Shanghai Wafer Microelectronics Co., Ltd.

23E,Liang Feng Building,NO.8,DongFang Road,Shanghai,China Tel.: (0086) 21 6845-8945 Fax: (0086)21 5045-4820

MDB Coin Changer and MDB Bill Acceptor to RS232 Interface

Model: MDB-RS232 (New Version box type V3)

SPECIFICATIONS

Communication format:

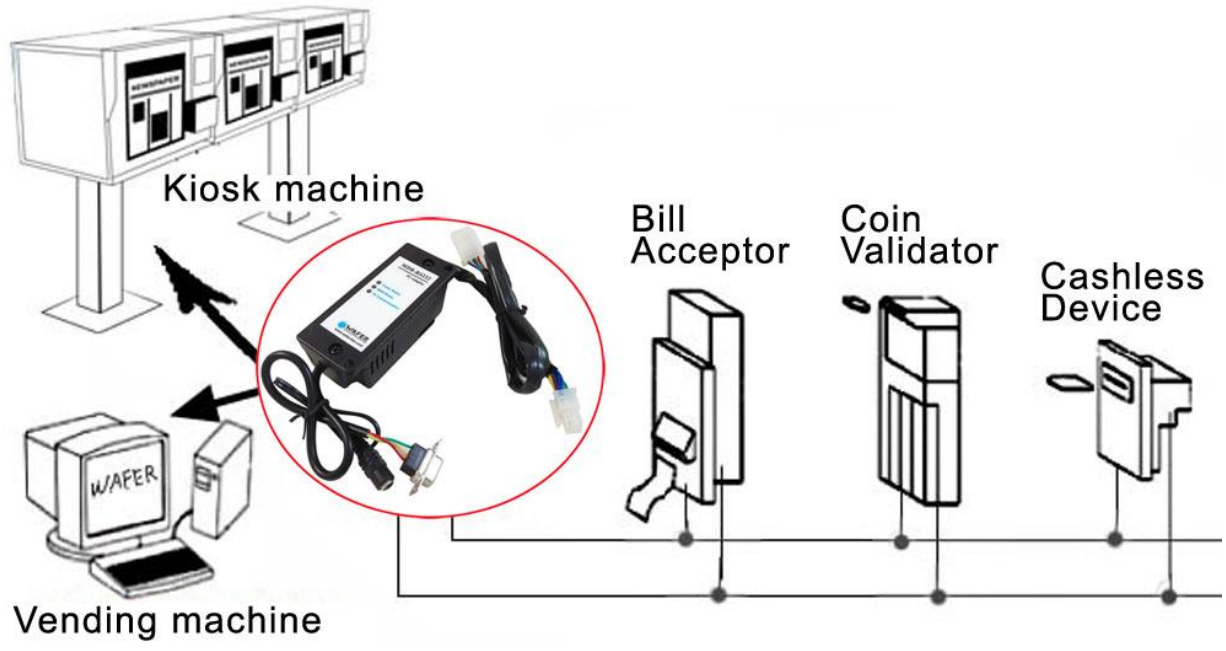
Baud rate:	9600	Start bit:	1
Data bits:	8	Parity:	NO
Stop bit:	1		
PC data Send:	Hex		
PC data Receive:	ASCII		

Hardware Specification.

Power	Min 20 VDC (Normal working voltage 24...30 AC or DC)
	Consumes an idle current < 0.05A (No MDB payment device connected)
Cable	MDB connector, Standard RS232 serial cable and DC2.1 Power connector
Dimensions	approx. 100 x 42 mm (Not include the cables)
Weight	approx. 100 g

Install the MDB-RS232

(VMC can be Computer(PC) or PLC or Android main board)

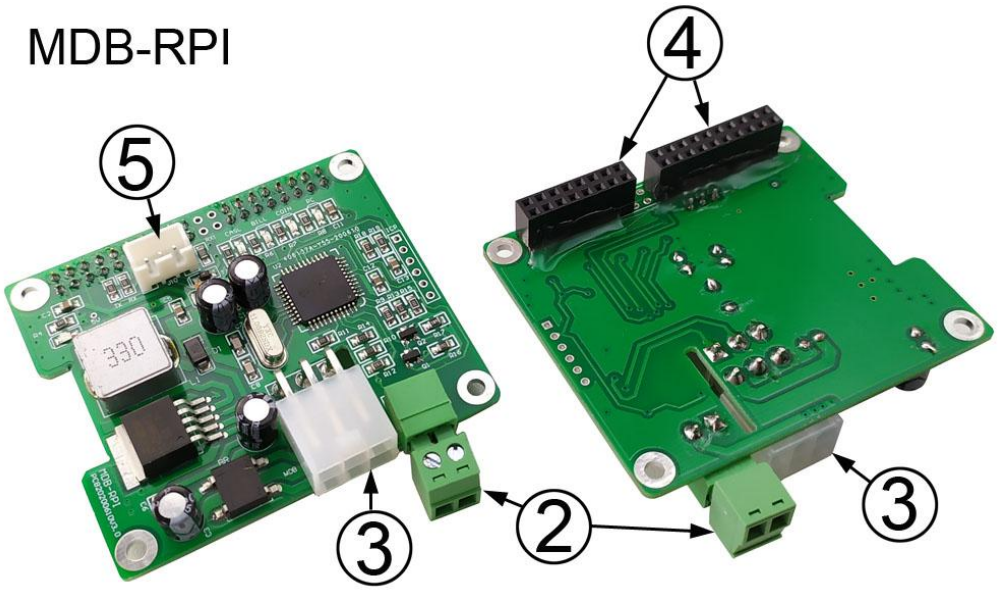


Below is the picture of two types of MDB-RS232, the same function and protocol ,the only difference is Three LED version will enable the payment device from the start and Five LED version start with disable status for payment device and user need to use the enable command to enable.

MDB-RS232

(2020 Version)
MDB-RS232

- (1) RS232 connector to Computer COM port
- (2) Power connector for AC/DC power supply (Normally we use the DC24V)
- (3) MDB connector to bill acceptor,coin validator or card reader



- (2) Power connector for AC/DC power supply (Normally we use the DC24V)
- (3) MDB connector to bill acceptor,coin validator or card reader
- (4) GPIO to Raspberry Pi board (Use RXD, TXD, GND and Ouput 5V to Raspberry pi)
- (5) Serial port to PC (Can use this port to test with PC software)

Installation is relatively simple; there are only three connections that must be made for full functioning of the device. There are connectors on the MDB adapter box.:

One cable plugs into a 24VDC power supply. (When connecting the DC24V power supply, there is no need to consider the specific polarity. The 6-pin Molex connects to the MDB devices. The final connector is a DB-9 and connects into the back of the computer or any other main board with RS232 port. There should be an open port on the back of the computer labeled “SERIAL2” or “COM2.” If you only has the USB port on your computer,then would be easy for you to order a RS232/USB adapter.

For MDB-RPI board,has two serial port to PC and also to Raspberry pi board GPIO.Also it will supply the DC5V voltage for Raspberry pi board.

After connected the device,and then Apply power on with DC24V. Check for **“Power Status”** LED on the box (RED led) indicating power is OK.

If the MDB device is properly connected and working properly,then the **“MDB Status”** LED should start to flash.

On the MDB-RS232 box also has another **“PC Communication”** LED,that would be flashing if has any data sendt from MDB-RS232 box to PC.

Software

The MDB-RS232 sends information generated by the MDB device directly to the PC via RS-232 serial communication. There is no need to poll each MDB device. This is done by the MDB-RS232. By default the MDB-RS232 will poll all known MDB devices. The MDB-RS232 then sends data to the PC if there is activity. The information sent to the PC is send as bytes in **hexadecimal**. For activity data,the first byte sent is the device ID. For example 30 XX means that a bill validator has sent information. Whereas 08 XX means that a coin mechanism has sent data. Consult the MDB V4.2 command specification for commands specific to your MDB device.

How to use the command to communicate with the MDB-RS232 adapter box?

Data sent and reply are all compabitle with the MDB protocol.

PC command: Just use the same command as the MDB protocol for VMC

PC received data1: Any data sent back according to PC query instructions, that is the same format as the MDB protocol,no need to add the first device ID byte

PC received data2: Any activity data from payment device will be sent to PC automatically and the first byte is the device ID

For example, Coin acceptor setup command: **09**

After sent the data **09** from PC , then adapter box will read and send back the coin acceptor setup information: **03 11 56 05 01 00 03 01 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 76**

For example, Bill acceptor enable command: **0C FF FF FF FF**

After sent the data **0CFFFFFFFF** from PC , then adapter box will send to bill acceptor and send back the validator response Data: **00**

Above PC received data,don't have the device ID at the first byte,but following data will have Activity data from coin acceptor,For example a coin is accepted will be sent to as: **08 51 00**

51 00 is the activity data from coin acceptor and when report the data to PC, MDB-RS232 add the first byte device ID 08h

Activity data from bill acceptor,for example,bill acceptor is disabled will be reported as: **30 09**

09 is the activity data from bill acceptor and MDB-RS232 add the first byte device ID 30h

(Just simply noted: Automatically reported data will have the device ID byte)

MDB-RS232 Software Communication

Receive and Transmit

Use an interrupt driven comm event on the appropriate com port. Settings are 9600-8-1-None.

Must be noted again

Any data sent from PC to MDB-RS232 box, that should use HEX data

Any data that PC received from MDB-RS232 box, that is ASCII data

So when user test command with MDB Demo tool or RS232 tools,must select the "hex" mode to send data

MDB OPERATION INSTRUCTIONS:

For BILL VALIDATOR

Bills Accepted (Byte 1) 1yyyxxxx

yyy = Bill Routing

000 = Bill Stacked

001 = Escrow Request

010 = Bill Returned

011 = Not Used

100 = Disabled Bill Rejected

xxxx = Bill Type

The bill types are:

Type 0 = $1 Type 2 = $5 Type 4 = $20
Type 1 = $2 Type 3 = $10

The software should have all of the bill types enabled, this will allow the user to set which type of bills to be accepted on the validator itself.

Bill Validator Operation Notes

-Firmware sets Bill Validator to accept 1, 2, 5, 10, 20 US bills by default

-Any commands to changed bills accepted or held in escrow will be set back to the firmware defaults upon a cycling of power or reset.

VMC Commands for Bill Validator

US Bills – Bit 0 = $1 Bit 1 = $2 Bit 3 = $5 Bit 4 = $10 Bit 5 = $20

BILL'S ACCEPTED

Bill Type 34h 4bytes Y1-Y4

Bill's Accepted

Y1-Y2 = 001Fh for all US bills accepted
= 0000h accept no bill's

For example:

Send the command: 3400030000h

Bill's held in Escrow

Y3-Y4 = 001Fh for all US bills held in escrow
= 0000h for no bill's held in escrow

Send out 34h and then the 4 bytes Y1-Y4 to change bill's accepted and held in escrow.

For example:

Send the command: 34001F001F

Enable the ESCROW, can accept the $1, But the coin go to the cash box directly

BILL'S IN ESCROW ACTION

Escrow 35h 1byte Y1
Return bill Y1 = 00h
Stack bill Y1 = 01h

Send 35h and then Y1 to act on bill held in escrow

For example:

Send the command: 3500h to Return the bill

The bill acceptor will reply: 00 and also following two data bytes: 30 A3 to show the bill type returned

Send the command: 3501h to accept the bill to the bill stacker box

The bill acceptor will reply: 00 and also following three status data bytes: 30 83 09 to show the bill type returned

STACKER STATUS

Stacker 36h response Z1-Z2
Byte1 Byte2
Fxxxxxxx xxxxxxxx
F=1 Stacker Full
Xxxxxxxxxxxxxx = Number of bill's in stacker

Send out a 36h to the Bill Validator—It will respond with 2 bytes Z1-Z2

For example,if the bill stacker is not full and already stacked 3 pcs bills,then would reply 03 03

Enable the escrow to accept or return bills

(For the following test,user should have bill validator with Bill recycler mounted,Following command data is tested with ITL NV11 bill validator)

(1) Use the 34FFFFFFFF or other 34 command to enable the escrow

(2) When user insert the bill, it will stop at the escrow and send the command 30 90 09 to PC and also later will keep to send 3009 to PC

30 that means data is from bill acceptor, 90 means a TYPE0 bill is accepted and stoped at the Escrow position (For different bills,maybe 91 or 92 or 93, just depond on the Bill Type accepted) and the last 09 means Validator is Disabled to wait the VMC to acceptor or return the bill

(3) PC send the command 3501 to accept the bill or 3500 to return the bill

BILL VALIDATOR	
All values are in hex	MDB data from Bill Validator to the PC
Bill Accepted	
$1	30 80 09
$2	30 81 09
$5	30 82 09
$10	30 83 09
$20	30 84 09
Bill Returned	All valid bill types disabled in software
$1	30 C0 09
$2	30 C1 09
$5	30 C2 09
$10	30 C3 09
$20	30 C4 09
Bill Held In Escrow	
$1	30 90 09
$2	30 91 09
$5	30 92 09
$10	30 93 09
$20	30 94 09
Bill forcibly Removed	
$1	30 A1 09
$2	30 A2 09
$5	30 A3 09
$10	30 A4 09
$20	30 A5 09

Bill Validator Status	
01	Defective Motor
02	Sensor Problem
03	Validator Busy
04	ROM Checksum Error
05	Validator Jammed
06	Validator was Reset
07	Bill Removed
08	Cash Box Out of Position
09	Unit Disabled
0A	Invalid Escrow Request
0B	Bill Rejected
010xxxxxx	Number of attempts to input a bill while validator is disabled
14	Bill not accepted either because the bill type is not enabled in the software or the bill was not recognized

For COIN ACCEPTOR

Coins Deposited:

(Byte1) (Byte 2)

01yyxxxx zzzzzzzz

yy = Coin Routing

00: Cash Box

01: Tubes

10: Not Used

11: Reject

xxxx = Coin Type

zzzzzzzz = The number of coins in the tube for the type accepted.

Coins Dispensed Manually

(Byte1) (Byte 2)

1yyyxxxx zzzzzzzz

yyy = The number of coins dispensed

xxxx = The coin type dispensed

zzzzzzzz = The number of coins in the tube

The coin types are:

Type 0 = 5c Type 2 = 25c Type 5 = $2 Can.

Type 1= 10c Type 4 = $1 Can.

Note: The type of the coin is the same as the bit that needs to be set in the ‘mdbCointype’ routine in order to enable the acceptance, or distribution of that coin.

COIN ACCEPTOR			
All values are in hex.	DATA RECEIVED FROM MDB AND SENT TO THE PC		
	Below Low Mark	Above Low Mark	Above High Mark
Coin Inserted			

NICKEL	08 50 00	08 50 06	08 40 4C
DIME	08 51 00	08 51 08	08 41 6B
QUARTER	08 52 00	08 52 06	08 42 4B
QUARTER (1)	08 52 00	08 52 06	08 42 15
$1 CANADIAN*	08 44 00		
$2 CANADIAN*	08 45 00		
* Dollar coins are routed directly to the cash box			
Coin Dispensed Manually			
NICKEL	08 90 00	08 90 06	08 90 4C
DIME	08 91 00	08 91 08	08 91 6B
QUARTER	08 92 00	08 92 06	08 92 4B
QUARTER (1)	08 92 00	08 92 06	08 92 15
Coin Rejected			
NICKEL	08 70 00	08 70 06	08 70 4C
DIME	08 71 00	08 71 08	08 71 6B
QUARTER	08 72 00	08 72 06	08 72 4B
QUARTER (1)	08 72 00	08 72 06	08 72 15
$1 CANADIAN*	08 74 00		
$2 CANADIAN*	08 75 00		

MDB STATUS	
01	Escrow Request
02	Changer Payout Busy
03	No Credit
04	Defective Tube Sensor
05	Double Arrival
06	Acceptor Unplugged
07	Tube Jam
08	ROM Checksum Error
09	Coin Routing Error
0A	Changer Busy
0B	Changer was Reset
0C	Coin Jam
21	Coin not recognized/slug. Returned
Upon startup one of these values below may be sent to the PC – These are the VMC Commands.	
08	Reset
09	Status
0A	Tube Status
0B	Poll
0C	Coin Type
0D	Dispense

* How to understand a currency data from bill validator ?

When insert a bill, we received: 30 82 09 ***(p94 and p95 in MDB file)***

The first byte: 30, that means this data is from bill validator
The second byte: 82 that is valid data **(Different currency credit will be different data)**
We translate 82 into binary values to compare each bit.: 1000 0010
(the first bit is 1, that is "currency" data. because other device "status" data,that first bit is 0 so that means the third byte: 09, that is status byte)

Z1
(1yyyxxxx) 82H = 1 000 0010

yyy = Bill Routing; 000: BILL STACKED ← 000
001: ESCROW POSITION[2]
010: BILL RETURNED
011: BILL TO RECYCLER[1]
100: DISABLED BILL REJECTED
101: BILL TO RECYCLER – MANUAL FILL[1,3]
110: MANUAL DISPENSE[1]
111: TRANSFERRED FROM RECYCLER TO CASHBOX[1]

xxxx = Bill Type (0 to 15) ← 0010

The third byte is 09, we can check the 95th page of the MDB protocol, compare it

(00001001) = Validator Disabled[2] - The validator has been disabled, by the VMC or because of internal conditions.

* How to understand a credit data from coin validator ?

When insert a bill, we received: 08 52 09 ***(p66 and p67 in MDB file)***

The first byte: 08, that means this data is from coin validator
The second byte: 52 that is valid data **(Different coin credit will be different data)**
We translate 52 into binary values to compare each bit.: 0101 0010
(the second bit is 1, that is "Coin Despsited" data. because other device "status" data,that first three bits are all 0, so that means the third byte: 09, that is status byte)

Coins Dispensed Manually:

Z1 Z2
(1yyyxxxx) (zzzzzzzz) 000

yyy = The number of coins dispensed.
xxxx = The coin type dispensed (0 to 15)
zzzzzzzz = The number of coins in the tube.

Coins Deposited:

Z1 Z2
52 09H = 01 01 0010 00001001

Z1 Z2
(01yyxxxx) (zzzzzzzz)

yy = Coin routing. 00: CASH BOX
01: TUBES ←
10: NOT USED
11: REJECT

(xxxx = Coin type deposited (0 to 15). ←

zzzzzzzz = The number of coins in the tube for the coin type accepted. ←

MDB-RS232 test with Nayax MDB cashless reader

Important note: if User want to test with Nayax card reader, must make sure that your card reader already connected to the nayax remote server system.that would be better to confirm with nayax servicer person. If not then MDB maybe cann't test it.

MDB card reader has six working status:

1.Inactive:

After powered on or after a Reset command,then device will go to this state.User can use the SETUP command to active the nayax reader

2.Disable:

When card reader received the config data,will go to this "Disable" Status,Also If user send the "Disable" Command,also will go to this state.

3.Enable:

After the "Enable" command and Before detected a valid card,then stay in this state.

4.Session Idle:

When read a valid card,will go to "Session Idle" state to wait the "Vend request"

5.Vend request

When received the "Vend request" from the VMC,will go to vend status

6.Vend

Command List:

1401 Enable card reader	1400 Diable card reader
1402 Cancel card reader	1300000A0001 REQUEST VEND
1301 VEND CANCEL	13020001 VEND SUCCESS
130500640001 CASH SALE	1304 SESSION COMPLETE
1500 REQUEST REVALUE	1700 REQUEST ID
110001000000 Config the card reader	1101FFFF0000 Setup the max and min price

Steps for Testing with the card reader:

VMC:	110001000000	Config the card reader
READER:	010109720102070D94	card reader reply
VMC:	1101FFFF0000	Set the maximum and minimum price
READER:	no reply	

Start to swipe the card

READER:	03FFFE	Reading a valid card and wait the Vend selection
VMC:	1300000A0001	VMC command to card reader after Vend selection
READER:	00	
READER:	05000A	Card reader send to VMC, confirm the good dispatch
VMC:	13020001	VMC tell the card reader,already dispatch the selected goods
READER:		no reply
VMC:	1304	end the section.
READER:	07	

Important questions during application:

1. Sometimes when send the command to the mdb-rs232,but I cann't get any reply. How can I know if the command has already been sent successfully to the payment device?

Answer: In MDB-RS232 box design,when PC send the command to it ,it will forward the command to payment device. But sometimes the payment device is busy,for example a bill is inserted and payment device cann't reply the box in time. So PC cann't get the reply.then just need to resend the command later. Of course,this is not a problem,because ALL the command from PC,that is not a realtime command.

2. How can I know if the payment device is enabled or disabled ?

Answer: If the payment device is in disabled status,Bill acceptors will report the status to PC always once each POLL. It will report **30 09** to PC, but for most coin acceptor,if need the status, user can read the status with **0F05** command.

3. If I can use a PLC or android board to connect it ?

Answer: That is no problem. Actually,user can use any main controller which has RS232 or USB port to work as the VMC.Of course, if the main controller only has the USB port.then will use a USB version. And install the driver to create the virtual com port in the main controller.

3. If can supply more documents to facilitate the development of applications?

Answer: The MDB box we provide is to forward the data uploaded to the PC by the MDB payment device. The documents we provide can only make it as easy as possible for customers to understand the process of sending and receiving data and the structure of the data. As for the commands of the host, the design of the user's host software requires the user to design the control process after having a detailed understanding of the payment device and the MDB protocol. We are not able to provide assistance in customer specific projects and software design.

4. About the Status reading command of coin acceptor (**0F05** command to read the status)

Not all coin validators can report the full working status,especially the old version,even in Level03,also cann't provide the proper status report data

Normally after powered on, it should report **01 00 06 00 07** (**01/00** means powering up)

Read the status again should report **06 00 06** (coin validator is disabled by default)

After use the command **0CFFFFFFFF** to enable,then read status should report with **03 00 03**

Must be noted: Some coin validators always report with **030003**,no matter in what status and some only port with **000000**. In these cases where the MDB protocol is not followed, please consult the coin validator manufacturer. Not a problem that MDB-RS232 boxes can solve

5. How to use the 0F02 command to payout the coins

Following is the samples to payout the coins:

- Firstly from the setup command 09 to read the configuration data
  03 11 56 **05 01** 00 03 **01 02** 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 76
  From this configuration data, then two type coins, coin value is 0.5$ and 1$
- Then use the 0A to check the tube status, which type and how many pieces in the tube

For example: 00 00 **03 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00** 04

then have two type of the coins and 03pcs 0.5$ and 1pcs 1$

So while the program is running, it must constantly check the status of the TUBE, so that it can know in real time how many coins can be paid out.

- Then you can use the payout command

0F 02 01 to payout one pcs 0.5$ coin.

0F 02 02 to payout one pcs 1$ coin or 2pcs 0.5$ coin

That means you must have the coins in the tube and also that can be read by the 0A command,then can be payed out.

5. What is the difference between normal MDB-RS232 and the 2020 Version MDB-RS232?

Normal MDB-RS232 will send the enable command to the connected MDB coin acceptor, bill acceptor and the cashless device, but the 2020 Version MDB-RS232 will not do the job, just start to poll the slave payment devices and VMC will need to send these commands. So if we connect the coin and bill acceptors to MDB box and powered on, Even PC is not connected, Normal MDB-RS232 will enable the coin acceptor and bill acceptor and is ready to accept the coin or bills. But V2020 Version box, after powered on, all payment devices are in the disable status.

6. If user can send the poll command from the PC ?

At present, our design is to complete the POLL command by the MDB-RS232 box. The POLL command cannot be sent from the PC. The PC only needs to process the remaining commands and receive the corresponding data.

How to order a sample to test ?

Answer : We can order the samples from online shopping store: http://cnkiosk.aliexpress.com

Wafer manufacture a series of the MDB payment adapters for Vending machines cashless payment system,wireless payment payment and Provide a rich solution for vending machine,kiosk machine or other self-service projects.

How can we connect the Pulse type coin acceptors or bill acceptors to PC ?

Answer: WAFER also have the PULSE-PC adapter box,that is used to connect the pulse type payment device to computer RS232 port.
We also can order the samples from: http://cnkiosk.aliexpress.com

How can we develop a cashless payment interface to existing vending machine?

Answer: WAFER also have the RS232-MDB adapter box,that is used to connect the RS232 interface PC or android main board or popular Raspberry pi board to vending machine,and then developer can use some simple command to act as a perfect cashless payment solution.
We also can order the samples from: http://cnkiosk.aliexpress.com

How can we develop a mobile payment solution for existing vending machine ?

Answer: WAFER have the 3G or 4G or LAN version payment module for selection.
We also can order the samples from: http://cnkiosk.aliexpress.com

Where can we get more further information and get the fast technical service ?

http://www.waferlife.com/en/MDB2PC-PC2MDB.html

How to have a customized MDB or vending payment board ?

Answer : WAFER can provide users with customized control boards in the field of self-service vending. Including time control boards, payment interface boards, coin refunders, lottery machines and other control boards.

Both pre-sales and after-sales can receive help and advice through our online skype technical support.

Email: wafer@waferstar.com
Web: http://www.waferlife.com
Tel: 0086-21-51870528

Online Service Skype: wafer-service