



USE AND MAINTENANCE MANUAL

AQUA CUBIC PLUS

EC DECLARATION OF CONFORMITY

Producer **S.I.A.T.A. S.r.l.**
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Declares that the following material:

PN
AC-PLUS2/05

Description
AQUA CUBIC PLUS

Conforms to the essential pre-requisites of the following **DIRECTIVES**:

- **Electromagnetic Compatibility 89/336/CEE, 93/68/CEE**
- **Low Voltage 73/23/CEE, 93/68/CEE**

The fulfilment of the following regulations has been verified:

EN 50081-1 General Regulation on Emissions - part 1 residential, commercial and light industry environment

EN 50082-1 General Regulation on Immunity - part 1:residential, commercial and light industry environments

S.I.A.T.A. S.R.L. has a Quality System which conforms to the requirements of the regulation:

ISO 9001/UNI EN ISO 9001-ed. 1994 (Certificate n°95.022 SGS ICS)

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1 – INTRODUCTION

Aqua Cubic Plus is a controller dedicated to the realisation of water **softening** systems working on the principle of the ionic exchange of the resins.

The systems can be produced according to the following **operative modalities**:

- **one single column**;
- **two alternated single columns**;
- **one duplex column**;
- **two single columns in parallel**;

In the modality **two alternated single columns** it is possible to activate the function **Modular**, which consists of putting into service the stand-by column when the **instantaneous load in litres/minutes absorbed by the utiliser exceeds the load which can be supplied by the only column in service**.

Aqua Cubic Plus automatically calculates the volume of water which can be treated, using as a basis the hardness of the water, the volume of the cylinders and the exchange capacity of the resins used., values which must be programmed by the operator at the time of the installation of the system.

It is also possible to programme a **reserve percentage of the total volume** which allows the regeneration of the resins to be started before they have completely run out.

Aqua Cubic Plus allows for the two columns to be controlled with **different dimensional characteristics** that is with different volume values, also allowing the differentiation of the regeneration cycle times.

The **regeneration** cycle is completely **programmable**: it can be started up by the control on the **volume**, **manually**, or by an **external signal**, it is possible to cancel the whole cycle or to jump one or more phases. The regeneration may be **immediate** or **deferred** to a programmed time.

Aqua Cubic Plus may be connected to a computer via **RS232** using the cable cod. 881-1, so as to be able to acquire and then analyse the progress of the work parameters

Aqua Cubic Plus is equipped with a **buffer battery** which allows for the work parameters to be retained in the memory should the electricity current fail.

Aqua Cubic Plus is equipped with an **EEPROM memory**, on which the programmed data is memorised, with the capacity to retain data for over **10 years**.

Aqua Cubic Plus, like all the range of SIATA controllers, conforms to the EEC Directives and is produced in the SIATA plant of Montespertoli which operates with the certified Quality System according to the regulation

ISO 9001 / UNI EN ISO 9001.

2 – TECHNICAL DATA

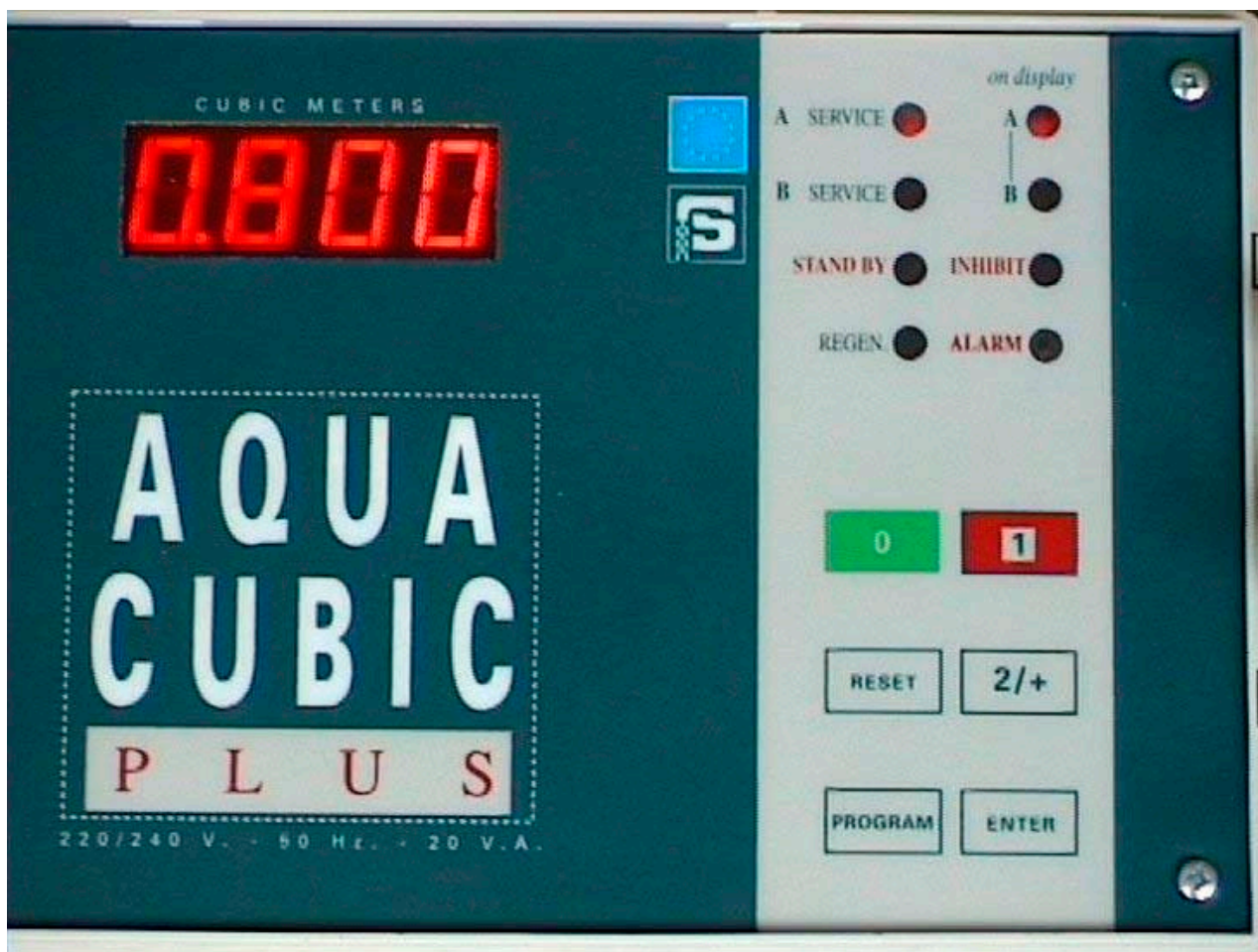


Fig. 1

Supply voltage	230 Vac \pm 10%
Network frequency	50 Hz \pm 3%
Power absorbed	30 VA
Operative temperature	0° C – 55° C
Class of protection	IP65
Protection from disturbances	ICE 65 Trial class 4 (3000 V)
Reading scale	0 – 999,999 Litres
Container dimensions	240 mm x 185 mm x 115 mm
Total weight	1.5 Kg

3 – EXPLANATION OF THE LEDs AND OF THE KEYS

Tab. 1 – Functionality of the LEDs

Led	Meaning
A SERVICE	Column A is in service
B SERVICE	Column B is in service
STAND-BY	Request for regeneration (this will be carried out at the programmed time)
REGEN	Regeneration in progress
A	The display shows the data of column A
B	The display shows the data of column B
INHIBIT	Regeneration inhibited. Cannot start automatically
ALARM	Alarm

Tab. 2 – Functionality of the keys

0	Key in the number 0 in the programming code. Within a programming code returns to zero the value of the number being varied. Cancels any regeneration in progress (when the flag 1dP is programmed to 1).
RESET	Allows for the programming to be exited from without memorising the last value keyed in.
PROGRAM	Allows access to the programming functions
1	Inserts number 1 in the programming code Starts up the regeneration of the column indicated on the Display . During the stop phase, returns to zero the residual time and accesses the next phase (when the flag 1dP is programmed to 1).
2 / +	Inserts number 2 in the programming code During the programming increases the value on the display Allows the visualisation mode of the display to be changed
ENTER	Confirms the code keyed in

4 – STATES OF VISUALISATION OF THE DISPLAY

The display allows the visualisation of the data and of the operative states. When possible, the key **2/+** allows for the passing from one column to the other.. In this case, the LEDs **A** and **B** will indicate to which column the visualised data refers.

Tab. 3 – Visualisation of the display

Display	Operative state / Visualised data
1 2 2.4	The column is in service. The display shows the volume available.
----	The column is in the <i>stand-by</i> phase after the regeneration.
1 C 2 0	The column is in regeneration.
0.0 0 0	The column has used up the programmed volume and is waiting to regenerate

5 – GENERAL

The installation of the *controller* must be carried out by qualified personnel; the installation procedures must be carried out when the controller is disconnected from the electricity supply

5.1 – Packaging and storage

The packaging consists of a cardboard box with a label identifying the product, carrying the following information: name of producer and PN producer **AC-PLUS2/05**; the **quick reference guide** for the installation and programming may be found inside.

No particular procedures are necessary for the removal of the controller from the packaging.

The controller must be stored in environments with the following characteristics:

- Temperature of between +0°C and +55°C;
- Relative humidity of between 30 % and 95 %.

5.2 – Installation

The appliance consists of a PVC box with a cover in plexi-glass which may be opened manually, giving access to the keypad, and of a cover which may be removed by loosening two screws and which gives access to the external connection terminal board.

The box is covered by a certificate with the **IP65** grade of protection, **Aqua Cubic Plus** is therefore protected against infiltration of dust and direct jets of water. This protection is valid when the cover is closed, and the wiring slots are of the correct size for the cables used and are correctly assembled. If these conditions are not respected, the level of protection falls to **IP40**, which gives no protection against infiltration of dust and water.

The back of the box is equipped with mechanical details which allow it to be wall-mounted.

5.3 – Electrical connections

The electrical connection of the *controller* must take place conforming to the conditions stated in the diagram **CE0024** shown on the attached page.

If the system uses **a distributor** connected with one or two valves, the relative electrical connections must conform to that indicated in the diagram **CE0025** which is shown on the attached page.

If the system uses **two distributors** connected to one valve each, the relative electrical connections must conform to that indicated in the diagram **CE0026** which is shown on the attached page.

The appliance is equipped with **free contact exits** with the following signals.

- **Dosage pump**
- **A in service**
- **B in service**
- **Alarm**
- **Regeneration in progress**

Warning!!

Before carrying out any installation and/or maintenance operation, check that the *controller* is **disconnected from the electricity supply**.

The supply to the *controller* must take place in accordance with all that is set out in the **Low Voltage directive(73/23/EEC)**. **Aqua Cubic Plus** is equipped with a clip for the earth connection.

5.4 – Protection devices

The appliance is protected from current overloads by a **0.6A supply retardant fuse** which is assembled on the front panel. It is also protected against disturbances originating from the electricity supply by filters mounted inside the controller.

6 – INSTRUCTIONS FOR USE

6.1 – Turning on

The appliance is turned on via the main switch **ON (I) - OFF (0)** situated on the front panel. This switch acts on both supply cables

The supply voltage must be **24 Vac - 50 Hz.** (on demand **24 vac – 50 Hz.**)

Check the supply voltage using the adhesive labels situated on the cover of the connections.

6.2 – Programming of the operative modalities

Before proceeding to the programming of **Aqua Cubic Plus**, it must be checked that the distributor cams are positioned at the **stroke end** and that any **unused limit switch** entries on the terminal are closed with a connector bridge. If this simple rule is not respected, **Aqua Cubic Plus** cannot enter into service and access to the keypad will be limited after a few operations.

The programming will be carried out via the keypad on the front of the appliance.


Aqua Cubic Plus has the following operative modalities:

Tab. 4 – Table of the operative modalities

Code	Description	Rotation times
P P P 0	One single column	4 phases with 50 -second rotation time
P P P 2	Two alternated single columns (Modular)	4 phases with 50 -second rotation time
P P P 4	One duplex column	4 phases with 25 -second rotation time
P P P 6	Cannot be used	Cannot be used
P P P A	Two single columns in parallel	4 phases with 50 -second rotation time

The selection is carried out according to the following sequence:

Tab. 5 – Selection of the operative modalities

	Display	Operative state / Visualised data
PROGRAM	P 0 0 0	State of access to the selection of the operative modality
ENTER	P P P x	Visualisation of current operative modality (x = 0, 2, 4, A)
2 / +	P P P *	The key 2 / + modifies the operative modality as in tab. 4

6.2.1 – PPP0 – One single column

6.2.1.a – Operative characteristics


This modality has been designed to resolve **emergency cases** if **Aqua Cubic Plus** is used in a duplex system and one column stops working, it is possible to use the other column singularly and to continue to provide treated water to the user (see par. 7.5 for details).

Depending on the programming of the flags, described in the next paragraph, **the start-up of the regeneration** may be immediate or deferred to a programmed time. In both cases, **the demand for regeneration** occurs when the volume of the treatable water reaches the value 0, or in the presence of a **Remote Start** signal which has been active for **15 seconds**. In the case of deferred regeneration (at the programmed time) a control of the treatable volume in relation to the percentage of the **reserve** programmed is automatically activated (see par. 6.4 programming of the reserve).; in this case the **demand for regeneration** is activated when the treatable volume reaches the value of volume calculated on the basis of the percentage of the reserve programmed.

6.2.1.b – Programming of the flags

Tab. 6 shows the options available for the **PPP0** modality:

Tab. 6 – Selection of the operative modality single column PPP0

	FLAG	Display	Operative state / Visualised data
PROGRAM		P 0 0 0	State of access to selection of the operative modality
ENTER		P P P X	Visualisation of current operative modality (x = 0, 2, 4, A)
2 / +		P P P 0	The key 2 / + modifies the operative modality as in tab. 4 : returns to 0
PROGRAM	0 H P	0 H P 0	Immediate regeneration
2 / +	0 H P	0 H P 1	Regeneration deferred to the programmed time
PROGRAM	1 H P	1 H P 0	FLAG not used
PROGRAM	2 H P	2 H P 0	Start-up of regeneration immediate if activated by the Remote Start
2 / +	2 H P	2 H P 1	Start-up of regeneration at the programmed time if activated by the Remote Start
PROGRAM	3 H P	3 H P 0	FLAG not used
PROGRAM	0 C P	0 C P 0	Modality of the litre counter divider(0 = free, see par. 6.6)
2 / +	0 C P	0 C P 1	Modality of the litre counter divider (1 = pre-programmed, see par. 6.6)
PROGRAM	1 C P	1 C P 0	FLAG not used
PROGRAM	2 C P	2 C P 0	The new programming is operative immediately.
2 / +	2 C P	2 C P 1	The new programming is operative after the next regeneration

PROGRAM	3 C P	3 C P 0	FLAG not used
PROGRAM	0 d P	0 d P 0	FLAG not used
PROGRAM	1 d P	1 d P 1	Enables the start-up and the stop of the manual regeneration with the keys 1 and 0
PROGRAM	2 d P	2 d P 0	FLAG not used
PROGRAM	3 d P	3 d P 0	FLAG not used
PROGRAM			The rapid flashing of the display indicates that the values have been saved in the EEPROM

At the end of the programming, the code **220** must always be keyed in (see par. 6.3) to start **Aqua Cubic Plus** with the new parameters.

6.2.1.c – Lists of codes to be programmed

For the programming and the meaning of the codes, see par. 6.3. In this modality, it is advisable to use the following codes

Tab. 7 – Table of the codes in the modality single column PPP0

Code	Meaning
011	Setting of the value of the capacity of the resins exchange
012	Setting of the time of regeneration and of the interval days between two regenerations
020	Setting of the time and day of the week
100	Setting of the volume of resin and of the percentage of the reserve of column A
110	Setting of the litre counter divider (prescaler)
112	Setting of the regeneration cycle (stop times)
010	Setting of the hardness value
220	Initialisation of the system

6.2.2 – PPP2 – Two alternated single columns

6.2.2.a – Operative characteristics.

This modality allows for the use of **two distributors each of which is connected to one single SIATA valve**. The two columns are **in service alternately**, so that while one is in service, the other will be **first in regeneration and then in stand-by**.


The start-up of the regeneration may be both *immediate* and *deferred* to a programmable time, and is activated only when the treatable volume reaches the value 0. Checks on the value of the **reserve** and on the presence of the **remote start** are not available.

When **Aqua Cubic Plus** is programmed in this operative modality, it is possible to activate the function «**Modular**», which consists of **putting into service the column in stand-by** when the consumption of water exceeds the intervention point in litres/minutes programmed with the code **202** (see par 6.3). This option is activated by the **3CP1**. The intervention point must be between the minimum and maximum limits shown in tab. 15 for the type of divider set.

6.2.2.b – Programming of the flags

Tab. 8 shows the options available for the modality **PPP2**

Tab. 8 – Selection of the operative modality two alternated single columns PPP2

	FLAG	Display	Operative state / Visualised data
PROGRAM		P 0 0 0	State of access to the selection of the operative modality
ENTER		P P P x	Visualisation of the current operative modality (x = 0, 2, 4, A)
2 / +		P P P 2	The key 2 / + modifies the operative modality as in tab. 4 : returns to 2
PROGRAM	0 H P	0 H P 0	Immediate regeneration
2 / +	0 H P	0 H P 1	Regeneration deferred to the programmed time
PROGRAM	1 H P	1 H P 0	FLAG not used
PROGRAM	2 H P	2 H P 0	FLAG not used
PROGRAM	3 H P	3 H P 0	FLAG not used
PROGRAM	0 C P	0 C P 0	Modality of the litre counter divider (0 = free, see par. 6.6)
2 / +	0 C P	0 C P 1	Modality of the litre counter divider (1 = pre-programmed, see par. 6.6)
PROGRAM	1 C P	1 C P 0	Same regeneration cycle times for the two columns A and B
2 / +	1 C P	1 C P 1	Different regeneration cycle times for the two columns A and B
PROGRAM	2 C P	2 C P 0	The new programming is operative immediately.
2 / +	2 C P	2 C P 1	The new programming is operative after the next regeneration
PROGRAM	3 C P	3 C P 0	Modular function not active
2 / +	3 C P	3 C P 1	Modular function active
PROGRAM	0 d P	0 d P 0	FLAG not used
PROGRAM	1 d P	1 d P 0	Manual start-up and stop of the regeneration not active
2 / +	1 d P	1 d P 1	Enables the start-up and stop of the manual regeneration with the keys 1 and 0
PROGRAM	2 d P	2 d P 0	FLAG not used
PROGRAM	3 d P	3 d P 0	FLAG not used
PROGRAM			The rapid <i>flashing</i> of the display indicates that the values have been saved in the EEPROM

At the end of the programming, the code **220** must always be keyed in (see par. 6.3) to start **Aqua Cubic Plus** with the new parameters.

6.2.2.c – List of codes to be programmed

For the programming of the codes, see par. 6.3. In this modality it is advisable to programme the following codes:

Tab. 9 – Table of the codes in the modality of two alternated single columns PPP2

Code	Meaning
011	Setting of the value of the capacity of the resins exchange
012	Setting of the time of the regeneration and the interval days between two regenerations
020	Setting of the time and of the day of the week
100	Setting of the volume of resin and of the percentage of reserve of column A
110	Setting of the litre counter divider (prescaler)
112	Setting of the regeneration cycle (stop times)
210	Transfer of the parameters programmed for the column A on the column B
202	Se required, setting of the intervention point of the modular
010	Setting of the hardness value
220	Initialisation of the system

In cases in which columns of different dimensions are used, the recommended programming varies as follows:

Tab. 10 – Table of the codes in the modality two alternated single columns PPP2 of different dimensions

Code	Meaning
011	Setting of the value of the capacity of resins exchange
012	Setting of the time of the regeneration and the interval days between two regenerations
020	Setting of the time and of the day of the week
100	Setting of the volume of resin and of the percentage of reserve of column A
101	Setting of the volume of resin and of the percentage of reserve of column B
110	Setting of the litre counter divider (prescaler)
111	Setting of the regeneration cycle (stop times) for the column B
112	Setting of the regeneration cycle (stop times) for the column A
202	If used, setting of the intervention point of the modular
010	Setting of hardness value
220	Initialisation of the system

6.2.3 – PPP4 – One duplex column.

6.2.3.a – Operative characteristics.

In this modality, **one single distributor connected to 2 SIATA valves** is used.


The start-up of the regeneration can take place only in *immediate* both when due to the running out of the volume of treatable water and when there is the **remote start**. The check on the reserve is not available.

In this operative modality, it is not possible to diversify either the dimensions of the columns, or the regeneration times. The key **2/+** has a particular function: during the service it has no influence, and on the display only the residual volume of the column in service is visible. When this goes into regeneration, the display shows the times, and pressing the key **2/+** it is possible to see the residual volume of the other column, which has entered into service. This data remains visible only for about 4 seconds, during which the keypad cannot be used and the cycle times are therefore visualised once again.

6.2.3.b – Programming of the flags

Tab. 11 shows the options available for the modality **PPP4**

Tab. 11 – Selection of the operative modality one duplex column PPP4

	FLAG	Display	Operative state / Visualised data
PROGRAM		P 0 0 0	State of access to the selection of the operative modality
ENTER		P P P x	Visualisation of the current operative modality (x = 0, 2, 4, A)
2 / +		P P P 4	The key 2 / + modifies the operative modality as in tab. 4 : returns to 4
PROGRAM	0 H P	0 H P 0	FLAG not used
PROGRAM	1 H P	1 H P 0	FLAG not used
PROGRAM	2 H P	2 H P 0	FLAG not used
PROGRAM	3 H P	3 H P 0	FLAG not used
PROGRAM	0 C P	0 C P 0	Modality of the litre counter divider (0 = free, see par. 6.6)
2 / +	0 C P	0 C P 1	Modality of the litre counter divider (1 = pre-programmed see par. 6.6)
PROGRAM	1 C P	1 C P 0	FLAG not used
PROGRAM	2 C P	2 C P 0	The new programming is immediately operative .
2 / +	2 C P	2 C P 1	The new programming is operative after the next regeneration
PROGRAM	3 C P	3 C P 0	FLAG not used
PROGRAM	0 d P	0 d P 0	FLAG not used
PROGRAM	1 d P	1 d P 1	Enables the start-up and stop of the manual regeneration with the keys 1 and 0
PROGRAM	2 d P	2 d P 0	FLAG not used
PROGRAM	3 d P	3 d P 0	FLAG not used
PROGRAM			The rapid <i>flashing</i> of the display indicates that the values have been saved in the EEPROM

At the end of the programming, the code **220** must always be keyed in (see par. 6.3) to initialise **Aqua Cubic Plus** with the new parameters.

6.2.3.c – List of codes to be programmed

For the programming and the explanation of the codes see par. 6.3. In this modality the programming of the following codes are recommended:

Tab. 12 – Table of the modality one duplex column PPP4

Code	Meaning
011	Setting of the value of the capacity of the resins exchange
100	Setting of the volume of resin and of the percentage of reserve of the column A
110	Setting of the litre counter divider (prescaler)
112	Setting of the regeneration cycle (stop times)
010	Setting of the hardness value
220	Initialisation of the system

6.2.4 – PPPA – Two single columns in parallel

6.2.4.a – Operative characteristics.


In this modality the system works with **two distributors, each of which is connected with one SIATA valve. Both of the columns are in service.** It is not possible to have both of the columns in regeneration

The start-up of the regeneration is immediate when the treatable volume of one of the two columns runs out, or, if activated, when both of the columns have a volume under the value of the reserve calculated.

6.2.4.b – Programming of the flags

Tab. 13 shows the options available for the modality PPPA

Tab. 13 – Selection of the operative modality two single columns in parallel PPPA

	FLAG	Display	Operative state / Visualised data
PROGRAM		P 0 0 0	State of access to the selection of the operative modality
ENTER		P P P x	Visualisation of the current operative modality (x = 0, 2, 4, A)
2 / +		P P P A	The key 2 / + modifies the operative modality as in tab. 4 : returns to A
PROGRAM	0 H P	0 H P 0	FLAG not used
PROGRAM	1 H P	1 H P 0	FLAG not used
PROGRAM	2 H P	2 H P 0	FLAG not used
PROGRAM	3 H P	3 H P 0	FLAG not used
PROGRAM	0 C P	0 C P 0	Modality of the litre counter divider (0 = free, see par. 6.6)
2 / +	0 C P	0 C P 1	Modality of the litre counter divider (1 = pre-programmed see par. 6.6)
PROGRAM	1 C P	1 C P 0	Same regeneration cycle times for the two columns A and B
2 / +	1 C P	1 C P 1	Different regeneration cycle times for the two columns A and B
PROGRAM	2 C P	2 C P 0	The new programming is operative immediately..

2 / +	2 C P	2 C P 1	The new programming is operative after the next regeneration
PROGRAM	3 C P	3 C P 0	FLAG not used
PROGRAM	0 d P	0 d P 0	Disables the check of the reserve
PROGRAM	0 d P	0 d P 1	Enables the control of the reserve
PROGRAM	1 d P	1 d P 1	Enables the start-up and stop of the manual regeneration with the 1 and 0 keys
PROGRAM	2 d P	2 d P 0	FLAG not used
PROGRAM	3 d P	3 d P 0	FLAG not used
PROGRAM			The rapid <i>flashing</i> of the display indicates that the values have been saved in the EEPROM

At the end of the programming the code **220** must always be keyed in (see par. 6.3) to initialisation **Aqua Cubic Plus** with the new parameters.

6.2.4.c – List of codes to be programmed

For the programming and the explanation of the codes, see par. 6.3. In this modality the programming of the following codes are recommended:

Tab. 14 – Table of the codes in the modality two single columns in parallel PPPA

Code	Meaning
011	Setting of the value of the capacity of the resins exchange
100	Setting of the volume of resin and the percentage of the column A
110	Setting of the litre counter divider (prescaler)
112	Setting of the regeneration cycle (stop times)
210	Transfer of the parameters programmed for the column A on the column B
010	Setting of the hardness value
220	Initialisation of the system

In cases in which columns of different dimensions are used, the programming recommended varies as follows:

Tab. 15 – Table of the codes in the modality two single columns in parallel PPPA of different dimensions

Code	Meaning
011	Setting of the value of the capacity of the resin exchange
100	Setting of the volume of resin and of the percentage of reserve of the column A
101	Setting of the volume of resin and of the percentage of reserve of the column B
110	Setting of the litre counter divider (prescaler)
111	Setting of the regeneration cycle (stop times) of the column B
112	Setting of the regeneration cycle (stop times) of the column A
010	Setting of the hardness value
220	Initialisation of the system


6.3 – Programming codes

The work parameters necessary for the correct functioning of **Aqua Cubic Plus** are inputted with access via the *programming codes*, under which the parameters are grouped with a precise function of the controller. The following paragraphs illustrate how the programming codes are accessed and their use.

6.3.1 – Access to the programming codes

The following table represents the procedure which must be carried out to access the programming codes:
(Where **P x x x** appears, instead of the **xs**, this means that there will be numbers which vary according to the pressing of the keys.)

Tab. 16 – Access to the programming codes

	Display	Meaning
PROGRAM	P 0 0 0	Modality of keying in of the programming codes.
0 - 1 - 2/+	P x x x	Composition of the number on the display via the keys indicated; after the keying in of the first three numbers, further pressing of the keys moving the numbers to the left, eliminating the first number keyed in and keying in the new number on the right.
ENTER	P x x x	Confirms the code selected and accesses its programming.


6.3.2 – List of programming codes and their use


The following table lists the programming codes available.

For each of these codes the sequence of the parameters as they appear on the display, and their meaning in the functioning cycle of **Aqua Cubic Plus**.

The code is accessed with the instructions shown in tab. 16; inside each code the key **2/+** allows for the modification of the parameter, while the key **PROGRAM** allows for the modifications carried out to be memorised.

Tab. 17 – Table of the programming codes

Codice visualizzato		Display	Meaning
P 0 0 2	ENTER		Modifies the movement times of the all the phases of the regeneration taking them to 5 seconds . Is used to carry out test regenerations. To return to the correct times the programming of the flags must be run through. Cannot be used for tests with the hydraulic distributors..
P 0 1 0	ENTER	d H x x	Programming of the hardness value . May assume values from 1 to 99 . At the end of the setting, calculates the new volume values, which become active immediately if the flag 2CP is programmed to 0 , otherwise they will become active after the first regeneration or the reset of the appliance via the code 220 . The value of hardness must be expressed in <i>French degrees</i> .
P 0 1 1	ENTER	C h x.x	Programming of the value of capacity of exchange of the resins ; xx may go from 1.4 to 9.0 , and is expressed in terms of gr CaCO ₃ /litre resin.

Code visualised		Display	Meaning
P 0 1 2	ENTER	X X X X	Time of regeneration; to change the flashing numbers use the key 2/+, press PROGRAM to pass from the minutes to the hours.
	PROGRAM	P - X X	Days of interval between two regenerations (from 1 to 30) (programming with no effect)
P 0 2 0	ENTER	X X X X	Programming of the local time
	PROGRAM	P - - X	Programming of the day of the week: x may be 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday
P 1 0 0	ENTER	X X X X	Programming of the volume of the resin (in litres) of the column A: may go from 1 to 10000 (to have 10000 litres, programme 0000)
	PROGRAM	H H X X	Programming of the percentage of reserve of the column A the value of the reserve may go from 10% to 80% of the total volume
P 1 0 1	ENTER	X X X X	Programming of the volume of the resin (in litres) of the column B: may go from 1 to 10000 (to have 10000 litres, programme 0000)
	PROGRAM	H H X X	Programming of the percentage of reserve of the column B; the value of the reserve may go from 10% to 80% of the total volume
P 1 1 0	ENTER	X X X X	Programming of the ratio impulses/litre (prescaler) of the counter. If the flag 0CP is at 0 , the divider is free and the value can go from 0 to 899 impulses / litre. If 0CP is at 1 the divider is pre-programmed, and par 6.6 should be seen for the list of options available.
P 1 1 1	ENTER	1 C X X	Programming of the stop times in minutes, of the regeneration cycle of the column B; xx varies from 1 to 99 minutes
	PROGRAM	* C X X	* stands for the phases 2, 3 and 4 of the regeneration cycle of the column B
P 1 1 2	ENTER	1 C X X	Programming of the stop times , in minutes, of the regeneration cycle of the column A; xx varies from 1 to 99 minutes
	PROGRAM	* C X X	*stands for the phases 2, 3 and 4 of the regeneration cycle of the column A
P 2 0 0	ENTER	X X X X	Programming of the value of division (prescaler) of the dosage pump; this value is decreased by both of the counters; the duration of the impulse is fixed at 1 second
P 2 0 2	ENTER	X X X X	Programming of the intervention point (litres/minute) which causes the column in stand-by to enter into service when working in the « Two single alternated columns » mode.
P 2 1 0	ENTER		Transfers the parameters programmed for the column A to the column B
P 2 1 1	ENTER		Calculates the volume and the reserve
P 2 1 2	ENTER		Activates the counters of the active columns and transfers the values of the treatable volumes in the work memory visible on the display.
P 2 2 0	ENTER		Start of the system. Function to be used always when carrying out modifications in the operative modality or in the programming of the parameters.
P 2 2 1	ENTER		Starts the forced regeneration of the column visualised on the display. Through the flag 1dP , this function is available directly on the keypad. The key 1 starts the regeneration and the key 0 stops it. The key 1 , pressed during the stop phase, cancels the residual time and allows for the next phase to be started.
P 2 2 2	ENTER		During the stop phase of the regeneration, causes the cancelling of the residual time and thus allows for the next phase to be passed to. When the flag 1dP is at 1 , this same function is available on the key 1

6.4 – Programming of the reserve

Aqua Cubic Plus allows for the volume of treatable water to be controlled, putting it into ratio with a possible **reserve** value. This is programmed via the code 100 (see par. 6.3) and expresses the **percentage of the total volume available** which must be held in reserve. Thus, if there are 10000 treatable litres available and if 70% reserve is required, the value **HH70** in the code 100 must be programmed and the code 211 keyed in to have the calculations of the volume carried out. If **Aqua Cubic Plus** is programmed as «**one single column**», and the flags are programmed to activate the control on the reserve, when the volume reaches the value 7000 a regeneration will be set which **will be carried out at the programmed time**. If **Aqua Cubic Plus** is programmed as «**two single columns in parallel**», the regeneration **will be set when both columns** have the volume value under 7000, and the regeneration will be carried out on the column which has consumed a greater volume of water than the other. The latter will go into regeneration either when its litres have run out or when the other column has in turn fallen below the reserve value.

Important!!

The control on the reserve may be activated only in the modalities «one single column» and «two single columns in parallel»

6.5 – Remote Start

Aqua Cubic Plus makes a «remote start» entry available which allows for the regeneration to be started up by an **external automatism** or manually via a button positioned at some distance from the controller. Whichever device is used, this must be of the *normally open* type, and to start up the regeneration, must be closed for at least 15 seconds. The regeneration by remote start can start both in immediate or deferred to the programmed time modes. To use the deferred regeneration start-up both the flag **0HP** and **2HP** must be programmed at **1**. The remote start is available only when a single distributor is active, and therefore in the modalities **PPP0** and **PPP4**.

6.6 – Programming of the litre counter divider (prescaler)

The programming of the litre counter divider (**prescaler**) defines the ratio between the number of *impulses* read by **Aqua Cubic Plus** and *the unit of load* in transit in the counter used (litres or m³). **Aqua Cubic Plus** has two work modes:

- **free prescaler** if the flag **0CP** is equal to **0**; in this case the prescaler may be programmed within the range of values $1 \div 899$ (n° of impulses given by the litre counter before the volume climbs by one unit);
- **pre-programmed prescaler** if the flag **0CP** is equal to **1**, in this case the prescalers which can be used are those indicated in the first column of table 18;

Tab.18 – Table of the pre-programmed litre counter dividers and range of flow admissible

Prescaler impulses/litre	Minimum load of the flow (lit/min)	Maximum load of the flow (lit/min)
14/01	0.2	40
4/1	1	150
1/1	3	600
4/10	7.5	1500
2/10	15	3000
1/10	30	6000
4/100	75	9999
2/100	150	9999
1/100	300	9999
4/1000	750	9999
2/1000	1500	9999
1/1000	3000	9999

The volume calculated by **Aqua Cubic Plus** can go from 0 to 999,999 litres. This value is optimised in order to be able to be visualised by the display of the controller which can show only four digits.

A decimal point will appear on the display to separate the cubic metres from the litres, that is the thousands of litres from the hundreds.

The value of the volume will be visualised from the left to the right, so that a volume value of 15,500 litres will be visualised as **15.50**, a value of 350,000 litres will appear as **350.0**. During the service, the normal consumption of water will cause the volume visualised to decrease; when the most significant digit becomes zero, **Aqua Cubic Plus** will optimise the visualisation moving the reference point towards the left, which allows new, less significant digits to be seen. Thus, the moment the volume passes from 10,000 to 9,999 litres, the visualisation will pass from **10.00** to **9.999**, if the volume passes from 100,000 to 99,900 litres, the visualisation passes from **100.0** to **99.90**.

If using a pre-programmed prescaler, the volume calculated is optimised by rounding it off.

Example:

If the volume calculated is 15,435 litres and the prescaler is programmed with the type 1/10, the volume will be optimised to the value 15,430; if the prescaler chosen is the type 4/1000, the volume will become 15,000 litres and will be visualised as such on the display.

6.7 – Calculation of the capacity of a system

Aqua Cubic Plus is able to calculate autonomously the volume of water that the system is capable of treating. The calculation is carried out using the parameters shown below.

The calculation is carried out automatically after the programming of the hardness, otherwise it can be carried out by using the code **211**.

Consult par. 6.11 for the immediate availability or otherwise of the result of the calculation.

$$\text{Treatable litres} = \frac{1000 \times A \times B}{C}$$

Where :

A = **Volume of resin in litres**

B = **Capacity of ionic exchange of the resin, on average 5 (gr of CaCO₃ / litre of resin)**

C = **Hardness of the water in French degrees [° F]**

6.8 Putting into service

IMPORTANT

Always remember to key in the code **220** (ref. par. 6.3) after the various phases of programming before **Aqua Cubic Plus** has been put into service.

Always remember that before carrying out operations on the keypad of **Aqua Cubic Plus**, it must be checked that the cams of the distributors are on the position of **stroke end** (except when they are in regeneration, a condition which may be verified via the led **Regen**), and that any unused limit switch entries are **closed with a connector bridge**.

During the normal functioning of **Aqua Cubic Plus**, the leds **A** or **B** will be on to indicate which column is in service, while the leds **A Service** or **B Service** will indicate which column is visualised in that moment on the display.

6.9 – Connections

The drawing shown on the attached page **A** shows the general connections of the controller, also available on a sticker positioned under the cover giving access to the terminal board.

The drawings shown on the attached pages **B** and **C**, show the connections between the controller and, respectively, a duplex distributor and two single distributors.

If one single distributor is required, the attached page to refer to must be **C**, the distributor to connect is **A-dist**, and care must be taken to close the terminals **3** and **4** with a bridge.

With reference to attached page **B**, the cables cod. **96-M** and **96-S** may be assembled in any way. The cable cod. **96-AB1**, on the other hand, is polarised and it is important that it should be assembled as shown in the attached page **B**.

With reference to the attached page **C**, the cable cod. **96-M** is not polarised and may be assembled in any way. The cable cod. **96-S** on the contrary, is polarised. If, after the assembly, positioning the distributor at the stroke end, the LED **Service** on the distributor does not come on, the connection of the cable cod. **96-S** must be inverted.

With reference to the attached page **A**, two types of litre counter may be used, **the SIATA magnetic sensor with Hall effect**, and the **Reed counter**, or otherwise a counter which however supplies a simple **closure** between two wires.

In the first case, using the cables **SIATA turbine sensor**, the following connections must be made:

Tab.19 – Connections of the magnetic sensor with Hall effect

COLOUR	FUNCTION	FOR THE COLUMN A	FOR THE COLUMN B
White	+ 12	Terminal 26	Terminal 12
Green	Mass	Terminal 27	Terminal 13
Brown	Signal	Terminal 28	Terminal 14

If a **single magnetic sensor for both of the columns** is desired, it is enough to connect the sensor as shown for the column A, and then add a connection with a bridge between the terminals 28 and 14, so as to make the signal of the sensor arrive on the column B (fig. 2).

The connections shown in the table must be respected rigorously, to avoid any possible damage to the sensor.

In the second case, there are only two wires, between which there is a closure for each impulse. These wires must be connected to the terminals 27 and 28 for the column A, and to the terminals 13 and 14 for the column B. Also in this case, if the use of **only one counter for both columns** is desired, it is sufficient to connect the counter to the column A and connect with a connector bridge the terminal 28 to the terminal 14.

The connections of this type of counter are not polarised. They may be assembled in any way.

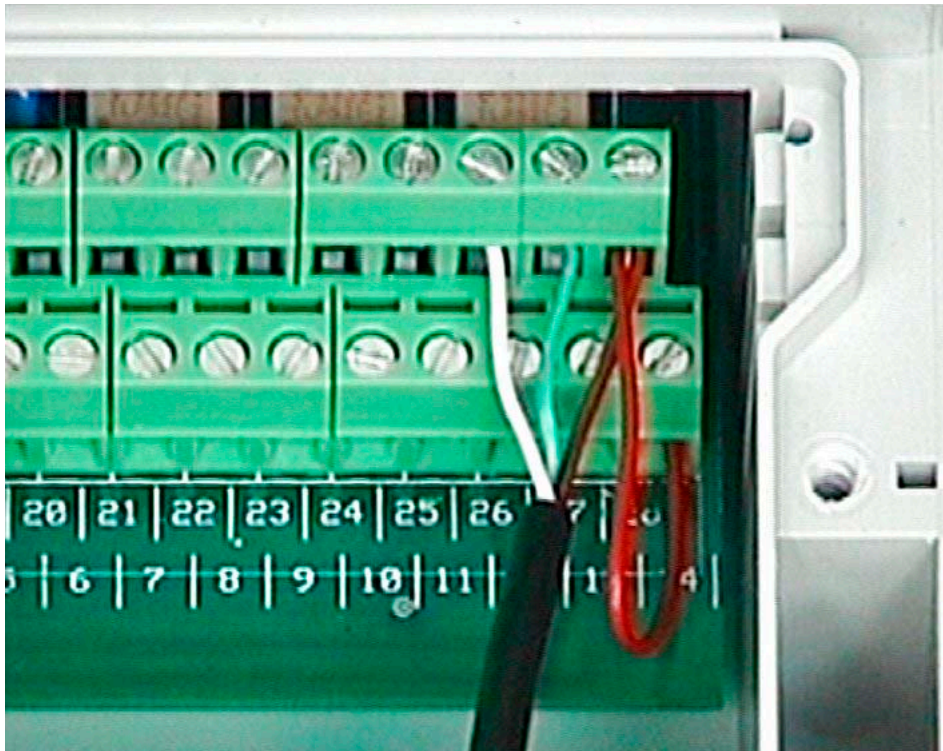


Fig. 2

6.10 – Management of the cylinder dimensions

Aqua Cubic Plus allows for a system to be formed consisting of two columns, that is using two columns, each connected to a SIATA valve and therefore to a cylinder containing the resins..

The programming of the capacity dimensions of the cylinders may be carried out all at once, if they are the same, or separately, if the cylinders have different capacities.

In the first case, proceed to the programming of the column **A** with the code **100**, to then copy the parameters of the column **A** to the column **B** by simply keying in the code **210**.

In the second case, both of the codes **100** and **101** must be programmed. The columns programmed in this way will enter into service according to the operative modality selected, and will go into regeneration according to the conditions provided.

The installer may choose whether to carry out the regeneration cycle of the two columns with the same times, or with different times, through the flag **1CP**.

When it is programmed with the value **0**, the two columns will regenerate with the same times, those programmed for the column **A** with the code **112**. If, however, it is programmed with the value **1**, the column **B** is regenerated with the times programmed with the code **111**.

6.11 –Modifying the programming during service, the flag 2CP

As already explained in par. 6.3, **Aqua Cubic Plus** calculates the volume of water which can be treated using the values of hardness of the water, the capacity of ionic exchange of the resins and the quantity of resin used. The calculation is carried out automatically at the end of the programming of the hardness (code **010**), or otherwise may also be carried out keying in the code **211**.

When these calculations are carried out at the time of the installation, the value of volume calculated must become operative immediately, so as to be able to start up the system.

When, however, the value of hardness is modified during the service, the fact of having the new value of volume operative immediately can become extremely dangerous, in that it cancels the value of residual volume treatable by the system; the consequence is that the column runs out and the regeneration does not start because the controller thinks it has a column which is still working efficiently.

The solution is the use of the flag **2CP**, which tells the controller when to make the value of volume calculated operative.

If it is programmed with the value **0**, the modifications to the programming are immediately operative.

When it is programmed with the value **1** the modifications are operative only after the next regeneration.

It can be a good rule to programme the flag **2CP** with the value **1** at the end of the installation, so that any modifications to the parameters during the service of **Aqua Cubic Plus** do not upset the possibility of the system to operate.

7 – What to do if ...

Some basic operations for the resolution of small problems which may arise during the use of **Aqua Cubic Plus** are described below.

If the suggestions shown do not help to resolve the situation, please call the SIATA service assistance.

7.1 - ... Aqua Cubic Plus does not come on ?

1. Check that the plug is correctly inserted in the electricity socket;
2. Check that the socket is correctly supplied;
3. Check that the adapter used does actually supply 24 Vac, code AC-PLUS 1/05, check that the transformer used does actually supply 24 Vac;
4. Check that the current conductors are correctly inserted into the terminals and that these are closed correctly.
5. Check that the fuse positioned on the panel has not blown.
In the case of Aqua Cubic Plus at 230 Vac, AC-PLUS2/05, this fuse must be of delayed 0.5A;
In the case of Aqua Cubic Plus at 24 Vac, AC-PLUS1/05, this fuse must be of delayed 1A

7.2 - ... the motors of the distributors do not stop ?

1. Check that the run end wires of the distributors, marked 96-S, are correctly inserted in the terminals and that these are closed correctly;

7.3 - ... there is no current to the utilisers?

1. Remember that **Aqua Cubic Plus does not supply current to the exits**, but only closures that the operator must wire at his own discretion, check that the wiring is correct, that the conductors are correctly inserted into the terminals and that these are closed correctly;

7.4 - ... Aqua Cubic Plus works in an irregular way?

1. Check that the distributors are at the stroke end, that is that the motors are not in movement;
2. If using **Aqua Cubic Plus** with a single distributor, check that the limit switch entry not used **is closed with a connector bridge**;

7.5 – ... one column is not working ?

To answer this query, the typology of the system must be distinguished. This can consist of two distributors with one valve each, or of one distributor with one or two valves. This advice is limited to:

- Systems consisting of two distributors with one valve each, in which:
 - ✓ there is a hydraulic problem on one of the columns;
 - ✓ or there is an electrical or mechanical problem on a distributor;
 - ✓ or there is an electrical problem inside **Aqua Cubic Plus limited to the user of column B**;

Aqua Cubic Plus allows for the blockage of the system to be resolved with two operative modalities:

- One single column
- Two single columns in parallel

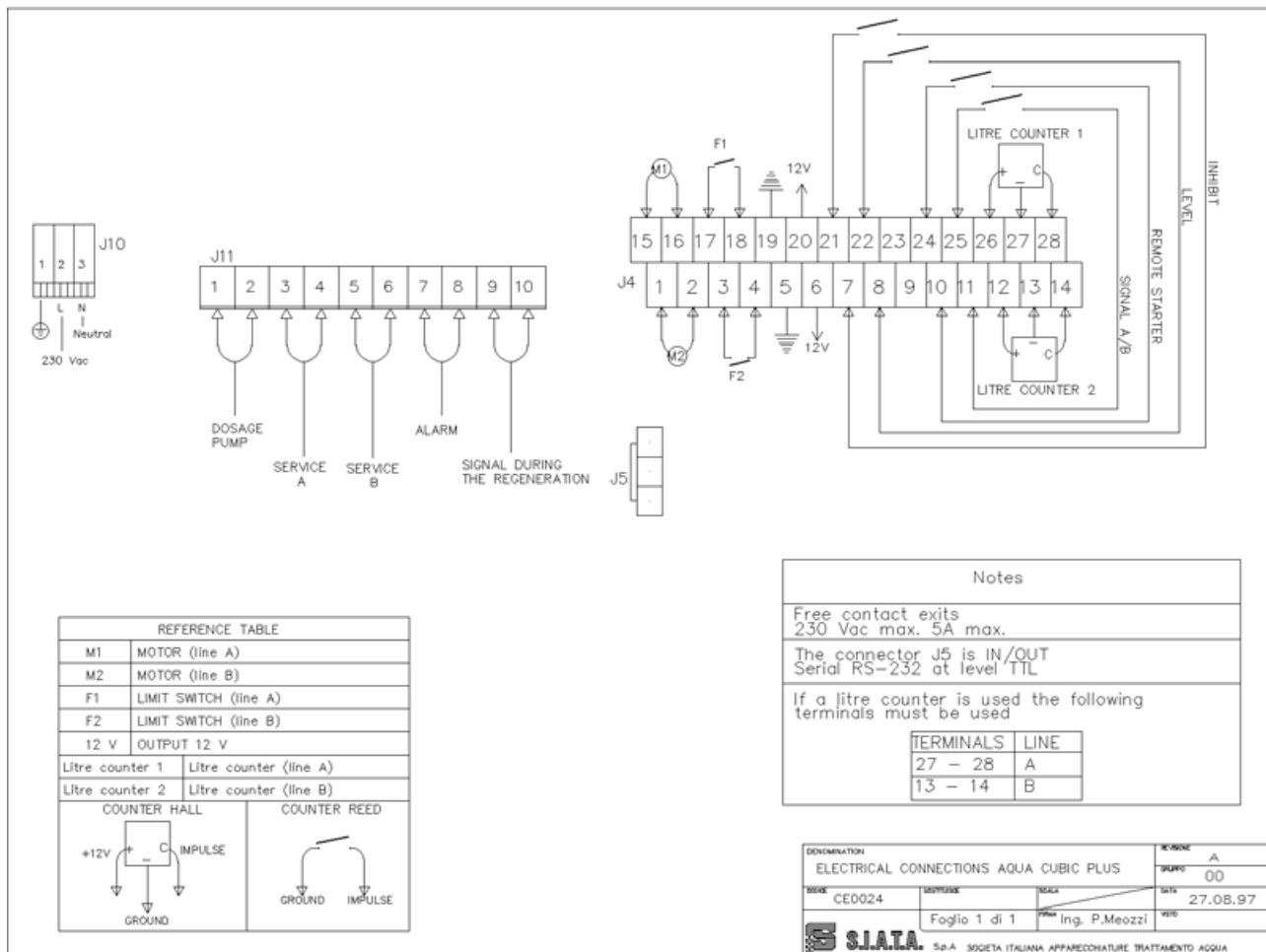
In the first case, **Aqua Cubic Plus** should be programmed as though it were one single column (see par. 6.2.1), and the distributor of the column in working order should be connected to the relative counter and any user to the terminals of **column A**.

In the second case, **Aqua Cubic Plus** should be programmed in the modality two single columns in parallel (see par. 6.2.4). In this case it is not necessary to modify the connections. It is sufficient to disconnect the counter and, if relevant, the service electro-valve of the column which is not working. The only working column will run out and will go into regeneration when the volume available runs out.

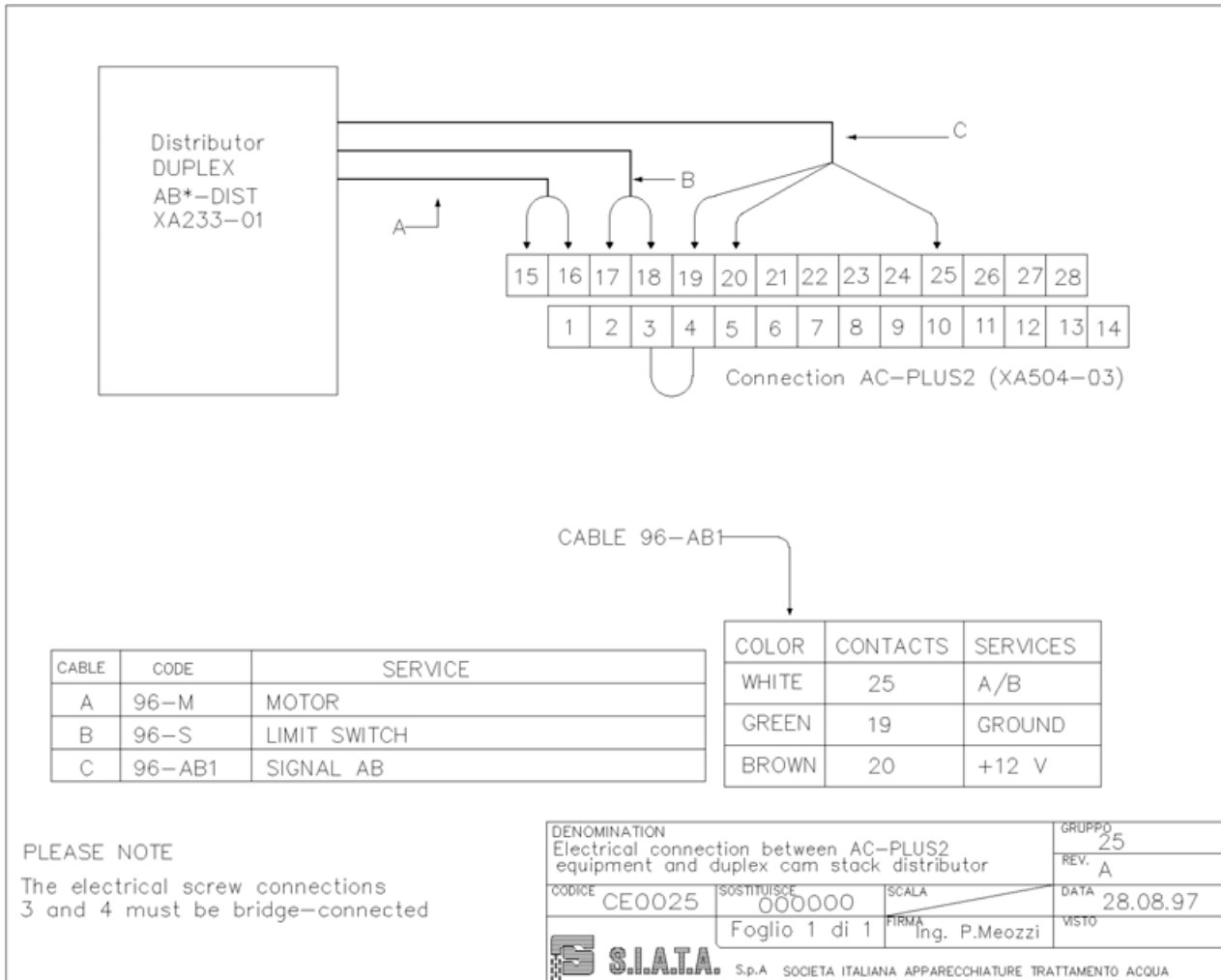
Obviously, in all cases, it should be checked that the correct programming of the parameters corresponding to the sizing of the columns and to the regeneration times should be checked, and the code 220 keyed in to render the modifications carried out operative.

In the particular case of a breakdown of any kind in a system consisting of one single distributor, it is not possible to intervene in any way except with spare parts.

Appendix A



Appendix B



Appendix C

