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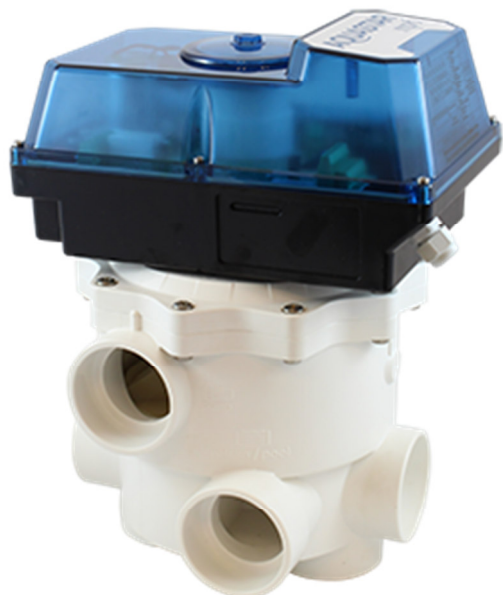
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AQUASTAR mp6
plc

BEDIENUNGSANLEITUNG
USER MANUAL



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1 Copyrights

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Knowledge of the instructions contained in this operation manual is indispensable for preventing failure and ensuring faultless operation of the Aquastar. Therefore, it is essential, that the person in charge of operating the equipment is familiar with the present documentation

2 Introduction to operation manual

This operation manual is intended to facilitate familiarization with the Aquastar and utilization of the same for the intended purpose.

This operation manual contains important information for safe, proper and economical operation of the Aquastar. Compliance with these instructions will contribute to

- preventing danger
- reducing repair costs and equipment failure, and
- increasing the liability and service life of the Aquastar

This operation manual supplements the instructions provided by existing accident prevention and environmental protection regulations. It must be available at the place of utilization of the equipment at any time and must be read by each person intending to use the Aquastar. This means

- operation, including
- correction measures in case of faulty operation and
- maintenance

In addition to the operation manual and the compulsory accident prevention regulations applicable at the place of utilization of the equipment, the generally subject specific technical rules must be taken into account.

3 Warranty and liability

Warranty and liability claims in the context of damage to person or property shall be excluded where such damage results from one or several of the causes listed below:

- Improper use of the Aquastar
- Improper installation, putting into operation, operation and maintenance of the Aquastar
- Operation of the Aquastar with defective or improper safety devices
- Non-compliance with the instructions contained in the operation manual for installation, putting into operation, operation and maintenance of the Aquastar
- Unauthorized modification of the Aquastar
- Insufficient monitoring of components subject to wear and tear
- Inadequately performed repair of the Aquastar
- Damage of the Aquastar resulting from foreign matter or Force Majeure

Before commissioning, all gaskets of the device have to be checked, the cable glands and all outside screwings must be retightened. Also leak and function tests have to be carried out. After the pressure test, all nuts and screws of the entire pipe system must be retightened in a depressurized state.

We recommend a maintenance service (testing of functionality and tightness) and careful visual inspection in regular maintenance intervals, whereas with high aggressive media, strong vibrations and significant variations of temperature, the intervals must be shortened. Seals must be considered as wear materials and must be lubricated and/or changed regularly. With unfiltered media we recommend the installation of line strainers.

Enduring damage due to neglect of the operation manual or due to damaging sealed parts lead to a lapse of the warranty. We do not take any liability for resulting damages thereof! Please read the operation manual carefully before starting operation.

4 Instructions for safety at work

- Each person, involved in the user's facility, in the installation, dismantling, putting into operation, operation or maintenance of the Aquastar must have read and understood the entire operation manual and, in particular, the chapter 'Safety Instructions'.
- The instruction and warning signs calling attention to dangers must be taken into account!



Dangerous voltage!
This is for your own safety

5 Safety instructions

- This equipment has been built and examined according to safety precaution for electronic devices and has left the plant in a perfect safety-related condition
- To keep this status and to guarantee a safe operation, the user must observe the safety instructions, which are included in these instructions
- This installation work may only be undertaken by an authorized and licensed installer or electrical business
- This equipment is not intended for it by persons (including children) with reduced physical, sensory or mental abilities or for lack of experience and/or for lack of knowledge to be used it is, it by a person responsible for their security is supervised or received from it instructions, how the equipment is to be used. Children should be supervised, in order to guarantee that they do not play with the equipment.
- The electrical installations must be carried out according to the respective local and regional regulations (e.g. OEVE, VDE,...) and possible official regulations
- the electrical connection must have separating device built into the permanently installed electrical installation, which enables the disconnection of all electrical contacts with a contact space of min. 3 mm from the mains.
- Pay attention that the supply voltage is correctly protected and an earth-leakage circuit breaker ≤ 30 mA is installed.
- Only use the equipment in dry rooms, in which no combustible gasses and vapours are present.
- Do not put the equipment into operation immediately if it has been taken from a cold to a warm area. The thereby developing condensation water could destroy your equipment
- If the equipment has visible damages, does not work anymore or has been stored under adverse conditions for longer periods, then it is to be expected that a safe operation is no more possible. In this case the equipment is to be secured against unintentional start-up and if necessary to be decommissioned.
- Live parts can be uncovered when opening the cover or removing parts. Before an alignment, maintenance, a repair or change of parts or devices, the equipment must be separated from all voltage supplies, if opening the equipment is necessary. If after that an alignment, maintenance or a repair on the opened equipment under voltage is inevitable, it may only be done by experienced, skilled staff, which has knowledge of the associated dangers and/or the relevant regulations.
- Capacitors in the equipment can still be charged, even if the equipment is separated from all voltage supplies.
- Assembly and/or disassembly of the valve only in a pressure-free status (i.e. empty piping beforehand)
- Valve flow and/or direction of flow must be considered.



**Each person involved in the operation and maintenance of the equipment must have read and understood the present operation manual!
It is for your own safety!**

6 Residual Risk

6.1 Hazard generated by current



Manipulation of the Aquastar by operating staff is strictly prohibited and may only be performed by duly authorized staff, qualified for electrical work. Compliance with the corresponding instruction and prohibition signs is required.

6.2 Hazard generated by human error

^



The operating staff must be instructed in regard to the residual danger resulting from electricity and familiarized with correct operation. Efficiency of the safety training must be verified.

6.3 Hazard generated by current during cleaning work



Cleaning of the Aquastar may only be performed after disconnection from power supply (lever switch).

7 General

PRAHER Aquastar controls are significant technical products, which are manufactured with high accuracy to the most modern technical production methods. Entitled complaints will naturally be rectified as fast as possible if they occur. The equipment has a warranty after valid European law. The warranty begins with the purchase date.



ATTENTION! For relief of the sealing system the valve is shipped on intermediate position and is not sealed! Prior to operation it has to be electrically set to position "Filter"!

8 Directions for use

This is a control unit for a **Praher Plastics Austria multiport valve with 6 positions** which is operated by a PLC. Operation of the Aquastar without corresponding valve can cause damage to the electronics.

Every Position selected by the PLC is approached automatically.

The Aquastar gives feedback to the PLC about its condition by switching 2 relays.



The Aquastar must never be operated without a Praher Plastics Austria V6 valve to avoid damage to the device

9 Assembly

Device installation – installation of the valve

Install the valve in the conduit according to the labelling and the sketch below. Use adapter unions. Threaded connections should be sealed only with Teflon strip. Although the device is functional in any position, it must not be installed with the actuator facing down.

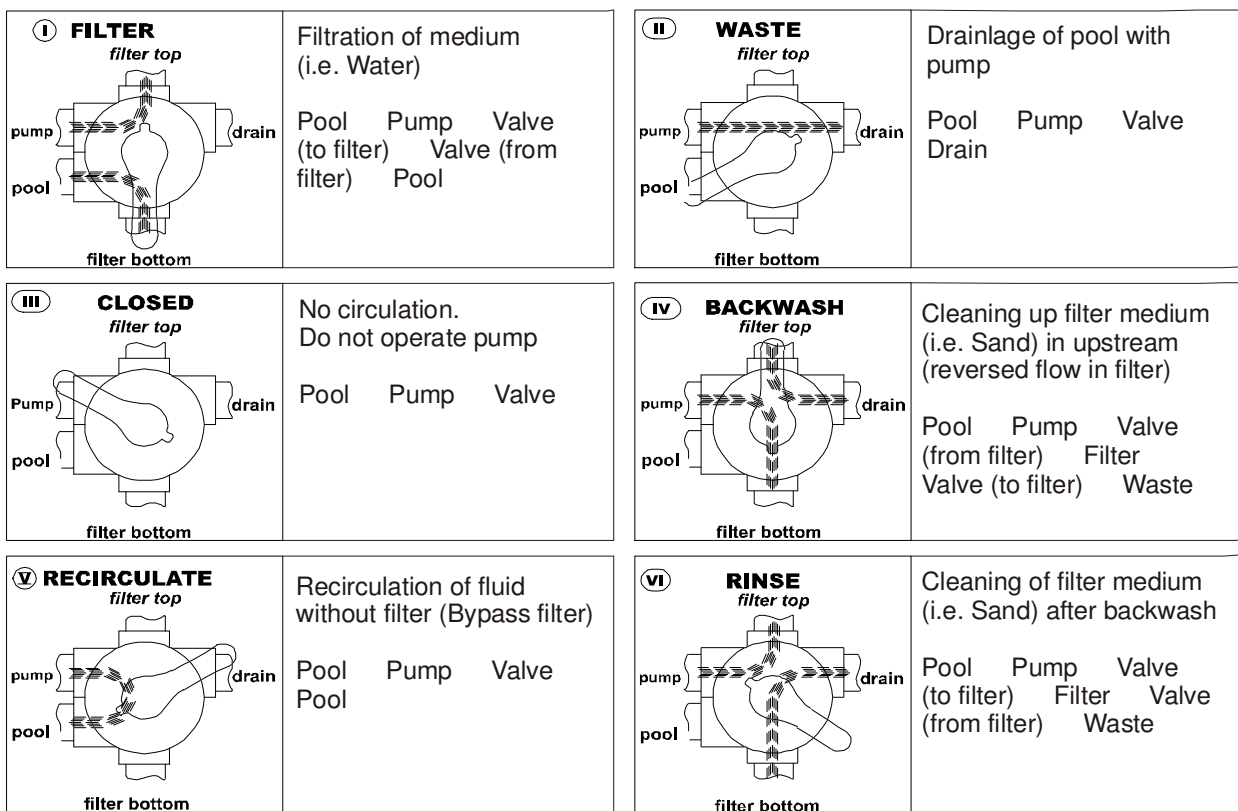
If the difference in level between system and tank exceeds 3 meters, stop valves or non-return valves should be installed to prevent severe damage to the actuator and the valve due to excessive pressure and flow.

As filter medium can be washed out during backwashing and rinsing, we recommend fitting the drain with a throttle. Otherwise a stuck valve disk can adversely affect the flawless functioning of the Aquastar. Polluted or grainy filtering media require the use of adequate pre filters.

Important! During a cycle the filter pump motor must be shut off!

The Praher Aquastar Comfort is approved for 6-way valves by Praher Plastics Austria. Malfunctions can occur with any other valve type as we are unable to guarantee that these valves match the dimensions of the Praher 6-way valves.

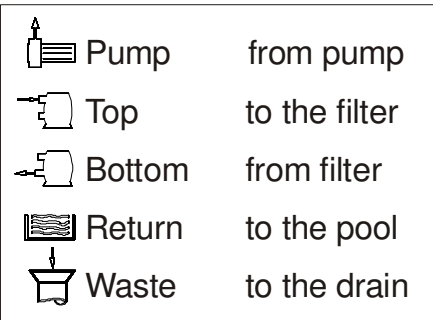
9.1 Functiondiagram for Praher Plastics Austria V6 valves



6-way valve type: 1,5", 2" and 3"

Connections: Thread or stick (all connectors open)

Max. Operating pressure: ABS 1,5", 2" and 3" 3,5 bar
 GFK 1,5", 2" 6 bar
 GFK 3" 5 bar



10 Electrical connection

10.1 Connection of the power supply

With Aquastar 230V power supply (look at 13.2):
100 – 240 VAC 50/60 Hz 20/30VA

With separate power supply:
12 – 24 VDC/AC 50/60 Hz 20/30VA

With PLC power supply:
12 – 24 VDC 20/30VA
In addition the jumpers ST13 and ST16 have to be set

10.2 Connection of the relays outputs for the PLC

Position Relays:
If the Aquastar is on position the clamps [13 → 14] are connected.
Error Relays:
If an error occurs the clamps [23 → 24] are connected for a certain time, corresponding to the kind of the error.
This repeats until the error is fixed and (if necessary) reset.
The corresponding Errors are treated in the chapter commissioning

10.3 Connection of the Aquastar inputs for the PLC

To use the inputs a voltage of 8-24VDC has to be applied at the clamps +24V and GND. (If the device is operated with this voltage and ST13/ST16 it has to be 10-24VDC)
Ideally the PLC power supply is used for this purpose, but in any case the GND must be connected for proper function.

Overview of the Aquastars inputs:

Clamp designation	position
DR	drain
CL	closed
WI	winter
FI	filter
BW	backwash
RI	rinse
CI	circulate
ERR	error reset

If a voltage is applied to an input of the Aquastar for a minimal time of 2 seconds the corresponding position is approached.
If however a voltage is applied to more than 1 input a corresponding error is signalled and the Aquastar approaches the position filter.
This error can be reset by not applying voltage to any input and setting a new position as described above.

If the Aquastar is in the errorstate it can be reset to normal operation by applying a voltage to either ERR or FI,BW and RI simultaneously for at least 5 seconds and taking it away after that. Before an error is reset the cause of the error should be checked to avoid damaging the device.

10.4 Operation with SafetyPack

If the Aquastar is used with a SafetyPack the power supply has to be 24VAC/DC or 24 VDC when it is driven by the PLC power supply.

If the Aquastar is driven by the 100-230VAC power supply however, no adjustments have to be done.

Additionally the Aquastar has to be connected to the blue SafetyPack connector and to the accumulator in the cap of the Aquastar.

→ Aquastar SafetyPack manual

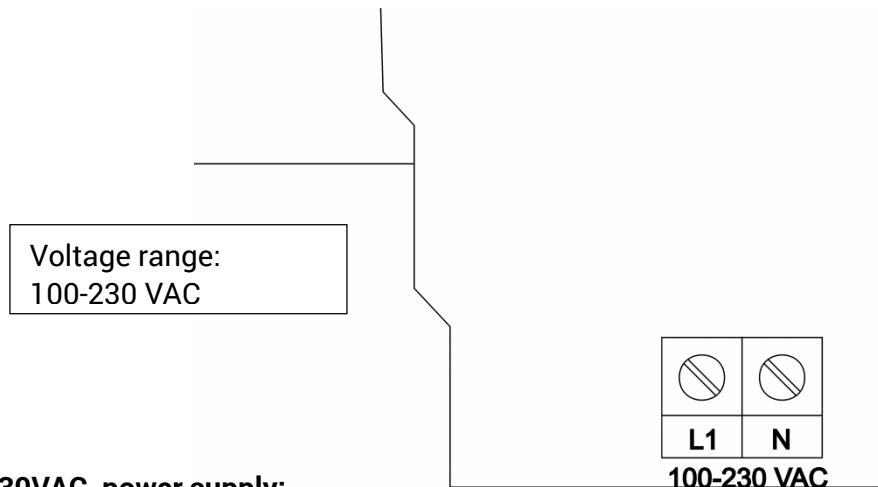
10.5 Technical data

Voltage:	24 V AC/DC / 100-240V AC (170 – 300V DC)
Protection:	IP 65
Frequency:	50/60 Hz
Rated operating current:	0.7 / 1A rms at 24V AC 0,5 / 0,7A rms at 24V DC 70 / 130mA rms at 230V AC
Max. Power:	20W at 1,5"-2" / 30W at 3"
Environmental conditions:	0-40°C, 0-95%RH not condensing
Max static pressure:	0,3 Bar
Max water column:	3m

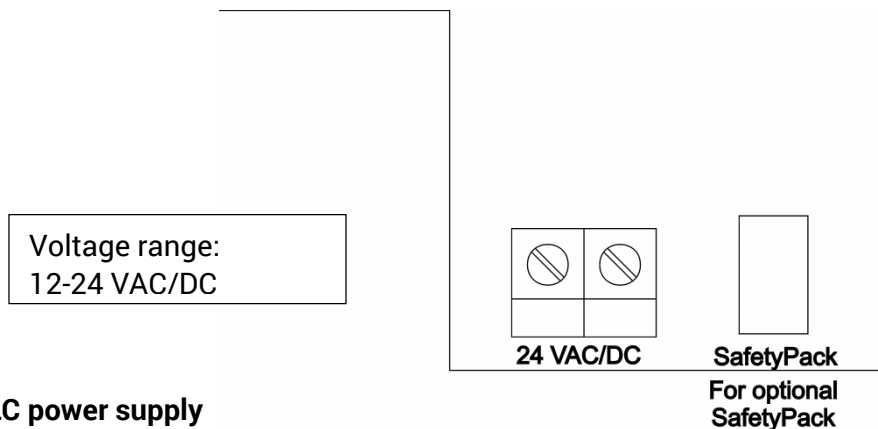
11 Wiring diagram

11.1 Connection of the power supply

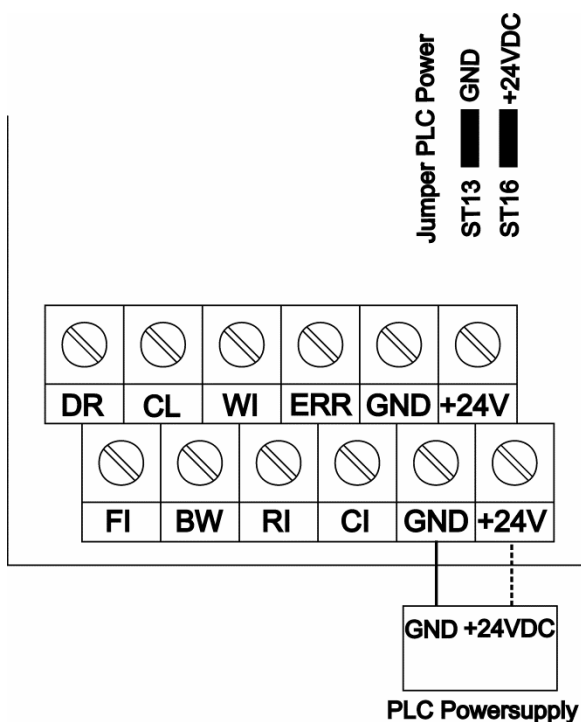
g) With 230VAC power supply (look at 13.2)



h) Without 230VAC power supply:



i) With PLC power supply



If a voltage of 12-24VDC is applied to the clamps near the SPS inputs and the Jumpers ST13 and ST16 are set the Aquastar can be driven by the PLC power supply.

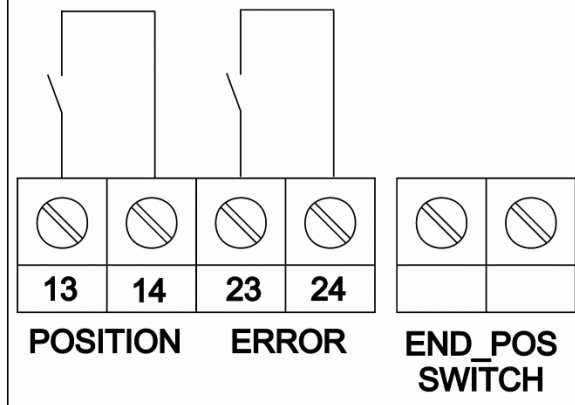
The Jumpers can only be set if the Aquastar is supplied by the PLC power supply!

They must be removed if it is supplied by the 230VAC power supply or the 24VAC/DC connectors!

Then the potential of the Aquastar is separated to the potential of the PLC

GND and +5V from the plc must be connected in any case!

11.2 Wiring diagram of the Relay outputs

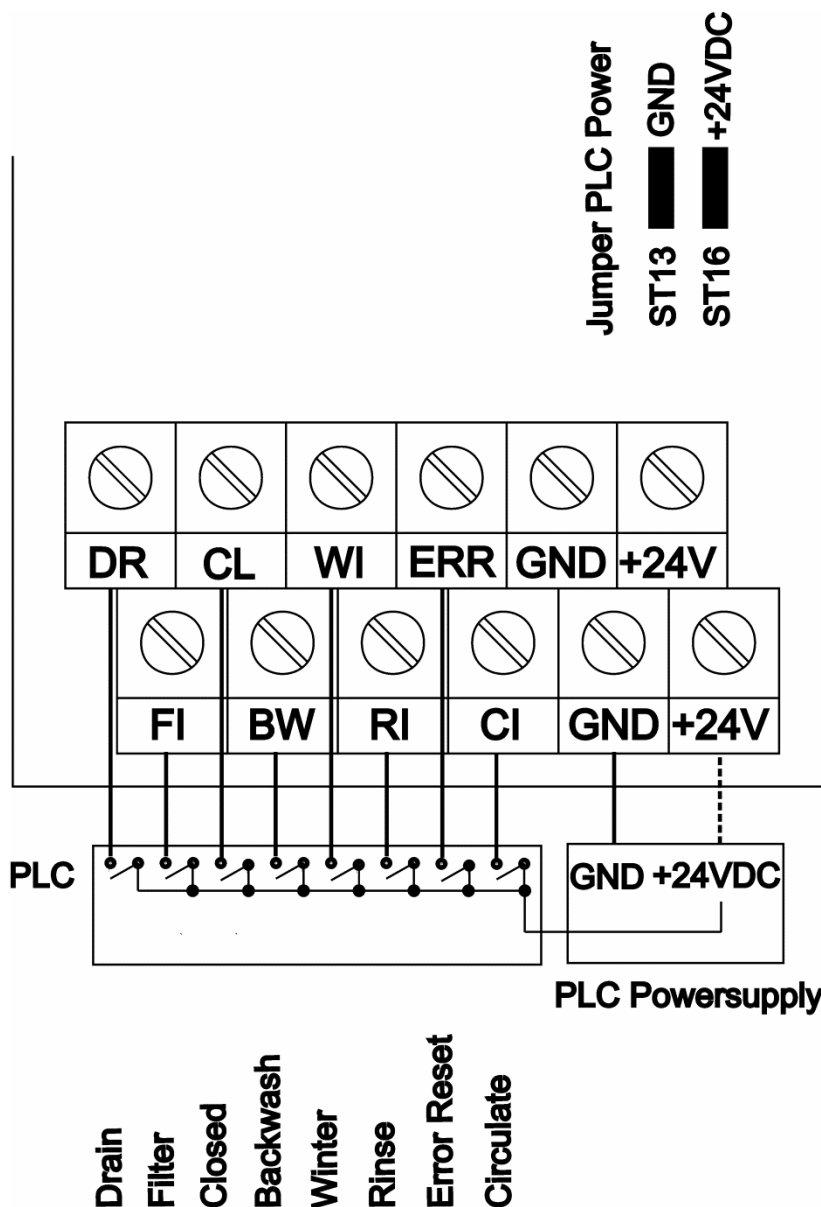


Maximum Operating
voltage of the relays:
250VAC
Or 24VDC

Operating current:
(Au-plated)
3-100mA or
100-2000mA with
 $\cos(\varphi)=1$

END_POS SWITCH must
be connected with the
END_POS SWITCH of the
Aquastar and must not be
changed!

11.3 Wiring diagram of the PLC inputs



Voltage range:
Inputs:
8-24VDC
Power supply:
12-24VDC

The inputs can also be
driven by setting the
jumpers ST13 and ST16.
GND and 24VDC has to be
connected to the PLC for
proper operation!

If the jumpers ST13 and
ST16 are set point i) has
to be considered!

12 Commissioning

To begin using the Aquastar the power supply has to be connected and turned on for both the device and the inputs. (as explained in the previous chapter)

Starting sequence:

If voltage is applied to the Aquastar it approaches either the last saved position or in the case of very first use the preset position.

Waiting for position changing:

The Aquastar stays in the last selected position.

The PLC can now select a new position at any time by applying a voltage for at least 2s at the corresponding input. The Aquastar then approaches this position automatically.

Before a new input can be set, all inputs have to be free of voltage for at least 1 second!

If this is not the case a Position error will occur.

During this positioning the pos relay is switched off and the PLC has to guarantee that the pump is turned off!

When the pos relay is turned on again the position has been reached.

Errors:

If the Aquastar detects any Errors it signals these to the PLC by the error relay.

This relay is turned on for a time corresponding to the error and then turned off for 1 second.

A red LED is driven at the same time as the relay. This repeats until the error is fixed and if necessary reset.

(As explained in the table 12.1: 2s means 2 seconds on 1 second off, 3s means 3 seconds on 1 second off and so on)

Basically there are two different types of errors:

Errors which are reset automatically when the problem is fixed:

The Aquastar goes immediately on with normal operation.

Errors which have to be reset because the Aquastar goes into an errorstate:

In this case the error has to be reset by applying voltage to either ERR or FI,BW and RI simultaneously for at least 5s and taking the voltage away after that.

The errorstate cannot be reset by turning off the power supply.

If an error occurs the Aquastar might approach a safe position. In this case the pos relay is not activated.

The position of the Aquastar must be set again after an error every time!

This assures that the position of the PLC is the same as the position of the Aquastar!

12.1 Errorstates

a) Power loss

Cause:	The power supply has been interrupted
Action:	When the Aquastar is at an unsafe position it approaches filter. Pos relay is turned off.(Only with safetypack)
Signal:	1s
Reset:	Connect power. The pos. relay is then turned on and the PLC must set the input again. The input will be ignored until the pos relay is set.
Possible reasons:	Power loss. Cable break

b) Position error

Cause:	Voltage has been applied to more than one input
Action:	Aquastar approaches position filter
Signal:	2s
Reset:	Reset all inputs (no voltage at any input)
Possible reasons:	More than one position is selected. Power supply of the inputs is ^ insufficient

c) Current error

Cause:	The permitted motor current has been exceeded
Action:	The motor stops. After two seconds the Aquastar retries to reach position
Signal:	3s
Reset:	No need to reset. If current is below current-limit in the next attempt, normal operation goes on
Possible reasons:	Aquastar is not enough fixed to the valve

d) Current errorstet

Cause:	The permitted motor current has been exceeded three times in this position cycle
Action:	Aquastar is set to errorstate. No possible actions until Aquastar is reset
Signal:	4s
Reset:	Apply voltage to either ERR or FI, BW and RI simultaneously for at least 5s. Disconnect voltage afterwards
Possible reasons:	Aquastar I not enough fixed to the valve. Cable break. Motor is broken. Valve is broken. Pump has not been turned off. Water column of 3 meter exceeded. One of the motors is not connected correctly (connect red cable to rt and blue cable to bl)

e) One Hall errorstate

Cause: Chosen position has not been reached within 3 minutes or 3 rounds.
Action: Aquastar is set to errorstate. No possible actions until Aquastar is reset
Signal: 5s
Reset: Apply voltage to either ERR or FI, BW and RI simultaneously for at least 5s. Disconnect voltage afterwards
Possible reasons: Defective electronics

f) Hall errorstate

Cause: Motor has been turned on but no position change for 30 seconds
Action: Aquastar is set to errorstate. No possible actions until Aquastar is reset
Signal: 6s
Reset: Apply voltage to either ERR or FI, BW and RI simultaneously for at least 5s. Disconnect voltage afterwards
Possible reasons: Defective electronics. Insufficient power supply. Motor is broken. Cable break. End pos. switch is not connected. Motor is not connected.

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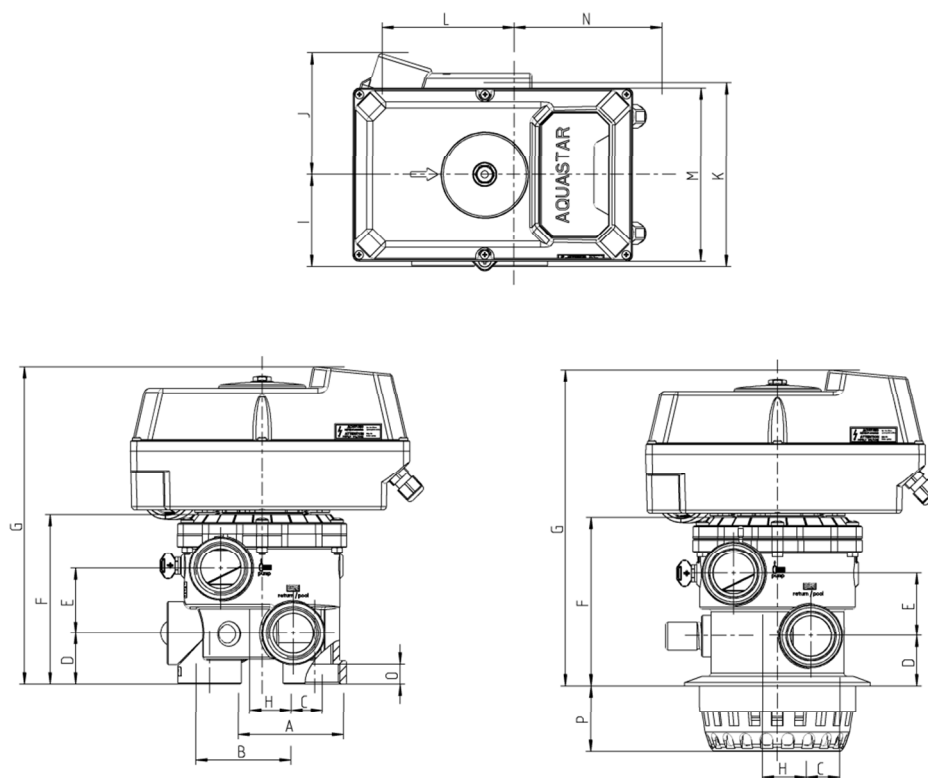
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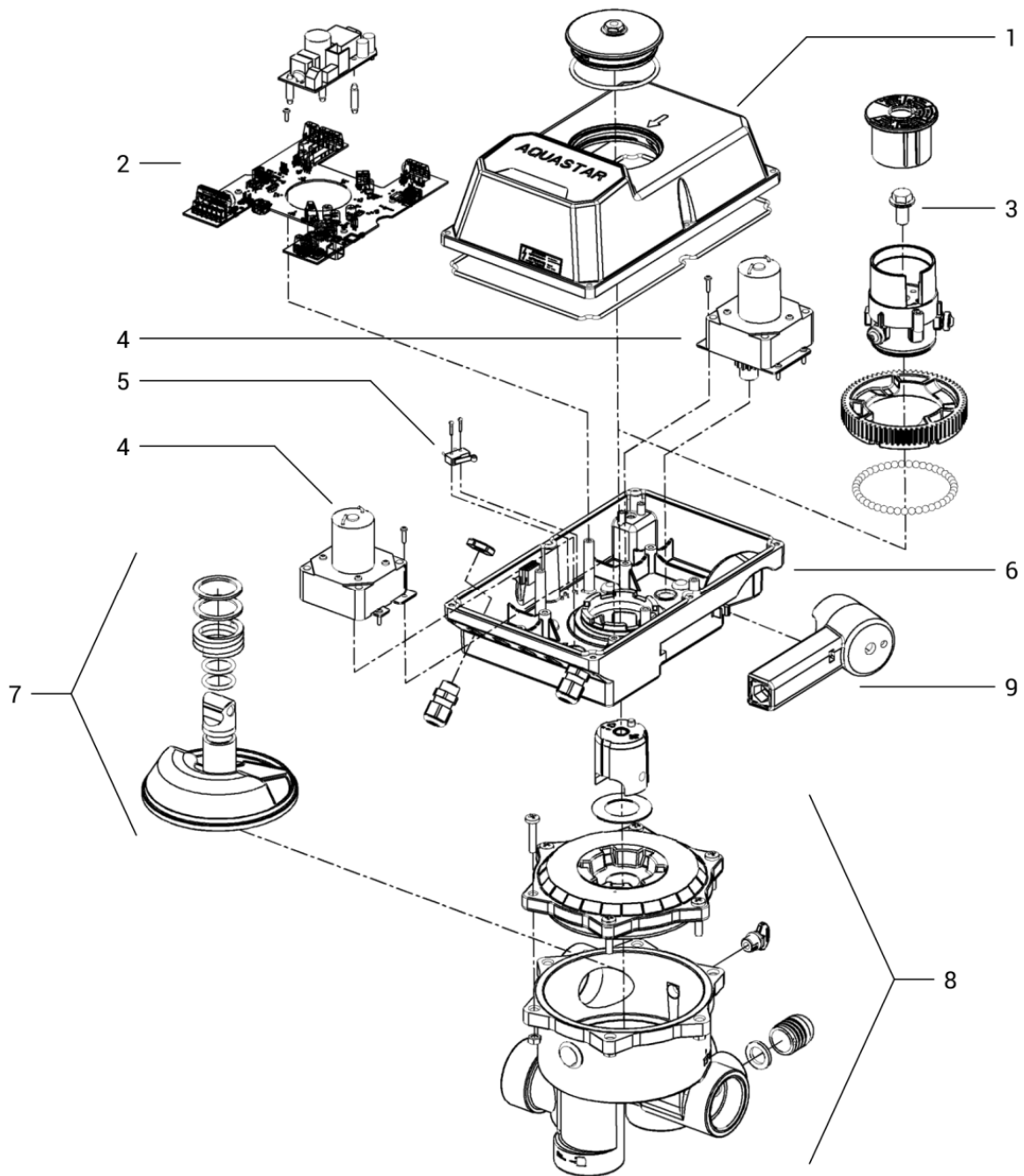
14 Dimensions



	1 ½" SM	1 ½" TM	2" SM	3" SM
A	99,5	X	110	170
B	90	X	114	165
C	29,5	31,5	38	50
D	48	47	60	85,5
E	61,5	59,5	81	110
F	163,5	160	210	306
G	304	300	348	445
H	39	42,5	36	50
I	87,5	90	114	165
J	117	117	117	117
K	175	180	228	330
L	125	125	125	125
M	165	165	165	165
N	140	140	140	140
O	18,5	18,5	26	35
P	X	62,5	X	X

Dimensions in mm

15 Exploded view drawing of the Aquastar

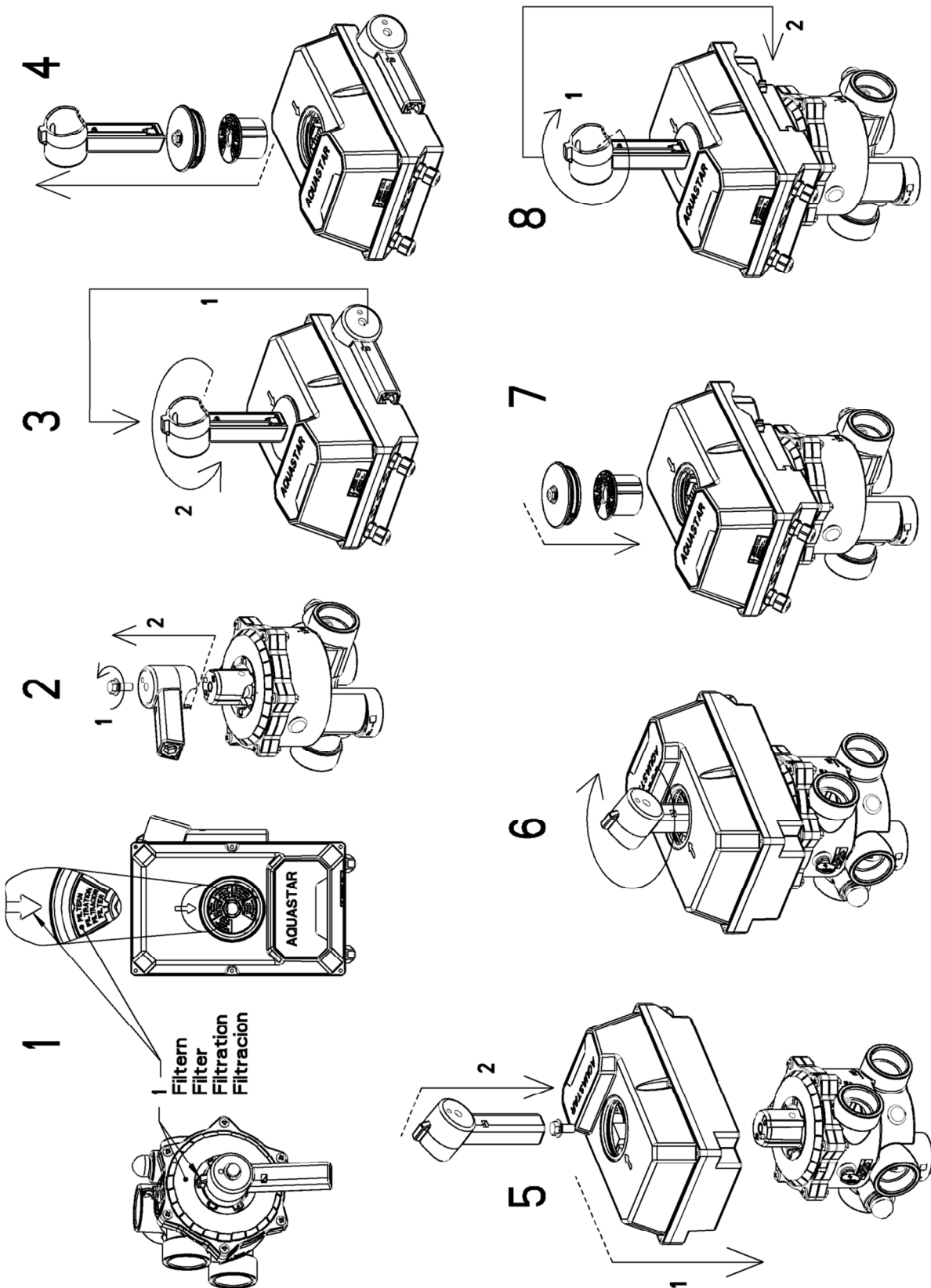


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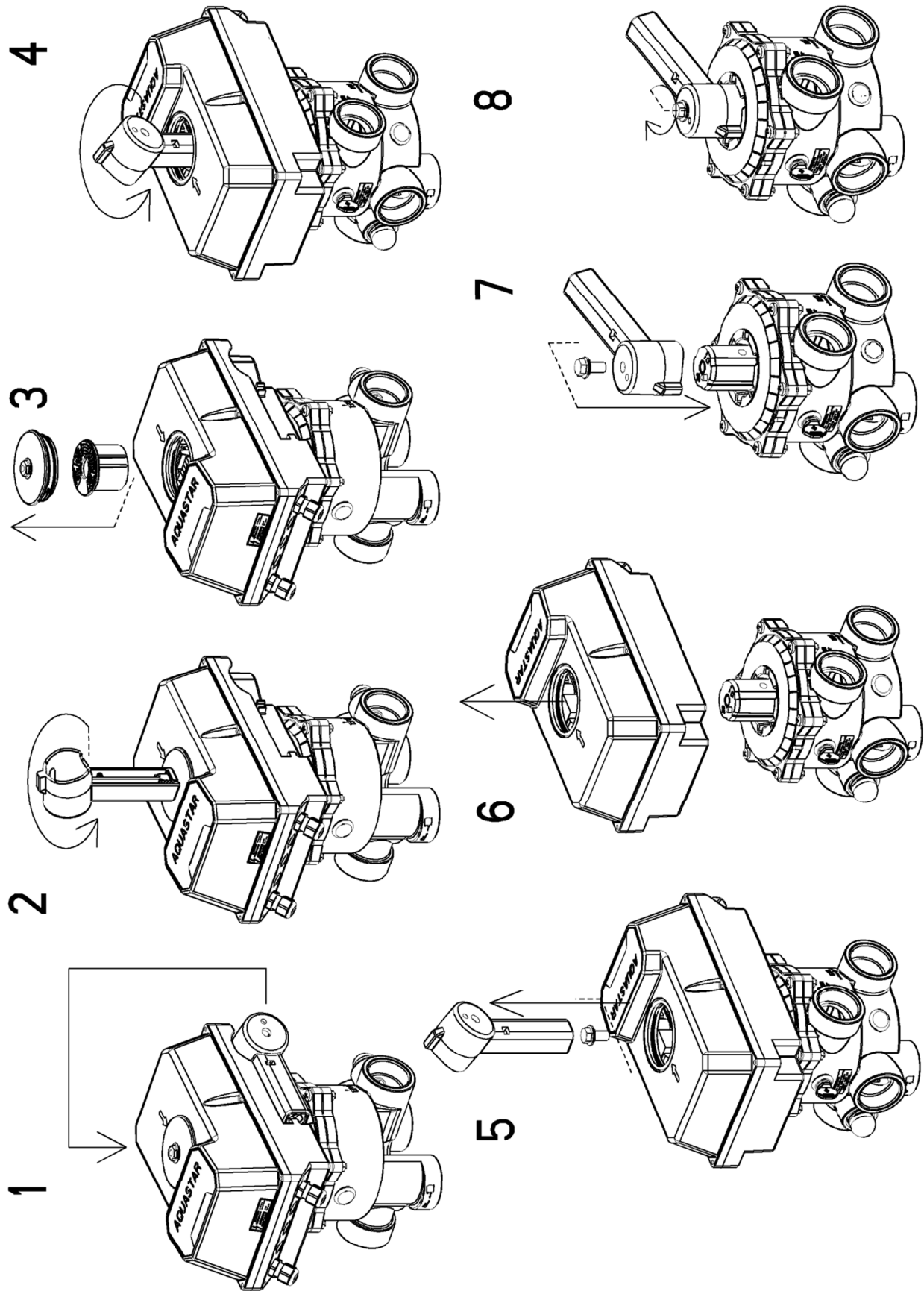
1. Aquastar lid with foam rubber cord
2. Control board
3. Hexagon screw
4. Gear motor
5. Pump end switch
6. Aquastar body bottom
7. Valve plate set up
8. V6ND valve 1 ½", 2"
9. Emergency handle

16 Installation

Attention: During installation screw tight the centre screw with a minimum torque of 10 Nm (pict 6) to secure the functionality and screw the sight glass hand-tight (4Nm – 8Nm) in the lid (pict. 8) in order to secure tightness of the Aquastar mp6

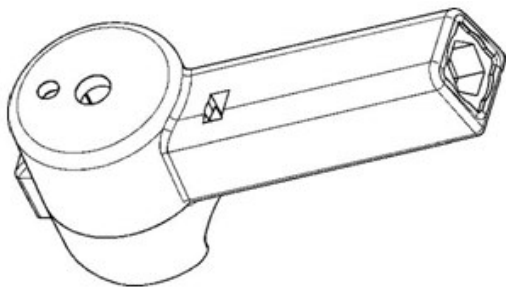


17 Dismantling

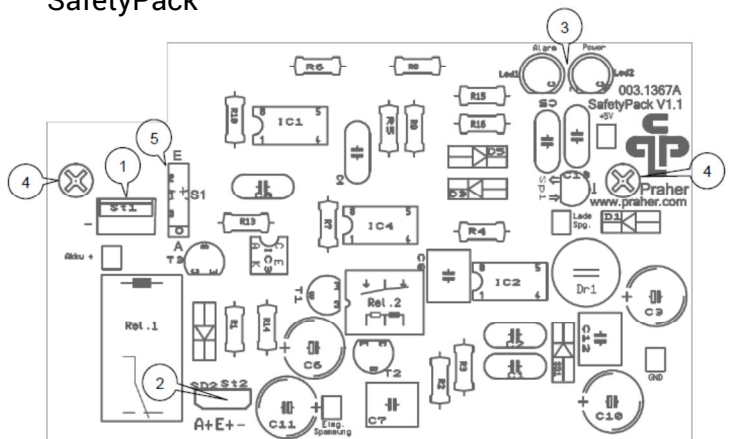


18 Accessories

Emergency handle
Item number 101862



Aquastar
SafetyPack



19 Trouble shooting

As described above in the chapter commissioning the device can detect and handle some errors on its own.

If however another error occurs proceed as follows:

- Motor turns in the wrong direction
 - ➔ Check if the motor is connected correctly
(Red wire with rt and blue wire with bl)
- One or both relays are connected or disconnected ongoing
 - Relays is/are broken
 - ➔ Send Aquastar to repair
- Motor stops ongoing after moving off
 - Power supply does not deliver enough current
In this case the red LED and the error relay signalise power loss
 - ➔ Use power supply with higher power

If an error occurs which is not mentioned in this instruction please send the Aquastar to repair and describe the error.

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