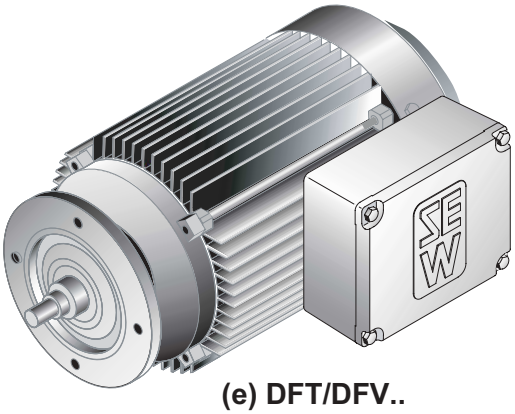
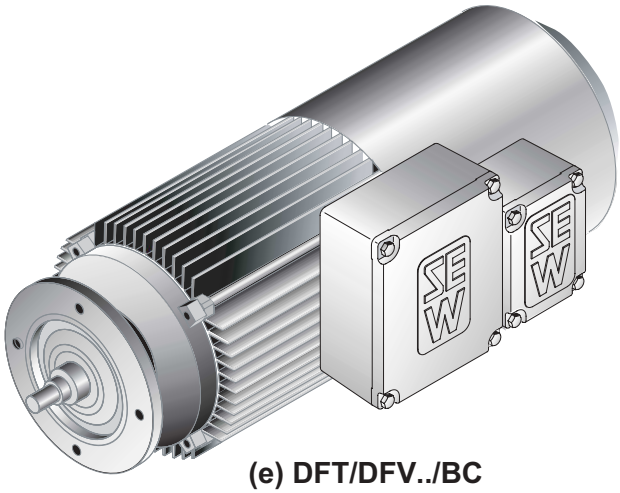
12 Operating Notes and Technical Data of AC Motors

12.1 Examples for different types



(e) DFT/DFV..



(e) DFT/DFV../BC

52375AXX

Figure 25: Explosion-proof AC (brake) motors

12.2 Motors for mains operation

Available motor types

SEW-EURODRIVE supplies motors of the following types for mains operation

Equipment category	Protection type	Zone	Temperature class				Max. surface temperature	
			T3	T4	T5	T6	120 °C	140 °C
II2G	e	1	X	X	-	-	-	-
II3GD	nA	2 and 22	X	-	-	-	-	-
II2D	-	21	-	-	-	-	X	-
II3D	-	22	-	-	-	-	X	X
On request: II2G	d	1 or 2	X	X	X	X	-	-

Not all sizes are always available in the respective categories, temperature classes and with the specific number of poles. For this reason it may be necessary to choose a higher safety level (category, protection type, temperature class).

Motor power values may vary within a size, depending on the type. For example, this means for a 4-pole motor of size 90S4:

- II3GD ExnA ... T3 → rated power 1.1 kW
- II2G EExe ... T3 → rated power 1.0 kW
- II2G EExe ... T4 → rated power 0.75 kW

The specific selection tables already take account of the different motor powers.

12.3 Technical data for protection type nA, category II3GD (zones 2 and 22)

1500 1/min II3GD EEx nA IIT3/T120 °C *(for types with insulation class F: T 140 °C)*

Motor type	P_N [kW]	n_N [1/min]	M_N [Nm]	I_N 400 V [A]	cosφ	EFF 2	$\eta_{75\%}$ $\eta_{100\%}$ [%]	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} [10^{-4} kgm^2] 1)	2)	Z_0 3) [1/h]	M_{Bmax} [Nm]	m [kg] 1)	2)
DR63S4[4]	0.12	1380	0.83	0.39	0.69	-	-	3.3	2.4 2.2	3.6	-	2000	-	6.1	-
DR63M4	0.18	1320	1.30	0.55	0.78	-	-	2.9	1.8 1.7	3.6	-	2000	-	6.1	-
DR63L4	0.25	1300	1.83	0.68	0.81	-	-	2.8	1.8 1.7	4.4	-	2000	-	6.7	-
DT71D4	0.372	1380	2.56	1.15	0.76	-	-	3.0	1.8 1.7	4.6	5.5	1900	5	7.0	9.9
DT80K4	0.55	1360	3.86	1.75	0.72	-	-	3.4	2.1 1.8	6.6	7.5	2200	10	9.9	12.7
DT80N4	0.755	1380	5.19	2.1	0.73	-	-	3.8	2.2 2.0	8.7	9.6	2800	10	11.5	14.3
DT90S4	1.1	1400	7.50	2.8	0.77	EFF 2	77.5 76.5	4.3	2.0 1.9	25	31	1260	20	16	26
DT90L4	1.5	1410	10.2	3.55	0.78	EFF 2	80.2 79.0	5.3	2.6 2.3	34	40	1500	20	18	28
DV100M4	2.2	1410	14.9	4.7	0.83	EFF 2	82.8 82.0	5.9	2.7 2.3	53	59	1700	40	27	37
DV100L4	3	1400	20.5	6.3	0.83	EFF 2	84.5 83.0	5.6	2.7 2.2	65	71	1500	40	30	40
DV112M4	4	1420	26.9	8.7	0.84	EFF 2	85.9 84.2	5.4	2.4 2.1	98	110	750	55	38	50
DV132S4	5.5	1430	36.7	11.0	0.85	EFF 2	87.6 85.7	6.0	2.7 2.4	146	458	600	75	48	63
DV132M4	7.5	1430	50	15.5	0.85	EFF 2	89.5 87.5	6.2	2.1 2.0	280	330	340	100	66	90
DV132ML4	9.2	1440	61	18.1	0.84	EFF 2	89.6 88.0	6.0	2.5 2.0	330	380	240	150	75	100
DV160M4	11	1440	73	22.5	0.83	EFF 2	88.9 88.5	6.0	2.5 2.3	398	448	240	150	84	109
DV160L4	15	1460	98	29.5	0.82	EFF 2	90.3 90.0	5.5	2.4 1.8	925	1060	200	200	148	190
DV180M4	18.5	1465	121	37.0	0.80	EFF 2	90.8 90.0	5.9	2.6 2.0	1120	1255 1350[5]	260	300 300[5]	175	216 220[5]
DV180L4	22	1465	143	42.5	0.82	EFF 2	91.4 90.5	6.0	2.7 2.0	1290	1425 1520[5]	130	300 300[5]	186	228 232[5]
DV200L4	30	1470	195	55	0.86	EFF 2	91.8 91.5	6.5	2.8 2.0	2340	2475 2570[5]	120	300 600[5]	244	295 299[5]
DV225S4	37	1470	240	67	0.87	EFF 2	93.2 92.5	6.5	2.8 2.0	3010	3145 3240[5]	70	300 600[5]	296	347 351[5]
DV225M4	45	1470	292	83	0.85	EFF 2	93.8 93.0	7.3	3.3 2.0	3570	3705 3800[5]	60	300 600[5]	325	377 381[5]
DV250M4	55	1475	356	102	0.83	EFF 2	94.0 93.8	6.0	2.7 2.0	6300	-	40	-	448	-
DV280S4	75	1480	483	142	0.81	EFF 2	94.2 94.4	7.2	3.2 2.2	8925	-	30	-	520	-

1) Without brake

2) With brake and TF temperature sensor as motor protection

3) With brake control system BGE/BME

4) Motors with lower rated power available on request

5) Double disc brake

1000 1/min - S1 ***II3GD EEx nA IIT3/T120 °C*** *(for types with insulation class F: T 140 °C)*

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 1) / 2) [10^{-4} kgm^2]		Z_0 3) [1/h]	M_{Bmax} [Nm]	m 1) / 2) [kg]	
DR63S6[4]	0.09	900	0.38	0.64	2.2	1.8 1.6	5.4	-	4000	-	6.0	-
DR63M6	0.12	900	0.58	0.65	2.1	1.8 1.7	5.4	-	4000	-	6.0	-
DR63L6	0.18	870	0.78	0.70	2.2	1.6 1.5	5.4	-	4000	-	6.6	-
DT71D6	0.25	880	0.85	0.72	2.7	1.6 1.6	8.3	9.2	3600	5	7.0	9.9
DT80K6	0.37	900	1.29	0.68	3.0	1.9 1.9	10.3	11.2	3200	10	9.9	12.7
DT80N6	0.55	900	1.7	0.73	3.0	1.8 1.7	14.1	15	3600	10	11.5	14.3
DT90S6	0.75	900	2.35	0.70	3.1	2.0 1.9	25	31	2000	20	16	26
DT90L6	1.1	920	3.3	0.69	3.5	2.2 2.1	34	40	1700	20	18	28
DV100M6	1.5	920	4.05	0.70	4.0	2.3 2.0	53	59	1400	40	27	37
DV112M6	2.2	940	5.5	0.77	4.6	1.8 1.8	98	110	900	55	38	50
DV132S6	3	940	7.6	0.75	4.6	2.2 2.2	146	158	720	75	48	63
DV132M6	4	960	10.0	0.70	5.9	2.1 2.1	430	480	600	100	66	90
DV132ML6	5.5	960	12.9	0.70	5.7	2.1 2.0	524	574	550	150	75	100
DV160M6	7.5	960	16.7	0.76	5.0	1.8 1.6	650	700	350	150	84	109
DV160L6	11	960	22	0.77	6.5	2.2 1.7	1340	1475	300	200	154	196
DV180L6	15	970	31.5	0.83	6.5	2.2 1.6	2010	3125 3220[5]	240	300 300[5]	192	233 237[5]
DV200LS6	18.5	970	37	0.80	5.0	2.2 1.7	2990	3125 3220[5]	180	300 600[5]	220	271 275[5]
DV200L6	22	970	43.5	0.80	4.7	2.2 1.7	3490	3625 3720[5]	140	300 600[5]	244	295 299[5]

1) Without brake
2) With brake and TF temperature sensor as motor protection
3) With brake control system BGE/BME
4) Motors with lower rated power available on request
5) Double disc brake

750 1/min - S1 ***II3GD EEx nA IIT3/T120 °C*** *(for types with insulation class F: T 140 °C)*

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 1) / 2) [10^{-4} kgm^2]		Z_0 3) [1/h]	M_{Bmax} [Nm]	m 1) / 2) [kg]	
DT71D8	0.15	650	0.69	0.72	2.2	1.4 1.4	8.3	9.2	4200	5	7.0	9.9
DT80N8	0.25	680	1.24	0.55	2.6	1.9 1.9	14.1	15	3400	10	11.5	14.3
DT90S8	0.37	680	1.55	0.62	2.5	1.4 1.4	25	31	2200	20	16	26
DT90L8	0.55	680	2.3	0.60	2.5	1.5 1.5	34	40	1900	20	18	28
DV100M8	0.75	690	2.9	0.59	2.6	2.1 2.0	53	59	1750	40	27	37
DV100L8	1.1	670	4.1	0.60	2.8	1.9 1.7	65	71	1600	40	30	40
DV112M8	1.5	700	5.1	0.62	3.4	1.7 1.6	98	110	1100	55	38	50
DV132S8	2.2	700	7.1	0.62	3.4	1.9 1.9	146	158	820	75	48	63
DV132M8	3	720	9.0	0.65	4.0	1.8 2.0	430	480	640	100	66	90
DV132ML8	4	720	12.4	0.67	4.2	1.8 1.6	524	574	540	150	75	100
DV160M8	5.5	710	15.8	0.65	4.5	1.8 1.5	650	700	460	150	84	109
DV160L8	7.5	720	19	0.73	5.2	1.8 1.7	1340	1475	320	200	154	196
DV180L8	11	720	25.5	0.72	5.2	2.0 1.8	2010	2145 2240[4)]	260	300 300[4)]	192	233 237[4)]
DV200L8	15	720	33.5	0.74	3.8	2.0 1.8	3490	3625 37204)	180	300 600[4)]	244	295 299[4)]

1) Without brake

2) With brake and TF temperature sensor as motor protection

3) With brake control system BGE/BME

4) Double disc brake

***750/1500 1/min - S1 II3GD EEx nA IIT3/T120 °C** (for types with insulation class F: T 140 °C)*

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N	M_A/M_N	J_{Mot} 1) [10^{-4} kgm^2]	J_{Mot} 2) [10^{-4} kgm^2]	Z_0 3) [1/h]	M_{Bmax} [Nm]	m 1) [kg]	m 2) [kg]
DT71D8/4 TF	0.1 0.18	650 1380	0.49 0.54	0.70 0.85	2.2 3.3	1.7 1.5	1.6 1.4	8.3	9.2	2400 1400	5	7.3	10.9
DT80K8/4 TF	0.16 0.3	650 1380	0.76 0.86	0.68 0.83	1.9 3.0	1.5 1.5	1.5 1.5	10.3	11.2	2200 1200	10	10	13.6
DT80N8/4 TF	0.22 0.4	670 1400	1.02 1.14	0.66 0.83	2.1 3.5	1.7 1.6	1.7 1.6	14.1	15	2000 1200	10	11.4	15
DT90S8/4 TF	0.3 0.6	700 1400	1.7 1.7	0.58 0.84	2.5 4.3	1.7 1.6	1.7 1.6	25	31	1800 1000	20	16	25
DT90L8/4 TF	0.44 0.88	700 1400	2.1 2.2	0.56 0.84	2.4 4.2	1.9 1.7	2.1 1.7	34	40	1440 860	20	18	27
DV100M8/4 TF	0.66 1.3	700 1420	2.55 2.85	0.57 0.84	3.2 5.0	2.0 1.9	1.9 1.7	53	59	1120 720	40	27	37
DV100L8/4 TF	0.9 1.8	690 1410	3.5 3.95	0.57 0.84	2.9 4.8	1.9 2.0	1.8 1.8	65	71	1000 540	40	30	40
DV112M8/4 TF	1.2 2.2	700 1440	4.25 4.75	0.58 0.86	3.4 5.8	1.9 1.9	1.8 1.3	98	110	800 400	55	36	46
DV132S8/4 TF	1.8 3.3	700 1440	7.2 7.1	0.57 0.86	3.7 6.3	2.3 2.1	2.3 1.9	146	158	620 300	75	45	55
DV132M8/4 TF	2.2 4.4	700 1410	7.08.9	0.60 0.88	3.9 5.7	2.2 2.2	2.2 2.0	280	330	600 300	100	66	90
DV132ML8/4 TF	2.7 5.5	700 1400	8.3 10.9	0.62 0.84	3.6 5.3	2.3 2.2	2.2 2.0	330	380	540 280	150	75	96
DV160M8/4 TF	3.8 7.5	720 1460	11.8 14.7	0.60 0.85	3.8 6.0	2.8 2.8	2.7 2.7	398	448	400 280	150	85	106
DV160L8/4 TF	5.5 10	720 1460	18.1 20	0.55 0.83	3.1 5.7	1.7 2.3	1.8 1.8	925	1060	320 240	200	144	180
DV180L8/4 TF[4]	7.5 15	730 1470	26 30.5	0.51 0.81	3.5 6.0	2.5 2.5	2.2 2.2	1290	1425 1520[5]	220 200	300 300[5]	182	218 222[5]
DV200LS8/4 TF[4]	12 20	730 1470	34.5 39.5	0.60 0.84	4.1 5.1	2.6 2.3	1.8 1.7	2990	3125 3220[5]	200 160	300 600[5]	222	264 268[5]
DV200L8/4 TF[4]	14 22	730 1470	34.5 39.5	0.66 0.88	4.8 6.4	2.9 2.6	2.3 2.5	3490	3625 3720[5]	180 140	300 600[5]	232	274 278[5]
DV225S8/4 TF[4]	18.8 28	730 1470	44.5 51	0.70 0.90	4.3 5.8	2.5 2.3	2.0 2.0	4487	4622 4717[5]	140 100	300 600[5]	308	350 354[5]
DV225M8/4 TF[4]	25 34	730 1470	57 62	0.72 0.88	3.8 6.0	2.2 2.5	1.7 1.9	5318	5453 5448[5]	120 90	300 600[5]	330	372 376[5]

1) Without brake
2) With brake
3) With brake control system BGE/BME
4) Only available in type II3D
5) Double disc brake

12.4 Technical data category II3D (zone 22)

3000 1/min - S1 ***II3D/T120 °C*** *(for types with insulation class F: T 140 °C)*

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	EFF3	I_A/I_N	M_A/M_N M_H/M_N	J_{Mot} 1) [10^{-4} kgm^2]	J_{Mot} 2) [10^{-4} kgm^2]	Z_0 3) [1/h]	M_{Bmax} [Nm]	m 1) [kg]	m 2) [kg]
DT71D2	0.55	2700	1.65	0.78	-	3.2	2.2 1.9	4.6	5.5	920	5	7.0	9.9
DT80K2	0.75	2700	2.0	0.86	-	3.7	2.0 1.8	6.6	7.5	1160	10	9.9	12.7
DT80N2	1.1	2700	2.65	0.84	EFF3	4.0	2.0 1.8	8.7	9.6	720	10	11.5	14.3
DT90S2	1.5	2700	3.8	0.82	EFF3	4.0	2.0 1.8	25	31	540	20	16	26
DT90L2	2.2	2810	5.1	0.82	EFF3	4.8	2.5 2.2	34	40	540	20	18	28
DV100M2	3	2800	5.9	0.94	EFF3	5.0	2.0 1.8	53	59	360	40	27	37
DV112M2	4	2860	8.1	0.88	EFF3	5.6	2.3 1.8	98	110	350	55	38	50
DV132S2	5.5	2880	10.5	0.88	EFF3	6.6	2.5 2.2	146	158	110	75	48	63
DV132M2	7.5	2900	15.2	0.86	EFF3	6.8	2.6 1.8	280	330	110	100	66	90
DV132ML2	9.2	2890	18.1	0.87	EFF3	7.2	2.8 1.8	330	380	90	150	75	100
DV160M2	11	2900	21	0.88	EFF3	7.7	2.7 1.7	398	448	80	150	84	109
DV160L2[4)]	15	2930	32	0.80	EFF3	6.0	2.7 1.4	925	1060	-	200	148	190
DV180M2[4)]	18.5	2910	33.5	0.90	EFF3	6.5	2.5 1.6	1120	1255	-	300	175	216
DV180L2[4)]	22	2910	39.5	0.90	EFF3	6.5	2.4 1.6	1290	1425	-	300	186	228

1) Without brake

2) With brake and TF temperature sensor as motor protection

3) With brake control system BGE/BME

4) Type with brake: For standstill only; operational braking not possible. Contact SEW-EURODRIVE concerning emergency braking.

1500/3000 1/min - S1 ***II3D/T120 °C****(for types with insulation class F: T 140 °C)*

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N	M_A/M_N	J_{Mot} 1) [10^{-4} kgm^2]	J_{Mot} 2) [10^{-4} kgm^2]	Z_0 3) [1/h]	M_{Bmax} [Nm]	m 1) [kg]	m 2) [kg]
DT71D4/2 TF	0.25 0.37	1400 2720	1.05 1.00	0.71 0.88	3.0 3.5	1.5 1.6	1.7 1.6	4.6	5.5	1500 540	5	7.0	9.9
DT80K4/2 TF	0.4 0.63	1380 2700	1.24 1.52	0.75 0.93	3.0 3.5	1.6 1.5	1.7 1.5	6.6	7.5	1100 440	10	9.9	12.7
DT80N4/2 TF	0.55 0.88	1380 2700	1.81 2.05	0.71 0.91	3.2 3.6	1.8 1.7	1.9 1.6	8.7	9.6	1000 850	10	11.5	14.3
DT90S4/2 TF	0.88 1.3	1420 2820	2.45 3.35	0.76 0.85	4.3 4.2	2.1 1.9	2.0 1.8	25	31	900 400	20	16	26
DT90L4/2 TF	1.1 1.8	1430 2780	2.95 4.25	0.75 0.90	5.3 4.6	2.3 2.0	2.4 2.0	34	40	820 280	20	18	28
DV100M4/2 TF	1.5 2.2	1430 2840	3.35 4.3	0.8 0.93	6.4 6.4	2.5 2.2	2.4 1.8	53	58	700 180	40	27	37
DV100L4/2 TF	2.5 3.0	1400 2840	5.4 5.6	0.84 0.93	5.0 6.7	2.2 2.5	1.9 2.0	65	71	480 200	40	30	40
DV112M4/2 TF	3.3 4.0	1420 2860	7.2 8.7	0.82 0.83	5.0 5.0	1.8 2.1	1.9 1.8	98	110	360 140	55	38	50
DV132S4/2 TF	4.4 5.5	1420 2860	8.9 11.8	0.85 0.85	5.0 4.4	2.1 2.4	1.9 1.8	146	158	180 100	75	48	63
DV132M4/2 TF	6.0 7.5	1450 2900	11.8 15.5	0.86 0.86	6.9 6.9	2.1 1.9	1.8 1.5	280	330	260 90	100	66	90
DV132ML4/2 TF	7.5 10.0	1450 2900	15 20.5	0.85 0.86	7.0 6.6	2.3 2.1	2.0 1.8	330	380	220 70	150	75	100
DV160L4/2 TF[4]	12.0 14.0	1460 2930	24.5 29	0.81 0.83	5.4 5.7	2.4 2.2	1.6 1.1	925	1060	200 50	200	148	190
DV180M4/2 TF [4]	16.0 18.5	1460 2950	32 36	0.79 0.87	6.3 7.6	2.8 2.6	1.6 2.0	1120	1255 1350[5]	180 35	300 300[5]	175	216 220[5]
DV180L4/2 TF [4]	18.5 23.0	1460 2930	38 43.5	0.80 0.88	6.2 7.2	2.7 2.6	2.1 1.7	1290	1425 1520[5]	160 30	300 300[5]	186	228 232[5]
DV200L4/2 TF [4]	26 33	1470 2940	47.5 63	0.87 0.91	7.3 7.3	3.4 3.0	2.6 2.0	2340	2475 2570[5]	70 150	300 600[5]	244	295 299[5]
DV225S4/2 TF [4]	30 38	1470 2950	56 73	0.86 0.90	6.8 8.2	3.0 3.0	2.5 2.0	3010	3145 3240[5]	55 10	300 600[5]	296	347 351[5]
DV225M4/2 TF [4]	35 45	1475 2950	64 84	0.86 0.90	6.8 8.3	3.2 3.2	2.5 2.0	3570	3705 3800[5]	35 10	300 600[5]	325	377 381[5]

1) Without brake

2) With brake

3) With brake control system BGE/BME

4) Do not brake from 2-pole speed. Contact SEW-EURODRIVE concerning emergency braking.

5) Double disc brake

12.5 Technical data for protection type e category II2G (zones 1 and 2)

1500 1/min II2G EEx e IIT3

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	EFF 2	$\eta_{75\%}$ $\eta_{100\%}$ [%]	I_A/I_N	M_A/M_N	M_H/M_N	t_E [s]	PTB-Nr.[1)]	m [kg]
eDT71D4	0.37	1365	1.14	0.70	-	67.5 67.8	3.7	1.9	1.7	29	99 ATEX 3402/03	9.2
eDT80K4	0.55	1375	1.54	0.73	-	71.7 71.3	4.0	2.1	1.9	28	99 ATEX 3403/11	12.5
eDT80N4	0.75	1380	2.10	0.69	-	74.4 74.2	4.4	2.4	2.2	22	99 ATEX3403/07	13.5
eDT90S4	1.0	1430	2.60	0.72	EFF 2	76.3 77.4	5.7	2.7	2.5	15	99 ATEX3404/05	18.0
eDT90L4	1.5	1425	3.45	0.78	EFF 2	80.8 80.7	6.1	2.8	2.6	13	99 ATEX3404/09	20.0
eDV100M4	2.2	1420	4.7	0.82	EFF 2	83.8 82.9	6.5	2.8	2.4	9	99 ATEX3405/11	28.7
eDV100L4	2.6	1410	5.4	0.84	EFF 2	84.7 85.5	6.5	2.9	2.5	10	99 ATEX3405/15	30
eDV112M4	3.6	1440	7.5	0.81	EFF 2	86.4 85.8	7.2	2.9	2.5	8	00 ATEX3356/01	40
eDV132S4	5	1430	10.1	0.84	EFF 2	87.8 86.4	7.1	2.9	2.5	8	00 ATEX3357/07	50
eDV132M4	6.8	1440	13.4	0.84	EFF 2	88.3 87.3	6.8	2.4	1.9	10	00 ATEX3357/03	66
eDV132ML4	7.5	1440	14.6	0.84	EFF 2	89.0 88.2	7.2	2.7	2.2	11	00 ATEX3357/05	75
eDV160M4	9.2	1445	18.3	0.83	EFF 2	89.0 88.2	7.4	2.7	2.3	8	01 ATEX3213/01	84
eDV160L4	11	1460	21.5	0.83	EFF 2	90.5 90.0	5.6	2.3	1.7	12	01 ATEX3213/03	148
eDV180M4	14	1460	27.5	0.81	EFF 2	91.3 90.8	5.7	2.6	1.8	9	01 ATEX3214/03	175
eDV180L4	16	1470	31.5	0.80	EFF 2	91.7 91.5	6.6	3	2.1	8	01 ATEX3214/01	186

1) Number of the EC prototype test certificate (PTB = Physikalisch-Technische Bundesanstalt)

1000 1/min II2G EEx e IIT3

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	t_E [s]	PTB no.[1)]	m [kg]
eDT71C6	0.15	930	0.51	0.66	3.3	2	2.1	90	99 ATEX 3402/05	9
eDT80K6	0.37	910	1.26	0.67	3.2	2	1.9	35	99 ATEX 3403/13	13
eDT80N6	0.50	900	1.5	0.72	3.4	1.6	1.5	30	99 ATEX3403/15	14
eDT90S6	0.75	925	2.30	0.69	3.8	1.9	1.8	20	99 ATEX3404/16	18
eDT90L6	1.1	920	3.20	0.69	4.1	2.2	2	17	99 ATEX3404/13	20
eDV100M6	1.5	920	4.10	0.71	4.2	2.2	1.9	18	99 ATEX3405/17	29
eDV112M6	2.2	940	5.2	0.75	5.0	2.2	2.0	15	00 ATEX3356/03	40
eDV132S6	3.0	950	7.1	0.75	5.9	2.5	2.3	10	00 ATEX3357/08	50

1) Number of the EC prototype test certificate (PTB = Physikalisch-Technische Bundesanstalt)

1500 1/min II2G EEx e IIT4

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	eff..	$\eta_{75\%}$ $\eta_{100\%}$ [%]	I_A/I_N	M_A/M_N	M_H/M_N	t_E T3 [s]	t_E T4 [s]	PTB99ATEX[1)]	m [kg]
eDT80N4	0.55	1395	1.43	0.72	-	76.8 77.4	4.7	2.4	2.1	35	17	3403/09	13.5
eDT90S4	0.75	1435	1.82	0.76	EFF 2	78.6 77.8	6.1	2.7	2.4	23	12	3404/07	18.0
eDT90L4	1.1	1430	2.45	0.80	EFF 2	80.7 80.5	6.4	2.7	2.5	19	10	3404/11	20.0
eDV100M4	1.5	1420	3.15	0.82	EFF1	83.1 83.7	6.5	2.8	2.4	16	8	3405/13	28.7

1) Number of the EC prototype test certificate (PTB = Physikalisch-Technische Bundesanstalt)

1000 1/min II2G EEx e IIT4

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	I_A/I_N	M_A/M_N	M_H/M_N	t_E T3 [s]	t_E T4 [s]	PTB99ATEX[1)]	m [kg]
eDT71C6	0.15	930	0.51	0.66	3.3	2.0	2.1	90	50	3402/05	13
eDT90S6	0.55	945	1.70	0.66	4.2	2.2	2.1	26	12	3404/17	18
eDT90L6	0.75	945	2.30	0.63	4.6	2.6	2.4	23	11	3404/14	29
eDT100L6	1.2	940	3.75	0.63	4.6	2.6	2.4	20	11	3404/14	29

1) Number of the EC prototype test certificate (PTB = Physikalisch-Technische Bundesanstalt)

12.6 Technical data for protection type ed category II2G (zones 1 and 2)

1500 1/min - S4 II2G EEx ed IIBT3

Motor type[1]	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	EFF 2	$\eta_{75\%}$ $\eta_{100\%}$ [%]	I_A/I_N	M_A/M_N M_H/M_N	t_A [s]	J_{Mot} [10^{-4} kgm^2]	M_{Bmax} [Nm]	Z_0 [1/h]	PTB99A TEX[2]	m [kg]
eDT71D4/BC05/HR/TF[3]	0.37	1345	1.09	0.77	-	64.0 67.8	3.6	1.7 1.6	52	5.7	5.0	3600	3402/01	20
eDT80K4/BC05/HR/TF[3]	0.55	1360	1.61	0.72	-	69.0 69.0	4.0	2.1 2.0	42	7.7	7.5	4500	3403/01	24
eDT80N4/BC05/HR/TF[3]	0.70	1380	1.96	0.71	-	73.0 72.5	4.2	2.5 2.2	43	9.8	7.5	3600	3403/03	25
eDT90S4/BC2/HR/TF[3]	1.1	1415	2.85	0.76	-	74.0 72.5	5.1	2.2 2.1	20	32	16	2200	3404/01	38
eDT90L4/BC2/HR/TF[3]	1.7	1390	3.90	0.82	EFF 2	79.5 78.5	5.2	2.4 2.2	20	41	24	3000	3404/03	41
eDT100LS4/BC2/HR/TF[3]	2.0	1400	4.35	0.83	EFF 2	80.5 79.5	5.9	2.6 2.4	16	49	30	1800	3405/01	46
eDT100L4/BC2/HR/TF[3]	2.6	1425	5.9	0.78	EFF 2	82.5 82.0	6.4	2.6 2.3	14	60	30	2400	3405/03	19

1) The brake rectifier must be accommodated in the control cabinet.

2) Number of the EC prototype test certificate (PTB = Physikalisch-Technische Bundesanstalt).

3) The brakemotors are supplied with "TF" as sole motor protection. The trip switch to be used must carry the PTB certification 3.53-PTC/A.

12.7 Technical data for category II2D (zones 21 and 22)

1500 1/min - S1 II2D/T120°

Motor type	P_N [kW]	n_N [1/min]	I_N 400 V [A]	cosφ	EFF 2	$\eta_{75\%}$ $\eta_{100\%}$ [%]	I_A/I_N	M_A/M_N M_H/M_N	DMT00ATEX[1)]	m [kg]
DT71D4 TF II2D	0.37	1365	1.14	0.70	-	-	3.7	1.9 1.7	..E 029 X	9.2
eDT80K4TF II2D	0.55	1385	1.60	0.67	-	-	4.2	2.5 2.1	..E 029 X	12.5
eDT80N4 TFF II2D	0.75	1380	2.10	0.69	-	-	4.4	2.4 2.3	..E 029 X	13.5
eDT90S4 TF II2D	1.0	1430	2.60	0.72	-	-	5.7	2.7 2.5	..E 029 X	18
eDT90L4 TF II2D	1.5	1425	3.45	0.78	EFF 2	80.2 79.0	6.1	2.8 2.6	..E 029 X	20
eDT100M4 TF II2D	2.2	1410	4.7	0.83	EFF 2	82.8 82.0	5.9	2.7 2.3	..E 029 X	25
eDT100L4 TF II2D	3.0	1400	6.3	0.83	EFF 2	84.5 83.0	5.6	2.7 2.2	..E 029 X	28.7
eDV112M4 TF II2D	4.0	1420	8.7	0.84	EFF 2	85.9 84.2	5.4	2.4 2.1	..E 029 X	38
eDV132S4 TF II2D	5.5	1430	11.0	0.85	EFF 2	87.6 85.7	5.8	2.7 2.4	..E 029 X	48
eDV132M4 TF II2D	7.5	1430	15.5	0.85	EFF 2	89.5 87.5	6.2	2.1 2.0	..E 029 X	66
eDV132ML4 TF II2D	9.2	1440	18.1	0.84	EFF 2	89.5 87.5	6.0	2.5 2.2	..E 029 X	75
eDV160M4 TF II2D	11.0	1440	22.5	0.83	EFF 2	89.6 88.0	6.0	2.5 2.3	..E 029 X	84
eDV160L4 TF II2D	15.0	1460	29.5	0.82	EFF 2	88.9 88.5	5.1	2.4 1.8	..E 029 X	148
eDV180M4 TF II2D	18.5	1465	37.0	0.80	EFF 2	90.8 90.0	5.9	2.6 2.1	..E 029 X	175
eDV180L4 TF II2D	22.0	1465	42.5	0.82	EFF 2	91.4 90.5	6.0	2.7 2.0	..E 029 X	186

1) Number of the EC prototype test certificate (DMT = Deutsche Montan Technologie).

12.8 Motors for frequency inverter operation

Inverter drives with variable speeds can also be operated in potentially explosive atmospheres. There are basically two different variants:

- Motor in the Ex-atmosphere – frequency inverter outside the Ex-atmosphere in the control cabinet
- Motor in the Ex-atmosphere – frequency inverter in the Ex-atmosphere in the motor terminal box

Permitted motor/ frequency inverter combinations

Drives with inverters outside the potentially explosive atmosphere are available in the following categories:

- II2G for operation in zone 1:

  Flameproof motors of type EExd in conjunction with MOVITRAC®07, MOVITRAC®31C, MOVIDRIVE® or MOVIDRIVE® *compact* inverters.

- II2D for operation in zone 21:

  Flameproof motors of type EExd with optional equipment in conjunction with MOVITRAC® 07, MOVITRAC® 31C, MOVIDRIVE® or MOVIDRIVE® compact inverters.

- II3GD for operation in zone 2:

  Non-sparking motors of type EEx nA in conjunction with MOVITRAC® 31C, MOVITRAC® 07, MOVIDRIVE® or MOVIDRIVE® *compact* inverters. Use of this frequency inverter type is mandatory. Please note the assignment tables and restrictions on operating modes in the section "Category II3G / II3D AC motor on inverter."

- II3GD for operation in zone 22:

  Dust-proof motors in conjunction with MOVITRAC® 31C, MOVIDRIVE® or MOVIDRIVE® *compact* inverters. Use of this frequency inverter type is recommended. If using other frequency inverter types, please note the restrictions (torque characteristic curves, etc.) in the section "Category II3G / II3D AC motor on inverter."

Category II2G and II2D drives

Technical data and additional information on these drives are available on request.

Category II3G and II3D drives

Motor / frequency inverter combination

- The listed motor/frequency inverter combinations are mandatory and must be strictly observed for category II3G motors for use in zone 2 (see EN 50021, 10.9.2 "Operation on a frequency inverter or from a non-sinusoidal voltage").
- The listed motor/frequency inverter combinations are recommended for category II3GD motors for use in zone 22. If you want to operate category II3GD motors in zone 22 on other frequency inverters (such as MOVITRAC® 07), the maximum speeds/frequencies as well as the thermal torque limiting characteristic curves must be observed. In addition, we strongly recommend to use a frequency inverter matching the respective power.

Winding type

Two voltage types are permitted for operation on a frequency inverter:

- Rated motor voltage 230 V / 400 V, frequency inverter supply 230 V:

  For operation with a base frequency of 50 Hz, the motor must be in delta connection; a base frequency of 87 Hz is not allowed.
- Rated motor voltage 230 V / 400 V, frequency inverter supply 400 V:

  For operation with a base frequency of 50 Hz, the motor must be in star connection; with a base frequency of 87 Hz, the motor must be in delta connection.
- Rated motor voltage 400 V / 690 V, frequency inverter supply 400 V:

  Operation only possible with base frequency of 50 Hz. Connect the motor in delta connection.

Due to the high thermal load, only motors with temperature class F winding must be used in frequency inverter operation.

Temperature class / maximum surface temperature

II3GD motors are marked with temperature class T3 and maximum surface temperature of 140 °C (other surface temperatures on request).

Protection against excessive temperature

Only motors that are equipped with a positive temperature coefficient thermistor (TF) are permitted for operation on a frequency inverter to ensure that the permitted limit temperature is not exceeded. The positive temperature coefficient thermistor must be evaluated using an appropriate PTC thermistor trip switch.

Evaluation in the frequency inverter is not permitted.

Supply voltage of the frequency inverter

The supply voltage of the frequency inverter must be within the range specified by the manufacturer without dropping below the minimum rated motor voltage.

During operation with a frequency inverter, dangerous overvoltages may be present at the motor connection terminals. As the overvoltage directly depends on the mains input voltage, the mains input voltage of the frequency inverter must be limited to a maximum of 400 V when operating motors in zone 2.

The mains input voltage of the frequency inverter is limited to a maximum of 500 V when operating motors in zone 22.

EMC measures

The following options are permitted:

- EMC modules of the EF.. type for frequency inverters of the MOVITRAC® 31C series
- Line filters of the NF type for frequency inverters of the MOVITRAC® 07 series
- Line filters of the NF...-... type for frequency inverters of the MOVIDRIVE® and MOVIDRIVE® compact series
- Output chokes of the HD... type for frequency inverters of the MOVITRAC® 31C, MOVIDRIVE® and MOVIDRIVE® compact series

Maximum permitted torques

Motors operated with a frequency inverter must not exceed the maximum torques (thermal torque limiting characteristic curves) specified in this section. The values may be exceeded for brief periods if the effective operating point lies below the characteristic curve.

Maximum permitted speeds/ frequencies

Strictly observe the maximum speeds/maximum frequencies given in the assignment tables of the motor/frequency inverter combinations. These values must not be exceeded.

Group drives

Group drive means that several motors are connected to one frequency inverter output. Motors of the DR/DT/DV series in category II3GD for use in zone 2 may generally not be operated as group drive!

The following restrictions apply to use in zone 22:

- The line lengths specified by the frequency inverter manufacturer must not be exceeded
- The motors in a group must not be more than two motor types apart.

Restrictions in hoist operation

The following motor/frequency inverter combinations are not allowed when operating MOVITRAC® 31C with activated "hoisting function" (parameter 710/712):

- DT 71D4 -Y connection + MOVITRAC® 31C008
- DT 71D4 - △ connection + MOVITRAC® 31C008
- DT 80K4 - Y connection + MOVITRAC® 31C008

The following motor/frequency inverter combinations are not allowed when operating MOVITRAC® 07 with activated "hoisting function" (parameter 700):

- DR63S4, Y and △ connection + MOVITRAC® 07A 005-5A3-4-00
- DR63M4, Y and △ connection + MOVITRAC® 07A 005-5A3-4-00
- DR63L4, Y and △ connection + MOVITRAC® 07A 005-5A3-4-00

Gear unit

There may be restrictions regarding the maximum input speed from the perspective of the gear unit when using controlled gearmotors. For this reason, please contact SEW-EURODRIVE for gear unit speeds above 50 Hz (4-pole).

Assignment of motor frequency inverter: MOVITRAC® 31C and MOVITRAC® 07

Motors in category II3GD for operation in zone 2: Fixed motor/frequency inverter combinations

Motors in categories II3GD and II3D for operation in zone 22: Recommended frequency inverter combinations

Motor type	Motor connection ⅄			Motor connection △		
	MOVITRAC®...	Current limit [%]	Maximum frequency/ speed	MOVITRAC®...	Current limit [%]	Maximum frequency/speed
DR63 S4.../ II3GDDR63 S4.../II3D	...07A005-5A3-4-00	-	70 Hz / 2100 min^{-1} 1)	...07A005-5A3-4-00	-	120/3500 min^{-1} 1)
DR63 M4.../ II3GDDR63 M4.../II3D	...07A005-5A3-4-00	-		...07A005-5A3-4-00	-	
DR63 L4.../ II3GDDR63 L4.../II3D	...07A005-5A3-4-00	-		...07A005-5A3-4-00	-	
DT 71 D4.../II3GD DT 71 D4.../II3D	...07A005-5A3-4-00 ..31C005-503-4-00 ..31C008-503-4-00	- 85 2) 55 2)		...07A005-5A3-4-00 ...31C005-503-4-00 ..31C008-503-4-00	- 116 2) 80 2)	
DT 80 K4.../II3GD DT 80 K4.../II3D	...07A005-5A3-4-00 ...31C005-503-4-00 ...31C008-503-4-00	- 98 2) 65 2)		...07A011-5A3-4-00 ...31C008-503-4-00	- 108 2)	
DT 80 N4.../II3GD DT 80 N4.../II3D	...07A008-5A3-4-00 ...31C008-503-4-00	- 80 2)		...07A011-5A3-4-00 ...31C015-503-4-00	- 86 2)	
DT 90 S4.../II3GD DT 90 S4.../II3D	...07A011-5A3-4-00 ...31C008-503-4-00	- 115 2)		...07A022-5A3-4-00 ...31C015-503-4-00	- 125 2)	
DT 90 L4.../II3GD DT 90 L4.../II3D	...07A015-5A3-4-00 ...31C015-503-4-00	- 105 2)		...07A030-5A3-4-00 ...31C022-503-4-00	- 125 2)	
DV 100 M4.../II3GD DV 100 M4.../II3D	...07A022-5A3-4-00 ..31C022-503-4-00	- 95 2)		...07A040-5A3-4-00 ...31C030-503-4-00	- 121 2)	
DV 100 L4.../II3GD DV 100 L4.../II3D	...07A030-5A3-4-00 ..31C022-503-4-00	- 119 2)		...07A055-5A3-4-00 ...31C040-503-4-00	- 119 2)	
DV 112 M4.../II3GD DV 112 M4.../II3D	...07A040-5A3-4-00 ..31C030-503-4-00	- 122 2)		...07A075-5A3-4-00 ...31C075-503-4-00	- 96 2)	
DV 132 S4.../II3GD DV 132 S4.../II3D	...07A055-5A3-4-00 ..31C040-503-4-00	- 118 2)		...07A110-5A3-4-00 ...31C110-503-4-00	- 87 2)	
DV 132 M4.../II3GD DV 132 M4.../II3D	...07A075-5A3-4-00 ..31C075-503-4-00	- 98 2)		...07A150-503-4-00 ...31C110-503-4-00	- 114 2)	
DV 132 ML4.../II3GD DV 132 ML4.../II3D	...07A110-5A3-4-00 ..31C110-503-4-00	- 83 2)		...07A150-503-4-00 ...31C150-503-4-00	- 100 2)	
DV 160 M4.../II3G DV 160 M4.../II3D	...07A110-5A3-4-00 ..31C110-503-4-00	- 96 2)		...07A220-503-4-00 ...31C220-503-4-00	- 87 2)	
DV 160 L4.../II3GD DV 160 L4.../II3D	...07A150-503-4-00 ..31C150-503-4-00	- 122 2)		...07A300-503-4-00 ...31C220-503-4-00	- 122 2)	
DV 180 M4.../II3GD DV 180 M4.../II3D	...07A220-503-4-00 ..31C220-503-4-00	- 86 2)		...07A370-503-4-00 ...31C 370-503-4-00	- 94 2)	90/2500 min^{-1} 1)
DV 180 L4.../II3GD DV 180 L4.../II3D	...07A220-503-4-00 ..31C220-503-4-00	- 100 2)		...07A370-503-4-00 ...31C370-503-4-00	- 112 2)	
DV 200 L4.../II3GD DV 200 L4.../II3D	...07A300-503-4-00 ..31C 300-503-4-00	- 95 2)		...07A450-503-4-00 ...31C450-503-4-00	- 110 2)	
DV 225 S4.../II3GD DV 225 S4.../II3D	...07A370-503-4-00 ..31C370-503-4-00	- 98 2)		-3)		
DV 225 M4.../II3GD DV 225 M4.../II3D	...07A450-503-4-00 ..31C450-503-4-00	- 96 2)		-3)		

1) Value of the maximum frequency of MOVITRAC® 31C (parameter P202 / P212 / P222) or of the maximum speed of MOVITRAC® 07A (parameter 302)

2) Value of the current limit of MOVITRAC® 31C (parameter P320/P340)

3) The combination motor type / MOVITRAC® ... is not available

Assignment of motor frequency inverter: MOVIDRIVE®

Motors in category II3GD for operation in zone 2: Fixed frequency inverter combinations

Motors in categories II3GD and II3D for operation in zone 22: Recommended frequency inverter combinations

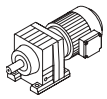
Motor type	Motor connection ⅄		Motor connection △	
	MOVIDRIVE®... MCF40/41A...[1] MCV40/41A...[2] MDF60A...[1] MDV60A...[2] MDX60/61B...[2]	Settings P320/P340 maximum output speed n_{max} [min^{-1}]	MOVIDRIVE®... MCF40/41A... MCV40/41A... MDF60A...[1] MDV60A...[2] MDX60/61B...[2]	Settings P320/P340 maximum output speed n_{max} [min^{-1}]
DR63 S4.../II3GD	...0005-...	2100	...0005-...	3500
DR63 S4.../II3D	-		-	
DR63 M4.../II3GD	...0005-..		...0005-...	
DR63 M4.../II3D	-		-	
DR63 L4.../II3GD	...0005-..		...0005-...	
DR63 L4.../II3D	-		-	
DT 71 D4.../II3GD	...0005-..		...0005-...	
DT 71 D4.../II3D	-		-	
DT 80 K4.../II3GD	...0005-..		...0011-...	
DT 80 K4.../II3D	-		-	
DT 80 N4.../II3GD	...0008-..		...0014-...	
DT 80 N4.../II3D	-		-	
DT 90 S4.../II3GD **DT 90 S4.../II3D**	...0015-...		...0015-...	
DT 90 L4.../II3GD **DT 90 L4.../II3D**	...0015-...		...0022-...	
DV 100 M4.../II3GD **DV 100 M4.../II3D**	...0022-...		...0040-...	
DV 100 L4.../II3GD **DV 100 L4.../II3D**	...0030-...		...0055-...	
DV 112 M4.../II3GD **DV 112 M4.../II3D**	...0040-...		...0075-...	
DV 132 S4.../II3GD **DV 132 S4.../II3D**	...0055-...		...0110-...	
DV 132 M4.../II3GD **DV 132 M4.../II3D**	...0075-...		...0110-...	
DV 132 ML4.../II3GD **DV 132 ML4.../II3D**	...0110-...		...0150-...	
DV 160 M4.../II3GD **DV 160 M4.../II3D**	...0110-...		...0220-...	
DV 160 L4.../II3GD **DV 160 L4.../II3D**	...0150-...		...0220-...	
DV 180 M4.../II3GD **DV 180 M4.../II3D**	...0220-...		...370-...	2500
DV 180 L4.../II3GD **DV 180 L4.../II3D**	...0220-...		...370-...	
DV 200 L4.../II3GD **DV 200 L4.../II3D**	...370-...		...550-...	
DV 225 S4.../II3GD **DV 225 S4.../II3D**	...370-...		...550-...	
DV 225 M4.../II3GD **DV 225 M4.../II3D**	...450-...		...0750-...	
DV 250 M4.../II3GD **DV 250 M4.../II3D**	...550-...	2000	...900-...	2000
DV 280 M4.../II3GD **DV 280 M4.../II3D**	...0750-...		...1320-	

1) Permitted operating mode for category II3G and II3GD motors: VFC1..

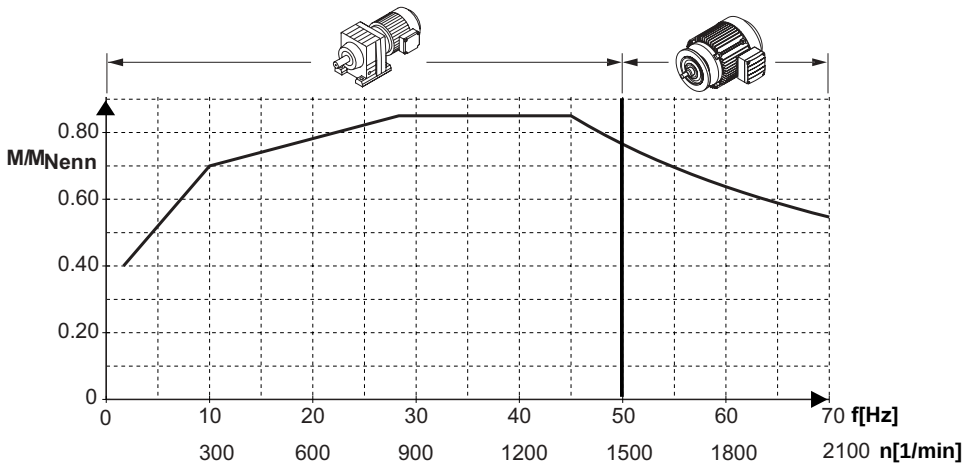
2) Permitted operating mode for category II3G and II3GD motors: VFC1... and VFC-n control.

Thermal torque limit characteristic curves

The following table shows the symbols used in the torque limit characteristic curves and what they mean:

Symbol	Meaning
	0 ≤ n ≤ 1500 1/min: Characteristic curve for gearmotors Gearmotor selection from the selection tables categories II3D and II3G
	At n >1500 1/min: Characteristic curve only applies to motors without gear unit. **Contact SEW-EURODRIVE regarding gearmotors!**

Thermal torque limit characteristic curve in inverter operation for 4-pole AC motors and AC brake motors with a base frequency of 50 Hz (operating mode S1, 100 % cdf):



52193AXX

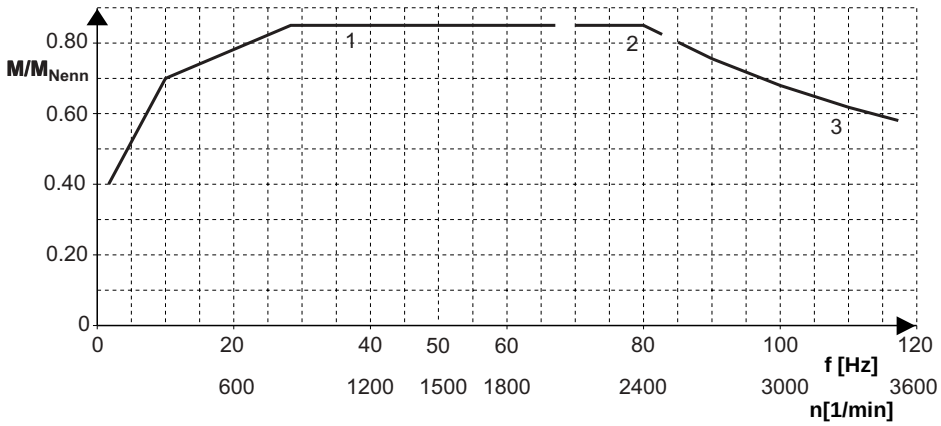
Figure 26: Thermal torque limit characteristic curve in frequency inverter operation

Thermal torque limit characteristic curve in inverter operation for 4-pole AC motors and AC brake motors with a base frequency of 87 Hz:

1 = Operating mode S1, 100 % cdf up to size 280

2 = Operating mode S1, 100 % cdf up to size 225

3 = Operating mode S1, 100 % cdf up to size 180



52011AXX

12.9 Frequency inverter in the potentially explosive atmosphere

MOVIMOT®

MOVIMOT® is the combination of an AC (brake) motor and a digital frequency inverter in the power range 0.25 ... 2.2 kW. It is the perfect match for decentralized drive configurations.

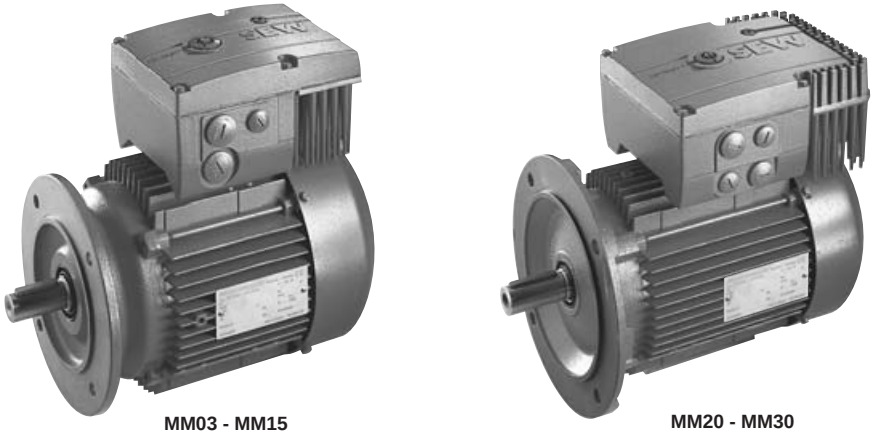
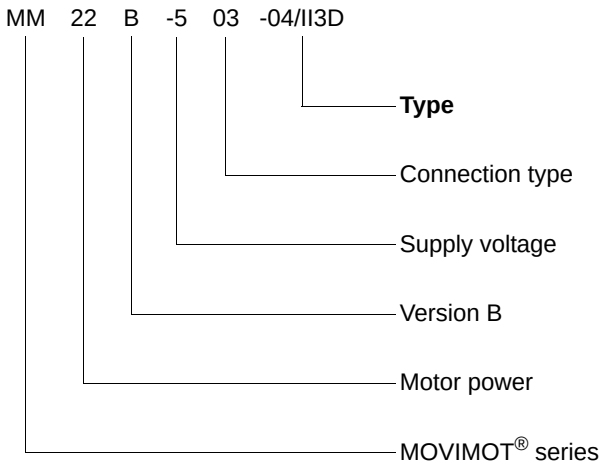


Figure 27: MOVIMOT® AC motor

Special characteristics of MOVIMOT®:

- Small total volume
- Interference-free integration of all electrical connections between the frequency inverter and motor
- Enclosed construction with integrated protection functions
- Frequency inverter cooling independent of the motor speed
- No space required in the control cabinet
- Optimum parameter presettings for the expected applications
- Compliance with EMC standards EN 50 081 (interference level A) and EN 50 082
- Simple installation, startup and maintenance
- Easy to service for retrofitting and exchange

Sample unit designation



Available equipment category

MOVIMOT® drives for potentially explosive atmospheres are available in category II3D.

Protection against excessive temperature

MOVIMOT® drives are always monitored with a TH temperature sensor to prevent the permitted limit temperature from being exceeded. The TH temperature sensor must be evaluated separately on the outside of the MOVIMOT® drive. The drive must be disconnected from the power supply system when the TH trips.

Maximum permitted torques

MOVIMOT® drives must not exceed the maximum torques (thermal torque limit characteristic curves) specified in this section in permanent operation. The values may be exceeded for brief periods if the effective operating point lies below the characteristic curve.

Rated speeds

- ⅄ connection: 1400 min^{-1}
- △ connection: 2900 min^{-1}

Winding type

The motor winding generally has thermal classification F because of the increased thermal load in frequency inverter operation.

Surface temperature

MOVIMOT® drives are marked with the maximum surface temperature T = 140 °C.

Supply voltage

The supply voltage must not fall below 400 V. The maximum permitted voltage is 500 V.

MOVIMOT® options in category II3D

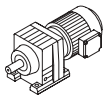
- MLA 12A: The unit is delivered with the analog setpoint converter directly mounted on the MOVIMOT® drive and wired up.
- MFP 21D: Fieldbus interface for controlling the MOVIMOT® drive using PROFIBUS. Please note the corresponding installation instructions.
- MFI 21A: Fieldbus interface for controlling the MOVIMOT® drive using InterBus. Please note the corresponding installation instructions.
- BW1, BW2: Integrated braking resistor.

Combinations and performance data

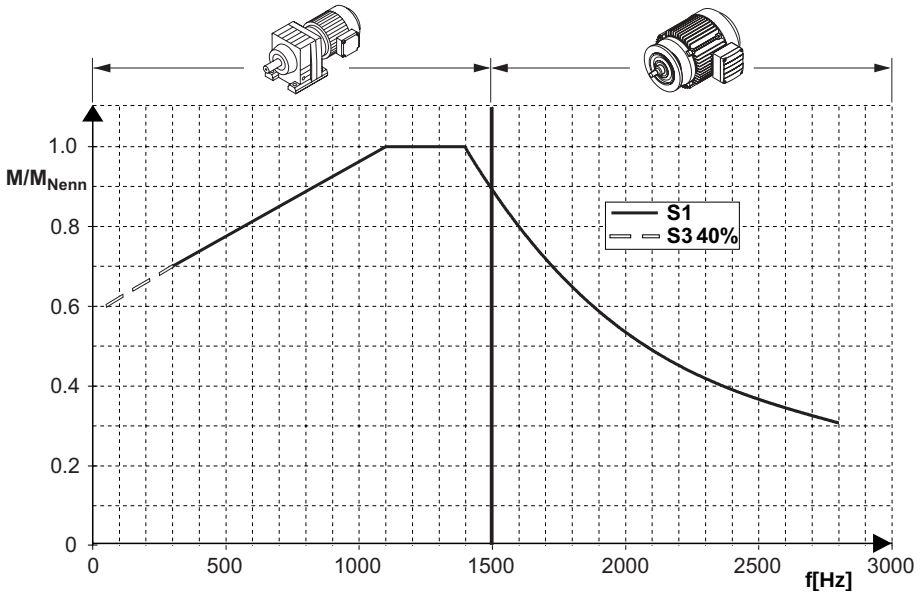
Type	Pn [kW]	M_n [Nm]	n_n [min^{-1}]	I_{in} / I_{out} [A]	MOVIMOT® type
⅄					
DT 71 D4(/BMG)/MM03/II3D	**0.25**	1.7	1400	1.0 / 1.2	MM03B-5043-04
DT 80 K4(/BMG)/MM05/II3D	**0.37**	2.5	1400	1.3 / 1.6	MM05B-5043-04
DT 80 N4(/BMG)/MM07/II3D	**0.55**	3.7	1400	1.6 / 2.0	MM07B-5043-04
DT 90 S4(/BMG)/MM011II3D	**0.75**	5.1	1400	1.9 / 2.5	MM11B-5043-04
DT 90 L4(/BMG)/MM15/II3D	**1.1**	7.5	1400	2.4 / 3.2	MM15B-5043-04
DT 100 LS4(/BMG)/MM22/II3D	**1.5**	10.2	1400	3.5 / 4.0	MM22B-5043-04
DT 100 L4(/BMG)/MM30/II3D	**2.2**	15.0	1400	5.0 / 5.5	MM30B-5043-04
△					
DT 71 D4(/BMG)/MM05/II3D	**0.37**	1.2	2900	1.3 / 1.6	MM05B-5043-04
DT 80 K4(/BMG)/MM07/II3D	**0.55**	1.8	2900	1.6 / 2.0	MM07B-5043-04
DT 80 N4(/BMG)/MM11/II3D	**0.75**	2.5	2900	1.9 / 2.5	MM11B-5043-04
DT 90 S4(/BMG)/MM15/II3D	**1.1**	3.6	2900	2.4 /3.2	MM15B-5043-04
DT 90 L4(/BMG)/MM22/II3D	**1.5**	4.9	2900	3.5 /4.0	MM22B-5043-04
DT 100 LS4(/BMG)/MM30/II3D	**2.2**	7.2	2900	5.0 / 5.5	MM30B-5043-04

Symbols used

The following table shows the symbols used in the torque limit characteristic curves and what they mean:

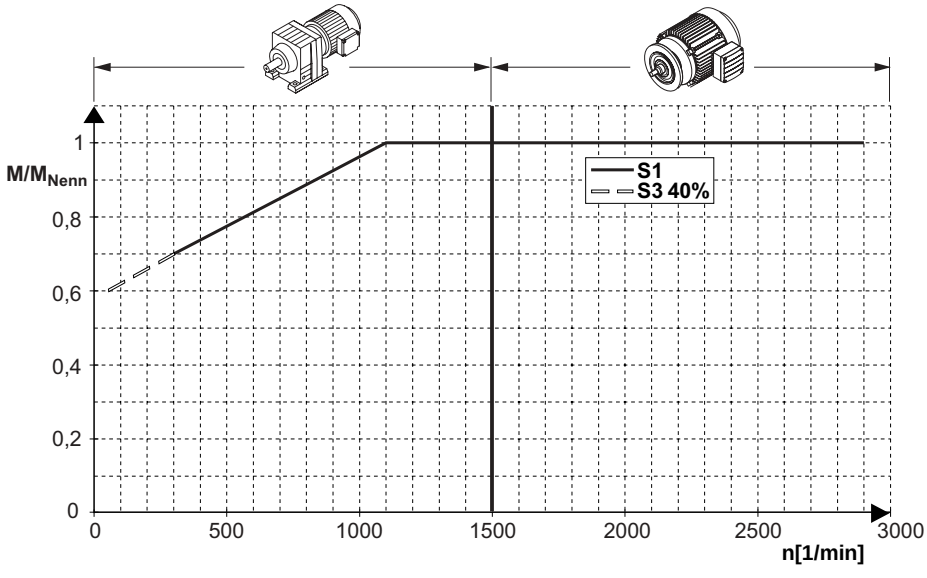
Symbol	Meaning
	0 ≤ n ≤ 1500 1/min: Characteristic curve for gearmotors Gearmotor selection from the selection tables categories II3D and II3G
	At n >1500 1/min: Characteristic curve only applies to motors without gear unit. **Contact SEW-EURODRIVE regarding gearmotors!**

50 Hz ⅄



51042AXX

100 Hz △



51043AXX

12.10 Integrated electronic switching and protection function MOVI-SWITCH®

MOVI-SWITCH®

MOVI-SWITCH® is a gearmotor with integrated electronic switching and protection function. Single speed AC motors and AC brakemotors in sizes DT71 to DV100 can be combined and operated in zone 22 with all appropriate gear units in the modular concept as part of the MOVI-SWITCH® range. Refer to the "Drive Systems for Decentralized Installation" manual for detailed information about MOVI-SWITCH®.

51066AXX

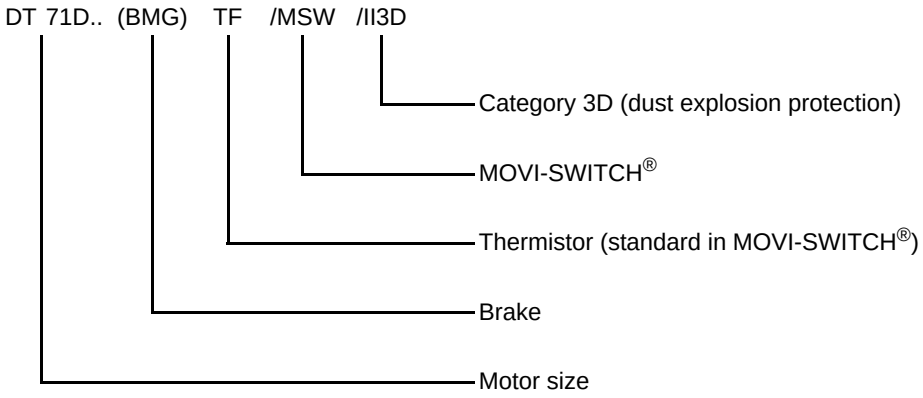
Figure 28: Gearmotor with MOVI-SWITCH®

MOVI-SWITCH® is switched on and off by means of a short circuit-proof star bridge connector without changing the direction of rotation. A thermal winding monitor (TF) is also integrated and directly linked to the connector. If the winding monitor trips, the drive must be disconnected from the supply voltage. Do not switch the drive on again until checking what has caused the fault. The mains and control connections are the same for motors with or without brake.

MOVI-SWITCH® offers the following advantages:

- The circuit breaker and protection functions are completely integrated, saving control cabinet space and cabling.
- Robust and compact, resulting in space-saving installation.
- Use MOVI-SWITCH® to operate motors in the voltage range 3 × 380 ... 500 V, 50/60 Hz.
- AC and AC brake motors with the same connection configuration, therefore simple installation.

Sample unit designation



Available equipment category

MOVI-SWITCH for use in potentially explosive atmospheres is available in category II3D.

Possible combinations

The following MOVI-SWITCH® AC motors and AC brakemotors can be combined with all suitable gear unit types, mounting positions and versions in accordance with the selection tables for category II3D gearmotors.

Motor size	Power [kW] with number of poles	
	4	6
DT71D.. (/BMG)/TF/MSW/II3D	0.37	0.25
DT80K.. (/BMG)/TF/MSW/II3D	0.55	0.37
DT80N.. (/BMG)/TF/MSW/II3D	0.75	0.55
DT90S.. (/BMG)/TF/MSW/II3D	1.1	0.75
DT90L.. (/BMG)/TF/MSW/II3D	1.5	1.1
DV100M.. (/BMG)/TF/MSW/II3D	2.2	1.5
DV100L.. (/BMG)/TF/MSW/II3D	3.0	-

Technical data

MOVI-SWITCH® features	Description
Motor voltage	3 × AC 380...500 V, 50/60 Hz, **motor winding only in ⅄ connection**.
Brake voltage	= Motor voltage / $\sqrt{3}$ Alternative motor voltage
Control voltage	DC 24 V according to EN 61131-2
Switching function	On/off with star bridge connector. Short circuit-proof semiconductor switch according to class B limit to EN 55011 and EN 55014.
Direction of rotation	CW or CCW, can only be altered externally.
Thermal motor protection	Integrated evaluation of positive temperature coefficient (PTC) thermistor TF, combined in logic operation with the enable signal.
Controller	With DC 24 V control voltage identical for motors with and without brake.
Brake control	With integrated brake control system BGW as standard, therefore minimum brake reaction times.

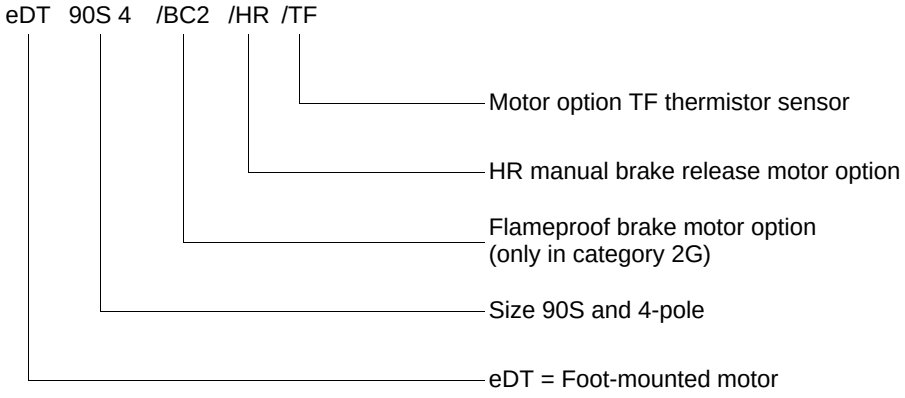
Order information

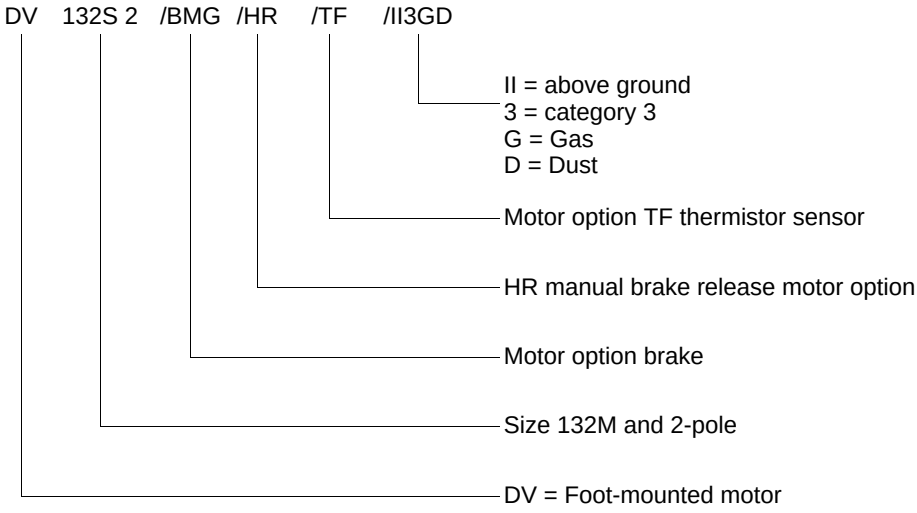
Note the following points when ordering AC (brake) motors or gearmotors with MOVI-SWITCH®:

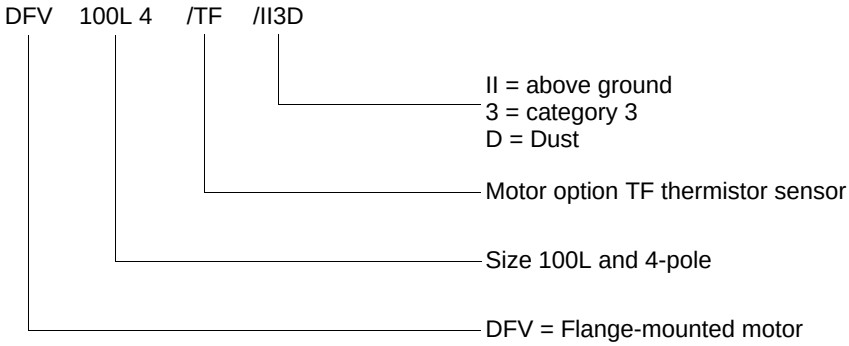
- Voltage only for winding in ⅄ connection.
- Only two brake voltages are possible, namely
  - motor voltage / $\sqrt{3}$ or
  - motor voltage.
- Preferred position of terminal box 270°, please contact SEW-EURODRIVE for other requirements.

12.11 Unit designation of AC (brake) motors

Examples







12.12 Brakes

General information

On request, SEW-EURODRIVE motors and gearmotors can be supplied with an integrated mechanical brake. The brake is an electromagnetic disc brake with a DC coil that opens electrically and brakes using spring force. The brake is applied in case of a power failure. This means it complies with fundamental safety requirements. The brake can also be released mechanically if equipped with manual brake release. For this purpose, either a hand lever or a setscrew is supplied with the brake. The hand lever springs back automatically and the setscrew is lockable. The brake is activated by a brake control system housed either in the wiring space of the motor or in the control cabinet. Refer to the "Brakes and Accessories" manual for detailed information about SEW-EURODRIVE brakes.

A significant advantage of SEW-EURODRIVE brakes is their very short length. The brake end shield is a part of both the motor and the brake. The integrated design of the brake motor permits particularly compact and sturdy solutions.

Basic structure

The illustration below shows the basic structure of the brake.

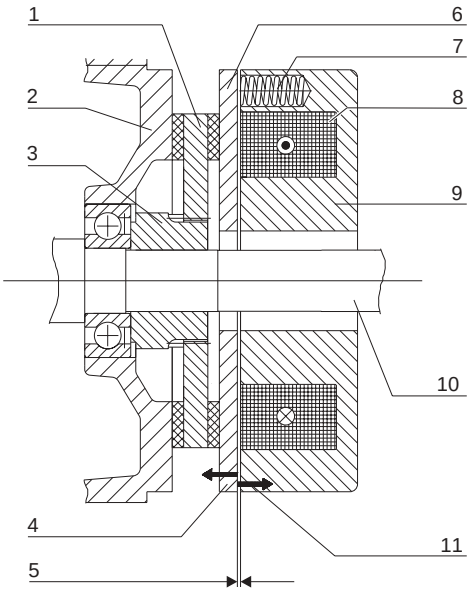


Figure 29: Basic structure of the brake

1	Brake disk	5	Working air gap	9	Brake coil body
2	Brake end shield	6	Pressure plate	10	Motor shaft
3	Carrier	7	Brake spring	11	Electromagnetic force
4	Spring force	8	Brake coil		

Rapid response times

A particular feature of the brake is its patented two coil system. This system comprises the accelerator coil BS and the coil section TS. The special SEW-EURODRIVE brake control system ensures that, when the brake is released, the accelerator coil is switched on first with a high current inrush, after which the coil section is switched on. The result is a particularly short response time when releasing the brake. The brake disk moves clear very swiftly and the motor starts up with hardly any brake friction.

This principle of the two coil system also reduces self-induction so that the brake is applied more rapidly. The result is a reduced braking distance. The brake can be switched off in the DC and AC circuit to achieve particularly short response times when applying the brake, for example in hoists.

Brakes for drives in categories II2G/II2D

At present, no brakes are available which satisfy the requirements of category II2D.

Brakes for category II2G are flameproof brakes of type BC. These brakes are able to perform the same braking work per brake application as the standard SEW-EURODRIVE brake. The absolute braking work (referred to as Work done W in the catalog) is also the same. The only difference is that the mass moment of inertia of a motor with a BC brake is greater than that of the combination with a normal brake.

Brakes for drives in categories II3GD / II3D

Compared to standard brakes, category II3GD brakes used in zone 2 perform less braking work per brake application (see characteristic curves in this section). Category II3D and II3GD brakes (for use in zone 22) correspond to standard brakes as far as their braking work is concerned.

Overview

AC brake motors from SEW-EURODRIVE are equipped with the following brake types:

In category	Brake type	For motor	Description
3GD, 3D	**BMG**	DT71...DV132S	Double-disc, spring-loaded brake
3GD, 3D	**BM**	DV132M...DV225	Double-disc, spring-loaded brake
3GD, 3D	**BM..2**	DV180...DV225	Double-disc, spring-loaded brake
2G	**BC**	eDT71...eDT100	Double-disc, spring-loaded brake
2D	No brake available		

Safe operation

The maximum braking work per braking must be checked to safely operate the brake. Never exceed the specified data. Additionally, the brake must be serviced at regular intervals.

Determining the braking work and maintenance intervals

The work to be done per braking is calculated as follows:

$$\omega = \frac{2 \times \pi \times n}{60}$$

Horizontal movement, rotational movement, vertical upward movement	Vertical downward movement
$W = \frac{J_{ges} \times \omega^2 \times M_B}{2 \times (M_B + M_L)}$	$W = \frac{J_{ges} \times \omega^2 \times M_B}{2 \times (M_B - M_L)}$

W_1	[J]	= braking work per braking application
J_{tot}	[10^{-4} kgm^2]	= mass moment of inertia of the brake motor + load mass moment of inertia related to the motor shaft
n	[1/min]	= motor speed
M_B	[Nm]	= braking torque
M_L	[Nm]	= load torque, note the sign!

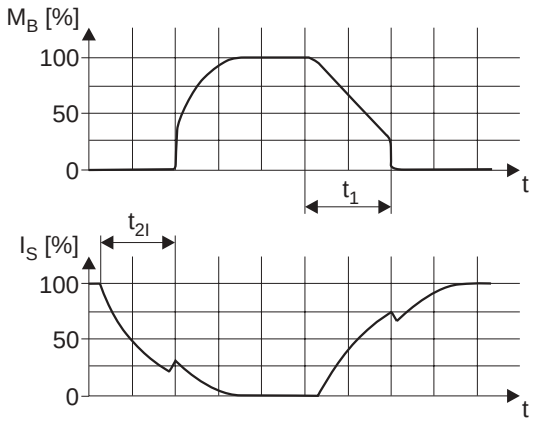
The calculated value W_1 must be within the assigned limit curve (→ Sec. "Permitted work done by the brake"). The brake must be serviced before the permitted braking work W has expired. Doing so is essential to guarantee explosion protection. Refer to the section "Mounting Positions, Technical Data and Dimension Sheets for AC Motors" for the value of the braking work W.

$$W \geq W_1 \times Z$$

W	[J]	= braking work until service
Z		= number of brake applications

Current and braking torque

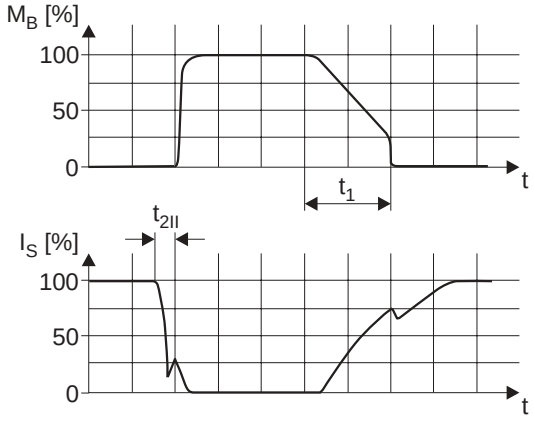
AC isolation:



04371AXX

Figure 30: Current and braking torque for AC isolation

DC and AC isolation:



04372AXX

Figure 31: Current and braking torque for DC and AC isolation

M_B = braking torque

I_S = coil current

Technical data II3GD EExnA / II3D

The following table lists the technical data of category II3G and II3D brakes. The type and number of brake springs determines the level of the braking torque. Maximum braking torque M_{Bmax} is installed as standard, unless specified otherwise in the order. Other brake spring combinations can result in reduced braking torque values M_{Bred}.

Brake type	For motor size	M_{Bmax} [Nm]	Reduced braking torques M_{Bred} [Nm]							W [10^6J]	t_1 [10^{-3}s]	t_2		P_B [W]
												t_2II [10^{-3}s]	t_2I [10^{-3}s]	
BMG05	**DT71/80**	5.0	4	2.5	1.6	1.2				120	30 20[1)]	5	35	32
BMG1	**DT80**	10	7.5	6						120	50 20[1)]	8	40	36
BMG2	**DT90/DV100**	20	16	10	6.6	5				260	70 30[1)]	12	80	40
BMG4	**DV100**	40	30	24						260	130 35[1)]	15	80	50
BMG8	**DV112M**	55	45	37	30	19	12.6	9.5		600	30	12	60	65
	DV132S	75	55	45	37	30	19	12.6	9.5	600	35	10	50	65
BM15	**DV132M**	100	75	50	35	25				1000	40	14	70	95
	DV132ML/ DV160M	150	125	100	75	50	35	25		1000	50	12	50	95
BM30	**DV160L**	200	150	125	100	75	50			1500	55	18	90	95
	DV180M/L	300	250	200	150	125	100	75	50	1500	60	16	80	95
BM31	**DV200/225**	300	250	200	150	125	100	75	50	1500	60	16	80	95
BM32[2)]	**DV180M/L**	300	250	200	150	100				1500	55	18	90	95
BM62[2)]	**DV200/225**	600	500	400	300	250	200	150	100	1500	60	16	80	95

1) For operation with the BGE/BME brake control system

2) Double disc brake

$M_{B\,max}$ = Maximum braking torque

$M_{B\,red}$ = Reduced braking torque

W = Braking work until service

t_1 = Response time

t_2I = Brake application time for cut-off in the AC circuit

t_2II = Brake application time for cut-off in the DC and AC circuit

P_B = Braking power

The response and application times are recommended values in relation to the maximum braking torque.

Permitted work done by the brake

If you are using a brake motor, you have to check whether the brake is approved for use with the required starting frequency Z. The following diagrams show the permitted work done W_{max} per cycle for the various brakes and rated speeds. The values are given with reference to the required starting frequency Z in cycles/hour (per h).

Example for brake in category II3D: The rated speed is 1500 min^{-1} and the brake BM 32 is used. Assuming 200 cycles per hour, the permitted work done per cycle is 9000 J (→ see following figure).

*Category **II3D** and category **II3GD** (use in zone 22)*

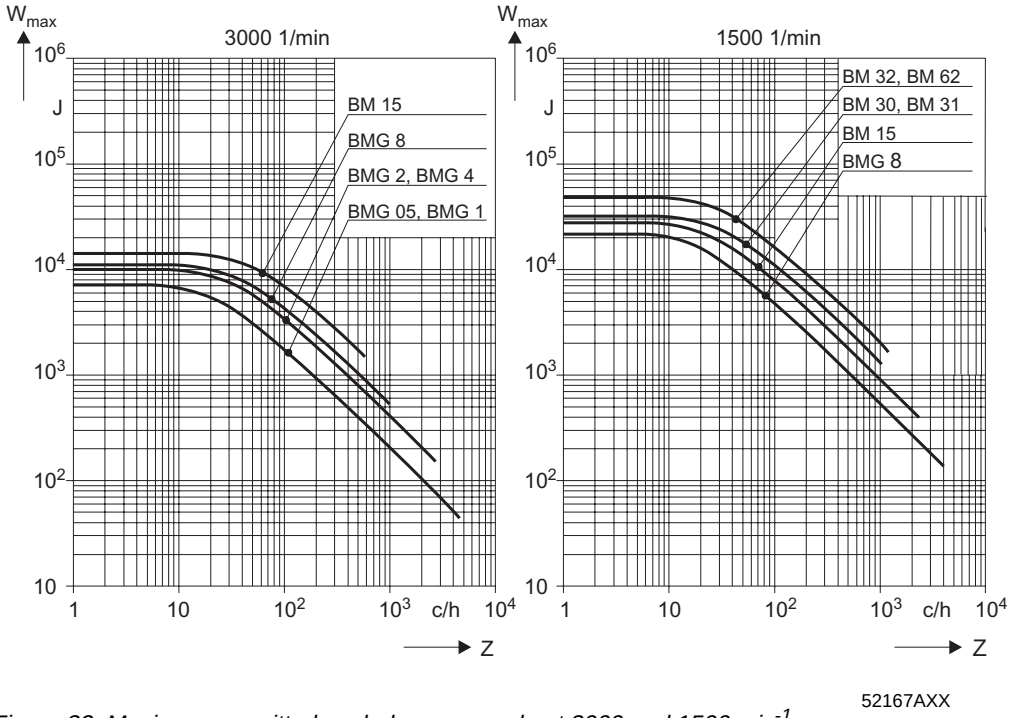


Figure 32: Maximum permitted work done per cycle at 3000 and 1500 min^{-1}

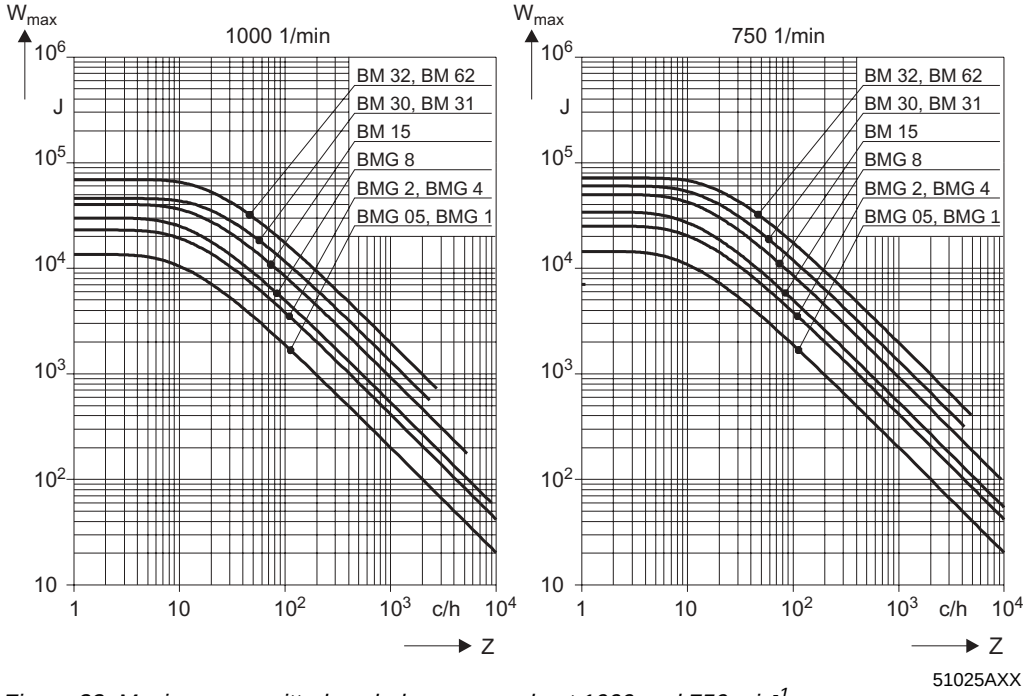


Figure 33: Maximum permitted work done per cycle at 1000 and 750 min^{-1}

*Category **II3GD** (use in zone 2)*

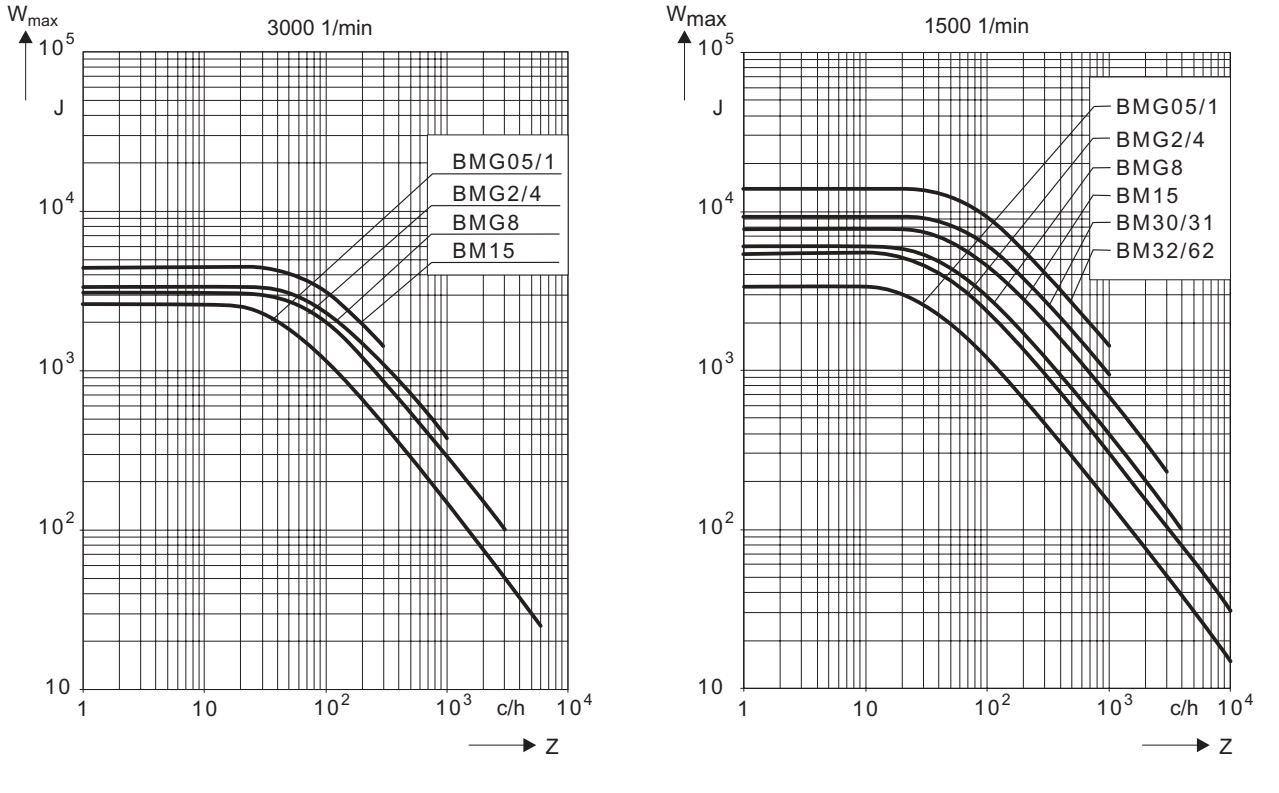


Figure 34: Maximum permitted work done per cycle at 3000 and 1500 min^{-1}

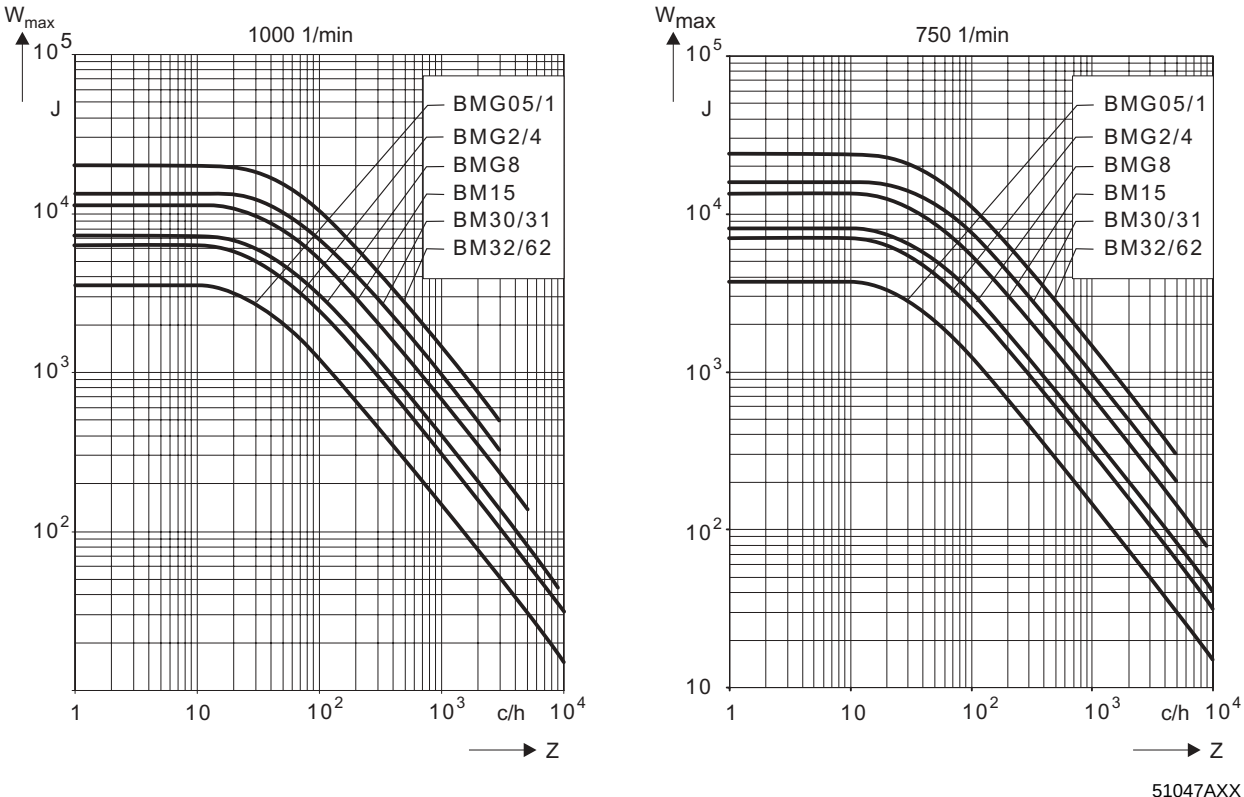
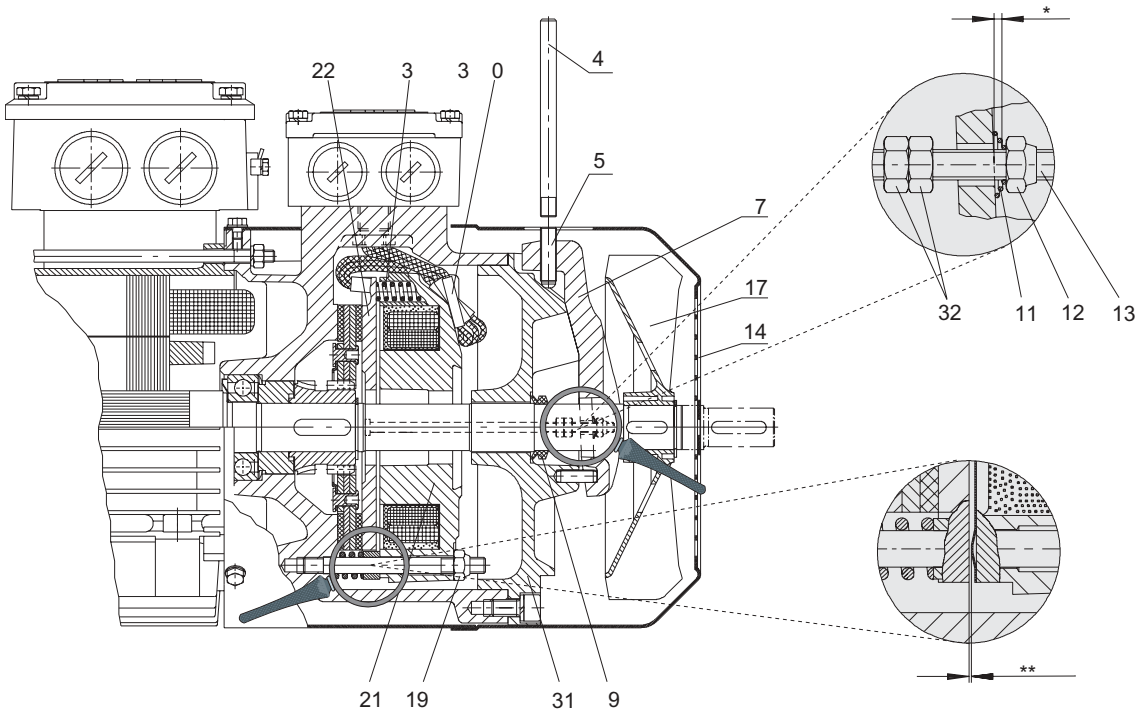


Figure 35: Maximum permitted work done per cycle at 1000 and 750 min^{-1}

Brake BC

BC is a flameproof brake with protection type EEx d IIB T3. The brake meets the requirements of category II2G and is suited for use in zone 1. It basically consists of the same elements as BMG and is integrated into eDT71..BC - eDT 100..BC motors.



00874AXX

3	Brake springs	13	Tie bolt	30	Cables
4	Hand lever	14	Fan guard	31	Housing cover
5	Setscrew	15	Fan	32	Nuts
9	V-ring	19	Hex nut	*	Floating clearance of manual brake release
11	Conical coil spring	21	Brake coil body	**	Working air gap
12	Setting nut	22	Pressure plate		

Brake type	Brake motor type	M_{Bmax} [Nm]	Reduced braking torques M_{Bred} [Nm]						W [10^6J]	t_1 [10^{-3}s]	t_2		P_B [W]
											t_2II [10^{-3}s]	t_2I [10^{-3}s]	
BC5	**eDT71 / 80..BC**	7.5	6	5	4	2.5	1.6	1.2	60	20	8	40	30
BC2	**eDT90 / 100..BC**	30	24	20	16	10	6.6	5	130	35	15	80	40

$M_{B\,max}$ = Maximum braking torque

$M_{B\,red}$ = Reduced braking torque

W = Braking work until service

t_1 = Response time

t_2I = Brake application time for cut-off in the AC circuit

t_2II = Brake application time for cut-off in the DC and AC circuit

P_B = Braking power

The response and application times are recommended values in relation to the maximum braking torque.

*Category **II2G** EExde IIT3 (zone1)*

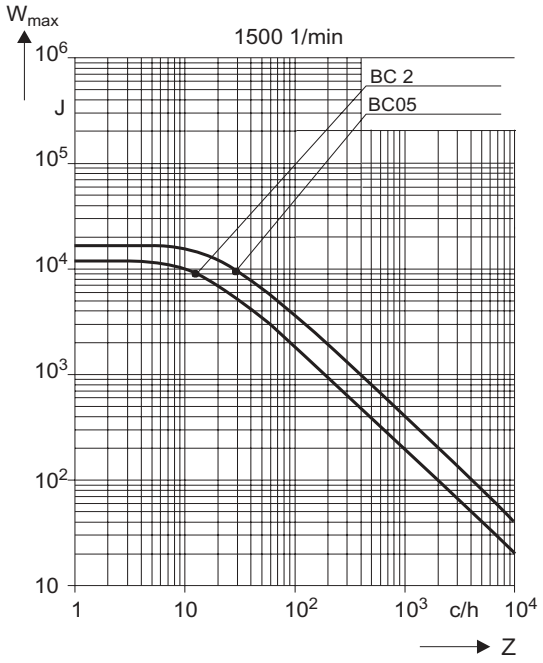


Figure 36: Maximum permitted work done per cycle at 1500 min^{-1}

The BC brake has been exclusively approved by the PTB for operation on eDT71.. to eDT100..BC brake motors for temperature classes T1...T3. The overall motor has protection type EExed IIB T3.

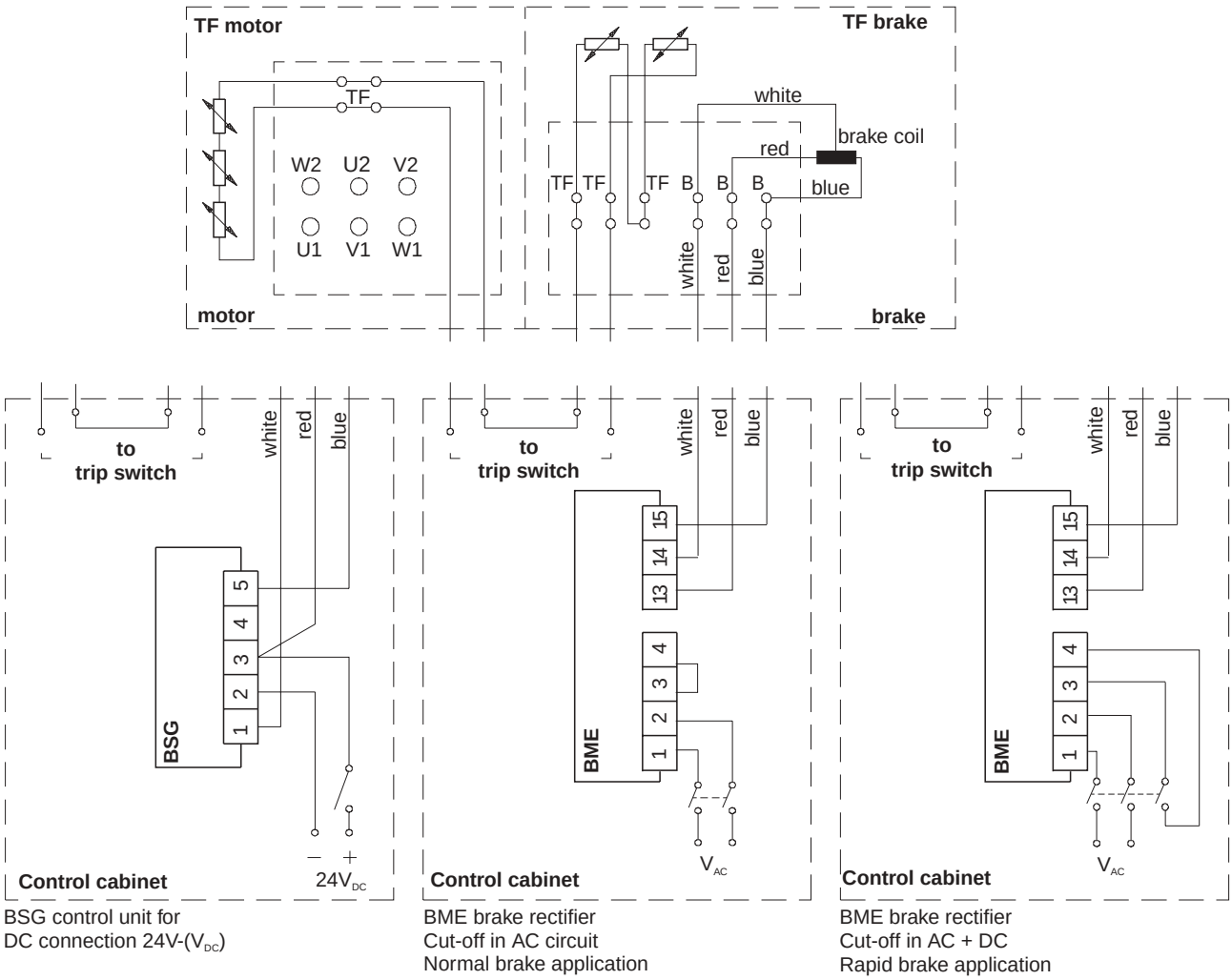
BC is only operated with brake rectifiers BME/BSG (in control cabinet).

The response and reaction times for the BC brake are guide values in relation to the maximum braking torque.

Adjustment intervals

The amount of wear on the brake is influenced by several parameters such as starting frequency, work done per cycle, braking torque and climatic conditions. Consequently, the values specified for work done can only be seen as approximate values. We recommend servicing the brake at the latest after reaching 50 % of the specified work done W.

Connection diagram



BSG control unit for DC connection 24V-(V_{DC})

BME brake rectifier
Cut-off in AC circuit
Normal brake application

BME brake rectifier
Cut-off in AC + DC
Rapid brake application

For required AC voltage, see Motor rating plate, V brake

Switch contacts for utilization category AC3 to EN 60947

03808AEN

12

Brake control

Various brake control systems are available for controlling disc brakes with a DC coil, depending on the requirements and the operating conditions. All brake control systems are protected against overvoltage by varistors as standard. Refer to the "Brakes and Accessories" manual for detailed information about SEW-EURODRIVE brakes.

The brake control systems are either installed directly on the motor in the wiring space or in the control cabinet. The following table gives an overview of possible installation locations.

Installed in	Zone 1	Zone 21	Zone 2	Zone 22
Motor	-	-	-	X
Control cabinet	X	-	X	X

Brake control system in motor wiring space

The supply voltage for brakes with an AC connection is either supplied separately or taken from the supply system of the motor in the wiring space. Only motors with a fixed speed can be supplied from the motor supply voltage. With pole-changing motors and for operation on a frequency inverter, the supply voltage for the brake must be supplied separately.

In addition, it is necessary to bear in mind that brake application is delayed by the residual voltage of the motor in case the brake is powered by the motor supply voltage. The brake application time t_2I stated in the technical data for cut-off in the AC circuit applies to a separate supply only.

The following tables list the technical data of brake control systems for installation in the motor wiring space. **For category II3GD motors, installation in the motor wiring space is only permitted if the drive is operated in zone 22.** The different housings have different colors (= color code) to make them easier to distinguish.

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BG[1)]	One-way rectifier	AC 150...500 V	1.5	BG 1.5	825 384 6	black
		AC 42...500 V	3.0	BG 3	825 386 2	brown
BGE	One-way rectifier with electronic switching	AC 150...500 V	1.5	BGE 1.5	825 385 4	red
		AC 42...150 V	3.0	BGE 3	825 387 0	blue
BS[1)]	Varistor suppressor circuit	DC 24 V	5.0	BS24	826 763 4	aqua
BSG[2)]	Electronic switch mode	DC 24 V	5.0	BSG	825 459 1	white

1) DT71-100

2) Recommended up to brake type BMG4 due to cross section of connecting lead

Combinations

The following table lists the possible combinations of brake control systems for the motor wiring space with the various motor sizes and connection types.

Type	Design	Standard terminal box
BG	BG1.5 BMS3	71 - 100
BGE	BGE1.5 BGE3	71 - 225
BS	BS24	71 - 100
BSG	BSG	71 - 225

Types SR and UR are not allowed to be used in potentially explosive atmospheres.

Brake control system in the control cabinet

The following table lists the technical data of brake control systems for installation in the control cabinet. The different housings have different colors (= color code) to make them easier to distinguish.

Type	Function	Voltage	Holding current I_{Hmax} [A]	Type	Part number	Color code
BMS[1)]	One-way rectifier like BG	AC 150..0.500 V	1.5	BMS 1.5	825 802 3	black
		AC 42...150 V	3.0	BMS 3	825 803 1	brown
BME	One-way rectifier with electronic switching like BGE	AC 150..0.500 V	1.5	BME 1.5	825 722 1	red
		AC 42...150 V	3.0	BME 3	825 723 X	blue
BMP	One-way rectifier with electronic switch mode, integrated voltage relay for cut-off in the DC circuit	AC 150..500 V	1.5	BMP 1.5	825 685 3	white
		AC 42...150 V	3.0	BMP 3	826 566 6	light blue
BMK	One-way rectifier with electronic switch mode, DC 24 V control input and separation in the DC circuit	AC 150...500 V	1.5	BMK 1.5	826 463 5	aqua
		AC 42...150 V	3.0	BMK 3	826 567 4	bright red

1) Only up to motor size 100 / only for motors in category 3

Combinations

The following table lists the possible combinations of brake control systems for control cabinet installation with the various motor sizes and connection types.

Type	Type	Standard terminal box
BMS	BMS1.5 BMS3	71 - 100
BME	BME1.5 BME3	71 - 225
BMP	BMP1.5 BMP3	
BMK	BMK1.5 BMK3	

Operating currents

The current values I_H (holding current) specified in the tables are r.m.s. values. Use only r.m.s. instruments for your measurement. The inrush current (accelerator current) I_B only flows for a short time (max. 120 ms) when the brake is released or during voltage dips below 70 % of rated voltage. There is no increased inrush current if the BG brake rectifier is used or if there is a direct DC voltage connection - both are only possible with brakes up to motor size 100.

Brake BMG 05 - BMG 4

	BMG05	BMG1	BMG2	BMG4
Motor size	71/80	80	90/100	100
Max. braking torque [Nm]	5	10	20	40
Braking power [W]	32	36	40	50
Control factor I_B/I_H	4	4	4	4

Rated voltage V_N		BMG05		BMG 1		BMG 2		BMG 4	
V_{AC}	V_{DC}	I_H [A_{AC}]	I_G [A_{DC}]	I_H [A_{AC}]	I_G [A_{DC}]	I_H [A_{AC}]	I_G [A_{DC}]	I_H [A_{AC}]	I_G [A_{DC}]
	24		1.38		1.54		1.77		2.20
24 (23-25)	**10**	2.0	3.3	2.4	3.7	-	-	-	-
42 (40-46)	**18**	1.14	1.74	1.37	1.94	1.46	2.25	1.80	2.80
48 (47-52)	**20**	1.02	1.55	1.22	1.73	1.30	2.00	1.60	2.50
56 (53-58)	**24**	0.90	1.38	1.09	1.54	1.16	1.77	1.43	2.20
60 (59-66)	**27**	0.81	1.23	0.97	1.37	1.03	1.58	1.27	2.00
73 (67-73)	**30**	0.72	1.10	0.86	1.23	0.92	1.41	1.14	1.76
77 (74-82)	**33**	0.64	0.98	0.77	1.09	0.82	1.25	1.00	1.57
88 (83-92)	**36**	0.57	0.87	0.69	0.97	0.73	1.12	0.90	1.40
97 (93-104)	**40**	0.51	0.78	0.61	0.87	0.65	1.00	0.80	1.25
110 (105-116)	**48**	0.45	0.69	0.54	0.77	0.58	0.90	0.72	1.11
125 (117-131)	**52**	0.40	0.62	0.48	0.69	0.52	0.80	0.64	1.00
139 (132-147)	**60**	0.36	0.55	0.43	0.61	0.46	0.70	0.57	0.88
153 (148-164)	**66**	0.32	0.49	0.39	0.55	0.41	0.63	0.51	0.79
175 (165-185)	**72**	0.29	0.44	0.34	0.49	0.37	0.56	0.45	0.70
200 (186-207)	**80**	0.26	0.39	0.31	0.43	0.33	0.50	0.40	0.62
230 (208-233)	**96**	0.23	0.35	0.27	0.39	0.29	0.44	0.36	0.56
240 (234-261)	**110**	0.20	0.31	0.24	0.35	0.26	0.40	0.32	0.50
290 (262-293)	**117**	0.18	0.28	0.22	0.31	0.23	0.35	0.29	0.44
318 (294-329)	**125**	0.16	0.25	0.19	0.27	0.21	0.31	0.25	0.39
346 (330-369)	**147**	0.14	0.22	0.17	0.24	0.18	0.28	0.23	0.35
400 (370-414)	**167**	0.13	0.20	0.15	0.22	0.16	0.25	0.20	0.31
440 (415-464)	**185**	0.11	0.17	0.14	0.19	0.15	0.22	0.18	0.28
500 (465-522)	**208**	0.10	0.15	0.12	0.17	0.13	0.20	0.16	0.25

Legend

I_H = Holding current r.m.s. value in the connecting harness to the SEW-EURODRIVE brake rectifier

I_B = Accelerator current - brief inrush current

I_G = Direct current with direct DC voltage supply

V_N = Rated voltage (rated voltage range)

Brake BMG 8 - BM 32/62

	BMG8	BM 15	BM30/31; BM32/62
Motor size	112/132S	132M-160M	160L-225
Max. braking torque [Nm]	75	150	600
Braking power [W]	65	95	120
Control factor I_B/I_H	6.3	7.5	8.5

Rated voltage V_N		BMG8	BM 15	BM 30/31; BM 32/62
V_{AC}	V_{DC}	I_H [A_{AC}]	I_H [A_{AC}]	I_H [A_{AC}]
	24	2.77[1)]	4.15[1)]	4.3[1)]
42 (40-46)	**-**	2.31	3.35	-
48 (47-52)	**-**	2.10	2-95	-
56 (53-58)	**-**	1.84	2.65	-
60 (59-66)	**-**	1.64	2.35	-
73 (67-73)	**-**	1.46	2.10	-
77 (74-82)	**-**	1.30	1.87	-
88 (83-92)	**-**	1.16	1.67	-
97 (93-104)	**-**	1.04	1.49	-
110 (105-116)	**-**	0.93	1.32	1.57
125 (117-131)	**-**	0.82	1.18	1.41
139 (132-147)	**-**	0.73	1.05	1.25
153 (148-164)	**-**	0.66	0.94	1.13
175 (165-185)	**-**	0.59	0.84	1.0
200 (186-207)	**-**	0.52	0.74	0.88
230 (208-233)	**-**	0.46	0.66	0.80
240 (234-261)	**-**	0.41	0.59	0.70
290 (262-293)	**-**	0.36	0.53	0.69
318 (294-329)	**-**	0.33	0.47	0.55
346 (330-369)	**-**	0.29	0.42	0.50
400 (370-414)	**-**	0.26	0.37	0.44
440 (415-464)	**-**	0.24	0.33	0.39
500 (465-522)	**-**	0.20	0.30	0.35

1) Direct current in BSG operation

Legend

I_H = Holding current r.m.s. value in the connecting harness to the SEW-EURODRIVE brake rectifier

I_B = Accelerator current - brief inrush current

I_G = Direct current with direct DC voltage supply

V_N = Rated voltage (rated voltage range)

Brake BC

	BC05	BC2
Motor size	71/80	90/100
Max. braking torque [Nm]	7.5	30
Braking power [W]	29	41
Control factor I_B/I_H	4	4

Rated voltage V_N		BC05		BC2	
V_{AC}	V_{DC}	I_H [A_{AC}]	I_G [A_{DC}]	I_H [A_{AC}]	I_G [A_{DC}]
	24	-	1.22	-	1.74
42 (40-46)	**18**	1.10	1.39	1.42	2.00
48 (47-52)	**20**	0.96	1.23	1.27	1.78
56 (53-58)	**24**	0.86	1.10	1.13	1.57
60 (59-66)	**27**	0.77	0.99	1.00	1.42
73 (67-73)	**30**	0.68	0.87	0.90	1.25
77 (74-82)	**33**	0.60	0.70	0.79	1.12
88 (83-92)	**36**	0.54	0.69	0.71	1.00
97 (93-104)	**40**	0.48	0.62	0.63	0.87
110 (105-116)	**48**	0.42	0.55	0.57	0.79
125 (117-131)	**52**	0.38	0.49	0.50	0.71
139 (132-147)	**60**	0.34	0.43	0.45	0.62
153 (148-164)	**66**	0.31	0.39	0.40	0.56
175 (165-185)	**72**	0.27	0.34	0.35	0.50
200 (186-207)	**80**	0.24	0.31	0.31	0.44
230 (208-233)	**96**	0.21	0.27	0.28	0.40
240 (234-261)	**110**	0.19	0.24	0.25	0.35
290 (262-293)	**117**	0.17	0.22	0.23	0.32
318 (294-329)	**125**	0.15	0.20	0.19	0.28
346 (330-369)	**147**	0.13	0.18	0.18	0.24
400 (370-414)	**167**	0.12	0.15	0.15	0.22
440 (415-464)	**185**	0.11	0.14	0.14	0.20
500 (465-522)	**208**	0.10	0.12	0.12	0.17

Legend

I_H = Holding current r.m.s. value in the connecting harness to the SEW-EURODRIVE brake rectifier

I_B = Accelerator current - brief inrush current

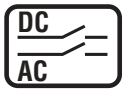
I_G = Direct current with direct DC voltage supply

V_N = Rated voltage (rated voltage range)

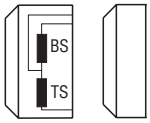
12.13 Block diagrams of brake control systems

Legend

Cut-off in the AC circuit
(standard application of the brake)



Cut-off in the DC and AC circuits
(rapid application of the brake)



Brake
BS = Accelerator coil
TS = Coil section

Auxiliary terminal strip in the terminal box

Motor with delta connection

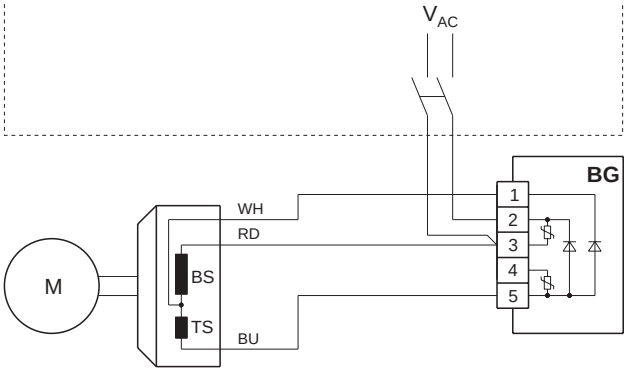
Motor with star connection

Color code according to IEC 757:

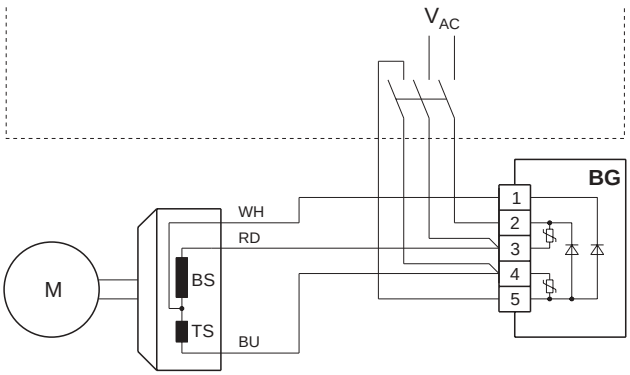
WH	white
RD	red
BU	blue
BN	brown
BK	black

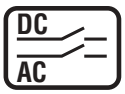
Control cabinet limit

BG, BMS

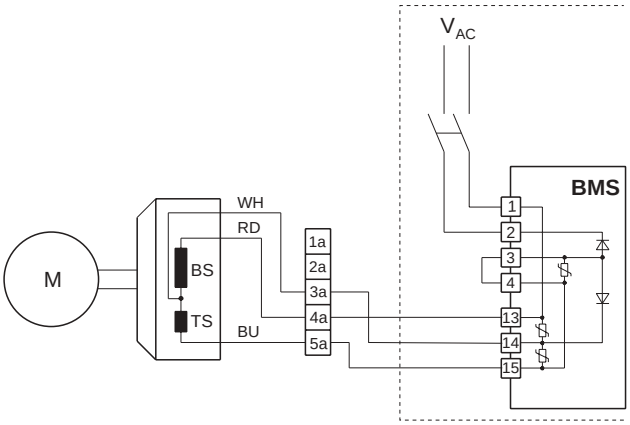


01524BXX

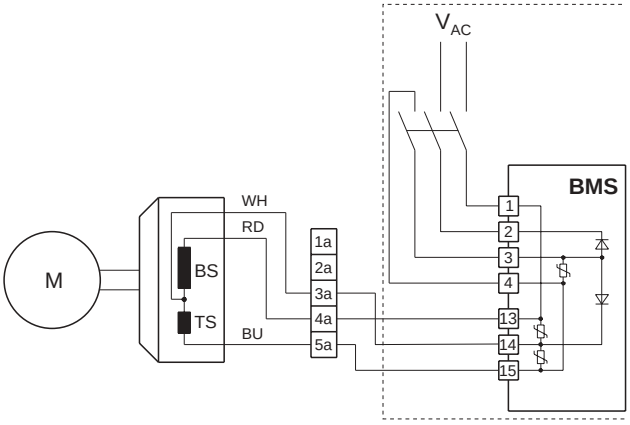


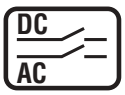


01525BXX



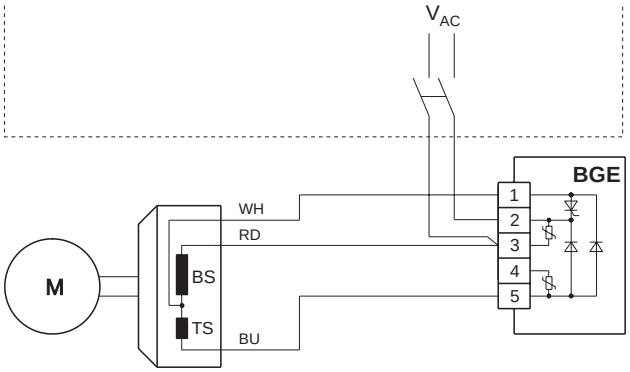
01526BXX



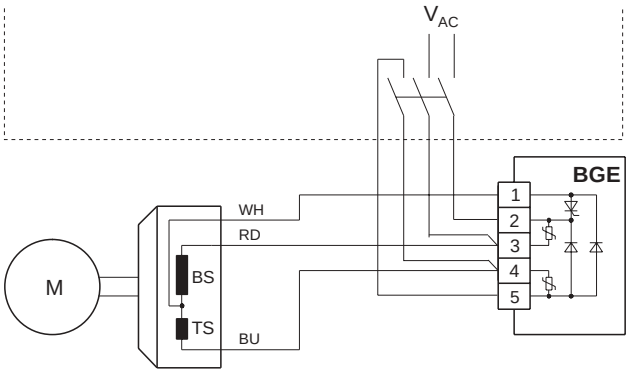


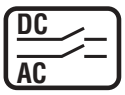
01527BXX

BGE, BME

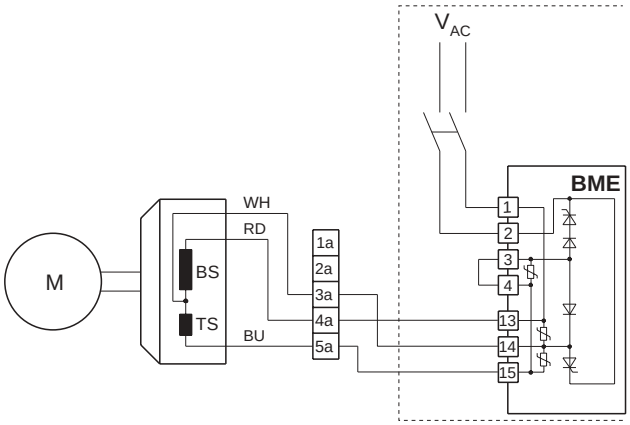


01533BXX

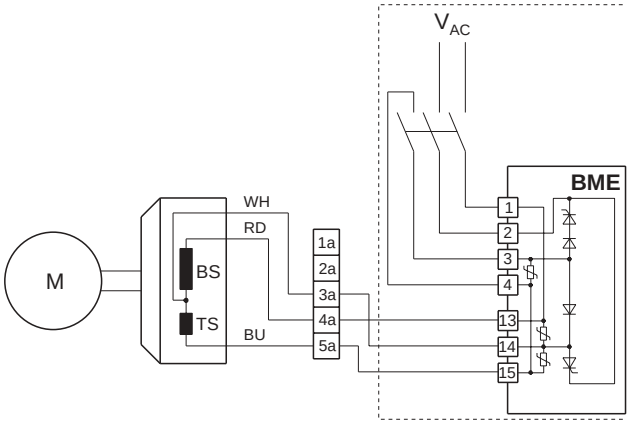


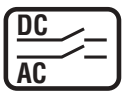


01534BXX



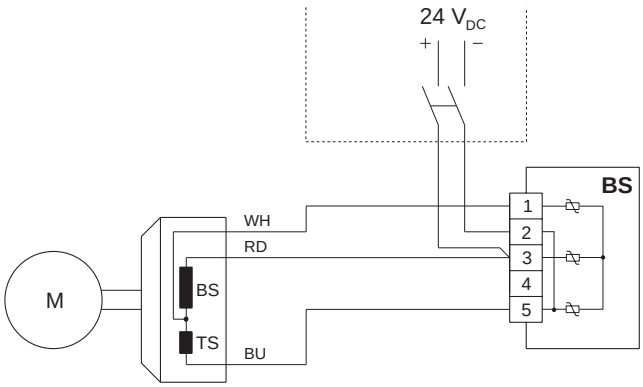
01535BXX





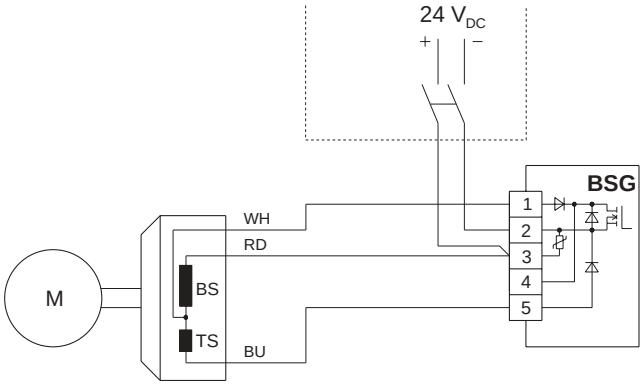
01536BXX

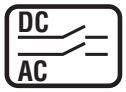
BS



03271AXX

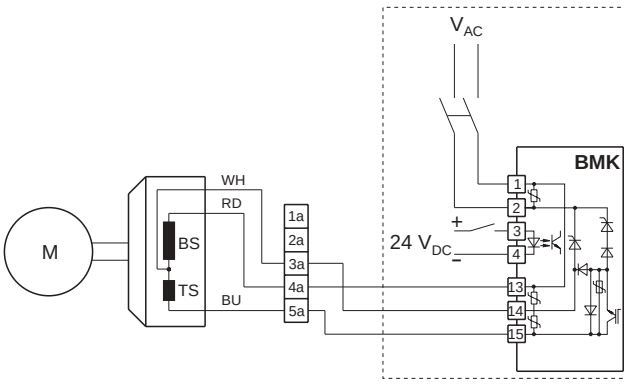
BSG

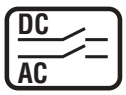




01539BXX

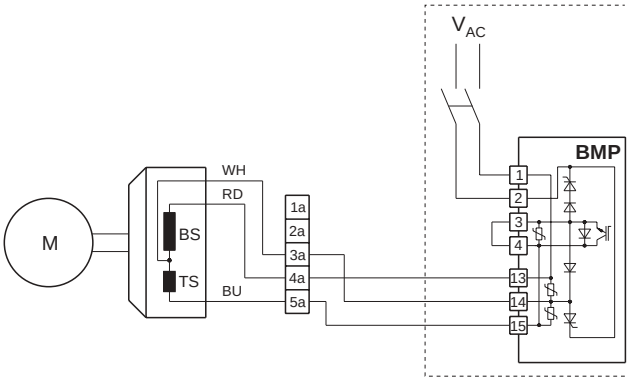
BMK





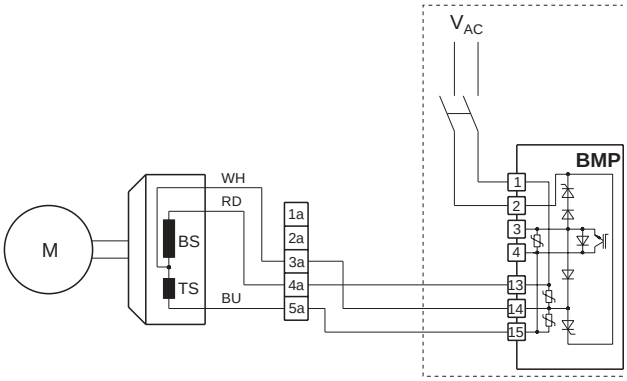
03252AXX

BMP, BMH



AC

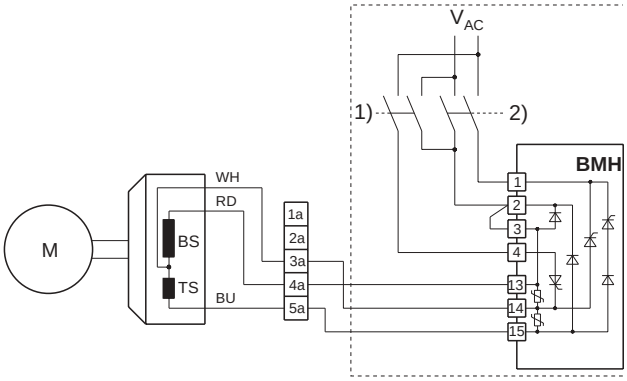
01540BXX



DC
AC

01541BXX

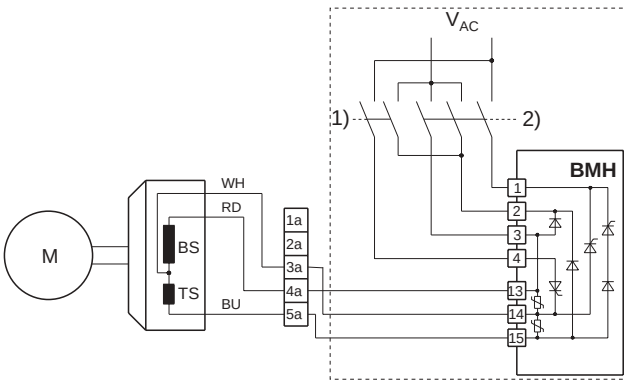
1) Heat
2) Ventilate



AC

01542BXX

1) Heat
2) Ventilate



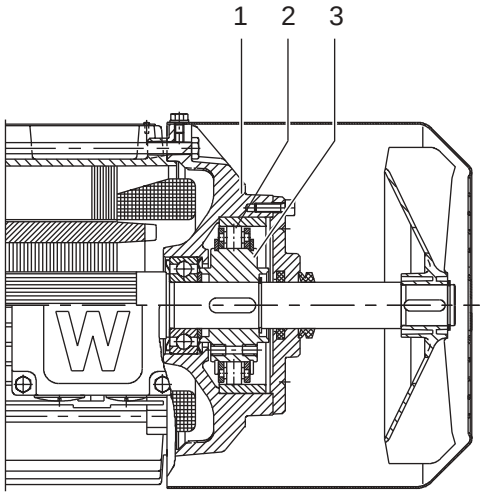
DC
AC

01543BXX

12.14 Backstop RS and protection cowl C

Backstop RS

The mechanical backstop RS is used for protecting equipment against reverse movement when the motor is switched off.



03077AXX

Figure 37: Design of the RS backstop

1 Non drive-end bearing shield
2 Sprags
3 Carrier

Specify the direction of rotation for the motor or gearmotor when placing your order. CW rotation means the output shaft rotates clockwise as viewed onto its face end and is blocked to prevent it from turning counterclockwise. CCW rotation is the other way around.

Protection cowl C

All explosion-proof AC motors and AC brake motors in a vertical mounting position with their output shaft pointing downwards come equipped with protection cowl C.

05665AXX

Figure 38: AC brakemotor with protection cowl C

12.15 Tachometers

Various types of tachometers for installation on DT../DV.. AC motors in categories II3D and II3D as standard are available depending on the application and motor size.

Overview of encoders

Designation	For motor	Encoder type	Shaft	Specification	Supply	Signal
ES1T[1)]	DT71...DV100	Encoder	Spread shaft	-	DC 5 V regulated	TTL/RS-422
ES1S[2)]					DC 24 V	1 V_{SS} sin/cos
ES1R						TTL/RS-422
ES2T[1)]	DV112...DV132S				DC 5 V regulated	TTL/RS-422
ES2S[2)]					DC 24 V	1 V_{SS} sin/cos
ES2R						TTL/RS-422
EV2T[1)]	DT71...DV225		Solid shaft		DC 5 V regulated	TTL/RS-422
EV2S[2)]					DC 24 V	1 V_{SS} sin/cos
EV2R						TTL/RS-422

1) Recommended encoder for operation with MOVITRAC® 31C

2) Recommended encoder for operation with MOVIDRIVE® and MOVIDRIVE® compact

Encoder connection

When connecting the encoder to the inverter, always follow the operating instructions for the relevant inverter and the wiring diagrams supplied with the encoder!

- Maximum line length (inverter - encoder): 100 m with a cable capacitance ≤ 120 nF/km.
- Use a shielded cable with twisted-pair conductors and the shield connected at both ends over a wide area:
  - on the encoder in the cable gland or in the encoder plug
  - on the frequency inverter on the electronics shield clamp or on the housing of the sub D plug.
- Install the encoder cables separately from the power cables, maintaining a distance of at least 200 mm.
- Encoder with cable gland: Observe the permitted diameter of the encoder cable to ensure that the cable gland functions correctly.

See the "Technical data of encoders/encoder mounting adapters" section for more information.

Technical data of encoders/ encoder mounting adapters

SEW-EURODRIVE encoders are incremental encoders. They generate two signal tracks offset at 90°, each with 1024 signal periods/revolution and a zero pulse track with one plus/revolution. In addition, the negated signals are output as well for possible interference voltage suppression.

Spreadshaft encoder

01934AXX

Figure 39: Encoder with spreadshaft

Spreadshaft encoders for AC motors 71...100 **Spreadshaft encoder for AC motors 112...132S**		**ES1T**[1)] **ES2T**[1)]	**ES1S**[2)] **ES2S**[2)]	**ES1R** **ES2R**
Supply voltage	U_B	DC 5 V ±5%	DC 24 V ± 25%	
Max. current consumption	I_{in}	180 mA	160 mA	180 mA
Output amplitude per track	U_{high} U_{low}	≥ DC 2.5 V ≤ DC 0.5 V	1 V_{SS}	≥ DC 2.5 V ≤ DC 0.5 V
Signal output		TTL/RS-422	sin/cos	TTL/RS-422
Output current per track	I_{out}	20 mA	40 mA	20 mA
max. pulse frequency	f_{max}	120 kHz		
Pulses (sine cycles) per revolution	**A, B** **C**	1024 1		
Mark-to-space ratio		1 : 1 ±20 %		
Phase angle A : B		90° ±20 %		
Ambient temperature	ϑ_{amb}	-30 °C ... +60 °C (EN 60721-3-3, class 3K3)		
Enclosure		IP55 (EN 60529)		
Connection		Terminal box on encoder		

1) Recommended encoder for operation with MOVITRAC® 31C

2) Recommended encoder for operation with MOVIDRIVE®

Solid shaft encoders

51064AXX

Figure 40: AC motor with solid shaft encoder

Solid shaft encoders for AC motors 71..0.225		EV1T[1)]	EV1S[2)]	EV1R
Supply voltage	U_B	DC 5 V ±5%	DC 24 V ± 25%	
Max. current consumption	I_{in}	180 mA	160 mA	180 mA
Output amplitude per track	U_{high} U_{low}	≥ DC 2.5 V ≤ DC 0.5 V	1 V_{SS}	≥ DC 2.5 V ≤ DC 0.5 V
Signal output		TTL/RS-422	sin/cos	TTL/RS-422
Output current per track	I_{out}	20 mA	40 mA	20 mA
Max. pulse frequency	f_{max}	120 kHz		
Pulses (sine cycles) per revolution	**A, B** **C**	1024 1		
Mark-to-space ratio		1 : 1 ±20 %		
Phase angle A : B		90° ±20 %		
Ambient temperature	ϑ_{amb}	-40 °C ... +60 °C (EN 60721-3-3, class 3K3)		
Enclosure		IP66 (EN 60529)		
Connection		Terminal box on encoder		

1) Recommended encoder for operation with MOVITRAC® 31C

2) Recommended encoder for operation with MOVIDRIVE®

Encoder mounting adapter

On request, motors can be equipped with a variety of encoder mounting adapters for mounting of encoders made by various manufacturers.

51065AXX

Figure 41: AC motor with EV1A encoder mounting adapter

Technical data

Type	ES1A	ES2A	EV1A
For motors	DT/DV71 ... 100	DV112 ... 132S	DT/DV71 ... 225
for	Spreadshaft encoders with 8 mm center bore	Spreadshaft encoders with 10 mm center bore	Solid shaft encoders (synchronous flange)
Flange diameter	-	-	58 mm
Center bore diameter	-	-	50 mm
Shaft end diameter	-	-	6 mm
Length of shaft end	-	-	10 mm

The encoder is attached to the EV1A (synchronous flange) using 3 pcs. encoder mounting clamps (bolts with eccentric disks) for 3 mm flange thickness.

12.16 Available motor options

Overview

The following motor options are availabe in various combinations:

- Disc brakes BM(G)/BC
- Backstop RS
- Protection cowl C
- Encoder
- Encoder mounting adapter
- MOVIMOT® integrated frequency inverter
- MOVI-SWITCH® integrated motor circuit breaker / motor protection
- TF temperature sensor

Not all options are always available for a specific equipment category!

Technical data and dimensions

The technical data and dimensions for the motor options are listed in the "Mounting Positions, Technical data and dimension sheets for AC motors" section.

12.17 Standards and regulations

Conformance to standards

AC motors and AC brakemotors from SEW-EURODRIVE conform to the relevant standards and regulations, in particular:

- IEC 60034-1, EN 60034-1
  Rotating electrical machinery, rating and performance.
- EN 60529
  IP degrees of protection provided by enclosures of electrical equipment.
- IEC 60072
  Dimensions and performance of rotating electrical machinery.
- EN 50262
  Metric threads of cable glands.
- EN 50347
  Standardized dimensions and power values.
- DIN 42925
  Terminal box cable entries for three-phase AC motors
- DIN 44080
  Thermistors; PTC, technical terms and tests
- EN 50014
  Electrical apparatus for potentially explosive atmospheres, general requirements
- EN 50018
  Flameproof enclosure "d"
- EN 50019
  Increased safety "e"
- EN 50021
  Protection type "n"
- EN 50281-1-1
  Electrical apparatus for use in areas with combustible dust

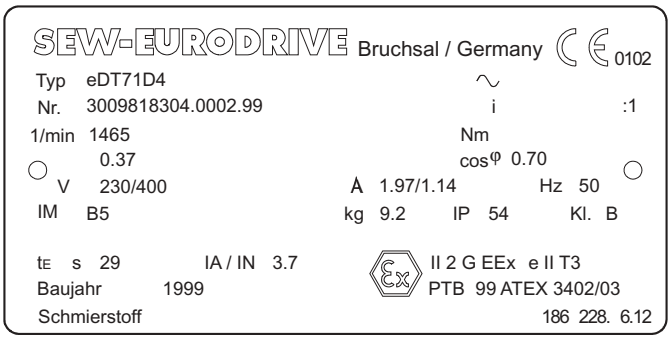
Energy efficient motors are only available in category 3

CEMEP, the association of European electric motor manufacturers, has reached an agreement with the European Commission's General Directorate for Energy that all 2 and 4-pole low-voltage AC motors from 1 to 100 kW will be classified on the basis of their efficiency, and that this classification will be identified on the nameplate and in catalogs. The following different categories will be used: EFF3, EFF2 and EFF1. EFF2 indicates improved efficiency motors and EFF1 is for high-efficiency motors.

All four-pole AC motors in categories II2D, II2G, II3D and II3G with a power of 1.1 kW and greater fulfill the requirements for efficiency class EFF 2.

Rated data

The specific data of an asynchronous AC motor (AC squirrel-cage motor) are its size, rated power, cyclic duration factor, rated speed, rated current, rated voltage, power factor cosφ, enclosure, thermal classification and efficiency category. These data are indicated on the nameplate of the motor. In accordance with IEC 60034 (EN 60034), the nameplate data apply to a maximum ambient temperature of 40 °C and a maximum altitude of 1000 m above sea level.



51947AXX

Figure 42: Motor nameplate

Tolerances

In accordance with IEC60034 (EN 60034), the following tolerances are permitted for electric motors at rated voltage (also applies to the rated voltage range):

Voltage and frequency		Tolerance A
Efficiency η	$P_N \leq 50$ kW $P_N > 50$ kW	-0,15 • (1-η) -0,1 • (1-η)
Power factor cosφ		$-\frac{1 - \cos\varphi}{6}$
Slip	$P_N < 1$ kW $P_N \geq 1$ kW	±30 % ±20 %
Starting current		+20 %
Starting torque		-15 %...+25 %
Breakdown torque		-10 %
Mass moment of inertia		±10 %

Tolerance A

Tolerance A describes the permitted range within which the frequency and voltage are allowed to deviate from their respective rated points. The origin identified with "0" indicates the respective rated points for frequency and voltage.

Motors for operation in systems with higher voltage fluctuations are available on request.

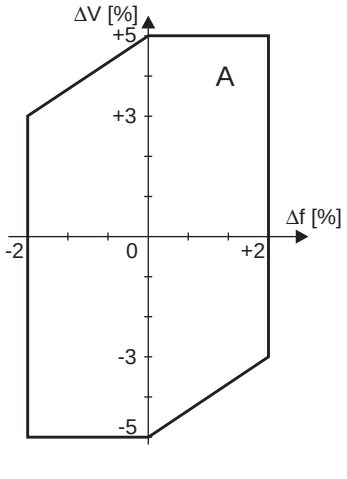


Figure 43: Range of tolerance A

Undervoltage

It is not possible to achieve the values in the catalog such as power, torque and speed in the event of undervoltage due to weak supply systems or an insufficiently large motor cable. This applies in particular to the motor start-up in which the starting current is a multiple of the rated current.

12.18 EMC measures

EMC measures

SEW-EURODRIVE AC motors and AC brakemotors are components for installation in machinery and systems. The designer of the machine or system is responsible for complying with the EMC Directive 89/336/EEC. Please refer to the publication "Drive Engineering - Practical Implementation, Electromagnetic Compatibility (EMC) in Drive Engineering" for detailed information about this topic.

Mains operation

SEW-EURODRIVE AC (brake) motors satisfy the EMC generic standards EN 50081 and EN 50082 when used in accordance with their designated use in continuous mains operation.

Switching operation

Please take suitable interference suppression measures on the switchgear if the motor is used in switching operation.

Frequency inverter operation

Please refer to the installation and EMC instructions provided by the inverter manufacturer regarding frequency inverter operation. Also note the following points:

Brakemotors on frequency inverter

Install the brake cables of brake motors separately from the other power cables, maintaining a distance of at least 200 mm. Collective installation is only permitted if either the brake cable or the power cable is shielded.

Tachometer connection on the frequency inverter

Observe the following instructions when connecting the tachometer:

- Use a shielded cable with twisted pair conductors only.
- Connect the shield to the PE potential on both ends over a large surface area.
- Install signal cables separately from power cables or brake cables (min. distance 200 mm).

Connecting positive temperature coefficient (PTC) thermistor TF on the frequency inverter

Install the connecting lead of the positive temperature coefficient (PTC) thermistor TF separately from other power cables, maintaining a distance of at least 200 mm. Collective installation is only permitted if either the TF cable or the power cable is shielded.

12.19 Motor protection

Selecting the correct protection device is a significant factor in determining the operational reliability of the motor. We distinguish between protection devices that are current-dependent and those that depend on the motor temperature. Current-dependent protection devices include fuses or motor circuit breakers. Temperature-dependent protection devices include PTC thermistors or bimetallic switches (thermostats) in the winding. PTC thermistors or bimetallic switches are triggered when the maximum permitted winding temperature is reached. They offer the advantage that the temperatures are measured where they arise.

Motor circuit breakers

Motor circuit breakers offer adequate protection against overload in standard operation with a low starting frequency, brief start-ups and starting currents that are not excessive. The motor circuit breaker is set to the rated motor current.

Motor circuit breakers are not adequate as the sole means of protection given switching operation with a high starting frequency and for high inertia starting. Under these circumstances, we recommend using positive temperature coefficient (PTC) thermistors TF as well.

PTC thermistors

Three positive temperature coefficient (PTC) thermistors **TF** (PTC, characteristic curve according to DIN 44080) are connected in series in the motor and connected from the terminal box to a trip switch in the control cabinet. Motor protection with a positive temperature coefficient (PTC) thermistor offers comprehensive protection against thermal overload. Motors protected in this way can be used for high inertia starting, switching and braking operation (note the certificate/approval for the corresponding-operating mode!). A motor circuit breaker is usually installed in addition to the TF. SEW-EURODRIVE recommends always using motors equipped with TF for frequency inverter operation.

Bimetallic switches

Three bimetallic switches **TH**, connected in series in the motor, are looped directly into the motor monitoring circuit from the terminal box.

Fuses

Fuses do not protect the motor against overloads. They are exclusively used for short-circuit protection.

The following table shows the qualification of the various protection devices for dealing with different causes of tripping.

○ = no protection ◑ = limited protection ● = comprehensive protection	Current-dependent protection device		Temperature-dependent protection device
	Fuse	Motor circuit breaker	PTC thermistor (TF)
Overcurrents up to 200 % I_N	○	●	●
Stalling	○	◑	◑ 1)
Single phasing	○	◑	●
Inadequate motor cooling	○	○	◑

1) If the motor with TF has been certified / approved

Secure switching of inductances

- Switching of low-speed motor windings.

  If the cable is installed unfavorably, switching of low-speed motor windings can generate voltage peaks. These voltage peaks can destroy windings and contacts. To avoid this, connect the cables using varistors outside the potentially explosive atmosphere.

- Switching of brake coils.

  Varistors must be used to avoid harmful switching overvoltages caused by switching operations in the DC circuit of disk brakes.

  SEW-EURODRIVE brake control systems contain varistors as standard. Only use contactors with contacts in **utilization category AC3 to EN 60947-4-1** for switching brake coils.

- Suppressor circuit on the switching devices.

  According to EN 60204 (Electrical Equipment of Machines), motor windings must be equipped with interference suppression to protect the numerical or programmable logic controllers. Because problems are primarily caused by switching operations, we recommend installing suppressor circuits on the switching devices.

- Always adhere to the information in the "Explosion-Proof AC Motors" operating instructions.

12.20 Electrical characteristics

Suitable for frequency inverter operation

AC (brake) motors in category 3 can be operated on the frequency inverter because of the high-quality insulation installed as standard (using phase separators, amongst other features). Note the permitted motor/frequency inverter combinations (→ Sec. "AC motors cat. II3G/II3D with frequency inverter").

Frequency

SEW-EURODRIVE AC motors are designed for 50 Hz or 60 Hz on request. As standard, the technical data for AC motors refers to a 50 Hz supply frequency. 60 Hz versions are not available for all category 2 motors.

Motor voltage

AC motors are available for rated voltages from 220 to 690 V. Pole-changing motors in sizes 71 ... 90 are available for rated voltages from 220 ... 500 V only.

For 50 Hz supply systems

The **standard voltages** are:

Motors	**Motor size**		
	63...90	**100...132S**	**> 132S**
	Motor voltage		
Single speed	**230/400 V_{AC} Δ/人290/500 V_{AC} Δ/人**	**230/400 V_{AC} Δ/人** 290/500 V_{AC} Δ/人 400/690 V_{AC} Δ/人 500 V_{AC} Δ	**230/400 V_{AC} Δ/人** 290/500 V_{AC} Δ/人 400/690 V_{AC} Δ/人 500 V_{AC} Δ
Multi-speed, Dahlander	**400 V_{AC} Δ/人人**		
	Brake voltage		
Standard voltages	**24 V_{DC} / 230 V_{AC} / 400 V_{AC}**		

Motors and brakes for AC 230/400 V and motors for AC 690 V may also be operated on supply systems with a rated voltage of AC 220/380 V or AC 660 V respectively. The voltage-dependent data are then slightly different.

Standard connections, 50 Hz motors

No. of poles		**Synchronous speed n_{syn} at 50 Hz [1/min]**	**Connection**
2	Single speed	3000	人 / Δ
4		1500	人 / Δ
6		1000	人 / Δ
8		750	人 / Δ
4/2	Multi-speed	1500/3000	Δ/人人 Dahlander
8/4		750/1500	Δ/人人 Dahlander

For 60 Hz supply systems

The **standard voltages** are indicated in **bold**:

Motors	Motor size		
	63...90	100...132S	> 132S
	Motor voltage		
Single speed	**266/460 V_{AC} Δ/人** 220/380 V_{AC} Δ/人 330/575 V_{AC} Δ/人	**266/460 V_{AC} Δ/人** 220/380 V_{AC} Δ/人 330/575 V_{AC} Δ/人	**266/460 V_{AC} Δ/人** 220/380 V_{AC} Δ/人 330/575 V_{AC} Δ/人
Multi-speed, Dahlander	460 V_{AC} Δ / 人人		
	Brake voltage		
Standard voltages	**24 V_{DC} / 266 V_{AC} / 460 V_{AC}**		

Standard connections, 60 Hz motors

No. of poles	Synchronous speed n_{syn} at 60 Hz [1/min]	Connection
2	3600	Δ/人
I	1800	Δ/人
6	1200	Δ/人
4/2	1800/3600	Δ/人人 Dahlander
8/4	900/1800	Δ/人人 Dahlander

12.21 Thermal characteristics

Thermal classifications to EN 60034-1

The standard design for all single speed motors and Dahlander motors is temperature class B. Thermal classification F is also available on request. The following table lists the overtemperatures according to EN 60034-1.

Temperature class	Overtemperature limit [K]
B	80 K (70 K)[1)]
F	105 K (90 K) [1)]

1) Values in brackets apply to explosion-proof motors and brake motors with EExe enclosure (increased safety)

12.22 Permitted operating modes

Motor type and equipment category	Protection against excessive temperatures exclusively by	Permitted operating mode
eDT../eDV.. II2G	Motor circuit breaker	• S1[1)] • Heavy starting not possible[2)]
eDT..BC.. II2G	Positive temperature coefficient thermistor (TF)	• S1 • S4, no-load starting frequency according to catalog data, starting frequency is to be calculated under load • Heavy starting[2)]
eDT../eDV.. II2D	Positive temperature coefficient thermistor (TF)	• S1 • Heavy starting
DT/DV II3G/II3D	Motor circuit breaker	• S1[1)] • No heavy start
DT/DV DT..BM../DV..BM.. II3G/II3D	Positive temperature coefficient thermistor (TF)	• S1 • S4, no-load starting frequency according to catalog data, starting frequency is to be calculated under load • Heavy start • Frenquency inverter operation according to the information in chapter 5

1) Contact the protective circuit breaker manufacturer for the permitted starting frequency

2) According to EN 50019 appendix A, heavy starting is present when a motor protection switch that was properly selected and set for normal operating conditions already trips during the acceleration time. This is usually the case when the acceleration time is > 1.7 x t_E time.

12.23 Starting frequency

A motor is usually rated according to its thermal loading. In many applications the motor is started only once (S1 = continuous running duty = 100 % cdf). The power demand calculated on the basis of the load torque of the driven machine is equal to the rated power of the motor.

Increased starting frequency

The maximum permitted starting frequency must be calculated if the operating mode is not continuous duty. The reason is that the decisive factor for the motor size in this case is not the power demand but the number of motor starts. Frequent starting means the high starting current flows every time, leading to disproportionate heating of the motor. The windings become overheated if the heat absorbed is greater than the heat dissipated by the motor ventilation system. A motor protection switch does not provide adequate protection for the motor against overtemperature if there are more than 30 cycles per hour. The motor then needs to be protected using positive temperature coefficient thermistors (TF).

No-load starting frequency Z_0

The manufacturer specifies the permitted starting frequency of a motor as the no-load starting frequency Z_0 at 50 % cdf. This value indicates the number of times per hour that the motor can accelerate the mass moment of inertia of its rotor up to speed without counter-torque at 50 % cdf. The run-up time of the motor is increased if an additional mass moment of inertia has to be accelerated or if there is an extra load torque. Increased current flows during this acceleration time. This means the motor is subjected to increased thermal load and the permitted starting frequency is reduced.

Permitted starting frequency of a motor

The permitted starting frequency Z of a motor in cycles/hour [per h] can be calculated using the following formula:

$$\mathbf{Z = Z0 \bullet KJ \bullet KM \bullet KP}$$

Refer to the following diagrams for the factors K_J, K_M and K_P:

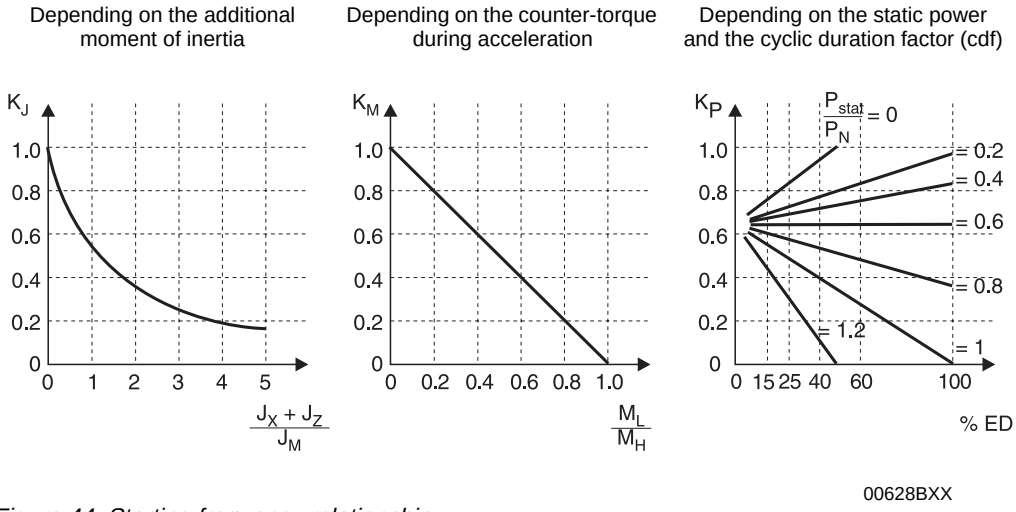


Figure 44: Starting frequency relationship

J_X=	Total of all external mass moments of inertia with reference to the motor axis	M_H=	Motor acceleration torque
J_Z=	Mass moment of inertia, flywheel fan	P_{stat}=	Power demand after acceleration (static power)
J_M=	Motor mass moment of inertia	P_N=	Rated motor power
M_L=	Counter-torque during acceleration	% cdf =	Cyclic duration factor

Example

Motor: eDT80N4/BC05

No-load starting frequency Z_0 = 3600 per h

1. $(J_X + J_Z) / J_M = 3.5$ → $K_J = 0.2$
2. $M_L / M_H = 0.6$ → $K_M = 0.4$
3. $P_{stat} / P_N = 0.6$ and 60 %cdf → $K_P = 0.65$

$Z = Z_0 \bullet K_J \bullet K_M \bullet K_P = 3600$ c/h $\bullet$ 0.2 $\bullet$ 0.4 $\bullet$ 0.65 = 187c/h

The cycle duration is 20 s, the operating time 11 s.

Permitted starting frequency of the brake

If you are using a brakemotor, you have to check whether the brake is approved for use with the required starting frequency Z. Please refer to the information in the "Permitted work done by the brake" section for details.

12.24 Mechanical characteristics

Enclosures according to EN 60529

The following enclosures are available for AC motors and AC brakemotors:

- Category 2G, 3G, 3D in IP54, IP55/IP65 on request
- Category 2D in IP65

IP	1st digit Protection against foreign objects	2nd digit Protection against water
0	No protection	No protection
1	Protected against solid foreign objects with diameter ∅50 mm and greater	Protection against dripping water
2	Protection against solid foreign objects with diameter ∅12 mm and greater	Protection against dripping water if the housing is tilted by up to 15°
3	Protection against solid foreign objects with diameter ∅ 2.5 mm and greater	Protection against spraying water
4	Protection against solid foreign objects with diameter ∅ 1 mm and greater	Protection against splashing water
5	Protection against dust penetration	Protection against water jets
6	Dust-proof	Protection against powerful water jets
7	-	Protection against temporary immersion in water
8	-	Protection against permanent immersion in water

Other options

Increased corrosion protection for metal parts and additional winding impregnation (moisture and acid protection) are possible (see section 2.10).

Vibration severity grade of motors

The rotors of AC motors are dynamically balanced with a half key. The motors correspond to vibration severity grade "N" according to IEC 60034-14 (EN 60034-14). If there are particular demands for smooth mechanical running, **4, 6 and 8-pole motors without add-ons** can be supplied in the low-vibration design "vibration severity grade R".

12.25 Overhung loads

Refer to the section "Project Planning for Gear Unit/Overhung loads and axial forces" for general information about overhung loads. The following table lists the permitted overhung loads (top value) and axial forces (bottom value) of AC motors.

Mounting position	[1/min] No. of poles	Permitted overhung load F_R [N] Permitted axial force F_A [N]; $F_{A\_Zug} = F_{A\_Druck}$ Size													
		63	71	80	90	100	112	132S	132ML 132M	160M	160L	180	200	225	250 280
Foot-mounted motor	750 8	- -	680 200	920 240	1280 320	1700 400	1750 480	1900 560	2600 640	3600 960	3800 960	5600 1280	6000 2000	- -	- -
	1000 6	- -	640 160	840 200	1200 240	1520 320	1600 400	1750 480	2400 560	3300 800	3400 800	5000 1120	5500 1900	- -	- -
	1500 4	- -	560 120	720 160	1040 210	1300 270	1400 270	1500 270	2000 400	2600 640	3100 640	4500 940	4700 2400	7000 2400	8000 2500
	3000 2	- -	400 80	520 100	720 145	960 190	980 200	1100 210	1450 320	2000 480	2300 480	3450 800	3700 1850	- -	- -
Flange-mounted motor	750 8	- -	850 250	1150 300	1600 400	2100 500	2200 600	2400 700	3200 800	4600 1200	4800 1200	7000 1600	7500 2500	- -	- -
	1000 6	600 150	800 200	1050 250	1500 300	1900 400	2000 500	2200 600	2900 700	4100 1000	4300 1000	6300 1400	6800 2400	- -	- -
	1500 4	500 110	700 140	900 200	1300 250	1650 350	1750 350	1900 350	2500 500	3200 800	3900 800	5600 1200	5900 3000	8700 3000	9000 2600
	3000 2	400 70	500 100	650 130	900 180	1200 240	1200 250	1300 260	1800 400	2500 600	2900 600	4300 1000	4600 2300	- -	- -

Overhung load conversion for off-center force application

The permitted overhung loads must be calculated using the following formulae in the event of force application not in the center of the shaft end. The smaller of the two values F_{xL} (according to bearing service life) and F_{xW} (according to shaft strength) is the permitted value for the overhung load at point x. Note that the calculations apply to $M_{a\ max}$.

F_{xL} based on bearing service life

$$F_{xL} = F_R \cdot \frac{a}{b + x}\ [N]$$

F_{xW} from the shaft strength

$$F_{xW} = \frac{c}{f + x}\ [N]$$

F_R = Permitted overhung load (x = l/2) [N]

x = Distance from the shaft shoulder to the force application point [mm]

a, b, f = Motor constants for overhung load conversion [mm]

c = Motor constant for overhung load conversion [Nmm]

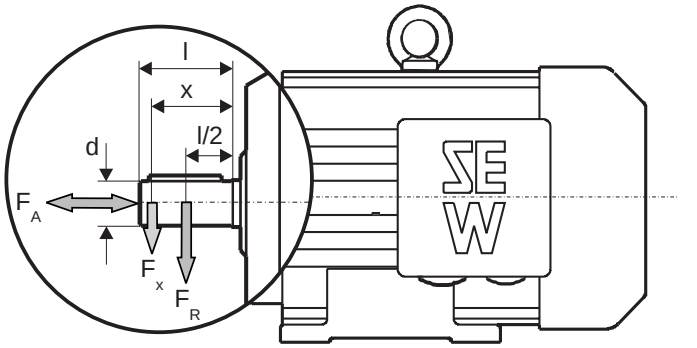


Figure 45: Overhung load F_X for off-center force application

Motor constants for overhung load conversion

Size	a [mm]	b [mm]	c 2-pole [Nmm]	c 4-pole [Nmm]	c 6-pole [Nmm]	c 8-pole [Nmm]	f [mm]	d [mm]	l [mm]
DFR63	161	146	$11.2 \bullet 10^3$	$16.8 \bullet 10^3$	$19 \bullet 10^3$	-	13	14	30
DT71	158.5	143.8	$11.4 \bullet 10^3$	$16 \bullet 10^3$	$18.3 \bullet 10^3$	$19.5 \bullet 10^3$	13.6	14	30
DT80	213.8	193.8	$17.5 \bullet 10^3$	$24.2 \bullet 10^3$	$28.2 \bullet 10^3$	$31 \bullet 10^3$	13.6	19	40
(S)DT90	227.8	202.8	$27.4 \bullet 10^3$	$39.6 \bullet 10^3$	$45.7 \bullet 10^3$	$48.7 \bullet 10^3$	13.1	24	50
SDT100	270.8	240.8	$42.3 \bullet 10^3$	$57.3 \bullet 10^3$	$67 \bullet 10^3$	$75 \bullet 10^3$	14.1	28	60
DV100	270.8	240.8	$42.3 \bullet 10^3$	$57.3 \bullet 10^3$	$67 \bullet 10^3$	$75 \bullet 10^3$	14.1	28	60
(S)DV112M	286.8	256.8	$53 \bullet 10^3$	$75.7 \bullet 10^3$	$86.5 \bullet 10^3$	$94.6 \bullet 10^3$	24.1	28	60
(S)DV132S	341.8	301.8	$70.5 \bullet 10^3$	$96.1 \bullet 10^3$	$112 \bullet 10^3$	$122 \bullet 10^3$	24.1	38	80
DV132M	344.5	304.5	$87.1 \bullet 10^3$	$120 \bullet 10^3$	$144 \bullet 10^3$	$156 \bullet 10^3$	20.1	38	80
DV132ML	404.5	364.5	$120 \bullet 10^3$	$156 \bullet 10^3$	$198 \bullet 10^3$	$216.5 \bullet 10^3$	20.1	38	80
DV160M	419.5	364.5	$150 \bullet 10^3$	$195.9 \bullet 10^3$	$248 \bullet 10^3$	$270 \bullet 10^3$	20.1	42	110
DV160L	435.5	380.5	$177.5 \bullet 10^3$	$239 \bullet 10^3$	$262.5 \bullet 10^3$	$293 \bullet 10^3$	22.15	42	110
DV180	507.5	452.5	$266 \bullet 10^3$	$347 \bullet 10^3$	$386 \bullet 10^3$	$432 \bullet 10^3$	22.15	48	110
DV200	537.5	482.5	$203.5 \bullet 10^3$	$258.5 \bullet 10^3$	$302.5 \bullet 10^3$	$330 \bullet 10^3$	0	55	110
DV225	626.5	556.5	-	$490 \bullet 10^3$	-	-	0	60	140
DV250	658	588	-	$630 \bullet 10^3$	-	-	0	65	140
DV280	658	588	-	$630 \bullet 10^3$	-	-	0	75	140

2nd motor shaft end

Contact SEW-EURODRIVE regarding the permitted load for a 2nd motor shaft end.

Motor bearings used

The following table shows which bearings are used in SEW-EURODRIVE AC (brake) motors:

Motor type	Drive-end bearing (AC motor, brake motor)		Non drive-end bearing (foot-mounted, flange-mounted, gear-motors)	
	Gearmotor	Flange-mounted and foot-mounted	AC motor	Brakemotor
eDT71 - eDT80	6303 2RS J C3	6204 2RS J C3	6203 2RS J C3	
eDT90 - eDV100	6306 2RS J C3		6205 2RS J C3	
eDV112 - eDV132S	6307 2RS J C3	6208 2RS J C3	6207 2RS J C3	-
eDV132M - eDV160M	6309 2RS J C3		6209 2RS J C3	-
eDV160L - eDV180L	6312 2RS J C3		6213 2RS J C3	-

Motor type	Drive-end bearing (AC motor, brakemotor)		Non drive-end bearing (foot-mounted, flange-mounted, gear-motors)	
	Gearmotor	Flange-mounted and foot-mounted	AC motor	Brakemotor
DR63	6303 2RS J C3	6203 2RS J C3	6202 2RS J C3	-
DT71 - DT80	6303 2RS J C3	6204 2RS J C3	6203 2RS J C3	
DT90 - DV100	6306 2RS J C3		6205 2RS J C3	
DV112 - DV132S	6307 2RS J C3	6208 2RS J C3	6207 2RS J C3	
DV132M - DV160M	6309 2RS J C3		6209 2RS J C3	
DV160L - DV180L	6312 2RS J C3		6213 2RS J C3	
DV200LS - DV225M	6314 2RS J C3		6314 2RS J C3	
DV250 - DV280S	6316 2RS J C3		6315 2RS J C3	

Bearing lubrication: Asonic GHY72

12.26 Special markets

V.I.K.

The Association of the Energy and Power Generation Industry (V.I.K.) has published a recommendation for its members concerning the technical requirements for three-phase asynchronous motors.

SEW-EURODRIVE drives can be supplied in conformity with these requirements. The following deviations from the standard are involved:

- Motor with enclosure of at least IP55.
- Motor of thermal class F, permitted overtemperature only as in thermal class B.
- Corrosion protection for motor components.
- Terminal box made of gray cast iron.
- Protection cowl for vertical motor mounting positions with fan guard on top.
- Additional ground wire connection via an external terminal.
- Nameplate with V.I.K. information. A second nameplate on the inside of the terminal box cover.

Note

Technical requirements issued by the V.I.K. must be applied analogously to gearmotors, pole-changing motors and motors for high inertia starting, switching operation and speed control. The requirements result in the following necessary deviations:

- Mounting position: The position of the breather valves and the lubricant fill quantities, which depend on the mounting position, means that gearmotors cannot be used in either horizontal or vertical mounting positions.
- Labeling: There are no holes for attaching an additional identification plate.