FAULHABER

FAULHABER Drive Systems

New Products

WE CREATE MOTION

EN

New Products

Awarded several times for its successful and sustained innovation management, FAULHABER as a pioneer and founder of a high-tech branch of industry is one of the most innovative companies in Germany.

It is our philosophy to always be technologically ahead by a nose length. We are pioneers, look beyond the horizon and constantly further develop our high-performance base technologies with focus on future requirements.

Discover our new products.

WE CREATE MOTION

WirtschaftsWoche
Deutschlands Innovativste Mittelständler
2019
FAULHABER
Im Vergleich: 3.500 Unternehmen
Partner: Munich Strategy
Ausgabe 44/2019

TOP 100
top100.de
top innovator 2018

FACTORY OF THE YEAR

FAULHABER

Brushless DC-Motors

Stepper Motors

Precision Gearheads

Encoders

For notes on technical data refer to "Technical information" under www.faulhaber.com in the support area.

NEW

FAULHABER

Brushless DC-Servomotors

2 Pole Technology

8 mNm

58,5 W

Series 1645 ... BHS

Values at 22°C and nominal voltage		1645 S	024 BHS	036 BHS	048 BHS	
1	Nominal voltage	U_N	24	36	48	V
2	Terminal resistance, phase-phase	R	0,684	1,51	2,81	Ω
3	Efficiency, max.	$\eta_{max.}$	90	90	90	%
4	No-load speed	n_0	62 000	62 900	61 400	min⁻¹
5	No-load current, typ. (with shaft ø 3 mm)	I_0	0,0988	0,0674	0,0486	A
6	Stall torque	M_H	137	138	135	mNm
7	Friction torque, static	C_0	0,114	0,114	0,114	mNm
8	Friction torque, dynamic	C_V	$4{,}49 \cdot 10^{-6}$	$4{,}49 \cdot 10^{-6}$	$4{,}49 \cdot 10^{-6}$	mNm/min⁻¹
9	Speed constant	k_n	2 450	1 650	1 210	min⁻¹/V
10	Back-EMF constant	k_E	0,409	0,606	0,825	mV/min⁻¹
11	Torque constant	k_M	3,9	5,79	7,88	mNm/A
12	Current constant	k_I	0,256	0,173	0,127	A/mNm
13	Slope of n-M curve	$\Delta n/\Delta M$	429	431	432	min⁻¹/mNm
14	Terminal inductance, phase-phase	L	46	103	190	µH
15	Mechanical time constant	τ_m	2,6	2,6	2,7	ms
16	Rotor inertia	J	0,59	0,59	0,59	gcm²
17	Angular acceleration	$\alpha_{max.}$	2 330	2 350	2 300	·10³rad/s²
18	Thermal resistance	R_{th1} / R_{th2}	3,1 / 22			K/W
19	Thermal time constant	τ_{w1} / τ_{w2}	6,5 / 580			s
20	Operating temperature range:					
	– motor		-30 ... +125			°C
	– winding, max. permissible		+125			°C
21	Shaft bearings		ball bearings, preloaded			
22	Shaft load max.:					
	– with shaft diameter		3			mm
	– radial at 40 000 min⁻¹ (5 mm from mounting flange)		18			N
	– axial at 40 000 min⁻¹ (push only)		9			N
	– axial at standstill (push only)		44			N
23	Shaft play:					
	– radial	≤	0,01			mm
	– axial	=	0			mm
24	Housing material		stainless steel			
25	Mass		58,2			g
26	Direction of rotation		electronically reversible			
27	Speed up to	$n_{max.}$	100 000			min⁻¹
28	Number of pole pairs		1			
29	Hall sensors		digital			
30	Magnet material		NdFeB			

Rated values for continuous operation						
31	Rated torque	M_N	6,09	6,02	6,1	mNm
32	Rated current (thermal limit)	I_N	1,86	1,24	0,924	A
33	Rated speed	n_N	61 300	62 100	60 600	min⁻¹

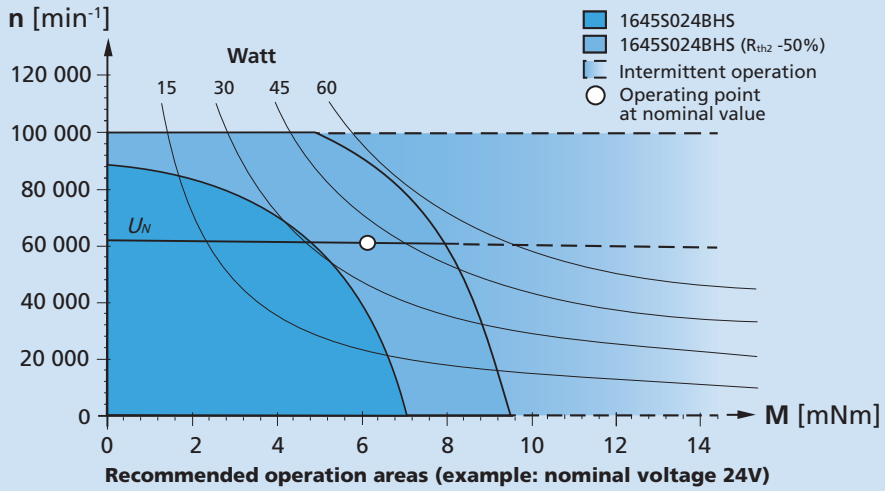
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

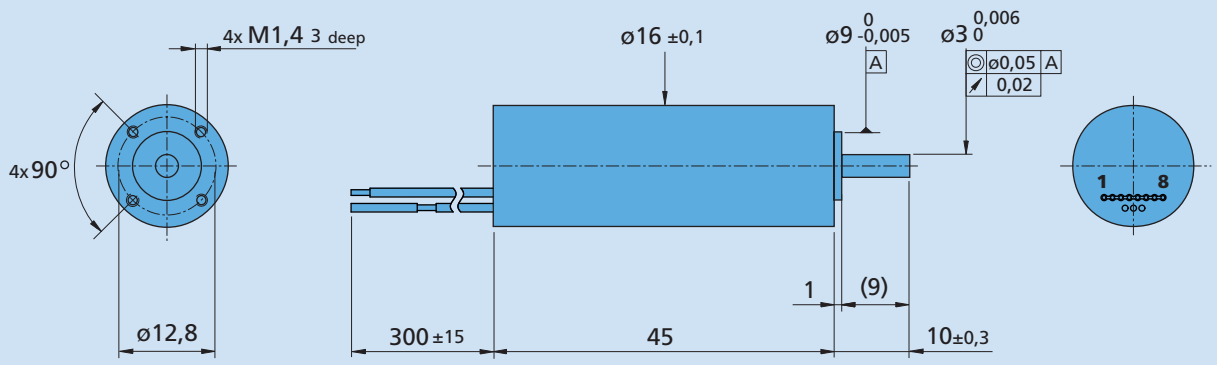
The diagram shows the motor in a completely insulated as well as thermally coupled condition (R_{th2} 50% reduced).

The nominal voltage (U_N) curve shows the operating point at nominal voltage in the insulated and thermally coupled condition. Any points of operation above the curve at nominal voltage will require a higher operating voltage. Any points below the nominal voltage curve will require less voltage.



Recommended operation areas (example: nominal voltage 24V)

Dimensional drawing



1645 S ... BHS

Option, cable and connection information

Example product designation: **1645S024BHS**

Option	Type	Description

Connection

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

Standard cable

Single wires, material PTFE
AWG24, Phase A/B/C
Flat cable, material PVC
AWG28, Pitch 1,27 mm
Hall A,B,C, U_{DD}, GND

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
15/10 17/1 20/1R	IEM3-1024	SC 5004 P SC 5008 S MC 5004 P MC 5005 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.

NEW

FAULHABER

Brushless DC-Servomotors

2 Pole Technology, High Speed for Autoclave Sterilisation

18,7 mNm

91,2 W

Series 2057 ... BA

Values at 22°C and nominal voltage		2057 S	024 BA	
1 Nominal voltage	U_N		24	V
2 Terminal resistance, phase-phase	R		0,427	Ω
3 Efficiency, max.	$\eta_{max.}$		90	%
4 No-load speed	n_0		44 300	min⁻¹
5 No-load current, typ. (with shaft ø 3 mm)	I_0		0,178	A
6 Stall torque	M_H		309	mNm
7 Friction torque, static	C_0		0,0559	mNm
8 Friction torque, dynamic	C_V		$1{,}95 \cdot 10^{-5}$	mNm/min⁻¹
9 Speed constant	k_n		1 740	min⁻¹/V
10 Back-EMF constant	k_E		0,576	mV/min⁻¹
11 Torque constant	k_M		5,5	mNm/A
12 Current constant	k_I		0,182	A/mNm
13 Slope of n-M curve	$\Delta n/\Delta M$		135	min⁻¹/mNm
14 Terminal inductance, phase-phase	L		36,2	µH
15 Mechanical time constant	τ_m		4,2	ms
16 Rotor inertia	J		3	gcm²
17 Angular acceleration	$\alpha_{max.}$		1 030	·10³rad/s²
18 Thermal resistance	R_{th1} / R_{th2}	1,1 / 15		K/W
19 Thermal time constant	τ_{w1} / τ_{w2}	5 / 630		s
20 Operating temperature range:				
– motor		-30 ... +140		°C
– winding, max. permissible		+140		°C
21 Shaft bearings		ball bearings, preloaded		
22 Shaft load max.:				
– with shaft diameter		3		mm
– radial at 40 000 min⁻¹ (5 mm from mounting flange)		22		N
– axial at 40 000 min⁻¹ (push only)		12		N
– axial at standstill (push only)		75		N
23 Shaft play:				
– radial	≤	0,05		mm
– axial	=	0		mm
24 Housing material		stainless steel		
25 Mass		100		g
26 Direction of rotation		electronically reversible		
27 Speed up to	$n_{max.}$	65 000		min⁻¹
28 Number of pole pairs		1		
29 Hall sensors		digital		
30 Magnet material		NdFeB		
Rated values for continuous operation				
31 Rated torque	M_N		13,7	mNm
32 Rated current (thermal limit)	I_N		3	A
33 Rated speed	n_N		43 200	min⁻¹

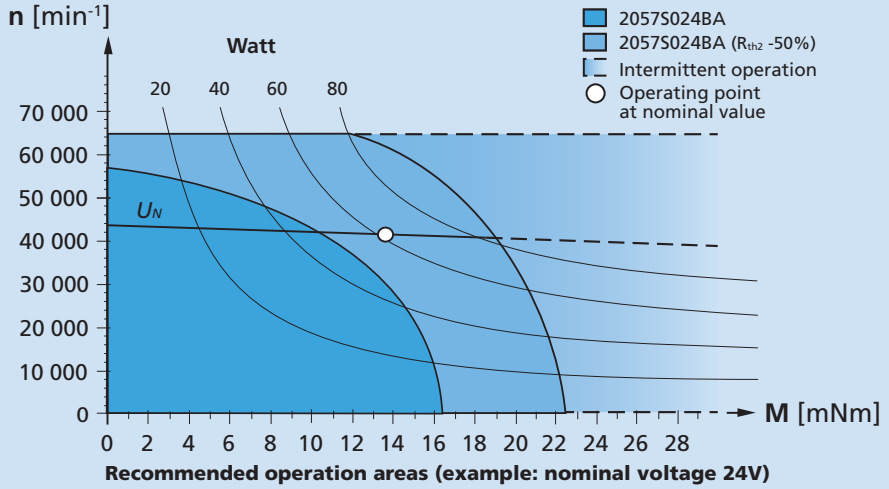
Note: Rated values are calculated with nominal voltage and at a 22°C ambient temperature. The R_{th2} value has been reduced by 25%.

Note:

The diagram indicates the recommended speed in relation to the available torque at the output shaft for a given ambient temperature of 22°C.

The diagram shows the motor in a completely insulated as well as thermally coupled condition (R_{th2} 50% reduced).

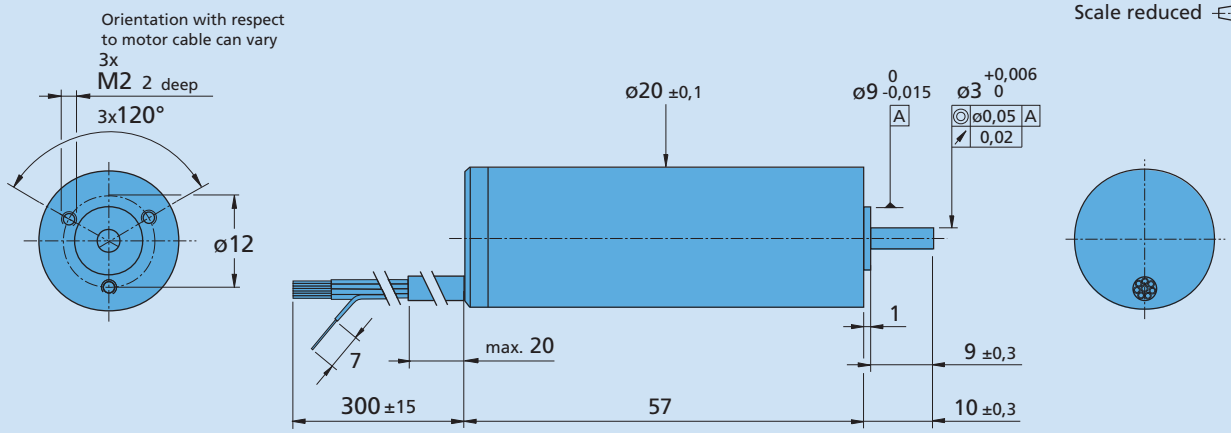
The nominal voltage (U_N) curve shows the operating point at nominal voltage in the insulated and thermally coupled condition. Any points of operation above the curve at nominal voltage will require a higher operating voltage. Any points below the nominal voltage curve will require less voltage.



Recommended operation areas (example: nominal voltage 24V)

Dimensional drawing

Scale reduced



2057 S ... BA

Option, cable and connection information

Example product designation: **2057S024BA-K3825**

Option	Type	Description
K3825	Sensor	Sensorless

Connection

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
Hall sensor A	green

Standard cable
Single wires, material PTFE
AWG 24: Phase A/B/C
AWG 26: Hall A/B/C, U_{DD}, GND

Autoclavable

Sterilisation Process

134°C

Reference	Description
Sterilisation conditions	134°C at 2.1 bars, 100% RH
Holding time	18 minutes
Number of cycles, typical	1 000
Number of cycles (sensorless, K3825), typical	1 500

Contact your sales representative for more detailed information

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
		SC 5004 P SC 5008 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.

NEW

FAULHABER

Brushless DC-Flat Motors

10,2 mNm

External rotor technology, without housing

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

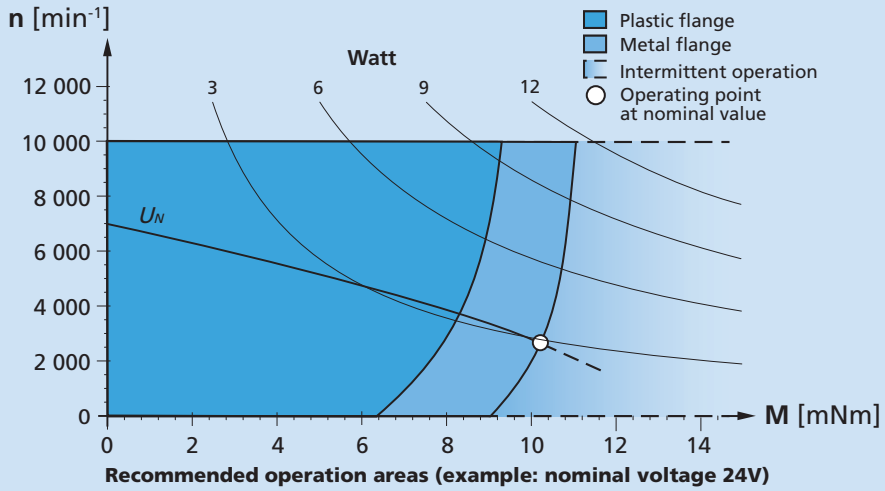
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

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

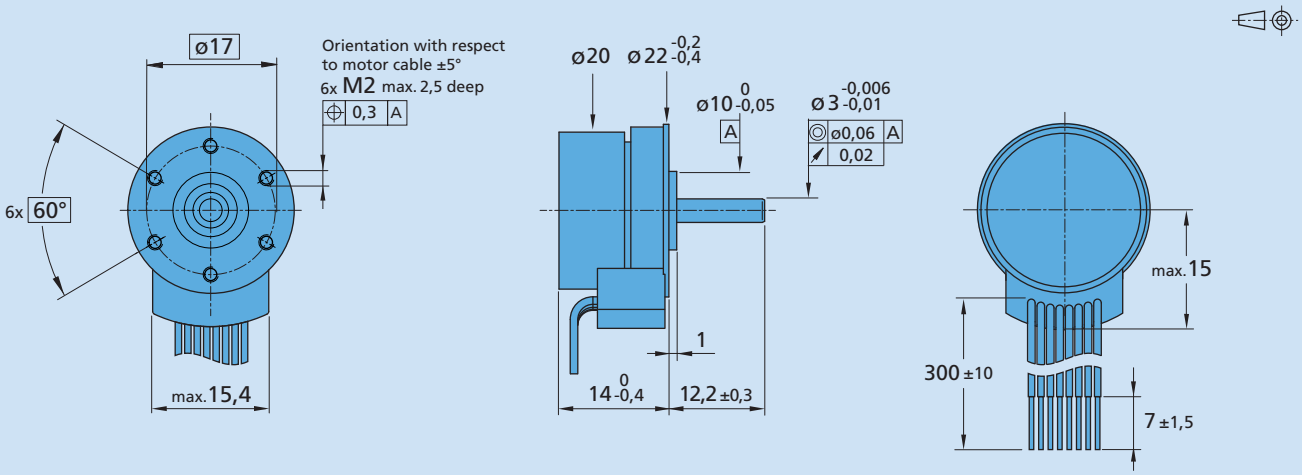
The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

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)

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

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
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 22F 22GPT 26/1R		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.

NEW

FAULHABER

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

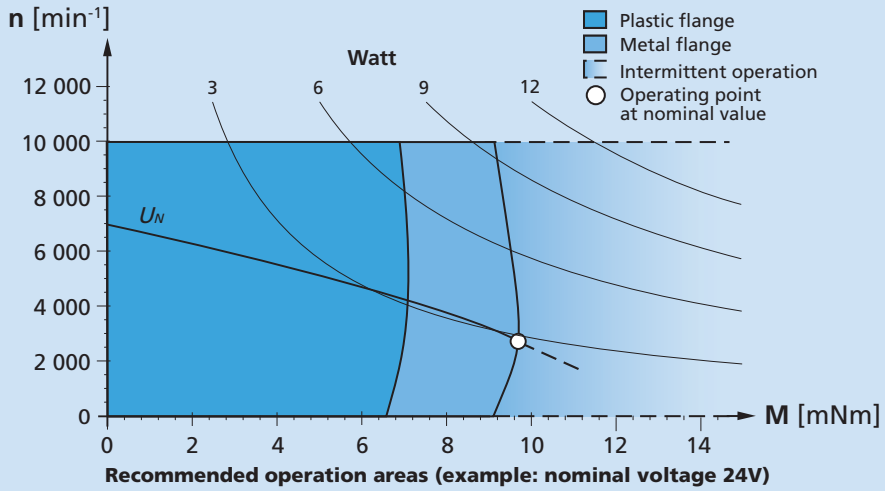
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

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

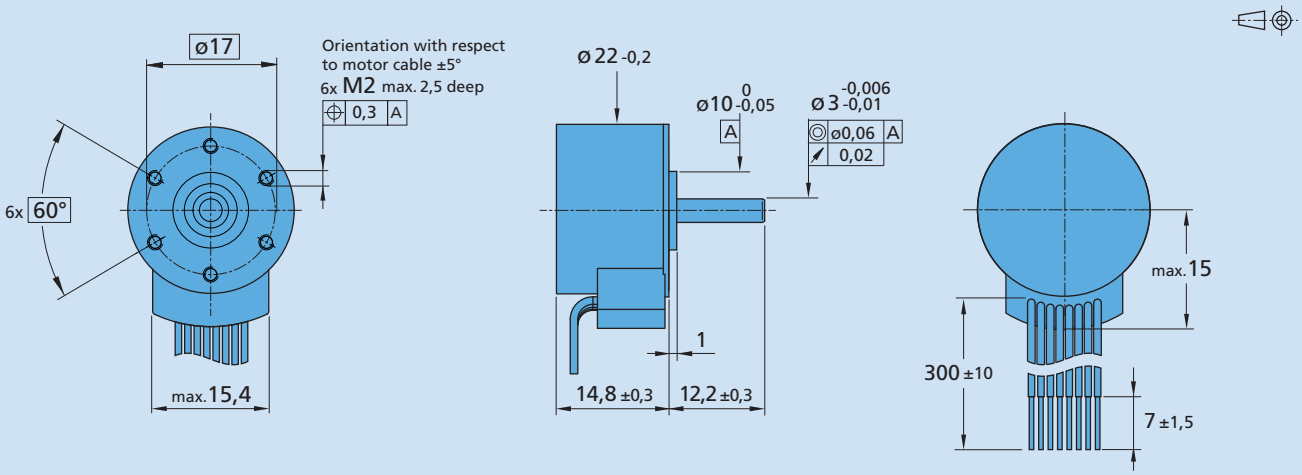
The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

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)

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

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
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 22F 22GPT 26/1R	IE3-1024 IE3-1024 L IEF3-4096 IEF3-4096 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L	SC 1801 P SC 1801 S SC 2402 P SC 2804 S MC 5004 P MC 5005 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.

NEW

FAULHABER

Brushless DC-Flat Motors

41 mNm

External rotor technology, without housing

30 W

Series 3216 ... BXT R

Values at 22°C and nominal voltage		3216 W	009 BXT R	012 BXT R	024 BXT R	
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.	$\eta_{max.}$	82	83	82	%
4	No-load speed	n_0	6 020	6 240	6 200	min⁻¹
5	No-load current, typ. (with shaft ø 4 mm)	I_0	0,179	0,129	0,084	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		57,9			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	39,5	40	41	mNm
27	Rated current (thermal limit)	I_N	2,87	2,28	1,17	A
28	Rated speed	n_N	3 320	3 750	4 150	min⁻¹
29	Rated slope of n-M curve	$\Delta n/\Delta M$	68,4	62,3	50	min⁻¹/mNm

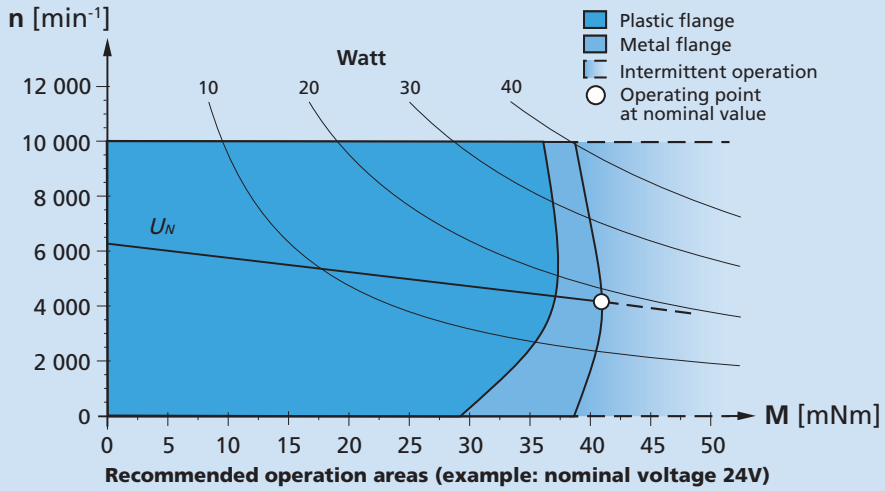
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

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

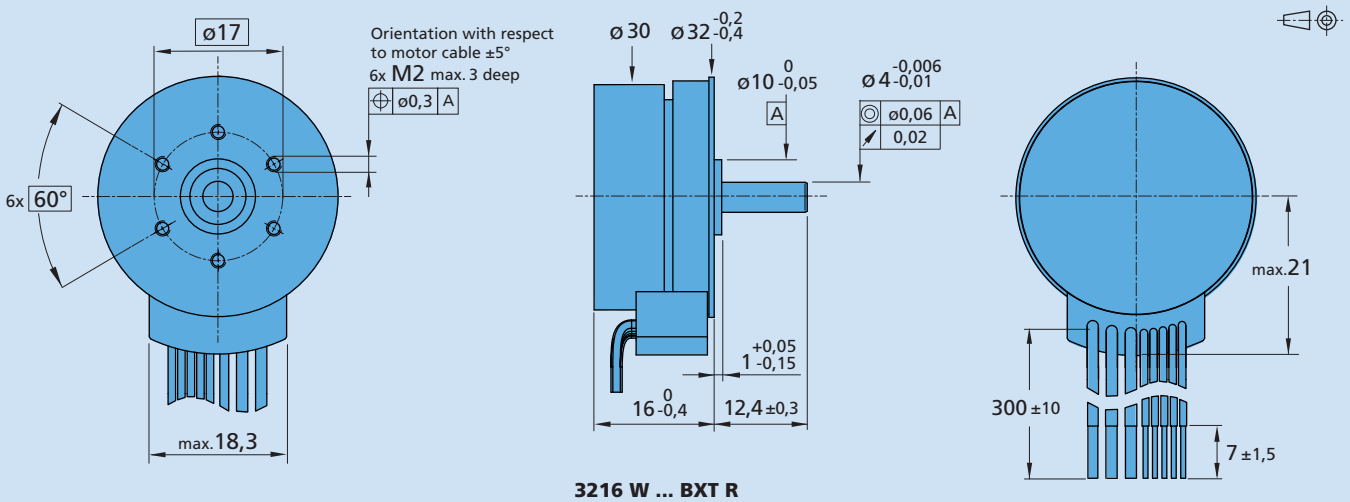
The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

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)

Dimensional drawing



3216 W ... BXT R

Option, cable and connection information

Example product designation: **3216W012BXTR-3830**

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

Connection

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
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
26A 26/1R 32GPT 32/3R		SC 2402 P SC 2804 S	To view our large range of accessory parts, please refer to the "Accessories" chapter.

NEW

FAULHABER

Brushless DC-Flat Motors

38 mNm

External rotor technology, with housing

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

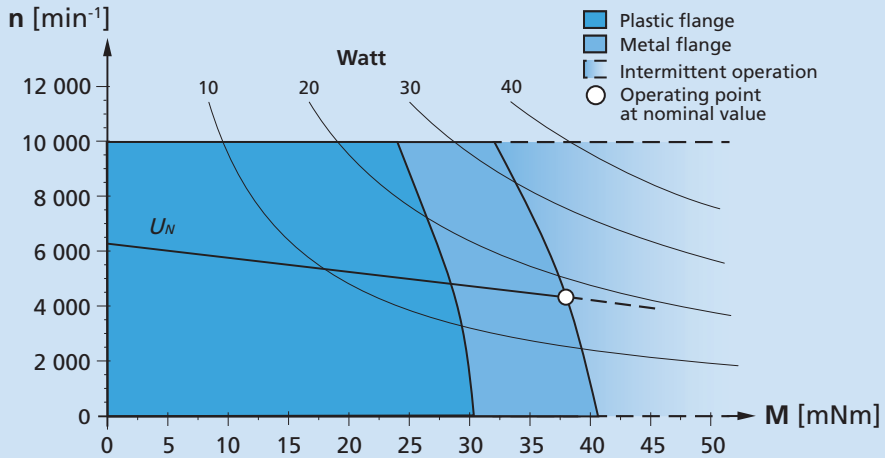
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

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

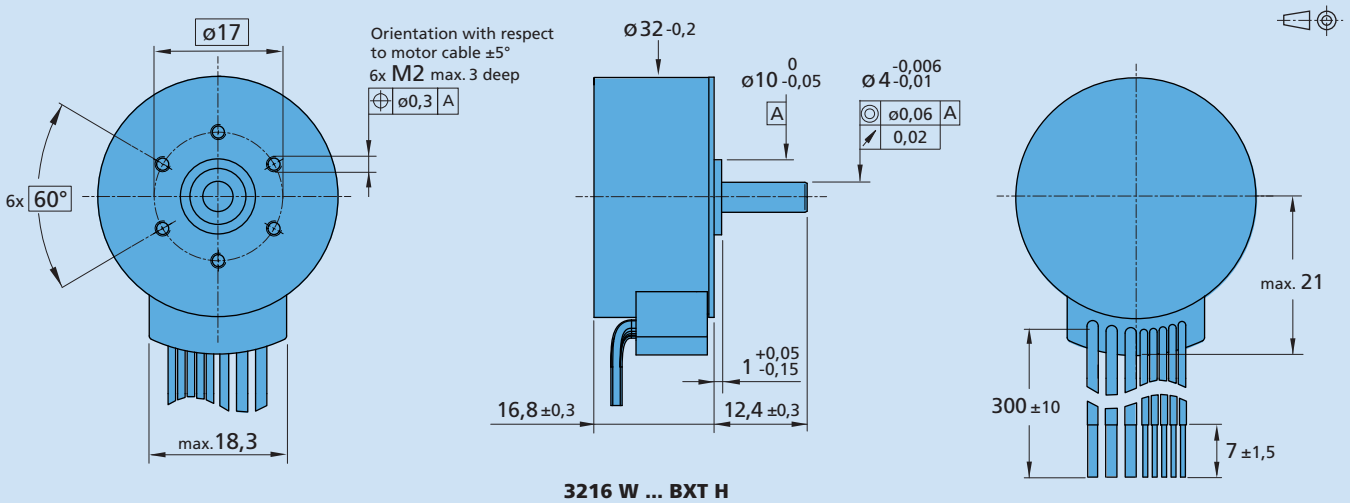
The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

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)

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

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
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
26A 26/1R 32GPT 32/3R	IE3-1024 IE3-1024 L IEF3-4096 IEF3-4096 L IERS3-500 IERS3-500 L IER3-10000 IER3-10000 L	SC 2402 P SC 2804 S MC 5004 P MC 5005 S	MBZ To view our large range of accessory parts, please refer to the “Accessories” chapter.

NEW

FAULHABER

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

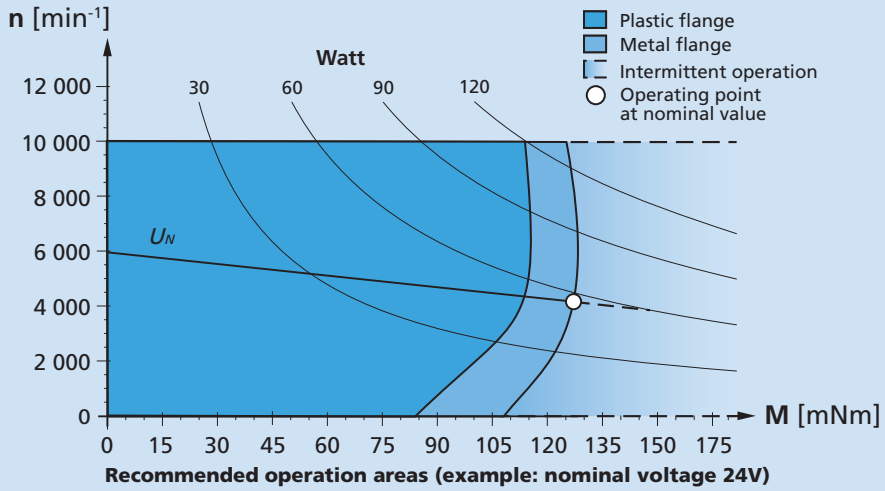
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

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

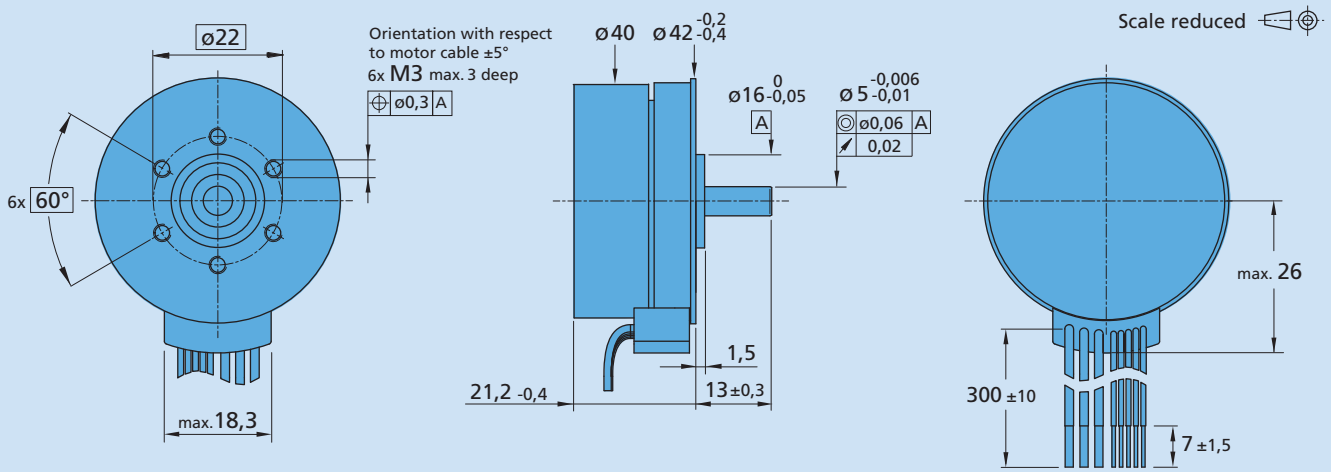
The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

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)

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

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
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
32A 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.

NEW

FAULHABER

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

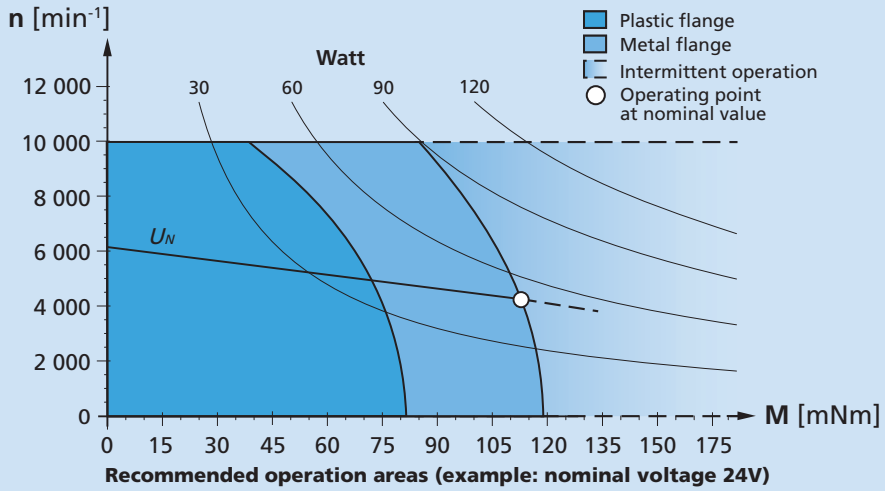
Note: Rated values are measured at nominal voltage and 22°C ambient temperature.

Note:

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

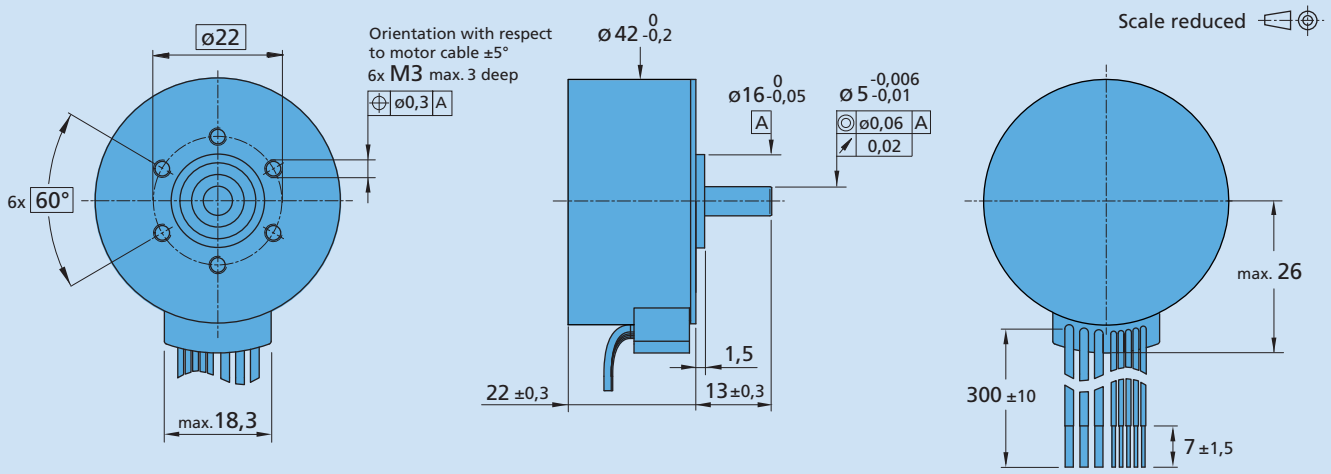
The diagram indicates the recommended speed in relation to the available torque at the output shaft.
It includes the assembly on a plastic- as well as on a metal flange (assembly method: IM B 5).

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)

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

Function	Colour
Phase C	yellow
Phase B	orange
Phase A	brown
GND	black
U_{DD} (+5V)	red
Hall sensor C	grey
Hall sensor B	blue
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
32A	IE3-1024	SC 2804 S	MBZ
38/1	IE3-1024 L	SC 5004 P	
38/1 S	IEF3-4096	SC 5008 S	To view our large range of accessory parts, please refer to the “Accessories” chapter.
38/2	IEF3-4096 L	MC 5004 P	
38/2 S	IERS3-500	MC 5005 S	
42GPT	IERS3-500 L		
	IER3-10000		
	IER3-10000 L		

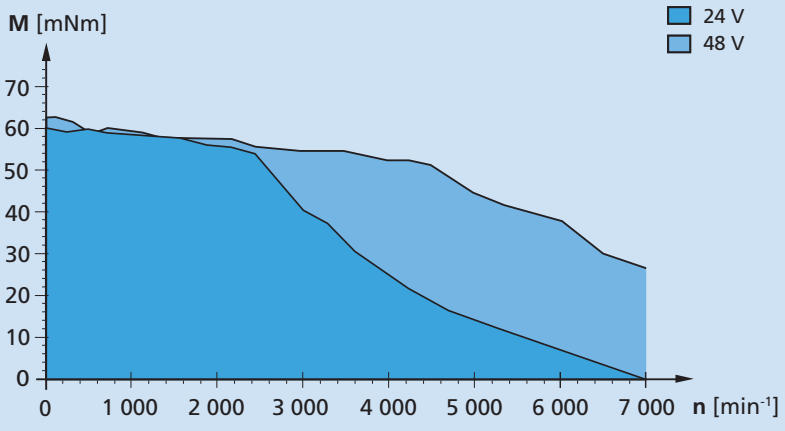
Stepper Motors 62 mNm

Two phase with Disc Magnet,
100 steps per revolution, microstepping motor

Series DM40100R

Values at 20°C	DM40100R	2630		1550		0940		
Connection		Parallel	Serial	Parallel	Serial	Parallel	Serial	
Nominal current per phase (1 phases ON)		2,63	1,32	1,55	0,78	0,94	0,47	A
Boosted current per phase (1 phases ON)		5,09	2,55	4,6	2,3	1,81	0,91	A
Phase resistance		0,9	3,8	2,9	11,8	7,5	30	Ω
Phase inductance (1 kHz)		1,15	4,6	3,3	13,2	9	36	mH
Holding torque at nominal current (1 phases ON)		62	62	62	62	62	62	mNm
Holding torque at boosted current		120	120	120	120	120	120	mNm
Residual torque, typ.		3	3	3	3	3	3	mNm
Back-EMF amplitude		1,47	2,95	2,5	5	4,14	8,27	V/k step/s
Electrical time constant		1,2						ms
Rotor inertia		$2{,}7 \cdot 10^{-7}$						kgm²
Step angle (full step)		3,6						°
Angular accuracy		±6						%
Angular acceleration, max.		$444 \cdot 10^{3}$						rad/s²
Speed up to		10 000						min^{-1}
Resonance frequency (at no load)		75						Hz
Thermal resistance		14						K/W
Thermal time constant		12						min
Operating temperature range		-20 ... +50						°C
Winding temperature, max.		+130						°C
Shaft bearings		ball bearings						
		(Bearing code: 2R)						
Shaft load max.:								
– with shaft diameter		5						mm
– radial at 5 000 min^{-1} (5 mm from bearing)		29						N
– axial at 5 000 min^{-1}		8						N
– axial at standstill		100						N
Shaft play:								
– radial		0,015						mm
– axial		0						mm
Housing material		Polyphenylensulfid (PPS)						
Mass		125						g
Magnet material		NdFeB						

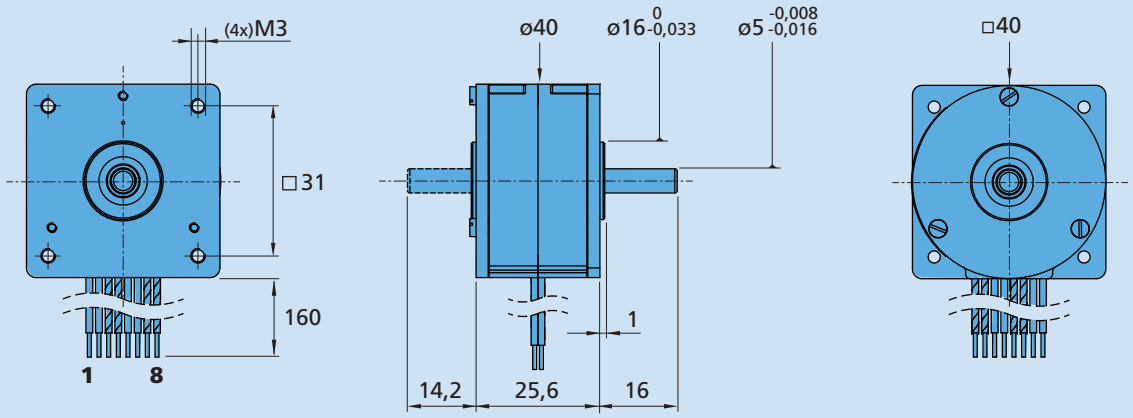
Driver settings
Curve measured with a load inertia of $1{,}49 \cdot 10^{-5}$ kgm² on the DM40100R2R263000 motor using a Technosoft IDS640 controller in sin/cos control mode, 256 micro-steps per full step and a peak phase current of 2,63A.



Possible operation areas

Dimensional drawing

Scale reduced



DM40100R

Options and connection information

Example product designation: **DM40100R2R155000**

Motor executions front shaft	Motor executions double shaft	Front shaft description
00	01	Plain shaft, L=16mm
	02	Plain shaft, L=16mm for encoder

Parallel connection

No.	Colour	Phase
1	brown	A+
2	orange	A+
3	brown-white	A-
4	orange-white	A-
5	red	B+
6	yellow	B+
7	red-white	B-
8	yellow-white	B-

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
	IE3-1024		

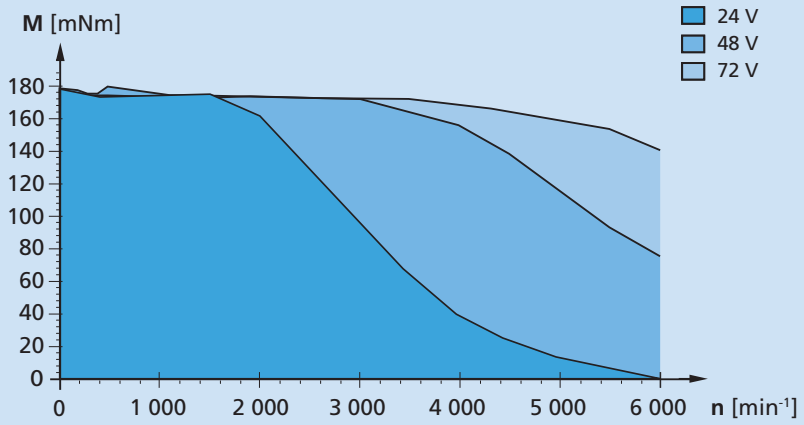
Stepper Motors 200 mNm

Two phase with Disc Magnet,
100 steps per revolution

Series DM52100N

Values at 20°C	DM52100N	5300		2000		
Connection		Parallel	Serial	Parallel	Serial	
Nominal current per phase (1 phases ON)		5,3	2,6	2	1	A
Boosted current per phase (1 phases ON)		12,2	6,1	4,6	2,3	A
Phase resistance		0,35	1,4	2,2	8,8	Ω
Phase inductance (1 kHz)		0,7	2,8	5	20	mH
Holding torque at nominal current (1 phases ON)		200	200	200	200	mNm
Holding torque at boosted current		450	450	450	450	mNm
Residual torque, typ.		20	20	20	20	mNm
Back-EMF amplitude		2,38	4,76	6,3	12,6	V/k step/s
Electrical time constant	2					ms
Rotor inertia	$9{,}4 \cdot 10^{-7}$					kgm²
Step angle (full step)	3,6					°
Angular accuracy	±6					%
Angular acceleration, max.	$478 \cdot 10^{3}$					rad/s²
Speed up to	5 000					min^{-1}
Resonance frequency (at no load)	75					Hz
Thermal resistance	7,3					K/W
Thermal time constant	18					min
Operating temperature range	-20 ... +50					°C
Winding temperature, max.	+130					°C
Shaft bearings	ball bearings (Bearing code: 2R)					
Shaft load max.:						
– with shaft diameter	5					mm
– radial at 5 000 min^{-1} (5 mm from bearing)	54					N
– axial at 5 000 min^{-1}	12					N
– axial at standstill	167					N
Shaft play:						
– radial	0,015					mm
– axial	0					mm
Housing material	Polyphenylensulfid (PPS)					
Mass	250					g
Magnet material	NdFeB					

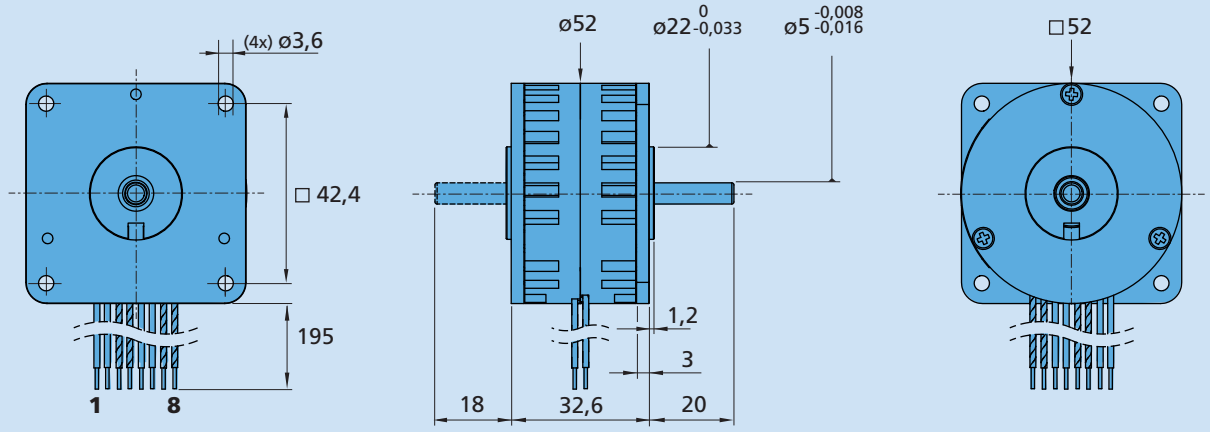
Driver settings
Curve measured with a load inertia of $3{,}96 \cdot 10^{-5}$ kgm² on the DM52100N2R530000 motor using a Technosoft IDS640 controller in sin/cos control mode, 256 micro-steps per full step and a peak phase current of 5,3A.



Possible operation areas

Dimensional drawing

Scale reduced



DM52100N

Options and connection information

Example product designation: **DM52100N2R530000**

Motor executions front shaft	Motor executions double shaft	Front shaft description
00	01	Plain shaft, L=20mm
	02	Plain shaft, L=20mm for encoder

Parallel connection

No.	Colour	Phase
1	brown	A+
2	orange	A+
3	brown-white	A-
4	orange-white	A-
5	red	B+
6	yellow	B+
7	red-white	B-
8	yellow-white	B-

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
	IE3-1024		

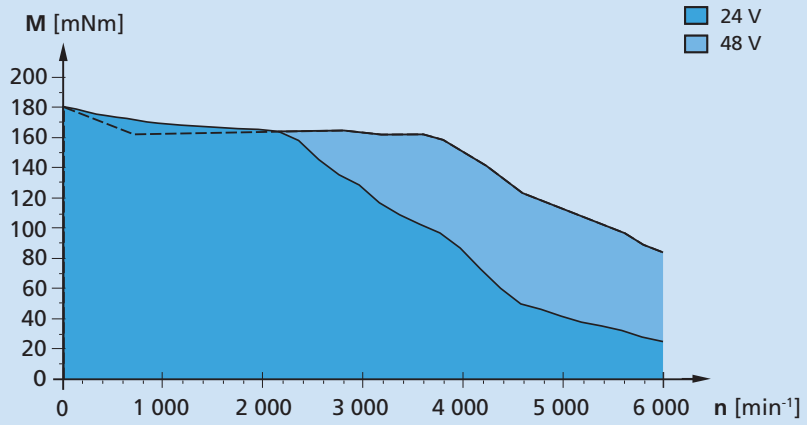
Stepper Motors 180 mNm

Two phase with Disc Magnet,
100 steps per revolution, microstepping motor

Series DM52100R

Values at 20°C	DM52100R	5300		2000		
Connection		Parallel	Serial	Parallel	Serial	
Nominal current per phase (1 phases ON)		5,3	2,6	2	1	A
Boosted current per phase (1 phases ON)		12,2	6,1	4,6	2,3	A
Phase resistance		0,35	1,4	2,2	8,8	Ω
Phase inductance (1 kHz)		0,7	2,8	5	20	mH
Holding torque at nominal current (1 phases ON)		180	180	180	180	mNm
Holding torque at boosted current		400	400	400	400	mNm
Residual torque, typ.		10	10	10	10	mNm
Back-EMF amplitude		2,15	4,3	5,65	11,4	V/k step/s
Electrical time constant	2					ms
Rotor inertia	$9{,}4 \cdot 10^{-7}$					kgm²
Step angle (full step)	3,6					°
Angular accuracy	±6					%
Angular acceleration, max.	$425 \cdot 10^{3}$					rad/s²
Speed up to	5 000					min^{-1}
Resonance frequency (at no load)	70					Hz
Thermal resistance	7,3					K/W
Thermal time constant	18					min
Operating temperature range	-20 ... +50					°C
Winding temperature, max.	+130					°C
Shaft bearings	ball bearings					
	(Bearing code: 2R)					
Shaft load max.:						
– with shaft diameter	5					mm
– radial at 5 000 min^{-1} (5 mm from bearing)	54					N
– axial at 5 000 min^{-1}	12					N
– axial at standstill	167					N
Shaft play:						
– radial	0,015					mm
– axial	0					mm
Housing material	Polyphenylensulfid (PPS)					
Mass	250					g
Magnet material	NdFeB					

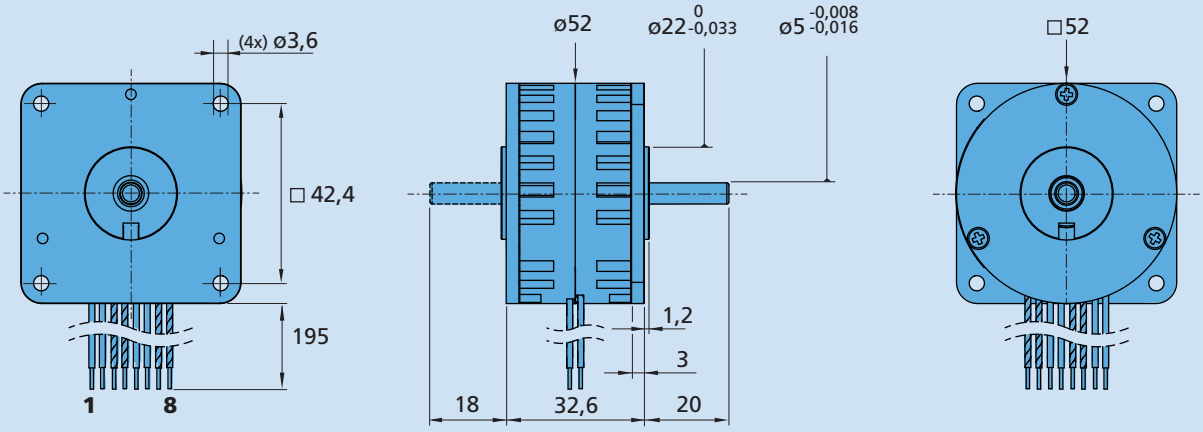
Driver settings
Curve measured with a load inertia of $3{,}96 \cdot 10^{-5}$ kgm² on the DM52100R2R530000 motor using a Technosoft IDS640 controller in sin/cos control mode, 256 micro-steps per full step and a peak phase current of 5,3A.



Possible operation areas

Dimensional drawing

Scale reduced



DM52100R

Options and connection information

Example product designation: **DM52100R2R530000**

Motor executions front shaft	Motor executions double shaft	Front shaft description
00	01	Plain shaft, L=20mm
	02	Plain shaft, L=20mm for encoder

Parallel connection

No.	Colour	Phase
1	brown	A+
2	orange	A+
3	brown-white	A-
4	orange-white	A-
5	red	B+
6	yellow	B+
7	red-white	B-
8	yellow-white	B-

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories
	IE3-1024		

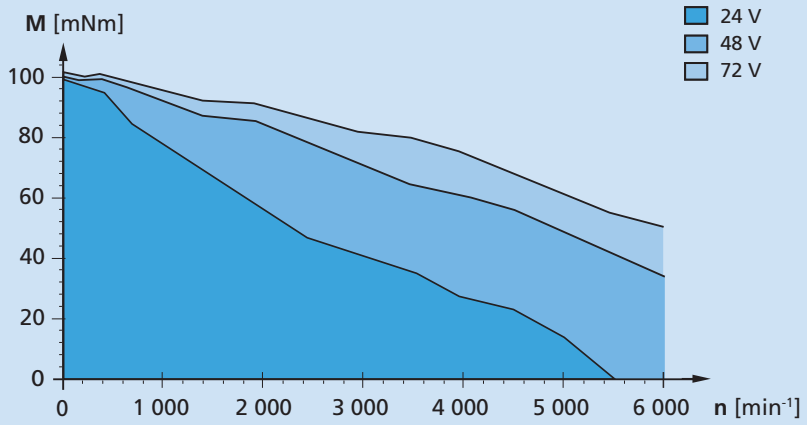
Stepper Motors 116 mNm

Two phase with Disc Magnet,
100 steps per revolution

Series DM52100S

Values at 20°C	DM52100S	3300	1300	
Nominal current per phase (1 phases ON)		3,3	1,3	A
Boosted current per phase (1 phases ON)		5	1,9	A
Phase resistance		0,7	4,4	Ω
Phase inductance (1 kHz)		1,3	8	mH
Holding torque at nominal current (1 phases ON)		116	116	mNm
Holding torque at boosted current		174	174	mNm
Residual torque, typ.		7	7	mNm
Back-EMF amplitude		2,2	5,82	V/k step/s
Electrical time constant	1,8			ms
Rotor inertia	$8 \cdot 10^{-7}$			kgm²
Step angle (full step)	3,6			°
Angular accuracy	±6			%
Angular acceleration, max.	$217 \cdot 10^{3}$			rad/s²
Speed up to	5 000			min^{-1}
Resonance frequency (at no load)	60			Hz
Thermal resistance	10			K/W
Thermal time constant	14			min
Operating temperature range	-20 ... +50			°C
Winding temperature, max.	+130			°C
Shaft bearings	ball bearings (Bearing code: 2R)			
Shaft load max.:				
– with shaft diameter	5			mm
– radial at 5 000 min^{-1} (5 mm from bearing)	54			N
– axial at 5 000 min^{-1}	12			N
– axial at standstill	167			N
Shaft play:				
– radial	0,015			mm
– axial	0			mm
Housing material	Polyphenylensulfid (PPS)			
Mass	185			g
Magnet material	NdFeB			

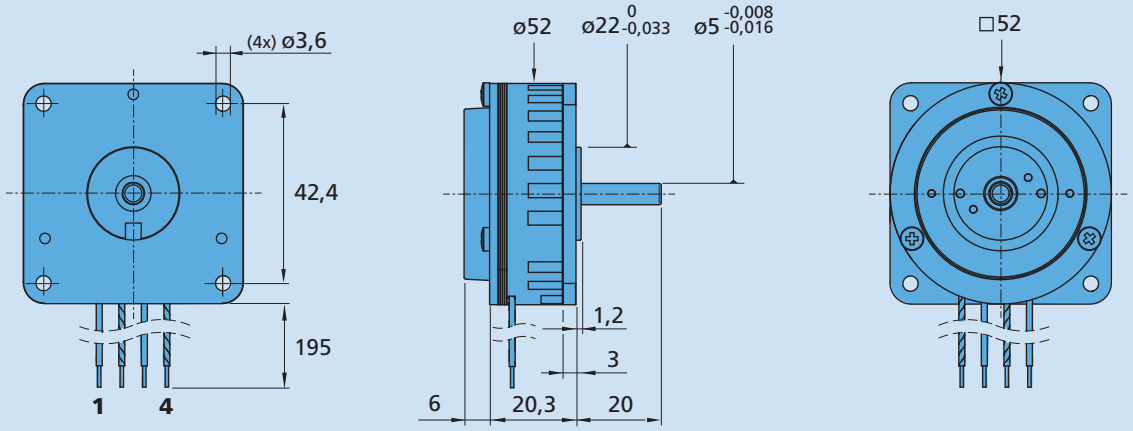
Driver settings
Curve measured with a load inertia of $1{,}49 \cdot 10^{-5}$ kgm² on the DM52100S2R330000 motor using a Technosoft IDS640 controller in sin/cos control mode, 256 micro-steps per full step and a peak phase current of 3,3A.



Possible operation areas

Dimensional drawing

Scale reduced



DM52100S

Options and connection information

Example product designation: **DM52100S2R330000**

Motor executions front shaft	Motor executions double shaft	Front shaft description
00		Plain shaft, L=20mm

Connection

No.	Colour	Phase
1	orange	A+
2	orange-white	A-
3	yellow	B+
4	yellow-white	B-

Product combination

Precision Gearheads / Lead Screws	Encoders	Drive Electronics	Cables / Accessories

NEW

FAULHABER

Planetary Gearheads

High Torque

1,8 Nm

15 000 min^{-1}

Series 22GPT

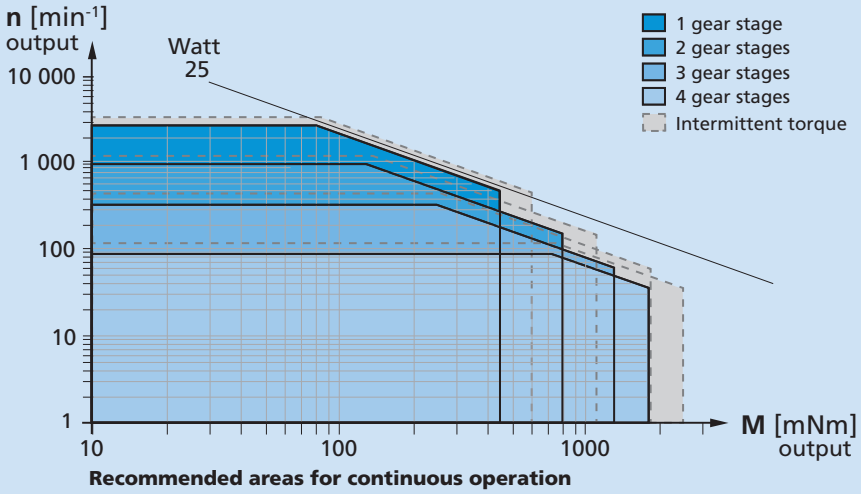
Values at 22°C							
Number of gear stages		1	2	2	3	4	4
Reduction ratio (rounded)[1]		3:1 3,6:1 4,5:1 6,6:1	9:1	11:1 14:1 16:1 20:1 24:1 30:1 44:1	41:1 49:1 59:1 72:1 89:1 108:1 131:1 158:1 196:1	178:1 215:1 267:1 323:1 401:1 474:1 588:1 862:1	711:1 1042:1 1294:1
Continuous torque, max.	Nm	0,45	0,8	0,8	1,3	1,8	1,4
Intermittent torque, max.	Nm	0,6	1,1	1,1	1,8	2,5	2,0
Peak torque	Nm	1	2,5	2,5	3,5	4,5	4,0
Continuous input speed, max.	min^{-1}	9 000	10 000	12 000	15 000	15 000	15 000
Intermittent input speed, max.	min^{-1}	11 000	12 000	15 000	20 000	20 000	20 000
Continuous output power, max.	W	21	12	12	8	7	7
Intermittent output power, max.	W	30	18	18	12	10	10
Efficiency, max.	%	92	84	82	78	65	65
Input inertia with pinion, max.	gmm^2	75	78	50	34	14	13
Torsional stiffness, typical	Nm/°	6	11	11	11	11	11
Backlash, at no-load, typical	°	0,8	0,8	0,8	0,8	0,8	0,8
Shaft load, max:							
– radial (10 mm from mounting face)	N	65	90	90	120	150	150
– axial	N	60	85	85	110	140	140
Shaf press fit force, max	N	150	150	150	150	150	150
Shaft play:							
– radial (10 mm from mounting face)	mm	≤ 0,05	≤ 0,05	≤ 0,05	≤ 0,05	≤ 0,05	≤ 0,05
– axial	mm	= 0	= 0	= 0	= 0	= 0	= 0
Length withtout motor (L2)	mm	18,1	24,5	24,5	30,8	37,2	37,2
Mass without motor and flange	g	51	66	66	82	97	97
Operating temperature	°C	-30 ... +120					
Direction of rotation, drive to output		=					
Housing material		stainless steel					
Geartrain material		stainless steel					
Bearings on output shaft		ball bearings, preloaded					

[1] The reduction ratios are rounded, the exact values are available on request or at www.faulhaber.com.

Note:

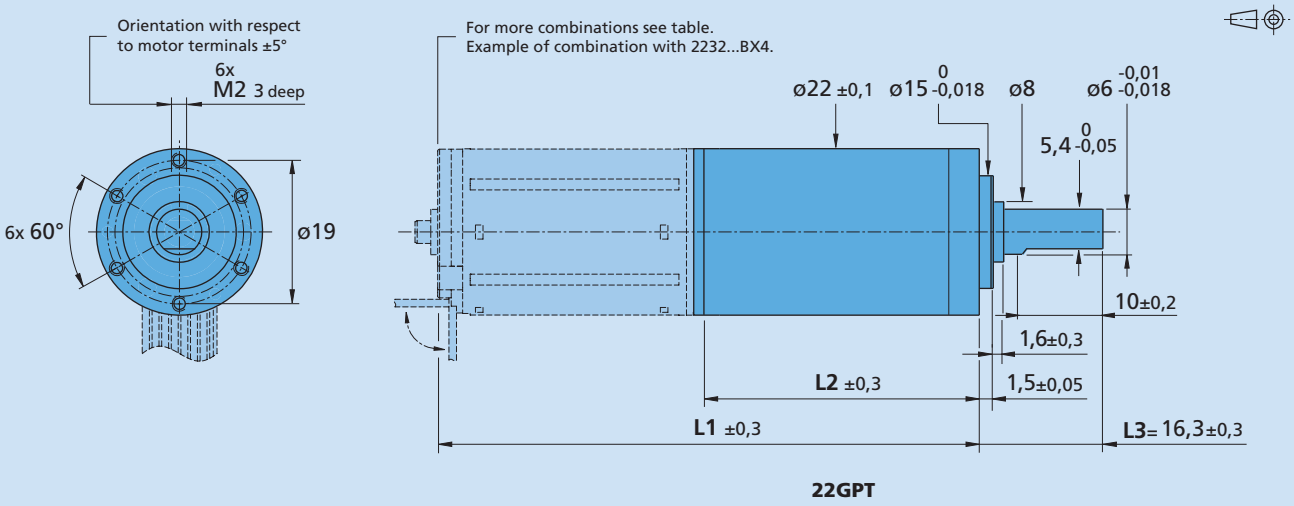
The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended output speed in relation to the available torque at the output shaft.



Recommended areas for continuous operation

Dimensional drawing



22GPT

Option information

Example product designation: **22GPT 89:1 KS6KL1**

Option	Type	Description
KS1	Output shaft	Round plain shaft, **L3**= 16,3 mm
KS2	Output shaft	Longer round plain shaft, **L3**= 27 mm
KS3	Output shaft	Shaft with double flat shape of 12 mm length on opposite sides, **L3**= 21 mm
KS4	Output shaft	Shaft with key DIN 6885-A with dimensions 2x2x12 mm, **L3**= 21 mm
KS5	Output shaft	Shaft with 12 mm single flat shape, **L3**= 21 mm
KS6	Output shaft	Shaft with 12 mm single flat shape and 2 mm cross bore at 6 mm of shaft end, **L3**= 21 mm
KS7	Output shaft	Shaft with 10 mm single flat shape and M2.5 axial threaded hole, **L3**= 16,3 mm
KS8	Output shaft	Shaft with fork shape of 2 mm width opening, **L3**= 16,3 mm
KL1	Ambient conditions	Low temperature range of -55°C ... +100°C
KL2	Ambient conditions	Vacuum down to 10^{-5} Pa @ 22°C
KL3	Ambient conditions	Temperature range of -55°C ... +150°C and vacuum down to 10^{-9} Pa @ 60°C
KC1	Cable orientation	Motor cable/wires or terminals oriented at 15° CCW vs gearhead front threads
KC2	Cable orientation	Motor cable/wires or terminals oriented at 30° CCW vs gearhead front threads
KC3	Cable orientation	Motor cable/wires or terminals oriented at 45° CCW vs gearhead front threads

Note: Specified values may differ from the standard values depending on the option.
Please consult your sales representative for further information.

Product combination

Number of Stages		1	2	3	4
L2 [mm] = length without motor		18,1	24,5	30,8	37,2
L1 [mm] = length with motor	2224U...SR	45,1	51,4	57,8	64,1
	2232U...SR	53,1	59,4	65,8	72,1
	2237X...CXR	56,8	63,2	69,5	75,9
	2342X...CR	61,8	68,2	74,5	80,9
	2642X...CXR/CR	65,2	71,6	77,9	84,3
	2657X...CXR/CR	80,2	86,6	92,9	99,3
	2668X...CR	91,2	97,6	103,9	110,3
	2232X...BX4	53,6	60,0	66,3	72,7
	2250X...BX4	71,6	78,0	84,3	90,7
	2264X...BP4	87,2	93,6	99,9	106,3
	2214X...BXT H	34,6	41,0	47,3	53,7
	2214X ...BXT R	33,8	40,2	46,5	52,9
	2036U...B	56,9	63,2	69,6	75,9
	2057X...B	76,8	83,2	89,5	95,9
	2444X...B	63,8	70,2	76,5	82,9
	AM2224-10	48,6	54,9	61,3	67,6

NEW

FAULHABER

Planetary Gearheads

High Torque

8 Nm

11 000 min^{-1}

Series 32GPT

Values at 22°C

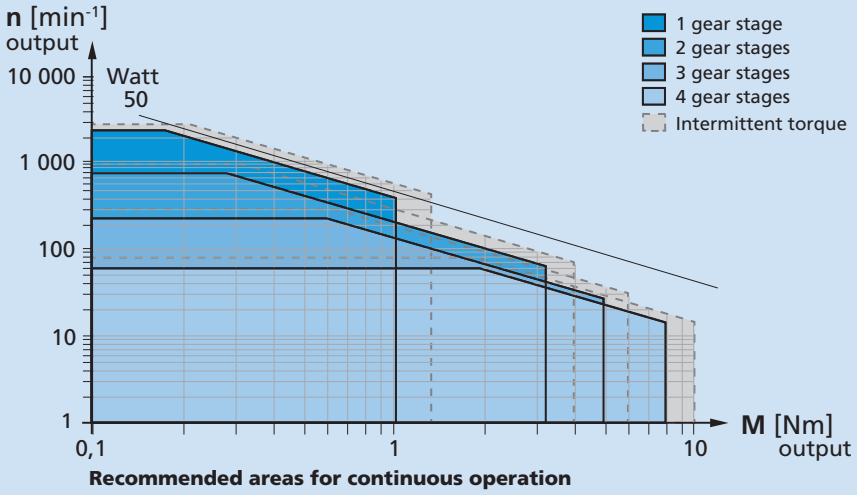
Number of gear stages		1	1	2	2	3	4	4
Reduction ratio (rounded)[1]		3:1	3,6:1 4,5:1 6,6:1	9:1 11:1	14:1 16:1 20:1 24:1 30:1 44:1	41:1 49:1 59:1 72:1 89:1 108:1 131:1 158:1 196:1	178:1 215:1 267:1 323:1 401:1 474:1 588:1 862:1	711:1 1042:1 1294:1
Continuous torque, max.	Nm	1,0	1,0	3,0	3,0	5,0	8,0	6,0
Intermittent torque, max.	Nm	1,3	1,3	4,0	4,0	7,0	10	7,2
Peak torque	Nm	2	2	6,5	6,5	10	13	10
Continuous input speed, max.	min^{-1}	6 500	8 000	6 500	10 000	11000	11 000	11 000
Intermittent input speed, max.	min^{-1}	7 500	9 500	7 500	12 500	14 000	14 000	14 000
Continuous output power, max.	W	40	40	21	21	14	12	12
Intermittent output power, max.	W	55	55	30	30	20	15	15
Efficiency, max.	%	93	93	89	89	80	65	65
Input inertia with pinion, max.	gmm^2	410	274	434	195	196	83	75
Torsional stiffness, typical	Nm/°	12	12	16	16	16	16	16
Backlash, at no-load, typical	°	0,6	0,6	0,6	0,6	0,6	0,6	0,6
Shaft load, max:								
– radial (10 mm from mounting face)	N	140	140	180	180	220	300	300
– axial	N	120	120	150	150	180	250	250
Shaf press fit force, max	N	250	250	250	250	250	250	250
Shaft play:								
– radial (10 mm from mounting face)	mm	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07
– axial	mm	= 0	= 0	= 0	= 0	= 0	= 0	= 0
Length withtout motor (L2)	mm	23,4	23,4	31,8	31,8	40,2	48,6	48,6
Mass without motor and flange	g	180	180	240	240	310	360	360
Operating temperature	°C	-30 ... + 120						
Direction of rotation, drive to output		=						
Housing material		stainless steel						
Geartrain material		stainless steel						
Bearings on output shaft		ball bearings, preloaded						

[1] The reduction ratios are rounded, the exact values are available on request or at www.faulhaber.com.

Note:

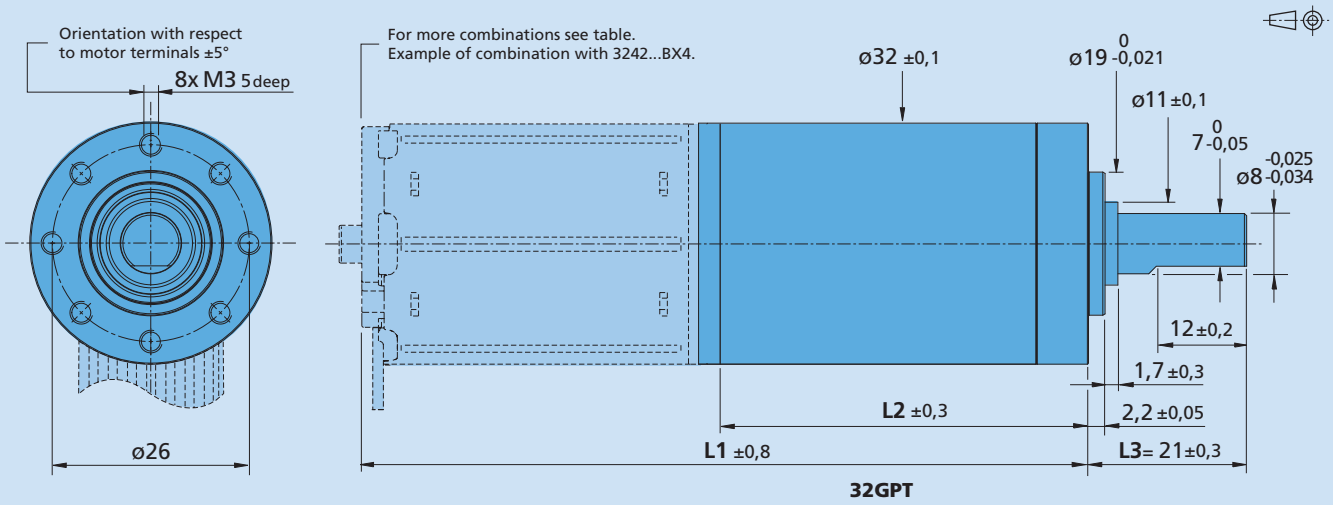
The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended output speed in relation to the available torque at the output shaft.



Recommended areas for continuous operation

Dimensional drawing



Option information

Example product designation: **32GPT 24:1 KS3KL2**

Option	Type	Description
KS1	Output shaft	Round plain shaft, **L3**= 21 mm
KS2	Output shaft	Longer round plain shaft, **L3**= 31 mm
KS3	Output shaft	Shaft with double flat shape of 12 mm length on opposite sides, **L3**= 21 mm
KS4	Output shaft	Shaft Shaft with key DIN 6885-A with dimensions 2x2x12 mm, **L3**= 21 mm
KS6	Output shaft	Shaft with 12 mm single flat shape and 2 mm cross bore at 6 mm of shaft end, **L3**= 21 mm
KS7	Output shaft	Shaft with 12 mm single flat shape and M4 axial threaded hole, **L3**= 21 mm
KS8	Output shaft	Shaft with fork shape of 3 mm width opening, **L3**= 21 mm
KL1	Ambient conditions	Low temperature range of -55°C ... +100°C
KL2	Ambient conditions	Vacuum down to 10^{-5} Pa @ 22°C
KL3	Ambient conditions	Temperature range of -55°C ... +150°C and vacuum down to 10^{-9} Pa @ 60°C
KC1	Cable orientation	Motor cable/wires or terminals oriented at 15° CCW vs gearhead front threads
KC2	Cable orientation	Motor cable/wires or terminals oriented at 30° CCW vs gearhead front threads
KC3	Cable orientation	Motor cable/wires or terminals oriented at 45° CCW vs gearhead front threads

Note: Specified values may differ from the standard values depending on the option.
Please consult your sales representative for further information.

Product combination

Number of Stages		1	2	3	4
L2 [mm] = length without motor		23,4	31,8	40,2	48,6
L1 [mm] = length with motor	2642X...CXR/CR	68,3	76,7	85,1	93,5
	2657X...CXR/CR	83,3	91,7	100,1	108,5
	2668X...CR	94,3	102,7	111,1	119,5
	3242X...CR	68,3	76,7	85,1	93,5
	3257X...CR	83,3	91,7	100,1	108,5
	3272X...CR	98,3	106,7	115,1	123,5
	2250X...BX4	78,1	86,5	94,9	103,3
	3242X...BX4	70,5	78,9	87,3	95,7
	3268X...BX4	96,5	104,9	113,3	121,7
	2264X...BP4	90,3	98,7	107,1	115,5
	3274X...BP4	104,4	112,8	121,2	129,6
	3056X...B	82,3	90,7	99,1	107,5
	3564X...B	90,3	98,7	107,1	115,5
	3216X...BXT H	43,1	51,5	59,9	68,3
	3216X...BXT R	42,3	50,7	59,1	67,5

NEW

FAULHABER

Planetary Gearheads

High Torque

18 Nm

10 000 min^{-1}

Series 42GPT

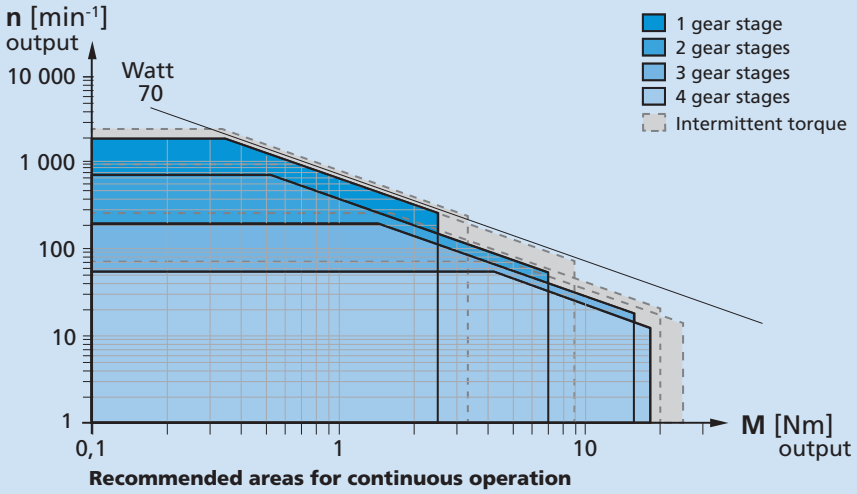
Values at 22°C									
Number of gear stages		1	1	2	2	2	3	4	4
Reduction ratio (rounded)[1]		3:1	3,6:1 4,5:1 6,6:1	9:1	11:1	14:1 16:1 20:1 24:1 30:1 44:1	41:1 49:1 59:1 72:1 89:1 108:1 131:1 158:1 196:1	178:1 215:1 267:1 323:1 401:1 474:1 588:1 862:1	711:1 1042:1 1294:1
Continuous torque, max.	Nm	2,5	2,5	7	7	7	15,5	18	15
Intermittent torque, max.	Nm	3,3	3,3	9	9	9	20	25	20
Peak torque	Nm	4	4	11,5	11,5	11,5	25	34	30
Continuous input speed, max.	min^{-1}	5 000	7 000	5 000	7 000	10 000	10000	10 000	10 000
Intermittent input speed, max.	min^{-1}	7 000	9 000	8 000	8 000	13 000	13 000	13 000	13 000
Continuous output power, max.	W	60	60	40	40	40	30	23	23
Intermittent output power, max.	W	90	90	65	65	65	45	35	35
Efficiency, max.	%	93	93	86	86	86	80	74	74
Input inertia with pinion, max.	gmm^2	2000	1 330	2 000	2 000	920	920	400	355
Torsional stiffness, typical	Nm/°	14	14	22	22	22	22	22	22
Backlash, at no-load, typical	°	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Shaft load, max:									
– radial (15 mm from mounting face)	N	200	200	280	280	280	310	390	390
– axial	N	170	170	200	200	200	230	250	250
Shaf press fit force, max	N	250	250	250	250	250	250	300	300
Shaft play:									
– radial (15 mm from mounting face)	mm	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07	≤ 0,07
– axial	mm	= 0	= 0	= 0	= 0	= 0	= 0	= 0	= 0
Length withtout motor (L2)	mm	30,8	30,8	43,2	43,2	43,2	55,7	68,1	68,1
Mass without motor and flange	g	310	420	420	420	420	530	640	640
Operating temperature	°C	-30 ... + 120							
Direction of rotation, drive to output		=							
Housing material		stainless steel							
Geartrain material		stainless steel							
Bearings on output shaft		ball bearings, preloaded							

[1] The reduction ratios are rounded, the exact values are available on request or at www.faulhaber.com.

Note:

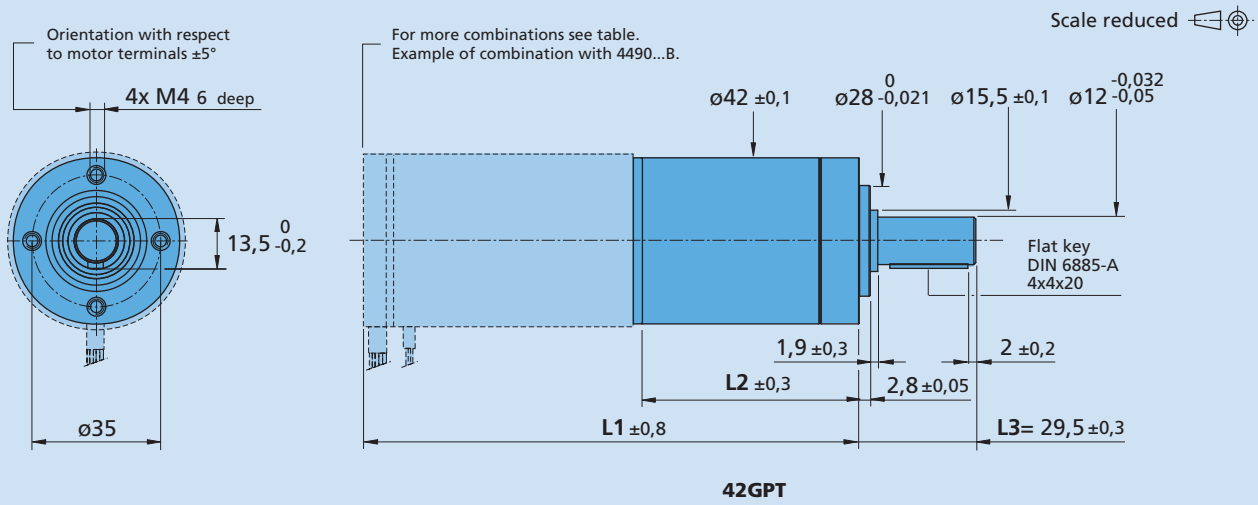
The display shows the range of possible operation points of the drives at a given ambient temperature of 22°C.

The diagram indicates the recommended output speed in relation to the available torque at the output shaft.



Recommended areas for continuous operation

Dimensional drawing



42GPT

Option information

Example product designation: **42GPT 158:1 KS2KL1**

Option	Type	Description
KS2	Output shaft	Longer round plain shaft, **L3**= 40 mm
KS7	Output shaft	Shaft with 20 mm single flat shape and M5 axial threaded hole, **L3**= 29,5 mm
KL1	Ambient conditions	Low temperature range of -55°C ... +100°C
KL2	Ambient conditions	Vacuum down to 10^{-5} Pa @ 22°C
KL3	Ambient conditions	Temperature range of -55°C ... +150°C and vacuum down to 10^{-9} Pa @ 60°C
KC1	Cable orientation	Motor cable/wires or terminals oriented at 15° CCW vs gearhead front threads
KC2	Cable orientation	Motor cable/wires or terminals oriented at 30° CCW vs gearhead front threads
KC3	Cable orientation	Motor cable/wires or terminals oriented at 45° CCW vs gearhead front threads
KC4	Cable orientation	Motor cable/wires or terminals oriented at 60° CCW vs gearhead front threads
KC5	Cable orientation	Motor cable/wires or terminals oriented at 75° CCW vs gearhead front threads

Note: Specified values may differ from the standard values depending on the option.
Please consult your sales representative for further information.

Product combination

Number of Stages		1	2	3	4
L2 [mm] = length without motor		30,8	43,2	55,7	68,1
L1 [mm] = length with motor	3242X...CR	76,0	88,4	100,9	113,3
	3257X...CR	91,0	103,4	115,9	128,3
	3272X...CR	106,0	118,4	130,9	143,3
	3863X...CR	98,0	110,4	122,9	135,3
	3890X...CR	120,0	136,4	148,9	161,3
	3242X...BX4	78,2	90,6	103,1	115,5
	3268X...BX4	104,2	116,6	129,1	141,5
	3274X...BP4	108,0	120,4	132,9	145,3
	4421X...BXT H	56,0	68,4	80,9	93,3
	4421X...BXT R	55,2	67,6	80,1	92,5
	3564X...B	98,0	110,4	122,9	135,3
	4490X...B	124,0	136,4	148,9	161,3

NEW

FAULHABER

Encoders

magnetic Encoder, digital outputs,
3 channels, 16 - 4096 lines per revolution

For combination with
Brushless DC-Motors

Series IEF3-4096

	IEF3	-16	-32	-64	-128	-256	-512	-1024	-2048	-4096	
Lines per revolution	*N*	16	32	64	128	256	512	1 024	2 048	4 096	
Frequency range, up to[1]	*f*	5	10	20	40	80	160	320	640	875	kHz
Signal output, square wave		2+1 Index									Channels
Supply voltage	U_{DD}	4,5 ... 5,5									V
Current consumption, typical[2]	I_{DD}	typ. 25, max. 40									mA
Output current, max.[3]	I_{OUT}	2,5									mA
Index Pulse width[4]	P_0	90 ± 45						90 ± 65	90 ± 75		°e
Phase shift, channel A to B	Φ	90 ± 45						90 ± 65	90 ± 75		°e
Signal rise/fall time, max. (C_{LOAD} = 50 pF)	*tr*/*tf*	0,05 / 0,05									µs
Inertia of sensor magnet	*J*	1,57									gcm²
Operating temperature range		-40 ... +100									°C
Accuracy, typ.		0,5									°m
Repeatability, typ.		0,08									°m
Hysteresis		0,02									°m
Edge spacing, min.		225									ns
Mass, typ.		15,4									g

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs
[3] U_{DD} = 5 V: low logic level < 0,4 V, high logic level > 4,5 V: CMOS- and TTL compatible
[4] At 5 000 min⁻¹

For combination with Motor

Dimensional drawing A	**<L1 [mm]**
2214 ... BXT H	21,3
Dimensional drawing B	**<L1 [mm]**
3216 ... BXT H	23,3
Dimensional drawing C	**<L1 [mm]**
4221 ... BXT H	28,3

Characteristics

These incremental encoders with 3 output channels, in combination with the FAULHABER Brushless DC-Motors, are used for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

The encoder is integrated in the Brushless DC-Motors BXT H-Series and extends the overall length by only 6,2 mm.

A segmented magnetic disc provides a magnetic field which is detected and further processed by an angle sensor.

At the encoder outputs, two 90° phase-shifted square wave signals are available with up to 4096 impulses and an index impulse per motor revolution.
The encoder is available with different standard resolutions.

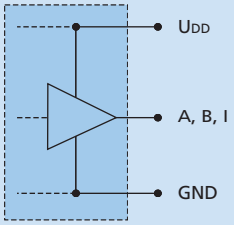
The supply voltage for the encoder and the output signals are interfaced through a ribbon cable, optional with connector.

Details for the Brushless DC-Motors and suitable reduction gearheads are on separate catalogue pages.

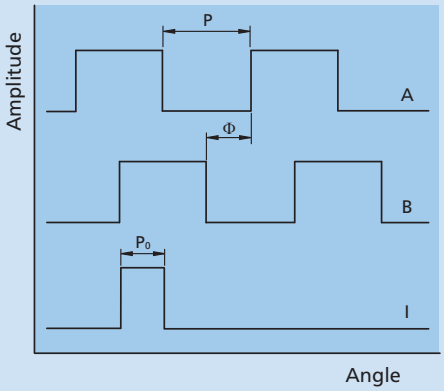
To view our large range of accessory parts, please refer to the "Accessories" chapter.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end



Connector information / Variants

No.	Function
1	N.C.
2	Channel I
3	GND
4	UDD
5	Channel B
6	Channel A

Connection Encoder

Cable
PVC-ribbon cable
6-AWG 28, 1,27 mm

Option

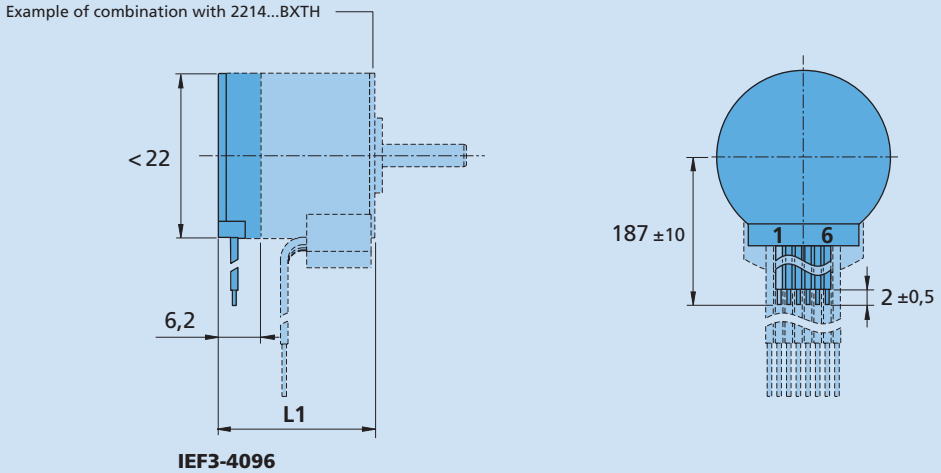
- Connector variants AWG 28 / PVC ribbon cable with connector MOLEX Picoblade 51021-0600, recommended mating connector 53047-0610.
  Option no.: 3807 for combination with Brushless DC-Flat Motors series BXT H or 3592 inclusive motor connector 3830.

Caution:
Incorrect lead connection will damage the motor electronics!

Full product description

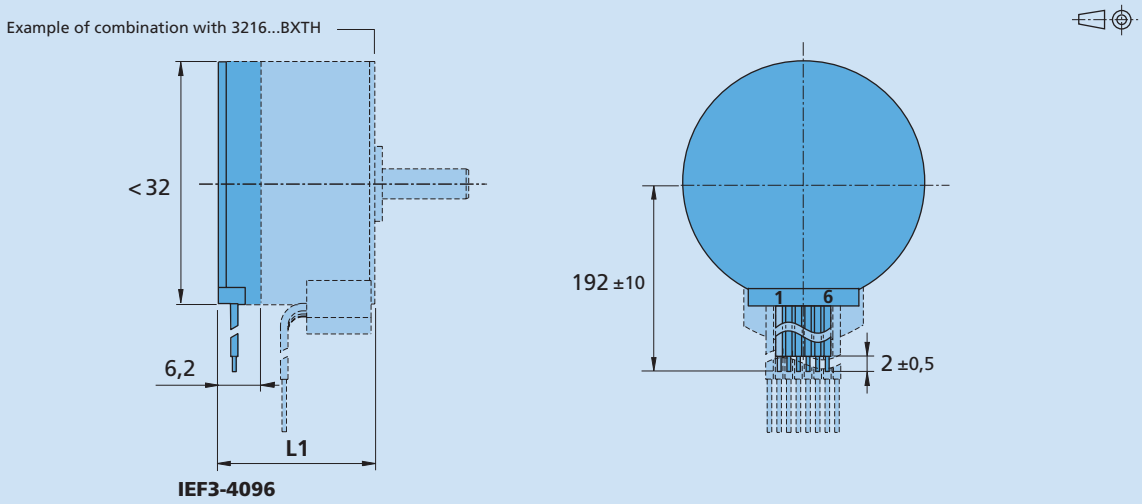
- Example:
  2214S012BXTH IEF3-4096

Dimensional drawing A



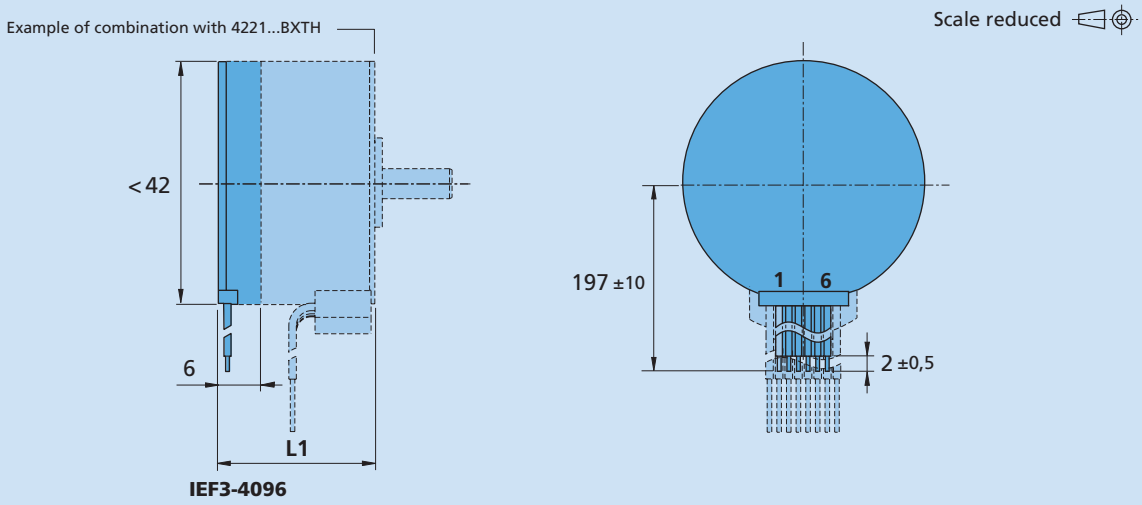
IEF3-4096

Dimensional drawing B



IEF3-4096

Dimensional drawing C



IEF3-4096

NEW

FAULHABER

Encoders

magnetic Encoder, digital outputs, 3 channels,
16 - 4096 lines per revolution, Line Driver

For combination with
Brushless DC-Motors

Series IEF3-4096 L

	IEF3	-16 L	-32 L	-64 L	-128 L	-256 L	-512 L	-1024 L	-2048 L	-4096 L	
Lines per revolution	*N*	16	32	64	128	256	512	1 024	2 048	4 096	
Frequency range, up to[1]	*f*	5	10	20	40	80	160	320	640	875	kHz
Signal output, square wave		2+1 Index and complementary outputs									Channels
Supply voltage	U_{DD}	4,5 ... 5,5									V
Current consumption, typical[2]	I_{DD}	typ. 25, max. 40									mA
Index Pulse width[3]	P_0	90 ± 45						90 ± 65	90 ± 75		°e
Phase shift, channel A to B	Φ	90 ± 45						90 ± 65	90 ± 75		°e
Inertia of sensor magnet	*J*	1,57									gcm²
Operating temperature range		-40 ... +100									°C
Accuracy, typ.		0,5									°m
Repeatability, typ.		0,08									°m
Hysteresis		0,02									°m
Edge spacing, min.		225									ns
Mass, typ.		16,8									g

[1] Velocity (min⁻¹) = *f* (Hz) x 60/*N*
[2] U_{DD} = 5 V: with unloaded outputs
[3] At 5 000 min⁻¹

Note: The output signals are TIA-422 compatible.
Examples of Line Driver Receivers: ST26C32AB (STM), AM26C32 (TI).

For combination with Motor

Dimensional drawing A	**<L1 [mm]**
2214 ... BXT H	21,3
Dimensional drawing B	**<L1 [mm]**
3216 ... BXT H	23,3
Dimensional drawing C	**<L1 [mm]**
4221 ... BXT H	28,3

Characteristics

These incremental encoders with 3 output channels, in combination with the FAULHABER Brushless DC-Motors, are used for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

The encoder is integrated in the Brushless DC-Motors BXT H-Series and extends the overall length by only 6,2 mm.

A segmented magnetic disc provides a magnetic field which is detected and further processed by an angle sensor.

At the encoder outputs, two 90° phase-shifted square wave signals are available with up to 4096 impulses and an index impulse per motor revolution.

The Line Driver version has differential signal outputs (TIA-422). Differential signals reduce ambient interference and are suitable for applications with high ambient interference.

The Line Driver amplifies the encoder signal which means that long cables can be used without signal degradation.
Differential signal outputs must be decoded by the appropriate receiver module. In addition, a suitable line termination resistance (100 ohm) is possibly useful.

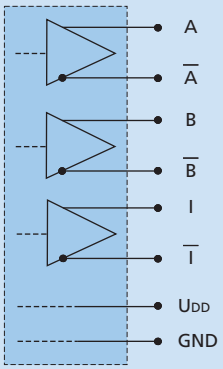
The supply voltage for the encoder and the output signals are interfaced through a ribbon cable, optional with connector.

Details for the Brushless DC-Motors and suitable reduction gearheads are on separate catalogue pages.

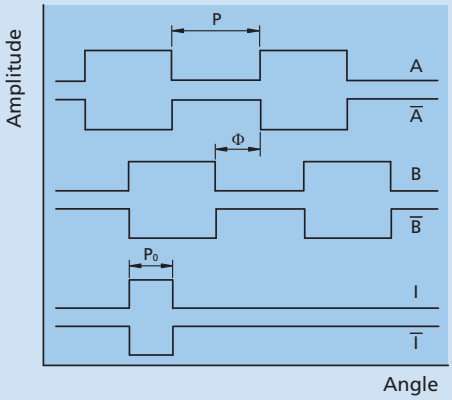
To view our large range of accessory parts, please refer to the "Accessories" chapter.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end

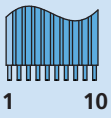


Connector information / Variants

No.	Function
1	N.C.
2	UDD
3	GND
4	N.C.
5	Channel $\overline{A}$
6	Channel A
7	Channel $\overline{B}$
8	Channel B
9	Channel $\overline{I}$
10	Channel I

Caution:
Incorrect lead connection will damage the motor electronics!

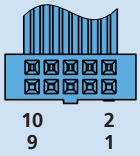
Connection Encoder



Cable
PVC-ribbon cable
10-AWG 28, 1,27 mm

Option

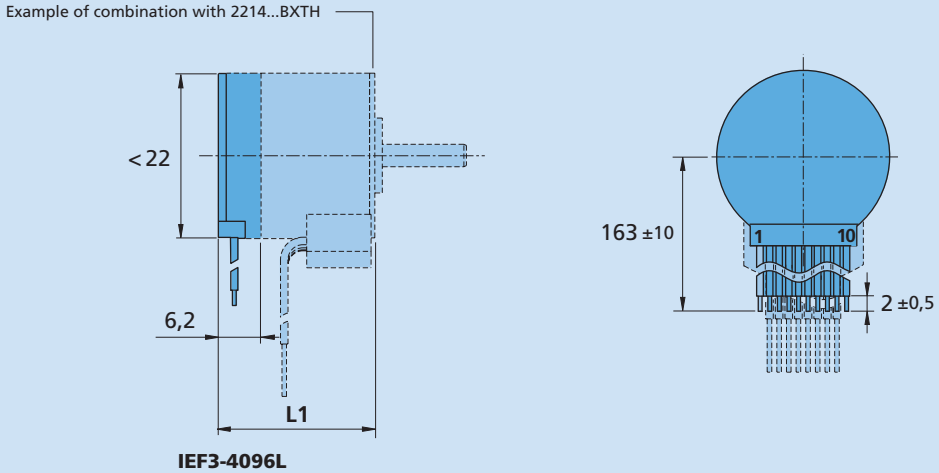
- Connector variants AWG 28 / PVC ribbon cable with connector based on EN 60603-13/DIN 41651.
  Option no.: 3589 for combination with Brushless DC-Flat Motors series BXT H inclusive motor connector 3830.



Full product description

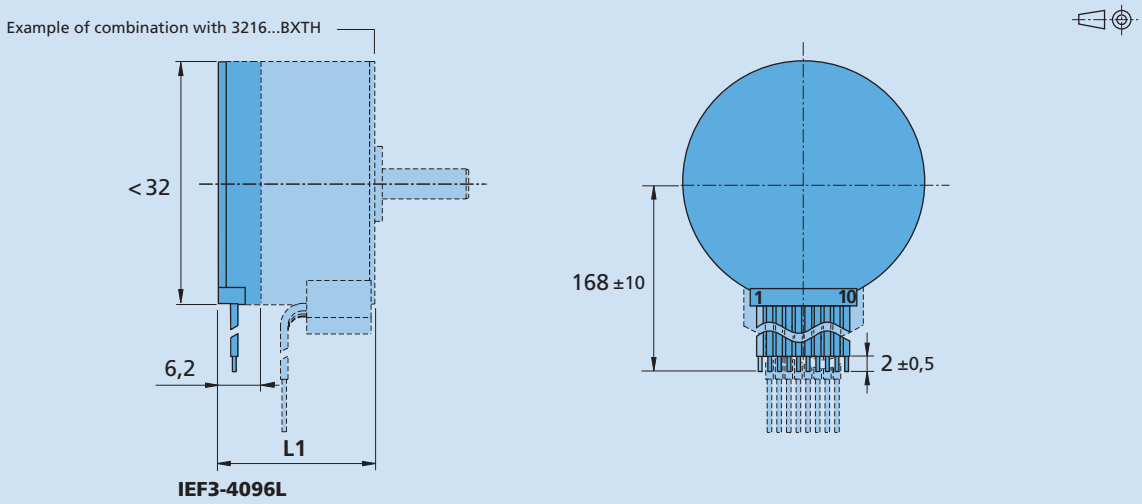
- Example:
  2214S012BXTH IEF3-4096L

Dimensional drawing A



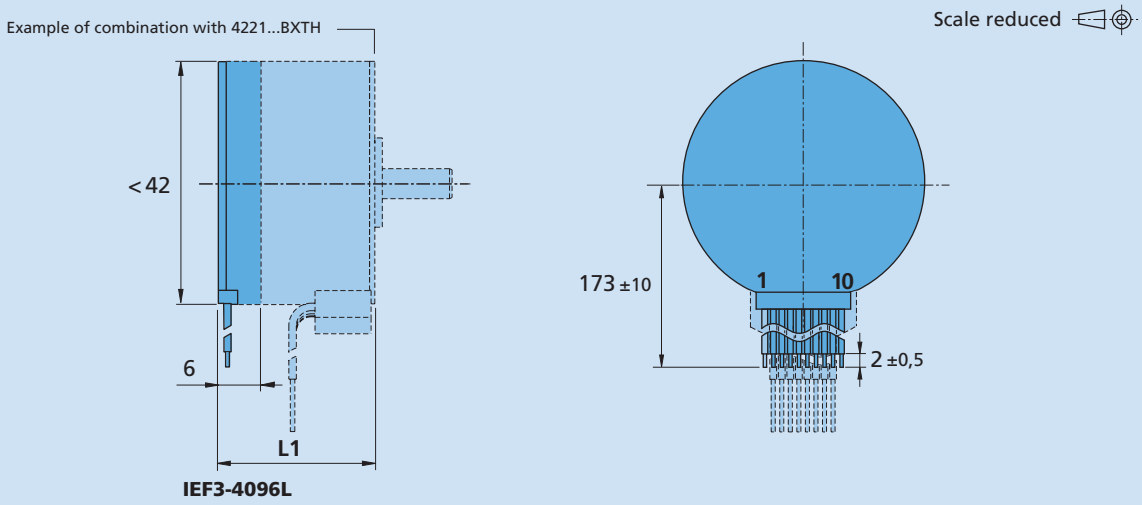
IEF3-4096L

Dimensional drawing B



IEF3-4096L

Dimensional drawing C



IEF3-4096L

NEW

FAULHABER

Encoders

magnetic Encoder, digital outputs, 3 channels,
256 - 4096 lines per revolution, Line Driver

For combination with
DC-Micromotors

Series IEH3-4096L

		IEH3-256L	IEH3-512L	IEH3-1024L	IEH3-2048L	IEH3-4096L	
Lines per revolution	N	256	512	1 024	2 048	4 096	
Frequency range, up to[1]	f	80	160	320	640	875	kHz
Signal output, square wave		2+1 Index and complementary outputs					Channels
Supply voltage	U_{DD}	4,5 ... 5,5					V
Current consumption, typical[2]	I_{DD}	typ. 25, max. 43					mA
Index Pulse width[3]	P_0	90 ± 45		90 ± 65	90 ± 75		°e
Phase shift, channel A to B[3]	Φ	90 ± 45		90 ± 65	90 ± 75		°e
Inertia of sensor magnet	J	0,11					gcm²
Operating temperature range		-40 ... +100					°C
Accuracy, typ.		0,8					°m
Repeatability, typ.		0,07					°m
Hysteresis		0,35					°m
Edge spacing, min.		225					ns
Mass, typ.		5					g

[1] Velocity (min⁻¹) = f (Hz) x 60/N
[2] U_{DD} = 5 V: with unloaded outputs
[3] At 5 000 min⁻¹

Note: The output signals are TIA-422 compatible.
Examples of Line Driver Receivers: ST26C32AB (STM), AM26C32 (TI).

For combination with Motor

Dimensional drawing A	**<L1 [mm]**
1336 ... CXR - 123	47,5

Dimensional drawing B	**<L1 [mm]**
1516 ... SR	18,2
1524 ... SR	26,2
1717 ... SR	19,4
1724 ... SR	26,4
2224 ... SR	26,6
2232 ... SR	34,6

Dimensional drawing C	**<L1 [mm]**
1727 ... CXR - 123	38,2
1741 ... CXR - 123	52,2

Characteristics

These incremental encoders with 3 output channels, in combination with the FAULHABER Motors, are used for the indication and control of both shaft velocity and direction of rotation as well as for positioning.

The encoder is integrated in the DC-Micromotors SR-Series and extends the overall length by only 1,4 mm with 3 output channels and Line Driver.

A segmented magnetic disc provides a magnetic field which is detected and further processed by an angle sensor.
The output signals of both channels consist of a square wave signal with 90° phase shift and up to 4096 impulses and an index impulse per motor revolution.

The Line Driver amplifies the encoder signal which means that long cables can be used without signal degradation.

Differential signal outputs must be decoded by the appropriate receiver module. In addition, a suitable line termination resistance (100 ohm) is possibly useful.

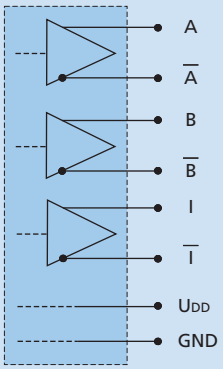
The supply voltage for the encoder and the DC-Micromotor as well as the two channel output signals are interfaced through a ribbon cable with connector.

Details for the DC-Micromotors and suitable reduction gearheads are on separate catalogue pages.

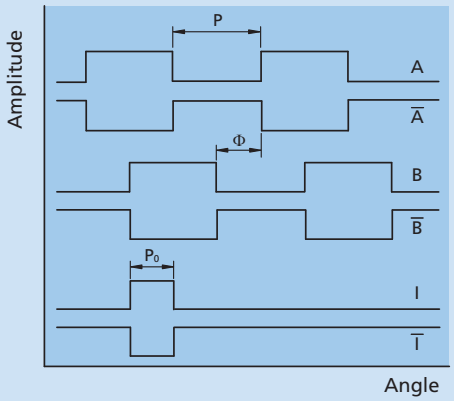
To view our large range of accessory parts, please refer to the "Accessories" chapter.

Circuit diagram / Output signals

Output circuit



Output signals
with clockwise rotation as seen from the shaft end



Connector information / Variants

No.	Function
1	Motor - *
2	UDD
3	GND
4	Motor + *
5	Channel A
6	Channel $\overline{A}$
7	Channel B
8	Channel $\overline{B}$
9	Channel I
10	Channel $\overline{I}$

* **Note:** DC-Micromotors series CXR have separate motor leads.

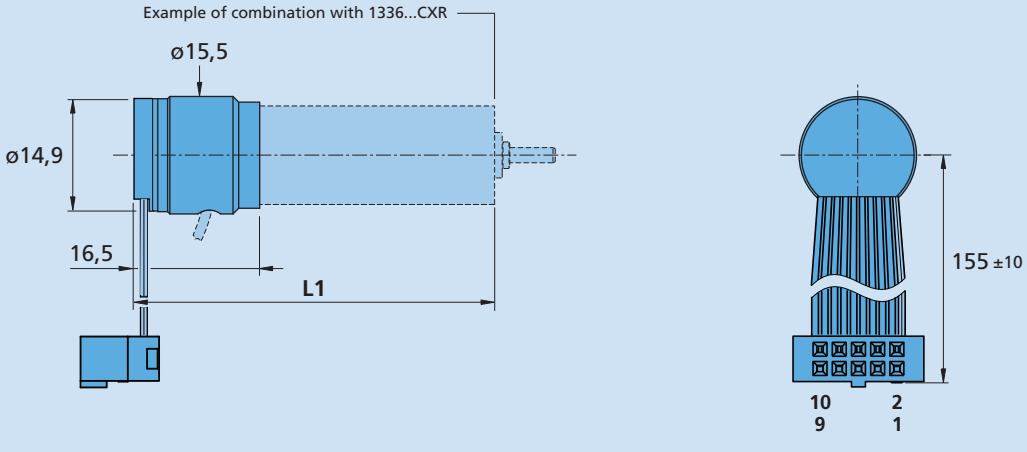
Connection Encoder

Cable
PVC-ribbon cable
10-AWG 28, 0,09 mm²

Connector
EN 60603-13 / DIN-41651

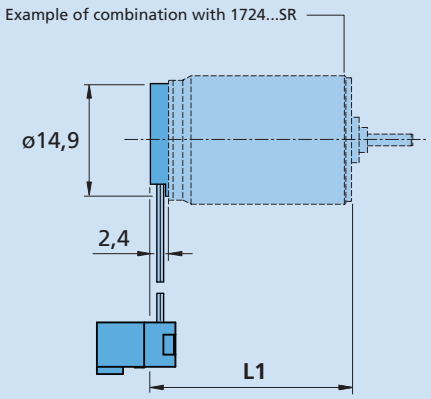
Full product description
Example:
1516T006SR IEH3-4096L

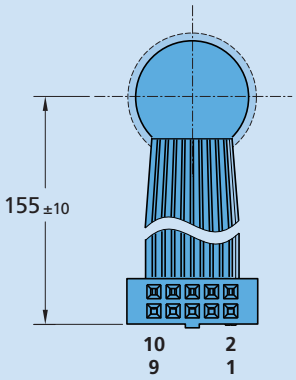
Dimensional drawing A



IEH3-4096L

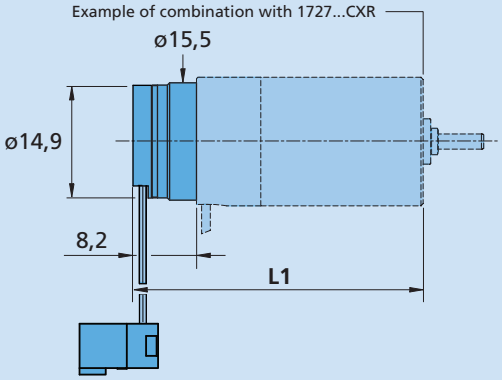
Dimensional drawing B

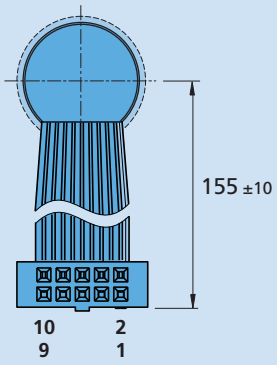




IEH3-4096L

Dimensional drawing C





IEH3-4096L

Notes

NEW

FAULHABER

Encoders

magnetic single-turn absolute Encoder,
SSI Interface with BISS-C Protocol,
4096 steps per revolution, Line Driver

For combination with
Brushless DC-Motors

Series AES-4096 L

		AES-4096 L	
Steps per revolution		4 096	
Single-turn resolution		12 Bit	
Signal output		SSI Interface with BISS-C Protocol	
Supply voltage	U_{DD}	4,5 ... 5,5	V
Current consumption, typical[1]	I_{DD}	typ. 22, max. 32	mA
Clock Frequency, max. (CLK and $\overline{CLK}$)		2	MHz
Input low level (CLK and $\overline{CLK}$)		0 ... 0,8	V
Input high level (CLK and $\overline{CLK}$)		2 ... 5	V
Setup time after power on, max.	t_{setup}	4	ms
Timeout, typ.	$t_{timeout}$	20	µs
Inertia of sensor magnet	J	0,08	gcm²
Operating temperature range		-40 ... +100	°C
Hysteresis		0	°m
Mass, typ.		13,5	g

[1] U_{DD} = 5 V: with unloaded outputs

Note: The output signals are TIA-422 compatible.
Examples of Line Driver Receivers: iC-HF, SN65LBC179, SN75179B

For combination with Motor	
Dimensional drawing A	**<L1 [mm]**
2444 ... B - K3051	55,3
3056 ... B - K3051	67,3
3564 ... B - K3051	75,3
4490 ... B - K3051	100,3
4490 ... BS - K3051	100,3
Dimensional drawing B	**<L1 [mm]**
2232 ... BX4	50,2
2250 ... BX4	68,2
2250 ... BX4 S	68,2
Dimensional drawing C	**<L1 [mm]**
3242 ... BX4	60,0
3268 ... BX4	86,0
Dimensional drawing D	**<L1 [mm]**
2264 ... BP4 - 6356	79,1
3274 ... BP4 - 6356	90,8

Characteristics

The absolute encoder with Line Driver in combination with the FAULHABER brushless DC-Servomotors is ideal for commutation, speed and position control. It can also be used to create a sinusoidal commutation signal.

In the AES-4096 L, absolute position information is provided with a resolution of up to 4096 steps per revolution at the signal outputs and communicated via a SSI Interface with BISS-C Protocol. Absolute means, that each shaft position is assigned to an unique angular value within one revolution. This value is already available directly after power-on.

Additional advantages are a higher efficiency of the motor and a reduced torque ripple.

The AES-4096 L has differential signal outputs (TIA-422). Differential signals reduce ambient interference and are suitable for applications with high ambient interference.
The Line Driver amplifies the encoder signal which means that long cables can be used without signal degradation.

Differential signal outputs must be decoded by the appropriate receiver module. In the encoder a 120 ohm line termination resistor is integrated between the CLK and $\overline{CLK}$ inputs. A corresponding resistor is recommended for the DATA and $\overline{DATA}$ output signals on the controller. Special number 6419 is recommended for operation with FAULHABER Motion Controllers of generation V3.0. With this variant, the resistor for the DATA and $\overline{DATA}$ output signals is already integrated in the controller.

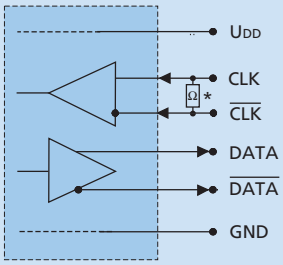
The supply voltage as well as the output signals for the encoder are interfaced through a ribbon cable, optionally with connector.

For the brushless DC servomotors series BX4, the motor and encoder are connected via two ribbon cables.
In the series B and BP4 the motors are connected via single wires and the encoders via ribbon cable.
Details for the brushless DC-servomotors and suitable reduction gearheads are on separate catalogue pages.

To view our large range of accessory parts, please refer to the "Accessories" chapter.

Circuit diagram / Output signals

Output circuit

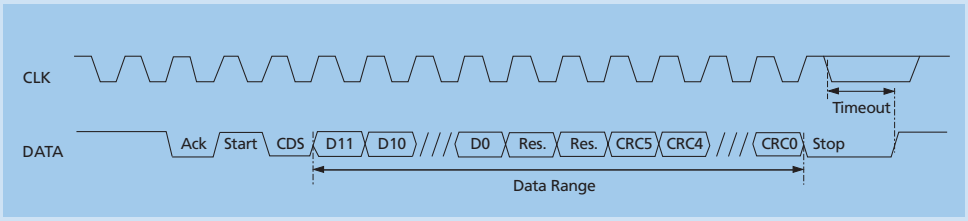


*Terminating resistor 120 Ω

Note: Data and Clock run inverted to the displayed signals Data and Clock.

Interface Protocol BISS-C

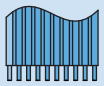
Angle position values are ascending for clockwise rotation.
Clockwise rotation as seen from the shaft end.



Connector information / Variants

No.	Function
1	N.C.
2	UDD
3	GND
4	N.C.
5	Reserved
6	Reserved
7	DATA
8	DATA
9	CLK
10	CLK

Connection Encoder

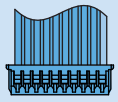


Cable

PVC-ribbon cable
10-AWG 28, 1,27 mm

Caution:
Incorrect lead connection will damage the motor electronics!

Option



- Connector variants AWG 28 / PVC ribbon cable with connector Molex Picoblade, 51021-1000, recommended mating connector Picoblade 53047-1010.

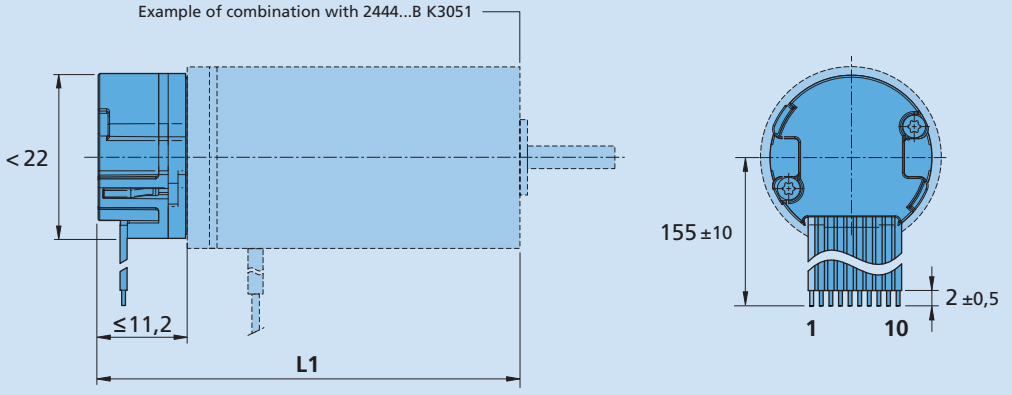
  Option no.: 5418 for combination with Brushless DC-Motor series BP4 and series B(S).

  Option no.: 5419 for combination with Brushless DC-Motors series BX4.
  Note: inclusive motor connector 3830.

Full product description

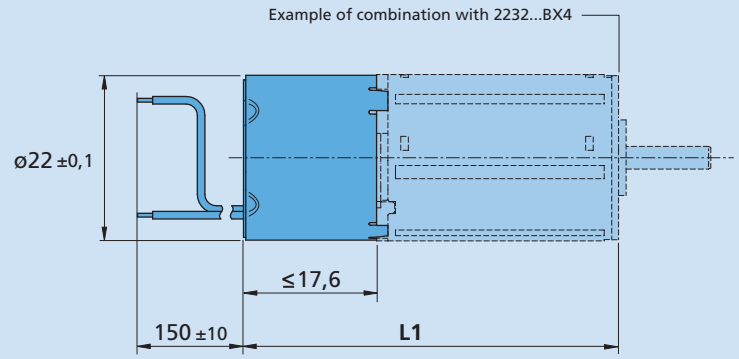
- Example:
  3242G024BX4 AES-4096 L

Dimensional drawing A



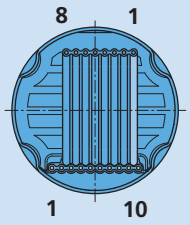
AES-4096 L

Dimensional drawing B



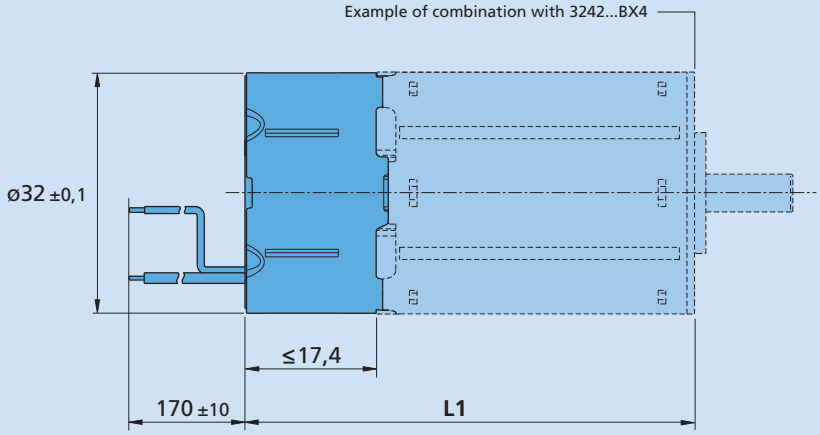
AES-4096 L

Connection Motor



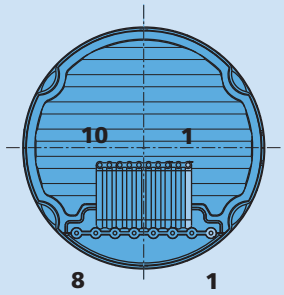
Connection Encoder

Dimensional drawing C



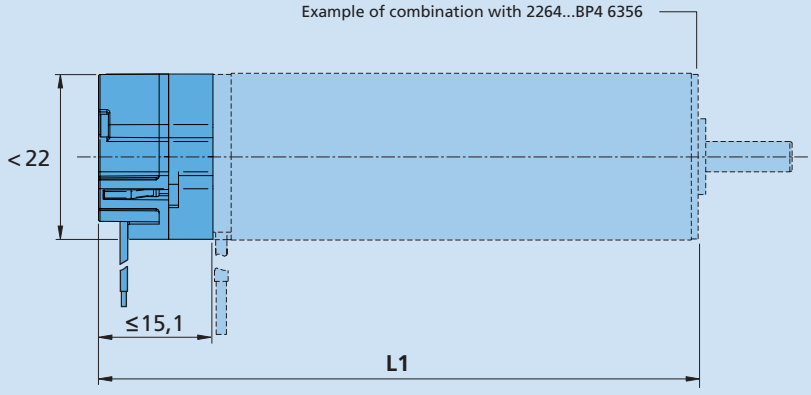
AES-4096 L

Connection Encoder

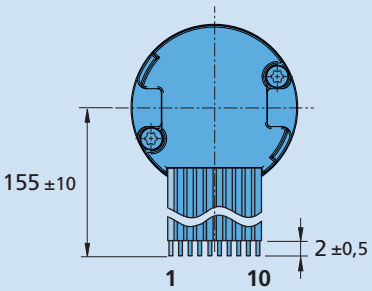


Connection Motor

Dimensional drawing D



AES-4096 L



Notes

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