

WELCOME!

FLOOR CLEANERS & SWEEPERS WEBINAR



- ▶ **Presented by VARTA:** Friday June 5th 2020 at 2:30pm CET
- ▶ We will begin in a few moments. We encourage you to use a separate phone to dial-in for the audio, especially in case any audio issues are experienced and use your computer for the presentation material only.
- ▶ Participants are automatically muted but may ask questions via the control panel. You can also chat via the control panel if you have an issue.
- ▶ We will handle any questions at the end but please feel free to submit questions at any time via your webinar control panel

Good Afternoon!



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WELCOME! FLOOR CLEANERS & SWEEPERS WEBINAR



www.varta-storage.com/asb

www.varta-storage.com/webinars

Floor Cleaners and Sweepers: An Overview



- ▶ **What factors are driving change within this market?**
 - ▶ Indirect cost savings from lithium-ion technology
 - ▶ Improved performance for specific devices
- ▶ **Which applications are emerging?**
 - ▶ A brief roundup of some of the solutions in the market now
- ▶ **The Battery Challenge**
 - ▶ Custom vs Standard
 - ▶ Energy Demands, Environment, Voltage
- ▶ **The Charging Challenge**
 - ▶ Multiple devices at the same, or variable run-times?



Floor Cleaners and Sweepers: Development Factors



- ▶ **Cost savings**
 - ▶ Purchase cost balanced by higher lifetime
 - ▶ Maintenance cost reduced because zero maintenance is required over the same period
 - ▶ Reduced equipment cost, depending on the individual customer's use profile
- ▶ **Think**
 - ▶ Size of area and need for continuous cleaning
 - ▶ Airports, exhibition centres, hypermarkets



Floor Cleaners and Sweepers: Development Factors



- ▶ **Improved performance**
 - ▶ Faster charging
 - ▶ Higher energy means longer run times
 - ▶ High power means potentially better cleaning

- ▶ **Think**
 - ▶ Additional cleaning accessories
 - ▶ Handle greater resistance or output



Floor Cleaners and Sweepers: Example Applications



▶ Ride-On

- ▶ Driver is carried by the machine for large areas to increase efficiency and coverage

▶ Operator-Walked or Automated

- ▶ Medium-sized can cover good floor area but no need to carry the operator

▶ Specialised

- ▶ Small, specific applications or consumer-grade for the home



Floor Cleaners and Sweepers: A Few Questions



- ▶ What type of cleaner?
 - ▶ Large, Medium, or Small?
 - ▶ Usage profile?
- ▶ Motor Voltage Requirements?
 - ▶ Higher is more efficient, since motor currents are lower.
- ▶ How often is it Charged?
 - ▶ During operation? (During the day?)
 - ▶ Will Battery be replaced with a full one or charged briefly?
 - ▶ Overnight only?
- ▶ Capacity needs – fixed or expandable?
 - ▶ Cleaners are all the same, or some need longer run-times?

What Type of Cleaners?



Large:

Ride-On



- ▶ 24V, 36V, 48V, +++
- ▶ 200 to 2000 Ah
- ▶ Large and heavy
- ▶ Flexible needs

Medium:

Walk-with, or Robotic



- ▶ 24V, 36V, 48V
- ▶ 10 to 100Ah
- ▶ Mostly Li-Ion
- ▶ Battery embedded
- ▶ Dedicated usage profile

Small:

**Robotic, specialised
or residential**



- ▶ 12V, 24V
- ▶ 5 to 50Ah
- ▶ Majority Li-Ion
- ▶ Embedded or removable
- ▶ Variety of usage models

What Type of Cleaners?



Large:

Ride-On

Medium:

Walk-with, or Robotic

Small:

**Robotic, specialised
or residential**

Custom Battery Solutions

Standard Battery Solutions

System Solution (Battery, Charger, Accessories)

- ▶ 24V, 36V, 48V, +++
- ▶ 200 to 2000 Ah
- ▶ Large and heavy
- ▶ Flexible usage

- ▶ 24V, 36V, 48V
- ▶ 10 to 100Ah
- ▶ Mostly Li-Ion
- ▶ Battery embedded
- ▶ Dedicated usage profile

- ▶ 12V, 24V
- ▶ 5 to 50Ah
- ▶ Majority Li-Ion
- ▶ Embedded or removable
- ▶ Variety of usage models

Motor Voltage Requirements



- ▶ Higher is Better for Motors
 - ▶ Higher Voltage Motors are More Efficient
 - ▶ Lower Operating Currents
 - ▶ Lower Operating Temperatures (Why? $\text{Power \& Heat} = I^2R$)



But ‘stacking’ Batteries risks imbalance. And will the Battery be too BIG?

- ▶ Fixed Voltage Systems avoid Battery imbalance (it’s handled in the design)
- ▶ Li-Ion up to 60V has low weight

Bigger within limits: 48V Nominal is highest without added handling concerns

- ▶ “48V” is typically 50-52V nominal and up to 59V for Charging
- ▶ Batteries >60V have additional safety handling precautions

- ▶ Fast Charge Options: Some Lithium Battery chemistries like it, others do not!
- ▶ How often is it Charged?
 - ▶ During operation? (During the day?)
 - ▶ If Charging during Operating time then “usage up-time” is decreased
 - ▶ Will Battery be replaced with a full one or charged briefly?
 - ▶ “Opportunity” charging during breaks vs. Battery “swap-out”
 - ▶ Overnight only?
 - ▶ Are there enough Chargers? Added cost if need 1:1 Charger to Cleaner
- ▶ Wireless Charging: A nice option, but may require a larger charger due to losses.
- ▶ Regenerative Charging: Can the Cleaner put energy back to the Battery?

- ▶ Capacity needs – fixed or expandable?
 - ▶ All the same, or a mixed fleet with some need longer run-times?
 - ▶ Ability to easily add capacity: “Parallel-ing” same voltage Batteries

From one...



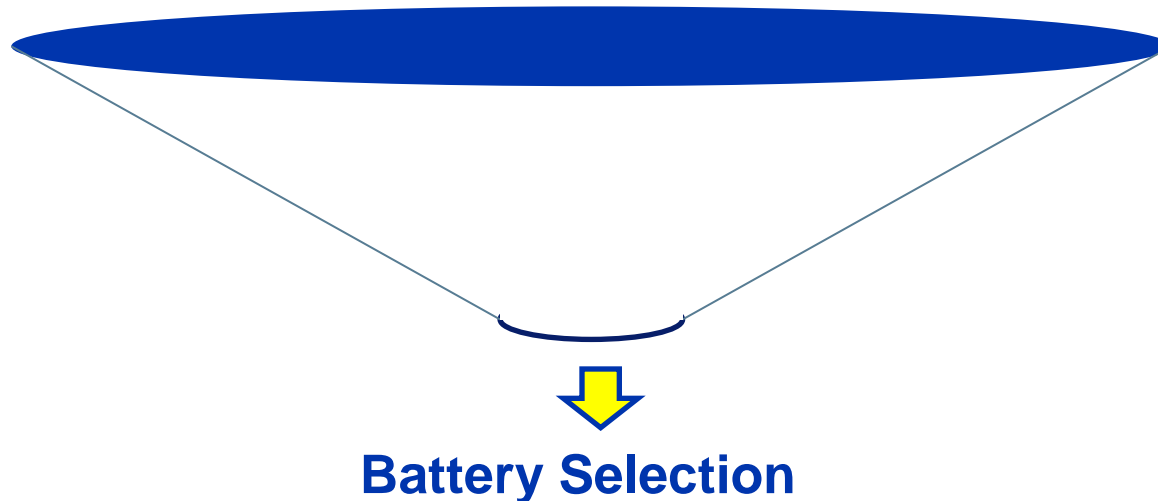
to many...



Summary: Factors in Battery Selection



- ▶ What type of Cleaner? Small – Medium – Large
- ▶ Motor Voltage Requirements? 12V, 24V, 36V, 48V
- ▶ How and where is it Charged? Charge capability
- ▶ Capacity needs – fixed or expandable? Single or Expandable



Mobile Robotics Batteries by VARTA



MODULAR



	Easy Block
12 V	-
24 V	22.8 Ah
36 V	-
48 V	11.4 Ah

**Connect up to 25 in Parallel
No Master BMS Needed**

STANDALONE



	Easy Stack	Easy Slice
	161 Ah	80.5 Ah
	80 Ah	40 Ah
	47 Ah	23.5 Ah
	40 Ah	20 Ah

**Easily Removeable for
Swappable Battery Options**

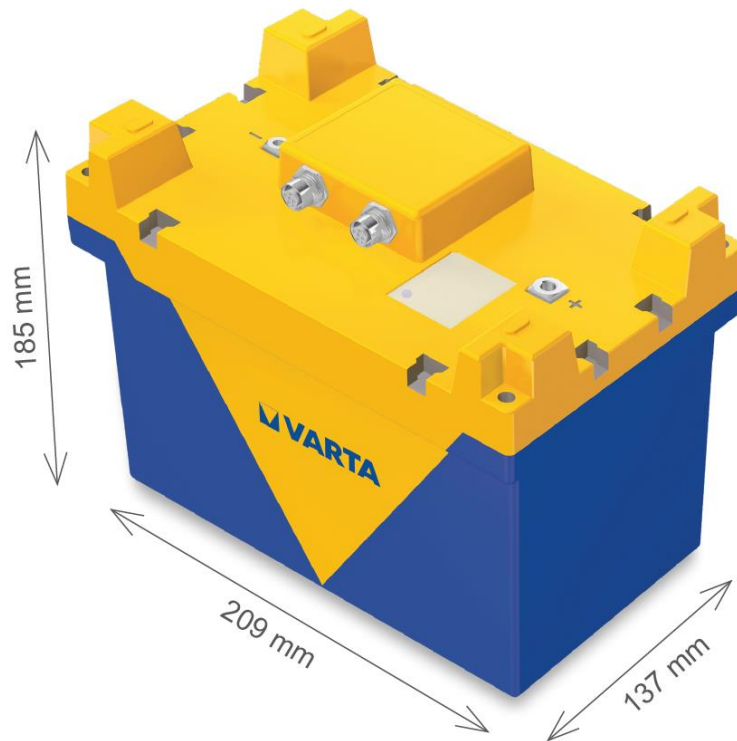
Features of EasyBlock



- ▶ Modular design for parallel connection up to 25 modules
- ▶ Fast charging to 80% within 1 hour, fully charged in <3 hours
- ▶ Allows Re-generative Charging
- ▶ Automatic Master-Slave Identification: One Battery controls the whole system
- ▶ Lightweight, compact modular designs with stacking and locking features for robust mechanical horizontal and vertical stacking
- ▶ Zero maintenance or service requirements from the user
- ▶ Balanced energy density, power and lifetime performance.
- ▶ Integrated communications – CAN Bus (CANopen)
- ▶ Multi-level safety integrated into each pack
- ▶ Comprehensive design-in resources



VARTA Easy Block Modular



- ▶ Long Life Li-Ion Technology
- ▶ Available in 24V and 48V versions
- ▶ 4,000 cycles to 80%
- ▶ Zero Maintenance during life cycle
- ▶ Up to 22.8Ah per module (24V)
- ▶ Connect up to 25 modules in parallel for more than 14kWh total system energy!

VARTA Easy Stack Standalone



- ▶ > 2kWh High Energy Li-Ion Technology
- ▶ Available in 12V, 24V, 36V, and 48V options
- ▶ LED State of Charge Indicator
- ▶ Zero Maintenance during life cycle
- ▶ Up to 161Ah per module
- ▶ 1,000 cycles to 80%
- ▶ Easy Exchange with standard connector and lifting/carrying handle

VARTA Easy Slice Standalone



- ▶ > 1kWh High Energy Li-Ion Technology
- ▶ Available in 12V, 24V, 36V, and 48V options
- ▶ LED State of Charge Indicator
- ▶ Zero Maintenance during life cycle
- ▶ Up to 80.5 Ah per module
- ▶ 1,000 cycles to 80%
- ▶ Easy Exchange with standard connector and lifting/carrying handle

Design-In Resources



► Datasheets for quick reference and product selection


► Technical Handbook containing detailed info and set-up guidance

► www.varta-storage.com/asb



Easy Blade 48

51.8 V | 32 Ah nominal | 1,657 Wh | VKB: 56654 799 097



GENERAL (Battery with safety circuit and plastic / metal construction)

Size (l x w x h) in mm	200 x 330 x 80
General	LiIbm-Ko-Mn-Al-Manganese-Co-Iso-Organic with SBR
Communication	CAN Bus (CanOpen)
Weight	Approx. 10 kg

* Illustration only

ELECTRICAL SPECIFICATION

Power connection	Negative terminal: M5 (old) screw type, rated female terminal Positive terminal: M5 (high) screw type, rated female terminal
CAN BUS connection	Type: 24 (new) M12-S, plug, female socket Wiring style: screw thread Coding: A Model: Tyco Electronics T411000001-000 or similar
Nominal voltage	51.8 V
Nominal capacity (0.2 C; 2.90 V discharge)	32 Ah
Nominal energy	1,657 Wh
Charging method	Constant current + constant voltage
Max. charge voltage	58.5 V
Rec. charge voltage	55.5 V
Max. charge current	31 A
Rec. charge current	10.3 A
Rec. charge cut off	Current < 1.0 A
Rec. discharge cut off	42 V
Max. continuous discharge current	80 A
Rec. discharge current	15.5 A
Exp. cycle life at (0.5 C / 0.5 C), 22 °C ± 2 °C	> 80 % of initial capacity at 1,000 cycles

CELL & BATTERY PROTECTION

Safety function	Overheat
Fuse	100 A

ENVIRONMENTAL CONDITIONS

Charge	0 °C to +20 °C
Discharge	-20 °C to +20 °C
Storage	1 to 3 m
Life	1 year
Humidity	25 to 85 %
IP rating	IP50, no

SAFETY CERTIFICATIONS

Please follow VARTA handling and safety precautions for the cell used in a UL recognized component according to IEC 60950-1.

This battery meets the requirements of battery directives. This battery is certified according to IEC62133-2:2017.


FEATURES

- Active cooling for improved lifetime.
- Easily connected up to 25 modules in parallel for higher capacity.
- Housing with locking feature for easy attachment to edge.
- No external battery management needed. Automatic read.
- Zero maintenance, zero emissions.
- Limited 2 year warranty.

Minimum order quantity: 200 pcs / Order multiples: 50 pcs

Easy Block 48

51.2 V | 11.4 Ah nominal | 563 Wh | VKB: 56650 764 098



GENERAL (Battery with safety circuit and plastic / metal construction)

Size (l x w x h) in mm	121 x 200 x 107
General	LiIbm-Ko-Mn-Al-Manganese-Co-Iso-Organic with SBR
Communication	CAN Bus (CanOpen)
Weight	Approx. 10 kg

Electrical Specification

Power connection	Negative terminal: M5 (old) screw type, rated female terminal Positive terminal: M5 (high) screw type, rated female terminal
CAN BUS connection	Type: 24 (new) M12-S, plug, female socket Wiring style: screw thread Coding: A Model: Tyco Electronics T411000001-000 or similar
Nominal voltage	51.2 V
Nominal capacity (0.2 C; 2.90 V discharge)	11.4 Ah
Nominal energy	563 Wh
Charging method	Constant current + constant voltage
Max. charge voltage	58.5 V
Rec. charge voltage	55.5 V
Max. charge current	31 A
Rec. charge current	10.3 A
Rec. charge cut off	Current < 1.0 A
Rec. discharge cut off	42 V
Max. continuous discharge current	80 A
Rec. discharge current	15.5 A
Exp. cycle life at (0.5 C / 0.5 C), 22 °C ± 2 °C	> 80 % of initial capacity at 1,000 cycles

CELL & BATTERY PROTECTION

Safety function	Overheat
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ENVIRONMENTAL CONDITIONS

Charge	0 °C to +20 °C
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IP rating	IP50, no

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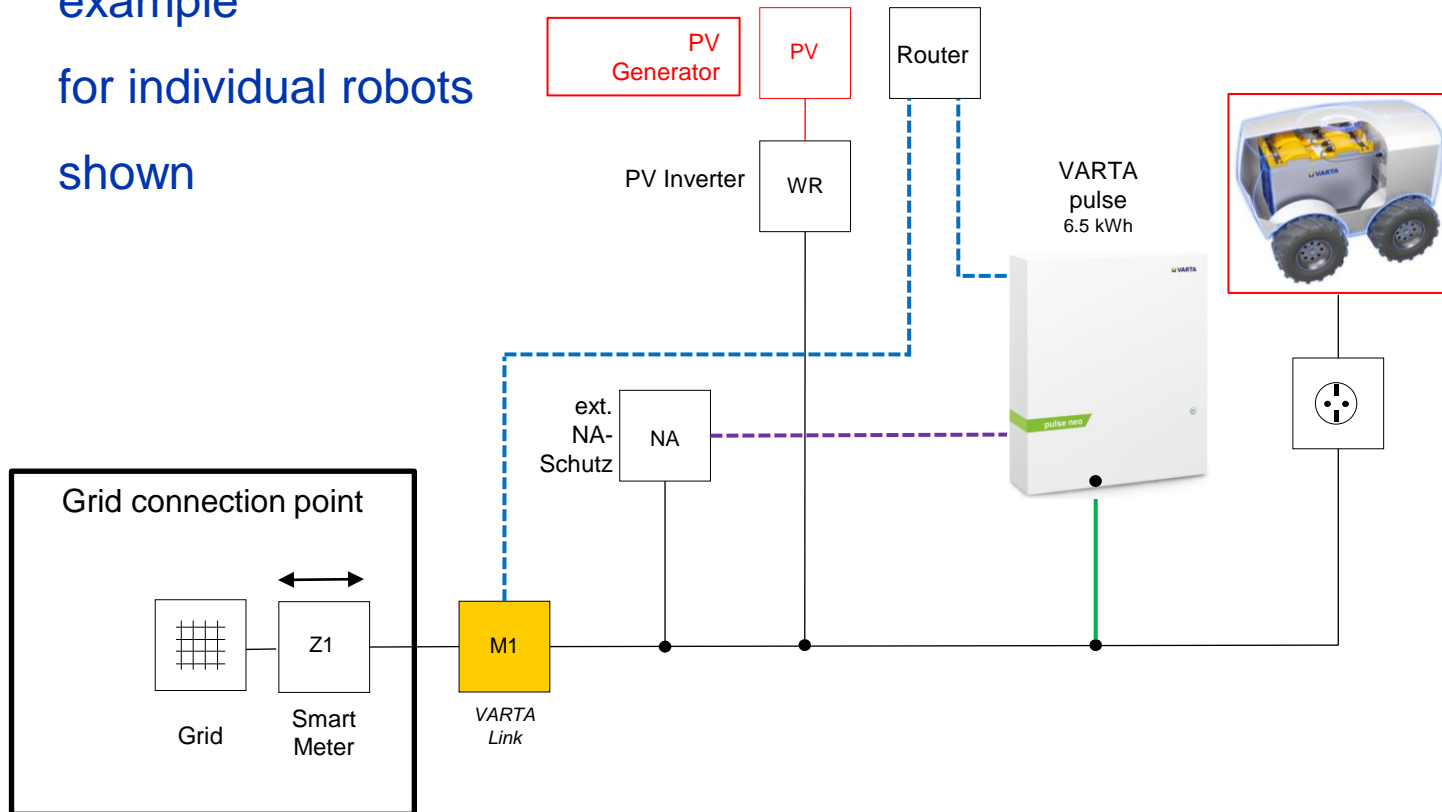
VARTA Storage – VARTA Microbattery

Our brands;

20

Energy Buffers and Solar Powered Charging Stations

- ▶ Charging buffer example for individual robots shown



VARTA AG

MICROBATTERIES & SOLUTIONS

HOUSEHOLD BATTERIES

Healthcare	Entertainment	Solutions
		

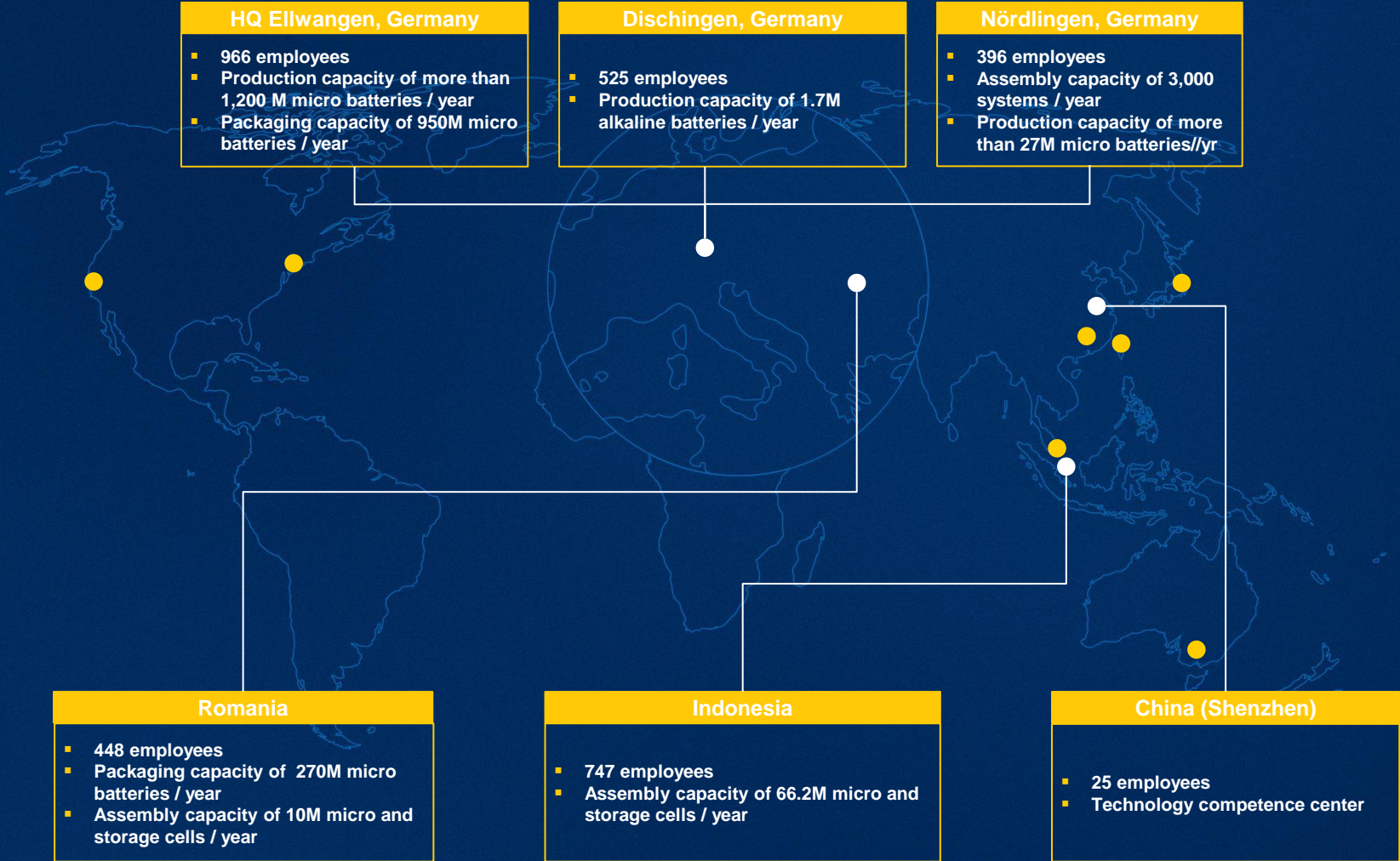
Consumer Batteries	Energy Storage
	

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Hearing Aid Cells (1B/yr)**
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**Standard & Custom Battery
Packs and Energy Storage**
www.VARTA-Storage.com

**Consumer Coin & Cylindrical Cells;
Home Energy Storage**
www.VARTA-Consumer.com

Global Footprint



● Production
● Sales Office

Batteries for Floor Cleaners

www.varta-storage.com/asb



MODULAR



	Easy Block
12 V	-
24 V	22.8 Ah
36 V	-
48 V	11.4 Ah

**Connect up to 25 in Parallel
No Master BMS Needed**

STANDALONE



	Easy Stack	Easy Slice
	161 Ah	80.5 Ah
	80 Ah	40 Ah
	47 Ah	23.5 Ah
	40 Ah	20 Ah

**Easily Removeable for
Swappable Battery Options**

CHOOSE WISELY – CHOOSE VARTA

THANK YOU!

Product information: www.varta-storage.com/asb

Webinar information: www.varta-storage.com/webinars

Start Today!



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