

# Temporary Power

## A Primer for Anyone Working Around It

From a wall socket to a stage feed — what the numbers mean, what the gear does, and how to work around it safely.



# You've Done This – The Breaker Trip

Coffee Maker

1,200W

*same circuit*

Window AC Unit

1,000W

*same circuit*

Hair Dryer

1,800W

*same circuit*

**TOTAL: 4,000W**

Circuit max: 1,800W → Breaker trips. Every time.

## Why It Happens

- ▶ Every circuit has a maximum safe load — in watts
- ▶ Exceed it, the breaker trips to prevent the wire overheating
- ▶ The breaker is not the problem — it is the protection

**Watts ÷ Volts = Amps**

4,000W ÷ 120V = 33 amps

Standard circuit: 15 amps → Breaker trips

# Watts, Volts & Amps – The Three Numbers

## VOLTS

Pressure

The force pushing electricity. US outlets: 120V. Heavy loads: 240V or 208V.

*120V household · 240V dryer · 208V stage*

## AMPS

Flow Rate

How much electricity moves. Your circuit's limit. Exceed it, breaker trips.

*15A kitchen circuit · 50A stage circuit · 400A stage feed*

## WATTS

Work Done

Power consumed. Volts × Amps = Watts. Every device has a wattage rating.

*100W LED fixture · 1,200W coffee maker · 60,000W stage*

$W \div V = A$  · Know any two, find the third · This one formula lives on every job site

# The Wall Outlet — What You're Working With

NEMA 5-15 — Standard US outlet: 120V · 15A · ~1,800W max



## Three Wires — What Each Does

### HOT

Carries the voltage. This is live. Treat it with respect.

### NEUTRAL

Current returns to the panel through this wire. Still carries current when load is connected.

### GROUND

Emergency path. No current normally. If something fails, fault current goes here — not through you.



### On one 15A / 120V circuit you can run:

- ▶ 10 LED stage wash lights (10 × 100W = 1,000W)
- ▶ Laptop + monitor + phone charger
- ▶ One coffee maker OR one hair dryer — not both

# Single-Phase vs. Three-Phase

One wave vs. three — why stages need a different kind of power

## Single-Phase Vs Three-Phase Power

FEATURE	SINGLE-PHASE POWER 	THREE-PHASE POWER 
<b>BASIC DEFINITION</b>	Uses a single alternating voltage.	Uses three alternating voltages, out of phase with each other.
<b>SUPPLY WIRES</b>	Requires two wires: one phase wire and one neutral wire.	Requires three or four wires: three phase wires, and sometimes a neutral wire.
<b>EFFICIENCY</b>	Less efficient for powering large motors and heavy loads.	More efficient for large motors and heavy loads due to constant power delivery.
<b>APPLICATION</b>	Suitable for homes and small appliances.	Ideal for industrial applications and large motors.
<b>VOLTAGE LEVELS</b>	Typically provides lower voltage, up to 240V.	Can deliver higher voltages, often 415V or higher.
<b>POWER DELIVERY</b>	Power fluctuates with each cycle of the AC waveform.	Delivers constant power, reducing vibration in motors.
<b>COST</b>	Generally less expensive for installation and equipment.	More expensive due to more complex installation and equipment.
<b>STABILITY</b>	Less stable for large loads, may cause more flicker in lighting.	More stable and reliable for powering large and sensitive equipment.
<b>USE CASE EXAMPLES</b>	Residential properties, small offices, light appliances.	Large commercial buildings, industrial facilities, equipment requiring high power.

**NNC**

## What the Difference Means on Site

	Single-Phase	Three-Phase
Hot wires	2	3 (L1, L2, L3)
Voltage	120 / 240V	120 / 208V (Wye)
Typical use	Home · Food truck · RV	Stage · HVAC · Large event
Generator	Portable / small	Towable trailer
Connector	Twist-lock	Cam-Lok 5-wire
Balance?	No	Yes — all 3 legs even

Confirm single- or three-phase before calling Sunbelt — they'll ask first thing

# Where Temporary Power Comes From

Generator — makes its own power from diesel or propane



BESS — battery storage, charges from grid or generator, discharges silently



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## Three Sources — One Concept

### Generator

Diesel or propane engine makes AC power on-site. Portable units: 1–10 kW for a food vendor. Towable trailers: up to 2,000 kW for a large stage. Most common at outdoor events.

### Shore Power (Utility)

Grid electricity accessed via a disconnect switch or pedestal. No fuel, no exhaust. Common at fairgrounds, permanent venues, RV parks. Capacity is fixed by the service size.

### BESS — Battery Storage

Stores power from grid, generator, or solar. Discharges silently — zero local emissions. 5 kWh portable to 1+ MWh trailer. Ideal for quiet zones, green stages, or grid backup.

# How Power Travels – From Source to Load

Every temporary power system follows the same path, no matter the size

## 1. GENERATOR



Source of power. Diesel or propane. Must be grounded, positioned 20+ ft from public.

## 2. FEEDER CABLES



5-wire Cam-Lok set. Color-coded by phase. Runs to main distro panel. Qualified personnel only.

## 3. DISTRO PANEL



Receives generator output. Breaks into branch circuits. Has its own master breaker.

## 4. SPIDER BOX



200A in, six 50A out. Last stop before the load. GFCI required near water or public.

# Connectors – Three You Need to Know

The connector tells you the voltage, amperage, and phase at a glance

## Standard Edison



**NEMA 5-15 · 120V · 15A · 1,800W max**

Phone chargers, laptops, LED fixtures, small audio gear. One per circuit — don't stack heavy loads.

## California Twist-Lock



**L14-30 / L14-50 · 120/240V · 30-50A**

Portable generators, food trucks, RV pedestals, spider box inputs. Twists 30° to lock — won't pull free.

## Cam-Lok



**Single-pole · 120/208V · 400A · 3-phase (5-wire)**

Stage power. Generator to distro panel. One connector per conductor — 5 total. Qualified personnel only.

# Scenario — Powering a Mobile Food Truck

Typical food truck: ~9,000–12,000W · 240V single-phase · 50A service



## What You'd Call Sunbelt For

- ▶ **Portable generator:** 6–8 kW propane or diesel with L14-50 receptacle. Connects directly to the truck inlet.
- ▶ **Shore power pedestal:** If venue has utility service — 50A NEMA 14-50 pedestal with twist-lock cable.
- ▶ **Spider box circuit:** 50A twist-lock output from a festival spider box to the truck shore inlet.

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## Before You Connect

- ▶ Confirm truck's shore power inlet rating — 30A or 50A?
- ▶ Total your loads — never assume a circuit handles everything
- ▶ Generator must be grounded and positioned away from food prep
- ▶ GFCI required at any exterior or wet location

"I need 240V single-phase, 50A minimum, one food truck" — that's the call to Sunbelt

# Scenario — Powering a Medium Outdoor Stage

Medium stage: 100–400 amp three-phase · towable generator · 5-wire Cam-Lok feed



## The Equipment Package

- ▶ **Generator:** 100–250 kW towable diesel trailer, three-phase output
- ▶ **Feeder cables:** 4/0 AWG Cam-Lok 5-wire set · generator to main distro panel
- ▶ **Main distro panel:** 400A input · multiple 100A and 50A breaker outputs
- ▶ **Spider boxes:** One per zone — stage left, stage right, FOH
- ▶ **Turtles:** 50A circuits to individual audio racks, lighting, HVAC

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## Three Rules at This Scale

- ▶ Balance loads across all three phases — uneven = overheating
- ▶ Feeder tie-in by qualified personnel only
- ▶ Size generator at 125% of total expected load

"200–400A three-phase, 208V, towable generator and distro package"

# Scenario — Emergency Cooling Center (Theater, No Power)

Theater lost utility power · 200 people · You called Sunbelt · Setting it up yourself



## Setup — In Order

"30–40 kW generator, 240V single-phase, distro panel, 50A branch circuits"

- 1 Generator outside — 20 ft from entry, exhaust away from building
- 2 Ground generator to a driven rod at the site
- 3 Run feeder cable to a distro panel at the building entry
- 4 Spider box or sub-panel inside → 50A circuits to AC units
- 5 20A circuits for lighting, refrigeration, communication
- 6 GFCI on every circuit near water or public access
- 7 Start generator, check voltage at panel, breakers on
- 8 Bring loads on one at a time — never everything at startup

# 5 Rules Before You Touch Anything

These apply whether you're plugging in a coffee maker or standing next to a 400A feeder

**1 Assume it's live until you can prove otherwise.**

Never assume a cable is off because nobody said it was on. Confirm with a meter or trace it to a locked breaker.

**2 Calculate before you connect.**

$\text{Watts} \div \text{Volts} = \text{Amps}$ . Know your load and your circuit rating before you plug anything in.

**3 Feeder tie-in is for qualified personnel only.**

Anyone can plug into a turtle. Only authorized people touch Cam-Lok cables, generator panels, or main distro tie-ins.

**4 GFCI everywhere near water or the public.**

Trips at 6 milliamps in ~3 seconds — the difference between a bad shock and a fatal one. Use it outdoors, always.

**5 Feels wrong? Turn it off first.**

Buzzing, flickering, warm cables, burning smell — those are "turn off the breaker and call someone" signals. Not reset-and-hope.

# Vocabulary – 12 Terms You'll Hear on Every Job

Learn these and you can follow any conversation about temporary power on-site

## Amps (A)

How much electricity flows. The circuit's capacity limit.

## Ampacity

Max amps a wire or connector can carry safely without overheating.

## Cam-Lok

Single-pole 400A+ connector. One per conductor. 5-wire set for 3-phase.

## Distro panel

Main distribution panel. Receives source power, splits into branch circuits.

## GFCI

Ground Fault Circuit Interrupter. Required near water. Trips at 6 milliamps.

## kW / kWh

Kilowatt = rate of power. Kilowatt-hour = energy over time.

## LOTO

Lockout/Tagout. Physically locks a circuit off while someone works on it.

## Shore power

Grid power via a disconnect switch — no generator needed.

## Spider box

200A in, six 50A out. The workhorse of festival distribution.

## Three-phase

3 hot conductors, 120/208V. Standard for stages and large loads.

## Turtle

Small sub-panel fed by a spider box. Provides 20A and 30A receptacles.

## Voltage drop

Power lost over long cable runs. Keep runs short or plan for it.