

Float Battery Chargers

Unfiltered SCR and Filtered SCRF Series
Single Phase Input / Three Phase Input



SAFT



Utility & General Industry

- Switchgear
- Alarm Systems
- Engine Starting
- Railroad
- Emergency Lighting
- Marine

Communication & Telecommunications

- Radio
- Telephone
- Telemetry
- Microwave

Saft's SCR/SCRF Series of industrial float chargers is designed to automatically control charging rates for a wide variety of battery types and to simultaneously provide full rated output for both continuous and intermittent DC loads.

The chargers are constant voltage devices with automatic current limiting. Voltage regulation and current limiting are controlled by solid state integrated circuitry to assure maximum performance in minimum space.

The SCR/SCRF Series is ideally suited to utility, communications and other stationary charger applications.

SCR-SCRF

Design Features

Component Selection

Electronic and electrical components are substantially derated to assure long life and reliability. Typical MTBF is 30,000 hours minimum. Components are selected or designed to provide a system life expectancy of 20 years.

Modular Construction

Control circuits, alarm circuits and electrical subassemblies are printed circuit board wired or modularized with plug and socket connections for easy serviceability.

Standard Subassemblies

Control modules and many electrical subassemblies are standardized across the entire range of charger sizes. This minimizes spare parts inventory and simplifies maintenance.

Durable

Front panels are recessed to prevent accidental damage to meters and controls. Standard cabinets are NEMA-1 enclosures of heavy gauge phosphatized steel with an attractive, long lasting acrylic enamel finish.

Easy Troubleshooting

A complete service manual, color-coded wiring, test point identification and circuit symbol labeling of internal components make troubleshooting easy.

Ease of Adjustment

Tap adjustments are not required. Output float voltage, equalize voltage, current limit and alarm levels are potentiometer adjustable.

Ease of Access

Internal components and connections are easily accessible and/or removable through a hinged front door that opens approximately 180 degrees for easy serviceability.

Ease of Installation

Cabinets are floor, wall or rack mountable and equipped with knockouts for cable or conduit entrance. Input, output and remote alarm connections are wired to easily accessible, internal terminal blocks.

Environmental Specifications

Operating Ambient Temperature

32° F to 122° F (0° C to 50° C) without derating.

Storage Temperature

-40° F to 185° F (-40° C to 85° C).

Operating Altitude

3300 feet (1000 meters) above sea level without derating.

Relative Humidity

5% to 95% (without condensation).

Audible Noise

Less than 65 dBA at any point 5 feet from any vertical surface of enclosure. Typical values measure 55 to 60 dBA at 100% load.

Ventilation

Units rated 300 Adc output or less are convection cooled via NEMA-1 vent openings in cabinet. Units rated 400 Adc output or greater have fan-assisted convection cooling with overheat audible alarm and remote alarm contacts. (Automatic charger shutdown due to overheat is optional.)

Electrical Specifications

AC Input

Standard transformers are available with taps for nominal voltages as listed below.

Single Phase Voltages:

- 120/220-240V 47-63Hz
- 480V 57-63Hz
- 120/208-240V 47-63Hz (optional)

Three Phase Voltages:

- 208/240V 57-63Hz
- 380-416V 47-63Hz
- 480V 57-63Hz

Chargers are wired and circuit protected for one nominal input voltage and frequency (to be specified at time of order).

Output Regulation

- ±0.5% of DC voltage setting maintained with input line variations of ±10% voltage and/or ±5% frequency.
- ±0.5% of DC voltage setting maintained with load variations from no load to full load.
- ±1.0% of DC voltage setting maintained against the combined variations of line, load and temperature.



SCR-SCRF

Output Transient Response & Recovery

- $\pm 5.0\%$ max. of DC voltage setting maintained with step load changes from 20% to 100% load.
- Recovery to $\pm 2.0\%$ of DC voltage setting, typically 200msec.
- Recovery to steady state DC voltage setting, typically 500msec.
- Overshoot of DC Voltage setting is not present at turn-on due to “soft-start” feature.

Output Current Limit

The electronic current limiting circuitry is factory set at 110% of rated output. It is continuously adjustable from 90% to 120% of rated load.

Output Ripple and Electrical Noise*

Unfiltered (SCR Series): Output ripple voltage is less than 10% rms for single phase input SCR units. Output ripple voltage is less than 3% rms for three phase input SCR units.

Filtered (SCRF Series): Output ripple voltage is 30mVrms or less for all SCRF units. Electrical voice band noise is less than 32dBnC using C-message weighting network.

**Measure when connected to a battery with an 8hr Amp-Hour rating of 4 times the full load current rating of the charger.*

Random Parallel Operation

SCR/SCRF Series Chargers may be random parallel operated with other chargers of similar regulation and current limit characteristics. Equal load sharing by two SCR/SCRF chargers requires the addition of the forced load sharing option.

Battery Eliminator Operation

SCRF Series Chargers will operate as DC power supplies without batteries. Addition of the Filtered Battery Eliminator option (SCRF units only) will reduce ripple when used as a battery eliminator.

Standard Accessories

AC On Indicating Light

Green front panel indicator

AC Input Circuit Breaker

- **Single Phase Input:**
 - Two-pole, 5000 A.I.C., UL Listed 100A-Frame
- **Three Phase Input:**
 - Three-pole, 5000 A.I.C., UL Recognized 100A-Frame
 - Three-pole, 25000 A.I.C., UL Listed 225A-Frame
 - Three-pole, 30000 A.I.C., UL Listed 400A and 600A-Frame

DC Output Fuses

Two-pole, fast acting, current limiting rectifier type.

AC and DC Surge Suppressors - MOV Type

- **AC Withstand**
 - 240Vac or less:
 - 1500Vpk - 1.2 x 20 μ sec pulse
 - Over 240Vac or less:
 - 3000Vpk - 1.2 x 20 μ sec pulse
- **DC Withstand**
 - All DC outputs:
 - 4000Vpk - 1.2 x 20 μ sec pulse

DC Output Ammeter and Voltmeter

Front panel, 2% accuracy, 3.5 inch case.

Manual Float/Equalize Switch

Front panel toggle switch.

Float and Equalize Adjustment Potentiometers

Two front panel mounted, lockable adjustment potentiometers.

Current Limit Adjustment Potentiometer

Internally mounted, with easily accessible adjustment.

DC Output Blocking Diode

Standard SCRF series feature prevents battery from discharging back through the filter and rectifier when charger is “off” due to AC power failure or charger malfunction. Standard SCR Series design provides the same protection on unfiltered units.

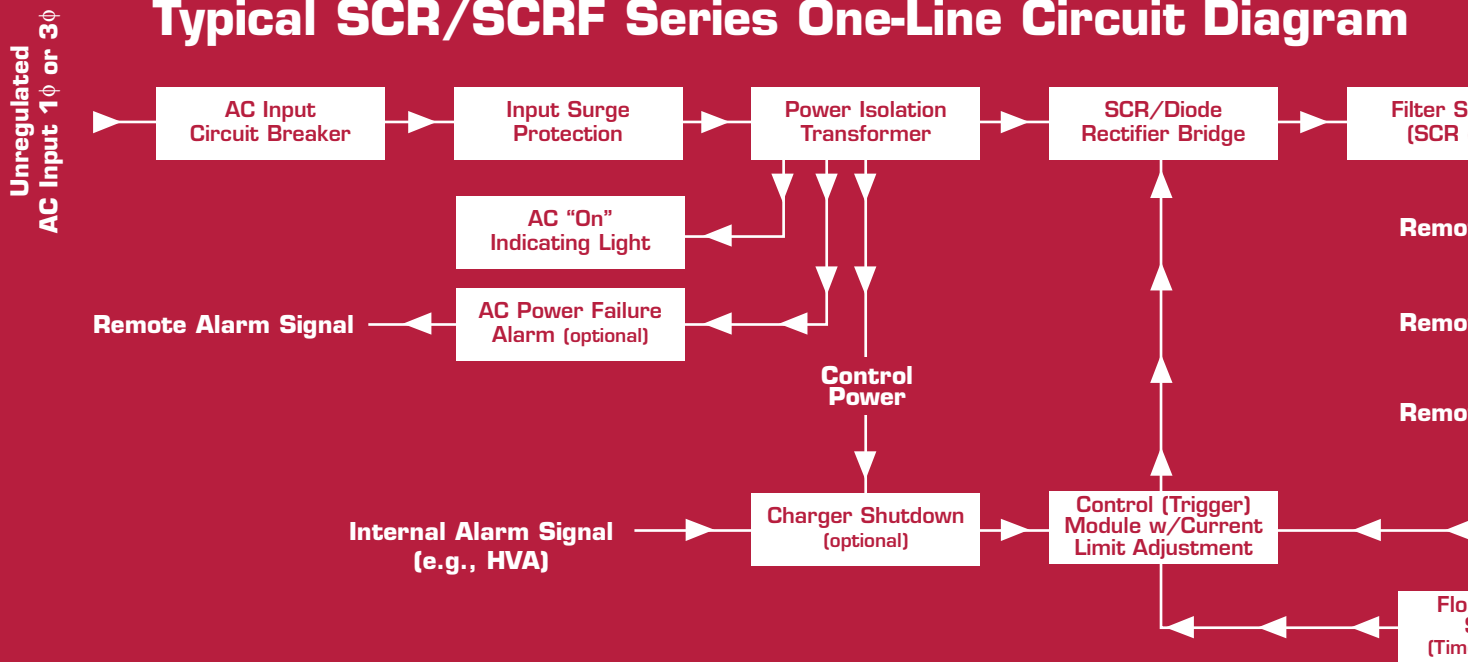
DC Output Protection Diode

Prevents damage to charger and battery due to reversed polarity connections.

Color-Coded Internal Wiring

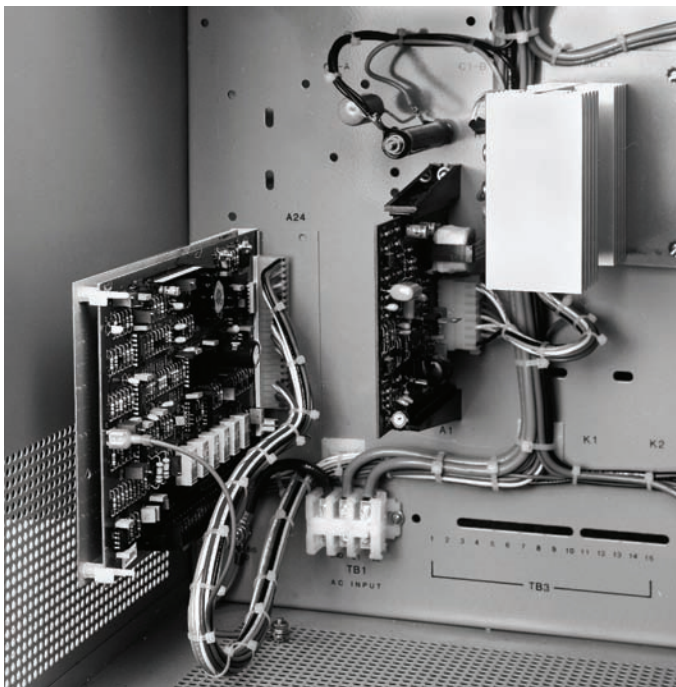
600 Volt, color-coded, polyvinylchloride (PVC) wiring is standard.

Typical SCR/SCRF Series One-Line Circuit Diagram



Battery charger DC Output Table

Vdc Nominal	Float Adjustment Range (Vdc)	Equalize Adjustment Range (Vdc)	A dc Size Range Available*		Lead-Acid Cell Capability** (No. of cells)		Ni-Cd Cell Capability*** (No. of cells)	
			1 ϕ Input	3 ϕ Input	Normal†	Reduced†	Normal†	Reduced†
12	10.5 - 14.5	11.3 - 16	6 to 100	60 to 100	5 - 6	—	8 - 10	—
24	23 - 30	24 - 32	6 to 100	50 to 600	11 - 13	—	17 - 20	[21]
48	46 - 60	48 - 64	6 to 100	50 to 600	22 - 26	[27]	34 - 40	[42]
130	115 - 140	124 - 150	6 to 50	25 to 600	55 - 62	[63]	86 - 94	[98]
260	230 - 280	245 - 300	6 to 25	16 to 300	110 - 124	[126]	172 - 188	[196]

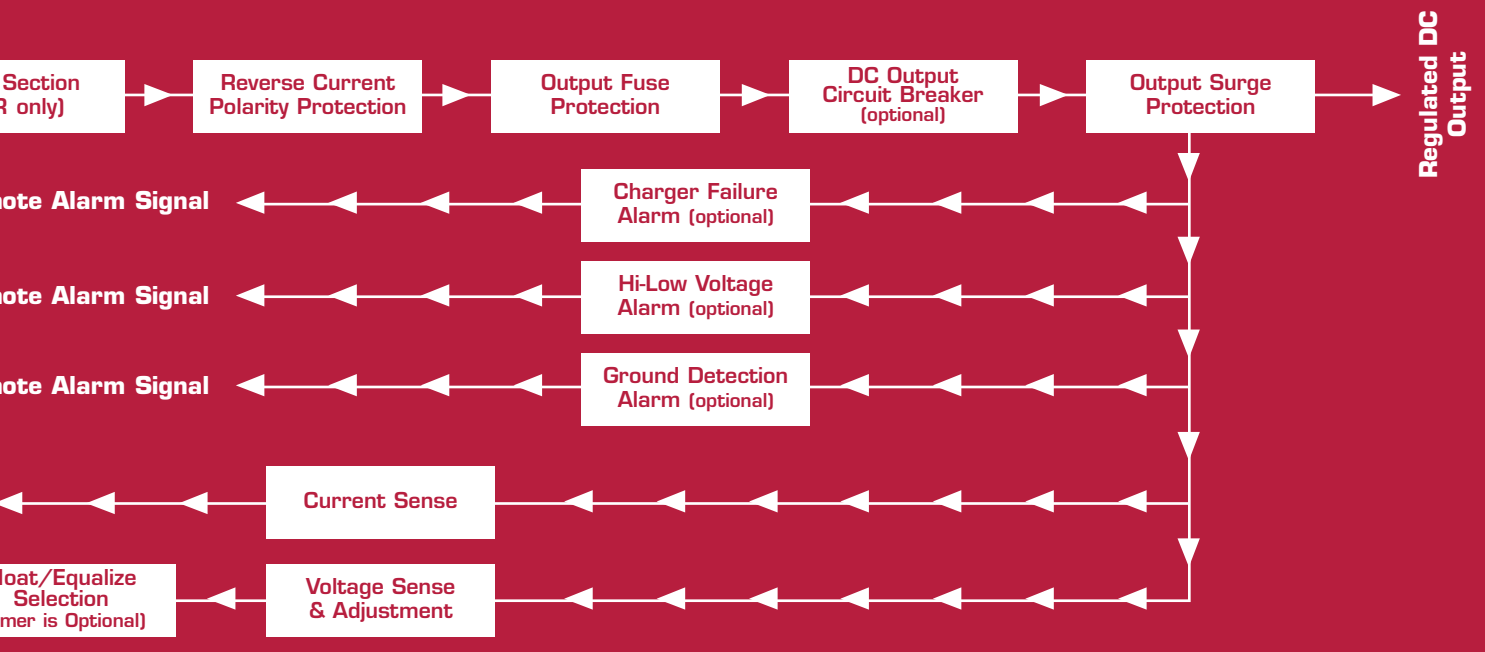


* The discrete A dc sizes offered within the ranges listed above are: 6, 12, 16, 20, 25, 30, 35, 40, 50, 60, 75, 100, 125, 150, 175, 200, 250, 300, 400, 500, 600A dc. All sizes are rated at 100% load. Some current ratings are not available on certain chargers. Consult factory or current priced list for exact offerings.

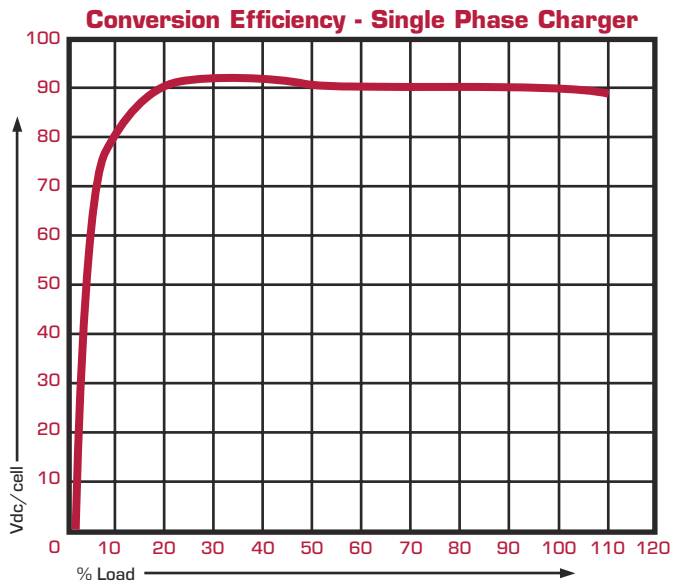
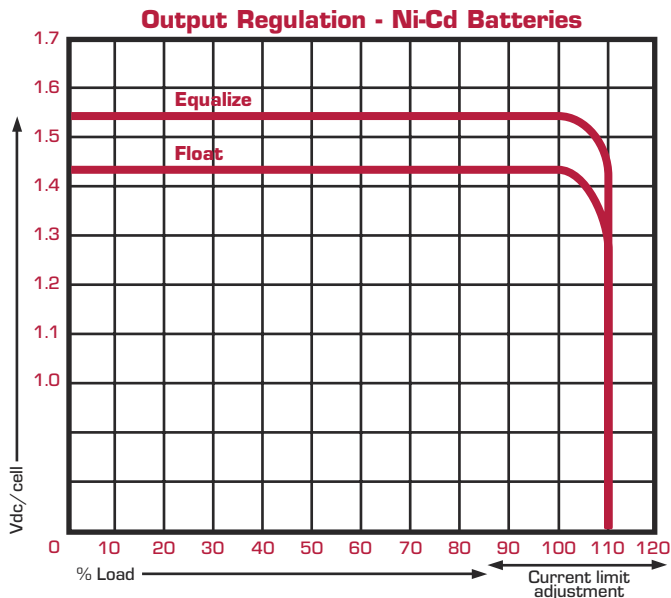
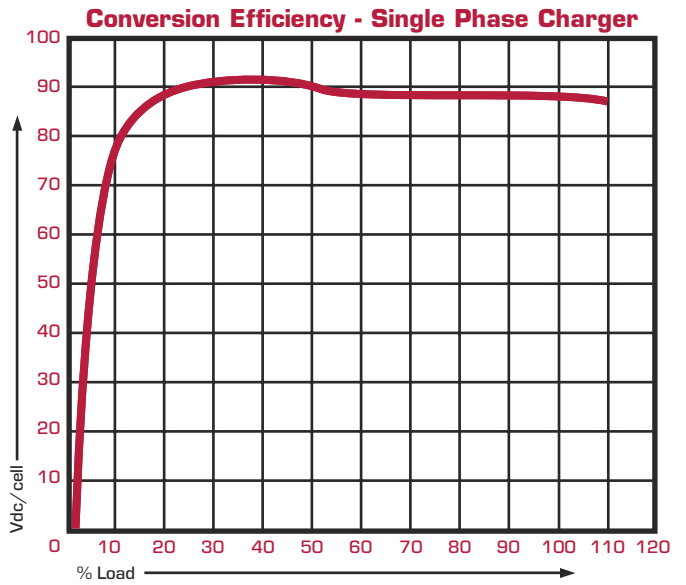
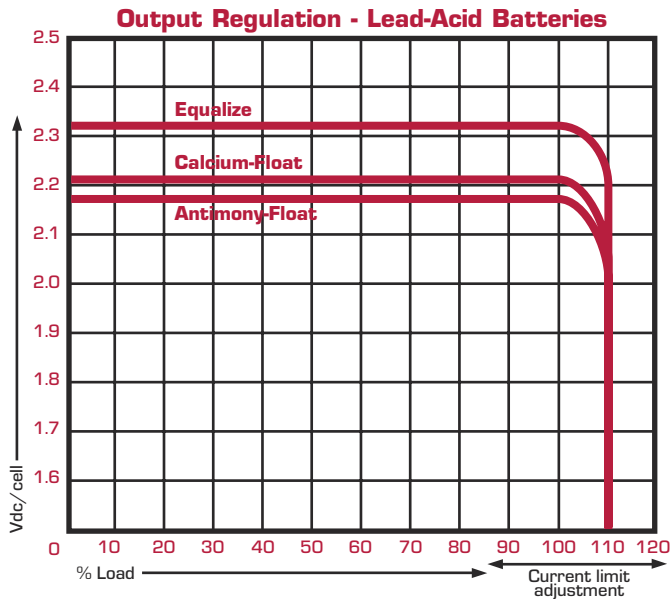
** Based on Lead-Acid Float of 2.15 to 2.25V/Cell and Equalize of 2.25 to 2.40V/Cell.

*** Based on Ni-Cd Float of 1.35 to 1.45V/Cell and Equalize of 1.50 to 1.60V/Cell.

† Greater cell capability indicated by [xx] can be obtained by slightly reducing float and equalize settings.



Typical Performance Curves



Note: No load loss is 5% or less of DC output power at 100% load. Values shown are for nominal AC input and typical DC output voltage settings.

OPTIONAL ACCESSORIES

Alarm Relays for Remote Indication*

Available with or without front panel alarm indicating lights.

- **AC Power Failure Alarm:** Provides alarm state when AC power fails or AC breaker is open.
- **DC Ground Detection Alarms:** Provides alarm state when a ground fault has occurred at either the "+" or "-" output terminal.
- **High-Low DC Voltage Alarms:** Provides high alarm state when battery is being overcharged and low alarm state when battery is near end of discharge.
- **Charger Failure Alarm (No DC Current):** Provides alarm state when charger output current is less than 2% of rated output for 30 seconds or more. Will also activate with AC power failure and/or DC breaker or fuse open.
- **Battery Discharging Alarm:** Provides alarm state when battery discharge current exceeds the charger recharge current.
- **End of Discharge Alarm:** Provides alarm state when battery has discharged to lowest system voltage limit.
- **DC Current Limit Alarm:** Provides alarm state when charger output current reaches the current limit setting.
- **Common (Summary) Alarm:** Provides a single alarm state when any one or all monitored alarm conditions exist on charger.

*Alarm circuits provide one (1) set of dry form "C" contacts (SPDT) wired to a terminal strip for customer termination. • Alarm circuits with two (2) sets of dry form "C" contacts (DPDT) are available without indicating lights at additional cost. • Standard relay contacts are rated for resistive loads of: 1A @ 120Vac, 2A @ 28Vdc, 1A @ 52Vdc, 0.1A @ 130Vdc. • Auxiliary relays are available for use with alarm circuits when alarm load exceeds the standard contact rating. • Auxiliary relay contacts are rated for resistive loads of: 5A @ 120Vac, 5A @ 28Vdc, 2A @ 52Vdc, 0.5A @ 130Vdc.

Combined Alarm - Status Charger Monitor*

The following alarm relays are available combined together on a single board. Each relay has one (1) set of isolated, dry form "C" contacts (SPDT) wired to a terminal strip for customer connection. Two (2) sets of form "C" contacts (DPDT) are available at additional cost.

- **High-Low AC Voltage Alarm Relay:** With High and Low Indicating Lights, 15 second Time Delay on Alarm, Auto Reset.
- **High DC Voltage Alarm Relay:** With Indicating Light, 15 second Time Delay on Alarm, Auto Reset.
- **Low DC Voltage Alarm Relay:** With Indicating Light, 15 second Time Delay on Alarm, Auto Reset.
- **Ground Detection Alarm Relay:** With (+) Ground Detection Indicating Light and (-) Ground Detection Indicating Light, 15 second Time Delay on Alarm, Auto Reset.
- **Charger Failure Alarm Relay:** With Indicating Light, 30 second Time Delay on Alarm, Auto Reset.
- **Common Alarm Relay:** Summary Alarm Relay for any one or all alarms on this board.

*Alarm contacts are rated for 0.5A @ 120V AC or DC. • Indicating lights are red LED's front panel mounted. • A "Lamp Test" switch is provided for verifying operation of indicating lights. • Customer terminal strip is rated 15A @ 120V AC or DC to accommodate #14AWG maximum wire. • This option may be ordered without Ground Detection for DC systems that are referenced to ground.

DC Ground Detection for Local Indication

- **Ground Detection Switch for Front Panel DC Voltmeter Indication:** Measures voltage from "+" or "-" output terminals to common ground.
- **Ground Detection Indicating Lights with Ground Test & Lamp Test Switch:** Front panel lamps indicate "+" or "-" output ground fault with switch in "Ground Test" position. In "Lamp Test" position both lights are verified as operational.

Equalize Timers

- **0-72hr Manual Equalize Timer w/ or w/o Float Equalize Indicating Lights:** Replaces Float/Equalize Switch. Charger automatically switches from "Equalize" to "Float" at end of set time interval.
- **0-72hr Line Failure Auto-Equalize Timer w/Float Equalize Indicating Lights:** Charger is switched to equalize for a set time interval after power is interrupted for 10 seconds or more. Equipped with "Float Reset" and "Equalize" override switches.
- **0-72hr Current Limit Auto-Equalize Timer w/Float Equalize Indicating Lights:** Charger is switched to equalize for a set time interval after charger is in current limit for 10 seconds or more. Equipped with "Float Reset" and "Equalize" override switches.

DC Circuit Breaker

Two pole DC Breaker is installed with one-pole standard fuse:

- 5000 A.I.C., UL Listed 100A-Frame
- 10000 A.I.C., UL Listed 250 & 400A-Frame
- 14000 A.I.C., UL Listed 600 & 800A-Frame

Forced Load Sharing

Chargers operating in parallel share load to within 2% of output current of each charger.

High DC Voltage Charger Shutdown

A contact closure from a High DC Voltage Alarm activates the shutdown circuit and charger output current goes to zero.

Filtered Battery Eliminator

Output ripple voltage is 30mVrms or 0.06% of nominal output voltage, whichever is higher, without battery connected.

Input Lightning Arrestors

Provides additional input protection against lightning induced transients.

Surge Withstand Capability

Additional surge protection to meet performance requirements of IEEE-472 SWC Specification.

AC Input Voltmeter and/or Ammeter

Front panel, 2% accuracy, 3.5-inch case.

Additional Optional Accessories

- Special input voltages and frequencies
- Special High Interrupting Capacity (A.I.C.) circuit breakers
- 1% accuracy panel or switchboard meters
- Alarm buzzer
- Device nameplates
- Fungus proofing (Tropicalization)
- Drip-proof cabinet shields
- Cabinet heater strips
- Special paint
- NEMA-4 or NEMA-12 cabinets
- Special SIS or Hypalon internal wiring
- Export packing

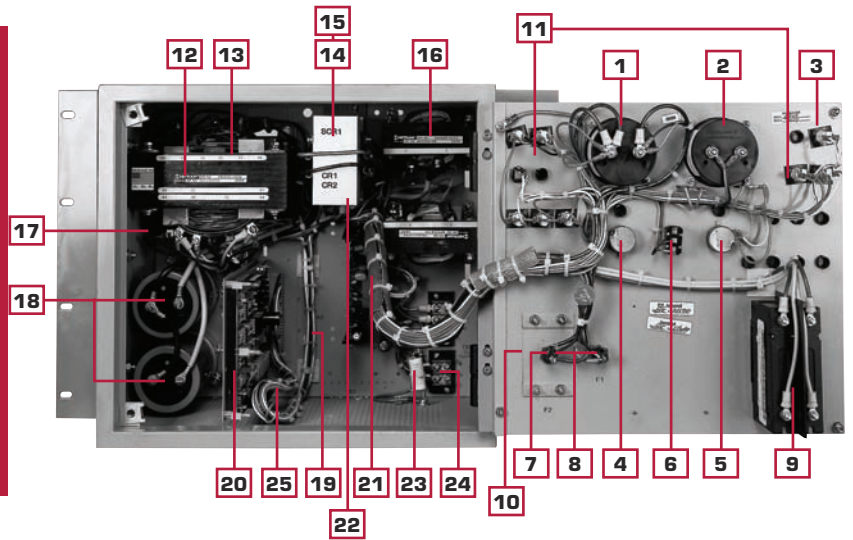
SCR-SCRF

TYPICAL INTERNAL CONSTRUCTION DETAIL

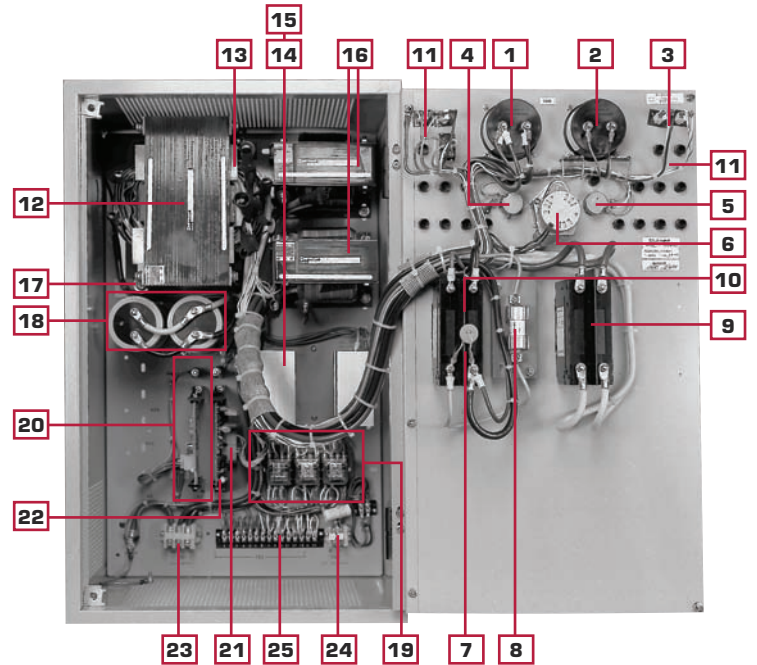
1. DC Ammeter
2. DC Voltmeter
3. AC Power "On" Light
4. Equalize Adjust POT
5. Float Adjust POT
6. Equalize Timer (optional)
Float/Equalize Switch (standard)
7. DC Circuit Breaker (optional)
8. DC Fuse(s)
9. AC Circuit Breaker
10. DC Surge Suppressor
11. Status Indicating Lights & Switches
12. Power Isolation Transformer w/AC Reconnection T.B.
13. AC Surge Suppressors
14. SCR Rectifier/Heat Sink Assembly
15. Polarity & Blocking Diode Assembly(s)
16. Filter Choke(s)
17. Bleeder Resistor
18. Filter Capacitor(s)
19. Alarm Relay(s) (optional)
20. Alarm Control Module(s) (optional)
21. Control Module
22. Current Limit Adjust POT
23. Input Line & Ground Terminals (TB1)
24. Output Terminals (TB2)
25. Remote Alarm Terminals (TB3)

Note: Component placement may vary due to options selected.

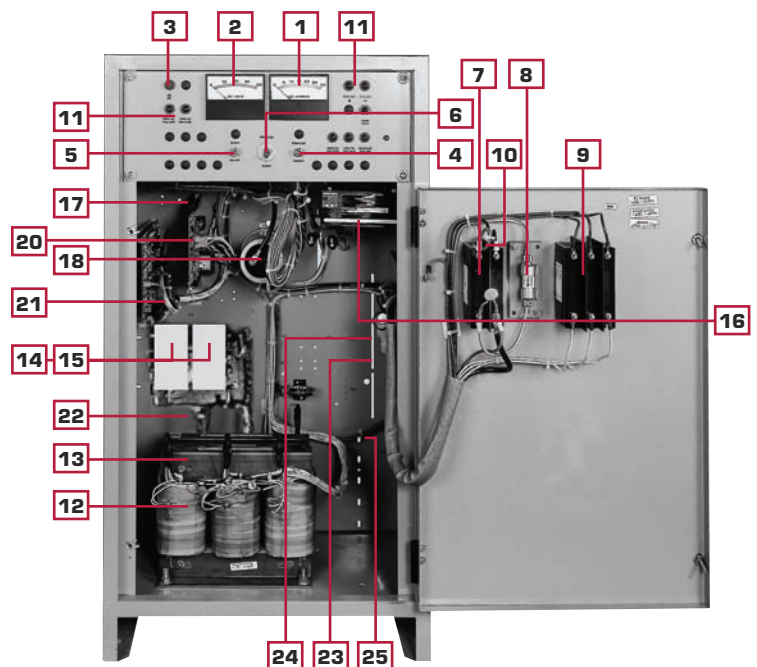
Style 1A Cabinet Construction



Style 1B Cabinet Construction



Style 2 Cabinet Construction



BATTERY CHARGER HEAT LOSS, SIZE & WEIGHT DATA TABLE

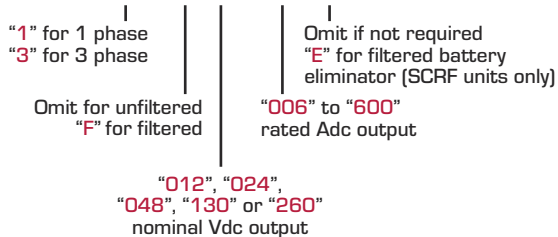
	12Vdc			24Vdc			48Vdc			130Vdc			260Vdc			
	AMPERE RATING	HEAT LOSS BTU/HR*	CABINET STYLE	SHIPPING WEIGHT (approx.) LBS (KG)	HEAT LOSS BTU/HR*	CABINET STYLE	SHIPPING WEIGHT (approx.) LBS (KG)	HEAT LOSS BTU/HR*	CABINET STYLE	SHIPPING WEIGHT (approx.) LBS (KG)	HEAT LOSS BTU/HR*	CABINET STYLE	SHIPPING WEIGHT (approx.) LBS (KG)	HEAT LOSS BTU/HR*	CABINET STYLE	SHIPPING WEIGHT (approx.) LBS (KG)
Single Phase Input	6	70	1A	80 (36)	95	1A	90 (41)	170	1A	105 (48)	370	1B	125 (57)	670	2	230 (104)
	12	135	1A	90 (41)	200	1A	105 (48)	330	1A	120 (54)	740	1B	160 (73)	—	—	—
	16	180	1A	98 (44)	260	1A	115 (52)	440	1B	135 (61)	990	1B	210 (95)	1790	2	320 (145)
	20	230	1A	105 (48)	320	1A	125 (57)	540	1B	160 (73)	1230	1B	220 (100)	—	—	—
	25	290	1B	120 (54)	400	1B	135 (61)	680	1B	170 (77)	1540	1B	230 (104)	2790	3	490 (222)
	30	340	1B	130 (59)	480	1B	150 (68)	810	1B	190 (86)	1850	1B	250 (113)	—	—	—
	35	400	1B	135 (61)	560	1B	160 (73)	950	1B	210 (95)	2150	2	340 (154)	—	—	—
	40	460	1B	145 (66)	640	1B	180 (82)	1080	1B	220 (100)	—	—	—	—	—	—
	50	570	1B	160 (73)	800	1B	190 (86)	1350	2	245 (111)	3080	2	440 (200)	—	—	—
	60	680	2	185 (84)	960	2	210 (95)	—	—	—	—	—	—	—	—	—
	75	850	2	205 (93)	1200	2	245 (111)	2020	2	330 (150)	—	—	—	—	—	—
	100	1130	3	280 (127)	1600	3	320 (145)	2700	3	440 (200)	—	—	—	—	—	—
Three Phase Input	16	—	—	—	—	—	—	—	—	—	—	—	—	1260	2	350 (159)
	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	25	—	—	—	—	—	—	—	—	1260	2	300 (136)	1960	3	510 (231)	
	30	—	—	—	—	—	—	—	—	1510	2	330 (150)	—	—	—	—
	35	—	—	—	—	—	—	—	—	1760	2	355 (161)	2750	3	560 (254)	
	40	—	—	—	—	—	—	—	—	2010	2	380 (172)	—	—	—	—
	50	—	—	—	740	2	210 (95)	1230	2	255 (116)	2510	3	500 (227)	3920	3	590 (268)
	60	600	2	215 (98)	880	2	240 (109)	1480	2	320 (145)	3010	3	520 (236)	—	—	—
	75	750	2	240 (109)	1100	2	275 (125)	1850	2	350 (159)	3760	3	550 (249)	5880	4	890 (404)
	100	990	3	315 (143)	1470	3	360 (163)	2460	3	460 (209)	5010	3	680 (308)	7840	4	1000 (454)
	125	—	—	—	1840	3	425 (193)	3080	3	500 (227)	6260	3	750 (340)	—	—	—
	150	—	—	—	2200	3	480 (218)	3690	3	540 (245)	7510	4	915 (415)	11800	5	1480 (671)
175	—	—	—	2570	3	510 (231)	4300	3	600 (272)	8760	4	1010 (458)	—	—	—	
200	—	—	—	2940	3	550 (249)	4920	3	650 (295)	10100	4	1100 (680)	15700	5	1610 (730)	
250	—	—	—	3670	4	600 (272)	6150	4	750 (340)	12600	4	1400 (635)	—	—	—	
300	—	—	—	4400	4	710 (322)	7380	4	860 (390)	15100	5	1500 (680)	23600	5	1950 (885)	
400	—	—	—	5870	4	780 (354)	9830	4	950 (431)	20100	5	1650 (748)	—	—	—	
500	—	—	—	7340	4	850 (386)	12300	5	1350 (612)	25100	5	1820 (826)	—	—	—	
600	—	—	—	8800	4	925 (420)	14800	5	1500 (680)	30100	5	1950 (885)	—	—	—	

* Heat loss in BTU/HR is stated for nominal number of cells at float voltage and 100% DC load current.

Ordering Information

Specify:

- Charger Model #XSCRX XXX - XXX - X



- Nominal input (Vac) and frequency (Hz)
- Number and type of battery cells
- All optional accessories required on charger

Cabinet Dimensions*

CABINET STYLE		1A	1B	2	3	4	5
Mounting Type		Wall**	Wall**	Floor**	Floor	Floor	Floor
Dimensions in M.M. (inches)	H	15	26 ¼	37 ¾	49	62	80
	W	18 ¼	19	20 ¾	32	42	58
	D	12 ½	15 ½	14 ¾	24	24	30

** Rack mounting cabinet is optional for these styles.

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