AZKOYEN
MEDIOS DE PAGO


# Modular AC DSP

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# 1 INTRODUCTION.

Coin validators are devices, installed inside the machines, with the task of identifying and validating coins introduced into the machine. They are used in various sectors such as slot machines, vending machines, gambling machines, cigarette vending machines and so on.

This manual contains technical information for the coin validators in the AC-DSP range that are part of the Modular DSP series. The points covered in this document are therefore valid for the following models of validators:

- AC6-D2S
- AC6-D4S
- A6-D2S **
- A6-D4S **

** Included within this range of **AC-DSP** validators are the previous range called **A-DSP**. Paragraph 1.2 explains this unification of models.

This manual will use general term AC-DSP, which shall refer to any of the aforementioned validators.

For full information on the operation of these validators, this manual must be complemented with the corresponding manual "Communication protocol" of the product available on the Azkoyen website: "http://sat.azkoyen.com".

## 1.1 CONCEPT OF MODULARITY.

The concept of modularity, a principle feature of the current range of Azkoyen validators, is characterized by a marked distinction between the part of the validator for reading the characteristics of the coin (SENSOR MODULE) and the part intended for communication with the machine (OUTPUT MODULE).

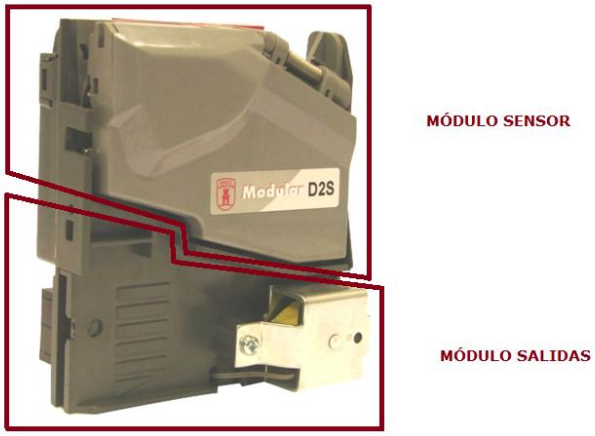



Figure 1. Modularity

Depending on the type of sensorization used (see paragraph 2.2) we have two versions of validators:

- **AC6-D2S**

  It is the standard validator used in most applications. It has 3 pairs of optical sensors, 1 acoustic sensor and 1 pair of inductive sensors.

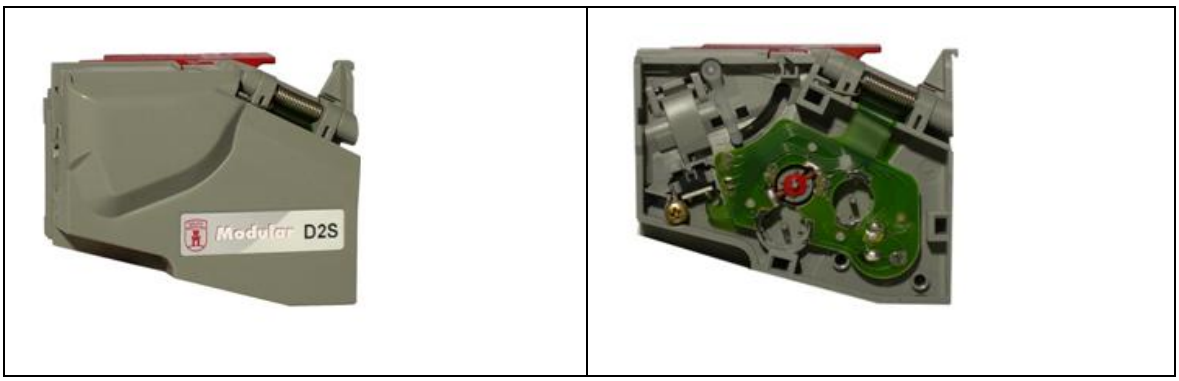


Figure 2Module D2S

- **AC6-D4S**

  It is the validator used in applications that, due to the metallic characteristics of the coins, require extra sensorization. It includes 3 pairs of optical sensors, 1 acoustic sensor and 2 pairs of inductive sensors.

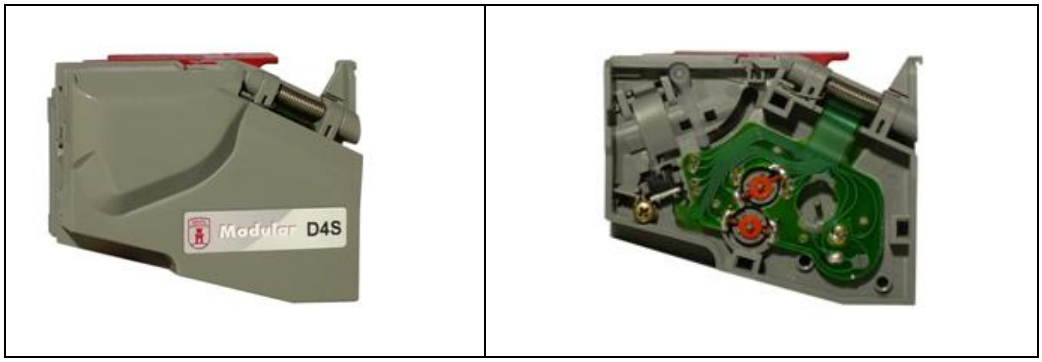



Figure 3. Module D4S

## 1.2 UNIFICATION OF THE MODELS "A-DSP" AND "AC-DSP".

As you can see in Figure 4, the difference between A and AC, validators range is simply to the position of the coin entry. In Model A the coins can only be introduced in the top, while in Model AC they can be introduced into the top and side.

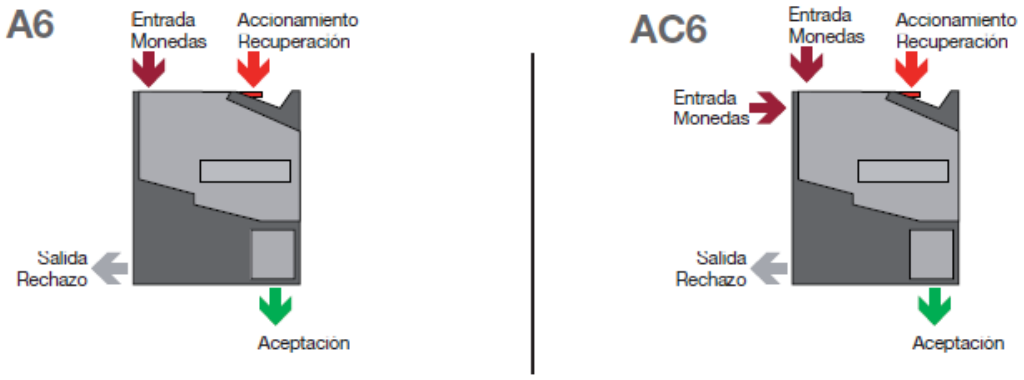



Figure 4. Unification A6 /AC6

Since the AC model encompasses model A and can be installed in all applications where A was previously installed, the unification of both models of validators has resulted, so the only available model at present is the model AC-DSP validator.

# 2 DESCRIPTION OF COMPONENTS

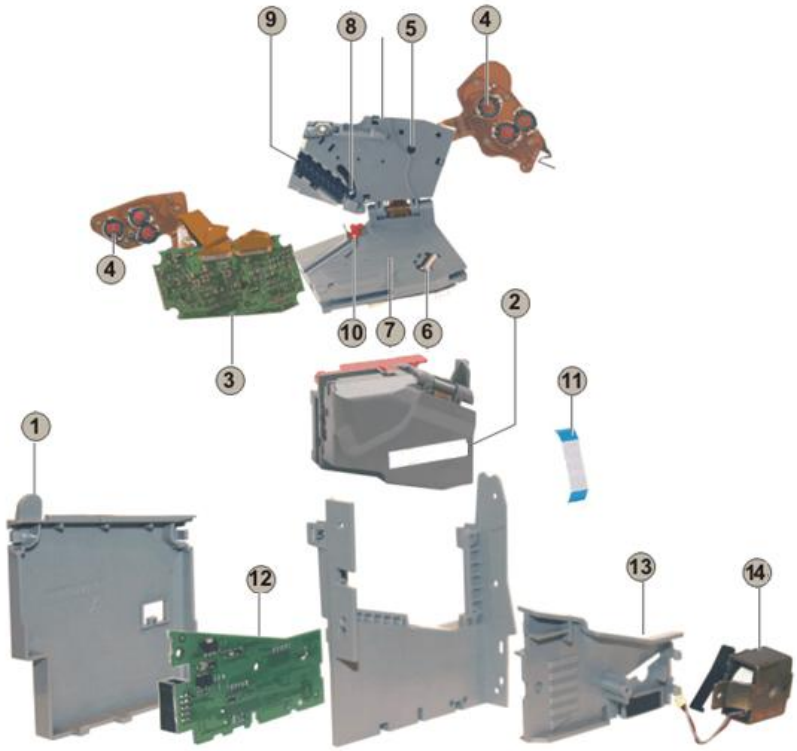



Figure 5. Components

## 2.1 COVER OF THE VALIDATOR (1).

It is designed to protect the various electronic components within the validator. It has information stickers with the characteristics of the validator associated with the corresponding references:

1- DESCRIPTION OF THE VALIDATOR
2- COUNTRY PROGRAMMING OF THE VALIDATOR
3- CODE OF THE VALIDATOR
4- COINS AND CODES PROGRAMMED IN THE VALIDATOR
5- POWER AND VOLTAGE.
6- PIN TO CONNECT THE POWER


Figure 6. Label

## 2.2 SENSOR MODULE (2).

This component has most of the measurement and control systems that the validator uses to determine whether the coin should be accepted or rejected and the value of the coin if it is accepted. It is a common element to all models of validators that have the same sensorization (option D2S or option D4S).


Figure 7. Sensor module

To remove it from the output module you need to remove the 2 screws in the holes that are indicated by arrows in the following image:

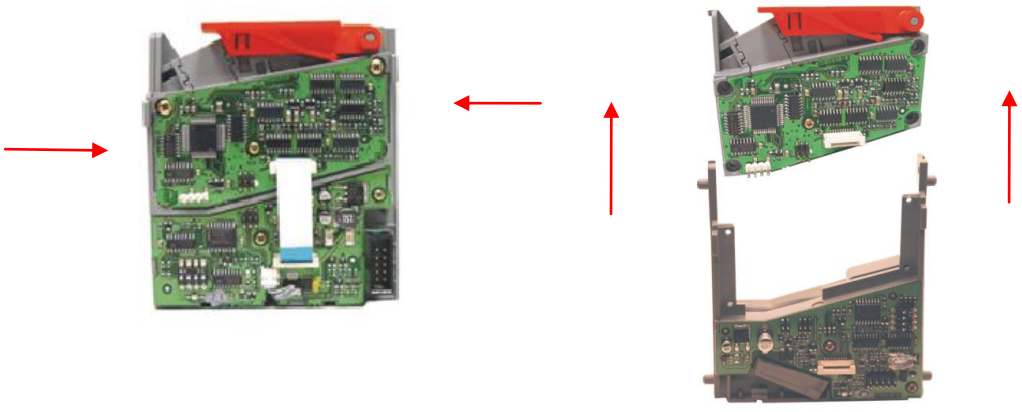
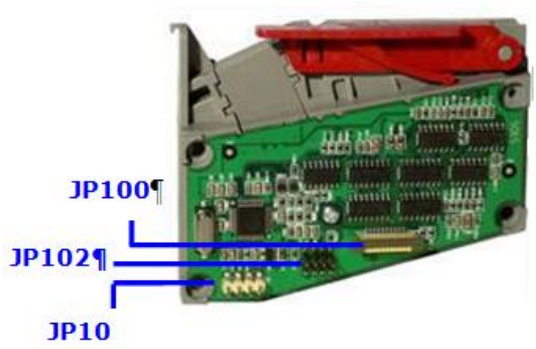


Figure 8. Removal of the sensor module

The main elements on the sensor module are:

### 2.2.1 Circuit board and connectors (3)



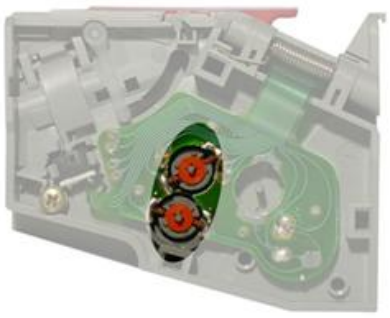

**JP100**: Bus for communicating with output module.

**JP101**: Serial port. For use in factory

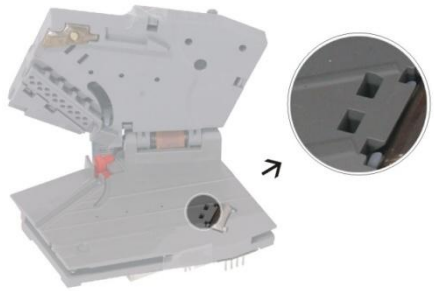
**JP102**: Programming connector. Available for connecting programming tools.

### 2.2.2 Inductive sensors (4).

The validator has, depending on model, between 2 and 4 inductive sensors to obtain coin parameters related to its alloy and thickness. The design enables the reading of coins manufactured with bimetallic and/or multilayer technologies.



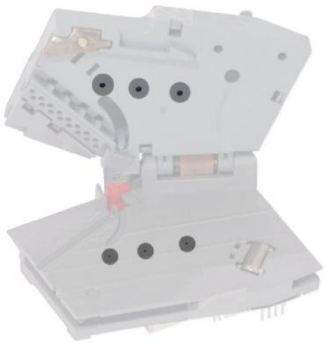
## 2.3 Acoustic sensor (5 and 6).



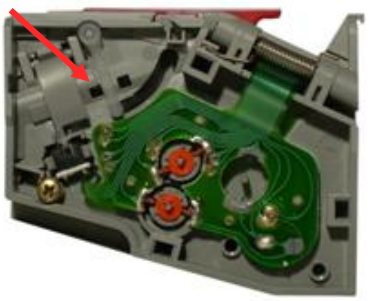
The acoustic sensor is located at the bottom of the entry module and this device captures the sound emitted by the coin when it passes against the metal cylinder on its way through the validator. The parameters collected by the sensor are very important in the process of acceptance or rejection of the coin.

### 2.2.4 Diameter sensor (7):

3 Pairs of infrared light sensors can be used to obtain parameters related to the diameter of the coin.



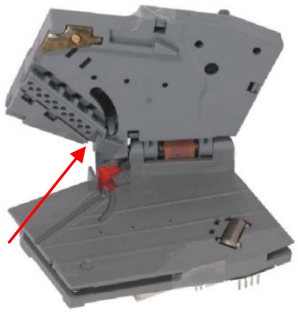
### 2.2.5 Rocker (8).



It stabilizes the speed of the coin to ensure a constant entry speed of the coin as is goes through the validator so that measurements taken from the coin are more precise.

### 2.2.6 String detector (9).

A "string detector" system is inside the sensor module, an electro-mechanical device that is intended to foil any attempt of fraud using the method of attaching a string to a coin. The operation relies on a barrier of infrared light that passes through the hole of the rocker. The infrared light beam is interrupted when the rocker is moved by the by the presence of the string. The validator understands this signal as an attempt of fraud and inhibits the coin.



### 2.2.7 Refund lever (10).

On pressing this lever, the validator door opens and thus eliminates possible coin jams produced within the validator.

## 2.3 COMMUNICATION BUS BETWEEN SENSOR AND OUTPUT MODULES (11).

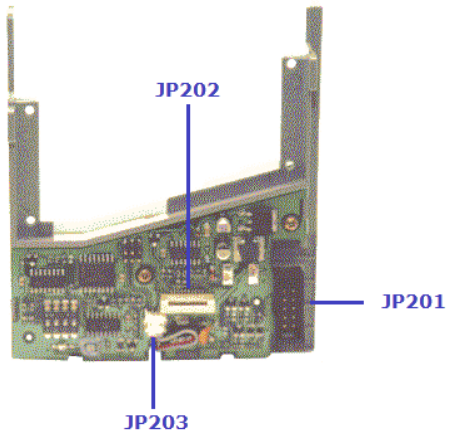
It provides communication between the output module and the sensor module. To disconnect it, remove it from the connector on the sensor module.

## 2.4 OUTPUT MODULE

It manages the communication between the validator and the machine on which it is installed. The circuit board has a "flash memory" which can be reprogrammed with the tools and procedures described in the Technical Manual of the "User Tool" (***HeUs***)

Its principle elements are:

### 2.4.1 Circuit board and connectors (12):




**JP201:** Connector 2 x 5 for communication with the machine.

**JP202:** Communication bus with the sensor module.

**JP203:** Acceptance gate connector.

### 2.4.2 Acceptance gate cover (13)

Its function is to adequately protect the whole of the acceptance gate. It is held on with "clips"

It has mechanical elements that prevent the coin from returning back up inside the validator (i.e. when pulled back up with a string).

### 2.4.3 Acceptance gate (14).

When the validator accepts a coin, this electromagnetic shutter is activated allowing the coin to go through the accepted coin channel.

The solenoid uses 12 Vdc.

# 3 TECHNICAL CHARACTERISTICS

## 3.1 Range of coins identified.

The physical dimensions of the coins supported by the validator are:

| | Minima | Maxim |
|---|---|---|
| Diameter | 16.25 mm | 32.5 mm |
| Thickness | 1.2 mm | 3.3 mm |

The data displayed in the table above are valid for circular coins. To confirm the proper functioning of this range of validators for other coins, please contact the factory.

## 3.2 Coin identification capacity.

The AC-DSP range of validators can support 32 different coin types.

**Two** of these 32 coins (tokens) can be programmed by the user in the field using the dipswitches of the product or using the Azkoyen user tools. For more information consult the "Parallel Protocol" manual of this product.

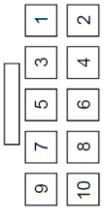
## 3.3 Power and current ranges.

| | VALUES |
|---|---|
| Power supply | From **12 V** to **24 V** (±10%) |
| Current during coin validation | **50 mA** |
| Current during coin acceptance | Average **50 mA**<br>(maximum of 400mA) |

## 3.4 Connections accessible to the user and pin out.


Figure 9. Connectors accessible to the user.

### 3.4.1 Connector J1 (10 pins) for communication with the machine.




It is the main connector for communication with the machine. The validator power supply is through pins 1 (GND) and 2 (Vdc) for this connector.

The use of each of the pins will vary depending on the operating mode selected in the validator, consult section 3 of the product manual "Protocols" for details.

However, in general, the following table shows the distribution of pins with regard to power, inputs and outputs:

| Connector J1 of the Output module | | |
|---|---|---|
| **Pins** | **Function** | **Notes** |
| Pin 1 | GND | |
| Pin 2 | 12-24 Vdc | Minimum: + 10 Vdc; Maximum: +27 Vdc |
| Pin 3 | Output | Open collector, transistor NPN. |
| Pin 4 | Output | Open collector, transistor NPN |
| Pin 5 | Output | Open collector, transistor NPN. |
| Pin 6 | Inhibition general | |

| | | |
|---|---|---|
| Pin 7 | Output | Open collector, transistor NPN |
| Pin 8 | Output | Open collector, transistor NPN |
| Pin 9 | Output | Open collector, transistor NPN |
| Pin 10 | Output | Open collector, transistor NPN |

Table. Connector J1 (2x5)

### 3.4.2 Connector J2 (4 pins) for communication with Azkoyen tools.

This 4-pin connector is used to connect the Azkoyen validator tools software (**HEUS**) and hardware interface (**TL20)**.

Section 7 of this manual contains details the procedure to follow for the connection of the validator tools.

The connector pinout is detailed in the following table


| Connector J2. AZKOYEN TOOLS | | |
|---|---|---|
| **Pins** | **Function** | **Notes** |
| Pin 1 | Rx | Reception of data |
| Pin 2 | GND | |
| Pin 3 | Tx | Transmission of data |
| Pin 4 | Vin | |

Table 1. Pinout of tool connector.

The 12/24 V power supply will not power the validator through this connector, it will always be necessary to maintain the validator powered through the J1 connector.

## 3.5 Configuration Switches.

The validator has 4 dipswitches used for selecting work mode for the programming of specific operating parameters as shown in the following table:

| Operation modes | Sw1 | Sw2 | Sw3 | Sw4 | Validator A Standard |
|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | Parallel |
| | 1 | 1 | 0 | 0 | Not used |
| | 0 | 0 | 1 | 0 | Not used |
| | 1 | 0 | 0 | 0 | Timer |
| | 0 | 1 | 0 | 0 | Credits |
| | x | x | x | x | Programming |

Table 2. Configuration dipswitches

### 3.6 Dimensions.

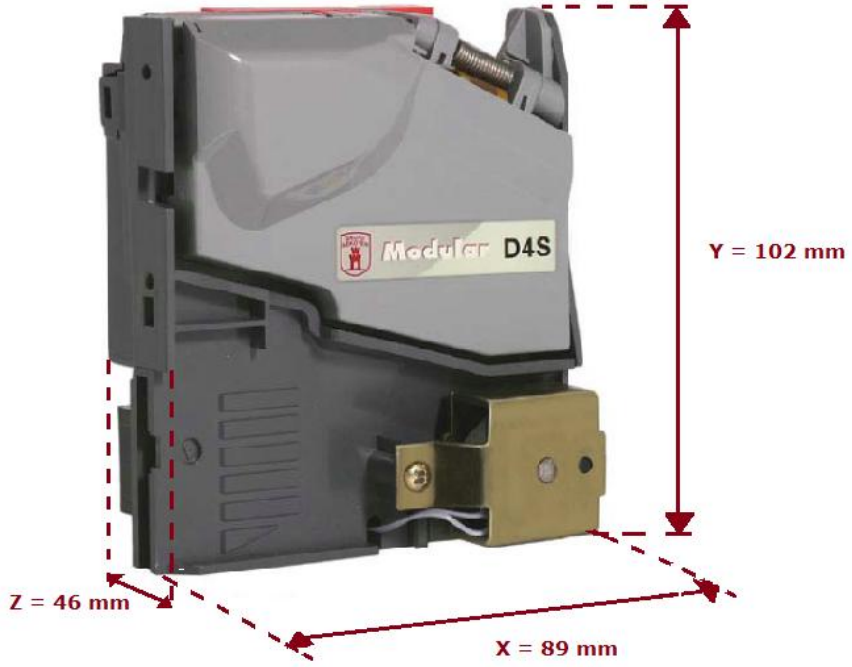



Figure 10. Dimensions

The validator weighs approximately 200 grams.

## 4 OPERATING CONDITIONS AND NORMS

The optimal operation of this equipment is achieved with the following requirements:

❒ Install the validator inside the machine with a maximum slope of any of its axis of **± 3º**.

- Temperatures:
  - Storage: from **-25 to +70ºC**.
  - Operation: from **+5 to +55ºC.**
- Humidity: **maximum 95%** (relative humidity without condensation)

Never connect or disconnect the validator with the machine switched on.

- Norms.
  - **EN50081-1**. Generic emission norm.
    - ✓ EN50022: radiated emission. Measurement of disturbances in field.
    - ✓ EN50022: conducted emission. Measurement of disturbances in power supply.
  - **EN50082-1**: Generic immunity norm.
    - ✓ IEC801-2: electrostatic discharges. Extent of the immunity to electrostatic discharges.
    - ✓ IEC801-3: radiated immunity. Extent of the immunity to electric fields.
    - ✓ IEC801-4: transient flashes / spikes. Extent of the immunity to transient flashes / spikes.
  - **EN60335-1** (94-95). Safety of appliances
  - **CE**

The manufacturer is not responsible of damage to the validators if the specifications above are not respected.

# 5 CLEANING AND MAINTENANCE

Maintenance on the Validator is determined by the quantity of dirt the coins leave and that obstruct its elements.

For cleaning, follow the following guidelines:

- Disconnect the power supply - connector J1-
- Clean soiled areas with a brush with vegetable fibres (never metallic) impregnated with alcohol. Clean with more detail:
  - ✓ Coin channel
  - ✓ Metal cylinder
  - ✓ The optic sensor holes and photocells on the string detector
  - ✓ The string detector system

**WARNING:**

Never use products containing benzenes. These compounds produce a rapid deterioration of the plastics causing irreparable damage.

The validator must never be immersed in liquid.

# 6 QUALITY PARAMETERS.

## 6.1 USEFUL LIFE.

The useful life of the validator is 1 million services.

## 6.2 MTBF. Mean time between failures.

Under normal operating conditions of work (excluding manipulation, fraudulent coins and working outside of the parameters referred to in section 4), AC-DSP validators have an MTBF value of 1.3 validators for every 100 units per year.

### 6.3 MCBF. Mean cycles between failures.

Under normal operating conditions of work (excluding manipulation, fraudulent coins and working outside of the parameters referred to in section 4), AC-DSP validators have an MCBF value of 840,000 coins.

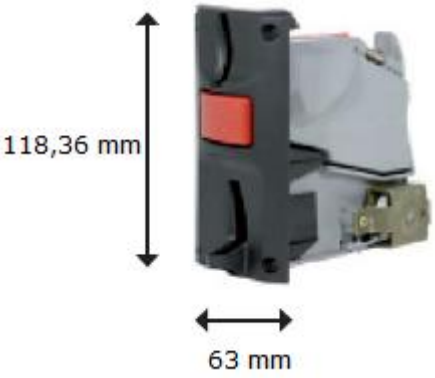
# 7 ACCESSORIES.

## 7.1 FRONT PLATES.

The AC-DSP validators can be coupled to two models of frontal plates to facilitate installation on machines

### 7.1.1 MINI FRONT PLATE

It is a small model which allows the side input and side output of rejected coins.




El code of this product is **41141791**

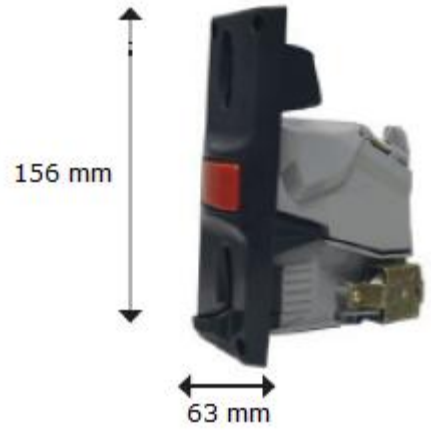
**The range of coins accepted when using the MINI are the following:

| | Minimum | Maximum |
|---|---|---|
| Diameter | 16.25 mm | 30.6 mm |
| Thickness | 1.2 mm | 3 mm |

Figure 11 MINI FRONT PLATE

### 7.1.2 MIDI FRONT PLATE

It is a model that allows the top input and side output of rejected coins.




The code of this product is **41141781**

Figure 12MIDI FRONT PLATE

# 8 AZKOYEN TOOLS.

## 8.1 HEUS.

The HEUS (user tool) software has two basic applications in the management of AC-DSP validators.

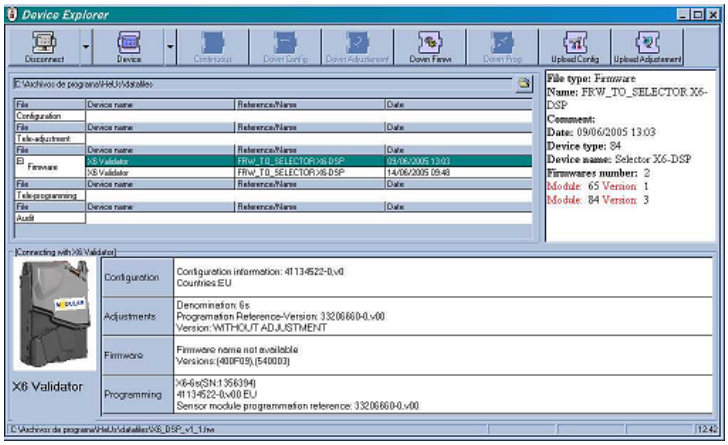



Figure 13. HeUs

- A tool for editing and modification of settings. It allows you to modify each one of the characteristic values in this range of validators detailed in paragraph 4.2.
- A tool for uploading files for configuration and programming. You can download files directly from your PC with the validator tool HEUS.

Communication between PC (HEUS) and the validator is done via cable right directly from the RS232 port of the PC to the 4-way connector J2 on the validator.

The 12/24 V power supply will not power the validator through this connector, it will always be necessary to maintain the validator powered through the J1 connector.

To know the details of the implementation and management of the HEUS, consult the specific manual available on the Azkoyen website http://sat.azkoyen.com.

## 8.2 TL20.

The TL20 is a hardware tool that is used to upload files for programming and configuration in AC-DSP validators.

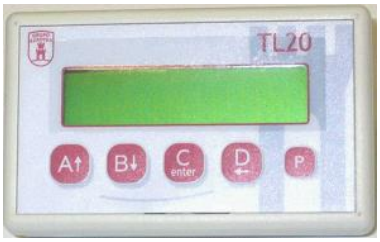



Figure 14. TL20

The TL20 programmer will connect to the validator on the 4-way connector on the validator module J2.

The 12/24 V power supply will not power the validator through this connector, it will always be necessary to maintain the validator powered through the J1 connector.

To know the details of the implementation and management of the TL20, consult the specific manual available on the Azkoyen website http://sat.azkoyen.com.

## 8.3 Simulation / Verification tool: IS21-A

The IS21-A interface allows us to verify the proper functioning of the validator as it simulates the behaviour of a machine.

There are numerous configuration switches as well as a Display to setup different working modes in the validator.

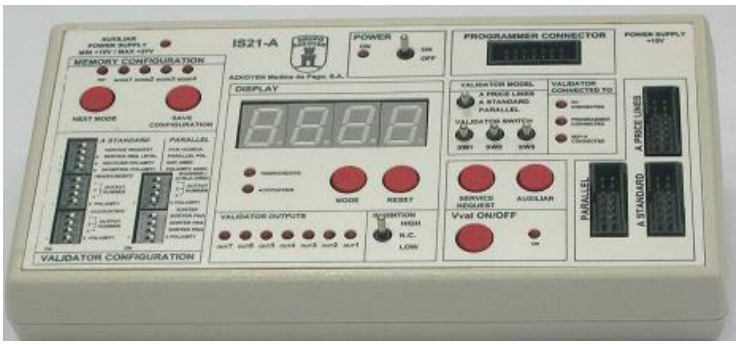



Figure 15. IS21-A

To know the details of the implementation and management of the IS21-A, consult the specific manual available on the Azkoyen website http://sat.azkoyen.com.