

Operating Instructions

BRINKMANN Immersion Pumps

STA/SAL401...608



BRINKMANN PUMPS, Inc.

47060 Cartier Drive
Wixom, MI 48393
USA

Phone: +1 248 926 9400
Fax.: +1 248 926 9405

www.brinkmannpumps.com
sales@brinkmannpumps.com

Subject to change without prior notice.

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Brinkmann Immersions Pumps of the Series STA/SAL401 ... 608

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1 Indication to the manual

This operating manual gives basic instructions which are to be observed during installation, operation and maintenance of the pump. It is therefore imperative that this manual be read by the responsible personnel and operator prior to assembly and commissioning. It is always to be kept available at the installation site.

1.1 Identification of safety instructions in the operating manual

Safety instructions given in this manual non-compliance with which would affect **safety** are identified by the following symbol



Safety sign according with ISO 3864 – B.3.1

or where **electrical safety** is involved, with:



Safety sign according with ISO 3864 – B.3.6

Where non-compliance with the safety instructions may cause a risk to the machine and it's function the word

ATTENTION

is inserted.

2 Description of the Product

2.1 General description of the pump

Pumps of this type are one or multi-stage rotary pumps where the impellers are fixed on the driving shaft extension. The pump shaft and motor shaft are interconnected by means of a shaft clamp. Pump and motor form a compact and space-saving unit. These pumps are fitted out with semi-open impellers, (and a suction screw SAL construction).

Vertically mounted pumps are equipped with a mounting flange. The pump end immerses into the tank and the motor extends vertically above the tank.

2.2 Intended use

The immersion pumps of the series STA/SAL are suitable for handling contaminated coolants within the limiting application in accordance with table 1. The pumps of SAL are suitable for handling extremely inflated fluids.

Limit of Application (Table 1)

Type	STA401...608	SAL401...608
Mediums	Coolant, cooling- and cutting-oils	
Kinetic viscosity of the medium	...200 SSU (...45 mm ² /s)	
Temperature of medium	30 ... 175 °F (0 ... 80 °C)	
Particle-size in the medium	0.28 Inches (7 mm) STA/SAL401...407 0.43 Inches (11 mm) STA/SAL601...608	
min. delivery volume	1% of Q max.	
Dry running	Dry running causes increased wear and should be avoided. During the test of the direction of rotation (< 30 s) permissible.	
Motor cycle time per hour	Motors less 4.0 HP (3 kW) max. 200 from 4.0 HP (3 kW) to 5.4 HP (4.0 kW) max. 40 from 6.7 HP (5 kW) to 14 HP (10.3 kW) max. 20	
Ambient temperature	104 °F (40 °C)	
Set-up altitude	3280 ft (1000 m)	

ATTENTION

The pumps are to be operated within their design limits. Applications outside of these limits are not approved. The manufacturer is not responsible for any damages resulting from use of the pumps in such applications.

2.3 Technical data

Type	Type	Max. del. pressure spec. weight 1		Max. del. volume		Height H Inches mm	Depth of immersion STA ¹⁾ h		Weight STA ²⁾		Power HP kW	Noise level STA ³⁾ dBA / 60 Hz
		PSI	bar	GPM	l/min		Inches	mm	lbs	kg		
STA401 S120	SAL401S140	18	1.25	108	400	13.1	4.72	120	47.4	21.5	1.3 0.98	65
200	220					334	7.87	200	49.6	22.5		
270	290					10.63	270	51.8	23.5			
350	370					13.78	350	54.0	24.5			
440	460					17.32	440	56.2	25.5			
550	570					21.65	550	60.6	27.5			
750	770					29.53	750	75.0	34.0			
900	920					35.43	900	79.4	36.0			
STA402 S170	SAL402S190	32	2.2	116	440	15.0	6.69	170	68.4	31.0	2.0 1.49	69
250	270					380	9.84	250	71.7	32.5		
320	340					12.59	320	73.9	33.5			
400	420					15.75	400	76.1	34.5			
490	510					19.29	490	78.3	35.5			
600	620					23.62	600	81.6	37.0			
800	820					31.50	800	97.0	44.0			
950	970					37.40	950	101.4	46.0			
STA403 S220	SAL403 S240	45	3.1	118	445	17.3	8.66	220	88.2	40	2.9 2.18	69
300	320					439	11.81	300	90.4	41		
370	390					14.57	370	92.6	42			
450	470					17.72	450	94.8	43			
540	560					21.26	540	97.0	44			
650	670					25.59	650	101.4	46			
850	870					33.46	850	114.7	52			
1000	1020					39.37	1000	121.3	55			
STA404 S270	SAL404 S290	64	4.4	120	460	17.3	10.63	270	97.0	44	3.9 2.94	69
350	370					439	13.78	350	99.2	45		
420	440					16.54	420	101.4	46			
500	520					19.69	500	105.8	48			
590	610					23.23	590	108.0	49			
700	720					27.56	700	112.5	51			
900	920					35.43	900	125.7	57			
1050	1070					41.34	1050	130.1	59			
STA405 S320	SAL405 S340	80	5.5	122	470	18.8	12.60	320	125.7	57	5.1 3.8	73
400	420					478	15.75	400	127.9	58		
470	490					18.50	470	130.1	59			
550	570					21.65	550	132.3	60			
640	660					25.20	640	134.5	61			
750	770					29.53	750	141.1	64			
950	970					37.40	950	154.4	70			
1100	1120					43.31	1100	158.8	72			
STA406 S370	SAL406 S390	95	6.6	125	475	18.8	14.57	370	130.1	59	6.1 4.55	73
450	470					478	17.72	450	134.5	61		
520	540					20.47	520	136.7	62			
600	620					23.62	600	138.9	63			
690	710					27.17	690	141.1	64			
800	820					31.50	800	145.5	66			
1000	1020					39.37	1000	161.0	73			
STA407 S420	SAL407 S440					110	7.6	126	480	20.0		
500	520	508	19.69	500	158.8					72		
570	590	22.44	570	161.0	73							
650	670	25.59	650	165	75							
740	760	29.13	740	168	76							
850	870	33.46	850	172	78							
STA430 S....	SAL430 S150	27	1.9	160	630	17.3	5.91	150	71.7	32.5	2.9 2.18	66
210	230					439	8.27	210	70.6	32		
280	300					11.02	280	72.8	33			
360	380					14.17	360	75.0	34			
450	470					17.72	450	77.2	35			
560	580					22.05	560	79.4	36			

Type	Type	Max. del. pressure spec. weight 1		Max. del. volume		Height H Inches mm	Depth of immersion STA ¹⁾ h		Weight STA ²⁾ g		Power HP kW	Noise level STA ³⁾ dBA / 60 Hz
		PSI	bar	GPM	l/min		Inches	mm	lbs	kg		
STA601 S130	SAL601 S150	20	1.4	125	480	14.2	5.12	130	50.7	23	1.7	66
210	230					361	8.27	210	52.9	24	1.27	
280	300						11.02	280	55.1	25		
360	380						14.17	360	57.3	26		
450	470						17.72	450	59.5	27		
560	580						22.05	560	63.9	29		
760	780						22.92	760	77.2	35		
910	930						35.83	910	79.4	36		
STA602 S200	SAL602 S220	38	2.6	140	555	17.3	7.68	195	86.0	39	3.4	69
280	300					439	10.83	275	88.2	40	2.55	
350	370						13.58	345	90.4	41		
430	450						16.73	425	92.6	42		
520	540						20.28	515	97.0	44		
630	650						24.61	625	101.4	46		
830	850						32.48	825	116.9	53		
1000	1020						39.17	995	119.1	54		
STA603 S260	SAL603 S280	56	3.8	150	560	18.8	10.24	260	116.9	53	5.1	73
340	360					478	13.39	340	119.1	54	3.8	
410	430						16.14	410	121.3	55		
490	510						19.29	490	123.5	56		
580	600						22.83	580	127.9	58		
690	710						27.17	690	130.1	59		
890	910						35.04	890	145.5	66		
1040	1060						40.94	1040	149.9	68		
STA604 S330	SAL604 S350	75	5.2	155	580	20.0	12.80	325	136.7	62	7.7	73
410	430					508	15.94	405	138.9	63	5.75	
480	500						18.70	475	143.3	65		
560	580						21.85	555	145.5	66		
650	670						25.39	645	147.7	67		
760	780						29.72	755	149.9	68		
960	980						37.60	955	165	75		
1110	1130						43.50	1105	170	77		
STA605 S390	SAL605 S410	94	6.4	158	620	20.0	15.35	390	143.3	65	8.4	73
470	490					508	18.50	470	145.5	66	6.3	
540	560						21.26	540	147.7	67		
620	640						24.41	620	149.9	68		
710	730						27.95	710	154.4	70		
820	840						32.28	820	158.8	72		
1020	1040						40.16	1020	172	78		
STA607 S520	SAL607 S540	131	9.1	165	630	23.1	20.47	520	225	102	11.5	
600	620					587	23.62	600	227	103	8.6	
670	690						26.38	670	229	104		
750	770						29.53	750	234	106		
840	860						33.07	840	236	107		
950	970						37.40	950	240	109		
STA608 S580	SAL608 S600	145	10	180	680	23.1	22.83	580	247	112	13.8	77
660	680					587	25.98	660	249	113	10.3	
730	750						28.74	730	251	114		
810	830						31.89	810	254	115		
900	920						35.43	900	256	116		
1010	1030						39.76	1010	262	119		

1) Depth of immersion SAL = h + 0.78 Inches (20 mm) ; 2) Weight SAL = g + 2.2 lbs (1 kg)

3) Noise emissions measured in accordance with DIN 45635 at a distance of 39.37 Inches (1 m).

The motor is surface-cooled and compliant with DIN IEC 34 and EN 60034 (protection degree IP 55).

3 Safety instructions

When operating the pump, the safety instructions contained in this manual, the relevant national accident prevention regulations and any other service and safety instructions issued by the plant operator are to be observed.

3.1 Hazards in the event of non-compliance with the safety instructions

Non-compliance with the safety instructions may produce a risk to the personnel as well as to the environment and the machine and results in a loss of any right to claim damages.

For example, non-compliance may involve the following hazards:

- Failure of important functions of the machines/plant
- Failure of specified procedures of maintenance and repair
- Exposure of people to electrical, mechanical and chemical hazards
- Endangering the environment due to hazardous substances being released

3.2 Unauthorized modes of operation



- Pump may not be used in potentially explosive environments!
- Pump and discharge piping are not designed to hold any weight and may not be used as a step ladder.

3.3 Remaining Risk



Risk of Injury!

Risk of squeezing or crushing body parts when installing or removing the pump exists. Proper and secured lifting tools must be used.

Risk of burns!

The pump must have cooled down sufficiently prior to commencing any repair, maintenance or installation.

3.4 Qualification and training of operating personnel

The personnel responsible for operation, maintenance, inspection and assembly must be adequately qualified. Scope of responsibility and supervision of the personnel must be exactly defined by the plant operator. If the staff does not have the necessary knowledge, they must be trained and instructed, which may be performed by the machine manufacturer or supplier on behalf of the plant operator. Moreover, the plant operator is to make sure that the contents of the operating manual are fully understood by the personnel.

3.5 Safety instructions relevant for operation

- If hot or cold machine components involve hazards, they must be guarded against accidental contact.
- Guards for moving parts (e.g. coupling) must not be removed from the machine while in operation.
- Any leakage of hazardous (e.g. explosive, toxic, hot) fluids (e.g. from the shaft seal) must be drained away so as to prevent any risk to persons or the environment. Statutory regulations are to be complied with.
- Hazards resulting from electricity are to be prevented (see for example, the VDE Specifications and the bye-laws of the local power supply utilities).
- The pumps' stability against falling over is not ensured unless it is properly mounted onto the tank.
- The female threads on the motor **MUST NOT** be used to lift the entire pump and motor assembly.

3.6 Safety instructions relevant for maintenance, inspection and assembly work

Any work on the machine shall only be performed when it is at a standstill, it being imperative that the procedure for shutting down the machine described in this manual be followed.

Pumps and pump units which convey hazardous media must be decontaminated.

On completion of work all safety and protective facilities must be re-installed and made operative again.

Prior to restarting the machine, the instructions listed under "Start up" are to be observed.

3.7 Signs on the pump

It is imperative that signs affixed to the machine, e.g.:

- arrow indicating the direction of rotation
- symbols indicating fluid connections

be observed and kept legible.

3.8 Unauthorized alterations and production of spare parts

Any modification may be made to the machine only after consultation with the manufacturer. Using spare parts and accessories authorized by the manufacturer is in the interest of safety. Use of other parts may exempt the manufacturer from any liability.

4 Transportation and Storage

Protect the pump against damage when transporting. The pumps may only be transported in a horizontal position and hooks or straps must be attached on the motor and pump end.

Do not use the pump shaft for connecting any transportation aids such as hooks or straps.

Pumps must be drained prior to their storage.

Store pump in dry and protected areas and protect it against penetration of foreign bodies.

Always store pump above the freezing point!

5 Installation and Connection

5.1 Mechanical installation

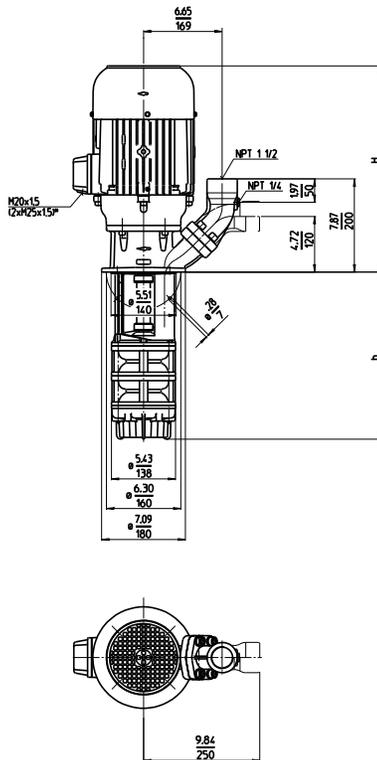
During any assembly or disassembly process the pumps must be secured against tipping through ropes for example at all times.

Pumps must be mounted securely. Piping, tank and pumps must be mounted without any tension.

The inlet is at the bottom of the immersed pump body. The distance between the inlet and the tank bottom must be so large that the inlet can not be blocked by deposits during longer shutdowns.

To obtain the full flow rate it is recommended to choose for the pipework the nominal bore diameter of the pumps cross section for connection. Therefore pipe bends should be used, not pipe angles!

The pipework must be qualified for occurring hydraulic pressure.



Dimensions in Inches (mm)

*) Dimensions up 11.5 HP (8.6 kW)

ATTENTION

Maximum tightening torque for piping connections is 110 ft. lbs. (150 Nm)!

When installed the space around the pump must be large enough to provide sufficient cooling of the motor.

Do not prop up the pressure line via the joining socket.



The pump must be mounted in that way that rotating parts under the cover of the coolant tank can not be touched!

5.2 Electric wiring



All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!

According to the European Standard EN809 a motor overload must be installed and properly set to the full load amps stated on the pump name plate.

It is the responsibility of the machine operator to decide whether or not an additional emergency switch must be installed.



Danger!

Risk of electric shock

Our asynchronous motors can optionally be fitted with temperature sensors in the form of triplet PTC thermistors, which are used for thermal monitoring of the motor windings. Please note that the temperature sensors meet the insulation requirements of basic insulation. The improper connection of the triplet PTC thermistors to evaluation units that do not have a protective function against overvoltage in the event of a fault can lead to voltages dangerous to the touch and electric shock.

Please check whether the evaluation units you intend to use are permissible for the electrical connection of the temperature sensors.

5.2.1 Circuit



Tension voltage and frequency must correspond with the shown specification on the nameplate.

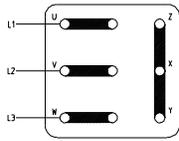
The pump must be wired so that a solid longterm electrical connection is ensured. Establish a solid ground connection.

The electrical wiring must be performed according to the wiring diagram shown inside the terminal box cover. (Please see above sample wiring diagrams)

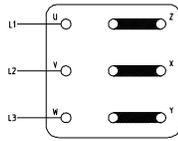
Wiring diagram e.g.

Voltage changing 1:2 YY / Y

e.g. 230 / 460 V, 60 Hz



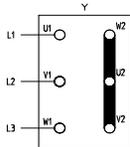
YY
Low Voltage



Y
High Voltage

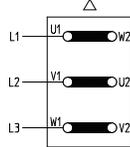
Circuit on request

Y (Star connection)
up to 7.4 HP
(5.5 kW)



Y 440 V – 480 V
60 Hz

Δ (Delta connection)
8, 8.7, 10.1, 12.1, 14.7, 17.4 HP
(6, 6.5, 7.5, 9, 11, 13 kW)

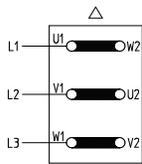


Δ 440 V – 480 V
60 Hz

Voltage changing Δ / Y.

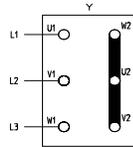
e. g. 220 V – 240 V / 380 V – 420 V, 50 Hz

Δ (Delta Connection)



Δ 220 V – 240 V,
50 Hz

Y (Star Connection)



Y 380 V – 420 V,
50 Hz

There may be no foreign objects such as dirt, particles or humidity inside the terminal board.

Mount terminal board cover to motor tight against dust and humidity and close up all unused wiring ports.

ATTENTION

When Variable Frequency Drives are used interfering signals might occur.

Non-sinus shaped supply voltage from a variable frequency drive might result in elevated motor temperatures.

6 Start-up / Shut-down

6.1 Start-up

ATTENTION

Switch off at the mains.

After connection the electrical wires, close the terminal box. Briefly start the motor (max. 30 sec.) and check the rotation according to the arrow on the top of the motor.

If the direction is incorrect change over two of the power leads.

6.2 Shut-down

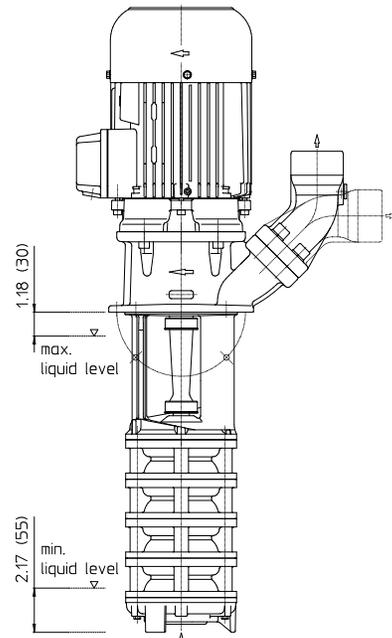
All service work must be carried out by qualified service personnel. Pump must be disconnected from the power source and all rotating parts must stand still. Reassure that pump is disconnected from power source and cannot be switched on. Verify that there is no voltage at the terminal board!

Open terminal box and disconnect the power leads. Empty out the pump.

7 Operation

Liquid level

According to the drawing shown below, the maximum liquid level must stay about 1.18 Inches (30 mm) below the mounting flange, also ensure that the minimal liquid level for the STA pump is 2.17 Inches (55 mm) before starting up the motor, for the SAL pump the suction hole of the pump body must be covered with liquid.



Dimensions in Inches (mm)



If the pump should lock up and cease, shut pump down (see 6.2) and disconnect from power supply. Pump must be uninstalled and removed from the system prior to its repair.

8 Servicing and Maintenance

ATTENTION

The surface of the motor must be kept free of dirt.

The motor shaft is spinning in permanently greased ball bearings (with special grease and increased bearing play) and does not require any special maintenance.

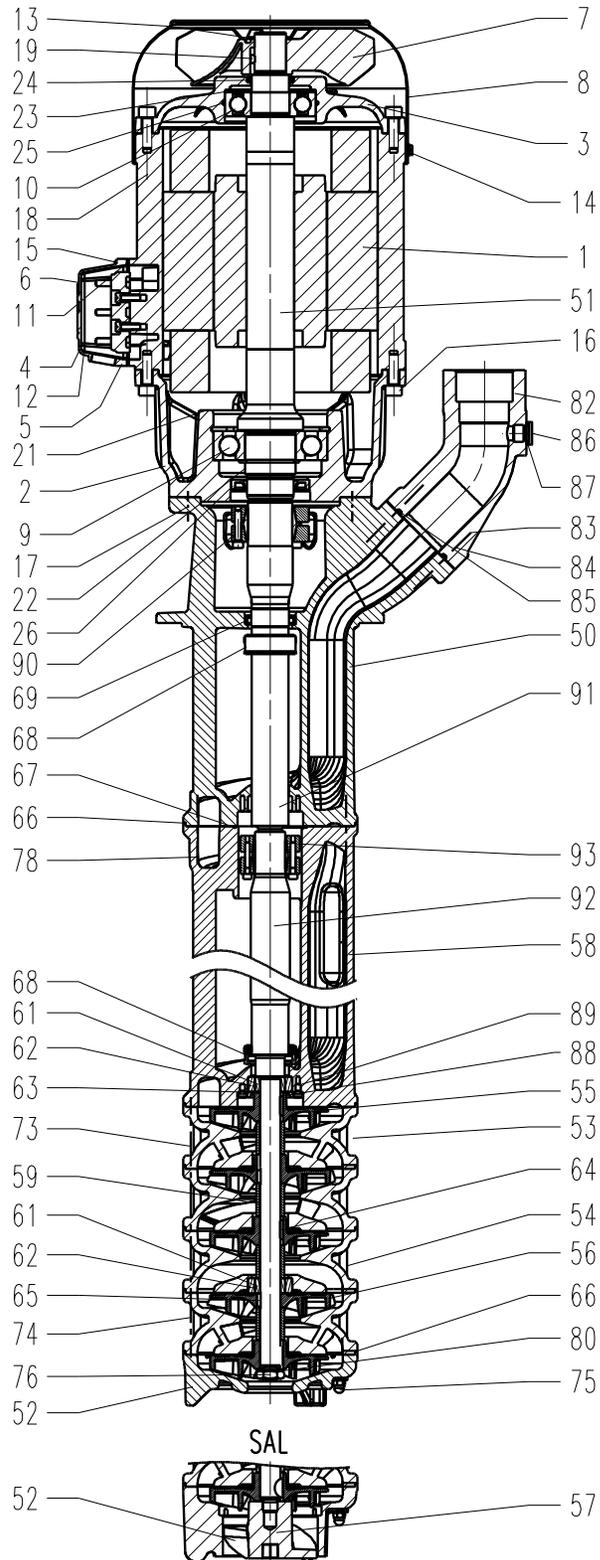
9 Troubleshooting Guide

Fault	Cause	Remedy
Motor does not start, no motor noise	At least two of the power supply leads have failed	Check fuses, terminals and supply leads .
	Overload has tripped	Inspect overload
Motor does not start, humming noise	One of the supply leads has failed	See above
	Impeller faulty Motor bearing faulty	Replace impeller Replace bearing
Overload trips	Pump locked up mechanically	Inspect pump hydraulics
	High on/of cycling frequency	Check application
Power consumption is too high	Wrong direction of rotation of impeller	See above
	Lime or other deposits mechanical friction	Clean pump mechanism repair pump
Motor overheats	High on/off cycling frequency	See above
	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
	Insufficient cooling	Check air flow at motor fan
Pump does not pump	liquid level too low	Fill up liquid
	Pump mechanism faulty	replace pump mechanism
	Pipe blocked	Clean pipe
Insufficient flow and pressure	Wrong direction of rotation of impeller	Change over two power supply leads
	Pump mechanism silted up	Clean pump mechanism
	Worn pump mechanism	Replace pump mechanism
Incorrect flow or pressure	Wrong power supply (voltage or cycles)	Power supply must correspond with name plate rating
Running noise/Vibration	Foreign objects in pump end	Remove foreign objects
	Impeller damaged	Replace impeller
	Bearing/Bushing broken	Replace bearing/bushing

10 Spare Parts

10.1 Spare Part List for the Immersion Pumps

of the Series STA/SAL401 ... 608



Item	Description	
1	Stator with terminal board	
2	Motor flange	
3	End shield	
4	Terminal box up to 8.4 HP	
5	Terminal box frame up 11.5 HP	
6	Terminal box cover up 11.5 HP	
7	Fan	
8	Fan cover	
9	Ball bearing	DIN 625
9	Ball bearing up 2.0...3.9 HP, up 11.5 HP	DIN 628
10	Ball bearing	DIN 625
11	Gasket	
12	Gasket up 11.5 HP	
13	Retaining ring up to 1.7 HP	
13	Retaining ring up 2.0 HP	DIN 471
14	Thread rolling screw up 2.0HP	DIN 7500
15	Slotted cheese head screw	DIN 84
16	Socket head cap screw up 2.0 HP	DIN 912
17	Socket head cap screw	DIN 912
18	Stud bolt with bond up to 1.7 HP	
19	Parallel pin	DIN 7
21	Retaining ring up to 8.4 HP	DIN 472
22	Retaining ring up to 8.4 HP	DIN 471
22	Bearing cover 11.5 HP (8.6 kW) and over	
(21.1)	Hexagon head screw 11.5 HP (8.6 kW)	DIN 931
(22)	Shaft nut 11.5 HP (8.6 kW) and over	
23	Compensation disk up 2.0 HP	
24	Shaft seal	
25	O-ring up 2.0 HP	
26	Shaft seal	
50	Pump body	
51	Shaft with rotor	
52	Inlet cover for STA	
52	Intake cover for SAL	
53	Pump plate up STA/SAL402, 602	
54	Pump plate with bearing bush up STA/SAL405, 604	
55	Impeller	
56	Impeller - bearing stage up STA/SAL405, 604	
57	Suction screw only for SAL	
58	Extension pump body up 21.65 Inches (550 mm) depth of immersion	
59	Distance liner up STA/SAL402, 602	
61	Running sleeve	
62	Bearing bush	
63	Distance plate	
64	Woodruff key	DIN 6888
65	Woodruff key short for bearing stage	
66	O-ring	
67	O-ring up 21.65 Inches (550 mm) depth of immersion	
68	Splash ring	
69	Shaft seal	
73	Hexagon head screw	DIN 931
74	Stud bolt up STA/SAL405...604	
75	Hexagon domed cap nut up STA/SAL405...604	DIN 1587
76	Hexagon thin nut STA	DIN 439
78	Socket head cap screw up 21.65 Inches (550 mm) depth of immersion	DIN 912
80	Washer STA	
82	Joining socket	
83	Socket head cap screw	DIN 912
84	Spring washer	DIN 7980
85	O-ring	
86	Screw plug	DIN 908

87	Sealing ring	DIN 7603
88	Serrated lock washer	
89	Flat head screw	DIN 7991
90	Shaft clamp	
91	Extension shaft up 21.65 Inches (550 mm) depth of immersion	
92	Insert shaft	
93	Shaft clamp up 21.65 Inches (550 mm) depth of immersion	

10.2 Indications to the spare part order

Spare parts are available from the supplier. Standard commercially available parts are to be purchased in accordance with the model type. The ordering of spare parts should contain the following details:

1. Pumptype

e.g. STA404S420

2. Pump No.

e.g. 08246000

The date of the construction year is a component of the pumps type number.

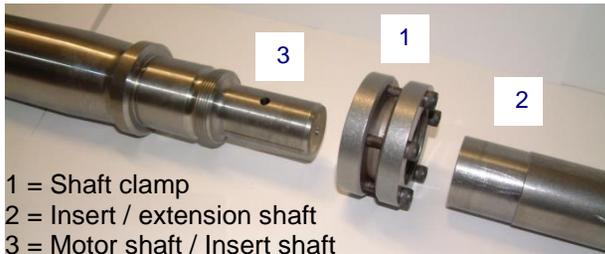
3. Voltage, Frequency and Power

Take item 1, 2 and 3 from the nameplate

4. Spare part with item No.

e.g. Intake cover item No. 52

11 Repair Instructions / Replacing shaft clamps and shafts



11.1 Dismantling the insert shaft or extension shaft

- Disconnect the submersible pump from the mains both electrically and mechanically.
- Remove pump from system. Secure pump against tipping over, i.e. use ropes to secure pump.
- Set the pump down on the fan cover. Dismantle the pump unit and the extension pump body (if appropriate).



Wear safety gloves!

Risk of injury due to sharp edges on pump components, i.e. impeller blades.

- Loosen the screws on the shaft clamp (1) one after the other.



Do not, under any circumstances, remove the screws completely, **danger of injury!**

- Remove the extension shaft (2) and shaft clamp (1).
- Dismantle the pump body.
- Loosen the screws on the shaft clamp (1) (see above), pull the insert shaft (2) off the motor shaft (3).

11.2 Assembling the insert shaft and motor shaft

ATTENTION

Clean the contact surfaces of the insert shaft (2) (inside) and the motor shaft (3). They must not be lubricated or oiled.

- Set the motor down on the fan cover.
 - Position the shaft clamp (1) (use a new shaft clamp) in the centre of the cranked clamping diameter (2) of the insert shaft.
 - Insert the motor shaft (3) into the insert shaft (2).
 - **Tighten:**
Mark the first screw and tighten all the screws evenly by hand, one after the other in a clockwise direction (not cross-ways).
 - Tighten the shaft clamp (\varnothing 24 mm) for STA/SAL401, 601
Use a torque screwdriver to tighten each screw first with 1 ft. lbs. (1.3 Nm) then with 2 ft. lbs. (2.6 Nm) and finally with 3 ft. lbs. (4 Nm) (in a clockwise direction again).
 - Tighten the shaft clamp (\varnothing 35 mm) for STA/SAL402...608
Use a torque screwdriver to tighten each screw first with 1.5 ft. lbs. (2 Nm) then with 2.6 ft. lbs. (3.5 Nm) and finally with 3.7 ft. lbs. (5 Nm) (in a clockwise direction again).
Repeat the last turn with 3.7 ft. lbs. (5 Nm) 3 times.
 - Mount the pump body.
 - In the case of pumps with an extension body, the assembly and tightening of the second shaft clamp (\varnothing 24 mm) is carried out as before.
- The remainder of the reassembly process is to be completed in the opposite order of the prior described dismantling process.

ATTENTION

Note torques for the screw connections!

When putting the pump back into use, **make sure the direction of rotation is correct!**

Tightening torques for screwed connections

Thread - \varnothing	M5	M6	M8	M12
Strength classes	8.8	8.8	8.8	
Tightening torque ft. lbs. (Nm)	3.3 (4.5)	3.3 (4.5)	15 (20) Item. 78 3.3 (4.5) Item 3	22 (30) Item. 83 , 76

12 Disposal

When disposing of the pump or the packaging materials the local and national regulation for proper disposal must be complied with.

Prior to its disposal, the pump must be completely drained and decontaminated if necessary.

13 Brinkmann Pumps Inc. Terms and Conditions

The following terms and conditions govern all quotations made by Brinkmann Pumps Inc. („Brinkmann“) and any orders based upon these quotations. No contract term or condition shall be amended, deleted or added without the express written consent of Brinkmann, and Brinkmann hereby rejects any terms set forth in any other writing which are in addition to or different from the terms in this quotation.

These items and conditions and any other terms and conditions delivered in writing by an authorized agent of Brinkmann contemporaneously herewith constitute the complete agreement between Brinkmann and the buyer and supersede all prior oral, written or printed statements of any kind (including any terms and conditions submitted by the buyer and performance or production data from any source whatsoever, including references to accuracy, capacity, and capability of products, all of which are estimates only) made by Brinkmann or the buyer or their respective representatives. No statement, recommendation or assistance given by Brinkmann or its representatives to buyer or its representatives, in connection with the use of any products by buyer, shall constitute a waiver by Brinkmann of any of the provisions hereof or affect Brinkmann's liability, as defined herein. All transactions covered hereby and all terms and conditions of sale shall be governed by the laws of the state of Michigan.

Prices

The products offered in this proposal and the prices quoted are based on our understanding of buyer's requirements; any change in requirements will necessitate a revision in prices quoted. Prices are F.O.B. our dock, Wixom, Michigan, or other location as specified on proposal. Brinkmann's prices do not include sales, use, excise, or similar tax, applicable to the sale or use of the equipment proposed. These taxes shall be paid by the buyer, or in lieu thereof, the buyer shall provide Brinkmann with a tax exemption certificate acceptable to the taxing authorities.

Delays or failure to deliver

Brinkmann shall not be responsible for delay or failure to deliver due to acts of God, or to government action (civil or military), or to prior orders, or to fire, embargo, strike or other labor problems, wrecks, delays in transportation, unusually severe weather or inability to obtain necessary labor or materials from the usual source of supply, or any other circumstances beyond Brinkmann's control.

Brinkmann shall have the right to furnish suitable substitutes for materials which cannot be obtained because of such force majeure.

Installation

Buyer shall install at its own expense, all products covered hereby in accordance with the operating instructions to be furnished to buyer upon request. Unless otherwise stated, no installation services are included in the price indicated.

Limited warranty

Brinkmann warrants to the buyer (but not to any others) for a period of one year from date of shipment that all new parts are free from defects in material and workmanship. Brinkmann's said warranty shall exist only if buyer gives written notice to Brinkmann within ten days after the first determination that the part is defective and within the aforesaid one year period from the date of shipment and includes in said notice consent to Brinkmann to inspect, at any reasonable time, said part and the machine in which it may be embodied, and if, and only if, Brinkmann determines to its reasonable satisfaction upon said inspection that said part and the machine in which it may be embodied are, and have been, used in accordance with all Brinkmann's instructions as to maintenance and operation set forth in the operating instructions relating to the machine. Brinkmann's warranty is limited to shipping to buyer replacement of any part which is so proven to be defective and in any event shall have **no liability whatsoever for incidental or consequential damage or loss of profit**, including damages resulting from personal injury or death, or damage to, or loss of use of, any property. Brinkmann is not responsible for shipping costs or labor, extends no warranty of any kind for gasket, seals and wear and tear materials. Notwithstanding any provisions of these terms and conditions, **this warranty is the only warranty extended by Brinkmann in connection with any sales of products and is in lieu of all other warranties, express or implied, including warranties of merchantability or fitness for purpose.** No agent, employee or representative of Brinkmann has any authority to bind Brinkmann to any affirmation, representation, or warranty concerning the products that are the subject of this quotation beyond that specifically included in the written quotation. Brinkmann shall have no obligation to install or provide improvements or changes in design adapted by Brinkmann for similar equipment subsequent to acceptance of buyer's order.

Warranties have been discussed and understood by both parties.

Buyer's use and O.S.H.A.

Buyer shall use and require all persons operating the equipment to use all proper and safe operating procedures set forth in operating instructions relating to the equipment and observe all occupational safety health and standards act (O.S.H.A.), American National Standard Institute (ANSI), and state regulations as required and all available, feasible and practical point of operation safety devices consistent with buyer's use of the equipment. Buyer shall not remove or modify, any device, warning sign, operating instructions or work handling tools installed on or attached to the equipment. Buyer shall notify Brinkmann promptly, in writing, and in all events within ten (10) days after its occurrence, of any accident or malfunction involving any equipment which results in injury to or death of persons or damage to property, or the loss of use thereof and buyer shall cooperate fully with Brinkmann in investigation and determining the cause of any such occurrence of malfunction. At Brinkmann's request made at any time, buyer will either at its or Brinkmann's place of business, permit to redesign, remodel or revise the equipment and buyer waives any claims against Brinkmann for buyer's inability to use the equipment during the time that same is out of service for such revision, modification or redesign.

Brinkmann shall not be responsible for any failure to comply which results from the location, operation, design, use or maintenance of the equipment from alternation of the equipment by persons or firms other than Brinkmann, or from an option or accessory to the equipment by persons or firms other than Brinkmann, which was available to the buyer but omitted at the buyer's direction, or from design or instructions furnished by the buyer or its agents. In view of the above, Brinkmann does not make any warranties with respect to O.S.H.A. requirements, including noise; and will not be responsible for fines, penalties, or consequential damages.

Payment terms

Net payment in full of all invoices is due thirty (30) days net, unless stated otherwise in quotation. Any unpaid balance thereafter shall be subject to a service charge of 1.75 % per month or, if illegal, at the highest rate allowed by law. There shall be no extension or change in the time for payment due to delay in installation and/or delays in operation of the equipment caused by damage, warranty service or warranty replacement of parts. If after Brinkmann's

acceptance of buyer's purchase order, buyer requests Brinkmann to delay shipment of the equipment, the purchase price shall become due and owing thirty (30) days after the equipment is ready for shipment.

If buyer fails to pay the purchase price as provided herein and Brinkmann institutes a lawsuit for the collection of said price, buyer agrees to pay Brinkmann's reasonable attorney fees incurred in connection therewith.

Acceptance of orders

Quotations are offered for written acceptance within thirty (30) days from date (unless otherwise stated) but are subject to change without notice at any time before acceptance. If any order contains printed, stamped or other provisions inconsistent or in conflict with the terms and conditions hereof, the terms and conditions hereof shall control, unless otherwise specifically stated by Brinkmann in writing. All clerical errors are subject to correction in favor of either party upon notice of either party. All orders are subject to the credit approval of Brinkmann. An order containing subject matter not within the contemplation of the proposal shall be subject to a further quotation as to price or delivery or both. Modifications, changes, deferred shipments, cancellations or additions will be effective only if accepted by Brinkmann in writing and then only upon terms that will indemnify Brinkmann against all costs and losses.

Title and security agreement

Delivery to carrier shall constitute transfer to the buyer, and all risk of loss or damage in transit shall be borne by the buyer.

By execution of a purchase order, buyer hereby grants to Brinkmann a security interest in the equipment covered by the proposal, and its products and/or proceeds in order to secure the payment of the purchase price thereof and buyer authorizes to file financing statements reflecting this security interest without buyer's signature. Buyer will cooperate with Brinkmann in preparing documents necessary to perfect this security interest.

Proprietary and other materials

This quotation and all drawings, specifications, materials, patterns, and special purpose manufacturing aids which are supplied to buyer by Brinkmann shall be kept in confidence and shall be listed and maintained in suitable condition at the expense of buyer and are to be considered the property of Brinkmann held on consignment by buyer and to be insured while in buyer's possession. Such articles and all copies thereof from any source shall be returned to Brinkmann at any time upon request and shall

not be used for or by any third parties without the express written permission of Brinkmann.

Performance in event of default

In addition to the rights and remedies conferred upon Brinkmann by law, Brinkmann will not be required to proceed with the performance of any order or contract if buyer is in default in the performance of any order or contract with Brinkmann and in case of doubt as to buyer's financial condition, shipments under an order may be suspended or sent sight draft with bill of lading attached and Brinkmann may decline further shipments except for cash before shipment.

Hold harmless/indemnity

Except to the extent of the limited warranty set forth above and Brinkmann's own gross negligence or willful misconduct, buyer hereby: (1) waives, releases and discharges any and all claims of any and every kind (including but not limited to injury or death of any person or damage to property), which it may have at any time against Brinkmann, its agents or employees, by reason of or arising out of any claimed improper design, specification or manufacture of the equipment sold hereunder, or of any claimed inadequate or insufficient safeguards or safety devices; and (2) covenants to indemnify and hold harmless Brinkmann, its agents and employees of, from and against any and all loss, damage, expense (including attorney's fees), claims, suits or liability which Brinkmann or any of its employees may sustain or incur at any time for or by reason of any injury or death of any person or persons or damage to any property, arising out of any claimed improper design or manufacture of the equipment sold hereunder, or of any claimed inadequate or insufficient safeguards or safety devices.

Electrical equipment

Motors, electrical equipment and wiring on the equipment quoted will be supplied in accordance with the manufacturer's standards. Unless specifically quoted they are not guaranteed to meet ordinances of any local governing body and the responsibility of conforming to any local ordinance is assumed by the buyer.

Inspection and testing, production estimates and performance

All working drawings or other materials provided by Brinkmann are for general information purposes only and may or may not relate to buyer's order or other equipment. Any specifications contained therein are not binding on Brinkmann except as expressly so stated. Brinkmann reserves the right to make, at any time, such changes in detail of design or construction as shall in the sole judgment of Brinkmann constitute an im-

provement over former practice. Production data, where given, are based on Brinkmann's careful analysis and understanding of the limits of accuracy, machinability of materials, amount of material to be removed, handling facilities provided, and location points but are nonetheless an estimate only and not guaranteed or warranted. In no event shall Brinkmann be responsible for performance figures supplied by other parties. If by written agreement the equipment is to be subject to acceptance tests before shipment, rejection under this clause must take place prior to shipment.

Returned equipment

In no case is equipment to be returned without first obtaining written permission from Brinkmann. Unless otherwise expressly agreed an order for equivalent value must accompany returned equipment and all such returned equipment will be accepted for credit only after inspection. Equipment returned without good cause and for which no credit is given shall be subject to a restocking charge. Buyer returning equipment must pay transportation charges and bear risks of loss or damage to goods while in transit. Acceptance of returned products by Brinkmann's receiving department shall not bind Brinkmann nor have any force or effect unless acceptance is made by Brinkmann in writing.