BRAVILOR BONAMAT

A RANGE-STANDARD MODULAR VALIDATOR

10042 UK 06 - 2004

1. INTRODUCTION AND DESCRIPTION OF COMPONENTS

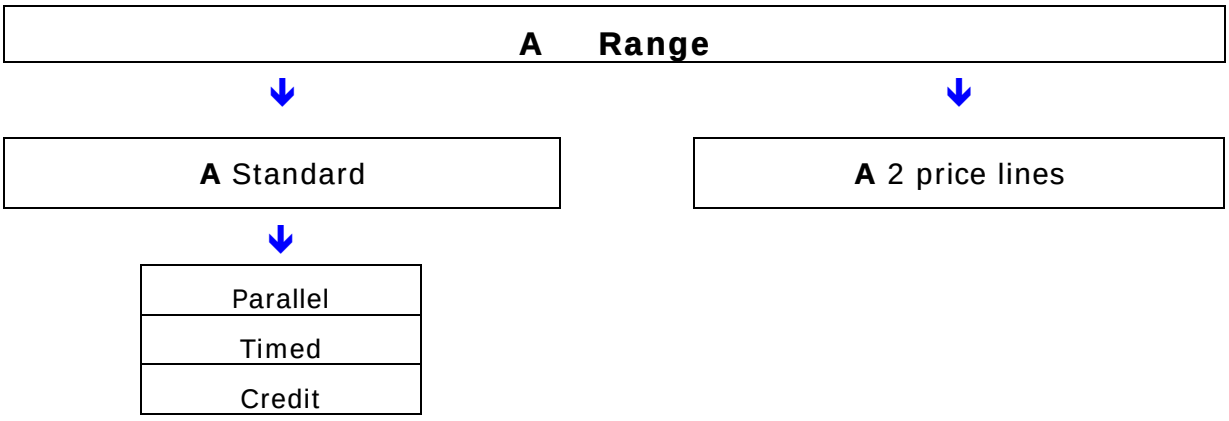
This Technical Manual contains the technical information related to the coin validators in the **A-standard** range that is part of the **Modular** series.

The *coin validators* in the **A** range are apparatus that, within the machine, and forming part of it, have the task of selecting and validating coins introduced into the machine.

> In the rest of this Technical Manual the coin *validators* in the **A-standard** range will be called *validator* or *validators*

> When the word **configurable** is used in the Technical Manual it means that the parameter or characteristic it refers to can be programmed in the factory to suit the needs of the customer. These parameters or characteristics can later be reprogrammed using the adequate technical means.

The following diagram will help the reader to better understand the architecture of the A range validators



> The models in the A Range **price lines** have their own Technical Manual, therefore they are not described here

1.1. CHARACTERISTICS AND MODELS THAT MAKE UP THE A RANGE FRONT PLATE-STANDARD

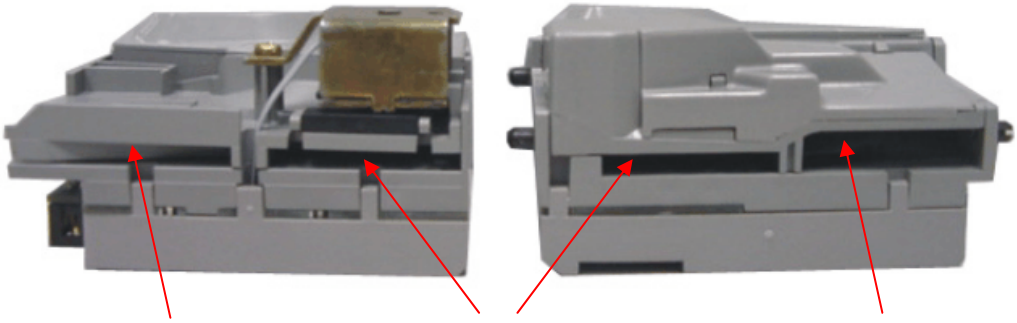
The special features of these *validators* are:

- All the coin *validators* in the **Modular** series, and therefore the **A-standard** range, are compatible with industry standards
- The coin entry can be through the top or through the side of the *validator*. To use the side entry the *validator* must be housed in the mini *front plate*.
- Coin exit for rejected/recuperated coins is at the side of the *validator*.

Coin exit for rejected / recuperated coins

- The two aforementioned characteristics means that the coin exit for accepted coins is on the opposite side to the rest of the models of *validators* in the range that make up the **Modular** series.

Validator A range **Validator L range**



Coin exit - rejected coins **Coin exit - accepted coins** **Coin exit - rejected coins**

- These *validators* do not have pivots as they are always installed in a front plate and this has its own fixing system deeming the pivots unnecessary.

The different models that make up the **A-standard** range are:

- **A-standard** with high sensorisation.

  It includes the protocols PARALLEL, CREDITS and TIMER.

  It has 3 pairs of ferrite coils and an acoustic sensor.

- **A-standard** with normal sensorisation.

  It includes the protocols PARALLEL, CREDITS and TIMER.

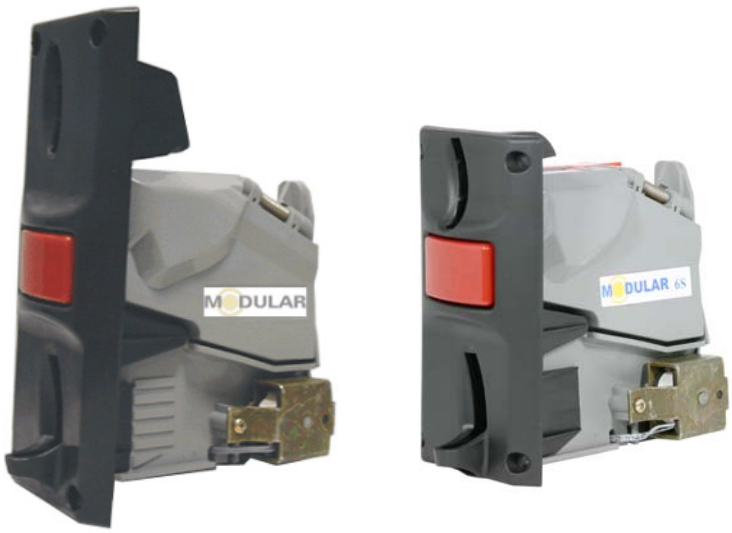
  It has 1 pair of ferrite coils in phase and an acoustic sensor.

- Both models can also be manufactured in a special version called **low consumption** designed for applications where power consumption is a critical factor of the application where the validator is installed.

The range of *Front plates* into which the *validators* can be installed is the following:

- **Normal front plate**: *validator* with top coin entry.

➢ **Mini front plate**: *validator* with side coin entry.



Normal **Mini**

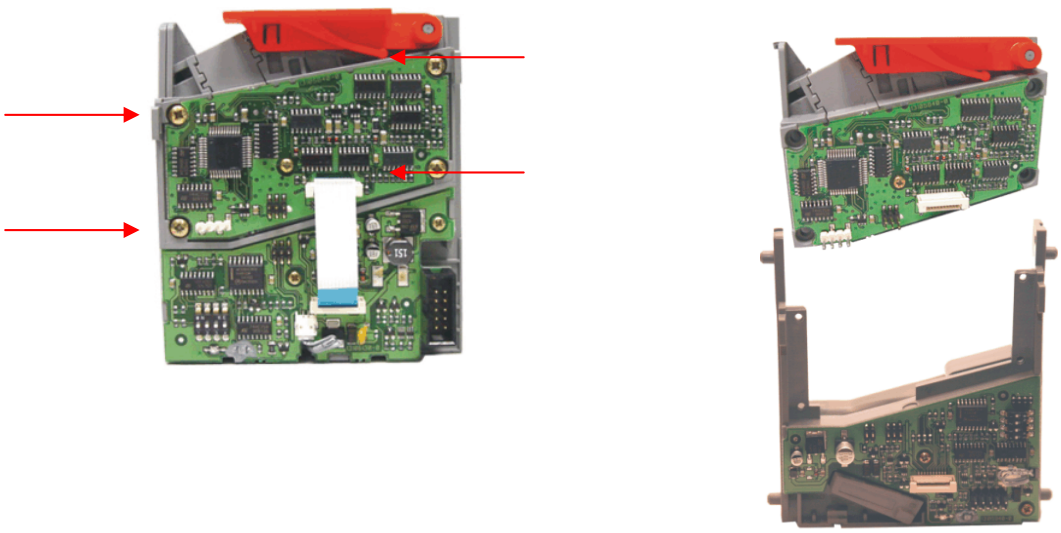
1.2. TECHNICAL FEATURES

The most relevant technical features are:

➘ The sensor module is independent and common for all models

It is manufactured using the most advanced technology and uses flash memory.

The sensor module is common in all the *validators* in the **Modular** series, which is a great innovation in the logistics process.

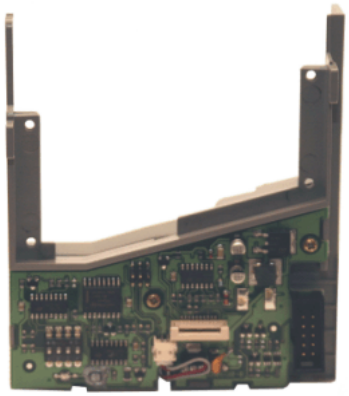


To disassemble the coin exit module it is necessary to remove the 4 screws located in the holes indicated by the arrows.

➘ Exit module

As with the *sensor module,* it is also manufactured with the most advanced technology and has a flash memory.

The exit module is unique for the different products that make up the **Modular** series.



➘ Power supply and consumption for the standard model

The nominal voltage is 12 Vdc admitting a minimum of 9 Vdc and a maximum of 27 Vdc.

Consumption:

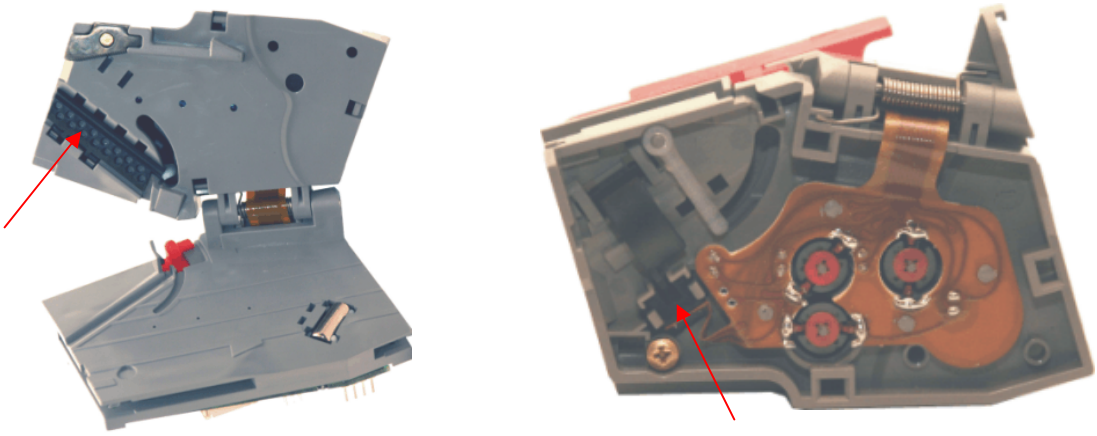
	Powered by 12 Vdc
At rest	120 mA
Validating a coin	135 mA
On accepting a coin	170 mA
Maximum current draw for each output	500 mA

➘ Coin admission

The *validator* admits 32 types of different coins. Of the 32 coins, 2 can be reprogrammed by the operator on site by introducing the coins with the *validator* in “learning” mode.

➘ String detection system

All the models come standard with an effective string detection system, which will foil any attempt at fraud using a string tied to a coin.



String detection system

➘ Mean time between failures (MTBF)

Under normal working conditions, these validators have a MTBF of.

➘ Mean cycles between failures (MCBF)

Under normal working conditions, these validators have a MCBF of 840,000 coins.

➘ Construction material

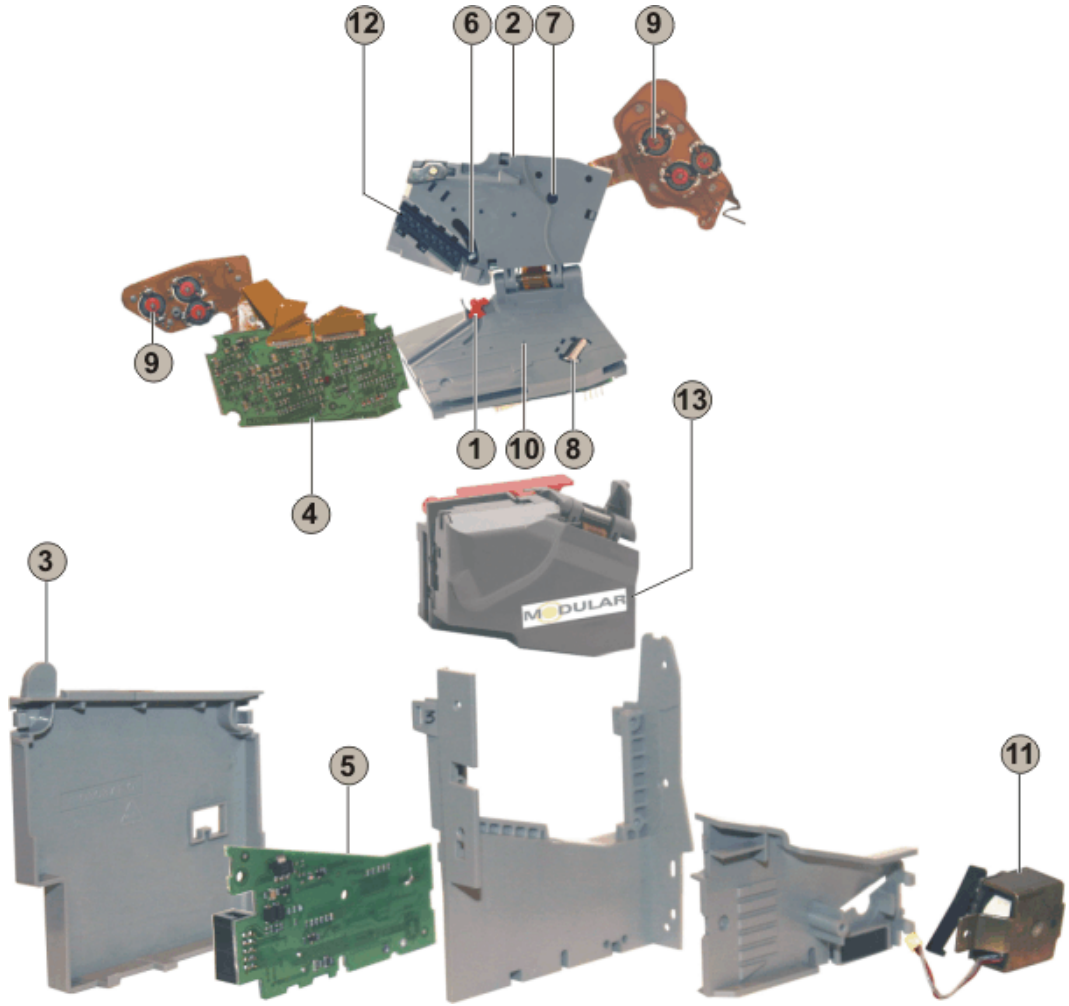
The latest generation plastics, resistant to wear, static electricity dissipating, of high rigidity and dimensionally stable at high temperatures and humidity (low absorption levels) and resistant to saline deposits.

➘ Coin return code

The validator has a system that generates a “coin return code” when the validator is opened. When this code is activated, the machine interprets this as a request for the return of the coins inserted and acts in consequence.

1.3. COMPONENT DESCRIPTION

The principle components in the **A** range *validators* are:



1. Recuperation lever

Activating this lever will open the *validator* to free possible coin jams within the *validator*.

2. Hinged door

This is the moving part of the *validator*. It opens when the *recuperation lever* is pressed.

3. PCB cover

This cover protects the PCBs in the *validator*.

4. Sensor module PCB

Houses the microprocessor with flash memory.

5. Exit module PCB

Houses the microprocessor with flash memory.

6. Coin entry rocker

This element is designed to stabilise the speed at which the coins move through the interior of the *validator*.

7. Acoustic sensor

This device receives the sound made by the coin when it hits the *metallic cylinder* on falling into the validator. The parameters received by this sensor are very important in the coin acceptance or rejection process.

8. Metallic cylinder

This is a complement to the acoustic sensor.

9. Inductive sensors

3 pairs of inductive sensors for the “turbo” version and 1 pair of sensors for the “normal” version, which obtain parameters related to the alloys and thickness of the coin.

10. Infrared sensors

3 pairs of infrared sensors that obtain parameters related to the diameter of the coin.

11. Acceptance gate

When the *validator* validates a coin, the electromagnet opens the gate to let the coin through the accepted coin channel.

12. String detector

An electro-mechanical system to foil any attempt at fraud using a string tied to the coin. The system is based on an infrared beam passing through a hole in the *shutter*. The beam is interrupted when the string attached to the coin tenses and moves the *shutter*. The *validator* interprets this signal as a fraud attempt and inhibits the coin.

13. Sensor module

This element houses the majority of the measuring and control systems the *validator* has. It is common in all the models that have the same sensorisation systems, and where all the different measurements and controls are carried out to determine if the coin is accepted or rejected.

1.4. FUNCTION

1.4.1. A-standard *Validator* in Parallel mode

The ***validator*** **working in Parallel mode gives a signal to identify the coin through one or more lines when a coin is accepted.**

- These *validators* have 7 lines that can be:
  - **dedicated:** which means that only 7 different coins can be validated as one line is used to identify each coin.
  - **binary:** which means various lines can be used to identify a coin, with a maximum of 32 different coins.

> As all the lines in these *validators* are configurable, the 7 lines can be used to identify coins or other tasks; for example for coin return

- The **duration of the pulses** is configurable data. They can be later modified by reprogramming using the TL20 programmer.
- The **exit assignation** is configurable data. They can be later modified by reprogramming using the TL20 programmer.
- Working in this mode, when a coin is validated one pulse of a determined duration is given through an assigned line. An Azkoyen sorter can be controlled using pins 3, 4 and 5. This implies the use of a different exit module PCB.

1.4.2. A-standard *Validator* in Timing mode

The ***validator*** **working in Timing mode gives time when the programmed price is reached.**

This *validator* offers three working modes:

- **Work for a continued time.**

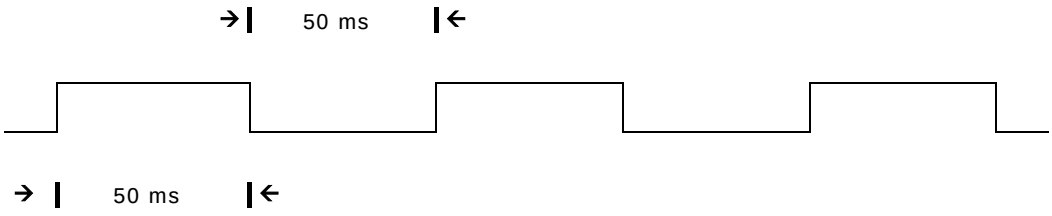
  On accepting the coin, the time signal is **automatically** given **all at once**, without varying the state of the pin until it is finished. The pin is configurable.

  Pin 6 works as inhibition in accepting the coin. The inhibition is configurable.

- **Work for a continued time with Service Request.**

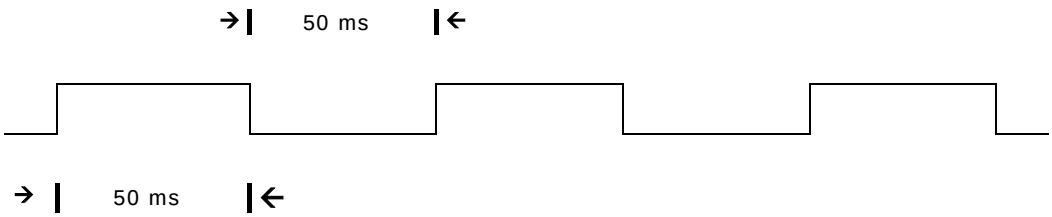
  On accepting the coin, the time signal is given all at once when the user requests it through pin 6. For this to happen it is necessary for pin 6 to change state, that is

form active (0 or 1, depending on the configuration) to inactive for a minimum of 50 milliseconds. It is necessary fir the pin to return to inactive state for a minimum of 50 milliseconds to be able to sell the following signal.



- **Work for Service Request.**

  Through pin 6 the time signals are requested **one** by **one**. For this to happen it is necessary for pin 6 to change state, that is form active (0 or 1, depending on the configuration) to inactive for a minimum of 50 milliseconds. It is necessary fir the pin to return to inactive state for a minimum of 50 milliseconds to be able to sell the following signal.



In the three working modes a **counter** signal is produced, which is variable and configurable, as much in the time ON as in the time OFF. It is used to count, usually in an electro-mechanical counter, the base coin that is introduced into the machine. For example, if the base coin is €1, when two 50-cent coins (1€) are introduced, a counter pulse is produced, or when five 20-cent coins (1€) are introduced, it also produces a counter pulse. The pulse on this line is configurable

In the three working modes a **credit available** signal is produced. It is usually used for a credit lamp to inform the user that there is a credit. The signal on this line is configurable.

In the three working modes a **warning** signal can be activated to advise of an imminent end to the service when a certain time is left, time also configurable. The signal on this line is configurable.

The **counter**, **credit available** and **warning** signals are all configurable: they may, or may not, be in the final configuration of the *validator*

1.4.3. A-standard *Validator* in Credit mode

The ***validator*** **working in Credits mode gives a credit signal when the price programmed is reached. This signal has a configurable length for "1" and "0". The pin is also configurable.**

These *validators* offer two working modes:

- **Working with continuous pulses.**
  It accepts the coin and **automatically**, gives the credit impulses consecutively until they are finished. The pulse on this is configurable.

Pin 6 works as inhibition in accepting the coin. The inhibition is configurable.

- **Working with Service Request.**
  Through pin 6, the pulses are requested **one** by **one**. For this to happen pin 6 must go from inactive to active for a minimum of 50 milliseconds. Then it must go back to inactive for a minimum of 50 milliseconds to be able to sell the following signal.

In both working modes, a **counter** pulse is produced, which is variable and configurable, as much in the time ON as in the time OFF. It is used to count, usually in an electro-mechanical counter, the base coin that is introduced into the machine. For example, if the base coin is €1, when two 50-cent coins (1€) are introduced, a counter pulse is produced, or when five 20-cent coins (1€) are introduced, it also produces a counter pulse. The pulse on this line is configurable.

In both working modes, a **credit available** signal is produced. It is usually used for a credit lamp to inform the user that there is a credit. The line for this signal is configurable.

The **counter** and **credit available** pulses are both configurable: they may, or may not, be in the final configuration of the *validator*

A **warning** pulse does not exist in either of the working modes

1.4.7. *Validator* programming method

The following lines indicate the possible working parameters of the *validator* that can be modified using a TL21, or similar, and the *validator* dipswitches.

1.4.7.1. Dipswitches

They have a dual use:

- Select the **working mode**.
- Programme determined **parameters.**

Position of the dipswitches for SELECTING THE WORKING MODE					
WORKING MODES	SW4	SW3	SW2	SW1	Validator A-standard
	0	0	0	0	Parallel
	0	0	1	1	Not used
	0	1	0	0	Not used
	0	0	0	1	Timer
	0	0	1	0	Credits

Position of the dipswitches to SELECT THE PARAMETER TO MODIFY				
PROGRAMMING PARAMETERS	SW3	SW2	SW1	Validator A-standard
	0	0	0	Price of service
	0	0	1	Coins to accept
	0	1	0	Time of the service
	x	x	x	Token 1 (Not available)
	1	0	0	Token 2
	1	0	1	Wide Tables
	1	1	0	Bonuses
	1	1	1	Not used

To programme the parameters with the *dipswitches,* follow these steps:

1. Set the dipswitches SW3, SW2 and SW1 to the configuration of the parameter to modify.
2. Set dipswitch SW4 to ON. The electro-magnet of the acceptance gate will give a "short click".
3. Follow the actions to programme the parameter (1.4.7.2)
4. Set dipswitch SW4 to OFF. If the programming has been done correctly, the acceptance gate will give a "long "click". If it has been done incorrectly, there will be no click and you should repeat the steps from the beginning.

1.4.7.2. Actions to carry out for correct programming

- **Service Price**: introduce the quantity of coins that are necessary to reach the price. The programmed price will be the sum of the value of coins introduced. If the validator rejects the coin, it will not be included in the programming.
- **Coins to accept**: the coins to be accepted are chosen from those programmed in the *validator*. The rest will be inhibited and not be accepted.

- **Service Time**: introduce the quantity of coins that are needed to reach the required time depending on the value, in time, of each coin. The value in time of each coin must be specified.

  Maximum value programmable 65,535 seconds.

  If the maximum value is exceeded while programming, this value will not be accepted and it will not be programmed.

  If a coin is rejected during programming, its value will not be considered.

- **Token 2**

  1. Set the dipswitches to programme token 2.
  2. Set dipswitch SW4 to ON. The electro-magnet will give a “short click”.
  3. Introduce at least 25 tokens of the model you wish to programme into the *validator.*
  4. Set dipswitch SW4 to OFF. The electro-magnet will give a “long click”.

  The value of the tokens is fixed (the value set in the factory when the validator was programmed) and can only be modified using the TL20 terminal, or similar.

- **Activate / Deactivate Wide Tables and Bonuses.**

  The process to **activate** wide Tables/Bonuses is the following:

  1. Set dipswitches SW3, SW2, SW1 to the correct positions.
  2. Set dipswitch SW4 to ON. The electro-magnet will give a “short click”.
  3. To activate Bonuses introduce a coin that should be accepted. If the *validator* rejects it, introduce another coin.
  4. Set SW4 to OFF. The electro-magnet will give a “long click”.

  The process to **deactivate** wide Tables/Bonuses is the following:

  1. Set dipswitches SW3, SW2, SW1 to the correct positions.
  2. Set dipswitch SW4 to ON. The electro-magnet will give a “short click”.
  3. Set SW4 to OFF. The electro-magnet will give a “long click”.

1.4.7.3. TL20 Programmer

The TL20 programmer, or similar, is connected to the *validator* with a 4-way connector located in the sensor *module*. The parameters can be modified and user configurations that suit the destination of the *validator* can be created with this programmer.

The TL20 programmer, or similar, can programme a unique configuration for each type of A *validator* (Standard or Totaliser); the parameters that are set with the dipswitches should be completed in each validator. The terminal can also read the configuration of one *validator*, save it and later programme it to other *validators*.

The parameters that can be modified for each type of *validator* with the TL20 programmer or similar are the following:

Validator A front plate-standard	
Common parameters to all modes	**Unique parameters**
Programming of the Classification	**Parallel mode**
Signal level of Inhibition / Service Request (pin 6)	Exit Assignation
Activate / Deactivate Wide Band	Exit signal level
	Length of exit pulse
	Timer Mode
	Active / Deactivate bonuses and their values with relation to price
	Working mode (continuous time/Service request)
	Value of the auto programmable tokens
	Time of service
	Timed exit pin
	Available credit pin
	Counter activated YES/NO
	Counter pin (default pin 8)
	Counter time ON
	Counter time OFF
	Warning pin
	Time of warning pulse
	Credit mode
	Active / Deactivate bonuses and their values with relation to price
	Working mode (continuous pulses/Service request)
	Value of the auto programmable tokens
	Credit pin
	Available credit pin
	Credit pulse time ON
	Credit pulse time OFF
	Counter active YES/NO
	Counter pin (default pin)
	Counter time ON
	Counter time OFF

2. WORKING CONDITIONS AND NORMS

Optimum results from using this equipment can be obtained by meeting the following requirements:

- Install the Coin validator with a maximum inclination of +/- 3ºon all axes.
- Temperatures:
  - ➘ Storage: from -25 to +70ºC.
  - ➘ Working: optimum 25ºC. The recommended margin is from +5 to +55ºC, accepting, at the extremes, a reduction in validation of 5%.
- Humidity: maximum 95% (relative humidity without condensation)
- Physical characteristics of the coins that are admissible:

	Minimum	Maximum
Diameter	16,25 mm	32,5 mm
Diameter	1,2 mm	3,3 mm

The typical admission rate of legal coins is 97% on the first try (coin without deformations and with standard electrical conductivity and standard magnetic permeability).

- Norms that are met:
  - ➘ EN50081-1. General emission norm.
    - EN50022: Radiated emission (measurement of the radiated perturbation field).
    - EN50022: Conductive emission (measurement of the conductive perturbations in power supply).
  - ➘ EN50082-1: General immunity norm.
    - IEC801-2: Electrostatic discharges (measurement of the immunity to electrostatic discharges).
    - IEC801-3: Radiation immunity (measurement of the immunity to electric fields).
    - IEC801-4: Transitory peaks and spikes (Measurement of the immunity of transitory peaks and spikes).
  - ➘ EN60335-1 (94-95). Electrical appliance safety norm
  - ➘ **CE**

3. CLEANING AND MAINTENANCE

The amount of dirt coins leave and the foreign objects and dirt that may obstruct its elements determine the maintenance the coin validator requires. Use the following guidelines for cleaning:

- Disconnect the power.
- Clean the dirty areas with paint brush or brush with fine vegetable fibres (never metal) impregnated with alcohol. Thoroughly clean the coin entry channel, metal ramp and the optic sensor windows.

WARNING:

Internal parts that are held with screws should never be dismantled. Their manipulation may result in alignment problems that provoke errors in measurement.

Never use products that contain benzene hydrocarbons. These products severely degenerate the plastic parts producing irreparable damage.

Never submerge the *Coin validator* in any liquid.

4. DIMENSIONS

The *validator* has the same general external dimensions as the “L”: 3.5 type *validator*. The brackets are removable and compatible with the competitor’s. The *validator* will fit in the same housing as the “L” *validator*, except for the differences in coin entry and exits and fixing points of the “A” *validator*.

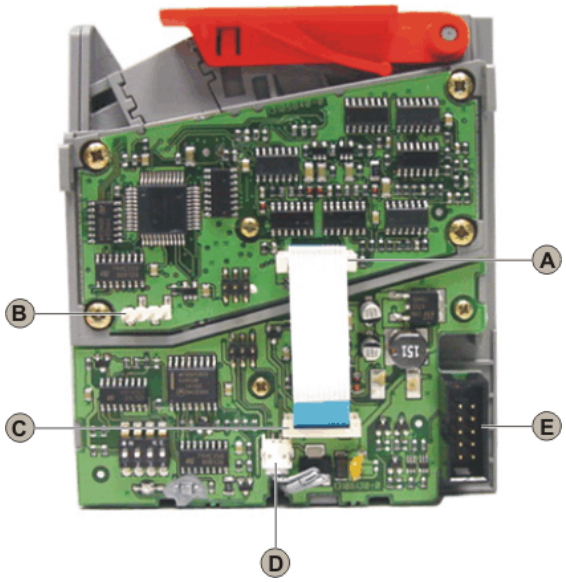
Dimensions (mm):

Height = 102

Width = 89

Depth = 48

5. PINOUT AND WIRING DIAGRAMS



The *validator* has three connectors called:

MOLEX 10-way general connector series 5320 reference 39-51-2100.

10-way connector. A-standard Validator		
Pins	Function	Type of connection
Pin 1	(*) + or Gnd	-
Pin 2	(*) + or Gnd	-
Pin 3	Output 5	Open collector
Pin 4	Output 6	Open collector
Pin 5	Output 7	Open collector
Pin 6	Inhibitions / Petition	TTL Input
Pin 7	Output 1	Open collector
Pin 8	Output 2	Open collector
Pin 9	Output 3	Open collector
Pin 10	Output 4	Open collector

(*) The polarity of the power (pin 1 and 2), is determined by the code of the validator, but it can be modified using shorts (resistors of 0Ω).

TECHNICAL NOTES OF INTEREST

TTL inputs:

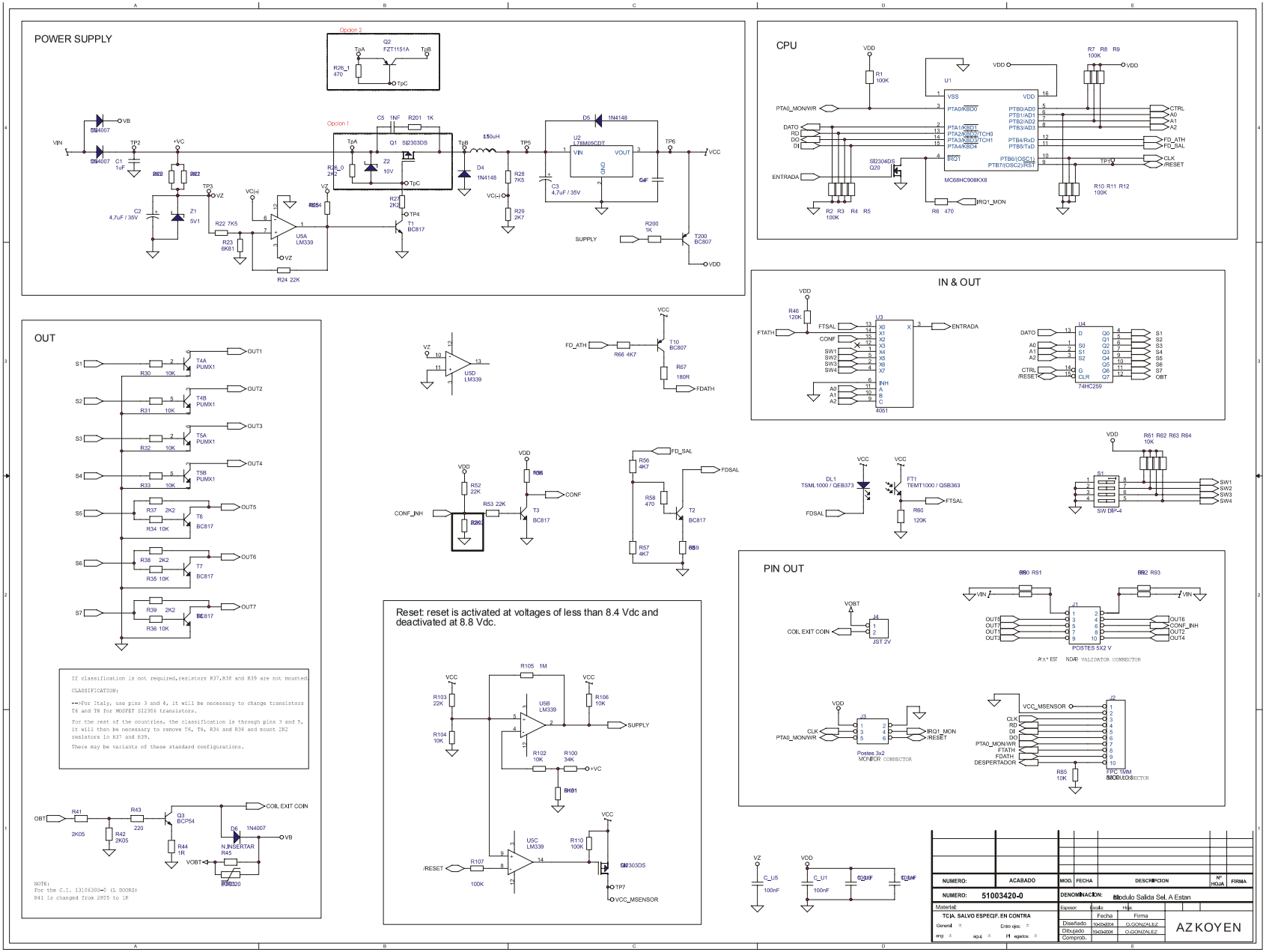
Logical level zero: 0 – 0.7 Vdc

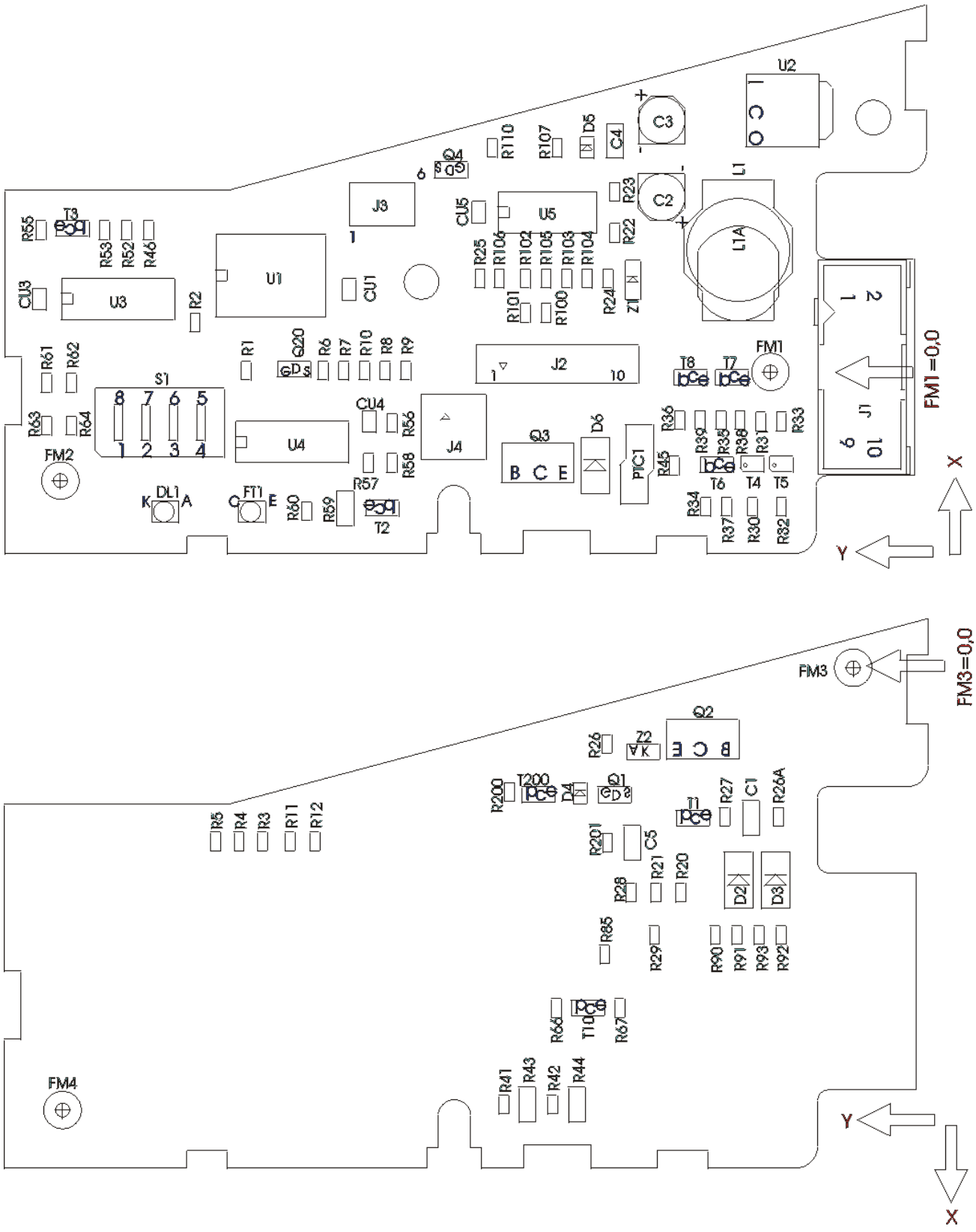
Logical level high: 5 Vdc

Input disconnected: It is configurable using hardware and each validator will have a determined value. The configuration consists of placing a pull-up or pull-down resistor on the corresponding input to “+” or “GND”.

The output module which incorporates the validator assembly should take into account the following things:

- It will not control a sorter
- It will control a sorter through an interface board
- It will control the solenoids directly from the output module


POWER SUPPLY
CPU
IN & OUT
OUT
PIN OUT
Reset: reset is activated at voltages of less than 8.4 Vdc and deactivated at 8.8 Vdc.
If classification is not required,resistors R37,R38 and R39 are not mounted
CLASSIFICATION:
--->For Italy, use pins 3 and 4, it will be necessary to change transistors T6 and T8 for MOSFET SI2306 transistors.
For the rest of the countries, the classification is through pins 3 and 5, it will then be necessary to remove T6, T8, R34 and R36 and mount 2K2 resistors in R37 and R39.
There may be variants of these standard configurations.
NOTE:
For the C.I. 13106300-0 (L DOORS)
R41 is changed from 2K05 to 1K
AZKOYEN


U2
C3
C4
D5
R110
R107
Q4
J3
CU5
U5
R23
C2
L1
L1A
R22
R25
R106
R102
R105
R103
R104
R101
R100
R24
Z1
R55
T3
R53
R52
R46
CU3
U3
R2
U1
CU1
R1
Q20
R6
R7
R10
R8
R9
J2
T8
T7
FM1
FM1=0,0
J1
R61
R62
S1
R63
R64
FM2
U4
CU4
R56
R58
J4
Q3
D6
R36
R39
R35
R38
R3
R33
PIC1
R45
T6
T4
T5
R34
R37
R30
R32
R57
T2
DL1
FT1
R60
R59
X
Y
FM3
FM3=0,0
Q2
R26
Z2
R200
T200
D4
Q1
T1
R27
C1
R26A
R201
C5
R5
R4
R3
R11
R12
R21
R20
D2
D3
R28
R85
R29
R90
R91
R93
R92
R66
T10
R67
FM4
R41
R43
R42
R44
Y
X

FM1=0,0
FM1
S1
8 7 6 5
1 2 3 4
U1
U2
U3
U4
U5
U6
J1
J2
J3
J4
C1
C2
C3
C4
C5
L1
L1A
FM2
FT1
DL1
PTC1
Q1
Q2
Q3
Q4
T1
T2
T3
T4
T5
T6
T7
T8
T10
Z1
Z2
D6
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
R31
R32
R33
R34
R35
R36
R37
R38
R39
R41
R42
R43
R44
R45
R46
R52
R53
R55
R56
R57
R58
R59
R60
R61
R62
R63
R64
R65
R66
R67
R100
R101
R102
R103
R104
R105
R106
R107
R110
R200
R201
R202
CU1
CU3
CU4
CU5
D2
D3
D4
D5
T200
R264
R90
R91
R93
R92
FM3=0,0
FM3
FM4
Y
X

BRAVILOR
BONAMAT