



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



Use of this pump with radioactive chemicals is forbidden!



## OPERATING INSTRUCTIONS MANUAL FOR “CMS DIGITAL” SERIES DOSING PUMP



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

Please read it carefully!



English language

R1-02-04

### « CE » referring norms



“CMS Digital” series 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)



All metering pumps supplied with 115 VAC are available with certification CSA, except for 25 05 and 15 10 pump models.



## GENERAL SAFETY GUIDELINES

### Danger!

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

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

When installing outside European Community, always observe national regulations!

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

### Caution!

Pumps 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 to automatically shut-off the pump when there is no flow!

Pumps 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!

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

## GENERAL INFORMATION

“CMS Digital” series, foot mounted solenoid driven metering pump is suitable for small and medium dosing amount of additive. Each pump is formed by the following main assemblies:

*Box*  
*Electronic Circuit*  
*Electro-Magnet*  
*Diaphragm*  
*Pump head*

“CMS Digital” working mode is intermittent: a magnetic field is created each time a pulse reaches the magnet. The magnetic field pushes the piston. A diaphragm (fixed on the piston head) compresses the liquid into the pump head. The liquid gets out through the delivery valves while the suction valves close. When the pulse ends, a spring takes back the piston and the diaphragm. The vacuum created by the diaphragm movement takes the liquid inside the pump head from the suction valve, while the delivery valve is closed. The pump capacity is proportional to the number of strokes and to the pump head internal volume (Single Stroke Injection Quantity). Solenoid driven dosing pumps can operate without liquid without problems to its assemblies.

### *Box*

“CMS Digital” series dosing pumps are assembled in IP65 (PP + glass fiber) plastic material boxes. Installation is wall mounted by means of two screws at a distance of 152 mm.

### *Electronic Circuit*

The electronic circuit is made of proved quality components. It provides the necessary electrical pulses to the magnet.

### *Electro-Magnet*

The electro-magnet with class H (180°C) copper winding, driven by the electronic circuit, gives the necessary push to the piston and the diaphragm. Piston stroke length varies from 0,7 to 1,7 mm, according to the pump dimension type (pressure/output).

### *Diaphragm*

PTFE diaphragms used in the “CMS Digital” series pumps assure good chemical compatibility and mechanical resistance.

### *Pump Head*

“CMS Digital” series Pump Head diameters are: ø22, ø32, ø44, ø58, ø64. The pump head works as a dosing chamber, the suction valve, delivery and manual outgassing valves are inside it. The purpose of the manual outgassing valve is to help the priming of the pump during installation. Pump head is made in PP and upon request PVDF.

## INSTALLATION

The pump is supplied with all the materials needed for the installation. To set up the “CMS Digital” series pump, first mount it in horizontal position in a well aerated and easily accessible environment. The distance between the pump head and the suction filter should not be more than 1.5m. Connect the suction pipe (transparent one) to the suction fittings (bottom pump head valve). Be sure the o-ring in the suction valve is in place. Use the hands to tight the fitting nut. Place the suction filter on the bottom of the product tank. The suction pipe should be as short as possible in vertical position without any bends to avoid air bubbles. Install the injection valve. Connect one end of the delivery pipe (opaque one) to the delivery fitting on the top of the pump head and the other end to the injection valve previously installed.



**To avoid delivery pipe breaking be sure it doesn't touch any other object.**

Always install the injection valve at the end of the rigid delivery hose. The injection valve should never be installed lower than the product tank to avoid that injection valve breaking lets the product flow freely into the system. If the only way to install the injection valve is lower than the tank, then it is recommended to use an anti-syphon valve (code 108.136.1) on the delivery side. This valve prevents vacuum on the pump. Feeder should be interlocked with a no-flow protection device to automatically shut-off the pump when there is no flow. Check regularly the delivery valve and immediately change it if inoperable or broken. Do not install tanks with chemical beneath: vapours may damage the pump.



**FREE END OF SUCTION HOSE SHOULD BE INSERTED JUST ABOVE THE BASE OF NOOZLE!**

**USE ONLY HOSES COMPATIBLES WITH PRODUCT TO DOSE. PLEASE REFERS TO OUR "CHEMICAL COMPATIBILITY TABLE"!**



**WARNING: when dosing Nitric Acid with concentration >33%, use PVDF or PTFE tubes.**

## PRIMING

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

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

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

## METERING

The "CMS Digital" series pump technical features are printed on a label located at the left side of pump box. They include: power supply, working counterpressure (Kpa/bar) and pump capacity in liter per hour (l/h). All these dosing information are calculated by dosing water at 20 °C temperature, at the maximum counterpressure reported on the label, using the injection valve and the % knob set to maximum. Dosing accuracy is  $\pm 2\%$  l/h at constant maximum counterpressure and 1 cps flow (**max viscosity: 60 cps**).

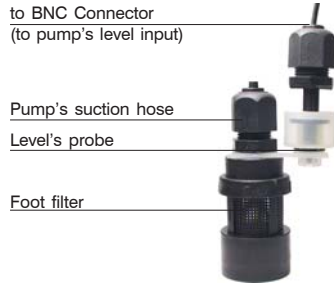
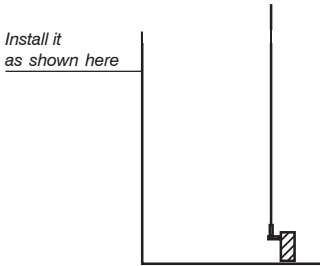


**Caution: injection capacity is a constant value but a variation in counterpressure or product's viscosity may cause some changes. For further details see "Delivery curves" paragraph.**

**"CMS Digital" series pump max dosing viscosity 60 cps, except for polymer models that can reach up to 50.000 cps!**

## LEVEL PROBE AND FOOT FILTER INSTALLATION

Level probe must be assembled using the foot valve included into pump's kit. Foot valve is designed to be installed in contact with tank base. It is not necessary a space to avoid sediment accumulation. Connect the BNC to dosing pump using "LEVEL" input.



## SINGLE STROKE INJECTION ADJUSTMENT

The "CMS Digital" series pumps have a double flow setting that can be operated at same time: the number of strokes per minute and the single stroke capacity. This feature results in a more accuracy of the metering. The single stroke capacity adjustment is a mechanical control on the piston that pushes the diaphragm and it is operated through the central panel knob. This knob is locked to avoid undesired metering by accidental movement. To unlock it push the knob and rotate it on the needed value.



**WARNING:** to avoid mechanical damages the piston displacement adjustment must be done when the pump is working.



**STROKE ADJUSTMENT RECOMMENDED RANGE:** from 30% to 100%.

Flow adjustment setting example: having a CMS IS 0720 pump, if 10 l/h must be dosed, leaving max pulse frequency, set stroke adjustment knob at 50%. **Although frequency and stroke length remain always the same, bear in mind that pump capacity performance is subject to variation due to counterpressure changes or dosing chemical viscosity value. Check always the pump flow delivery curves.**



\*See "Input/Output connections" chapter for details

## ELECTRICAL CONNECTIONS

Pump has to be connected to power supply using the standard "SCHUKO" plug supplied or the special power supply cable.



**Before starting any electrical connection perform the following operations:**

- ensure a correct ground installation!
- if there is a bad ground, install a differential switch with high sensibility (0,03 A) as additional protection from electric shocks!
- check that pump voltage corresponds to supply voltage!
- make ground connection before any other connection!



**REPAIR MUST BE PERFORMED BY AUTHORIZED PERSONNEL ONLY.**

Features:

Power supply range for 230 V model: 184 ÷ 268 Vac

Power supply range for 115 V model: 92 ÷ 134 Vac

Frequency: 50 ÷ 60 Hz

## Power Consumption

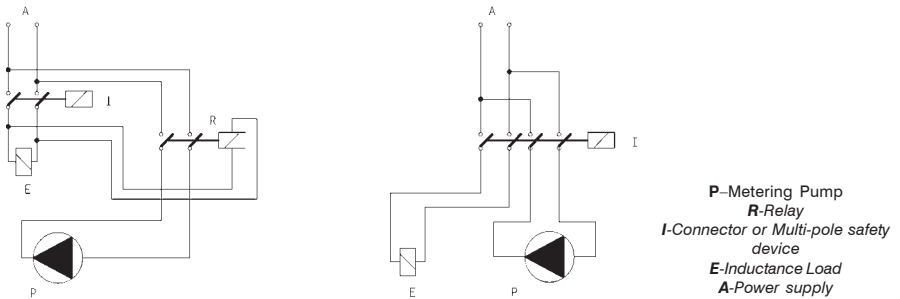
Pump Model	Consumption for 115 Vac model	Consumption for 230 Vac model
CMSxx 2505	24 W	42 W
CMSxx 1510	24 W	42 W
CMSxx 1804	24 W	42 W
CMSxx 1408	24 W	42 W
CMSxx 0720	24 W	42 W
CMSxx 0340	24 W	42 W
CMSxx 0260	24 W	42 W

Pump power “on” is confirmed with a green led on the frontal panel that turns off each stroke.



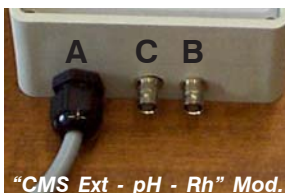
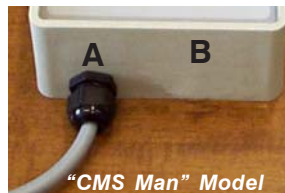
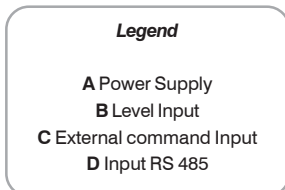
**Do not connect the pump in parallel to an inductance load, e.g. motors, to prevent electronic circuitry damages. Always use a connector to cut off spikes due to other devices switching.**

### Dosing pump in parallel connection with inductive loads



## INPUT/OUTPUT CONNECTIONS

The “CMS Digital” series covers a wide range of applications. Please follow chart and double check each type of connection.



## LEVEL ALARM

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



**ENSURE PUMP LEVEL SWITCH AND PH OR ELECTRODE CONNECTIONS (LATTERS ONLY WHEN IN USE). REFER TO PAGE 8: IN CASE OF UNCORRECT CONNECTIONS, ELECTRODE COULD BE DAMAGED.**

## THRESHOLD VALUES

All pump inputs are protected and can withstand overload as previously indicated. Closing REED contact or other similar types, the maximum input frequency is 100 Hz or 10 mS. Pump Input impedance varies according selected operation mode: mA mode  $R_{in}=100\ \text{ohm}$ ; V mode and Mv mode= $100\ \text{Kohm}$ .

## ELECTRICAL PROTECTION

Internal circuitry is protected against noises using the EMC system and with a fuse located under the front cover of pump. To replace the fuse (**trained personnel only**) do as follow:

- **unplug power supply;**
- **remove the 4 screws on the pump back cover;**
- **replace fuse, use only approved fuses shown in chart below;**
- **fasten back-cover, using the same screws, and make sure the sealing materials is properly placed. Improper sealing of back cover, will in time result in corrosion of printed circuit.**

Each pump type fuse (**5x20**) **T(delayed)** can be found in table below:

<b>Pump</b>	<b>Fuse for 115Vac model</b>	<b>Fuse for 230Vac model</b>
<b>CMS*</b> 2505	800mA	1,6A
<b>CMS*</b> 1510	800mA	1,6A
<b>CMS*</b> 1804	800mA	1,6A
<b>CMS*</b> 1408	800mA	1,6A
<b>CMS*</b> 0720	800mA	1,6A
<b>CMS*</b> 0340	800mA	1,6A
<b>CMS*</b> 0260	800mA	1,6A

\* for “pH”, “Rh”, “Man”, “Ext” and “Ext485” models

“CMS Digital” pump is equipped with an overvoltage protection (working voltages: 275 V, 150V, 39V) and a voltage peak protection up to 4 KV, 50  $\mu\text{sec}$  against pulses as shown in fig. 1.

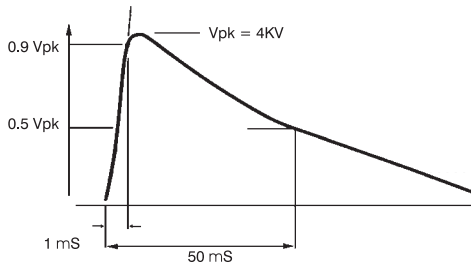


fig. 1

## “START/STOP” - PRIMING BUTTON

This allows to **start** or **stop** pump programmed operations as well as to **prime** the pump. Pressing this button, while the pump is working, will display **OFF** (flashing). Continuing to press the button “**START-STOP**” while **OFF** is showing, will change the display into **MAN**, and the pump will deliver 80 strokes. During all this time, the external input signal is **off**. Releasing the button pump will return the pump to the original programmed operations.

## INFORMATION ON DISPLAY

### [LO VI]

When power supply voltage drops below the permissible minimum, **minimum allowed being** 92Vac (for 115Vac version) or 184Vac (for 230Vac version), pump will stop and display will show [LO VI], meaning LOW VOLTAGE INPUT.

### [HI VI]

When power supply voltage increases above permissible maximum, **maximum allowed being** 134Vac (for 115Vac version) or 268Vac (for 230Vac version), pump will stop and display will show [HI VI], meaning HIGH VOLTAGE INPUT.

### [SYNC]

Every time pump is powered by the main electrical supply, display shows [SYNC] for 1 second. The message indicates that the microprocessor is analysing power supply frequency. This auto-analysis operation, along with power supply verification, ensure the best and most accurate results in dosing operation, frequency or voltage fluctuations.

### [TANK LEVEL]

Level probe signals when additive level in the tank is below allowable height. The pump therefore stops. Display will show [TANK LEVEL]. Once additive level is restored, message is turned-off and pump will restart.

### [DATA ERROR]

It appears every time there has been a mistake in programming. Re-enter the **programming mode** and follow instructions.

### [MEM ERROR]

Indicates a problem with microprocessor memory. **For assistance, please contact EMEC service department or any other authorized personnel.**

### [MAN]

Operator is priming the pump.

### [OFF]

Pump is OFF.

## [RANGE]

Input signal is not received or **beyond programming threshold values**.

## PROGRAMMING “CMS MAN” PUMP

This pump works in constant on/off mode. **Constant mode may be set in % (“S” is shown on pump’s display) or in pulses per minutes (“F” is shown on pump’s display).**

### *“S” (stroke) mode program*

This mode allows to set pump’s stroke capacity from 100% (max) to 1% (min). Step increasing is 1%. If “S” mode is set to 100% then pump’s pulses are 120 pulses per minute. If “S” mode is set to 1% then pump’s pulses are 1 pulse every 40 seconds. To set pump into “S” mode, keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys choose “[S---]”. Press “P”, then edit percentual value by increasing/decreasing it with “UP” and “DOWN” keys. Keep pressed the “P” key for at least four seconds to return to pump’s normal operation.

### *“F” (frequency) mode program*

This mode allows to dose a liquid for a time that may be set from 1 pulse per hour to 120 pulses per minute. To set pump into “F” mode, keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys choose “[F---]”. Press “P”, then edit percentual value by increasing/decreasing it with “UP” and “DOWN” keys. Keep pressed the “P” key for at least four seconds to return to pump’s normal operation.

## PROGRAMMING “CMS EXT” PUMP

This pump may work in three basic modes: **“Constant mode”, “Analog Input Signal” and “Digital Input Signal”**. For constant mode instructions, please refers to “Programming HMS MAN pump” paragraph.

### ***“ANALOG INPUT SIGNAL” (mA - mV - V) mode program***

This mode allows to dose a liquid proportionally or inversely proportional to the input signal. External signal’s range can be 0÷20 mA for mA mode, 0÷99 mV for mV mode and 0÷9,9 V for Volt mode. For example, this signal may be an instrument’s output. When analog signal reaches pump’s set values (SetPoints) dosing operations start or end. Pump’s pulses, during dosing operations, may be set as described in *“Setting %L and %H values”* paragraph.

### ***“mA” mode***

Turn “ON” the pump. Keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys scroll through the seven working modes:

[S---] (stroke), [F---] (frequency), [M---] (multiply), [D---] (divide), [mA---] (milliamperes), [mV---] (millivolts), [V---] (volts).

Choose [mA--] and press “P” to confirm. The pump shows the lower mA intervention value. For

example **[A04,0L]** where “L” means “Low”. This is the “Low SetPoint”. If “analog input signal” reaches a value lower than this, pump will stop all dosing operation and it will display “**[RANGE]**”. To change it, use “UP” and “DOWN” keys. Press “P” to confirm the intervention value. Pump will display (for example) **[A20,0H]** where “H” means “High”. This is the “High SetPoint”. If “analog input signal” reaches a value higher than this, pump will dose at %H value and it will display “**[RANGE]**”. To change it use “UP” and “DOWN” keys. Press “P” to confirm the intervention value.

#### Setting %L and %H values

Now pump will display **[000%L]**. This is the pulse value refers to lower setpoint. To change it use “UP” and “DOWN” keys. Press “P” to confirm. When analog signal reaches the lower mA value pump will not stop the dosing but will decrease pulses until %L. We suggest to use a value different from 0% only for special purpose.

Press “P” to confirm lower % value. The pump will display (for example) **[100%H]**. This is the pulse value refers to higher setpoint. To change it use “UP” and “DOWN” keys. Press “P” to confirm. When analog signal reaches the higher mA value pump will dose at %H.

- \* %L value must be always lower than %H value. Otherwise pump displays **[DATA ERROR]**.
- \* Pump may work also in “reverse” mode. Using this mode, pump will stop to dose at maximum setpoint value. To set this mode set “L” setpoint with the highest mA value and set “H” setpoint with the lowest mA value.

#### “mV” mode

Turn “ON” the pump. Keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys scroll through the seven working modes:

**[S---**] (stroke), **[F---**] (frequency), **[M---**] (multiply), **[D---**] (divide), **[mA---**] (milliamperes), **[mV--]** (millivolts), **[V--]** (volts).

Choose **[mV--]** and press “P” to confirm. The pump shows the lower mV intervention value. For example **[mV00L]** where “L” means “Low”. This is the “Low SetPoint”. If “analog input signal” reaches a value lower than this, pump will stop all dosing operation and it will display “**[RANGE]**”. To change it, use “UP” and “DOWN” keys. Press “P” to confirm the intervention value. Pump will display (for example) **[mV99H]** where “H” means “High”. This is the “High SetPoint”. If “analog input signal” reaches a value higher than this, pump will dose at %H value and it will display “**[RANGE]**”. To change it use “UP” and “DOWN” keys. Press “P” to confirm the intervention value.

#### Setting %L and %H values

Now pump will display **[000%L]**. This is the pulse value refers to lower setpoint. To change it use “UP” and “DOWN” keys. Press “P” to confirm. When analog signal reaches the lower mV value pump will not stop the dosing but will decrease pulses until %L. We suggest to use a value different from 0% only for special purpose.

Press “P” to confirm lower % value. The pump will display (for example) **[100%H]**. This is the pulse value refers to higher setpoint. To change it use “UP” and “DOWN” keys. Press “P” to confirm. When analog signal reaches the higher mV value pump will dose at %H.

- \* %L value must be always lower than %H value. Otherwise pump displays **[DATA ERROR]**.
- \* Pump may work also in “reverse” mode. Using this mode, pump will stop to dose at

**maximum setpoint value. To set this mode set “L” setpoint with the highest mA value and set “H” setpoint with the lowest mV value.**

### **“V” mode**

Turn “ON” the pump. Keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys scroll through the seven working modes:

[S---] (stroke), [F---] (frequency), [M---] (multiply), [D---] (divide), [mA---] (milliamperes), [mV--] (millivolts), [V---] (volts).

Choose [V---] and press “P” to confirm. The pump shows the lower V intervention value. For example [V0,0L] where “L” means “Low”. This is the “Low SetPoint”. If “analog input signal” reaches a value lower than this, pump will stop all dosing operation and it will display “[RANGE]”. To change it, use “UP” and “DOWN” keys. Press “P” to confirm the intervention value. Pump will display (for example) [V9,9H] where “H” means “High”. This is the “High SetPoint”. If “analog input signal” reaches a value higher than this, pump will dose at %H value and it will display “[RANGE]”. To change it use “UP” and “DOWN” keys. Press “P” to confirm the intervention value.

### *Setting %L and %H values*

Now pump will display [000%L]. This is the pulse value refers to lower setpoint. To change it use “UP” and “DOWN” keys. Press “P” to confirm. When analog signal reaches the lower V value pump will not stop the dosing but will decrease pulses until %L. We suggest to use a value different from 0% only for special purpose.

Press “P” to confirm lower % value. The pump will display (for example) [100%H]. This is the pulse value refers to higher setpoint. To change it use “UP” and “DOWN” keys. Press “P” to confirm. When analog signal reaches the higher V value pump will dose at %H.

- \* %L value must be always lower than %H value. Otherwise pump displays [DATA ERROR].
- \* Pump may work also in “reverse” mode. Using this mode, pump will stop to dose at maximum setpoint value. To set this mode set “L” setpoint with the highest V value and set “H” setpoint with the lowest V value.

### **“DIGITAL INPUT SIGNAL” (“D” and “M”) mode program**

Turn “ON” the pump. Keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys scroll through the seven working modes:

[S---] (stroke), [F---] (frequency), [M---] (multiply), [D---] (divide), [mA---] (milliamperes), [mV--] (millivolts), [V---] (volts).

These modes are useful when pump is used with a water meter or another system that sends pulses through a free of voltage contact. “D” (divide) mode is used on little “pulse emitter water meter” and pump needs to divide pulses. “M” (multiply) mode is used on big “pulse emitter water meter” (6” size and over) and pump needs to multiply pulses for a more accurate dosing.

### **“M” MODE**

Turn “ON” the pump. Keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys scroll through the seven working modes:

[S---] (stroke), [F---] (frequency), [M---] (multiply), [D---] (divide), [mA---] (milliamperes), [mV--] (millivolts), [V---] (volts).

Choose “[M---]” and press “P” to confirm. Pump displays [ M 1 ]: choose the value to set using “UP” or “DOWN” keys.

Example: if we set [M6] and water meter gives 1 pulse per minute, when pump receive first pulse, it will deliver 6 fast strokes with rate of 2 pulses per second. On second water meter pulse, the pump will deliver 1 stroke every 10 seconds, and so on until pulses will end. Pulses distribution is recalculated every pulse. Maximum distribution time is: 2 minutes. If input pulses are too frequents for the multiplying coefficient pump’s display will show [ RANGE ]. Press again [ P ]: the display will show the previously programmed pulses, etc. *To exit from program menu keep pressed “P” key for about 4 seconds.*

### “D” MODE

Turn “ON” the pump. Keep pressed the “P” key for at least four seconds. The pump will enter into the main program menu. Using “UP” or “DOWN” keys scroll through the seven working modes:

[S---] (stroke), [F---] (frequency), [M---] (multiply), [D---] (divide), [mA---] (milliamperes), [mV--] (millivolts), [V---] (volts).

Choose “[D---]” and press “P” to confirm. Pump displays [ D 1 ]: choose the value to set using “UP” or “DOWN” keys.

The pump gives a maximum of 2 strokes per second; if the input pulses are too frequent for the multiplying coefficient, the display show [ RANGE ]. Pressing again [ P ] the display will show the previously programmed pulses, etc. To exit the programming just press [ P ] for 4 seconds: the display shows a confirmation message [ OK ] for around 1 second. *To exit from program menu keep pressed “P” key for about 4 seconds.*

### HOW TO DETERMINE “D” or “M” VALUE ?

Dividing (D) or multiply (M) factor (F), may be set on pump using the following formula (strokes knob on 100%) :

$$\left( \frac{10 \times \text{imp/l} \times \text{cc} \times \text{P}\%}{\text{ppm}} \right) = F$$

F: factor

imp/l: pulse per liter given by the water meter

cc: pump’s single stroke dosing quantity (in cc\*).

*\*For cc quantity please refer to table at page 20 and stroke knob’s position*

P%: product concentration. If product is not diluted enter 100

ppm: product quantity to dose in p.p.m. (gr/m<sup>3</sup>)

### Results:

If F<1 calculate M= 1/F and set obtained number into pump’s program. Use “M”(multiply) mode.

If F>1 use “D” (divisor) mode and set obtained number into pump’s program.

If F>1000 increase dilution or increase water meter’s pulses per liter or reduce stroke on pump’s knob.

## CMS “EXT/RS485 “ MODEL

On demand the pump can be supplied with **serial interface**, installed in the pump electronic circuit. **Specific requests are accepted when ordering.** RS485 transmission provides serial connection and requires two wires and screen. Using a 120 Ohm impedance-line, perfectly balanced, it is possible to connect up to 1 Km distance without intermediate amplifiers. A maximum of 20 pumps can be connected on the same line without intermediate amplifiers. The line needs as terminal-closing a resistance of 120 ohm, 1/2 Watt. Pump running with serial programming responds only when required. The reply message contains all data shown on the display (see paragraph “Display Information”), including the number of the pulses released by the pump while running. The pump is connected via serial to any remote central station, utilising the mainframe which can be a computer or other system. It is possible to program the running mode, modify parameters, start and stop the pump. The pump also can communicate with a PC. However, the transmission protocol is often not compatible with that of the pump. It is therefore necessary to install an external interface card. To interface a PC and one or more pumps, a customized program must be created according to the system requirements.

## TECHNICAL FEATURES FOR “CMS RH” METERING PUMP

“CMS RH” metering pump is suitable for dosing chemicals, like sodium hypochlorite, to control Redox potential into water. For example, using an ORP probe it is possible to maintain the correct disinfectant value into swimming pool. “CMS RH” pump is a proportional pump driven by an internal built-in Redox (ORP) meter with level control setting.

## PROGRAMMING “CMS RH” PUMP

Before using the pump, it must be set for using into plant. To modify enter into program mode keep pressed “P” key for about three seconds. This time is needed to avoid any undesired use. Doing this, pump’s display begins to flash. During this time if there is no keyboard activity, the pump will exit from program mode and will return to its normal operation. Note: during programming the pump will not dose.

## EXAMPLE OF DOSING AN OXIDANT CHEMICAL

Before to enter into program mode it is necessary to know pump’s working range. This example will set the working range between 700mV and 650mV using proportional mode. This mode set the pump to work at its maximum capacity (100%) when probe’s reading is = or < than 650mV. When this value increases, pump will reduce dosing capacity proportionally until probe’s reading will be = or > than 700mV. Reached this value the pump will stop dosing activity.

Keep pressed “P” key for about three seconds. Pump’s display will show: “mV—“. Press again “P” key. Display will show “700L”. This is the lowest intervention point (L means low) value. When pump reaches this value all dosing activities will be stopped. To change this value use scroll keys (up and down arrows).

Press “P”. Pump’s display will show “650H”. This is the highest intervention point (H means high) value. When reading reaches this value pump will operate at its maximum capacity. To change this value use scroll keys (up and down arrows).

Press “P”. Pump’s display will show “000%L”. Flow capacity for “L” setpoint. Leave as it is or change it if a special dosing operation is needed.

Press “P”. Pump’s display will show “100%H”. Flow capacity for “H” setpoint. Leave as it is or

change it if a special dosing operation is needed.

Warning: Do not set “L” and “H” parameters with the same value or the pump will show “Data Error”.

To exit from program mode keep pressed “P” key for about three seconds. A confirmation message will be displayed: “700L”, “650H”, “000%L”, “100%H”.

mV Read Value	Pump’s dosing capacity
≥ 700	0%
= 675	50%
≤ 650	100%

Now pump is ready to work. Display shows “S100%” (pulses). Pressing “UP” key display shows read mV. If the difference between “L” and “H” values is equal or minor to 4mV then pump will work into “on/off” mode.

### EXAMPLE OF DOSING A DE-OXIDANT CHEMICAL

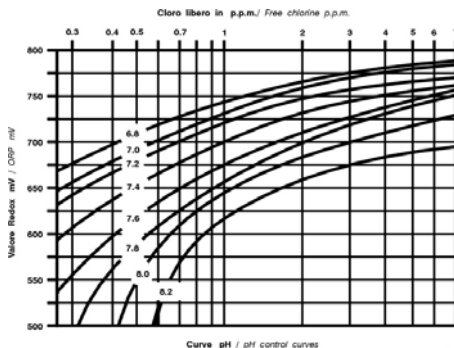
Using the same programming procedure the highest mV value must be set for “H” setpoint and the lowest for “L” setpoint. For example: 700H, 650L, 0%L, 100%H.

### REDOX PROBE CALIBRATION

Insert probe’s connector into its relative input. Turn on the pump and set the pump into mV reading (“UP” key). Unscrew PG11 cap from pump’s right side and locate two trimmers. Before to dip probe into buffer solution it must be washed into water and then carefully dried. Remove cap from the probe. Dip probe into buffer solution (buffer solution must be “650mV”). Wait a stable reading then begin to rotate the lower trimmer using a 3x75 screwdriver until display will show 650mV value. Screw back PG11 cap, keeping attention to the oring.

### SETTING THE PUMP FOR “FREE CHLORINE OPERATION”

Turn on the pump and connect Redox probe to its proper input. Using a pH meter measure pH value into water to treat. It is necessary to convert ppm free chlorine into mV. To do this use the conversion table. Prepare a buffer solution with water and chlorine with a value nearest to the working value. Check free chlorine value using a DPD colorimeter. Dip Rh probe, wait a stable reading then begin to rotate the lower trimmer using a 3x75 screwdriver until display will show the same buffer solution value. Screw back PG11 cap, keeping attention to the oring.



## PROGRAMMING “CMS PH” PUMP

Before to use the pump, it must be set for using into plant. To modify enter into program mode keep pressed “P” key for about three seconds. This time is needed to avoid any undesired use. Doing this, pump’s display begins to flash. During this time if there is no keyboard activity, the pump will exit from program mode and will return to its normal operation. Note: during programming the pump will not dose.

### EXAMPLE OF DOSING AN OXIDANT CHEMICAL

Before to enter into program mode it is necessary to know pump’s working range. This example will set the working range between 7pH and 7.6pH using proportional mode. This mode set the pump to work at its maximum capacity (100%) when probe’s reading is = or > than 7.6pH. When this value decreases, pump will reduce dosing capacity proportionally until probe’s reading will be = or < than 7pH. Reached this value the pump will stop dosing activity.

Keep pressed “P” key for about three seconds. Pump’s display will show: “pH—“. Press again “P” key. Display will show “7.0L”. This is the lowest intervention point (L means low) value. When pump reaches this value all dosing activities will be stopped. To change this value use scroll keys (up and down arrows).

Press “P”. Pump’s display will show “14H”. This is the highest intervention point (H means high) value. When reading reaches this value pump will operate at its maximum capacity. To change this value use scroll keys (up and down arrows). For this example set “H” to 7.6pH.

Press “P”. Pump’s display will show “000%L”. Flow capacity for “L” setpoint. Leave as it is or change it if a special dosing operation is needed.

Press “P”. Pump’s display will show “100%H”. Flow capacity for “H” setpoint. Leave as it is or change it if a special dosing operation is needed.

Warning: Do not set “L” and “H” parameters with the same value or the pump will show “Data Error”.

To exit from program mode keep pressed “P” key for about three seconds. A confirmation message will be displayed: “7.0L”, “7.6H”, “000%L”, “100%H”.

mV Read Value	Pump’s dosing capacity
≤ 7.0	0%
= 7.3	50%
≥ 7.6	100%

Now pump is ready to work. Display shows “S100%” (pulses). Pressing “UP” key display shows read mV. If the difference between “L” and “H” values is equal or minor to 4mV then pump will work into “on/off” mode.

### EXAMPLE OF DOSING AN ALKALINE CHEMICAL

Using the same programming procedure. The lowest pH value must be set for “H” setpoint and the highest for “L” setpoint. For example: 7.0H, 7.6L, 0%L, 100%H.

## Ph PROBE CALIBRATION

To perform this procedure two buffer solution are needed. Insert probe's connector into its relative input. Turn on the pump and set the pump into mV reading ("UP" key). Unscrew PG11 cap from pump's right side and locate the two trimmers. Before to dip probe into buffer solution it must be washed into water and then carefully dried. Remove cap from the probe. Dip probe into buffer solution (buffer solution must be "7pH"). Wait a stable reading then begin to rotate the lower trimmer using a 3x75 screwdriver until display will show 7pH value.

Press the navigational key to proceed to next calibration step and repeat the procedure using a 4pH buffer solution and rotate the higher trimmer using a 3x75 screwdriver until display will show 4pH value.

Screw back PG11 cap, keeping attention to the oring.

## MAINTENANCE

Every month (when in normal use) pump and accessories should be checked for proper operation.

For a correct maintenance, please perform following tasks:

- check electrical connections
- check liquid end screws
- check discharge line connections
- check discharge and suction valve connections
- check the entire liquid end for leakage
- check feed rate: run the pump for a short period in priming mode

## REPAIR



**All repair measures must be performed by authorized and qualified personnel. If pump needs to be repaired in manufacturer's factory send it only if it has been cleaned and after the liquid end has been rinsed!**

If, despite pump's emptying and cleaning, there are still possible safety hazards the information must be declared on return's form!



**If pump needs a replacement use only ORIGINAL spare parts!**

Replacing discharge valve:

- remove discharge line
- unscrew discharge valve from the liquid end
- remove oring from the liquid end
- screw in the new discharge valve with oring up to the stop
- refit discharge line

## QUICK TROUBLESHOOTING GUIDE

*If... pump does not work and green LED is off:*

- check power supply;
- verify that power supply conforms to the one shown on pump tag;
- check fuse and if needed replace it;
- in case all the above are OK, replace printed circuit board.

*If... pump does not work and red LED is off, displays shows "Tank Level":*

- check whether tank is empty;
- check that floating level switch and make sure it is not blocked;
- remove crystals generated by the product that can obstruct filter or level switch operation.

*If... pump does not work and solenoid is pulsing:*

- check that filter is not blocked by impurities or crystals;
- check whether air entered pump head and remove it as described in PRIMING section;
- check that discharge and suction valves are not blocked by impurities or crystals;
- verify that seals and o-rings are not worn, swollen or damaged. When this occurs, it is possible that the o-rings are incompatible with the additive (see o-ring section).

*If... pump fuse blows after short time working:*

- verify the power supply conforms to the one shown on pump tag;
- disconnect pcb from the solenoid and connect it to a lamp (make sure of proper voltage). Since all connections are of quick-lock type, it is a fast test to perform. If lamp does not light with intermittence, pcb must be replaced;
- check that solenoid impedance (electrical resistance) is within  $\pm 5\%$  of value shown on the tag placed on the solenoid.

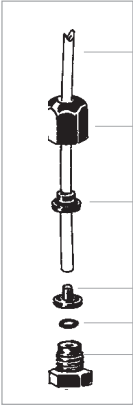
*If... pump provides wrong measurement (PH/RH model):*

- verify correct reading operation using a buffer solution;
- replace electrode if necessary.

## O-RINGS

The valve sealings are provided in 5 different types to satisfy different chemical compatibility issues. The elastomer that will best fit the requested needings can be found on the manufacturer compatibility table. Get in touch with customer support if needed. The elastomer used for the o-rings equipping the "CMS Digital" pumps are characterized by different suction/delivery valve colours.

<i>Elastomer</i>	<i>ISO Code</i>	<i>Manufacturer Code</i>	<i>Valve Colour</i>
Fluorocarbon	FPM	FP	black
Ethylenepropylene	EPDM	EP	grey
Polytetrafluoroethylene	PTFE	PTFE	blue
Nitrile	NBR	WAX	green
Silicone	MVQ	SI	yellow



Discharge hose (PE Hard)

Hose nut

Clamping ring

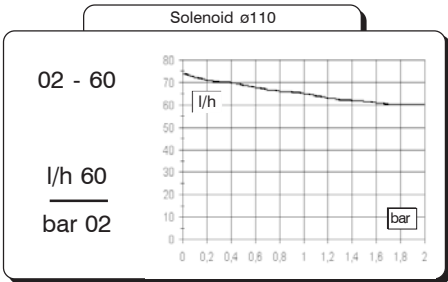
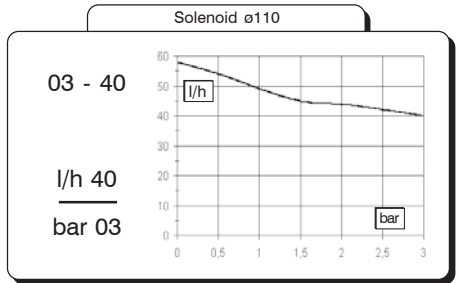
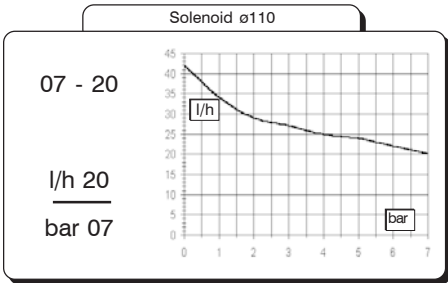
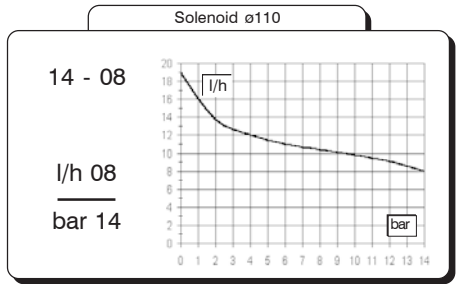
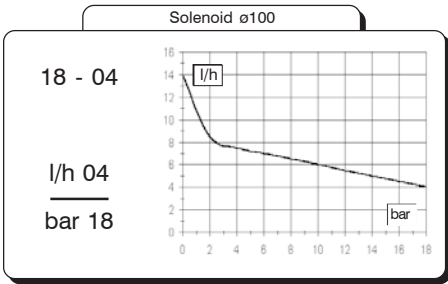
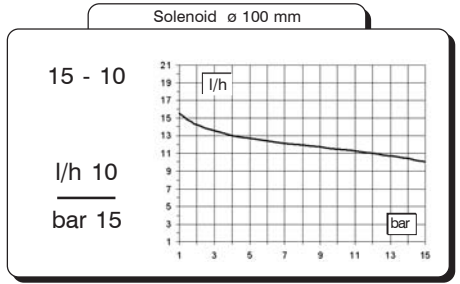
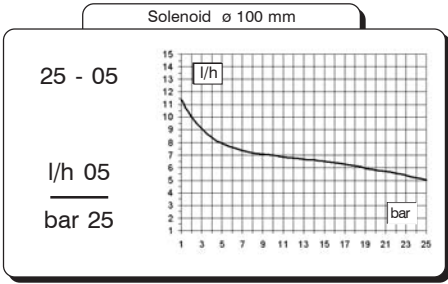
Nozzle

O-ring

Discharge valve connection

Flow	Max Capacity l/h	Max Pressure bar	Capacity l/h	Pressure bar	ml stroke	Strokes/min	Hoses mm	Watt W	Shipping weight Kg
<b>25 05</b>	5 l/h	25	7	12,5	0,70	120	4 x 8 PE	42 W	9
<b>15 10</b>	10 l/h	15	12	7,5	1,4	120	4 x 8 PE	42 W	9
<b>07 20</b>	20 l/h	7	27	3,5	2,8	120	6 x 8 PE	42 W	9
<b>03 40</b>	40 l/h	3	45	1,5	5,6	120	8 x 12 PE	42 W	9
<b>02 60</b>	60 l/h	2	66	1	8,4	120	8 x 12 PE	42 W	9

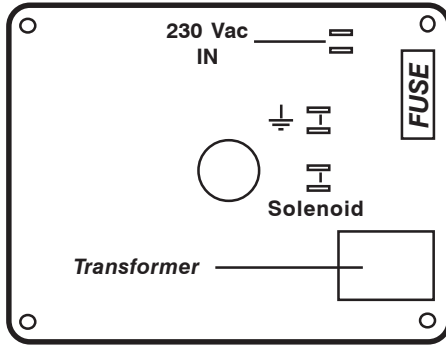
# Delivery Curves



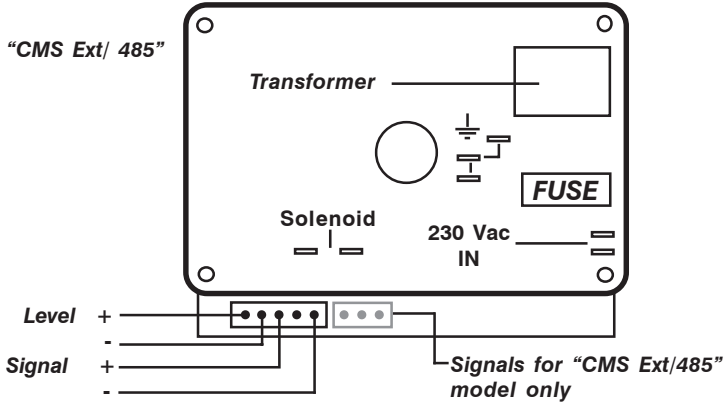
Flow rate indicated for H<sub>2</sub>O at 20 °C at the rated pressure. Dosing accuracy  $\pm 2\%$  at constant pressure  $\pm 0,5$  bar.

# Circuit Board Connections

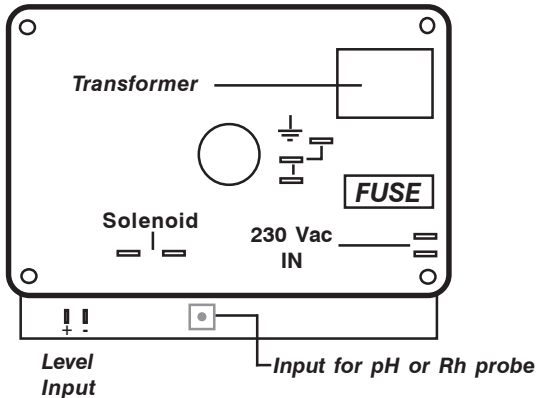
**Mod. "CMS Man"**



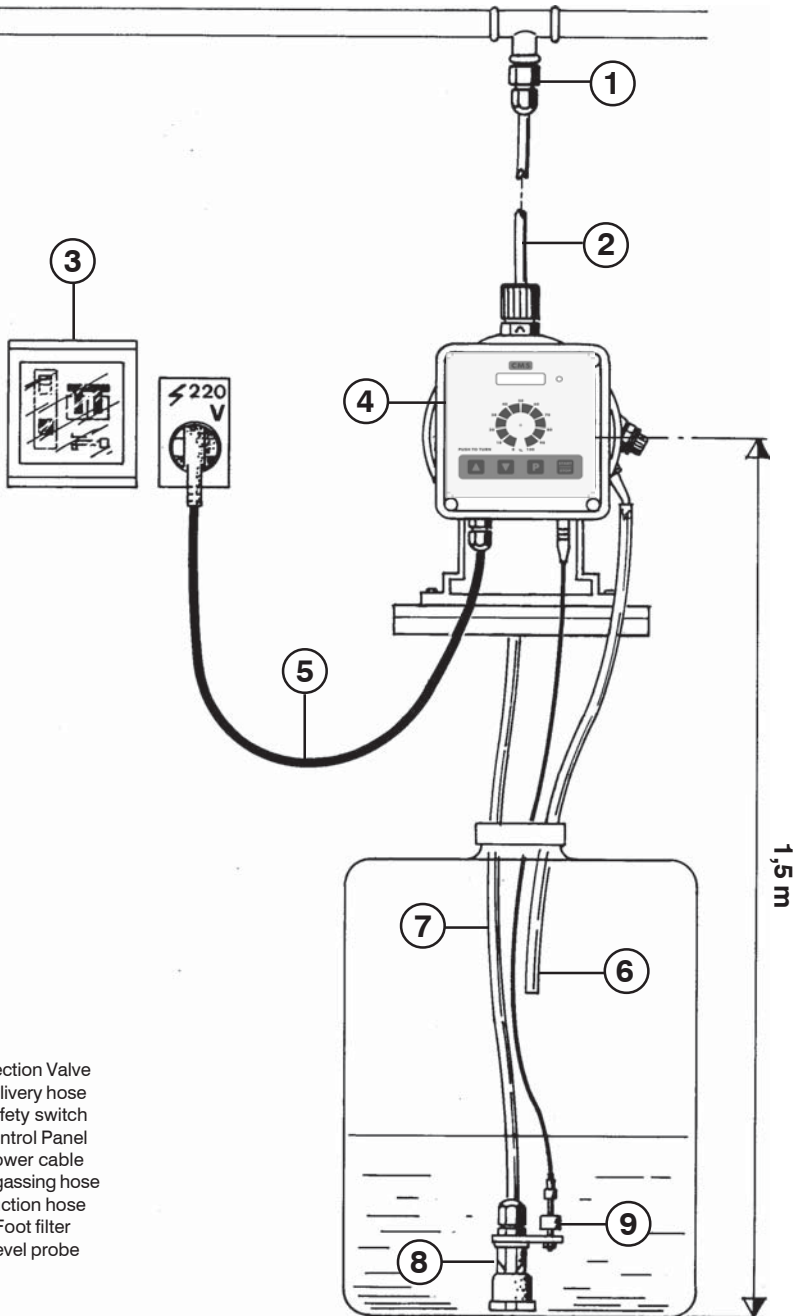
**Mod. "CMS Ext/ 485"**



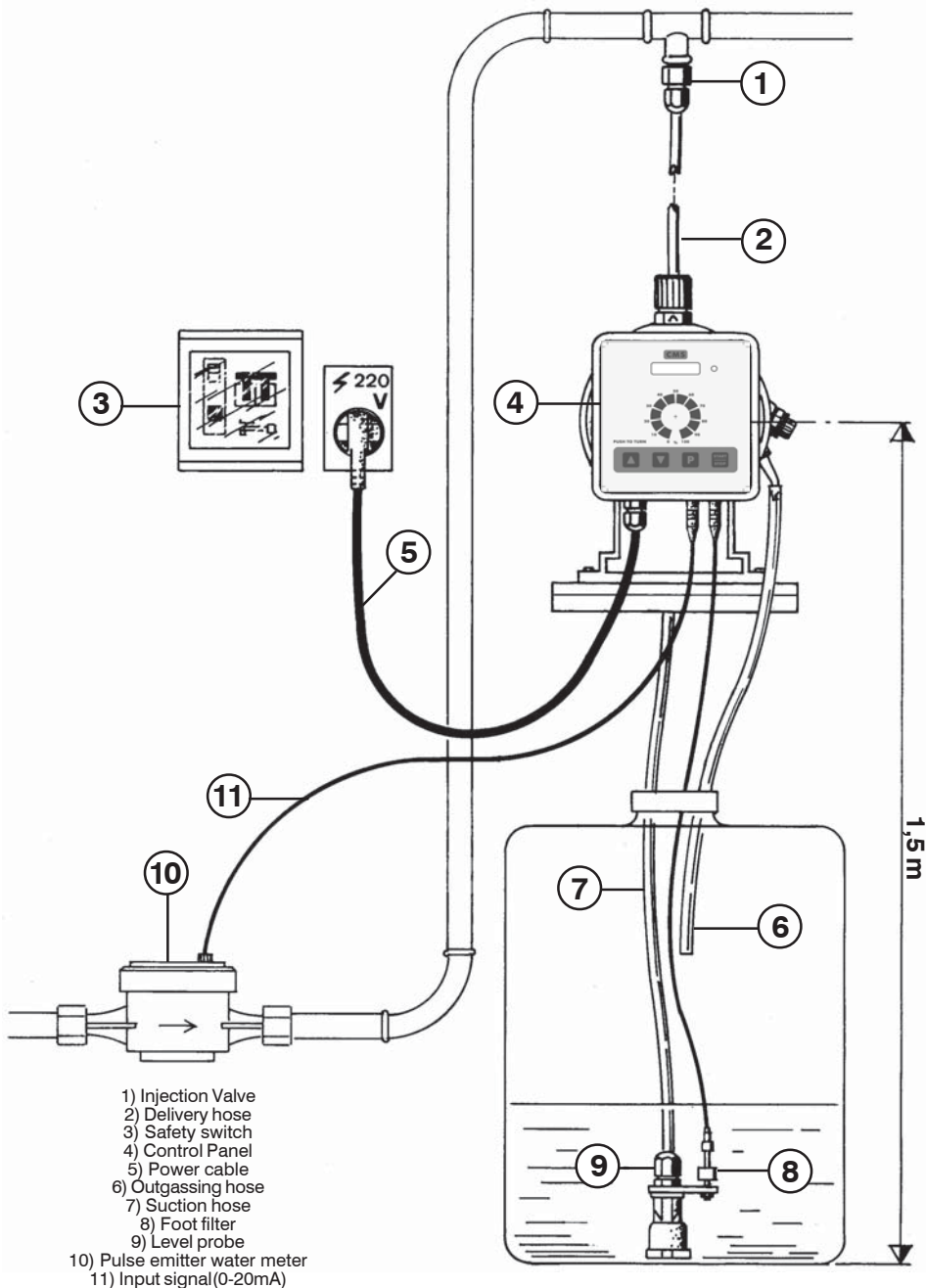
**Mod. "CMS pH / Rh"**



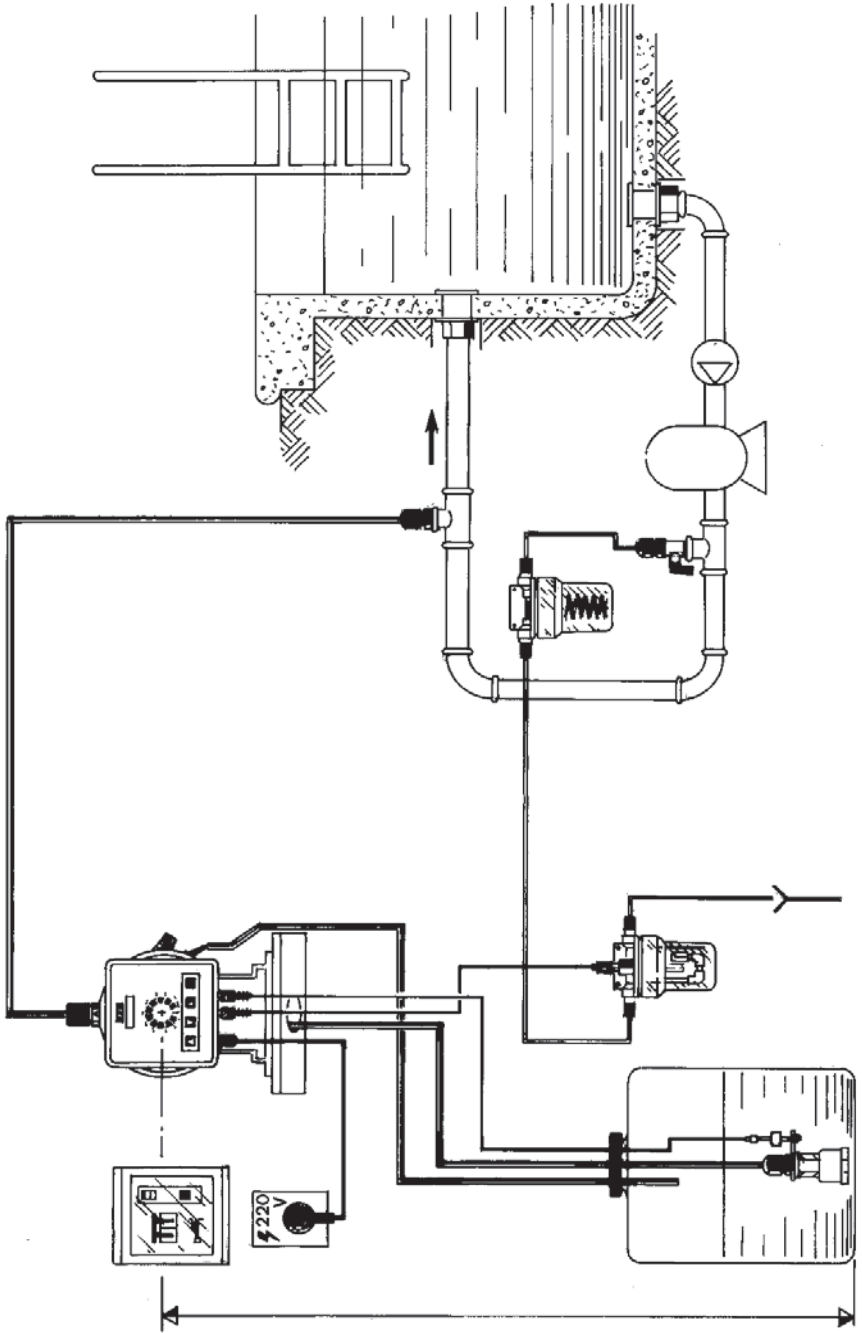
Installation draw for "CMS MAN" metering pump



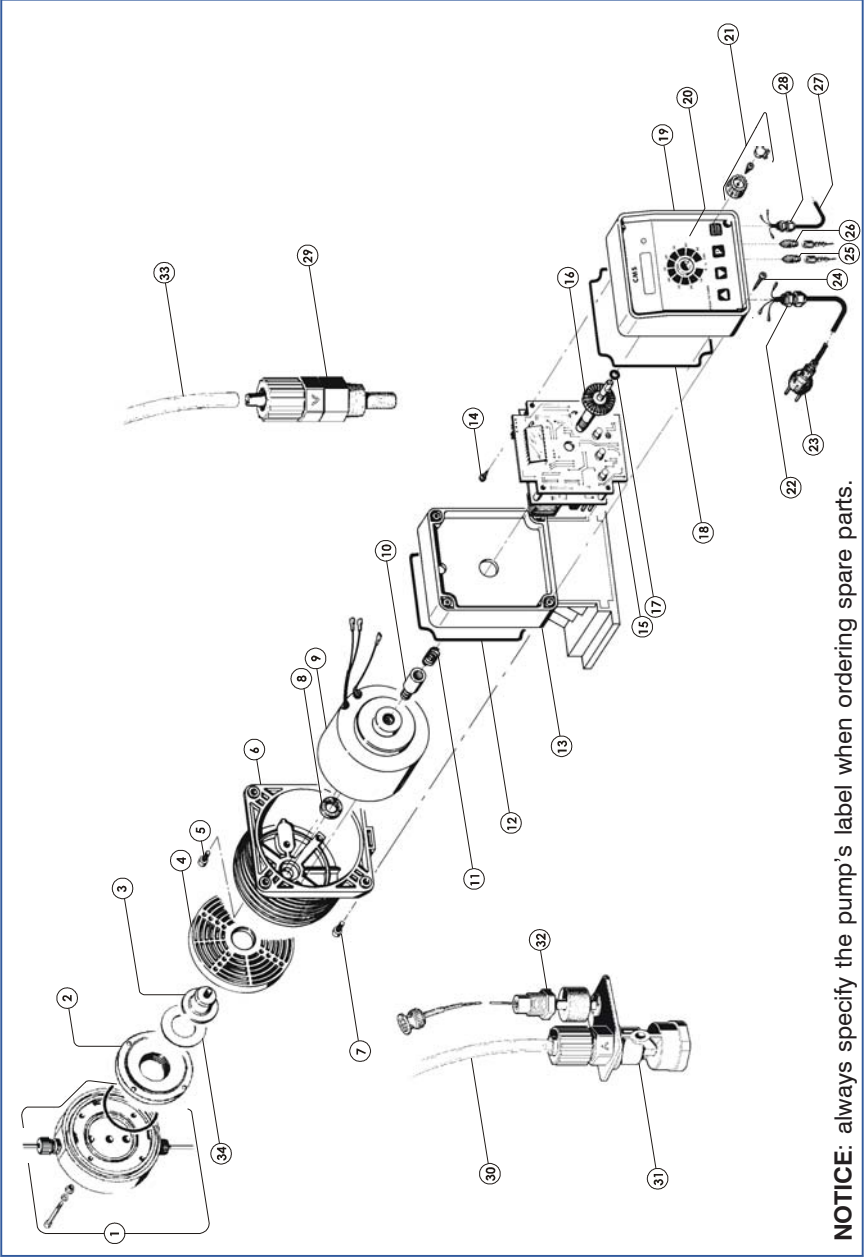
— Installation draw for Mod. "CMS EXT" metering pump —



Example of installation for "CMS PH / RH" models



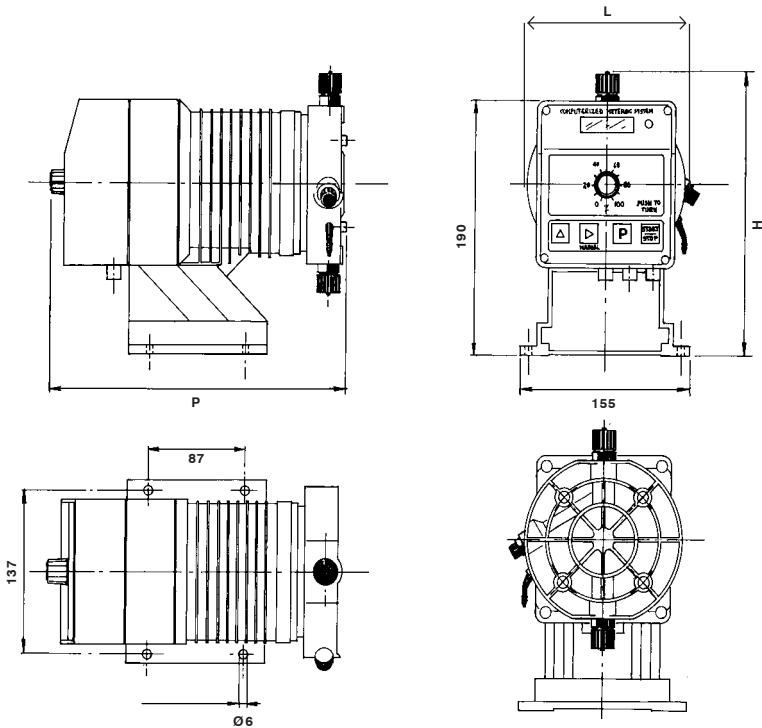
Exploded view



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

# Dimensions

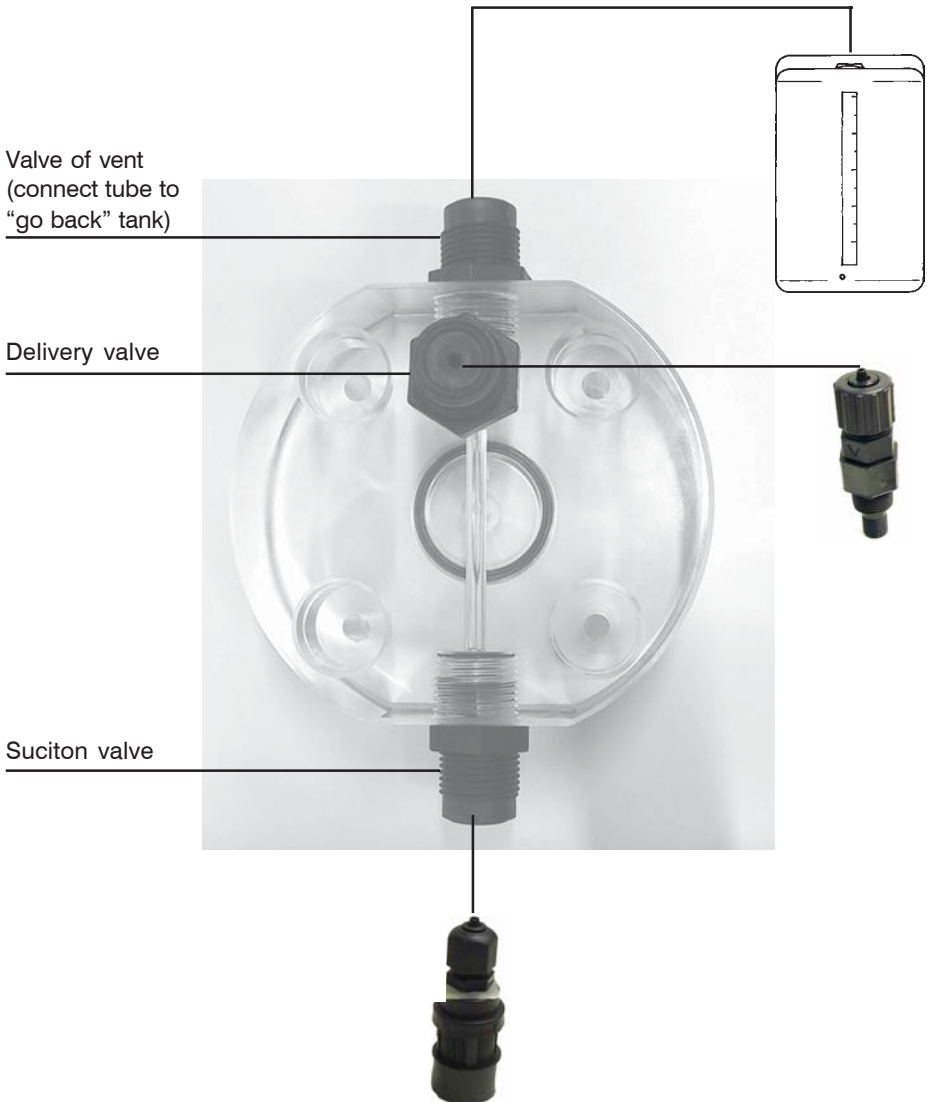
Pump Model		Ø22	Ø32	Ø44	Ø58	Ø64
Net weight	<b>Kg.</b>	6,0	7,5	7,5	8,0	8,0
Length (L)	<b>mm</b>	125	125	145	175	175
High (H)	<b>mm</b>	210	210	240	250	250
Width (P)	<b>mm</b>	300	300	300	300	300
Consumption	<b>W</b>	40	50	50	50	50



## Self-venting pump head

This pump head removes the gas from gaseous chemicals during operation, independently of back pressure.

Attention: valves cannot be changed from their original position.











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