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SWH-6000, SWH-6000PCB

SWH-6100 and 6200 Contactless Multi-Technology 125 KHz and 13.56 MHz Reader

Installation Guide

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Johnson Controls

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Overview

This chapter provides an overview of the Software House SWH 6100 and 6200 readers.

In this chapter:

Introduction

The SWH-6100 and SWH-6200 contactless readers read Proximity Cards and Smart Cards at frequencies of 125 KHz and 13.56 MHz. The SWH-6200 reader has a built-in keypad with 12 keys, including CMD/ENTER and CE (Clear Entry). The reader outputs the PIN code in an 8-bit burst Wiegand format. The reader can read and verify the PIN on Smart Cards if enabled with the use of program cards.

Reading Capability

The readers can read unencrypted serial numbers and encrypted MIFARE programmed sectors. Refer to Supported Proximity Formats on Page 13 for a complete list of compatible standards and data.

OSDP Functionality

The SWH-6100 and SWH-6200 contactless readers support OSDP functionality.

Features

Software House SWH 6100 and 6200 readers contain the following features:

- Universal compatibility with most 125 kHz Prox (including all HID® Prox formats), all ISO 15693, and ISO 14443A credentials (badges, disk tags and key fobs).
- Reads 125 kHz and 13.56 MHz credentials in the same reader.
- Reads U.S. Government PIV, TWIC, and CAC cards simultaneously with PIVI (PIV Interoperable) and PIV cards.
- Electrical protection (reverse polarity diode protection on power lines).
- Data lines: high-speed transient voltage suppressor diodes.
- IP65-rated sealed electronics for deployment in both interior and exterior environments.
- Integrated reader tamper protection.
- PIV-I Support - The reader supports reading of a PIV-I (PIV-Interoperable) card. With a PIV-I card, the Agency code, System code and Credential number are all set to 9s. The reader senses this and outputs the full UUID (Universally Unique Identifier), which is a 128-bit long number. The firmware only supports PIV-I when the 200-bit FASC-N output is selected.
- PIV-C Support - The reader supports reading of a PIV-C (PIV-Credentials) card.
- CAC 5.5 Support - The firmware supports reading the new CAC card from Oberthur, v5.5 and outputs the FASC-N according to the firmware FASC-N setting.
- MIFARE 7-byte CSN Support - The reader firmware will be able to distinguish between a legacy MIFARE Classic card and a “next-generation” MIFARE classic card. The next generation MIFARE cards have a unique 7-byte serial number. When presented to a reader, the next-gen card causes the reader to output a 56-bit CSN. Older cards still output a 32-bit CSN.
- MIFARE DesFire EV1 and EV2 Support - The reader supports serial number or application area (it can copy MIFARE line as 128-bit).
- OSDP 2.1.7 Support - The reader supports OSDP v2.1.7.
- Wiegand Corporate 1000 Support - The reader supports 48-bit Corporate 1000 cards.
- New configuration tool for end-users:
  - Supports firmware downloads.
  - Supports the introduction of encrypted keys to the reader.
  - Supports programming readers with the required key.
  - Supports reading different card formats.
  - Supports conversions from Wiegand to OSDP.

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Technical Specifications

This chapter provides technical specification lists and measurements for the Software House SWH 6100 and 6200 readers.

In this chapter

Technical Specification Table

6000 and 6000PCB

Table 1: Software House 6100 and 6200 Technical Specifications

Cable Recommendations	4 core (minimum), shielded, 22 AWG (minimum) cable.
Connectors	12 position, 3.5mm screw terminals - Plug-In
Certifications	FCC Part 15, CE and UL 294
Open Standards Compliance	ISO 14443A ISO 14443B (Depending on specific implementation) ISO 15693 (including some partially compliant credentials)
Other Standards Compliance	Deister SmartFrame® in both 125 kHz and 13.56 MHz implementations HID® Prox at 125 kHz (All formats)
PIN Code Entry Keys (SWH-6200 model only)	12 (twelve) PIN code entry keys 0-9, Command/Enter, CE (Clear Entry)
Standard Color	Black (light grey is also available; contact your sales representative)
Dimensions with Backplate	4.37" x 3.31" x 1.10" (110.99 x 84.07 x 27.94mm)
Power Supply	9.5 to 25.5 VDC 200mA maximum current
Operator Environments	Indoor Outdoor (Tested to IP65 for outdoor use. IP65 not evaluated by UL.)
Humidity	5 - 90% non-condensing. Tested from 5 - 85% by UL.
Operating Temperature	-13F to +140F (-25°C to +60°C) Tested from -31F to +151F (-35°C to +66°C) by UL.
Index of Protection	IP 65 (IEC 529)
Read Range	1-5" (25mm - 127mm) depending on credential technology and environment NOTE: Read range for credentials of identical technologies may vary depending on tuning and antenna structure of each individual credential.
Standard Wiegand Output	ID Pass-Through Option Serial Number Read Fixed Wiegand bit stream option SmartFrame® encrypted MIFARE Sector read and conversion to Wiegand. 8-bit burst Wiegand PIN code (SWH-6200 model only) PIN-on-card featured (SWH-6200 model only)
OSDP	Complies with OSDP standard 2.1.7

LED Indications Table

Table 2, LED Indications shows the default LED modes. You can change the configuration of the LED modes using the Configuration Tool.

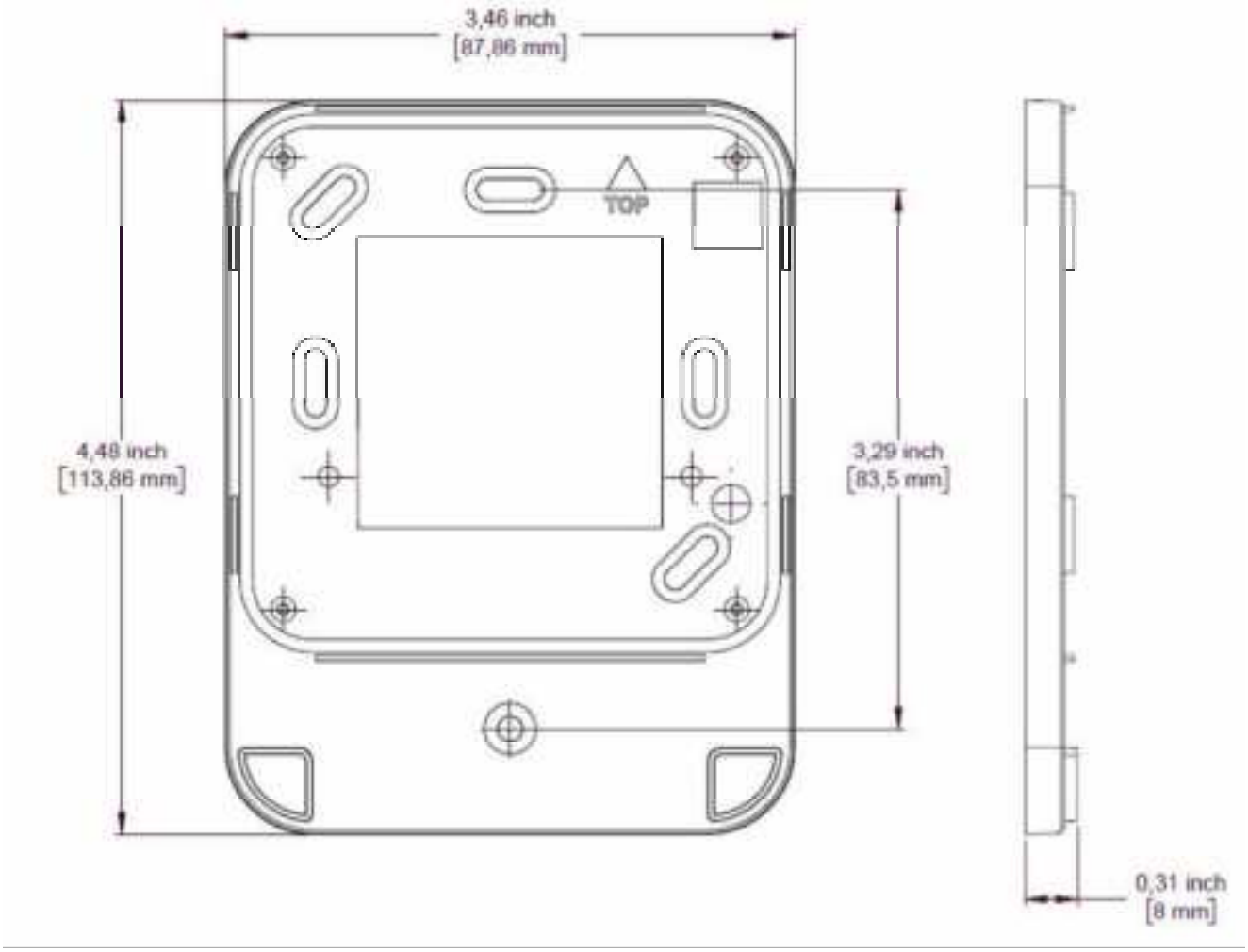
Table 2: LED Indications

LED Color	Mode	Indication
White	On	Reader is powered on and is operational.
	Off	Reader is powered off and is not operational.
Red	On	Access is denied.
	Off	
	Flashing	Door Alert (Forced or Held).
Green	On	Access granted.
	Off	
	Flashing	Access is granted (if User configured).

Measurements

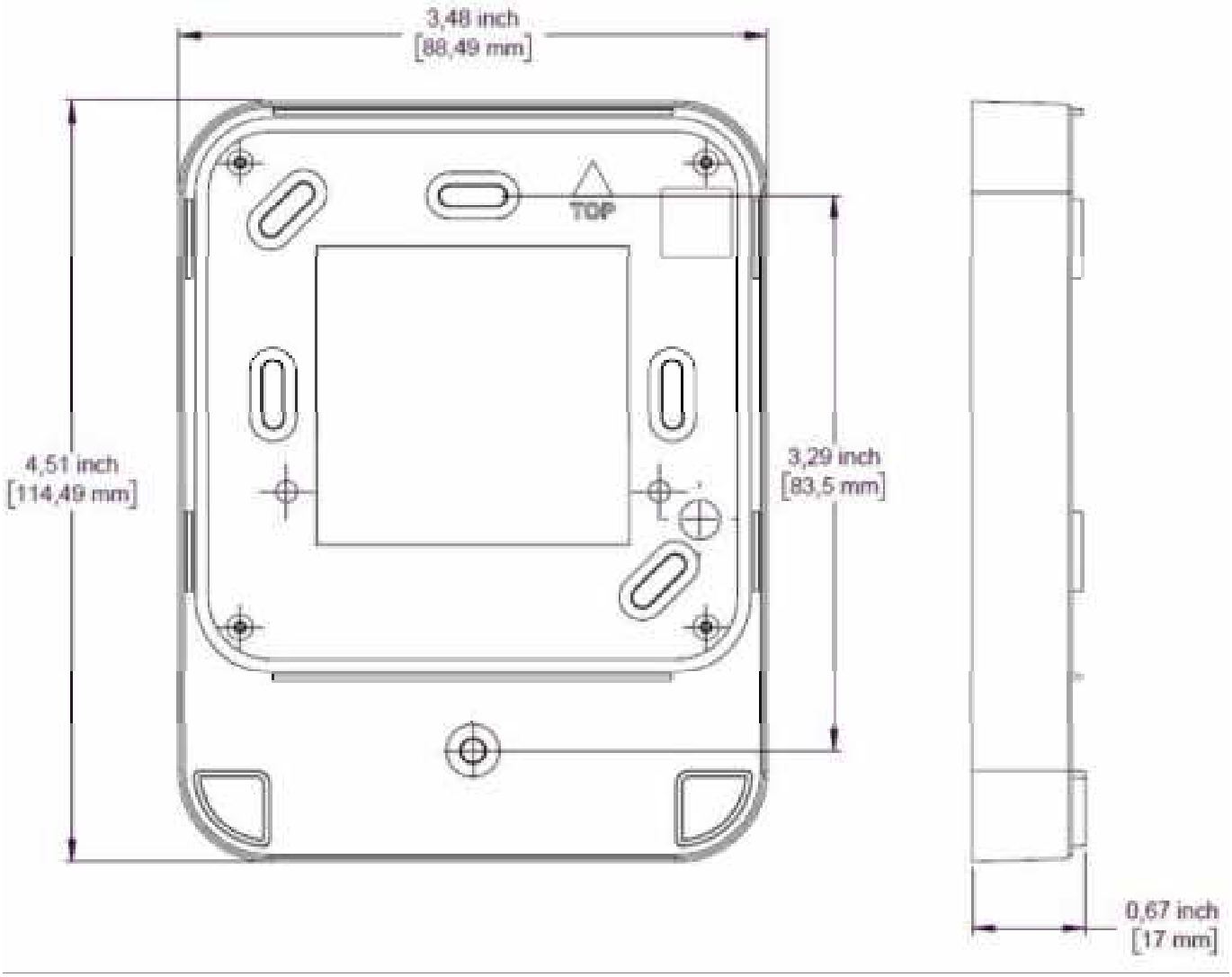
ATL 6-6 Backing Plate Measurements

Use the optional ATL6-6 backing plate for installations on non-metallic surfaces.



ATL 6-15 Backing Plate Measurements

Use the standard ATL6-15 backing plate for installations on metallic surfaces.



Supported Proximity Formats

Software House SWH 6100 and 6200 readers support both 125 KHz and 13.56 MHz proximity and smart card formats, as listed in Table 3, Table 4, and Table 5.

NOTE Mifare and Wiegand 36 have been evaluated by UL.

Table 3: Supported Proximity Formats (125 KHz)

Supported Proximity (125 KHz) Formats	Enabled by default
HID® 26 Bit	Yes
HID® 35 Bit Corporate 1000	Yes
HID® 48 Bit Corporate 1000	Yes
HID® 36 Bit Wiegand	Yes
HID® 37 Bit Wiegand	Yes
Other HID® Pass-through Formats	Yes
Deister Prox SmartFrame®	Yes
(GE) Casi Rusco ProxLite	Yes
Kantech ioProx	Yes

Table 4: Supported Smart Card Formats (13.56 MHz)

Supported Smart Card (13.56 MHz) Formats	Enabled by default
MIFARE® Sector	No
MIFARE® Serial number, 32 bit	Yes
MIFARE® Serial number, 56 bit	Yes
MIFARE® Plus Serial number, 56 bit	Yes
MIFARE® DesFire® Serial number, 56 bit	No
MIFARE® DesFire® EV1 Serial number, 56 bit	No
MIFARE® DesFire® EV2 Serial number, 56 bit	No
iCLASS® ISO 15693 Serial number, 64 bit	Yes

Table 5: Supported US Government HSPD-12 Smart Card Initiative Formats (13.56 MHz)

Supported US Government HSPD-12 Smart Card (13.56 MHz) Formats	Enabled by default
PIV, TWIC, CAC, FASC-N Read	Yes (200-bit output)

Table 5: Supported US Government HSPD-12 Smart Card Initiative Formats (13.56 MHz) (continued)

Supported US Government HSPD-12 Smart Card (13.56 MHz) Formats	Enabled by default
PIV-I, 128 bit, GUID	Yes (if 200-bit output is enabled)
PIV-C, 128 bit, GUID	Yes (if 200-bit output is enabled)

Wiring Distances

Table 6 shows the wiring distance for Wiegand with a 12VDC power supply. Table 7 shows the wiring distances for OSDP with a 12VDC power supply.

Table 6: Maximum wiring distance for Wiegand

Wiring Gauge	Maximum Distance Reader to Controller
18 AWG	300 feet (152 meters)
20 AWG	300 feet (91 meters)
22 AWG	200 feet (61 meters)
24 AWG	200 feet (61 meters)

Table 7: Maximum wiring distances for OSDP

Wiring Gauge	Maximum Distance Reader to Controller	Maximum Distance for RS485 Signal
12 AWG	1220 meters	1220 meters
14 AWG	900 meters	1220 meters
16 AWG	575 meters	1220 meters
18 AWG	350 meters	1220 meters
20 AWG	225 meters	1220 meters
22 AWG	130 meters	1220 meters
24 AWG	90 meters	1220 meters

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Installation

This chapter provides installation instructions for the Software House SWH 6100 and 6200 readers.

In this chapter

Prerequisites

Ensure the following prerequisites are met to ensure a successful installation:

1. Shielded cable must be used in electrically-noisy environments.
2. Ensure that there is at least 4 inches (101.6mm) between readers when planning your installation. This is to avoid field interference and double-card reads.
3. Some controllers require the use of a pull-up resistor. Check your controller manual for more information.
4. There is a built-in electronic optical tamper for reporting via OSDP evaluated by UL. A mechanical direct wired tamper board can also be added as an optional component. Refer to your controller manual for wiring the optional mechanical tamper connection to a normally closed supervised input. The mechanical direct wired tamper is not UL evaluated.

Installation

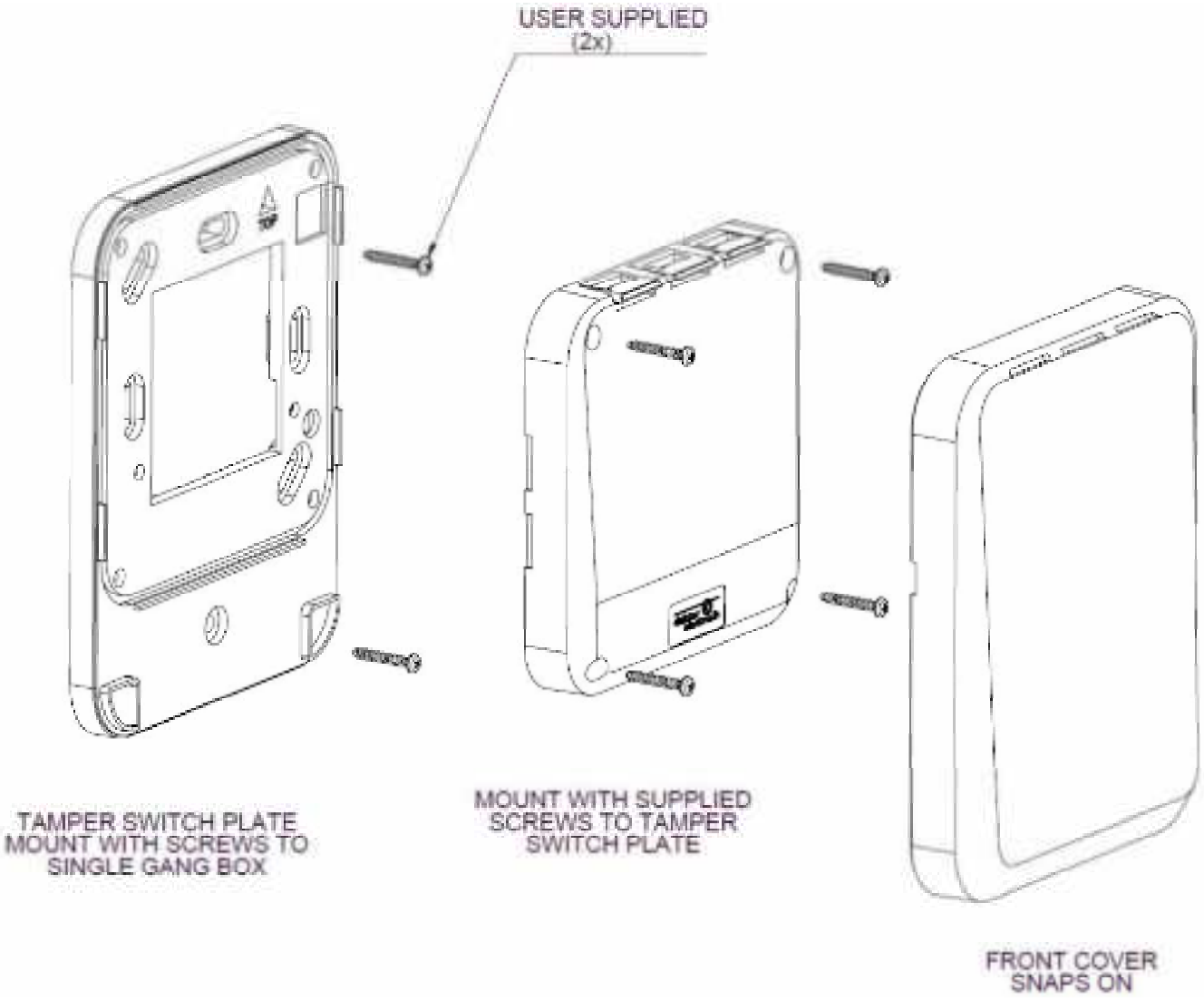
Installing Readers on Non-Conductive Surfaces

Follow these steps to install the reader on concrete, plasterboard, wood, and other non-conductive surfaces:

1. Mount the ATL6-6 single-gang backplate, with tamper magnet installed, to the surface. See Installing Readers on Metallic Surfaces on Page 19 if mounting the reader on a metallic surface.
2. Screw the reader module to the backplate with the supplied screws.
3. Align the front cover with the backplate and reader module and snap it in place.

NOTE The backplate mounting holes fit standard US single-width electrical box and standard European (EMEA) electrical box hole patterns.

Figure 1: APT6-6 mounting assembly.



Installing Readers on Metallic Surfaces

Software House recommends using the APT6-15 single-gang backplate to ensure the read range is maintained on a metallic surface. See Table 8 to determine read range for readers mounted on a metallic surface.

Figure 2: APT6-15 mounting assembly.

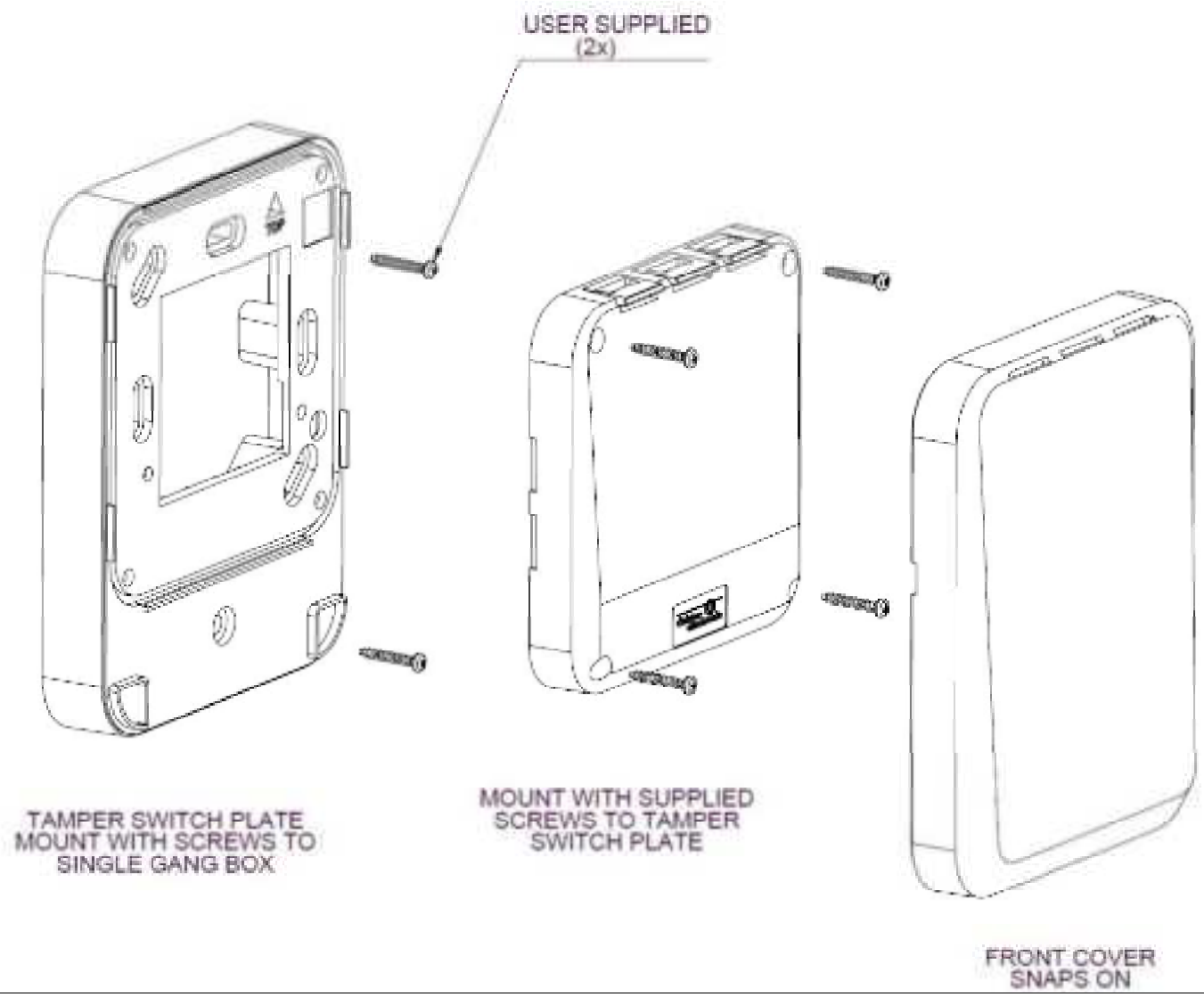


Table 8: Installation distance and backplates recommended for installing readers on metallic surfaces

Distance from metallic surface	Reading Distance for 13.56mhz	Reading Distance for 125khz
15mm using the ATP6-15 backplate	90%	85%
6mm using the ATP6-6 backplate	75%	70%

Installing Readers Back-to-Back or Side-by-Side

Ensure readers are installed with a center-to-center distance of, at least, 4 inches (101.6 millimetres) back-to-back and/or side-by-side to avoid field interference.

NOTE

If two readers are installed back-to-back on a surface less than 4 inches (101.6 millimetres) thick, use a metal separation plate on the surface, then use isolation spacers as required before installing the reader.

Wiring

Software House SWH 6100 and 6200 readers have 12 wiring terminals, as detailed in Table 9. The wiring terminal strip is removable to make wiring and installation easier.

1. Remove 1/8 inch (3mm) of insulation from the end of the wiring to be connected.
2. Push the bare wire into the connector until the insulation is flush with the connector or inside the connector body.

NOTE Ensure the cable insulation is inside the connector body when installing the reader outdoors. This is to prevent water ingress causing the wires to corrode.

3. Tighten the connector screws to secure the wires.

Table 9: Connector Pins for SWH 6100 and 6200

Pin	Description	Pin	
1	External Beeper Control	7	External Green LED Control
2	Ground	8	External Red LED Control
3	Power (9.5 to 25.5 VDC)	9	A - RS485 - used for Flash upgrade and OSDP wiring
4	D1 Wiegand	10	B - RS485 - used for Flash upgrade and OSDP wiring
5	D0 Wiegand	11	Not used
6	Reserved for future use	12	Not used

NOTE Location and wiring methods which should be in accordance with National Electrical Code standards, ANSI/NFPA 70.

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Configuration

This chapter provides information on configuring and upgrading the Software House SWH 6100 and 6200 readers.

In this chapter

Configuring the Reader

Use the Configuration Tool to program the card reader and upgrade the card reader firmware.

NOTE The Configuration Tool is compatible with Windows 10 and up.

Programming the Reader

1. Connect the reader to a Windows computer using a Software House RS485-to-USB connector (SWH-USB-485 or SNG3).
2. Launch the Configuration Tool.
3. Program the reader using the Configuration Tool.

For more information on programming a card reader, refer to *Software House Readers Program Card Use* in the Software House Member Center online.

Updating the Reader Firmware

Firmware design is constantly updated to enhance security and performance. Check the Software House website for the latest firmware.

1. Connect the reader to a Windows computer using a Software House RS485-to-USB connector (SWH-USB-485 or SNG3).
2. Launch the Configuration Tool.
3. Update the firmware using the Configuration Tool.

For more information on upgrading firmware, refer to the *Software House Readers Download Firmware to Reader* document in the Software House Member Center online.

NOTE Firmware updates are not evaluated by UL.

Identifying Firmware and Configuration Versions

A label on the back of the reader identifies the firmware version and configuration version as a code in the following format:

- xxx_x.xx (the first three digits identify the firmware version and the final three digits identify the configuration version).

Another label on the back of the reader contains the detailed programming number for that reader in the following format:

- #xxxxx (the five digits identify the detailed programming number).

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Troubleshooting

This chapter describes how to troubleshoot Software House SWH 6100 and 6200 readers.

Troubleshooting

Use the table to troubleshoot the reader. If a physical component is in doubt, substitute a known good component for the suspected bad component.

NOTE Always verify the reader wiring against the provided wiring information before powering up the reader.

Table 10: Error conditions and possible solutions

Error Condition	Possible Solutions
No LEDs are lighting	Check power connections to the reader. Check reader supply voltage at connector pin 3. Check the ground connection pin 2 is securely connected.
Door does not open and green LED does not light when a qualified credential is presented to the reader	Verify that the green LED is wired correctly. Verify that the access credential has been entered and that the reader has been properly configured in the host system.
The green LED does not light but the door strike unlocks the door when a valid credential is presented	Refer to the appropriate wiring diagram in your controller manual. Disconnect the wire from pin 7 (green LED) and connect pin 7 to pin 2 (ground). If the green LED is lighting, the reader is good and the connection to the reader is defective. If the green LED does not light, replace the reader.

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Compliance

In this chapter:

Standards and Compliance

Canadian Radio Emissions Requirements

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de la classe A est conform à la norme NMB-003 du Canada.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s).
Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference; including interference that may cause undesired operation of the device.

Cet appareil contient un ou des émetteurs/récepteurs exempts de licence conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada.
Le fonctionnement est soumis aux deux conditions suivantes :

1. Cet appareil ne doit pas causer d'interférences.
2. Cet appareil doit accepter toute interférence; y compris les interférences pouvant entraîner un fonctionnement indésirable de l'appareil.

FCC Digital Device Limitations

Radio and Television Interference

This equipment has been tested and found to comply with the limits for a digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and television reception.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment and could create a hazardous condition.

UL Standards Compliance

This reader has been tested by Underwriters Laboratories, Inc. for standard UL 294, Access Control System Units, and has been tested with the iSTAR Ultra controller.

Tamper detection is optical and internal. Optional electro-mechanical tamper board was not evaluated by UL.

Reader must be powered from a UL 294 or UL 603 listed, power limited/Class 2, power supply with appropriate ratings.

The product complies with the following UL 294 performance levels:

Table 11: UL 294 Performance Level Table

Line Security	1
Destructive Attack	1
Endurance	4
Standby Power	1