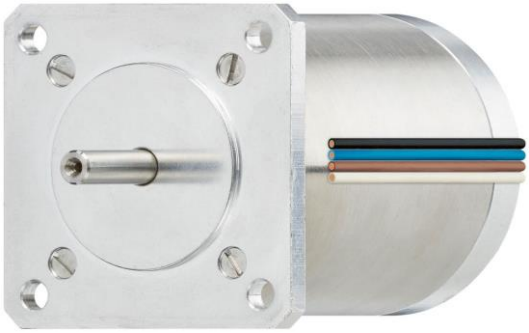
specialists stepper motor



• IP00 vacuum

• IP65 splash water

• IP68 underwater

• IP65 splash water

special stepper motor MOT-...-S-…

special stepper motor

MOT – … – S – 060 – 007 – 056 – M – A – AAAA

specifics	
AAAK	IP65 splash water
AAAL	IP65 splash water + encoder
AAAI	IP68 underwater
AAAM	IP68 underwater + encoder
AAAJ	IP00 vacuum

options	
A	without
C	incremental encoder (IP65 and IP68)

motor connection	
M	metric plug
L	stranded wire
K	terminal box

flange dimension	
056	56mm (NEMA23)

holding torque	
007	0,7Nm
013	1,3Nm
017	1,7Nm

max. voltage	
060	60VDC

motor type	
S	stepper motor

type	
…	version

product group	
MOT	motor

special stepper motor MOT- ...-S-…

special stepper motor

MOT – ST – … – C – … - C

specifics	
C	special characteristic

options	
A	without
C	Encoder

motor connection	
C	stranded wire

flange dimension	
042	42mm (NEMA17)
056	56mm (NEMA23)
060	60mm (NEMA24)
086	86mm (NEMA34)

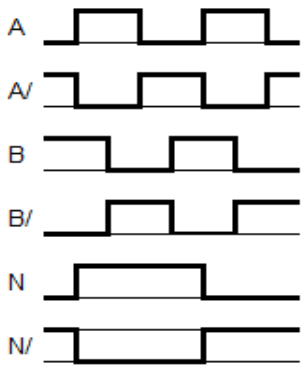
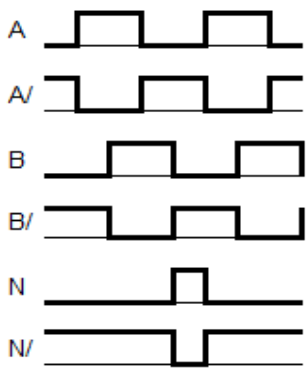
motor type	
ST	stepper motor

product group	
MOT	motor

technical data						
motor		MOT-AD-S-060-017-056-M-A-AAAK IP65 splash water	MOT-AD-S-060-017-056-M-C-AAAL IP65 splash water	MOT-AP-S-060-013-056-K-A-AAAI IP68 underwater	MOT-AP-S-060-013-056-K-C-AAAM IP68 underwater	MOT-AP-S-060-007-056-L-A-AAAJ IP00 vacuum
max. voltage	[VDC]	60	60	60	60	60
nominal voltage	[VDC]	24-48	24-48	24-48	24-48	24-48
intermittent operation	[A] at 25°C	3,00	3,00	4,20	4,20	2,50
continuous operation	[A] at 25°C	2,25	2,25	3,15	3,15	1,87
holding torque	[Nm]	1,7	1,7	1,3	1,3	0,7
detent torque	[Nm]	0,055	0,055	0,025	0,025	0,050
step angle	[°]	1,8±5%	1,8±5%	1,8±5%	1,8±5%	1,8±5%
resistance / phase	[Ω]	0,9	0,9	0,8	0,8	0,8
inductance / phase	[mH]	4,4	4,4	1,5	1,5	2,4
moment of inertia / rotor	[kgcm²]	0,36	0,36	0,38	0,38	0,24
max. shaft load axial	[N]	15	15	80	80	40
max. shaft load radial	[N]	23	23	150	150	80

weight / material						
motor	[kg]	1,20	1,25	1,47	1,51	1,00
motor housing material		Al/St lacquered	Al/St lacquered	Al lacquered	Al lacquered	V2A

operating data						
ambient temperature	[°C]	-10 …+50	-10 …+50	-10 …+50	-10 …+50	-10 …+50
max temperature rise	[°C]	80	80	80	80	110
humidity (not condensing)	[%]	100	100	100	100	0
protection class engine case		IP65	IP65	IP68 (10m)	IP68 (10m	IP00
fine vacuum	[mbar]	-	-	-	-	10^{-3}
resistant to radiation	[J/kg]	-	-	-	-	10

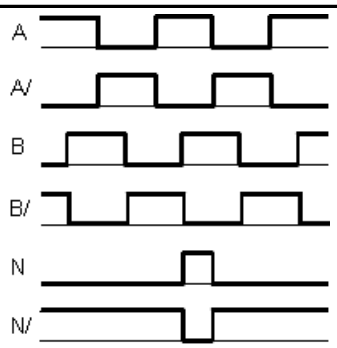
encoder			
operating voltage	[VDC]	5	
impulse / turn		500	
zero impulse / index		yes	
line-driver		RS422 protocol	
signal sequence		MOT-AD-S-060-017-056-M-C-AAAL	MOT-AP-S-060-013-056-K-C-AAAM
motor rotation clockwise	CW		

stepper motor MOT-ST-…-C-...-C

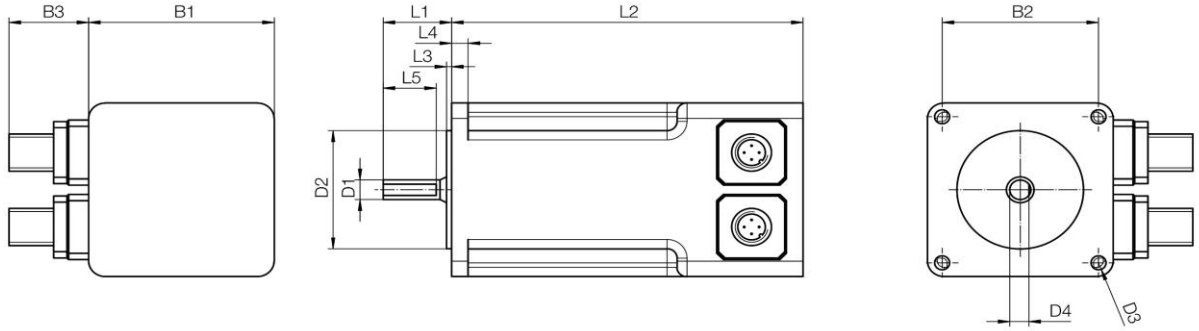
technical data					
Motor		MOT-ST-42-C-...-C	MOT-ST-56-C-...-C	MOT-ST-60-C-...-C	MOT-ST-86-C-...-C
max. voltage	[VDC]	60	60	60	60
nominal voltage	[VDC]	24-48	24-48	24-48	24-48
intermittent operation	[A] at 25°C	1,8	4,2	4,2	6,4
continuous operation	[A] at 25°C	1,08	3,15	3,15	4,8
holding torque	[Nm]	0,5	2,0	3,5	5,9
detent torque	[Nm]	0,022	0,068	0,075	0,210
step angle	[°]	1,8 ±5%	1,8 ±5%	1,8 ±5%	1,8 ±5%
resistance / phase	[Ω]	1,75 ±10%	0,50 ±10%	0,65 ±10%	0,33 ±10%
inductance / phase	[mH]	3,30 ±20%	2,20 ±20%	3,20 ±20%	3,00 ±20%
moment of inertia / rotor	[VAC]	500	500	500	500
max. shaft load axial	[kgcm²]	0,082	0,48	0,84	2,70
max. shaft load radial	[N]	7	15	15	65
Wellenbelastung, radial (20 mm)	[N]	20	52	63	200

weight / material					
motor	[kg]	0,4	1,05	1,5	3,1

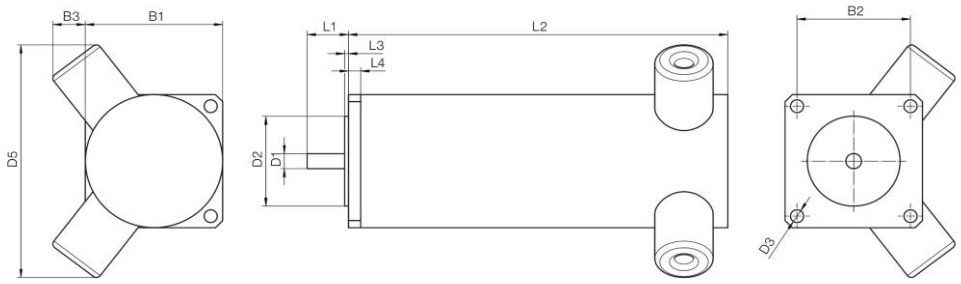
operating data		
ambient temperature	[°C]	-10 …+50
max temperature rise	[°C]	80
insulation class	[°C]	B 130
humidity (not condensing)	[%]	85
protection class engine case		IP65 with shaft seal
resistant to radiation		EMV guideline

Encoder (inkremental)		
Betriebsspannung	[VDC]	5
Impulse/Umdrehung		500
Nullimpuls/Index		ja
Line Treiber		RS422 Protokoll
Signalverlauf (Motordrehrichtung im Uhrzeigersinn)	CW	

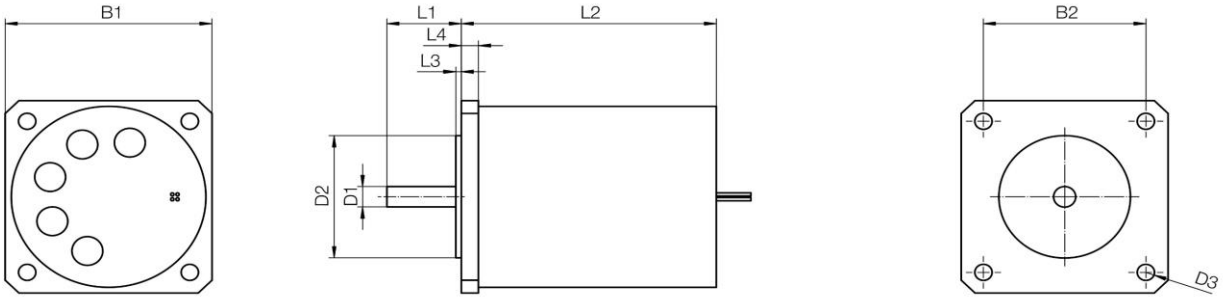
dimension



Typ	B1 [mm] ±1	B2 [mm] ±1	B3 [mm] ±1	D1 Ø [mm] -0,015	D2 Ø [mm] ±0,05	D3 Ø [mm] +0,5	D4 Ø [mm] ±0,15	L1 [mm] ±1	L2 [mm] ±1	L3 [mm]	L4 [mm]	L5 [mm] ±1
MOT-AD-S-060-017-056-M-A-AAAK	56,4	47,14	13	6,35	38,1	5,0	5,8	20,6	106,0	1,6	5	16
MOT-AD-S-060-017-056-M-C-AAAL	56,4	47,14	24	6,35	38,1	5,0	5,8	20,6	106,0	1,6	5	16

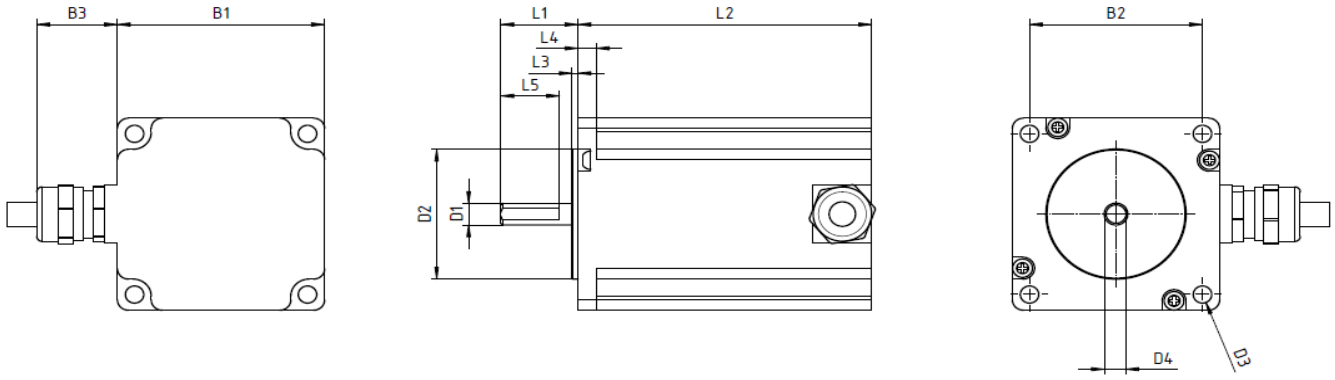


Typ	B1 [mm] ±1	B2 [mm] ±1	B3 [mm] ±1	D1 Ø [mm] -0,015	D2 Ø [mm] ±0,05	D3 Ø [mm] +0,5	D5 [mm] ±0,15	L1 [mm] ±1	L2 [mm] ±1	L3 [mm]	L4 [mm]	L5 [mm] ±1
MOT-AP-S-060-013-056-K-A-AAAI	56,8	47,1	-	6,35	38,10	5,3	-	17,0	134,0	1,6	5	-
MOT-AP-S-060-013-056-K-C-AAAM	56,8	47,1	16,6	6,35	38,10	5,3	90	17,0	154,0	1,6	5	-



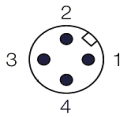
Typ	B1 [mm] ±1	B2 [mm] ±1	B3 [mm] ±1	D1 Ø [mm] -0,015	D2 Ø [mm] ±0,05	D3 Ø [mm] ±0,5	D4 [mm] -0,15	L1 [mm] ±1	L2 [mm] ±1	L3 [mm]	L4 [mm]	L5 [mm] ±1
MOT-AP-S-060-007-056-L-A-AAAJ	59,95	47	-	6,35	38,1	5,0	-	22	74,0	1,6	4,5	-

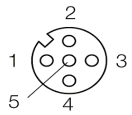
dimension

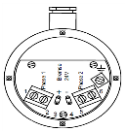


Typ	B1 [mm] ±1	B2 [mm] ±1	B3 [mm] ±0,5	D1 Ø [mm] -0,013	D2 Ø [mm] ±0,5	D3 Ø [mm]	D4 [mm] ±1	L1 [mm] ±1	L2 [mm] ±1	L3 [mm] ±0,25	L4 [mm] ±0,5	L5 [mm]
MOT-ST-42-C-A-C	42,3	31,0	19,0	5,0	22,0	M3	4,5	24,0	53,0	2,0	-	19,0
MOT-ST-42-C-C-C	42,3	31,0	19,0	5,0	22,0	M3	4,5	24,0	66,0	2,0	-	19,0
MOT-ST-56-C-A-C	56,4	47,1	22,0	6,35	38,1	5,0	5,8	21,0	80,0	1,6	5,0	16,0
MOT-ST-56-C-C-C	56,4	47,1	22,0	6,35	38,1	5,0	5,8	21,0	101,0	1,6	5,0	16,0
MOT-ST-60-C-A-C	60,0	47,1	22,0	8,0	38,1	5,0	7,5	21,0	94,5	1,6	7,0	16,0
MOT-ST-60-C-C-C	60,0	47,1	22,0	8,0	38,1	5,0	7,5	21,0	116,0	1,6	7,0	16,0
MOT-ST-86-C-A-C	86,0	69,6	27,0	14,0	73,0	6,5	13,0	37,0	110,0	1,6	10,0	32,0
MOT-ST-86-C-C-C	86,0	69,6	27,0	14,0	73,0	6,5	13,0	37,0	124,0	1,6	10,0	32,0

pin assignment motor
MOT-AD-S-060-017-056-M-… MOT-AP-S-060-013-056-K-A-AAAI



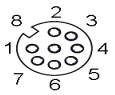


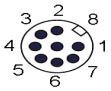


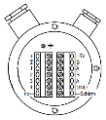
motor bipolar				**motor cable**
M12 4-pole			wires	M12 5-pole
pin	signal	phase	color	color
1	A/	1	brown	brown
2	A		white	white
3	B	2	blue	blue
4	B/		black	black
-	-		-	green/yellow
housing	shielding		-	-

Motor bipolar	
cable inlet M16	
pin	signal
1	A/
2	A
5	B
6	B/
⏚	PE

pin assignment encoder / motor + encoder
MOT-AD-S-060-017-056-M-C-AAAL MOT-AP-S-060-013-056-K-C-AAAM







encoder		**encoder cable**
M12 8-pole		M12 8-pole
pin	signal	color
1	A	white
2	A/	brown
3	B	green
4	B/	yellow
5	0V	grey
6	N/	pink
7	N	blue
8	5V DC	red
housing	shielding	shielding

encoder		**motor**		
cable inlet M16		cable inlet M16		
pin	signal	pin	signal	phase
+5V	+5V	1	A/	1
A	A	2	A	
A/	A/	3	B	2
B	B	4	B/	
B/	B/	⏚	PE	
GND	0V	nc	no connection	
I/	N/	-	-	
I	N	-	-	
shield	shielding	-	-	

wire assignment
MOT-AP-S-060-007-056-L-A-AAAJ

motor bipolar			
			wires
pin	signal	phase	color
-	A/	1	brown
-	A		white
-	B	2	blue
-	B/		black

wire assignment
MOT-ST-…-C-...-C

motor bipolar				motor cable
Molex 46992-0410				wires
pin	color	signal	phase	color
1	red	A	1	1
2	green	A/		2
3	yellow	B	2	3
4	blue	B/		4
5	/	shielding		shielding

Encoder bipolar			motor cable
Molex 39012100			wires
Pin	Farbe	Signal	Farbe
1	red	+5V	red
2	black	0V	blue
3	green	A	white
4	green/black	A/	brown
5	white	B	yellow
6	white/black	B/	green
7	yellow	N	pink
8	yellow/black	N/	gray
9			
10	black	shielding	shielding

special stepper motor MOT-...-S-…

cable part number	outer jacket	type	cable length	plug
MOT-AD-S-060-017-056-M-…				
motor	**- cable Ø: 5,5 mm / bending radius moved < 10m travel distance: min. 5 x d**			
DLE904121451-3 (MAT9043737 old)	TPE	CF9-CF.INI	3	straight
DLE904121451-5 (MAT9043738 old)	TPE	CF9-CF.INI	5	straight
DLE904121451-10 (MAT9043740 old)	TPE	CF9-CF.INI	10	straight
DLE904121452-3 (MAT9043742 old)	TPE	CF9-CF.INI	3	angulate
DLE904121452-5 (MAT9043743 old)	TPE	CF9-CF.INI	5	angulate
DLE904121452-10 (MAT9043745 old)	TPE	CF9-CF.INI	10	angulate

MOT-AP-S-060-013-056-K-…				
motor	**- cable Ø: 7,5 mm / bending radius moved < 10m travel distance: min. 5 x d**			
-	TPE	CF9.10.05	no minimum order quantity	-

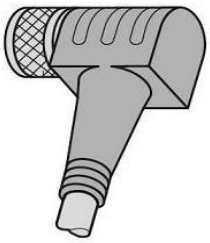
MOT-AP-S-060-013-056-K-C-AAAM				
encoder	**- cable Ø: 8,5 mm / bending radius moved < 10m travel distance: min. 6,8 x d**			
-	TPE	CF11.02.04.02	no minimum order quantity	-

MOT-ST-...-C-…-C				
motor	**- cable Ø: 7 mm / bending radius moved < 10m travel distance: min. 12.5 x d**			
DLE904161278-3	TPE	CF880.07.05	3	straight
DLE904161278-5	TPE	CF880.07.05	5	straight
DLE904161278-10	TPE	CF880.07.05	10	straight
encoder	**- cable Ø: 7 mm / bending radius moved < 10m travel distance: min. 12.5 x d**			
DLE904184369-3	TPE	CF211.02.05.02	3	straight
DLE904184369-5	TPE	CF211.02.05.02	5	straight
DLE904184369-10	TPE	CF211.02.05.02	10	straight

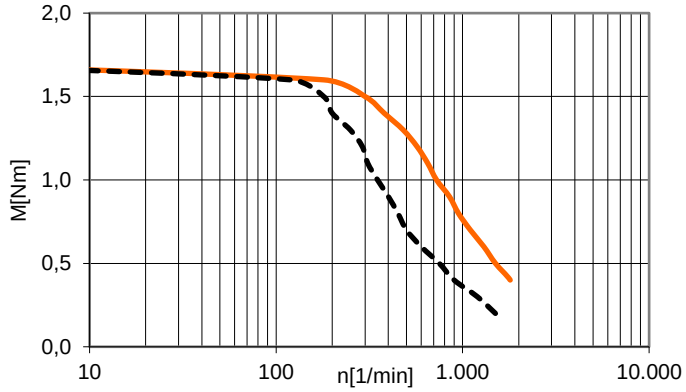
Note: By underwater applications should be used TPE cable.

plug straight

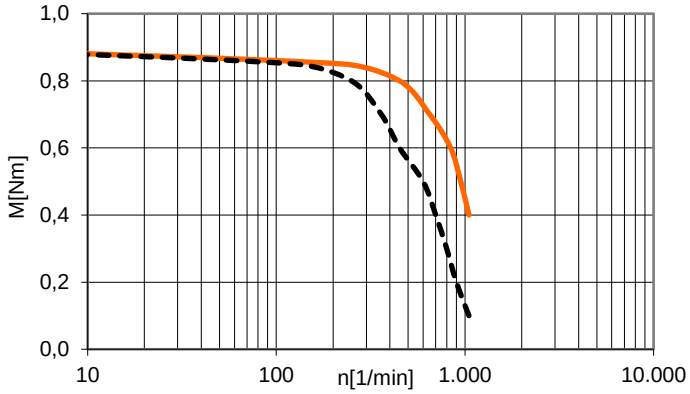
plug angulate



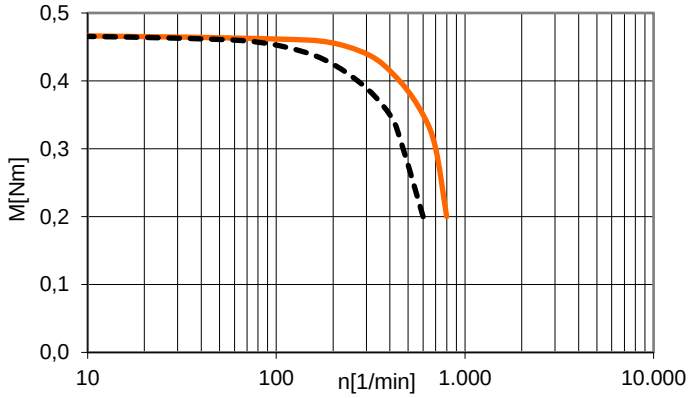
characteristic
flange dimension 56 (NEMA23)
MOT-AD-S-060-017-056-M-... (IP65 splash water)



flange dimension 56 (NEMA23)
MOT-AP-S-060-013-056-K-… (IP68 underwater)



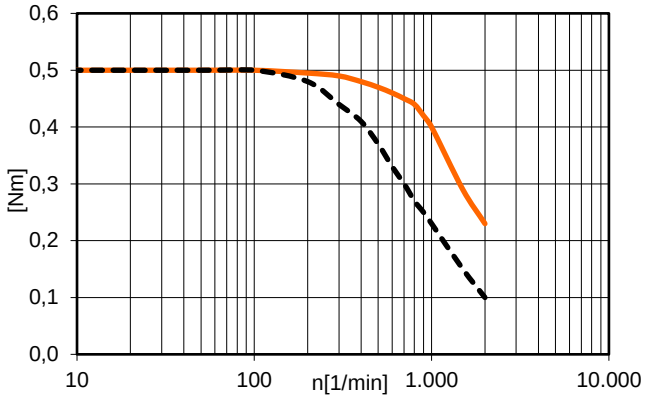
flange dimension 56 (NEMA23)
MOT-AP-S-060-007-056-L-A-AAAJ (IP00 vacuum)



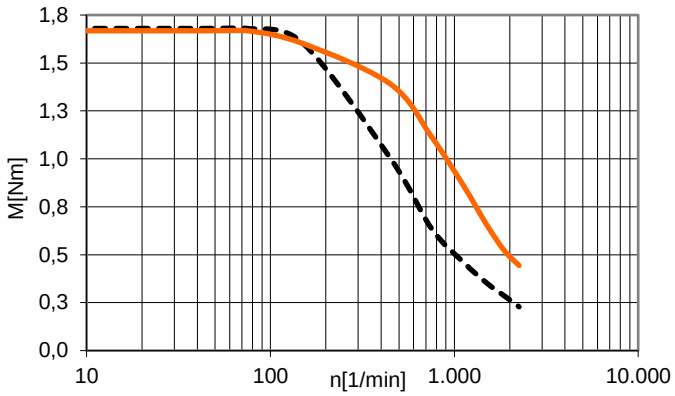
- - - - - - 24VDC ——— 48 VDC characteristic based on quarter step mode

characteristic

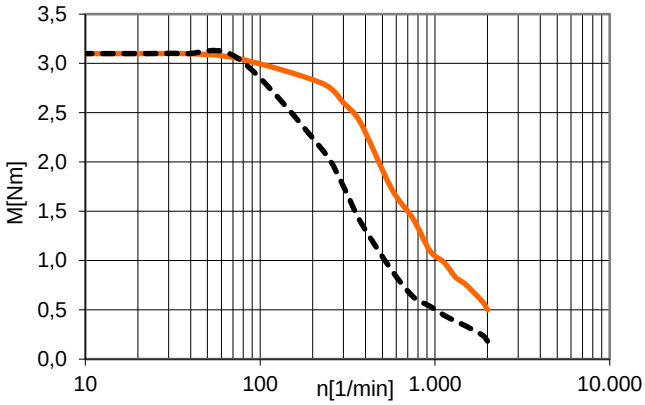
flange dimension 42 (NEMA17)
MOT-ST-042-C-...-C



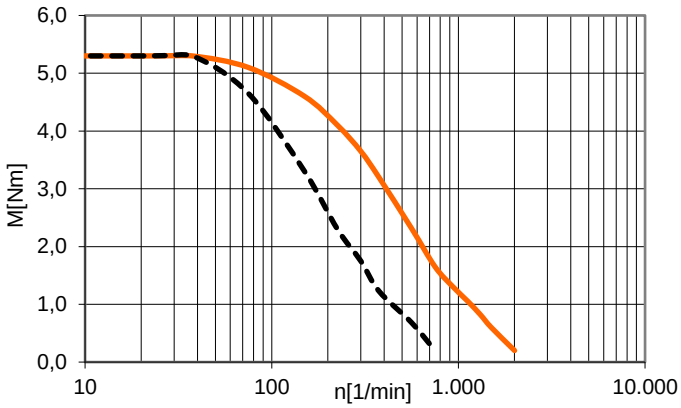
flange dimension 56 (NEMA23)
MOT-ST-056-C-...-C



flange dimension 60 (NEMA24)
MOT-ST-060-C-...-C



flange dimension 86 (NEMA34)
MOT-ST-086-C-...-C



- - - - - 24VDC ——— 48 VDC characteristic based on quarter step mode

MOT-AP-S-060-013-056-K-... (IP68 underwater)

+ = resistant
0 = conditionally resistant
- = not resistant

chemical resistance		
substance	residence time	
	1h	24h
formic acid (10%)	+	+
acetic acid (10%)	+	+
lactic acid (10%)	+	+
phosphoric acid (25%)	+	+
sulphur acid (25%)	+	+
hydrochloric acid (10%)	+	+
caustic soda (50%)	+	+
ammoniac (10%)	+	+
salinde solution (10%)	+	+

solvent-, fuel- and detergent resistance		
substance	residence time	
	1h	24h
ethanol	+	0
methylated spirit	+	0
isopropanol	+	+
ethyl acetate	0	0
butyl acetate	+	0
acetone	0	0
methylisobutylketone	+	0
white spirit	+	+
xylene	+	0
unleaded petrol	+	+
diesel oil	+	+
gear oil	+	+
hydraulic oil	+	+
brake fuid	+	+
cooling liquid (4%ig)	+	+
Sidolin (konz.)	+	+
Meister Proper (konz.)	+	+
Microzid Liquid (konz.)	+	+
Pril (1%ig)	+	+
chlorine blech Domestos	+	+