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STANDARD SAMPLE SPECIFICATION

AT30 Series Microprocessor-Controlled Float Battery Charger (three phase input)

A battery charger shall be furnished in accordance with the following specification:

1.0 - General

1.1 - The battery charger shall be sized to continuously carry the load demand as required in the plans, and have sufficient reserve capacity as deemed appropriate for the application.

1.2 - The battery charger shall provide a continuous regulated dc output, derived from an ac input source. The output shall be suitable to maintain the battery in a fully charged state, while supporting any additional dc loads as defined in the plans. The battery charger shall also have the ability to automatically or manually provide an equalizing charge as required for recharging the battery after discharge.

1.3 - The battery charger shall be of a design that employs microprocessor technology to control and define all critical operational, calibration, regulation and alarm functions.

2.0 - Applicable Codes

The AT30 Charger product line meets the requirements of the designated versions of the following industry and agency standards:

- NEMA PE5-1996 stationary type battery chargers
- UL 1564 standard for industrial battery chargers
- UL 1012 standard for stationary power supplies
- CSA 22.2 standard for battery chargers
- ANSI C37.90-1989 surge withstand capability definitions and tests
- IEC 146 semiconductor converters
- FCC Part 15 Subpart J Class A

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3.0 - Standard Features

3.1 - Standard three phase input voltages include:

3.1.1 - 208, 240, 480, and 600 Vac 60Hz

3.1.2 - 220, 380, and 416 Vac 50/60Hz

3.1.3 - battery charger will hold regulation with an ac input voltage tolerance of +10% to -12%

3.2 - Standard output voltages include 12, 24, 48, and 130 Vdc, with output currents ratings ranging from 25 to 1000 Adc, depending on charger output voltage rating.

3.3 - Output control is constant-voltage, current-limited. Flat temperature coefficient of dc output voltage is standard.

3.3.1 - An optional battery temperature probe is available for temperature compensation of the output voltage. The probe is compatible with Lead-Acid and Nickel Cadmium battery types.

3.4 - The AT30 charger is capable of delivering 100% rated output current at the maximum stated equalize voltage and at the minimum rated ac input voltage, at 50 °C.

3.5 - Current limit adjustable from 50 to 110%, factory set to 110%. The current limit specification does not mean that the charger will be able to deliver greater than 100% rated output current under all operating conditions.

3.6 - Meets the SWC (oscillatory surge) requirements of ANSI C37.90, and the transient suppression levels for category B in IEEE Std. 28/ANSI C62.1.

3.7 - Full wave six-pulse rectifier bridge with free-wheeling diode, single-winding transformer secondary, and dc inductor.

3.8 - An ac input circuit breaker (CB1) is standard. Fuses may be specified in place of an input circuit breaker at no charge, or fuses can be added in conjunction with the input circuit breaker to achieve higher AIC ratings.

3.9 - A dc output circuit breaker (CB2) is standard. Fuses may be specified in place of an output circuit breaker at no charge, or fuses can be added in conjunction with the output circuit breaker to achieve higher AIC ratings.

3.10 - AT30 starts and operates with a crowbar short circuit on dc output without tripping the standard dc circuit breaker. A filtered charger equipped with dc fuses may clear the fuses in the event of a crowbar short circuit during operation, caused by the filter caps discharging through fuses.

3.11 - No blocking diode is provided. A blocking diode is not required, since a dc circuit breaker is standard. During an ac power failure, the dc load on the battery (without optional equipment) is less than 0.5 A.

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3.12 - AT30 survives a reverse polarity battery connection. The standard circuit breaker trips through the free-wheeling diode on unfiltered chargers. A polarity diode is included with filtered chargers to protect the output capacitors.

3.13 - Cooling is natural convection for all ratings 25-300 Adc in NEMA Type-1 enclosures.

3.13.1 - NEMA Type-4 cabinets may have forced air-cooling for those ratings. Power for the cooling fans is provided externally.

3.14 - Solderless CU-AL compression input and output terminals, including chassis ground.

3.15 - A clear safety cover over all internal components. The safety cover is marked with an internal wiring diagram.

3.16 - Battery remote sense terminals are provided.

3.17 - Switchboard Insulation System (SIS) wiring is standard, using Hypalon or XLPE (cross-linked polyethylene), 600V, 105 °C. An exception is pc board interconnections, which may use ribbon cable assemblies, or other standard industrial grade pc board interconnections. XLPE insulation is rated for the UL VW-1 vertical wire flame test.

3.18 - Test points are provided for semi-automatic final test.

4.0 - Operation

4.1 - Battery charger shall automatically determine the appropriate dc output, in terms of either voltage or current required for maintaining the battery and load either by pre-programming or in-field re-programming, via the touch panel controls.

4.2 - The battery charger shall automatically know and respond to any alarm options or remote sensing options installed according to the manufacturer's instructions without further operator action.

4.3 - The battery charger shall display, via a 1% digital display and associated LED indicators, all functions important to operation.

4.3.1 - During float operation, the digital display shall alternate between dc voltage and dc current indications as designated by the appropriate LED being lit for the respective indication.

4.3.2 - During equalize operation, the digital display shall alternate between dc voltage and dc current indications as designated by the appropriate LED being lit for the respective indication. If the unit is employing a timer, either automatic or manual the LED indicators shall indicate timer function while the Digital display indicates the hours remaining for equalize charge.

4.4 - Error and message codes, indicating certain self-diagnostic anomalies and operating conditions shall be indicated by the digital display, as required.

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5.0 - Protective Devices

5.1 - The charger shall employ a circuit breaker as standard for each ac input and dc output protection.

5.2 - An ac input transient over voltage protection shall be accomplished via a MOV (metal-oxide varistor) on the ac input terminals.

5.3 - A dc external transient over voltage protection shall be via a MOV (metal-oxide varistor) on the dc bus. This shall be located on the output terminals of the battery charger.

5.4 - The charger shall be protected against damage in the event that the battery is connected in reverse.

5.5 - Protection from oscillatory surges (SWC) as defined by ANSI C37.90-1978. Battery charger shall operate correctly during and after application of oscillatory surges.

5.6 - Output current limit shall be adjustable from 50% to 110% of rated output.

5.6.1 - The battery charger shall electrically protect itself from a short circuit on the dc output, so as to limit current output. When the short is corrected the battery charger will automatically return to normal operation. During a short circuit of the output an error code shall be provided as indication. The error code shall be removed when the output voltage rises above 2.0 Vdc.

6.0 - Controls

6.1 - The following controls shall be located on the front panel, using touch sensitive switches to initiate all adjustments.

6.1.1 - charge mode key (selects float or equalize mode)

6.1.2 - equalization method key (selects timer method, manual, automatic, or manual timer)

6.1.3 - EDIT/ENTER key (initiates changes in AT30 parameters)

6.1.4 - METER MODE key (selects Volts, Amperes, hours, or alternating display)

6.1.5 - UP key (increases parameter value in Edit mode)

6.1.6 - DOWN key (decreases parameter value in Edit mode)

6.1.7 - ac input circuit breaker

6.1.8 - dc output circuit breaker

6.1.9 - LAMP TEST key

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7.0 - Indicators

7.1 - Standard front panel indicators shall include the following:

7.1.2 - digital meter, 1% accuracy, 4-digit, 7-segment, that shall indicate the following:

- dc Volts
- dc Amperes
- equalize hours remaining
- error and message codes

7.1.3 - dc Volts meter indicator (red LED)

7.1.4 - dc Amperes meter indicator (red LED)

7.1.5 - equalize Hours Remaining indicator (red LED)

7.1.6 - ac on indicator (green LED)

7.1.7 - float mode indicator (green LED)

7.1.8 - equalize mode indicator (yellow LED)

7.1.9 - manual equalize timer indicator (yellow LED)

7.1.10 - manual equalize indicator (yellow LED)

7.1.11 - automatic equalize indicator (yellow LED)

7.2 - Standard Front Panel Primary Alarm indicators shall include the following:

7.2.1 - high voltage dc alarm indicator (red LED)

7.2.2 - low voltage dc alarm indicator (red LED)

7.2.3 - dc output failure alarm indicator (red LED)

7.2.4 - positive ground fault indicator (red LED)

7.2.5 - negative ground fault indicator (red LED)

7.2.6 - ac failure alarm indicator (red LED)

8.0 - Current Limit

8.1 - The battery charger is equipped with software current-limiting control. It shall be factory-set at 110% of rating. This shall also be the limit available from the charger. Field adjustments may be made over a range from 50% to 110% of rating. Current limit shall be displayed directly in Adc.

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9.0 - Parallel Operation

9.1 - Operating two (2) or more chargers with the same dc voltage rating shall be a standard feature of the filtered charger with random load sharing.

10.0 - Operating Environment

10.1 - without de-rating: -18 °C to +50 °C (-1 °F to 122 °F)

10.2 - storage: -30 °C to +70 °C (-22 °F to 158 °F)

10.3 - relative humidity: RH 0% - 95% non-condensing

10.4 - elevation to: 1,000 meters (3,300 feet)

11.0 - Construction

11.1 - I/O power terminals with CU-AL compression lugs, appropriately sized for field wiring

11.2 - Alarm function contacts, compression terminal blocks for #22-14 AWG

11.3 - Enclosure shall be steel 14 GA for the outer skin, door and chassis.

11.4 - Enclosure shall employ adequate knock-outs for top, bottom, and right side conduit entry.

11.4 - Enclosure finish will be ANSI-61 gray, baked powder epoxy.

12.0 - Serviceability

12.1 - The battery charger shall be serviceable by a technician using standard hand tools.

12.2 - Addition of any and all options including but not limited to filtering, alarm capabilities, battery eliminator, remote temperature compensation, and medium and high interrupting breakers, shall be able to be added in the field by the customer without any special training, using standard hand tools.

13.0 - Alarms, Self-Diagnostics, and Error Codes

13.1 - The charger shall be capable of automatic self diagnostics, and indicate any anomaly by means of an error code on the digital display. Error and message code definitions shall be posted within the battery charger.

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13.2 - Primary Alarms (*standard with all AT Series models*) shall provide an alarm sensing capability for all the following:

- 13.2.1 - high voltage dc alarm indicator (red LED)
- 13.2.2 - low voltage dc alarm indicator (red LED)
- 13.2.3 - dc output failure alarm indicator (red LED)
- 13.2.4 - positive ground fault indicator (red LED)
- 13.2.5 - negative ground fault indicator (red LED)
- 13.2.6 - ac failure alarm indicator (red LED)
- 13.2.7 - summary (common) alarm contact (one form-C)

14.0 - Control Panel

14.1 - Front panel controls shall be a touch sensitive type, permanently laminated for protection, thereby eliminating the need for engraved functional nameplates.

15.0 - Documentation

15.1 - A manual completely describing the installation, operation, and maintenance of the charger including all accessories and options shall be included. The charger shall have provision for storing the manual in a convenient permanent pocket.

15.2 - A customized parts data package, including manufacturer's replacement part number and recommended spares shall be included with charger.

15.3 - Standard drawings consisting of an outline, internal layout, schematic and wiring diagram may be provided as needed.

16.0 - Optional Accessories

16.1 - Standard dc output filter, consisting of one inductor and a one or more capacitors capable of limiting the output ripple with battery connected, when measured at the battery terminals, to the limits specified in NEMA PE5 (output ripple may be 20% higher on units operating at 50 Hz).

16.2 - Eliminator filter, consisting of one or more capacitors installed within the battery charger enclosure. The filter reduces the output ripple voltage to 30 mV rms and 100 mV rms for 130 Vdc chargers. Output ripple may be 20% higher on units operating at 50 Hz. The ripple voltage is measured at the charger terminals.

16.3 - Auxiliary Relay PC Board provides two (2) sets of form-C contacts for each alarm function listed in Section 13.2, plus an additional summary alarm contact, one (1) form-C.

- 16.3.1 - auxiliary alarm terminal block with barrier type terminals

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16.0 - Optional Accessories (*continued*)

- 16.4 - medium/high interrupting capacity circuit breakers available per customer specification
- 16.5 - copper ground pad with one (1) CU-AL compression lug, appropriately sized for field wiring
- 16.6 - three phase ac input lightning arrester
- 16.7 - remote temperature compensation (TempCo) probe, with automatic failure detection and fail-safe control override
- 16.8 - rack, floor, or wall installation kits
- 16.9 - NEMA Type-2 drip shield assembly
- 16.10 - NEMA Type-4 (12/13) cabinet
- 16.11 - fungus proofing
- 16.12 - anti-static coating
- 16.13 - export packaging
- 16.14 - certified test data
- 16.15 - end of discharge alarm
- 16.16 - fan control contactor

17.0 - Error Codes

17.1 - Error codes as indicated on the front panel shall determine certain malfunctions as part of an integral microprocessor controlled self-diagnostic system. The error codes shall appear in the digital display as an alphanumeric indication beginning with the letter "E" followed by a number code, which reveals the problem being identified. Error code definitions shall be posted inside the access door to the charger and shall be listed in the manual.

17.2 - Certain status codes, preceded by the letter "A" are also provided to indicate special operating conditions.

18.0 - Fail Safe Operation

18.1 - The battery charger shall feature a separate circuit from the microcontroller to detect a low dc voltage condition, and enable the common alarm on the main board to change state. This uniquely protects the battery due a failure of the microprocessor.