MICROHARD
VENDING PROJECTS

REFERENCE MANUAL FOR ELECTRONIC COIN ACCEPTOR EVOLUTION SERIES

CONTENTS

GENERAL INFORMATION

Coin acceptor evolution series is the result from years of research and investment.
The project started before the new EURO coin came into force and continued with several studies. In particular, research about the different alloys, i.e. metals used by the several European Mints that change the technical features of the money coined, has been made. Very useful were the mechanical improvements and the use of suitable materials that allowed us to bring to the market a cutting-edge product.
Our goal has been achieved: coin acceptor accept the majority of the coins in the current European market thus succeeding in discriminating definitely the fake. This is thanks to the many parameters that it can measure and to its cutting-edge electronics.

The electronic Evolution coin acceptor has been realised in several versions in order to be used in a plenty of sectors such as:

- Recreational
- AWP
- Automatic distribution
- Petrol station
- Parking system
- And much more besides

Technical basic features:

Acceptance	16 coins or different tokens
Acceptance maximum speed	3 coins per second
Power tension	+12 Vdc / + 24 Vdc
Output signal	NPN OPEN COLLECTOR (ULN2003A) output level “0” logic ≤ 1.0V
Programming	Self program and PC programmer
Total disabling	Input ENABLE (see connectors)
Coin partial disabling	Through button on the back of the coin acceptor

Basic functions are available through buttons while advanced functions need the portable programmer.

WARRANTY

Warranty is for 12 months. The registration number on the label will be the proof.

The products will not be guaranteed if the following occur:

- Product is not installed properly.
- The registration number on the label has been tampered.
- The product has not been used properly or carefully.
- The product has been damaged during its transportation.
- The product has been damaged through vandalic acts, natural disaster or fraudulent acts.
- The electrical equipment is inadeguate or anomalous.
- The instructions for its functioning have not been respected.
- Inverventions for presumed faults or convenient tests have been made.

Repair interventions are made, where all the material will arrive free of charge. The material sent for repair must be accompanied by a declaration on the fault found. The return of the material will take place carriage forward or carriage paid by bill debit.
Our service centre will be at Your disposal for any possible explanation about the repair made even when the warranty has expired.

COIN ACCEPTOR CONNECTION

Evolution model is equipped with two 10-output and 16-output standard connectors and one 4-output connectors for the programming or through serial/usb adaptator for the connection to a PC.

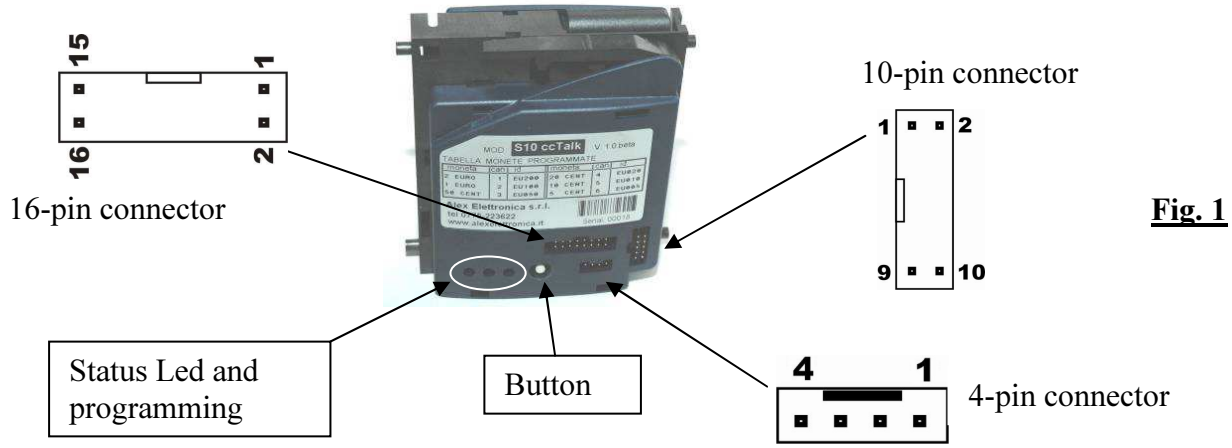


Fig. 1

10-pin connector

1	GND	6	ENABLE
2	+12V (max +26V)	7	OUT 1
3	OUT 5	8	OUT 2
4	OUT 6	9	OUT 3
5	NC	10	OUT 4

16-pin connector

1	DT7 - lcd module	9	OUT 4
2	DT6 - lcd module	10	OUT 5
3	DT5 - lcd module	11	OUT 6
4	DT4 - lcd module	12	OUT 2
5	RS - lcd module	13	OUT 1
6	ENABLE	14	EN – lcd module
7	OUT 3	15	OUT 5V lcd module
8	GND	16	+12V (max +28V)

4-pin connector

1	DATA (TTL)	3	NC
2	GND	4	+12V (max +28V)

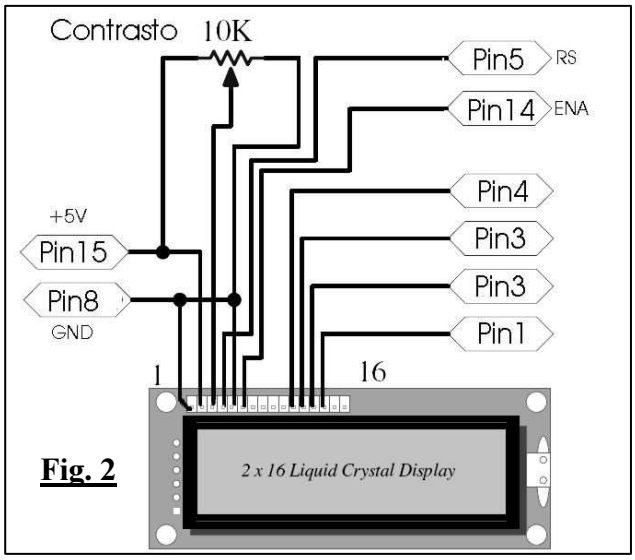


Fig. 2

Evolution model can directly manage a 2x16 LCD module
The module must be connetted to the **16-pin connector** as in fig. 2
The contrast trimmer must be added externally. The supply of the backlighting varies according to the model selected. It can be taken from +5v of pin 15 **as long as it does not absorb more than 100mA.**
It is used for timer and multiprice versions. By request it can carry out other functions that can be customized and that make use of the display

WARNING:

In the event of a inductive load it is necessary to protect the outputs externally with clamp diodes. (See Fig. 3)
Anyway the maximum load must not exceed 500mA per output

Do not connect >5.5 VOLT (TTL) tensions to every input

NB: IF THE INHIBITION PIN IS NOT USED
IT HAS TO BE BRIDGED TO GND.

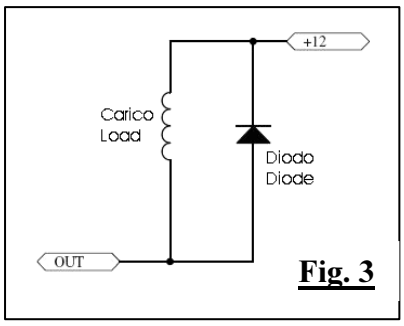
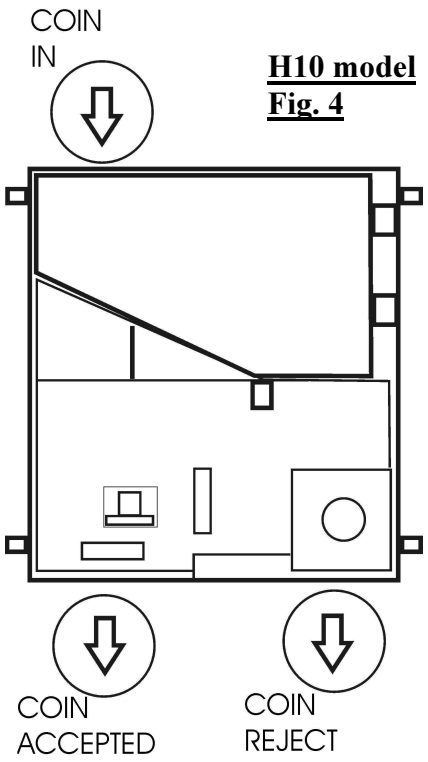
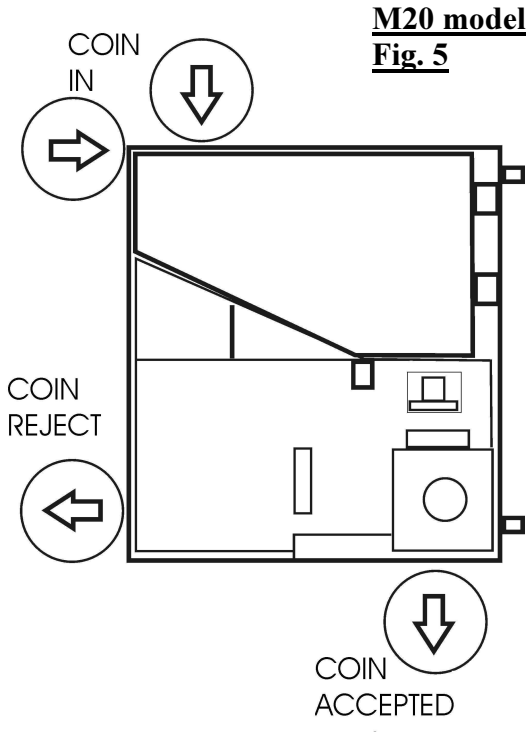


Fig. 3

COIN ACCEPTOR VERSIONS and LABELLING

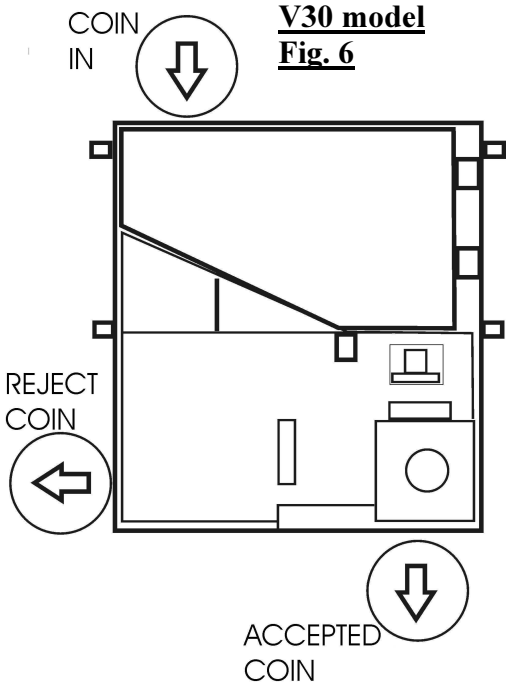


H10 model
Fig. 4



M20 model
Fig. 5

In fig. 4, 5, 6 the subdivision of the several models is displayed according to the coin course. Therefore, the three different typologies are subdivided into: H10, M20, V30 that show the different type of coupling/mechanics.
on "SW 3.1" are worth noting



V30 model
Fig. 6

PROGRAMMING SYSTEMS

There are two programming systems: self program and pc programmer.

AVAILABLE CONFIGURATIONS

Basic versions: H10, M20, V30

-Pulses mode with credit signal that can be taken from OUT 1, 2, 3, or 4
-Pulses speed adjustable from 100 to 600 mS
-Parallel mode: Credit signal output on OUT 1 to OUT 6
-Accumulation mode: possibility to deliver the pulses when a set price has been achieved.

Custom versions

It is possible to have custom versions by particular request on behalf of the customers. They will have the suffix Cn where n is a number that indicates the particular version.
The related manuals will be available for the ultimate customer only.

TECHNICAL FEATURES

GENERAL INFORMATION:

Voltage:	**min 10VDC -- max 28 VDC**
Absorption at 12V:	**30 mA (300 mA in acceptance)**
Assembly angle:	**+-10° in every direction**
Temperature:	**-5°C to 50°C**
Output maximum load:	**500mA**
Acceptance speed:	**3 coins per second**
Coin minimum diameter:	**16 mm**
Coin maximum diameter:	**32 mm (with the specific lever for large coins)**
Coin maximum thickness:	**3,2 mm**

SECURITY:

Active security:	**double pair of photocells that rule the coin reverse**
Passive security:	**Triple security: string cutter + antistring + lever to block the coin**

SENSORS:

Optical:	**5 pairs of optical sensors to measure diameter and thickness**
Analogue:	**a pair of inductive sensors**
Digital:	**hall-effect sensor for an absolute security against the fake**

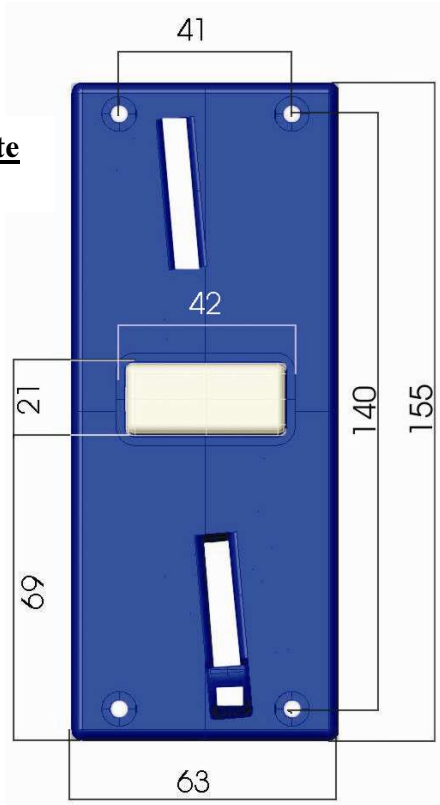
MATERIALS USED:

Main body:	**NORIL: high resistance to usury and high stability**
Coin course:	**The beating and the coin course in the sensor sections are made of stainless steel**
Springs:	**All springs are made of steel. Plastic springs are not used at all**

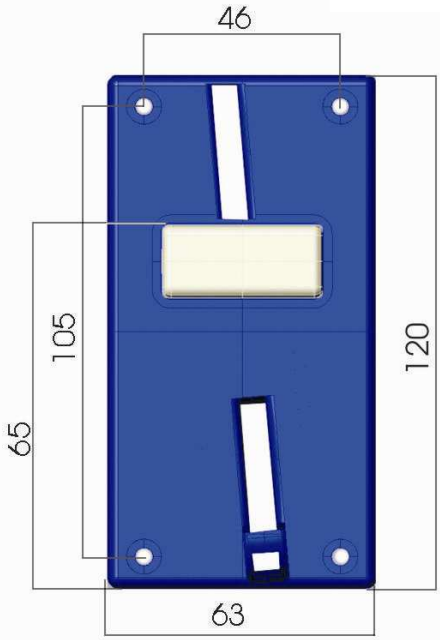
FRONT PLATE AND COIN ACCEPTOR DIMENSIONS

All measures are expressed in millimeters

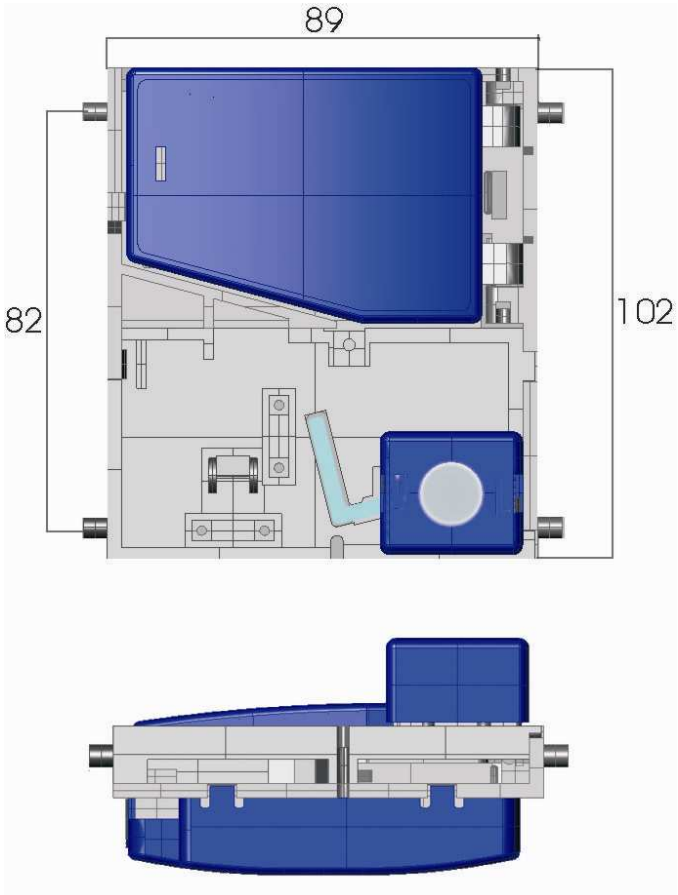
F15 front plate
Fig. 8



F12 front plate
Fig. 9



Coin acceptor sizes
Fig. 10



MAINTENANCE AND PROBLEM SOLVING

Cleaning:
Open the door (fig. 11-A) and use a damp cloth and one that does not shed hair to clean the part where the coin streams.
Make sure the three holes of the photocells are not blocked. In the event that they are blocked do not use metal parts to clean them. Rather, use a wooden toothpicks or compressed air.
To clean the security photocells (fig. 11-B or fig. 11-B* for Fxx versions) on the hole of the accepted coin output use compressed air.
Do not use solvents, oils or grease in any part of the coin acceptor.

Problem solving:
No coin is accepted:
- Make sure that no led is on (see list of error messages below)
- Make sure that thr inhibition input is connected to the right level (see page 4)

A coin is not accepted:
- Make sure that no led is on (see list of error messages below)
- Make sure that the coin is not inhibited: press the button twice and insert the coin, and if it is accepted the led switches on. If it is not accepted it means that that coin is not programmed so program it again.

A coin is accepted but it does not deliver credit:
- Make sure that once the coin is inserted no led will be on. If so, it is necessary to clean the security photocells below (fig. 11-B or fig. 11_B* for Fxx versions).
- Make sure that the acceptance coil is stimulated (fig. 11-d) and that the course where the lever diverts the coin is not dirty (fig. 11-C). Liquids like coffee or drinks containing sugar can often dirty this part.

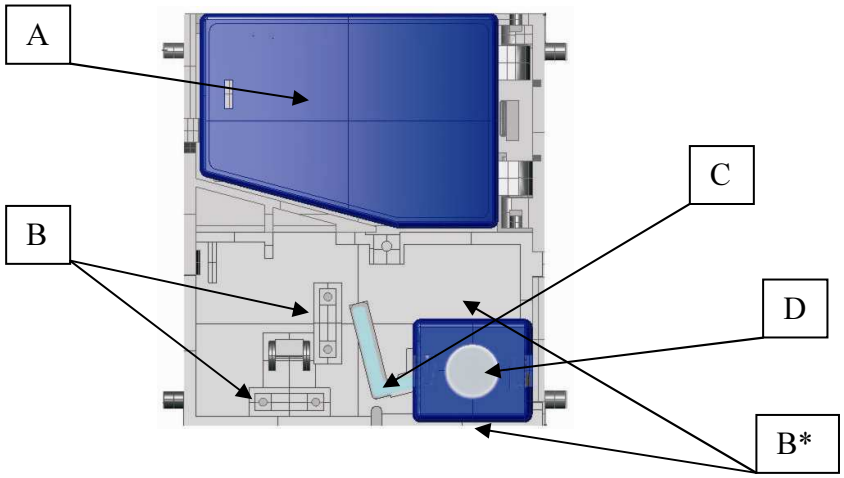
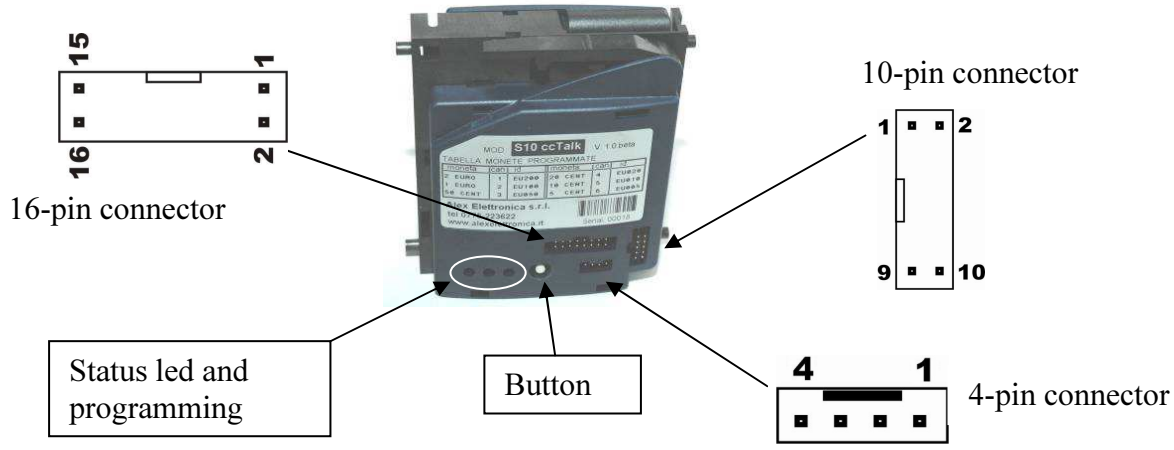


Fig. 11

List of error messages displayed on the led:
When it is on the led flash once and then they stay off. If a sensor is faulty 1 or more led indicators stay on. By cleaning all the photocells the problem should disappear. If otherwise it does not disappear it is necessary to send the coin acceptor back to the service centre.

SELF-PROGRAM MANUAL FOR H10, M20, V30 VERSIONS



10-pin connector

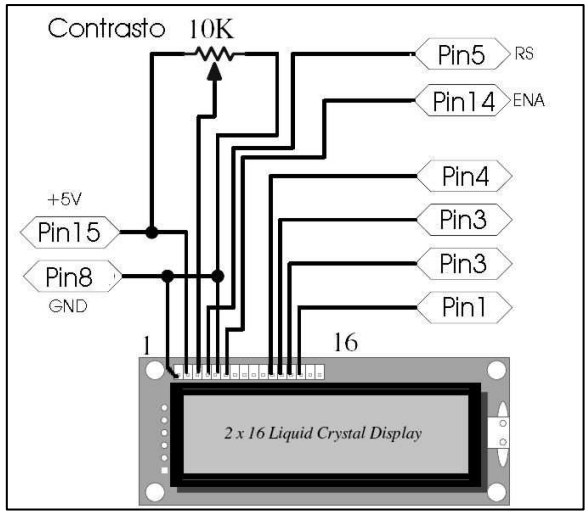
1	GND	6	ENABLE
2	+12V (max +26V)	7	OUT 1
3	OUT 5	8	OUT 2
4	OUT 6	9	OUT 3
5	NC	10	OUT 4

16-pin connector

1	DT7 - lcd module	9	OUT 4
2	DT6 - lcd module	10	OUT 5
3	DT5 - lcd module	11	OUT 6
4	DT4 - lcd module	12	OUT 2
5	RS - lcd module	13	OUT 1
6	ENABLE	14	EN – lcd module
7	OUT 3	15	OUT 5V lcd module
8	GND	16	+12V (max +28V)

4-pin connector

1	DATA (TTL)	3	NC
2	GND	4	+12V (max +28V)



READ THE INSTRUCTIONS FIRST BEFORE TOUCHING THE BUTTON IMPROPERLY

Memory reset.

Push and keep the button pushed and then supply the coin acceptor keeping the button pushed, the 3 led indicators will light up back to back and when releasing the button before all the led indicators are on, then the reset is cancelled. The reel will hit three times in order to confirm that the reset has been successful.

After memory reset is restored the factory setup.

Error messages on the led:

When on, the led flash once and then they stay off. If a sensor is faulty 1 or more led indicators stay on.

Voltage:	**9-25 VDC**	**Acceptance speed:**	**3 coins per second**
Absorption at 12V:	**30 mA (300 mA in acceptance)**	**Coin minimum diameter:**	**16 mm**
Assembly angle:	**+-10° in every direction**	**Coin maximum diameter:**	**32 mm**
Temperature:	**-5°C to 50°C**	**Coin maximum thickness:**	**3.2 mm**
Output maximum load:	**500mA**		

TO EXIT FROM THE PROGRAMMING PROCESS, IF IN DOUBT, DO NOT TOUCH THE BUTTON FOR AT LEAST 2 SECONDS AND THEN UNPLUG THE SUPPLY

To get to the programming process push the button for at least half second. The first led lights up to indicate the function 1. Seven functions are available as follows:

1 Disabling a coin - push the button once: the led 1 lights up

Insert as long as the coin that needs to be disabled is accepted
NB: if the coin is not accepted then it means that it is not programmed

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2 Enabling a coin - push the button twice: the led 2 lights up

Insert as long as the coin that needs to be enabled is accepted
NB: if the coin is not accepted then it means that it is not programmed

---

3 Programming a coin: push the button three times: the led 1and 2 light up

Insert 10 coins, when the tenth coin is inserted the reel will hit twice and it will be automatically stored in the first channel available
REMEMBER: if a coin already in store is programmed more than once the reel will eventually hit four times. The data of that coin will be overwritten to the old ones and then all new channels will be available again. Once the programming process is complete the value will be the previous one and it will not be set up. The same applies if the coin was inside but disabled. It will only be recollected and enabled again.
But if the coin was never programmed, then the value of the coin must be set up now. To do so, push the button as many times as the number of pulses you wish to assign (if the parallel mode has been set up, then the exit 1to 6 must be set up).
At first the led 1 is on to indicate 1 pulse, and every time you push the button the led indicators change their status.
Once the number of pulses you wish has been set up, insert any coin to exit and save (the reel will hit twice)

---

4 Changing the value of a coin - push the button four times: the led 3 lights up

Insert as long as the coin whose value must be changed is accepted
To do so, push the button as many times as the number of pulses you wish to assign (if the parallel mode has been set up, then the exit 1to 6 must be set up).
At first the led 1 is on to indicate 1 pulse, and every time you push the button the led indicators change their status.
Once the number of pulses you wish has been set up, insert any coin to exit and save (the reel will hit twice)

---

5 Changing modes of working - push the button five times: the led 1 and 3 light up

Insert any coin
Push the button now as long as the led indicate the mode you wish according to the following table:

MODE=1 PULSES (without accumulation)	MODE=2 PARALLEL	MODE=3 PULSES ACCUMULATION=2	MODE=4 PULSES ACCUMULATION=5
MODE=5 PULSES ACCUMULATION=10	MODE=6 PULSES ACCUMULATION=20	MODE=7 PULSES ACCUMULATION CAN BE ADJUSTED 1 TO 20	

Once the mode wanted has been set up, insert any coin to exit and save (the reel will hit twice)

For MODE7 only: once the mode has been set up by passing the coin then the value of the ACCUMULATION must be set up. Push the button now as many times as the value you wish to assign, and every time you push the led change their status and the value increases by 1 (UP TO A MAXIMUM OF 20).
Once the value you wish has been set up, insert any coin to exit and save (the reel will hit twice)

MEANING OF THE ACCUMULATION: all the pulses are divided according to the value of the ACCUMULATION. If for example it has been programmed to 5, inserting a coin/token which is worth 1 pulse, you will get the credit after inserting 5 such coins. You will get the signal of the credit also by inserting 2 coins which are worth 2 pulses and 1 coin which is worth 1 pulse. Indeed the pulses are added up and the credit is given when the "ACCUMULATION" value is reached.
Now if you insert 3 coins which are worth 2 pulses, the first signal of the credit will be given when the third coin has been inserted, so to regain the remaining credit you must insert more coins which are worth 4 pulses: e.g. 1 coin which is worth 2 pulses and 2 coins which are worth 1 pulse. The remaining credit will be stored until the machine is shutdown.

---

6 Changing the pulses speed - push the button six times: the led 2 and 3 light up

Insert any coin
Push the button now as long as the led indicate the speed you wish according to the following table:

100 mS ON 100 mS OFF	300 mS ON 300 mS OFF	600 mS ON 600 mS OFF	

Once the value you wish has been set up, insert any coin to exit and save (the reel will hit twice)

---

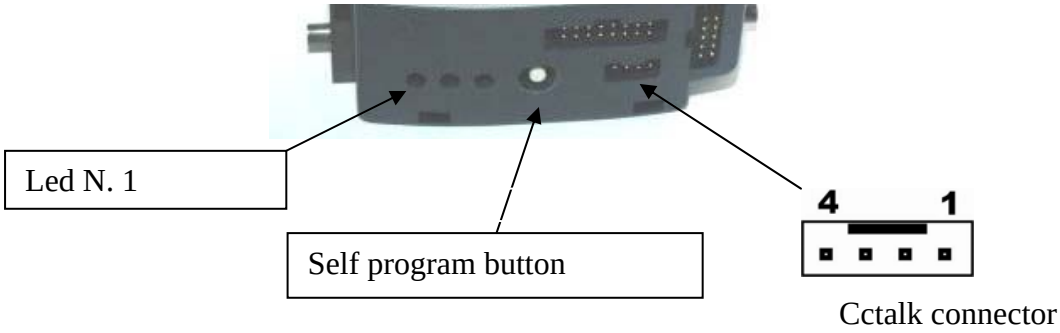
7 Changing the credit output pin - push the button seven times: all led indicators light up

Insert any coin
Push the button now as long as the led indicate the output you wish

OUT1 (pin 7)	OUT2 (pin 8)	OUT3 (pin 9)	OUT4 (pin 10)

Once the value you wish has been set up, insert any coin to exit and save (the reel will hit twice)

Cctalk coin-changer with self program function:



Pic. 1

CONNECTOR 10 ways

1	GND	6	IN (NU)
2	+12V (max +26V)	7	OUT 1 separator
3	OUT 5 separator	8	OUT 2 separator
4	OUT 6 separator	9	OUT 3 separator
5	OUT (NU)	10	OUT 4 separator

CONNECTOR 16 ways

1	NC	9	OUT 4 separator
2	NC	10	OUT 5 separator
3	NC	11	OUT 6 separator
4	NC	12	OUT 2 separator
5	NU	13	OUT 1 separator
6	NU	14	NU
7	OUT 3 separator	15	NC
8	GND	16	+12V (max +26V)

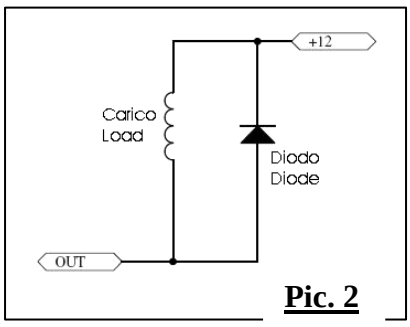
CONNECTOR 4 ways

1	DATA (TTL)	3	NC
2	GND	4	+12V (max +26V)

WARNING:

In case of inductive load the outputs must be externally protected through camp's diodes. (Pic. 2)
In any case the maximum load can't exceed 500mA for each output.

To any input do not connect voltage >5.5 VOLT (TTL)



Pic. 2

DO NOT TOUCH INOPPORTUNELY THE BUTTON BEFORE READING THE INSTRUCTIONS

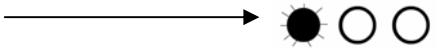
Reset coin-changer:

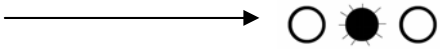
While the coin-changer is off push and keep pushed the button, energize the coin-changer keeping the button pushed, the 3 leds will turn on in sequence and if the button is released before all the leds turn on the reset is annulled. The confirmation that the reset successfully happened is that the coil will give 3 bangs. After the reset, all the programmed settings and coins will be back to manufacturing setup. So the coins programmed by the user will be delete but the coins programmed in factory will result still be present.

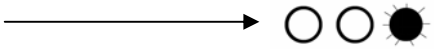
Coins Set-up

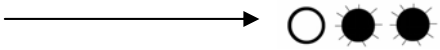
<u>It is recommended the use of several different coins for the set-up (so do not use one single coin again and again).</u>

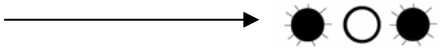
In case nothing has to be programmed, once the button is pushed, push it again and again till the leds turn off (the coil will give 2 bangs)

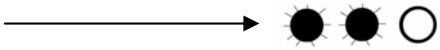
1 Set up coin 2 €
push the button 2 times so that the led 1 turns on 
Insert 8 coins till the coil gives 2 bangs and the leds turn off.
PN: in case very different coins get insert (different diameter or very different alloy) it appears an error signal that is 5 coil's bangs and all 8 coins have to be insert again from the start trying to eliminate the different one.
The coin will be programmed on channel 9.

2 Set up coin 1€
push the button 3 times so that the led 2 turns on 
Insert 8 coins till the coil gives 2 bangs and the leds turn off.
PN: in case very different coins get insert (different diameter or very different alloy) it appears an error signal that is 5 coil's bangs and all 8 coins have to be insert again from the start trying to eliminate the different one.
The coin will be programmed on channel 10.

3 Set up coin 50cent
push the button 4 times so that the led 3 turns on 
Insert 8 coins till the coil gives 2 bangs and the leds turn off.
PN: in case very different coins get insert (different diameter or very different alloy) it appears an error signal that is 5 coil's bangs and all 8 coins have to be insert again from the start trying to eliminate the different one.
The coin will be programmed on channel 11.

4 Set up coin 20cent
push the button 5 times so that the led 1 turns off 
Insert 8 coins till the coil gives 2 bangs and the leds turn off.
PN: in case very different coins get insert (different diameter or very different alloy) it appears an error signal that is 5 coil's bangs and all 8 coins have to be insert again from the start trying to eliminate the different one.
The coin will be programmed on channel 12.

5 Set up coin 10cent
push the button 6 times so that the led 2 turns off 
Insert 8 coins till the coil gives 2 bangs and the leds turn off.
PN: in case very different coins get insert (different diameter or very different alloy) it appears an error signal that is 5 coil's bangs and all 8 coins have to be insert again from the start trying to eliminate the different one.
The coin will be programmed on channel 13.

6 Regular set up coin 5cent
push the button 7 times so that the led 3 turns off 
Insert 8 coins till the coil gives 2 bangs and the leds turn off.
PN: in case very different coins get insert (different diameter or very different alloy) it appears an error signal that is 5 coil's bangs and all 8 coins have to be insert again from the start trying to eliminate the different one.
The coin will be programmed on channel 14.

Programming's system
Cctalk coin-changers use the same programming's system for PC "Programmer V10.x" used for not-cctalk coin-changers.

Default programmed coins

TABLE 1: how coins get programmed and codes (see command 184 for codes)
Channel 1 = 2 € (code="EU200A")
Channel 2 = 1 € (code="EU100A")
Channel 3 = .50 € (code="EU050A")
Channel 4 = .20 € (code="EU020A")
Channel 5 = .10 € (code="EU010A")
Channel 6 = .05 € (code="EU005A")

Credit buffer format

Byte1 = event counter	It increases in value 1 each new byte 2-11 update (when it gets to 255 it starts again from 1)
Byte2 = Result 1A Byte3= Result 1B	Result 1A=credit=N. channel Result 1B=sorter in which the coin got insert
Byte4 = Result 2A Byte5= Result 2B	Result 2A=credit=N. channel Result 2B=sorter in which the coin got insert
Byte6 = Result 3A Byte7= Result 3B	Result 3A=credit=N. channel Result 3B=sorter in which the coin got insert
Byte8 = Result 4A Byte9= Result 4B	Result 4A=credit=N. channel Result 4B=sorter in which the coin got insert
Byte10 = Result 5A Byte11= Result 5B	Result 5A=credit=N. channel Result 5B=sorter in which the coin got insert

Other technical features:

1- The default's address (editable through bus) counts 2. It is saved in EEprom so **if changed it lasts after turning off**.
2- The sorter's value of each channel is saved in in EEprom so **if changed it lasts after turning off.**
3- The inhibition's bits of coins are saved in RAM (volatile memory)
4- The inhibit master is in RAM and at the moment of turning on it is always =1 (enabled coin-changer) and make it compatible with coin-changers that don't use this command..
5- The Reject couner counters, Fraud counter and the 3 state's variables (see commands 2 and 3) are in ram e and get reset at each turning on.
6- The command 236 (read opto states) returns to 0 if all the photocells are free, it goes to 1 if one or more of them get occluded.

Inhibit Mask. (ref.commands 230, 231)
Each bit if =0 inhibits the coin of the correspondent channel. If =1 it enables it.
Bit 0 of M1 inhibits/activates coin from 2 € (0=inhibit 1=activate)
Bit 1 of M1 inhibits/activates coin from 1 € (0=inhibit 1=activate)
……
Bit 5 of M1 inhibits/activates coin from 5 cent (0=inhibit 1=activate)
Other bit of M1 and M2 influence possible programmed by user coins/tokens.
At the moment of turning on, every channel of the coin-changer are disabled (M1 and M2 =0)

Polling's interval. If the coin-changer does not receive commands (credit reading) or 231 (modify inhibition mask) for 500 mS it self-inhibits and refuse the coin.

List enforced commands

	Command description:	Destination	N. byte	Source	Header	byte value	Destination	N. byte	Source	Header	byte value
1	simple poll	x	0	1	254		1	0	x	0	
2	address poll	x	0	1	253		x				
3	address clash	x	0	1	252		x				
4	address change	x	1	1	251	[new address]	1	0	x	0	
5	address random	x	0	1	250		1	0	x	0	
6	request polling priority	x	0	1	249		1	2	x	0	50,2
7	request status	x	0	1	248		1	1	x	0	1 byte
8	request man. ID	x	0	1	246		1	3	x	0	MicroHard.Srl.
9	request equipement category ID	x	0	1	245		1	13	x	0	Coin Acceptor
10	request product code	x	0	1	244		1	8	x	0	H10
11	request database version	x	0	1	243		1	1	x	0	0
12	request serial number	x	0	1	242		1	3	x	0	lsb,…,msb
13	request software revision	x	0	1	241		1	10	x	0	5.2/2.5
14	Test solenoid	x	0	1	240		1	0	x	0	
15	read opto states	x	0	1	236		1	1	x	0	1 byte
16	perform self test	x	0	1	232		1	1	x	0	1 byte
17	modify inhibit	x	2	1	231	[m1][m2]	1	0	x	0	
18	request inh. Status	x	0	1	230		1	2	x	0	[m1][m2]
19	read buffered data	x	0	1	229		1	11	x	0	lsb,…,msb
20	modify master inhibit status	x	1	1	228	[m1]	1	0	x	0	
21	request master inhibit status	x	0	1	227		1	1	x	0	1 byte
22	modify sorter path	x	2	1	210	[canale],[sorter]	1	0	x	0	
23	request sorter path	x	1	1	209	[canale]	1	1	x	0	1 byte
24	calculate rom checksum	x	0	1	197		1	4	x	0	lsb,…,msb
25	request creation date	x	0	1	196		1	2	x	0	lsb,msb
26	request last modification date	x	0	1	195		1	2	x	0	lsb,msb
27	request reject counter	x	0	1	194		1	3	x	0	lsb,…,msb
28	request fraud counter	x	0	1	193		1	3	x	0	lsb,…,msb
29	request build code	x	0	1	192		1	8	x	0	H10
30	request coin ID	x	1	1	184	[canale]	1	6	x	0	lsb,…,msb
31	request base year	x	0	1	170		1	4	x	0	2000
32	Request address mode	x	0	1	169		1	1	x	0	132
33	request comm revision	x	0	1	4		1	3	x	0	1,4,2
34	clear comms status variable	x	0	1	3		1	0	x	0	
35	request comms status variable	x	0	1	2		1	3	x	0	a,b,c
36	Reset	x	0	1	1		1	0	x	0	