1. INTRODUCTION

1.1. This specification defines an engine starting system consisting of integrated internal nickel-zinc battery bank, dedicated charger, controls, and communications. System shall provide reliable engine starting power to industrial engines.

2. AGENCY STANDARDS AND CERTIFICATIONS

2.1. Safety Agency Standards
- 2.1.1. C-UL Listed for US & Canada: UL 1973, category BBFX
- 2.1.2. NFPA 70, NFPA-110

2.2. FCC Standards Emissions
- 2.2.1. 47-CFR-15 (FCC Part 15) Class B

2.3. Vibration and Shock
- 2.3.1. Swept Sine (EN60068-2-6): 4G, 18-500 Hz, 3 axes. Random: 20-500Hz, .01G^2/Hz. Shock: EN 60068-2-27 (15G)

2.4. Electrical Transient
- 2.4.1. ANSI/IEEE C62.41 & EN 61000-4-12 on power terminals

2.5. European Union (CE), United Kingdom (UKCA)
- 2.5.1. EMC: 2014/30/EU, UK 2016 (EN 61000-6-2 and EN 61000-6-4)
- 2.5.2. LVD/Safety: 2014/35/EU, UK 2016 (EN 60335-1 and EN 60335-2-29)
- 2.5.3. RoHS: 2015/863, UK 2012 (EN 63000)
- 2.5.4. Battery Directive: 2006/66/EC

2.6. Seismic
- 2.6.1. Seismic: Rigid base mount; max S_{ds} of 2.5g. Certified to IBC 2000 - 2021 and California Building Code 2007 – 2021.

2.7. American Bureau of Shipping: Type Approved

3. AC MAINS SUPPLY

3.1. The AC input voltage range shall be 90-265VAC.

3.2. The AC input frequency range shall be 47-63Hz.

3.3. Charging system efficiency shall be to 93%.

3.4. The charging system shall provide active power factor correction. The power factor shall be at least 0.95 or greater at maximum charging power.

3.5. Supplementary overcurrent protection fuse, transient protected to EN 61000-4-5 level 4

4. BATTERY

4.1. The internal battery shall be nickel-zinc chemistry.

4.2. The system shall be available in 12V and 24V models.

4.3. The onboard battery shall have a minimum capacity of 80Ah or 90Ah depending on model.

5. BATTERY CHARGING

5.1. The onboard battery charger shall have custom charging algorithms specifically designed for use with nickel-zinc batteries.

5.2. The charging algorithms shall be specifically approved by the nickel-zinc battery manufacturer.

5.3. Internal battery temperature charging compensation shall be standard.

5.4. The onboard battery charger shall be able to completely recharge the batteries within 8 hours.

5.5. The onboard battery charger shall have an output current of 12A minimum.

5.6. The charging ripple shall not exceed 30mV.

6. DC OUTPUT

6.1. Output Current

6.1.1. Locked Rotor Performance (breakaway current condition)

6.1.1.1. The unit shall provide breakaway currents of 2,700A or greater.

6.1.1.2. For 12V starting systems, the locked-rotor voltage shall not drop below 5.0VDC during the locked-rotor condition.

6.1.1.3. For 24V starting systems, the locked-rotor voltage shall not drop below 10.0VDC during the locked-rotor condition.

6.1.2. Engine Cranking Performance (rolling current condition)

6.1.2.1. The unit shall provide engine cranking (rolling) currents of up to 1000A.

6.1.2.2. For 12V starting systems, the cranking voltage shall not drop below 9.5VDC during cranking.

6.1.2.3. For 24V starting systems, the cranking voltage shall not drop below 19.0VDC during cranking.

6.1.3. Shall meet NFPA 110 engine cranking performance requirements.

7. PARALLELING AND REDUNDANCY

7.1. The engine starting system shall support connection in parallel with two or more systems for increased starting capacities and redundancy.

7.2. The engine starting system shall support integration with Best Battery Selectors or battery isolators.

7.3. The engine starting system shall be useable in conjunction with lead-acid, nickel-cadmium or other battery types when coupled through a best battery selector.

8. ENVIRONMENTAL

8.1. The engine starting system shall operate from -10°C to 55°C.

8.2. The engine starting system shall charge from 0°C to 45°C.

8.3. The engine system shall be stored in temperatures from -20°C to 60°C.

8.4. Ingress Protection

8.4.1. The ingress protection shall be NEMA2/IP22.

8.4.2. Charger shall have internal ingress protection such that all AC and communications connections are non-exposed and protected from incidental jarring.

8.5. The engine starting system shall operate in humidity levels ranging from 0% to 95%, non-condensing.

8.6. The engine starting system shall operate at full specification from 0 to 13,000 ft, or 0 to 4000m above sea level.

8.7. The engine starting system shall be cooled via natural convection with no internal fans.

9. OPTIONS

9.1. Floormount brackets for bolted mounting

9.2. SAE Battery Posts for DC connections

9.3. Keypad user interface and display

9.4. Communication

9.5. Battery capacity of 80Ah or 90Ah

9.6. Field wiring kit including a field terminable AC connector and a field wiring cover

9.7. Paralleling kits

10. USER INTERFACE

10.1. The base level user interface shall provide a multicolor LED panel showing system status.

10.2. The optional level user interface shall include a backlit LCD displaying plain language text, a multicolor LED panel showing system status, and a user control panel.

10.2.1. System shall be equipped with a 1% accuracy meter for indicating AC input and DC output voltage and 1% accuracy meter for indicating DC charging current.

10.3. User interface shall ensure that users cannot change settings that would damage the battery.

11. REMOTE COMMUNICATIONS

11.1. Standard Communications

11.1.1. (2) Form-C Alarm Relay Contacts

11.1.1.1. Alarm relay contacts shall be customizable to support customer-specific alarm combinations and setpoints.

11.1.2. USB-C

11.1.2.1. A Setup Utility shall be available providing a custom configuration and diagnostics software utility that runs on a Windows PC via USB-C or an ethernet port.

11.2. Optional Communications

11.2.1. J1939

11.2.2. Modbus RS-485

11.2.3. Modbus TCP/IP

11.2.4. Ethernet

11.3. Custom alarm profiles shall be supported which allow the alarm relay and communications settings to be assigned at the factory according to the specific customer requirements.

11.4. Alarms

11.4.1. Any alarm indication shall cause plain language text to appear on the LCD and change appropriate LEDs. Normal LED indication shall be green. Alarm LEDs shall be red. Warning LEDs shall be amber. Multiple alarms result in the relevant LEDs changing color and multiple alarm message screens on the LCD. Alarm status shall also be available via communication interfaces.

11.4.2. The following alarms shall be provided, and shall be made assignable to any relay:

11.4.2.1. AC Line Failure

11.4.2.2. High DC Voltage

11.4.2.3. Battery on Discharge

11.4.2.4. Low DC Voltage

11.4.2.5. Battery End of Discharge

11.4.2.6. Charger Fail

11.4.2.7. Over Voltage Shutdown

11.4.2.8. Invalid Settings

11.4.2.9. Thermal Foldback

11.4.2.10. Temperature Probe Fault

11.4.2.11. Current Limiting

11.4.2.12. Load Share Fail

11.4.2.13. DC Below Startup Voltage

11.4.2.14. High Battery Temperature

11.4.2.15. High Battery Temperature Shutdown

11.4.2.16. AC Voltage Low
11.4.2.17. AC Voltage High
11.4.2.18. AC Frequency Out of Range
11.4.2.19. Low Engine Crank

12. CONNECTIONS

12.1. AC input connection shall be a locking-type IEC 320 C13 connector.
12.1.1. An optional UL Listed field terminable locking connector shall provide accommodation for hard wiring. Ordered separately.
12.2. An IEC 320 C14 AC output connection shall be provided for system paralleling.
12.3. Unit shall be supplied with AC input power cord. Locking-type, 8ft minimum length. IEC 320 C13 connection to unit, NEMA 5-15R plug connection to AC feeder.
12.4. The standard DC output connections shall be M8 threaded inserts.
12.4.1. The optional DC output connection shall be SAE battery posts.
12.5. The communications wiring shall be connected via pluggable field terminal blocks or RJ45 connections.

13. MECHANICAL

13.1. Enclosure construction shall be 1/8” 5052 aluminum.
13.2. Enclosure top surface shall be non-conductive.
13.3. Enclosure shall accommodate side cable conductor and conduit entry.
13.4. Unit weight shall not exceed 100lbs (45kg).
13.5. Enclosure shall not exceed 22in (l) x 12in in (w) x 11in (h).
13.6. Enclosure shall support the weight of a 300lb vertical load.

14. WARRANTY

14.1. 10-year full replacement warranty shall be standard.

15. CHANGES TO SPECIFICATION

15.1. In order to meet evolving customer requirements, changes to the product and to this specification may be made without notice from time to time.

END OF SPECIFICATION

