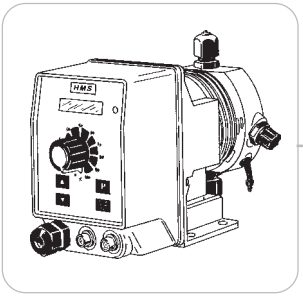
This operating instructions contains safety information that if ignored can endanger life or result in serious injury. They are indicated by this icon.

Use of this pump with radioactive chemicals is forbidden!

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



OPERATING INSTRUCTIONS MANUAL FOR "HMS MF" DOSING PUMP

Read Carefully !

ENGLISH Version

R1-05-04

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

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

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

GENERAL SAFETY GUIDELINES

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

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

When installing always observe national regulations!

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

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

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

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

Always discharge the liquid end before servicing the pump!

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

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

Introduction:

Metering Pumps “HMS MF” Series are the ideal solution for low / middle dosing of chemicals. All control and setup parameters are available through a digital keyboard and they are displayed on a LCD backlit display. Pump has: “Standby” input, “SEFL” input and “Alarm” (N.O. contact) output. *Note: “SEFL” not included.*

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%.

Working modes:

Pump can work in 7 differents ways.
See related chapters for extended description of each single mode.

STROKE mode.
Pump doses at a constant rate set in “SPH” (strokes for hour) or “SPM” (strokes for minute) parameters set during program session.

DIVIDE mode.
External pulses from a water meter are divided by a value set during program session. The pump doses with a rate determined by this parameter.

MULTIPLY mode.
External pulses from a water meter are multiplied by a value set during program session. The pump doses with a rate determined by this parameter.

PPM mode.
Dosing rate is determined by pulses from a water meter on the base of set PPM, chemical product concentration (%) and quantity for each single stroke set during program session.

BATCH mode.
Signal from an external contact starts the pump to dose the set quantity.

VOLT mode.
Voltage from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

mA mode.
Current from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

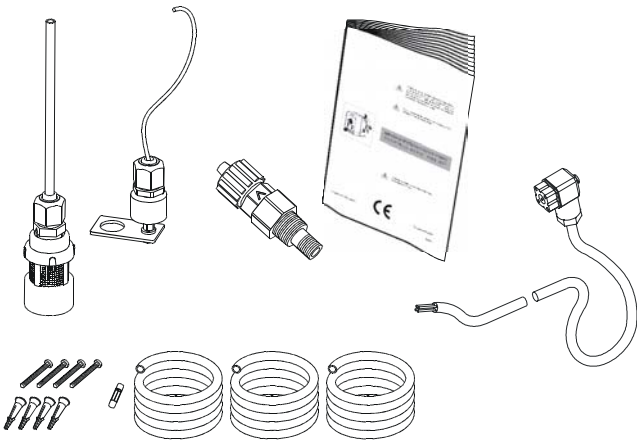
2. Unpacking

Included into package:

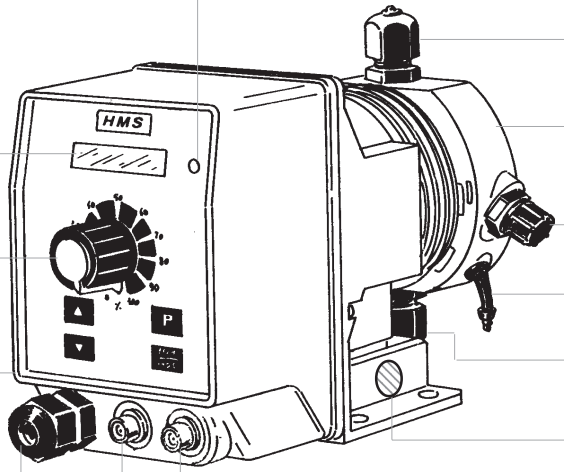
n.4	Dibbles ø6
n.4	Self tapping screws 4,5 x 40
n.1	Delayed fuse 5 X 20
n.1	Foot filter with valve
n.1	Injection valve
n.1	Level probe
m 2	Delivery pipe* (opaque PE)
m 2	Suction pipe * (transparent PVC)
m 2	Discharge pipe (transparent PVC)
m 2,5	Signal cable for “Stand-by” and “Alarm”
n.1	This installation manual

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

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.*

***See page 13 for "Stand-by" and "Alarm" connections.*

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, SEFL installation, 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

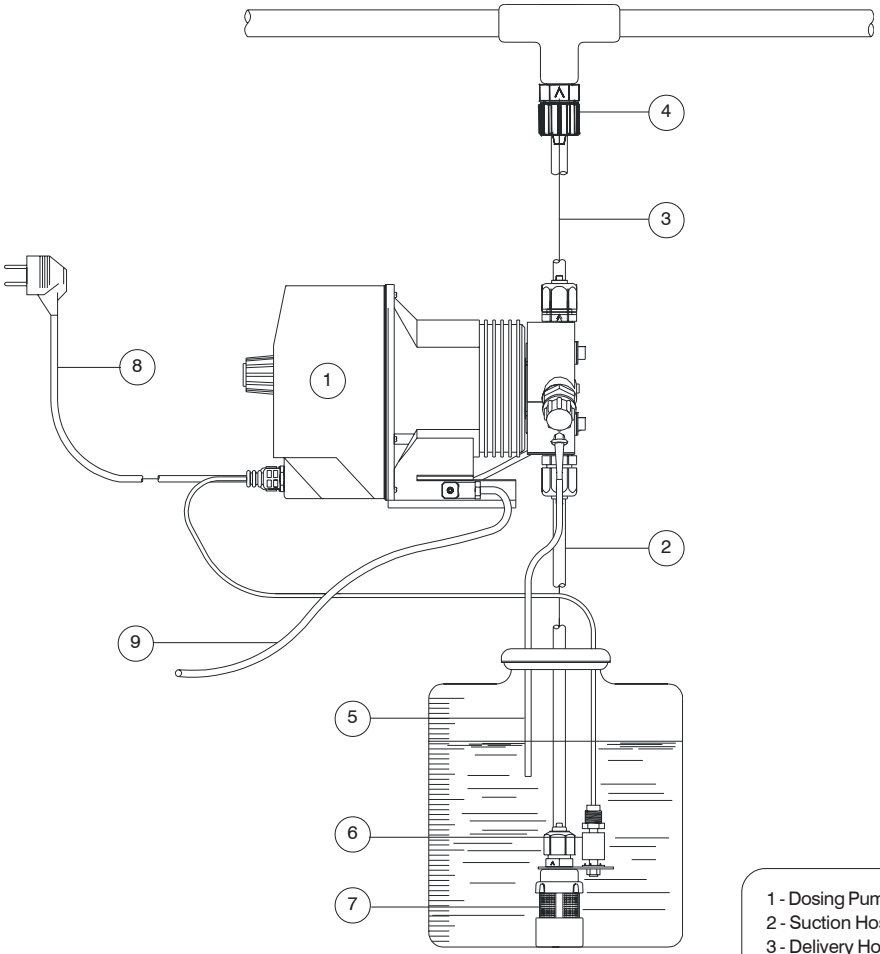
Suction and delivery hoses must be installed in horizontal position! All hoses connections must be performed using only hands' force! No tongs required!

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 at page 49. If dosing product is not listed please consult full compatibility table or contact chemical's manufacturer!

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



1 - Dosing Pump
2 - Suction Hose
3 - Delivery Hose
4 - Injection Valve
5 - Air discharge
6 - Level Probe
7 - Foot Filter
8 - Power Cable
9 - Standby / Alarm

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.

Completely unscrew level probe's nut and assembly as described in fig. (B) **paying attention to the black ring: it must be inserted from floater side.** Lock nut on the opposite side of the floater using hands only.

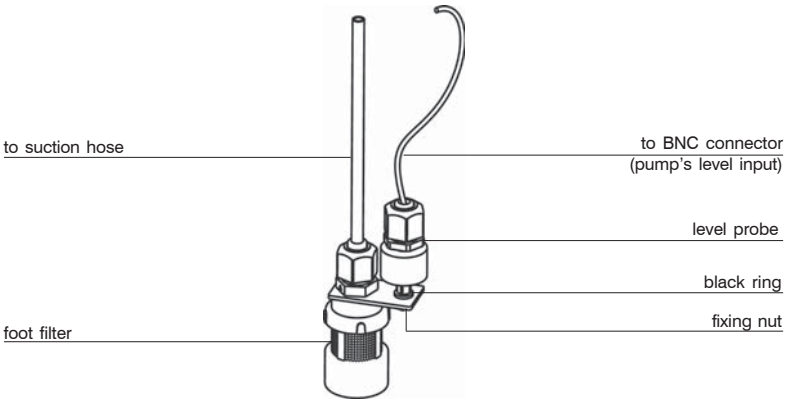


fig. (B)

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.

Tubo di spurgo.

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.

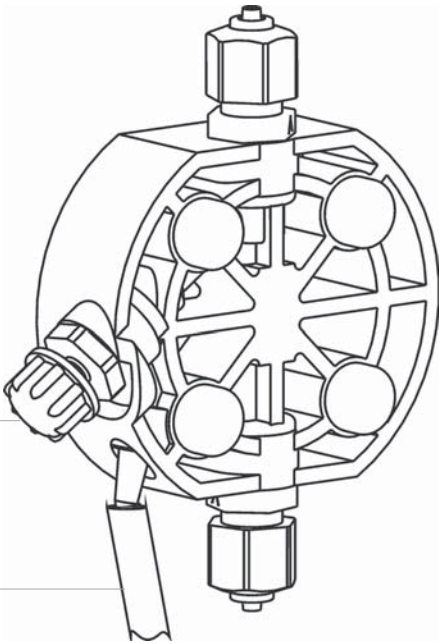
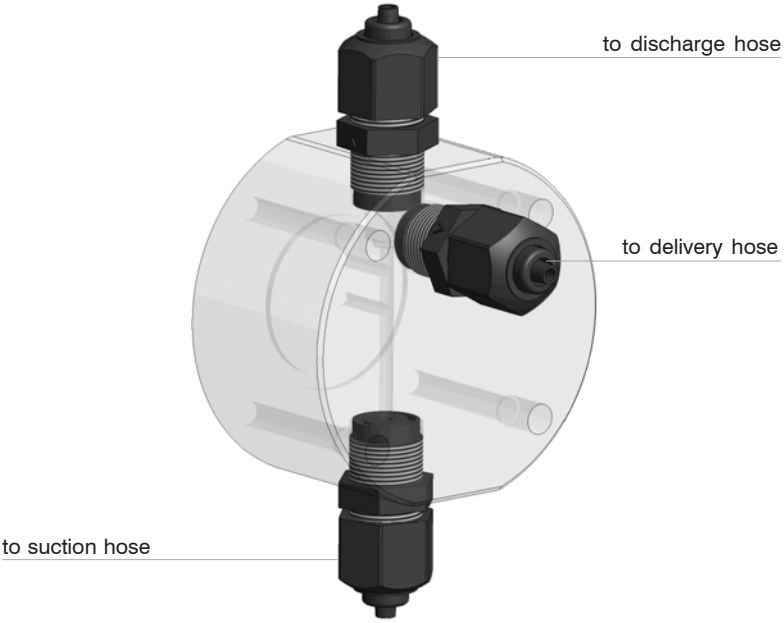


fig (C)

For priming procedure see page 16.

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!

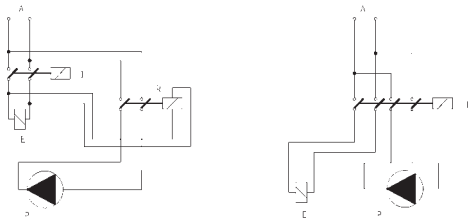
7. Electrical Installation

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

- verify that pump's label values are compatible with main power supply.

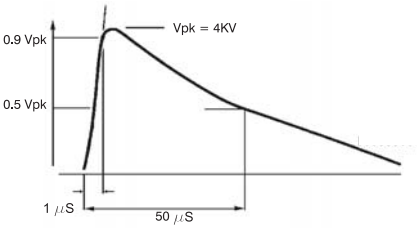
- pump must be connected to a plant with a differential switch (0,03A sensitivity) if there isn't a good ground.

- to avoid damages to the pump do not install it in parallel with heavy inductance load (for example: engines). A relay switch must be used. See below picture.



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

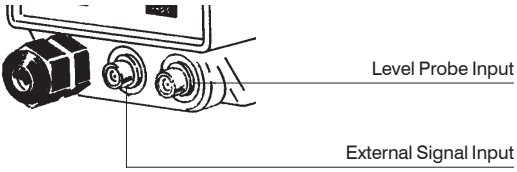
- On pump's mother board there is a further protection against over voltages (275V - 150V) and distribution line noises (4KV for max 50μsec) as shown:



Once verified previous steps proceed as follows:

- check that “BNC” of level probe has been connected as described in “Hydraulic Installation” chapter.

- connect “BNC” and external signal to pump’s “INPUT” connectors.



- connect alarm and/or stand-by signal as described below fig (D):

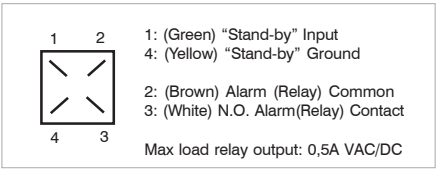


fig (D)

Notes: - *“Alarm” signal isn’t fuse protected*
- *“Standby” signal has main priority on pump’s enabling / disabling.*

- proceed to “SEFL” connection (Flow sensor is optional) as described in page 50.

8. Basic Settings

LCD backlit display

Storke Lenght Knob

Scroll and increase digit

Turn the pump on or off and exit from setup menu (without saving parameters)

Enter / exit from setup menu (saving parameters)

The “HMS MF” pump is equipped with a keyboard.To avoid any misunderstanding during next chapters all keys will be described as shown on this legend:

▲ **“UP” key**

ON/OFF ESC **“ESC” key**

▶ **“RIGHT” key**

E **“E” key**

Menu navigation:

To enter into programming mode press and keep pressed **“E” key** from main screen (fig.3):

fig.3

After about 4 seconds the pump will show the password screen (fig.5):

fig.5

Default password is “0000”. Just press **“E”** key. Otherwise insert password using **“UP”** and **“RIGHT”** keys.

Saving / Discarding changes / Activating working mode

Once edited data into setup menu it's possible to save them by pressing **"E"** key or to discard them by pressing **"ESC"** key.

To activate a workgin mode (*Stroke, Divide, Multiply, PPM, Batch, Volt, mA*) select the required mode and confirm it using **"E"** key.

Turning on and off the pump

"ESC" key has a double function. It can be used to discard all changes made into setup mode or to turn on/off the pump. To turn on/off the pump press and keep pressed this key while in main screen (fig.3). The pumps will show:

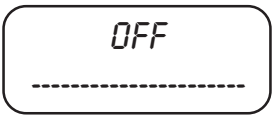


fig.6

To return into operating mode press **"ESC"** key.

Alarm output logical working.

The pump has an "Alarm" output that uses a N.O. contact that changes its status (from N.O. to N.C.) when a signal is received from "LEVEL" and/or "SEFL". To set this alarm refer to related chapter.

9. Priming

PRIMING

To proceed follow these steps: connect all hoses to the pump; open dischage valve by completely turning the discharging knob (counter clock-wise). Power up the pump and turn stroke lenght knob to 100%. After pump's intro (fig.1):

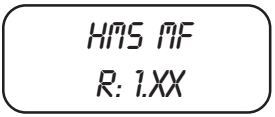


fig.1

the pump will show the "Delay" (pump's activation delay) as shown fig.2:

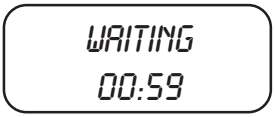


fig.2

Press **"ESC"** key to skip the "Delay". Pump will show "Srokes" (actual strokes) as shown in fig.3:

fig.3

Press and keep pressed the "RIGHT" key to enter into priming mode. Pump will go for 30 seconds into priming mode as shown in fig.4.

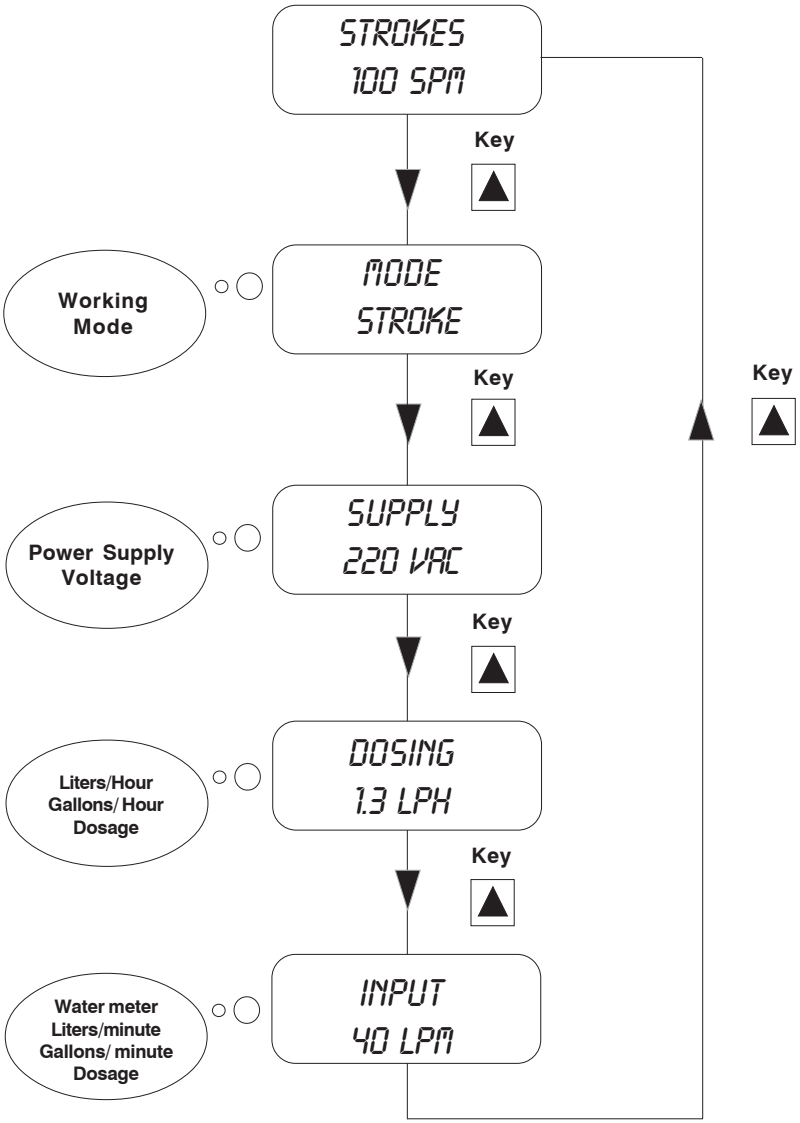
fig.4

When the chemical begins to flow out from the outgassing hose then completely close the outgassing knob. This ends the priming procedure. If countdown for priming is not yet ended press **"ESC"** key.

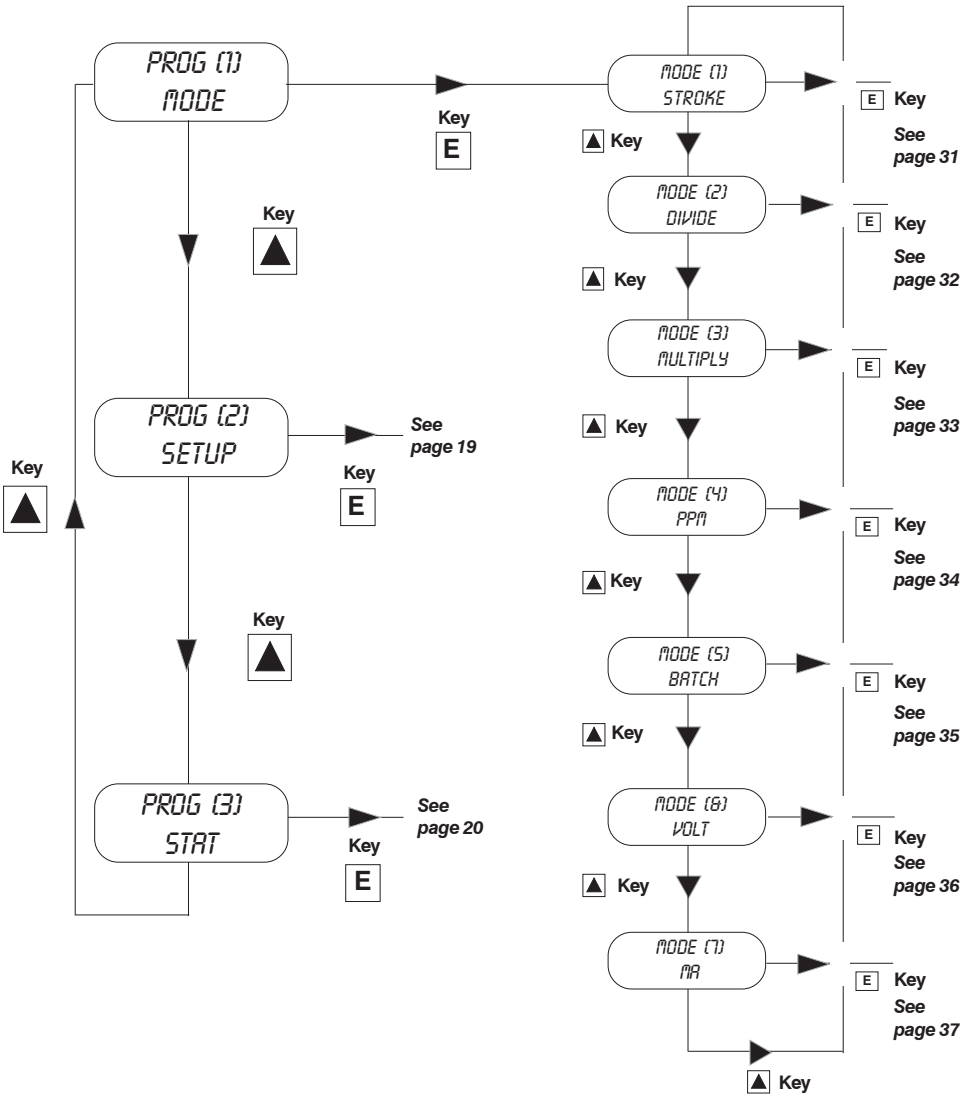
Now the pump is operative. Proceed to setup and programming.

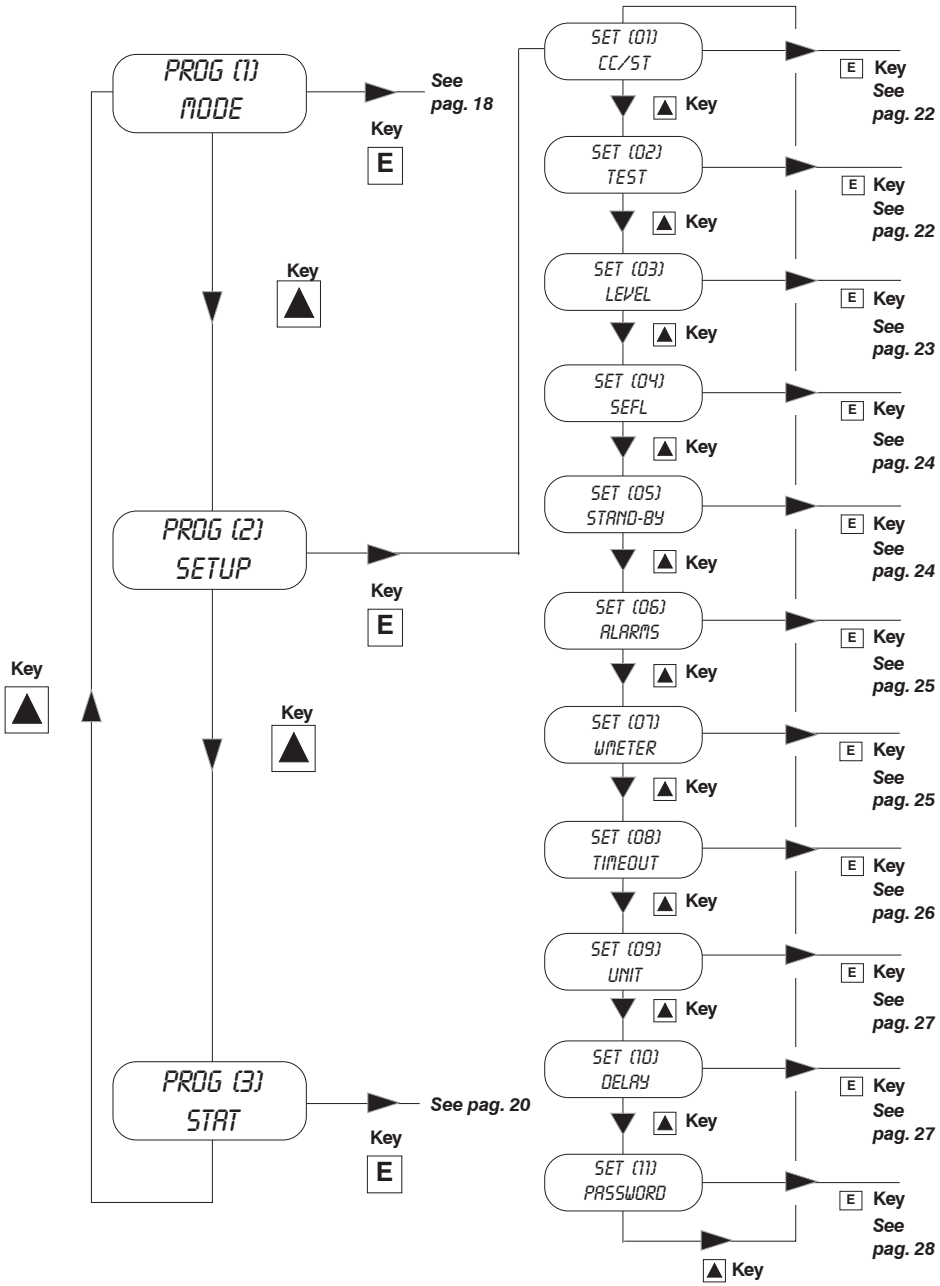
Pump's functions summary

During pump's working mode is it possible to see furthers working information.
Press more times the **"UP"** key to cycle through following information:



11. Quick Guide - Main Menu (Prog [1] Mode)




PROG (1)
MODE
See pag. 18
Key
E
Key
PROG (2)
SETUP
Key
E
Key
Key
PROG (3)
STAT
See pag. 20
Key
E
SET (01)
CC/ST
SET (02)
TEST
SET (03)
LEVEL
SET (04)
SEFL
SET (05)
STAND-BY
SET (06)
ALARMS
SET (07)
UMETER
SET (08)
TIMEOUT
SET (09)
UNIT
SET (10)
DELAY
SET (11)
PASSWORD
Key
E Key See pag. 22
E Key See pag. 22
E Key See pag. 23
E Key See pag. 24
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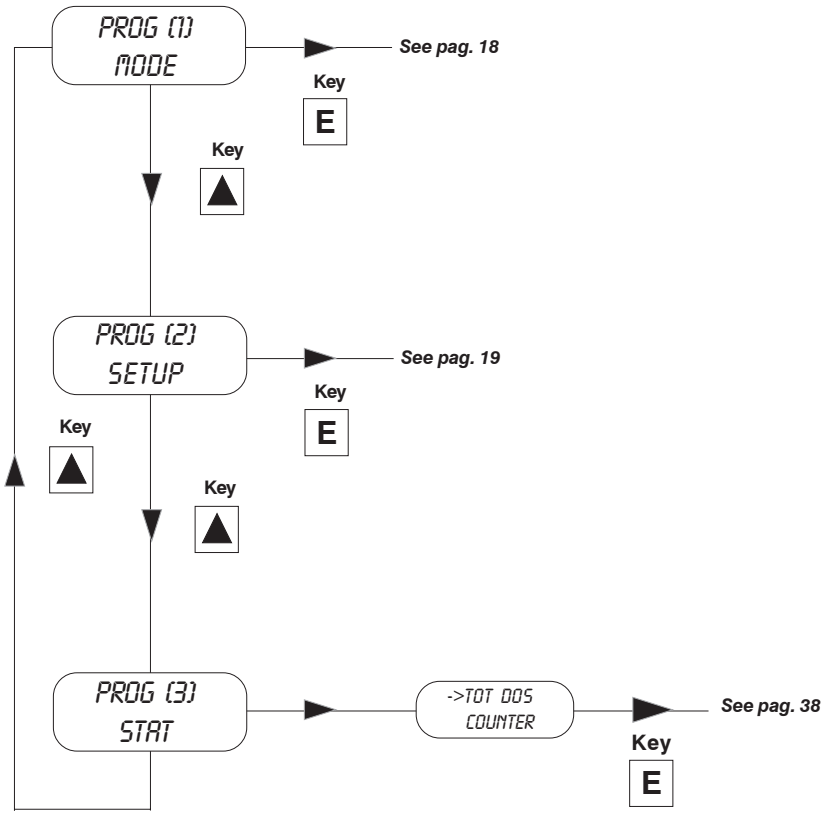
E Key See pag. 27
E Key See pag. 28
Key

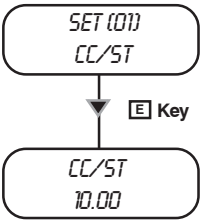

PROG (1)
MODE
See pag. 18
Key
E
Key
PROG (2)
SETUP
See pag. 19
Key
E
Key
Key
PROG (3)
STAT
->TOT DOS
COUNTER
See pag. 38
Key
E

Use this page to record pump programming

15. Setup

Pump's initial setup

Apart of choosen working mode, the pump must be prepared to operate by setting the main parameters into "SETUP" menu. To enter into this menu please follow the "Quick Guide through menu" at page 31.



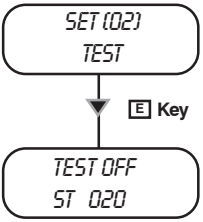
CC per Stroke.

Enter here the cc/stroke value obtained during "Test" mode (calibration).

Use **"UP"** key to increase of one unit the blinking digit "_".

Press **"RIGHT"** key to skip on next digit.

Press **"E"** key to save typed datas or press **"ESC"** key to exit without saving (discarding changes).



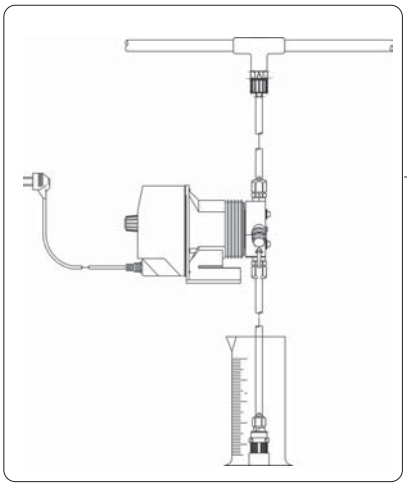
Calibration.

This procedure defines the cc quantity (cubical centimeters) that the pump feed every single injection. To determine this value the pump must be calibrated.

1) Install the pump on plant and insert the suction hose (with its level probe / foot filter) into a BEKER "test-tube".
If pump's model is self-priming put the discharge hose into the "test-tube" too.

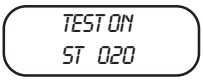
2) Power up the pump and turn the flow's knob to required position.

3) Fill up the "test-tube" with the chemical until to reach a known value.



4) From setup menu choose "TEST", and insert 20". This value is the strokes that the pump will produce during the procedure.

6) Press **"E"**. The pump will begin to produce the 20 strokes and to suck the chemical from the "test-tube".



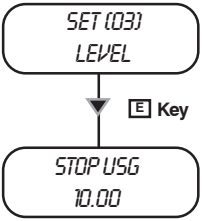
7) At the end of 20 strokes the pump will stop. Read the value of chemical left into "test-tube".

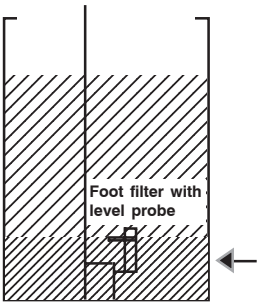
8) Substract the initial value to the left value.

9) Divide the result with the ST value (20).

10) Type this value into "CC/ST" (Set [01]) as previously described.

11) If obtained result is too small or too big, please, try to change strokes value (20).





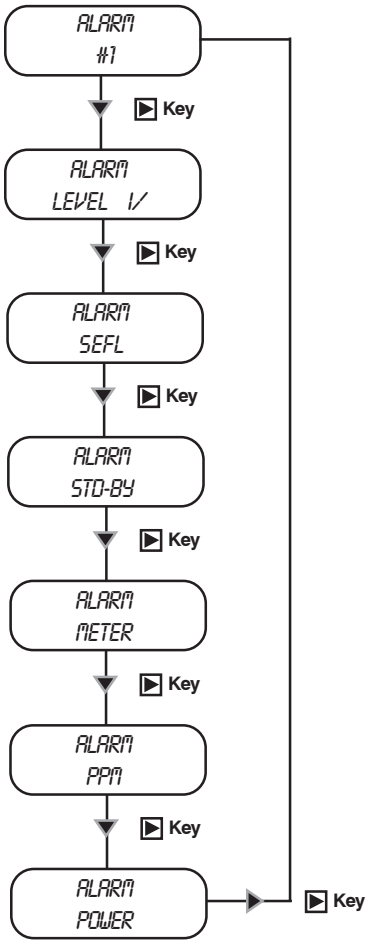
Customizable Reserver (liters / gallons)

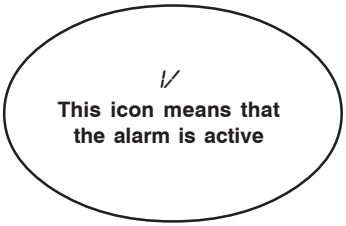
Pre Level Alarm (Reserve).

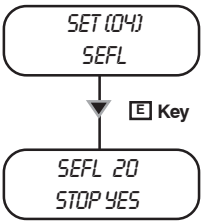
This function defines a pre-alarm status to inform user that the dosing product is near to end. Reserve value to be set, must be calculated on product quantity left between foot filter and pump's suction level.

- Use **"UP"** key to increase the blinking "_" digit.
- Press **"RIGHT"** key to skip on next digit.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

During the alarm the pump continues to dose but it'll show the following picture:



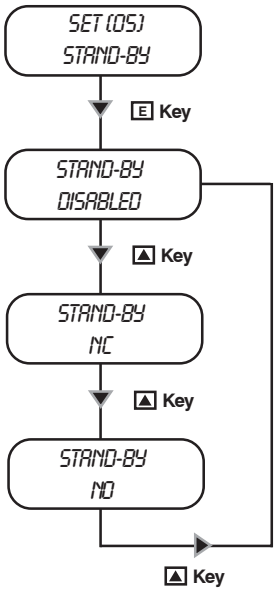




Flow Sensor (SEFL).

This function enables an external alarm and ,eventually, stops the dosage if the pump doesn't receive a "confirmation signal" from the "SEFL". ("SEFL" is optional).

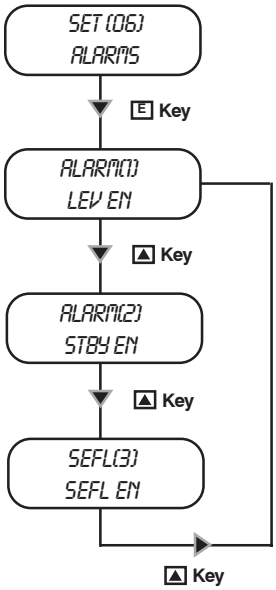
- Use **"UP"** key to increase the blinking "_" digit and set the number of failing strokes before to stop or not the pump.
- Press **"RIGHT"** key to skip on next digit.
- Press again **"RIGHT"** key to choose the working procedure.
- Press **"UP"** key to choose if pump must be stopped after a numbers of pulses (YES) or continue to dose (NO).
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.



"Stand-By" signal.

This function allows the pump to dose only when an external signal is received from "Stand-by" input. This signal can be enabled as a N.O. contact (Normally Opened) , N.C. contact (Normally Closed) or disabled.

- Use "UP" key to change working mode for "Stand-by" signal.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.



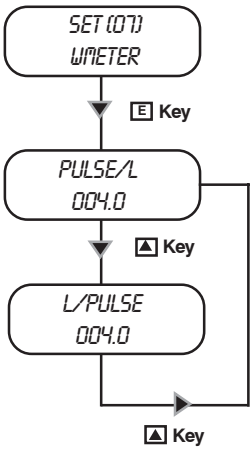
Alarms Management.

Use this function to enable/disable the relay output for level alarm (lev) and / or standby (stby) and / or flow sensor (sefl).

If alarm is activated for one or more events then the output relay will be enabled, the pump will show the alarm status and it'll stop or not the dosing activity.

If alarm is not activated for one or more events then the output relay will be disabled, the pump will show the alarm status and it'll stop or not the dosing activity.

- Use **"UP"** key to choose the alarm to set.
- Use **"RIGHT"** key to enable (EN) or disable (DI) the alarm.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.



Water Meter Setup.

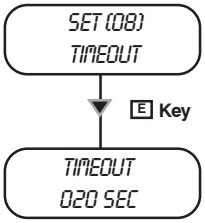
Use this function to setup the water meter information.

By entering the amount of pulses produced by the water meter the pump will optimize the working mode when programmed to work in ppm and update the stats menu.

- Use "UP" key to choose from "Pulse/L" (pulse/liter) or "L/Pulse" (liter/pulse).

  Choose "Pulse/L" for a water meter that produces many pulses.

  Choose "L/Pulse" for a water meter that produces few pulses.
- Use **"UP"** key to increase the blinking "_" digit. Enter number of pulses that pump must receive to stop or not the pump.
- Press **"RIGHT"** key for next digit / field.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

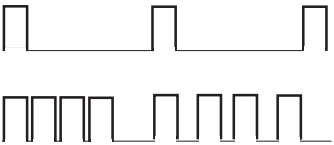


Pulses Timeout (only for "Multiply" working mode).

When the pump receives a pulse from the water meter it starts the dosing activity through an amount of time (from the first pulse to the following one).
At the beginning the pump doesn't know the time lapse between the first and the second pulse. So it'll dose the product in the fastest way. From the second pulse, the pump will dose the product correctly.

This function set the maximum time between a pulse and the following one. Once that this time is exceeded the pump will reinitialize the dosing activity as the first time that a pulse has been received.

- Use **"UP"** key to increase the blinking "_" digit. Enter number of pulses that pump must receive to stop or not the pump.
- Press **"RIGHT"** key for next digit / field.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

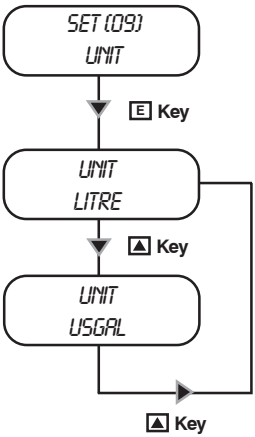


External Pulses

The first time that the pump receives a pulse it doesn't know the the time between this pulse and the following one. So the pump will run faster as possible. "Timeout" function forces the pump to work in this way, once a specified amount of time has been exceeded.

After second pulse the pump will know the time between a pulse and the following one.

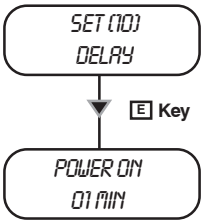
So it'll dose optimizing the dosage through the time.



Unit Change.

This function allows to choose between liters or gallons measurement unit.

- Use **"UP"** key to switch between liter or gallons measurement unit.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

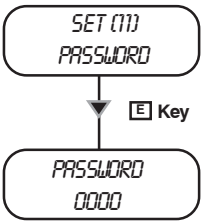


Startup Delay Setup.

When the pump is powered is it possible to have a delay time before dosing activities.

- Use **"UP"** key to choose the alarm to set.
- Use **"RIGHT"** key for next digit.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Note: Press "ESC" key during delay time to skip it.



Password Setup.

"Setup" menu is password protected. Default value to enter into "setup" menu is "0000" (only numeric units). To change this password proceed as follows:

- Use **"UP"** key to change first digit.
- Press **"RIGHT"** key to move cursor over next digit.
- Press **"E"** key to save data and exit to main menu. Otherwise press **"ESC"** to discard data and exit to main menu.

Note: *For lost password, please, contact "Technical Assistance".*

Introduction.

"MF" pump can work in 7 differents modes.

STROKE mode.

Pump doses at a constant rate set in "SPH" (strokes for hour) or "SPM" (strokes for minute) parameters set during program session.

When to use this mode ?
This mode is useful when there isn't an input signal to control the dosing activity. Pump doses requested product quantity in constantly.

Which parameters must be set ?
SPH (strokes per hour) or SPM (strokes per minute)

DIVIDE mode.

External pulses from a water meter are divided by a value set during program session. The pump doses with a rate determined by this parameter.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter that produces elevated quantities of pulses. Pump divides these pulses to allow a correct dosing activity.

Which parameters must be set ?
DIVIDE (division factor)

MULTIPLY mode.

External pulses are multiplied by a value set during program session. The pump doses with a rate determined by this parameter.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter that produces low quantities of pulses. Pump multiplies these pulses to allow a correct dosing activity.

Which parameters must be set ?
MULTIPLY (multiply factor)

PPM mode.

Dosing rate is determined by pulses from a water meter, desired concentration in PPM, chemical product concentration (%) and quantity for each single stroke set during program session.

When to use this mode ?
This mode is useful using an external signal from a pulse sender water meter and it's necessary to specify only PPM (parts per million) and product concentration, leaving the pump to manage coming pulses.

Which parameters must be set ?
PPM (parts per million product quantity)
CONC (% of product's concentration)
Water Meter Pulses
CC/Stroke

BATCH mode.

Signal from an external contact starts the pump to dose product or to produce an amount of strokes set during program session.

When to use this mode ?
This function allows to begin dosing activities when pump receives an external signal.

Which parameters must be set ?
ST (strokes)
CC (product's quantity to dose)

VOLT mode.

Voltage from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

When to use this mode ?
This mode is used with controllers provided of a proportional output in voltage.

Which parameters must be set ?
HIV (maximum tension)
LOV (minimum tension)
SPM (strokes per minute)

mA mode.

Current from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

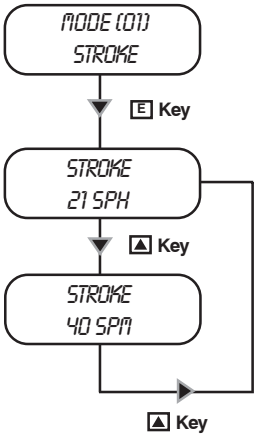
When to use this mode ?
This mode is used with controllers provided of a proportional output in current.

Which parameters must be set ?
HImA (maximum current)
LOmA (minimum current)
SPM (strokes per minute)

STROKE mode.

Pump doses at a constant rate set in“SPH” (strokes for hour) or “SPM” (strokes for minute) parameters set during program session.

Which parameters must be set ?
SPH (strokes per hour) or SPM (strokes per minute).



Choose “stroke” working mode: “SPH” (strokes per hour) or “SPM” (strokes per minute) .

Use **“UP”** key to choose between these two modes. Use **“RIGHT”** key to change value. For next digit press again “RIGHT” key.

Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu.

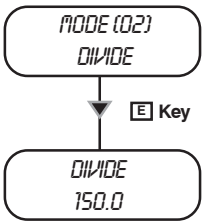
Note: last mode displayed before press the “E” key will be the active one.

18. “DIVIDE” working mode

DIVIDE mode.

External pulses are divided by a value set during program session. The pump doses with a frequency determined by this parameter.

Which parameters must be set ?
DIVIDE (divisor factor)



Use this mode if connected pulse sender water meter produces many pulses and pump must divide them for correct dosing activities. See formula below to verify this value.

Use **“UP”** key to modify the value. Press **“RIGHT”** key to move on next digit.

Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu.

Use the following formula to find the divider to keep desired concentration.

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

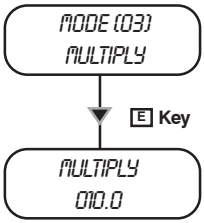
N - divisor value to enter into the pump
[imp/l]- pulses/liter from pulse sender water meter
[cc] - single injection quantity of dosing pump
[ppm] - part per millions product quantity to dose (gr/m^3)
[K] - product dilution coefficient. $0<K<=1$.
100% of product when K=1

If obtained “N” is < 1 then install a pulse sender water meter that produces more pulses. Otherwise use the “MULTIPLY” mode and multiply for 1/N. It’s also possible to fix the problem trying to decrease product dilution.

MULTIPLY mode.

External pulses are multiplied by a value set during program session. The pump doses with a frequency determined by this parameter.

Which parameters must be set ?
MULTIPLY (multiply factor)



Use this mode if: connected pulse sender water meter produces few pulses and pump must multiply them for correct dosing activities. See formula below to verify this value.

Use **“UP”** key to modify the value. Press **“RIGHT”** key to move on next digit.

Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu.

Use the following formula to find the divider to keep desired concentration.

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

N - multiplier value to enter into the pump
[imp/l] - pulses/liter from pulse sender water meter
[cc] - single injection product quantity of dosing pump
[ppm] - part per millions product quantity to dose (gr/m^3)
[K] - product dilution coefficient. $0<K<=1$.
100% of product when K=1

If obtained “N” is < 1 then install a pulse sender water meter that produces less pulses. Otherwise use the “DIVIDE” mode and divice for 1/N. It’s also possible to fix the problem trying to decrease product dilution.

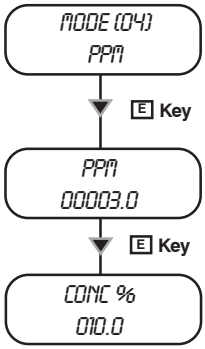
Nota: before to use this mode please set the “TIMEOUT” parameter as described in page 26.

20. “PPM” working mode

PPM mode.

Dosing rate is determined by pulses from a water meter, PPM, chemical product (%) concentration and quantity for each single stroke set during program session.

Which parameters must be set ?
PPM (parts per million product quantity)
CONC (% of product’s concentration)



Use **“UP”** key to change selected unit (“_” blinking cursor) of PPM.

To move on next digit press **“RIGHT”** key.

To modify quantity of product concentration press **“E”** key.

Use **“UP”** key to change selected unit (“_” blinking cursor) of CONC%.

To move on next digit press **“RIGHT”** key.

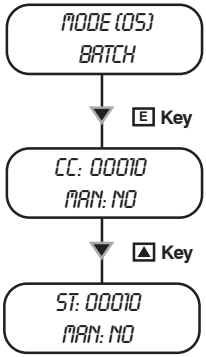
Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu.

BATCH mode.

Signal from an external contact starts the pump to dose the needed quantity set during program session or for the set number of strokes.

When to use this mode ?
This function allows to begin dosing activities when pump receives an external signal.

Which parameters must be set ?
ST (strokes)
CC (product’s quantity to dose only if programmed to feed a set amount of chemical)
CC/STROKE (see page 18)



First of all choose if dosage must be made per strokes or per cc of product. Pump must be calibrated (“TEST” function) in order to work properly into this mode. Do not change flow’s knob position: leave it as during calibration procedure.It’s not possible to program the pump for both modes. Last entry overwrite previous ones.

At the beginning the cursor is on “CC” working unit. Press **“UP”** key to change it and to work into “ST” mode. Otherwise press **“RIGHT”** key to move on required value (**“UP”** key to change it). Press **“RIGHT”** key to move on next digit.

Now cursor moves on “MAN:NO”. Press **“E”** key to quit and save.

If pump must dose immediately the specified amount of product, press **“UP”** key to change “MAN:NO” into “MAN:YES”.

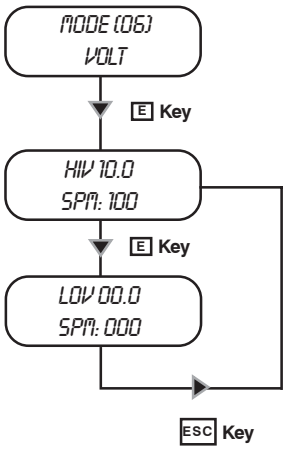
Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu.

22. “VOLT” working mode

VOLT mode.

Voltage from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

Which parameters must be set ?
HIV (maximum tension)
LOV (minimum tension)
SPM (strokes per minute)



To work in this mode is necessary to specify the “HIV” (maximum working tension), “LOV” (minimum working tension) and “SPM” (strokes per minute) values that pump will produce between the parameters.

To setup this values enter into “VOLT” mode. The cursor will blink on first digit (“HIV” field). Insert maximum tension value that will be supplied to the pump (**“UP”** key). To move on next digit press **“RIGHT”** key.

The cursor will blink on “SPM” field. Insert strokes per minute that pump will produce near “HIV” value (**“UP”** key). To move on next digit press **“RIGHT”** key.

Press **“E”** key to move on “LOV”.

The cursor will blink on first digit (“LOV” field). Insert minimum tension value that will be supplied to the pump (**“UP”** key). To move on next digit press **“RIGHT”** key.

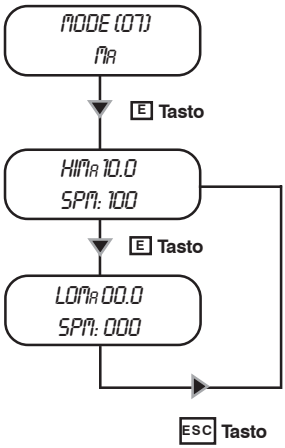
The cursor will blink on “SPM” field. Insert strokes per minute that pump will produce near “LOV” value (**“UP”** key). To move on next digit press **“RIGHT”** key.

Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu.

mA mode.

Current from an external device drives the pump that doses proportionally using a minimum and maximum of strokes for minute set during program session.

Which parameters must be set ?
HImA (maximum current)
LOmA (minimum current)
SPM (strokes per minute)



To work in this mode is necessary to specify the “HImA” (maximum working current), “LOmA” (minimum working current) and “SPM” (strokes per minute) values that pump will produce between the parameters.

To setup this values enter into “mA” mode. The cursor will blink on first digit (“HImA” field). Insert maximum current value that will be supplied to the pump (**“UP”** key). To move on next digit press **“RIGHT”** key.

The cursor will blink on “SPM” field. Insert strokes per minute that pump will produce near “HImA” value (**“UP”** key). To move on next digit press **“RIGHT”** key.

Press **“E”** key to move on “LOmA”.

The cursor will blink on first digit (“LOmA” field). Insert minimum current value that will be supplied to the pump (**“UP”** key). To move on next digit press **“RIGHT”** key.

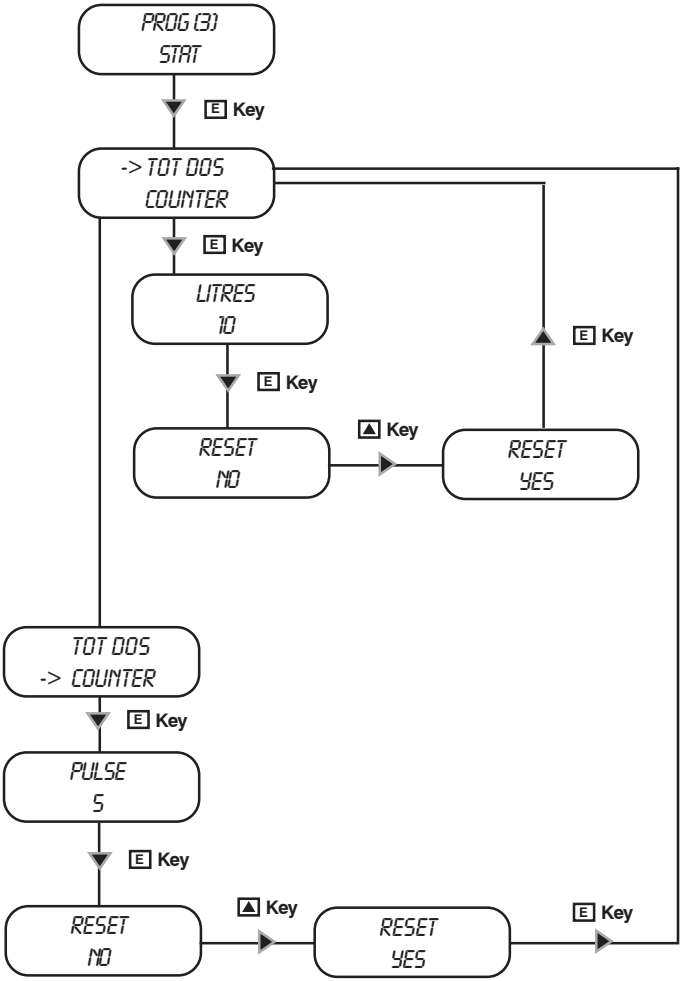
The cursor will blink on “SPM” field. Insert strokes per minute that pump will produce near “LOmA” value (**“UP”** key). To move on next digit press **“RIGHT”** key.

Press **“E”** key to save data and exit to main menu. Otherwise press **“ESC”** to discard data and exit to main menu

24. STATISTICS management

Stat.

To see dosing statistics choose “STAT” from main menu. See quick guide at pag. 20



“TOT DOS” means total dosed product since pump last reset.
“COUNTER” means strokes numbers since pump last reset.

Use this page to record pump programming

25. Troubleshooting

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 41 for replacement procedure.* *Pump's main board is broken. Replace it. See page 41 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.*
Pump's display show "ERROR" message followed by a number.	*ERROR 1 or ERROR2: contact assistance.* *ERROR 3: verify programming procedure.*

26. 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.

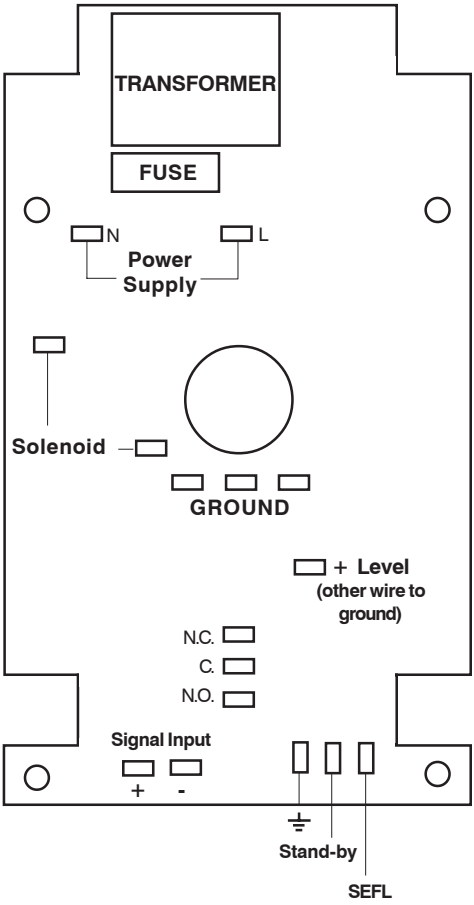
- Completely disconnect wires from main board and replace it. Reinsert screws.

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

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

- Reinsert screws.

27. Main Board



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

Pump strokes:	0 ÷ 150 ; 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)
Installation Class:	II
Pollution Level:	2
Audible Noise:	74dbA
Packaging and Transporting Temperature:	-10÷+50°C

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 (glass, HASTELLOY C276 spring)
Level Probe:	PP, PVDF *
Level probe cable:	PE
Foot Filter:	PP, PVDF *

***as ordered.**
**** according with pump's model.**

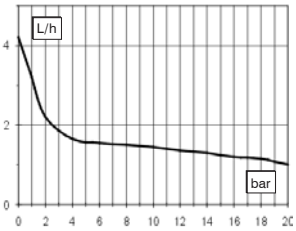
Flow	Max Capacity *l/h*	Max Pressure *bar*	Capacity *l/h*	Pressure *bar*	*ml* stroke	Strokes/ min	Hoses *mm*	Watt *W*	Shipping weight *Kg*
20 01	1	20	1,5	10	0,14	120	4 X 8	19 W	4,1
18 02	2	18	3	9	0,23	150	4 X 8	19 W	4,1
10 04	4	10	7	5	0,45	150	4 X 6	19 W	4,1
07 06	6	7	7	3,5	0,66	150	4 X 6	19 W	4,1
04 08	8	4	10	2	0,89	150	4 X 6	19 W	4,1
02 16	16	2	17	1	1,8	150	6 X 8	19 W	4,1

Pump Head ø13

20 01

l/h 01

bar 20

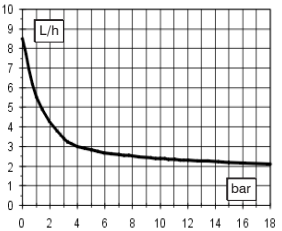


Pump Head ø13

18 02

l/h 02

bar 18

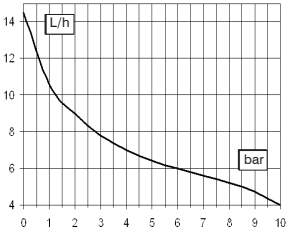


Pump Head ø22

10 04

l/h 04

bar 10

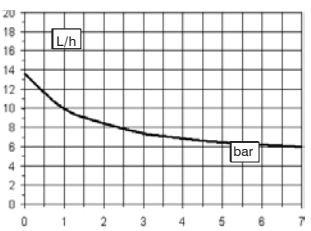


Pump Head ø22

07 06

l/h 06

bar 07

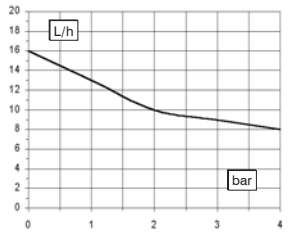


Pump Head ø22

04 08

l/h 08

bar 04

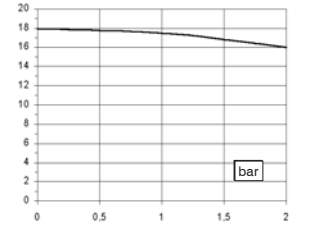


Pump Head ø22

02 16

l/h 16

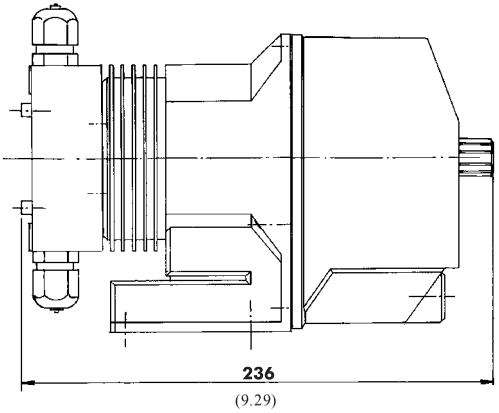
bar 02

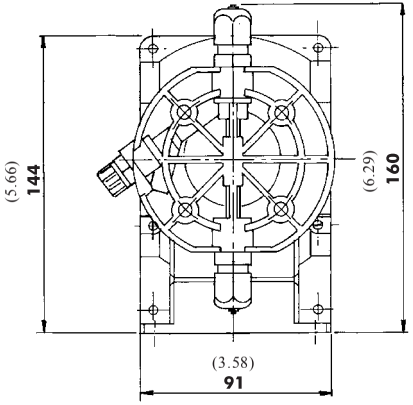


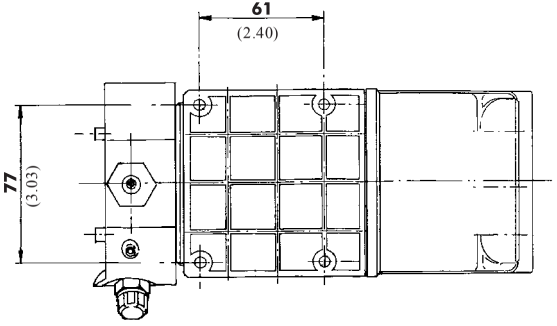
Flow rate indicated is for H_2O at 20°C at the rated pressure. Dosing accuracy ± 2% at constant pressure ± 0,5 bar.

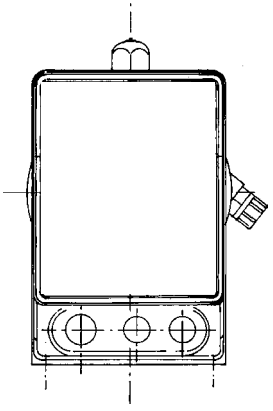
C Appendix. Delivery Curves for self-purge pump head

Dimensions









bold : mm
( ) : inches

E Appendix. Chemical Compatibility Table

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

Chemical	Formula	Glass	PVDF	PP	PVC	SS 316	PMMA	Hastelloy	PTFE	FPM	EPDM	NBR	PE
Acetic Acid, Max 75%	CH_3COOH	2	1	1	1	1	3	1	1	3	1	3	1
Aluminium Sulphate	$Al_2(SO_4)_3$	1	1	1	1	1	1	1	1	1	1	1	1
Amines	$R\text{-}NH_2$	1	2	1	3	1	-	1	1	3	2	4	1
Calcium Hydroxide (Lime Milk)(Slaked Lime)	$Ca(OH)_2$	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Hypochlorite (Chlorinated Lime)	$Ca(OCl)_2$	1	1	1	1	3	1	1	1	1	1	3	1
Copper-II-Sulphate (Roman Vitriol)	$CuSO_4$	1	1	1	1	1	1	1	1	1	1	1	1
Ferric Chloride	$FeCl_3$	1	1	1	1	3	1	1	1	1	1	1	1
Hydrofluoric Acid 40%	HF	3	1	1	2	3	3	2	1	1	3	3	1
Hydrochloric Acid, Concentrate	HCl	1	1	1	1	3	1	1	1	1	3	3	1
Hydrogen Peroxide, 30% (Perydrol)	H_2O_2	1	1	1	1	1	3	1	1	1	2	3	1
Nitric Acid, 65%	HNO_3	1	1	2	3	2	3	1	1	1	3	3	2
Phosphoric Acid, 50% (Orthophosphoric Acid)	H_3PO_4	1	1	1	1	2	1	1	1	1	1	3	1
Potassium Permanganate, 10%	$KMnO_4$	1	1	1	1	1	1	1	1	1	1	3	1
Sodium Bisulphite	$NaHSO_3$	1	1	1	1	2	1	1	1	1	1	1	1
Sodium Carbonate (Soda)	Na_2CO_3	2	1	1	1	1	1	1	1	2	1	1	1
Sodium Hydroxide (Caustic Soda)	NaOH	2	1	1	1	1	1	1	1	2	1	2	1
Sodium Hypochlorite, 12.5%	NaOCl + NaCl	1	1	2	1	3	1	1	1	1	1	2	1
Sulphuric Acid, 85%	H_2SO_4	1	1	1	1	2	3	1	1	1	3	3	1
Sulphuric Acid, 98.5%	H_2SO_4	1	1	3	3	3	3	1	1	1	3	3	3

Resistance rating

Resistant	1
Fairly resistant	2
Not resistant	3

Materials

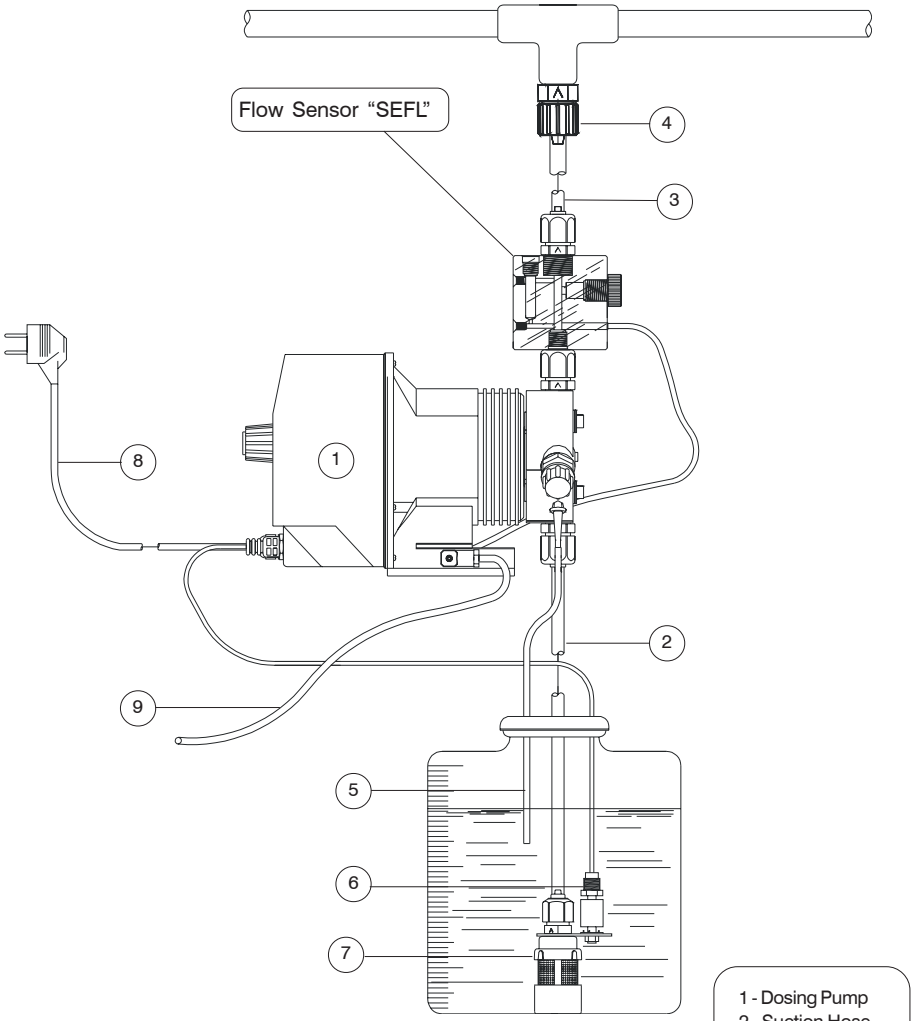
Polyvinyldene fluoride	PVDF	Pump Heads, valves, fitting, tubing
Polypropylene	PP	Pump Heads, valves, fitting, level floater
PVC	PVC	Pump Heads
Stainless steel	SS 316	Pump Heads, valves
Polymethyl Metacrilate (Acrylic)	PMMA	Pump Heads
Hastelloy C-276	Hastelloy	Injection valve spring
Polytetrafluoroethylene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

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)

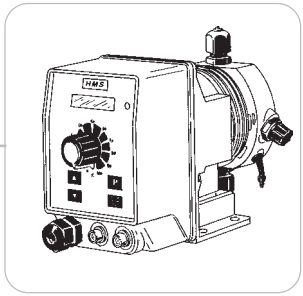
Delivery Hose	Working Pressure				Breaking Pressure			
4x6 mm PE (opaque)	20°C 12 bar	30°C 10.5 bar	40°C 8.5 bar	50°C 6.2 bar	20°C 36 bar	30°C 31.5 bar	40°C 25.5 bar	50°C 18.5 bar
4x8 mm PE (opaque)	20°C 25 bar	30°C 22 bar	40°C 18 bar	50°C 13.5 bar	20°C 60 bar	30°C 51 bar	40°C 39 bar	50°C 25.5 bar
6x8 mm PE (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 (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 (opaque)	20°C 45 bar	30°C 39 bar	40°C 34 bar	50°C 30 bar				
6x8 mm PVDF (opaque)	20°C 35 bar	30°C 30 bar	40°C 26 bar	50°C 24 bar				
8X10 mm PVDF (opaque)	20°C 25 bar	30°C 22 bar	40°C 19 bar	50°C 17 bar				

G Appendix. “SEFL” Installation



1 - Dosing Pump
2 - Suction Hose
3 - Delivery Hose
4 - Injection Valve
5 - Air discharge
6 - Level Probe
7 - Foot Filter
8 - Power Cable
9 - Standby / Alarm

Summary



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