TECHNICAL MANUAL

ELECTRONIC COIN SELECTOR

TYPE AL 06/07

SUMMARY

1   INTRODUCTION

The **AL06 – AL07** electronic coin selectors' series belong to a new generation of coin and/or tokens validators, successors of the **AL03** series with which are fully compatible both at mechanic and electronic level.

These coin selectors are compatible with most of coin selectors 3 ½" type, these latters use 10 poles IDC connectors and give the possibility to invert the polarity by a simple connection on the electronic card.

The improvements introduced in these brand new models are:

- system of optimal measurement thanks to a suitable placement of the sensors and to the introduction of optical sensors that prevent the possibility of fraud (*jojo fraud*);
- consumption absolutely lower than the one of the AL03 series;
- feeding with tensions from 10VDC to 24VDC without any adaptor (thanks to the low consumption, in the modality *sleep mode* or *renewal,* it can be feeded from a simple battery);
- microcontroller of FLASH type that gives the possibility at the user to make modifications and updating on the program.

FEATURES	AL06	AL03
Number of channels	24	12
Speed of acceptance	3 (4)[1] coin/sec	3 (4)[2] coin/sec
Diameter acceptables coins	15 – 26 (31)[2] mm	15 – 26 (31)[3] mm
Thickness acceptables coins	0,8 – 2,6 (3,3)[3] mm	0,8 – 2,6 (3,3)[3] mm
Feeding	8 – 26 V DC[3]	10 – 16 V DC
Consumption in rest	25 mA	35[4] mA
Consumption in "sleep mode"	5 mA	35[5] mA
Consumption in acceptance	350 mA (20ms)/50 mA (hold)[5]	350 mA[5]
Communication	Serial,Parallel, RS232	Serial, Parallel, RS232
Connection	10 poles IDC (outputs ser. and par.) 4 ways RS232	10 poles IDC (outputs ser. and par.) 4 ways RS232
Outputs	50 V, 500mA "open collector"	50 V, 500mA "open collector"
Inputs	"activ H" 2,5 V – 30 V DC	"activ H" 2,5 V – 30 V DC
Dimensions	89 x 102 x 53 mm	89 x 102 x 53 mm
Weight	240 g	240 g
Work temperature	- 5 °C do + 55 °C	- 5 °C do + 55 °C

Schedule 1.1 Comparison between the AL06 and AL03 coin selectors' series

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[1] The models K and KS type have the possibility of acceptance of 4 coins each second
[2] It is necessary to remove the small plastic piece on the collapsible plate
[3] The consumption and the features remain the same
[4] At a tension of 12 VDC
[5] It is not dependent from the input tension

2   MECHANICAL VERSIONS

The mechanical versions are:

1.   V model
2a. K model
2b. KS model

2.1 V Model

This model is mechanically compatible with the mechanic coin selectors[6] from 3½".
The input of the coins is in the high side, while the output of the accepted coins and that one of the refused coins are in the low side of the coin selector (*see ph. 2.1*).

Entry   Entry

102
86
89   52

Acepted   Refused
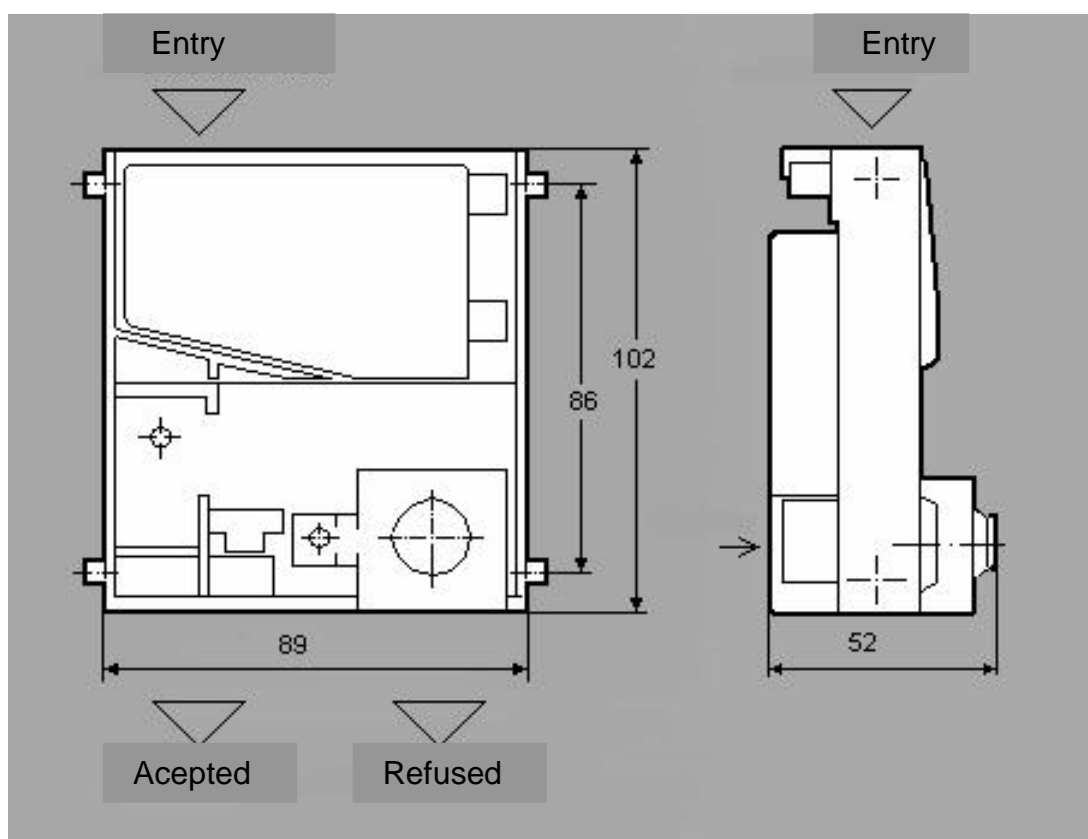
photo. 2.1 V Model

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[6] Also called "English coin selector"

2.2 K Model

This model is usually used on the machines of recent production.
Its features are:

- simple to assemble;
- it needs of a smaller space of assembly;
- more speedy (*up to 4 coins each second* thanks to the position selected for the input of the accepted coins).

The input of the coins is in the high side of the coin selector.
The output of the accepted coins is in the low side, while that one of the refused coins is frontal (*see ph. 2.2*).

Entry

Refu
sed

Acepted

155
140

41
63

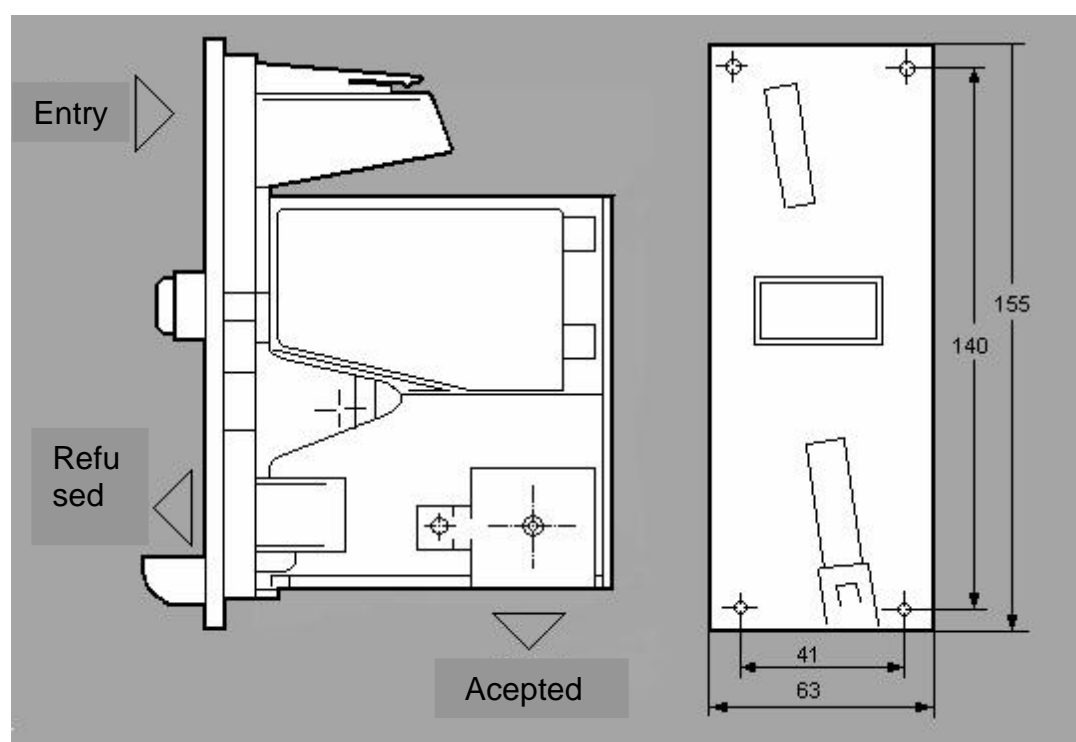photo. 2.2 K Model with front plate

2.3 S Model

This model is similar to the K model, except for the input of coins (side entrance), that is lateral and for the reduced dimensions of the front plate (60x120).
This latter feature gives a bigger flexibility of assembly of the coin selector on the equipments where the space is limited
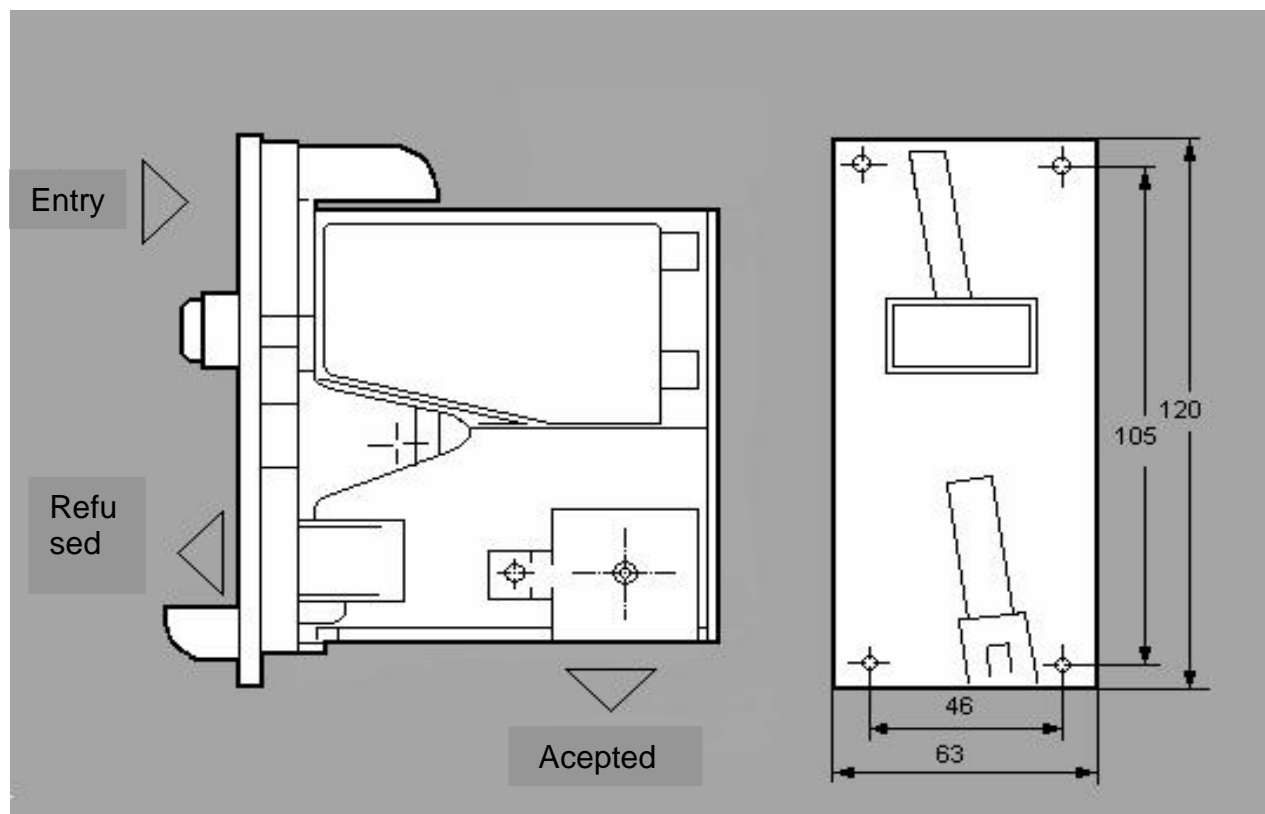 (*see ph. 2.3*).

photo. 2.3 KS Model with front plate

3   CONNECTIONS

The coin selector use 3 connectors for the connection with the exterior world (ph. 3.1).

- The feeding takes place by the 10 poles IDC connector (X1), represented with a scheme in the ph. 3.2.This connector is composed from 6 outputs "open collector" type (*pin 3,4,7,8 ,9*,10), an active input at high level (*pin 6*), while the pin 5 has a double function, or better it can be used both as input and "open collector" (output).

- The RS232 serial transmission takes place by a 4 poles connector (X3) and an **AL032** adaptor. The communication protocol includes the "master" and "slave" modality at disposition of the user on the web site www.alberici.net.
  The connection scheme of the connector X3 is represented in the ph. 3.2.

- The 6 poles **X2** connector is used for the connection with the visualizer (display).

  At present the coin selector has a display with SPI or I²C protocol bus among which:

  - MC 14499 4 digit compatible with RM924S (Seci) and G-51.1092 (NRI)
  - MC 14489 5 digit compatible with G-53.0747 NRI
  - MAX7219 6 digit ALxxx ALBERICI

  For the Seci and NRI displays is necessary to use the adaptor for the connection cable.
  The connection scheme of the **X2** connector is represented in the ph.3.2

At demand is possible to modify the positions of the R63 - R64 resistances (see ph. 3.1) and to invert the polarity of feeding (*pin 1 i 2*) in order to obtain a perfect compatibility with the spanish coin selectors.
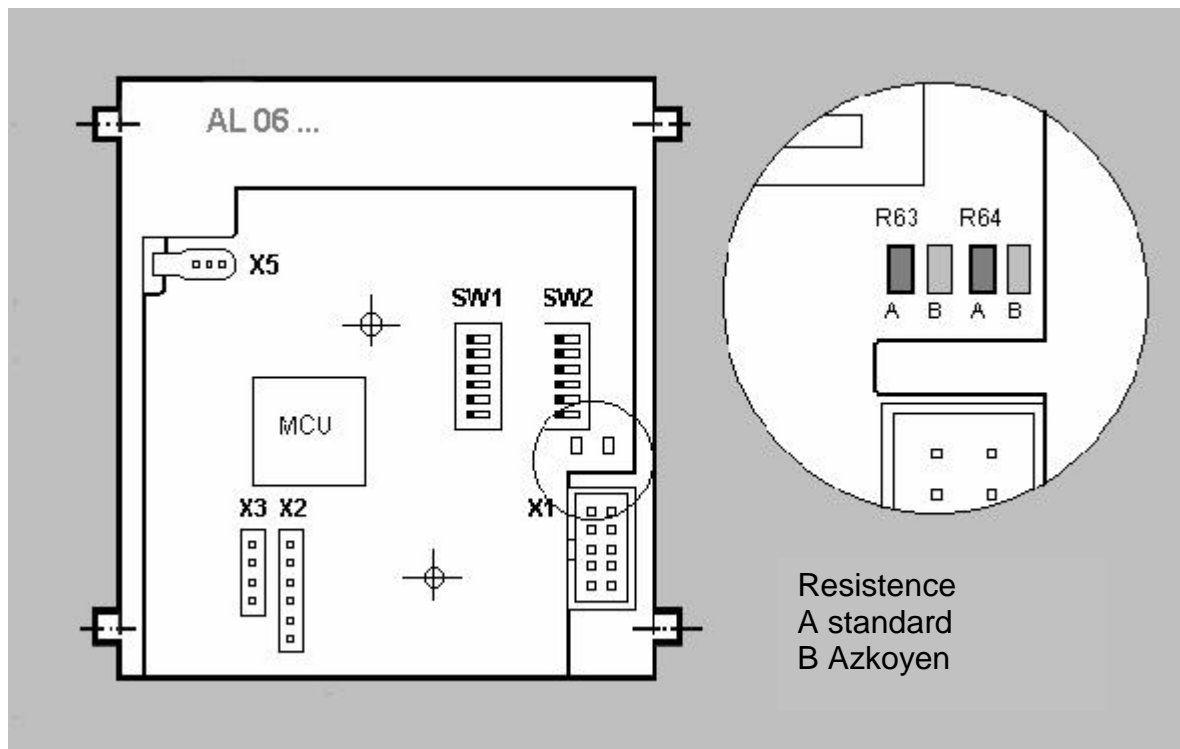

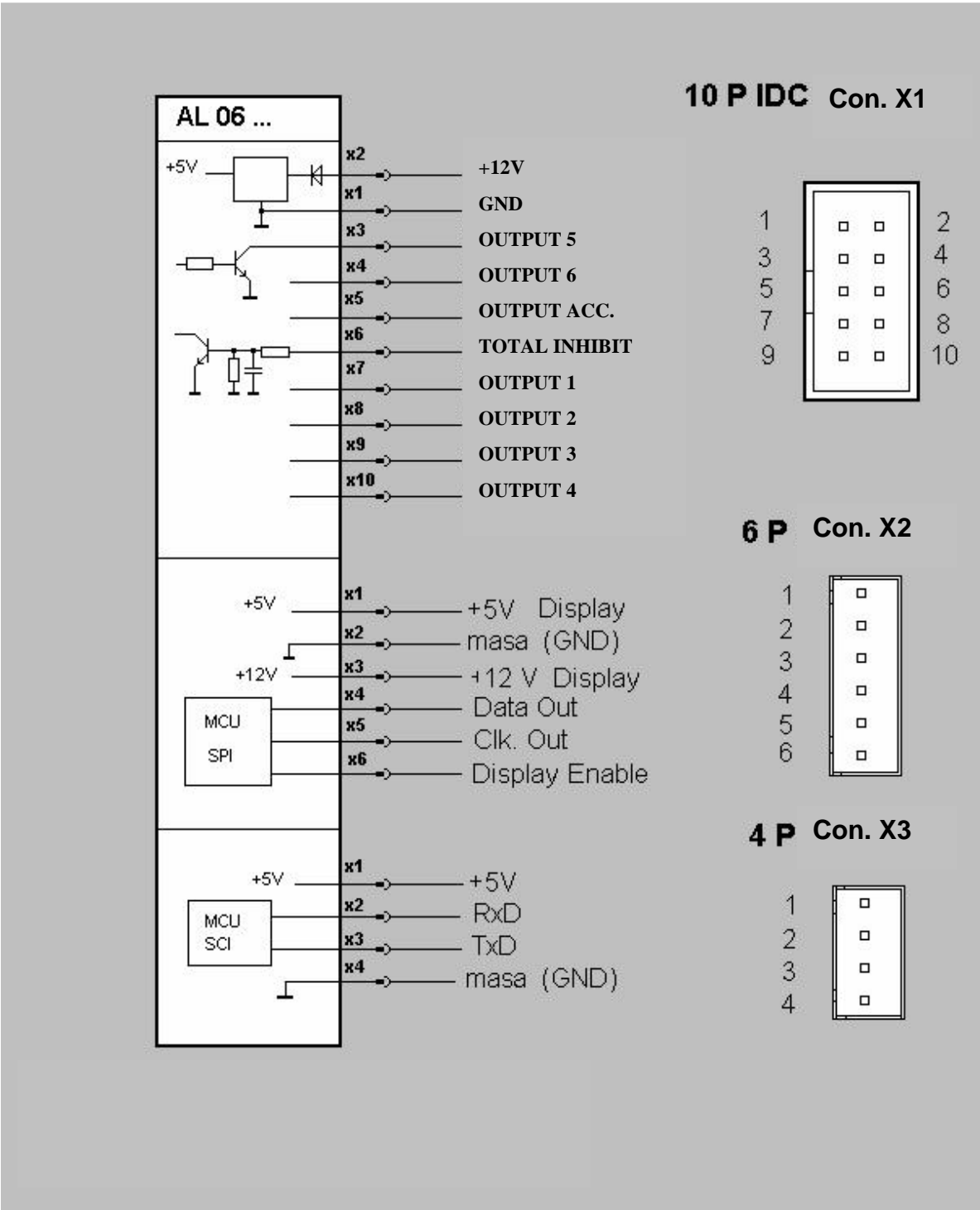photo. 3.1 Placement of connectors, DIP-switch and inversion of polarity

photo. 3.2 Scheme of AL06 connection

4   FUNCTIONAL VERSIONS

There are different types of functions and/or versions that the user can formulate with complete autonomy, by the use of a support program (*programmer*), a PC (*Win9x,2000 ili NT4*) or a "palm" PC with Windows-CE installed.
The available versions (correspondent with the connection standards[7]) are:

1. Validators
2. Totalizators
3. Timers
4. Multiprice

All the AL06 electronic coin selectors' series, in addition to the standard connection by the 10 poles connector, have the possibility to transmit some data in the so-called "master" mode[8], both by a RS232 interface and by SPI[9] or I²C bus.

Besides what said up to now, all the versions listed, except the first of Validators, give the possibility of connection at the display that can visualize the credit numbers, the rest or the accumulated value and the duration of time.
The communication protocol is at disposition of the user (as well as all the records) on the web site.

4.1 VALIDATORS

This group is referred to the electronic coin selectors with the 6 outputs in parallel.
At each output it can be associated one (or more) among the available 24 channels, and it can works in the modality *single or multi impulse.*
This latter possibility lately has found a vast usage in the vending machines that need a continuous updating, in particular after the introduction of the new **euro**[10] coins.
There are also validators with 3 and/or 4 outputs with the pilotage of the separators bobbins at 3[11] and/or 4 ways.
They are also available in the autoprogrammable version with the possibility of programming of all the 24 channels by DIP-switch(*see description in the 5 OPTIONS chapter*).
The formulation of the time of duration of the active signal like the channels programming has made by programmer.
The deshabilitation of the single output or channel can be made by DIP-switch directly on the coin selector, or by programmer.
Bringing a tension from 2,5 VDC to 30 VDC on the pin 6 (or *5, if it has been chosen*) the acceptance of all coins (*Inhibit*) is stopped (inhibited).
One of these inputs can be used also for the "renewal" of the electronic coin selector when it is in "stand by" modality (*see description in the 5 OPZIONI chapter*).

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[7] It is implicit a standard of connection of data transmission and cable lay up
[8] Master mod means the data transmission from the coin selector at the end of some function
  as the passage of an accepted or refused coin.
[9] **S**erial **P**eripheral **I**nterface
[10] All records is available on the web site: http//www.alberici.net
[11] SA3 Alberici Separators

The standard placement of the validator pins is shown in the schedule here below.

	pin 1	Pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9	pin 10
standard and multi imp.	GND	+Vs[12]	output 5	output 6	-------	block	output 1	output 2	output 3	output 4
combinat.	GND	+Vs[12]	bit 3 MSB	parity	-------	block	mod[13]	bit 0 LSB	bit 1	bit 2
separator	GND	+Vs[12]	bobin. separ. B	bobin. separ. A	-------	block	output 1	output 2	output 3	output 4[14]

Schedule 4.1 Function of the validator pins

4.2 TOTALIZATORS

The totalizators are also called **coin selectors with emission of serial impulses.**
The main feature of the totalizators is that each time the insertion of a coin allows to reach the formulated value in the accumulator, at the output you have a series of impulses of the programmed duration.
The transmission protocol of the serial impulses, proportionals at the acquired values, is called **Executive Protocol**.
The duration of the active impulse can be regulate from 5 to 1000 ms with feed from 5 ms.
The value of each channel (*coin value*) vary from 1 to 100.
The **AL06** totalizators have the introduction of two bonus levels (additional impulses) programmables.
The bonus active itself if there are the following two conditions:

1. the inserted coins reach the bonus level programmed;
2. the insertion of coins happens within the prearranged time (Max 2 minutes, typical 15 seconds).

The credit and Bonus value can be formulated both by programmer and DIP-switch SW1 - SW2 (as in the *autoprogrammable* version).
If you leave all the DIP-switch in position **off** the programmed value stay active.
Besides the basis version, it is possible to program the coin selector in the underversion **with emission of impulses at demand**.
The blockage of the acceptance of coins can be made by program, while the blockage of the coin selector can be made bringing a tension on the **Inhibit** entry (*pin 5 or 6*).
The activation of the output impulse in the version at demand can be made bringing a tension on pin 5 or 6 (*programmable*).
In addition one of the outputs can be used as meter and another one to inform about the relative rests of credit.
The user is free to use any output pin (*see ph. 3.2*) for the activation of credits or for other functions.
For all the versions, there is the possibility to activate the option of the separator.

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[12] Tension from 10 to 26 VDC
[13] Way selection: active = combinatory, deactive = standard
[14] It does not used with the SA3 separator

The standard placement of the functions of pins is represented in the schedule 4.2

	pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9	Pin 10
Standard ALBERICI	GND	$+V_s$[12]	-------	-------	Output Credit	input block	-------	-------	-------	-------
Standard SECI	GND	$+V_s$[12]	-------	-------	-------	input block	-------	output contat	output credits	output rest
at demand ALBERICI	GND	$+V_s$[12]	-------	-------	Output Credit	input block/ at dem.	-------	-------	-------	-------
at demand SECI	GND	$+V_s$[12]	-------	-------	Output at dem.	input block	-------	Output contat	output credits	output rest

Schedule 4.2 Function of totalizator pins

4.3 TIMERS

The coin selectors that give in output a temporised impulse whose duration is proportional at the acquired value are called **Timers**.
There are two timers' versions:

1. **proportional timer;**
2. **timer at demand**.

In the proportional version when the accumulated value reaches a credit value the output is activate for a specific period of time.
Adding coins in a proportional way the time of activation is increased.
In the version at demand, on the contrary, you have the activation of the output bringing an high tension on one of the input pins (pin 5 or 6), only if the accumulated value reachs the value of a credit.
The period of duration of the impulse is always the same and, if at the end there are still credits not realized, bringing once again a tension at the input the next impulse is activated, or is extended the present one if the input is activated before the ending of time.
The rest of credit can be indicated in the specific pin as in the timer at demand version.
The **Timer at demand** too can use two bonus levels.
In addition there is the possibility to program an output to indicate the ending of time.
The time of activation of this indicator must be programmed as multiple of basis[15] time.
In the same way is possible to program an input to make the blockage of the time sequence (*time stop*).

As in the totalizator version, also in this case are possible the following options:
autoprogrammable and separator.

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[15] The basis time is the time of the credit value =1

The placement of the functions of pins in the timers is represented in the schedule 4.3

	pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9	Pin 10
timer proport. ALBERICI	GND	$+Vs^{12}$	------	------	output timer	input block	------	------	------	------
timer proport.	GND	$+Vs^{12}$	------	------	------	input block/ stop	------	output meter	output timer	Output Time Out
timer at demand ALBERICI	GND	$+Vs^{12}$	------	------	output timer	input block/ dem.	------	------	------	------
timer at demand	GND	$+Vs^{12}$	------	------	------	imput block/ dem.	------	output meter	output timer	Output Rest
timer at demand SECI	GND	$+Vs^{12}$	------	------	input requir.	input block	------	output meter	output timer	Output Rest

Schedule 4.3 Function of pins of the coin selectors with timer

4.4 MULTIPRICE

This version is used mainly in the vending machines.
The feature of this version is that the outputs are activated and stay in this state until when the accumulated value arrives at the formulated value *(price).*
At each of the 6 outputs you can formulate (program) a different price.
Reaching the determined price, is activated the output at them programmed.
There are different ways of functionality of the outputs, and they can be formulated only in factory.
The first way is that the line of the lower price is deactivated when the formulated value reachs the value of the next price (higher) programmed.
The second way is that all the lines with the reached price stay active.
The third way is the survey system *(scanner)*, where there is the possibility to identify which of the sales lines was active.
The first two ways, after that the sale is made, always take away the value of the maximum active line of sale.
Since it has been reached the maximum price, the coin selector does not accept anymore coins!
After that the sale is made, the equipment (vending machine) send at the input a **reset** impulse with which cancel the value of the price of the active output (deducted from that one accumulated), and this value, if the accumulated value remaining should be not enough, is deactivated.
As in the versions of totalizator and timer at demand, the rest of the credit can be indicated by pins (correspondent with the used number).
There is the possibility to keep or to cancel the rest (immediately or after a certain period), this latter is lower than the minimum price (adjustable).
In addition of the listed versions, there is also the version for **photocopiers**.
This version uses only an output to make the sale, and cancels itself (goes to zero) when the coin selector receive a specific number of impulses (adjustables).

The standard placement of the pins functions of the multiprice coin selectors is represented in the schedule here below.

	pin 1	pin 2	pin 3	pin 4	pin 5	pin 6	pin 7	pin 8	pin 9	pin 10
multi price	GND	+Vs^{12}	Pz. 5	Pz. 6	reset	block	Pz. 1	Pz. 2	Pz. 3	Pz. 4
two prices	GND	+Vs^{12}	-------	-------	reset	block	-------	Pz. 1	Pz. 2	output rest
photocop.	GND	+Vs^{12}	-------	-------	emiss. demand	block/ reset	-------	contat. monet.	uscita vend.	output rest

Schedule 4.4 Placement of pins for the multiprice versions

5 OPTIONS

The standard versions of working, described in the previous chapters, can be completed with the following options:

1 Autoprogrammable
2 Separator
3 Renewal

5.1 AUTOPROGRAMMABLE

At demand each type of AL06 electronic coin selector can be sell as autoprogrammable, where the programming of coins and/or tokens is made by DIP-switch, without the help of the programmer.
By SW1 DIP-switch you can formulate, in binary code, the channel to program (from 1 to 24), as shown in the schedule 5.1; whereas by the SW2 DIP-switch you can define the value to associate at the channel as pointed out in the schedule 5.2.
The steps to follow in order to make the programming are:

1. put SW1 and SW2 in position **off** (switched off), in this way the coin selector is in the programming modality;
2. switch on the feeding;
3. put SW1 and SW2 with the appropriate combinations on-off;
4. insert the 10 coins or tokens to program in the select channel;
5. be sure that, after the introduction of the tenth coin, the bobbin makes a double click as confirmation of the programming;
6. in order to program a new channel you have to change the combination of the DIP-switches and repeat the step 4;
7. at the end of programming switch off the feeding, formulate the DIP-switches accordingly the use and switch on again the feeding.

At specific demand is possible to increase or decrease the samples number to use.
If the bobbin, at the end of the insertion of the 10 coins, makes a single click you must repeat the operation, since the programming has not been accepted. Usually the reason of this latter hitch is due to DIP-switches that are at the same time in on.
During the programming phase, formulating all the 6 swiches of the SW2 DIP-switch in **off**, the programmed coin will be processed as a false.

DIP SW1	1	2	3	4	5	6
BIN VALUE	1	2	4	8	16	32
PROGRAMM.	OFF	OFF	OFF	OFF	OFF	OFF
CHANNEL 1	ON	OFF	OFF	OFF	OFF	OFF
CHANNEL 2	OFF	ON	OFF	OFF	OFF	OFF
CHANNEL 3	ON	ON	OFF	OFF	OFF	OFF
….	….	….	….	….	….	….
….	….	….	….	….	….	….
CHANNEL 23	ON	ON	ON	OFF	ON	OFF
CHANNEL 24	OFF	OFF	OFF	ON	ON	OFF
NOT TO USE	ON	OFF	OFF	ON	ON	OFF
….	….	….	….	….	….	….
RESETTING	ON	ON	ON	ON	ON	ON

Schedule 5.1 Description of programming of coins by the SW1 DIP-switch

In the work phase SW1 and SW2 change role.

The SW1 DIP-switch is used to indicate the credits value (accumulator value) as per the binary combinations shown in the schedule 5.2[16].

On the contrary by SW2 DIP-switch you can indicate the bonus level (always by the binary code indicated in the schedule 5.2).

DIP SW1 e SW2	1	2	3	4	5	6
BIN VALUE	1	2	4	8	16	32

Schedule 5.2 Indication of the credit values by DIP-switch

5.2 SEPARATOR

This option too can be applied at all the AL06 electronic coin selectors' versions.

When the coin selector works in accordance with this modality, the available outputs pass from 6 to 4, since 2 of them are used in order to steer the bobbins of the separator.

Usually are used pin 3 (*bobbin A*) and pin 4 (*bobbin B*).

At demand or by the programmer, it is possible to formulate also different pins.

The activation of the separator' bobbins is synchronized with the arrival of the coin at the output of the coin selector.

In this way the "rock-burst" is reduced in the phase of the coin acceptance and separator activation.

The time of stoppage of the separator bobbin is of 100 msec (*typical*), but at demand it can be programmed as per any requirements.

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[16] At each open switch is added the binary value from the schedule

5.3 RENEWAL (sleep mode)

The AL06 electronic coin selector can works also in **sleep mode** modality with consumptions very reduced[17].

In fact the coin selector stay in a state of low consumption and the renewal happens only at the arrival of a coin.

The impulse for the renewal[18] has to be activated on pin 6 before the entry of the coin in the coin selector.

When the coin selector has been revived, it stays in the active state for a minimum of 50 ms (this is the necessary time for the coin recognition) up to a maximum of 60 seconds.

The time of activation at demand is formulated in factory.

The modality of sleep mode working allows to reduce of 5 times the consumption of the coin selector (5 mA *typical*).

You can obtain a further saving if in the acceptance phase the PWM is activated.

This latter steers the bobbin in order that its winding is activated from a brief current impulse (*tip.350mA/20 ms*) then it is detained until the exit of the coin from the coin selector.

In order to stop that the coin selector goes in sleep mode during the programming phase, is necessary to formulate all the switches of the SW1 and SW2 DIP-switch in position **on**, and then switch on the feeding.

In case you use an autoprogrammale coin selector, to block the work in sleep mode of this latter, is necessary, before to switch on the feeding, to formulate all the switches of the SW1 and SW2 DIP-switch in position **off**.

The descriptions and drawings in this manual are not binding : ALBERICI S.R.L reserves the right to carry out any necessary modifications.

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[17] Stop the function of the microcontroller - "sleep" mode
[18] High level from 3 to 30 VDC