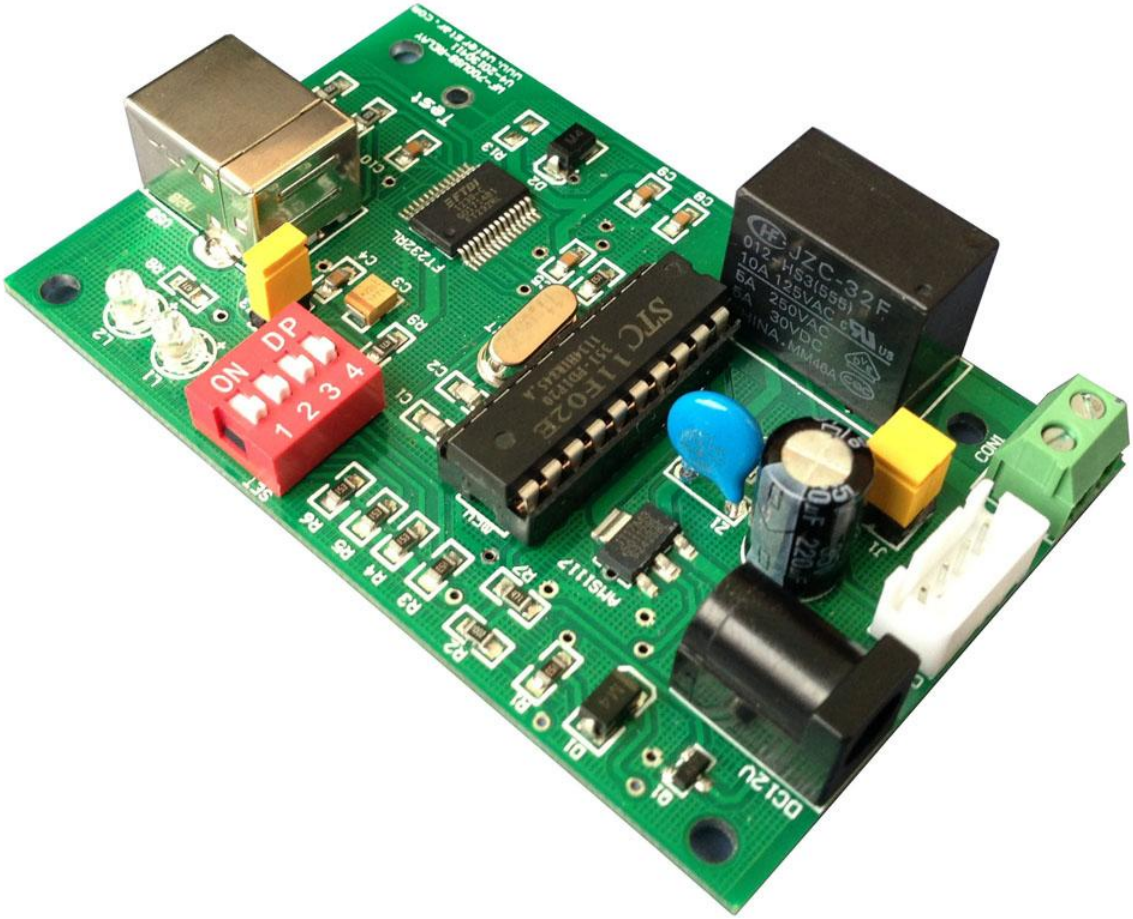
RS232(USB) Interface for Coin Validators

WF-700USB User Manual

Version 2.3-2018-12-13

1.0 Introduction

The WF-700USB is an RS232 (USB) interface module for most pulse type coin acceptor or bill acceptors. The WF-700USB has a built-in USB to RS232 port on its uplink communication port to interface with the serial port on a PC and a downlink port with inhibit line or inhibit relay to interface with validators. With the WF-700USB, the end operator can treat all different kinds of pulse interface validators as a standard RS232 device and can concentrate on the real operation of the validator rather than the tedious interface work of the hardware discrepancy.
On the PC platform or Android system, the software developer can easily program the validators via the WF-700USB with common computer languages such as Visual Basic / C++.



For USB version,that has a USB to RS232 chip on board to convert the RS232 to USB and build a virtual RS232 port in the PC. And user firstly need to install a driver in the PC for USB / RS232 chip. And the USB chip FT232RL driver download address:
http://www.ftdichip.com/Products/ICs/FT232R.htm

2.0 Compatibility

WF-700USB is a successor of the WF-700 model and the updated version of WF-700B. WF-700USB is 100% functionality compatible to WF-700B. With the DIP Switch, a more versatile configuration can be setup to interface with over 90% of the most commonly used banknote / coin validators found in the market.

3.0 Communications

This interface is a three wire interface using a Transmit line (TXD), a receive line (RXD) and a Common line. The Host machine is thought of as being the Master device. The WF-700USB is the slave device that responds only to the polls (or requests) from the Master.In this polled system, the Master requests information from the WF-700USB at a periodic rate. This rate can be as fast as every 30 milliseconds or as slow as the elapse time defined by the Lockout Timer. Faster rates are more desirable since overall system performance (in terms of bills/coins per minute accepted) will be higher at high poll rate system.

WF-700USB has a "Lockout" Timer feature that it will disable the acceptor if the specified poll rate is not met. In another words, if the host system is too busy to keep up with the desired minimum poll rate, WF-700USB will put the acceptor into the Disabled mode. The acceptor will be enabled again once the communication resumes.

4.0 GENERAL DATA

Baud Rate: - 9600
Duplex: - Half Duplex
Character Format: 1 start and 1 stop bit,,8 data bits (Bits 0 = sent first (LSB)

Lockout Timer

If the WF-700USB does not receive a poll after an elapse time specified by the hardware jumper, it will:

- Suspend (Disable) the acceptor
- Return any note being held in escrow (if applicable)

This Lockout Timer has a selection of 1 second ,10 second, 20 seconds or no lockout specified by the setting of a DIP Switch.

Credit stack, Parallel Mode

WF-700USB has a 6-level of credit stack in parallel mode. The stack is a FIFO type and holds up to 6 distinct credits and status information from the acceptor. On a slow polling system or whenever a communication loss occurs, credits issued by the acceptor are temporary stored in the WF-700USB RAM and to be released to the Master on future polls. When the 2nd level of stack is entered, WF-700USB will disable the acceptor to avoid taking in any new tokens. Any credits already on the way sending from the acceptor will be piled up in the WF-700USB stack.

Pulse chain, Pulse Mode

WF-700USB has a pulse counter that can hold up to 261 pulses. Each pulse received from the acceptor is treated as an individual event. Thus, in another word, if a $20 dollar bill is accepted by a bill acceptor, 20 individual credits will be reported by the WF-700USB in 20 consecutive events in its uplink communication. If the number of pulses is larger than 261, and the system is not polling fast enough to clear the stack, a stack overflow situation will occur. In such a case, the WF-700USB will output the inhibit to Lock the coin selector.

5.0 MESSAGE FORMAT, UPLINK COMMUNICATION

Format: STX, Length, MSG Type and Ack #, Data Fields….., ETX, Checksum

Descriptions are as follows:

STX - 02h One byte indicating Start of message

LENGTH - One byte representation of the number of bytes in each message (binary), including the STX, ETX and the Checksum.

MSG TYPE and ACK # - One byte of Data

MSG Type - (Bits 4-6)

001 - for Master to WF-700 Message

010 - for WF-700 to Master Message

011 to 111 - reserved for future.

ACK # - (Bits 0-3)

00h or 01h

(So data from PC to PULSE-PC will be 10h and from PULSE-PC to PC will be 20h)

In the messages sent by Master, the Ack # is used to identify the message. The Ack # alternates between 00 and 01h. If the WF-700 receisves two consecutive messages with the same number, the second message is treated as a retransmission of the first message.

In the messages sent by WF-700, the Ack # number is set the same as in the Master message to indicate the successfulness of the current message. If the WF-700 receives a message incorrectly (wrong checksum), the received message will be discarded and no message will be sent back.

DATA - The data portion of the message consists of the multiple data fields. We will discuss it in the section of DATA FIELDS.

ETX - 03h One byte indicating End of message.

CHECKSUM - One byte checksum. The checksum is calculated on all bytes except the STX, ETX, and checksum byte itself. The calculation is done by XORing the bytes.

(Data from PC to WF-700 ,checksum no need to be exactly calculated)

For example data:	02 0B 20 **01** 10 **01** 00 00 01 03 3A
Checksum	3A= 0B⊕20⊕01⊕10⊕01⊕00⊕00⊕01

5.1 PC-to-WF-700 communications

Example: 02 08 10 7F 10 00 03 77

(Checksum data from PC to WF-700, no need to be exactly calculated,so can always use 77h)

Data Fields (02 08 10 will be fixed data bytes):

BYTE 0

For WF-700

Set to 00h – Disable acceptor

Otherwise – Enable acceptor

For future models with acceptor has programmable acceptance or escrow function.

Bit 0 to Bit7 will be used to enable seperate denomination channel

BYTE 1

For WF-700

Set to 10h

For future models,for example PULSE-PC is used to control the Onboard Relay output

BYTE 2

For all WF-700 models

Set to 00h

5.2 WF-700-to-PC communications

Example: 02 0B 20 01 10 00 00 01 01 03 3A

Data Fields (02 0B 20 will be fixed data bytes):

BYTE 0

For WF-700

Set to 01h – Nothing to report

Set to 10h – Credit was accepted

Bit 0 - Idling (= 1 if WF-700 have nothing to report)

Bit 1 - Reserved

Bit 2 - Reserved

Bit 3 - Reserved

Bit 4 - Stacked (= 1 if a credit was accepted)

Bit 5 - Reserved

Bit 6 – Reserved

For future models,every bit will be used for separate input channel

BYTE 1

For all WF-700 models

Set to 10h

BYTE 2

For all WF-700 models

Bit 0 - Power up (= 1 if WF-700 experienced a reset since the last poll)

Bit 1 - Invalid command (= 1 if invalid command received)

Bit 2 - Failure (= 1 if acceptor has failed or cashbox full)

Bit 3-5 Credit Channel Field

000 = None

001 = 1st credit channel type

010 = 2nd credit channel type

011 = 3rd credit channel type

100 = 4th credit channel type

101 = 5th credit channel type

110 = 6th credit channel type, Pulse channel (WF-700 use this channel type)

111 = Reserved

Bit 6- Reserved (set to 0)

For example,pc will receive the following data:

02 0B 20 **01** 10 **01** 00 00 01 03 3A	The first power up, No data report
02 0B 20 **01** 10 00 00 00 01 03 3B	No data report
02 0B 20 10 10 **30** 00 00 01 03 1A	Coin acceptor payment report

BYTE 3, BYTE 4

Credit Left in the stack

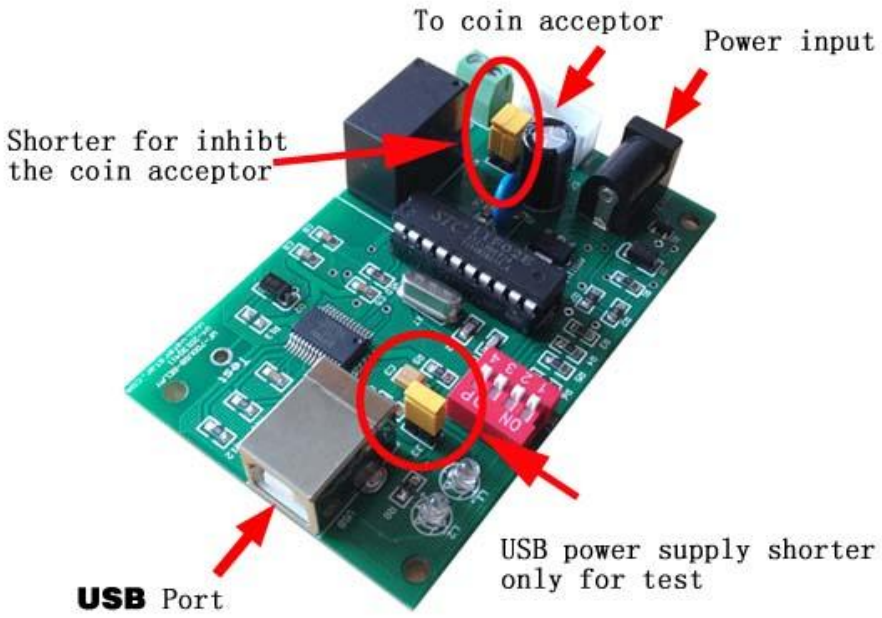
(If the adapter only received one pulse,then this would be 00h,because after the current report data,there is no credit left to report)

02 0B 20 10 10 **30** 00 00 01 03 1A Coin acceptor payment report

BYTE 5

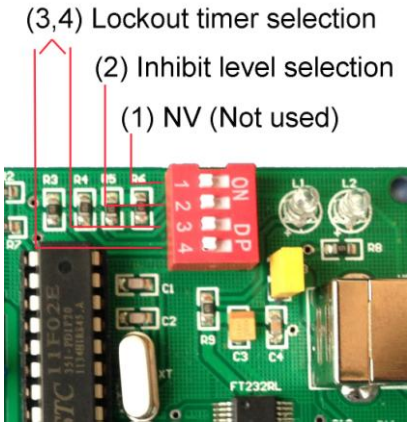
Set to 01h

6.0 ELECTRICAL HOOKUP FOR WF-700-RELAY and WF-700USB



WF-700USB

6.1 Default DIP SWITCH Settings



Lockout timer DIP switch Configuration

4	3	Lockout Time
OFF	OFF	No Lockout
OFF	ON	1 second
ON	OFF	10 second
ON	ON	20 second

Inhibit Level Configuration

When DIP Switch 2 is ON, then Inhibit Level Output is LOW

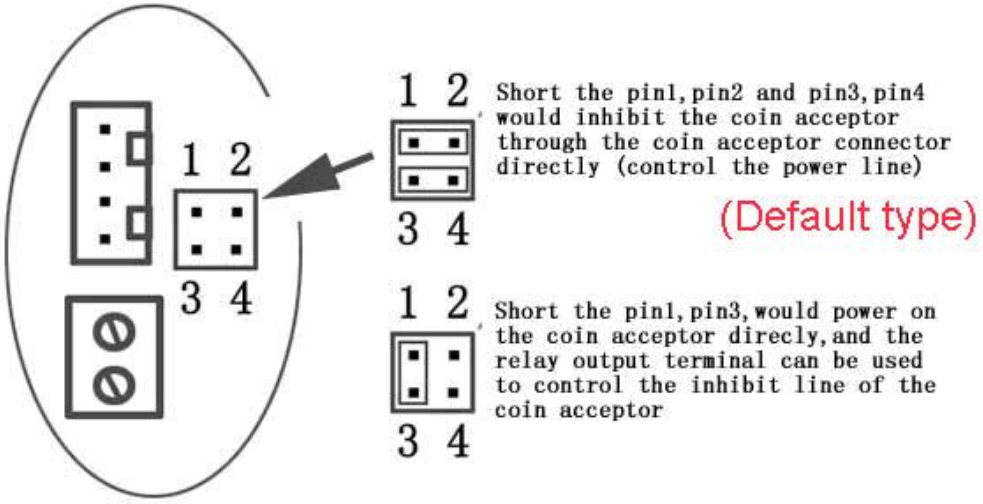
When DIP Switch 2 is OFF, then Inhibit Level Output is HIGH

6.2 Pulse interface coin acceptor input terminal

The three pin or four pin white connector,that is for pulse interface coin acceptor.Normally for pulse interface coin acceptor,we include a three color wire for connection to coin acceptor: **(1) Red wire**: DC12V Power voltage output to coin acceptor **(2) Black wire**: GND wire for coin acceptor **(3) White wire**: Pulse output wire from coin acceptor

6.3 Inhibit line input

Normally,use the default inhibit type,because WF-700USB board has the DC12V output directly to the pulse interface coin acceptor,so from the Four pins white connector,it can power on the coin acceptor directly. When need to inhibit the coin acceptor,then just power off the coin acceptor.



Why we need to inhibit the coin acceptor?

Just after powered on,if VMC has problems or stop working,then need to inhibit the coin acceptor automatically to reject the coins.

When will the inhibit function start working??

Any time,when WF-700USB cann't successfully received the POLL data command from VMC,then it will power off the pulse interface automatically.

Why on board also designed a inhibit relay, when we need to use that ??

Because on the white connector,that voltage output is DC12V,so if your payment device is DC12V,then no problem to use. If your payment device is not DC12V,for example,5V or 24V or other voltage,then need to cut off the DC12V(Red wire) ,only connect the white pulse signal wire and black GND wire. And power the payment device separately.Then need to use the Relay switch to ON or OFF the power supply cable to payment device.

That means,for the Relay switch,when communication is working properly,then relay switch is ON (Two green pins connector on board is shorted), when need to inhibit the payment deivce,then Relay switch is OFF (Two green pins connector on board is disconnected)

6.4 Sample Wire Diagram Map

7. Important for software development

✧ About the data received

When pc received the data bytes,sometimes will some interference bytes in front of the correct data,for example you should receive the " 02 0B 20 10 10 00 00 01 01 03 3A ",but in fact you maybe receive the following bytes in your com port:

FF 02 0B 20 10 10 00 00 01 01 03 3A

FE 02 0B 20 10 10 00 00 01 01 03 3A

FF FE 02 0B 20 10 10 00 00 01 01 03 3A

So must received the 02h and also followed with 0Bh, then will be determined as the correct data byte.

✧ Why I cann't input the coins after powered on the WF-700 adapter board?

(1) Check the power supply is DC12V and properly connected to the WF-700 board

(2) Even after powered on,if no PC polling data received,WF-700 Board will inhibit the acceptor.

(3) Don't put the coin acceptor on the desk, because for all the coin acceptors if the previous coin is blocked in the exit,then the acceptor will be inhibited and cann't insert more coins.so you must keep the exit smooth when you start to insert the coin.