EMAUX®
Water Technology

CTRL2 - 5L / CTRL2 - 7L

SERIES
DUAL PARAMETER PH-RX
MICROCONTROLLER
SOLENOID DRIVEN DOSING PUMP
OPERATING INSTRUCTIONS AND MAINTENANCE

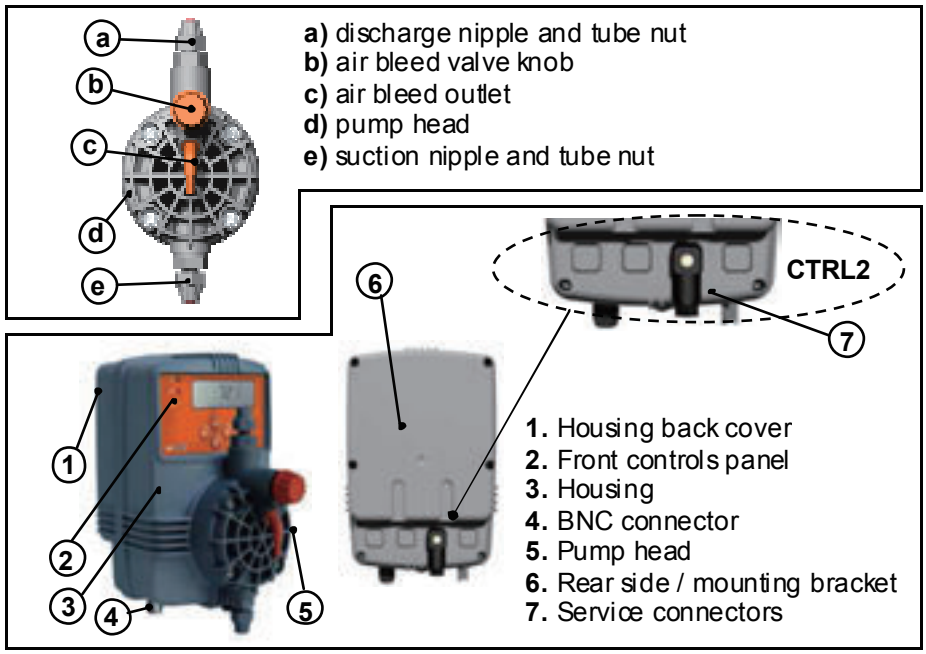
ENGLISH

CE

EMPU12053149

INDEX

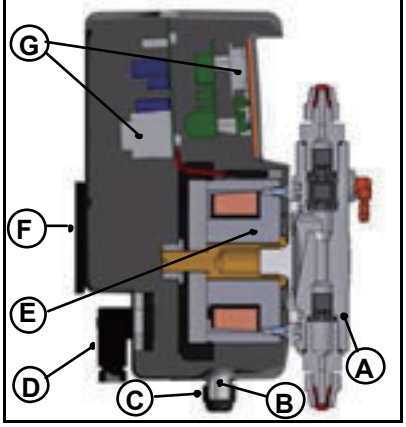
CTRL2 DOSING PUMPS MAIN COMPONENTS



a) discharge nipple and tube nut
b) air bleed valve knob
c) air bleed outlet
d) pump head
e) suction nipple and tube nut

1. Housing back cover
2. Front controls panel
3. Housing
4. BNC connector
5. Pump head
6. Rear side / mounting bracket
7. Service connectors

A. Pump head
B. BNC connector
C. Power cable fitting
D. Service connectors
E. Solenoid
F. Quick mounting bracket
G. Electronic circuit boards



USER INFORMATION SIGNS:

NOTE / ***KEEP IN MIND*** ***operating guidelines and reminders:*** *further details to implement information*

WARNING: ignoring safety information can endanger life or result in serious injury !

CAUTION: ignoring safety information can result in injury to persons or damage to systems or materials !

1.0 – HINTS AND WARNINGS

Please read the warning notices given in this section very carefully, because they provide important information regarding safety in installation, use and maintenance of the unit.

- Keep this manual in a safe place, so that it will always be available for further consultation.
- The unit has been manufactured in accordance with best practice. Both its lifetime and electrical and mechanical reliability will be enhanced if it is correctly used and subjected to regular maintenance.

1.1 - WARNING: any intervention or repair for the unit must be carried out by qualified and authorised personnel: manufacturer declines any responsibility for consequences in case this rule is not complied.

1.2 - SHIPPING AND TRANSPORTING: shipment is always at the purchaser's risk. Claims for any missing materials must be made within 15 (fifteen) days of goods arrival, while claims for defective materials will be considered within 30 (thirty) days from the same date. Return of equipment or other materials to EMAUX or to authorized distributor must be previously agreed with EMAUX authorised personnel.

1.3 - PROPER USE OF DOSING PUMP

- Dosing pumps are not designed to dose additives in gaseous or solids form.
- Any different use is to be considered improper and therefore dangerous.
- Always ensure the right compatibility with dosed liquid and pumps wetted parts. In case of doubt, please contact our offices for further information and suggestions.
- All other applications or modifications are prohibited.
- The pump is not designed for use in explosion-hazardous locations.
- When using flammable chemicals, observe relevant rules concerning transport and storage of these liquids.
- Do not use these pumps with radioactive chemicals !!!!!!
- When using aggressive chemicals ensure that materials forming wetted parts are compatible with those chemicals (ask for EMAUX Chemical Compatibility Resistance Chart).
- The pump can only be used for applications duties which technical requirements meet with CTRL - 2 technical characteristics and specifics data shown in the present operating instructions booklet.
- The vendor is not liable for damages deriving from improper and/or unreasonable use of the pump.

1.4 - RISKS

- After unpacking the equipment, ensure it's in good shape. In case of doubt, do not use it and contact qualified personnel. Packing materials (plastics bags, polystyrene, etc.) should be kept out of reach of children being potential sources of danger. However, save packaging: it can be used for future shipments.
- Before connecting the equipment ensure voltage ratings corresponds to local power supply. You will find these characteristics in the product label placed on the equipment and packing.
- The electrical installation must comply with the standards and rules in force in the country where it's utilised.
- Use of electrical equipment always implies observance of some basic rules:

1 - do not touch the equipment with wet or damp hands or feet;
2 - do not operate the equipment with bare feet (example: swimming pool equipment);
3 - do not leave the equipment exposed to the action of the atmospheric agents;
4 - do not allow the equipment to be touched by children or used by unskilled individuals without supervision;

- **In case of emergencies or improper functioning, the pump should be switched off immediately Disconnect the power cable from the main power supply !**
  Contact our technical assistance for any necessary repairs, use only original spares ! Failure to respect this condition could render the equipment unsafe to use.
- When there is no longer use requirement of installed equipment, ensure to disconnect it from power supply:

1. Disconnect power from mains or from the single-pole switch-contact.
2. Relieve all pressure from discharge hose. In case of liquid ends losses (rupture of the hoses) the unit should be immediately switched OFF, emptying and depressurizing discharge hose.

Take all due safety precautions during unit service (gloves, goggles, overalls, etc.).

1.5 - DOSING TOXIC AND/OR DANGEROUS LIQUIDS HANDLING

To avoid risk from contact with hazardous liquids or toxic fumes, always adhere to this instruction manual:

- Follow the instructions of the chemical liquid manufacturer.
- Frequently check the hydraulic part of the pump and use it only if it is in perfect condition.
- Use only correct materials for hoses, valves, seals to suit dosing liquid; if possible shield it with PVC pipe.
- Before handling the pump, ensure to flush out and neutralize the pump head with proper reagent liquid.

PUMPS USED WITH RADIOACTIVE MATERIALS CANNOT BE RETURNED FOR REPAIRS OR REPLACEMENTS AND WILL NOT BE ACCEPTED BY EMAUX.

1.6 - ASSEMBLING AND DISMANTLING THE EQUIPMENT

1.6.1 - ASSEMBLY

All EMAUX equipments are supplied fully assembled. Please refer to exploded view drawings shown in the present booklet, showing all details and a complete overview of all components. These drawings are in any case useful whenever spare parts are needed.

1.6.2 - DISMANTLEMENT

Before dismantling the unit or before carrying any operation, proceed as follows:

1. disconnect power.
2. relieve all pressure from discharge hose.

2.0 – CTRL - 2 SERIES DOSING PUMPS

2.1 – OPERATION PRINCIPLE

The dosing pump is activated by a PTFE diaphragm mounted onto a piston operated by pulses received from the electromagnet. Return phase is spring operated. Control circuit is SMD (surface mounting device) with microcontroller technology, digital controls, display and LED indicators for visualizing pump status. Operations are simple, pump doesn't need lubrication, and therefore maintenance is reduced almost to zero.

NOTE ***CTRL2*** *is microcontroller based dosing pump which includes both a dosing pumps and high tech controller which features two parameters all in one endosure: PH or RX (ORP).*

2.2 - CTRL - 2 SERIES COMMON FEATURES

The products are manufactured according CE regulation

Protection rating/ Housing:	IP65 / Anti-acid plastic casing PP reinforced.
Control panel:	ensured by an adhesive polyester film, weatherproof and resisting to UV rays
Standard power supply:	fluctuations not to exceed ±10%: 230 V a.c.50 Hz single phase
Optional power supply:	110 Vac / 240 Vac/ 50-60Hz/single phase
Overvoltage / Fuse:	category II. **MICRO-FUSE MT 1A SLOW**
Noise level:	65 ÷ 75 dBA
Ideal installation:	although IP65 rating, indoor or enclosed installation use always recommended.
Environmental Conditions:	possibly dry environment, altitude up to 2000m, ideal working temperature 5°C÷40°C. Relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C. Pollutio n degree 2.
Power cable:	3 m length **WITH** plug

Connections for level switch to activate level control for model **CTRL - 2**

2.3 - LIQUID ENDS MATERIALS

PARTS IN CONTACT WITH LIQUID	STANDARD VERSION	UPON REQUEST
Pump head	**PP**	PVDF; PMMA *MEMO1 / NOTE*; AISI 316
Diaphragm	**PTFE**	------
Ball check valve	**CERAMIC**	AISI 316
Pump head Nipples / Hose-nut	**PP**	PVDF; AISI 316
Seals / O-rings	**FPM** (Viton®)	EPDM (Dutral®); NBR; SILICON
Injection Fitting	**PP**	PVDF ; AISI 316; PTFE
Injection No-Return Valve (sleeve)	**FPM** (Viton®)	EPDM (Dutral®); NBR; SILICON
Foot "Lip" type check valve	**FPM** (Viton®)	EPDM (Dutral®); NBR; SILICON
Filter body / *Filtering media*	**PP / *GLASSWOOL***	PVDF; AISI 316
Suction Hose / Air Bleed hose4x6mm	**PVC flexible**	PVDF; PTFE
Discharge Hose 4x6mm	**PE semi- flexible**	PVDF; PTFE
OTHER OPTIONS AND SPECIAL CONFIGURATIONS UPON REQUEST:		
Reed type "Lip" Valve	**FPM** (Viton®)	EPDM (Dutral®); NBR; SILICON
Hastelloy spring foot ball valve/*Fitting*	**HASTELLOY / CERAMIC / *PP-PVC***	PVDF; AISI 316
Hastelloy spring injection valve/*Fitting*	**HASTELLOY / PYREX / *PP-PVC***	PVDF; AISI 316
Automatic auto-bleed pump head	**PVDF AUTO BLEED** *NOTE*	------
Aggressive chemicals configuration	**PVDF acid configuration** *MEMO2*	------

FPM=Viton® / EPDM=Dutral®: are registered trademarks of Dupont Elastomers

MEMO 1: *polymer viscous liquid configuration PMMA pump head, Ceramic ball checks (Ø11), Fittings PP1/2", seals FPM or EPDM), Injection fitting and Strainer (without no- return valve), suction hose PVC flex.10x14, discharge hose PE 10x14.*

MEMO 2: *aggressive chemical configuration PVDF pump head/fittings, double Ceramic ball check valves, o-rings/seals FPM (or EPDM or PTFE), Foot valve "LIP" type FPM, injection no-return Ceramic ball check valves with hastelloy spring return, suction / discharge hose PVDF*

NOTE *Using AUTO-BLEED or Polymer PMMA configuration, pump pressure performance decreases of about 50%*

PUMP HEAD TYPES CTRL2 (Fig.1)					
					
	PP Standard 1 ÷ 15 l/h	PVDF Auto-bleed 1 ÷ 15 l/h	PVDF 1 ÷ 15 l/h	AISI 316L 1 ÷ 15 l/h	PMMA 1 ÷ 20 l/h

2.4 - TECHNICAL CHARACTERISTICS

CTRL2 - 7L								
Pump type range	Max Flow / Max Pressure		*Start up* performance*		Frequency	Stroke volume	Pump head	Valves
	l/h	bar	*l/h*	*bar*	imp/min	cc(ml) / stroke	type	types
CTRL2 - 7L	**7**	**4**	*7*	*4*	120	0,98	PP 3/8"	Ball checks
CTRL2 - 5L								
CTRL2 - 5L	**5**	**4**	*5*	*5*	120	0,69	PP 3/8"	"Lip" types
Hose size: **4 x 6 mm** (available 6x8 fittings)					Max suction lift: **2 m**			
Power consumption: **CTRL2 - 7L 37 watt CTRL2 - 5L *32 watt***					Current consumption: **CTRL2 - 7L 0,16 Amp CTRL2 - 5L *0,14 Amp***			
***NOTE**: "Start up" performances are available when the pump starts the operations and are constant only if duties are not continuous (working for time periods not over 20/30 min and with at least 15 min rest).*								

2.5 – PERFORMANCE CURVES

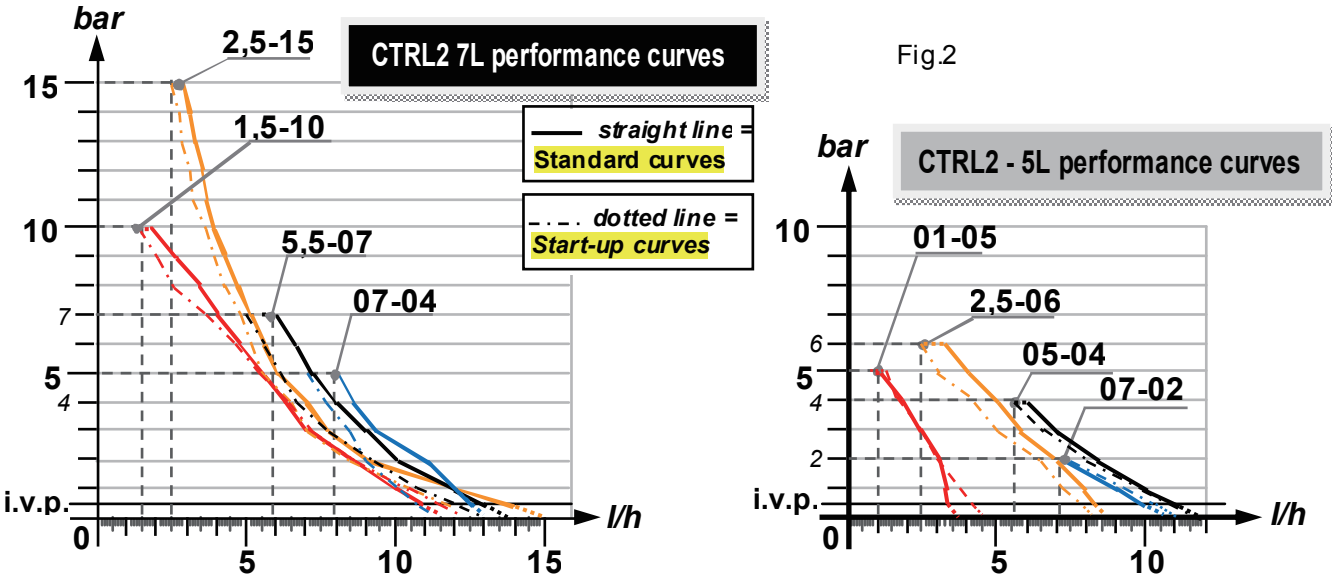


Fig.2

Performance curves (fig.2) are obtained testing the pump with water at room temperature and nominal suction height. The above diagrams indicate max metering pump flow variation in relation to the working pressure in the plant; the diagrams also include i.v.p. flow loss (injection valve pressure about 0,3÷0,4 bar).
***REMINDER:** ratings vary with a tolerance of ±5% CTRL2-7L / ±10% CTRL2-5L which must be taken into account when choosing the pump typ: above diagrams show the performance and some of the curves have slight variation from nominal rating.*

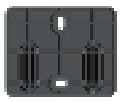
***NOTE** when programming pump operations keep in mind that flow variation are related to the system pressure variation; refer always to pump curves. Also consider that unexpected flow variations may occur for reasons not related to pump functioning (viscosity, specific weight, sedimentation, etc).*

3.0 – COMMISSIONING

CTRL2-7L series is provided with a **quick mounting support bracket:**

a. - Install the pump in a dry place, firmly to avoid vibrations, and well away from sources of heat and, in any case, at environmental temperatures not exceeding 40°C. The minimum operating temperature depends on the liquid to be pumped, bearing in mind that it must always remain in a liquid state.

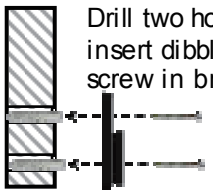
b. - Fix the wall support brackets as shown in (fig.3).



Rear side to place against wall or panel

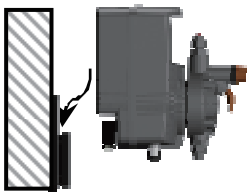
Front side for sliding pump rear slots

Mounting bracket side view

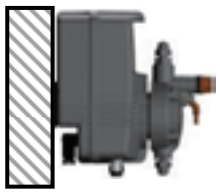


Drill two holes and insert dibbles then screw in bracket

Fig.3



Slide pump into slots



c. - Carefully observe the regulations in force in the various countries as regards electrical installations (fig.4). The pump is supplied with 3 m power cable without plug, the pump should be connected to mains supply by means of a single-pole circuit breaker having a minimum distance of 3 mm between the contacts.

Before accessing any of the electrical parts, ENSURE that no electrical power supply is ON. Operator must always protect itself when handling hazardous feed chemicals. Use goggles And protective clothing and follow the safety information sheets of chemical manufacturer.

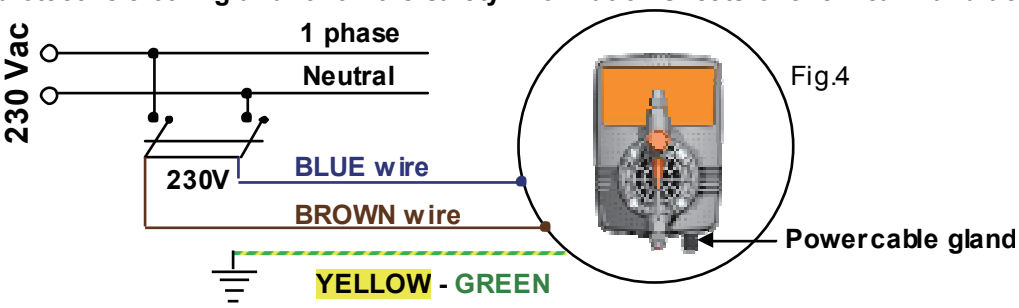


Fig.4

KEEP IN MIND: *the unit works with voltage 230Vac +/-10% (within range 207÷253V). If the actual voltage is constantly at the limit 10% and/or lower or higher and when voltage spikes are much higher then mentioned range, fuse will blow and it must be replaced with one of same characteristics. We* ***RECOMMEND*** *the use of voltage protections, check system ground and when connecting in parallel to other equipment use a "power switch".*

PARALLEL CONNECTIONS: when the unit is connected to main power supply in parallel with other inductive equipment (motors, pumps, blowers, solenoid and motorized valves), these gears must be electrically isolated and well grounded to prevent damages from inductive voltages when switching ON / OFF.
- try to use a power switch in order to have separate connections via contact relay or relay.
- when this is not possible, contact EMAUX technical service.

d. Install the pump as shown in fig.4 bearing in mind that:
- ensure that max system pressure corresponds to unit max pressure data (see performance curves).
- do not exceed the suction height over 2 m or as short as possible and vertical to prevent air pockets (fig.10)
- before connecting delivery hose to injection point, prime the pump following the sequence shown in fig.5,6,7.
- always use curved joints with suction or discharge hose. Try to keep both the suction and discharge hose **as straight as possible, avoiding all unnecessary bends.**
- always use our standard strainer/foot valve provided with the pump, check clogging in case of solid particles.
- before finalizing connection of discharge hose, ensure that the pump strokes will not cause it to move from installation or to touch external bodies.

Fig.5,6,7 the discharge nipple is always placed at the upper part of the pump head. The suction nipple (to connect hose to foot valve / filter placed into chemical tank) is located at the lower part of the pump head.

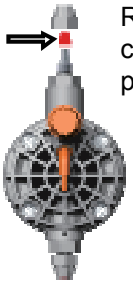

1. Remove the RED protection caps from two pump head nipples

Fig.5

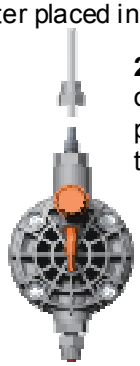
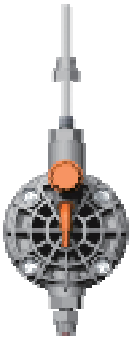

2. Slide the hoses over the nipples, pushing them toward the base

Fig.6


3. Tighten hose-nut using appropriate force or by using a wrench ensuring not to break the nipple.

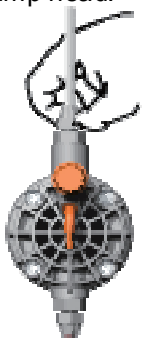
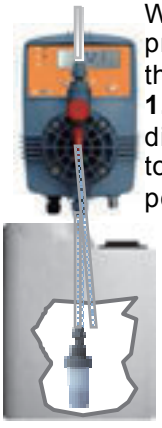
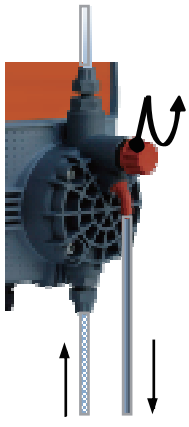


Fig.7


When priming the pump:
1. do not connect discharge hose to injection point yet


2. open Air bleed knob turning it counter clockwise

3. Set press of frequency range at 50% and stroke adjustment (only FX series) at about 80/100% of stroke length, then push **START**,

4. suction of chemical from dosing tank

5. once chemical will start to be expelled from air bleed hose returning to dosing tank, press **STOP**


6. close Air bleed knob turning clockwise

7. connect discharge hose to injection point and begin dosing operations

Fig.8

CTRL2 DOSING PUMP PRIMING: power the pump without sensor, wait for display to show initial measurings and after few seconds for pulses to start; open pump head air bleed valve, as soon as liquid starts to move forward into discharge hose, close bleed valve and stop the pump. In case pulses will not start, refer to page 18, paragraph "13.1 – Dosing field direction menu", change the direction dosing mode, move back to initial measuring display and wait for pump pulses. Ensure during programming afterwords to select require dosing direction.

NOTE ***In case of priming difficulties:*** *use a normal syringe to suck liquid from the discharge nipple while the pump is in operation (air bleed valve closed), continuing until you actually see the liquid rise in the syringe. Use a short piece of suction hose to connect the syringe to the discharge nipple (refer parag."TROUBLESHOOTING").*

3.1 - INJECTION VALVE INSTALLATION DIAGRAM

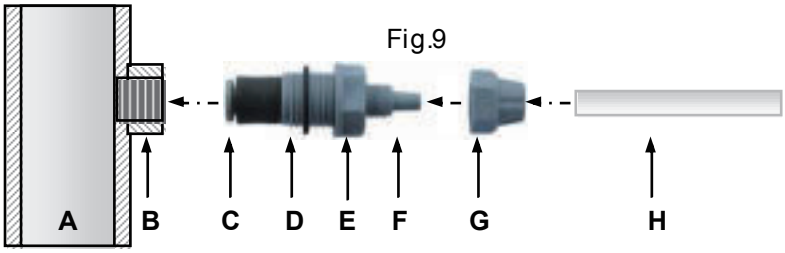


Fig.9

A - Process plant
B - 3/8" female steel gas thread connector
C - Cylinder sleeve (no return valve)
D - O-ring
E - Injection fitting
F - Conical fitting to connect discharge hose
G - Hose tube nut
H - Polyethylene discharge hose

e. - Select the most appropriate injection point on the system pipe to be treated and fit a 3/8" female gas threaded connection (BSPf): connection not supplied with the pump. Screw injection fitting into the connection (fig.9). We recommend the use of a damp-saddle for a clean installation.
- Although the injection fitting is provided with o-ring, we suggest increasing the sealing with PTFE tape.
- Connect discharge hose to the conical connector on the injection fitting and lock it with supplied hose-nut.

NOTE *The injection valve also acts as no-return valve by means of a cylinder sleeve (elastomer, standard supplied in FPM "Viton"). Available also Hastelloy Spring return valve with ball checks. The "sleeve"* ***D*** *must not be removed, performances will drastically change especially when operating at atmospheric working pressure: flow rates will increase beyond performance curves (page 6).*

3.2 - DOSING PUMPS TYPICAL INSTALLATIONS DIAGRAMS (fig.10, 11, 12)

- When operating at atmospheric pressure (no back-pressure) and additive chemical tank is located above injection point (fig.11), injection valve condition should be checked at regular intervals because excessive wear could cause additive to drip into the plant even when the pump is OFF. If the problem persists, install a proper calibrated counter-pressure valve (C) between injection point and pump head discharge side.
- When dosing tank level and injection point are higher above the pump (fig.12), check hoses conditions.
- With chemicals generating vapours, don't install the pump above the tank unless hermetically sealed.

TYPICAL INSTALLATION

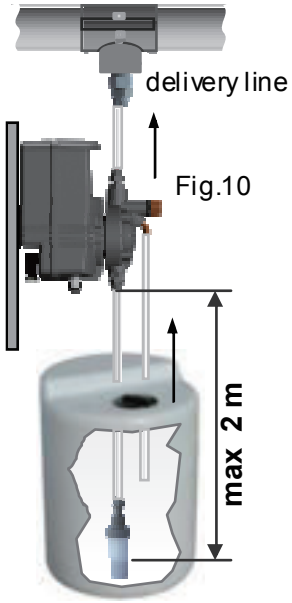


Fig.10

INSTALLATION WITH INJECTION POINT LOWER THEN PUMP AND DOSING TANK

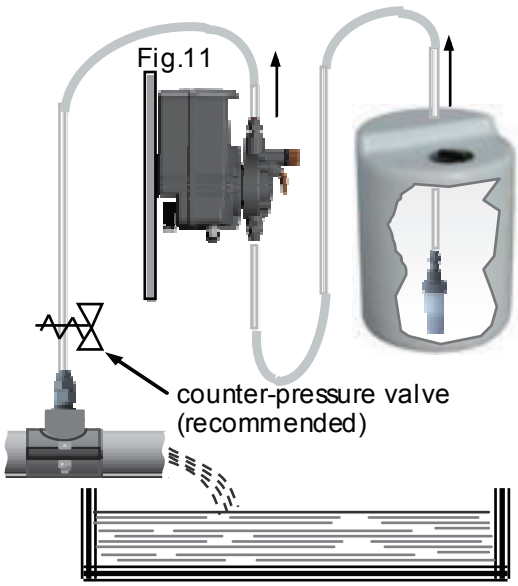


Fig.11

INSTALLATION WITH INJECTION POINT HIGHER THEN DOSING

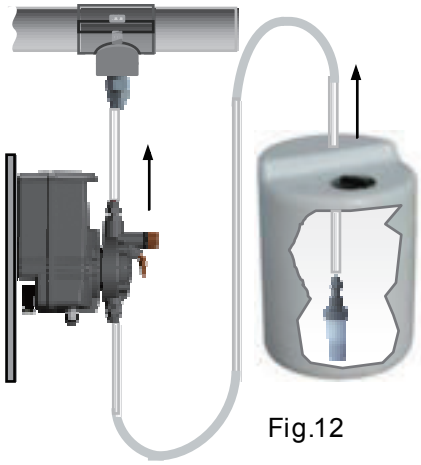


Fig.12

NOTE ***INSTALLATION NOTE FOR PVDF AUTOBLEED PUMP HEAD:***
Auto-bleed pump head expels automatically air bubbles that are formed by the chemical additive and are present into the suction tube thus during pump priming there is no need for manual intervention. However, although this functions is absolutely guaranteed, it's always advisable to mount the pump with overflow suction position (as shown in fig.13) just to prevent a sudden increase of air due to mostly to temperature increase or when using a mixer.

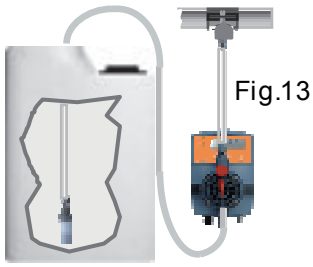


Fig.13

4.0 – DISMANTLEMENT AND DISPOSAL

Commissioning, maintenance and repairs operations must be carried out by qualified personnel only

Operator must always protect itself when handling hazardous feed chemicals.

CAUTION before carrying out any service on the pump: pump must be accessible at all times for operation and service. Access must be free and without obstacles.

- Disconnect pump from the mains or from switch contact switch.
- Relieve all the pressure from the pump head and all liquid ends.
- Drain or flush all dosing liquid from pump head. This operation can also be executed by disconnecting the pump from the plant by turning the pump upside-down for 15 to 30 seconds without connecting the tubing to the nipples; if this operation is not possible, dismount and remount the pump head using the four mounting screws. In the event of possible liquid ends leakage (wearing out or damage of "O" ring seals, valves or hoses) the pump should immediately be brought to a stop, emptying and depressurising the discharge hose while taking all due safety precautions (gloves, goggles, overalls, etc.).
- Whenever the pump is dismantled from installation, place back the RED protection caps on the nipples to avoid residual liquid being spilled.
- When dismantling a pump, clean the pump and liquid ends removing all chemical additive residuals present on the housing and inside hydraulic components.
- For disposing a unit, follow local authorities rules for disposing of equipments and chemical products; send parts to authorized recycling centers for correct disposal. **DO NOT POLLUTE THE EARTH !!!!**

REMINDER: during maintenance operation bear in mind that discharge and suction valves are mounted in different position according to function**.**

5.0 – MAINTENANCE

1. Periodically check chemical additive tank level so as to avoid the pump operates without liquid. This would not damage the pump, but may damage the process plant due to lack of chemical. FX series dosing pumps are all supplied with level control setting. The level switch is not included therefore to be ordered separately. Level control stops pump operation once chemical level into the tank is lower than level switch, thus activating a L.E.D. on the pump

2. Check the pump operating conditions at least every 6 months:

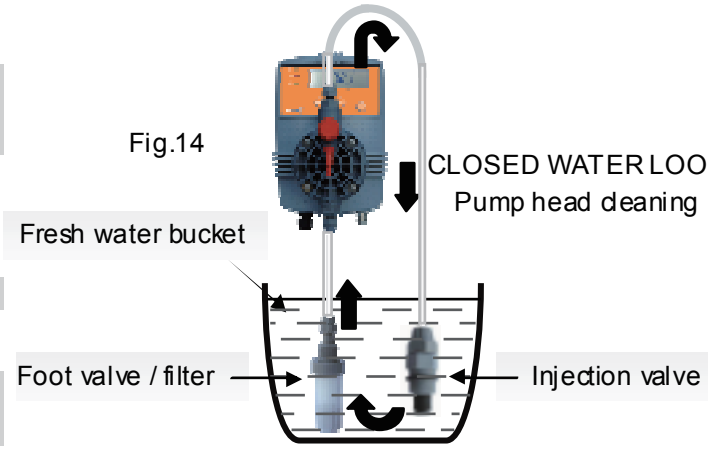
- pump head position, screws, bolts and seals;
- check more frequently where aggressive chemicals are pumped, especially:
- If a reduction of the required additive concentration in the process plant is detected, this could be caused the reduction of the dosing pump flow rate by valves wearing, in which case they need to be replaced or by the clogging of the filter which has to be cleaned as in fig.13 here below.

3. The Company suggests periodically cleaning hydraulic parts (valves and filter). We cannot say how often this cleaning should be done as it depends on the type of application, we also cannot suggest what cleaning agent to use as this will depend on the additive used.

Operating suggestions when dosing sodium hypochlorite (most frequent case):

a - Disconnect the pins from the mains or from power switch;
b - disconnect discharge hose from process plant;
c - remove the suction hose (with filter) from the tank and dip it into clean water; switch ON the dosing pump and let it operate with water for 5 to 10 minutes;
d - switch OFF the pump, dip the filter into a hydrochloric acid solution and wait until end of cleaning;
e - switch ON the pump again and operate it with hydrochloric acid for 5 minutes in a closed-circuit, with suction and discharge hose dipped into the same tank (fig.14);
f - repeat the operation with water;
g - re-connect hoses to dosing pump and injection valve to the process plant;
h - re-tighten liquid end screws after 24 hours in operation, and then after 3 months.

Fig.14



Operator must always protect itself when handling hazardous feed chemicals.

5.1 - HOW TO OPERATE WHEN DOSING SULPHURIC ACID

In case of dosing Sulphuric Acid up to 96% or other aggressive chemicals, bear in mind the following:

1. replace PVC suction hose with polyethylene discharge hose;
2. empty any residual water from the pump head beforehand.

Warning: if water mixes with sulphuric acid it can produce a large quantity of gas with consequent overheating of the area causing damage to valves and pump head. This operation can also be done with the pump disconnected from the plant by turning the pump upside-down for 15 to 30 seconds and without connecting the hose to the nipples; if it's not possible, unscrew the pump head, empty it and then remount it. EMAUX provides a special liquid ends configuration for Sulphuric Acid or other aggressive chemicals.

6.0 – WIRING SERVICE CONNECTORS FOR CTRL2 (fig.15)

Always TURN PUMP OFF when servicing and wiring connectors !!!

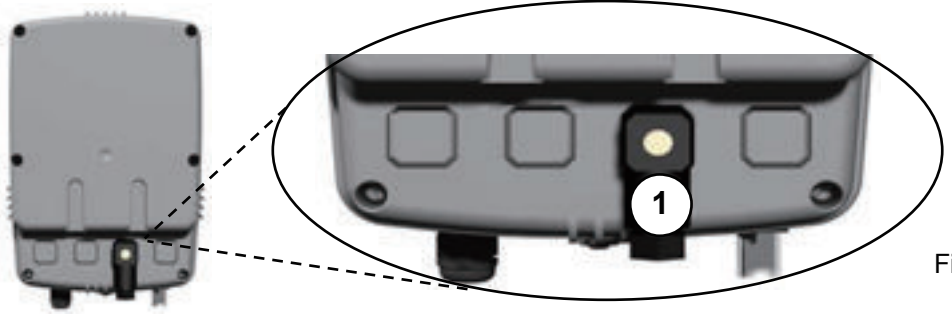
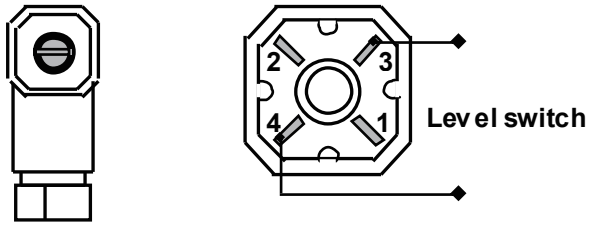


Fig.15

FEMALE SERVICE CONNECTOR WIRING DIAGRAM		Functions descriptions
	CONNECTOR 1	**CONNECTOR 1** **Level switch connection** (fig.15) Configurations Pin **1** = NO connection Pin **2** = NO connection Pin **3** = Level switch wire Pin **4** = Level switch wire
		**PUMP LOWER SIDE** **- Power cable clamp** **- pH or RX electrode**

NOTE *once wiring is completed there will be no accessible contacts*

OVERALL DIMENSIONS

Approximate net weight **kg 2.0÷2.5**

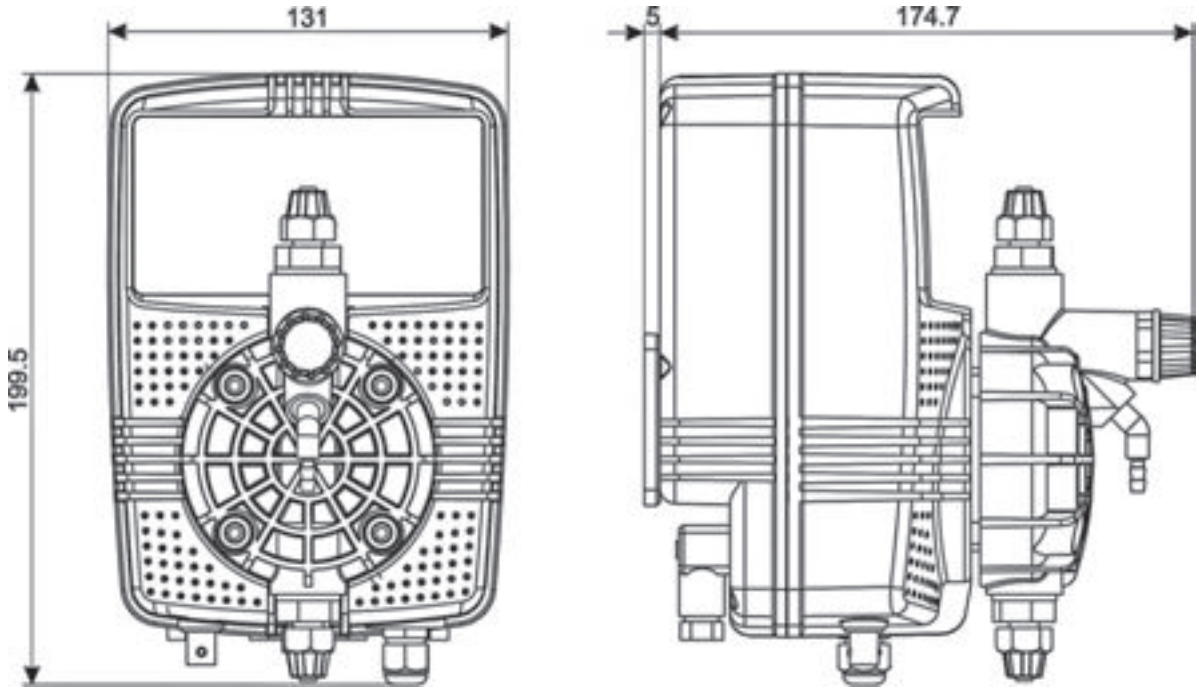


Fig.16

CTRL2

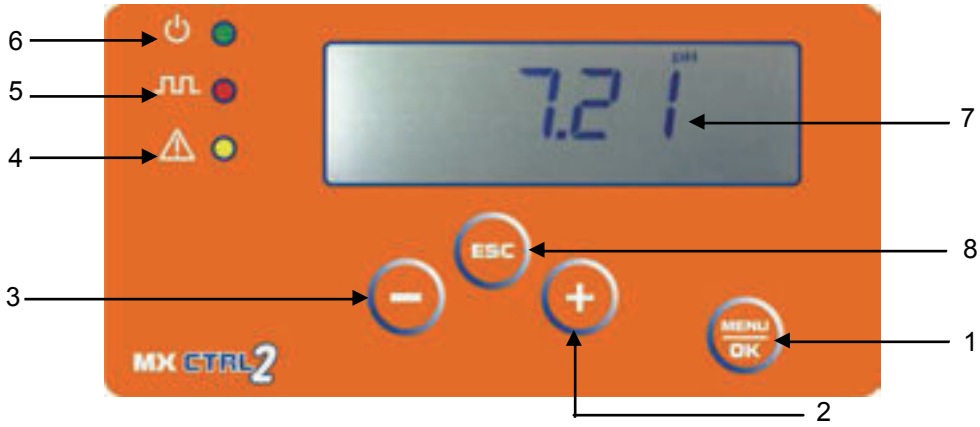


Fig.17

7.0 – DUAL PARAMETER DOSING PUMP AND PHRX CONTROLLER CTRL2

This unit is microcontroller based dosing pump includes both a dosing pumps and high tech controllers which features three parameters all in one endosure: PH or RX (ORP).
BENEFITS: reducing stock value against a great quality and versatility

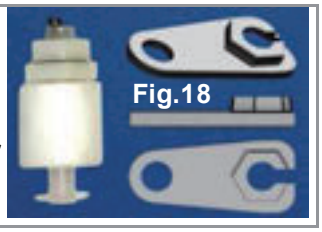
7.1 - CTRL2 DIGITAL CONTROLS (fig.17)	
1 - Enter button "OK": confirms selection	
2 - Increasing value button	
3 - Decreasing values button	
4 - "YELLOW" LED: level alarm / over dosing alarm / malfunction alarm	
5 - "RED" LED injection pulse flashing	
6 - Power "GREEN" LED: pump is feed by mains power supply	
7 - LCD display	
8 - ESC escape button	

7.2 - CTRL2 CONTROLLER MAIN FEATURES

pH: measuring range 0÷14,00 pH (resolution 0,01pH) **RX:** measuring range: -1000÷+1400 mV (resolution 1mV)

- 2 Reset modes: full reset - partial reset keeping calibration settings
- Proportional mode: selection of proportional range value
- Delay adjustment - Delay at powering ON (electrodes polarization)
- Stand-by for cleaning electrodes and sensors or re-calibration

7.3 - LEVEL CONTROL ONLY CTRL2/L (fig.18)
The pump is supplied with level control setting and upon request floating level switch. When the level of the additive is lower than the switch, level alarm and yellow led are ON: **the pump is OFF**. The level control alarm goes ON within 5 seconds delay.



Floating Level Switch Joint level switch / filter

NOTE: *when using a mixer in dosing tank this will cause turbulence, ensure that floating switch is connected to filter fitting to avoid floating switch incorrect operations.*

7.4 - ACCESSORIES (fig.19)

- 1 semi-rigid Polyethylene hose 4x6 mm, white, 2 m;
- 1 flexible PVC suction / air bleed hose, 4x6 mm, transparent, 2+1,5m;
- 1 injection valve 3/8 BSP m;
- 1 foot valve / filter;
- 3 m power cable (three wires) with plug;
- mounting screws and dibbles, instruction booklet;
- level switch in case of CTRL2/L model

8.0 – DISPLAY DESCRIPTION

OVER	Overdosing alarm	**SETUP**	Unit general settings
DELAY	Delay after switching unit ON	**STARTUP**	Switching-on delay settings
SET POINT	Set-point programming	**RESET**	Reset activation
LEVEL	Level alarm	**DIRECTION**	Intervention field selection
ALARM	Alarms level setting	**MAX****	Max Impulse / minute (frequency)
MENU	Menu selection Basic/Full	**h:m:s**	Hours:minutes:seconds
ON-OFF	ON-OFF operating mode	**°C**	Temperature °C
PROP.	Proportional functioning mode	**°F**	Temperature °F
HYST.	Hysteresis programming	**%**	Flow rate percentage
1 2	Calibration points	**pH**	pH measurement
CALIB.	Calibration menu	**mV Rx**	mV (Rx) measurement
▲	Intervention Alkaline / Oxidant / Direct		
▼	Intervention Acid / Reduction / Inverse		
/ min	pulses / minute		

* Flow sensor = Proximity switch
** Maximum pulses frequency based to maximum measuring value

9,0 – PARAMETERS AND FUNCTIONS (pH default)

	DEFAULT
Set-point setting	7,2
Hysteresis setting	0,1
Choice of intervention of dosing field (acid / alkaline)	Acid
Selection ON-OFF mode or proportional mode	Manual
Definition of proportional intervention value "AUTO" selection	+ 1pH Set point
First point of calibration procedure	-------
Second point of calibration procedure	-------
Minimum alarm point	0,00
Maximum alarm point	14,00
Over-dosing time alarm value	99:59 h:m
Parameter measuring selection (PH or RX)	pH
Temperature system selection (°C or °F)	°C
Temperature compensation selection (manual - auto)	Manual - 25°C
Delay relay operations when switching pump ON	00:03 m:s
Selecting time delay to exit programming	05:00 m:s
PARAMETER TYPICAL CHARACTERISTICS	**VALUE**
Environmental temperature range	0÷40°C
Max current relay output	6A (resistive load)–1A(inductive load)
pH measurement	0÷14°C (resolution 0,01 pH)
RX (mV) measurement	–1000 ÷ +1000 (resolution 1 mV)

10.0 – PROGRAMMING CONTROLLER

KEEP IN MIND: ***if no selection is made dusring set-up step, pump wil start to release pulse strokes***

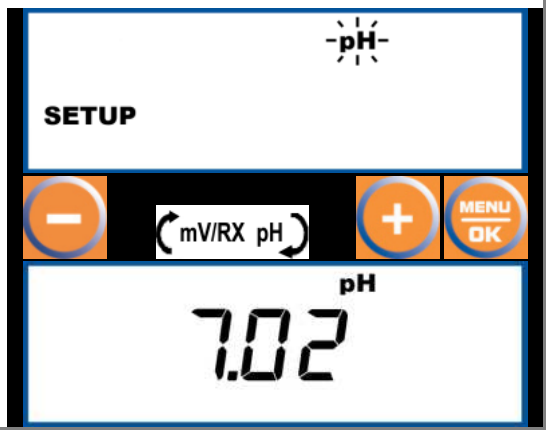
10.1 – PUMP SET UP / CONTROLLER SETTING

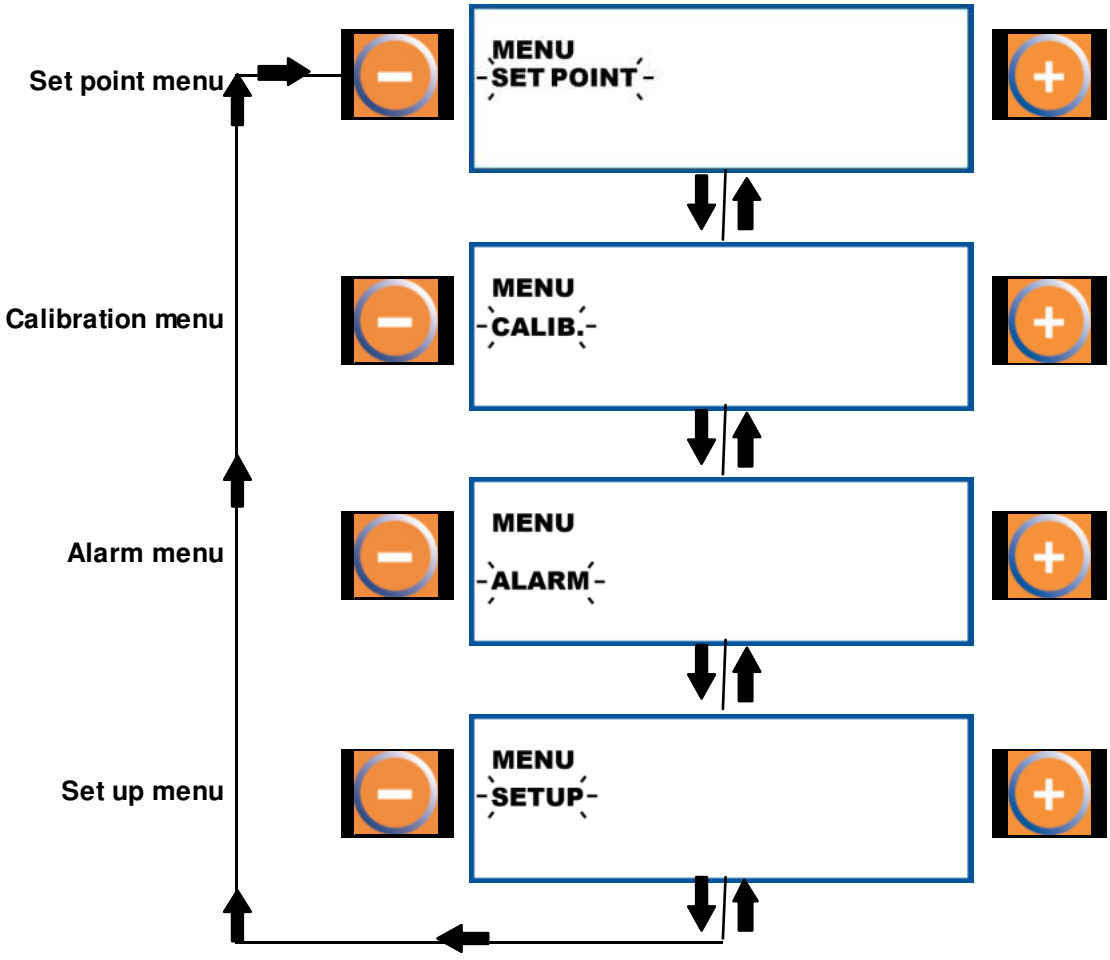
The first operation is to select the required parameter intended to measure and control pH or RX (mV).

Pump power **ON**, display will show last software revision and also the type of measurement parameter flashing (default setting: pH with operating menu BASE basic-simplified mode).
Now it is possible **to select required measuring parameter**, pH or RX, by means of – or + buttons and press **OK** to confirm.

Select type of measuring parameter and confirm **OK**, programming moves to measuring mode, display will show current measured value.

☛ Press **OK** to enter menus; it will show **SETPOINT** menu, using – or + buttons to scroll all 4 menus.





- this symbol "pointing finger" indicates programming steps "PRESS".

NOTE *After about 2 seconds, selection is operational and operator can decide whether to quit SETUP menu or to continue for additional settings. In view of selecting pH, Redox measuring, check next paragraph.*

To enter **SET UP** menu, display will flash **SETUP**
scroll with + or – buttons and once reached required menu

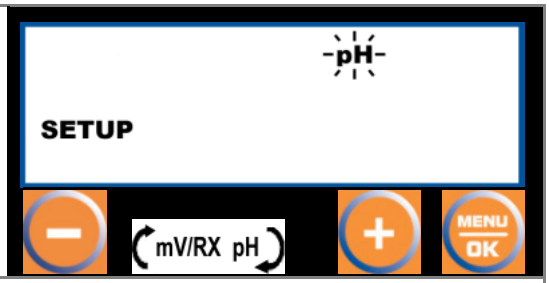
☛ press **OK** to confirm

After about 2 seconds, selection is operational and operator can decide whether to quit SETUP menu or to continue for additional settings. In view of selecting pH, Redox measuring, check next paragraph.

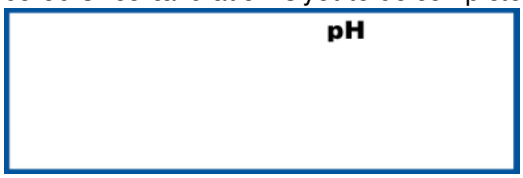
10.1 – MEASUREMENT TYPE SELECTION

Once entered **SETUP** menu it's possible to select the required type of measurement parameter. Default is to **pH**

☛ Pressing **–** and **+** buttons a loop menu is entered , user can select among 2 measurements parameters: pH or RX (mV).
To confirm selection ☛ press **OK**
The program will enter Password menu.

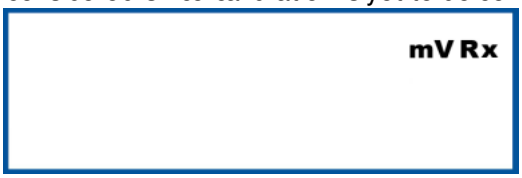


pH flashing, display visualises pH value not to be considered since calibration is yet to be completed



To select ☛ **OK**
Moving to **SETPOINT** menu

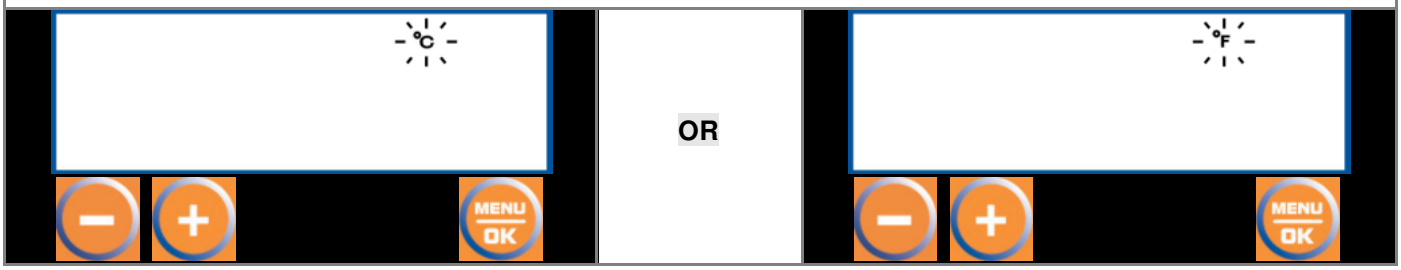
mV RX flashing, display visualises a RX value not to be considered since calibration is yet to be completed



To select ☛ **OK**
Moving to **SETPOINT** menu

10.2 – TEMPERATURE: SELECTION CELSIUS OR FAHRENHEIT

☛ Press **OK**, select temperature reading either in Celsius degrees or Fahrenheit degrees (°C or °F).
To shift use ☛ **–** or **+** Press **OK** to confirm selection



10.3 – TEMPERATURE COMPENSATION

The pump allows to select **manual** temperature compensation, that is setting the temperature at the same value of the system to be treated and such value will remain constant. Also it's possible to switch from C° (celsius default) to F° Fahrenheit.

To select manual temperature compensation display will flash **OFF**
☛ pressing **OK** display will flash default temperature **25.0** °C.
☛ Using **+** or **–** buttons it is possible to change this value. When the desired value is reached press **OK** to memorize and move on.

10.4 – DELAY OF DOSING OPERATION AFTER SWITCHING "ON" THE UNIT

Due to electrodes time polarization inertia or plant installation characteristics or previous programming data, the pump has the possibility to set a delay from the time the pump is switched ON to the concrete measuring, control and dosing operations. It will start measuring operation after 3 seconds (default) from switch ON.
It's a safety measure to ensure a correct electrode reading before activating the dosing pump.

☛ Using **–** or **+** it's possible to set delay time, from 0 to 99 min.59 sec.

To shift from minutes to second ☛ press **Right** arrow

☛ Press **OK** to confirm

11.0 – CALIBRATION

To calibrate controller, user must adjust two calibration points:

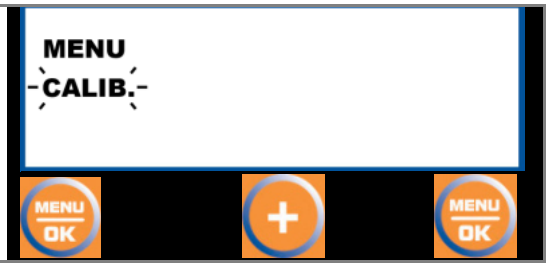
- ✓ for pH two adjustable point
- ✓ for Redox (mV) one adjustable point

11.1 – CALIBRATION MENU

To enter CALIBRATION menu from measuring mode

☛ press **OK** then **+** button, on display ⇉ **CALIB.** ⇇ will flash

☛ press again **OK** to confirm



Display will show **POINT 1 and default 7,20**

pH CALIBRATION PROCEDURE

- Dip pH electrode into buffer solution pH 7.00
- Adjust value on display ☛ using **–** or **+** until reaching ⇉ **7.00** ⇇

Wash electrode with tap water before dipping into second solution.

☛ Press **OK** to confirm. Display now will show **POINT 2**.

- Dip pH electrode, in the second buffer solution (pH 9.00 or pH 4.00, use fresh solution always).
- Adjust value on display ☛ using **–** or **+** until reaching **9.00 or 4.00.**

☛ Press **OK** to confirm

REDOX (mV) CALIBRATION PROCEDURE

- Short circuit BNC connector. Using a metal wire (eg: screwdriver), connect the pin core with the external element of BNC.

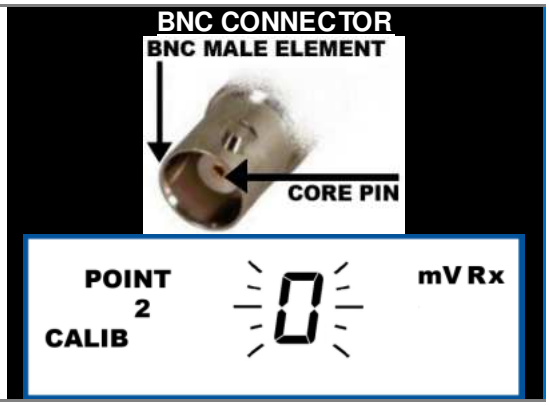
☛ Using **–** or **+** adjust value on display to reach ⇉ **0** ⇇

☛ Press **OK** to confirm. Display will show **POINT 2**

- Dip RX electrode into buffer solution (475 or 250 or 650mV).

☛ Using **–** or **+** adjust until display shows the buffer solution value.

☛ Press **OK** to confirm.



12.0 – PROGRAMMING SET POINT

NOTE *To have the pump operative it's mandatory to set the following data: Set-point values, type of dosing "DIRECTION" meaning (for example for pH measurement acid or alkaline operation, for RX reduction or oxidant), hysteresis setting, manual (ON-OFF) or proportional dosing.*

*There are **two different** Set point setting procedures according to the operating menu of the pump: **BASE** or **FULL**.*

NOTE *FULL menu is functional **only** if it has been selecte; a pump with FULL menu features extra output connectors but only with CTRL3a version. **Let's start with BASE menu** activated (paragraph 10.1),but KEEP IN MIND that the same procedure is valid also for FULL version menu.*

12.1 – PROGRAMMING PH SET-POINT

From measuring status,

☛ press **OK,** the program will move to **SETPOINT** programming.

☛ Press **OK** again, display will show ⇉ **7,20** ⇇ **pH** flashing meaning that it can be adjusted to required set point

☛ Using **–** or **+** buttons.

Once selected required set point, ☛ press **OK** to confirm.
The pump automatically will move to **DOSING DIRECTION** menu.

12.2 – PROGRAMMING REDOX SET-POINT

From measuring status,
☛ press **OK,** the program will move to **SETPOINT** programming.

☛ Press **OK** again, display will show ⇉ **650** ⇇ **mV** flashing meaning that it can be adjusted to required set point.

☛ Using **–** or **+** buttons.

Once selected required set point, ☛ press **OK** to confirm.
The pump automatically will move to **DOSING DIRECTION** menu.

13.0 – SET POINT SETTINGS

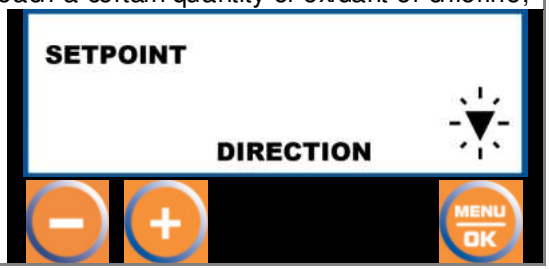
13.1 – DOSING FIELD DIRECTION MENU

This menu selects the dosing field direction of dosing pump (above the setpoint or below this value) according to water acid or alkalin characteristics: to reduce pH value acid must be dosed, **direction arrow** must point down. This way dosing pump will be active when pH value is higher than the setpoint previously set.

Viceversa, to increase pH value alkaline chemical must be dosed. This way dosing pump will be active when pH value is higher than required set-point.

Same procedure for RX and Chlorine measurements: if pump has to reach a certain quantity of oxidant or chlorine, the direction arrow has to point aloft, vice versa, for a reducent chemical.

From measuring status,
To select arrow direction, ☛ press **–** and **+**
☛ Press **OK** to confirm.



13.2 – MANUAL ON-OFF DOSING MODE / PROPORTIONAL DOSING MODE MENU

ABOUT DOSING MODES

⇉ ***ON-OFF*** ⇇ ***:*** *dosing pump will operate with ON-OFF mode and with flow rate selected by the user at max frequency (chapter 11.5) and will stop once reached required set-point.*

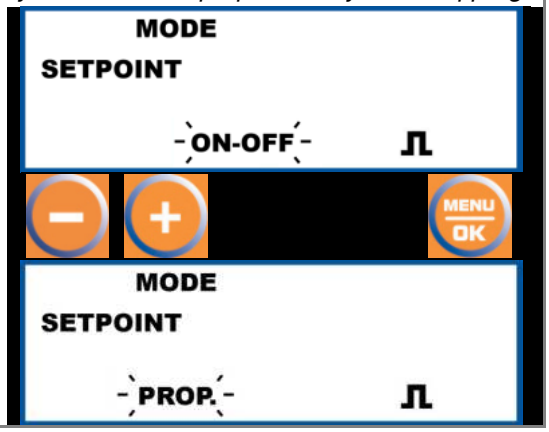
⇉ ***PROP*** ⇇ ***:*** *with this mode the pump will dose proportionally to the current measured value and its distance to selected set-point. The pump starts dosing over set-point (determined by hysteresis), at MAX FREQUENCY selected after ☛ pressing **OK** from this menu. Then injections frequency will decrease proportionally until stopping once reached set-point value.*

After selected "direction", display will show ⇉ ***ON-OFF*** ⇇ flashing

☛ With **–** and **+** it's possible to shift to ⇉ **PROP** ⇇

☛ Press **OK** to confirm the selection.

Herefollowing will be described flow rate adjustment setting.



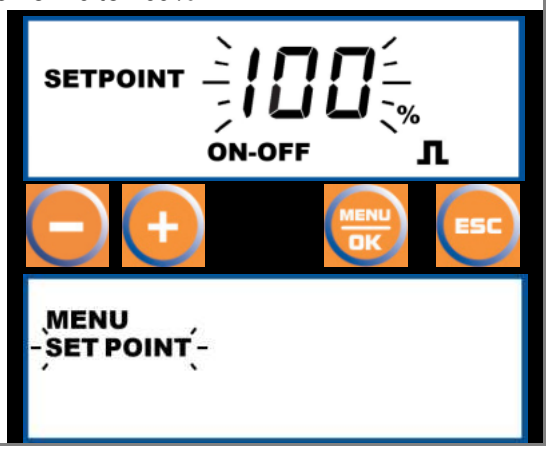
WHAT'S THE HYSTERESIS ? Hysteresis *function is featured when working with **ON-OFF mode:** it's useful when there are to many or quick changes around set point value which could damage dosing pump. Increasing Hysteresis value will activate outputs only when measured value moves away from set point according the required value. Example: if required and selected pH set-point is 7.2 and hysteresis is set at 0,1, in case of measurement changes from selected set point, dosing output operations will be activated at 7,1 or 7,3 pH.*

13.3 –HYSTERESIS SETTING

Once selected direction of dosing (paragraph 11.1.1), adjust **hysteresis** value, meaning the distance from selected Set-point, over this value the pump will start or stop dosing operations
☛ Pressing **OK** to enter **Hysteresis** menu setting
☛ Press **–** or **+** to select required hysteresis value (default 0.05 pH)
☛ Press **OK** to confirm

13.4 – FLOW RATE FREQUENCY ADJUSTMENT – MAN (MANUAL ON-OFF) SETTING

Selecting Manual mode (ON-OFF), pressing ☛ **OK**, program will move to **Frequency adjustment** setting.
User must set dosing pump flow rate selecting strokes frequency range from 0 to 100%.
Max frequency 120 imp/min.



☛ Use **+** or **–** to select strokes frequency percentage equivalent to required flow rate.

☛ Press **OK** to confirm and exit Setpoint menu.

☛ Press **ESC** to return to measuring mode.

13.5 – MAX FREQUENCY ADJUSTMENT - PROPORTIONAL DOSING MODE SETTING

Selecting Proportional mode (**PROP.**), after pressing **OK**, pump will move to **Max frequency adjustment** menu. Select at which pH, Redox or Chlorine measuring value dosing pump will operate at max strokes (injections) frequency. From this point pump will decrease injection proportionally while getting close to set-point until stopping once is reached. Follow these three **STEPS**.

STEP 1	STEP 2	STEP 3
☛ With **–** and **+** select maximum measured value to correspond dosing pump maximum injection frequency. Press **OK** to confirm and move to Step 2.	Ensure display show max injection frequency 100% (120 imp/min).	☛ With **–** and **+** select minimum measured value to correspond dosing pump minimum injection frequency. Press **OK** to confirm and exit Set-point menu.

☛ Press **ESC** to return to measuring mode.

15.0 – ALARM SETTINGS

15.1 – ALLARM SETTINGS

It is possible to plan three different types of alarm settings:
1 - MAX ALARM point: user can select maximum value ALARM point (pH or mV or ppm) where the unit will enter Alarm mode. When measuring value will go over selected point, display will show ⇉ **ALARM** ⇇ flashing and Alarm **LED** flashing.
2 - minimum ALARM point: user can select minimum value ALARM point (pH or mV or ppm) where the unit will enter Alarm mode. When measuring value will go lower this point, display will show **min** and ⇉ **ALARM** ⇇ flashing and Alarm **LED** flashing.
3 - OVER ALARM TIME: In case problems may occur in the system and/or the unit (wrong calibration, dirty or broken sensors, etc.) to avoid overdosing of chemical, user can select **OVER ALARM TIME** in which the pump must reach Set-point, passed the selected time, pump will stop dosing operations.
Display will show ⇉ **ALARM** ⇇ flashing and Alarm **LED** flashing.

To enter in **ALARM** menu follow the procedure described in paragraph *10.1 "PUMP SET UP / CONTROLLER SETTING"*, when ALARM menu is reached, ☛ press **OK** to enter submenus.

15.1.1 – MAXIMUM ALARM SETTING

Display shows **MAX** and current measured value both flashing.

- Press **–** or **+** to select **max** measured value ALARM point
- Press **OK** to confirm

15.1.2 – MINIMUM ALARM SETTING

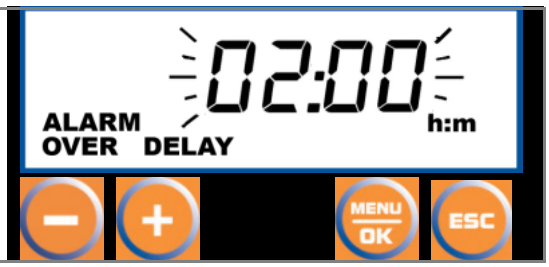
Display shows **min** and current measured value both flashing.

- Press **–** or **+** to select **min** measured value ALARM point
- Press **OK** to confirm

15.1.3 – ALARM SETTING

Display shows **OVER DELAY** and time counter **h:min** flashes.

- Press **–** or **+** to select Over Dosing time, passed this point pump will enter alarm mode and stop dosing operations.
- Press **OK** to confirm
- Press **ESC** to return measuring mode



16.0 – RESET / STAND-BY

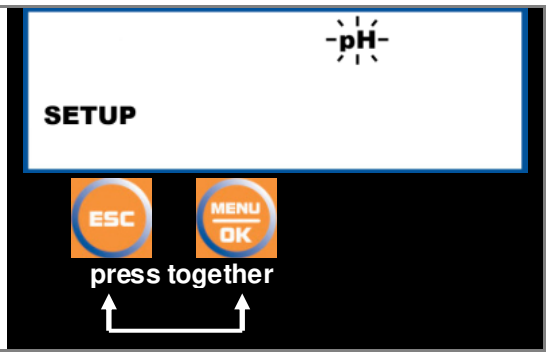
16.1 – RESET PROCEDURE

Here following are steps for **RESET** procedure:

• Switch **OFF** and **ON** the unit

- Press **at the same time** **ESC** and **OK** until display will show the latest firmware revision (e.g.02.3.3), then will appear **SET UP** and default parameters will blink.

Now user has 15 seconds to complete reset operation.



NOTE *After **15 seconds** from entering SETPOINT menu, it' **NOT** possible to activate reset procedure. Therefore the user has to switch unit OFF and then ON again to start reset procedure.*

16.2 – STAND-BY PROCEDURE

The unit can be placed in STAND-BY mode to allow sensors and accessories maintenance operations.

- Press and hold **+** and **–** at the same time until display will show STAND-BY **STBY** flashing

• To exit Stand-By mode

- Press and hold **+** and **–** buttons at the same time until display will show previous measuring settings.

17.0 – TROUBLE-SHOOTING FOR CTRL2 SERIES

Operator must always protect itself when handling hazardous feed chemicals. Use googles and protective clothing and follow the safety information sheets of chemical manufacturer.

When removing the metering pump from the plant, be careful as there might be some residual additive in the discharge hose.

- Due to robust design the pump is quite robust therefore there are no apparent mechanical problems.
- In case of leakage from nipples, check tube nut tight setting.
- Diaphragm rarely breaks (made of pure PTFE synthesized), however check diaphragm-pump head o-ring.
- Occasionally there might be a loss of liquid from the nipple because the tube nut has loosened, or more simply the discharge hose has broken. Very rarely there may be losses caused by the breakage of the membrane, or by the membrane seals in which case they have to be replaced by disassembling the four screws of the pump head, when re-mounting the pump head ensure that the screws are replaced properly, properly, along with "O" ring.
- re-tighten liquid end screws after 24 hours in operation.
- After repair, metering pump will need to be cleaned of additive residues which can damage pump casing.

TROUBLE-SHOOTING QUICK VIEW

PROBLEM	CAUSE	*ACTION TO TAKE:*
1 ⇒ GREEN LED LIT AND RED LED FLASHING, DOSING PUMP PULSES BUT ADDITIVE IS NOT INJECTED	**cause 1:** diaphragm rupture and/or pump head o-ring is not sealing because worn out or not compatible with liquid.	***a.*** *Dismount the suction and discharge valves, clean them reinstall them or replace (pump head views in the following pages). In case of using LIP type valves and should the valves be swollen, check valves material against our chemical resistance compatibility chart and fit correct valves.*
	cause 2: chemical can produce crystalline deposits in the hydraulic parts or clogging the filter.	***b.*** *Check clogging of the filter* ***c.*** *Check injection valve condition* ***d.*** *Check system pressure*
2 ⇒ GREEN LED LIT AND RED LED FLASHING, PUMP PULSES BUT PUMP IS NOT PRIMING (NO LIQUID SUCKED)	***a.*** *Dismount the suction and discharge valves, clean them and replace, see position (fig.10) and follow the same point as above point 1.* ***b. In case of priming difficulties****: use a normal syringe to suck liquid from the discharge nipple while the pump is in operation (air bleed valve closed), continuing until you actually see the liquid rise in the syringe. Use a short piece of suction PVC hose to connect the syringe to the discharge nipple (see photo sequence below)*	
	 *Insert syringe hose in place of discharge hose ensuring that the same is NOT connected to injection valve.*	 *Close pump head air bleed valve.* *Start pump pulses above 50% rate and start sucking with syringe until the liquid start to come up costantly in syringe hose then stop the pump and take out syringe hose.*	 *Reinsert discharge hose ensuring that the same is connected to injection valve and start the pump.*
3 ⇒ ALL LED DISPLAYS ARE OFF, THE PUMP DOES NOT PULSE	**cause 1:** power supply cable not plugged or wrong power supply or plug not wired correctly.	*Check power supply (socket, plug, power switch ON), if the pump doesn't work contact manufacturer Customer Service, Dealer or Distributor. Ensure system is well grounded,*
	cause2: fuse blown or defective. Also a possible voltage spike higher then pump range has blown fuse or damaged pcb.	Disconnect the pump from power supply, check the fuse and if blown or defective change it with same type or contact manu facturer Customer Service, Dealeror Distributor. CTRL2 series are equipped with a **MICROFUSE MT 1A slow.**

DO NOT REPLACE FUSE WITH OTHER TYPES: it will severely damage pump and other equipment !!!
In case of severe and continuous voltage fluctuation, the fuse could blow continuously. In this case contact manufacturer Customer Service, Dealer or Distributor for a correct solution.

…MORE TROUBLE-SHOOTING QUICK VIEW

PROBLEM	CAUSE	*ACTION TO TAKE:*
4 ⇒ GREEN LED IS ON, RED LED (PULSE) IS OFF, THE PUMP DOES NOT PULSE ***SOLENOID DATA TO CHECK WITH TESTER*** *CTRL2-7L types 1,5-10 / 2,5-15 / 5,5-07 / 07-04:* ***Ω 230*** *CTRL2-5L types 01-05 / 2,5-06 / 05-04 / 07-02* ***Ω275***		*Disconnect the pump from power supply, open dosing pump and disconnect solenoid wires from pcb and, with a tester, measure electrical resistance (check solenoid view page 23) then contact manufacturer Customer Service, Dealer or Distributor.*
5 ⇒ PUMP PULSES ARE NOT CONSTANT		*Check that voltage is within +/- 10-15% of rated voltage*
6 ⇒ DOSING PUMP GIVES ONLY ONE PULSE		*Disconnect the equipment and contact manufacturer Customer Service, Dealer or Distributor.*
7 ⇒ DOSING PUMP PULSES WORKING NORMALLY, ALL LEDS ON, BUT FLOW RATE IS MUCH LESS THEN EXPECTED	**cause 1:** pumped additive is very viscous or with high specific weight	*a. Check liquid viscousity and if it's higher then 500 cps change standard pump head with PMMA type (viscous configuration)* *b. If it's not higher then 200 cps, using same pump head, select higher performance dosing pump (at least double flow rate of the one requested*
	cause 2: solenoid not working properly	*Disconnect power supply, open dosing pump and disconnect solenoid wires from pcb and, with a tester, measure electrical resistance then contact manufacturer Customer Service, Dealer or Distributor.*
8 ⇒ LIQUID IS LEAKING **- from back of the pump head:**	**cause 1:** diaphragm-pump head o-ring is not sealing because worned out or faulty due to not compatible with liquid.	*Check diaphragm-pump head o-ring and replace it with new one or compatible one.*
	cause 2: pump head screws are not well tighten.	*Tighten firmly pump head screws.*
9 ⇒ LEAKAGE **- from the pump head nipples:**	**cause 1:** nipple o-ring is not sealing because worn out or faulty because not compatible with liquid.	*Check nipple o-ring and replace it with new one or proper one compatible.*
	cause 2: hose is not locked tight with tube nut.	*Tighten tube nut on hose.*
10 ⇒ HOSE BREAKING	Hoses are breaking (mostly discharge one) and liquid is coming out	***a.*** *Ensure hose-nuts on the nipple (mostly discharge side) are NOT over-tighten* ***b.*** *ensure that hoses are straight, without angles* ***c.*** *check chemical compatibility*
11⇒ FOR CTRL2/L ONLY **FLOATING LEVEL SWITCH NOT WORKING**		***a.*** *Check that the connector male/female between level probe and pump is securely fastened.* ***b.*** *If problem persists make a short connection between pin #3 and pin #4 with a wire or small pliers. In case the level alarm LED turns ON, replace level probe. If problem persists, contact distributor.*
12 ⇒ IN CASE ADDITIVE LEVEL IS BELOW THE LEVEL PROBE AND LEVEL ALARM IS STILL OFF		*Check the level switch connection as previous point b., in case the level switch is working and the level alarm LED is still OFF, contact manufacturer customer service, dealer or distributor*

18.0 – ELECTRODE CLEANING AND MAINTENANCE

The formation of deposits on the electrode will produce erroneous readings. The necessary cleaning action depends on the type of deposit under consideration. In case of thin deposits, shake the electrode or use a spray of distilled water. Organic residues or particularly resistant deposits should be removed by chemical means. Mechanical cleaning of the bulb should be resorted to only in extreme cases, but bear in mind that abrasion can lead to irreparable damage. If cleaning does not fully re-establish the efficacy of the electrode, it may be that the electrode has aged. Ageing will show itself in the for of either a measurement error or a slow response.

RECONDITIONING

The following chemical treatments may be carried out with a view to reconditioning the electrode. We list them in order of increasing aggressiveness as far as the bulb is concerned and would ask you to note that they will not necessarily improve the electrode quality, which in some cases may even be further reduced.

1) Immerse the tip of the electrode in 0.1N hydrochloric acid (HCl) for 15 seconds, then rinse with water and dip again the electrode in a 0.1N solution of sodium hydroxide (NaOH) for 15 seconds, followed by a second rinsing. Repeat this sequence three times, and then carry out another check measurement. If the reading remains erroneous, proceed to treatment 2.

2) Immerse the tip of the electrode in a 20% solution of ammonium bifluoride (NH2F-HF) for two or three minutes, then rinse with water and make another check measurement. If the reading is still unacceptable, proceed to treatment 3.

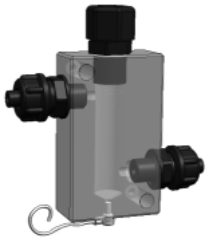
3) Immerse the tip of the electrode in 5% hydrofluoric acid (HF) for 10 seconds, then rinse thoroughly in water and very quickly in 5N hydrochloric acid (HCl), followed by a second rinsing in water. If the check measurement still produces unacceptable measurements, it only remains to change the electrode.

17.1 - ELECTRODE HOLDERS

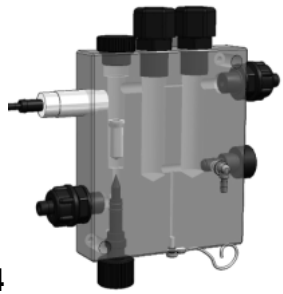
Different types of electrode holders are available: for immersion, electrode cell, and in-line. It is essential to bear in mind that the distance between the injection point and the electrode must never be less than one meter. When this is not possible, an appropriate chemical mixer must be inserted between the injection point and the electrode.

EMAUX ELECTRODE HOLDERS FOR CTRL2-7L APPLICATIONS

ECELL1



ECELL 4



ELINE 1 / ELINE 1-A

ELINE 2

ESUB

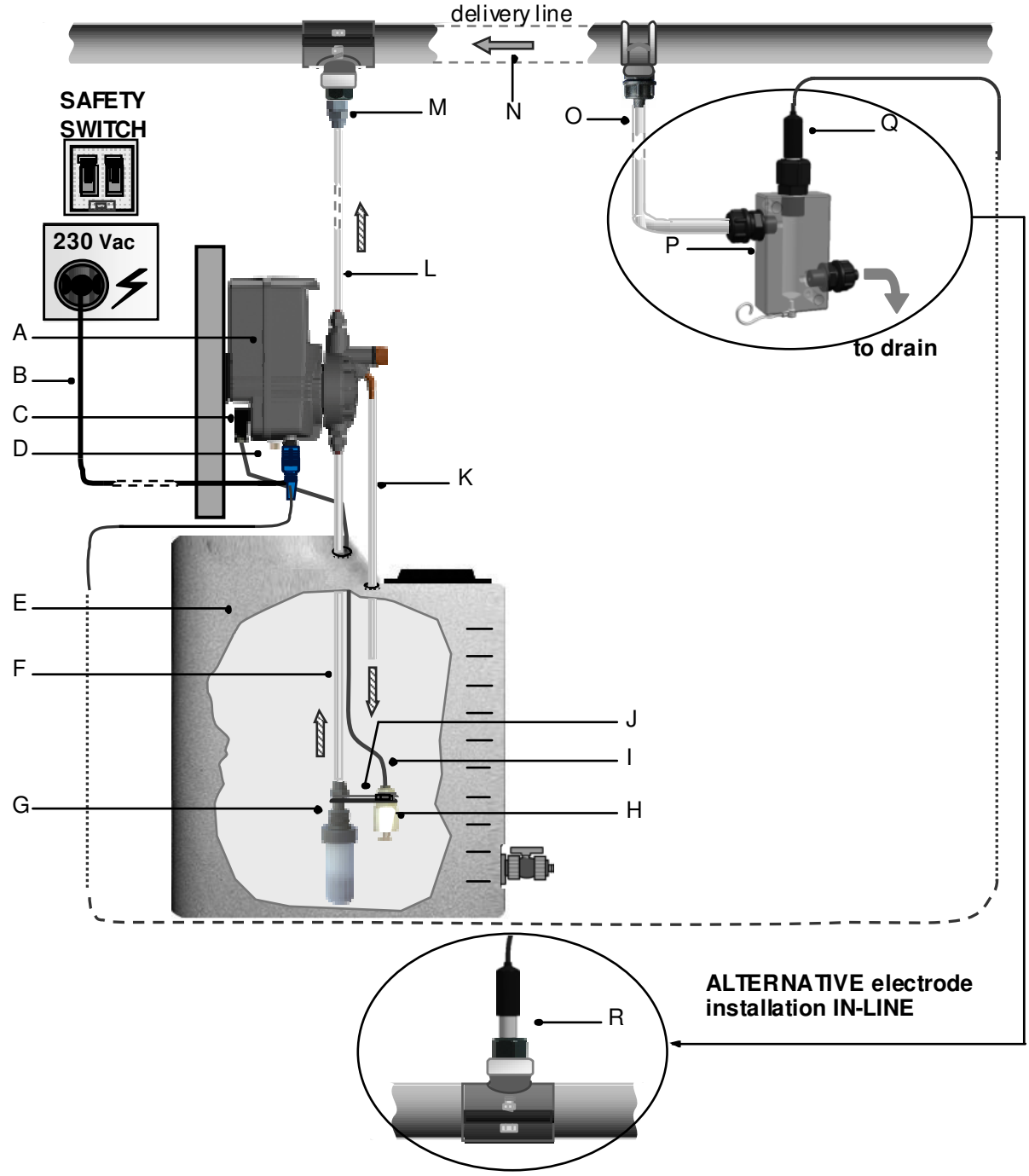
Part no.	**Model**
SPS0000901	ECELL1: Off-line holder 1 electrode, earth , external valve for incoming flow control
SPS0001201	ECELL4: Off-line electrode and temperature probe holder, with Proximity switch
2143002	ESUB 0,5 m submersible holder, PVC body, length 50 cm
2143003 / 2143004	ESUB 1 m / 1,5 m: submersible holder, PVC body, length 100 cm / 150 cm
2143001	ELINE1 (PVC) In-line holder, PVC, pg3,5 1/2”
DPS0001601	ELINE1-A (AISI) In-line holder, AISI 316L, pg3,5 1/2”
1PRS005	ELINE2 (PP) In-line holder, pg3,5 1/2”

TYPICAL INSTALLATIONS CTRL2 SERIES

TYPICAL INSTALLATIONS CTRL2 SERIES: PH or RX

- ✓ VERSION **OFF-LINE** ECELL1 ELECTRODE HOLDER
- ✓ VERSION **IN-LINE** ELECTRODE HOLDER

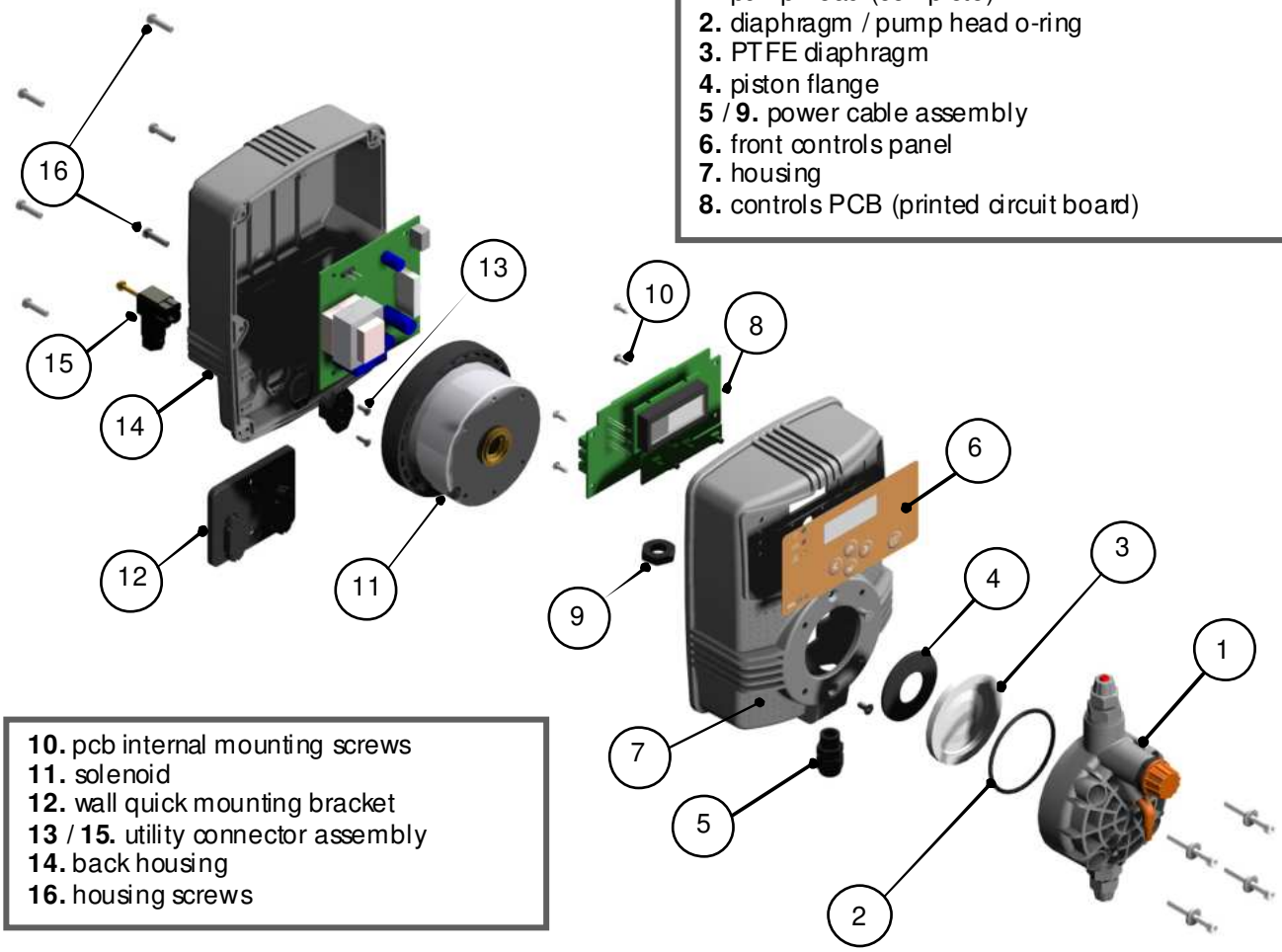
A. Dosing pump	**J.** Joint bracket floating level switch / filter
B. Power supply cable	**K.** Air bleed hose
C. Service connectors output	**L.** Discharge hose
D. BNC electrode connector+cable	**M.** Injection fitting / Injection non–return valve
E. Chemical dosing tank	**N.** Delivery line to process plant
F. Suction hose	**O.** By-pass from system line to electrode cell holder
G. Filter / Foot valve	**P.** ECELL1 off-line electrode holder (code SPS0000901)
H. Floating level switch	**Q.** PH or RX electrode
I. Level switch cable	**R.** ALTERNATIVE IN-LINE electrode installation



NOTE *The above installation drawing is an example of typical installation. However, each system to be treated differs from one to another, therefore ensure first that installation respond to application requirements following the instructions on page 8 of the present booklet.*

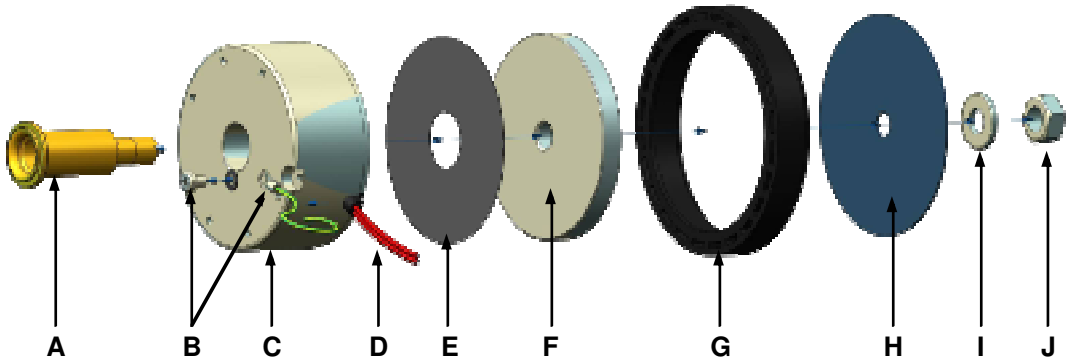
EXPLODED VIEWS

1. pump head (complete)
2. diaphragm / pump head o-ring
3. PTFE diaphragm
4. piston flange
5 / **9.** power cable assembly
6. front controls panel
7. housing
8. controls PCB (printed circuit board)



10. pcb internal mounting screws
11. solenoid
12. wall quick mounting bracket
13 / **15.** utility connector assembly
14. back housing
16. housing screws

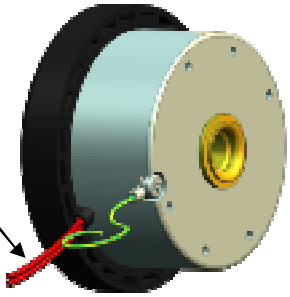
SOLENOID EXPLODED VIEW



A. PISTON
B. THERMAL SENSOR ASSEMBLY
C. SOLENOID COIL ASSEMBLY
D. WIRES TO CIRCUIT
E. NOISE REDUCTION WASHER
F. MOVING PLATE
G. PRELOADING RING
H. FLAT SPRING
I. WASHER
J. NUT

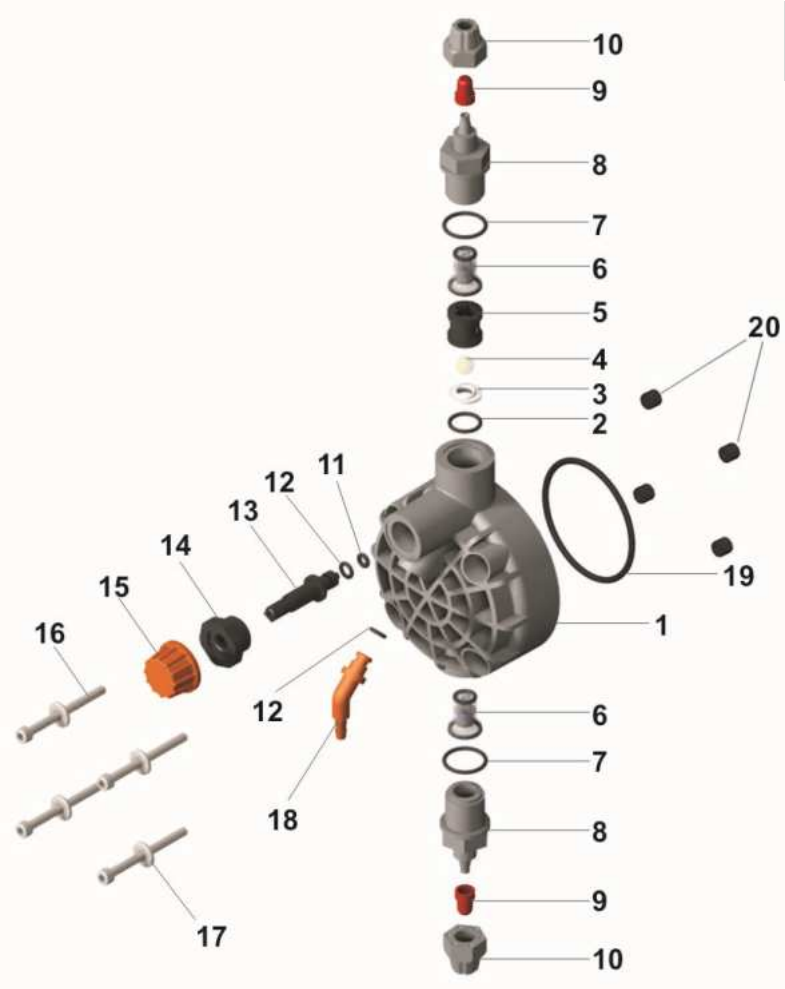
To test solenoid reliability, attach tester to the two wires and check electrical resistance from "Troubleshooting" paragraph page 20 point 4.

COMPLETE ASSEMBLED SOLENOID



NOTE *the above drawing shows the main components of a typical solenoid, however each type of performance could have extra components to keep in mind when contacting EMAUX customer service.*

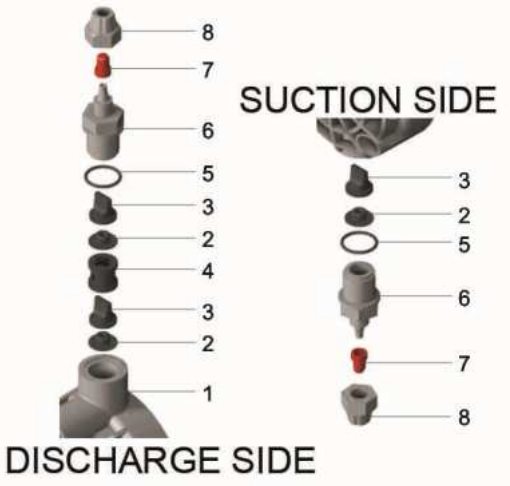
PUMP HEAD EXPLODED VIEW STANDARD PP TYPE 1÷15 l/h



STANDARD PP PUMP HEAD WITH BALL CHECKS

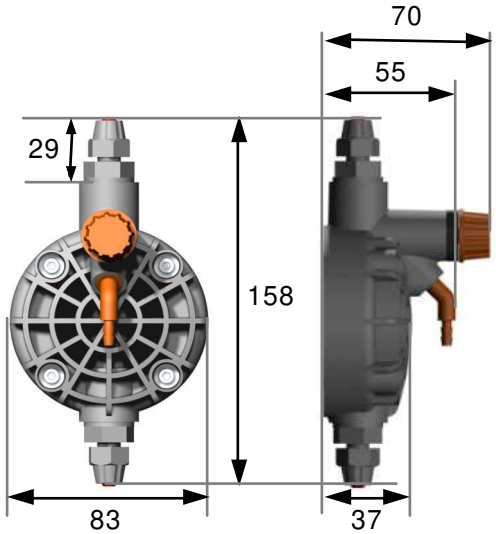
1. PUMP HEAD (PP standard 1÷15 l/h) *
2. AIR BLEED VALVE O-RING
3. BALL CHECK SEAT (air bleed)
4. BALL CHECK VALVE (air bleed)
5. VALVE SPACER (air bleed) *
6. P.HEAD BALL CHECK VALVE ASSEMBLY
7. NIPPLE O-RING
8. NIPPLE PP 3/8" *
9. PROTECTION CAP
10. HOSE NUT PP
11/12/13/14/15. AIR BLEED KNOB ASSEMBLY
16/17. PUMP HEAD SCREWS
12/18. O-RING / BLEED OUTLET
19. DIAPHRAGM / PUMP HEAD O-RING
20. PUMP HEAD SCREWS BUSH

PUMP HEAD "LIP" TYPE VALVE

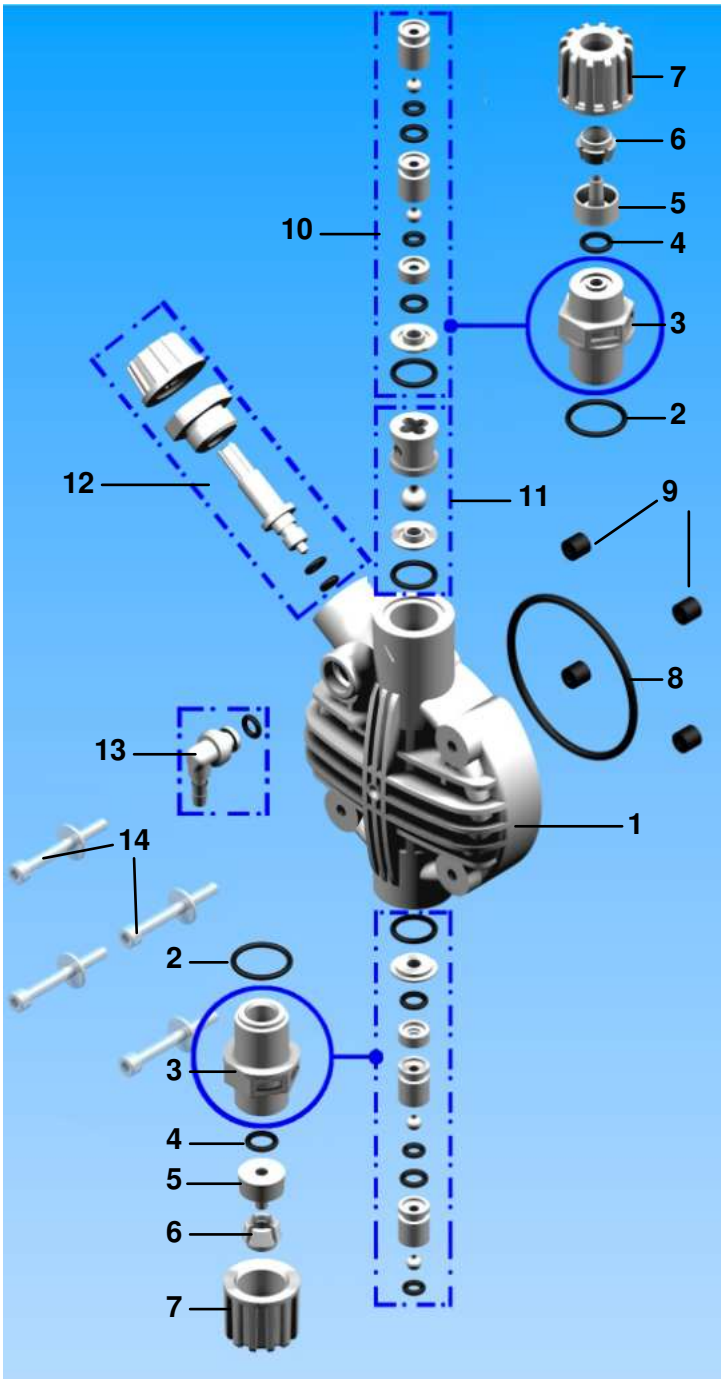


2. VALVE SEAT GUIDE (air bleed)
3. "LIP" TYPE VALVE (air bleed)

OVERALL DIMENSIONS mm



PVDF PUMP HEAD AGGRESSIVE CHEMICALS CONFIGURATION 1÷15 l/h

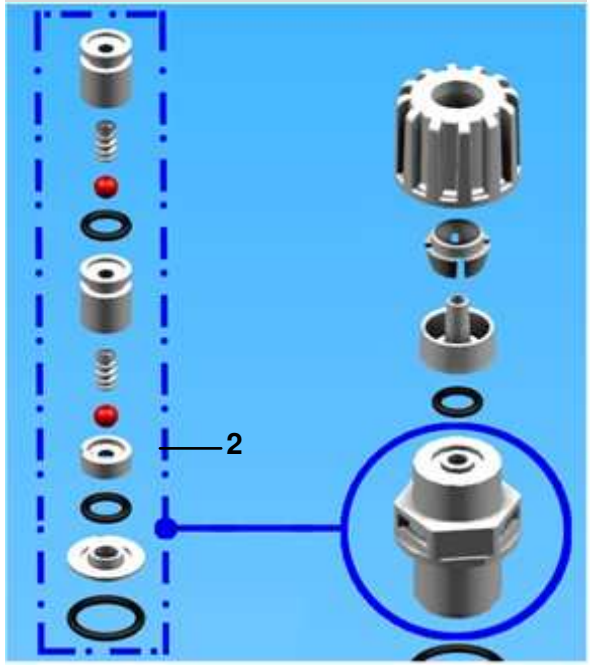


PVDF PUMP HEAD WITH DOUBLE BALL CHECKS

1. PUMP HEAD (PVDF 1÷15 l/h) *
2. NIPPLE O-RING
3. SUCTION BALL CHECK ASSEMBLY*
4. BALL CHECK O-RING
5. HOSE ADAPTER PVDF
6. HOSE STOPPER PVDF
7. HOSE NUT PVDF
8. DIAPHRAGM / PUMP HEAD O-RING
9. PUMP HEAD SCREWS BUSH
10. DISCHARGE BALL CHECK ASSEMBLY*
11. AIR BLEED BALL CHECK ASSEMBLY
12. AIR BLEED KNOB ASSEMBLY
13. O-RING / BLEED OUTLET
14. PUMP HEAD SCREWS

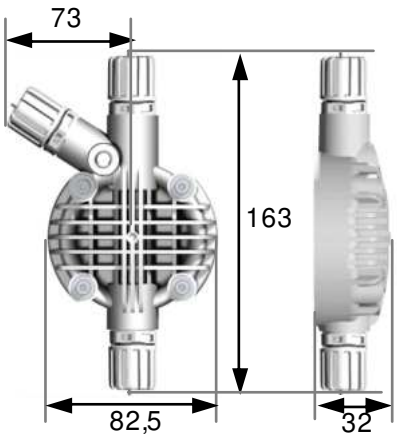
** Assembly includes Housing and Nipple 3/8" in PVDF*

PVDF PUMP HEAD SPRING BALL CHECK VALVE

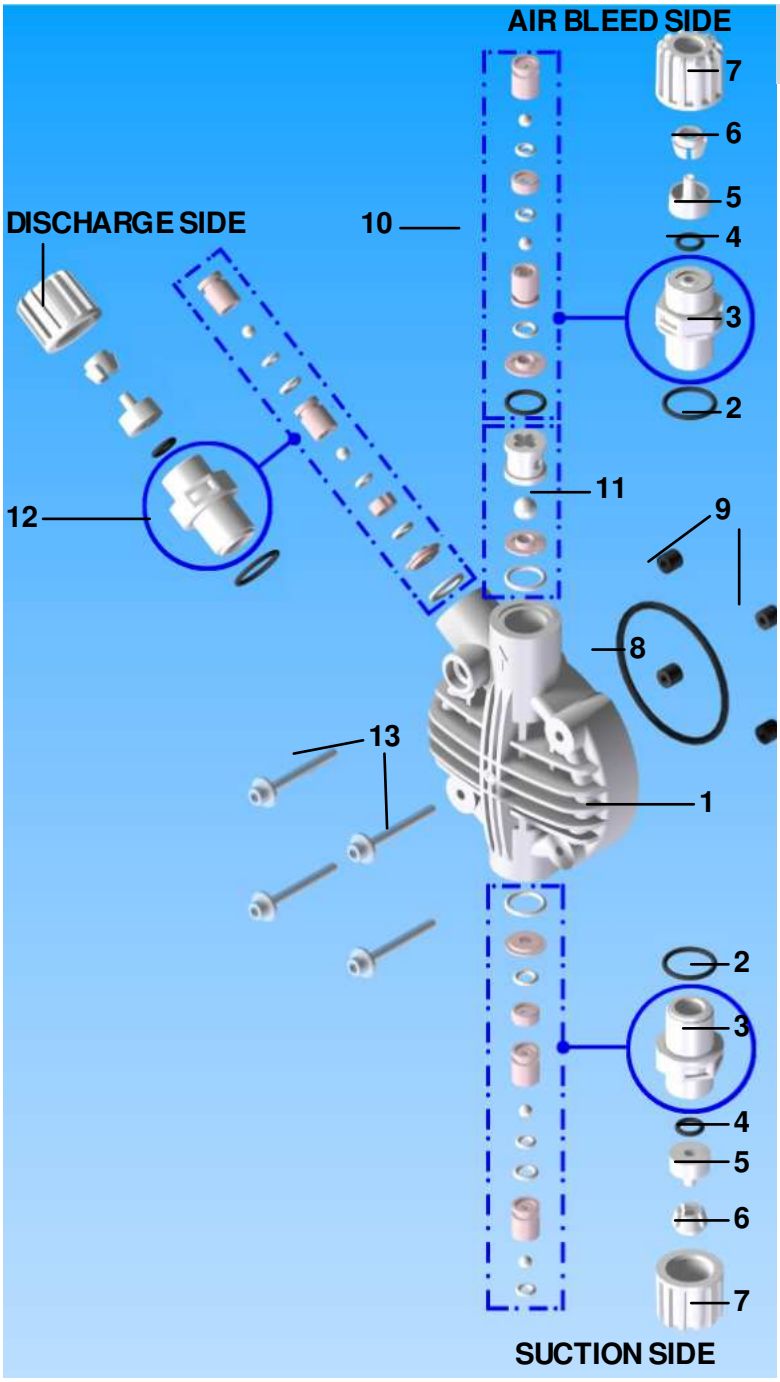


2. BALL CHECK ASSEMBLY PVDF WITH SPRING RETURN+NIPPLE 3/8"

OVERALL DIMENSIONS mm



PVDF AUTO BLEED PUMP HEAD 1÷15 l/h

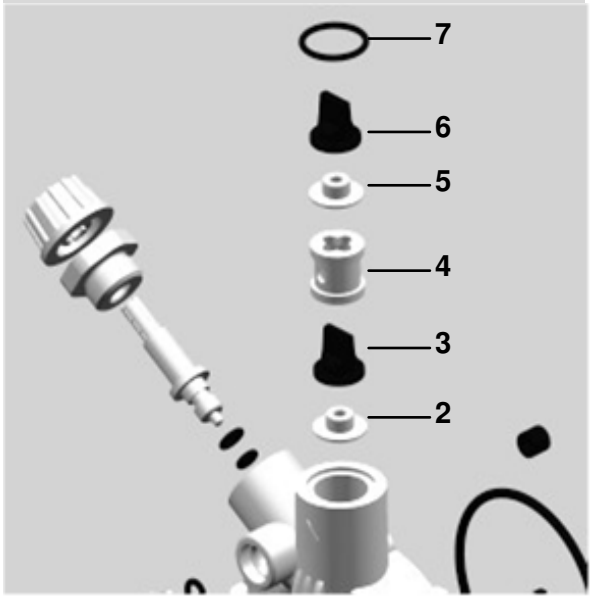


PVDF AUTO BLEED PUMP HEAD WITH DOUBLE BALL CHECKS

1. PUMP HEAD (PVDF 1÷15 l/h)
2. NIPPLE O-RING
3. SUCTION BALL CHECK ASSEMBLY*
4. BALL CHECK O-RING
5. HOSE ADAPTER PVDF
6. HOSE STOPPER PVDF
7. HOSE NUT PVDF
8. DIAPHRAGM / PUMP HEAD O-RING
9. PUMP HEAD SCREWS BUSH
10/11. AIR BLEED BALL CHECK ASSEMBLY
12. DISCHARGE BALL CHECK ASSEMBLY*
13. PUMP HEAD SCREWS

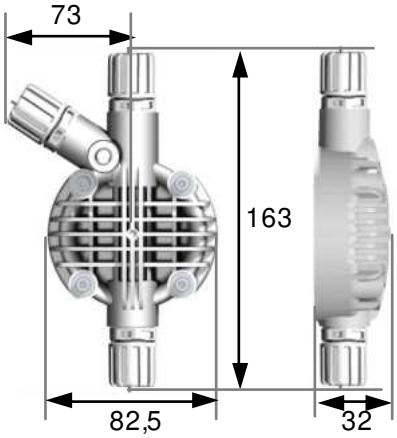
** Assembly includes Housing and Nipple 3/8" in PVDF*

PVDF PUMP HEAD "LIP" VALVE

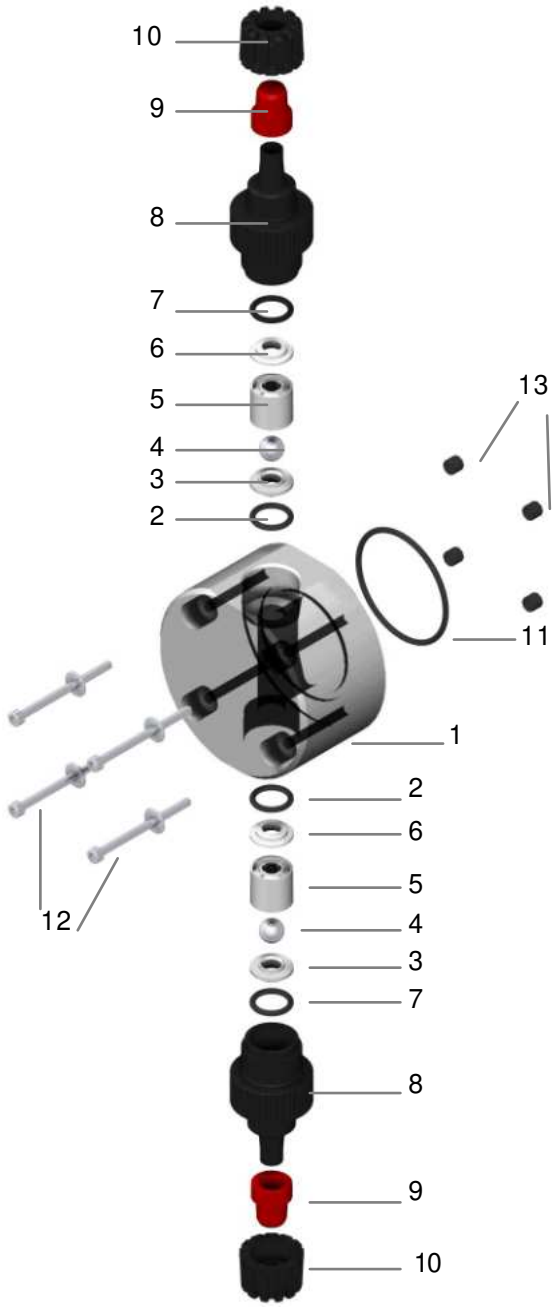


2. VALVE SEAT GUIDE (air bleed)
3. "LIP" TYPE VALVE (air bleed)
4. VALVE SPACER (air bleed)
5. VALVE SEAT GUIDE
6. "LIP" TYPE VALVE
7. NIPPLE O-RING

OVERALL DIMENSIONS mm



PUMP HEAD EXPLODED VIEW PMMA FOR VISCOUS LIQUIDS 1÷20 l/h

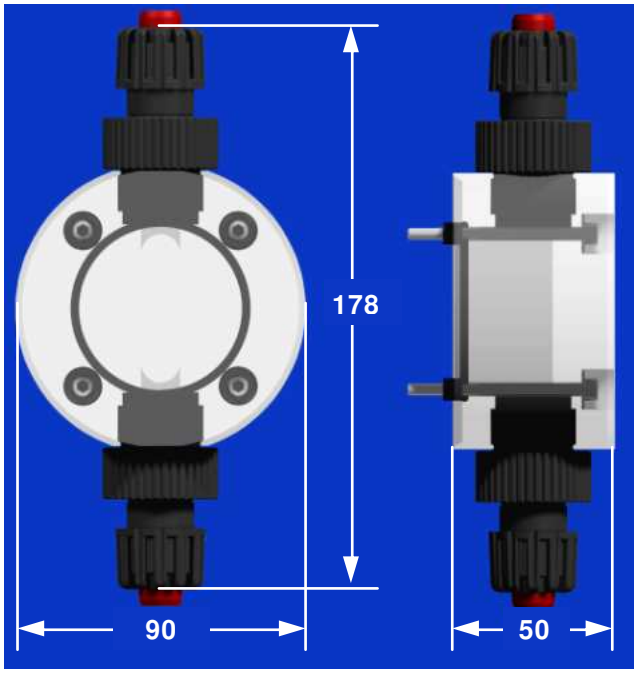


PMMA PUMP HEAD FOR VISCOUS LIQUIDS

1. PUMP HEAD
2. VALVE O-RING
3. BALL CHECK SEAT
4. BALL CHECK
5. VALVE ENCLOSER
6. BALL CHECK LIMITER
7. NIPPLE O-RING
8. NIPPLE 1/2" PP
9. PROTECTION CAP
10. HOSE NUT
11. DIAPHRAGM / PUMP HEAD O-RING
12. PUMP HEAD SCREWS
13. PUMP HEAD SCREWS BUSH

ONLY CTRL2-7L SERIES

OVERALL DIMENSIONS mm



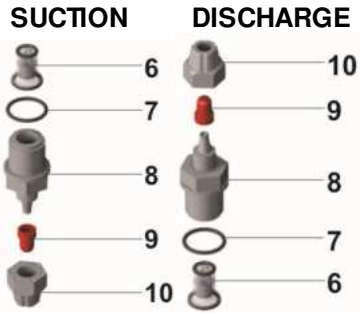
PMMA pump head polymer viscous liquid configuration includes:

- ✔ Ceramic ball checks (Ø11), O-rings FPM (or EPDM
- ✔ Fittings PP1/2",
- ✔ Injection lance PP and Strainer PP 1/2" (without no-return valve),
- ✔ Suction hose PVC flexible 10x14,
- ✔ Discharge hose PE 10x14.

EXPLODED VIEWS

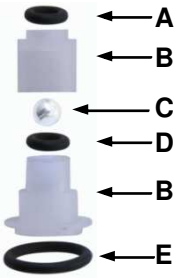
VALVES AND NIPPLES EXPLODED VIEWS

STANDARD BALL CHECK ASSEMBLY



6. BALL CHECK VALVE
7. NIPPLE O-RING 2062
8. NIPPLE
9. PROTECTION CAP
10.HOSE NUT

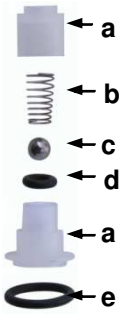
STANDARD VALVE EQUIPPED WITH **CERAMIC** BALL CHECK



A. O-RING 106
B. VALVE HOUSING
C. BALL CHECK
D. O-RING 2015
E. O-RING 114

Valid for CERAMIC and AISI 316 ball checks

SPRING RETURN BALL VALVE



a. BALL VALVE HOUSING
b. SPRING
c. BALL CHECK
d. O-RING 2015
e. O-RING 114

Valid for CERAMIC,AISI316 ball checks, Spring are AISI or Hastelloy

DOUBLE BALL CHECK VALVE

1.NIPPLE PVDF
2.HOSE ADAPTOR
3.O-RING
4.VALVE HOUSING
5. O-RING 2062

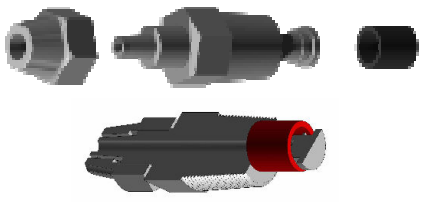
Featured with aggressive chemical liquid ends PVDF configuration

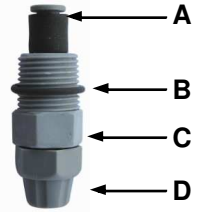
"LIP" TYPE VALVE

2. VALVE SEAT
3. LIP VALVE
5. O-RING 2062
6. NIPPLE
7. PROTECTION CAP
8. HOSE NUT

Valid for LIP type valves in FPM (standard), EPDM, SILICON, NBR

INJECTION VALVE, FITTING, NO-RETURN VALVE



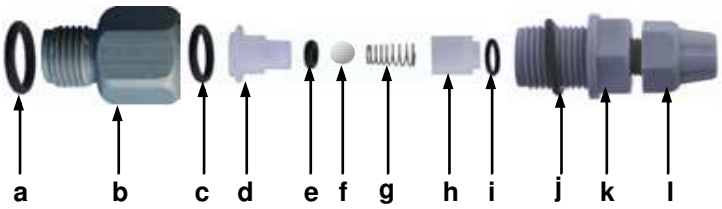


STANDARD INJECTION VALVE

A. CYLINDER SLEEVE NO-RETURN VALVE
B. NIPPLE O-RING 2062
C. INJECTION FITING PP
D. HOSE NUT PP

Valid for SLEEVE type valves in FPM (standard), EPDM, SILICON, NBR

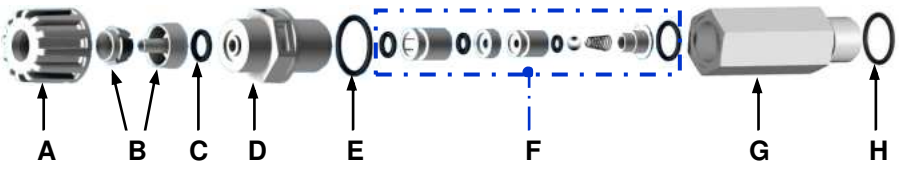
HASTELLOY SPRING INJECTION BALL VALVE PP/PVC



Valid for CERAMIC and AISI316 ball checks

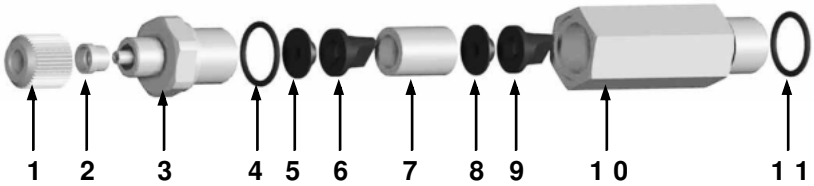
a/i. O-RING 2062
b. PVC DOUBLE FITTING 3/8"
c. O-RING 114
d/h. BALL VALVE HOUSING
e. O-RING 2015
f. BALL CHECK
g. HASTELLOY SPRING
i. O-RING 106
k. NIPPLE PP
l. HOSE NUT PP

SPRING RETURN INJECTION VALVE PVDF CONFIGURATION



A. HOSE NUT PVDF
B. HOSE ADAPTER PVDF
C. O-RING 2075
D. VALVE HOUSING *VDF
E/H. O-RING 2062
F. SPRING VALVE ASSEMBLY
G. PVDF 2XTHREAD FITTING

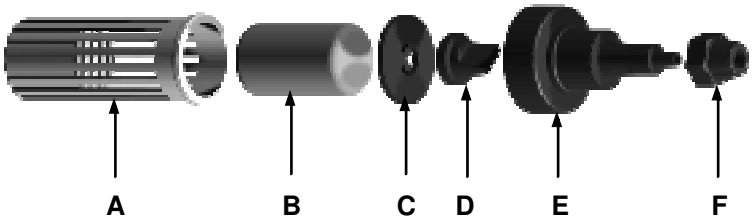
DOUBLE LIP INJECTION VALVE PVDF CONFIGURATION



1. HOSE NUT PVDF
2. HOSE ADAPTER PVDF
3. NIPPLE PVDF
4/11. O-RING 2075
5/8. VALVE SEAT
6/9. LIP VALVE
7. VALVE BUSH
10. PVDF 2XTHREAD FITTING

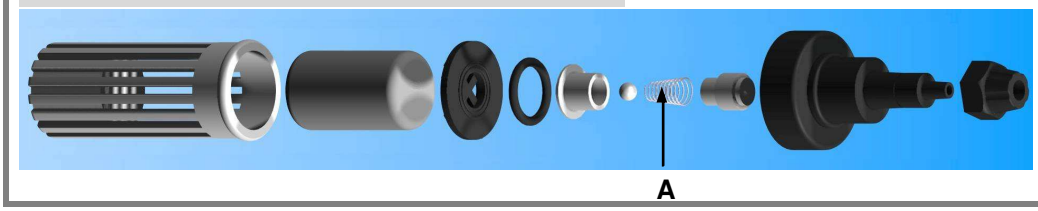
FOOT VALVE - FILTER

STANDARD FOOT VALVE / FILTER



A. STRAINER
B. FILTERING MEDIA
C. STRAINER COVER
D. FOOT VALVE*
E. NIPPLE
F. HOSE NUT
*Valid for LIP type valves in FPM (standard), EPDM, SILICON

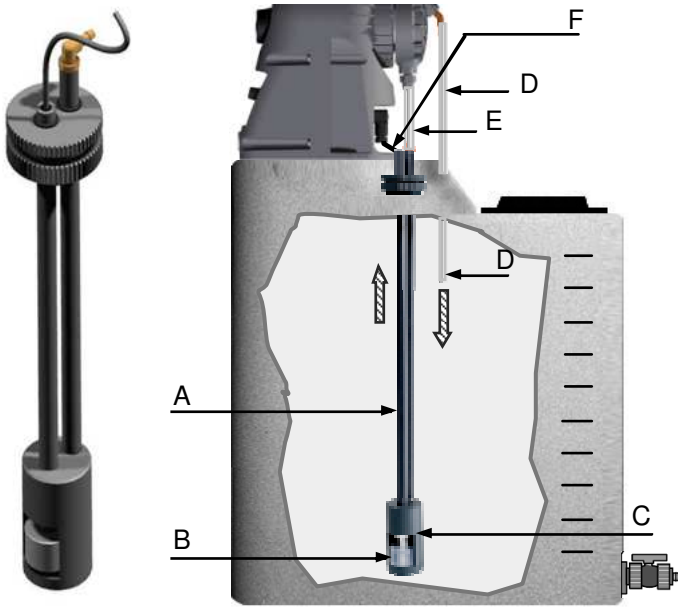
FOOT VALVE WITH HASTELLOY SPRING LOADED BALL CHECK VALVE / FILTER



A. SPRING LOADED BALL CHECK VALVE

DOSING PUMP ACCESSORIES

SUCTION LANCE



Suction lance is useful when using mixers which operation create turbulence in the tank thus unwanted moving the floating level switch and/or the foot valve/ filter. It also reduces the tangling of the hoses and cables of the previous mentioned components.

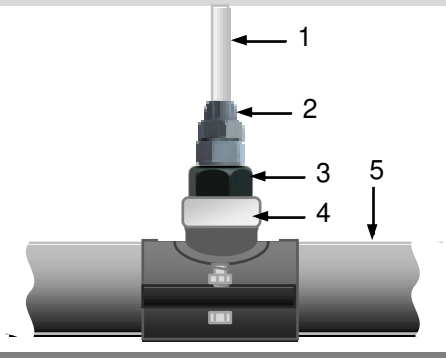
A. SUCTION LANCE
B. LEVEL SWITCH
C. FOOT VALVE/FILTER
D. AIR BLEED HOSE
E. PUMP SUCTION HOSE
F. LEVEL SWITCH CABLE

Suction lance is made in PVC and are available with the following length:

- ✓ **60 cm**
- ✓ **80 cm**
- ✓ **100 cm**
- ✓ **130 cm**

Also available upon request other lengths

CLAMP SADDLE FOR INJECTION VALVE FITTING



CLAMP SADDLE guarantees a proper injection valve fitting mounting, ensuring also a clean and fast maintenance operations

1 - Polyethylene discharge hose
2 - Injection fitting with no-return valve
3 - Clamp saddle
4 - PVC reduction fitting
5 - Process plant pipe

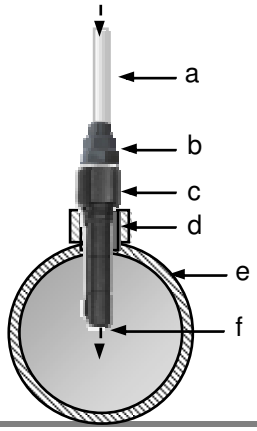
Clamp saddles are in **PP** DN50 or DN63 1/2" and a reduction fitting is needed to fit injection valve 3/8".

DOSING PUMP ACCESSORIES

QUICK REMOVABLE INJECTION LANCE

QUICK REMOVABLE INJECTION LANCE guarantees clean and fast maintenance operations of the injection no-return valve. Furthermore allows the operator to adjust the length of the injection point inside the pipe of the system to treat thus set the injection point at the center of the pipe where the internal flow will guarantee better mixing. Removable injection lances are in **PVC** or **PVDF**

INJECTION LANCES



INJECTION LANCE allows the operator to adjust set the injection point at the center of the pipe where the internal flow will guarantee better mixing and homogeneous dosing.

a - Polyethylene discharge hose
b - Injection fitting with no-return valve
c - Injection lance
d - 3/8" female steel gas thread connector
e - Process plant pipe
f - Injection point

Injection lances are in **PP**, **PVC** or **PVDF**

RELIEF VALVE or BACK-PRESSURE VALVE

This valve can be utilized either as:
RELIEF VALVE: opens an overflow line if the preset pressure limit is exceeded. This application also is a safety device to protect pump diaphragm.
BACK-PRESSURE VALVE: useful when injection point is below dosing tank to prevent siphoning effect.
Configurations PVC-FPM / *PVC EPDM* / *PVDF*

PULSATION DAMPNER

Pulsation dampeners are used to smooth pulsations injections in the process plant pipe generating a continuous small flow
This application allows limits pressure loss along the pipelines and prevents interfering vibrations.

Configurations 3/8" PVC-FPM / *PVC EPDM*

ANTI-SYPHON VALVE

Useful when injection point is below dosing tank to prevent siphoning effect.
Max back pressure 2 bar.
Available with EPDM valve upon request

THREE FUNCTIONS VALVE

Useful for 20 l/h pump head type with no build-in air bleed PP material, 3 functions are:
- air bleed
- back pressure (1bar)
- antisyphon

AVAILABLE DOUBLE THREAD NIPPLES AND REDUCTION FITTINGS

MEASUREMENTS AND PROGRAMMING NOTES

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