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Architectural & Engineering Specifications

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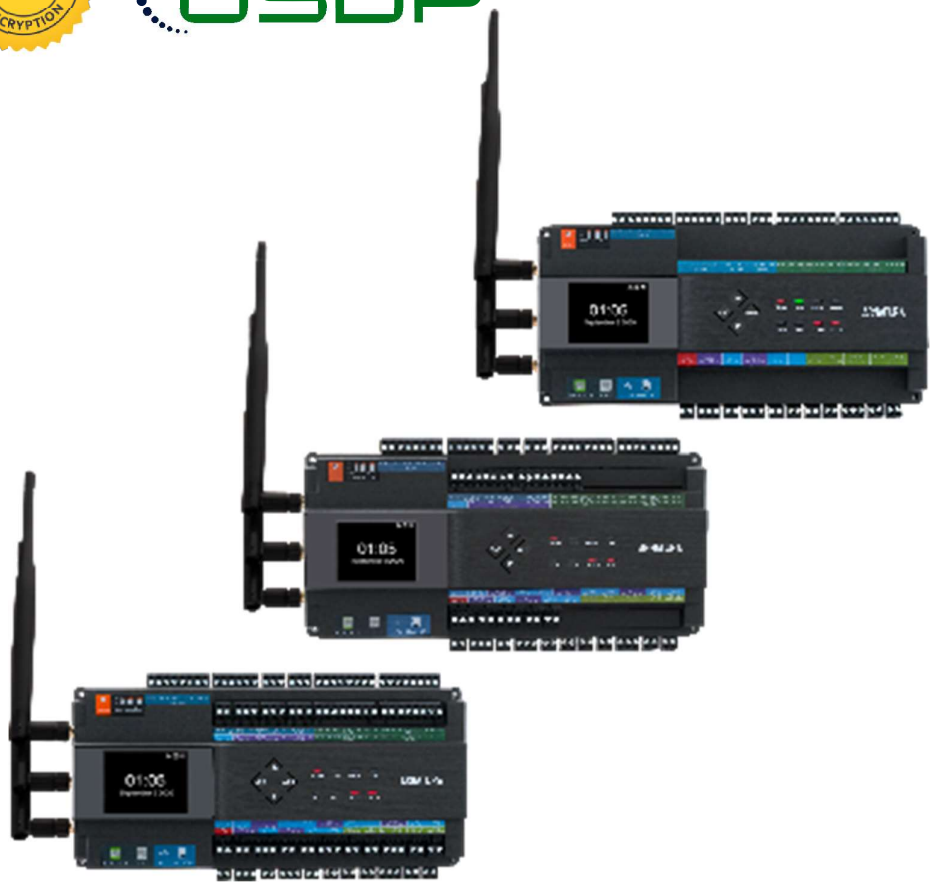
AHDU Series IP-Based Biometric Door Unit Controller

POE

ENCRYPTION AES 256 ENCRYPTION

OSDP



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Email: sales@armatura.us

Date: 28 April 2023
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Table of Contents

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
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Date: 28 April 2023
Version 1.0

Section 1

1. Purpose

This architectural and engineering specifications document (A&E) outlines the minimum requirements for the design, supply, installation, and commissioning of the AHDU Series.

2. Goals and Objectives

The Access Control A&E specification aims to achieve the following goals and objectives:

- Provide a highly secure and reliable IP-based core controller with advanced authentication and access control capabilities.
- Ensure scalability and flexibility to accommodate varying user and system requirements.
- Meet or exceed relevant industry standards and regulations.
- Provide a clear and detailed specification for the design, supply, installation, and commissioning of the AHDU Series.

3. Key Features and Requirements

The AHDU Series shall have the following key features and requirements:

- The AHDU Series should have multi-modal biometrics capabilities, including face, palm, fingerprints, and RFID cards.
- It should have Ethernet network connectivity and support PoE and 3rd party integration.
- It should have advanced access control functions, including threat levels and port failover, supervised and programmable inputs, and secure communication channels.
- The AHDU Series should be made of durable materials and be suitable for wall mounting.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- The AHDU Series includes three different models: AHDU-1160, AHDU-1260, and AHDU-1460, with varying numbers of inputs and outputs and access points.

4. Design and Implementation Constraints

- The AHDU Series should be designed to comply with industry standards and regulations, including IEEE 802.3 Ethernet Standards, IEEE 802.3at/af PoE Standards, Wi-Fi IEEE 802.11ac 5GHz or 2.4GHz/5GHz IEEE 802.11n, Certified OSDP V2.2, Bluetooth 5.2 Standards, FCC, CE, and UL294.
- The AHDU Series should be designed to operate in a wide range of environmental conditions, including temperature, humidity, and vibration.
- The AHDU Series should be designed to be easily integrated with the AHSC-1000 Access Control System and other third-party systems.

5. Existing Standards and Regulations

The AHDU Series should comply with the following standards and regulations.

- IEEE 802.3 Ethernet Standards
- IEEE 802.3at PoE Standards
- Wi-Fi IEEE 802.11ac 5GHz or 2.4GHz/5GHz IEEE 802.11n
- Certified OSDP V2.2
- Bluetooth 5.2 Standards
- FCC Standards
- CE Standards
- UL294 Standards

6. Submittals

The following submittals shall be provided.

- Product data sheets
- Installation instructions
- Operation manuals

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Test reports

7. Qualifications

The manufacturer of the AHDU Series shall have the following qualifications.

- ISO 9001, ISO27001, ISO27701, ISO27017, CMMI5 certification.
- Minimum of 5 years' experience in producing access control equipment.

8. Warranty

The manufacturer shall provide a limited 36-month warranty for the product to be free of defects in material and workmanship.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

Section 2

Key Features and Requirements

The AHDU Series shall have the following key features and requirements:

1. Ultimate Authentication Performance
   - Supports up to 400,000 (1:N) RFID card/mobile credential, 800,000 (1:1) & 400,000 (1:N) (Bluetooth); 400,000(1:N) (NFC); 400,000 (1:N) (Dynamic QR Code). Fingerprint, 100,000 (1:1) & 50,000 (1:N). Facial, 5,000 (1:N) & 100,000 (1:1). Palm authentication 3,000 (1:N) & 5,000 (1:1) ,in one single controller.

2. Scalable
   - Supports up to 384 inputs (when using AHEB-0216 IO expansion board) through OSDP V2.2 connection between boards.
   - Acts as an edge device under the AHSC-1000 security core, which supports cascading to manage up to 128 doors under a single controller.

3. Innovative MQTT Based Communication Protocol
   - Lightweight messaging protocol designed for IoT devices that allows the controller to communicate with more edge devices (Door Unit, Reader, and sensor) under the same network environment.

4. Threat Levels
   - Unlimited threat levels are used to adjust user access right and/ or credential requirement during lockdowns and lockouts instantaneously.

5. Advanced Communication
   - Serverless design enables the controller to operate independently.
   - Peer-to-peer cross-controller linkage through the AHSC-1000 security core allows communication between controllers and can be active while the Armatura One server is unavailable.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- With onboard web server design, the controller can be configured and programmed through the Armatura Connect mobile app and web browser through TCP/IP connection.
- Simple diagnostics can also be done by the built-in monitor and keypad on the controller.

6. Dual System ROM Protection Design

- Built with a dual ROM design, one of the ROMs acts as a primary ROM for the system startup, and the second layer ROM acts as a "Recover" ROM.
- Automatically switches to the second layer ROM if the primary ROM fails or malfunctions.

7. Supervised Inputs

- Equipped with 4-state supervised inputs that gradually avoid open or short circuit attacks.
- Can detect abnormal changes as low as 5% Ohms in the circuits and filter out all attacks.
- REX inputs and dedicated fire alarm inputs are independently managed by isolated microchips to ensure these inputs can work normally under various extreme and catastrophic situations, even if the motherboard isn't functioning properly.

8. PoE

- Power-over-Ethernet (PoE) 802.3at/ 9-24VDC from power sourcing equipment (PSE) according to IEEE PoE 802.3at standards.

9. 3rd Party Integration

- Supports various reader protocols, including Armatura Explorer series readers, 3rd party biometric readers, along with 3rd party Wiegand and OSDP readers.
- Armatura One provides RESTful based API for 3rd Party software Integration.

10. Cyber Security

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Advanced Encryption Standard (AES) 256-bit algorithm for communication with Explorer series readers and I/O expansion boards through TCP/IP.
- AES 128-bit encryption to the readers and I/O expansion boards through OSDP V2.2 over RS-485.
- AES128 / TLS 1.2 (with AES256) communication between Armatura One server and edge devices.
- Communications between the Armatura One server and web-client are protected by HTTPS / TLS1.2 (AES256) or above.
- Enhanced cybersecurity level is provided by an additional crypto chip (Certified EAL6+ standard), providing dedicated storage and cryptographic functionality for the AHSC-1000 controller.
- Supports IP/Mac address filtering functions and VLAN isolation to enhance cybersecurity standards.
- The controller supports IEEE 802.1X network authentication protocol (PEAP, TLS, TTLS).

11. Port Failover (TCP/IP coming soon) & Redundancy

- Dual ethernet ports with port failover and redundancy functions.
- If the primary communication port fails, it will then switch to the secondary port automatically (the controller supports separate network configurations for both ports).
- 100Base-TX Ethernet data transfer is included on the AHDU controller.
- 100Base-TX communication between the AHDU controller allows users to take full advantage of high-speed network technology.
- The AHDU controller series has 3 RS-485 ports on the board, which support redundancy function dedicated on ports 2 & 3. If one of the RS-485 connections experiences problems, the other port will activate automatically to avoid disconnection.

12. Intelligent Power Monitoring

- Supports flexible voltage inputs (9V-24V with automatic voltage detection) with multiple power supply options.
- Onboard intelligent power monitoring system precisely monitors onboard battery power supply, onboard battery health, PoE power supply status & PSU power supply status.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Displays real-time power status on the webserver dashboard, ensuring administrators have clear indicators for troubleshooting.

14. Compliance

The AHDU Series IP-Based Secondary controller shall comply with the following standards and regulations:

- IEEE PoE 802.3at standards
- OSDP V2.2 communication over RS-485 with Advanced Encryption Standard (AES) 128-bit encryption
- AES256 / TLS 1.2 communication
- HTTPS / TLS1.2 (AES256) or above communication
- Certified EAL6+ standard for the additional crypto chip
- IP/Mac address filtering functions and VLAN isolation

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

Maintenance and Support

The AHDU Series IP-Based Secondary controller shall be supported by a comprehensive maintenance and support program, which shall include the following.

- Regular software updates and security patches.
- Technical support via phone and email.
- Spare parts availability.
- Training for system administrators and end-users.

Documentation

The supplier shall provide the following documentation for the AHDU Series IP-Based Secondary controller.

- User manual
- Installation guide
- Technical specifications
- Software release notes
- Warranty terms and conditions

Specifications

AHDU Series General Information

- Primary Power: PoE IEEE 802.3at / 9 - 24 VDC ± 20%, 550 mA maximum (reader current not included).
- Primary Host Communication: Ethernet, 100Base-TX.
- Secondary Host Communication: Bluetooth 5.2.
- Third Host Communication: Wi-Fi IEEE 802.11ac 5GHz, or 2.4GHz/5GHz IEEE 802.11n.
- Ethernet network connection: Port 1 Ethernet: 100Base-TX, Port 2: Ethernet 100Base-TX, (Configurable for Port Failover).
- RS-485 connection: Port 1-Armatura RS-485 / OSDP V2.2. Port 2-Armatura RS-485 / OSDP V2.2. Port 3- Armatura RS-485 / OSDP V2.2 (Configurable for Port Redundancy dedicated on port 2 & 3).

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Number of Ports: AHDU-1160: 2*TCP/IP, 3*RS-485, 2*Wiegand. AHDU-1260: 2*TCP/IP, 3*RS-485, 4*Wiegand. AHDU-1460: 2*TCP/IP, 3*RS-485, 4*Wiegand.
- Inputs: 4 states supervision, resistor values (5% tolerance).Normally open contact: use 1.2k, 2.2k. 4.7k or 10k. Normally closed contact: use 1.2k, 2.2k. 4.7k or 10k, Dedicated Panel Tamper IO Input*. Dedicated Microchip Control Fire Alarm IO Input & REX Input for catastrophic situation.
- Outputs: AHDU-1160-1 relay, 1* Form-C with dry contacts. AHDU-1260-2 relays, 2* Form-C with dry contacts. AHDU-1460-4 relays, 4* Form-C with dry contacts.
- Normally Open Contact Rating: 5A @ 30Vdc resistive.
- Normally Closed Contact Rating: 5A @ 30Vdc resistive.
- On-Board Monitor Size: 2.4", Resolution (320*240), TFT Monitor Quickly view status of board, connected doors and for configuration information display.
- On-Board Web server: Web server for System Configuration and Management, Dashboard for Controller Status Monitoring, Device Connection Status Monitoring & Configuration, Performance Status, Server Primary Controller Setting, Network Status Monitoring & Setting, IP Access Filter, SSL / TLS Certificates Setting, Access Log Export, Controller Reset, Debug Status Monitoring, Operation Log Monitoring, User Management, Date & Time Setting, Daylight Saving Time Setting, NTP Server Setting, General Status, Controller Information.
- RFID Card Capacity: 400,000 (1:N) / 800,000 (1:1).
- Maximum RFID Card Number Length Supported: up to 512bits card number length.
- Mobile Credential Capacity: 400,000 (1:N) (Bluetooth), 400,000 (1:N) (NFC), 400,000 (1:N) (Dynamic QR Code).

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Fingerprint Capacity (as a Primary Controller): 50,000 (1:N) / 100,000 (1:1).
- Face Capacity 5,000 (1:N) / 100,000 (1:1).
- Palm Capacity: 3,000 (1:N) / 5,000 (1:1).
- Transaction Buffer: 5,000,000 Events.
- Access Level: 100,000 Levels.
- On-Board Access Point Control: AHDU-1160- 1 access point on board. AHDU-1260- 2 access point on board. AHDU-1460- 4 access point on board.
- On-Board Reader Support: AHDU-1160- 3 (OSDP over RS-485) or 1 (Wiegand) with on-board IO. AHDU-1260- 3 (OSDP over RS-485) or 2 (Wiegand) with on-board IO. AHDU-1460- 3 (OSDP over RS-485) or 4 (Wiegand) with on-board IO.
- Maximum Access Points: AHDU-1160- 1. AHDU-1260- 2. AHDU-1460- 4.
- Maximum Readers: AHDU-1160- 2. AHDU-1260- 4. AHDU-1460-8
- Maximum Inputs: 384 (using Armatura AHEB-1602).
- Maximum Outputs: 385 (using Armatura AHEB-0216).
- Maximum IO Board: 24pcs (3*High Speed RS-485 communication).

AHDU Series RFID / Biometrics Reader Interface

- Input Voltage: 12 -24 Vdc +/- 10% regulated; 500 mA maximum each reader.
- Maximum Input Current: 12 -24 Vdc +/- 10% regulated; 500 mA maximum each reader.
- RS-485 Protocol: AES-128, OSDP Secure Channel.
- OSDP Mode: 9600-115200 bps, OSDP V2.2, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. 3rd Party reader: support OSDP V2.2 or above.
- Wiegand: Read-support up to 128 bits / Write-Support 26 / 34 / 37 bit, and other customized card formats.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Tamper Input (Wiegand): TTL levels, high > 3 V, low < 0.5 V, 5 mA source/sink maximum.
- Buzzer Output (Wiegand): TTL levels, high > 3 V, low < 0.5 V, 5 mA source/sink maximum.
- LED Output (Wiegand): TTL levels, high > 3 V, low < 0.5 V, 5 mA source/sink maximum.
- Data Inputs: RS-485, OSDP and Wiegand standards supported. Maximum RS-485 /OSDP cable length: 3937ft. (1200m). Maximum Wiegand cable length: 328ft (100m).

AHDU Series IO Expansion Board Interface

- RS-485 Protocol: AES-128, OSDP V2.2 Secure Channel.
- OSDP Mode: 9600-115200 bps, OSDP V2.2, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit. Maximum cable length: 2,000 ft. (609.6m).
- Data Inputs: OSDP and Wiegand standards supported. Maximum cable length: 500 ft. (152m).

AHDU Series Software Interface

TCP/IP Mode: Ethernet, 100Base-TX.

- TCP/IP Protocol: NTP, SNMP V2 /V3, 802.1X, vLan, SSH, MQTT, IPv4, IPv6, DNS, DDNS.
- TCP/IP Encryption: Complied up to TLS1.2, AES-256 end to end secured communication channel.
- TCP/IP Communication: Spada Protocol over MQTT.

AHDU Series Cable Requirement

- Power & Relays: One twisted pair, 18-16 AWG.
- Ethernet: CAT-5, minimum 330 ft. (100m).
- Ethernet Failover Port: CAT-5, minimum 330 ft. (100m).
- RS-485 Reader Port: 9600-115200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and1 stop bit. One twisted pair with drain wire and

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

shield, 120 ohm resistance, 22-18 AWG, Maximum cable length: 3937ft (1200m).

- RS-485 I/O Device Port: 9600-115200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and1 stop bit. One twisted pair with drain wire and shield, 120 ohm resistance, 22-18 AWG, Maximum cable length:3937ft (1200m).
- RS-485 Failover Port: 9600-115200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and1 stop bit. One twisted pair with drain wire and shield, 120 ohm resistance, 22-18 AWG, Maximum cable length: 3937ft (1200m).
- Wiegand Port: 20 AWG shielded Wiegand wire ,328ft. (100m).

AHDU Series Mechanical

- Dimensions: 4.8” W x 10.2” L x 2.5” H in. (122 x 260 x 62.5mm).
- Weight: approx. 30oz (830g).
- Mounting Method: Wall Mount. Support DIN35 Rail, compatible with UTA89 Din Rail Adapter for screwing on switchgear (Sold Separately).

AHDU Series Environmental

- Operating Temperature: -30°C to +70°C (-22°F to 158°F)
- Storage Temperature: -30°C to +70°C (-22°F to 158°F)
- Operating Humidity: 0% to 95% non-condensing
- Storage Humidity: 0% to 95% non-condensing
- Certifications: CE, FCC, UL, RoHS, UL294

Supported Software

Supported Software: Armatura One Security System

Power Supply

- Input Voltage: 100-240Vac, 50/60Hz
- Output Voltage: 12Vdc, 5A

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- Power Consumption: 10W (max)

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

Installation and Configuration

The AHDU Controller shall be installed and configured in accordance with the following requirements.

- The installation shall be conducted by qualified and experienced personnel in accordance with applicable codes, standards, and regulations.
- The controller shall be configured using the on-board webserver or through software provided by the manufacturer.
- The configuration shall include setting up access levels, user accounts, time schedules, and other relevant parameters.
- The controller shall be tested and commissioned to ensure proper operation and compliance with the specified requirements.

Warranty and Support

The AHDU series shall be covered by a minimum of 36-month manufacturer's warranty that covers defects in materials and workmanship. The manufacturer shall provide remote technical support and assistance to the installer and end-user during the installation and operation of the controller.

Integration and Interoperability

The AHDU Series IP-Based Controller shall support the following integration and interoperability requirements.

- The controller shall be able to integrate with third-party access control systems, security systems, and building automation systems using open protocols such as BACnet, OPC, Modbus, and RESTful APIs.
- The controller shall be able to interoperate with other AHSC-1000 controllers in a distributed architecture for large-scale access control systems.
- The controller shall be able to communicate with mobile devices running iOS or Android operating systems for mobile credential verification.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

- The controller shall support integration with LDAP and Active Directory for user authentication and management.
- The controller shall be able to integrate with elevator control systems for floor access control.
- The controller shall support integration with fire alarm systems for fire door release and emergency access control.
- The controller shall support integration with intercom systems for door release and visitor management.
- The controller shall be able to integrate with biometric enrolment and verification systems for multi-modal biometric authentication.
- The controller shall support integration with license plate recognition systems for vehicle access control.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

Software Requirements

The software shall be compatible with the latest versions of popular web browsers such as Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.

- The controller shall support remote software updates and firmware upgrades through the on-board webserver or through software provided by the manufacturer.
- The controller shall provide real-time monitoring and reporting of access events, system status, and performance metrics through the on-board webserver or through software provided by the manufacturer.
- The software shall support customized reporting and analytics for access control data.
- The software shall provide an audit trail of all access events, system changes, and user activities.
- The software shall support role-based access control for system administrators and operators.
- The controller shall provide an SDK for third-party software development and integration.

Training and Documentation

The manufacturer shall provide the following training and documentation for the AHDU Series IP-Based Secondary Controller.

- User manuals and technical documentation for installation, configuration, and operation of the controller.
- Online training courses and videos for system administrators and operators.
- On-site or remote training sessions for system integrators and installers.
- Technical support and assistance for system integrators, installers, and end-users.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0

*Note: Certifications may vary by region and country. Please consult the manufacturer for the specific certifications applicable to your location.

Address: 190 Bluegrass Valley Parkway Alpharetta, GA 30005
Email: sales@armatura.us

Date: 28 April 2023
Version 1.0