Material Handling

BONITRON

Conveyors
Cranes
Elevators
Hoists
Palletizers
Wind / Unwind
+ More!

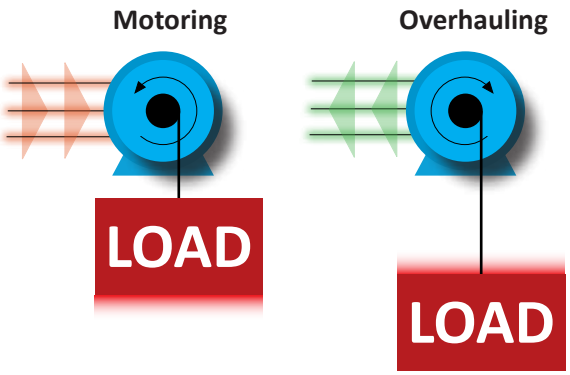
- *Enhance AC drive and process reliability.*
- *Maximize uptime with Bonitron UPDs.*
- *Save energy with Line Regen.*
- *Reduce cost, wiring, component count with Common DC Bus*

Products

Braking Resistors
Braking Transistors
Common Bus Power Supplies
Line Regeneration
Uninterruptible Power for Drives

Overvoltage Solutions

Electric motors serve many applications and are one of the largest end users of electricity in industry, so increasing motor-driven process efficiency can have a big impact on cost savings.

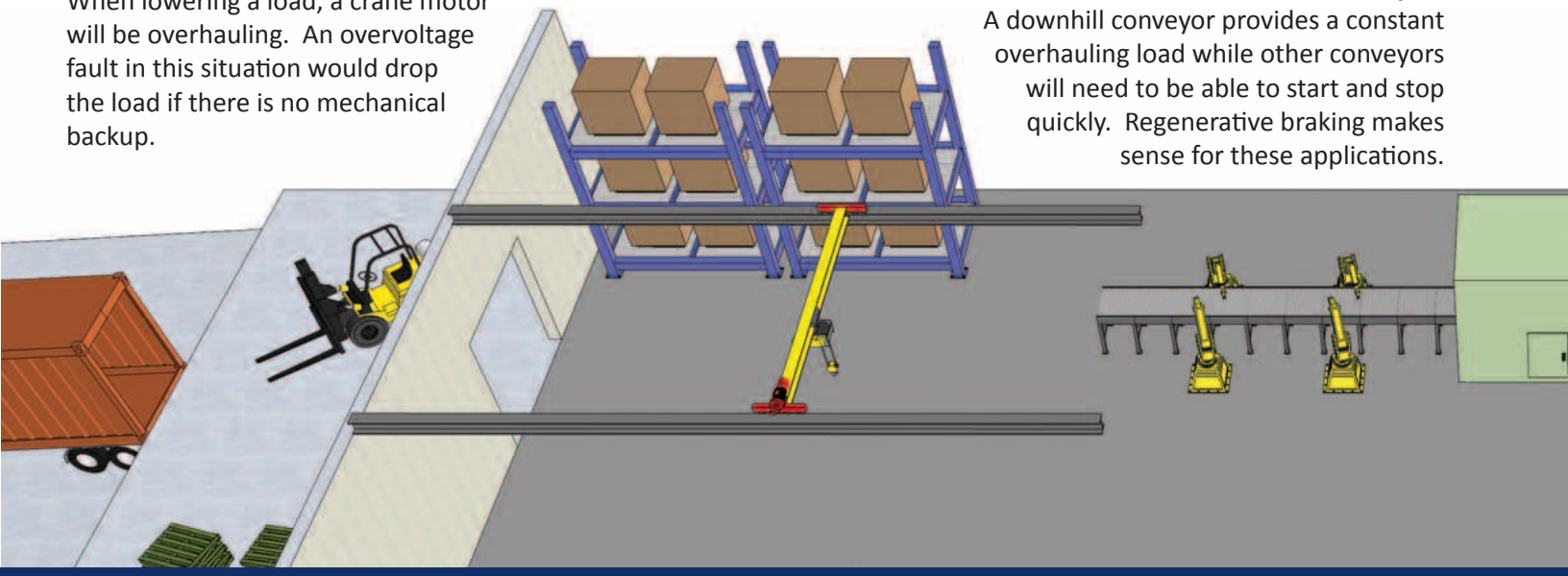


A motor connected to a load will be either "**motoring**" or "**overhauling**". A motoring motor is converting electrical energy into mechanical energy. An overhauling motor is being driven by the load and is converting mechanical energy in to electricity, acting as a generator.

An overhauling load is creating power that, if left alone, could potentially cause an overvoltage fault in the drive. If this happens the motor will be out of control potentially damaging the equipment being run by the motor. The overvoltage fault can be avoided by implementing either a dynamic brake or a regenerative brake. A **dynamic brake** or "chopper" uses transistors and resistors to dissipate the excess energy. A **regenerative brake** channels the energy back onto the utility grid or into a common DC Bus where it can be used by other motors.

Crane/Hoist
When lowering a load, a crane motor will be overhauling. An overvoltage fault in this situation would drop the load if there is no mechanical backup.

Conveyors
A downhill conveyor provides a constant overhauling load while other conveyors will need to be able to start and stop quickly. Regenerative braking makes sense for these applications.



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Transistor & Resistor vs. Regen

Whether you use a transistor and resistor or a regen is dependent on the application and a cost benefit analysis. Using a transistor and resistor combination is typically less expensive on the front end, but it has a larger footprint and extra energy must be expended to cool the room housing the resistors. A regen costs more up front but saves on operating costs and can ultimately pay for itself over time. The regen also has a smaller footprint and requires significantly less cooling of the control room. Each is suited to different applications and Bonitron will work with you to find the best solution for your application.

Braking Transistor

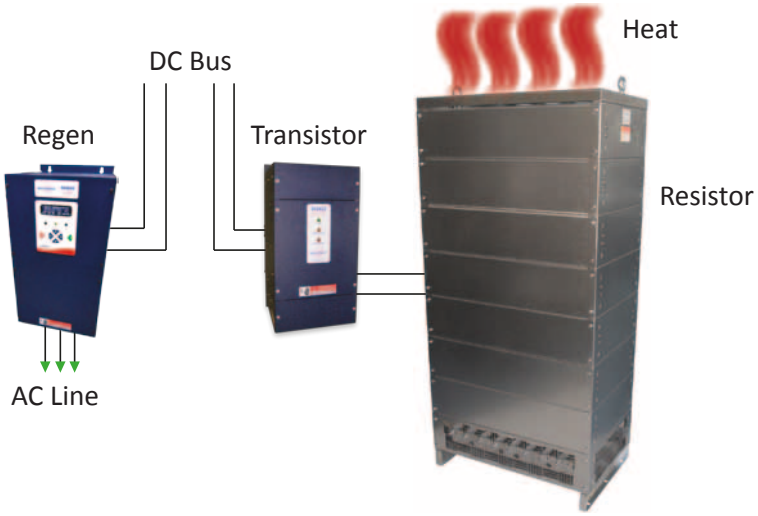
- M3452
- M3575T
- M3675T

Braking Resistor

- Case Resistors
- M3575R
- M3775R

Line Regeneration

- M3545
- M3645

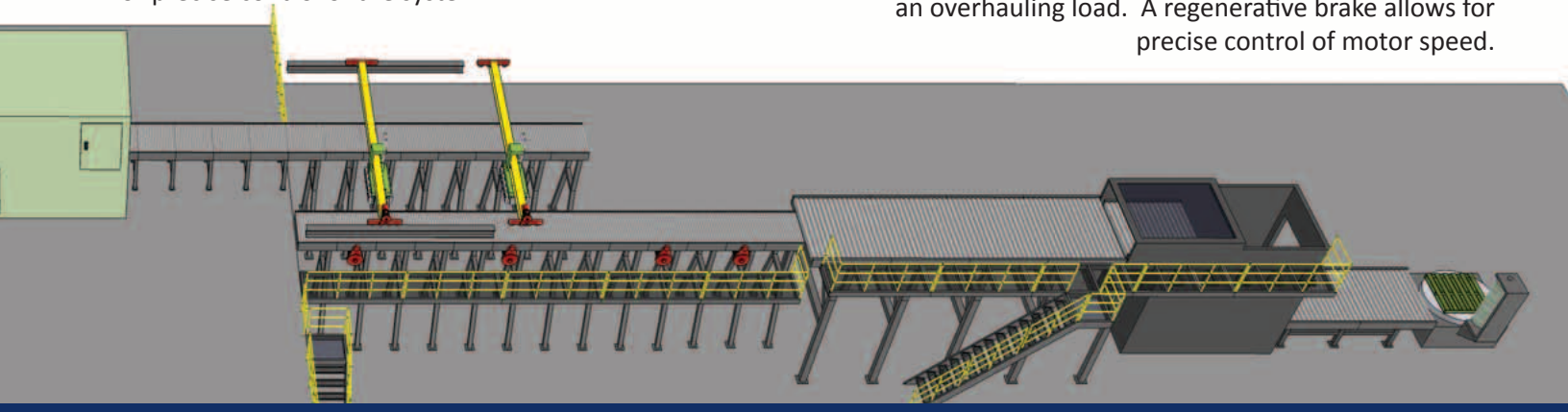


Pick and Place

Motors are required to stop and start quickly and repeatedly. A regenerative brake allows for precise control of the system.

Palletizer

Motors lower pallets as they are filled and this creates an overhauling load. A regenerative brake allows for precise control of motor speed.



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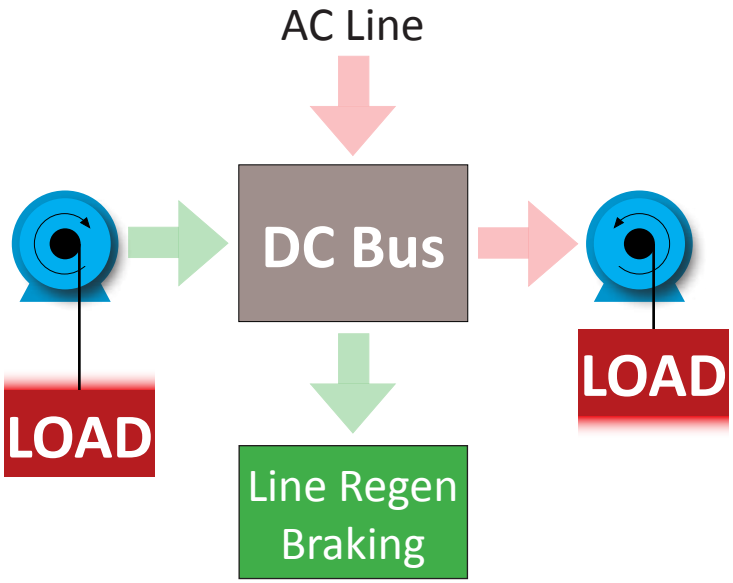
Common DC Bus

Material handling applications that require the use of multiple electric motors in a system can benefit from the use of a common DC bus. The use of a common bus allows for the **reduction of wiring and components** in the system as the linked drives can now share many components. It can also allow for the direct **sharing of power between drives**, reducing amount of power needed from the grid. This can be achieved with either a common bus power supply or with diode sharing.

The power generated by stopping one drive can be used to power another drive.

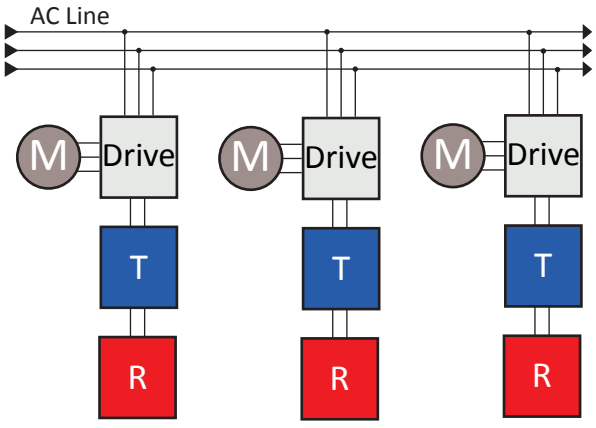


Common Bus Power Supply

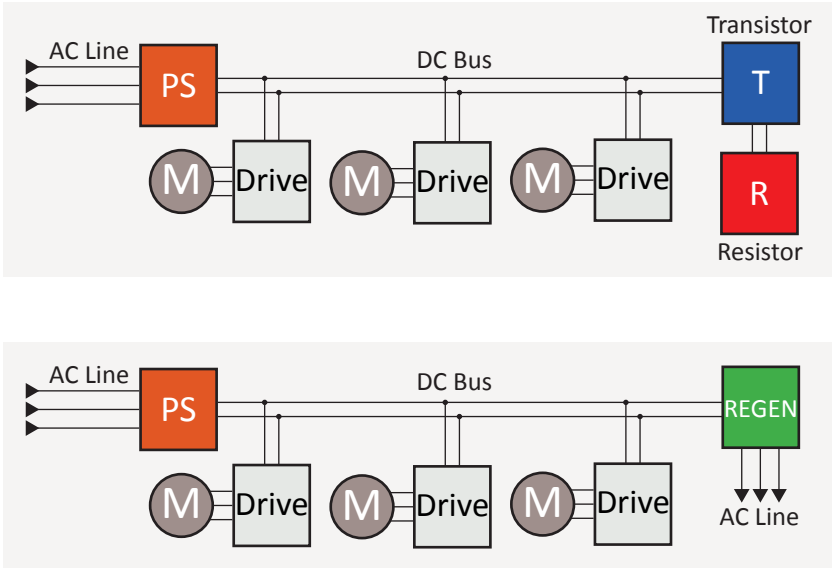
M3712, M3713

Using a common bus power supply can reduce the amount of wiring as well as the number of components in a system resulting in a reduction of maintenance and footprint of the system. In a system with multiple motors, there could be some motors regenerating while others are motoring. The common bus allows the regenerating drives to share power with the motoring drives and reduces the amount of power needed from the grid. If the drives are creating a net surplus of energy, a single line regen or braking unit can be installed to dissipate the excess energy.

A common bus power supply can also allow the use of **single phase AC power** with three phase motors **without having to oversize the drive or the motor**. The M3713 can create a common DC bus from single phase power while the M3712 uses three phase power.



Without common DC bus

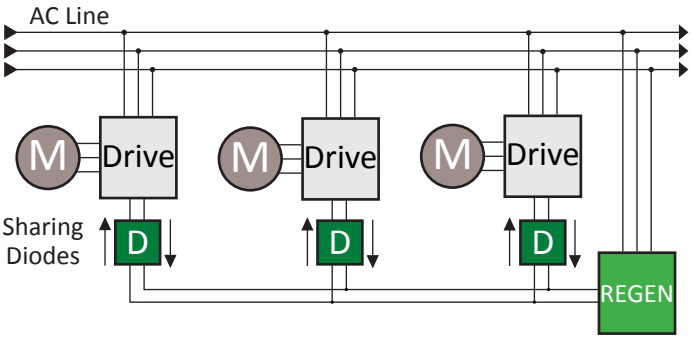


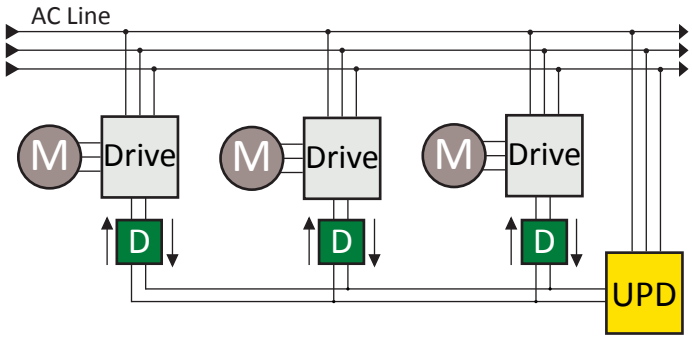
With common DC bus Power Supply

Common Bus Sharing Diodes

M3345CBM

If drives on the AC line are connected by a DC bus, circulating currents can be created that might cause drive faults. The sharing diodes allow a **two way flow of power** to and from drives enabling them to share regenerative power between their DC busses while preventing circulating currents. The two-way flow allows the drives to share power with each other and use a common braking, regen, or UPD. **Multiple drives of similar size can be run through a single diode unit while different size drives can be handled with separate diode units.**





Common DC Bus Filter Capacitance

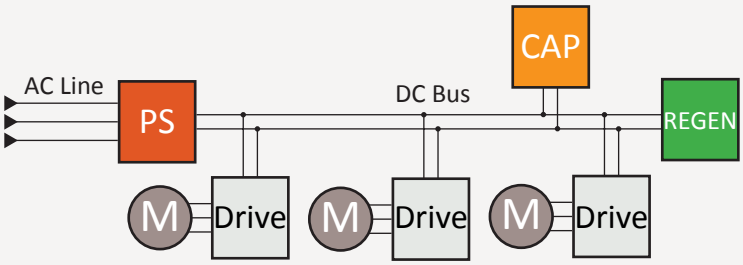
Extra capacitance on the DC Bus with **power supply or diode units.**

3612EC

- Reduces ripple on DC bus from AC conversion.

3612RC

- Limits high frequency spikes from switching.

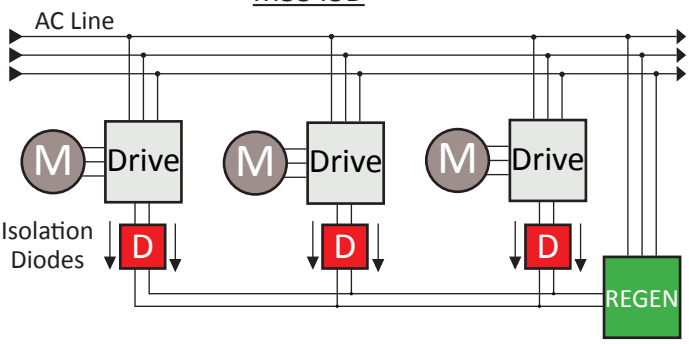


Common Bus Isolation Diodes

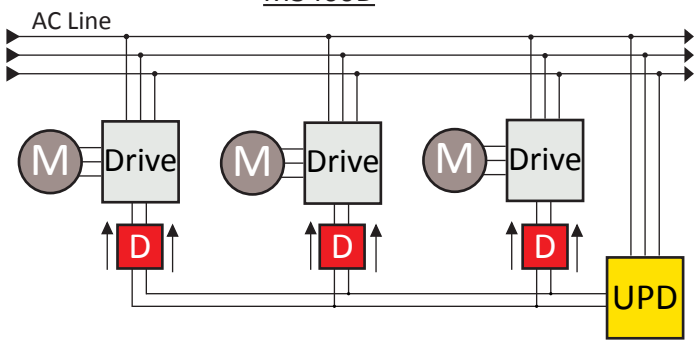
M3345D, M3460D

Unlike the sharing diodes, the isolation diodes allow only a **one-way flow of power** and do not allow drives to share power with each other, completely isolating the drives and preventing circulating currents. The isolation diodes allow multiple drives to be connected on the DC bus so that they can share one braking unit, regen, or UPD. The M3345D allows an outward flow of power from the connected drives to be dissipated by a braking or regen unit. The M3460D allows inward flow of power so that one UPD can power all of the drives connected to the DC bus. **Multiple drives of similar size can be run through a single diode unit while different size drives can be handled with separate diode units.**

M3345D



M3460D

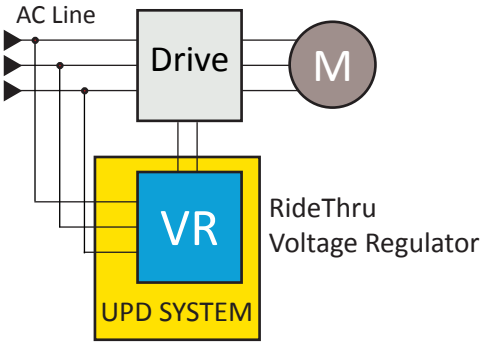


Undervoltage Solutions

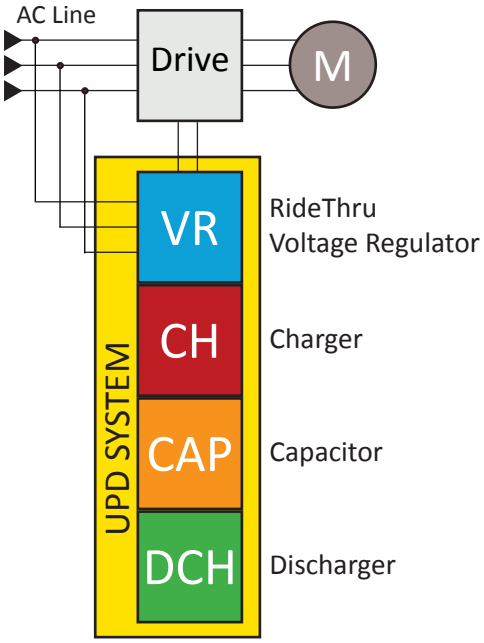
For various reasons, voltage to a process could suffer a momentary power sag or a longer power outage, causing a shutdown. Depending on the process, this may mean seconds or hours of lost production time. **Bonitron Uninterruptible Power for Drives (UPD)** can provide power for **up to 15 minutes** so that the process never sees the loss, and allows the process to continue running until generators can be brought online or the system is safely shut down.

Typical UPD Configurations

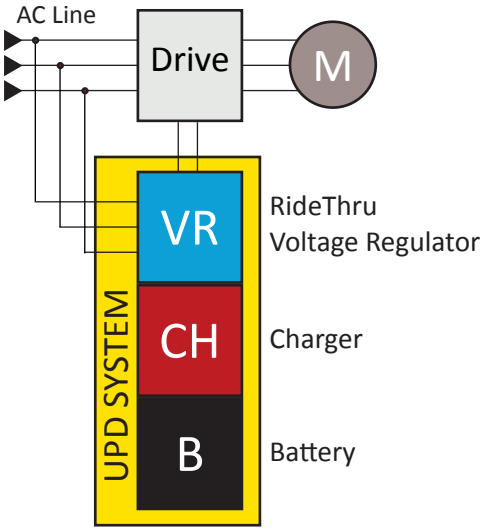
Sag
No Energy Storage
2 second - 50% sag



Brief Outage
Capacitor
2 second - 100% outage



Extended Outage
Battery
15 minute - 100% outage



Ride-Thru Voltage Regulator
The voltage regulator can support a voltage drop, but not a complete outage, and so does not need any extra energy storage components.

Charger
The charger, as its name suggests, charges the capacitor or battery bank for energy storage.

Discharger
The discharger uses a properly sized transistor and resistor to deplete the energy stored in the capacitor banks quickly.

Capacitors
Ultracapacitors are used for energy storage for durations less than 2 seconds.

Batteries
Batteries are used for energy storage for durations longer than 2 seconds.

UPD Lite

Some processes may not require uninterruptible power, but just enough to shut down safely or reset the equipment to a default position. For these applications the UPD can be undersized to 10-20% of the motor HP, greatly reducing the cost.

- Elevators - Move to nearest floor
- Ovens - Move system before product or conveyor damaged by heat.
- Extruders - Purge system before solidification
- Hoists - Lower load to a safe postion
- Stamping - Retract feeder mechanisms

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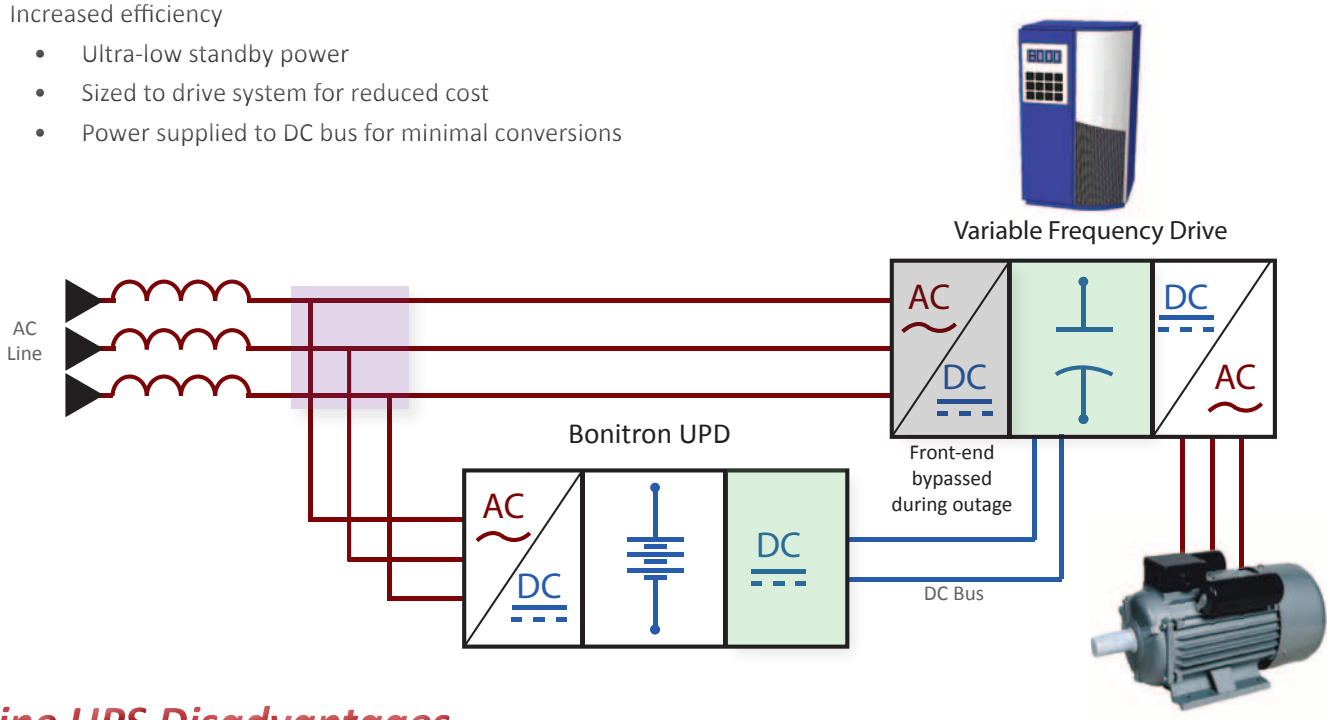
info@bonitron.com

Bonitron UPD Advantages

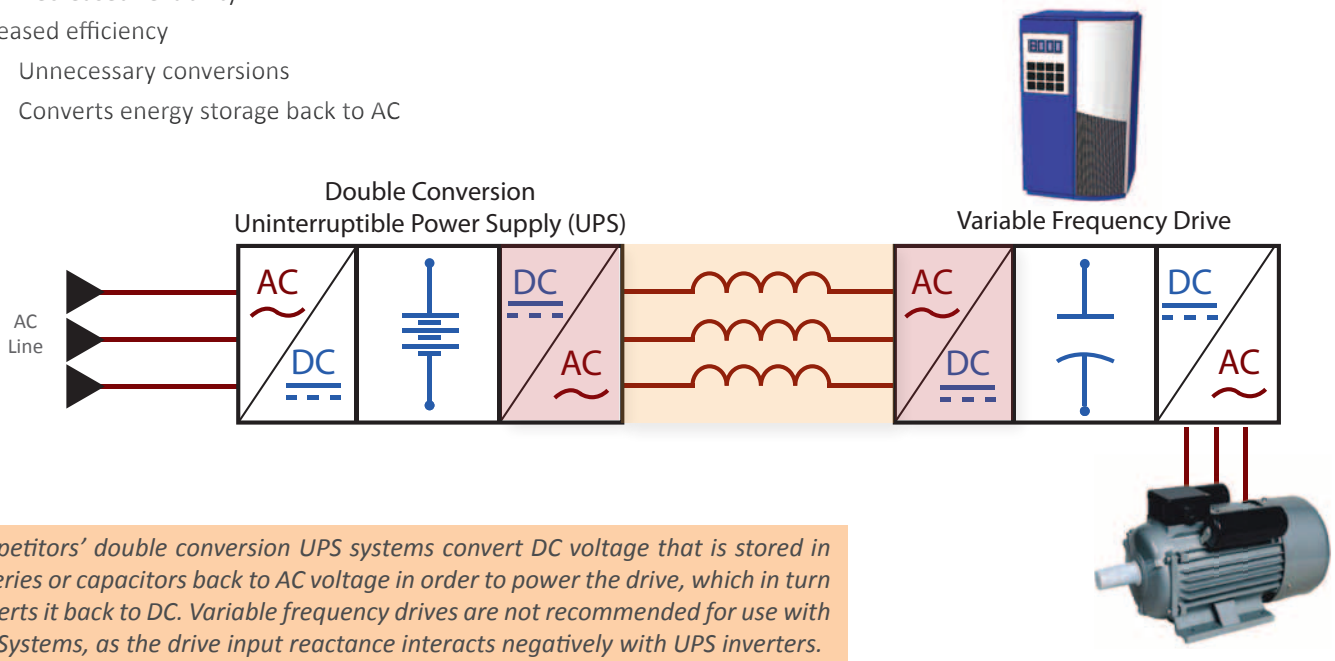
Bonitron UPD Systems use capacitor, ultracapacitor or battery banks to power the DC bus of the drive via DC bus connection terminals on the drive. This eliminates an unnecessary and energy wasting DC to AC conversion.

- Parallel Connection
  - High reliability
  - Seamless power source transfer
- Increased efficiency
  - Ultra-low standby power
  - Sized to drive system for reduced cost
  - Power supplied to DC bus for minimal conversions



In-line UPS Disadvantages

- Series Connection
  - Decreased reliability
- Decreased efficiency
  - Unnecessary conversions
  - Converts energy storage back to AC

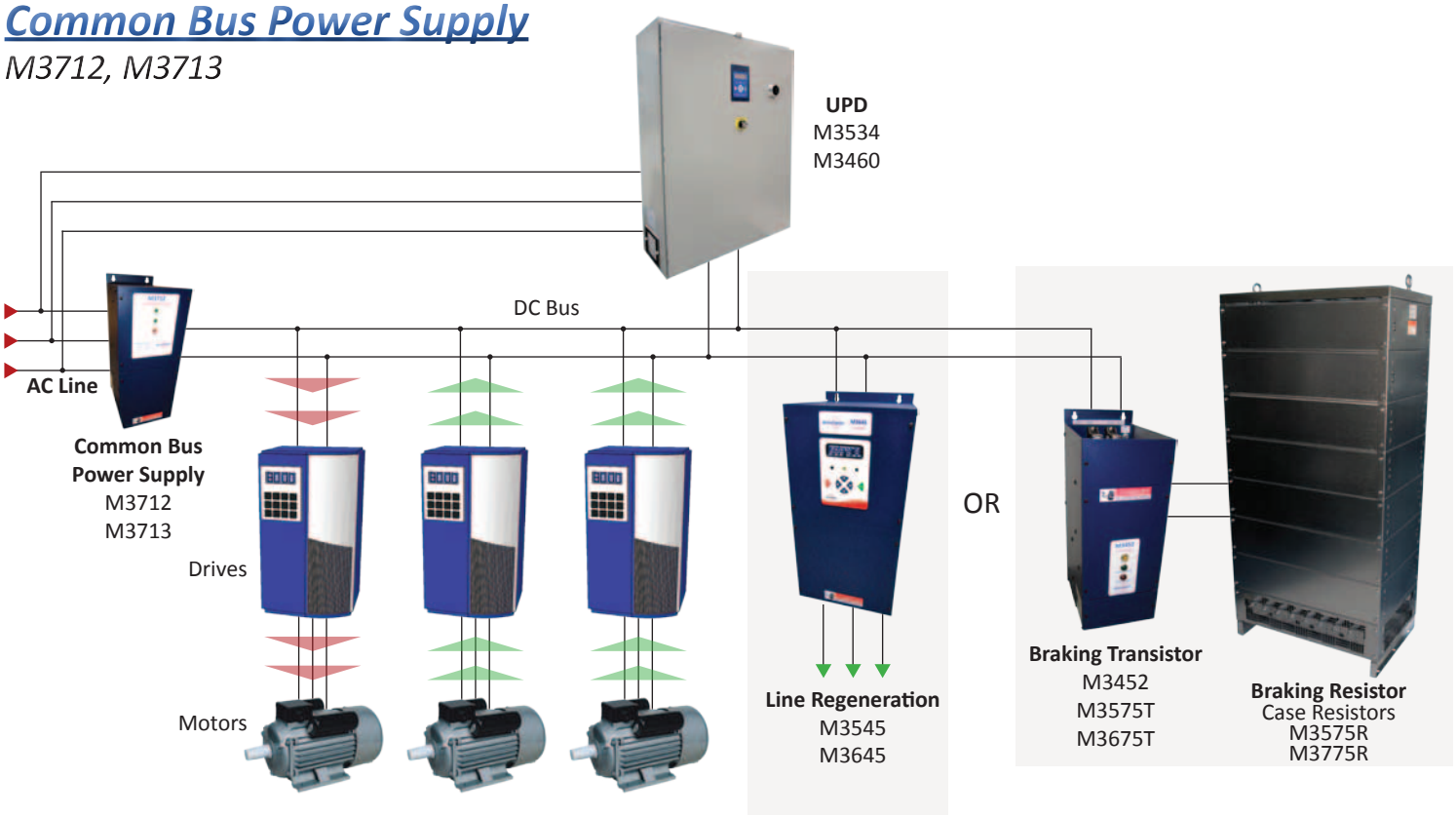


Competitors' double conversion UPS systems convert DC voltage that is stored in batteries or capacitors back to AC voltage in order to power the drive, which in turn converts it back to DC. Variable frequency drives are not recommended for use with UPS Systems, as the drive input reactance interacts negatively with UPS inverters.

Bonitron Connectivity

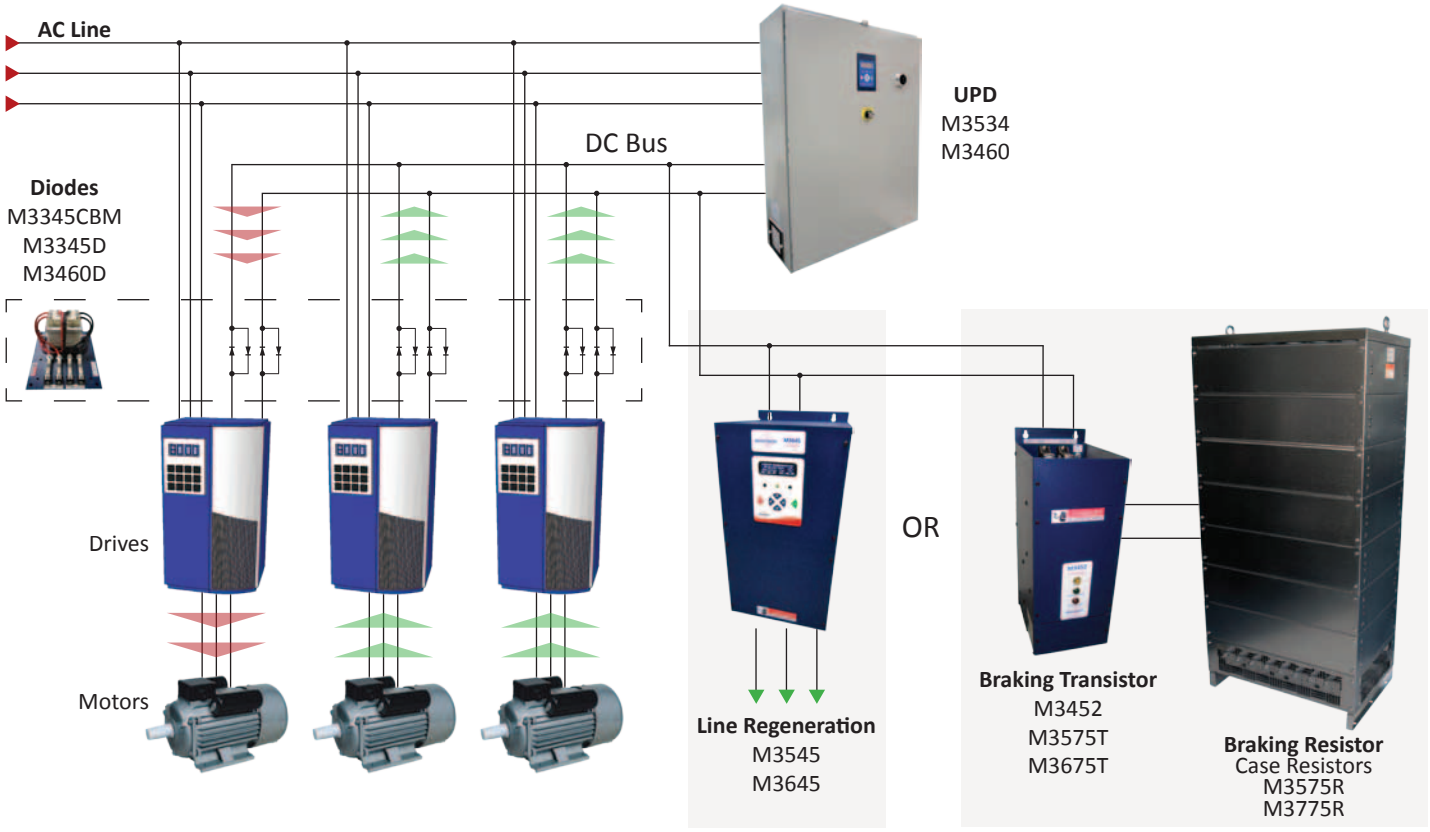
Common Bus Power Supply

M3712, M3713



Common Bus Diodes

M3345CBM, M3345D, M3460D



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521 Fairground Court | Nashville, TN 37211 | U.S.A.
Monday - Friday 8:00am - 5:00pm CT | Tel: 615-244-2825
Email: info@bonitron.com | Fax: 615-244-2833 | www.bonitron.com