

ROBOT POWER SYSTEM

PowerSwap DUO 400

Dual-Bay Smart Battery Rotation Station



Charge two. Rotate faster. Keep every mission moving.

CONCEPT PRODUCT • TARGET SPECIFICATIONS • SEPTEMBER 2026

Designed around operational continuity

A compact energy hub for removable robot and equipment batteries.

The idea

PowerSwap Duo 400 converts a simple two-drawer form into a managed battery rotation point. One pack can power the mission while the second is identified, charged and prepared for the next shift. The result is predictable availability without tying every mobile asset to a dedicated charger.

01 Ready spare

Two independent bays keep a verified replacement pack available.

02 Clean interface

A guided, sealed power interface avoids exposed user-accessible contacts.

03 Battery intelligence

Pack identity, cycle count, temperature and state-of-health become fleet data.

04 Open integration

Standard industrial interfaces connect the station to robots, BMS and fleet software.

Electrical & mechanical targets

Values are proposed development targets and require engineering validation and certification.

AC input	100–240 VAC, 50/60 Hz, 5 A max
Rated output	400 W total; 2 × 200 W independent channels
DC range	18–54.6 V programmable CC/CV
Output current	Up to 8 A @ 24 V or 4 A @ 48 V per bay; 200 W max
Battery chemistry	Li-ion and LiFePO ₄ profiles; custom profile option
Efficiency target	≥90% peak AC-to-battery
Interfaces	Ethernet; CAN 2.0B; RS-485/Modbus RTU; optional Wi-Fi
BMS data	Pack ID, voltage, current, temperature, SoC, SoH, cycle count
Operating modes	Parallel charge; priority pack; storage mode; rotation scheduler
Dimensions target	360 W × 250 D × 330 H mm
Mass target	≤12 kg, excluding battery cartridges
Environment	0–40 °C full power; –10–50 °C derated; indoor IP30 target
Acoustics	<35 dBA typical at 1 m
Protection	OVP, OCP, SCP, OTP, pack polarity, FOD, fan fault
Compliance path	IEC/EN 62368-1, EMC, RoHS/REACH; regional review required

From depleted pack to mission-ready energy

1

1. INSERT

Guided bay detects the pack and verifies ID.

2

2. PROFILE

BMS handshake selects voltage, chemistry and limits.

3

3. CHARGE

Each bay runs an independent temperature-aware CC/CV cycle.

4

4. VERIFY

Charge completion, SoH and exceptions are logged.

5

5. ROTATE

A ready pack is released for the next robot or device.

CONTROL PRINCIPLE

- The station never assumes two packs are identical.
- Each bay negotiates limits independently through the BMS.
- If communication is lost, output stops and the event is logged.

Six website-ready selling points

01**Dual-bay continuity**

Charge and stage two packs at once so operations are not paced by a single charger.

02**Independent power control**

Mixed voltage profiles can be managed bay by bay within the validated pack family.

03**No exposed user contacts**

A recessed, guided interface supports safer handling in shared environments.

04**Fleet-level battery insight**

Turn every charge cycle into usable SoH, cycle and temperature data.

05**Fast service model**

Front-access cartridges reduce the time and floor space needed for battery exchange.

06**Designed to integrate**

Ethernet, CAN and RS-485 provide clear paths to BMS, robot and fleet software.

Built for fleets and shared equipment



AMR & warehouse robots

Shift-based battery rotation for intralogistics fleets.

Hospital service robots

Centralized battery readiness for delivery and transport robots.

Inspection & security

Rapid pack exchange for route-based autonomous platforms.

Portable instruments

Shared charging for field test, survey and mobile diagnostic equipment.

DEPLOYMENT NOTE

Final pack geometry, connector isolation, thermal path and charge profile must be co-engineered with the battery supplier.

What must be validated before launch

ELECTRICAL	Load regulation, efficiency map, inrush, leakage, fault shutdown.
BATTERY	BMS compatibility, cell limits, SoC/SoH accuracy, cycle-life impact.
THERMAL	Worst-case dual-bay charging, blocked airflow and component derating.
MECHANICAL	Drawer endurance, retention, mis-insertion, drop and transport vibration.
EMC & SAFETY	Pre-compliance emissions, immunity, dielectric strength and touch temperature.
SOFTWARE	Authentication, logs, recovery, firmware update and API stability.

Market rationale

- MiR positions automatic charging as a path to continuous operation and fleet-level charge optimization.
- WiBotic highlights multi-chemistry, multi-voltage charging, battery intelligence and reduced contact maintenance.
- These patterns support a compact dual-bay rotation product focused on uptime, pack visibility and shared infrastructure.

REFERENCE SOURCES

Mobile Industrial Robots — MiR Charge 48V: mobile-industrial-robots.com/products/applications/mir-charge-48v

WiBotic — Autonomous robot charging, battery support and fleet intelligence: wibotic.com

Accessed 17 September 2026. Sources inform the market rationale only; all PowerSwap values are concept targets.