



## MULTIFUNCTION DOSING PUMPS



**BT MF**



**BTB MF**

# INSTRUCTION MANUAL



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## 1. Technical features

### 1.1 Electric features

Power supply	230 Vac 50/60 Hz	110 Vac 50/60 Hz
Power consumption	55 W	
Electric current consumption	0,3 A	
Peak current	2,4 A	

### 1.2 Operating functions

<b>Manual</b>	<p>The pump can be programmed to operate on one of the following ways:</p> <p><b>0 – 120 (BTB), 0 - 160/180 (BT) pump pulses per minute</b>  <b>0 – 120 (BTB, BT) pump pulses per hour</b>  <b>0 – 48 (BTB, BT) pump pulses per day</b></p>
<b>1xN</b>	<p>When a contact water meter is connected to the pump, every pulse signal received water meter will cause the pump to pulse N times.</p> <p><b>0 – 999 pump pulses for each water meter signal received</b>  <b>0 – 120 (BTB), 0 - 160/180 (BT) pump pulses per minute (frequency setting)</b></p>
<b>1xN(M)</b>	<p>Every pulse signal received from a water meter contact will cause the pump to pulse N times. While the pump is pulsing, it still registers all further water meter signals received (M) and translates them into successive pump pulses</p> <p><b>0 – 999 pump pulses (value of N) for each water meter signal received</b></p>
<b>1 : N</b>	<p>When a contact water meter is connected to the pump, every N number of pulse signals received from the contact water meter will cause the pump to pulse once</p> <p><b>0 - 999 water meter signals received (value of N) to effect one pump pulse</b></p>
<b>MA</b>	<p>A 4-20 mA signal fed to the pump adjusts the pump pulse rate from 0-100 pulses per minute respectively</p> <p><b>0 – 20 Ma</b>  <b>0 – 120 (BTB), 0 - 160/180 (BT) pump pulses per minute</b>          At the minimum and maximum full range adjustment:          Stop/Continue</p>

**PPM** User can set the following parameters:  
**Water meter liter/contacts** 0.1, 0.25, 0.5, 1, 2.5, 5, 10, 25, 50, 100, 250, 500, 1000.  
**cc/injection** 0.00 - 20.00  
**Concentration of solution (%)**  
**PPM** 0.1 – 20000

### 1.3 Accessories functions

**Flow Alarm** A flow sensor (optional) checks the actual pump flow and activates an alarm should the actual flow stop  
**Reference injections** 0 - 100 (BTB, BT)  
**Max injection difference** 0 - 100 (BTB, BT)

**Remote control** Ability to remote control the pump operation state (Start/Stop)  
**Normal and/or Reversed polarity**

**Buzzer** Audible alarm for missed pump pulses  
**Enabled / Disabled**

**Clock** Date and time  
day/month/year  
hour/minutes  
Clock holds its settings in the case of power failure of up to 15 hours. At the first use, with the purpose to allow a correct charge of the internal battery, it is necessary to power the pump for at least 4-5 hours.

**Timer** Built-in weekly and daily timer  
**8 cycles of daily on/off operation. Setting to the minute**

**Language** Menu languages choice  
**Italian / English**

**Serial Line Connection (RS 232)** Connection to personal computer via serial line  
**ASCI 8bit**

### 1.4 Control panel

**16 x 2 alphanumeric display** Illuminated

**Bicolor green/red Led** Operative green  
Red stand-by

**red Led** Injection

**yellow Led** Alarm maximum injection difference, overcome / missed feeding from the electric net

## 1.5 FACTORY SETTINGS

### Pulses electromagnet characteristics

Pulse duration mSec.:	80 (BTB), 90 (BT) (user can not change it)
Max pulses frequency / minute:	120 (BTB), 160 (BT), 180 (high flow rate BT)
Max pulses frequency / hour:	120 (BTB, BT)
Max pulses frequency / day:	48 (BTB, BT)

### Connectors input characteristics

Min contact duration mSec.:	10
Max contact number / second:	40

### Characteristics / “mA” function selection

Ampere meter accuracy:	0,1 mA
Setting mA (1) SET 1:	4,0 mA
Setting mA (2) SET 2:	20,0 mA
Pulses/minute (1) SET 1:	0
Pulses/minute (2) SET 2:	120 (BTB), 160 (BT) , 180 (high flow rate BT)
Below mA (1) SET 1:	Stop
Above mA (2) SET 2:	Stop

### Serial Line Connection (RS 232)

Baud rate:	19200
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### Remote control

Closing /opening delay contact:	3 seconds
Polarity	Normal

## Wiring connection

### BT MF



*bottom view*

### BTB - MF

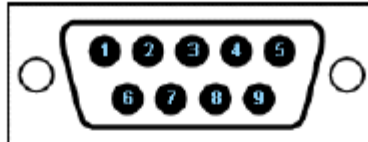


*front view*

- 1 Relay output (1 normally open - normally closed - 3 common)
- 2 Flow sensor (1 - 2) & Remote control/floating level switch (3 - 4)
- 3 mA input [(+)1 - (-)2] & Water meter (3-4)
- 4 RS232[1(tx) - 2(rx) - 3(gnd)]

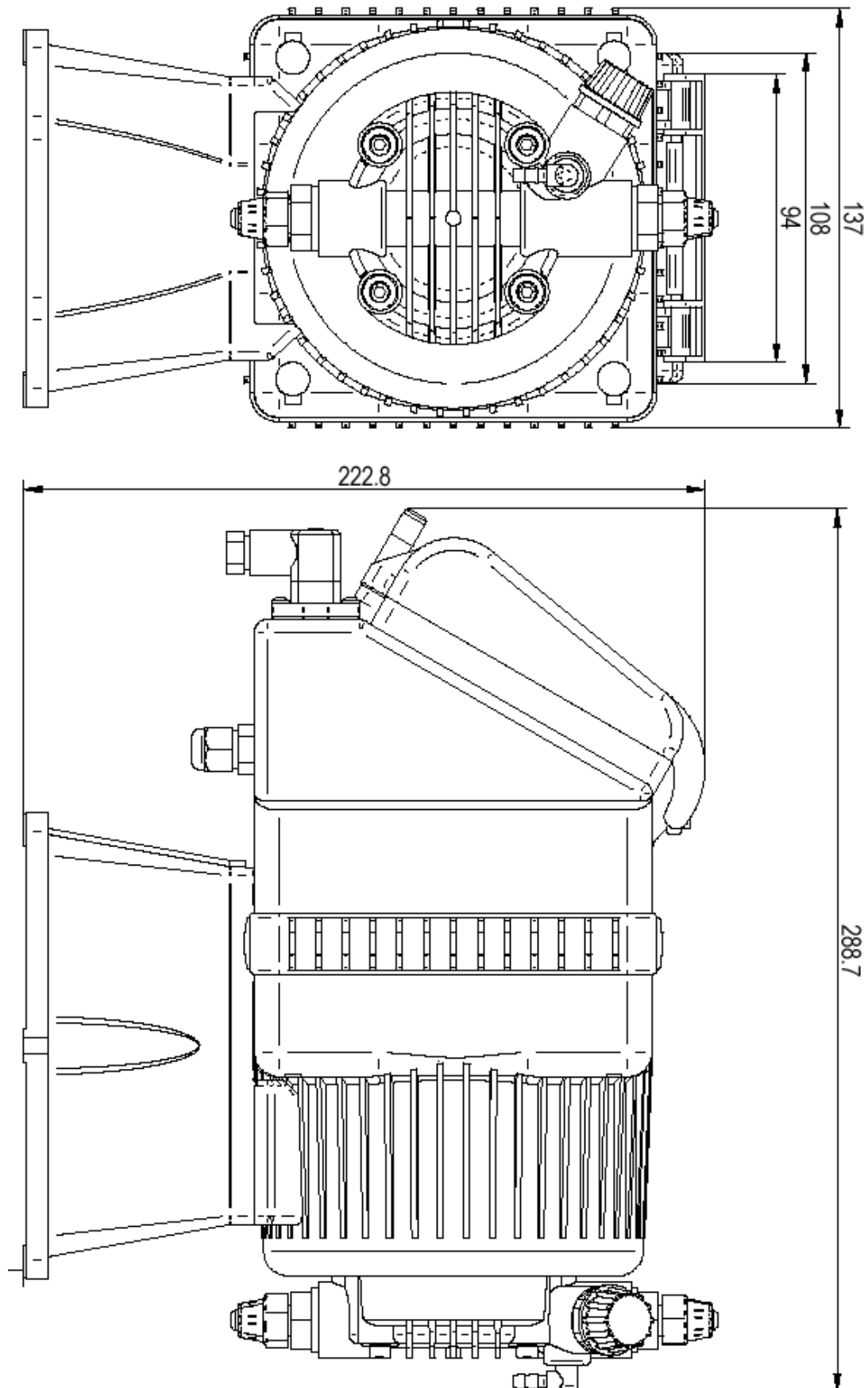


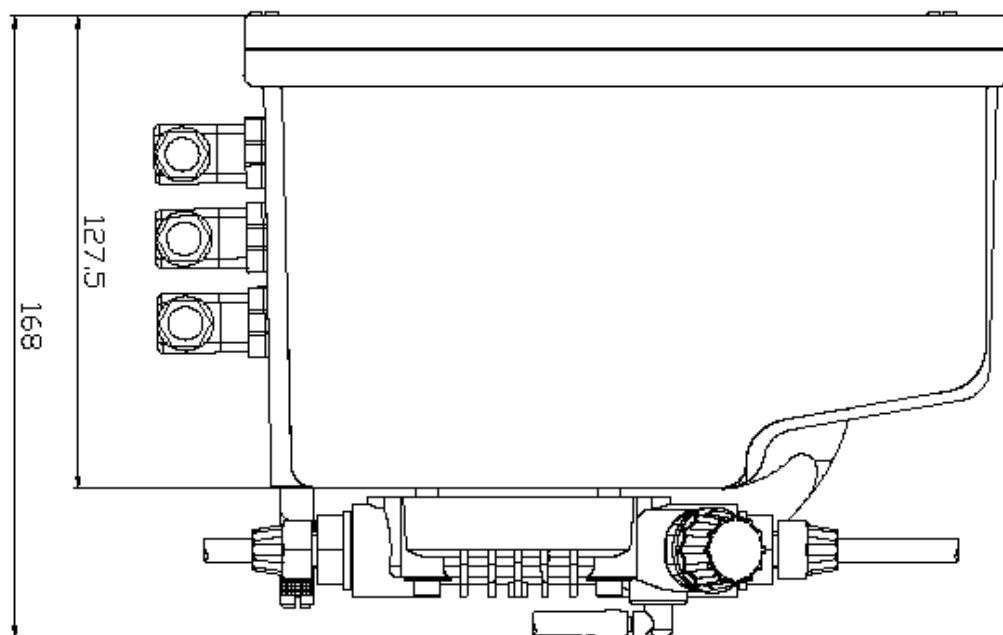
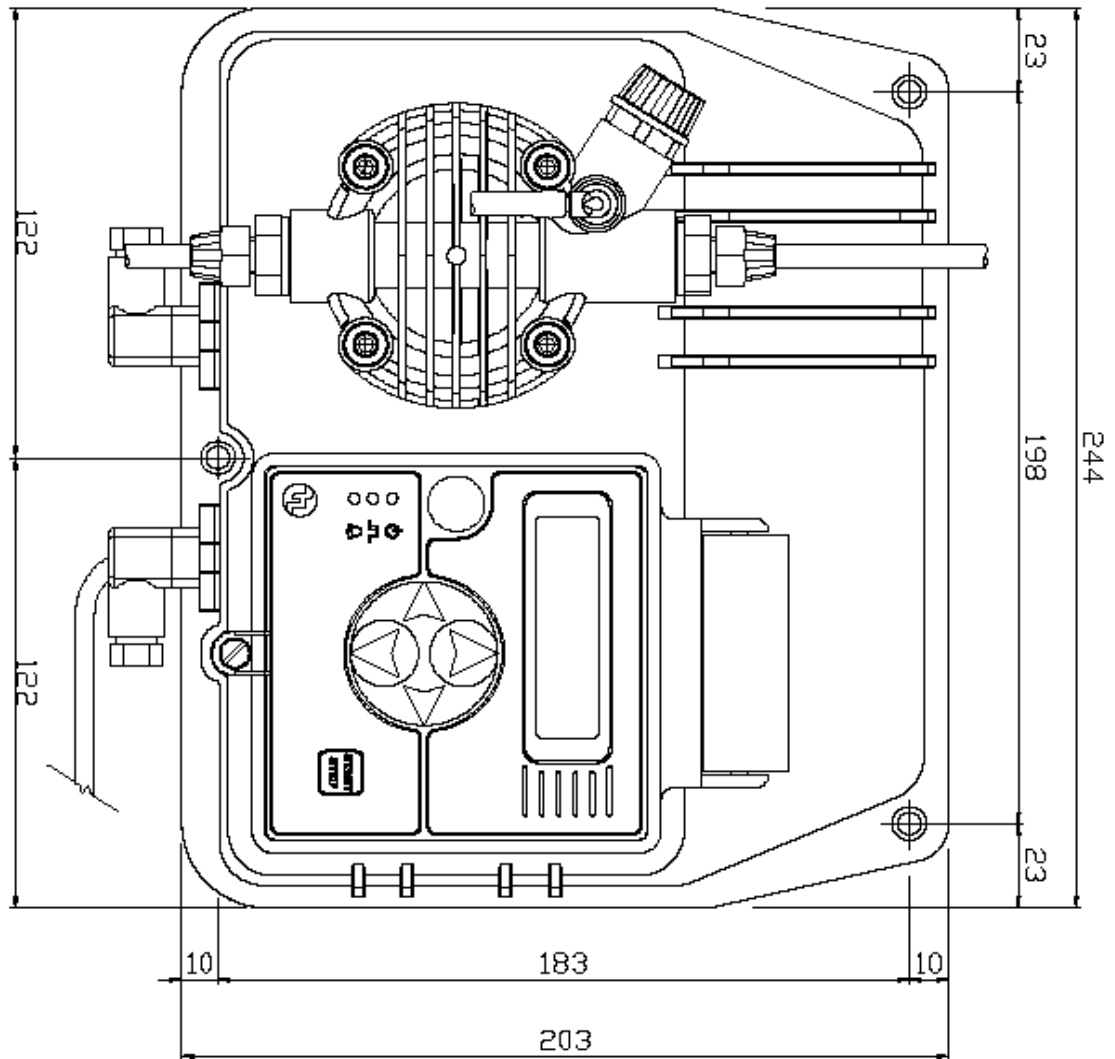
## RS232 CONNECTOR



Contatto N° Contact no.	Codice Code	Descrizione Description
1	CD (oppure DCD)	Rivelatore Carrier Dati (Carrier Detect)
2	RxD	Ricezione Dati (Receive Data)
3	TxD	Trasmissione Dati (Transmit Data)
4	DTR	Terminale Dati pronto (Data Terminal ready)
5	GND	Massa Segnali (Signal Ground)
6	DSR	Data Set pronto (Data Set ready)
7	RTS	Richiesta di trasmissione (Request to send)
8	CTS	Clear to Send
9	RI	Ring Indicator

## OVERALL DIMENSION





## 2. DESCRIPTION OF OPERATING MODE

### 2.1 Manual

In this mode, the pump operates with its flow rate manually controlled with the keypad. Stroke rate can be set in three ways:

- Pulses per minute (this is common for normal metering pump operations).
- Pulses per hour.
- Pulses per day.

### 2.2 1 x N

When a contact water meter is connected to the pump, every pulse received from the water meter causes the pump to pulse N times. With the keypad, the user sets these parameters:

- The value of N, the number of pump pulses for each water meter pulse received.
- Pump stroke rate, how fast the N pulses will occur.

While the pump is still pulsing, further water meter pulses received are ignored.

Example:

- Pump in "1 x n" mode.
- N set to "23".
- The moment the water meter or other device emits a pulse, the pump starts dispensing 23 injections. If the contact is closed again during this phase, these are ignored.
- On completion of the 23 injections, the pump waits for the next pulse to restart the dispensing cycle.

### 2.3 1 X N(M)

This is the same as "1 X N" operation (2.2 above), except that while the pump is still pulsing, further water meter pulses (M) received are registered. Thus, the total number of pump pulses are 1 X N(M). The values of N and M are set by the user.

Example:

- Pump in "1 x n (M)" mode.
- N set to "23".
- The moment the water meter emits a pulse, the pump will effect 23 injections. If the contact closes again during this phase, e.g. 5 times, the microprocessor multiplies the two data and the pump supplies 115 injections (23 x 5).
- On completion of the 115 injections, the pump waits for the next external pulse to restart the dispensing cycle.

### 2.4 1/N

In this mode, N number of water meter pulses received will activate the pump to pulse once. The value of N is set by the user.

Example:

- Pump in "1 / n" mode.
- N set to "23".
- The moment the water meter or other device has emitted 23 pulses, the pump gives an injection.

### 2.5 MA

In this mode, the pump accepts an incoming 0-20 mA signal to control its stroke rate. This allows for remote and proportional control. From the pump control panel, the user sets the following:

- 1- "Set 1", the value in mA which the pump should start pumping, eg. 0.0 mA, 4.0 mA, etc.
- 2- "Set 2", the value in mA which the pump should stop pumping, eg. 18.0 mA, 20.0 mA, etc.

3- The pump stroke rate at "Set 1", eg. 4.0 mA = 0 strokes/minute, etc.

4- The pump stroke rate at "Set 2", eg. 20.0 mA = 120 or 160 strokes/minute, etc.

5- Whether the pump should continue working or stop if the incoming signal falls below "Set 1".

6- Whether the pump should continue working or stop if the incoming signal rise above "Set 2".

In this mode, pump stroke rate (and thus stroke rate) is proportional for all mA values between "Set 1" and "Set 2". Since Set 1 and Set 2 can be independently set, reverse signal input operation (e.g. 20-4 mA) is also possible. For example:

Set 1 = 20 mA at 0% of pump flow rate.

Set 2 = 4 mA at 100% of pump flow rate.

## 2.6 PPM

The PPM (parts per million) mode allows for very accurate chemical dosage. The pump must be connected to a contact water meter for this function to work. The user uses the pump keypad to program the following:

- Input of contact water meter details in litres per pulse: 0.1, 0.25, 0.5, 1, 2.5, 5, 10, 25, 50, 100, 250, 500 or 1,000 litres per pulse.

- The volume per pump pulse, from 0.01 to 20.00 cc. Our pumps have cc/pulse ratings, but for greater accuracy due difference in liquid properties, the user would need to calibrate the volume of each pump pulse at site, using a measuring cylinder.

- Concentration of the chemical solution being pumped (% solution), eg. 5% Sodium Hydroxide, 98% Sulphuric Acid, etc.

- PPM desired, from 0.1 to 20,000 p.p.m.

Using the information above, the microprocessor in the pump will calculate accurately the number of pump pulses per volume of water which passes through the water meter.

## 3. DESCRIPTION OF ADDITIONAL FEATURES

### 3.1 Flow Alarm with flow sensor (optional)

Should the pump fail to pulse for any reason (fault), an alarm buzzer sounds to warn the user. The pump then stops by itself and a yellow warning LED comes on, signaling that it needs the user's attention. The relay output (connector no. 1) is activated. The tolerance limit for the activation of this alarm to be activated can be set by the user (the number of missed pulses before the alarm comes on).

**Reference pulses:** periodic break between a control and the following one.

**Max count diff.:** maximum pulses to which does not correspond liquid injection from the pump.

Example:

a) Reference value set by user = 100 pulses.

b) Maximum allowed variance = 12 pulses.

c) Actual pulses detected by the pump = X pulses.

If  $100 - X > \text{or} = 12$ , then the pump will produce an audible alarm (buzzer). At the same time, the output relay will also be energized.

### 3.2 Remote Control

This function allows the user to activate or de-activate the pump from a maximum distance of 100 meters away, using a contact switch. Two different polarities are available.

**Direct:** switch closed - pump stand by; switch open - pump on.

**Reverse:** switch closed - pump on; switch open - pump stand by

A float switch (level switch) connected to No. 2 of the wiring diagram will allow the pump to detect low feed tank levels and automatically stop the pump.

### 3.3 Buzzer

The pump is fitted with an acoustic alarm to warn the user (see paragraph 3.1, Flow Alarm). This sound alarm can be manually disabled if so desired.

### 3.4 Clock

An on-screen clock is standard. This gives additional functions to the pump (eg. timer - see paragraph 3.5). The clock shows the following information:

- Time in hh:mm (hours:minutes) format
- Day
- Date
- Month
- Year

### 3.5 Timer

An in-built timer allows the user to program dosing cycles as follows:

- **Timer Disabled:** Pump works in manual mode without timer influence.
- **Daily Timer:** The user can program up to 8 start/stop cycles per day.
- **Weekly Timer:** The user can program up to 8 start/stop cycles per week.

## 4. Troubleshooting for electrical problems

### 4.1 Display off, no LED light on

Check power supply line (AC plug, power cord, fuse and connections). If not working please contact the nearest assistance center

### 4.2 Display on, red LED (power/stand by) on, pump not operational

Check whole programming data's previously inserted or push the Start/Stop button.

### 4.3 Pump pulses are not constant

Check that supply voltage is within +/- 10% of rated voltage

### 4.4 Pump memory not working

Power up the pump for 4 to 5 hours to allow the internal battery to charge up (this is especially important during first start-up). If problem persist contact the nearest assistance center.

### 4.5 Floating switch (tank level sensor) not working

- a. Check that the connection between level probe and pump is securely fastened.
- b. If problem persist make a short connection between pin #3 and pin #4 on the second connector at the pump body. In case that the pump makes the alarm substitute the whole level probe unit, on the contrary contact the nearest assistance center.

### 4.6 Pump not working when water meter modes 1XN, 1XN(M) and 1/N are selected

- a. Check that the connection between the water meter cable and pump is securely fastened.
- b. This function can be tested by selecting the 1 x N mode (choose a value of N), removing the water meter cable, then short-circuiting pins 3 and 4 on the pump connector for one second. The pump should pulse N times.

### 4.7 Pump alarm not working when connected with flow-sensing device

- a. Check that the connection between the flow-sending device and pump is securely fastened.
- b. Check that the pump is primed - the pump head should be filled with liquid.

- c. Start the pump again. If the alarm persist use a spring loaded on/off switch (the one with normally open contact) connect to #2 pump connector (pin #1 and #2) than follow instruction in section d.

Select from the menu screen the manual mode. Set 30 pulses/minute; subsequently in the alarm menu set 4 reference pulses of and 1 the max difference therefore press start/stop: the pump will start working in manual way (turned on green led and flashing red led of the pulses). For every pump pulses press the on/off switch button to simulate the flow sensor: if the pump doesn't put itself in alarm, replace the flow sensor. In the case in which the pump goes in alarm simulating the flow sensor with the button to turn please contact the nearest assistance center

## 5. Restoration of default parameters

For any reasons if user want to erase all the parameters set and re-start the pump to the default set, it is necessary to press the START/STOP button and then press contemporarily UP and DOWN arrows.





When START/STOP button will be press the pump will have the default setting.

In this way all the parameters set will be annulled.

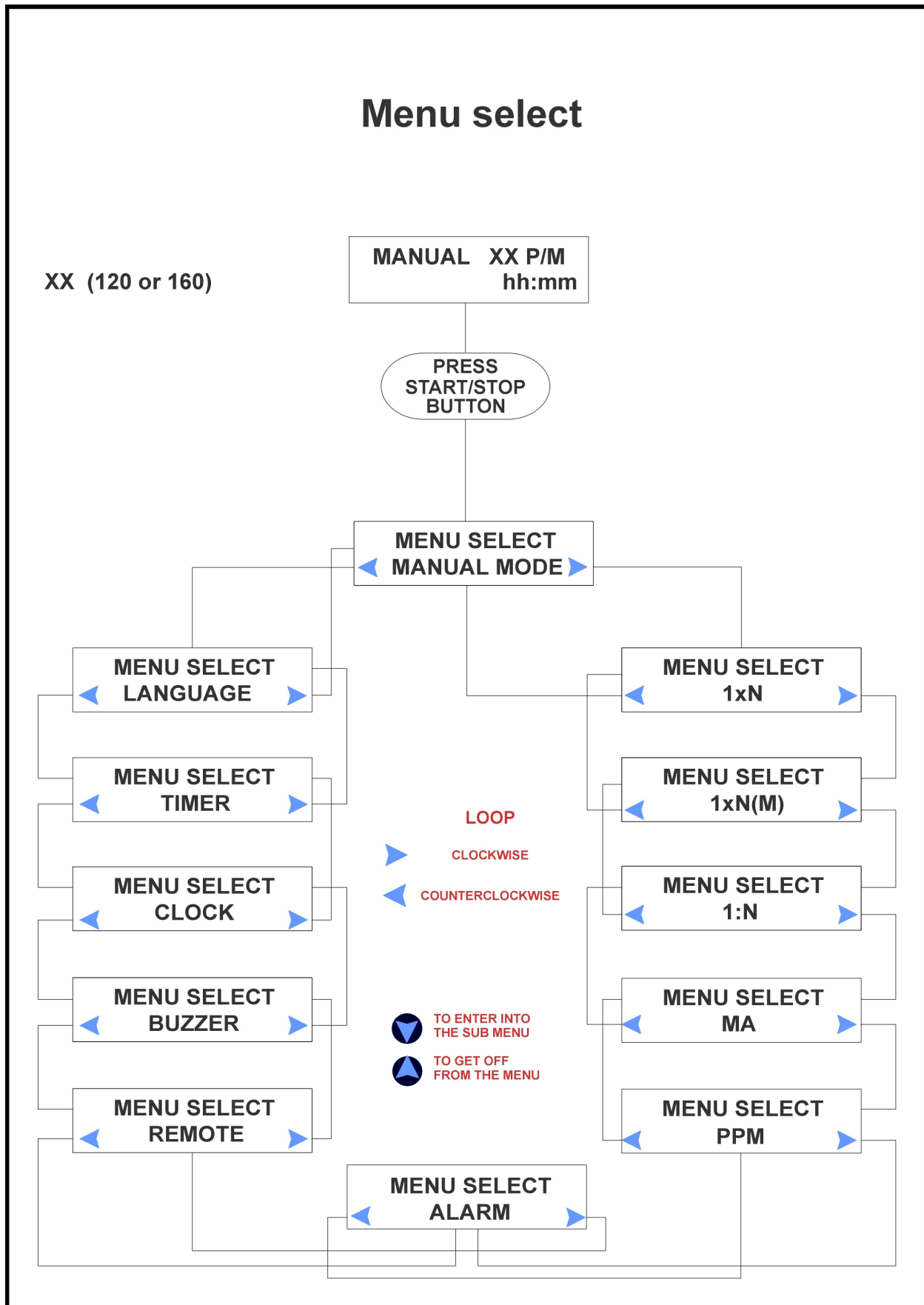
### 5.1 Keypad Description:

There are five keys on the pump control panel, as described in the illustration below. With these keys, the user can access to every function of the pump.

For simplicity, control panel operations have been illustrated in flow-chart form, see Appendix A.

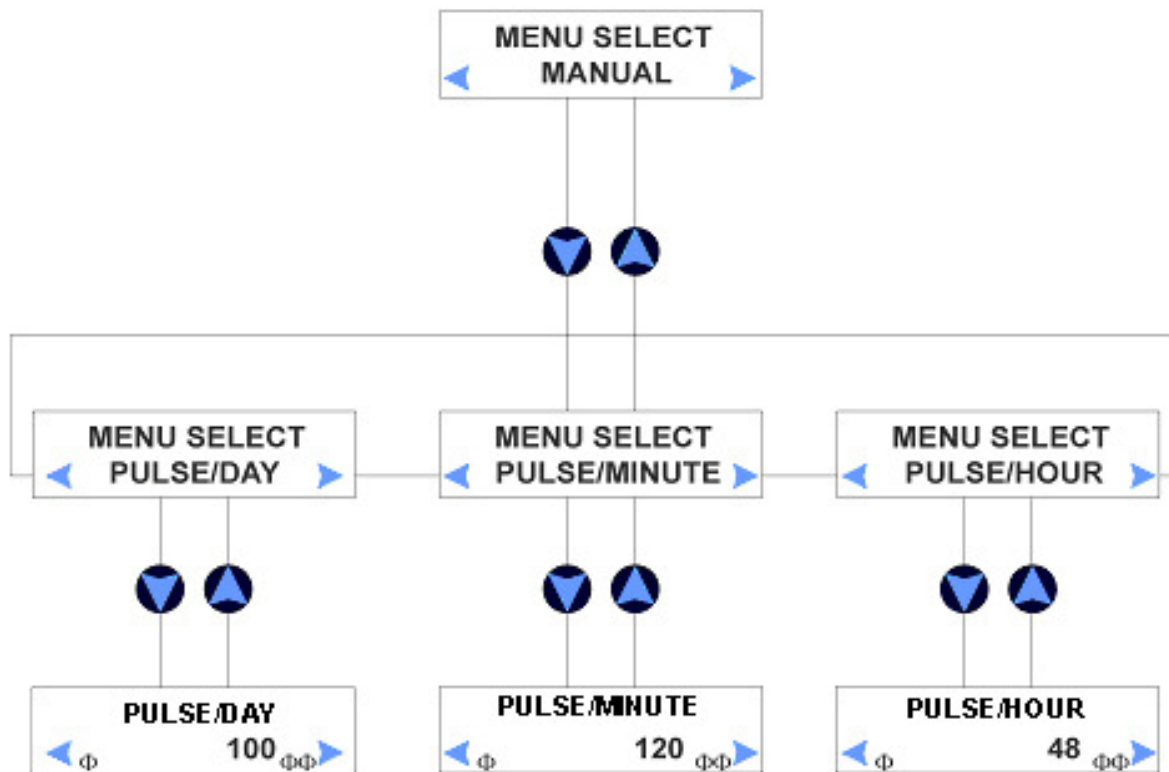
	<b>NEXT:</b> Go to next step in programming sequence
	<b>PREVIOUS:</b> Go back a step in programming sequence
	<b>LEFT:</b> move to the left of the planning menu or numerical parameter reduction button
	<b>RIGTH:</b> move to the right of the planning menu or numerical parameter increase button
<b>START STOP</b>	<b>START/STOP:</b> active or put in stand and let in or out the programming menu

## APPENDIX A: flow chart





## MANUAL MENU



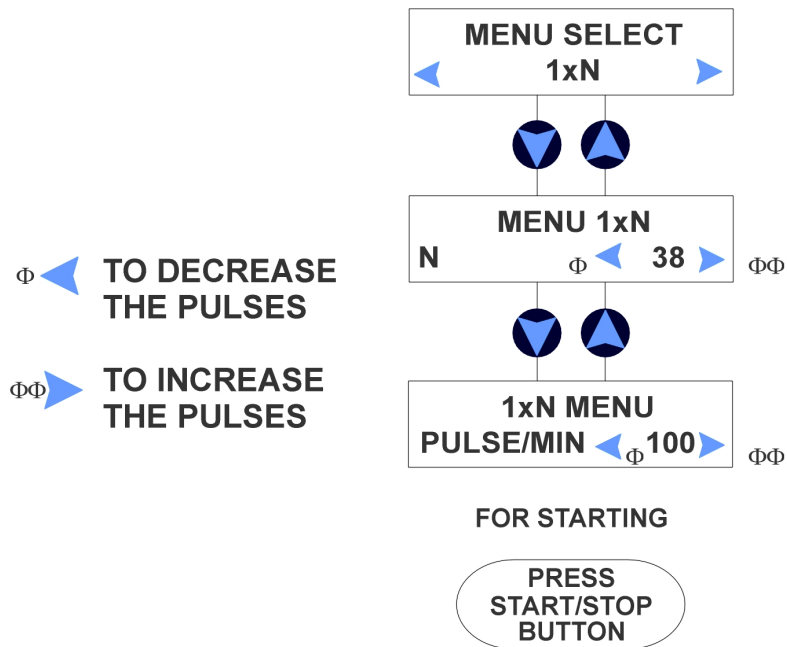
FOR STARTING

◀ TO DECREASE  
THE PULSES

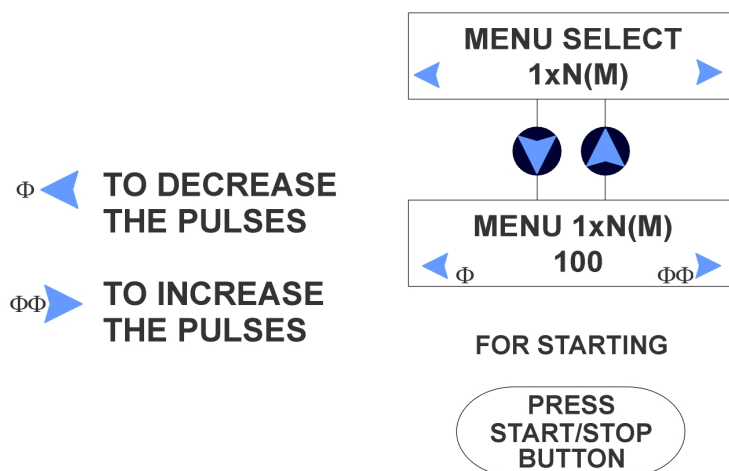
▶ TO INCREASE  
THE PULSES

PRESS  
START/STOP  
BUTTON

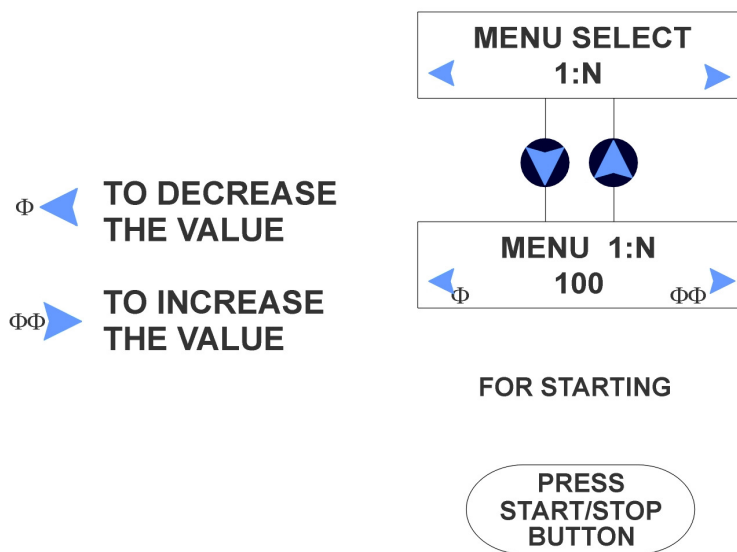
## 1xN Menu



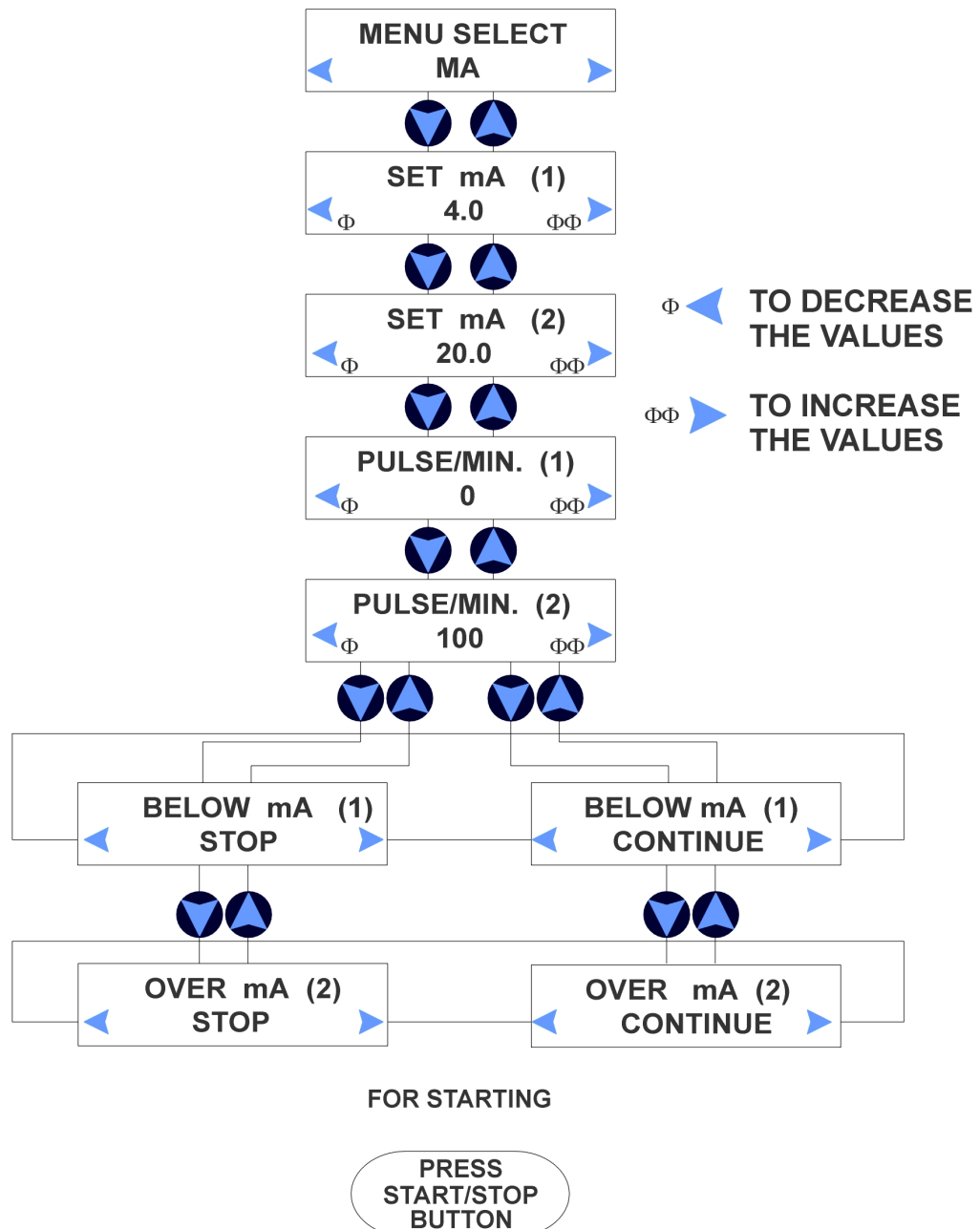
## 1xN(M) Menu



## 1:N Menu

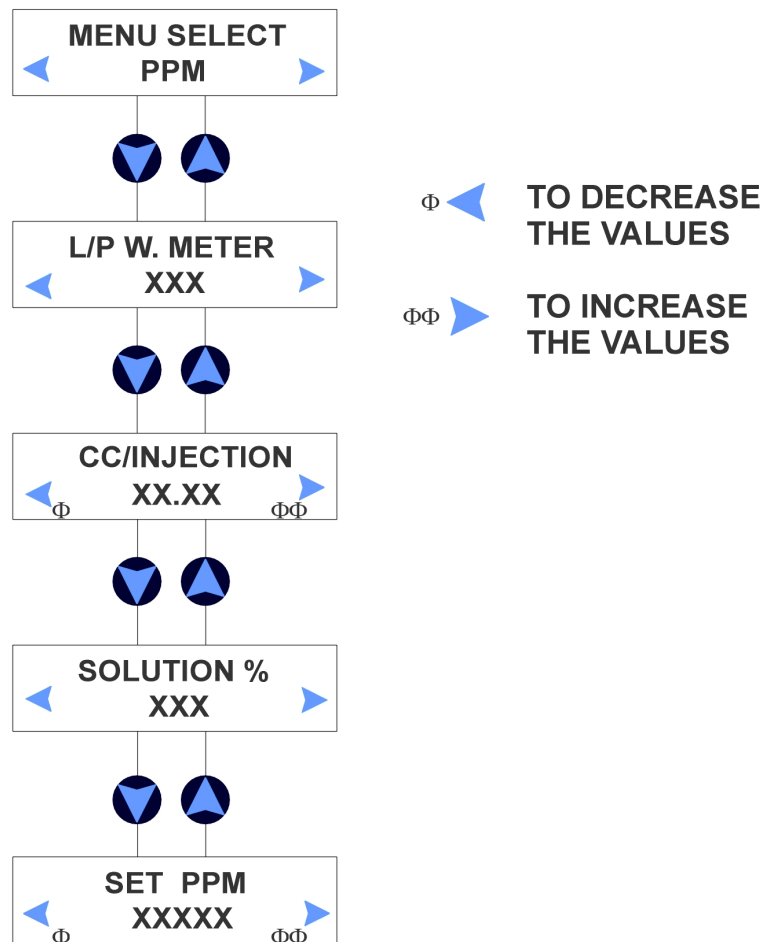


## mA Menu



## PPM Menu

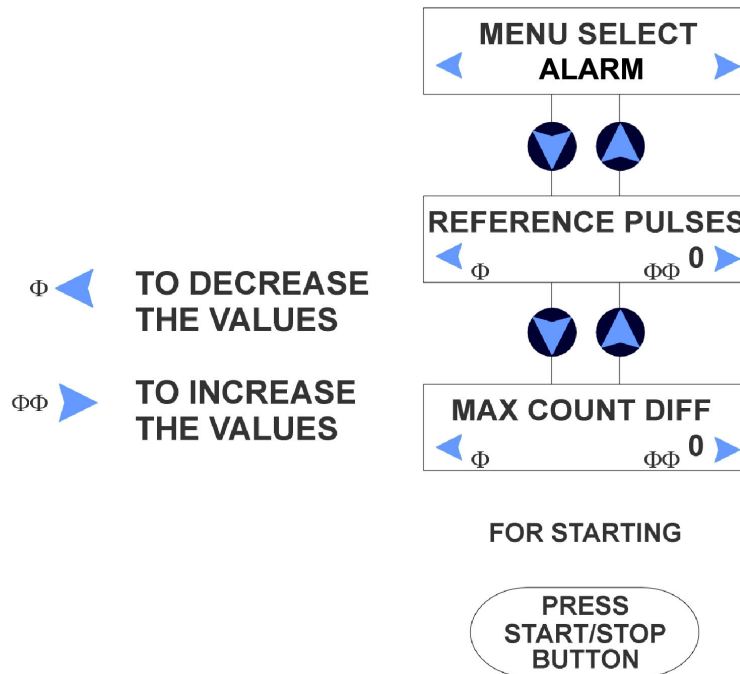
NOTE : L/P = LITER PER PULSE



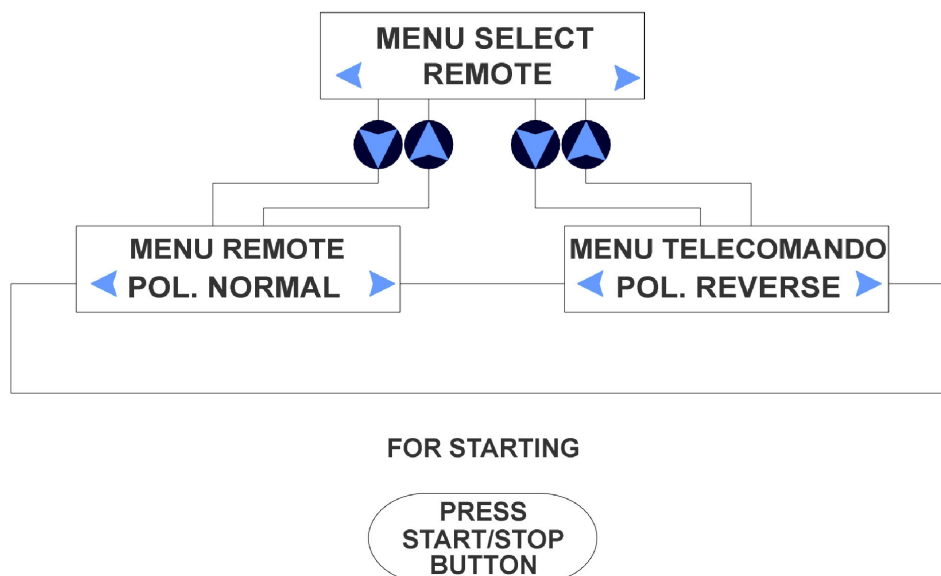
FOR STARTING

PRESS  
START/STOP  
BUTTON

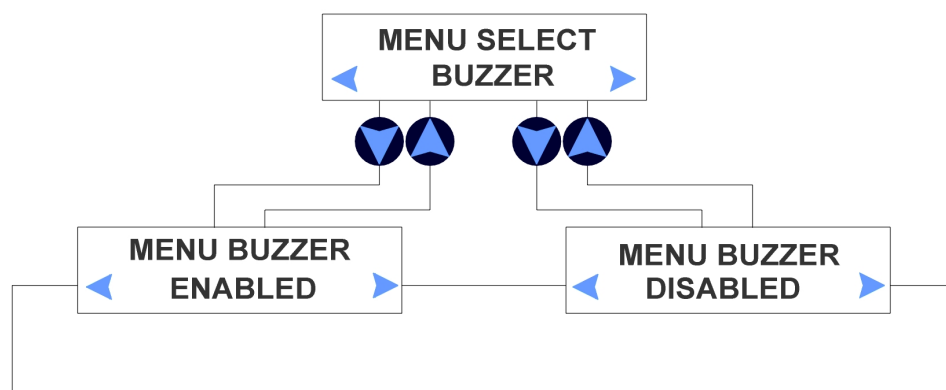
## ALARM MENU



## REMOTE CONTROL MENU



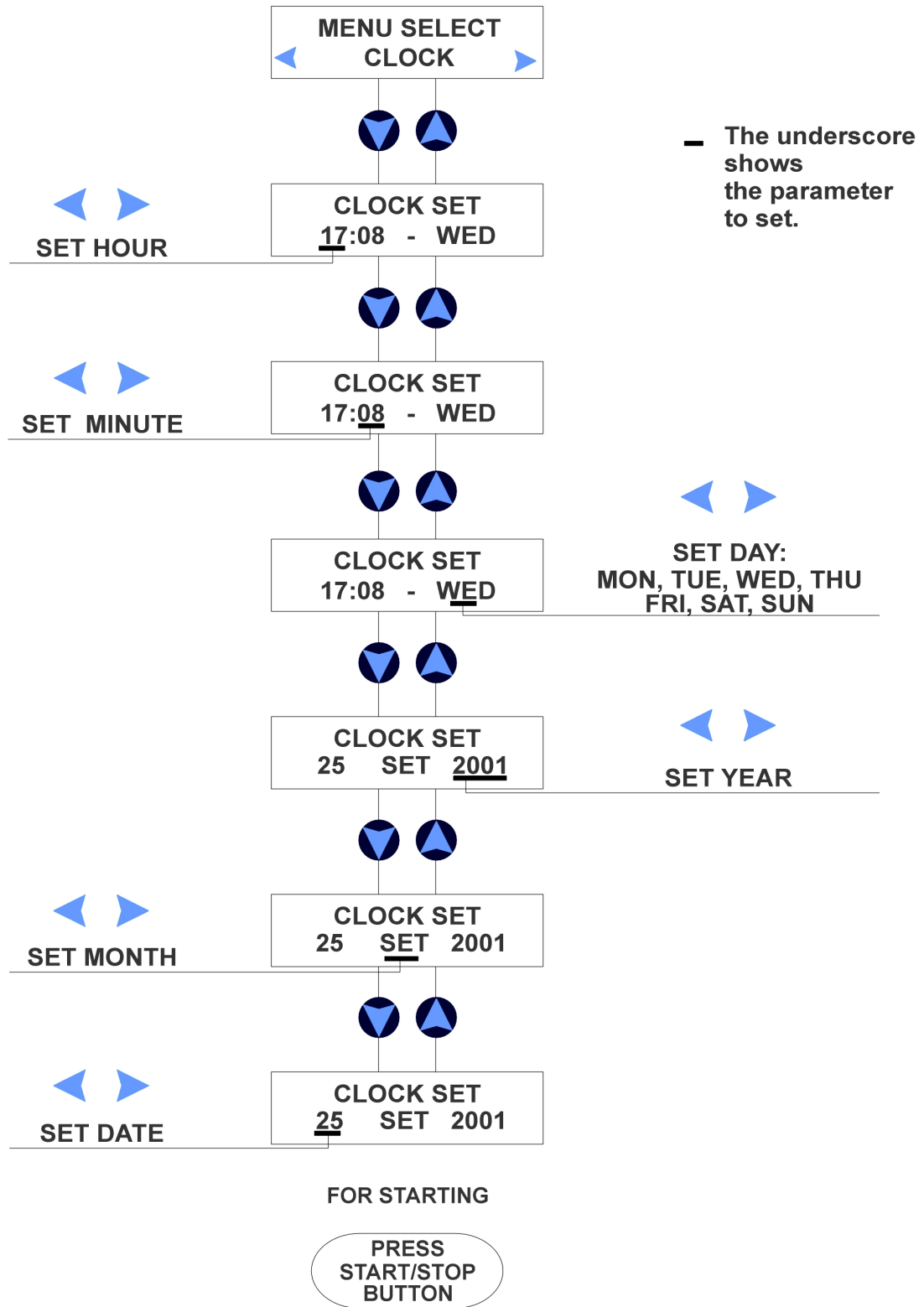
## BUZZER MENU



FOR STARTING

PRESS  
START/STOP  
BUTTON

## CLOCK MENU

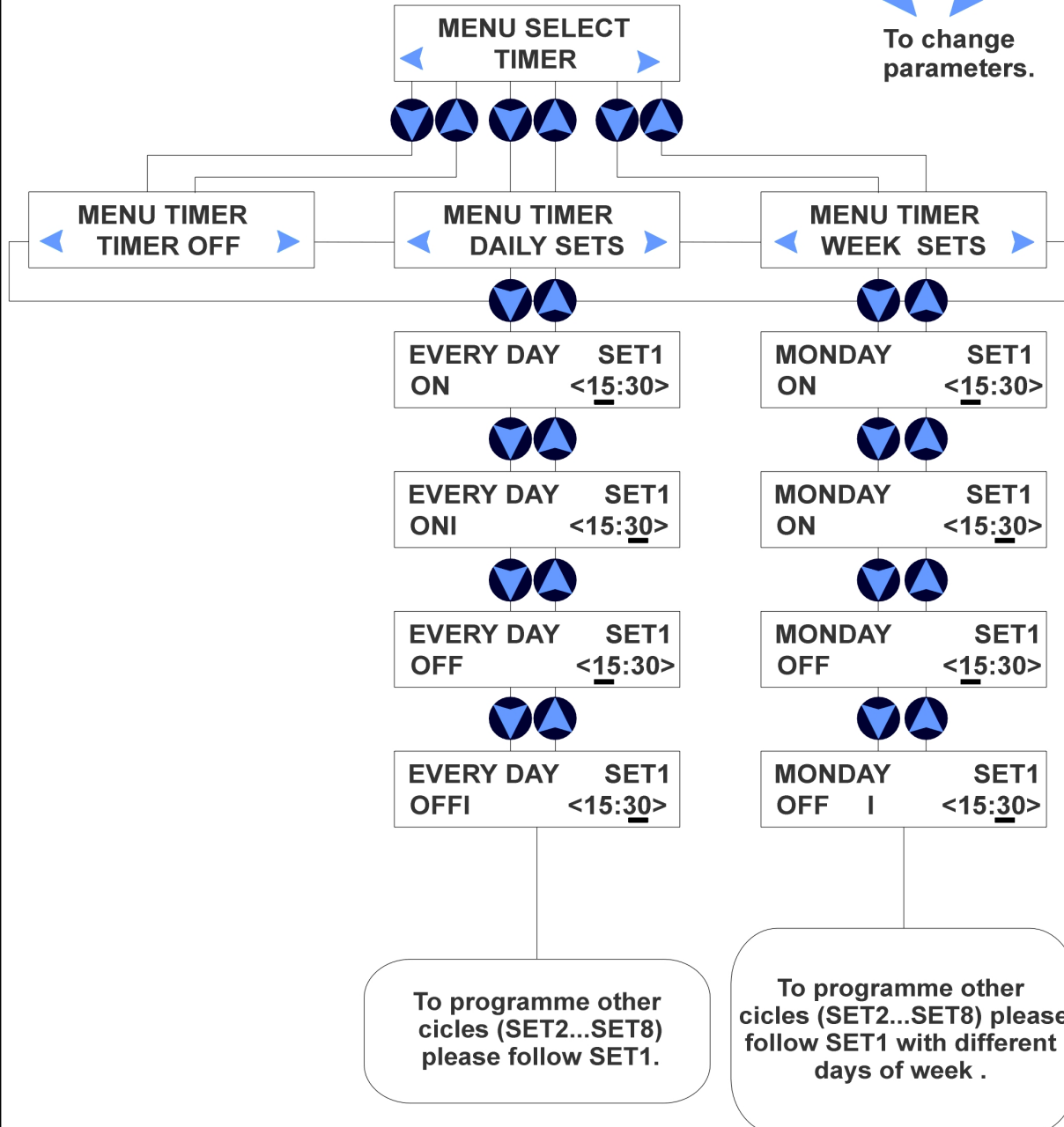




## TIMER MENU

— The underscore shows the parameter to set.

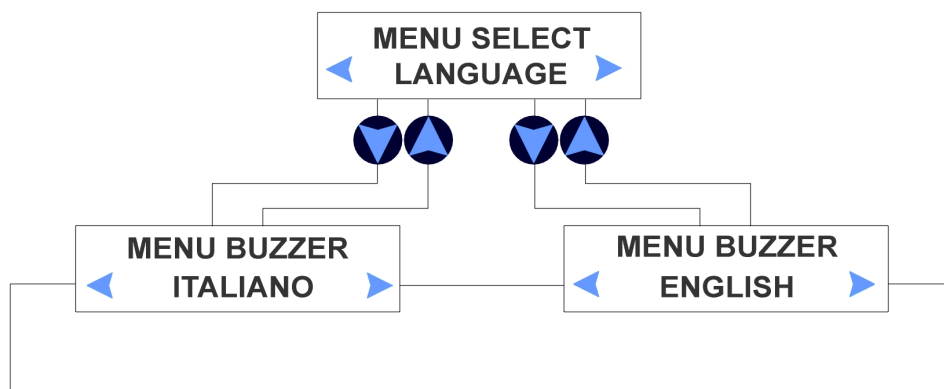
◀ ▶  
To change parameters.



FOR STARTING

PRESS  
START/STOP  
BUTTON

## LANGUAGE MENU



FOR STARTING

PRESS  
START/STOP  
BUTTON