

V-Station iCLASS™ Fingerprint Reader

May 3, 2006

1. Introduction

The intent of this document is to describe the specifications, operation, and physical attributes of the V-Station iCLASS fingerprint reader, Model Number V-STATION, A, H, manufactured by Bioscrypt, Inc. The device specifications, installation specifications, and connections are provided in detail for system architects and engineers designing access control and other systems utilizing the V-Station iCLASS reader.

2. Description

The V-Station iCLASS reader shall provide a 1:1 fingerprint verification utilizing an embedded numeric keypad and HID iCLASS™ contactless smart card reader that negate the need for external Wiegand input. The V-Station iCLASS shall prevent unauthorized access via loaned, lost or stolen cards or PINs by requiring that the SiteKey stored on the card matches that of the reader and that the fingerprint of the person seeking entry match the identity of the cardholder. The V-Station iCLASS shall also include the ability to implement triple authentication: smart card (what you have), fingerprint (who you are), and numeric password (what you know).

3. Mechanical Specifications

3.1. Dimensions

The V-Station iCLASS reader shall measure 5.63" x 6.63" x 2.63" (142.9 x 168.3 x 66.7 mm) and shall arrive disassembled. The V-Station iCLASS shall be comprised of:

- A. A wall plate that mounts directly to the wall or a triple-gang box mounted in the wall.
- B. The body that mounts to the wall plate.

A 1:1 scale diagram of this wall plate with dimensions is provided in *Figure 1: V-Station iCLASS Wall Mounting Plate*.

3.2. Material

The V-Station iCLASS reader shall be made of PolyIac PA-765A, a high flow grade, flame retardant material to a UL94 V-0 standard. This material shall be used for the case body and the wall mounting plate and shall be an ABS plastic. The “finger mask” that surrounds the fingerprint sensor itself shall be a carbon fiber conductive plastic.

3.3. Fingerprint Sensor

The V-Station iCLASS reader shall incorporate the Authentec, Inc. sensor model AF-S2. The AF-S2 sensor shall be manufactured of silicon and shall be capacitive-based. The sensor surface area shall measure 24 x 24 x 3.5 mm. The sensor shall additionally incorporate Authentec’s TruePrint technology, which utilizes a patented radio frequency (RF) imaging technique that allows the sensor to generate an image of the shape of the live layer of skin that is buried beneath the surface of the finger. For more information on this imaging technology, please visit <http://www.authentec.com>.

3.4. Color

The V-Station iCLASS case shall have a charcoal gray body (ABS Grey – Pantone 426C). Furthermore, the color used in the “bioscrypt” text shall be Pantone 423C.

3.5. Weight

The V-Station iCLASS shall weigh 1 pound, 10 ounces (packaged weight for shipping shall be 2 pounds, 10 ounces).

3.6. Mounting

The wall mounting plate shall be designed to mount to a triple gang electrical box using 6 #6-32 screws in the oval holes. The shape of the holes shall provide for some adjustment to ensure the wall plate is mounted level. The V-Station iCLASS may additionally be mounted onto a wall anchor, wood or sheet metal using #4 flat head screws (thread diameter of <0.125 inch and a head diameter of <0.250 inch) in the 6 outer holes.

The rear of the reader shall protrude past the wall plate and into the wall approximately 1 inch (depending on the Weidmuller connectors attached). The access hole in the wall for wiring **must** be exactly the size of the hole in

the wall plate, or 5.38" x 2.75" (136 x 69 mm). It may be helpful to trace the edges of the hole in the wall plate in pencil.

The V-Station iCLASS body case shall have eight tabs that slide into slots on the wall plate. The body shall be secured to the wall plate by two #4-40 inch screws.

3.7. Mounting Position

The V-Station iCLASS should be mounted on the wall or structure to be in compliance with all American Disabilities Act (ADA), local and federal laws as they apply to the installation. The reader should also be mounted at a height that is comfortable to use. In general, the reader is mounted such that the height of the sensor (top of the device) is between 48 and 54 inches from the ground. Should the reader be installed below this mounting height (i.e., on a turnstile), installation of a wedge piece shall be required between the mounting surface and the V-Station iCLASS wall mounting plate. Please contact Bioscrypt Technical Support for further information.

Furthermore, the reader shall require free space above the reader such that the user has room to place their finger on the sensor. Roughly, 2-3 inches (or more) of free space is recommended depending on if there is any obstruction interfering with the view of the V-Station iCLASS. The reader should also be provided with free space (roughly 3-4 inches recommended) below the device for convenient access to the bottom RJ11 RS-232 port (see *Section 7.2: RS-232 Communications* for further details).

If connecting an external card reader to the V-Station iCLASS for enrollment purposes, the two devices should be placed in close proximity to one another to make it simple for the enrollment administrator to first present the card at the external card reader and then prompt the user to place their finger on the sensor for enrollment. Please see *Section 8.3: External Wiegand Reader* for further information.

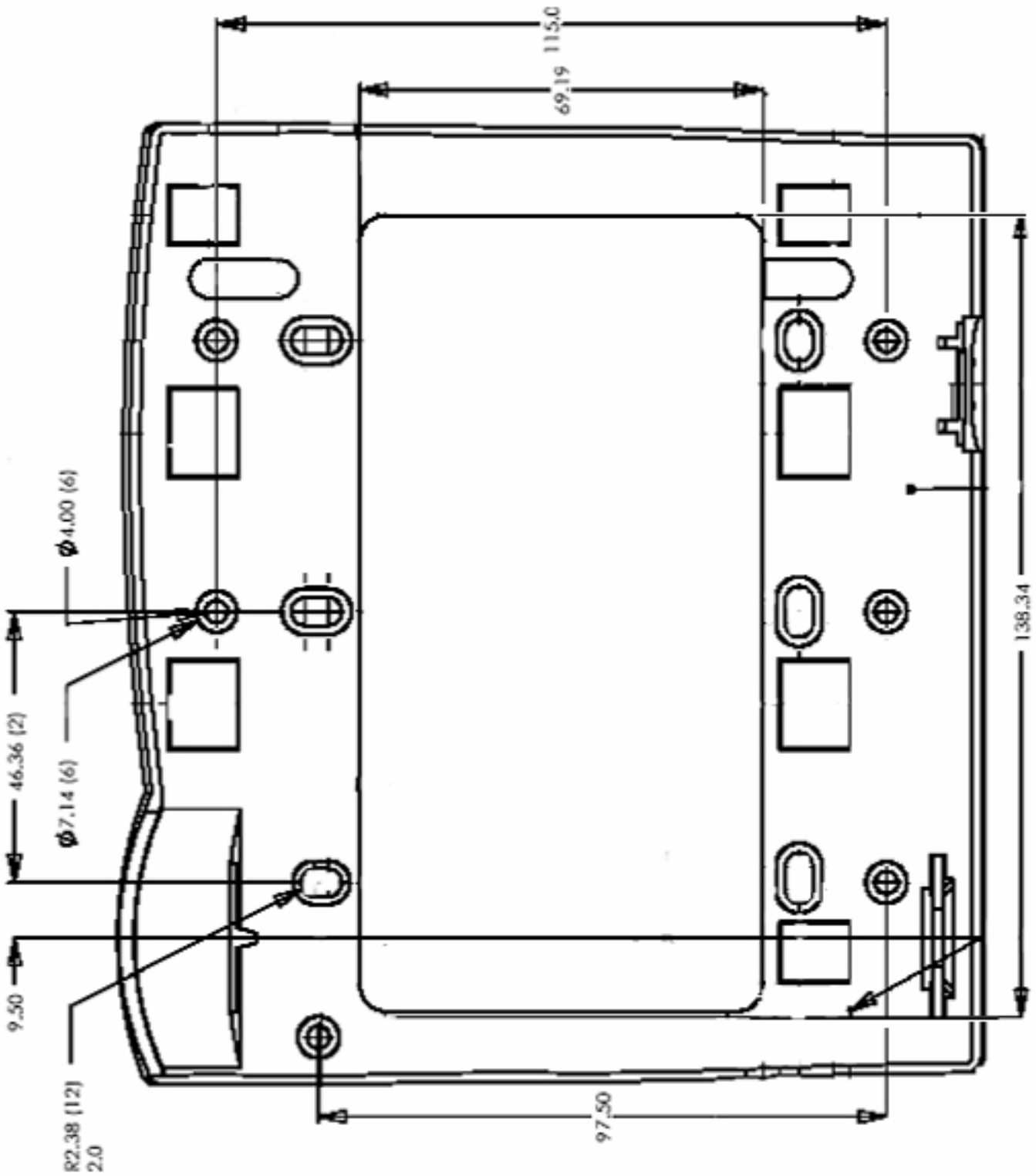


Figure 1: V-Station iCLASS Wall Mounting Plate

4. Certifications and Approvals

The V-Station iCLASS has been tested for compliance with all applicable international standards and shall have the following approvals: FCC, UL294, CSA, cUL, CE under R&TTE. These approvals shall be printed on the labeling located on the rear panel of the reader.

4.1. Frequency

The V-Smart shall include an embedded HID iCLASS™ Model R10 contactless smart card reader. This device shall be a radio-transceiver with the following characteristics:

Operating Frequency Range:	13.553 – 13.567 MHz
RF Power Rating:	0.0 Watts
RF Output Impedance:	50 Ohms

4.2. FCC Class B Digital Device or Peripheral - User's Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- ❑ Reorient or relocate the receiving antenna
- ❑ Increase the separation between the equipment and receiver
- ❑ Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- ❑ Consult the dealer or an experienced radio/TV technician for help

4.3. UL and cUL Information to Users

The V-Station iCLASS shall comply with the Standard for Access Control System Units for UL294 and with CSA C22.2 No. 205 for the cUL Mark. **If using Ethernet as the primary communications port, the product shall comply with**

UL294 if, and only if, the user installs the specified Ethernet Coupler Kit (Bioscript part number 842-00113-00). This kit shall be included with any V-Station iCLASS product.

4.4. CE Information to Users

The V-Station iCLASS shall have the CE mark, for compliance with CISPR22, EN 55022 and EN 50082-1 requirements. For European Union (EU) countries, the V-Station iCLASS shall be compliant with CE under the R&TTE Directive, related to the radio transceivers that are part of its design. **The V-Station iCLASS shall be compliant with this directive if, and only if, the user installs the Bioscript specified R&TTE Installation Kit** (Bioscript part number 832-00103-00). This filter kit shall be included with any V-Station iCLASS product if it was shipped to a country within the EU.

The R&TTE Installation Kit shall consist of two filters: a line filter used to minimize conducted emissions from power supply lead lengths greater than 3 meters and a DB15 "Pass-Thru" filter used to minimize radiated emissions.

Line Filter:	Manufacturer:	JMK Filters Amhearst, New Hampshire USA, 03031 http://www.JMKFilters.com
	Part Number:	FF-1586-1

Pass-Thru Filter:	Manufacturer:	Spectrum Control Fairview, Pennsylvania USA, 16415 http://www.SpectrumControl.com
	Part Number:	56-605-019

NOTE: The installation of these filters is mandatory for the registered CE mark, and associated R&TTE directive compliance to be valid within the European Union. Failure to do so will render the CE mark and consequent right to operate the equipment null and void. Refer to the *Veri-Series Installation Manual: Appendix C* for information on proper installation of these filters.

4.5. European Certification Documentation

The V-Station iCLASS reader shall contain radio transmitters. Hereby, Bioscript declares that the V-Station iCLASS shall be in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Restrictions of Use

Bioscript has notified and gained approval to sell the V-Station iCLASS in the following EU countries. There shall be no restrictions of use for the V-Station iCLASS reader within these countries.

- | | | |
|----------------------------------|------------------------------------|---|
| <input type="checkbox"/> Austria | <input type="checkbox"/> Germany | <input type="checkbox"/> Netherlands |
| <input type="checkbox"/> Belgium | <input type="checkbox"/> Greece | <input type="checkbox"/> Portugal |
| <input type="checkbox"/> Denmark | <input type="checkbox"/> Ireland | <input type="checkbox"/> Spain |
| <input type="checkbox"/> Finland | <input type="checkbox"/> Italy | <input type="checkbox"/> Sweden |
| <input type="checkbox"/> France | <input type="checkbox"/> Luxemburg | <input type="checkbox"/> United Kingdom |

Declarations of Conformity are listed on the following pages for:

- R&TTE Directive 1999/5/EC
- EMC Directive 89/336/EEC
- Low Voltage Safety Directive 73/23/EEC

**DECLARATION OF CONFORMITY
FOR THE R&TTE DIRECTIVE 1999/5/EC**

Manufacturer's Name/Address:	Bioscrypt Inc.
Address:	5450 Explorer Drive, Suite 500 Mississauga, Ontario Canada, L4W 5M1
Contact Person:	Mr. Shiraz Kapadia, Director of Manufacturing Phone #: 905-624-7719 Fax #: 905-624-7742 Email Address: shiraz.kapadia@bioscrypt.com
Equipment Type:	Radio Communications Equipment
Product Name:	V-Station
Model No.:	V-Station, A, H
RF Output Power:	-6.4 dBuA/m 10 meters
Transmitter Operating Frequency Range:	13.553-13.567 MHz
Emission Designation:	20K0D1D
Duty Cycle:	100%
Year of manufacture:	2003
Country Of Manufacture:	Canada
The above product has been tested by UltraTech Engineering Labs Inc., and found to comply with:	European Telecommunications Standards Institute (ETSI) EN 300 330-1 V1.3.1 (2001-06) & EN 300 330-2 V1.1.1 (2001-06); Radio Equipment and Systems; Short Range Devices (SRD); Technical Characteristics and Test Methods for Radio Equipment in the Frequency Range 9 kHz to 25 MHz and Inductive Loop Systems in the Frequency Range 9 kHz to 30 MHz, Parts 1 and 2.
Test Laboratories:	UltraTech EMC Labs Inc. 3000 Bristol Circle Oakville, Ontario, Canada, L6H 6G4

I, the undersigned, hereby declare that the equipment as tested is representative within manufacturing tolerance to units

Manufacturer



Shiraz Kapadia
Director of Manufacturing
Mississauga, ON, Canada
September 9, 2003

Legal Representative in Europe



Neil McDonald
Director of Sales, EMEA
High Wycombe, England
January 6, 2003

DECLARATION OF CONFORMITY FOR THE EMC DIRECTIVE 89/336/EEC

Manufacturer's Name/Address:	Bioscript Inc.
Address:	5450 Explorer Drive, Suite 500 Mississauga, Ontario Canada, L4W 5M1
Contact Person:	Mr. Shiraz Kapadia, Director of Manufacturing Phone #: 905-624-7719 Fax #: 905-624-7742 Email Address: shiraz.kapadia@bioscript.com
Equipment Type:	Radio Communications Equipment
Product Name:	V-Station
Model No.:	V-Station, A, H
RF Output Power:	-6.4 dBuA/m 10 meters
Transmitter Operating Frequency Range:	13.553-13.567 MHz
Emission Designation:	20K0D1D
Duty Cycle:	100%
Year of manufacture:	2003
Country Of Manufacture:	Canada
The above product has been tested by UltraTech Engineering Labs Inc., and found to comply with:	European Telecommunications Standards Institute (ETSI) EN 301 489-1 V1.4.1 (2002-04) & EN 301 489-3 V1.4.1 (2002-08) – Electromagnetic Compatibility and Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services, Parts 1 and 3.
Test Laboratories:	UltraTech EMC Labs Inc. 3000 Bristol Circle Oakville, Ontario, Canada, L6H 6G4

I, the undersigned, hereby declare that the equipment as tested is representative within manufacturing tolerance to units

Manufacturer



Shiraz Kapadia
Director of Manufacturing
Mississauga, ON, Canada
September 9, 2003

Legal Representative in Europe



Neil McDonald
Director of Sales, EMEA
High Wycombe, England
January 6, 2003

DECLARATION OF CONFORMITY FOR THE LOW VOLTAGE SAFETY DIRECTIVE 73/23/EEC

Manufacturer's Name/Address:	Bioscript Inc.
Address:	5450 Explorer Drive, Suite 500 Mississauga, Ontario Canada, L4W 5M1
Contact Person:	Mr. Shiraz Kapadia, Director of Manufacturing Phone #: 905-624-7719 Fax #: 905-624-7742 Email Address: shiraz.kapadia@bioscript.com
Equipment Type:	Radio Communications Equipment
Product Name:	V-Station
Model No.:	V-Station, A, H
RF Output Power:	-6.4 dBuA/m 10 meters
Transmitter Operating Frequency Range:	13.553-13.567 MHz
Emission Designation:	20K0D1D
Duty Cycle:	100%
Year of manufacture:	2003
Country Of Manufacture:	Canada
The above product has been tested by UltraTech Engineering Labs Inc., and found to comply with:	EN 60215:1996 +A1:1996 - Safety Requirements for Radio Transmitting Equipment
Test Laboratories:	UltraTech EMC Labs Inc. 3000 Bristol Circle Oakville, Ontario, Canada, L6H 6G4

I, the undersigned, hereby declare that the equipment as tested is representative within manufacturing tolerance to units

Manufacturer



Shiraz Kapadia
Director of Manufacturing
Mississauga, ON, Canada
September 9, 2003

Legal Representative in Europe



Neil McDonald
Director of Sales, EMEA
High Wycombe, England
January 6, 2003

5. Environmental Specifications

The V-Station iCLASS shall be manufactured for indoor use, and if placed outdoors must be installed within a complete Bioscript certified enclosure to protect the reader against direct contact with the elements, including rain, sun, snow, or excessive moisture. Failure to place V-Station iCLASS readers installed outdoors within such an enclosure will void the warranty.

5.1. Bioscript Enclosure

The Bioscript certified enclosure shall be required for outdoor installations and shall optionally include a heater that shall trigger on when temperatures reach below 24° C (75° F). For further information on the Bioscript certified enclosure, including power requirements and schematics, please contact Bioscript Technical Support.

5.2. Temperature

The electronics and mechanical parts that make up the V-Station iCLASS reader shall be rated to operate in a temperature range of 0° C to 60° C (32° F to 140° F). However, the extremes of this temperature range will not be a comfortable operating range for users of the system. The temperature range for the environment in which the reader will be installed should be limited to 10° C to 50° C (50° F to 120° F). Additionally, the reader should not be placed in direct sunlight or in uncontrolled environments (indoors or out).

5.3. Humidity

The V-Station iCLASS reader shall be rated to operate within a humidity range of 0% to 95% non-condensing.

5.4. Vibration

The environment in which the V-Station iCLASS shall be installed should not subject the reader to vibration.

6. Electrical Specifications

6.1. Weidmuller Connections

The V-Station iCLASS reader shall include three Weidmuller connectors, RJ45 ports, and RJ11 ports for external connections to power and other devices.

Appendix A: Weidmuller Connections lists the connections available on the back plate of the reader. Also, see *Section 7: Communications* and *Section 8: Connections to External Equipment*. For additional instructions on installing the V-Station iCLASS reader, please refer to the *Veri-Series Installation Manual* which shall be provided within the software CD received with the reader.

6.2. Power Requirements

The V-Station iCLASS reader shall operate on DC power between 12.5 and 24 volts, however, operation at 12.5 VDC is recommended. The V-Station iCLASS shall consume approximately a maximum of 12 watts of power:

- At 12.5 VDC the device shall require up to 1 A during operation.

The V-Station iCLASS reader shall require an isolated power supply (not provided with reader). This power supply may be optionally purchased from Bioscrypt. The power supply should be:

- Isolated from other equipment including card reader power, lock power, Access Control System power and other interference-causing or non-Bioscrypt electro-mechanical devices (i.e., power supply should be dedicated to the V-Station iCLASS reader(s)).
- Regulated and filtered.
- Protected by means of an uninterruptible power supply (UPS) or battery backup.
- A UL-Listed Class II power supply at 12.5 VDC, 1 A continuous.

Additionally, the power supply should **NOT** be:

- Connected to any device that may put transients on the power supply line or cause the power supply to behave improperly. If transients are an issue in the installation, a transient voltage suppression device is also recommended.

If power is to be distributed to various V-Station iCLASS readers over some distance, then it is important to take into consideration the resistance of the cable used for power distribution. Since the reader shall require significant power levels, the cable should be of appropriate gauge (18AWG or better is recommended). -(NEG) should be connected to Power GND and +(POS) should be connected to +VDC power input.

6.3. Grounding

The V-Station iCLASS reader shall have various grounding requirements:

- ❑ Power GND [-(NEG)]: the return for the input power supply. -(NEG) shall be connected to the negative on the power supply. Refer to *Section 6.2: Power Requirements* for further details.
- ❑ Wiegand GND [WIEGAND GND]: the reference ground for the Wiegand Data 0 and Data 1 interface. WIEGAND GND shall be connected to the GND on reader port of the Access Control System. Refer to *Section 8.4: Access Control System* for further details.
- ❑ Signal GND [RS-485 GND or RS-232 GND]: the reference for serial communications. SIGNAL GND shall be connected to the GND on the serial port or RS-485/RS-232 converter (dependent on communications protocol selected). Refer to *Section 7: Communications* for further details.
- ❑ Safety GND [EGND]: protects the V-Station iCLASS (sensor and internal electronics) from electro-static discharge (ESD) by providing a safe discharge path to an earth ground. Refer to *Section 8.2: Earth Ground* and *Section 9.7: Fingerprint Placement: Lock, Drop & Hold* for further details.

7. Communications

The V-Station iCLASS shall include support for RS-232 and RS-485 serial communications as well as Ethernet TCP/IP communications. This is primarily intended for use with a PC running the VeriAdmin software, which allows for template management (enrollments, deletions, editions, distribution) and reader configuration. If PC communications are desired for use with an application other than the VeriAdmin software, the BIO-SDK (Bioscript Software Development Kit) shall be required to integrate V-Station iCLASS support into a custom application. Refer to *Section 11: VeriAdmin Management Software* for further details on the software features.

The V-Station iCLASS shall provide the following communications ports:

Host Serial Port

- ❑ Weidmuller RS-485 terminals
- ❑ Weidmuller RS-232 terminals
- ❑ Rear RJ45 RS-485 port
- ❑ Rear RJ11 RS-232 port

Auxiliary Serial Port

- ❑ Bottom RJ11 RS-232 port

Ethernet

- ❑ Rear RJ45 Ethernet Port

The RJ45 Ethernet port and bottom RJ11 RS-232 ports shall always be active and available for use. The bottom RJ11 RS-232 shall be considered an Auxiliary port. Of the remaining ports, one may be configured as the Host Port. By default, the V-Station iCLASS reader will have a Host Port configuration of RS-232 which will allow the user to use either the rear RJ11 RS-232 port or RS-232 Weidmuller terminals. For RS-485 Host Port configuration, please refer to *Section 7.1: RS-485 Communications*.

7.1. RS-485 Communications

The V-Station iCLASS reader shall support RS-485 serial communications protocol accessible from the both the Weidmuller connectors and a RJ45 port implemented as an 8p8c (8-position, 8-conductor) jack. The RS-485 ports are not active by default and must be activated either through the Administrator Mode on the keypad or using through the VeriAdmin software connection to an active port. In addition, an RS-485 switch located on the back plate of the reader must be manually set to the ENABLED position.

Typically, V-Station iCLASS readers do not require RS-485 communication since the fingerprint templates are stored on the smart card itself rather than in the reader's memory; thus, they do not require a network for template distribution. However, if templates will be stored on the reader's local memory (for use with keypad ID entry), then an RS-485 network may be installed for convenient template distribution.

For RS-485 protocol support, an external converter must be utilized. Bioscrypt has tested and qualified the B&B Electronics 485TBLED RS-485/RS-232 converter for use with the V-Station iCLASS reader (must be purchased separately). The B&B Electronics converter connects directly to both the Host PC and to the V-Station iCLASS reader. This converter shall support "sense data," also referred to as "send data".

The RS-485 communications protocol should be chosen if a network of more than one V-Station iCLASS reader is being installed or if a single reader is being installed more than 150 feet from the PC or other host. The maximum cable distance for a RS-485 network is 4,000 feet (1200 meters), over which no more than 31 V-Station iCLASS readers can be added. To extend these limitations, contact Bioscrypt Technical Support. No end-of-line termination is required at a baud rate of 9600. For RS-485 communications, the V-Station iCLASS readers must be connected as follows:

- Use Category 5 rated cable (shielded is recommended). This cable should be dedicated to the RS-485 network connection between the B&B Electronics 485TBLED converter and the V-Station iCLASS readers and should not be used for any other purpose.
- Use five conductors: RS-485 TX(+), RS-485 TX(-), RS-485 RX(+), RS-485 RX(-), and RS-485 GND
- The B&B Electronics 485TBLED converter shall require 12VDC/100mA power from an external supply.
- Connect the B&B Electronics 485TBLED converter to the PC's DB9 COM Port using a DB25-to-DB9 cable.
- Connect the V-Station iCLASS readers in a daisy-chain configuration (i.e., Converter → Reader 1 → Reader 2 → Reader 3, etc.). Do NOT use a star or other multi-drop configurations.

For a wiring diagram and more specific instructions please refer to the *Configuration for Veri-Series Fingerprint Readers and RS-485/RS-232 Converter* application note.

7.2. RS-232 Communications

The V-Station iCLASS reader shall support RS-232 serial communications protocol accessible from both the Weidmuller connectors and a two RJ11 ports implemented as 6p6c (6-position, 6-conductor) jacks. The Weidmuller terminals and rear RJ11 port shall be considered as the Host Port. The bottom RJ11 port shall be considered as the Auxiliary Port. The bottom Auxiliary RJ11 port shall always be active; the Host RS-232 ports shall be active by default, but may be deactivated if the reader is configured to a Host Port of RS-485 (refer to *Section 7.1: RS-485 Communications*).

The Auxiliary RJ11 RS-232 port shall be physically protected by means of a pin-in-hex security screw. Additional security is provided through a password protection feature, which may be activated through the VeriAdmin software.

Additionally, an RJ11-to-DB9 programming cable shall be provided with each V-Station iCLASS reader. This cable is a 6-foot, 6p6c straight-thru cable with an RJ11-to-DB9 adaptor. This cable may be optionally used to configure the reader, perform template management and other functions desired via a local connection. Otherwise, basic reader configuration may be performed via an Administrator Mode accessible through the keypad of the V-Station iCLASS. Please refer to *Section 9.6: Administrator Mode* for further information.

The RS-232 protocol does not run on a differential pair of wires like the RS-485 protocol, and shall therefore be less immune to EMI and other noise sources. The tradeoff for RS-232 shall be speed versus distance. RS-232 communications distances are dependent on the baud rate (bps). For example, at 9600 baud, a distance of 150 feet is possible using shielded cable, but at 57600 baud, a maximum of 20 feet is recommended.

RS-232 communications protocol should be chosen only if a single reader is being installed less than 150 feet from the PC or Host device. For RS-232 communications accessible from the Weidmuller connectors, the V-Station iCLASS readers must be connected as follows:

- ❑ Use Category 5 rated cable (shielded is recommended). This cable should be dedicated to the RS-232 connection between the V-Station iCLASS reader and the PC or host device.
- ❑ Use a female DB9 connector.
- ❑ Connect RS-232 Tx to the DB9 Pin 2.
- ❑ Connect RS-232 Rx to the DB9 Pin 3.
- ❑ Connect RS-232 GND to the DB9 Pin 5.

To create your own RJ11-to-DB9 cable for use with the RJ11 RS-232 Host and Auxiliary ports, the following is required:

- ❑ Use Category 5 rated cable (shielded is recommended). This cable should be dedicated to the RS-232 connection between the V-Station iCLASS reader and the PC or host device.
- ❑ Use a female DB9 connector.
- ❑ Use a 6p6c RJ11 jack.
- ❑ Orient the jack so that the 6 gold pins are facing upward and the jack (or clip) is facing the user. Pin 1 would be on the far left and Pin 6 would be on the far right.
- ❑ Connect the RJ11 Pin 1 (RS-232 Tx) to the DB9 Pin 2.
- ❑ Connect the RJ11 Pin 2 (RS-232 Rx) to the DB9 Pin 3.
- ❑ Connect the RJ11 Pin 5 (Signal GND) to the DB9 Pin 5.

7.3. Ethernet Communications

The V-Station iCLASS reader shall support 10Base-T Ethernet (10 Mbps) communications accessible through an RJ45 port located on the rear plate of the reader. The V-Station iCLASS 10 Mbps Ethernet network shall support distances up to 328 feet (100 meters) between the reader and its network connection (i.e., hub, bus, switch, etc.).

The V-Station iCLASS shall require that a static IP address be assigned that is in accordance with the subnet mask used on the PC. For example, if the subnet mask is 255.255.255.0, both the PC and the V-Station iCLASS must be assigned an IP address of A.B.C.x where A, B, and C are the same for each and x is different. Additionally, the PC's ARP table may need to be set at the command prompt to resolve the Ethernet MAC address to IP Address translation. This last step is not needed on a normal Ethernet network, which consists of more than just a single PC-to-V-Station iCLASS connection. Please refer to the *Veri-Series Operations Manual* for more information on this topic.

Bioscrypt recommends isolating your Ethernet network of readers from computers (other than the administrative Host PC) and other devices to maximize security. A firewall is highly recommended if the network will include other devices or PCs. For obvious reasons, it is not a good idea to expose your network of readers to the outside world (i.e., the Internet).

For Ethernet communication, standard RJ45-to-RJ45 cat5 UTP patch cables should be used. Care must be taken to identify straight-through cables versus crossover cables. To connect a V-Station iCLASS directly to a PC NIC card, a crossover cable must be used. For connecting a V-Station iCLASS to an Ethernet bus or directly to a switch or hub, straight-through cables should be used.

NOTE: If using Ethernet as the primary communications port, the product must be installed using the supplied *Ethernet Coupler Kit* (Bioscrypt P/N 842-00113-00). Refer to *Section 4.3: UL and cUL Information to Users*.

Communication cables for Ethernet logically form a straight-line bus, however, the more devices placed on that bus, the less efficient the network due to increased collisions and the weaker signal due to increased distance. Repeaters may be used to boost signal strength, however a better solution would be placing switches at intermediate positions along the bus. The most common Ethernet topology in use today is the star configuration, with a hub or switch in the center.

8. Connections to External Equipment

8.1. Power

The V-Station iCLASS reader shall require an isolated power supply (not provided with reader). This power supply may be optionally purchased from

Bioscrypt. Two conductors shall be required for this connection [+ (POS) and – (NEG)]. Since the reader requires significant power levels (see *Section 6.2: Power Requirements*), the cable should be of appropriate gauge (18 AWG or better is recommended).

8.2. Earth Ground

The V-Station iCLASS reader shall require a homerun connection to Earth Ground using the Weidmuller terminal EGND. This connection shall help to protect the V-Station iCLASS (sensor and internal electronics) from electrostatic discharge (ESD) by providing a safe discharge path to an earth ground. EGND must be connected to a proper earth ground such as a cold-water copper pipe or building ground. The connection chosen for Earth Ground should measure less than 4 ohms resistance when measured against a known local Earth Ground. DO NOT CONNECT EGND TO POWER GROUND. At a minimum, this connection should be made with a low-resistance, single-conductor cable (14 – 18 AWG is recommended). Internally, EGND is connected to the finger mask (conductive plastic surrounding the fingerprint sensor) and should be used in conjunction with the Ridge-Lock. Refer to *Section 9.7: Fingerprint Placement: Lock, Drop & Hold* for further details.

If no such connection is provided, Bioscrypt will consider that the reader was not properly installed and may consider the warranty void.

8.3. External Wiegand Reader

The V-Station iCLASS reader shall include an embedded HID iCLASS™ contactless smart card reader. The V-Station iCLASS shall NOT have the ability to read proximity Wiegand sequences directly. The V-Station iCLASS by default shall generate a Wiegand output sequence based on the fingerprint template ID number and a pre-configured site code. If using dual-technology contactless smart cards (such as HID iCLASS Prox cards), the designated V-Station iCLASS enrollment station may optionally capture the Wiegand sequence as provided by the proximity portion of the card by means of an external proximity card reader. Once captured, the sequence may be written to the smart card along with the enrolled fingerprint template where the two items are linked together. When the dual-technology cards are used in this fashion, V-Station iCLASS readers used for access control shall simply send the Wiegand sequence from the smart card to the Access Control System. In this case, the Wiegand output sent by V-Station iCLASS shall be identical to the Wiegand output sent by the proximity card reader when the same card is presented to both devices. Any V-Station iCLASS readers used

for access control shall NOT require the connection to the external card reader.

To enroll cards in this manner, a direct connection shall be required from the proximity card reader to the Wiegand input lines of the V-Station iCLASS reader that has been designated as the enrollment station using the following three conductors:

- ❑ Wiegand In 0 connected to the card reader Data 0
- ❑ Wiegand In 1 connected to the card reader Data 1
- ❑ Wiegand GND (Pin 6) connected to the card reader Power GND*

An 18 – 22 AWG cable should be used for this connection. The V-Station iCLASS reader by default shall have the Wiegand input activated for Standard 26-bit Wiegand format. The reader shall support other formats. Refer to *Appendix B: Wiegand Protocol* for further information.

*Wiegand GND should be commoned to both Power GND on the card reader and Power GND on the Access Control System if both Wiegand input and Wiegand output connections are used (refer to *Section 8.4: Access Control System*). Wiegand GND acts as the reference ground for the Wiegand Data 0 and Data 1 interface.

8.4. Access Control System

The V-Station iCLASS reader shall support Wiegand protocol output for connection to a Access Control System (ACS). This system may provide advanced access control features such as audit trails, user-defined access scheduling, anti-passback, etc.

The V-Station iCLASS by default shall generate a Wiegand output sequence based on the fingerprint template ID number, unless a Wiegand sequence has been provided to the V-Station iCLASS reader during enrollment and stored on the smart card. Please refer to *Section 8.3: External Wiegand Reader* for further details.

An 18 – 22 AWG cable should be used for this connection. At 18 AWG, a distance of 500 feet is possible. For Wiegand output the V-Station iCLASS reader shall require a homerun connection to the ACS using the following three conductors:

- ❑ Wiegand OUT 0 connected to the ACS Data 0

- ❑ Wiegand OUT 1 connected to the ACS Data 1
- ❑ Wiegand GND connected to the ACS reader power GND (0 VDC)*

The V-Station iCLASS reader shall by default have the Wiegand output activated for Standard 26-bit Wiegand format. The reader shall support other formats. Refer to *Appendix B: Wiegand Protocol* for further information.

*Wiegand GND should be commoned to both Power GND on the card reader and Power GND on the Access Control System if both Wiegand input and Wiegand output connections are used (refer to *Section 8.3: External Wiegand Reader*). Wiegand GND acts as the reference ground for the Wiegand Data 0 and Data 1 interface.

8.5. General Purpose Input/Output

The V-Station iCLASS reader shall include General Purpose Input/Output connections. These connections shall be standard TTL Logic lines. The TTL Out 0H line is capable of sourcing a low-current signal. The TTL Out 1L line is capable of sinking a low-current signal. The TTL functionality shall be enabled by default, but can be disabled using the VeriAdmin software or the Administrative Mode. For more information on this feature please contact Bioscrypt Technical Support.

8.6. PC or other Host Device

The V-Station iCLASS reader shall support RS-232, RS-485 and Ethernet communications protocols for connection to a PC or other host device. This connection shall be optional, as the reader shall include an Administrator Mode for direct reader configuration and template management without the use of the software. Each V-Station iCLASS reader shall include a VeriAdmin software CD. This software allows for reader configuration and template management. For more information on the VeriAdmin software functionality please refer to *Section 11: VeriAdmin Management Software*. If connecting to a PC, it should have the following characteristics:

- ❑ Operating System: Windows 98, ME, NT4.0, 2000, or XP (not compatible with Windows 95)
- ❑ 486-compatible
- ❑ 16 MB RAM
- ❑ 30 MB Disk space
- ❑ DB9 Serial communications port (do not support USB ports)

For more information on the RS-232, RS-485 and Ethernet connections please refer to *Section 7: Communications*.

9. Operation

The V-Station iCLASS reader shall be designed to integrate easily into most access control systems. To function, a fingerprint must be enrolled and stored on an iCLASS contactless smart card or directly on the reader and this can be done through the VeriAdmin software included with the reader or through an Administrator Mode accessible through the keypad and display. Once a fingerprint is enrolled, authentication may be performed any number of times. Authentication may be initiated either through the keypad (if a template is stored directly on the reader) or by presenting a smart card to the reader. After authentication, the V-Station iCLASS shall send a Wiegand string to the Access Control System or other host equipment for appropriate action. Refer to *Section 8.3: External Wiegand Reader* and *Section 8.4: Access Control System* for information on connections required to send this sequence.

9.1. Fingerprint Template Capacity

The V-Station iCLASS shall support an unlimited number of users since the fingerprint template file is stored on the smart card itself rather than on the V-Station iCLASS reader's local memory. A maximum of two fingerprint templates may be stored per contactless smart card.

If templates are stored on the reader's local memory, whereby the verification is initiated by providing an ID number via keypad entry, the V-Station iCLASS shall store up to 3550 fingerprint templates.

9.2. Supported Cards

The V-Station iCLASS shall support the following contactless smart cards:

- HID Corp. iCLASS 16kbits (2kBytes) 2-Application Area cards
- HID Corp. iCLASS 16kbits (2kBytes) 16-Application Area cards
- Honeywell Access Systems 16kbits (2kBytes) OmniSmart cards

9.3. Memory

The V-Station iCLASS reader shall utilize non-volatile flash memory to store all templates and data configurations and shall therefore not lose any templates or configuration information if the reader is powered down.

9.4. SiteKey

The SiteKey shall be a password used by the V-Station iCLASS, the smart cards, and the VeriAdmin software to communicate and transfer information. If the SiteKey stored in the V-Station iCLASS does not match the SiteKey stored in the smart card, the V-Station iCLASS will be unable to read or write to the card. This key shall ensure that only authorized smart cards are used at a specific installation. Additionally, the SiteKey shall act as the administrator password so that only authorized personnel may perform read/write functions on the V-Station iCLASS, such as enrollments, deletions, and V-Station iCLASS security configuration.

By default, each V-Station iCLASS reader shall contain an empty-string for the SiteKey that should be configured prior to enrollment. Each installation must set their own SiteKey to distinguish their V-Station iCLASS contactless smart cards from every other V-Station iCLASS installation. The SiteKey may be an alphanumeric string consisting of fifteen characters; however, if any enrollments or deletions shall be initiated through the keypad Administrator Mode, then the string should consist of numeric characters only. Please refer to *Section 9.6: Administrator Mode* for further information.

The SiteKey shall be stored within the internal memory of the V-Station iCLASS and shall be encrypted and stored on the smart card itself. For security purposes, the SiteKey shall not be stored within the VeriAdmin software or PC, and may NOT be retrieved by the V-Station iCLASS. Additionally, if enrollments will be initiated at the reader through the Administrator Mode, a numeric SiteKey must be selected. For more information on the SiteKey, please refer to the *Veri-Series Operations Manual: Appendix E- V-Smart Administrator SiteKey Management*.

9.5. User Interface

The V-Station iCLASS shall have a common user interface. A green LED on the front of the reader shall indicate that power is on. A bi-color LED on the top of the reader shall display green, red, or amber (green and red together). The top LED may display in an off, solid or blinking (flashing) state. The color and state of the top LED may also be customized through the use of the VeriAdmin software. By default, the color and state of the top LED shall have particular meanings as shown in Table 1: V-Station iCLASS LED Feedback.

Top LED Indicator	Meaning
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Off	Reader is Idle
Solid Red	Invalid ID (Keypad entry) No Templates Stored on Smart Card Biometric Authentication Failed
Solid Amber	Place Finger on Sensor
Solid Green	Biometric Authentication Accepted Enrollment Fingerprint Image Captured
Flashing Red	SiteKey Invalid*

Table 1: V-Station iCLASS LED Feedback

*If the V-Station iCLASS top LED returns a flashing red state after presenting a smart card to the reader, this indicates that the V-Station iCLASS was unable to read the card due to an invalid SiteKey between the V-Station iCLASS and the smart card. For more information on the SiteKey refer to *Section 9.4: SiteKey*.

9.6. Administrator Mode

The V-Station iCLASS shall include an Administrator Mode which allows users to perform a wide array of tasks directly at the reader without the use of the software. These functions include: fingerprint template enrollments, template deletions, template editions, and basic reader configuration. The reader configuration shall include options to configure the communications (serial, Ethernet, and Wiegand), biometric security, and system date and time, etc. More advanced reader configuration (such as creating user-defined or biometric access control schedules), shall require the use of the software.

In order to enter the Administrator Mode, a fingerprint template with administrative privileges must be enrolled and stored on the reader's local memory. The Administrator Mode may NOT be accessed using a smart card. If no such template exists, all users shall have access to the Administrator Mode.

The Administrator Mode shall include two security levels: full Administrators who shall have full access to all administrative functions and Enrollment Administrators who shall only have access to perform enrollments on the readers. If enrollments are initiated through the Administrator Mode for storing on a smart card, a numeric SiteKey shall be required. For more information on the Administrator Mode, please refer to the *V-Station iCLASS Operator's Manual*.

9.7. Fingerprint Placement: Lock, Drop & Hold

A Ridge-Lock shall be provided as part of the fingerprint sensor mask as a fingerprint placement guide and a means to discharge ESD. To properly place the finger on the sensor, the user should slide their finger across this Ridge-Lock, parallel to the sensor. Once the Ridge-Lock locks into place under the first joint, the user should then lower the finger evenly onto the sensor and apply moderate pressure. The user should hold the finger on the sensor until the top LED turns off and returns a green LED. A Macromedia Flash animation depicting proper fingerprint placement using the Ridge-Lock may be viewed online at <http://www.bioscrypt.com> > Support > Enrollment Tips. This information is also available for download as a PDF file.

The Ridge-Lock is designed as a guide to help the user to properly and consistently position their finger on the sensor so as to fully capture the fingerprint core, the unique information-rich area of the fingerprint. When used properly during enrollment and authentication, the Ridge-Lock shall help to reduce false rejections.

As the end user's first point of contact with the reader, the Ridge-Lock is also designed as means of discharging ESD through the Earth Ground connection, which is manufactured using a carbon fiber conductive plastic. This helps to protect the sensor from damage by ESD. This requires that the reader have a proper connection to Earth Ground. For more information on this connection please refer to *Section 6.3: Grounding* and *Section 8.2: Earth Ground*.

9.8. Enrollment

Enrollment is the process of adding users to the fingerprint reader system. The V-Station iCLASS shall provide one-touch enrollment through either of the following methods:

- At a PC running the VeriAdmin software. The Enrollment PC should be located in close proximity to a V-Station iCLASS reader. When initiated through the software, the template that is created through the enrollment process may be stored either on the PC, the reader's local memory, or the smart card. When saved to the PC, the fingerprint template shall not be usable on the V-Station iCLASS reader for authentication until the template is transferred to the reader's internal memory (for keypad ID entry) or the smart card.
- At the reader locally through the Administrator Mode. When initiated through the Administrator Mode, the template that is created during

the enrollment process may be stored locally on the reader itself (for keypad entry) or on the smart card. If storing the template on the smart card, the reader shall prompt the user for the SiteKey. Please refer to *Section 9.4: SiteKey* for further information.

When enrollment is initiated, the reader shall display a solid amber LED to indicate to the user to place a finger on the sensor. When the fingerprint is captured, the LED shall turn off. Once the processing is completed, the LED shall turn red or green depending on the result. The reader shall also produce an audible tone when enrollment is successful.

We suggest that enrollments be performed through the method using the VeriAdmin software instead of using the Administrator Mode. When the VeriAdmin software is used for enrollments, the software shall provide feedback regarding the image capture which allows the enrollment administrator to validate that the fingerprint core was fully captured and properly centered in the field of view. Additionally, quality and content scores shall be returned rating the enrollment; however, the image capture should act as the ultimate deciding factor in accepting the enrollment. This typically tends to yield a higher quality database of fingerprint templates, helping to reduce false rejections.

A Wiegand sequence may optionally be written to the smart card at the time of enrollment. This sequence shall be linked to the fingerprint template and shall be released to the access control panel upon successful authentication. This sequence is not required as the V-Station iCLASS may generate a Wiegand output based on the template ID number. For more information, please refer to *Section 8.3: External Wiegand Reader*.

When a template is stored on the reader or the smart card after enrollment is complete, the template shall reside on the reader or smart card until deleted. When stored on the reader, the user shall be able to authenticate on this particular reader as long as the template is resident. When stored on the smart card, the user shall be able to authenticate on this particular reader as long as the SiteKey matches between the reader and the smart card.

During the enrollment process, the V-Station iCLASS reader shall not be available for access control functions. This, however, shall not affect other readers on the network (if any). In many circumstances, it is recommended that an additional reader be designated for use as an Enrollment Station.

9.9. Fingerprint Template Format

During the enrollment process, the V-Station iCLASS shall create a fingerprint template roughly 348 bytes and shall be compatible with other Bioscrypt authentication devices (i.e., V-Prox, V-Flex, V-Smart, V-Smart iCLASS, V-Station, V-Station Prox, V-Station MIFARE). This template is smaller in size than identification templates and may not be converted to identification templates for use on a searching device (i.e., V-Pass or V-Station Search).

9.10. Template Distribution

The V-Station iCLASS shall utilize a portable database - the fingerprint templates are stored on the smart card itself rather than on the V-Station iCLASS reader's internal memory. Thus, template distribution shall not be necessary. However, if templates are stored on the reader's internal memory (for verifications initiated from the keypad), then the templates may be distributed to other V-Station iCLASS readers using the VeriAdmin software. This distribution may occur over a RS-485 or Ethernet network, or templates may be downloaded to a laptop and then the laptop may be used to upload the templates locally to each of the remaining readers via the bottom Auxiliary RJ11 RS-232 port.

9.11. Authentication

Authentication is the process of providing the V-Station iCLASS with an ID number representing one or more templates stored on the reader or smart card, presenting a candidate fingerprint to the sensor, and getting a result of pass, fail, or invalid ID. The V-Station iCLASS reader shall be based on a digital signal processor (DSP) that utilizes a fingerprint sensor to capture an image of the presented finger. The authentication process on the V-Station iCLASS is as follows:

- The user shall enter their ID number using the embedded keypad -OR- present a smart card to the belly of the V-Station iCLASS reader
- If a card was presented, the V-Station iCLASS shall return an amber LED to indicate that the SiteKey, template data and optional Wiegand string were successfully passed from the smart card to the reader and stored in a buffer. If the data was not successfully passed, or an invalid SiteKey was stored on the card, the V-Station iCLASS shall instead return a flashing red LED to indicate failure.
- If an ID number was entered using the embedded keypad, the V-Station iCLASS shall pull up the template(s) corresponding to the ID and

return an amber LED signaling the user to place their finger on the sensor to proceed with the verification process. If the ID number provided by the user does not correspond to a validly enrolled template, the reader shall return a red LED indicating failure.

- ❑ The user will present their finger to the sensor
- ❑ The V-Station iCLASS sensor shall capture the fingerprint
- ❑ The V-Station iCLASS DSP shall perform a 1:1 verification between the captured image and the stored template
- ❑ The V-Station iCLASS shall return a red or green LED indicating failure or pass.
- ❑ On a pass, the V-Station iCLASS shall perform one or more of the following actions:
 - Generate and release a Wiegand sequence to the Access Control System based on the template ID number and a pre-configured site code if an ID was entered through the keypad or the template was downloaded from a smart card (the default action)
 - Release the Wiegand sequence from buffer to a Access Control System (if a Wiegand sequence was provided and stored on the smart card during the enrollment process).
 - Activate the TTL Output line (depending on the reader's configuration).

Due to the nature of the 1:1 (one-to-one) algorithm utilized by the V-Station iCLASS, an input (either Keypad or smart card) shall be required in order to initiate the biometric authentication.

9.12.Password Mode

For additional security, the V-Station iCLASS shall support a Password Mode. When this mode is activated, the V-Station iCLASS shall prompt the user for a unique numeric password, in addition to their ID and finger. The user must supply this password during the enrollment process. In this case, triple authentication may be achieved: smart card (what you have), fingerprint (who you are), and password (what you know).

9.13.Granting Access

When used in conjunction with an Access Control System (ACS), the V-Station iCLASS shall not directly grant physical access. The V-Station iCLASS reader shall simply send a Wiegand data signal to the ACS. That system is responsible for logging and making the decision to release door locks, etc.

When the TTL Output feature is used, any user fingerprint template stored on the reader shall have the ability to perform a biometric authentication and access the V-Station iCLASS reader. The V-Station iCLASS reader itself does not support advanced access control features, such as anti-passback. For these features, an ACS shall be required.

9.14. Biometric Authentication

By default, the V-Station iCLASS reader shall require that users present a candidate fingerprint for authentication. However, biometric authentication may be globally disabled on the V-Station iCLASS reader. In this mode, the reader will act simply as a keypad or card reader and output a Wiegand string after a valid template ID (for templates stored on reader) or smart card (with correct SiteKey and fingerprint template) has been provided.

9.15. User Access Scheduling

The V-Station iCLASS shall support individual user access schedules. Up to 58 unique weekly schedules may be set (plus an additional 6 reserved schedules). Schedules may be activated and assigned to individual user templates. Users shall only be allowed access for the designated times. If users attempt to access the reader outside of the designated time, the reader shall return a "User Not Scheduled" message and fail the verification attempt.

In addition, the V-Station iCLASS shall support up to 46 user-defined holidays (plus an additional 4 reserved holidays). Individual user templates may be configured to observe these holidays as well.

9.16. Biometric Scheduling

The V-Station iCLASS shall support biometric schedules which designate times when biometric authentication shall not be required. Schedules may be configured differently for every day of the week. If a biometric schedule is activated, users shall simply enter their ID number on the keypad or present a smart card to the reader, and if it is a valid SiteKey and/or ID, the V-Station iCLASS shall accept the user and output the Wiegand sequence without requiring that a finger be presented for authentication.

9.17. Transaction Log

The V-Station iCLASS shall generate and maintain a transaction log that tracks all actions and events that occur on the reader by providing the following information:

- ❑ Date and time-stamp of the action or event
- ❑ User template ID, index and name (if the event involves a template)
- ❑ Description of the action or event
- ❑ Data associated with the action or event (i.e., result, quality, content, score)
- ❑ Port that was used to initiate the action or event

The transaction log shall store a minimum of 4096 events, but may store additional entries. If the data provided by the transaction log is desired by the user, it is imperative that the log be downloaded before 4096 entries have been accumulated. When the reader approaches 8095 entries, the first 4096 entries shall be permanently erased. This shall ensure that transaction logging never stops. The transaction log may be downloaded and saved to the PC as a Comma-Separated Value (*.csv) file with the use of the VeriAdmin software.

9.18. Custom Verification Entry Mode

The V-Station MIFARE shall support a Custom Verification Entry (CVE) Mode. When this mode is enabled, the V-Station MIFARE shall prompt the user to enter a CVE code into the embedded keypad to complete the biometric verification sequence. This value shall be stored within the Transaction Log along with the verification data for retrieval.

10. Estimated Performance

Bioscrypt works to continuously improve the performance of the core fingerprint authentication technology while also improving the usability and flexibility of the system. We have developed a database of real-world fingerprint images and use these images to test the algorithm used by the V-Station iCLASS. This database has increased in size to the point where today we perform 1,000,000 comparisons to generate the following statistics.

10.1. Performance Terminology

Biometric systems typically state performance in terms of False Rejection Rates (FRR) and False Acceptance Rates (FAR).

The FRR is the expected rate at which the system would incorrectly reject (fail) the correct fingerprint – this assumes that a valid ID number is provided correctly from the embedded keypad or smart card reader.

The FAR is the expected rate at which the system would incorrectly accept (pass) the wrong fingerprint.

10.2. Authentication Algorithm

The authentication algorithm allows for two different performance-tuning parameters: Global Security Threshold and individual Template Security Threshold. Table 2: Security Threshold Error Rates lists the FRR and FAR values for various security levels. The V-Station iCLASS will use the lower of either the Global Security or individual Template Security Threshold when performing the authentication.

Security Threshold	FRR	FAR
Very High (1)	1/100	1/20,000
High (2)	1/200	1/5000
Medium (3)	1/1000	1/1000
Low (4)	1/5000	1/200
Very Low (5)	1/10,000	1/100
None (0)*	0	1
Password Only (6)**	0	1

Table 2: Security Threshold Error Rates

The V-Station iCLASS by default shall be configured to a Medium Global and Template Security Threshold. This threshold level is referred to as the Equal Error Rate (EER) or the point at which the FRR is equal to the FAR. As shown above, the EER for the V-Station iCLASS is 1/1000.

*The None Template Security Threshold level shall be applicable only to individual fingerprint template files and may not be applied as a global reader setting. When a level of None is selected for an individual fingerprint template, the reader shall not initiate a biometric authentication and shall instead accept any user that presents a valid ID or smart card corresponding to an enrolled fingerprint template. There shall be two options for this setting: a finger is required, but any finger shall be accepted (the default setting), or no finger shall be required.

**The Password Only Template Security Threshold shall be applicable only to individual fingerprint templates and may not be applied as a global reader setting. When a level of Password Only is selected for an individual fingerprint template, the reader shall not initiate a biometric authentication and shall instead prompt the user for a numeric password. The password entered must match the numeric password supplied by the user during the enrollment process. The Password Only Template Security Threshold level shall not be an available feature if an Extended ID Wiegand format is being used. Please contact Bioscrypt Technical Support for further information.

11. VeriAdmin Management Software

Each V-Station iCLASS reader shall include a CD-ROM containing the VeriAdmin PC software. The VeriAdmin software supports Windows 98/NT4.0/ME/2000/XP. It is not tested under other Windows-compatible or non-Windows-based operating systems.

The VeriAdmin Management Software may be used to perform the following functions:

- ❑ Manage a network of V-Station iCLASS readers
- ❑ Secure smart cards with a SiteKey.
- ❑ Configure V-Station iCLASS smart card reader security settings
- ❑ Read/Write the fingerprint template information to a smart card
- ❑ Enroll new user fingerprint templates
- ❑ Edit existing user fingerprint templates
- ❑ Delete user fingerprint templates
- ❑ Distribute the user templates from the V-Station iCLASS reader or PC to other Bioscrypt readers in the installation
- ❑ Adjust the parameters (communications, biometrics, Wiegand, line trigger, etc.) of an individual reader or all readers connected on a network
- ❑ Configure the operation of the V-Station iCLASS top LED
- ❑ Create user access, holiday, and biometric schedules
- ❑ Download the V-Station iCLASS transaction log
- ❑ Upload alternate menu prompts (i.e., Spanish menu prompt)
- ❑ Perform firmware upgrades

For further details on the VeriAdmin software and its operation, please refer to the *Veri-Series Operations Manual* (installed on the PC at the time of software installation).

12. Appendix A – Weidmuller Connections

The following table represents the group and signal descriptions used in Weidmuller connections available on the back plate of the V-Station iCLASS reader.

Pin	Group	Label	Signal Description
8-Pin Connector:			
1	RS-485	TX(+)	Transmit +
2		TX(-)	Transmit -
3		RX(+)	Receive +
4		RX(-)	Receive -
5		GND	RS-485 Signal Ground
6	RS-232	GND	RS-232 Signal Ground
7		TX	Transmit
8		RX	Receive
3-Pin Connector:			
1	Power/Ground	+(POS)	12.5 – 24 VDC +
2		-(NEG)	12.5 – 24 VDC -
3		EGND	Earth Ground
12-Pin Connector:			
1	Wiegand	IN 0	Data 0 In
2		IN 1	Data 1 In
3		OUT 0	Data 0 Out
4		OUT 1	Data 1 Out
5		LED IN	LED In
6		LED OUT	LED Out
7		GND	Wiegand Ground
8	TTL (IN)	IN 0	TTL Data 0 In
9		IN 1	TTL Data 1 In
10	TTL (OUT)	Out 0H	TTL Data 0 Out
11		OUT 1L	TTL Data 1 Out
12		GND	TTL Ground

Table 3: V-Station iCLASS Weidmuller Connections

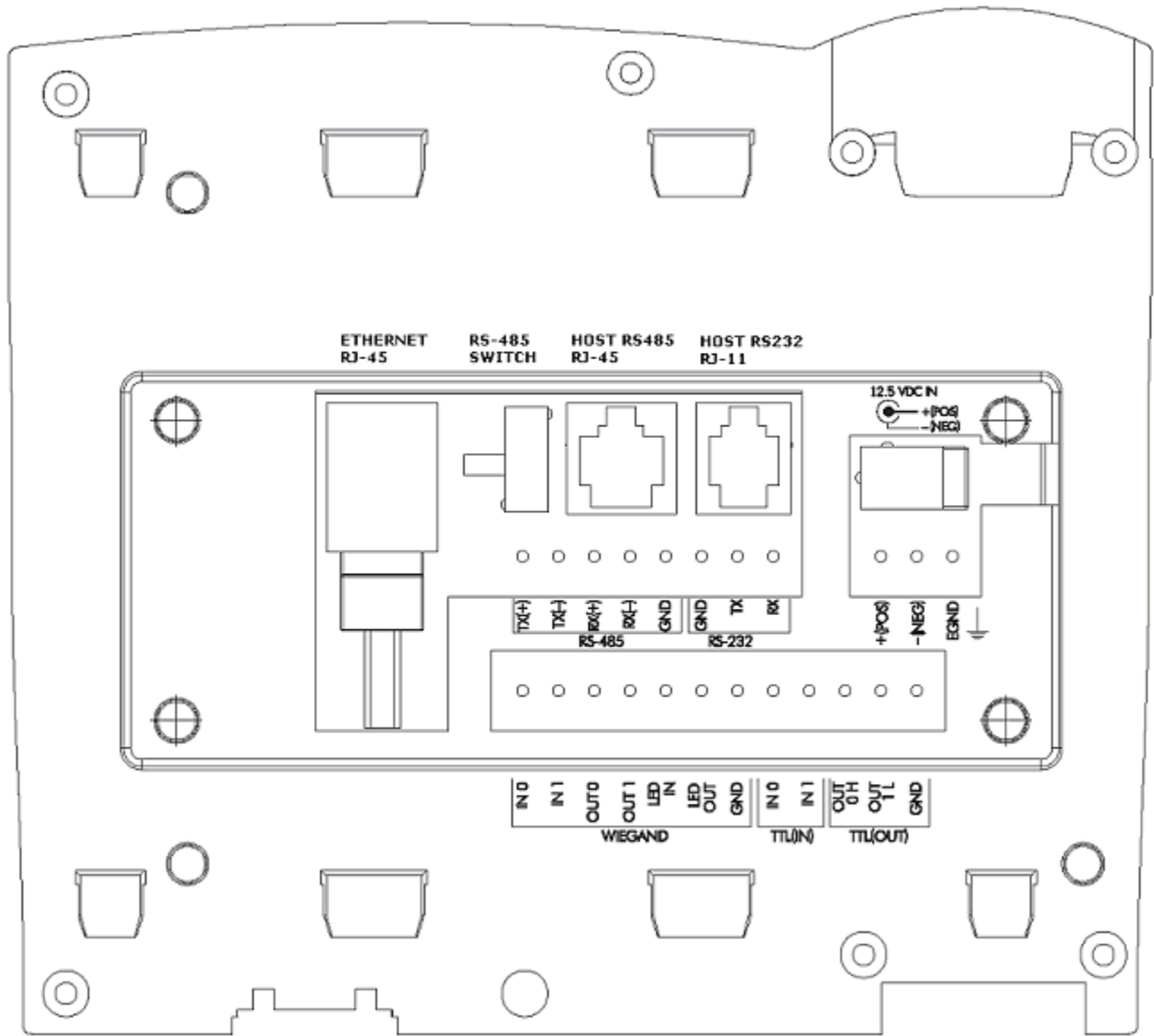


Figure 2: Rear Diagram of V-Station iCLASS

13. Appendix B – Wiegand Protocol

The Wiegand protocol has become a standard means of communicating user identification numbers between access control front-end products, such as a card reader or keypad, and the access control system interface to that front-end. Some manufacturers have modified the original standard format for their own use, but often still support the original standard.

The V-Station iCLASS reader shall support a variety of formats; however, the factory default is the Standard 26-bit format as described below.

13.1. Standard 26-bit Format

The Wiegand protocol is described completely in a document available from the Security Industry Association (SIA) as *Access Control 26-bit Wiegand Reader Interface Standard*. Without going into the detail provided in that document, the Wiegand communication format can be summarized as providing a series of binary bits (0 or 1) that are interpreted as two (2) data fields: site code and identification number. Proprietary and customized formats are prevalent and can contain extended data ranges or additional data fields, but the standard format is 26-bit.

The 26-bit format is generally diagrammed as follows:

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 _E	S	S	S	S	S	S	S	S	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P _O
	E	E	E	E	E	E	E	E	E	E	E	E	O	O	O	O	O	O	O	O	O	O	O	O	O	

Where P represents a parity bit, S represents a bit from the Site Code (also referred to as a Facility Code), N is a bit from the ID Number (also referred to as Card ID), E represents bit positions that are used for Even parity calculations, and O represents bit positions that are used for Odd parity calculations. The facility code is 8 bits and supports values from 000 to 255. The ID number is 16 bits and supports values from 00000 to 65535.

In the case of a V-Station iCLASS the ID number assigned to each fingerprint template should be enrolled in the Access Control System as the Card ID.

13.2. Other Supported Formats

The V-Station iCLASS shall support the following Pre-Defined Wiegand formats:

- ❑ Standard 26-bit
- ❑ Apollo 44-bit
- ❑ Northern 34-bit
- ❑ Northern 34-bit (no parity)
- ❑ Andover 37-bit*
- ❑ Generic 64-bit*
- ❑ Ademco 34-bit
- ❑ HID Corporate 1000 35-bit
- ❑ HID 37-bit
- ❑ Wiegand 4002 40-bit*
- ❑ Generic 34-bit*

If the Access Control System is configured for a Wiegand format other than the default of Standard 26-bit, then the software shall be required to select the supported format.

Only one format may be selected and configured into the reader at a time (i.e., the V-Station iCLASS reader shall not support both Standard 26-bit output and Northern 34-bit output at the same time).

*This format is available as a Custom Pre-Defined Format and must be manually uploaded to the reader. Please refer to section *13.3: Custom Pre-Defined Formats*. Contact Bioscrypt Technical Support to confirm compatibility with your reader.

13.3. Custom Pre-Defined Formats

The V-Station iCLASS reader shall support the use of a Custom Wiegand Format. A slot on the Pre-Defined Wiegand Formats drop-down list shall be allocated to a Custom Wiegand Format. A Custom Wiegand Format file shall be required and must be uploaded onto the V-Station iCLASS reader. This file may be created only by the Bioscrypt Engineering Department after thorough tests are completed involving all necessary equipment (i.e., cards, Access Control System, etc.) to be utilized at the site. Please contact Bioscrypt Technical Support to see if the Wiegand format used by your Access Control System is available as a custom Wiegand format.

13.4. Pass-Thru Formats

If the format you prefer to use is not available as a Pre-defined or Custom format, the V-Station iCLASS reader shall support a Pass-Thru mode. In this mode, critical information about the format is provided to the V-Station iCLASS, which shall allow the V-Station iCLASS to correctly generate the card ID required to send to the Access Control System. To support your proprietary Wiegand format in a Pass-Thru mode, the following is required:

- ❑ Wiegand data is interpreted as a standard binary representation (i.e., hex and other data interpretations are not supported)
- ❑ A contiguous series of bits for the ID number
- ❑ The sequence must be non-encrypted
- ❑ The Total number of bits in the format is 64 or fewer
- ❑ The bit stream provides the bits in order from Most Significant Bit (MSB) to Least Significant Bit (LSB)

The V-Station iCLASS reader shall be unable to correctly generate the Wiegand sequence if the conditions above are not met. If your Wiegand format meets these requirements, then the following information is required to configure this format into the V-Station iCLASS reader in Pass-Thru mode:

- ❑ Total Number of Bits in the format
- ❑ Start bit position of the ID number data in the format (note: Bioscrypt considers the first bit position as 0)
- ❑ Length of the ID number data in the format (number of card id bits)

13.5.Pre-Defined vs. Pass-Thru Functionality

Advanced Wiegand functionality shall be available for use on a V-Station iCLASS when a Pre-Defined or Custom format is used that shall not be available for Pass-Thru formats. Since Bioscrypt has intimate knowledge of Pre-defined and Custom formats (including site code start and length, parity bit start and length, parity bit calculation, etc.), the following features are available for Pre-Defined and Custom formats:

- ❑ Alt Site Code: an alternate site code may be activated and selected. This code shall act as the site or facility code required by the Access Control System for access for successful authentications. When this option is not selected, the V-Station iCLASS shall generate and send a site code of 0. If a Wiegand sequence was provided and stored on the smart card during the enrollment process, the Alt Site Code field should not be selected so that the reader may instead pass through the site code as provided by the Wiegand sequence.
- ❑ Fail ID Code: a failure code may be activated and selected. This code shall supersede the ID portion of the Wiegand string for all failed authentications that occur at the reader. When this option is not selected, a Wiegand sequence shall not be sent to the Access Control System on failures.
- ❑ Fail Site Code: a failure code may be activated and selected. This code shall supersede the site or facility code portion of the Wiegand

string for all failed authentications that occur at the reader. When this option is not selected, a Wiegand sequence shall not be sent to the Access Control System on biometric failures.

- On Fail Send Inverse Parity: when activated, a failed identification shall result in the Wiegand sequence being sent to the Access Control System with the parity bits inversed to indicate failure. This option should not be selected unless the Access Control System performs parity bit calculation and supports this feature.

13.6. Extended ID

The V-Station iCLASS reader shall support Wiegand formats, which allocate up to 64 bits for the Card ID. Because Bioscrypt fingerprint templates by default use only up to a 32-bit ID, any Wiegand Formats which allocate more than 32 bits to the ID number shall require the V-Station iCLASS to be in a special Extended ID mode, which adds an Extended ID field to the fingerprint template. This field actually uses the Employee ID field (not shown in VeriAdmin) and the Password field and is thus incompatible with the Password Mode.

For Extended ID support, the V-Station iCLASS shall require firmware version 7.30 or greater with a VeriAdmin software version of 5.30 or greater. Also, a Custom Wiegand Format file or Pass-Thru Format shall be required to support Extended IDs. For more information on this feature, please contact Bioscrypt Technical Support.

13.7. Duress Signals

The V-Station iCLASS reader shall support a Duress Finger Mode which offers users a way to indicate a duress situation (such as being forced to open a door) by authenticating with a specially designated "duress finger". An individual fingerprint template may be specified as such by selecting the "Make Duress Finger" option during enrollment. One ID number or card may be used for both duress and non-duress templates by assigning unique index numbers. When a successful authentication occurs with such a template, the reader shall send the Wiegand sequence to the access control panel in reverse bit order. The Access Control System can then respond with the appropriate action (alerting security personnel, sounding alarms, etc.). To fully support this feature, the access control panel must also support reverse-bit Wiegand sequence duress signals.

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