

# Operating instructions PAKDOS - 60



Commissioning Form for PAKDOS 60 - V61

Please see hereto § 4 Commissioning

Objekt:.....date.....

PAKDOS-Type:.....year:.....ser.no.....

Commissioning undertaken by.....sign.....

Sign of operator:.....

1. Dissolving system (at switches note 6 seconds delay!)

- 1.1 Adjust pressure switch: see § 4.4 [ ]
- 1.2 Check pressure switch: close inlet ball valve- L2 burns, GR stopp [ ]
- 1.3 Check flow switch: close outlet ball valve - dos. off, L1 burns [ ]
- 1.4 Check level switch: switch body up - dos. off, L1 burns [ ]
- 1.5 Check level switch: switch body down - PAKDOS stopps, L2 burns [ ]
- 1.6 Adjust water level: - adjust washer to pressure conditions [ ]
- 1.7 Check function of floating valve: water flow reacts smoothly [ ]
- 1.8 Adjust spray nozzles: see § 4.3 [ ]

2. Dosing unit

- 2.1 Function heating nozzle: dosing tube warm [ ]
- 2.2 Function empty switch: turn drum - L4 burns [ ]
- 2.3 Function dosing motor: programme „B5" - carbon dosed [ ]
- 2.4 check clamp bands and safety belt [ ]
- 2.5 introduction to drum change § 5.1 [ ]
- 2.6 adjust dosing capacity § 5.2 [ ]

3. Control unit - after opening of the housing

- 3.1 check all push connectors: well pushed in [ ]
- 3.2 External control:  
programme "BZ" with switch timer or external contact (see § 5.4) [ ]

4. Other jobs

- 4.1 Clean PAKDOS thoroughly [ ]
- 4.2 Clean environement of PAKDOS thoroughly [ ]
- 4.3 Operation instructions discussed and handed to the operator [ ]

**No warranty without fully signed commissioning form!**

## Table of Content

|  | page |
|--|------|
| <b>1. Function</b>   | 4    |
| <b>2. Technical description</b>                                  | 4    |
| 2.1 Framework with drum carrier                                  | 5    |
| 2.2 Powder dosing head   | 5    |
| 2.3 Suspensions- and flushing device                             | 6    |
| 2.4 Control board PAK 60   | 7    |
| 2.4.1 Programmes   | 7    |
| 2.4.2 Supervision / external switch off                          | 8    |
| 2.5 Demands to the quality of the carbon powder                  | 8    |
| <b>3. Mounting</b>   | 8    |
| 3.1 Installation into the water circulation                      | 8    |
| 3.1.1 Water take off before the filter                           | 9    |
| 3.1.2 Water take off behind the filter - standard                | 10   |
| 3.1.3 Use of town water  | 10   |
| 3.1.4 How to avoid an overflow                                   | 10   |
| 3.2 Suspensions distribution to several filters                  | 10   |
| 3.3 Mounting of the water take off and suspension injection      | 10   |
| 3.4 Electrical installation                                      | 11   |
| <b>4. Taking into service</b>                                    | 11   |
| 4.1 Water flow through the flushing tank                         | 11   |
| 4.2 Water level adjustment                                       | 11   |
| 4.3 Adjustment of the spraying nozzles in the suspension device  | 11   |
| 4.4 Adjustment of the pump pressure switch                       | 11   |
| 4.5 Fitting of drum to PAKDOS 60                                 | 12   |
| <b>5. Operation</b>  | 13   |
| 5.1 Drum change  | 13   |
| 5.2 Adjustment of the dosing performance – Program switch on „B“ | 14   |
| 5.3 Back wash– isolation of the PAKDOS                           | 15   |
| 5.4 Control of the PAKDOS by a timer / SPS / performance control | 15   |
| <b>6. Irritations indication – LED meaning</b>                   | 15   |
| 6.1 Short diagnosis  | 15   |
| 6.2 Irritations identification - short                           | 16   |
| 6.3 Irritations identification – trouble shooting                | 17   |
| 6.4 Maintenance – taking out of service                          | 19   |
| <b>7. wiring plan - fuses</b>                                    | 19   |
| 7.1 Connector housing dosing hopper                              | 19   |
| 7.2 Connector housing flushing tank                              | 19   |
| 7.3 Power plate with external control                            | 20   |
| <b>8. Maintenance protocoll</b>                                  | 22   |
| <b>9. Spare parts list</b>                                       | 23   |

## 1. Function

By dosing powdered activated carbon (PAC) onto the filter the concentration of unwanted and dangerous water ingredients as hydrocarbons and chlorinated hydrocarbons are reduced to about 10-20%. At diatomite filter this technique is stand of the art (DIN 19643).

The dosing machine PAKDOS 60 meters the PAC by means of a dosing screw directly from the container into a suspension device, from where the suspension is conveyed to the filter system by a venturi nozzle. The high dilution of the carbon powder leads to good mixing into the raw water flow to be treated. The suspension produced in the PAKDOS can be distributed to up tu 4 filters.

Basis for an effective use of the PAC to improve the water quality is a good functioning filter as to the DIN 19643.

**Attention! The different powder qualities need very often different dosing screws for good function. If there are problems, do not hesitate to contact us.**

## 2. Technical description

the dosing machine PAKDOS 60 consists of:

- Frame with turnable drum carrier
- Suspensions and flushing tank with Venturi nozzle and booster pump
- Control unit
- Water tapping device
- Pneumatique valves (option)
- Suspensions distribution (option)

measures: space app. 60x70 cm  
heigh app. 146 cm  
weight app. 50 kg

material: steel, powder coated  
other functional parts:  
PVC, PE, ABS  
seals: Viton, EPDM

container/drum: PE – drum 60 l (Euro)  
filling weight 15 – 25 kg

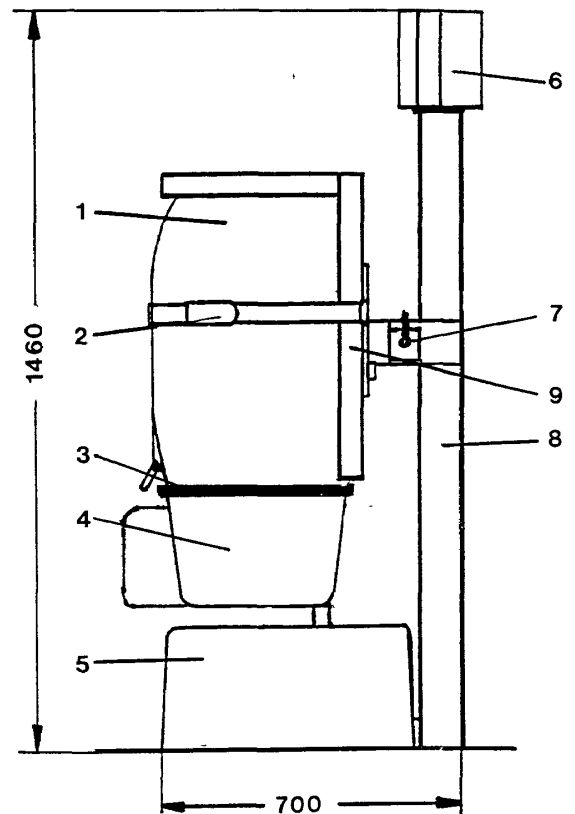
dosing perform: Typ PAK 1200: 10 – 1200 g/h  
Typ PAK 5000: 50 – 5000 g/h  
Also dependent to the powder quality

Booster pump: Centrifugal pump 230 V / 0,33 kW  
Supply pressure : 0,2 – 2 bar  
counterpressure: 0 – 1,8 bar,  
dependent on supply pressure  
see para 3.1

water flow: 1000 - 1500 l/h

electric supply:

mains plug 230 V +/- 6%, to be linked to filter pump,

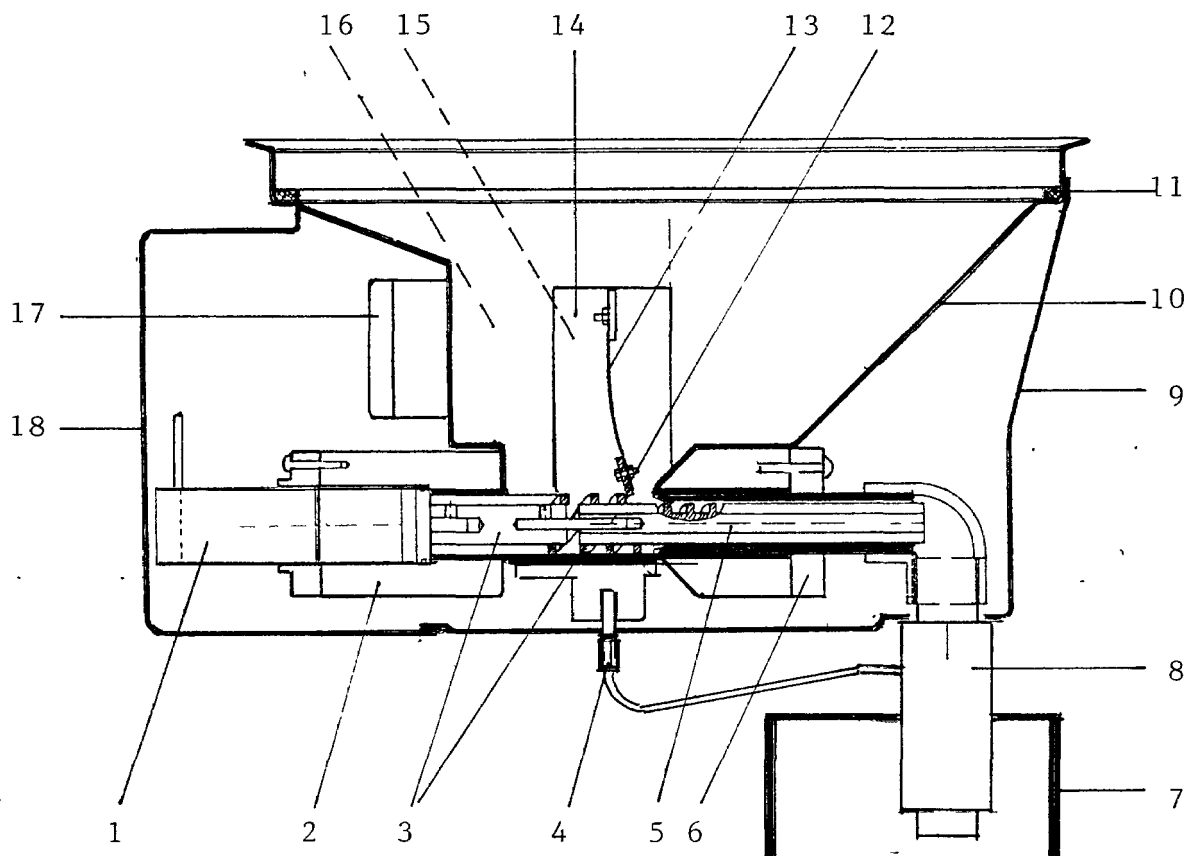


- |   |                                    |
|---|------------------------------------|
| 1 | drum                               |
| 2 | belts for fasten drum              |
| 3 | drum ring for fasten dosing hopper |
| 4 | dosing unit                        |
| 5 | suspension unit                    |
| 6 | control system                     |
| 7 | locker for drum carrier            |
| 8 | supporting stand                   |
| 9 | drum carrier                       |

## 2.1 Standsäule mit Fassaufnahme

The rotating drum carrier assembly (9) is fixed to the main vertical support (8). The drum (1) with PAC is fixed on the carrier assembly (6) by 2 band clamps (2). The dosing hopper (4) is fixed on the drum in place of the drum lid by use of the spanning ring (3) of the drum. The carrier with the drum is then turned through 180° to the dosing position, the chemical is dosed into the suspension system (5) where it is fully suspended and conveyed by a venturi to the filter tubing.

## 2.2 Dosing head



- |                                      |  |
|--------------------------------------|--|
| 1 dosing motor                       | 11 drum seal                           |
| 2 motor holder                       | 12 wore plate for powder activation    |
| 3 moving screw for powder activation | 13 flat spring for powder activation   |
| 4 connector for dosing tube heater   | 14 fitting plate for powder activation |
| 5 dosing screw                       | 15 solenoid knocker (not shown)        |
| 6 guide tube for dosing screw        | 16 empty switch (not shown)            |
| 7 seal tube                          | 17 connector housing                   |
| 8 dosing tube heated                 | 18 cover for dosing motor              |
| 9 cover for dosing hopper            |  |
| 10 dosing hopper                     |  |

The dosing head is mounted onto the drum instead of the drum lid and fixed by using the original spanning ring for the lid. An capacitive switch indicates "drum empty" through the wall of the dosing hopper.

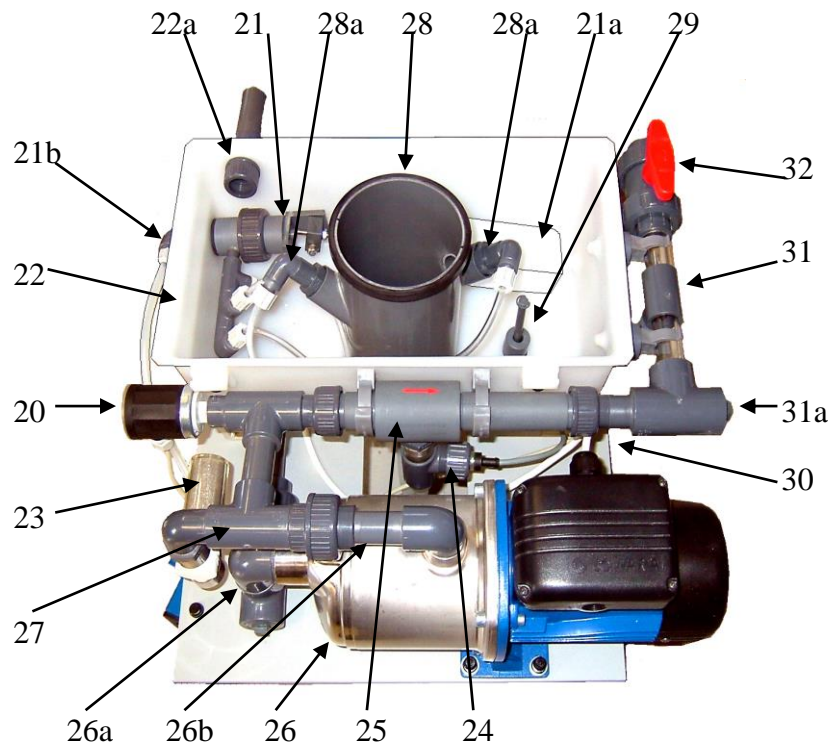
The powder is activated by a knocker that gives every some seconds a stroke to the hopper wall. To avoid condensation in the dosing tube (8) this is heated.

The dosing performance is adjusted to the needs of the water treatment by adjusting dosing cycles: At every start of a dosing cycle adjustable by the front switch S3 the dosing screw runs for a certain time, to be adjusted by the front switch S4. The dosing performance is very dependent on the quality of the powder. So the adjustment according to the table on page 13 is only a thumb value. But at the end we have to adjust the dosing performance according to the readings of the water quality. If the water quality is not good enough we have to dose more, is it better than wanted, we can reduce the dosing.

### 2.3 Suspension system

For the function of the PAKDOS the pressure conditions are important. The limits are described under para „Mounting, page 7.

At the standard type the suspension water comes from the circulation water behind the filter. (supply pressure min. 0,2 bar). Behind the booster pump (26) the high pressure water is distributed at the distribution part (27) via the floating valve (21) to the suspension tube (28 - through the rain nozzles 28a) and flushing water through a side nozzle at the floating valve and booster water to the venturi nozzle (25).



|     |  |     |   |
|-----|--|-----|---|
| 20  | pressure switch  | 26b | pump connector pressure side 1"                           |
| 21  | floating valve   | 27  | pressure water distribution PAK                           |
| 21a | floater of floating valve                                  | 28  | suspensor   |
| 22  | flushing tank  | 28a | rain nozzles (2 pieces)                                   |
| 22a | overflow   | 29  | level switch  |
| 23  | filter 300 $\mu$ for flushing water                        | 30  | pressure washers (in union)                               |
| 24  | flow switch  | 31  | transparent detection tube -<br>with Opto-sensor (option) |
| 25  | venturi nozzle   | 31a | gauge connector 1/4"                                      |
| 26  | booster pump   | 32  | isolation valve d25                                       |
| 26a | pump connector suction side<br>1 1/4" with gauge connector |     |   |

The produced PAC-suspension is sucked off by the venturi (25) from the suspension tube. The black powder is to be seen shortly after dosing in the transparent suction tube (with the

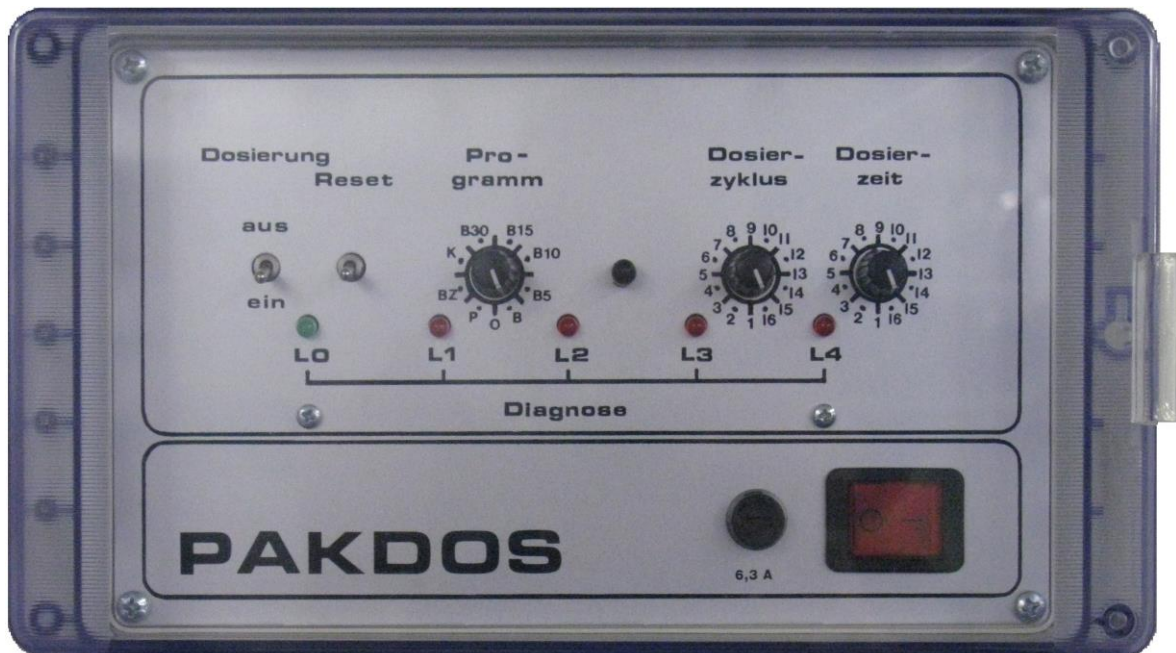
flow switch 24) and the transparent detection tube with the optional available opto-sensor to monitor the dosing function. The suction power of the venturi is adjusted at taking into service by fitting a washer into the union behind the venturi nozzle: is the suction power too high, use a nozzle with smaller hole, is the suction power too low, use one with bigger hole. A set of these washers is packed by to the machine. The pressure and flow situation is monitored by the pressure switch (20) on top of the booster pump, level switch (29) in the flushing tank and the flow switch (24) below the venturi. Dosing and also the booster pump are switched off in case of any irritations situation. The irritation is indicated by the 4 red LEDs at the front plate. The switch bobbin of the flow switch (24) functions as a non return valve to avoid a high rate backflow of suspension from the flushing tank in case of switch off. To avoid completely a backflow at switch off, e.g. at back wash of the filter, pneumatic isolation valves may be installed in the supply and dosing tube.

Switching the PAKDOS through a timer watch and using the program BZ the tubing of the PAKDOS is rinsed for 1 minute without dosing to clean the tubing.

## 2.4 Control system

The microprocessor based control system fits three functions:

- Dosing and test programmes with 3 switches
- Functions and irritations identification by means of 1 green and 4 red LEDs  
If an irritation occurs, the dosing is switched off automatically
- Short diagnosis and function check



### 2.4.1 Programmes

**4 test programmes to check the set dosing performance:**

- B 5: dosing 5 minutes
- B10: dosing 10 minutes
- B15: dosing 15 minutes
- B30: dosing 30 minutes

After the end of the test the green LED is blinking



- K: knocker 1 minute all 4 seconds – no dosing  
 P: - only for authorised personal.

## 2 service programs:

- B: normal service program with continuous dosing  
 BZ: service based on timer watch. Dosing is active, when the control input on conn. S04,7-8 is closed. If the input is opened dosing is stopped, the booster pump is running on for another minute to flush the dosing tubing. The green LED is blinking.

This program may be used for an external dosing control e.g. if a measuring system for the combined chlorine is used. Within a cycle time of 1 minute dosing may be activated from 1-60 seconds. See para 5.4

If changing a program dosing stops and the green LED blinks for 4 seconds.

### 2.4.2 Monitoring / external switch off

**All functions are monitored.** In the case of an irritation, dosing is switched off, the irritation is indicated and identified by means of the LED. Dosing is indicated by flickering of the LED 4. Remote fault control non volt is available – see wiring diagram para 6.

**For daily** switch off it is recommended to use the program **BZ** for timer control.

### 2.5 Needed specification of the carbon powder

there are a lot of different qualities of PAC on the market. They differ in the physical properties as in the selectivity on the water chemicals. For a wanted effect on the water quality with different PAC may be needed different dosing rates. So it may be necessary to alter the dosing rates / the set values at the front plate even from 1 drum to another.

A high content of fine dust or humidity may lead to blocking of the screw. Coarse grains may block the suspension tube or the venturi nozzle.

**Attention! Some qualities need special dosing screws. Please contact us if problems with the dosing occurs.**

## 3 Mounting

### 3.1 Installation of the PAKDOS into the water circulation

for mounting and operation a place of app. 1x1,5m is needed.

For a good function the pressure conditions are important. So we use 2 booster pumps for different pressure levels. For a low pressure level, e.g. preferred dosing before the circulation pump, we use the pump HMS3 which may cover following pressure levels:

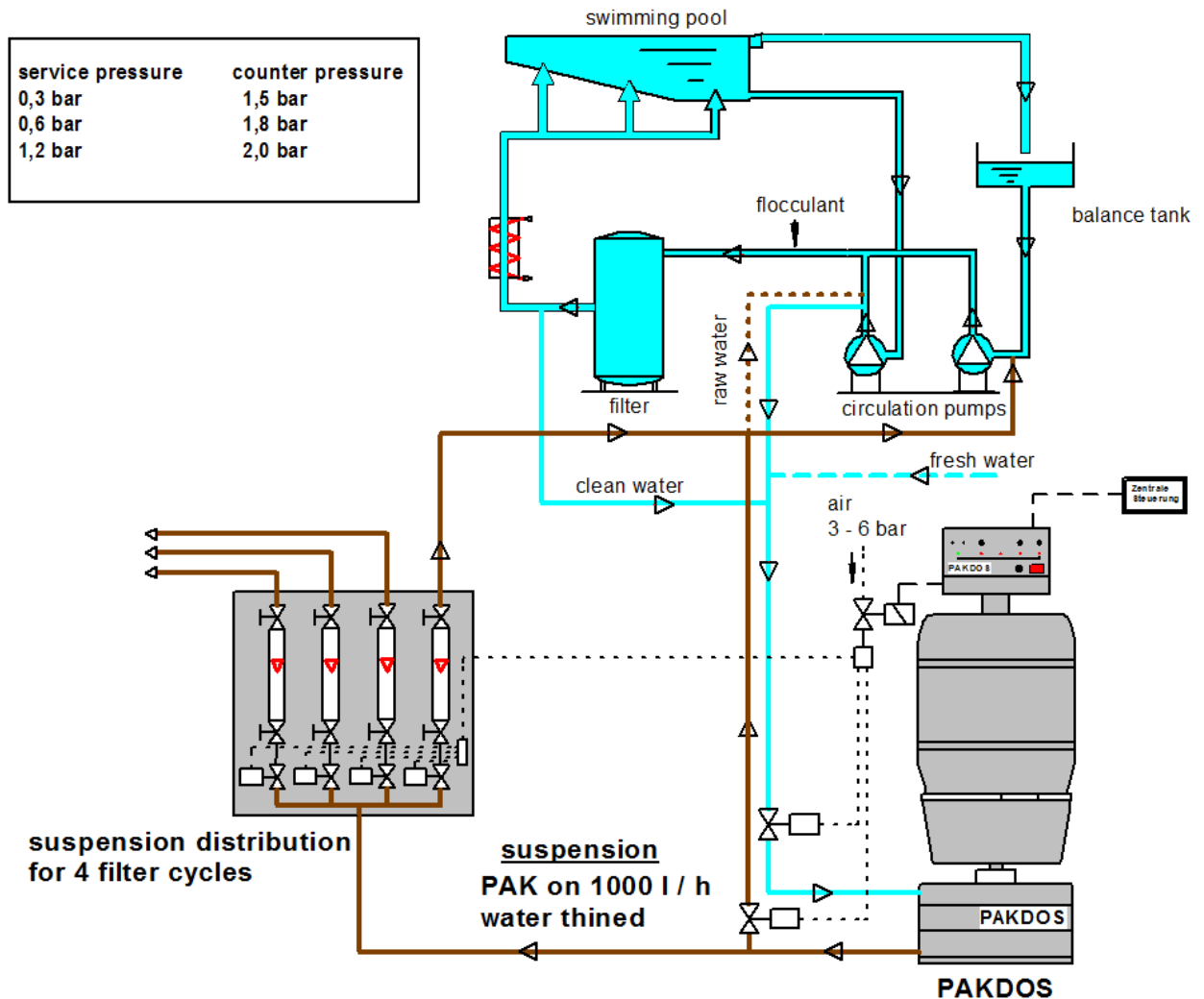
|                    |         |                           |         |
|--------------------|---------|---------------------------|---------|
| At supply pressure | 1,2 bar | possible counter pressure | 1,4 bar |
|                    | 0,6 bar |                           | 1,1 bar |
|                    | 0,3 bar |                           | 0,9 bar |

for higher counter pressures we use the pump HMS4 with which pressures may be covered



|                    |         |                           |         |
|--------------------|---------|---------------------------|---------|
| At supply pressure | 1,2 bar | possible counter pressure | 2,0 bar |
|                    | 0,6 bar |                           | 1,8 bar |
|                    | 0,3 bar |                           | 1,5 bar |

To measure the existing pressures before and behind the booster pump there are hose unions 6x1 to connect the water gauge supplied with the machine.



### 3.1.1 Water take off between circulation pump and filter

respectively to the pressure conditions see before

1. water take off directly behind the filter pump before the non return valve
2. dosing behind the non return valve before injection of the flocculant but behind take off of the probe water
3. pay attention to low pressure loss:
  - short distances
  - hose 1" or tubing d25, for longer distances use bends instead elbows
  - only use the by-packed isolation valves
4. for the connections female threads 1" are needed with no enclosers. The diameter of the water take off tube is 26mm.

### 3.1.2 Water take off from behind filter:

In an outdoor pool it may be advantageous to take the water from behind filter as this water is cleaned by the filter. Here is only to be seen for the pressure situation. The booster pump of the PAKDOS needs a positive pressure of at least 0,2 bar. Dosing point principally before the circulation pump.

### 3.1.3 Use of town water

Town water is used best

- at diatomite filters where only few fresh water is needed for the back wash of the filter and fresh water is added anyhow.
- if the supply of several filters with the PAC suspension from one filter circulation makes problems

**Supply pressure min 3 bar. - mount a pressure control device  
Pay attention to the regulation to protect the town water.**

### 3.1.4 How to avoid an overflow

At switch off of the PAKDOS 60, especially at irritations of the filter system or only at automatic filter back wash, the open flushing system of the PAKDOS remains connected to the water circulation. As the standard isolation devices to the flushing tank, as floating valve and flow switch bobbin are not able to isolate 100% (especially when the maintenance is not made correctly), we get a slight overflow of black water.

A 100% isolation is only possible by installing membrane valves to the inlet and outlet of the machine which are closed automatically if an irritation leads to a stop of the machine.

### 3.2 Suspensions distribution on several filter circulations (PAK SV)

The suspension produced by the PAKDOS 60 of app. 1000 l/h can be distributed to several different filter circulations by dosing lines. The device consists of an isolation ball valve d25, a flow meter 100-1000 l/h as a ball valve d20V to adjust the flow to the filter. For automatic function we use pneumatic membrane valves which isolate **all dosing lines** at an irritation event at one filter. A short interruption of the PAC dosing does not affect the general cleaning effect of the PAC.

**Water take off from behind the filter, dosing point before the circulation pump.  
Never mount additional isolation valves to the system!**

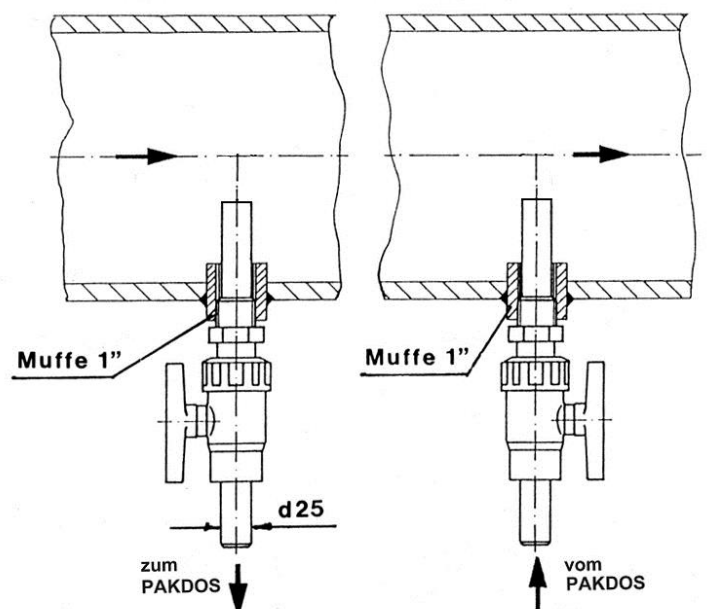
### 3.3 Mounting of the water take off and suspension injection device

**Attention! The elbow injection tubes have a diameter of 26 mm. The female threads must be free!**

Cut the injection tube as shown and glue it into the ball valve connection.

- Mark the opening side of the elbow tube at the adapter.

- after hardening ( app. 1 hour ) screw in the injection device as shown in the picture. To tighten the connection only seize the adapter! Otherwise you could loosen the glue.



### 3.4 Connection of the control cables to a central control board

For the fault remote and to control the machine you need for both a non volt contact to be connected on the control plate of the PAKDOS - see para 7.

**Principally use only flexible cables max. 0,5<sup>2</sup>**

### 4. Taking into service / adjustment of the flushing system (see diagram page 5)

Dosing is switched off at the front plate, the valves at the tapping points are open. The valves at the PAKDOS are closed.

Now open the inlet ball valve top of the filter. Water flows into the tank. When the tank is half full, open the outlet ball valve at the machine and switch on the machine.

If town water is used the machine can be switched on immediately after opening all valves.

#### 4.1 Water flow

A good water flow through the flushing tank is the basis of a good function of the PAKDOS.. this flow relates to the suction power of the venturi. By means of the washer (30) this suction performance is adjusted to the pressure conditions. If the water level in the tank falls steadily, the suction power is too big, you must fit a washer with a smaller bore. If the level rises, you need a washer with bigger bore or use without washer. The switch bobbin of the flow switch must be pressed up in the flow switch holder (24), the LED at the switch must not burn.

Off works a washer with a 6mm bore is fitted, washers with bores 5,5 and 7mm are in the spare parts kit in the by-pack. If there is no good flow possible, meter the supply and counter pressure and compare with the table para 3, page 6. for this a water gauge is packed by which is to be connected to the adapters 26a und 31a.

**Attention! At the mounting works different particles may be fallen into the flushing tank as cut parts from cable or pvc. Durch mehrmaliges Abdrücken des Saugschlauches oder Schließen des Ablaufhahnes die Beweglichkeit des Schaltkörpers prüfen.**

**Vibriert das Schwimmerventil am Arbeitspunkt, Schwimmerventil öffnen und den O-Ring am Ventilkegel abnehmen**

#### 4.2 water level in the flushing tank

A higher level you get by crewing out the floater (21a) a lower level by screwing it in. one turn relates to app. 1 cm. Please adjust the level at the situation of good flow through the tank to medium between level low and level high.

#### 4.3 Adjustment of the rain nozzles

The suspension water to humidify the powder falling onto the water surface should rain smoothly from the nozzles (28a). For adjustment you screw in or out the by-pass nozzle at the outlet of the floating valve: comes the water from the rain nozzles too hard, open the by-pass nozzle and reverse. If the water comes too hard, the fine droplets may come up to the dosing nozzle and this could be blocked.

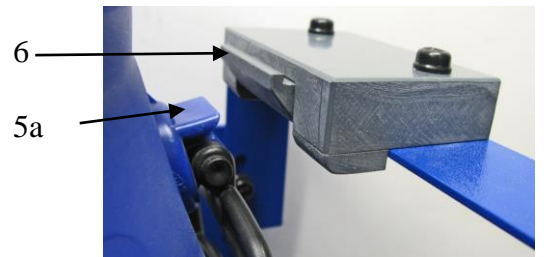
#### 4.4 Adjustment of the pressure switch

The pressure switch, fitted pressure side of the booster pump, is to monitor the performance of the pump. If the pump runs well, there should be a pressure of at least 1,5 bar. If the pressure falls down, obviously there is something wrong with the pump: maybe air in the supply tubing, anything broken. Off works the switch is adjusted to 1,5 bar. On

operation the switch point can be changed by the adjusting screw from 1-3 bar. If changed, it must be sure, that at any operating time the supply pressure is minimum 0,2 bar.

4.5 **Fitting of drum to PAKDOS 60**

**Attention!** The powdered activated carbon will be delivered in 60 l-drums. There are different executions of the drum holding bow. For fitting the holder (2), the holding bow (3) could be adjusted with the 4 screws (4) to enable a correct fastening of the drum and the drum could not glide off by turning the drum. For fitting the holder (2) to the different moulding parts of drum (5,5a) you will find a shaped piece (6) at the right backplate of the drum carrier.



## 5 Operation

### 5.1 Drum change

As the powder can be compressed within the drum by vibration on transport and this could make problems at dosing, please roll the drum on the floor before loading some times.

1. turn up the empty drum and take it off together with the the dosing head
2. open the new drum and take off the lid – let the spanning ring at the drum
3. position the dosing hopper on the open drum so that the cable is coming on right side and fix it with the spanning ring.

In summer time the drum may be heated and the air in the drum may have a positive pressure. So carefully open the drum.

Sicherungsblech am Klemmbügel einsetzen und umbiegen.

4. position the new drum on the carrier, so that the handle fits into the slide at the frame. The drum must stand symmetrically on the drum carrier, touching the rear rails
5. Fix the drum securely in position using the drum band clamps. Adjust the clasp tension by adjusting the nuts on the screwed end of the band clamps. Lock the clamp clasps with the securing clips provided so that they cannot open by itself.
6. unlock the drum carrier swivel lock (7) and slowly rotate the drum and carrier left side through 180°. Care should be taken not to stretch or entangle the cable joining the hopper to the control box.  
Lock the drum carrier in this position via the swivel lock right at the frame
7. Now push the sealing tube (7) over the suspension tube

the PAKDOS in the dosing position

5.2 Adjustment of the dosing performance – Program switch on “B” or “BZ”

Diagram for the determination of the switch positions for the cycle and dosing time

100% dosing performance are at the PAKDOS 60/1200 app. 1200 g/h.

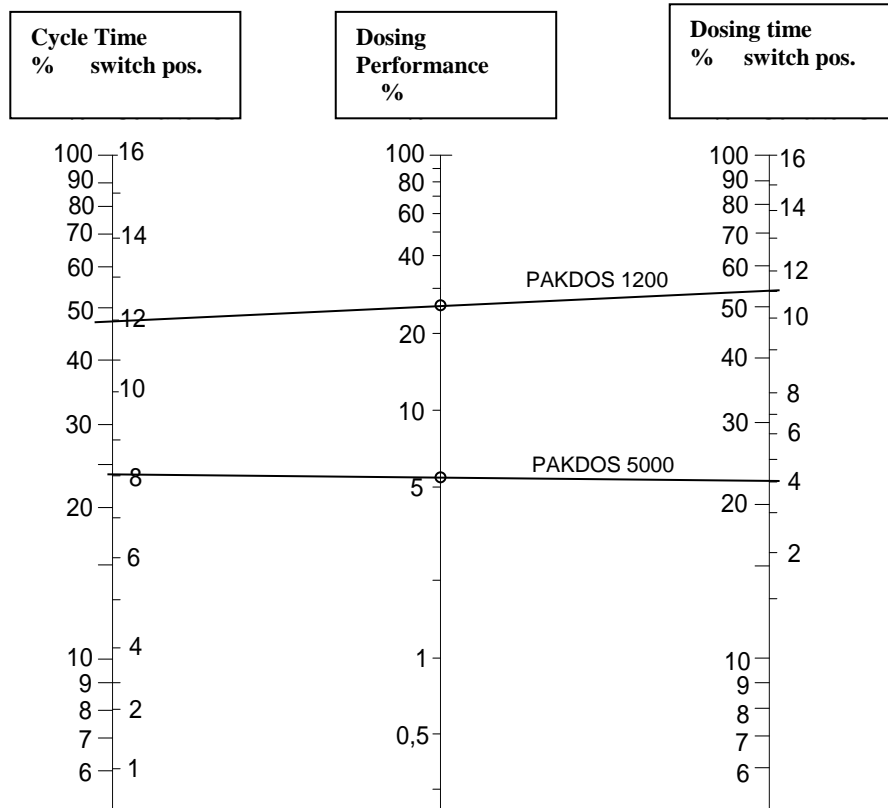


Table for cycle and dosing times

| Switch pos. | Cycle time seconds |     | dosing time seconds |     |
|-------------|--------------------|-----|---------------------|-----|
|             | Sek.               | %   | Sek.                | %   |
| 1           | 493                | 6   | 4                   | 13  |
| 2           | 411                | 8   | 5                   | 16  |
| 3           | 342                | 9   | 6                   | 19  |
| 4           | 285                | 11  | 7                   | 22  |
| 5           | 238                | 13  | 8                   | 25  |
| 6           | 198                | 16  | 9                   | 28  |
| 7           | 165                | 19  | 10                  | 31  |
| 8           | 138                | 23  | 11                  | 34  |
| 9           | 115                | 28  | 13                  | 41  |
| 10          | 95                 | 34  | 15                  | 47  |
| 11          | 80                 | 40  | 17                  | 53  |
| 12          | 66                 | 48  | 19                  | 59  |
| 13          | 55                 | 58  | 22                  | 69  |
| 14          | 46                 | 69  | 25                  | 78  |
| 15          | 38                 | 84  | 28                  | 88  |
| 16          | 32                 | 100 | 32                  | 100 |

Example:

The need of PAC is, depending on water quality actual and wanted, at app. 0.5-2 g/m<sup>3</sup>/h circulated water. For the first we work with a dosing rate of 1 g/m<sup>3</sup>/h. At a filter circulation of 300 m<sup>3</sup>/h we would need a dosing performance of 300 g/h. These are 25% of the dosing capacity of 1200 g/h having the PAKDOS 60/1200.

At the diagram you lay a straight line through 25% on the middle line meeting a switch position on the cycle time line, here 12. on the dosing time line the line meets the switch position 11. All 66 seconds the dosing motor will work for 17 seconds as shown in the table below the diagram. This setting is only for first approximation.

At PAKDOS 60/5000 the 300 g/h means 6% dosing capacity. In that case the switch position on the cycle line is 8 and switch position on the dosing time is 4. Hence the dosing motor works every 138 seconds for 7 seconds.

**By measuring the water quality after 2-3 days you will find whether the dosing was right, too high or too small. So you adjust the dosing rate by means of the dosing time switch as needed to your water quality.**

### 5.3 Back wash – isolation of the PAKDOS

At back wash the PAKDOS must be isolated from the filter to avoid a PAC-dosing to the filter. If a suspension distribution is installed this is automatically done as the control valves are closed for this time.

Doing the back wash manually you must switch off the PAKDOS and close the ball valves at the PAKDOS.

### 5.4 Control of the PAKDOS by a switch timer / SPS / performance control

**Switch timer:** Program switch on „BZ“. Position the lever at the watch to the „watch“ sign. For the wanted dosing time the timer levers must be pushed outside, At the end of the set time dosing stops and the pump runs on for a further minute to flush the machine and the tubing. In the switch off time the green LED flickers.

**SPS:** Program switch on „BZ“. To activate the PAKDOS the control contact (S04,7-8) is to be closed. At the end of the set time dosing stops and the pump runs on for a further minute to flush the machine and the tubing. In the switch off time the green LED flickers.

**Performance control:** Program switch on „BZ“. The switch for dosing cycle and dosing time are to be set on 16. by pulsing the control contact (S04,7-8) within 1 minute every wanted dosing performance from 0-100% can be set. If the control contact remains longer than 1 minute open, the machine stops, the green LED flickers. By closing the contact again the machine starts again.

## 6. Irritation identification / trouble shooting

### 6.1 Short – diagnose

When the machine is switched on a diagnosis programme for the control equipment runs. The same happens when the reset key is pressed.

1. All lights burn together 3 seconds
2. Each light comes on one after another for one second
3. If there is no fault, all red lamps go out and the dosing programme commences.



## 6.2 LED Indicators for function and irritations

### Grüne LED L0:

#### **Green LED – indicates program switch and external inputs**

**on continuously:** GRANUDOS in operation

**no light:** Transformer Tr. 2 or fuse F1 for control system burnt

**fast blink** (0,5 second on, 0,5 second off...)

- programme knob not on a programme position
- end of test programme
- dosing switched off with front fascia switch

**slow blink** (2 seconds on, 2 seconds off)

External switch off e.g. by a central control on conn. S04-5

#### **Flickering:**

- dosing switched off on program BZ
- external switch off of dosing on connector S04-4
- 

**Red LED** shows function of dosing and interruptions indicated by the different Sensors. At any interruption dosing stops. Flickering of L4 shows that the dosing motor is activated, the motor should run.

| LED     | irritation                     | what happens                                    | see below |
|---------|--------------------------------|---|-----------|
| L1      | burns                          | water level high<br>water flow too low          | 2         |
| L2      | burns                          | water level low<br>pump pressure low            | 1<br>1    |
| L3      | burns                          | counter pressure high (external)                | 1         |
| L4      | burns                          | dosing hopper empty                             | 3         |
|         | blink slow                     | fuse F2 315 mAT – dosing motor                  | 2         |
|         | blink fast                     | option optical sensor – no carbon in suspension | 3         |
| L1 + L4 | L1 blink slow<br>L4 blink fast | fuse F3 800 mAT or power transformer faulty 1   |           |

Effect 1: dosing stops, booster pump stops

Effect 2: dosing stops

Effect 3: only indication, no further

**Fault identification - trouble shooting**

**Attention – an indicated irritation may result by a faulty switch too! Switches out of function if disconnected. Fault indication must go, if the switch is disconnected!**

irritation

reason / trouble shouting

L1 burns:  
Level high,  
Flow low  
dosing stops

It comes more water to the flushing tank as is sucked off  
If there is a good suction down in the flushing cone:

1. Floating valve hangs or diaphragm faulty –
2. Suspensor blocked by coarse particles. I

If there is no good suction: flow switch bobbin down, switch LED burns

3. booster pump blocked by big parts – dismantle and clean
4. prefilter blocked – clean it
5. particles in the venturi - dismount
6. higher counter pressure – use bigger washer or take it out
7. flushing cone blocked – clean it

L1+L4 blink slow

fuse F3 of the power supply or transformer Tr.1 24 VDC faulty

L2 burns:  
Level low,  
machine stops

it comes less water to the flushing tank as is sucked off by the venturi,.

1. prefilter blocked – clean it
2. floating valve blocked – clean it or new diaphragm
3. low counter pressure – fit smaller washer –(see. Para 4.1)

L2 burns  
pump pressure low  
machine stops

pump pressure too low  
1. prefilter blocked – clean it  
2. air in the pump – carefully deaerate

3. pressure switch not right adjusted – if readjusting not possible, disconnect (s. Punkt 4.4)

L3 burns:  
machine stops

if pressure switch is fitted in the water circulation tubing to monitor the right filter / back wash / automatic valve function:  
something is wrong depending on switch function

**Attention!****This irritation can only be put out by a “reset”**

L 4 burns  
drum empty  
No further reaction

1. drum empty

If drum not empty: falls  
2. empty switch to be new adjusted:  
turn drum to top, take off the motor cover (18). Right side at the hopper you see the square empty switch. By means of the small screw driver you turn to right, till the switch LED burns then left till LED is out, plus about 10°

3. Empty switch is faulty – fit a new one

---

|   |   |
|---|---|
| L4 blink slow                                 | <p>fuse F2 of the dosing motor 315 mA burnt</p> <p>1. dosing motor may be blocked by</p> <ul style="list-style-type: none"><li>- particles in the powder</li><li>- blocking of the powder in the dosing screw</li><li>- blocking of the dosing tube maybe by humidity</li></ul> <p>In every case dismount the dosing motor with the screwThe screw must have a very smooth surface. Clean dosing tube proper.</p> <p>2. dosing motor faulty</p> |
| L4 blinks fast                                | <p>Option: if optical sensor is fitted to monitor the powder dosing:<br/>For longer than 8 minutes no powder has been seen by the sensor.</p> <p>1. reasons for that as above indicated</p>   |
| adjustment of the opto sensor (Carlo Gavazzi) | <p>with clear water and clean transparent tube the switch LED must burn. Turn adjusting screw to left till end (LED off) then again to right till the LED burns + 10°</p>   |

**6.4 Maintenance / taking out of service**

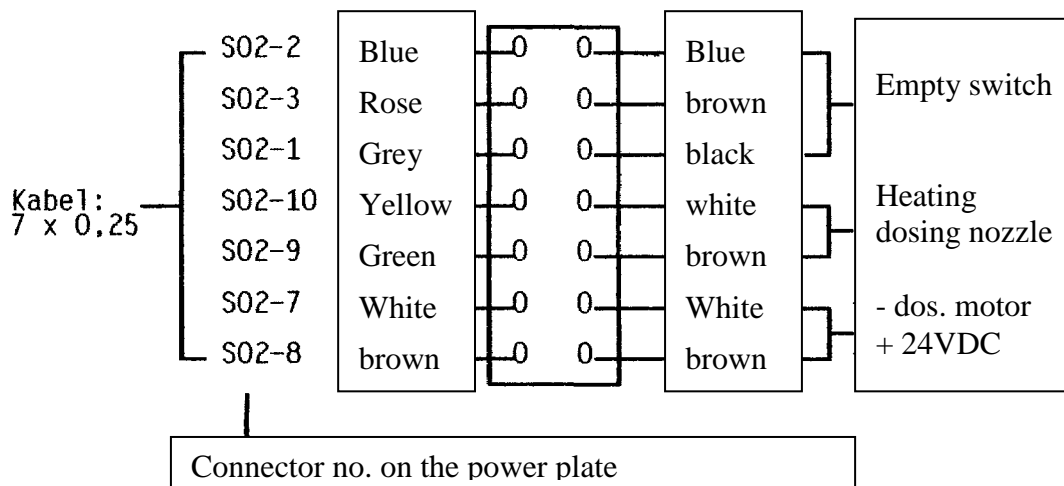
1. use only good powder qualities – see para 2.5
2. hold prefilter proper
3. check the function of the rain nozzles more often, continuous, smooth rain
4. check the function of the monitoring switches
5. with every new drum or at least all 2 months clean the suspension tube and tank properly by means of by-packed brush
6. at same time clean the heated dosing tube til the upper elbow by means of the small round brush
7. every year change the diaphragm of the floating valve and the seal ring of the flow switch bobbin
8. hold clean the transparent tube of the opto-sensor

for longer time of take out of service turn up the hopper, take out the dosing motor with the screw clean the screw properly from all particles. Refit the screw only at next taking into service.

The maintenance jobs are listed in the attached list.

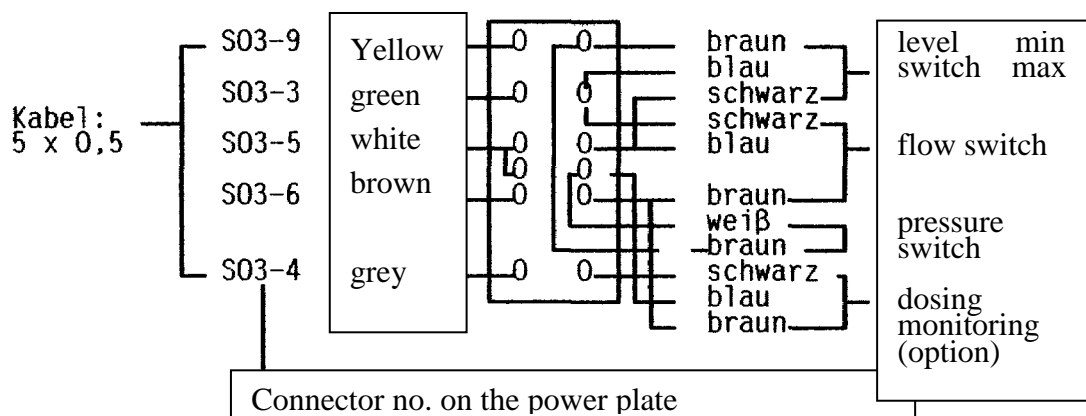
**7 Wiring at the dosing hopper and the flushing tank**

**7.1 Dosing hopper**

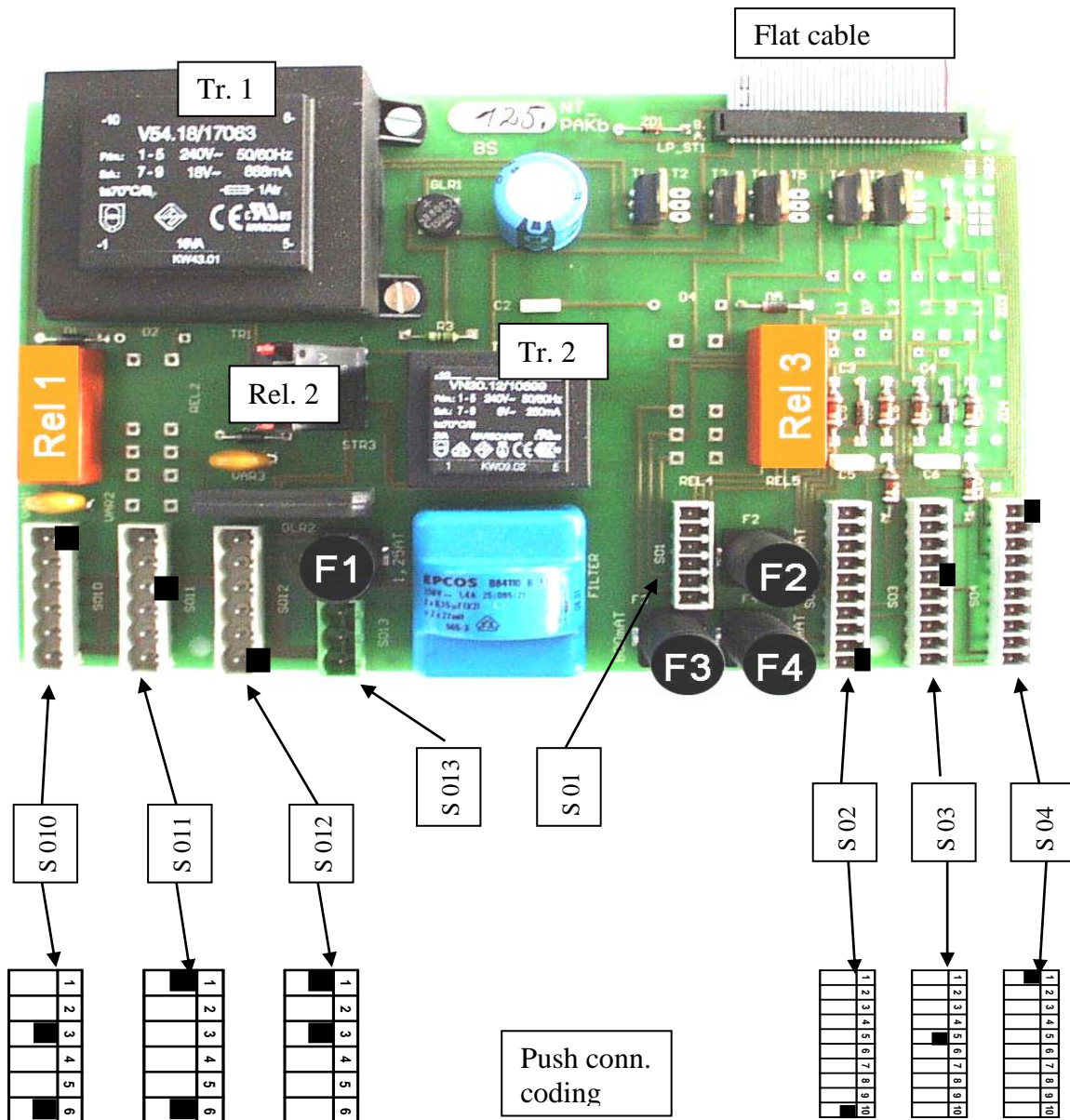


The knocker is connected directly

**7.2 Wiring at the flushing tank**



**7.3 Wiring at the power plate, fuses, transformers**



|       |                                       |                |      |
|-------|---------------------------------------|----------------|------|
| F1    | fuse for supply 230 VAC incl. knocker | 1,25           | Atr  |
| F2    | fuse dosing motor                     | 315            | mAtr |
| F3    | fuse all power outputs 24 VDC         | 800            | mAtr |
| F4    | fuse supply 6 VDC processor plate     | 315            | mAtr |
| F0    | mains fuse at front plate             | 6,3            | Atr  |
| Tr1   | power transformer                     | 16 VA, 18 Volt |      |
| Tr2   | controller transformer                | 1,5 VA, 6 Volt |      |
| Rel.1 | booster pump, solenoid valve          |                |      |
| Rel.2 | knocker                               |                |      |
| Rel.3 | fault remote                          |                |      |

**connectors for 230 VAC 6 x 5 mm**push connector S010

|     |                     |
|-----|---------------------|
| 1+2 | 230 V booster pump  |
| 3   | PE                  |
| 4+5 | 230 V control valve |
| 6   | PE                  |

push connector S011

|     |                              |
|-----|------------------------------|
| 1+2 | 230 V reserve                |
| 3   | PE                           |
| 4+5 | 230 V reserve (booster pump) |
| 6   | PE                           |

push connector S012

|     |                            |
|-----|----------------------------|
| 1+2 | 230 Volt mains             |
| 3   | PE mains 230 volt          |
| 4   | +205 VDC knocker (black1)  |
| 5   | - 205 VDC knocker(black 2) |
| 6   | PE Klopfer                 |

push connector S013 (4x5mm)

|     |                            |
|-----|----------------------------|
| 1+2 | mains 230 Volt timer watch |
| 3   | PE                         |

**push connector 8 x 3,5 mm low voltage / non volt**push connector S01**fault remote non volt/ max 24V/ 8A**

|     |                 |
|-----|-----------------|
| 1   | normally open   |
| 2   | C-contact       |
| 3   | normally closed |
| 4-6 | reserve         |

push connector S02**control cable from the dosing head**

|     |                              |
|-----|------------------------------|
| 1   | empty switch (inductive)     |
| 2   | - 24 VDC empty switch        |
| 3   | +24 VDC empty switch         |
| 4-6 | reserve                      |
| 7   | - 24 VDC dosing motor        |
| 8   | +24 VDC dosing motor         |
| 9   | - 24 VDC heating dos. nozzle |
| 10  | +24 VDC heating dos. nozzle  |

push connector S03**control cable from the flushing tank**

|     |   |
|-----|---|
| 1   | reserve                                 |
| 2   | - mass                                  |
| 3   | water level in tank max, or flow low    |
| 4   | dosing monitoring (option)              |
| 5   | - mass                                  |
| 6   | + 24 VDC                                |
| 7,8 | reserve                                 |
| 9   | water level in tank, pump pressure min. |
| 10  | - mass                                  |

push connector S04**external controls**

switches normally open, function to be bridged to mass

|     |   |
|-----|---|
| 1   | counter pressure (ext.) max   |
| 2   | pump pressure min   |
| 3   | - mass  |
| 4   | dosing off  |
| 5   | PAKDOS off  |
| 6   | - mass  |
| 7-8 | switch timer for program <b>BZ</b><br>(operation if switch is closed) |

**for the control cbles to the connector housing please only use flexible ones max 0,5<sup>2</sup>**

**8. Maintenance protocol PAKDOS 60**

Objekt:.....  
 PAKDOS type:.....year:.....  
 Maintenance executed on:.....by:.....

Subscription by the operator:.....

**↓↓ This must be done!**

**1 Suspensions and flushing**

- 1.1 check level switch: OK  change switch
- 1.2 check pressure switch: OK  change switch
- 1.3 check flow switch: OK  change switch
- 1.4 change flow switch diaphragm  change bobbin
- 1.5 change floating valve diaphragm and O-ring
- 1.6 check floating valve function OK  adjust water level
- 1.7 clean suspensor and flushing tank
- 1.8 clean rain nozzles
- 1.9 check slide ring seal  change
- 1.11 clean pre-filter d75 and fine filter 300

**2 dosing head**

- 2.1 function heating: OK  change heated nozzle
- 2.2 function empty switch: OK  change switch
- 2.3 current dosing motor: I max: 150+/- 30 mA OK  change motor
- 2.4 change seal of dosing motor
- 2.5 check and clean dosing screw OK  change
- 2.6 check flat spring with wore plate OK  change
- 2.7 check knocker function OK  change

**3 additional jobs**

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**9. spare parts list PAKDOS 60**

the positions nos. relate to the sketches on the indicated pages

**1. dosing head page 4**

*(numbers in brackets for PAKDOS 60/5000)*

| <u>Pos.</u> | <u>designation</u>                           | <u>article code no.</u> |         |
|-------------|--|-------------------------|---------|
| 1           | dosing motor PLG 30 – 60 (SA 80)             | 11546                   | (21452) |
| 3           | moving srew PAK 16/24x85 (16/24x75)          | 11779                   | (23781) |
| 5           | dosing screw PAK d16,5 x140 with kit (24,5)  | 11773                   | (23792) |
| 7           | sealing tube 125/70 on suspensor PAK         | 11783                   |         |
| 8           | dosing nozzle PAK heated d25x100 PTFE        | 11780                   | (21196) |
| 9           | cover dosing hopper PAK                      | 11760                   | (24647) |
| 10          | dosing hopper PAK 60 without techniques      | 11759                   | (21179) |
| 11          | seal 8x8 EPDM for dosing hopper, length 1,2m | 11534                   |         |
| 12          | wear plate PTFE for blade spring             | 11771                   |         |
| 15          | knocker PAK complete                         | 11764                   |         |
| 16          | empty switch                                 | 10337                   |         |
| 18          | motor protection cover PAK                   | 14046                   |         |

**2. suspensions and flushing system page 4**

|      |  |       |  |
|------|--|-------|--|
| (19) | filter d75 GPL/PAK complete                      | 11804 |  |
|      | filter insert d75 GR/PAK SS                      | 11640 |  |
|      | O-ring filter top d75 EPDM                       | 11258 |  |
| 20   | pressure switch M10x1, 1-3 bar                   | 17275 |  |
| 21   | floating valve d25 PAK complete                  | 11798 |  |
|      | diaphragm kit for floating valve d25 GR/PAK      | 11619 |  |
| 21a  | floater  | 11621 |  |
| 21b  | elbow 3/8"-6x1 to floating valve                 | 11616 |  |
| 23   | filter 1/2" 300u flushing water PAK              | 11797 |  |
|      | filter element 300µm SS                          | 10482 |  |
| 24   | water flow monitoring with                       |       |  |
| 24a  | flow switch holder 1/2" -S14 -US                 | 12729 |  |
| 24b  | flow switch 18x1 ind. for GR/PAK, lead 0,6m      | 11603 |  |
| 24c  | flow switch bobbin 1/2" US                       | 12730 |  |
| 25   | venturi PAK 1/2" complete                        | 11792 |  |
| 26   | booster pump Lo 2HMS4                            | 10658 |  |
|      | booster pump Lo 2HMS3                            | 18181 |  |
| 26c  | slide ring seal Lo 2HMS 3/4-A                    | 12800 |  |
| 27   | fitting booster pump Lo3/4 to venturi w/o filter | 19813 |  |
| 28   | suspensor PAK (PE-tank)                          | 11801 |  |
| 28a  | rain nozzle PAK complete                         | 11803 |  |
| 29   | level switch flushing tank 3/8" GR/PAK           | 10496 |  |
| 30   | orifice washers kit 5,5 - 6 - 7 mm               | 11594 |  |
| 31   | photoelectric switch, diffuse refl (option)      | 10342 |  |

**3. controlling page 6**

|  |   |       |  |
|--|---|-------|--|
|  | cover control housing                         | 12600 |  |
|  | locker Plexi for controller housing Vario Box | 11967 |  |

|   |       |
|---|-------|
| mains switch GR/PAK                     | 11338 |
| mains fuse holder on front plate GR/PAK | 12324 |
| turn key knob 4mm for control board MCU | 11757 |

#### 5. control power plate page18

|  |       |
|--|-------|
| transformer board NTPAK-A flat cable         | 11755 |
| transformer power supply 240/18 volt -888 mA | 11665 |
| transformer 240/6 volt 250 mA, 1,5 VA        | 10929 |

#### 6. control plate

|                                    |       |
|------------------------------------|-------|
| control board MCU 1c exchange part | 12225 |
| fuses - set for GR 10-100 / PAK    | 11752 |