VOLT CONTROL SYSTEM

POWER QUALITY / TEST SOLUTIONS

3 MW

Containerized Load Bank

Resistive + Inductive (R+L)

Engineered for generator testing, data-centre commissioning and controlled load simulation.



Industrial-grade containerized architecture

380-415 V	50 / 60 Hz	1.0 to 0.4	100%
OPERATING RANGE	FREQUENCY	POWER FACTOR	CONTINUOUS DUTY

Containerized testing, engineered at scale.

A 3 MW nominal resistive + inductive (R+L) load bank platform for high-capacity generator testing, commissioning and controlled load simulation.



OUTDOOR ENCLOSURE / FORCED AIR COOLED

DESIGNED FOR

01 Generator / alternator load testing

02 Data-centre commissioning

03 Controlled power-factor simulation

04 Prolonged full-load testing

05 Single or parallel generator test scenarios

NOMINAL PHYSICAL ENVELOPE

LENGTH	WIDTH	HEIGHT	APPROX. WEIGHT
12.0 m	2.3 m	2.3 m	15 tonnes

Electrical and mechanical particulars.

Core ratings are drawn from the 3 MW project specification. Items dependent on final engineering are identified rather than assumed.

ELECTRICAL / LOAD PERFORMANCE

Product type	**Containerized R+L load bank**
Nominal capacity	**3 MW**
Specified load-step total	**3,277 kW**
Input / test voltage	**380-415 V AC**
Supply frequency	**50 / 60 Hz**
Power factor target	**1.0 to 0.4**
Load accuracy	**+/- 1%**
Specified switching time	**Less than 1 second**
Duty cycle	**Continuous, 100% rated load**

CONTROL / CONSTRUCTION

Control platform	**Programmable SCADA**
Confirmed operating modes	**Automatic / Manual**
SCADA features	**Monitoring, history, alarms**
Communication	**Modbus TCP/IP, Ethernet**
Auxiliary supply	**UPS-backed source required***
Enclosure	**Weatherproof / outdoor rated**
Cooling	**Forced-air cooling**
Noise (preferred limit)	**85 dB or less at 1 m**

R + L CAPABILITY / POWER FACTOR

The specification calls for adjustable power factor from unity to 0.4. Final independent resistive (kW), inductive (kVAr) and combined operating limits must be approved in the design schedule; the full 3 MW rating is not assumed at every power factor.

*Auxiliary UPS supply responsibility to be agreed.

21 specified load steps. 3,277 kW provision.

Granular load-stage selection supports controlled test points, repeatable increments and tailored loading profiles.

3,000 kW	3,277 kW	+277 kW
NOMINAL SYSTEM RATING	SUM OF SPECIFIED LOAD-STEP VALUES	9.23% EXTRA

SPECIFIED STEP ALLOCATION

STEP RATING	QTY	GROUP TOTAL
0.5 kW	x 2	1 kW
1 kW	x 2	2 kW
2 kW	x 2	4 kW
5 kW	x 2	10 kW
10 kW	x 2	20 kW
20 kW	x 2	40 kW

STEP RATING	QTY	GROUP TOTAL
50 kW	x 2	100 kW
100 kW	x 2	200 kW
200 kW	x 2	400 kW
500 kW	x 1	500 kW
1000 kW	x 2	2,000 kW

Load-step values reproduce the supplied 3 MW specification. The detailed R/L stage allocation remains subject to design confirmation.

Manual and programmable operating modes.

Automatic and manual are specified for this 3 MW system. The other four modes below follow the 50 kVA control reference and are proposed for the 3 MW PLC/SCADA scope.

01 MANUAL MODE

Operator enables or disables permitted R/L stages individually and monitors applied load, electrical parameters and safety status.

02 AUTOMATIC MODE

Operator enters start load, end load, increment and dwell time; controller applies a programmed load ramp and unloading sequence.

03 AUTOMATIC LOAD SELECTION

Enter a target load; stage-selection logic chooses an achievable combination, respecting interlocks and approved R/L limits.

04 AUTOMATIC LOAD SEQUENCE

Set a multi-step profile with target points and holding durations; execute and capture sequential load transitions.

05 LOAD CYCLING TEST

Set ON time, OFF time and cycle count; repeat a programmed load condition with status and elapsed-time display.

06 ENDURANCE TEST

Apply a defined permitted load for the specified test duration with continuous measurement, alarm tracking and reporting.

PROPOSED 3 MW FUNCTIONALITY: final sequences, R/L coordination and parameter limits require software approval and FAT validation.

Programmable testing and cooling sequence.

The sequence below is a proposed 3 MW control architecture. Pre-run permissives and fan overrun periods will be established during detailed engineering.

PROPOSED TEST / FAN SEQUENCE

01	02	03	04	05	06	07
CHECK	START	PROVE	ENABLE	RUN	REMOVE	COOL
Permissives	Cooling fans	Airflow & temp	R/L stages	Test profile	All stages	Post-run

PROGRAMMABLE LOAD SEQUENCE

Automated ramps, dwell periods and unloading for repeatable generator and commissioning tests.

- Start and end target
- Step increment
- Holding time
- Start / stop / pause control

LOAD CYCLING / ENDURANCE

Repeat ON/OFF duty cycles or hold a defined test load over an agreed duration.

- Load ON / OFF time
- Total number of cycles
- Elapsed / remaining time
- End-of-test data package

TEST DATA OUTPUT

Recorded electrical quantities, stage commands, alarm events, timestamps and test status support traceability. Customer, asset, test profile and operator references can be included in the approved reporting template.

SCADA, measurements and reporting.

The 3 MW specification calls for pre-programmable SCADA, a graphical interface, historical data, alarms, reporting, Ethernet and Modbus TCP/IP.



ACTUAL CONTROL-PANEL PHOTOGRAPH

LIVE ELECTRICAL MEASUREMENTS

- Line-to-line voltage
- Current per phase
- Frequency
- Active power (kW)
- Apparent power (kVA)
- Reactive power (kVAr)
- Power factor
- Energy (kWh)
- Fan / stage status
- Temperature / alarm status

LOGGING / CONNECTIVITY

Time-stamped readings, alarms and test history; Modbus TCP/IP over Ethernet for agreed system interfaces. Sampling intervals, report format, storage duration and external point maps are finalized during SCADA engineering.

FUNCTIONS TO CONFIRM

CSV / Excel / PDF report export, network access policy, operator roles and exact available sensors.

Safety interlocks, trips and alarm handling.

Specified protective functions are shown separately from recommended supervisory alarms. Safety commands take priority over manual and automatic load requests.

SPECIFIED PROTECTION	DESIGN INTENT / RESPONSE
Emergency stop	Inhibit / remove load; retain alarm for operator reset
Overcurrent	Electrical protective isolation / load removal as designed
Overtemperature	Inhibit / remove loading and initiate controlled cooling
Cooling fan failure	Prevent loading or unload when airflow is not assured
Overvoltage	Protect against a voltage condition outside approved range
Wrong phase sequence	Prevent enable until correct phase arrangement is verified
Arc / surge at switching	Appropriate suppression / surge protective measures

RECOMMENDED ADDITIONAL ALARMS / INTERLOCKS - SUBJECT TO FINAL I/O LIST

- High-temperature warning
- Door-access status
- PLC / I/O fault
- Fan / airflow supervision
- Communication failure
- SCADA event history
- Breaker or MCCB trip
- Auxiliary supply failure
- Alarm acknowledge / reset

Final trip thresholds, latching, annunciation and reset logic to be defined in the approved cause-and-effect matrix.

From engineered design to documented testing.

Project-specific engineering deliverables and final test documentation follow the confirmed order and agreed commercial milestones.

ENGINEERING DOCUMENTATION

AFTER PO CONFIRMATION + AGREED ADVANCE

Project-specific GA drawings, electrical schematics, control logic diagrams and SCADA documentation will be shared as they are developed and approved.

AFTER MANUFACTURING / TESTING

Final Operation & Maintenance manuals and test reports will be provided on completion. FAT / SAT records are supplied as applicable to the agreed scope.

VOLT CONTROL SYSTEM

ENGINEERED FOR RELIABLE POWER.

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