BATCHING UNITS - PUMPS SERIES AKL - TPZ

DOSING PUMPS	**SERIE AKL - TPZ**
STORAGE TANKS	**SERIE SL**
WATER METER	**SERIE CD - CW**

INSTRUCTIONS MANUAL

WARNING!

The equipment must be used only for the utilization for which they have been designed, as shown in the technical documentation.
Read carefully this leaflet until the end before starting any operation.
Proceed strictly according to all directions included in this manual.

Nobel batching units are suitable for the dosing of chemicals supplied by Nobel and, besides, caustic soda, hydrochloric acid and sodium hypochlorite.

ANY OTHER APPLICATIONS OF THE EQUIPMENT DIFFERENT THAN THE MENTIONED ONES IS MADE UNDER THE ONLY RESPONSIBILITY OF THE USER.

For any assistance concerning the installations, maintenance or utilization of the equipment apply the NOBEL Service Center closest to you or directly:

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Annex:

- declaration of conformity

1. Safety

1.1. CE mark, declaration of conformity

The equipment is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate.

The equipment complies with the applicable standards and regulations as listed in the CE declaration of conformity and thus complies with the statutory requirements of the CE Directives.

NOBEL confirms the successful testing of the equipment by sticking to it the CE mark.

1.2. Hydraulics

All operations must be performed by and/or under direct supervision of skilled and authorized operators, using proper tools and personal protection devices if required (CE marked), according to safety regulations for working areas. The operators must be aware of the hazards and danger of the chemicals used in the process. In case of leakage of chemicals and/or in case of accident (contact with skin, eyes, etc.) follow strictly the directions mentioned on the safety bulletins of the chemicals themselves. Before any operation of taking out pipes or part of hydraulic system, it is required to release the pressure inside and empty the part of the system.

WARNING: always use proper pipes and tubes. Pressure, working temperature and materials of the used tubing must be always suitable for the operating conditions of the pump as well as for the liquid to be dosed.

1.3. Electrical

Before starting any operation on electrical devices, be sure that main power supply is OFF. All operations must be performed by skilled and authorized operators, using proper tools and personal protection devices if required (CE marked), according to safety regulations for working areas. In case of liquid leakage, switch off the main power supply before operate. Before the switching ON, be sure all the parts of the system are perfectly dry. Check that the available electrical power is correct, as shown on technical data, before connection. Do not make preliminary wiring connections.

1.4. Directions for storage, delivery, installation

	temperature	humidity rel.	notes
• closed rooms	5÷40ºC (41 ÷104°F)	5÷90% without condensate	
• open space	5÷40ºC (41 ÷104°F)	5÷90% without condensate	protect from sun-light and rain.
• trasport	5÷40ºC (41 ÷104°F)	5÷90% without condensate	protect from sun-light and rain.
• installation	5÷40ºC (41 ÷104°F)	5÷90% without condensate	protect from sun-light and rain.

2. Technical characteristics

Nobel batching units are suitable for the dosing of chemicals supplied by Nobel and, besides, caustic soda, hydrochloric acid and sodium hypochlorite.
EPDM seals versions are suggested to dose caustic soda
FPM seals versions are suggested to dose sodium hypochlorite
Both EPDM an FPM are suitable to dose the other chemicals
Please apply our Technical Dept before use Nobel dosing pumps to dose different chemicals

• temperature min÷max	ºC (ºF)	5÷40 (41÷104)
• max viscosity of the liquid to be injected	cps	40
• power supply	V ph/Hz	100÷240 1/50÷60
• MAX height suction	m	1.5
• protection		IP65
• materials:	• body and fitting: PVC-PVDF (all PVDF upon request) • membrane: PTFE • balls: ceramic • bottom strainer and injection fitting: PVC (PVDF upon request) • seals: FPM (EPDM upon request) • suction tubinge: PVC transparent (PVDF upon request) • forcing tubing: PE (PVDF upon request)	

2.1. Characteristics of the pumps

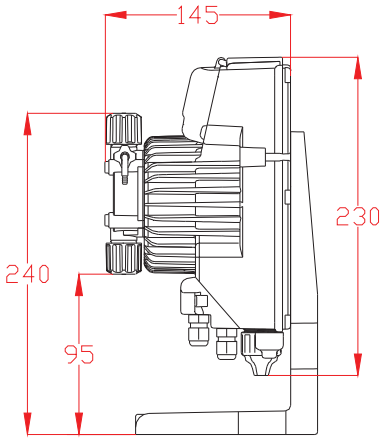
The model and the main characteristcs of each pump appear on the identification label placed on the left side of the pump itself.

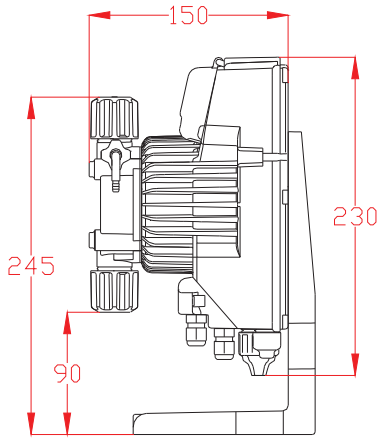
The flow of a pump depends on many factors such as the pressure inside the system in which the liquid is injected (back-pressure) and the viscosity of the liquid (linked to its temperature). The pump works correctly when the viscosity is lower than 40 cps.

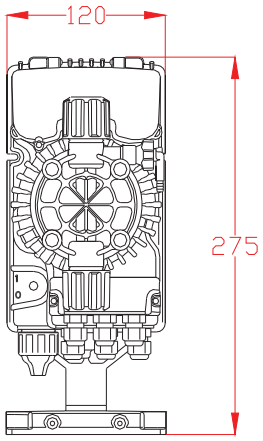
MODEL	Back-pressure bar/kPa	flow rate l/h	volume of single injection cm^3	max frequency pulses/min	peak absorption power	average absorption power	Ø tubing mm	Ø injection fitting	weight kg
AKL 500 **TPZ 500**	20/2000 *16/1600* ***10/1000*** 6/600	0.4 0.8 ***1.2*** 1.5	0.06 0.11 ***0.16*** 0.21	120	90 VA	13 VA	4x6	3/8" 1/2"	2
AKL 603 **TPZ 603**	12/1200 10/1000 ***8/800*** 2/200	4 5 ***6*** 8	0.42 0.52 ***0.63*** 0.83	160	90 VA	13 VA	4x6	3/8" 1/2"	2
AKL 800 **TPZ 800**	12/1200 10/1000 ***5/500*** 1/100	7 10 ***15*** 18	0.36 0.52 ***0.78*** 0.94	300	90 VA	24 VA	4x6	3/8" 1/2"	3
AKL 803 **TPZ 803**	5/500 4/400 ***2/200*** 1/100	20 25 ***40*** 54	1.11 1.39 ***2.22*** 3	300	90 VA	23 VA	8x12	1/2""	3

2.2. Dimensions of the pumps

MODELS 500-603-800	MODEL 803	ALL MODELS



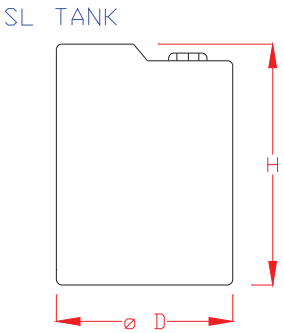




2.3. Characteristics of storage tanks

The storage tanks are made in shock-resistant plastic (PE) material. They are graduated and suitable to hold the dosing pumps; they are complete with holes and covers for liquid filling. The tanks are suitable to hold the dosing pump using the special bracket supplied with pump. The bracket has to be fixed to tank by 4 self-thread screws. A special seat in the rear part of the pump body allows to fix the pump itself to the bracket.

MODEL	**Capacity liters**	**dimensions**		**weight**
		Ø mm	h mm	kg
SL 50	50	400	460	3
SL 100	100	460	640	5
SL 150	150	480	860	8
SL 250	250	600	870	9
SL 300	300	670	950	12
SL 500	500	760	1200	18
SL 1000	1000	1100	1230	25



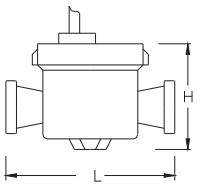
2.4. Characteristics of pulse sender water meter

Water meter with dry dial and visualization of supplied volume of water. Equipped with REED contact.

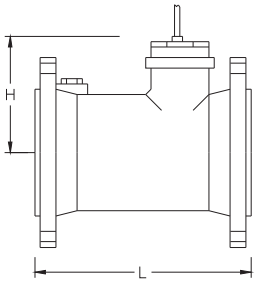
Serie CD:
Turbine type, multiple jet, brass body, thread connections.

Serie CW:
Woltman type, cast-iron body, flange connections PN10.

Water meters CD



Water meters CW



MODEL	connections Ø	flow rate m³/h		pulses per liter	dimensions		weight
		max	min		L mm	H mm	kg
CD 403	½"	1.5	0.06	4	110	80	1.5
CD 405	¾"	2.5	0.1	4	130	80	2.0
CD 407	1"	3.5	0.14	4	260	130	3.0
CD 410	1¼"	6.0	0.24	4	260	130	3.0
CD 420	1½"	10.0	0.4	4	300	170	5.0
CD 430	2"	15.0	1.2	4	300	190	5.0
CW 060	DN65	25.0	2.0	0.01	200	150	13.5
CW 080	DN80	40.0	3.2	0.01	225	170	14.5
CW 100	DN100	60.0	4.8	0.01	250	180	18.0
CW 125	DN125	100.0	8.0	0.01	250	190	22.0
CW 150	DN150	150.0	12.0	0.001	300	170	32.0
CW 200	DN200	250.0	20.0	0.001	350	200	46.0

3. Installation

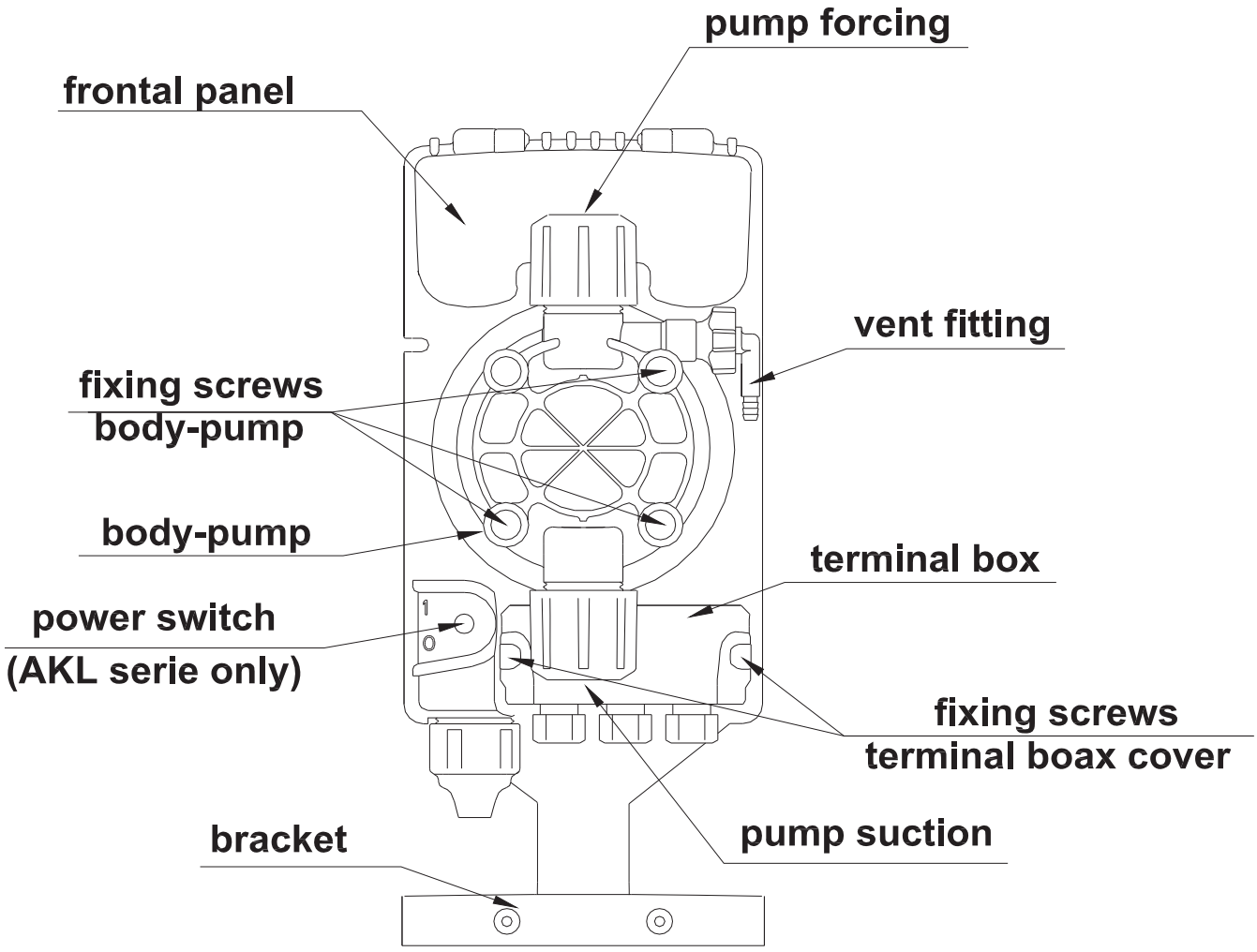
3.1. How to remove packaging and to move the unit

The tank is wrapped in a colourless plastic foils. The pump, if already assembled on the storage tank, is protected with shock-resistant protection. Whether not assembled on storage tank, the pump is packed in a separated carton box. Open the packages and keep the cards and everything contained inside the packaging. Move carefully all components in order to avoid bumps or shock that could seriously damage it.

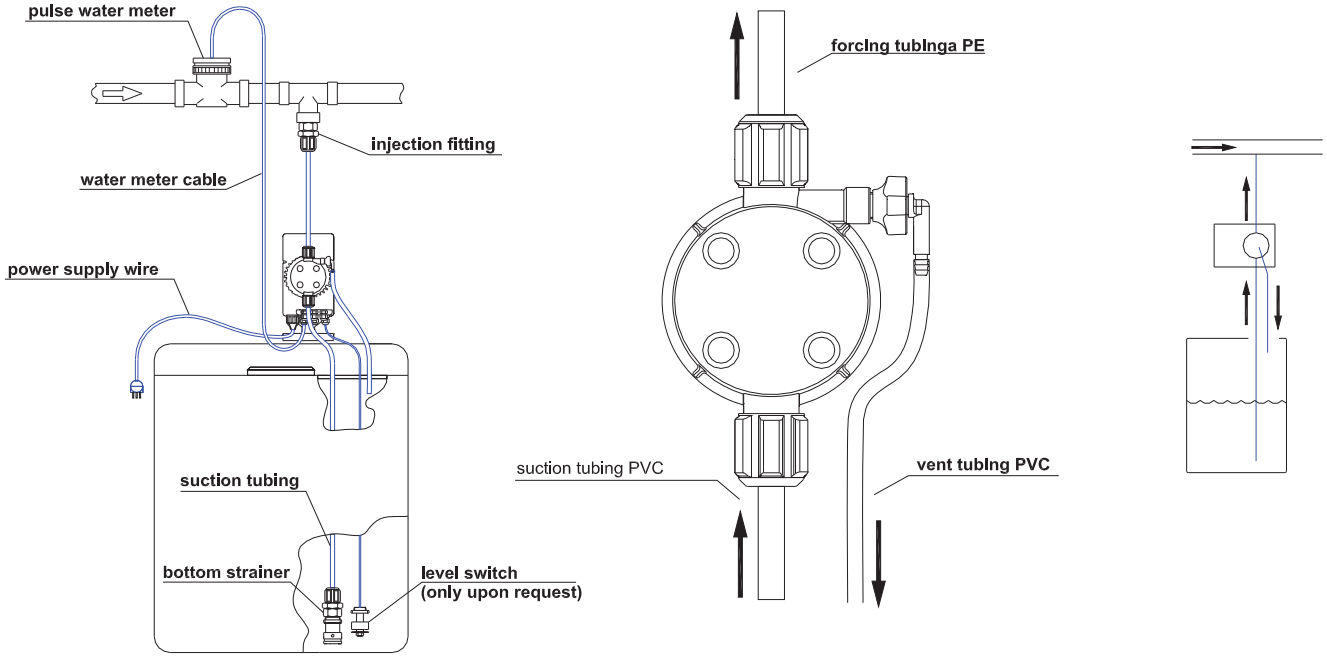
The accessories included in standard supplying are:

- injection fitting
- bottom strainer
- colourless tubing for suction and the vent of the priming manual valve
- opaque, semirigid tubing for the forcing line
- screw anchors to fix the pump on the wall
- bracket and screws to fix the pump on the tank
- connection clamp for level switch connection

COMPONENTS



3.2. Placing and hydraulic connections



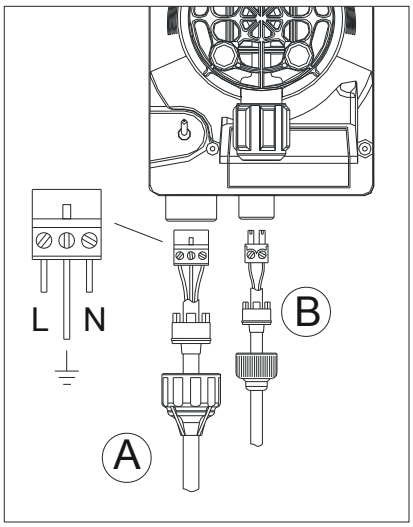
- Place the tank on a perfectly flat surface
- Assembly the pump on the tank as shown in the sketch. The pump can also be fixed to the wall, using the screw anchors included in the supplying.
- Put in the water meter, whether provided, along the pipe of the water to be addicted, on horizontal position.
- Put in the injection fitting of the pump, included in the supplying, along the same pipe of water, prefereably downstream of the water meter.
- Connect the suction fitting, placed on the bottom side at the center of the body pump, to the bottom strainer, using the supplied smooth colorless PVC tubing; adjust the length of the tubing in order that the bottom strainer will be at 50 mm approx from the bottom of the tank.
- Connect the vent fitting, placed on right side of the body-pump, to the tank, using the same tubing of the suction line.
- Connect the forcing fitting, placed on the top side at the center of the body-pump, to the injection fitting, using the semirigid opaque PE tubing:
  - Standard tubings 4x6 mm and 8x12 mm are suitable for pressure up to 16 bar (1600 kPa) at 20°C
  - PE-HD and PVDF tubings 4x6 mm (available on request) are suitable for pressure up to 20 bar (2000 kPa) at 40°C

WARNING: the forcing tubing vibrates according to the pulses of the pump. Take care that the tubing does not bump against wall or other objects; the continuous bumping could cause abrasion on the contact-point and, then, the breaking of the tubing itself.

3.3. Electrical connections

The pumps are designed to accept small over-voltage; however, in order to avoid damage, it is prefereable that the pump has a power supply separated from the ones of other equipments that can cause over-voltage.

The electrical connections are made inside the terminal box, placed in the lower part of the pump. The connections clamps can be taken out.

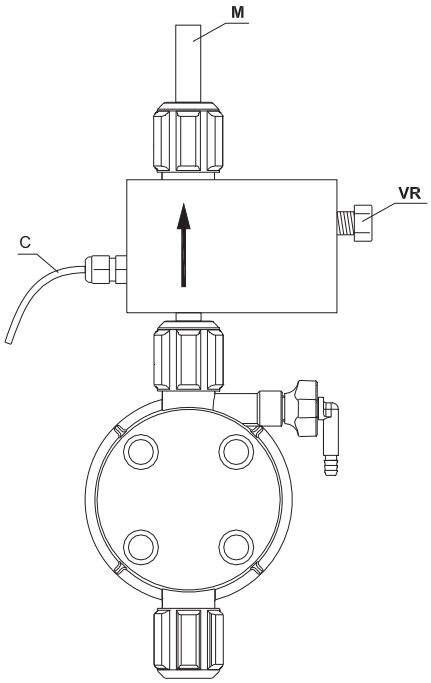


• pumps serie **AKL**	• connect the power supply (100÷240 V, 50/60 Hz) to the clamps on the A connection (the power wire is supplied already connected). • connect the level switch (whether provided) to the clamps on the B connection

• pumps serie **TPZ**	• connect the power supply (100÷240 V, 50/60 Hz) to the clamps on the A connection (the power wire is supplied already connected). • connect the level switch (whether provided) to the clamps on the B connection Following connections have to be made on terminal board: • free voltage contact for remote alarm to the clamps 1 and 2 • 0/4-24 mA current input to the clamps 3(+) and 4(-) • remote control to the clamps 5 and 6 • **pulse sender water meter to the clamps 7 and 8** • flow sensor to the clamps 9 and 10 FUSE 2A □ 1 □ 2 □ □ □ □ 3 4 5 6 7 8 9 10 □ □ □ □

WARNING: TPZ serie pumps are NOT provided with power switch.
A START/STOP button for start up is available.

3.4. Flow sensor (optional)



The flow sensor is installed along the pump outlet; at every injection of the pump, it sends a pulse to the control panel of the pump itself, allowing to check the actual dosing (no pulse = no injection)

How to instal and programme the flow sensor

- Put in the flow sensor along the forcing line of the pump, as shown in the sketch (outlet towards the injection line "**M**", according to arrow).
- Connect the cable "**C**" to clamps 9 and 10 on the terminal board.of the pump.
- Enable the function "***flow alarm***" in programming mode.
- Start the dosing and adjust the sensibility of flow sensor by the regulation valve "**VR**".

4. Description of pumps serie AKL

The dosing pumps serie **AKL** are electronically controlled membrane type, with adjustable constant flow.

The pump works by a membrane, the movement of which is driven by a magnet. As the dimension of the injection chamber is the same, the flow of the pumps depends on the frequency (how often the magnet drives the membrane) of the pulses of the magnet.

Pump is equipped with a potentiometer that allows to modify the frequency of the pulses; besides, dosing pump **AKL** serie are complete with a range selector allowing to reduce the frequency of the pulses (then the flow rate) of 5 times.

Pump can be also equipped with an electronic timer **(PDT),** in order to control the working of the pump, according to time schedule.

A special level switch (**LEV4**), can be connected to the pump in order to stop the working of the same when the tank is empty.

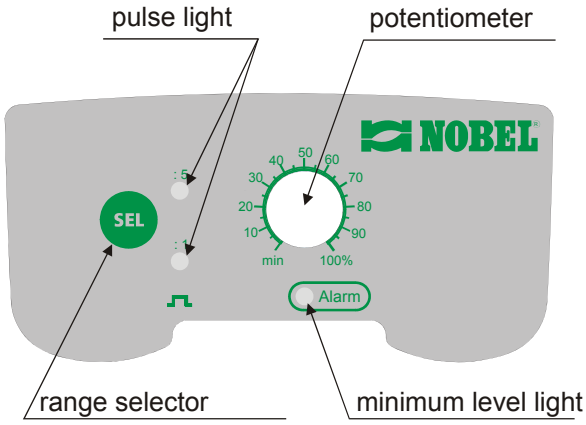
4.1. Starting-up of AKL pump

When the installation, the electrical and hydraulic connections have been completed, proceed as follows:

- Turn the power switch on 1 position, at max flow (potentiometer at 100 %).
- Open the vent fitting by turning counter-clockwise the knob and wait until some liquid comes out from the tubing, in order that the pump be full of liquid.
- Close the vent fitting by turning clockwise the knob: the pump starts to dose.

4.2. Adjustment

FRONTAL PANEL



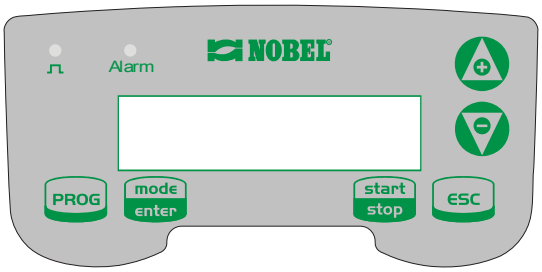
AKL serie pumps work according to a constant dosing; the quantity of injected liquid is adjusted by the position of the potentiometer; it controls the (frequency) pulses of injection and regulates the flow of the pump.

- Range selector on "**:1**" position : the adjustment of the flow is linear (± 5% error) in a range between min (~5%) and 100% of the flow rate

- Range selector on "**:5**" position: the adjustment of the flow is linear (±12% error) in a range between min (~1%) and 20% of the flow rate.

5. Description of the pumps serie TPZ

FRONTAL PANEL



LIGHTS SIGNALS	
Alarm O	The pump is stopped for the minimum level alarm
O ⎍	It reports any injection supplied by the pump

KEYBOARD	
Button	Function
Prog	Button to access to programming menu
start/Stop	Button to switch ON-OFF the pump
mode/enter	Button to adjust and visualize the flow operating parameters
esc	Exit from programming menu levels
▲ ▼	Button to modify the parameters visualized on the display

DISPLAY AREA (DURING OPERATION)

Display area	Visualization	Description
MODES	MAN	The pump works on constant mode
	mA	The pump works proportionally according to signal (0/4-20 mA –20-4/0 mA)
	1: n	The pump works proportionally according to external pulses (1:n)
	n: 1	The pump works proportionally according to external pulses (n:1)
	Batch	The pump works proportionally according to external pulses (Batch)
	ppm	The pump works proportionally according to external pulses (ppm)
	Timed	Time controlled dosage
STATUS	**F**	Flow sensor activated
	M	Memory function activated
	Stop	The pump is stopped
	Paus	The pump is paused
ALARMS	Liv	Minimum liquid level inside the storage tank (alarm light ON)
	Flw	Flow sensor alarm (**alarm** light ON)
	Mem	The pump receives exceeding pulses during operation
VALUES	Visualize set dosing parameters. Units and values changes according to the operation mode .	

The dosing pumps serie **TPZ** are electronically controlled membrane type, with two working modes (proportional or constant flow), that can be selected via software by the control panel.

The pump works by a membrane, the movement of which is driven by a magnet. As the dimension of the injection chamber is the same, the flow of the pumps depends on the frequency (how often the magnet drives the membrane) of the pulses of the magnet.

A special level switch (**LEV4**), can be connected to the pump in order to stop the working of the same (or just drives alarm, to be selected) when the tank is empty.

A special level flow sensor (**SFL**), can be connected to the pump in order to stop the working of the same when there is no flow along injection line.

Selecting the **manual** mode, the pump works alike serie **AKL** pump (except different way of adjusting the flow rate).

Selecting the proportional mode, the pump works by handling the dosage adjustment according to input signal; more exactly:

- **0/4-20 mA** mode: the pump doses proportionally according to an input signal of (0)4-20 mA. The pump stops dosage at 4mA signal and doses at the maximum frequency at 20 mA signal. (Factory set)
- **20-4/0 mA** mode: the pump doses proportionally according to an input signal of 20-4(0) mA. The pump stops dosage at 20mA and doses at the maximum frequency at 4 mA signal. (Factory set)
- **n:1** mode: the pump feeds **one single** injection every time it receives **n pulses** from the water meter (dosing proportionallly to the flow rate of water through the meter itself).
- **1:n** mode: the pump feeds **n injections** every time it receives **1 pulse** from the water meter; working according to this mode, the **n** injections are fed with a frequency proportional to the time between the last 2 pulses from the water meter, hence with a dosage distributed uniformly along the flow of water (dosage proportional to the flow rate of water through the meter itself).
- **Batch** mode: the pump doses the pre-set quantity of product in ml, during the pre-set time in seconds, every pulse received from water meter; the frequency of dosage is automaticly calculated.
- **ppm** mode: the pump automatically calculates the dosage frequency according to pre-set value in ppm and the frequency of pulses from water meter (dosage proportional to the flow rate of water through the meter itself).
- **Time controlled** mode: the pump doses the pre-set quantity of product at regular interval of time; **only one** time interval (day, hour, minute) can be scheduled.

Special functions

- **Alarm relay**: it is driven (or not driven, to be selected) under alarm conditions (**Alarm** light ON)
- **remote control**: input used to inhibit pump operation by remote (inhibition by closed or open contact; to be selected)
- **level alarm**: it stops the pump working or drives the alarm (**Alarm** light ON) if tank is empty
- **flow alarm**: it stops pump working if no injection, if flow sensor is installed (**Alarm** light ON)
- **memory function**: it allows to keep in memory the exceeding dosage (calculated according to the pulses from water meter), if the pump should had to work at a frequency higher than maximum allowable. The pump doses the stored strokes as soon as possible (feature available only in **1:n, ppm** and **batch** modes). *Warning: This feature can be used only if the installations allows the injections of chemicals when there is no water flowing along the line*
- **flow calibration**: it is possible to calibrate the volume of a single injection (cc/stroke) at the working pressure
- **maximum flow**: it is possible to set the maximum working frequency and the standard display unit (% or strokes/min)
- **flow display unit**: it is possible to change the display unit
- **statistics**: to get informations about the pump operation
- **password**: to protect configurations by password

See the attached "ADVANCED PROGRAMMING FOR TPZ PUMPS" in order to configure and get more informations about above functions.

5.1. Adjustment of the pump TPZ

Factory set of TPZ pumps :

mode	ppm
product concentration	100 %
for CD serie water meter	4.0 strokes/l
for water meter CW 060-125	100.0 l/stroke
for water meter CW 150-200	1000.0 l/stroke
memory function	OFF
flow display unit	standard / %
maximum frequency	100 %
flow alarm	OFF
level alarm	minimum level=stop
alarm relay	not active with alarm (N.C.)
remote control	open=start, close=pause
password	0000 (disabled)

PUMP mod.	*SINGLE INJECTION* cc/stroke	*(pressure of reference) (bar/kPa)*
500	**0.16**	*(10/1000)*
603	**0.63**	*(8/800)*
800	**0.78**	*(5/500)*
803	**2.22**	*(2/200)*

According to this factory set, the following values are visualized in the display area **VALUES** during working:
- first line: pre-set value of dosage in ppm
- second line: maximum frequency

The following other pre-set values can be visualized in the display area **MODE,** by keeping pushed the button **mode/enter** (values will be visualized in sequence)
- cc/strokes: single injection volume in cm³
- strokes/L (L/strokes): strokes /liter (liters/stroke) of the water meter
- Conc. (%): concentration (%) of the chemical to dose.

5.1.1. Modification of a dosage value

To modify the value of ppm to dose, push in the same time both buttons **mode/enter** and ▲ (or ▼) (values between 0 ppm and 3000 ppm).

5.1.2. Modification of water meter parameter

This modification must be done ***only*** if a meter with pulse sending different from programmed rate is installed.

- Keep pushed the button **PROG** until the notice "**PROG configuration**" appears on the display
- push **3 times** the button **mode/enter**
- push **1 time** the button ▼
- push **1 time** the button **mode/enter**
- push the button ▲ (or ▼) to select the unit of measurement:
  - for meter **serie CD** select **pulse/L**
  - for meter **serie CW** select **L/pulse**
- push **1 time** the button **mode/enter**
- push the button ▲ (or ▼) to set the parameter:
  - for meter **serie CD** set the value **4.0**
  - for meter **CW 060-125** set the value **100.0**
  - for meter **CW 150-200** set the value **1000.0**
- push **1 time** the button **mode/enter**
- push **1 time** the button **esc**
- push **1 time** the button ▲ (or ▼) the notice "**Save**" appears on display
- push **1 time** the button **mode/enter**
- the pump turns again on working mode

See the attached "ADVANCED PROGRAMMING FOR TPZ PUMPS" in order to modify the working mode or factory adjustments.

5.2. Starting up of TPZ pumps

When the installation, the electrical and hydraulic connections have been completed, proceed as follows:

- open the vent fitting by turning counter-clockwise the knob.
- keep pushed both buttons ▲ ▼ (the pumps starts to work at the maximum frequency)
- wait until some liquid comes out from the tubing, in order that the pump be full of liquid.
- release both the buttons ▲ ▼ and close the vent fitting by turning clockwise the knob: the pump starts to dose.

6. Maintenance

Ordinary maintenance of the dosing pump consists of the cleaning of the bottom strainer.

If there are deposits of the injected chemical, the cleaning or replacing of the injection system (tubing, complete body-pump, injection fitting) can be required.

7. Disposal

The disposal of the unit or parts of it, must be made according to local laws concerning the waste of the materials of which they are made.

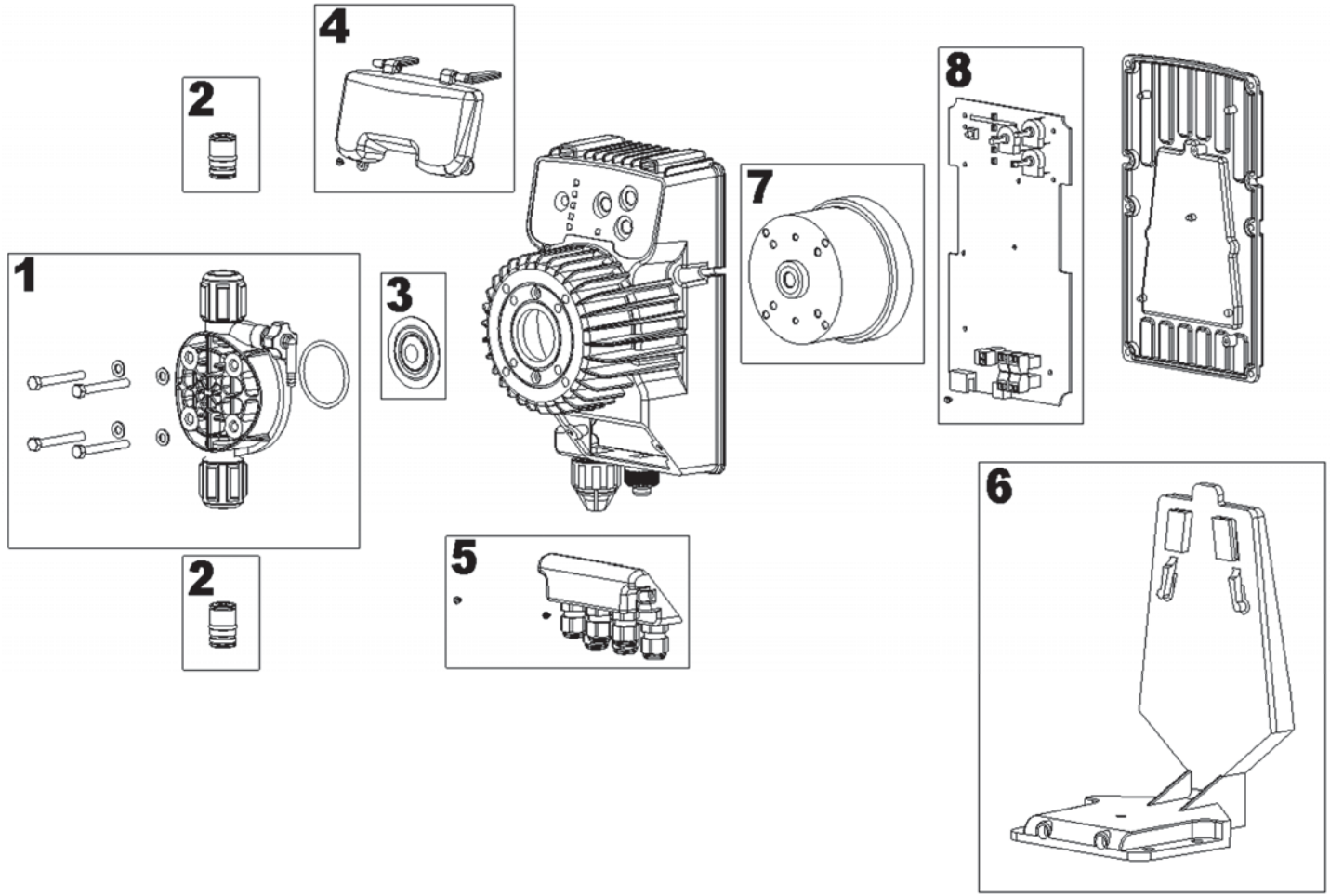
8. Trouble-shooting guide pumps TPZ

MALFUNCTIOIN	CAUSE	HOW TO FIX
The pump works properly but the dosage is interrupted or reduced flow	The valves are blocked	Clean the valves or replace them if it is not possible to remove the deposits
	Too high height of suction	Place correctly the pump or the tank in order to reduce the suction height (pump under head)
	There is not liquid in the tank	Refill the liquid in the tank
Exceeding flow rate	Siphoning along the injection line	Check the installation of injection valve. If not enough install a back pressure valve
The membrane is broken	Exceeding back pressure	Check the water pressure in the system. Check if the injection valve is blocked. Check if there is any obstruction along the injection line
	Working with no liquid	Check if the bottom strainer is installed. Use level switch to stop the pump if there is no liquid in the tank
	Membrane is not properly locked	If the membrane has been changed, check the correct locking
The pump does not turn on	Electrical connections are wrong	Check electrical connections
	Power failure	Check power supply
	Protection fuse broken (**TPZ pump only**)	Replace the protection fuse placed next to the terminal board

Special situation for TPZ pump only

VISUALIZATION	CAUSE	HOW TO FIX
led **Alarm** on + notice **Lev** blinking	Minimum liquid level in the tank without stopping dosage	Refill the liquid in the tank; after refill the notice **Liv** and led **Alarm** will turn off
led **Alarm** on + notice **Liv** blinking + notice **Stop** blinking	Minimum liquid level in the tank stops dosage	Refill the liquid in the tank; after refill the notices **Liv** and **Stop** and led **Alarm** will turn off
led **Alarm** on + notice **Flw** blinking + notice **Stop** blinking	The pump did not receive the expected pulses from flow sensor	By pushing the button **Start/Stop**, or when flow comes back to normal operation, the notices **Flw** and **Stop** and the led **Alarm** will turn off The pump restarts automaticly
notice **Parameter error** **PROG to default** on display	Internal CPU comunication error	By pushing the button **PROG** all default parameters will be restored

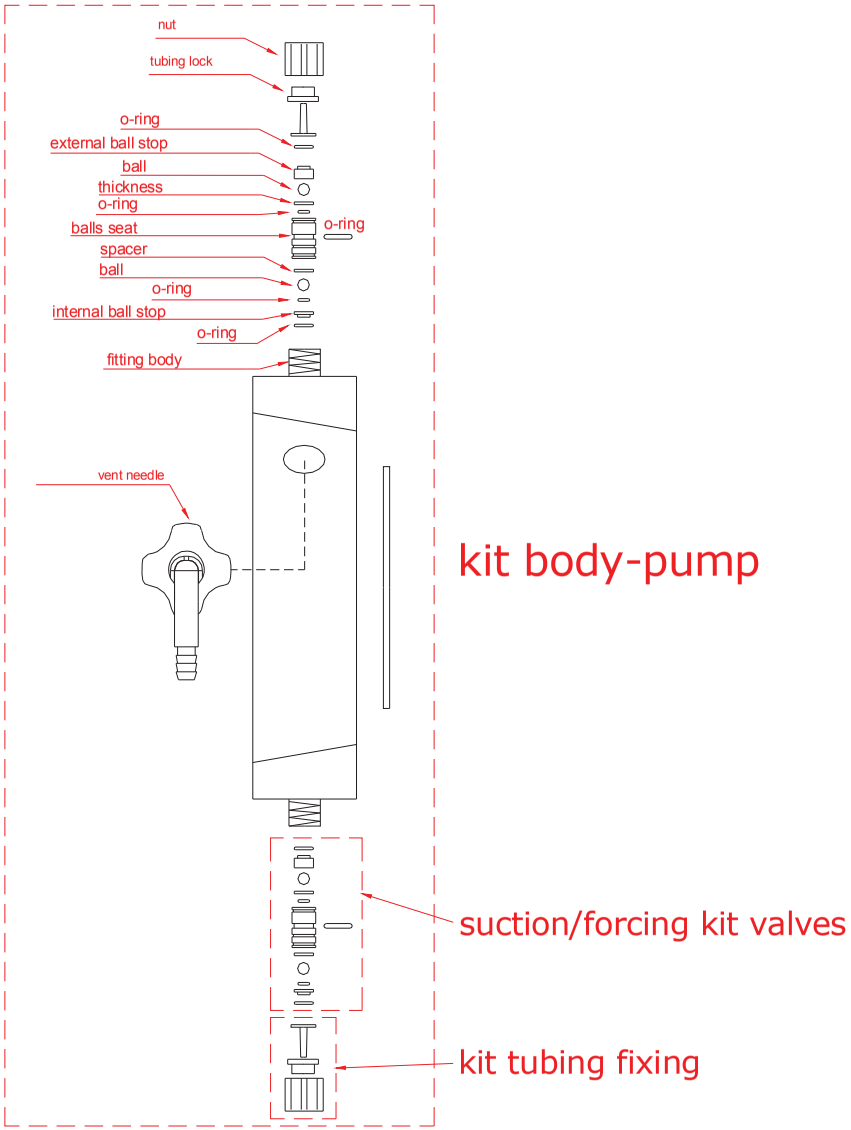
9. Spare parts

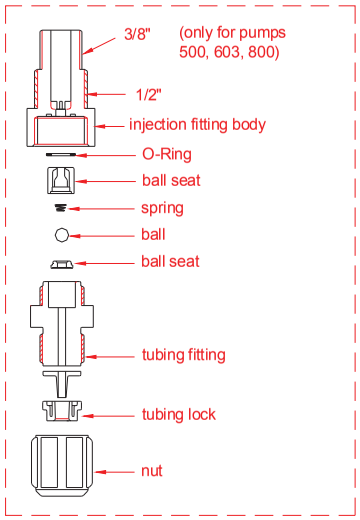


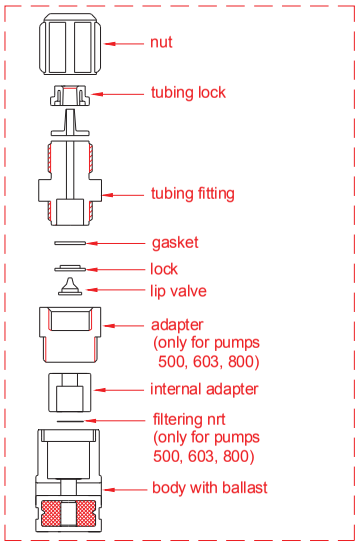
1.	kit body-pump complete (detail in next page)	5.	extractable connection
2.	suction/forcing kit valves	6.	horyzontal bracket
3.	membrane	7.	complete magnet
4.	cover of frontal panel	8.	complete electronic card

When placing order of spare parts, it is strictly required to specify type of pump, material of body and gaskets.

ASSEMBLING SCHEME







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società italiana per lo studio e la realizzazione di apparecchiature ed impianti per il trattamento acqua
engineering and manufacturing of equipments and plants for water treatment

DICHIARAZIONE CE DI CONFORMITÀ
DECLARATION OF CONFORMITY

La Nobel srl dichiara che l'apparecchiatura (vedi etichetta in prima pagina)
delle serie
Nobel srl hereby declares that the equipment (see label on first page)
of series
AKL – TPR – TCK – TPZ – CL180i

è conforme alle seguenti Direttive Europee:

- 2006/42/CE – 2006/95/CE – 2004/108/CE

Principali Norme armonizzate osservate durante la progettazione e costruzione:

UNI EN ISO 12100:2010 – UNI EN 60204-1 (CEI 44-5)

Il direttore tecnico è autorizzato alla costituzione del fascicolo tecnico.

complies to the requirement of the following European Directives :

- *2006/42/CE – 2006/95/CE – 2004/108/CE*

Besides, the main regulations followed for the design and manufacturing are :

UNI EN ISO 12100:2010 – UNI EN 60204-1 (CEI 44-5)

The technical manager is authorized to manage the technical folder.

Direttore Tecnico
Technical Manager
Giorgio Da Dalt

Milano, 18 febbraio 2013

sede legale : via dell'Unione 3 20122 Milano ***rev. 2***
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