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Three-phase Synchronous motors

DSD 45-100..540 V
DS 45-100..540 V

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Note: Preliminary DSD list!
The technical data—electrical and mechanical—are subject to change!
Date: 05/03

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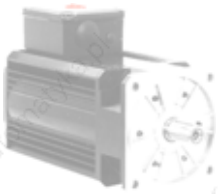
Three-phase synchronous motors DSD 45 - 100..540V

New design for frame size 56/71/100 available from October 2003.
Frame size 45 is already available.



General technical data

Version:	IM B5	Horizontal mounting
	IM V1	Vertical mounting, shaft end to the bottom
	IM V3	Vertical mounting, shaft end to the top
Protection type:	IP65	Surface-cooled, **without** fan, DIN 40050, DIN 40053
	IP54	Surface-cooled, **with** fan
Shaft gland:	IP64	Standard
	IP65	with shaft sealing ring (option)
Connection:		
Main connection	U V W	Terminal box
		Connector (option)
		Frame size 45 with connector as standard
Control connection		12-pin connector
Brake		in the main connection
Thermal sensor		in control connection (for resolver only)
Cooling type:	IC 0041	Completely enclosed machine surface-cooled no fan
	IC 0641	as above, but with fan (air flow direction from B to A end)
Thermal sensor:		Linear thermal sensor for evaluation in the controller
Temperature rise:	$\Delta\vartheta$ = 105K	Insulation class F acc. to EN 60034
Temperature range:	0....+ 40°C	
Storage:	-30°C...+85°C	
Paint:	black matt	RAL 9005
Bearing:	$\geq$ 20,000h	Service life
Balance quality:	N	According to DIN ISO 2373
	R, S	On request
Vibration resistant up to:	radial 3g	20 Hz to 2 kHz acc. to EN 60068-2-6
	axial 0.5g	20 Hz to 2 kHz acc. to EN 60068-2-6
		Higher vibration resistance on request
Flange:	acc. to IEC standard	Dimension b1: Tolerance j6
Shaft end:	cylindrical	Smooth acc. to DIN 748; (also available with key DIN 6885)
		Dimension d: Tolerance k6
		Centering with internal thread acc. to DIN 332 form D
Holding brake:	Option	
Actual speed encoder:	2-pin resolver	
	Sincos encoder (option)	Other encoders on request

Explanation of the motor data

$M_{0,}\ I_0$	Nominal torque (Nm) with nominal current (A) with speed >= 1 min^{-1} no time limit, I_0 is the r.m.s. value
$M_{0,\ max,}\ I_{0,\ max}$	Maximum torque (Nm) with Maximum current (A) with zero speed, $I_{0\ max}$ is the r.m.s. value
P_N	Nominal power (kW) with nominal speed n_N in continuous operation (S1) T_A=40°C installation up to 1000m a.m.s.l.
$M_{N,}\ I_N$	Nominal torque (Nm) at nominal current (A) with nominal speed n_N in continuous operation (S1); TA= 40°C
n_N	Nominal speed (min^{-1})
k_{TN}	Torque constant: M_N / I_N
f_N	Nominal frequency (Hz)
J	Rotor inertia incl. resolver without holding brake (kg cm²)
m	Weight in kg

The specified ratings / torques at nominal speed are achieved with a chopping frequency of ≥ 4 kHz in the power unit of the converter. A chopping frequency of > 6 kHz is recommended.

Type key

DSD	G	100	S	64	U	20	-5

DC link voltage:	5	540 V
	X	special
Nominal speed:	e.g. 20 =	2000 min^{-1}
	X:	special
Cooling:	U	Without fan
	O	With fan
	W	Water cooling
Type of protection:	e.g. 64 =	IP64
Length:	S	
	M	
	L	
	B	
Frame size:	045	
	056	
	071	
	100	
Holding brake:	Without	
	with	G
Motor type:	DSD	Three-phase Synchronous Dynamic

Technical data

DSD 045..64 U.. (IP 64 without fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1]		Stand-still current[1]	max. stand-still torque		max. stand-still current	Nom. power[1]		Nom. torque[1]		Nom. current[1]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O,max}$ Nm	$M_{O,max}$ lbf ft	$I_{O,max}$ A	P_N kW	P_N hp	M_N Nm	M_N lbf ft	I_N A
3000	DSD045S64U30-5	2.5	1.84	1.60	11	8	7.6	0.63	0.8	2.0	1.5	1.40
	DSD045M64U30-5	4.0	2.95	2.40	18[2]	13	12.0	0.94	1.3	3.0	2.2	2.0
	DSD045L64U30-5	5.2	3.84	3.10	25[2]	18	16.2	1.22	1.6	3.9	2.9	2.50
4500	DSD045S64U45-5	2.5	1.84	2.25	11	8	11.0	0.89	1.2	1.9	1.4	1.95
	DSD045M64U45-5	4.0	2.95	3.45	18[2]	13	17.0	1.18	1.6	2.5	1.8	2.40
	DSD045L64U45-5	5.2	3.84	4.45	25[2]	18	23.0	1.37	1.8	2.9	2.1	2.74

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J Kgcm^2	J lb in^2	m kg	m lb
3000	DSD045S64U30-5	1.43	1.05	200.0	1.39	0.47	4.2	9.3
	DSD045M64U30-5	1.50	1.11	200.0	1.64	0.56	5.3	11.7
	DSD045L64U30-5	1.56	1.15	200.0	1.90	0.65	6.3	13.9
4500	DSD045S64U45-5	0.97	0.72	300.0	1.39	0.47	4.2	9.3
	DSD045M64U45-5	1.04	0.77	300.0	1.64	0.56	5.3	11.7
	DSD045L64U45-5	1.06	0.78	300.0	1.90	0.65	6.3	13.9

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 250mm×250mm)

2) max. shaft torque: **M_{max} ≤ 16 Nm for shaft end with key**
M_{max} ≤ 28 Nm for shaft end without key

Legend

	American units

DSD 056..64 U.. (IP 64 without fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1]		Stand-still current[1]	max. stand-still torque		max. stand-still current	Nom. power[1]		Nom. torque[1]		Nom. current[1]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O,max}$ Nm	$M_{O,max}$ lbf ft	$I_{O,max}$ A	P_N KW	P_N hp	M_N Nm	M_N lbf ft	I_N A
2000	DSD056S64U20-5	5.5	4.06	2.4	23	17	11.0	1.0	1.3	4.8	3.5	2.2
	DSD056M64U20-5	8.8	6.49	3.8	38	28	18.0	1.6	2.1	7.5	5.5	3.3
	DSD056L64U20-5	11.5	8.48	4.9	52	38	24.0	2.0	2.7	9.4	6.9	4.2
3000	DSD056S64U30-5	5.5	4.06	3.5	23	17	16.0	1.3	1.7	4.1	3.0	2.7
	DSD056M64U30-5	8.8	6.49	5.4	38	28	25.5	2.0	2.7	6.5	4.8	4.2
	DSD056L64U30-5	11.5	8.48	6.8	52	38	34.0	2.4	3.2	7.7	5.7	5.0
4500	DSD056S64U45-5	5.5	4.06	4.9	23	17	22.0	1.6	2.1	3.4	2.5	3.3
	DSD056M64U45-5	8.8	6.49	7.6	38	28	36.0	2.4	3.2	5.0	3.7	4.7
	DSD056L64U45-5	11.5	8.48	9.6	52	38	47.5	2.3	3.1	4.8	3.5	4.7

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J Kgcm^2	J lb in^2	m Kg	m lb
2000	DSD056S64U20-5	2.18	1.61	133.3	3.0	1.03	8.2	18.1
	DSD056M64U20-5	2.27	1.67	133.3	4.3	1.47	10.0	22.0
	DSD056L64U20-5	2.24	1.65	133.3	5.7	1.95	11.8	26.0
3000	DSD056S64U30-5	1.52	1.12	200.0	3.0	1.03	8.2	18.1
	DSD056M64U30-5	1.55	1.14	200.0	4.3	1.47	10.0	22.0
	DSD056L64U30-5	1.54	1.14	200.0	5.7	1.95	11.8	26.0
4500	DSD056S64U45-5	1.03	0.76	300.0	3.0	1.03	8.2	18.1
	DSD056M64U45-5	1.06	0.78	300.0	4.3	1.47	10.0	22.0
	DSD056L64U45-5	1.02	0.75	300.0	5.7	1.95	11.8	26.0

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 250mm×250mm)

Legend

	American units

DSD 056..54 O.. (IP 54 with fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1)]		Stand-still current[1)]	max. stand-still torque		Max. stand-still current	Nom. power[1)]		Nom. torque[1)]		Nom. current[1)]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O,max}$ Nm	$M_{O,max}$ lbf ft	$I_{O,max}$ A	P_N KW	P_N hp	M_N Nm	M_N lbf ft	I_N A
2000	DSD056S54O20-5	7.2	5.31	3.2	23	17	11.0	1.4	1.9	6.6	4.9	3.0
	DSD056M54O20-5	11.8	8.7	5.1	38	28	18.0	2.3	3.1	11.0	8.1	4.9
	DSD056L54O20-5	15.5	11.4	6.7	52	38	24.0	3.0	4.0	14.2	10.5	6.3
3000	DSD056S54O30-5	7.2	5.31	4.6	23	17	16.0	2.0	2.7	6.3	4.6	4.1
	DSD056M54O30-5	11.8	8.7	7.3	38	28	25.5	3.3	4.4	10.4	7.7	6.6
	DSD056L54O30-5	15.5	11.4	9.4	52	38	34.0	4.1	5.5	13.0	9.6	8.2
4500	DSD056S54O45-5	7.2	5.31	6.4	23	17	22.0	2.6	3.5	5.5	4.1	5.2
	DSD056M54O45-5	11.8	8.7	10.3	38	28	36.0	4.2	5.6	9.0	6.6	8.2
	DSD056L54O45-5	15.5	11.4	13.0	52	38	47.5	5.4	7.2	11.4	8.4	10.5

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J Kgcm^2	J lb in^2	m Kg	m lb
2000	DSD056S54O20-5	2.20	1.62	133.3	3.0	1.03	11.0	24.3
	DSD056M54O20-5	2.24	1.65	133.3	4.3	1.47	12.8	28.2
	DSD056L54O20-5	2.25	1.66	133.3	5.7	1.95	14.6	32.2
3000	DSD056S54O30-5	1.54	1.14	200.0	3.0	1.03	11.0	24.3
	DSD056M54O30-5	1.58	1.17	200.0	4.3	1.47	12.8	28.2
	DSD056L54O30-5	1.58	1.17	200.0	5.7	1.95	14.6	32.2
4500	DSD056S54O45-5	1.06	0.78	300.0	3.0	1.03	11.0	24.3
	DSD056M54O45-5	1.10	0.81	300.0	4.3	1.47	12.8	28.2
	DSD056L54O45-5	1.09	0.80	300.0	5.7	1.95	14.6	32.2

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 250mm×250mm)

Legend

	American units

DSD 071..64 U.. (IP 64 without fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1)]		Stand-still current[1)]	Max. stand-still torque		max. stand-still current	Nom. power[1)]		Nom. torque[1)]		Nom. current[1)]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O.max}$ Nm	$M_{O.max}$ lbf ft	$I_{O.max}$ A	P_N KW	P_N hp	M_N Nm	M_N lbf ft	I_N A
2000	DSD071S64U20-5	13.5	9.96	5.7	51	38	24.5	2.3	3.1	11.0	8.1	4.9
	DSD071M64U20-5	19.5	14.4	8.4	75	55	36.5	3.1	4.2	15.0	11.1	6.8
	DSD071L64U20-5	25.0	18.4	10.7	100	74	48.0	4.2	5.6	20.0	14.8	8.9
3000	DSD071S64U30-5	13.5	9.96	8.2	51	38	35.5	2.9	3.9	9.2	6.8	6.0
	DSD071M64U30-5	19.5	14.4	11.7	75	55	51.0	4.0	5.4	12.6	9.3	8.0
	DSD071L64U30-5	25.0	18.4	15.2	100	74	68.0	5.0	6.7	16.0	11.8	10.2
4500	DSD071S64U45-5	13.5	9.96	11.6	51	38	50.0	3.4	4.6	7.2	5.3	6.7
	DSD071M64U45-5	19.5	14.4	17.0	75	55	75.0	4.3	5.8	9.2	6.8	8.7
	DSD071L64U45-5	25.0	18.4	21.4	100	74	95.0	5.2	7.0	11.0	8.1	10.0

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J kgcm^2	J lb in^2	m kg	m lb
2000	DSD071S64U20-5	2.24	1.65	133.3	9.2	3.14	16.2	35.7
	DSD071M64U20-5	2.21	1.63	133.3	12.8	4.37	18.7	41.2
	DSD071L64U20-5	2.25	1.66	133.3	16.5	5.64	21.0	46.3
3000	DSD071S64U30-5	1.53	1.13	200.0	9.2	3.14	16.2	35.7
	DSD071M64U30-5	1.58	1.17	200.0	12.8	4.37	18.7	41.2
	DSD071L64U30-5	1.57	1.16	200.0	16.5	5.64	21.0	46.3
4500	DSD071S64U45-5	1.07	0.79	300.0	9.2	3.14	16.2	35.7
	DSD071M64U45-5	1.06	0.78	300.0	12.8	4.37	18.7	41.2
	DSD071L64U45-5	1.10	0.81	300.0	16.5	5.64	21.0	46.3

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 400mm×400mm)

Legend

	American units

DSD 071..54 O.. (IP 54 with fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1)]		Stand-still current[1)]	Max. stand-still torque		max. stand-still current	Nom. power[1)]		Nom. torque[1)]		Nom. current[1)]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O,max}$ Nm	$M_{O,max}$ lbf ft	$I_{O,max}$ A	P_N kW	P_N hp	M_N Nm	M_N lbf ft	I_N A
2000	DSD071S54O20-5	18.0	13.3	7.7	51	38	24.5	3.1	4.2	15.0	11.1	6.7
	DSD071M54O20-5	26.5	19.5	11.3	75	55	36.5	4.6	6.2	22.0	16.2	9.9
	DSD071L54O20-5	34.5	25.4	14.8	100	74	48.0	6.1	8.2	29.0	21.4	12.8
3000	DSD071S54O30-5	18.0	13.3	11.2	51	38	35.5	4.2	5.6	13.5	10.0	8.8
	DSD071M54O30-5	26.5	19.5	15.9	75	55	51.0	6.3	8.4	20.0	14.8	12.6
	DSD071L54O30-5	34.5	25.4	21.0	100	74	68.0	8.0	10.7	24.5	18.1	15.4
4500	DSD071S54O45-5	18.0	13.3	15.7	51	38	50.0	5.7	7.6	12.0	8.9	11.0
	DSD071M54O45-5	26.5	19.5	23.0	75	55	75.0	8.0	10.7	17.0	12.5	15.8
	DSD071L54O45-5	34.5	25.4	29.6	100	74	95.0	10.1	13.5	21.5	15.9	19.2

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J Kgcm^2	J lb in^2	m Kg	m lb
2000	DSD071S54O20-5	2.24	1.65	133.3	9.2	3.14	20.0	44.1
	DSD071M54O20-5	2.22	1.64	133.3	12.8	4.37	22.5	49.6
	DSD071L54O20-5	2.26	1.67	133.3	16.5	5.64	24.8	54.7
3000	DSD071S54O30-5	1.53	1.13	200.0	9.2	3.14	20.0	44.1
	DSD071M54O30-5	1.59	1.17	200.0	12.8	4.37	22.5	49.6
	DSD071L54O30-5	1.59	1.17	200.0	16.5	5.64	24.8	54.7
4500	DSD071S54O45-5	1.09	0.80	300.0	9.2	3.14	20.0	44.1
	DSD071M54O45-5	1.08	0.80	300.0	12.8	4.37	22.5	49.6
	DSD071L54O45-5	1.12	0.83	300.0	16.5	5.64	24.8	54.7

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 400mm×400mm)

Legend

	American units

DSD 100..64 U.. (IP 64 without fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1)]		Stand-still current[1)]	max. stand-still torque		max. stand-still current	Nom. power[1)]		Nom. torque[1)]		Nom. current[1)]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O,max}$ Nm	$M_{O,max}$ lbf ft	$I_{O,max}$ A	P_N KW	P_N hp	M_N Nm	M_N lbf ft	I_N A
1200	DSD100S64U12-5	34.0	25.1	9.1	105	77	33	3.8	5.1	30.0	22.1	8.3
	DSD100M64U12-5	51.0	37.6	13.7	158	117	49	5.6	7.5	44.5	32.8	12.3
	DSD100L64U12-5	66.5	49	18.0	210	155	66	7.0	9.4	56.0	41.3	15.5
2000	DSD100S64U20-5	34.0	25.1	14.5	105	77	52	5.4	7.2	26.0	19.2	11.5
	DSD100M64U20-5	51.0	37.6	21.0	158	117	75	7.7	10.3	37.0	27.3	16.0
	DSD100L64U20-5	66.5	49	27.5	210	155	102	9.4	12.6	45.0	33.2	19.5
3000	DSD100S64U30-5	34.0	25.1	21.5	105	77	76	6.6	8.9	21.0	15.5	13.5
	DSD100M64U30-5	51.0	37.6	30.5	158	117	110	9.0	12.1	28.5	21.0	18.5
	DSD100L64U30-5	66.5	49	40.0	210	155	147	10.7	14.3	34.0	25.1	21.5
4500	DSD100S64U45-5	34.0	25.1	30.5	105	77	110	5.9	7.9	12.5	9.2	11.7
	DSD100M64U45-5	51.0	37.6	44.0	158	117	157	7.5	10.1	16.0	11.8	15.0

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J Kgcm^2	J lb in²	m kg	m lb
1200	DSD100S64U12-5	3.61	2.66	80.0	42.5	14.52	31.0	68.3
	DSD100M64U12-5	3.62	2.67	80.0	60.0	20.50	38.5	84.9
	DSD100L64U12-5	3.61	2.66	80.0	77.0	26.31	45.5	100.3
2000	DSD100S64U20-5	2.26	1.67	133.3	42.5	14.52	31.0	68.3
	DSD100M64U20-5	2.31	1.70	133.3	60.0	20.50	38.5	84.9
	DSD100L64U20-5	2.31	1.70	133.3	77.0	26.31	45.5	100.3
3000	DSD100S64U30-5	1.56	1.15	200.0	42.5	14.52	31.0	68.3
	DSD100M64U30-5	1.54	1.14	200.0	60.0	20.50	38.5	84.9
	DSD100L64U30-5	1.58	1.17	200.0	77.0	26.31	45.5	100.3
4500	DSD100S64U45-5	1.07	0.79	300.0	42.5	14.52	31.0	68.3
	DSD100M64U45-5	1.07	0.79	300.0	60.0	20.50	38.5	84.9

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 400mm×400mm)

Legend

	American units

DSD 100..54 O.. (IP 54 with fan)

Mains voltage 3 AC 400 V for converters with uncontrolled supply

Nom. speed	Motor type	Stand-still torque[1]		Stand-still current[1]	Max. stand-still torque		max. stand-still current	Nom. power[1]		Nom. torque[1]		Nom. current[1]
n_N min^{-1}		M_O Nm	M_O lbf ft	I_O A	$M_{O,max}$ Nm	$M_{O,max}$ lbf ft	$I_{O,max}$ A	P_N KW	P_N hp	M_N Nm	M_N lbf ft	I_N A
1200	DSD100S54O12-5	43.5	32.1	11.8	105	77	33	4.6	6.2	37.0	27.3	10.2
	DSD100M54O12-5	67.0	49.4	18.0	158	117	49	7.3	9.8	58.0	42.8	16.1
	DSD100L54O12-5	89.0	65.6	24.0	210	155	66	9.3	12.5	74.0	54.6	20.6
2000	DSD100S54O20-5	43.5	32.1	18.5	105	77	52	6.8	9.1	32.5	24.0	14.3
	DSD100M54O20-5	67.0	49.4	27.5	158	117	75	10.3	13.8	49.0	36.1	21.2
	DSD100L54O20-5	89.0	65.6	37.0	210	155	102	13.4	18.0	64.0	47.2	27.7
3000	DSD100S54O30-5	43.5	32.1	27.2	105	77	76	8.6	11.5	27.5	20.3	18.0
	DSD100M54O30-5	67.0	49.4	40.0	158	117	110	13.2	17.7	42.0	31.0	26.8
	DSD100L54O30-5	89.0	65.6	53.5	210	155	147	17.0	22.8	54.0	39.8	34.0
4500	DSD100S54O45-5	43.5	32.1	39.0	105	77	110	10.0	13.4	21.5	15.9	20.0
	DSD100M54O45-5	67.0	49.4	57.5	158	117	157	15.0	20.1	32.0	23.6	29.5

Nom. speed	Motor type	Torque con-stant		Nom. fre-quency	Rotor inertia (motor)		Weight	
n_N min^{-1}		k_{TN} Nm/A	k_{TN} lbf ft / A	f_N Hz	J $Kgcm^2$	J lb in^2	m kg	m lb
1200	DSD100S54O12-5	3.63	2.68	80.0	42.5	14.52	36.3	80.0
	DSD100M54O12-5	3.60	2.66	80.0	60.0	20.50	43.8	96.6
	DSD100L54O12-5	3.59	2.65	80.0	77.0	26.31	50.8	112.0
2000	DSD100S54O20-5	2.25	1.66	133.3	42.5	14.52	36.3	80.0
	DSD100M54O20-5	2.31	1.70	133.3	60.0	20.50	43.8	96.6
	DSD100L54O20-5	2.38	1.76	133.3	77.0	26.31	50.8	112.0
3000	DSD100S54O30-5	1.53	1.13	200.0	42.5	14.52	36.3	80.0
	DSD100M54O30-5	1.56	1.15	200.0	60.0	20.50	43.8	96.6
	DSD100L54O30-5	1.59	1.17	200.0	77.0	26.31	50.8	112.0
4500	DSD100S54O45-5	1.07	0.79	300.0	42.5	14.52	36.3	80.0
	DSD100M54O45-5	1.08	0,80	300.0	60.0	20,50	43.8	96,6

1) Winding overheat ΔT < 105 K; direct flange connection (mounting plate 400mm×400mm)

Legend

	American units

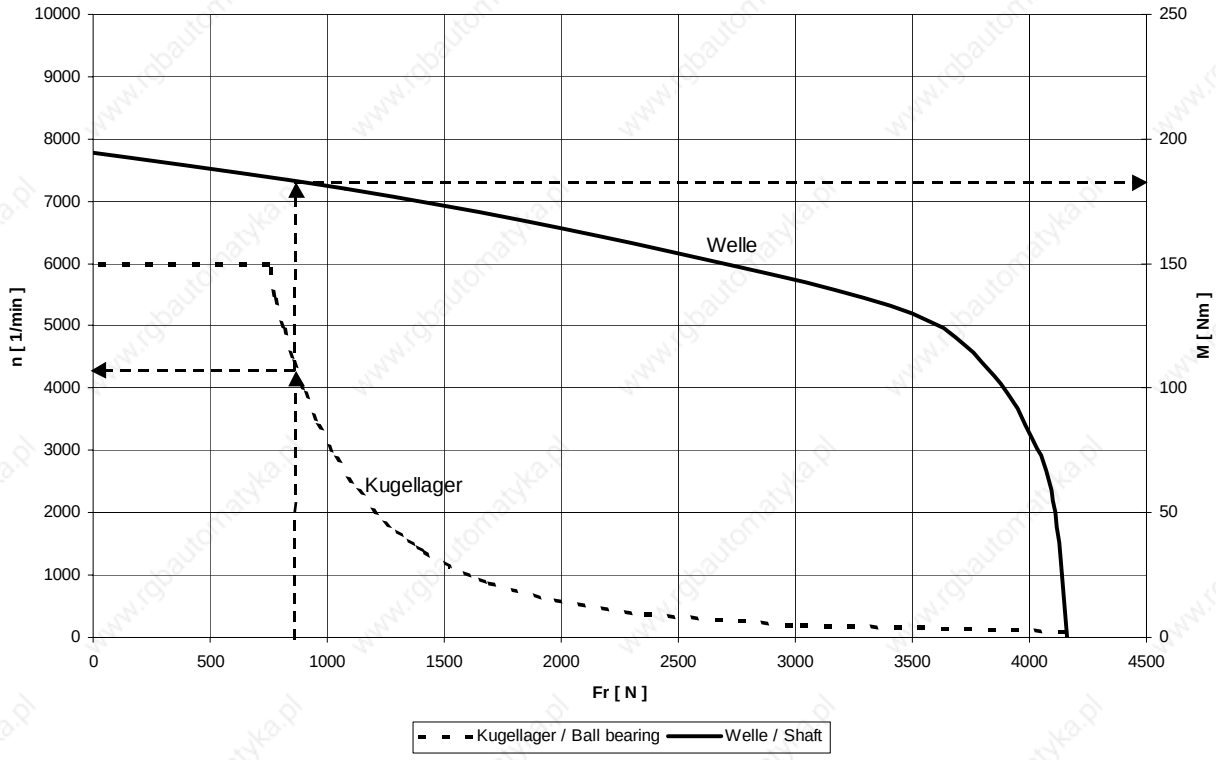
Radial force diagrams

Permissible radial forces F_R at the shaft end
All bearings are dimensioned for a service life of approx. 20,000 operating hours; the loads specified in the following must not be exceeded. The specified permissible radial forces F_R are valid only for horizontal mounting of the motor without additional axial forces.

Axial load of the motor shaft
When mounting clutches, pulleys, etc. onto the motor shaft, axial forces must not occur! Therefore use the internal thread of the shaft end as assembly aid.

Example

Force acting on the end of the shaft end (for force acting on the middle of the shaft end Fr x 1.1)
Bearing life 20,000 h; shaft end with keyway



Explanation of the example

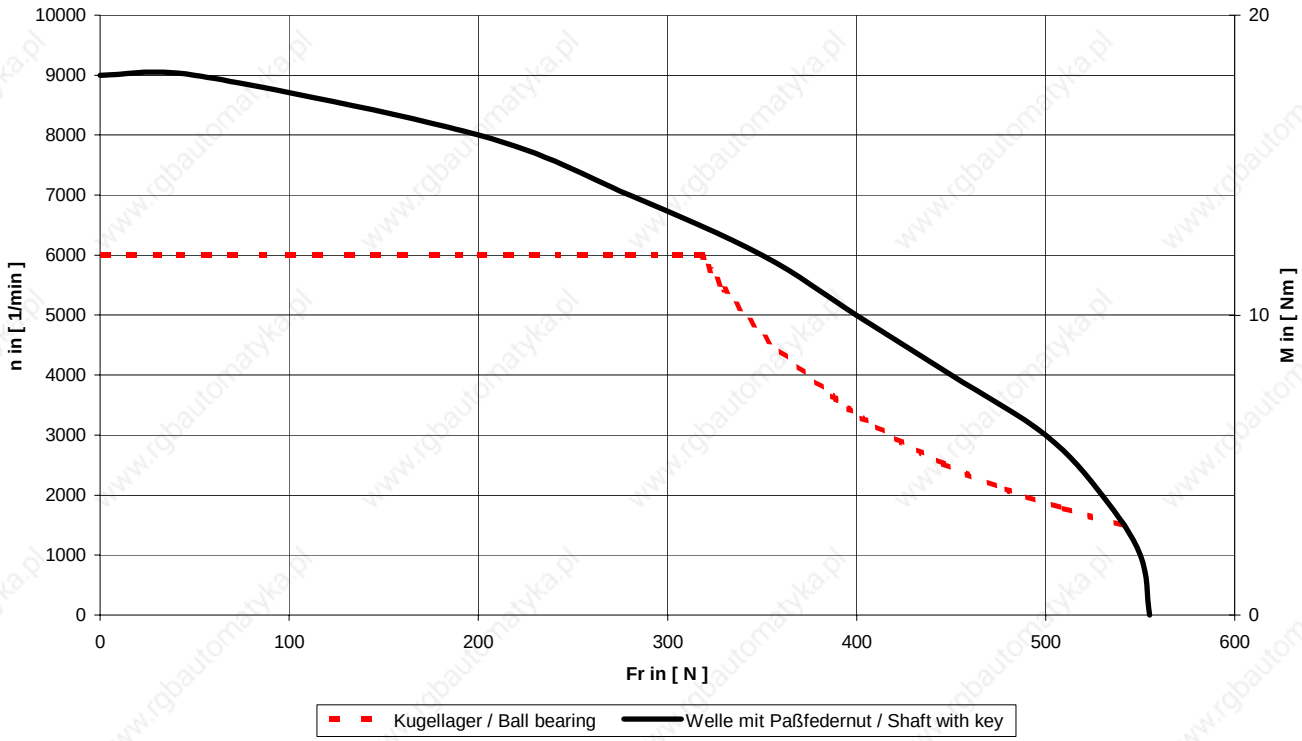
The radial force Fr of the application is used to determine the possible maximum speed of the bearing in the “Ball bearing” characteristic.

Radial force 850 N => maximum speed 4250 min^{-1}

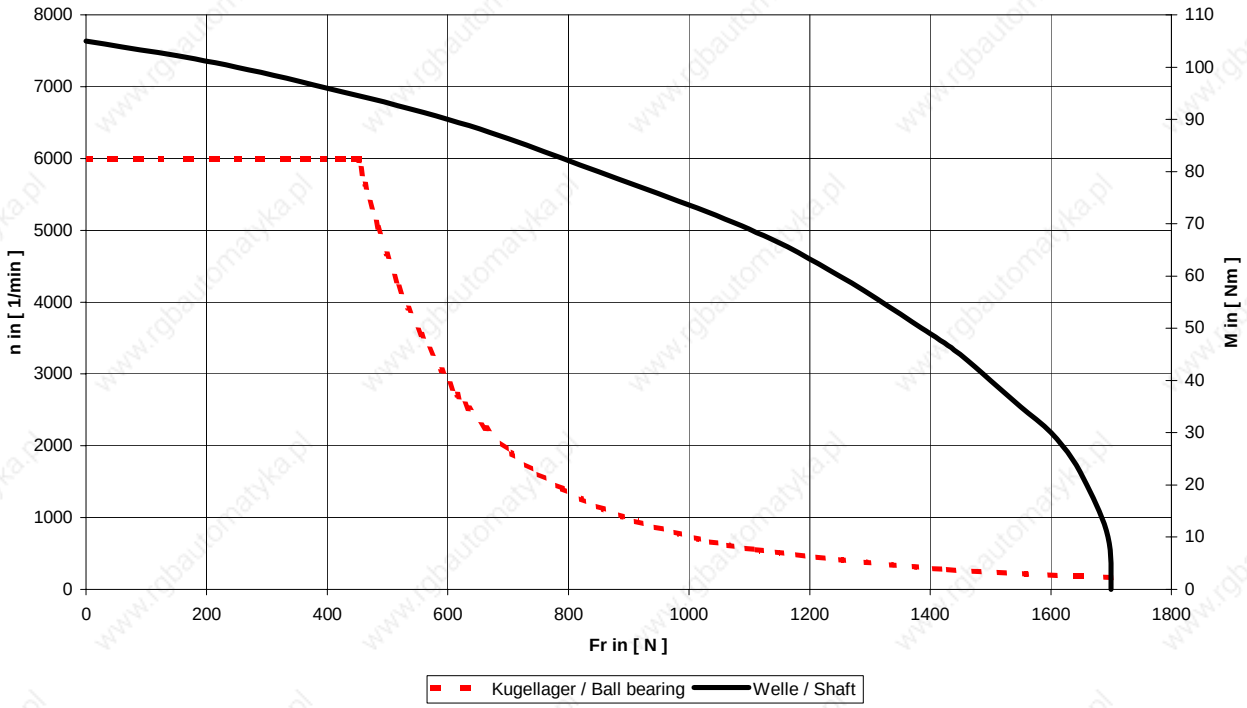
The maximum transmittable torque results from the “Shaft” characteristic.

Radial force 850 N => maximum transmittable torque 185 Nm

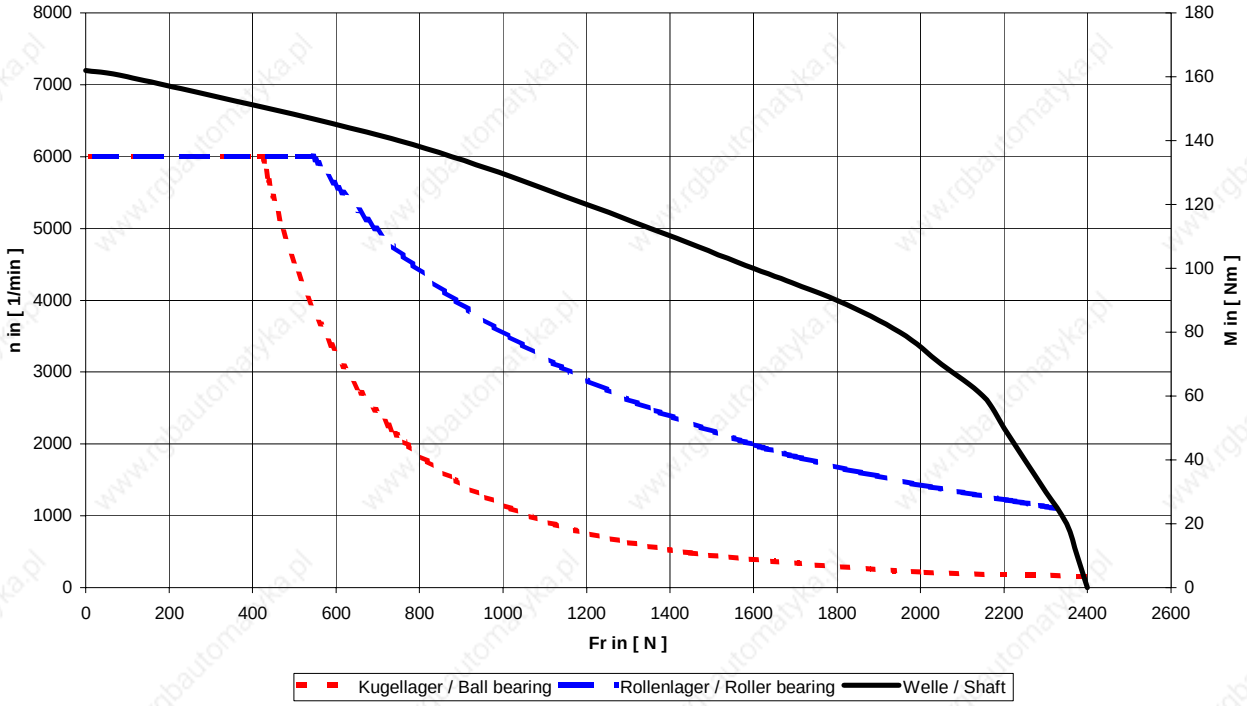
DSD 45


10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
n in [1/min]
20
10
0
M in [Nm]
0
100
200
300
400
500
600
Fr in [N]
Kugellager / Ball bearing
Welle mit Paßfedernut / Shaft with key

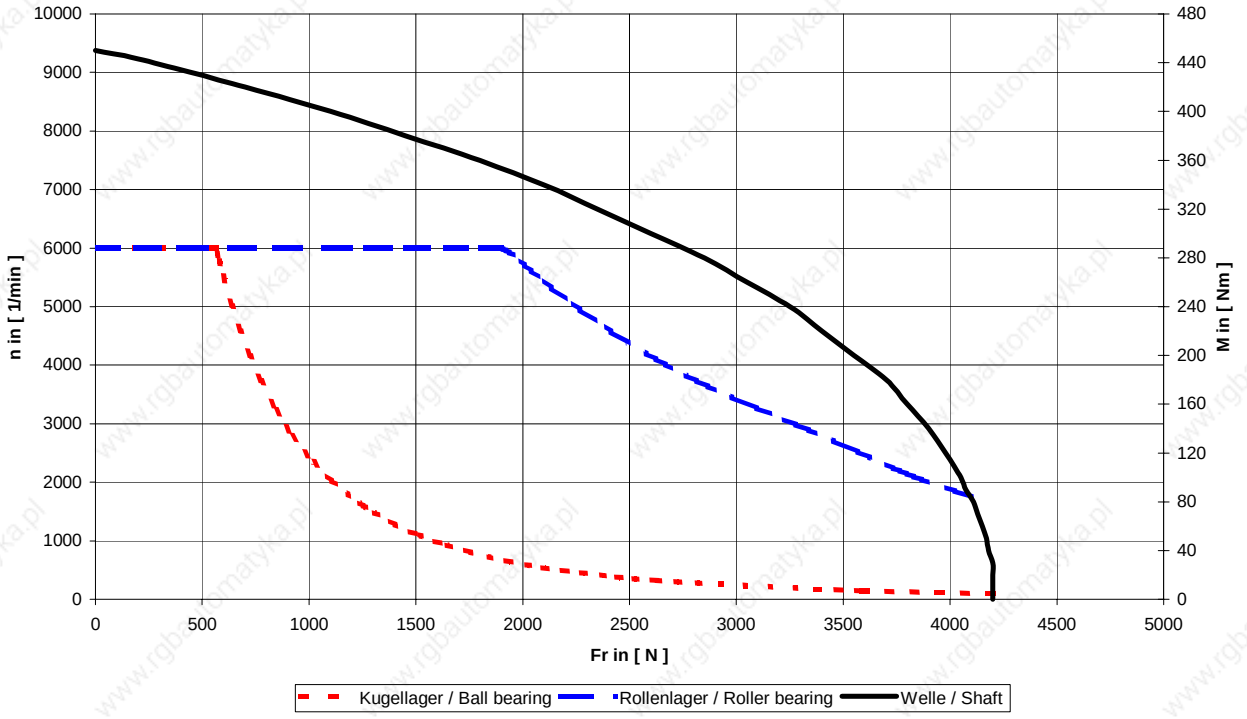
DSD 56


8000
7000
6000
5000
4000
3000
2000
1000
0
n in [1/min]
110
100
90
80
70
60
50
40
30
20
10
0
M in [Nm]
0
200
400
600
800
1000
1200
1400
1600
1800
Fr in [N]
Kugellager / Ball bearing
Welle / Shaft

DSD 71



DSD 100



Brake assignment

The motors are optionally equipped with a holding brake. The brake uses the normally-on principle, i.e. the brake engages with the operating voltage is switched off or fails. The brakes are supplied for a switching voltage of 24 VDC ± 10%.

The motors are available with the following holding brakes:

Motor type	DSD 45	DSD 56	DSD 71	DSD 100
minimum holding torque	6	15	35	80
max. perm. friction work per braking operation [J]	1000	2000	5000	15000
Connection values (±10% smoothed)	24 V = 19 W	24 V = 22 W	24 V = 35 W	24 V = 52 W
Inertia [$kgcm^2$]	0.3	0.8	3.5	8.6
Maximum speed [min^{-1}]	6000	6000	6000	4500
Switching time On Brake released [ms]	50	70	100	140
Off [ms]	50	70	100	140
Weight [kg]	1.0	2.0	3.5	8.2

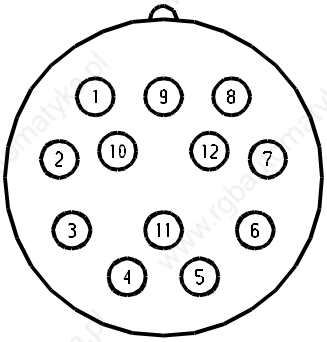
None of the brakes are **fail-safe brakes** so that the torque may be reduced by interference factors beyond control. In accordance with the case of application, observe the relevant accident prevention guidelines as well as the basic safety and health requirements of Appendix I of the Machinery Directive and the harmonized European Standards.
In the event of emergency stop or voltage failure, approx. 2,500 braking operations can be carried out without causing the holding brake to overheat (Condition: maximum external inertia = motor inertia and $n_{max.}$ type-related).

Encoders

Resolver

Pole pair number	1
Ratio	0.5
Frequency	5 kHz
Nominal input voltage	4 V
Active input power for no-load operation	112 mW
Current consumption for no-load operation	40 mA
Max. output voltage for no-load operation	2 V eff
Voltage constant	-
Rotor resistance	44 Ω ± 10%
Stator resistance	28 Ω ± 10%
Rotor impedance for no-load operation	70 + j 74 Ω ± 15%
Rotor impedance at short-circuit	62 + j 66 Ω ± 15%
Stator impedance for no-load operation with min. coupling	108 + j 206 Ω ± 15%
Stator impedance at short-circuit and maximum coupling	97 + j 183 Ω ± 15%
Phase shift	8°
Zero voltage	15 mV / °
Phase error referred to zero position	10´

Resolver connection



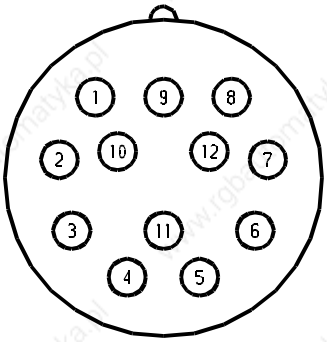
Pin	Signal
1	cos -
2	
3	
4	
5	sin –
6	sin +
7	TM -
8	cos +
9	TM +
10	Ref +
11	
12	Ref -

View to contact side of female connector

SINCOS SRS/SRM 50 (Stegmann)

	SRS 50 / SRM 50	
Number of sine, cosine periods per revolution	1024	
Number of increments per revolution	32768	
Number of absolute resolved revolutions	1	4096
Code type for the absolute value	binary	
Output frequency of sine, cosine signals (kHz)	0 ... 200	
Error limits when evaluating 1024 signals, integral non-linearity (arc seconds)	+/- 45	
Non-linearity within a sine, cosine period; differential non-linearity (arc seconds)	+/- 7	
Working speed up to which the absolute position can be formed (1/min)	6000	
Maximum operating speed (1/min)	12000	
Output signals; 2 x 90° shifted sinusoidal signals (V_{pp})	1	
Output signal	Serial RS 485, asynchronous, halbduplex	
Operating voltage range (V)	7 ... 12	
Operating current without load (mA)	80	

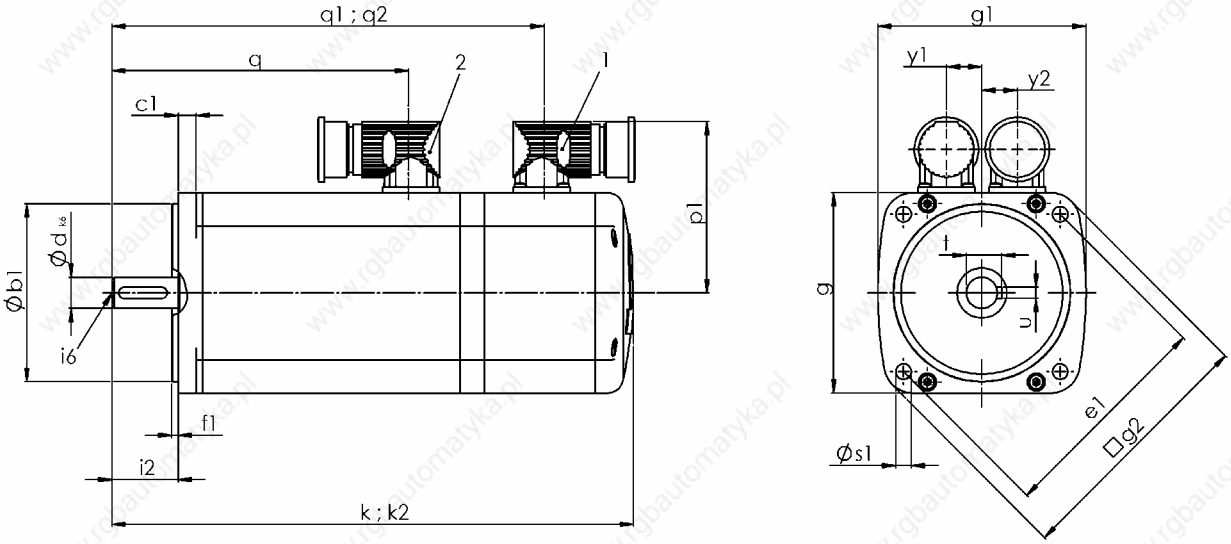
SRS/SRM 50 connection

		Pin	Signal
		1	ref cos
		2	+ 485
		3	-
		4	-
		5	sin
		6	ref sin
		7	- 485
		8	cos
		9	-
		10	Gnd
		11	-
		12	+ U

View to contact side of female connector

Drawings

DSD 45 standard version,
main connection with connector



k = motor with encoder
k2 = motor with brake and encoder
q1 = motor with encoder
q2 = motor with brake and encoder

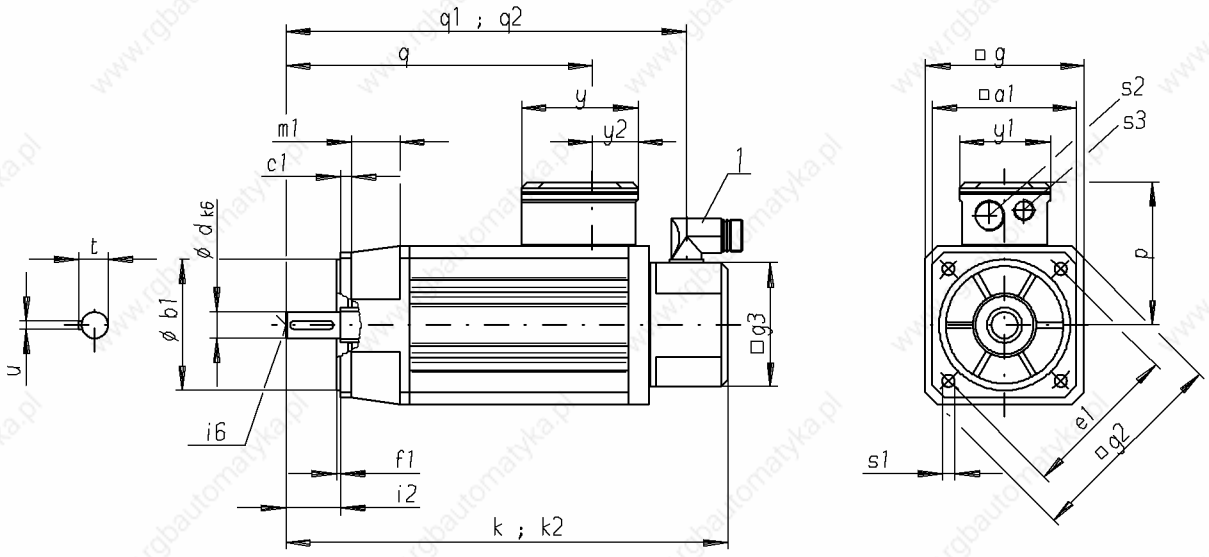
i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector
2 = Connector for main connection/brake (use only up to 44 A)

- DC link voltage of 540 V motors
- Key: Motors are also available with key DIN 6885.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor												Brake	
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	g1	k	m1	p1	q	q1	y	y1	y2	s2	s3	k2	q2
45 S	-	80	8	100	3	30	7	14	16	5	115	90	94	240	-	75	134	195	-	16	16	-	-	300	260
45 M														270			164	225						330	290
45 L														300			194	255						360	320

Version IM B5	Type of protection IP 65	Cooling method IC 0041		

DSD 56 / 71 / 100 standard version,
main connection with terminal box



k = motor with encoder
k2 = motor with brake and encoder
q1 = motor with encoder
q2 = motor with brake and encoder

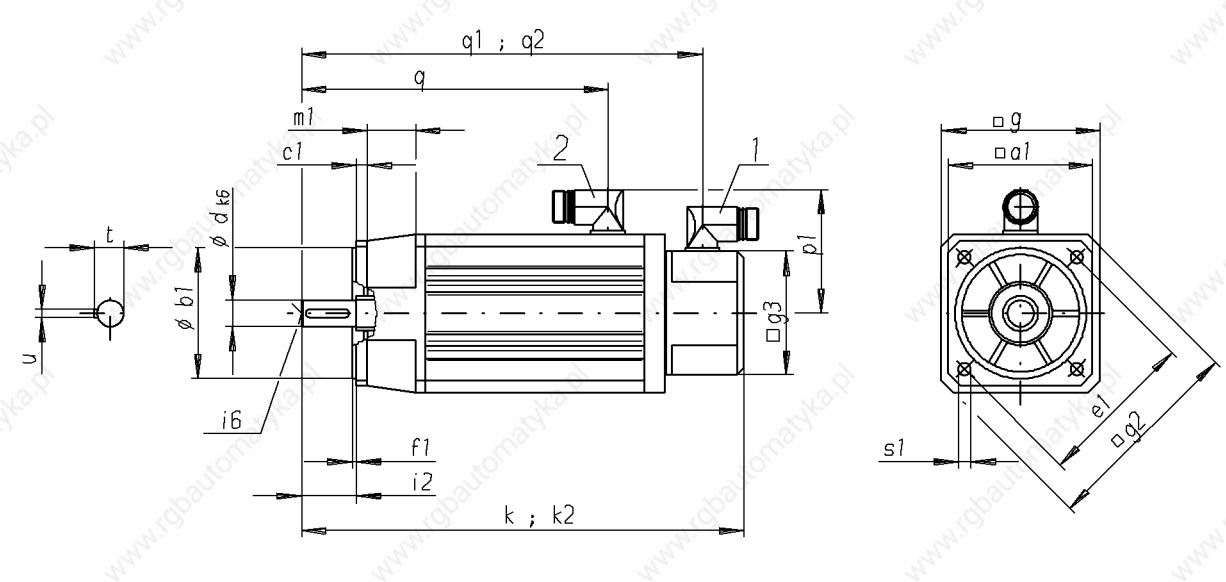
i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector

- DC link voltage of 540 V motors
- Key: Motors are also available with key DIN 6885.
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor													Brake	
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	g3	k	m1	p	q	q1	s2	s3	y	y1	y2	k2	q2
56 S	120	110	9	130	3.5	50	9	24	27	8	150	115	90	291	28	103	183	261	M20	M16	85	66	33	376	346
56 M														329			221	299						414	384
56 L														367			259	337						452	422
71 S	142	130	10	165	3.5	58	12	28	31	8	186	142	90	337	32	129	230	307	M25	M16	110	70	35	421	391
71 M														377			270	347						461	431
71 L														417			310	387						501	471
100 S	190	180	12	215	4	80	14	38	41	10	250	190	90	408	38	174	288	378	M16	M40	150	135	37	528	498
100 M														460			340	430						580	550
100 L														512			392	482						632	602

Version IM B5	Type of protection IP 65	Cooling method IC 0041		

DSD 56 / 71 / 100 standard version,
main connection with connector



k = motor with encoder
k2 = motor with brake and encoder
q1 = motor with encoder
q2 = motor with brake and encoder

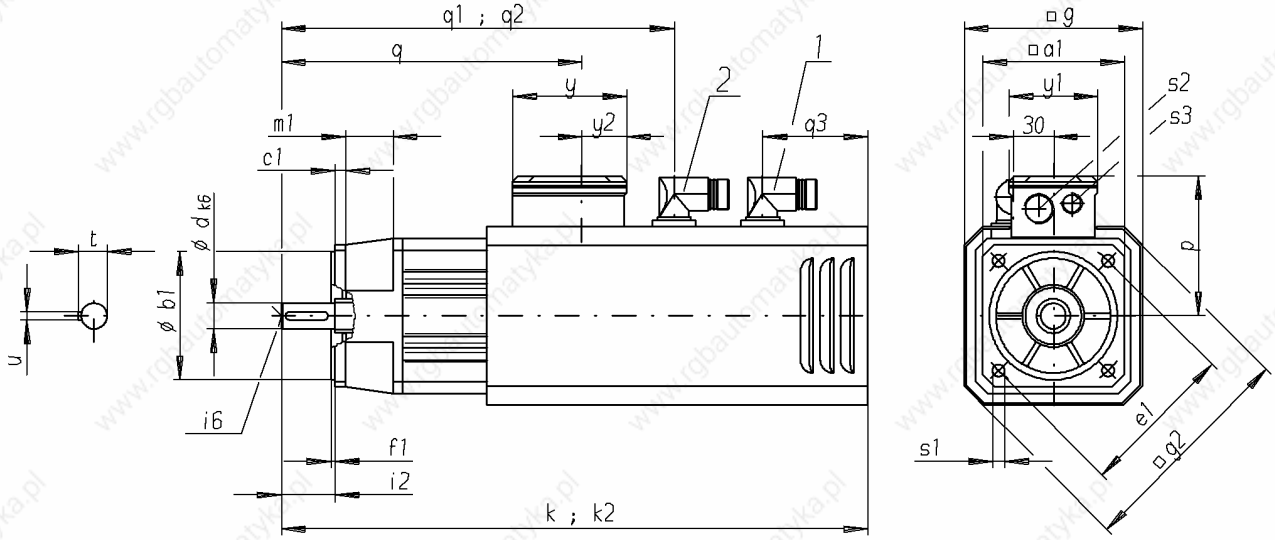
i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector
2 = Connector for main connection/brake (use only up to 44 A)

- DC link voltage of 540 V motors
- Key: Motors are also available with key DIN 6885.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor													Brake	
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	g3	k	m1	p1	q	q1	y	y1	y2	s2	s3	k2	q2
56 S	120	110	9	130	3.5	50	9	24	27	8	150	115	90	291	28	123	183	261	-	-	-	-	-	376	346
56 M														329			221	299						414	384
56 L														367			259	337						452	422
71 S	142	130	10	165	3.5	58	12	28	31	8	186	142	90	337	32	136	230	307	-	-	-	-	-	421	391
71 M														377			270	347						461	431
71 L														417			310	387						501	471
100 S	190	180	12	215	4	80	14	38	41	10	250	190	90	408	38	160	288	378	-	-	-	-	-	528	498
100 M														460			340	430						580	550
100 L														512			392	482						632	602

Version IM B5	Type of protection IP 65	Cooling method IC 0041		

DSD 56 / 71 / 100 standard version with fan,
main connection with terminal box



k = motor with encoder
k2 = motor with brake and encoder
q1 = motor with encoder
q2 = motor with brake and encoder

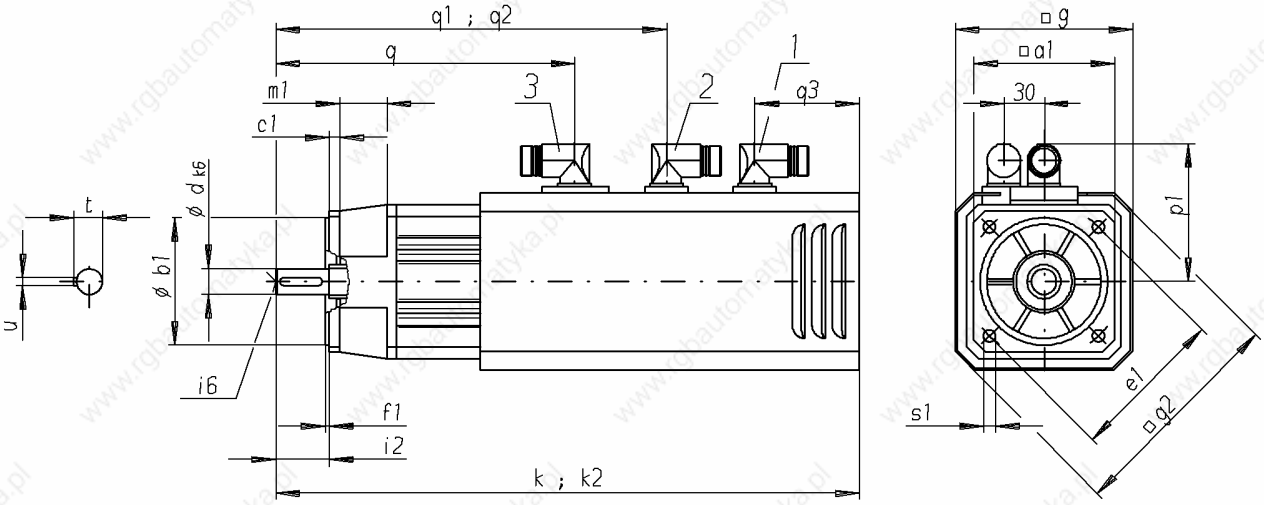
i6 = Centring with internal thread acc. to DIN 332 form D
1 = Fan connector
2 = Encoder connector

- DC link voltage of 540 V motors
- Key: Motors are also available with key DIN 6885.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor														Brake	
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p	q	q1	q3	y	y1	y2	s2	s3	k2	q2
56 S	120	110	9	130	3.5	50	9	24	27	8	185	140	426	28	103	183	261	124	85	66	33	M20	M16	511	346
56 M													464			221	299							549	384
56 L													502			259	337							587	422
71 S	142	130	10	165	3.5	58	12	28	31	8	230	180	466	32	129	230	307	124	110	70	35	M25	M16	550	391
71 M													506			270	347							590	431
71 L													546			310	387							630	471
100 S	190	180	12	215	4	80	14	38	41	10	275	215	537	38	174	288	378	124	150	135	37	M16	M40	657	498
100 M													589			340	430							709	550
100 L													641			392	482							761	602

Version IM B5	Type of protection IP 54	Cooling method IC 0641		

DSD 56 / 71 / 100 standard version with fan,
main connection with connector



k = motor with encoder
k2 = motor with brake and encoder
q1 = motor with encoder
q2 = motor with brake and encoder

i6 = Centring with internal thread acc. to DIN 332 form D
1 = Fan connector
2 = Encoder connector
3 = Connector for main connection/brake

- DC link voltage of 540 V motors
- Key: Motors are also available without key
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor														Brake	
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p1	q	q1	q3	y	y1	y2	s2	s3	k2	q2
56 S	120	110	9	130	3.5	50	9	24	27	8	180	134	426	28	123	183	261	124	-	-	-	-	-	511	346
56 M													464			221	299							549	384
56 L													502			259	337							587	422
71 S	142	130	10	165	3.5	58	12	28	31	8	230	178	466	32	136	230	307	124	-	-	-	-	-	550	391
71 M													506			270	347							590	431
71 L													546			310	387							630	471
100 S	190	180	12	215	4	80	14	38	41	10	284	224	537	38	160	288	378	124	-	-	-	-	-	657	498
100 M													589			340	430							709	550
100 L													641			392	482							761	602

Version IM B5	Type of protection IP 54	Cooling method IC 0641		

Motor cables

General
The motor cables are highly flexible trailing cables with overall shielding. They comply with the regulations VDE, UL and CSA.
The control cables are integrated as star-quads integriert. When the sincos encoder is used the brake triggering and the connection of the thermal sensor are brought out via the main connector.
The cables are particularly suitable for the optimum use of cable racks thanks to their low cross-section, low weight and non-impeding surface. They can thus be efficiently used in trailing chains.
The overall shielding with an optical coverage of more than 85% makes it an EMC uncritical cable.
The connector size is designed in accordance with the motor's standstill current I_0.

Technical data
Technical description

- Sheath resistance against media such as coolants, machine and gearbox oils
- Abrasion resistance because of a special surface in cable racks and trailing chains
- High-flexible, trailing cable
- Sheath surface not blocking, satin-finish
- Shield made of tinned copper braid with optical coverage of ≥ 85 %
- Core insulation made of TPE or polyester, sheath material PUR holgene-free
- Cable FCF-free and silicone-free
- Behavior in case of fire: fire-inhibiting, halogene-free
- Cable color in RAL 1028, melon yellow
- Labelling with Baumüller sign, VDE, UL and CSA sign
- Minimum bending radius for flexible use 12 x D

Nominal voltage
Uo/U 600 / 1000 V (power cores)
U 24 V DC (control cores)

Core lettering
Power cores U, VV, WWW
Colored control cable pairs as star-quads in red, white, black, yellow
Assignment of pairs red – black (brake),
white – yellow (temperature)

Cable data

Cable cross-section	Nominal current [A][1)]	Cable diameter [mm]
4×1.5 mm² 4×0.75 mm²	15	11.7 – 12.3
4×2.5 mm² 4×0.75 mm²	21	12.7 – 14.6
4×4 mm² 4×0.75 mm²	28	14.2 – 15.4
4×6 mm² 4×0.75 mm²	36	16.6 – 17.9
4×10 mm² 4×0.75 mm²	50	20.5 – 21.5
4×16 mm² 4×0.75 mm²	66	23.0 – 25.8
4×25 mm² 2×(2×1.5 mm²)	84	26.3 – 29.7
4×35 mm² 2×(2×1.5 mm²)	104	30.8 – 32.5

1) Current carrying capacity acc. to table 5 laying type C or E
(VDE 0113 / EN 60 204 Part 1 issue 1997)
Ambient temperature 40°C

Cable – connector assignment

Cable cross-sections	nominal current [A]	Male connector 540 V Volume
4×1.5 mm^2 4×0.75 mm^2	15	1
4×2.5 mm^2 4×0.75 mm^2	21	1.5
4×4 mm^2 4×0.75 mm^2	28	1.5
4×6 mm^2 4×0.75 mm^2	36	1.5
4×10 mm^2 4×0.75 mm^2	50	1.5

The connectors must be designed with respect to the I_0 motor current. For the laying of the cables, the current carrying capacity acc. to table 5 laying type C or E (VDE 0113 / EN 60 204 Part 1 issue 1997) and an ambient temperature of 40°C must be considered.

Cables of 2.5 mm^2 can be laid up to 100 m without additional filters, when larger cross-sections used, up to 40 m are permissible. The terminal voltage at the motor must be < 1kV. When longer cables are used, filters must be installed between converter and motor.

Application notes

Operating temperature
The cables can be operated within a temperature range from –20°C to +80°C.

Cable laying at the motor
The cables must not touch the motor surface.

Smallest permissible bending radii
12 times outer cable diameter.
Smaller bending radii are possible with reduced service life.

Main connection cables / Assembled cable with connector

Nominal current: 15 A
Cable 4 x 1.5 mm² + 4x 0.75 mm²
with connector size 1

Length in m	Article no.
5	324781
7	324782
10	324783
15	324784
20	324785
25	324786
30	324787
35	324788
40	324789
50	324790
75	324791
100	324792

Nominal current: 21 A
Cable 4 x 2.5 mm² + 4x 0.75 mm²
with connector size 1.5

Length in m	Article no.
5	326577
7	326578
10	326579
15	326580
20	326581
25	326582
30	326583
35	326584
40	326585
50	326586
75	326587
100	326588

Nominal current: 28 A
Cable 4 x 4 mm² + 4x 0.75 mm²
with connector size 1.5

Length in m	Article no.
5	326589
7	326591
10	326592
15	326593
20	326594
25	326596
30	326597
35	326598
40	326599

Nominal current: 36 A
Cable 4 x 6 mm² + 4x 0.75 mm²
with connector size 1.5

Length in m	Article no.
5	326600
7	326601
10	326602
15	326603
20	326604
25	326605
30	326606
35	326607
40	326608

Nominal current: 50 A
Cable 4 x 10 mm² + 4x 0.75 mm²
with connector size 1.5

Length in m	Article no.
5	326609
7	326610
10	326611
15	326612
20	326613
25	326614
30	326615
35	326616
40	326617

Connector

Type	Article no.
Size 1 f. 4x1.5mm^2	261740
Size 1.5 f. 4x2.5mm^2 o. 4mm^2	326574
Size 1.5 f. 4x6mm^2 o.10mm^2	326569

Larger cable cross-sections on request.
Longer cables can also be used. The terminal voltage at the motor must be < 1kV. In this case, however, filters must be installed between converter and motor.

Encoder cables

General

A fully preassembled encoder cable is used for all encoder systems. Motor connection is via a 12-pin round signal connector and converter connection via a 15-pin sub-D plug. The encoder cables are available as 'trailing' and 'non-trailing' cables. The trailing cable is suitable for use in trailing chains, for example. As opposed to the 'non-trailing' cable, the cable sheath consists of tougher PUR for use in environments with acids and bases (coolants) instead of PVC. Up to a length of 10 m, the cables are available in 1 m sections (1 m, 2 m, 10 m). From a cable length of 10 m, the sections come in 5 m intervals (10 m, 15 m, …).

In the case of servo motors, the resolver encoder system links the temperature sensor with the converter via the encoder cable.

Technical data

1. Technical description – non-trailing

- LiYCY, 5x (2x0.14mm²) + 2 x 0.5mm² copper lead, twisted pair
- PVC sheath, grey
- 1st end: 12-pin signal circular connector with 12 female contacts
- 2nd end: 15-pin D-Sub connector with male contacts and locking screws 4-4OUNC
- Baumüller labelling, black
- Outer diameter 9.0 mm (+/-3mm)
- Bending radius: $r \geq 60$ mm (fixed installation), $r \geq 135$ mm (flexible use)
- Nominal voltage: $250V_{AC}$

2. Technical description – trailing

- Li12YC11Y, 5x (2x0.14mm²) + 2 x 0.5mm² copper lead, twisted pair
- PU sheath, black
- 1st end: 12-pin signal circular connector with 12 female contacts
- 2nd end: 15-pin D-Sub connector with male contacts and locking screws 4-4OUNC
- Baumüller labelling, white
- Outer diameter 9.0 mm (+/-3mm)
- Bending radius: $r \geq 70$ mm (fixed installation), $r \geq 100$ mm (flexible use)
- Nominal voltage: $300V_{AC}$

Application notes

- Operating temperature

	trailing	non-trailing
Limit temperature	at the surface	at the surface
no / few movements	-40 °C to +80 °C	- 30 °C to +80 °C
continuous movements	- 30 °C to +80 °C	-5 °C to + 70 °C

- Cable laying at the motor

The cables must not touch the motor surface.

Ordering data

Encoder cables / preassembled cables with connector

Encoder cable

Non-trailing,assembled
Cable 5 x (2x014mm^2) + 2 x 0.5 mm² with connector

Length in m	Article no.
1	243601
2	211338
3	219333
4	231166
5	209879
6	220197
7	216455
8	220429
10	210052
15	215716
20	218568
25	218569
30	217094
35	216444
40	217095
45	217567
50	217568
55	217569
60	217570
70	232088

Trailing, assembled
Cable 5 x (2x014mm^2) + 2 x 0.5 mm² with connector

Length in m	Article no.
3	246658
4	243379
5	239540
6	242954
8	239541
10	239542
15	239543
20	239544
25	239545
30	239546
35	239547
40	240520
45	240521
50	240522
55	244033
60	245484

Encoder connector	Article no.
Encoder connector	201833

Commissioning and maintenance instructions

Please contact us for our commissioning and maintenance instructions for motor commissioning.

Three-phase synchronous motors DS 45 - 100..540V

General technical data

Version:	IM B5	Horizontal mounting
	IM V1	Vertical mounting, shaft end to the bottom
	IM V3	Vertical mounting, shaft end to the top
Type of protection:	IP65	Surface-cooled, **without** fan, DIN 40050, DIN 40053
	IP54	Surface-cooled, **with** fan
Shaft gland:	IP64	Standard
	IP65	with shaft sealing ring (option)
Connection:		
Main connection	U V W	Terminal box
		Connector (option)
		Frame size 45 with connector as standard
Control connection		12-pin connector
Brake		in the main connection
Thermal sensor		in control connection (for resolver only)
Cooling method:	IC 0041	completely enclosed machine surface-cooled no fan
	IC 0641	as above, but with fan (air flow direction from B to A end)
Thermal sensor:		Linear thermal sensor for evaluation in the controller
Temperature rise:	$\Delta\vartheta$ = 105K	Insulation class F acc. to EN 60034
Temperature range:	0....+ 40°C	
Storage:	-30°C...+85°C	
Paint:	black matt	RAL 9005
Lager:	$\geq$ 20,000h	Service life
Balance quality:	N	According to DIN ISO 2373
	R, S	On request
Vibration-resistant up to:	radial 3g	20 Hz to 2 kHz acc. to EN 60068-2-6
	axial 0.5g	20 Hz to kHz acc to EN 60068-2-6
		Higher vibration resistance on request
Flange:	acc. to IEC standard	Dimension b1: Tolerance j6
Shaft end:	cylindrical	According to DIN 748 with shaft key DIN 6885; also available without keyway)
		Dimension d: Tolerance k6
		Centering with internal thread acc. to DIN 332 form D
Holding brake:	Option	
Actual speed encoder:	2-pin resolver	
	Sincos encoder (option)	Other encoders on request

Ratings definition

The ratings (torques) listed in the table apply to continuous operation (S1) with nominal speed at a maximum ambient temperature of 40°C with the machine being installed below 1000m a.m.s.l.

If motors are to be operated in an ambient temperature of more than 40 °C or altitudes above 1000 m a.m.s.l., the required list nominal power P_L (list torque M_n) results from the product of the factors k_1, k_2 specified in the table and the required power P (torque M).

Ambient temperature	40 °C	45°C	50 °C	55°C	60°C	For ambient temperatures above 40 °C and enclosed installation of motors, it is absolutely necessary to contact the manufacturer, because design changes may be necessary.
Correction factor k_1	1	1.06	1.13	1.22	1.34	
Altitude a.m.s.l. up to	1.000 m	2.000 m	3.000 m	4.000 m	5.000 m	If, with increasing site altitude above 1000 m, the ambient temperature decreases by approx. 10 °C per 1000 m increase in altitude, no power correction is necessary.
Correction factor k_2	1	1.07	1.16	1.27	1.55	

Winding isolation and temperature rise

All machines of this series are designed in insulation class F according to EN 60034 for a permissible winding temperature of 105 K at a room temperature of up to 40 °C. The insulation is resistant against gases and vapours of combustible materials and it meets the requirements placed on a moisture-proof and tropical insulation.

A special insulation that can be obtained for an extra charge is necessary if concentrated acid vapours and metallic powders occur, with a permanent relative air humidity of more than 80% and as protection against termite and mould fungus attacks.

In the case of converters with a DC link voltage > 500 V, the cables between the converter and the motor must not be longer than 20 meters. For longer cables, additional measures (e.g. motor filters) must be provided. The maximum permissible terminal voltage is 1000 V.

Explanation of the motor data

M_0, I_0	Nominal torque (Nm) with nominal current (A) with speed >= 1 min^{-1} without time limit, I_0 is the r.m.s. value
M_N, I_N	Nominal torque (Nm) with Nominal current (A) with nominal speed n_N in continuous operation (S1);TA = 40 °C*
$M_{S3-40\%}$, $I_{S3-40\%}$	Torque and speed for intermittent operation S3-40% duty time, cycle of 10 minutes
n_N	Nominal speed (min^{-1})
k_E	Motor e.m.f. referred to 1000 min^{-1} (voltage constant)
k_T	Torque constant: $k_T \times I_0 = M_0 + M_R$ (intrinsic moment)
k_D	Torque loss referred to 1000 min^{-1} (eddy-current loss)
M_R	Bearing friction including hysteresis torque
m	Weight in kg
J	Rotor inertia incl. resolver without holding brake (kg cm²)

The specified ratings / torques at nominal speed are achieved with a chopping frequency of $\geq$ 4 kHz in the power unit of the converter. A chopping frequency of $>$ 6 kHz is recommended.
* A part of the loss in the motor is dissipated via the flange. The temperature at the flange must not exceed 65°C!

Basic calculation

Valid under the prerequisite that torque and speed are within the speed-torque characteristic.

Motor current I for speed n and torque M

$$I = \frac{M + M_R + k_D * n/10^3}{k_T} [A]$$

Torque M for any speed and current I

$$M = I * k_T - (M_R + k_D * \frac{n}{10^3}) [Nm]$$

Performance overview

DS (Three-phase current synchronous	Frame size	Standstill torque
Standard version without fan	DS 45...100	0.8 - 57 Nm
Standard version with fan	DSO 56...100	4.8 - 84 Nm
Short version without fan	DS 56...100	1.9 – 24 Nm
Standard version with holding brake	DSG 45...100	0.8 – 57 Nm
Standard version with holding brake and fan	DSOG 56...DSOG 100	4.8 – 84 Nm
Short version with brake	DSG 56...DSG 100	1.9 – 24 Nm

Type key

DS	O	G	100	K	2	5

DC link voltage:	5	540 V
Nominal speed:	1:	1200 min^{-1}
	2:	2000 min^{-1}
	3:	3000 min^{-1}
	4:	4000 min^{-1}
	6:	6000 min^{-1}
Length:	Standard	Short
	K	A
	S	B
	M	C
	L	D
Frame size:	45	
	56	
	71	
	100	
Holding brake:	without	
	with	G
Fan:	without	
	with	O
Motor type:	DS	Three-phase synchronous

Technical data

DS standard version

Type	n_N ($^1/_{min}$)	M_0 (Nm)	M_0 (lbf ft)	M_N (Nm)	M_N (lbf ft)	$M_{S3-40\%}$ (Nm)	M_{S3-40} (lbf ft)	I_0 (A)	I_N (A)	$I_{S3-40\%}$ (A)
DS 45 S	3000	0.8	0.6	0.8	0.6	1.0	0.74	0.7	0.7	0.8
DS 45 S	4000			0.7	0.5	1.2	0.89	0.9	0.8	1.3
DS 45 S	6000			0.6	0.4	1.0	0.74	1.4	1.1	1.7
DS 45 M	3000	1.7	1.3	1.6	1.2	2.4	1.8	1.3	1.3	1.9
DS 45 M	4000			1.5	1.1	2.3	1.7	1.8	1.6	2.4
DS 45 M	6000			1.1	0.8	2.0	1.5	2.7	1.9	3.2
DS 45 L	3000	3.2	2.4	2.9	2.1	4.4	3.2	2.5	2.3	3.4
DS 45 L	4000			2.7	2.0	4.2	3.1	3.3	2.9	4.3
DS 45 L	6000			2.0	1.5	3.8	2.8	4.9	3.3	6.0
DS 56 S	2000	3.8	2.8	3.7	2.7	5.4	4.0	1.8	1.8	2.6
DS 56 S	3000			3.6	2.7	5.4	4.0	2.5	2.4	3.6
DS 56 S	4000			3.4	2.5	5.3	3.9	3.2	3.0	4.5
DS 56 S	6000			2.6	1.9	4.7	3.5	5.1	3.8	6.6
DS 56 M	2000	7.0	5.2	6.9	5.1	10.1	7.4	3.0	3.0	4.3
DS 56 M	3000			6.4	4.7	9.8	7.2	4.2	4.0	6.0
DS 56 M	4000			5.6	4.1	9.4	6.9	5.5	4.6	7.6
DS 56 M	6000			2.9	2.1	7.9	5.8	8.0	3.8	9.4
DS 56 L	2000	10.0	7.4	9.5	7.0	14.1	10.4	4.1	4.0	5.8
DS 56 L	3000			8.4	6.2	13.6	10.0	5.9	5.1	8.1
DS 56 L	4000			6.9	5.1	12.7	9.4	7.7	5.6	10.0
DS 56 L	6000			0.6	0.4	9.8	7.2	11.1	1.5	11.5
DS 71 K	2000	10.5	7.7	10.3	7.6	15.2	11.2	4.4	4.4	6.4
DS 71 K	3000			9.5	7.0	14.8	10.9	6.3	5.9	9.0
DS 71 K	4000			8.2	6.0	14.2	10.5	8.3	6.7	11.4
DS 71 K	6000			3.8	2.8	11.8	8.7	11.9	5.0	13.9
DS 71 S	2000	16.5	12.2	15.4	11.4	23.4	17.3	6.6	6.3	9.5
DS 71 S	3000			13.4	9.9	22.4	16.5	9.6	8.1	13.3
DS 71 S	4000			10.3	7.6	20.7	15.3	12.4	8.2	16.0
DS 71 S	6000			0.0	0.0	16.4	12.1	18.6	0.0	20.1
DS 71 M	2000	22.0	16.2	20.0	14.8	27.6	20.4	8.4	7.8	10.7
DS 71 M	3000			16.3	12.0	28.3	20.9	12.3	9.5	16.2
DS 71 M	4000			10.4	7.7	16.3	12.0	15.8	8.2	12.4
DS 71 M	6000			0.0	0.0	18	13.3	24.8	0.0	13.8
DS 100 K	1200	25.0	18.4	24.8	18.3	36.3	26.8	6.3	6.3	9.2
DS 100 K	2000			23.3	17.2	35.9	26.5	10.0	9.5	14.4
DS 100 K	3000			19.9	14.7	34.4	25.4	14.5	11.9	20.2
DS 100 K	4000			14.7	10.8	31.7	23.4	19.1	11.9	24.7
DS 100 K	6000			0.0	0.0	24.8	18.3	28.2	0.0	19.8
DS 100 S	1200	36.0	26.6	34.7	25.6	51.6	38.1	8.8	8.6	12.6
DS 100 S	2000			31.4	23.2	50.4	37.2	14.0	12.4	19.7
DS 100 S	3000			24.6	18.1	47.0	34.7	20.3	14.4	26.9
DS 100 S	4000			13.8	10.2	41.7	30.8	27.0	11.5	32.1
DS 100 M	1200	46.0	33.9	43.7	32.2	66.0	48.7	11.0	10.5	15.8
DS 100 M	2000			38.2	28.2	63.6	46.9	17.6	15.0	24.6
DS 100 M	3000			27.1	20.0	58.0	42.8	25.9	16.0	33.2
DS 100 L	1200	57.0	42.0	52.1	38.4	79.7	58.8	13.5	12.5	19.0
DS 100 L	2000			44.2	32.6	76.0	56.1	21.4	17.1	28.9
DS 100 L	3000			28.1	20.7	67.7	49.9	32.2	16.9	39.0

Legend

	American units

Type	n_N ($^1/_{min}$)	k_E ($^V/_{1000\ 1/min}$)	k_T ($^{Nm}/_A$)	k_T (lbf ft / A)	k_D ($^{Nm}/_{1000\ 1/min}$)	M_R (Nm)	M_R (lbf ft)	m (kg)	m (lb)	J ($kgcm^2$)	J ($lb\ in^2$)
DS 45 S	3000	82.3	1.36	1.00	0.005	0.127	0.094	4.9	10.8	1.5	0.51
DS 45 S	4000	61.8	1.02	0.75							
DS 45 S	6000	41.2	0.68	0.50							
DS 45 M	3000	82.3	1.36	1.00	0.010	0.131	0.097	5.9	13.0	2.1	0.72
DS 45 M	4000	61.8	1.02	0.75							
DS 45 M	6000	41.2	0.68	0.50							
DS 45 L	3000	82.3	1.36	1.00	0.021	0.140	0.103	6.9	15.2	3.4	1.16
DS 45 L	4000	61.8	1.02	0.75							
DS 45 L	6000	41.2	0.68	0.50							
DS 56 S	2000	133	2.2	1.62	0.030	0.154	0.114	6.6	14.6	5.7	1.95
DS 56 S	3000	95.2	1.57	1.16							
DS 56 S	4000	74.6	1.23	0.91							
DS 56 S	6000	46.0	0.76	0.56							
DS 56 M	2000	145.4	2.41	1.78	0.062	0.180	0.133	8.5	18.7	10.2	3.49
DS 56 M	3000	102	1.69	1.25							
DS 56 M	4000	78.8	1.3	0.96							
DS 56 M	6000	54.5	0.9	0.66							
DS 56 L	2000	150	2.48	1.83	0.094	0.208	0.153	10.8	23.8	15.7	5.36
DS 56 L	3000	104.7	1.73	1.28							
DS 56 L	4000	80	1.33	0.98							
DS 56 L	6000	55.6	0.92	0.68							
DS 71 K	2000	147.5	2.44	1.80	0.082	0.230	0.170	12.2	26.9	22.4	7.65
DS 71 K	3000	102.4	1.69	1.25							
DS 71 K	4000	79	1.3	0.96							
DS 71 K	6000	54.3	0.9	0.66							
DS 71 S	2000	152.8	2.53	1.87	0.139	0.280	0.207	16.3	35.9	36.3	12.40
DS 71 S	3000	105.2	1.74	1.28							
DS 71 S	4000	81.5	1.35	1.00							
DS 71 S	6000	56	0.9	0.66							
DS 71 M	2000	161	2.66	1.96	0.202	0.334	0.246	20.5	45.2	50.2	17.15
DS 71 M	3000	109.7	1.81	1.33							
DS 71 M	4000	85.3	1.41	1.04							
DS 71 M	6000	54.5	0.9	0.66							
DS 100 K	1200	243	4.02	2.96	0.195	0.400	0.295	26.1	57.5	74	25.29
DS 100 K	2000	153.5	2.54	1.87							
DS 100 K	3000	106	1.75	1.29							
DS 100 K	4000	80.4	1.33	0.98							
DS 100 K	6000	54.8	0.9	0.66							
DS 100 S	1200	250	4.15	3.06	0.297	0.489	0.361	32.7	72.1	108	36.91
DS 100 S	2000	158	2.61	1.93							
DS 100 S	3000	109	1.8	1.33							
DS 100 S	4000	81.7	1.35	1.00							
DS 100 M	1200	257	4.25	3.13	0.398	0.579	0.427	39.6	87.3	141	48.18
DS 100 M	2000	159.3	2.64	1.95							
DS 100 M	3000	108.6	1.8	1.33							
DS 100 L	1200	257.5	4.26	3.14	0.500	0.668	0.493	48.8	107.6	175	59.80
DS 100 L	2000	162.6	2.69	1.98							
DS 100 L	3000	108.4	1.79	1.32							

DS standard version with fan

Type	n_N ($^1/_{min}$)	M_0 (Nm)	M_0 (lbf ft)	M_N (Nm)	M_N (lbf ft)	$M_{S3-40\%}$ (Nm)	$M_{S3-40\%}$ (lbf ft)	I_0 (A)	I_N (A)	$I_{S3-40\%}$ (A)
DSO 56 S	2000	4.8	3.5	4.8	3.5	5.5	4.1	2.2	2.3	2.6
DSO 56 S	3000			4.8	3.5	5.3	3.9	3.1	3.2	3.5
DSO 56 S	4000			4.7	3.5	5.2	3.8	4.0	4.1	4.5
DSO 56 S	6000			4.2	3.1	4.7	3.5	5.9	5.4	6.0
DSO 56 M	2000	9.2	6.8	9.1	6.7	10.3	7.6	3.9	3.9	4.4
DSO 56 M	3000			9.0	6.6	10.1	7.4	5.5	5.5	6.2
DSO 56 M	4000			8.6	6.3	9.6	7.1	7.2	7.0	7.7
DSO 56 M	6000			7.3	5.4	8.5	6.3	10.5	8.8	10.2
DSO 56 L	2000	13.2	9.7	13.1	9.7	14.5	10.7	5.4	5.4	6.0
DSO 56 L	3000			12.5	9.2	14.2	10.5	7.7	7.5	8.5
DSO 56 L	4000			11.7	8.6	13.1	9.7	10.1	9.2	10.3
DSO 56 L	6000			9.2	6.8	11.5	8.5	14.7	10.9	13.4
DSO 71 K	2000	14.0	10.3	13.9	10.3	16.3	12.0	5.8	5.8	6.8
DSO 71 K	3000			13.7	10.1	15.9	11.7	8.4	8.4	9.7
DSO 71 K	4000			13.4	9.9	15.0	11.1	11.0	10.8	12.0
DSO 71 K	6000			11.8	8.7	13.5	10.0	16.0	14.1	16.0
DSO 71 S	2000	23.0	17.0	22.8	16.8	25.6	18.9	9.2	9.2	10.3
DSO 71 S	3000			21.9	16.2	24.5	18.1	13.4	13.0	14.5
DSO 71 S	4000			20.5	15.1	23.4	17.3	17.3	15.8	18.0
DSO 71 S	6000			16.3	12.0	18.1	13.3	25.2	18.9	20.8
DSO 71 M	2000	31.0	22.9	30.2	22.3	33.4	24.6	12.1	11.9	13.2
DSO 71 M	3000			28.6	21.1	33.5	24.7	17.8	16.8	19.6
DSO 71 M	4000			26.2	19.3	29.4	21.7	22.9	20.0	22.3
DSO 71 M	6000			18.8	13.9	25.0	18.4	35.0	22.7	29.6
DSO 100 K	1200	36.0	26.6	35.9	26.5	41.5	30.6	9.0	9.1	10.5
DSO 100 K	2000			35.6	26.3	41.3	30.5	14.3	14.3	16.6
DSO 100 K	3000			35.1	25.9	40.4	29.8	20.9	20.7	23.7
DSO 100 K	4000			33.5	24.7	37.7	27.8	27.5	26.2	29.4
DSO 100 K	6000			27.6	20.4	32.2	23.7	40.5	32.5	37.6
DSO 100 S	1200	53.0	39.1	52.8	38.9	59.0	43.5	12.9	12.9	14.4
DSO 100 S	2000			52.4	38.6	60.1	44.3	20.5	20.5	23.4
DSO 100 S	3000			50.1	37.0	57.2	42.2	29.8	28.7	32.6
DSO 100 S	4000			46.1	34.0	51.2	37.8	39.8	35.5	39.3
DSO 100 M	1200	69.0	50.9	68.8	50.7	77.9	57.5	16.3	16.4	18.6
DSO 100 M	2000			67.5	49.8	75.4	55.6	26.4	26.1	29.1
DSO 100 M	3000			63.1	46.5	69.9	51.6	38.7	36.1	39.9
DSO 100 L	1200	84.0	62.0	83.8	61.8	96.8	71.4	19.9	19.9	23.0
DSO 100 L	2000			81.4	60.0	91.8	67.7	31.5	30.9	34.7
DSO 100 L	3000			75.0	55.3	82.9	61.1	47.4	43.2	47.6

Legend

	American units

Typ	n_N ($^1/_{min}$)	k_E ($^V/_{1000\ 1/min}$)	k_T ($^{Nm}/_A$)	k_T (lbf ft / A)	k_D ($^{Nm}/_{1000\ 1/min}$)	M_R (Nm)	M_R (lbf ft)	m (kg)	m (lb)	J ($kgcm^2$)	J ($lb\ in^2$)
DSO 56 S	2000	132.9	2.2	1.62	0.030	0.154	0.114	8.3	18.3	5.7	1.95
DSO 56 S	3000	95.2	1.57	1.16							
DSO 56 S	4000	74.6	1.23	0.91							
DSO 56 S	6000	52.2	0.86	0.63							
DSO 56 M	2000	145.4	2.41	1.78	0.062	0.180	0.133	10.2	22.5	10.2	3.49
DSO 56 M	3000	102.1	1.69	1.25							
DSO 56 M	4000	78.8	1.3	0.96							
DSO 56 M	6000	54.5	0.9	0.66							
DSO 56 L	2000	149.9	2.48	1.83	0.094	0.208	0.153	12.5	27.6	15.7	5.36
DSO 56 L	3000	104.7	1.73	1.28							
DSO 56 L	4000	80.1	1.33	0.98							
DSO 56 L	6000	55.6	0.92	0.68							
DSO 71 K	2000	147.5	2.44	1.80	0.082	0.230	0.170	14.7	32.4	22.4	7.65
DSO 71 K	3000	102.4	1.69	1.25							
DSO 71 K	4000	78.9	1.3	0.96							
DSO 71 K	6000	54.3	0.9	0.66							
DSO 71 S	2000	152.8	2.53	1.87	0.139	0.280	0.207	18.8	41.4	36.3	12.40
DSO 71 S	3000	105.2	1.74	1.28							
DSO 71 S	4000	81.5	1.35	1.00							
DSO 71 S	6000	56	0.9	0.66							
DSO 71 M	2000	160.9	2.66	1.96	0.202	0.334	0.246	23.0	50.7	50.2	17.15
DSO 71 M	3000	109.7	1.81	1.33							
DSO 71 M	4000	85.3	1.41	1.04							
DSO 71 M	6000	54.5	0.9	0.66							
DSO 100 K	1200	243.1	4.02	2.96	0.195	0.400	0.295	29.6	65.3	74	25.29
DSO 100 K	2000	153.5	2.54	1.87							
DSO 100 K	3000	106	1.75	1.29							
DSO 100 K	4000	80.4	1.33	0.98							
DSO 100 K	6000	54.8	0.9	0.66							
DSO 100 S	1200	250.7	4.15	3.06	0.297	0.489	0.361	36.2	79.8	108	36.91
DSO 100 S	2000	158	2.61	1.93							
DSO 100 S	3000	109	1.8	1.33							
DSO 100 S	4000	81.7	1.35	1.00							
DSO 100 M	1200	257.1	4.25	3.13	0.398	0.579	0.427	43.1	95.0	141	48.18
DSO 100 M	2000	159.3	2.64	1.95							
DSO 100 M	3000	108.6	1.8	1.33							
DSO 100 L	1200	257.5	4.26	3.14	0.500	0.668	0.493	52.3	115.3	175	59.80
DSO 100 L	2000	162.6	2.69	1.98							
DSO 100 L	3000	108.4	1.79	1.32							

DS short version

Type	n_N ($^1/_{min}$)	M_0 (Nm)	M_0 (lbf ft)	M_N (Nm)	M_N (lbf ft)	$M_{S3-40\%}$ (Nm)	$M_{S3-40\%}$ (lbf ft)	I_0 (A)	I_N (A)	$I_{S3-40\%}$ (A)
DS 56 A	2000	1.9	1.4	1.8	1.3	2.7	2.0	1.0	0.9	1.4
DS 56 A	3000			1.8	1.3	2.8	2.1	1.5	1.4	2.2
DS 56 A	4000			1.8	1.3	2.7	2.0	2.0	2.0	2.9
DS 56 A	6000			1.4	1.0	2.5	1.8	3.1	2.5	4.1
DS 56 B	2000	3.7	2.7	3.6	2.7	5.4	4.0	1.7	1.7	2.5
DS 56 B	3000			3.6	2.7	5.3	3.9	2.4	2.4	3.5
DS 56 B	4000			3.3	2.4	5.1	3.8	3.1	2.9	4.4
DS 56 B	6000			2.4	1.8	4.6	3.4	4.6	3.3	5.8
DS 71 B	2000	7.0	5.2	6.9	5.1	10.2	7.5	3.5	3.5	5.1
DS 71 B	3000			6.5	4.8	10.0	7.4	5.3	5.1	7.6
DS 71 B	4000			5.7	4.2	9.6	7.1	7.1	6.1	9.9
DS 71 B	6000			3.3	2.4	8.2	6.0	10.8	5.9	13.1
DS 71 C	2000	10.0	7.4	9.8	7.2	14.6	10.8	4.2	4.2	6.1
DS 71 C	3000			8.9	6.6	14.2	10.5	6.1	5.5	8.7
DS 71 C	4000			7.4	5.5	13.4	9.9	7.9	6.2	10.8
DS 71 C	6000			2.2	1.6	10.8	8.0	11.6	3.4	13.0
DS 100 B	1200	12.5	9.2	12.4	9.1	18.8	13.9	3.7	3.7	5.6
DS 100 B	2000			12.3	9.1	18.8	13.9	6.3	6.3	9.5
DS 100 B	3000			11.5	8.5	18.4	13.6	9.5	9.0	14.0
DS 100 B	4000			9.8	7.2	17.5	12.9	12.8	10.5	18.0
DS 100 B	6000			3.7	2.7	14.3	10.5	19.5	7.4	22.9
DS 100 C	1200	18.5	13.6	18.4	13.6	27.2	20.1	5.5	5.5	8.1
DS 100 C	2000			17.8	13.1	27.1	20.0	9.2	9.0	13.6
DS 100 C	3000			15.5	11.4	26.1	19.3	13.9	12.1	19.8
DS 100 C	4000			12.1	8.9	24.3	17.9	18.7	13.0	24.9
DS 100 C	6000			0.0	0.0	20.1	14.8	28.0	0.0	31.0
DS 100 D	1200	24.0	17.7	23.8	17.6	35.2	26.0	6.0	6.1	8.9
DS 100 D	2000			22.3	16.4	34.7	25.6	9.6	9.1	14.0
DS 100 D	3000			18.6	13.7	33.0	24.3	14.0	11.2	19.5
DS 100 D	4000			13.0	9.6	30.1	22.2	18.5	10.8	23.7
DS 100 D	6000			0.0	0.0	22.8	16.8	18.5	0.0	18.5

Legend

	American units

Typ	n_N ($^1/_{min}$)	k_E ($^V/_{1000\ 1/min}$)	k_T ($^{Nm}/_A$)	k_T (lbf ft / A)	k_D (lbf ft / A)	M_R (Nm)	M_R (lbf ft)	m (kg)	m (lb)	J ($kgcm^2$)	J ($lb\ in^2$)
DS 56 A	2000	123.5	2.04	1.50	0.014	0.14	0.103	5.5	12.1	3.0	1.03
DS 56 A	3000	82.3	1.36	1.00							
DS 56 A	4000	61.8	1.02	0.75							
DS 56 A	6000	41.2	0.68	0.50							
DS 56 B	2000	132.9	2.2	1.62	0.030	0.154	0.114	6.7	14.8	5.5	1.88
DS 56 B	3000	95.2	1.57	1.16							
DS 56 B	4000	74.6	1.23	0.91							
DS 56 B	6000	52.2	0.86	0.63							
DS 71 B	2000	123.5	2.04	1.50	0.054	0.206	0.152	10.3	22.7	14.6	4.99
DS 71 B	3000	82.3	1.36	1.00							
DS 71 B	4000	61.8	1.02	0.75							
DS 71 B	6000	41.2	0.68	0.50							
DS 71 C	2000	147.5	2.44	1.80	0.082	0.230	0.170	12.4	27.3	21.5	7.35
DS 71 C	3000	102.4	1.69	1.25							
DS 71 C	4000	78.9	1.3	0.96							
DS 71 C	6000	54.3	0.9	0.66							
DS 100 B	1200	205.8	3.4	2.51	0.094	0.31	0.229	18.9	41.7	36.5	12.47
DS 100 B	2000	123.5	2.04	1.50							
DS 100 B	3000	82.3	1.36	1.00							
DS 100 B	4000	61.7	1.02	0.75							
DS 100 B	6000	41.2	0.68	0.50							
DS 100 C	1200	205.8	3.4	2.51	0.144	0.355	0.262	22.5	49.6	53.3	18.21
DS 100 C	2000	123.5	2.04	1.50							
DS 100 C	3000	82.3	1.36	1.00							
DS 100 C	4000	61.8	1.02	0.75							
DS 100 C	6000	41.0	0.68	0.50							
DS 100 D	1200	243.1	4.02	2.96	0.195	0.400	0.295	26.3	58.0	70.0	23.92
DS 100 D	2000	153.5	2.54	1.87							
DS 100 D	3000	106	1.75	1.29							
DS 100 D	4000	80.4	1.33	0.98							
DS 100 D	6000	54.8	0.9	0.66							

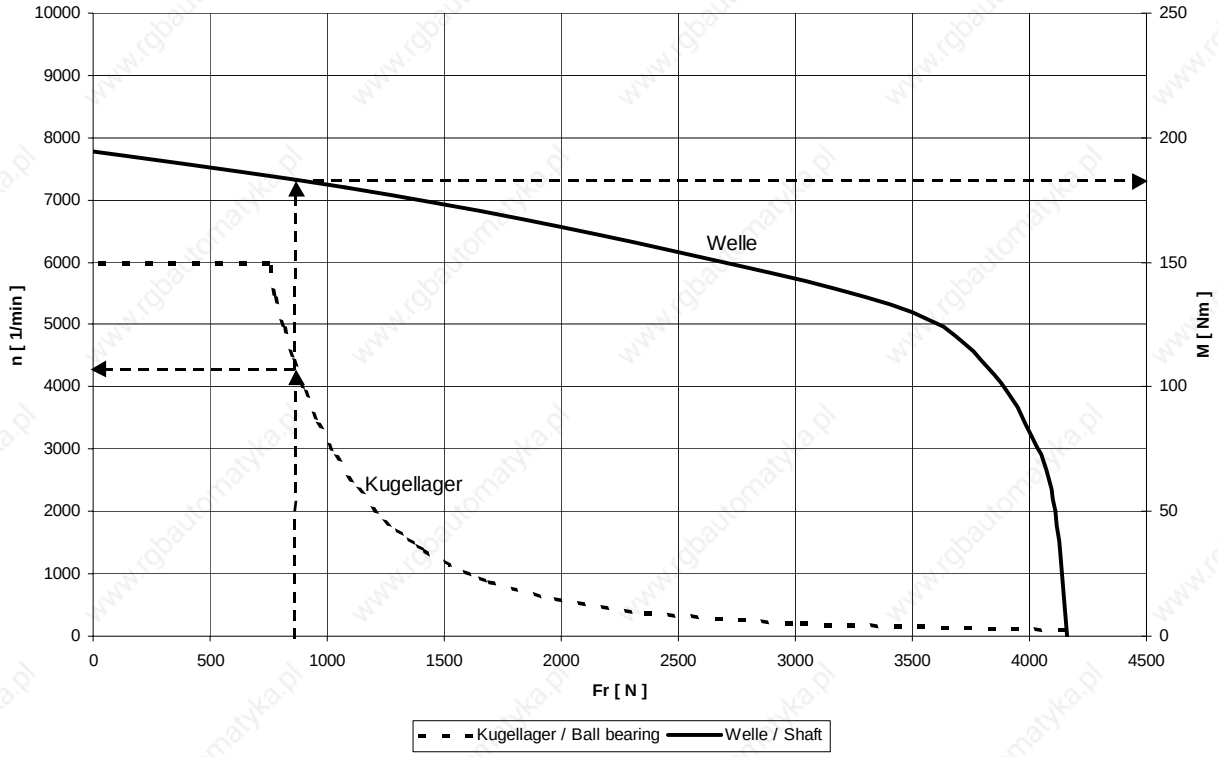
Radial force diagrams

Permissible radial forces F_R at the shaft end
All bearings are dimensioned for a service life of approx. 20.000 operating hours; the loads specified in the following must not be exceeded. The specified permissible radial forces F_R are valid only for horizontal mounting of the motor without additional axial forces.

Axial load of the motor shaft
When mounting clutches. pulleys. etc. onto the motor shaft. axial forces must not occur! Therefore use the internal thread of the shaft end as assembly aid.

Example

Force acting on the end of the shaft end (for force acting on the middle of the shaft end Fr x 1.1)
Bearing life 20.000 h; shaft end with keyway

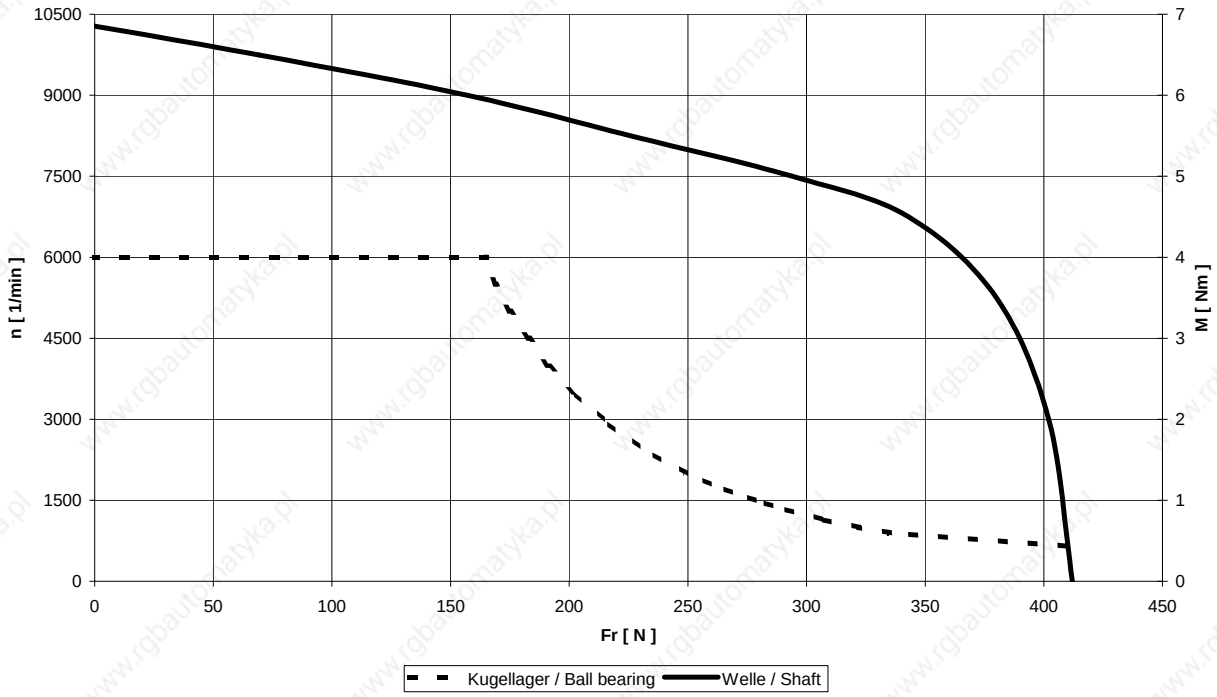


Explanation of the example

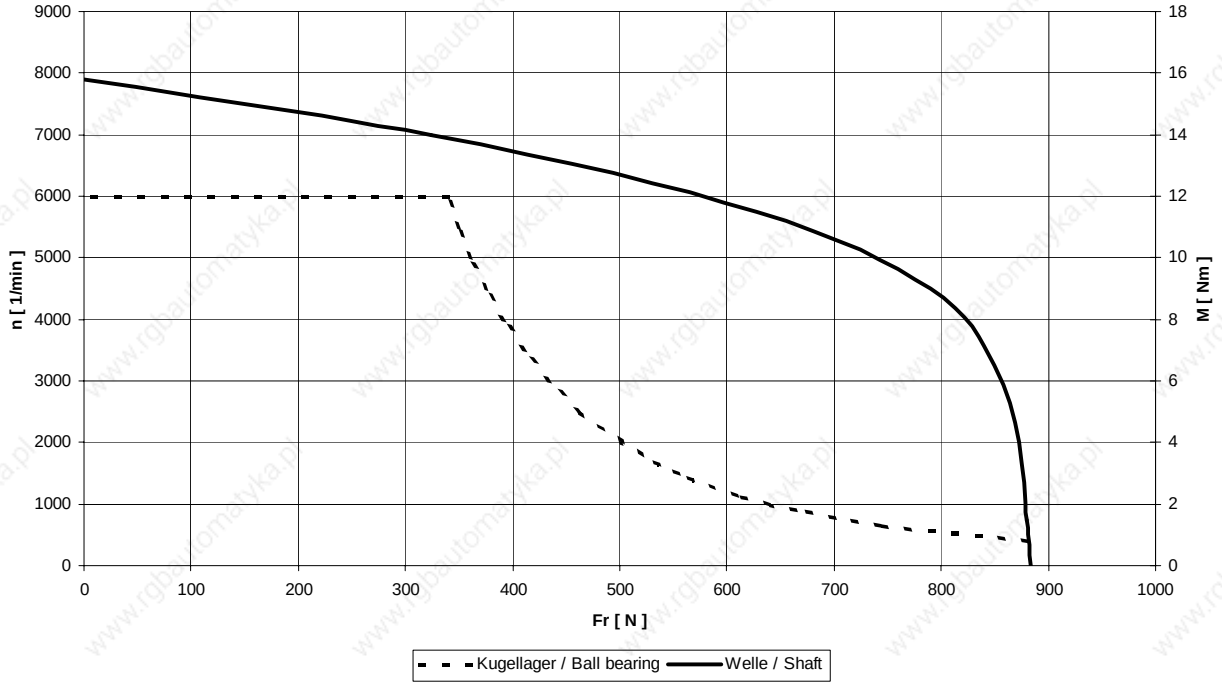
The radial force Fr of the application is used to determine the possible maximum speed of the bearing in the “Ball bearing” characteristic.
Radial force 850 N => maximum speed 4250 min^{-1}
The maximum transmittable torque results from the “Shaft” characteristic.
Radial force 850 N => maximum transmittable torque 185 Nm

DS in standard version or with fan

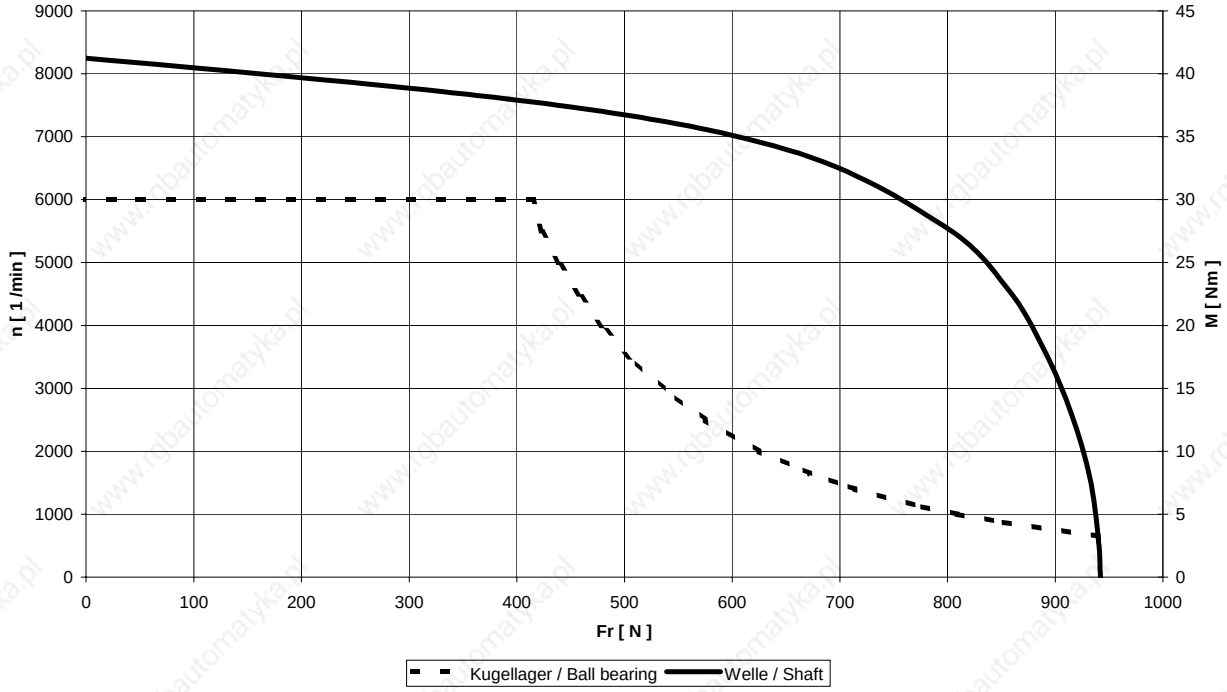
DS 36



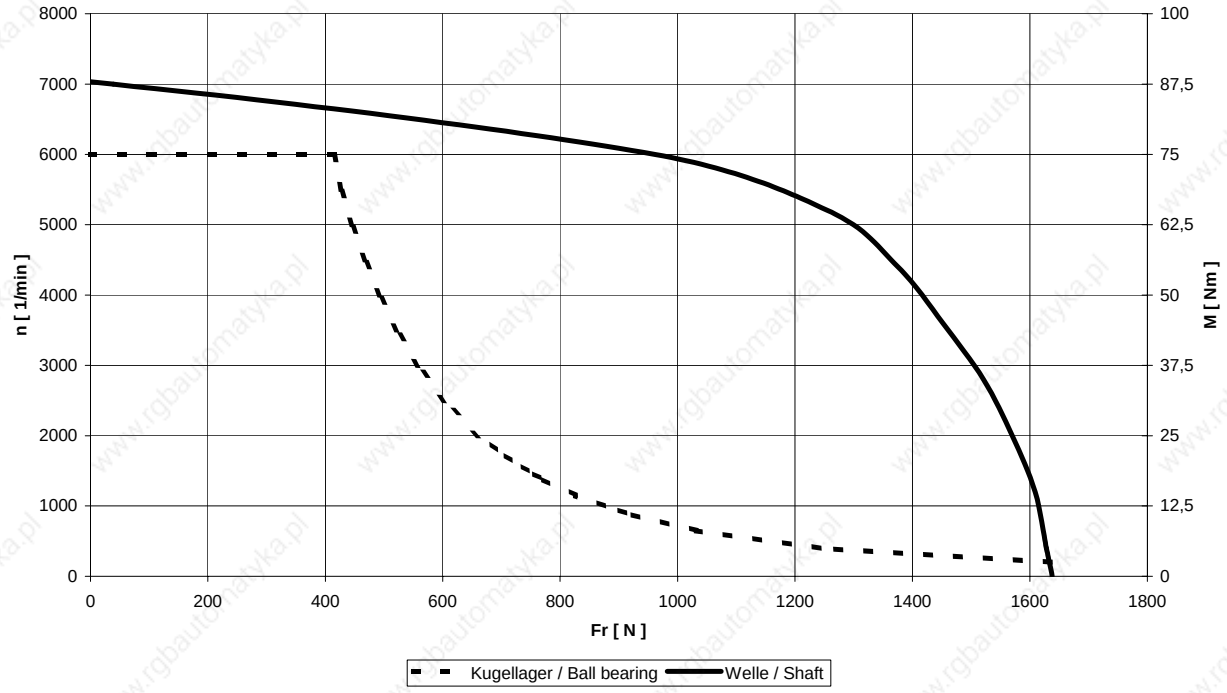
DS 45



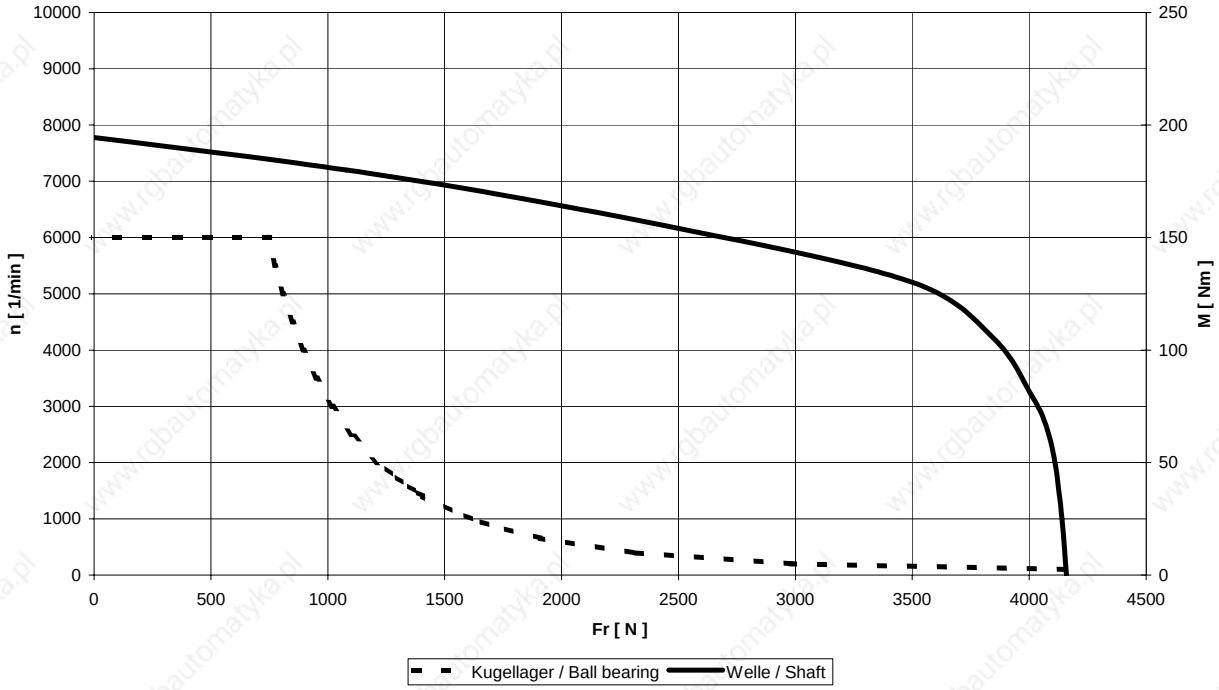
DS 56


9000
8000
7000
6000
5000
4000
3000
2000
1000
0
n [1 /min]
45
40
35
30
25
20
15
10
5
0
M [Nm]
0
100
200
300
400
500
600
700
800
900
1000
Fr [N]
Kugellager / Ball bearing
Welle / Shaft

DS 71

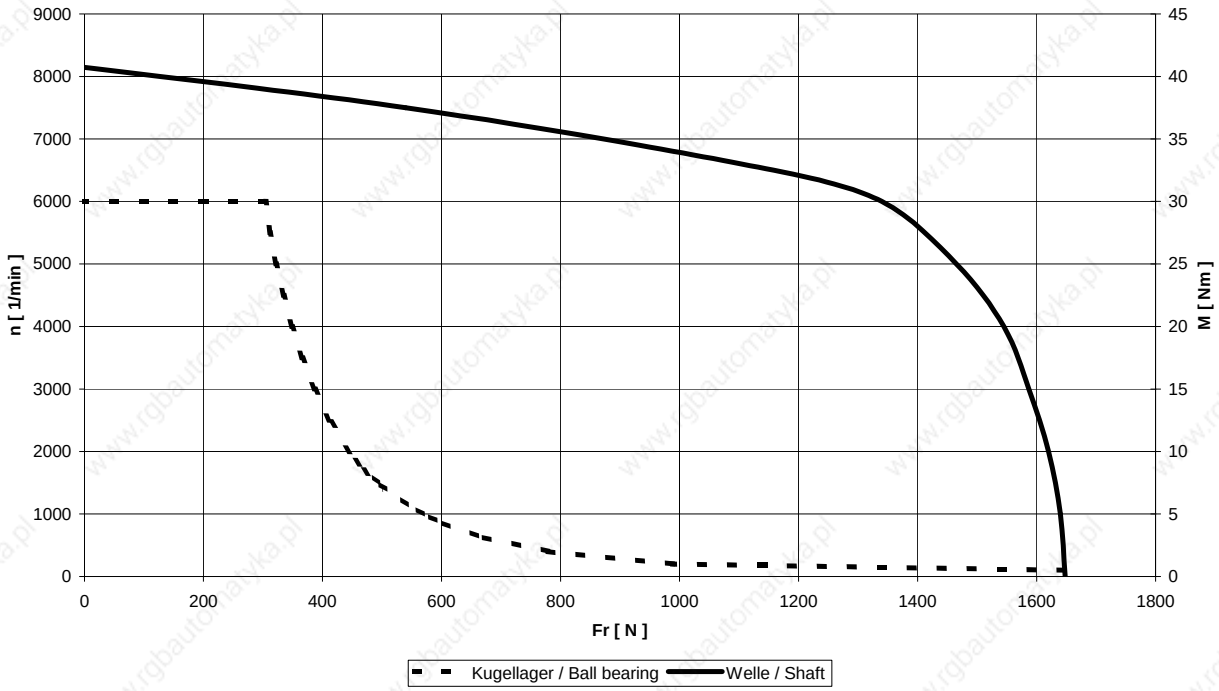

8000
7000
6000
5000
4000
3000
2000
1000
0
n [1/min]
100
87,5
75
62,5
50
37,5
25
12,5
0
M [Nm]
0
200
400
600
800
1000
1200
1400
1600
1800
Fr [N]
Kugellager / Ball bearing
Welle / Shaft

DS 100

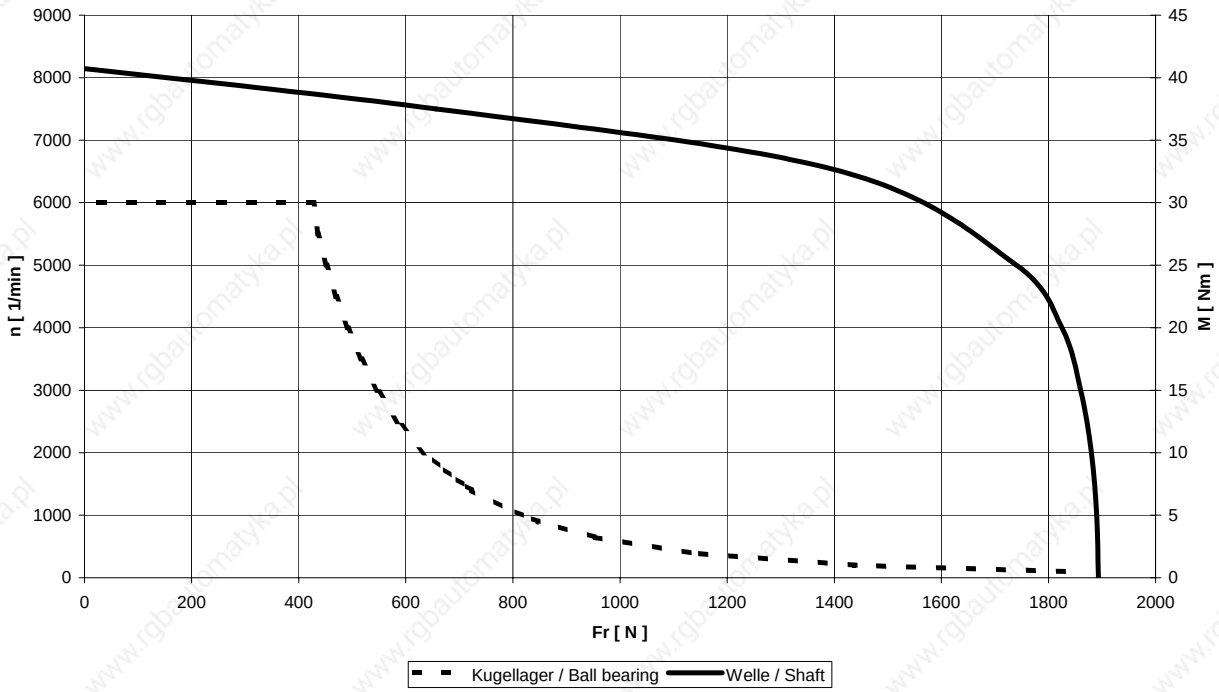

10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
n [1/min]
250
200
150
100
50
0
M [Nm]
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Fr [N]
Kugellager / Ball bearing
Welle / Shaft

DS in short version

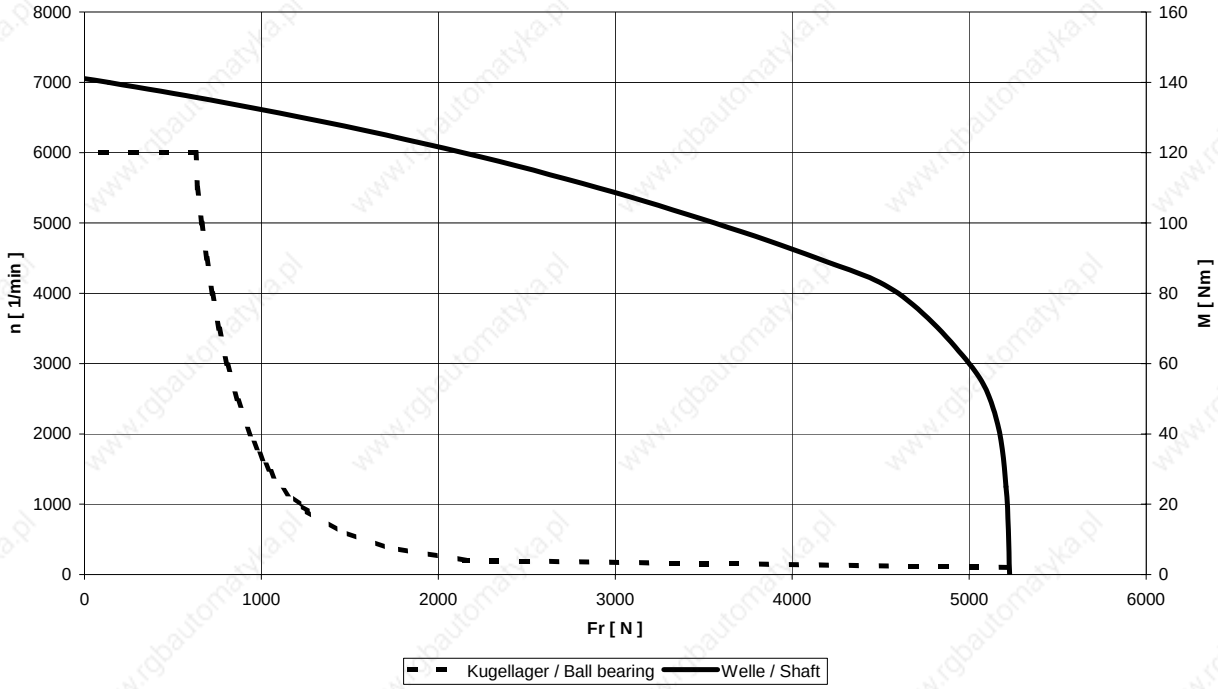
DS 56 (Kurz / Short)



DS 71 (Kurz / Short)



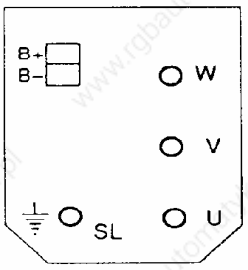
DS 100 (Kurz / Short)



Main connection – terminal marking and connector assignment

Main connection via terminal box
The thermal sensor for the resolver is connected via the encoder cable.

Connection diagram

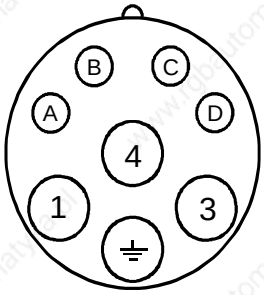
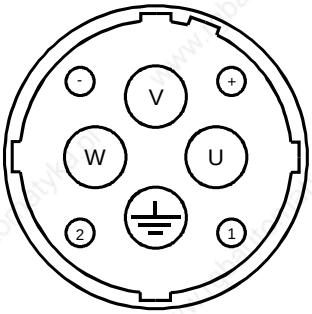


U V W ----------Power connection
SL ----------Protective earth
B+ B- ----------Brake (option)

Frame size	56	71	100
Stud	M4	M6	M8
metric gland	M20 and M16	M25 and M16	M16 and M40

Main connection via connector
The connector size is determined by the standstill current I_0 of the motor used. The thermal sensor for the resolver is connected via the encoder cable.

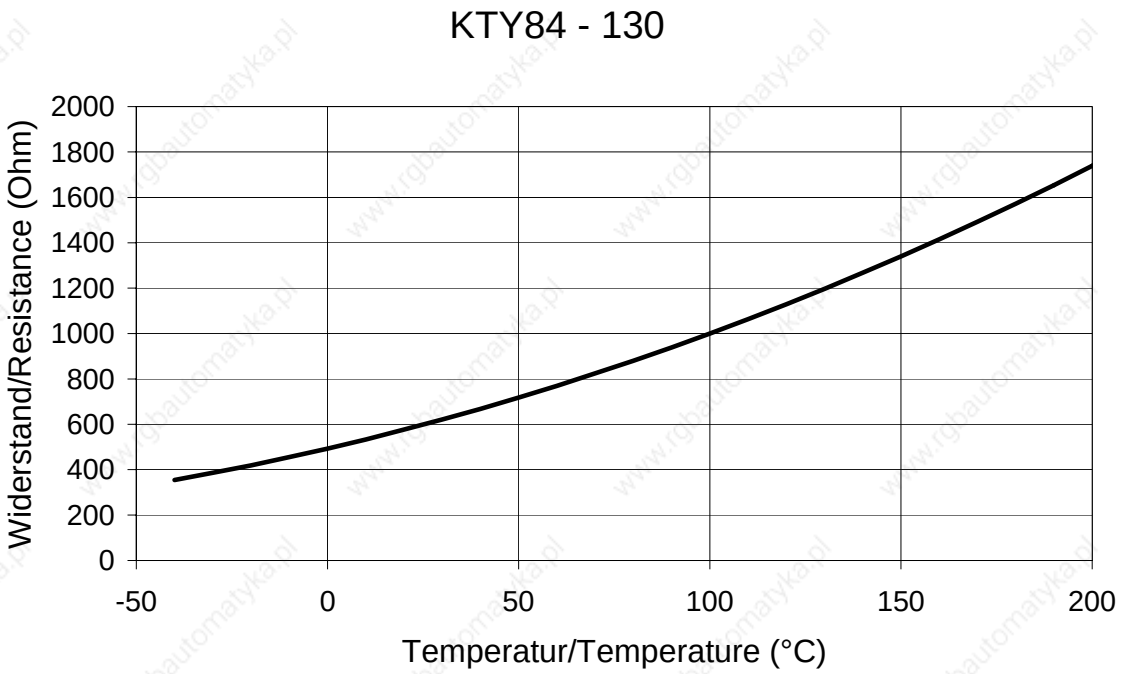
Poles of the female main connectors

		Pin	Signal	Color / marking
Size 1 I < 15 A		1 ⏚ 3 4 A B C D	Phase U PE Phase V Phase W B+ B-	U green / yellow V V W W W red black white yellow
Size 1.5 I < 50 A		U V W ⏚ + - 1 2	Phase U Phase V Phase W PE B+ B-	U V V W W W green / yellow red black white yellow

View to contact side of female connector

Thermal sensor

On resolver use. the temperature sensor is connected via the encoder plug. For SinCos encoder use. connection is effected via the main connection.



The motor temperature is continuously monitored using the thermal sensor type KTY 84-130.
The above shown resistance results when the sensor is supplied with a measuring current of 2 mA.

Fan data

Fan for type	DSO 56	4656 ZW - 956	230V. 50/60Hz; 0.12A
		4606 ZW - 958	115V. 60 Hz
Fan for type	DSO/ 71 and DSO/LIO 100	148VK028172	230V. 50/60Hz; 0.2A
		148VK028272	115V. 50/60Hz; 0.3A
Type of protection	IP54		
Connection	6-pin connector		

Fan connection

Pin	Signal
1	Phase U
2	Neutral N
⏚	PE

View to contact side of female connector

Brake assignment

The motors are optionally equipped with a holding brake. The brake uses the normally-on principle. i.e. the brake engages with the operating voltage is switched off or fails. The brakes are supplied for a switching voltage of 24 VDC +5%-10%.

The motors are available with the following holding brakes:

Motor type	Standard version				Short version		
	DS 45	DS 56	DS 71	DS 100	DS 56	DS 71	DS 100
Holding brake	Pm07	PM09	Pm11	Pm16	Pm06	Pm07	Pm11
Minimum static holding torque [Nm] at 120°C	6.5	12	20	80	2.5	6.5	20
Minimum dynamic torque [Nm] at 120°C	4.5	7.5	13	45	1.3	4.5	13
Max. switching work [Joule] per braking operation from n = 3000 min^{-1}	260	200	1000	2800	40	260	460
Connection values (+5% -10%)	24 V = 16 W	24 V = 18 W	24 V = 22 W	24 V = 31 W	24 V = 12 W	24 V = 16 W	24 V = 22 W
Inertia [$kgcm^2$]	1.06	3.6	7.6	30	0.8	1.06	9.5
Weight [kg]	0.7	1.1	1.9	3.0	0.3	0.7	1.9
Switching time On Brake released [ms]	40	60	100	130	30	40	70
Off [ms]	20	30	25	50	25	20	30

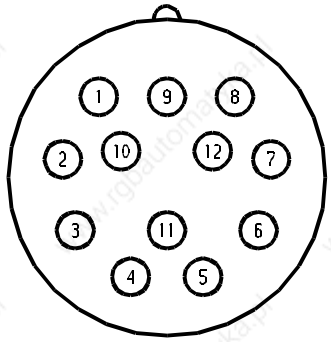
None of the brakes are **fail-safe brakes** so that the torque may be reduced by interference factors beyond control. In accordance with the case of application. observe the relevant accident prevention guidelines as well as the basic safety and health requirements of Appendix I of the Machinery Directive and the harmonized European Standards.
In the event of emergency stop or voltage failure. approx. 2000 braking operations can be carried out without causing the holding brake to overheat (Condition: maximum external inertia = motor inertia and $n_{max.}$ type-related).

Encoder

Resolver

Pole pair number	1
Ratio	0.5
Frequency	5 kHz
Nominal input voltage	4 V
Active input power for no-load operation	112 mW
Current consumption for no-load operation	40 mA
Max. output voltage for no-load operation	2 V eff
Voltage constant	-
Rotor resistance	44 Ω ± 10%
Stator resistance	28 Ω ± 10%
Rotor impedance for no-load operation	70 + j 74 Ω ± 15%
Rotor impedance at short-circuit	62 + j 66 Ω ± 15%
Stator impedance for no-load operation with min. coupling	108 + j 206 Ω ± 15%
Stator impedance at short-circuit and maximum coupling	97 + j 183 Ω ± 15%
Phase shift	8°
Zero voltage	15 mV / °
Phase error referred to zero position	10´

Resolver connection



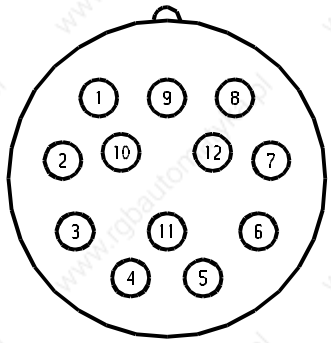
Pin	Signal
1	cos -
2	
3	
4	
5	sin –
6	sin +
7	TM -
8	cos +
9	TM +
10	Ref +
11	
12	Ref -

View to contact side of female connector

SINCOS SRS/SRM 50 (Stegmann)

	SRS 50 / SRM 50	
Number of sine. cosine periods per revolution	1024	
Number of increments per revolution	32768	
Number of absolute resolved revolutions	1	4096
Code type for the absolute value	Binary	
Output frequency of sine. cosine signals (kHz)	0 ... 200	
Error limits when evaluating 1024 signals. integral non-linearity (arc seconds)	+/- 45	
Non-linearity within a sine. cosine period; differential non-linearity (arc seconds)	+/- 7	
Working speed up to which the absolute position can be formed (1/min)	6000	
Maximum operating speed (1/min)	12000	
Output signals; 2 x 90° shifted sinusoidal signals (V_{pp})	1	
Output signal	serial RS 485. asynchronous. halfduplex	
Operating voltage range (V)	7 ... 12	
Operating current without load (mA)	80	

SRS/SRM 50 connection

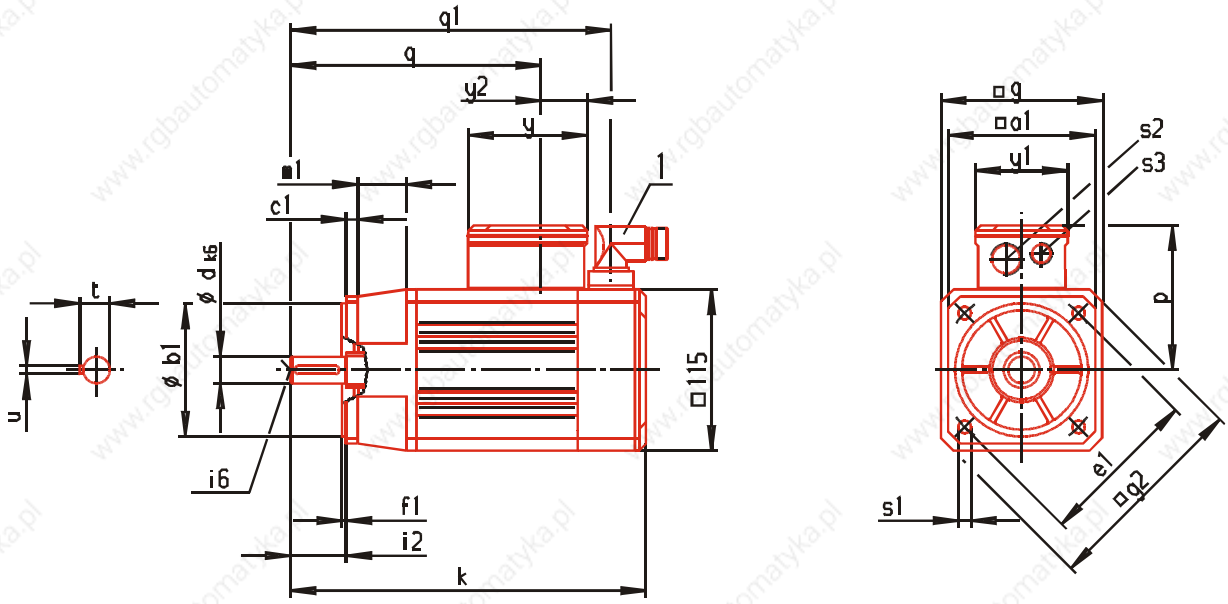


Pin	Signal
1	ref cos
2	+ 485
3	-
4	-
5	sin
6	ref sin
7	- 485
8	cos
9	-
10	Gnd
11	-
12	+ U

View to contact side of female connector

We recommend not to use optical encoders for motors with a vibration resistance of more than 3g.

DS 56 / 71 / 100 standard version.
main connection with terminal box



i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector

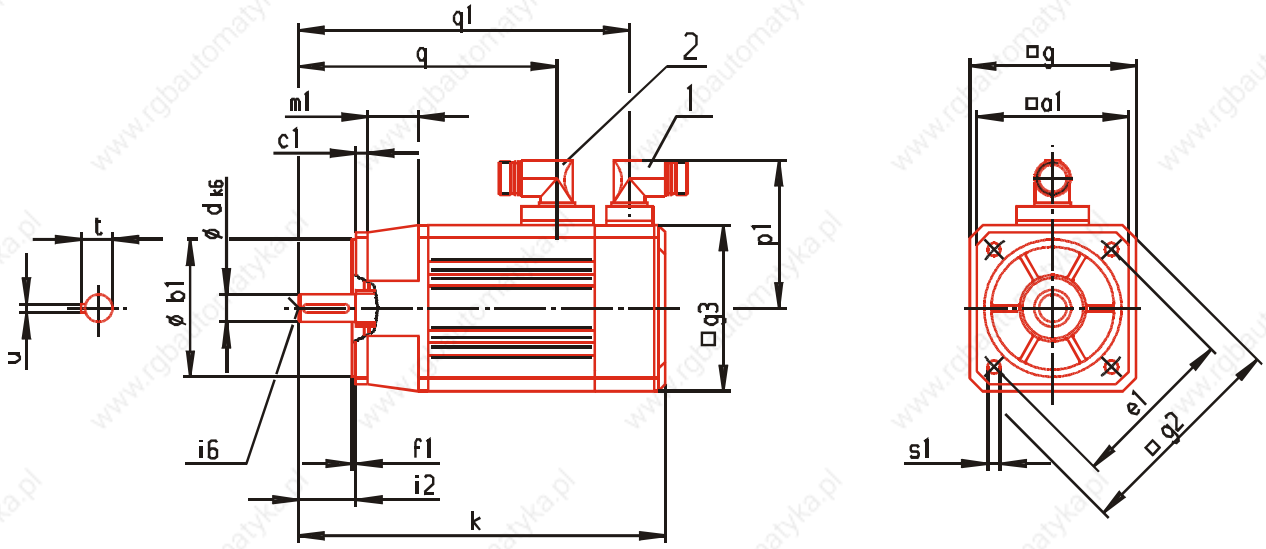
- DC link voltage of 540 V motors
- Key: Motors are also available without keyway.
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor													
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p	q	q1	s2	s3	y	y1	y2
56 S	105	95	8	115	3	40	9	19	21.5	6	150	115	255**	29	103	179	229	M20	M16	85	66	33
56 M													295**			219	269					
56 L													335**			259	309					
56 *	120	110	9	130	3.5	40	9							28								
71 K	142	130	12	165	3.5	50	12	24	27	8	186	142	316**	32	129	238	290	M25	M16	110	70	35
71 S													366**			288	340					
71 M													416**			338	390					
100 K	190	180	13	215	4	58	14	32	35	10	250	190	367**	45	174	287	341	M16	M40	150	135	37
100 S													415**			335	389					
100 M													463**			383	437					
100 L													511**			431	485					

* The flange of frame size 56 is also available with dimension a1 = 120 mm as a standard. Order in plain text.
** for sincos encoder SCS/SCM k + 20 mm; SRS/SRM k + 30 mm

Version IM B5	Type of protection IP 65	Cooling method IC 0041		

DS 45 / 56 / 71 / 100 standard version.
main connection with connector



i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector
2 = Connector for main connection/brake (use only up to 44 A)

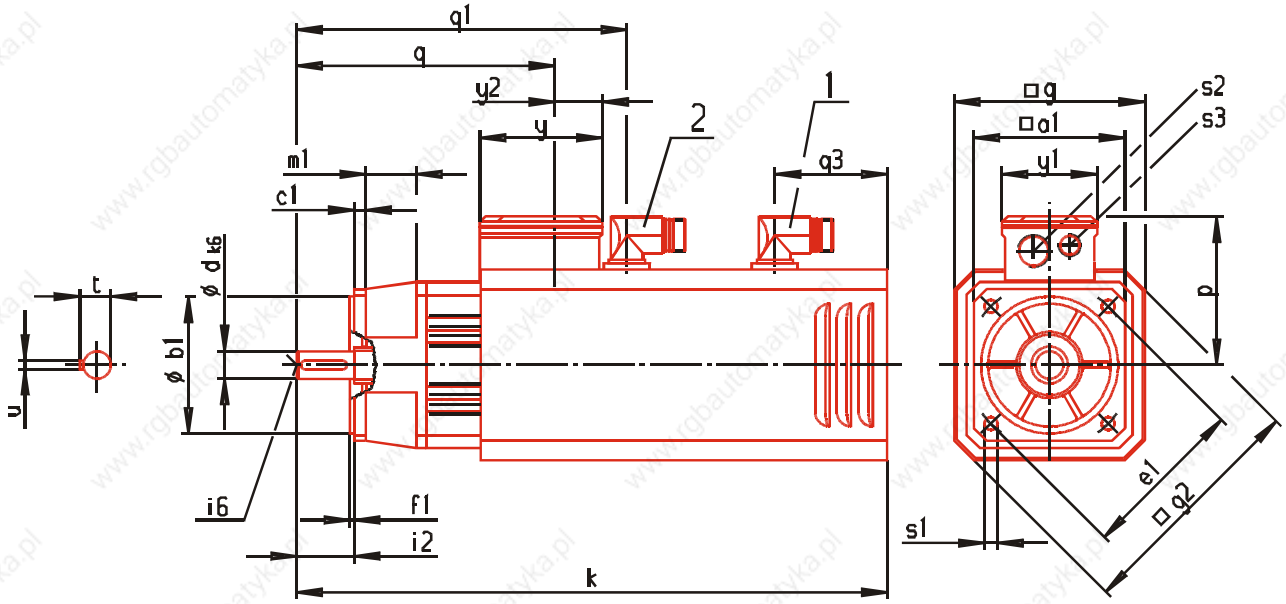
- DC link voltage of 540 V motors
- Key: Motors are also available without key.
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor											
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	g3	k	m1	p1	q	q1	q2	y	y1	y2
45 S	90	80	8	100	3	30	7	14	16	5	121	90	90*	192*	27	82	142	175	-	-	-	-
45 M														217*			167	200				
45 L														267*			217	250				
56 S	105	95	8	115	3	40	9	19	21.5	6	150	115	115	255**	29	100	179	229	-	-	-	-
56 M														295**			219	269				
56 L														335**			259	309				
56 ***	120	110	9	130	3.5	40	9								28							
71 K	142	130	12	165	3.5	50	12	24	27	8	186	142	115	316**	32	100	238	290	-	-	-	-
71 S														366**			288	340				
71 M														416**			338	390				
100 K	190	180	13	215	4	58	14	32	35	10	250	190	115	367**	45	100	287	341	-	-	-	-
100 S														415**			335	389				
100 M														463**			383	437				
100 L														511**			431	485				

* for sincos encoder SCS/SCM g3 + 9 mm and k + 33 mm; SRS/SRM g3 + 9 mm and k + 35 mm
** for sincos encoder SCS/SCM k + 20 mm; SRS/SRM k + 30 mm
*** The flange of frame size 56 is also available with dimension a1 = 120 mm as a standard. Order in plain text.

Version IM B5	Type of protection IP 65	Cooling method IC 0041		70599207

DS 56 / 71 / 100 standard version with fan.
main connection with terminal box



i6 = Centring with internal thread acc. to DIN 332 form D
1 = Fan connector
2 = Encoder connector

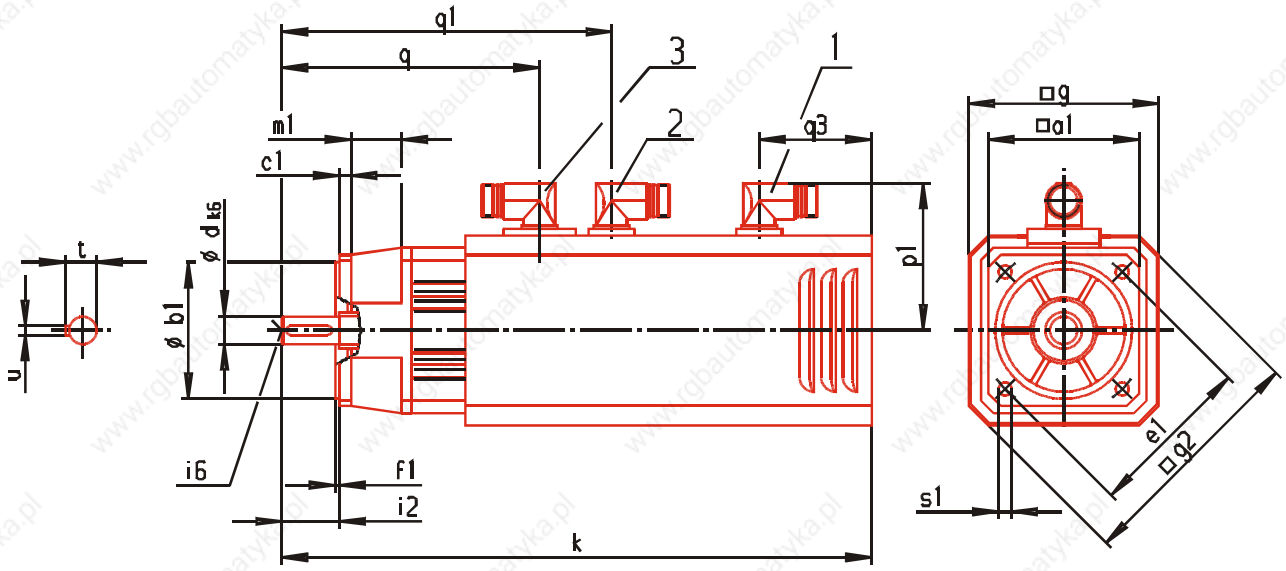
- DC link voltage of 540 V motors
- Key: Motors are also available without key
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 54 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor													
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p	q	q1	q3	y	y1	y2	s2	s3
56 S	105	95	8	115	3	40	9	19	21.5	6	167	132	411	29	103	179	229	78	85	66	33	M20	M16
56 M													451			219	269						
56 L													491			259	309						
56 *	120	110	9	130	3.5	40	9							28									
71 K	142	130	12	165	3.5	50	12	24	27	8	218	180	503	32	129	238	290	90	110	70	35	M25	M16
71 S													553			288	340						
71 M													603			338	390						
100 K	190	180	13	215	4	58	14	32	35	10	270	210	576	45	174	287	341	115	150	135	37	M16	M40
100 S													624			335	389						
100 M													672			383	437						
100 L													720			431	485						

* The flange of frame size 56 is also available with dimension a1 = 120 mm as a standard. Order in plain text.

Version IM B5	Type of protection IP 54	Cooling method IC 0641		70599208

DS 56 / 71 / 100 standard version with fan.
main connection with connector



i6 = Centring with internal thread acc. to DIN 332 form D
1 = Fan connector
2 = Encoder connector
3 = Connector for main connection/brake

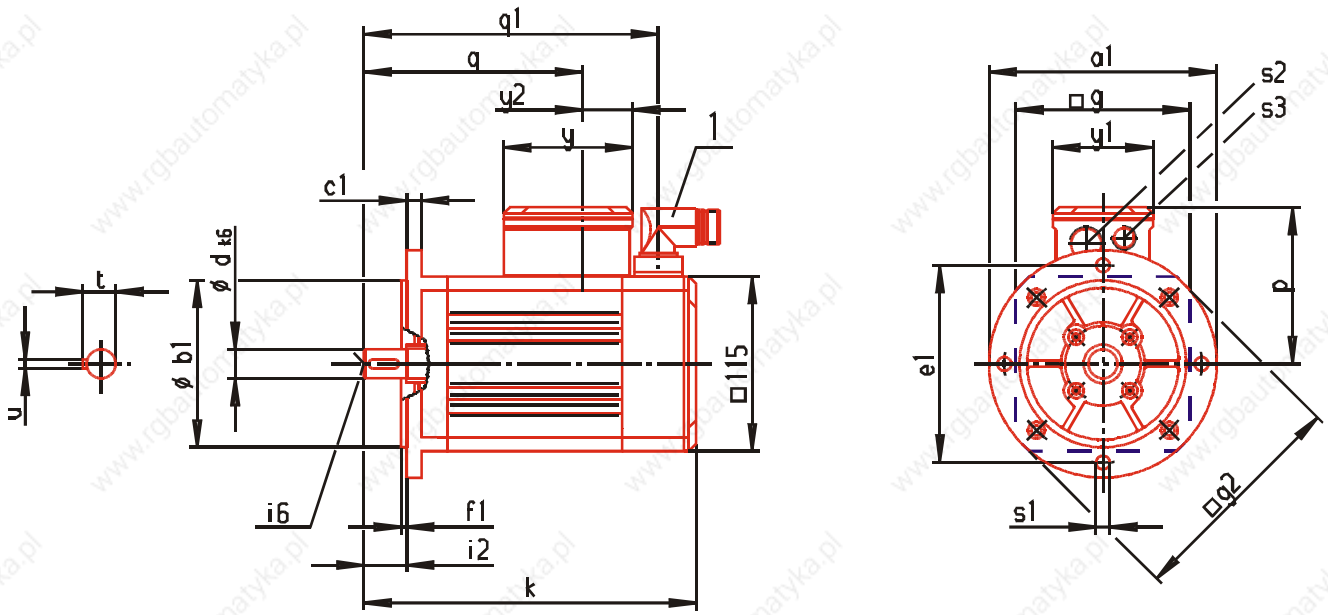
- DC link voltage of 540 V motors
- Key: Motors are also available without key
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 54 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor													
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p1	q	q1	q3	y	y1	y2	s2	s3
56 S	105	95	8	115	3	40	9	19	21.5	6	167	132	411	29	97	179	229	78					
56 M													451			219	269						
56 L													491			259	309						
56 *	120	110	9	130	3.5	40	9							28									
71 K	142	130	12	165	3.5	50	12	24	27	8	218	180	503	32	110	238	290	90					
71 S													553			288	340						
71 M													603			338	390						
100 K	190	180	13	215	4	58	14	32	35	10	270	210	576	45	134	287	341	115					
100 S													624			335	389						
100 M													672			383	437						
100 L													720			431	485						

* The flange of frame size 56 is also available with dimension a1 = 120 mm as a standard. Order in plain text.

Bauform IM B5	Schutzart IP 54	Kühlart IC 0641		70599209

DS 56 / 71 / 100 short version.
main connection with terminal box



i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector

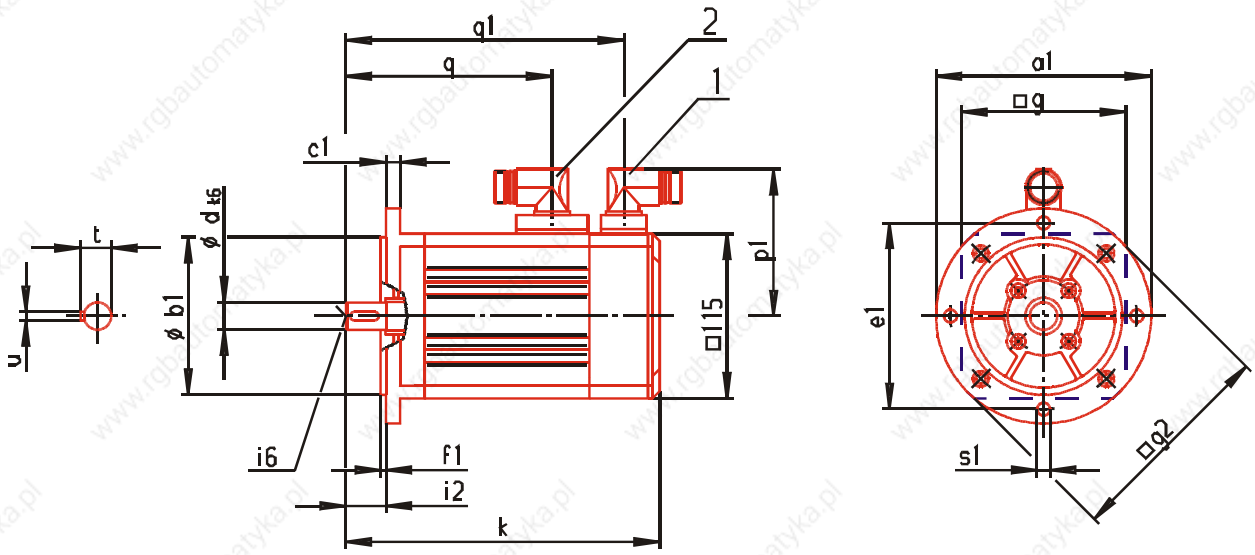
- DC link voltage of 540 V motors
- Key: Motors are also available without key
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

Type	Flange							Shaft			Motor												
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p	q	q1	s2	s3	y	y1	y2
56 A	150	110	10	130	3.5	28	9	19	21.5	6	150	115	199*	-	103	124	174	M20	M16	85	66	33
56 B													219*			144	194					
71 B	186	130	10	165	3.5	28	11	19	21.5	6	186	142	234*	-	129	157	209	M25	M16	110	70	35
71 C													259*			182	234					
100 B	250	180	13	215	4	42	14	28	31	8	250	190	266*	-	174	186	240	M16	M40	150	135	37
100 C													290*			210	264					
100 D													314*			234	288					

* for sincos encoder SCS/SCM k + 20 mm; SRS/SRM k + 30 mm

Version IM B5	Type of protection IP 65	Cooling method IC 0041		

DS 56 / 71 / 100 short version.
main connection with connector



i6 = Centring with internal thread acc. to DIN 332 form D
1 = Encoder connector
2 = Main connection/brake

- DC link voltage of 540 V motors
- Key: Motors are also available without key
- Brake: When a brake is mounted the dimensions remain unchanged.
- IP 65 type of protection is ensured with mounted connectors only.
- Shaft gland protection type is IP64

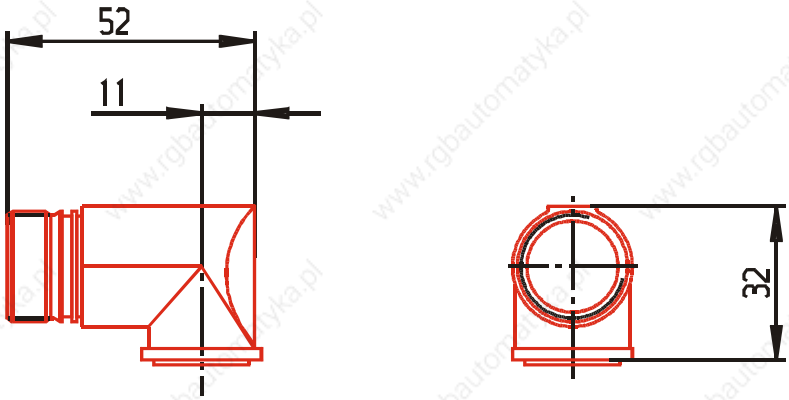
Type	Flange							Shaft			Motor												
	a1	b1	c1	e1	f1	i2	s1	d	t	u	g2	g	k	m1	p1	q	q1	q2	q3	y	y1	y2
56 A	150	110	10	130	3.5	28	9	19	21.5	6	150	115	199*	-	100	124	174	-	-	-	-	-
56 B													219*			144	194					
71 B	186	130	10	165	3.5	28	11	19	21.5	6	186	142	234*	-	100	157	209	-	-	-	-	-
71 C													259*			182	234					
100 B	250	180	13	215	4	42	14	28	31	8	250	190	266*	-	100	186	240	-	-	-	-	-
100 C													290*			210	264					
100 D													314*			234	288					

* for Sincos encoder SCS/SCM k + 20 mm; SRS/SRM k + 30 mm

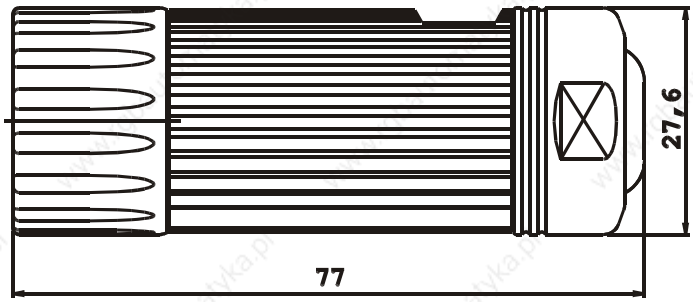
Version IM B5	Type of protection IP 65	Cooling method IC 0041		70599211

Main connection. fan and male and female encoder connectors

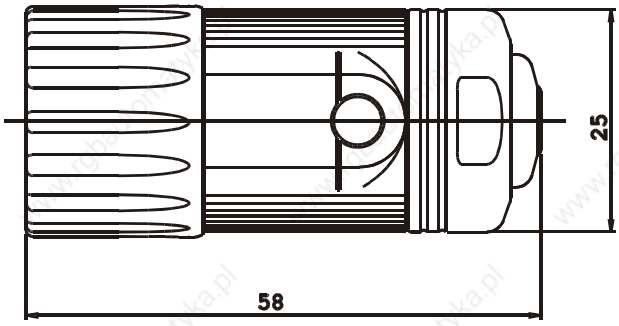
Female flange connector main connection (size 1 for current I_0 to 15 A). fan and encoder



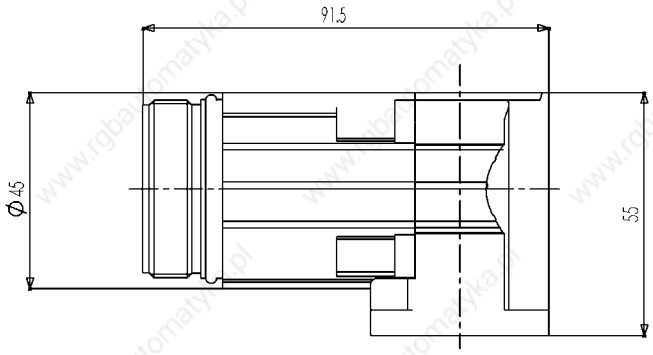
Main connector (size 1 for current I_0 to 15 A) and fan



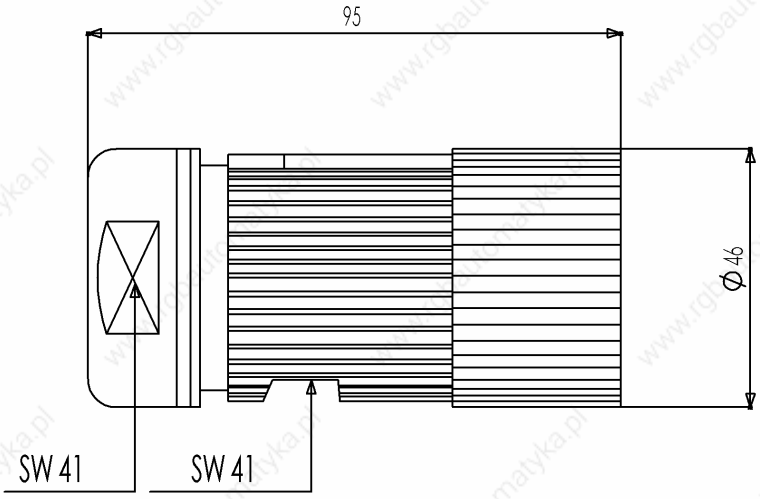
Encoder connector



Female flange connector main connection (size 1.5 for current I_0 to 50 A)



Main connector (size 1.5 for current I_0 to 50 A)



Motor cables

General
The motor cables are highly flexible trailing cables with overall shielding. They comply with the regulations VDE. UL and CSA.
The control cables are integrated as star-quads. When the sincos encoder is used the brake triggering and the connection of the thermal sensor are brought out via the main connector.
The cables are particularly suitable for the optimum use of cable racks thanks to their low cross-section. low weight and non-impeding surface. They can thus be efficiently used in trailing chains.
The overall shielding with an optical coverage of more than 85% makes it an EMC uncritical cable.
The connector size is designed in accordance with the motor's standstill current I_0.

Technical data
Technical description

- Sheath resistance against media such as coolants. machine and gearbox oils
- Abrasion resistance because of a special surface in cable racks and trailing chains
- High-flexible. trailing cable
- Sheath surface not blocking. satin-finish
- Shield made of tinned copper braid with optical coverage of ≥ 85 %
- Core insulation made of TPE or polyester. sheath material PUR holgene-free
- Cable FCF-free and silicone-free
- Behavior in case of fire: fire-inhibiting. halogene-free
- Cable color in RAL 1028. melon yellow
- Labelling with Baumüller sign. VDE. UL and CSA sign
- Minimum bending radius for flexible use 12 x D

Nominal voltage
Uo/U 600 / 1000 V (power cores)
U 24 V DC (control cores)

Core lettering
Power cores U. VV. WWW
Colored control cable pairs as star-quads in red. white. black. yellow
Assignment of pairs red – black (brake).
white – yellow (temperature)

Cable data

Cable cross-section	Nominal current [A][1)]	Cable diameter [mm]
4×1.5 mm² 4×0.75 mm²	15	11.7 – 12.3
4×2.5 mm² 4×0.75 mm²	21	12.7 – 14.6
4×4 mm² 4×0.75 mm²	28	14.2 – 15.4
4×6 mm² 4×0.75 mm²	36	16.6 – 17.9
4×10 mm² 4×0.75 mm²	50	20.5 – 21.5
4×16 mm² 4×0.75 mm²	66	23.0 – 25.8
4×25 mm² 2×(2×1.5 mm²)	84	26.3 – 29.7
4×35 mm² 2×(2×1.5 mm²)	104	30.8 – 32.5

1) Current carrying capacity acc. to table 5 laying type C or E
(VDE 0113 / EN 60 204 Part 1 issue 1997)
Ambient temperature 40°C

Cable – connector assignment

Cable cross-sections	Nominal current [A]	Male connector 540 V Size
4×1.5 mm^2 4×0.75 mm^2	15	1
4×2.5 mm^2 4×0.75 mm^2	21	1.5
4×4 mm^2 4×0.75 mm^2	28	1.5
4×6 mm^2 4×0.75 mm^2	36	1.5
4×10 mm^2 4×0.75 mm^2	50	1.5

The connectors must be designed with respect to the I_0 motor current. For the laying of the cables. the current carrying capacity acc. to table 5 laying type C or E (VDE 0113 / EN 60 204 Part 1 issue 1997) and an ambient temperature of 40°C must be considered.

Cables of 2.5 mm^2 can be laid up to 100 m without additional filters. when larger cross-sections used. up to 40 m are permissible. The terminal voltage at the motor must be < 1kV. When longer cables are used. filters must be installed between converter and motor.

Application notes

Operating temperature
The cables can be operated within a temperature range from –20°C to +80°C.

Cable laying at the motor
The cables must not touch the motor surface.

Smallest permissible bending radii
12 times outer cable diameter.
Smaller bending radii are possible with reduced service life.

Main connection cables / Assembled cable with connector

Nominal current: 15 A
Cable 4 x 1.5 mm² + 4x 0.75 mm²
with connector Size1

Length in m	Article no.
5	324781
7	324782
10	324783
15	324784
20	324785
25	324786
30	324787
35	324788
40	324789
50	324790
75	324791
100	324792

Nominal current: 21 A
Cable 4 x 2.5 mm² + 4x 0.75 mm²
with connector Size1.5

Length in m	Article no.
5	326577
7	326578
10	326579
15	326580
20	326581
25	326582
30	326583
35	326584
40	326585
50	326586
75	326587
100	326588

Nominal current: 28 A
Cable 4 x 4 mm² + 4x 0.75 mm²
with connector Size1.5

Length in m	Article no.
5	326589
7	326591
10	326592
15	326593
20	326594
25	326596
30	326597
35	326598
40	326599

Nominal current: 36 A
Cable 4 x 6 mm² + 4x 0.75 mm²
with connector Size1.5

Length in m	Article no.
5	326600
7	326601
10	326602
15	326603
20	326604
25	326605
30	326606
35	326607
40	326608

Nominal current: 50 A
Cable 4 x 10 mm² + 4x 0.75 mm²
with connector Size1.5

Length in m	Article no.
5	326609
7	326610
10	326611
15	326612
20	326613
25	326614
30	326615
35	326616
40	326617

Connector

Type	Article no.
Size 1 f. 4x1.5mm^2	261740
Size 1.5 f. 4x2.5mm^2 o. 4mm^2	326574
Size 1.5 f. 4x6mm^2 o.10mm^2	326569

Larger cable cross-sections on request.
Longer cables can also be used. The terminal voltage at the motor must be < 1kV. In this case. however. filters must be installed between converter and motor.

Encoder cables

General

A fully preassembled encoder cable is used for all encoder systems. Motor connection is via a 12-pin round signal connector and converter connection via a 15-pin sub-D plug. The encoder cables are available as 'trailing' and 'non-trailing' cables. The trailing cable is suitable for use in trailing chains. for example. As opposed to the 'non-trailing' cable. the cable sheath consists of tougher PUR for use in environments with acids and bases (coolants) instead of PVC. Up to a length of 10 m. the cables are available in 1 m sections (1 m. 2 m. 10 m). From a cable length of 10 m. the sections come in 5 m intervals (10 m. 15 m. …).

In the case of servo motors. the resolver encoder system links the temperature sensor with the converter via the encoder cable.

Technical data

1. Technical description – non-trailing

- LiYCY. 5x (2x0.14mm²) + 2 x 0.5mm² copper lead. twisted pair
- PVC sheath. grey
- 1st end: 12-pin signal circular connector with 12 female contacts
- 2nd end: 15-pin D-Sub connector with male contacts and locking screws 4-4OUNC
- Baumüller labelling. black
- Outer diameter 9.0 mm (+/-3mm)
- Bending radius: $r \geq 60$ mm (fixed installation). $r \geq 135$ mm (flexible use)
- Nominal voltage: $250V_{AC}$

2. Technical description – trailing

- Li12YC11Y. 5x (2x0.14mm²) + 2 x 0.5mm² copper lead. twisted pair
- PU sheath. black
- 1st end: 12-pin signal circular connector with 12 female contacts
- 2nd end: 15-pin D-Sub connector with male contacts and locking screws 4-4OUNC
- Baumüller labelling. white
- Outer diameter 9.0 mm (+/-3mm)
- Bending radius: $r \geq 70$ mm (fixed installation). $r \geq 100$ mm (flexible use)
- Nominal voltage: $300V_{AC}$

Application notes

- Operating temperature

	trailing	non-trailing
Limit temperature	at the surface	at the surface
no / few movements	-40 °C to +80 °C	- 30 °C to +80 °C
continuous movements	- 30 °C to +80 °C	-5 °C to + 70 °C

- Cable laying at the motor

The cables must not touch the motor surface.

Ordering data

Encoder cables / preassembled cables with connector

Encoder cable
non-trailing.
assembled
Cable 5 x (2x014mm^2) + 2 x 0.5 mm² with connector

Length in m	Article no.
1	243601
2	211338
3	219333
4	231166
5	209879
6	220197
7	216455
8	220429
10	210052
15	215716
20	218568
25	218569
30	217094
35	216444
40	217095
45	217567
50	217568
55	217569
60	217570
70	232088

trailing.
assembled
Cable 5 x (2x014mm^2) + 2 x 0.5 mm² with connector

Length in m	Article no.
3	246658
4	243379
5	239540
6	242954
8	239541
10	239542
15	239543
20	239544
25	239545
30	239546
35	239547
40	240520
45	240521
50	240522
55	244033
60	245484

Encoder connector	Article no.
Encoder connector	201833

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