Standard Specification

EPIC Console Series 2.0

EPIC Console Series 2.0 will be furnished in accordance with the following specification.

1. Scope

This specification applies to the construction, materials, and performance of the EPIC Console Series 2.0 ("the console" hereafter.) The console provides a means for batteries and electrical equipment to be stored in environmentally controlled enclosure and allow operator(s) to remotely monitor the system.

2. Applicable Ratings, Codes, and Standards

2.1. NEMA Type 3R, IP14
2.2. IBC (2012): International Building Code; Seismic certified, essential equipment
2.3. CBC (2013): California Building Code; Seismic certified, essential equipment
2.4. ASCE 7-10 (2010): Minimum Design Loads for Buildings and Other Structures, as applicable for wind and snow loading
2.5. IEEE 693 (2018): IEEE Recommended Practice for Seismic Design of Substations; High, Seismic certified, essential equipment (up to 1000lbs/ door or width of section)
2.6. IEEE 693 (2018): IEEE Recommended Practice for Seismic Design of Substations; Moderate, Seismic certified, essential equipment (up to 2000lbs/ door or width of section)
2.7. IEEE 1635 (2018): Guide for the Ventilation and Thermal Management of Batteries for Stationary Applications
2.8. CSA C22.2 No. 286-17 (2017), Industrial Control Panels (Pending)
2.9. UL 508A (2018), Standard for Safety Control Equipment (Pending)

3. Performance Conditions

3.1. The console will be an outdoor enclosure meeting the requirements of NEMA Type 3R rating, protecting contents from falling rain, sleet, snow, and external ice formation while allowing for ventilation of hydrogen gas.
3.2. The console will be able to maintain a steady internal temperature of 68º F to 75º F (+/- 3°F) through an external ambient temperature of -30°F to 120ºF.
3.3. The console will safely mitigate hydrogen to a level of 2% per IEEE 1635 (2018).
3.4. The console will incorporate a ventilation system:
  3.4.1. Each battery section will include exhaust fans in the eave of each roof section.
  3.4.2. Each battery section will include a make-up air vent in each door.
  3.4.3. Each electrical section will include exhaust fans in the eave of each roof section.
  3.4.4. Each electrical section will include a make-up air vent in each door.

4. Mechanical Performance and Design

4.1. The console will be scalable, allowing the addition of sections for greater length.
4.2. The console roof will withstand loads from falling snow up to 40 psf.
4.3. The console will withstand loads from wind up to 151 mph.
4.4. The console wall and door panels will consist of injected foam insulated panels
  4.4.1. Panels will nominally measure 74 5/8" in height, 36 1/8" in width, and 2" in thickness.
  4.4.2. Panels will incorporate skins fabricated from 20-gauge powder-coated aluminum sheet.

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4.4.3. Panels will incorporate a core of injected polyurethane foam utilizing HFO 1233zd(E) and water blowing agent, designed for commercial and industrial insulation applications meeting the requirements of UL94HF-1
4.4.4. Panels will incorporate a perimeter of polymeric material with a UV inhibitor package and include an integrated provision for gasketing material.
4.4.5. Panel gasketing will be EPDM rubber foam or equivalent for sealing to the console frame and around any mechanical fasteners.
4.5. The console will incorporate insulation in the walls, doors, ceiling, and base.
4.5.1. Wall and door panels will provide a heat resistance capacity of not less than R-12.
4.5.2. Ceiling will provide a heat resistance capacity of not less than R-12.
4.5.3. Floor will provide a heat resistance capacity of not less than R-6.
4.6. The console brackets, hinges, and hinge pins will be 316 stainless steel or better.
4.7. All console hardware will be 18-8 stainless steel or better.
4.8. The console base frame will be not less than 12-gauge.
4.9. The console base frame will be coated, before final powder coating, with a cationic epoxy primer
4.9.1.1. Tested per ASTM B117 for salt spray resistance at 500 hours and 1000 hours
4.9.1.2. Tested per GMW14872 for cyclic corrosion at 28 cycles
4.9.1.3. Tested per ASTM D1735 for humidity resistance at 500 hours, 5B rating
4.9.1.4. Tested per ASTM D870 for water resistance at 500 hours, 5B rating
4.10. The console will resist water penetration through exterior seams via interlocking sheet metal, gasketing, or silicone adhesives.
4.10.1. The console doors
4.10.2. Will have a pad-lockable, three-point latching system.
4.10.3. Will incorporate handles made from polyamide thermoplastic.
4.11. The console interior frame will be constructed from painted 1-5/8" P1000H3 Unistrut® or equivelent.
4.12. The console will include facilities for moving, lifting, and positioning.
At no time will the console be moved, lifted, or positioned with batteries installed.
Provisions for lifting from beneath with a forklift or similar equipment.
Attachment points for overhead lifting via crane or similar equipment.
4.13. The console will allow for conduit entry by the following means
4.13.1. Stub-ups through the floor
4.13.2. Knockouts on either end of the console base frame
4.13.3. Factory-installed conduit bushings through the console wall

5. Electrical Bay and Equipment

5.1. The console will accommodate the following factory-installed electrical equipment in the electrical section.
5.1.1. Required EPIC Console Controller (one per complete console system)
5.1.2. ATevo, AT10, and AT30 battery charger(s)
5.1.2.1. 12 VDC
5.1.2.2. 24 VDC
5.1.2.3. 48 VDC
5.1.2.4. 130 VDC
5.1.2.5. Optional DC distribution panel
5.1.2.6. Optional DC disconnect
5.1.2.7. Optional AC distribution panel

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5.1.2.8. Optional AC disconnect
5.1.2.9. Optional AC main breaker
5.1.2.10. Optional best battery selector
5.1.2.11. Optional equipment racking for customer -installed equipment per EIA 19" or 23" standards. Rack to be removable for equipment install and wiring.

6. Battery Bay and Racking System

6.1. The console will incorporate a battery racking system comprising a standard P1000H3 Unistrut® (or equivalent) system to accommodate a variety of battery sizes and arrangements per application requirements.
6.2. An optional battery racking system with seismic certifications per applicable standards and capacities included in Section 2.
6.3. Battery supports will be rated to handle the battery weight per standards included in Section 2.
6.4. Battery rack rails will incorporate an electrolyte-resistant nonconductive rail cover.
6.5. Battery rack rails will be supported by re-positionable brackets bolted into Unistrut® to allow for field modification if required.

7. Electrical Design Specifications

7.1. The console will accept 120/240 VAC split phase as its standard input.
7.1.1. Console operation will be powered from 120VAC (line, neutral)
7.1.2. Battery chargers will operate from 240VAC (line, line)
7.1.3. Nonstandard inputs are available via isolation transformer
7.2. The console internal power and control wiring will utilize XLPE wire per HindlePower standard CB0002-00.
7.2.1. The console internal wiring will include wire identification labels.
7.2.2. The console internal wiring will be in accordance with standards listed in section 2.

8. System Control and Monitoring (Hindle Health® System)

8.1. The Hindle Health® System will consist of a metal enclosure integrating a user interface with display, microprocessor control, AC power distribution, binary I/O, and MODbus capabilities.
8.2. The Hindle Health® System will operate from a 12 VDC universal input switchmode power supply
8.3. The Hindle Health® System will provide
8.3.1. AC control and distribution for
8.3.1.1. Console heating
8.3.1.2. Console air conditioning
8.3.1.3. GFCI utility outlet (when 120 VAC is available from console input power)
8.3.2. 12VDC supply, control, and distribution for
8.3.2.1. Ventilation fans
8.3.2.2. Interior lighting
8.3.2.3. Binary inputs for customer-supplied equipment alarms
8.3.2.4. Modbus over Ethernet I/O
8.3.3. Temperature sensor inputs for battery and internal ambient temperatures
8.3.3.1. Alarming of any equipment with built-in communication abilities
8.4. Each input acknowledged by the Hindle Health® System will have remote monitoring capabilities.
8.5. The Hindle Health® System will illuminate exterior indicators displaying the system health status

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8.6. The Hindle Health® System will provide red and green indicators for system status
- 8.6.1.1. Under the following conditions, the system will indicate steady green:
  - 8.6.1.1.1. Normal operation (no faults or alarms within the system or subsystem)
- 8.6.1.2. Under the following conditions, the controller will indicate steady red:
  - 8.6.1.2.1. Console alarms
    - 8.6.1.2.1.1. Relay board failure
    - 8.6.1.2.1.2. Fan failure
    - 8.6.1.2.1.3. Battery bay over-temperature
    - 8.6.1.2.1.4. Battery bay low temperature
    - 8.6.1.2.1.5. Battery bay temperature error
    - 8.6.1.2.1.6. Electronic bay over temperature
    - 8.6.1.2.1.7. Electronic bay low temperature
    - 8.6.1.2.1.8. Electronic bay temperature error
    - 8.6.1.2.1.9. Smoke alarm (if equipped)
    - 8.6.1.2.1.10. Hydrogen 2% (if equipped)
    - 8.6.1.2.1.11. Hydrogen 1% (if equipped)
  - 8.6.1.2.2. Charger alarms
- 8.6.1.3. Any third-party device that can communicate a digital or analog signal for alarm or value will be integrated into the alarm schedule, event log, and able to illuminate the green or red LED.
- 8.6.1.4. Any analog threshold will be user-settable.
- 8.6.1.5. Any digital alarm will be configurable, high, or low.
- 8.6.1.6. Under the following conditions, the RED led will flash on / off repeatedly
  - 8.6.1.6.1. Microprocessor failure
  - 8.6.1.6.2. ATevo Hindle Health® System critical alarm

8.7. Controller Communication
- 8.7.1. The controller will support communication via DNP3.0 level 2 / Modbus over Ethernet and RS-485.
- 8.7.2. The controller will support communication with legacy AT-series battery chargers and ATevo battery chargers to poll alarms.
- 8.7.3. The controller will have Modbus slave abilities to communicate to external SCADA systems.

8.8. Hindle Health® System relay board
- 8.8.1. The Hindle Health® System will include:
  - 8.8.1.1. (6) Form C relays capable of 8ADC @ 30VDC or 10A @ 125VAC
  - 8.8.1.2. (2) Isolated binary inputs, high logic @ 12-120Vdc. Low logic @ 0-8Vdc.
  - 8.8.1.3. (8) analog inputs, (5) dedicated for thermistors, (4) generic inputs 0-3Vdc.
  - 8.8.1.4. (10) Non-isolated inputs for use with external dry contact circuits
  - 8.8.1.5. (1) Common alarm relay rated at .5A @ 125VAC/VDC
  - 8.8.1.6. External control of SCR for heat

8.9. Hindle Health® System HMI
- 8.9.1. The Hindle Health® System will have an HMI that displays:
  - 8.9.1.1. Real-time temperature status
  - 8.9.1.2. EPIC Console active alarms
  - 8.9.1.3. AT or EVO battery charger active alarms
  - 8.9.1.4. Connected 3rd party active alarms
  - 8.9.1.5. Relay configuration
  - 8.9.1.6. Temperature setpoints

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8.9.1.7. Communication configuration
8.9.1.8. Charger, ventilation fan, heater, and air conditioning status

8.10. The Hindle Health® System will have a 9-button matrix that navigates the controller software.
8.10.1. (4) Arrow buttons
8.10.2. Enter button
8.10.3. Menu button
8.10.4. Alarm button
8.10.5. ESC button
8.10.6. Hindle Health button

9. Finish

9.1. The console exterior finish will be ANSI 61 gray epoxy powder coat per HindlePower standard CB5046-00 or equivalent when carbon steel is selected for:
9.1.1. Exterior wall and door panel skins
9.1.2. Exterior base and upper frame assemblies
9.1.3. Roof assembly

9.2. The console interior wall and door skins will be smooth matte white per RAL 9010 per HindlePower standard CB5046-01 49/10103 or equivalent.
9.2.1. The console exterior door/wall panel skins, base, and upper frame assemblies will be unfinished when 316 stainless steel is selected.
9.2.2. The console wall and door panel perimeter extrusions will be color-coordinated to ANSI 61 gray.
9.2.3. The console will accommodate custom colors per customer specification (at increased cost and lead-time) for:
9.2.3.1. Exterior wall and door panel skins
9.2.3.2. Exterior base and upper frame assemblies
9.2.3.3. Roof assembly

10. Drawing and Instruction manuals

10.1. Each console will be furnished with the following standard documentation:
10.1.1. Drawing list
10.1.2. Outline drawing
10.1.3. Internal component layout
10.1.4. Foundation drawing
10.1.5. Lifting diagram
10.1.6. Console schematic
10.1.7. Connection diagram
10.1.8. Circuit breaker coordination study
10.1.9. Hydrogen mitigation calculations

11. Nameplate Information

11.1. Each nameplate will include:
11.1.1. Model number
11.1.2. Serial number
11.1.3. AC input voltage and configuration
11.1.4. AC input frequency
11.1.5. Maximum AC input amperes

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11.1.6. Cooling capacity BTU/h (if installed)
11.1.7. Heating capacity BTU/h (if installed)
11.1.8. Interupting capacity
11.1.9. Short circuit rating

12. Standard features

12.1. Integrated NEMA two-hole ground pads for each section
12.2. 120 VAC, 15A GFCI duplex outlet (when 120V is available via console input power)
12.3. 12 VDC ventilation fans in all sections
12.4. Internal 12 VDC lighting in all sections with timer switch
12.5. Wire labels
12.6. Seismic-rated pad mounting clips
12.7. Eyewash (two bottle, door-mounted in battery bay)

13. Optional Features

13.1. Customized parts data package
13.1.1. Manufacturer's replacement part number
13.1.2. Recommended spares
13.2. Optional customized drawings are available for user-defined console requirements
13.3. Optional features available:
13.3.1. Battery section heating and air conditioning
13.3.2. Electrical section heat (anti-condensation)
13.3.3. Seismic battery racking
13.3.4. Battery spill containment (lead-acid or NiCd)
13.3.5. Smoke detector
13.3.6. Fire extinguisher
13.3.7. Hydrogen detector
13.3.8. Cold-weather kit (includes increased heater capacity)
13.3.9. Crane lifting kit
13.3.10. Elevated base kit
13.3.11. Ground bus
13.3.12. HHS integration of 3rd party equipment
13.3.13. Main battery cables
13.3.14. Rear doors
13.3.15. Custom colors
13.3.16. Stainless steel
13.3.17. Custom nameplate data (markings, model number, etc.)

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