HID CORPORATION

Installation Manual - 5375-900 Rev E

MaxiProx Wiegand Reader 5375A

MaxiProx System Overview

The MaxiProx reader is a self contained proximity reader. The two piece polycarbonate enclosure has an O-ring that seals the pieces together and a cable fitting that seals the cable entry. The water resistant unit is rated for outdoor use. The enclosure is designed to fit on a single gang electrical box. A bi-color LED and audible tone, enhance user feedback. Configurable open collector data outputs provide the Wiegand data to the Host. A tamper switch will alert the Host when the enclosure is opened. An internal DIP switch makes the configuration of the outputs, audible tone and LED control options simple. Installation of the MaxiProx Reader consists of mounting, verifying the DIP switch settings, connecting the cable to the Host, and verifying proper receive coil adjustment.

Operation

Transponders (Access Cards) are presented to the front of the MaxiProx. The LED is red when ready to read a transponder. The LED turns green and the beeper sounds when the transponder is read and the message is transmitted to the Host computer or interface panel. The system is ready for another transponder as soon as the LED returns to red. There is an anti-passback delay of about one second before it will read the same card. The LED flash is typically 250 milliseconds long. The operation of the LED and beeper may be controlled by the Host. If Host controlled, the actual operation will depend on the programmed timing of the Host.

Parts List

1) MaxiProx Reader	qty 1 (included)
2) Installation Sheet	qty 1 (included)
3) Cable Fitting	qty 1 (included)
4) Label for front cover - HID logo	qty 1 (included)
5) O-ring - 12" diameter X .25" thick	qty 1 (included)
6) #6-32 x 1" flat head screw, for upper-left base mount screw	qty 1 (included)
7) #6-32 x 1" black screw, for gang-box mounting	qty 2 (included)
8) #6-32 x .75" flat head screw, for front cover mounting	qty 1 (included)
9) Cable, 5 conductor, 22 AWG (Alpha 1295 C or equivalent)	Up to 500' (See cable notes)
10) Power Supply Requirements	14-28.5VDC, 2.0A

Regulatory Approvals and Certifications

- Underwriters Laboratories listing under UL 294, Access Control Unit Accessory, Indoor and Outdoor
- UK Type Approval
- German General License Type Approval per RTP letter, Vfg 70/1998, dated 30 June 1998
- CE Mark – See letter of Conformance
- FCC Certification
- EMC Certification

Installation Procedure

1. Preparation - Determine an appropriate mounting position for the MaxiProx. Install an electrical box or drill the appropriate mounting holes for #6 fasteners. For optimum performance, the Reader should be mounted at least 6 inches away from any metallic surface 12"x12" or larger. Incidental metal such as aluminum studs and conduit can be compensated. For more information, see "Installation near metal" below. The best method for installing the MaxiProx is on the back surface. Side mounting is usually accomplished with an adapter or spacer that mounts to the back of the Reader.
2. Install Cable - Route the interface cable from the MaxiProx and/or power supply to the Host.

3. Cable Preparation - Prepare the cable by cutting the cable jacket back 2 inches and strip the wires 1/4-inch. Tinning the wires is not required.

4. Cable Connections - Install the cable fitting on the rear of the MaxiProx. Feed the cable through the cable fitting. Connect the wires to the terminal strip with the minimum length necessary. Do not leave extra loops of wire inside the Reader housing. Connect the Reader to the Host according to the terminal descriptions in the dimension diagram. Tighten the fitting to secure the cable. Connect the drain line of the shield to terminal 3 (Power Supply Ground). If it is bare, cover it with heat shrink or tape to avoid short circuits to the other wires. The opposite end of the drain line should be connected to the negative terminal and the frame connection of the power supply.

5. Tamper Switch - Connect the tamper switch to the Host, if available on the Host. When the cover is removed, the tamper switch is released. The switch contacts available on pins 11 and 12 are either normally open or normally closed dependent upon the position of the jumper on P3. Install the jumper to connect pins 1 and 2 if you need the normally open contact. Select the 2-3 position if you need the normally closed contacts. The normally open and normally closed refer to the condition of the switch when the case is open. The contacts are rated for 50 mA at 28.5 VDC.

6. Mounting - Mount the base of the MaxiProx that holds the electronics to the surface using the holes located on the base of the Reader. There are 12 recessed holes for mounting. The holes are not through holes and require drilling before mounting. Chose the appropriate holes to be used and drill with a 5/32 (.156) inch bit. Use #6 screws only. Use the provided #6-32 x 1" flat head screw if upper-left corner base mounting hole (near receive coil) is used.

7. O-ring - After the MaxiProx is mounted, install the rubber o-ring by stretching it around the reader base and placing it in the groove located along the outer edge.

8. Configuration Switches - Set the DIP switches according to the table in the section "DIP Switch Settings".

9. Buzzer - The loud buzzer can be disabled by leaving buzzer wire disconnected from "DC+" at pin 2 of TB1. Be sure to properly insulate bare exposed wire end to prevent shorting.

10. Power Supply - The MaxiProx Reader can be operated over the full range of 14-28.5VDC. A linear supply is recommended. Noise from devices such as switching power supplies, computer monitors and arc welders can reduce the read range or make the unit inoperable. Keep these devices at least 10 ft away from the Reader. With the MaxiProx and power supply wired together, apply power to the Reader.

11. Adjustment - If the null indicator LED (DS1) is flashing red after the base mounting is complete, there has probably been some de-tuning due to some metal or cabling behind the MaxiProx. To compensate, loosen the hold-down screws on the round antenna coil, and very slowly adjust the coil position using the knurled nut in the center of the receive coil. Adjust slowly until the LED is a steady green. In some cases this "null" area is very small, and may require some care to find the right position. To find general coil position vicinity, you may need to switch SW1-9 to the "off" (coarse) position, and make a coarse adjustment first. Then switch SW1-9 back to "on" for the final fine adjustment. Re-tighten the hold-down screws with a snug force - do not over-tighten. You'll note that in some cases, the red flashing will come back while the screwdriver is in the vicinity of the round antenna. Simply finish tightening the screws and remove the screwdriver to check the LED's final condition. If there is some trouble getting the unit to show a consistent green null LED, Refer to the "MaxiProx - detailed nulling instructions", below.

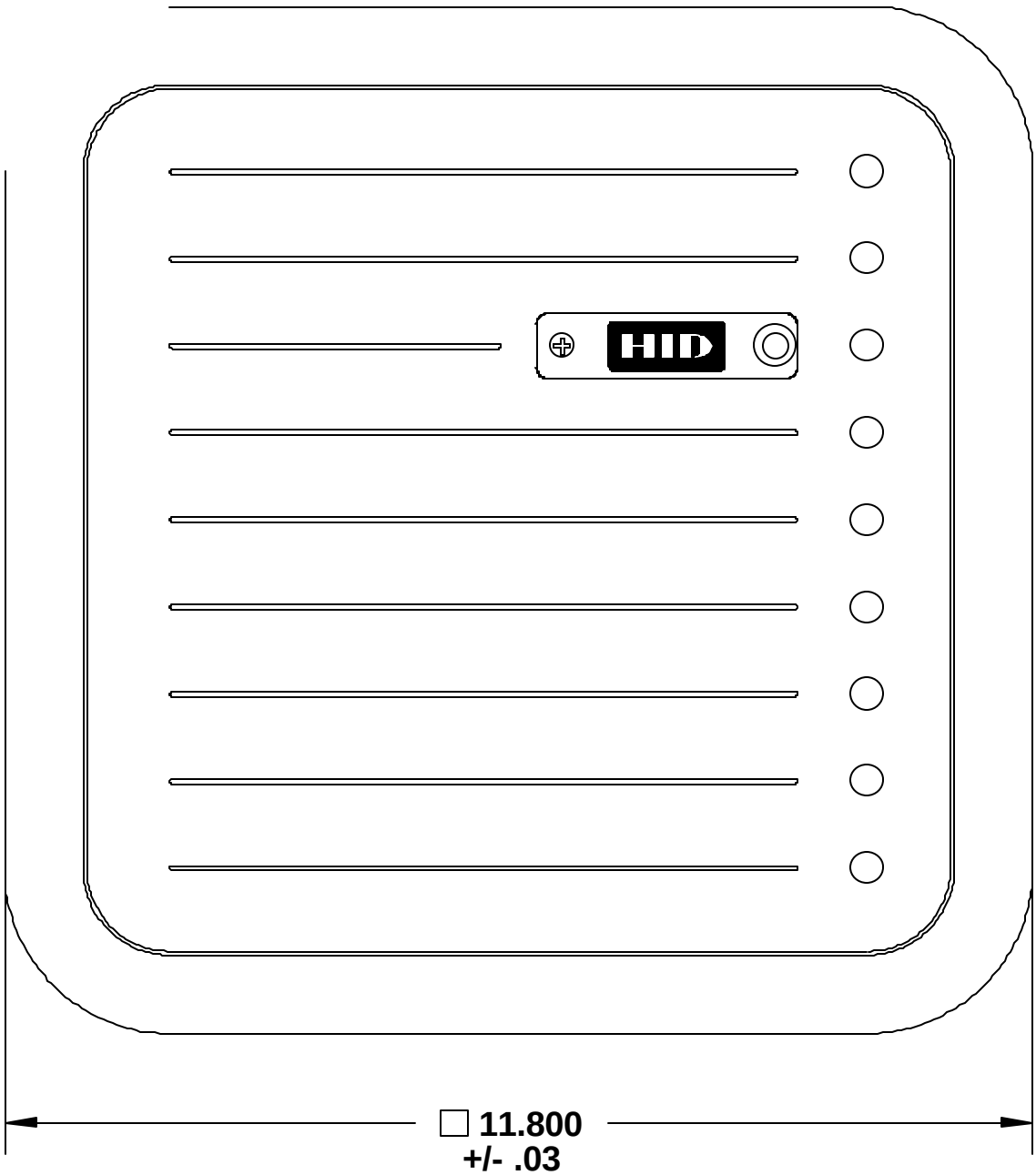
    IMPORTANT- Do not adjust L2 inductor. This is the white barrel-shaped component with heavy gauge wire windings located at the bottom edge of the circuit card. L2 is set at the factory for optimum performance under most conditions. Changes to the setting will reduce read range.

12. Testing - Once the receive coil is adjusted, the Reader can be tested. With the DIP switches in the default positions, power up the Reader, and the LED will display a sequence of flashes and beeps. The flashes and beeps indicate the configuration of the Reader. The sequence indicates the LED control mode and the hardware configuration. Two flashes of green and two beeps followed by a short delay, then one additional flash (beep), is the correct sequence for "Internal LED mode" and "Wiegand configuration". Three initial flashes (beeps) indicate external (Host controlled) LED mode (see switch settings, below). Present a transponder and the LED should

momentarily turn green and an audible tone is sounded, indicating a read of the transponder. If the MaxiProx LED is controlled by the Host, refer to the Host description of the LED operation.

13. Install Cover - Replace the top cover and top cover screw. Make sure that the null indicator LED remains in a steady green state. If the LED is flashing red, remove cover and readjust round antenna coil to provide for a steady green state when top cover is screwed back on. The front label can now be installed over the top cover screw and the null indicator lens.

MaxiProx front view



MaxiProx - Inside view showing mounting hole locations

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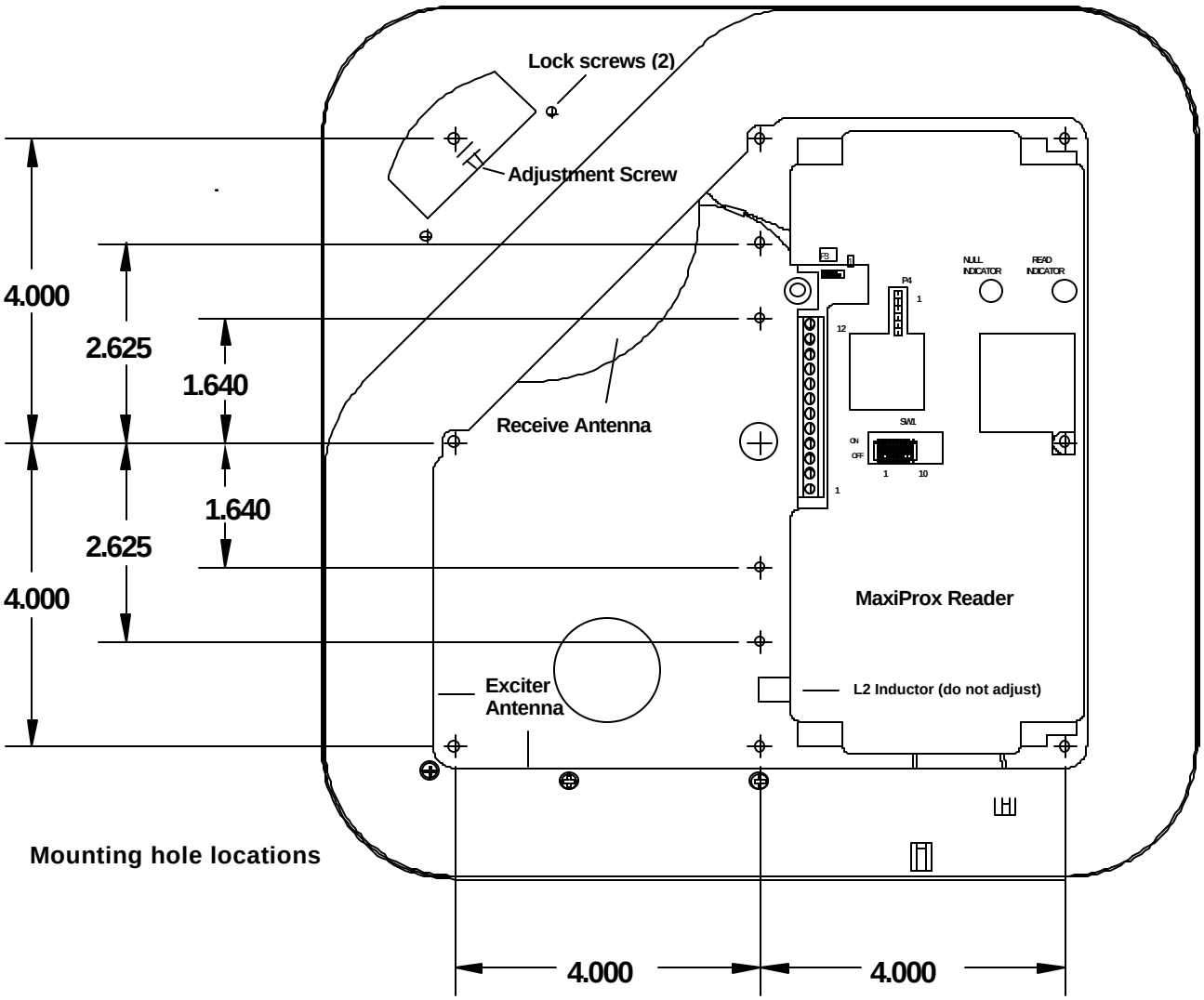


Installation Notes/Guidelines

Power Supply

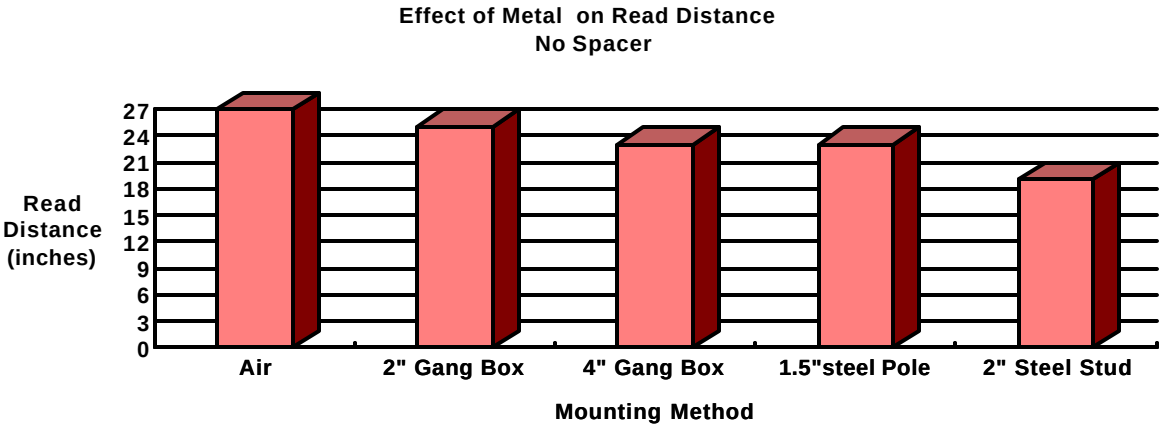
1. The recommended power supply is 24VDC, 2.0A current rating, with linear type regulation. The MaxiProx cycles through varying power stages and has a peak current demand of approximately 1.0A when in long range read mode. Average current consumption is about 200mA. Failure to provide adequate current supply will result in reduced read range.
2. The use of switching power supplies is not recommended for two reasons: This type of supply does not provide adequate response to rapid transient current loads and also generates radio frequency (RF) interference in the same band that the reader receives data. Switching power supplies are often designed to oscillate at 10-20 Khz. The power supply may generate noise that is large enough to be transmitted or conducted to the MaxiProx that interferes with the reception of a card signal. Some switching power supplies are not able to provide adequate regulation to the MaxiProx reader.

Installation near Metal

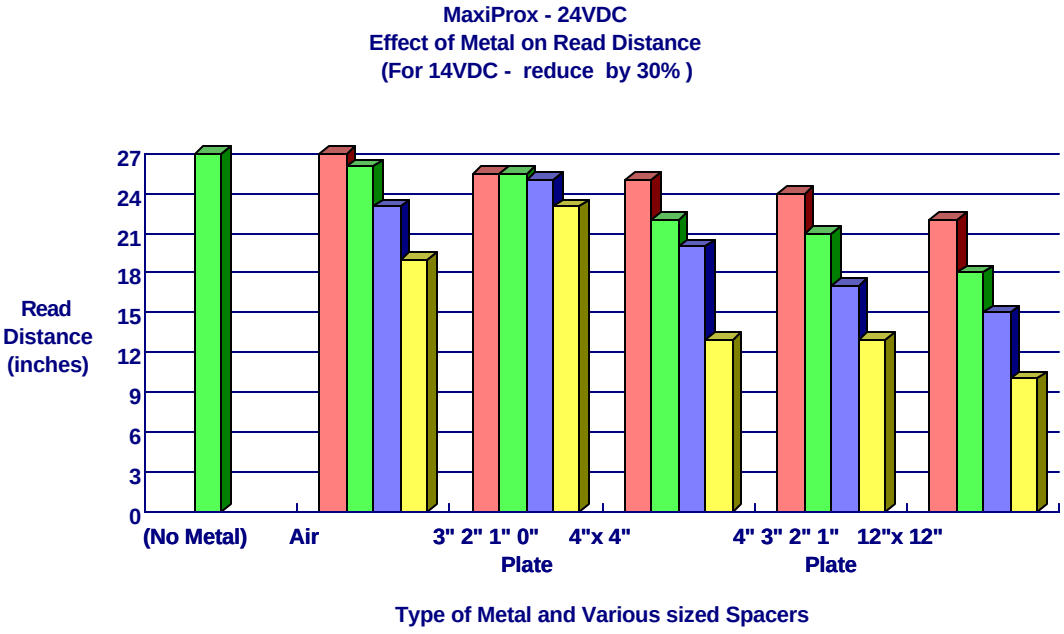
1. Read range will be reduced if located on metal surfaces or in the vicinity of metal objects. The amount of reduction will be a factor of the amount of metal and the distance the reader is from the metal. Metal near the reader absorbs energy from the reader excite field and affects the signal being received from the card by re-directing excite field transmissions into the receiver circuitry. Energy loss is reduced by moving the reader away from the metal objects. Signal interference can be minimized by adjusting the null setting of the signal receive antenna.

2. Try to limit the amount of metallic materials installed near the MaxiProx. Use a plastic electrical box if possible. Avoid installing conduit and other metal hardware within 2 inches of the back of the Reader. The typical read distance specification (26 inches) refers to operation without metal in the vicinity of the Reader. The read distance will be reduced slightly if metal is installed nearby. For an example, mounting the MaxiProx on a steel single gang box reduces the read range about 1.5 inches, a double gang box, about 2.5 inches. If metal in the area of the Reader cannot be avoided, refer to the following graphs for predicting the metal's effect on the performance of the Reader.

3. The MaxiProx generates a magnetic field on all sides of the reader. Any metal that conducts electricity, especially metal that contains iron, steel or copper, will interfere with the field and reduce the effective read range (this will happen even if the metal is behind the Reader). It helps to put a non-metallic spacer between the reader and the metal object. The following graph shows the effect of mounting the MaxiProx directly on some common metal items:



4. The following graph illustrates installation of the MaxiProx on different sized metal mounting plates, and how various sized non-metallic spacers improve the read distance. If mounting on a metal plate larger than 4"x 4" is required, it is recommended that a 2" or larger spacer is used.



Mounting / Installation

1. When fastening the MaxiProx to the mounting surface, do not use a metallic fastener larger than a # 6 screw or bolt inside of the receive antenna (smaller round coil). A non-metallic fastener is preferred for fastening around the receive coil.
2. Avoid mounting the MaxiProx to uneven surfaces. The twisting and flexing of the rear base affects the tuning of the receive antenna. Keep the rear base of the MaxiProx flat and secure.
3. Avoid mounting the MaxiProx in areas of high vibration. The vibration over time will de-tune the excite and receive coils.
4. Avoid mounting the MaxiProx within 60 inches of another MaxiProx. This is either in free space or when mounting to any non-conductive materials. With two nearby MaxiProx readers, the RF fields can either interfere or cancel.

Mounting Applications

1. The MaxiProx may be mounted to a gooseneck that is 1 ½" in diameter with a 4" diameter mounting flange without degradation of read range. The flange should be mounted to a non-metallic adapter that will ease the installation of the MaxiProx to the flange. The read range would not be affected.
2. The MaxiProx may be mounted to a metal plate with a four-inch spacer used to separate the reader from the plate. The read range will be reduced to 15 - 17 inches.
3. The MaxiProx has a read range of 19 inches when directly mounted on/over a 2-inch steel stud.
4. Acrylic, Plexiglas, Lexan (polycarbonate) or other suitable plastics may be found in ½" to 1" stock. Mounting adapters may be fabricated from these materials that would be sturdy and not affect the performance of the MaxiProx.

Cable Notes

1. When using 5 conductor cable, the power supply and Host must have a common ground (voltage reference).
2. 6 conductor cable is required when using the "Hold" function or if the ground for the MaxiProx's power supply is not common with the ground of the Host. Terminal 6, Data Return, is to be connected to the ground of the Host. (Alpha 1296 C or equivalent)

3. 7 conductor cable is required when the "Hold" function is used, and the power supply and Host "ground" are separate. (Alpha 1297 C or equivalent)

4. A 22 AWG twisted pair, shielded, stranded cable is often required for the tamper switch. Follow the recommendations of the manufacturer of the Host system. If the tamper input is a supervised input, the "end of line" resistors may be mounted in the enclosure. Use extreme care and shield any bare wire from the printed circuit assembly and its components. (Belden 9330 or equivalent)

5. The inner diameter of the cable fitting will accommodate a cable with an outer diameter of .260 inches (nominally).

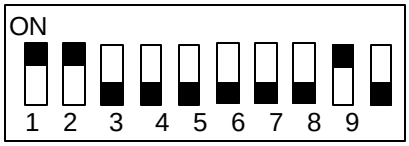
6. The Cable shield should be connected to the Shield Ground on Reader TB1- 6, and left floating at the panel or power supply end of the cable. This configuration is the best for shielding the reader cable from external interference and reducing the likelihood of the Reader causing interference.

Connector Definition - TB1

1	2	3	4	5	6	7	8	9	10	11	12
Buzzer	+DC	Ground	Data0	Data1	Shield Ground	Green LED	Red LED	Beeper	Hold	Tamper Common	Tamper Select
---	Red	Black	Gree n	White	Drain	Orange	Brown	Yellow	Blue	---	---

DIP Switch Settings (Refer to the following diagram showing Switch 1)

Switch Description - SW1



Switch	Default	Description
10) Not Used	Off	---
9) Null Sensitivity	On	Null Indicator LED operates for fine adjust
8) Antipassback	Off	For future use
7) UK	Off	Switch “On” for use in UK
6) Not Used	Off	---
5) Single/Dual LED Control	Off	Single Mode; LED is normally red unless flashed by internal or Host
4) Beeper Control On/Off	Off	; if internal, will beep when LED is flashed green. (ext - alway s enabled)
3) Internal/Ext. LED Control	Off	Internal; LED is controlled by the Reader and can be controlled by the Host
2) Wiegand Data 1 Isolation	On	Not isolated; The pull-up on Reader is connected to 5VDC through 1Koh
1) Wiegand Data 0 Isolation	On	Not isolated; The pull-up on Reader is connected to 5VDC through 1Kohm

1. Open Collector Data Outputs SW1-1&2 - The data outputs may be configured so the MaxiProx is electrically isolated from the Host pull-up resistors. The default (standard) configuration is non-isolated outputs, switches 1 and 2 are "on" . Note: When the outputs are configured as isolated, separate power supplies should be used for the MaxiProx and Host.

3. LED Control SW1-3 - The LED can be controlled by both, the MaxiProx and Host or Host only. Switch 3 in the "off" position selects the MaxiProx and Host control (the default).

4. Beeper Control SW1-4 - The on-board beeper may be enabled or disabled. When enabled, the beeper tone is sounded when the LED is green. Switch 4 in the "OFF" position enables the beeper (the default).

5. LED Mode SW1-5 - Single/Dual Mode. With SW1-5 off (default) it is in single Mode. The LED is normally red, until internal or host control turns it green (only a single control line is necessary). If on, it is in Dual mode , and the LED is normally off (two control lines are necessary for host control of red and green).

6. SW1-6 is not used.

7. UK Mode SW1-7 - It is required that this switch be in the “on” position when the Reader is installed in the UK. The default “off” position is used for all other countries. Note that read distance is reduced when using the MaxiProx in the UK.

8. Anti-pass back Control SW1-8 - Set to default “off” position. For possible future use in configuring the anti-pass back feature.

9. Null Sensitivity SW1-9 - Fine/Coarse nulling Mode. With SW1-9 “on” (default), receive antenna (round coil) null adjustment is in “fine tuning” mode. Use “off” position for “coarse tuning mode”. When the null indicator LED DS1 is green, the position of the coil is correct. Begin null adjustment by selecting “off” position for coarse adjust until LED is steady green. Then select “on” for fine adjust until LED is again steady green. Always leave this switch “on” upon completion of installation. See “Detailed tuning instructions, below.

10. SW1-10 is not used.

Detailed Nulling instructions

Null adjustment: The physical relationship between the receive antenna and the large excite antenna determines the level of signal interference that will occur due to mutual inductance. The MaxiProx is set at the factory for optimum performance in free air or non-metallic mounting. Metal in the vicinity of the reader after installation will alter this relationship and require resetting the null adjustment. **Adjust the receive coil only if the Null indicator is flashing red.** Refer to the drawing showing the inside parts of the MaxiProx, above. The 5375 MaxiProx is adjusted as follows:

1. Locate the receive antenna inside the reader housing. The receive antenna will be in the upper left hand corner of the reader if the reader is positioned with the LED’s on the right side. The antenna is connected to the MaxiProx circuit card with two leads at E1 and E2. The curved portion of the antenna housing is visible extending toward the center of the reader case.

2. Loosen the two Phillips head screws located in the slots above the receive antenna. Move the receive antenna by hand, pushing it towards the center of the reader, to be sure that it is not binding. It should bounce back against the pressure of the spring located inside the antenna assembly.

3. Set DIP switch 9 to the “OFF” position. This setting places the null detect circuitry into the coarse tuning mode.

4. Check the state of the LED marked “NULL INDICATOR”. The LED will be solid green when the null adjustment is optimized. The LED will be blinking red and green if adjustment is required. Turn the adjusting screw in the cutout above the receive antenna to reposition the receive antenna. The antenna is spring loaded; turning the screw clockwise moves the antenna against spring force; turning the screw counter-clockwise allows the spring to move the antenna away from the center of the reader. The antenna may occasionally stick during this adjustment. Move it by hand to be sure it is free to move. The null zone is narrowly defined, the null indicator LED will typically be blinking during adjustment. The rate of blinking decreases as the null position is approached. Tighten the two lock screws after reaching the point where the null LED is solid green. Turn the adjusting screw clockwise by hand until resistance is felt to take up any play in the adjustment.

5. Move DIP switch 9 to the “ON” position. This places the null detect circuit into the fine tuning mode. This is a hardware only switch so power to the reader does not have to be reset for the change in setting to take place. Check the null indicator LED state. Most likely the LED will now be blinking. Loosen the receive antenna lock screws and use the adjusting screw to again reposition the receive antenna. The null zone in the fine sensitivity setting is even more narrowly defined. Usually, only a few turns are required in one or the other directions to achieve proper null in the fine setting. In some cases the amount of metal near the reader prevents signal noise

reduction below the threshold allowed for fine tune indication. Simply adjust the antenna to a position that results in the least amount of red LED flashing. Set DIP switch 9 to the "OFF" position and verify that the LED is still steady green. This condition indicates that the amount of metal near the reader precludes setting the null adjustment to the levels required for the "Fine" tuning indication to be stable. Read range reduction will still be minimal if the LED is steady green in the coarse setting. Tighten the two lock screws just snug enough to hold the receive antenna in position and recheck the null indicator LED. Place the reader cover in position. The null indicator will be visible through the window in the reader cover next to the read indicator LED. The null indicator should still be steady green. Readjust as above if necessary. Normally, only slight adjustments are required if null position is altered by cover installation.

Radio Frequency Interference

Motors and electronic devices generate RF noise that may interfere with the reception of the signal from a transponder. The affect of RF noise is typically a reduction of read range. The MaxiProx is susceptible to RF interference as are all devices that receive RF signals. The read range is affected by the amount of interference (noise) in the area. Common sources of RF interference are power supplies, electrical and electronic equipment, some types of lighting, computers and monitors, motors and generators. Moving the reader to a location known to be free of interference and testing read range there will help to isolate RF interference as a factor in low read range situations. The MaxiProx should not be mounted within six feet of any monitors (VDTs or CRTs) because the scan frequencies of most monitors include frequencies that may interfere with the signal received from the access control cards.

Card types

Card type: The type of card used affects the read range of the MaxiProx. The various styles of HID cards or transponders use different types of antennae. The antenna type will determine the read range for that type of transponder. The ProxCardII provides the longest read range. The IsoProx/DuoProx read at about 20% less distance than the ProxCardII. The ProxKey reads at a distance about 50% that of the ProxCardII.

NOTE: THE ABOVE ARE RECOMMENDED INSTALLATION PROCEDURES. ALL LOCAL, STATE AND NATIONAL ELECTRICAL CODES HAVE PRECEDENCE