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ProxPro® Wiegand/Clock-and-Data

5355/8A
INSTALLATION GUIDE

5355A-900, Rev N.1

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Contents

1 System Overview

The ProxPro® reader is a self-contained proximity reader. The two-piece polycarbonate enclosure has an rubber Gasket that seals the pieces together and a cable fitting that seals the cable entry. The water resistant unit is approved 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. A tamper switch feature is available that will alert the Host when the enclosure is opened. An internal DIP switch makes the configuration of the outputs, audible tone, keypad and LED control options simple.

Installation of the ProxPro reader consists of mounting, verifying the DIP switch settings, setting a tuning jumper and connecting the cable to the Host.

1.1 Operation

Access Cards may be presented to either the front or the back of the reader. Optimum read range is achieved when the access card is presented face on, and parallel to the reader face. The LED is normally controlled by the internal reader firmware. Alternatively, the LED can be controlled by the access control host panel. When the LED is controlled directly by the reader, the LED normal state is red, and indicates that the reader is ready to read an access card. The LED turns green when the access card is read and the message is transmitted to the Host system. When the reader is ready for another access card, the LED returns to red. The typical time the LED is green is 250 milliseconds . The reader only controls the green state of the LED, there is no amber LED state. The operation of the LED may be controlled by the Host. When the LED is host system controlled, the LED and beeper operation may vary depending on the particular host software. The LED may then exhibit a red, green or “amber” color for certain status conditions as controlled by that host’s software.

1.2 Parts List

1	ProxPro Reader	qty 1 (included)
2	#6-32 x 1 self tapping screws, Type T or 23	qty 2 (included)
3	Installation Manual	qty 1 (included)
4	Cable Fitting	qty 1 (included)
5	Cable, 5 conductor, 22awg (Alpha 1295 C or equivalent)	as required (max. 500 feet) See cable notes
6	Cable, 20 conductor, 22awg (Alpha 1299/20C or equivalent)	as required (max. 500 feet) See cable notes
7	DC Power Supply 12V/100mA or 24V/120mA	1 (Installer supplied)
8	Recommended power supply in the E.U. is the Micro State Electronics Model PS-5	

2 Installation Procedure

1. Determine an appropriate **mounting position** for the reader. The reader drawing below is actual size and may be used as a template. Install a single or double gang electrical box or drill the appropriate mounting for #6 fasteners. If mounting to a metal surface, drill two 7/64 (.109) inch holes and use the enclosed self-tapping screws for mounting.
2. **Route** the interface **cable** from the reader and/or power supply to the Host.
3. **Prepare the cable** by cutting the cable jacket back 2 (two) inches and strip the wires 1/4 inch. Tinning the wires is not required.
4. Pry off the center faceplate by placing a thin blade into the grove that outlines the face of the reader. **Use care to avoid scratching the surface of the reader.** The faceplate is attached to the reader by friction only. The screws that hold the enclosure pieces together will be exposed. Loosen the four screws to open the enclosure (the enclosure screws are captive to the cover).
5. **Install the cable** fitting on the rear of the reader. Feed the cable through the cable fitting; tighten the fitting nut so the cable jacket is flush with the printed circuit board. Dress the cable conductors and connect the reader to the Host according to the terminal descriptions in the dimension diagram and wiring table. The descriptions are on the PCB guard in the reader. Connect the drain line of the shield to terminal 2 (Power Supply Ground). Terminal 5, Data Return, is to be connected to the ground of the Host if the power supply ground is not common with the Host. The opposite end of the drain line should be cut flush with the jacket and left disconnected.
6. If the **tamper feature** is available on the Host, connect the tamper switch using the connections recommended by the Host documentation. The switch is a single pole, double throw. When the inner reader cover is removed, the tamper switch is released. The TB1 connections to the tamper switch are pins 10 and 11. Pin 10 is the common contact of the switch and pin 11 is either the normally open or closed. Jumper P3 selects the contact of the tamper switch, either the normally closed or the normally open contact. The default position is P3 across pins 1 and 2. This selects the normally open contact on TB1 pin 11. If the normally closed contact is required, move P3 across pins 2 and 3. (Note - “normally open and normally closed refer to the Pin 11 status while the cover is removed.) The contacts are rated for 100mA at 35 VDC.
7. **Mount the base** of the reader that holds the electronics to the gang box or surface using the two holes located on the center axis of the reader. Two #6-32 x 1 inch screws are provided for mounting to a gang box or metal surface.
8. Set the DIP switches according to the table in the section, **DIP Switch Settings**.
9. Place the jumper on P1 between pins 1 and 2 when **mounting to a metallic surface** or to a junction box with a metal cover plate. Otherwise, the jumper should be between pins 2 and 3, the default position.
10. After wiring the Reader and power supply, the Reader is ready to be tested. **Power up the Reader** and the LED and Beeper will flash and beep 3 times in a sequence of two short delays and one long delay. This indicates that the micro-controller unit is working properly. If the switches have been set for external control only, the Reader will 3 shorts and a long. Present an ID card to the Reader and the LED should momentarily turn green, indicating a read of the card. If the Reader LED is controlled by the Host refer to the Host description of the LED operation.
11. **Replace the top cover** and faceplate.

3 Wiring

3.1 Standard Wire Connections

TB1										
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
+DC	Ground	Data0/ Data	Data1/ Clock	Shield Ground	Green LED	Red LED	Beeper	Hold/ Card Present	Tamper Common	Tamper Select
Red	Black	Green	White	Violet	Orange	Brown	Yellow	Blue	--	--

3.2 Buffered Direct Wire Connections – Option D

10	**11**	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**E9**	**E10**
Tamper Common	Tamper Select	+DC	Ground	Row 1	Row 2	Row 3	Row 4	Column 1	Column 2	Column 3	Select Low
Red / Black	Red / Green	White / Red	White / Black	Gray	Violet	Red / Yellow	Pink	Tan	White / Blue	White / Green	White / Yellow

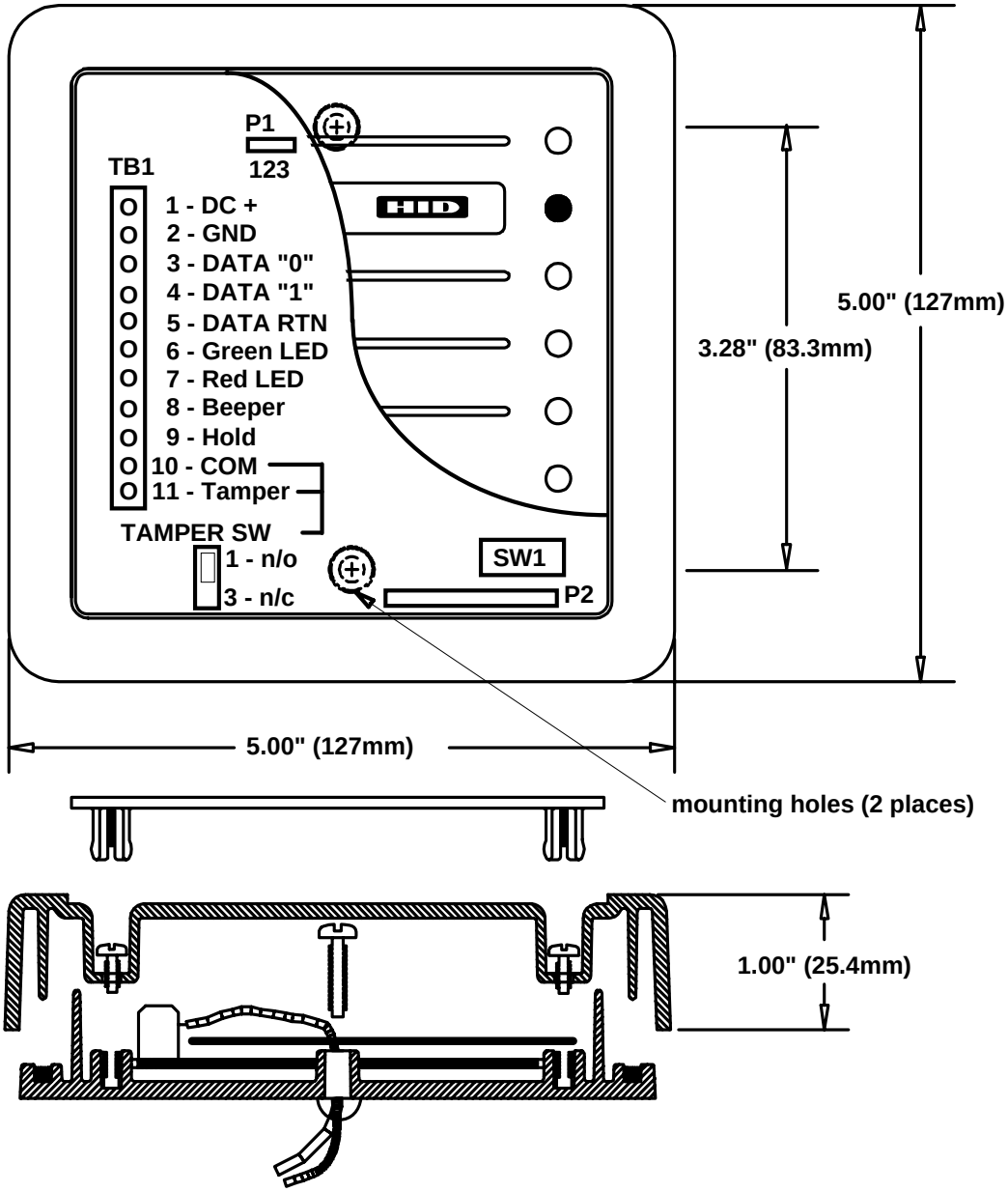
3.3 Direct Wire Connections – Option S

TB2						
1	**2**	**3**	**4**	**5**	**6**	**7**
Row 1	Row 2	Row 3	Row 4	Column 3	Column 2	Column 1
Red	Black	Green	White	Drain	Orange	Brown

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 controlling the red and green LED. (Alpha 1296 C or equivalent)
3. **7 conductor cable** is required when both green and red LED's are controlled by the Host 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.
5. The inner diameter of the cable fitting will accommodate a cable with an outer diameter of **.300** inches (nominally).
6. **Connect cable shield** by connecting drain wire to TB1-2 ground. Leave foil and drain wire disconnected at host end of cable by cutting them off at the end of the cable jacket.
7. When using the Buffered Direct Connect ProxPro with a **20 conductor** cable, DC+ and Power (Red and White / Red wires) must have a common connection to the host +DC power supply. The two ground wires (Black and White / Black) must have a common ground connection to the host +DC power supply.

4 Switch Configuration



Dimension Drawing (Actual Size)

Figure 1 DIP Switch Settings - Switch 1

4.1 Switch 1-1 Hardware Identity

When set in the "on" position the unit is configured for "Wiegand" interface. The "off" position configures the unit for "Clock-and-data" interface.

4.2 Switch 1-2 Audible Tone Control

The Audible Tone (Beeper) may be enabled or disabled to sound when an access card is read. When enabled, the audible tone is sounded when a card is successfully read. When the Beeper is disabled, the only method to activate the Beeper is to use the external Beeper control line. The Beeper will turn on when the control line is switched to ground. Switch 2 in the "on" position enables the audible tone (the default).

4.3 Switch 1-3 Green LED Control

The Green LED can be configured to turn on, or not turn on when an access card is read. Switch 3 in the “off” position selects the Green LED to be turned on (the default).

4.4 Switch 1-4 Keypad Operation

The keypad inputs may be processed by the reader or may be connected directly to the Host. When the keypad inputs are processed by the reader, the reader scans the keypad and outputs the keypad entries over the "Wiegand" interface. When the keypad is connected to the Host, the Host determines which key is being entered. Switch 4 is in the "on" position for the default mode (the keypad inputs are processed by the reader).

4.5 Switch 1-5 Single / Dual LED Control

In Single LED Control the LED is Red. When an access card is read, the LED toggles Green, and then back to Red. Grounding the Green LED Control line will change the LED from Red to Green. The reader maybe configured so the Green LED is externally controlled independently from the Red LED. This is referred to as Dual LED Control. When the Red or Green LED Control line is switched to ground, the respective LED is turned on. If both LED’s are on, the LED appears to glow amber. Switch 5 in the “off” position selects Single LED Control (the default).

4.6 Switch 1-6 and 1-7 Data Output Biasing

The data outputs may be configured as open collector or biased at 5VDC through 1k Ohm resistors by the reader. The default (standard) configuration is output biasing, with switches 6 and 7 "on" .

Note: When the outputs are configured as open collector, the host panel should provide bias voltage at the panel inputs.

	Default Setting	
Not used	on	
Wiegand Data 0 Bias	on	(The Wiegand data outputs are pulled up to +5VDC
Wiegand Data 1 Bias	on	through a 1kOhm resistor)
Single/Dual LED CNTL	off	(Single Line LED Control)
KeyPad	on	(The keypad data is sent on data lines), N/A for D version
Green LED Control	off	(The green LED is enabled when a card is read)
Beeper Control	on	(The beeper is enabled when a card is read)
Hardware Identity	on	(Identifies the unit to be "Wiegand")

Notes:

This section of this document describes the keypad interface. The keypad has twelve keys, four rows by three columns. The characters 0 to 9, # and * are arranged the same as a standard telephone keypad. There are two methods for interfacing to the Keypad.

The first configuration (K version, internal keypad) processes the keypad entries in the reader and then transmits the data to the host system via the Wiegand data lines. The reader outputs each key as an ASCII encoded hexadecimal digit. The decoding of the message sent through the Wiegand interface is the only processing required of the host system. The user interface has been implemented in the most generic fashion to give the integrator the most flexibility.

The Second configuration (S version, direct connect keypad), the host must scan the keypad directly using a separate cable.

5 K Version – Internal keypad processing

Parity and Length options must be factory configured. Contact customer service to enable these options.

5.1 Parity Option

The default does not included parity in the data message. When the parity option is enabled, parity is added to the total message independent of length. The parity coverage is diagrammed below. Each parity bit covers exactly one half of the message.

```
P XXXXXXXX......XXXXXXXXP
EXXXXXXXX...
            ...XXXXXXXXP
```

5.2 Length Buffer Keys Option

The length option chooses the number of key entries that will be buffered before the message is sent to the host. The maximum number of entries is 10 with parity and 11 without parity. When the option is set for multiple entries the reader has a five (5) second timer that will clear all entries after five seconds has expired between entries. The length option requires the user to enter the programmed number of key entries. Upon completion of the last key entry, the message is assembled and sent. Parity is added if the option is set. This requires the system integrator to configure the reader for the number of key entries before installation.

5.3 User Interface

The user is able to press keys at any time. Card reads and key entries are independent of each other, the user is not required to follow any sequence, unless specified by the system integrator. The reader is equipped to give the user audible, visual and tactile feedback when a key is pressed. The amount of time is 5 (five) seconds between key entries when the multiple key entry option is used. If the time expires between key entries, all keys entered are cleared and the user must start the sequence from the beginning.

5.4 Keypad Message

The keypad message follows a basic format. The entries are transmitted in the hexadecimal representation. When parity is added, the message format mimics the "standard 26 bit Wiegand format". The key that is pressed is represented in Hexadecimal with * represented by A (HEX) and # represented by B (HEX).

```
0 = 0000        4 = 0100        8 = 1000
1 = 0001        5 = 0101        9 = 1001
2 = 0010        6 = 0110        * =  1010
3 = 0011        7 = 0111        # = 1011
```

Example without parity:

AAAA BBBB CCCC DDDD ..... KKKK

AAAA = The first key entered

BBBB = Second key entered

KKKK = Eleventh key entered (the maximum)

Example with parity:

A message that has a fixed number of key entries set to 4 and the parity option included.

P AAAA BBBB CCCC DDDD P

A - First key entered

B - Second key entered

C - Third key entered

D - Fourth key entered

P - Parity Bits

The whole message is similar to the "Standard 26 Bit Wiegand" formatted message. The format consists of two parity bits at the opposite ends, one odd and the other even. Each parity bit covering exactly one-half of the message.

P X X X X X X X X . . . . . X X X X X X X X P

E X X X X X X X X . . .

. . . X X X X X X X X P

5.5 Keypad Scanning 2 of 7

This mode requires a separate cable to be supplied that connects to the Keypad board, inside the ProxPro, to the Host via P2. P2 is a 7 position terminal strip. Switch 1-4 (SW1-4) should be switched to the “off” position. The reader will then NOT process the keypad data, and it will be decoded by the host in 2 of 7 format.

The keypad has a matrix of contacts corresponding with the matrix of keys. The contact outputs are wired to the seven terminals of P2. The seven terminals are called P2-1 thru P2-7 and provide the 2 of 7 decode of the buttons. When a key is pressed, the button closes two contacts that pull 2 lines to ground. This results of the key entries are in the table below. The reader and the host that is scanning the keypad will require a common signal ground. The connection is to be made on either pin 2 (power supply ground) or 5 (Data Return) of TB1 of the ProxPro.

This method of interfacing the keypad requires additional processing by the host. These include the de-bouncing of the keys, decoding of the keypad, and timing between key entries, as well as others depending on the Host. The 2 of 7 format is available on the ProxPro 5355XX**K**XX versions.

5.6 Key Pad Data Table 2 of 7

Key #	Terminal Number						
	P2-1	P2-2	P2-3	P2-4	P2-5	P2-6	P2-7
1	LO	HI	HI	HI	HI	HI	LO
2	LO	HI	HI	HI	HI	LO	HI
3	LO	HI	HI	HI	LO	HI	HI
4	HI	LO	HI	HI	HI	HI	LO

Key #	Terminal Number						
	P2-1	P2-2	P2-3	P2-4	P2-5	P2-6	P2-7
5	HI	LO	HI	HI	HI	LO	HI
6	HI	LO	HI	HI	LO	HI	HI
7	HI	HI	LO	HI	HI	HI	LO
8	HI	HI	LO	HI	HI	LO	HI
9	HI	HI	LO	HI	LO	HI	HI
*	HI	HI	HI	LO	HI	HI	LO
0	HI	HI	HI	LO	HI	LO	HI
#	HI	HI	HI	LO	LO	HI	HI

HI represents a voltage of +5 volts in reference to the ProxPro ground.

LO represents the ProxPro ground.

Note: The system is to be used on a single point ground system.

6 S Version – Direct connect keypad scanning

The ProxPro reader is available with a 3 x 4 matrix keypad. The keypad is independent of the ProxPro reader and only provides the connections to the keypad. This mode requires a separate cable to be supplied that connects to the Keypad board, inside the ProxPro, to the Host via P2. P2 is a 7 position terminal strip. The following is the table for the contact closures.

This table indicates the connection between the connector pins when a key is pressed. For example, if key 3 is pressed P2-5 is connected (shorted) to P2-1. This is available on the Serial ProxPro 5355XX**S**XX versions.

Rows	Columns		
	P2-5	**P2-6**	**P2-7**
P2-1	3	2	1
P2-2	6	5	4
P2-3	9	8	7
P2-4	#	0	*

7 D Version – Buffered direct connect keypad scanning

The ProxPro reader is available with a 3 x 4 matrix keypad. The keypad is independent of the ProxPro reader and only provides a voltage output from the keypad. This mode requires a separate cable to be supplied that connects to the Keypad wiring to the host. This method of interfacing the keypad requires additional processing by the host. This includes toggling the select low line to ground to enable the keypad, debouncing of the keys, decoding of the keypad voltages, timing between key entries, as well as others depending on the host.

This table indicates the voltage on the keypad wires when a key is pressed. This is available on the Buffered Direct Connect ProxPro 5355XX**D**XX versions.

Table 1 Buffered Direct Connect KeyPad Data

Key #	Wire Colors						
	Gray	Violet	Red / Yellow	Pink	Tan	White / Blue	White / Green
1	LO	HI	HI	HI	LO	HI	HI
2	LO	HI	HI	HI	HI	LO	HI
3	LO	HI	HI	HI	HI	HI	LO
4	HI	LO	HI	HI	LO	HI	HI
5	HI	LO	HI	HI	HI	LO	HI
6	HI	LO	HI	HI	HI	HI	LO
7	HI	HI	LO	HI	LO	HI	HI
8	HI	HI	LO	HI	HI	LO	HI
9	HI	HI	LO	HI	HI	HI	LO
*	HI	HI	HI	LO	LO	HI	HI
0	HI	HI	HI	LO	HI	LO	HI
#	HI	HI	HI	LO	HI	HI	LO

HI represents a voltage of +5 volts in reference to the ProxPro ground.

LO represents the ProxPro ground.

Notes:

1. The system is to be used on a single point ground system.
2. On the Buffered Direct Connect toggle Select Low (White/Yellow) wire to ground to enable the above keypad outputs.

8 Specifications

8.1 Read Distance – using PROXCARD II®

Over all Operating Limits, minimum (@12VDC))	5.0 inches (12.7 cm)
Non-Metallic Mounting, typical (@12VDC)	8.0 inches (20.3 cm)
Mounted on Metal, typical (@12VDC)	5.5 inches (14 cm)
Overall Operating Limits, minimum (@24VDC)	5.5 inches (14 cm)
Non-Metallic Mounting, typical (@24VDC)	9.0 inches (23 cm)
Mounted on Metal, typical (@24VDC)	6.0 inches (15.2 cm)

8.2 Environmental Characteristics

Designed for listing under UL 294 “Standard for Access Control System Units”	
Operating Temperature Range	-30°C to 65°C (-22°F to 150°F)
Storage Temperature Range	-40°C to 85°C (-40°F to 185°F)
Operating Humidity Range	5% to 95% non-condensing
Operating Vibration Limit	.04 g^2/Hz 20-2000Hz
Operating Shock Limit	30g, 11mS, Half Sine
Enclosure Material	UL Recognized Lexan® Polycarbonate
Weight	11.3oz (310gms)

8.3 Power Requirements

Power supply	Linear type recommended
Operating Voltage Range (+DC)	10VDC -28.5VDC
Maximum Average Current 12V/24V	90mA/155mA
Transient Protection (all terminals)	UL 294
Reverse Voltage Protection	YES
Input Voltage (maximum data-0/1 lines)	28.5VDC
Input Voltage (maximum interface lines)	28.5VDC

8.4 Option D – Buffered Direct Connect Keypad

Operating Voltage Range (+DC)	10VDC -26VDC
Input Voltage (Maximum Data – 0/1 Lines)	14VDC
Input Voltage (Maximum Interface Lines)	14VDC

8.5 Operating Parameters

Excitation Frequency	125KHz
Duty Cycle (alternate power level rate)	20% @ 60mS period
Read and Report Speed (26 bit Wiegand Card)	175mS
Maximum Cable Distance to Host	500 feet (152 meters)
LED Type	Bi-colored Red/Green
LED Operation (host control of red/green)	<.5V on LED control line
Beeper Operation (host control)	<.5V on beeper line
LED Control (default)	internal/single
Beeper Control (default)	Beeper enabled
Anti-Pass Back Delay (default)	1 second
Wiegand Data Pulse Widths (default)	40uS
Wiegand Data Interval (default)	2mS

➢ Clock/Data bit time	1.5ms (default)
➢ Clock/Data strobe width	bit time/3 (33% of bit time), default = 500us
➢ Clock/Data clock/strobe is valid present is	1.5ms (one clock cycle, min) after card

Asserted data is valid 10us (min) before the negative edge of clock/strobe card present returns to the high level 50 ms (max) after the last clock/strobe.

9 Product Configuration / Ordering Options

5355 A G N 00 -XXXX Y

- XXXX — Customer Custom Artwork or Firmware Number 1 through 9, A through Z
- 00 — Customer Custom Number
- N — Configuration Options - (00 standard)
- A — Standard Hardware Options - N = None, K = Standard Keypad (internal or 2 of 7), S = Direct Connect Keypad (3 x 4 type), D = Buffered Direct Connect Keypad (3 x 4 type)
- G — Color - G = Gray, B = Beige
- Y — Model Number Suffix
- 5355 — Model Number 5355 = ProxPro Wiegand; Model Number 5358 = ProxPro Clock/Data

Final Assembly Number = 5355-300-XX Changes with Revisions

- FCC Compliance Statement: 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. 2) This device must accept any interference received, including interference that may cause undesired operation.
- For proper regulatory compliance, the drain wire should be disconnected at the power supply end of the cable.
- The Reader is intended to be powered from a limited source output of a previously certified power supply.
- Changes of modifications not expressly approved by the responsible for compliance could void the user's authority to operate the equipment.

Note: The above are recommended installation procedures. All Local, State and National Electrical Codes take precedence.

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