Manual

B&S DIGI

Peristaltic pump

B&S DIGI 7 / 40 / 100 / V

The specialist in clean, safe pool water

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General information

SEM Waterbehandeling's B&S DIGI peristaltic pumps are universal metering pumps that have been specially designed to dose chemicals for swimming pool applications. B&S peristaltic pumps have also proven their merit in sectors such as agriculture, hospitality, industry and food.

There are four types of B&S peristaltic pumps: B&S DIGI Vlok, B&S DIGI 7, B&S DIGI 40 and B&S DIGI 100. The B&S DIGI Vlok is a simple pump that cannot be controlled externally. The DIGI 7 , DIGI 40 and DIGI 100 have a universal motor control system and can be controlled by means of various external signals. Variable dosing is possible using all four types as they can be used with various tube sizes and because the rotational speed of the motor can be adjusted continuously.

B&S peristaltic pumps can be used either as a stand-alone pump or be connected to a measurement and control unit. The pump has a special control input, which can be configured using a set-up menu.

B&S peristaltic pumps are supplied without a flow tube, control cable or any other accessories.
This manual contains all the information required for operating and servicing a B&S DIGI 7, B&S DIGI 40, B&S DIGI 100 or DIGI Vlok pump manufactured after 2011.
As the control input of the B&S DIGI 7 , 40 and 100 pumps can be configured for various control signals and the various parameters are adjustable (tube size, rotational speed, etc.), the pump can be controlled in a variety of ways, depending on its specific use.

Limited warranty
This documentation has been provided by SEM Waterbehandeling B.V. SEM Waterbehandeling B.V. accepts no liability whatsoever for any damage resulting directly or indirectly from the use of this documentation. No guarantee is given with regards to the suitability of these products for any special applications or parameter settings. SEM Waterbehandeling B.V. will only replace parts or documentation, and only if malfunctions are not due to improper use.

Declaration of CE conformity
If this peristaltic pump is used as a stand-alone pump, the Machinery Directive 89/392/EEC EN60204-1 for industrial machinery and EN 55011, class A apply.
The peristaltic pump complies with the Low Voltage Directive EN60950 and the Electromagnetic Compatibility Directives EN50081-1, EN50082-1, EN61000-3-2, EN61000-3-3, EN61000-4-2, EN60000-4-4, EN61000-4-5, EN61000-4-11 and ENV50204.

Copyright notice

1. Introduction

The peristaltic pump works by creating peristaltic movement in a tube. This movement propels liquid through the tube. When the tube is empty, liquids are sucked in through the creation of negative pressure in the tube.

Properties of the peristaltic pump:

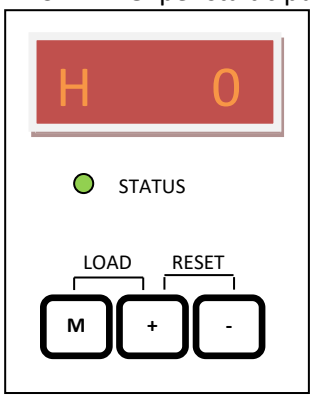
- It is self-priming and can run dry without any damage to the pump
- It is auto-locking to prevent fluids from flowing back
- It is protected from fluids by isolating them in the flow tube
- It has no valves, gaskets or stops that can fail or cause blockages
- It is easy to maintain and service. Instead of disassembling, cleaning, replacing parts and adjusting the pump, as would be necessary for other metering pumps, all it requires is the replacement of a small piece of flow tube, saving time, effort and money!
- The adjustable rotational speed and compatibility with three tube sizes give each B&S peristaltic pump a wide feed rate range:

Pump type	1,6mm tube	2.4 mm tube	3.2 mm tube	4.8 mm tube
B&S DIGI VLOK	15-140ml/hour	35-330 ml/hour	60-510 ml/hour	120-1000 ml/hour
B&S DIGI 7	15-140ml/hour	35-330 ml/hour	60-510 ml/hour	120-1000 ml/hour
B&S DIGI 40	100-950ml/hour	180-2200 ml/hour	300-3600 ml/hour	700-7000 ml/hour
B&S DIGI 100	260-4000ml/hour	500-6400 ml/uur	810-10000 ml/uur	1500-22000 ml/uur

- It has a minimum pump pressure of 2 bar (max. 4 bar)
- The universal motor control makes it possible to control the B&S DIGI peristaltic pump with any measurement and control unit.

2. Start-up

All SEM DIGI peristaltic pumps have a digital display that contains all of the relevant information.

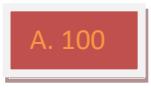


Powering up

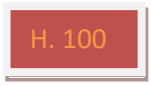
After powering up, the pump display will show its current software version for three seconds. The pump always stays in the same mode it was in when it was turned off.

Standard operation

The display shows the current mode of operation and the pump's rotational speed in %.



A = automatic operation (the rotational speed is determined by an external control signal)



H = manual operation (the rotational speed is determined by pressing the + and - keys)

To switch between automatic and manual mode, briefly press the M key.

Resetting in case of malfunction

To reset all alarms, press + and - at the same time.

Emergency stop

If the pump is in manual mode, press + and - at the same time to stop the pump immediately.

Indicator light:

If the indicator light is green, the pump is running. If it is flashing red, there is a malfunction.
● = green - pump running
● = flashing red - malfunction. The error code in the display indicates the nature of the malfunction.

ERR1 = motor failure, the motor is overloaded or blocked

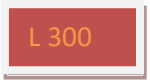
SD = the tube has to be repositioned, the service interval counter has exceeded 120 days

.

Tube positioning mode

This mode is ideal for quickly filling the pump tube and transport tubes when the pump tube has been replaced or in the case of first use.

Press M and - at the same time to make the pump rotate at 100% for 300 seconds. The following code will be displayed:



The number will count down from 300 to 0 seconds. After 300 seconds, the pump resumes its previous mode of operation.

3. Service menu

The service menu can be accessed by pressing and holding the M key for more than 3 seconds. When the service menu is active, the decimal point in the right half of the display flashes. The various menu items can be accessed by repeatedly pressing the M key. The service menu is automatically closed after 10 seconds.

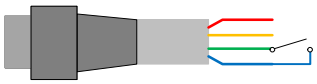
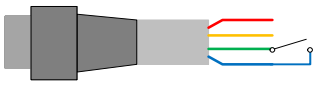
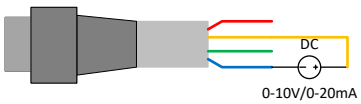
Code	Description	Explanation
b. xxx	Weeks running	Number of weeks the pump motor has been running
u. xxx	Hours running	Number of hours the pump motor has been running. Add up B and U to calculate how long the pump has been running (1 week = 168 hours).
S. xxx	PCB serial number	Serial number of the motor control unit
o. xxx	Maintenance timer	Number of days the pump has been powered up. After 120 days (3 months), the message "SD" will be displayed, to remind you to reposition the tube. Press + and - at the same time to reset the counter each time after repositioning or replacing the pump tube.

4. Automatic operation (external control)

The external control signal is connected to the 4-pole plug on the back. The following table shows how to connect it properly.

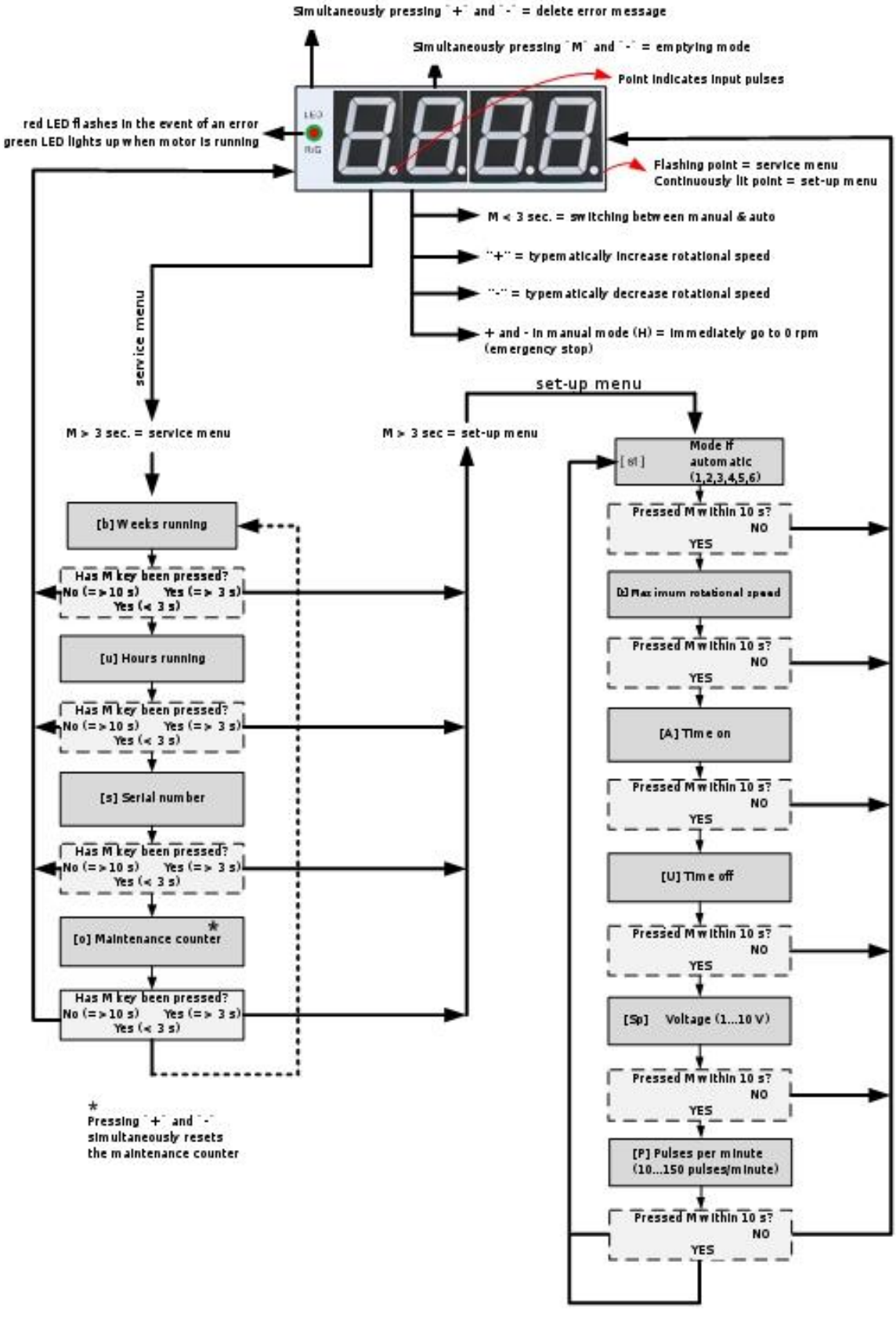
Set-up menu

The DIGI 7 , DIGI 40 and DIGI 100 have six pre-set operating modes, designated ST 1 to ST 6. Each mode allows for customisation of the controls by changing the relevant parameters. Note: the DIGI VLOK has only one mode for automatic control - the ST 4 on/off setting.
The following operating modes are available:

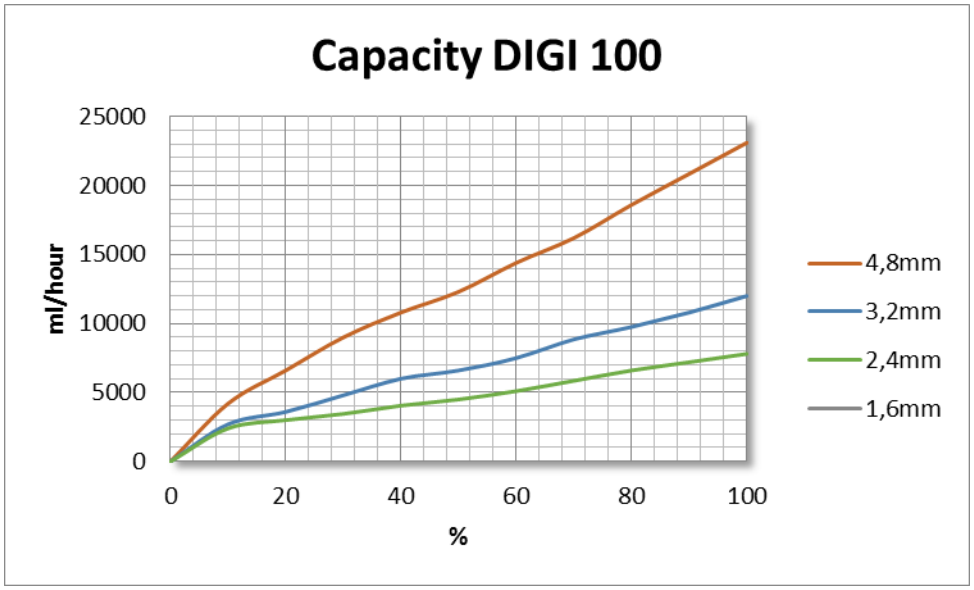
mode	description	parameters
ST1	**Pulse control by means of a potential-free dosing contact** The pump's rotational speed is linearly related to the number of pulses coming in via the control cable. The maximum rotational speed ***t*** is reached at maximum pulse frequency ***P.***	t=0-100% maximum rotational speed (in %) P=10-600 pulses/minute  *Control signal between blue and green*
ST2	**Batch dosage**. When the pump receives a pulse from a potential-free contact on the control cable, it will run ***A*** seconds on adjustable rotational speed ***t***. This mode is ideal when the dosing pump is connected to a pulse water meter. The pump will run for a determined amount of time after each pulse from the water meter.	t=0-100% maximum rotational speed (in %) A=1-600 seconds  *Control signal between blue and green*
ST3	**Control by proportional pulse length** As soon as a potential-free make-contact is created on the control cable, the pump will start running with adjustable rotational speed ***t***. As soon as contact is broken, the pump will stop. The pump uses a fixed start-up and run-down time of two seconds.	t=0-100% maximum rotational speed (in %)  *Control signal between red and yellow*
ST4	**Interval timer** No control cable is needed for this mode. The pump starts and stops periodically and both the running time ***A*** and the off-time ***U*** are adjustable. The rotational speed is set via parameter ***t***.	t=0-100% maximum rotational speed (in %) A=1-600 seconds U=1-600 seconds *No control signal*
ST5	**0-20mA** The pump's rotational speed is determined by the incoming current (mA) signal on the control cable. 0 mA=0%, 20 mA=100%. No adjustable parameters.	 *Control signal between yellow and blue*
ST6	**0-10V** The pump's rotational speed is determined by the voltage. 0 V=0%, 10 V=100%. The maximum rotational speed can be achieved with less control voltage by adjusting the ***SP*** parameter. The value of the SP parameter determines at which voltage the pump will run at maximum speed (for example, SP=5 means the pump will run at 100% when receiving 5 V).	SP= 1-10 V (value at which the pump runs at 100%)  *Control signal between yellow and blue*

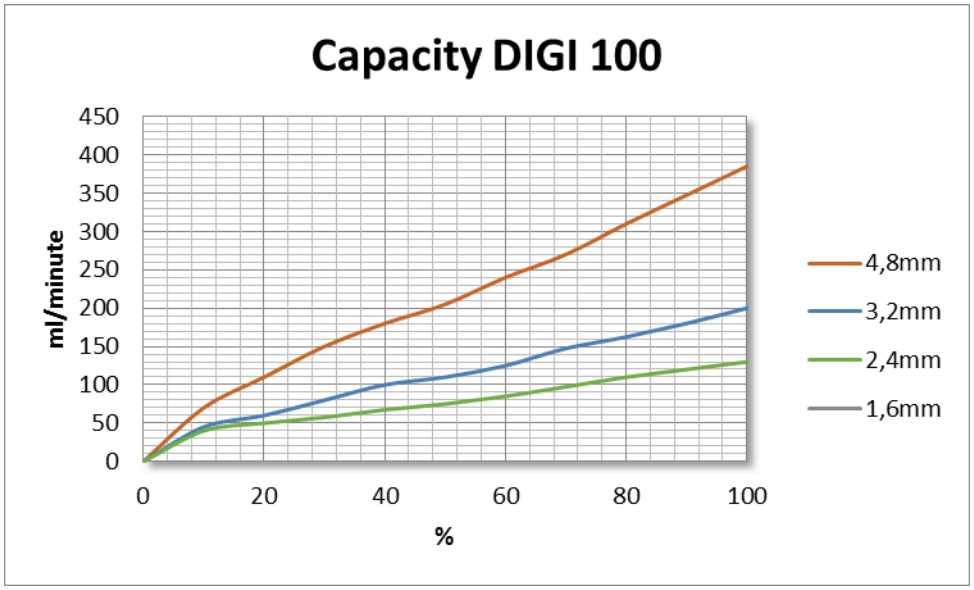
code	description	range of settings	factory setting
St	1=pulse controlled 2=water meter (starts after pulse) 3=proportional pulse length on/off 4=internal on/off time control 5=current controlled 6=voltage controlled	St=1,2,3,4,5,6	1
t	**Maximum rotational speed** in automatic mode	0-100%	100
A	**On time**, of the on/off interval timer (setting 4): running time for the pump. For ST 4 (batch dosage) this is the time it takes to turn the pump on after a pulse on the control input.	1-300 seconds (5 seconds)	5
U	**Off time** of the on/off interval timer (setting 4): stopping time for the pump.	1-300 seconds (5 seconds)	5
SP	The value of the ***SP*** parameter determines the voltage at which the pump will run at maximum speed (for example, ***SP***=5 means the pump will run at 100% when receiving 5 V).	1-10 Volt (10 Volt)	10
P	The value of the ***P*** parameter determines the pulse frequency at which the pump will run at its maximum speed. For P=100, the pump will run at the maximum rotational speed that has been set (***t***) when 100 pulses per minute are used.	15-600 pulses/minute (100 pulses/minute)	100

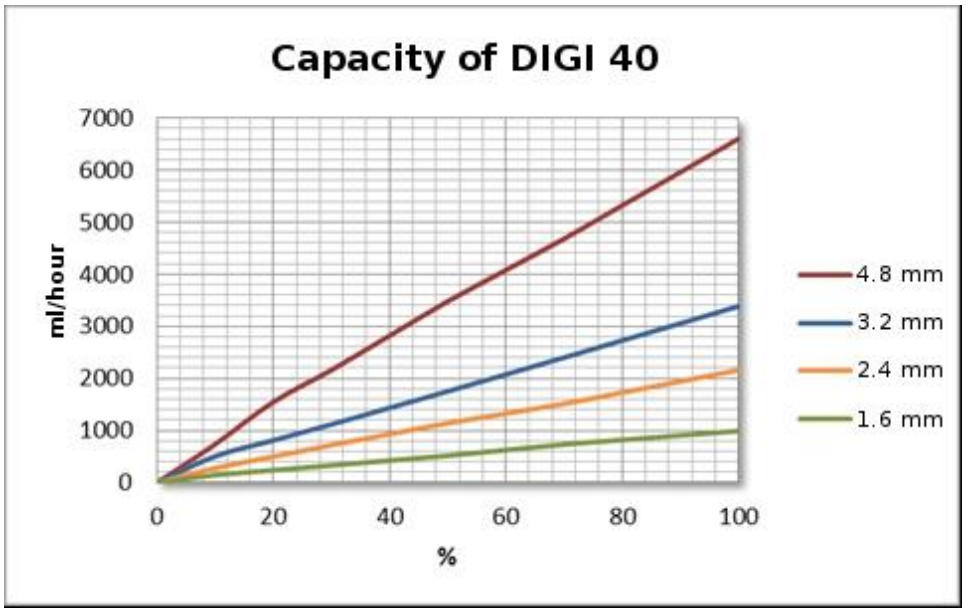
5. Schematic overview of the menus

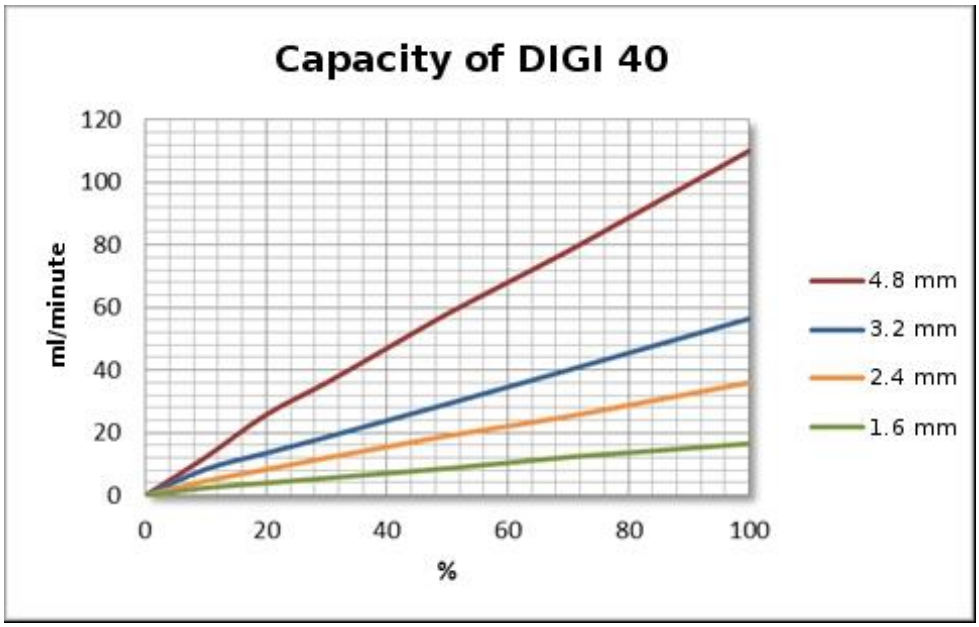


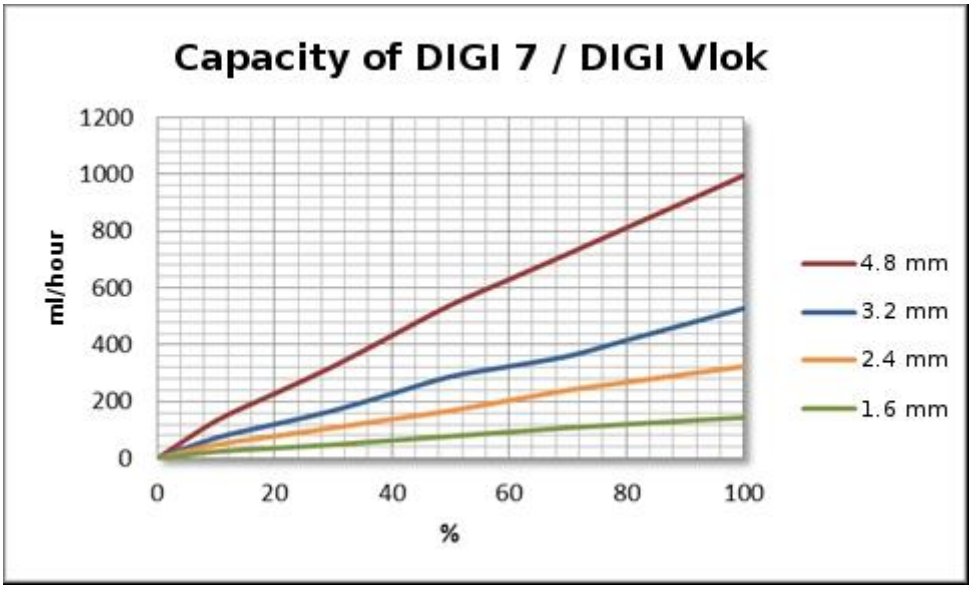
6. Capacity

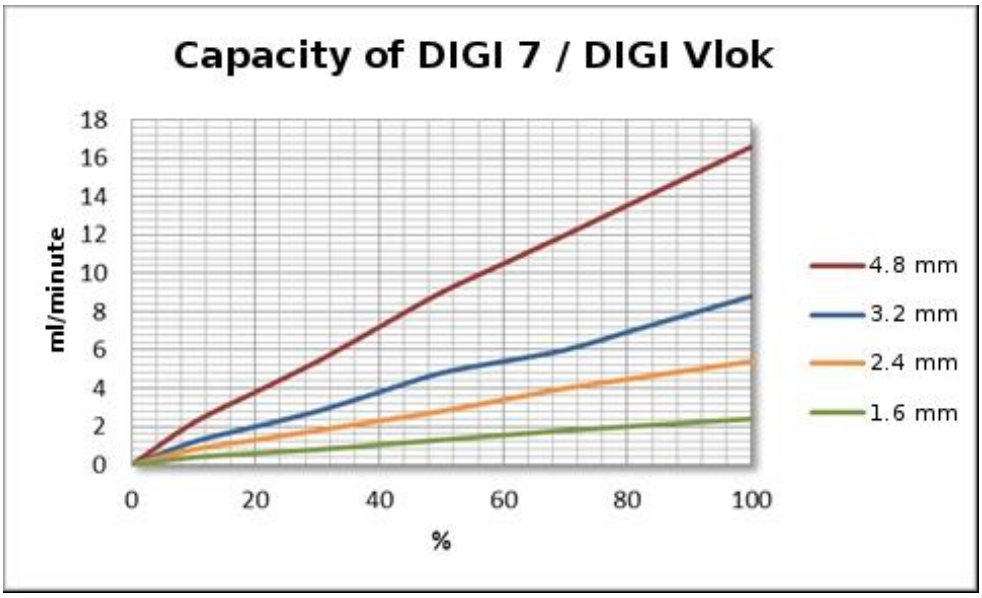

Capacity DIGI 100
25000
20000
15000
10000
5000
0
ml/hour
0
20
40
60
80
100
%
4,8mm
3,2mm
2,4mm
1,6mm


Capacity DIGI 100
450
400
350
300
250
200
150
100
50
0
ml/minute
0
20
40
60
80
100
%
4,8mm
3,2mm
2,4mm
1,6mm

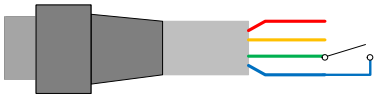

Capacity of DIGI 40
ml/hour
7000
6000
5000
4000
3000
2000
1000
0
0
20
40
60
80
100
%
4.8 mm
3.2 mm
2.4 mm
1.6 mm


Capacity of DIGI 40
ml/minute
120
100
80
60
40
20
0
0
20
40
60
80
100
%
4.8 mm
3.2 mm
2.4 mm
1.6 mm

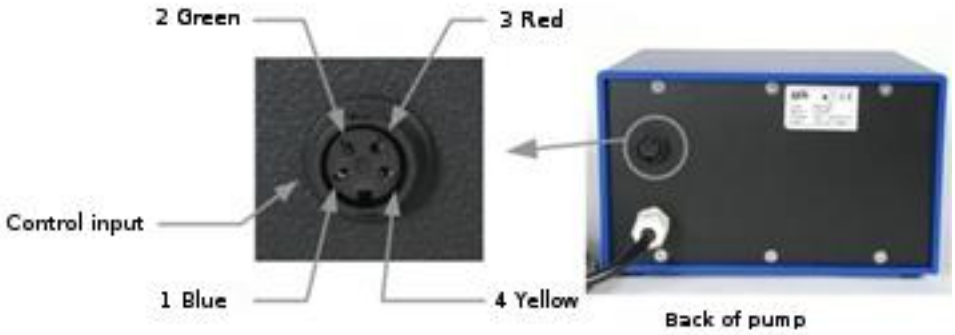

Capacity of DIGI 7 / DIGI Vlok
ml/hour
1200
1000
800
600
400
200
0
0
20
40
60
80
100
%
4.8 mm
3.2 mm
2.4 mm
1.6 mm

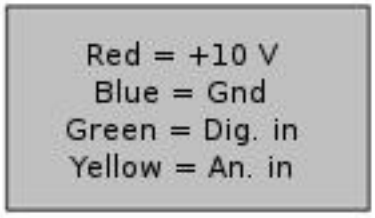

Capacity of DIGI 7 / DIGI Vlok
ml/minute
18
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
%
4.8 mm
3.2 mm
2.4 mm
1.6 mm

7. Electrical wiring diagram

	
• **Pulse control by means of a potential-free dosing contact** • **Batch dosage.**	 *Control signal between blue and green*
• **Proportional control** • **Water meter**	 *Control signal between red and yellow*
• **Control 0-10 V** • **Control 0-20 mA**	 *Control signal between yellow and blue*

7.1 Pin numbers for peristaltic pump control





Control cable 2 m
Prod. no. 2501010

8. Maintenance and service

Under regular use conditions, the peristaltic pump requires little maintenance. Below are some points for attention:

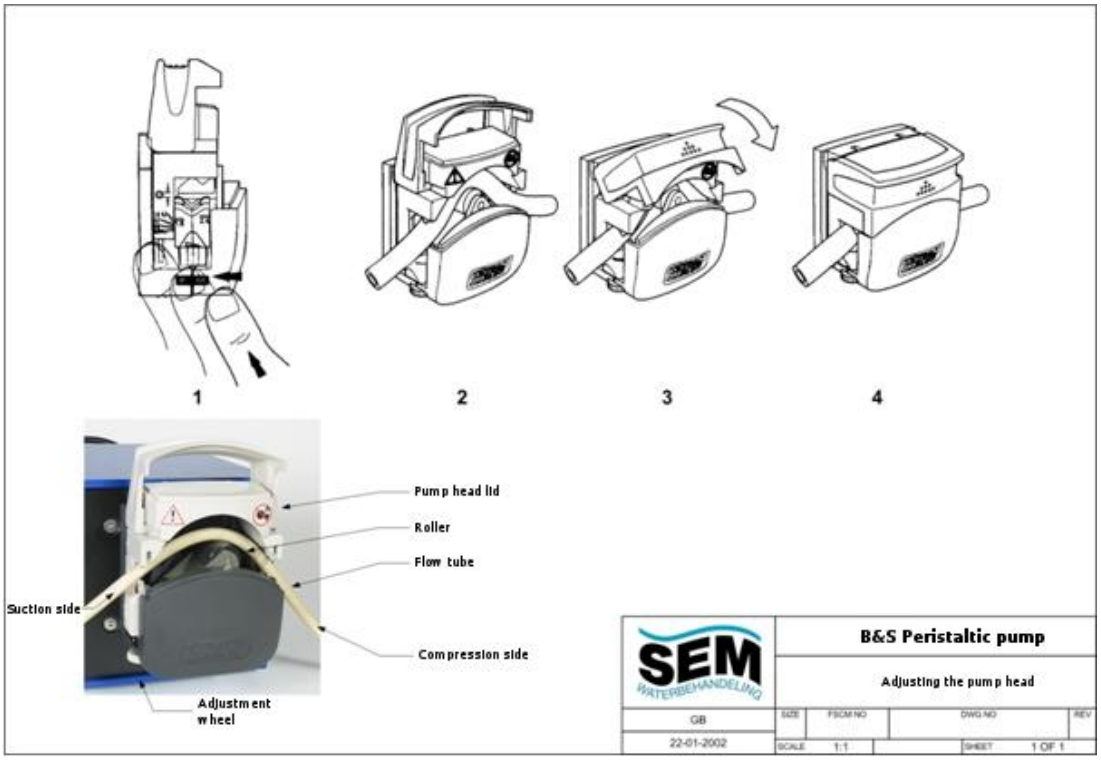
- A proper pump flow tube is crucial. The inside diameter of the tube determines the pump capacity (see technical specifications). The tubes are available with a diameter of 2.4, 3.2 or 4.8 mm (see accessories). These sizes are adequate for most applications. For special applications, a 1.6 or 6.4 mm tube can be used. The tube's wall thickness must always be 1.6 mm. SEM Waterbehandeling recommends repositioning the flow tube every three months and replacing it every year. Refer to §8.1 and §8.2 for instructions.
- Regularly clean the pump thoroughly to remove any chemicals from its exterior. The chemicals will not damage the pump, but can be unsafe for the operator. The housing is sealed in accordance with IP54 and is resistant to chemicals.
- The B&S DIGI peristaltic pump's motor does not require any maintenance.
- The pump head and motor bearings are fully encapsulated and do not require lubrication.

8.1 Positioning the flow tube

Always turn the pump off before positioning a flow tube!

How to position the flow tube:

1. Open the pump head's lid and adjust the tube clamp on the *suction side* to the size of the tube. The tube clamp on the *compression side* must be fully open (figure 1).
2. Place the tube between the rollers and the lid of the pump head (figure 2).
3. Close the lid and make sure there are no loops in the tube in the pump head (figure 3).
4. The pump is ready for use (figure 4.)



- **Attention:** the Marprene flow tube usually extends in length during the first half hour of use due to mechanical stresses. It is therefore recommended that the flow tube is tightened slightly in the pump head after the pump has been running for approximately 30 minutes in order to optimize its lifespan. To do so, gently pull on the tube at the compression side of the pump. We also recommend repositioning the tube in the direction of the suction side every three months.

Observe proper safety procedures when working with chemicals. Always wear gloves, safety goggles, etc. and turn the pump off.

8.2 Adjusting the pump head

Adjust the tube clamp on the suction side to the tube's diameter so that the tube cannot be pulled into the pump head or be pressed shut. Make these adjustments using the white adjustment wheel. A scale representing the tube's inside diameter can be found on the head. Align the marking on the tube clamp with the scale indication on the head that corresponds to the tube size. Important: make sure that the lid of the pump head is fully open when you do this and that the tube clamp on the compression side is also fully open.
Now position the tube between the rollers and the top part of the pump head, pull the tube a little tighter and close the pump head, so that the rollers firmly press on the tube. While doing so, ensure that the flow tube is not too loosely positioned in the pump head, that there are no loops in it and that it sits in the tube clamps correctly. If the tube can move, it will form a loop in the pump head and wear much faster. Also, it will be impossible for pressure to be built up on the compression side.

An instruction video entitled "Plaatsen doorloopslang en instellen pompkop" can be viewed on our website. Alternatively, scan the following QR code:
www.semwaterbehandeling.nl

9. Malfunctions

If the pump is not functioning or is not functioning properly, please refer to the following table in order to determine whether repair is necessary:

Malfunction	Cause and solution
The pump is running, but is not displacing any liquid	• The tank is empty. • The suction mechanism is higher than the surface of the liquid. • The tube is not positioned correctly in the pump head or is leaking. • The tube or the injector is blocked. • Sodium hypochlorite can gasify when still. In long pressure pipes (>50 m) this process can create gas bubbles that obstruct circulation. These gas bubbles are compressed by the pump pressure, but cannot be pressed through the tube. • The pump head's flow tube has worn and become flat. Reposition the tube approximately 20 cm (8 inches) towards the suction side of the pump. • There is a leak in the suction side of the pump. Check the pump tube and the couplings.
The message Error 1 appears in the LED display	There is a motor malfunction, the motor is overloaded or blocked: • Remove the blockage from the pump head (defective tube). • If no cause for the motor blockage can be found, write down the pump's serial number, which is located on the back, and then contact SEM Waterbehandeling.
The message SD appears in the LED display	The service interval counter has exceeded 120 days: • Reposition the flow tube approximately 20 cm (8 inches) towards the suction side of the pump. • Turn off the 'SD' message by simultaneously pressing the + and - keys. It is also possible to reset the counter earlier using the service menu (see chapter 3 of this manual).
When the pump is not controlled by means of an external control signal:	
Pump is not running, LED display is not functioning	There is no power or the internal fuse (100 mA slow-blow) is defective. • Check the mains voltage using a voltage tester or multimeter. • Replace the fuse.
Pump is not running, LED display is functioning	There is power. • The display is set to **(A) Auto** instead of **(H) manual**; • The display is set to 0% instead of the desired rotational speed (10%..100%).
Pump is not running, status indicator is green	The printed circuit board or motor is defective. • Write down the pump's serial number, located on its back, and then contact SEM Waterbehandeling.
When the pump is controlled by means of an external control signal:	
Pump is not running, LED display is not functioning	There is no power or the internal fuse (100 mA slow-blow) is defective. • Check the mains voltage using a voltage tester or multimeter. • Replace the fuse.
Pump is not running, status indicator is red	There is power. • There is no external control signal. • The display is set to 0% instead of the desired rotational speed (10%..100%).

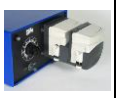
In the event of any other malfunction, always contact SEM Waterbehandeling's technical service department.

SEM Waterbehandeling does not handle any equipment soiled with chemicals or toxic substances that may be hazardous to health!

10. Technical specifications

Product code	B&S DIGI Vlok 2502041	B&S DIGI 7 2502011	B&S DIGI 40 2502031	B&S DIGI 100 2502051
Adjustable rotational speed	1-7 rpm	1-7 rpm	5-51 rpm	8-180 rpm
Capacity 1,6 mm tube (ml/hour)	15-140	15-140	100-950	260-4000
Capacity 2,4 mm tube (ml/hour)	35-330	35-330	180-2200	500-6400
Capacity 3,2 mm tube (ml/hour)	60-510	60-510	300-3600	810-10000
Capacity 4,8 mm tube (ml/hour)	120-1000	120-1000	700-7000	1500-22000
Minimum pump pressure 2 bar	•	•	•	•
Motor overload alarms	•	•	•	•
Running hours counter	•	•	•	•
3-month tube repositioning indicator	•	•	•	•
External control	o	•	•	•
Potential-free contact 0-10 up to 150 pulses/minute	o	•	•	•
Pulse length of the potential-free contact	o	•	•	•
Batch dosage (fixed amount after each pulse)	o	•	•	•
Internal on/off timer, on/off time (adjustable 1-300 sec.)	•	•	•	•
Analogue 0-20 mA	o	•	•	•
Analogue 0-1 up to 10 V (adjustable)	o	•	•	•
Suitable for additional 313X head*	•	•	•	o
LED indication	•	•	•	•
Connection for external control with 4-pole plug	o	•	•	•
Voltage	230V	230V	230V	230V
Power consumption	18VA	18VA	18VA	18VA
Synthetic housing (high-impact polystyrene)	IP54	IP54	IP54	IP54
Dimensions l x w x h	200 x 100 x125 mm	200 x 200 x125 mm	200 x 200 x125 mm	200 x 200 x125 mm
Weight	3,5 kg	3,5 kg	3,5 kg	3,5 kg

11. Accessories and parts

Product	Description	Product code
	**Flow tube, 1.6 mm, with tube couplings (6x12)**	2505900
	Flow tube, 2.4 mm, with tube couplings (6x12)	2505901
	Flow tube, 3.2 mm, with tube couplings (6x12)	2505902
	Flow tube, 4.8 mm, with tube couplings (6x12)	2505903
	**Marprene flow tube, 1.6 mm, by the meter**	4913016
	Marprene flow tube, 2.4 mm, by the meter	4913024
	Marprene flow tube, 3.2 mm, by the meter	4913032
	Marprene flow tube, 4.8 mm, by the meter	4913048
	**Control cable with plug, 2m**	2501010
	Control cable with plug, 4m	2501011
	Control cable with plug, 10m	2501015
	Control cable with plug, 25 m	2501025
	**Separate 313D-ER pump head**	4916040
 	**Separate 313X-ER pump head** Suitable for B&S DIGI Vlok, B&S DIGI 07 and B&S DIGI 40. NOTE: not suitable for B&S 20 and B&S DIGI 100 due to its maximum motor torque!	4916030
	**Wall mount** Including spill collector, in accordance with the Dutch law "Wet hygiëne en veiligheid badinrichtingen en zwemgelegenheden" relating to the hygiene and safety of bathing and swimming establishments.	2816030
	**Slow-blow fuse 100 mA**	1922631
	Motor B&S 07 (also suitable for pumps made before 01-2002)	3213011
	Motor B&S 40	3213030
	Motor B&S 100	3213100
	PCB DIGIMOTO Main PCB including flat cable	2516005
	PCB DIGIMOTO Display PCB	2516006

Notes: