

THE 208V / 240V MISMATCH

Commercial buildings, apartment complexes, hotels, and multi-tenant properties are fed 208V three-phase power. Much of the equipment installed in these buildings, from laundry machines to ice makers to EV chargers, is designed for 240V. Facility managers deal with the consequences: underperforming equipment, premature failures, tenant complaints, and repeated service calls.

COMMERCIAL LAUNDRY

- **Dryer heating elements lose 25% output**, longer dry cycles
- **Clothes not fully dry**, tenants run extra cycles
- **Washer motors lose torque**, poor spin extraction
- **Higher utility costs** from extended run times
- **Coin-op revenue drops** when machines underperform

ICE MACHINES & VENDING

- **Compressor runs hotter**, ice production drops
- **Can't keep up with demand** during peak occupancy
- **Refrigerated display cases** can't hold set temperature
- **Vending machine compressors** cycle longer, fail sooner
- **Condenser fan motors affected**, reduced heat rejection

WALK-IN COOLERS & FREEZERS

- **Compressor motors overheat**, premature failure
- **Product temp drifts above safe range** on hot days
- **Food safety risk** and health code violation
- **Evaporator fans lose airflow**, uneven cooling
- **Defrost heaters lose output**, ice buildup on coils

EV CHARGERS

- **Undervoltage: 13% less power**, 8-hr charge becomes 9+ hrs
- **Fleet operations:** lost vehicles per charge cycle
- **Overvoltage:** some vehicles fault at 250V+
- **Charger electronics stressed** by sustained voltage mismatch

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the equipment disconnect or receptacle with a true-RMS meter.
- STEP 2:** Read the equipment nameplate voltage rating (e.g. 208V, 230V, 240V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you have a voltage problem.
- STEP 4:** Size the correction: Match circuit amperage to the SKU table on the back of this sheet.

ELEVATORS & BUILDING SYSTEMS

- **Hydraulic elevator pump motors** strain at reduced voltage
- **Slow car speed**, longer wait times for tenants
- **Door operator motors affected**, erratic open/close
- **Building exhaust fans lose CFM**, ventilation codes at risk
- **Booster pumps for upper floors** can't maintain pressure

COMMON EQUIPMENT AFFECTED

- Commercial washers / dryers
- Ice machines
- Vending machines
- Walk-in coolers / freezers
- Reach-in refrigeration
- EV charging stations
- Hydraulic elevators
- Exhaust / ventilation fans
- Booster pumps
- Water heaters
- Trash compactors
- Loading dock equipment
- Security gate operators
- Parking garage equipment

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Commercial dryer element	\$150 - \$500
Ice machine compressor	\$800 - \$2,500
Walk-in compressor replacement	\$2,000 - \$5,000
Elevator hydraulic pump motor	\$1,500 - \$4,000
EV charger board replacement	\$500 - \$2,000
Tenant complaints / vacancy cost	Ongoing loss
Buck-boost transformer*	\$300 - \$1,000

*Cost depends on % of voltage correction, phase, and amperage of circuit.

The fix costs less than the first service call.

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Installer-Friendly**
6 NPT knockouts, labeled terminals, wall mount
- **Install Hardware Included**
Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

STEP-UP: 208V BUILDING / 240V EQUIPMENT

208V commercial building with facility equipment designed for 240V. Dryer heating elements lose 25% output. Compressor motors produce 75% of rated torque. Ice machines, coolers, and laundry equipment all underperform. Corrects 208V up to 240V, restoring full rated performance.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Vending machines, small equipment	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Ice machines, water heaters	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Commercial washers, EV chargers	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Commercial dryers, reach-in coolers	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Walk-in compressors, large dryers	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Large walk-ins, elevator pumps	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Multi-unit laundry circuits	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Heavy facility equipment	Single Phase
TX-BB-208D-240D-30A	Up to 30A	3PH compressors, elevators	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	Large 3PH refrigeration	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Multi-compressor systems	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	Large building systems	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Full building facility circuits	Three-Phase Delta
TX-BB-208Y-240Y.138-20A	Up to 20A	3PH motor loads	Three-Phase Wye
TX-BB-208Y-240Y.138-30A	Up to 30A	Elevator motors, pumps	Three-Phase Wye
TX-BB-208Y-240Y.138-40A	Up to 40A	Large motor circuits	Three-Phase Wye
TX-BB-208Y-240Y.138-50A	Up to 50A	Multi-equipment circuits	Three-Phase Wye
TX-BB-208Y-240Y.138-60A	Up to 60A	High-capacity building circuits	Three-Phase Wye

STEP-DOWN: 240V BUILDING / 208V EQUIPMENT

240V service with equipment rated for 208V. Overvoltage stresses compressor motors, heating elements, control boards, and electronic controllers. Corrects 240V down to 208V, protecting equipment and extending service life.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Vending machines, small equipment	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Ice machines, water heaters	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Commercial washers, EV chargers	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Commercial dryers, reach-in coolers	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Walk-in compressors, large dryers	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Large walk-ins, elevator pumps	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Multi-unit laundry circuits	Single Phase
TX-BB-240V-208V-60A	Up to 60A	Heavy facility equipment	Single Phase
TX-BB-240D-208D-30A	Up to 30A	3PH compressors, elevators	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	Large 3PH refrigeration	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Multi-compressor systems	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	Large building systems	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Full building facility circuits	Three-Phase Delta

NEED A DIFFERENT VOLTAGE PAIR?

208V/240V is the most common building equipment mismatch, but we build units for any voltage correction. 480V to 460V for large motors? 277V to 240V? Tell us the input voltage, output voltage, phase, and amperage. We confirm the correct unit and ship it.

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Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the equipment disconnect with a true-RMS meter under load.
- STEP 2:** Read the equipment nameplate voltage rating (e.g. 208/230V, 230V, 230/240V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you may have a voltage problem.
- STEP 4:** Determine direction: Is measured voltage HIGHER or LOWER than the equipment operating range?
- STEP 5:** Size the correction: Match tonnage and amperage to the SKU table on the back of this sheet.

OVERVOLTAGE SYMPTOMS (250V+)

- Inverter board failure (most common, most expensive)
- ECM motor overheating and shortened life
- Capacitor failure causing compressor issues
- Compressor short-cycling
- Board replacement \$500-\$1,500 per event
- Three service calls before anyone checks voltage

FIX: Step-down corrects 250V to 234V

UNDERVOLTAGE SYMPTOMS (208V)

- Equipment operating at bottom of acceptable voltage range
- Voltage sag during startup or peak load drops below spec
- Compressor runs hotter, draws more current
- Cooling capacity reduced on hottest days
- Longer runtime, shorter equipment life
- Resistance heating output reduced significantly
- Heat pumps affected in both heating and cooling
- SEER/SEER2 rated at 230V (AHRI 210/240). Not delivered at 208V

FIX: Step-up corrects 208V to 222V

OVERVOLTAGE: THE SLOW BURN

A new system on a 250V circuit runs fine on day one. Over the next 4-6 months, elevated DC bus voltage slowly degrades capacitors and transistors inside the inverter board. No error codes. No warning signs. Then the board fails. New board on the same 250V circuit. Second board fails 4-6 months later. Nobody checked voltage because the system was working fine the whole time.

UNDERVOLTAGE: THE SLOW BURN

A system rated 208/230V on a 208V building runs on day one. But the compressor draws more current than designed, runs hotter, cycles longer. On the first 95-degree afternoon, voltage sags to 200-204V. The compressor never shuts off. This repeats every hot day for two or three seasons. Then the compressor fails. Nobody traces it to voltage because 208V was within spec. Same circuit. Same slow death.

Both problems look like equipment failure. Both problems are voltage. Both are preventable at install for less than the cost of one service call.

WHEN TO RECOMMEND A BUCK-BOOST

- Repeat service calls on the same unit (boards, capacitors, compressors)
- New install where building voltage does not match equipment operating range
- Equipment not reaching set temperature or slow recovery after door open
- Compressor running hot or cycling excessively on a hot day
- Premature component failure on equipment less than 3 years old
- Contractor measures 250V+ at the disconnect
- 208V commercial building with 230V rated HVAC equipment
- Heat pump underperforming in both heating and cooling modes
- Voltage sag during compressor startup causing fault codes
- Kitchen equipment not holding temp during service

WHY TWO DIFFERENT CORRECTIONS

These two products solve two different problems.

On the low side, 208V puts the motor at the bottom of its acceptable range. Any sag during operation pushes below spec. We step up to 222V to put the equipment back in the middle of its safe operating zone.

On the high side, 250V+ stresses the electronics. Inverter boards, capacitors, and control circuits degrade at elevated voltage. We step down to 234V to get the electronics out of the danger zone while the motor continues running efficiently.

Different problem. Different target. Same fix.

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Compressor replacement	\$2,000 - \$5,000
Inverter board	\$500 - \$1,500
Commercial oven	\$15,000+
Service calls (x3)	\$450 - \$900
Buck-boost transformer*	\$300 - \$1,000

**Cost depends on % of voltage correction, phase, and tonnage of unit.*

The fix costs less than the first callback.



OVERVOLTAGE CORRECTION (STEP-DOWN)

Utility delivering 250V+ to 230V rated equipment. Corrects 250V down to 234V for the circuit before the equipment. Brings the DC bus voltage on inverter boards back into safe operating range while the motor continues running efficiently.

PART NUMBER	OUTPUT AMPS	TYPICAL LOAD	PHASE
TX-BB-250V-234V-20A	Up to 20A	1-1.5 ton & 6-18K Mini-Splits	Single Phase
TX-BB-250V-234V-30A	Up to 30A	2-3.5 ton & 24K Mini-Splits	Single Phase
TX-BB-250V-234V-50A	Up to 50A	4-5 ton	Single Phase
TX-BB-250V-234V-60A	Up to 60A	5-7.5 ton	Single Phase
TX-BB-250D-234D-20A	Up to 20A	3-5 ton	Three-Phase Delta
TX-BB-250D-234D-30A	Up to 30A	6-7.5 ton	Three-Phase Delta
TX-BB-250D-234D-50A	Up to 50A	8-12.5 ton	Three-Phase Delta
TX-BB-250D-234D-60A	Up to 60A	13-15 ton	Three-Phase Delta

UNDERVOLTAGE CORRECTION (STEP-UP)

208V commercial building with equipment designed for 230V nominal. 208V is the bottom of the acceptable operating range, not the design point. Any voltage sag during compressor startup or peak grid load pushes the equipment below spec. Corrects 208V up to 222V, placing the equipment back in the middle of its safe operating zone.

PART NUMBER	OUTPUT AMPS	TYPICAL LOAD	PHASE
TX-BB-208V-222V-20A	Up to 20A	1-1.5 ton & 6-18K Mini-Splits	Single Phase
TX-BB-208V-222V-30A	Up to 30A	2-3.5 ton & 24K Mini-Splits	Single Phase
TX-BB-208V-222V-50A	Up to 50A	4-5 ton	Single Phase
TX-BB-208V-222V-60A	Up to 60A	5-7.5 ton	Single Phase
TX-BB-208D-222D-20A	Up to 20A	3-5 ton	Three-Phase Delta
TX-BB-208D-222D-30A	Up to 30A	6-7.5 ton	Three-Phase Delta
TX-BB-208D-222D-50A	Up to 50A	8-12.5 ton	Three-Phase Delta
TX-BB-208D-222D-60A	Up to 60A	13-15 ton	Three-Phase Delta

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **Installer-Friendly**
6 NPT knockouts, labeled terminals, wall mount bracket
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Install Electrical Hardware Included**
Wire nuts, crimp connectors, and jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

THE 208V / 240V MISMATCH

Most commercial buildings are fed 208V three-phase power. Most commercial kitchen equipment is designed for 240V. That voltage gap exists on nearly every commercial kitchen install and affects every piece of equipment differently.

HEATING EQUIPMENT (208V on 240V)

Power = V squared / R. A 13% voltage drop means 25% less heat output. No error code. Equipment quietly underperforms.

- **Ovens preheat 30-50% slower**, can't recover between loads
- **Fryers lose recovery time** during rush, food quality drops
- **Griddles develop cold spots**, uneven cooking across surface
- **Steamers can't hold temp**, longer cook times across menu
- **Booster heaters fail to reach** 180F sanitizing temp (health code)
- **Heat strips and warmers** can't maintain holding temperature

MOTOR EQUIPMENT (208V on 230/240V)

Torque is proportional to voltage squared. At 208V vs 240V, motors produce only 75% of rated torque. More current, more heat, reduced performance under load.

- **Mixers bog on heavy dough**, motor overheats under load
- **Slicers slow through dense product**, inconsistent cuts
- **Food processors stall** on thick batches
- **Walk-in compressors run hot**, shorter life, product risk
- **Ice machines can't keep up** during peak service
- **Refrigeration runs longer**, higher energy cost

ELECTRONICS & CONTROL BOARDS

Combi ovens, programmable fryers, conveyor ovens, and ice machines all rely on electronic controls. Overvoltage (240V on 208V-rated equipment) degrades boards and capacitors silently. Undervoltage causes erratic behavior and fault codes.

WHY THE WRONG VOLTAGE HAPPENS

- **Lead times:** correct voltage unit is 8-12 weeks out, available unit ships today
- **Ordered wrong:** didn't know the difference between 208V and 240V at time of purchase
- **Better price:** wrong voltage unit was cheaper or available on the used market
- **European imports:** 220/230V rated equipment on 208V buildings (Rational, Unox, espresso machines)

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the equipment disconnect or receptacle with a true-RMS meter.
- STEP 2:** Read the equipment nameplate voltage rating (e.g. 208V, 240V, 220V, 230V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you have a voltage problem.
- STEP 4:** Size the correction: Match circuit amperage to the SKU table on the back of this sheet.

COMMON EQUIPMENT AFFECTED

- Convection ovens
- Combi ovens
- Conveyor/pizza ovens
- Deck ovens
- Fryers
- Griddles/flat tops
- Ranges
- Steamers
- Booster heaters
- Mixers (Hobart, etc.)
- Food processors
- Slicers
- Walk-in compressors
- Reach-in refrigeration
- Ice machines
- Espresso machines
- Dough sheeters
- Rotisseries

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Commercial oven replacement	\$5,000 - \$30,000+
Combi oven control board	\$300 - \$1,500
Heating element replacement	\$150 - \$500
Walk-in compressor replacement	\$2,000 - \$5,000
Service calls (x3)	\$450 - \$1,050
Health code violation (sanitation temp)	Potential shutdown
Buck-boost transformer*	\$300 - \$1,200

**Cost depends on % of voltage correction, phase, and amperage of circuit.*

The fix costs less than the first service call.

STANDARD FEATURES

- **NEMA 3R Enclosed** Indoor/outdoor, powder-coated steel
- **Encapsulated Core** Quiet operation, stable thermal performance
- **Installer-Friendly** 6 NPT knockouts, labeled terminals, wall mount
- **cETLus Certified** UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty** No derating required
- **Install Hardware Included** Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

STEP-UP: 208V BUILDING / 240V EQUIPMENT

208V commercial building with equipment designed for 240V. Resistance heating equipment loses 25% of heat output. Motors produce 75% of rated torque. Corrects 208V up to 240V, restoring full rated performance for both heating and motor loads.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Warmers, small appliances	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Espresso machines, small ovens	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Countertop equipment, mixers	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Fryers, small griddles	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Convection ovens, griddles	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Deck ovens, large fryers	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Ranges, large ovens	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Conveyor ovens, combi ovens	Single Phase
TX-BB-208D-240D-30A	Up to 30A	Three-phase ovens, steamers	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	Large combi ovens, conveyor ovens	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Multi-rack ovens, large steamers	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	High-capacity cooking lines	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Full kitchen circuits	Three-Phase Delta
TX-BB-208Y-240Y.138-20A	Up to 20A	Three-phase motor loads	Three-Phase Wye
TX-BB-208Y-240Y.138-30A	Up to 30A	Walk-in compressors, mixers	Three-Phase Wye
TX-BB-208Y-240Y.138-40A	Up to 40A	Large compressors, blowers	Three-Phase Wye
TX-BB-208Y-240Y.138-50A	Up to 50A	Multiple motor circuits	Three-Phase Wye
TX-BB-208Y-240Y.138-60A	Up to 60A	High-capacity motor circuits	Three-Phase Wye

STEP-DOWN: 240V BUILDING / 208V EQUIPMENT

240V service with equipment rated for 208V. Overvoltage stresses heating elements, control boards, and motor windings. Elements burn out prematurely. Control boards degrade silently. Corrects 240V down to 208V, protecting equipment and extending service life.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Warmers, small appliances	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Espresso machines, small ovens	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Countertop equipment, mixers	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Fryers, small griddles	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Convection ovens, griddles	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Deck ovens, large fryers	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Ranges, large ovens	Single Phase
TX-BB-240V-208V-60A	Up to 60A	Conveyor ovens, combi ovens	Single Phase
TX-BB-240D-208D-30A	Up to 30A	Three-phase ovens, steamers	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	Large combi ovens, conveyor ovens	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Multi-rack ovens, large steamers	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	High-capacity cooking lines	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Full kitchen circuits	Three-Phase Delta

NEED A DIFFERENT VOLTAGE PAIR?

208V/240V is the most common commercial kitchen mismatch, but we build units for any voltage pair. European imports rated 220V or 230V on a 208V building? Equipment rated 208V on a 250V+ service? Tell us the input voltage, output voltage, phase, and amperage. We confirm the correct unit and ship it.

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Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the operator disconnect with a true-RMS meter under load.
- STEP 2:** Read the operator nameplate voltage rating (e.g. 115V, 230V, 208V, 460V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you have a voltage problem.
- STEP 4:** Determine direction: Is measured voltage HIGHER or LOWER than the operator's rated voltage?
- STEP 5:** Size the correction: Match operator HP and amperage to the SKU table on the back.

UNDERVOLTAGE SYMPTOMS (208V)

- **Motor torque reduced to 75%** of rated (V-squared)
- **Door slows or stalls** on heavy insulated sectional doors
- **Thermal overload trips** from excessive current draw
- **Cold weather compounds problem** as lubricants thicken
- **Start capacitor stress** from repeated low-voltage starting
- **Shorter motor life** from chronic overheating
- **Timer-to-close faults** when max run timer trips

FIX: Step-up corrects 208V to 230V

OVERVOLTAGE SYMPTOMS (250V+)

- **Control board failure** (most common, most expensive)
- **Start capacitor burnout** from elevated voltage stress
- **Contactors and relay damage** from sustained overvoltage
- **24V control transformer burnout** from high primary voltage
- **Motor overheating** and shortened winding life
- **Board replacement** \$150 - \$400+ per event
- **Multiple service calls** before anyone checks voltage

FIX: Step-down corrects 250V to 230V

WHY TWO DIFFERENT CORRECTIONS

These two products solve two different problems.

On the low side, 208V puts the motor at 75% of rated torque. Any additional load from cold weather, heavy doors, or worn springs pushes the motor past its limits. We step up to 230V to restore full rated performance.

On the high side, 250V+ stresses every electrical component. Control boards, capacitors, contactors, and the internal 24V transformer all degrade at elevated voltage. We step down to 230V to bring the operator back to spec.

Different problem. Different target. Same fix.

UNDERVOLTAGE: THE SLOW BURN

A 230V-rated operator on a 208V commercial building runs on day one. Nobody flags it. But the motor draws more current than designed, runs hotter, produces less torque. On the first cold morning, thick lubricant and stiff weatherseal add resistance. The motor strains. Thermal overload trips. Technician resets it. Same thing next cold day. After two seasons, the motor fails. Nobody traces it to voltage because 208V seemed close enough. Same circuit. Same slow death.

OVERVOLTAGE: THE SLOW BURN

A commercial door operator on a 250V circuit runs fine on day one. Over the next several months, elevated voltage slowly degrades the start capacitor, control board components, and the internal 24V transformer. No error codes. No warning signs. Then the board fails. New board on the same 250V circuit. Second board fails months later. Nobody checked voltage because the door was working fine the whole time.

WHEN TO RECOMMEND A BUCK-BOOST

- Repeat service calls on same operator (boards, capacitors)
- New install where building voltage does not match operator
- Door slowing, stalling, or failing to lift in cold weather
- Motor running hot or tripping thermal overload
- Premature component failure on equipment < 3 years old
- Technician measures 250V+ at the operator disconnect
- 208V commercial building with 230V rated door operator
- Timer-to-close or max run timer faulting repeatedly
- Control board or start capacitor replaced more than once
- High-cycle doors (docks, warehouses, fire stations)

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Operator replacement (installed)	\$2,000 - \$4,000+
Control board replacement	\$150 - \$400+
Start capacitor + service call	\$150 - \$300
Motor replacement + labor	\$300 - \$800
Service calls (x3)	\$450 - \$900
Buck-boost transformer*	\$300 - \$800

*Cost depends on % of voltage correction, phase, and amperage of circuit.

The fix costs less than the first service call.

STANDARD FEATURES

- **NEMA 3R Enclosed** Indoor/outdoor, powder-coated steel
- **Encapsulated Core** Quiet operation, stable thermal performance
- **Installer-Friendly** 6 NPT knockouts, labeled terminals, wall mount
- **cETLus Certified** UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty** No derating required
- **Install Hardware Included** Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

UNDERVOLTAGE CORRECTION (STEP-UP)

208V commercial building with door operators designed for 230V nominal. 208V delivers only 75% of rated motor torque. Any additional load from cold weather, heavy doors, or worn springs pushes the motor past its limits. Corrects 208V up to 230V, restoring full rated torque and protecting the operator.

PART NUMBER	OUTPUT AMPS	TYPICAL LOAD	PHASE
TX-BB-208V-230V-10A	Up to 10A	1/3 - 1/2 HP operators	Single Phase
TX-BB-208V-230V-15A	Up to 15A	1/2 - 3/4 HP operators	Single Phase
TX-BB-208V-230V-20A	Up to 20A	3/4 - 1 HP operators	Single Phase
TX-BB-208V-230V-25A	Up to 25A	1 - 1-1/2 HP operators	Single Phase
TX-BB-208V-230V-30A	Up to 30A	1-1/2 - 2 HP operators	Single Phase
TX-BB-208V-230V-40A	Up to 40A	2 - 3 HP operators	Single Phase
TX-BB-208V-230V-50A	Up to 50A	3 - 5 HP operators	Single Phase
TX-BB-208V-230V-60A	Up to 60A	5 - 7-1/2 HP operators	Single Phase
TX-BB-208D-230D-30A	Up to 30A	3 - 5 HP operators	Three-Phase Delta
TX-BB-208D-230D-40A	Up to 40A	5 - 7-1/2 HP operators	Three-Phase Delta
TX-BB-208D-230D-50A	Up to 50A	10 - 15 HP operators	Three-Phase Delta
TX-BB-208D-230D-60A	Up to 60A	15 - 20 HP operators	Three-Phase Delta
TX-BB-208D-230D-70A	Up to 70A	20 - 25 HP operators	Three-Phase Delta
TX-BB-208Y-230Y.133-20A	Up to 20A	3 - 5 HP operators	Three-Phase Wye
TX-BB-208Y-230Y.133-30A	Up to 30A	5 - 7-1/2 HP operators	Three-Phase Wye
TX-BB-208Y-230Y.133-40A	Up to 40A	7-1/2 - 10 HP operators	Three-Phase Wye
TX-BB-208Y-230Y.133-50A	Up to 50A	10 - 15 HP operators	Three-Phase Wye
TX-BB-208Y-230Y.133-60A	Up to 60A	15 - 20 HP operators	Three-Phase Wye

OVERVOLTAGE CORRECTION (STEP-DOWN)

Utility delivering 250V+ to 230V rated door operators. Corrects 250V down to 230V at the circuit before the operator. Brings control boards, capacitors, contactors, and internal transformers back to the operator's rated voltage.

PART NUMBER	OUTPUT AMPS	TYPICAL LOAD	PHASE
TX-BB-250V-230V-10A	Up to 10A	1/3 - 1/2 HP operators	Single Phase
TX-BB-250V-230V-15A	Up to 15A	1/2 - 3/4 HP operators	Single Phase
TX-BB-250V-230V-20A	Up to 20A	3/4 - 1 HP operators	Single Phase
TX-BB-250V-230V-25A	Up to 25A	1 - 1-1/2 HP operators	Single Phase
TX-BB-250V-230V-30A	Up to 30A	1-1/2 - 2 HP operators	Single Phase
TX-BB-250V-230V-40A	Up to 40A	2 - 3 HP operators	Single Phase
TX-BB-250V-230V-50A	Up to 50A	3 - 5 HP operators	Single Phase
TX-BB-250V-230V-60A	Up to 60A	5 - 7-1/2 HP operators	Single Phase
TX-BB-250D-230D-30A	Up to 30A	3 - 5 HP operators	Three-Phase Delta
TX-BB-250D-230D-40A	Up to 40A	5 - 7-1/2 HP operators	Three-Phase Delta
TX-BB-250D-230D-50A	Up to 50A	10 - 15 HP operators	Three-Phase Delta
TX-BB-250D-230D-60A	Up to 60A	15 - 20 HP operators	Three-Phase Delta
TX-BB-250D-230D-70A	Up to 70A	20 - 25 HP operators	Three-Phase Delta

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

WHY VOLTAGE IS WRONG ON THE FARM

Farms sit at the end of the power grid. Long wire runs from the utility transformer to the barn or field create voltage drop that gets worse under load. Equipment rated for 230V or 240V may only see 210V or lower at the point of use. The result is the same: reduced torque, overheating motors, premature failure, and equipment that can't perform when you need it most.

VENTILATION & FANS

Dairy and livestock operations depend on fans for animal welfare and milk production. Less voltage means less airflow. Heat stress in dairy cows starts at 72F and directly reduces milk output, feed intake, and fertility.

- **Circulation fans lose CFM**, heat stress builds in barn
- **Exhaust fans can't maintain** air exchange rates
- **Tunnel ventilation falls short**, dead zones develop
- **Fan motors run hot**, shortened life, frequent replacement
- **Long runs from panel to fans** compound voltage drop

IRRIGATION & PUMPS

Irrigation pumps are often the largest load on a farm circuit and the first to suffer from voltage drop. As voltage drops, amp draw increases, which drops voltage further. The condition cascades until the system faults.

- **Pump motors overheat and fail** from sustained low voltage
- **Submersible pumps burn out** underground, expensive to replace
- **Center pivot systems fault** on low voltage during peak load
- **Well pumps can't maintain pressure** across the system
- **Amp draw increases as voltage drops**, tripping breakers

GRAIN HANDLING & FEED EQUIPMENT

- **Grain dryer motors overheat**, fire risk from dust buildup
- **Augers and elevators stall** under full load
- **Feed mixers and grinders bog**, inconsistent feed quality
- **Conveyor motors strain**, shortened belt and motor life

THE VOLTAGE DROP PROBLEM

Every foot of wire between the utility transformer and your equipment drops voltage. A 600-foot run that delivers 240V at the panel may deliver 215V or less at the barn. Add load from multiple fans, a compressor, and a bulk tank, and voltage drops further. The equipment at the end of the longest run suffers the most.

A buck-boost transformer installed at the point of use corrects the voltage after the drop has already occurred. No need to re-wire the building or upsize conductors.

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the equipment disconnect under load, not at the panel.
- STEP 2:** Read the equipment nameplate voltage rating (e.g. 230V, 240V, 460V).
- STEP 3:** Compare. If measured voltage is more than 5% below nameplate, you have a problem.
- STEP 4:** Size the correction: Match circuit amperage to the SKU table on the back.

COMMON EQUIPMENT AFFECTED

- Circulation / exhaust fans
- Tunnel ventilation fans
- HVLS barn fans
- Irrigation pumps
- Submersible well pumps
- Center pivot motors
- Grain dryer motors
- Augers / elevators
- Feed mixers / grinders
- Conveyor belts
- Milk bulk tank compressors
- Milking system vacuums
- Air compressors
- Refrigeration / coolers
- Heaters / heat lamps
- Manure handling equipment

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Irrigation pump motor replacement	\$1,000 - \$5,000+
Submersible pump replacement	\$2,000 - \$8,000+
Fan motor replacement (each)	\$200 - \$800
Grain dryer motor replacement	\$500 - \$2,000
Milk production loss (heat stress)	\$2 - \$5/cow/day
Re-wiring long building runs	\$5,000 - \$20,000+
Buck-boost transformer*	\$300 - \$1,200

*Cost depends on % of voltage correction, phase, and amperage of circuit.

Cheaper than re-wiring. Faster than waiting on the utility.

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Installer-Friendly**
6 NPT knockouts, labeled terminals, wall mount
- **Install Hardware Included**
Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

VOLTAGE CORRECTION (STEP-UP)

Corrects low voltage at the point of use caused by long wire runs, utility voltage drop under load, or 208V service feeding 230/240V equipment. Installed at the equipment, after the voltage drop has already occurred. No need to re-wire the building or upsize conductors from the panel.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Heat lamps, small fans	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Circulation fans, small pumps	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Exhaust fans, feed augers	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Multiple fan circuits, grinders	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Tunnel fans, well pumps	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Irrigation pumps, grain dryers	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Large pumps, bulk tank compressors	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Heavy equipment, large dryers	Single Phase
TX-BB-208D-240D-30A	Up to 30A	3PH fans, pumps, compressors	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	Irrigation pumps, grain handling	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Large irrigation, center pivots	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	Multi-motor barn circuits	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Full barn or building circuits	Three-Phase Delta
TX-BB-208Y-240Y.138-20A	Up to 20A	3PH fan and pump motors	Three-Phase Wye
TX-BB-208Y-240Y.138-30A	Up to 30A	Dairy equipment, compressors	Three-Phase Wye
TX-BB-208Y-240Y.138-40A	Up to 40A	Large pump motors	Three-Phase Wye
TX-BB-208Y-240Y.138-50A	Up to 50A	Multi-equipment circuits	Three-Phase Wye
TX-BB-208Y-240Y.138-60A	Up to 60A	High-capacity building circuits	Three-Phase Wye

VOLTAGE CORRECTION (STEP-DOWN)

Corrects overvoltage where utility delivers above equipment rating. Rural utilities sometimes deliver 250V+ during off-peak hours. Overvoltage stresses motor windings, control boards, and electronic controllers on modern equipment. Also corrects 240V service feeding 208V rated equipment.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Controls, sensors, small loads	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Electronic controllers, small motors	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Fan controllers, VFDs	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Motor loads, feed equipment	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Pumps, compressors	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Large motors, dryers	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Heavy equipment	Single Phase
TX-BB-240V-208V-60A	Up to 60A	High-capacity circuits	Single Phase
TX-BB-240D-208D-30A	Up to 30A	3PH motors, pumps	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	Large 3PH equipment	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Irrigation, grain systems	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	Heavy 3PH loads	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Full building circuits	Three-Phase Delta

NEED A DIFFERENT VOLTAGE PAIR?

Voltage drop varies by wire run length and load. We build units for any correction amount. Whether your building measures 215V, 220V, or 205V at the equipment, tell us what you measure and what the equipment needs. We confirm the correct unit and ship it. 480V to 460V motor corrections also available.

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Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

THE VOLTAGE MISMATCH

Most automotive shop equipment is rated for 230V or 240V. Many commercial buildings deliver 208V. That voltage gap means hydraulic lift motors strain under load, air compressors can't keep up, and spray booth heaters can't hold cure temp. Every piece of equipment underperforms.

LIFTS & HYDRAULIC EQUIPMENT

Car lifts, frame machines, and hydraulic presses all rely on electric motors driving hydraulic pumps. Undervoltage reduces starting torque, and these motors must start against hydraulic back-pressure with a vehicle on the lift.

- **Lift motors strain on startup** against loaded hydraulic system
- **Slow or incomplete lift cycles**, safety concern under load
- **Start capacitor and motor failures** from repeated strain
- **Frame machines can't develop** full pulling force
- **Hydraulic press pumps overheat**, shorter service life

COMPRESSORS & MOTOR LOADS

Air compressors are the backbone of every shop. At reduced voltage, the motor produces 75% of rated torque. Recovery time increases, and multiple bays running impact tools simultaneously drops tank pressure faster than the compressor can recover.

- **Compressors can't keep up** with multi-bay demand
- **Longer recovery between cycles**, techs waiting on air
- **Motor runs hotter**, thermal overload trips
- **Tire changers lose turntable torque**, struggle on stiff beads
- **Brake lathes slow under cut**, inconsistent finish

SPRAY BOOTHS & HEATING LOADS

- **Booth heaters can't hold cure temp**, longer cycle times
- **Blower fans lose airflow**, poor paint atomization
- **Exhaust fans underperform**, fume buildup risk
- **Resistance heating loses 25%** output at reduced voltage

WASH EQUIPMENT & PUMPS

- **High-pressure pump motors overheat**, shortened life
- **Reduced water pressure** from lower pump output
- **Blower/dryer motors lose speed**, incomplete drying
- **Chemical metering pumps affected**, inconsistent mix

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the equipment disconnect or receptacle with a true-RMS meter.
- STEP 2:** Read the equipment nameplate voltage rating (e.g. 208V, 230V, 240V, 460V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you have a voltage problem.
- STEP 4:** Size the correction: Match circuit amperage to the SKU table on the back of this sheet.

COMMON EQUIPMENT AFFECTED

- 2-post / 4-post car lifts
- Scissor lifts
- Air compressors
- Tire changers
- Wheel balancers
- Alignment machines
- Brake lathes
- Frame straighteners
- Paint / spray booths
- Exhaust extraction systems
- Car wash pumps / blowers
- Battery / EV chargers
- Hydraulic presses
- Parts washers
- Chain hoists / cranes
- Fuel transfer pumps

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Car lift motor / pump replacement	\$800 - \$2,500
Air compressor motor replacement	\$500 - \$3,000
Spray booth heater element	\$300 - \$1,000
Tire changer motor replacement	\$400 - \$1,200
Service calls (x3)	\$450 - \$900
Bay downtime per hour	\$100 - \$300+
Buck-boost transformer*	\$300 - \$1,200

*Cost depends on % of voltage correction, phase, and amperage of circuit.

The fix costs less than one bay-hour of downtime.

WHY THE WRONG VOLTAGE HAPPENS

- **208V building, 230/240V equipment:** the standard mismatch in commercial auto shops
- **Used or auction equipment:** voltage didn't match your building, price was right
- **Lead times on correct spec:** wrong voltage unit ships today, correct one is weeks out
- **Imported equipment:** European lifts and booths rated 220/380V on North American service

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Installer-Friendly**
6 NPT knockouts, labeled terminals, wall mount
- **Install Hardware Included**
Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

STEP-UP: 208V BUILDING / 230-240V EQUIPMENT

208V commercial building with automotive equipment designed for 230V or 240V. Hydraulic lift motors produce only 75% of rated torque. Air compressors can't keep up with demand. Spray booth heaters lose 25% of heat output. Corrects 208V up to 240V, restoring full rated performance across the shop.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Parts washers, battery chargers	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Wheel balancers, small equipment	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Tire changers, brake lathes	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Car lifts (2-post), small compressors	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Car lifts (4-post), alignment racks	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Large compressors, frame machines	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Spray booth blowers, large lifts	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Spray booth heaters, heavy equipment	Single Phase
TX-BB-208D-240D-30A	Up to 30A	3PH compressors, car wash pumps	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	Large compressors, booth systems	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Multi-bay compressors, large booths	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	Heavy industrial shop equipment	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Full shop circuits	Three-Phase Delta
TX-BB-208Y-240Y.138-20A	Up to 20A	3PH motor loads	Three-Phase Wye
TX-BB-208Y-240Y.138-30A	Up to 30A	Car wash systems, compressors	Three-Phase Wye
TX-BB-208Y-240Y.138-40A	Up to 40A	Large motor circuits	Three-Phase Wye
TX-BB-208Y-240Y.138-50A	Up to 50A	Multi-equipment circuits	Three-Phase Wye
TX-BB-208Y-240Y.138-60A	Up to 60A	High-capacity shop circuits	Three-Phase Wye

STEP-DOWN: 240V BUILDING / 208V EQUIPMENT

240V service with equipment rated for 208V. Overvoltage at 115% of nameplate stresses motor windings, control boards, and hydraulic pump seals. Starting torque increases to 130%+, causing mechanical stress on lift mechanisms and compressor valves. Corrects 240V down to 208V, protecting equipment.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Parts washers, battery chargers	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Wheel balancers, small equipment	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Tire changers, brake lathes	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Car lifts (2-post), small compressors	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Car lifts (4-post), alignment racks	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Large compressors, frame machines	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Spray booth blowers, large lifts	Single Phase
TX-BB-240V-208V-60A	Up to 60A	Spray booth heaters, heavy equipment	Single Phase
TX-BB-240D-208D-30A	Up to 30A	3PH compressors, car wash pumps	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	Large compressors, booth systems	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Multi-bay compressors, large booths	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	Heavy industrial shop equipment	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Full shop circuits	Three-Phase Delta

NEED A DIFFERENT VOLTAGE PAIR?

208V/240V is the most common shop mismatch, but we build units for any voltage correction. European lifts and booths rated 220V or 380V? EV chargers faulting on high voltage? Phase converter output running outside tolerance? Tell us the input voltage, output voltage, phase, and amperage.

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Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

THE VOLTAGE MISMATCH

Most shop and industrial equipment is rated for 230V or 240V. Many commercial buildings deliver 208V. That voltage gap costs 25% of motor torque and degrades cut quality, weld quality, and machine life. The fix is permanent and pays for itself faster than the first broken tool or failed weld.

MOTOR EQUIPMENT (UNDERVOLTAGE)

Torque is proportional to voltage squared. At 208V on a 230/240V motor, output drops to 75% of rated torque. The motor draws more current to compensate, runs hotter, and fails earlier.

- **CNC spindles lose 20%+ performance** per Tormach testing
- **Lathes bog on heavy cuts**, chatter under load
- **Mills can't hold feed rates**, finish quality degrades
- **Table saws and bandsaws stall** on hardwoods and thick stock
- **Jointers and planers struggle** on wide boards and hard grain
- **Wide belt sanders lose speed**, inconsistent finish quality
- **Grinders slow under load**, inconsistent material removal
- **Air compressors run hot**, longer recovery, shorter life

WELDERS (UNDERVOLTAGE)

Welding output is directly affected by input voltage. Reduced input means reduced arc stability, lower duty cycle, and the machine working harder to deliver rated output. Some welders will not operate at all below a minimum input voltage threshold.

- **Reduced welding output**, can't hold arc on thick material
- **Lower duty cycle**, machine overheats faster
- **Unstable arc**, poor penetration, weak welds
- **Some units shut down** below minimum input voltage
- **Inverter welders fault** on low input voltage

OVERVOLTAGE DAMAGE (240V on 208V)

Equipment rated for 208V on a 240V service receives 115% of rated voltage. Starting torque jumps to 130%+, stressing mechanical components. Control boards, VFDs, and CNC controllers degrade from sustained overvoltage. Capacitors in Fanuc and similar drives fail prematurely.

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the machine disconnect or receptacle with a true-RMS meter under load.
- STEP 2:** Read the machine nameplate voltage rating (e.g. 208V, 230V, 240V, 460V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you have a voltage problem.
- STEP 4:** Size the correction: Match circuit amperage to the SKU table on the back of this sheet.

WHY THE WRONG VOLTAGE HAPPENS

- **208V building, 230/240V equipment:** the most common mismatch in commercial and industrial shops
- **Lead times on correct voltage:** wrong spec unit is available now, correct unit is weeks out
- **Used equipment:** bought at auction or secondhand, voltage didn't match your building
- **Imported machines:** European equipment rated 220V or 380V on North American service
- **Phase converter output:** RPC or VFD delivering voltage outside equipment tolerance

COMMON EQUIPMENT AFFECTED

- CNC mills / VMCs
- CNC lathes
- Manual / wood lathes
- Vertical mills
- Surface grinders
- Bandsaws
- Drill presses
- Welders (MIG/TIG/Stick)
- Wide belt sanders
- Routers
- Table saws
- Jointers / planers
- Shapers / molders
- Edge banders
- Press brakes
- Shears
- Plasma cutters
- Air compressors
- Dust collectors
- Scroll saws

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
CNC spindle motor replacement	\$1,500 - \$5,000+
Fanuc/servo drive replacement	\$1,000 - \$4,000
VFD replacement	\$500 - \$2,000
Motor rewind or replacement	\$500 - \$3,000
Scrap parts from poor cut quality	Ongoing loss
Machine downtime per hour	\$150 - \$500+
Buck-boost transformer*	\$300 - \$1,200

*Cost depends on % of voltage correction, phase, and amperage of circuit.

The fix costs less than one hour of downtime.

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Installer-Friendly**
6 NPT knockouts, labeled terminals, wall mount
- **Install Hardware Included**
Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

STEP-UP: 208V BUILDING / 230-240V EQUIPMENT

208V commercial or industrial building with equipment designed for 230V or 240V. Motors produce only 75% of rated torque. Welders deliver reduced output. CNC machines lose spindle performance. Corrects 208V up to 240V, restoring full rated power for motor, welding, and resistive heating loads.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Bench grinders, scroll saws	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Drill presses, routers, small lathes	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Bandsaws, small mills, sanders	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Table saws, jointers, shapers	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Planers, welders, edge banders	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Large saws, surface grinders	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Large welders, CNC machines	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Heavy industrial equipment	Single Phase
TX-BB-208D-240D-30A	Up to 30A	3PH mills, lathes, compressors	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	VMCs, CNC lathes, wide belt sanders	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Large CNC, press brakes, molders	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	Heavy industrial machinery	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Multi-machine shop circuits	Three-Phase Delta
TX-BB-208Y-240Y.138-20A	Up to 20A	3PH motor loads, small CNC	Three-Phase Wye
TX-BB-208Y-240Y.138-30A	Up to 30A	CNC mills, lathes	Three-Phase Wye
TX-BB-208Y-240Y.138-40A	Up to 40A	VMCs, large lathes	Three-Phase Wye
TX-BB-208Y-240Y.138-50A	Up to 50A	Heavy CNC, hydraulic presses	Three-Phase Wye
TX-BB-208Y-240Y.138-60A	Up to 60A	High-capacity shop circuits	Three-Phase Wye

STEP-DOWN: 240V BUILDING / 208V EQUIPMENT

240V service with equipment rated for 208V. Overvoltage at 115% of nameplate stresses motor windings, VFDs, CNC controllers, and servo drives. Starting torque increases to 130%+, causing mechanical stress. Corrects 240V down to 208V, protecting sensitive electronics and extending equipment life.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Bench grinders, small tools	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Drill presses, small lathes	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Bandsaws, small mills	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Table saws, jointers	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Planers, shapers, welders	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Large saws, surface grinders	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Large welders, CNC machines	Single Phase
TX-BB-240V-208V-60A	Up to 60A	Heavy industrial equipment	Single Phase
TX-BB-240D-208D-30A	Up to 30A	3PH mills, lathes, compressors	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	VMCs, CNC lathes	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Large CNC, press brakes	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	Heavy industrial machinery	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Multi-machine shop circuits	Three-Phase Delta

NEED A DIFFERENT VOLTAGE PAIR?

208V/240V is the most common shop mismatch, but we build units for any voltage correction. European imports rated 220V or 380V? 480V to 460V motor correction? Phase converter output running high or low? Tell us the input voltage, output voltage, phase, and amperage. We confirm the correct unit and ship it.

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Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

THE 208V / 240V MISMATCH

Hotels, apartment complexes, fitness centers, HOAs, country clubs, and commercial properties are typically fed 208V three-phase power. Pool pumps, hot tubs, tanning beds, and spa equipment are almost always designed for 240V residential service. The equipment works, but it doesn't work right. And nobody traces the problem to voltage.

POOL & SPA PUMPS

Pool pumps rated 240V on 208V service produce 75% of rated torque. The pump works harder, draws more current, runs hotter, and fails years before it should.

- **Pump motor overheats**, premature bearing and winding failure
- **Reduced flow rate**, filtration and circulation suffer
- **Variable speed drives fault** on low input voltage
- **Heat pump pool heaters lose 25% heating capacity**
- **Salt chlorine generators** underperform at low voltage

HOT TUBS & SPA HEATERS

Hot tub heaters are resistance loads. Power = V squared / R. At 208V instead of 240V, the heater produces 25% less heat. The tub takes longer to reach set temperature and can't recover between uses.

- **Longer heat-up time**, guests waiting, complaints
- **Can't maintain temp** with multiple users back to back
- **Jet pump motors lose torque**, weaker jet performance
- **Control boards stressed** from voltage outside rated range
- **Higher electric bills** from extended heating cycles

TANNING BEDS & SALON EQUIPMENT

- **Tanning lamp ballasts** underperform at reduced voltage
- **Lamps don't reach full output**, longer sessions, less result
- **Ballast life shortened** from operating outside spec
- **Facial steamers and autoclaves** can't reach target temp
- **Towel warmers and wax heaters** slow to heat, can't hold temp

HOW TO DIAGNOSE A VOLTAGE PROBLEM

- STEP 1:** Measure voltage at the equipment disconnect or receptacle with a true-RMS meter.
- STEP 2:** Read the equipment nameplate voltage rating (e.g. 208V, 230V, 240V).
- STEP 3:** Compare measured voltage to nameplate. If they don't match, you have a voltage problem.
- STEP 4:** Size the correction: Match circuit amperage to the SKU table on the back of this sheet.

SAUNAS & STEAM ROOMS

- **Electric sauna heaters lose 25% heat output** at reduced voltage
- **Longer preheat times**, facility can't turn rooms over
- **Steam generators can't hold temp**, inconsistent experience
- **Elements burn out faster** cycling more to compensate

COMMON EQUIPMENT AFFECTED

- Pool circulation pumps
- Variable speed pool pumps
- Heat pump pool heaters
- Hot tub / spa heaters
- Jet pumps
- Salt chlorine generators
- Tanning beds
- Sauna heaters
- Steam generators
- Facial steamers
- Autoclaves / sterilizers
- Towel warmers
- Wax heaters
- Salon dryer chairs

COST OF THE PROBLEM vs COST OF THE FIX

FAILURE	COST
Pool pump motor replacement	\$300 - \$1,200
Heat pump pool heater repair	\$500 - \$2,500
Hot tub heater element	\$150 - \$500
Hot tub control board	\$200 - \$800
Tanning bed ballast replacement	\$100 - \$400 each
Sauna heater element	\$200 - \$600
Buck-boost transformer*	\$300 - \$800

*Cost depends on % of voltage correction, phase, and amperage of circuit.

The fix costs less than the first service call.

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Installer-Friendly**
6 NPT knockouts, labeled terminals, wall mount
- **Install Hardware Included**
Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

STEP-UP: 208V BUILDING / 240V EQUIPMENT

208V commercial property with pool, spa, tanning, or salon equipment designed for 240V. Resistance heating equipment loses 25% of heat output. Motors produce 75% of rated torque. Corrects 208V up to 240V, restoring full rated performance for both heating and motor loads.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Towel warmers, wax heaters	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Facial steamers, salt generators	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Tanning beds, small pumps	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Pool pumps, spa jet pumps	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Hot tub heaters, sauna heaters	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Large pool pumps, heat pump heaters	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Commercial pool/spa systems	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Large commercial pool equipment	Single Phase
TX-BB-208D-240D-30A	Up to 30A	3PH pool pumps, commercial systems	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	Large 3PH pool/spa equipment	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Commercial aquatic facilities	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	Multi-pool commercial systems	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Large aquatic facility circuits	Three-Phase Delta

STEP-DOWN: 240V BUILDING / 208V EQUIPMENT

240V residential or commercial service with equipment rated for 208V. Overvoltage stresses heating elements, control boards, and pump motor windings. Corrects 240V down to 208V, protecting equipment and extending service life.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Small salon equipment	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Steamers, small heaters	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Tanning beds, small pumps	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Pool pumps, spa equipment	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Hot tub heaters, sauna heaters	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Large pool pumps, heat pumps	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Commercial pool/spa systems	Single Phase
TX-BB-240V-208V-60A	Up to 60A	Large commercial pool equipment	Single Phase
TX-BB-240D-208D-30A	Up to 30A	3PH pool pumps	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	Large 3PH pool/spa equipment	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Commercial aquatic facilities	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	Multi-pool commercial systems	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Large aquatic facility circuits	Three-Phase Delta

NEED A DIFFERENT VOLTAGE PAIR?

208V/240V is the most common mismatch for pool, spa, and recreational equipment, but we build units for any voltage correction. European spa equipment rated 220V or 230V? Tell us the input voltage, output voltage, phase, and amperage. We confirm the correct unit and ship it.

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Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

THE PROBLEM: VOLTAGE CHANGES

Portable equipment moves between job sites. One building delivers 208V. The next delivers 240V. The equipment is rated for one voltage but plugged into whatever is available. That mismatch causes reduced performance, overheating, equipment damage, and callbacks that cost more than the fix.

THE FIX: PORTABLE CORRECTION

A pre-wired buck-boost transformer travels with the equipment. Smaller units ship as inline corded units with plug and receptacle, ready to use out of the box. Larger units install with a transfer switch or disconnect at the equipment. No electrician needed at every job site.

PRESSURE WASHING & CLEANING

- **Pump motors lose pressure** at reduced voltage
- **Hot water heaters lose 25% output**, water not reaching temp
- **Chemical metering affected**, inconsistent cleaning results
- **Motor overheats on long jobs**, thermal shutdown mid-service

TEMPORARY HVAC & CLIMATE CONTROL

- **Spot coolers rated 208V on 240V**: compressor stress
- **Spot coolers rated 230V on 208V**: reduced cooling
- **Portable heaters lose output** at wrong voltage
- **Dehumidifiers underperform**, moisture targets not met
- **Air scrubbers lose airflow**, inadequate filtration

RENTAL & RESTORATION EQUIPMENT

- **Rental fleet serves 208V and 240V sites** with one unit
- **Dehumidifiers and air movers** on varied job site power
- **Temporary generators output** may not match equipment rating
- **Avoid buying two versions** of the same equipment

WHO NEEDS THIS

- **Pressure washing contractors** moving site to site
- **Rental companies** deploying to varied buildings
- **Restoration contractors** water/fire damage on any building
- **Mobile food service** food trucks, concession trailers
- **Event production** temporary power at venues
- **Portable HVAC providers** spot coolers, temp heating
- **Construction contractors** tools on different job sites
- **Mobile detailing / car wash** varied power at each location

COMMON EQUIPMENT AFFECTED

- Hot/cold pressure washers
- Spot coolers / portable AC
- Portable heaters
- Dehumidifiers
- Air scrubbers / movers
- Portable welders
- Concrete saws / cutters
- EV charging stations
- Battery pack chargers
- Portable compressors
- Food truck equipment
- Construction lighting
- Temporary power panels
- Mobile detailing equipment

PRE-WIRED OPTIONS AVAILABLE

For portable applications, we offer pre-wired units with line-in and line-out cords terminated in the correct plug and connector for your equipment. Plug into the building power, plug your equipment into the transformer. No hardwiring. No electrician. Ready to use out of the box.

Larger loads use hardwired units with a disconnect or transfer switch. Tell us the plug type and we build it.

WHY VOLTAGE VARIES BY SITE

- **208V buildings**: commercial, multi-tenant, high-rise
- **240V buildings**: residential, small commercial, rural
- **Generator output**: may not match equipment rating
- **Long temp cable runs**: voltage drop at the equipment
- **International equipment**: 220/230V on US power

STANDARD FEATURES

- **NEMA 3R Enclosed**
Indoor/outdoor, powder-coated steel
- **Encapsulated Core**
Quiet operation, stable thermal performance
- **cETLus Certified**
UL 5085-1/2, CAN/CSA-C22.2 No. 66.1
- **Class H Continuous Duty**
No derating required
- **Pre-Wired Options**
Line-in and line-out cords, plug and play
- **Install Hardware Included**
Wire nuts, crimp connectors, jumper wires

Buck-boost transformers applied as autotransformers do not provide circuit isolation and do not create a neutral.

STEP-UP: 208V SITE / 240V EQUIPMENT

Equipment rated for 240V plugged in at a 208V building. Motors lose 25% torque, heating elements lose 25% output. Pre-wired inline units available for portable applications. Corrects 208V up to 240V.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-208V-240V-10A	Up to 10A	Small tools, chargers, lighting	Single Phase
TX-BB-208V-240V-15A	Up to 15A	Dehumidifiers, air movers	Single Phase
TX-BB-208V-240V-20A	Up to 20A	Pressure washers, portable AC	Single Phase
TX-BB-208V-240V-25A	Up to 25A	Spot coolers, food truck equipment	Single Phase
TX-BB-208V-240V-30A	Up to 30A	Portable welders, heaters	Single Phase
TX-BB-208V-240V-40A	Up to 40A	Large spot coolers, compressors	Single Phase
TX-BB-208V-240V-50A	Up to 50A	Large portable HVAC, EV chargers	Single Phase
TX-BB-208V-240V-60A	Up to 60A	Heavy portable equipment	Single Phase
TX-BB-208D-240D-30A	Up to 30A	3PH portable compressors	Three-Phase Delta
TX-BB-208D-240D-40A	Up to 40A	3PH pressure washers, coolers	Three-Phase Delta
TX-BB-208D-240D-50A	Up to 50A	Large 3PH portable equipment	Three-Phase Delta
TX-BB-208D-240D-60A	Up to 60A	Heavy 3PH portable loads	Three-Phase Delta
TX-BB-208D-240D-70A	Up to 70A	Temp power distribution	Three-Phase Delta

STEP-DOWN: 240V SITE / 208V EQUIPMENT

Equipment rated for 208V plugged in at a 240V building. Overvoltage at 115% of nameplate stresses motors, control boards, and heating elements. Pre-wired inline units available. Corrects 240V to 208V.

PART NUMBER	OUTPUT AMPS	TYPICAL EQUIPMENT	PHASE
TX-BB-240V-208V-10A	Up to 10A	Small tools, chargers, lighting	Single Phase
TX-BB-240V-208V-15A	Up to 15A	Dehumidifiers, air movers	Single Phase
TX-BB-240V-208V-20A	Up to 20A	Pressure washers, portable AC	Single Phase
TX-BB-240V-208V-25A	Up to 25A	Spot coolers, food truck equipment	Single Phase
TX-BB-240V-208V-30A	Up to 30A	Portable welders, heaters	Single Phase
TX-BB-240V-208V-40A	Up to 40A	Large spot coolers, compressors	Single Phase
TX-BB-240V-208V-50A	Up to 50A	Large portable HVAC, EV chargers	Single Phase
TX-BB-240V-208V-60A	Up to 60A	Heavy portable equipment	Single Phase
TX-BB-240D-208D-30A	Up to 30A	3PH portable compressors	Three-Phase Delta
TX-BB-240D-208D-40A	Up to 40A	3PH pressure washers, coolers	Three-Phase Delta
TX-BB-240D-208D-50A	Up to 50A	Large 3PH portable equipment	Three-Phase Delta
TX-BB-240D-208D-60A	Up to 60A	Heavy 3PH portable loads	Three-Phase Delta
TX-BB-240D-208D-70A	Up to 70A	Temp power distribution	Three-Phase Delta

PRE-WIRED & CUSTOM CONFIGURATIONS

Any unit can be built as a pre-wired inline configuration with line-in and line-out cords terminated in the correct plug and connector for your application. Tell us the voltage pair, amperage, and plug type. We build it ready to use. Other voltage pairs available including 220V, 230V, and 480V corrections.

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