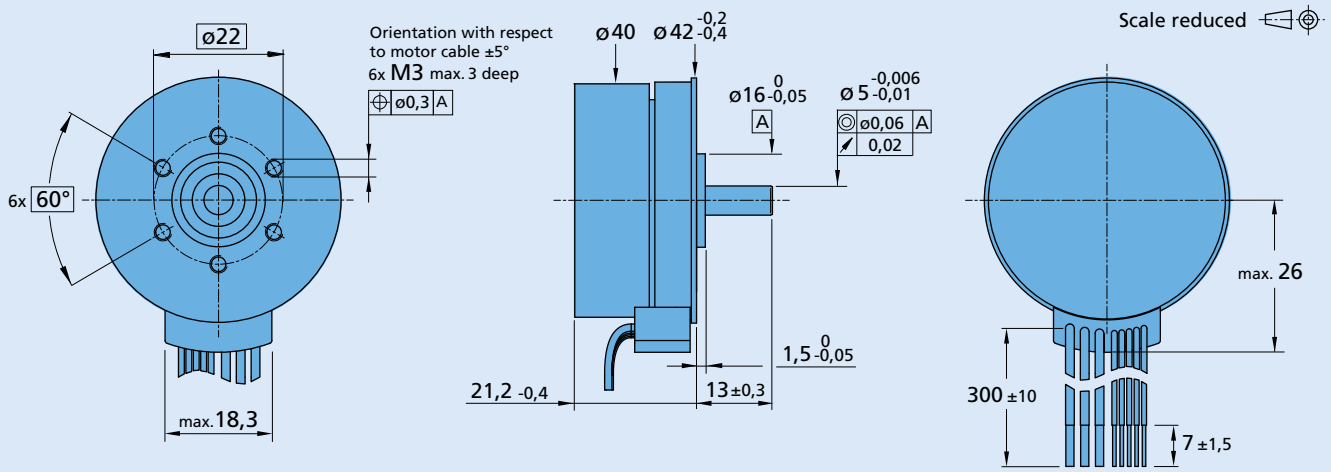
The nominal voltage linear slope describes the maximal achievable operating points at nominal voltage.
Any points of operation above this linear slope will require a supply voltage $U_{mot} > U_N$.



Recommended operation areas (example: nominal voltage 24V)

For notes on technical data and lifetime performance refer to "Technical Information".

Dimensional drawing



4221 G ... BXT R

Option, cable and connection information

Example product designation: **4221G018BXTR-3830**

Option	Type	Description
3830	Connector 	Standard cable with connector MOLEX Microfit 3.0, 43025-0800, recommended mating connector 43020-0800

Connection

No.	Function	Colour
1	Phase C	yellow
2	Phase B	orange
3	Phase A	brown
4	GND	black
5	U_{DD} (+5V)	red
6	Hall sensor C	grey
7	Hall sensor B	blue
8	Hall sensor A	green

Standard cable

Single wires, material PVC,
AWG 20, Phase A/B/C
AWG 26, Hall A/B/C, U_{DD}, GND

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
32GPT HT 38/1 38/1 S 38/2 38/2 S 42GPT		SC 2804 S SC 5004 P SC 5008 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.

Brushless DC-Flat Motors

112 mNm

External rotor technology, with housing

60 W

Series 4221 ... BXT H

Values at 22°C and nominal voltage		4221 G		018 BXT H	024 BXT H	048 BXT H	
1	Nominal voltage	U_N		18	24	48	V
2	Terminal resistance, phase-phase	R		0,46	0,74	2,6	Ω
3	Efficiency, max.	$\eta_{max.}$		88	87	88	%
4	No-load speed	n_0		5 710	6 040	6 070	min^{-1}
5	No-load current, typ. (with shaft ø 5 mm)	I_0		0,177	0,139	0,103	A
6	Starting torque	M_A		1 170	1 220	1 390	mNm
7	Speed constant	k_n		320	253	127	min^{-1}/V
8	Back-EMF constant	k_E		3,13	3,95	7,87	mV/min^{-1}
9	Torque constant	k_M		29,8	37,7	75,2	mNm/A
10	Current constant	k_I		0,0335	0,0265	0,0133	A/mNm
11	Slope of n-M curve	$\Delta n/\Delta M$		4,93	4,97	4,4	min^{-1}/mNm
12	Terminal inductance, phase-phase	L		396	664	2 550	µH
13	Mechanical time constant	τ_m		3,56	3,59	3,18	ms
14	Rotor inertia	J		69	69	69	gcm²
15	Angular acceleration	$\alpha_{max.}$		169	177	201	·10³rad/s²
16	Operating temperature range:						
	– motor		-40 ... +100				°C
	– winding, max. permissible		+125				°C
17	Shaft bearings		ball bearings, preloaded				
18	Shaft load max.:						
	– with shaft diameter		5				mm
	– radial at 3 000 min^{-1} (5 mm from mounting flange)		25				N
	– axial at 3 000 min^{-1} (push / pull)		4				N
	– axial at standstill (push / pull)		50				N
19	Shaft play:						
	– radial	≤	0,015				mm
	– axial	=	0				mm
20	Mass		142				g
21	Direction of rotation		electronically reversible				
22	Speed up to	$n_{max.}$	10 000				min^{-1}
23	Number of pole pairs		7				
24	Hall sensors		digital				
25	Magnet material		NdFeB				
Rated values for continuous operation							
26	Rated torque	M_N		102	112	107	mNm
27	Rated current (thermal limit)	I_N		3,33	2,87	1,39	A
28	Rated speed	n_N		3 980	4 380	4 700	min^{-1}
29	Rated slope of n-M curve	$\Delta n/\Delta M$		17	14,8	12,8	min^{-1}/mNm

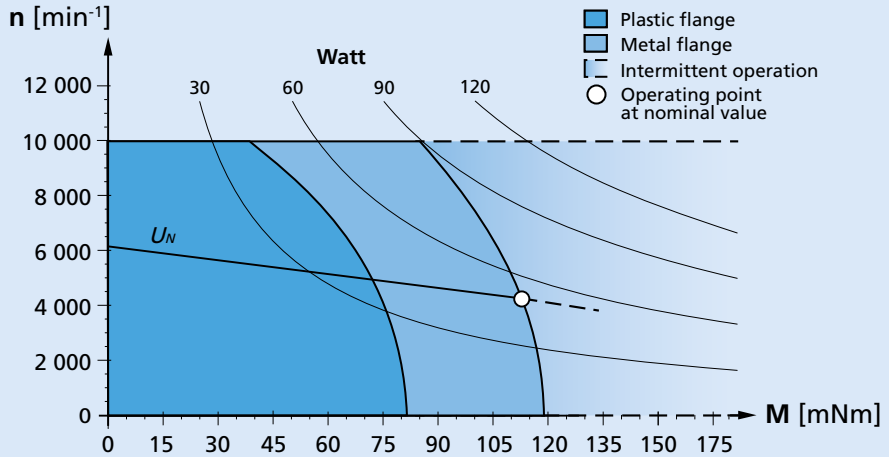
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

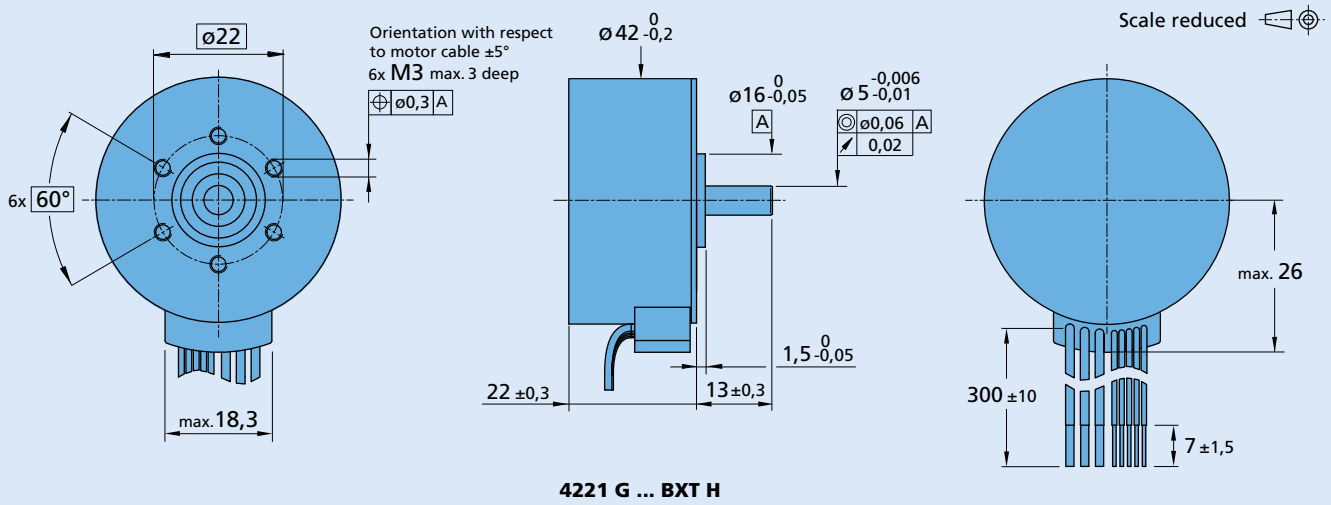
The nominal voltage linear slope describes the maximal achievable operating points at nominal voltage.
Any points of operation above this linear slope will require a supply voltage $U_{mot} > U_N$.



Recommended operation areas (example: nominal voltage 24V)

For notes on technical data and lifetime performance refer to "Technical Information".

Dimensional drawing



4221 G ... BXT H

Option, cable and connection information

Example product designation: **4221G018BXTH-3830**

Option	Type	Description
3830		Standard cable with connector MOLEX Microfit 3.0, 43025-0800, recommended mating connector 43020-0800

Connection

No.	Function	Colour
1	Phase C	yellow
2	Phase B	orange
3	Phase A	brown
4	GND	black
5	U_{DD} (+5V)	red
6	Hall sensor C	grey
7	Hall sensor B	blue
8	Hall sensor A	green

Standard cable

Single wires, material PVC,
AWG 20, Phase A/B/C
AWG 26, Hall A/B/C, U_{DD}, GND

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
32GPT HT 38/1 38/1 S 38/2 38/2 S 42GPT	IE3-1024 IE3-1024 L IEF3-4096 IEF3-4096 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L IERF3-16384 L	SC 2804 S SC 5004 P SC 5008 S MC 3603 S MC 3606 B MC 5004 P MC 5005 S	PMB32 To view our large range of accessory parts, please refer to the “Accessories” chapter.

Brushless DC-Flat Motors

External rotor technology, with housing

38 mNm

20 W

Series 3216 ... BXT H

Values at 22°C and nominal voltage		3216 W		009 BXT H	012 BXT H	024 BXT H	
1	Nominal voltage	U_N		9	12	24	V
2	Terminal resistance, phase-phase	R		0,55	0,88	3,26	Ω
3	Efficiency, max.	$\eta_{max.}$		83	84	81	%
4	No-load speed	n_0		6 060	6 230	6 250	min^{-1}
5	No-load current, typ. (with shaft ø 4 mm)	I_0		0,165	0,126	0,068	A
6	Starting torque	M_A		225	245	263	mNm
7	Speed constant	k_n		691	530	267	min^{-1}/V
8	Back-EMF constant	k_E		1,45	1,89	3,75	mV/min^{-1}
9	Torque constant	k_M		13,8	18	35,8	mNm/A
10	Current constant	k_I		0,0724	0,0555	0,0279	A/mNm
11	Slope of n-M curve	$\Delta n/\Delta M$		27,5	25,9	24,3	min^{-1}/mNm
12	Terminal inductance, phase-phase	L		191	331	1 290	µH
13	Mechanical time constant	τ_m		5,28	4,97	4,66	ms
14	Rotor inertia	J		18,3	18,3	18,3	gcm²
15	Angular acceleration	$\alpha_{max.}$		123	134	144	·10³rad/s²
16	Operating temperature range:						
	– motor		-40 ... +100				°C
	– winding, max. permissible		+125				°C
17	Shaft bearings		ball bearings, preloaded				
18	Shaft load max.:						
	– with shaft diameter		4				mm
	– radial at 3 000 min^{-1} (5 mm from mounting flange)		15				N
	– axial at 3 000 min^{-1} (push / pull)		3				N
	– axial at standstill (push / pull)		50				N
19	Shaft play:						
	– radial	≤	0,015				mm
	– axial	=	0				mm
20	Mass		65,3				g
21	Direction of rotation		electronically reversible				
22	Speed up to	$n_{max.}$	10 000				min^{-1}
23	Number of pole pairs		7				
24	Hall sensors		digital				
25	Magnet material		NdFeB				
Rated values for continuous operation							
26	Rated torque	M_N		37	38	38	mNm
27	Rated current (thermal limit)	I_N		2,76	2,18	1,1	A
28	Rated speed	n_N		3 400	3 860	4 320	min^{-1}
29	Rated slope of n-M curve	$\Delta n/\Delta M$		71,9	62,4	50,8	min^{-1}/mNm

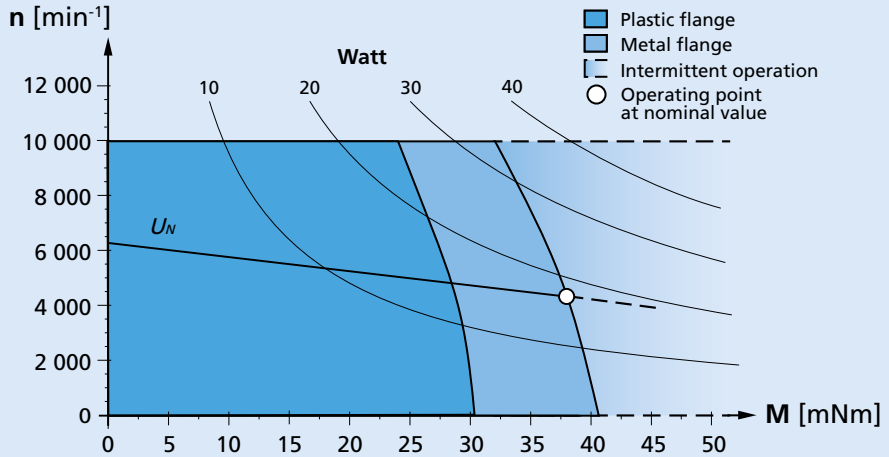
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

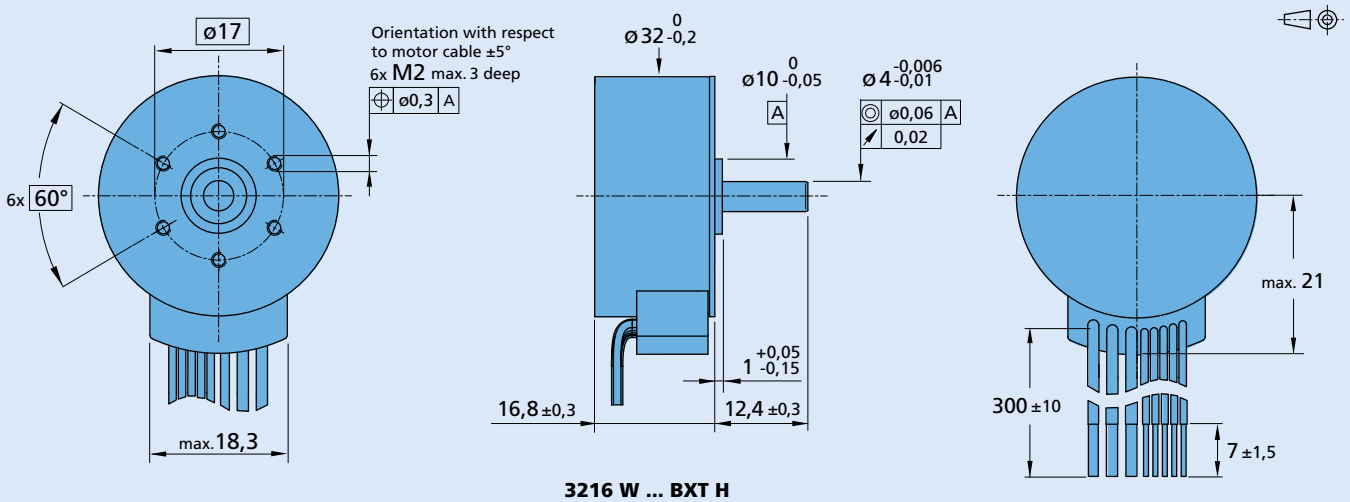
The nominal voltage linear slope describes the maximal achievable operating points at nominal voltage.
Any points of operation above this linear slope will require a supply voltage $U_{mot} > U_N$.



Recommended operation areas (example: nominal voltage 24V)

For notes on technical data and lifetime performance refer to "Technical Information".

Dimensional drawing



3216 W ... BXT H

Option, cable and connection information

Example product designation: **3216W012BXTH-3830**

Option	Type	Description
3830	Connector 	Standard cable with connector MOLEX Microfit 3.0, 43025-0800, recommended mating connector 43020-0800

Connection

No.	Function	Colour
1	Phase C	yellow
2	Phase B	orange
3	Phase A	brown
4	GND	black
5	U_{DD} (+5V)	red
6	Hall sensor C	grey
7	Hall sensor B	blue
8	Hall sensor A	green

Standard cable

Single wires, material PVC,
AWG 20, Phase A/B/C
AWG 26, Hall A/B/C, U_{DD}, GND

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
22GPT 22GPT LN 22GPT HT 26A 26/1R 32GPT 32GPT LN 32GPT HT 32/3R 22L ... ML 22L ... SB 22L ... PB 32L ... TL 32L ... ML 32L ... SB 32L ... PB	IE3-1024 IE3-1024 L IEF3-4096 IEF3-4096 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L IERF3-16384 L	SC 2402 P SC 2804 S MC 3602 B MC 3603 S MC 3606 B MC 5004 P MC 5005 S	PMB32 To view our large range of accessory parts, please refer to the “Accessories” chapter.

Brushless DC-Flat Motors

External rotor technology, without housing

10,2 mNm

9 W

Series 2214 ... BXT R

Values at 22°C and nominal voltage		2214 S	006 BXT R	012 BXT R	024 BXT R	
1 Nominal voltage	U_N		6	12	24	V
2 Terminal resistance, phase-phase	R		2,42	6,95	25,9	Ω
3 Efficiency, max.	$\eta_{max.}$		72	73	70	%
4 No-load speed	n_0		5 740	6 500	6 960	min^{-1}
5 No-load current, typ. (with shaft ø 3 mm)	I_0		0,062	0,039	0,016	A
6 Starting torque	M_A		23,5	29,1	29,6	mNm
7 Speed constant	k_n		997	561	296	min^{-1}/V
8 Back-EMF constant	k_E		1	1,78	3,37	mV/min^{-1}
9 Torque constant	k_M		9,58	17	32,2	mNm/A
10 Current constant	k_I		0,104	0,0588	0,031	A/mNm
11 Slope of n-M curve	$\Delta n/\Delta M$		252	229	238	min^{-1}/mNm
12 Terminal inductance, phase-phase	L		271	884	3 150	µH
13 Mechanical time constant	τ_m		8,7	7,92	8,22	ms
14 Rotor inertia	J		3,3	3,3	3,3	gcm²
15 Angular acceleration	$\alpha_{max.}$		71,1	88,2	89,7	·10³rad/s²
16 Operating temperature range:						
– motor		-40 ... +100				°C
– winding, max. permissible		+125				°C
17 Shaft bearings		ball bearings, preloaded				
18 Shaft load max.:						
– with shaft diameter		3				mm
– radial at 3 000 min^{-1} (5 mm from mounting flange)		6				N
– axial at 3 000 min^{-1} (push / pull)		2				N
– axial at standstill (push / pull)		50				N
19 Shaft play:						
– radial	≤	0,015				mm
– axial	=	0				mm
20 Mass		25,5				g
21 Direction of rotation		electronically reversible				
22 Speed up to	$n_{max.}$	10 000				min^{-1}
23 Number of pole pairs		7				
24 Hall sensors		digital				
25 Magnet material		NdFeB				
Rated values for continuous operation						
26 Rated torque	M_N		9,5	10	10,2	mNm
27 Rated current (thermal limit)	I_N		1,18	0,66	0,368	A
28 Rated speed	n_N		1 200	2 590	2 600	min^{-1}
29 Rated slope of n-M curve	$\Delta n/\Delta M$		478	391	427	min^{-1}/mNm

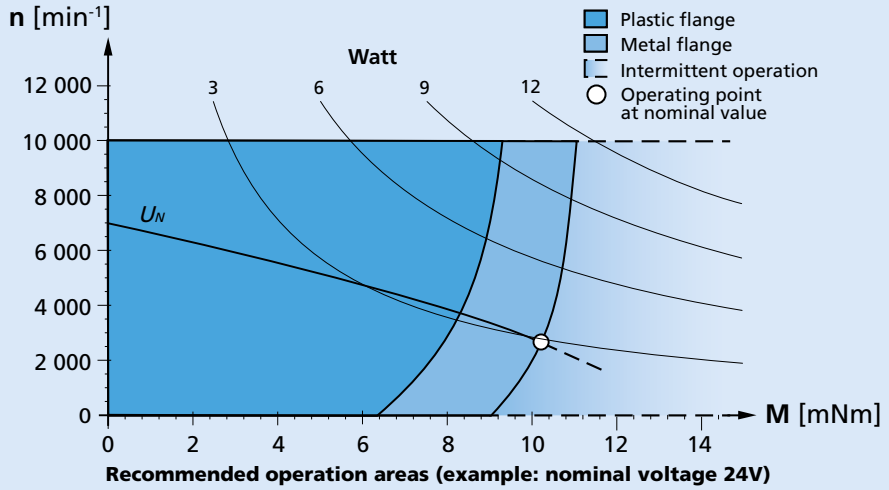
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

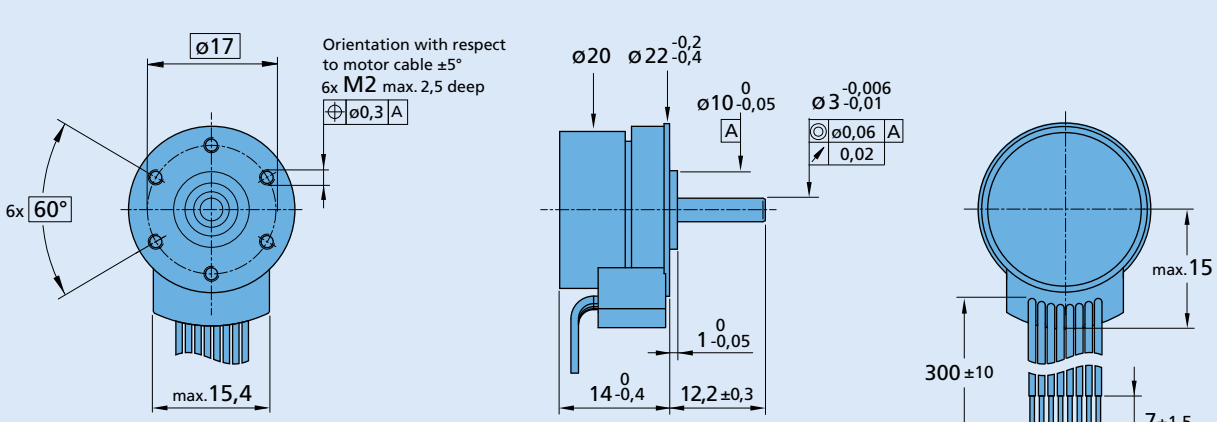
The nominal voltage linear slope describes the maximal achievable operating points at nominal voltage.
Any points of operation above this linear slope will require a supply voltage $U_{mot} > U_N$.



Recommended operation areas (example: nominal voltage 24V)

For notes on technical data and lifetime performance refer to "Technical Information".

Dimensional drawing



2214 S ... BXT R

Option, cable and connection information

Example product designation: **2214S012BXTR-3830**

Option	Type	Description
3830	Connector 	Standard cable with connector MOLEX Microfit 3.0, 43025-0800, recommended mating connector 43020-0800
4337	Gearhead combination	For combination with gearhead 20/1R

Connection

No.	Function	Colour
1	Phase C	yellow
2	Phase B	orange
3	Phase A	brown
4	GND	black
5	U_{DD} (+5V)	red
6	Hall sensor C	grey
7	Hall sensor B	blue
8	Hall sensor A	green

Standard cable

Single wires, material PVC,
AWG 26, Phase A/B/C
AWG 26, Hall A/B/C, U_{DD}, GND

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
20/1R 22GPT 22GPT LN 22GPT HT 26/1R 22L ... ML 22L ... SB 22L ... PB		SC 1801 P SC 1801 S SC 2402 P SC 2804 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.