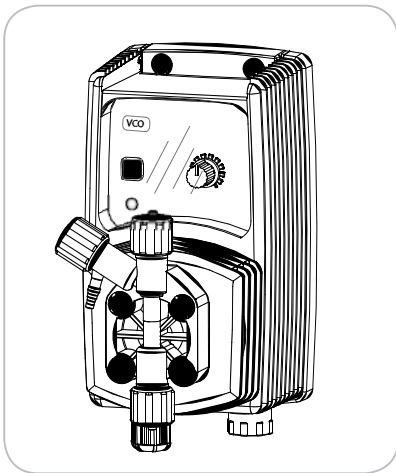




This operating instructions contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.



Use of this pump with radioactive chemicals is forbidden!



## OPERATING INSTRUCTIONS MANUAL FOR “V” PUMPS



Keep the pump protected from sun and water. Avoid water splashes.

Read Carefully!



English language

R2-03-09



“V” series solenoid dosing pumps comply with the following European regulations:

EN60335-1 : 1995, EN55014, EN50081-1/2, EN50082-1/2, EN6055-2, EN60555,3

Based on directive CEE 73/23 c 93/68 (DBT Low voltage directive) and directive 89/336/ CEE (EMC Electromagnetic Compatibility)



## GENERAL SAFETY GUIDELINES

### **Danger!**

In emergencies the pump should be switched off immediately! Disconnect the power cable from the power supply!

When using pump with aggressive chemicals observe the regulations concerning the transport and storage of aggressive fluids!

When installing always observe national regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that may cause injury, damage to persons or materials.

### **Caution!**

Pump must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device.

Pump and accessories must be serviced and repaired by qualified and authorized personnel only!

Always discharge the liquid end before servicing the pump!

Empty and rinse the liquid end before work on a pump which has been used with hazardous or unknown chemicals!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

### *Introduction:*

“V” Series metering pumps are the ideal solution for low / middle dosing of chemicals. All control and setup parameters are available using accurate control knobs and a visual system (led). “V” Series metering pumps have digital On/Off switch to ensure dosing activities (available on some models only).

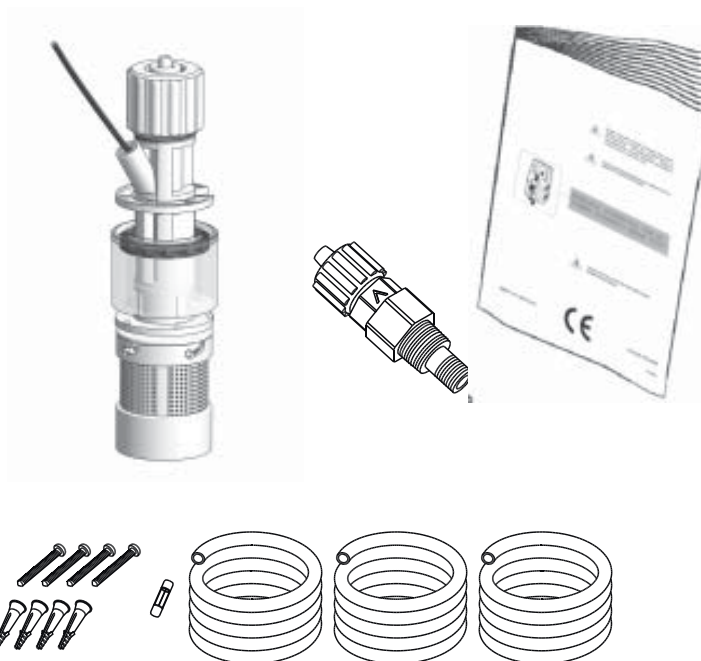
### *Pump capacity:*

Flow rate is determined by the stroke speed (frequency) adjustment. The stroke speed is adjustable from 0 to 100% using the adjustment knob. However dosing accuracy is guarantee within an adjustment range from 30% to 100%. The led on the panel shows the status activity of the pump.

## 2. Unpacking

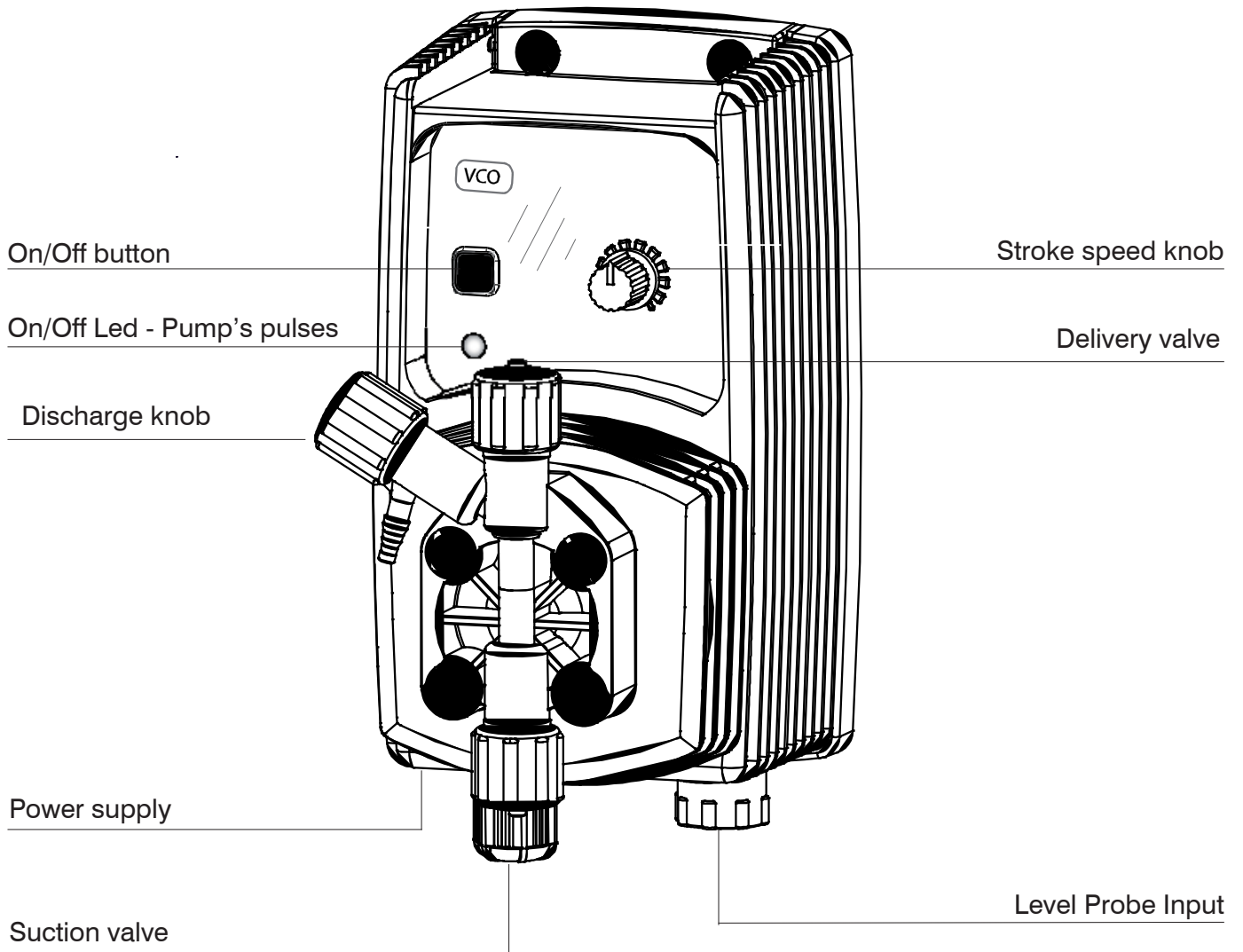
*Included into package:*

n.4	Dibbles ø6
n.4	Self tapping screws 4,5 x 40
n.1	Delayed fuse 5 X 20
n.1	Foot filter with valve
n.1	Injection valve
n. 1	Level probe (not included in VCO model)
m 2	Delivery pipe* (opaque PE)
m 2	Suction pipe * (transparent PVC)
m 2	Discharge pipe (transparent PVC 4x6)
n.1	This installation manual
* If hose is 6x8 then there is only a 4mt long hose. Cut to obtain suction and delivery hoses.	



**PLEASE DO NOT TRASH PACKAGING.  
IT CAN BE USED TO RETURN THE PUMP.**

### 3. General description



*Note:*

Shown image does not represent a specific pump's model. It is only for general purpose.

---

## 4. Before to Install warnings

---

Pump's installation and operativity is performed in 4 main steps:

*Pump's installation*

*Hydraulic Installation (hoses, level probe, injection valve)*

*Electrical Installation (main power connection, priming)*

*Programming the pump.*

Before to start, please read carefully the following safety information.

### *Protective clothes*



*Wear always protective clothes as masks, gloves, safety glasses and further security devices during ALL installation procedure and while handling chemicals.*

### *Installation location*



*Pump must be installed in a safety place and fixed to the table / wall to avoid vibration problems!*

*Pump must be installed in a easy accessible place!*

*Pump must be installed in horizontal position!*

*Avoid water splashes and direct sun!*

### *Hoses and Valves*



*Suction and delivery hoses must be installed in vertical position!  
All hoses connections must be performed using only hands' force!  
No tongs required!*

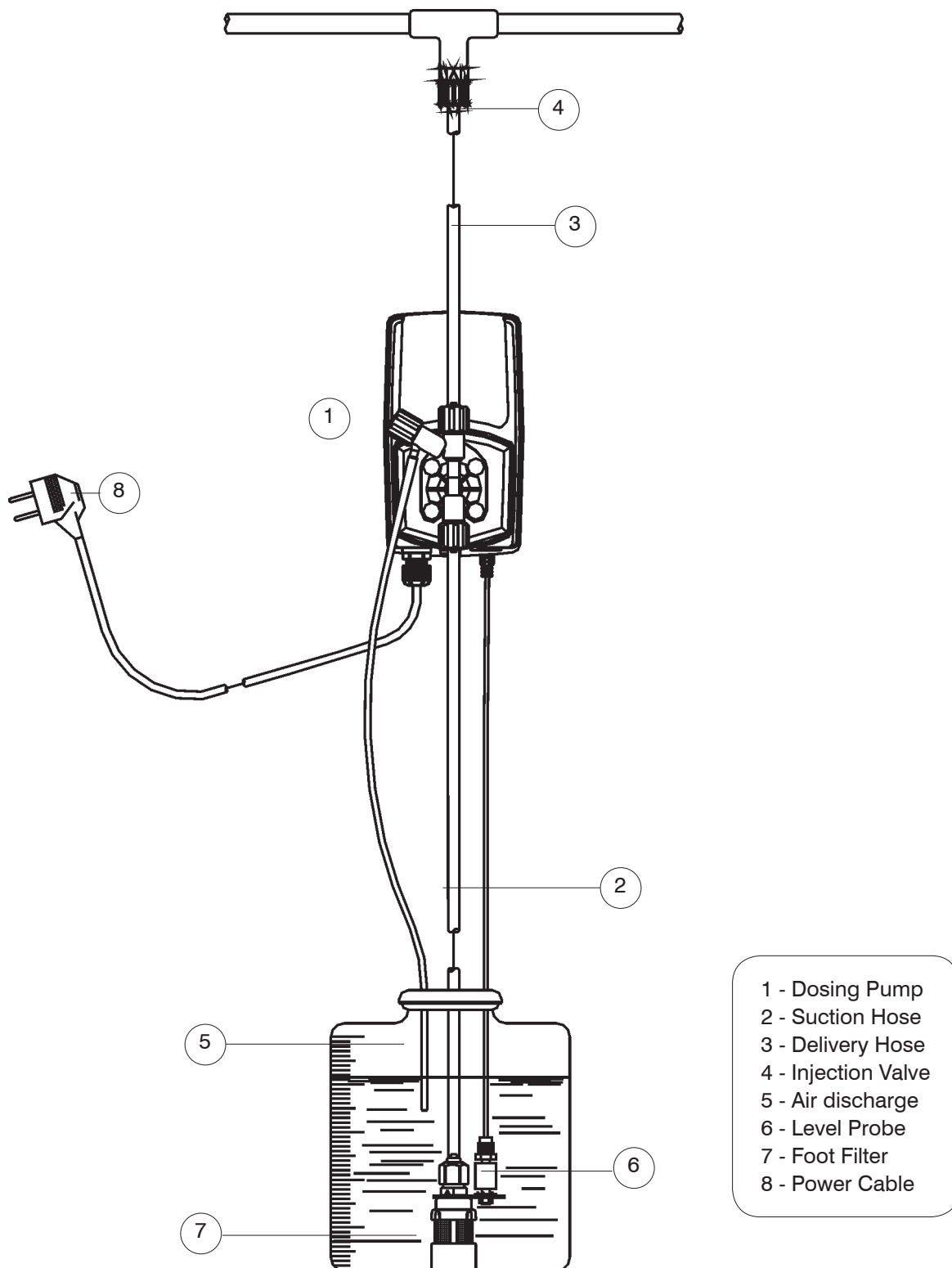
***Delivery hose must be firmly fixed to avoid suddenly movements that could damage near objects!***

***Suction hose must be shorter as possible and installed in vertical position to avoid air bubbles suction!***

*Use only hoses compatibles with product to dose! See chemical compatibility table. If dosing product is not listed please consult full Compatibility Table or contact chemical's manufacturer!*

## 5. Installation draw

Pump must be installed in a stable support at a maximum height (from tank's bottom) of 1,5 meters.



## 6. Hydraulic Installation

Hydraulic connections are:

- Suction Hose with level probe and foot filter*
- Delivery Hose with injection valve*
- Discharge Hose*

### Suction Hose.

Completely unscrew tightening nut from pump's head and remove assembling components: *tightening nut, holding ring and pipe holder*.

Assembly as shown in fig. (A). Insert hose into pipe holder until it reaches the bottom.

Lock hose on pump's head by screwing down the tightening nut.  
Use only hands to do it!

Connect other side of the hose to the foot filter using the same procedure.

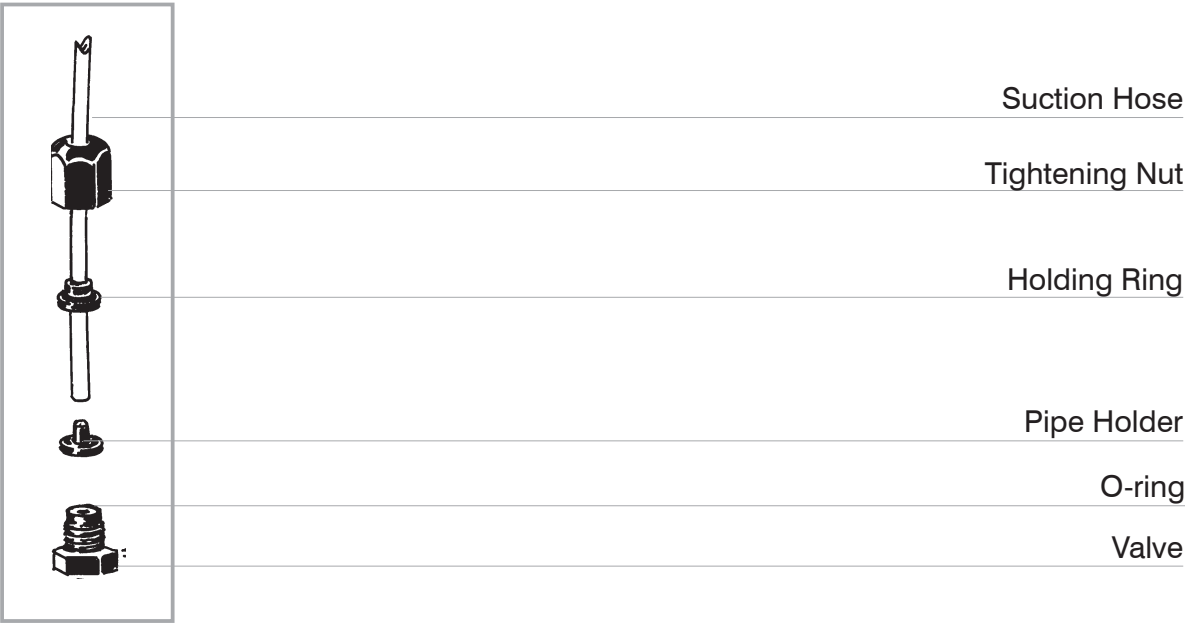
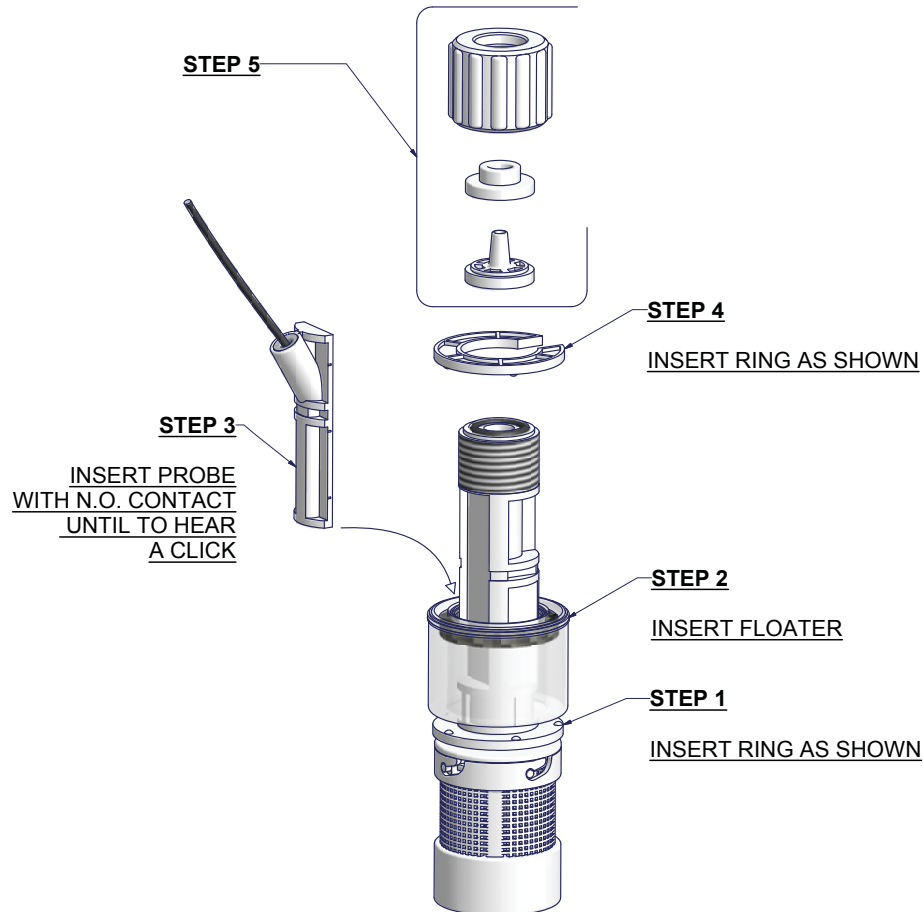


fig. (A)



### Assembling foot filter with level probe.

Level probe must be assembled with foot filter using the provided kit. Foot valve is made to be installed into tank's bottom without sediments priming problem.



Connect BNC from level probe into pump's level input (front side of the pump). Put level probe assembled with foot filter into tank's bottom.

**Warning:** If there is a mixer installed into tank, install a suction lance instead of level probe / foot filter.

### Delivery Hose.

Completely unscrew tightening nut from pump's head and remove assembling components: *tightening nut, holding ring and pipe holder*.

Assembly as shown in fig. (A). Insert hose into pipe holder until it reaches the bottom.

Lock hose on pump's head by screwing down the tightening nut. Use only hands to do it!

Connect other side of the hose to the injection valve using the same procedure.

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## 7. Pump head

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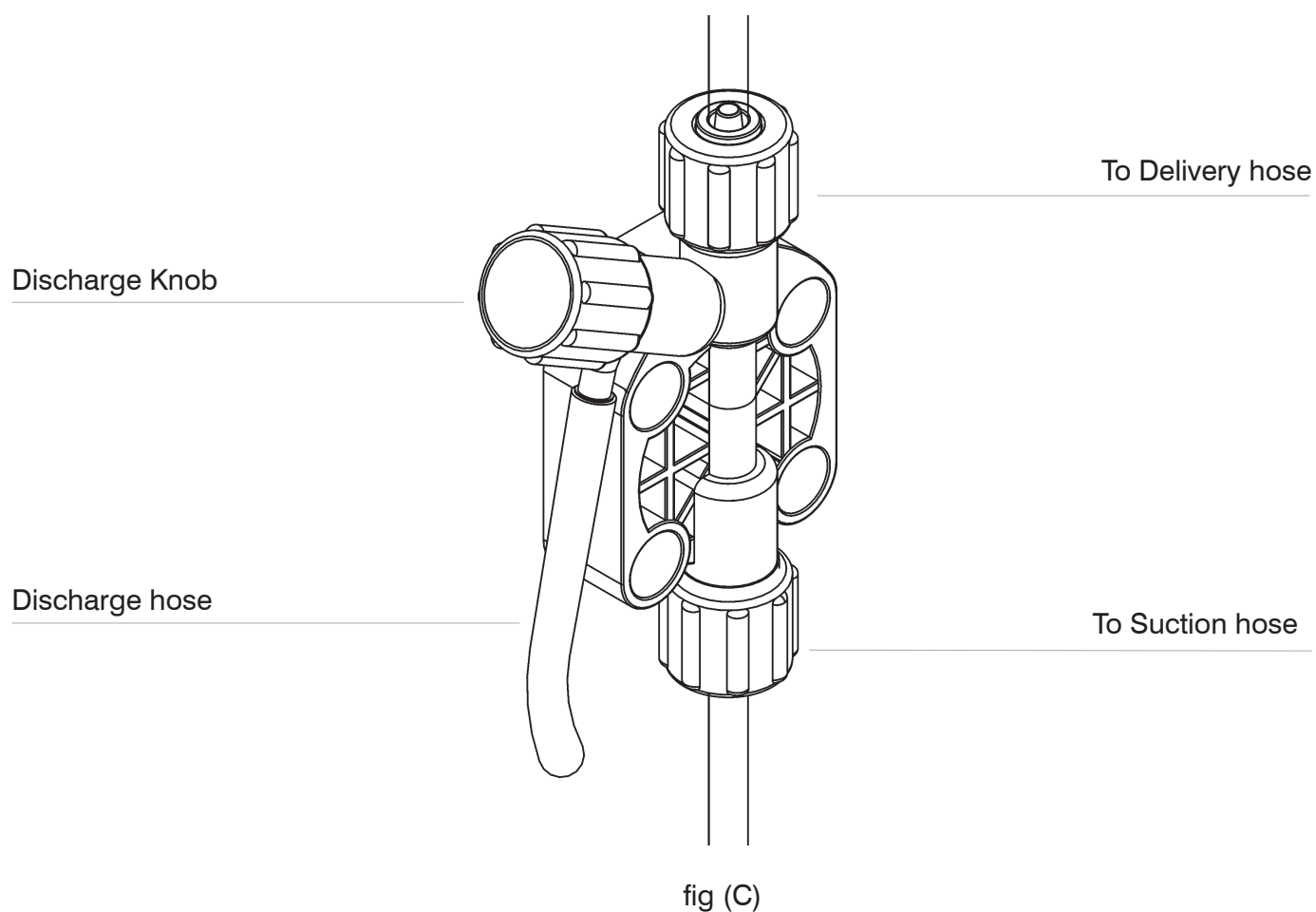
### ***Injection Valve.***

Injection valve must be installed on plant from water's input.  
Injection valve will open at pressure greater than 0,3bar.

### ***Discharge hose.***

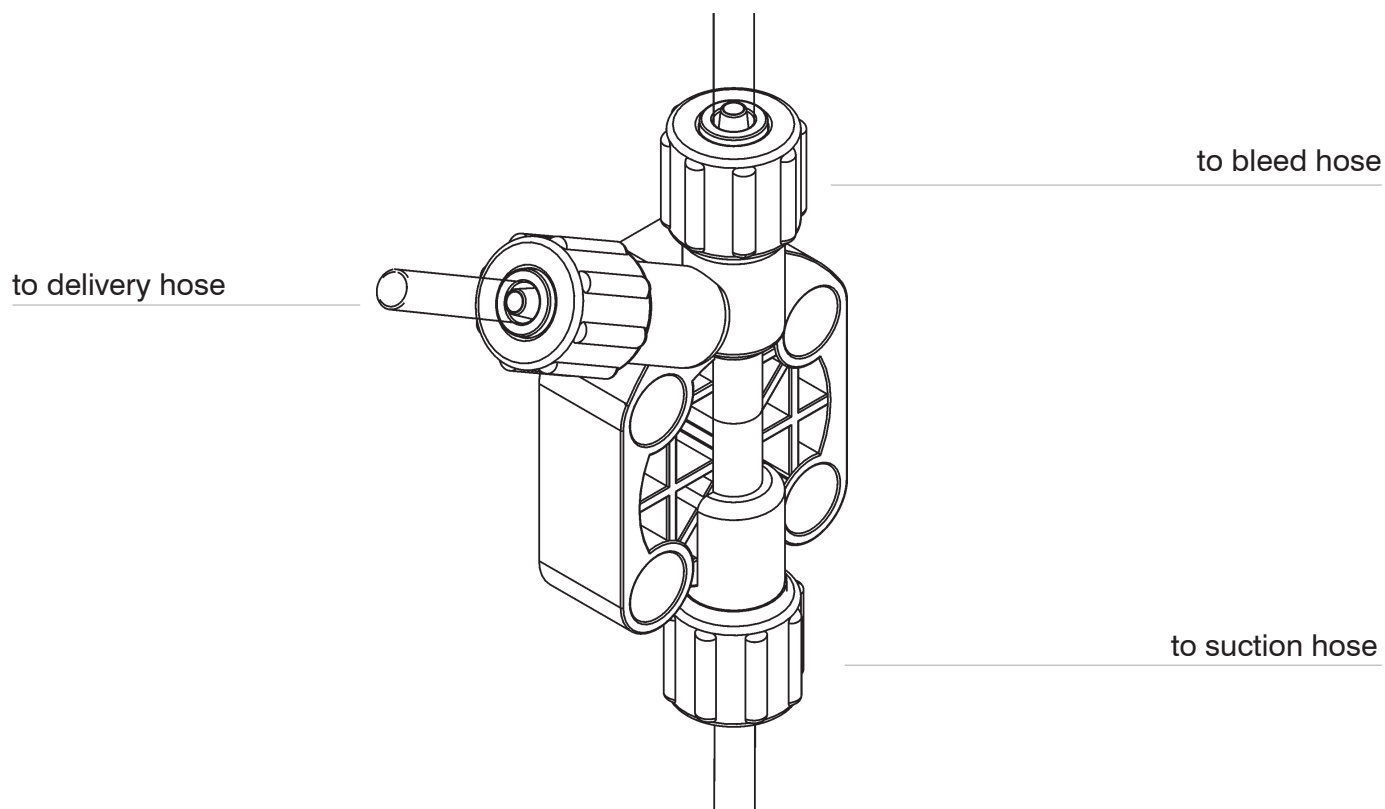
Insert one side of discharge hose into discharge connector as shown in fig (C).

Insert other side of discharge hose into product's tank.  
During priming procedure product exceeding will flow into tank.



For priming procedure see the related chapter.

### **Self-venting pump head.**



*Self-venting* pump head must be used when using chemicals that produce gas (i.e. hydrogen peroxide, ammonium, sodium hypochlorite at particular conditions).

Hoses assembling procedure (*including purge hose*) is described in fig. (A).

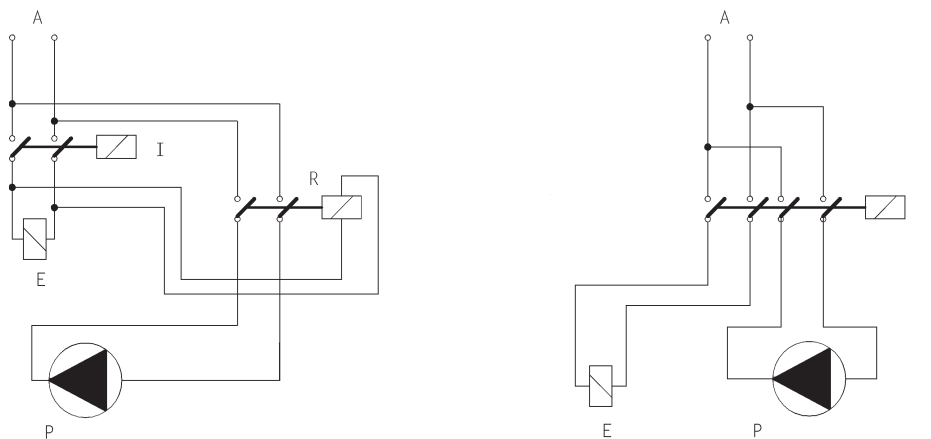
#### **Notes:**

- suction, delivery and purge valves are DIFFERENT! Do not exchange them!
- delivery and purge hoses are made of same material!
- it's allowed to lightly bend discharge hose!
- during calibration procedure ("TEST") insert discharge hose into BECKER test-tube!

## 8. Electrical installation

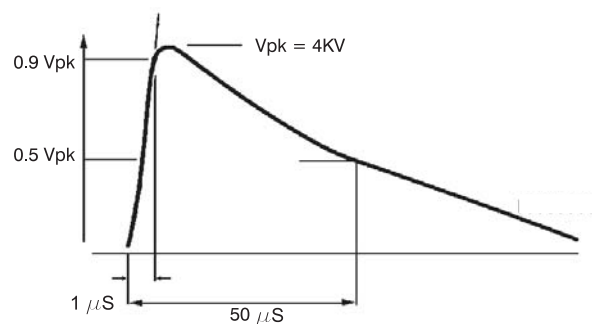
All electrical connections must be performed by **AUTHORIZED AND QUALIFIED** personnel only. Before to proceed, please, verify the following steps:

- verify that pump's label values are compatible with main power supply.
- pump must be connected to a plant with a differential switch (0,03A sensitivity) if there isn't a good ground.
- to avoid damages to the pump do not install it in parallel with heavy inductance load (for example: engines). A relay switch must be used. See below picture.



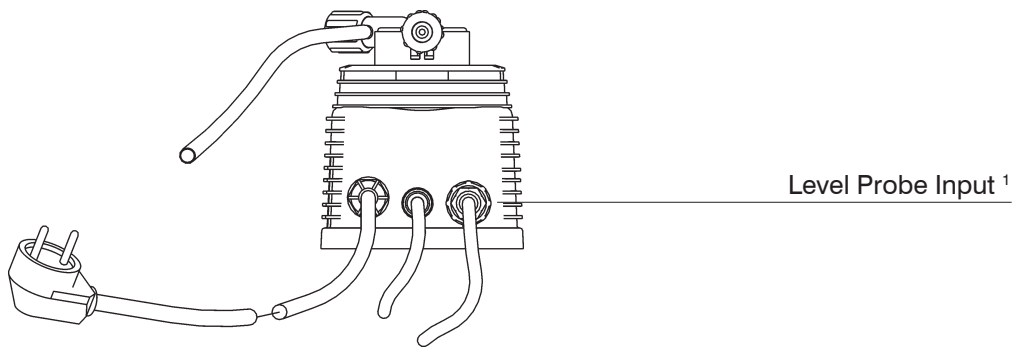
***P** - Dosing Pump  
**R** - Relay  
**I** - Switch or safety device  
**E** - Electrovalve or inductance load  
**A** - Main Power*

- On pump's mother board there is a further protection against over voltages (275V - 150V) and distribution line noises (4KV for max 50 $\mu$ sec) as shown:



Once verified previous steps proceed as follows:

- check that “BNC” of level probe has been connected as described in “Hydraulic Installation” chapter.
- connect “BNC” and external signal to pump’s “INPUT” connectors.



(bottom view)

<sup>1</sup> Level Probe Input available on: VCL

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## 9. Models

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### LEVEL ALARM

CL type pumps are provided with a liquid level alarm to indicate product tank is empty. The level probe is connected to the right BNC plug on pump's bottom panel. The level probe is made of a N.O. reed contact (10VA, 1A max., 230Vac max.) closed by a floating magnet housed in a (PP) plastic box. When the product level goes below the minimum the magnet closes the reed contact. The pump stops and the red LED on pump's front panel indicates the alarm status.

### PUMP TYPES

*Pumps mod. "VCLF" and "VCL" (12-24 Vac/Vdc) are equipped with a bicolour led.*

*Led on, red colour: low level product alarm. Check product's tank and restore the level.*

*Led on, blinking green colour: pump normal operating mode.*

*Led on, blinking green colour (one second on, one second off): power supply out of range. Check pump's label and check the main power.*

## VCO

Constant pump with flow control (front panel knob may be set from 0% to 100% of pump nominal capacity). Flow control is electronically set and it operates on pump injections number. To avoid linearity problem do not set the knob of pump flow between 0% and 10%.

VCO may operate in constant dosing mode or On-Off mode (using an external signal).

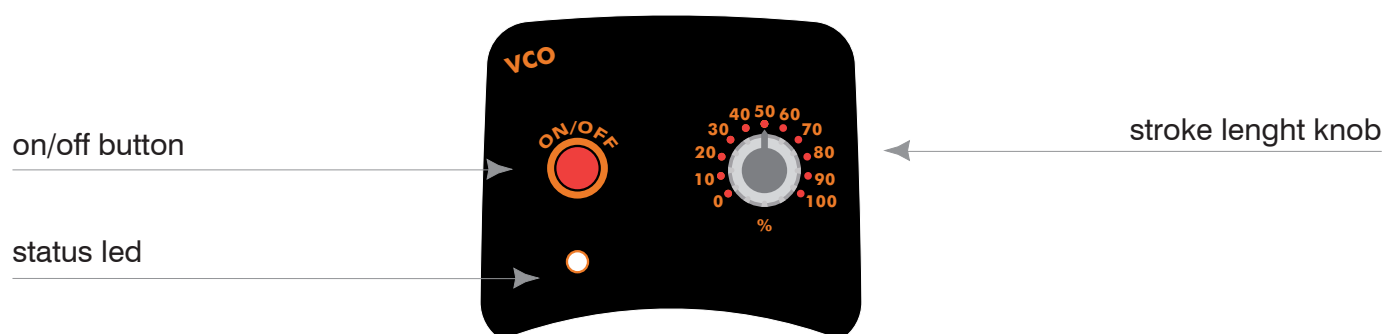
Dosing example using an VCO 0505: to dose 2,5 l/h at 5bar counter-pressure rotate front panel knob to 50%.

VCO has a divider (x- 0,1) to reduce by ten times the pump capacity by dividing the pump stroke speed.

How to enable “divider mode”:

- set the pump into OFF\* mode;
- keeping pressed the on/off button, wait 3 flashes from the status led. The pump will start the dosing activity with the stroke speed reduced ten times than the value set on stroke lenght knob.

To disable the “divider mode”, power OFF the pump. Keeping pressed the on/off button, wait 3 flashes of the status led.



## LED

The led on the frontal panel shows the pump's operating status through 5 flashing:

LED ACTIVITY	PUMP'S STATUS
It flashes 3 times per second	the pump is powered with a power supply lower than the label
It flashes 2 times per second	the pump is powered with a power supply higher than the label
It flashes 1 time every 2 seconds	the pump is in pause (OFF) and it is powered (OFF* mode)
led ON, it switches off when pump strokes	the pump is active and functioning (ON)
led ON, it switches off 1 time every 2 seconds	the pump is working into DIVIDE mode

**VCOG is automatic priming model: when the pump is working (ON), keep pressed on/off key for 7 seconds. The pump starts priming. Leave the key to turn off the pump (OFF).**

## 9. Models

### VCL

*Constant dosing pump with level alarm.*

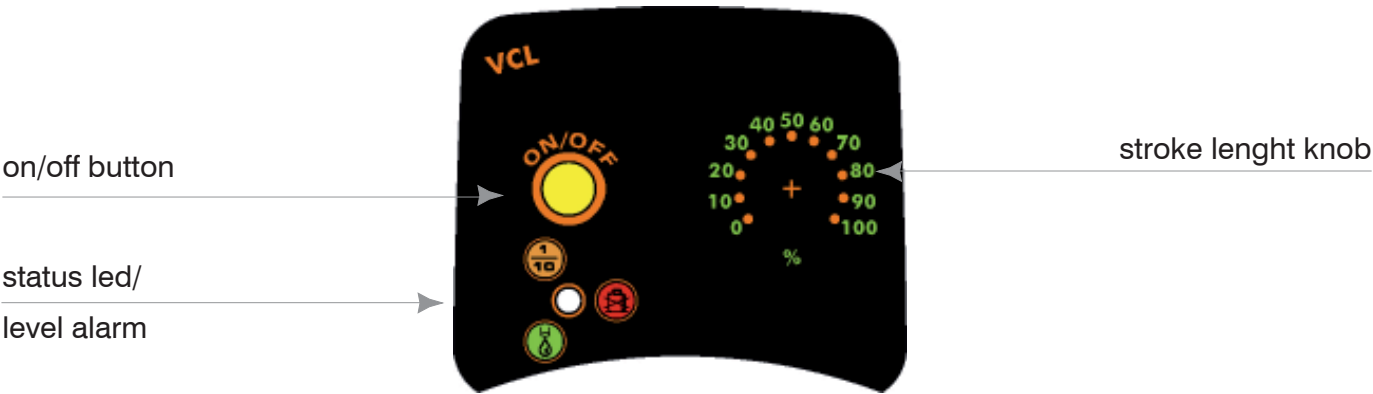
A red led indicates that the product's tank is empty. During this condition the pump does not dose. The pump has flow control (front panel knob may be set from 0% to 100% of pump nominal capacity). Flow control is electronically set and it operates on pump injections number. To avoid linearity problem do not set the knob of pump flow between 0% and 10%.

VCL has a divider ( $\times 0,1$ ) to reduce by ten times the pump capacity by dividing the pump stroke speed.

How to enable "divider mode":

- set the pump into OFF\* mode;
- keeping pressed the on/off button, wait 3 flashes from the status led. The pump will start the dosing activity with the stroke speed reduced ten times than the value set on stroke lenght knob.

To disable the "divider mode", power OFF the pump. Keeping pressed the on/off button, wait 3 flashes of the status led.



### LED

The led on the frontal panel shows the pump's operating status through 5 flashing:

LED	PUMP'S STATUS
Three times per second blinking (RED)	Too low power supply
Two times per second blinking (RED)	Too high power supply
One time every 2 seconds blinking (GREEN) One time every 2 seconds blinking into DIVIDE mode (ORANGE)	OFF mode. Pump powered.
Always ON (GREEN), but off when pump strokes Always ON (ORANGE), but off when pump strokes into DIVIDE mode	ON mode. Pump powered.

**VCLG is automatic priming model: when the pump is working (ON), keep pressed on/off key for 7 seconds. The pump starts priming. Leave the key to turn off the pump (OFF).**



### **MANUAL PRIMING / DISCHARGING**

1. Connect the pump to main power.
2. Rotate front panel knob to 70%.
3. Turn on the pump.
4. Rotate discharge knob (open it completely).
5. The chemical will begin to flow into discharge hose. Close the discharge knob.
6. Proceed to normal operating mode.

## 11. Troubleshooting

PROBLEM	POSSIBLE CAUSE
<b>Pump doesn't turn on.</b>	<p><i>Pump isn't powered. Connect it to main supply.</i></p> <p><i>Pump's protection fuse is broken. Replace it. See page 19 for replacement procedure.</i></p> <p><i>Pump's main board is broken. Replace it. See page 19 for replacement procedure.</i></p>
<b>Pump is not dosing and solenoid is operating.</b>	<p><i>The foot filter is obstructed. Clean it.</i></p> <p><i>Suction hose is empty. Pump must be primed. Repeat priming procedure.</i></p> <p><i>Air bubbles inside hydraulic circuit. Check valves - hoses - fittings.</i></p> <p><i>Product to dose is generating gas. Turn discharge knob and let air flow away.</i></p> <p><i>Use a self-venting pump head.</i></p>
<b>Pump is not dosing and solenoid isn't operating or slightly operating.</b>	<p><i>Crystals presence inside valves. Check them and try to dose 2-3 liters of normal water. Change valves.</i></p> <p><i>Injection valve obstructed. Change it.</i></p>

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## 12. Fuse and main board replacement

---

Fuse or main board replacement is allowed to qualified personnel only. Before to operate disconnect the pump from main power and all hydraulic connections.

For fuse replacement is necessary to use a 3x16 and 3x15 screwdriver and a new fuse (same model of old one).

For main board replacement is necessary to use a 3x16 and 3x15 screwdriver and a new main board (same model of old one).

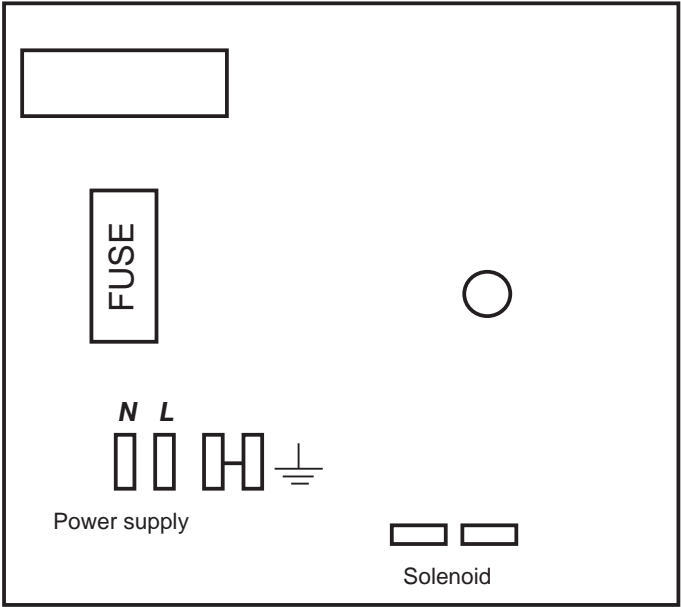
### ***Fuse replacement procedure:***

- Remove 6 screws from pump's back.
- Pull pump's back cover until it's completed separated from pump's front. Be careful of the knob's spring.
- Locate the blown fuse and replace it.
- Reassemble the pump.
- Reinsert screws.

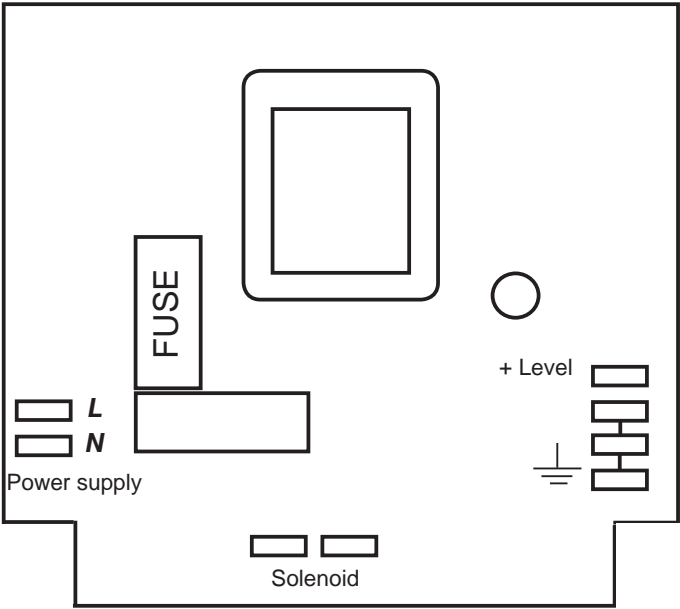
### ***Main board replacement procedure:***

- Remove 6 screws from pump's back.
- Pull pump's back cover until it's completed separated from pump's front. Be careful of the knob's spring.
- Remove board's screws.
- Completely disconnect wires from main board and replace it. Reinsert screws.
- Reconnect wires to the main board (see enclosed picture).
- Reassemble the pump.
- Reinsert screws.

VCO



VCL



During normal operating mode, pump must be checked once for month. Wear needed safety devices and check hoses and all hydraulic components for:

- product leak
- broken hoses
- corroded connections

**All maintenance operations must be performed by authorized and trained personnel only. If pump needs factory assistance please use original package to return it.**

**Before to do it, please, remove all dosing product inside the pump and hoses.**

**Use only original spare parts!**

## B Appendix. Construction Materials and Technical info

### TECHNICAL FEATURES

Power supply:	230 VAC (180-270 VAC)
Power supply:	115 VAC (90-135 VAC)
Power supply:	24 VAC (20-32 VAC)
Power supply:	12 VDC (10-16 VDC)
Pump strokes:	0 ÷ 180
Suction Height:	1,5 metres
Environment Temperature:	0 ÷ 45°C (32 ÷ 113°F)
Chemical Temperature:	0 ÷ 50°C (32 ÷ 122°F)
Installation Class:	II
Pollution Level:	2
Audible Noise:	74dbA
Packaging and Transporting Temperature:	-10 ÷ +50°C (14 ÷ 122°F)
Protection degree	IP65

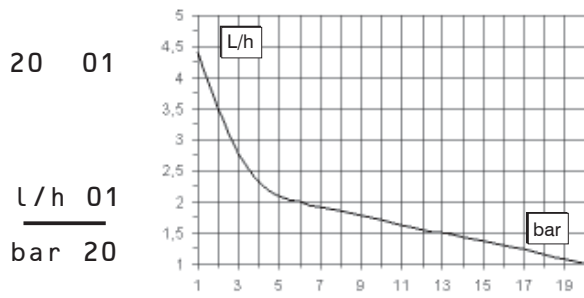
### MANUFACTURING MATERIALS

Case:	PPO
Pump head:	PVDF
Diaphragm:	PTFE
Balls:	CERAMIC, GLASS, PTFE, SS *
Suction Pipe	PVC
Delivery Pipe:	PE
Valve Body:	PVDF
O-ring:	FP, EP, WAX, SI, PTFE *
Injection connector	PP, PVDF (ceramic, HASTELLOY C276 spring)
Level Probe:	PP, PVDF *
Level probe cable:	PE
Foot Filter:	PP, PVDF *

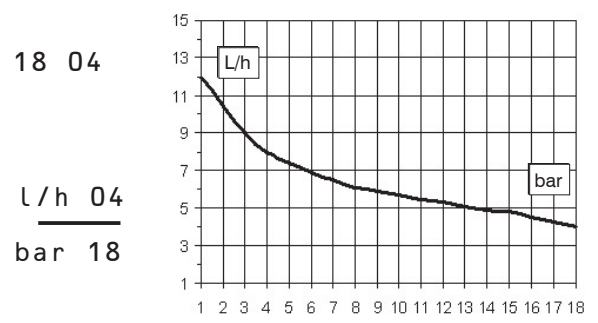
\* as ordered.

INFORMAZIONI							
	Portata				cc per impulso	Pressione massima	
	Min cc/h	Max l/h	Min GPH	Max GPH			
2001	0.1	1	0.00002	0.26	0.1	20 bar	290 PSI
1802	0.19	2	0.00005	0.52	0.19	18 bar	261 PSI
1804	0.37	4	0.00009	1.05	0.37	18 bar	261 PSI
1502	0.19	2	0.00005	0.52	0.19	15 bar	217 PSI
1504	0.37	4	0.00009	1.05	0.37	15 bar	217 PSI
1505	0.46	5	0.00012	1.32	0.46	15 bar	217 PSI
1004	0.37	4	0.00009	1.05	0.37	10 bar	145 PSI
1005	0.46	5	0.00012	1.32	0.46	10 bar	145 PSI
1010	0.93	10	0.00024	2.64	0.93	10 bar	145 PSI
0706	0.56	6	0.00014	1.58	0.56	7 bar	101 PSI
0510	0.93	10	0.00024	2.64	0.93	5 bar	72 PSI
0512	1.11	12	0.00029	3.17	1.11	5 bar	72 PSI
0408	0.74	8	0.00019	2.11	0.74	4 bar	58 PSI
0310	0.93	10	0.00024	2.64	0.93	3 bar	43 PSI
0217	1.57	17	0.00041	4.49	1.57	2 bar	29 PSI

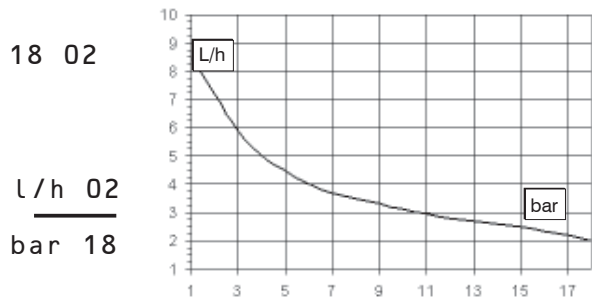
Pump Head J



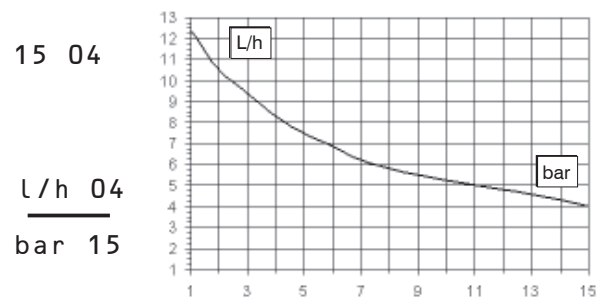
Pump Head K



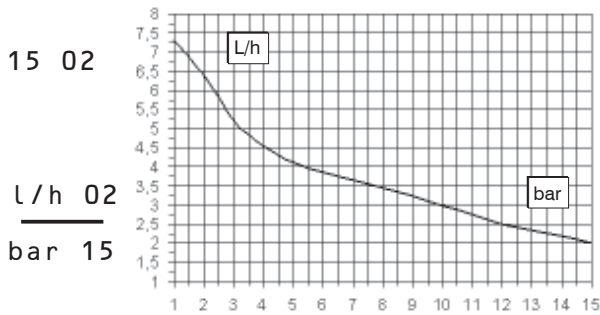
Pump Head K



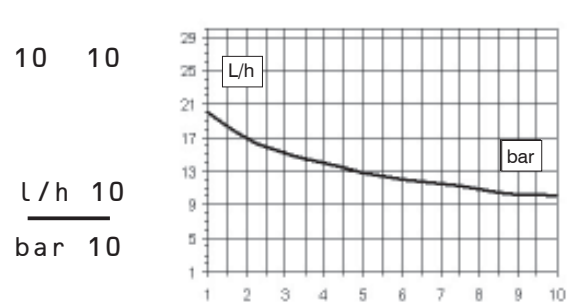
Pump Head K



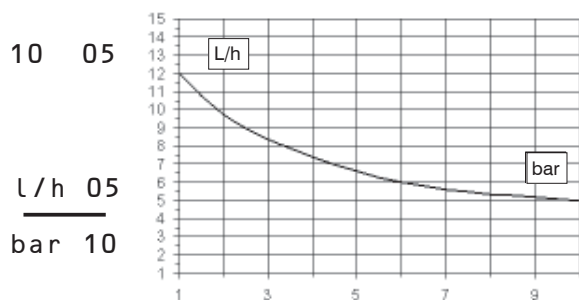
Pump Head K



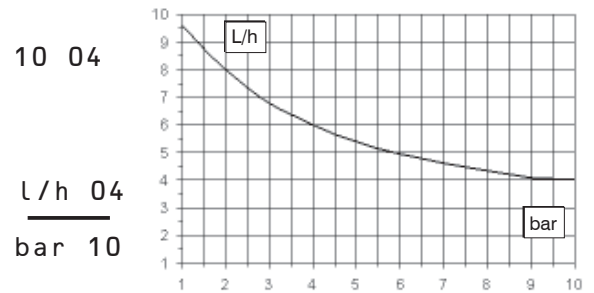
Pump Head K



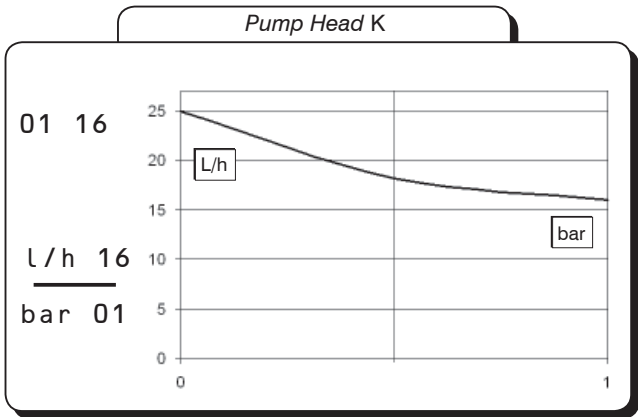
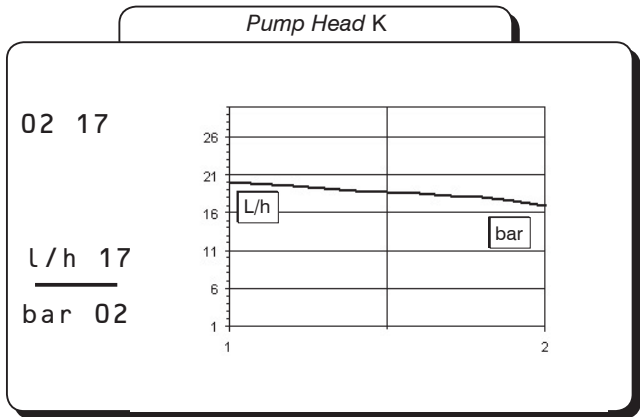
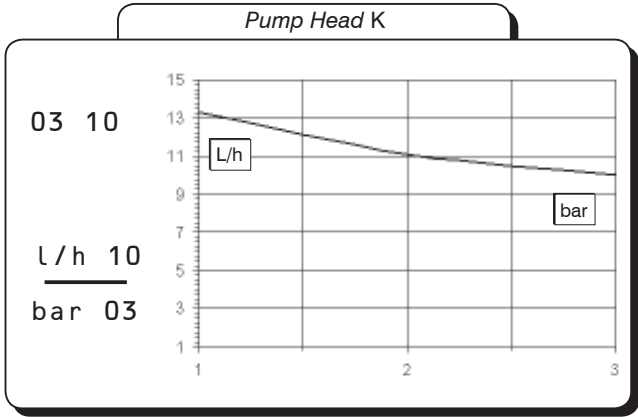
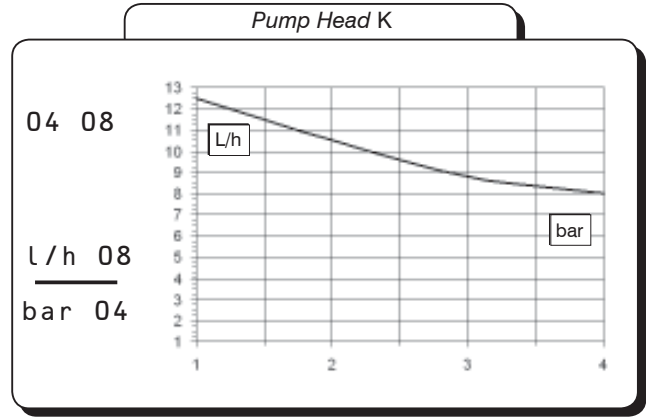
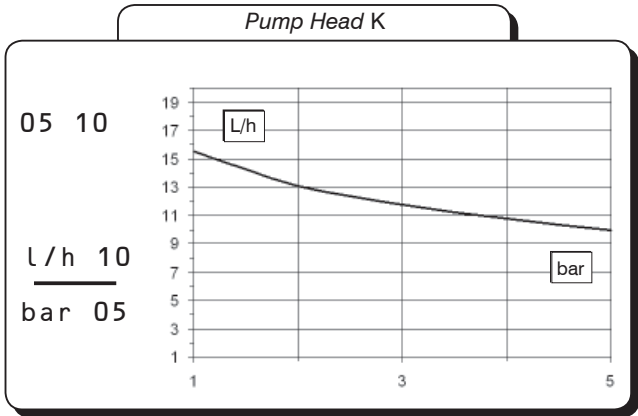
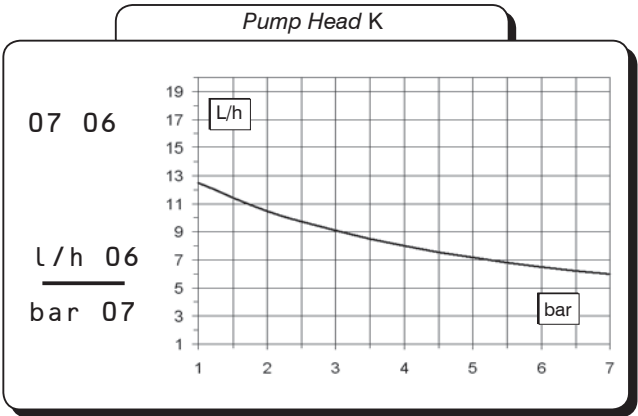
Pump Head K



Pump Head K

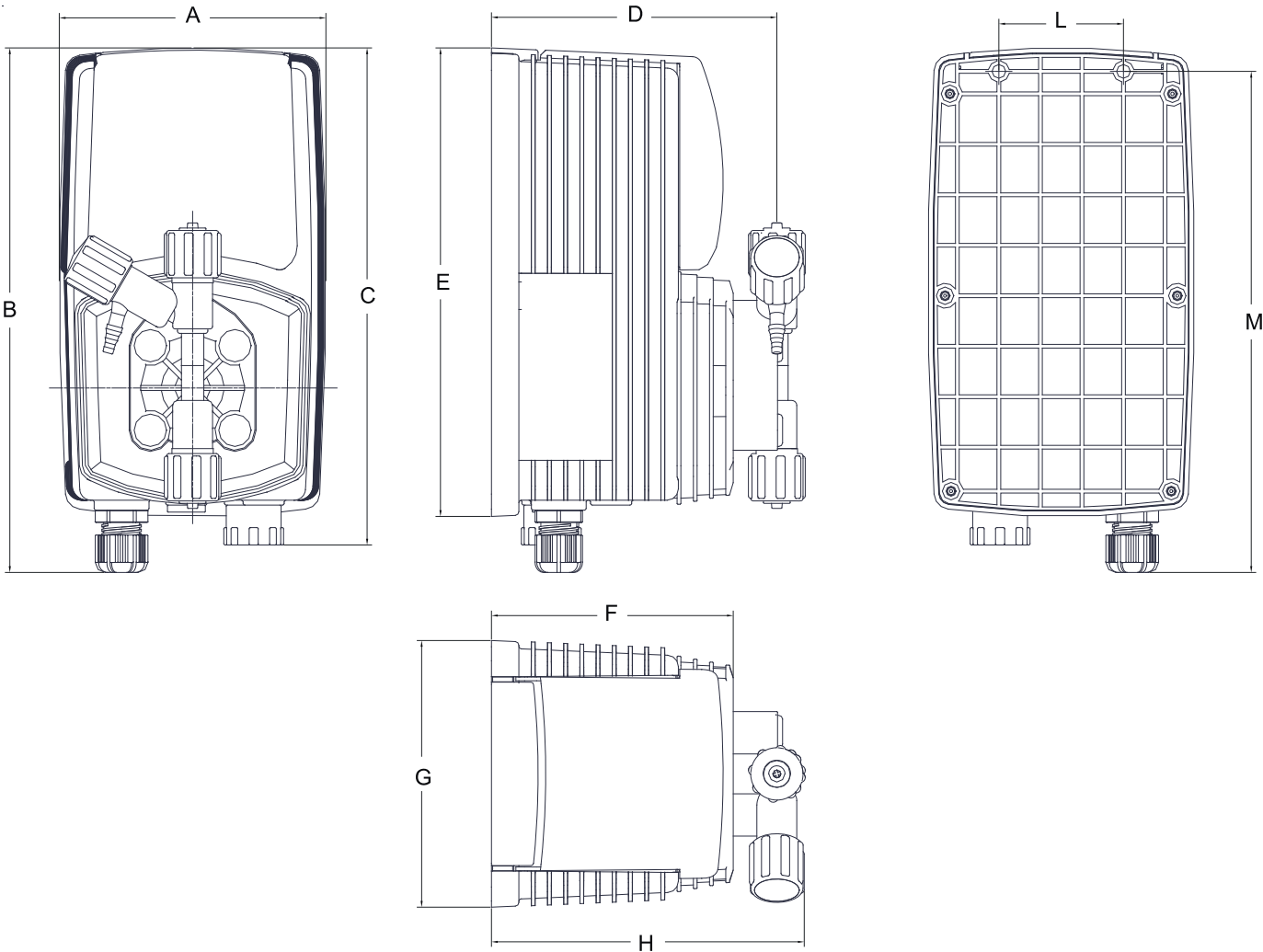


# C Appendix. Delivery Curves



Flow rate indicated is for H<sub>2</sub>O at 20°C at the rated pressure.  
Dosing accuracy ± 2% at constant pressure ± 0,5 bar.





DIMENSIONS		
	<i>mm</i>	<i>inches</i>
<i>A</i>	106.96	4.21
<i>B</i>	210.44	8.28
<i>C</i>	199.44	7.85
<i>D</i>	114.50	4.50
<i>E</i>	187.96	7.40
<i>F</i>	97.00	3.81
<i>G</i>	106.96	4.21
<i>H</i>	125.47	4.93
<i>L</i>	50.00	1.96
<i>M</i>	201.00	7.91

## E Appendix. Chemical Compatibility Table

Solenoid driven metering pumps are widely used to dose chemical fluids and it is important that the most suitable material in contact with fluid is selected for each application. This compatibility table serves as a useful help in this respect. All the informations in this list are verified periodically and believed to be correct on the date of issuance. All the informations in this list are based on manufacturer's data and its own experience but since the resistance of any material depends by several factors this list is supplied only as an initial guide, in no way EMEC makes warranties of any matter respect to the informations provided in this list.

Chemical	Formula	Ceramic	PVDF	PP	PVC	SS 316	PMMA	Hastelloy	PTFE	FPM	EPDM	NBR	PE
Acetic Acid, Max 75%	CH <sub>3</sub> COOH	2	1	1	1	1	3	1	1	3	1	3	1
Aluminium Sulphate	Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	1	1	1	1	1	1	1	1	1	1	1	1
Amines	R-NH <sub>2</sub>	1	2	1	3	1	-	1	1	3	3	1	1
Calcium Hydroxide (Lime Milk)(Slaked Lime)	Ca(OH) <sub>2</sub>	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Hypochlorite (Chlorinated Lime)	Ca(OCl) <sub>2</sub>	1	1	1	1	3	1	1	1	1	1	3	1
Copper-II-Sulphate (Roman Vitriol)	CuSO <sub>4</sub>	1	1	1	1	1	1	1	1	1	1	1	1
Ferric Chloride	FeCl <sub>3</sub>	1	1	1	1	3	1	1	1	1	1	1	1
Hydrofluoric Acid 40%	HF	3	1	1	2	3	3	2	1	1	3	3	1
Hydrochloric Acid, Concentrate	HCl	1	1	1	1	3	1	1	1	1	3	3	1
Hydrogen Peroxide, 30% (Perydrol)	H <sub>2</sub> O <sub>2</sub>	1	1	1	1	1	1	1	1	1	2	3	1
Nitric Acid, 65%	HNO <sub>3</sub>	1	1	2	3	2	3	1	1	1	3	3	2
Phosphoric Acid, 50% (Orthophosphoric Acid)	H <sub>3</sub> PO <sub>4</sub>	1	1	1	1	2	1	1	1	1	1	3	1
Potassium Permanganate, 10%	KMnO <sub>4</sub>	1	1	1	1	1	1	1	1	1	1	3	1
Sodium Bisulphite	NaHSO <sub>3</sub>	1	1	1	1	2	1	1	1	1	1	1	1
Sodium Carbonate (Soda)	Na <sub>2</sub> CO <sub>3</sub>	2	1	1	1	1	1	1	1	2	1	1	1
Sodium Hydroxide (Caustic Soda)	NaOH	2	1	1	1	1	1	1	1	2	1	2	1
Sodium Hypochlorite, 12.5%	NaOCl + NaCl	1	1	2	1	3	1	1	1	1	1	2	1
Sulphuric Acid, 85%	H <sub>2</sub> SO <sub>4</sub>	1	1	1	1	2	3	1	1	1	3	3	1
Sulphuric Acid, 98.5%	H <sub>2</sub> SO <sub>4</sub>	1	1	3	3	3	3	1	1	1	3	3	3

### Resistance rating

Resistant	1
Fairly resistant	2
Not resistant	3

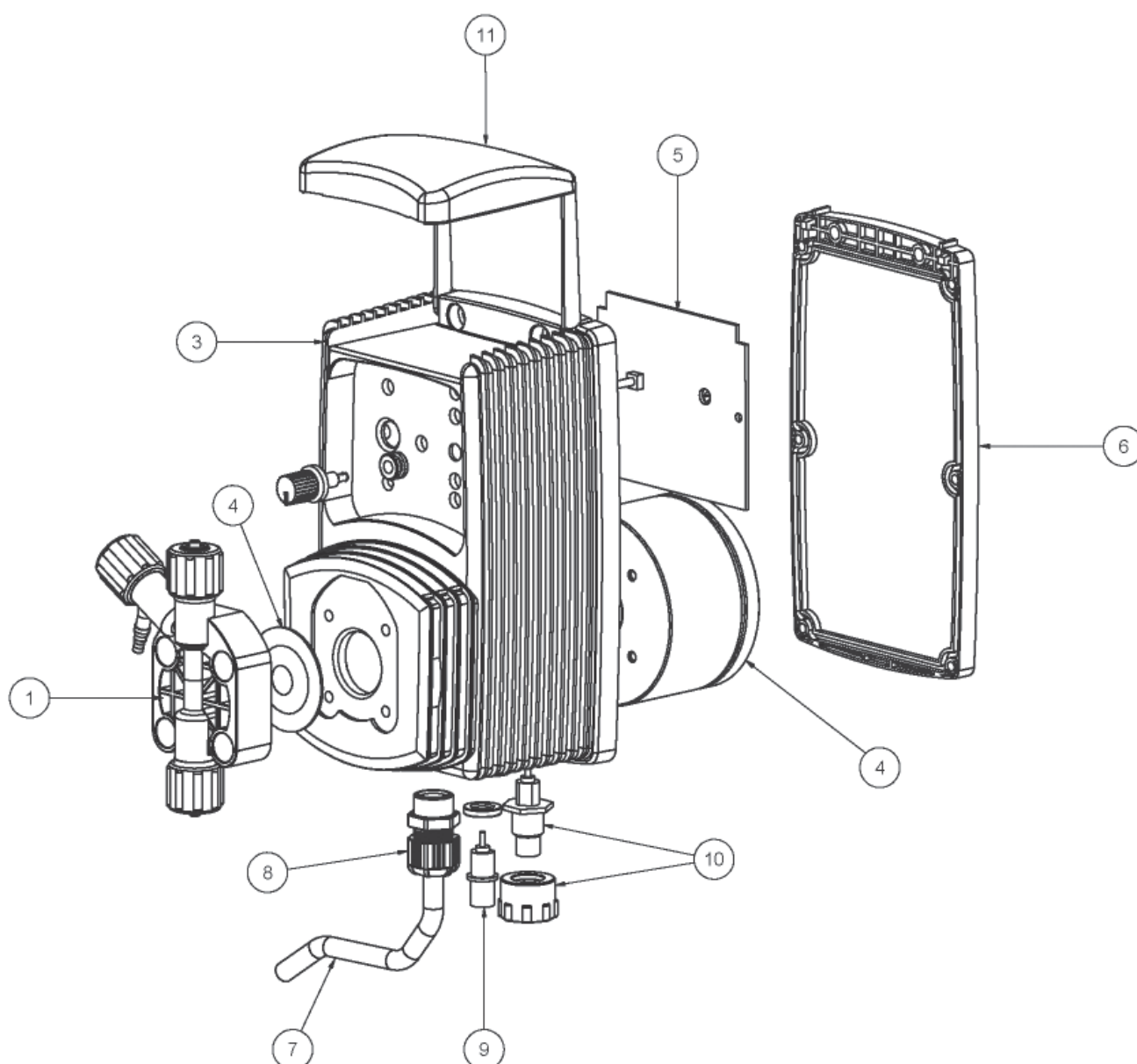
### Materials

Pump Heads, valves, fitting, tubing	Polyvinylidene fluoride	PVDF
PP		Polypropylene
PVC	Pump Heads, valves, fitting, level floater	
Stainless steel	PVC	Pump Heads
Polymethyl Metacrilate (Acrylic)	SS 316	Pump Heads, valves
Hastelloy C-276	PMMA	Pump Heads
Polytetrafluoroethylene	Hastelloy	Injection valve spring
Fluorocarbon (Viton® B)	PTFE	Diaphragm
Ethylene propylene	FPM	Sealings
Nitrile	EPDM	Sealings
Polyethylene	NBR	Sealings
	PE	Tubing

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## G Appendix. “V” series pump exploded view

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**NOTICE:** always specify the pump's label when ordering spare parts.

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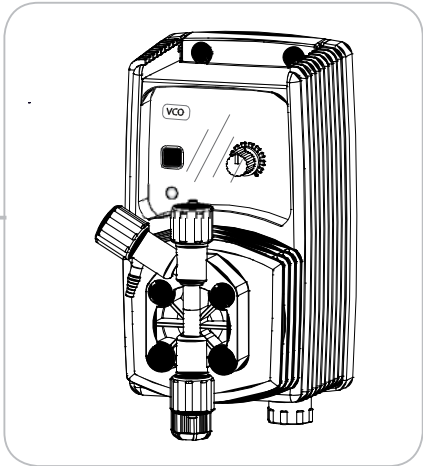
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**Technical features and drawings are subject to changes and modifications without any advice.**



*When dismantling a pump please separate material types and send them according to local recycling disposal requirements.  
We appreciate your efforts in supporting your local Recycle Environmental Program.  
Working together we'll form an active union to assure the world's invaluable resources are conserved.*