INSTALLATION MANUAL

Manual language	ENGLISH
Line	S
Product	**S21N1**
Description	TIMED MICROPROCESSOR BATCH CONTROLLER

Contents:

CE

Configuration and programming tools are available, for free download, from website: www.seneca.it

PRELIMINARY WARNINGS

Before performing any operation, it is mandatory to read and understood, in full, the contents of this installation manual. The module may only be used by qualified and skilled technicians in the field of electric installations. Specific documentation is available at site: www.seneca.it

Only the Manufacturer is authorized to repair the module or to replace damaged parts. The product is susceptible to electrostatic discharge, take appropriate countermeasures during any operation.

No warranty is guaranteed in connection with faults resulting from improper use, from modifications or repairs carried out by Manufacturer-unauthorized personnel on the module, or if the content of this user Manual is not followed.

PRELIMINARY INSTRUCTIONS FOR USE

It is forbidden to install the module near heat sources.

GENERAL CHARACTERISTICS

Batch controller with clock.
Dual display with five digits high brightness red LED.
7 LED indicating operating status.
6 keys for device's configuration and batching cycle command.
3 digital inputs, 3 control inputs (start, stop, reset) and
1 pulses signals input (with max frequency 2.2 kHz) configurable as: free contact, reed contact, NPN open collector BJT, NAMUR sensor, Hall effect sensor or photoelectric sensor.
Digital outputs: 2 relays SPDT (5 A, 250 V, resistive load).
Self-powered clock.
Dimensions L: 144 mm; H: 72 mm; W: 130 mm.
Power supply 115-230 V∿ o 24 V∿/⎓.
RS485 configurable port.
Micro USB port for software upgrade.
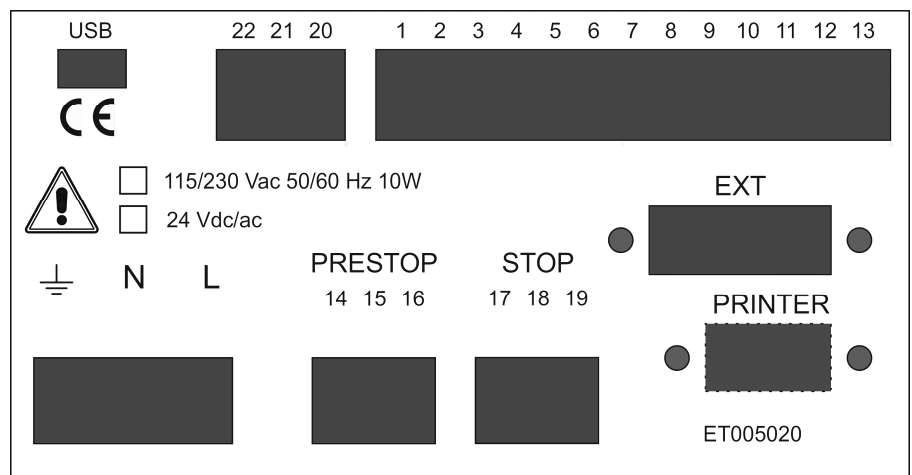
POSSIBLE USES:
DRUM REPETITIVE FILLING STATION

REAR PANEL:

The rear panel includes all connections of the batch controller **S21N1** through removable screw terminal connectors.
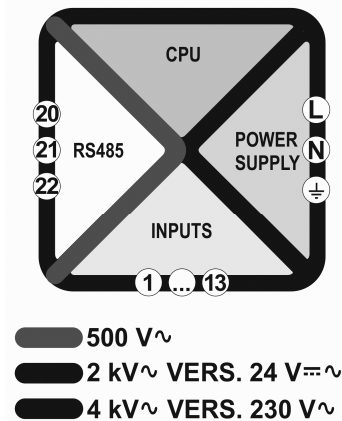
USB   22 21 20   1 2 3 4 5 6 7 8 9 10 11 12 13

CE

⚠ ☐ 115/230 Vac 50/60 Hz 10W
    ☐ 24 Vdc/ac

EXT

⏚ N L   PRESTOP   STOP   PRINTER
              14 15 16   17 18 19

ET005020

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TECHNICAL SPECIFICATIONS

Isolations 1500 V∿	Standards
	The module complies with the following standards:

CE	**EN61000-6-4** (electromagnetic emission, industrial environment). **EN61000-6-2** (electromagnetic immunity, industrial environment) **EN61010-1** (safety).

Communication ports

RS485 rear screw terminal (22-21-20)	Maximum baud rate 115k, Modbus RTU Protocol.
rear micro USB	USB port for software upgrade.
RS232 rear DB9 male socket	Printer serial port.

Power supply S21N1-1-ST

Voltage	115 – 230 V∿ ± 10% 50 – 60 Hz
Power consumption	Typical: 10VA

Power supply S21N1-23-ST

Voltage	24 V± 10%
Power consumption	Typical: 10VA

Environmental condition

Temperature	-0 °C – +50 °C
Humidity	30 – 90% at 40°C not condensing
Storage Temperature	-20 °C – +85 °C
Protection degree	IP20

Connections

| |
|---|
| Removable 3-way 5mm pitch screw terminals |
| Rear micro USB connector |

Dimensions / Box

|	
Dimensions / Weight	L: 144 mm; H: 72 mm; W: 140 mm / about 1 kg.
Box	PPO self-extinguishing UL94-V0, Black
Hole size for installation	L x H : 135 mm x 67 mm

INSTALLATION RULES

The S21N1 is designed to be installed on a panel with two mounting brackets, supplied.

Display panel installation

Cut a rectangular hole size:
W=135 mm x H=67 mm.
Insert the S21N1 into the hole.
Lock the S21N1 on panel using the two brackets supplied. Please see the picture below:
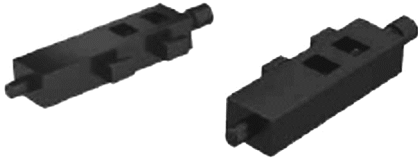
The brackets must be hooked into the slots on the sides of the S21N1 box.
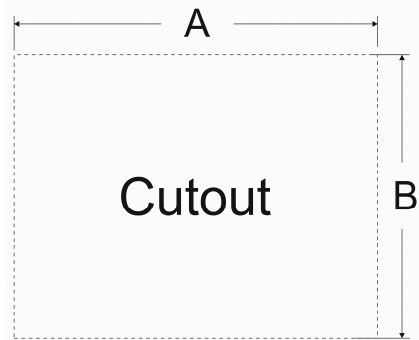
Model	A (mm)	B (mm)
S21N1	135	67

ELECTRICAL CONNECTIONS

Power supply S21N1-1-ST (115 – 230 V∿ 50 – 60 Hz)
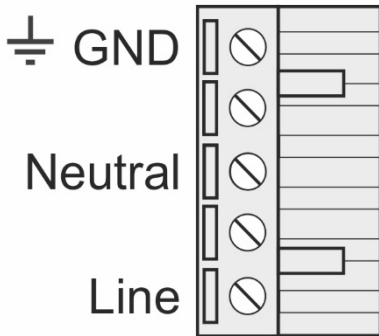
On S21N1-1-ST version, the switching between: 230 V∿ and 115 V∿ is carried out with an internal voltage selector.
By default the device is factory configured at 230 V∿.
If you want to change the power supply voltage please follow this procedure:
1. Open the device removing the 4 screws on the rear panel.
2. Remove the rear panel.
3. Pull out the power supply board and change the voltage with a screwdriver.
4. Close the device.

Power supply S21N1-23-ST (12 – 24 V⎓ / 12 – 24 V∿ 50 – 60 Hz)
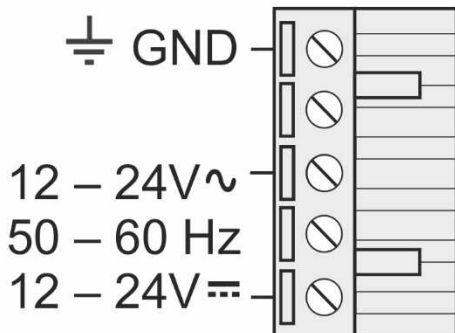
In order to avoid damage of the device, **before you connect power supply**, verify the power supply voltage recommended in the back panel.

MODBUS RS485

RS485

B Data– ⊘ 20
A Data+ ⊘ 21
GND ⊘ 22

One RS485 serial port, for communication with the Modbus Master system, is available from terminals 20 – 21 - 22.
The picture shows the connections.
Note: the indication of RS485 connection polarity is not standard, it may be inverted on some masters.

MICRO USB PORT

USB   22 21 20

CE

The S21N1 has a rear micro USB connector for software upgrade.

PRINTER DB9 PORT

DB9-M

DB9-M

5 ○ ○ ○ ○ ○ 1
9 ○ ○ ○ ○ 6
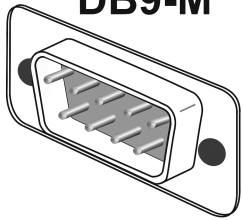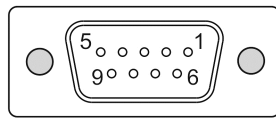
The S21N1 has a rear DB9 male socket that allows the connection to a dedicated printer.
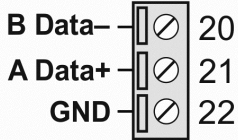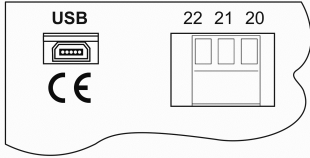
PULSES INPUT

This pulses opto-coupled input can receive up to 2 kHz pulses signals.

The pictures below show the connections to the most common types of sensors:

6 = GND (Negative power supply)/ **7 = GND+R** (1kΩ Resistor to GND)/ **8 = TRIGGER** (hysteresis input)

/ **12 = TRIGGER+R** (10kΩ resistor in series to TRIGGER) / **13 = +12V** (Positive power supply)
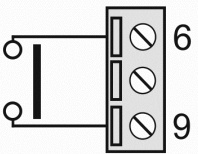
Free Contact	NPN open collector	NAMUR (8 V⎓)	(24V⎓) Pulses	Slow Pulses
6 / 9	– / + : 6 / 9	– / + : 10 / 11	– / + : 6 / 10	– / + : 6 / 8
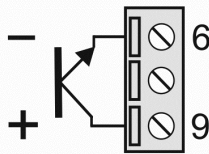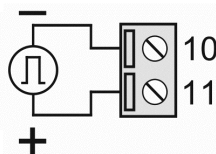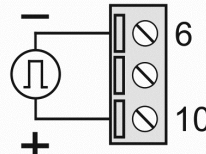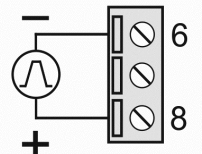
Note: The slow pulses input **8 = TRIGGER** is designed with hysteresis for signals with slow rising and falling edge or for signals with overlapped noise.

24 V⎓ NPN OUTPUT SENSOR	12 V⎓ NPN OUTPUT SENSOR	PHOTOELECTRIC SENSOR
NPN NO — BLUE – GND 6, BLACK 9, BROWN +24 V 11	NPN NO — BLUE – GND 6, BLACK 9, BROWN +12 V 13	WHITE 7, GREEN 10, BROWN +24 V 11
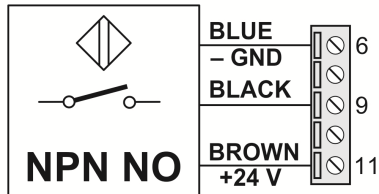
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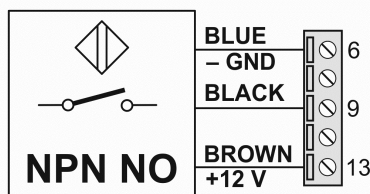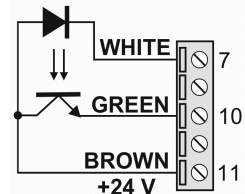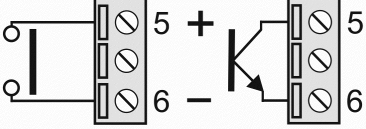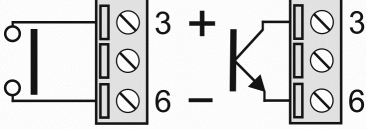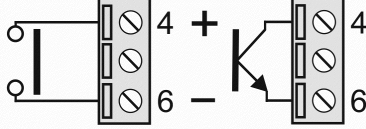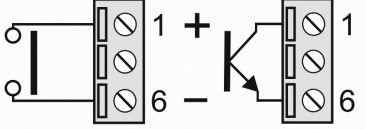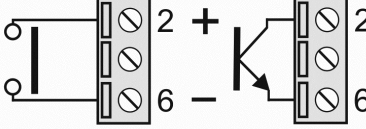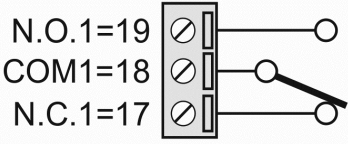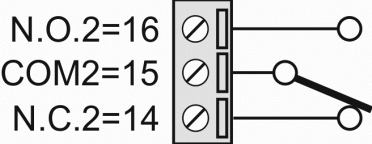
PUSH-BUTTON REMOTE CONTROL INPUTS

Those opto-coupled inputs allow to start, stop and reset the measurement.
They can be put in a easily accessible place for the operator, or placed on dispensing gun.
Those inputs can be connected to buttons, free contacts, opto isolators with NPN out or NPN BJT.

REMOTE START	REMOTE STOP (AUX3)	REMOTE RESET

REMOTE AUX1	REMOTE AUX2	REMOTE AUX3
		The remote STOP input can be configured for operate like AUX3. Then, if the S21N1 is in START or PRESTOP state, the RESET input emulate the PAUSE function, Else, if the S20N1 is in STOP state the RESET input remain in his own RESET function.

COMMAND OUTPUTS

S21N1 has two free contacts with rated current: 5 A at 250 V∿ (resistive load).
To extend contact's life we suggest using R-C filters for inductive loads in alternate current or diodes for inductive loads in direct current.

STOP	PRESTOP
N.O.1=19 COM1=18 N.C.1=17 	N.O.2=16 COM2=15 N.C.2=14

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S20N-KIT (OPTIONAL) CARD CONNECTIONS

To connect external buttons and lights to S21N1 batch, please use the appropriate S20N-KIT board.
Pease connect the S20N-KIT card to the EXT rear socket with the flat cable supplied.
With the S20N-KIT you can connect the 6 buttons (START, STOP, RESET, SEL, RIGHT ARROW and UP ARROW) and the 3 light indicators (START, STOP and RESET) directly on the card terminals.
The 6 buttons shall be N.O. (normally open) and voltage free (free contacts) and the 3 light indicators shall be 24V 2W. The light indicators are powered internally from the card.
Please follow the connections on the schematic below.

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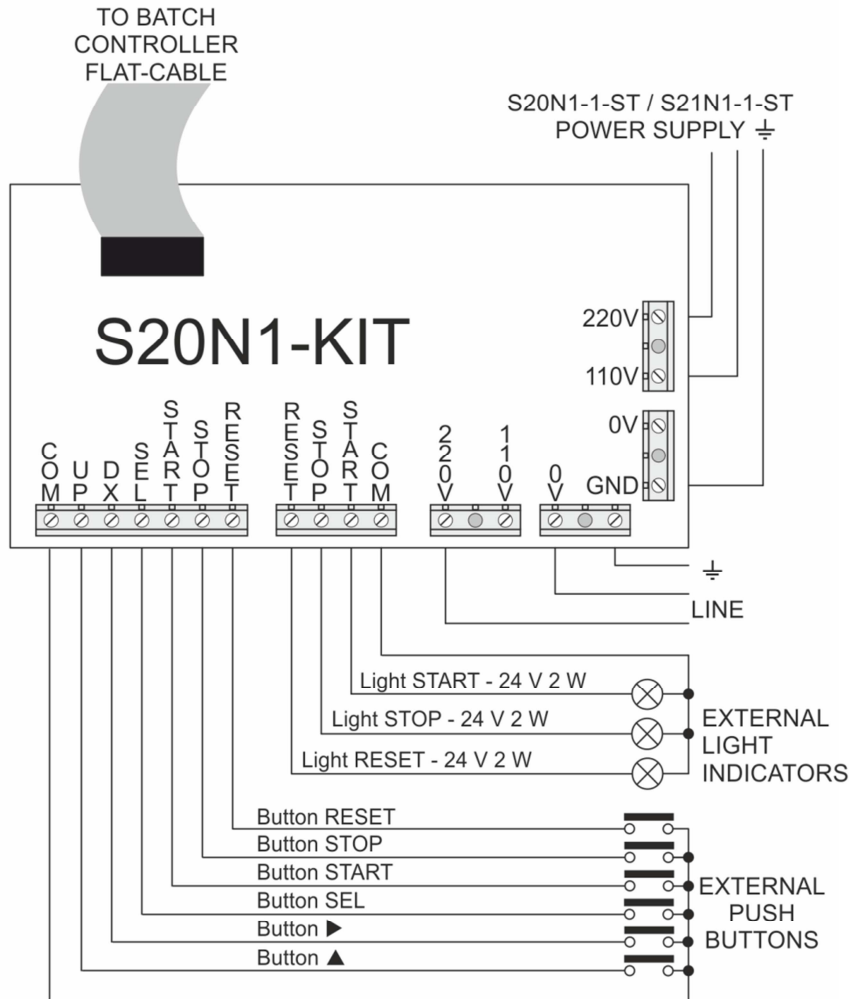
OPERATION

KEYBOARD CONTROLS

The frontal keyboard of **S21N1** batch controller allows the device programming and control.

START (green button)	Puts the S21N1 in START state. Normally this means that <u>both relays</u> (STOP and PRESTOP) will be activated. Simultaneously the batch stopwatch starts, if the device was in a state of RESET, then before starting sets the device to zero. if the device was in a state of START, then initializes the digital filter for FLOW measurement (tracking).	The three functions STOP, RESET and START of the 3 frontal keys are activable also via remote controls and are related respectively to terminals 3, 4 and 5 in rear panel. In order to activate the remote commands is possible to use buttons, free contacts, opto-couplers or transistors.
STOP (red button)	Puts the S21N1 in PAUSE state. Normally this means that <u>both relays</u> (STOP and PRESTOP) will be deactivated. Simultaneously the batch stopwatch stops.	
RESET	If the STOP input is configured in normal way and the state is PAUSE or STOP puts the S21N1 in RESET state. If the STOP input is configured like AUX3 and the state is PAUSE or STOP puts the S21N1 in RESET state. If the STOP input is configured like AUX3 and the state is START or PRESTOP, puts the S21 in PAUSE state.	
▲	If pressed and released then the device displays for 2 sec. the cumulative TOTAL of executed batch. If pressed and held for few seconds allows to programming the clock.	
▶	If pressed and released then displays for 2 sec. the SET parameter. If pressed and held for few seconds allows to programming the printer.	
SEL	If pressed and released then displays for 2 sec. the PRESET parameter. If pressed and held for few seconds allows to programming the parameters	

FRONTAL LED SIGNALLINGS

On the S21N1 batch controller frontal panel there are two display with 5 digits, 3 LED for the buttons START, STOP and RESET and 4 function LED: SET, FLOW, ALARM and TIME under the displays.
The **BATCH** display shows the evolution of the count during the dosage. The **FUNCTION** display shows the value of various parameters with its own display format depending on the programmed function.

FUNCTION	FORMAT	LED SET	LED FLOW	LED ALARM	LED TIME
SET (*SEt*)	00000	ON	OFF	OFF	OFF
PRESET (*PrE*)	00000	OFF	OFF	OFF	OFF
FLOW (*FLO*)	000.00 unit/sec. 0000.0 unit/min. 000.00 unit/hour	OFF	ON	OFF	OFF
RESIDUAL TIME (*Cdt*)	0.00.00 hours/min./sec.	OFF	OFF	OFF	ON
STOPWATCH (*CHr*)	0.00.00 hours/min./sec.	OFF	OFF	OFF	BLINKING
TOTAL	t=000 00000	ON	ON	ON	ON
CLOCK	HH.MM GG SS	ON	ON	ON	ON

You can insert a decimal point in the **BATCH**, **SET**, **PRESET** and **TOTAL** display values.
This parameter will also affect the FLOW display.
The **Unit** parameter is always displayed in 0.0000 format and corresponds to the increment of the number displayed on the BATCH (read as without decimal numbers) to each input pulse.
E.G.: If **Unit** = 0.25 the batch register is incremented by 0.25 unit to every pulse, then every 4 pulses the rightmost digit of batch display will change because only the integer part are displayed.
The decimal point is only an aid to the visualization.

The dosage can be performed in two phases, an initial fast phase and a final slow phase (to improve the precision of the dosage) using, for example, a valve with closure in two times controlled by the contacts of two relays called STOP and PRESTOP. You can also set the automatic recovery of the dosage queues in order to compensate the inertia of the valve closure at the end of dosage.
The following table shows the LEDs and relays outputs related with the batch controller states:

STATE S21N1	PRESTOP OUTPUT	Motors STOP OUTPUT	Valves STOP OUTPUT	LED START	LED STOP	LED RESET
RESET	OFF	OFF	OFF	OFF	OFF	ON
STOP without dosage's self-repetition	OFF	OFF	OFF	OFF	ON	OFF
STOP with dosage's self-repetition	OFF	OFF	OFF	OFF	BLINKING	OFF
PAUSE	OFF	OFF	OFF	BLINKING	BLINKING	OFF
START	ON	ON	ON 0.5 s Delay	ON	OFF	OFF

FUNCTIONS	
SET	Batch mode. The BATCH display shows the progress of counter. The FUNCTION display shows the actual value of SET. Pressing shortly the key ▲ you can read the cumulative TOTAL value. Pressing shortly the key ▶ you can read the estimated time remaining to the end of Batch. Pressing shortly the key SEL you can read the PRESET. Pressing shortly and Holding the key SEL you can read the hour and date.
FLOW	FLOW-meter mode. The BATCH display shows the progress of counter. The FUNCTION display shows the instantaneous flow over time. The SCALA FLOW configure the time units among: the pulses per second, pulses per minute and tens of thousands pulses per hour. Pressing shortly the key ▲ you can read the cumulative TOTAL value. Pressing shortly the key ▶ you can read the SET value. Pressing shortly the key SEL you can read the PRESET. Pressing shortly and Holding the key SEL you can read the hour and date.
CDT	Time remaining (to the end of batch) mode. The BATCH display shows the progress of counter. The FUNCTION display shows the time scheduled for the end of the batch, calculated by measuring the time between a pulse and the next. Pressing shortly the key ▲ you can read the cumulative TOTAL value. Pressing shortly the key ▶ you can read the SET value. Pressing shortly and Holding the key ▶ you can read the stopwatch. Pressing shortly the key SEL you can read the PRESET. Pressing shortly and Holding the key SEL you can read the hour and date.
CHR	Stopwatch mode. The BATCH display shows the progress of counter. Il display FUNCTION times the elapsed time. Pressing shortly the key ▲ you can read the cumulative TOTAL value. Pressing shortly the key ▶ you can read the SET value. Pressing shortly and Holding the key ▶ you can read the Time remaining (to the end of batch) Pressing shortly the key SEL you can read the PRESET. Pressing shortly and Holding the key SEL you can read the hour and date.

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OPERATING STATES	
RESET	Waiting state from where you can start a new batching cycle (pushing the START button) or to access to parameters configuration mode (pushing the SEL button). When the device is in RESET state the relays for PRESTOP and STOP are de-energized. The S21N1 batch controller goes from STOP to RESET or from PAUSE to RESET by pushing the RESET button.
START	Fast dosage state begins when you push the START button. When the device is in START state, the PRESTOP and STOP relays are energized. When the batching cycle counter reaches the Value = (SET – PRESET) the device goes automatically in PRESTOP state and the PRESTOP relay is de-energized. The S21N1 batch controller goes from START to PAUSE by pushing the STOP button in order to stop the batching cycle temporarily. If you configured the Valves output (see parameter bAtCF) after START command the PRESTOP relay is instantaneously energized while the STOP relay is energized only after 500 ms. If you hold down the START button or the START contact, when the S21N1 has reached the STOP, then the batch TOPPING UP is carried out. If you release the START button or contact, then the S21N1 returns in STOP state. CAUTION: If you make the TOPPING UP you alter the queue value, so if the queue retrieval function is activated then you have to take them into account.
PRESTOP	Slow dosage state begins when the device reaches the Value = (SET – PRESET). When the device is in PRESTOP state only the STOP relay is energized. Only if you have set the PRESET parameter to a value different from zero this state can be activated. The S21N1 batch controller goes from PRESTOP to PAUSE by pushing the STOP button.
STOP	State reached at the end of the batching cycle. When the device is in STOP state, the PRESTOP and STOP relays are de-energized. When the device is in STOP state you can manually correct the batch (if parameter bAtCF = 0) by pushing the START button the PRESTOP and STOP relays are energized until the START button is released. From STOP state you can return to START or PRESTOP state (it depends on the PRESET). **The STOP can not be imposed from buttons or keyboard but is achieved according to the pulses count.** The tStoP parameter value is a time in seconds (from 5 s to 99 s or 0). The minimum acceptable value different to zero is 5 s. If the tStoP parameter value is different from zero, after this time and if there is no input pulses, S21N1 switches to the STOP state. The rPdLY parameter value is a delay in seconds (from 1 s to 9999 s or 0). If the rPdLY parameter value is different from zero, after the device had reached the STOP state and after this delay the batch counter reset and then started the next batch cycle. To skip the automatic starting of a new batching cycle, press the RESET button twice, or press RESET and START in order to start in advance a new dosage. The reservation of repetition is signaled by the STOP or RESET LED flashing.
PAUSE	State where the dosage is temporarily stopped. When the device is in PAUSE state, the relays PRESTOP and STOP are de-energized. The S21N1 batch controller goes from START to PAUSE or from PRESTOP to PAUSE by pushing the STOP button. From PAUSE state you can return to START or PRESTOP state in order to continue the automatic Batching cycle by pushing the START button. From PAUSE state you can go in RESET state in order to set to zero the parameter for a new batching cycle by pushing the RESET button.

	RECOVERY QUEUE

When S21N1 receive the STOP command (both the relays are de-energized), the counter can continue to increment because of valve closing time or because of the pump inertia.

The exceeding value is named dosing queue and it is an imprecision of batch.

If the system has stable behavior the queue will always have the same value and will therefore be compensated by shortening the dosage.

The parameters **RECUP**, **CODA** and **– CODA** are dedicated to this purpose.

AUTOMATIC QUEUE	It is determined by the outcome of the previous batch. When you press the RESET button the exceeding value is moved into BATCH register, then the next batch cycle starts from this value and the STOP state is reached in advance. If you press twice the RESET button the queue value is set to zero and the next batch will be starting from zero. You can set the parameters rEcuP = YES, CodA = 000, -CodA = No in order to activate the automatic queue.
FIXED QUEUE	The user, who already knows the system characteristics, can set this fixed value in advance. Pressing the RESET button the value of this parameter is moved into BATCH register. Pressing the RESET button again the BACTH register value is set to zero. You can set the parameters rEcuP = YES, CodA = fixed value, -CodA = No in order to activate the fixed queue.
NEGATIVE QUEUE	If you selects this option, then you gives a negative sign to the value of the fixed queue. The dosage is extended by an amount equal to the stored queue, this parameter is used to compensate for a constant loss that occurs at each dosage. You can set the parameters rEcuP = YES, CodA = valore fissato, -CodA = YES in order to activate negative queue.

CONFIGURATIONS

The access to CONFIGURATION MODE is protected against the accidental keys presses, to ensure a higher level of the devices safety.

In order to access to CONFIGURATION MODE you must do the following:

Go to the RESET state and hold down for a few seconds one of this three buttons: ▲, ▶ and SEL.

All parameter settings are stored in non-volatile FeRAM memory, and are retained even without power.

In CONFIGURATION MODE the two displays and the four LED show this informations:

- The BATCH display shows the name of parameter you are configuring.
- The FUNCTION display shows the value of parameter you are configuring.
- The four function LED are all OFF.

CONFIGURATION MENÙ

Holding down the button ▲ you can enter in the clock configuration menu:

Clock Menu

Name	Allowed Values	Description
dAtE	Sun, Non, tuE, UEd, thu, Fr i, SAt	Day of the week
YEAr	00 – 99	Century fraction; after 99 return to 00.
Nonth	JAn, FEb, NAr, APr, NAY, Jun, JuL, AuG, SEP, Oct, Nou, dEc	Month of the year
dAY	0 1, 02, – , 30, 3 1	Day of the month
Hour	00 – 23	Hour in 24h mode (you can't use AM/PM)
N inut	00 – 59	Minute
dSt	YES, No	Enabling automatic summer/winter time

Holding down the button ▶ you can enter in the printer configuration menu:

Printer menu

Name	Allowed Values	Description
CHO 1 – CH24	032 – 127	It is the ASCII code of 24 characters that form the user custom string.
Pr00 – Pr24	00 – 99	It is the code of the print list items; It can be a style command or a print command.
t icN	00 – 02	It is the code that indicates the number of tickets (receipts) printed.

CONFIGURATION MENÙ

Holding down the button SEL you can enter in the parameters configuration menu:

Parameters menu

Name	Allowed Values	Description
COdE	0000 – 9999	5477 It is the secret code that allows you to change all parameters values. The other codes make not editable all the parameters where the line is grey. Remain editable only the following values that have the white line: COdE, SEt, PrE and rEu
SEt0 1 – SEt08	0000 1 – 99999 0000 1 – 99999	SET is the value that the BATCH counter must reach to give the dosing STOP command (both relays deactivated). 8 SET are available for respective 8 doses. See also decimal point parameter.
PrE0 1 – PrE08	0000 1 – (SEt0 1- 1) 0000 1 – (SEt08- 1)	PRESET is the difference between SET and the value that the counter BATCH must reach to give the precision dosage command (only the relay "STOP" is active). If PRESET = 0 there is no precision dosing. 8 PRESET are available for the respective 8 doses. See also decimal point parameter.

CONFIGURATION MENÙ

Holding down the button [SEL] you can enter in the parameters configuration menu:

Parameters menu

Name	Allowed Values	Description
Un iO1 – Un iO8	0.0001 – 1.0000 0.0001 – 1.0000	UNIT is the scale factor of the value obtained from the pulses input. For each input pulse the BATCH value is incremented by UNIT (only the integer part of the value is displayed). 8 UNIT are available for the respective 8 doses. See also the PRESCALER parameter.
Funct	SEt, FLO, Cdt or CHr	FUNCTION is the parameter shown on FUNCTION display among: Set, Flow, Estimated time remaining to the end of the batch and Stopwatch.
ScFLo	un itS, un itn or 103uh	SCALE FLOW is the unit of measure for displaying the value FLOW among: Unity / second, unity / minute and Kilo-unity / hour.
Cont	I ncr, I ncrO, dEcr or dEcrO	COUNTER TYPE is the type of counter and the mode for displaying the batch value on BATCH display among: Increment, Increment with leading zeros, Decrement and Decrement with leading zeros.
rEcuP	YES, No	RECOVERY is the enabling for the recovery of dosing queues.
CodA	000 – 255	If > 0 is the fixed value given to the dosing queue. If = 0 the queue is automatically calculated. This value isn't used if RECOVERY = NO.
-CodA	YES, No	NEGATIVE QUEUE puts a negative sign before the value of fixed queue. This value isn't used if RECOVERY = NO
FILt	00 – 99	K FILTER is the time constant, in seconds, of the digital filter for the measurement of FLOW input pulses. If K FILTER = 0 the filter is disabled. Typical value is 02.
PrESc	001 – 255	PRESCALER is an additional divider for the pulses input. If is set to a value N different from 1 then the batch register will be increased by UNIT once every N pulses

CONFIGURATION MENÙ

Holding down the button $\boxed{\text{SEL}}$ you can enter in the parameters configuration menu:

Parameter menu

The InCFG parameter allows you to configure the following functions:
- The automatic printing at the end of a batching cycle, when the device goes in stop state.
- The printing start from an external AUX1 contact.
- The selection of the allowed dosages.
For example:
If INCFG = 2 then from the table below you can obtain that: the AUX1 and AUX2 inputs are enabled.
From the RESET state the binary number available on the two auxiliary inputs defines the number of next batch:
In order to load the third batch (2dec = 0<u>10</u>bin) you must set AUX2 = 1 and AUX1 = 0.

If INCFG = 11 then all the auxiliary inputs AUX3 (STOP), AUX2 and AUX1 are enabled.
From the RESET state the binary number available on the three auxiliary inputs defines the number of next batch:
In order to load the fifth batch (4dec= <u>100</u>bin) you must set AUX3 (STOP) = 1, AUX2 = 0 and AUX1= 0.
Moreover automatic printing at the end of Batch is enabled.

If INCFG = 15 then only the auxiliary inputs AUX3 (STOP) and AUX2 are enabled.
From the RESET state the binary number available on the two auxiliary inputs defines the number of next batch:
In order to load the fifth batch (4dec = <u>100</u>bin) you must set AUX3 (STOP) = 1 and AUX2 = 0.
Moreover automatic printing at the end of Batch and printing from AUX1 external command are enabled.

Name	Allowed Values		Description		
		InCFG	**Configuration effects on operation**		
		decimal	**Allowed prints**		**Allowed batches**
InCFG	0 – 15 00:0000 01:0001 02:0010 03:0011 04:0100 05:0101 06:0110 07:0111 08:1000 09:1001 10:1010 11:1011 12:1100 13:1101 14:1110 15:1111	0	automatic printing at the end of dosage (batch) disabled	printing from external command AUX1 disabled	No dosage
		1			Dosages 1 and 2 (AUX1)
		2			Dosages 1, 2, 3 and 4 (AUX 1 and AUX2)
		3			All the dosages from 1 to 8 (AUX 1, AUX2 and AUX3)
		4		printing from external command AUX1 enabled	No dosage
		5			No dosage
		6			Dosages 1 and 3 (AUX2)
		7			Dosages 1, 3, 5 and 7 (AUX2 and AUX3)
		8	automatic printing at the end of dosage (batch) enabled	printing from external command AUX1 disabled	No dosage
		9			Dosages 1 and 2 (AUX1)
		10			Dosages 1, 2, 3 and 4 (AUX 1 and AUX2)
		11			All the dosages from 1 to 8 (AUX 1, AUX2 and AUX3)
		12		printing from external command AUX1 enabled	No dosage
		13			No dosage
		14			Dosages 1 and 3 (AUX2)
		15			Dosages 1, 3, 5 and 7 (AUX2 and AUX3)
tStoP	00 or 05 – 99		After this time (from 5 s to 99 s) if there is no pulses in input, S21N1 switches to the STOP state. (tStoP = 00 = tStoP function disabled).		
rPdLY	0000 – 9999		If S21N1 have reached the STOP state, after this time (from 0 to 9999 s) starts the next batch cycle. Before the start of a new dosage, S21N is automatically reset even if the bit0 of BATCHFG is zero. (rPdLY = 0000 = rPdLY function disabled).		

CONFIGURATION MENÙ

Holding down the button [SEL] you can enter in the parameters configuration menu:

Parameter menu

Name	Allowed Values		Description		
		Decimal bAtCF	Relays management	PAUSE management	automatic RESET management
bAtCF	0 – 7 0: 000 1: 001 2: 010 3: 011 4: 100 5: 101 6: 110 7: 111	0	For motor control	PAUSE function disabled	Automatic RESET disabled
		1			when S21N1 after reaching the STOP state, receives the new START command then S21N1 Automatic RESET the batch.
		2		When the external START contact is released then S21N1 goes in PAUSE and when the external START contact is closed then S21N1 return in START (if the counter allows it).	Automatic RESET disabled
		3			when S21N1 after reaching the STOP state, receives the new START command then S21N1 Automatic RESET the batch.
		4	For valves control	PAUSE function disabled	Automatic RESET disabled
		5			when S21N1 after reaching the STOP state, receives the new START command then S21N1 Automatic RESET the batch.
		6		When the external START contact is released then S21N1 goes in PAUSE and when the external START contact is closed then S21N1 return in START (if the counter allows it).	Automatic RESET disabled
		7			when S21N1 after reaching the STOP state, receives the new START command then S21N1 Automatic RESET the batch.
Punto	0 – 4		Select the number of decimals in the SET, PRESET and TOTAL displaying. If is zero then the point isn't displayed. FLOW displaying has 2 or 3 additional decimal digit. In the FLOW displaying, when you set 3 or 4 decimal and the measure is **unit / s** or **k unit / h** or when you set 4 decimal and the measure is **unit / min** then the point position means **FLOW*1000** and you must divide the measure read by 1000 in order to obtain the real value (real value = display value / 1000).		
t-rES	YES, No		Reset the cumulative total BATCH.		
Addr	001 – 250		The **ADDRESS** (Addr) parameter allows you set the device address for the RS485 interface. The **ADDRESS** (Addr) value can be from 001 to 250. In order to edit the **ADDRESS** (Addr) value, you need to press the ► button and the four LEDs under the lower display start blinking. Press the ▲ button until the display shows the address you need. In order to save the new address you must press the ► button until the display shows the message: **–SEL–**, now pressing the **SEL** button the new address value is stored and pressing again the **SEL** button you can move to the next parameter.		
bAUd	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6 o 115.2		The **BAUD RATE** (bAUd) parameter allows you set the communication speed of the RS485 interface. The **BAUD RATE** (bAUd) parameter can take one of the following values: 1k2 / 2k4 / 4k8 / 9k6 / 19k2 / 38k4 / 57k6 / 115k2 In order to edit the **BAUD RATE** (bAUd) value, you need to press the ► button and the four LEDs under the lower display start blinking. Press the ▲ button until the display shows the desired speed value. In order to save the change you must press the ► button until the display shows the message: **–SEL–**, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.		
PArit	n, E, O.		The **PARITY** (PArit) parameter allows you set the parity error control of the RS485 interface. The **PARITY** (PArit) parameter can take one of the following values: none (n), even (E) and odd (O). In order to edit the **PARITY** (PArit) value, you need to press the ► button and the four LEDs under the lower display start blinking. Press the ▲ button until the display shows the desired parity value. In order to save the change you must press the ► button until the display shows the message: **–SEL–**, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can return to the first parameter.		
rEu	00 00 – 99 99		Is the actual firmware version number. (not editable parameter)		

REDUCED MENU CODE ≠ 5477							
PARAMETER		**LED SIGNALLING**					
name	on Display	Set	Preset	Unit	Total	Visible	Editable
SET	5Et	OFF	OFF	OFF	OFF	YES	YES
PRESET	PrE	OFF	OFF	OFF	OFF	YES	YES
UNIT	Un ı	OFF	OFF	OFF	OFF	YES	NO
Cumulative TOTAL	tᴤ	OFF	OFF	OFF	OFF	YES	NO
Protection CODE	COdE	OFF	OFF	OFF	OFF	YES	YES

FULL MENU CODE = 5477							
PARAMETER		**LED SIGNALLING**					
name	on Display	Set	Preset	Unit	Total	Visible	Editable
SET	5Et	OFF	OFF	OFF	OFF	YES	YES
PRESET	PrE	OFF	OFF	OFF	OFF	YES	YES
UNIT	Un ı	OFF	OFF	OFF	OFF	YES	YES
FUNCTION	Funct	OFF	OFF	OFF	OFF	YES	YES
FLOW SCALE	ScFLo	OFF	OFF	OFF	OFF	YES	YES
COUNTER TYPE	Cont	OFF	OFF	OFF	OFF	YES	YES
RECOVERY QUEUES	rEcuP	OFF	OFF	OFF	OFF	YES	YES
FIXED QUEUE	CodA	OFF	OFF	OFF	OFF	YES	YES
NEGATIVE QUEUE	-CodA	OFF	OFF	OFF	OFF	YES	YES
k FILTER	FILt	OFF	OFF	OFF	OFF	YES	YES
PRESCALER	PrESc	OFF	OFF	OFF	OFF	YES	YES
DOSAGES INPUT CONF.	InCFG	OFF	OFF	OFF	OFF	YES	YES
AUTOSTOP TIME	tStoP	OFF	OFF	OFF	OFF	YES	YES
AUTOSTART TIME	rPdLY	OFF	OFF	OFF	OFF	YES	YES
BATCH CFG	bAtCF	OFF	OFF	OFF	OFF	YES	YES
DECIMAL POINT	Punto	OFF	OFF	OFF	OFF	YES	YES
cumulative TOTAL	tᴤ	OFF	OFF	OFF	OFF	YES	Only by MODBUS
cumulative TOTAL RESET	t-rES	OFF	OFF	OFF	ON	YES	YES
ADDRESS	Addr	OFF	OFF	OFF	OFF	YES	YES
BAUD RATE	bAUd	OFF	OFF	OFF	OFF	YES	YES
PARITY	PArıt	OFF	OFF	OFF	OFF	YES	YES
REVISION	rEu	OFF	OFF	OFF	OFF	YES	NO

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PARAMETERS PROGRAMMING	
From RESET state holding the **SEL** button you can change the first parameter: *CodE*.	
CODE	The **CODE** (*CodE*) parameter is the password that allows to prevent unauthorized personnel, changing some parameters (UNIT, cumulative TOTAL RESET, cumulative TOTAL, QUEUES RECOVERY, COUNTER TYPE, DECIMAL POINT, … etc.). This **CODE** is factory set to *5477* value and the protection is disabled then all parameters are visible and editable. After you setting the parameters, to enable protection, simply change the parameter *CodE* with any value other than *5477*. In order to edit the *CodE* value you need to press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the change you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.
SET *SEt01—08* In order to move to the next dosage SET press the **START** button	The **SET** (*SEt*) parameter is the value of the end of dosage. The **SET** (*SEt*) parameter can be from *00001* and *99999*. 8 **SETs** are available for respective 8 doses. In order to change the **SET** (*SEt*) value you need to press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter. **Note:** If **SET** value is *0.0000* you can't exit from edit mode and move to next parameter.
PRESET *PrE 01—08* In order to move to the next dosage PRESET press the **START** button	The **PRESET** (*PrE*) parameter is the value of the final stage of a two times dosage. The **PRESET** (*PrE*) parameter is defined in subtraction with respect to the **SET** value and can be any numeric value among *00000* and the **SET** value. 8 **PRESETs** are available for respective 8 doses. Use this parameter when the system is provided with a valve with two stages closure, to perform a first phase of fast dosage with a fully open valve and a second phase of slow dosing with the valve partially open to improve the accuracy of dosage. In order to change the **PRESET** (*PrE*) value you need to press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new **PRESET** is stored and pressing again the **SEL** button you can move to the next parameter.

PARAMETERS PROGRAMMING	
UNIT *Un ı 0 1—08* In order to move to the next dosage UNIT press the **START** button	The **UNIT** (*Un ı*) parameter is the multiplication factor by which the input pulses are weighed in order to show on the display the SET value and PRESET value directly in engineering units. The **UNIT** (*Un ı*) parameter can be from *0.000 1* and *1.0000*. This parameter is visible, but can be edited only if you set the security code *5477*. In order to change the **UNIT** (*Un ı*) value you need to press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-5EL-*, now pressing the **SEL** button the new **PRESET** is stored and pressing again the **SEL** button you can move to the next parameter. **Note:** If **UNIT** value is *0.0000* you can't exit from edit mode and move to next parameter.
FUNCTION	The **FUNCTION** (*Funct*) parameter is the type of value that can be displayed in the FUNCTION display among: Set, Flow, Estimated time remaining to the end of the batch and Stopwatch. This parameter can be edited only if you set the security code *5477*. In order to change the **FUNCTION** (*Funct*) value you need to press the ▶ button, the function on lower display start blinking and now you can modify the value pressing the ▲ button. In order to save the change you must press the ▶ button until the display shows the message: *-5EL-*, now pressing the **SEL** button the new **FUNCTION** is stored and pressing again the **SEL** button you can move to the next parameter.
FLOW SCALE	The **FLOW SCALE** (*5cFLo*) parameter is the unit of measure for displaying the FLOW value among: Unity / second (*un ıt5*), unity / minute (*un ıtn*) and Kilo-unity / hour (*l03uh*). This parameter can be edited only if you set the security code *5477*. In order to change the **FLOW SCALE** (*5cFLo*) value you need to press the ▶ button, the unit of measure on lower display start blinking and now you can modify the value pressing the ▲ button. In order to save the new unit of measure you must press the ▶ button until the display shows the message: *-5EL-*, now pressing the **SEL** button the new unit of measure is stored and pressing again the **SEL** button you can move to the next parameter.
COUNTER TYPE	The **COUNTER TYPE** (*Cont*) parameter allows to set the counter to increase the counting or decrease the counting. This parameter can be edited only if you set the security code *5477*. The counter type can be configured in the following ways: *I ncr* to increase the counting without displaying leading zeros, *I ncr0* to increase the counting with displaying leading zeros, *dEcr* to decrease the counting without displaying leading zeros and *dEcr0* to decrease the counting with displaying leading zeros. In order to change the **COUNTER TYPE** (*Cont*) value you must press the ▶ button, the **COUNTER TYPE** on lower display start blinking and now you can modify the value pressing the ▲ button. In order to save the change you must press the ▶ button until the display shows the message: *-5EL-*, now pressing the **SEL** button the new counter type is stored and pressing again the **SEL** button you can move to the next parameter.

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PARAMETERS PROGRAMMING

QUEUES RECOVERY	The **QUEUES RECOVERY** (rEcuP) parameter value can be YES or No in order to enabling or disabling the **QUEUES RECOVERY** function. This parameter can be edited only if you set the security code 5477. The **QUEUES RECOVERY** function is used when the time necessary for the full closure of the valve causes errors on the value of the end of dosage. The exceeding value is named dosing queue and is an inaccuracy than the set value. If the system has a stable behavior the queue will always have the same value and will therefore be compensated enabling the **QUEUES RECOVERY** (rEcuP) parameter. The batch controller stores the excess value found in the previous dosage and sets this value at the beginning of the next dose automatically compensating the dosing queue. In order to edit the rEcuP value you must press the ▶ button, the parameter value on lower display start blinking and now you can edit it pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: -SEL-, now pressing the **SEL** button the new **PRESET** is stored and pressing again the **SEL** button you can move to the next parameter. **Note:** To delete the value of the queue you can press the RESET button twice, the next dose will start from zero.
FIXED QUEUE	The **FIXED QUEUE** (CodA) parameter: If CodA > 000, it is the fixed value to compensate the dosing queue. If CodA = 000, then the queue is automatically calculated by the batch controller. This parameter can be edited only if you set the security code 5477. The **FIXED QUEUE** (CodA) value can be from 000 to 255. In order to modify the CodA value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: -SEL-, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter. **Note:** If **QUEUES RECOVERY** (rEcuP) is No, the **FIXED QUEUE** value is not used.
NEGATIVE QUEUE	The **NEGATIVE QUEUE** (-CodA) parameter puts a negative sign before the **QUEUE** value. This parameter can be edited only if you set the security code 5477. The **NEGATIVE QUEUE** (-CodA) parameter can be YES or No in order to enabling or disabling the **NEGATIVE QUEUE** function. In order to change the -CodA value you can press the ▶ button, the parameter value on lower display start blinking and now you can edit it pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: -SEL-, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter. **Note:** If **QUEUES RECOVERY** (rEcuP) is No, the **NEGATIVE QUEUE** value is not used.

	PARAMETERS PROGRAMMING
K FILTER	The **K FILTER** (*FiLt*) parameter: If *FiLt* > *00*, then the **K FILTER** parameter is the time constant, in seconds, of the digital filter for the measurement of FLOW input pulses. Typical value is *02*. If *FiLt* = *00*, then the filter is disabled. This parameter can be edited only if you set the security code *5477*. The **K FILTER** (*FiLt*) parameter value can be from *00* to *99*. In order to edit the *FiLt* value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.
PRESCALER	The **PRESCALER** (*PrESc*) parameter is an additional divider for the pulses input. This parameter can be edited only if you set the security code *5477*. The **PRESCALER** (*PrESc*) parameter value can be from *001* to *255*. If *PrESc* > *001* and *PrESc* = N then **BATCH** register will be increased by UNIT once every N pulses. In order to change the *PrESc* value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.

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PARAMETERS PROGRAMMING

The **INCFG (I nCFG)** parameter allows you to enable the following functions:
The automatic print at the end of batch, the print from external AUX1 input and the selection of available dosages. This parameter can be edited only if you set the security code 5477.
The **INCFG (I nCFG)** parameter can be from 0 to 15.
The dosages are numbered from 0 to 7 in binary mode then:
1° Dosage = 000bin, 2° Dosage = 001bin, 3° Dosage = 010bin, 4° Dosage = 011bin,
5° Dosage = 100bin, 6° Dosage = 101bin, 7° Dosage = 110bin and 8° Dosage = 111bin.

For example:
If INCFG value = 3 the table below shows that: All AUX3, AUX2 and AUX1 inputs are enabled.
From the RESET state, the binary number read on the auxiliary inputs will set the next batch.
In order to load the eighth batch 8° Dosage = 111bin then the inputs will be:
AUX3 =1, AUX2 = 1 and AUX1 = 1

If INCFG value = 10 then only the AUX2 and AUX1 inputs are enabled.
From the RESET state, the binary number read on the two auxiliary inputs will set the next batch.
In order to load the fourth batch 4° Dosage = 011bin then the inputs will be:
AUX2 = 1 and AUX1 = 1. Moreover the automatic print at the end of Batch is enabled.
If INCFG value = 14 then only the AUX2 input is enabled.
From the RESET state, the binary number read on the auxiliary input will set the next batch.
In order to load the third batch 3° Dosage = 010bin then the AUX2 input will be AUX2 = 1.
Moreover the automatic print at the end of batch and the print from AUX1 contact are enabled.

I nCFG
0 – 15
1st 00=0000
2nd 01=0001
3rd 02=0010
4th 03=0011
5th 04=0100
6th 05=0101
7th 06=0110
8th 07=0111
9th 08=1000
10th 09=1001
11th 10=1010
12th 11=1011
13th 12=1100
14th 13=1101
15th 14=1110
16th 15=1111
	The **INCFG.(I nCFG)** parameter can be from 0 to 15.
	The binary value defines three configurations:
	The automatic print at the end of batch, the print from external AUX1 input and the selection of available dosages.
	
	bit 4 = 0 means automatic print at the end of batch disabled.
	bit 4 = 1 means automatic print at the end of batch enabled.
	
	bit 3 = 0 means print from external AUX1 input disabled.
	bit 3 = 1 means print from external AUX1 input enabled.
	
	bit 3 = 0, bit 2 = 0 and bit 1 = 0 no dosage
	bit 3 = 0, bit 2 = 0 and bit 1 = 1 dosages 1 and 2 controlled by AUX1
	  if AUX1 = 0 dosage 1 or if AUX1 = 1 dosage 2.
	bit 3 = 0, bit 2 = 1 and bit 1 = 0 dosages 1, 2, 3 and 4 controlled by AUX1 and 2
	  if AUX2 = 0 and AUX1 = 0 dosage 1 or if AUX2 = 0 and AUX1 = 1 dosage 2
	  if AUX2 = 1 and AUX1 = 0 dosage 3 or if AUX2 = 1 and AUX1 = 1 dosage 4
	bit 3 = 0, bit 2 = 1 and bit 1 = 1 all the dosages from 1 to 8 controlled by AUX1, 2 and 3
	  if AUX3 = 0, AUX2 = 0 and AUX1 = 0 dosage 1
	  if AUX3 = 0, AUX2 = 0 and AUX1 = 1 dosage 2
	……………………………………………………
	  if AUX3 = 1, AUX2 = 1 and AUX1 = 0 dosage 7
	  if AUX3 = 1, AUX2 = 1 and AUX1 = 1 dosage 8
	bit 3 = 1, bit 2 = 0 and bit 1 = 0 no dosage
	bit 3 = 1, bit 2 = 0 and bit 1 = 1 no dosage
	bit 3 = 1, bit 2 = 1 and bit 1 = 0 dosages 1 and 3 controlled by AUX2
	if AUX2 = 0 dosage 1 or if AUX2 = 1 dosage 3.
	bit 3 = 1, bit 2 = 1 and bit 1 = 1 dosages 1, 3, 5 and 7 controlled by AUX2 and 3
	  if AUX3 = 0 and AUX2 = 0 dosage 1 or if AUX3 = 0 and AUX2 = 1 dosage 3
	  if AUX3 = 1 and AUX2 = 0 dosage 5 or if AUX3 = 1 and AUX2 = 1 dosage7

PARAMETERS PROGRAMMING

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AUTOSTOP TIME	The **AUTOSTOP TIME** (*t5toP*) parameter is the time after which, if there is no pulses at the input, the system automatically switches to STOP state. This parameter can be edited only if you set the security code *5477*. The **AUTOSTOP TIME** (*t5toP*) parameter can be *00* or any value from *05* to *99*. If *t5toP* = *00*, then the **AUTOSTOP** function is disabled. In order to modify the *t5toP* value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-5EL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter. **Note:** If *t5toP* is from *01* to *04* you can't exit from edit mode.
AUTOSTART TIME	The **AUTOSTART TIME** (*rPdLY*) parameter is the time, in seconds, after which, if the system is in STOP state, automatically starts a new batch. This parameter can be edited only if you set the security code *5477*. The **AUTOSTART TIME** (*rPdLY*) parameter can be any value from *0000* to *9999*. If *rPdLY* = *0000*, then the **AUTOSTART** function is disabled. In order to change the *rPdLY* value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button. In order to save the new value you must press the ▶ button until the display shows the message: *-5EL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter. **Nota:** After an **AUTOSTART** S21N1 is automatically reset, even if the bit0 of *bAtCF* is equal to zero (automatic RESET disabled).
BATCFG *0* = 000 *1* = 001 *2* = 010 *3* = 011 *4* = 100 *5* = 101 *6* = 110 *7* = 111	The **BATCFG** (*bAtCF*) parameter value allows you to enable the following functions: Relays management, external command PAUSE, and automatic RESET at START. This parameter can be edited only if you set the security code *5477*. The **BATCFG** (*bAtCF*) parameter can be any value from *0* to *7*. bit 2 = 0 means motors control, bit 2 = 1 means valves control. bit 1 = 0 disables and bit 1 = 1 enables the following function: The release of the external START button brings in PAUSE the system and the pressure of external START button brings it back to the START state (if the counting allows it). bit 0 = 0 disables and bit 0 = 1 enables the following function: Automatic system reset and batch reset when after reaching the STOP state S21N1 receives the START command. For example: If BATCFG = 6dec = 110bin then: bit 2 = 1 means: the device uses the relays for valves control. bit 1 = 1 means: if start contact is open the device brings to pause. If external start contact is open then the device brings the system to pause. If external start contact is closed then the device brings the system in start state without resetting the counting.

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	PARAMETERS PROGRAMMING
POINT	The **POINT** (*Punto*) parameter allows to set the number of decimal places with which the values of SET, PRESET, TOTAL and BATCH are displayed.
	This parameter can be edited only if you set the security code *5477*.
	The **POINT** (*Punto*) parameter can be any value from *0* to *4*.
	If *Punto* = *00* then the decimal point is not displayed.
	In order to edit the *Punto* value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button.
	In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.
	In the FLOW displaying, when you set 3 or 4 decimal and the measure is **unit / s** or **k unit / h** or when you set 4 decimal and the measure is **unit / min** then the point position means **FLOW*1000** and you must divide the measure read by 1000 in order to obtain the real value (real value = display value / 1000).
TOTAL	The **TOTAL** (*t=*) parameter is the cumulative total of all dosages made by the batch controller. You can't change this value by buttons. By Modbus you can edit even this parameter. You can set this value to zero with the **TOTAL RESET** parameter.
	The **TOTAL** (*t=*) value has 8 digits split in two displays then you must read the lower display after the upper display.
	Pressing the **SEL** button you can move to the next parameter.
TOTAL RESET	The **TOTAL RESET** (*t-rES*) parameter allows to reset the cumulative **TOTAL**.
	This parameter can be edited only if you set the security code *5477*.
	Usually the value of this function is *No* if you change this value to *YES* when you store this new value then the cumulative **TOTAL** is setting to zero.
	Pressing the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button. In order to save the value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the *YES* value is stored and the cumulative TOTAL is resetting.
	Pressing again the **SEL** button you can move to the next parameter.
ADDRESS	The **ADDRESS** (*Addr*) parameter allows to set the number of device address for the RS485 interface.
	This parameter can be edited only if you set the security code *5477*.
	The **ADDRESS** (*Addr*) parameter can be any value from *001* to *250*.
	In order to modify the address *Addr* value you can press the ▶ button, the first digit of lower display start blinking and you can modify the value pressing the ▲ button.
	All the digits can be modified one by one, then press the ▶ button until the desired digit start blinking and change its value like desired pressing the ▲ button.
	In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.
BAUD RATE	The **RATE** (*bAUd*) parameter allows to set the speed of the RS485 interface.
	This parameter can be edited only if you set the security code *5477*.
	The **RATE** (*bAUd*) parameter can be one of the following value:
	1k2 / 2k4 / 4k8 / 9k6 / 19k2 / 38k4 / 57k6 / 115k2
	In order to change the address *bAUd* value you can press the ▶ button, the value on lower display start blinking and you can modify it by pressing the ▲ button.
	In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the next parameter.
PARITY	The **PARITY** (*PArit*) parameter allows set the RS485 interface, parity error control.
	This parameter can be edited only if you set the security code *5477*.
	The **PARITY** (*PArit*) parameter can be one of the following values: none(*n*), even(*E*) and odd(*0*).
	In order to edit the address *PArit* value you can press the ▶ button, the value on lower display start blinking and you can modify it by pressing the ▲ button until you read the desired value.
	In order to save the new value you must press the ▶ button until the display shows the message: *-SEL-*, now pressing the **SEL** button the new value is stored and pressing again the **SEL** button you can move to the first parameter.

SOFTWARE UPGRADE

Please download the upgrade software from the website: www.seneca.it in S21N1 section.
Connect S21N1 to a PC with a micro USB / USB cable and run the following procedure:

1. Turn off the power of S20N1.
2. Disconnect the control outputs of S20N1.
3. Power up the S20N1, the display show the software version currently loaded (**49 00** / **-----**), simultaneously pressing both SEL and RESET buttons the display show (**boot** / **LoAd**) this means upgrade state, the reset LED start blinking, after few seconds the display turn off and only the reset LED remain ON.
4. Please execute the Serial Bootloader software.
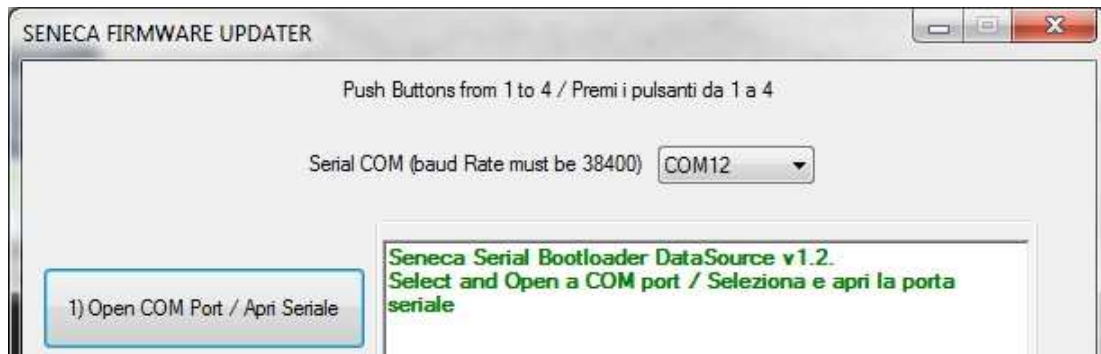
In the window SENECA FIRMWARE UPDATER press the first button to open the COM port. You should read the message: **Port opened: COMxx**.

5. You can push the second button "Select Firmware File" and select the new released software for example: s20n R4900 150325 bootable.hex
   After the update you should read the message:
   Firmware File was loaded successfully! / File Firmware caricato con successo!
   FW CODE = 109 / FW BUILD = 65535 / START = 0400 / END = FBFF.

6. Please push the third button "Update Firmware" in order to start the firmware update.
   At the end of the update the start LED turn ON and you should read the message:
   Writing flash Signature ... / Signature OK
   OK, Elapsed 22.1676s.

7. Please push the fourth button "Restart S2xN1" to reset the S20N1 and you should read the message: **Reset MCU... / OK**.

8. Restore the connections of S20N1 control outputs.

MODBUS REGISTERS

MODBUS RTU PROTOCOL

All registers are "Holding registers" (Read Modbus) and the first address register is 40001.
The following functions are available:
Read Single Modbus Register / Write Single Modbus Register / Write Multiple Modbus Registers.
The RS485 port for access to MODBUS registers is available at terminals 20, 21 and 22.
The S21N1 configured parameters are matched to the MODBUS registers like in the following table:

Register Offset	Register number	Name	Description
1	40001	DEV. ID. & EXT. REV.	Product ID (6C01 hex).
2	40002	Rev. FW	FirmWare revision number. Displayed on the upper display when you Power up the device (4900 dec).
3-4	40003-40004	CODE	Security code of configuration menu. Password 5477 dec. With MSW on 40003 not used.
5-6	40005-40006	SET 1	Integer value of the SET parameter of the first batch, as shown in the display, without decimal point. With MSW on 40005. From 0 to 99999 dec. For example: with SET1 = 33.444 Modbus Register value = 33444
7-8	40007-40008	PRESET 1	Integer value of the PRESET parameter of the first batch, as shown in the display, without decimal point. With MSW on 40007. From 0 to 99999 dec. For example: with PRESET1 = 65.537 Modbus Register value = 65537
9-10	40009-40010	UNIT 1	Counter multiplier parameter divided for 10000 of the first batch. With MSW on 40009. For example: with UNIT1 = 0.0001 Modbus Register value = 1.
11-12	40011-40012	SET 2	Integer value of the SET parameter of the second batch, as shown in the display, without decimal point. With MSW on 40011. From 0 to 99999 dec.
13-14	40013-40014	PRESET 2	Integer value of the PRESET parameter of the second batch, as shown in the display, without decimal point. With MSW on 40013. From 0 to 99999 dec.
15-16	40015-40016	UNIT 2	Counter multiplier parameter divided for 10000 of the second batch. With MSW on 40015.

Register Offset	Register number	Name	Description
17-18	40017-40018	SET 3	Integer value of the SET parameter of the third batch, as shown in the display, without decimal point. With MSW on 40017. From 0 to 99999 dec.
19-20	40019-40020	PRESET 3	Integer value of the PRESET parameter of the third batch, as shown in the display, without decimal point. With MSW on 40019. From 0 to 99999 dec.
21-22	40021-40022	UNIT 3	Counter multiplier parameter divided for 10000 of the third batch. With MSW on 40021.
23-24	40023-40024	SET 4	Integer value of the SET parameter of the fourth batch, as shown in the display, without decimal point. With MSW on 40023. From 0 to 99999 dec.
25-26	40025-40026	PRESET 4	Integer value of the PRESET parameter of the fourth batch, as shown in the display, without decimal point. With MSW on 40025. From 0 to 99999 dec.
27-28	40027-40028	UNIT 4	Counter multiplier parameter divided for 10000 of the fourth batch. With MSW on 40027.
29-30	40029-40030	SET 5	Integer value of the SET parameter of the fifth batch, as shown in the display, without decimal point. With MSW on 40029. From 0 to 99999 dec.
31-32	40031-40032	PRESET 5	Integer value of the PRESET parameter of the fifth batch, as shown in the display, without decimal point. With MSW on 40031. From 0 to 99999 dec.
33-34	40033-40034	UNIT 5	Counter multiplier parameter divided for 10000 of the fifth batch. With MSW on 40033.
35-36	40035-40036	SET 6	Integer value of the SET parameter of the sixth batch, as shown in the display, without decimal point. With MSW on 40035. From 0 to 99999 dec.
37-38	40037-40038	PRESET 6	Integer value of the PRESET parameter of the sixth batch, as shown in the display, without decimal point. With MSW on 40037. From 0 to 99999 dec.
39-40	40039-40040	UNIT 6	Counter multiplier parameter divided for 10000 of the sixth batch. With MSW on 40039.
41-42	40041-40042	SET 7	Integer value of the SET parameter of the seventh batch, as shown in the display, without decimal point. With MSW on 40041. From 0 to 99999 dec.
43-44	40043-40044	PRESET 7	Integer value of the PRESET parameter of the seventh batch, as shown in the display, without decimal point. With MSW on 40043. From 0 to 99999 dec.
45-46	40045-40046	UNIT 7	Counter multiplier parameter divided for 10000 of the seventh batch. With MSW on 40045.

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Register Offset	Register number	Name	Description
47-48	40047-40048	SET 8	Integer value of the SET parameter of the eighth batch, as shown in the display, without decimal point. With MSW on 40047. From 0 to 99999 dec.
49-50	40049-40050	PRESET 8	Integer value of the PRESET parameter of the eighth batch, as shown in the display, without decimal point. With MSW on 40049. From 0 to 99999 dec.
51-52	40051-40052	UNIT 8	Counter multiplier parameter divided for 10000 of the eighth batch. With MSW on 40051.
53-54	40053-40054	FUNCTION	Parameter that can be displayed in the FUNCTION display among: 2 (MODBUS Value) = SEt = displays the dosage (batch). 3 (MODBUS Value) = FLo = displays the il flux (Flow). 4 (MODBUS Value) = Cdt = displays the time remaining to the end of the dosage (batch). 5 (MODBUS Value) = CHr = displays the time elapsed from the start to the end of dosing (batch). Via MODBUS you can activate also the following two states: 1 (MODBUS Value) = displays the software version. 0 (MODBUS Value) = display and LED Test. MSW on 40053 not used.
55-56	40055-40056	FLOW SCALE	Unit of measure for displaying the value of FLOW among: Unity / second = un itS = 0 (MODBUS Value), unity / minute = un itn = 1 (MODBUS Value) and Kilo-unity / hour = I03uh = 2 (MODBUS Value). MSW on 40055 not used.
57-58	40057-40058	COUNTER TYPE	Counter type and display of BATCH value among: Increment Incr = 0 (MODBUS Value), Increment with leading zeros Incr0 = 1, Decrement = dEcr = 2 (MODBUS Value) and Decrement with leading zeros = dEcr0 = 3. MSW on 40057 not used.
59-60	40059-40060	RECOVERY QUEUES	Enabling the automatic recovery of dosing queues: Disabling recovery queues = No = 0 and Enabling recovery queues = YES = 1. MSW on 40059 not used.
61-62	40061-40062	QUEUE	Recovery queues value: QUEUE = 000 = queue value calculated from device. QUEUE = 001 – 255 = fixed queue value. If RECOVERY QUEUES = No = 0, this value isn't used. MSW on 40061 not used.
63-64	40063-40064	NEGATIVE QUEUE	NEGATIVE QUEUE = No = 0 = disabling a negative sign before queue value. NEGATIVE QUEUE = YES = 1 = enabling a negative sign before queue value. If RECOVERY QUEUES = No = 0, this value isn't used. MSW on 40063 not used.

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Register Offset	Register number	Name	Description
65-66	40065-40066	K FILTER	Time constant, in seconds, of the digital filter for the measurement of FLOW input pulses. K FILTER = 00 = the filter is disabled. K FILTER = 01 – 99 seconds = filter value. The typical value is 02. MSW on 40065 not used.
67-68	40067-40068	PRESCALER	PRESCALER is an additional divider for the pulses input. PRESCALER = 001 = it does not affect the scale. PRESCALER = 002 – 255 = N = the BATCH register will be increased by UNIT once every N pulses. MSW on 40067 not used.
69-70	40069-40070	INCFG	Parameter that configure the following functions: the automatic printing at the end of batch, the printing start from an external AUX1 contact and the selection of the allowed dosages from STOP, AUX2 and AUX1 inputs among: 1st. dosage (SEt01, PrE01, Uni01) = 0 bin and 8th. dosage (SEt08, PrE08, Uni08) = 7 bin. MSW on 40069 not used.
71-72	40071-40072	AUTOSTOP TIME	Time after which, if there is no pulses at the input, the system automatically switches to STOP state If tStoP = 00,the AUTOSTOP function is disabled. tStoP value can be from 05 to 99 seconds. MSW on 40071 not used.
73-74	40073-40074	AUTOSTART TIME	Time after which, if the system is in STOP state, automatically starts a new batch. If rPdLY = 00 the AUTOSTART function is disabled. rPdLY value can be from 0001 to 9999 seconds. After an **AUTOSTART** S21N1 is automatically reset, even if the bit0 of bAtCF is equal to zero (automatic RESET disabled). MSW on 40073 not used.
75-76	40075-40076	BATCHCFG	Parameter that configure the following functions: - relays management for valves or motors control, - the function that when you release the external START button brings in PAUSE the system and when you press the external START button brings it back to the START state and - the function that from the STOP state when you give a start command does an automatic RESET of batch. MSW on 40075 not used.
77-78	40077-40078	POINT	Select the number of decimals in the SET, PRESET and TOTAL displaying. POINT = 0 = the point isn't displayed. POINT = 1 – 4 decimal point position. MSW on 40077 not used.

Register Offset	Register number	Name	Description
79-80	40079-40080	TOTAL-H	**TOTAL-H** is the most significant value between the two double words that make the total. With MSW on 40079. **TOTAL-L** is the least significant value between the two double words that make the total. With MSW on 40081. **TOTAL** (*t꞊*) is the value of the cumulative total of all doses made by the batch controller, it is editable only by MODBUS.
81-82	40081-40082	TOTAL-L	You can see this parameter without decimals on the two displays. The TOTAL value is expressed by 8 digits, then the lower display will read below the upper display. By Modbus you can read the four words that make the total, even the four decimal digits that the display doesn't shows.
83-84	40083-40084	BATCH	**BATCH** is the value of the number of pulses during the evolution of the dosage count without the decimal point multiplied by 10000. (if function = SET then it is the value displayed in the BATCH display). With MSW on 40083. Example: with Batch = 0001 the value of the register = 1.
85-86	40085-40086	485 ADDR/SPEED	Configuration **ADDR / SPEED** MSB = device address LSB = speed (Baud-Rate) Example: 6505 -> 65hex = 101 device address -> 05hex = 38k4 Baud rate
87-88	40087-40088	RS485 ADDRESS	**ADDRESS** (*Addr*) can be from 1 to 250 and is the address number of the device for the serial RS485 interface.
89-90	40089-40090	RS485 SPEED	**BAUD-RATE** (*bAUd*) can be: 0 (1k2), 1 (2k4), 2 (4k8), 3 (9k6), 4 (19k2), 5 (38k4), 6 (57k6) and 7 (115k2), for the speed rate configuration of the RS485 interface.
91-92	40091-40092	RS485-PARITY	**PARITY** (*PArit*) can be: 0 (none), 1 (even) or 2 (odd) for the parity error control of the RS485 interface.
93-94	40093-40094	-	Not Used
95-96	40095-40096	-	Not Used

Register Offset	Register number	Name	Description
97-98	40097-40098	TICKET	**TICKET** indicates the number of tickets (receipts) printed.
99-00	40099-40100	CH01	1st. character of custom string
101-102	40101-40102	CH02	2nd. character of custom string
145-146	40145-40146	CH24	24th. character of custom string
147-148	40147-40148	PR01	1st parameter to control of printing
149-150	40149-40150	PR02	2nd. parameter to control of printing
193-194	40193-40194	PR024	24th. parameter to control of printing
195-196	40195-40196	DST	Daylight saving time enabling.
197-198	40197-40198	WEEK-DAY	Day of the week configured on the internal watch
199-200	40199-40200	YEAR	Year configured on the internal watch
201-202	40201-40202	MONTH	Month configured on the internal watch
203-204	40203-40204	DAY	Day configured on the internal watch
205-206	40205-40206	HOUR	Hour configured on the internal watch
207-208	40207-40208	MINUT	Minute configured on the internal watch
209-210	40209-40210	-	Not Used
211-212	40211-40212	-	Not Used
213-214	40213-40214	-	Not Used
215-216	40215-40216	-	Not Used
217-218	40217-40218	-	Not Used
219-220	40219-40220	BATCH	Dosage value (batch) dec. as shown on the display
221-222	40221-40222	TOTAL	Cumulative total value dec. as shown on the display
223-224	40223-40224	STATUS	0=Reset, 1=Start, 2=Pause, 3=Prestop, 4=Stop

Register Offset	Register number	Name	Description
225-226	40225-40226	RTCPAR_COMMAND	Remote control real time register.
		Bit [15] CPU Reset	Controls the reset of the device
		Bit [14] Keyboard Lock	If =1 locks the keyboard
		Bit [13…6]	No function
		Bit [5] AUX2	Emulates the AUX2 input behavior. State=0 AUX2=0 / State=1 AUX2=1
		Bit [4] AUX1	Emulates the AUX1 input behavior. State=0 AUX1=0 / State=1 AUX1=1
		Bit [3] RESET	Emulates the RESET input behavior. State=0 RESET =0 / State=1 RESET= 1
		Bit [2] STOP	Emulates the STOP input behavior. State=0 STOP= 0 / State=1 STOP= 1
		Bit [1] START	Emulates the START input behavior. State=0 START= 0 / State=1 START= 1
		Bit [0]	No function

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PRINTER

PRINT OF THE REPORT

The S21N1 can print a report customized with various parameters and a programmable structure.

Pressing the [▲] and [▶] buttons simultaneously, **the actual value of parameters are stored to be printed**, and starts the printing process.

All the printed data will refer to the moment when the print command is given.

While S21N1 is busy transferring data to the printer, on the lower display remains displayed the message *Print*.

The normal operation of the system persists even during printing, and then the management of inputs and outputs is not altered.

You must use **FT190-II** Thermal printer with **CS-DB9F-DB25M** printer serial cable to print this report.

PRINT CONFIGURATION

Holding down the [▶] button you can enter in the printer parameters configuration:

The following tables show the print menu parameters with description and range of possible values.

CHARACTER	ALLOWED VALUES	DESCRIPTION
Da *CH01* a *CH24*	Da *032* a *127*	It is the ASCII code of each of the 24 characters of the custom string.

PRINTER CHARACTERS FOR THE CUSTOM STRING *CH01* – *CH24*

32		64	@	96	`
33	!	65	A	97	a
34	"	66	B	98	b
35	#	67	C	99	c
36	$	68	D	100	d
37	%	69	E	101	e
38	&	70	F	102	f
39	'	71	G	103	g
40	(	72	H	104	h
41	)	73	I	105	i
42	*	74	J	106	j
43	+	75	K	107	k
44	,	76	L	108	l
45	–	77	M	109	m
46	.	78	N	110	n
47	/	79	O	111	o
48	0	80	P	112	p
49	1	81	Q	113	q
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	U	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	:	90	Z	122	z
59	;	91	[	123	{
60	<	92	\	124	|
61	=	93	]	125	}
62	>	94	^	126	~
63	?	95	_	127	□

PARAMETER	ALLOWED VALUES	DESCRIPTION
From Pr01 to Pr24	From 00 to 99	It is the code of each of the print list item; it can be a style command or a print command.

CODE	PRINTER FUNCTION DESCRIPTION
0	No operation.
1	Print time in `Time  9:17:59` format.
2	Print date in `Date 25/10/96` format
3	Print the SET value (point where the counter STOP the batch) in `SET   = 12345` format
4	Print the PRESET value (point where the counter start slow dosing with the valve partially open to improve the accuracy) in `PRESET= 00150` format
5	Print the UNIT value (conversion unit of the pulses input) in `UNIT  = 0.5742` format
6	Future features reserved code
7	Print the actual counting's level (of the pulses input) in `BATCH = 87254` format or If the 7 digit print is activated, in `BATCH = 0087254` format
8	Print the cumulative TOTAL of all the dosages in `TOT.  = 12345678` format

9	Print the actual FLOW value with its unity of measure in one of the following formats:
	`unit/sec = 099.20`
	`unit/min = 5940.0`
	`unit/ora = 357.12`

12	Print the stopwatch (It is active in START state or PRESTOP state and automatically sets the device to zero if you go in START state from RESET state) in `CRONO = 001:25:39` or `CRONO = 000:08:27.761` format
13	Print the progressive number of tickets issued
14 – 27	Future features reserved codes
28	Carriage return
29	Space
30	Print the custom string with **CH1...CH24**
31 – 39	Future features reserved codes
40	Sets the printer with normal height normal width and text mode
41	Sets the double width
42	Sets the double height
43	Sets the double height and the double width
99	End of print: all the next codes after this code will NOT be printed.

PARAMETER	ALLOWED VALUES	DESCRIPTION
t icN	Format: 0.00.00	It's the number of prints (ticket number).

FOR EXAMPLE: PRINTING REPORT CONFIGURATION

Printing report:

Tot. = 0005976
Crono = 0.00.15
Time = 14:09:43
Date = 21/05/15
BATCH = 4325
SENECA s.r.l. S21N1

The custom string is: SENECA s.r.l. S21N1

The 24 characters (from **CH01** to **CH24**) of the custom string are:
83,69,78,69,67,65,32,115,46,114,46,108,46,32,32,83,50,49,78,49,32,32,32,32

Codes to select the printing functions (from **Pr01** to **Pr24**):

```
Pr01 40 normal print
Pr02 30 print the custom string
Pr03 28 carriage return
Pr04 07 print the BATCH
Pr05 28 carriage return
Pr06 02 print date
Pr07 28 carriage return
Pr08 01 print time
Pr09 28 carriage return
Pr10 12 print stopwatch
Pr11 28 double height
Pr12 08 print cumulative TOTAL
Pr13 28 carriage return
Pr14 28 carriage return
Pr15 28 carriage return
Pr16 99 end of printing report (all the next codes until Pr24 are ignored)
```

PURCHASE ORDER CODE

CODE	DESCRIPTION
S20N-KIT-1-ST	KIT REMOTE CONTROL FOR S20N / S21 – SUPPLY 115/230 V∿
FT190-II	THERMAL PRINTER - ALIM. 9-40 Vdc
CS-DB9F-DB25M	S21N1 – PRINTER SERIAL CABLE

FRONTAL PANEL / MODULE LAYOUT
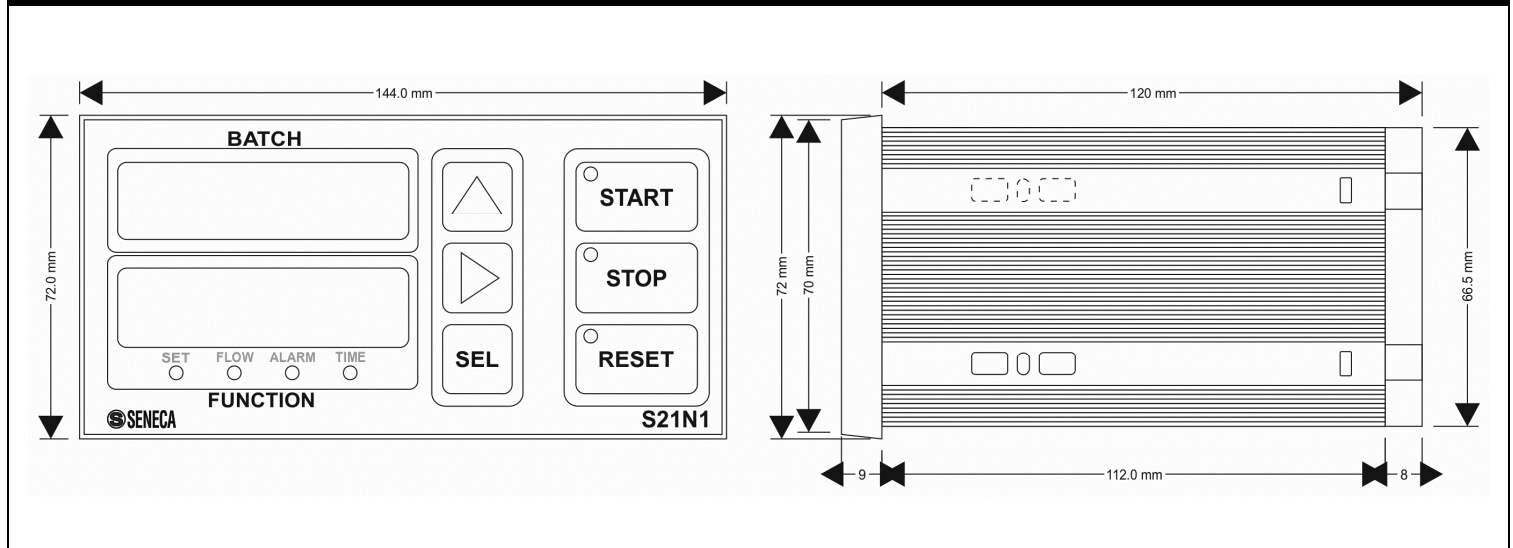
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