
SECI
SoftEnergy Controls Inc.
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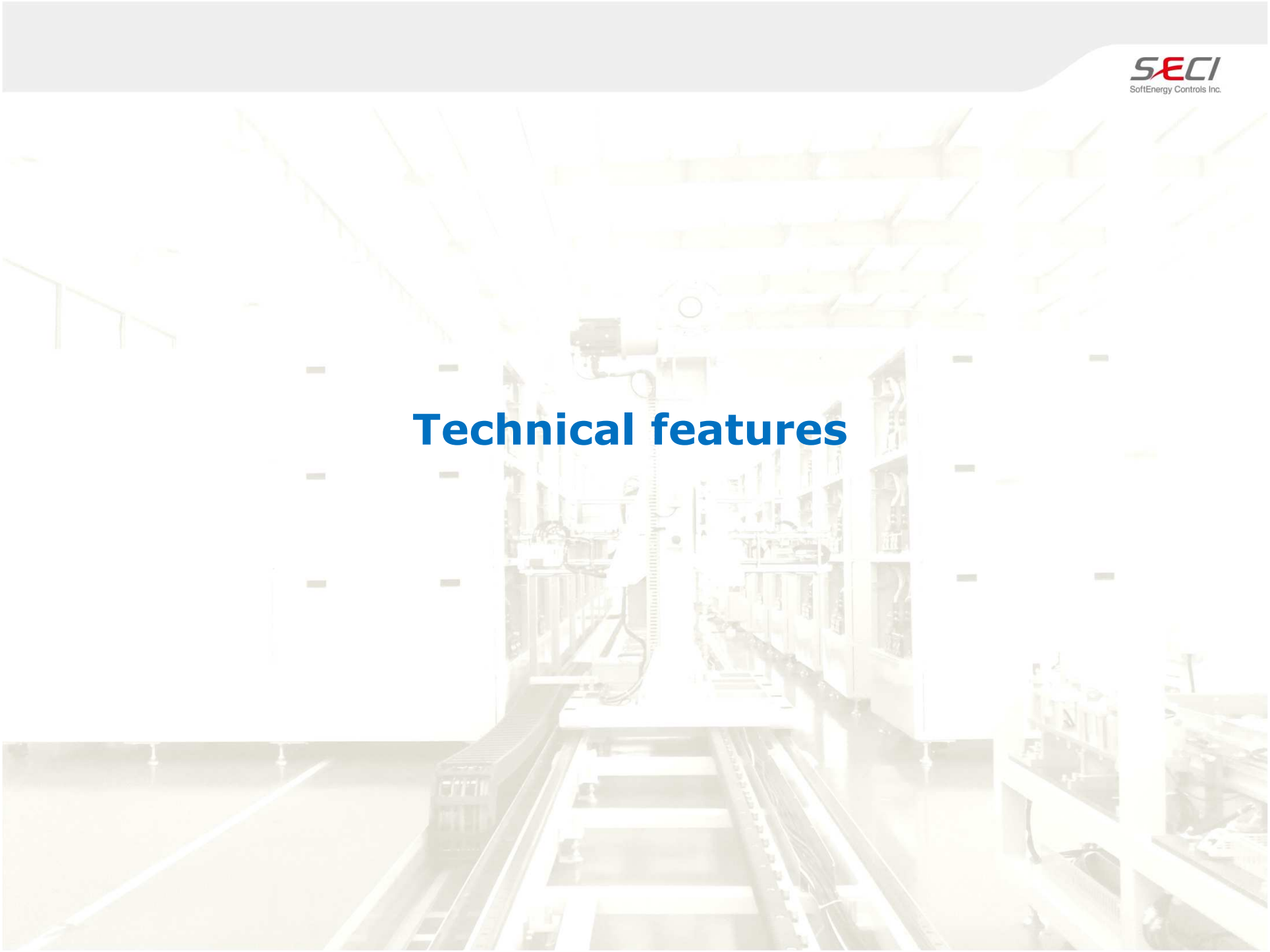
More Reliability
2017.9

Experience matters

SoftEnergy Controls is motivated by the belief that great experiences build great businesses.
20+ years of expertise and know-how gives us superior advantage in the Li-Ion battery industry.
Our “Customer-Proven” engineering know-how gives you the opportunity to make low-risk investment for your project.

More Reliability

- SoftEnergy Controls



Technical features

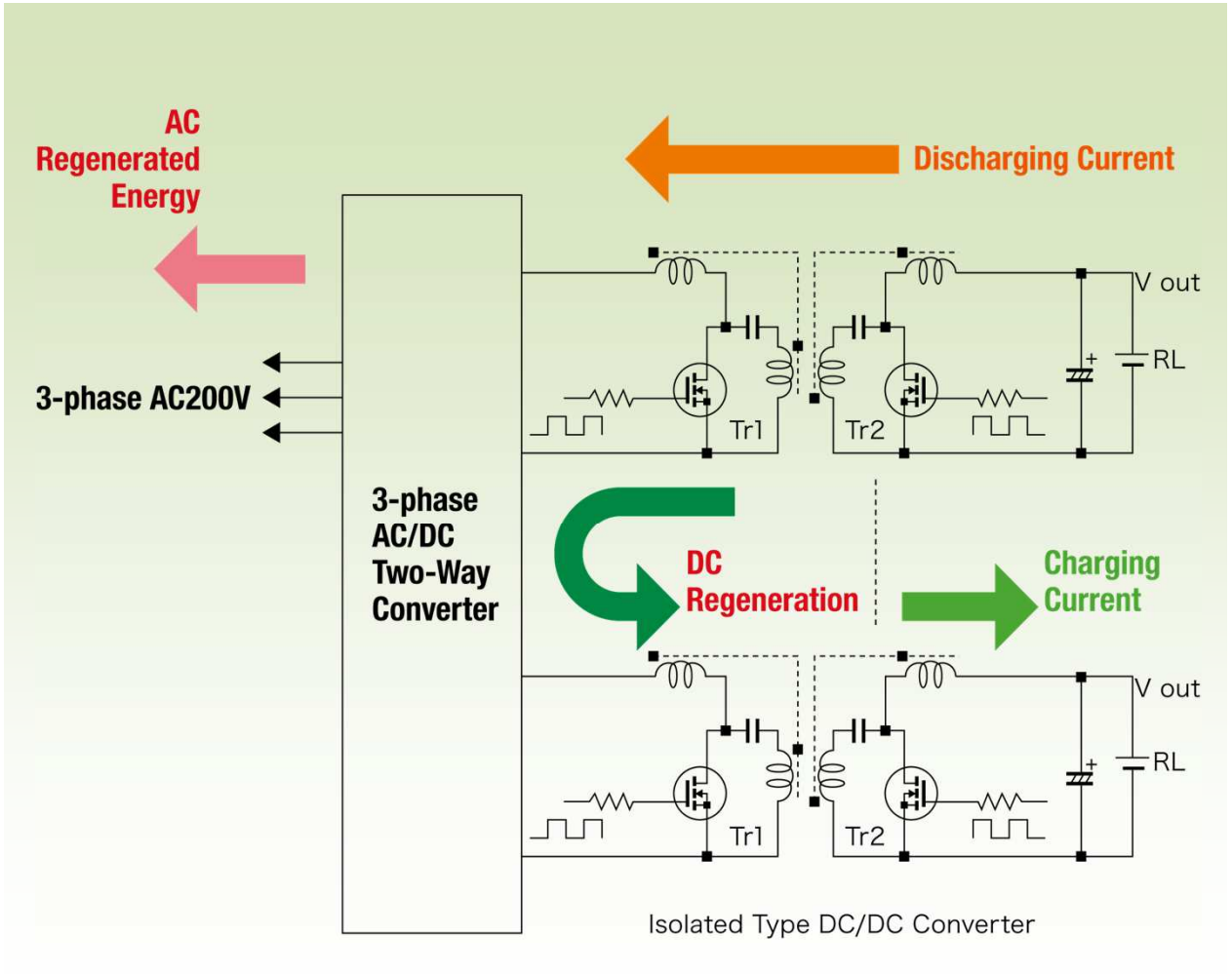
SECI Original Power Supply

How it works? AC Regeneration System

The AC regeneration system will provide 2 exclusive functions.

1. Regeneration of discharged electric power to AC200V system.

2. DC regeneration system which will be the energy to charge the DC/DC converter in other channels.



Regenerative power supply

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(Low-heat generating power supply)

1. Energy saving: Recycling discharged energy to charging energy
   = Minimizing running cost: AC regeneration efficiency up to 70+%
2. High accuracy PWM High frequency Switching-mode Power Supply
   = Provide voltage and current accuracy of up to 0.05% FS
3. Advanced inside temperature control
   = Battery area temp is controlled within +/- 2 deg C
4. Isolated channel
   = Any transistor error activates Fail-safe mode protection (Battery safety protection)
   = Static electricity in cells activates Fail-safe mode protection (CPU circuit protection)
5. Smaller dimension and extended equipment lifetime due to low-heat generation
   = ½ equipment size and 10+ years lifetime
6. Less Air-conditioning equipment required in your Formation room
   = Enable to cut utility costs for A/C: Energy Savings more than 30%
7. Made in Fukushima, Japan, at our “Quality Driven” Operation facility

PC-based Control system

More Reliable & Faster control

1. High-speed calculation by a PC-based PLC
2. General-purpose network with Gigabit EtherNet
3. International standard PLC programming language(IEC91131-3)
4. High-speed communication in lower-network via EtherCAT (EtherNet-based open field bus network)

Charge and Discharge Control PC

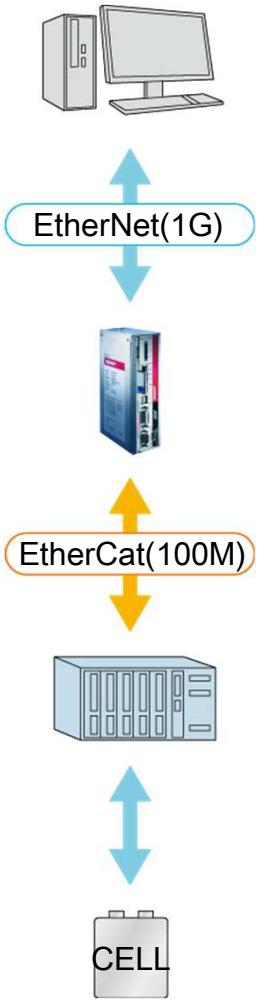
- Inspection pattern registration
- Data collection and display
- Status display
- Maintenance support

Controller

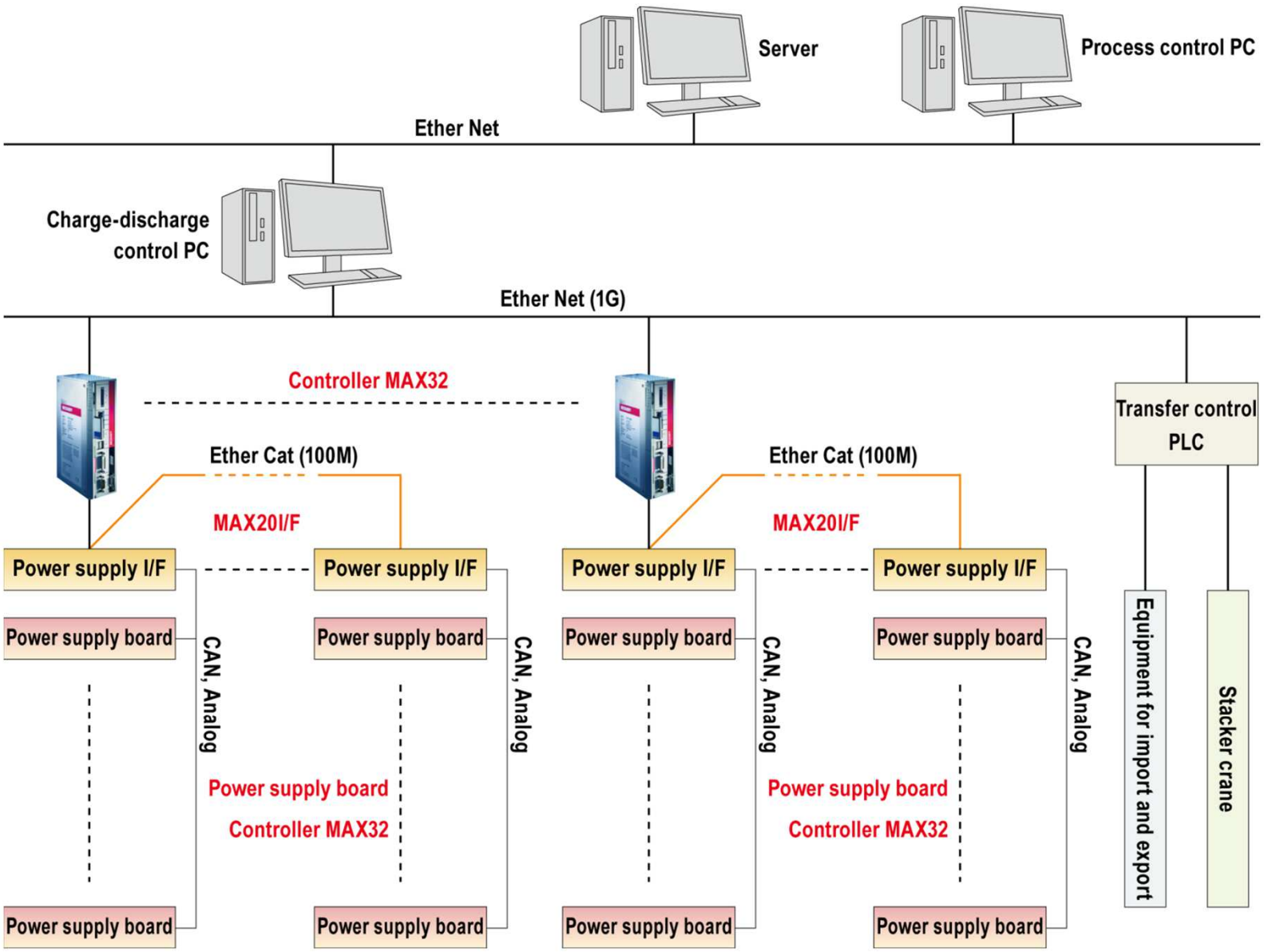
- Power supply control and rejection criteria determination
- Abnormality monitoring
- Stage control

Charge and Discharge Power Supply

- Voltage and current control
- Voltage and current monitoring
- Abnormality monitoring



System Configuration (Formation)



Safety functions

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Fail-Safe design = no consequential cell damage

1. Safety function: System level

Software

+ Power Supply temperature check

If P/S temperature goes out of set range, all channels will be shut down.

+ Network monitoring

(Data header check, serial # check, etc.)

Monitored with the alternate-responding timer, CRC16.

Hardware

+ CPU monitoring with Watchdog Timer

Any output error on CPU stops all channels

+ Standard safety functions

Smoke detector, temp monitoring, etc

+ Optional safety functions

CO2 extinguisher, Water shower, Submersion tank, etc.

Safety functions

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Fail-Safe design = no consequential cell damage

2. Safety function: Battery Protection

+ Battery Internal short detection

  based on dV, current and voltage change rate

+ Bad or loose contact monitoring

  comparing P/S output voltage and cell voltage including cable resistance calculations

+ Battery Capacity monitoring

  each channel to prevent overcharging

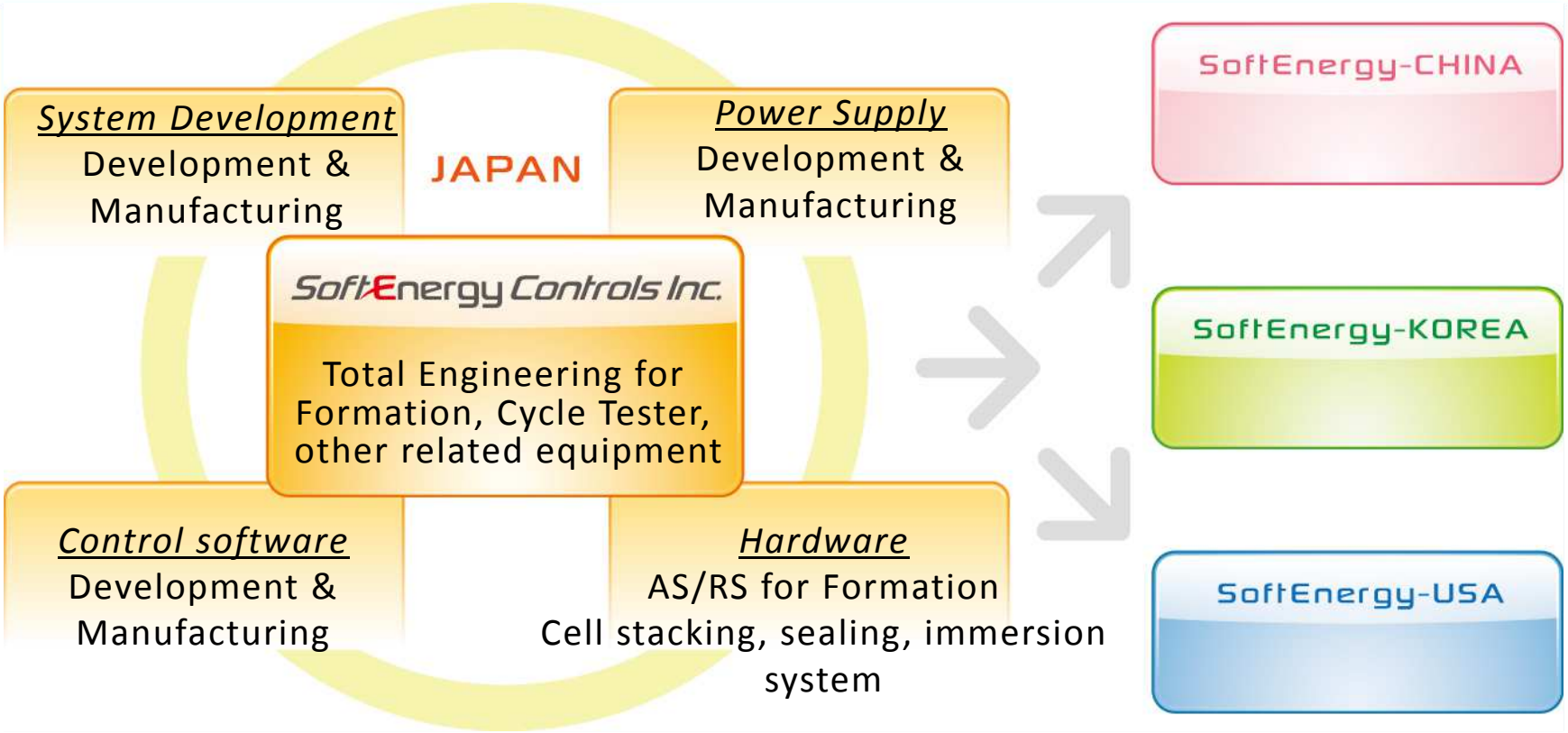
3. Safety function: Independent Over-Charge Protection

+ Protective circuit on Power Supply

+ Algorithm Software based on cell V and A info

+ CC Charge time limit to prevent overcharging

Established Network



With flexibility on designing, engineering, safety options and manufacturing under one company SoftEnergy Controls provides you Total solutions based on YOUR “demand”.

Customization capability is what makes SoftEnergy Controls stood out from other manufacturers. Minimize your investment and operational costs, but gain most reliable and safest systems in the industry.

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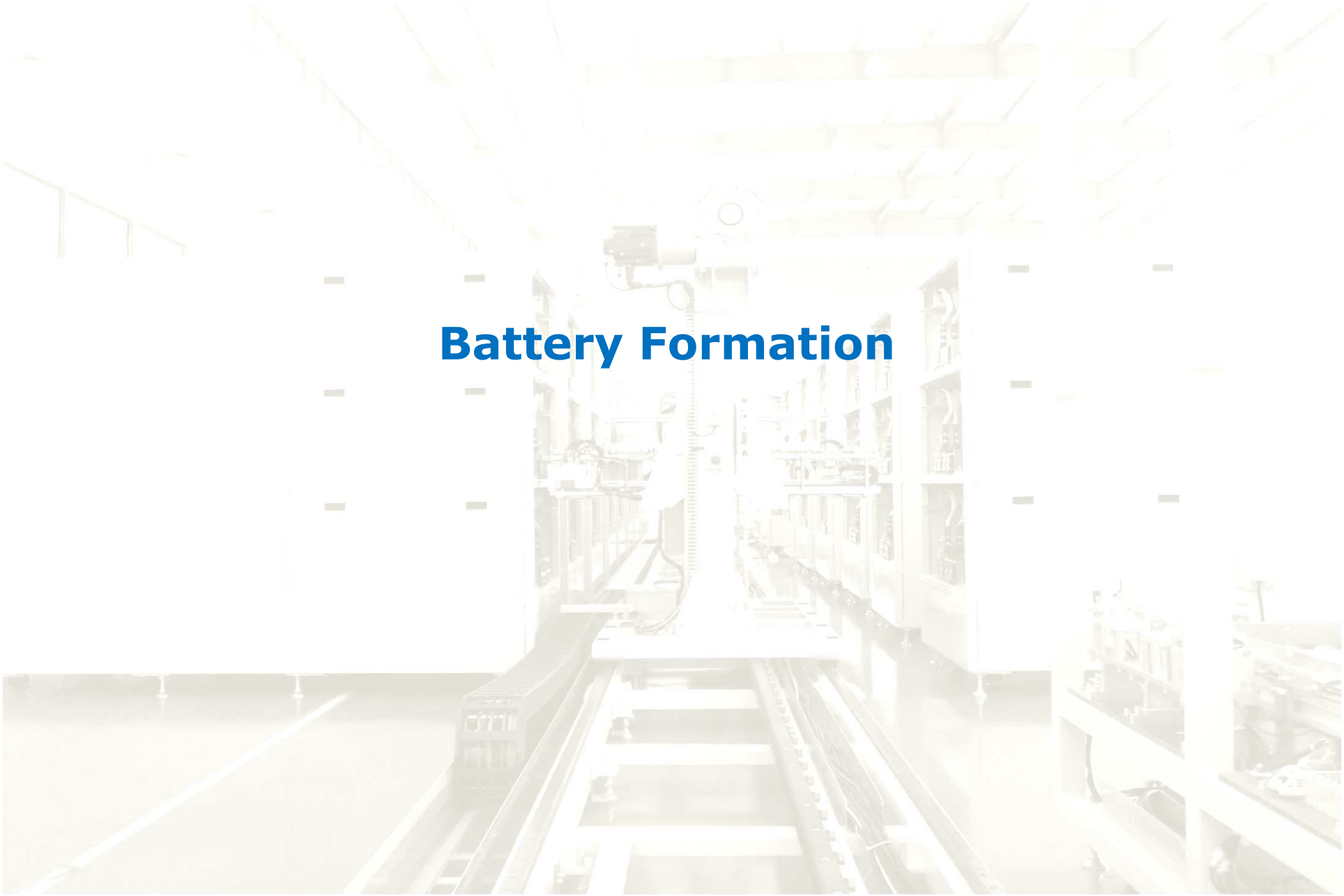
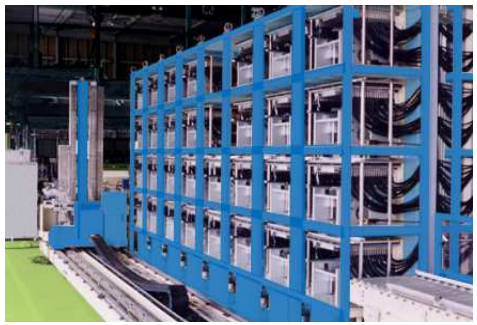


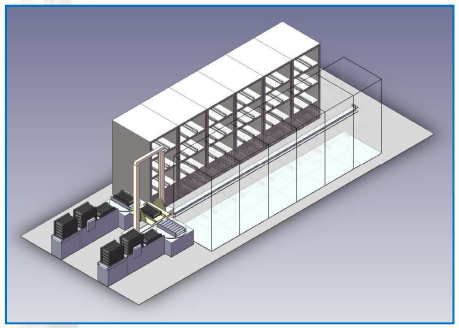
Battery Formation

Production scale system

What is your main priority for your cell production?
Production rate? Safety? Efficiency? Capital investment? Operational cost?

We, SoftEnergy Controls, have the answer for you.
From pilot scale to fully automated 100,000 channel production line, you can rely on our 20+ years of expertise and know-how.






Battery Formation systems

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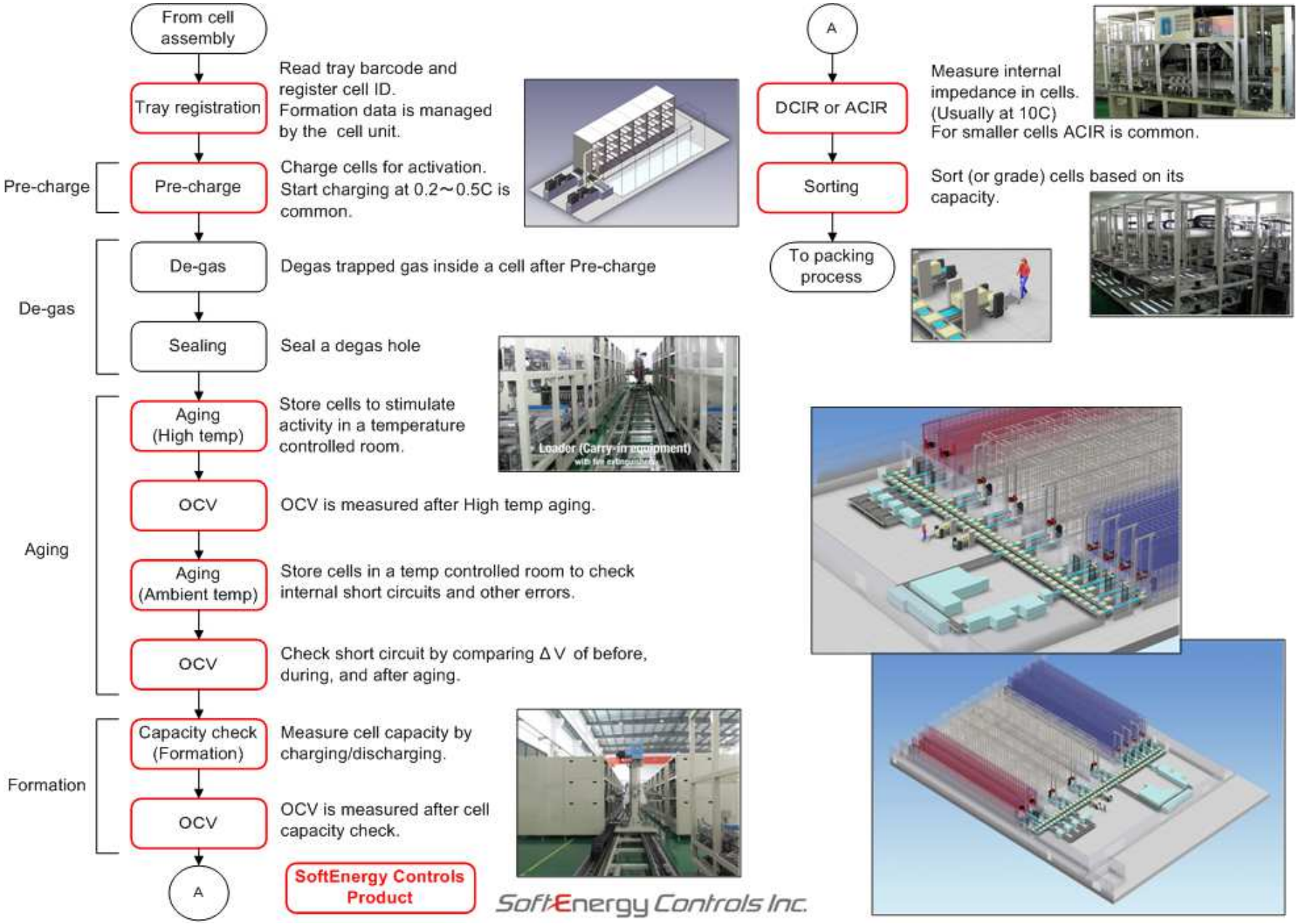

Cableless system for 18650/21700

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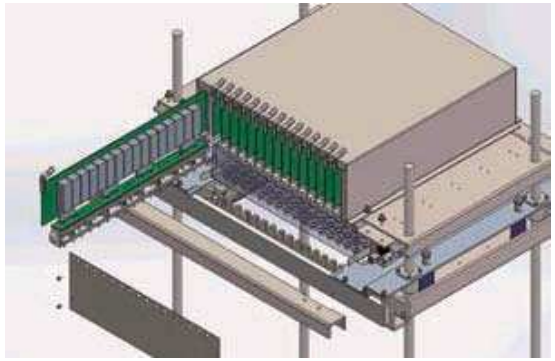
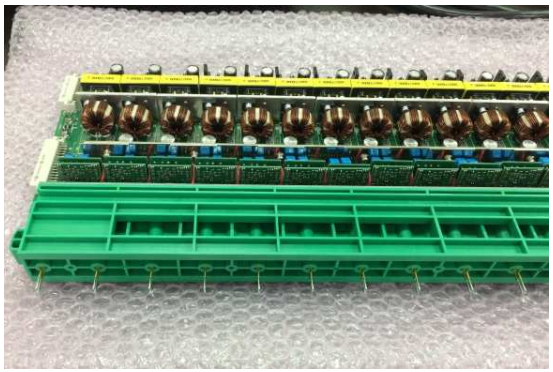
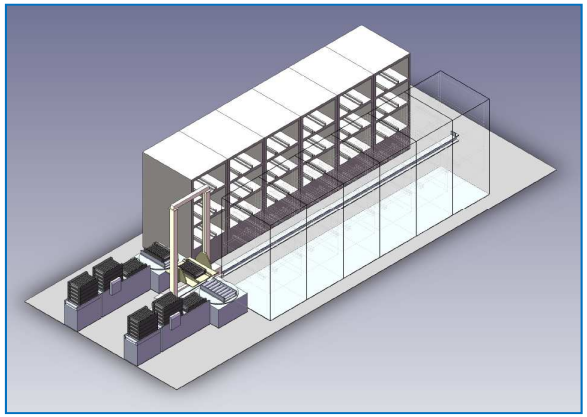
Cableless▪Built-in Power Supply fixture 5V4/6A
For 15600 – 18650 – 21700 – 26700 cells

+ High efficiency, AC regenerative Power Supply
+ Downsizing (less than ¼ of regular system)
+ Easy maintenance
+ Can be used for cell screening







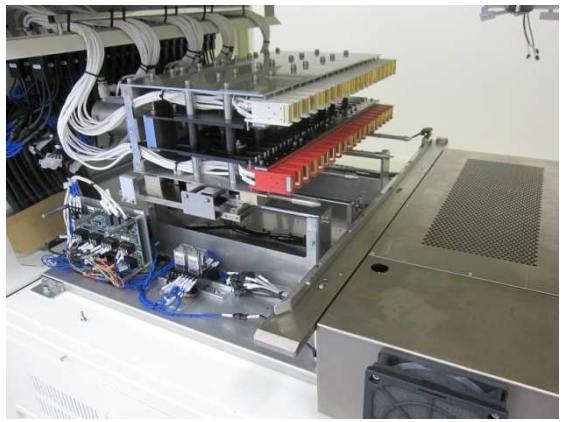
For pouch & prismatic cell

Pilot scale – Semi-automatic Formation – Fully automated Formation with loading systems

From low-current 100mA to high-current 60A & up, with Active PFC AC regenerative P/S you can achieve higher production rate (smaller size, less downtime, more efficient, less operation costs, and *More Reliable*).

+ No more contact failure problem
+ Stable contact with tabs every time
+ Auto Calibration
+ PWM High frequency Switching Power Supply
+ Advanced safety features
+ Aging & Sorting systems available

SECI original clip and tray



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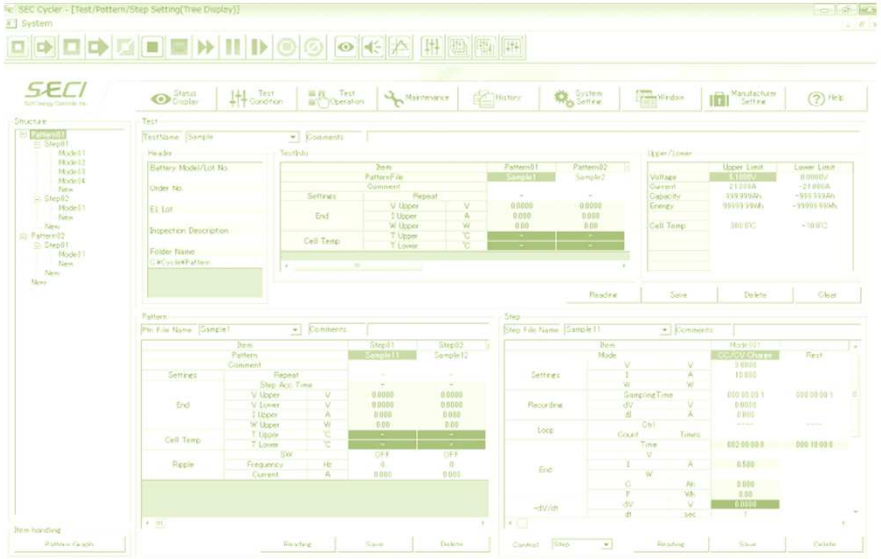
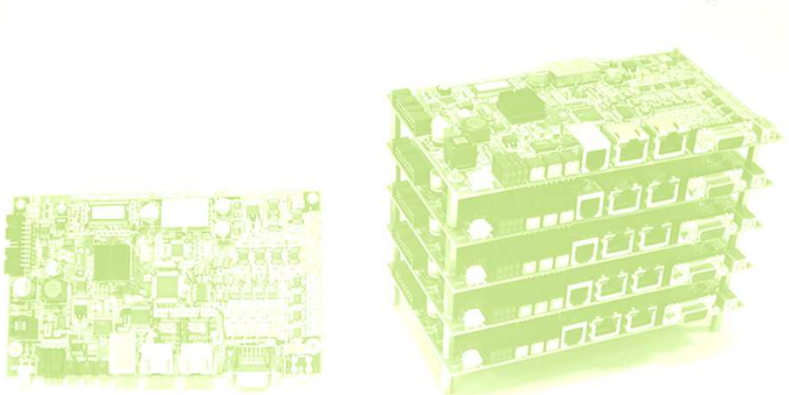
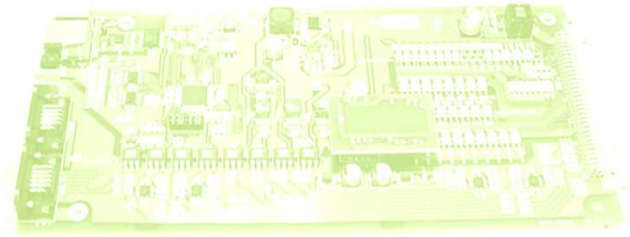
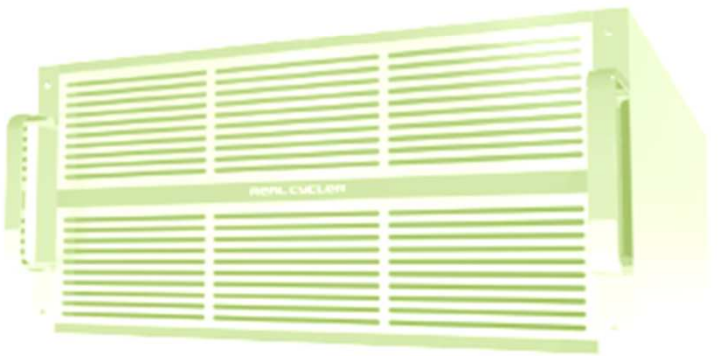






Cycle Tester



Multifunctional Cycle Tester

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REAL CYCLER

5V single cell testing

For module & Pack
50/60/120/250/
500/650V

Ripple Current Superimposition, Pulse output, Dynamic AC/IR

Performance Test for EV/PHEV/FCV

Customized Power Supply

High Performance & Multifunctional Cycle tester

For R&D, Performance Test, Screening, Long term/Lifetime capacity test, IR check, SECI Real Cycler plays a key role for your next project.

+ Original application software & Flexible test data management
+ EMC protection/Less harmonic/99% power factor
+ Active PFC, AC regenerative Power Supply
+ Current output accuracy: +/- 0.05%, Quick step response: less than 5 msec

Cycle Tester (Real Cycler Series)

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General spec for cell tester

Item		Specification
Voltage	Setting range	Charge: 0 to 5Vcharging (*charge voltage setting range should be over DC 0.5V)/ discharge: 0 to 5V
	Resolution	0.1mV
	Output accuracy	Fs x ±0.05% (at 0.5 to 5V)
	Measurement accuracy	Fs x ±0.05% (at 0.5 to 5V)
Current	Setting range	0 to 10mA/100mA/3/6/12/60/120/240/360/480A
	Resolution	16bit resolution (0.1mA resolution at 6A)
	Output accuracy	Fs x ±0.05% (at 0.1A to FS)
	Measurement accuracy	Fs x ±0.05% (at 0.1A to FS)
Response	Charge-discharge rise/drop time	5msec or less (at 0% to 90%)
	Charge-discharge switching time	10msec or less

For module and pack following voltage range is available

50/60/120/250/500/650V

Cycle Tester (Real Cycler Series)

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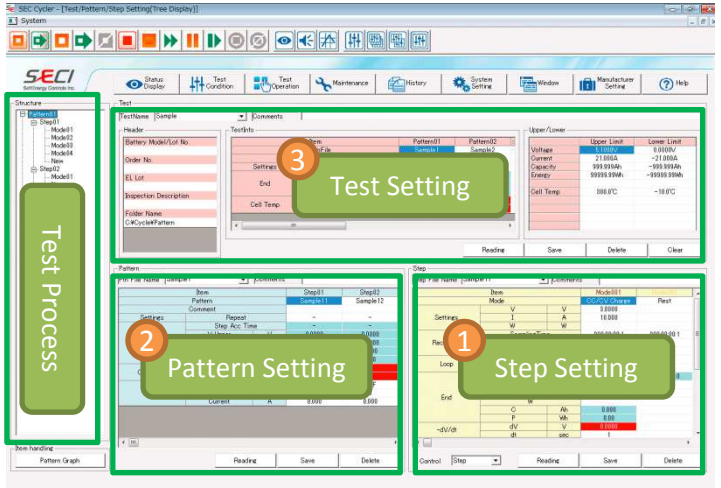
Original application software

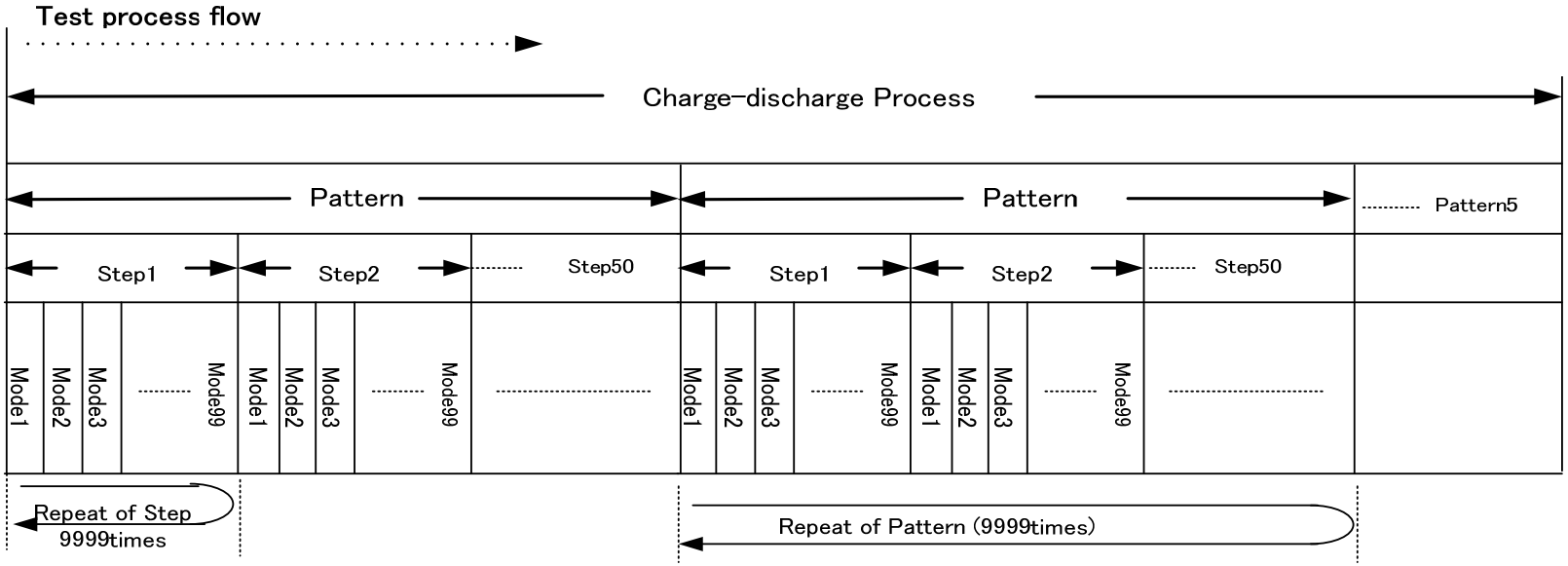
- Simple & Straight forward setting -

Unique three-layer setting makes it more logical and easier to understand and set up your test conditions.

1) Step setting: Enable to set up to 99 Modes per Step
2) Pattern setting: Enable to set up to 50 Steps per Pattern
   Also enable to set Repeat of Steps up to 9999 times
3) Test setting: Enable to set up to 5Patterns per Test
   Also enable to set Repeat of Patterns up to 9999 times

*End items can be set number of times under one Mode.
The Mode ends once any of the set conditions is reached (OR condition).





Cycle Tester (Real Cycler Series)

Original application software

- Flexible Test Data Management-

Reliable data management system is as important as tester itself. Eliminate your operator's mistakes and minimize data handling routine.

Data Collection (Standard) (csv format)

(1) Characteristic Data (Raw Data)
Recorded based on sampling conditions: Time, Delta V, Delta I

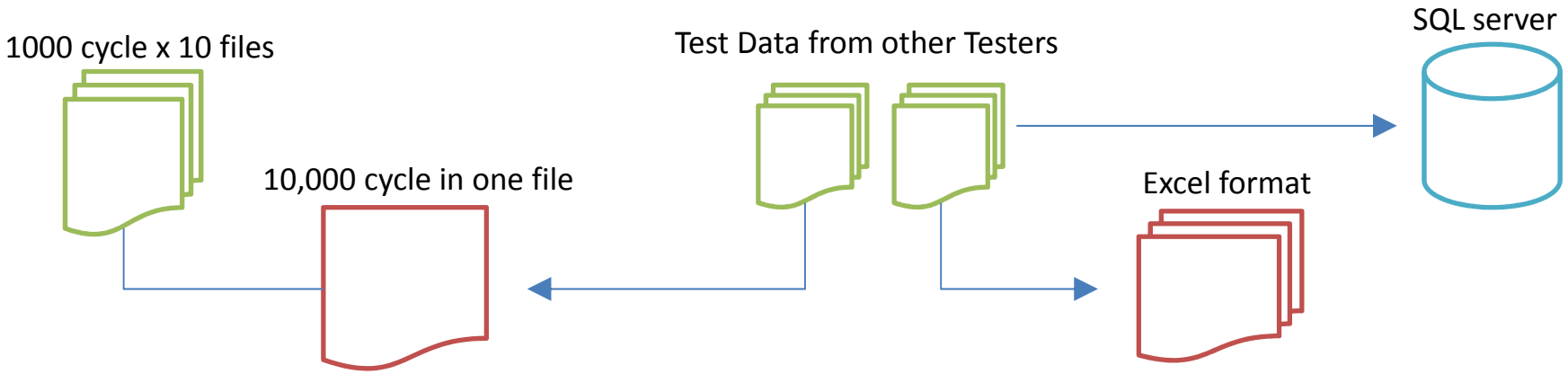
(2) Cycle Data
Recorded at the end of each Mode

(3) Condition Data
Test settings and parameters

Data Management (Option)

(1) Customize Test Data (ex. Combine data files into one file, customize data format, etc)

(2) Excel conversion



All-in-One Cycle Tester (CP3 Series)

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Three-zone Thermostatic Chamber and Cycle Tester are put together into once unit.

+ Cycle Tester + 3 Thermostatic Chambers in All-in-One system
+ Compact size: W1200mm x D1400mm x H2022mm
+ Current settings: 100mA to 480A
+ Independent Temp control, -40C to 100C
+ No interface troubles, No additional installation works, one PC controls both units

Application

R&D …… Cell analysis, evaluation
QC control ……. Capacity and IR check
Pilot scale …… Formation, Long-term test
Cell evaluation …. Capacity analysis, Error check

CP3 Series, Product line

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Specification

Type	Power Supply	Channels / system	Cell holders (option)
Type-0	5V 100mA	100 ch	Button cell/ Laminated
Type-1	5V 12A	60 ch	18650/26650/ Prismatic
Type-2	5V 24A	30 ch	Prismatic/Laminated
Type-3	5V 60A	24 ch	Prismatic/Laminated
Type-4	5V 120A	12 ch	Prismatic/Laminated
Type-5	5V 240A	12 ch	Prismatic/Laminated
Type-6	5V 360A	6 ch	Prismatic/Laminated
Type-7	5V 480A	6 ch	Prismatic/Laminated

* Number of channels depends on cell size and cell holder dimensions
* Custom model is available per your spec requirement

Detailed specifications, Thermostatic Chamber

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Thermostatic Chamber Specifications

Item	Specification
Temperature range	-40 to +100 deg C (Each of 3 chambers are independently controlled)
Temperature rise time	less than 80 minutes from +20 to +100 deg C
Temperature fall time	less than 90 minutes from +20 to -40 deg C
Temperature change	± 0.3 deg C (-40 to +100 deg C)
Remote control	Controlling each of the 3 chambers separately and remotely is possible
Operational ambient temp range	0 to 30 deg C (up to 75%rh)
Test chamber capacity	82L (Approx. W510mm x D400mm x H400mm) x 3 chambers
	1 freezer/ when an abnormality occurs, all the 3 chambers stop their operation.
External dimension	W1200mm x D1400mm x H2022mm
Weight	650kg
Equipment	Automatic fire extinguishing system and smoke detector
	explosion vent, reinforced door lock and exhausting vent (optional)
	1 fire-extinguisher for 3 chambers
Power supply	AC200V/ 3ϕ/ 50/60Hz/ 45A

Why SoftEnergy Controls?

Why SoftEnergy Controls?

1. Safety: Fail-Safe concept = no consequential cell damage

Fire accident and thermal runway was never happened with SoftEnergy Controls equipment in the past. Never. Even once. That is our standard about safety.

+ Safety function: Software
  - Battery Internal short detection (based on dV, current & voltage change rate)
  - Network monitoring (Data header check, serial # check, etc.)
  - P/S temperature check
  - Bad or loose contact monitoring: comparing P/S output voltage and cell voltage including cable resistance calculations
  - Standard safety functions (Smoke detector, temp monitoring, etc)

+ Safety function: Hardware
  - CPU monitoring with Watchdog Timer

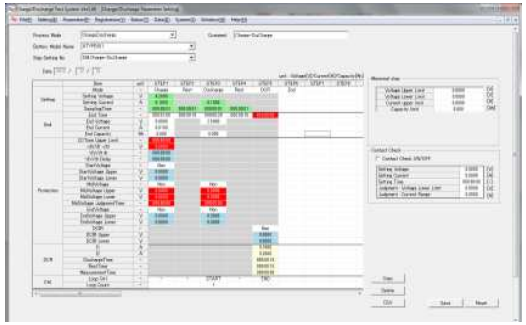
+ Safety function: Independent Over-Charge Protection
  - Protective circuit on P/S
  - Algorithm Software based on cell V and A info
  - CC Charge time limit to prevent overcharging

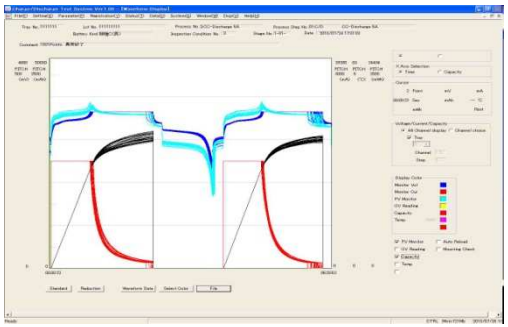
Why SoftEnergy Controls?

2. Customization capability

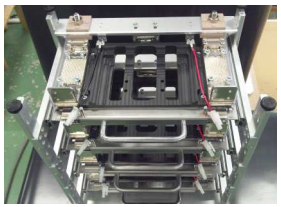
Everything we design and engineer is based on customer's request and "demand".
Ask me your question, we have answers.

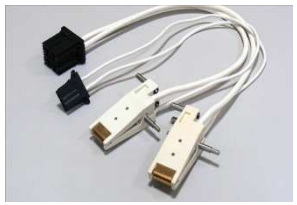
Original Application Software + Flexible Data Management

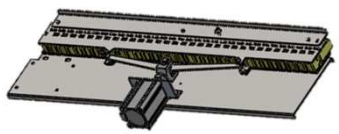




Original accessories and standard stage design

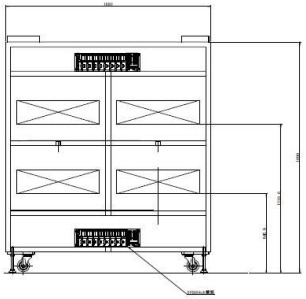




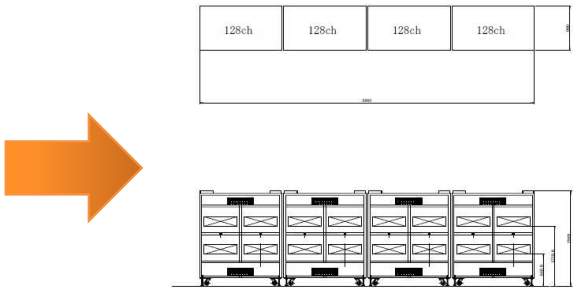


Cell holders and contact clips

Expansion plan



Single unit (128ch)



4 units (512ch)

Why SoftEnergy Controls?

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3. Reliability

Minimize your risk.
“Accident” is not your option. Our customers choose SoftEnergy Controls because of its reliability. Isn’t it good enough to choose us?
Followings are just part of the examples what our users say about SECI reliability.

+ Reliable after service and friendly customer service

+ Original Power Supply (made in Fukushima, Japan) and other key components

+ Stands for long term test (5 – 8 years battery lifetime test)

+ Customer support to prevent installation/operational issues
  (ex. two acceptance tests with customer appearance, installation SV, Service call visit)

+ SECI made the world smallest Ultra-High accuracy current sensor,
  +/- 0.01% accuracy (200A), half the size of competitive units

+ Demo/Trial units are available for your evaluation before making your decision






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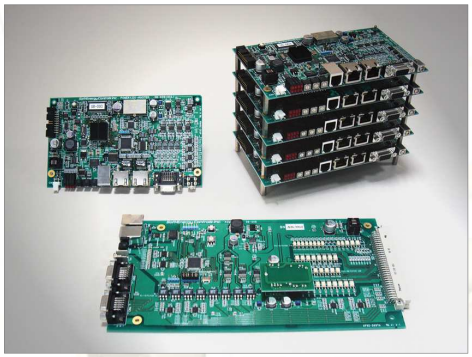

Main Business

1. Battery Cycle Tester (for battery R&D)
   Battery Formation systems (for production scale)
2. Energy solution business
   (including eBus, Solar system, Smart City solutions)

Established November 18th 2009

Capital Fund JPY 305,000,000 (about $3,000,000)

Employees Group Total: 82 (as of 2017.4) (63 Engineers & Production, 19 Management, Sales & Admin)

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Thank you

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