Installation and operation manual for plastic circulation pumps, non-self priming Series BADU 21 and BADU FA 21

GB

1. General

Speck-Pumpen Verkaufsgesellschaft Karl Speck GmbH & Co., Lauf/Germany
Series BADU 21 and BADU FA 21
Country of Origin: Federal Republic of Germany

Range of application:
Series BADU 21: Pumping of clear or slightly turbid water in swimming pools, whirlpools, dishwashers, water slides, air conditioning units, temperature conditioning units etc.

Series BADU FA 21: Pumping of clear and slightly turbid water in swimming pools, whirlpools as well as water circulation in the intake area.

Using these pumps for other media or other purposes will in most cases require special equipment and should be first discussed with the manufacturer. In case of use for different purposes or misuse, the manufacturer shall not be liable for any damage.

These pumps should **never** be used for the pumping of:

- flammable liquids
- very volatile liquids
- toxic liquids
- aggressive liquids

Maximal operational temperature in constant operation:
Series BADU 21:
70°C (45°C for BADU 21-40/5.)
Exceptions: BADU 21-40/33 and BADU 21-40/34 as well as BADU 21-40/53 and BADU 21-40/54 (to be used for whirlpools): **40°C**

Series BADU FA 21:
45°C

Max. permissible housing interior pressure: 2.5 bar

Each pump, before delivery, is subjected to a trial run for the determination of total dynamic head, flow rate, power input, noise level and leakage.

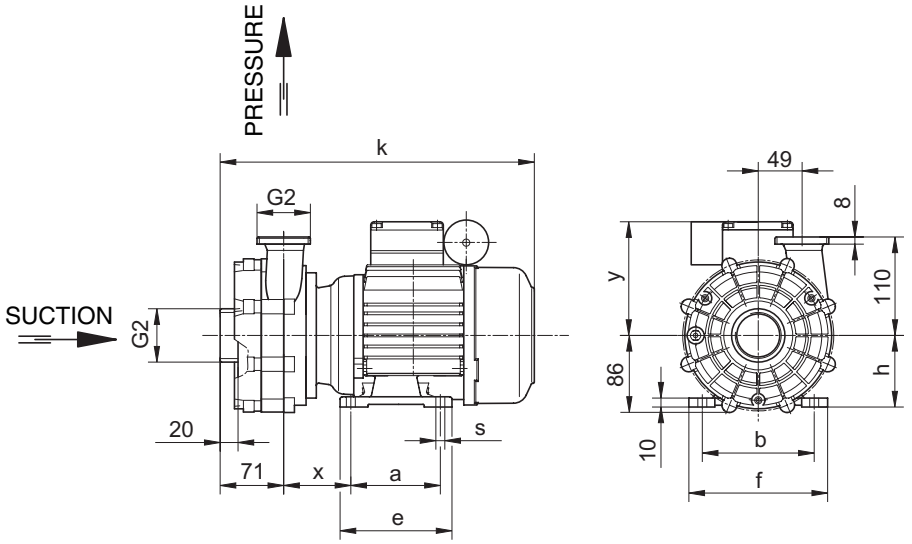
Noise level:
With the types BADU 21-40/.., the continuous noise pressure level ranges below 70 dB (A). For all other pumps of series BADU 21, the continuous noise pressure level **depending on type**, ranges from 70 to max. 78.5 dB (A). Measured with sound level meter as per DIN 45635.

BADU 21-40

Plastic circulation pumps, non-self priming

Dimensional drawing

Dimensions in mm



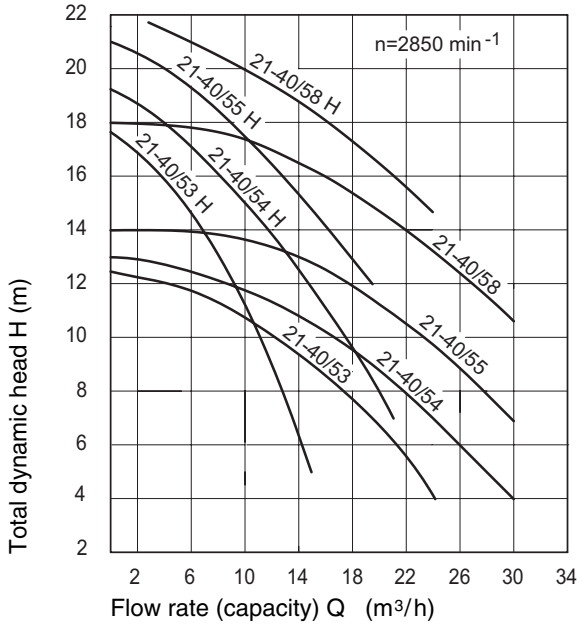
Subject to technical modifications!

VD 21.04.540

Dimensional table
Dimensions in mm

Type	a	b	e	f	h	s	x	y	k
21-40/53 G	90	112	115	138	71	7.0	84	132	313
21-40/53 HG	90	112	115	138	71	7.0	84	132	313
21-40/54 G	90	112	115	138	71	7.0	84	132	313
21-40/53 G	90	112	115	138	71	7.0	84	132	313
21-40/55 G	100	125	125	153	80	9.0	75	142	351
21-40/55 HG	100	125	125	153	80	9.0	75	142	351
21-40/58 G	100	125	125	153	80	9.0	75	142	351
21-40/58 HG	100	125	125	153	80	9.0	75	142	351

Characteristics
BADU 21-40



VKL 21.013-3

Technical data at 50 Hz	BADU 21- BADU 21-	40/53 G 40/53 HG	40/54 G 40/54 HG	40/55 G 40/55 HG	40/58 G 40/58 HG
Suction/pressure (G)*)		External thread 2/2 2)			
Recommended suction/pressure, PVC hose, d		63/63	63/63	63/63	75/75
Power input P_1 (kW)	1~230 V	0.85	1.10	1.40	2.00
	3~400/230 V	-	-	-	1.85
Power output P_2 (kW)	1~230 V	0.55	0.75	1.00	1.50
	3~400/230 V	-	-	-	1.50
Rated current (A)	1~230 V	4.20	5.00	6.70	8.80
	3~400/230 V	-	-	-	3.25/5.60
Weight (kg)	1~	9.50	9.50	13.80	15.0
	3~	-	-	-	13.0

Type of motor enclosure		IP X5
Thermal class		F
Speed (min.-1) ca.		2850
Continuous sound pressure level dB (A)	≤	70 1)
Water temperature (°C) max.		40
Housing interior pressure (bar) max.		2,5

For standardized voltage as per IEC 38 and DIN EN 60034 (European voltage)

Suitable for continuous operation at 1~ 220-240 V and 3~ Y/Δ 380-420 V / 220-240 V.

Tolerances ± 5%.

1) Measured with sound level meter as per DIN 45635

*) Thread as per DIN ISO 228 part 1 (seal with gasket)

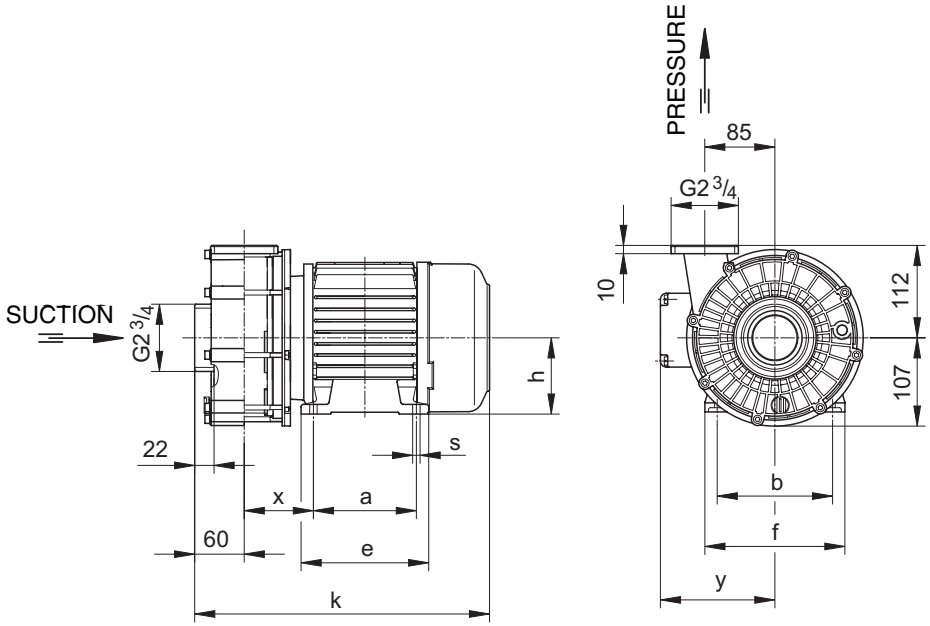
2) Also available with hose nozzles 50/40 or glue sockets 50/40 or 63/40

BADU 21-50 and BADU 21-60

Plastic circulation pumps, non-self priming

Dimensional drawing

Dimensions in mm



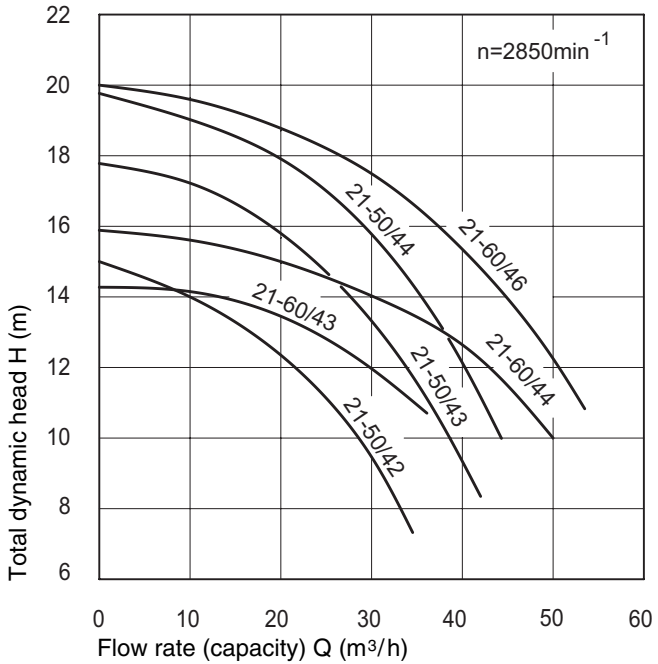
Subject to technical modifications!

VD 21.05.410-1

Dimensional table
Dimensions in mm

	Motor 1~									Motor 3~								
Type	**a**	**b**	**e**	**f**	**h**	**k**	**s**	**x**	**y**	**a**	**b**	**e**	**f**	**h**	**k**	**s**	**x**	**y**
21-50/42 G	125	140	155	170	90	358	9	85	139	100	125	125	156	80	331	9	94	127
21-50/43 G	125	140	155	170	90	358	9	85	139	100	140	130	170	90	325	9	85	139
21-50/44 G	125	140	155	170	90	373	9	100	139	125	140	155	170	90	373	9	100	139
21-60/43 G	125	140	155	170	90	358	9	85	139	100	140	130	170	90	325	9	85	139
21-60/44 G	125	140	155	170	90	373	9	100	139	125	140	155	170	90	373	9	100	139
21-60/46 G	140	160	176	195	100	427	12	107	154	125	140	155	170	90	373	9	100	139

Characteristics BADU 21-50 and BADU 21-60



VKL 21.011-4

Technical data at 50 Hz	BADU 21-	50/42 G	50/43 G	50/44 G	60/43 G	60/44 G	60/46 G
Suction/pressure (G)*)		External thread 2¾/2¾ 2)					
Recommended suction/pressure, PVC hose, d		90/75	90/75	90/75	90/75	90/75	90/75
Power input P_1 (kW)	1~230 V	1.63	2.30	2.90	2.30	2.90	3.90
	3~Y/Δ 400/230 V	1.46	2.10	2.70	2.10	2.70	3.80
Power output P_2 (kW)	1~230 V	1.10	1.60	2.20	1.60	2.20	3.00
	3~Y/Δ 400/230 V	1.10	1.60	2.20	1.60	2.20	3.00
Rated current (A)	1~230 V	7.20	10.00	13.00	10.00	13.00	17.00
	3~Y/Δ 400/230 V	2.60/4.50	3.40/5.90	4.60/8.00	3.40/5.90	4.60/8.00	6.50/11.20
Weight (kg)	1~	16.50	16.50	18.30	16.5	18.3	22.5
	3~	13.0	14.5	16.0	14.5	16.0	16.5

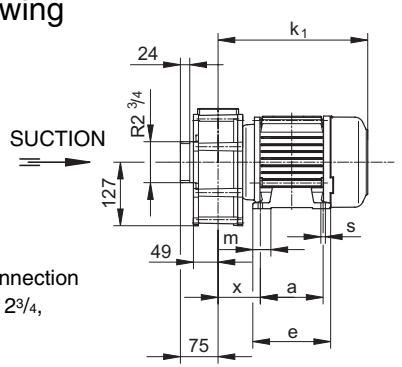
Type of motor enclosure	IP X5	For standardized voltage as per IEC 38 and DIN EN 60034 (European voltage)
Thermal class	F	Suitable continuous operation at 1~ 220-240 V and 3~ Y/Δ 380-420 V / 220-240 V.
Speed (min.-1) ca.	2850	Tolerances ± 5%.
Continuous sound pressure level dB (A)	≤ 78,5 1)	1) Measured with sound level meter as per DIN 45635
Water temperature (°C) max.	60	*) Thread as per DIN ISO 228 part 1 (seal with gasket)
Housing interior pressure (bar) max.	2,5	2) Also available with hose nozzles 50/40 or glue sockets 50/40 or 63/40

BADU 21-80

Circulation pumps, non-self priming and self priming Δ

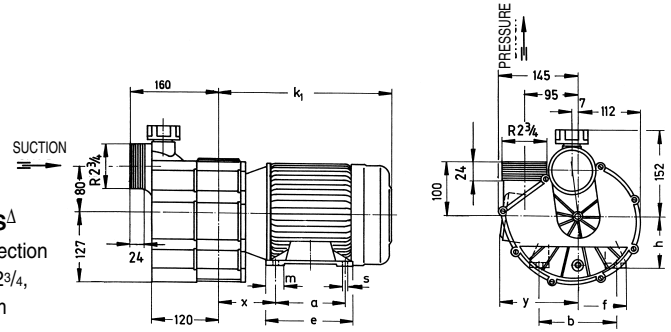
Dimensional drawing

Dimensions in mm



D 21.08.517-1

Non-self priming
21-80/31 to 21-80/34
Suction and pressure connection G with external thread R 2¾, with hose nozzle 82 mm



D 21.08.517-2

Self priming
21-80/32 and 21-80/33 SΔ
Suction and pressure connection SG with external thread R 2¾, SΔ with hose nozzle 82 mm

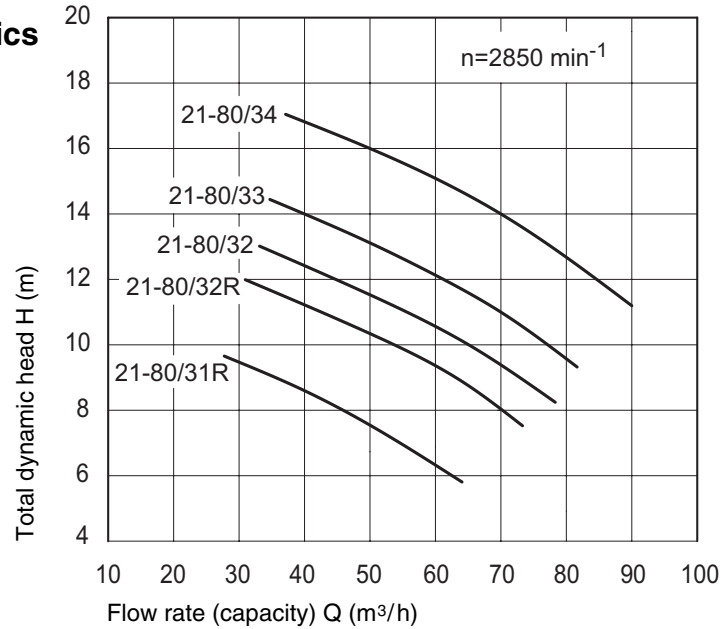
Subject to technical modifications!

Dimensional table
Dimensions in mm

Type BADU	Motor P_2 Phases	kW	a	b	e	f	h	m	s	y	x	k_1
21-80/31 RG	3~	1,60	100	140	130	170	90	36	9	139	85	265
21-80/31 RG	1~	1,60	125	140	155	170	90	36	9	139	85	298
21-80/32 RG	3~	2,20	125	140	155	170	90	36	9	139	100	313
21-80/32 RG	1~	2,20	125	140	155	170	90	36	9	139	100	313
21-80/32 G	3~	2,60	125	140	155	170	90	36	9	139	100	313
21-80/33 G	3~	3,00	125	140	155	170	90	36	9	139	100	313
21-80/33 G	1~	3,00	140	160	176	195	100	43	12	154	107	367
21-80/34 G	3~	4,00	140	160	176	195	100	43	12	154	107	347

Δ limited automatic suction only in conjunction with our suspended submerged counter swim units **BADU Jet swing** and **BADU Jet action**. Please **consult** us before using for other purposes.

Characteristics BADU 21-80



VKL 21.08.525-4

This operating point should be within the given power range; otherwise the continuous noise pressure level is elevated. In the lower area of the characteristic curve, this is all the higher, the lower the pressure on the suction side of the pump is.

Technical data at 50 Hz	**BADU 21-**	**80/31 RG**	**80/32 RG**	**80/32 G**	**80/33 G**	**80/34 G**
Suction/pressure (G) *)		External thread $2^3/_4$/$2^3/_4$ 3)				
Recommended suction/pressure, PVC hose, d		110/110	110/110	110/110	140/110	140/110
Power input P_1 (kW)	1~230 V	2.30	2.90	-	3.90	-
	3~Y/Δ 400/230 V	2.10	2.70	3.30	3.80	4.85
Power output P_2 (kW)	1~230 V	1.60	2.20	-	3.00	-
	3~Y/Δ 400/230 V	1.60	2.20	2.60	3.00	4.00
Rated current (A)	1~230 V	10.00	13.00	-	17.00 2)	-
	3~Y/Δ 400/230 V	3.40/5.90	4.60/8.00	5.60/9.70	6.50/11.20	Δ 400-7.80
Weight (kg)	1~	18.5	20.0	-	24.5	-
	3~	16.5	18.0	18.0	18.5	22.5

Type of motor enclosure		IP X5
Thermal class		F
Speed (min.-1) ca.		2850
Continuous sound pressure level dB (A)	≤	78,5 1)
Water temperature (°C) max.		60
Housing interior pressure (bar) max.		2,5

For standardized voltage as per IEC 38 and DIN EN 60034 (European voltage)

Suitable for continuous operation at 1~ 220-240 V and 3~ Y/Δ 380-420 V / 220-240 V.

Tolerances ± 5%.

1) Measured with sound level meter as per DIN 45635

*) External thread as per DIN 2999 part 1 and ISO 7/1 (seal with Teflon tape only).

2) Current at start-up approx. 75 A

3) Pumps also available with 82 mm hose connection!

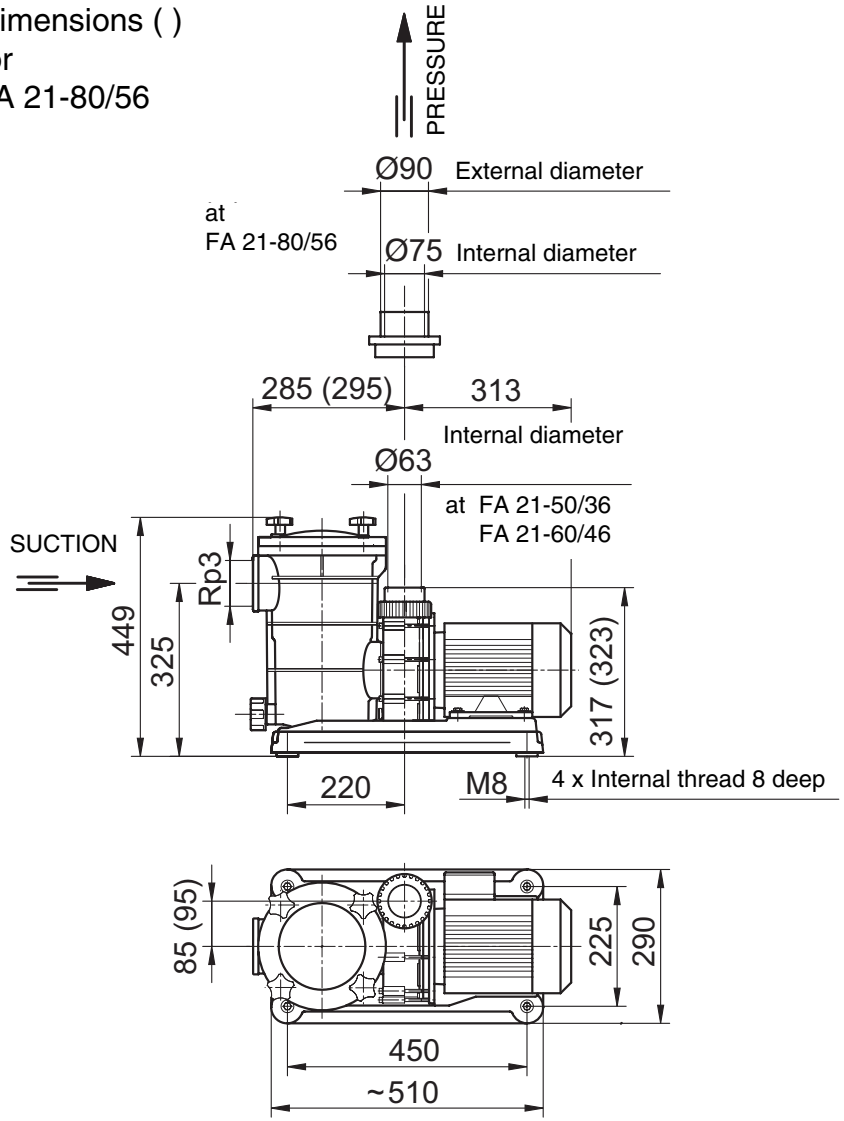
BADU FA 21-50, FA 21-60 and FA 21-80

Circulation pumps with lint catcher, non-self priming

Dimensional drawing

Dimensions in mm

Dimensions ( ) for FA 21-80/56



Subject to technical modifications!

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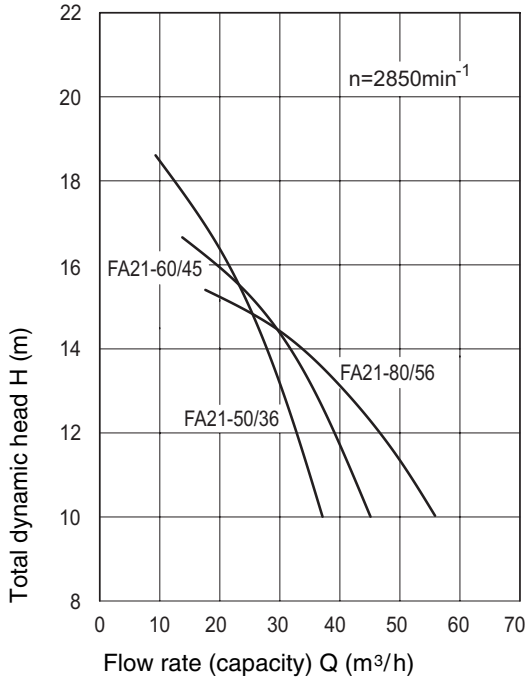
Characteristics
BADU FA 21-50
BADU FA 21-60
BADU FA 21-80

VKL 21.012-6



This operating point should be within the given power range; otherwise the continuous noise pressure level is elevated. In the lower area of the characteristic curve, this is all the higher, the lower the pressure on the suction side of the pump is.

Technical data at 50 Hz	**BADU**	**FA 21-50/36**	**FA 21-60/45**	**FA 21-50/36**
Suction/pressure (G) *)		3/63	3/63	3/75 or 90
Recommended suction/pressure, PVC hose, d		90/90	90/90	110/110
Power input P_1 (kW)	3~Y/Δ 400/230 V	2.70	3.30	3.80
Power output P_2 (kW)	3~Y/Δ 400/230 V	2.20[1)]	2.60[1)]	3.00[1)]
Rated current (A)	3~Y/Δ 400 V	4.60	5.60	6.50
Rated current (A)	3~Y/Δ 230 V	8.00	9.70	11.20
Weight (kg)	3~	20.00	22.00	25.00

Type of motor enclosure		IP X5
Thermal class		F
Speed (min.-1) ca.		2850
Continuous sound pressure level dB (A)	≤	78,5[1)]
Water temperature (°C) max.		60
Housing interior pressure (bar) max.		2,5

For standardized voltage as per IEC 38 and DIN EN 60034 (European voltage)

Suitable for continuous operation at 1~ 220-240 V and 3~ Y/Δ 380-420 V / 220-240 V.

Tolerances ± 5%.

[1)] Measured with sound level meter as per DIN 45635

*) External thread as per DIN 2999 part 1 and ISO 7/1 (seal with Teflon tape only)

2. Safety

This operation manual contains fundamental instructions which must be observed during installation, operation and maintenance. Thus this operation manual, before assembly and start-up, must be read by the person performing the assembly as well as by the responsible personnel/operator and must at all times be available at the installation site of the machine or plant.

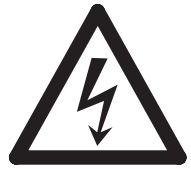
Not only the general safety instructions cited under said main chapter Safety Instructions must be observed, but also the special safety instructions contained in other main chapters, e.g. for private use.

2.1 Marking of Safety Instructions in the Operation Manual

The safety hints contained in the operation manual which, when ignored may cause danger to persons, are conspicuously highlighted by general safety Symbols

In accordance with DIN 4844 - W 9

As a warning against electrical voltage they are marked by



in accordance with DIN 4844 - W 8

For Safety Instructions which, when ignored may cause danger to persons and damage to the environment, the word

ATTENTION!

is inserted.

Warning labels directly attached to the machine, e.g.

- rotation direction arrow
- markings for fluid connections
- rating plate

must be carefully observed and kept in a legible state at all times.

2.2 Qualification and Training of Personnel

Any personnel engaged in the operation, inspection and maintenance of the machine must have the necessary qualification for that particular type of work. Area of responsibility, competence and the supervision of the personnel must be clearly defined by the user. Whenever the personnel in question lacks the necessary knowledge or skills, they should be trained and instructed accordingly. The user may authorise the manufacturer/seller to carry out such a training programme. Furthermore, it is the user's responsibility to ascertain that his personnel is fully acquainted with the operation manual and understands its contents.

2.3 Dangers of Ignoring Safety Instructions

Failure to observe safety instructions may cause danger to persons as well as to the environment, the machine and its immediate surroundings. Failure to observe safety instructions may also invalidate any guarantees. In detail, failure to observe safety instructions may, **for example,** entail the following hazards:

- failure of important machine/plant functions
- failure of prescribed methods for maintenance and repair
- endangering of persons through electrical, mechanical or chemical exposure
- pollution of the environment through leakage of hazardous substances
- damage to plants and buildings

2.4 Safety-conscious Operation

The Safety Instructions contained in this operation manual as well as any existing national regulations for the prevention of accidents plus any internal work-related, operational and safety regulations instituted by the user must be observed at all times.

2.5 General Safety Instructions for the User / Operator

Whenever hot or cold machine parts pose risks of any kind, these parts must be protected by the user against inadvertent contact. Contact protection for moving parts (e.g. couplings) must never be removed as long as the machine is in operation.

Leakages (e.g. at the shaft seal), hazardous pumped media (e.g. explosive, toxic, corrosive or hot) must be handled in such a way that there is no danger for persons, property or the environment. Statutory rules and regulations must be observed at all times.

Any danger through electrical energy must be eliminated (for details, see regulations issued by the VDE and local utility enterprises).

2.6 Safety Instructions for Maintenance, Inspection and Assembly Work

It is incumbent upon the operator to provide qualified personnel for all maintenance, inspection and assembly work who are thoroughly acquainted with the operator's manual.

Accident prevention regulations must be adhered to at all times.

As a matter of principle, any work on the machine should be performed while the machine is shut down and disconnected from mains. The instructions contained in the operator's manual for shutting down the machine must be followed closely.

Pumps or units used for pumping hazardous media must be decontaminated.

Immediately upon completion of the work, all safety and protective devices must be reattached and/or reactivated.

Prior to restarting the machine, all points contained in the chapter „First Start-up" must be followed closely.

2.7 Unauthorised Alterations and Manufacture of Spare Parts

Alterations or changes to the machine may only be undertaken after prior consultation with the manufacturer. Original spare parts and manufacturer-authorised accessories guarantee operational safety. Using other parts may invalidate the liability for consequential damages.

2.8 Unauthorised Operation

The operational safety of the machine delivered can only be guaranteed if it is used in conformity with the instructions in Section 1 - General - of the operator's manual. The limits indicated in the data sheets must never be exceeded.

Cited Standards and other Documentation

DIN 4844 Part 1 Supplement 13	Safety designation	Safety marking W 8
DIN 4844 Part 1 Supplement 14	Safety designation	Safety marking W 9

3. Transportation and Intermediate Storage

Extended intermediate storage in an environment of high humidity and varying temperatures must be avoided. Condensed water may damage motor windings and metal parts. This will invalidate any guarantees.

4. Description

The plastic pumps of series BADU 21 and BADU FA 21 have been designed for the pumping of liquids in combination with additional plant components. The motor shaft simultaneously serves as the pump shaft, on which the impeller is mounted. The seal for the shaft is a bellows-type mechanical seal arranged on a plastic impeller hub. This guarantees positive electrical separation between the pool water and the electric motor. Above mentioned hub also serves as shaft protector sleeve. Because of their unit construction, these pumps require very little space. They are driven by three-phase or single phase AC motors.

5. Installation / Mounting

5.1 **ATTENTION!**

The pump is equipped with a motor with protection type IP X5. We nevertheless recommend providing a simple rain protection cover in the event of outdoor installation. This extends the service life of your pump. A drain must be provided in enclosed rooms such as basements. If the pump is installed in a damp location, provision must be made for effective ventilation to prevent condensation. In small rooms, natural air cooling may be so slight as to necessitate a ventilation system there too, to prevent the ambient temperature from exceeding 40°C. If the motor is equipped with boreholes to drain off condensate, the unit must be installed in such a way as to allow any condensate to drain off freely.

Appropriate measures must be taken to ensure that structure-borne or airborne noise from the pumps does not have a negative impact on the environment.

Sufficient space, at least 50 mm, must be provided between the fan cover and the wall. In the case of BADU FA 21 pumps, at least 220 mm free overhead space must be available to allow the suction strainer to be removed. For fastening the pump, only screws, threads or dowels must be used in the foundation so as not to prevent removal of the motor unit. The suction and pressure lines must be attached voltage-free to the pump housing.

5.2 **ATTENTION!**

Mechanics / Hydraulics:

The pump must be mounted horizontally and in a dry place. It can be installed **below** the water level (max. 5 m) or also **above** the water level (suction mode). In the latter case, the suction lift between water level and pump (geodetic head) must not exceed 3 m. The suction lift is drastically reduced by flow resistance in the suction line (especially in longer and/or insufficiently dimensioned pipelines). **The pump connections of the BADU 21-80/.. and BADU 21-80/56 must be sealed with sealing tape only.** Leaks in the suction line will cause reduced or no suction.The suction line should be as short as possible. This will also minimize priming time which also depends on the air volume inside the suction line.

With very long suction lines it may take up to 12 min. Whenever possible, the suction line should be **below** water level right up to the pump. We suggest the installation of a foot valve at the location where the pump is installed above the water level. Otherwise the suction line cannot be drained when the pump is switched off.

Gravity feed operation:

The pump can be installed below water level (max. 3 m). The pump does not have to be filled for this purpose, but there must be a possibility for the pump housing and the suction line to be vented, so that the pump body can fill with water and the pump will not run dry.

Suction mode:

When the pump is mounted above the liquid level, a foot valve must be installed in the suction line. Access to the pump for the purpose of filling the pump housing and the suction line before start-up must be guaranteed at all times. The suction capacity is drastically reduced by flow resistance inside the suction line (in the case of longer or too narrowly dimensioned pipelines). Thus the suction line should be **as short as possible.** If the suction line leaks, the pump **cannot** prime properly.

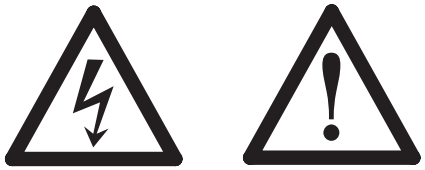
5.3 **ATTENTION!**

Danger of clogging

Series BADU 21:
If the possibility of clogging (leaves, straw, grass etc.) cannot be excluded, a strainer must be installed into the suction or intake line.

Series BADU FA 21:
Series BADU 21 comes with an intake strainer installed into the lint catcher.

5.4



Electrical connection: Should be performed exclusively by a licensed electrician!

Make sure there is a disconnecting device in your electrical insulation which guarantees positive separation for the power supply by a contact gap of at least 3 mm at each pole. This pump has been built according to protection class 1. The ambient temperature must never exceed 40°C. Pumps with three-phase motors

require the installation of a correctly adjusted motor cut-out switch. Observe the data on the rating plate. Failure to do so will invalidate any guarantee in case of motor failure. AC motors of series BADU 21 - 40/.. and BADU FA 21 - 40/.. come with that type of motor protection switch or with a thermal cut-out; for all other types of series BADU 21 and BADU FA 21 such a switch must be provided by the user.

The motors are constructed in accordance with ISO class F (thermal class) and may reach temperatures of up to 70°C on the ribs.

Caution! Using these pumps for pools and their protective environment is only permitted if the latter have been built in accordance with DIN/VDE 0100 Part 702. We suggest that you consult your licensed electrician!

The power source used must be protected by means of a fault current circuit breaker with a rated fault current of $I_{\Delta N} \leq$ 30 mA.

When connecting or changing electrical leads for motors of series BADU 21-40/.., only 3 screws may be removed from the terminal box. The fourth screw should be loosened only to such a degree, that the terminal box cover can be swung aside. The terminal box frame must remain attached to the motor housing.

The pumps are designed for permanent electrical connection.

6. First Start-up

6.1 **ATTENTION!**

Series BADU 21:
Fill pump slowly with water up to the pressure connection. **Never allow the pump to run dry! Not even just to check the direction of rotation!** Running dry will destroy the mechanical seal.

Series BADU FA 21:
Detach lid of the lint catcher (160.3). Slowly fill the lint catcher and the pump, respectively, with clean water up to the suction connection. Then put the lid on straight and tighten the 4 palm knobs uniformly! Before that, make sure that the sealing surfaces are clean. Otherwise the pump cannot prime under full power. **Never let the pump run dry! Not even just to check the direction of rotation!**

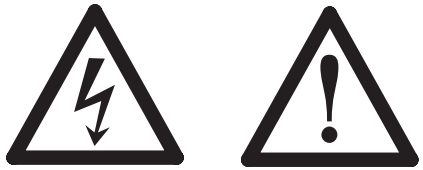
6.2 **ATTENTION!**

Check pump for smooth running after a longer downtime or storage time by inserting a screwdriver into the slot at the end of the motor shaft (fan side) and turning by hand in the direction of motor rotation. Or, if necessary, remove the fan cover and also turn by hand at the impeller in direction of motor rotation. After starting up, check that the mechanical seal is watertight.

6.3 **ATTENTION!**

The pump must never be operated without the strainer basket (143) or the strainer basket handle (otherwise the strainer basket will float upward) in order to avoid clogging or blocking.

6.4 **ATTENTION!**



Three-phase current pumps: During first start-up, check carefully whether the motor rotates in the direction of the attached arrow. If not, call a qualified expert! (Two phases must be exchanged).

6.5 **ATTENTION!**

Make sure that the built-in shutoff valves in the pressure and suction lines are completely open when the pump is in operation. The pump must never be allowed to run with shutoff valves closed!

7. Maintenance and Repair

7.1 **ATTENTION!**

Series BADU FA:
The suction strainer in the lint catcher must be cleaned periodically. If the strainer is full or clogged, the pump's rate of flow will diminish and filtration will be insufficient. Furthermore, there is danger of cavitation which may cause severe damage to various parts of the pump.

Cleaning the suction strainer:

1. Switch off pump.
2. Close shutoff valves.
3. Open lid (160.3). Take out suction strainer (143), clean it and reinsert it. Close lid (see points 6.1 and 6.3).
4. Open shutoff valves.
5. Restart pump.

7.2 **ATTENTION!**

If the pump is switched off by the built-in thermal cut-out or by the exterior protection cut-out switch, the power supply must be interrupted and a check must be made to see whether the pump can be readily rotated, by inserting a screwdriver or similar tool on the fan side and turning the motor shaft several times. If the motor shaft cannot be readily turned, the pump must be inspected by an expert. If it can be readily turned, withdraw the screwdriver etc. and re-establish the electrical connection. Once the motor has cooled down, the built-in thermal cut-out is switched on again automatically or the button of the protection cut-out can be pressed in again. This may be done only **once** more. Check the amperage intake. If the built-in thermal cut-out or motor protection cut-out is triggered again, the cause of the fault (e.g. pump blocked by impurities, sand from floor cleaning) must be determined by an expert. Check power supply and fuses.

7.3 **ATTENTION!**

If the pump rotor has seized, the pump must be cleaned by a qualified expert. Repeatedly switching on a blocked pump may damage the motor. In such a case, no claim can be made under warranty.

7.4 **ATTENTION!**

The leakage drain below between pump housing and motor should never be stopped up or sealed, because otherwise water will accumulate inside and eventually damage the motor. Ensure that no consequential damage can result from any leakage. If necessary, provide a suitable receptacle to catch the water or a leakage hose.

7.5 **Important repair instructions**

ATTENTION!

Replacing the mechanical seal

Dismantling:

The pump must be switched off and disconnected from the mains. **The replacement must be carried out by an expert. The mechanical seal must always be replaced as a complete assembly (433, 475, 412.3).** The entire pump need not be dismantled for this purpose. Only the motor unit must be removed from the housing (107) by slackening the 8 casing bolts or washer-and-screw assemblies (914.1 or 900.1 respectively) from the housing (107).

Removing the impeller

In types BADU 21-40/5, the impeller is screwed onto the motor shaft (clockwise thread).

Dismantling:

Insert a screwdriver into the slot of the motor shaft, hold firmly and unscrew impeller.

Attention: In the case of three-phase motors, the impeller is secured with LOCTITE 480 (similar to cyan acrylic instant glue). If necessary, remove motor fan blades and clamp in motor shaft.

In types BADU 21-50/4, 21-60/4, 21-80/3 and BADU FA 21-50/36, FA 21-60/45, FA 21-80/56, the impeller is fitted onto the motor shaft.

Dismantling:

Unscrew the cap nut (922) with O-ring (412.13). Remove the impeller (230.1) from the motor.

Assembly:

Installing the **new** complete mechanical seal:

Moisten the impeller hub (230) and sleeve of the complete ceramic ring (475 and 412.3) lightly with soapy water and press the mechanical seal (433) onto the impeller hub or press the ceramic ring into the gland housing (161.2).

Installing the impeller:

Prior to re-installing the impeller, clean the sliding surface of the ceramic ring and of the mechanical seal, e.g. with spirit or a tissue.

For types BADU 21-40/5, apply the reverse procedure (see Dismantling).

Attention: In the case of three-phase motors, leave the pump stationary at room temperature for 24 hours until the impeller/shaft bonded connection (see Dismantling) has attained its ultimate strength.

Re-installing the impeller in BADU 21-50/4, 21-60/4, 21-80/3 and BADU FA 21-50/36, FA 21-60/45, FA 21-80/56

First slip the impeller (230.1) onto the motor shaft as far as the limit stop. Then screw cap nut (922) with O-ring (412.13) on again.

Re-installing the motor unit in the pump housing:

For type BADU 21-40/5, tighten the 8 washer-and-screw assemblies (900.1) at 4 Nm. For types BADU 21-60/4, BADU 21-80/3 and BADU FA 21-..., tighten the 8 Allan screws (914.1) at 3 Nm (tightening torque).

Never use force.

7.6 **ATTENTION!**

Series BADU 21:
Whenever frost is expected, drain pump well ahead of time.
With horizontal arrangement, pull the end plug (903) and drain all water out of the pump.

Series BADU FA 21:
With BADU FA 21, the filter housing must be drained in addition. For this purpose, pull the drain plug (916) and allow the water to flow out of the filter housing.

8. Malfunction

The shaft seal is a so-called mechanical seal. For the purpose of lubrication and cooling, a few drops of water may ooze out from time to time, especially during the running-in period. Depending on the composition of the water and the hours of operation, the above mentioned mechanical seal may start leaking over the course of time. If water is constantly oozing out, replace the mechanical seal with a new one. For this purpose, the pump must be switched off and positively separated from the power supply.

The exchange of parts as well as any repair work must be performed by authorised personnel only!

It is unnecessary to dismantle the entire pump. (Not valid for pumps of series BADU 21-40//5). Only the motor unit (i.e. the motor with housing lid, mechanical seal and impeller) must be removed from the pump housing.

We suggest that in cases of malfunction you first contact the supplier of the unit.

When replacing the ball bearings of the motor, use exclusively bearings with C3 air and high-temperature lubrication grease (up to a minimum of 180°C)!

When restarting pump, proceed according to chapter 6.

9. Drawing of spare parts with parts list

See page 58