

Service instructions

SQ, SQE, SQ-N
Model B

MS 3, MSE 3
Model B

50/60 Hz
1~

Table of contents

1. Type identification 2
1.1 Nameplates 2
1.2 Type keys 5
2. Torques and lubricants 6
3. Service tools 7
3.1 Special tools 7
3.2 Standard tools 7
3.3 Torque tools 7
4. Dismantling and assembly 8
4.1 General 8
4.2 Separating and connecting pump and motor 9
4.3 Replacement of hydraulic parts 10
4.4 Checking the motor 11
4.5 Filling of motor liquid 13
5. Order of assembly 14
6. Test specifications 18

1. Type identification

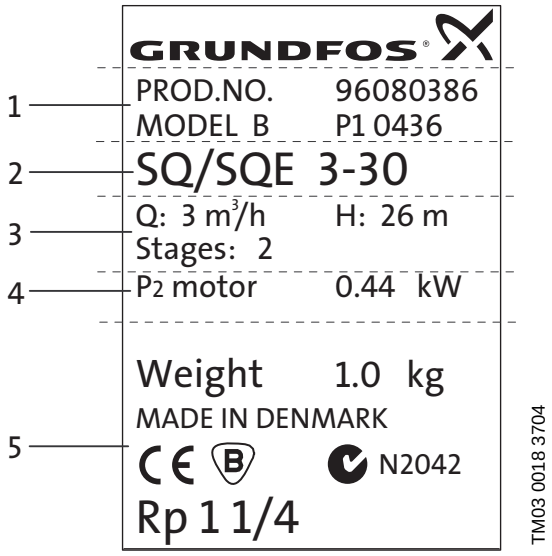
This section shows the nameplates, the type keys and the codes that can appear in the variant code.

1.1 Nameplates

1.1.1 Nameplate, pump

The pump nameplate is engraved into the pump sleeve.

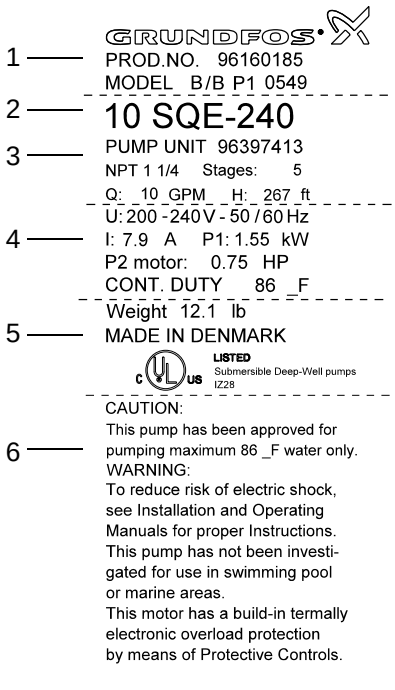
Example of nameplate, Europe, S-AMREG, APREG, Japan, Australia



Key to nameplate

Pos.	Code	Description
1	PROD.NO. 96080386	Product number
	MODEL B	Pump generation
	P1 0436	Production code - Bjerringbro (P1) + year/week code
2	SQ/SQE 3-30	Type designation, see 1.2.1 Type key, pump
3	Q: 3 m³/h	Flow (Q) **3** [m³/h]
	H: 26 m	Head (H) **26** [m]
	Stages: 2	Number of stages **2**
4	P2 motor 0.44 kW	Required input power pump **0.44** [kW]
5	Weight 1.0 kg	Pump net weight in kg
	MADE IN DENMARK	Country of origin: Denmark
		Misc. marks of approval: CE etc.
	Rp 1 1/4	Type and size of connecting thread

Example of nameplate, N-AMREG

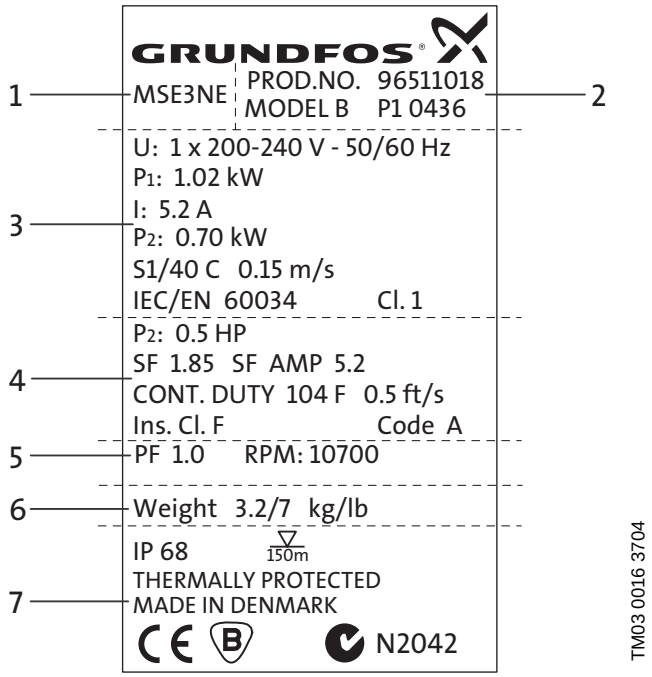


Key to nameplate:

Pos.	Code	Description
1	PROD. NO. 96160185	Product number
	MODEL B/B	Pump/motor generation
	P1 0549	Production code - Bjerringbro (P1) + year/week code
2	10 SQE - 240	Type designation, see 1.2.1 Type key, pump
3	Pump unit 96397413	
	NPT 1 ¼	Type and size of connecting thread
	Stages: 5	Number of stages: 5
	Q: 10 GPM	Flow (Q) 10 [GPM]
	H: 267 ft	Head (H) 267 [ft]
4	U: 200-240 V - 50/60 HZ	Supply Voltage and frequenc
	I: 7.9 A	Current consumption
	P1: 1.55 kW	Required input power motor in kW
	P2 motor 0.75 HP	Required input power pump (P2) in hp
	CONT. DUTY 86°F	
5	Weight 12.1 lb	Pump net weight in pounds
	MADE IN DENMARK	Country of origin: Denmark
		Misc. marks of approval: UL etc.
6	CAUTION: WARNING:	Various warnings

1.1.2 Nameplate, motor

The motor nameplate is engraved into the motor sleeve.



Key to nameplate, motor

Pos.	Code	Description
1	MSE3NE	Type designation, see 1.2.2 Type key, motor
2	PROD.NO. 96511018	Product number
	MODEL B	Motor generation
	P1 0436	Production code – Bjerringbro (P1) + year/week code
3	**IEC data**	
	U: 1x200-240 V - 50/60 Hz	Required electricity supply [V]
	P1: 1.02 kW	Input power [kW]
	I: 5.2 A	Input current [A]
	P2: 0.7 kW	Output power [kW].
	S1/40C 0.15 m/s IEC/EN 60034 Cl. 1	Continuous operation up to 40°C, min. flow velocity past the motor in m/s. Standard: IEC/EN 60034.
4	**N-AMREG data**	
	P2 0.5 HP	Output power (P2) in horse power
	SF 1.85 SF AMP 5.2	Service factor + max. ampere for a given SF
	CONT. DUTY 104F 0.5 ft/s	Suitable for continuous operation at 104°F and flow of 0.5 ft/s
	Ins. CL. F Code A	Insulation class F. Start-kVA per hp
5	PF 1.0 RPM 10700	Power factor = 1. Rated speed 10,700 rpm
6	Weight 3.2/7 kg/lb	Motor net weight in kg and pounds
7	IP 68 $\frac{\nabla}{150\ m}$	Enclosure class: IP 68. Max installation depth: 150 m.
	THERMALLY PROTECTED	Temperature sensor built into the electronic unit
	MADE IN DENMARK	Country of origin: Denmark
		Misc. marks of approval: CE, etc.

1.2 Type keys

1.2.1 Type key, pump

Pump type key, S-AMREG, APREG, Japan, Australia

Example	**SQE**	**2 -**	**35**	**N**
Type range: • SQ = Basic version, i.e. without communication. • SQE = Electronically controllable pump offering possibility of communication via CU 300 and CU 301.				
Rated flow rate in m^3/h.				
Head in m at rated flow. **Note:** Head is an approximated value.				
Material code: • Blank = Stainless steel DIN W.-Nr. 1.4301 - AISI 304. • N = Stainless steel DIN W.-Nr. 1.4401 - AISI 316.				

Pump type key, N-AMREG

Example	**10**	**SQE -**	**140**	**N**
Rated flow in US GPM.				
Type range: • SQ = Basic version, i.e. without communication. • SQE = Electronically controllable pump offering possibility of communication via CU 300 and CU 301.				
Head in ft at rated flow. **Note:** Head is an approximated value.				
Material code: • Blank = Stainless steel DIN W.-Nr. 1.4301 - AISI 304. • N = Stainless steel DIN W.-Nr. 1.4401 - AISI 316.				

1.2.2 Type key, motor

Example	**MSE**	**3 -**	**N**
Type range: • MS = Basic version, i.e. without communication. • MSE = Electronically controllable pump offering possibility of communication via CU 300 and CU 301.			
Motor diameter: 3”.			
Material code: • Blank = Stainless steel DIN W.-Nr. 1.4301 - AISI 304. • N = Stainless steel DIN W.-Nr. 1.4401 - AISI 316.			

2. Torques and lubricants

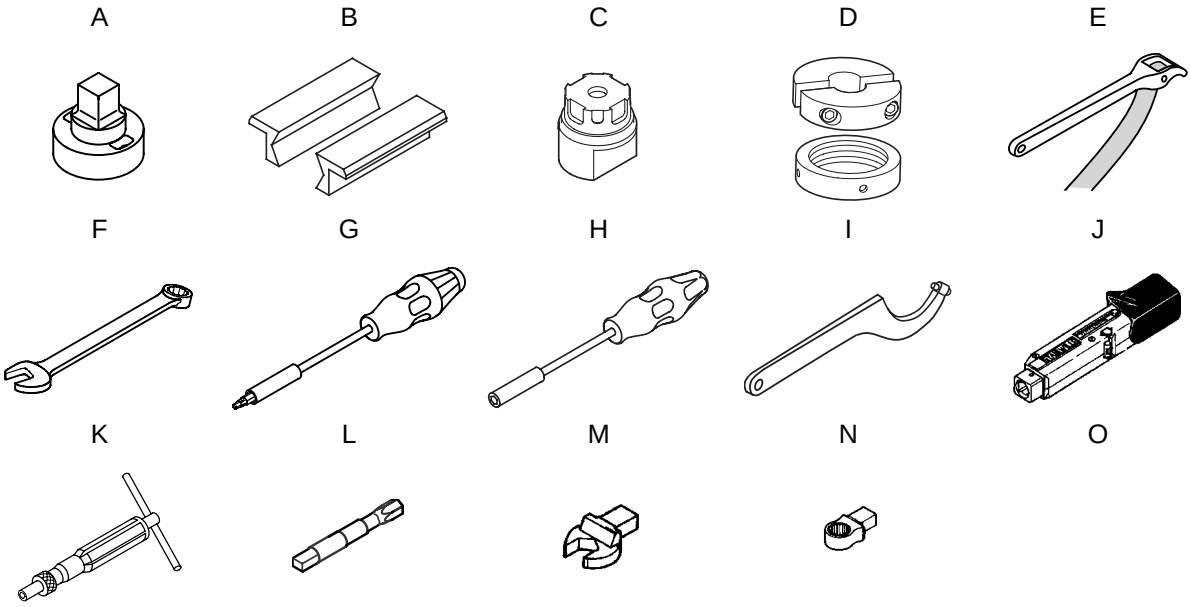
This section shows the parts and nuts that must be tightened to a certain torque and the lubricants to be used.

Pos.	Description	Number	Torque [Nm]	Lubricant
1a	Discharge chamber	1	150	Unisilkon
220	End cover with cable	1		Unisilkon
225	Top cover *)	1	15±5	Unisilkon
232	Lip seal ring	1		Unisilkon
250	Screw	4	$1.0^{+0.5}$	
	Pump	1	55	

Grease, type Unisilkon, L 641, 5 g, part number 96037562.

*) It is not possible to do service on motors produced after week 6, 2006. It is only possible to dismantle them for Analysing.

3. Service tools



3.1 Special tools

Pos.	Description	For pos.	Additional information	Part no.
A	Key for discharge chamber	1a		00SV0064
B	Protective clamps			00SV0412
C	Fitting tool for cone for pressure equalization	16-64-87		00SV2076
D	Puller for metal top [2])	-		96617759

3.2 Standard tools

Pos.	Description	For pos.	Additional information	Part no.
E	Band pipe wrench	55		00SV0853
F	Ring/open-end spanner [1])	225	27 mm	00SV0084
G	Screwdriver (torx)	18b	T20	00SV0066
H	Nut driver with socket	250		00SV0065
I	Hook spanner [2])	D		00SV0241

3.3 Torque tools

Pos.	Description	For pos.	Additional information	Part no.
J	Torque wrench		40-200 Nm 14x18	00SV0400
K	Torque screwdriver	pos. L	1-6 Nm 1/4"	00SV0438
L	Adapter for torque screwdriver	pos. G	1/4" hexagon to 1/4"square	00SV0437
M	Open-end insert tool	pos. K	24 mm 14x18	00SV0624
N	Ring insert tool [1])	pos. K	27 mm 14x18	00SV0527

[1]) Used only in connection with service operations on motors produced before week 6, 2006.
[2]) Used only in connection with service operations on motors produced after week 5, 2006.

4. Dismantling and assembly

4.1 General

When the pump has been pulled out, possibly because it was running at reduced performance, it is important both to repair the pump and to check the submersible motor, please follow the instructions in the following sections.
Position numbers of parts (digits) refer to exploded views, sectional drawings and parts lists; position numbers of tools (letters) refer to section 3. Service tools.

4.1.1 Before dismantling

- Disconnect the electricity supply to the motor.

4.1.2 During dismantling

- When loosening the pump from the motor and from the discharge chamber, take care to apply counterpressure to the pump, see *Fig. 1.* This will prevent the pump or pump parts from being damaged, bent or twisted.

4.1.3 Before assembly

- Clean and check all parts, especially the shaft with rotor due to magnetism. Citric acid is recommended for decalcifying.
- Check all parts for fractures and wear.
- Order the necessary service kits and/or parts.
- Replace defective parts by new parts.

4.1.4 During assembly

- Lubricate and/or tighten threads and rubber parts according to section 2. Torques and lubricants.
- When tightening the discharge chamber to the pump and the pump to the motor, take care to apply counterpressure to the pump, see *Fig. 1.* This will prevent the pump or pump parts from being damaged, bent or twisted.
- Before connecting the pump to the motor, fill the motor with GRUNDFOS motor liquid SML 2, see section 4.5 Filling of motor liquid.

4.1.5 After assembly

- The head and flow should be tested according to the test specifications, see section 6. Test specifications

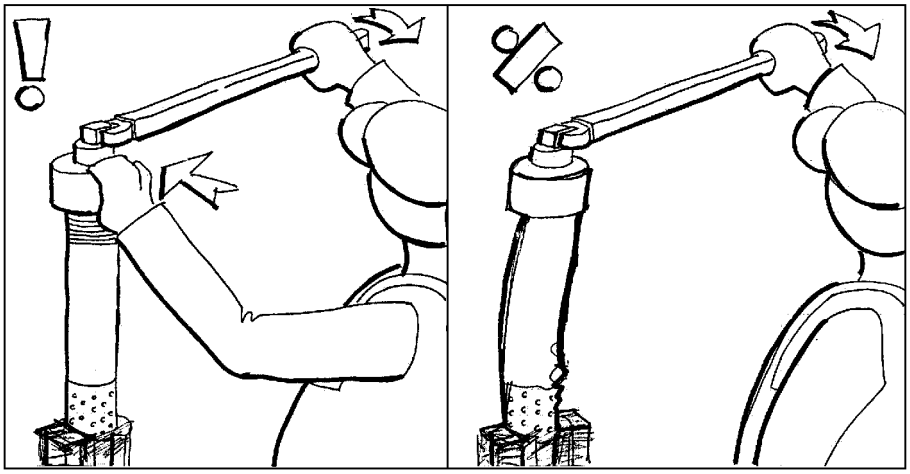
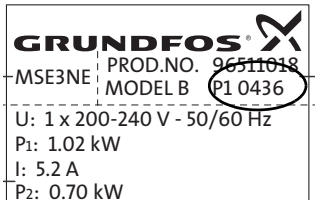


Fig. 1. Apply counterpressure to the pump, when loosening the pump.

4.2 Separating and connecting pump and motor

4.2.1 Dismantling



1. Slacken the screw (pos. 18b) and remove it together with the cable guard pos. 18.
2. If the motor is intact, the cable need not be removed. If the motor is defective, remove the Screws (pos. 250) and pull the end cover with cable and socket out of the motor.
3. Place the motor in a vice, using the two *protective clamps* pos. B.
   Tighten only on the "A"-marked end of the motor according to table Fig. 3..
   NOTE: Do not tighten "L"-marked part of the motor due to lack of support.

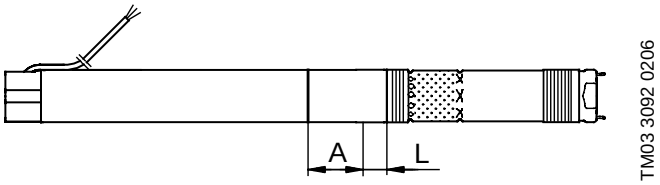


Fig. 2. Tighten area

Motor (P2) [kW]	A mm	L mm
0.70	100	64
1.15	136	82
1.68-1.85	136	46

Fig. 3. Tighten area distance

4. Place a *Band pipe wrench* pos. E on the upper pump thread and loosen the pump by max. ½ turn (right-hand thread). *Do not remove the pump from the motor.*
5. Slacken the vice. Stand the motor with pump upright with the motor uppermost and tighten the two clamping faces of the discharge chamber in the vice.
6. Place the band pipe wrench on the pump thread close to the motor and loosen the pump (right-hand thread).
7. Lift the motor with pump off the vice and place it on a plane surface.
8. Screw the pump off the motor.

4.2.2 Assembly

1. Place the motor in a vice, using the two *Protective clamps* pos. B.
   Tighten only on the "A"-marked end of the motor according to table Fig. 3..
2. Pull the pump shaft a little out of the pump (approx. corresponding to the length of the coupling).
3. Apply a thin layer of grease to the spline inside the coupling and the thread on the motor.
4. Hold the coupling with your fingers and press the coupling home on the motor shaft.
5. Screw the pump home on the motor.
6. Turn motor and pump to a vertical position with the pump upwards and tighten the vice around the thread below the suction strainer.
7. Using the *Key for discharge chamber* pos. A, the *Open-end insert tool* pos. M and the *Torque wrench*- pos. J tighten the discharge chamber to the sleeve.
8. Turn motor and pump to a horisontal position and place them in a vice, using the two *Protective clamps* pos. B, see Fig. 2.Tighten area.
9. Using the *Key for discharge chamber* pos. A, the *Open-end insert tool* pos. M and the *Torque wrench* pos. J tighten the pump to the motor.
10. Clean and apply a thin layer of grease to the end cover.

11. Push the end cover into the motor. Fit and tighten the screws pos. 250 using the *Torque screwdriver* pos. K and the bit torx T20 from service tool pos. G .
12. Place the motor cable along the motor and the pump so that it lies flat.
13. Fit the cable guard over the cable. The two tabs of the cable guard must engage with the upper edge of the pump sleeve. Fit the screw 18b and tighten it.

4.3 Replacement of hydraulic parts

4.3.1 Dismantling

1. Separate the pump from the motor, see section 4.2 Separating and connecting pump and motor.
2. Screw the discharge chamber out of the pump sleeve.
3. Shake the pump parts gently out of the top of the pump sleeve, and pull the pump shaft complete pos. 16 down and out of the pump sleeve.
   If the pump parts are stuck, remove the cone for pressure equalization pos. 87.
4. Remove the cone by pressing the four projections (locks) on the cone that engage with the holes in the pump sleeve at the same time as the cone is pressed down and out of the pump sleeve.
5. Press the parts out through *the top* of the pump sleeve using a punch.
6. If the parts of the valve casing complete, see “Parts list”, are defective, replace these parts. Prise the retaining ring pos. 7a out of the recess of the discharge chamber pos. 1a and press the parts down and out of the discharge chamber.

4.3.2 Assembly

1. Assemble the chamber stack.
   - Before assembling the chamber stack, assemble the chamber parts into a unit: chamber complete, see *Fig. 4.*.
     The chamber bottom pos. 9c can be accidentally separated, and if so, assemble it before assembling the chamber. The neck ring retainer should be pressed home in the chamber bottom.
     In SQ 1, 2 and 3, make sure that the guide vanes pos. 32 engage with the bottom of the chamber.

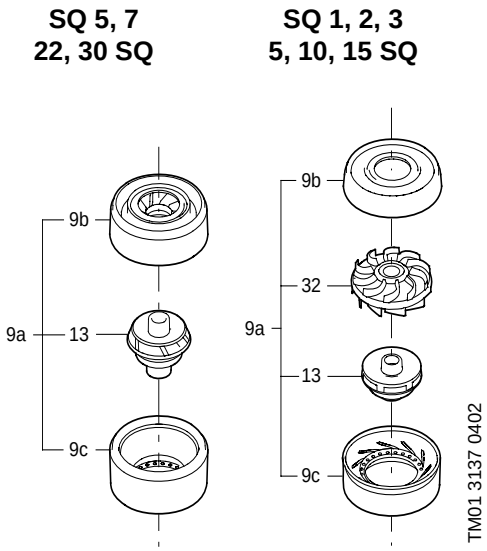


Fig. 4. Assembly of chamber

   - Fit the ring pos. 14a on the inlet part. Then place inlet part complete pos. 14 on a plane surface.
   - Further assembly until the last chamber, see section 5. Order of assembly.
2. Fit the sleeve.
   - Carefully turn the chamber stack so that the inlet part is pointing upwards.
   - Turn the sleeve pos. 55 with the suction strainer upwards and carefully place it over the chamber stack.
   - Pull the sleeve with chamber stack so far out over the edge of the work top that the chamber stack can be pushed home in the sleeve by hand.
   - Turn the sleeve with chamber stack so the suction strainer is pointing downwards.
3. Fit the valve and discharge chamber.
   - Place the valve casing complete on a plane surface with the bearing pos. 6 downwards.

- Lubricate the O-ring pos. 1d with grease and fit it in the outside recess of the valve casing.
- Press the discharge chamber pos. 1a over the valve casing. Turn the discharge chamber and fit the retaining ring pos. 7a in the recess of the discharge chamber.
- Grease the discharge chamber with valve casing complete and screw it into the top of the sleeve.

4. Fit the pump shaft complete.
   - Grease the lip seal ring pos. 86.
   - Fit the pump shaft pos. 16 into the cone for pressure equalization complete pos. 87.
     Take care not to damage the lip seal ring pos. 86.
   - Turn the priming screw pos. 64 with the cylindrical part (without screw) upwards and fit it on the shaft.
   - Place the cone for pressure equalization complete with shaft and priming screw on *Fitting tool for cone for pressure equalization* pos. C. Then press sleeve with chamber stack down over the cone.
     Make sure that the four projections of the cone engage with the holes in the sleeve.
   - If necessary, turn the shaft till the splines engage with the impellers.

4.4 Checking the motor

It is not possible to dismantle motors produced after week 5, 2006
It is only possible to dismantle the motor for analysis, see 4.4.3 Analysing motors produced after week 5, 2006.

4.4.1 Dismantling

1. Place the motor in a vice, using the two *protective clamps* pos. B.
   Tighten only on the "A"-marked end of the motor according to table Fig. 3.Tighten area distance.
   NOTE: Do not tighten "L"-marked part of the motor due to lack of support.

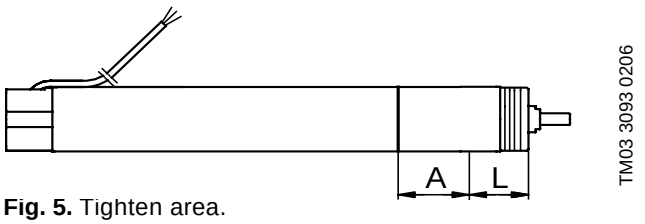


Fig. 5. Tighten area.

Motor (P2) [kW]	A mm	L mm
0.70	120	84
1.15	156	102
1.68-1.85	156	66

Fig. 6. Tighten area distance.

2. Prise off the filling plug pos. 222a.
   Please note that the motor is full of liquid.
3. Screw the top cover (right-hand thread) out of the motor using the ring of the Ring/open-end spanner 1) pos. F.
4. Due to the powerful magnetism of the shaft with rotor, hold the splined shaft end firmly and pull the shaft with rotor and upper radial bearing pos. 205 out of the motor.
   The thrust bearing pos. 203 may come out together with the shaft with rotor.
   Check if the thrust bearing pos. 203 is in the motor.

4.4.2 Assembly

1. Fit the thrust bearing pos. 203 with the sliding surface uppermost carefully into the motor.
2. Turn the thrust bearing until its three dogs engage with the three notches at the bottom of the motor.
3. Fit the stop ring pos. 202a on the shaft with rotor with the sliding surface uppermost.
4. Turn the stop ring until the driving dogs engage with the shaft.
5. Hold the splined shaft end firmly due to magnetism and fit the shaft with rotor pos. 202 carefully into the motor. The shaft with rotor must engage with the thrust bearing.
6. Check the shaft height, see Fig. 7.Motor shaft height.

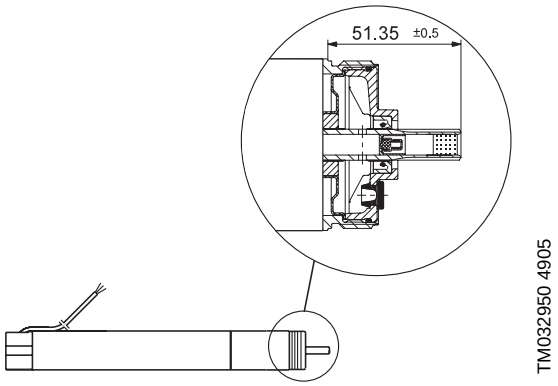


Fig. 7. Motor shaft height

7. Fit the upper radial bearing pos. 205 carefully on the shaft with rotor and press it home in the recess of the motor.
8. Apply a thin layer of grease to the O-ring pos. 224 and the lip seal ring pos. 232.
9. Tighten the top cover pos. 225 into the stator using the *Ring insert tool 1)* pos. N and the *Torque wrench* pos. J.
   Make sure that the cover is under the top of the motor, see Fig. 8., and that the axial play is between 0.3 and 1.3 mm.

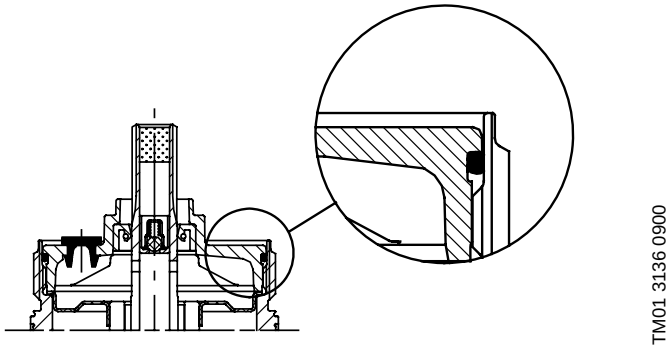


Fig. 8. *Make sure that the cover is under the top of the motor*

10. Fill the motor with liquid, see section 4.5 Filling of motor liquid.

4.4.3 Analysing motors produced after week 5, 2006

1. Place the motor in a vice with the shaft end upwards.
2. Lubricate the thread of the motor with oil.
3. Screw the brass nut on the motor until the upper edge of the nut is flush with the top of the motor.
4. Fit the split cone, and tighten the screws.
   Note: The split cone conical internally.
5. Tighten the nut against the split cone using the hook spanner (pos. I), and pull off the motor top.
6. Remove the motor top including the split cone when loose.
7. Unscrew the nut, and remove the motor from the vice.
8. Pour the motor liquid into a container. Make sure the rotor does not drop out.

4.5 Filling of motor liquid

1. Place the motor in vertical position with an inclination of approx. 10°.
2. Remove the filling plug using a screwdriver or a similar tool.
3. Inject motor liquid into the motor with a filling syringe or the like.
4. To allow possible air to escape, move the motor from side to side.
5. Refit the filling plug and make sure that it is tight.
6. The motor is now ready for installation. Fit the pump to the motor, see section 4.2.2 Assembly.

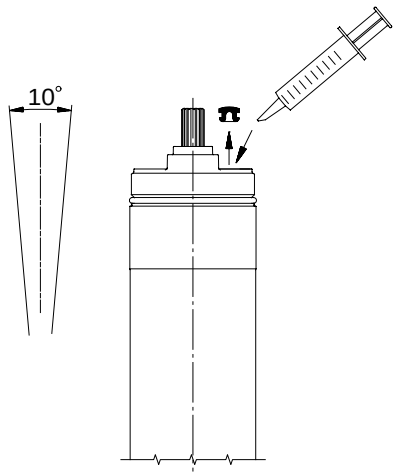


Fig. 9. Max tilt angel af the motor, when filling in motor liquid.

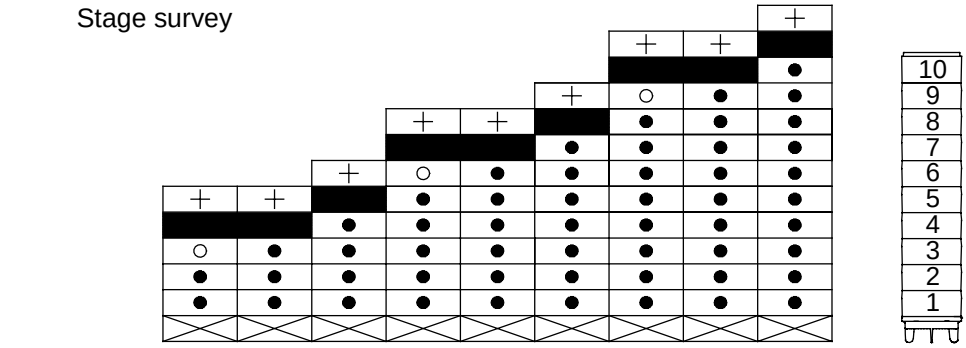
5. Order of assembly

1. Determine pump type and stage variant. Find the pump in the relevant stage survey table.
2. Find the components of each stage in the symbol survey.

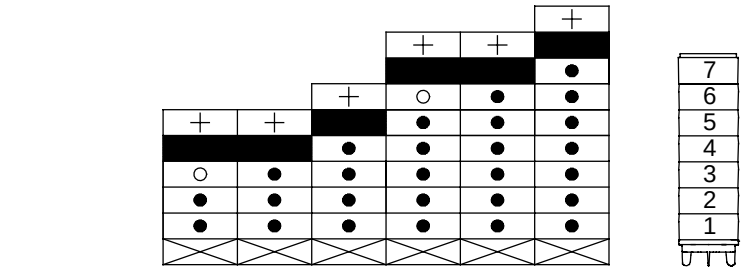
Example:
SQ/SQE 1-35(N)
5 SQ(N)/SQE 90

1 x = pos. 1a
2 x = pos. 9a
1 x = pos. 4a **See drawing on page 16**
1 x = pos. 6, 7a, 1d, 1, 3, 2, 39, 70
1 x = pos. 14

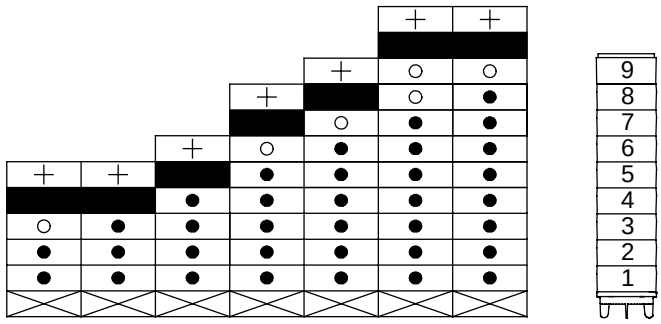
Stage survey



SQ / SQE 1 -	35	50	65	80	95	110	125	140	155
5 SQ / SQE	90	140	180	230	270	320	360	410	450



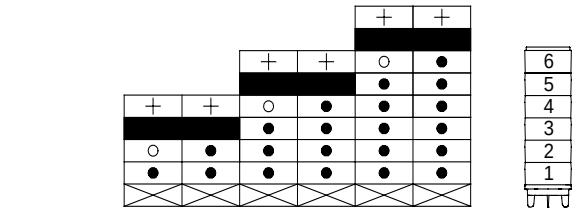
SQ / SQE 2 -	35	55	70	85	100	115
10 SQ / SQE	110	160	200	240	290	330



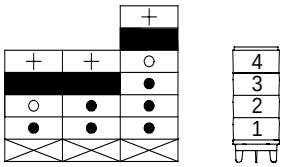
SQ / SQE 3 -	30	40	55	65	80	95	105
15 SQ / SQE	70	110	150	180	220	250	290

TM01 3068 0402

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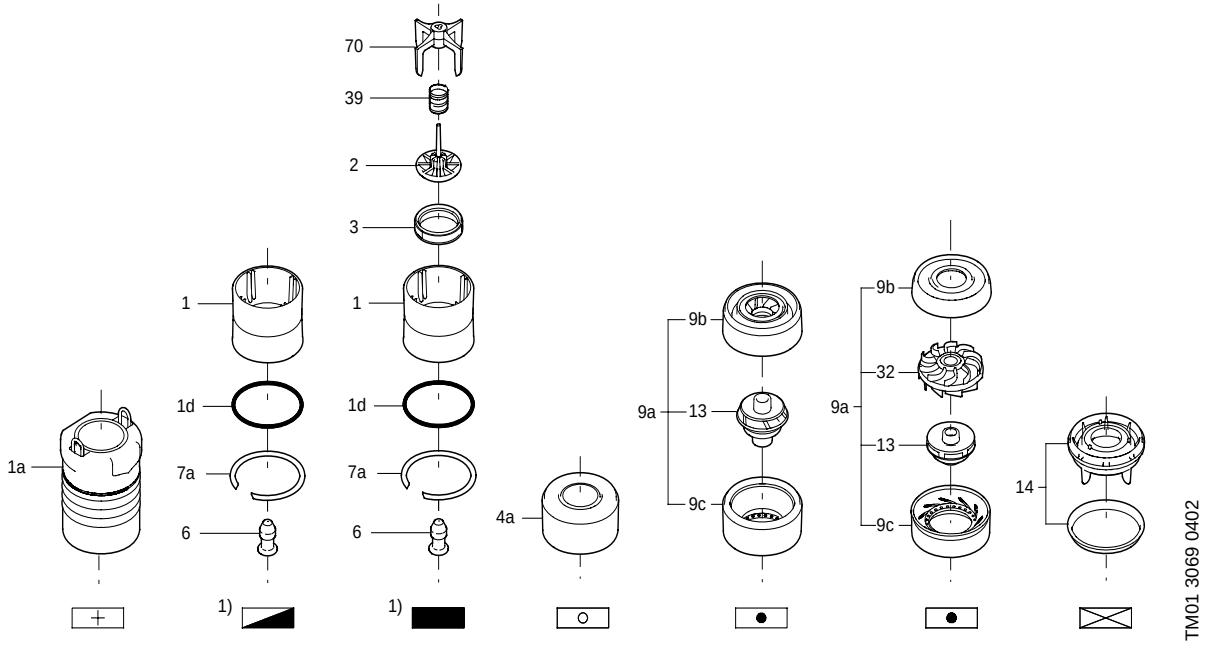


SQ / SQE 5 - 22	15	25	35	50	60	70
SQ / SQE	40	80	120	160	190	220



SQ / SQE 7 - 30	15	30	40
SQ / SQE	40	90	130

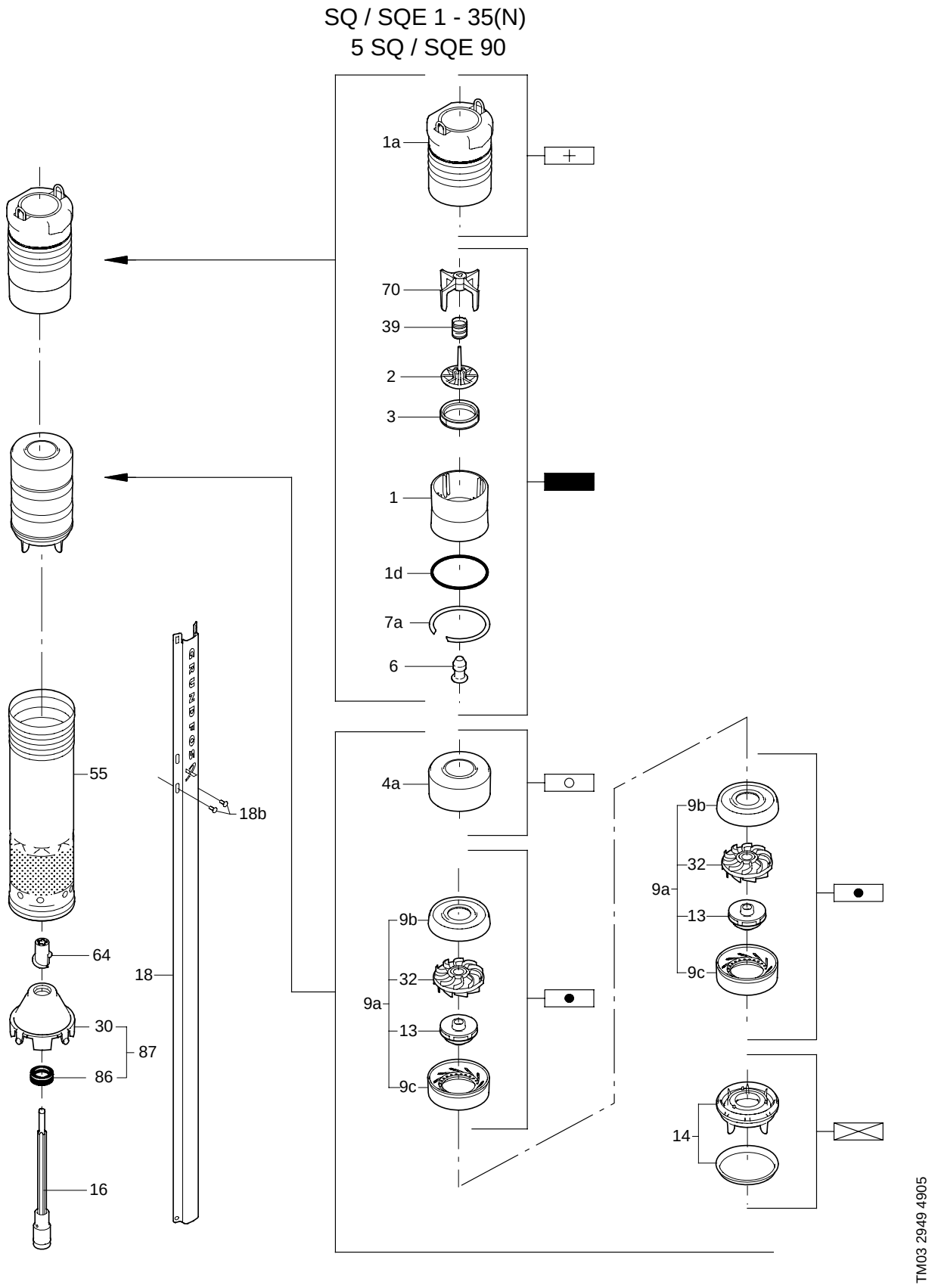
Symbol survey



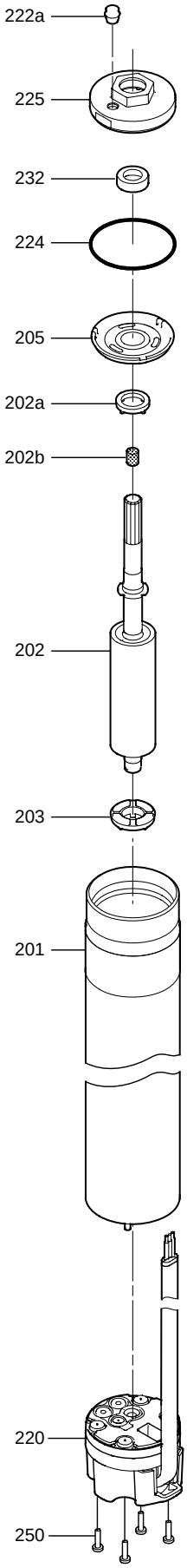
Order of assembly

1)In case the pump has no valve (Austria), symbol ◢ is used instead of ■.

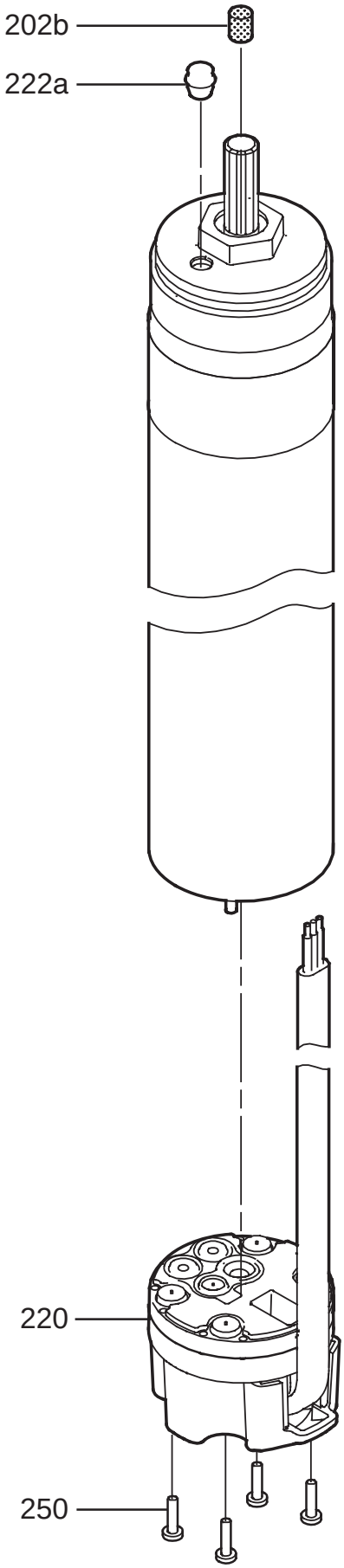
Example of order of assembly



Motor drawing



Model B produced before week 6, 2006



Model B produced after week 5, 2006

TM01 2016 1400, TM03 8212 0807

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6. Test specifications

SQ / SQE 1

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ1-35	2	0	43	46	50	590	5.10	580	2.50
5-SQ-90		1	31	34	36				
SQ1-50	3	0	65	70	76	810	7.00	780	3.30
5-SQ-140		1	48	53	56				
SQ1-65	4	0	87	94	101	1050	9.00	1000	4.30
5-SQ-180		1	65	71	74				
SQ1-80	5	0	110	118	127			1180	5.10
5-SQ-230		1	83	90	93				
SQ1-95	6	0	132	142	153			1380	6.00
5-SQ-270		1	100	108	112				
SQ1-110	7	0	154	166	178			1590	7.00
5-SQ-320		1	117	126	132				
SQ1-125	8	0	176	190	204			1820	7.80
5-SQ-360		1	134	144	152				
SQ1-140	9	0	198	214	229			2020	8.6
5-SQ-410		1	151	162	171				
SQ1-155	10	0	221	238	255			2190	9.6
5-SQ-450		1	168	181	190				

SQ / SQE 2

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ2-35	2	0	41	44	49	730	6.30	710	3.00
10-SQ-110		2	32	35	38				
SQ2-55	3	0	62	68	74	1050	9.0	1000	4.30
10-SQ-160		2	50	54	59				
SQ2-70	4	0	81	88	96			1270	5.50
10-SQ-200		2	66	71	78				
SQ2-85	5	0	100	109	119			1550	6.80
10-SQ-240		2	81	88	96				
SQ2-100	6	0	121	132	143			1860	8.00
10-SQ-290		2	100	108	118				
SQ2-115	7	0	143	155	168			2110	9.30
10-SQ-330		2	119	128	139				

Water temperature: 20-25°C

Max. testtime: 5 min

To be tested at nominal voltage an frequence

Flow adjusted to +/- 0.02

SQ / SQE 3

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ3-30	2	0	32	35	39	730	6.20	700	2.30
15-SQ-70		3	23	26	28				
SQ3-40	3	0	51	55	61	1040	8.90	990	4.20
15-SQ-110		3	38	42	46				
SQ3-55	4	0	67	73	80			1250	5.40
15-SQ-150		3	51	56	61				
SQ3-65	5	0	84	91	99			1520	6.70
15-SQ-180		3	63	70	76				
SQ3-80	6	0	101	110	119			1820	7.80
15-SQ-220		3	76	84	91				
SQ3-95	7	0	118	128	139			2090	9.00
15-SQ-250		3	89	98	107				
SQ3-105	8	0	135	146	159			2330	10.30
15-SQ-290		3	101	113	122				

SQ / SQE 5

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ5-15	1	0	16	18	20	540	4.70	530	2.30
22-SQ-40		5	9	11	13				
SQ5-25	2	0	33	36	40	960	8.20	920	3.90
22-SQ-80		5	20	23	26				
SQ5-35	3	0	49	53	59			1290	5.60
22-SQ-120		5	31	36	40				
SQ5-50	4	0	65	71	77			1700	7.30
22-SQ-160		5	43	48	53				
SQ5-60	5	0	81	88	96			2080	8.90
22-SQ-190		5	54	61	66				
SQ5-70	6	0	97	106	115			2430	10.70
22-SQ-220		5	65	73	81				

SQ / SQE 7

Type	Stage	Flow m3/h	Pressure min. mvs	Pressure nom. mvs	Pressure max. mvs	Nom. effect P1/115V	Amps 115V	Nom. effect P1/230V	Amps 230V
SQ7-15	1	0	19	20	23	750	6.40	730	3.10
30-SQ-40		7	6	9	12				
SQ7-30	2	0	38	42	46			1260	5.60
30-SQ-90		7	19	23	27				
SQ7-40	3	0	58	63	69			1810	7.80
30-SQ-130		7	32	37	42				
SQ7-55	4	0	72	78	84			2310	10.20
30-SQ-170		7	42	48	54				

Water temperature: 20-25°C

Max. testtime: 5 min

To be tested at nominal voltage an frequence

Flow adjusted to +/- 0.02