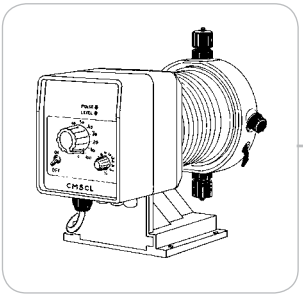
This operating instructions contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.

Use of this pump with radioactive chemicals is forbidden!



OPERATING INSTRUCTIONS MANUAL FOR "CMS ANALOG" SERIES DOSING PUMP

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

Please read it carefully!

English language

R1-01-13

NORME CE
EC RULES(STANDARD EC)
NORMAS DE LA CE

Direttiva Basso Voltaggio
Low Voltage Directive
Directiva de baja tensión
} **2006/95/CE**

Direttiva EMC Compatibilità Elettromagnetica
EMC electromagnetic compatibility directive
EMC directiva de compatibilidad electromagnética
} **2004/108/CE**

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:
Metering Pumps “CMS Analog” Series are the ideal solution for low / middle dosing of chemicals. All control and setup parameters are available through knobs and a visual system (led).

Pump’s capacity
Flow rate is determined by the stroke length and by the stroke speed. The stroke length is adjustable from 0 to 100% using the stroke length adjustment knob. However dosing accuracy is guarantee within an adjustment range from 30% to 100%.

Models:

CMS CO	Constant pump with stroke speed (frequency) adjustment
CMS CL	Constant pump with level control, stroke speed (frequency) adjustment
CMS IS	Constant-proportional pump driven by external digital signal with level control: to each external pulse correspond one pump stroke
CMS PV	Constant-proportional pump driven by external digital signal with pulse divider mode (ratio 1 to 1000) and level control
CMS PVM	Constant-proportional pump driven by external digital signal, level control , with pulse divider mode (ratio 1 to 100) and multiplier mode (ratio 1 to 10)
CMS IC	Constant-proportional pump driven by current signal (0/4mA = 0 pulses; 20mA = max pulses) and level control

Capacity:

Pressure	Flow
bar	*l/h*
25	05
15	10
07	20
03	40
02	60

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
m 2	Delivery pipe***** (opaque PE)
m 2	Suction pipe ***** (transparent PVC)
m 2	Discharge pipe (transparent PVC)
n.1	This installation manual

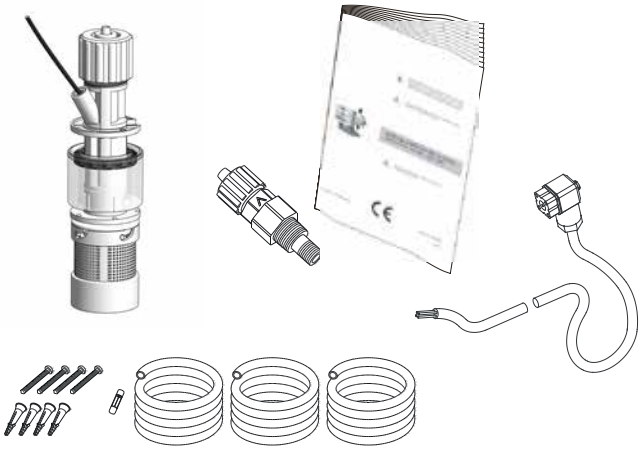
If Polymer pump head:

m 0,3	discharge hose
n. 1	syringe

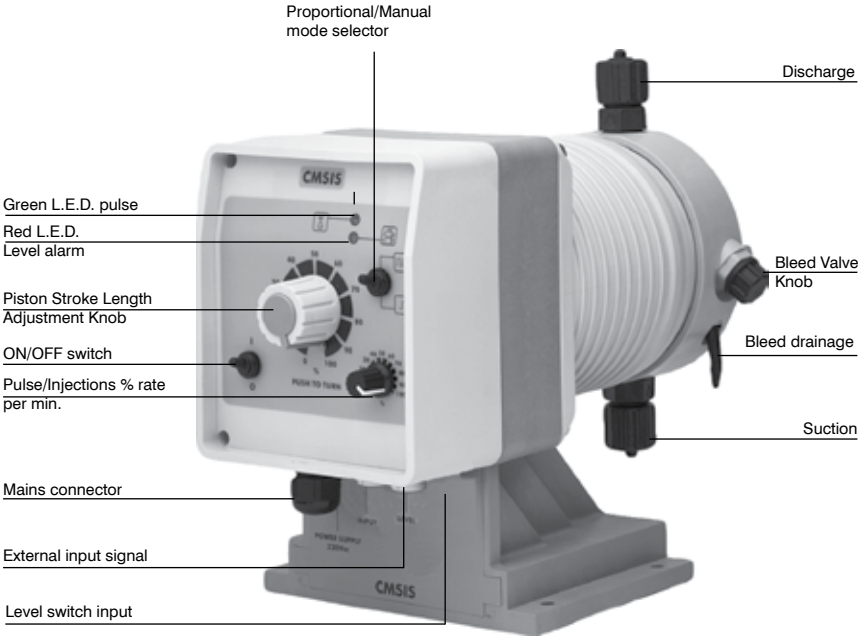
***** If hose is 6x8 there is only a 4meters long hose. Cut to obtain suction and delivery hoses.

Stainlees steel foot filter sold as option.

Remove the contents from the box.



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



** Note:if knob isn't on 100% position then the pump will dose at pressure greater than the one declared on label.*

4. Before to Install warnings

Pump's installation and operativity is made 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!

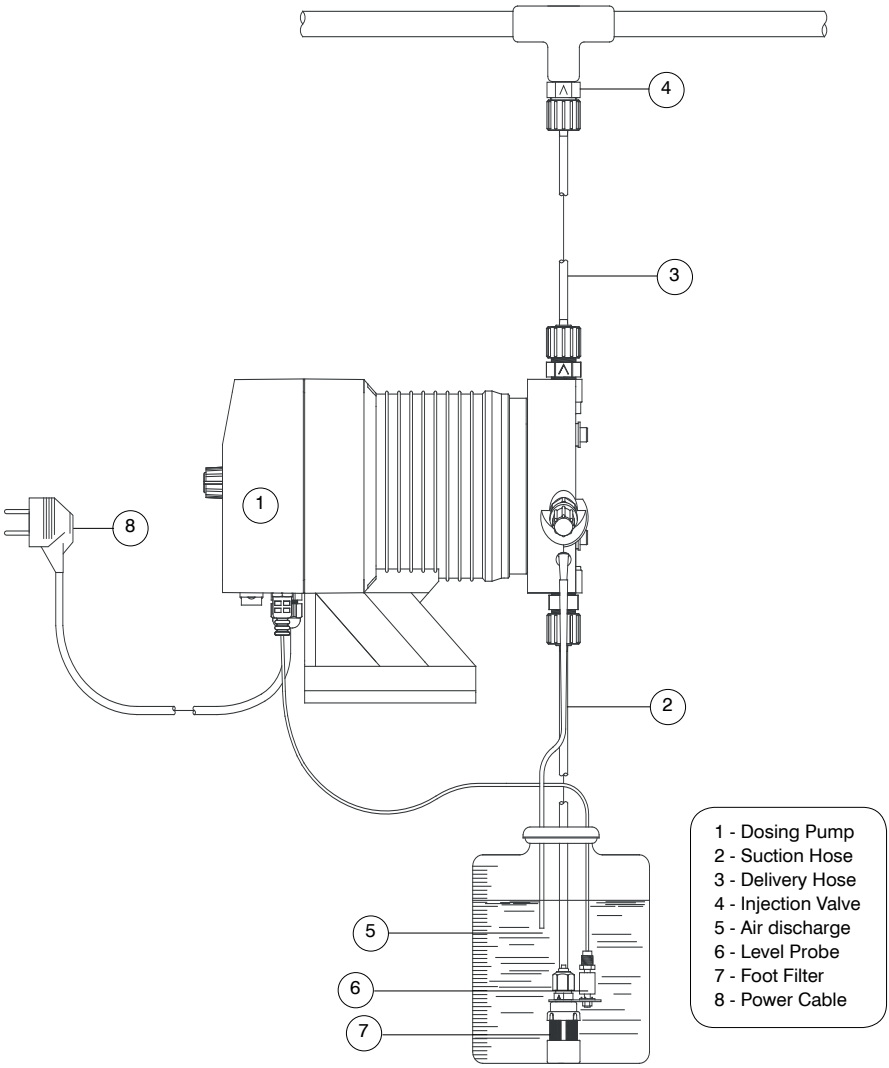
Use only hoses compatibles with product to dose! See chemical compatibility table. If dosing product is not listed please consult full compatibility table or contact chemical's manufacturer!

Feeder should be interlocked with a no-flow protection device to automatically shut-off the pumps when there is no flow!

Adequate measures shall be taken to prevent cross connection of chemicals!

Chemical feeding must be stopped during backwash cycles and periods of noflow as these conditions may introduce the potential for chemical overdosing. Not doing so may result in elevated chemical concentrations and hazerdous gas introduction into the pool or spa.

Pump must be installed in a stable support (for example a table) 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.

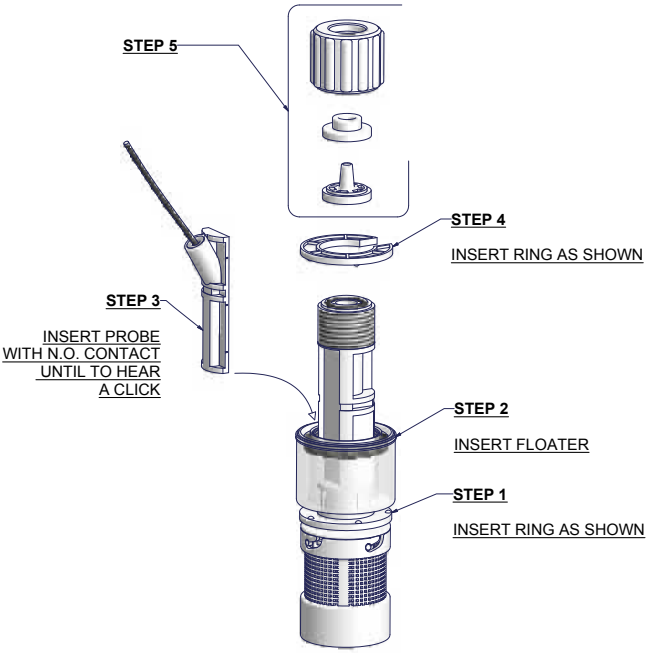
Lock hose on pump's head by screwing down the tightening nut.
Use only hands to do it!

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.

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.

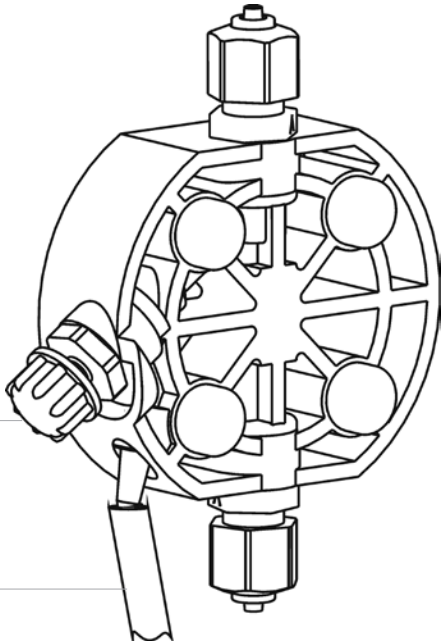
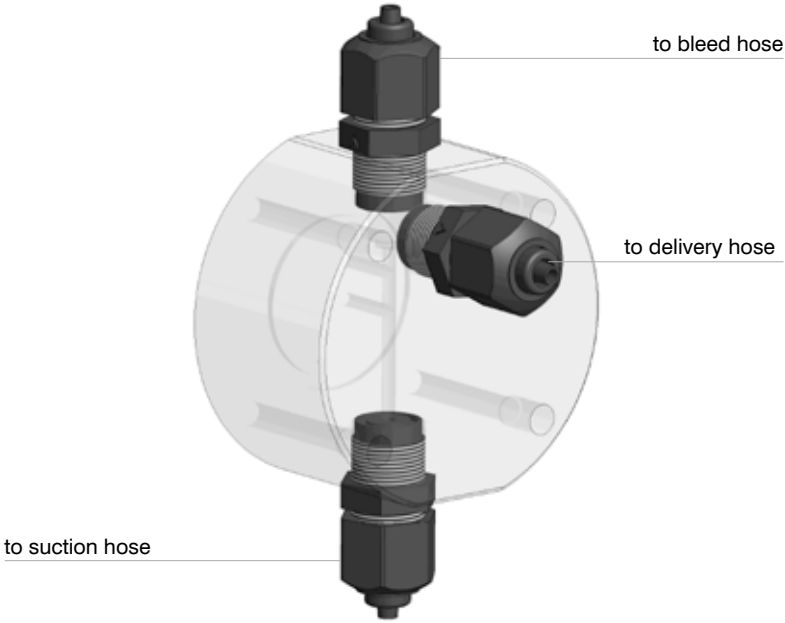


fig (C)

For priming procedure see page the chapter "Priming".

Self-venting pump head.



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

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

Notes:

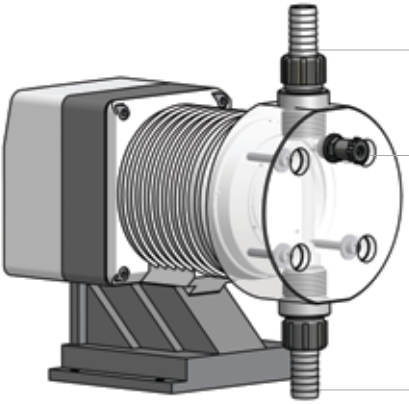
- suction, delivery and purge valves are DIFFERENT! Do not exchange them!

- 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!

6. Polymers pump head hydraulic installation



Priming instruction
To prime the pump connect the 30 cm discharge hose included. Use the syringe to suck.

CAPACITIES						
MODELS			Suction Hose	Delivery Hose	Suction Valve	Delivery Valve
0802	2 l/h at 8 bar	0,52 GPH at 116 PSI	20 x 27	16 x 22	1" x 20	3/4" x 16
0604	4 l/h at 6 bar	1,05 GPH at 87 PSI	20 x 27	16 x 22	1" x 20	3/4" x 16
0410	10 l/h at 4 bar	2,64 GPH at 58 PSI	20 x 27	16 x 22	1" x 20	3/4" x 16
0225	25 l/h at 2 bar	6,60 GPH at 29 PSI	20 x 27	16 x 22	1" x 20	3/4" x 16
0140	40 l/h at 1 bar	10.56 GPH at 14 PSI	20 x 27	16 x 22	1" x 20	3/4" x 16

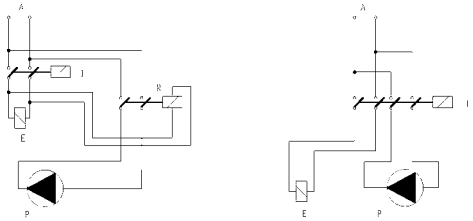
LIQUID ENDS									
	HEAD	ORINGS	VALVE			DIAPHRAGM	HOSES		VISCOSITY
			Body	Balls	Spring		Delivery	Suction	Max CPS
B	Acrylic	Viton ®	Polypropylene	PTFE	Hastelloy	PTFE	PVC	PVC	50000
Viton ® is a registered trademark DuPont Dow Elastomers.									

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.

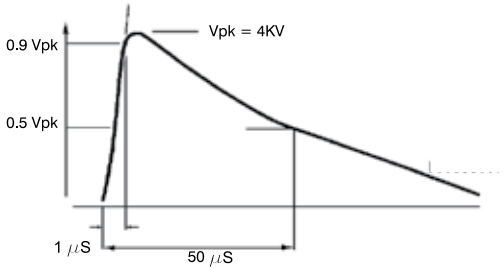
- pump must be connected to a plant with a differential switch (0,03A sensitivity) if there isn't a good ground.

- 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 50μsec) as shown:

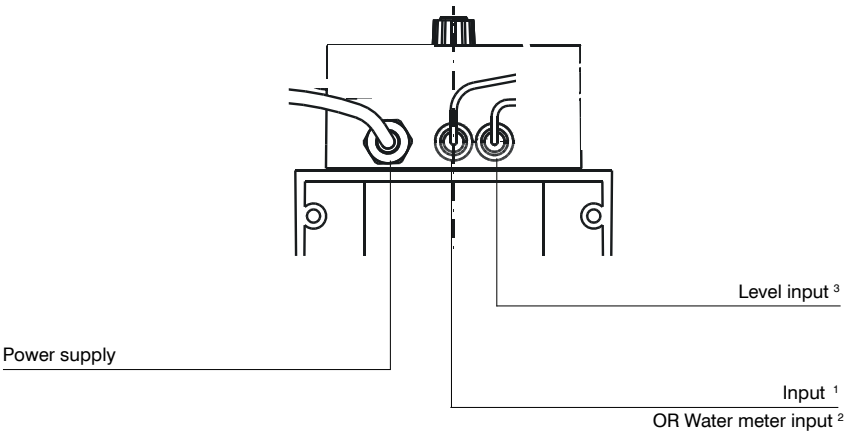


7. Electrical Installation

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.



[1] Only for CMS IC; CMS IS model.
[2] Only for CMS PV; CMS PVM model.
[3] Not available for CMS CO model.

WARNING
IF EQUIPMENT IS SUPPLIED WITH A PLUG:

If an appliance coupler or separable plug is used as the disconnecting device, it shall be readily identifiable and easily reached by the operator. For single-phase portable equipment, a plug on a cord of length not greater than 3m is considered to be easily reached.

WARNING
IF EQUIPMENT IS NOT SUPPLIED WITH A PLUG:

a) a switch or circuit-breaker shall be included in the building installation
b) it shall be in close proximity to the equipment and within easy reach of the operator
c) it shall be marked as the disconnetting device for the equipment

LEVEL ALARM

CL, IS, IC, PV and TE type pump are provided with a liquid level alarm to indicate if 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

"CMS Analog" series pump capacity can be reduced 10 or 100 times operating the 1/10/100 switch in the frontal panel, the % marked knob will act on this set capacity.

CMS CO

Constant dosing pump with stroke speed adjustment between 0 and 100% of indicated capacity (see label on pump type). The % marked knob sets the pump capacity, changing linearly the magnet stroke number per minute. It is strongly suggested to not operate the pump in the range from 0 to 10%, since there is not a linear correlation with the pump stroke speed in that range. This pump is specially designed for constant dosing rates. CMS CO pump can be ON/OFF driven by a LPH or a LCD instrument. To set 2 l/h against 10 bar on a CMS CO 1004 the % marked knob should be set to 50%.

CMS CL

Constant dosing pump with level alarm, provided with a floating magnetic sensor probe. A red led indicates that the pump stops dosing because the product tank is empty. This pump has the same features and adjustments of the CO type pump.

CMS IC

Proportional/*constant* pump driven by current signal. Setting the switch on the *constant* ⎍ position, the pump has the same features and adjustments of the CL pump. Setting the switch on the *proportional* ⌐ position, the pump capacity is set proportionally to a given analog current signal; a given linear change of the signal will be followed by a linear change of capacity.
The current signal accepted range is 0÷20 mA (it can be changed upon demand). The maximum pump capacity requested by the maximum input signal is set by the % marked knob. The IC pump can be driven by any electronic device (such as pH-meter, RH-meter, etc) that gives an analog current signal output. This signal must be applied to the bipolar cable provided with the pump, already internal connected, being care to connections: red wire: *positive (+);* black wire: *negative (-).*

8. Models

CMS IS

Proportional/*constant* pump driven by a digital signal. Setting the switch on the *constant* position, the pump has the same features and adjustments of the CL pump. Setting the switch on the *proportional* position, to each external voltage free pulse correspond a magnet stroke. When proportional position is set, the % marked knob does NOT affect the pump capacity. The IS proportional dosing pump can be driven by any external device (PCs, PLCs, etc.) that produce a digital signal. The digital signal (N.O. contact) must be applied to the cable provided with the pump, already internal connected. If it is requested a 0÷5; 0÷12 Vdc input signal option, be care to connections: red wire: *positive* (+); black wire: *negative* (-).

CMS PV

Proportional/*constant* pump driven by a water meter digital signal. Setting the switch on the *constant* position, the pump has the same features and adjustments of the CL pump. It is furthermore possible to divide the maximum magnet strokes per minute by 1, 10 and 100 using the switch on the front panel. Setting the switch on the *proportional* position, to each external pulse correspond one pump stroke. This pump can be driven by a CTFI or CWFI series water meters. This pump can also be driven by a digital signal coming from a voltage free contact. Driving signal is applied on the BNC plug on the left bottom of the front cover. Dividing factor (N) value is obtained multiplying the value indicated on the adjustment knob by the multiplying switch (x1, x10, x100) value.

Capacity definition for "CMS PV" pump

Given the water m^3 to be treated and the product amount to dose in p.p.m., the minimum pump capacity to be used can be obtained with the following formula:

$$\frac{ppm \times K \times m^3}{1000} = l/h$$

l/h - minimum pump capacity required
ppm - product amount to dose in p.p.m. (gr/m^3)
k - dosed product dilution factor (pure chemical k=1)
m^3 - maximum capacity of the system to be treated in m^3 /h.

Dividing factor (N) to be set on the adjustment knob is given by the following formula:

$$\left(\frac{imp/l \times cc}{ppm \times K}\right) \times 1000 = N$$

N - is the number the external pulses are divided by to be set on the adjustment knob
imp/l- pulse per liter given by the water meter
cc - pump's single stroke dosing quantity (in cc). Refer to following table
k - dosed product dilution factor (pure chemical k=1)
*ppm** - product amount to dose in p.p.m. (gr/m^3)
***** 10.000 ppm equals to 1%

Pump model	cc max	Piston displacement
CMSPV 0260	8,4	100%
CMSPV 0340	5,6	100%
CMSPV 0720	2,8	100%
CMSPV 1408	0,89	100%
CMSPV 1804	0,45	100%
CMSPV 1510	1,4	100%
CMSPV 2505	0,70	100%

If the dividing factor (N), obtained with the above formula, is <1, a pump with higher single stroke dosing quantity is required or the water meter needs to be changed with one that gives higher number of pulses per liter. In some application this issue can be solved reducing the dosed product dilution factor. If dosed amount is higher than the needed one, the set dividing factor (N) can be increased.

CMS PVM

Proportional/*constant* pump driven by a water meter digital signal.
Setting the switch on the *constant* position, the pump has stroke speed adjustment between 0 and 100% of indicated capacity (see label on pump type). The % marked knob sets the pump capacity, changing linearly the magnet stroke number per minute. It is strongly suggested to not operate the pump in the range from 0 to 10%, since there is not a linear correlation with the pump stroke speed in that range. It is furthermore possible to divide the maximum magnet strokes per minute by 1 (÷1), 10 (÷10) and 100 (÷100) using the switch on the front panel. The electronic capacity adjustment sets the injection per minute.

If the pump is set to Proportional mode, you only use the settings labelled in the colour of the water meter symbol on the face of the pump.

Set the selector switch to x1, /1 or /10.

In Proportional mode, the Stroke Frequency adjustment knob becomes a Factor Setting, eg 1, 2, 3 etc.

This factor is used to multiply or divide the pulses.
For instance, if the selector switch is set to x1, and the Factor Setting is set to 5, the pump will stroke 5 times for every pulse received.
Conversely, if the selector switch is set to /1, and the Factor Setting is set to 4, say, the pump will only give 1 stroke very 4 pulses received.

This pump can be driven by a CTFI or CWFI series water meters. This pump can also be driven by a digital signal coming from a voltage free contact. Driving signal is applied on the BNC plug on the left of the bottom pump cover.

9. Priming

PRIMING

To prime the pump without touching chemicals please do as follow:

- connect all hoses into proper places (delivery hose, suction hose, outgassing hose).
- open outgassing valve and turn on the pump.
- set pump's single injection at 100% and pulses at 50%.

All air inside the pump head will exit through the outgassing outlet. When product will leak from it, close immediately the outgassing valve. If dosing product is particularly dense, to facilitate the priming, insert on vent pipe a syringe of 20 cc and suck inside.

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

11. 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:

- Turn pump's injection knob on 0%.

- 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. Be careful to put back the knob's spring.

- Reinsert screws.

Main board replacement procedure:

- Turn pump's injection knob on 0%.

- 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.

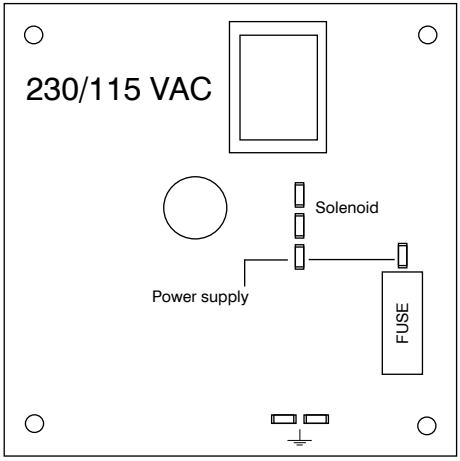
- Remove board's screws.

- Completely disconnect wires from main board and replace it. Reinsert screws.

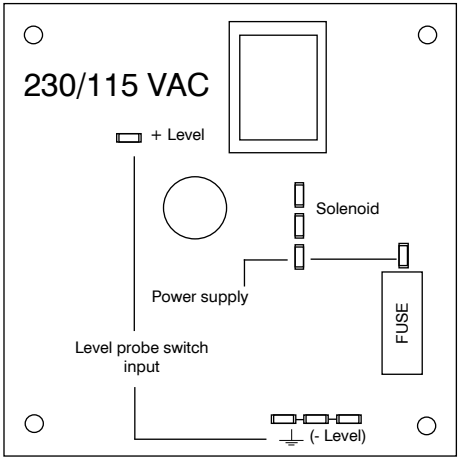
- Reconnect wires to the main board (see enclosed picture).

- Reassemble the pump. Be careful to put back the knob's spring.

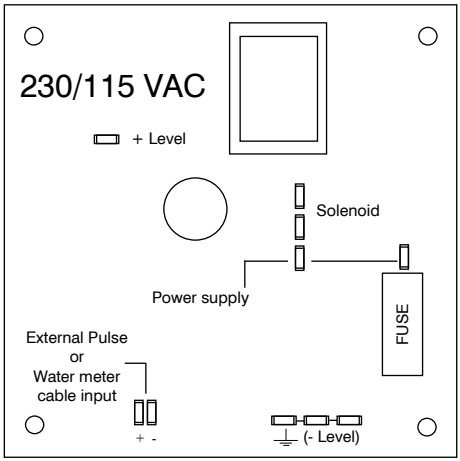
- Reinsert screws.



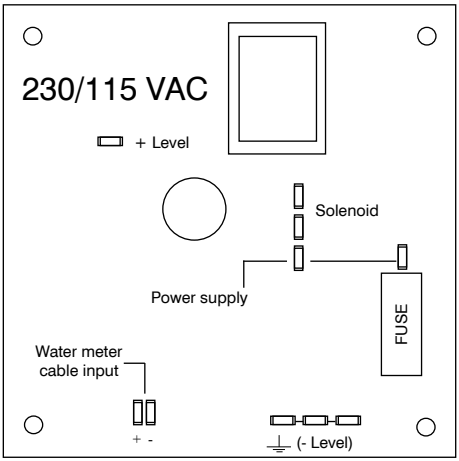
"CO" Power Circuit Board



"CL" Power Circuit Board



"IS/IC" Power Circuit Board



"PV" Power Circuit Board

A Appendix. Maintenance.

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!

Technical Features and Manufacturing materials

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)
Power supply: 24 VDC (20-32 VDC)
Pump strokes: 0 ÷ 120 injections/minute
Suction Height: 1,5 metres
Environment Temperature: 0 ÷ 45°C (32 ÷ 113°F)
Chemical Temperature: 0 ÷ 50°C (32 ÷ 122°F)
Protection degree: IP 65

MANUFACTURING MATERIALS

Case: PP
Pump head: PP, PVDF, PMMA, SS *
Diaphragm: PTFE
Balls: CERAMIC, GLASS, PTFE, SS *
Suction Pipe PVC/PE **
Delivery Pipe: PE
Valve Body: PP, PVDF, SS *
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.**
**** according with pump's model.**

MORE INFORMATION								
	Flow				cc per Stroke		Maximum injection Pressure	
	Min cc/h	Max l/h	Min GPH	Max GPH	Min	Max		
2505	150	5	0.039	1.32	0.21	0.70	25 bar	362 PSI
1510	300	10	0.079	2.64	0.42	1.4	15 bar	217 PSI
1015	450	15	0.118	3.96	0.66	2.1	10 bar	145 PSI
0720	600	20	0.158	5.28	0.84	2.8	7 bar	101 PSI
0340	1200	40	0.317	10.56	1.68	5.6	3 bar	43 PSI
0260	1800	60	0.475	15.85	2.52	8.4	2 bar	29 PSI
MORE INFORMATION FOR Self Venting MODELS								
253,2	96	3,2	0.025	0.84	0.13	0.44	25 bar	362 PSI
1506	180	6	0.047	1.59	0.249	0.83	15 bar	217 PSI
1010	300	10	0.079	2.64	0.42	1.4	10 bar	145 PSI

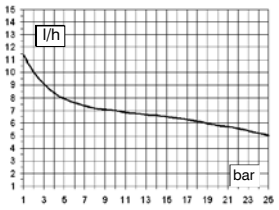
C Appendix. Delivery Curves

Pump head B

25 - 05

l/h 05

bar 25

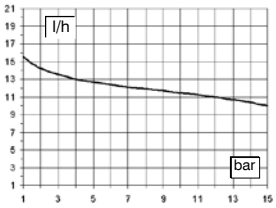


Pump head C

15 - 10

l/h 10

bar 15

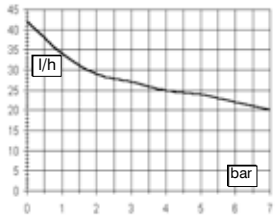


Pump head D

07 - 20

l/h 20

bar 07

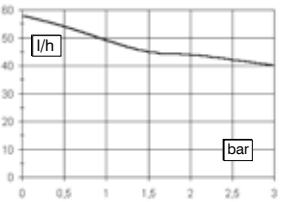


Pump head E

03 - 40

l/h 40

bar 03

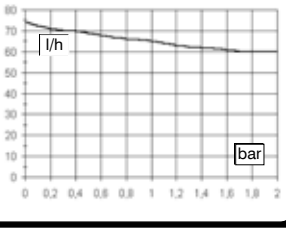


Pump head F

02 - 60

l/h 60

bar 02



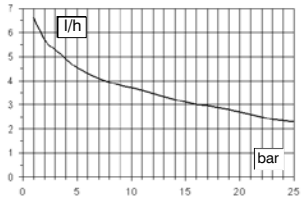
Flow rate indicated is for H_2O at 20°C at the rated pressure. Dosing accuracy ± 2% at constant pressure ± 0,5 bar.

Pump head B

25 - 2,3

l/h 2,3

bar 25

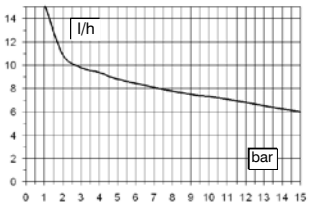


Pump head C

15 - 06

l/h 06

bar 15

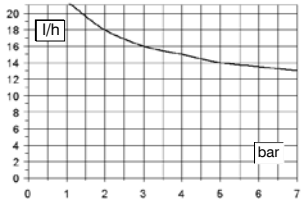


Pump head D

07- 13

l/h 13

bar 07

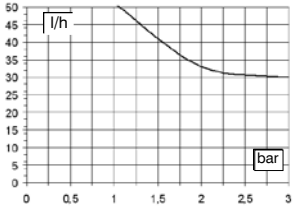


Pump head E

03- 30

l/h 30

bar 03

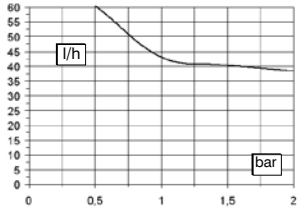


Pump head F

02 - 38,5

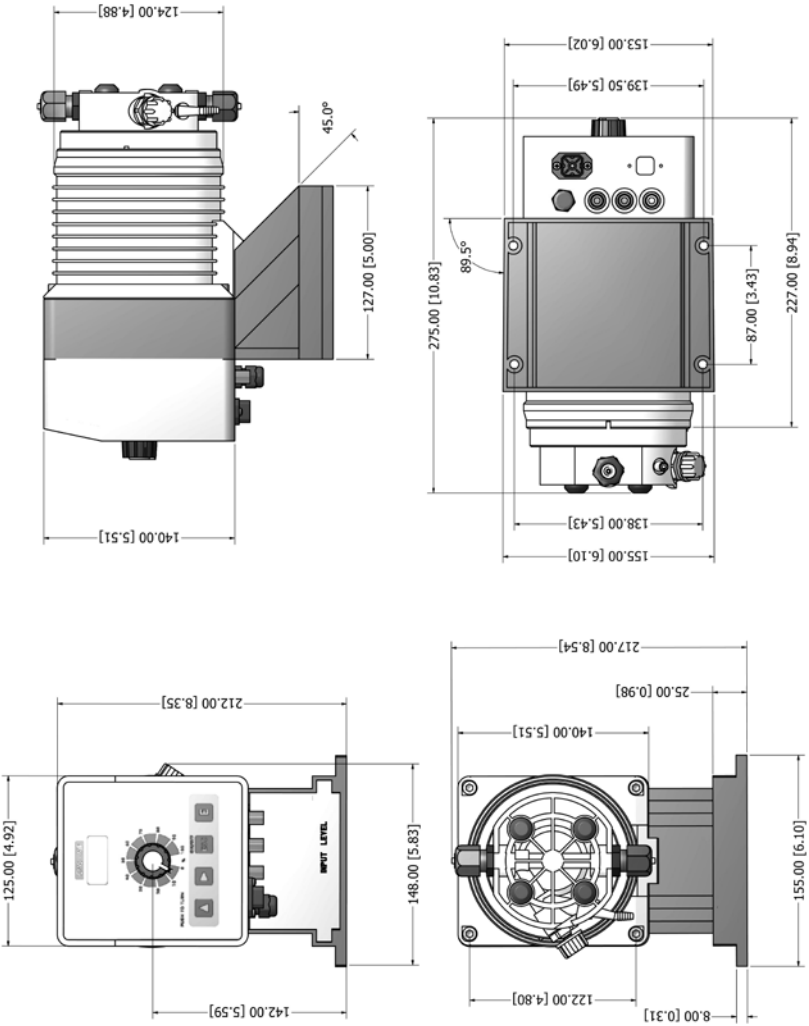
l/h 38,5

bar 02



Flow rate indicated is for H_2O at 20°C at the rated pressure. Dosing accuracy ± 2% at constant pressure ± 0,5 bar.

Dimensions



mm [inches]

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.

Product	Formula	Ceram.	PVDF	PP	PVC	SS 316	PMMA	Hastel.	PTFE	FPM	EPDM	NBR	PE
Acetic Acid, Max 75%	CH3COOH	2	1	1	1	1	3	1	1	3	1	3	1
Hydrochloric Acid, Concentrate	HCl	1	1	1	1	3	1	1	1	1	3	3	1
Hydrofluoric Acid 40%	H2F2	3	1	1	2	3	3	2	1	1	3	3	1
Phosphoric Acid, 50%	H3PO4	1	1	1	1	2	1	1	1	1	1	3	1
Nitric Acid, 65%	HNO3	1	1	2	3	2	3	1	1	1	3	3	2
Sulphuric Acid, 85%	H2SO4	1	1	1	1	2	3	1	1	1	3	3	1
Sulphuric Acid, 98.5%	H2SO4	1	1	3	3	3	3	1	1	1	3	3	3
Amines	R-NH2	1	2	1	3	1	-	1	1	3	3	1	1
Sodium Bisulphite	NaHSO3	1	1	1	1	2	1	1	1	1	1	1	1
Sodium Carbonate (Soda)	Na2CO3	2	1	1	1	1	1	1	1	2	1	1	1
Ferric Chloride	FeCl3	1	1	1	1	3	1	1	1	1	1	1	1
Calcium Hydroxide (Slaked Lime)	Ca(OH)2	1	1	1	1	1	1	1	1	1	1	1	1
Sodium Hydroxide (Caustic Soda)	NaOH	2	1	1	1	1	1	1	1	2	1	2	1
Calcium Hypochlor.(Chlor.ted Lime)	Ca(OCl)2	1	1	1	1	3	1	1	1	1	1	3	1
Sodium Hypochlorite, 12.5%	NaOCl + NaCl	1	1	2	1	3	1	1	1	1	1	2	2
Potassium Permanganate, 10%	KMnO4	1	1	1	1	1	1	1	1	1	1	3	1
Hydrogen Peroxide, 30% (Perydrol)	H2O2	1	1	1	1	1	3	1	1	1	3	3	1
Aluminium Sulphate	Al2(SO4)3	1	1	1	1	1	1	1	1	1	1	1	1
Copper-II-Sulphate (Roman Vitriol)	CuSO4	1	1	1	1	1	1	1	1	1	1	1	1

Resistance rating

Resistant	1
Fairly resistant	2
Not resistant	3

MATERIALS

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

F Appendix. Hoses resistance table

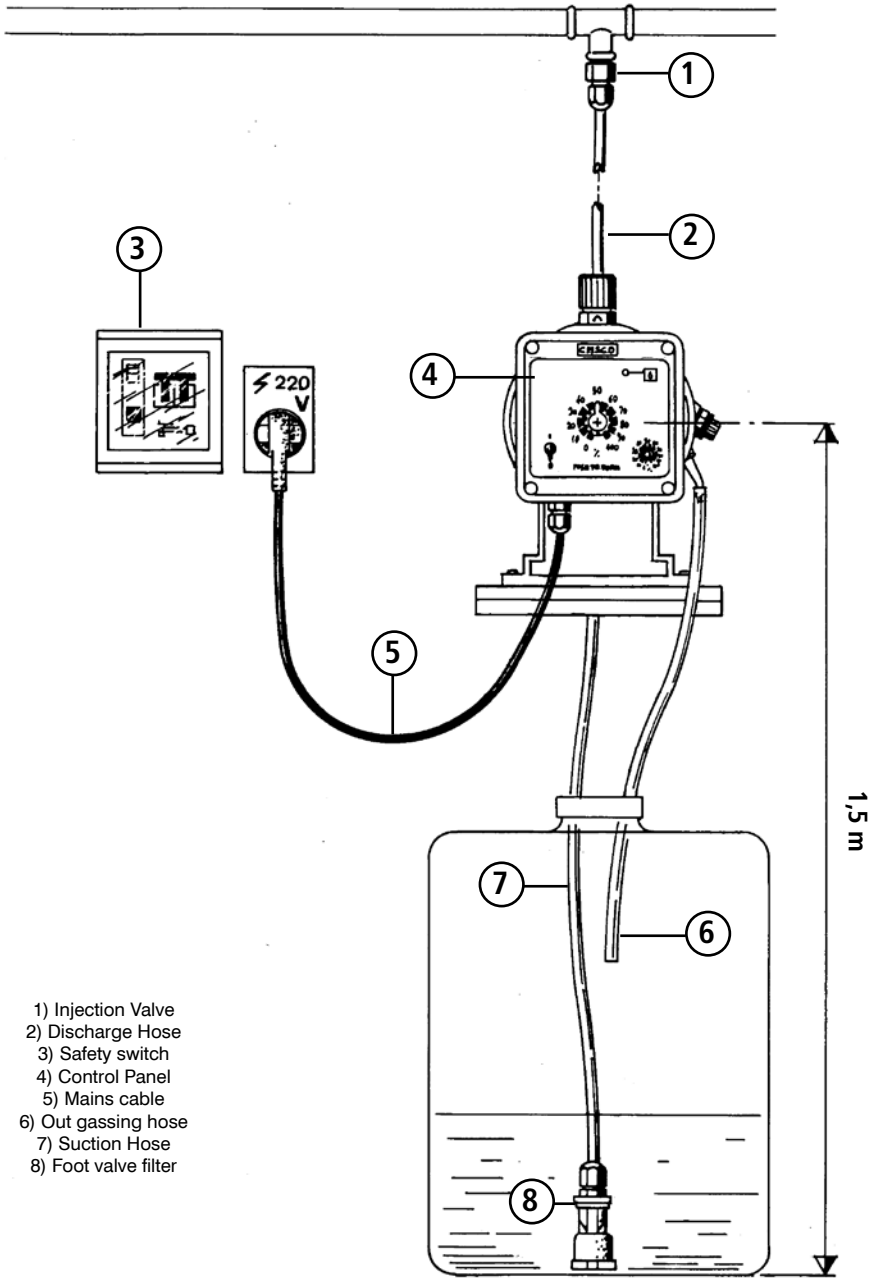
Hose features are very important for a reliable dosage. Every pump's model is made to work in the best way using selected hoses according to pump's capacity / model. Information reported here are intended for standard use only. For extended information ask to hose's manufacturer.

Suction / Delivery Hose			
4x6 mm PVC (transparent)	4x8 mm PE (opaque)	6x8 mm PE (opaque)	8x12 mm PVC (transparent)

Delivery Hose	Working Pressure				Breaking Pressure			
4x6 mm PE 230 (opaque)	20°C 12 bar	30°C 10.5 bar	40°C 8.5 bar	50°C 6.2 bar	20°C 36 bar	30°C 31.5 bar	40°C 25.5 bar	50°C 18.5 bar
4x8 mm PE 230 (opaque)	20°C 19 bar	30°C 15.7 bar	40°C 12 bar	50°C 7.5 bar	20°C 57 bar	30°C 47 bar	40°C 36 bar	50°C 22.5 bar
6x8 mm PE 230 (opaque)	20°C 8.6 bar	30°C 6.8 bar	40°C 4.8 bar	50°C 2.3 bar	20°C 26 bar	30°C 20.5 bar	40°C 14.5 bar	50°C 7 bar
8x12 mm PE 230 (opaque)	20°C 12 bar	30°C 10.5 bar	40°C 8.5 bar	50°C 6.2 bar	20°C 36 bar	30°C 31.5 bar	40°C 25.5 bar	50°C 18.5 bar

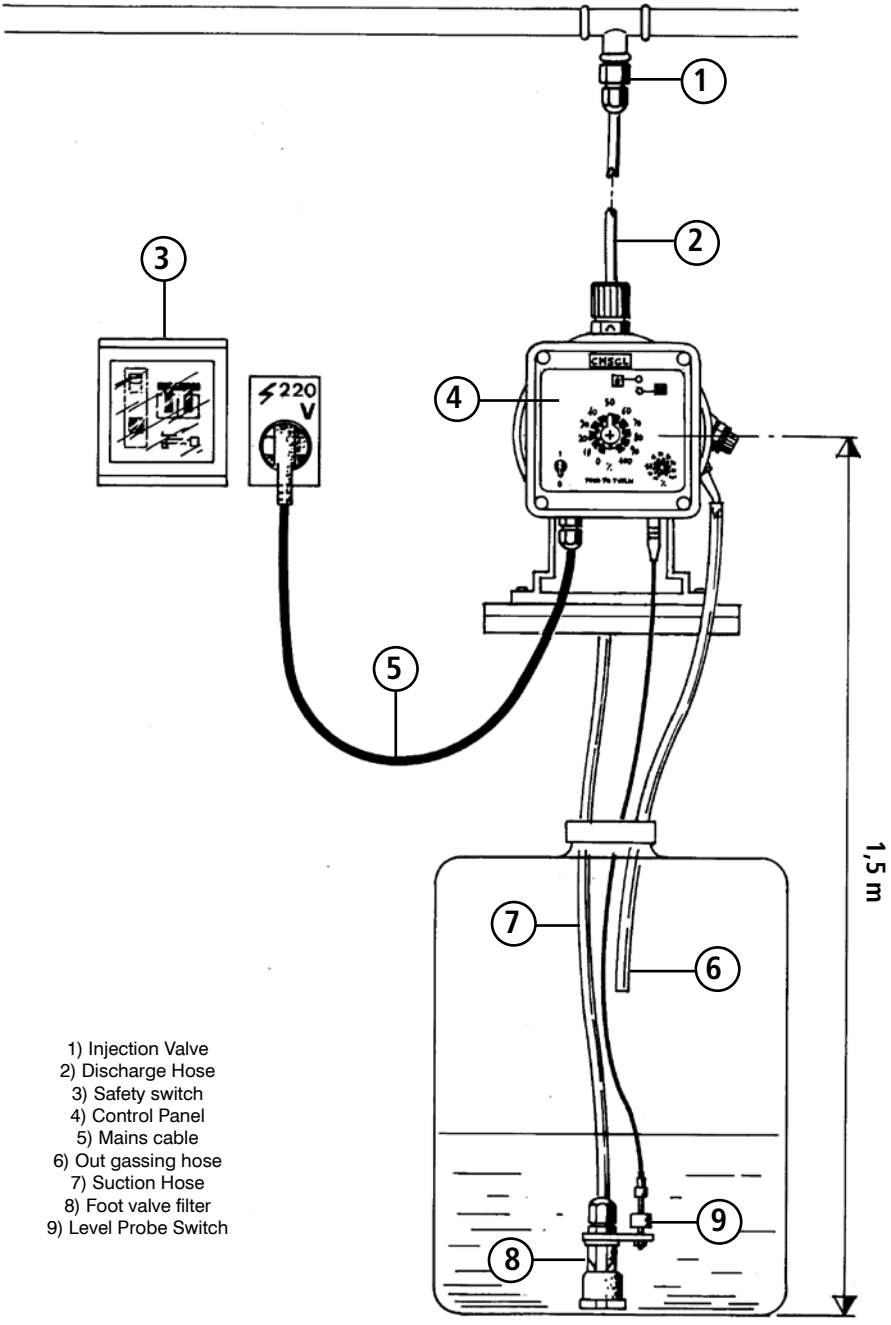
4x6 mm PVDF Flex 2800 (opaque)	20°C 40 bar	30°C 34 bar	40°C 30 bar	50°C 27 bar	60°C 24.8 bar	80°C 20 bar	90°C 10 bar
6x8 mm PVDF Flex 2800 (opaque)	20°C 29 bar	30°C 25.5 bar	40°C 22 bar	50°C 20 bar	60°C 18 bar	80°C 14.5 bar	90°C 7.3 bar
8X10 mm PVDF Flex 2800 (opaque)	20°C 18 bar	30°C 15.5 bar	40°C 13.5 bar	50°C 12.5 bar	60°C 11.2 bar	80°C 9 bar	90°C 4.5 bar

1/4 PE 230 (opaque)	20°C 17.6 bar
3/8 PE 230 (opaque)	20°C 10.6 bar
1/2 PE 230 (opaque)	20°C 10.6 bar

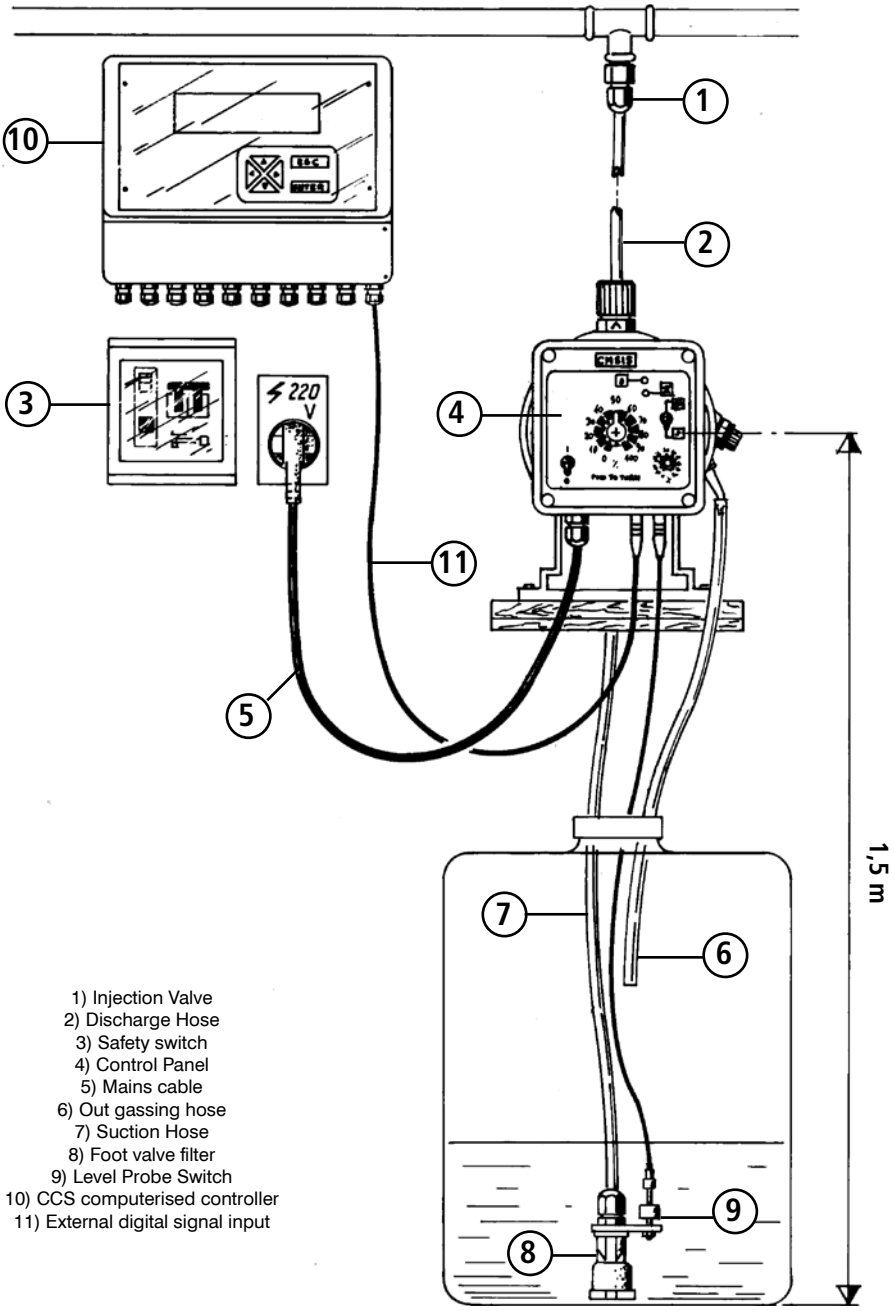


1) Injection Valve
2) Discharge Hose
3) Safety switch
4) Control Panel
5) Mains cable
6) Out gassing hose
7) Suction Hose
8) Foot valve filter

G Appendix. Installation draw for CMS CL

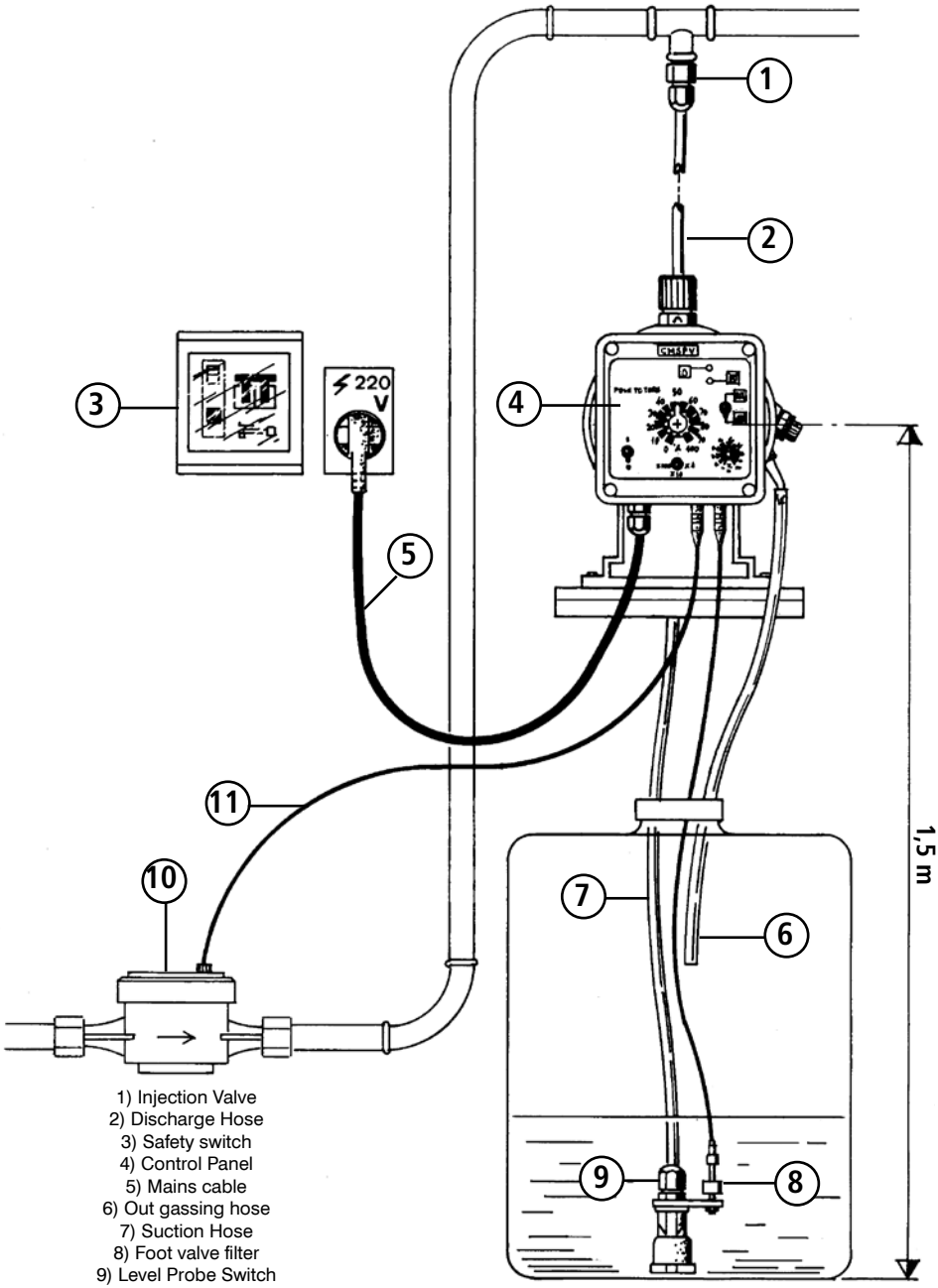


1) Injection Valve
2) Discharge Hose
3) Safety switch
4) Control Panel
5) Mains cable
6) Out gassing hose
7) Suction Hose
8) Foot valve filter
9) Level Probe Switch

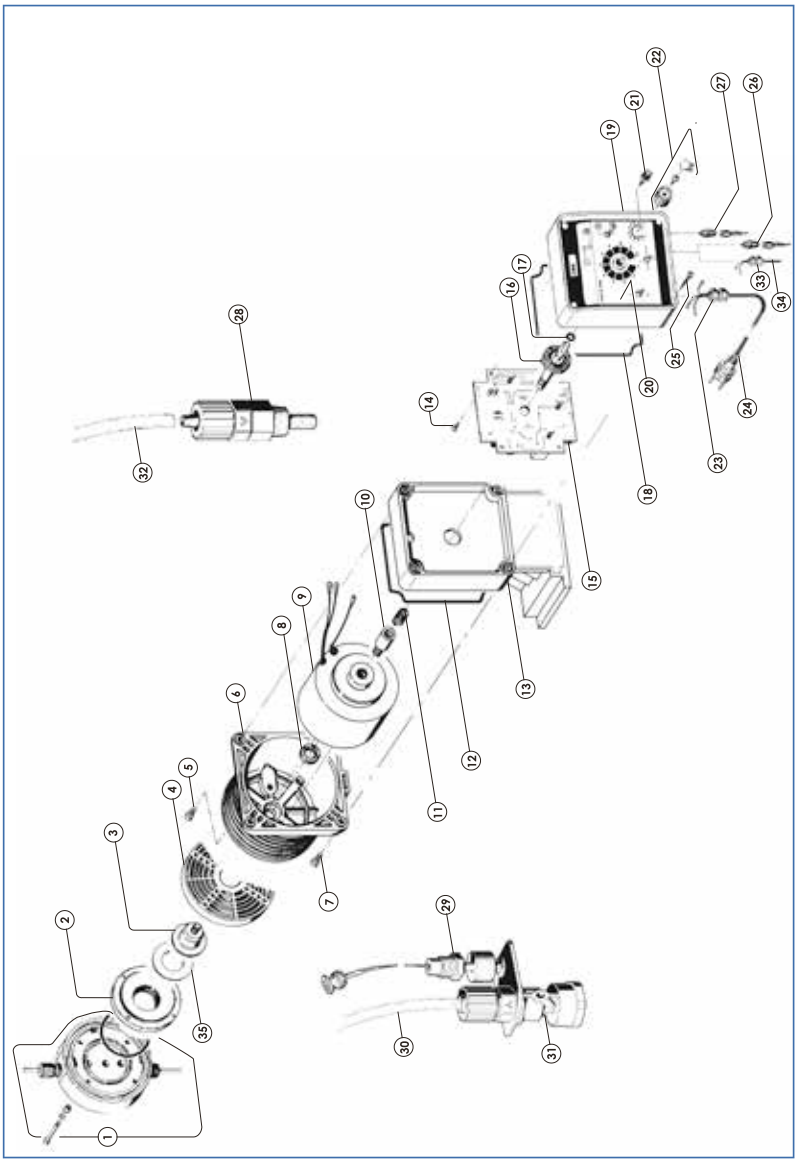


1) Injection Valve
2) Discharge Hose
3) Safety switch
4) Control Panel
5) Mains cable
6) Out gassing hose
7) Suction Hose
8) Foot valve filter
9) Level Probe Switch
10) CCS computerised controller
11) External digital signal input

G Appendix. Installation draw for CMS PV



1) Injection Valve
2) Discharge Hose
3) Safety switch
4) Control Panel
5) Mains cable
6) Out gassing hose
7) Suction Hose
8) Foot valve filter
9) Level Probe Switch
10) Pulse emitting water meter



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

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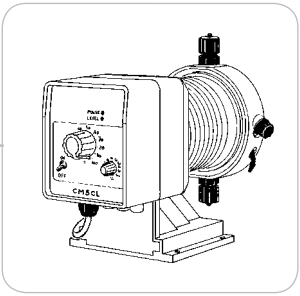

When dismantling a pump please separate material types and send them according to local recycling disposal requirements.
We appreciate your efforts in supporting your local Recycle Environmental Program.
Working together we will form an active union to assure the world's invaluable resources are conserved.