

GP60A

Long-range RFID (proximity) card reader

(1) Features:

- Extended reading range of up to 60 cm with ISO-size cards
- High-precision auto tuning compensates for environmental changes
- Four user-selectable interfaces: Magstripe, Wiegand, RS232, RS485
- Firmware Download Mode allows for firmware upgrades in the field
- Internal relay and serial port commands to control it
- Six function LEDs, one of them externally controlled
- Wide input power range (6.5V-15V, 12V nominal)
- Compact and stylish design
- Electronic circuit completely sealed (potted)

(2) Cable wire assignment

	Magstripe I/F	Wiegand I/F
Green	Data	Data0
White	Clock	Data1
Orange	Card present	<unused>
Dark Blue	RS232, RX	
Brown	RS232, TX	
Light Blue	+RS485	
Light Green	-RS485	
Yellow	I/F selection, see (6)	
White/Black	Enable Firmware Download Mode, see (11)	
Pink	External LED control, see (9)	
Black	Relay, common	
Purple	Relay, normally opened	
Gray	Relay, normally closed	
Red	Power (6.5V-15V, 12V nominal), see (5)	
Shield with black wire	Ground	

(3) LED signaling

	Normal mode	Firmware Download Mode
Power (green)	Always on when power is applied	
Relay (Green)	On when internal relay is activated	
Comms/Dload (Green)	Blinks when command is received	Displays download status
Tuning/Dload (Red)	Displays tuning result	Displays download errors
Ext (Red)	Externally controlled LED	
Red (Red)	Blinks once when good read occurs	

(4) Installation requirements

For best reading results the GP60A should be installed on a metal-free surfaces and away from large metal objects. Despite high-precision auto-tuning circuitry the presence of metal objects decreases the reading range of the GP60A. Presence of metal and the degree to which it affects the operation of the GP60A can be verified by checking the results of auto-tuning. See (7) for more details.

(5) Power supply

Best reading results are achieved when the GP60A is used with a high-quality linear power supply (12VDC, min 500mA). Using low-cost power adaptors severely affects the reading distance of the GP60A.

(6) Interface selection & lines

Interface lines for Magstripe, Wiegand, and RS232 interfaces, as well as interface selection are 100% compatible with the original GP60:

Magstripe	Connect Yellow to Orange
Wiegand	Connect Yellow to White
RS232 (or RS485)	Leave Yellow unconnected

The GP60A features both the RS232 and the RS485 interfaces. Only one of them can be used at a time. That is, if you are using RS485 then leave RS232 lines unconnected, and vice versa! Serial communications parameters for both interfaces are fixed at 9600,N,8,1.

(7) Auto-tuning

The GP60A is equipped with an advanced 8-bit auto-tuning circuitry that compensates for the presence of metal objects in the vicinity of the GP60A and for other environmental factors that can affect the tuning of the GP60A's internal antenna and decrease the reading distance. Although it is best to install the GP60A away from metal objects and on a metal-free surface this is not always possible. Auto-tuning recovers significant portion of the reading distance that otherwise would have been lost due to the presence of metal.

The auto-tuning is performed once each time the GP-60 is powered up. Moving the GP60A after the auto-tuning voids the tuning results. Always switch the GP60A off and on to repeat the auto-tuning after relocating the GP60A or changing the environment around it.

The GP60A displays the results of auto-tuning (and expected reading performance) by blinking its Tuning LED and beeping a certain number of times:

Number of blinks/beeps	Tuning condition
3 times	Good
2 or 4 times	Acceptable
5 times	Poor
1 time or 6 times	Unacceptable

(8) Internal relay

The GP60A features an internal relay that can be controlled by sending commands via the RS232 or RS485 interface. Relay can be used to control an electric lock. Commands are described in (10).

(9) Externally controlled LED

The "Ext" LED on the front panel can be controlled externally. The LED is lighted up by applying 3V-15V to the Pink Wire (there is a 1.5K resistor connected in series with this LED).

(10) Serial commands

All commands are sent to the GP60A via its RS232 or RS485 port. For each command sent the GP60A will issue a reply. Serial port settings are 9600,N,8,1. Commands and replies have the following format:

STX(02h)	Command or reply code	Check field	CR(0Dh)
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Currently supported commands (with their check field already calculated and shown in gray) are shown below (without STX and CR):

Switch the relay on (relay enable)	"RE68"
Switch the relay off (relay disable)	"RD69"

The GP60A can issue two possible replies:

Command acknowledged	"ABE"
Invalid command	"CBC"

(11) Firmware Download Mode

Internal firmware of the GP60A can be upgraded in the field using a new Firmware Download Mode. The download is effected through the serial port (communications parameters are 9600,N,8,1). To download a firmware file you'll need any PC software that supports an XMODEM communications protocol (checksum version). Procedures below assume the use of *HyperTerminal* for *Windows*:

- Power the GP60 off
- Connect the RS232 port of the GP60A to the PC
- Ground the Download wire of the GP60A
- Launch the *HyperTerminal* and configure it for an appropriate COM port with communications parameters set to 9600,8,N,1.
- Choose *Transfer* → *Send file* from the *Main* menu- the *Send file* dialog will appear
- In the *Send file* dialog, select the firmware file that you want to download into the GP60A and choose the *Xmodem protocol* from the *Protocol* drop-down box. Click *OK* when finished. The *Xmodem file send for a dialog* will be displayed
- Power the GP60A up- the download will begin
- The Green "Dload" LED of the GP60A will blink during the download

- When the download is finished, untie the Download wire from the ground and switch the GP60A off and back on- the reader will resume normal operation
- If, when you power the GP60A up after the download, both Green and Red "Dload" LEDs start to blink this means that you have downloaded a wrong file or that the download process was not completed.

A number of errors can occur during the download. These errors are displayed by the Red "Dload" LED:

1 long "blink"	Communications timeout (check baudrate, protocol)
1 long + 1 short "blink"	Communications error (check baudrate, protocol)
1 long + 2 short "blinks"	Invalid data file (check which file you are downloading)
1 long + 3 short "blinks"	Hardware failure (this GP60A is malfunctioning)

(12) Data output formats

Magstripe interface, simulated to 38 IPS (inches per second)

10 leading zeros	SS	Data (14 digits)	ES	LRC	10 trailing zeroes
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Wiegand interface (26-bit format):

0	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
P	S	S	S	S	S	S	S	S	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													
													O	O	O	O	O	O	O	O	O	O	O	O	P
Summed for even parity (E)													Summed for odd parity (O)												

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

Serial interface (9600,N,8,1)

STX (02h)	Data (10x "hex" ASCII chars)	CR (0Dh)	LF (0Ah)	ETX (03h)
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(13) Specifications

Power Requirements	12V, ~0.25A, linear power regulator recommended!
Interfaces	Magstripe, Wiegand (24 bits), RS232 & RS485 (9600,N,8,1)
Maximum reading range (with ISO-size card in a noise-free environment, when installed on a metal-free surface and powered by a linear low-noise power supply)	~60cm
RFID (proximity) cards accepted	125KHz, 64 bits, Manchester encoding
Maximum power switched by internal relay	Up to 24V/2A
Dimensions	210x210x28mm
Nominal weight	~900g
Interface cable length	~90cm
Operating temperature range	-10 ~ +60 C°