ETConcept

Systems Engineering

Wiegand to RS232 Converter

W2RS232

User's Guide

CE

V1.4

2009

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Table of Contents

List of Accessories Included

The packaged include the following items:

Wiegand to RS232 Converter (W2RS232)

User's Guide

2x- CTF female connectors

List of Required Accessories (not included)

To install the convert the following item are required:

ScrewDrivers

Power Supply

Null-Modem Cable

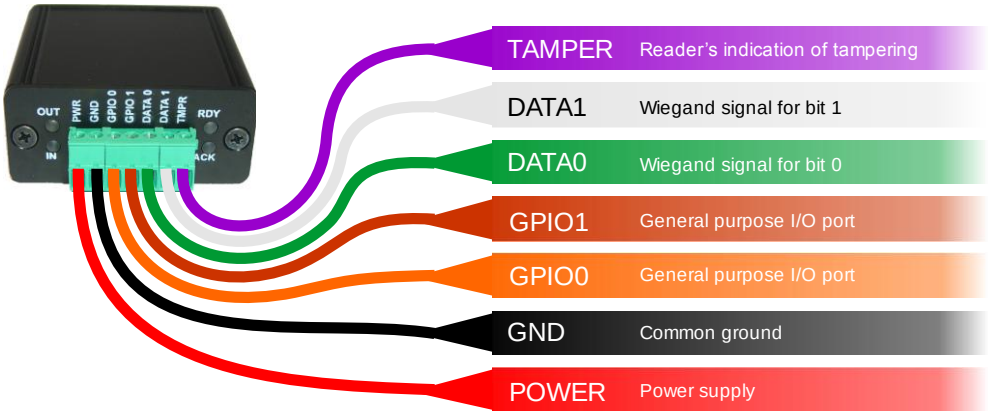
Quick Installation

To install the converter follow the steps below:

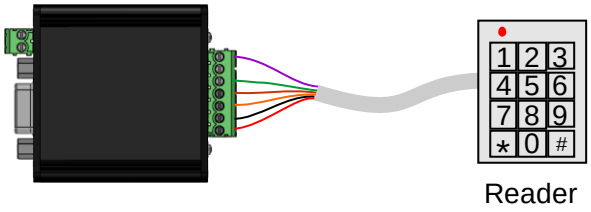
1. Verify the package contents (see the list of accessories included)

2. Connect the reader/controller Wiegand interface to the CTF terminal block

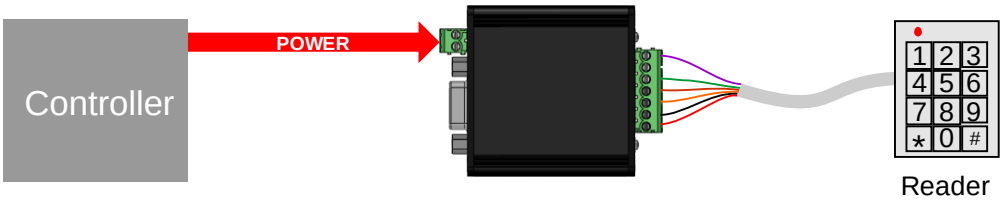
    a. Follow the connection diagram below and use the screwdriver



b. Plug the CTF terminal block to the converter



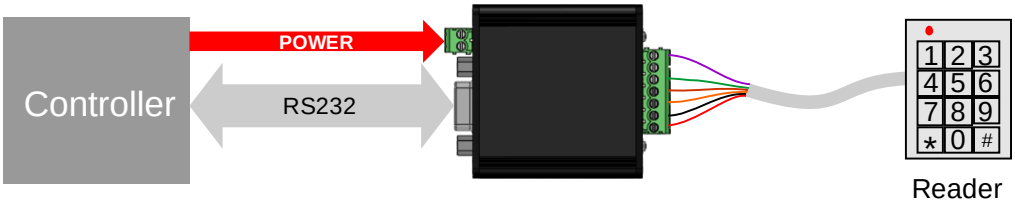
3. Connect the converter to the power supply



4. Confirm that the correct mode has been detected (Input or Output):

    a) If the converter isn't in the correct mode repeat step 3.

5. Then connect the serial cable to the controller.



General Information

Wiegand converters were developed for the security market to connect control access equipments like, for example, keypads and card readers with Wiegand interface, to other interfaced equipments like for example the serial port of a computer. This family of bidirectional Wiegand converters can convert data in binary format to Wiegand and vice-versa. The converter's setup is reduced to minimum for rapid installation.

The Converter has two working modes: input-mode and output-mode, explained in detail on the next subchapters.

Operating in Input Mode

The converter will operate in **Input-Mode** when connected to the **output interface** of a Wiegand compliant device e.g., a keypad or card-reader. In this mode, the converter will automatically convert a Wiegand 6-bit up to 96-bit input sequence to a formatted binary frame, see command set. It will

also detects changes on the Tamper input signal and reports to the controller. The converter sets the two general purpose I/O to output and will accept commands from the serial interface to control the $GPIO_0$ and $GPIO_1$. Figure 1 shows a conceptual diagram of the Wiegand converter in input mode and the data flow directions.

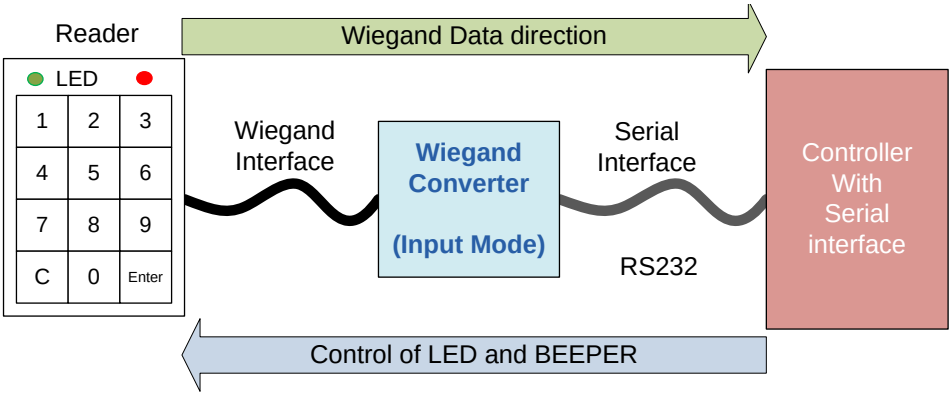


Figure 1 Conceptual diagram of the Wiegand converter dataflow on input mode

Wiegand interface Panel LED Signaling for Input-Mode

Waiting Wiegand frame in Input-Mode

The converter is connected to the Wiegand interfaced equipment waiting for Wiegand frames from Wiegand Interface and commands from the RS232 interface.

Processing data in Input-Mode

The converter is processing the received Wiegand frame or command. After processing the converter returns to the **Waiting Wiegand frame** state.

Operating in Output Mode

The converter will operate in **Output-Mode** in two situations: when connected to the **input interface** of a Wiegand compliant device or if not connected to any device. In this mode, the converter will convert data received from the serial interface to Wiegand frames. It will also accept commands to control the Tamper signal. Changes in the general purpose inputs GPIO are converted to commands and sent out through the serial interface. Figure 2 shows a conceptual diagram of the wiegand converter in input mode and the data flow directions.

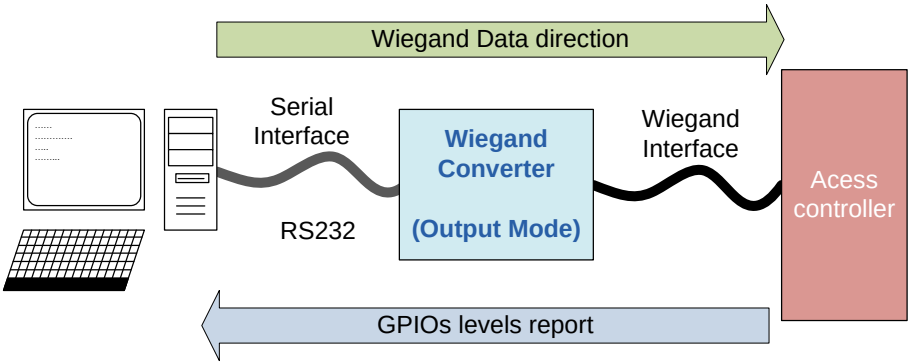


Figure 2 Conceptual diagram of the Wiegand converter dataflow on output mode

Wiegand interface Panel LED Signaling for Output-mode

Waiting command in Output-Mode

The converter is waiting for commands from the RS232 interface and changes on the GPIOs or Tamper ports

Processing data in Output-Mode

The converter is processing the received command. After the processing and sending the wiegand frame the converter return to **Waiting command** state.

Command Set

The Wiegand converter is bidirectional and converts Wiegand frames on both directions. These frames follow the following basic structure:

Byte						Byte
N-1	N-2	N-3	N-4	… 2	1	0
Sync		ID	Command Data		-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Values 00_h – Reserved 01_h – Wiegand frame Command 02_h – Tamper Signal 03_h – $GPIO_0$ Signal 04_h – $GPIO_1$ Signal 05_h to 08_h – Reserved 09_h – Write to EEPROM $0A_h$ – Force Reset $0B_h$ – Dump EEPROM data to terminal $0C_h$ to FF_h – Reserved
Byte N-4 a Byte 2	**Command Data:** Command Specific Data. (See commands)
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

The transmission order on the serial channel is the most-significant byte first (N-1). The two most-significant bytes are the synchronization pattern field frame detection. The next byte is the identification field that stores the command identity, followed by the command's data. All commands finish with a carriage return character.

Wiegand Frame

When the converter is operating in Input-Mode and receives Wiegand frame, it issues a command on the serial interface. When operating in Output-Mode, the same command received on the serial interface will generate the corresponding Wiegand frame. The Wiegand frame command is presented in the following structure:

Byte																		Byte
19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Sync		ID	N_B	WDATA												T_P	T_B		CR

Byte 19-18	**Sync** : Frame synchronization pattern. Value 55_h 55_h
Byte 17	**ID** : Command Identification. Value 01_h
Byte 16	**N_B:** Wiegand frame size (including parity bits). Value from 6 to 96
Byte 15-4	**WDATA :** Wiegand Data including parity bits.
Byte 3	**TP:** Wiegand Pulse width **(Not implemented on this version)**
Byte 2	**TB :** Wiegand Bit Period **(Not implemented on this version)**
Byte 1	**Reserved for future use**
Byte 0	**CR:** Caracter terminador (*Carriage Return character*) Valor = $0D_h$

The TP and TB fields represent the timing specifications of the Wiegand pulse width, t_P, and the bit period, t_B, as shown in Figure 3.

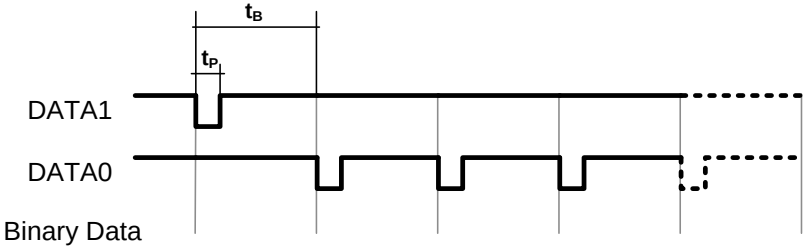
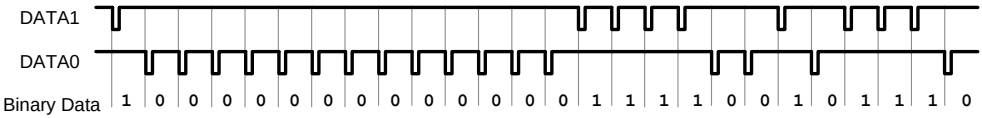


Figure 3 - Wiegand data timings.

Figure 4 presents a conversion example of a 26bit Wiegand frame with a pulse width of 100µs and a bit period of 1ms. Both signals for DATA1 and DATA0 of the Wiegand interface are shown, with the corresponding converted frame.



Byte																		Byte	
19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
55_h	55_h	01_h	$1A_h$	80_h	03_h	CB_h	80_h	00_h	00_h	00_h	00_h	00_h	00_h	00_h	00_h	FF_h	00_h	X	$0D_h$

Figure 4 - 26bit Wiegand Frame conversion example.

The converter needs a standby period t_W between Wiegand frames in order to process and transmit data, as shown in Figure 5. For example, a 26 bit Wiegand frame with a 1ms bit period must have minimum standby period of 26ms.

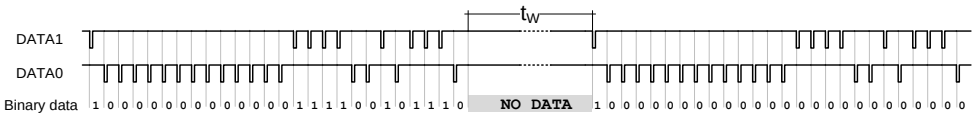


Figure 5 - Standby period between Wiegand frames

TAMPER Signal

When operating in Input-Mode, the converter will issue a TAMPER signal command every time the tamper signal changes state. If operating in Output-Mode, a TAMPER signal command will cause an update to this output signal, with the appropriate received value. The command has the following structure:

Byte				Byte	
5	4	3	2	1	0
Sync		ID	B_T	-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Value 02_h
Byte 2	**B_T:** Tamper Signal Value Value 00_h Tamper Signal is 0 FF_h Tamper Signal is 1
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

$GPIO_0$ Signal

When operating in Input-Mode, the converter will update the $GPIO_0$ signal with a value received in a $GPIO_0$ signal command. If operating in Output-Mode, a $GPIO_0$ signal command is issued every time the GPIO0 signal changes state. The command has the following structure:

Byte				Byte	
5	4	3	2	1	0
Sync		ID	B_0	-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Value 03_h
Byte 2	**B_0:** Tamper Signal Value Value 00_h GPIO0 Signal is 0 FF_h GPIO0 Signal is 1
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

$GPIO_1$ Signal

When operating in Input-Mode, the converter will update the $GPIO_1$ signal with a value received in a $GPIO_1$ signal command. If operating in Output-Mode, a $GPIO_1$ signal command is issued every time the GPIO1 signal changes state. The command has the following structure:

Byte 5	Byte 4	Byte 3	Byte 2	Byte 1	Byte 0
Sync		ID	B_1	-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Value 04_h
Byte 2	**B_1:** Tamper Signal Value Value 00_h GPIO1 Signal is 0 FF_h GPIO1 Signal is 1
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

Write to EEPROM

This command writes a byte on the converter's EEPROM memory. The EEPROM memory addresses affected by the command are the configurations zone (the first 6 bytes). The new configurations only take effect on the next reset. The command has the following structure:

Byte 6	5	4	3	2	1	Byte 0
Sync		ID	Address	Data	-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Value 09_h
Byte 3	**Address:** Value between 00_h and $0F_h$
Byte 2	**Data:** Value between 00_h and FF_h
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

EEPROM Address Map

Address	Type	Value	Descriptions
00_h	Byte	$A5_h$	Working mode Auto (Default)
		$0F_h$	Input mode allways
		$F0_h$	Output mode allways
$01_h 02_h$	Int	$0D_h 00_h$	Defines the T_p time (50µs) (Default)
		$1A_h 00_h$	Defines the T_p time (100µs)
$03_h 04_h$	Int	$9A_h 15_h$	Defines the T_b time (2 ms) (Default)
		$CD_h 0A_h$	Defines the T_b time (1 ms)
$05_h 06_h$	Int	$FF_h C9_h$	Defines the Time-Out (5 ms) (Default)
07_h	Byte	01_h	Defines Binary Format (Default)
		02_h	Defines ASCII Format
08_h	Byte	10_h (Init value)	Next position for the Event Log
10_h-FF_h		-	Event Log (Stores all events i.e Reset, PowerUp and several other events).

Soft Reset

This command forces a reset. Two seconds after the receptions of this command the converters restarts. The command has the following structure:

Byte					Byte
5	4	3	2	1	0
Sync		ID	x	-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Value $0A_h$
Byte 2	**Don't care**
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

EEPROM memory dump

This command dumps the EEPROM contents to the serial interface. The command has the following structure:

Byte					Byte
5	4	3	2	1	0
Sync		ID	x	-	CR

Byte N-1 Byte N-2	**Sync** : Frame synchronization pattern. Value = 55_h 55_h
Byte N-3	**ID** : Command Identification. Value $0B_h$
Byte 2	**Don't care**
Byte 1	**Reserved for future use**
Byte 0	**CR:** *Carriage Return character* Value = $0D_h$

ASCII Output Format

When the converter is set to ASCII output format all the data is converted to the equivalent, ASCII, Hexadecimal value until output. Except for sync pattern and the stop char ($0D_h$).

The example on the Wiegand Frame section will be outputed as follows:

UU011A8003CB80000000000000000FF0000<CR>

ATTENTION: When the converter is set to ASCII output all the commands must be send in ASCII format as well.

To set the converter to ASCII output format the followig command must be send:

55_h	55_h	09_h	07_h	02_h	X	$0D_h$

To teturn to the Binary output the following command must be send:

UU09070100<CR>

CUSTOM COMMANDS

Custom commands can be provided to adjust the converter to specific project needs. Contact ETConcept for further information on this subject.

Product Specifications

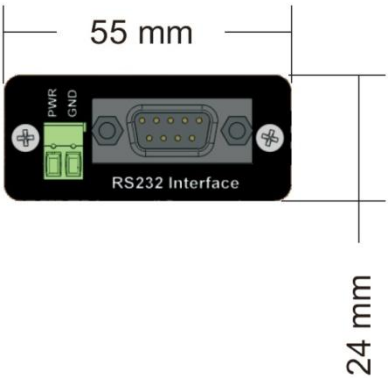
Electrical Characteristics	
Operating Voltage Range	Min. 7V DC Max. 16V DC
Current Consumption	Typ. 30mA
Environmental Characteristics	
Operating Environment	Indoor and Outdoor[1)]
Operating Temperature Range[2)]	0°C to 70°C
Operating Humidity	0 - 95% (non-condensing)
Storage	-40°C - 70°C and 0 - 95% (non-condensing)
Wiegand Interface	
Wiegand Format Length	From 6 bits to 96 bits
Idle Period	Min. 30ms
Wiegand Pulse Width	Min. 50µs and Max. 200µs
Wiegand Bit Period	1ms, 2ms
General Purpose I/O	2
Tamper Signal	1 Port to read/write the TAMPER signal

RS232 Interface	
Communication Distance	Up to 50m
Communication Modes	Full-Duplex without flow control
Baud Rate[3)]	9600
Mechanical Characteristics	
Weight	75 g
Dimensions	55 mm x 72 mm x 24 mm [4)]
Enclosure material	Anodized Aluminium

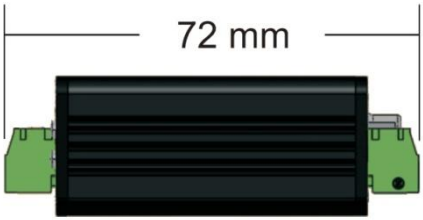
Notes:

1) For Outdoor applications the converter must be protected against direct rain and direct sun exposure;
2) Other temperature ranges are available on demand;
3) Other Baud Rates are available on demand;
4) Dimensions include the terminal block CTF connectors.

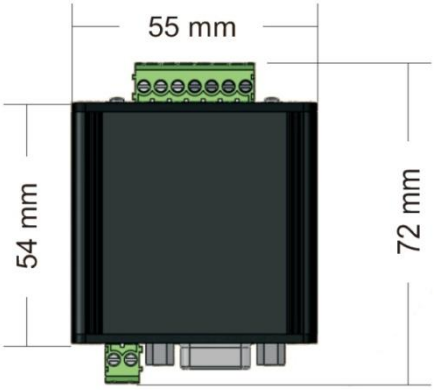
Mechanical Specifications



Front View



Side View



Top View

Note: All dimensions are in millimeters

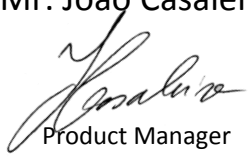
CE Statement of Conformity

Manufacturer:	ETConcept, Systems Engineering
Address:	Bairro da Paradela Rua Jacinto Duarte, Lt.97 2660-270 Santo António dos Cavaleiros Portugal
Type of Equipment:	Wiegand to RS232 Converter
Model:	W2RS232
Council directives applied:	2004/108/CE
Year mark applied:	2008

The product has been tested in the typical installation configuration and with peripherals complying with the above listed Directives. I, the Undersigned, hereby declare that the above mentioned equipment conforms to the requirements of the Directives specified above, when installed in accordance with the manufacturer specifications.

01/07/2008

Mr. João Casaleiro



Product Manager

Important Information

This manual provides information on how to setup and interface the Wiegand to RS232 Converter (W2RS232). It has been written for experienced users to setup the system within the shortest time. Please take special care to all specifications and do not hesitate to contact ETConcept for any additional support.

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