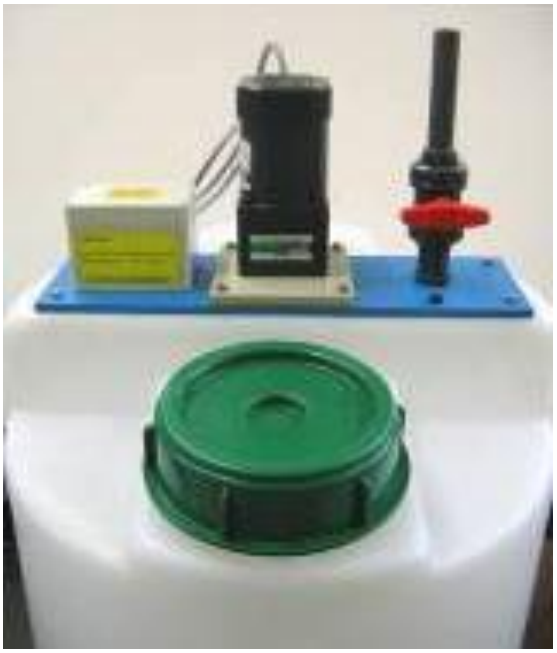
PAK-MINI-S



PICTURE: ***PAK-MINI-S (2 DOSING LINES WITH SUSPENSION TANK)***

Table of contents

1. Safety notes

The manufacturer takes no liability for harms that might occur due to a non-observance of this manual. The easy and secure operation of the controller postulates the correct transport and a competent stocking, mounting and installtion. Please consider the following instructions to minimize dangers.

The installation of the unit has to be in accordance with gerneral safety regulations (e.g. DIN, VDE) and all other relevant governmental and local laws. During the operation all covers have to be closed. Switch-off the voltage supply in case of maintenance works and ensure that the voltage supply cannot be reconnected again during the maintenance.

Pay attention to the herein given safety notes.

Disposal in case of a removal of the unit:
The operator is responsible for a conforming to the law disposal of removed parts of the system.

1.1 Used symbols:

Attention!
„Attention" refers to circumstances that may lead to material damage.

Danger!
Refers to circumstances that my lead to personal damage!

Caustic!
Refers to circumstances that my lead to personal and material damage.

Note!
„Note" describes a circumstance that leads to an improvement of the operation if you act in compliance.

2. Function of the PAK-Mini-S

By dosing powdered activated carbon (PAC) onto the filter the concentration of undesirable and dangerous water ingredients as hydrocarbons and chlorinated hydrocarbons can be reduced to a very low level, depending on the dosed amount of PAC. It is used for sand- and diatomide filters. The pre-condition for a proper function is a good working filter (fluidising at back-wash) incl. a flocculation. Dust-free, acided PAC is preferably used. For the preparation of the suspension you can use fresh or filtered water. The dosing capacity is restricted to max. 100 g/h with a suspension concentration of 3%, that are approx. 3 liters of suspension. The standard unit is therefore useful for small pools with a flow rate up to max. 100 m³/h. For bigger filtration rates a high performance pump (10 l/h) is available but for such application the PAKDOS 60, dosing cheaper dry PAC, should be more economic.

To prevent a germ contamination of the suspension the pH in the buffer tank has to be kept below pH2. If the flushing water is taken from the town water supply a tube cutter according DIN EN 1717 has to be installed.

3. Technical description

The unit consits of:

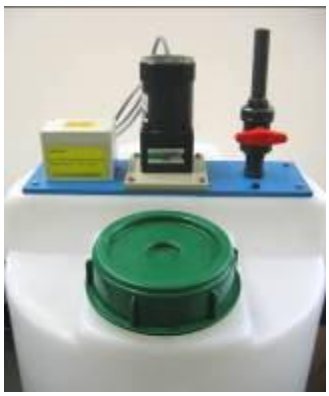
- Suspension/ buffer tank PE 100/200/300/500 l with agitator
- Manual filling
- Empty indication
- Dosing lines with hose break detection
- Flushing unit for the dosing tubes

Tank sizes:

Size:	**100 l**	**200 l**	**300 l**	**500 l**	
Diameter:	30x30cm	45cm	56cm	65 cm	79 cm
Total height:	130cm	112cm	123cm	132 cm	146 cm
Volume:	80 l	100l	200 l	300 l	500 l
Usage volume[1] app.:	60 l	60l	150 l	220 l	400 l
Empty weight app.	10 kg	32 kg	40 kg	45 kg	50 kg

[1] From Reserve until upper alarm.

Electrical power of the stirrer: 60 Watt 230 VAC
Dosing technics: approx. 5 Watt 24 VDC



3.1 Dosing lines

Dosing lines 1,2,3,4 or 5 fold with a dosing performance of app. 3.5 l /h max.

or a dosing line with max. 10 l/h:

For high dosing demands the suspension has to be refilled rather often with the accordingly high manpower input. Therefore we recommend to use the dosing machine PAKDOS 60 with a dosing performance of 1200 g/h if the demanded dosing quantity is more than approx. 100 g/h of PAC.

3.2 Performances of the dosing pumps

The dosing consumption of the ***dosing line 3.5*** is adjustable between 40 and 3500 ml/h suspension.

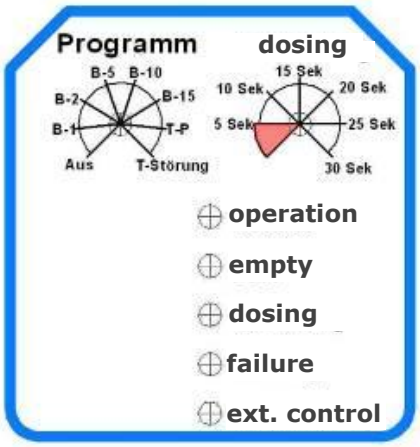
The dosing consumption of the ***dosing line 10*** is adjustable between 120 and 10000 ml/h suspension.

Standard concentration of the PAC ist 3 %. (means 3 kg PAC in 100 l oder 30 g/l). A bag with dustfree powderd carbon incl. approx. 50 % water/acid. Hence a bag of 6 kg (standard size) includes 3 kg PAC.
The dosing performance of the pump Sa/2 with a hose size 4.8x2.4 mm is max. 3.5 l/h

or approx. 100 g/h PAC.

3.3 Control of dosing (see chapter 5.2)

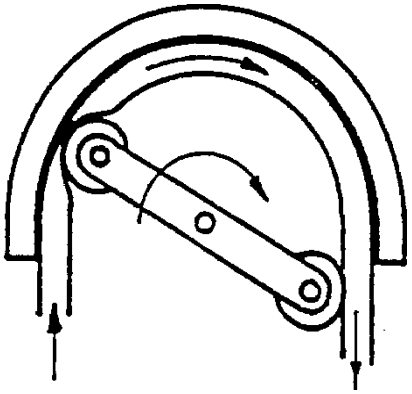
The recommended dosing performance will be selected time (max. 30 sec) and one for cycle time (B-1 til B-1 plate are for first orientation at the start of the dosing will be selected depending to the need following the w dosing pumps could be switched on or off by potential controlled switch for defined periods (day or night).



3.4 Dosing pumps:

The dosing line must be installed near to the suspension tank.
The hight of the dosing line must be in the recommended area shown in chapter 4.1 otherwise the suspension tank emptied uncontrolled or the dosing will be disturbed.

The rotated, spring controled rollers compressed the hose to the housing. The fluid in the hose is transported in front of the rollers and new fluid is sucted afterwards. Hence no valves necessary and the pumps are immune to impurities and air bubbles. It is ideal for metering suspensions. The pumps are running noiceless. The max. dosing performance is approx. 3.5 l/h.



3.5 Flushing of injection pipe

To enssure no blockage in the injection pipe a permanent flushing is necessary. Therefor approx. 10-20 l/h water are required, adjustable at the indication glas between the marks.
The water is taken from the filtrate of the filter circuit.

3.6 Stirrer

The stirrer motor is mounted on top of the tank. The stirrer must run continuously that no sedimentation happens. Only for maintenance reasons the stirrer should shut down. Viewing from above the rotation direction is counter clockwise.

Operation temperature of 60- 70 °C of the motor is normal.

Don't stop stirrer!

3.7 Level control

Low level will be indicated by a pressure switch. The pressure switch register the static pressure and hence the water level in the tank. At low water level the dosing stops and a failure is indicated.

3.8 Overflow

The overflow d40 must be connected to the waste water system with a free outlet. A PVC bow d40 is part of the supply.

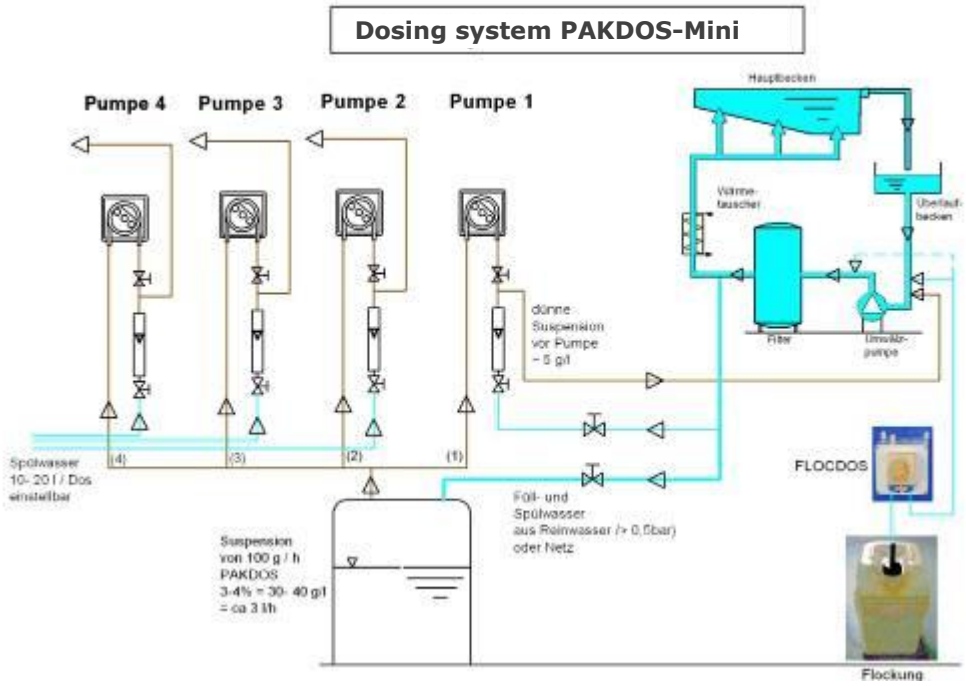
3.9 Emptyning

During the yearly cleaning the tank could be emptied. At the instalation dismantle the ½" plug at the lower side of the tank and srew in the ½" ball valve. The outlet of the valve should be connected to the waste water system.

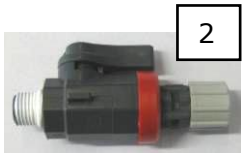
4. Mounting

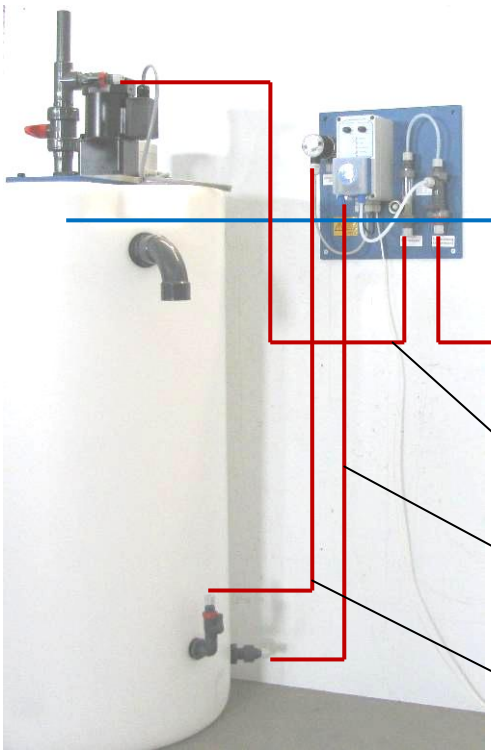
4.1 Assemply / water connection

The PAKDOS-Mini-S should be installed near by the filter and must be accessible. The water for preparation of the suspension must be connected to the filtrate pipe before heater with a PVC-pipe d25.



The flushing water is taken from the first circuit directly out of the filling pipe (1). The others are taken from the filtrate pipes of the circuits. The valves ¼" (2) are part of supply.





Dosing line
(dosing unit)

Mounting level
(optimal)

Connection of injection pipe (hose PE 6x1)

Connection flush water 1st pump
(hose PE 4x1)

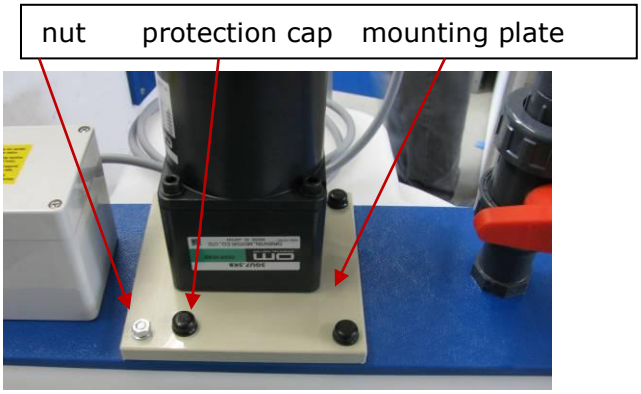
Suction tube
(hose PE 4x1)

Level indication
(hose PVC 4x1)

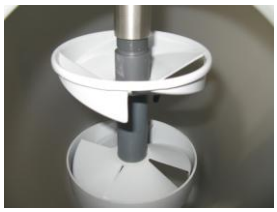
4.2 Electrical connection

The dosing equipment PAK-mini-S is supplied with Schuko connetor ready for operation.
For installation a Schuko connection box 230V 50Hz is necessary for the stirrer and one for each dosing line (20W for each dosing line). The connection box must be switched on for external controlling. By a potential free contact each dosing line could be switched on or off (see wiring diagram).

4.3 Stirrer



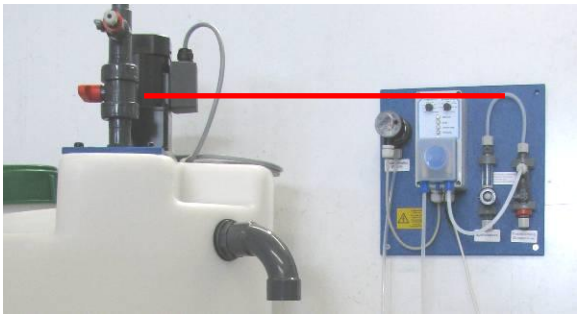
First remove protection cap from nut and loose the nuts of the mounting plate for the stirrer. Lift the plate with geared motor and support it.
Insert the stirrer shaft to the tank. Screw the stirrer to the shaft (only hand-screwed) inside the tank. Attention: left-hand thread! Put the adapter of the stirrer shaft onto the motor shaft and fasten it with the screw. Fasten now the mounting plate with stirrer (approx. **4 Nm** torque).



Attention:
The stirrer motor runs continuously and the temperature will be high (60 - 70 °C).

4.4 Erection of dosing line

The dosing line must be installed near by the suspension tank. The mounting hight of the dosing line must be at the shown level hereafter to ensure a failure fre operation of the system.

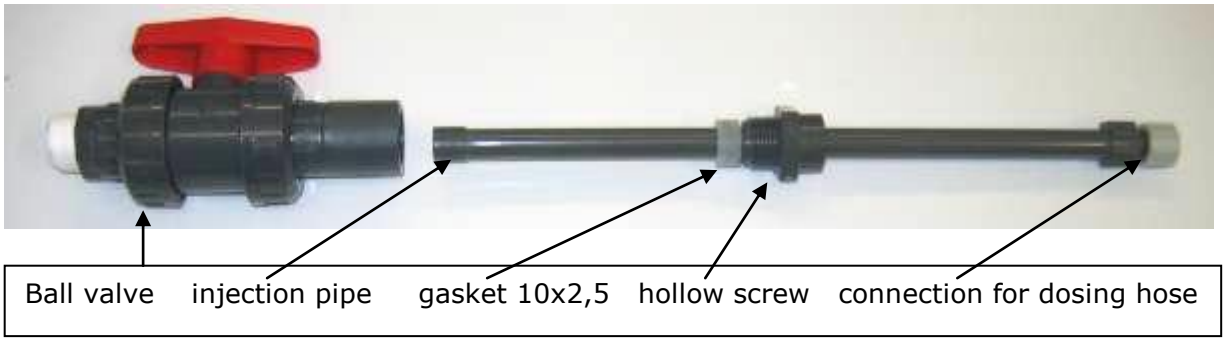


The peristaltic pump must be installed above overflow of tank (see level line).

One to four dosing lines are mounted to the erection plate.
Use the
PAKDOS-60 for higher dosing performance up to 1200 g/h PAC.

4.5 Injection lance for Pakdos Mini-S

Following the DIN 19643 the powdered activated carbon (PAC) should be dosed before the injection of flucculent as far as possible before the. Due to a good mixing of the PAC into the water as well as the low pressure and operating safety the injection must be before the circulation pump(s). Therefor a ½" bushing or a saddle clamp is necessary.



Attention:
Following the DIN 19643 the reaction time (flocculent / adsorption) should be 10 seconds. At a velocity of 1.5 m/s (or lower) a pipe length of 15 m is necessary for optimal flocculation / adsorption.

The ball valve (1/2") will be screwed to the injection point. If water in the pipe, close the valve.
The injection pipe (PE 6x1) with hollow screw Überwurfmutter ¼" – d8 is clamped to the injection pipe.
Pull the gasket 10x2.5 til the front block of the injection pipe. Put in the injection pipe in to the valve connection and fasten the hollow screw slightly.
If the valve is closed open now and pull in the injection pipe til the front of injection pipe will reach approx. the center of circulation pipe. Hence the gasket will be at the right position. If hand-fasten the hollow schrew the injection pipe will be fasten and tight by the gasket.

For dismantling the injection pipe first loose the hollow screw and pull out the PVC-injection pipe carefully til the block in valve. Now close the valve and loose the hollow screw complete and the injection pipe will be pulled out of the valve. Now the injection pipe could be cleaned or changed. The assembling follow this instruction counterwise. A change of the gasket must be necessary if injury happens.

Attention:
Please pull out the injection pipe til the block. Otherwise a break of injection pipe or valve may happen!

4.6 Dosing tube

The dosing tube **PE 6 x 1** to the injection should be installed in a protective pipe with low level difference. Select the shortest distance for piping.

Attention:
Don't kink the injection pipe, remove defect parts of piping.

4.7 Preparation of peristaltic dosing pumps

During the transportation and storage the roller of the pump is dismantled that no deformationen of the hose happens. Pull out the pump hose and put the roller upon the pump shaft. Now turn the roller right and put in the hose carefully in the gap. By turning the roller a few time the hose will be centred up. Now put on the safety disc on the shaft and the cover to the housing.
The suction pipe is fasten to the left connection.

Attention:
The counter pressure at the injection should be below 0.5 bar. We recommend dosing before the circulation pump directly into the suction nozzle. The pump hoses should be renewed frequently depending to the applied load.
At high dosing capacity may be all 1 – 2 month.

5. Start-up / operation

Attention:
To prevent a germ contamination of the suspension the pH in the buffer tank has to be kept below 2.

If the PAC isn't acidify, please add approx. 1 liter sulphuric acid (37 %) per 100 liter water.

5.1 Preparing suspension

Operation (workflow)		**Function of stirrer and dosing line**	**LED indication of control system of dosing line**
I.	Main switch of stirrer on. Dosing switch-off	Stirrer runs (be not switched) no dosing	LED operation on LED empty on LED dosing off LED failure on LED input[1] on/off [1] The input signal off or on is unnoticed if dosing doesn't work
	Ball valve at water inlet open	Stirrer runs Water enters no dosing	LED operation on LED empty on LED dosing off LED failure on LED input on/off
III.	At partly filled tankage fill in PAC (optionally acid too) slowly and carefully	Stirrer runs Water enters no dosing	LED operation on LED empty off LED dosing off LED failure off LED input on/off
IV.	Close the inlet valve if tankage is filled	Stirrer runs Water stops no dosing	LED operation on LED empty off LED dosing off LED failure off LED input on/off
V.	Switch on dosing, select dosing performance (see chapter 3.3)	Stirrer runs Dosing starts	LED operation on LED empty off LED dosing on LED failure off LED input on
VI.	Open ball valve für flushing, adjust the valve at the indication glas til ball is at the middle (see chapter 3.5)	Stirrer runs Dosing runs intermittent acc. to selection	LED operation on LED empty off LED dosing on/off LED failure off LED input on/off

5.2 Adjusting of dosing performance

The effective need of powderd activated carbon (PAC) depends to the pollution of the swimming pool water by organics, the required water quality and kind of filter.
For the start-up we recommended to use a dosing performance of **0.5 Gramm PAC/m3/h** for **sandfilter** and **1 Gramm PAC/m3/h** circulation capacity for pre-coated filter.

At dust-free PAC normally up to 50% water and acid included. Hence a standard package with 6-kg contents approx. 3 kg PAC. Please consider for preparation of PAC concentration. With one PAC-package in 100 liter water gets a suspension of 3%, means approx. 30 g/l.

The dosing performance of powderd activated carbon results of the PAC-concentration in the suspension and the dosing capacity of the pump.

The dosing performance is defined by the operation time of the dosing pump between 5-30 seconds and the cycle length (1 – 15 minuts – adjustable awith programme B1-B15). – see table

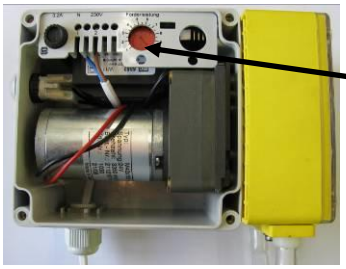
Table of dosing performance

Pumpe UNPL – with hose 4.8 x 2.4 approx. 3.3 l/h max.

Cycle time in minuts	Operation time in seconds	Dosing performance suspension in ml/h	PAC concentration in g/h
B 1	5-30	550 - 3300	16.5 - 100
B 2	5-30	275 - 1650	8.3 – 49.5
B 5	5-30	110 - 660	3.3 – 19.8
B 10	5-30	55 - 330	1.7 – 9.9
B 15	5-30	37 - 220	1.1 – 6.6

Pumpe UNPL-mit Schlauch 6.4 x 2.4 bei Einstellung der maximalen Drehzahl in der Steuerung.

Cycle time in minuts	Operation time in seconds	Dosing performance suspension in ml/h	PAC concentration in g/h
B 1	5-30	1400 - 8500	42 - 255
B 2	5-30	700 - 4250	21 - 128
B 5	5-30	280 - 1700	8.5 - 50
B 10	5-30	140 - 850	4.2 – 25.5
B 15	5-30	100 - 560	3- 16.8



Reduction of dosing performance at Poti between 1(10%) to 10 (100%)

The numbers in table descripes adjustment at 10 (100%).

5.3 External control

The dosing lines could be switched on or off by an external control.
No spontaneous influence to the water quality will happen hereof due to the slow action of the PAC.
Connection according to the wiring diagram (chapter 7).

5.4 Failure indication

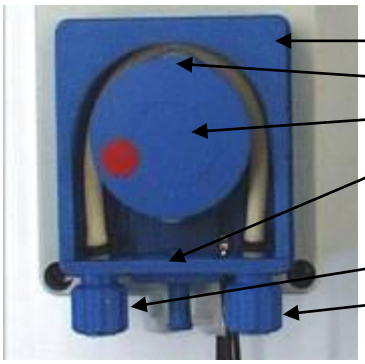
- The failure indication is shown by the LED's.
- Leckage contacts are installed at the dosing pumps and the LED „failure" burns in case of leckage. The dosing pump stops and an alarm is generated.
- All pumps are switched of if tankage is empty and the LED „failure" burns and an alarm is generated.
- If main fuse (3.15 A) falls at stirrer:
  no function of stirrer → check failure (short-circuit etc.), repair and change fuse.

6. Maintenance

6.1 Change of hose dosing line 3.5

The dosing hoses of the peristaltic pumps have to be changed every 1-3 month. Switch off pump for change and close ball valve

Dismantle the transparent pump cover and the safety disc and lightly pull forward the hose holder. Turn the roller right and pull out the hose.
Cut lace and take care of the nozzle. Put the dosing hose – marks to front – onto the nozzles. Hence the hose is not twisted. Fix the hose ends with the laces.



Attention
The hose should not mount twisted!

See coloured marks!

Put the roller upon the pump shaft, turn right and put in the hose carefully in the gap. By turning the roller a few time the hose will be centred up. Now put on the safety disc on the shaft and the cover to the housing. Open ball valve and switch on the pump.

For shutdown of the dosing system the dosing hoses and pipes must be flushed for 10 minutes. Afterwards dismantle the pump hoses.

6.2 Change of hose dosing line 10

The dosing hoses of the peristaltic pumps have to be changed every 1-3 month. Switch off pump for change and close ball valve

Dismantle the transparent pump cover and the safety disc and lightly pull forward the hose holder. Turn the roller right and pull out the hose.
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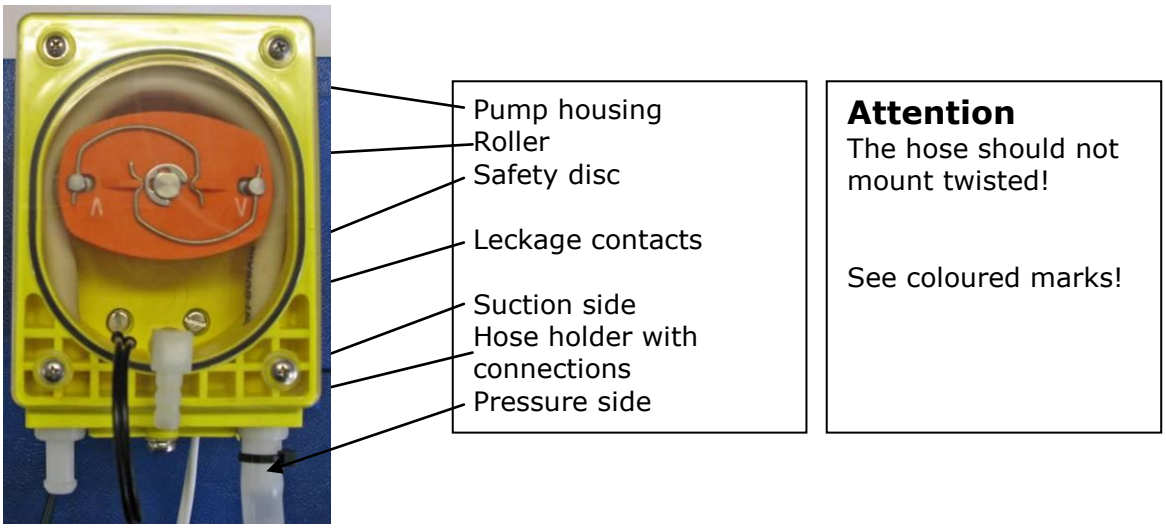


Put the roller upon the pump shaft, turn right and put in the hose carefully in the gap. By turning the roller a few time the hose will be centred up. Now put on the safety disc on the shaft and the cover to the housing. Open ball valve and switch on the pump.

For shutdown of the dosing system the dosing hoses and pipes must be flushed for 10 minutes. Afterwards dismantle the pump hoses.

6.3 Cleaning level indication

Every 2 – 6 months the pipe for level indication must be cleaned.

Close the ball valve at the tankage and loose the connceting hose at the pressure switch. Put on the syringe, reopen the ball valve and push air in the pipe. Ensure that no suspension is in the hose. Close the ball valve, connect the hose and reopen the ball vlave.

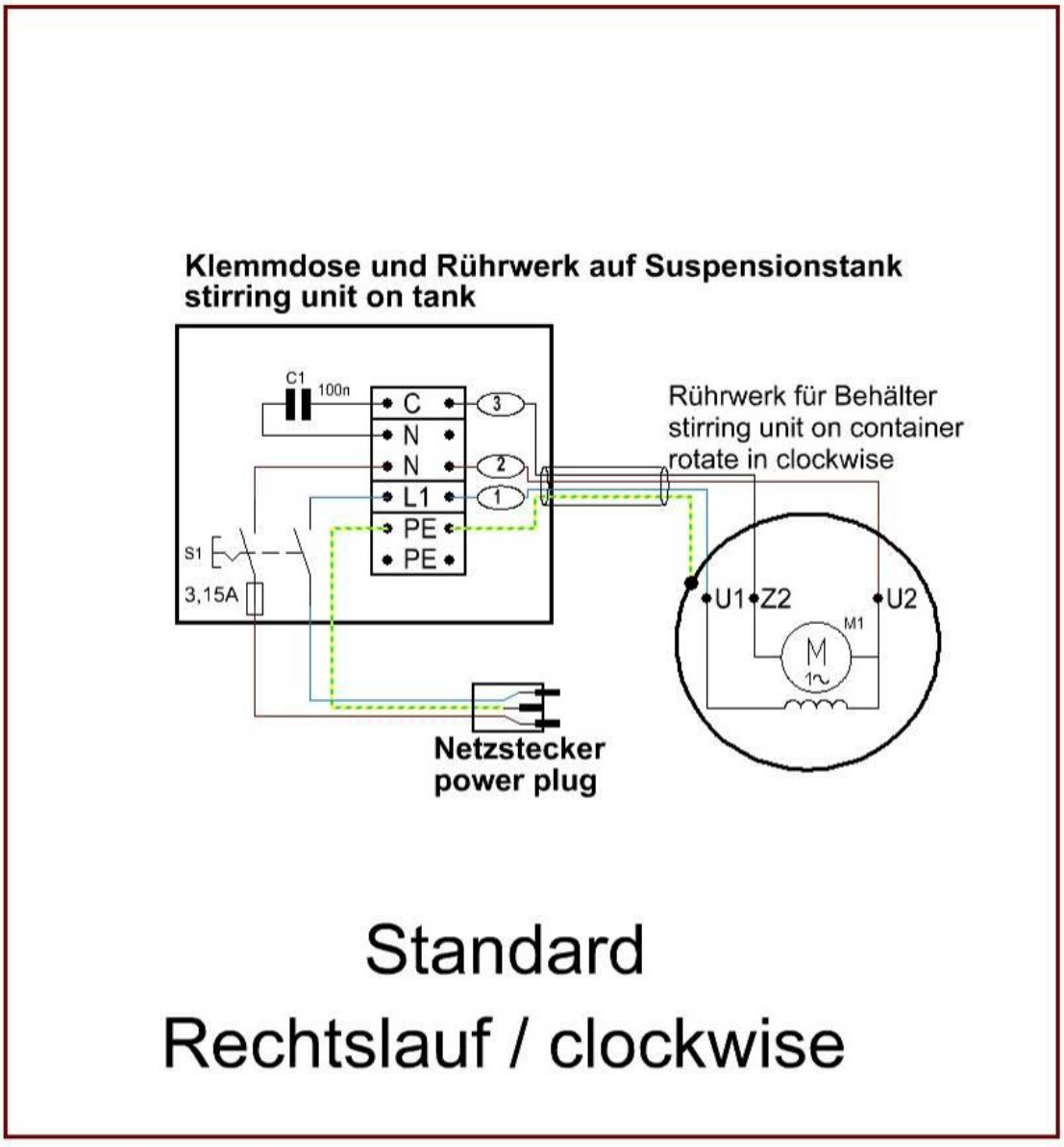
6.4 Cleaning of the suspension tank

The tank has to be cleaned taillings free yearly.

7. Wiring diagram

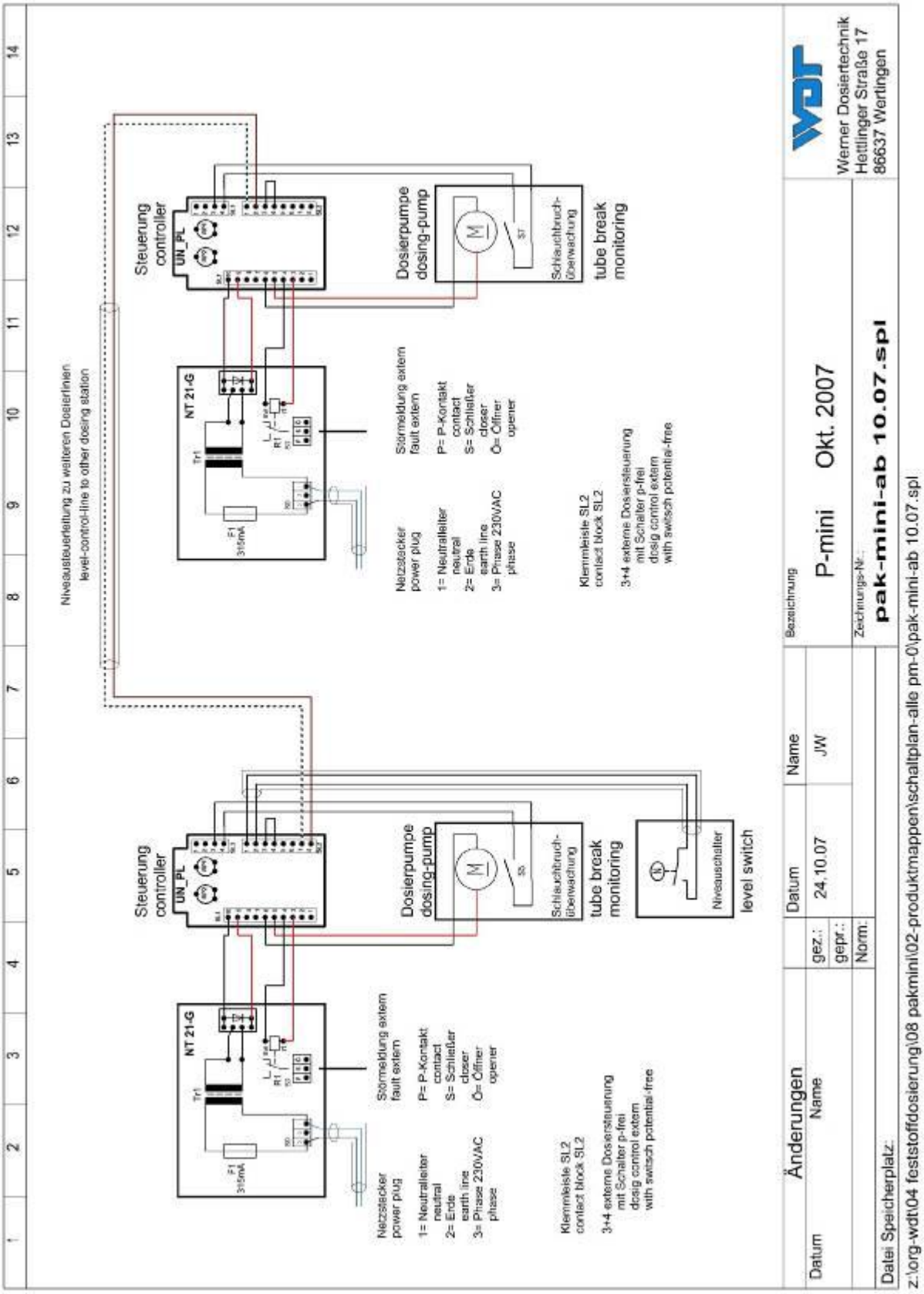
7.1 Wiring diagram of motor

Viewing from upper site to the stirrer it must run counter clockwise.

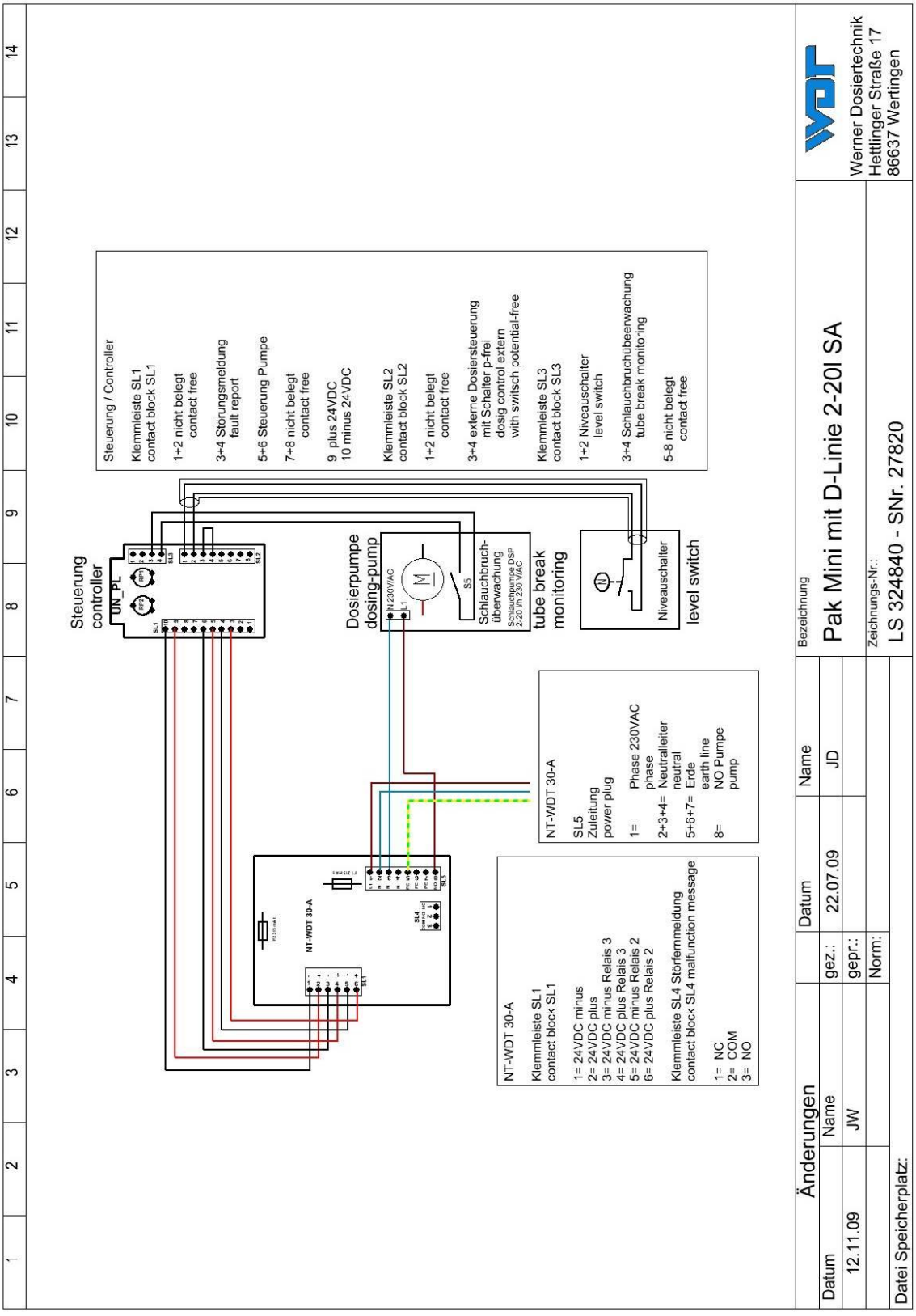


7.2 Wiring diagram of dosing line 3.5

To use a external control the bridge at connector SI2 between the connecting points 3 and 4 has to be removed.

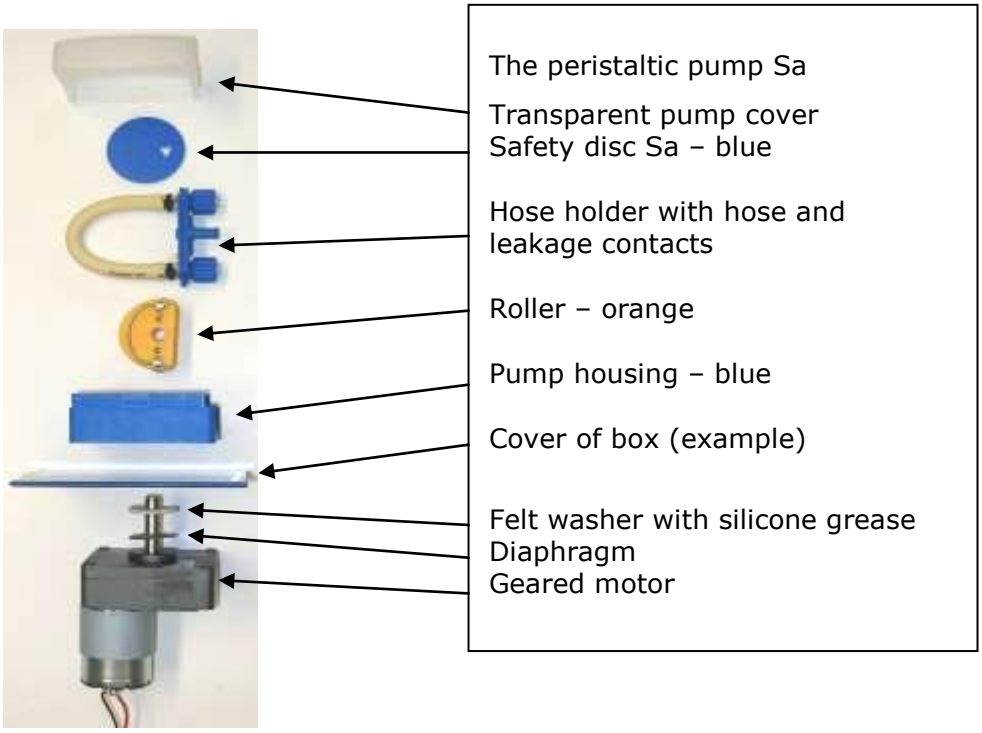


7.3 Wiring diagram of dosing line 10



8. Spare parts list

8.1 peristaltic pump 3.5



Description	article No.
Geared motor SA	14982
Pump housing SA blue	14140
Roller SA orange	13705
Hose holder 4.8x2.4 with hose	16347
Safety disc Sa blue	13633
seal kit set (felt washer, diaphragm, silicone grease)	20033
Hose kit 4.8x2.4 (2 pieces)	20311

8.2 Controller

Controller plate UNI1-V3	19357
Transformer board NT 21G	18714
Spare fuse 315mA	16840
Pressure switch M10x1 - 60mm	10080
Housing of pressure switch	10083

8.3 Dosing technics

Dosing equipment 6x1	12168
Injector 6x1	12169
Gasket dosing lance Si 12x3x10	12650
Injection pipe PE 6x1	10435
Flushing pipe PE 4x1	12064
Ball valve ¼"- 4x1	20132
suspension extraction PM for one dosing line	20124
suspension extraction PM for two dosing lines	20125
suspension extraction PM for three dosing lines	20126
suspension extraction PM for four dosing lines	17954

8.4 Additional spare parts for peristaltic pump dosing line 10

Description	**article No.**
Peristaltic pump 20 l complete	15811
Hose kit 6.4x2.4x228 mm	19275
Transformer board NT-WDT 30A	20607
Roller SA red 20/50	14923
Pump complete SA 20/50 w/o controller	12652
Pump cover SA 20/50	14924
Pump housing SA 20/50	14922

8.5 Spare parts P-mini 100 yellow tankage

Stirrer	14454
Motor	10971
Gear	10970
Flushing set	20137
Tankage yellow	12952

8.6 Spare parts P-mini 100 cylindrical tankage

Stirrer	
Motor	10971
Gear	10970
Flushing set	20138
Tankage 100 liter	20237

8.1 Spare parts P-mini 200 cylindrical tankage

Stirrer	12073
Motor	10973
Gear	10972
Flushing set	20138
Tankage 200 liter	10013

8.1 Spare parts P-mini 300 cylindrical tankage

Stirrer	16407
Motor	10973
Gear	14695
Flushing set	20138
Tankage 300 liter	10015

8.1 Spare parts P-mini 500 cylindrical tankage

Stirrer	20135
Motor	10973
Gear	14695
Flushing set	20138
Tankage 500 liter	14058