LEGION 1

Kit for the Dosage of a Biocide Product for Legionella Prevention

TECHNICAL MANUAL

CE

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Certified Company, according to UNI EN ISO 9001 standards

WARNINGS

This manual is dedicated to the technical personnel responsible of the installation, management and maintenance of the plants. The manufacturer assumes no responsibility for damages or malfunctions occurring after intervention by non-authorized personnel, or not compliant with the prescribed instructions.

All maintenance or repair must be performed with the system isolated both electrically and hydraulically. Before performing any operation on the pump, unplug the pump and discharge the liquid from the pump head and tubes.
Never operate on working pump!

During maintenance and repair of parts that normally become in contact with chemicals, always wear all prescribed personal protections (gloves, clothes, glasses, etc.). **Any intervention must be performed ONLY by qualified personnel and using original spare parts.**

Dispose of waste material and consumables accordingly with local regulations.

How to ship the pump

To send back the pump for repairing or calibration purposes, proceed as follows:

- Fill the module “REPAIR REQUEST AND DECONTAMINATION DECLARATION” supplied with this manual, and include it in the transport documentation.
- Clean the pump properly, to eliminate any hazardous residuals.

<u>For further details about the PSP161 dosing pump, please refer to the supplied specific manual.</u>

The manufacturer can modify the instrument or the technical manual without advanced notice.

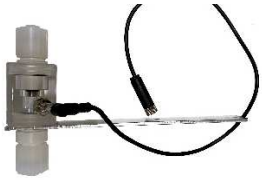
Warranty

All our products are warranted for a period of 12 months from the delivery date.
Warranty is not valid if all instructions of installation, maintenance and use, are not strictly followed by the user. Local regulations and applicable standards have also to be followed.
In particular, the warranties regarding the operational safety and reliability of dosing pumps will be recognized only if the following conditions are fulfilled.

- The installation, wiring, adjustment, maintenance and repairs performed <u>only</u> by qualified personnel
- <u>Only</u> original spare parts have been used for repairs

DESCRIPTION OF THE LEGION 1 KIT

The kit includes a dosing pump with accessories and has been specifically designed for the accurate injection of a biocide product (e.g. stabilized chlorine dioxide, hydrogen peroxide, etc.).

	PROXIMA PSP161-PKTT/AS 0310 dosing pump, model with special hydraulic group, suitable for dosing a gaseous and aggressive product (for example, concentrated chlorine dioxide), with relay output and input for “Flow Control” sensor.
	Wall mounting bracket with rotating support, for easy maintenance of the pump hydraulics.
	“Flow Control” sensor for continuous monitoring of the real dosage. With this device the pump can detect a disengaging due to air presence and activate an automatic priming cycle. The “Flow Control” sensor is supplied with a special aluminium mounting support.
	Accessory kit for biocide dosing pump: • PTFE hose (4x6, 10 m) to be used for the suction line (max 1 m) and for the delivery line (cutting it at the needed length). **Warning**! In case of hermetic drum, the suction hose is directly connected to the special fitting; **in case of biocide stored in normal tanks, you need to ask for a suction lance of proper length!** • PVDF injection valve without spring, to be installed vertically
	<u>Purge collection bottle</u> with PTFE hose, to be connected to the pump purge outlet in case of biocide stored in hermetic drum, which does not allow the return of the product that may leak from the purge valve during the pump priming. In this case, it is strongly recommended to install the collection bottle and dispose the collected product as described below. <u>Storage bottle for the solution to be used for biocide neutralization</u> (for example, diluted sodium thiosulphate solution for the neutralization of chlorine dioxide).

TECHNICAL DATA

PSP161-PKTT/AS 0310 Dosing Pump

Flow rate	3 l/h @ 10 bar (with stroke 100% and frequency 180 injections/min)
Power supply	100 … 240 V~, 50/60 Hz, 60 VA max (cable with Schuko plug)
Electrical protection	fuse 5x20; F1.6A
Display	dual row (x 12 characters), alphanumeric LCD, with backlight
Clock	RTC, precision ±5 sec/month, with CR2032 buffer battery (minimum autonomy of 3 years with not power supply)
Dosing precision	-5 … +10% (with max stroke length)
Materials	PP housing reinforced with glass fibre; PVDF head with self-venting valve; full PTFE diaphragm; ceramic ball valves; PTFE (FPM or EPDM) seals
Viscosity of the dosed product	max 50 mPas
Environment	storage temperature -20 ... +60 °C working temperature -10 ... +45 °C RH max 92 % no condensing
Protection rate	IP65
Dimensions	110 x 260 x h 190 mm (wiring excluded)
Weight	approx. 4 kg

Inputs / Outputs

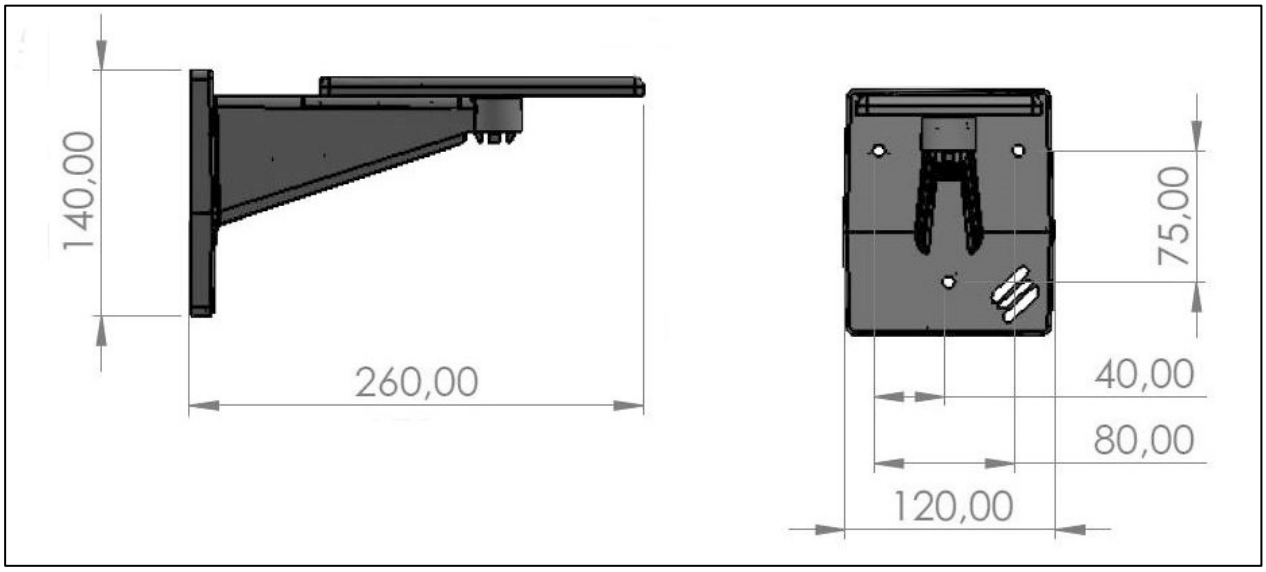
mA Input	0/4-20 mA analogic input (configurable); input impedance 30 Ω; precision > ± 0.05 mA, repeatability > ± 0.03 mA
PULSE Input	pulse input for volumetric water meter; accepts voltage-free contact; if you need to connect it in parallel with similar inputs of similar pumps, it is advisable to use a signal splitter
LEV Input	voltage-free contact, from level sensor
FLW Input	contact from injection flow control sensor
OUT Output	alarm relay; NO / NC contact, configurable, max 30V~ (40V-), 3A resistive

"Flow Control" Sensor

Model	Flow Control 1-6 l/h, with aluminium mounting support
Flow sensor	NPN micro-magnetic
Connection	cable with M8 connector
Working conditions	temperature 1…55 °C; pressure 0.5 … 25 bar
Density of dosed liquid	max 1.25 g/cm^3
Minimum stroke	60% @ 2.5 bar

Mounting bracket with rotating support, SMP18

Mounting	wall installation of PROXIMA pumps, with supplied screws and wall plugs
Support	rotation up to 360°; with slots for housing suction and purge hoses



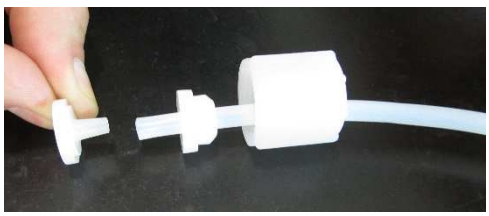
Kit hose + valve

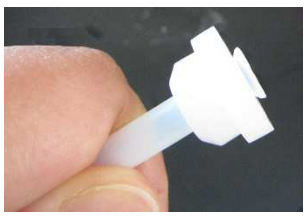
Hose	PTFE, 4x6 mm, 10 meters
Injection valve	PVDF, without spring

INSTALLATION

For the proper installation of the kit, please proceed as follows:

1) Wall mount the bracket, checking that the rotating support is perfectly horizontal and at a maximum hight of 70 cm from the ground.
2) The power cable is provided with Schuko plug and is 2 m long; ensure that a power socket from a dedicated, stable and selectable line is available at a correct distance.
3) Fix the clips for hanging the supplied bottles near the bracket (see figure).
4) Screw the dosing pump to the rotating support, and insert the aluminium accessory between pump and support, for the installation of the “Flow Control” sensor (see figure).
5) Assemble the hydraulic fittings using the PTFE plain gaskets.
6) Cut the PTFE hose at the needed length for the suction line (max 1 m) and the injection line, inserting it so as to obtain a lip deformation which guarantees its mechanical hold. For this purpose, it is advisable to heat the hose end before inserting it on the pipe-holder fitting (the sequence is shown in the below pictures).





7) The suction line is connected to the “Flow Control” sensor, which is then connected to the suction valve of the pump.

8) Connect the purge valve to the collection bottle, using the supplied piece of PVC hose.

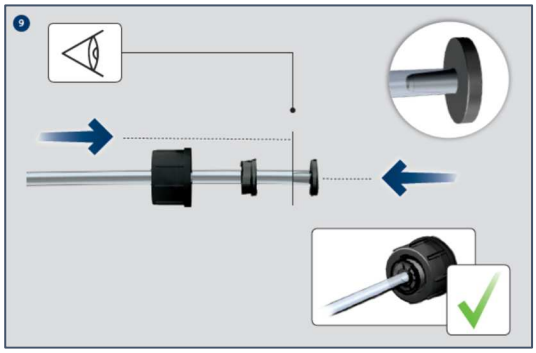
***The chlorine dioxide must not be discharged into the environment**. Neutralize the product in the collection bottle with a diluted solution of sodium thiosulphate before dispose it.*
Sodium thiosulphate is typically sold as salt (to be dissolved in water at approx. 10%) or as a 0.1 M solution.
Add to the collection bottle an equal volume of neutralizing solution, to be kept available in the second bottle supplied, and leave to act for a few minutes.
For an exact analysis of the neutralization, you need to add a proper indicator.

9) Provide a safety container for the biocide tank.

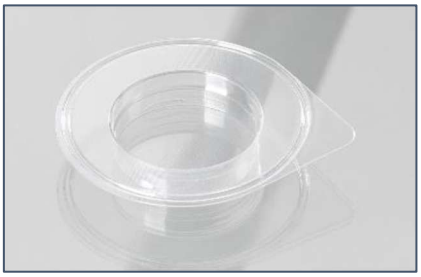
10) Connect the suction hose to the proper extracting connector of the drum, proceeding as follows:

a. Connect the suction line to the supplied extracting connector, using the suitable fittings kit, as shown here below.

Use these fittings



b. Remove the protection transparent sealing form the suction opening of the drum.

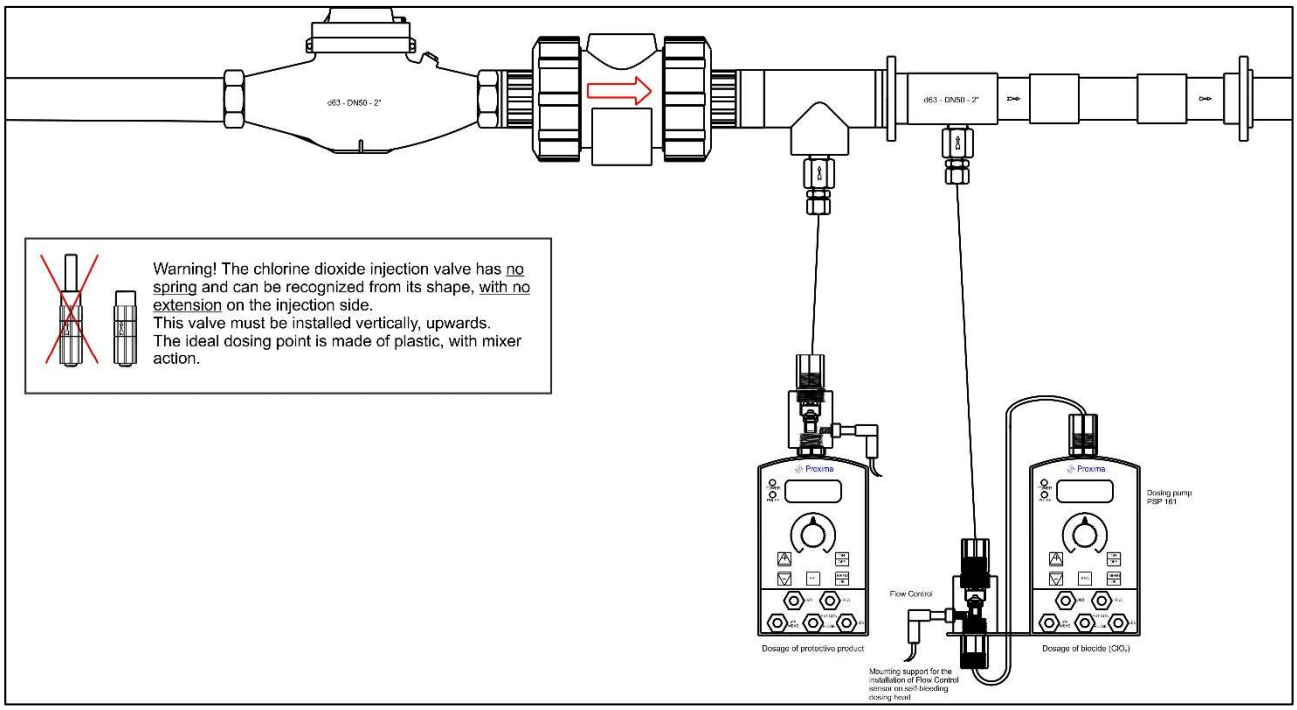


c. Unscrew the white cap with the supplied tool.

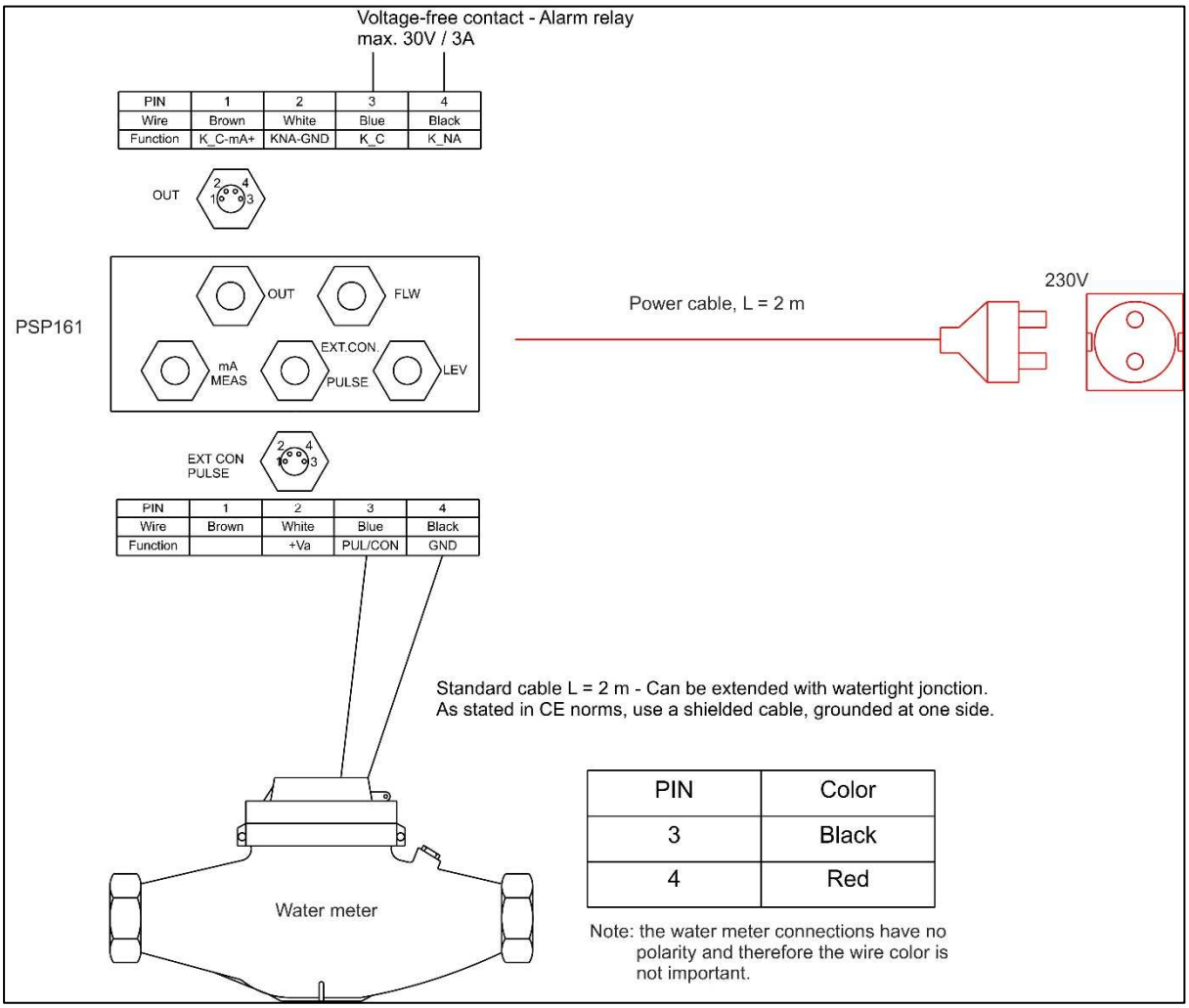
d. Insert the extracting connector immediately, in order to prevent toxic fumes from the drum; screw it by rotating the locking ring clockwise (tighten by hand).
e. Before starting dosing operations, check that the suction hose is correctly and firmly installed.

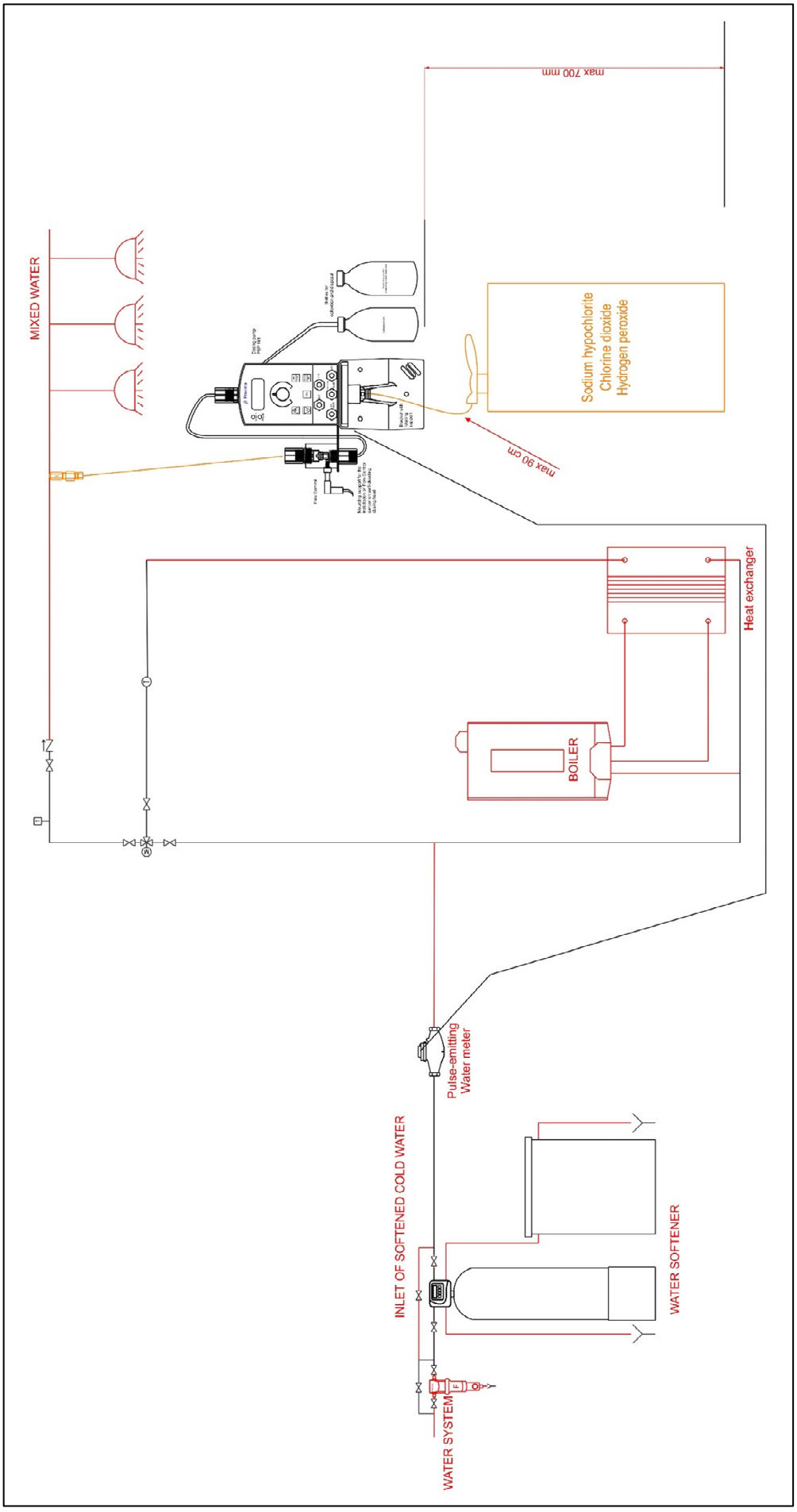
11) The delivery line goes from the pump to the “Flow Control” sensor and from the sensor to the injection valve.
12) Screw the injection valve to a ½” female connector placed vertically. Note that the valve has no spring and, therefore, can works properly only in this position. Connect the dosing hose to the injection valve.
Warning! The chlorine dioxide injection valve has no spring and it can be recognized from its shape, with no extension on the injection side. This valve must be installed vertically, upwards! The ideal dosing point is made of plastic, with mixer action.

***Note**: It is recommended to install a second pump for dosing a filming product.*



13) Connect the cable of the “Flow Control” sensor to the FLW input of the dosing pump.
14) Connect the water meter to the PULSE input of the pump, while avoiding to extend the power cable longer than 10 m. If a greater length is needed, use a shielded cable and connect the shield to the plant grounding on one side only.




max 700 mm
MIXED WATER
Sodium hypochlorite
Chlorine dioxide
Hydrogen peroxide
max 90 cm
Heat exchanger
BOILER
Pulse-emitting
Water meter
INLET OF SOFTENED COLD WATER
WATER SOFTENER
WATER SYSTEM

START-UP

The dosing pump is factory configured to operate as follows:

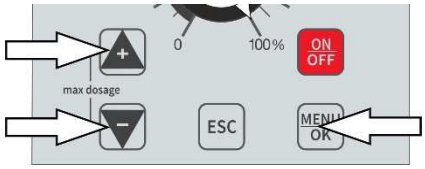
- Concentration of the biocide to be dosed: 0.6 % (6000 ppm)
- Desired dosage: 0.25 ppm
- K of the water meter of water to be treated: 10 L/pulse
- Working stroke length of the pump: 100%
- Working pressure: 4 bar

Calibration setting of the dosing pump corresponding to 3 l/h flow rate with an injection volume of 0.39 ml at 100% of stroke length and 4 bar counterpressure.

The pump working mode is set to “Automatic Calc”, i.e. automatic calculation of the ratio between pulses received from the water meter and injection strokes performed by the pump.

Actions at start-up:

1) Prime the pump manually:
   a. Open the purge valve
   b. Press simultaneously the two arrow keys & MENU/OK
   c. Wait for successful priming (approximately 300 dosing strokes)
   d. Close the purge valve
   e. Wait until the product reaches the injection valve, then press ON/OFF



2) Check the concentration of the dose product and, if necessary, change the value of P08
3) Check the K constant of the water meter and, if necessary, change the value of P10
4) Decide the desired dosage value and set parameter P09

It is advisable to start the system keeping the factory settings and make the pump work for a couple of days. Then, check the biocide concentration in the treated water.
This check must be performed periodically, as the content of the dosed biocide (chlorine dioxide) may be not stable, but tends to decrease over the time.
If the final value differs from the parameter P09 setting, recalculate (and set in P08) the biocide concentration with the following formula:

Content % = Measured conc. x K (L/pulse) / (Mult/div factor (P11) x Injection volume (P16) x 10)

For example: the desired value is 0.25 ppm, but the analysis result is 0.19 ppm → the concentration set in P08 must be modified.

Calculation of the new value: 0.19 x 10 / [(1.06 x 0.39) x10] = 0.46 %

Enter this new value in parameter P08. The microcontroller will automatically recalculate the multiplication / division factor, in order to obtain the desired output concentration, and will update the parameter P11.

Configuration parameters for PSP161 pump (software v.0621)

PAR.	Description	Min value	Max value	Reset value	Set value
P01	Pump Type	**ppm Calculation**			
P02	Relay Output Type	NO / NC / Repetition / Timer / Threshold / mA		NC	NC
P03	Level Input	NO / NC		NO	NO
P04	Maintaining time (minutes)	0	99	0	**10**
P05	Manual Frequency (pulses/minute)	0 i/m	180 i/m	90 i/m	90
P06	Max frequency (pulses/minute)	0 i/m	180 i/m	180 i/m	180
P07	Pulse Accumulation	2 imp	200 imp	50 imp	**2**
P08	**Solution Concentration**	**0.1 %**	**99.9 %**	**14.0 %**	**0.6 %**
P09	**Desired ppm**	**0.02 ppm**	**99.99 ppm**	**0.30 ppm**	**0.25**
P10	K Constant of the Pulse Water Meter	0.1	1000	100 L/imp.	**10**
P11	Multiplication / Division Factor	0.01	50.00	1.00	**1.06**
P12	Display Type	0	10	2	2
P13	Injection Flow Control Input	Excluded / Active / Self-priming		Excluded	**Self-priming**
P14	Dosage Error	2 %	50 %	20 %	20 %
P15	Priming Pulses	5	500	100	**500**
P16	Injection Volume	0.05 ml	9.99 ml	1.11 ml	**0.39**
P17	Mechanical Stroke Adjustment	5 %	100 %	100 %	100 %
P18	Service Request (max litres)	0 L	9999 L	0 L	**1500**
P19	Reset litre-counter for maintenance	Yes / No		No	No
P20	Not used	-	-	-	-
P21	Not used	-	-	-	-
P22	Clock	Excluded / Daily / Weekly		Excluded	Excluded
P23 … P36	On / Off Times	0:00	23:59	0:00	0:00
P37	Start Delay (min:sec)	00:02	59:59	00:02	00:02
P38	ON at Start-up	Remember last status / Always (ON) / Never (ON)		Remember	Remember
P39	**Language**	**ITA / ENG / FRA / ESP / DEU**		**ITA**	**ITA**
P40	Password for standard config.	0	999	0	0
P41	Password for advanced config.	0	999	0	0
P42	Serial Type (BPS)	Not used		A 9600	A 9600
P43	Serial Address	Not used		0	0
P44	Options	0	3	0	0

Flow Rate Curve for Pump PSP161-PKTT/AS 0310

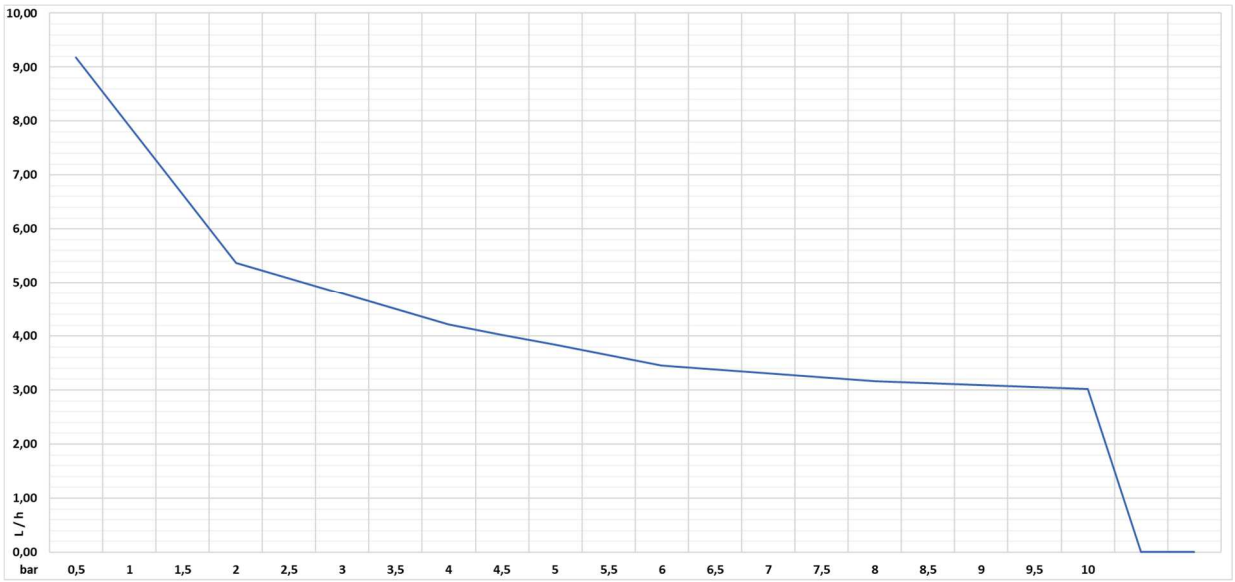


Table of the dosing yield for some pressure values:

Working pressure	**Injection volume with stroke 100%**	**Flow rate (stroke 100% and 180 injections/min)**
bar	**ml**	**l/h**
0.5	0.85	9.18
2	0.50	5.36
4	0.39	4.21
6	0.32	3.46
8	0.29	3.17
10	0.28	3.02

MAINTENANCE

If the biocide product (for example, concentrated chlorine dioxide) developpes a relevant amount of oxidizing gas, the plastic and ferrous materials with which it comes into contact, degrade. Moreover, this action is amplified by the working pressure in the dosing group and by the water temperature in the injection line.

It is therefore recommended to schedule a complete maintenance at least once a year, using the KIT 03 PKTT/AS.
Maintenance must be performed by qualified technicians.

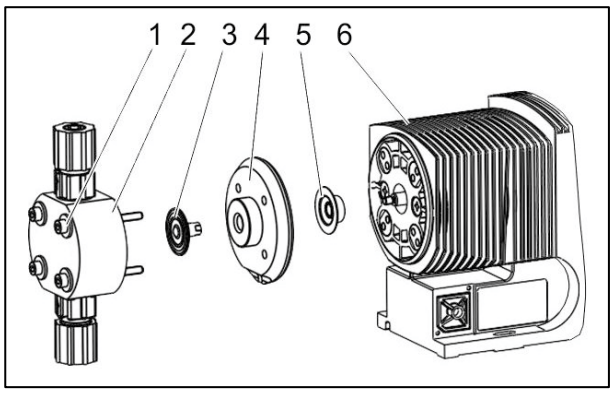
List of the spare parts:

Item		Description	Part Number
	KIT 03 PKTT/AS	Complete suction and delivery/AS valves, spare parts for a further maintenance (balls and gaskets), purge valve, dosing diaphragm and safety membrane	97003007/PKTT-AS
	Diaphragm 03	Full PTFE diaphragm	97003017
	Dosing head 0310 PKT/AS	Dosing head with self-bleeding option for pump 0310	9700311A/PKT
	Flow Control, size D	Flow Control sensor for pump 0310 / 1-6 l/h, with NPN sensor, cable with M8 connector and aluminium support	948D133211

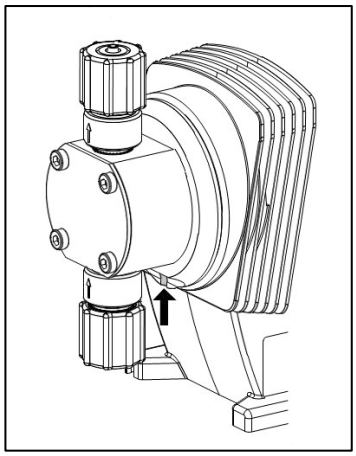
Maintenance Procedure

1) Suck water and dose till the hydraulic line is drained and the residual biocide has been removed from the dosing head
2) Adjust the pump stroke to 100%
3) Loosen the fixing screws of the dosing head and remove it
4) Adjust the pump stroke to 0% (diaphragm push pin fully out)
5) Unscrew the diaphragm
6) Remove the safety membrane and replace it with the new one
7) Screw the diaphragm till the end of its screwing stroke
8) Adjust the pump stroke to 100%
9) Replace the dosing head valves, while respecting the correct positions: suction valve on the bottom (one-way arrow) and delivery vale on the top (two-way arrow)

10) Assemble the dosing head checking that the head disc has the drain hole facing downwards (see figure)
11) Tighten the screws with a torque wrench calibrated to 3.0 Nm
12) Fit the suction and delivery hoses using new plain gaskets
13) Prime the dosing pump by making it work with 100% stroke and check the hydraulic sealing
14) Adjust the dosing stroke while the pump is working (otherwise a mechanical force is exerted on the adjustment vernier, which could be damaged)
15) Let the pump work and check its correct operations



1. *Fixing screws*
2. *Dosing head*
3. *Diaphragm*
4. *Head disc*
5. *Safety membrane*
6. *Pump housing*



Drain hole

Replacing the Chlorine Dioxide Drum

When the drum is empty, loosen the locking ring of the extracting connector, by rotating it counter-clockwise. Remove the connector and install it on the new drum as explained in the “Installation” section.

Close the empty drum with its cap, by rotating it clockwise by hand.