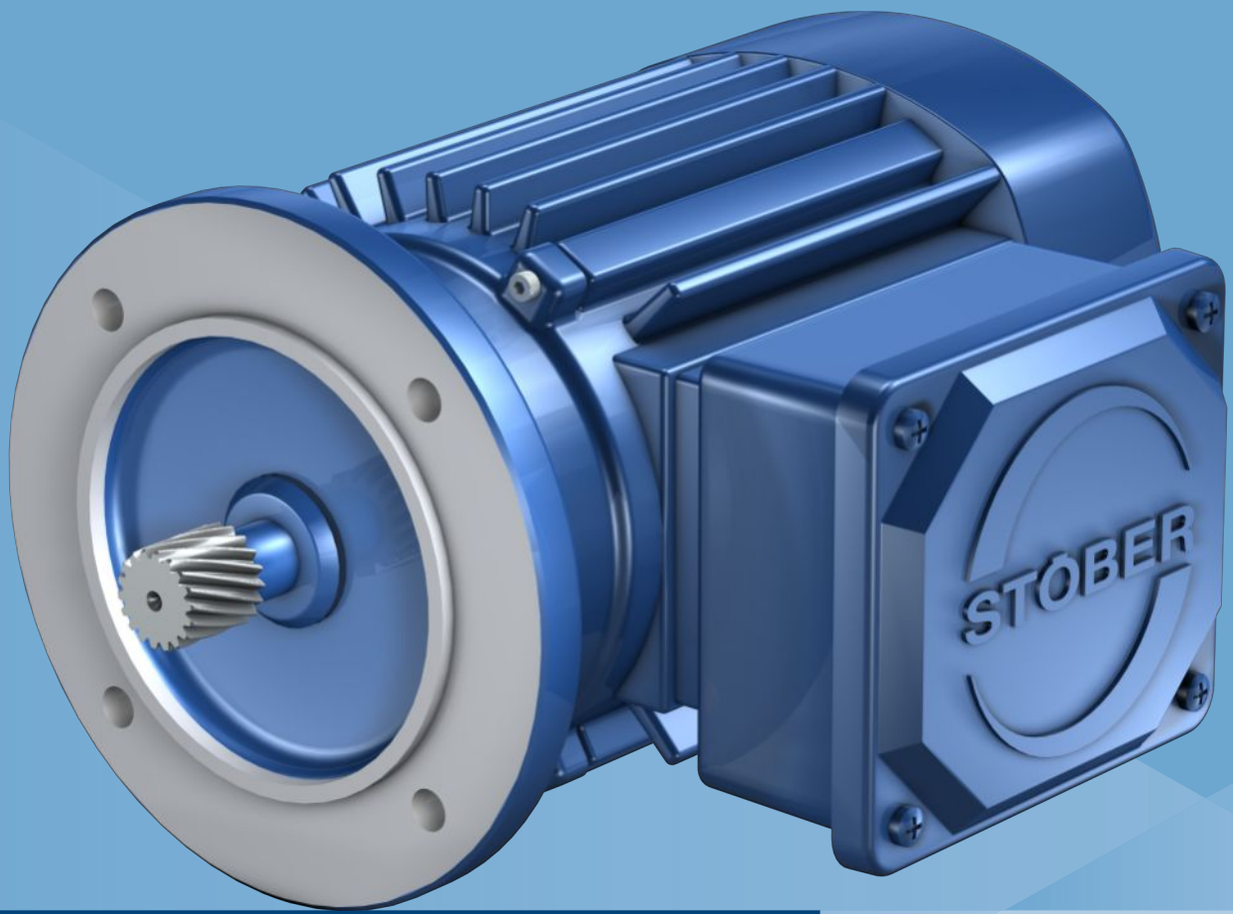


6 Asynchronous motors

6.1 Overview

Asynchronous motors

Features

Self-ventilation or forced ventilation (optional)	✓
Spring-loaded brake (optional)	✓
Incremental encoder (optional) or SSI absolute encoder (optional)	✓
Elimination of referencing with multi-turn absolute encoders (optional)	✓
Terminal box	✓
Energy efficiency class IE3 in accordance with EN 60034-30-1 starting from 0.75 kW	✓

Technical data (400 V ± 10%, 50 Hz)

n_2	1360 – 2920 rpm
P_N	0.12 – 45 kW
M_N	0.62 – 290 Nm
I_N	0.44 – 84 A

6.2 Selection tables

The technical data specified in the following selection table apply to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- 230 / 400 V AC nominal voltage
- 50 Hz nominal frequency
- Number of poles: 2 or 4

For technical data for other motor designs, go to http://products.stoeber.de.

Observe the legal requirements in Chapter [▶ 6.6.1].

The type designation for the motors in this product catalog and on the nameplate of the motor are different. The allocation is shown in the following table.

Type on nameplate	Type in catalog
K21R 63 K4	D063K04
K21R 63 K2	D063K02
K21R 63 G4	D063M04
K21R 63 G2	D063M02
K21R 71 K4	D071K04
K21R 71 K2	D071K02
K21R 71 G4	D071L04
K21R 71 G2	D071L02
K21R 80 K4	D080K04
IE3-W42R 80 K2	IE3D080K02
IE3-W41R 80 G4	IE3D080L04
IE3-W41R 80 GY2	IE3D080L02
IE3-W41R 90 SY4	IE3D090S04
IE3-W42R 90 S2	IE3D090S02
IE3-W41R 90 L4	IE3D090L04
IE3-W41R 90 LY2	IE3D090L02
IE3-W41R 100 LY4	IE3D100K04
IE3-W41R 100 LY2	IE3D100L02
IE3-W41R 100 LZ4	IE3D100L04
IE3-W41R 112 MY2	IE3D112M02
IE3-W41R 112 MW4	IE3D112M04
IE3-W41R 132 S4	IE3D132S04
IE3-W41R 132 M4	IE3D132M04
IE3-W41R 160 M4	IE3D160M04
IE3-W41R 160 L4C	IE3D160L04
IE3-W41R 180 M4	IE3D180M04
IE3-W41R 180 L4	IE3D180L04
IE3-W41R 200 L4C	IE3D200L04
IE3-W41R 225 S4C	IE3D225S04
IE3-W41R 225 M4	IE3D225M04

The technical data for the motors can be found in the following selection table.

Type	Y/Δ	η	η	η	$\cos\phi_N$	P_N	n_N	I_N	M_N	I_{1mot}/I_N	M_{1mot}/M_N	M_k/M_N	J	m
		[%]	[%]	[%]		[kW]	[rpm]	[A]	[Nm]				[10^{-4} kgm²]	[kg]
		100%	75%	50%										
D063K04	Y	57.50	56.70	–	0.68	0.12	1370	0.44	0.84	3.2	1.9	2.2	1.9	4.8
D063K02	Y	67.10	63.10	–	0.76	0.18	2790	0.50	0.62	4.1	1.9	2.2	1.3	4.9
D063M04	Y	61.00	56.50	–	0.66	0.18	1360	0.65	1.26	3.3	2.0	2.3	2.4	5.2
D063M02	Y	68.10	65.60	–	0.72	0.25	2800	0.74	0.85	4.2	2.2	2.4	1.5	5.2
D071K04	Y	64.60	62.30	–	0.72	0.25	1385	0.78	1.72	3.6	1.8	2.1	4.0	6.8
D071K02	Y	71.50	69.70	–	0.79	0.37	2780	0.94	1.27	4.4	2.1	2.3	2.5	6.7
D071L04	Y	67.80	66.90	–	0.74	0.37	1370	1.06	2.58	3.8	2.0	2.2	5.0	7.8
D071L02	Y	74.30	72.70	–	0.81	0.55	2775	1.32	1.89	5.1	2.3	2.6	3.2	7.6
D080K04	Y	71.50	69.30	–	0.69	0.55	1400	1.60	3.75	4.1	2.1	2.3	8.7	10.6
IE3D080K02	Y	80.70	80.70	78.00	0.81	0.75	2870	1.65	2.50	6.4	2.6	3.5	7.2	11.5
IE3D080L04	Y	82.50	82.30	80.00	0.77	0.75	1445	1.70	5.00	7.0	3.1	3.7	26.0	17.0
IE3D080L02	Y	82.70	83.80	83.00	0.86	1.10	2870	2.22	3.70	7.0	2.8	3.4	13.2	15.0
IE3D090S04	Y	84.10	82.60	80.00	0.76	1.10	1440	2.50	7.30	6.7	2.8	3.7	40.0	22.5
IE3D090S02	Y	84.20	85.40	83.00	0.81	1.50	2900	3.12	4.90	7.9	3.5	4.4	17.0	19.0
IE3D090L04	Y	85.30	83.20	81.00	0.77	1.50	1445	3.35	9.90	7.2	3.2	3.5	45.0	28.0
IE3D090L02	Y	85.90	85.70	84.00	0.88	2.20	2880	4.25	7.30	8.0	2.5	2.9	27.5	23.5
IE3D100K04	Y	86.70	85.20	82.00	0.77	2.20	1455	4.80	14.40	9.3	3.2	3.6	90.0	36.0
IE3D100L02	Y	87.10	86.90	85.00	0.82	3.00	2920	6.00	9.80	7.7	2.3	3.5	45.0	31.0
IE3D100L04	Y	87.70	87.60	86.00	0.77	3.00	1455	6.40	19.70	8.6	3.2	4.1	110.0	45.0
IE3D112M02	Δ	88.10	87.50	87.00	0.84	4.00	2920	7.90	13.10	8.3	2.3	3.3	55.0	38.0
IE3D112M04	Δ	88.60	87.90	86.00	0.85	4.00	1460	7.95	26.20	8.7	2.6	4.1	170.0	56.0
IE3D132S04	Δ	91.00	90.20	88.00	0.73	5.50	1480	12.00	35.00	9.9	3.4	5.4	350.0	90.0
IE3D132M04	Δ	91.30	91.30	90.00	0.83	7.50	1475	14.50	49.00	8.6	2.4	3.9	430.0	100.0
IE3D160M04	Δ	91.40	91.50	90.00	0.83	11.00	1475	21.00	71.00	7.5	2.5	3.2	780.0	125.0
IE3D160L04	Δ	92.80	92.50	91.00	0.83	15.00	1490	28.00	96.00	10.5	2.8	3.9	1567.0	175.0
IE3D180M04	Δ	92.70	92.90	92.00	0.84	18.50	1475	34.50	120.00	6.9	1.9	3.0	1680.0	210.0
IE3D180L04	Δ	93.00	93.00	92.00	0.84	22.00	1480	40.50	142.00	7.6	2.2	3.2	2030.0	240.0
IE3D200L04	Δ	93.60	92.40	92.00	0.85	30.00	1485	54.50	193.00	7.0	1.6	2.6	4110.0	327.0
IE3D225S04	Δ	93.90	93.80	93.00	0.85	37.00	1490	67.00	237.00	7.4	1.9	2.7	4675.0	367.0
IE3D225M04	Δ	94.20	94.30	94.00	0.82	45.00	1482	84.00	290.00	8.1	2.6	2.6	6190.0	450.0

6.3 Dimensional drawings

In the following dimensional drawings, motors are shown with an output flange for direct attachment onto STOBER gear units. Note that other dimensions may apply to motors with IEC output flange, cURus test symbol or EISA 2007 certification in some cases. You can find corresponding dimensional drawings at http://cad.stoeber.de.

For IE3D080 – IE3D112 motors, the center of the terminal box is not at the center line of the motor axis.

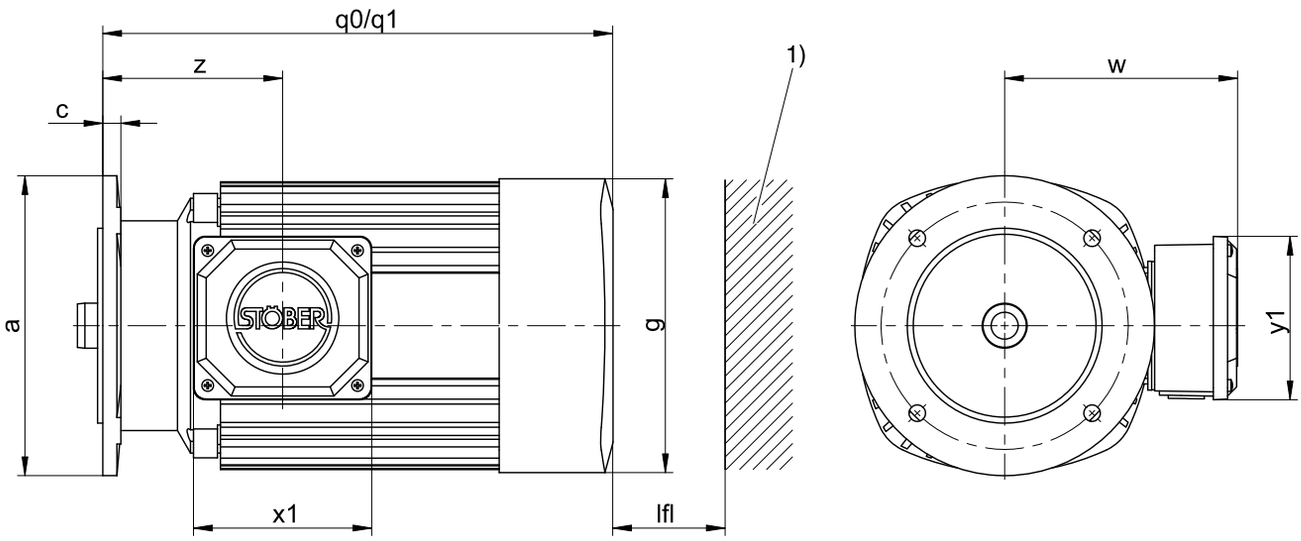
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at http://cad.stoeber.de.

6.3.1 Motors with self-ventilation

In the following dimensional drawings, motors are shown with an output flange for direct attachment onto STOBER gear units. Note that other dimensions may apply to motors with IEC output flange, cURus test symbol or EISA 2007 certification in some cases. You can find corresponding dimensional drawings at http://cad.stoeber.de.



q0 Applies to motors without brake

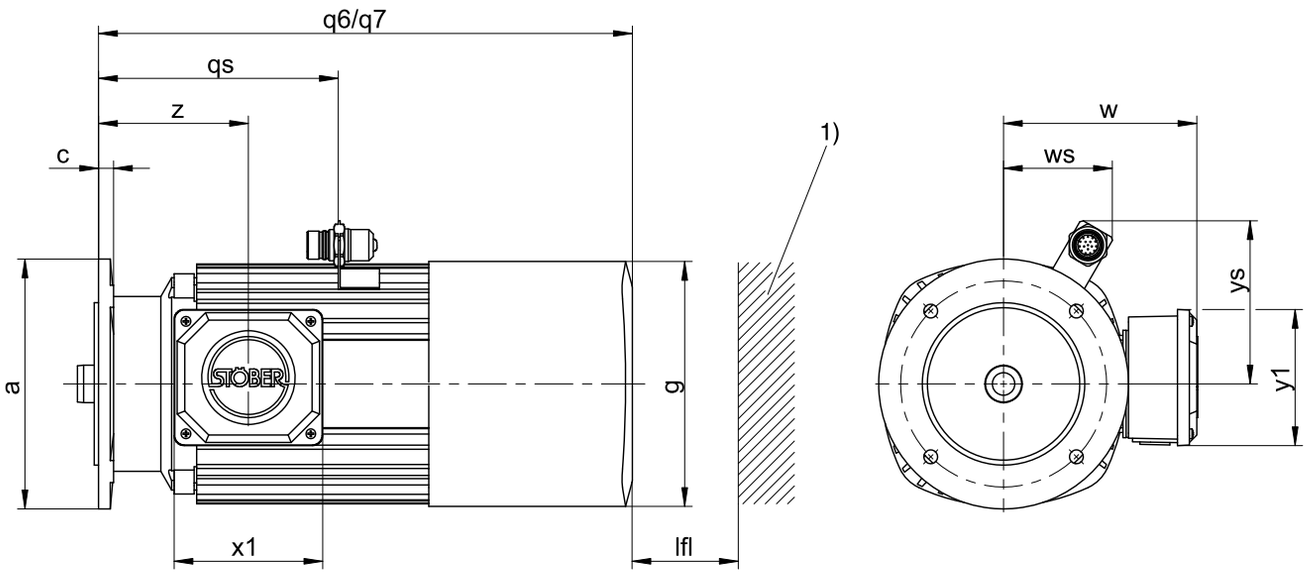
q1 Applies to motors with brake

1) Machine wall

Type	pz	Øa	c	g	lfl	q0	q1	w	x1	y1	z
D063K04	4	140	10	109	14	179	231	115	109	97	81
D063K02	2	140	10	109	14	179	231	115	109	97	81
D063M04	4	140	10	109	14	179	231	115	109	97	81
D063M02	2	140	10	109	14	179	231	115	109	97	81
D071K04	4	140	11	124	14	208	260	120	109	97	94
D071K02	2	140	11	124	14	208	260	120	109	97	94
D071L04	4	140	11	124	14	208	260	120	109	97	94
D071L02	2	140	11	124	14	208	260	120	109	97	94
D080K04	4	160	11	139	16	238	295	128	109	97	97
IE3D080K02	2	160	11	139	16	238	295	128	109	97	97
IE3D080L04	4	160	11	157	16	283	351	137	109	97	107
IE3D080L02	2	160	11	157	16	261	329	137	109	97	107
IE3D090S04	4	160	11	177	18	310	380	146	120	109	114
IE3D090S02	2	160	11	157	18	283	351	137	120	109	107
IE3D090L04	4	160	11	177	18	340	410	146	120	109	114
IE3D090L02	2	160	11	177	18	310	380	146	120	109	114
IE3D100K04	4	200	12	196	20	394	481	155	120	109	120
IE3D100L02	2	200	12	196	20	340	427	155	120	109	120
IE3D100L04	4	200	12	196	20	444	531	155	120	109	120
IE3D112M02	2	200	12	196	20	374	461	155	120	109	120
IE3D112M04	4	200	12	217	35	424	521	178	147	157	134
IE3D132S04	4	250	11	258	35	476	591	199	147	157	142
IE3D132M04	4	250	11	258	35	526	641	199	147	157	142
IE3D160M04	4	300	12	313	35	461	589	242	167	194	138
IE3D160L04	4	300	12	313	35	549	677	242	167	194	138
IE3D180M04	4	300	16	351	35	601	748	260	167	194	178
IE3D180L04	4	300	16	351	35	651	798	260	167	194	178
IE3D200L04	4	350	20	390	35	729	878	298	207	209	242
IE3D225S04	4	400	15	390	40	706	855	300	207	209	169
IE3D225M04	4	400	20	440	45	838	986	324	207	209	242

6.3.2 Motors with self-ventilation and encoder

In the following dimensional drawings, motors are shown with an output flange for direct attachment onto STOBER gear units. Note that other dimensions may apply to motors with IEC output flange, cURus test symbol or EISA 2007 certification in some cases. You can find corresponding dimensional drawings at http://cad.stoeber.de.



q6 Applies to motors without brake

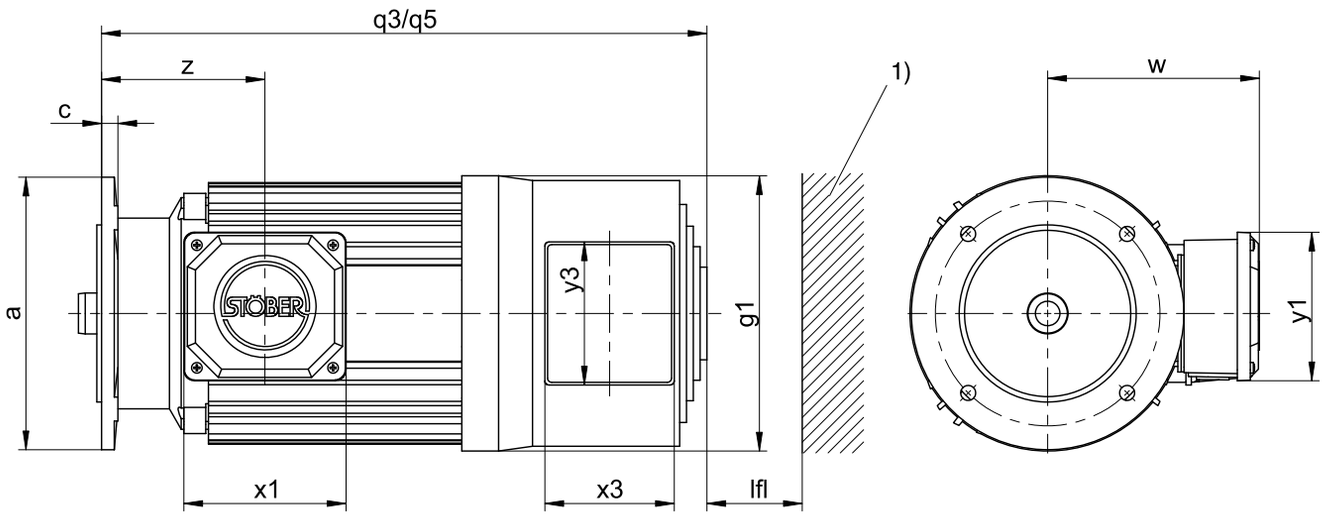
q7 Applies to motors with brake

1) Machine wall

Type	pz	Øa	c	g	lfl	q6	q7	qs	w	ws	x1	y1	ys	z
D063K04	4	140	10	109	14	231	285	111	115	58	109	97	83	81
D063K02	2	140	10	109	14	231	285	111	115	58	109	97	83	81
D063M04	4	140	10	109	14	231	285	111	115	58	109	97	83	81
D063M02	2	140	10	109	14	231	285	111	115	58	109	97	83	81
D071K04	4	140	11	124	14	260	315	123	120	63	109	97	90	94
D071K02	2	140	11	124	14	260	315	123	120	63	109	97	90	94
D071L04	4	140	11	124	14	260	315	123	120	63	109	97	90	94
D071L02	2	140	11	124	14	260	315	123	120	63	109	97	90	94
D080K04	4	160	11	139	16	295	354	126	128	67	109	97	97	97
IE3D080K02	2	160	11	139	16	295	353	172	128	77	109	97	113	97
IE3D080L04	4	160	11	157	16	351	408	172	137	77	109	97	113	107
IE3D080L02	2	160	11	157	16	329	386	172	137	77	109	97	113	107
IE3D090S04	4	160	11	177	18	380	437	186	146	82	120	109	121	114
IE3D090S02	2	160	11	157	18	351	408	186	137	82	120	109	121	107
IE3D090L04	4	160	11	177	18	410	467	186	146	82	120	109	121	114
IE3D090L02	2	160	11	177	18	380	437	186	146	82	120	109	121	114
IE3D100K04	4	200	12	196	20	481	533	192	155	87	120	109	131	120
IE3D100L02	2	200	12	196	20	427	479	192	155	87	120	109	131	120
IE3D100L04	4	200	12	196	20	531	583	192	155	87	120	109	131	120
IE3D112M02	2	200	12	196	20	461	513	192	155	87	120	109	131	120
IE3D112M04	4	200	12	217	35	521	569	–	178	–	147	157	–	134
IE3D132S04	4	250	11	258	35	591	706	213	199	102	147	157	145	142
IE3D132M04	4	250	11	258	35	641	756	213	199	102	147	157	145	142
IE3D160M04	4	300	12	313	35	589	717	285	242	123	167	194	166	138
IE3D160L04	4	300	12	313	35	677	805	285	242	123	167	194	166	138
IE3D180M04	4	300	16	351	35	748	895	326	260	136	167	194	179	178
IE3D180L04	4	300	16	351	35	798	945	326	260	136	167	194	179	178
IE3D200L04	4	350	20	390	35	878	1026	361	298	155	207	209	198	242
IE3D225S04	4	400	15	390	40	855	1003	399	300	155	207	209	198	169
IE3D225M04	4	400	20	440	45	986	1090	472	324	180	207	209	223	242

6.3.3 Motors with forced ventilation

In the following dimensional drawings, motors are shown with an output flange for direct attachment onto STOBER gear units. Note that other dimensions may apply to motors with IEC output flange, cURus test symbol or EISA 2007 certification in some cases. You can find corresponding dimensional drawings at http://cad.stoeber.de.



q3 Applies to motors without brake

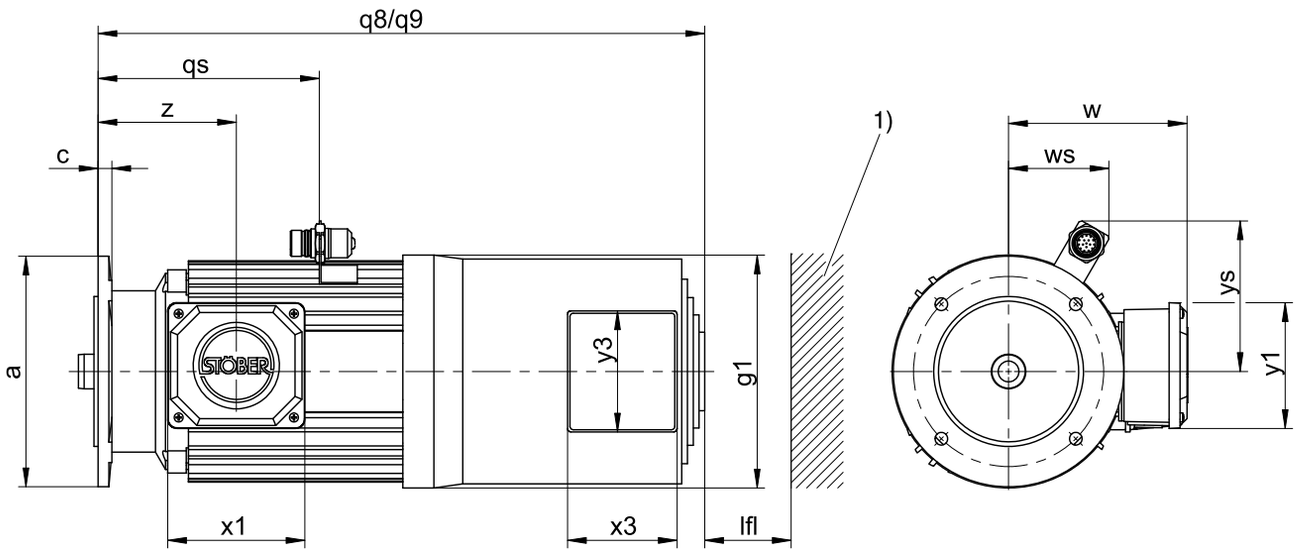
q5 Applies to motors with brake

1) Machine wall

Type	pz	Øa	c	g1	lfl	q3	q5	w	x1	x3	y1	y3	z
D063K04	4	140	10	115	14	286	340	115	109	109	97	97	81
D063K02	2	140	10	115	14	286	340	115	109	109	97	97	81
D063M04	4	140	10	115	14	286	340	115	109	109	97	97	81
D063M02	2	140	10	115	14	286	340	115	109	109	97	97	81
D071K04	4	140	11	131	14	324	378	120	109	109	97	97	94
D071K02	2	140	11	131	14	324	378	120	109	109	97	97	94
D071L04	4	140	11	131	14	324	378	120	109	109	97	97	94
D071L02	2	140	11	131	14	324	378	120	109	109	97	97	94
D080K04	4	160	11	146	16	354	409	128	109	109	97	97	97
IE3D080K02	2	160	11	146	16	343	388	128	109	95	97	105	97
IE3D080L04	4	160	11	162	16	384	443	137	109	95	97	105	107
IE3D080L02	2	160	11	162	16	362	421	137	109	95	97	105	107
IE3D090S04	4	160	11	180	18	416	467	146	120	95	109	105	114
IE3D090S02	2	160	11	162	18	384	443	137	120	95	109	105	107
IE3D090L04	4	160	11	180	18	446	497	146	120	95	109	105	114
IE3D090L02	2	160	11	180	18	416	467	146	120	95	109	105	114
IE3D100K04	4	200	12	202	20	498	580	155	120	95	109	105	120
IE3D100L02	2	200	12	202	20	445	526	155	120	95	109	105	120
IE3D100L04	4	200	12	202	20	548	630	155	120	95	109	105	120
IE3D112M02	2	200	12	202	20	478	560	155	120	95	109	105	120
IE3D112M04	4	200	12	217	35	514	559	178	147	95	157	105	134
IE3D132S04	4	250	11	258	35	615	715	199	147	95	157	105	142
IE3D132M04	4	250	11	258	35	665	765	199	147	95	157	105	142
IE3D160M04	4	300	12	313	35	637	747	242	167	95	194	105	138
IE3D160L04	4	300	12	313	35	725	835	242	167	95	194	105	138
IE3D180M04	4	300	16	351	35	774	910	260	167	95	194	105	178
IE3D180L04	4	300	16	351	35	824	960	260	167	95	194	105	178
IE3D200L04	4	350	20	390	35	923	1108	298	207	95	209	105	242
IE3D225S04	4	400	15	390	40	900	1085	300	207	95	209	105	169
IE3D225M04	4	400	20	440	45	993	1143	324	207	95	209	105	242

6.3.4 Motors with forced ventilation and encoder

In the following dimensional drawings, motors are shown with an output flange for direct attachment onto STOBER gear units. Note that other dimensions may apply to motors with IEC output flange, cURus test symbol or EISA 2007 certification in some cases. You can find corresponding dimensional drawings at http://cad.stoeber.de.



q8 Applies to motors without brake

q9 Applies to motors with brake

1) Machine wall

Type	pz	Øa	c	g1	lfl	q8	q9	qs	w	ws	x1	x3	y1	y3	ys	z
D063K04	4	140	10	115	14	340	392	111	115	58	109	109	97	97	83	81
D063K02	2	140	10	115	14	340	392	111	115	58	109	109	97	97	83	81
D063M04	4	140	10	115	14	340	392	111	115	58	109	109	97	97	83	81
D063M02	2	140	10	115	14	340	392	111	115	58	109	109	97	97	83	81
D071K04	4	140	11	131	14	378	427	123	120	63	109	109	97	97	90	94
D071K02	2	140	11	131	14	378	427	123	120	63	109	109	97	97	90	94
D071L04	4	140	11	131	14	378	427	123	120	63	109	109	97	97	90	94
D071L02	2	140	11	131	14	378	427	123	120	63	109	109	97	97	90	94
D080K04	4	160	11	146	16	409	464	126	128	67	109	109	97	97	97	97
IE3D080K02	2	160	11	146	16	388	423	172	128	77	109	95	97	105	113	97
IE3D080L04	4	160	11	162	16	443	473	172	137	77	109	95	97	105	113	107
IE3D080L02	2	160	11	162	16	421	451	172	137	77	109	95	97	105	113	107
IE3D090S04	4	160	11	180	18	467	517	186	146	82	120	95	109	105	121	114
IE3D090S02	2	160	11	162	18	443	473	186	137	82	120	95	109	105	121	107
IE3D090L04	4	160	11	180	18	497	547	186	146	82	120	95	109	105	121	114
IE3D090L02	2	160	11	180	18	467	517	186	146	82	120	95	109	105	121	114
IE3D100K04	4	200	12	202	20	580	608	192	155	87	120	95	109	105	131	120
IE3D100L02	2	200	12	202	20	526	554	192	155	87	120	95	109	105	131	120
IE3D100L04	4	200	12	202	20	630	658	192	155	87	120	95	109	105	131	120
IE3D112M02	2	200	12	202	20	560	588	192	155	87	120	95	109	105	131	120
IE3D112M04	4	200	12	217	35	559	624	–	178	–	147	95	157	105	–	134
IE3D132S04	4	250	11	258	35	715	815	213	199	102	147	95	157	105	145	142
IE3D132M04	4	250	11	258	35	765	865	213	199	102	147	95	157	105	145	142
IE3D160M04	4	300	12	313	35	747	847	285	242	123	167	95	194	105	166	138
IE3D160L04	4	300	12	313	35	835	935	285	242	123	167	95	194	105	166	138
IE3D180M04	4	300	16	351	35	910	1010	326	260	136	167	95	194	105	179	178
IE3D180L04	4	300	16	351	35	960	1060	326	260	136	167	95	194	105	179	178
IE3D200L04	4	350	20	390	35	1108	1216	361	298	155	207	95	209	105	198	242
IE3D225S04	4	400	15	390	40	1085	1193	399	300	155	207	95	209	105	198	169
IE3D225M04	4	400	20	440	45	1143	1243	472	324	180	207	95	209	105	223	242

6.4 Type designation

IE3	D	080	K	04

Explanation

Code	Designation	Design
IE3	Energy efficiency class in accordance with EN 60034-30-1	IE3
D	Type	Asynchronous motor
080	Size	80 (example)
K	Length	Short
L		Long
M		Medium
S		Small
02	Number of poles	2
04		4

The type designation on the motor nameplate differs from the type designation in the product catalog. The allocation can be found in the Selection Tables chapter.

In order to complete the type designation, also specify:

- With IEC output flange or for direct attachment to STOBER gear units?
- With spring-loaded brake? (see the chapter [▶ 6.5.7])?
- With cURUs test symbol option?
- With EISA 2007 certification option?
- With forced ventilation option (see the chapter [▶ 6.5.6.1])?
- With forced ventilation and encoder option (see the chapter Encoders)?
- Side for cable entry (see the chapter [▶ 6.5.8.1])

6.5 Product description

6.5.1 General features

Feature	Description
Design	IM B5, IM V1, IM V3 in accordance with EN 60034-7
Protection class	IP54
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)
Cooling	IC 411 self-ventilation IC 416 forced ventilation (option)
Paint	RAL 7035 light gray Optional selection of various RAL colors.
Bearing	Rolling bearing with lifetime lubrication
Vibration intensity	A in accordance with EN 60034-14
Noise level	Limit values in accordance with EN 60034-9

6.5.2 Electrical features

General electrical features of the asynchronous motors are described in this chapter. Details can be found in the "Selection tables" chapter.

Motors D063 – D080, IE3D080 – IE3D100

	50 Hz	60 Hz
Nominal voltage	Delta connection: AC 230 V Star connection: AC 400 V	Delta connection: AC 265 V Star connection: AC 460 V
Voltage range	Delta connection: AC 220 – 240 V Star connection: AC 380 – 420 V	Delta connection: AC 220 – 275 V Star connection: AC 380 – 480 V

IE3D112 – IE3D225 motors

	50 Hz	60 Hz
Nominal voltage	Delta connection: AC 400 V	Delta connection: AC 460 V
Voltage range	Delta connection: AC 380 – 420 V	Delta connection: AC 380 – 480 V

6.5.3 Ambient conditions

Standard ambient conditions for transport, storage and operation of the motor are described in this chapter.

Feature	Description
Surrounding temperature for transport/storage	−30 °C to +85 °C
Surrounding temperature for operation	−15 °C to +40 °C
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s² (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- STOBER Asynchronous motors are not suitable for potentially explosive atmospheres in accordance with (ATEX) Directive2014/34/EU. You can get asynchronous motors for use in potentially explosive atmospheres on request.
- Secure the connection cables close to the motor so that cable vibrations do not place impermissible loads on the screw connections, terminal boxes or plug connectors.
- Also take into consideration the shock load of the motor due to output units (such as gear units and pumps) which are coupled with the motor.

6.5.4 Encoders

Asynchronous motors with forced ventilation can optionally be equipped with an incremental or absolute encoder. Self-ventilated asynchronous motors are optionally available with an incremental encoder. The encoder connection method is described in Chapter [▷ 6.5.8].

6.5.4.1 Incremental encoders

Incremental encoder technical data can be found in this chapter.

Feature	Description
Sensing principle	Optical
Pulses per revolution	2048
Reference signal	Zero pulse
TTL output level	RS422
HTL output level	Push-pull
TTL operating voltage	DC 5 V ± 5%
HTL operating voltage	DC 8 – 30 V

6.5.4.2 Multi-turn absolute encoders

Multi-turn absolute encoder technical data can be found in this chapter. This encoder is used to detect several revolutions of the motor shaft, making it possible to reduce the amount of referencing.

Technical Data

Feature	Description
Type	EQN 425
Interface	SSI
Code	Gray
Position values per revolution	8192 (13 bits)
Recordable revolutions	4096 (12 bits)
Operating voltage	DC 4.75 – 30 V

6.5.5 PTC thermistor

In this chapter, you can find technical data on the PTC thermistor that can optionally be installed in STOBER asynchronous motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the PTC thermistor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that allows the temperature of each winding phase to be monitored. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R −20 °C up to ϑ_{NAT} − 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} − 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating Δϑ = 100 K)

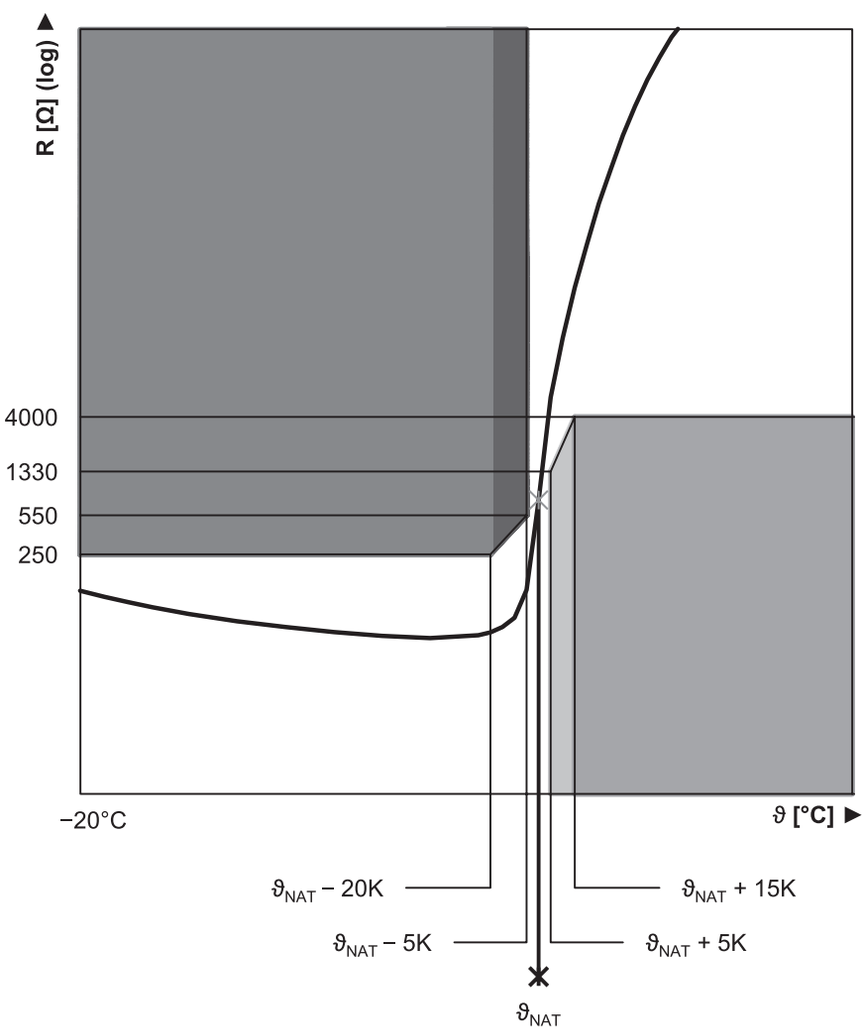


Fig. 1: PTC thermistor curve (single thermistor)

6.5.6 Cooling

STOBER asynchronous motors in the standard design are cooled using the impeller installed on the motor shaft (self-ventilation). In this process, the motor waste heat is transported away by the air aspirated by the impeller and blown over the motor cooling fins.

6.5.6.1 Forced ventilation

STOBER asynchronous motors can be equipped with an optional forced ventilation unit. This may be necessary at low speeds or for operation on a drive controller in order to ensure cooling independent of the motor speed. A forced ventilation unit can also be added later. The performance data for motors with forced ventilation can be found in Chapter [▶ 6.2] and the dimensional drawings in Chapter [▶ 6.3].

Technical data (50 Hz)

Motor	Type	$U_{N,F}$ [V]	$I_{N,F}$ [A]	$\cos\varphi_F$	n_F [rpm]	q_{vF} [m³/h]	$L_{pA,F}$ [dBA]	C_F [µF]
D063K02. D063K04. D063M02. D063M04	FL-63	Δ_C	0.3	0.90	2830	55	35	3
D063K02. D063K04. D063M02. D063M04	FL-63	Δ 220–240 / Y 380–420	0.30/0.17	0.56	2700	55	35	–
D071K02. D071K04. D071L02. D071L04	FL-71	Δ_C	0.3	0.90	2830	78	35	3
D071K02. D071K04. D071L02. D071L04	FL-71	Δ 220–240 / Y 380–420	0.30/0.17	0.56	2700	78	35	–
D080K04	FL-80	Δ_C	0.3	0.90	2830	103	35	3
D080K04	FL-80	Δ 220–240 / Y 380–420	0.30/0.17	0.56	2700	103	35	–
IE3D080L04	FL-80	Δ_C	0.11	0.99	2150	127	55	2
IE3D080L04	FL-80	Δ 220–240 / Y 380–420	0.11/0.06	0.77	2582	127	55	–
IE3D090L04. IE3D090S04	FL-90	Δ_C	0.29	0.91	2845	200	58	3
IE3D090L04. IE3D090S04	FL-90	Δ 220–240 / Y 380–420	0.38/0.22	0.56	2865	200	58	–
IE3D100K04. IE3D100L04	FL-100	Δ_C	0.28	0.96	2732	260	59	3
IE3D100K04. IE3D100L04	FL-100	Δ 220–240 / Y 380–420	0.37/0.22	0.66	2803	260	59	–
IE3D112M04	FL-112	Δ_C	0.28	0.99	2480	337	61	3
IE3D112M04	FL-112	Δ 220–240 / Y 380–420	0.35/0.20	0.74	2733	337	61	–
IE3D132M04. IE3D132S04	FL-132	Δ_C	0.4	1.00	2610	532	69	6
IE3D132M04. IE3D132S04	FL-132	Δ 220–240 / Y 380–420	0.58/0.33	0.83	2700	532	69	–

Technical data for force-ventilated motors of size 160 or larger are available on request.

Technical data (60 Hz)

Motor	Type	$U_{N,F}$ [V]	$I_{N,F}$ [A]	$\cos\varphi_F$	n_F [rpm]	q_{vF} [m³/h]	$L_{pA,F}$ [dBA]	C_F [µF]
D063K02. D063K04. D063M02. D063M04	FL-63	Δ_C	0.28	0.96	3410	65	35	3
D063K02. D063K04. D063M02. D063M04	FL-63	Δ 220–275 / Y 380–480	0.26/0.15	0.63	3240	65	35	–
D071K02. D071K04. D071L02. D071L04	FL-71	Δ_C	0.28	0.96	3410	93	35	3
D071K02. D071K04. D071L02. D071L04	FL-71	Δ 220–275 / Y 380–480	0.26/0.15	0.63	3240	93	35	–
D080K04	FL-80	Δ_C	0.28	0.96	3410	133	35	3
D080K04	FL-80	Δ 220–275 / Y 380–480	0.26/0.15	0.63	3240	133	35	–
IE3D080L04	FL-80	Δ_C	0.14	0.98	1693	148	59	2
IE3D080L04	FL-80	Δ 220–275 / Y 380–480	0.10/0.06	0.87	2668	148	59	–
IE3D090L04. IE3D090S04	FL-90	Δ_C	0.25	0.99	3279	240	66	3
IE3D090L04. IE3D090S04	FL-90	Δ 220–275 / Y 380–480	0.33/0.19	0.72	3327	240	66	–
IE3D100K04. IE3D100L04	FL-100	Δ_C	0.3	0.99	2734	310	70	3
IE3D100K04. IE3D100L04	FL-100	Δ 220–275 / Y 380–480	0.31/0.18	0.84	3171	310	70	–
IE3D112M04	FL-112	Δ_C	0.37	0.99	1979	411	70	3
IE3D112M04	FL-112	Δ 220–275 / Y 380–480	0.31/0.18	0.91	2941	411	70	–
IE3D132M04. IE3D132S04	FL-132	Δ_C	0.57	0.99	2360	633	75	6
IE3D132M04. IE3D132S04	FL-132	Δ 220–275 / Y 380–480	0.44/0.25	0.92	2980	633	75	–

Technical data for force-ventilated motors of size 160 or larger are available on request.

6.5.7 Brake

STOBER asynchronous motors can optionally be equipped with a spring-loaded brake that engages automatically when switching off the supply voltage and quickly brings the motor shaft to a stop. The spring-loaded brake is designed for dynamic applications with regular braking operations at high speed.

The spring-loaded brake can be released in the de-energized state using an optional manual release lever.

6.5.7.1 Power supply

DC voltage is needed to supply power to the spring-loaded brake. The DC voltage can be provided by an external DC voltage source or by rectifiers installed in the motor terminal box or control cabinet. If you use an external DC voltage source, connect a S14 K35 varistor (or comparable) in parallel to the brake coil to protect your machine from switching surges.

The brake coil is designed for 115 V DC (K38 brake type) or 127 V DC (L48 brake type) by default. Additional designs are optionally available.

Rectifiers installed in the motor terminal box can be supplied with AC voltage directly from the motor terminal board in many applications. During project configuration, ensure that the permitted input voltage U_{1rf} for the rectifier and the nominal voltage for the brake are not exceeded. The following interactions apply depending on the rectifier design:

- Half-wave rectifier: $U_{2rf} = 0.45 \times U_{1rf}$
- Bridge rectifier: $U_{2rf} = 0.9 \times U_{1rf}$
- Powerbox rectifier: 220 V AC ≤ U_{1rf} ≤ 277 V AC

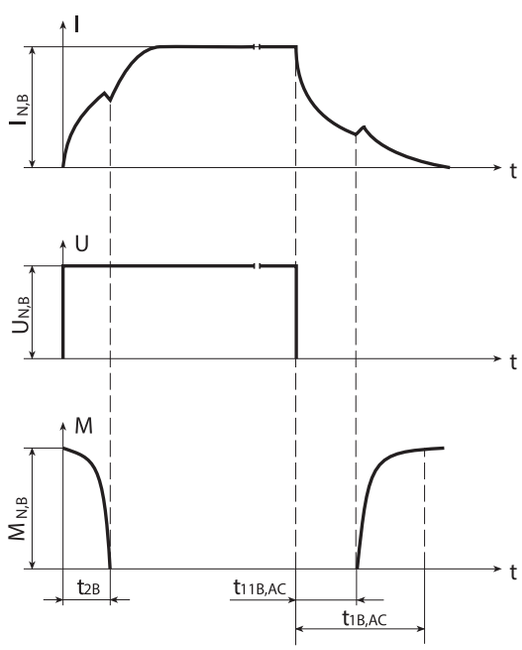
Supplying the rectifier with power from the motor terminal board is not permitted in the following applications:

- Motors operated on a frequency inverter;
- Motors with polarity reversal;
- Motors operated in a star/delta circuit.

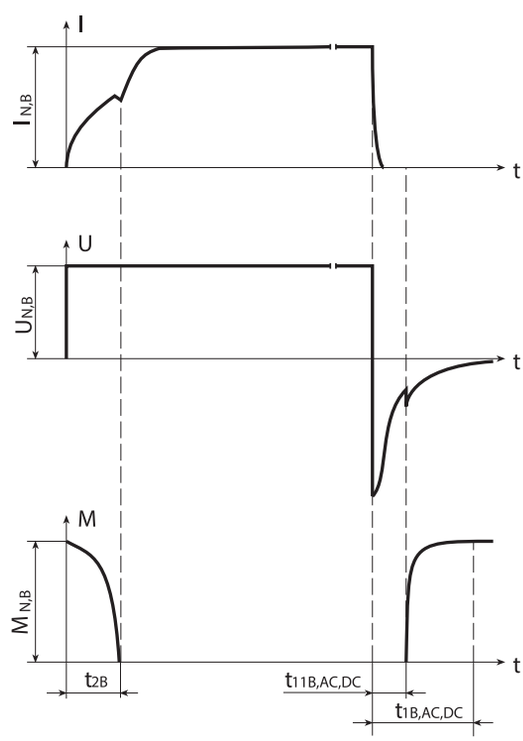
6.5.7.2 Connection

The spring-loaded brake engages once its power supply is switched off. In terms of the circuitry, the power supply can be switched off in two ways. The alternating current side of the rectifier always has to be switched. Simultaneously switching the alternating current side of the rectifier significantly reduces the linking time $t_{1,B}$ and trigger delay $t_{11,B}$ until the brake engages. The following diagrams and technical data illustrate this point.

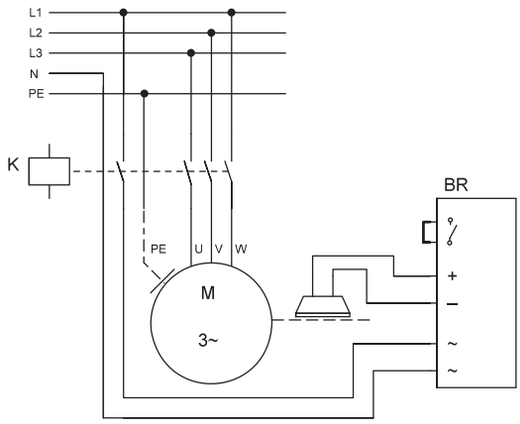
For more information, refer to the connection plan included in the delivery of every motor.



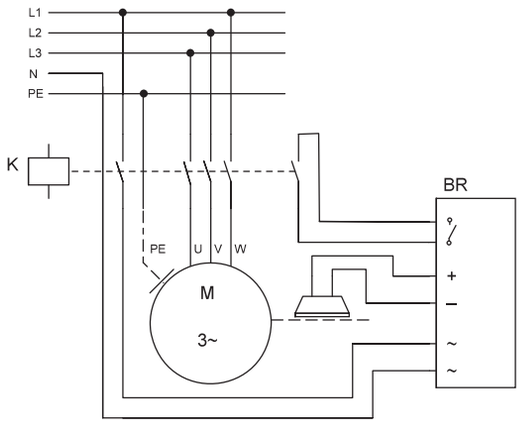
Switching behavior of the brake during AC-side switching



Switching behavior of the brake during DC-side switching



Switching example for AC-side switching



Switching example for AC and DC-side switching

6.5.7.3 Powerbox rectifier

STOBER asynchronous motors with spring-loaded brake are equipped with a device called a Powerbox rectifier as standard. A Powerbox rectifier acts as a bridge rectifier during overexcitation and then as a half-wave rectifier afterwards. This provides the following advantages:

- Faster brake engaging;
- Longer intervals between maintenance because the maximum permitted air gap x_{Bmax} increases;
- Increase in brake life span.

The Powerbox rectifier also offers the advantage that it is possible to supply the rectifier with power from the motor terminal board in many applications for wide-range motors.

Features

Feature	Description
Installation location	D063 – D080, IE3D80 – IE3D132 motors: terminal box or control cabinet IE3D160 to IE3D225 motors: control cabinet
Input voltage	180 – 300 V AC ± 0%, 50/60 Hz (applicable for a wide range of 220 – 275 V AC ± 5%, 50/60 Hz)
Overexcitation time	350 ms ± 10%
Conductor length	Maximum of 100 m (from Powerbox rectifier to brake coil)
Max. permitted output current at 45 °C	1.2 A continuously 2.4 A for 350 ms
Max. permitted output current at 75 °C	0.7 A continuously 1.4 A for 350 ms

The following table describes the technical data for spring-loaded brakes operated using a Powerbox rectifier.

Technical data

Motor	Type	$M_{N,B}$ [Nm]	$U_{N,B}$ [V]	U_{1rf} [V] 50-60 [Hz]	$x_{B,N}$ [mm]	x_{Bmax} [mm]	t_{2B} [ms]	$t_{11B,AC,DC}$ [ms]	$t_{11B,AC}$ [ms]	K_{Bpb}	Z_B [1/h]
D063K_B. D063M_B	K38-02R	2.5	115	220 – 275	0.2	0.8 – 1.02	26 – 21	9 – 11	30 – 33	3.0 – 4.1	3300
D071K_B. D071L_B	K38-02	5.0	115	220 – 275	0.2	0.8 – 1.02	26 – 21	9 – 11	30 – 33	3.0 – 4.1	3300
D080K_B	K38-03	10	115	220 – 275	0.2	1.36 – 1.75	31 – 26	13 – 16	78 – 85	3.9 – 5.2	2400
IE3D090L_B. IE3D090S_B	K38-04	20	115	220 – 275	0.2	1.6 – 2.1	50 – 44	17 – 21	126 – 139	3.5 – 5.3	2400
IE3D100K_B. IE3D100L_B	K38-05	36	115	220 – 275	0.2	2.1 - 2.8	55 – 48	35 – 42	186 – 198	4.8 – 6.5	1500
IE3D112M_B	L48-14	60	127	220 – 275	0.3	2.5 – 3.4	89 – 76	54 – 65	359 – 390	4.6 – 6.2	300
IE3D132K_B. IE3D132L_B. IE3D132M_B. IE3D132S_B	L48-16	80	127	220 – 275	0.3	2.5 – 3.4	107 – 91	75 – 90	497 – 540	4.1 – 5.6	300
IE3D160K_B. IE3D160L_B. IE3D160M_B	L48-18	150	127	220 – 275	0.4	2.5 – 3.4	179 – 152	91 – 110	608 – 660	4.7 – 6.3	300
IE3D180K_B. IE3D180L_B	L48-20	260	127	220 – 275	0.4	2.5 – 3.4	238 – 203	166 – 200	1105 – 1200	3.5 – 5.9	120
IE3D200L_B. IE3D200M_B	L48-25	400	127	220 – 275	0.5	2.5 – 3.4	286 – 244	224 – 270	1492 – 1620	4.3 – 6.0	60

Notes

Note that the performance data for the brake depends on the Powerbox rectifier input voltage U_{1rf}.

An explanation of the formula symbols can be found in the Chapter [▶ 14.1].

6.5.7.4 Half-wave or bridge rectifier

The DC voltage for the spring-loaded brake can also be converted from AC voltage by an optional half-wave rectifier or bridge rectifier.

Half-wave rectifiers are intended for applications lacking an AC voltage ≤ 277 V AC for the rectifier. If lower voltages are available, a bridge rectifier with better DC voltage quality should be used.

The following table describes the technical data for spring-loaded brakes operated using a half-wave or bridge rectifier.

Technical data

Motor	Type	$M_{N,B}$ [Nm]	P_{B20} [W]	$W_{B,Radj}$ [10^6 J]	$W_{B,R01}$ [10^6 J]	$x_{B,N}$ [mm]	x_{Bmax} [mm]	y_{Blim} [mm]	t_{2B} [ms]	$t_{11B,AC,DC}$ [ms]	$t_{11B,AC}$ [ms]	ΔJ_B [10^{-4} kgm²]	Δm_B [kg]
D063K_B. D063M_B	K38-02R	2.5	25	15.0	7.5	0.2	0.4	5.5	40	10	70	0.28	1.1
D071K_B. D071L_B	K38-02	5.0	25	15.0	7.5	0.2	0.4	5.5	40	10	70	0.28	1.1
D080K_B	K38-03	10	30	37.5	12.5	0.2	0.5	6.5	55	15	100	0.79	1.7
IE3D090L_B. IE3D090S_B	K38-04	20	30	76.0	19.0	0.2	0.6	8.0	90	25	180	1.50	3.3
IE3D100K_B. IE3D100L_B	K38-05	36	48	112.0	28.0	0.2	0.6	10.0	110	25	220	3.85	5.0
IE3D112M_B	L48-14	60	50	215.0	43.0	0.3	0.8	6.0	150	65	390	6.93	5.7
IE3D132K_B. IE3D132L_B. IE3D132M_B. IE3D132S_B	L48-16	80	55	434.0	62.0	0.3	1.0	7.5	180	90	540	16.5	8.7
IE3D160K_B. IE3D160L_B. IE3D160M_B	L48-18	150	85	540.0	90.0	0.4	1.0	8.0	300	110	660	31.9	13.2
IE3D180K_B. IE3D180L_B	L48-20	260	100	612.0	76.5	0.4	1.2	9.6	400	200	1200	80.3	21.2
IE3D200L_B. IE3D200M_B	L48-25	400	110	792.0	88.0	0.5	1.4	12.5	500	270	1620	220	32.0

An explanation of the formula symbols can be found in the Chapter [▶ 14.1].

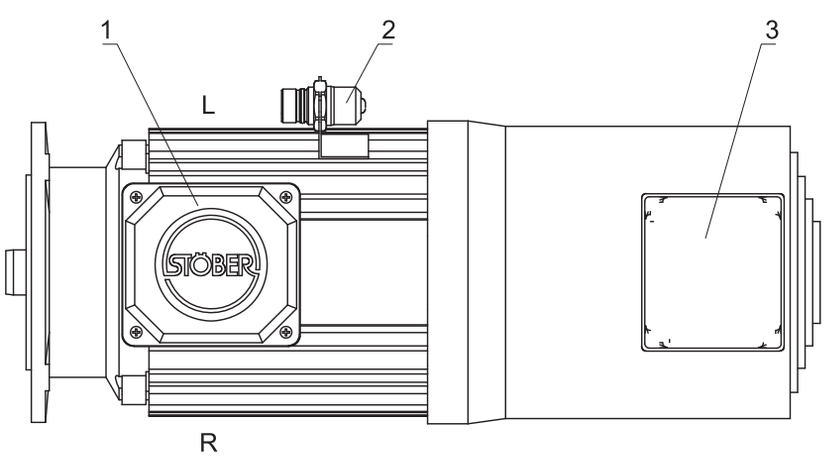
6.5.8 Connection method

6.5.8.1 Position of the connections

In the following figure, there are markings on both sides of the terminal box through which the connecting cables can be routed into the terminal box. Specify one of the two sides when placing your purchase order. If the motor is installed in another mounting position, the position of the terminal box and optional connections changes accordingly.

You can find the position of the motor terminal box in relation to the geared motor in the corresponding chapter of this catalog.

You can find the dimensions of the terminal box in Chapter [▶ 6.3].



1	Motor terminal box	2	Encoder plug connector (optional)
3	Forced ventilation unit terminal box (optional)	L	Left side of the terminal box
R	Right side of the terminal box		

6.5.8.2 Motor terminal box

The motor power connections and other connections are located in the terminal box.

In the terminal box, there are three metric tapped holes for screw connections. The tapped holes are closed with plugs. The diameter of the tapped holes depends on the size of the motor, as shown in the following table.

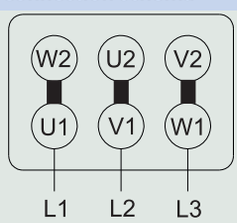
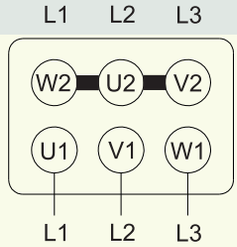
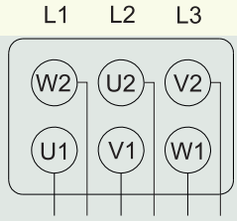
Size	1st bore	2nd bore	3rd bore
080	M20	M16	M12
090	M25	M20	M12
100	M25	M20	M12
112	M25	M20	M12
132	M32	M32	M20
160	M40	M40	M20
180	M40	M40	M20
200	M50	M50	M20
225	M50	M50	M20

For the motor connection, use shielded cables and screw connections connected to the cable shielding in order to avoid EMC problems.

Power connection

The terminal box contains a terminal board with connections labeled in accordance with EN 60034-8. Terminal links are provided for a wye or delta connection. The terminal box contains 3 metric threaded holes for connection cable screw connections. The screw connections are not included in the scope of delivery.

The connection schema for the different connection types is shown in the following table.

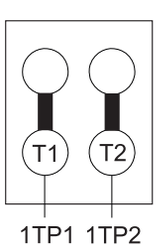
Connection type	Connection schema
Delta connection	
Star connection	
Star/Delta connection	

Grounding conductor connection

For connecting the grounding conductor, the terminal box contains a grounding screw that is marked with the ⏚ symbol in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

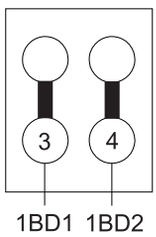
PTC thermistor connection

The terminal box contains connection terminals for the PTC thermistor for implementing thermal winding protection (optional).



Spring-loaded brake connection

The terminal box also contains connection terminals for the spring-loaded brake (optional).

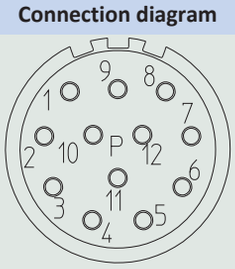


6.5.8.3 Encoder connection

A plug connector with a quick lock is installed on the motor housing for the optional encoder connection. You can find the dimensions and position of the plug connector in Chapter [▶ 6.3]. You can find appropriate cables for the connection to the drive controller in Chapter [▶ 12].

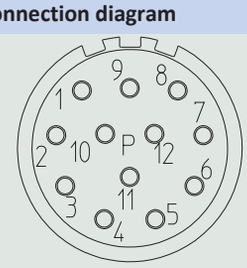
In the following connection assignment, the colors of the motor-internal connecting wires are specified in accordance with IEC 60757.

SSI digital encoder, plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	Clock +	VT
	2	Up sense	WH GN
	3		
	4		
	5	Data –	PK
	6	Data +	GY
	7		
	8	Clock –	YE
	9		
	10	0 V GND	WH GN
	11		
	12	Up +	BN GN
	Pin 2 is connected to pin 12 in the plug connector		

HTL/TTL incremental encoder, plug connector size con.23

Color 1 of the motor-internal connecting wires applies up to motor size 80, color 2 applies starting with motor size 90.

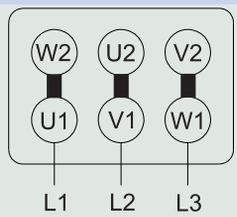
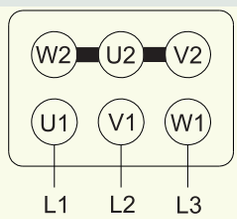
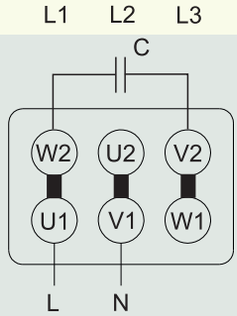
Connection diagram	Pin	Connection	Color 1	Color 2
	1	B –	PK	BK
	2	Up sense	–	YE
	3	N +	BU	PK
	4	N –	RD	WH
	5	A +	GN	GN
	6	A –	YE	BN
	7			
	8	B +	GY	GY
	9			
	10	0 V GND	WH	BU
	11	0 V GND	–	VT
	12	Up +	BN	RD

6.5.8.4 Forced ventilation unit terminal box

The power connections for the optional forced ventilation unit are located in a separate terminal box.

The terminal box contains a terminal board with connections labeled in accordance with EN 60034-8. Terminal links are provided for a wye or delta connection. The terminal box contains 3 metric threaded holes for connection cable screw connections. The screw connections are not included in the scope of delivery.

The connection types for the forced ventilation unit power supply are described in the following table.

Connection type	Connection schema
Delta connection	
Star connection	
Steinmetz connection with operating capacitor C	

The operating capacitor C for the Steinmetz connection is not included in the forced ventilation unit scope of delivery.

For connecting the grounding conductor, the terminal box contains a grounding screw that is marked with the ⏚ symbol in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

6.6 Project configuration

6.6.1 Legal requirements

In many countries or economic regions, putting asynchronous motors on the market requires complying with certain laws. Below you can find information on a few legal requirements to be observed in conjunction with projecting STOBER asynchronous motors.

European Union

Asynchronous motors fall under the scope of the (Low Voltage) Directive 2014/35/EU and must bear the CE mark.

In addition, asynchronous motors (without brake) are subject to the (Ecodesign) Directive 2009/125/EC along with the resulting Regulation (EC) No. 640/2009 and Regulation (EU) No. 4/2014 from the European Commission. Accordingly, asynchronous motors brought onto the market on or after 2017-01-01 that have a nominal output voltage of 0.75 to 375 kW must meet at least efficiency class IE3. As an alternative to operating IE3 motors, the law allows the operation of IE2 motors on a drive controller. IE2 motors must be marked with "VSD use only" on the nameplate and must not be operated directly on the grid network.

USA

Asynchronous motors brought onto the market in the United States are subject to the Energy Independence and Security Act of 2007 (EISA) under US law and must be registered with the US Department of Energy (DoE). This includes labeling the asynchronous motor's nameplate with the "ee" logo and the CC registration number.

Certificates and standards

The following certificates and standards are not required by law but are common in some countries:

- Registration with Underwriters Laboratory (UL). This includes labeling the asynchronous motor's nameplate with the CURus logo and registration number.

- Electrical design of the asynchronous motor in accordance with the NEMA-MG 1 standard in the United States.

Available combinations

STOBER Asynchronous motors are available in the following combinations in relation to the properties listed above:

Conformity/Certificate	Nominal frequency
CE	50 Hz
CE, cURus, NEMA	50/60 Hz
EISA, cURus (size 112 and higher)	60 Hz

6.6.2 Operation on a drive controller

Drive controllers can adjust the speed of asynchronous motors to any value with minimal losses. In this chapter, you can find information on operating asynchronous motors above and below the nominal frequency.

Operation below the nominal frequency

Operating asynchronous motors with self-ventilation below approximately 60% of the nominal frequency requires limiting the motor current as well as the torque as a result. Otherwise the motor may overheat. This type of limiting is not necessary on motors with forced ventilation.

6.6.2.1 Operation above the nominal frequency

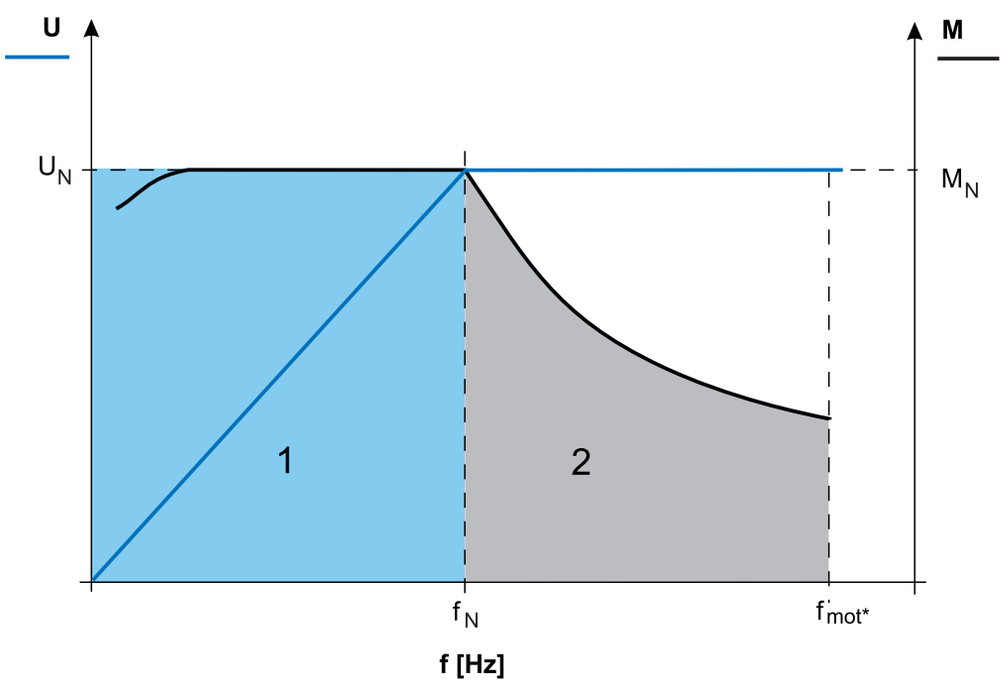
The motor can also be operated above its nominal frequency. Two basic operating modes for doing so are explained below:

- Operation in a field weakening range
- Operation per the 87 Hz characteristic

Operation in a field weakening range

If the motor is operated above its nominal frequency at a constant nominal voltage, operation is considered in the field weakening range. For this operating mode, the drive controller is configured to a maximum frequency that is larger than the nominal frequency (e.g. 80 Hz/400 V). Speed increases as the drive controller frequency increases; torque, in contrast, decreases proportionally because the flux in the motor drops.

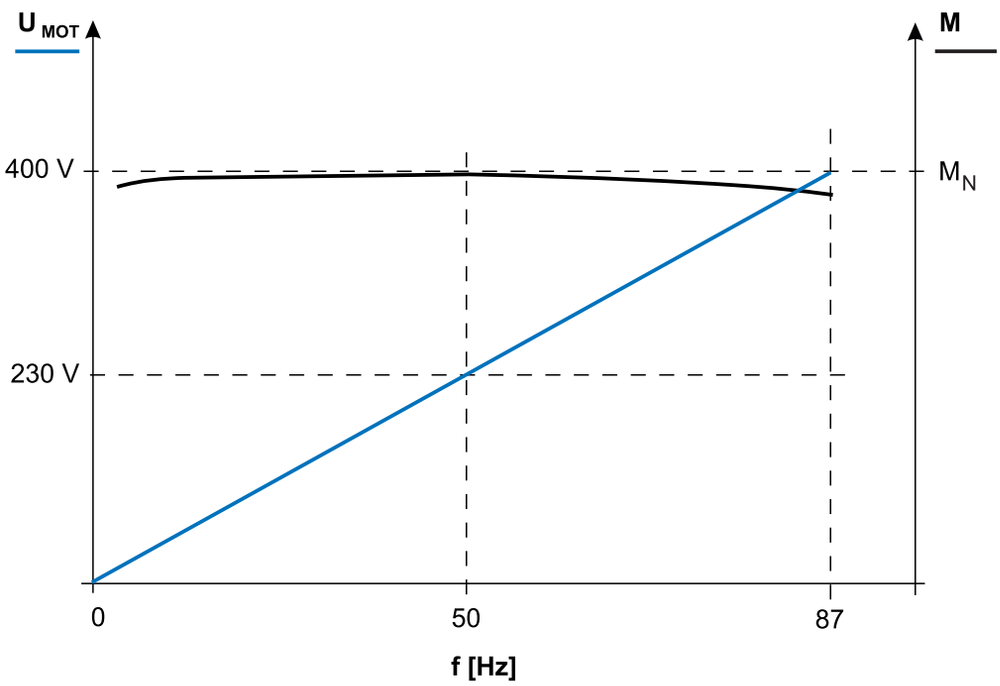
You can operate the motor in the field weakening range using both a delta and a star connection.



1 Constant torque range 2 Field weakening range

Operation per the 87 Hz characteristic

In this operating mode, the speed of the motor also increases proportionally to the motor voltage to a value above its nominal frequency. In this process, the torque remains almost constant. To this end, a 50 Hz, 230/400 V motor is connected with a delta setup (50 Hz, 230 V), but the drive controller is configured to 87 Hz, 400 V. This can increase the speed by √3x times the nominal frequency (87 Hz) with virtually constant torque. In doing so, the motor voltage is also increased continuously so that the motor operates with constant flux instead of field weakening.



Keep the following information in mind in this context:

- The motor must be designed for operation per the 87 Hz characteristic. Keep this in mind when placing a purchase order.
- Take the higher (√3-times) current requirement of the motor when selecting the drive controller.
- You can find the connection schema for the delta connection in the chapter [▶ 6.5.8.2].

6.7 Further information

6.7.1 Directives and standards

STOBER Asynchronous motors correspond to the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- (Ecodesign) Directive 2009/125/EC (if applicable)
- EN 60034-1:2010 + Cor.:2010
- EN 60204-1:2006
- EN 60038:2011

6.7.2 Marks and test symbols

STOBER asynchronous motors can be provided with the following marks and test symbols:

CE mark: The product meets the requirements of EU directives (standard).

cURus test symbol "Systems, Electrical Insulation - Component", registered with Underwriters Laboratories USA (optional).

ee logo: The asynchronous motor conforms to the Energy Independence and Security Act of 2007 (EISA) under US law and is registered with the US Department of Energy (DoE) under registration number CC301B (optional).

CC301B

6.7.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/download

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for asynchronous motors	442577_en
Operating manual for asynchronous motor encoder	442025_en
Operating manual for brakes of asynchronous motors	442015_en