



Industrial Generator Sizing Calculator

Step-by-step power sizing worksheet for diesel & gas generator sets | 5kW – 3000kW

HUAQUAN POWER — Free Download | Version 1.0 — June 2026

How to use this worksheet: Fill in each step in order. The calculator applies industry-standard derating factors and a 20–30% margin to recommend the right generator size for your facility. Print this form, fill it in by hand, or use it as a reference when speaking with a generator supplier. **Tip:** For facilities with motor loads (compressors, lifts, pumps), Step 2 is critical — starting kW is almost always higher than running kW.

1 Your Facility Information

Facility / Project Name:

e.g. Steel Factory Phase 2

Industry / Application:

e.g. Manufacturing / Mining / Data Center

Site Altitude (m above sea level):

0

m (0m = sea level)

Max Summer Ambient Temp (°C):

35

°C (standard = 25°C)

2 List Your Loads

List every load that must run on backup power. Mark each as Critical (must have) or Non-critical (can shed).

LOAD DESCRIPTION	QTY	RUNNING KW EACH UNIT	STARTING KW EACH UNIT	RUNNING KW TOTAL
e.g. Server racks / Air c	1	0.0	0.0	—
e.g. Lighting	1	0.0	0.0	—
e.g. HVAC / Ventilation	1	0.0	0.0	—
e.g. Cold storage	1	0.0	0.0	—
e.g. Emergency lighting	1	0.0	0.0	—
e.g. Production line mo	1	0.0	0.0	—
Other	1	0.0	0.0	—
TOTAL RUNNING kW (all loads)				___ kW
HIGHEST SINGLE STARTING kW				___ kW

⚠ Starting kW tip: Motors typically need 3–5× their running power at startup. If a 30kW motor shows only 30kW starting kW, it is likely undersized. Typical starting multipliers: soft-start VFD motors = 1.2–1.5×, direct-on-line (DOL) motors = 4–6×, star-delta = 2–3×.

3 Apply Diversity Factor

Most facilities do not run all loads at full capacity simultaneously. Choose the factor that matches your operation type.

Industry Standard Diversity Factors

Data center / Hospital	0.90–0.95
Manufacturing (single line)	0.70–0.80
Manufacturing (multi-line)	0.60–0.70
Commercial building	0.65–0.75
Mining / Construction site	0.60–0.70
HVAC-dominant (mall/stadium)	0.50–0.65

Your Selected Factor

Cross out the values above that do not apply, then circle your chosen factor:

0.75 (typical range: 0.60 – 0.90)

Your adjusted running load = Total running kW × Diversity factor

4 Apply Derating Factors

Generator capacity decreases when conditions are not standard (25°C, sea level). Apply derating if applicable.

Derating Factor	Rule	Your Value	Output Loss
Altitude derating	-1% per 100m above 1,000m	m m	- ____ %
Temperature derating	-1% per 1°C above 25°C	°C °C	- ____ %
Harmonic load derating	-10–20% if >25% load is VFD/UPS	Y / N (VFD or UPS load present?)	-0% or -15%
TOTAL DERATING FACTOR			- ____ %

Why this matters: A 1000kW generator rated at sea level and 25°C produces approximately 850kW at 1,500m altitude and 35°C ambient temperature. Sizing without derating is the most common cause of generator failure in the field.

5 Calculate Your Recommended Generator Size

The Sizing Formula

Step A: Adjusted Running Load = Total Running kW × Diversity Factor
Step B: Derated Capacity = Adjusted Running Load ÷ (1 - Total Derating %)
Step C: Recommended Size = Derated Capacity × 1.25 (20 - 30% margin)
Step D: Verify Starting Capacity — must be ≥ Highest Single Starting kW × 1.1

Step A — Adjusted Running Load (kW): ____ kW

Step B — After Derating (kW): ____ kW

Step C — Recommended Generator Size (kW): ____ kW

Step D — Starting Capacity Check (kW): ____ kW ≥ ____ kW ✓/X

RECOMMENDED GENERATOR CONFIGURATION

RECOMMENDED SIZE

kW

PRIMARY RECOMMEND

kW

Best fit for your load profile

MINIMUM SIZE

kW

Only if load can be shed

N+1 REDUNDANCY

kW

2 units for critical facilities

Standard ambient
conditions

Quick Reference — Generator Size by Facility

Small workshop / workshop	50 – 150 kW
Commercial office building	200 – 500 kW
Manufacturing plant	500 – 2000 kW
Large industrial facility	2000 – 5000 kW
Data center / Hospital	1000 – 5000+ kW
Mining operation	500 – 6000 kW
Oil & gas facility	200 – 3000 kW

Need a Formal Sizing Report?

Huaquan Power offers free technical sizing support. Our engineers will review your load list, apply the correct derating factors, and recommend the right configuration — including ATS, parallel systems, and fuel runtime planning.

No cost. No obligation. Just the right answer before you spend.

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HUAQUAN POWER

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Need technical support?

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