

WEC200 Wiegand to Ethernet Converter/Controller

User Manual

Version 1.0R5

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1. General Information

1-A. Model Classification:

WEC 200 - 00

① ② ③

① **Model name: WEC (Wiegand Ethernet Controller)**

② **Model number: 200**

③ **Type: 00→ standard**

This device complies with Part 15 of the FCC . Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1-B. Accessories

- a. WAS-1499 for LAN cable.
- b. 5 Pin Wiegand Input (CN2-L35005-T01-G)
- c. 10 Pin Output (CN2-L35010-T01-G)

1-C. Key features

- Network-enable Wiegand Reader device
- The beep mode of BUZZER is adjustable.
- Two relay outputs are set, each relay includes Action (N.O.)/Non Action (N.C.)/Common Contact
- Two input contacts are set.
- Able to output Wiegand (raw data), or Facility Code (Site Code) and Card Code directly.
- If your computer is equipped with one RJ45 port, you are able to connect the 10/100BaseT Ethernet, and support TCP/IP, UDP with your Wiegand reader through WEC200.
- Featuring of unduplicated service code
- Able to define the machine ID and name from users' end.

2. Introduction

Points to follow to ensure correct use of the controller

WEC200 applies Ethernet technology to do the communication, which is important respectably when working on the program applying Ethernet technology. Thanks to WEC200 converter, which is built-in Ethernet module featuring:

- i. **The working Ethernet package will transform all Data into Serial Signal.**
- ii. **The Data will be sent to MCU, the internal of WEC200.**

Please refer to **Chapter 5** for framework and useful tips of WEC200

Please refer to **Chapter 6** for the functions of MCU

The package tool named "**DS manager**" and "**Connection wizard**" should be attached, which both equip you rapidly to set a virtual COM port. With connecting to WEC200, you may run the

MCU via above mentioned virtual COM port.

(Same as running the general COM port) This is a fast way else you are able to develop the application program using by Winsock. Please refer to **Chapter 7** if you are developing a new program. You have to understand what the format is especially for Ethernet package.

In addition WEC200 features a service code formatted in unduplicated within every device. This so-called service code serves the function of self check-up to ensure the software works for the right user while developing the software.

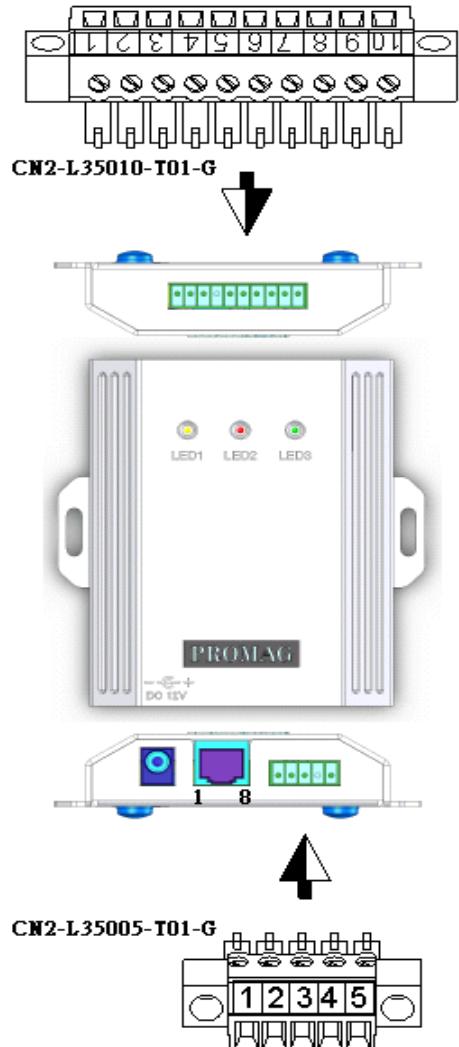
WEC200 is working under LAN base; it will help a lot with your work if you configure several devices of WEC200 in the network. WEC200 can be identified with each machine IDs and Names.

Wiegand interface applies 4-wire technology (V/G/D0/D1) for connection. 4-wire connection is a must have to short distance communication which is good enough but to long distance wiring will be too much trouble. We suggest applying 2 WEC200 to serve as the extension Wiegand interface tool. One device should be set up as a receiver the other should be set up as a transmitter. The two WEC200 devices need to set up the matching IP to each other. The two WEC200 will transmit from Wiegand reader accordingly over LAN network.

3. Installation

Connection in LAN

- A. Connect WEC200 RJ45 jack to HUB/SWITCHING HUB correctly with cable **WAS-1499**.
- B. Attach the Wiegand reader to CN2-L35005-T01-G and plug into WEC200
- C. Attach the input/output device to CN2-L35010-T01-G and plug into WEC200.
- D. Plug the power supply of the DC transformer into the Jack Panel of WEC200 (refer to 4-C as below)



4. Pin Assignment

4-A. RJ45

Pin#	Signal
1	TX+(Positive line of the differential output signal pair)

2	TX-(Negative line of the differential output signal pair)
3	RX+(Positive line of the differential input signal pair)
6	RX-(Negative line of the differential input signal pair)
4, 5 short connection & 7, 8 short connection	

4-B. LED (indicator)

LED2 is a bi-color LED displaying two colors should be switched automatically by indicating different status. (Please refer the details to Appendix A. LED2 Status)

LED3 (Red) displays the current connecting speed at 100M. If 10M only which is fail.

LED1 (Green) normally displays the status of the Ethernet Port. When receiving an Internet package, the LED1 will be cut off temporarily until the package is received entirely.

4-C. DC JACK

Pin#	Signal	
Center (D2.1mm)	+12VDC	
Outer	GROUND	

4-D. Wiegand input

PIN#	1	2	3	4	5
Signal	+12V	+5V	GND	D0	D1

Mainly registered by PIN#CN2-L35005-T01-G

4-E. Relay - contact and input

PIN#	Input		Relay#2			Relay#1				
	1	2	3	4	5	6	7	8	9	10
Signal	+12V	GND	IN2	IN1	N.O.	C	N.C.	N.O.	C	N.C.

Mainly registered by PIN#CN2-L35010-T01-G

Relay applies to:

“C” represents (Common) Contact

“N.C.” represents (Action) Contact

“N.O.” represents (Non action) Contact

5. How to integrate with Access Control

An adequate component is significant influence, which is very helpful solution to security by selecting an adequate component.

Suggestion

Electric Lock

Electric Lock is controlled by the terminal of relay No.1 or relay No.2 of WEC200, hence whichever the electric lock you are using should be able to be compatible with the relay specifications below:

CONTACT RATINGS

Contact Arrangement	1 Form C (SPDT)
Max. Switching Power	125VA 60W
Max. Switching Voltage	125VAC 30VDC
Max. Switching Current	2A
Contact Resistance	$\leq 100\text{m}\Omega$
Rating Load	1A/125VAC 2A/30VDC
Contact Material	AgNi10

CHARACTERISTICS

Electrical Life	1×10^5
Mechanical Life	1×10^7
Initial Insulation Resistance	Min. $100\text{M}\Omega$ 500VDC
Contact Resistance (Initial)	$\leq 100\text{m}\Omega$
Operate Time	$\leq 6\text{ms}$
Release Time	$\leq 3\text{ms}$
Initial Dielectric Strength	50/60Hz 500VAC 1 min. (between open contact) 50/60Hz 500VAC 1 min. (between all conductors)
Vibration Resistance	Malfunction: 10 to 55Hz at Double Amplitude of 1.5mm Destructive: 10 to 55Hz at Double Amplitude of 1.5mm
Shock Resistance	Malfunction: 10G (11ms) / Destructive: 100G (6ms)
Ambient Temperature	$-20^\circ\text{C} \sim +40^\circ\text{C}$
Relative Humidity	85% at 40°C
Unit Weight	Approx. 3g

1. Configuration

Mode: normally-opened (N.O.) and normally-closed (N.C.)

What is N.O.?

It means when deactivation is appearing, the status for the electric lock is unlock, otherwise if activation is appearing for the electric lock, the status will be switched to lock up.

What is N.C.?

When deactivation is appearing, the status will be switched to lock-up. If activation is appearing now, and the status will be unlocked relatively.

2. WEC200 supports above two modes.

3. Power Drive for Electric Lock

Able to divide into 2 modes: DC and AC. Some of the electric locks probably support these two modes, but some of them supports DC mode only. We highly recommend Model DC12V accordingly, which is also compatible with WEC200.

Power supply is no problem even for DC12V, WEC200 or Electric Lock. **Please note** the current is not more than **3A** for electric lock particularly. You may use DC12V right now if your survey is available. Unfortunately, if only DC24V is workable for your electric lock, you are still able to use your own electric lock with DC24V separately. As for model WEC200, it accepts the power supply of DC12V only. Definitely, two GND should be connected together, and then the whole system works actually. **(Refer to the illustration of this chapter – separateness way of power supply).**

If your electric lock supports AC, **please note** the voltage volume rates at 1A/125VAC for the contact of relay, so the current is not more than **1A**. Some countries accept 220VAC~240VAC only for their local voltage, we hence suggest that you may use an external relay. Let the relay of WEC200 control your external relay unaffectedly.

Power Supply

The power supply of WEC200 adopts DC12V. If only one power supply is available for WEC200 and electric lock together, moreover current of the electric lock is I_{LOCK} fortuitously, you have to adjust $2*I_{LOCK}$ at least for the power supply. WEC200 itself is causative, which its consumable current stays at 150mA. The running electric locks on the market exceed in this value widely. In order to prevent the power consumption is incapable load under the status of activation or deactivation, supernumerary power supply is necessary, which lose voltage in a second and re-activate WEC200 again. **(If you discover this status is appeared when testing, please use other power supply) (Refer to last illustration) We strongly suggest to use separate power supply for electric lock.**

All above is just mentioning only one electric lock is using. If using two electric locks, the power supply should be loaded by $4*I_{LOCK}$ at least.

For the sake of safety, power supply device should be mounted at a safe location.

Door Open Sensor

Two kinds of door open sensor are normally-opened and normally-closed dividedly. N.C. is rather popular on the market, which is proper to connect the terminals of INPUT1 or INPUT2 for WEC200. So WEC200 is working the current status for the entrance.

	Min.	Type	Max.
V_{IH} (logic1) input voltage	7.5V	11.2V	12V
V_{IL} (logic0) input voltage	0V	0.8V	7.3V

If voltage of INPUT1 contact is 0VDC, please refer 6-C (stated as below). Logic0 is generated when Data access is processing **(as above table)** If $>/=7.5$ VDC or vacant, logic1 is generated.

Alarm

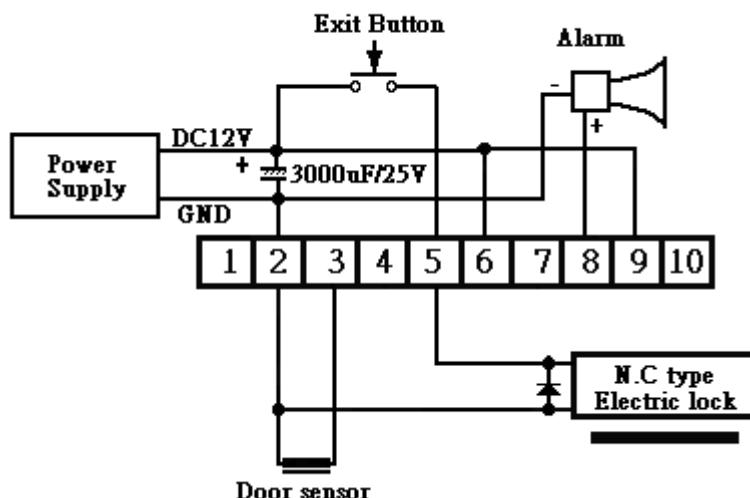
General alarms in the market are available with two types of N.O. and N.C. usually. If an alarm is needed, WEC200 is available with relay No.1 or relay No. 2 to connect with the alarm. (Please refer to **Electric Lock chapter 5**)

Example of the Wiring Illustration of WEC200

Please refer to the example we illustrate

Applying a separate power supply at DC12V output, which is good enough to supply the power requirement for both of electric lock and alarm.

The part of lock is connected to the relay 2 of WEC200 working for the lock control function and the part of door sensor is connected to IN2. The said alarm is connected to relay 1 of WEC200. **Also refer to 4-E. Relay - contact and input**



* Actual electric lock required may differ from the one shown

6. Protocol

Command symbols definitions are as below:

STX	02H
CR	0DH
ACK	41H
NACK	4EH
m	1 byte parameter
n	1 byte parameter
<Data...>	contents of data

6-A. Get device firmware version

HOST to DEVICE (4 bytes)	STX	G	R	CR
	02H	47H	52H	0DH
DEVICE to HOST (11 bytes)	STX "ROMXXXXVY" CR			

You can get device information and status by this command.

XXXX: Firmware Number

V: Version

Y: Revision

For example: STX-“ROM0722A7”-CR

6-B. Get service code

HOST to DEVICE (4 bytes)	STX	G	S	CR
	02H	47H	53H	0DH
DEVICE to HOST (12 bytes)	STX "XXXXXXXXXX" CR			

You can get the unique service code by this command.

XXXX: service code

For example: STX-“0000000000”-CR

6-C. Get input status

HOST to DEVICE (4 bytes)	STX	G	I	CR
	02H	47H	49H	0DH
DEVICE to HOST (4 bytes)	STX "XY" CR			

You can get the 2 input data with this command.

X: INPUT1 status (0: Low/1:High)

Y: INPUT2 status (0: Low/1:High)

For example: STX-“11”-CR. that means input 1&2 all high.

6-D. Get machine ID

HOST to DEVICE (4 bytes)	STX	G	M	CR
	02H	47H	4DH	0DH
DEVICE to HOST (6 bytes)	STX "XXXX" CR			

You can get the machine ID with this command.

XXXX: machine ID

6-E. Get name

HOST to DEVICE (4 bytes)	STX	G	N	CR
	02H	47H	4EH	0DH
DEVICE to HOST (18 bytes)	STX "XXXX" CR			

You can get the name with this command

XXXX= Name (16 bytes max)

6-F. Get type

HOST to DEVICE (4 bytes)	STX	G	T	CR
	02H	47H	54H	0DH
DEVICE to HOST (3 bytes)	STX "X" CR			

You can get the type with this command

X: 0---- receive only/1 -----transmit only (default)

6-G. Get format status

HOST to DEVICE (4 bytes)	STX	G	F	CR
	02H	47H	46H	0DH
DEVICE to HOST (3 bytes)	STX "X" CR			

You can get the format status by this command

X: 0----RAW data format/1----SITE data + CARD data format

6-H. Control beep

HOST to DEVICE (12 bytes)	STX	S	B	"XXXXXXXX"	CR
	02H	53H	42H	8 bytes	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

XXXXXXXX: beep string, composed of 0and 1. Each 1 will activate buzzer, 0 will stop buzzer.

Each bit control buzzer 0.1 sec.

For example, XXXXXXXX = " 11110101", it sounds like " BBBB-B-B".

6-I. Set format status

HOST to DEVICE (5 bytes)	STX	S	F	0/1	CR
	02H	53H	46H	30H/31H	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

You can set the format status with this command

0(Raw format) 1(SITE+CARD code)

Default: 0(RAW data)

6-J. Set relay1 output status

HOST to DEVICE (5 bytes)	STX	S	D	n	CR
	02H	53H	44H	byte	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

You can activate relay1 (n*0.1s) status by this command

n=0, relay#1 keeping in open status

n=255, relay#1 keeping in close status

6-K. Set relay2 output status

HOST to DEVICE (5 bytes)	STX	S	A	n	CR
	02H	53H	41H	byte	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

You can activate relay2 (n*0.1s) status by this command

n=0, relay#2 keeping in open status

n=255, relay#2 keeping in close status

6-L. Set machine ID

HOST to DEVICE (8 bytes)	STX	S	M	“XXXX”	CR
	02H	53H	4DH	4 bytes	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

You can set machineID by this command

Default: “0000”

6-M. Set Name

HOST to DEVICE (20 bytes max)	STX	S	N	“XXXX”	CR
	02H	53H	4EH	16 bytes max	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

You can set Name by this command

Default: none

6-N. Set Type

HOST to DEVICE (5 bytes)	STX	S	T	0/1	CR
	02H	53H	54H	30H/31H	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

You can set the type 0(receive)/1(transmit) by this command

The WEC200 will reboot after you execute this command.

Default: 1(transmit)

6-O. Notice Message

Notice Message is Device to send a notice to host automatically.

HOST to DEVICE (5 bytes)	STX	S	C	0/1	CR
	02H	53H	43H	30H/31H	0DH
DEVICE to HOST (3 bytes)	STX ACK/NACK CR				

When you set up auto advice by (=1), once the status of the two inputs differ from the previous status, a string data will go automatically by STX—C—CR to give you the notice of input is changing due to 0.1(s) has detected itself. It implied that several messages might send out already. After receipt of these messages, apply 6-C command to get the current status of these two inputs.

Default: 0 (means no auto notice)

6-P. Auto get set up format when an variation is made

HOST to DEVICE (4 bytes)	STX	G	C	CR
	02H	47H	43H	0DH
DEVICE to HOST (3 bytes)	STX "X" CR			

A backup message will run automatically when the input status varies.

X: 0—No backup/1—backup

6-Q. Notice Message

Notice Message is Device to send a notice to host automatically.

Events	Message
Card read OK	<STX>+<W>+<data bytes>+<CR>
Input status variation	<STX>+<C>+CR

7. Communication-Ethernet Module

7-A. EM module (DS - Device Server) commands

EM contains a lot of commands, but just only 4 of EM commands are needed to utilize the WEC200 terminal. The default protocol that WEC200 uses is TCP. Below are the details.

● Get available IP of connected WEC200 on LAN command

Command format:	A. X
Possible replies (network):	<p>Annn.aaa.aaa.aaa.aaa.aaa/ppppp/mseic/ES/oo...o/dd...d,</p> <p>where</p> <p>nnn.aaa.aaa.aaa.aaa.aaa- MAC-address of the DS</p> <p>ppppp- data port number of the DS</p> <p>m- fixed to 'N' (means that the application firmware, not the NetLoader is running)</p> <p>s- programming mode: '*' (none), 'S' (serial), 'U' (out-of-band UDP), 'T' (inband TCP or command-phase TCP);</p> <p>e- error status: '*' (no errors detected), 'E' (running in the error mode);</p> <p>i- IP-address status: '*' (not obtained yet), 'I' (obtained via DHCP), 'M' (fixed, set manually);</p> <p>c- data connection status: '*' (closed), 'A' (sending ARP), 'O' (being established), 'C' (TCP connection established or being closed), 'U' (UDP connection established), 'R' (reset by remote host);</p> <p>E- Ethernet-to-serial buffer overflow: '*' (no overflow), 'E' (overflow detected);</p> <p>S- serial-to-Ethernet buffer overflow: '*' (no overflow), 'S' (overflow detected);</p> <p>oo...o- owner name;</p> <p>dd...d- device name.</p>
Example (VB6 Code)	Winsock1.RemoteHost = "255.255.255.255" Winsock1.SendData = "X"

Note:

1. This is a broadcasts command, so the remote host IP needs to be set to "255.255.255.255".
2. For more details, please refer to the on-line help file of DS Manager tibbo_docs.chm on [Echo (X) command] section.

- **Assign new IP-address command**

Command format:	<p>B. Ammm.ddd.ddd.ddd.ddd.ddd.ddd/pp...p/iii.iii.iii.ii</p> <p>Where</p> <p>mmm.ddd.ddd.ddd.ddd.ddd.ddd- MAC-address of the target DS</p> <p>pp...p- password (defined by the Password (PW) setting)</p> <p>m- fixed to 'N' (means that the application firmware, not the NetLoader is running)</p> <p>iii.iii.iii.ii- new IP-address to be assigned to the DS</p>
Possible replies:	A, D, C, F (see Reply Code section)
Example (VB6 Code): Change the IP of MAC (0.2.3.5.0.62) to 192.168.100.216	Winsock1.RemoteHost = "255.255.255.255" Winsock1.SendData =_ "A0.2.3.5.0.62//192.168.100.216"

Note:

1. This is a broadcasts command, so the remote host IP needs to be set to "255.255.255.255".
2. The default password is blank.
3. For more details, please refer to the on-line help file of DS Manager tibbo_docs.chm on [Assign IP-address (A) command] section.

- **Get I/O Pin Status command**

Command format:	PGx , where x is the I/O line number
Possible replies:	As, C, D, R , where s is the state of I/O line (0 or 1)
Example (VB6 Code): Get the Status of Pin 0, which the WEC200 IP is 192.168.100.216	Winsock1.RemoteHost = "192.168.100.216" Winsock1.SendData = "PG0"

Note:

1. For more details, please refer to the on-line help file of DS Manager tibbo_docs.chm on [Get I/O Pin Status (Gx) instruction] section.

- **Set I/O Pin Status command**

Command format:	PSxs , where x is the I/O line number and s is the desired status of the I/O line (0 or 1)
Possible replies:	A, C, D, R
Example (VB6 Code): Set the Status of Pin 0 to Low, which the WEC200 IP is 192.168.100.216	Winsock1.RemoteHost = "192.168.100.216" Winsock1.SendData = "PS01"

Note:

1. For more details, please refer to the on-line help file of DS Manager tibbo_docs.chm on [Set I/O Pin Status (Sx) instruction] section.

7-B. Reply Codes

Listed below are all available reply codes:

C. RC	Description
A	OK (command completed successfully)
C	Error (incorrect command was issued)
R	Rejected (command was rejected by the DS)
D	Denied (access was denied by the DS)
F	Failed (command execution failed)

8. Specification

Communication	One Wiegand port One 10/100 BaseT Ethernet Port Network: Ethernet RJ45
Available Wiegand format	26, 30, 34, 35, 37, 38, 42 bits
Power consumption	140mA 12VDC
Protocols	Communicates with server on the networking using TCP or UDP protocols
Indication type	Three LEDs display status information, One built in buzzer 2 sets of input, 2 sets relay output (including N.C/ N O, Common)
Dimension	100 x 96.8 x 24.35 mm
Environment	Operating Temp: 0-55 Deg.C Storage Temp: -10 – 55 Deg C Humidity: 10-90% relative

Appendix A. LED2 Status

Please see the following illustrations, LED indicates (example),

 Represents Green and Red flash 3 times in chorus. As LED2 is dual display for configuration, you may see orange color flash 3 times visually.

 Red LED makes one long blink followed by two short ones

DS aims at the EM module located inside WEC200.

Accordingly, please see the following patterns:



Powerup pattern. This pattern is played once when the DS is switched on.



Buzz pattern. Both LEDs blink fast. this pattern is played when the DS receives the **Buzz (B) command**. This is used to identify a particular DS. Please note that this is unrelated 6-E(BUZZER), DS is just receiving the order itself. (BUZZER).



Error mode.



Ethernet port failure. Indicates that the Ethernet port hardware is malfunctioning and network communications with the DS is not possible.



IP-address not obtained. Means that the **DHCP (DH) setting** is 1 (enabled) and the DS has not yet obtained its IP-address from the DHCP server.



Data connection is closed. This pattern means that no data connection (TCP or UDP) with any network host is currently established.



Sending ARP. Displayed when the DS is sending ARP requests to find out the MAC-address of the destination network host with which the DS is about to establish a connection.



TCP connection is being opened. Indicates that TCP connection (either incoming or outgoing) is being established (i.e. SYN-SYN-ACK exchange is in progress).



Data connection is established (or being closed). Means that data UDP "connection" or TCP connection is currently established or that TCP connection is being closed (i.e. FIN-ACK-FIN-ACK exchange is in progress).



Data is being routed. This pattern is played when the data connection is established and the data is being routed through the DS



Buffer overrun (and no data routing). This pattern is displayed when the data connection is established and the routing buffer overrun has been detected (within the present data connection).



Buffer overrun + data routing. Data routing and overrun can be displayed at the same time.



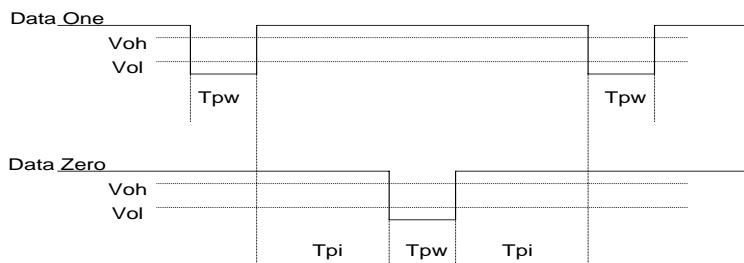
TCP connection reset by the network host. Means that the TCP connection has been reset (using RST packet) by the network host (not by the DS itself).

Above list shows frequent status, any details please visit Tibbo at <http://www.tibbo.com>

Appendix B. Wiegand Specification

Data Pulses

The Data One and Data Zero signals are normally held at a logic high level until the data is ready to be sent. Data is sent as below on Data1 or Data0 lines. The following timing parameters shall be observed:



T_{pw} Pulse Width Time -- 20 μ Sec (minimum) to 100 μ Sec (maximum)

T_{pi} Pulse Interval Time -- 200 μ Sec (minimum) to 20mSec (maximum)

Wiegand interface (26-bit format):

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
P	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	P	
P	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	
Summed for even parity (E)													Summed for odd parity (O)												

Wiegand interface (30-bit format):

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
P	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	P	
P	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	
Summed for even parity (E)															Summed for odd parity (O)														

Wiegand interface (34-bit format):

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
P	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	C	C	C	C	C	C	C	C	C	C	C	C	C	C	P			
P	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E			
Summed for even parity (E)																	Summed for odd parity (O)																

Wiegand interface (35-bit format):

Wiegand interface (37-bit format):

Wiegand interface (38-bit format):

Wiegand interface (42-bit format):

P- parity (Even/Odd), S- facility bits, C- card data