

Systeme für Aquakultur,
Aquaristik, Labore und
zur Wasseraufbereitung

Systems for aqua culture,
sea water aquaria, labs and
water desalination and purification

Systèmes pour aquacultur,
aquariums eau de mer,
laboratoires et traitements d'eau



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Instruction manual of Level Feedback Control



modifications possible

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1. Safety Instructions

1.1. General information

This manual contains basic information that are important for assembly, operation, and maintenance. This should be read before mounting by the assembly operator and the responsible operator and/or qualified personnel. This instruction must be disposable the at unit at any time.

Pay attention to this safety instruction as well as to the special instructions within the other chapters. In addition local laws and safety instruction must be minded.

1.2. Indication of information



If safety information are important for life or health for persons they are marked with the relevant hazard symbol according DIN 4844-W9.



Safety information marked with this symbol can cause danger for the machine and its function if not respected.



This hints can ease the work with the machine and its maintenance.

At the machine directly marked information as rotation arrow, fluid connections and setting points should be noticed. These marks should be readable at any time.

1.3. Qualification of the personnel

The staff for operation, maintaining, inspection and assembly must be qualified for these work. Responsibility and controlling of the personnel should be directed by the operator.

1.4. Dangers if safety information are not minded

If safety information are not minded persons, environment, and the machine can be endangered. Failure of observe lead to loss of the warranty.

Failure of observe can coarse:

- Failure of important functions of the machine.

- Failure of stipulated methods for maintenance.
- Endanger of persons with electric, chemical or mechanical impacts.

1.5. Safe working

Working with the machine is only allowed if all safety information of this manual, national laws and rules for preventing accidents and internal working, operating and safety rules of the operator must be minded.

1.6. Safety information for the operator

Contact protection for rotating or moving parts should not be removed while operation.

Risks of electrical energy must be averted. Please pay attention to the local laws and information, too.

1.7. Safety information for maintaining and assembling personnel

The operator must take care that all works for assembling, inspecting and maintaining are made by authorized and qualified personnel. These persons must be informed about the machine and the works by reading the manual or otherwise.

Working at the machine is only permitted if unit is out of operation. The described procedure of putting out of operation must be redeemed. Immediately after the work safety and protection facilities must be mounted and put into function.

Before starting again all issues treated in the chapter “putting into operation” must be minded.

1.8. Arbitrary reconstruction and spare parts production

Reconstruction or modifying the unit are only proper if the manufacture agrees. Original spare parts and authorized accessories by the manufacture are made for the safety. The use of other parts can destroy the warranty demands.

1.9. Illegal operation

Safety is only guaranteed if the unit is running within the field of application described in „designated use“ in this manual. The technical limits mentioned in manual (chapter “Technical data and unit protocol”) must be redeemed.

1.10. Linked aggregates

The listed information dealing with safety and operation in manuals of linked aggregates must be redeemed, too.

2. Designated use

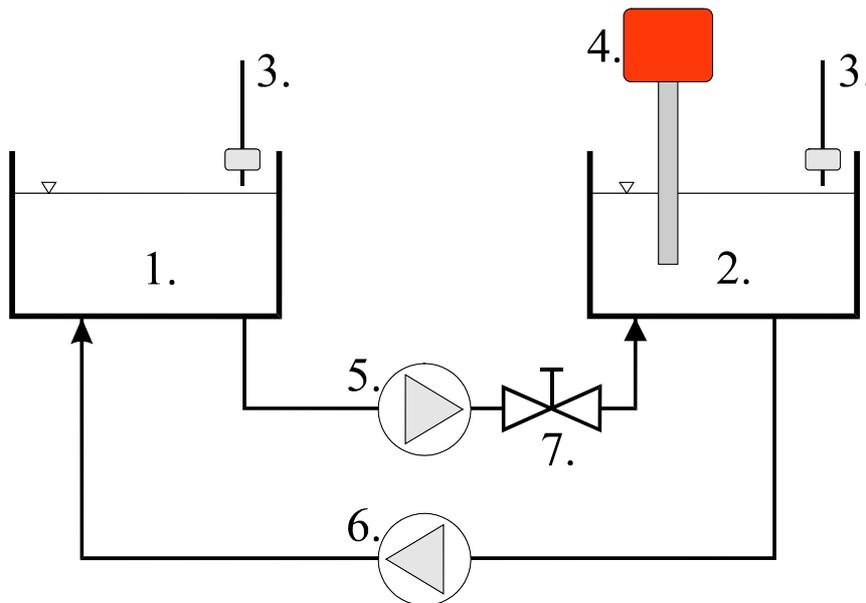
AquaCare Level Feedback Controls are made only for connecting two pumps with two water tanks.

Other purposes are only allowed after consultation with AquaCare.

3. Configuration

The unit is completely delivered. The 1-phase version can be connected to 3 phases, too. But use only 1-phase pumps.

The 3-phase version can be connected only with 3-phase pumps. Only phase pumps will be destroyed.



The unit should be connected to two tanks (1, 2) consists of:

electric box with all necessary parts;

3. level switch for high level alarm;

4. analog level sensor with sensor tube.

The pumps are not included:

5. pump (not regulated)

6. pump (regulated by the control box)

7. ball valve to get a slightly low flow of pump 5.

Components inside of the control box:

1Q1 main switch

3Q1 main contactor

X0 input terminal

X0: L1-L3 1 or 3 phases (if you use 1 phase please short-circuit L1-L3.

X1 output terminal

X1: 1+2 output terminal: pump (6. regulated)

X1: 3+4 output terminal: pump (5. not regulated)

X2 sensor input terminal

X2: 1+2 digital level sensor (3.)

X2: 3+4 digital level sensor (3.)

X2: 5+6 analog level sensor (4.)

6B1 analog level sensor (4.)

3K1 output relay

6K1 analog – digital converter

6K2, 6K3 timer

4M1	regulated pump (6.)
5M1	not regulated pump (5.)
2S1	on/off switch
2T1	low voltage transformer
4T1	AC power controller

4. Principle of function

If the unit is turned on with main switch (1Q1) the main contactor (3Q1) turns on. You can start the pumps (5.+6.) with the on/off switch (2S1: “Aus” = off, “Ein” = on). The pump 5. (X1:3+4) starts at once and the LED inside of the switch 2S1 is illuminated.

The analog level sensor creates an output signal of 4...20 mA proportional to the water level. This signal is transformed by the AC power controller (4T1) to a 0...230 V AC output signal for the regulated pump 6. (X1:1+2). To prevent the pump for burning at too low voltage (every motor needs a minimum voltage to begin to turn around) an analog-digital converter (6K1) creates an on-off signal. This signal feeds two timers (6K2, 6K3). The timers “try” to start the pump (6.) regularly. If the mA-signal of the analog level sensor (4:, 6B1) is too low the pump will not start. If the mA-signal is high enough the pump starts with the lowest rotation. If the mA-signal rises the output signal of the AC power controller (4T1) rises, too, maximum to 100%.

If the water level in one of the tanks reaches the digital level switch (3.) the box shuts down both pumps and the red light “Störung” is flashing. To re-start the unit turn off the switch 2S1, wait several seconds to eliminated the rest voltage of the low voltage transformer 2T1 and turn on the switch again.

5. Installation

5.1. Setting up



To guarantee a faultlessly operation the box should be mounted at a dry place in the near of the tanks.

The distance box to analog level sensor should be as short as possible. If strong magnetic fields are

in the near (e.g. extreme strong motors) the cable to the analog level sensor must be shielded. The analog level sensor must be fixed inside of the tank 2. e.g. a filter tank. The opening of the sensor tube should never be covered or blocked.

Fix each high level switch (3.) in both tanks.

5.2. Connecting the water tubes

The two tanks must be connected with the two pumps as shown in the figure (see configuration). Make sure that the not-regulated pump 6. has a lower water flow than the regulated pump 5. at 100%. If not reduce the water flow with a ball valve (7.). Make sure that the high level switches (3.) are mounted in the correct height.

5.3. Electrical connection

The electrical connection must be done by authorized and qualified according with the local regulation only.



Before opening a terminal box and before every disassembling of electrical components the supply voltage must be disconnected at all phases (contact opening minimum 3 mm).

The electrical supply must be conform with the data at the rating plate.



If the power supply is not stable a voltage guard may be installed. If the phase are not stable a phases guard should be installed.



The rotation direction of the pumps must be conform with the arrow at the pump body (only at 3 phases pumps). If the pump runs in the wrong direction faults can occur. The change the direction of rotating two phase must be interchanged.

6. Start up the unit



Before start up the unit check out of all connections are done well. Make sure that all PVC-unions are tight and their o-ring seals are in the correct position.



Check out if the electrical connection is made correctly.

6.1. Filling up the system with water

Before starting the level feedback control both pumps must be protected against running dry. There must be enough water in both tanks and the tube should be de-aerated.

If one of the tanks is very small (e.g. a filter tank) reduce the flow of both pumps to the half. The level feedback control is working with some delay and if the water level rises faster than the control is able to trigger the regulated pump the water level will reach one high level sensor and shuts off the whole system immediately.

6.2. Start of the pumps

To start the system switch on the main switch 1Q1. Then turn on the on-off switch 2S1:

”EIN” = on

”AUS” = off.

The not-regulated pump (5.) starts and the water level in tank 2 is rising. The level feedback control starts the regulated pump (6.) and adjusts the flow of pump. The higher the water level in tank 2 the higher the rotation of the pump. If the pump (6.) works at 100% and the water level is still rising you must reduce the flow of pump (5.) by throttling the valve (7.).



Make sure that the minimum rotation of the connected pump (6.) is reached at low level. If the starting voltage of the pump is too low the motor will burn. To adjust the starting voltage you can calibrate the “Ie” in % of the analog-digital converter 6K1. Please do not adjust the timers 6K2 and 6K3 or other units. After every adjusting of the “Ie” wait for the system: the timers need some time to trigger the next start.

6.3. Adjusting the level in tank 2

It is possible to adjust the level of tank 2 by two ways.

1. You can lift up and lower the analog level sensor (4.). It is possible to cut and extend the sensor tube.

2. You can calibrate the height of the sensor inside of the control box at the top of the analog level sensor (see instruction of the sensor).

7. Shut down the unit

To shut down the system you switch off the on-off-switch 2S1 and the main switch 1Q1.

8. Maintain the unit

8.1. analog sensor



the opening of the sensor tube must be open every time. If dirt or other material is blocking the opening the sensor works not properly.

8.2. digital sensors

Make sure that both digital sensors (3.) are not blocked by objects. Normally they are not inside of the water and so they cannot be blocked by dirt.

9. Trouble shooting

If you cannot eliminate the disturbance ask your service partner or AquaCare.

9.1. The alarm LED is flushing

If the alarm LED “Störung” is flashing the water level of one tank has reached one digital level sensor (3.).

Turn off the on-off-switch 2S1 (“An/Aus”), wait for some seconds and switch is on again. Make sure that the water level will not reach the sensor again, normally by reducing the ball valve (7.).

9.2. The regulated pump will not start

1. The pump is not connected or has a problem.
2. The water level is too low.

- 3. The analog-digital converter 6K1 is not adjusted.
- 4. The analog sensor is not calibrated.
- 5. The sensor tube of the analog sensor is too short.

10. Warranty

You have 24 months warranty on all AquaCare units excepts spare parts like pump bearings and rotors. You have no warranty if parts are broken by violent (for example totally closed water inlet). For consequential losses AquaCare is not liable.

11. Technical data

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Anlagentyp / Type of unit	Level Feedback Control
Anlagennr./unit no.	2-2006-0021
Abmessungen L×B×H / Dimensions L×W×H	400 × 300 × 200 mm
Gewicht / weight	5 kg
Elektrischer Anschluss / electrical connection	230 V AC or 3 × 230 V AC (400 V)
Anschlussleistung / power connection	2,2 kW
Leistung der Pumpen / pump capacity	max. 2 × 1 kW
Umgebungstemperatur / ambient temperature	4...45°C
Sensortyp / type of sensor	Analoger Sensor mittles Luftdruck / analog sensor adjusted by the air pressure inside of the level tube
Sensorausgang / sensor output	4...20 mA

Datum / date: 2006

AquaCare: Herr B. Ramsch

Kunde / customer:

Unterschrift / signature:

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12. Appendix: electrical connection sheets

13. Appendix: thyristor control unit

14. Appendix: analog level sensor